

# SAR Test Report

Report No.: AGC10211210702FH01

**FCC ID** : 2AJG4-FH-V4-4G

**APPLICATION PURPOSE** : Original Equipment

**PRODUCT DESIGNATION** : FastHelp Home Emergency Alert Device-V4-4G

**BRAND NAME** : FastHelp

**MODEL NAME** : FH-V4-4G

**APPLICANT** : Universal Physicians, LLC

**DATE OF ISSUE** : Aug. 19,2021

**STANDARD(S)** : IEEE Std. 1528:2013  
FCC 47 CFR Part 2§2.1093:2013  
IEEE Std C95.1™-2005  
IEC 62209-1: 2016

**REPORT VERSION** : V1.0

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### Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Aug. 19,2021	Valid	Initial Release

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# Test Report

Applicant Name	Universal Physicians, LLC
Applicant Address	7747 Supreme Street NW, North Canton, Ohio United States 44720
Manufacturer Name	SHENZHEN SMARTI-TECH LIMITED
Manufacturer Address	Room 902, Longsheng Times Building, Industrial Road, Longhua District, Shenzhen, Guangdong, China
Factory Name	Universal Physicians, LLC
Factory Address	Oficina N.33 Edificio Ofidepositos Central, Calidonia - Distrito Federal, Panama
Product Designation	FastHelp Home Emergency Alert Device-V4-4G
Brand Name	FastHelp
Model Name	FH-V4-4G
EUT Voltage	DC3.6V by battery
Applicable Standard	IEEE Std. 1528:2013 FCC 47 CFR Part 2§2.1093:2013 IEEE Std C95.1™-2005 IEC 62209-1: 2016
Test Date	Jul. 24,2021 to Aug. 06,2021
Report Template	AGCRT-US-4G/SAR (2021-04-20)

Note: The results of testing in this report apply to the product/system which was tested only.

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Prepared By

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Aug. 06,2021

*Angela Li*

Reviewed By

Angela Li (Reviewer)

Aug. 19,2021

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Approved By

Forrest Lei (Authorized Officer)

Aug. 19,2021

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## TABLE OF CONTENTS

<b>1. SUMMARY OF MAXIMUM SAR VALUE .....</b>	<b>5</b>
<b>2. GENERAL INFORMATION.....</b>	<b>6</b>
2.1. EUT DESCRIPTION.....	6
<b>3. SAR MEASUREMENT SYSTEM.....</b>	<b>7</b>
3.1. THE SATIMO SYSTEM USED FOR PERFORMING COMPLIANCE TESTS CONSISTS OF FOLLOWING ITEMS .....	7
3.2. COMOSAR E-FIELD PROBE .....	9
3.3. ROBOT.....	9
3.4. VIDEO POSITIONING SYSTEM .....	10
3.5. DEVICE HOLDER .....	10
3.6. SAM TWIN PHANTOM.....	11
<b>4. SAR MEASUREMENT PROCEDURE.....</b>	<b>12</b>
4.1. SPECIFIC ABSORPTION RATE (SAR).....	12
4.2. SAR MEASUREMENT PROCEDURE .....	13
4.3. RF EXPOSURE CONDITIONS .....	15
<b>5. TISSUE SIMULATING LIQUID.....</b>	<b>16</b>
5.1. THE COMPOSITION OF THE TISSUE SIMULATING LIQUID.....	16
5.2. TISSUE DIELECTRIC PARAMETERS FOR HEAD AND BODY PHANTOMS .....	17
5.3. TISSUE CALIBRATION RESULT .....	18
<b>6. SAR SYSTEM CHECK PROCEDURE .....</b>	<b>20</b>
6.1. SAR SYSTEM CHECK PROCEDURES .....	20
6.2. SAR SYSTEM CHECK.....	21
<b>7. EUT TEST POSITION.....</b>	<b>23</b>
7.1. BODY WORN POSITION .....	23
<b>8. SAR EXPOSURE LIMITS .....</b>	<b>24</b>
<b>9. TEST FACILITY .....</b>	<b>25</b>
<b>10. TEST EQUIPMENT LIST .....</b>	<b>26</b>
<b>11. MEASUREMENT UNCERTAINTY .....</b>	<b>27</b>
<b>12. CONDUCTED POWER MEASUREMENT.....</b>	<b>30</b>
<b>13. TEST RESULTS.....</b>	<b>49</b>
13.1. SAR TEST RESULTS SUMMARY.....	49
<b>APPENDIX A. SAR SYSTEM CHECK DATA .....</b>	<b>63</b>
<b>APPENDIX B. SAR MEASUREMENT DATA.....</b>	<b>77</b>
<b>APPENDIX C. TEST SETUP PHOTOGRAPHS.....</b>	<b>107</b>
<b>APPENDIX D. CALIBRATION DATA .....</b>	<b>111</b>

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## 1. SUMMARY OF MAXIMUM SAR VALUE

The maximum results of Specific Absorption Rate (SAR) found during testing for EUT are as follows:

Frequency Band	Highest Reported 1g-SAR(W/kg)	SAR Test Limit (W/kg)
	Body-worn(with 0mm separation)	
GSM 850	1.001	1.6
PCS 1900	0.702	
LTE Band 2	0.793	
LTE Band 4	1.463	
LTE Band 5	0.479	
LTE Band 12	0.506	
LTE Band 13	0.754	
LTE Band 17	0.770	
LTE Band 25	0.782	
LTE Band 38	1.466	
LTE Band 41	1.222	
SAR Test Result	PASS	

This device is compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6W/kg) specified in IEEE Std. 1528:2013; FCC 47CFR § 2.1093; IEEE/ANSI C95.1:2005 and the following specific FCC Test Procedures:

- KDB 447498 D01 General RF Exposure Guidance v06
- KDB 648474 D04 Handset SAR v01r03
- KDB 865664 D01 SAR Measurement 100MHz to 6GHz v01r04
- KDB 941225 D01 3G SAR Procedures v03r01
- KDB 941225 D05 SAR for LTE Devices v02r05

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## 2. GENERAL INFORMATION

### 2.1. EUT Description

General Information	
Product Designation	FastHelp Home Emergency Alert Device-V4-4G
Test Model	FH-V4-4G
Sample ID	210714054
Hardware Version	A01_MB_V1.0
Software Version	A01_V1.0
Device Category	Portable
RF Exposure Environment	Uncontrolled
Antenna Type	Internal
GSM	
Support Band	<input checked="" type="checkbox"/> GSM 850 <input checked="" type="checkbox"/> PCS 1900 <input type="checkbox"/> GSM 900 <input type="checkbox"/> DCS 1800
TX Frequency Range	GSM 850 : 820-850MHz; PCS 1900: 1850-1910MHz;
RX Frequency Range	GSM 850 : 869~894MHz; PCS 1900: 1930~1990MHz
Release Version	R99
Type of modulation	GMSK for GSM
Antenna Gain	GSM850: 0.75dBi; PCS1900: 1.35dBi
Max. Average Power	GSM850: 31.63dBm; PCS1900: 29.72dBm

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## EUT Description( Continue)

LTE	
Support Band	<input checked="" type="checkbox"/> FDD Band 2 <input checked="" type="checkbox"/> FDD Band 4 <input checked="" type="checkbox"/> FDD Band 5 <input checked="" type="checkbox"/> FDD Band 12 <input checked="" type="checkbox"/> FDD Band 13 <input checked="" type="checkbox"/> FDD Band 17 <input checked="" type="checkbox"/> FDD Band 25 <input checked="" type="checkbox"/> FDD Band 38 <input checked="" type="checkbox"/> TDD Band 41 <input type="checkbox"/> FDD Band 66 (U.S. Bands)
TX Frequency Range	Band 2:1850-1910MHz; Band 4:1710-1755MHz;Band 5:824-849MHz; Band 12:699-716MHz; Band 13: 777-787MHz; Band 17: 704-716MHz; Band 25: 1850-1915MHz; Band 38: 2570-2620 MHz; Band 41:2535-2655MHz;
RX Frequency Range	Band 2:1930-1990MHz; Band 4:2110-2155MHz; Band 5:869-894MHz; Band 12: 729-746 MHz; Band 13: 746-756MHz; Band 17: 734-746 MHz; Band 25: 1930-1995MHz; Band 38: 2570-2620 MHz; Band 41:2535-2655MHz;
Release Version	Rel-8
Type of modulation	QPSK, 16QAM
Antenna Gain	Band 2: 1.41dBi; Band 4: 1.37dBi; Band 5: 0.67dBi; Band 12: 0.62dBi; Band 13: 0.57dBi; Band 17: 0.62dBi; Band 25: 0.21dBi; Band 38: 1.44dBi; Band 41: 0.94dBi;
Max. Average Power	Band 2: 21.14dBm; Band 4: 19.87dBm; Band 5: 23.33dBm; Band 12: 22.94dBm; Band 13: 23.38dBm; Band 17: 22.85dBm; Band 25: 21.04dBm; Band 38: 21.83dBm; Band 41: 21.27dBm;
Accessories	
Battery	Brand name: Season Model No. : 18650 Voltage and Capacitance: 3.6 V & 1800mAh
Earphone	Brand name: N/A Model No. : N/A

- Note:1.CMU200 can measure the average power and Peak power at the same time  
 2.The sample used for testing is end product.  
 3. The test sample has no any deviation to the test method of standard mentioned in page 1.

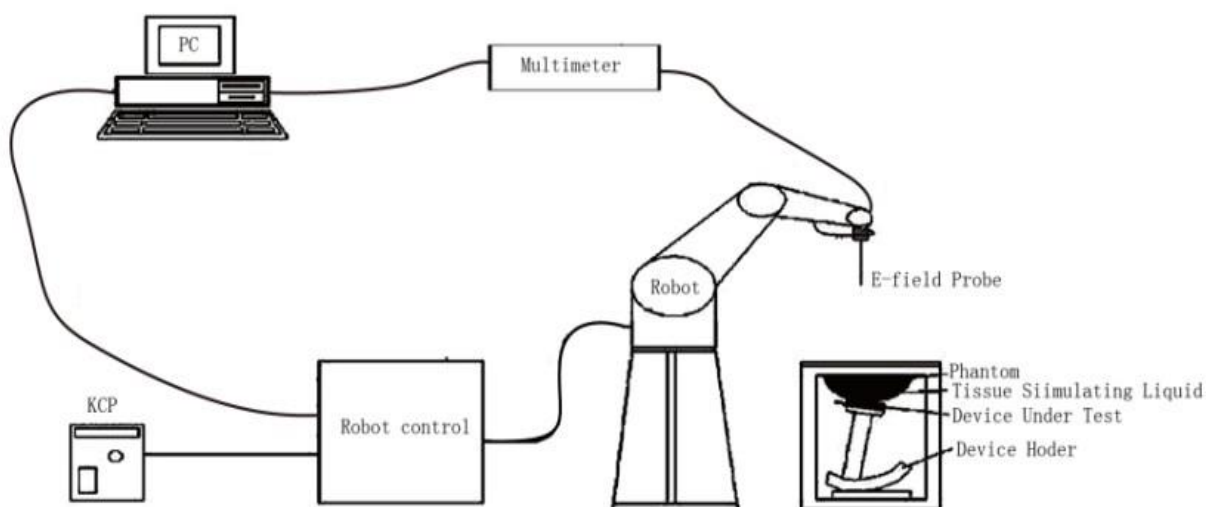
Product	Type
	<input checked="" type="checkbox"/> Production unit <input type="checkbox"/> Identical Prototype

## 3. SAR MEASUREMENT SYSTEM

### 3.1. The SATIMO system used for performing compliance tests consists of following items

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The COMOSAR system for performing compliance tests consists of the following items:

- The PC. It controls most of the bench devices and stores measurement data. A computer running WinXP and the Opensar software.
- The E-Field probe. The probe is a 3-axis system made of 3 distinct dipoles. Each dipole returns a voltage in function of the ambient electric field.
- The Keithley multimeter measures each probe dipole voltages.
- The SAM phantom simulates a human head. The measurement of the electric field is made inside the phantom.
- The liquids simulate the dielectric properties of the human head tissues.
- The network emulator controls the mobile phone under test.
- The validation dipoles are used to measure a reference SAR. They are used to periodically check the bench to make sure that there is no drift of the system characteristics over time.
- The phantom, the device holder and other accessories according to the targeted measurement.

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### 3.2. COMOSAR E-Field Probe

The SAR measurement is conducted with the dosimetric probe manufactured by SATIMO. The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency. SATIMO conducts the probe calibration in compliance with international and national standards (e.g. IEEE 1528 and relevant KDB files.) The calibration data are in Appendix D.

#### Isotropic E-Field Probe Specification

<b>Model</b>	SSE5	
<b>Manufacture</b>	MVG	
<b>Identification No.</b>	SN 03/18 EP327	
<b>Frequency</b>	0.15GHz-3GHz Linearity:±0.08dB(150MHz-3GHz)	
<b>Dynamic Range</b>	0.01W/kg-100W/kg Linearity:±0.08dB	
<b>Dimensions</b>	Overall length:330mm Length of individual dipoles:4.5mm Maximum external diameter:8mm Probe Tip external diameter:5mm Distance between dipoles/ probe extremity:2.7mm	
<b>Application</b>	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 3 GHz with precision of better 30%.	

### 3.3. Robot

The COMOSAR system uses the KUKA robot from SATIMO SA (France).For the 6-axis controller COMOSAR system, the KUKA robot controller version from SATIMO is used.

The XL robot series have many features that are important for our application:

- ☐ High precision (repeatability 0.02 mm)
- ☐ High reliability (industrial design)
- ☐ Jerk-free straight movements
- ☐ Low ELF interference (the closed metallic construction shields against motor control fields)
- ☐ 6-axis controller



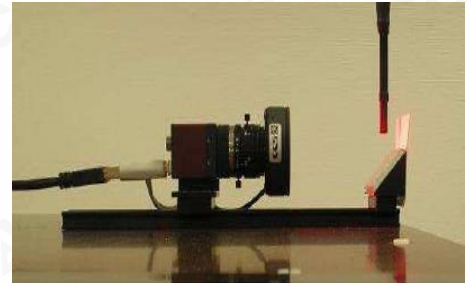
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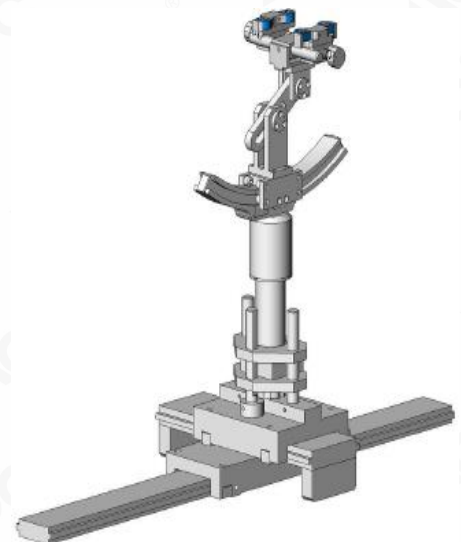
### 3.4. Video Positioning System

The video positioning system is used in OpenSAR to check the probe. Which is composed of a camera, LED, mirror and mechanical parts. The camera is piloted by the main computer with firewire link. During the process, the actual position of the probe tip with respect to the robot arm is measured, as well as the probe length and the horizontal probe offset. The software then corrects all movements, such that the robot coordinates are valid for the probe tip. The repeatability of this process is better than 0.1 mm. If a position has been taught with an aligned probe, the same position will be reached with another aligned probe within 0.1 mm, even if the other probe has different dimensions. During probe rotations, the probe tip will keep its actual position.



### 3.5. Device Holder

The COMOSAR device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation center for both scales is the ear reference point (EPR). Thus the device needs no repositioning when changing the angles. The COMOSAR device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity  $\epsilon_r = 3$  and loss tangent  $\delta = 0.02$ . The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.



### 3.6. SAM Twin Phantom

The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region where shell thickness increases to 6mm). It has three measurement areas:

- ☐ Left head
- ☐ Right head
- ☐ Flat phantom



The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

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## 4. SAR MEASUREMENT PROCEDURE

### 4.1. Specific Absorption Rate (SAR)

SAR is related to the rate at which energy is absorbed per unit mass in object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and occupational/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element(dv) of given mass density (ρ). The equation description is as below:

$$SAR = \frac{d}{dt} \left( \frac{dW}{dm} \right) = \frac{d}{dt} \left( \frac{dW}{\rho dV} \right)$$

SAR is expressed in units of Watts per kilogram (W/kg)

SAR can be obtained using either of the following equations:

$$SAR = \frac{\sigma E^2}{\rho}$$

$$SAR = c_h \left. \frac{dT}{dt} \right|_{t=0}$$

Where

SAR	is the specific absorption rate in watts per kilogram;
E	is the r.m.s. value of the electric field strength in the tissue in volts per meter;
σ	is the conductivity of the tissue in siemens per metre;
ρ	is the density of the tissue in kilograms per cubic metre;
c <sub>h</sub>	is the heat capacity of the tissue in joules per kilogram and Kelvin;

$\left. \frac{dT}{dt} \right|_{t=0}$  is the initial time derivative of temperature in the tissue in kelvins per second



## 4.2. SAR Measurement Procedure

### Step 1: Power Reference Measurement

The Power Reference Measurement and Power Drift Measurement are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface is 2.7mm This distance cannot be smaller than the distance os sensor calibration points to probe tip as `defined in the probe properties,

### Step 2: 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 fine measurement around the hot spot. The sophisticated interpolation routines implemented in SATIMO software can find the maximum locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in db) is specified in the standards for compliance testing. For example, a 2db range is required in IEEE Standard 1528 and IEC62209 standards, whereby 3db is a requirement when compliance is assessed in accordance with the ARIB standard (Japan) If one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximum are detected, the number of Zoom Scan has to be increased accordingly.

Area Scan Parameters extracted from KDB 865664 D01 SAR Measurement 100MHz to 6GHz

	$\leq 3 \text{ GHz}$	$> 3 \text{ GHz}$
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	$5 \pm 1 \text{ mm}$	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5 \text{ mm}$
Maximum probe angle from probe axis to phantom surface normal at the measurement location	$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
Maximum area scan spatial resolution: $\Delta x_{\text{Area}}, \Delta y_{\text{Area}}$	$\leq 2 \text{ GHz}: \leq 15 \text{ mm}$ $2 - 3 \text{ GHz}: \leq 12 \text{ mm}$	$3 - 4 \text{ GHz}: \leq 12 \text{ mm}$ $4 - 6 \text{ GHz}: \leq 10 \text{ mm}$
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be $\leq$ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

### Step 3: Zoom Scan

Zoom Scan are used to assess the peak spatial SAR value within a cubic average volume containing 1g abd 10g of simulated tissue. The Zoom Scan measures points(refer to table below) within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1g and 10g and displays these values next to the job's label.

## Zoom Scan Parameters extracted from KDB865664 d01 SAR Measurement 100MHz to 6GHz

Maximum zoom scan spatial resolution: $\Delta x_{Zoom}$ , $\Delta y_{Zoom}$			$\leq 2$ GHz: $\leq 8$ mm 2 – 3 GHz: $\leq 5$ mm*	3 – 4 GHz: $\leq 5$ mm* 4 – 6 GHz: $\leq 4$ mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		$\leq 5$ mm	3 – 4 GHz: $\leq 4$ mm 4 – 5 GHz: $\leq 3$ mm 5 – 6 GHz: $\leq 2$ mm
	graded grid	$\Delta z_{Zoom}(1)$ : between 1 <sup>st</sup> two points closest to phantom surface	$\leq 4$ mm	3 – 4 GHz: $\leq 3$ mm 4 – 5 GHz: $\leq 2.5$ mm 5 – 6 GHz: $\leq 2$ mm
		$\Delta z_{Zoom}(n>1)$ : between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		$\geq 30$ mm	3 – 4 GHz: $\geq 28$ mm 4 – 5 GHz: $\geq 25$ mm 5 – 6 GHz: $\geq 22$ mm
Note: $\delta$ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.				
* When zoom scan is required and the <u>reported</u> SAR from the <u>area scan based 1-g SAR estimation</u> procedures of KDB 447498 is $\leq 1.4$ W/kg, $\leq 8$ mm, $\leq 7$ mm and $\leq 5$ mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

## Step 4: Power Drift Measurement

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the same settings. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

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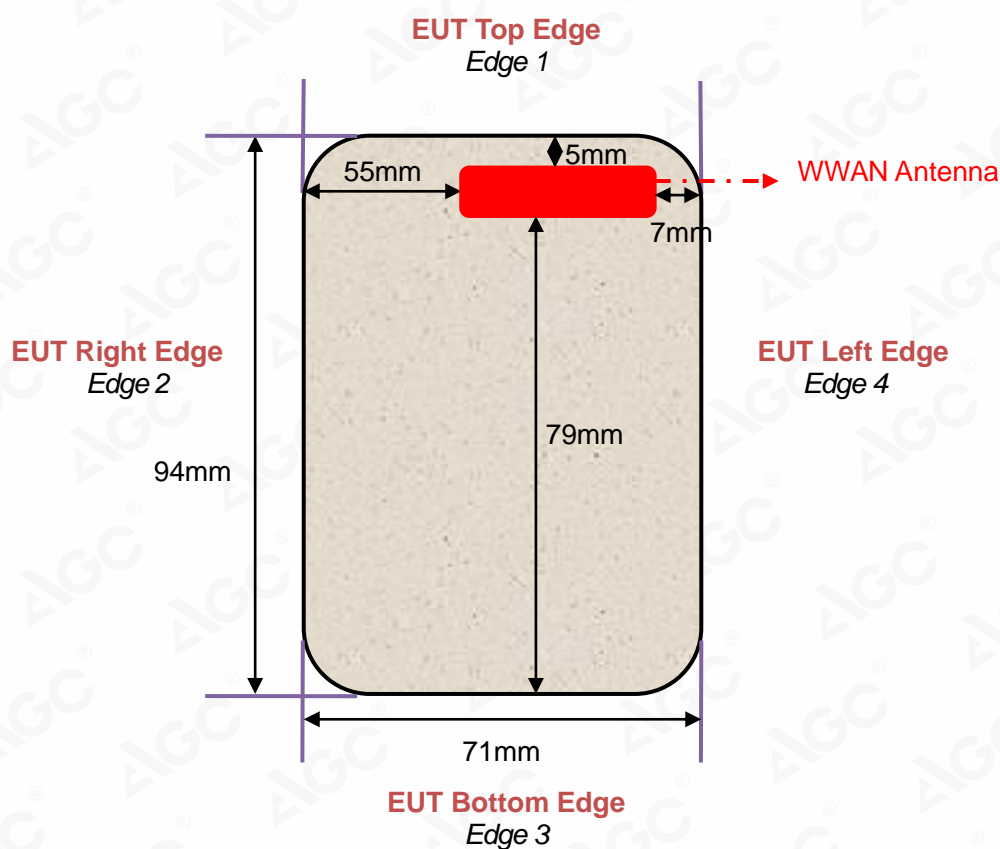
### 4.3. RF Exposure Conditions

Test Configuration and setting:

The EUT is a model of GSM Portable Mobile Station (MS). It supports GSM, LTE,.

For WWAN SAR testing, the device was controlled by using a base station emulator. Communication between the device and the emulator were established by air link. The distance between the EUT and the antenna is larger than 50cm, and the output power radiated from the emulator antenna is at least 30db smaller than the output power of EUT.

**Antenna Location: (the back view)**



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## 5. TISSUE SIMULATING LIQUID

For SAR measurement of the field distribution inside the phantom, the phantom must be filled with homogeneous tissue simulating liquid to a depth of at least 15cm. For head SAR testing the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15cm For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15cm. The nominal dielectric values of the tissue simulating liquids in the phantom and the tolerance of 10% are listed in 6.2

### 5.1. The composition of the tissue simulating liquid

Ingredient (% Weight) Frequency (MHz)	Water	Nacl	Polysorbate 20	DGBE	1,2 Propanediol	Triton X-100
750 Head	35	2	0.0	0.0	63	0.0
835 Head	50.36	1.25	48.39	0.0	0.0	0.0
1750 Head	52.64	0.36	0.0	47	0.0	0.0
1900 Head	54.9	0.18	0.0	44.92	0.0	0.0
2600 Head	55.242	0.306	0	44.452	0	0

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## 5.2. Tissue Dielectric Parameters for Head and Body Phantoms

The head tissue dielectric parameters recommended by the IEC 62209-1 have been incorporated in the following table. The body tissue dielectric parameters recommended by the IEC 62209-2 have been incorporated in the following table.

Target Frequency (MHz)	head		body	
	$\epsilon_r$	$\sigma$ (S/m)	$\epsilon_r$	$\sigma$ (S/m)
300	45.3	0.87	45.3	0.87
450	43.5	0.87	43.5	0.87
<b>750</b>	<b>41.9</b>	<b>0.89</b>	<b>41.9</b>	<b>0.89</b>
<b>835</b>	<b>41.5</b>	<b>0.90</b>	<b>41.5</b>	<b>0.90</b>
900	41.5	0.97	41.5	0.97
915	41.5	1.01	41.5	1.01
1450	40.5	1.20	40.5	1.20
1610	40.3	1.29	40.3	1.29
<b>1750</b>	<b>40.1</b>	<b>1.37</b>	<b>40.1</b>	<b>1.37</b>
<b>1800 – 2000</b>	<b>40.0</b>	<b>1.40</b>	<b>40.0</b>	<b>1.40</b>
2450	39.2	1.80	39.2	1.80
<b>2600</b>	<b>39.0</b>	<b>1.96</b>	<b>39.0</b>	<b>1.96</b>
3000	38.5	2.40	38.5	2.40

( $\epsilon_r$  = relative permittivity,  $\sigma$  = conductivity and  $\rho = 1000 \text{ kg/m}^3$ )

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### 5.3. Tissue Calibration Result

The dielectric parameters of the liquids were verified prior to the SAR evaluation using SATIMO Dielectric Probe Kit and R&S Network Analyzer ZVL6.

Tissue Stimulant Measurement for 750MHz					
Head	Fr. (MHz)	Dielectric Parameters ( $\pm 10\%$ )		Tissue Temp [°C]	Test time
		$\epsilon_r$ 41.9 (37.71-46.09)	$\delta$ [s/m] 0.89(0.801-0.979)		
	707.5	44.76	0.85	21.0	Aug. 06,2021
	710	43.40	0.88		
	750	42.68	0.90		
	782	41.22	0.93		

Tissue Stimulant Measurement for 835MHz					
Head	Fr. (MHz)	Dielectric Parameters ( $\pm 10\%$ )		Tissue Temp [°C]	Test time
		$\epsilon_r$ 41.5 (37.35-45.65)	$\delta$ [s/m] 0.90(0.81-0.99)		
	824.2	43.15	0.89	21.2	Jul. 24,2021
	835	42.37	0.91		
	836.6	41.62	0.93		
	848.8	40.26	0.96		

Tissue Stimulant Measurement for 835MHz					
Head	Fr. (MHz)	Dielectric Parameters ( $\pm 10\%$ )		Tissue Temp [°C]	Test time
		$\epsilon_r$ 41.5 (37.35-45.65)	$\delta$ [s/m] 0.90(0.81-0.99)		
	835	40.61	0.89	21.1	Aug. 02,2021
	836.5	39.42	0.92		

Tissue Stimulant Measurement for 1750MHz					
Head	Fr. (MHz)	Dielectric Parameters ( $\pm 10\%$ )		Tissue Temp [°C]	Test time
		$\epsilon_r$ 40.1 (36.09-44.11)	$\delta$ [s/m] 1.37(1.233-1.507)		
	1712.5	42.12	1.32	21.5	Aug. 04,2021
	1732.5	40.76	1.36		
	1750	40.37	1.37		
	1752.5	39.23	1.38		

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Tissue Stimulant Measurement for 1900MHz					
Head	Fr. (MHz)	Dielectric Parameters ( $\pm 10\%$ )		Tissue Temp [°C]	Test time
		$\epsilon_r 40.00(36.00-44.00)$	$\delta [s/m] 1.40(1.26-1.54)$		
	1880	41.42	1.38	20.8	Jul. 25,2021
	1900	40.81	1.41		

Tissue Stimulant Measurement for 1900MHz					
Head	Fr. (MHz)	Dielectric Parameters ( $\pm 10\%$ )		Tissue Temp [°C]	Test time
		$\epsilon_r 40.00(36.00-44.00)$	$\delta [s/m] 1.40(1.26-1.54)$		
	1880	41.63	1.38	21.8	Aug. 03,2021
	1882.5	40.56	1.40		
	1900	39.51	1.41		

Tissue Stimulant Measurement for 2600MHz					
Head	Fr. (MHz)	Dielectric Parameters ( $\pm 10\%$ )		Tissue Temp [°C]	Test time
		$\epsilon_r 39(35.1-42.9)$	$\delta [s/m] 1.96(1.764-2.156)$		
	2537.5	40.95	1.83	21.3	Jul. 28,2021
	2572.5	40.59	1.85		
	2593	40.16	1.90		
	2595	40.03	1.92		
	2600	39.14	1.98		
	2617.5	38.76	1.99		
	2652.5	38.46	1.99		

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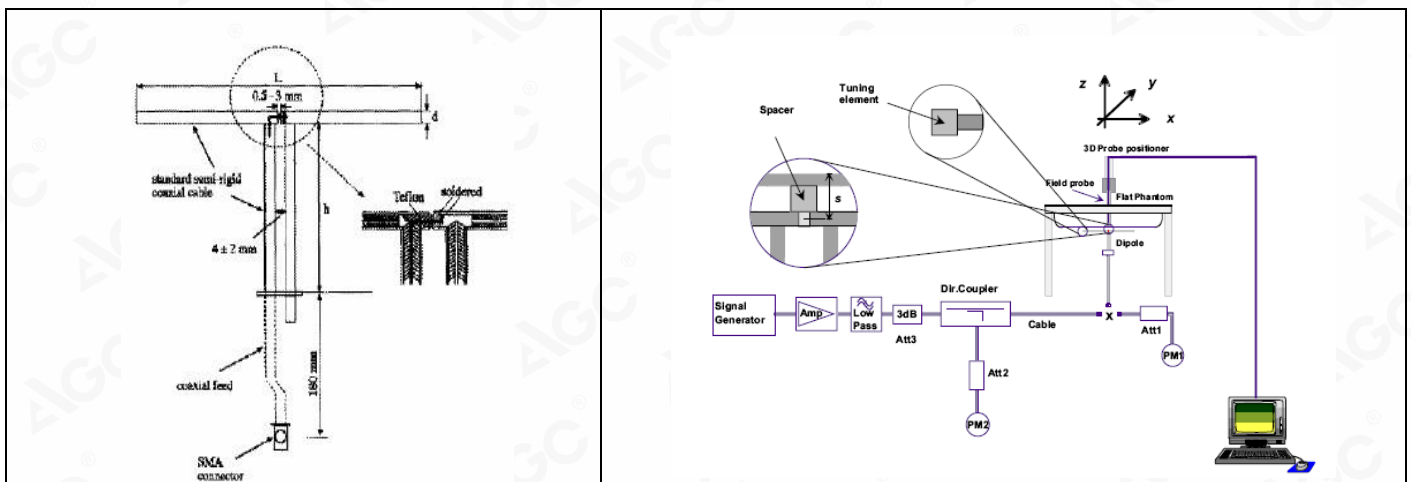
## 6. SAR SYSTEM CHECK PROCEDURE

### 6.1. SAR System Check Procedures

SAR system check is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device. The same SAR probe(s) and tissue-equivalent media combinations used with each specific SAR system for system verification must be used for device testing. When multiple probe calibration points are required to cover substantially large transmission bands, independent system verifications are required for each probe calibration point. A system verification must be performed before each series of SAR measurements using the same probe calibration point and tissue-equivalent medium. Additional system verification should be considered according to the conditions of the tissue-equivalent medium and measured tissue dielectric parameters, typically every three to four days when the liquid parameters are remeasured or sooner when marginal liquid parameters are used at the beginning of a series of measurements.

Each SATIMO system is equipped with one or more system check kits. These units, together with the predefined measurement procedures within the SATIMO software, enable the user to conduct the system check and system validation. System kit includes a dipole, and dipole device holder.

The system check verifies that the system operates within its specifications. It's performed daily or before every SAR measurement. The system check uses normal SAR measurement in the flat section of the phantom with a matched dipole at a specified distance. The system check setup is shown as below.



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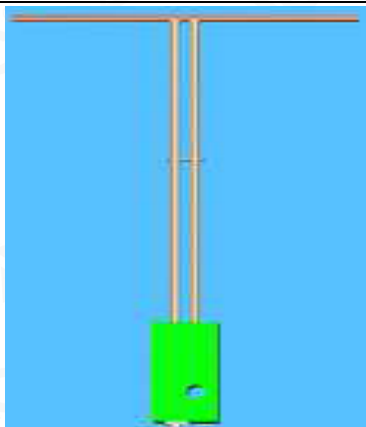
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## 6.2. SAR System Check

### 6.2.1. Dipoles

	<p>The dipoles used is based on the IEEE-1528 standard, and is complied with mechanical and electrical specifications in line with the requirements of IEEE. the table below provides details for the mechanical and electrical Specifications for the dipoles.</p>
---	---

Frequency	L (mm)	h (mm)	d (mm)
750MHz	176	100	6.35
835MHz	161.0	89.8	3.6
1800MHz	71.6	41.7	3.6
1900MHz	68	39.5	3.6
2600MHz	48.5	28.8	3.6

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## 6.2.2. System Check Result

System Performance Check at 750MHz&835MHz &1800MHz &1900MHz &2600MHz for Head								
Validation Kit: SN47/14 DIP 0G750-340& SN29/15 DIP 0G835-383& SN46/11 DIP 1G800-186& SN 46/11 DIP 1G900-187& SN 47/14 DIP 2G600-342								
Frequency [MHz]	Target Value(W/kg)		Reference Result ( $\pm 10\%$ )		Tested Value(W/kg)		Tissue Temp. [°C]	Test time
	1g	10g	1g	10g	1g	10g		
750	8.31	5.45	7.479-9.141	4.905-5.995	8.19	5.16	21.0	Aug. 06,2021
835	9.85	6.27	8.865-10.835	5.643-6.897	9.73	6.17	21.2	Jul. 24,2021
835	9.85	6.27	8.865-10.835	5.643-6.897	9.89	6.11	21.1	Aug. 02,2021
1800	39.07	20.29	35.163-42.977	18.261-22.319	37.11	19.25	21.5	Aug. 04,2021
1900	40.25	20.50	36.225-44.275	18.45-22.55	37.44	19.24	20.8	Jul. 25,2021
1900	40.25	20.50	36.225-44.275	18.45-22.55	40.66	20.34	21.8	Aug. 03,2021
2600	56.86	24.84	51.174-62.546	22.356-27.324	54.94	24.05	21.3	Jul. 28,2021

Note:

(1) We use a CW signal of 18dBm for system check, and then all SAR value are normalized to 1W forward power. The result must be within  $\pm 10\%$  of target value.

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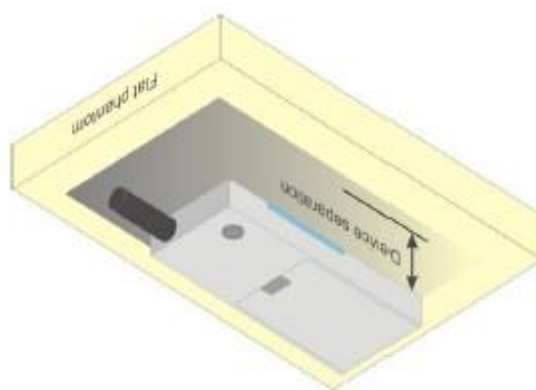
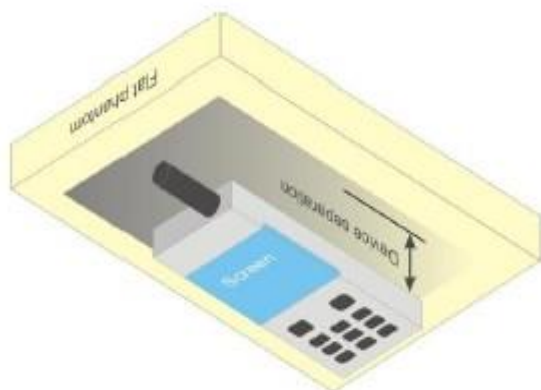


## 7. EUT TEST POSITION

This EUT was tested in **Body back, Body front and 4 edges**.

### 7.1. Body Worn Position

- (1) To position the EUT parallel to the phantom surface.
- (2) To adjust the EUT parallel to the flat phantom.
- (3) To adjust the distance between the EUT surface and the flat phantom to **0mm**.



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## 8. SAR EXPOSURE LIMITS

### Limits for General Population/Uncontrolled Exposure (W/kg)

Type Exposure	Uncontrolled Environment Limit (W/kg)
Spatial Peak SAR (1g cube tissue for brain or body)	1.60
Spatial Average SAR (Whole body)	0.08
Spatial Peak SAR (Limbs)	4.0

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## 9. TEST FACILITY

<b>Test Site</b>	Attestation of Global Compliance (Shenzhen) Co., Ltd
<b>Location</b>	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
<b>Designation Number</b>	CN1259
<b>FCC Test Firm Registration Number</b>	975832
<b>A2LA Cert. No.</b>	5054.02
<b>Description</b>	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA

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## 10. TEST EQUIPMENT LIST

Equipment description	Manufacturer/ Model	Identification No.	Current calibration date	Next calibration date
SAR Probe	MVG	SN 03/18 EP327	Dec. 17,2020	Dec. 16,2021
Phantom	SATIMO	SN_4511_SAM90	Validated. No cal required.	Validated. No cal required.
Liquid	SATIMO	-	Validated. No cal required.	Validated. No cal required.
Comm Tester	Agilent-8960	GB46310822	Aug. 21,2020	Aug. 20,2021
Comm Tester	R&S- CMW500	121209	Aug. 21,2020	Aug. 20,2021
Multimeter	Keithley 2000	1350784	Sep. 07,2020	Sep. 06,2021
SAR Software	SATIMO-OpenSAR	OpenSAR V4_02_32	N/A	N/A
Dipole	SATIMO SID750	SN47/14 DIP 0G750-340	Apr. 26,2019	Apr. 25,2022
Dipole	SATIMO SID835	SN29/15 DIP 0G835-383	Apr. 26,2019	Apr. 25,2022
Dipole	SATIMO SID1800	SN46/11 DIP 1G800-186	Apr. 26,2019	Apr. 25,2022
Dipole	SATIMO SID1900	SN 46/11 DIP 1G900-187	Apr. 26,2019	Apr. 25,2022
Dipole	SATIMO SID2600	SN 47/14 DIP 2G600-342	Apr. 26,2019	Apr. 25,2022
Signal Generator	Agilent-E4438C	US41461365	Aug. 21,2020	Aug. 20,2021
Vector Analyzer	Agilent / E4440A	US41421290	Sep. 06,2020	Sep. 05,2021
Network Analyzer	Rhode & Schwarz ZVL6	SN101443	Oct. 16,2020	Oct. 15,2021
Attenuator	Warison /WATT-6SR1211	S/N:WRJ34AYM2F1	June 09,2021	June 08,2022
Attenuator	Mini-circuits / VAT-10+	31405	June 09,2021	June 08,2022
Amplifier	AS0104-55_55	1004793	June 10,2021	June 09,2022
Directional Couple	Werlatone/ C5571-10	SN99463	May 15,2020	May 14,2022
Directional Couple	Werlatone/ C6026-10	SN99482	May 15,2020	May 14,2022
Power Sensor	NRP-Z21	1137.6000.02	Sep. 08,2020	Sep. 07,2021
Power Sensor	NRP-Z23	100323	Feb. 17,2021	Feb. 16,2022
Power Viewer	R&S	V2.3.1.0	N/A	N/A

Note: Per KDB 865664 Dipole SAR Validation, AGC Lab has adopted 3 years calibration intervals. On annual basis, every measurement dipole has been evaluated and is in compliance with the following criteria:

1. There is no physical damage on the dipole;
2. System validation with specific dipole is within 10% of calibrated value;
3. Return-loss is within 20% of calibrated measurement;
4. Impedance is within 5Ω of calibrated measurement.

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## 11. MEASUREMENT UNCERTAINTY

SATIMO Uncertainty- SN 03/18 EP327 Measurement uncertainty for DUT averaged over 1 gram / 10 gram.									
Uncertainty Component	Sec.	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	vi
<b>Measurement System</b>									
Probe calibration	E.2.1	7.000	N	1	1	1	7.000	7.000	∞
Axial Isotropy	E.2.2	0.075	R	$\sqrt{3}$	$\sqrt{0.5}$	$\sqrt{0.5}$	0.031	0.031	∞
Hemispherical Isotropy	E.2.2	0.075	R	$\sqrt{3}$	$\sqrt{0.5}$	$\sqrt{0.5}$	0.031	0.031	∞
Boundary effect	E.2.3	1.000	R	$\sqrt{3}$	1	1	0.577	0.577	∞
Linearity	E.2.4	0.870	R	$\sqrt{3}$	1	1	0.502	0.502	∞
System detection limits	E.2.4	1.000	R	$\sqrt{3}$	1	1	0.577	0.577	∞
Modulation response	E.2.5	3.000	R	$\sqrt{3}$	1	1	1.732	1.732	∞
Readout Electronics	E.2.6	0.021	N	1	1	1	0.021	0.021	∞
Response Time	E.2.7	0.000	R	$\sqrt{3}$	1	1	0.000	0.000	∞
Integration Time	E.2.8	1.400	R	$\sqrt{3}$	1	1	0.808	0.808	∞
RF ambient conditions-Noise	E.6.1	3.000	R	$\sqrt{3}$	1	1	1.732	1.732	∞
RF ambient conditions-reflections	E.6.1	3.000	R	$\sqrt{3}$	1	1	1.732	1.732	∞
Probe positioner mechanical tolerance	E.6.2	1.400	R	$\sqrt{3}$	1	1	0.808	0.808	∞
Probe positioning with respect to phantom shell	E.6.3	1.400	R	$\sqrt{3}$	1	1	0.808	0.808	∞
Extrapolation, interpolation, and integrations algorithms for max. SAR evaluation	E.5	2.300	R	$\sqrt{3}$	1	1	1.328	1.328	∞
<b>Test sample Related</b>									
Test sample positioning	E.4.2	2.6	N	1	1	1	2.600	2.600	∞
Device holder uncertainty	E.4.1	3	N	1	1	1	3.000	3.000	∞
Output power variation—SAR drift measurement	E.2.9	5	R	$\sqrt{3}$	1	1	2.887	2.887	∞
SAR scaling	E.6.5	5	R	$\sqrt{3}$	1	1	2.887	2.887	∞
<b>Phantom and tissue parameters</b>									
Phantom shell uncertainty—shape, thickness, and permittivity	E.3.1	4	R	$\sqrt{3}$	1	1	2.309	2.309	∞
Uncertainty in SAR correction for deviations in permittivity and conductivity	E.3.2	1.9	N	1	1	0.84	1.900	1.596	∞
Liquid conductivity measurement	E.3.3	2.5	R	$\sqrt{3}$	0.78	0.71	1.126	1.025	∞
Liquid permittivity measurement	E.3.3	4	N	1	0.78	0.71	3.120	2.840	M
Liquid conductivity—temperature uncertainty	E.3.4	2.5	R	$\sqrt{3}$	0.23	0.26	0.332	0.375	∞
Liquid permittivity—temperature uncertainty	E.3.4	5	N	1	0.23	0.26	1.150	1.300	M
Combined Standard Uncertainty			RSS				10.525	10.341	
Expanded Uncertainty (95% Confidence interval)			K=2				21.051	20.681	

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SATIMO Uncertainty- SN 03/18 EP327									
System Validation uncertainty for DUT averaged over 1 gram / 10 gram.									
Uncertainty Component	Sec.	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	vi
<b>Measurement System</b>									
Probe calibration	E.2.1	7.000	N	1	1	1	7.000	7.000	∞
Axial Isotropy	E.2.2	0.075	R	$\sqrt{3}$	1	1	0.043	0.043	∞
Hemispherical Isotropy	E.2.2	0.075	R	$\sqrt{3}$	0	0	0.000	0.000	∞
Boundary effect	E.2.3	1.000	R	$\sqrt{3}$	1	1	0.577	0.577	∞
Linearity	E.2.4	0.870	R	$\sqrt{3}$	1	1	0.502	0.502	∞
System detection limits	E.2.4	1.0	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Modulation response	E.2.5	3.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Readout Electronics	E.2.6	0.021	N	1	1	1	0.021	0.021	∞
Response Time	E.2.7	0.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Integration Time	E.2.8	1.4	R	$\sqrt{3}$	0	0	0.00	0.00	∞
RF ambient conditions-Noise	E.6.1	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
RF ambient conditions-reflections	E.6.1	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
Probe positioner mechanical tolerance	E.6.2	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Probe positioning with respect to phantom shell	E.6.3	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Extrapolation, interpolation, and integrations algorithms for max. SAR evaluation	E.5	2.3	R	$\sqrt{3}$	1	1	1.33	1.33	∞
<b>System validation source</b>									
Deviation of experimental dipole from numerical dipole	E.6.4	5.0	N	1	1	1	5.00	5.00	∞
Input power and SAR drift measurement	8,6.6.4	5.0	R	$\sqrt{3}$	1	1	2.89	2.89	∞
Dipole axis to liquid distance	8,E.6.6	2.0	R	$\sqrt{3}$	1	1	1.15	1.15	∞
<b>Phantom and set-up</b>									
Phantom shell uncertainty—shape, thickness, and permittivity	E.3.1	4.0	R	$\sqrt{3}$	1	1	2.31	2.31	∞
Uncertainty in SAR correction for deviations in permittivity and conductivity	E.3.2	1.9	N	1	1	0.84	1.90	1.60	∞
Liquid conductivity (temperature uncertainty)	E.3.3	2.5	R	$\sqrt{3}$	0.78	0.71	1.13	1.02	∞
Liquid conductivity (measured)	E.3.3	4	N	1	0.78	0.71	3.12	2.84	M
Liquid permittivity (temperature uncertainty)	E.3.4	2.5	R	$\sqrt{3}$	0.23	0.26	0.33	0.38	∞
Liquid permittivity (measured)	E.3.4	5	N	1	0.23	0.26	1.15	1.30	M
Combined Standard Uncertainty			RSS				10.458	10.272	
Expanded Uncertainty (95% Confidence interval)			K=2				20.916	20.543	

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SATIMO Uncertainty- SN 03/18 EP327									
System Check uncertainty for DUT averaged over 1 gram / 10 gram.									
Uncertainty Component	Sec.	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	vi
<b>Measurement System</b>									
Probe calibration drift	E.2.1.3	0.5	N	1	1	1	0.50	0.50	∞
Axial Isotropy	E.2.2	0.075	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Hemispherical Isotropy	E.2.2	0.075	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Boundary effect	E.2.3	1.000	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Linearity	E.2.4	0.870	R	$\sqrt{3}$	0	0	0.00	0.00	∞
System detection limits	E.2.4	1.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Modulation response	E.2.5	3.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Readout Electronics	E.2.6	0.021	N	1	0	0	0.00	0.00	∞
Response Time	E.2.7	0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Integration Time	E.2.8	1.4	R	$\sqrt{3}$	0	0	0.00	0.00	∞
RF ambient conditions-Noise	E.6.1	3.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
RF ambient conditions-reflections	E.6.1	3.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Probe positioner mechanical tolerance	E.6.2	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Probe positioning with respect to phantom shell	E.6.3	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Extrapolation, interpolation, and integrations algorithms for max. SAR evaluation	E.5	2.3	R	$\sqrt{3}$	0	0	0.00	0.00	∞
<b>System check source (dipole)</b>									
Deviation of experimental dipoles	E.6.4	2.0	N	1	1	1	2.00	2.00	∞
Input power and SAR drift measurement	8,6.6.4	5.0	R	$\sqrt{3}$	1	1	2.89	2.89	∞
Dipole axis to liquid distance	8,E.6.6	2.0	R	$\sqrt{3}$	1	1	1.15	1.15	∞
<b>Phantom and tissue parameters</b>									
Phantom shell uncertainty—shape, thickness, and permittivity	E.3.1	4	R	$\sqrt{3}$	1	1	2.31	2.31	∞
Uncertainty in SAR correction for deviations in permittivity and conductivity	E.3.2	1.9	N	1	1	0.84	1.90	1.60	∞
Liquid conductivity measurement	E.3.3	2.5	R	$\sqrt{3}$	0.78	0.71	1.13	1.02	∞
Liquid permittivity measurement	E.3.3	4	N	1	0.78	0.71	3.12	2.84	M
Liquid conductivity—temperature uncertainty	E.3.4	2.5	R	$\sqrt{3}$	0.23	0.26	0.33	0.38	∞
Liquid permittivity—temperature uncertainty	E.3.4	5	N	1	0.23	0.26	1.15	1.30	M
Combined Standard Uncertainty			RSS				5.562	5.203	
Expanded Uncertainty (95% Confidence interval)			K=2				11.124	10.406	

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## 12. CONDUCTED POWER MEASUREMENT

### GSM BAND

Mode	Frequency(MHz)	Avg. Burst Power(dBm)	Duty cycle Factor(dBm)	Frame Power(dBm)
Maximum Power <1>				
GSM 850	824.2	31.44	-9.03	22.41
	836.6	31.39	-9.03	22.36
	848.8	<b>31.63</b>	-9.03	22.60

Mode	Frequency(MHz)	Avg. Burst Power(dBm)	Duty cycle Factor(dBm)	Frame Power(dBm)
Maximum Power <1>				
PCS1900	1850.2	29.51	-9.03	20.48
	1880	29.53	-9.03	20.50
	1909.8	<b>29.72</b>	-9.03	20.69

#### Note 1:

The Frame Power (Source-based time-averaged Power) is scaled the maximum burst average power based on time slots. The calculated methods are show as following:

Frame Power = Max burst power (1 Up Slot) – 9 dB

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## LTE Band

### LTE (TDD) Considerations

For Time-Division Duplex (TDD) systems, SAR must be tested using a fixed periodic duty factor according to the highest transmission duty factor implemented for the device and supported by the defined 3GPP LTE TDD configurations.

SAR was tested with the highest transmission duty factor (63.33%) using Uplink-downlink configuration 0 and Special subframe configuration 7.

LTE TDD Band 38,41 supports 3GPP TS 36.211 section 4.2 for Type 2 Frame Structure and Table 4.2-2 for uplink-downlink configurations and Table 4.2-1 for Special subframe configurations.

**Table 4.2-1: Configuration of special subframe (lengths of DwPTS/GP/UpPTS)**

Special subframe configuration	Normal cyclic prefix in downlink			Extended cyclic prefix in downlink		
	DwPTS	UpPTS		DwPTS	UpPTS	
		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
0	$6592 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$	$7680 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$
1	$19760 \cdot T_s$			$20480 \cdot T_s$		
2	$21952 \cdot T_s$			$23040 \cdot T_s$		
3	$24144 \cdot T_s$			$25600 \cdot T_s$		
4	$26336 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$	$7680 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$
5	$6592 \cdot T_s$			$20480 \cdot T_s$		
6	$19760 \cdot T_s$			$23040 \cdot T_s$		
7	$21952 \cdot T_s$			$12800 \cdot T_s$	-	-
8	$24144 \cdot T_s$			-		
9	$13168 \cdot T_s$			-	-	-

**Table 4.2-2: Uplink-downlink configurations**

Uplink-downlink configuration	Downlink-to-Uplink Switch-point periodicity	Subframe number									
		0	1	2	3	4	5	6	7	8	9
0	5 ms	D	S	U	U	U	D	S	U	U	U
1	5 ms	D	S	U	U	D	D	S	U	U	D
2	5 ms	D	S	U	D	D	D	S	U	D	D
3	10 ms	D	S	U	U	U	D	D	D	D	D
4	10 ms	D	S	U	U	D	D	D	D	D	D
5	10 ms	D	S	U	D	D	D	D	D	D	D
6	5 ms	D	S	U	U	U	D	S	U	U	D

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### Calculated Duty Cycle

Uplink-Downlink Configuration	Downlink-to-Uplink Switch-point Periodicity	Subframe Number										Calculated Duty Cycle(%)
		0	1	2	3	4	5	6	7	8	9	
0	5ms	D	S	U	U	U	D	S	U	U	U	63.33
1	5ms	D	S	U	U	D	D	S	U	U	D	43.33
2	5ms	D	S	U	D	D	D	S	U	D	D	23.33
3	10ms	D	S	U	U	U	D	D	D	D	D	31.67
4	10ms	D	S	U	U	D	D	D	D	D	D	21.67
5	10ms	D	S	U	D	D	D	D	D	D	D	11.67
6	5ms	D	S	U	U	U	D	S	U	U	D	53.33

**Note:** Calculated Duty Cycle = Extended cyclic prefix in uplink x (Ts) x # of S + # of U

Example for Calculated Duty Cycle for Uplink-Downlink Configuration 0:

Calculated Duty Cycle =  $5120 \times [1/(15000 \times 2048)] \times 2 + 6 \text{ ms} = 63.33\%$

where

$T_s = 1/(15000 \times 2048)$  seconds

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# LTE Band

Conducted Power of LTE Band 2(dBm)							
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					1852.57	18900	19193
1.4MHz	QPSK	1	0	0	19.53	20.89	20.29
			3	0	19.42	20.96	20.29
			5	0	19.35	20.93	20.22
		3	0	0	19.65	20.89	20.27
			2	0	19.63	20.88	20.26
			3	0	19.64	20.92	20.21
		6	0	1	20.03	20.99	20.42
	16QAM	1	0	1	19.50	20.93	20.48
			3	1	19.53	21.00	20.47
			5	1	19.47	21.02	20.39
		3	0	1	19.38	21.11	20.39
			2	1	19.38	21.10	20.39
			3	1	19.39	21.14	20.34
		6	0	2	19.41	20.85	20.32
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					18615	18900	19185
3MHz	QPSK	1	0	0	18.81	20.64	20.11
			7	0	18.89	20.81	20.22
			14	0	18.74	20.71	20.02
		8	0	1	18.88	20.66	20.19
			4	1	18.88	20.66	20.20
			7	1	18.84	20.74	20.17
		15	0	1	18.87	20.71	20.34
	16QAM	1	0	1	19.55	20.76	20.46
			7	1	19.64	20.93	20.57
			14	1	19.48	20.84	20.36
		8	0	2	19.10	20.66	20.38
			4	2	19.09	20.66	20.39
			7	2	19.07	20.74	20.37
		15	0	2	19.00	20.72	20.29

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Conducted Power of LTE Band 2(dBm)							
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					18625	18900	19175
5MHz	QPSK	1	0	0	18.74	20.47	19.86
			13	0	18.94	20.84	20.26
			24	0	18.55	20.52	19.90
		12	0	1	18.81	20.60	20.10
			6	1	18.85	20.60	20.09
			13	1	18.75	20.66	20.16
		25	0	1	18.81	20.67	20.26
	16QAM	1	0	1	18.87	20.76	20.03
			13	1	19.07	21.12	20.41
			24	1	18.68	20.81	20.03
		12	0	2	18.91	20.68	20.15
			6	2	18.91	20.68	20.15
			13	2	18.83	20.76	20.21
		25	0	2	18.94	20.07	20.16

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Conducted Power of LTE Band 4(dBm)							
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					19957	20175	20393
1.4MHz	QPSK	1	0	0	18.23	19.36	19.11
			3	0	18.31	19.34	19.18
			5	0	18.29	19.31	19.14
		3	0	0	18.21	19.32	19.19
			2	0	18.21	19.32	19.18
			3	0	18.25	19.29	19.24
		6	0	1	18.35	19.28	19.10
	16QAM	1	0	1	18.52	19.63	19.32
			3	1	18.58	19.63	19.38
			5	1	18.60	19.60	19.36
		3	0	1	18.66	19.52	19.20
			2	1	18.67	19.52	19.20
			3	1	18.72	19.49	19.25
		6	0	2	18.29	19.45	19.24
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					19965	20175	20385
3MHz	QPSK	1	0	0	18.14	19.36	19.08
			7	0	18.33	19.41	19.19
			14	0	18.34	19.24	19.10
		8	0	1	18.24	19.32	19.17
			4	1	18.24	19.32	19.16
			7	1	18.37	19.29	19.20
		15	0	1	18.49	19.29	19.12
	16QAM	1	0	1	19.04	19.66	19.27
			7	1	19.23	19.67	19.40
			14	1	19.23	19.51	19.32
		8	0	2	18.61	19.49	19.23
			4	2	18.61	19.50	19.22
			7	2	18.74	19.44	19.26
		15	0	2	18.43	19.39	19.30

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Conducted Power of LTE Band 4(dBm)							
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					19975	20175	20375
5MHz	QPSK	1	0	0	18.20	19.26	18.83
			13	0	18.65	19.45	19.21
			24	0	18.47	19.09	18.97
		12	0	1	18.25	19.30	19.03
			6	1	18.27	19.31	19.03
			13	1	18.51	19.21	19.12
		25	0	1	18.61	19.30	19.03
	16QAM	1	0	1	18.31	19.73	18.89
			13	1	18.78	<b>19.87</b>	19.25
			24	1	18.69	19.51	19.01
		12	0	2	18.43	19.54	18.98
			6	2	18.43	19.55	18.99
			13	2	18.69	19.44	19.08
		25	0	2	18.49	19.35	19.13

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Conducted Power of LTE Band 5(dBm)							
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					20407	20525	20643
1.4MHz	QPSK	1	0	0	21.43	23.12	23.20
			3	0	21.40	23.00	23.22
			5	0	21.36	22.86	23.26
		3	0	0	21.53	23.03	23.23
			2	0	21.49	23.03	23.19
			3	0	21.38	22.87	23.29
		6	0	1	20.55	21.99	22.35
	16QAM	1	0	1	20.64	22.27	22.47
			3	1	20.62	22.21	22.50
			5	1	20.60	22.04	22.56
		3	0	1	20.75	22.15	22.32
			2	1	20.73	22.16	22.32
			3	1	20.71	22.02	22.34
		6	0	2	19.46	21.11	21.33
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					20415	20525	20635
3MHz	QPSK	1	0	0	21.36	23.33	22.31
			7	0	21.40	23.06	23.12
			14	0	21.47	22.48	23.21
		8	0	1	20.52	22.20	21.66
			4	1	20.50	22.23	21.68
			7	1	20.54	21.83	22.22
		15	0	1	20.68	22.01	22.01
	16QAM	1	0	1	21.10	22.54	21.53
			7	1	21.19	22.20	22.38
			14	1	21.17	21.71	22.48
		8	0	2	19.66	21.29	20.82
			4	2	19.69	21.31	20.82
			7	2	19.75	20.92	21.39
		15	0	2	19.51	21.08	21.08

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Conducted Power of LTE Band 5(dBm)							
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					20425	20525	20625
5MHz	QPSK	1	0	0	21.25	23.29	21.39
			13	0	21.60	23.03	22.63
			24	0	21.86	22.07	23.01
		12	0	1	20.46	22.25	20.90
			6	1	20.44	22.26	20.86
			13	1	20.75	21.61	22.02
		25	0	1	20.81	21.92	21.59
	16QAM	1	0	1	20.37	22.72	20.51
			13	1	20.71	22.43	21.65
			24	1	20.93	21.46	22.14
		12	0	2	19.45	21.47	19.94
			6	2	19.47	21.51	19.94
			13	2	19.83	20.82	21.02
		25	0	2	19.62	21.05	20.58

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Conducted Power of LTE Band 12(dBm)							
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					23017	23095	23173
1.4MHz	QPSK	1	0	0	19.84	21.71	22.33
			3	0	20.19	21.38	22.30
			5	0	20.47	21.08	22.24
		3	0	0	19.96	21.55	22.49
			2	0	19.93	21.54	22.47
			3	0	20.31	21.15	22.30
		6	0	1	19.05	20.28	21.61
	16QAM	1	0	1	18.94	20.94	21.55
			3	1	19.33	20.59	21.87
			5	1	19.60	20.33	21.55
		3	0	1	19.23	20.72	21.63
			2	1	19.21	20.72	21.60
			3	1	19.58	20.34	21.56
		6	0	2	18.17	19.63	20.66
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					23025	23095	23165
3MHz	QPSK	1	0	0	19.74	22.44	20.59
			7	0	21.01	21.36	22.10
			14	0	21.97	20.50	22.18
		8	0	1	19.35	21.03	20.30
			4	1	19.34	21.06	20.27
			7	1	20.57	20.06	21.51
		15	0	1	20.04	20.34	21.11
	16QAM	1	0	1	19.47	21.66	19.91
			7	1	20.73	20.58	21.49
			14	1	21.62	19.93	21.52
		8	0	2	18.39	20.09	19.45
			4	2	18.40	20.13	19.45
			7	2	19.61	19.15	20.75
		15	0	2	19.00	19.61	20.17

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Conducted Power of LTE Band 12(dBm)							
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					23035	23095	23155
5MHz	QPSK	1	0	0	19.82	<b>22.94</b>	19.45
			13	0	22.14	21.47	21.13
			24	0	22.83	20.00	22.01
		12	0	1	19.80	21.59	19.01
			6	1	19.81	21.61	19.00
			13	1	21.77	19.81	21.12
		25	0	1	21.08	20.70	20.35
	16QAM	1	0	1	18.95	22.35	18.60
			13	1	21.19	20.91	20.28
			24	1	21.94	19.46	21.35
		12	0	2	18.74	20.70	18.10
			6	2	18.71	20.75	18.10
			13	2	20.72	18.99	20.18
		25	0	2	20.04	19.84	19.32

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Conducted Power of LTE Band 13(dBm)							
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					23205	23230	23255
5MHz	QPSK	1	0	0	23.38	21.66	20.34
			13	0	22.65	20.56	21.94
			24	0	21.39	20.43	22.64
		12	0	1	22.75	20.28	19.62
			6	1	22.71	20.15	19.61
			13	1	21.10	19.63	21.82
		25	0	1	22.15	20.02	21.01
	16QAM	1	0	1	22.75	20.87	19.40
			13	1	21.72	20.05	20.81
			24	1	20.38	19.84	22.15
		12	0	2	21.78	19.21	18.67
			6	2	21.96	19.54	18.65
			13	2	20.24	18.98	20.86
		25	0	2	21.16	19.12	19.87

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Conducted Power of LTE Band 17(dBm)							
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					23755	23790	23825
5MHz	QPSK	1	0	0	22.85	20.95	19.51
			13	0	22.10	20.01	21.17
			24	0	20.50	19.79	22.04
		12	0	1	21.98	19.52	19.07
			6	1	21.99	19.54	19.06
			13	1	20.49	18.84	21.16
		25	0	1	21.18	19.28	20.33
	16QAM	1	0	1	21.83	20.27	18.67
			13	1	21.16	19.44	20.27
			24	1	19.66	19.11	21.29
		12	0	2	20.98	18.64	18.17
			6	2	21.00	18.69	18.17
			13	2	19.54	18.06	20.25
		25	0	2	20.41	18.25	19.42

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Conducted Power of LTE Band 25(dBm)							
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					26047	26365	26683
1.4MHz	QPSK	1	0	0	19.07	20.78	19.14
			2	0	19.09	20.82	19.19
			5	0	19.03	20.80	20.10
		3	0	0	19.04	20.74	19.08
			1	0	19.04	20.73	19.05
			3	0	19.04	20.76	18.99
		6	0	1	19.14	20.78	19.13
	16QAM	1	0	1	19.17	20.90	20.11
			2	1	19.20	20.94	20.17
			5	1	19.20	20.94	20.09
		3	0	1	19.32	20.80	20.38
			1	1	19.31	20.79	20.34
			3	1	19.32	20.82	20.17
		6	0	2	19.08	20.85	20.09
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					26055	26365	26675
3MHz	QPSK	1	0	0	19.11	20.86	19.56
			8	0	19.12	20.90	19.21
			14	0	18.96	20.77	18.70
		8	0	1	19.22	20.83	19.44
			4	1	19.21	20.83	19.45
			7	1	19.17	20.83	19.02
		15	0	1	19.49	20.86	19.41
	16QAM	1	0	1	19.75	21.01	19.84
			8	1	19.80	<b>21.04</b>	19.46
			14	1	19.64	20.92	18.93
		8	0	2	19.30	20.80	19.58
			4	2	19.31	20.80	19.58
			7	2	19.29	20.82	19.15
		15	0	2	19.19	20.80	19.34

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Conducted Power of LTE Band 25(dBm)							
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					26065	26365	26665
5MHz	QPSK	1	0	0	18.81	20.60	19.89
			12	0	19.05	20.88	19.54
			24	0	18.64	20.54	18.60
		12	0	1	18.91	20.71	19.81
			6	1	18.91	20.70	19.80
			13	1	18.84	20.65	19.14
		25	0	1	18.81	20.74	19.66
	16QAM	1	0	1	18.92	20.93	20.04
			12	1	19.12	21.23	19.65
			24	1	18.74	20.90	18.68
		12	0	2	18.95	20.82	19.86
			6	2	18.98	20.82	19.87
			13	2	18.88	20.81	19.19
		25	0	2	18.99	20.75	19.52

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Conducted Power of LTE Band 38(dBm)						
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				37775	38000	38225
5MHz	QPSK	1	0	21.82	20.79	21.17
			12	<b>21.83</b>	20.90	21.53
			24	21.44	20.70	21.43
		12	0	20.82	19.73	20.05
			6	20.80	19.73	20.07
			13	20.66	19.71	20.22
		25	0	20.84	19.66	20.21
	16QAM	1	0	20.66	19.90	20.02
			12	20.70	20.05	20.38
			24	20.38	19.75	20.25
		12	0	19.87	18.72	19.07
			6	19.88	18.75	19.06
			13	19.78	18.69	19.21
		25	0	19.86	18.53	19.21

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Conducted Power of LTE Band 41(dBm)							
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					39675	40620	41565
5MHz	QPSK	1	0	0	20.64	21.16	19.62
			12	0	20.99	<b>21.27</b>	19.58
			24	0	20.95	20.95	19.10
		12	0	1	19.65	19.95	18.48
			6	1	19.65	19.96	18.52
			13	1	19.81	19.84	18.28
		25	0	1	19.83	19.63	18.56
	16QAM	1	0	1	19.81	19.87	18.55
			12	1	20.21	20.05	18.51
			24	1	20.07	19.70	17.89
		12	0	2	18.68	18.78	17.63
			6	2	18.69	18.79	17.66
			13	2	18.95	18.66	17.45
		25	0	2	18.65	18.81	17.58

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The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS36.101 specification.

UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3.3-1 of the 3GPP TS36.101.

**Table 6.2.3.3-1 Maximum Power Reduction (MPR) for Power class3**

Modulation	Maximum Power Reduction (MPR) for Power[RB]						MPR(dB)
	1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

The allowed A-MPR values specified below in Table 6.2.4.3-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of "NS\_01".3

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