TEST REPORT
IEC 62368-1
Audio/video, information and communication technology equipment
Part 1: Safety requirements

Report Number ..... :	LCS190415003AS
Date of issue ..... :	2019-05-06
Total number of pages ..... :	64
Applicant's name ..... :	Shenzhen Eview GPS Technology
Address ..... :	1203/ #1203 Building 2, GuoLe Technology Park, Lirong Road, Dalang, Longhua, Shenzhen, China
Test specification:	
Standard..... :	IEC 62368-1:2014 (Second Edition)
Test procedure ..... :	Type test
Non-standard test method ..... :	N/A
Test Report Form No. ..... :	IEC62368_1B
Test Report Form(s) Originator..... :	UL(US)
Master TRF ..... :	2014-03

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Test Item description ..... :	Personal Mobile Alarm System	
Trade Mark ..... :	N/A	
Manufacturer ..... :	Same as applicant	
Model/Type reference ..... :	EV-07B-4G	
Ratings ..... :	Input : 5V⎓, 1A; Battery: 3.7V⎓, 800mAh	
Testing procedure and testing location:		
☒ Testing Laboratory:	Shenzhen LCS Compliance Testing Laboratory Ltd.	
Testing location/ address ..... :	101, 601, Xingyuan Industrial Park, Gushu Community, Xixiang Street, Bao'an District, Shenzhen, Guangdong, China	
Tested by.....:	Karl Wen / Test Engineer	Karl Wen
Checked by.....:	Jowie Jiao/ Project Engineer	Jowie Jiao
Approved by.....:	Peter Chen / Project Manager	

List of Attachments (including a total number of pages in each attachment):

Attachment No. 1: EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES (10 pages)

Attachment No. 2: Photo document (5 pages)

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
The submitted samples were found to comply with the requirements of: **Electrical safety:** ➢ IEC 62368-1:2014 ED2 ➢ EN 62368-1:2014 ➢ EN 62368-1:2014/A11:2017	Shenzhen LCS Compliance Testing Laboratory Ltd. 101, 601, Xingyuan Industrial Park, Gushu Community, Xixiang Street, Bao'an District, Shenzhen, Guangdong, China

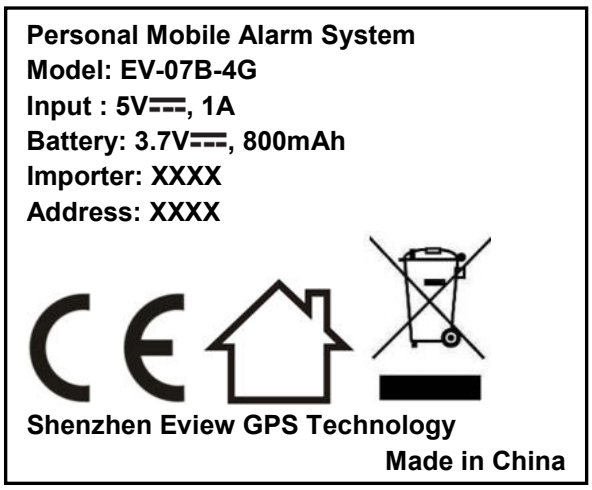
Summary of compliance with National Differences:

List of countries addressed: EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES, Refer Attachment No. 1 for details.

☒ **The product fulfils the requirements of EN 62368-1:2014+A11:2017**

Copy of marking plate:

The artwork below may be only a draft.



Note:

The height of CE symbol ≥ 5.0mm; the height of WEEE symbol ≥ 7.0mm.

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TEST ITEM PARTICULARS:	
Classification of use by ..... :	☒ Ordinary person ☐ Instructed person ☐ Skilled person ☐ Children likely to be present
Supply Connection ..... :	☐ AC Mains ☐ DC Mains ☒ External Circuit - not Mains connected - ☒ ES1 ☐ ES2 ☐ ES3
Supply % Tolerance ..... :	☐ +10%/-10% ☐ +20%/-15% ☐ +____%/ -_____% ☒ None
Supply Connection – Type ..... :	☐ pluggable equipment type A - ☐ non-detachable supply cord ☐ appliance coupler ☐ direct plug-in ☐ mating connector ☐ pluggable equipment type B - ☐ non-detachable supply cord ☐ appliance coupler ☐ permanent connection ☐ mating connector ☒ other:not directly connected to mains
Considered current rating of protective device as part of building or equipment installation ..... :	Not directly connected to mains Installation location: ☐ building; ☐ equipment
Equipment mobility ..... :	☒ movable ☐ hand-held ☐ transportable ☐ stationary ☐ for building-in ☐ direct plug-in ☐ rack-mounting ☐ wall-mounted
Over voltage category (OVC) ..... :	☐ OVC I ☐ OVC II ☐ OVC III ☐ OVC IV ☒ other: Not directly connected to mains
Class of equipment ..... :	☐ Class I ☐ Class II ☒ Class III
Access location ..... :	☐ restricted access location ☒ N/A
Pollution degree (PD) ..... :	☐ PD 1 ☒ PD 2 ☐ PD 3
Manufacturer's specified maxium operating ambient :	45°C
IP protection class ..... :	☒ IPX0 ☐ IP___
Power Systems ..... :	☐ TN ☐ TT ☐ IT - ____ V_{L-L} ☒ other: Not directly connected to mains
Altitude during operation (m) ..... :	☒ 2000 m or less ☐ _____ m
Altitude of test laboratory (m) ..... :	☐ 2000 m or less ☒ __500__ m
Mass of equipment (kg) ..... :	☒ 0.21kg

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POSSIBLE TEST CASE VERDICTS:	
- test case does not apply to the test object..... :	N/A
- test object does meet the requirement ..... :	P (Pass)
- test object does not meet the requirement ..... :	F (Fail)
TESTING:	
Date of receipt of test item..... :	2019-04-15
Date (s) of performance of tests..... :	From 2019-04-15 to 2019-05-06

GENERAL REMARKS:

"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.

Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

According to the EU directives which have been aligned with EU NLF (new legislative framework), both of manufacturer and importer's name and address shall be affixed on the product or, where that is not possible, on its packaging or in a document accompanying the product before the product is placed on the EU market.

Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided ..... :	☐ **Yes** ☒ **Not applicable**
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies) ..... :	Same as manufacturer

GENERAL PRODUCT INFORMATION:

Product Description

1. This product include internal rechargeable Li-ion Polymer Battery, manufacturer: SHENZHEN EVIWE TECHNOLOGY CO., LTD , model: WA PJ-653237, rating: 3.7V, 800mAh
2. All components were mounted on PCB and housed with plastic enclosure.
3. The maximum operated ambient temperature is +45°C.

Model Differences –

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Additional application considerations – (Considerations used to test a component or sub-assembly) –

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ENERGY SOURCE IDENTIFICATION AND CLASSIFICATION TABLE:	
(Note 1: Identify the following six (6) energy source forms based on the origin of the energy.) (Note 2: The identified classification e.g., ES2, TS1, should be with respect to its ability to cause pain or injury on the body or its ability to ignite a combustible material. Any energy source can be declared Class 3 as a worse case classification e.g. PS3, ES3.	
Electrically-caused injury (Clause 5): (Note: Identify type of source, list sub-assembly or circuit designation and corresponding energy source classification) Example: +5V dc input ES1	
Source of electrical energy	**Corresponding classification (ES)**
5Vd.c. input	ES1
All internal circuits	ES1
Electrically-caused fire (Clause 6): (Note: List sub-assembly or circuit designation and corresponding energy source classification) Example: Battery pack (maximum 85 watts): PS2	
Source of power or PIS	**Corresponding classification (PS)**
Internal circuits	PS1
Injury caused by hazardous substances (Clause 7) (Note: Specify hazardous chemicals, whether produces ozone or other chemical construction not addressed as part of the component evaluation.) Example: Liquid in filled component Glycol	
Source of hazardous substances	**Corresponding chemical**
N/A	N/A
Mechanically-caused injury (Clause 8) (Note: List moving part(s), fan, special installations, etc. & corresponding MS classification based on Table 35.) Example: Wall mount unit MS2	
Source of kinetic/mechanical energy	**Corresponding classification (MS)**
Edges and corners	MS1
Equipment mass	MS1
Thermal burn injury (Clause 9) (Note: Identify the surface or support, and corresponding energy source classification based on type of part, location, operating temperature and contact time in Table 38.) Example: Hand-held scanner – thermoplastic enclosure TS1	
Source of thermal energy	**Corresponding classification (TS)**
Enclosure	TS1
Internal circuits/parts	TS1
Radiation (Clause 10) (Note: List the types of radiation present in the product and the corresponding energy source classification.) Example: DVD – Class 1 Laser Product RS1	
Type of radiation	**Corresponding classification (RS)**
Indicator light	RS1

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ENERGY SOURCE DIAGRAM
Indicate which energy sources are included in the energy source diagram. Insert diagram below
☒ ES ☒ PS ☒ MS ☒ TS ☒ RS

OVERVIEW OF EMPLOYED SAFEGUARDS				
Clause	**Possible Hazard**			
5.1	Electrically-caused injury			
Body Part (e.g. Ordinary)	Energy Source (ES3: Primary Filter circuit)	Safeguards		
		Basic	Supplementary	Reinforced (Enclosure)
Ordinary	ES1: 5Vd.c. input	N/A	N/A	N/A
Ordinary	ES1: All internal circuits	N/A	N/A	N/A
6.1	Electrically-caused fire			
Material part (e.g. mouse enclosure)	Energy Source (PS1: 15 Watt circuit)	Safeguards		
		Basic	Supplementary	Reinforced
All combustible materials within plastic enclosure	PS1: All secondary circuits inside the equipment enclosure	Equipment safeguard (e.g., no ignition occurs; no parts exceeding 90% of its spontaneous ignition temperature)	Equipment safeguard (e.g., control of fire spread; PCB is complied with V-0 material; All other components at least V-2 except for mounted on min. V-1 material or small parts of combustible material)	N/A
7.1	Injury caused by hazardous substances			
Body Part (e.g., skilled)	Energy Source (hazardous material)	Safeguards		
		Basic	Supplementary	Reinforced
N/A	N/A	N/A	N/A	N/A
8.1	Mechanically-caused injury			
Body Part (e.g. Ordinary)	Energy Source (MS3:High Pressure Lamp)	Safeguards		
		Basic	Supplementary	Reinforced (Enclosure)
Ordinary	MS1: Edges and corners	N/A	N/A	N/A
Ordinary	MS1: Mass＜7kg	N/A	N/A	N/A
9.1	Thermal Burn			

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Body Part (e.g., Ordinary)	Energy Source (TS2)	Safeguards		
		Basic	Supplementary	Reinforced
Ordinary	TS1: Enclosure	N/A	N/A	N/A
Ordinary	TS1: Internal circuits/parts	N/A	N/A	N/A
10.1	Radiation			
Body Part (e.g., Ordinary)	Energy Source (Output from audio port)	Safeguards		
		Basic	Supplementary	Reinforced
Ordinary	RS1: Indicator light	N/A	N/A	N/A
Supplementary Information: (1) See attached energy source diagram for additional details. (2) “N” – Normal Condition; “A” – Abnormal Condition; “S” Single Fault				

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IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

4	**GENERAL REQUIREMENTS**		P
4.1.1	Acceptance of materials, components and subassemblies		P
4.1.2	Use of components		P
4.1.3	Equipment design and construction		P
4.1.15	Markings and instructions.....:	(See Annex F)	P
4.4.4	Safeguard robustness		P
4.4.4.2	Steady force tests.....:	(See Annex T.2, T.3, T.4, T.5)	P
4.4.4.3	Drop tests .....:	(See Annex T.7)	P
4.4.4.4	Impact tests .....:		N/A
4.4.4.5	Internal accessible safeguard enclosure and barrier tests.....:		N/A
4.4.4.6	Glass Impact tests .....:		N/A
4.4.4.7	Thermoplastic material tests.....:	(See Annex T.8)	P
4.4.4.8	Air comprising a safeguard.....:		N/A
4.4.4.9	Accessibility and safeguard effectiveness		P
4.5	Explosion		N/A
4.6	Fixing of conductors		N/A
4.6.1	Fix conductors not to defeat a safeguard		N/A
4.6.2	10 N force test applied to .....:		N/A
4.7	Equipment for direct insertion into mains socket - outlets		N/A
4.7.2	Mains plug part complies with the relevant standard.....:		N/A
4.7.3	Torque (Nm) .....:		N/A
4.8	Products containing coin/button cell batteries		N/A
4.8.2	Instructional safeguard		N/A
4.8.3	Battery Compartment Construction		N/A
	Means to reduce the possibility of children removing the battery.....:		—
4.8.4	Battery Compartment Mechanical Tests .....:		N/A
4.8.5	Battery Accessibility		N/A
4.9	Likelihood of fire or shock due to entry of conductive object.....:	(See Annex P)	P

5	**ELECTRICALLY-CAUSED INJURY**		P
5.2.1	Electrical energy source classifications.....:	(See appended table 5.2)	P
5.2.2	ES1, ES2 and ES3 limits	ES1	P

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IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.2.2.2	Steady-state voltage and current..... :	(See appended table 5.2)	P
5.2.2.3	Capacitance limits ..... :		N/A
5.2.2.4	Single pulse limits ..... :		N/A
5.2.2.5	Limits for repetitive pulses ..... :		N/A
5.2.2.6	Ringing signals ..... :		N/A
5.2.2.7	Audio signals ..... :		N/A
5.3	Protection against electrical energy sources		N/A
5.3.1	General Requirements for accessible parts to ordinary, instructed and skilled persons		N/A
5.3.2.1	Accessibility to electrical energy sources and safeguards		N/A
5.3.2.2	Contact requirements		N/A
	a) Test with test probe from Annex V ..... :		N/A
	b) Electric strength test potential (V) ..... :		N/A
	c) Air gap (mm) ..... :		N/A
5.3.2.4	Terminals for connecting stripped wire		N/A
5.4	Insulation materials and requirements		N/A
5.4.1.2	Properties of insulating material		N/A
5.4.1.3	Humidity conditioning ..... :		N/A
5.4.1.4	Maximum operating temperature for insulating materials ..... :		N/A
5.4.1.5	Pollution degree ..... :		—
5.4.1.5.2	Test for pollution degree 1 environment and for an insulating compound		N/A
5.4.1.5.3	Thermal cycling		N/A
5.4.1.6	Insulation in transformers with varying dimensions		N/A
5.4.1.7	Insulation in circuits generating starting pulses		N/A
5.4.1.8	Determination of working voltage		N/A
5.4.1.9	Insulating surfaces		N/A
5.4.1.10	Thermoplastic parts on which conductive metallic parts are directly mounted		N/A
5.4.1.10.2	Vicat softening temperature..... :		N/A
5.4.1.10.3	Ball pressure ..... :		N/A
5.4.2	Clearances		N/A
5.4.2.2	Determining clearance using peak working voltage		N/A
5.4.2.3	Determining clearance using required withstand voltage ..... :		N/A

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IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	a) a.c. mains transient voltage ..... :		—
	b) d.c. mains transient voltage ..... :		—
	c) external circuit transient voltage ..... :		—
	d) transient voltage determined by measurement ..... :		—
5.4.2.4	Determining the adequacy of a clearance using an electric strength test		N/A
5.4.2.5	Multiplication factors for clearances and test voltages ..... :		N/A
5.4.3	Creepage distances ..... :		N/A
5.4.3.1	General		N/A
5.4.3.3	Material Group ..... :		—
5.4.4	Solid insulation		N/A
5.4.4.2	Minimum distance through insulation ..... :		N/A
5.4.4.3	Insulation compound forming solid insulation		N/A
5.4.4.4	Solid insulation in semiconductor devices		N/A
5.4.4.5	Cemented joints		N/A
5.4.4.6	Thin sheet material		N/A
5.4.4.6.1	General requirements		N/A
5.4.4.6.2	Separable thin sheet material		N/A
	Number of layers (pcs) ..... :		N/A
5.4.4.6.3	Non-separable thin sheet material		N/A
5.4.4.6.4	Standard test procedure for non-separable thin sheet material ..... :		N/A
5.4.4.6.5	Mandrel test		N/A
5.4.4.7	Solid insulation in wound components		N/A
5.4.4.9	Solid insulation at frequencies >30 kHz ..... :		N/A
5.4.5	Antenna terminal insulation		N/A
5.4.5.1	General		N/A
5.4.5.2	Voltage surge test		N/A
	Insulation resistance (MΩ)..... :		—
5.4.6	Insulation of internal wire as part of supplementary safeguard ..... :		N/A
5.4.7	Tests for semiconductor components and for cemented joints		N/A
5.4.8	Humidity conditioning		N/A
	Relative humidity (%)..... :		—

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Temperature (°C) ..... :		—
	Duration (h) ..... :		—
5.4.9	Electric strength test ..... :		N/A
5.4.9.1	Test procedure for a solid insulation type test		N/A
5.4.9.2	Test procedure for routine tests		N/A
5.4.10	Protection against transient voltages between external circuit		N/A
5.4.10.1	Parts and circuits separated from external circuits		N/A
5.4.10.2	Test methods		N/A
5.4.10.2.1	General		N/A
5.4.10.2.2	Impulse test ..... :		N/A
5.4.10.2.3	Steady-state test..... :		N/A
5.4.11	Insulation between external circuits and earthed circuitry ..... :		N/A
5.4.11.1	Exceptions to separation between external circuits and earth		N/A
5.4.11.2	Requirements		N/A
	Rated operating voltage U_{op} (V)..... :		—
	Nominal voltage U_{peak} (V)..... :		—
	Max increase due to variation U_{sp} ..... :		—
	Max increase due to ageing ΔU_{sa} ..... :		—
	$U_{op}= U_{peak} + \Delta U_{sp} + \Delta U_{sa}$ ..... :		—
5.5	Components as safeguards		N/A
5.5.1	General		N/A
5.5.2	Capacitors and RC units		N/A
5.5.2.1	General requirement		N/A
5.5.2.2	Safeguards against capacitor discharge after disconnection of a connector..... :		N/A
5.5.3	Transformers		N/A
5.5.4	Optocouplers		N/A
5.5.5	Relays		N/A
5.5.6	Resistors		N/A
5.5.7	SPD's		N/A
5.5.7.1	Use of an SPD connected to reliable earthing		N/A
5.5.7.2	Use of an SPD between mains and protective earth		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.5.8	Insulation between the mains and external circuit consisting of a coaxial cable.....:		N/A
5.6	Protective conductor		N/A
5.6.2	Requirement for protective conductors		N/A
5.6.2.1	General requirements		N/A
5.6.2.2	Colour of insulation		N/A
5.6.3	Requirement for protective earthing conductors		N/A
	Protective earthing conductor size (mm^2) .....:		—
5.6.4	Requirement for protective bonding conductors		N/A
5.6.4.1	Protective bonding conductors		N/A
	Protective bonding conductor size (mm^2). .....:		—
	Protective current rating (A) ..... :		—
5.6.4.3	Current limiting and overcurrent protective devices		N/A
5.6.5	Terminals for protective conductors		N/A
5.6.5.1	Requirement		N/A
	Conductor size (mm^2), nominal thread diameter (mm). .....:		N/A
5.6.5.2	Corrosion		N/A
5.6.6	Resistance of the protective system		N/A
5.6.6.1	Requirements		N/A
5.6.6.2	Test Method Resistance (Ω).....:		N/A
5.6.7	Reliable earthing		N/A
5.7	Prospective touch voltage, touch current and protective conductor current		N/A
5.7.2	Measuring devices and networks		N/A
5.7.2.1	Measurement of touch current .....:		N/A
5.7.2.2	Measurement of prospective touch voltage		N/A
5.7.3	Equipment set-up, supply connections and earth connections		N/A
	System of interconnected equipment (separate connections/single connection) .....:		—
	Multiple connections to mains (one connection at a time/simultaneous connections) .....:		—
5.7.4	Earthed conductive accessible parts.....:		N/A
5.7.5	Protective conductor current		N/A
	Supply Voltage (V).....:		—
	Measured current (mA).....:		—

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Clause	Requirement + Test	Result - Remark	Verdict
	Instructional Safeguard.....:		N/A
5.7.6	Prospective touch voltage and touch current due to external circuits		N/A
5.7.6.1	Touch current from coaxial cables		N/A
5.7.6.2	Prospective touch voltage and touch current from external circuits		N/A
5.7.7	Summation of touch currents from external circuits		N/A
	a) Equipment with earthed external circuits Measured current (mA).....:		N/A
	b) Equipment whose external circuits are not referenced to earth. Measured current (mA).....:		N/A
6	**ELECTRICALLY- CAUSED FIRE**		P
6.2	Classification of power sources (PS) and potential ignition sources (PIS)		P
6.2.2	Power source circuit classifications		P
6.2.2.1	General		P
6.2.2.2	Power measurement for worst-case load fault ... :	(See appended table 6.2.2)	P
6.2.2.3	Power measurement for worst-case power source fault ..... :	(See appended table 6.2.2)	P
6.2.2.4	PS1 ..... :		N/A
6.2.2.5	PS2 ..... :		P
6.2.2.6	PS3 ..... :		N/A
6.2.3	Classification of potential ignition sources		P
6.2.3.1	Arcing PIS ..... :	(See appended table 6.2.3.1)	P
6.2.3.2	Resistive PIS ..... :		N/A
6.3	Safeguards against fire under normal operating and abnormal operating conditions		P
6.3.1 (a)	No ignition and attainable temperature value less than 90 % defined by ISO 871 or less than 300 °C for unknown materials ..... :	(See appended table 5.4.1.5, 6.3.2, 9.0, B.2.6)	P
6.3.1 (b)	Combustible materials outside fire enclosure		P
6.4	Safeguards against fire under single fault conditions		P
6.4.1	Safeguard Method		P
6.4.2	Reduction of the likelihood of ignition under single fault conditions in PS1 circuits		P
6.4.3	Reduction of the likelihood of ignition under single fault conditions in PS2 and PS3 circuits		N/A
6.4.3.1	General		P
6.4.3.2	Supplementary Safeguards		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Special conditions if conductors on printed boards are opened or peeled		N/A
6.4.3.3	Single Fault Conditions ..... :	(See appended table 6.4.3)	P
	Special conditions for temperature limited by fuse		N/A
6.4.4	Control of fire spread in PS1 circuits		N/A
6.4.5	Control of fire spread in PS2 circuits		N/A
6.4.5.2	Supplementary safeguards .....:		N/A
6.4.6	Control of fire spread in PS3 circuit		N/A
6.4.7	Separation of combustible materials from a PIS	PCB rated Min. V-1 class material except for other small components made of V-2 class material.	N/A
6.4.7.1	General.....:		N/A
6.4.7.2	Separation by distance	V-0 PCB used	P
6.4.7.3	Separation by a fire barrier		N/A
6.4.8	Fire enclosures and fire barriers	See below	P
6.4.8.1	Fire enclosure and fire barrier material properties	V-0 plastic enclosure used.	P
6.4.8.2.1	Requirements for a fire barrier	No fire barrier	N/A
6.4.8.2.2	Requirements for a fire enclosure		P
6.4.8.3	Constructional requirements for a fire enclosure and a fire barrier		P
6.4.8.3.1	Fire enclosure and fire barrier openings		P
6.4.8.3.2	Fire barrier dimensions		N/A
6.4.8.3.3	Top Openings in Fire Enclosure: dimensions (mm) .....:		N/A
	Needle Flame test		N/A
6.4.8.3.4	Bottom Openings in Fire Enclosure, condition met a), b) and/or c) dimensions (mm) .....:	V-0 plastic enclosure used.	P
	Flammability tests for the bottom of a fire enclosure .....:		N/A
6.4.8.3.5	Integrity of the fire enclosure, condition met: a), b) or c) .....:		N/A
6.4.8.4	Separation of PIS from fire enclosure and fire barrier distance (mm) or flammability rating.....:		P
6.5	Internal and external wiring		N/A
6.5.1	Requirements		N/A
6.5.2	Cross-sectional area (mm^2) .....:		—
6.5.3	Requirements for interconnection to building wiring .....:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
6.6	Safeguards against fire due to connection to additional equipment		P
	External port limited to PS2 or complies with Clause Q.1		N/A
7	**INJURY CAUSED BY HAZARDOUS SUBSTANCES**		N/A
7.2	Reduction of exposure to hazardous substances	No such hazardous substances	N/A
7.3	Ozone exposure		N/A
7.4	Use of personal safeguards (PPE)		N/A
	Personal safeguards and instructions ..... :		—
7.5	Use of instructional safeguards and instructions		N/A
	Instructional safeguard (ISO 7010) .....:		—
7.6	Batteries.....:		N/A
8	**MECHANICALLY-CAUSED INJURY**		P
8.1	General		P
8.2	Mechanical energy source classifications	MS1: does not cause pain or injury	P
8.3	Safeguards against mechanical energy sources		N/A
8.4	Safeguards against parts with sharp edges and corners	Edges and corners are classed as MS1	P
8.4.1	Safeguards	No such sharp edge or corner	N/A
8.5	Safeguards against moving parts		N/A
8.5.1	MS2 or MS3 part required to be accessible for the function of the equipment		N/A
8.5.2	Instructional Safeguard ..... :		—
8.5.4	Special categories of equipment comprising moving parts		N/A
8.5.4.1	Large data storage equipment		N/A
8.5.4.2	Equipment having electromechanical device for destruction of media		N/A
8.5.4.2.1	Safeguards and Safety Interlocks .....:		N/A
8.5.4.2.2	Instructional safeguards against moving parts		N/A
	Instructional Safeguard .....:		—
8.5.4.2.3	Disconnection from the supply		N/A
8.5.4.2.4	Probe type and force (N) .....:		N/A
8.5.5	High Pressure Lamps		N/A
8.5.5.1	Energy Source Classification		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.5.5.2	High Pressure Lamp Explosion Test.....:		N/A
8.6	Stability		N/A
8.6.1	Product classification	MS1	N/A
	Instructional Safeguard.....:		—
8.6.2	Static stability		N/A
8.6.2.2	Static stability test		N/A
	Applied Force.....:		—
8.6.2.3	Downward Force Test		N/A
8.6.3	Relocation stability test		N/A
	Unit configuration during 10° tilt.....:		—
8.6.4	Glass slide test		N/A
8.6.5	Horizontal force test (Applied Force).....:		N/A
	Position of feet or movable parts.....:		—
8.7	Equipment mounted to wall or ceiling		N/A
8.7.1	Mounting Means (Length of screws (mm) and mounting surface) .....:		N/A
8.7.2	Direction and applied force.....:		N/A
8.8	Handles strength		N/A
8.8.1	Classification		N/A
8.8.2	Applied Force .....:		N/A
8.9	Wheels or casters attachment requirements		N/A
8.9.1	Classification		N/A
8.9.2	Applied force .....:		—
8.10	Carts, stands and similar carriers		N/A
8.10.1	General		N/A
8.10.2	Marking and instructions		N/A
	Instructional Safeguard.....:		—
8.10.3	Cart, stand or carrier loading test and compliance		N/A
	Applied force .....:		—
8.10.4	Cart, stand or carrier impact test		N/A
8.10.5	Mechanical stability		N/A
	Applied horizontal force (N).....:		—
8.10.6	Thermoplastic temperature stability (°C).....:		N/A
8.11	Mounting means for rack mounted equipment		N/A
8.11.1	General		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.11.2	Product Classification		N/A
8.11.3	Mechanical strength test, variable *N* .....:		N/A
8.11.4	Mechanical strength test 250N, including end stops		N/A
8.12	Telescoping or rod antennas.....		N/A
	Button/Ball diameter (mm).....:		—
9	**THERMAL BURN INJURY**		P
9.2	Thermal energy source classifications	TS1	P
9.3	Safeguard against thermal energy sources		P
9.4	Requirements for safeguards		P
9.4.1	Equipment safeguard	Equipment safeguard	P
9.4.2	Instructional safeguard .....:		N/A
10	**RADIATION**		P
10.2	Radiation energy source classification		P
10.2.1	General classification		P
10.3	Protection against laser radiation		N/A
	Laser radiation that exists equipment:		—
	Normal, abnormal, single-fault..... :		N/A
	Instructional safeguard ..... :		—
	Tool..... :		—
10.4	Protection against visible, infrared, and UV radiation		P
10.4.1	General		P
10.4.1.a)	RS3 for Ordinary and instructed persons .....:		N/A
10.4.1.b)	RS3 accessible to a skilled person.....:		N/A
	Personal safeguard (PPE) instructional safeguard.....:		—
10.4.1.c)	Equipment visible, IR, UV does not exceed RS1 . :		N/A
10.4.1.d)	Normal, abnormal, single-fault conditions ..... :		N/A
10.4.1.e)	Enclosure material employed as safeguard is opaque.....:		N/A
10.4.1.f)	UV attenuation.....:		N/A
10.4.1.g)	Materials resistant to degradation UV .....:		N/A
10.4.1.h)	Enclosure containment of optical radiation.....:		N/A
10.4.1.i)	Exempt Group under normal operating	LED indicator light only	P

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Clause	Requirement + Test	Result - Remark	Verdict
	conditions.....:		
10.4.2	Instructional safeguard .....:		N/A
10.5	Protection against x-radiation		N/A
10.5.1	X- radiation energy source that exists equipment:		N/A
	Normal, abnormal, single fault conditions		N/A
	Equipment safeguards.....:		N/A
	Instructional safeguard for skilled person..... :		N/A
10.5.3	Most unfavourable supply voltage to give maximum radiation .....:		—
	Abnormal and single-fault condition ..... :		N/A
	Maximum radiation (pA/kg)..... :		N/A
10.6	Protection against acoustic energy sources		N/A
10.6.1	General		N/A
10.6.2	Classification		N/A
	Acoustic output, dB(A)..... :		N/A
	Output voltage, unweighted r.m.s..... :		N/A
10.6.4	Protection of persons		N/A
	Instructional safeguards ..... :		N/A
	Equipment safeguard prevent ordinary person to RS2..... :		—
	Means to actively inform user of increase sound pressure..... :		—
	Equipment safeguard prevent ordinary person to RS2..... :		—
10.6.5	Requirements for listening devices (headphones, earphones, etc.)		N/A
10.6.5.1	Corded passive listening devices with analog input		N/A
	Input voltage with 94 dB(A) L_{Aeq} acoustic pressure output..... :		—
10.6.5.2	Corded listening devices with digital input		N/A
	Maximum dB(A)..... :		—
10.6.5.3	Cordless listening device		N/A
	Maximum dB(A)..... :		—

B	**NORMAL OPERATING CONDITION TESTS, ABNORMAL OPERATING CONDITION TESTS AND SINGLE FAULT CONDITION TESTS**		P
B.2	Normal Operating Conditions		P

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IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
B.2.1	General requirements..... :	(See Test Item Particulars and appended test tables)	P
	Audio Amplifiers and equipment with audio amplifiers ..... :		N/A
B.2.3	Supply voltage and tolerances		P
B.2.5	Input test..... :	(See appended table B.2.5)	P
B.3	Simulated abnormal operating conditions		P
B.3.1	General requirements..... :	(See appended table B.3)	P
B.3.2	Covering of ventilation openings		P
B.3.3	D.C. mains polarity test		N/A
B.3.4	Setting of voltage selector ..... :	No such voltage selector	N/A
B.3.5	Maximum load at output terminals ..... :		N/A
B.3.6	Reverse battery polarity		N/A
B.3.7	Abnormal operating conditions as specified in Clause E.2.		N/A
B.3.8	Safeguards functional during and after abnormal operating conditions		P
B.4	Simulated single fault conditions		P
B.4.2	Temperature controlling device open or short-circuited ..... :		N/A
B.4.3	Motor tests		N/A
B.4.3.1	Motor blocked or rotor locked increasing the internal ambient temperature ..... :		N/A
B.4.4	Short circuit of functional insulation		P
B.4.4.1	Short circuit of clearances for functional insulation		P
B.4.4.2	Short circuit of creepage distances for functional insulation		P
B.4.4.3	Short circuit of functional insulation on coated printed boards		P
B.4.5	Short circuit and interruption of electrodes in tubes and semiconductors		N/A
B.4.6	Short circuit or disconnect of passive components		P
B.4.7	Continuous operation of components		N/A
B.4.8	Class 1 and Class 2 energy sources within limits during and after single fault conditions		P
B.4.9	Battery charging under single fault conditions ... :		P
C	**UV RADIATION**		N/A
C.1	Protection of materials in equipment from UV radiation		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
C.1.2	Requirements		N/A
C.1.3	Test method		N/A
C.2	UV light conditioning test		N/A
C.2.1	Test apparatus		N/A
C.2.2	Mounting of test samples		N/A
C.2.3	Carbon-arc light-exposure apparatus		N/A
C.2.4	Xenon-arc light exposure apparatus		N/A
D	**TEST GENERATORS**		N/A
D.1	Impulse test generators		N/A
D.2	Antenna interface test generator		N/A
D.3	Electronic pulse generator		N/A
E	**TEST CONDITIONS FOR EQUIPMENT CONTAINING AUDIO AMPLIFIERS**		N/A
E.1	Audio amplifier normal operating conditions		N/A
	Audio signal voltage (V) .....:		—
	Rated load impedance (Ω) .....:		
E.2	Audio amplifier abnormal operating conditions		N/A
F	**EQUIPMENT MARKINGS, INSTRUCTIONS, AND INSTRUCTIONAL SAFEGUARDS**		P
F.1	General requirements		P
	Instructions – Language .....:	English instructions provided	—
F.2	Letter symbols and graphical symbols		P
F.2.1	Letter symbols according to IEC60027-1		P
F.2.2	Graphic symbols IEC, ISO or manufacturer specific	See copy of marking plate	P
F.3	Equipment markings		P
F.3.1	Equipment marking locations		P
F.3.2	Equipment identification markings	See copy of marking plate	P
F.3.2.1	Manufacturer identification .....:	See copy of marking plate	—
F.3.2.2	Model identification .....:	See copy of marking plate	—
F.3.3	Equipment rating markings		P
F.3.3.1	Equipment with direct connection to mains		N/A
F.3.3.2	Equipment without direct connection to mains	See copy of marking plate	P
F.3.3.3	Nature of supply voltage.....:	See copy of marking plate	—
F.3.3.4	Rated voltage .....:	See copy of marking plate	—
F.3.3.5	Rated frequency .....:		—
F.3.3.6	Rated current or rated power .....:	See copy of marking plate	—

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Clause	Requirement + Test	Result - Remark	Verdict
F.3.3.7	Equipment with multiple supply connections		N/A
F.3.4	Voltage setting device		N/A
F.3.5	Terminals and operating devices		N/A
F.3.5.1	Mains appliance outlet and socket-outlet markings..... :		N/A
F.3.5.2	Switch position identification marking ..... :		N/A
F.3.5.3	Replacement fuse identification and rating markings..... :		N/A
F.3.5.4	Replacement battery identification marking ..... :		N/A
F.3.5.5	Terminal marking location		N/A
F.3.6	Equipment markings related to equipment classification		N/A
F.3.6.1	Class I Equipment		N/A
F.3.6.1.1	Protective earthing conductor terminal		N/A
F.3.6.1.2	Neutral conductor terminal		N/A
F.3.6.1.3	Protective bonding conductor terminals		N/A
F.3.6.2	Class II equipment (IEC60417-5172)		N/A
F.3.6.2.1	Class II equipment with or without functional earth		N/A
F.3.6.2.2	Class II equipment with functional earth terminal marking		N/A
F.3.7	Equipment IP rating marking .....:		—
F.3.8	External power supply output marking		N/A
F.3.9	Durability, legibility and permanence of marking		P
F.3.10	Test for permanence of markings		P
F.4	Instructions		P
	a) Equipment for use in locations where children not likely to be present - marking		N/A
	b) Instructions given for installation or initial use		P
	c) Equipment intended to be fastened in place		N/A
	d) Equipment intended for use only in restricted access area		N/A
	e) Audio equipment terminals classified as ES3 and other equipment with terminals marked in accordance F.3.6.1		N/A
	f) Protective earthing employed as safeguard		N/A
	g) Protective earthing conductor current exceeding ES 2 limits		N/A
	h) Symbols used on equipment		P

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Clause	Requirement + Test	Result - Remark	Verdict
	i) Permanently connected equipment not provided with all-pole mains switch		N/A
j)	j) Replaceable components or modules providing safeguard function		N/A
F.5	Instructional safeguards		N/A
	Where “instructional safeguard” is referenced in the test report it specifies the required elements, location of marking and/or instruction		N/A
G	**COMPONENTS**		P
G.1	**Switches**		N/A
G.1.1	General requirements		N/A
G.1.2	Ratings, endurance, spacing, maximum load		N/A
G.2	**Relays**		N/A
G.2.1	General requirements		N/A
G.2.2	Overload test		N/A
G.2.3	Relay controlling connectors supply power		N/A
G.2.4	Mains relay, modified as stated in G.2		N/A
G.3	**Protection Devices**		N/A
G.3.1	Thermal cut-offs		N/A
G.3.1.1a) &b)	Thermal cut-outs separately approved according to IEC 60730 with conditions indicated in a) & b)		N/A
G.3.1.1c)	Thermal cut-outs tested as part of the equipment as indicated in c)		N/A
G.3.1.2	Thermal cut-off connections maintained and secure		N/A
G.3.2	Thermal links		N/A
G.3.2.1a)	Thermal links separately tested with IEC 60691		N/A
G.3.2.1b)	Thermal links tested as part of the equipment		N/A
	Aging hours (H) ..... :		—
	Single Fault Condition ..... :		—
	Test Voltage (V) and Insulation Resistance (Ω). :		—
G.3.3	PTC Thermistors		N/A
G.3.4	Overcurrent protection devices		N/A
G.3.5	Safeguards components not mentioned in G.3.1 to G.3.5		N/A
G.3.5.1	Non-resettable devices suitably rated and marking provided		N/A
G.3.5.2	Single faults conditions.....:		N/A
G.4	**Connectors**		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
G.4.1	Spacings		N/A
G.4.2	Mains connector configuration .....:		N/A
G.4.3	Plug is shaped that insertion into mains socket-outlets or appliance coupler is unlikely		N/A
G.5	**Wound Components**		N/A
G.5.1	Wire insulation in wound components.....		N/A
G.5.1.2 a)	Two wires in contact inside wound component, angle between 45° and 90°		N/A
G.5.1.2 b)	Construction subject to routine testing		N/A
G.5.2	Endurance test on wound components		N/A
G.5.2.1	General test requirements		N/A
G.5.2.2	Heat run test		N/A
	Time (s) .....:		—
	Temperature (°C) .....:		—
G.5.2.3	Wound Components supplied by mains		N/A
G.5.3	**Transformers**		N/A
G.5.3.1	Requirements applied (IEC61204-7, IEC61558-1/-2, and/or IEC62368-1).....:		N/A
	Position.....:		—
	Method of protection .....:		—
G.5.3.2	Insulation		N/A
	Protection from displacement of windings.....:		—
G.5.3.3	Overload test ..... :		N/A
G.5.3.3.1	Test conditions		N/A
G.5.3.3.2	Winding Temperatures testing in the unit		N/A
G.5.3.3.3	Winding Temperatures - Alternative test method		N/A
G.5.4	**Motors**		N/A
G.5.4.1	General requirements		N/A
	Position .....:		—
G.5.4.2	Test conditions		N/A
G.5.4.3	Running overload test		N/A
G.5.4.4	Locked-rotor overload test		N/A
	Test duration (days) .....:		—
G.5.4.5	Running overload test for d.c. motors in secondary circuits		N/A
G.5.4.5.2	Tested in the unit		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Electric strength test (V).....:		—
G.5.4.5.3	Tested on the Bench - Alternative test method; test time (h) .....:		N/A
	Electric strength test (V).....:		—
G.5.4.6	Locked-rotor overload test for d.c. motors in secondary circuits		N/A
G.5.4.6.2	Tested in the unit		N/A
	Maximum Temperature .....:		N/A
	Electric strength test (V) .....:		N/A
G.5.4.6.3	Tested on the bench - Alternative test method; test time (h) .....:		N/A
	Electric strength test (V).....:		N/A
G.5.4.7	Motors with capacitors		N/A
G.5.4.8	Three-phase motors		N/A
G.5.4.9	Series motors		N/A
	Operating voltage .....:		—
G.6	**Wire Insulation**		N/A
G.6.1	General		N/A
G.6.2	Solvent-based enamel wiring insulation		N/A
G.7	**Mains supply cords**		N/A
G.7.1	General requirements		N/A
	Type.....:		—
	Rated current (A).....:		—
	Cross-sectional area (mm^2), (AWG)..... :		—
G.7.2	Compliance and test method		N/A
G.7.3	Cord anchorages and strain relief for non-detachable power supply cords		N/A
G.7.3.2	Cord strain relief		N/A
G.7.3.2.1	Requirements		N/A
	Strain relief test force (N) .....:		—
G.7.3.2.2	Strain relief mechanism failure		N/A
G.7.3.2.3	Cord sheath or jacket position, distance (mm)....:		—
G.7.3.2.4	Strain relief comprised of polymeric material		N/A
G.7.4	Cord Entry ..... :		N/A
G.7.5	Non-detachable cord bend protection		N/A
G.7.5.1	Requirements		N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
G.7.5.2	Mass (g) ..... :		—
	Diameter (m) ..... :		—
	Temperature (°C) ..... :		—
G.7.6	Supply wiring space		N/A
G.7.6.2	Stranded wire		N/A
G.7.6.2.1	Test with 8 mm strand		N/A
G.8	**Varistors**		N/A
G.8.1	General requirements		N/A
G.8.2	Safeguard against shock		N/A
G.8.3	Safeguard against fire		N/A
G.8.3.2	Varistor overload test ..... :		N/A
G.8.3.3	Temporary overvoltage ..... :		N/A
G.9	**Integrated Circuit (IC) Current Limiters**		N/A
G.9.1 a)	Manufacturer defines limit at max. 5A.		N/A
G.9.1 b)	Limiters do not have manual operator or reset		N/A
G.9.1 c)	Supply source does not exceed 250 VA ..... :		—
G.9.1 d)	IC limiter output current (max. 5A) ..... :		—
G.9.1 e)	Manufacturers' defined drift ..... :		—
G.9.2	Test Program 1		N/A
G.9.3	Test Program 2		N/A
G.9.4	Test Program 3		N/A
G.10	**Resistors**		N/A
G.10.1	General requirements		N/A
G.10.2	Resistor test		N/A
G.10.3	Test for resistors serving as safeguards between the mains and an external circuit consisting of a coaxial cable		N/A
G.10.3.1	General requirements		N/A
G.10.3.2	Voltage surge test		N/A
G.10.3.3	Impulse test		N/A
G.11	**Capacitor and RC units**		N/A
G.11.1	General requirements		N/A
G.11.2	Conditioning of capacitors and RC units		N/A
G.11.3	Rules for selecting capacitors		N/A
G.12	**Optocouplers**		N/A

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IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Optocouplers comply with IEC 60747-5-5:2007 Spacing or Electric Strength Test (specify option and test results).....:		N/A
	Type test voltage Vini .....:		—
	Routine test voltage, Vini,b .....:		—
G.13	**Printed boards**		P
G.13.1	General requirements	Certified PCB used	P
G.13.2	Uncoated printed boards		P
G.13.3	Coated printed boards		N/A
G.13.4	Insulation between conductors on the same inner surface		N/A
	Compliance with cemented joint requirements (Specify construction).....:		—
G.13.5	Insulation between conductors on different surfaces		N/A
	Distance through insulation .....:	(See appended table 5.4.4.5)	N/A
	Number of insulation layers (pcs) .....:		—
G.13.6	Tests on coated printed boards		N/A
G.13.6.1	Sample preparation and preliminary inspection		N/A
G.13.6.2a)	Thermal conditioning		N/A
G.13.6.2b)	Electric strength test		N/A
G.13.6.2c)	Abrasion resistance test		N/A
G.14	**Coating on components terminals**		N/A
G.14.1	Requirements ..... :		N/A
G.15	**Liquid filled components**		N/A
G.15.1	General requirements		N/A
G.15.2	Requirements		N/A
G.15.3	Compliance and test methods		N/A
G.15.3.1	Hydrostatic pressure test		N/A
G.15.3.2	Creep resistance test		N/A
G.15.3.3	Tubing and fittings compatibility test		N/A
G.15.3.4	Vibration test		N/A
G.15.3.5	Thermal cycling test		N/A
G.15.3.6	Force test		N/A
G.15.4	Compliance		N/A
G.16	**IC including capacitor discharge function (ICX)**		N/A

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IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
a)	Humidity treatment in accordance with sc5.4.8 – 120 hours		N/A
b)	Impulse test using circuit 2 with Uc = to transient voltage .....:		N/A
C1)	Application of ac voltage at 110% of rated voltage for 2.5 minutes		N/A
C2)	Test voltage .....:		—
D1)	10,000 cycles on and off using capacitor with smallest capacitance resistor with largest resistance specified by manufacturer		N/A
D2)	Capacitance .....:		—
D3)	Resistance .....:		—
H	**CRITERIA FOR TELEPHONE RINGING SIGNALS**		N/A
H.1	General		N/A
H.2	Method A		N/A
H.3	Method B		N/A
H.3.1	Ringing signal		N/A
H.3.1.1	Frequency (Hz) .....:		—
H.3.1.2	Voltage (V) .....:		—
H.3.1.3	Cadence; time (s) and voltage (V) .....:		—
H.3.1.4	Single fault current (mA):.....:		—
H.3.2	Tripping device and monitoring voltage .....:		N/A
H.3.2.1	Conditions for use of a tripping device or a monitoring voltage complied with		N/A
H.3.2.2	Tripping device		N/A
H.3.2.3	Monitoring voltage (V) .....:		—
J	**INSULATED WINDING WIRES FOR USE WITHOUT INTERLEAVED INSULATION**		N/A
	General requirements		N/A
K	**SAFETY INTERLOCKS**		N/A
K.1	General requirements		N/A
K.2	Components of safety interlock safeguard mechanism		N/A
K.3	Inadvertent change of operating mode		N/A
K.4	Interlock safeguard override		N/A
K.5	Fail-safe		N/A
	Compliance .....:		N/A
K.6	Mechanically operated safety interlocks		N/A

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IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
K.6.1	Endurance requirement		N/A
K.6.2	Compliance and Test method .....:		N/A
K.7	Interlock circuit isolation		N/A
K.7.1	Separation distance for contact gaps & interlock circuit elements (type and circuit location) .....:		N/A
K.7.2	Overload test, Current (A) .....:		N/A
K.7.3	Endurance test		N/A
K.7.4	Electric strength test .....:		N/A
L	**DISCONNECT DEVICES**		N/A
L.1	General requirements	Not directly connected to mains supply	N/A
L.2	Permanently connected equipment		N/A
L.3	Parts that remain energized		N/A
L.4	Single phase equipment		N/A
L.5	Three-phase equipment		N/A
L.6	Switches as disconnect devices		N/A
L.7	Plugs as disconnect devices		N/A
L.8	Multiple power sources		N/A
M	**EQUIPMENT CONTAINING BATTERIES AND THEIR PROTECTION CIRCUITS**		P
M.1	General requirements		P
M.2	Safety of batteries and their cells	The NI-MH batteries comp	P
M.2.1	Requirements		P
M.2.2	Compliance and test method (identify method) .. :		P
M.3	Protection circuits		P
M.3.1	Requirements		P
M.3.2	Tests		P
	- Overcharging of a rechargeable battery	(See appended M)	P
	- Unintentional charging of a non-rechargeable battery		N/A
	- Reverse charging of a rechargeable battery	(See appended M)	P
	- Excessive discharging rate for any battery	(See appended M)	P
M.3.3	Compliance .....:	(See appended Tables and Annex M and M.4)	P
M.4	Additional safeguards for equipment containing secondary lithium battery		N/A
M.4.1	General		N/A
M.4.2	Charging safeguards		N/A

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IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
M.4.2.1	Charging operating limits		N/A
M.4.2.2a)	Charging voltage, current and temperature .....:		—
M.4.2.2 b)	Single faults in charging circuitry .....:		—
M.4.3	Fire Enclosure		N/A
M.4.4	Endurance of equipment containing a secondary lithium battery		N/A
M.4.4.2	Preparation		N/A
M.4.4.3	Drop and charge/discharge function tests		N/A
	Drop		N/A
	Charge		N/A
	Discharge		N/A
M.4.4.4	Charge-discharge cycle test		N/A
M.4.4.5	Result of charge-discharge cycle test		N/A
M.5	Risk of burn due to short circuit during carrying		N/A
M.5.1	Requirement		N/A
M.5.2	Compliance and Test Method (Test of P.2.3)		N/A
M.6	Prevention of short circuits and protection from other effects of electric current		P
M.6.1	Short circuits		P
M.6.1.1	General requirements		P
M.6.1.2	Test method to simulate an internal fault		P
M.6.1.3	Compliance (Specify M.6.1.2 or alternative method) .....:		N/A
M.6.2	Leakage current (mA) .....:		N/A
M.7	Risk of explosion from lead acid and NiCd batteries		N/A
M.7.1	Ventilation preventing explosive gas concentration		N/A
M.7.2	Compliance and test method		N/A
M.8	Protection against internal ignition from external spark sources of lead acid batteries		N/A
M.8.1	General requirements		N/A
M.8.2	Test method		N/A
M.8.2.1	General requirements		N/A
M.8.2.2	Estimation of hypothetical volume *Vz* (m^3/s).....:		—
M.8.2.3	Correction factors.....:		—
M.8.2.4	Calculation of distance *d* (mm) .....:		—

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IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
M.9	Preventing electrolyte spillage		N/A
M.9.1	Protection from electrolyte spillage		N/A
M.9.2	Tray for preventing electrolyte spillage		N/A
M.10	Instructions to prevent reasonably foreseeable misuse (Determination of compliance: inspection, data review; or abnormal testing) ..... :		N/A
N	**ELECTROCHEMICAL POTENTIALS**		N/A
	Metal(s) used ..... :		—
O	**MEASUREMENT OF CREEPAGE DISTANCES AND CLEARANCES**		N/A
	Figures O.1 to O.20 of this Annex applied ..... :		—
P	**SAFEGUARDS AGAINST ENTRY OF FOREIGN OBJECTS AND SPILLAGE OF INTERNAL LIQUIDS**		N/A
P.1	General requirements		N/A
P.2.2	Safeguards against entry of foreign object		N/A
	Location and Dimensions (mm) ..... :		—
P.2.3	Safeguard against the consequences of entry of foreign object		N/A
P.2.3.1	Safeguards against the entry of a foreign object		N/A
	Openings in transportable equipment		N/A
	Transportable equipment with metalized plastic parts ..... :		N/A
P.2.3.2	Openings in transportable equipment in relation to metallized parts of a barrier or enclosure (identification of supplementary safeguard) ..... :		N/A
P.3	Safeguards against spillage of internal liquids		N/A
P.3.1	General requirements		N/A
P.3.2	Determination of spillage consequences		N/A
P.3.3	Spillage safeguards		N/A
P.3.4	Safeguards effectiveness		N/A
P.4	Metallized coatings and adhesive securing parts		N/A
P.4.2 a)	Conditioning testing		N/A
	Tc (°C) ..... :		—
	Tr (°C) ..... :		—
	Ta (°C) ..... :		—
P.4.2 b)	Abrasion testing ..... :		N/A
P.4.2 c)	Mechanical strength testing ..... :		N/A
Q	**CIRCUITS INTENDED FOR INTERCONNECTION WITH BUILDING WIRING**		N/A
Q.1	Limited power sources		N/A

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IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
Q.1.1 a)	Inherently limited output		N/A
Q.1.1 b)	Impedance limited output		N/A
	- Regulating network limited output under normal operating and simulated single fault condition		N/A
Q.1.1 c)	Overcurrent protective device limited output		N/A
Q.1.1 d)	IC current limiter complying with G.9		N/A
Q.1.2	Compliance and test method		N/A
Q.2	Test for external circuits – paired conductor cable		N/A
	Maximum output current (A) .....:		—
	Current limiting method .....:		—
R	**LIMITED SHORT CIRCUIT TEST**		**N/A**
R.1	General requirements		N/A
R.2	Determination of the overcurrent protective device and circuit		N/A
R.3	Test method Supply voltage (V) and short-circuit current (A)). .....:		N/A
S	**TESTS FOR RESISTANCE TO HEAT AND FIRE**		**N/A**
S.1	Flammability test for fire enclosures and fire barrier materials of equipment where the steady state power does not exceed 4 000 W		N/A
	Samples, material .....:		—
	Wall thickness (mm).....:		—
	Conditioning (°C).....:		—
	Test flame according to IEC 60695-11-5 with conditions as set out		N/A
	- Material not consumed completely		N/A
	- Material extinguishes within 30s		N/A
	- No burning of layer or wrapping tissue		N/A
S.2	Flammability test for fire enclosure and fire barrier integrity		N/A
	Samples, material .....:		—
	Wall thickness (mm).....:		—
	Conditioning (°C).....:		—
	Test flame according to IEC 60695-11-5 with conditions as set out		N/A
	Test specimen does not show any additional hole		N/A
S.3	Flammability test for the bottom of a fire enclosure		N/A

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IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Samples, material .....:		—
	Wall thickness (mm).....:		—
	Cheesecloth did not ignite		N/A
S.4	Flammability classification of materials		N/A
S.5	Flammability test for fire enclosures and fire barrier materials of equipment where the steady state power does not exceed 4 000 W		N/A
	Samples, material .....:		—
	Wall thickness (mm).....:		—
	Conditioning (test condition), (°C).....:		—
	Test flame according to IEC 60695-11-20 with conditions as set out		N/A
	After every test specimen was not consumed completely		N/A
	After fifth flame application, flame extinguished within 1 min		N/A
T	**MECHANICAL STRENGTH TESTS**		**P**
T.1	General requirements		P
T.2	Steady force test, 10 N .....:		P
T.3	Steady force test, 30 N .....:		N/A
T.4	Steady force test, 100 N .....:		N/A
T.5	Steady force test, 250 N .....:	(See Annex T.2, T.3, T.4, T.5)	P
T.6	Enclosure impact test		N/A
	Fall test		N/A
	Swing test		N/A
T.7	Drop test .....:	(See appended table T.7)	P
T.8	Stress relief test .....:	(See appended table T.8)	P
T.9	Impact Test (glass)		N/A
T.9.1	General requirements		N/A
T.9.2	Impact test and compliance		N/A
	Impact energy (J).....:		—
	Height (m) .....:		—
T.10	Glass fragmentation test .....:		N/A
T.11	Test for telescoping or rod antennas		N/A
	Torque value (Nm) .....:		—

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IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
U	**MECHANICAL STRENGTH OF CATHODE RAY TUBES (CRT) AND PROTECTION AGAINST THE EFECTS OF IMPLOSION**		N/A
U.1	General requirements		N/A
U.2	Compliance and test method for non-intrinsically protected CRTs		N/A
U.3	Protective Screen.....:		N/A
V	**DETERMINATION OF ACCESSIBLE PARTS (FINGERS, PROBES AND WEDGES)**		P
V.1	Accessible parts of equipment		P
V.2	Accessible part criterion		P

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IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

4.1.2	TABLE: List of critical components				P
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity[1]
Battery	SHENZHEN EVIWE TECHNOLOGY CO., LTD	PJ-653237	3.7V, 800mAh	IEC62133:2012	SGS SZES15050 0161701
Plastic enclosure	SABIC INNOVATIVE PLASTICS B V	141R	Rated V-0, 130°C	UL 94	UL E45329
PCB	Jiangxi Zhiboxin Technology Co., Ltd.	I500_PCT_V1.1	V-0, 130°C	UL 94	UL E465280
Charging base	Shenzhen Eview GPS Technology	DS2	Input: 5Vdc,1A; Output: 5Vdc, 1A; Battery: 3.7V800mAh	IEC/EN 60950-1	LCS190302069AS
Supplementary information: 1) Provided evidence ensures the agreed level of compliance.					

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IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

4.8.4, 4.8.5	**TABLE: Lithium coin/button cell batteries mechanical tests**	N/A

(The following mechanical tests are conducted in the sequence noted.)

4.8.4.2 TABLE: Stress Relief test —

Part	Material	Oven Temperature (°C)	Comments
--	--	--	--

4.8.4.3 TABLE: Battery replacement test —

Battery part no. .....:	--	—
Battery Installation/withdrawal	Battery Installation/Removal Cycle	Comments
	1	--
	2	--
	3	--
	4	--
	5	--
	6	--
	7	--
	8	--
	9	--

4.8.4.4 TABLE: Drop test —

Impact Area	Drop Distance	Drop No.	Observations
--	--	1	--
--	--	2	--
--	--	3	--

4.8.4.5 TABLE: Impact —

Impacts per surface	Surface tested	Impact energy (Nm)	Comments
--	--	--	--
--	--	--	--
--	--	--	--

4.8.4.6 TABLE: Crush test —

Test position	Surface tested	Crushing Force (N)	Duration force applied (s)
--	--	--	--
--	--	--	--

Supplementary information:

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Clause	Requirement + Test	Result - Remark	Verdict

4.8.5	TABLE: Lithium coin/button cell batteries mechanical test result		N/A
Test position	**Surface tested**	**Force (N)**	**Duration force applied (s)**
--	--	--	--
--	--	--	--
Supplementary information:			

5.2	Table: Classification of electrical energy sources						P
5.2.2.2 – Steady State Voltage and Current conditions							
No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters			ES Class
				U (Vrms or Vpk)	I (Apk or Arms)	Hz	
1	5Vd.c.	Internal circuits	Normal	5Vpeak	--	--	ES1
			Abnormal	--	--	--	
			Single fault – SC/OC	--	--	--	

5.2.2.3 - Capacitance Limits						
No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters		ES Class
				Capacitance, nF	Upk (V)	
--	--	--	Normal	--	--	--
			Abnormal	--	--	
			Single fault – SC/OC	--	--	

5.2.2.4 - Single Pulses							
No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters			ES Class
				Duration (ms)	Upk (V)	Ipk (mA)	
--	--	--	Normal	--	--	--	--
			Abnormal	--	--	--	
			Single fault – SC/OC	--	--	--	

5.2.2.5 - Repetitive Pulses							
No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters			ES Class
				Off time (ms)	Upk (V)	Ipk (mA)	
--	--	--	Normal	--	--	--	--
			Abnormal	--	--	--	

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IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

			Single fault – SC/OC	--	--	--	

Test Conditions:

Normal –

Abnormal -

Supplementary information: SC=Short circuit, OC=Open circuit.

5.4.1.4, 6.3.2, 9.0, B.2.6	**TABLE: Temperature measurements**					P
	Supply voltage (V)	5Vd.c. charging	5Vd.c. charging	3.7V discharging	3.7V discharging	—
	Ambient T_{min} (°C)	See below	Adjust to 45	--	--	—
	Ambient T_{max} (°C)	-	--	--	--	—
	Tma (°C)	--	--	--	--	—

Maximum measured temperature T of part/at:	T (°C)				Allowed T_{max} (°C)
PCB near U1	60.2	80.2	65.2	85.2	130
PCB near U2	64.5	84.5	63.8	83.8	130
C1	53.8	73.8	57.4	77.4	105
PCB near U4	60.2	80.2	65.4	85.4	130
Battery surface	33.8	53.8	34.2	54.2	60
Enclosure, inside	34.8	54.8	35.1	55.1	85
Enclosure, outside	31.2	51.2	30.9	50.9	77
Ambient	25.0	45.0	25.0	45.0	--

Supplementary information:

Temperature T of winding:	t_1 (°C)	R_1 (Ω)	t_2 (°C)	R_2 (Ω)	T (°C)	Allowed T_{max} (°C)	Insulation class
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--

Supplementary information:

Note 1: Tma should be considered as directed by appliable requirement

Note 2: Tma is not included in assessment of Touch Temperatures (Clause 9)

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5.4.1.10.2	TABLE: Vicat softening temperature of thermoplastics		N/A
Penetration (mm)..... :			—
Object/ Part No./Material		Manufacturer/trademark	T softening (°C)
--		--	--
--		--	--
supplementary information:			

5.4.1.10.3	TABLE: Ball pressure test of thermoplastics			N/A
Allowed impression diameter (mm) ..... :		≤ 2 mm		—
Object/Part No./Material	Manufacturer/trademark	Test temperature (°C)	Impression diameter (mm)	
--	--	--	--	
--	--	--	--	
Supplementary information:				

5.4.2.2, 5.4.2.4 and 5.4.3	TABLE: Minimum Clearances/Creepage distance						N/A
Clearance (cl) and creepage distance (cr) at/of/between:	Up (V)	U r.m.s. (V)	Frequency (kHz)[1]	Required cl (mm)	cl (mm)[2]	Required[3] cr (mm)	cr (mm)
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--

Supplementary information:

Note 1: Only for frequency above 30 kHz
Note 2: See table 5.4.2.4 if this is based on electric strength test
Note 3: Provide Material Group

5.4.2.3	TABLE: Minimum Clearances distances using required withstand voltage			N/A
	Overvoltage Category (OV):			--
	Pollution Degree:			--
Clearance distanced between:		Required withstand voltage	Required cl (mm)	Measured cl (mm)
--		--	--	--
--		--	--	--
Supplementary information:				

5.4.2.4	TABLE: Clearances based on electric strength test	N/A

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Test voltage applied between:	Required cl (mm)	Test voltage (kV) peak/ r.m.s. / d.c.	Breakdown Yes / No
--	--	--	--
--	--	--	--
Supplementary information:			

5.4.4.2, 5.4.4.5 c) 5.4.4.9	TABLE: Distance through insulation measurements	N/A

Distance through insulation di at/of:	Peak voltage (V)	Frequency (kHz)	Material	Required DTI (mm)	DTI (mm)
--	--	--	--	--	--
--	--	--	--	--	--
Supplementary information:					

5.4.9	TABLE: Electric strength tests	N/A

Test voltage applied between:	Voltage shape (AC, DC)	Test voltage (V)	Breakdown Yes / No
Functional:			
--	--	--	--
--	--	--	--
Basic/supplementary:			
--	--	--	--
--	--	--	--
Reinforced:			
--	--	--	--
--	--	--	--
Routine Tests:			
--	--	--	--
--	--	--	--
Supplementary information:			

5.5.2.2	TABLE: Stored discharge on capacitors	N/A

Supply Voltage (V), Hz	Test Location	Operating Condition (N, S)	Switch position On or off	Measured Voltage (after 2 seconds)	ES Classification

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--	--	--	--	--	--
--	--	--	--	--	--

Supplementary information:

X-capacitors installed for testing are:

☐ bleeding resistor rating:

☐ ICX:

Notes:

A. Test Location:

Phase to Neutral; Phase to Phase; Phase to Earth; and/or Neutral to Earth

B. Operating condition abbreviations:

N – Normal operating condition (e.g., normal operation, or open fuse); S –Single fault condition

5.6.6.2	TABLE: Resistance of protective conductors and terminations			N/A
Accessible part	Test current (A)	Duration (min)	Voltage drop (V)	Resistance (Ω)
--	--	--	--	--
--	--	--	--	--

Supplementary information:

5.7.2.2, 5.7.4	TABLE: Earthed accessible conductive part	N/A
Supply voltage .....:		—
Location	Test conditions specified in 6.1 of IEC 60990 or Fault Condition No in IEC 60990 clause 6.2.2.1 through 6.2.2.8, except for 6.2.2.7	Touch current (mA)
--	1	--
	2*	--
	3	--
	4	--
	5	--
	6	--
	8	--

Supplementary Information:

Notes:

[1] Supply voltage is the anticipated maximum Touch Voltage

[2] Earthed neutral conductor [Voltage differences less than 1% or more]

[3] Specify method used for measurement as described in IEC 60990 sub-clause 4.3

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[4] IEC60990, sub-clause 6.2.2.7, Fault 7 not applicable.

[5] (*) IEC60990, sub-clause 6.2.2.2 is not applicable if switch or disconnect device (e.g., appliance coupler) provided.

6.2.2	Table: Electrical power sources (PS) measurements for classification				P
Source	Description	Measurement	Max Power after 3 s	Max Power after 5 s*)	PS Classification
A	Internal circuit	Power (W) :	＜15W	--	PS1
		V_A (V) :	--	--	
		I_A (A) :	--	--	
B	Battery	Power (W) :	12.10	12.07	PS2
		V_A (V) :	4.2	4.2	
		I_A (A) :	3.11	3.09	
Supplementary Information:					

6.2.3.1	Table: Determination of Potential Ignition Sources (Arcing PIS)			P
Location	Open circuit voltage After 3 s (Vp)	Measured r.m.s current (Irms)	Calculated value (V_p x I_{rms})	Arcing PIS? Yes / No
All internal circuits / parts	--	--	--	Yes (declaration)

Supplementary information:

An Arcing PIS requires a minimum of 50 V (peak) a.c. or d.c. An Arcing PIS is established when the product of the open circuit voltage (V_p) and normal operating condition rms current (I_{rms}) is greater than 15.

6.2.3.2	Table: Determination of Potential Ignition Sources (Resistive PIS)				N/A
Circuit Location (x-y)	Operating Condition (Normal / Describe Single Fault)	Measured wattage or VA During first 30 s (W / VA)	Measured wattage or VA After 30 s (W / VA)	Protective Circuit, Regulator, or PTC Operated? Yes / No (Comment)	Resistive PIS? Yes/No
--	--	--	--	--	--

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Supplementary Information:

A combination of voltmeter, VA and ammeter IA may be used instead of a wattmeter.

If a separate voltmeter and ammeter are used, the product of (VA x IA) is used to determine Resistive PIS classification.

A Resistive PIS: (a) dissipates more than 15 W, measured after 30 s of normal operation, or (b) under single fault conditions has either a power exceeding 100 W measured immediately after the introduction of the fault if electronic circuits, regulators or PTC devices are used, or has an available power exceeding 15 W measured 30 s after introduction of the fault.

8.5.5	TABLE: High Pressure Lamp		N/A
Description		Values	Energy Source Classification
Lamp type.....:		--	—
Manufacturer .....:		--	—
Cat no. .....:		--	—
Pressure (cold) (MPa).....:		--	MS_
Pressure (operating) (MPa) .....:		--	MS_
Operating time (minutes) .....:		--	—
Explosion method .....:		--	—
Max particle length escaping enclosure (mm) .:		--	MS_
Max particle length beyond 1 m (mm).....:		--	MS_
Overall result .....:		--	
Supplementary information:			

B.2.5	TABLE: Input test(only for main unit)						P
U (V)	I (A)	I rated (A)	P (W)	P rated (W)	Fuse No	I fuse (A)	Condition/status
5	0.65	1	3.3	--	--	--	Working normally, battery charging
3.7	0.68	--	2.58	--	--	--	Working normally, battery discharging
Supplementary information: Equipment may be have rated current or rated power or both. Both should be measured							

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Clause	Requirement + Test	Result - Remark	Verdict

B.3	TABLE: Abnormal operating condition tests							N/A
Ambient temperature (°C) .....:			24.5-27.0					—
Power source for EUT: Manufacturer, model/type, output rating ..:			See page 2 for details					—
Component No.	Abnormal Condition	Supply voltage, (V)	Test time (ms)	Fuse no.	Fuse current, (A)	T-couple	Temp. (°C)	Observation
--	--	--	--	--	--	--	--	--

Supplementary information:
Test table is provided to record abnormal and fault conditions for all applicable energy sources including Thermal burn injury. Column “Abnormal/Fault.” Specify if test condition by indicating “Abnormal” then the condition for a Clause B.3 test or “Single Fault” then the condition for Clause B.4.

OL: overload

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Clause	Requirement + Test	Result - Remark	Verdict

B.4	TABLE: Fault condition tests							P
Ambient temperature (°C) .....:			24.5-27.0					—
Power source for EUT: Manufacturer, model/type, output rating .:			--					—
Component No.	Fault Condition	Supply voltage, (V)	Test time (ms)	Fuse no.	Fuse current, (A)	T-couple	Temp. (°C)	Observation
Test condition: Working normally, battery charging								
U1 pin 1-5	SC	5Vd.c.	10mins	--	--	--	--	Input current: 0.01A. Unit shut down immediately, recoverable. After test, no damage, no hazard.
D1	SC	5Vd.c.	10mins	--	--	--	--	Input current: 0.01A. Unit shut down immediately, recoverable. After test, no damage, no hazard.
U2 pin 1-4	SC	5Vd.c.	10mins	--	--	--	--	Input current: 0.01A. Unit shut down immediately, recoverable. After test, no damage, no hazard.
U2 pin 2-3	SC	5Vd.c.	10mins	--	--	--	--	Input current: 0.01A. Unit shut down immediately, recoverable. After test, no damage, no hazard.

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Clause	Requirement + Test	Result - Remark	Verdict

Battery (B-~P-)	OC	5Vd.c.	7hrs25mins	--	--	--	--	Max continuous charging current was 0.32A. The product worked as normal. No chemicals leak, explosion, molten metal emission or expulsion observed.
Test condition: Working normally, battery discharging								
C1	SC	3.7Vd.c.	10mins	--	--	--	--	Input current: 0.01A. Unit shut down immediately, recoverable. After test, no damage, no hazard.
U1 pin 2-4	SC	3.7Vd.c..	10mins	--	--	--	--	Input current: 0.01A. Unit shut down immediately, recoverable. After test, no damage, no hazard.
U1 pin 3-6	SC	3.7Vd.c.	10mins	--	--	--	--	Input current: 0.01A. Unit shut down immediately, recoverable. After test, no damage, no hazard.

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Clause	Requirement + Test	Result - Remark	Verdict

Battery (B-~P-)	ED	3.7Vdc	7hrs10mins	--	--	--	--	Max continuous charging current was 0.37A. The product worked as normal. No chemicals leak, explosion, molten metal emission or expulsion observed.
Supplementary information: SC: short circuit								

Annex M	**TABLE: Batteries**									P
The tests of Annex M are applicable only when appropriate battery data is not available										P
Is it possible to install the battery in a reverse polarity position? ..... :										N/A
	Non-rechargeable batteries			Rechargeable batteries						
	Discharging		Un-intentional charging	Charging		Discharging		Reversed charging		
	Meas. current	Manuf. Specs.		Meas. current	Manuf. Specs.	Meas. current	Manuf. Specs.	Meas. current	Manuf. Specs.	
Max. current during normal condition	--	--	--	0.30A	0.4A	0.34A	0.4A	--	--	
Max. current during fault condition	--	--	--	0.32A (U1 pin 2-4 SC)	0.4A	0.37A (U1 pin 5-2 SC)	0.4A	--	--	
Test results:										Verdict
- Chemical leaks										P
- Explosion of the battery										P
- Emission of flame or expulsion of molten metal										P
- Electric strength tests of equipment after completion of tests										N/A
Supplementary information:										

Annex M.4	**Table: Additional safeguards for equipment containing secondary lithium batteries**	N/A

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Battery/Cell No.	Test conditions	Measurements			Observation
		U	I (A)	Temp (C)	
--	Normal	--	--	--	--
	Abnormal	--	--	--	--
	Single fault –	--	--	--	--
Supplementary Information:					

Battery identification	Charging at T_{lowest} (°C)	Observation	Charging at $T_{highest}$ (°C)	Observation
--	--	--	--	--
Supplementary Information:				

Annex Q.1	**TABLE: Circuits intended for interconnection with building wiring (LPS)**						N/A
Note: Measured UOC (V) with all load circuits disconnected:							
Output Circuit	Components	U_{oc} (V)	I_{sc} (A)		S (VA)		
			Meas.	Limit	Meas.	Limit	
--	--	--	--	--	--	--	
Supplementary Information:							

T.2, T.3, T.4, T.5	**TABLE: Steady force test(only for remote control unit)**				P
Part/Location	Material	Thickness (mm)	Force (N)	Test Duration (sec)	Observation
Internal parts	--	--	10	5	Enclosure remained intact, no crack/opening developed.
Enclosure / top	Plastic	2	100/250	5	Enclosure remained intact, no crack/opening developed.
Enclosure / bottom	Plastic	2	100/250	5	Enclosure remained intact, no crack/opening developed.
Enclosure / Side	Plastic	2	100/250	5	Enclosure remained intact, no crack/opening developed.
Supplementary information:					

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T.6, T.9	TABLE: Impact tests				N/A
Part/Location	Material	Thickness (mm)	Vertical distance (mm)	Observation	
--	--	--	--	--	
Supplementary information:					

T.7	TABLE: Drop tests(only for remote control unit)			P
Part/Location	Material	Thickness (mm)	Drop Height (mm)	Observation
Enclosure / top	Plastic	2	1000	Enclosure remained intact, nocrack/opening developed.
Enclosure / bottom	Plastic	2	1000	Enclosure remained intact, no crack/opening developed.
Enclosure / Side	Plastic	2	1000	Enclosure remained intact, no crack/opening developed.
Supplementary information:				

T.8	TABLE: Stress relief test(only for remote control unit)				P
Part/Location	Material	Thickness (mm)	Oven Temperature (°C)	Duration (h)	Observation
Enclosure	Plastic	Min. 1.5	70	7	Enclosure remained intact, no crack/opening developed.
Supplementary information:					

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Attachment No. 1

IEC62368_1B - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
ATTACHMENT TO TEST REPORT **IEC 62368-1** **EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES** (Audio/video, information and communication technology equipment - Part 1: Safety requirements)			
Differences according to ..... : EN 62368-1:2014+A11:2017			
Attachment Form No. ..... : EU_GD_IEC62368_1B_II **Attachment Originator**..... : Nemko AS **Master Attachment**..... : Date 2017-09-22			
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	CENELEC COMMON MODIFICATIONS (EN)		
	Clauses, subclauses, notes, tables, figures and annexes which are additional to those in IEC 62368-1:2014 are prefixed "Z".		P
CONTENTS	**Add** the following annexes: Annex ZA (normative) Normative references to international publications with their corresponding European publications Annex ZB (normative) Special national conditions Annex ZC (informative) A-deviations Annex ZD (informative) IEC and CENELEC code designations for flexible cords		P
	Delete all the "country" notes in the reference document (IEC 62368-1:2014) according to the following list:		P
	For special national conditions, see Annex ZB.		P

0.2.1	Note	1	Note 3	4.1.15	Note
4.7.3	Note 1 and 2	5.2.2.2	Note	5.4.2.3.2.2 Table 13	Note c
5.4.2.3.2.4	Note 1 and 3	5.4.2.5	Note 2	5.4.5.1	Note
5.5.2.1	Note	5.5.6	Note	5.6.4.2.1	Note 2 and 3
5.7.5	Note	5.7.6.1	Note 1 and 2	10.2.1 Table 39	Note 2, 3 and 4
10.5.3	Note 2	10.6.2.1	Note 3	F.3.3.6	Note 3

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Attachment No. 1

IEC62368_1B - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
1	**Add** the following note: NOTE Z1 The use of certain substances in electrical and electronic equipment is restricted within the EU: see Directive 2011/65/EU.		P
4.Z1	**Add** the following new subclause after 4.9: To protect against excessive current, short-circuits and earth faults in circuits connected to an a.c. **mains**, protective devices shall be included either as integral parts of the equipment or as parts of the building installation, subject to the following, a), b) and c): a) except as detailed in b) and c), protective devices necessary to comply with the requirements of B.3.1 and B.4 shall be included as parts of the equipment; b) for components in series with the mains input to the equipment such as the supply cord, appliance coupler, r.f.i. filter and switch, short-circuit and earth fault protection may be provided by protective devices in the building installation; c) it is permitted for **pluggable equipment type B** or **permanently connected equipment**, to rely on dedicated overcurrent and short-circuit protection in the building installation, provided that the means of protection, e.g. fuses or circuit breakers, is fully specified in the installation instructions. If reliance is placed on protection in the building installation, the installation instructions shall so state, except that for **pluggable equipment type A** the building installation shall be regarded as providing protection in accordance with the rating of the wall socket outlet.		P
5.4.2.3.2.4	**Add** the following to the end of this subclause: The requirement for interconnection with **external circuit** is in addition given in EN 50491-3:2009.		N/A
10.2.1	Add the following to [c] and [d] in table 39: For additional requirements, see 10.5.1.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
10.5.1	**Add** the following after the first paragraph: *For RS 1 compliance is checked by measurement under the following conditions:* *In addition to the normal operating conditions, all controls adjustable from the outside by hand, by any object such as a tool or a coin, and those internal adjustments or presets which are not locked in a reliable manner, are adjusted so as to give maximum radiation whilst maintaining an intelligible picture for 1 h, at the end of which the measurement is made.* NOTE Z1 Soldered joints and paint lockings are examples of adequate locking. *The dose-rate is determined by means of a radiation monitor with an effective area of 10 cm², at any point 10 cm from the outer surface of the apparatus.* *Moreover, the measurement shall be made under fault conditions causing an increase of the high-voltage, provided an intelligible picture is maintained for 1 h, at the end of which the measurement is made.* *For RS1, the dose-rate shall not exceed 1 µSv/h taking account of the background level.* NOTE Z2 These values appear in Directive 96/29/Euratom of 13 May 1996.		N/A
10.6.1	**Add** the following paragraph to the end of the subclause: EN 71-1:2011, 4.20 and the related tests methods and measurement distances apply.		N/A
10.Z1	**Add** the following new subclause after 10.6.5. **10.Z1 Non-ionizing radiation from radio frequencies in the range 0 to 300 GHz** The amount of non-ionizing radiation is regulated by European Council Recommendation 1999/519/EC of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz). For intentional radiators, ICNIRP guidelines should be taken into account for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz). For hand-held and body-mounted devices, attention is drawn to EN 50360 and EN 50566		N/A
G.7.1	**Add** the following note: NOTE Z1 The harmonized code designations corresponding to the IEC cord types are given in Annex ZD.		N/A

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IEC62368_1B - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
Bibliography	**Add** the following standards: **Add** the following notes for the standards indicated: IEC 60130-9 NOTE Harmonized as EN 60130-9. IEC 60269-2 NOTE Harmonized as HD 60269-2. IEC 60309-1 NOTE Harmonized as EN 60309-1. IEC 60364 NOTE some parts harmonized in HD 384/HD 60364 series. IEC 60601-2-4 NOTE Harmonized as EN 60601-2-4. IEC 60664-5 NOTE Harmonized as EN 60664-5. IEC 61032:1997 NOTE Harmonized as EN 61032:1998 (not modified). IEC 61508-1 NOTE Harmonized as EN 61508-1. IEC 61558-2-1 NOTE Harmonized as EN 61558-2-1. IEC 61558-2-4 NOTE Harmonized as EN 61558-2-4. IEC 61558-2-6 NOTE Harmonized as EN 61558-2-6. IEC 61643-1 NOTE Harmonized as EN 61643-1. IEC 61643-21 NOTE Harmonized as EN 61643-21. IEC 61643-311 NOTE Harmonized as EN 61643-311. IEC 61643-321 NOTE Harmonized as EN 61643-321. IEC 61643-331 NOTE Harmonized as EN 61643-331.		N/A
ZB	**ANNEX ZB, SPECIAL NATIONAL CONDITIONS (EN)**		N/A
4.1.15	**Denmark, Finland, Norway** and **Sweden** To the end of the subclause the following is added: **Class I pluggable equipment type A** intended for connection to other equipment or a network shall, if safety relies on connection to reliable earthing or if surge suppressors are connected between the network terminals and **accessible** parts, have a marking stating that the equipment shall be connected to an earthed **mains** socket-outlet. The marking text in the applicable countries shall be as follows: In **Denmark**: “Apparatets stikprop skal tilsluttes en stikkontakt med jord som giver forbindelse til stikproppens jord.” In **Finland**: "Laite on liitettävä suojakoskettimilla varustettuun pistorasiaan" In **Norway**: “Apparatet må tilkoples jordet stikkontakt” In **Sweden**: “Apparaten skall anslutas till jordat uttag”		N/A
4.7.3	**United Kingdom** To the end of the subclause the following is added: The torque test is performed using a socket-outlet complying with BS 1363, and the plug part shall be assessed to the relevant clauses of BS 1363. Also see Annex G.4.2 of this annex		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.2.2.2	**Denmark** After the 2nd paragraph add the following: A warning (marking **safeguard**) for high **touch current** is required if the **touch current** exceeds the limits of 3,5 mA a.c. or 10 mA d.c.		N/A
5.4.11.1 and Annex G	**Finland and Sweden** To the end of the subclause the following is added: For separation of the telecommunication network from earth the following is applicable: If this insulation is solid, including insulation forming part of a component, it shall at least consist of either • two layers of thin sheet material, each of which shall pass the electric strength test below, or • one layer having a distance through insulation of at least 0,4 mm, which shall pass the electric strength test below. If this insulation forms part of a semiconductor component (e.g. an optocoupler), there is no distance through insulation requirement for the insulation consisting of an insulating compound completely filling the casing, so that clearances and creepage distances do not exist, if the component passes the electric strength test in accordance with the compliance clause below and in addition • passes the tests and inspection criteria of 5.4.8 with an electric strength test of 1,5 kV multiplied by 1,6 (the electric strength test of 5.4.9 shall be performed using 1,5 kV), and • is subject to routine testing for electric strength during manufacturing, using a test voltage of 1,5kV. It is permitted to bridge this insulation with a capacitor complying with EN 60384-14:2005, subclass Y2. A capacitor classified Y3 according to EN 60384-14:2005, may bridge this insulation under the following conditions: • the insulation requirements are satisfied by having a capacitor classified Y3 as defined by EN 60384-14, which in addition to the Y3 testing, is tested with an impulse test of 2,5 kV defined in 5.4.11; • the additional testing shall be performed on all the test specimens as described in EN 60384-14; the impulse test of 2,5 kV is to be performed before the endurance test in EN 60384-14, in the sequence of tests as described in EN 60384-14.		N/A

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IEC62368_1B - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
5.5.2.1	**Norway** After the 3rd paragraph the following is added: Due to the IT power system used, capacitors are required to be rated for the applicable line-to-line voltage (230 V).		N/A
5.5.6	**Finland, Norway** and **Sweden** To the end of the subclause the following is added: Resistors used as **basic safeguard** or bridging **basic insulation** in **class I pluggable equipment type A** shall comply with G.10.1 and the test of G.10.2.		N/A
5.6.1	**Denmark** **Add** to the end of the subclause Due to many existing installations where the socket-outlets can be protected with fuses with higher rating than the rating of the socket-outlets the protection for pluggable equipment type A shall be an integral part of the equipment. *Justification:* In Denmark an existing 13 A socket outlet can be protected by a 20 A fuse.		N/A
5.6.4.2.1	**Ireland and United Kingdom** After the indent for **pluggable equipment type A**, the following is added: – the **protective current rating** is taken to be 13 A, this being the largest rating of fuse used in the **mains** plug.		N/A
5.6.5.1	To the second paragraph the following is added: The range of conductor sizes of flexible cords to be accepted by terminals for equipment with a rated current over 10 A and up to and including 13 A is: 1,25 mm^2 to 1,5 mm^2 in cross-sectional area.		N/A
5.7.5	**Denmark** To the end of the subclause the following is added: The installation instruction shall be affixed to the equipment if the **protective conductor current** exceeds the limits of 3,5 mA a.c. or 10 mA d.c.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.7.6.1	**Norway and Sweden** To the end of the subclause the following is added: The screen of the television distribution system is normally not earthed at the entrance of the building and there is normally no equipotential bonding system within the building. Therefore the protective earthing of the building installation needs to be isolated from the screen of a cable distribution system. It is however accepted to provide the insulation external to the equipment by an adapter or an interconnection cable with galvanic isolator, which may be provided by a retailer, for example. The user manual shall then have the following or similar information in Norwegian and Swedish language respectively, depending on in what country the equipment is intended to be used in: “Apparatus connected to the protective earthing of the building installation through the mains connection or through other apparatus with a connection to protective earthing – and to a television distribution system using coaxial cable, may in some circumstances create a fire hazard. Connection to a television distribution system therefore has to be provided through a device providing electrical isolation below a certain frequency range (galvanic isolator, see EN 60728-11)” NOTE In Norway, due to regulation for CATV-installations, and in Sweden, a galvanic isolator shall provide electrical insulation below 5 MHz. The insulation shall withstand a dielectric strength of 1,5 kV r.m.s., 50 Hz or 60 Hz, for 1 min. Translation to Norwegian (the Swedish text will also be accepted in Norway): “Apparater som er koplet til beskyttelsesjord via nettplugg og/eller via annet jordtilkoplet utstyr – og er tilkoplet et koaksialbasert kabel-TV nett, kan forårsake brannfare. For å unngå dette skal det ved tilkopling av apparater til kabel-TV nett installeres en galvanisk isolator mellom apparatet og kabel-TV nettet.” Translation to Swedish: ”Apparater som är kopplad till skyddsjord via jordat vägguttag och/eller via annan utrustning och samtidigt är kopplad till kabel-TV nät kan i vissa fall medföra risk för brand. För att undvika detta skall vid anslutning av apparaten till kabel-TV nät galvanisk isolator finnas mellan apparaten och kabel-TV nätet.”.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.7.6.2	**Denmark** To the end of the subclause the following is added: The warning (marking safeguard) for high touch current is required if the touch current or the protective current exceed the limits of 3,5 mA .		N/A
B.3.1 and B.4	**Ireland and United Kingdom** The following is applicable: To protect against excessive currents and short-circuits in the primary circuit of **direct plug-in equipment**, tests according to Annexes B.3.1 and B.4 shall be conducted using an external miniature circuit breaker complying with EN 60898-1, Type B, rated 32A. If the equipment does not pass these tests, suitable protective devices shall be included as an integral part of the **direct plug-in equipment**, until the requirements of Annexes B.3.1 and B.4 are met		N/A
G.4.2	**Denmark** To the end of the subclause the following is added: Supply cords of single phase appliances having a rated current not exceeding 13 A shall be provided with a plug according to DS 60884-2-D1:2011. CLASS I EQUIPMENT provided with socket-outlets with earth contacts or which are intended to be used in locations where protection against indirect contact is required according to the wiring rules shall be provided with a plug in accordance with standard sheet DK 2-1a or DK 2-5a. If a single-phase equipment having a RATED CURRENT exceeding 13 A or if a poly-phase equipment is provided with a supply cord with a plug, this plug shall be in accordance with the standard sheets DK 6-1a in DS 60884-2-D1 or EN 60309-2. Mains socket outlets intended for providing power to Class II apparatus with a rated current of 2,5 A shall be in accordance DS 60884-2-D1:2011 standard sheet DKA 1-4a. Other current rating socket outlets shall be in compliance with Standard Sheet DKA 1-3a or DKA 1-1c. Mains socket-outlets with earth shall be in compliance with DS 60884-2-D1:2011 Standard Sheet DK 1-3a, DK 1-1c, DK1-1d, DK 1-5a or DK 1-7a *Justification:* Heavy Current Regulations, Section 6c		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
G.4.2	**United Kingdom** To the end of the subclause the following is added: The plug part of direct plug-in equipment shall be assessed to BS 1363: Part 1, 12.1, 12.2, 12.3, 12.9, 12.11, 12.12, 12.13, 12.16, and 12.17, except that the test of 12.17 is performed at not less than 125 °C. Where the metal earth pin is replaced by an Insulated Shutter Opening Device (ISOD), the requirements of clauses 22.2 and 23 also apply.		N/A
G.7.1	**United Kingdom** To the first paragraph the following is added: Equipment which is fitted with a flexible cable or cord and is designed to be connected to a mains socket conforming to BS 1363 by means of that flexible cable or cord shall be fitted with a 'standard plug' in accordance with the Plugs and Sockets etc (Safety) Regulations 1994, Statutory Instrument 1994 No. 1768, unless exempted by those regulations. NOTE "Standard plug" is defined in SI 1768:1994 and essentially means an approved plug conforming to BS 1363 or an approved conversion plug.		N/A
G.7.1	**Ireland** To the first paragraph the following is added: Apparatus which is fitted with a flexible cable or cord shall be provided with a plug in accordance with Statutory Instrument 525: 1997, "13 A Plugs and Conversion Adapters for Domestic Use Regulations: 1997. S.I. 525 provides for the recognition of a standard of another Member State which is equivalent to the relevant Irish Standard		N/A
G.7.2	**Ireland and United Kingdom** To the first paragraph the following is added: A power supply cord with a conductor of 1,25 mm^2 is allowed for equipment which is rated over 10 A and up to and including 13 A.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
ZC	ANNEX ZC, NATIONAL DEVIATIONS (EN)		
10.5.2	**Germany** The following requirement applies: For the operation of any cathode ray tube intended for the display of visual images operating at an acceleration voltage exceeding 40 kV, authorization is required, or application of type approval (Bauartzulassung) and marking. *Justification:* German ministerial decree against ionizing radiation (Röntgenverordnung), in force since 2002-07-01, implementing the European Directive 96/29/EURATOM. **NOTE** Contact address: Physikalisch-Technische Bundesanstalt, Bundesallee 100, D-38116 Braunschweig, Tel.: Int +49-531-592-6320, Internet: http://www.ptb.de		N/A

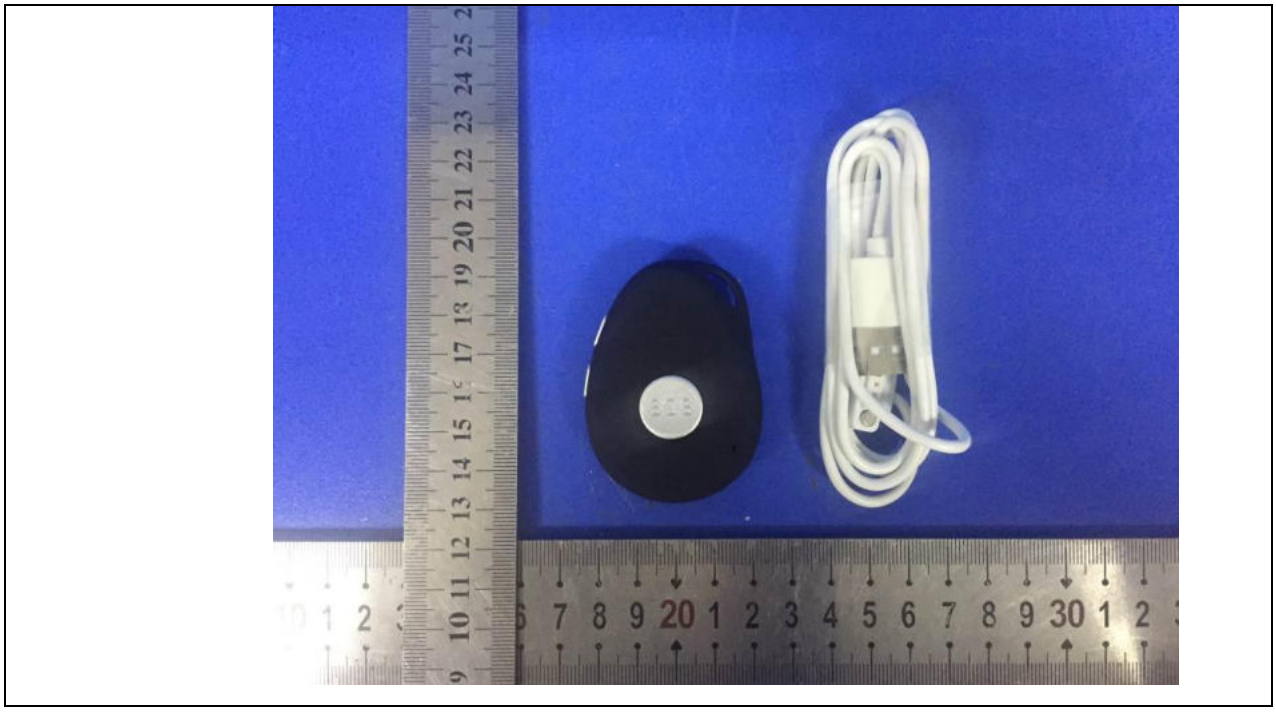
Note: Before placing the products in the different countries, the manufacturer must ensure that:

1. Operating Instructions, Ratings Labels and Warnings Labels written in an Accepted or Official Language of the county in question.
2. The equipment complies with the National Standards and/or Electrical Codes of the country in question.
3. Mains plugs and power cordset should be assessed to the national standard.

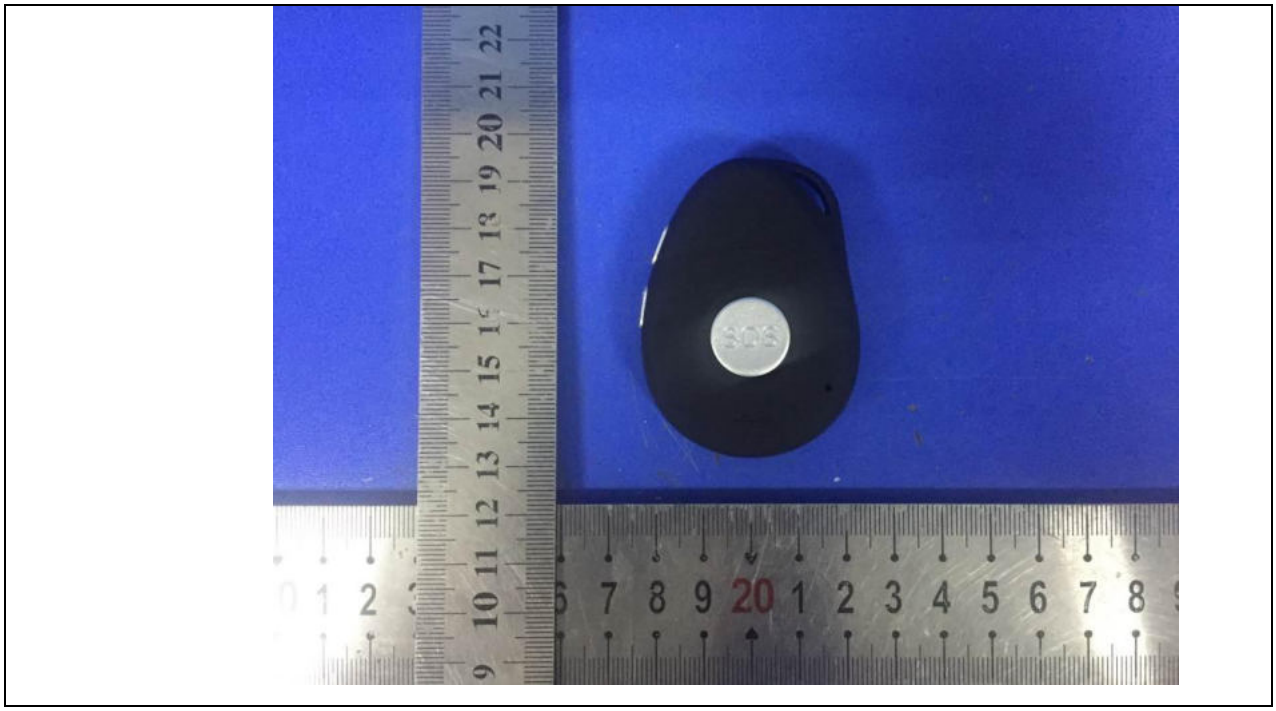
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Attachment No. 2

Details of: External View-1

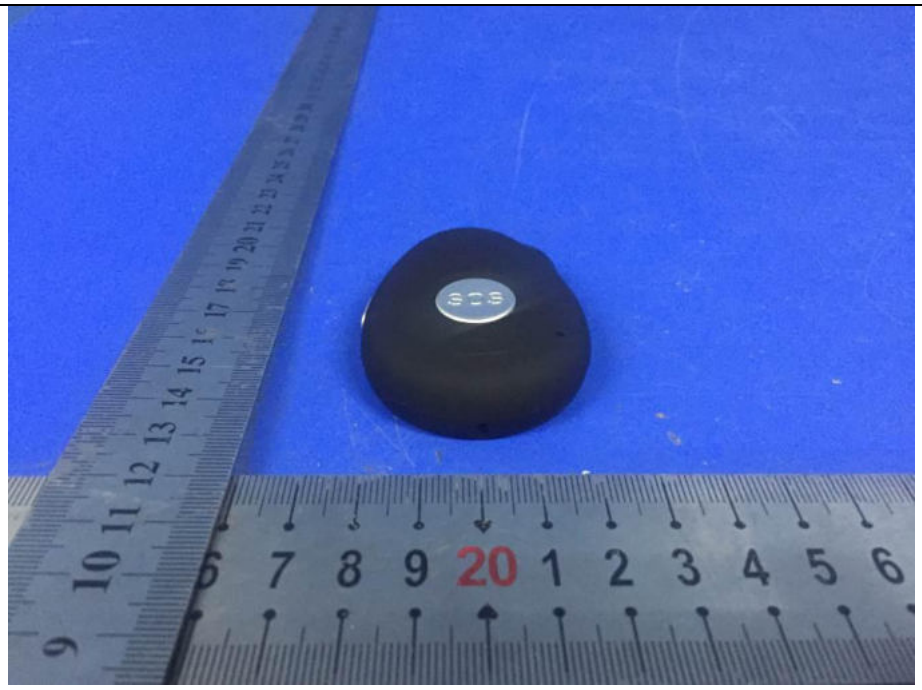


Details of: External View-2

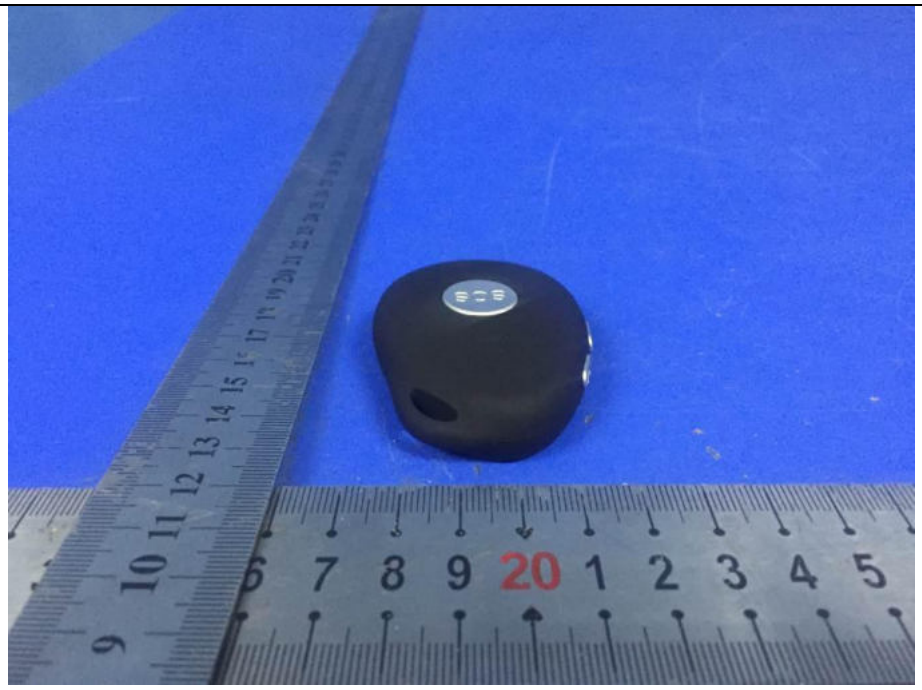


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Details of: External View-3



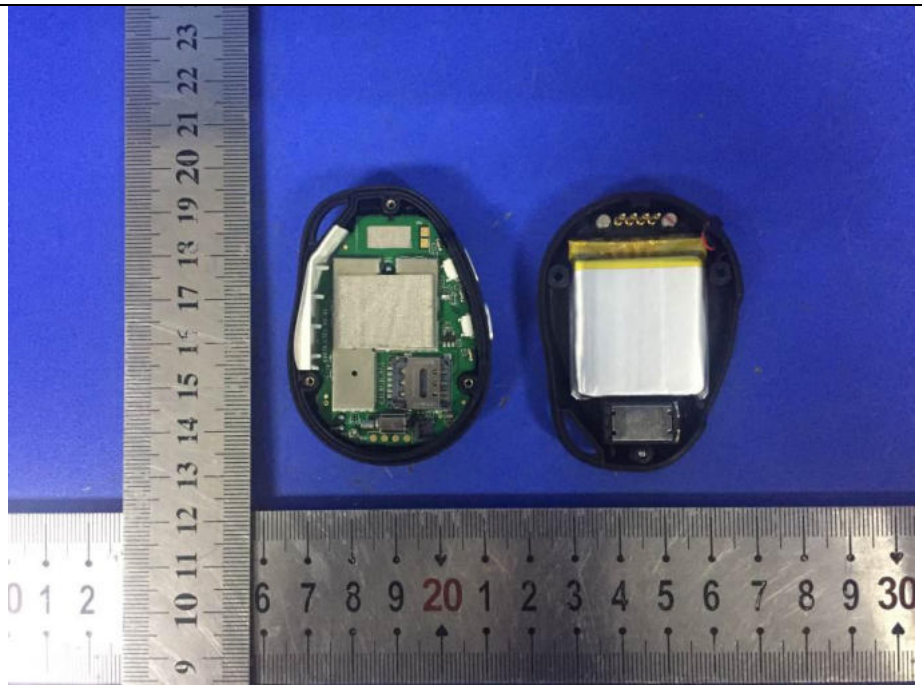
Details of: External View-4



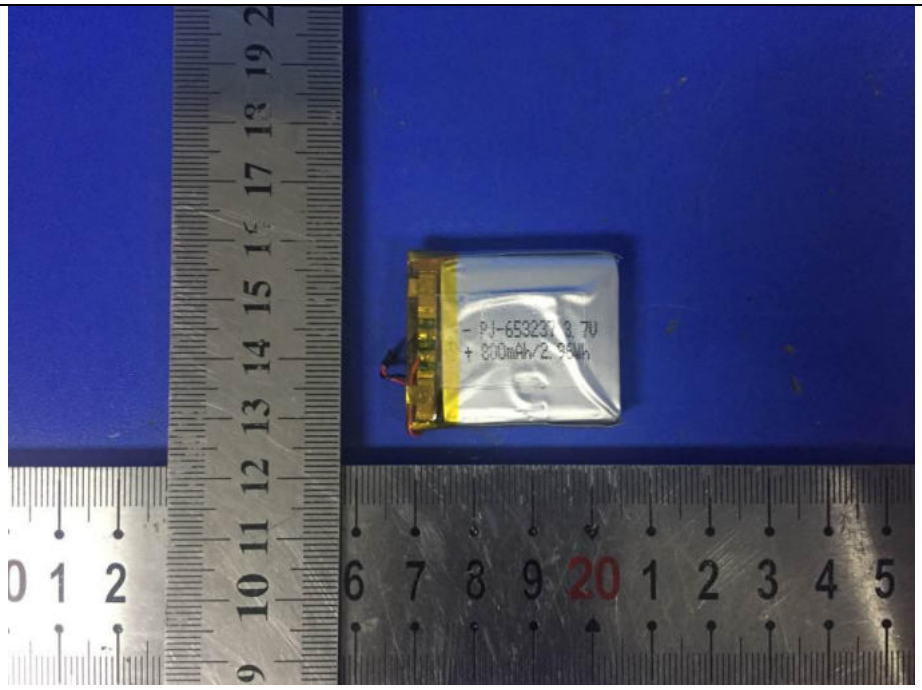
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Attachment No. 2

Details of: Internal View-1



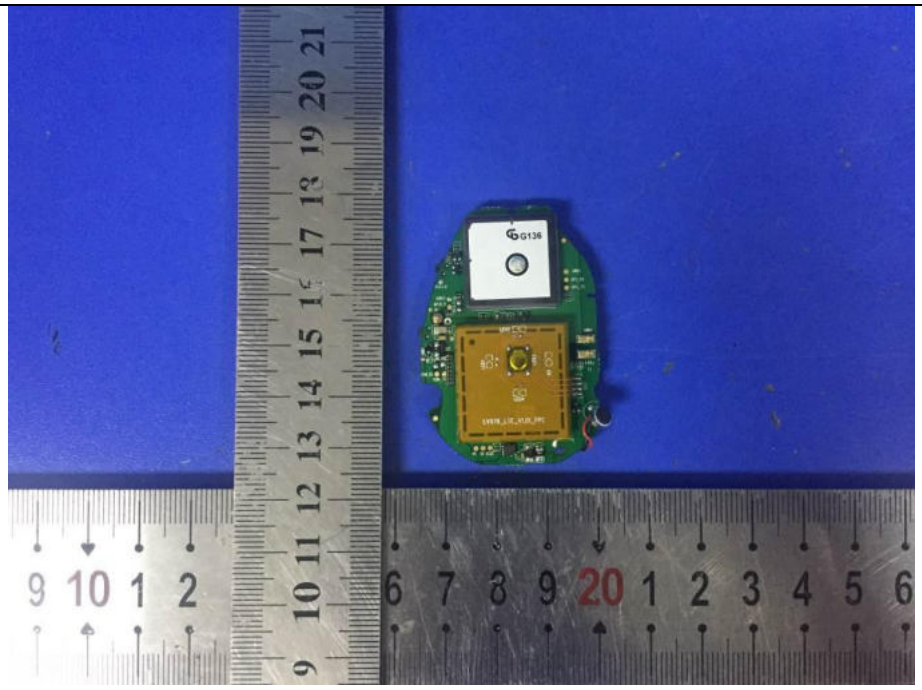
Details of: battery View



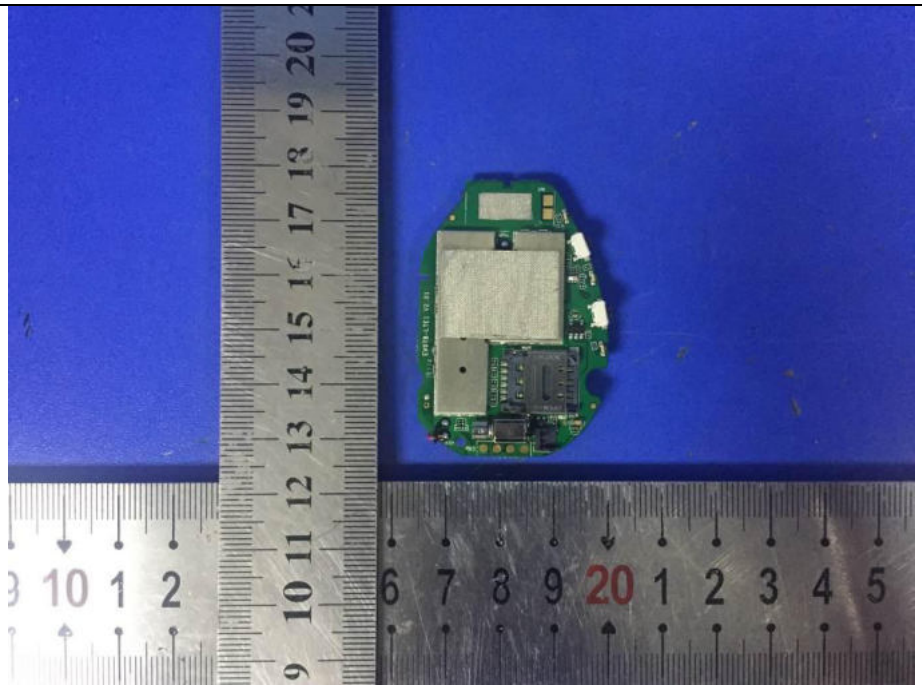
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Attachment No. 2

Details of: PCB board View-1



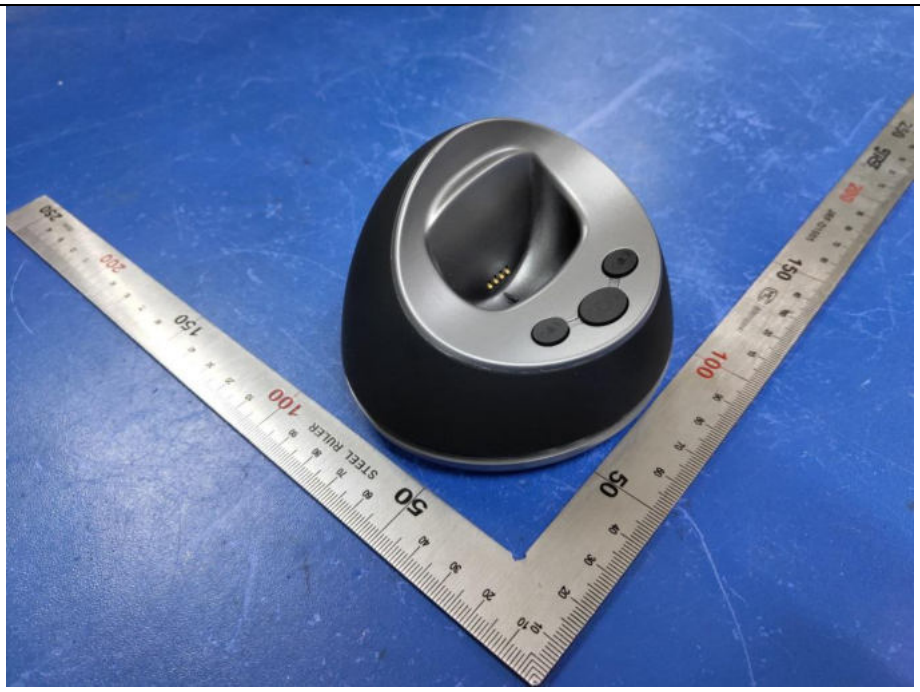
Details of: PCB board View-2



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Attachment No. 2

Details of: Charging base View



----------END OF TEST REPORT----------

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RADIO TEST REPORT

For

Shenzhen Eview GPS Technology

Personal Mobile Alarm System

Test Model: EV-07B-4G

List Model No.: N/A

Prepared for	:	Shenzhen Eview GPS Technology
Address	:	#1203 Building 2, GuoLe Technology Park, Lirong Road, Dalang, Longhua, Shenzhen, China
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
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Tel	:	(+86)755-82591330
Fax	:	(+86)755-82591332
Web	:	www.LCS-cert.com
Mail	:	webmaster@LCS-cert.com
Date of receipt of test sample	:	April 16, 2019
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	April 16, 2019~May 17, 2019
Date of Report	:	May 20, 2019

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RADIO TEST REPORT
ETSI EN 300 328 V2.1.1 (2016-11)
Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU

Report Reference No.	**: LCS190415004AEC**
Date of Issue	: May 20, 2019
Testing Laboratory Name	**: Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address	: 101, 601, Xingyuan Industrial Park, Gushu Community, Xixiang Street, Bao' an District, Shenzhen, Guangdong, China
Testing Location/ Procedure	: Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name.....	**: Shenzhen Eview GPS Technology**
Address	: #1203 Building 2, GuoLe Technology Park, Lirong Road, Dalang, Longhua, Shenzhen, China
Test Specification	
Standard	: ETSI EN 300 328 V2.1.1 (2016-11)
Test Report Form No.	: LCSEMC-1.0
TRF Originator.....	: Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF	: Dated 2017-06

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Test Item Description.	**: Personal Mobile Alarm System**
Trade Mark.....	: N/A
Test Model	: EV-07B-4G
Ratings	: DC 3.7V by Rechargeable Li-ion Battery (800mAh) Recharged by DC 5V 1000mA Adapter
Result	**: Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Aking Jin	Leo Lee	
Aking Jin/ File administrator	Leo Lee/ Technique principal	Gavin Liang/ Manager

RADIO -- TEST REPORT

Test Report No. : LCS190415004AEC	May 20, 2019 Date of issue

Test Model.....	: EV-07B-4G
EUT.....	: Personal Mobile Alarm System
Applicant.....	**: Shenzhen Eview GPS Technology**
Address.....	: #1203 Building 2, GuoLe Technology Park, Lirong Road, Dalang, Longhua, Shenzhen, China
Telephone.....	: /
Fax.....	: /
Manufacturer.....	**: Shenzhen Eview GPS Technology**
Address.....	: #1203 Building 2, GuoLe Technology Park, Lirong Road, Dalang, Longhua, Shenzhen, China
Telephone.....	: /
Fax.....	: /
Factory.....	**: Shenzhen Eview GPS Technology**
Address.....	: #1203 Building 2, GuoLe Technology Park, Lirong Road, Dalang, Longhua, Shenzhen, China
Telephone.....	: /
Fax.....	: /

Test Result:	**Positive**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

Revision	Issue Date	Revisions	Revised By
000	May 20, 2019	Initial Issue	Gavin Liang

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1. GENERAL INFORMATION

1.1. Product Description for Equipment Under Test (EUT)

EUT	:	Personal Mobile Alarm System
Model No.	:	EV-07B-4G
Model Declaration	:	N/A
Test Model	:	EV-07B-4G
Power Supply	:	DC 3.7V by Rechargeable Li-ion Battery (800mAh) Recharged by DC 5V 1000mA Adapter
Hardware Version	:	EV07B-LTE1-V2.01
Software Version	:	V1.0.6.25
3G	:	
Support Band	:	☐WCDMA Band II(US-Band) ☒WCDMA Band V(US-Band) ☒WCDMA Band I(EU-Band) ☒WCDMA Band VIII(EU-Band)
Release Version	:	R8
Uplink	:	WCDMA Band I: 1920MHz ~ 1980MHz WCDMA Band VIII: 880MHz~915MHz
Downlink	:	WCDMA Band I: 2110MHz ~ 2170MHz WCDMA Band VIII: 925MHz~960MHz
Type Of Modulation	:	WCDMA: BPSK; HSDPA/HSUPA: BPSK
Antenna Description	:	PIFA Antenna, -1.42dBi (max.) For WCDMA Band I; -2.67dBi (max.) For WCDMA Band VIII
Power Class	:	Level 3
LTE	:	
Support Band	:	☒E-UTRA Band 3(EU-Band) ☒E-UTRA Band 5(No EU-Band) ☒E-UTRA Band 28(EU-Band)
LTE Release Version	:	R9
FDD Band	:	Uplink: E-UTRA Band 3: 1710MHz ~ 1785MHz E-UTRA Band 28: 703MHz ~ 748MHz Downlink: E-UTRA Band 3: 1805MHz ~ 1880MHz E-UTRA Band 28: 758MHz ~ 803MHz
Type Of Modulation	:	QPSK/16-QAM
Antenna Description	:	PIFA Antenna, -1.57dBi (max.) For LTE Band 3; -3.26dBi (max.) For LTE Band 28
Power Class	:	Class 3
Bluetooth	:	
Frequency Range	:	2.402-2.480GHz
Channel Number	:	40 channels
Channel Spacing	:	2MHz
Modulation Type	:	GFSK
Bluetooth Version	:	V4.0 (Support only BT LE)
Antenna Description	:	PIFA Antenna, -0.87dBi (Max.)
WIFI(2.4G Band)	:	
Frequency Range	:	2412-2472MHz
Channel Spacing	:	5MHz
Channel Number	:	13 Channel for 20MHz bandwidth(2412~2472MHz) (Not applicable 802.11n-HT40)
Modulation Type	:	802.11b: DSSS; 802.11g/n: OFDM
Antenna Description	:	PIFA Antenna, -0.87dBi (Max.)
GPS Receiver	:	
Receive Frequency	:	1575.42MHz
Channel Number	:	1
Antenna Description	:	Ceramic Antenna

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Product Information

a) The type of modulation used by the equipment:

☐FHSS

☒other forms of modulation

b) In case of FHSS modulation:

•In case of non-Adaptive Frequency Hopping equipment:

The number of Hopping Frequencies:

•In case of Adaptive Frequency Hopping Equipment:

The maximum number of Hopping Frequencies:

The minimum number of Hopping Frequencies:

The Dwell Time:

The Minimum Channel Occupation Time:

c) Adaptive / non-adaptive equipment:

☐non-adaptive Equipment

☒adaptive Equipment without the possibility to switch to a non-adaptive mode

☐adaptive Equipment which can also operate in a non-adaptive mode

d) In case of adaptive equipment:

The Channel Occupancy Time implemented by the equipment:

☐The equipment has implemented an LBT based DAA mechanism

- In case of equipment using modulation different from FHSS:

☐The equipment is Frame Based equipment

☐The equipment is Load Based equipment

☐The equipment can switch dynamically between Frame Based and Load Based equipment

The CCA time implemented by the equipment: ..... μs

The value q as referred to in clause 4.3.2.5.2.2.2 .....

☒The equipment has implemented an non-LBT based DAA mechanism

☐The equipment can operate in more than one adaptive mode

e) In case of non-adaptive Equipment:

The maximum RF Output Power (e.i.r.p.): ….dBm

The maximum (corresponding) Duty Cycle: 100%

Equipment with dynamic behaviour, that behaviour is described here. (e.g. the different combinations of duty cycle and corresponding power levels to be declared):

f) The worst case operational mode for each of the following tests:

- RF Output Power

GFSK

- Power Spectral Density

GFSK

- Duty cycle, Tx-Sequence, Tx-gap

.....

- Dwell time, Minimum Frequency Occupation & Hopping Sequence (only for FHSS equipment)

.....

- Hopping Frequency Separation (only for FHSS equipment)

.....

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- Medium Utilisation

.....

- Adaptivity & Receiver Blocking

.....

- Occupied Channel Bandwidth

GFSK

- Transmitter unwanted emissions in the OOB domain

GFSK

- Transmitter unwanted emissions in the spurious domain

GFSK

- Receiver spurious emissions

GFSK

g) The different transmit operating modes (tick all that apply):

☒Operating mode 1: Single Antenna Equipment

☒Equipment with only 1 antenna

☐Equipment with 2 diversity antennas but only 1 antenna active at any moment in time

☐Smart Antenna Systems with 2 or more antennas, but operating in a (legacy) mode where only 1 antenna is used. (e.g. IEEE 802.11™ [i.3] legacy mode in smart antenna systems)

☐Operating mode 2: Smart Antenna Systems - Multiple Antennas without beam forming

☐Single spatial stream / Standard throughput / (e.g. IEEE 802.11™ [i.3] legacy mode)

☐High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 1

☐High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 2

NOTE: Add more lines if more channel bandwidths are supported.

☐Operating mode 3: Smart Antenna Systems - Multiple Antennas with beam forming

☐Single spatial stream / Standard throughput (e.g. IEEE 802.11™ [i.3] legacy mode)

☐High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 1

☐High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 2

NOTE: Add more lines if more channel bandwidths are supported.

h) In case of Smart Antenna Systems:

- The number of Receive chains: .....
- The number of Transmit chains: .....

☐symmetrical power distribution

☐asymmetrical power distribution

In case of beam forming, the maximum beam forming gain: .....

NOTE: Beam forming gain does not include the basic gain of a single antenna.

i) Operating Frequency Range(s) of the equipment:

- Operating Frequency Range 1: 2402 MHz to 2480 MHz
- Operating Frequency Range 2: ..... MHz to ..... MHz

NOTE: Add more lines if more Frequency Ranges are supported.

j) Occupied Channel Bandwidth(s):

- Occupied Channel Bandwidth: 1.037MHz

NOTE: Add more lines if more channel bandwidths are supported.

k) Type of Equipment (stand-alone, combined, plug-in radio device, etc.):

☒Stand-alone

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☐Combined Equipment (Equipment where the radio part is fully integrated within another type of equipment)
☐Plug-in radio device (Equipment intended for a variety of host systems)
Other .....

l) The extreme operating conditions that apply to the equipment:
Operating temperature range: -20° C to 45° C
Operating voltage range: 3.3V to 4.1V ☐AC ☒DC
Details provided are for the: ☒stand-alone equipment
☐combined (or host) equipment
☐test jig

m) The intended combination(s) of the radio equipment power settings and one or more antenna assemblies and their corresponding e.i.r.p levels:
• Antenna Type
☒PIFA Antenna
Antenna Gain: -0.87dBi
If applicable, additional beamforming gain (excluding basic antenna gain): ..... dB
☐Temporary RF connector provided
☐No temporary RF connector provided
☐Dedicated Antennas (equipment with antenna connector)
☐Single power level with corresponding antenna(s)
☐Multiple power settings and corresponding antenna(s)
Number of different Power Levels: .....
Power Level 1: ……. dBm
Power Level 2: ..... dBm
Power Level 3: ..... dBm
NOTE 1: Add more lines in case the equipment has more power levels.
NOTE 2: These power levels are conducted power levels (at antenna connector).

n) The nominal voltages of the stand-alone radio equipment or the nominal voltages of the combined (host) equipment or test jig in case of plug-in devices:
Details provided are for the: ☒stand-alone equipment
☐combined (or host) equipment
☐test jig
Supply Voltage ☐AC mains State AC voltage ……. V
☒ DC State DC voltage: 3.7V

In case of DC, indicate the type of power source
☐Internal Power Supply
☐External Power Supply or AC/DC adapter
☒Battery: 3.7V
☐Other: .....

o) Describe the test modes available which can facilitate testing:
The EUT can transmit in engineering mode.

p) The equipment type (e.g. Bluetooth®, IEEE 802.11™ [i.3], proprietary, etc.):
Bluetooth®

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1.2. Objective

This Type approval report is prepared on behalf of **Shenzhen Eview GPS Technology** in accordance with ETSI EN 300 328 V2.1.1 (2016-11), Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU.

The objective is to determine compliance with ETSI EN 300 328 V2.1.1 (2016-11).

1.3. Related Submittal(s)/Grant(s)

No Related Submittals.

1.4. Test Methodology

All measurements contained in this report were conducted with ETSI EN 300 328 V2.1.1 (2016-11).

1.5. Description of Test Facility

FCC Registration Number is 254912.
Industry Canada Registration Number is 9642A-1.
EMSD Registration Number is ARCB0108.
UL Registration Number is 100571-492.
TUV SUD Registration Number is SCN1081.
TUV RH Registration Number is UA 50296516-001.
NVLAP Accreditation Code is 600167-0.
FCC Designation Number is CN5024.
CAB identifier is CN0071.

1.6. Support Equipment List

Manufacturer	Description	Model	Serial Number	Certificate
--	--	--	--	-

1.7. External I/O

I/O Port Description	Quantity	Cable
SIM Card Slot	1	N/A

1.8. List Of Measuring Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	X-series USB Peak and Average Power Sensor Agilent	Agilent	U2021XA	MY54080022	2018-10-25	2019-10-24
2	4 CH. Simultaneous Sampling 14 Bits 2MS/s	Agilent	U2531A	MY54080016	2018-10-25	2019-10-24
3	Test Software	Ascentest	AT890-SW	20160630	N/A	N/A
4	RF Control Unit	Ascentest	AT890-RFB	N/A	2018-06-16	2019-06-15
5	MXA Signal Analyzer	Agilent	N9020A	MY49061051	2018-06-16	2019-06-15
6	DC Power Supply	Agilent	E3642A	N/A	2018-11-15	2019-11-14
7	MXG Vector Signal Generator	Agilent	N5182A	MY47071151	2018-06-16	2019-06-15
8	ESG Vector Signal Generator	Agilent	E4438C	MY49072627	2018-06-16	2019-06-15
9	PSG Analog Signal Generator	Agilent	E8257D	MY4520521	2018-06-16	2019-06-15
10	Temperature & Humidity Chamber	GUANGZHOU GOGNWEN	GDS-100	70932	2018-10-10	2019-10-09
11	EMI Test Software	AUDIX	E3	/	2018-06-16	2019-06-15
12	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2018-06-16	2019-06-15
13	Positioning Controller	MF	MF-7082	/	2018-06-16	2019-06-15
14	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2018-07-26	2019-07-25
15	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2018-07-26	2019-07-25
16	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2018-07-02	2019-07-01
17	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	791	2018-09-20	2019-09-19
18	Broadband Preamplifier	SCHWARZBECK	BBV 9719	9719-025	2018-09-20	2019-09-19
19	EMI Test Receiver	R&S	ESR 7	101181	2018-06-16	2019-06-15
20	RS SPECTRUM ANALYZER	R&S	FSP40	100503	2018-11-15	2019-11-14
21	AMPLIFIER	QuieTek	QTK	CHM/0809065	2018-11-15	2019-11-14
22	RF Cable-R03m	Jye Bao	RG142	CB021	2018-06-16	2019-06-15
23	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2018-06-16	2019-06-15
24	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW 500	103818	2018-06-16	2019-06-15
25	6dB Attenuator	/	100W/6dB	1172040	2018-06-16	2019-06-15
26	3dB Attenuator	/	2N-3dB	/	2018-06-16	2019-06-15
Note: All equipment is calibrated through GUANGZHOU LISAI CALIBRATION AND TEST CO.,LTD.						

1.9. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty
Occupied Channel Bandwidth	5 %
RF output power, conducted	1,5 dB
Power Spectral Density, conducted	3 dB
Unwanted Emissions, conducted	3 dB
All emissions, radiated	6 dB
Temperature	1 °C
Humidity	5 %
DC and low frequency voltages	3 %
Time	5 %
Duty Cycle	5 %

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1.9. Test Environment

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	24.8
Humidity (%RH)	25-75	52.9
Barometric pressure (mbar)	860-1060	950-1000

1.10. Description Of Test Modes

LCS has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode1: Transmit by BLE
Mode2: Receive by BLE

Note:

(1) For portable device, radiated spurious emission was verified over X, Y, Z Axis, and shown the worst case on this report.

(2) Regard to the frequency band operation for systems using Wide Band modulation: the lowest, middle, highest frequency channel for conducted test, and the lowest, highest frequency channel for radiation spurious test.

(3) The extreme test condition for voltage and temperature were declared by the manufacturer.

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2. SYSTEM TEST CONFIGURATION

2.1. Justification

The system was configured for testing in engineering mode.

2.2. EUT Exercise Software

N/A.

2.3. Special Accessories

N/A.

2.4. Block Diagram/Schematics

Please refer to the related document.

2.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

2.6. Configuration of Test Setup

Please refer to the test setup photo.

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3. SUMMARY OF TEST RESULT

☒ No deviations from the test standards

☐ Deviations from the test standards as below description:

Technical requirements for the equipment using wide band modulations other than FHSS:

Performed Test Item	Normative References	Test Performed	Deviation
RF Output Power & Receiver Category	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No
Power Spectral Density	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No
Duty cycle, Tx-Sequence, Tx-gap	ETSI EN 300 328 V2.1.1 (2016-11)	N/A	N/A
Medium Utilisation (MU) factor	ETSI EN 300 328 V2.1.1 (2016-11)	N/A	N/A
Adaptivity	ETSI EN 300 328 V2.1.1 (2016-11)	N/A	N/A
Occupied Channel Bandwidth	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No
Transmitter unwanted emissions in the out-of-band domain	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No
Transmitter unwanted emissions in the spurious domain	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No
Receiver Spurious Emissions	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No
Receiver Blocking	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No

Note: The EUT can operate in an adaptive mode, and can't operate in a non-adaptive mode which is stated by the supplier.

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4. RF OUTPUT POWER

4.1. Limit

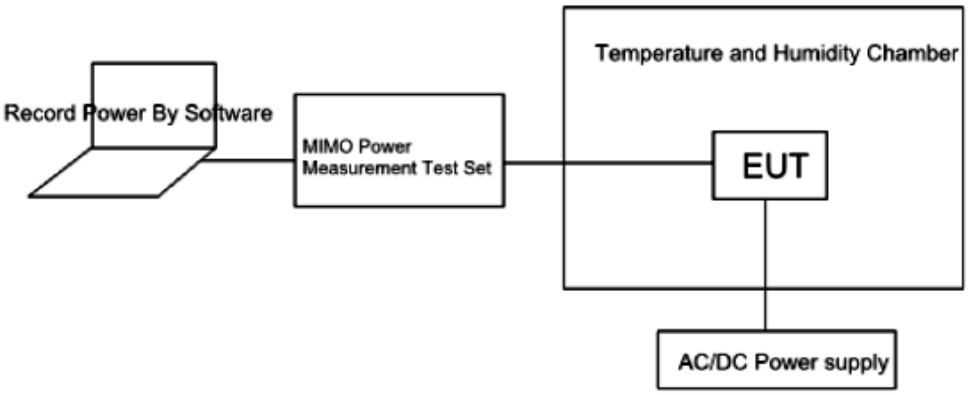
For adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be 20 dBm.

The maximum RF output power for non-adaptive equipment shall be declared by the supplier and shall not exceed 20 dBm. For non-adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be equal to or less than the value declared by the supplier.

This limit shall apply for any combination of power level and intended antenna assembly.

4.2. Test Setup

For Conducted Measurement



4.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.2

Step 1:

• The fast power sensor use the following setting: Sample speed 1 MS/s.

Step 2:

• Connect the power sensor to the transmit port, sample the transmit signal and store the raw data.Use these stored samples in all following steps.

Step 3:

• Find the start and stop times of each burst in the stored measurement samples.

Step 4:

• Between the start and stop times of each individual burst calculate the RMS power over the burst. Save these Pburst values, as well as the start and stop times for each burst.

Step 5:

• The highest of all Pburst values (value "A" in dBm) will be used for maximum e.i.r.p. calculations.

Step 6:

• Add the (stated) antenna assembly gain "G" in dBi of the individual antenna.

• If applicable, add the additional beamforming gain "Y" in dB.

The RF Output Power (P) shall be calculated using the formula below:
P = A + G + Y

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4.4. Test Result

Please refer to the Appendix for Blutooth (BT LE) RF Test Data.

4.5. Receiver Category

Receiver Category 1: Adaptive equipment with a maximum RF output power greater than 10 dBm e.i.r.p. shall be considered as receiver category 1 equipment.

Receiver Category 2:Non-adaptive equipment with a Medium Utilization (MU) factor greater than 1 % and less than or equal to 10 % or adaptive equipment with a maximum RF output power of 10 dBm e.i.r.p. shall be considered as receiver category 2 equipment.

Receiver Category 3: Non-adaptive equipment with a maximum Medium Utilization (MU) factor of 1 % or adaptive equipment with a maximum RF output power of 0 dBm e.i.r.p. shall be considered as receiver category 3 equipment.

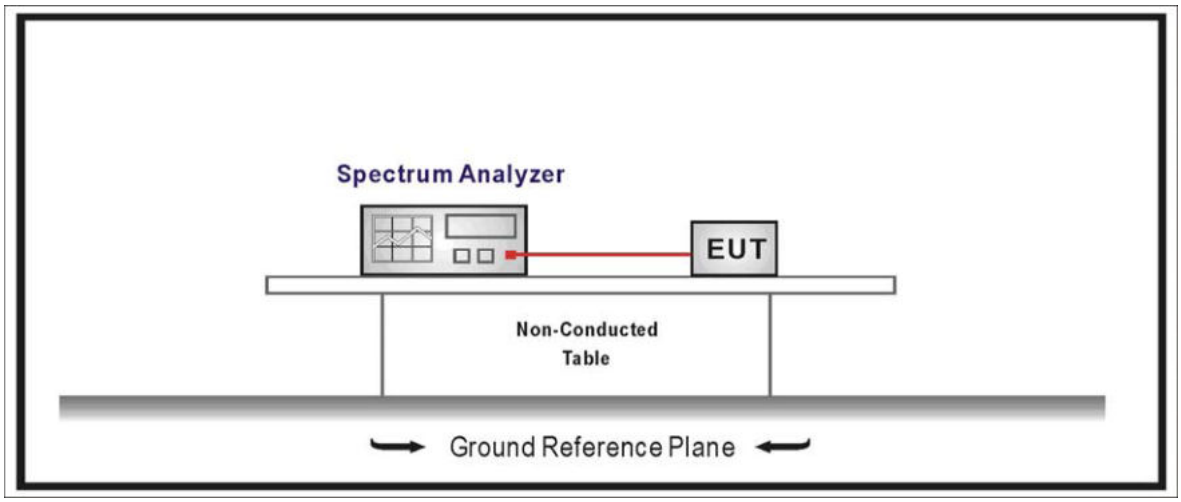
As this an adaptivity device with a maximum power of greater than 0dBm, it belongs to **receiver category 3**.

5. POWER SPECTRAL DENSITY

5.1. Limit

For equipment using wide band modulations other than FHSS, the maximum Power Spectral Density is limited to 10dBm per MHz.

5.2. Test Setup



5.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.3

Step 1:

Connect the UUT to the spectrum analyzer and use the following settings:

- Start Frequency: 2 400 MHz
- Stop Frequency: 2 483,5 MHz
- Resolution BW: 10 kHz
- Video BW: 30 kHz
- Sweep Points: > 8 350
- Detector: RMS
- Trace Mode: Max Hold
- Sweep time: Auto

For non-continuous signals, wait for the trace to be completed. Save the (trace) data set to a file.

Step 2:

For each frequency point, add up the amplitude (power) values for the different transmit chains and use this as the new data set.

Step 3:

Add up the values for amplitude (power) for all the samples in the file.

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Step 4:

Normalize the individual values for amplitude so that the sum is equal to the RF Output Power (e.i.r.p.).

Step 5:

Starting from the first sample in the file (lowest frequency), add up the power of the following samples representing a 1 MHz segment and record the results for power and position (i.e. sample #1 to #100). This is the Power Spectral Density (e.i.r.p.) for the first 1 MHz segment which shall be recorded.

Step 6:

Shift the start point of the samples added up in step 5 by 1 sample and repeat the procedure in step 5 (i.e. sample #2 to #101).

Step 7:

Repeat step 6 until the end of the data set and record the radiated Power Spectral Density values for each of the 1 MHz segments. From all the recorded results, the highest value is the maximum Power Spectral Density for the UUT.

5.4. Test Result

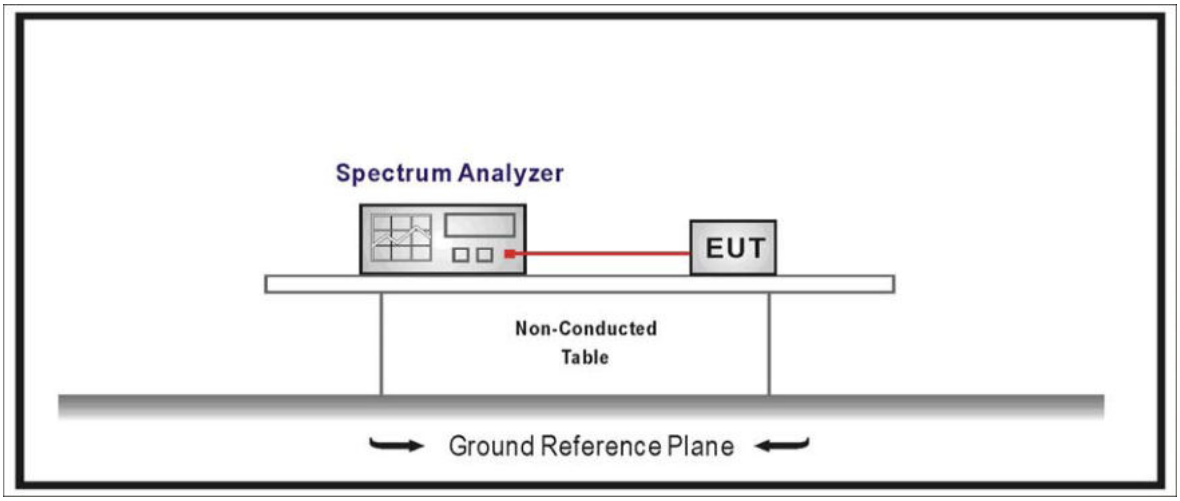
Please refer to the Appendix for Blutooth(BT LE) RF Test Data.

6. DUTY CYCLE, TX-SEQUENCE, TX-GAP

6.1. Limit

The Duty Cycle shall be equal to or less than the maximum value declared by the supplier.
The maximum Tx-sequence Time and the minimum Tx-gap Time shall be according to the formula below: Maximum Tx-Sequence Time = Minimum Tx-gap Time = M
where M is in the range of 3,5 ms to 10 ms.

6.2. Test Setup



6.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.2

6.4. Test Result

These requirements apply to non-adaptive frequency hopping equipment or to adaptive frequency hopping equipment operating in a non-adaptive mode.
These requirements do not apply for equipment with a maximum declared RF Output power of less than 10dBm E.I.R.P. or for equipment when operating in a mode where the RF Output power is less than 10dBm E.I.R.P.
No applicable.

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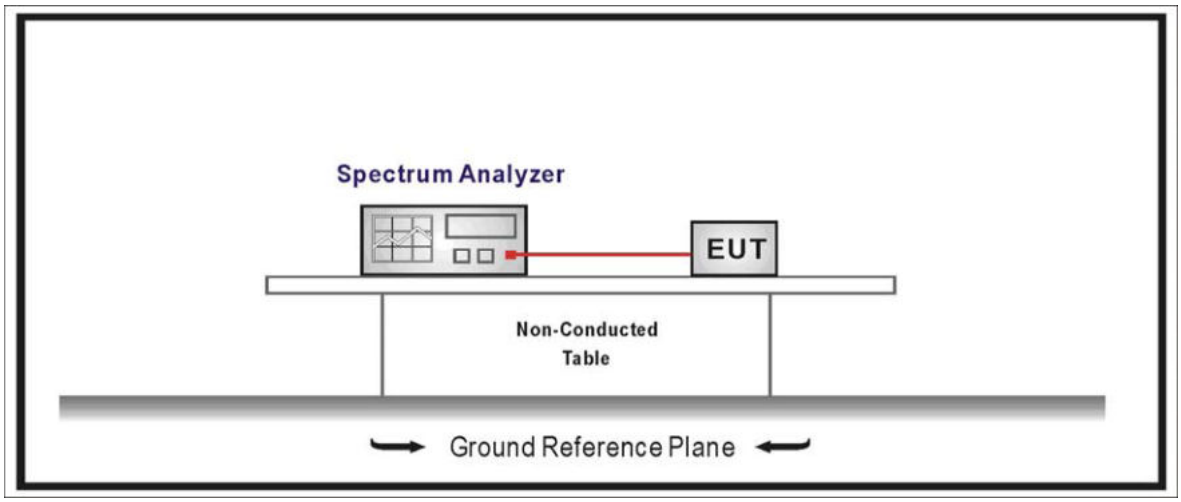
7. MEDIUM UTILISATION (MU) FACTOR

7.1. Limit

For non-adaptive equipment

The maximum Medium Utilisation factor for non-adaptive Frequency Hopping equipment shall be 10 %.

7.2. Test Setup



7.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.2

7.4. Test Result

This requirement does not apply to adaptive equipment unless operating in a non-adaptive mode.
In addition, this requirement does not apply for equipment with a maximum declared RF Output power level of less than 10dBm E.I.R.P. or for equipment when operating in a mode where the RF Output power is less than 10dBm E.I.R.P.
No applicable.

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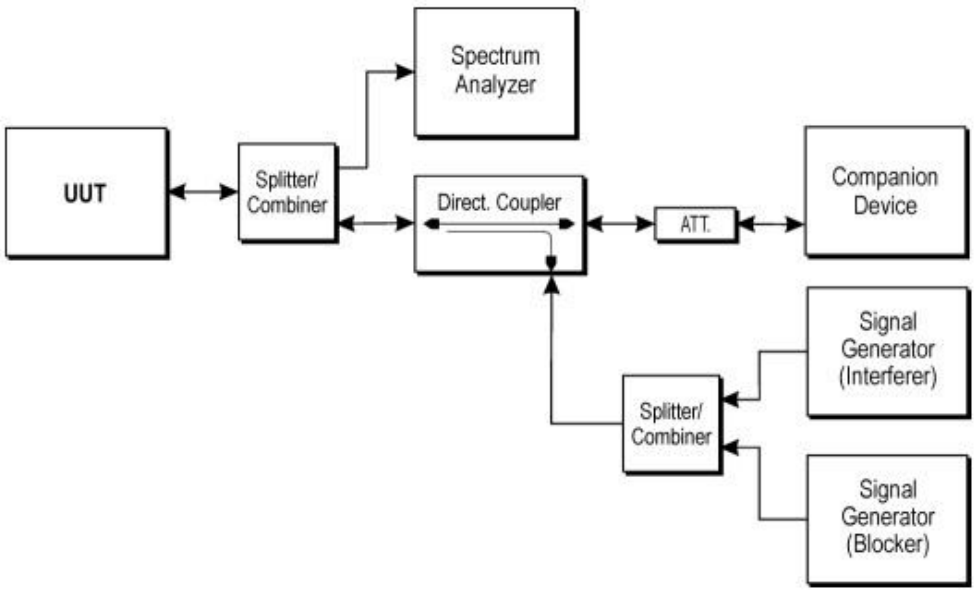
8. ADAPTIVITY (ADAPTIVE EQUIPMENT USING MODULATIONS OTHER THAN FHSS)

8.1. Limit

Adaptivity Limit
☐ Non-LBT based Detect and Avoid --- The channel shall remain unavailable for a minimum time equal to 1 s after which the channel may be considered again as an 'available' channel; --- COT ≤ 40 ms; --- COT ≤ 60 ms; --- Idle Period shall be minimum 5% of COT with a minimum of 100us; --- Detection threshold level = -70dBm/MHz + 20 – Pout E.I.R.P (Pout in dBm);
☐ LBT based Detect and Avoid(Frame Based Equipment) --- The CCA observation time shall be not less than 20 us; --- The CCA time used by the equipment shall be declared by the supplier; --- COT = 1-10 ms; --- Idle Period = 5% of COT; --- Detection threshold level = -70dBm/MHz + 20 – Pout E.I.R.P (Pout in dBm);
☐ LBT based Detect and Avoid(Load Based Equipment) --- The CCA observation time shall be not less than 20 us; --- The CCA time used by the equipment shall be declared by the supplier; --- COT ≤ (13 / 32) * q ms; q = [4~32]; 1.625ms~13ms; --- R = number of clear idle slots are randomly [1~q]. Every time an Extended CCA is required and the 'R' value stored in a counter. --- Detection threshold level = -70dBm/MHz + 20 – Pout E.I.R.P (Pout in dBm);
☐ Short Control Signalling Transmissions: --- Short Control Signalling Transmissions shall have a maximum duty cycle of 10% within an observation period of 50ms.

8.2. Test Setup

Conducted measurements



8.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.7

8.4. Test Result

This requirement does not apply to non-adaptive equipment or adaptive equipment operating in a non-adaptive mode providing the equipment complies with the requirements and/or restrictions applicable to non-adaptive equipment.
In addition, this requirement does not apply for equipment with a maximum declared RF Output power level of less than 10dBm E.I.R.P. or for equipment when operating in a mode where the RF Output power is less than 10dBm E.I.R.P.
No applicable.

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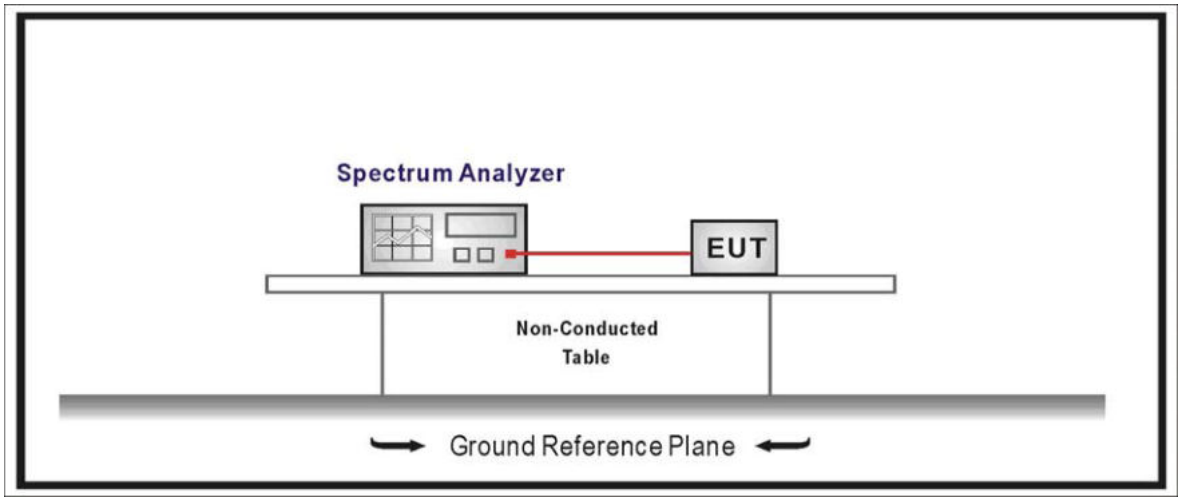
9. OCCUPIED CHANNEL BANDWIDTH

9.1. Limit

The Occupied Channel Bandwidth for each hopping frequency shall fall completely within the band given in 2.4GHz to 2.4835GHz.

For non-adaptive Frequency Hopping equipment with E.I.R.P greater than 10dBm, the Occupied Channel Bandwidth for every occupied hopping frequency shall be equal to or less than the value declared by the supplier. This declared value shall not be greater than 5 MHz.

9.2. Test Setup



9.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.8

Step 1:

Connect the UUT to the spectrum analyser and use the following settings:

- Centre Frequency: The centre frequency of the channel under test
- Resolution BW: ~ 1 % of the span without going below 1 % (We set RBW= 40KHz)
- Video BW: 3 × RBW
- Frequency Span: 2 × Occupied Channel Bandwidth (e.g. 40 MHz for a 20 MHz channel)
- Detector Mode: RMS
- Trace Mode: Max Hold

Step 2:

Wait until the trace is completed. Find the peak value of the trace and place the analyzer marker on this peak.

Step 3:

Use the 99 % bandwidth function of the spectrum analyzer to measure the Occupied Channel Bandwidth of the UUT. This value shall be recorded.

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9.4. Test Result

Please refer to the Appendix for Blutooth(BT LE) RF Test Data.

10. TRANSMITTER UNWANTED EMISSIONS IN THE OUT-OF-BAND DOMAIN

10.1. Limit

The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask in figure 3.

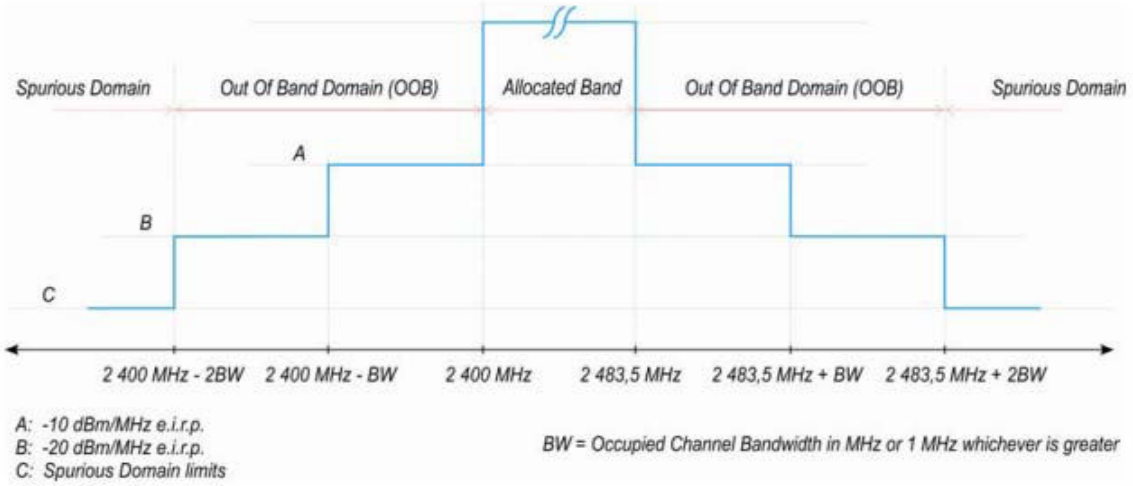
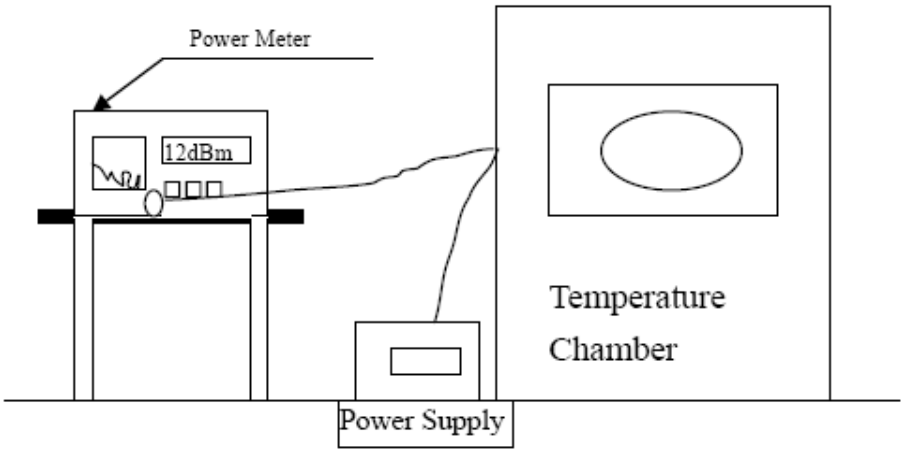


Figure 3: Transmit mask

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

10.2. Test Setup

For Conducted Measurement



10.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.9

Step 1:

• Connect the UUT to the spectrum analyzer and use the following settings:
- Centre Frequency: 2 484 MHz
- Span: 0 Hz
- Resolution BW: 1 MHz
- Filter mode: Channel filter
- Video BW: 3 MHz
- Detector Mode: RMS
- Trace Mode: Clear / Write
- Sweep Mode: Continuous
- Sweep Points: 5 000
- Trigger Mode: Video trigger

NOTE 1: In case video triggering is not possible, an external trigger source may be used.
- Sweep Time: Suitable to capture one transmission burst

Step 2: (segment 2 483,5 MHz to 2 483,5 MHz + BW)

• Adjust the trigger level to select the transmissions with the highest power level.

• For frequency hopping equipment operating in a normal hopping mode, the different hops will result in signal bursts with different power levels. In this case the burst with the highest power level shall be selected.

• Set a window (start and stop lines) to match with the start and end of the burst and in which the RMS power shall be measured using the Time Domain Power function.

• Select RMS power to be measured within the selected window and note the result which is the RMS power within this 1 MHz segment (2 483,5 MHz to 2 484,5 MHz). Compare this value with the applicable limit provided by the mask.

• Increase the centre frequency in steps of 1 MHz and repeat this measurement for every 1 MHz segment within the range 2 483,5 MHz to 2 483,5 MHz + BW. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + BW - 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 3: (segment 2 483,5 MHz + BW to 2 483,5 MHz + 2BW)

• Change the centre frequency of the analyzer to 2 484 MHz + BW and perform the measurement for the first 1 MHz segment within range 2 483,5 MHz + BW to 2 483,5 MHz + 2BW. Increase the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + 2 BW - 0,5 MHz.

Step 4: (segment 2 400 MHz - BW to 2 400 MHz)

• Change the centre frequency of the analyzer to 2 399,5 MHz and perform the measurement for the first 1 MHz segment within range 2 400 MHz - BW to 2 400 MHz Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2BW + 0,5 MHz.

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Step 5: (segment 2 400 MHz - 2BW to 2 400 MHz - BW)

• Change the centre frequency of the analyzer to 2 399,5 MHz - BW and perform the measurement for the first 1 MHz segment within range 2 400 MHz - 2BW to 2 400 MHz - BW. Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2BW + 0,5 MHz.

Step 6:

• In case of conducted measurements on equipment with a single transmit chain, the declared antenna assembly gain "G" in dBi shall be added to the results for each of the 1 MHz segments and compared with the limits provided by the mask given in figures 1 or 3. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered.

• In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), the measurements need to be repeated for each of the active transmit chains. The declared antenna assembly gain "G" in dBi for a single antenna shall be added to these results. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered. Comparison with the applicable limits shall be done using any of the options given below:

- Option 1: the results for each of the transmit chains for the corresponding 1 MHz segments shall be added. The additional beamforming gain "Y" in dB shall be added as well and the resulting values compared with the limits provided by the mask given in figures 1 or 3.
- Option 2: the limits provided by the mask given in figures 1 or 3 shall be reduced by 10 x log10(Ach) and the additional beamforming gain "Y" in dB. The results for each of the transmit chains shall be individually compared with these reduced limits.

NOTE 2: Ach refers to the number of active transmit chains.

It shall be recorded whether the equipment complies with the mask provided in figures 1 or 3.

10.4. Test Result

Please refer to the Appendix for Blutooth(BT LE) RF Test Data.

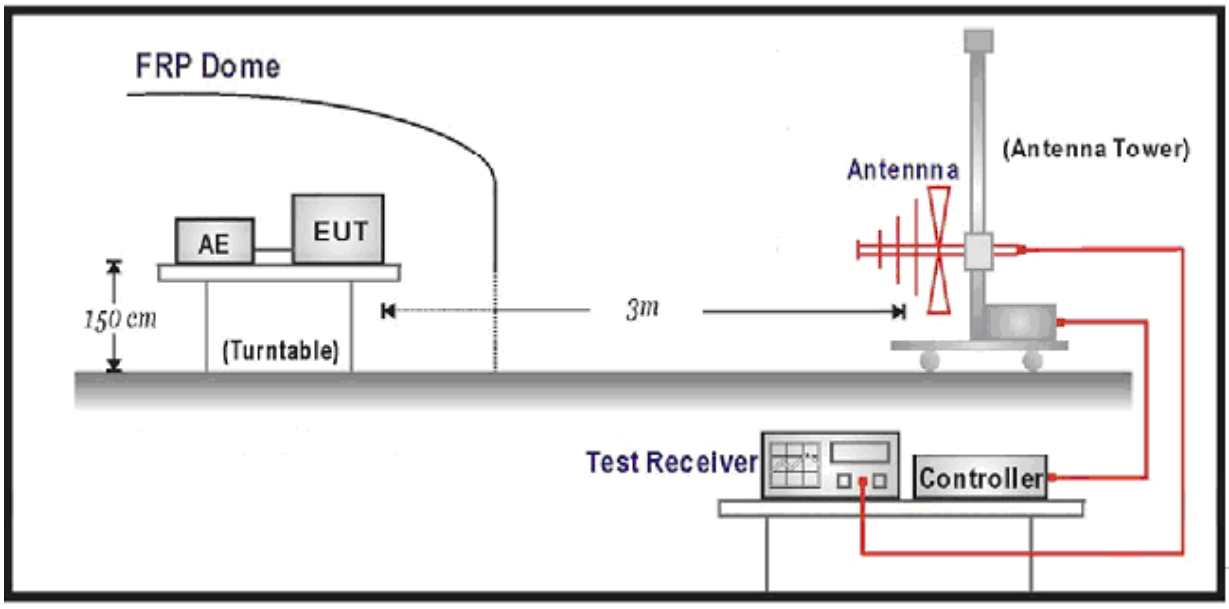
11. TRANSMITTER UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN

11.1. Limit

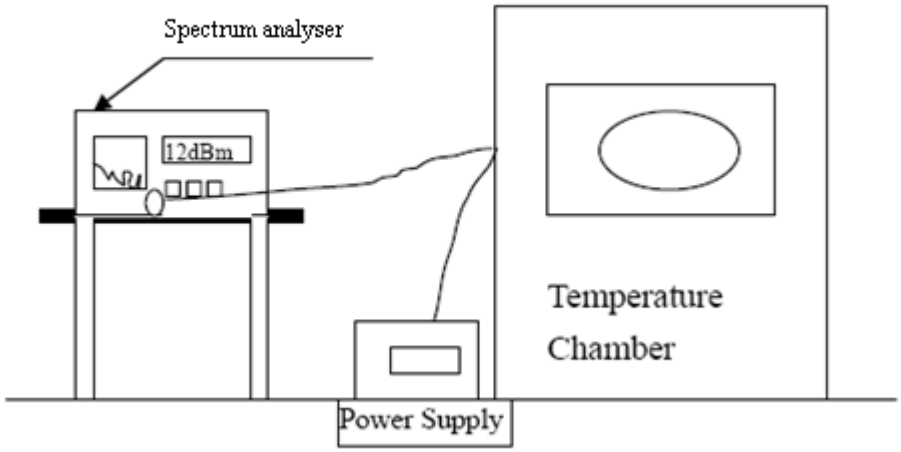
Transmitter Limits for Spurious Emissions		
Frequency Range	Maximum power E.R.P. (≤ 1GHz) E.I.R.P. (> 1GHz)	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87,5 MHz	-36 dBm	100 kHz
87,5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 862 MHz	-54 dBm	100 kHz
862 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to 12,75 GHz	-30 dBm	1 MHz

11.2. Test Setup

For Radiated Measurement



For Conducted Measurement



11.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.10

Step 1:

The sensitivity of the spectrum analyser should be such that the noise floor is at least 12 dB below the limits given in tables 1 or 4.

Step 2:

The emissions over the range 30 MHz to 1 000 MHz shall be identified.

Spectrum analyser settings:

• Resolution bandwidth: 100 kHz

• Video bandwidth: 300 kHz

• Detector mode: Peak

• Trace Mode: Max Hold

• Sweep Points: ≥ 9 970

NOTE 1: For spectrum analysers not supporting this high number of sweep points, the frequency band may need to be segmented.

• Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 100 kHz frequency step, the measurement time is greater than two transmissions of the UUT. For Frequency Hopping equipment operating in a normal operating (hopping not disabled) mode, the sweep time shall be further increased to capture multiple transmissions on the same hopping frequency in different hopping sequences. Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.3.10.2.1.2 and compared to the limits given in tables 1 or 4.

Step 3:

The emissions over the range 1 GHz to 12,75 GHz shall be identified.

Spectrum analyser settings:

• Resolution bandwidth: 1 MHz

• Video bandwidth: 3 MHz

• Detector mode: Peak

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• Trace Mode: Max Hold
• Sweep Points: ≥ 11 750
NOTE 2: For spectrum analysers not supporting this high number of sweep points, the frequency band may need to be segmented.
• Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 1 MHz frequency step, the measurement time is greater than two transmissions of the UUT.

11.4. Test Result

Please refer to the Appendix for Blutooth(BT LE) RF Test Data.

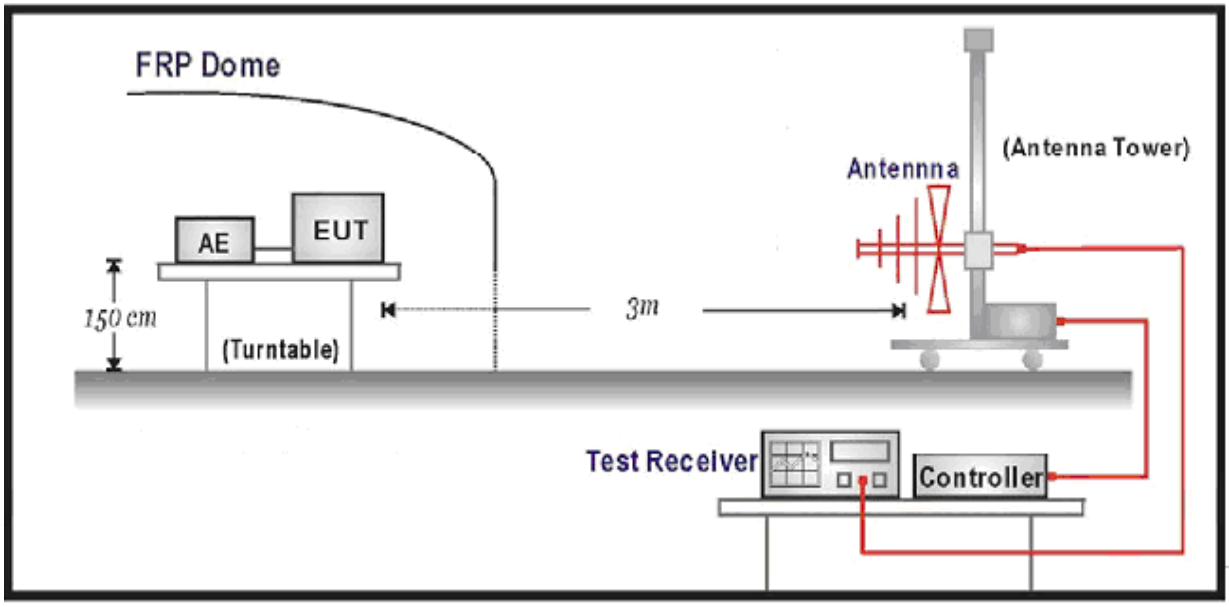
12. RECEIVER SPURIOUS EMISSIONS

12.1. Limit

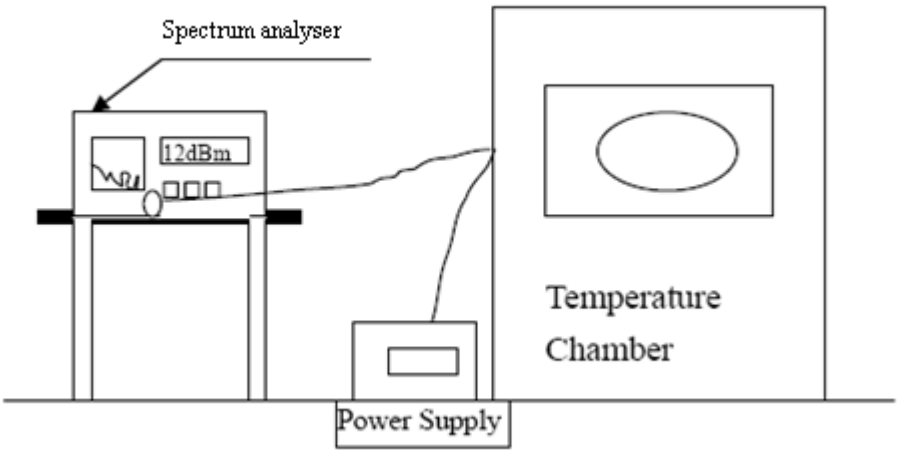
Spurious emissions limits for receivers		
Frequency Range	Maximum power E.R.P. (≤ 1GHz) E.I.R.P. (> 1GHz)	Measurement bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 12.75 GHz	-47 dBm	1 MHz

12.2. Test Setup

For Radiated Measurement



For Conducted Measurement



12.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.11

Step 1:

The sensitivity of the spectrum analyzer should be such that the noise floor is at least 12 dB below the limits given in tables 2 or 5.

Step 2:

The emissions over the range 30 MHz to 1 000 MHz shall be identified.

Spectrum analyzer settings:

• Resolution bandwidth: 100 kHz
• Video bandwidth: 300 kHz
• Detector mode: Peak
• Trace Mode: Max Hold
• Sweep Points: ≥ 9 970
• Sweep time: Auto

Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.3.11.2.1.2 and compared to the limits given in tables 2 or 5.

Step 3:

The emissions over the range 1 GHz to 12,75 GHz shall be identified.

Spectrum analyzer settings:

• Resolution bandwidth: 1 MHz
• Video bandwidth: 3 MHz
• Detector mode: Peak
• Trace Mode: Max Hold
• Sweep Points: ≥ 11 750
• Sweep time: Auto

Allow the trace to stabilize. Any emissions identified during the sweeps above that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.3.11.2.1.2 and compared to the limits given in tables 2 or 5. Frequency Hopping equipment may generate a block (or several blocks) of spurious emissions anywhere within the spurious domain. If this is the case, only the highest peak of each block of emissions shall be measured using the procedure in clause 5.3.11.2.1.2.

Step 4:

• In case of conducted measurements on smart antenna systems (equipment with multiple receive chains), the steps 2 and 3 need to be repeated for each of the active receive chains (Ach).The limits used to identify emissions during this pre-scan need to be reduced with 10 × log10 (Ach) (number of active receive chains).

12.4. Test Result

Please refer to the Appendix for Blutooth(BT LE) RF Test Data.

13. RECEIVER BLOCKING

13.1. Limit

Adaptive Frequency Hopping equipment shall comply with the requirements defined in clause 4.3.1.12.4

Table 6: Receiver Blocking parameters for Receiver Category 1 equipment

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
P_{min} + 6 dB	2 380 2 503,5	-53	CW
P_{min} + 6 dB	2 300 2 330 2 360	-47	CW
P_{min} + 6 dB	2 523,5 2 553,5 2 583,5 2 613,5 2 643,5 2 673,5	-47	CW
NOTE 1: P_{min} is the minimum level of wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.			

Table 7: Receiver Blocking parameters receiver category 2 equipment

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
P_{min} + 6 dB	2 380 2 503,5	-57	CW
P_{min} + 6 dB	2 300 2 583,5	-47	CW
NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.			

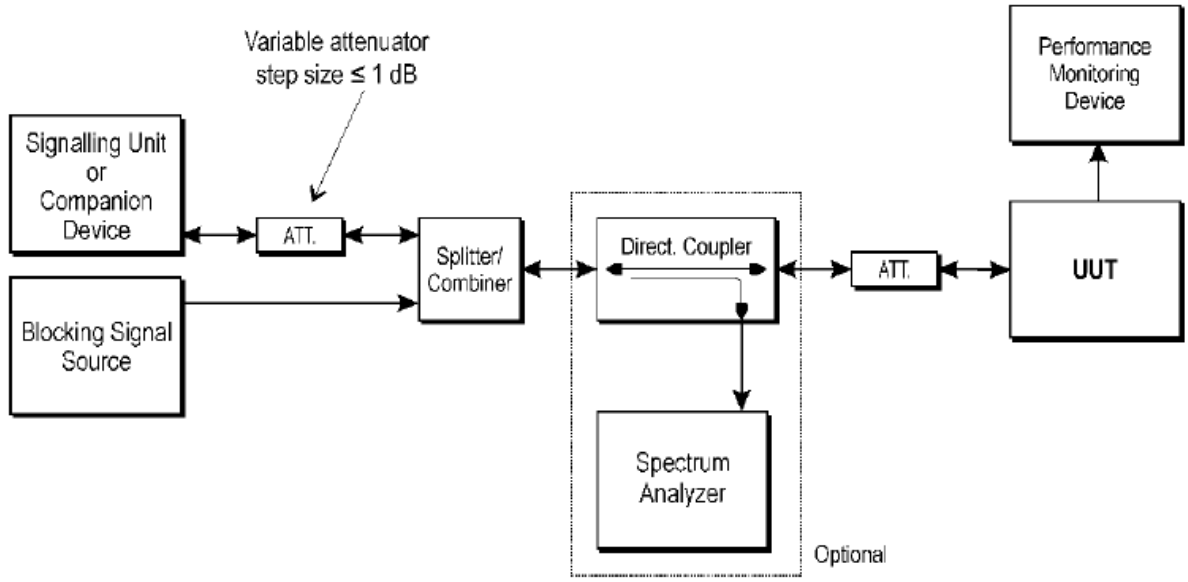
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Table 8: Receiver Blocking parameters receiver category 3 equipment

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
P_{min} + 12 dB	2 380 2 503,5	-57	CW
P_{min} + 12 dB	2 300 2 583,5	-47	CW
NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.			

13.2. Test Setup

Conducted measurements



13.3. Test Procedure

Step 1:

• For non-frequency hopping equipment, the UUT shall be set to the lowest operating channel.

Step 2:

• The blocking signal generator is set to the first frequency as defined in the appropriate table corresponding to the receiver category and type of equipment.

Step 3:

• With the blocking signal generator switched off, a communication link is established between the UUT and the associated companion device using the test setup shown in figure 6. The attenuation of the variable attenuator shall be increased in 1 dB steps to a value at which the minimum performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still met. The resulting level for the wanted signal at the input of the UUT is Pmin.

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• This signal level (Pmin) is increased by the value provided in the table corresponding to the receiver category and type of equipment.

Step 4:

• The blocking signal at the UUT is set to the level provided in the table corresponding to the receiver category and type of equipment. It shall be verified and recorded in the test report that the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is met.

Step 5:

• Repeat step 4 for each remaining combination of frequency and level for the blocking signal as provided in the table corresponding to the receiver category and type of equipment.

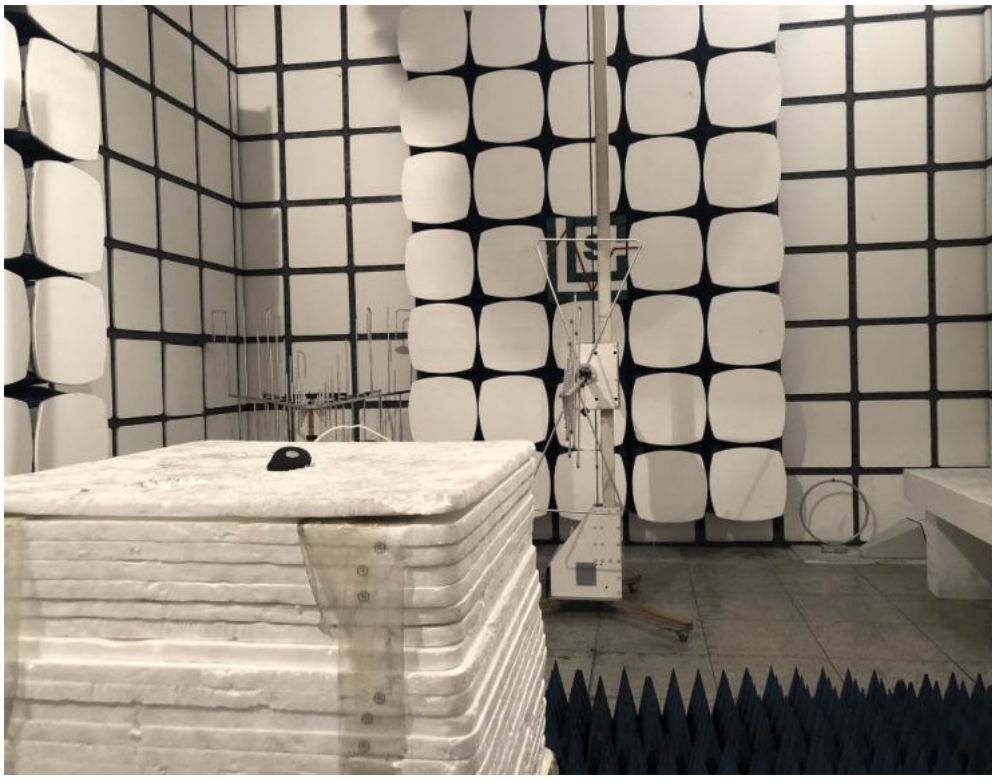
Step 6:

• For non-frequency hopping equipment, repeat step 2 to step 5 with the UUT operating at the highest operating channel.

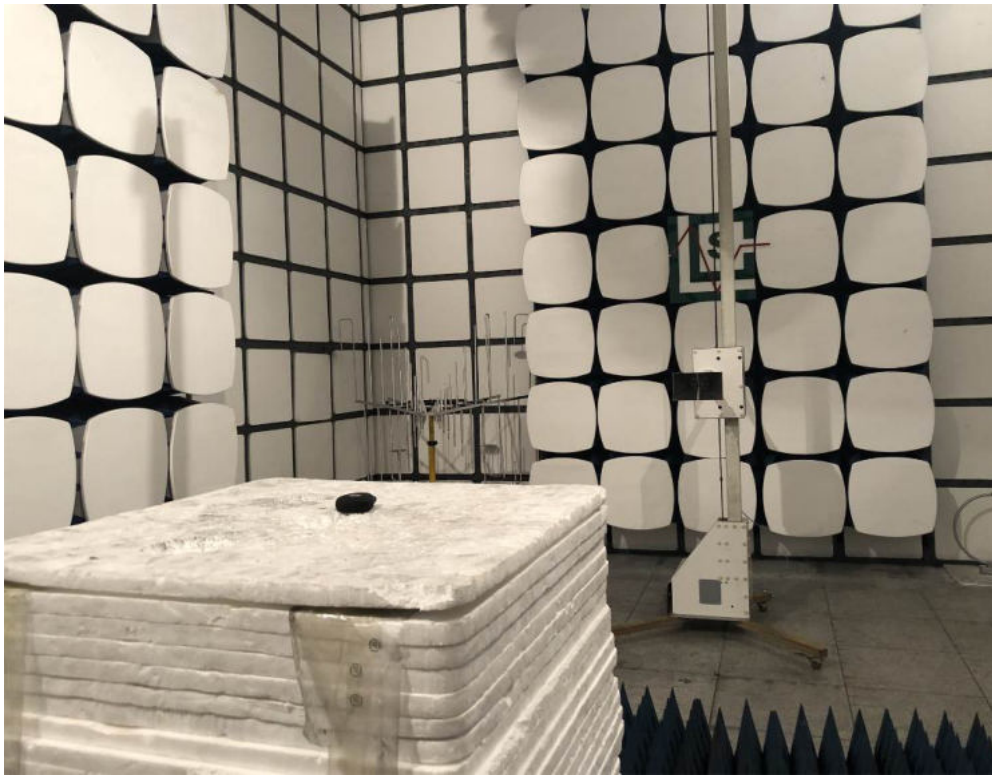
13.4. Test Result

Please refer to the Appendix for Blutooth(BT LE) RF Test Data.

14. PHOTOGRAPHS OF TEST SETUP



Spurious Emission below 1GHz



Spurious Emission above 1GHz

----------THE END OF REPORT----------

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Bluetooth LE RF Test Data Appendix

Product Name: Personal Mobile Alarm System

Test Model: EV-07B-4G

Environmental Conditions

Temperature:	24.8 ° C
Relative Humidity:	52.9%
ATM Pressure:	100.0 kPa
Test Engineer:	Diamond.Lu
Supervised by:	Tom.Liu

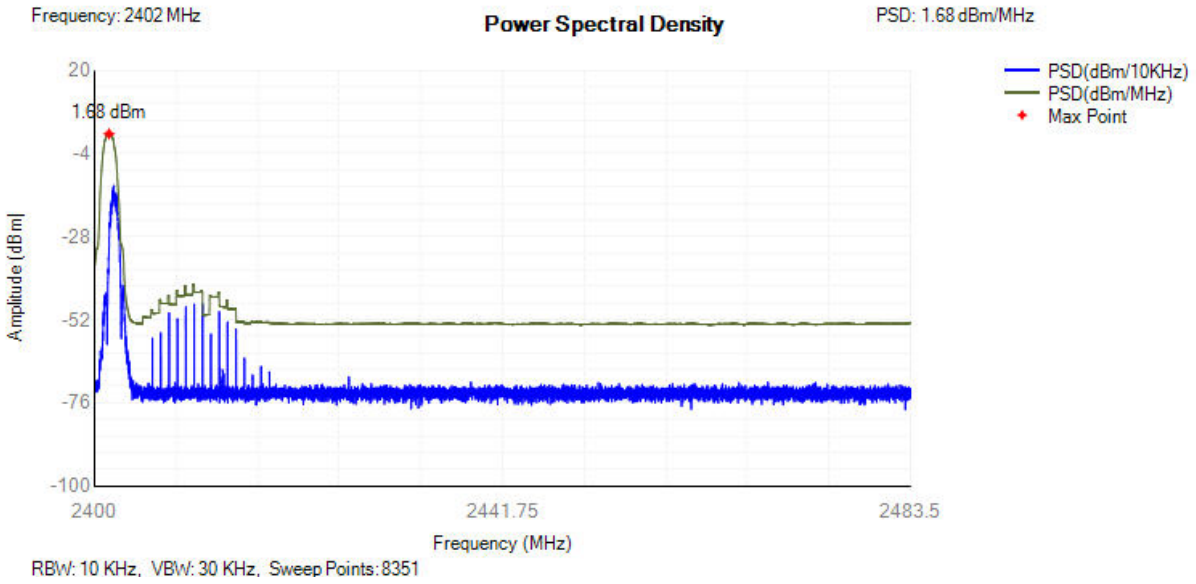
5.4.2 RF Output Power

Condition	Mode	Frequency (MHz)	Max Burst RMS Power (dBm)	Max EIRP (dBm)	Limit (dBm)	Verdict
NVNT	BLE	2402	1.68	1.67	20	Pass
NVNT	BLE	2440	2.41	2.4	20	Pass
NVNT	BLE	2480	2.24	2.23	20	Pass

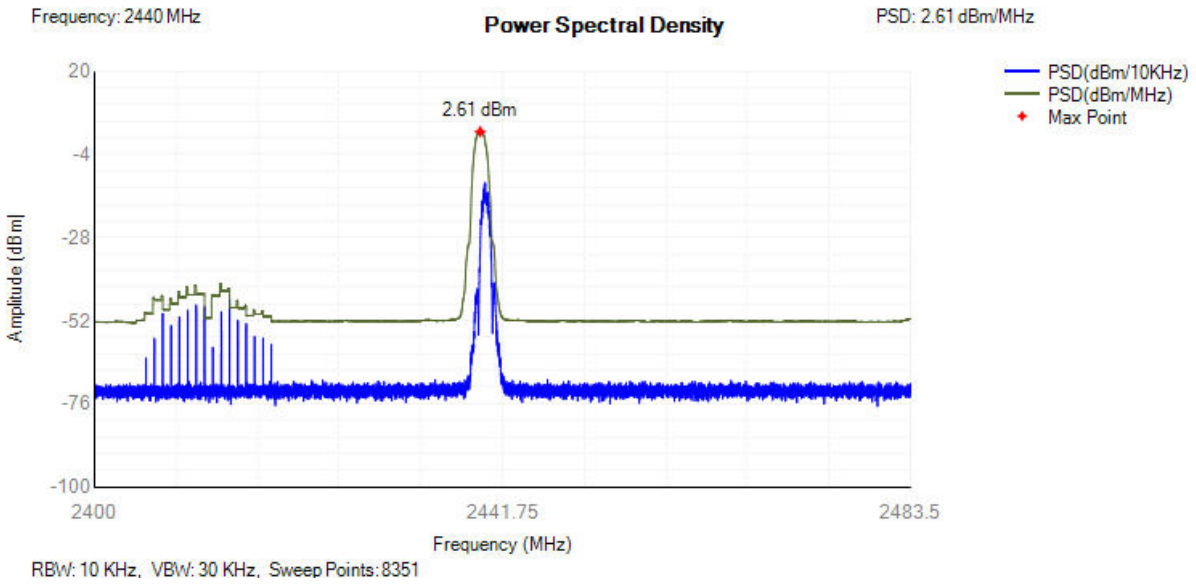
5.4.3 Power Spectral Density

Condition	Mode	Frequency (MHz)	Max PSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
NVNT	BLE	2402	1.68	10	Pass
NVNT	BLE	2440	2.61	10	Pass
NVNT	BLE	2480	2.14	10	Pass

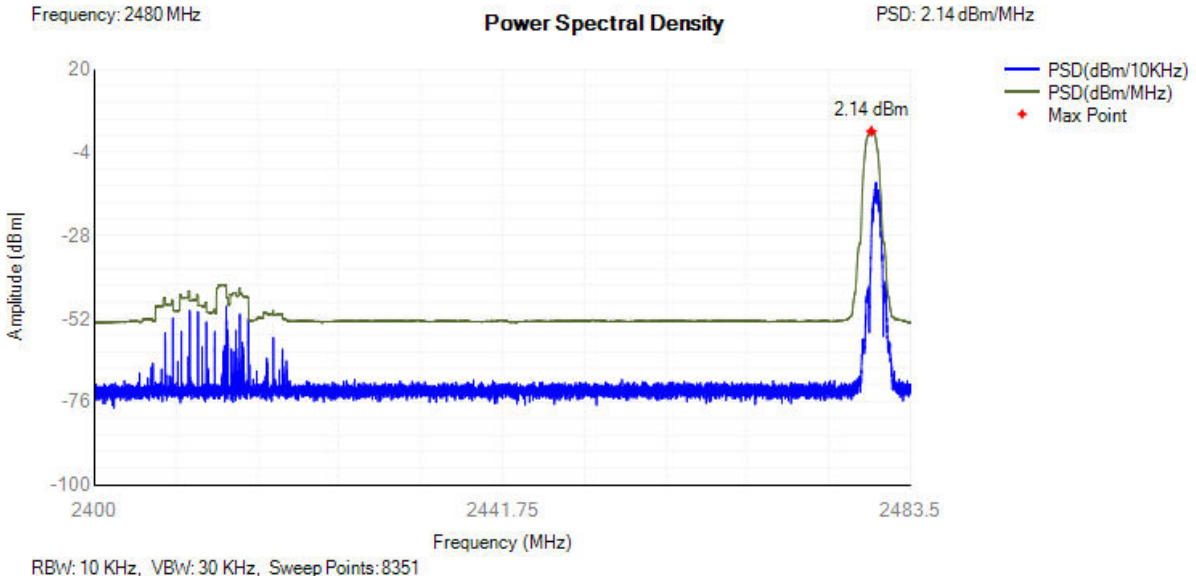
PSD NVNT BLE 2402MHz



PSD NVNT BLE 2440MHz



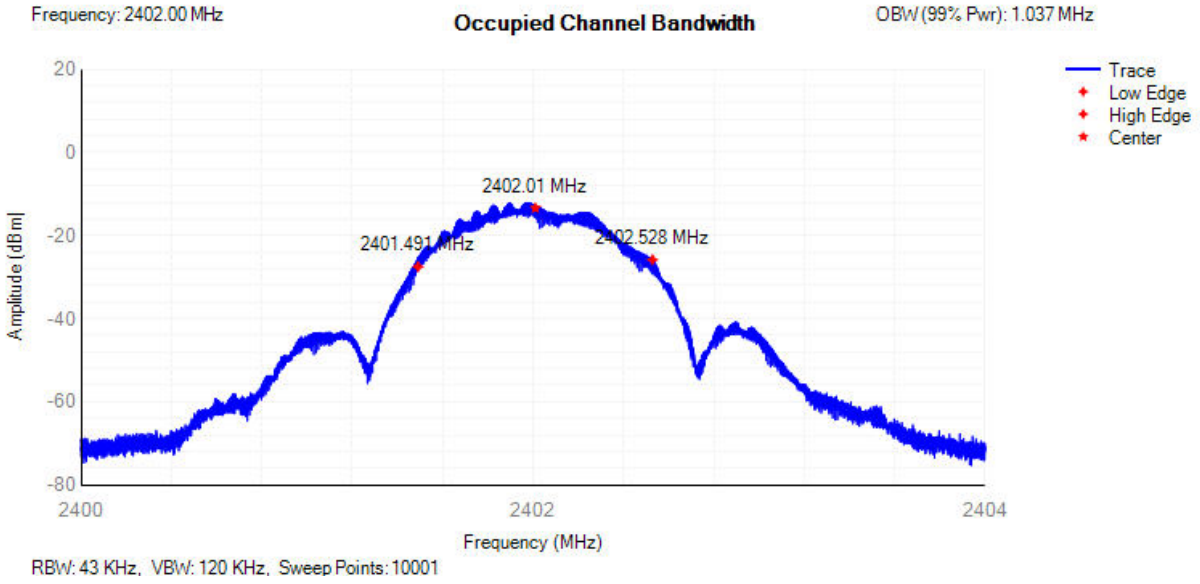
PSD NVNT BLE 2480MHz



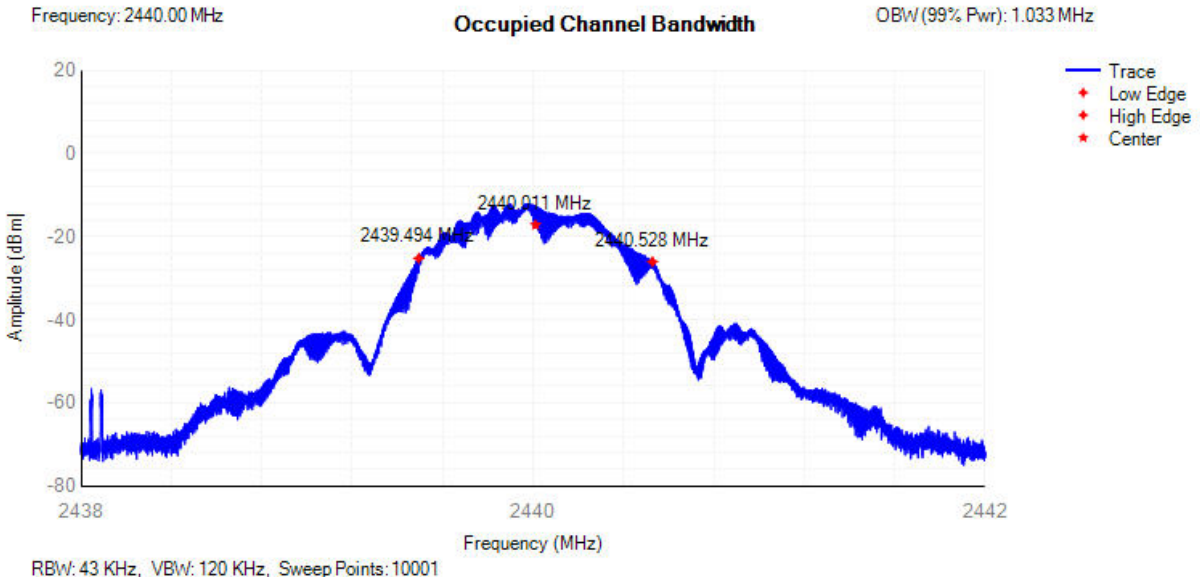
5.4.7 Occupied Channel Bandwidth

Condition	Mode	Frequency (MHz)	Center Frequency (MHz)	OBW (MHz)	Lower Edge (MHz)	Upper Edge (MHz)	Limit OBW (MHz)	Verdict
NVNT	BLE	2402	2402.01	1.037	2401.491	2402.528	2400 - 2483.5MHz	Pass
NVNT	BLE	2440	2440.011	1.033	2439.494	2440.528	2400 - 2483.5MHz	Pass
NVNT	BLE	2480	2480.01	1.030	2479.495	2480.526	2400 - 2483.5MHz	Pass

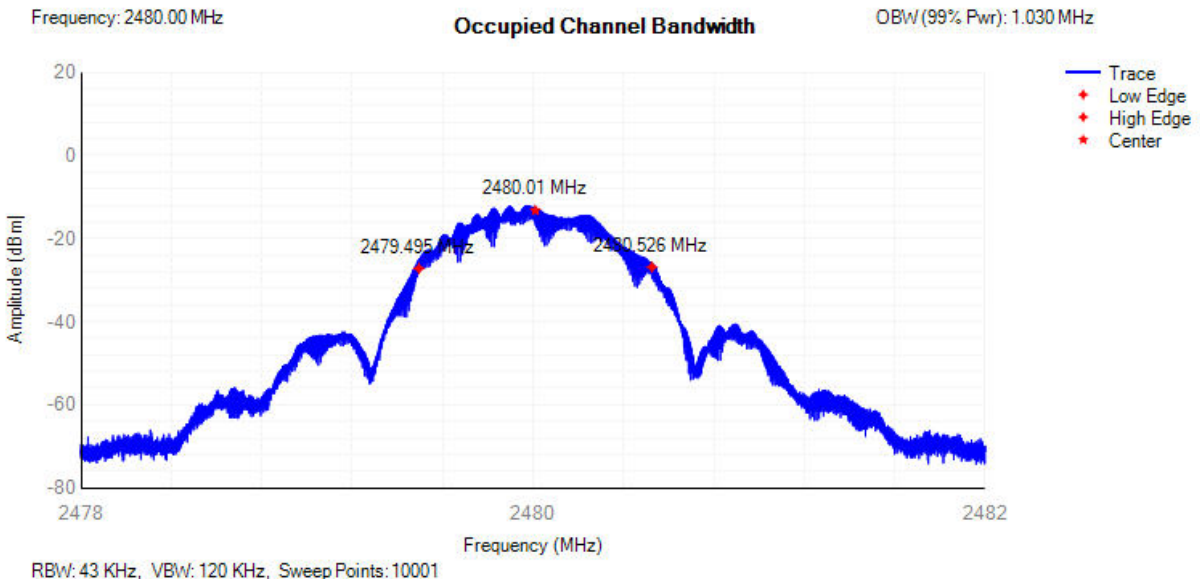
OBW NVNT BLE 2402MHz



OBW NVNT BLE 2440MHz



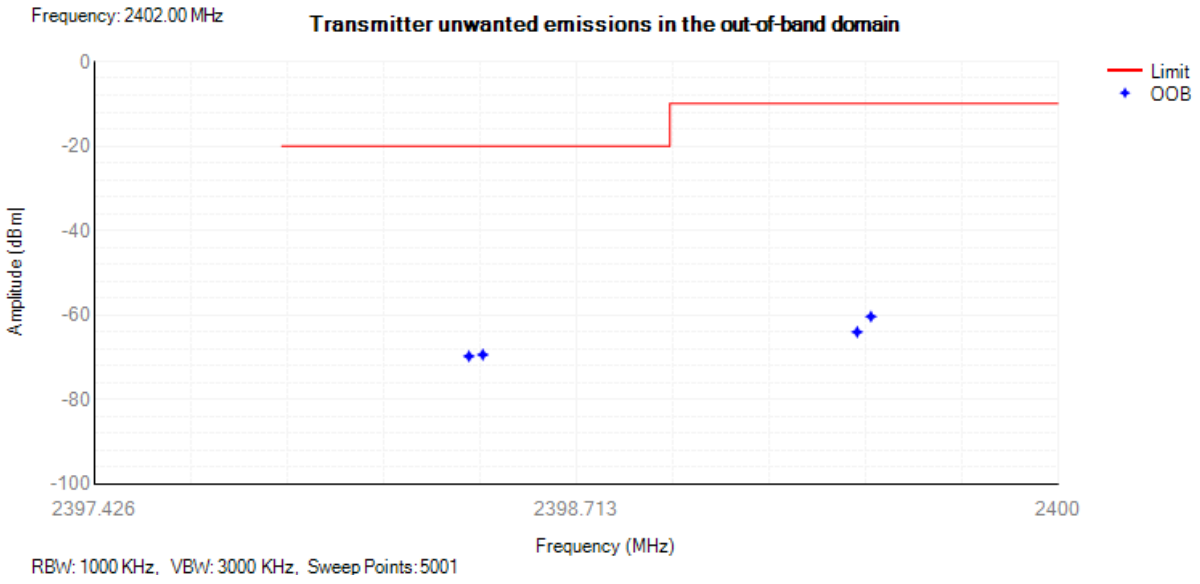
OBW NVNT BLE 2480MHz



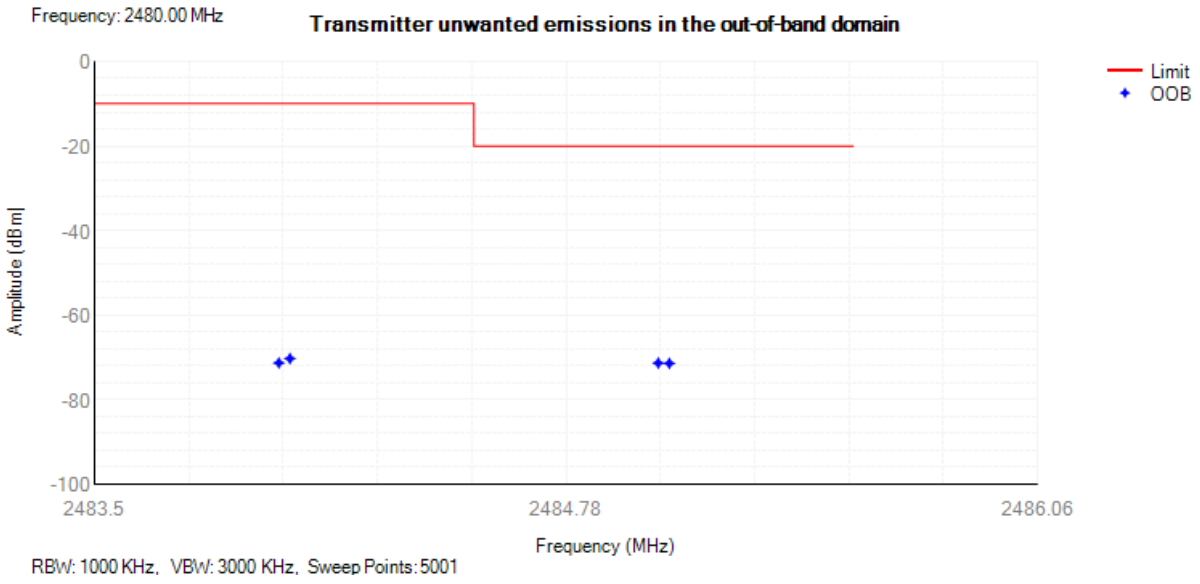
5.4.8 Transmitter unwanted emissions in the out-of-band domain

Condition	Mode	Frequency (MHz)	OOB Frequency (MHz)	Level (dBm/MHz)	Limit (dBm/MHz)	Verdict
NVNT	BLE	2402	2399.5	-60.36	-10	Pass
NVNT	BLE	2402	2399.463	-64.02	-10	Pass
NVNT	BLE	2402	2398.463	-69.38	-20	Pass
NVNT	BLE	2402	2398.426	-69.75	-20	Pass
NVNT	BLE	2480	2484	-71.33	-10	Pass
NVNT	BLE	2480	2484.03	-70.3	-10	Pass
NVNT	BLE	2480	2485.03	-71.36	-20	Pass
NVNT	BLE	2480	2485.06	-71.43	-20	Pass

Tx. Emissions OOB NVNT BLE 2402MHz



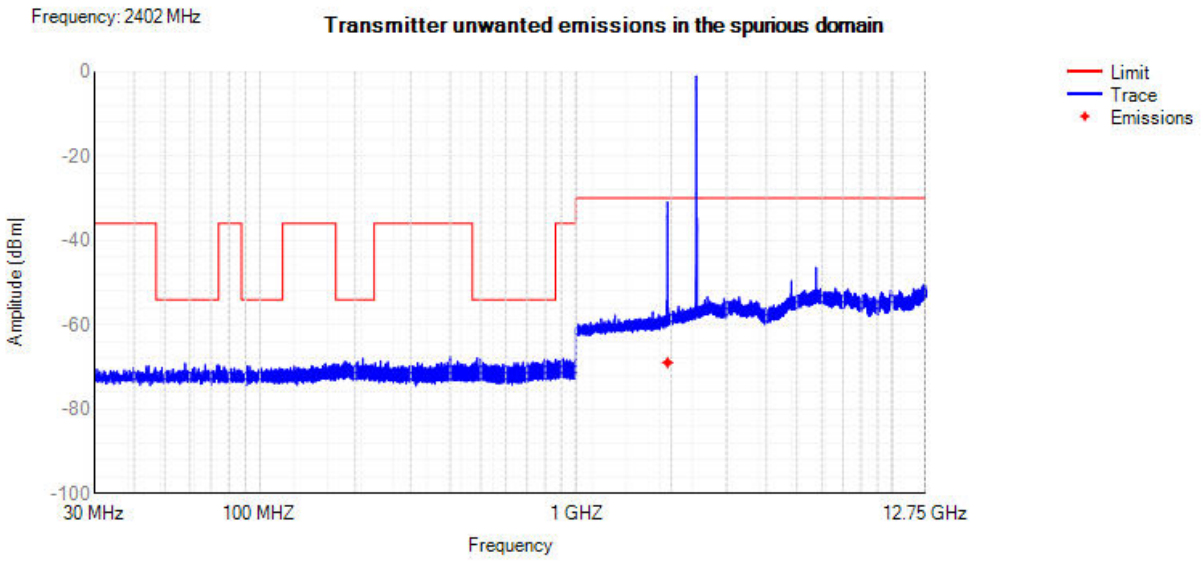
Tx. Emissions OOB NVNT BLE 2480MHz



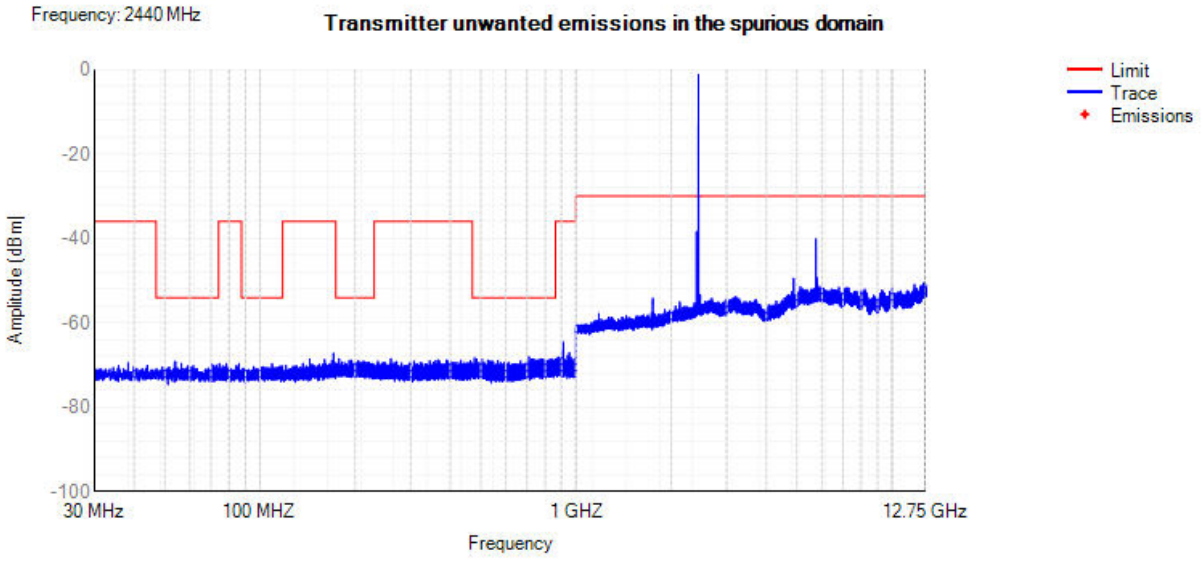
5.4.9 Transmitter unwanted emissions in the spurious domain

Conducted Measurement

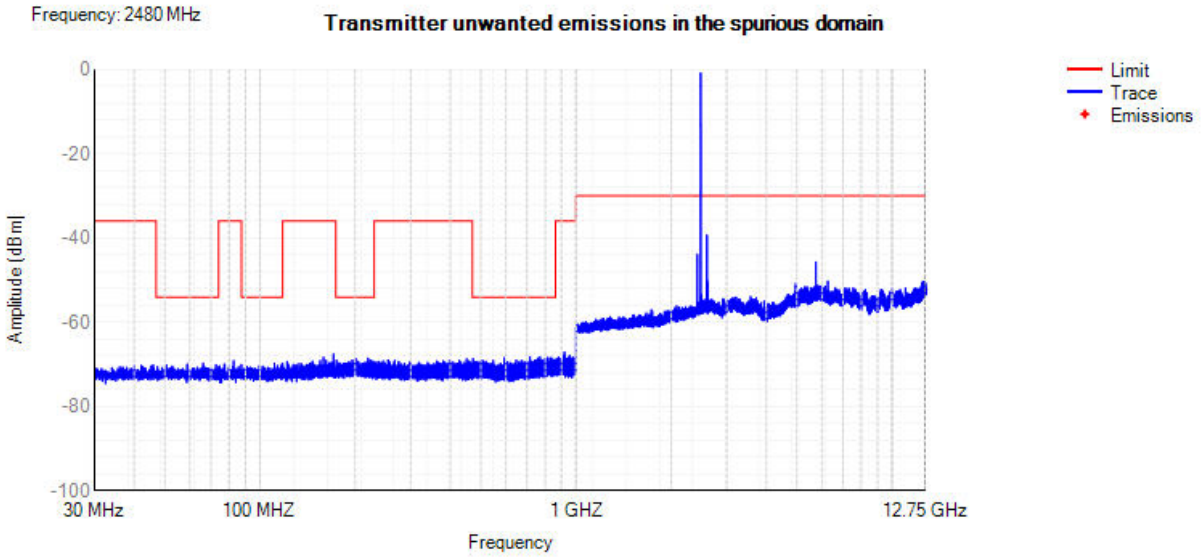
Tx. Spurious NVNT BLE 2402MHz



Tx. Spurious NVNT BLE 2440MHz



Tx. Spurious NVNT BLE 2480MHz



Tx. Spurious NVNT BLE

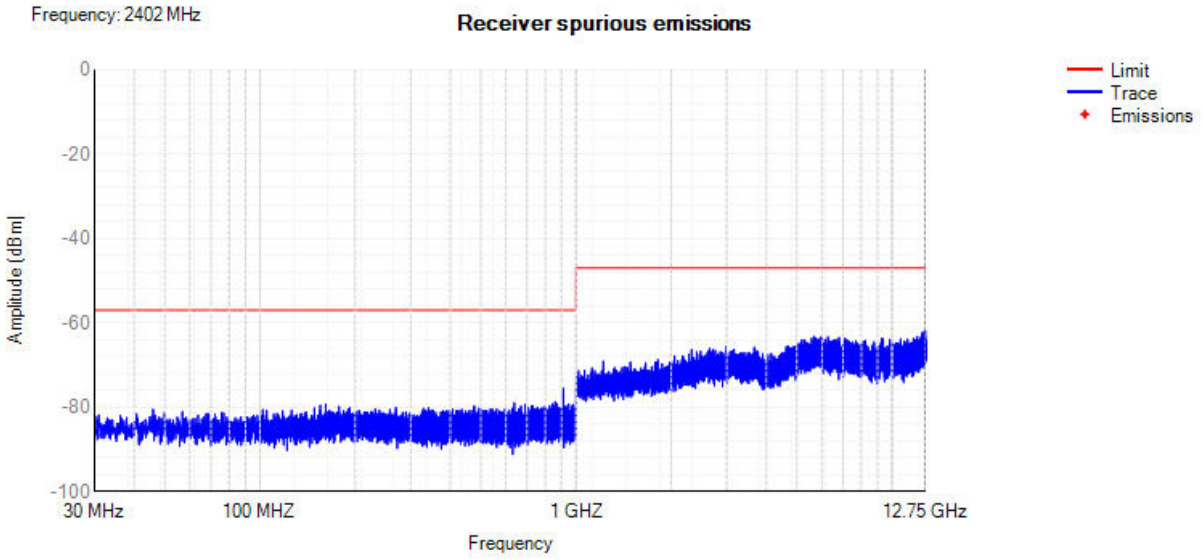
Radiated Measurement

Frequency (MHz)	Polarization (H/V)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector
Channel 0 (2402MHz)					
169.99	H	-47.77	-36.00	-11.77	PK
261.36	V	-47.90	-36.00	-11.90	PK
972.25	H	-49.06	-36.00	-13.06	PK
872.58	V	-46.10	-36.00	-10.10	PK
4804.03	H	-44.39	-30.00	-14.39	PK
4803.97	V	-41.83	-30.00	-11.83	PK
7205.98	H	-44.94	-30.00	-14.94	PK
7206.02	V	-44.16	-30.00	-14.16	PK
Channel 39 (2480MHz)					
119.68	H	-49.97	-36.00	-13.97	PK
279.17	V	-46.79	-36.00	-10.79	PK
817.23	H	-66.24	-54.00	-12.24	PK
931.20	V	-50.33	-36.00	-14.33	PK
4959.99	H	-41.99	-30.00	-11.99	PK
4960.01	V	-43.92	-30.00	-13.92	PK
7440.02	H	-40.23	-30.00	-10.23	PK
7440.00	V	-44.16	-30.00	-14.16	PK

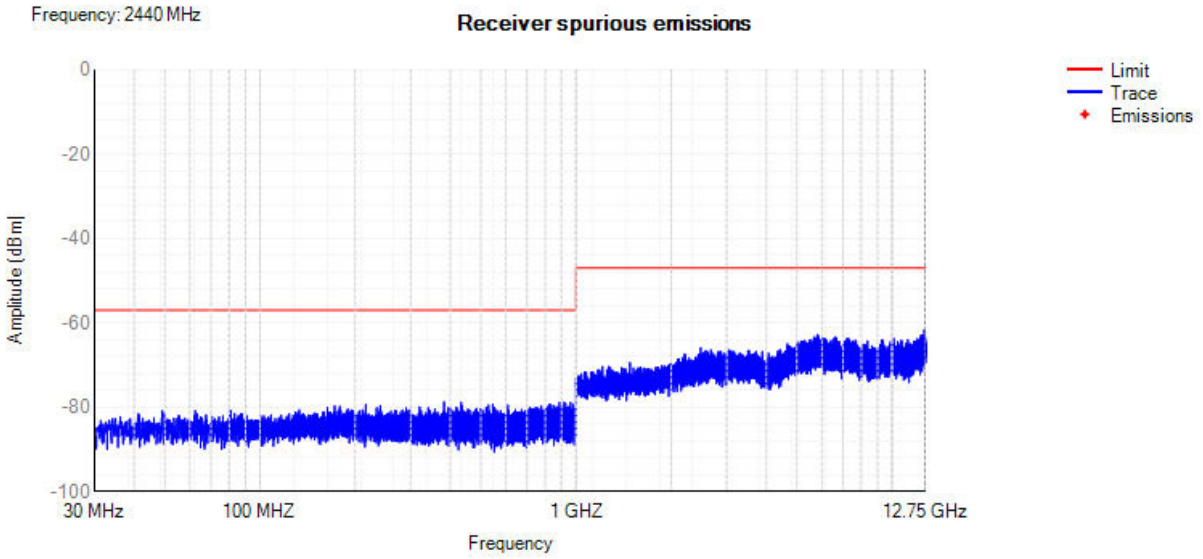
5.4.10 Receiver spurious emissions

Conducted Measurement

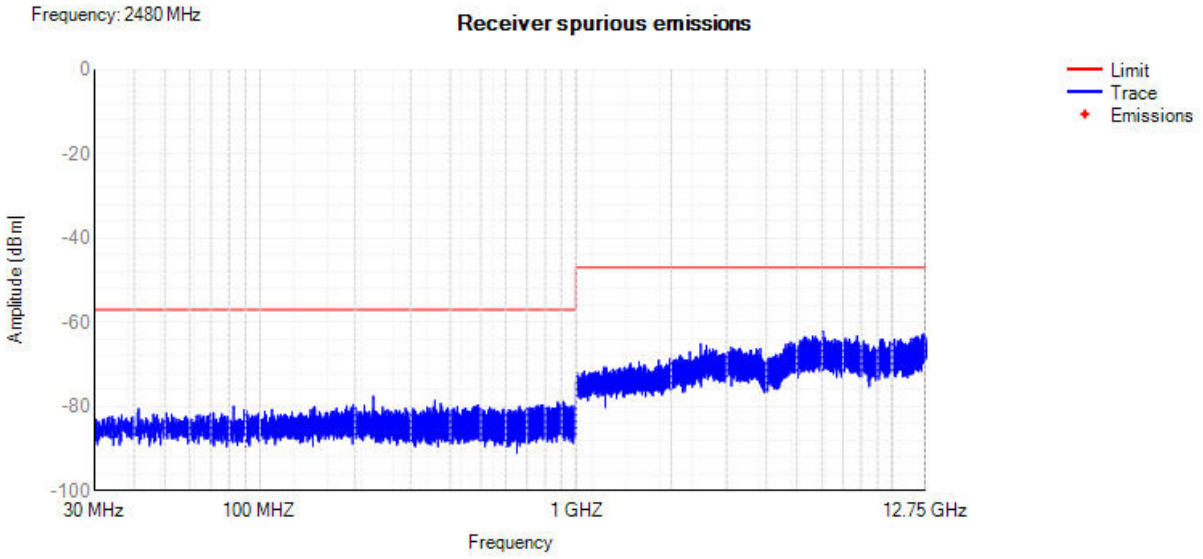
Rx. Spurious NVNT BLE 2402MHz



Rx. Spurious NVNT BLE 2440MHz



Rx. Spurious NVNT BLE 2480MHz



Radiated Measurement

Rx. Spurious NVNT BLE

Frequency (MHz)	Polarization (H/V)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector
Channel 0 (2402MHz)					
266.07	H	-68.65	-57.00	-11.65	PK
129.96	V	-67.54	-57.00	-10.54	PK
964.57	H	-69.62	-57.00	-12.62	PK
838.24	V	-67.23	-57.00	-10.23	PK
1730.35	H	-59.62	-47.00	-12.62	PK
1566.69	V	-61.61	-47.00	-14.61	PK
2263.88	H	-61.66	-47.00	-14.66	PK
2849.09	V	-57.09	-47.00	-10.09	PK
Channel 39 (2480MHz)					
260.81	H	-69.82	-57.00	-12.82	PK
187.50	V	-70.86	-57.00	-13.86	PK
871.61	H	-70.15	-57.00	-13.15	PK
878.93	V	-71.74	-57.00	-14.74	PK
1773.57	H	-57.28	-47.00	-10.28	PK
1589.50	V	-57.17	-47.00	-10.17	PK
2192.83	H	-58.80	-47.00	-11.80	PK
2843.56	V	-58.81	-47.00	-11.81	PK

5.4.11 Receiver Blocking

Wanted Signal Mean Power from Companion Device (dBm)	Test Mode	Test Channel (MHz)	Blocking Signal Frequency (MHz)	Pmin	Blocking Signal Power (dBm)		Type of Blocking Signal	PER(%		Test Result
					Test Value	Limit		Test Value	Limit	
Pmin + 6 dB	BLE	2402	2380	-86	-33	≥-57	CW	7.98	10	Pass
			2503.5	-88	-25	≥-57	CW	7.35	10	Pass
			2300	-89	-26	≥-47	CW	8.48	10	Pass
			2583.5	-92	-18	≥-47	CW	8.60	10	Pass
		2480	2380	-90	-29	≥-57	CW	5.52	10	Pass
			2503.5	-89	-25	≥-57	CW	6.59	10	Pass
			2300	-89	-22	≥-47	CW	6.05	10	Pass
			2583.5	-89	-19	≥-47	CW	5.34	10	Pass

RADIO TEST REPORT

For

Shenzhen Eview GPS Technology

Personal Mobile Alarm System

Test Model: EV-07B-4G

List Model No.: N/A

Prepared for	:	Shenzhen Eview GPS Technology
Address	:	#1203 Building 2, GuoLe Technology Park, Lirong Road, Dalang, Longhua, Shenzhen, China
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	:	101, 601, Xingyuan Industrial Park, Gushu Community, Xixiang Street, Bao'an District, Shenzhen, Guangdong, China
Tel	:	(+86)755-82591330
Fax	:	(+86)755-82591332
Web	:	www.LCS-cert.com
Mail	:	webmaster@LCS-cert.com
Date of receipt of test sample	:	April 16, 2019
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	April 16, 2019~May 17, 2019
Date of Report	:	May 20, 2019

CE

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RADIO TEST REPORT
ETSI EN 300 328 V2.1.1 (2016-11)
Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU

Report Reference No.	**: LCS190415004AED**
Date of Issue	: May 20, 2019
Testing Laboratory Name.....	**: Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address	: 101, 601, Xingyuan Industrial Park, Gushu Community, Xixiang Street, Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure	: Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name.....	: Shenzhen Eview GPS Technology
Address	: #1203 Building 2, GuoLe Technology Park, Lirong Road, Dalang, Longhua, Shenzhen, China
Test Specification	
Standard	: ETSI EN 300 328 V2.1.1 (2016-11)
Test Report Form No.	: LCSEMC-1.0
TRF Originator.....	: Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF	: Dated 2017-06

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Test Item Description.	**: Personal Mobile Alarm System**
Trade Mark.....	: N/A
Test Model	: EV-07B-4G
Ratings	: DC 3.7V by Rechargeable Li-ion Battery (800mAh) Recharged by DC 5V 1000mA Adapter
Result	**: Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Aking Jin	Leo Lee	Gavin Liang
Aking Jin/ File administrator	Leo Lee/ Technique principal	Gavin Liang/ Manager

RADIO -- TEST REPORT

Test Report No. : LCS190415004AED	May 20, 2019 Date of issue

Test Model.....	: EV-07B-4G
EUT.....	: Personal Mobile Alarm System
Applicant.....	**: Shenzhen Eview GPS Technology**
Address.....	: #1203 Building 2, GuoLe Technology Park, Lirong Road, Dalang, Longhua, Shenzhen, China
Telephone.....	: /
Fax.....	: /
Manufacturer.....	**: Shenzhen Eview GPS Technology**
Address.....	: #1203 Building 2, GuoLe Technology Park, Lirong Road, Dalang, Longhua, Shenzhen, China
Telephone.....	: /
Fax.....	: /
Factory.....	**: Shenzhen Eview GPS Technology**
Address.....	: #1203 Building 2, GuoLe Technology Park, Lirong Road, Dalang, Longhua, Shenzhen, China
Telephone.....	: /
Fax.....	: /

Test Result	Positive

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

Revision	Issue Date	Revisions	Revised By
000	May 20, 2019	Initial Issue	Gavin Liang

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1. GENERAL INFORMATION

1.1. Product Description for Equipment Under Test (EUT)

EUT	:	Personal Mobile Alarm System
Model No.	:	EV-07B-4G
Model Declaration	:	N/A
Test Model	:	EV-07B-4G
Power Supply	:	DC 3.7V by Rechargeable Li-ion Battery (800mAh) Recharged by DC 5V 1000mA Adapter
Hardware Version	:	EV07B-LTE1-V2.01
Software Version	:	V1.0.6.25
3G	:	
Support Band	:	☐WCDMA Band II(US-Band) ☒WCDMA Band V(US-Band) ☒WCDMA Band I(EU-Band) ☒WCDMA Band VIII(EU-Band)
Release Version	:	R8
Uplink	:	WCDMA Band I: 1920MHz ~ 1980MHz WCDMA Band VIII: 880MHz~915MHz
Downlink	:	WCDMA Band I: 2110MHz ~ 2170MHz WCDMA Band VIII: 925MHz~960MHz
Type Of Modulation	:	WCDMA: BPSK; HSDPA/HSUPA: BPSK
Antenna Description	:	PIFA Antenna, -1.42dBi (max.) For WCDMA Band I; -2.67dBi (max.) For WCDMA Band VIII
Power Class	:	Level 3
LTE	:	
Support Band	:	☒E-UTRA Band 3(EU-Band) ☒E-UTRA Band 5(No EU-Band) ☒E-UTRA Band 28(EU-Band)
LTE Release Version	:	R9
FDD Band	:	Uplink: E-UTRA Band 3: 1710MHz ~ 1785MHz E-UTRA Band 28: 703MHz ~ 748MHz Downlink: E-UTRA Band 3: 1805MHz ~ 1880MHz E-UTRA Band 28: 758MHz ~ 803MHz
Type Of Modulation	:	QPSK/16-QAM
Antenna Description	:	PIFA Antenna, -1.57dBi (max.) For LTE Band 3; -3.26dBi (max.) For LTE Band 28
Power Class	:	Class 3
Bluetooth	:	
Frequency Range	:	2.402-2.480GHz
Channel Number	:	40 channels
Channel Spacing	:	2MHz
Modulation Type	:	GFSK
Bluetooth Version	:	V4.0 (Support only BT LE)
Antenna Description	:	PIFA Antenna, -0.87dBi (Max.)
WIFI(2.4G Band)	:	
Frequency Range	:	2412-2472MHz
Channel Spacing	:	5MHz
Channel Number	:	13 Channel for 20MHz bandwidth(2412~2472MHz) (Not applicable 802.11n-HT40)
Modulation Type	:	802.11b: DSSS; 802.11g/n: OFDM
Antenna Description	:	PIFA Antenna, -0.87dBi (Max.)
GPS Receiver	:	
Receive Frequency	:	1575.42MHz
Channel Number	:	1
Antenna Description	:	Ceramic Antenna

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Product Information

a) The type of modulation used by the equipment:

☐FHSS

☒other forms of modulation

b) In case of FHSS modulation:

•In case of non-Adaptive Frequency Hopping equipment:

The number of Hopping Frequencies: .....

•In case of Adaptive Frequency Hopping Equipment:

The maximum number of Hopping Frequencies: .....

The minimum number of Hopping Frequencies: .....

The Dwell Time: .....

The Minimum Channel Occupation Time: .....

c) Adaptive / non-adaptive equipment:

☐non-adaptive Equipment

☒adaptive Equipment without the possibility to switch to a non-adaptive mode

☐adaptive Equipment which can also operate in a non-adaptive mode

d) In case of adaptive equipment:

The Channel Occupancy Time implemented by the equipment:

☒The equipment has implemented an LBT based DAA mechanism

- In case of equipment using modulation different from FHSS:

☐The equipment is Frame Based equipment

☒The equipment is Load Based equipment

☐The equipment can switch dynamically between Frame Based and Load Based equipment

The CCA time implemented by the equipment: 20μs

The value q as referred to in clause 4.3.2.5.2.2.2 4

☐The equipment has implemented an non-LBT based DAA mechanism

☐The equipment can operate in more than one adaptive mode

e) In case of non-adaptive Equipment:

The maximum RF Output Power (e.i.r.p.): ……dBm

The maximum (corresponding) Duty Cycle: 100 %

Equipment with dynamic behaviour, that behaviour is described here. (e.g. the different combinations of duty cycle and corresponding power levels to be declared):

f) The worst case operational mode for each of the following tests:

- RF Output Power (worst case 802.11b)

DSSS, OFDM

- Power Spectral Density (worst case 802.11b)

DSSS, OFDM

- Duty cycle, Tx-Sequence, Tx-gap

.....

- Dwell time, Minimum Frequency Occupation & Hopping Sequence (only for FHSS equipment)

.....

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- Hopping Frequency Separation (only for FHSS equipment)

.....

- Medium Utilisation

.....

- Adaptivity & Receiver Blocking (worst case 802.11b)

DSSS, OFDM

- Occupied Channel Bandwidth (worst case 802.11n20)

DSSS, OFDM

- Transmitter unwanted emissions in the OOB domain (worst case 802.11b)

DSSS, OFDM

- Transmitter unwanted emissions in the spurious domain (worst case 802.11b)

DSSS, OFDM

- Receiver spurious emissions (worst case 802.11n20)

DSSS, OFDM

g) The different transmit operating modes (tick all that apply):

☒Operating mode 1: Single Antenna Equipment

☒Equipment with only 1 antenna

☐Equipment with 2 diversity antennas but only 1 antenna active at any moment in time

☐Smart Antenna Systems with 2 or more antennas, but operating in a (legacy) mode where only 1 antenna is used. (e.g. IEEE 802.11™ [i.3] legacy mode in smart antenna systems)

☐Operating mode 2: Smart Antenna Systems - Multiple Antennas without beam forming

☐Single spatial stream / Standard throughput / (e.g. IEEE 802.11™ [i.3] legacy mode)

☐High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 1

☐High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 2

NOTE: Add more lines if more channel bandwidths are supported.

☐Operating mode 3: Smart Antenna Systems - Multiple Antennas with beam forming

☐Single spatial stream / Standard throughput (e.g. IEEE 802.11™ [i.3] legacy mode)

☐High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 1

☐High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 2

NOTE: Add more lines if more channel bandwidths are supported.

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h) In case of Smart Antenna Systems:

- The number of Receive chains: .....
- The number of Transmit chains: .....

☐symmetrical power distribution

☐asymmetrical power distribution

In case of beam forming, the maximum beam forming gain: .....

NOTE: Beam forming gain does not include the basic gain of a single antenna.

i) Operating Frequency Range(s) of the equipment:

- Operating Frequency Range 1: 2412MHz to 2472MHz
- Operating Frequency Range 2: ……MHz to ……MHz

NOTE: Add more lines if more Frequency Ranges are supported.

j) Occupied Channel Bandwidth(s):

- Occupied Channel Bandwidth 1: 17.772MHz (20MHz norminal bandwidth)
- Occupied Channel Bandwidth 2: ……MHz (…MHz norminal bandwidth)

NOTE: Add more lines if more channel bandwidths are supported.

k) Type of Equipment (stand-alone, combined, plug-in radio device, etc.):

☒Stand-alone

☐Combined Equipment (Equipment where the radio part is fully integrated within another type of equipment)

☐Plug-in radio device (Equipment intended for a variety of host systems)

Other .....

l) The extreme operating conditions that apply to the equipment:

Operating temperature range: -20° C to 45° C

Operating voltage range: 3.7V ☐AC ■DC

Details provided are for the: ■stand-alone equipment

☐combined (or host) equipment

☐test jig

m) The intended combination(s) of the radio equipment power settings and one or more antenna assemblies and their corresponding e.i.r.p levels:

- Antenna Type

☒PIFA Antenna

Antenna Gain: -0.87dBi

If applicable, additional beamforming gain (excluding basic antenna gain): ..... dB

☐Temporary RF connector provided

☐No temporary RF connector provided

☐Dedicated Antennas (equipment with antenna connector)

☐Single power level with corresponding antenna(s)

☐Multiple power settings and corresponding antenna(s)

Number of different Power Levels: .....

Power Level 1: ..... dBm

Power Level 2: ..... dBm

Power Level 3: ..... dBm

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NOTE 1: Add more lines in case the equipment has more power levels.
NOTE 2: These power levels are conducted power levels (at antenna connector).

n) The nominal voltages of the stand-alone radio equipment or the nominal voltages of the combined (host) equipment or test jig in case of plug-in devices:
Details provided are for the: ☒stand-alone equipment
☐combined (or host) equipment
☐test jig
Supply Voltage ☐AC mains State AC voltage ……. V
☒ DC State DC voltage: 3.7V

In case of DC, indicate the type of power source
☐Internal Power Supply
☐External Power Supply or AC/DC adapter
☒Battery: 3.7V
☐Other: .....

o) Describe the test modes available which can facilitate testing:
The EUT can transmit in engineering mode.

p) The equipment type (e.g. Bluetooth®, IEEE 802.11™ [i.3], proprietary, etc.):
IEEE 802.11™

1.2. Objective

This Type approval report is prepared on behalf of **Shenzhen Eview GPS Technology** in accordance with ETSI EN 300 328 V2.1.1 (2016-11), Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU.

The objective is to determine compliance with ETSI EN 300 328 V2.1.1 (2016-11).

1.3. Related Submittal(s)/Grant(s)

No Related Submittals.

1.4. Test Methodology

All measurements contained in this report were conducted with ETSI EN 300 328 V2.1.1 (2016-11).

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1.5. Description of Test Facility

FCC Registration Number is 254912.
Industry Canada Registration Number is 9642A-1.
EMSD Registration Number is ARCB0108.
UL Registration Number is 100571-492.
TUV SUD Registration Number is SCN1081.
TUV RH Registration Number is UA 50296516-001.
NVLAP Accreditation Code is 600167-0.
FCC Designation Number is CN5024.
CAB identifier is CN0071.

1.6. Support equipment List

Manufacturer	Description	Model	Serial Number	Certificate
---	---	---	---	---

1.7. External I/O

I/O Port Description	Quantity	Cable
SIM Card Slot	1	N/A

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1.8. List Of Measuring Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	X-series USB Peak and Average Power Sensor Agilent	Agilent	U2021XA	MY54080022	2018-10-25	2019-10-24
2	4 CH. Simultaneous Sampling 14 Bits 2MS/s	Agilent	U2531A	MY54080016	2018-10-25	2019-10-24
3	Test Software	Ascentest	AT890-SW	20160630	N/A	N/A
4	RF Control Unit	Ascentest	AT890-RFB	N/A	2018-06-16	2019-06-15
5	MXA Signal Analyzer	Agilent	N9020A	MY49061051	2018-06-16	2019-06-15
6	DC Power Supply	Agilent	E3642A	N/A	2018-11-15	2019-11-14
7	MXG Vector Signal Generator	Agilent	N5182A	MY47071151	2018-06-16	2019-06-15
8	ESG Vector Signal Generator	Agilent	E4438C	MY49072627	2018-06-16	2019-06-15
9	PSG Analog Signal Generator	Agilent	E8257D	MY4520521	2018-06-16	2019-06-15
10	Temperature & Humidity Chamber	GUANGZHOU GOGNWEN	GDS-100	70932	2018-10-10	2019-10-09
11	EMI Test Software	AUDIX	E3	/	2018-06-16	2019-06-15
12	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2018-06-16	2019-06-15
13	Positioning Controller	MF	MF-7082	/	2018-06-16	2019-06-15
14	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2018-07-26	2019-07-25
15	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2018-07-26	2019-07-25
16	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2018-07-02	2019-07-01
17	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	791	2018-09-20	2019-09-19
18	Broadband Preamplifier	SCHWARZBECK	BBV 9719	9719-025	2018-09-20	2019-09-19
19	EMI Test Receiver	R&S	ESR 7	101181	2018-06-16	2019-06-15
20	RS SPECTRUM ANALYZER	R&S	FSP40	100503	2018-11-15	2019-11-14
21	AMPLIFIER	QuieTek	QTK	CHM/0809065	2018-11-15	2019-11-14
22	RF Cable-R03m	Jye Bao	RG142	CB021	2018-06-16	2019-06-15
23	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2018-06-16	2019-06-15
24	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW 500	103818	2018-06-16	2019-06-15
25	6dB Attenuator	/	100W/6dB	1172040	2018-06-16	2019-06-15
26	3dB Attenuator	/	2N-3dB	/	2018-06-16	2019-06-15
Note: All equipment is calibrated through GUANGZHOU LISAI CALIBRATION AND TEST CO.,LTD.						

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1.9. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty
Occupied Channel Bandwidth	5 %
RF output power, conducted	1,5 dB
Power Spectral Density, conducted	3 dB
Unwanted Emissions, conducted	3 dB
All emissions, radiated	6 dB
Temperature	1 °C
Humidity	5 %
DC and low frequency voltages	3 %
Time	5 %
Duty Cycle	5 %

1.10. Test Environment

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	22.9
Humidity (%RH)	25-75	52.4
Barometric pressure (mbar)	860-1060	950-1000

1.11. Description Of Test Modes

LCS has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1: Transmit by 802.11b
Mode 2: Transmit by 802.11g
Mode 3: Transmit by 802.11n(20MHz)
Mode 4: Receive by 802.11b
Mode 5: Receive by 802.11g
Mode 6: Receive by 802.11n(20MHz)

Note:

(1) For portable device, radiated spurious emission was verified over X, Y, Z Axis, and shown the worst case (X axis) on this report.

(2) Regard to the frequency band operation for systems using Wide Band modulation: the lowest, middle, highest frequency channel for conducted test, and the lowest, highest frequency channel for radiation spurious test.

(3) The extreme test condition for temperature was declared by the manufacturer.

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2. SYSTEM TEST CONFIGURATION

2.1. Justification

The system was configured for testing in engineering mode.

2.2. EUT Exercise Software

N/A.

2.3. Special Accessories

N/A.

2.4. Block Diagram/Schematics

Please refer to the related document.

2.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

2.6. Configuration of Test Setup

Please refer to the test setup photo.

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3. SUMMARY OF TEST RESULT

☒ No deviations from the test standards

☐ Deviations from the test standards as below description:

Technical requirements for the equipment using wide band modulations other than FHSS:

Performed Test Item	Normative References	Test Performed	Deviation
RF Output Power & Receiver Category	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No
Power Spectral Density	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No
Duty cycle, Tx-Sequence, Tx-gap	ETSI EN 300 328 V2.1.1 (2016-11)	N/A	N/A
Medium Utilisation (MU) factor	ETSI EN 300 328 V2.1.1 (2016-11)	N/A	N/A
Adaptivity	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No
Occupied Channel Bandwidth	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No
Transmitter unwanted emissions in the out-of-band domain	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No
Transmitter unwanted emissions in the spurious domain	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No
Receiver Spurious Emissions	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No
Receiver Blocking	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No

Note:
1. The EUT can operate in an adaptive mode, and can't operate in a non-adaptive mode which is stated by the supplier.
2. The EUT is equipment which using wide band modulations other than FHSS. It is an adaptive equipment which can't operate in non-adaptive mode.

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4. RF OUTPUT POWER

4.1. Limit

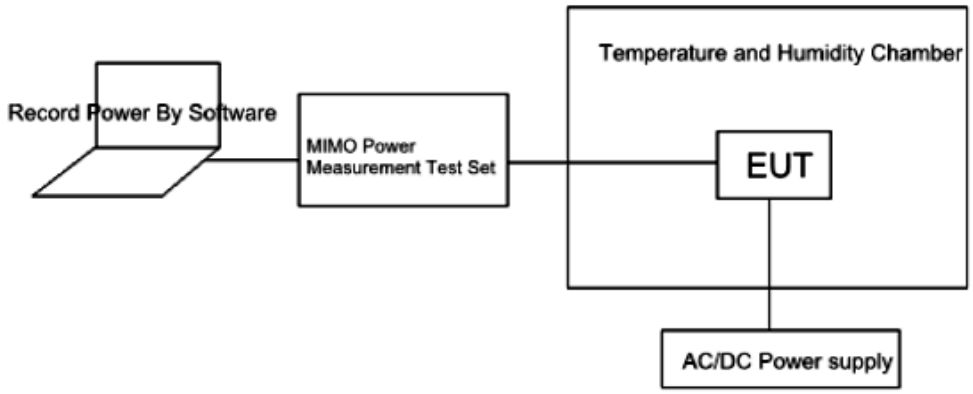
For adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be 20 dBm.

The maximum RF output power for non-adaptive equipment shall be declared by the supplier and shall not exceed 20 dBm. For non-adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be equal to or less than the value declared by the supplier.

This limit shall apply for any combination of power level and intended antenna assembly.

4.2. Test Setup

For Conducted Measurement



4.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.2

Step 1:

• The fast power sensor use the following setting: Sample speed 1 MS/s.

Step 2:

• Connect the power sensor to the transmit port, sample the transmit signal and store the raw data.Use these stored samples in all following steps.

Step 3:

• Find the start and stop times of each burst in the stored measurement samples.

Step 4:

• Between the start and stop times of each individual burst calculate the RMS power over the burst. Save these Pburst values, as well as the start and stop times for each burst.

Step 5:

• The highest of all Pburst values (value "A" in dBm) will be used for maximum e.i.r.p. calculations.

Step 6:

• Add the (stated) antenna assembly gain "G" in dBi of the individual antenna.

• If applicable, add the additional beamforming gain "Y" in dB.

The RF Output Power (P) shall be calculated using the formula below:
P = A + G + Y

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4.4. Test Result

Please refer to the 2.4G WIFI RF Test Data Appendix 5.4.2.

4.5. Receiver Category

Receiver Category 1: Adaptive equipment with a maximum RF output power greater than 10 dBm e.i.r.p. shall be considered as receiver category 1 equipment.

Receiver Category 2:Non-adaptive equipment with a Medium Utilization (MU) factor greater than 1 % and less than or equal to 10 % or adaptive equipment with a maximum RF output power of 10 dBm e.i.r.p. shall be considered as receiver category 2 equipment.

Receiver Category 3: Non-adaptive equipment with a maximum Medium Utilization (MU) factor of 1 % or adaptive equipment with a maximum RF output power of 0 dBm e.i.r.p. shall be considered as receiver category 3 equipment.

As this an adaptivity device with a maximum power of greater than 10dBm, **it belongs to recevier category 1**.

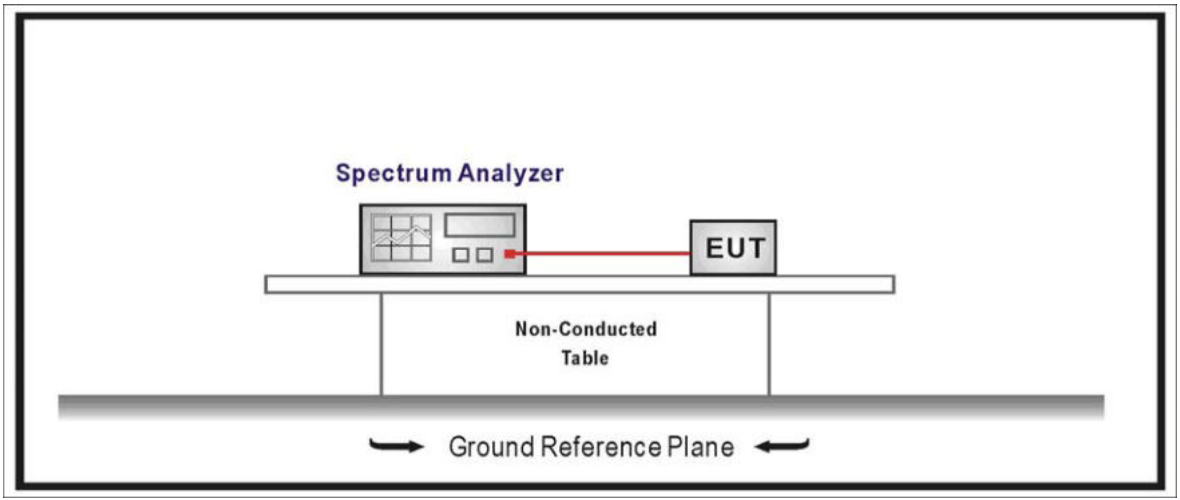
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5. POWER SPECTRAL DENSITY

5.1. Limit

For equipment using wide band modulations other than FHSS, the maximum Power Spectral Density is limited to 10dBm per MHz.

5.2. Test Setup



5.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.3

Step 1:

Connect the UUT to the spectrum analyser and use the following settings:

- Start Frequency: 2 400 MHz
- Stop Frequency: 2 483,5 MHz
- Resolution BW: 10 kHz
- Video BW: 30 kHz
- Sweep Points: > 8 350
- Detector: RMS
- Trace Mode: Max Hold
- Sweep time: Auto

For non-continuous signals, wait for the trace to be completed. Save the (trace) data set to a file.

Step 2:

For each frequency point, add up the amplitude (power) values for the different transmit chains and use this as the new data set.

Step 3:

Add up the values for amplitude (power) for all the samples in the file.

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Step 4:

Normalize the individual values for amplitude so that the sum is equal to the RF Output Power (e.i.r.p.).

Step 5:

Starting from the first sample in the file (lowest frequency), add up the power of the following samples representing a 1 MHz segment and record the results for power and position (i.e. sample #1 to #100). This is the Power Spectral Density (e.i.r.p.) for the first 1 MHz segment which shall be recorded.

Step 6:

Shift the start point of the samples added up in step 5 by 1 sample and repeat the procedure in step 5 (i.e. sample #2 to #101).

Step 7:

Repeat step 6 until the end of the data set and record the radiated Power Spectral Density values for each of the 1 MHz segments. From all the recorded results, the highest value is the maximum Power Spectral Density for the UUT.

5.4. Test Result

Please refer to the 2.4G WIFI RF Test Data Appendix 5.4.3.

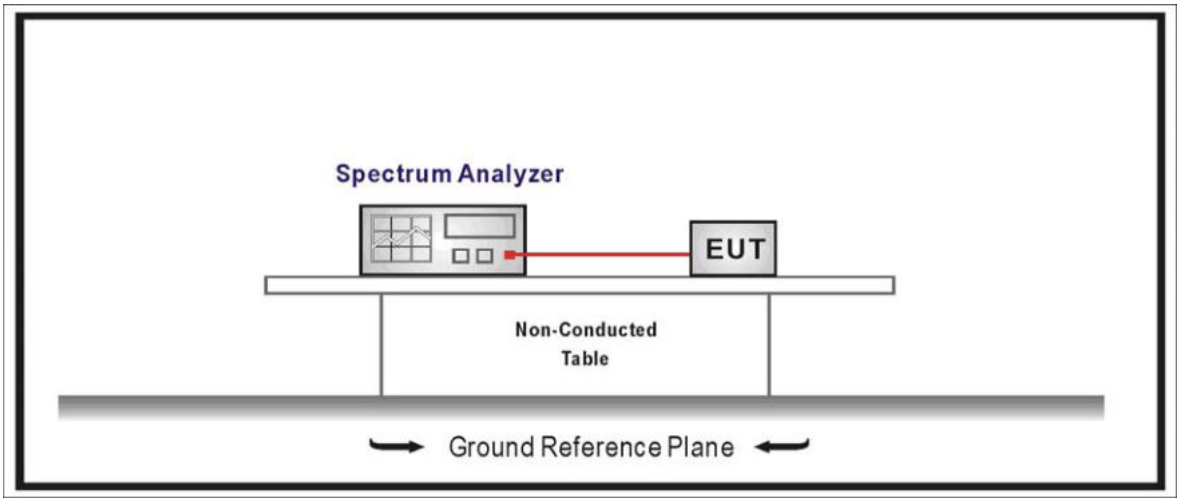
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6. DUTY CYCLE, TX-SEQUENCE, TX-GAP

6.1. Limit

The Duty Cycle shall be equal to or less than the maximum value declared by the supplier.
The maximum Tx-sequence Time and the minimum Tx-gap Time shall be according to the formula below: Maximum Tx-Sequence Time = Minimum Tx-gap Time = M
where M is in the range of 3,5 ms to 10 ms.

6.2. Test Setup



6.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.2

6.4. Test Result

These requirements apply to non-adaptive frequency hopping equipment or to adaptive frequency hopping equipment operating in a non-adaptive mode.
These requirements do not apply for equipment with a maximum declared RF Output power of less than 10dBm E.I.R.P. or for equipment when operating in a mode where the RF Output power is less than 10dBm E.I.R.P.
No applicable.

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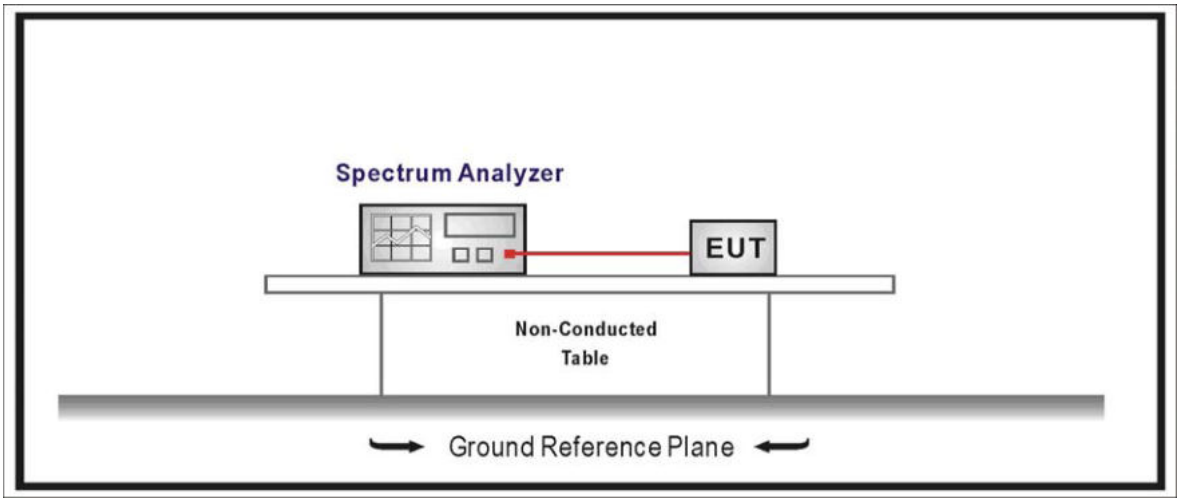
7. MEDIUM UTILISATION (MU) FACTOR

7.1. Limit

For non-adaptive equipment

The maximum Medium Utilisation factor for non-adaptive Frequency Hopping equipment shall be 10 %.

7.2. Test Setup



7.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.2

7.4. Test Result

This requirement does not apply to adaptive equipment unless operating in a non-adaptive mode.
In addition, this requirement does not apply for equipment with a maximum declared RF Output power level of less than 10dBm E.I.R.P. or for equipment when operating in a mode where the RF Output power is less than 10dBm E.I.R.P.
No applicable.

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8. ADAPTIVITY AND RECEIVER BLOCKING

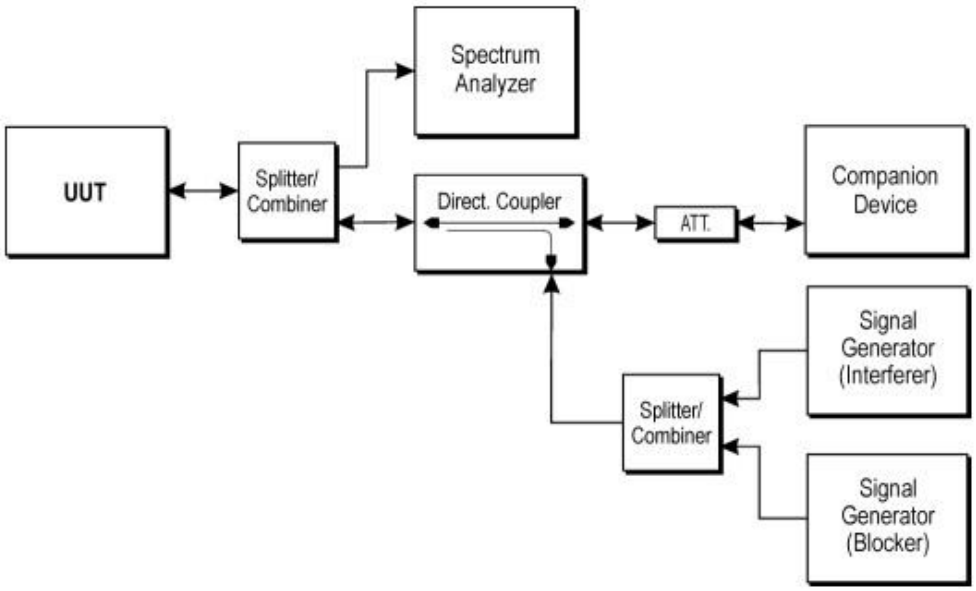
8.1. Limit

Adaptivity Limit
☐ Non-LBT based Detect and Avoid --- The channel shall remain unavailable for a minimum time equal to 1 s after which the channel may be considered again as an 'available' channel; --- COT ≤ 40 ms; --- COT ≤ 60 ms; --- Idle Period shall be minimum 5% of COT with a minimum of 100us; --- Detection threshold level = -70dBm/MHz + 20 – Pout E.I.R.P (Pout in dBm);
☐ LBT based Detect and Avoid(Frame Based Equipment) --- The CCA observation time shall be not less than 20 us; --- The CCA time used by the equipment shall be declared by the supplier; --- COT = 1-10 ms; --- Idle Period = 5% of COT; --- Detection threshold level = -70dBm/MHz + 20 – Pout E.I.R.P (Pout in dBm);
☒ LBT based Detect and Avoid(Load Based Equipment) --- The CCA observation time shall be not less than 20 us; --- The CCA time used by the equipment shall be declared by the supplier; --- COT ≤ (13 / 32) * q ms; q = [4~32]; 1.625ms~13ms; --- R = number of clear idle slots are randomly [1~q]. Every time an Extended CCA is required and the 'R' value stored in a counter. --- Detection threshold level = -70dBm/MHz + 20 – Pout E.I.R.P (Pout in dBm);
☐ Short Control Signalling Transmissions: --- Short Control Signalling Transmissions shall have a maximum duty cycle of 10% within an observation period of 50ms.

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8.2. Test Setup

Conducted measurements



8.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.7

1) The EUT connect to a companion device during the test. Adjust the received signal level at the EUT to the value defined in table 6 of ETSI EN 300 328 V2.1.1 (2016-11) Clause 4.3.2.10.2
2) the analyzer shall be set as below: RBW=8MHz and VBW=28MHz.
3) Configure the EUT for normal transmission with a sufficiently high payload to allow demonstration of compliance of the adaptive mechanism on the channel being tested.
4) Adding the interference signal and blocking signal.
5) Record the data.

8.4. Test Result

Please refer to the 2.4G WIFI RF Test Data Appendix 5.4.6.

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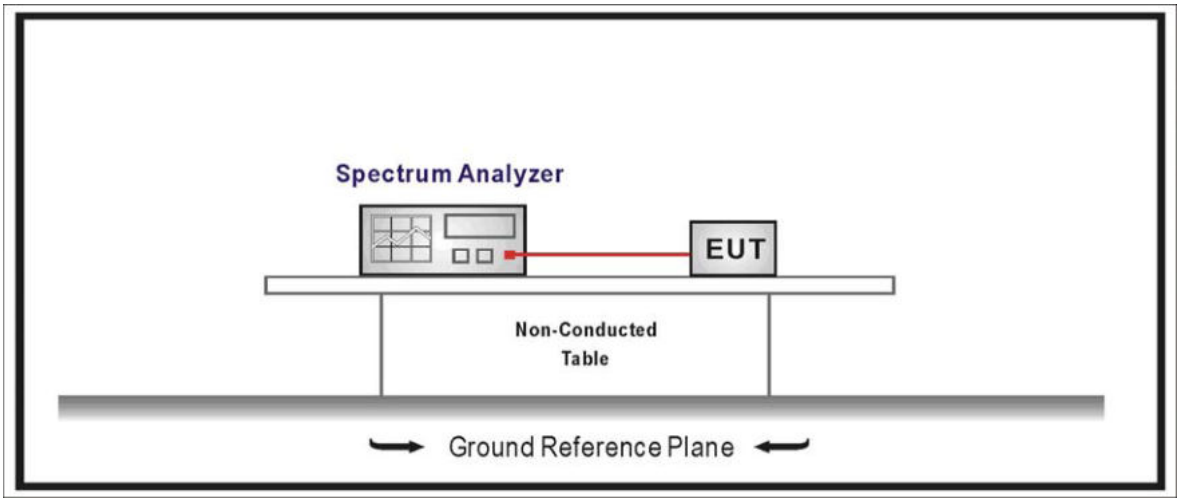
9. OCCUPIED CHANNEL BANDWIDTH

9.1. Limit

The Occupied Channel Bandwidth shall fall completely within the band given in 2.4GHz to 2.4835GHz.

In addition, for non-adaptive systems using wide band modulations other than FHSS and with e.i.r.p greater than 10 dBm, the occupied channel bandwidth shall be less than 20 MHz.

9.2. Test Setup



9.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.8

Step 1:

Connect the UUT to the spectrum analyser and use the following settings:

• Centre Frequency: The centre frequency of the channel under test

• Resolution BW: ~ 1 % of the span without going below 1 %

(we set RBW=430KHz for 802.11b/g/n20 and 1MHz for 802.11n40)

• Video BW: 3 × RBW (we set VBW=1.2MHz for 802.11b/g/n20 and 3MHz for 802.11n40)

• Frequency Span: 2 × Occupied Channel Bandwidth

(we set Span=40MHz(for 802.11b/g/n20) & 80MHz(for 802.11n40))

• Detector Mode: RMS

• Trace Mode: Max Hold

Step 2:

Wait until the trace is completed. Find the peak value of the trace and place the analyser marker on this peak.

Step 3:

Use the 99 % bandwidth function of the spectrum analyser to measure the Occupied Channel Bandwidth of the UUT. This value shall be recorded.

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9.4. Test Result

Please refer to the 2.4G WIFI RF Test Data Appendix 5.4.7.

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10. TRANSMITTER UNWANTED EMISSIONS IN THE OUT-OF-BAND DOMAIN

10.1. Limit

The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask in figure 3.

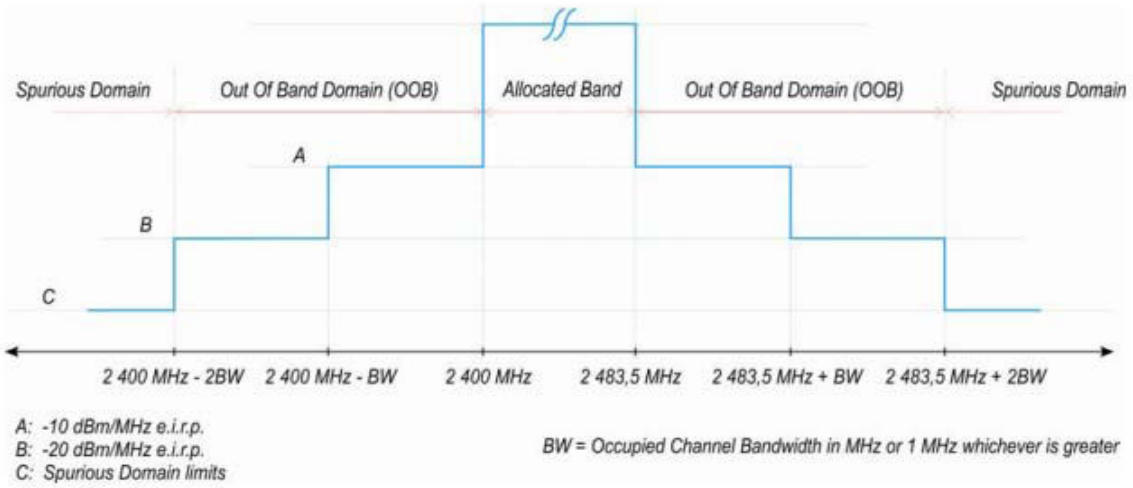
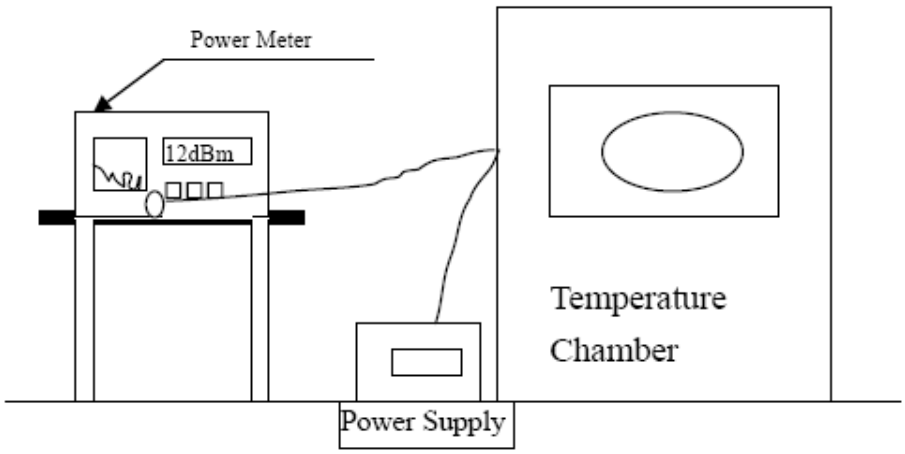


Figure 3: Transmit mask

10.2. Test Setup

For Conducted Measurement



10.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.9

Step 1:

• Connect the UUT to the spectrum analyser and use the following settings:
- Centre Frequency: 2 484 MHz
- Span: 0 Hz
- Resolution BW: 1 MHz
- Filter mode: Channel filter
- Video BW: 3 MHz
- Detector Mode: RMS
- Trace Mode: Clear / Write
- Sweep Mode: Continuous
- Sweep Points: 5 000
- Trigger Mode: Video trigger

NOTE 1: In case video triggering is not possible, an external trigger source may be used.
- Sweep Time: Suitable to capture one transmission burst

Step 2: (segment 2 483,5 MHz to 2 483,5 MHz + BW)

• Adjust the trigger level to select the transmissions with the highest power level.

• For frequency hopping equipment operating in a normal hopping mode, the different hops will result in signal bursts with different power levels. In this case the burst with the highest power level shall be selected.

• Set a window (start and stop lines) to match with the start and end of the burst and in which the RMS power shall be measured using the Time Domain Power function.

• Select RMS power to be measured within the selected window and note the result which is the RMS power within this 1 MHz segment (2 483,5 MHz to 2 484,5 MHz). Compare this value with the applicable limit provided by the mask.

• Increase the centre frequency in steps of 1 MHz and repeat this measurement for every 1 MHz segment within the range 2 483,5 MHz to 2 483,5 MHz + BW. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + BW - 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 3: (segment 2 483,5 MHz + BW to 2 483,5 MHz + 2BW)

• Change the centre frequency of the analyser to 2 484 MHz + BW and perform the measurement for the first 1 MHz segment within range 2 483,5 MHz + BW to 2 483,5 MHz + 2BW. Increase the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + 2 BW - 0,5 MHz.

Step 4: (segment 2 400 MHz - BW to 2 400 MHz)

• Change the centre frequency of the analyser to 2 399,5 MHz and perform the measurement for the first 1 MHz segment within range 2 400 MHz - BW to 2 400 MHz Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2BW + 0,5 MHz.

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Step 5: (segment 2 400 MHz - 2BW to 2 400 MHz - BW)

• Change the centre frequency of the analyser to 2 399,5 MHz - BW and perform the measurement for the first 1 MHz segment within range 2 400 MHz - 2BW to 2 400 MHz - BW. Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2BW + 0,5 MHz.

Step 6:

• In case of conducted measurements on equipment with a single transmit chain, the declared antenna assembly gain "G" in dBi shall be added to the results for each of the 1 MHz segments and compared with the limits provided by the mask given in figures 1 or 3. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered.

• In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), the measurements need to be repeated for each of the active transmit chains. The declared antenna assembly gain "G" in dBi for a single antenna shall be added to these results. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered. Comparison with the applicable limits shall be done using any of the options given below:

- Option 1: the results for each of the transmit chains for the corresponding 1 MHz segments shall be added. The additional beamforming gain "Y" in dB shall be added as well and the resulting values compared with the limits provided by the mask given in figures 1 or 3.
- Option 2: the limits provided by the mask given in figures 1 or 3 shall be reduced by 10 x log10(Ach) and the additional beamforming gain "Y" in dB. The results for each of the transmit chains shall be individually compared with these reduced limits.

NOTE 2: Ach refers to the number of active transmit chains.

It shall be recorded whether the equipment complies with the mask provided in figures 1 or 3.

10.4. Test Result

Please refer to the 2.4G WIFI RF Test Data Appendix 5.4.8.

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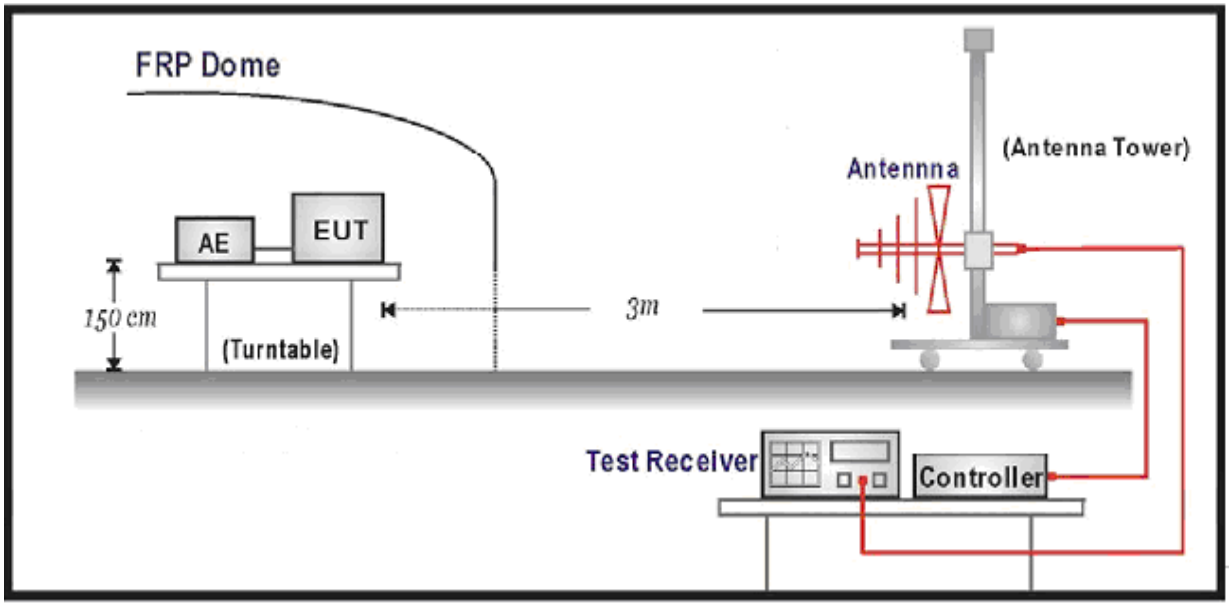
11. TRANSMITTER UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN

11.1. Limit

Transmitter Limits for Spurious Emissions		
Frequency Range	Maximum power E.R.P. (≤ 1GHz) E.I.R.P. (> 1GHz)	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87,5 MHz	-36 dBm	100 kHz
87,5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 862 MHz	-54 dBm	100 kHz
862 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to 12,75 GHz	-30 dBm	1 MHz

11.2. Test Setup

For Radiated Measurement



11.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.10

Step 1:

The sensitivity of the spectrum analyser should be such that the noise floor is at least 12 dB below the limits given in tables 1 or 4.

Step 2:

The emissions over the range 30 MHz to 1 000 MHz shall be identified.

Spectrum analyser settings:

• Resolution bandwidth: 100 kHz

• Video bandwidth: 300 kHz

• Detector mode: Peak

• Trace Mode: Max Hold

• Sweep Points: ≥ 9 970

NOTE 1: For spectrum analysers not supporting this high number of sweep points, the frequency band may need to be segmented.

• Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 100 kHz frequency step, the measurement time is greater than two transmissions of the UUT. For Frequency Hopping equipment operating in a normal operating (hopping not disabled) mode, the sweep time shall be further increased to capture multiple transmissions on the same hopping frequency in different hopping sequences. Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.3.10.2.1.2 and compared to the limits given in tables 1 or 4.

Step 3:

The emissions over the range 1 GHz to 12,75 GHz shall be identified.

Spectrum analyser settings:

• Resolution bandwidth: 1 MHz

• Video bandwidth: 3 MHz

• Detector mode: Peak

• Trace Mode: Max Hold

• Sweep Points: ≥ 11 750

NOTE 2: For spectrum analysers not supporting this high number of sweep points, the frequency band may need to be segmented.

• Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 1 MHz frequency step, the measurement time is greater than two transmissions of the UUT.

11.4. Test Result

Please refer to the 2.4G WIFI RF Test Data Appendix 5.4.9.

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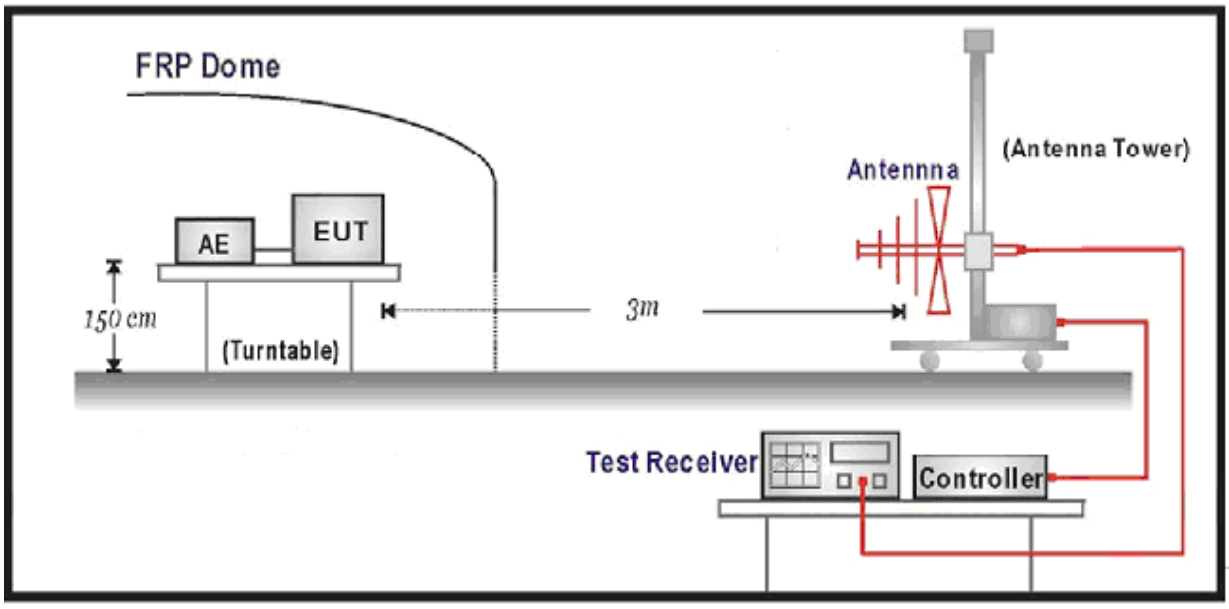
12. RECEIVER SPURIOUS EMISSIONS

12.1. Limit

Spurious emissions limits for receivers		
Frequency Range	Maximum power E.R.P. (≤ 1GHz) E.I.R.P. (> 1GHz)	Measurement bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 12.75 GHz	-47 dBm	1 MHz

12.2. Test Setup

For Radiated Measurement



12.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.11

Step 1:

The sensitivity of the spectrum analyser should be such that the noise floor is at least 12 dB below the limits given in tables 2 or 5.

Step 2:

The emissions over the range 30 MHz to 1 000 MHz shall be identified.

Spectrum analyser settings:

• Resolution bandwidth: 100 kHz
• Video bandwidth: 300 kHz
• Detector mode: Peak
• Trace Mode: Max Hold
• Sweep Points: ≥ 9 970
• Sweep time: Auto

Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.3.11.2.1.2 and compared to the limits given in tables 2 or 5.

Step 3:

The emissions over the range 1 GHz to 12,75 GHz shall be identified.

Spectrum analyser settings:

• Resolution bandwidth: 1 MHz
• Video bandwidth: 3 MHz
• Detector mode: Peak
• Trace Mode: Max Hold
• Sweep Points: ≥ 11 750
• Sweep time: Auto

Allow the trace to stabilize. Any emissions identified during the sweeps above that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.3.11.2.1.2 and compared to the limits given in tables 2 or 5. Frequency Hopping equipment may generate a block (or several blocks) of spurious emissions anywhere within the spurious domain. If this is the case, only the highest peak of each block of emissions shall be measured using the procedure in clause 5.3.11.2.1.2.

Step 4:

• In case of conducted measurements on smart antenna systems (equipment with multiple receive chains), the steps 2 and 3 need to be repeated for each of the active receive chains (Ach).The limits used to identify emissions during this pre-scan need to be reduced with 10 × log10 (Ach) (number of active receive chains).

12.4. Test Result

Please refer to the 2.4G WIFI RF Test Data Appendix 5.4.10.

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13. RECEIVER BLOCKING

13.1. Limit

Adaptive Frequency Hopping equipment shall comply with the requirements defined in clause 4.3.1.12.4

Table 6: Receiver Blocking parameters for Receiver Category 1 equipment

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
P_{min} + 6 dB	2 380 2 503,5	-53	CW
P_{min} + 6 dB	2 300 2 330 2 360	-47	CW
P_{min} + 6 dB	2 523,5 2 553,5 2 583,5 2 613,5 2 643,5 2 673,5	-47	CW
NOTE 1: P_{min} is the minimum level of wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.			

Table 7: Receiver Blocking parameters receiver category 2 equipment

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
P_{min} + 6 dB	2 380 2 503,5	-57	CW
P_{min} + 6 dB	2 300 2 583,5	-47	CW
NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.			

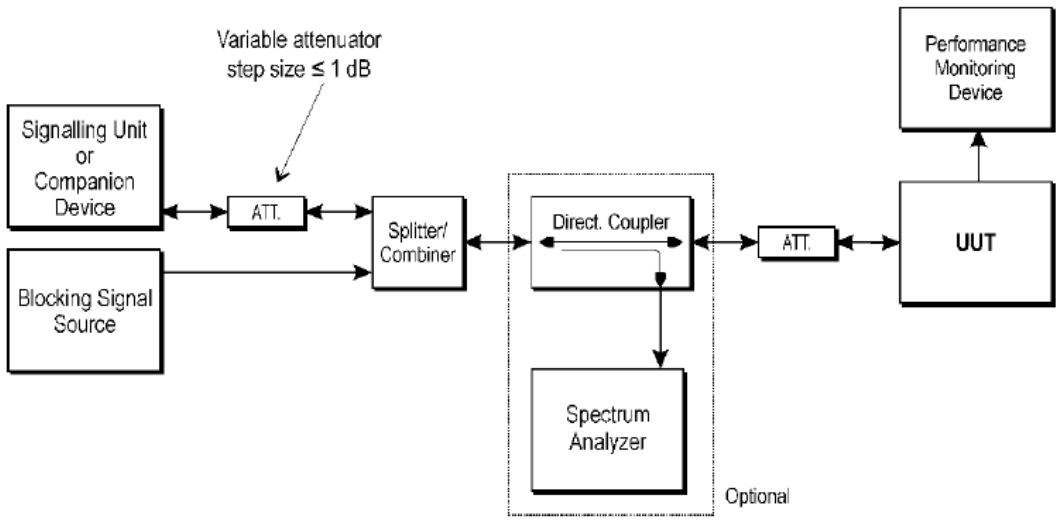
Table 8: Receiver Blocking parameters receiver category 3 equipment

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
P_{min} + 12 dB	2 380 2 503,5	-57	CW
P_{min} + 12 dB	2 300 2 583,5	-47	CW
NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.			

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13.2. Test Setup

Conducted measurements



13.3. Test Procedure

Step 1:

• For non-frequency hopping equipment, the UUT shall be set to the lowest operating channel.

Step 2:

• The blocking signal generator is set to the first frequency as defined in the appropriate table corresponding to the receiver category and type of equipment.

Step 3:

• With the blocking signal generator switched off, a communication link is established between the UUT and the associated companion device using the test setup shown in figure 6. The attenuation of the variable attenuator shall be increased in 1 dB steps to a value at which the minimum performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still met. The resulting level for the wanted signal at the input of the UUT is Pmin.

• This signal level (Pmin) is increased by the value provided in the table corresponding to the receiver category and type of equipment.

Step 4:

• The blocking signal at the UUT is set to the level provided in the table corresponding to the receiver category and type of equipment. It shall be verified and recorded in the test report that the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is met.

Step 5:

• Repeat step 4 for each remaining combination of frequency and level for the blocking signal as provided in the table corresponding to the receiver category and type of equipment.

Step 6:

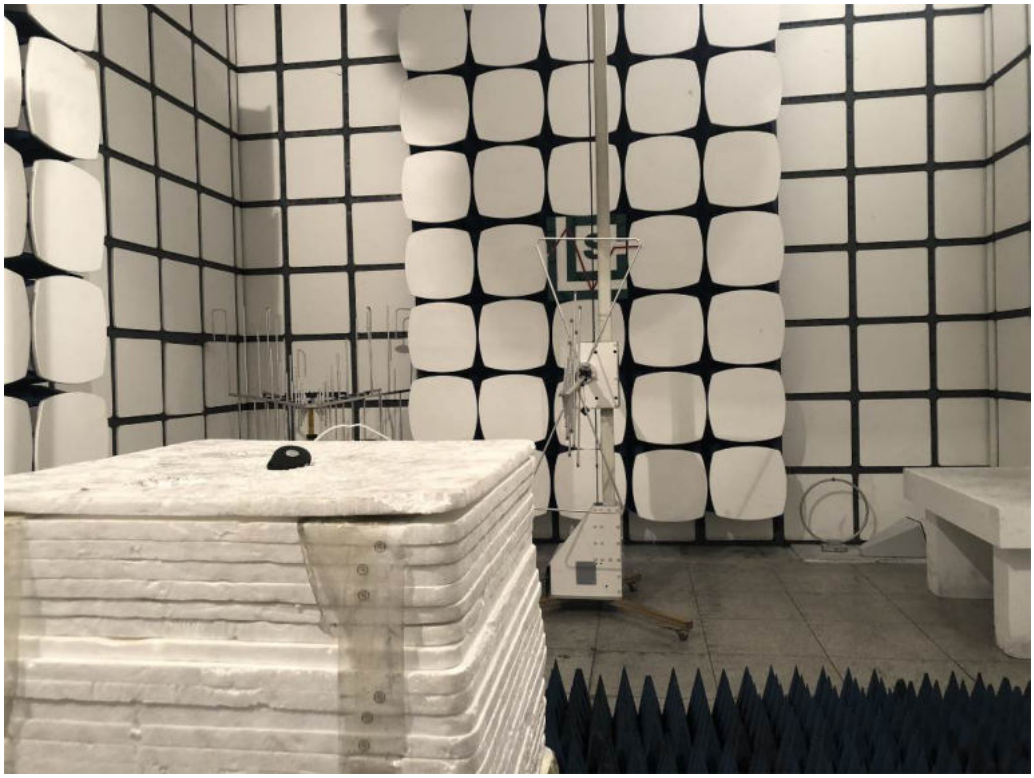
• For non-frequency hopping equipment, repeat step 2 to step 5 with the UUT operating at the highest operating channel.

13.4. Test Result

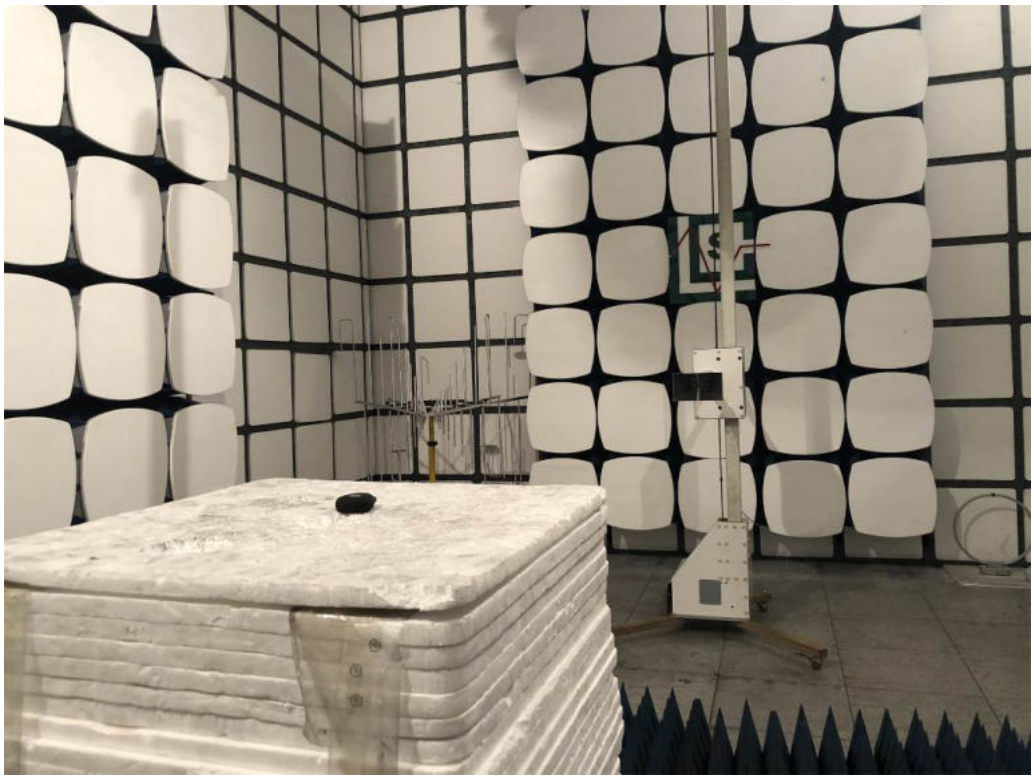
Please refer to the 2.4G WIFI RF Test Data Appendix 5.4.11.

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14. PHOTOGRAPHS OF TEST SETUP



Spurious Emission below 1GHz



Spurious Emission above 1GHz

----------THE END OF REPORT----------

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2.4G WIFI RF Test Data Appendix

Product Name: Personal Mobile Alarm System

Test Model: EV-07B-4G

Environmental Conditions

Temperature:	22.9 ° C
Relative Humidity:	52.4%
ATM Pressure:	100.0 kPa
Test Engineer:	Diamond.Lu
Supervised by:	Tom.Liu

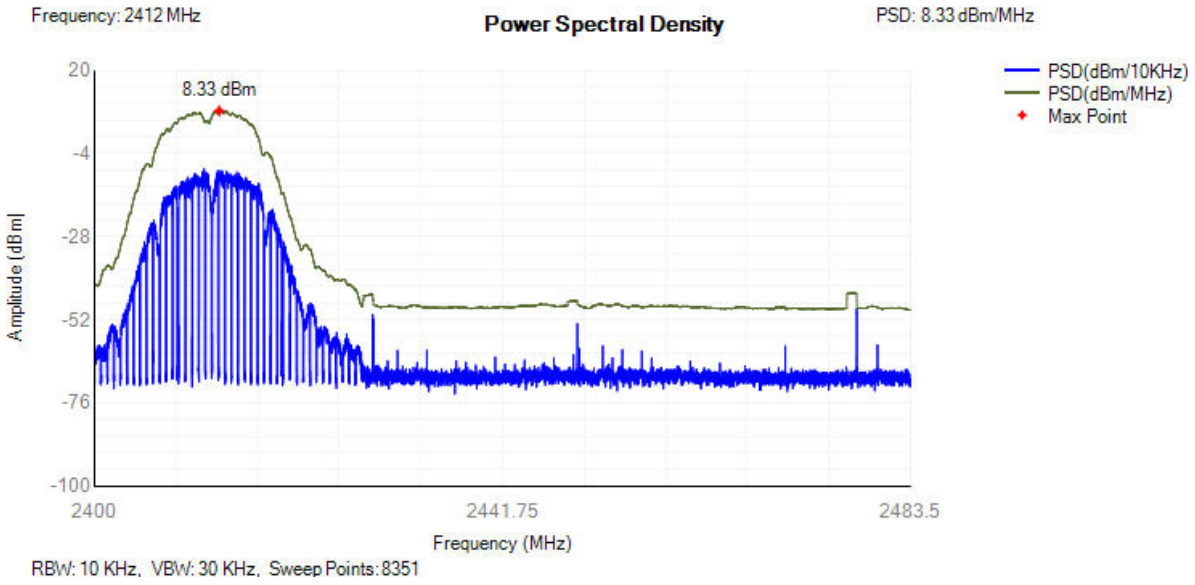
5.4.2 RF Output Power

Condition	Mode	Frequency (MHz)	Max Burst RMS Power (dBm)	Max EIRP (dBm)	Limit (dBm)	Verdict
NVNT	b	2412	16.68	16.68	20	Pass
NVNT	b	2442	15.29	15.29	20	Pass
NVNT	b	2472	17.11	17.11	20	Pass
NVNT	g	2412	11.69	11.69	20	Pass
NVNT	g	2442	13.60	13.60	20	Pass
NVNT	g	2472	11.86	11.86	20	Pass
NVNT	n20	2412	11.34	11.34	20	Pass
NVNT	n20	2442	13.79	13.79	20	Pass
NVNT	n20	2472	12.42	12.42	20	Pass

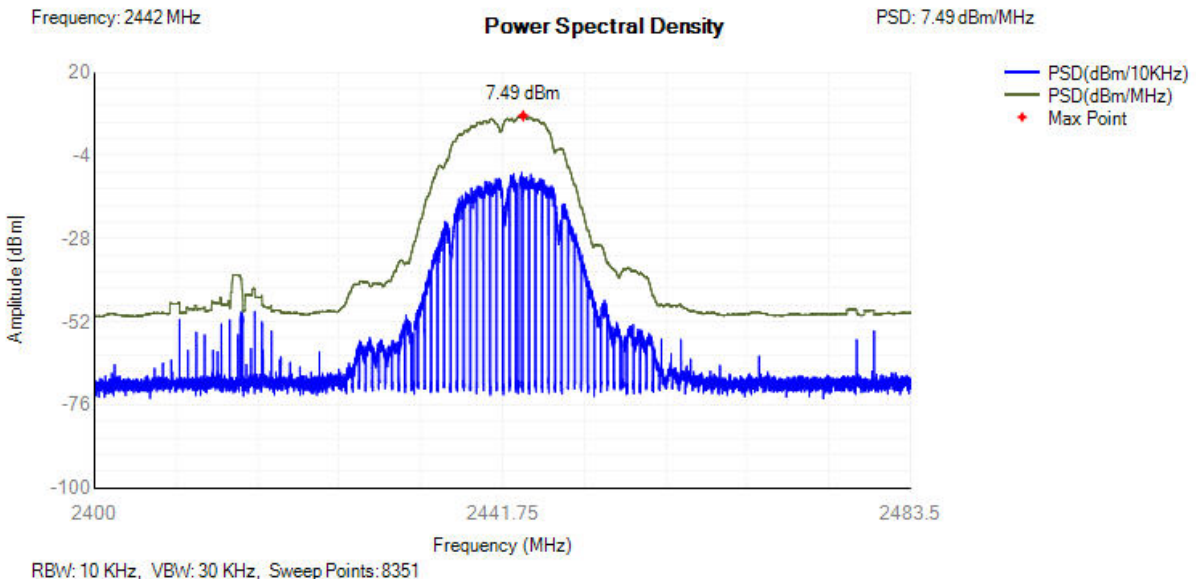
5.4.3 Power Spectral Density

Condition	Mode	Frequency (MHz)	Max PSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
NVNT	b	2412	8.33	10	Pass
NVNT	b	2442	7.49	10	Pass
NVNT	b	2472	8.63	10	Pass
NVNT	g	2412	1.93	10	Pass
NVNT	g	2442	3.43	10	Pass
NVNT	g	2472	1.47	10	Pass
NVNT	n20	2412	1.52	10	Pass
NVNT	n20	2442	3.53	10	Pass
NVNT	n20	2472	1.75	10	Pass

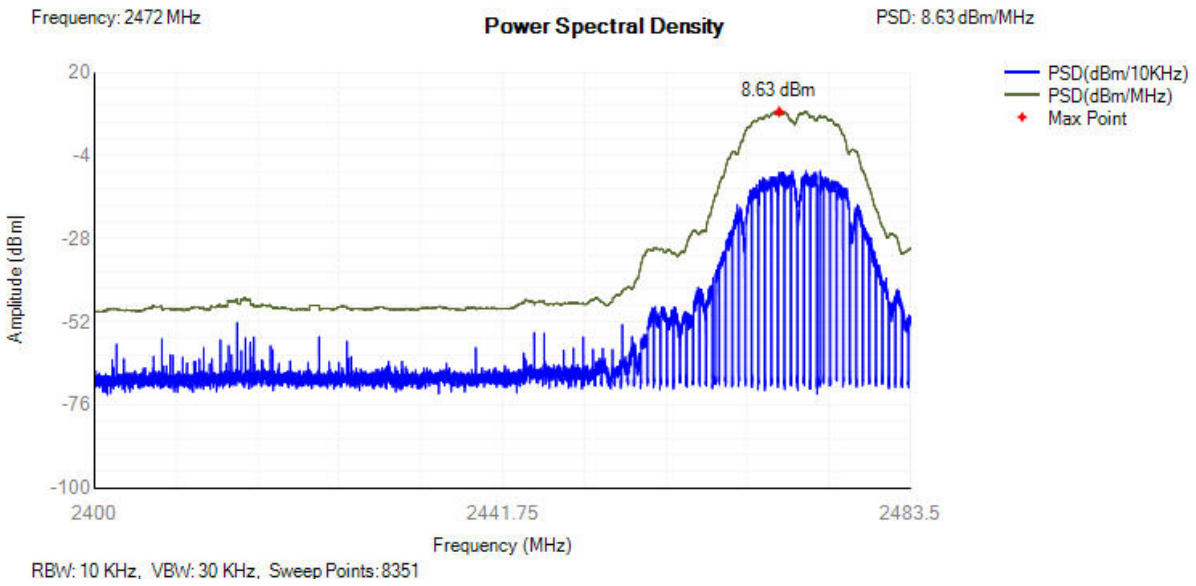
PSD NVNT b 2412MHz



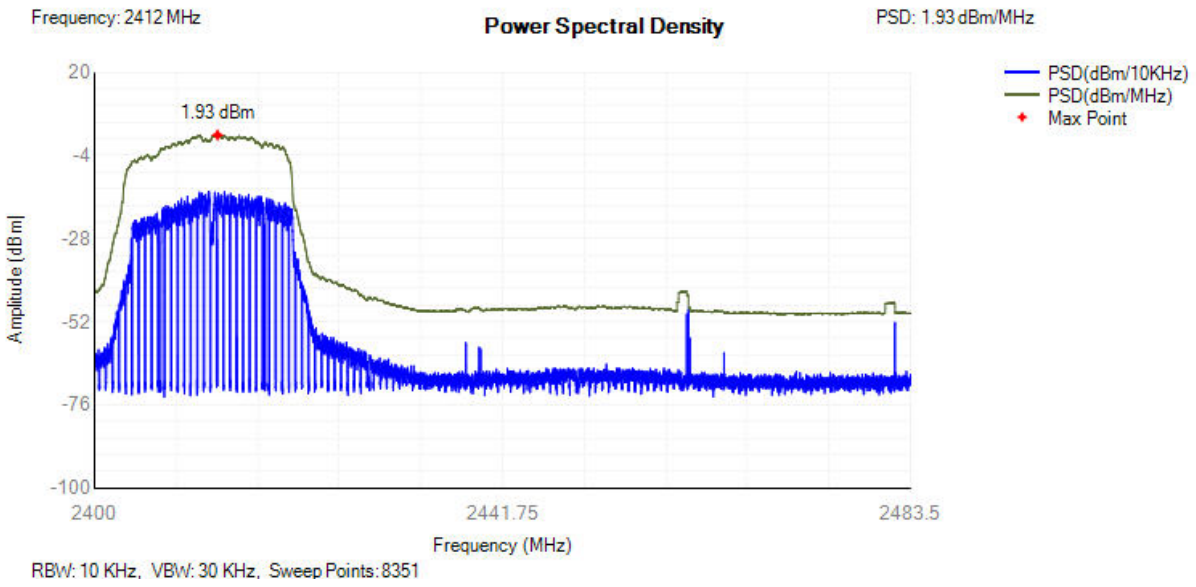
PSD NVNT b 2442MHz



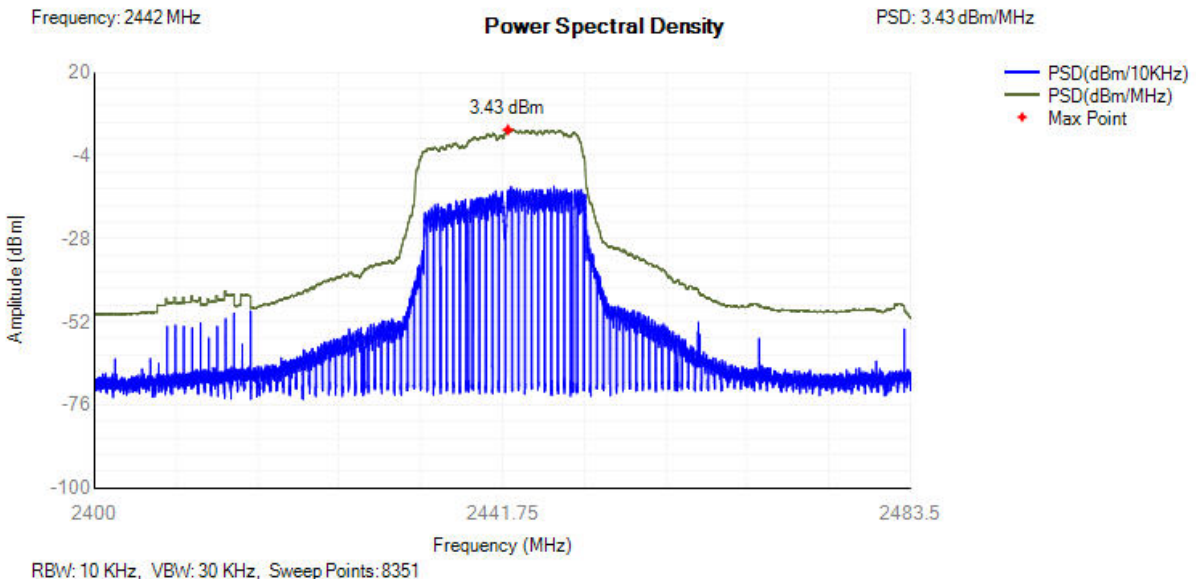
PSD NVNT b 2472MHz



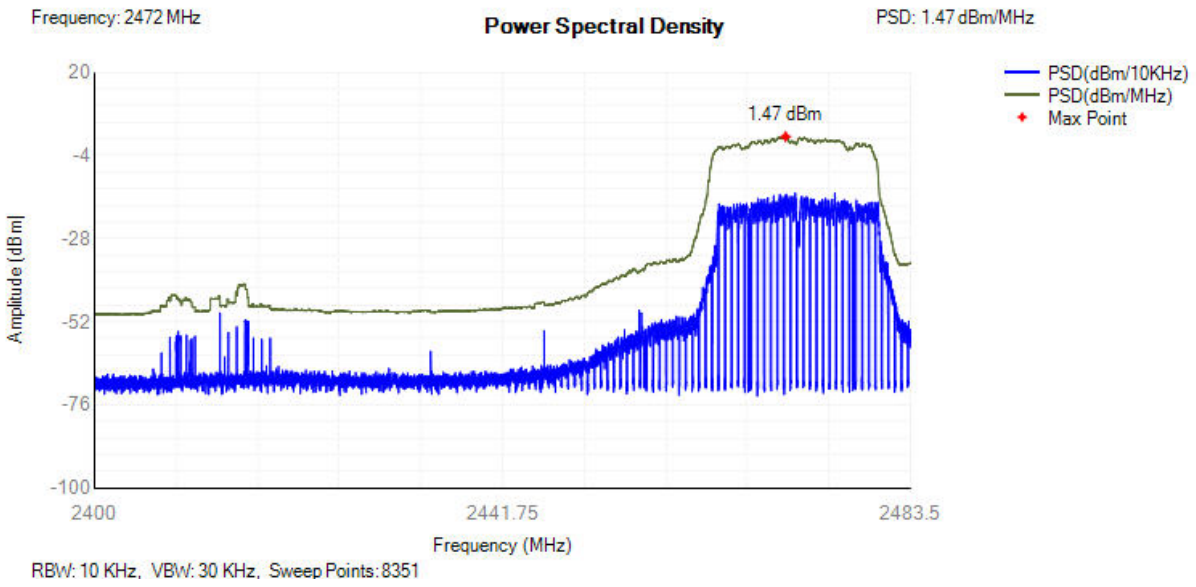
PSD NVNT g 2412MHz



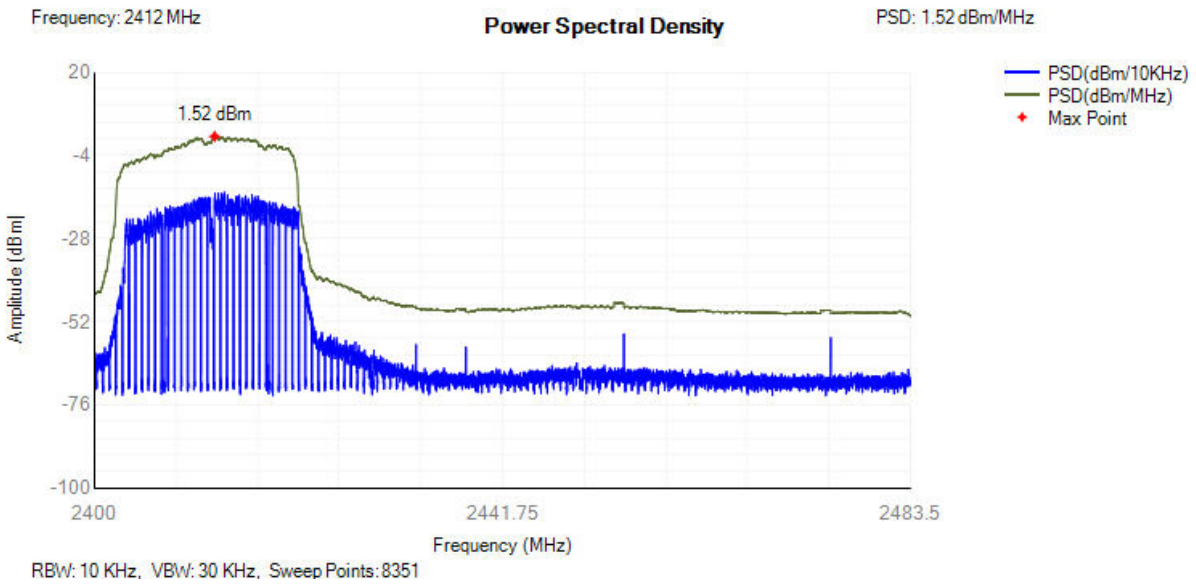
PSD NVNT g 2442MHz



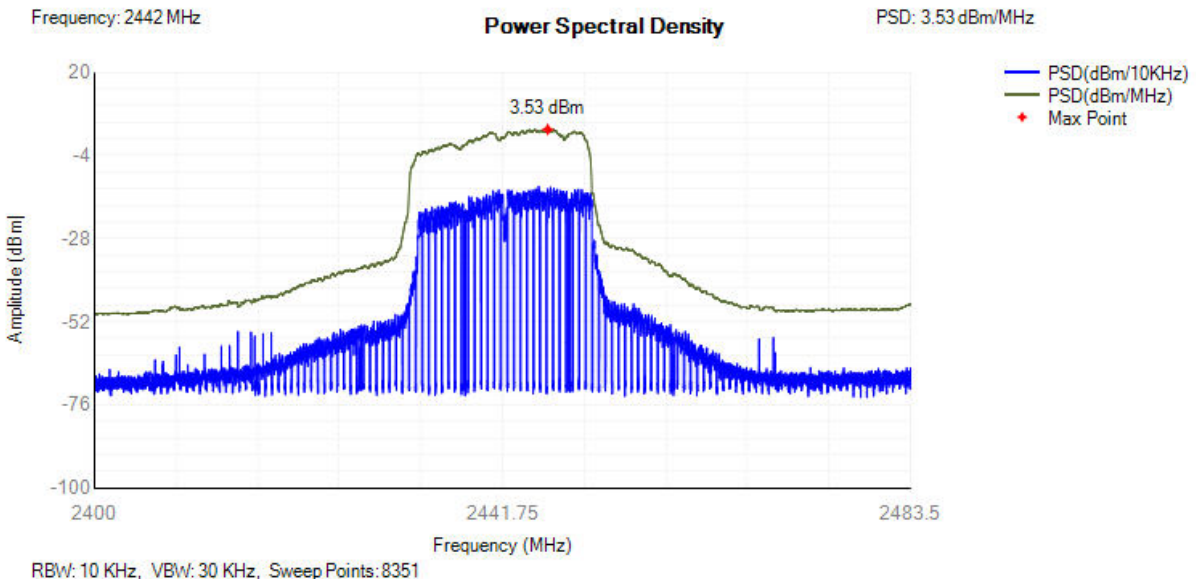
PSD NVNT g 2472MHz



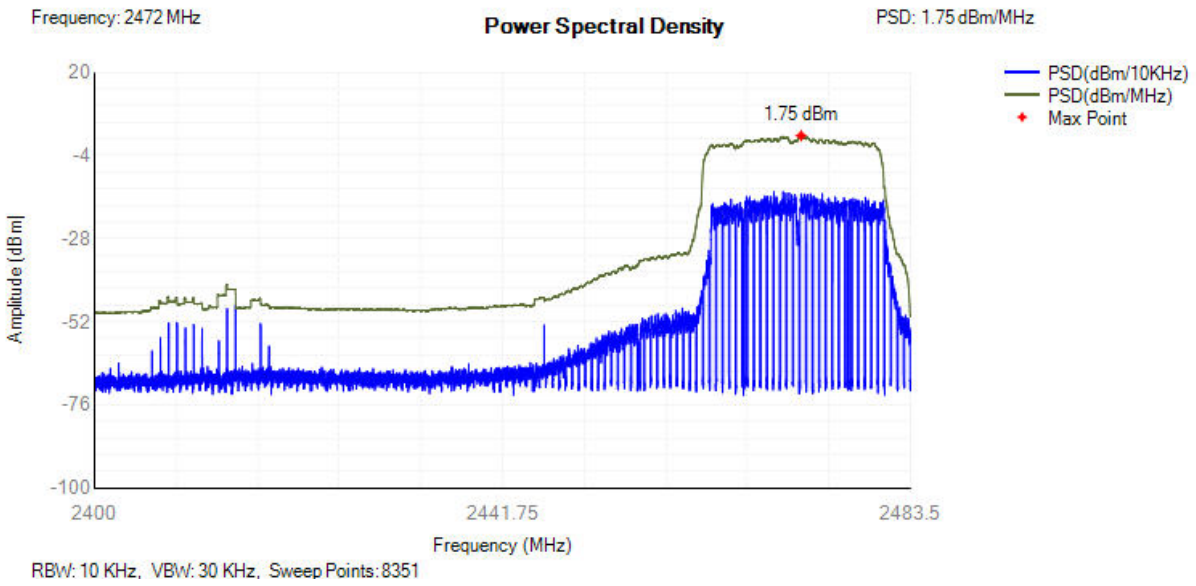
PSD NVNT n20 2412MHz



PSD NVNT n20 2442MHz



PSD NVNT n20 2472MHz



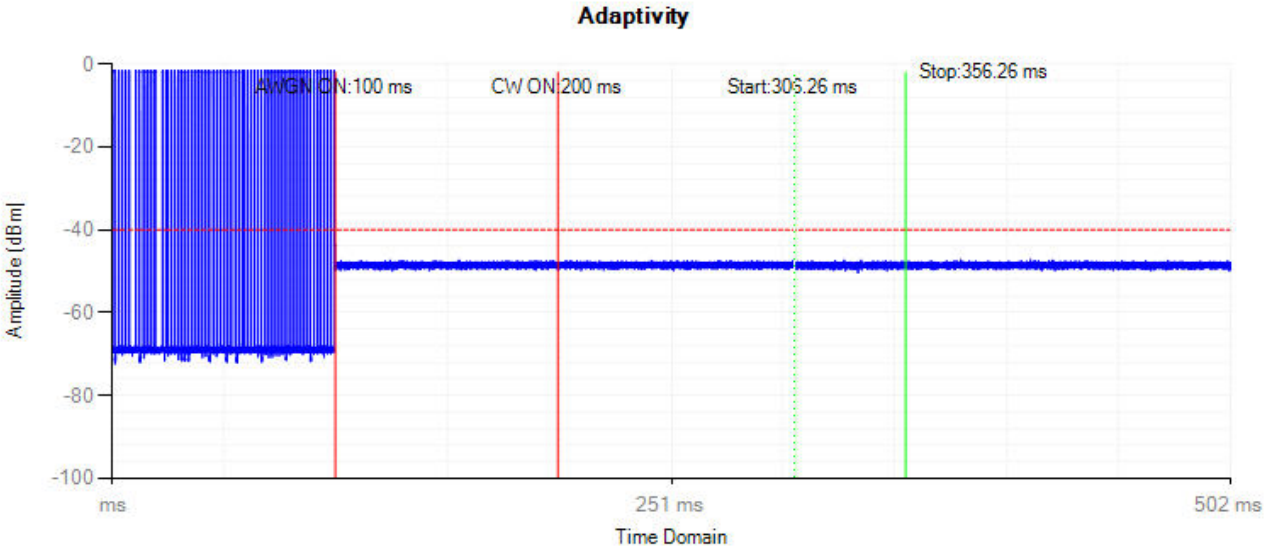
PSD NVNT n40 2412MHz

5.4.6 Adaptivity And Receiver Blocking

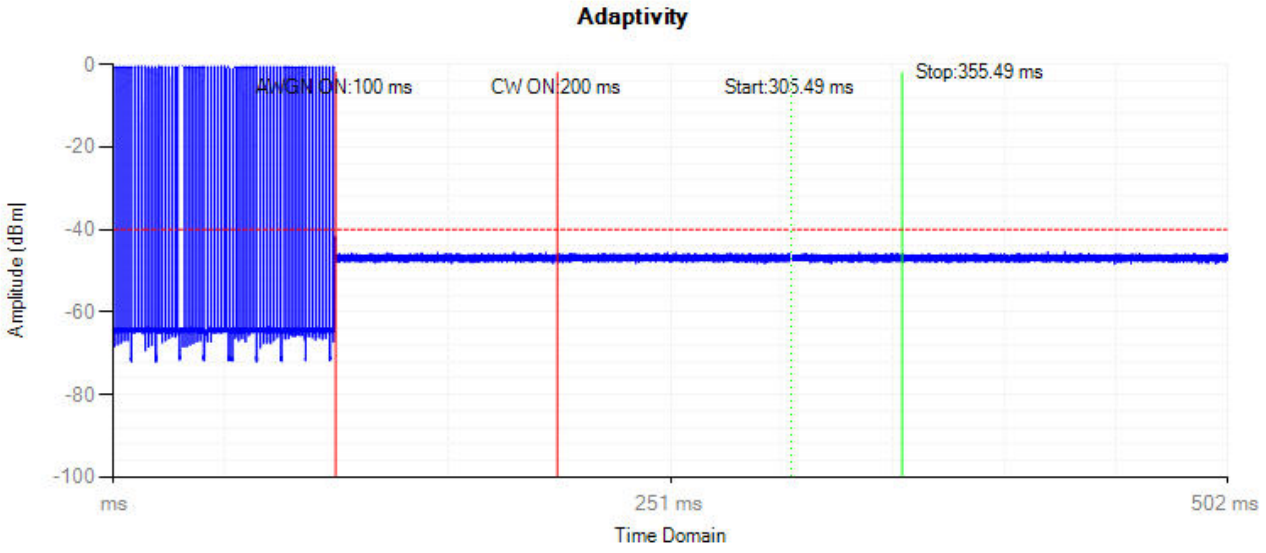
Summary Of Test Result		
Test Mode	Channel	Conclusion
802.11b	Low	Pass
	High	Pass
802.11g	Low	Pass
	High	Pass
802.11n20	Low	Pass
	High	Pass
802.11n40	Low	Pass
	High	Pass
Note: All modulation of EUT which maximum output power is more than 10dbm have been tested.		

The Worst Test Mode	802.11b: Low Channel
AWGN Interference Level (dBm)	-63.23
Blocking Interference Level (dBm)	-35
Interference Start Time (ms)	100
Stop time after interfering signal(ms)	100
Blocking ON Time (ms)	200
Suggest q Level	4
Max. COT (ms)	1.33
Pulse width (ms)	0
Duty Cycle (%)	0
The Worst Test Mode	802.11b: High Channel
AWGN Interference Level (dBm)	-64.25
Blocking Interference Level (dBm)	-35
Interference Start Time (ms)	100
Stop time after interfering signal(ms)	100
Blocking ON Time (ms)	200
Suggest q Level	4
Max COT (ms)	3.02
Pulse width (ms)	0
Duty Cycle (%)	0

Test plot (802.11b-Low channel):

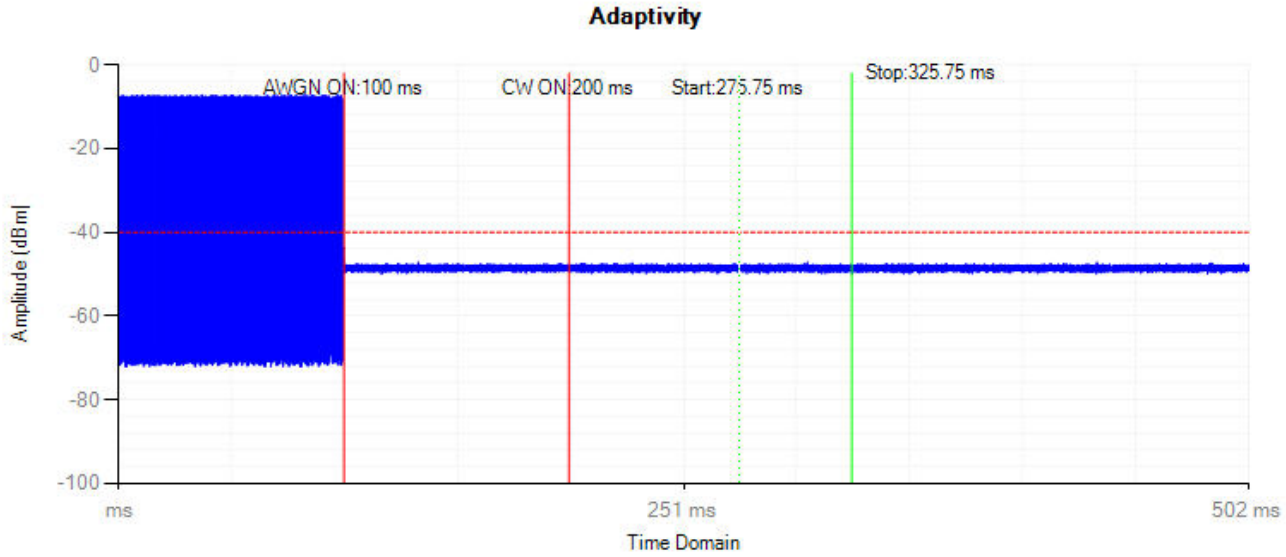


Test plot (802.11b-High channel):

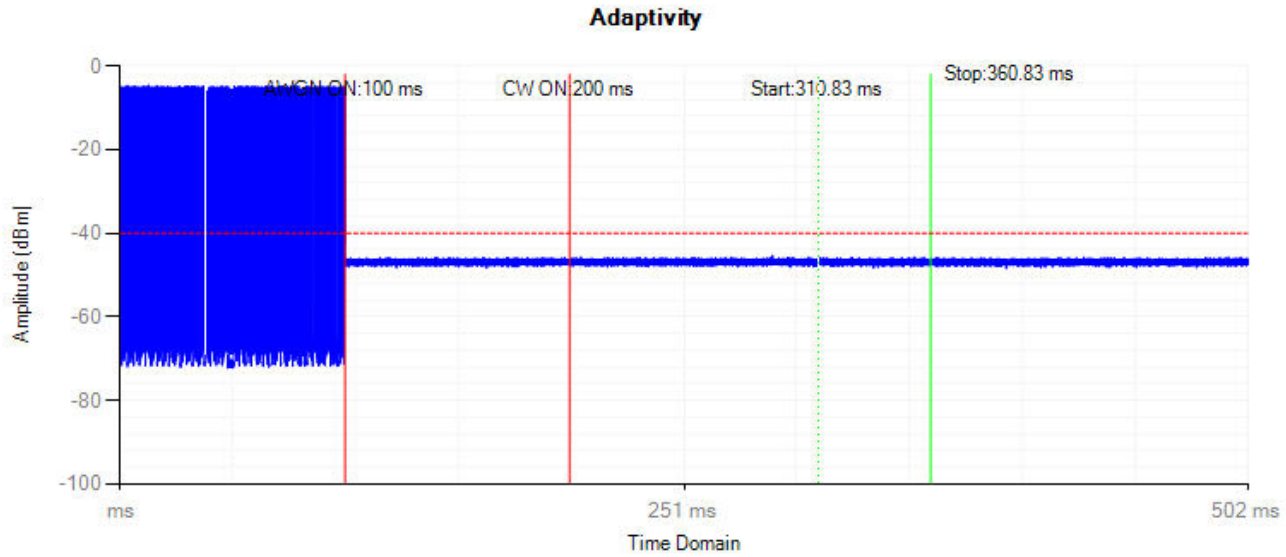


Test Mode	802.11g: Low Channel
AWGN Interference Level (dBm)	-64.15
Blocking Interference Level (dBm)	-35
Interference Start Time (ms)	100
Stop time after interfering signal(ms)	100
Blocking ON Time (ms)	200
Suggest q Level	4
Max COT (ms)	1.22
Pulse width (ms)	0
Duty Cycle (%)	0
Test Mode	802.11g: High Channel
AWGN Interference Level (dBm)	-63.26
Blocking Interference Level (dBm)	-35
Interference Start Time (ms)	100
Stop time after interfering signal(ms)	100
Blocking ON Time (ms)	200
Suggest q Level	4
Max COT (ms)	2.06
Pulse width (ms)	0
Duty Cycle (%)	0

Test plot (802.11g-Low channel):

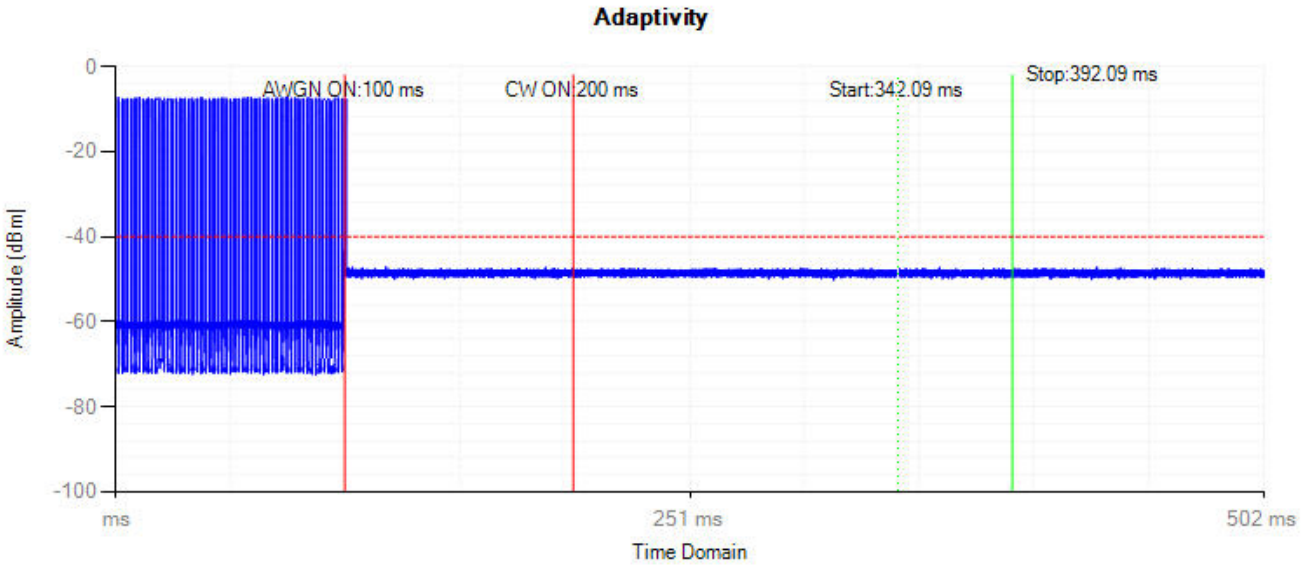


Test plot (802.11g-High channel):

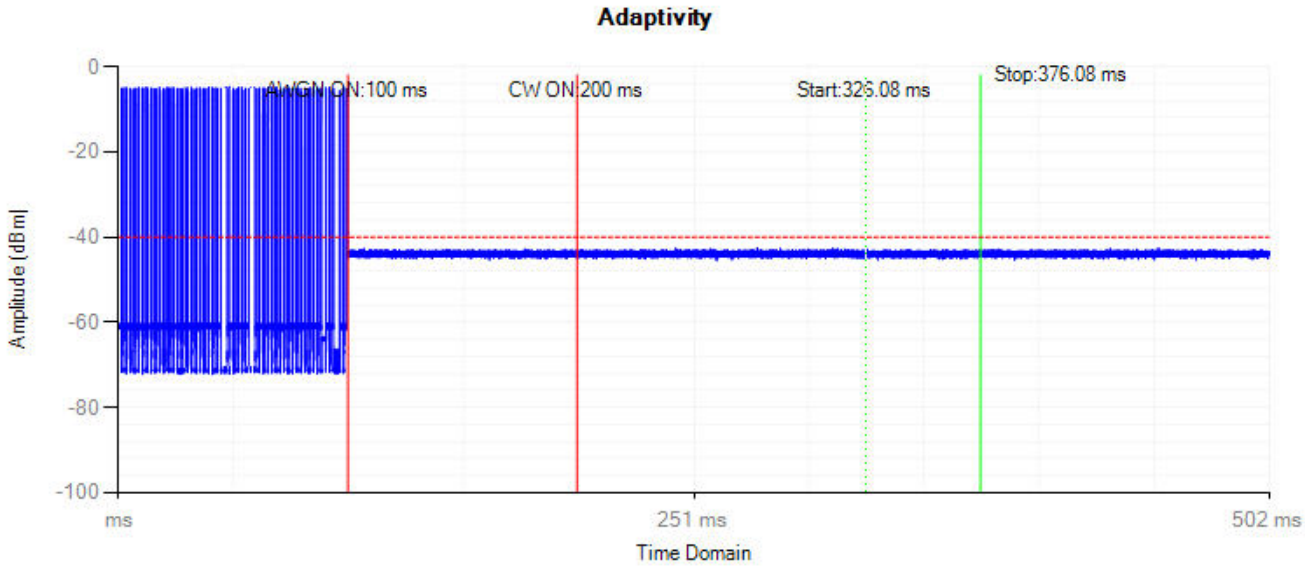


The Worst Test Mode	802.11n20: Low Channel
AWGN Interference Level (dBm)	-64.50
Blocking Interference Level (dBm)	-35
Interference Start Time (ms)	100
Stop time after interfering signal(ms)	100
Blocking ON Time (ms)	200
Suggest q Level	4
Max. COT (ms)	2.51
Pulse width (ms)	0
Duty Cycle (%)	0
The Worst Test Mode	802.11n20: High Channel
AWGN Interference Level (dBm)	-64.81
Blocking Interference Level (dBm)	-35
Interference Start Time (ms)	100
Stop time after interfering signal(ms)	100
Blocking ON Time (ms)	200
Suggest q Level	4
Max COT (ms)	2.05
Pulse width (ms)	0
Duty Cycle (%)	0

Test plot (802.11n20-Low channel):

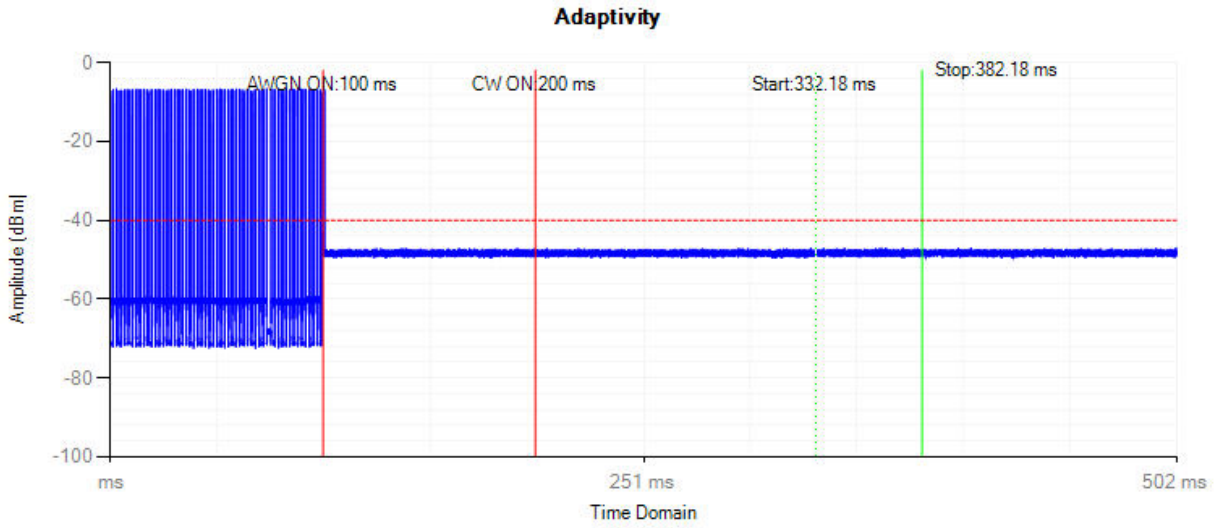


Test plot (802.11n20-High channel):

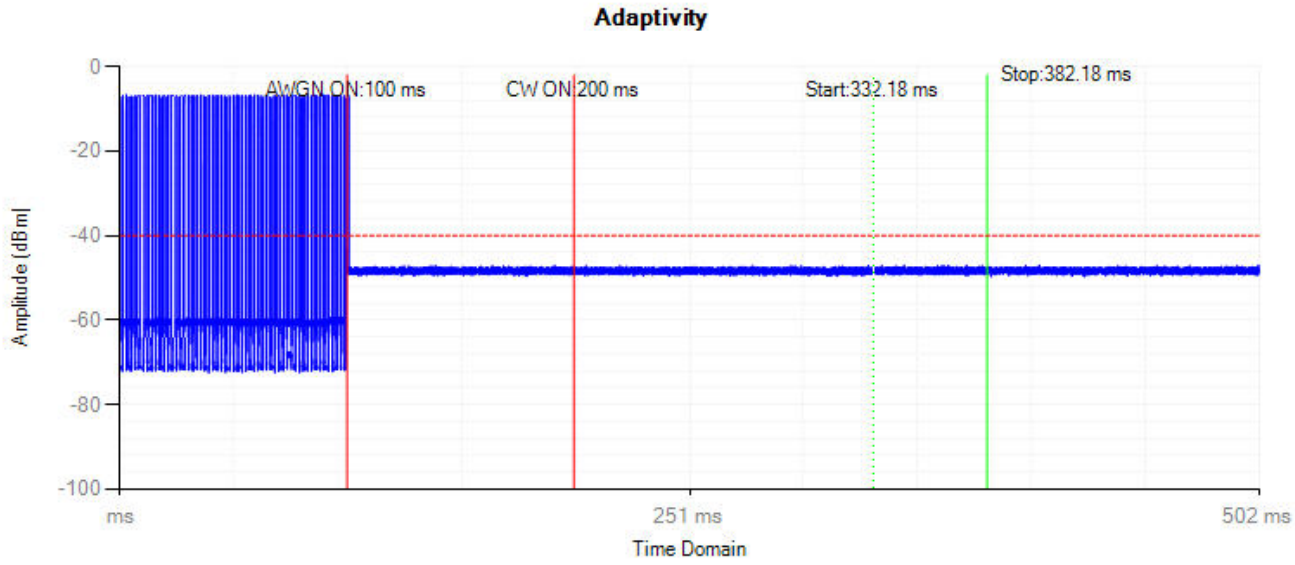


The Worst Test Mode	802.11n40: Low Channel
AWGN Interference Level (dBm)	-64.55
Blocking Interference Level (dBm)	-35
Interference Start Time (ms)	100
Stop time after interfering signal(ms)	100
Blocking ON Time (ms)	200
Suggest q Level	4
Max. COT (ms)	2.90
Pulse width (ms)	0
Duty Cycle (%)	0
The Worst Test Mode	802.11n40: High Channel
AWGN Interference Level (dBm)	-63.05
Blocking Interference Level (dBm)	-35
Interference Start Time (ms)	100
Stop time after interfering signal(ms)	100
Blocking ON Time (ms)	200
Suggest q Level	4
Max COT (ms)	2.11
Pulse width (ms)	0
Duty Cycle (%)	0

Test plot (802.11n40-Low channel):



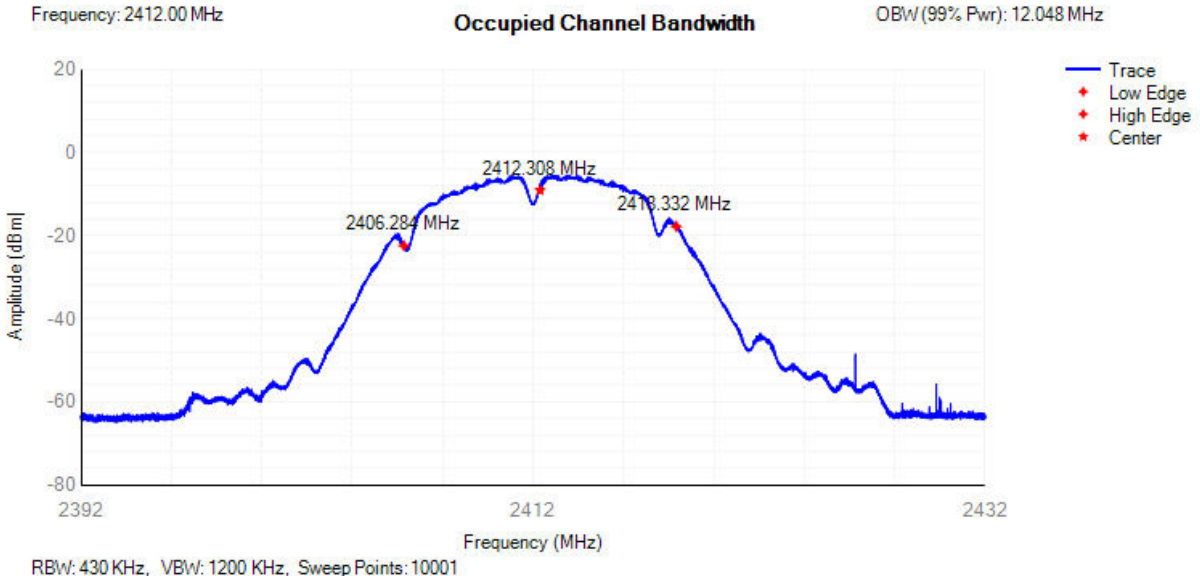
Test plot (802.11n40-High channel):



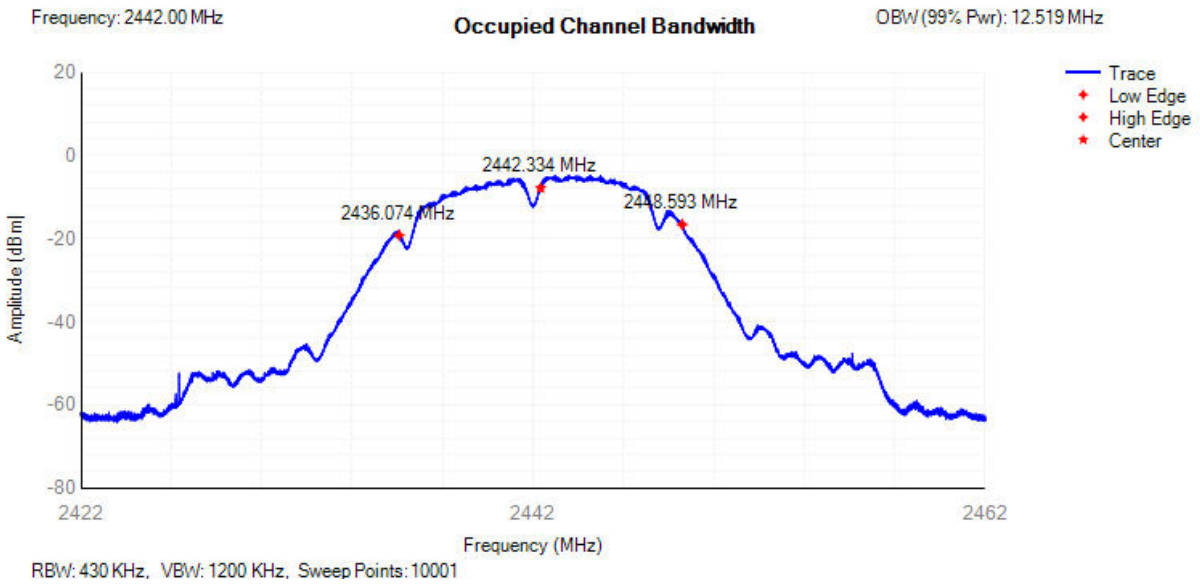
5.4.7 Occupied Channel Bandwidth

Condition	Mode	Frequency (MHz)	Center Frequency (MHz)	OBW (MHz)	Lower Edge (MHz)	Upper Edge (MHz)	Limit OBW (MHz)	Verdict
NVNT	b	2412	2412.308	12.048	2406.284	2418.332	2400 - 2483.5MHz	Pass
NVNT	b	2442	2442.334	12.519	2436.074	2448.593	2400 - 2483.5MHz	Pass
NVNT	b	2472	2472.040	12.750	2465.665	2478.416	2400 - 2483.5MHz	Pass
NVNT	g	2412	2412.115	16.300	2403.965	2420.265	2400 - 2483.5MHz	Pass
NVNT	g	2442	2442.132	16.458	2433.903	2450.361	2400 - 2483.5MHz	Pass
NVNT	g	2472	2472.005	16.593	2463.709	2480.302	2400 - 2483.5MHz	Pass
NVNT	n20	2412	2412.116	17.448	2403.391	2420.84	2400 - 2483.5MHz	Pass
NVNT	n20	2442	2442.082	17.678	2433.242	2450.921	2400 - 2483.5MHz	Pass
NVNT	n20	2472	2472.00	17.772	2463.114	2480.886	2400 - 2483.5MHz	Pass

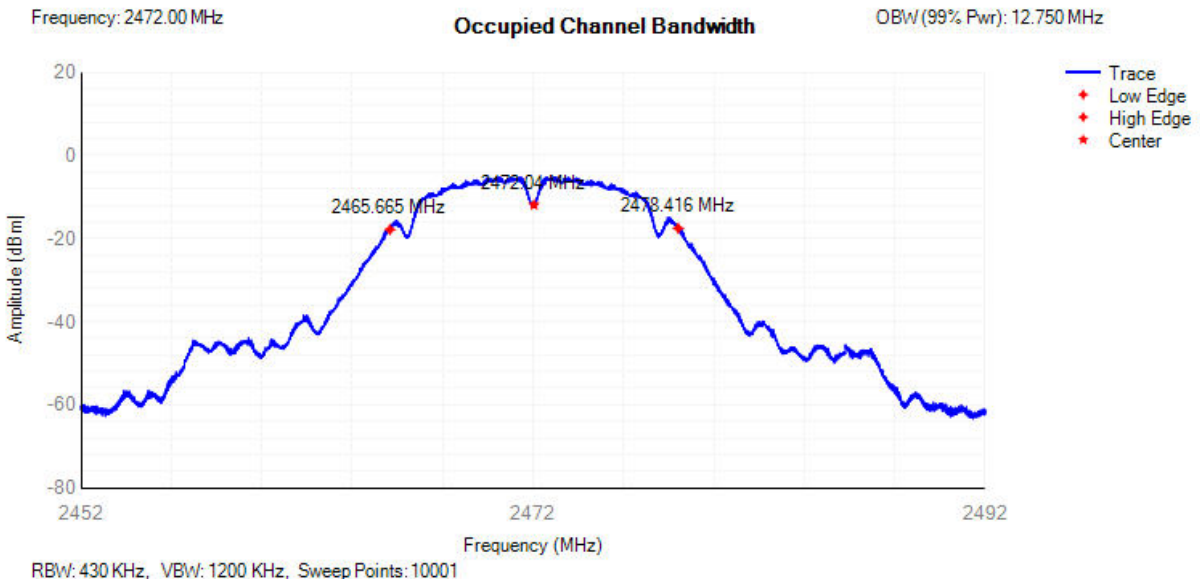
OBW NVNT b 2412MHz



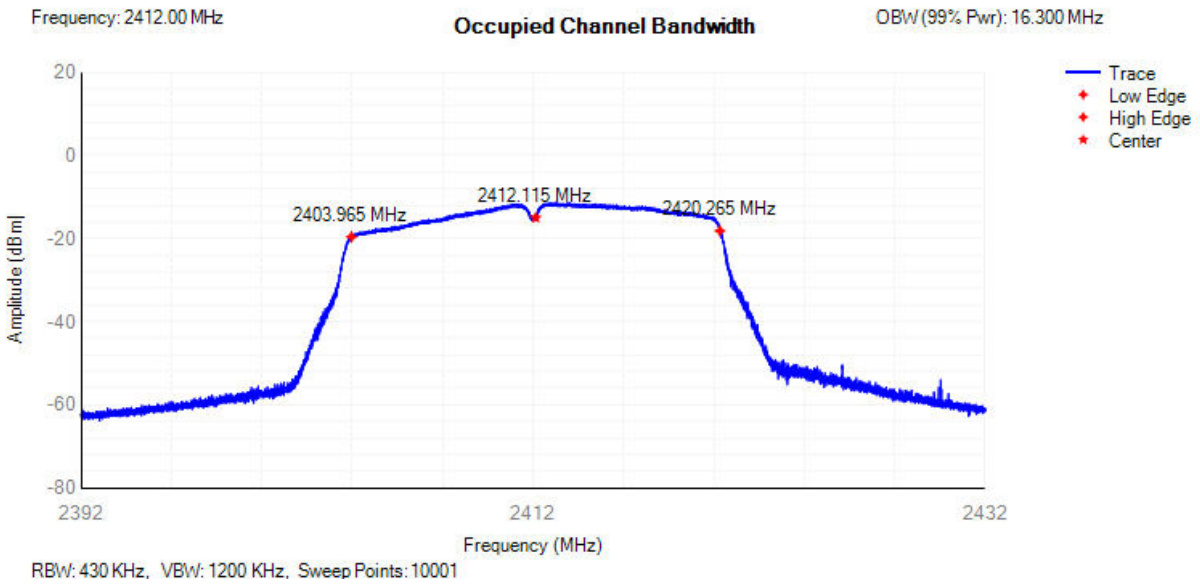
OBW NVNT b 2442MHz



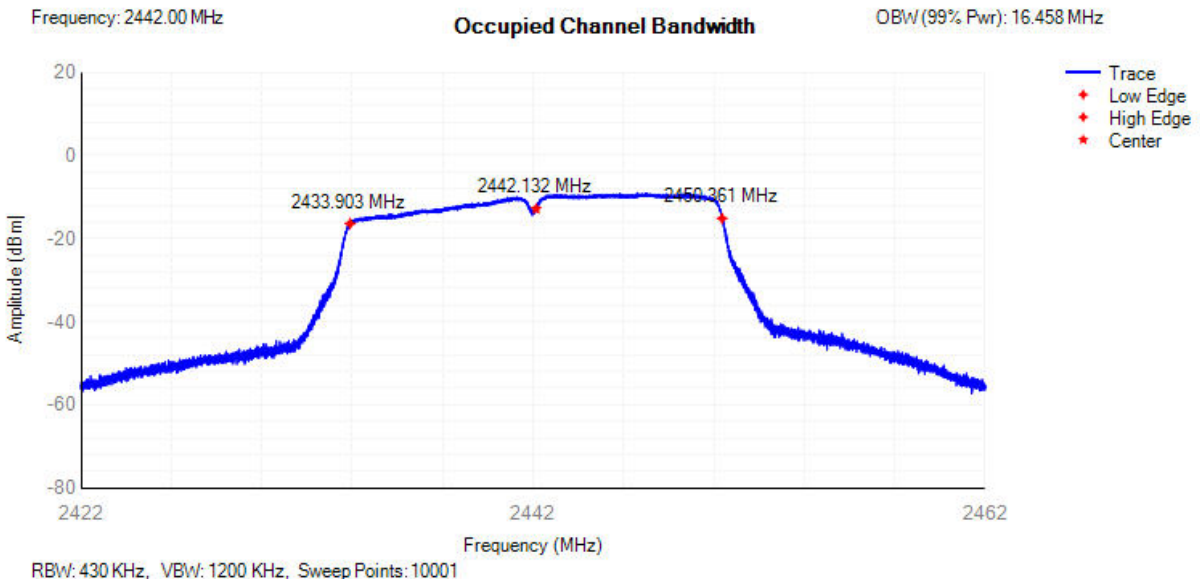
OBW NVNT b 2472MHz



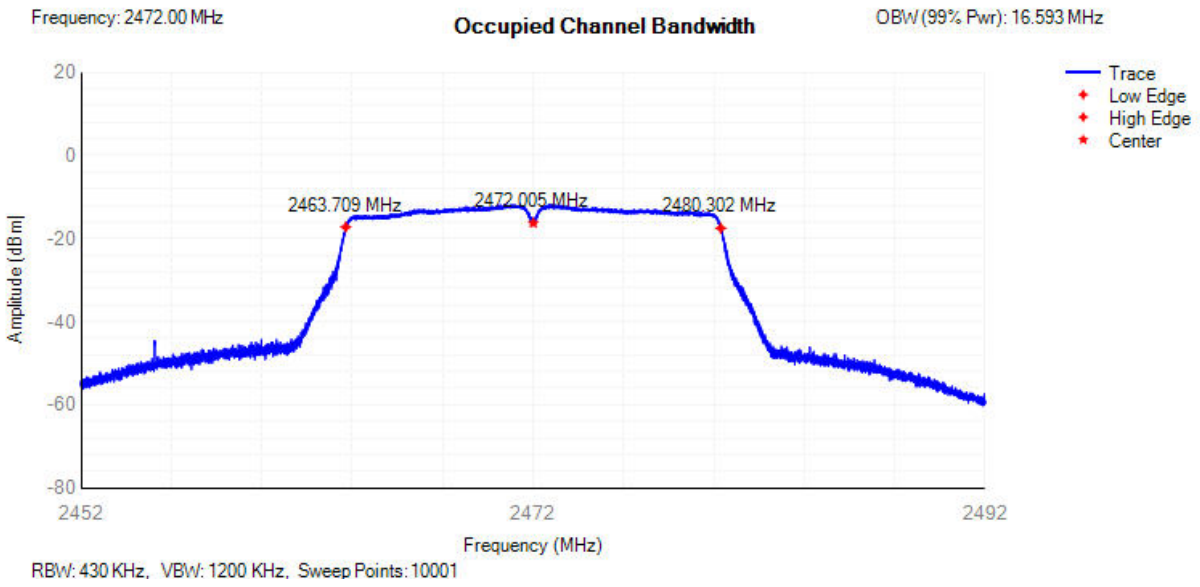
OBW NVNT g 2412MHz



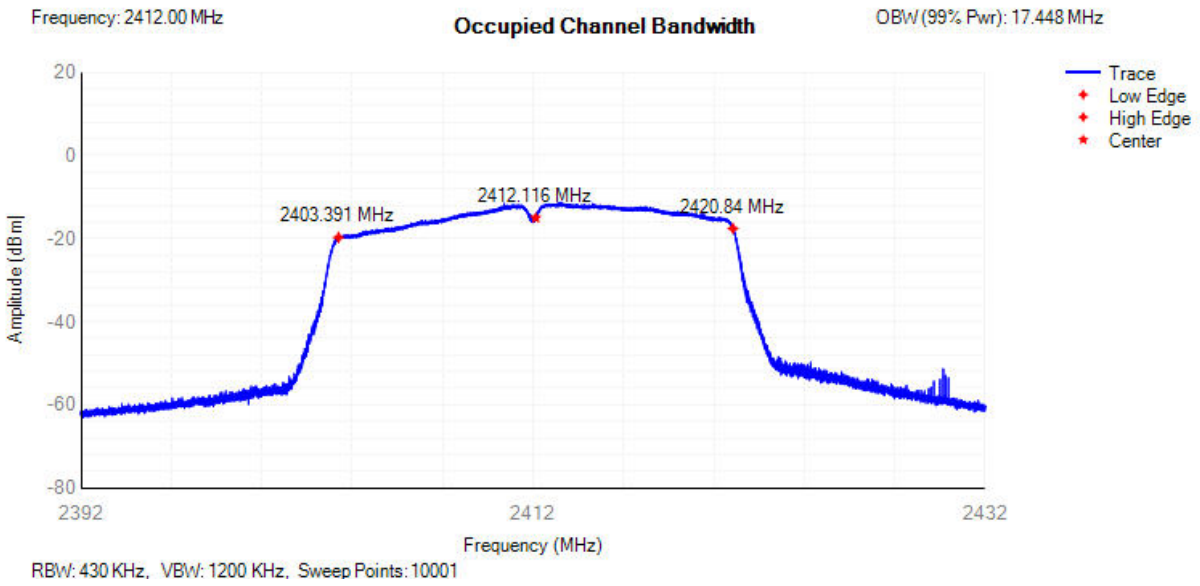
OBW NVNT g 2442MHz



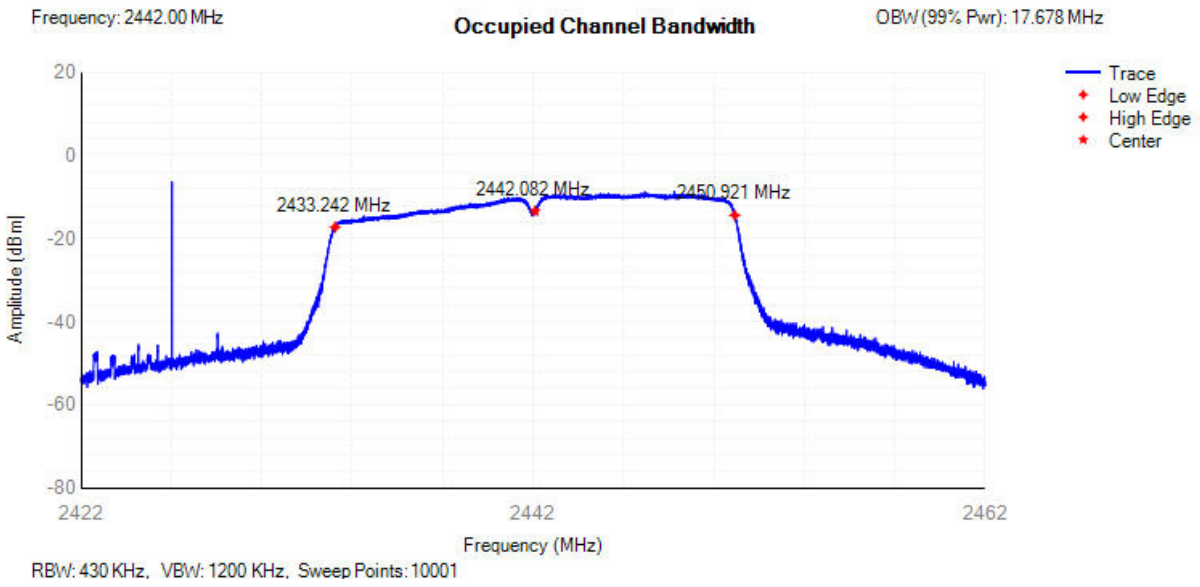
OBW NVNT g 2472MHz



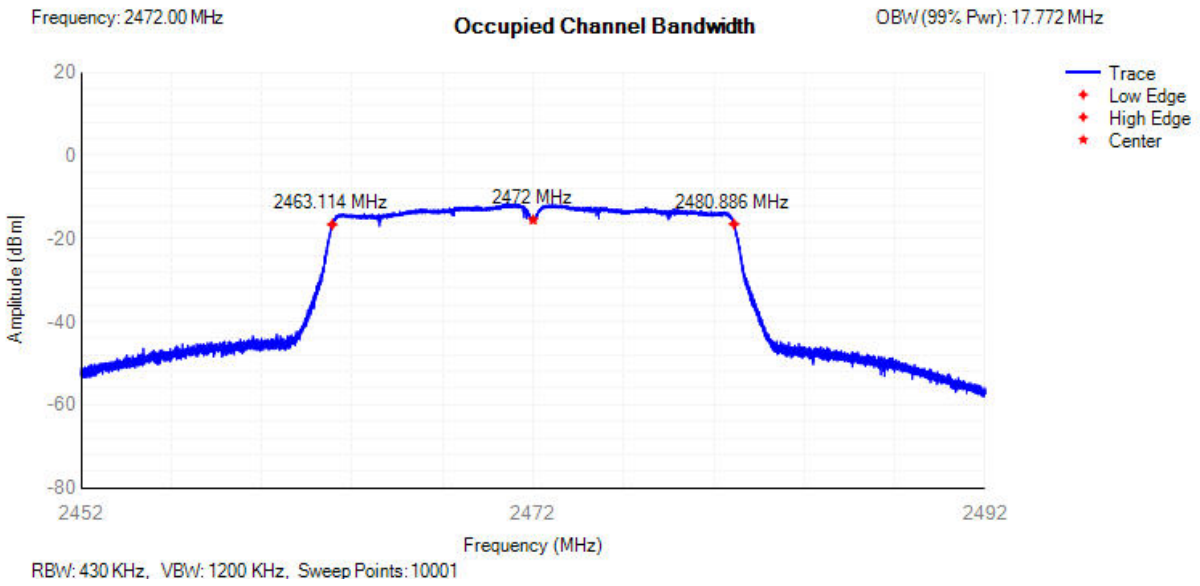
OBW NVNT n20 2412MHz



OBW NVNT n20 2442MHz



OBW NVNT n20 2472MHz



5.4.8 Transmitter unwanted emissions in the out-of-band domain

Condition	Mode	Frequency (MHz)	OOB Frequency (MHz)	Level (dBm/MHz)	Limit (dBm/MHz)	Verdict
NVNT	b	2412	2399.5	-52.17	-10	Pass
NVNT	b	2412	2398.5	-75.48	-10	Pass
NVNT	b	2412	2397.5	-76.19	-10	Pass
NVNT	b	2412	2396.5	-76.1	-10	Pass
NVNT	b	2412	2395.5	-76.19	-10	Pass
NVNT	b	2412	2394.5	-76.06	-10	Pass
NVNT	b	2412	2393.5	-76.18	-10	Pass
NVNT	b	2412	2392.5	-76.16	-10	Pass
NVNT	b	2412	2391.5	-76.24	-10	Pass
NVNT	b	2412	2390.5	-76.23	-10	Pass
NVNT	b	2412	2389.5	-76.11	-10	Pass
NVNT	b	2412	2388.5	-76.21	-10	Pass
NVNT	b	2412	2388.451	-69.87	-10	Pass
NVNT	b	2412	2387.451	-76.23	-20	Pass
NVNT	b	2412	2386.451	-71.41	-20	Pass
NVNT	b	2412	2385.451	-73.36	-20	Pass
NVNT	b	2412	2384.451	-74.25	-20	Pass
NVNT	b	2412	2383.451	-74.24	-20	Pass
NVNT	b	2412	2382.451	-74.58	-20	Pass
NVNT	b	2412	2381.451	-74.68	-20	Pass
NVNT	b	2412	2380.451	-75.85	-20	Pass
NVNT	b	2412	2379.451	-74.88	-20	Pass
NVNT	b	2412	2378.451	-74.93	-20	Pass
NVNT	b	2412	2377.451	-74.99	-20	Pass
NVNT	b	2412	2376.451	-75.69	-20	Pass
NVNT	b	2412	2376.402	-75	-20	Pass
NVNT	b	2472	2484	-38.76	-10	Pass
NVNT	b	2472	2485	-38.35	-10	Pass
NVNT	b	2472	2486	-75.95	-10	Pass
NVNT	b	2472	2487	-75.84	-10	Pass
NVNT	b	2472	2488	-75.97	-10	Pass
NVNT	b	2472	2489	-76.01	-10	Pass
NVNT	b	2472	2490	-56.61	-10	Pass
NVNT	b	2472	2491	-76.03	-10	Pass
NVNT	b	2472	2492	-76.03	-10	Pass
NVNT	b	2472	2493	-60.08	-10	Pass

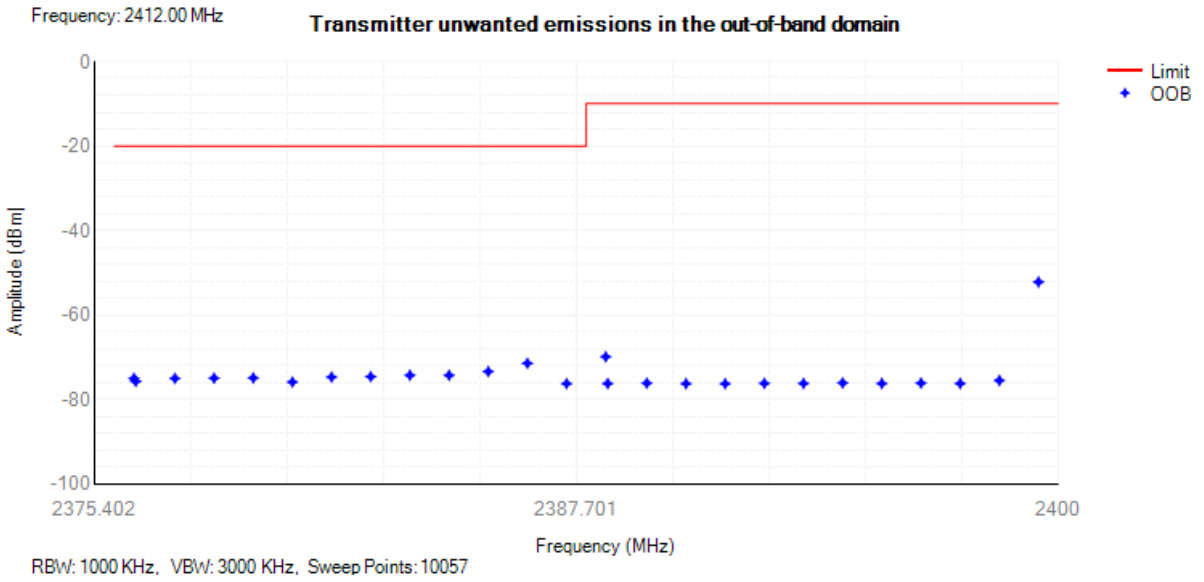
NVNT	b	2472	2494	-75.97	-10	Pass
NVNT	b	2472	2495	-62.54	-10	Pass
NVNT	b	2472	2495.693	-76.01	-10	Pass
NVNT	b	2472	2496.693	-75.97	-20	Pass
NVNT	b	2472	2497.693	-61.4	-20	Pass
NVNT	b	2472	2498.693	-63.15	-20	Pass
NVNT	b	2472	2499.693	-63.44	-20	Pass
NVNT	b	2472	2500.693	-63.34	-20	Pass
NVNT	b	2472	2501.693	-76.02	-20	Pass
NVNT	b	2472	2502.693	-63.34	-20	Pass
NVNT	b	2472	2503.693	-62.04	-20	Pass
NVNT	b	2472	2504.693	-75.93	-20	Pass
NVNT	b	2472	2505.693	-75.95	-20	Pass
NVNT	b	2472	2506.693	-59.31	-20	Pass
NVNT	b	2472	2507.693	-75.82	-20	Pass
NVNT	b	2472	2508.386	-75.88	-20	Pass
NVNT	g	2412	2399.5	-62.96	-10	Pass
NVNT	g	2412	2398.5	-63.37	-10	Pass
NVNT	g	2412	2397.5	-66.39	-10	Pass
NVNT	g	2412	2396.5	-66.34	-10	Pass
NVNT	g	2412	2395.5	-63.77	-10	Pass
NVNT	g	2412	2394.5	-63.62	-10	Pass
NVNT	g	2412	2393.5	-65.66	-10	Pass
NVNT	g	2412	2392.5	-65.29	-10	Pass
NVNT	g	2412	2391.5	-69.91	-10	Pass
NVNT	g	2412	2390.5	-67.72	-10	Pass
NVNT	g	2412	2389.5	-66.17	-10	Pass
NVNT	g	2412	2388.5	-69.4	-10	Pass
NVNT	g	2412	2387.5	-70.36	-10	Pass
NVNT	g	2412	2386.5	-72.02	-10	Pass
NVNT	g	2412	2385.5	-72.54	-10	Pass
NVNT	g	2412	2384.5	-70.41	-10	Pass
NVNT	g	2412	2383.5	-69.82	-20	Pass
NVNT	g	2412	2382.5	-70.72	-20	Pass
NVNT	g	2412	2381.5	-72.17	-20	Pass
NVNT	g	2412	2380.5	-74.72	-20	Pass
NVNT	g	2412	2379.5	-77.43	-20	Pass
NVNT	g	2412	2378.5	-74.17	-20	Pass
NVNT	g	2412	2377.5	-74.04	-20	Pass
NVNT	g	2412	2376.5	-75.75	-20	Pass
NVNT	g	2412	2375.5	-76.59	-20	Pass

NVNT	g	2412	2374.5	-74.97	-20	Pass
NVNT	g	2412	2373.5	-76.17	-20	Pass
NVNT	g	2412	2372.5	-75.32	-20	Pass
NVNT	g	2412	2371.5	-77.68	-20	Pass
NVNT	g	2412	2370.5	-78.03	-20	Pass
NVNT	g	2412	2369.5	-74.2	-20	Pass
NVNT	g	2412	2368.5	-77.13	-20	Pass
NVNT	g	2472	2484	-61.92	-10	Pass
NVNT	g	2472	2485	-62.1	-10	Pass
NVNT	g	2472	2486	-59.31	-10	Pass
NVNT	g	2472	2487	-61.44	-10	Pass
NVNT	g	2472	2488	-62.48	-10	Pass
NVNT	g	2472	2489	-64.29	-10	Pass
NVNT	g	2472	2490	-64.5	-10	Pass
NVNT	g	2472	2491	-65.23	-10	Pass
NVNT	g	2472	2492	-68.38	-10	Pass
NVNT	g	2472	2493	-64.62	-10	Pass
NVNT	g	2472	2494	-69.73	-10	Pass
NVNT	g	2472	2495	-68.7	-10	Pass
NVNT	g	2472	2496	-66.94	-10	Pass
NVNT	g	2472	2497	-68.98	-10	Pass
NVNT	g	2472	2498	-67.9	-10	Pass
NVNT	g	2472	2499	-72.92	-10	Pass
NVNT	g	2472	2500	-71.99	-20	Pass
NVNT	g	2472	2501	-71.6	-20	Pass
NVNT	g	2472	2502	-69.76	-20	Pass
NVNT	g	2472	2503	-73.29	-20	Pass
NVNT	g	2472	2504	-72.51	-20	Pass
NVNT	g	2472	2505	-73.26	-20	Pass
NVNT	g	2472	2506	-71.7	-20	Pass
NVNT	g	2472	2507	-75.15	-20	Pass
NVNT	g	2472	2508	-73.03	-20	Pass
NVNT	g	2472	2509	-74.38	-20	Pass
NVNT	g	2472	2510	-74.87	-20	Pass
NVNT	g	2472	2511	-75.03	-20	Pass
NVNT	g	2472	2512	-73.93	-20	Pass
NVNT	g	2472	2513	-75.28	-20	Pass
NVNT	g	2472	2514	-76.73	-20	Pass
NVNT	g	2472	2515	-74.06	-20	Pass
NVNT	n20	2412	2399.5	-64.45	-10	Pass
NVNT	n20	2412	2398.5	-63.59	-10	Pass

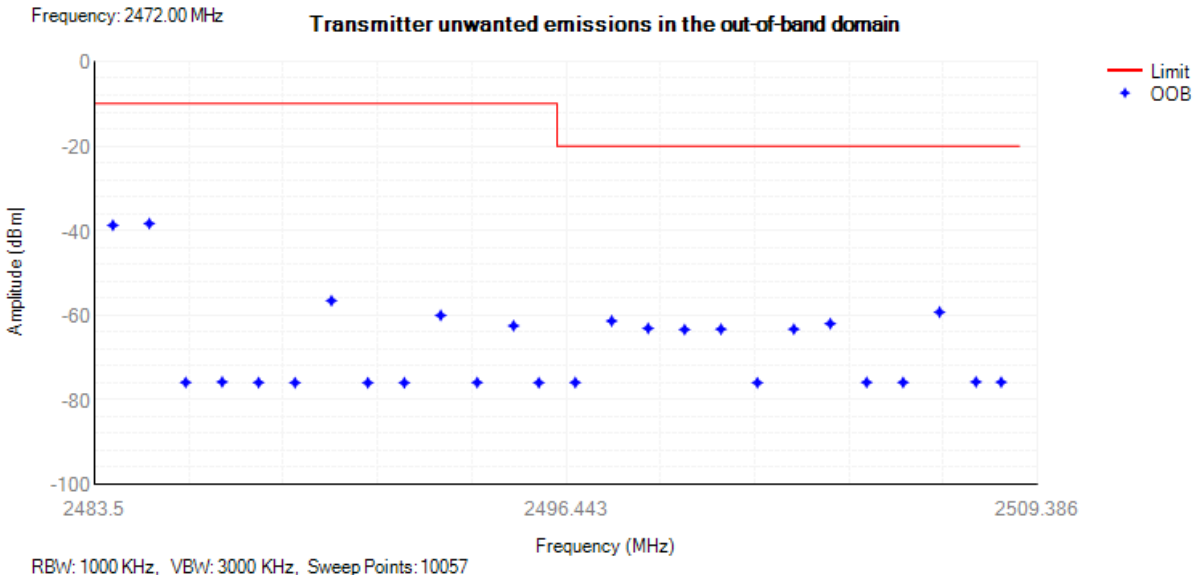
NVNT	n20	2412	2397.5	-66.16	-10	Pass
NVNT	n20	2412	2396.5	-64.88	-10	Pass
NVNT	n20	2412	2395.5	-66.08	-10	Pass
NVNT	n20	2412	2394.5	-66.09	-10	Pass
NVNT	n20	2412	2393.5	-66.74	-10	Pass
NVNT	n20	2412	2392.5	-67.06	-10	Pass
NVNT	n20	2412	2391.5	-66.76	-10	Pass
NVNT	n20	2412	2390.5	-66.8	-10	Pass
NVNT	n20	2412	2389.5	-67.06	-10	Pass
NVNT	n20	2412	2388.5	-70.41	-10	Pass
NVNT	n20	2412	2387.5	-70.7	-10	Pass
NVNT	n20	2412	2386.5	-72.11	-10	Pass
NVNT	n20	2412	2385.5	-71.92	-10	Pass
NVNT	n20	2412	2384.5	-70.35	-10	Pass
NVNT	n20	2412	2383.5	-73.47	-20	Pass
NVNT	n20	2412	2382.5	-73.76	-20	Pass
NVNT	n20	2412	2381.5	-74.07	-20	Pass
NVNT	n20	2412	2380.5	-73.92	-20	Pass
NVNT	n20	2412	2379.5	-75.54	-20	Pass
NVNT	n20	2412	2378.5	-75.1	-20	Pass
NVNT	n20	2412	2377.5	-75.92	-20	Pass
NVNT	n20	2412	2376.5	-76.24	-20	Pass
NVNT	n20	2412	2375.5	-76.24	-20	Pass
NVNT	n20	2412	2374.5	-77.5	-20	Pass
NVNT	n20	2412	2373.5	-76.88	-20	Pass
NVNT	n20	2412	2372.5	-77.43	-20	Pass
NVNT	n20	2412	2371.5	-77.27	-20	Pass
NVNT	n20	2412	2370.5	-77.1	-20	Pass
NVNT	n20	2412	2369.5	-76.63	-20	Pass
NVNT	n20	2412	2368.5	-77.89	-20	Pass
NVNT	n20	2472	2484	-62.89	-10	Pass
NVNT	n20	2472	2485	-65.73	-10	Pass
NVNT	n20	2472	2486	-62.72	-10	Pass
NVNT	n20	2472	2487	-61.94	-10	Pass
NVNT	n20	2472	2488	-63.48	-10	Pass
NVNT	n20	2472	2489	-67	-10	Pass
NVNT	n20	2472	2490	-67.78	-10	Pass
NVNT	n20	2472	2491	-65.58	-10	Pass
NVNT	n20	2472	2492	-66.25	-10	Pass
NVNT	n20	2472	2493	-68.2	-10	Pass
NVNT	n20	2472	2494	-68.75	-10	Pass

NVNT	n20	2472	2495	-70.35	-10	Pass
NVNT	n20	2472	2496	-67.95	-10	Pass
NVNT	n20	2472	2497	-66.99	-10	Pass
NVNT	n20	2472	2498	-69.51	-10	Pass
NVNT	n20	2472	2499	-71.24	-10	Pass
NVNT	n20	2472	2500	-70.64	-20	Pass
NVNT	n20	2472	2501	-71.25	-20	Pass
NVNT	n20	2472	2502	-70.85	-20	Pass
NVNT	n20	2472	2503	-71.52	-20	Pass
NVNT	n20	2472	2504	-73.09	-20	Pass
NVNT	n20	2472	2505	-72.44	-20	Pass
NVNT	n20	2472	2506	-72.18	-20	Pass
NVNT	n20	2472	2507	-71.91	-20	Pass
NVNT	n20	2472	2508	-73.81	-20	Pass
NVNT	n20	2472	2509	-74.77	-20	Pass
NVNT	n20	2472	2510	-73.81	-20	Pass
NVNT	n20	2472	2511	-75.71	-20	Pass
NVNT	n20	2472	2512	-74.02	-20	Pass
NVNT	n20	2472	2513	-75.9	-20	Pass
NVNT	n20	2472	2514	-74.31	-20	Pass
NVNT	n20	2472	2515	-75.4	-20	Pass

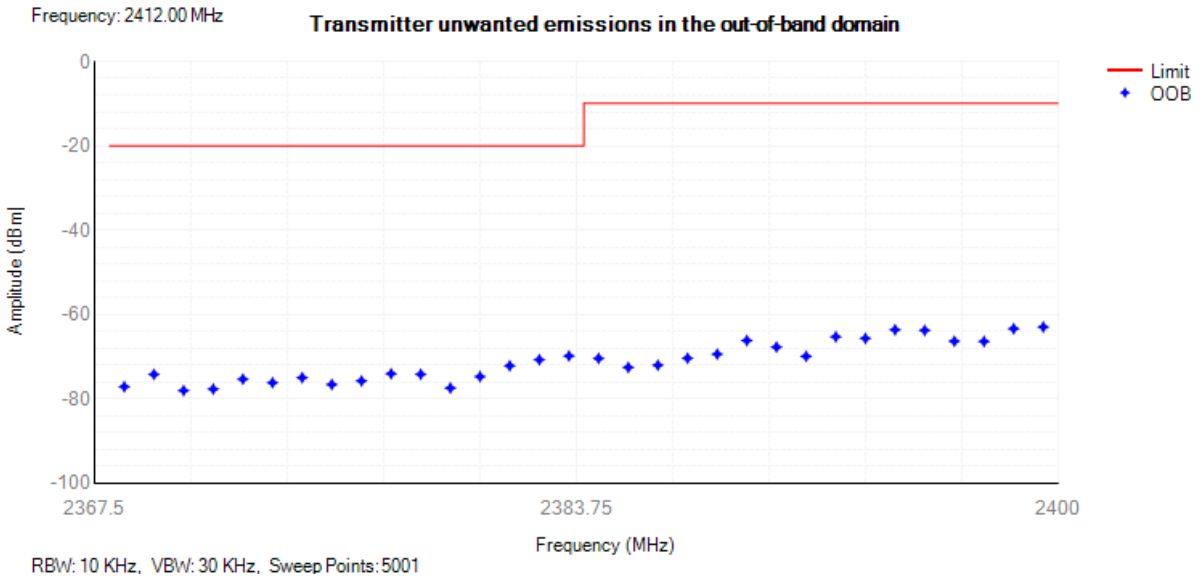
Tx. Emissions OOB NVNT b 2412MHz



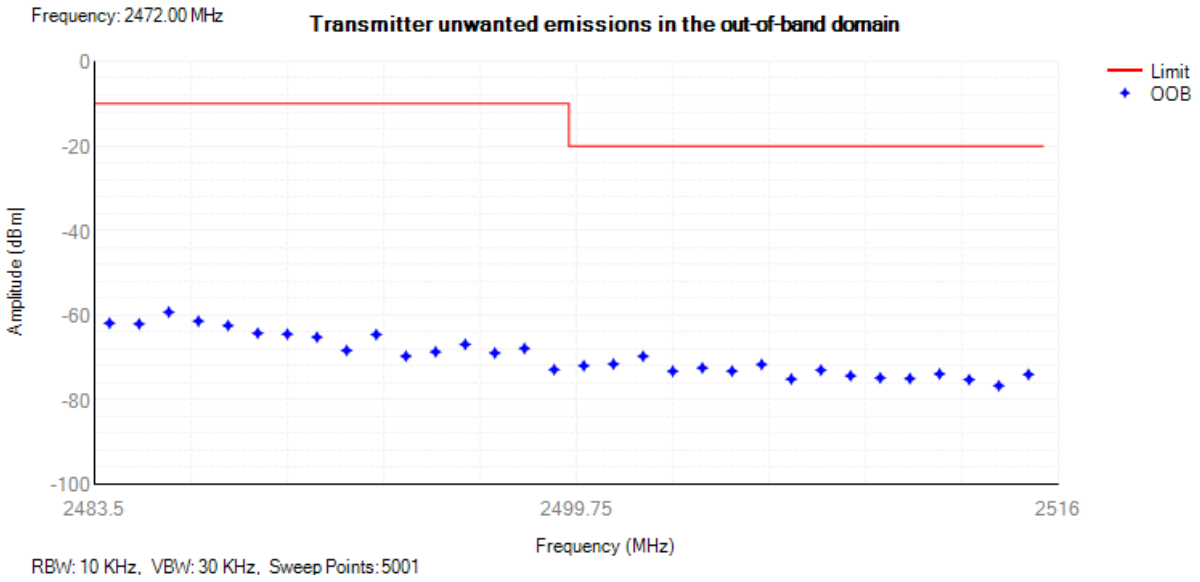
Tx. Emissions OOB NVNT b 2472MHz



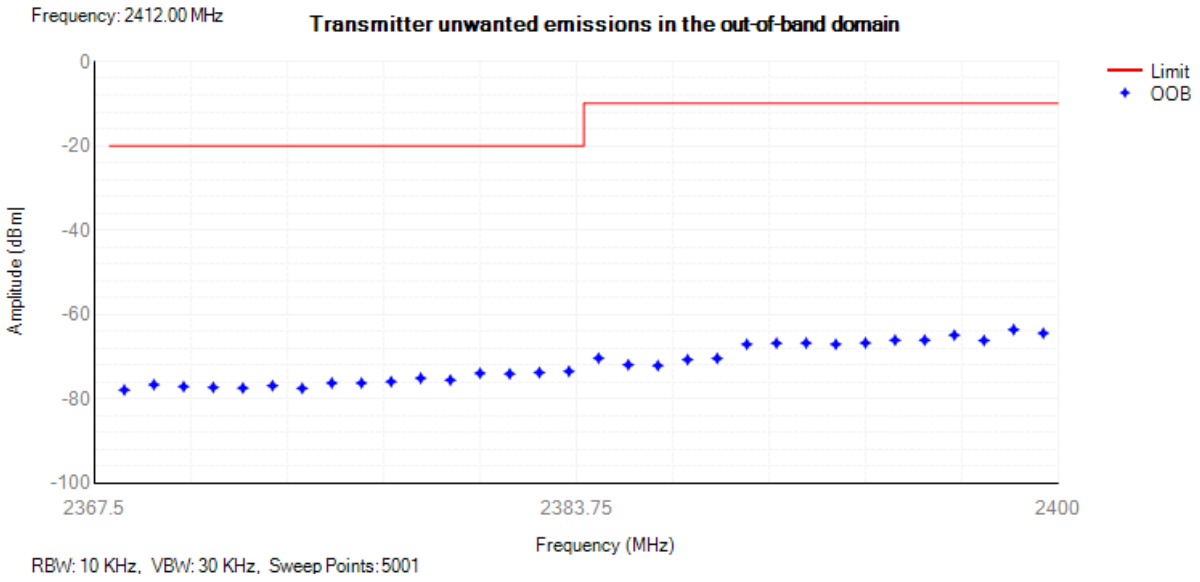
Tx. Emissions OOB NVNT g 2412MHz



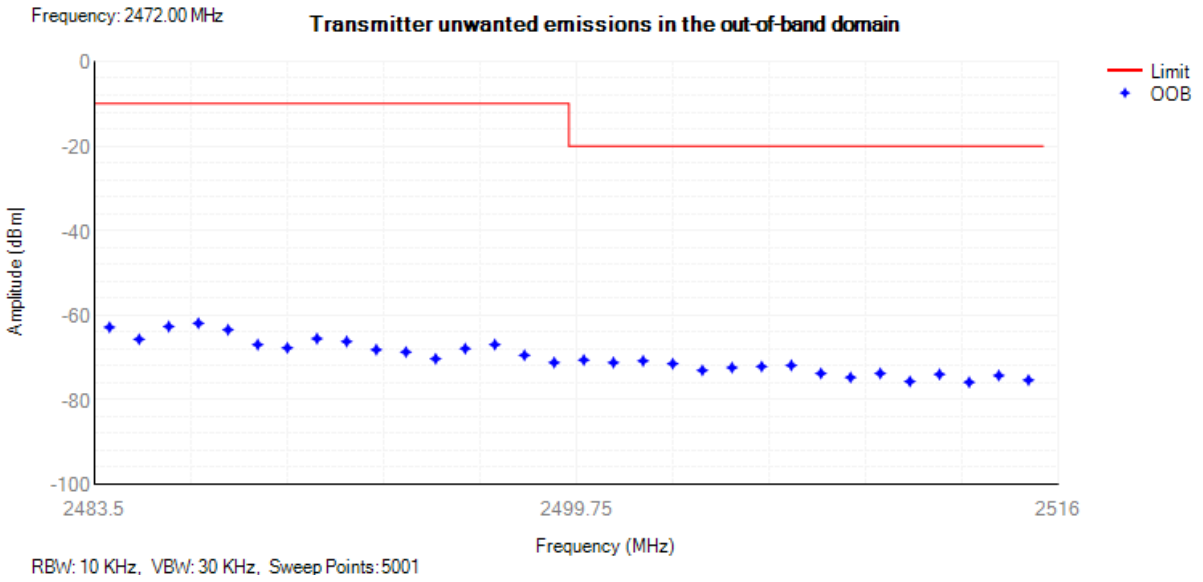
Tx. Emissions OOB NVNT g 2472MHz



Tx. Emissions OOB NVNT n20 2412MHz



Tx. Emissions OOB NVNT n20 2472MHz



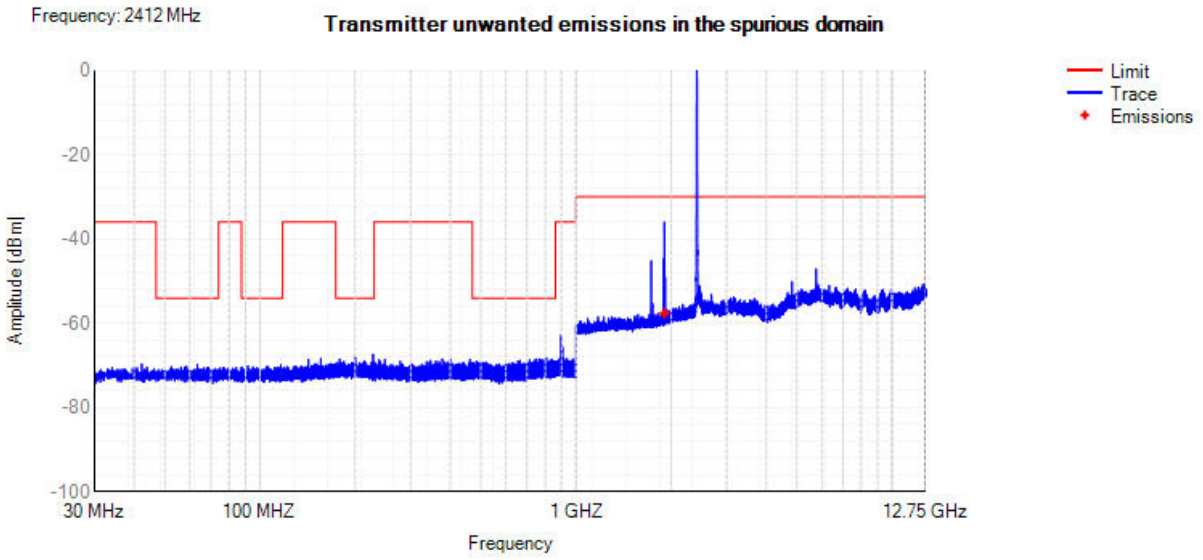
5.4.9 Transmitter unwanted emissions in the spurious domain

Test Mode	:	Mode 1: Transmit by 802.11b (Worst case) (Radiated Measurement)

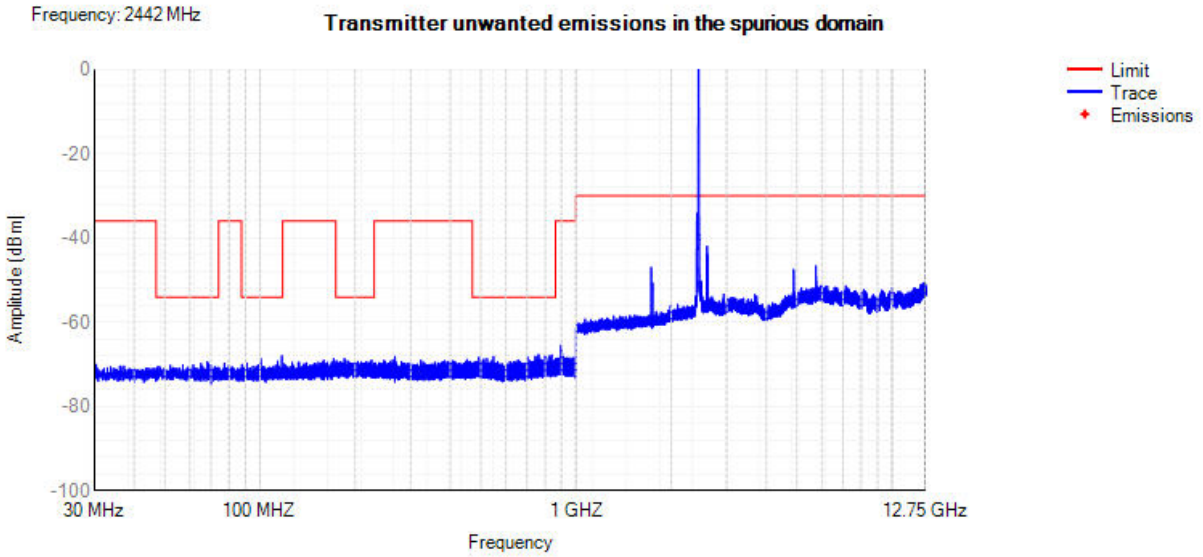
Frequency (MHz)	Polarization (H/V)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector
Channel 1 (2412MHz)					
127.12	H	-45.50	-36.00	-9.50	PK
77.82	V	-43.08	-36.00	-7.08	PK
405.21	H	-49.11	-36.00	-13.11	PK
603.41	V	-64.60	-54.00	-10.60	PK
4826.81	H	-40.76	-30.00	-10.76	PK
4827.12	V	-44.16	-30.00	-14.16	PK
7239.07	H	-43.90	-30.00	-13.90	PK
7237.74	V	-42.84	-30.00	-12.84	PK
Channel 13 (2472MHz)					
150.37	H	-37.33	-36.00	-1.33	PK
136.88	V	-46.49	-36.00	-10.49	PK
335.70	H	-39.08	-36.00	-3.08	PK
959.98	V	-38.15	-36.00	-2.15	PK
4947.03	H	-41.43	-30.00	-11.43	PK
4947.51	V	-38.19	-30.00	-8.19	PK
7418.47	H	-41.38	-30.00	-11.38	PK
7418.19	V	-36.94	-30.00	-6.94	PK

Transmitter spurious emissions (Conducted Measurement)

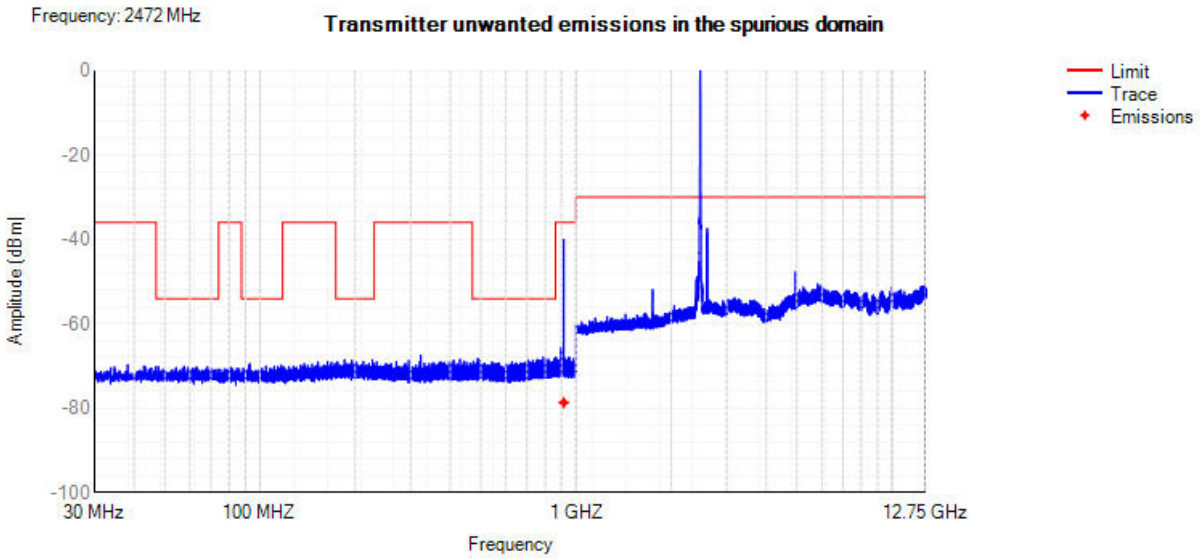
Tx. Spurious NVNT b 2412MHz



Tx. Spurious NVNT b 2442MHz



Tx. Spurious NVNT b 2472MHz



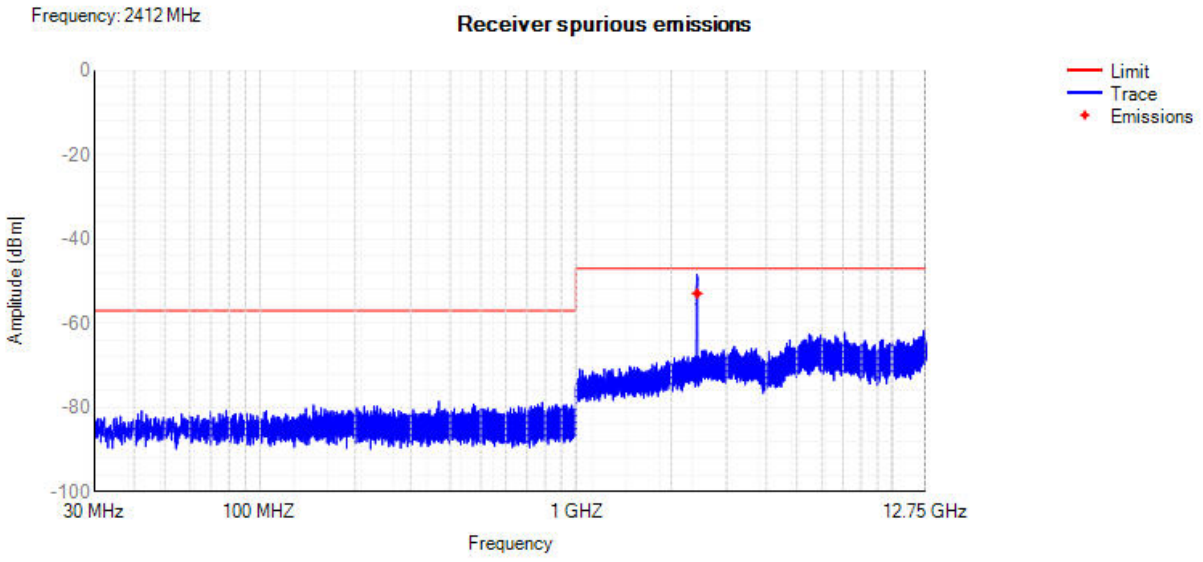
5.4.10 Receiver spurious emissions

Test Mode	:	Mode 4: Receive by 802.11b (Worst case) (Radiated Measurement)

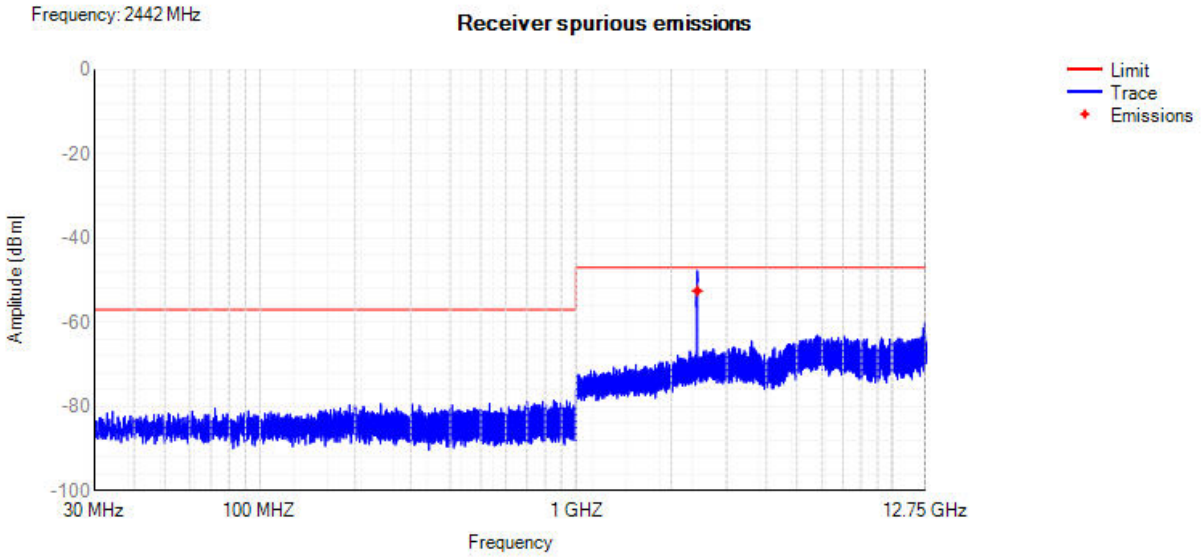
Frequency (MHz)	Polarization (H/V)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector
Channel 1 (2412MHz)					
132.75	H	-65.67	-57.00	-8.67	PK
183.71	V	-74.57	-57.00	-17.57	PK
972.17	H	-64.99	-57.00	-7.99	PK
834.09	V	-60.29	-57.00	-3.29	PK
1080.35	H	-67.01	-47.00	-20.01	PK
1748.59	V	-58.42	-47.00	-11.42	PK
2142.82	H	-71.45	-47.00	-24.45	PK
2232.59	V	-56.32	-47.00	-9.32	PK
Channel 13 (2472MHz)					
387.05	H	-64.66	-57.00	-7.66	PK
263.33	V	-67.85	-57.00	-10.85	PK
603.30	H	-68.16	-57.00	-11.16	PK
545.74	V	-72.76	-57.00	-15.76	PK
1027.52	H	-65.11	-47.00	-18.11	PK
1033.52	V	-62.87	-47.00	-15.87	PK
2859.11	H	-68.17	-47.00	-21.17	PK
2953.69	V	-69.36	-47.00	-22.36	PK

Receiver spurious emissions (Conducted Measurement)

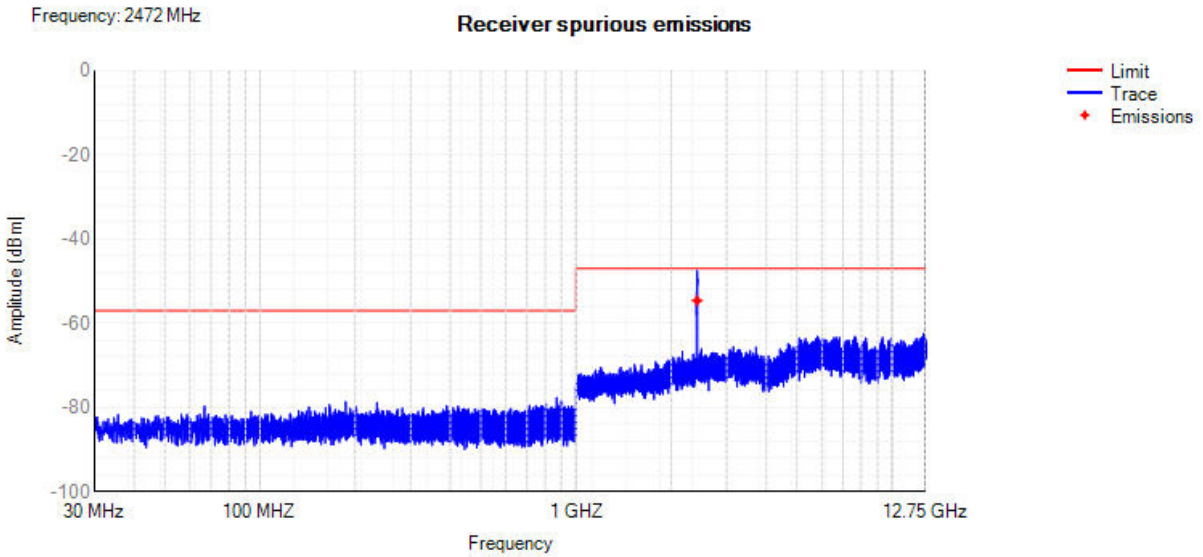
Rx. Spurious NVNT b 2412MHz



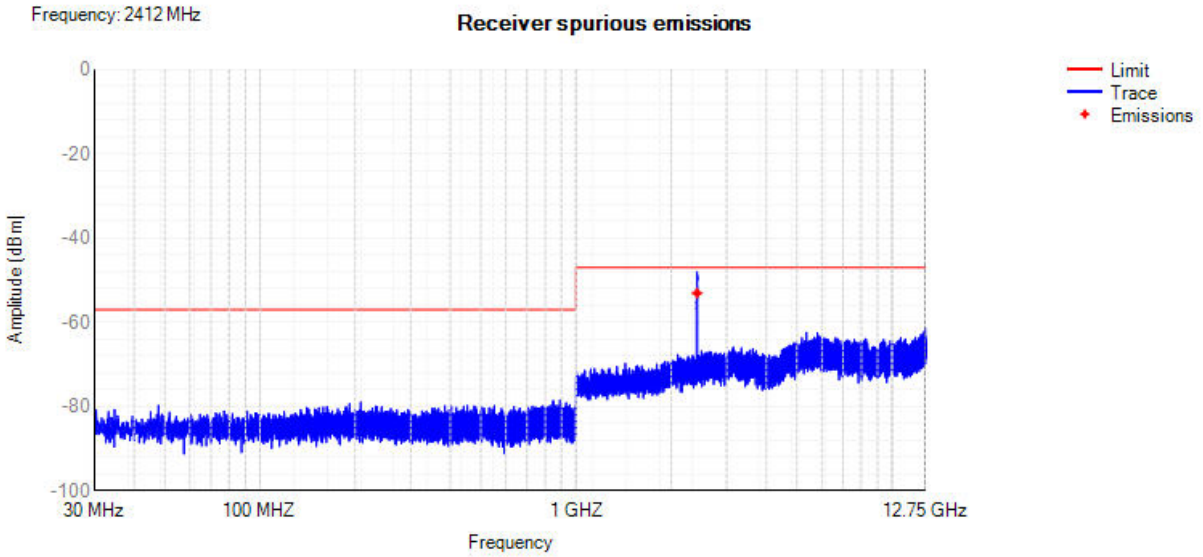
Rx. Spurious NVNT b 2442MHz



Rx. Spurious NVNT b 2472MHz



Rx. Spurious NVNT g 2412MHz



5.4.11 Receiver Blocking

Wanted Signal Mean Power from Companion Device (dBm)	Test Mode	Test Channel (MHz)	Blocking Signal Frequency (MHz)	Pmin	Blocking Signal Power (dBm)		Type of Blocking Signal	PER(%		Test Result
					Test Value	Limit		Test Value	Limit	
Pmin + 6 dB	802.11b	2412	2380	-85	-29	≥-53	CW	4.14	10	Pass
			2503.5	-86	-23	≥-53	CW	5.87	10	Pass
			2300	-82	-23	≥-47	CW	3.35	10	Pass
			2330	-85	-20	≥-47	CW	5.29	10	Pass
			2360	-84	-16	≥-47	CW	4.57	10	Pass
			2523.5	-88	-27	≥-47	CW	5.97	10	Pass
			2553.5	-83	-24	≥-47	CW	5.75	10	Pass
			2583.5	-85	-18	≥-47	CW	5.53	10	Pass
			2613.5	-92	-17	≥-47	CW	4.18	10	Pass
			2643.5	-84	-16	≥-47	CW	5.11	10	Pass
			2673.5	-86	-19	≥-47	CW	4.03	10	Pass
		2472	2380	-82	-31	≥-53	CW	5.70	10	Pass
			2503.5	-85	-24	≥-53	CW	6.27	10	Pass
			2300	-93	-19	≥-47	CW	5.70	10	Pass
			2330	-95	-17	≥-47	CW	6.53	10	Pass
			2360	-88	-23	≥-47	CW	5.80	10	Pass
			2523.5	-86	-21	≥-47	CW	4.31	10	Pass
			2553.5	-95	-25	≥-47	CW	5.21	10	Pass
			2583.5	-92	-18	≥-47	CW	3.10	10	Pass
			2613.5	-83	-22	≥-47	CW	4.24	10	Pass
			2643.5	-96	-20	≥-47	CW	6.17	10	Pass
			2673.5	-85	-21	≥-47	CW	5.85	10	Pass

Wanted Signal Mean Power from Companion Device (dBm)	Test Mode	Test Channel (MHz)	Blocking Signal Frequency (MHz)	Pmin	Blocking Signal Power (dBm)		Type of Blocking Signal	PER(%		Test Result
					Test Value	Limit		Test Value	Limit	
Pmin + 6 dB	802.11g	2412	2380	-84	-32	≥-53	CW	3.46	10	Pass
			2503.5	-85	-27	≥-53	CW	4.08	10	Pass
			2300	-86	-22	≥-47	CW	6.01	10	Pass
			2330	-85	-23	≥-47	CW	4.37	10	Pass
			2360	-84	-22	≥-47	CW	4.93	10	Pass
			2523.5	-82	-24	≥-47	CW	5.94	10	Pass
			2553.5	-83	-23	≥-47	CW	6.07	10	Pass
			2583.5	-85	-19	≥-47	CW	6.39	10	Pass
			2613.5	-94	-14	≥-47	CW	5.42	10	Pass
			2643.5	-86	-23	≥-47	CW	6.18	10	Pass
			2673.5	-88	-20	≥-47	CW	4.34	10	Pass
		2472	2380	-85	-28	≥-53	CW	4.27	10	Pass
			2503.5	-87	-25	≥-53	CW	4.41	10	Pass
			2300	-86	-23	≥-47	CW	3.51	10	Pass
			2330	-95	-24	≥-47	CW	5.31	10	Pass
			2360	-81	-20	≥-47	CW	4.91	10	Pass
			2523.5	-85	-23	≥-47	CW	4.23	10	Pass
			2553.5	-86	-19	≥-47	CW	4.19	10	Pass
			2583.5	-88	-18	≥-47	CW	4.38	10	Pass
			2613.5	-85	-22	≥-47	CW	3.51	10	Pass
			2643.5	-87	-16	≥-47	CW	5.44	10	Pass
			2673.5	-85	-13	≥-47	CW	5.25	10	Pass

Wanted Signal Mean Power from Companion Device (dBm)	Test Mode	Test Channel (MHz)	Blocking Signal Frequency (MHz)	Pmin	Blocking Signal Power (dBm)		Type of Blocking Signal	PER(%		Test Result
					Test Value	Limit		Test Value	Limit	
Pmin + 6 dB	802.11n20	2412	2380	-82	-34	≥-53	CW	4.01	10	Pass
			2503.5	-83	-31	≥-53	CW	5.01	10	Pass
			2300	-90	-20	≥-47	CW	3.27	10	Pass
			2330	-87	-25	≥-47	CW	5.75	10	Pass
			2360	-86	-19	≥-47	CW	3.26	10	Pass
			2523.5	-84	-30	≥-47	CW	4.36	10	Pass
			2553.5	-85	-21	≥-47	CW	6.38	10	Pass
			2583.5	-83	-21	≥-47	CW	4.01	10	Pass
			2613.5	-87	-22	≥-47	CW	3.32	10	Pass
			2643.5	-86	-16	≥-47	CW	5.49	10	Pass
			2673.5	-88	-20	≥-47	CW	5.19	10	Pass
		2472	2380	-90	-34	≥-53	CW	5.32	10	Pass
			2503.5	-87	-28	≥-53	CW	4.13	10	Pass
			2300	-90	-19	≥-47	CW	3.72	10	Pass
			2330	-82	-17	≥-47	CW	6.13	10	Pass
			2360	-85	-20	≥-47	CW	4.94	10	Pass
			2523.5	-88	-28	≥-47	CW	4.82	10	Pass
			2553.5	-86	-21	≥-47	CW	4.40	10	Pass
			2583.5	-83	-26	≥-47	CW	5.04	10	Pass
			2613.5	-84	-22	≥-47	CW	5.54	10	Pass
			2643.5	-85	-16	≥-47	CW	5.75	10	Pass
			2673.5	-88	-20	≥-47	CW	6.09	10	Pass

RADIO TEST REPORT

For

Shenzhen Eview GPS Technology

Personal Mobile Alarm System

Test Model: EV-07B-4G

List Model No.: N/A

Prepared for	:	Shenzhen Eview GPS Technology
Address	:	#1203 Building 2, GuoLe Technology Park, Lirong Road, Dalang, Longhua, Shenzhen, China
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	:	101, 601, Xingyuan Industrial Park, Gushu Community, Xixiang Street, Bao'an District, Shenzhen, Guangdong, China
Tel	:	(+86)755-82591330
Fax	:	(+86)755-82591332
Web	:	www.LCS-cert.com
Mail	:	webmaster@LCS-cert.com
Date of receipt of test sample	:	April 16, 2019
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	April 16, 2019~May 17, 2019
Date of Report	:	May 20, 2019

CE

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RADIO TEST REPORT

ETSI EN 301 908-13 V11.1.2 (2017-07)

IMT cellular networks; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU; Part 13: Evolved Universal Terrestrial Radio Access (E-UTRA) User Equipment (UE)

Report Reference No.	:	LCS190415004AEF
Date of Issue	:	May 20, 2019
Testing Laboratory Name	:	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address	:	101, 601, Xingyuan Industrial Park, Gushu Community, Xixiang Street, Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure	:	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name.....	:	Shenzhen Eview GPS Technology
Address	:	#1203 Building 2, GuoLe Technology Park, Lirong Road, Dalang, Longhua, Shenzhen, China
Test Specification		
Standard	:	ETSI EN 301 908-1 V11.1.1 (2016-07) ETSI EN 301 908-13 V11.1.2 (2017-07)
Test Report Form No.	:	LCSEMC-1.0
TRF Originator.....	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF	:	Dated 2017-06

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Test Item Description.	:	Personal Mobile Alarm System
Trade Mark.....	:	N/A
Test Model	:	EV-07B-4G
Ratings	:	DC 3.7V by Rechargeable Li-ion Battery (800mAh) Recharged by DC 5V 1000mA Adapter
Result	:	**Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Aking Jin	Leo Lee	Gavin Liang
Aking Jin/ File administrator	Leo Lee/ Technique principal	Gavin Liang/ Manager

RADIO -- TEST REPORT

Test Report No. : LCS190415004AEF	May 20, 2019 Date of issue

Test Model.....	: EV-07B-4G
EUT.....	: Personal Mobile Alarm System
Applicant.....	**: Shenzhen Eview GPS Technology**
Address.....	: #1203 Building 2, GuoLe Technology Park, Lirong Road, Dalang, Longhua, Shenzhen, China
Telephone.....	: /
Fax.....	: /
Manufacturer.....	**: Shenzhen Eview GPS Technology**
Address.....	: #1203 Building 2, GuoLe Technology Park, Lirong Road, Dalang, Longhua, Shenzhen, China
Telephone.....	: /
Fax.....	: /
Factory.....	**: Shenzhen Eview GPS Technology**
Address.....	: #1203 Building 2, GuoLe Technology Park, Lirong Road, Dalang, Longhua, Shenzhen, China
Telephone.....	: /
Fax.....	: /

Test Result	**Positive**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

Revision	Issue Date	Revisions	Revised By
000	May 20, 2019	Initial Issue	Gavin Liang

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1. GENERAL INFORMATION

1.1. Product Description for Equipment Under Test (EUT)

EUT	:	Personal Mobile Alarm System
Model No.	:	EV-07B-4G
Model Declaration	:	N/A
Test Model	:	EV-07B-4G
Power Supply	:	DC 3.7V by Rechargeable Li-ion Battery (800mAh) Recharged by DC 5V 1000mA Adapter
Hardware Version	:	EV07B-LTE1-V2.01
Software Version	:	V1.0.6.25
3G	:	
Support Band	:	☐WCDMA Band II(US-Band) ☒WCDMA Band V(US-Band) ☒WCDMA Band I(EU-Band) ☒WCDMA Band VIII(EU-Band)
Release Version	:	R8
Uplink	:	WCDMA Band I: 1920MHz ~ 1980MHz WCDMA Band VIII: 880MHz~915MHz
Downlink	:	WCDMA Band I: 2110MHz ~ 2170MHz WCDMA Band VIII: 925MHz~960MHz
Type Of Modulation	:	WCDMA: BPSK; HSDPA/HSUPA: BPSK
Antenna Description	:	PIFA Antenna, -1.42dBi (max.) For WCDMA Band I; -2.67dBi (max.) For WCDMA Band VIII
Power Class	:	Level 3
LTE	:	
Support Band	:	☒E-UTRA Band 3(EU-Band) ☒E-UTRA Band 5(No EU-Band) ☒E-UTRA Band 28(EU-Band)
LTE Release Version	:	R9
FDD Band	:	Uplink: E-UTRA Band 3: 1710MHz ~ 1785MHz E-UTRA Band 28: 703MHz ~ 748MHz Downlink: E-UTRA Band 3: 1805MHz ~ 1880MHz E-UTRA Band 28: 758MHz ~ 803MHz
Type Of Modulation	:	QPSK/16-QAM
Antenna Description	:	PIFA Antenna, -1.57dBi (max.) For LTE Band 3; -3.26dBi (max.) For LTE Band 28
Power Class	:	Class 3
Bluetooth	:	
Frequency Range	:	2.402-2.480GHz
Channel Number	:	40 channels
Channel Spacing	:	2MHz
Modulation Type	:	GFSK
Bluetooth Version	:	V4.0 (Support only BT LE)
Antenna Description	:	PIFA Antenna, -0.87dBi (Max.)
WIFI(2.4G Band)	:	
Frequency Range	:	2412-2472MHz
Channel Spacing	:	5MHz
Channel Number	:	13 Channel for 20MHz bandwidth(2412~2472MHz) (Not applicable 802.11n-HT40)
Modulation Type	:	802.11b: DSSS; 802.11g/n: OFDM
Antenna Description	:	PIFA Antenna, -0.87dBi (Max.)
GPS Receiver	:	
Receive Frequency	:	1575.42MHz
Channel Number	:	1
Antenna Description	:	Ceramic Antenna

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1.2. Support Equipment List

Manufacturer	Description	Model	Serial Number	Certificate
--	--	--	--	--

1.3. External I/O

I/O Port Description	Quantity	Cable
SIM Card Slot	1	N/A

1.4. Objective

Standard Referenced	Standard Title	Standard Version
ETSI EN 301 908-1	IMT cellular networks; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU; Part 1: Introduction and common requirements	V11.1.1 (2016-07)
ETSI EN 301 908-13	IMT cellular networks; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU; Part 13: Evolved Universal Terrestrial Radio Access (E-UTRA) User Equipment (UE)	V11.1.2 (2017-07)
ETSI TS 136 521-1	LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: Conformance testing (3GPP TS 36.521-1 version 12.8.0 Release 12)	V12.8.0 (2016-05)

The objective is to determine compliance with ETSI EN 301 908-1 V11.1.1 (2016-07) & ETSI EN 301 908-13 V11.1.2 (2017-07).

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1.5. Test Conditions

Conditions	Temperature	Voltage
Normal	21-25℃	DC 3.7V
Low extreme temperature/low extreme voltage (LT/LV);	-20℃	DC 3.3V
Low extreme temperature/high extreme voltage (LT/HV);	-20℃	DC 4.1V
High extreme temperature/low extreme voltage (HT/LV);	+55℃	DC 3.3V
High extreme temperature/high extreme voltage (HT/HV).	+55℃	DC 4.1V
Note1: For all conditions, the humidity range is: 40-75%, the pressure range is 86-106kPa. The High Voltage DC 4.1V and Low Voltage DC 3.3V was declared by manufacturer		

1.6. Description Of Test Mode

The following operating modes were applied for the related test items. For radiated measurement, the test was performed with EUT in X, Y, Z position and the worse case was found when EUT in X position. All test modes were tested, only the result of the worst case was recorded in the report.

Band	Bandwidth (MHz)						Modulation		RB #			Test Channel		
	1.4	3	5	10	15	20	QPSK	16-QAM	1	Part	Full	L	M	H
3	Y	/	Y	/	/	Y	Y	Y	Y	Y	Y	Y	Y	Y
28	N/A	Y	/	Y	/	Y	Y	Y	Y	Y	Y	Y	Y	Y

Note:
1)The mark "**Y**" means that this configuration is chosen for testing.
2)The mark "**/**" means that this bandwidth is supported but is not chosen for testing.
3)The mark "**N/A**" means that this bandwidth is not supported.

1.7. List Of Measuring Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	LTE Test Software	Tonscend	JS1120-1	N/A	N/A	N/A
2	RF Control Unit	Tonscend	JS0806	158060009	2018-06-16	2019-06-15
3	MXA Signal Analyzer	Agilent	N9020A	MY51250905	2018-11-15	2019-11-14
4	DC Power Supply	Agilent	E3642A	N/A	2018-11-15	2019-11-14
5	MXG Vector Signal Generator	Agilent	N5182A	MY47071151	2018-06-16	2019-06-15
6	PSG Analog Signal Generator	Agilent	E8257D	MY4520521	2018-06-16	2019-06-15
7	Temperature & Humidity Chamber	GUANGZHOU GOGNWEN	GDS-100	70932	2018-10-10	2019-10-09
8	EMI Test Software	AUDIX	E3	/	2018-06-16	2019-06-15
9	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2018-06-16	2019-06-15
10	Positioning Controller	MF	MF-7082	/	2018-06-16	2019-06-15
11	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2018-07-26	2019-07-25
12	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2018-07-26	2019-07-25
13	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2018-07-02	2019-07-01
14	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	791	2018-09-20	2019-09-19
15	Broadband Preamplifier	SCHWARZBECK	BBV 9719	9719-025	2018-09-20	2019-09-19
16	EMI Test Receiver	R&S	ESR 7	101181	2018-06-16	2019-06-15
17	RS SPECTRUM ANALYZER	R&S	FSP40	100503	2018-11-15	2019-11-14
18	AMPLIFIER	QuieTek	QTK	CHM/0809065	2018-11-15	2019-11-14
19	RF Cable-R03m	Jye Bao	RG142	CB021	2018-06-16	2019-06-15
20	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2018-06-16	2019-06-15
21	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW 500	103818	2018-06-16	2019-06-15
22	RF Filter	Micro-Tronics	BRC50718	S/N-017	2018-06-16	2019-06-15
23	RF Filter	Micro-Tronics	BRC50719	S/N-011	2018-06-16	2019-06-15
24	RF Filter	Micro-Tronics	BRC50720	S/N-011	2018-06-16	2019-06-15
25	RF Filter	Micro-Tronics	BRC50721	S/N-013	2018-06-16	2019-06-15
26	RF Filter	Micro-Tronics	BRM50702	S/N-195	2018-06-16	2019-06-15
27	6dB Attenuator	/	100W/6dB	1172040	2018-06-16	2019-06-15
28	3dB Attenuator	/	2N-3dB	/	2018-06-16	2019-06-15
29	RS SPECTRUM ANALYZER	R&S	FSP40	100503	2018-11-15	2019-11-14
Note: All equipment is calibrated through GUANGZHOU LISAI CALIBRATION AND TEST CO.,LTD.						

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1.8. Measurement Uncertainty (95% confidence levels, k=2)

Test Item		Uncertainty
Radio Frequency	:	0.9×10^{-4}
Total RF Power, Conducted	:	1.0 dB
RF Power Density, Conducted	:	1.8 dB
Spurious Emissions, Conducted	:	1.8 dB
All Emissions, Radiated	:	3.1 dB
Temperature	:	0.5°C
Humidity	:	1 %
DC And Low Frequency Voltages	:	1 %

1.9. Description of Test Facility

FCC Registration Number is 254912.
Industry Canada Registration Number is 9642A-1.
EMSD Registration Number is ARCB0108.
UL Registration Number is 100571-492.
TUV SUD Registration Number is SCN1081.
TUV RH Registration Number is UA 50296516-001.
NVLAP Accreditation Code is 600167-0.
FCC Designation Number is CN5024.
CAB identifier is CN0071.

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2. SYSTEM TEST CONFIGURATION

2.1. Justification

N/A

2.2. EUT Exercise Software

N/A

2.3. Special Accessories

The special accessories were supplied by Shenzhen LCS Compliance Testing Laboratory Ltd.

2.4. Block Diagram/Schematics

Please refer to the related document.

2.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

2.6. Test Setup

Please refer to the test setup photo.

3. TEST RESULTS

Reference Clause No. (ETSI EN 301 908-13)	Description of Test Items	Result	
		E-UTRA Band	
		Band 3	Band 28
4.2.2	Transmitter Maximum Output Power		
	NT / NV	Pass	
	LT / LV	Pass	
	LT / HV	Pass	
	HT / LV	Pass	
	HT / HV	Pass	
4.2.5	Transmitter Minimum Output Power		
	NT / NV	Pass	
	LT / LV	Pass	
	LT / HV	Pass	
	HT / LV	Pass	
	HT / HV	Pass	
4.2.3	Transmitter Spectrum Emission Mask		
	NT / NV	Pass	
4.2.11	Transmitter Adjacent Channel Leakage Power Ratio		
	NT / NV	Pass	
	LT / LV	Pass	
	LT / HV	Pass	
	HT / LV	Pass	
	HT / HV	Pass	
4.2.4	Transmitter Spurious Emissions		
	NT / NV	Pass	
4.2.10	Receiver Spurious Emissions		
	NT / NV	Pass	
4.2.6	Receiver Adjacent Channel Selectivity (ACS)		
	NT / NV	Pass	
4.2.7	Receiver Blocking Characteristics		
	NT / NV	Pass	
4.2.8	Receiver Spurious Response		
	NT / NV	Pass	
4.2.9	Receiver Intermodulation Characteristics		
	NT / NV	Pass	
4.2.12	Receiver Reference Sensitivity Level		
	NT / NV	Pass	
	LT / LV	Pass	
	LT / HV	Pass	
	HT / LV	Pass	
	HT / HV	Pass	

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Reference Clause No. (ETSI EN 301 908-1)	Description of Test Items	Result	
		E-UTRA Band	
		Band 3	Band 28
4.2.2	Radiated emissions (UE)		
	NT / NV	Pass	
4.2.4	Control and monitoring functions (UE)		
	NT / NV	Pass	

***Note:

Result: Describes test result of Test Case.

Pass: Test Case passed on specified conformance test platform.

NT: Normal temperature – 25℃

NV: Normal voltage. – DC 3.7V

HT: High temperature – +55℃

HV: High voltage – DC 4.1V

LT: Low temperature – -20℃

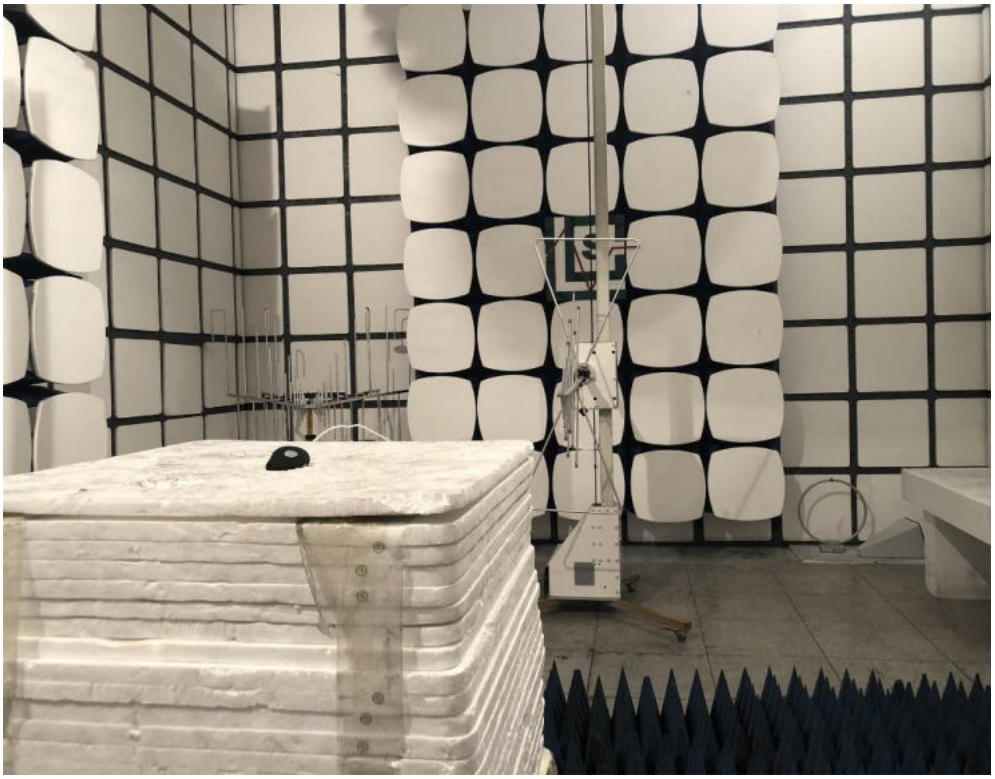
LV: Low voltage – DC 3.3V

Vibration X-axis/ Y-axis/ Z-axis: Vibration test condition for X/Y/Z axis.

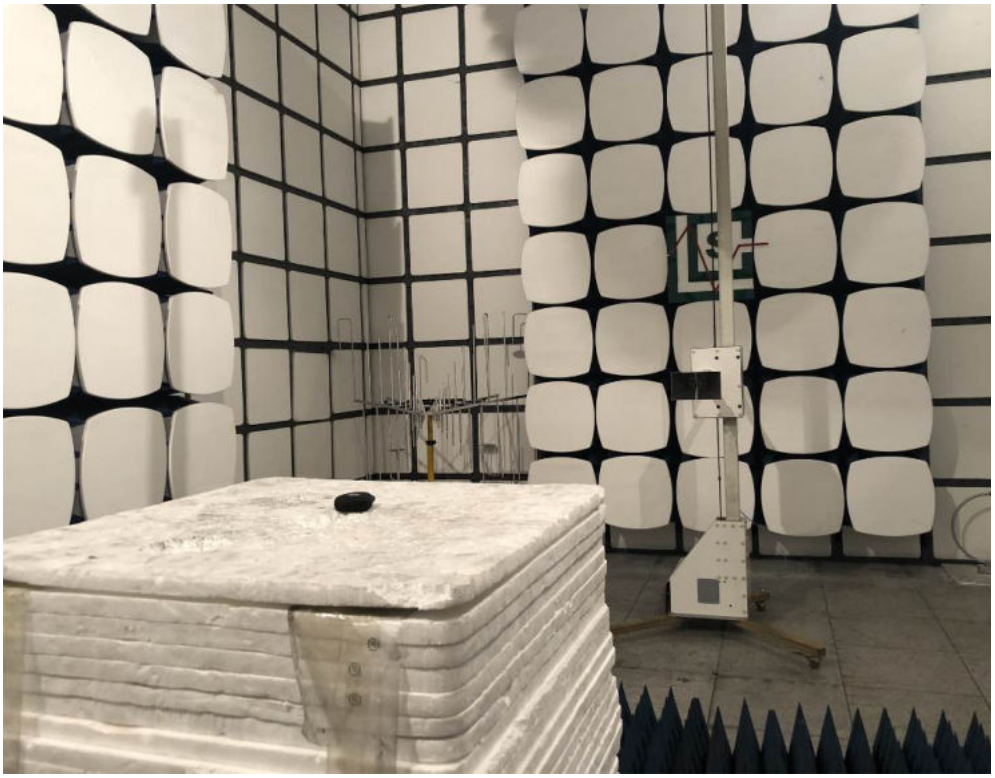
N/A: Not applicable.

—: Not test.

4. PHOTOGRAPHS OF TEST SETUP



Spurious Emission below 1GHz



Spurious Emission above 1GHz

The conducted power measurement results for LTE

LTE-BAND3

Channel Bandwidth	Channel	RB allocation		Average Power (dBm) QPSK	Average Power (dBm) 16-QAM
		RB Size	RB Offset		
1.4MHz	Low range	1	0	22.84	21.23
			max	22.89	21.63
		Partial	0	22.52	21.48
			max	22.34	21.40
	Mid range	1	0	22.26	21.83
			max	22.70	21.48
		Partial	0	22.45	21.43
			max	22.34	21.65
	High range	1	0	22.43	21.29
			max	22.17	21.69
		Partial	0	22.13	21.70
			max	22.59	21.25
5 MHz	Low range	1	0	22.31	21.42
			max	22.48	21.29
		Partial	0	22.05	21.66
			max	22.05	21.63
	Mid range	1	0	22.75	21.32
			max	22.33	21.20
		Partial	0	22.58	21.16
			max	22.84	21.18
	High range	1	0	22.02	21.27
			max	22.83	21.48
		Partial	0	22.82	21.98
			max	22.35	21.50
20MHz	Low range	1	0	22.27	21.86
			max	22.53	21.76
		Partial	0	22.66	21.68
			max	22.45	21.44
	Mid range	1	0	22.02	21.35
			max	22.40	21.76
		Partial	0	22.34	22.02
			max	22.52	22.47
	High range	1	0	23.00	21.59
			max	23.13	22.66
		Partial	0	22.93	22.19
			max	22.95	22.51

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LTE-BAND28

Channel Bandwidth	Channel	RB allocation		Average Power (dBm) QPSK	Average Power (dBm) 16-QAM
		RB Size	RB Offset		
3 MHz	Low range	1	0	22.47	21.58
			max	22.45	21.54
		Partial	0	22.27	21.11
			max	22.12	21.79
	Mid range	1	0	22.83	21.80
			max	22.47	21.15
		Partial	0	22.44	21.58
			max	22.30	21.26
	High range	1	0	22.50	21.59
			max	22.26	21.02
		Partial	0	22.20	21.87
			max	22.55	21.01
10 MHz	Low range	1	0	22.80	21.99
			max	22.33	21.40
		Partial	0	22.36	21.55
			max	22.38	21.77
	Mid range	1	0	22.68	21.98
			max	22.32	21.50
		Partial	0	22.53	21.98
			max	22.94	21.26
	High range	1	0	22.34	21.71
			max	22.53	21.55
		Partial	0	22.69	21.73
			max	22.20	21.88
20MHz	Low range	1	0	22.39	21.85
			max	22.04	21.78
		Partial	0	22.43	21.13
			max	22.57	21.51
	Mid range	1	0	22.13	21.76
			max	22.43	21.49
		Partial	0	22.69	21.11
			max	22.52	21.79
	High range	1	0	22.43	21.80
			max	22.35	21.03
		Partial	0	22.53	21.79
			max	22.29	21.92

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Annex of Radiated spurious emission

Radiated spurious emissions - MS allocated a channel(Worst Case)

LTE Band 3(1.4MHz, RB allocation=6): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
52.41	Horizontal	-74.16	-36.00	Pass
811.82	H	-76.39	-36.00	
3505.90	H	-69.96	-30.00	
5251.94	H	-55.62	-30.00	
56.32	Vertical	-71.45	-36.00	Pass
742.45	V	-72.85	-36.00	
3500.66	V	-60.59	-30.00	
5252.97	V	-54.01	-30.00	

LTE Band 3(1.4MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
60.78	Horizontal	-73.79	-36.00	Pass
706.32	H	-75.12	-36.00	
3500.01	H	-67.35	-30.00	
5251.68	H	-57.16	-30.00	
51.37	Vertical	-73.06	-36.00	Pass
777.44	V	-79.25	-36.00	
3503.99	V	-60.24	-30.00	
5253.62	V	-56.19	-30.00	

LTE Band 3(5MHz, RB allocation=25): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
54.51	Horizontal	-75.09	-36.00	Pass
832.77	H	-75.92	-36.00	
3503.59	H	-62.11	-30.00	
5255.81	H	-58.11	-30.00	
54.80	Vertical	-80.72	-36.00	Pass
897.85	V	-71.94	-36.00	
3500.03	V	-62.58	-30.00	
5251.96	V	-56.01	-30.00	

LTE Band 3(5MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
58.85	Horizontal	-76.56	-36.00	Pass
938.90	H	-71.05	-36.00	
3505.59	H	-67.49	-30.00	
5251.75	H	-50.77	-30.00	
54.90	Vertical	-76.38	-36.00	Pass
866.06	V	-80.10	-36.00	
3505.03	V	-64.72	-30.00	
5253.13	V	-50.02	-30.00	

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LTE Band 3(20MHz, RB allocation=100): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
59.47	Horizontal	-76.83	-36.00	Pass
724.67	H	-80.66	-36.00	
3504.62	H	-61.72	-30.00	
5253.31	H	-60.26	-30.00	
52.61	Vertical	-78.81	-36.00	Pass
941.61	V	-80.11	-36.00	
3505.39	V	-64.26	-30.00	
5252.69	V	-54.45	-30.00	

LTE Band 3(20MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
54.77	Horizontal	-73.21	-36.00	Pass
756.18	H	-71.04	-36.00	
3501.09	H	-61.23	-30.00	
5253.05	H	-56.56	-30.00	
59.32	Vertical	-79.10	-36.00	Pass
847.56	V	-80.43	-36.00	
3501.41	V	-66.46	-30.00	
5251.30	V	-56.10	-30.00	

LTE Band 28(3MHz, RB allocation=12): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
50.64	Horizontal	-74.81	-36.00	Pass
832.79	H	-75.37	-36.00	
1449.46	H	-66.11	-30.00	
2170.38	H	-57.67	-30.00	
56.13	Vertical	-71.92	-36.00	Pass
815.29	V	-80.06	-36.00	
1451.36	V	-64.27	-30.00	
2172.76	V	-56.22	-30.00	

LTE Band 28(3MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
57.53	Horizontal	-77.68	-36.00	Pass
733.58	H	-70.36	-36.00	
1447.92	H	-70.45	-30.00	
2172.00	H	-54.32	-30.00	
53.60	Vertical	-71.53	-36.00	Pass
937.43	V	-71.08	-36.00	
1449.41	V	-66.37	-30.00	
2175.22	V	-57.12	-30.00	

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LTE Band 28(10MHz, RB allocation=50): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
55.46	Horizontal	-80.97	-36.00	Pass
895.74	H	-76.36	-36.00	
1453.27	H	-69.58	-30.00	
2178.04	H	-58.52	-30.00	
58.29	Vertical	-72.52	-36.00	Pass
791.75	V	-70.28	-36.00	
1449.44	V	-64.95	-30.00	
2178.59	V	-60.65	-30.00	

LTE Band 28(10MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
56.89	Horizontal	-80.74	-36.00	Pass
761.15	H	-70.90	-36.00	
1448.00	H	-69.99	-30.00	
2173.72	H	-52.21	-30.00	
60.70	Vertical	-75.53	-36.00	Pass
707.97	V	-77.18	-36.00	
1452.59	V	-64.70	-30.00	
2172.56	V	-58.38	-30.00	

LTE Band 28(20MHz, RB allocation=100): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
55.16	Horizontal	-77.90	-36.00	Pass
752.87	H	-75.75	-36.00	
1446.71	H	-61.40	-30.00	
2177.89	H	-53.46	-30.00	
56.10	Vertical	-74.49	-36.00	Pass
895.34	V	-70.07	-36.00	
1447.56	V	-60.80	-30.00	
2179.97	V	-54.35	-30.00	

LTE Band 28(20MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
50.78	Horizontal	-78.15	-36.00	Pass
775.77	H	-80.48	-36.00	
1449.82	H	-60.74	-30.00	
2177.08	H	-56.01	-30.00	
55.79	Vertical	-79.57	-36.00	Pass
800.99	V	-80.94	-36.00	
1449.93	V	-66.61	-30.00	
2174.25	V	-58.88	-30.00	

----------THE END OF REPORT----------

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CERTIFICATE
of Conformity

Reference No. : **LCS190415004AE**

Applicant : **Shenzhen Eview GPS Technology**

Address : **#1203 Building 2, GuoLe Technology Park, Lirong Road, Dalang, Longhua, Shenzhen, China**

Trade Mark : **N/A**

Product : **Personal Mobile Alarm System**

Model(s) : **EV-07B-4G**

Opinion on the Essential Requirements

Article 3.1a): Health and Safety	**Conform**
Article 3.1b): Electromagnetic Compatibility	**Conform**
Article 3.2: Effective Use of the Radio Spectrum	**Conform**

CE-marking

Marking Example (Class 1)

CE

This certificate is issued in accordance with 2014/53/EU directive of the European Parliament and the Council and the mutual recognition of their conformity.

June 10, 2019

Date of issue

Center of Testing Service
LCS
* APPROVED *

Manager

Shenzhen LCS Compliance Testing Laboratory Ltd.
101, 601, Xingyuan Industrial Park, Gushu Community, Xixiang Street, Bao'an District,
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Annex

Applied Standards and Test Reports

Standard	Laboratory	Test Report Number
ETSI EN 301 489-1 V2.1.1 (2017-02) ETSI EN 301 489-17 V3.1.1 (2017-02) Draft ETSI EN 301 489-19 V2.1.0 (2017-03) Draft ETSI EN 301 489-52 V1.1.0 (2016-11)	Shenzhen LCS Compliance Testing Laboratory Ltd.	LCS190415004AEA
ETSI EN 300 328 V2.1.1 (2016-11)	Shenzhen LCS Compliance Testing Laboratory Ltd.	LCS190415004AEC LCS190415004AED
ETSI EN 301 908-1 V11.1.1 (2016-07) ETSI EN 301 908-2 V11.1.2 (2017-08)	Shenzhen LCS Compliance Testing Laboratory Ltd.	LCS190415004AEE
ETSI EN 301 908-1 V11.1.1 (2016-07) ETSI EN 301 908-13 V11.1.2 (2017-07)	Shenzhen LCS Compliance Testing Laboratory Ltd.	LCS190415004AEF
ETSI EN 303 413 V1.1.1 (2017-06)	Shenzhen LCS Compliance Testing Laboratory Ltd.	LCS190415004AEG
EN 62209-2: 2010 EN 50566: 2017 EN 50663: 2017	Shenzhen LCS Compliance Testing Laboratory Ltd.	LCS190415004AEB
EN 62368-1:2014+A11:2017	Shenzhen LCS Compliance Testing Laboratory Ltd.	LCS190415003AS

General Remarks:

- This conformity assessment is limited to the essential requirements of the RED Directive. Only products fulfilling all essential requirements of all applicable new approach directives may be placed on the market and put into service.
  Products in compliance with all provisions of the applicable directives providing for the CE marking must bear this marking.
- This device also contains frequency bands that are not operational in EU member states. Only the frequency bands used in European Union have been assessed for this Certificate.

Center of Testing Service * APPROVED *

Shenzhen LCS Compliance Testing Laboratory Ltd.
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SAR TEST REPORT

For

Shenzhen Eview GPS Technology

Personal Mobile Alarm System

Test Model: EV-07B-4G

List Model No.: N/A

Prepared for	:	Shenzhen Eview GPS Technology
Address	:	#1203 Building 2, GuoLe Technology Park, Lirong Road, Dalang, Longhua, Shenzhen, China
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	:	101, 601, Xingyuan Industrial Park, Gushu Community, Xixiang Street, Bao' an District, Shenzhen, Guangdong, China
Tel	:	(86)755-82591330
Fax	:	(86)755-82591332
Web	:	www.LCS-cert.com
Mail	:	webmaster@LCS-cert.com
Date of receipt of test sample	:	April 16, 2019
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	April 16, 2019~ May 17, 2019
Date of Report	:	May 20, 2019

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SAR TEST REPORT

Report Reference No. .....:	**LCS190415004AEB**
Date Of Issue .....:	May 20, 2019
Testing Laboratory Name .....:	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address .....:	101, 601, Xingyuan Industrial Park, Gushu Community, Xixiang Street, Bao' an District, Shenzhen, Guangdong, China
Testing Location/ Procedure .....:	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name.....:	**Shenzhen Eview GPS Technology**
Address .....:	#1203 Building 2, GuoLe Technology Park, Lirong Road, Dalang, Longhua, Shenzhen, China
Test Specification:	
SAR Max. Values is.....:	0.611 W/kg (10g) for Body.
Standard .....:	EN62209-2:2010&EN50566:2017&EN50663:2017&AS/NZS 2772.2:2016 Amd 1:2018
Test Report Form No. .....:	LCSEMC-1.0
TRF Originator .....:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF .....:	Dated 2017-12

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Test Item Description. .....:	**Personal Mobile Alarm System**
Trade Mark .....:	N/A
Model/Type Reference .....:	EV-07B-4G
Ratings .....:	DC 3.7V by Rechargeable Li-ion Battery (800mAh) Recharged by DC 5V 1000mA Adapter
Result .....:	**Positive**

Compiled by:	Supervised by:	Approved by:
Vera Deng	Aking Jin	Gavin Liang
Vera Deng/ File administrators	Aking Jin/ Technique principal	Gavin Liang/ Manager

SAR -- TEST REPORT

Test Report No. : LCS190415004AEB	May 20, 2019 Date of issue

Test Model.....	: EV-07B-4G
EUT.....	: Personal Mobile Alarm System
Applicant.....	**: Shenzhen Eview GPS Technology**
Address.....	: #1203 Building 2, GuoLe Technology Park, Lirong Road, Dalang, Longhua, Shenzhen, China
Telephone.....	: /
Fax.....	: /
Manufacturer.....	**: Shenzhen Eview GPS Technology**
Address.....	: #1203 Building 2, GuoLe Technology Park, Lirong Road, Dalang, Longhua, Shenzhen, China
Telephone.....	: /
Fax.....	: /
Factory.....	**: Shenzhen Eview GPS Technology**
Address.....	: #1203 Building 2, GuoLe Technology Park, Lirong Road, Dalang, Longhua, Shenzhen, China
Telephone.....	: /
Fax.....	: /

Test Result	Positive

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revison History

Revision	Issue Date	Revisions	Revised By
000	May 20, 2019	Initial Issue	Gavin Liang

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1.TEST STANDARDS AND TEST DESCRIPTION

1.1. Test Standards

The tests were performed according to following standards:

EN 62209-2:2010:Human exposure to radio frequency fields from hand-held and bodymounted wireless communication devices.Human models,instrumentation, and procedures.Part 2: Procedure to determine thespecific absorption rate (SAR) forwireless communication devices usedin close proximity to the human body(frequency range of 30 MHz to 6 GHz)
EN 50663:2017:Generic standard for assessment of low power electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (10 MHz - 300 GHz)
EN 50566:2017:Product standard to demonstrate the compliance of wireless communication devices with thebasic restrictions and exposure limit values related to human exposure to electromagnetic fields in the frequency range from 30 MHz to 6 GHz: hand-held and body mounted devices in close proximity to the human body
AS/NZS 2772.2:2016 Amd 1:2018:Radiofrequency fields, Part 2: Principles and methods of measurement and computation - 3 kHz to 300 GHz

1.2. Test Description

The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power

1.3. Product Description

Product Name:	Personal Mobile Alarm System
Test Model:	EV-07B-4G
Additional Model No.:	/
Model Declaration:	/
Hardware Version	EV07B-LTE1-V2.01
Software Version:	V1.0.6.25
Power supply:	DC 3.7V by Rechargeable Li-ion Battery (800mAh) Recharged by DC 5V 1000mA Adapter
WCDMA	
Operation Band:	☐WCDMA Band II(US-Band) ☒WCDMA Band V(US-Band) ☒WCDMA Band I(EU-Band) ☒WCDMA Band VIII(EU-Band)
Power Class:	Class 3
Uplink	WCDMA Band I: 1920MHz ~ 1980MHz WCDMA Band VIII: 880MHz~915MHz
Downlink	WCDMA Band I: 2110MHz ~ 2170MHz WCDMA Band VIII: 925MHz~960MHz
Modulation Type:	WCDMA: BPSK; HSDPA/HSUPA: BPSK
WCDMA Release Version:	R8
DC-HSUPA Release Version:	Not Supported
Antenna Description	PIFA Antenna, -1.42dBi (max.) For WCDMA Band I; -2.67dBi (max.) For WCDMA Band VIII
LTE	
Operation Band:	☒E-UTRA Band 3(EU-Band) ☒E-UTRA Band 5(No EU-Band) ☒E-UTRA Band 28(EU-Band)
Power Class:	Class 3
FDD Band	Uplink: E-UTRA Band 3: 1710MHz ~ 1785MHz E-UTRA Band 28: 703MHz ~ 748MHz Downlink: E-UTRA Band 3: 1805MHz ~ 1880MHz E-UTRA Band 28: 758MHz ~ 803MHz
Modulation Type:	QPSK/16-QAM
LTE Release Version:	R9
Antenna Description:	PIFA Antenna, -1.57dBi (max.) For LTE Band 3; -3.26dBi (max.) For LTE Band 28
WIFI	
Supported type:	802.11b/802.11g/802.11n(HT20)
Modulation:	802.11b: DSSS, 802.11g/802.11n:OFDM
Operation frequency:	802.11b/802.11g/802.11n(HT20): 2412MHz~2472MHz;
Channel number:	13 Channel for 20MHz bandwidth(2412~2472MHz) (Not applicable 802.11n-HT40)
Channel separation:	5MHz
Antenna Description:	PIFA Antenna, -0.87dBi (Max.)

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Bluetooth	
Version:	V4.0
Modulation:	GFSK for Bluetooth V4.0(DTS)
Operation frequency:	2402MHz~2480MHz
Channel number:	40
Channel separation:	2MHz
Antenna Description	PIFA Antenna, -0.87dBi (Max.)

1.4. Summary SAR Results

Table 1:Max. SAR Measured(10g)

Exposure Configuration	Technolohy Band	Highest Measured SAR 10g(W/kg)
Body-worn	WCDMA Band VIII	0.030
	WCDMA Band I	0.064
	E-UTRA Band 3	0.366
	E-UTRA Band 28	0.611
	WLAN2450	0.313

The SAR values found for the EUT below the maximum recommended levels of 2.0W/kg as averaged over for 10g tissue according to EN62209.
The maximum SAR value is obtained at the case of (Table 1), and the maximum value is:0.611W/kg (10g) for Body.
The EUT has one LTE/WCDMA card slot (SIM1) . The result for LTE/ WCDMA card slot(SIM1) is the worst case which was only recorded.

1.5. EUT operation mode

The EUT has been tested under typical operating condition and The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

1.6. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer
○ - supplied by the lab

○	Power Cable	Length (m) :	/
		Shield :	/
		Detachable :	/
○	Multimeter	Manufacturer :	/
		Model No. :	/

2.TEST ENVIRONMENT

2.1. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

Site Description

EMC Lab. : FCC Registration Number is 254912.
Industry Canada Registration Number is 9642A-1.
EMSD Registration Number is ARCB0108.
UL Registration Number is 100571-492.
TUV SUD Registration Number is SCN1081.
TUV RH Registration Number is UA 50296516-001.
NVLAP Accreditation Code is 600167-0.
FCC Designation Number is CN5024.
CAB identifier is CN0071.

2.2. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	18-25 ° C
Humidity:	40-65 %
Atmospheric pressure:	950-1050mbar

2.3. SAR Limits

CE Limit (10g Tissue)

EXPOSURE LIMITS	SAR (W/kg)	
	(General Population / Uncontrolled Exposure Environment)	(Occupational / Controlled Exposure Environment)
Spatial Average(averaged over the whole body)	0.08	0.4
Spatial Peak(averaged over any 1 g of tissue)	2.0	10
Spatial Peak(hands/wrists/ feet/anklesaveraged over 10 g)	4.0	20.0

Population/Uncontrolled Environments are defined as locations where there is the exposure of individual who have no knowledge or control of their exposure.
Occupational/Controlled Environments are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure (i.e. as a result of employment or occupation).

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2.4. Equipments Used during the Test

Test Equipment	Manufacturer	Type/Model	Serial Number	Calibration	
				Calibration Date	Calibration Due
PC	Lenovo	G5005	MY42081102	N/A	N/A
SAR Measurement system	SATIMO	4014_01	SAR_4014_01	N/A	N/A
Signal Generator	Angilent	E4438C	MY42081396	06/16/2018	06/15/2019
Multimeter	Keithley	MiltiMeter 2000	4059164	06/16/2018	06/15/2019
S-parameter Network Analyzer	Agilent	8753ES	US38432944	11/15/2018	11/14/2019
Wideband Radia Communication Tester	R&S	CMW500	1201.0002K50	11/15/2018	11/14/2019
E-Field PROBE	SATIMO	SSE2	SN 31/17 EPGO324	10/08/2018	10/07/2019
DIPOLE 750	SATIMO	SID 750	SN 30/14 DIP 0G750-302	10/01/2015	09/30/2018
DIPOLE 900	SATIMO	SID 900	SN 07/14 DIP 0G900-300	10/01/2018	09/30/2021
DIPOLE 1800	SATIMO	SID 1800	SN 07/14 DIP 1G800-301	10/01/2018	09/30/2021
DIPOLE 2000	SATIMO	SID 2000	SN 07/14 DIP 2G000-305	10/01/2018	09/30/2021
DIPOLE 2450	SATIMO	SID 2450	SN 07/14 DIP 2G450-306	10/01/2018	09/30/2021
Power meter	Agilent	E4419B	MY45104493	06/16/2018	06/15/2019
Power meter	Agilent	E4418B	GB4331256	06/16/2018	06/15/2019
Power sensor	Agilent	E9301H	MY41497725	06/16/2018	06/15/2019
Power sensor	Agilent	E9301H	MY41495234	06/16/2018	06/15/2019
Directional Coupler	MCLI/USA	4426-20	0D2L51502	06/16/2018	06/15/2019
Mobile Phone POSITIONING DEVICE	SATIMO	MSH98	SN 40/14 MSH98	N/A	N/A
SAM PHANTOM	SATIMO	SAM117	SN 40/14 SAM117	N/A	N/A
COMOSAR OPEN Coaxial Probe	SATIMO	OCPG 68	SN 40/14 OCPG68	N/A	N/A
Liquid measurement Kit	HP	85033D	3423A03482	N/A	N/A

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3.SAR MEASUREMENTS SYSTEM CONFIGURATION

3.1. SAR Measurement Set-up

The OPENSAR system for performing compliance tests consist of the following items:

A standard high precision 6-axis robot (KUKA) with controller and software.

KUKA Control Panel (KCP)

A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with a Video Positioning System(VPS).

The stress sensor is composed with mechanical and electronic when the electronic part detects a change on the electro-mechanical switch,It sends an “Emergency signal” to the robot controller that to stop robot’s moves

A computer operating Windows XP.

OPENSAR software

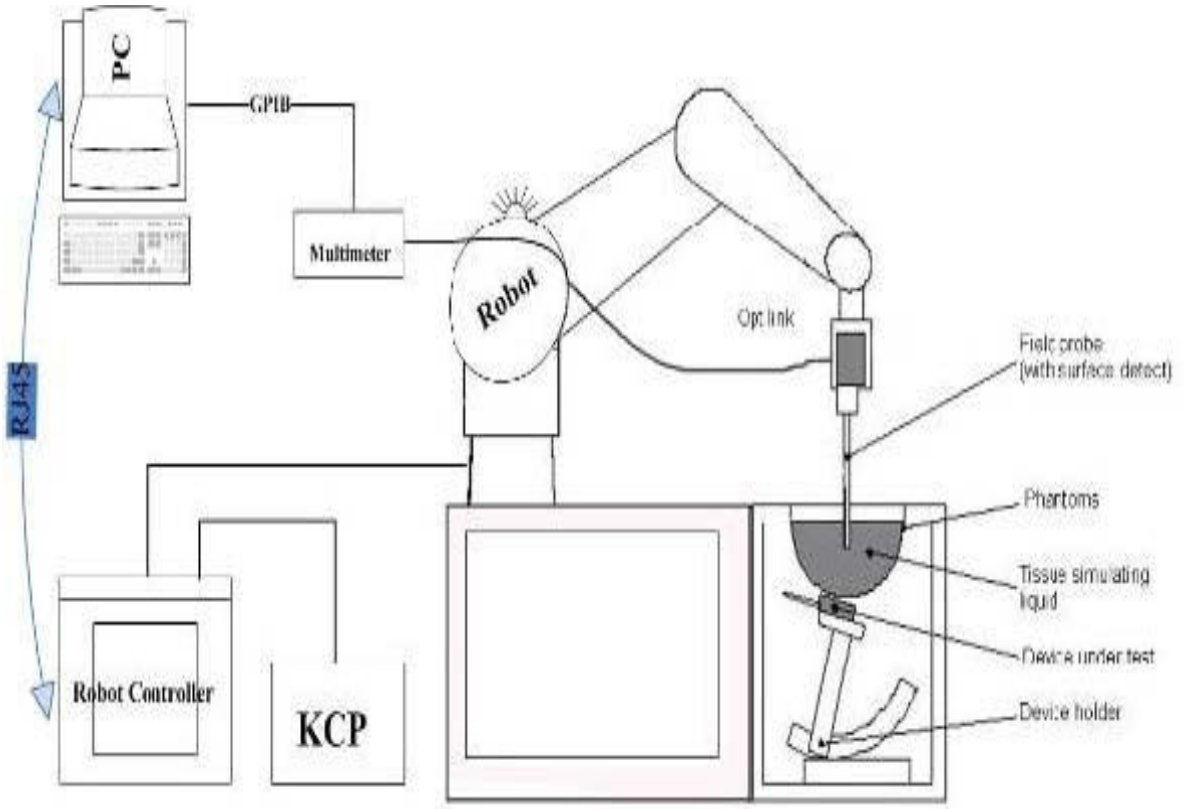
Remote control with teaches pendant and additional circuitry for robot safety such as warning lamps, etc.

The SAM phantom enabling testing left-hand right-hand and body usage.

The Position device for handheld EUT

Tissue simulating liquid mixed according to the given recipes .

System validation dipoles to validate the proper functioning of the system.



3.2. OPENSAR E-field Probe System

The SAR measurements were conducted with the dosimetric probe EPGO324 (manufactured by SATIMO), designed in the classical triangular configuration and optimized for dosimetric evaluation.

Probe Specification

ConstructionSymmetrical design with triangular core
Interleaved sensors
Built-in shielding against static charges
PEEK enclosure material (resistant to organic solvents, e.g., DGBE)

CalibrationISO/IEC 17025 calibration service available.

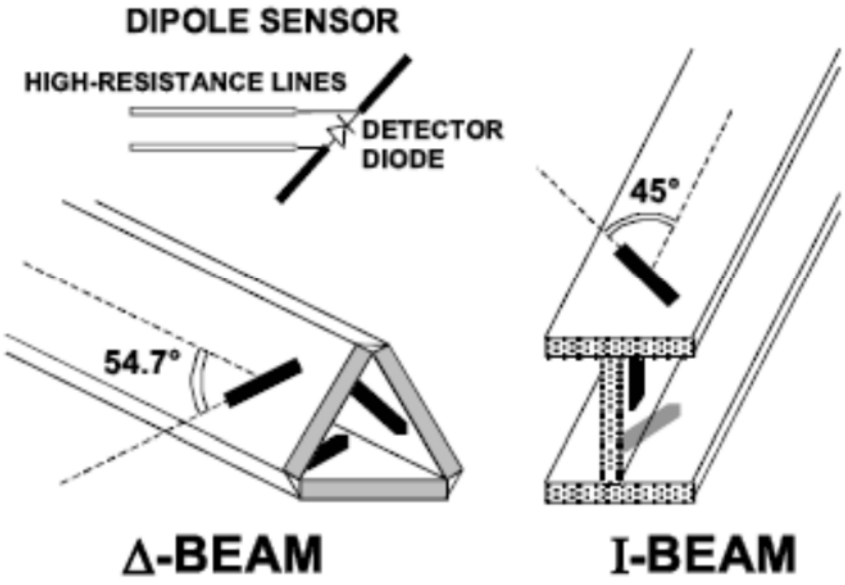
Frequency	450 MHz to 6 GHz; Linearity:0.25dB(450 MHz to 6 GHz)
Directivity	0.25 dB in HSL (rotation around probe axis) 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range	0.01W/kg to > 100 W/kg; Linearity: 0.25 dB
Dimensions	Overall length: 330 mm (Tip: 16mm) Tip diameter: 5 mm (Body: 8 mm) Distance from probe tip to sensor centers: 2.5 mm
Application	General dosimetry up to 6 GHz Dosimetry in strong gradient fields Compliance tests of Handheld terminals



Isotropic E-Field Probe

The isotropic E-Field probe has been fully calibrated and assessed for isotropicity, and boundary effect within a controlled environment. Depending on the frequency for which the probe is calibrated the method utilized for calibration will change.

The E-Field probe utilizes a triangular sensor arrangement as detailed in the diagram below:



3.3. Phantoms

The SAM Phantom SAM117 is constructed of a fiberglass shell ntegrated in a wooden table. The shape of the shell is in compliance with the specification set in IEEE P1528 and CENELEC EN62209-1 , EN62209-2:2010.The phantom enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents the evaporation of the liquid. Reference markings on the Phantom allow the complete setup of allpredefined phantom positions and measurement grids by manually teaching three points in the robo

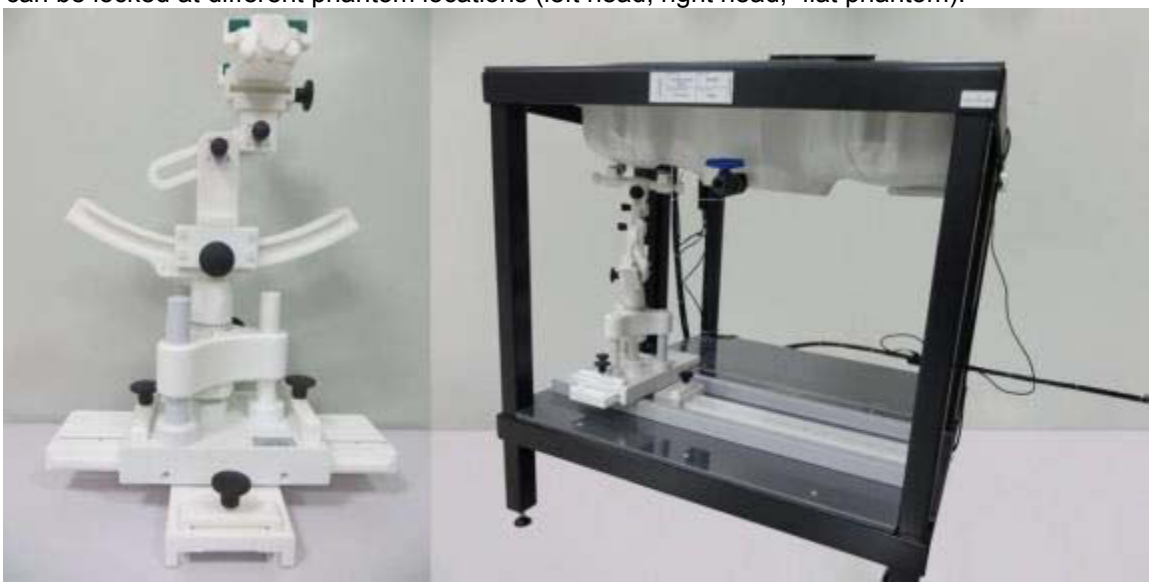
System checking was performed using the flat section, whilst Head SAR tests used the left and right head profile sections. Body SAR testing also used the flat section between the head profiles.



SAM Twin Phantom

3.4. Device Holder

In combination with the Generic Twin PhantomSAM117, the Mounting Device enables the rotation of the mounted transmitter in spherical coordinates whereby the rotation points is the ear opening. The devices can be easily, accurately, and repeatedly positioned according to the FCC and CENELEC specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).



Device holder supplied by SATIMO

3.5. Scanning Procedure

The procedure for assessing the peak spatial-average SAR value consists of the following steps

Power Reference Measurement
The referenceand drift jobs are useful jobs for monitoring the power drift of the device under test in the batch process. Both jobs measure the field at a specified reference position, at a selectable distance from the phantom surface. The reference position can be either the selected section's grid reference point or a user point in this section. The reference job projects the selected point onto the phantom surface, orients the probe perpendicularly to the surface, and approaches the surface using the selected detection method.

Area Scan
The area scan is used as a fast scan in two dimensions to find the area of high field values, before doing a finer measurement around the hot spot.Thesophisticated interpolation routines implemented in OPENSAR software can find the maximum locations even in relatively coarse grids. The scan area is defined by an editable grid. This grid is anchored at the grid reference point of the selected section in the phantom. When the area scan's property sheet is brought-up, grid was at to 15 mm by 15 mm and can be edited by a user.

Zoom Scan
Zoom scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The default zoom scan measures 5 x 5 x 4 points within a cube whose base faces are centered around the maximum found in a preceding area scan job within the same procedure. If the preceding Area Scan job indicates more then one maximum, the number of Zoom Scans has to be enlarged accordingly (The default number inserted is 1).

Power Drift measurement
The drift job measures the field at the same location as the most recent reference job within the same procedure, and with the same settings. The drift measurement gives the field difference in dB from the reading conducted within the last reference measurement. Several drift measurements are possible for one reference measurement. This allows a user to monitor the power drift of the device under test within a batch process. In the properties of the Drift job, the user can specify a limit for the drift and have OPENSAR software stop the measurements if this limit is exceeded.

3.6. Data Storage and Evaluation

Data Storage
The OPENSAR software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files . The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [mW/g], [mW/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

Data Evaluation
The OPENSAR software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe parameters:	- Sensitivity	Normi, ai0, ai1, ai2
	- Conversion factor	ConvFi
	- Diode compression point	Dcpi
Device parameters:	- Frequency	f
	- Crest factor	cf
Media parameters:	- Conductivity	σ
	- Density	ρ

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These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the OPENSAR components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics.If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot \frac{cf}{dcp_i}$$

With Vi = compensated signal of channel i (i = x, y, z)
Ui = input signal of channel i (i = x, y, z)
cf = crest factor of exciting field
dcpi = diode compression point

From the compensated input signals the primary field data for each channel can be evaluated:

$$\text{E} - \text{fieldprobes}: \qquad E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}$$

$$\text{H} - \text{fieldprobes}: \qquad H_i = \sqrt{V_i} \cdot \frac{a_{i0} + a_{i1} f + a_{i2} f^2}{f}$$

With Vi = compensated signal of channel i (i = x, y, z)
Normi = sensor sensitivity of channel i (i = x, y, z)
[mV/(V/m)2] for E-field Probes
ConvF = sensitivity enhancement in solution
aij = sensor sensitivity factors for H-field probes
f = carrier frequency [GHz]
Ei = electric field strength of channel i in V/m
Hi = magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = \sqrt{E_x^2 + E_y^2 + E_z^2}$$

The primary field data are used to calculate the derived field units.

$$SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1'000}$$

with SAR = local specific absorption rate in mW/g
Etot = total field strength in V/m
σ = conductivity in [mho/m] or [Siemens/m]
ρ = equivalent tissue density in g/cm3

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid.

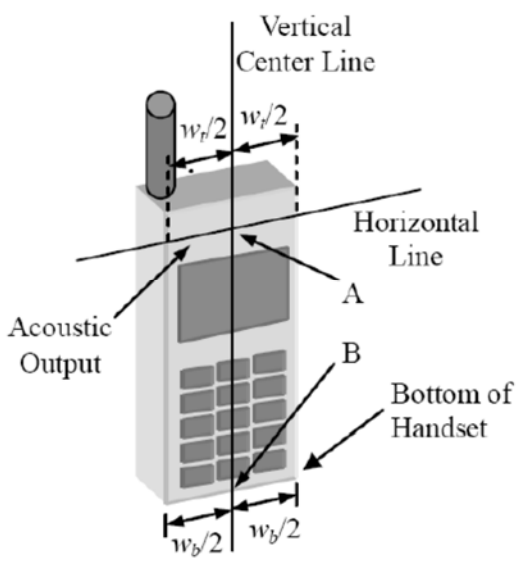
3.7. Position of the wireless device in relation to the phantom

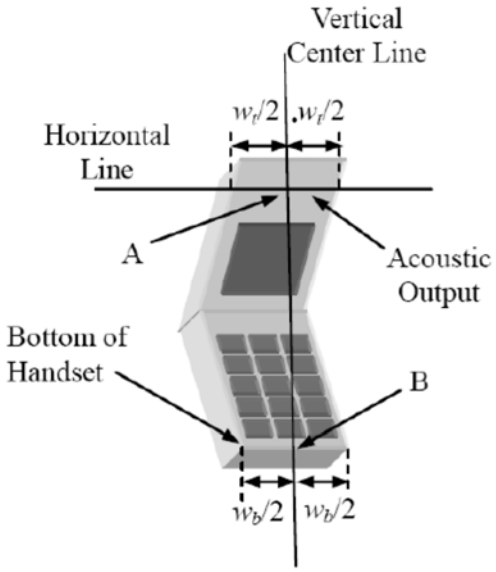
General considerations
This standard specifies two handset test positions against the head phantom – the “cheek” position and the “tilt” position.

The power flow density is calculated assuming the excitation field as a free space field

$$P_{(\text{pwe})} = \frac{E_{tot}^2}{3770} \text{ or } P_{(\text{pwe})} = H^2_{tot} \cdot 37.7$$

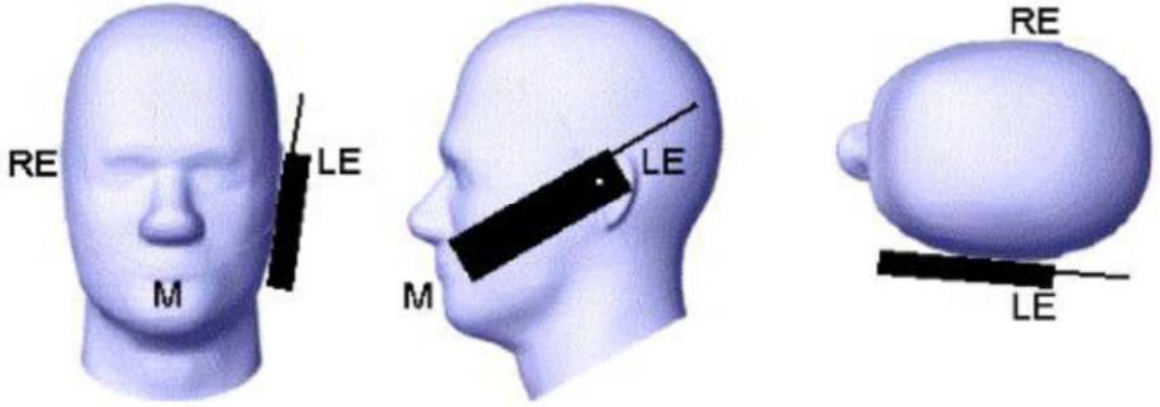
Where P_{pwe}=Equivalent power density of a plane wave in mW/cm2
E_{tot}=total electric field strength in V/m
H_{tot}=total magnetic field strength in A/m



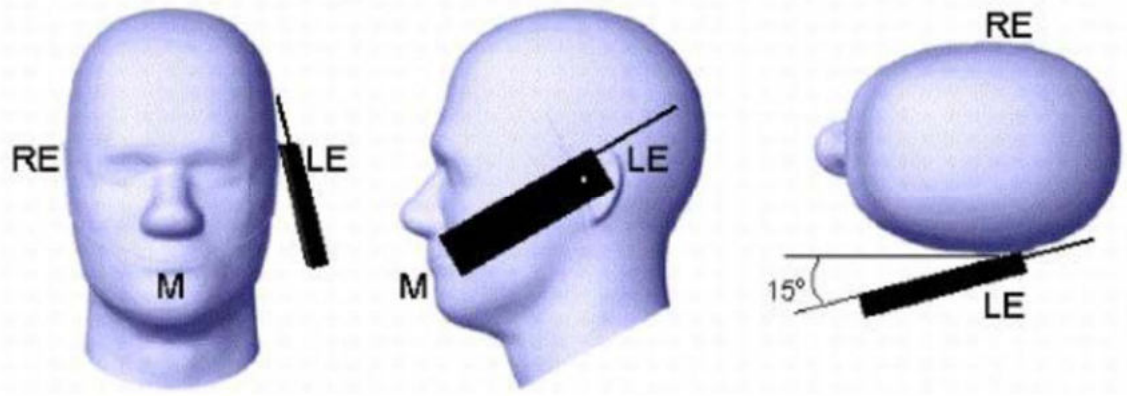


W_t Width of the handset at the level of the acoustic
W_b Width of the bottom of the handset
A Midpoint of the width w_t of the handset at the level of the acoustic output
B Midpoint of the width w_b of the bottom of the handset

Picture 1-a Typical “fixed” case handset Picture 1-b Typical “clam-shell” case handset



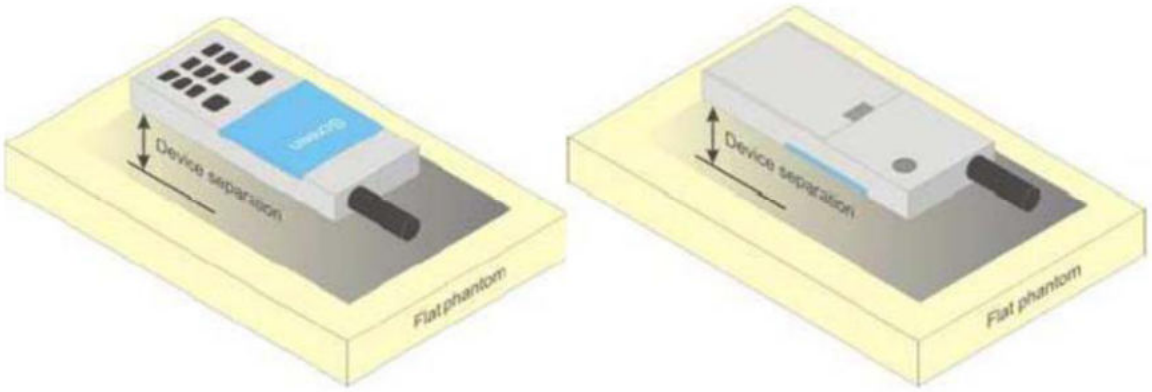
Picture 2 Cheek position of the wireless device on the left side of SAM



Picture 3 Tilt position of the wireless device on the left side of SAM

Body-worn device

A typical example of a body-worn device is a Handheld terminal, wireless enabled PDA or other battery operated wireless device with the ability to transmit while mounted on a person's body using a carry accessory approved by the wireless device manufacturer.



Picture 4 Test positions for body-worn devices

Devices with hinged or swivel antenna(s)

For devices that employ one or more external antennas with variable positions (e.g. antenna extended, retracted, rotated), these shall be positioned in accordance with the user instructions provided by the manufacturer. For a device with only one antenna, if no intended antenna position is specified, tests shall be performed if applicable in both the horizontal and vertical positions relative to the phantom, and with the antenna oriented away from the body of the DUT (Figure 5) and/or with the antenna extended and retracted such as to obtain the highest exposure condition. For antennas that may be rotated through one or two planes, an evaluation should be made and documented in the measurement report to the highest exposure scenario and only that position(s) need(s) to be tested. For devices with multiple detachable antennas see provisions of 6.2.2.

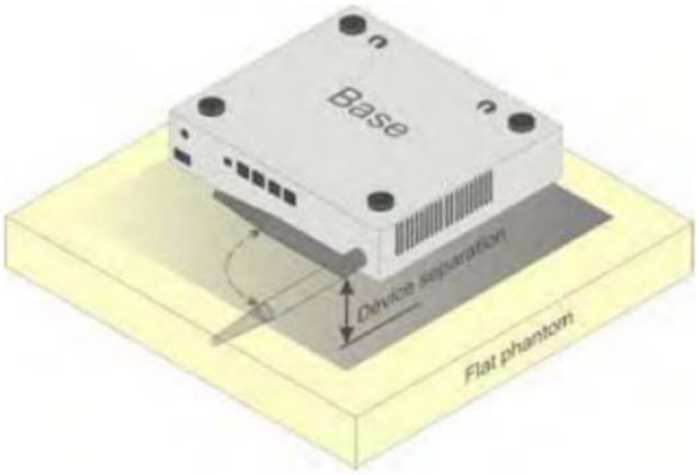


Figure 5– Device with swivel antenna (example of desktop device)

Body-supported device

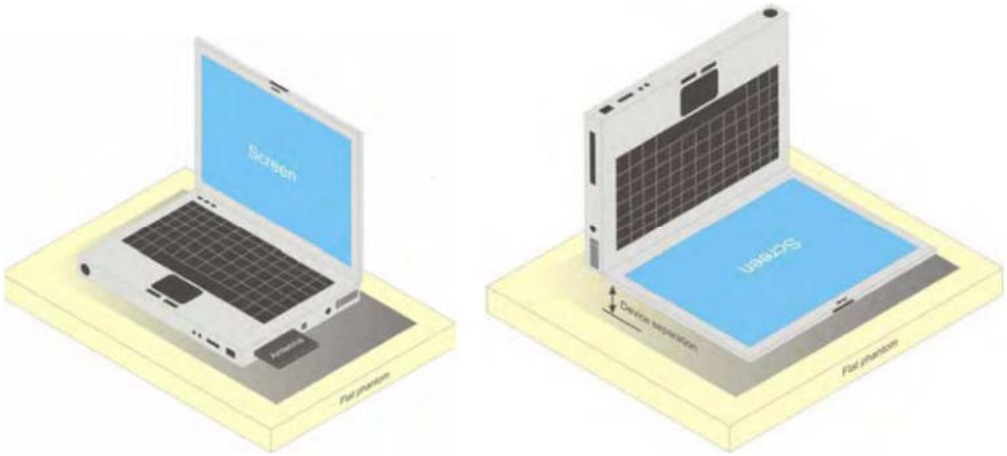
A typical example of a body supported device is a wireless enabled laptop device that among other orientations may be supported on the thighs of a sitting user. To represent this orientation, the device shall be positioned with its base against the flat phantom. Other orientations may be specified by the manufacturer in the user instructions. If the intended use is not specified, the device shall be tested directly against the flat phantom in all usable orientations.

The screen portion of the device shall be in an open position at a 90° angle as seen in Figure 6a (left side), or at an operating angle specified for intended use by the manufacturer in the operating instructions. Where a body supported device has an integral screen required for normal operation, then the screen-side will not need to be tested if the antenna(s) integrated in it ordinarily remain(s) 200 mm from the body. Where a screen mounted antenna is present, the measurement shall be performed with the screen against the flat phantom as shown in Figure 6a) (right side), if operating the screen against the body is consistent with the intended use.

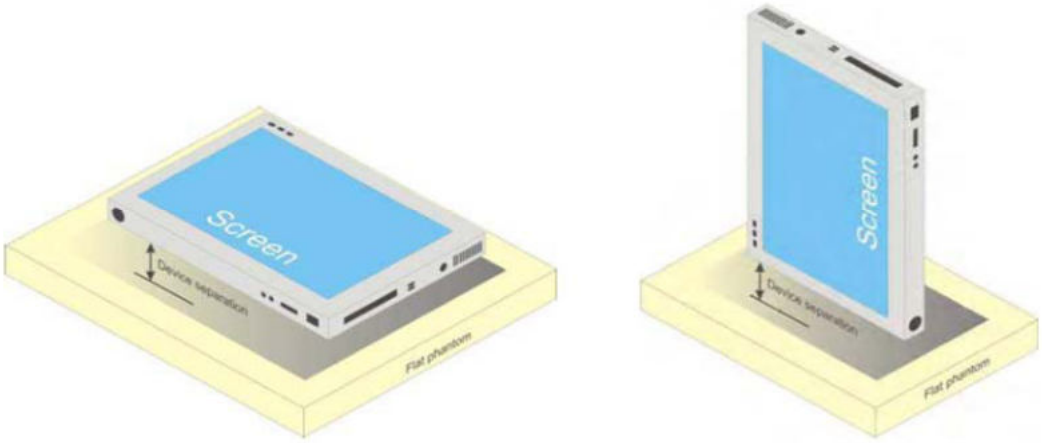
Other devices that fall into this category include tablet type portable computers and credit card transaction authorisation terminals, point-of-sale and/or inventory terminals. Where these devices may be torso or limb-supported, the same principles for body-supported devices are applied.

The example in Figure 6b) shows a tablet form factor portable computer for which SAR should be separately assessed with

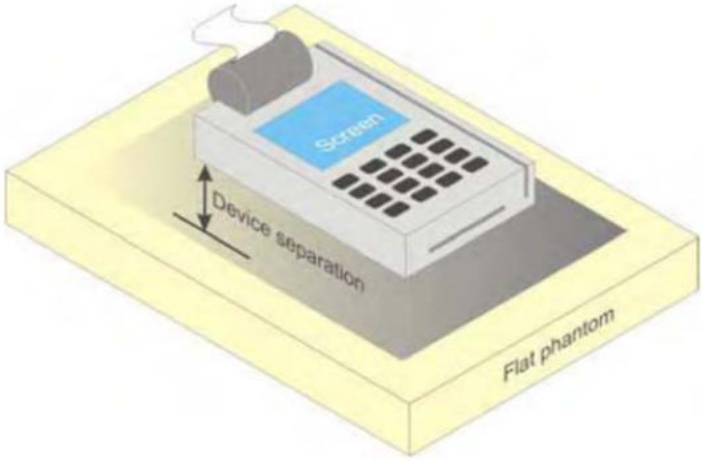
c). each surface and
d). the separation distances
positioned against the flat phantom that correspond to the intended use as specified by the manufacturer. If the intended use is not specified in the user instructions, the device shall be tested directly against the flat phantom in all usable orientations.
Some body-supported devices may allow testing with an external power supply (e.g. a.c. adapter) supplemental to the battery, but it shall be verified and documented in the measurement report that SAR is still conservative.
For devices that employ an external antenna with variable positions (e.g. swivel antenna), see 6.1.4.5 and Figure 5.



a) Portable computer with external antenna plug-in-radio-card (left side) or with internal antenna located in screen section (right side)



b) Tablet form factor portable computer



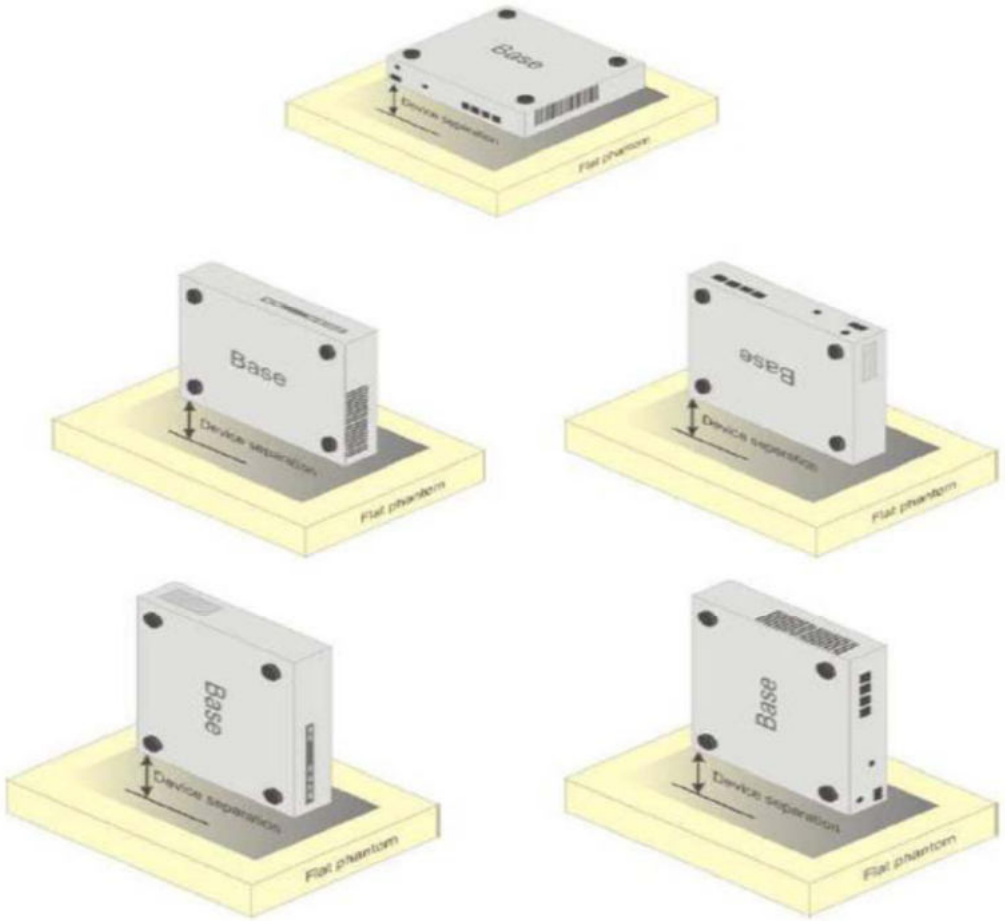
c) Wireless credit card transaction authorisation terminal

Figure 6 – Test positions for body supported devices

Desktop device

A typical example of a desktop device is a wireless enabled desktop computer placed on a table or desk when used.

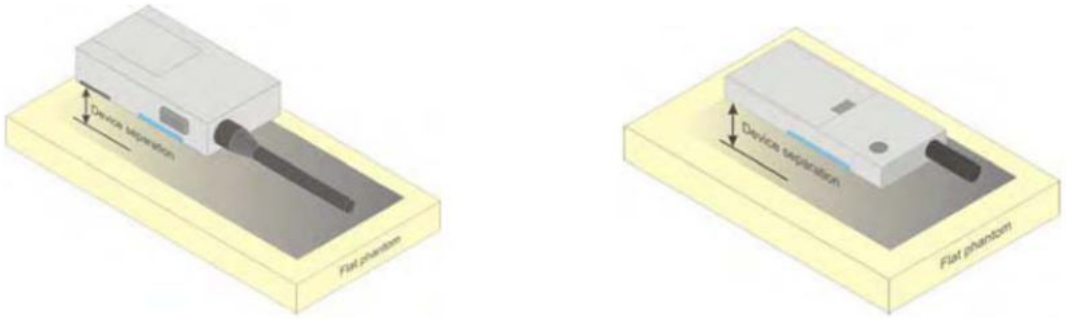
The DUT shall be positioned at the distance and in the orientation to the phantom that corresponds to the intended use as specified by the manufacturer in the user instructions. For devices that employ an external antenna with variable positions, tests shall be performed for all antenna positions specified. Picture 14 shows positions for desktop device SAR tests. If the intended use is not specified, the device shall be tested directly against the flat phantom.



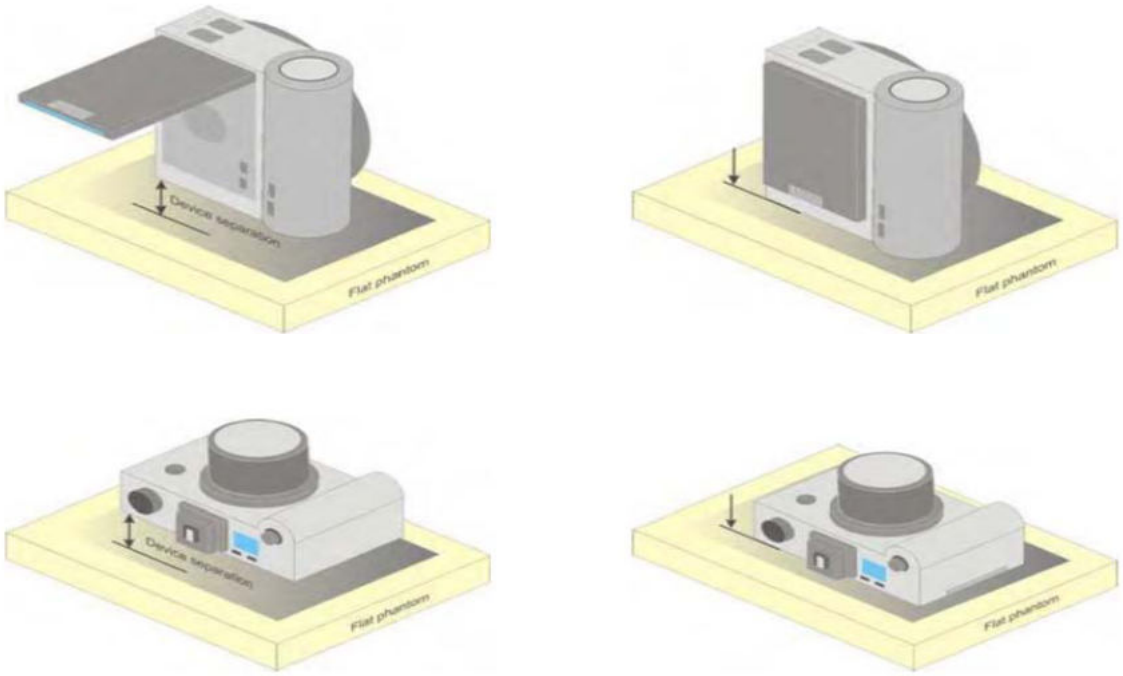
Picture 7 Test positions for desktop devices

Front-of-face device

A typical example of a front-of-face device is a two-way radio that is held at a distance from the face of the user when transmitting. In these cases the device under test shall be positioned at the distance to the phantom surface that corresponds to the intended use as specified by the manufacturer in the user instructions (Figure 8a). If the intended use is not specified, a separation distance of 25 mm between the phantom surface and the device shall be used.



a) Two-way radios



b) Still cameras and video cameras

Figure 8 – Test positions for front-of-face devices

Other devices that fall into this category include wireless-enabled still cameras and video cameras that can send data to a network or other device (Figure 8b). In the case of a devicewhose intended use requires a separation distance from the user (e.g., device with a viewing screen), this shall be positioned at the distance to the phantom surface that corresponds to the intended use as specified by the manufacturer in the user instructions (Figure 8b, left side). If the intended use is not specified, a separation distance of 25 mm between the phantom surface and the device shall be used.
For a device whose intended use requires the user's face to be in contact with the device (e.g., device with an optical viewfinder), this shall be placed directly against the phantom (Figure 8b, right side).

Hand-held usage of the device, not at the head or torso
Additional studies remain needed for devising a representative method for evaluating SAR in the hand of hand-held devices. Future versions of this standard are intended to contain a test method based on scientific data and rationale. Annex J presents the currently available test procedure.

Limb-worn device
A limb-worn device is a unit whose intended use includes being strapped to the arm or leg of the user while transmitting (except in idle mode). It is similar to a body-worn device. Therefore, the test positions of 6.1.4.4 also apply. The strap shall be opened so that it is divided into two parts as shown in Figure 9. The device shall be positioned directly against the phantom surface with the strap straightened as much as possible and the back of the device towards the phantom.
If the strap cannot normally be opened to allow placing in direct contact with the phantom surface, it may be necessary to break the strap of the device but ensuring to not damage the antenna.

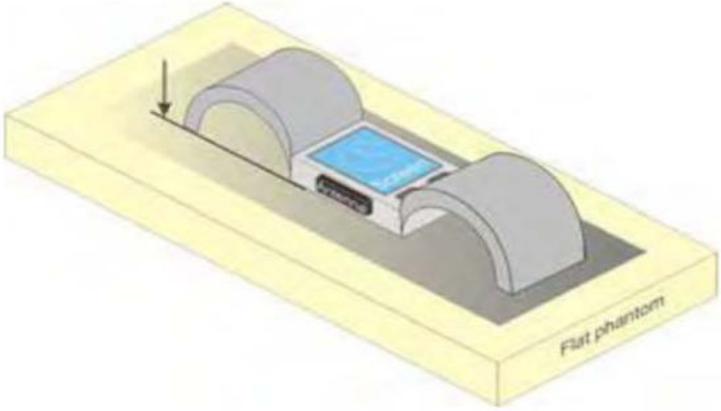


Figure 9 – Test position for limb-worn devices

Clothing-integrated device

A typical example of a clothing-integrated device is a wireless device (Handheld terminal) integrated into a jacket to provide voice communications through an embedded speaker and microphone. This category also includes headgear with integrated wireless devices.

All wireless or RF transmitting components shall be placed in the orientation and at the separation distance to the phantom surface that correspond to intended use of the device when it is integrated into the clothing (Figure 10).

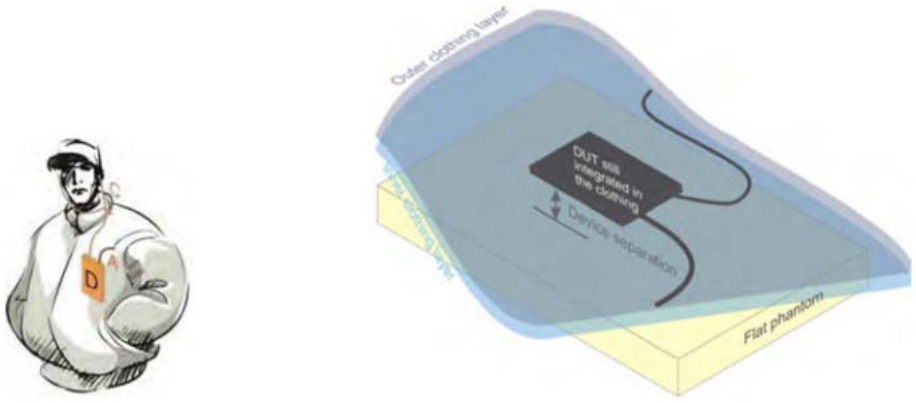


Figure 10– Test position for clothing-integrated wireless devices

3.8. Tissue Dielectric Parameters for Head and Body Phantoms

The liquid used for the frequency range of 700-3000 MHz consisted of water, sugar, salt and Cellulose. The liquid has been previously proven to be suited for worst-case. The Table 3 and 4 shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the IEEE 1528 and IEC 62209.

Table 2. Composition of the Head Tissue Equivalent Matter

Frequency (MHz)	Bactericide	DGBE	HEC	NaCl	Sucrose	1,2-Propanediol	X100	Water	Conductivity	Permittivity
	%	%	%	%	%	%	%	%	σ	εr
750	/	/	/	0.79	/	64.81	/	34.40	0.97	41.8
835	/	/	/	0.79	/	64.81	/	34.40	0.97	41.8
900	/	/	/	0.79	/	64.81	/	34.40	0.97	41.8
1800	/	13.84	/	0.35	/	/	30.45	55.36	1.38	41.0
1900	/	13.84	/	0.35	/	/	30.45	55.36	1.38	41.0
2000	/	7.99	/	0.16	/	/	19.97	71.88	1.55	41.1
2450	/	7.99	/	0.16	/	/	19.97	71.88	1.88	40.3
2600	/	7.99	/	0.16	/	/	19.97	71.88	1.88	40.3

Table 3. Targets for tissue simulating liquid

Frequency (MHz)	Liquid Type	Liquid Type (σ)	± 5% Range	Permittivity (ε)	± 5% Range
300	Head	0.87	0.83～0.91	45.30	43.04～47.57
450	Head	0.87	0.83～0.91	43.50	41.33～45.68
835	Head	0.90	0.86～0.95	41.50	39.43～43.58
900	Head	0.97	0.92～1.02	41.50	39.43～43.58
1450	Head	1.20	1.14～1.26	40.50	38.48～42.53
1800	Head	1.40	1.33～1.47	40.00	38.00～42.00
1900	Head	1.40	1.33～1.47	40.00	38.00～42.00
1950	Head	1.40	1.33～1.47	40.00	38.00～42.00
2000	Head	1.40	1.33～1.47	40.00	38.00～42.00
2450	Head	1.80	1.71～1.89	39.20	37.24～41.16
3000	Head	2.40	2.28～2.52	38.50	36.58～40.43
300	Body	0.87	0.83～0.91	45.30	43.04～47.57
450	Body	0.87	0.83～0.91	43.50	41.33～45.68
835	Body	0.90	0.86～0.95	41.50	39.43～43.58
900	Body	0.97	0.92～1.02	41.50	39.43～43.58
1450	Body	1.20	1.14～1.26	40.50	38.48～42.53
1800	Body	1.40	1.33～1.47	40.00	38.00～42.00
1900	Body	1.40	1.33～1.47	40.00	38.00～42.00
1950	Body	1.40	1.33～1.47	40.00	38.00～42.00
2000	Body	1.40	1.33～1.47	40.00	38.00～42.00
2100	Body	1.49	1.42～1.56	39.80	37.81～41.79
2450	Body	1.80	1.71～1.89	39.20	37.24～41.16
2600	Body	1.96	1.86～2.06	39.00	37.05～40.95
3000	Body	2.40	2.28～2.52	38.50	36.58～40.43
3500	Body	2.91	2.77～3.06	37.90	36.01～39.80
4000	Body	3.43	3.26～3.61	37.40	35.53～39.27
4500	Body	4.44	3.74～4.14	36.80	34.96～38.64
5000	Body	4.45	4.23～4.67	36.20	34.39～38.01
5200	Body	4.66	4.43～4.89	36.00	34.20～37.80
5400	Body	4.86	4.62～5.10	35.80	34.01～37.59
5600	Body	5.07	4.82～5.32	35.50	33.73～37.28
5800	Body	5.27	5.01～5.53	35.30	33.54～37.07
6000	Body	5.48	5.21～5.75	35.10	33.35～36.86

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3.9. Dielectric Performance

Test Condition and Test Date

Test Engineer:Vera Deng			
Liquid Frequency	Measurement temperature	Measurement humidity	Measurement Date
750 MHz	24.8℃	53.9%	April 16, 2019
900 MHz	23.4℃	53.9%	April 18, 2019
1800 MHz	23.8℃	53.1%	April 19, 2019
2000 MHz	23.5℃	54.1%	May 11, 2019
2450 MHz	23.8℃	53.1%	May 17, 2019

Dielectric Performance of Head Tissue Simulating Liquid

Measured Frequency (MHz)	Target Tissue		Measured Tissue			
	σ	ε_r	σ	Dev.	ε_r	Dev.
750	0.89	42.06	0.88	-1.12%	41.90	-0.38%
900	0.97	41.5	0.95	-2.06%	41.87	0.89%
1800	1.40	40.0	1.41	0.71%	39.55	-1.13%
2000	1.40	40.0	1.43	2.14%	41.26	3.15%
2450	1.80	39.2	1.79	-0.56%	39.64	1.12%

3.10. System Check

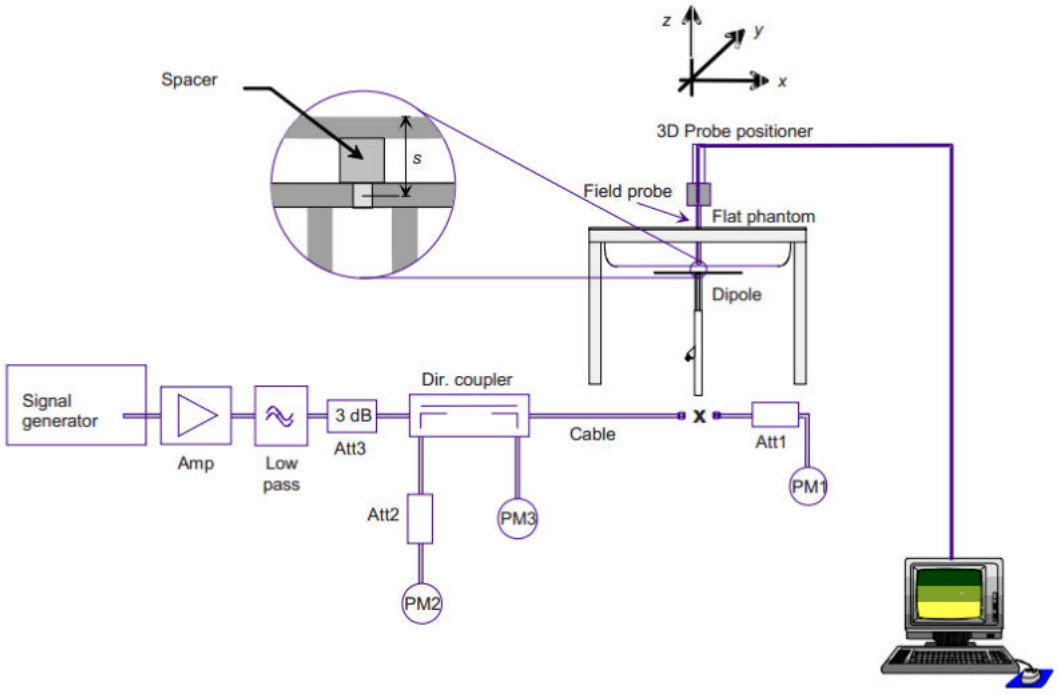


Figure B.1 – Set-up for the system check

Test set-up for the system check

The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check be performed prior to any usage of the system in order to guarantee reproducible results. The system performance check uses normal SAR measurements in a simplified setup with a well characterized source. This setup was selected to give a high sensitivity to all parameters that might fail or vary over time. The system check does not intend to replace the calibration of the components, but indicates situations where the system uncertainty is exceeded due to drift or failure.

In the simplified setup for system evaluation, the DUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave that comes from a signal generator. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch

the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The equipment setup is shown below:

1 Signal Generator
2 Amplifier
3 Directional Coupler
4 Power Meter
5 Calibrated Dipole

The output power on dipole port must be calibrated to 20 dBm (100 mW) before dipole is connected.



Photo of Dipole Setup

System Validation of Head

Verification results	Frequency (MHz)	Target value (W/kg)		Measured value (W/kg)		Deviation	
		1 g Average	10 g Average	1 g Average	10 g Average	1 g Average	10 g Average
	750	8.49	5.55	8.71	5.53	2.591	-0.360
	900	10.9	6.99	10.6	6.78	-2.75%	-3.00%
	1800	38.4	20.1	40.2	18.9	4.69%	-5.97%
	2000	41.1	21.1	42.6	20.2	3.65%	-4.27%
	2450	52.4	24.0	49.8	23.5	-4.96%	-2.08%

3.11. Measurement Procedures

Tests to be performed

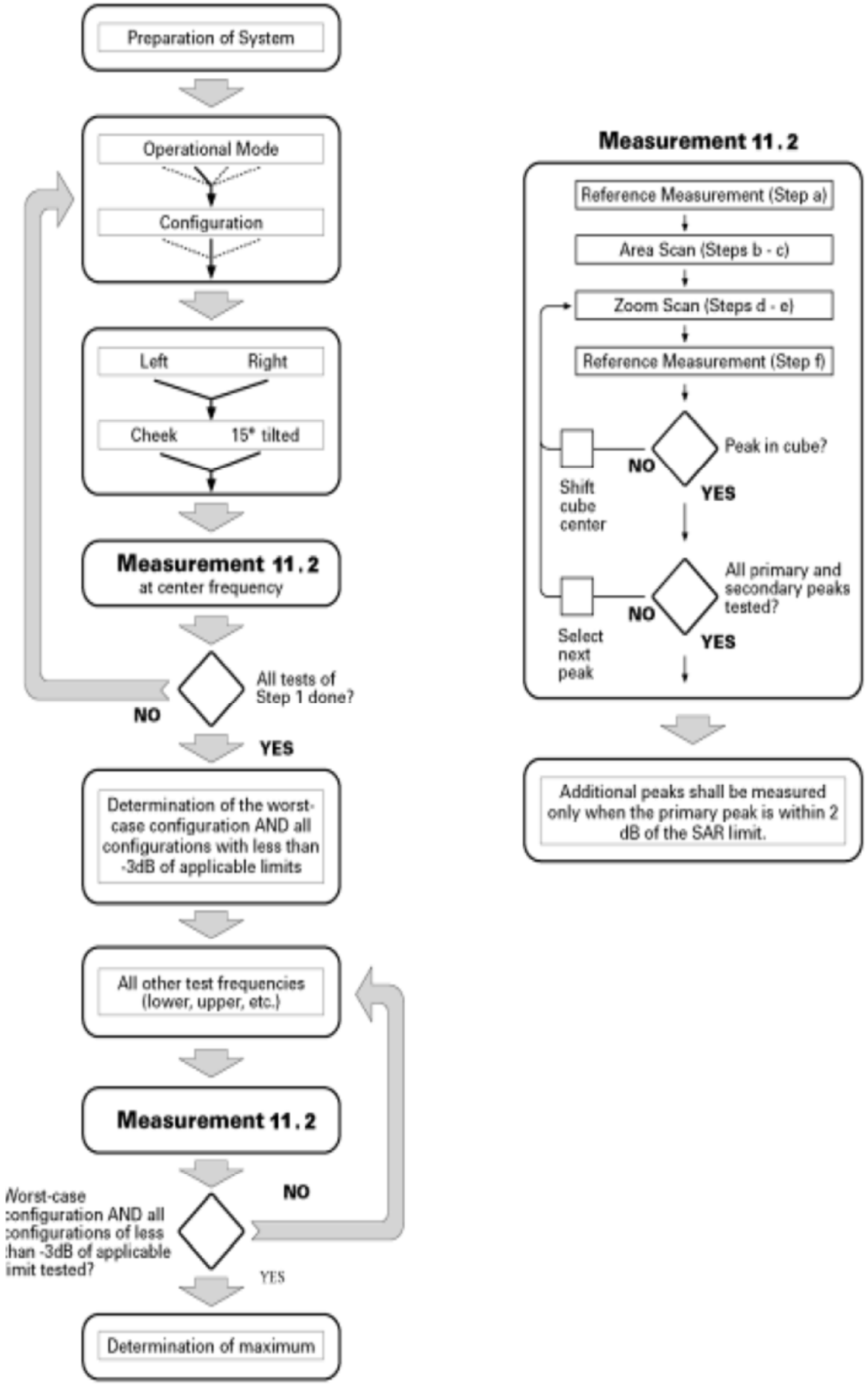
In order to determine the highest value of the peak spatial-average SAR of a handset, all device positions, configurations and operational modes shall be tested for each frequency band according to steps 1 to 3 below. A flowchart of the test process is shown in Picture 11

Step 1: The tests described in 11.2 shall be performed at the channel that is closest to the centre of the transmit frequency band (f_c) for:

a) all device positions (cheek and tilt, for both left and right sides of the SAM phantom, as described in Chapter 8),
b) all configurations for each device position in a), e.g., antenna extended and retracted, and
c) all operational modes, e.g., analogue and digital, for each device position in a) and configuration in b) in each frequency band.
d) If more than three frequencies need to be tested according to 11.1 (i.e., N_c> 3), then allfrequencies, configurations and modes shall be tested for all of the above test conditions.

Step 2: For the condition providing highest peak spatial-average SAR determined in Step 1, perform all tests described in 11.2 at all other test frequencies, i.e., lowest and highest frequencies. In addition, for all other conditions (device position, configuration and operational mode) where the peak spatial-average SAR value determined in Step 1 is within 3 dB of the applicable SAR limit, it is recommended that all other test frequencies shall be tested as well.

Step 3: Examine all data to determine the highest value of the peak spatial-average SAR found in Steps 1 to 2.



Picture 11 Block diagram of the tests to be performed

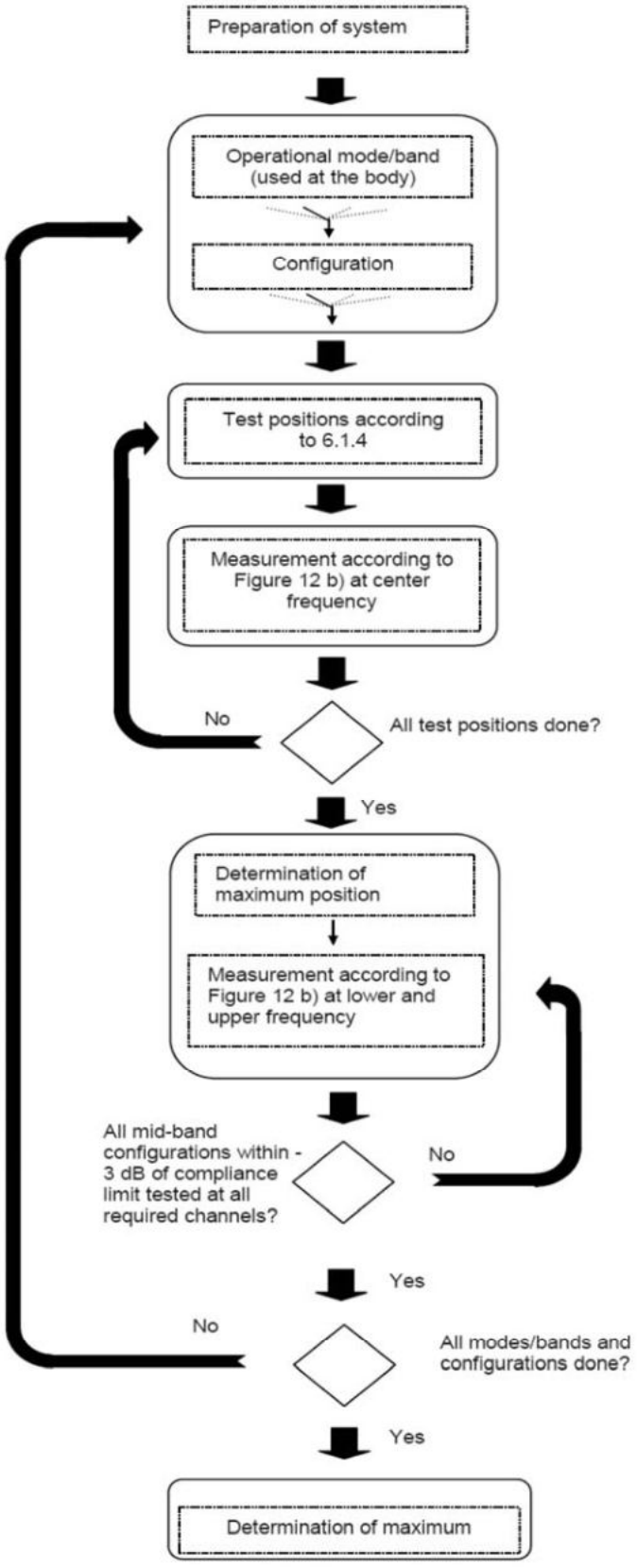


Figure 12a – Tests to be performed

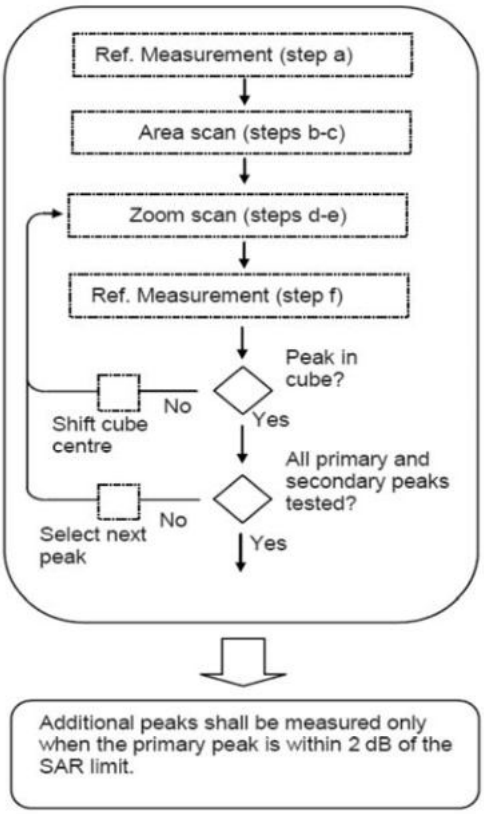


Figure 12b – General procedure

Picture 12 Block diagram of the tests to be performed

Measurement procedure

The following procedure shall be performed for each of the test conditions (see Picture 11) described in 11.1:

a) Measure the local SAR at a test point within 4 mm or less in the normal direction from the inner surface of the phantom.

b) Measure the two-dimensional SAR distribution within the phantom (area scan procedure). The boundary of the measurement area shall not be closer than 20 mm from the phantom side walls. The distance between the measurement points should enable the detection of the location of localmaximum with an accuracy of better than half the linear dimension of the tissue cube after interpolation. A maximum grip spacing of 20 mm for frequencies below 3 GHz and (60/f [GHz]) mm for frequencies of 3GHz and greater is recommended. The maximum distance between the geometrical centre of the probe detectors and the inner surface of the phantom shall be 5 mm for frequencies below 3 GHz andδIn(2)/2 mm for frequencies of 3 GHz and greater, whereδis theplane wave skin depth and In(x) is the natural logarithm. The maximum variation of thesensor-phantom surface shall be ±1 mm for frequencies below 3 GHz and ±0.5 mm forfrequencies of 3 GHz and greater. At all measurement points the angle of the probe with respect tothe line normal to the surface should be less than 5°. If this cannot be achieved for ameasurement distance to the phantom inner surface shorter than the probe diameter, additionalmeasurement distance to the phantom inner surface shorter than the probe diameter, additional

c) From the scanned SAR distribution, identify the position of the maximum SAR value, in addition identify the positions of any local maxima with SAR values within 2 dB of the maximum value that are not within the zoom-scan volume; additional peaks shall be measured only when the primary peak is within 2 dB of the SAR limit. This is consistent with the 2 dB threshold already stated;

d) Measure the three-dimensional SAR distribution at the local maxima locations identified in step

e) The horizontal grid step shall be (24 / f[GHz]) mm or less but not more than 8 mm. The minimum zoom size of 30 mm by 30 mm and 30 mm for frequencies below 3 GHz. For higher frequencies, the minimum zoom size of 22 mm by 22 mm and 22 mm. The grip step in the vertical direction shall be (8-f[GHz]) mm or less but not more than 5 mm, if uniform spacing is used. If variable spacing is used in the vertical direction, the maximum spacing between the two closest measured points to the phantom shell shall be (12 / f[GHz]) mm or less but not more than 4 mm, and the spacing between father points shall increase by an incremental factor not exceeding 1.5. When variable spacing is used, extrapolation routines shall be tested with the same spacing as used in measurements. The maximum distance between the geometrical centre of the probe detectors and the inner surface of the phantom shall be 5 mm for frequencies below 3 GHz andδIn(2)/2 mm for frequencies of 3 GHz and greater, where δis the plane wave skin depth and In(x)is the natural logarithm. Separate grids shall be centered on each of the local SAR maxima foundin step c). Uncertainties due to field distortion between the media boundary and the dielectricenclosure of the probe should also be minimized, which is achieved is the distance between thephantom surface and physical tip of the probe is larger than probe tip diameter. Other methodsmay utilize correction procedures for these boundary effects that enable high precisionmeasurements closer than half the probe diameter. For all measurement points, the angle of theprobe with respect to the flat phantom surface shall be less than 5. If this cannot be achievedan additional uncertainty evaluation is needed.

f) Use post processing(e.g. interpolation and extrapolation) procedures to determine the localSAR values at the spatial resolution needed for mass averaging.

WCDMA Measurement Procedures for SAR

The following procedures are applicable to WCDMA handsets operating under 3GPP Release99,Release 5 and Release 6. The default test configuration is to measure SAR with an establishedradio link between the DUT and a communication test set using a 12.2kbps RMC (referencemeasurement channel) configured in Test Loop Mode 1. SAR is selectively confirmed for otherphysical channel configurations (DPCCH & DPDCH), HSDPA and HSPA (HSUPA/HSDPA)modes according to output power, exposure conditions and device operating capabilities. Bothuplink and downlink should be configured with the same RMC or AMR, when required. SAR forRelease 5 HSDPA and Release 6 HSPA are measured using the applicable FRC (fixed referencechannel) and E-DCH reference channel configurations. Maximum output power is verified
according to applicable versions of 3GPP TS 34.121 and SAR must be measured according tothesemaximum output conditions. When Maximum Power Reduction (MPR) is not implementedaccording to Cubic Metric (CM) requirements for Release 6 HSPA, the following procedures do notapply.

For Release 5 HSDPA Data Devices:

Sub-test	β_c	β_d	β_d (SF)	β_c / β_d	β_{hs}	CM/dB
1	2/15	15/15	64	2/15	4/15	0.0
2	12/15	15/15	64	12/15	24/25	1.0
3	15/15	8/15	64	15/8	30/15	1.5
4	15/15	4/15	64	15/4	30/15	1.5

For Release 6 HSUPA Data Devices

Sub-test	β_c	β_d	β_d (SF)	β_c / β_d	β_{hs}	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	CM (dB)	MPR (dB)	AG Index	E-TFCI
1	11/15	15/15	64	11/15	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	12/15	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	βed1:47/15 βed2 :47/15	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	4/15	56/75	4	1	3.0	2.0	17	71
5	15/15	15/15	64	15/15	24/15	30/15	134/15	4	1	1.0	0.0	21	81

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4.TEST CONDITIONS AND RESULTS

4.1. Conducted Power Results

During the process of testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication tester (CMW500) to ensure the maximum power transmission and proper modulation. This result contains conducted output power for the EUT. In all cases, the measured peak output power should be greater and within 5% than EMI measurement.

The conducted power measurement results for WCDMA

Item	band	FDD Band VIII result (dBm)			FDD Band I result (dBm)		
		Test Channel			Test Channel		
	Sub-test	2713	2788	2862	9612	9750	9888
WCDMA	\	23.22	23.33	23.28	23.26	23.34	23.22
HSDPA	1	22.15	22.23	22.18	22.22	22.25	22.18
	2	22.08	21.92	22.07	22.00	21.95	21.99
	3	21.91	21.74	21.70	21.76	21.83	21.83
	4	21.70	21.39	21.47	21.44	21.53	21.77
HSUPA	1	22.29	22.36	22.27	22.27	22.40	22.22
	2	22.12	22.29	22.04	22.00	22.15	22.07
	3	21.98	22.10	22.04	22.08	22.07	21.83
	4	21.88	22.16	21.87	21.84	22.15	21.69
	5	21.85	21.97	21.87	21.66	22.02	21.54

The conducted power measurement results for WLAN

Mode	Channel	Frequency (MHz)	Conducted Output Power (dBm)	Test Rate Data
802.11b	1	2412	16.68	1 Mbps
	7	2442	15.29	1 Mbps
	13	2472	17.11	1 Mbps
802.11g	1	2412	11.69	6 Mbps
	7	2442	13.60	6 Mbps
	13	2472	11.86	6 Mbps
802.11n(20MHz)	1	2412	11.34	6.5 Mbps
	7	2442	13.79	6.5 Mbps
	13	2472	12.42	6.5 Mbps

The conducted power measurement results for BluetoothV4.0

Mode	Channel	Frequency (MHz)	Conducted Output Power (dBm)
BLE	00	2402	1.68
	19	2440	2.41
	39	2480	2.24

Note: 1. beause the ouput power(eirp) of Bluetooth of the EUT is less than 20mW(13dBm), so standalone SAR are exempt according EN50663.
2.The EUT contains G-sensor and it do not affect the output power.

The conducted power measurement results for LTE

LTE-BAND3

Channel Bandwidth	Channel	RB allocation		Average Power (dBm) QPSK	Average Power (dBm) 16-QAM
		RB Size	RB Offset		
1.4MHz	Low range	1	0	22.84	22.81
			max	22.89	22.86
		Partial	0	22.52	22.46
			max	22.34	22.27
	Mid range	1	0	22.26	22.33
			max	22.70	22.66
		Partial	0	22.45	22.42
			max	22.34	22.41
	High range	1	0	22.43	22.48
			max	22.17	22.20
		Partial	0	22.13	22.14
			max	22.59	22.62
5 MHz	Low range	1	0	22.31	22.30
			max	22.48	22.42
		Partial	0	22.05	22.02
			max	22.05	22.03
	Mid range	1	0	22.75	22.73
			max	22.33	22.33
		Partial	0	22.58	22.51
			max	22.84	22.84
	High range	1	0	22.02	22.08
			max	22.83	22.89
		Partial	0	22.82	22.83
			max	22.35	22.35
20MHz	Low range	1	0	22.27	22.27
			max	22.53	22.53
		Partial	0	22.66	22.70
			max	22.45	22.46
	Mid range	1	0	22.02	22.00
			max	22.40	22.38
		Partial	0	22.34	22.40
			max	22.52	22.52
	High range	1	0	23.00	22.99
			max	23.13	23.09
		Partial	0	22.93	23.00
			max	22.95	22.97

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LTE-BAND 28

Channel Bandwidth	Channel	RB allocation		Average Power (dBm) QPSK	Average Power (dBm) 16-QAM
		RB Size	RB Offset		
3MHz	Low range	1	0	22.47	22.45
			max	22.45	22.49
		Partial	0	22.27	22.26
			max	22.12	22.15
	Mid range	1	0	22.83	22.83
			max	22.47	22.42
		Partial	0	22.44	22.46
			max	22.30	22.33
	High range	1	0	22.50	22.57
			max	22.26	22.30
		Partial	0	22.20	22.16
			max	22.55	22.53
5 MHz	Low range	1	0	22.80	22.72
			max	22.33	22.32
		Partial	0	22.36	22.36
			max	22.38	22.45
	Mid range	1	0	22.68	22.66
			max	22.32	22.36
		Partial	0	22.53	22.52
			max	22.94	22.88
	High range	1	0	22.34	22.35
			max	22.53	22.53
		Partial	0	22.69	22.76
			max	22.20	22.28
20MHz	Low range	1	0	22.39	22.36
			max	22.04	22.00
		Partial	0	22.43	22.42
			max	22.57	22.60
	Mid range	1	0	22.13	22.15
			max	22.43	22.39
		Partial	0	22.69	22.69
			max	22.52	22.58
	High range	1	0	22.43	22.47
			max	22.35	22.35
		Partial	0	22.53	22.54
			max	22.29	22.26

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4.2. Test reduction procedure

Maximum power level

The maximum power level, $P_{max,m}$, that can be transmitted by a device before the SAR averaged over a mass, m, exceeds a given limit, SAR_{lim}, can be defined. Any device transmitting at power levels below $P_{max,m}$ can then be excluded from SAR testing. The lowest possible value for $P_{max,m}$ is: $P_{max,m} = SAR_{lim}$* m.
When working alone, the averages transmit power ofBT module should be less than 20mW. According tothe test results, when working alone, the testing of BT module is not necessary.

Simultaneous Multi-band Transmission SAR Analysis List of Mode for Simultaneous Multi-band

Transmission

No.	Configurations	Head SAR	Body SAR
1	WCDMA + WLAN	Yes	Yes
2	LTE+ WLAN	Yes	Yes
3	WCDMA + Bluetooth	Yes	Yes
4	LTE+ Bluetooth	Yes	Yes

Remark:

One way of determining the threshold power level available to the secondary transmitter ($P_{available}$) is to calculate it from the measured peak spatial-average SAR of the primary transmitter (SAR_1) according to the equation:

$$P_{available} = P_{th,m} \times (SAR_{lim} - SAR_1) / SAR_{lim}$$

where $P_{th,m}$ is the threshold exclusion power level taken from Annex B of EN 50663 for the frequency of the secondary transmitter at the separation distance used in the testing.

For simultaneous transmission analysis, Bluetooth SAR is below:

Bluetooth:

	Average Power (dBm)	Output Power (mW)	$P_{th,m}$ (mW)	SAR_{lim} (W/kg)	SAR_1 (W/kg)	$P_{available}$ (mW)
Body	2.41	1.742	20	2.0	0.611	13.89

The Bluetooth output power of the secondary transmitter is less than $P_{available}$, So SAR measurement for the secondary transmitter is not necessary.

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Maximum SAR value and the sum of the 10-g SAR for WWAN &WLAN - Body

WWAN Band	WWAN Max SAR (W/kg)	2.4GWLAN Max SAR (W/kg)	Max SAR Sum (W/kg)	Limit (W/kg)
WCDMA900	0.030	0.313	0.343	2.0
WCDMA2100	0.064	0.313	0.377	
LTE 3	0.366	0.313	0.679	
LTE 28	0.611	0.313	0.924	

Remark:

1 WLAN and Bluetooth share the same antenna, and cannot transmit simultaneously.
2 WCDMA and LTE share the same antenna, and cannot transmit simultaneously.
3 The maximum SAR summation is calculated based on the same configuration and test position.
If 10g-SAR summation < 2.0W/kg , simultaneous SAR measurement is not necessary.
4 When the maximum SAR summation ⩾1.0W/kg on Body, WWAN, WLAN2.4G for low and high Channels are necessary to be tested and the test results please refer to the SAR Measurement Results.

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4.3. SAR Measurement Results

SAR Values forWCDMABand VIII -Body

Frequency		Mode/Band	Test Position	Spacing(mm)	SAR(10g) (W/kg)	Power Drift(%)	Ref.Plot #
MHz	Channel						
897.4	2788	RMC	Front	0	0.015	2.85	--
897.4	2788	RMC	Rear	0	**0.303**	-1.03	1

Note:
1.When the 10-g SAR is ≤ 1.0W/kg, testing for low and high channel is optional.
2.The default test configuration is to measure SAR with an established radio link between the EUT and a communication test set using a 12.2kbps RMC(reference measurement channel) configuration in test loop mode

SAR Values forWCDMA Band I-Body

Frequency		Mode/Band	Test Position	Spacing(mm)	SAR(10g) (W/kg)	Power Drift(%)	Ref.Plot #
MHz	Channel						
1950.0	9750	RMC	Front	0	**0.064**	-0.83	2
1950.0	9750	RMC	Rear	0	0.055	3.95	--

Note:
1.When the 10-g SAR is ≤ 1.0W/kg, testing for low and high channel is optional.
2.The default test configuration is to measure SAR with an established radio link between the EUT and a communication test set using a 12.2kbps RMC(reference measurement channel) configuration in test loop mode.

SAR Values for WLAN2450 Band -Body

Frequency		Mode/Band	Test Position	Spacing(mm)	SAR(10g) (W/kg)	Power Drift(%)	Ref.Plot #
MHz	Channel						
2442.0	7	802.11b	Front	0	**0.313**	-0.37	3
2442.0	7	802.11b	Rear	0	0.264	2.65	--

Note:
1.When the 10-g SAR is ≤ 1.0W/kg, testing for low and high channel is optional.
2. The result was tested under the lowest data rate 1Mbps for 802.11b.

SAR Values for E-UTRA Band3 -Body

Frequency		Mode/Band	Test Position	Spacing(mm)	SAR(10g) (W/kg)	Power Drift(%)	Ref.Plot #
MHz	Channel						
1747.5	19575	RMC	Front	0	**0.366**	0.66	4
1747.5	19575	RMC	Rear	0	0.282	-3.50	--

Note:
1.When the 10-g SAR is ≤ 1.0W/kg, testing for low and high channel is optional.
2.The default test configuration is to measure SAR with an established radio link between the EUT and a communication test set using a 12.2kbps RMC(reference measurement channel) configuration in test loop mode.

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SAR Values for E-UTRA Band 28 -Body

Frequency		Mode/Band	Test Position	Spacing(mm)	SAR(10g) (W/kg)	Power Drift(%)	Ref.Plot #
MHz	Channel						
725.50	27210	RMC	Front	0	0.222	-3.00	--
725.50	27210	RMC	Rear	0	**0.611**	-1.65	5

Note:
1.When the 10-g SAR is ≤ 1.0W/Kg, testing for low and high channel is optional.
2.The default test configuration is to measure SAR with an established radio link between the EUT and a communication test set using a 12.2kbps RMC(reference measurement channel) configuration in test loop mode.

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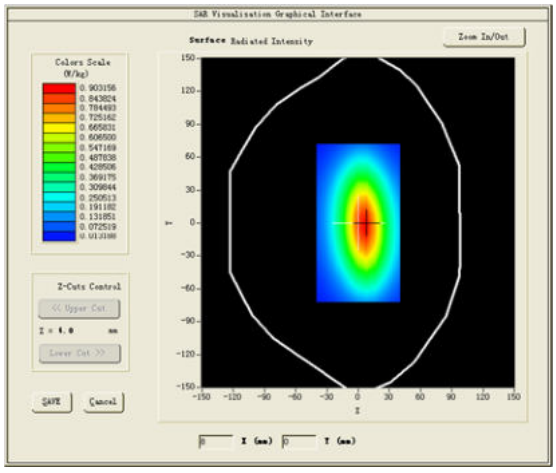
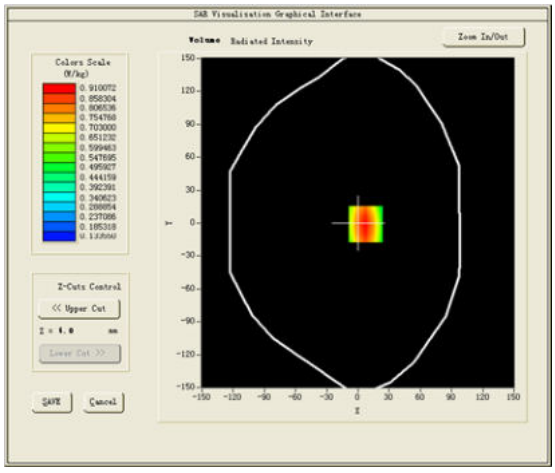
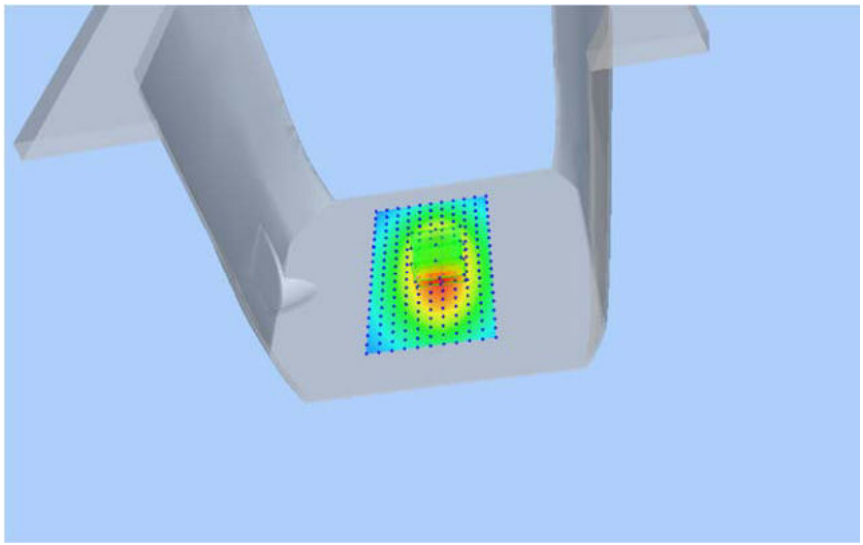
4.4. Measurement Uncertainty (450MHz-6GHz)

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in IEEE 1528: 2013.This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

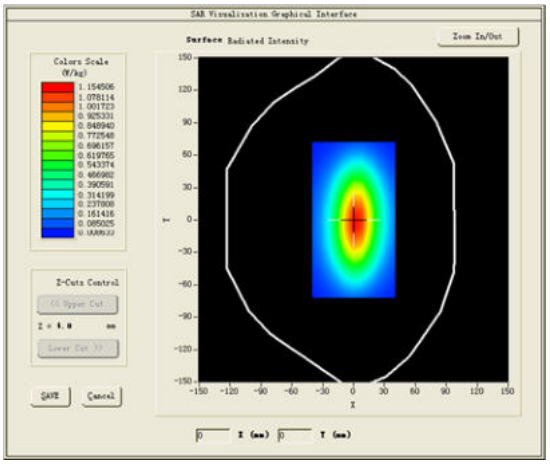
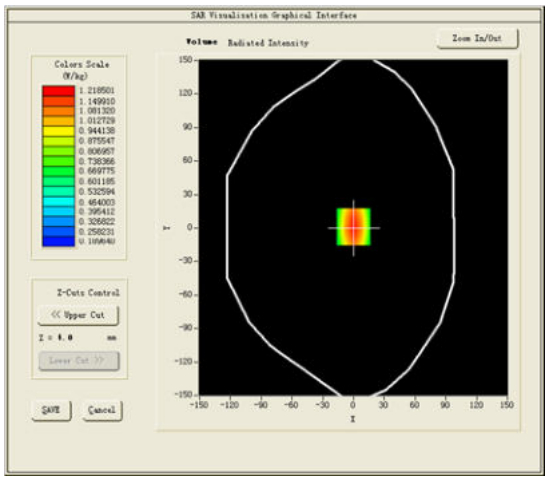
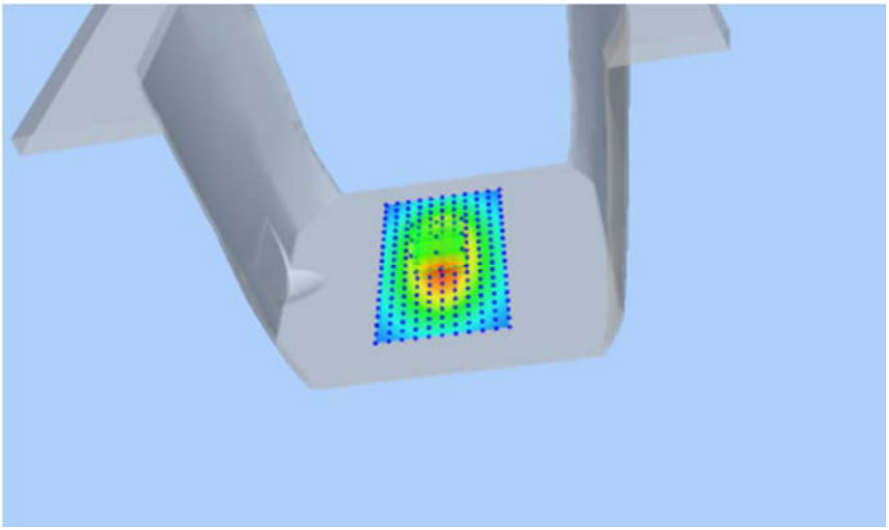
Uncertainty Component	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	Veff
Measurement System								
Probe calibration	5.8	N	1	1	1	5.80	5.80	∞
Axial Isotropy	3.5	R	√3	$\sqrt{1-C_p}$	$\sqrt{1-C_p}$	1.43	1.43	∞
Hemispherical Isotropy	5.9	R	√3	$\sqrt{C_p}$	$\sqrt{C_p}$	2.41	2.41	∞
Boundary effect	1.0	R	√3	1	1	0.58	0.58	∞
Linearity	4.7	R	√3	1	1	2.71	2.71	∞
System detection limits	1.0	R	√3	1	1	0.58	0.58	∞
Readout Electronics	0.5	N	1	1	1	0.50	0.50	∞
Response Time	0.0	R	√3	1	1	0.00	0.00	∞
Integration Time	1.4	R	√3	1	1	0.81	0.81	∞
RF ambient Conditions - Noise	3.0	R	√3	1	1	1.73	1.73	∞
RF ambient Conditions - Reflections	3.0	R	√3	1	1	1.73	1.73	∞
Probe positioner Mechanical Tolerance	1.4	R	√3	1	1	0.81	0.81	∞
Probe positioning with respect to Phantom Shell	1.4	R	√3	1	1	0.81	0.81	∞
Max. SAR Evaluation	1.0	R	√3	1	1	0.6	0.6	∞
Test sample Related								
Device positioning	2.6	N	1	1	1	2.6	2.6	11
Device holder	3.0	N	1	1	1	3.0	3.0	7
Drift of output power	5.0	N	√3	1	1	2.89	2.89	∞
Phantom and Tissue Parameters								
Phantom uncertainty	4.00	R	√3	1	1	2.31	2.31	∞
Liquid conductivity (target)	2.50	N	1	0.78	0.71	1.95	1.78	5
Liquid conductivity (meas)	4.00	N	1	0.23	0.26	0.92	1.04	5
Liquid Permittivity (target)	2.50	N	1	0.78	0.71	1.95	1.78	∞
Liquid Permittivity (meas)	5.00	N	1	0.23	0.26	1.15	1.30	∞
Combined Standard		RSS	$U_c = \sqrt{\sum_{i=1}^{n} C_i^2 U_i^2}$			10.63 %	10.54%	
Expanded Uncertainty (95% Confidence interval)	U = k U_C , k=2					21.26 %	21.08%	

4.5. System Check Results

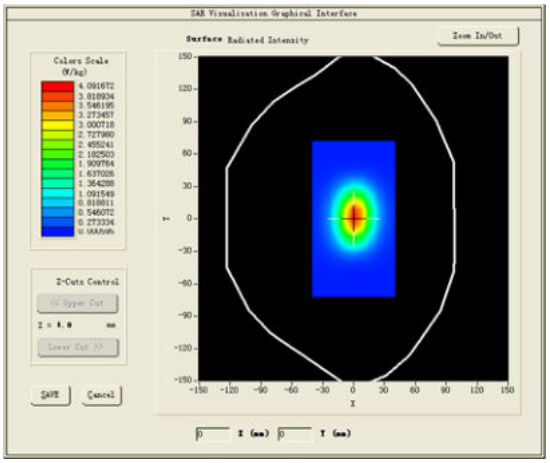
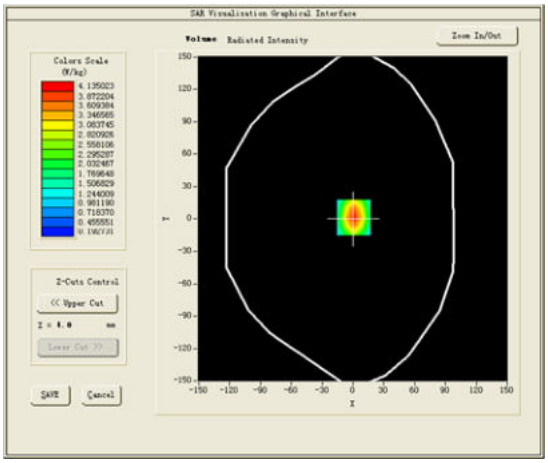
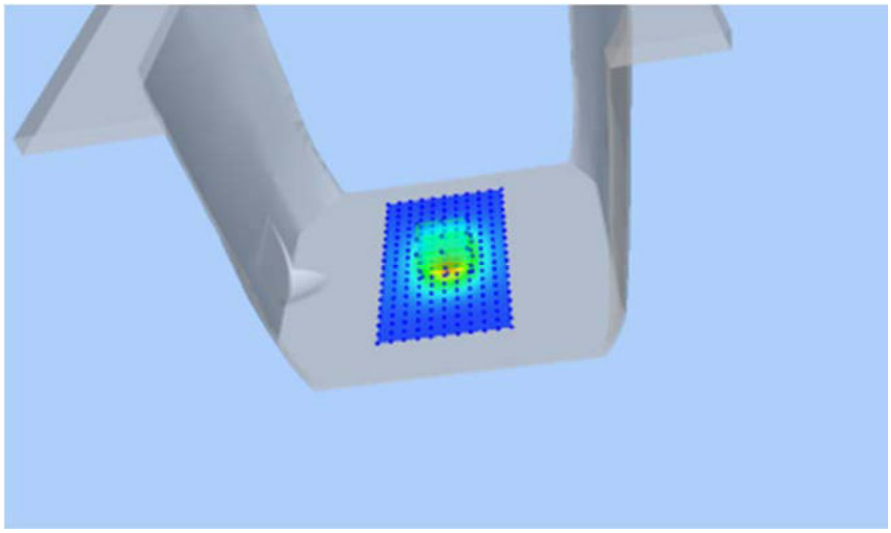
Test mode:750MHz
Product Description:Validation
Model:Dipole SID750
E-Field Probe: SSE2(SN 31/17 EPGO324)
Test Date: April 16, 2019

Medium(liquid type)	HSL_750
Frequency (MHz)	750.0000
Relative permittivity (real part)	41.90
Conductivity (S/m)	0.88
Input power	100mW
Crest Factor	1.0
Conversion Factor	1.45
Variation (%)	-0.170000
SAR 10g (W/Kg)	0.552559
SAR 1g (W/Kg)	0.871285
SURFACE SAR	**VOLUME SAR**
	
	

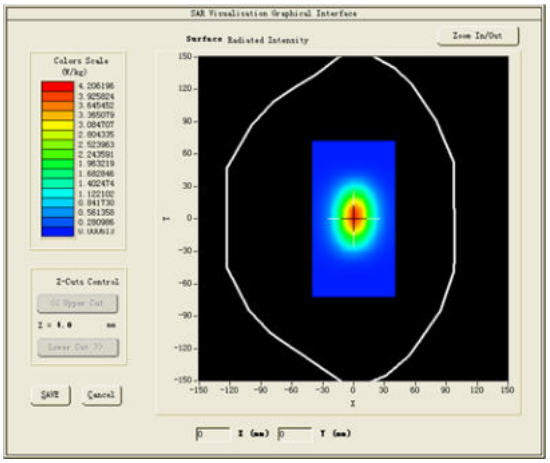
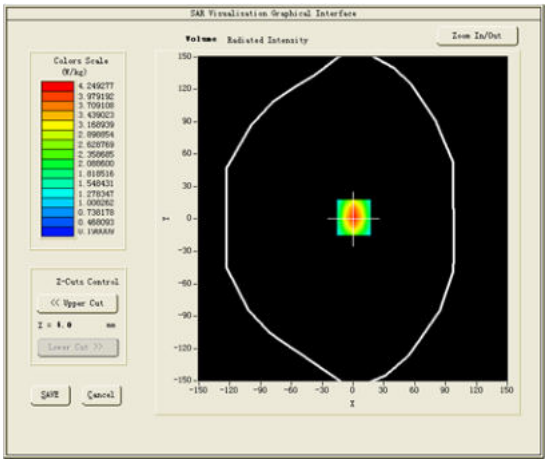
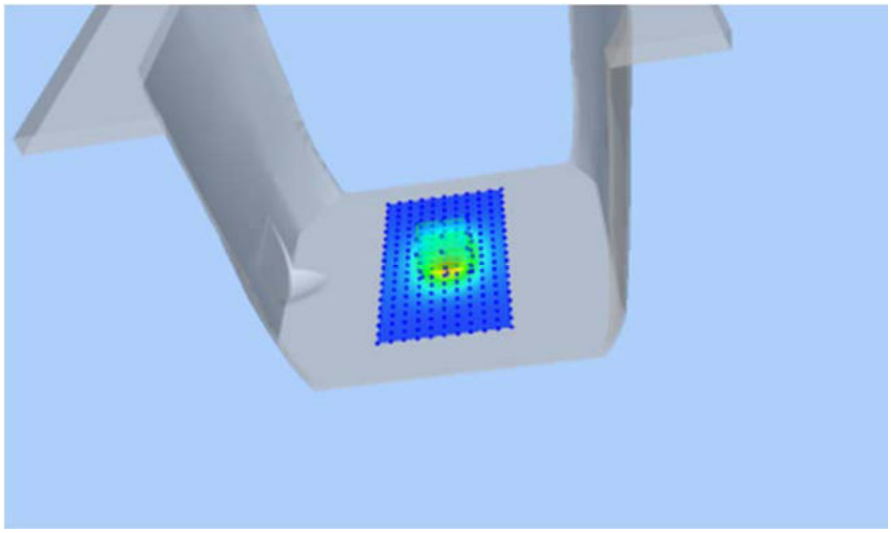
Test mode:900MHz
Product Description:Validation
Model:Dipole SID900
E-Field Probe:SSE2(SN 31/17 EPGO324)
Test Date: April 18, 2019

Medium(liquid type)	HSL_900
Frequency (MHz)	900.0000
Relative permittivity (real part)	41.87
Conductivity (S/m)	0.95
Input power	100mW
Crest Factor	1.0
Conversion Factor	1.54
Variation (%)	1.570000
SAR 10g (W/Kg)	0.678402
SAR 1g (W/Kg)	1.055213
SURFACE SAR	**VOLUME SAR**
	
	

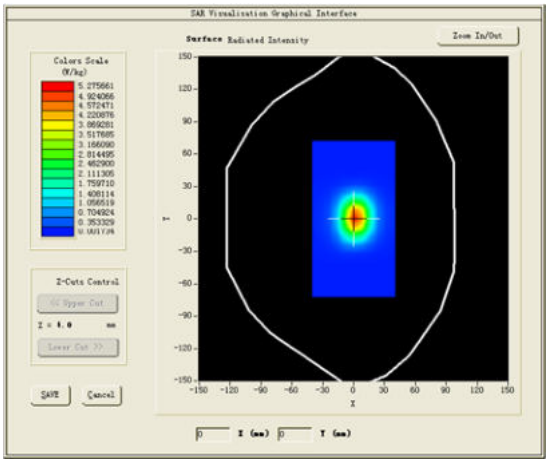
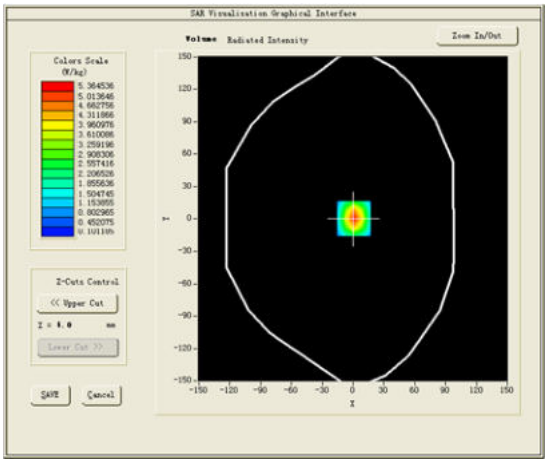
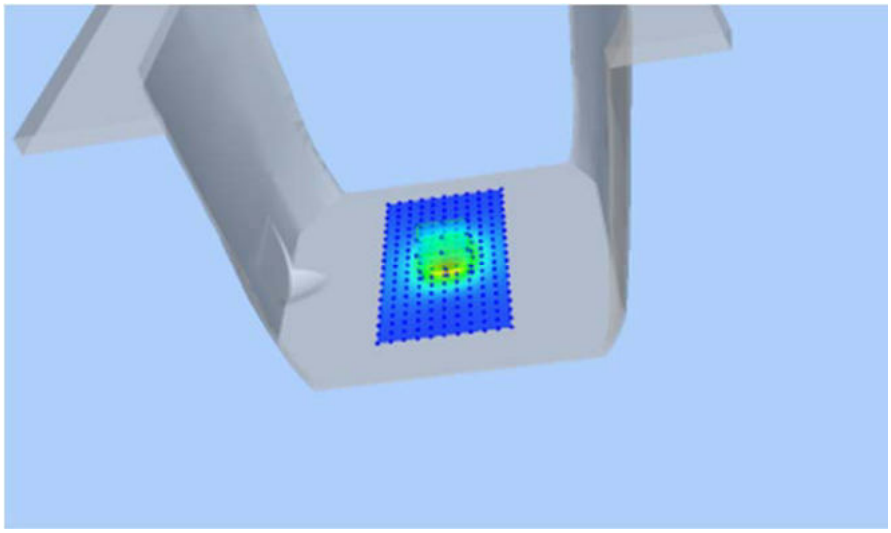
Test mode:1800MHz
Product Description:Validation
Model:Dipole SID1800
E-Field Probe:SSE2(SN 31/17 EPGO324)
Test Date: April 19, 2019

Medium(liquid type)	HSL_1800
Frequency (MHz)	1800.0000
Relative permittivity (real part)	39.55
Conductivity (S/m)	1.41
Input power	100mW
Crest Factor	1.0
Conversion Factor	1.65
Variation (%)	1.040000
SAR 10g (W/Kg)	1.887620
SAR 1g (W/Kg)	4.017692
SURFACE SAR	**VOLUME SAR**
	
	

Test mode:2000MHz
Product Description:Validation
Model:Dipole SID2000
E-Field Probe:SSE2(SN 31/17 EPGO324)
Test Date: May 11, 2019

Medium(liquid type)	HSL_2000
Frequency (MHz)	2000.0000
Relative permittivity (real part)	41.26
Conductivity (S/m)	1.43
Input power	100mW
Crest Factor	1.0
Conversion Factor	1.83
Variation (%)	1.750000
SAR 10g (W/Kg)	2.019630
SAR 1g (W/Kg)	4.264319
SURFACE SAR	**VOLUME SAR**
	
	

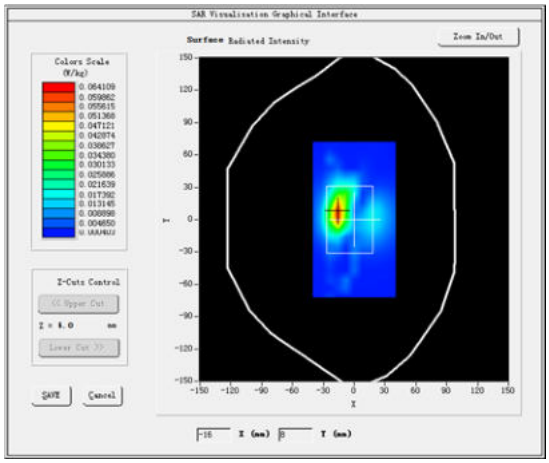
Test mode:2450MHz
Product Description:Validation
Model:Dipole SID2450
E-Field Probe:SSE2(SN 31/17 EPGO324)
Test Date: May 17, 2019

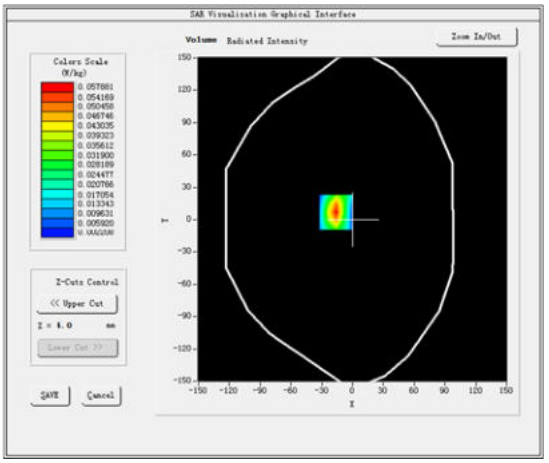
Medium(liquid type)	HSL_2450
Frequency (MHz)	2450.0000
Relative permittivity (real part)	39.64
Conductivity (S/m)	1.79
Input power	100mW
Crest Factor	1.0
Conversion Factor	1.91
Variation (%)	2.740000
SAR 10g (W/Kg)	2.347910
SAR 1g (W/Kg)	4.976820
SURFACE SAR	**VOLUME SAR**
	
	

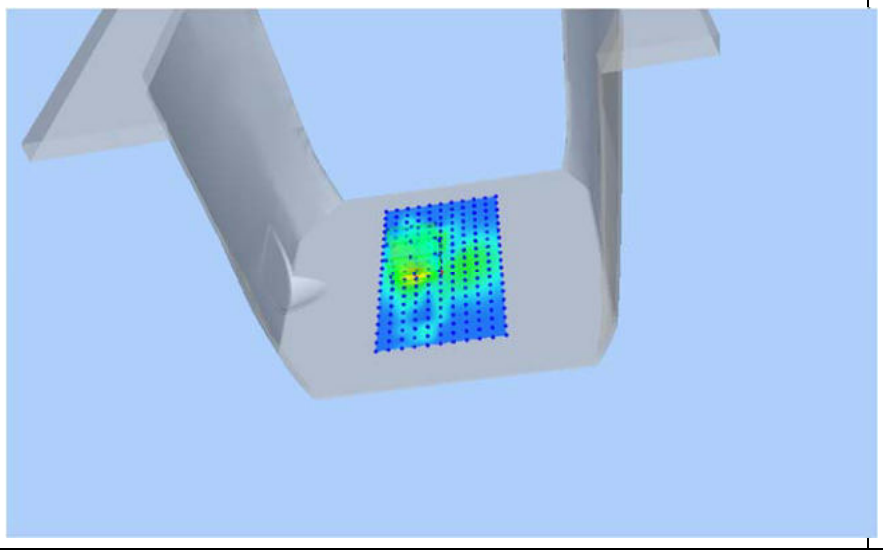
4.6. SAR Test Graph Results

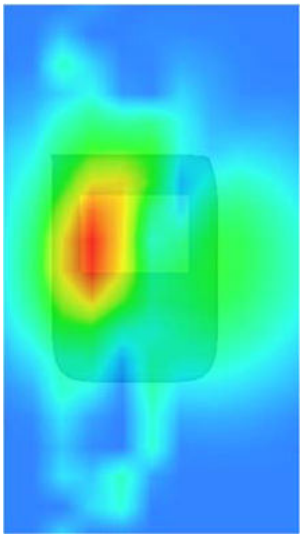
#1 Test Mode:WCDMA 900MHz,Mid channel(Body-LCD Down)
Product Description: Personal Mobile Alarm System
Model:EV-07B-4G
Test Date: April 18, 2019

Medium(liquid type)	HSL_900
Frequency (MHz)	897.4000
Relative permittivity (real part)	41.87
Conductivity (S/m)	0.95
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.54
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-1.030000
SAR 10g (W/Kg)	0.030471
SAR 1g (W/Kg)	0.053375
SURFACE SAR	**VOLUME SAR**

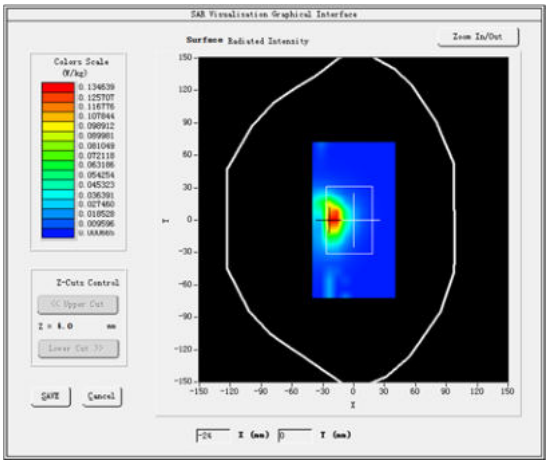
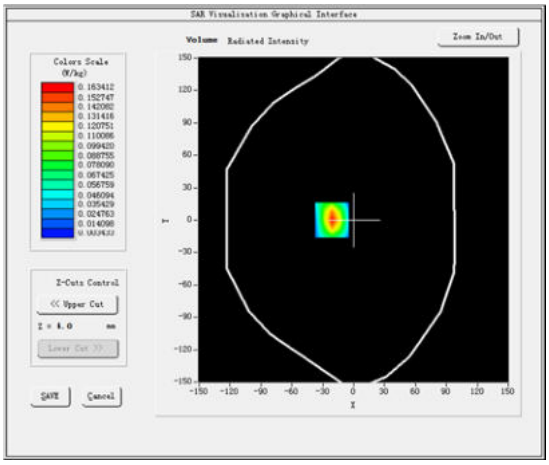
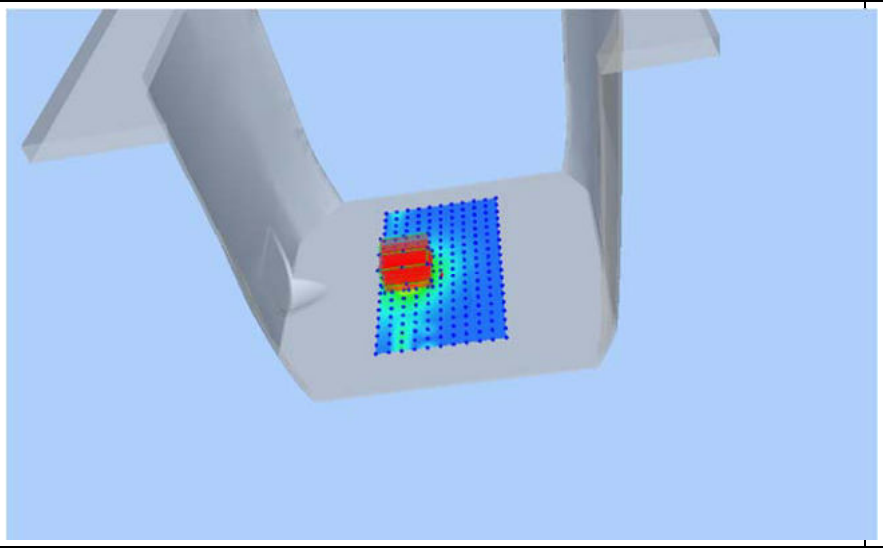
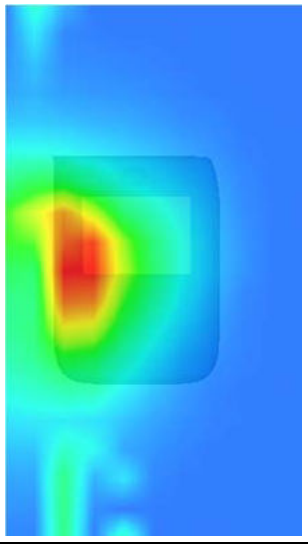






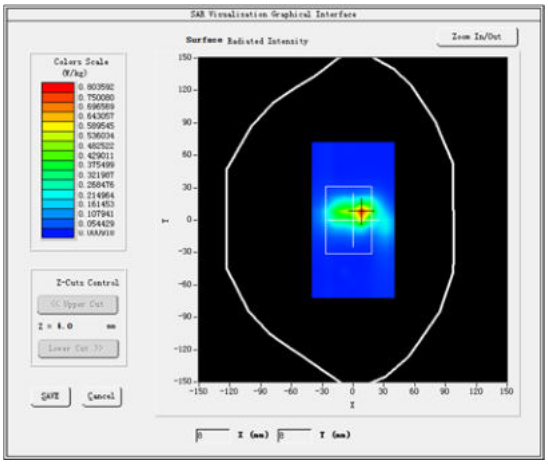


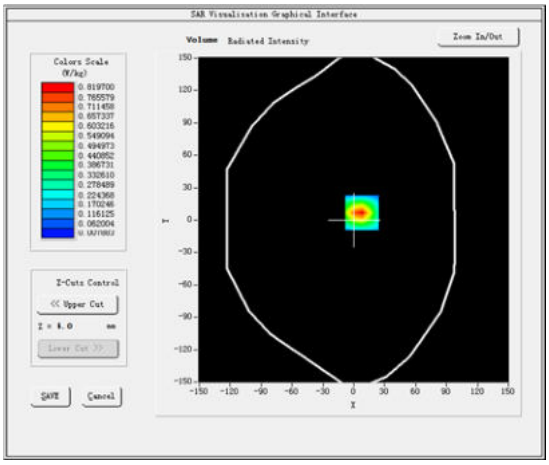
#2 Test Mode:WCDMA2100MHz,Mid channel(Body-LCD Up)
Product Description: Personal Mobile Alarm System
Model: EV-07B-4G
Test Date: May 11, 2019

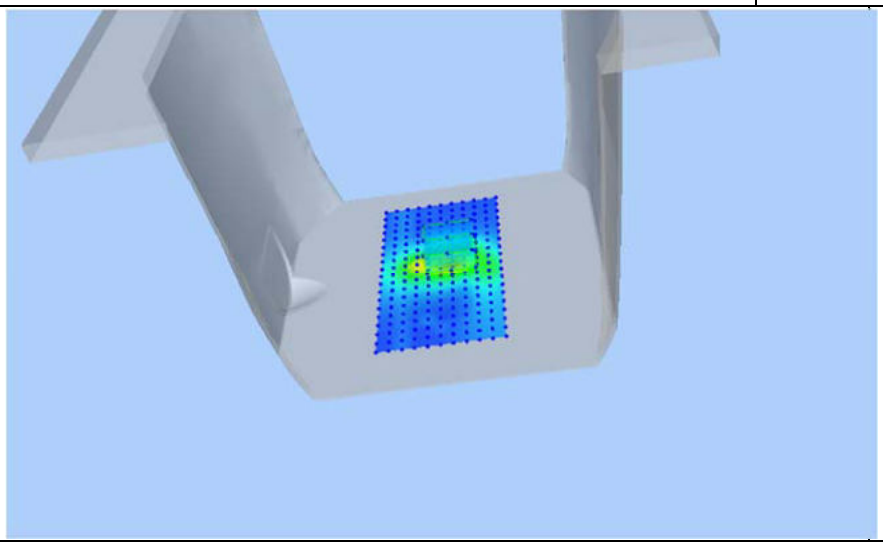
Medium(liquid type)	HSL_2000
Frequency (MHz)	1950.0000
Relative permittivity (real part)	41.26
Conductivity (S/m)	1.43
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.83
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-0.830000
SAR 10g (W/Kg)	0.063724
SAR 1g (W/Kg)	0.153338
SURFACE SAR	**VOLUME SAR**
	
	

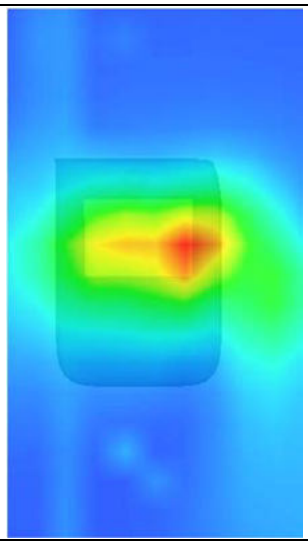
#3 Test Mode:802.11b, Mid channel(Body-LCD Up)
Product Description:Personal Mobile Alarm System
Model:EV-07B-4G
Test Date: May 17, 2019

Medium(liquid type)	HSL_2450
Frequency (MHz)	2442.0000
Relative permittivity (real part)	39.64
Conductivity (S/m)	1.79
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.91
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-0.370000
SAR 10g (W/Kg)	0.312714
SAR 1g (W/Kg)	0.763848
SURFACE SAR	**VOLUME SAR**



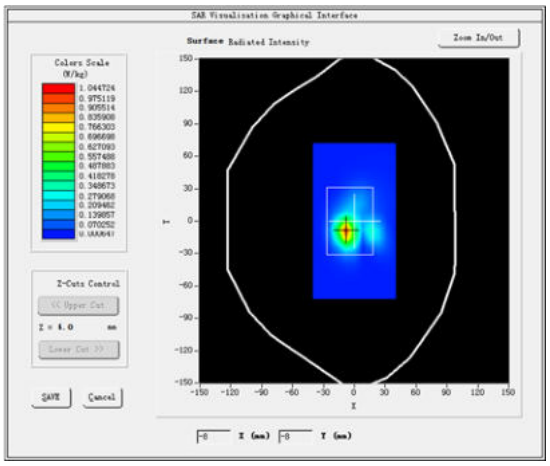


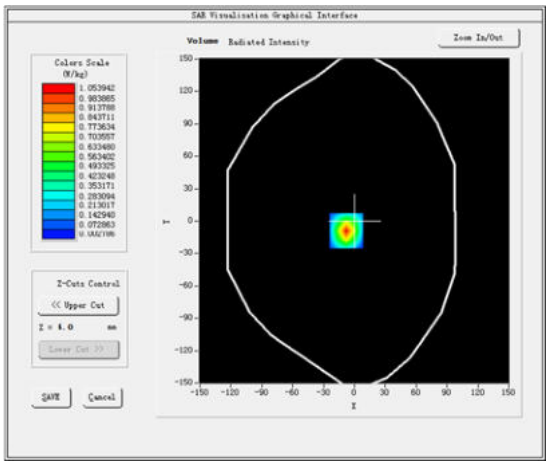


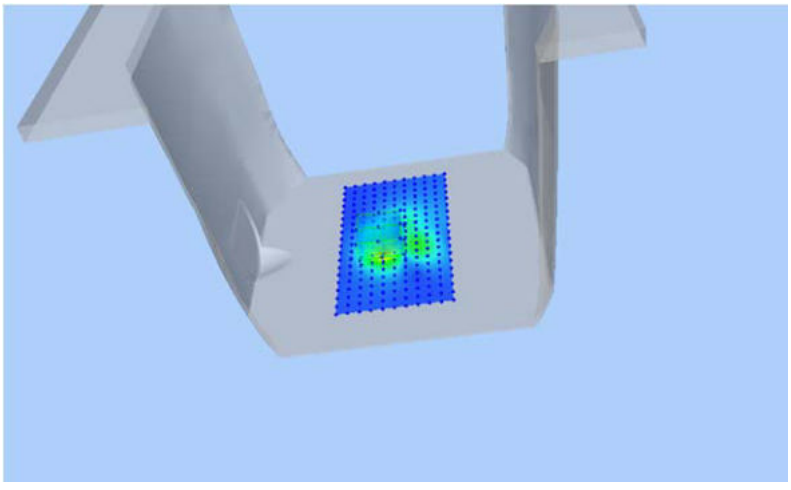


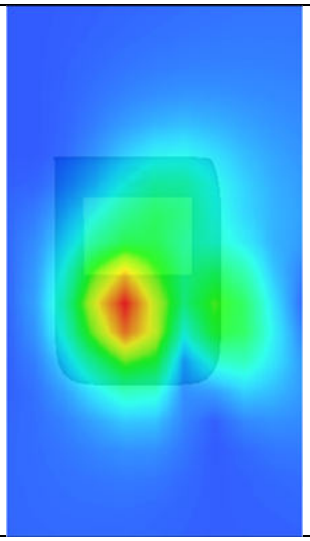
#4 Test Mode: E-UTRA3,Mid channel(Body-LCD Up)
Product Description: Personal Mobile Alarm System
Model: EV-07B-4G
Test Date: April 19, 2019

Medium(liquid type)	HSL_1800
Frequency (MHz)	1747.5000
Relative permittivity (real part)	39.55
Conductivity (S/m)	1.41
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.65
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	0.660000
SAR 10g (W/Kg)	0.366057
SAR 1g (W/Kg)	0.944271
SURFACE SAR	**VOLUME SAR**

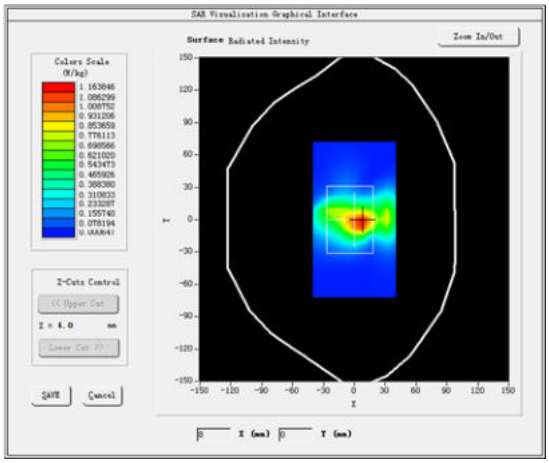
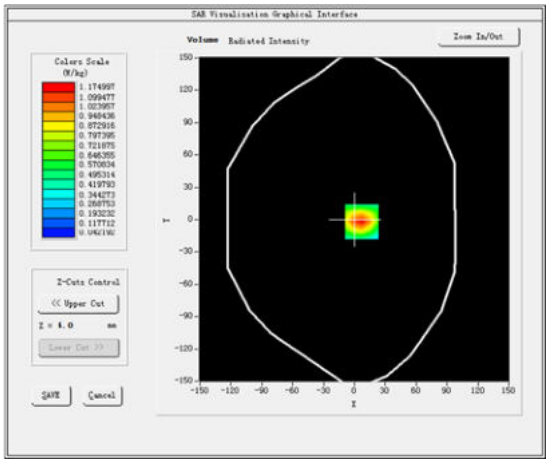
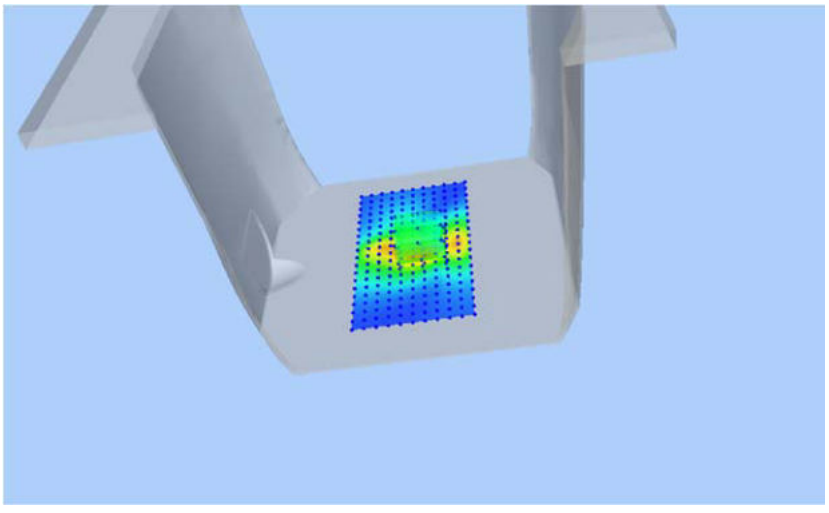
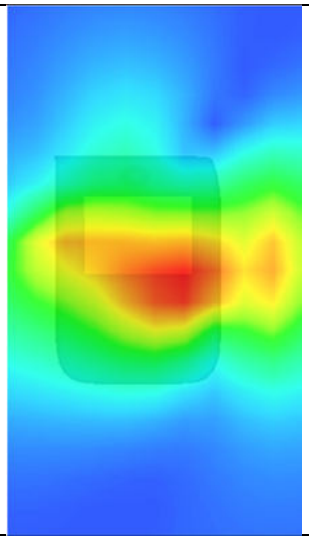








#5 Test Mode: E-UTRA28,Middle channel(Body-LCD Down)
Product Description:Molbile phone
Model:Wren
Test Date: April 16, 2019

Medium(liquid type)	HSL_750
Frequency (MHz)	725.5000
Relative permittivity (real part)	41.90
Conductivity (S/m)	0.88
E-Field Probe	SN 45/15 EPGO281
Crest Factor	1.0
Conversion Factor	4.20
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-1.650000
SAR 10g (W/Kg)	0.611196
SAR 1g (W/Kg)	1.093280
SURFACE SAR	**VOLUME SAR**
	
	

5.ALIBRATION CETIFICATE

SARTIMO Calibration Certificate-Extended Dipole Calibrations

According to KDB 450824 D02, Dipoles must be recalibrated at least once every three years; however, immediate re-calibration is required for following conditions. The test laboratory must ensure that the required supporting information and documentation have been included in the SAR report to qualify for extended 3-year calibration interval.

1) When the most recent return-loss, measured at least annually, deviates by more than 20% from theprevious measurement (i.e. 0.2 of the dB value) or not meeting the required -20 dB return-loss specification
2) When the most recent measurement of the real or imaginary parts of the impedance, measured at least annually, deviates by more than 5Ω from the previous measurement

Summary Result:

SID750			
Frquency	Return Loss(dB)	Requirement(dB)	Impedence
750	-34.48	-20	51.2Ω+1.4jΩ

SID900			
Frquency	Return Loss(dB)	Requirement(dB)	Impedence
900	-23.55	-20	52.8Ω-5.4jΩ

SID1800			
Frquency	Return Loss(dB)	Requirement(dB)	Impedence
1800	-20.26	-20	43.1Ω+6.9jΩ

SID 2000			
Frquency	Return Loss(dB)	Requirement(dB)	Impedence
2000	-23.67	-20	50.8Ω-6.2jΩ

SID 2450			
Frquency	Return Loss(dB)	Requirement(dB)	Impedence
2450	-25.59	-20	44.7Ω-1.1jΩ

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5.1 Probe-EPGO324 Calibration Certificate

COMOSAR E-Field Probe Calibration Report

Ref : ACR.281.2.18.SATU.A

SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD.

1F., XINGYUAN INDUSTRIAL PARK, TONGDA ROAD, BAO'AN BLVD

BAO'AN DISTRICT, SHENZHEN, GUANGDONG, CHINA

MVG COMOSAR DOSIMETRIC E-FIELD PROBE

SERIAL NO.: SN 31/17 EPGO324

Calibrated at MVG US

2105 Barrett Park Dr. - Kennesaw, GA 30144

ACCREDITED

Calibration CERT #2246-02

Calibration Date: 10/08/2018

Summary:

This document presents the method and results from an accredited COMOSAR Dosimetric E-Field Probe calibration performed in MVG USA using the CALISAR / CALIBAIR test bench, for use with a COMOSAR system only. All calibration results are traceable to national metrology institutions.

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COMOSAR E-FIELD PROBE CALIBRATION REPORT Ref: ACR.281.2.18.SATU.A

	Name	Function	Date	Signature
Prepared by :	Jérôme LUC	Product Manager	10/8/2018	
Checked by :	Jérôme LUC	Product Manager	10/8/2018	
Approved by :	Kim RUTKOWSKI	Quality Manager	10/8/2018	

	Customer Name
Distribution :	Shenzhen LCS Compliance Testing Laboratory Ltd.

Issue	Date	Modifications
A	10/8/2018	Initial release

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1 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR DOSIMETRIC E FIELD PROBE
Manufacturer	MVG
Model	SSE2
Serial Number	SN 31/17 EPGO324
Product Condition (new / used)	New
Frequency Range of Probe	0.15 GHz-6GHz
Resistance of Three Dipoles at Connector	Dipole 1: R1=0.189 MΩ Dipole 2: R2=0.203 MΩ Dipole 3: R3=0.218 MΩ

A yearly calibration interval is recommended.

2 PRODUCT DESCRIPTION

2.1 GENERAL INFORMATION

MVG's COMOSAR E field Probes are built in accordance to the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards.



Figure 1 – *MVG COMOSAR Dosimetric E field Dipole*

Probe Length	330 mm
Length of Individual Dipoles	2 mm
Maximum external diameter	8 mm
Probe Tip External Diameter	2.5 mm
Distance between dipoles / probe extremity	1 mm

3 MEASUREMENT METHOD

The IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards provide recommended practices for the probe calibrations, including the performance characteristics of interest and methods by which to assess their affect. All calibrations / measurements performed meet the fore mentioned standards.

3.1 LINEARITY

The evaluation of the linearity was done in free space using the waveguide, performing a power sweep to cover the SAR range 0.01W/kg to 100W/kg.

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3.2 SENSITIVITY

The sensitivity factors of the three dipoles were determined using a two step calibration method (air and tissue simulating liquid) using waveguides as outlined in the standards.

3.3 LOWER DETECTION LIMIT

The lower detection limit was assessed using the same measurement set up as used for the linearity measurement. The required lower detection limit is 10 mW/kg.

3.4 ISOTROPY

The axial isotropy was evaluated by exposing the probe to a reference wave from a standard dipole with the dipole mounted under the flat phantom in the test configuration suggested for system validations and checks. The probe was rotated along its main axis from 0 - 360 degrees in 15 degree steps. The hemispherical isotropy is determined by inserting the probe in a thin plastic box filled with tissue-equivalent liquid, with the plastic box illuminated with the fields from a half wave dipole. The dipole is rotated about its axis (0°–180°) in 15° increments. At each step the probe is rotated about its axis (0°–360°).

3.5 BOUNDARY EFFECT

The boundary effect is defined as the deviation between the SAR measured data and the expected exponential decay in the liquid when the probe is oriented normal to the interface. To evaluate this effect, the liquid filled flat phantom is exposed to fields from either a reference dipole or waveguide. With the probe normal to the phantom surface, the peak spatial average SAR is measured and compared to the analytical value at the surface.

4 MEASUREMENT UNCERTAINTY

The guidelines outlined in the IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty associated with an E-field probe calibration using the waveguide technique. All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

Uncertainty analysis of the probe calibration in waveguide					
ERROR SOURCES	**Uncertainty value (%)**	**Probability Distribution**	**Divisor**	**ci**	**Standard Uncertainty (%)**
Incident or forward power	3.00%	Rectangular	$\sqrt{3}$	1	1.732%
Reflected power	3.00%	Rectangular	$\sqrt{3}$	1	1.732%
Liquid conductivity	5.00%	Rectangular	$\sqrt{3}$	1	2.887%
Liquid permittivity	4.00%	Rectangular	$\sqrt{3}$	1	2.309%
Field homogeneity	3.00%	Rectangular	$\sqrt{3}$	1	1.732%
Field probe positioning	5.00%	Rectangular	$\sqrt{3}$	1	2.887%

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Field probe linearity	3.00%	Rectangular	$\sqrt{3}$	1	1.732%
Combined standard uncertainty					5.831%
Expanded uncertainty 95 % confidence level k = 2					12.0%

5 CALIBRATION MEASUREMENT RESULTS

Calibration Parameters	
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

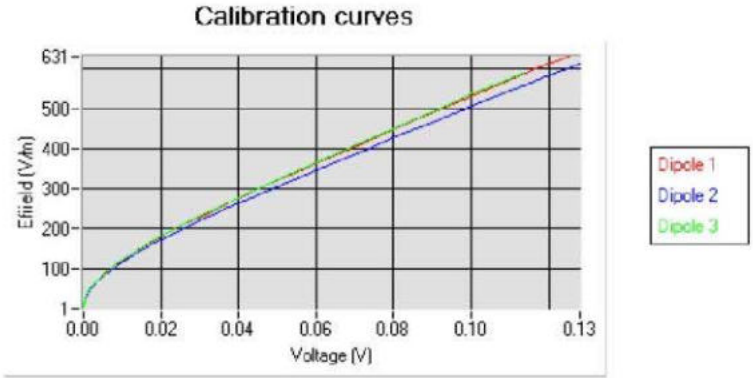
5.1 SENSITIVITY IN AIR

Normx dipole 1 (μV/(V/m)²)	Normy dipole 2 (μV/(V/m)²)	Normz dipole 3 (μV/(V/m)²)
0.80	0.83	0.68

DCP dipole 1 (mV)	DCP dipole 2 (mV)	DCP dipole 3 (mV)
95	90	93

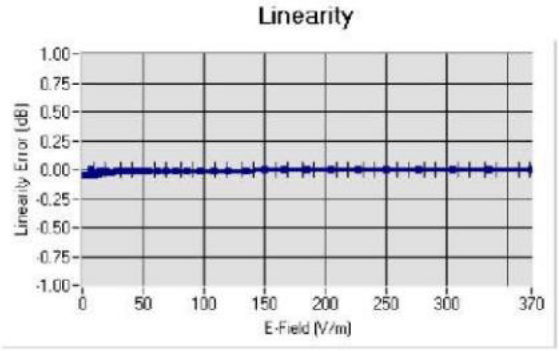
Calibration curves ei=f(V) (i=1,2,3) allow to obtain H-field value using the formula:

$$E = \sqrt{E_1^{\,2} + E_2^{\,2} + E_3^{\,2}}$$



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5.2 LINEARITY



Linearity: ±1.13% (±0.05dB)

5.3 SENSITIVITY IN LIQUID

Liquid	Frequency (MHz +/- 100MHz)	Permittivity	Epsilon (S/m)	ConvF
HL450	450	42.17	0.86	1.56
BL450	450	57.65	0.95	1.60
HL750	750	40.03	0.93	1.45
BL750	750	56.83	1.00	1.50
HL850	835	42.19	0.90	1.55
BL850	835	54.67	1.01	1.59
HL900	900	42.08	1.01	1.54
BL900	900	55.25	1.08	1.60
HL1800	1800	41.68	1.46	1.65
BL1800	1800	53.86	1.46	1.68
HL1900	1900	38.45	1.45	1.86
BL1900	1900	53.32	1.56	1.93
HL2000	2000	38.26	1.38	1.83
BL2000	2000	52.70	1.51	1.89
HL2300	2300	39.44	1.62	1.95
BL2300	2300	54.52	1.77	2.01
HL2450	2450	37.50	1.80	1.91
BL2450	2450	53.22	1.89	1.95
HL2600	2600	39.80	1.99	1.89
BL2600	2600	52.52	2.23	1.94
HL5200	5200	35.64	4.67	1.50
BL5200	5200	48.64	5.51	1.56
HL5400	5400	36.44	4.87	1.44
BL5400	5400	46.52	5.77	1.47
HL5600	5600	36.66	5.17	1.48
BL5600	5600	46.79	5.77	1.53
HL5800	5800	35.31	5.31	1.50
BL5800	5800	47.04	6.10	1.55

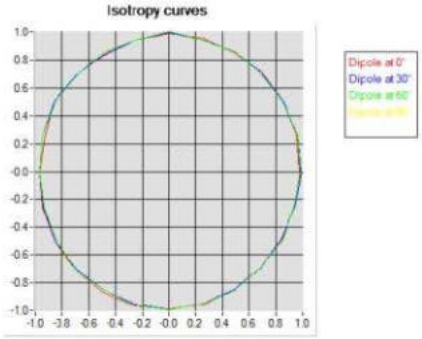
LOWER DETECTION LIMIT: 9mW/kg

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5.4 ISOTROPY

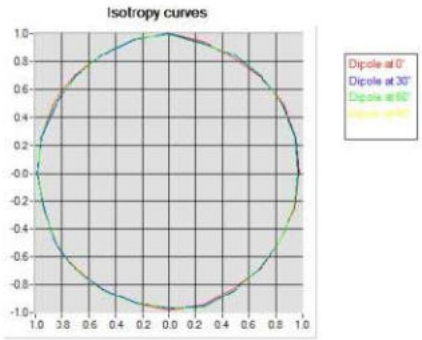
HL900 MHz

- Axial isotropy: 0.05 dB
- Hemispherical isotropy: 0.07 dB



HL1800 MHz

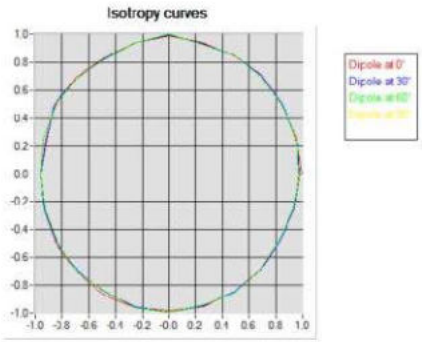
- Axial isotropy: 0.06 dB
- Hemispherical isotropy: 0.07 dB



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HL5600 MHz

- Axial isotropy: 0.06 dB
- Hemispherical isotropy: 0.10 dB



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6 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
Flat Phantom	MVG	SN-20/09-SAM71	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rhode & Schwarz ZVA	SN100132	02/2016	02/2019
Reference Probe	MVG	EP 94 SN 37/08	10/2017	10/2019
Multimeter	Keithley 2000	1188656	01/2017	01/2020
Signal Generator	Agilent E4438C	MY49070581	01/2017	01/2020
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	HP E4418A	US38261498	01/2017	01/2020
Power Sensor	HP ECP-E26A	US37181460	01/2017	01/2020
Directional Coupler	Narda 4216-20	01386	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Waveguide	Mega Industries	069Y7-158-13-712	Validated. No cal required.	Validated. No cal required.
Waveguide Transition	Mega Industries	069Y7-158-13-701	Validated. No cal required.	Validated. No cal required.
Waveguide Termination	Mega Industries	069Y7-158-13-701	Validated. No cal required.	Validated. No cal required.
Temperature / Humidity Sensor	Control Company	150798832	11/2017	11/2020

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5.2 SID750 Dipole Calibration Ceriticate

SAR Reference Dipole Calibration Report

Ref : ACR.287.3.14.SATU.A

SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD.

1F., XINGYUAN INDUSTRIAL PARK, TONGDA ROAD, BAO'AN BLVD

BAO'AN DISTRICT, SHENZHEN, GUANGDONG, CHINA

SATIMO COMOSAR REFERENCE DIPOLE

FREQUENCY: 750 MHZ

SERIAL NO.: SN 07/14 DIP 0G750-302

Calibrated at SATIMO US

2105 Barrett Park Dr. - Kennesaw, GA 30144

ACCREDITED Calibration CERT #2246-02

10/01/2018

Summary:

This document presents the method and results from an accredited SAR reference dipole calibration performed in SATIMO USA using the COMOSAR test bench. All calibration results are traceable to national metrology institutions.

SATIMO **SAR REFERENCE DIPOLE CALIBRATION REPORT** Ref: ACR.287.3.14.SATU.A

	Name	Function	Date	Signature
Prepared by :	Jérôme LUC	Product Manager	10/14/2018	
Checked by :	Jérôme LUC	Product Manager	10/14/2018	
Approved by :	Kim RUTKOWSKI	Quality Manager	10/14/2018	

	Customer Name
Distribution :	Shenzhen LCS Compliance Testing Laboratory Ltd.

Issue	Date	Modifications
A	10/14/2018	Initial release

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1 INTRODUCTION

This document contains a summary of the requirements set forth by the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards for reference dipoles used for SAR measurement system validations and the measurements that were performed to verify that the product complies with the fore mentioned standards.

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 750 MHz REFERENCE DIPOLE
Manufacturer	Satimo
Model	SID750
Serial Number	SN 07/14 DIP 0G750-302
Product Condition (new / used)	New

A yearly calibration interval is recommended.

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

Satimo's COMOSAR Validation Dipoles are built in accordance to the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards. The product is designed for use with the COMOSAR test bench only.



Figure 1 – *Satimo COMOSAR Validation Dipole*

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4 MEASUREMENT METHOD

The IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards provide requirements for reference dipoles used for system validation measurements. The following measurements were performed to verify that the product complies with the fore mentioned standards.

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constucted as outlined in the fore mentioned standards.

4.2 MECHANICAL REQUIREMENTS

The IEEE Std. 1528 and CEI/IEC 62209 standards specify the mechanical components and dimensions of the validation dipoles, with the dimensions frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness.

5 MEASUREMENT UNCERTAINTY

All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.1 dB

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
3 - 300	0.05 mm

5.3 VALIDATION MEASUREMENT

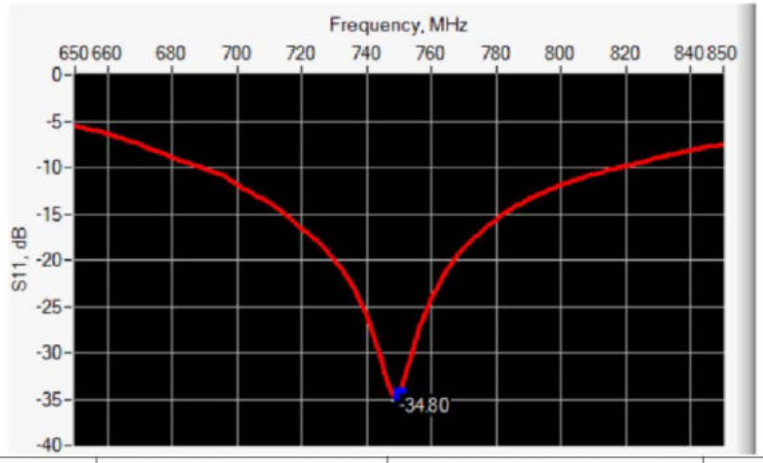
The guidelines outlined in the IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty for validation measurements.

Scan Volume	Expanded Uncertainty
1 g	20.3 %
10 g	20.1 %

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6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
750	-34.80	-20	50.7 Ω + 1.6 jΩ

6.2 MECHANICAL DIMENSIONS

Frequency MHz	L mm		h mm		d mm	
	required	measured	required	measured	required	measured
300	420.0 ±1 %.		250.0 ±1 %.		6.35 ±1 %.	
450	290.0 ±1 %.		166.7 ±1 %.		6.35 ±1 %.	
750	176.0 ±1 %.	PASS	100.0 ±1 %.	PASS	6.35 ±1 %.	PASS
835	161.0 ±1 %.		89.8 ±1 %.		3.6 ±1 %.	
900	149.0 ±1 %.		83.3 ±1 %.		3.6 ±1 %.	
1450	89.1 ±1 %.		51.7 ±1 %.		3.6 ±1 %.	
1500	80.5 ±1 %.		50.0 ±1 %.		3.6 ±1 %.	
1640	79.0 ±1 %.		45.7 ±1 %.		3.6 ±1 %.	
1750	75.2 ±1 %.		42.9 ±1 %.		3.6 ±1 %.	
1800	72.0 ±1 %.		41.7 ±1 %.		3.6 ±1 %.	
1900	68.0 ±1 %.		39.5 ±1 %.		3.6 ±1 %.	
1950	66.3 ±1 %.		38.5 ±1 %.		3.6 ±1 %.	
2000	64.5 ±1 %.		37.5 ±1 %.		3.6 ±1 %.	
2100	61.0 ±1 %.		35.7 ±1 %.		3.6 ±1 %.	
2300	55.5 ±1 %.		32.6 ±1 %.		3.6 ±1 %.	
2450	51.5 ±1 %.		30.4 ±1 %.		3.6 ±1 %.	
2600	48.5 ±1 %.		28.8 ±1 %.		3.6 ±1 %.	
3000	41.5 ±1 %.		25.0 ±1 %.		3.6 ±1 %.	
3500	37.0±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3700	34.7±1 %.		26.4 ±1 %.		3.6 ±1 %.	

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7 VALIDATION MEASUREMENT

The IEEE Std. 1528, OET 65 Bulletin C and CEI/IEC 62209 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

7.1 HEAD LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±5 %		0.87 ±5 %	
450	43.5 ±5 %		0.87 ±5 %	
750	41.9 ±5 %	PASS	0.89 ±5 %	PASS
835	41.5 ±5 %		0.90 ±5 %	
900	41.5 ±5 %		0.97 ±5 %	
1450	40.5 ±5 %		1.20 ±5 %	
1500	40.4 ±5 %		1.23 ±5 %	
1640	40.2 ±5 %		1.31 ±5 %	
1750	40.1 ±5 %		1.37 ±5 %	
1800	40.0 ±5 %		1.40 ±5 %	
1900	40.0 ±5 %		1.40 ±5 %	
1950	40.0 ±5 %		1.40 ±5 %	
2000	40.0 ±5 %		1.40 ±5 %	
2100	39.8 ±5 %		1.49 ±5 %	
2300	39.5 ±5 %		1.67 ±5 %	
2450	39.2 ±5 %		1.80 ±5 %	
2600	39.0 ±5 %		1.96 ±5 %	
3000	38.5 ±5 %		2.40 ±5 %	
3500	37.9 ±5 %		2.91 ±5 %	

7.2 SAR MEASUREMENT RESULT WITH HEAD LIQUID

The IEEE Std. 1528 and CEI/IEC 62209 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Head Liquid Values: eps' : 42.1 sigma : 0.89
Distance between dipole center and liquid	15.0 mm
Area scan resolution	dx=8mm/dy=8mm

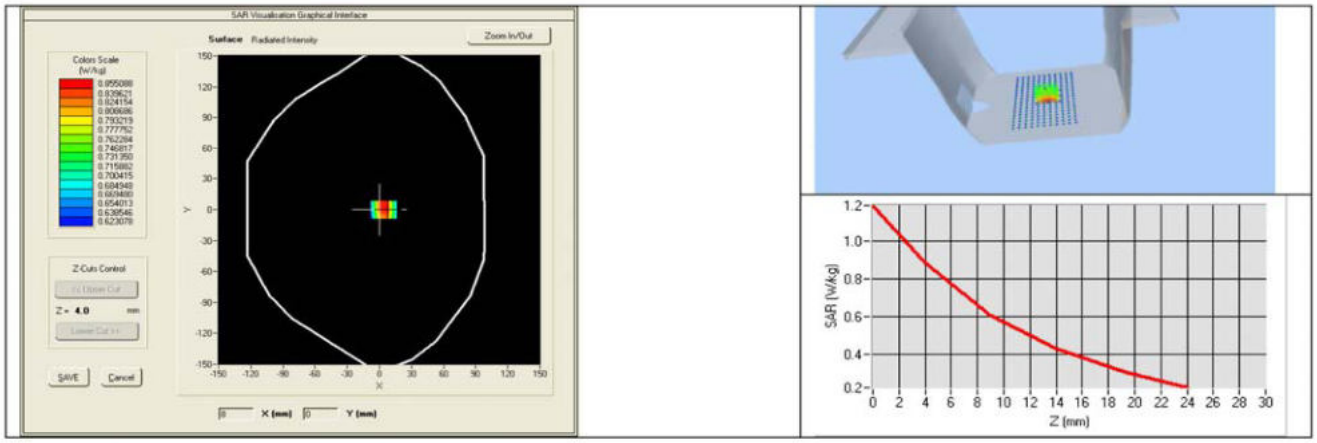
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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.287.3.14.SATU.A

Zoon Scan Resolution	dx=8mm/dy=8m/dz=5mm
Frequency	750 MHz
Input power	20 dBm
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49	8.38 (0.84)	5.55	5.53 (0.55)
835	9.56		6.22	
900	10.9		6.99	
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4		20.1	
1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1		21.1	
2100	43.6		21.9	
2300	48.7		23.3	
2450	52.4		24	
2600	55.3		24.6	
3000	63.8		25.7	
3500	67.1		25	



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7.3 BODY LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
150	61.9 ±5 %		0.80 ±5 %	
300	58.2 ±5 %		0.92 ±5 %	
450	56.7 ±5 %		0.94 ±5 %	
750	55.5 ±5 %	PASS	0.96 ±5 %	PASS
835	55.2 ±5 %		0.97 ±5 %	
900	55.0 ±5 %		1.05 ±5 %	
915	55.0 ±5 %		1.06 ±5 %	
1450	54.0 ±5 %		1.30 ±5 %	
1610	53.8 ±5 %		1.40 ±5 %	
1800	53.3 ±5 %		1.52 ±5 %	
1900	53.3 ±5 %		1.52 ±5 %	
2000	53.3 ±5 %		1.52 ±5 %	
2100	53.2 ±5 %		1.62 ±5 %	
2450	52.7 ±5 %		1.95 ±5 %	
2600	52.5 ±5 %		2.16 ±5 %	
3000	52.0 ±5 %		2.73 ±5 %	
3500	51.3 ±5 %		3.31 ±5 %	
5200	49.0 ±10 %		5.30 ±10 %	
5300	48.9 ±10 %		5.42 ±10 %	
5400	48.7 ±10 %		5.53 ±10 %	
5500	48.6 ±10 %		5.65 ±10 %	
5600	48.5 ±10 %		5.77 ±10 %	
5800	48.2 ±10 %		6.00 ±10 %	

7.4 SAR MEASUREMENT RESULT WITH BODY LIQUID

Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Body Liquid Values: eps' : 56.6 sigma : 0.99
Distance between dipole center and liquid	15.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=8mm/dy=8m/dz=5mm
Frequency	750 MHz
Input power	20 dBm
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

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5.3 SID900 Dipole Calibration Ceriticate

SAR Reference Dipole Calibration Report

Ref : ACR.287.5.14.SATU.A

SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD.

1F., XINGYUAN INDUSTRIAL PARK, TONGDA ROAD, BAO'AN BLVD

BAO'AN DISTRICT, SHENZHEN, GUANGDONG, CHINA

SATIMO COMOSAR REFERENCE DIPOLE

FREQUENCY: 900 MHZ

SERIAL NO.: SN 07/14 DIP 0G900-300

Calibrated at SATIMO US

2105 Barrett Park Dr. - Kennesaw, GA 30144

10/01/2018

Summary:

This document presents the method and results from an accredited SAR reference dipole calibration performed in SATIMO USA using the COMOSAR test bench. All calibration results are traceable to national metrology institutions.

SATIMO **SAR REFERENCE DIPOLE CALIBRATION REPORT** Ref: ACR.287.5.14.SATU.A

	Name	Function	Date	Signature
Prepared by :	Jérôme LUC	Product Manager	10/14/2018	
Checked by :	Jérôme LUC	Product Manager	10/14/2018	
Approved by :	Kim RUTKOWSKI	Quality Manager	10/14/2018	

	Customer Name
Distribution :	Shenzhen LCS Compliance Testing Laboratory Ltd.

Issue	Date	Modifications
A	10/14/2018	Initial release

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1 INTRODUCTION

This document contains a summary of the requirements set forth by the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards for reference dipoles used for SAR measurement system validations and the measurements that were performed to verify that the product complies with the fore mentioned standards.

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 900 MHz REFERENCE DIPOLE
Manufacturer	Satimo
Model	SID900
Serial Number	SN 07/14 DIP 0G900-300
Product Condition (new / used)	New

A yearly calibration interval is recommended.

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

Satimo's COMOSAR Validation Dipoles are built in accordance to the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards. The product is designed for use with the COMOSAR test bench only.



Figure 1 – *Satimo COMOSAR Validation Dipole*

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4 MEASUREMENT METHOD

The IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards provide requirements for reference dipoles used for system validation measurements. The following measurements were performed to verify that the product complies with the fore mentioned standards.

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constucted as outlined in the fore mentioned standards.

4.2 MECHANICAL REQUIREMENTS

The IEEE Std. 1528 and CEI/IEC 62209 standards specify the mechanical components and dimensions of the validation dipoles, with the dimensions frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness.

5 MEASUREMENT UNCERTAINTY

All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.1 dB

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
3 - 300	0.05 mm

5.3 VALIDATION MEASUREMENT

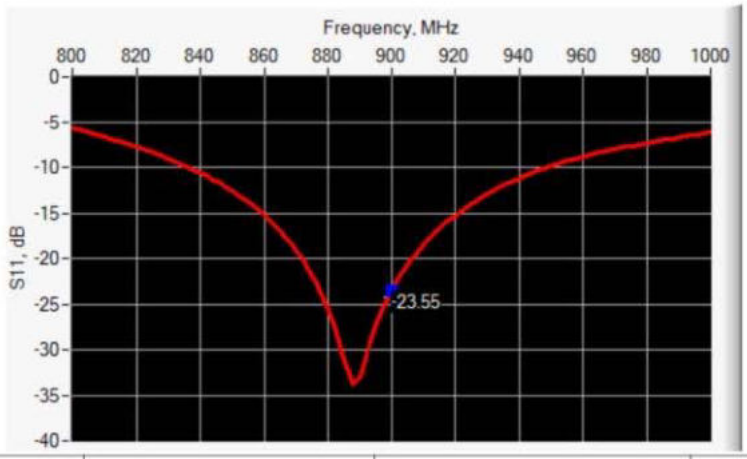
The guidelines outlined in the IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty for validation measurements.

Scan Volume	Expanded Uncertainty
1 g	20.3 %
10 g	20.1 %

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6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
900	-23.55	-20	52.8 Ω - 5.4 jΩ

6.2 MECHANICAL DIMENSIONS

Frequency MHz	L mm		h mm		d mm	
	required	measured	required	measured	required	measured
300	420.0 ±1 %.		250.0 ±1 %.		6.35 ±1 %.	
450	290.0 ±1 %.		166.7 ±1 %.		6.35 ±1 %.	
750	176.0 ±1 %.		100.0 ±1 %.		6.35 ±1 %.	
835	161.0 ±1 %.		89.8 ±1 %.		3.6 ±1 %.	
900	149.0 ±1 %.	PASS	83.3 ±1 %.	PASS	3.6 ±1 %.	PASS
1450	89.1 ±1 %.		51.7 ±1 %.		3.6 ±1 %.	
1500	80.5 ±1 %.		50.0 ±1 %.		3.6 ±1 %.	
1640	79.0 ±1 %.		45.7 ±1 %.		3.6 ±1 %.	
1750	75.2 ±1 %.		42.9 ±1 %.		3.6 ±1 %.	
1800	72.0 ±1 %.		41.7 ±1 %.		3.6 ±1 %.	
1900	68.0 ±1 %.		39.5 ±1 %.		3.6 ±1 %.	
1950	66.3 ±1 %.		38.5 ±1 %.		3.6 ±1 %.	
2000	64.5 ±1 %.		37.5 ±1 %.		3.6 ±1 %.	
2100	61.0 ±1 %.		35.7 ±1 %.		3.6 ±1 %.	
2300	55.5 ±1 %.		32.6 ±1 %.		3.6 ±1 %.	
2450	51.5 ±1 %.		30.4 ±1 %.		3.6 ±1 %.	
2600	48.5 ±1 %.		28.8 ±1 %.		3.6 ±1 %.	
3000	41.5 ±1 %.		25.0 ±1 %.		3.6 ±1 %.	
3500	37.0±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3700	34.7±1 %.		26.4 ±1 %.		3.6 ±1 %.	

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7 VALIDATION MEASUREMENT

The IEEE Std. 1528, OET 65 Bulletin C and CEI/IEC 62209 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

7.1 HEAD LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±5 %		0.87 ±5 %	
450	43.5 ±5 %		0.87 ±5 %	
750	41.9 ±5 %		0.89 ±5 %	
835	41.5 ±5 %		0.90 ±5 %	
900	41.5 ±5 %	PASS	0.97 ±5 %	PASS
1450	40.5 ±5 %		1.20 ±5 %	
1500	40.4 ±5 %		1.23 ±5 %	
1640	40.2 ±5 %		1.31 ±5 %	
1750	40.1 ±5 %		1.37 ±5 %	
1800	40.0 ±5 %		1.40 ±5 %	
1900	40.0 ±5 %		1.40 ±5 %	
1950	40.0 ±5 %		1.40 ±5 %	
2000	40.0 ±5 %		1.40 ±5 %	
2100	39.8 ±5 %		1.49 ±5 %	
2300	39.5 ±5 %		1.67 ±5 %	
2450	39.2 ±5 %		1.80 ±5 %	
2600	39.0 ±5 %		1.96 ±5 %	
3000	38.5 ±5 %		2.40 ±5 %	
3500	37.9 ±5 %		2.91 ±5 %	

7.2 SAR MEASUREMENT RESULT WITH HEAD LIQUID

The IEEE Std. 1528 and CEI/IEC 62209 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

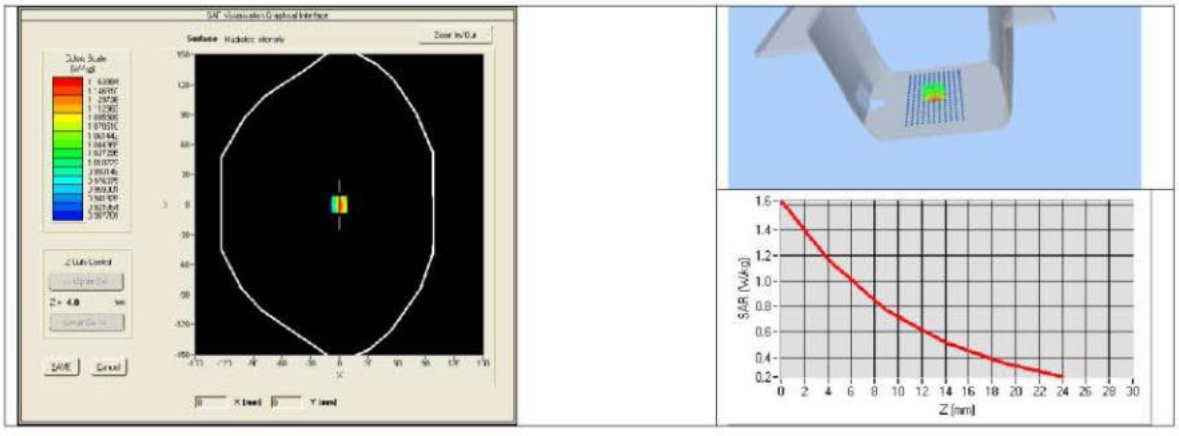
Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Head Liquid Values: eps' : 42.5 sigma : 0.96
Distance between dipole center and liquid	15.0 mm
Area scan resolution	dx=8mm/dy=8mm

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SAR REFERENCE DIPOLE CALIBRATION REPORT Ref: ACR.287.5.14.SATU.A

Zoon Scan Resolution	dx=8mm/dy=8m/dz=5mm
Frequency	900 MHz
Input power	20 dBm
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49		5.55	
835	9.56		6.22	
900	10.9	11.12 (1.11)	6.99	7.01 (0.70)
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4		20.1	
1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1		21.1	
2100	43.6		21.9	
2300	48.7		23.3	
2450	52.4		24	
2600	55.3		24.6	
3000	63.8		25.7	
3500	67.1		25	



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7.3 BODY LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε,')		Conductivity (σ) S/m	
	required	measured	required	measured
150	61.9 ±5 %		0.80 ±5 %	
300	58.2 ±5 %		0.92 ±5 %	
450	56.7 ±5 %		0.94 ±5 %	
750	55.5 ±5 %		0.96 ±5 %	
835	55.2 ±5 %		0.97 ±5 %	
900	55.0 ±5 %	PASS	1.05 ±5 %	PASS
915	55.0 ±5 %		1.06 ±5 %	
1450	54.0 ±5 %		1.30 ±5 %	
1610	53.8 ±5 %		1.40 ±5 %	
1800	53.3 ±5 %		1.52 ±5 %	
1900	53.3 ±5 %		1.52 ±5 %	
2000	53.3 ±5 %		1.52 ±5 %	
2100	53.2 ±5 %		1.62 ±5 %	
2450	52.7 ±5 %		1.95 ±5 %	
2600	52.5 ±5 %		2.16 ±5 %	
3000	52.0 ±5 %		2.73 ±5 %	
3500	51.3 ±5 %		3.31 ±5 %	
5200	49.0 ±10 %		5.30 ±10 %	
5300	48.9 ±10 %		5.42 ±10 %	
5400	48.7 ±10 %		5.53 ±10 %	
5500	48.6 ±10 %		5.65 ±10 %	
5600	48.5 ±10 %		5.77 ±10 %	
5800	48.2 ±10 %		6.00 ±10 %	

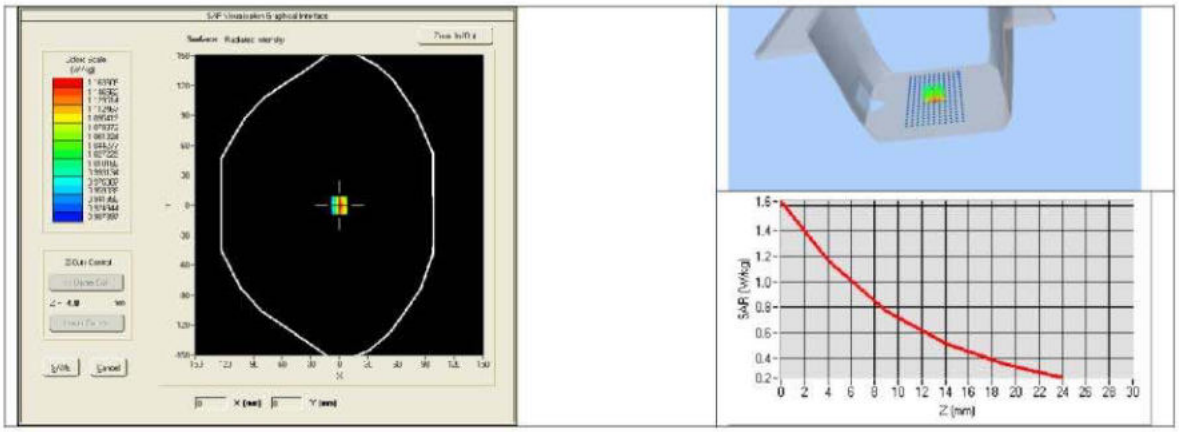
7.4 SAR MEASUREMENT RESULT WITH BODY LIQUID

Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Body Liquid Values: eps' : 56.7 sigma : 1.08
Distance between dipole center and liquid	15.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=8mm/dy=8m/dz=5mm
Frequency	900 MHz
Input power	20 dBm
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

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SAR REFERENCE DIPOLE CALIBRATION REPORT Ref: ACR.287.5.14.SATU.A

Frequency MHz	1 g SAR (W/kg/W)	10 g SAR (W/kg/W)
	measured	measured
900	11.34 (1.13)	7.15 (0.72)



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8 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
SAM Phantom	Satimo	SN-20/09-SAM71	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rhode & Schwarz ZVA	SN100132	02/2016	02/2019
Calipers	Carrera	CALIPER-01	12/2016	12/2019
Reference Probe	Satimo	EPG122 SN 18/11	10/2018	10/2019
Multimeter	Keithley 2000	1188656	12/2016	12/2019
Signal Generator	Agilent E4438C	MY49070581	12/2016	12/2019
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	HP E4418A	US38261498	12/2016	12/2019
Power Sensor	HP ECP-E26A	US37181460	12/2016	12/2019
Directional Coupler	Narda 4216-20	01386	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature and Humidity Sensor	Control Company	11-661-9	8/2016	8/2019

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5.4 SID1800 Dipole Calibration Certificate

SAR Reference Dipole Calibration Report

Ref : ACR.287.6.14.SATU.A

SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD.

1F., XINGYUAN INDUSTRIAL PARK, TONGDA ROAD, BAO'AN BLVD

BAO'AN DISTRICT, SHENZHEN, GUANGDONG, CHINA

SATIMO COMOSAR REFERENCE DIPOLE

FREQUENCY: 1800 MHZ

SERIAL NO.: SN 07/14 DIP 1G800-301

Calibrated at SATIMO US

2105 Barrett Park Dr. - Kennesaw, GA 30144

ACCREDITED

Calibration CERT #2146-02

10/01/2018

Summary:

This document presents the method and results from an accredited SAR reference dipole calibration performed in SATIMO USA using the COMOSAR test bench. All calibration results are traceable to national metrology institutions.

SATIMO **SAR REFERENCE DIPOLE CALIBRATION REPORT** Ref: ACR.287.6.14.SATU.A

	Name	Function	Date	Signature
Prepared by :	Jérôme LUC	Product Manager	10/14/2018	
Checked by :	Jérôme LUC	Product Manager	10/14/2018	
Approved by :	Kim RUTKOWSKI	Quality Manager	10/14/2018	

	Customer Name
Distribution :	Shenzhen LCS Compliance Testing Laboratory Ltd.

Issue	Date	Modifications
A	10/14/2018	Initial release

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1 INTRODUCTION

This document contains a summary of the requirements set forth by the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards for reference dipoles used for SAR measurement system validations and the measurements that were performed to verify that the product complies with the fore mentioned standards.

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 1800 MHz REFERENCE DIPOLE
Manufacturer	Satimo
Model	SID1800
Serial Number	SN 07/14 DIP 1G800-301
Product Condition (new / used)	New

A yearly calibration interval is recommended.

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

Satimo's COMOSAR Validation Dipoles are built in accordance to the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards. The product is designed for use with the COMOSAR test bench only.



Figure 1 – *Satimo COMOSAR Validation Dipole*

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4 MEASUREMENT METHOD

The IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards provide requirements for reference dipoles used for system validation measurements. The following measurements were performed to verify that the product complies with the fore mentioned standards.

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constucted as outlined in the fore mentioned standards.

4.2 MECHANICAL REQUIREMENTS

The IEEE Std. 1528 and CEI/IEC 62209 standards specify the mechanical components and dimensions of the validation dipoles, with the dimensions frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness.

5 MEASUREMENT UNCERTAINTY

All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.1 dB

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
3 - 300	0.05 mm

5.3 VALIDATION MEASUREMENT

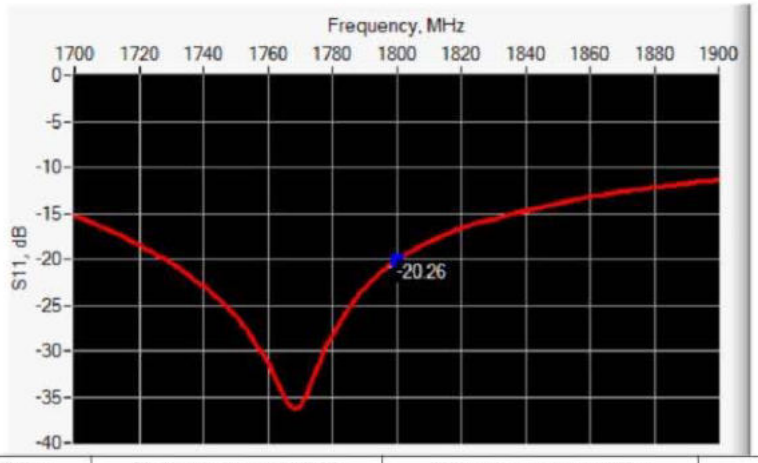
The guidelines outlined in the IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty for validation measurements.

Scan Volume	Expanded Uncertainty
1 g	20.3 %
10 g	20.1 %

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6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
1800	-20.26	-20	43.1 Ω + 6.9 jΩ

6.2 MECHANICAL DIMENSIONS

Frequency MHz	L mm		h mm		d mm	
	required	measured	required	measured	required	measured
300	420.0 ±1 %.		250.0 ±1 %.		6.35 ±1 %.	
450	290.0 ±1 %.		166.7 ±1 %.		6.35 ±1 %.	
750	176.0 ±1 %.		100.0 ±1 %.		6.35 ±1 %.	
835	161.0 ±1 %.		89.8 ±1 %.		3.6 ±1 %.	
900	149.0 ±1 %.		83.3 ±1 %.		3.6 ±1 %.	
1450	89.1 ±1 %.		51.7 ±1 %.		3.6 ±1 %.	
1500	80.5 ±1 %.		50.0 ±1 %.		3.6 ±1 %.	
1640	79.0 ±1 %.		45.7 ±1 %.		3.6 ±1 %.	
1750	75.2 ±1 %.		42.9 ±1 %.		3.6 ±1 %.	
1800	72.0 ±1 %.	PASS	41.7 ±1 %.	PASS	3.6 ±1 %.	PASS
1900	68.0 ±1 %.		39.5 ±1 %.		3.6 ±1 %.	
1950	66.3 ±1 %.		38.5 ±1 %.		3.6 ±1 %.	
2000	64.5 ±1 %.		37.5 ±1 %.		3.6 ±1 %.	
2100	61.0 ±1 %.		35.7 ±1 %.		3.6 ±1 %.	
2300	55.5 ±1 %.		32.6 ±1 %.		3.6 ±1 %.	
2450	51.5 ±1 %.		30.4 ±1 %.		3.6 ±1 %.	
2600	48.5 ±1 %.		28.8 ±1 %.		3.6 ±1 %.	
3000	41.5 ±1 %.		25.0 ±1 %.		3.6 ±1 %.	
3500	37.0±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3700	34.7±1 %.		26.4 ±1 %.		3.6 ±1 %.	

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7 VALIDATION MEASUREMENT

The IEEE Std. 1528, OET 65 Bulletin C and CEI/IEC 62209 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

7.1 HEAD LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±5 %		0.87 ±5 %	
450	43.5 ±5 %		0.87 ±5 %	
750	41.9 ±5 %		0.89 ±5 %	
835	41.5 ±5 %		0.90 ±5 %	
900	41.5 ±5 %		0.97 ±5 %	
1450	40.5 ±5 %		1.20 ±5 %	
1500	40.4 ±5 %		1.23 ±5 %	
1640	40.2 ±5 %		1.31 ±5 %	
1750	40.1 ±5 %		1.37 ±5 %	
1800	40.0 ±5 %	PASS	1.40 ±5 %	PASS
1900	40.0 ±5 %		1.40 ±5 %	
1950	40.0 ±5 %		1.40 ±5 %	
2000	40.0 ±5 %		1.40 ±5 %	
2100	39.8 ±5 %		1.49 ±5 %	
2300	39.5 ±5 %		1.67 ±5 %	
2450	39.2 ±5 %		1.80 ±5 %	
2600	39.0 ±5 %		1.96 ±5 %	
3000	38.5 ±5 %		2.40 ±5 %	
3500	37.9 ±5 %		2.91 ±5 %	

7.2 SAR MEASUREMENT RESULT WITH HEAD LIQUID

The IEEE Std. 1528 and CEI/IEC 62209 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Head Liquid Values: eps' : 41.3 sigma : 1.38
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm

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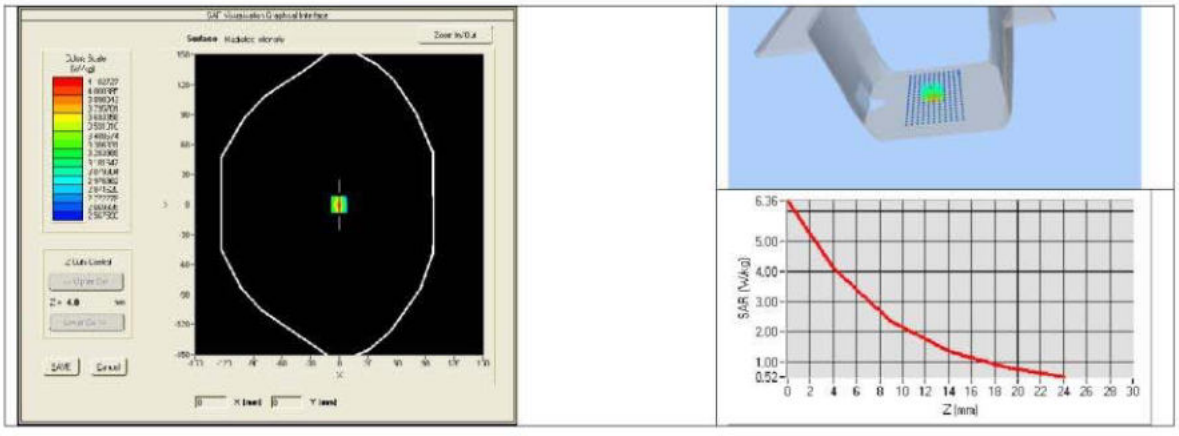
SATIMO

SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.287.6.14.SATU.A

Zoon Scan Resolution	dx=8mm/dy=8m/dz=5mm
Frequency	1800 MHz
Input power	20 dBm
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49		5.55	
835	9.56		6.22	
900	10.9		6.99	
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4	38.13 (3.81)	20.1	20.20 (2.02)
1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1		21.1	
2100	43.6		21.9	
2300	48.7		23.3	
2450	52.4		24	
2600	55.3		24.6	
3000	63.8		25.7	
3500	67.1		25	



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7.3 BODY LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε,')		Conductivity (σ) S/m	
	required	measured	required	measured
150	61.9 ±5 %		0.80 ±5 %	
300	58.2 ±5 %		0.92 ±5 %	
450	56.7 ±5 %		0.94 ±5 %	
750	55.5 ±5 %		0.96 ±5 %	
835	55.2 ±5 %		0.97 ±5 %	
900	55.0 ±5 %		1.05 ±5 %	
915	55.0 ±5 %		1.06 ±5 %	
1450	54.0 ±5 %		1.30 ±5 %	
1610	53.8 ±5 %		1.40 ±5 %	
1800	53.3 ±5 %	PASS	1.52 ±5 %	PASS
1900	53.3 ±5 %		1.52 ±5 %	
2000	53.3 ±5 %		1.52 ±5 %	
2100	53.2 ±5 %		1.62 ±5 %	
2450	52.7 ±5 %		1.95 ±5 %	
2600	52.5 ±5 %		2.16 ±5 %	
3000	52.0 ±5 %		2.73 ±5 %	
3500	51.3 ±5 %		3.31 ±5 %	
5200	49.0 ±10 %		5.30 ±10 %	
5300	48.9 ±10 %		5.42 ±10 %	
5400	48.7 ±10 %		5.53 ±10 %	
5500	48.6 ±10 %		5.65 ±10 %	
5600	48.5 ±10 %		5.77 ±10 %	
5800	48.2 ±10 %		6.00 ±10 %	

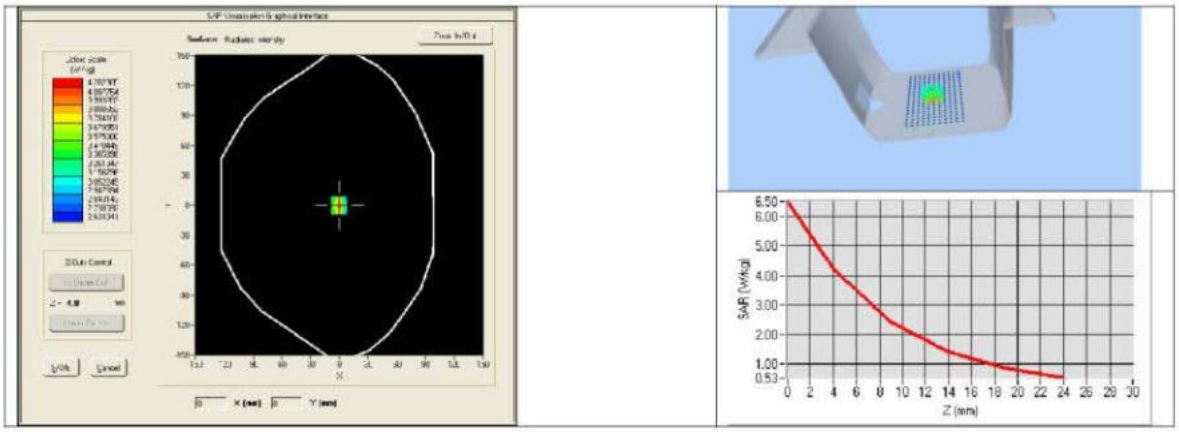
7.4 SAR MEASUREMENT RESULT WITH BODY LIQUID

Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Body Liquid Values: eps' : 53.3 sigma : 1.51
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=8mm/dy=8m/dz=5mm
Frequency	1800 MHz
Input power	20 dBm
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

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SAR REFERENCE DIPOLE CALIBRATION REPORT Ref: ACR.287.6.14.SATU.A

Frequency MHz	1 g SAR (W/kg/W)	10 g SAR (W/kg/W)
	measured	measured
1800	39.03 (3.90)	20.65 (2.07)



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8 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
SAM Phantom	Satimo	SN-20/09-SAM71	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rhode & Schwarz ZVA	SN100132	02/2016	02/2019
Calipers	Carrera	CALIPER-01	12/2016	12/2019
Reference Probe	Satimo	EPG122 SN 18/11	10/2018	10/2019
Multimeter	Keithley 2000	1188656	12/2016	12/2019
Signal Generator	Agilent E4438C	MY49070581	12/2016	12/2019
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	HP E4418A	US38261498	12/2016	12/2019
Power Sensor	HP ECP-E26A	US37181460	12/2016	12/2019
Directional Coupler	Narda 4216-20	01386	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature and Humidity Sensor	Control Company	11-661-9	8/2016	8/2019

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5.5 SID2000 Dipole Calibration Ceriticate

SAR Reference Dipole Calibration Report

Ref : ACR.287.7.14.SATU.A

SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD.

1F., XINGYUAN INDUSTRIAL PARK, TONGDA ROAD, BAO'AN BLVD

BAO'AN DISTRICT, SHENZHEN, GUANGDONG, CHINA

SATIMO COMOSAR REFERENCE DIPOLE

FREQUENCY: 2000 MHZ

SERIAL NO.: SN 07/14 DIP 2G000-305

Calibrated at SATIMO US

2105 Barrett Park Dr. - Kennesaw, GA 30144

10/01/2018

Summary:

This document presents the method and results from an accredited SAR reference dipole calibration performed in SATIMO USA using the COMOSAR test bench. All calibration results are traceable to national metrology institutions.

SATIMO **SAR REFERENCE DIPOLE CALIBRATION REPORT** Ref: ACR.287.7.14.SATU.A

	Name	Function	Date	Signature
Prepared by :	Jérôme LUC	Product Manager	10/14/2018	
Checked by :	Jérôme LUC	Product Manager	10/14/2018	
Approved by :	Kim RUTKOWSKI	Quality Manager	10/14/2018	

	Customer Name
Distribution :	Shenzhen LCS Compliance Testing Laboratory Ltd.

Issue	Date	Modifications
A	10/14/2018	Initial release

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1 INTRODUCTION

This document contains a summary of the requirements set forth by the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards for reference dipoles used for SAR measurement system validations and the measurements that were performed to verify that the product complies with the fore mentioned standards.

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 2000 MHz REFERENCE DIPOLE
Manufacturer	Satimo
Model	SID2000
Serial Number	SN 07/14 DIP 2G000-305
Product Condition (new / used)	New

A yearly calibration interval is recommended.

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

Satimo's COMOSAR Validation Dipoles are built in accordance to the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards. The product is designed for use with the COMOSAR test bench only.



Figure 1 – *Satimo COMOSAR Validation Dipole*

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4 MEASUREMENT METHOD

The IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards provide requirements for reference dipoles used for system validation measurements. The following measurements were performed to verify that the product complies with the fore mentioned standards.

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constucted as outlined in the fore mentioned standards.

4.2 MECHANICAL REQUIREMENTS

The IEEE Std. 1528 and CEI/IEC 62209 standards specify the mechanical components and dimensions of the validation dipoles, with the dimensions frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness.

5 MEASUREMENT UNCERTAINTY

All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.1 dB

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
3 - 300	0.05 mm

5.3 VALIDATION MEASUREMENT

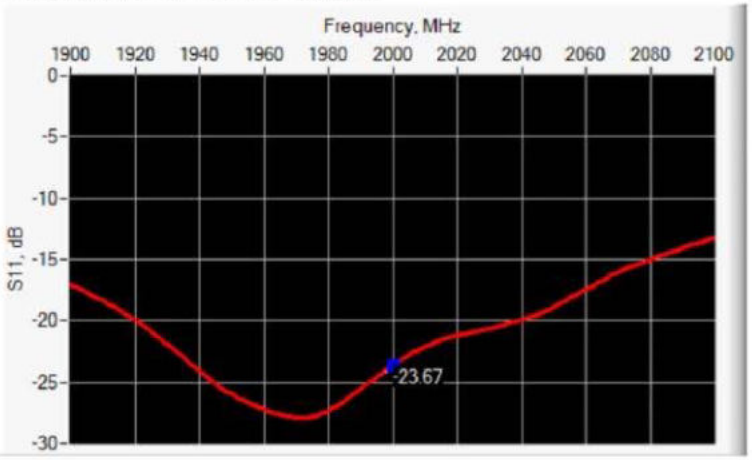
The guidelines outlined in the IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty for validation measurements.

Scan Volume	Expanded Uncertainty
1 g	20.3 %
10 g	20.1 %

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6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
2000	-23.67	-20	50.8 Ω - 6.2 jΩ

6.2 MECHANICAL DIMENSIONS

Frequency MHz	L mm		h mm		d mm	
	required	measured	required	measured	required	measured
300	420.0 ±1 %.		250.0 ±1 %.		6.35 ±1 %.	
450	290.0 ±1 %.		166.7 ±1 %.		6.35 ±1 %.	
750	176.0 ±1 %.		100.0 ±1 %.		6.35 ±1 %.	
835	161.0 ±1 %.		89.8 ±1 %.		3.6 ±1 %.	
900	149.0 ±1 %.		83.3 ±1 %.		3.6 ±1 %.	
1450	89.1 ±1 %.		51.7 ±1 %.		3.6 ±1 %.	
1500	80.5 ±1 %.		50.0 ±1 %.		3.6 ±1 %.	
1640	79.0 ±1 %.		45.7 ±1 %.		3.6 ±1 %.	
1750	75.2 ±1 %.		42.9 ±1 %.		3.6 ±1 %.	
1800	72.0 ±1 %.		41.7 ±1 %.		3.6 ±1 %.	
1900	68.0 ±1 %.		39.5 ±1 %.		3.6 ±1 %.	
1950	66.3 ±1 %.		38.5 ±1 %.		3.6 ±1 %.	
2000	64.5 ±1 %.	PASS	37.5 ±1 %.	PASS	3.6 ±1 %.	PASS
2100	61.0 ±1 %.		35.7 ±1 %.		3.6 ±1 %.	
2300	55.5 ±1 %.		32.6 ±1 %.		3.6 ±1 %.	
2450	51.5 ±1 %.		30.4 ±1 %.		3.6 ±1 %.	
2600	48.5 ±1 %.		28.8 ±1 %.		3.6 ±1 %.	
3000	41.5 ±1 %.		25.0 ±1 %.		3.6 ±1 %.	
3500	37.0±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3700	34.7±1 %.		26.4 ±1 %.		3.6 ±1 %.	

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7 VALIDATION MEASUREMENT

The IEEE Std. 1528, OET 65 Bulletin C and CEI/IEC 62209 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

7.1 HEAD LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±5 %		0.87 ±5 %	
450	43.5 ±5 %		0.87 ±5 %	
750	41.9 ±5 %		0.89 ±5 %	
835	41.5 ±5 %		0.90 ±5 %	
900	41.5 ±5 %		0.97 ±5 %	
1450	40.5 ±5 %		1.20 ±5 %	
1500	40.4 ±5 %		1.23 ±5 %	
1640	40.2 ±5 %		1.31 ±5 %	
1750	40.1 ±5 %		1.37 ±5 %	
1800	40.0 ±5 %		1.40 ±5 %	
1900	40.0 ±5 %		1.40 ±5 %	
1950	40.0 ±5 %		1.40 ±5 %	
2000	40.0 ±5 %	PASS	1.40 ±5 %	PASS
2100	39.8 ±5 %		1.49 ±5 %	
2300	39.5 ±5 %		1.67 ±5 %	
2450	39.2 ±5 %		1.80 ±5 %	
2600	39.0 ±5 %		1.96 ±5 %	
3000	38.5 ±5 %		2.40 ±5 %	
3500	37.9 ±5 %		2.91 ±5 %	

7.2 SAR MEASUREMENT RESULT WITH HEAD LIQUID

The IEEE Std. 1528 and CEI/IEC 62209 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Head Liquid Values: eps' : 39.7 sigma : 1.43
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm

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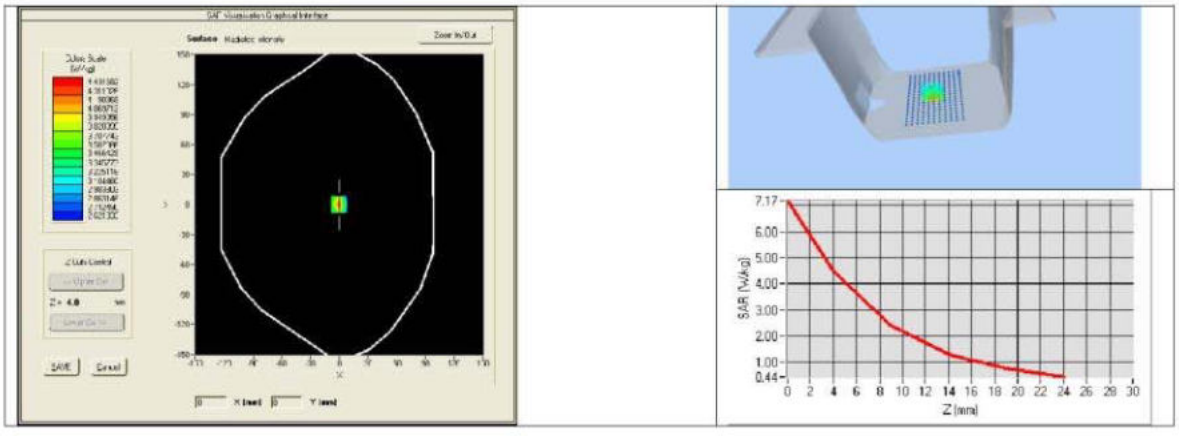
SATIMO

SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.287.7.14.SATU.A

Zoon Scan Resolution	dx=8mm/dy=8m/dz=5mm
Frequency	2000 MHz
Input power	20 dBm
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49		5.55	
835	9.56		6.22	
900	10.9		6.99	
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4		20.1	
1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1	43.00 (4.30)	21.1	21.20 (2.12)
2100	43.6		21.9	
2300	48.7		23.3	
2450	52.4		24	
2600	55.3		24.6	
3000	63.8		25.7	
3500	67.1		25	



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7.3 BODY LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε,')		Conductivity (σ) S/m	
	required	measured	required	measured
150	61.9 ±5 %		0.80 ±5 %	
300	58.2 ±5 %		0.92 ±5 %	
450	56.7 ±5 %		0.94 ±5 %	
750	55.5 ±5 %		0.96 ±5 %	
835	55.2 ±5 %		0.97 ±5 %	
900	55.0 ±5 %		1.05 ±5 %	
915	55.0 ±5 %		1.06 ±5 %	
1450	54.0 ±5 %		1.30 ±5 %	
1610	53.8 ±5 %		1.40 ±5 %	
1800	53.3 ±5 %		1.52 ±5 %	
1900	53.3 ±5 %		1.52 ±5 %	
2000	53.3 ±5 %	PASS	1.52 ±5 %	PASS
2100	53.2 ±5 %		1.62 ±5 %	
2450	52.7 ±5 %		1.95 ±5 %	
2600	52.5 ±5 %		2.16 ±5 %	
3000	52.0 ±5 %		2.73 ±5 %	
3500	51.3 ±5 %		3.31 ±5 %	
5200	49.0 ±10 %		5.30 ±10 %	
5300	48.9 ±10 %		5.42 ±10 %	
5400	48.7 ±10 %		5.53 ±10 %	
5500	48.6 ±10 %		5.65 ±10 %	
5600	48.5 ±10 %		5.77 ±10 %	
5800	48.2 ±10 %		6.00 ±10 %	

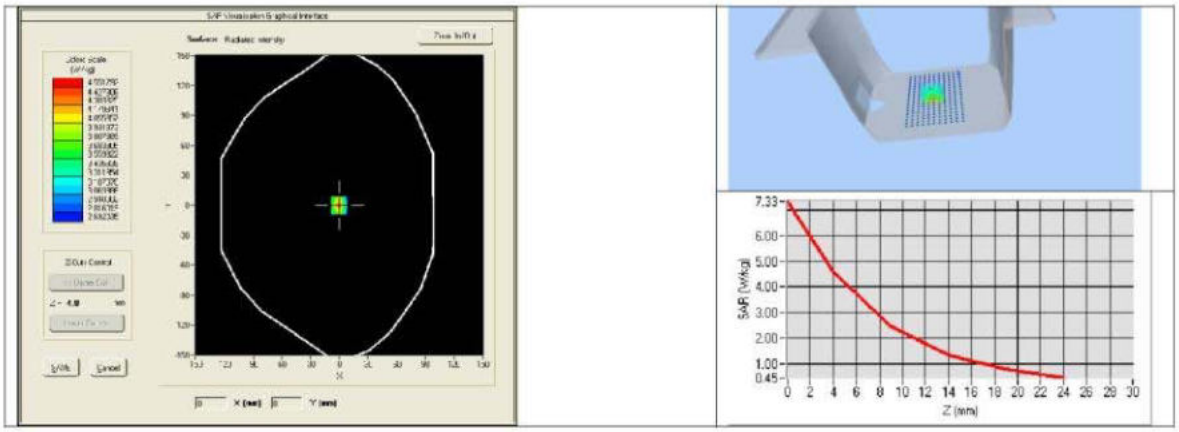
7.4 SAR MEASUREMENT RESULT WITH BODY LIQUID

Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Body Liquid Values: eps' : 53.9 sigma : 1.53
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=8mm/dy=8m/dz=5mm
Frequency	2000 MHz
Input power	20 dBm
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

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SAR REFERENCE DIPOLE CALIBRATION REPORT Ref: ACR.287.7.14.SATU.A

Frequency MHz	1 g SAR (W/kg/W)	10 g SAR (W/kg/W)
	measured	measured
2000	45.84 (4.58)	22.30 (2.23)



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8 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
SAM Phantom	Satimo	SN-20/09-SAM71	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rhode & Schwarz ZVA	SN100132	02/2016	02/2019
Calipers	Carrera	CALIPER-01	12/2016	12/2019
Reference Probe	Satimo	EPG122 SN 18/11	10/2018	10/2019
Multimeter	Keithley 2000	1188656	12/2016	12/2019
Signal Generator	Agilent E4438C	MY49070581	12/2016	12/2019
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	HP E4418A	US38261498	12/2016	12/2019
Power Sensor	HP ECP-E26A	US37181460	12/2016	12/2019
Directional Coupler	Narda 4216-20	01386	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature and Humidity Sensor	Control Company	11-661-9	8/2016	8/2019

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5.6 SID2450 Dipole Calibration Ceriticate

SAR Reference Dipole Calibration Report

Ref : ACR.287.8.14.SATU.A

SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD.

1F., XINGYUAN INDUSTRIAL PARK, TONGDA ROAD, BAO'AN BLVD

BAO'AN DISTRICT, SHENZHEN, GUANGDONG, CHINA

SATIMO COMOSAR REFERENCE DIPOLE

FREQUENCY: 2450 MHZ

SERIAL NO.: SN 07/14 DIP 2G450-306

Calibrated at SATIMO US

2105 Barrett Park Dr. - Kennesaw, GA 30144

10/01/2018

Summary:

This document presents the method and results from an accredited SAR reference dipole calibration performed in SATIMO USA using the COMOSAR test bench. All calibration results are traceable to national metrology institutions.

SATIMO **SAR REFERENCE DIPOLE CALIBRATION REPORT** Ref: ACR.287.8.14.SATU.A

	Name	Function	Date	Signature
Prepared by :	Jérôme LUC	Product Manager	10/14/2018	
Checked by :	Jérôme LUC	Product Manager	10/14/2018	
Approved by :	Kim RUTKOWSKI	Quality Manager	10/14/2018	

	Customer Name
Distribution :	Shenzhen LCS Compliance Testing Laboratory Ltd.

Issue	Date	Modifications
A	10/14/2018	Initial release

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1 INTRODUCTION

This document contains a summary of the requirements set forth by the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards for reference dipoles used for SAR measurement system validations and the measurements that were performed to verify that the product complies with the fore mentioned standards.

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 2450 MHz REFERENCE DIPOLE
Manufacturer	Satimo
Model	SID2450
Serial Number	SN 07/14 DIP 2G450-306
Product Condition (new / used)	New

A yearly calibration interval is recommended.

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

Satimo's COMOSAR Validation Dipoles are built in accordance to the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards. The product is designed for use with the COMOSAR test bench only.



Figure 1 – *Satimo COMOSAR Validation Dipole*

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4 MEASUREMENT METHOD

The IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards provide requirements for reference dipoles used for system validation measurements. The following measurements were performed to verify that the product complies with the fore mentioned standards.

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constucted as outlined in the fore mentioned standards.

4.2 MECHANICAL REQUIREMENTS

The IEEE Std. 1528 and CEI/IEC 62209 standards specify the mechanical components and dimensions of the validation dipoles, with the dimensions frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness.

5 MEASUREMENT UNCERTAINTY

All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.1 dB

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
3 - 300	0.05 mm

5.3 VALIDATION MEASUREMENT

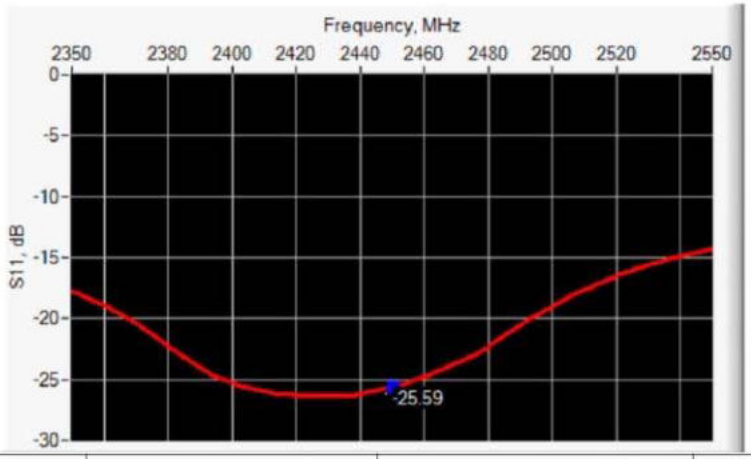
The guidelines outlined in the IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty for validation measurements.

Scan Volume	Expanded Uncertainty
1 g	20.3 %
10 g	20.1 %

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6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
2450	-25.59	-20	44.7 Ω - 1.1 jΩ

6.2 MECHANICAL DIMENSIONS

Frequency MHz	L mm		h mm		d mm	
	required	measured	required	measured	required	measured
300	420.0 ±1 %.		250.0 ±1 %.		6.35 ±1 %.	
450	290.0 ±1 %.		166.7 ±1 %.		6.35 ±1 %.	
750	176.0 ±1 %.		100.0 ±1 %.		6.35 ±1 %.	
835	161.0 ±1 %.		89.8 ±1 %.		3.6 ±1 %.	
900	149.0 ±1 %.		83.3 ±1 %.		3.6 ±1 %.	
1450	89.1 ±1 %.		51.7 ±1 %.		3.6 ±1 %.	
1500	80.5 ±1 %.		50.0 ±1 %.		3.6 ±1 %.	
1640	79.0 ±1 %.		45.7 ±1 %.		3.6 ±1 %.	
1750	75.2 ±1 %.		42.9 ±1 %.		3.6 ±1 %.	
1800	72.0 ±1 %.		41.7 ±1 %.		3.6 ±1 %.	
1900	68.0 ±1 %.		39.5 ±1 %.		3.6 ±1 %.	
1950	66.3 ±1 %.		38.5 ±1 %.		3.6 ±1 %.	
2000	64.5 ±1 %.		37.5 ±1 %.		3.6 ±1 %.	
2100	61.0 ±1 %.		35.7 ±1 %.		3.6 ±1 %.	
2300	55.5 ±1 %.		32.6 ±1 %.		3.6 ±1 %.	
2450	51.5 ±1 %.	PASS	30.4 ±1 %.	PASS	3.6 ±1 %.	PASS
2600	48.5 ±1 %.		28.8 ±1 %.		3.6 ±1 %.	
3000	41.5 ±1 %.		25.0 ±1 %.		3.6 ±1 %.	
3500	37.0±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3700	34.7±1 %.		26.4 ±1 %.		3.6 ±1 %.	

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7 VALIDATION MEASUREMENT

The IEEE Std. 1528, OET 65 Bulletin C and CEI/IEC 62209 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

7.1 HEAD LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±5 %		0.87 ±5 %	
450	43.5 ±5 %		0.87 ±5 %	
750	41.9 ±5 %		0.89 ±5 %	
835	41.5 ±5 %		0.90 ±5 %	
900	41.5 ±5 %		0.97 ±5 %	
1450	40.5 ±5 %		1.20 ±5 %	
1500	40.4 ±5 %		1.23 ±5 %	
1640	40.2 ±5 %		1.31 ±5 %	
1750	40.1 ±5 %		1.37 ±5 %	
1800	40.0 ±5 %		1.40 ±5 %	
1900	40.0 ±5 %		1.40 ±5 %	
1950	40.0 ±5 %		1.40 ±5 %	
2000	40.0 ±5 %		1.40 ±5 %	
2100	39.8 ±5 %		1.49 ±5 %	
2300	39.5 ±5 %		1.67 ±5 %	
2450	39.2 ±5 %	PASS	1.80 ±5 %	PASS
2600	39.0 ±5 %		1.96 ±5 %	
3000	38.5 ±5 %		2.40 ±5 %	
3500	37.9 ±5 %		2.91 ±5 %	

7.2 SAR MEASUREMENT RESULT WITH HEAD LIQUID

The IEEE Std. 1528 and CEI/IEC 62209 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Head Liquid Values: eps' : 39.0 sigma : 1.77
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm

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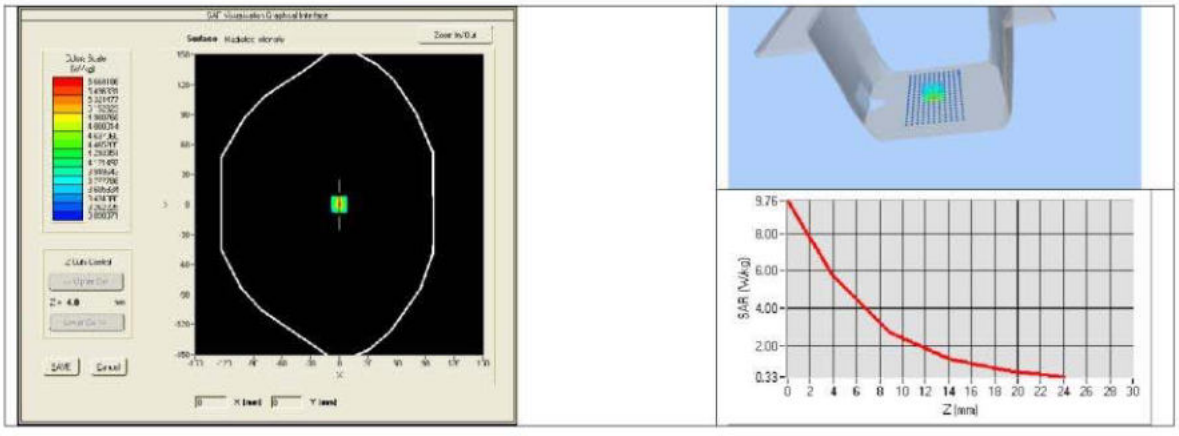
SATIMO

SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.287.8.14.SATU.A

Zoon Scan Resolution	dx=8mm/dy=8m/dz=5mm
Frequency	2450 MHz
Input power	20 dBm
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49		5.55	
835	9.56		6.22	
900	10.9		6.99	
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4		20.1	
1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1		21.1	
2100	43.6		21.9	
2300	48.7		23.3	
2450	52.4	53.89 (5.39)	24	24.15 (2.42)
2600	55.3		24.6	
3000	63.8		25.7	
3500	67.1		25	



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7.3 BODY LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε,')		Conductivity (σ) S/m	
	required	measured	required	measured
150	61.9 ±5 %		0.80 ±5 %	
300	58.2 ±5 %		0.92 ±5 %	
450	56.7 ±5 %		0.94 ±5 %	
750	55.5 ±5 %		0.96 ±5 %	
835	55.2 ±5 %		0.97 ±5 %	
900	55.0 ±5 %		1.05 ±5 %	
915	55.0 ±5 %		1.06 ±5 %	
1450	54.0 ±5 %		1.30 ±5 %	
1610	53.8 ±5 %		1.40 ±5 %	
1800	53.3 ±5 %		1.52 ±5 %	
1900	53.3 ±5 %		1.52 ±5 %	
2000	53.3 ±5 %		1.52 ±5 %	
2100	53.2 ±5 %		1.62 ±5 %	
2450	52.7 ±5 %	PASS	1.95 ±5 %	PASS
2600	52.5 ±5 %		2.16 ±5 %	
3000	52.0 ±5 %		2.73 ±5 %	
3500	51.3 ±5 %		3.31 ±5 %	
5200	49.0 ±10 %		5.30 ±10 %	
5300	48.9 ±10 %		5.42 ±10 %	
5400	48.7 ±10 %		5.53 ±10 %	
5500	48.6 ±10 %		5.65 ±10 %	
5600	48.5 ±10 %		5.77 ±10 %	
5800	48.2 ±10 %		6.00 ±10 %	

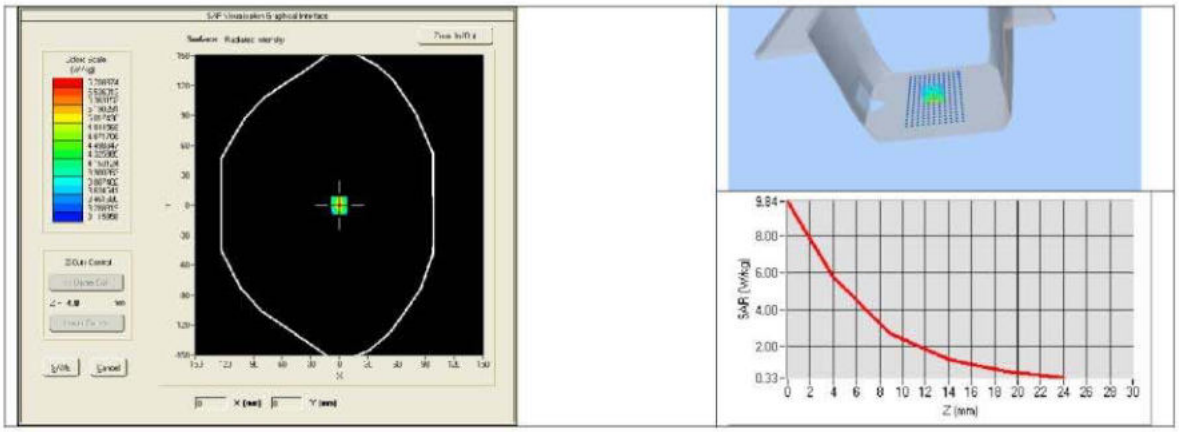
7.4 SAR MEASUREMENT RESULT WITH BODY LIQUID

Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Body Liquid Values: eps' : 53.0 sigma : 1.93
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=8mm/dy=8m/dz=5mm
Frequency	2450 MHz
Input power	20 dBm
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

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SAR REFERENCE DIPOLE CALIBRATION REPORT Ref: ACR.287.8.14.SATU.A

Frequency MHz	1 g SAR (W/kg/W)	10 g SAR (W/kg/W)
	measured	measured
2450	54.65 (5.46)	24.58 (2.46)



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8 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
SAM Phantom	Satimo	SN-20/09-SAM71	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rhode & Schwarz ZVA	SN100132	02/2016	02/2019
Calipers	Carrera	CALIPER-01	12/2016	12/2019
Reference Probe	Satimo	EPG122 SN 18/11	10/2018	10/2019
Multimeter	Keithley 2000	1188656	12/2016	12/2019
Signal Generator	Agilent E4438C	MY49070581	12/2016	12/2019
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	HP E4418A	US38261498	12/2016	12/2019
Power Sensor	HP ECP-E26A	US37181460	12/2016	12/2019
Directional Coupler	Narda 4216-20	01386	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature and Humidity Sensor	Control Company	11-661-9	8/2016	8/2019

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6. SAR System PHOTOGRAPHS

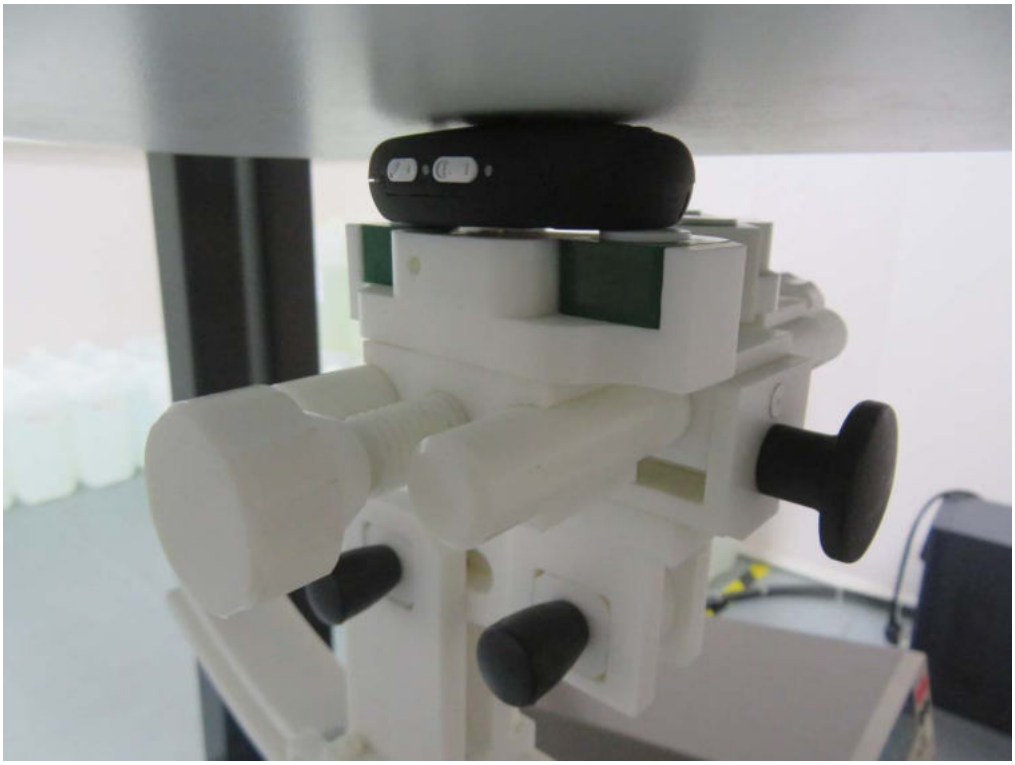


Liquid depth ≧15cm

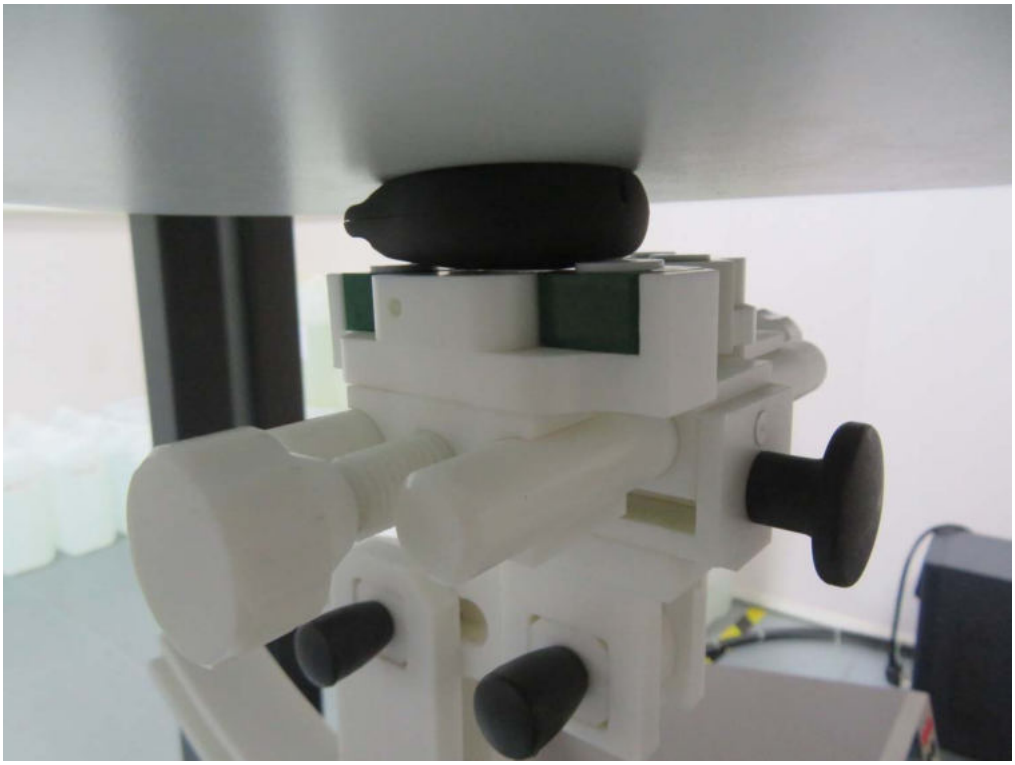


7. SETUP PHOTOGRAPHS

Body Setup photo(Front 0mm)



Body Setup photo(Back 0mm)



8.EUT PHOTOGRAPHS

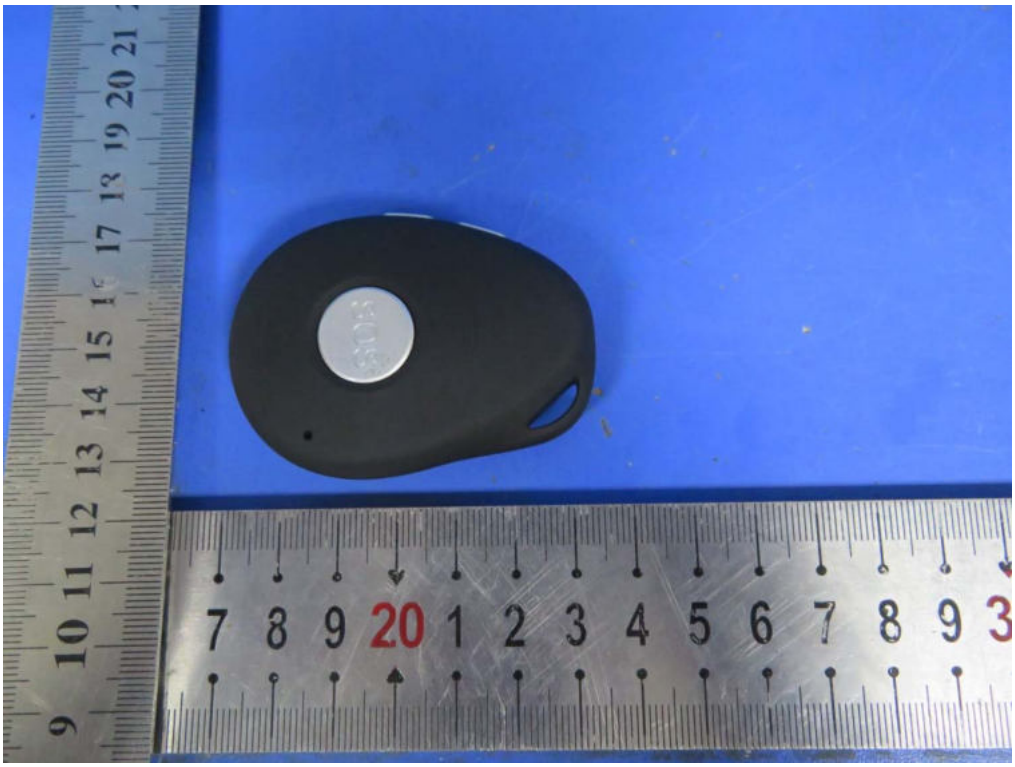


Fig.1

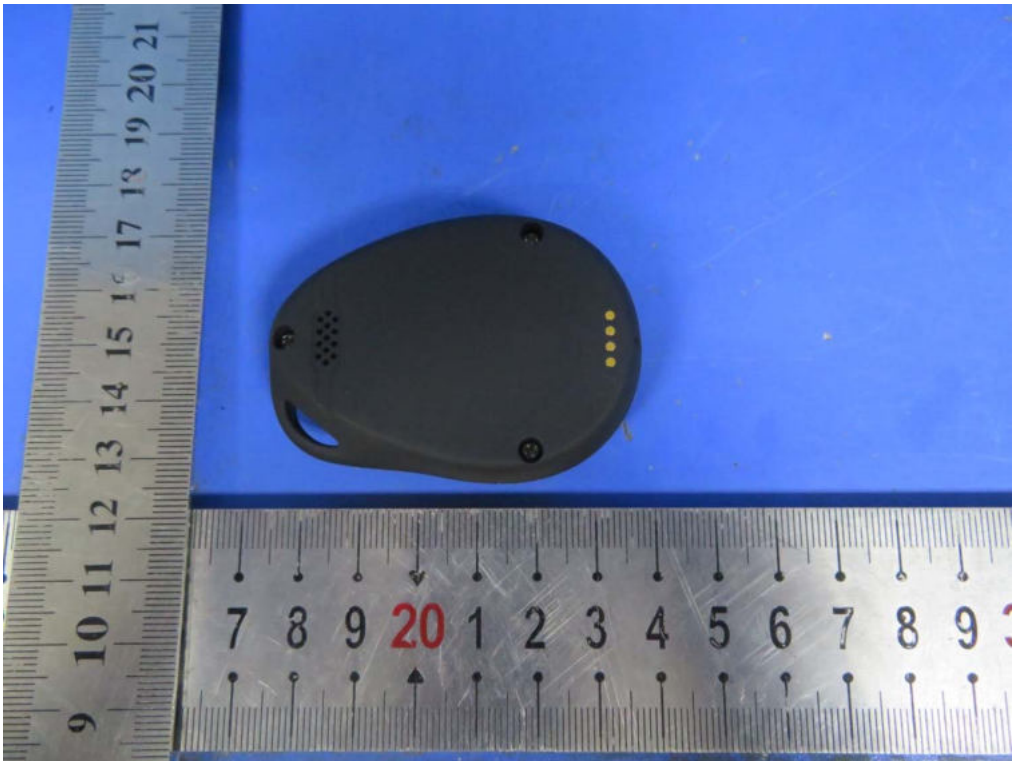


Fig.2

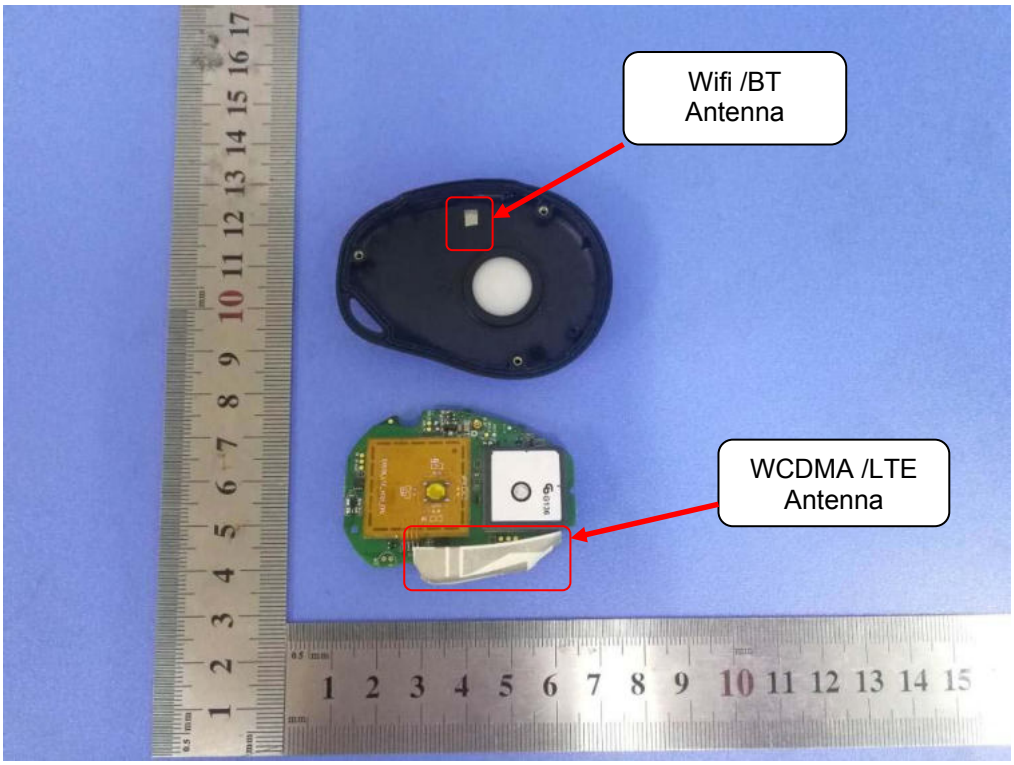


Fig.3

.....The End of Test Report.....

Steinberg am See 2.7.2021

Anwendungstest

zur Aufnahme eines neuen Pflegemittles in das Pflegehilfsmittelverzeichnis für Produktgruppe 52 40 03 0

Typ:	SMT_EVO7
Art.Nr.	730977047363

Auftraggeber:	Test durchgeführt:
Fa. Simmotrade	Caritasverband
Holzheimer Weg 12	Rote Gasse 4
92449 Steinberg am See	78050 Villingen-Schwenningen
Erwin Lechleitner	Jenny Fries

Pos.	Kriterium	Ja	Nein	1= sehr gut/ 10 = sehr schlecht
1	War die Inbetriebnahme sehr kompliziert?		X	2
2	Welcher Eindruck macht das Gerät auf sie?			3
3	Ist die Betriebsanleitung übersichtlich?	X		2
	Telefonie			
5	Nimmt das Notrufsystem Anrufe entgegen?	X		1
6	Wie ist die Sprachqualität			3
	Wenn das Notrufsystem keinen Anruf entgegen nimmt, wird			
7	dann der Anruf automatisch entgegen genommen?	X		2
8	Funtioniert das Anrufen mit dem Notrufsystem?	X		2
	Not Ruf			
9	Ist der Not-Ruf Knopf gut zu bedienen?	X		
10	Funktioniert der Not-Ruf	X		
	Funktioniert die automatische Weiterleitung wenn eine oder			
11	mehrere Notfallnummen den Anruf nicht entgegen nehmen?			Nicht getestet
	GEO Zaun			
	Meldet das Notrufsystem wenn der Patient einen bestimmten			
12	Bereich verlässt?			Nicht getestet
	Ortung im Freien			
13	Funktioniert die Ortung wenn der Patient sich im freien aufhält	X		1
	Ortung in Gebäuden			
	Funktioniert dir Ortung in Räumen wenn der Tracker sich im			
14	Bereich der Ladestation aufhält?			teilweise
	Bewegung-Sensor			
15	Funktioniert der Bewegung-Sensor			Nicht getestet
	Keine Bewegung Sensor			
	Wird ein Alarm gesendet, wenn der Tracker für eine Zeit X nicht			
16	bewegt wird?			Nicht getestet
	Akku Warnung			
	Wird ein Alarm gesendet, wenn der Akku unter 20% Restladung			
17	fällt?	X		

Test durchgeführt

Name: Christian Fitt

Ort/Datum: VS 5.8.21

Herstellererklärung zu Indikation und Einsatzbezogenen Eigenschaften:

Bei dem Produkt SMT_EV-07 2G/4G handelt es sich um einen GPS-Tracker als Notrufsystem der speziell auf die Bedürfnisse von älteren Menschen entworfen wurde.

Folgende Merkmale unterstützen den Bedürftigen und die Aufsichtsperson dabei ein weitgehend freies Leben zu führen.

1. **GPS/ WiFi/BLE/LBS Ortung**

Außenbereich

Mittels GPS und LBS Ortung, kann die hilfsbedürftige Person jederzeit per APP von einer Vertrauensperson geortet werden.

Innenbereich

Ist im Innenbereich ein WiFi Signal vorhanden, kann das Notrufsystem darüber seine Position berechnen.

Das Notrufsystem kann sich per Bluetooth mit der Ladestation verbinden, da dem System die Position der Ladestation bekannt ist, kann ebenfalls die aktuelle Position berechnet werden.

Durch zusätzliche Sender, die in verschiedenen Räumen installiert werden, kann das Notruf- System Raum genau die Position der bedürftigen Person ermitteln, dies ist besonders in Krankenhäuser oder Pflegeheime äußerst hilfreich beim Auffinden einer Person.

2. **GEO Fence (virtueller Zaun)**

Mit dem GEO-Fence kann virtuell ein bestimmter Bereich definiert werden. Beim Verlassen oder Betreten, wird eine Meldung an die betreuende Person per SMS gesendet.

3. **Notruf Taste**

In einem Notfall kann die große und gut zu bedienende SOS Taste betätigt werden, in diesem Fall wird eine im System hinterlegt Telefonnummer angerufen, es können max. 10 Telefonnummer angelegt werden. Ist die erste Nummer nicht erreichbar, wird die nächste und dann alle weiteren Nummern angewählt bis der Notruf entgegengenommen wurde. Die Kennung des Notrufsystemes wird mitgesendet, sodass eine eindeutige Identifizierung möglich ist

4. **Keine Bewegung Meldung**

Wird das Notrufsystem für eine einstellbare Zeit nicht bewegt, wird eine Meldung an die Betreuende Person gesendet.

5. **Bewegungsmeldung**

Wird nach einer einstellbaren Zeit eine Bewegung festgestellt, sendet das Notruf System eine Meldung an die Betreuende Person

6. **Batter Low**

Unterschreitet der Akku einen bestimmten Ladezustand, wird eine Meldung an die Betreuende Person gesendet.

7. **Automatische Gesprächs Entgegennahme**

Ist eine Person verunfallt oder bewusstlos, kann das Not-Rufsystem automatisch einen Anruf entgegennehmen, dadurch kann versucht werden kontakt mit der hilfsbedürftigen Person aufzunehmen oder in den Raum hineinzuhören.

Diese Funktion kann auch deaktiviert werden.

8. **Stromausfall**

Die Funktionalität ist bei einem Stromausfall im vollen Umfang vorhanden. Für einen Längeren Stromausfall ist die Komfort Ladeschale mit einem zusätzliche 850 mAh Akku ausgestattet.

Simmotrade
GPS Not-Ruf- System SMT_EV07



Beispiel mit Komfort Ladeschale

Bitte lesen Sie ich die Anleitung genau durch bevor sie den Tracker in Betrieb nehmen.
Sollten sie Fragen haben oder Hilfe benötigen, können sie uns gerne kontaktieren. Die Kontaktdaten finden sie auf Ihrer Rechnung.

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1.0 Produktübersicht…… Seite 3
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3.0 Kommunizieren mit dem Notrufsystem ……. Seite 6
4.0 Positionsabfrage …… Seite 6
5.0 Bezeichnung des Notrufsenders festlegen …..Seite 8
6.0 Fallsensor…… Seite 9
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19.0 APP Download …… Seite 24

1.0 Produktübersicht: Notrufsystem



Spezifikation

Netz:	SMT - 07B2G	2G
	SMT - 07B4G	4G
Batterie:	850mAh Lion- Akku	
Wasserdicht:	IPX7	
Positionierung:	BLE, GPS, Wifi, LBS	
Zertifikate:	CE, ROHS, UN38.3	
WiFi:	802.11 2.4G	
Größe:	61mm X 44mm X 16mm	

Zubehör: Deutsche Beschreibung, Ladekabel, Ladeschale, Netzteil, Halsband

2.0 Inbetriebnahme

Bevor sie mit der Inbetriebnahme starten können, muss die Sim-Karte von uns frei geschaltet und registriert werden, nach der Freischaltung werden sie von uns informiert.
Bitte füllen sie zuvor das Formular auf unserer Webseite aus.
Das Formular finden sie unter:
https://www.simmosim.com/formular/

Bitte laden sie das Gerät vor dem ersten Gebrauch 2-3 Stunden auf.
Zum Einschalten des Gerätes drücken sie mit dem Fingernagel kurz auf die seitliche Anruf-Taste. Zum Ausschalten drücken sie die Anruf-Taste und SOS-Taste gemeinsam.

Wir haben das Gerät für sie bereits eingerichtet, die gelbe und blaue LED blinken nach dem Einschalten, sollte dies nicht der Fall sein, dann bringen sie ihren Tracker ins Freie.

Zur Anzeige des aktuellen Status befinden sich an der Seite 3 LED, sollte keine der LED leuchten, ist der Tracker ausgeschaltet oder im Schlafmodus.
Möchte sie ihre eigene Sim-Karte verwende, dann informieren sie sich bitte unter 19.0 APP und Web Portal

Grüne LED

LED	Grün blinkt kurz alle 3 Sekunden	Grün blinkt zweimal alle 3 Sekunden	Grün blinkt eine Sek. an, drei Sek aus.	Grün leuchtet konstant
Bedeutung	Gerät ist mit dem GSM Netz verbunden	Gerät ist mit dem Internet verbunden	Die Verbindung zum GSM Netz wir aufgebaut	Sim–Karte nicht erkannt

Blaue LED

LED	Blau blinkt kurz alle 3 sek.	Blau blinkt eine Sek. an, drei Sek. aus	Blau ist aus
Bedeutung	GPS-Position ermittelt	Noch keine GPS-Position	Das GPS Modul ist im Schlafmodus

Rote LED

LED	Rot leuchtet kontant	Rot blinkt schnell	Rot ist aus oder blinkt langsam
Bedeutung	Der Akku wird geladen	Akku Kapazität < 20%	Der Akku ist geladen

3.0 Kommunizieren mit dem Notrufsystem

Es gibt zwei Wege mit dem Notrufsystem zu kommunizieren

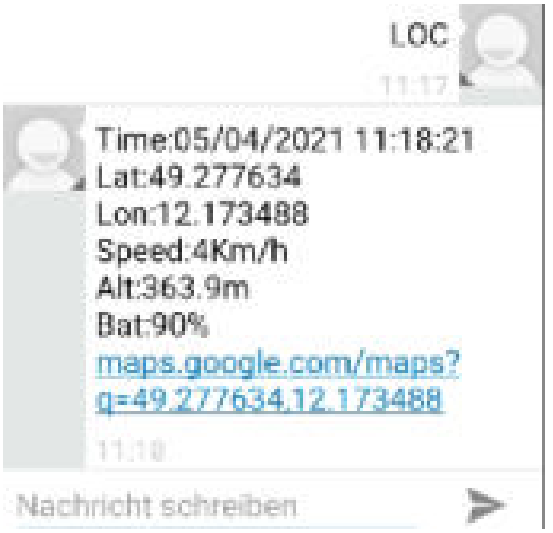
1. Per SMS
2. Über Internet

In dieser Beschreibung wird die SMS-Kommunikation beschrieben. Mittels sehr einfacher Kommandos, die sie per SMS an die Sim-Karten Telefonnummer ihres Notrufsystems senden, können nahezu alle Funktionen ausgeführt werden. Im Notfall werden sie vom Notrufsystem per Anruf oder SMS informiert.

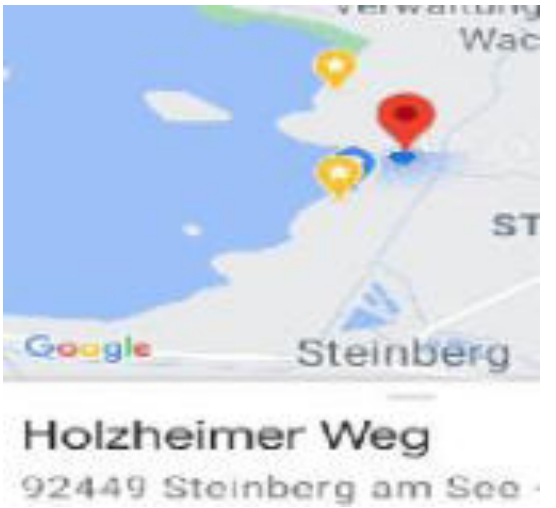
4.0 Positionsabfrage

Befehl: LOC
Bedeutung: Senden sie LOC per SMS an den GPS-Notrufsender. Mit diesem Befehl wird ihnen die aktuelle Position per SMS als Link auf ihr Smartphone gesendet.

Beispiel:



Nach anklicken des Links öffnet sich Google MAPS mit der aktuellen Position und Adresse



5.0 Die SMS-Bezeichnung des Notrufsenders festlegen

Befehl: prefix1,Gustav

Bedeutung: Sie können einen Namen für den Notrufsender festlegen, der am Anfang jeder Antwort SMS mitgesendet wird. Dies hilft bei der Identifikation, wenn sie mehrere Geräte benutzen.

Beispiel:



6.0 Fallsensor

Befehl: FL1-9
Bedeutung: Stürzt eine Person wird der Fallsensor ausgelöst und eine SMS an alle Notrufnummern gesendet.
Beispiel: Senden sie den SMS-Befehl FL1,5 an den Notrufsender
FL1=Fallsensor aktiviert die 5 beschreibt die Sensibilität der Auslösung.

Sensibilität 1= sehr empfindlich, 9 sehr unempfindlich. Als Standard ist die Sensibilität 5 voreingestellt.

Bitte beachten sie das nicht immer bei einem Sturz der Fallsensor sicher ausgelöst wird.

Beispiel: Fallsensor



Fallsensor Empfindlichkeit=3

7.0 Telefonnummern für Not-Ruf anlegen

Wird ein Not-Ruf ausgelöst, werden nacheinander drei zuvor festgelegte Rufnummer angewählt. Sollte die erste Nummer besetzt sein wird automatisch die zweite und dann die dritte Telefonnummer angerufen

Befehl: A1,1,1, +49172123123
Bedeutung: A1= Befehl, 1= SMS ja / 0= SMS nein, 1 =Anruf ja 0=Anruf nein, Telefonnummer mit Ländervorwahl, keine Leerzeichen Einfügen

Beispiel: Erste Nummer SMS=Nein, Anruf = Ja



Im Notfall wird die Nummer als erste Nummer angewählt
Nur Anruf, keine SMS

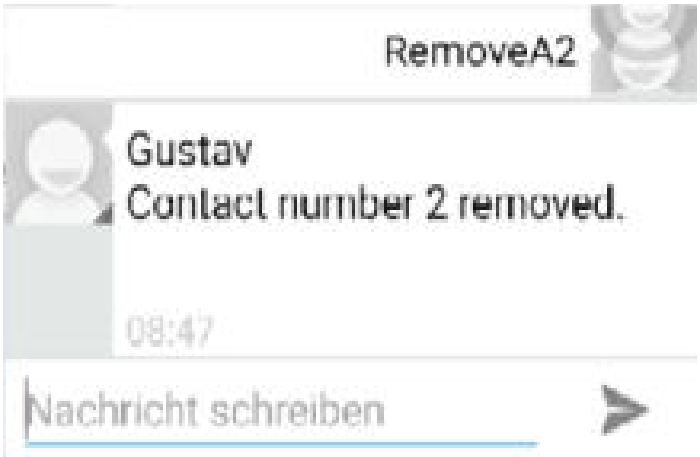
Beispiel: Zweite Nummer SMS=Ja, Anruf = Nein



Im Notfall wird die zweite Nummer angerufen, falls die erste Nummer nicht erreichbar ist

Es können bis zu 5 Telefonnummern angelegt werden, mit dem SMS- Befehl „Remove“ kann eine Telefonnummer gelöscht werden

Beispiel: Mit dem Befehl „Remove2“ wird die zweite Telefonnummer gelöscht



8.0 Das Gerät finden

Befehl: findme

Das Gerät meldet sich akustisch und vibriert, der Befehl kann durch das Drücken eine Taste am Notrufsystem quittiert werden.

9. 0 Das Notufsystem anrufen

Sie können das Notrufsystem anrufen und telefonieren, sollte der Anruf nach dem fünften Freizeichen nicht entgegengenommen werden, wir der Anruf durchgeschaltet im Notfall könne sie versuchen Kontakt mit dem Patienten aufzunehmen oder in den Raum reinhören. Wenn möglich informieren sie die von ihnen zu betreuende Person von dieser Möglichkeit. Auf Anfrage können wir die Funktion deaktivieren.

10.0 Mit dem Notrufsystem telefonieren.

Durch Drücken der seitlichen oberen Taste am Gerät, wird die zuvor unter A2 festgelegt Nummer angerufen. Der Anruf kann durch Betätigen der seitlichen untere Taste beendet werden.



Anrufen

Auflegen

11.0 SOS Not-Ruf Taste

Durch Drücken der SOS Taste wird die erste festgelegte „A1“ Telefonnummer angerufen. Das Betätigen der SOS Taste wir dem Benutzer durch ein Vibrieren und eine Sprachansage mitgeteilt, der Benutzer hat nun 5 Sek. um den Not-Ruf durch nochmaliges Drücken der SOS Taste zu unterbrechen. Sollte die erste Nummer nicht erreichbar sein, wird die zweite und dann die dritte Nummer angerufen.



12.0 Komfort Ladestation (optional)



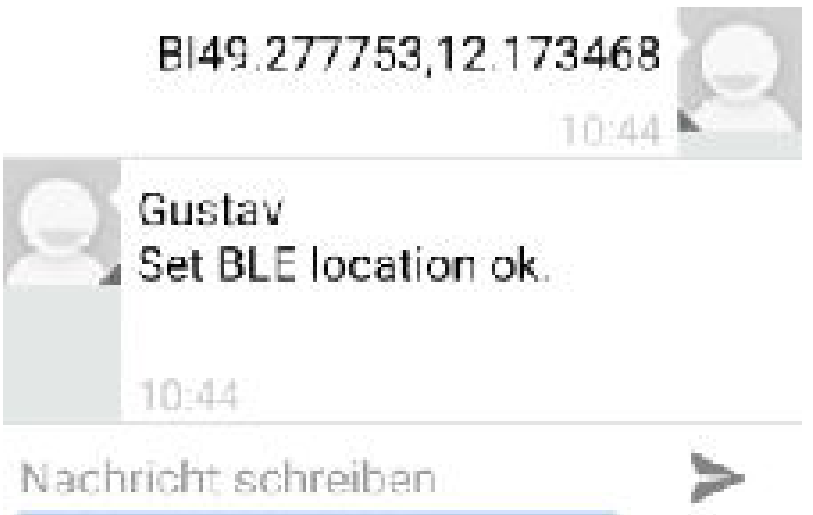
Zu dem Notruf System ist eine Komfort Ladestation erhältlich. Das Ladegerät ist mit 2 Tasten zum Telefonieren und einer Taste zum Not-Ruf ausgelegt.

Das Ladegerät verfügt über einen wiederaufladbaren Akku, somit ist auch bei einem längeren Stromausfall gewährleistet, das mit dem Patienten kommuniziert werden kann.
Per Bluetooth kann das Ladegerät mit dem Not-Ruf System verbunden werden, hierzu muss für ca. 3 Sek. die untere seitlich Taste am Notrufsystem und die Call2 Taste der Ladestation gleichzeitig gedrückt werden.

Da innerhalb von Gebäuden oftmals keine GPS-Ortung möglich ist, kann die Ladestation die Ortung übernehmen, dazu werden die Koordinaten für das Ladegerät festgelegt, verbindet sich nun das Notrufsystem per Bluetooth mit der Ladestation, werden die Koordinaten an das Not-Ruf System übergeben

Befehl: BLLängengrad,Breitengrad

Beispiel: BL49.277753,12.173468



Nachdem sie den Befehl gesendet haben, betätigen sie innerhalb von 3 Minuten die Verbindung durch das Drücken der CALL2 Taste an der Ladestation

Der Aktuelle Längengrad und Breitengrad der Ladestation kann man mit Google MAPS ermitteln.

13.0 GEO Zaun (optional nur mit APP)

Verlässt oder betritt der Patient einen vorher festgelegten Bereich werden sie per SMS informiert.
Mit folgendem Befehl wird der Bereich festgelegt.
Beispiel:
GEO1,1,1,100M,Längengrad,Breitengrad
GEO1 = Erstes Geo Fence, max. können vier Bereiche angelegt werden.

GEO1,1 = GEO Fence Ein
GEO1,0 = GEO Fence Aus

GEO1,1,1 = Alarm beim Betreten des Bereiches
GEO1,1,0 = Alarm beim Verlassen des Bereiches

GEO1,1,0,100M = Kreisdurchmesser ist 100M, der Kreisdurchmesser sollte nicht keiner als 100M sein.



14. 0 Keine Bewegung „Alarm“

Wenn das Notrufsystem für eine bestimmte Zeit keine Bewegung registriert hat, wird eine Meldung per SMS an die Notrufnummer gesendet.

Beispiel:
nmo1,80M,1

Wird 80 min. keine Bewegung registriert, wird eine SMS an die Notrufnummer gesendet.

nmo0 = Alarm aus

1= Anruf bei Alarm
0 = kein Anruf bei Alarm

15.0 Bewegungs „Alarm“

Wenn das Notrufsystem nach einer bestimmten Zeit eine Bewegung registriert hat, wird eine Meldung per SMS an die Notrufnummer gesendet

Beispiel:

mo1,60m,03s,1

Wird nach 60min. eine Bewegung für 3 Sek. registriert, wird ein Alarm ausgelöst.

mo1 = Alarm aktiviert
mo0 = Alarm deaktiviert

16.0 Arbeitsmodus

Das Gerät verfügt über 5 verschieden Arbeit Modi, damit können sie das Gerät auf Ihre Bedürfnisse anpassen,

Änderungen haben einen direkten Einfluss auf den Verbrauch von Datenvolumen und Batterieverfügbarkeit

16.1 Arbeitsmodus 1

SMS Befehl: mode1
Mode1 = Arbeitsmodus 1

Beschreibung:
Das Gerät ist ständig mit dem Server verbunden.
Im Alarmfall werden die Positionsdaten an den Server bzw. an das App gesendet

16.2 Arbeitsmodus 2

SMS Befehl: mode2,03M,01H

Mode2 = Arbeitsmodus 2
03M = 3 Minuten
01H = 1 Stunde

Beschreibung:
Ist der Notfallsender in Bewegung, wird alle 3 Minuten die Position an den Server gesendet. Ist der Notfallsender nicht in

Bewegung wird alle Stunde die Position an den Server gesendet.

16.3 Arbeitsmodus 3

SMS Befehl: mode3,01H

Sekunde= S
Minute = M
Stunde = H

Beschreibung:
Jede Stunde wird die Position an den Server gesendet, der Sender bleibt online

16.4 Arbeitsmodus 4

SMS Befehl: mode4,30M

Beschreibung:
Alle 30 Minuten wird die Position an den Server gesendet, der Sender ist sonst offline.

16.5 Arbeitsmodus 5

SMS Befehl: mode5,10H

Beschreibung:
Der Sender meldet sich alle Stunde am Server, in der Zwischenzeit wird die Verbindung abgebrochen, sie können den Tracker nicht mehr erreichen.

17.0 Kontinuierliche Überwachung nach einem Alarm

SMS Befehl: cl10S,600S

Wertebereich 10-600 Sekunden

Beispiel:
Bei einem Alarm wird alle 10 Sek. die Position gesendet, dies ist für 600 Sek. gültig.

18.0 App und Webportal

Wenn sie möchten, können sie das Notrufsystem sehr komfortabel mit eine APP bedienen. Die APP ist werbefrei und kostet 2,60€ im Monat.

Um das Notrufgerät mit der APP zu verbinden, senden sie folgenden Befehl:

S2 = Internetverbindung = Ein
S0= Internetverbindung = Aus

Sollten sie ihre eigene Sim-Karte benutzen müssen sie noch folgende Befehl an das Gerät senden:

S1,apn

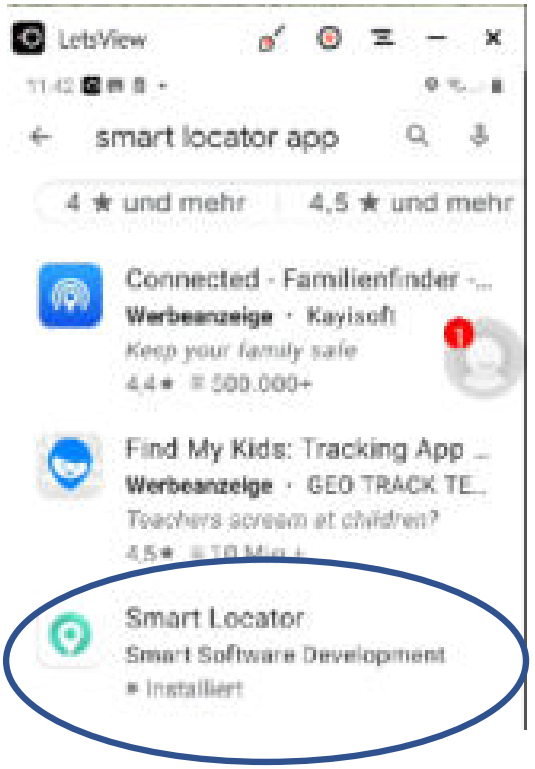
Beispiel: S1,Internet.telekom (für eine Telekom Sim Karte)

Die APN ihrer Sim-Karte erhalten sie von ihrem Sim-Karten Provider.

Wichtig! Deaktivieren sie den Pin Code ihrer Sim Karte

19.0 APP Downloaden

Im Play Store oder Apple Store die “Smart – Locator” APP downloaden und installieren.



Zugang zum Webportal:
https://www.smart-locator.com/login.html

Bitte beachten sie, dass sie für das APP und das Webportal den gleichen Benutzernamen und das gleiche Password verwenden.

Eine vollständige Liste mit SMS-Kommandos finden sie ebenfalls auf unserer Homepage:
https://www.simmotrade.com/gps-notrufsysteme/betriebsanleitung/

Alle Zertifikate finden sie auf unserer Homepage unter:
https://www.simmotrade.com/gps-notrufsysteme/zertifikate/

Unsere Hinweispflicht nach dem Batteriegesetz
Altbatterien gehören nicht in den Hausmüll. Sie können gebrauchte Batterien unentgeltlich an unserem Versandlager zurückgeben. Sie sind als Verbraucher zur Rückgabe von Altbatterien gesetzlich verpflichtet.
Schadstoffhaltige Batterien sind mit einem Zeichen, bestehend aus einer durchgestrichenen Mülltonne und dem chemischen Symbol (Cd, Hg oder Pb) des für die Einstufung als schadstoffhaltig ausschlaggebenden Schwermetalls versehen:



Notizen:

中国认可
国际互认
检测
TESTING
CNAS L10443

UN38.3 检 测 报 告
UN38.3 Test Report

产品名称： Name of Samples:	锂离子电池 Lithium ion Battery
型号： Model:	PJ-653237
申请商名称： Applicant's name:	东莞市德泰能源有限公司 Dongguan Data Power Technology Limited.
测试标准： Test Standard:	ST/SG/AC.10/11/Rev.6/Amend.1/section 38.3

东莞市华检电磁技术有限公司
Dongguan CTL Electromagnetic Technology Co., Ltd.

TEST REPORT
UN38.3, Sixth Edition Amendment 1
Recommendations on transport of dangerous goods, manual of test and criteria, Section 38.3 - Lithium metal and lithium ion Batteries

Report Number :	DGCTL201912030010A
Date of issue :	2019-12-13
Total number of pages :	18 pages
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Reviewed by (name + signature) :	王子豪
Approved by (name + signature) :	彭康东
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申请商 :	东莞市德泰能源有限公司
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Test specification:	
Standard :	ST/SG/AC.10/11/Rev.6/Amend.1/Section 38.3
Test procedure :	Test Report
Non-standard test method :	N/A
Test item description :	Lithium ion Battery
Trade Mark :	-
Model/Type reference :	PJ-653237
Ratings :	3.7Vd.c., 800mAh, 2.96Wh

List of Attachments:

Appendix 1: 3 pages of Photo Documentation

Summary of testing:

Tests performed (name of test and test clause):

Test items	Sample Number
T.1: Altitude simulation / 高度模拟	B1# -B10#
T.2: Thermal test / 温度测试	
T.3: Vibration / 振动	
T.4: Shock / 冲击	
T.5: External short circuit / 外接短路	
T.6: Crush / 挤压 or Impact/撞击	C1# - C10#
T.7 Overcharge / 过充电	B11# - B18#
T.8: Forced discharge / 强制放电	C11# - C30#

The sample's status is good.
样品状况良好。

The conditions of the batteries of samples No. B1# to B5# are at first cycle, in fully charged states.
样品编号B1# - B5#为第一次循环充放电周期完全充电状态的电池。

The conditions of the batteries of samples No. B6# - B10# are after 25 cycles ending in fully charged states.
样品编号B6# - B10#为二十五次循环充放电周期后完全充电状态的电池。

The conditions of the cells of samples No. C1# to C5# are at first cycle at 50% of the design rated capacity.
样品编号C1# - C5#为第一次循环充放电周期充电至标称容量的50%状态的电芯。

The conditions of the cells of samples No. C6# to C10# are after 25 cycles at 50% of the design rated capacity.
样品编号C6# to C10#为二十五次循环放电周期充电至标称容量的50%状态的电芯。

The conditions of the batteries of samples No. B11# - B14# are at first cycle, in fully charged states.
样品编号B11# - B14#为第一次循环充放电周期后完全充电状态的电池。

The conditions of the batteries of samples No. B15# - B18# are after 25 cycles ending in fully charged states.
样品编号B15# - B18#为二十五次循环充放电周期后完全充电状态的电池。

The conditions of the cells of samples No. C11# to C20# are at first cycle, in fully discharged states.
样品编号C11# - C20#为第一次循环充放电周期完全放电状态的电芯。

The conditions of the cells of samples No. C21# to C30# are after 25 cycles ending in fully discharged states.
样品编号C21# to C30#为二十五次循环充放电周期后完全放电状态的电芯。

The Lithium ion Battery submitted by manufacturer are single cell batteries. According to the standard, a single cell Battery is considered a "cell" and shall be tested according to the testing requirements for "cell".
制造商提供的锂离子电池为单电芯电池，根据标准规定，单电芯电池要作为电芯来评估，按照电芯的测试

要求进行测试。

Test Procedure:

1.Each battery type is subjected to tests T.1 to T.8. Tests T.1 to T.5 are conducted in sequence on the same battery. Tests 6 and 8 are conducted using not otherwise tested batteries. Test T.7 may be conducted using undamaged batteries previously used in Tests T.1 to T.5 for purposes of testing on cycled batteries.
每一种类型的电池均应进行T.1至T.8项试验。电池必须按顺序在相同的一组电池上进行试验T.1至T.5。试验T.6和T.8应使用未另外试验过的电池。试验T.7可以使用先前在试验T.1至T.5中使用过的未损坏电池进行，以便测 试进行在循环过的电池上。
2.In order to quantify the mass loss, the following procedure is provided:
Mass loss(%)=$(M_1-M_2)/M_1\times100$
为了量化质量损失，可用以下公式计算：质量损失(%)=$(M_1-M_2)/M_1\times100$

Where M_1 is the mass before the test and M_2 is the mass after the test. When mass loss does not exceed the values in Table below, it is considered as "no mass loss".
式中：M_1是试验前的质量，M_2是试验后的质量。如果质量损失不超过下表所列的数值，应视为“无质量损失”。

Mass M of cell or battery 电芯或电池的质量	Mass loss limit 质量损失限值
M＜1g	0.5%
1g≤M≤75g	0.2%
M＞75g	0.1%

3. In test T.1 to T.4, batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test battery after testing is not less than 90% of its voltage immediately prior to this procedure.
在测试T.1至T.4中，电池须满足无渗漏、无泄气、无解体、无破裂和无起火，并且每个试验电池在试验后的开路电压不小于其在进行这一试验前电压的90%。

Possible test case verdicts:
测试判定
- test case does not apply to the test object ..... : N/A
判定不适用于测试对象
- test object does meet the requirement ..... : P (Pass)
测试符合规定
- test object does not meet the requirement ..... : F (Fail)
测试不符合规定

Testing..... :

Date of receipt of test item ..... : 2019-11-29

Date (s) of performance of tests ..... : 2019-11-29 to 2019-12-13

General remarks:

The test results presented in this report relate only to the object tested.

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"(See Enclosure #)" refers to additional information appended to the report.

"(See appended table)" refers to a table appended to the report.

Throughout this report a point is used as the decimal separator.

General product information:

The batteries, model no. PJ-653237, are Lithium ion Battery and used in port-able applications, consist of single Lithium ion Cell, model no. PJ-653237
Additionally, details information of the cell and battery, as following:

Product name	Lithium ion Cell	Lithium ion Battery
Type/model	PJ-653237	PJ-653237
Nominal voltage	3.7V	3.7V
Rated capacity	800mAh	800mAh
Recommended charging voltage	4.2V	4.2V
Maximum charging current	800mA	800mA
Maximum discharging current	800mA	800mA
Discharge cut-off voltage	2.75V	2.75V
Dimensions	Max: 35.5mm X 31.5mm X 6.5mm	Max:37.5mm X 31.5mm X 6.5mm
Weight	Approx. 13.8g	Approx.14.5g
Appearance of Samples	Silvery and Pouch	Silvery and Pouch

The final evaluation of the battery must be conducted in the end product for which the battery will be used.

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
38.3.4.1	**Test T.1: Altitude simulation/高度模拟**		**P**
	Test cells and batteries shall be stored at a pressure of 11.6 kPa or less for at least six hours at ambient temperature (20±5°C)/将电芯和电池在温度为20±5°C、大气压力不大于11.6kpa的环境中贮存不少于6个小时。		P
	Cells and batteries meet this requirement if there is no mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states. /电芯和电池符合要求：无质量损失、无漏液、无冒烟、无分解、无破裂以及无着火现象；电芯或电池测试后的开路电压不低于测试前开路电压的90%。此项关于电压方面的要求不适用于完全放电后的电芯和电池。	No leakage, no venting, no disassembly, no rupture and no fire. / 无漏液、无冒烟、无分解、无破裂以及无着火现象。 The data see table 1. / 测试数据见表1。	P
38.3.4.2	**Test T.2: Thermal test/温度试验**		**P**
	Test cells and batteries are to be stored for at least six hours at a test temperature equal to 72±2°C, followed by storage for at least six hours at a test temperature equal to - 40±2°C. The maximum time interval between test temperature extremes is 30 minutes. This procedure is to be repeated 10 times, after which all test cells and batteries are to be stored for 24 hours at ambient temperature (20 ±5°C). /首先将样品放在72±2°C的环境中放置至少6个小时，然后放在- 40±2°C的环境中放置至少6个小时。温度转换的最大间隔时间为30分钟。如此循环10次，最后将样品放在20±5°C的环境中静置24小时。		P
	For large cells and batteries the duration of exposure to the test temperature extremes should be at least 12 hours. /对于大电芯，在高温和低温中放置的时间最少12个小时。		N/A
	Cells and batteries meet this requirement if there is no mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states. /电芯和电池符合要求：无质量损失、无漏液、无冒烟、无分解、无破裂以及无着火现象；电芯或电池测试后的开路电压不低于测试前开路电压的90%。此项关于电压方面的要求不适用于完全放电后的电芯和电池。	No leakage, no venting, no disassembly, no rupture and no fire. / 无漏液、无冒烟、无分解、无破裂以及无着火现象。 The data see table 1. / 测试数据见表1。	P
38.3.4.3	**Test T.3: Vibration/振动**		**P**

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
	Cells and batteries are firmly secured to the platform of the vibration machine without distorting the cells in such a manner as to faithfully transmit the vibration. The vibration shall be a sinusoidal waveform with a logarithmic sweep between 7 Hz and 200 Hz and back to 7 Hz traversed in 15 minutes. This cycle shall be repeated 12 times for a total of 3 hours for each of three mutually perpendicular mounting positions of the cell. One of the directions of vibration must be perpendicular to the terminal face. /样品必须牢固地安装在振动台台面上。振动以正弦波形式，以7Hz增加至200Hz，然后减少回到7Hz为一个循环，一个循环持续15分钟。对样品从三个互相垂直的方向上循环12次，共3个小时。其中一个振动方向必须是垂直样品的极性平面。		P
	The logarithmic frequency sweep shall differ for cells and batteries with a gross mass of not more than 12 kg (cells and small batteries), and for batteries with a gross mass of more than 12 kg (large batteries). /对于质量不大于12kg的样品(电芯和小电池)和质量超过12kg的电池(大电池)，对数扫频不同。		P
	For cells and small batteries: from 7 Hz a peak acceleration of 1 gn is maintained until 18 Hz is reached. The amplitude is then maintained at 0.8 mm (1.6 mm total excursion) and the frequency increased until a peak acceleration of 8 gn occurs (approximately 50 Hz). A peak acceleration of 8 gn is then maintained until the frequency is increased to 200 Hz. /对于电芯和小电池，对数扫频为：从7Hz开始保持1gn的最大加速度直到频率为18Hz，然后将振幅保持在0.8mm (总偏移1.6mm) 并增加频率直到最大加速度达到8gn (频率约为50Hz)，将最大加速度保持在8gn直到频率增加到200Hz。		P
	For large batteries: from 7 Hz to a peak acceleration of 1 gn is maintained until 18 Hz is reached. The amplitude is then maintained at 0.8 mm (1.6 mm total excursion) and the frequency increased until a peak acceleration of 2 gn occurs (approximately 25 Hz). A peak acceleration of 2 gn is then maintained until the frequency is increased to 200 Hz. /对于大电池，对数扫频为：从7Hz开始保持1gn的最大加速度直到频率为18Hz，然后将振幅保持在0.8mm (总偏移1.6mm) 并增加频率直到最大加速度达到2gn (频率约为25Hz)，将最大加速度保持在2gn直到频率增加到200Hz。		N/A

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
	Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire during the test and after the test and if the open circuit voltage of each test cell or battery directly after testing in its third perpendicular mounting position is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states./电芯和电池符合要求：无漏液、无冒烟、无分解、无破裂以及无着火现象；电芯或电池测试后的开路电压不低于测试前开路电压的90%。此项关于电压方面的要求不适用于完全放电后的电芯和电池。	No leakage, no venting, no disassembly, no rupture and no fire. / 无漏液、无冒烟、无分解、无破裂以及无着火现象。 The data see table 1. / 测试数据见表1。	P
38.3.4.4	**Test T.4: Shock/冲击**		**P**
	Test cells shall be secured to the testing machine by means of a rigid mount which will support all mounting surfaces of each test cell. Each cell or battery shall be subjected to a half-sine shock of peak acceleration of 150 gn and pulse duration of 6 milliseconds. Alternatively, large cells may be subjected to a half-sine shock of peak acceleration of 50 gn and pulse duration of 11 milliseconds. Each cell shall be subjected to three shocks in the positive direction followed by three shocks in the negative direction of three mutually perpendicular mounting positions of the cell or battery for a total of 18 shocks. /以稳固的托架固定住每个样品。对每 个电芯样品以峰值为150gn的半正弦的加速度撞击，脉冲持续6ms，另外，大电芯须经受最大加速度50gn和脉冲持续时间11ms的半正弦波冲击，每个样品必须在三个互相垂直的电池安装方位的正方向经受三次冲击，接着在反方向经受三次冲击，总共经受18次冲击。		N/A
	Each battery shall be subjected to a half-sine shock of peak acceleration depending on the mass of the battery. The pulse duration shall be 6 milliseconds for small batteries and 11 milliseconds for large batteries. .Each cell or battery is subjected to three shocks in the positive direction followed by three shocks in the negative direction of each of three mutually perpendicular mounting positions of the cell for a total of 18 shocks. The formulas below are provided to calculate the appropriate minimum peak accelerations /每个电池经受冲击峰值加速度取决于电池的质量，小电池的脉冲持续时间为6ms，大电池的脉冲持续时间为11ms，每个样品必须在三个互相垂直的电池安装方位的正方向经受三次冲击，接着在反方向经受三次冲击，总共经受18次冲击,提供下面的公式来计算合适的最小峰值加速度。		P

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
	<table><tr><th>Battery</th><th>Minimum peak acceleration</th><th>Pulse duration</th></tr><tr><td>Small batteries</td><td>150 g_n or result of formula $Acceleration(g_n) = \sqrt{\left(\frac{100850}{mass^*}\right)}$ whichever is smaller</td><td>6 ms</td></tr><tr><td>Large batteries</td><td>50 g_n or result of formula $Acceleration(g_n) = \sqrt{\left(\frac{30000}{mass^*}\right)}$ whichever is smaller</td><td>11 ms</td></tr></table> * Mass is expressed in kilograms.		P
	Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states. / 电芯和电池符合要求：无漏液、无冒烟、无分解、无破裂以及无着火现象；电芯或电池测试后的开路电压不低于测试前开路电压的90%。 此项关于电压方面的要求不适用于完全放电后的电芯和电池。	No leakage, no venting, no disassembly, no rupture and no fire. / 无漏液、无冒烟、无分解、无破裂以及无着火现象。 The data see table 1. / 测试数据见表1。	P
38.3.4.5	**Test T.5: External short circuit/外部短路**		**P**
	The cell or battery to be tested shall be temperature stabilized so that its external case temperature reaches 57±4°C and then the cell or battery shall be subjected to a short circuit condition with a total external resistance of less than 0.1 ohm at 57±4°C. This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to 57±4°C. /保持测试环境温度稳定在57 ±4°C，以便 样品外表温度达到57±4°C，然后将样品正负极用小于0.1欧姆的总电阻回路进行短路，样品的外表温度恢复到57±4°C之后保持短路状态1小时以上。		P
	Cells and batteries meet this requirement if their external temperature does not exceed 170 °C and there is no disassembly, no rupture and no fire during the test and within six hours after the test./电芯和电池符合要求：在测试过程中以及之后6个小时内，外表温度不超过170°C，并且无分解、无破裂和无着火现象发生。	No disassembly, no rupture and no fire during the test and within six hours after the test./ 在测试过程中以及之后6个小时内，外表温度不超过170° C，并且无分解、无破裂和无着火现象发生。 The data see table 1. / 测试数据见表1。	P
38.3.4.6	**Test T.6: Impact / Crush/撞击/挤压**		**P**

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
	Test procedure – Impact (applicable to cylindrical cells greater than or equal to 18 mm in diameter) /撞击(适合于直径大于或等于18mm的圆柱形电芯)	pouch cell/袋状电芯	N/A
	The sample cell or component cell is to be placed on a flat smooth surface. A 15.8 mm±0.1mm diameter, at least 6 cm long, or the longest dimension of the cell, whichever is greater, Type 316 stainless steel bar is to be placed across the centre of the sample. A 9.1 kg±0.1 kg mass is to be dropped from a height of 61±2.5 cm at the intersection of the bar and sample in a controlled manner using a near frictionless, vertical sliding track or channel with minimal drag on the falling mass. The vertical track or channel used to guide the falling mass shall be oriented 90 degrees from the horizontal supporting surface. /将样品放在一个平坦的光滑平面上。将一直径为15.8 mm± 0.1mm，长度不小于6cm的316不锈钢棒横过样品中部放置后，将一质量为9.1 kg±0.1 kg的重物从61±2.5 cm的高度落向样品		N/A
	The test sample is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8 mm±0.1mm diameter curved surface lying across the centre of the test sample. Each sample is to be subjected to only a single impact. /接受撞击的样品，纵轴应与平坦的表面平行并与横放在样品中心的直径15.8 mm±0.1mm弯曲表面的纵轴垂直。每一个样品只接受一次撞击。		N/A
	Test Procedure – Crush (applicable to prismatic, pouch, coin/button cells and cylindrical cells not more than 18 mm in diameter). /挤压 (适用于棱柱形、袋状、硬币/纽扣电芯和直径不超过18mm的圆柱形电芯)	pouch cell/袋状电芯	P
	A cell or component cell is to be crushed between two flat surfaces. The crushing is to be gradual with a speed of approximately 1.5 cm/s at the first point of contact. The crushing is to be continued until the first of the three options below is reached. /将样品放在两个平面之间挤压，挤压力度逐渐加大，在第一个接触点上的速度大约为1.5cm/s。挤压持续进行，直到出现以下三种情况之一		P
	(a) The applied force reaches 13 kN±0.78 kN; /施加力达到13 kN±0.78 kN		P
	(b) The voltage of the cell drops by at least 100 mV; /样品的电压下降至少100mV		N/A
	(c) The cell is deformed by 50% or more of its original thickness. /电池变形达原始厚度的50%以上。		N/A

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
	A prismatic or pouch cell shall be crushed by applying the force to the widest side. A button/coin cell shall be crushed by applying the force on its flat surfaces. For cylindrical cells, the crush force shall be applied perpendicular to the longitudinal axis. /棱柱形或袋状电芯应从最宽的一面施压。纽扣/硬币形电芯应从其平坦表面施压。圆柱形应从与纵轴垂直的方向施压。		P
	Each test cell or component cell is to be subjected to one crush only. The test sample shall be observed for a further 6 h. The test shall be conducted using test cells or component cells that have not previously been subjected to other tests./每个样品都是全新样品，并且只经受一次施压。施压结束后样品应静置观察6小时。		P
	Cells and component cells meet this requirement if their external temperature does not exceed 170°C and there is no disassembly and no fire during the test and within six hours after this test. /电芯满足要求：在测试过程中以及之后6个小时内，外表温度不超过170°C，并且无分解和无着火现象发生。	No disassembly and no fire. /无分解，无着火现象发生。 The data see table 2. / 测试数据见表2。	P
38.3.4.7	**Test T.7: Overcharge/过充电**		**P**
	The charge current shall be twice the manufacturer's recommended maximum continuous charge current. Tests are to be conducted at ambient temperature. The duration of the test shall be 24 hours. The minimum voltage of the test shall be as follows: /在室温下，以2倍的制造商宣称的最大持续充电电流对样品充电，测试时间为24小时。测试的最小电压如下：		P
	(a) When the manufacturer's recommended charge voltage is not more than 18V, the minimum voltage of the test shall be the lesser of two times the maximum charge voltage of the battery or 22V. /如果制造商宣称的充电电压不超过18V，本测试的最小充电电压应是制造商宣称的最大充电电压的两倍或者是22V之中的较小者。	The voltage of the test is 8.4V, and the current is 1.6A / 测试电压为8.4V, 电流为1.6A.	P
	(b) When the manufacturer's recommended charge voltage is more than 18V, the minimum voltage of the test shall be 1.2 times the maximum charge voltage. /如果制造商宣称的充电电压超过18V，本测试的最小充电电压应该是制造商宣称的最大充电电压的1.2倍。		N/A
	There is no disassembly and no fire during the test and within seven days after the test. /在测试中和测试完成后7天内，样品无分解和无着火现象。	No disassembly and no fire. /无分解，无着火现象发生。 The data see table 3. /测试数据见表3。	P
38.3.4.8	**Test T.8: Forced discharge/强制放电**		**P**

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
	Each cell shall be forced discharged at ambient temperature by connecting it in series with a 12V D.C. power supply at an initial current equal to the maximum discharge current specified by the manufacturer. /在室温下，将单个电芯连接在12V的直流电源上进行强制放电，此直流电源供给每个电芯初始电流为制造商宣称的最大放电电流。 The specified discharge current is to be obtained by connecting a resistive load of the appropriate size and rating in series with the test cell. Each cell shall be forced discharged for a time interval (in hours) equal to its rated capacity divided by the initial test current (in ampere). /指定的放电电流通过串联在测试电芯上的合适大小和功率的负载来获得，每个电芯的强制放电时间(小时)为额定容量除以初始电流(安培)。		P
	There is no disassembly and no fire during the test and within seven days after the test./在测试中和测试完成后7天内，样品无分解和无着火现象发生	No disassembly and no fire. /无分解和无着火现象发生。 The data see table 4. / 测试数据见表4	P

Tables

Table 1: T.1~T.5 / 表1. 测试T.1~测试T.5											
Sample No. 样品编号	Mass prior to Test/试验前质量(g)	OCV prior to test/ 试验前电压(V)	Test 1: Altitude Simulation/ 试验1：高度模拟		Test 2: Thermal test/ 试验 2：温度试验		Test 3: Vibration/ 试验3：振动		Test 4 : Shock/ 试验 4：冲击		Test 5 :External Short Circuit/试验5：外部短路
			Mass loss 质量损失(%)	Voltage after test/ voltage pre-test 试验后电压/试验前电压(%)	Mass loss 质量损失(%)	Voltage after test/ voltage pre-test 试验后电压/试验前电压(%)	Mass loss 质量损失(%)	Voltage after test/ voltage pre-test 试验后电压/试验前电压(%)	Mass loss 质量损失(%)	Voltage after test/ voltage pre-test 试验后电压/试验前电压(%)	Temp. (温度(°C)
B1#	14.497	4.18	0.00	100.0	0.069	99.04	0.00	100.0	0.012	100.0	58.4
B2#	14.737	4.18	0.00	100.0	0.061	99.04	0.00	100.0	0.00	100.0	57.1
B3#	14.401	4.19	0.00	99.76	0.069	99.04	0.007	100.0	0.00	99.76	56.8
B4#	14.447	4.18	0.014	100.0	0.076	99.04	0.00	100.0	0.007	100.0	58.7
B5#	14.625	4.19	0.00	100.0	0.068	99.05	0.00	100.0	0.00	100.0	58.1
B6#	14.604	4.19	0.00	100.0	0.062	99.28	0.00	99.81	0.00	99.76	59.3
B7#	14.425	4.18	0.00	100.0	0.069	99.04	0.007	100.0	0.00	100.0	58.6
B8#	14.354	4.19	0.00	99.76	0.070	99.04	0.00	100.0	0.00	100.0	57.4
B9#	14.482	4.19	0.00	100.0	0.069	99.05	0.00	99.80	0.00	100.0	57.8
B10#	14.523	4.19	0.00	100.0	0.062	99.05	0.00	100.0	0.00	100.0	58.3

Table 2: Crush or impact/ 表2：挤压或撞击						
Test 6: Crush/测试T.6:挤压	Sample No./样品编号	C1#	C2#	C3#	C4#	C5#
	OCV prior to test /实验前开路电压(V)	3.71	3.71	3.71	3.72	3.71
	Temp./温度 (°C)	24.1	24.3	23.6	24.6	24.7
	Sample No./样品编号	C6#	C7#	C8#	C9#	C10#
	OCV prior to test /实验前开路电压(V)	3.71	3.72	3.71	3.71	3.71
	Temp./温度 (°C)	24.1	24.0	24.3	23.8	24.7

Table 3：Overcharge / 表3：过充电									
Test 7: Overcharge /测试T.7：过充电	Sample No./样品编号	B11#	B12#	B13#	B14#	B15#	B16#	B17#	B18#
	OCV prior to test/实验前开路电压 (V)	4.18	4.18	4.18	4.19	4.18	4.18	4.19	4.18

Table 4：Forced discharge / 表4：强制放电											
Test 8: Forced discharge/测试T.8强制放电	Sample No./样品编号	C11#	C12#	C13#	C14#	C15#	C16#	C17#	C18#	C19#	C20#
	OCV prior to test/实验前开路电压 (V)	3.19	3.21	3.22	3.21	3.21	3.22	3.21	3.21	3.24	3.21
	Sample No./样品编号	C21#	C22#	C23#	C24#	C25#	C26#	C27#	C28#	C29#	C30#
	OCV prior to test/实验前开路电压 (V)	3.21	3.20	3.21	3.20	3.21	3.21	3.20	3.21	3.21	3.20

Appendix 1

Photo Documentation

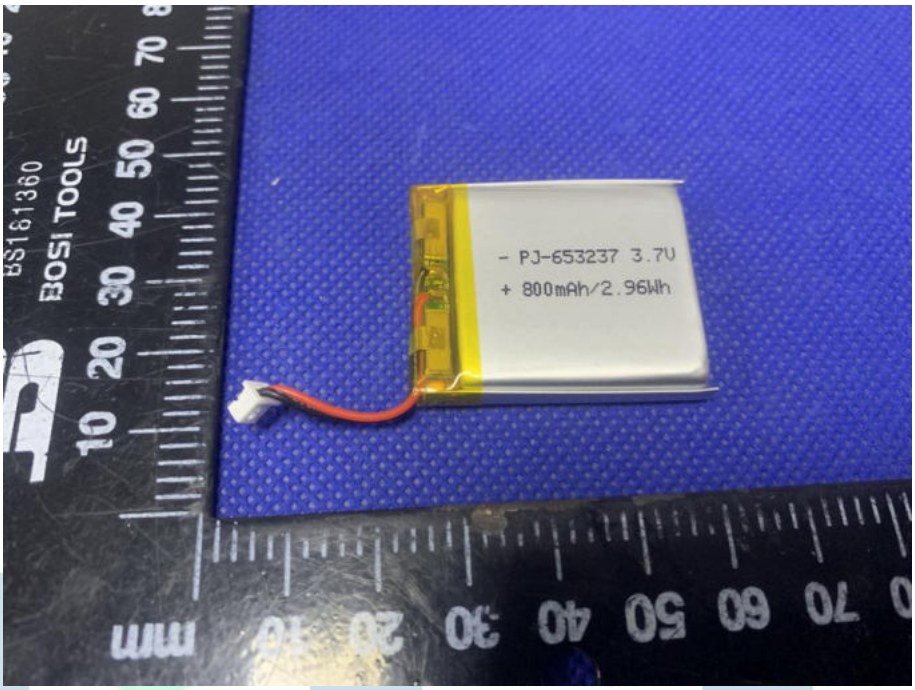


Fig.1-Front view of battery

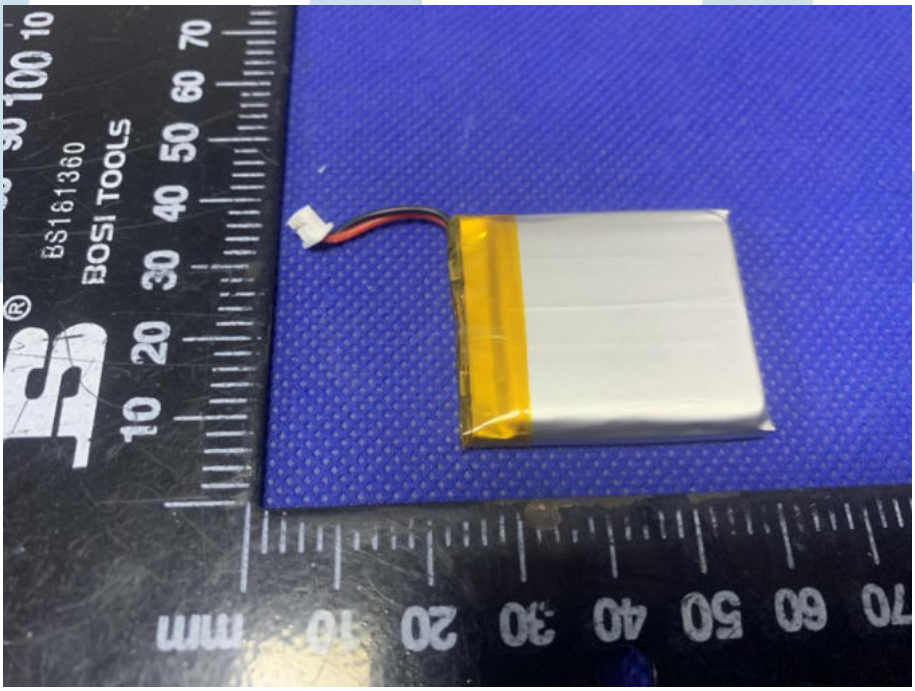


Fig.2-Back view of battery

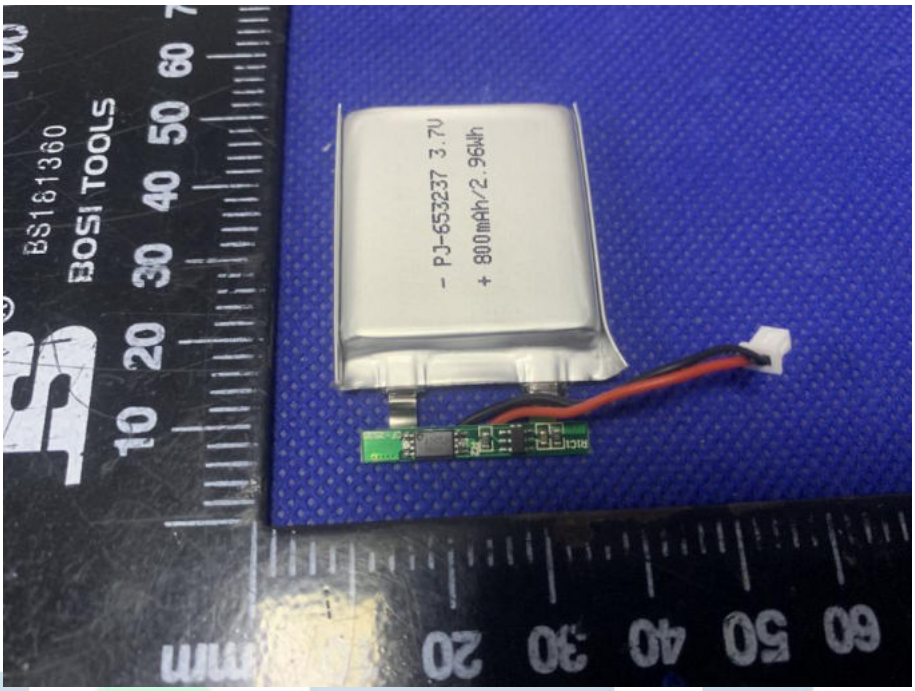


Fig.3- Battery disassembled

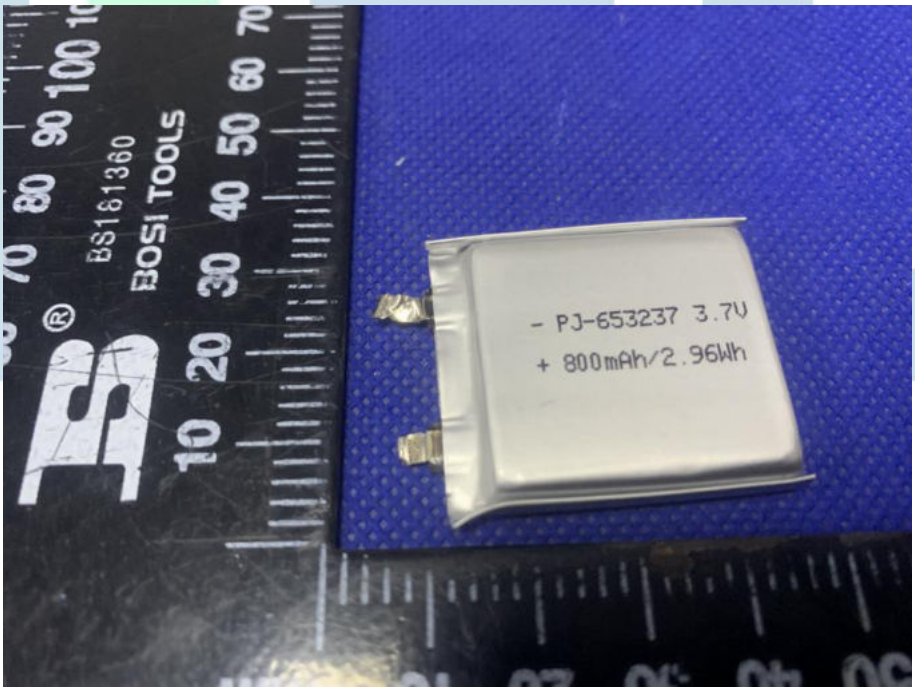


Fig.4- Front view of cell

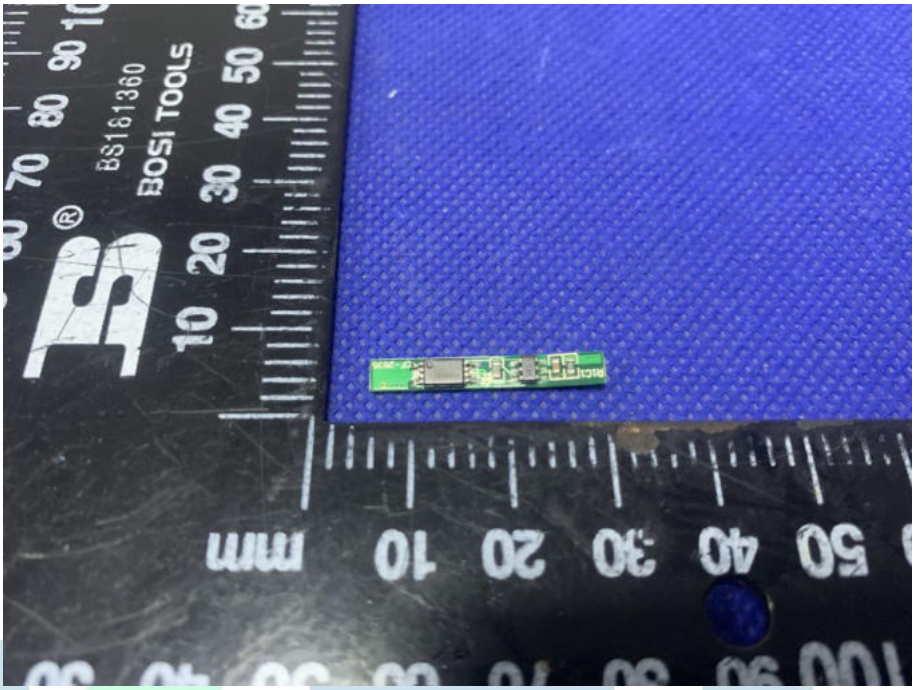


Fig.5- Front view of PCM

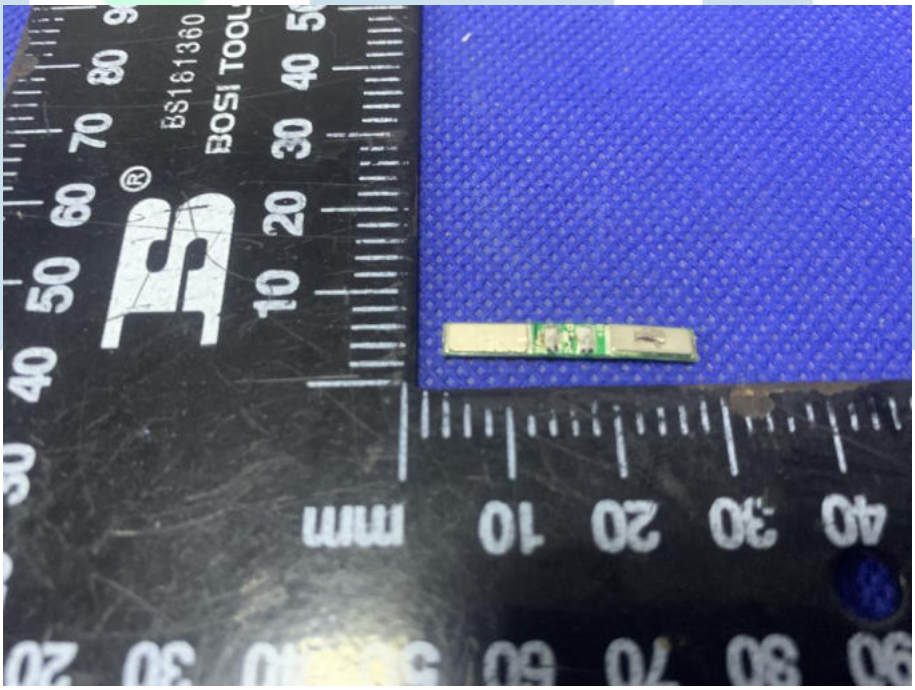


Fig.6- Back view of PCM

---End of Test Report---

Important
注意事项

1. The test report is invalid without the test stamp of DGCTL.
   本报告书无本公司测试章无效.
2. Nobody is allowed to photocopy or partly photocopy this test report without written permission of DGCTL.
   未经本公司书面同意，不得部分地复制本报告书。
3. The test report is invalid without the signatures of Approver, Reviewer and Testing engineer.
   本报告书无批准人、审核人、及主检人签名无效。
4. The report is invalid when anything of following happens – illegal transfer, reproduce, embezzlement, imposture, modification or tampering in any media form.
   私自转让、复制、盗用、冒用、涂改、或以任何媒体形式篡改的报告书无效。
5. Objections to the test report must be submitted to DGCTL within 15 days.
   对报告书若有异议，应于收到报告之日起15天内向本公司提出。
6. The test report is valid for the tested samples only.
   本报告仅对测试样品有效。

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Simmotrade
GPS Not-Ruf- System SMT_EV07



Beispiel mit Komfort Ladeschale

Bitte lesen Sie ich die Anleitung genau durch bevor sie den Tracker in Betrieb nehmen.
Sollten sie Fragen haben oder Hilfe benötigen, können sie uns gerne kontaktieren. Die Kontaktdaten finden sie auf Ihrer Rechnung.

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1.0 Produktübersicht: Notrufsystem



Spezifikation

Netz:	SMT - 07B2G	2G
	SMT - 07B4G	4G
Batterie:	850mAh Lion- Akku	
Wasserdicht:	IPX7	
Positionierung:	BLE, GPS, Wifi, LBS	
Zertifikate:	CE, ROHS, UN38.3	
WiFi:	802.11 2.4G	
Größe:	61mm X 44mm X 16mm	

Zubehör: Deutsche Beschreibung, Ladekabel, Ladeschale, Netzteil, Halsband

2.0 Inbetriebnahme

Bevor sie mit der Inbetriebnahme starten können, muss die Sim-Karte von uns frei geschaltet und registriert werden, nach der Freischaltung werden sie von uns informiert.
Bitte füllen sie zuvor das Formular auf unserer Webseite aus.
Das Formular finden sie unter:
https://www.simmosim.com/formular/

Bitte laden sie das Gerät vor dem ersten Gebrauch 2-3 Stunden auf.
Zum Einschalten des Gerätes drücken sie mit dem Fingernagel kurz auf die seitliche Anruf-Taste. Zum Ausschalten drücken sie die Anruf-Taste und SOS-Taste gemeinsam.

Wir haben das Gerät für sie bereits eingerichtet, die gelbe und blaue LED blinken nach dem Einschalten, sollte dies nicht der Fall sein, dann bringen sie ihren Tracker ins Freie.

Zur Anzeige des aktuellen Status befinden sich an der Seite 3 LED, sollte keine der LED leuchten, ist der Tracker ausgeschaltet oder im Schlafmodus.
Möchte sie ihre eigene Sim-Karte verwende, dann informieren sie sich bitte unter 19.0 APP und Web Portal

Grüne LED

LED	Grün blinkt kurz alle 3 Sekunden	Grün blinkt zweimal alle 3 Sekunden	Grün blinkt eine Sek. an, drei Sek aus.	Grün leuchtet konstant
Bedeutung	Gerät ist mit dem GSM Netz verbunden	Gerät ist mit dem Internet verbunden	Die Verbindung zum GSM Netz wir aufgebaut	Sim–Karte nicht erkannt

Blaue LED

LED	Blau blinkt kurz alle 3 sek.	Blau blinkt eine Sek. an, drei Sek. aus	Blau ist aus
Bedeutung	GPS-Position ermittelt	Noch keine GPS-Position	Das GPS Modul ist im Schlafmodus

Rote LED

LED	Rot leuchtet kontant	Rot blinkt schnell	Rot ist aus oder blinkt langsam
Bedeutung	Der Akku wird geladen	Akku Kapazität < 20%	Der Akku ist geladen

3.0 Kommunizieren mit dem Notrufsystem

Es gibt zwei Wege mit dem Notrufsystem zu kommunizieren

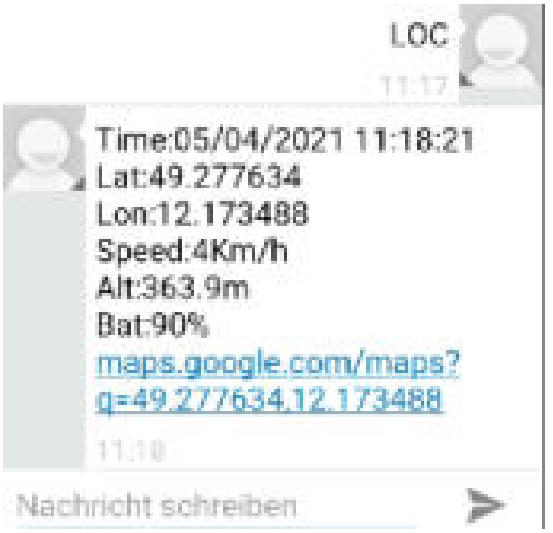
1. Per SMS
2. Über Internet

In dieser Beschreibung wird die SMS-Kommunikation beschrieben. Mittels sehr einfacher Kommandos, die sie per SMS an die Sim-Karten Telefonnummer ihres Notrufsystems senden, können nahezu alle Funktionen ausgeführt werden. Im Notfall werden sie vom Notrufsystem per Anruf oder SMS informiert.

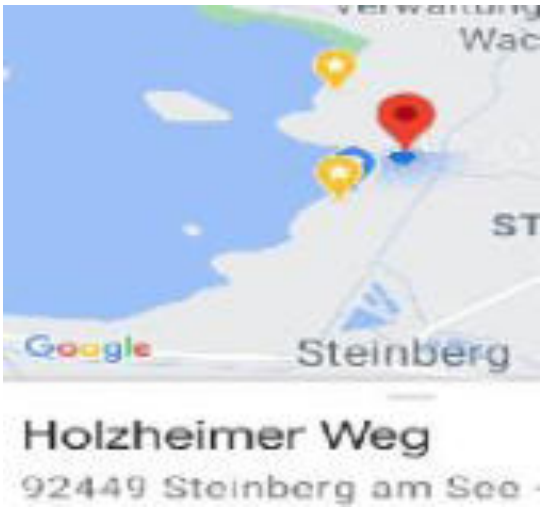
4.0 Positionsabfrage

Befehl: LOC
Bedeutung: Senden sie LOC per SMS an den GPS-Notrufsender. Mit diesem Befehl wird ihnen die aktuelle Position per SMS als Link auf ihr Smartphone gesendet.

Beispiel:



Nach anklicken des Links öffnet sich Google MAPS mit der aktuellen Position und Adresse



5.0 Die SMS-Bezeichnung des Notrufsenders festlegen

Befehl: prefix1,Gustav

Bedeutung: Sie können einen Namen für den Notrufsender festlegen, der am Anfang jeder Antwort SMS mitgesendet wird. Dies hilft bei der Identifikation, wenn sie mehrere Geräte benutzen.

Beispiel:



6.0 Fallsensor

Befehl: FL1-9
Bedeutung: Stürzt eine Person wird der Fallsensor ausgelöst und eine SMS an alle Notrufnummern gesendet.
Beispiel: Senden sie den SMS-Befehl FL1,5 an den Notrufsender
FL1=Fallsensor aktiviert die 5 beschreibt die Sensibilität der Auslösung.

Sensibilität 1= sehr empfindlich, 9 sehr unempfindlich. Als Standard ist die Sensibilität 5 voreingestellt.

Bitte beachten sie das nicht immer bei einem Sturz der Fallsensor sicher ausgelöst wird.

Beispiel: Fallsensor



Fallsensor Empfindlichkeit=3

7.0 Telefonnummern für Not-Ruf anlegen

Wird ein Not-Ruf ausgelöst, werden nacheinander drei zuvor festgelegte Rufnummer angewählt. Sollte die erste Nummer besetzt sein wird automatisch die zweite und dann die dritte Telefonnummer angerufen

Befehl: A1,1,1, +49172123123
Bedeutung: A1= Befehl, 1= SMS ja / 0= SMS nein, 1 =Anruf ja 0=Anruf nein, Telefonnummer mit Ländervorwahl, keine Leerzeichen Einfügen

Beispiel: Erste Nummer SMS=Nein, Anruf = Ja



Im Notfall wird die Nummer als erste Nummer angewählt
Nur Anruf, keine SMS

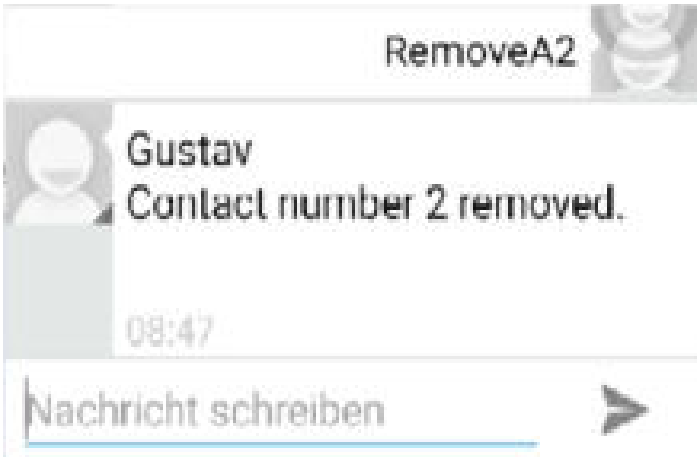
Beispiel: Zweite Nummer SMS=Ja, Anruf = Nein



Im Notfall wird die zweite Nummer angerufen, falls die erste Nummer nicht erreichbar ist

Es können bis zu 5 Telefonnummern angelegt werden, mit dem SMS- Befehl „Remove“ kann eine Telefonnummer gelöscht werden

Beispiel: Mit dem Befehl „Remove2“ wird die zweite Telefonnummer gelöscht



8.0 Das Gerät finden

Befehl: findme

Das Gerät meldet sich akustisch und vibriert, der Befehl kann durch das Drücken eine Taste am Notrufsystem quittiert werden.

9. 0 Das Notufsystem anrufen

Sie können das Notrufsystem anrufen und telefonieren, sollte der Anruf nach dem fünften Freizeichen nicht entgegengenommen werden, wir der Anruf durchgeschaltet im Notfall könne sie versuchen Kontakt mit dem Patienten aufzunehmen oder in den Raum reinhören. Wenn möglich informieren sie die von ihnen zu betreuende Person von dieser Möglichkeit. Auf Anfrage können wir die Funktion deaktivieren.

10.0 Mit dem Notrufsystem telefonieren.

Durch Drücken der seitlichen oberen Taste am Gerät, wird die zuvor unter A2 festgelegt Nummer angerufen. Der Anruf kann durch Betätigen der seitlichen untere Taste beendet werden.



Anrufen

Auflegen

11.0 SOS Not-Ruf Taste

Durch Drücken der SOS Taste wird die erste festgelegte „A1“ Telefonnummer angerufen. Das Betätigen der SOS Taste wir dem Benutzer durch ein Vibrieren und eine Sprachansage mitgeteilt, der Benutzer hat nun 5 Sek. um den Not-Ruf durch nochmaliges Drücken der SOS Taste zu unterbrechen. Sollte die erste Nummer nicht erreichbar sein, wird die zweite und dann die dritte Nummer angerufen.



12.0 Komfort Ladestation (optional)



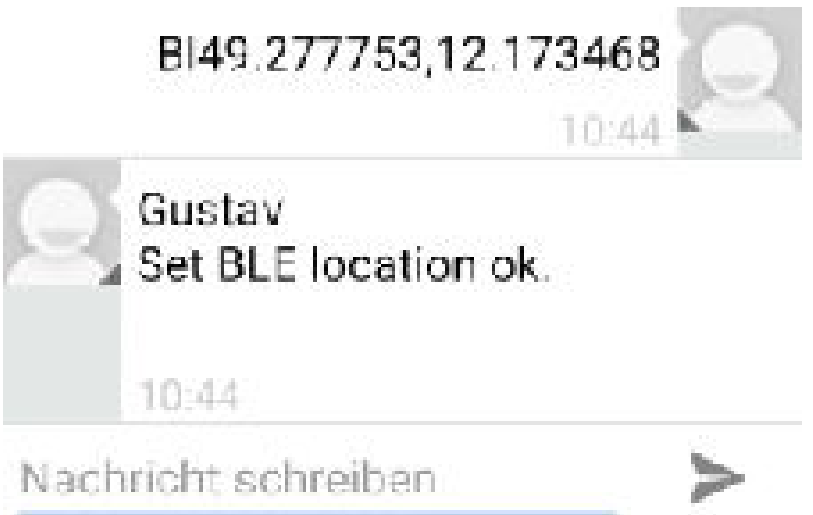
Zu dem Notruf System ist eine Komfort Ladestation erhältlich. Das Ladegerät ist mit 2 Tasten zum Telefonieren und einer Taste zum Not-Ruf ausgelegt.

Das Ladegerät verfügt über einen wiederaufladbaren Akku, somit ist auch bei einem längeren Stromausfall gewährleistet, das mit dem Patienten kommuniziert werden kann.
Per Bluetooth kann das Ladegerät mit dem Not-Ruf System verbunden werden, hierzu muss für ca. 3 Sek. die untere seitlich Taste am Notrufsystem und die Call2 Taste der Ladestation gleichzeitig gedrückt werden.

Da innerhalb von Gebäuden oftmals keine GPS-Ortung möglich ist, kann die Ladestation die Ortung übernehmen, dazu werden die Koordinaten für das Ladegerät festgelegt, verbindet sich nun das Notrufsystem per Bluetooth mit der Ladestation, werden die Koordinaten an das Not-Ruf System übergeben

Befehl: BLLängengrad,Breitengrad

Beispiel: BL49.277753,12.173468



Nachdem sie den Befehl gesendet haben, betätigen sie innerhalb von 3 Minuten die Verbindung durch das Drücken der CALL2 Taste an der Ladestation

Der Aktuelle Längengrad und Breitengrad der Ladestation kann man mit Google MAPS ermitteln.

13.0 GEO Zaun (optional nur mit APP)

Verlässt oder betritt der Patient einen vorher festgelegten Bereich werden sie per SMS informiert.
Mit folgendem Befehl wird der Bereich festgelegt.
Beispiel:
GEO1,1,1,100M,Längengrad,Breitengrad
GEO1 = Erstes Geo Fence, max. können vier Bereiche angelegt werden.

GEO1,1 = GEO Fence Ein
GEO1,0 = GEO Fence Aus

GEO1,1,1 = Alarm beim Betreten des Bereiches
GEO1,1,0 = Alarm beim Verlassen des Bereiches

GEO1,1,0,100M = Kreisdurchmesser ist 100M, der Kreisdurchmesser sollte nicht keiner als 100M sein.



14. 0 Keine Bewegung „Alarm“

Wenn das Notrufsystem für eine bestimmte Zeit keine Bewegung registriert hat, wird eine Meldung per SMS an die Notrufnummer gesendet.

Beispiel:
nmo1,80M,1

Wird 80 min. keine Bewegung registriert, wird eine SMS an die Notrufnummer gesendet.

nmo0 = Alarm aus

1= Anruf bei Alarm
0 = kein Anruf bei Alarm

15.0 Bewegungs „Alarm“

Wenn das Notrufsystem nach einer bestimmten Zeit eine Bewegung registriert hat, wird eine Meldung per SMS an die Notrufnummer gesendet

Beispiel:

mo1,60m,03s,1

Wird nach 60min. eine Bewegung für 3 Sek. registriert, wird ein Alarm ausgelöst.

mo1 = Alarm aktiviert
mo0 = Alarm deaktiviert

16.0 Arbeitsmodus

Das Gerät verfügt über 5 verschieden Arbeit Modi, damit können sie das Gerät auf Ihre Bedürfnisse anpassen,

Änderungen haben einen direkten Einfluss auf den Verbrauch von Datenvolumen und Batterieverfügbarkeit

16.1 Arbeitsmodus 1

SMS Befehl: mode1
Mode1 = Arbeitsmodus 1

Beschreibung:
Das Gerät ist ständig mit dem Server verbunden.
Im Alarmfall werden die Positionsdaten an den Server bzw. an das App gesendet

16.2 Arbeitsmodus 2

SMS Befehl: mode2,03M,01H

Mode2 = Arbeitsmodus 2
03M = 3 Minuten
01H = 1 Stunde

Beschreibung:
Ist der Notfallsender in Bewegung, wird alle 3 Minuten die Position an den Server gesendet. Ist der Notfallsender nicht in

Bewegung wird alle Stunde die Position an den Server gesendet.

16.3 Arbeitsmodus 3

SMS Befehl: mode3,01H

Sekunde= S
Minute = M
Stunde = H

Beschreibung:
Jede Stunde wird die Position an den Server gesendet, der Sender bleibt online

16.4 Arbeitsmodus 4

SMS Befehl: mode4,30M

Beschreibung:
Alle 30 Minuten wird die Position an den Server gesendet, der Sender ist sonst offline.

16.5 Arbeitsmodus 5

SMS Befehl: mode5,10H

Beschreibung:
Der Sender meldet sich alle Stunde am Server, in der Zwischenzeit wird die Verbindung abgebrochen, sie können den Tracker nicht mehr erreichen.

17.0 Kontinuierliche Überwachung nach einem Alarm

SMS Befehl: cl10S,600S

Wertebereich 10-600 Sekunden

Beispiel:
Bei einem Alarm wird alle 10 Sek. die Position gesendet, dies ist für 600 Sek. gültig.

18.0 App und Webportal

Wenn sie möchten, können sie das Notrufsystem sehr komfortabel mit eine APP bedienen. Die APP ist werbefrei und kostet 2,60€ im Monat.

Um das Notrufgerät mit der APP zu verbinden, senden sie folgenden Befehl:

S2 = Internetverbindung = Ein
S0= Internetverbindung = Aus

Sollten sie ihre eigene Sim-Karte benutzen müssen sie noch folgende Befehl an das Gerät senden:

S1,apn

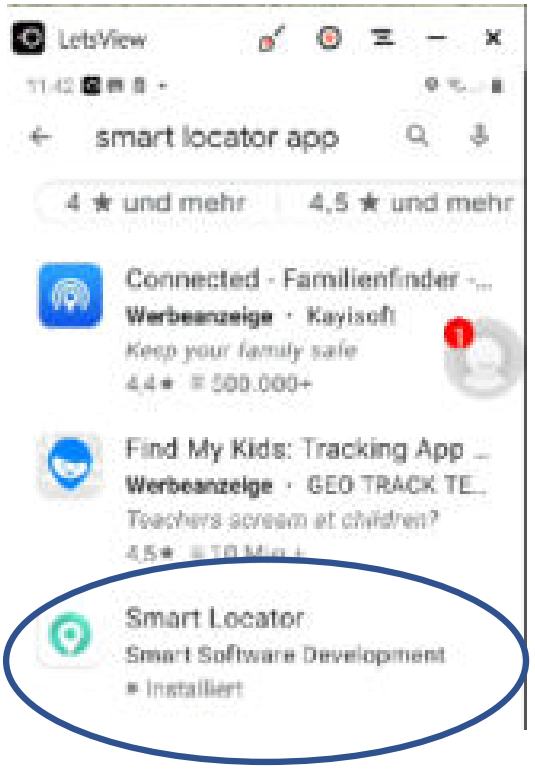
Beispiel: S1,Internet.telekom (für eine Telekom Sim Karte)

Die APN ihrer Sim-Karte erhalten sie von ihrem Sim-Karten Provider.

Wichtig! Deaktivieren sie den Pin Code ihrer Sim Karte

19.0 APP Downloaden

Im Play Store oder Apple Store die “Smart – Locator” APP downloaden und installieren.



Zugang zum Webportal:
https://www.smart-locator.com/login.html

Bitte beachten sie, dass sie für das APP und das Webportal den gleichen Benutzernamen und das gleiche Password verwenden.

Eine vollständige Liste mit SMS-Kommandos finden sie ebenfalls auf unserer Homepage:
https://www.simmotrade.com/gps-notrufsysteme/betriebsanleitung/

Alle Zertifikate finden sie auf unserer Homepage unter:
https://www.simmotrade.com/gps-notrufsysteme/zertifikate/

Unsere Hinweispflicht nach dem Batteriegesetz
Altbatterien gehören nicht in den Hausmüll. Sie können gebrauchte Batterien unentgeltlich an unserem Versandlager zurückgeben. Sie sind als Verbraucher zur Rückgabe von Altbatterien gesetzlich verpflichtet.
Schadstoffhaltige Batterien sind mit einem Zeichen, bestehend aus einer durchgestrichenen Mülltonne und dem chemischen Symbol (Cd, Hg oder Pb) des für die Einstufung als schadstoffhaltig ausschlaggebenden Schwermetalls versehen:



Notizen:

GPS Tracker Shop Simmotrade - Holzheimer Weg, 12 - 92449 Steinberg am See

Simmotrade
Lechleitner
Holzheimer Weg, 12
92449 Steinberg am See

So erreichen Sie uns

Internet	www.simmotrade.com
E-Mail	Simmotrade@gmx.de
Telefon	09431790682

Steuer-Nr.	**248/243/80356**
USt-IdNr.	**DE320199351**

Datum	**27.08.2021**
Kunde	**11632**

Herstellererklärung zum Wiedereinsatz des Poduktes EV07

Herstellererklärung:

Hiermit nehmen wir Stellung zum Wiedereinsatz des Produktes.

Das Produkt ist nicht Personenbezogen, eine Weitergabe ist nach Austausch der Sim Karte und löschen der personenbezogenen Daten ohne weiteres möglich.

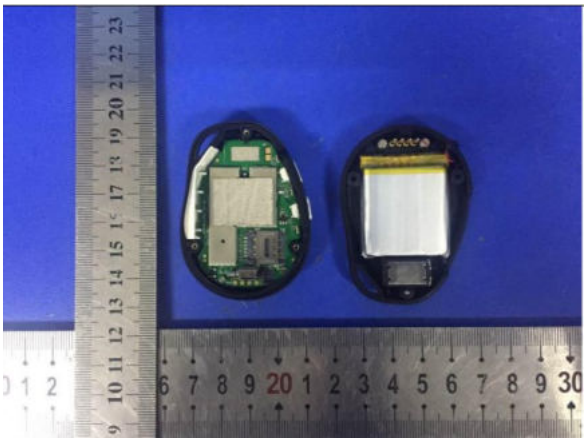
Entwurf

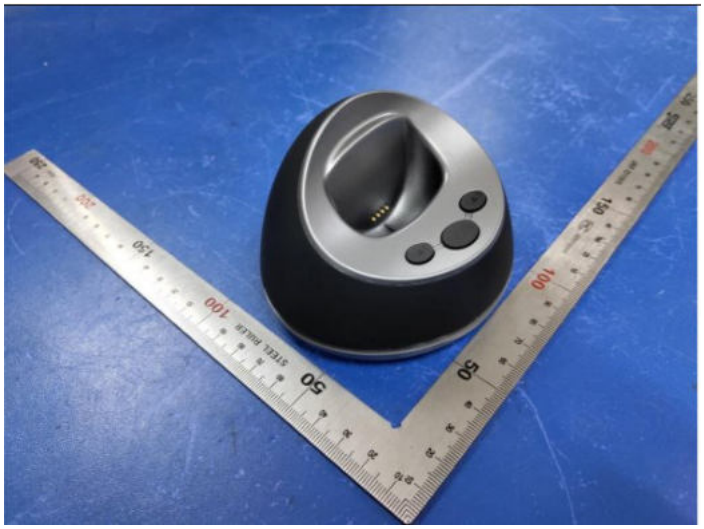
Mit freundlichen Grüßen
Erwin Lechleitner

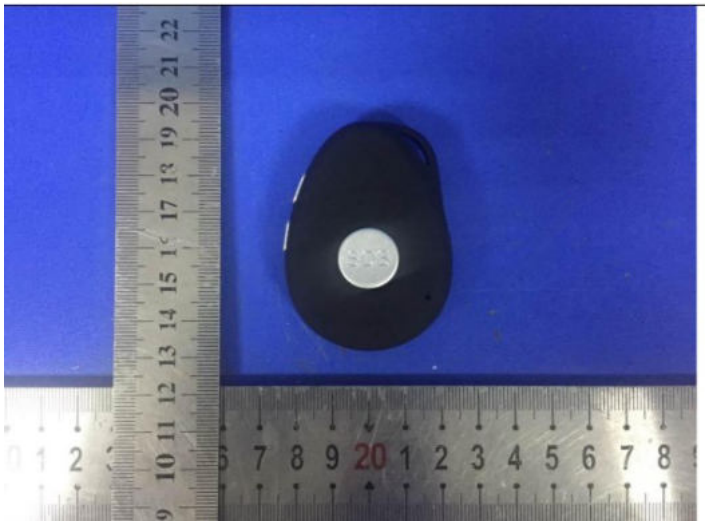
Geschäftsführer

Produkt Aufbau









Simmotrade
GPS Not-Ruf- System SMT_EV07



Beispiel mit Komfort Ladeschale

Bitte lesen Sie ich die Anleitung genau durch bevor sie den Tracker in Betrieb nehmen.
Sollten sie Fragen haben oder Hilfe benötigen, können sie uns gerne kontaktieren. Die Kontaktdaten finden sie auf Ihrer Rechnung.

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5.0 Bezeichnung des Notrufsenders festlegen …..Seite 8
6.0 Fallsensor…… Seite 9
7.0 Telefonnummern für Not-Ruf anlegen ……. Seite 10
8.0 Das Gerät finden…… Seite 12
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17.0 Kontinuierliche Überwachung ……Seite 22
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1.0 Produktübersicht: Notrufsystem



Spezifikation

Netz:	SMT - 07B2G	2G
	SMT - 07B4G	4G
Batterie:	850mAh Lion- Akku	
Wasserdicht:	IPX7	
Positionierung:	BLE, GPS, Wifi, LBS	
Zertifikate:	CE, ROHS, UN38.3	
WiFi:	802.11 2.4G	
Größe:	61mm X 44mm X 16mm	

Zubehör: Deutsche Beschreibung, Ladekabel, Ladeschale, Netzteil, Halsband

2.0 Inbetriebnahme

Bevor sie mit der Inbetriebnahme starten können, muss die Sim-Karte von uns frei geschaltet und registriert werden, nach der Freischaltung werden sie von uns informiert.
Bitte füllen sie zuvor das Formular auf unserer Webseite aus.
Das Formular finden sie unter:
https://www.simmosim.com/formular/

Bitte laden sie das Gerät vor dem ersten Gebrauch 2-3 Stunden auf.
Zum Einschalten des Gerätes drücken sie mit dem Fingernagel kurz auf die seitliche Anruf-Taste. Zum Ausschalten drücken sie die Anruf-Taste und SOS-Taste gemeinsam.

Wir haben das Gerät für sie bereits eingerichtet, die gelbe und blaue LED blinken nach dem Einschalten, sollte dies nicht der Fall sein, dann bringen sie ihren Tracker ins Freie.

Zur Anzeige des aktuellen Status befinden sich an der Seite 3 LED, sollte keine der LED leuchten, ist der Tracker ausgeschaltet oder im Schlafmodus.
Möchte sie ihre eigene Sim-Karte verwende, dann informieren sie sich bitte unter 19.0 APP und Web Portal

Grüne LED

LED	Grün blinkt kurz alle 3 Sekunden	Grün blinkt zweimal alle 3 Sekunden	Grün blinkt eine Sek. an, drei Sek aus.	Grün leuchtet konstant
Bedeutung	Gerät ist mit dem GSM Netz verbunden	Gerät ist mit dem Internet verbunden	Die Verbindung zum GSM Netz wir aufgebaut	Sim–Karte nicht erkannt

Blaue LED

LED	Blau blinkt kurz alle 3 sek.	Blau blinkt eine Sek. an, drei Sek. aus	Blau ist aus
Bedeutung	GPS-Position ermittelt	Noch keine GPS-Position	Das GPS Modul ist im Schlafmodus

Rote LED

LED	Rot leuchtet kontant	Rot blinkt schnell	Rot ist aus oder blinkt langsam
Bedeutung	Der Akku wird geladen	Akku Kapazität < 20%	Der Akku ist geladen

3.0 Kommunizieren mit dem Notrufsystem

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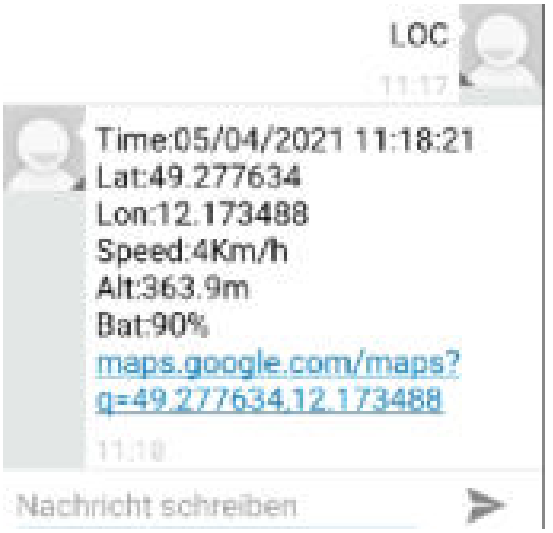
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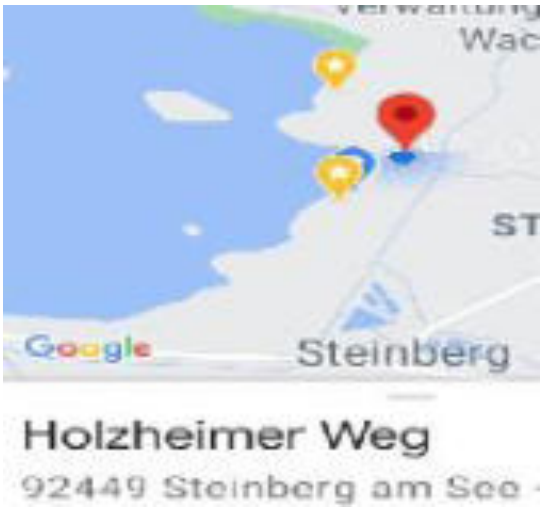
4.0 Positionsabfrage

Befehl: LOC
Bedeutung: Senden sie LOC per SMS an den GPS-Notrufsender. Mit diesem Befehl wird ihnen die aktuelle Position per SMS als Link auf ihr Smartphone gesendet.

Beispiel:



Nach anklicken des Links öffnet sich Google MAPS mit der aktuellen Position und Adresse



5.0 Die SMS-Bezeichnung des Notrufsenders festlegen

Befehl: prefix1,Gustav

Bedeutung: Sie können einen Namen für den Notrufsender festlegen, der am Anfang jeder Antwort SMS mitgesendet wird. Dies hilft bei der Identifikation, wenn sie mehrere Geräte benutzen.

Beispiel:



6.0 Fallsensor

Befehl: FL1-9
Bedeutung: Stürzt eine Person wird der Fallsensor ausgelöst und eine SMS an alle Notrufnummern gesendet.
Beispiel: Senden sie den SMS-Befehl FL1,5 an den Notrufsender
FL1=Fallsensor aktiviert die 5 beschreibt die Sensibilität der Auslösung.

Sensibilität 1= sehr empfindlich, 9 sehr unempfindlich. Als Standard ist die Sensibilität 5 voreingestellt.

Bitte beachten sie das nicht immer bei einem Sturz der Fallsensor sicher ausgelöst wird.

Beispiel: Fallsensor



Fallsensor Empfindlichkeit=3

7.0 Telefonnummern für Not-Ruf anlegen

Wird ein Not-Ruf ausgelöst, werden nacheinander drei zuvor festgelegte Rufnummer angewählt. Sollte die erste Nummer besetzt sein wird automatisch die zweite und dann die dritte Telefonnummer angerufen

Befehl: A1,1,1, +49172123123
Bedeutung: A1= Befehl, 1= SMS ja / 0= SMS nein, 1 =Anruf ja 0=Anruf nein, Telefonnummer mit Ländervorwahl, keine Leerzeichen Einfügen

Beispiel: Erste Nummer SMS=Nein, Anruf = Ja



Im Notfall wird die Nummer als erste Nummer angewählt
Nur Anruf, keine SMS

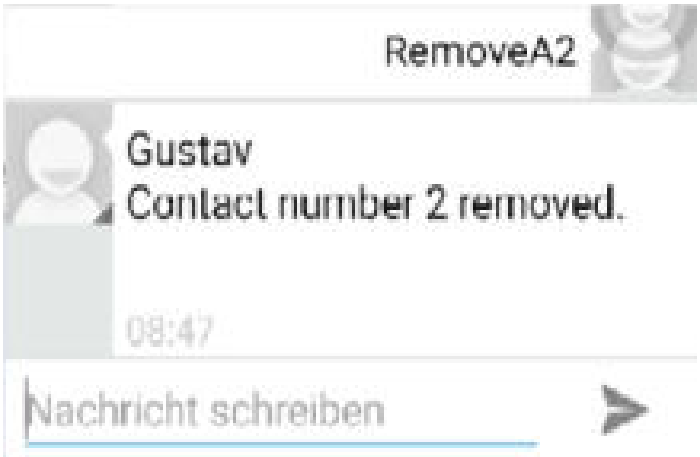
Beispiel: Zweite Nummer SMS=Ja, Anruf = Nein



Im Notfall wird die zweite Nummer angerufen, falls die erste Nummer nicht erreichbar ist

Es können bis zu 5 Telefonnummern angelegt werden, mit dem SMS- Befehl „Remove“ kann eine Telefonnummer gelöscht werden

Beispiel: Mit dem Befehl „Remove2“ wird die zweite Telefonnummer gelöscht



8.0 Das Gerät finden

Befehl: findme

Das Gerät meldet sich akustisch und vibriert, der Befehl kann durch das Drücken eine Taste am Notrufsystem quittiert werden.

9. 0 Das Notufsystem anrufen

Sie können das Notrufsystem anrufen und telefonieren, sollte der Anruf nach dem fünften Freizeichen nicht entgegengenommen werden, wir der Anruf durchgeschaltet im Notfall könne sie versuchen Kontakt mit dem Patienten aufzunehmen oder in den Raum reinhören. Wenn möglich informieren sie die von ihnen zu betreuende Person von dieser Möglichkeit. Auf Anfrage können wir die Funktion deaktivieren.

10.0 Mit dem Notrufsystem telefonieren.

Durch Drücken der seitlichen oberen Taste am Gerät, wird die zuvor unter A2 festgelegt Nummer angerufen. Der Anruf kann durch Betätigen der seitlichen untere Taste beendet werden.



Anrufen

Auflegen

11.0 SOS Not-Ruf Taste

Durch Drücken der SOS Taste wird die erste festgelegte „A1“ Telefonnummer angerufen. Das Betätigen der SOS Taste wir dem Benutzer durch ein Vibrieren und eine Sprachansage mitgeteilt, der Benutzer hat nun 5 Sek. um den Not-Ruf durch nochmaliges Drücken der SOS Taste zu unterbrechen. Sollte die erste Nummer nicht erreichbar sein, wird die zweite und dann die dritte Nummer angerufen.



12.0 Komfort Ladestation (optional)



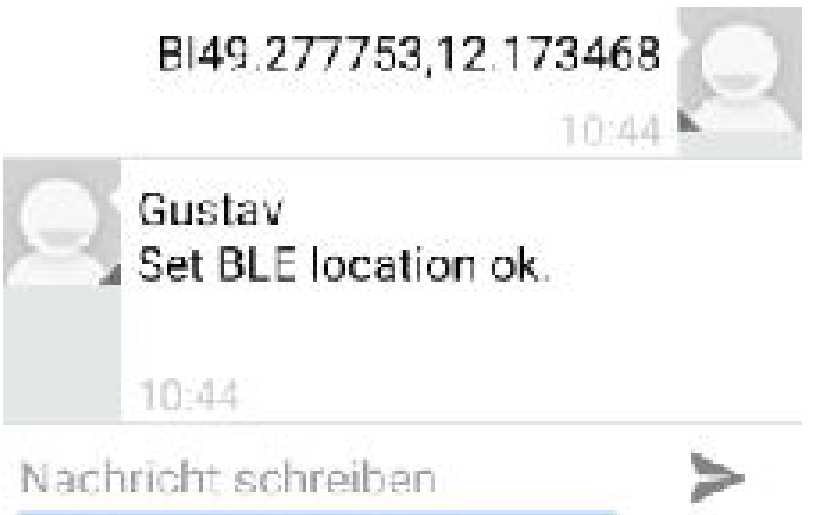
Zu dem Notruf System ist eine Komfort Ladestation erhältlich. Das Ladegerät ist mit 2 Tasten zum Telefonieren und einer Taste zum Not-Ruf ausgelegt.

Das Ladegerät verfügt über einen wiederaufladbaren Akku, somit ist auch bei einem längeren Stromausfall gewährleistet, das mit dem Patienten kommuniziert werden kann.
Per Bluetooth kann das Ladegerät mit dem Not-Ruf System verbunden werden, hierzu muss für ca. 3 Sek. die untere seitlich Taste am Notrufsystem und die Call2 Taste der Ladestation gleichzeitig gedrückt werden.

Da innerhalb von Gebäuden oftmals keine GPS-Ortung möglich ist, kann die Ladestation die Ortung übernehmen, dazu werden die Koordinaten für das Ladegerät festgelegt, verbindet sich nun das Notrufsystem per Bluetooth mit der Ladestation, werden die Koordinaten an das Not-Ruf System übergeben

Befehl: BLLängengrad,Breitengrad

Beispiel: BL49.277753,12.173468



Nachdem sie den Befehl gesendet haben, betätigen sie innerhalb von 3 Minuten die Verbindung durch das Drücken der CALL2 Taste an der Ladestation

Der Aktuelle Längengrad und Breitengrad der Ladestation kann man mit Google MAPS ermitteln.

13.0 GEO Zaun (optional nur mit APP)

Verlässt oder betritt der Patient einen vorher festgelegten Bereich werden sie per SMS informiert.
Mit folgendem Befehl wird der Bereich festgelegt.
Beispiel:
GEO1,1,1,100M,Längengrad,Breitengrad
GEO1 = Erstes Geo Fence, max. können vier Bereiche angelegt werden.

GEO1,1 = GEO Fence Ein
GEO1,0 = GEO Fence Aus

GEO1,1,1 = Alarm beim Betreten des Bereiches
GEO1,1,0 = Alarm beim Verlassen des Bereiches

GEO1,1,0,100M = Kreisdurchmesser ist 100M, der Kreisdurchmesser sollte nicht keiner als 100M sein.



14. 0 Keine Bewegung „Alarm“

Wenn das Notrufsystem für eine bestimmte Zeit keine Bewegung registriert hat, wird eine Meldung per SMS an die Notrufnummer gesendet.

Beispiel:
nmo1,80M,1

Wird 80 min. keine Bewegung registriert, wird eine SMS an die Notrufnummer gesendet.

nmo0 = Alarm aus

1= Anruf bei Alarm
0 = kein Anruf bei Alarm

15.0 Bewegungs „Alarm“

Wenn das Notrufsystem nach einer bestimmten Zeit eine Bewegung registriert hat, wird eine Meldung per SMS an die Notrufnummer gesendet

Beispiel:

mo1,60m,03s,1

Wird nach 60min. eine Bewegung für 3 Sek. registriert, wird ein Alarm ausgelöst.

mo1 = Alarm aktiviert
mo0 = Alarm deaktiviert

16.0 Arbeitsmodus

Das Gerät verfügt über 5 verschieden Arbeit Modi, damit können sie das Gerät auf Ihre Bedürfnisse anpassen,

Änderungen haben einen direkten Einfluss auf den Verbrauch von Datenvolumen und Batterieverfügbarkeit

16.1 Arbeitsmodus 1

SMS Befehl: mode1
Mode1 = Arbeitsmodus 1

Beschreibung:
Das Gerät ist ständig mit dem Server verbunden.
Im Alarmfall werden die Positionsdaten an den Server bzw. an das App gesendet

16.2 Arbeitsmodus 2

SMS Befehl: mode2,03M,01H

Mode2 = Arbeitsmodus 2
03M = 3 Minuten
01H = 1 Stunde

Beschreibung:
Ist der Notfallsender in Bewegung, wird alle 3 Minuten die Position an den Server gesendet. Ist der Notfallsender nicht in

Bewegung wird alle Stunde die Position an den Server gesendet.

16.3 Arbeitsmodus 3

SMS Befehl: mode3,01H

Sekunde= S
Minute = M
Stunde = H

Beschreibung:
Jede Stunde wird die Position an den Server gesendet, der Sender bleibt online

16.4 Arbeitsmodus 4

SMS Befehl: mode4,30M

Beschreibung:
Alle 30 Minuten wird die Position an den Server gesendet, der Sender ist sonst offline.

16.5 Arbeitsmodus 5

SMS Befehl: mode5,10H

Beschreibung:
Der Sender meldet sich alle Stunde am Server, in der Zwischenzeit wird die Verbindung abgebrochen, sie können den Tracker nicht mehr erreichen.

17.0 Kontinuierliche Überwachung nach einem Alarm

SMS Befehl: cl10S,600S

Wertebereich 10-600 Sekunden

Beispiel:
Bei einem Alarm wird alle 10 Sek. die Position gesendet, dies ist für 600 Sek. gültig.

18.0 App und Webportal

Wenn sie möchten, können sie das Notrufsystem sehr komfortabel mit eine APP bedienen. Die APP ist werbefrei und kostet 2,60€ im Monat.

Um das Notrufgerät mit der APP zu verbinden, senden sie folgenden Befehl:

S2 = Internetverbindung = Ein
S0= Internetverbindung = Aus

Sollten sie ihre eigene Sim-Karte benutzen müssen sie noch folgende Befehl an das Gerät senden:

S1,apn

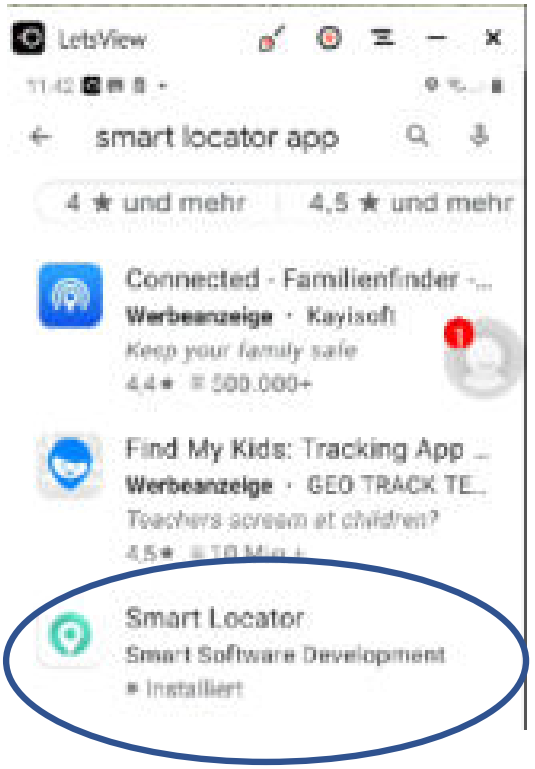
Beispiel: S1,Internet.telekom (für eine Telekom Sim Karte)

Die APN ihrer Sim-Karte erhalten sie von ihrem Sim-Karten Provider.

Wichtig! Deaktivieren sie den Pin Code ihrer Sim Karte

19.0 APP Downloaden

Im Play Store oder Apple Store die “Smart – Locator” APP downloaden und installieren.



Zugang zum Webportal:
https://www.smart-locator.com/login.html

Bitte beachten sie, dass sie für das APP und das Webportal den gleichen Benutzernamen und das gleiche Password verwenden.

Eine vollständige Liste mit SMS-Kommandos finden sie ebenfalls auf unserer Homepage:
https://www.simmotrade.com/gps-notrufsysteme/betriebsanleitung/

Alle Zertifikate finden sie auf unserer Homepage unter:
https://www.simmotrade.com/gps-notrufsysteme/zertifikate/

Unsere Hinweispflicht nach dem Batteriegesetz
Altbatterien gehören nicht in den Hausmüll. Sie können gebrauchte Batterien unentgeltlich an unserem Versandlager zurückgeben. Sie sind als Verbraucher zur Rückgabe von Altbatterien gesetzlich verpflichtet.
Schadstoffhaltige Batterien sind mit einem Zeichen, bestehend aus einer durchgestrichenen Mülltonne und dem chemischen Symbol (Cd, Hg oder Pb) des für die Einstufung als schadstoffhaltig ausschlaggebenden Schwermetalls versehen:



Notizen:

Not-Rufsystem für hilfsbedürftige Personen

Mit diesen Produkten wird ein Bereich, in dem sich die Pflegebedürftige oder der Pflegebedürftige frei bewegen kann, definiert. Wird dieser Bereich verlassen, alarmiert das Produkt ggf. über eine Alarmkette eine Pflegeperson, die den Aufenthalt der Pflegebedürftigen oder des Pflegebedürftigen anhand der GPS-Koordinaten ermitteln kann. Das Produkte verfügt zusätzlich über eine Notruffunktion, mit der Pflegebedürftige bei Verlust der Orientierung aktiv Hilfe herbeirufen kann. GPS-Tracker mit Geozaun-Funktion ermöglichen es Pflegebedürftigen sich bei bestehenden Beeinträchtigungen der Fähigkeiten bei der örtlichen Orientierung einen gewissen körperlichen Freiraum außerhalb des häuslichen Wohnumfeldes zu erschließen, da das Notrufsystem die Gefahren durch ein Verirren eingrenzt.

Pflegehilfsmittel zur örtlichen Orientierung dürfen nur mit Einwilligung der Pflegebedürftigen oder des Pflegebedürftigen zum Einsatz kommen.

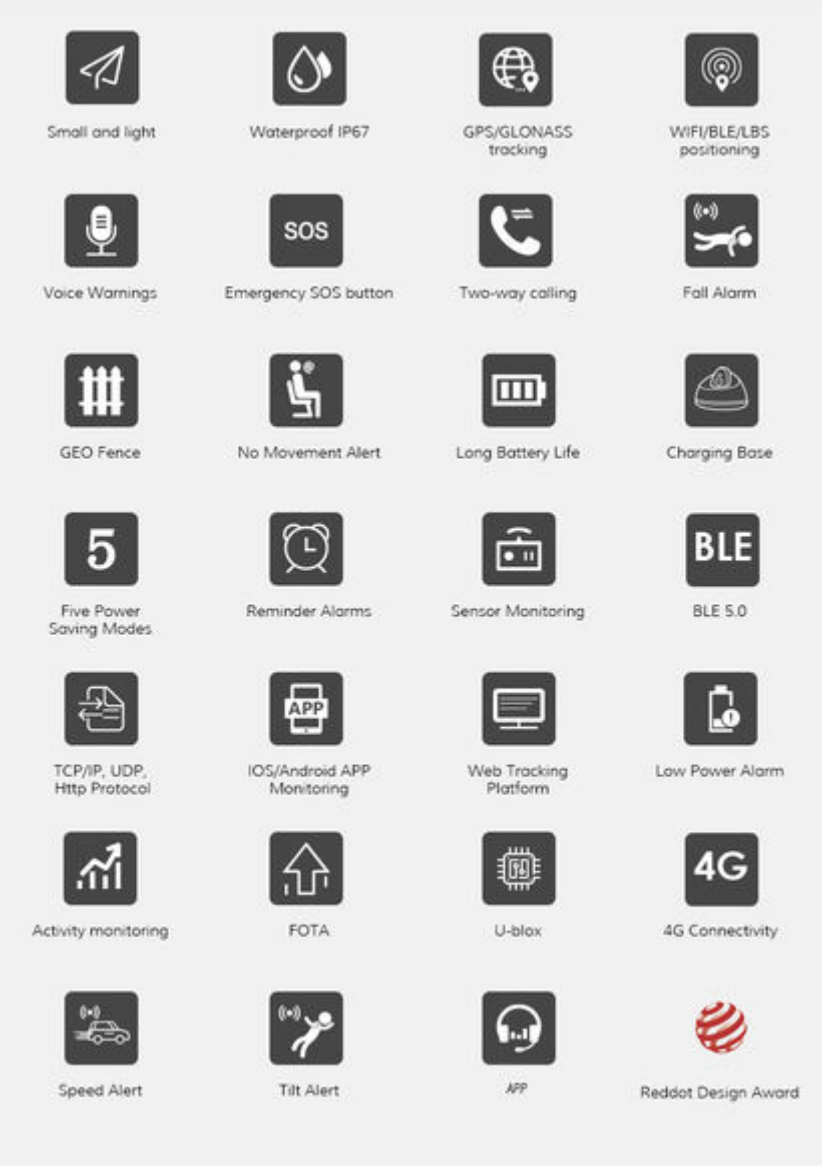


Produktansicht SMT EV07 mit Komfort Ladeschale

Haupteigenschaften:

1. Schnelle und einfache Installation: Wir liefern ihnen das GPS-Notrufsystem fertig eingerichtet mit Sim-Karte.
2. Echtzeit-Tracking: GPS-Tracking, WiFi und LBS im Freien und BLE/WIFI als Indoor-Tracking.
3. Klein, leicht, wasserdicht: Geringe Größe und Gewicht von nur 40gr. Das Gerät ist nach IP67 wasserdicht

4. Intelligentes Geo Fencing: Sie können einen sicheren Bereich festlegen, wird der Bereich verlassen oder Betreten werden sie über Ihr Handy informiert.
5. Fall Alarm: Bei einem Sturz löst das Gerät eigenständig einen Alarm aus, der auf einer der Notrufnummer geschaltet wird
6. Standortverlauf: Zeigen Sie in der App jederzeit einen 24-Stunden-Verlauf an.
7. SOS Not-Ruf Taste: Wird die Notruftaste betätigt, wird die erste Notrufnummer gewählt, sollte die Nummer nicht erreichbar sein, wird die nächste Nummer aus dem Telefonbuch gewählt. Der Notruf bleibt so lange aktiv, bis ein Teilnehmer den Anruf entgegennimmt.
8. In den Raum hören: Nach mehrmaligem läuten wird der Anruf an das Notrufsystem durchgeschaltet, diese Funktion ist im Notfall wichtig damit man Kontakt mit der eventuell verunfallten Person aufnehmen kann.
9. Positionsfindung im Innenbereich: Zimmergenaue Ortung, das Notrufsystem verbindet sich per Bluetooth mit der Ladestation (nur Komfortausführung) oder weiteren im Raum installierten Sendern.
10. APP+WEB-Überwachungsdienst: Öffnen Sie einfach die APP/WEB und beobachten Sie die Bewegungen in Echtzeit
11. Intelligentes Batterie Management: Es stehen 6 Batterie Management Programme, die sie selbst auf ihre Bedürfnisse einstellen können zu Verfügung.



Weitere Merkmale:

- Das Gerät ist sehr leicht und klein
- Wasserdicht IP67
- GPS/Glonas Satelitten-Ortung

- Wifi, BLE, LBS Positionierung
- Sprachunterstützung
- Großer SOS Knopf
- Telefonfunktion
- Fall Alarm
- Geo Zaun
- Keine Bewegungsalarm
- Anzeige Batteriestatus
- Ladeschale
- Batteriemanagement
- Wecker
- Sensor Überwachung
- Bluetooth
- TCP/IP Protokoll
- Web und APP Plattform ohne Werbung
- Batterie entladen Alarm
- Aktivitätsüberwachung
- On Air Update
- 2G/3G/4G Netz wahlweise
- Geschwindigkeitsalarm
- Das Gerät wurde von Reddat Design ausgezeichnet


IMEI:863921033968606
Model:EV-07BX-E
Black

Preisliste Stand 27.08.21

GPS-Notrufsystem mit Standardladegerät 2G Netz	143,90€ inkl. MwSt.
GPS-Notrufsystem mit Komfort Ladestation 2G Netz	163,90€ inkl. MwSt.
GSP-Notrufsystem mit Komfort Ladestation 4G Netz	199,00€ inkl. MwSt.

Zubehörliste:

- Ladekabel
- Betriebsanleitung deutsch
- Armband
- Halsband
- Gürtel Clip

Garantie:

Wir gewähren 2 Jahre Garantie

Aufstellung der technischen Daten:

Generelle Spezifikation	Model	SMT-EV-07B-4G/2G
	Größe	61mm*44mm*16mm
	Gewicht	40g
	Backup Batterie	Wiederaufladbar, 3.7V, 800mAh
	Ladespannung	5V DC
	Arbeitstemperatur	-20°C bis +80°C Arbeitstemperatur -30°C to +70°C Lager Temperatur
	Batterie Kapazität	Bis zu 72Stunden bei normalen Gebrauch
	Waterproof	IP67
Hardware	Sensor	Bewegung und Vibrationssensor
	Anschluss	4 Pin-Magnet zum Laden
	SIM Karte	Nano
	Flash Speicher	1MB
	Eingebautes Mikrofon und Lautsprecherr	
	WIFI	802.11 b/g/n, 2.4G

	BLE	BT5.0 LE
GPS	GPS Chipsatz	Ubx M8130 (AGPS support)
	Support	GPS and Glonass
	Empfangsfrequenz	1575.42MHz
	Kalt Start	ca. 26s
	Warm Start	ca. 2s
	Hot Start	ca. 1s
	Antenne	Eingebaute Keramik Antenne
Sonstige Informationen	Standard Zubehör	EV-07B-4G/2G Gerät
		Ladegerät EU
		Magnetisches USB Kabel
		Deutsche Betriebsanleitung
		Halsband
		Ladeschale (Komfort oder Standard)
		Schlüsselring, Gürtel Clip
		Beschreibung in deutsch