FCC SAR Test Report

Report No.	:	**PSU-NQN2206140110SA01**
Applicant	:	**MUNIC**
Address	:	**100 Avenue de Stalingrad 94800 Villejuif – France**
Product	:	**Telematics Embedded System**
FCC ID	:	**A6GC4D-4G4USV8-3**
Brand	:	**MUNIC**
Model No.	:	**C4D-4G4USAC_V8+**
Standards	:	**FCC 47 CFR Part 2 (2.1093) / IEEE C95.1:1992 / IEEE 62209-1528:2020 KDB 865664 D01 v01r04 / KDB 865664 D02 v01r02 / KDB 447498 D04 v01 / KDB 941225 D05 v02r05**
Sample Received Date	:	**May. 28, 2022**
Date of Testing	:	**Jun. 09, 2022~ Jun.13 , 2022**
FCC Designation No.	:	**CN1325**
FCC Site Registration No.	:	**434559**

CERTIFICATION: The above equipment have been tested by **Huarui 7layers High Technology (Suzhou) Co., Ltd.**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's SAR characteristics under the conditions specified in this report. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product certification, approval, or endorsement by A2LA or any government agencies.

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Certificate #6613.01

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Release Control Record

Report No.	Reason for Change	Date Issued
PSU-NQN2206140110SA01	Initial release	Jun 15,2022

1. Summary of Maximum SAR Value

Equipment Class	Mode	Highest Reported Body-worn SAR_{1g} (2.0 cm Gap) (W/kg)	Highest Reported Extremity SAR_{10g} (0 cm Gap) (W/kg)
PCB	LTE 2	1.37	3.67
	LTE 5	0.07	0.57
	LTE 12	0.39	0.94
	LTE 66/4	1.06	3.21
	LTE 71	0.24	1.40

Note:

1. The SAR limit **(Head & Body: SAR_{1g} 1.6 W/kg, Extremity: SAR_{10g} 4.0 W/kg)** for general population / uncontrolled exposure is specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992.

2. Description of Equipment Under Test

EUT Type	Telematics Embedded System
FCC ID	A6GC4D-4G4USV8-3
Brand Name	MUNIC
Model Name	C4D-4G4USAC_V8+
HW Version	HW.01
SW Version	SW.01
Tx Frequency Bands (Unit: MHz)	LTE Band 2 : 1850 ~ 1910 LTE Band 4 : 1710 ~ 1755 LTE Band 5 : 824 ~ 849 LTE Band 12 : 699 ~ 716 LTE Band 66 : 1710 ~ 1780 LTE Band 71 : 663 ~ 698
Uplink Modulations	LTE : QPSK, 16QAM
Maximum Tune-up Conducted Power (Unit: dBm)	Please refer to section 4.5.1 of this report.
Antenna Type	WWAN: Fixed Internal Antenna
EUT Stage	Identical Prototype

Note:

1. The above EUT information is declared by manufacturer and for more detailed features description please refers to the manufacturer's specifications or User's Manual.
2. This device supports LTE B4 and B66. Because LTE B4's supported frequency range is completely within the supported frequency range of LTEB66. LTE bands have the same target power, and LTE bands share the same transmission path; Therefore, SAR was evaluated only for LTE B66.

3. SAR Measurement System

3.1 Definition of Specific Absorption Rate (SAR)

SAR is related to the rate at which energy is absorbed per unit mass in an 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 general population/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 a given density (ρ). The equation description is as below:

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

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

SAR measurement can be related to the electrical field in the tissue by

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

Where: σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the RMS electrical field strength.

3.2 SPEAG DASY System

DASY system consists of high precision robot, probe alignment sensor, phantom, robot controller, controlled measurement server and near-field probe. The robot includes six axes that can move to the precision position of the DASY5 software defined. The DASY software can define the area that is detected by the probe. The robot is connected to controlled box. Controlled measurement server is connected to the controlled robot box. The DAE includes amplifier, signal multiplexing, AD converter, offset measurement and surface detection. It is connected to the Electro-optical coupler (ECO). The ECO performs the conversion form the optical into digital electric signal of the DAE and transfers data to the PC.

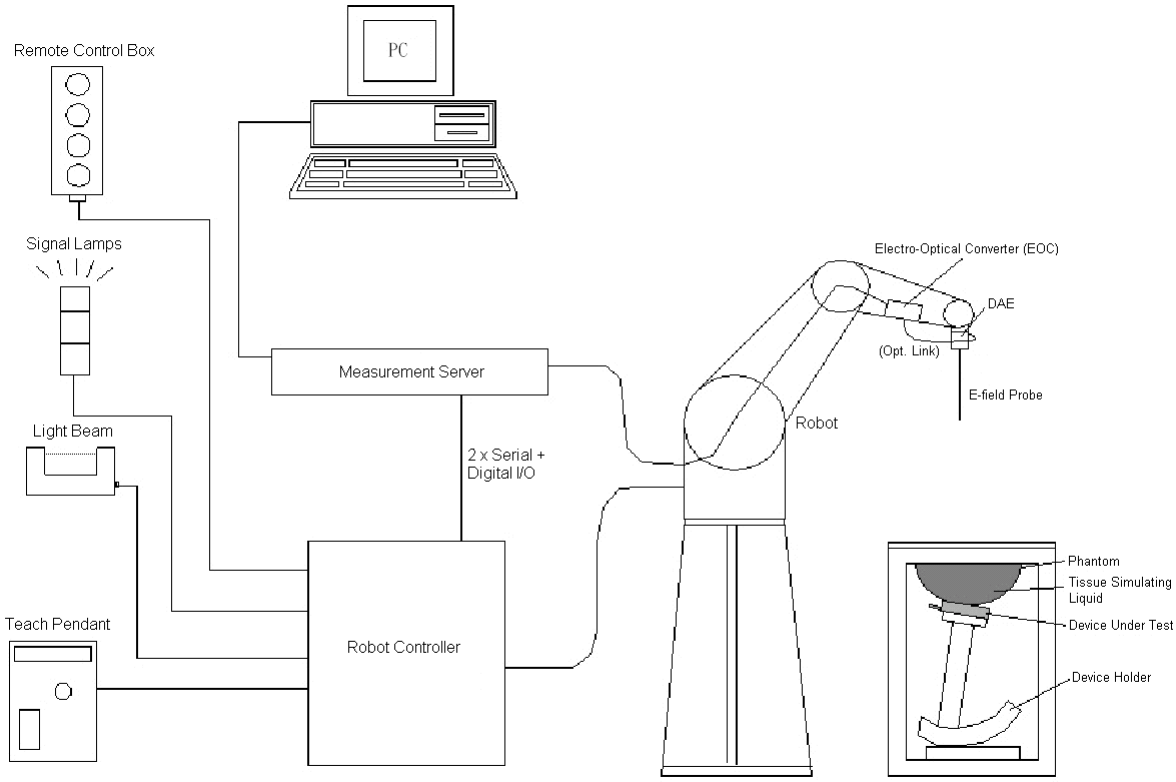


Fig-3.1 DASY System Setup

Robot

The DASY system uses the high precision robots from Stäubli SA (France). For the 6-axis controller system, the robot controller version (DASY6：CS8c) from Stäubli is used. The Stäubli robot series have many features that are important for our application:

- High precision (repeatability ±0.035 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)

Fig-3.2 DASY6

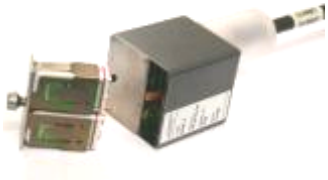
Probes

The SAR measurement is conducted with the dosimetric probe. 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.

Model	EX3DV4	
Construction	Symmetrical design with triangular core. Built-in shielding against static charges. PEEK enclosure material (resistant to organic solvents, e.g., DGBE).	
Frequency	10 MHz to 6 GHz Linearity: ± 0.2 dB	
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)	
Dynamic Range	10 µW/g to 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 µW/g)	
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	

Model	ES3DV3	
Construction	Symmetrical design with triangular core. Interleaved sensors. Built-in shielding against static charges. PEEK enclosure material (resistant to organic solvents, e.g., DGBE).	
Frequency	10 MHz to 4 GHz Linearity: ± 0.2 dB	
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.3 dB in tissue material (rotation normal to probe axis)	
Dynamic Range	5 µW/g to 100 mW/g Linearity: ± 0.2 dB	
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 3.9 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.0 mm	

Data Acquisition Electronics (DAE)

Model	DAE3, DAE4	
Construction	Signal amplifier, multiplexer, A/D converter and control logic. Serial optical link for communication with DASY embedded system (fully remote controlled). Two step probe touch detector for mechanical surface detection and emergency robot stop.	
Measurement Range	-100 to +300 mV (16 bit resolution and two range settings: 4mV, 400mV)	
Input Offset Voltage	< 5µV (with auto zero)	
Input Bias Current	< 50 fA	
Dimensions	60 x 60 x 68 mm	

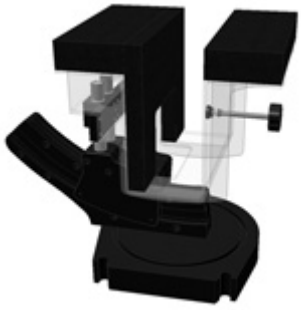
Phantoms

Model	Twin SAM	
Construction	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. It 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 evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.	
Material	Vinylester, glass fiber reinforced (VE-GF)	
Shell Thickness	2 ± 0.2 mm (6 ± 0.2 mm at ear point)	
Dimensions	Length: 1000 mm Width: 500 mm Height: adjustable feet	
Filling Volume	approx. 25 liters	

Model	ELI	
Construction	Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.	
Material	Vinylester, glass fiber reinforced (VE-GF)	
Shell Thickness	2.0 ± 0.2 mm (bottom plate)	
Dimensions	Major axis: 600 mm Minor axis: 400 mm	
Filling Volume	approx. 30 liters	

Device Holder

Model	Mounting Device	
Construction	In combination with the Twin SAM Phantom or ELI4, the Mounting Device enables the rotation of the mounted transmitter device in spherical coordinates. Rotation point is the ear opening point. Transmitter devices can be easily and accurately positioned according to IEC, IEEE, FCC or other specifications. The device holder can be locked for positioning at different phantom sections (left head, right head, flat).	
Material	POM	

Model	Laptop Extensions Kit	
Construction	Simple but effective and easy-to-use extension for Mounting Device that facilitates the testing of larger devices according to IEC 62209-2 (e.g., laptops, cameras, etc.). It is lightweight and fits easily on the upper part of the Mounting Device in place of the phone positioner.	
Material	POM, Acrylic glass, Foam	

System Validation Dipoles

Model	D-Serial	
Construction	Symmetrical dipole with l/4 balun. Enables measurement of feed point impedance with NWA. Matched for use near flat phantoms filled with tissue simulating solutions.	
Frequency	750 MHz to 5800 MHz	
Return Loss	> 20 dB	
Power Capability	> 100 W (f < 1GHz), > 40 W (f > 1GHz)	

Tissue Simulating Liquids

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 15 cm. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm. The nominal dielectric values of the tissue simulating liquids in the phantom and the tolerance of 5% are listed in Table-3.1.

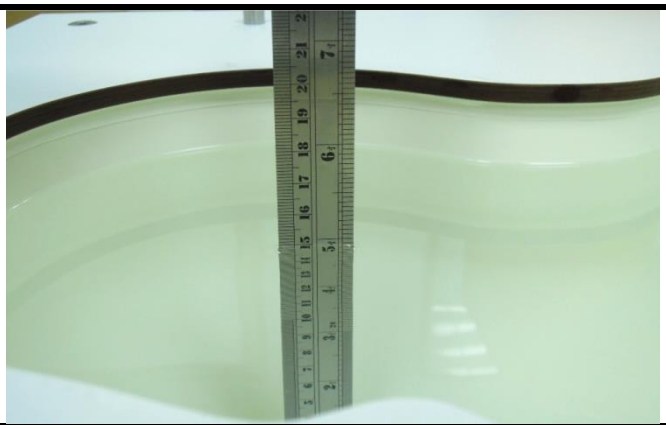
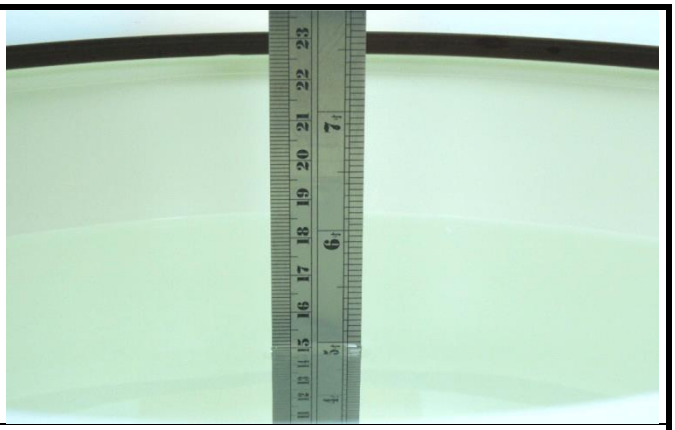
	

Photo of Liquid Height for Head Position	**Photo of Liquid Height for Body Position**

The dielectric properties of the head tissue simulating liquids are defined in IEEE 1528, and KDB 865664 D01 Appendix A. For the body tissue simulating liquids, the dielectric properties are defined in KDB 865664 D01 Appendix A. The dielectric properties of the tissue simulating liquids were verified prior to the SAR evaluation using a dielectric assessment kit and a network analyzer.

Table-3.1 Targets of Tissue Simulating Liquid

Frequency (MHz)	Target Permittivity	Range of ±5%	Target Conductivity	Range of ±5%
For Head				
750	41.9	39.8 ~ 44.0	0.89	0.85 ~ 0.93
835	41.5	39.4 ~ 43.6	0.90	0.86 ~ 0.95
900	41.5	39.4 ~ 43.6	0.97	0.92 ~ 1.02
1450	40.5	38.5 ~ 42.5	1.20	1.14 ~ 1.26
1640	40.3	38.3 ~ 42.3	1.29	1.23 ~ 1.35
1750	40.1	38.1 ~ 42.1	1.37	1.30 ~ 1.44
1800	40.0	38.0 ~ 42.0	1.40	1.33 ~ 1.47
1900	40.0	38.0 ~ 42.0	1.40	1.33 ~ 1.47
2000	40.0	38.0 ~ 42.0	1.40	1.33 ~ 1.47
2300	39.5	37.5 ~ 41.5	1.67	1.59 ~ 1.75
2450	39.2	37.2 ~ 41.2	1.80	1.71 ~ 1.89
2600	39.0	37.1 ~ 41.0	1.96	1.86 ~ 2.06
3500	37.9	36.0 ~ 39.8	2.91	2.76 ~ 3.06
5200	36.0	34.2 ~ 37.8	4.66	4.43 ~ 4.89
5300	35.9	34.1 ~ 37.7	4.76	4.52 ~ 5.00
5500	35.6	33.8 ~ 37.4	4.96	4.71 ~ 5.21
5600	35.5	33.7 ~ 37.3	5.07	4.82 ~ 5.32
5800	35.3	33.5 ~ 37.1	5.27	5.01 ~ 5.53

The following table gives the recipes for tissue simulating liquids.

Table-3.2 Recipes of Tissue Simulating Liquid

Tissue Type	Bactericide	DGBE	HEC	NaCl	Sucrose	Triton X-100	Water	Diethylene Glycol Mono-hexylether
H750	0.2	-	0.2	1.5	56.0	-	42.1	-
H835	0.2	-	0.2	1.5	57.0	-	41.1	-
H900	0.2	-	0.2	1.4	58.0	-	40.2	-
H1450	-	43.3	-	0.6	-	-	56.1	-
H1640	-	45.8	-	0.5	-	-	53.7	-
H1750	-	47.0	-	0.4	-	-	52.6	-
H1800	-	44.5	-	0.3	-	-	55.2	-
H1900	-	44.5	-	0.2	-	-	55.3	-
H2000	-	44.5	-	0.1	-	-	55.4	-
H2300	-	44.9	-	0.1	-	-	55.0	-
H2450	-	45.0	-	0.1	-	-	54.9	-
H2600	-	45.1	-	0.1	-	-	54.8	-
H3500	-	28.0	-	0.2	-	20.0	71.8	-
H5G	-	-	-	-	-	17.2	65.5	17.3

3.3 SAR System Verification

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

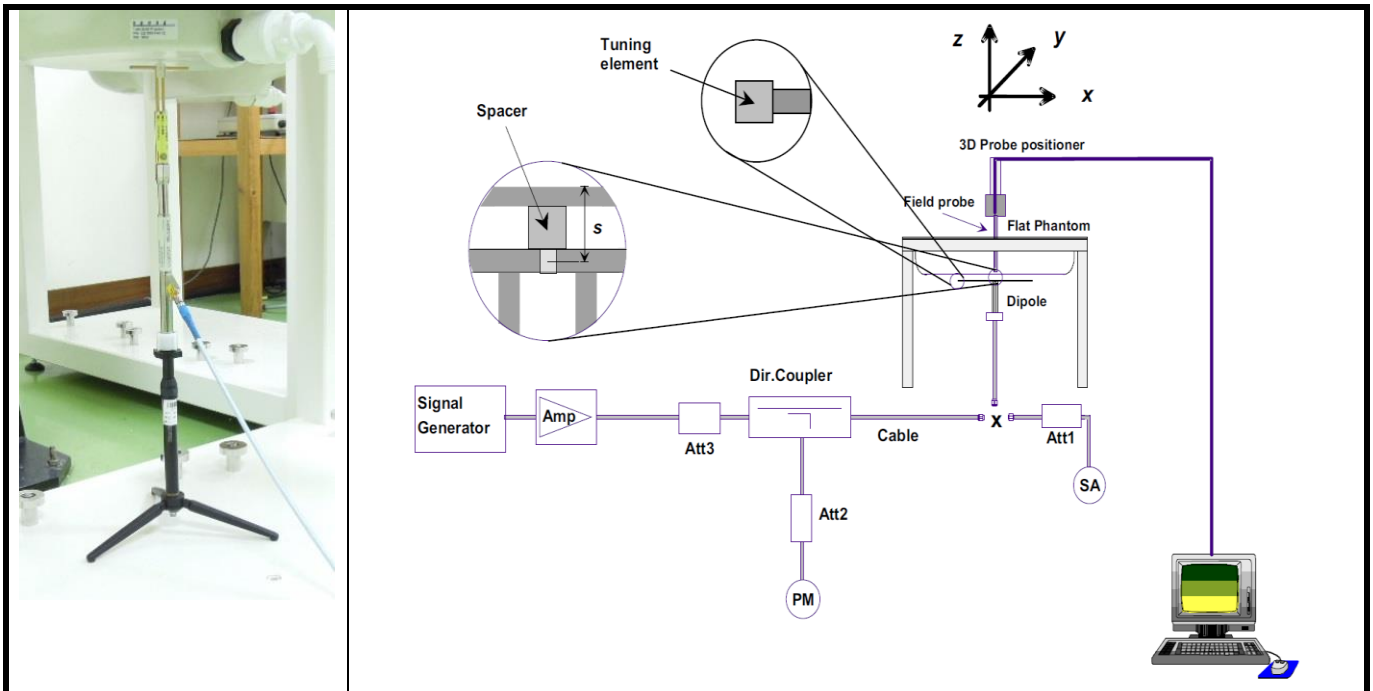


Fig-3.4 System Verification Setup

The validation dipole is placed beneath the flat phantom with the specific spacer in place. The distance spacer is touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The spectrum analyzer measures the forward power at the location of the system check dipole connector. The signal generator is adjusted for the desired forward power (250 mW is used for 700 MHz to 3 GHz, 100 mW is used for 3.5 GHz to 6 GHz) at the dipole connector and the power meter is read at that level. After connecting the cable to the dipole, the signal generator is readjusted for the same reading at power meter.

After system check testing, the SAR result will be normalized to 1W forward input power and compared with the reference SAR value derived from validation dipole certificate report. The deviation of system check should be within 10 %.

3.4 SAR Measurement Procedure

According to the SAR test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

(a) Power reference measurement
(b) Area scan
(c) Zoom scan
(d) Power drift measurement

The SAR measurement procedures for each of test conditions are as follows:

(a) Make EUT to transmit maximum output power
(b) Measure conducted output power through RF cable
(c) Place the EUT in the specific position of phantom
(d) Perform SAR testing steps on the DASY system
(e) Record the SAR value

Area & Zoom Scan Procedure

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g. According to KDB 865664 D01, the resolution for Area and Zoom scan is specified in the table below.

Items	<= 2 GHz	2-3 GHz	3-4 GHz	4-5 GHz	5-6 GHz
Area Scan (Δx, Δy)	<= 15 mm	<= 12 mm	<= 12 mm	<= 10 mm	<= 10 mm
Zoom Scan (Δx, Δy)	<= 8 mm	<= 5 mm	<= 5 mm	<= 4 mm	<= 4 mm
Zoom Scan (Δz)	<= 5 mm	<= 5 mm	<= 4 mm	<= 3 mm	<= 2 mm
Zoom Scan Volume	>= 30 mm	>= 30 mm	>= 28 mm	>= 25 mm	>= 22 mm

Note:

When zoom scan is required and report SAR is <= 1.4 W/kg, the zoom scan resolution of Δx / Δy (2-3GHz: <= 8 mm, 3-4GHz: <= 7 mm, 4-6GHz: <= 5 mm) may be applied.

Volume Scan Procedure

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing. When all volume scan were completed, the software, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In DASY measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drift more than 5%, the SAR will be retested.

Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The DASY software includes all numerical procedures necessary to evaluate the spatial peak SAR value.

The base for the evaluation is a "cube" measurement. The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.

The entire evaluation of the spatial peak values is performed within the post-processing engine (SEMCAD). The system always gives the maximum values for the 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

(a) Extraction of the measured data (grid and values) from the Zoom Scan
(b) Calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
(c) Generation of a high-resolution mesh within the measured volume
(d) Interpolation of all measured values form the measurement grid to the high-resolution grid
(e) Extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
(f) Calculation of the averaged SAR within masses of 1g and 10g

SAR Averaged Methods

In DASY, the interpolation and extrapolation are both based on the modified Quadratic Shepard’s method. The interpolation scheme combines a least-square fitted function method and a weighted average method which are the two basic types of computational interpolation and approximation.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5 mm.

4. SAR Measurement Evaluation

4.1 EUT Configuration and Setting

<Connections between EUT and System Simulator>

The WWAN SAR test was connected and controlled using a base station simulator (LTE using CMW500). Simulators communicate with each other through aerial links. When the distance between the simulator and the communication antenna is greater than 50 cm, the output power radiated by the simulator antenna is at least 30 dB smaller than that of the simulator. During THE SAR test, the emulator sets the output power to the maximum radiation output power.

<Considerations Related to LTE for Setup and Testing>

This device contains LTE transmitter which follows 3GPP standards, supports both QPSK 16QAM modulations, and supported LTE band and channel bandwidth is listed in below. The output power was tested per 3GPP TS 36.521-1 maximum transmit procedures for both QPSK 16QAM and 64QAM modulation. The results please refer to section 4.6 of this report.

EUT Supported LTE Band and Channel Bandwidth						
LTE Band	BW 1.4 MHz	BW 3 MHz	BW 5 MHz	BW 10 MHz	BW 15 MHz	BW 20 MHz
2	V	V	V	V	V	V
4	V	V	V	V	V	V
5	V	V	V	V		
12	V	V	V	V		
66	V	V	V	V	V	V
71			V	V	V	V

The LTE maximum power reduction (MPR) in accordance with 3GPP TS 36.101 is active all times during LTE operation. The allowed MPR for the maximum output power is specified in below.

Modulation	Channel Bandwidth / RB Configurations						LTE MPR Setting (dB)
	BW 1.4 MHz	BW 3 MHz	BW 5 MHz	BW 10 MHz	BW 15 MHz	BW 20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	1
16QAM	<= 5	<= 4	<= 8	<= 12	<= 16	<= 18	1
16QAM	> 5	> 4	> 8	> 12	> 16	> 18	2

Note: MPR is according to the standard and implemented in the circuit (mandatory).

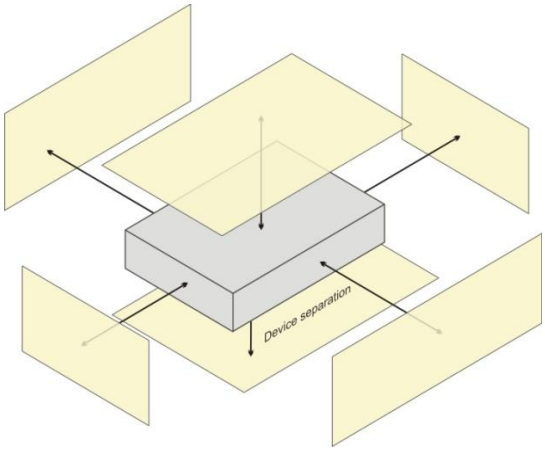
In addition, the device is compliant with additional maximum power reduction (A-MPR) requirements defined in 3GPP TS 36.101 section 6.2.4 that was disabled for all FCC compliance testing.

During LTE SAR testing, the related parameters of operating band, channel bandwidth, uplink channel number, modulation type, and RB was set in base station simulator. When the EUT has registered and communicated to base station simulator, the simulator set to make EUT transmitting the maximum radiated power.

4.2 EUT Testing Position

4.2.1 Body Exposure Condition

This EUT was tested for five surfaces of the EUT as Front Face, Rear Face, Left Side, Right Side and Top Side. The separation distance between this EUT and phantom is 2.0 cm.



4.2.2 Extremity Exposure Conditions

Devices that are designed or intended for use on extremities or mainly operated in extremity only exposure conditions; i.e., hands, wrists, feet and ankles, may require extremity SAR evaluation. When the device also operates in close proximity to the user's body, SAR compliance for the body is also required. When extremity SAR testing is required, a flat phantom must be used if the exposure condition is more conservative than the actual use conditions; otherwise, a KDB inquiry is required to determine the phantom and test requirements. Body SAR compliance is also tested with a flat phantom. For devices with irregular shapes or form factors that do not conform to a flat phantom, and/or unusual operating configurations and exposure conditions, a KDB inquiry is also required to determine the appropriate SAR measurement procedures.

4.3 Tissue Verification

The measuring results for tissue simulating liquid are shown as below.

Test Date	Tissue Type	Frequency (MHz)	Liquid Temp. (℃)	Measured Conductivity (σ)	Measured Permittivity (ε_r)	Target Conductivity (σ)	Target Permittivity (ε_r)	Conductivity Deviation (%)	Permittivity Deviation (%)
2022.06.13	Head	750	22.3	0.865	42.01	0.89	41.90	-2.81	0.26
2022.06.09	Head	835	22.2	0.912	43.08	0.90	41.50	1.33	3.81
2022.06.10	Head	1750	22.1	1.316	39.288	1.37	40.10	-3.94	-2.02
2022.06.09	Head	1950	22.2	1.381	40.213	1.40	40.00	-1.36	0.53

Note:

The dielectric properties of the tissue simulating liquid must be measured within 24 hours before the SAR testing and within ±5% of the target values. Liquid temperature during the SAR testing must be within ±2 ℃.

4.4 System Verification

The measuring result for system verification is tabulated as below.

Test Date	Mode	Frequency (MHz)	1W Target SAR-1g (W/kg)	Measured SAR-1g (W/kg)	Normalized to 1W SAR-1g (W/kg)	Deviation (%)	Dipole S/N	Probe S/N	DAE S/N
2022.06.13	Head	750	8.58	2.11	8.44	1.66	1200	7612	1633
2022.06.09	Head	835	9.49	2.47	9.88	-3.95	4d265	7612	1633
2022.06.10	Head	1750	36.40	8.82	35.28	3.17	1176	7612	1633
2022.06.09	Head	1950	40.10	10.30	41.2	-2.67	1229	7612	1633

Note:

Comparing to the reference SAR value provided by SPEAG, the validation data should be within its specification of 10 %. The result indicates the system check can meet the variation criterion and the plots can be referred to Appendix A of this report.

4.5 Maximum Output Power

4.5.1 Maximum Conducted Power

The maximum conducted average power (Unit: dBm) including tune-up tolerance is shown as below.

Mode	LTE 2	LTE 4	LTE 5	LTE 12	LTE 66	LTE 71
	Full Power	Full Power	Full Power	Full Power	Full Power	Full Power
QPSK	23	23.5	25	25	23.5	23.5
16QAM	22	22.5	24	24	22.5	22.5

4.5.2 Measured Conducted Power Result

The measuring conducted average power (Unit: dBm) is shown as below.

<WWAN Power>

LTE Band 2							
BW	**MCS Index**	**RB Size**	**RB Offset**	**Low**	**Mid**	**High**	**3GPP MPR (dB)**
		Channel		**18700**	**18900**	**19100**	
		Frequency (MHz)		**1860**	**1880**	**1900**	
20M	QPSK	1	0	22.56	22.48	22.35	0
		1	50	22.69	22.51	22.46	0
		1	99	22.27	22.19	22.06	0
		50	0	21.59	21.44	21.36	1
		50	25	21.65	21.48	21.38	1
		50	50	21.53	21.39	21.33	1
		100	0	21.54	21.41	21.23	1
	16QAM	1	0	20.94	20.81	20.71	1
		1	50	20.79	20.64	20.56	1
		1	99	21.01	20.84	20.74	1
		50	0	20.17	20.03	19.97	2
		50	25	20.36	20.18	20.13	2
		50	50	20.18	20.10	19.97	2
		100	0	20.30	20.12	20.07	2
BW	**MCS Index**	**Channel**		**18675**	**18900**	**19125**	**3GPP MPR**
		Frequency (MHz)		**1857.5**	**1880**	**1902.5**	
15M	QPSK	1	0	22.48	22.44	22.30	0
		1	37	22.67	22.43	22.45	0
		1	74	22.19	22.15	22.01	0
		36	0	21.56	21.38	21.34	1
		36	19	21.63	21.41	21.33	1
		36	39	21.47	21.31	21.31	1
		75	0	21.53	21.39	21.15	1
	16QAM	1	0	20.87	20.73	20.65	1
		1	37	20.76	20.58	20.54	1
		1	74	20.99	20.77	20.69	1
		36	0	20.11	19.95	19.95	2
		36	19	20.34	20.10	20.12	2
		36	39	20.10	20.06	19.92	2
		75	0	20.28	20.04	20.06	2

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR
		Channel		18650	18900	19150	
		Frequency (MHz)		1855	1880	1905	
10M	QPSK	1	0	22.55	22.44	22.27	0
		1	24	22.65	22.48	22.40	0
		1	49	22.25	22.18	22.02	0
		25	0	21.53	21.39	21.35	1
		25	12	21.64	21.46	21.33	1
		25	25	21.45	21.32	21.31	1
		50	0	21.53	21.37	21.20	1
	16QAM	1	0	20.91	20.80	20.65	1
		1	24	20.75	20.59	20.54	1
		1	49	20.95	20.82	20.71	1
		25	0	20.15	19.95	19.96	2
		25	12	20.28	20.14	20.08	2
		25	25	20.15	20.04	19.95	2
		50	0	20.29	20.07	19.99	2
BW	MCS Index	Channel		18625	18900	19175	3GPP MPR
		Frequency (MHz)		1852.5	1880	1907.5	
5M	QPSK	1	0	22.50	22.46	22.29	0
		1	12	22.62	22.46	22.44	0
		1	24	22.21	22.12	22.01	0
		12	0	21.52	21.39	21.34	1
		12	6	21.57	21.46	21.32	1
		12	13	21.45	21.38	21.31	1
		25	0	21.50	21.36	21.15	1
	16QAM	1	0	20.86	20.80	20.69	1
		1	12	20.74	20.59	20.52	1
		1	24	20.99	20.76	20.73	1
		12	0	20.09	19.99	19.92	2
		12	6	20.33	20.12	20.11	2
		12	13	20.16	20.03	19.92	2
		25	0	20.24	20.04	20.05	2

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR
		Channel		18615	18900	19185	
		Frequency (MHz)		1851.5	1880	1908.5	
3M	QPSK	1	0	22.51	22.41	22.30	0
		1	7	22.67	22.43	22.44	0
		1	14	22.22	22.11	22.05	0
		8	0	21.55	21.39	21.31	1
		8	3	21.57	21.47	21.33	1
		8	7	21.49	21.34	21.32	1
		15	0	21.48	21.39	21.18	1
	16QAM	1	0	20.87	20.76	20.69	1
		1	7	20.71	20.62	20.51	1
		1	14	20.99	20.76	20.72	1
		8	0	20.09	19.97	19.89	2
		8	3	20.30	20.16	20.07	2
		8	7	20.11	20.05	19.95	2
		15	0	20.24	20.05	20.02	2
BW	MCS Index	Channel		18700	18900	19100	3GPP MPR
		Frequency (MHz)		1860	1880	1900	
1.4M	QPSK	1	0	22.48	22.44	22.30	0
		1	2	22.66	22.45	22.44	0
		1	5	22.25	22.12	22.01	0
		3	0	22.53	22.36	22.34	0
		3	1	22.59	22.46	22.30	0
		3	3	22.48	22.31	22.27	0
		6	0	21.53	21.35	21.21	1
	16QAM	1	0	20.89	20.74	20.66	1
		1	2	20.77	20.56	20.54	1
		1	5	20.96	20.76	20.73	1
		3	0	21.13	20.98	20.92	1
		3	1	21.28	21.17	21.08	1
		3	3	21.14	21.05	20.96	1
		6	0	20.24	20.10	20.02	2

LTE Band 4							
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		20050	20175	20300	
		Frequency (MHz)		1720	1732.5	1745	
20M	QPSK	1	0	22.63	22.49	22.67	0
		1	50	22.84	22.70	22.88	0
		1	99	22.50	22.36	22.61	0
		50	0	21.98	21.82	22.00	1
		50	25	21.87	21.73	21.99	1
		50	50	21.91	21.73	21.95	1
		100	0	21.69	21.56	21.72	1
	16QAM	1	0	21.91	21.75	21.99	1
		1	50	22.00	21.89	22.09	1
		1	99	21.90	21.69	21.97	1
		50	0	20.75	20.64	20.84	2
		50	25	20.76	20.58	20.83	2
		50	50	20.85	20.66	20.84	2
		100	0	20.76	20.64	20.84	2
BW	MCS Index	Channel		20025	20175	20325	3GPP MPR
		Frequency (MHz)		1717.5	1732.5	1747.5	
15M	QPSK	1	0	22.59	22.46	22.61	0
		1	37	22.82	22.69	22.84	0
		1	74	22.44	22.31	22.60	0
		36	0	21.97	21.80	21.95	1
		36	19	21.79	21.66	21.97	1
		36	39	21.90	21.69	21.92	1
		75	0	21.66	21.55	21.66	1
	16QAM	1	0	21.87	21.70	21.97	1
		1	37	21.94	21.87	22.06	1
		1	74	21.88	21.61	21.96	1
		36	0	20.67	20.60	20.79	2
		36	19	20.73	20.52	20.81	2
		36	39	20.84	20.61	20.76	2
		75	0	20.70	20.61	20.80	2

BW	MCS Index	Channel		20000	20175	20350	3GPP MPR
		Frequency (MHz)		1715	1732.5	1750	
10M	QPSK	1	0	22.55	22.45	22.62	0
		1	24	22.81	22.64	22.86	0
		1	49	22.48	22.29	22.56	0
		25	0	21.92	21.74	21.98	1
		25	12	21.86	21.71	21.91	1
		25	25	21.84	21.65	21.89	1
		50	0	21.66	21.50	21.70	1
	16QAM	1	0	21.89	21.68	21.94	1
		1	24	21.94	21.81	22.07	1
		1	49	21.88	21.61	21.96	1
		25	0	20.67	20.60	20.79	2
		25	12	20.74	20.50	20.82	2
		25	25	20.77	20.62	20.79	2
		50	0	20.73	20.58	20.82	2
BW	MCS Index	Channel		19975	20175	20375	3GPP MPR
		Frequency (MHz)		1712.5	1732.5	1752.5	
5M	QPSK	1	0	22.58	22.41	22.66	0
		1	12	22.80	22.65	22.83	0
		1	24	22.42	22.35	22.56	0
		12	0	21.94	21.77	21.99	1
		12	6	21.81	21.71	21.94	1
		12	13	21.84	21.68	21.93	1
		25	0	21.61	21.54	21.67	1
	16QAM	1	0	21.89	21.67	21.97	1
		1	12	21.92	21.83	22.01	1
		1	24	21.84	21.67	21.91	1
		12	0	20.68	20.59	20.82	2
		12	6	20.70	20.51	20.78	2
		12	13	20.78	20.61	20.82	2
		25	0	20.68	20.62	20.78	2

BW	MCS Index	Channel		19965	20175	20385	3GPP MPR
		Frequency (MHz)		1711.5	1732.5	1753.5	
3M	QPSK	1	0	22.57	22.42	22.62	0
		1	7	22.77	22.65	22.86	0
		1	14	22.42	22.34	22.55	0
		8	0	21.90	21.81	21.98	1
		8	3	21.83	21.68	21.91	1
		8	7	21.83	21.72	21.93	1
		15	0	21.64	21.51	21.68	1
	16QAM	1	0	21.89	21.67	21.98	1
		1	7	21.92	21.85	22.04	1
		1	14	21.87	21.63	21.95	1
		8	0	20.73	20.57	20.79	2
		8	3	20.70	20.50	20.81	2
		8	7	20.84	20.64	20.76	2
		15	0	20.71	20.56	20.78	2
BW	MCS Index	Channel		19957	20175	20393	3GPP MPR
		Frequency (MHz)		1710.7	1732.5	1754.3	
1.4M	QPSK	1	0	22.55	22.45	22.62	0
		1	2	22.81	22.64	22.86	0
		1	5	22.48	22.29	22.56	0
		3	0	22.92	22.74	22.98	0
		3	1	22.86	22.71	22.91	0
		3	3	22.86	22.65	22.89	0
		6	0	21.68	21.50	21.70	1
	16QAM	1	0	21.86	21.68	21.94	1
		1	2	21.98	21.81	22.07	1
		1	5	21.85	21.61	21.96	1
		3	0	21.71	21.59	21.79	1
		3	1	21.68	21.57	21.78	1
		3	3	21.81	21.61	21.83	1
		6	0	20.70	20.62	20.79	2

LTE Band 5							
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		20450	20525	20600	
		Frequency (MHz)		829	836.5	844	
10M	QPSK	1	0	23.24	23.26	23.31	0
		1	24	23.29	23.39	23.40	0
		1	49	23.63	23.65	23.74	0
		25	0	22.30	22.37	22.39	1
		25	12	22.25	22.30	22.38	1
		25	25	22.26	22.35	22.37	1
		50	0	22.33	22.30	22.41	1
	16QAM	1	0	21.98	22.03	22.06	1
		1	24	22.26	22.33	22.34	1
		1	49	22.45	22.50	22.58	1
		25	0	21.27	21.29	21.36	2
		25	12	21.29	21.34	21.42	2
		25	25	21.31	21.40	21.41	2
		50	0	21.20	21.30	21.34	2
BW	MCS Index	Channel		20425	20525	20625	3GPP MPR
		Frequency (MHz)		826.5	836.5	846.5	
5M	QPSK	1	0	23.20	23.21	23.26	0
		1	12	23.21	23.38	23.35	0
		1	24	23.59	23.60	23.73	0
		12	0	22.24	22.35	22.34	1
		12	6	22.18	22.25	22.36	1
		12	13	22.18	22.33	22.32	1
		25	0	22.31	22.22	22.39	1
	16QAM	1	0	21.90	21.97	21.98	1
		1	12	22.20	22.31	22.28	1
		1	24	22.38	22.45	22.56	1
		12	0	21.21	21.22	21.31	2
		12	6	21.22	21.29	21.40	2
		12	13	21.23	21.38	21.35	2
		25	0	21.12	21.29	21.32	2

BW	MCS Index	Channel		20415	20525	20635	3GPP MPR
		Frequency (MHz)		825.5	836.5	847.5	
3M	QPSK	1	0	23.18	23.19	23.26	0
		1	7	23.22	23.34	23.38	0
		1	14	23.55	23.63	23.68	0
		8	0	22.22	22.36	22.37	1
		8	3	22.21	22.25	22.30	1
		8	7	22.18	22.34	22.35	1
		15	0	22.28	22.25	22.37	1
	16QAM	1	0	21.96	21.95	22.05	1
		1	7	22.18	22.29	22.29	1
		1	14	22.42	22.44	22.56	1
		8	0	21.25	21.22	21.31	2
		8	3	21.23	21.26	21.40	2
		8	7	21.30	21.38	21.33	2
		15	0	21.15	21.22	21.28	2
BW	MCS Index	Channel		20407	20525	20643	3GPP MPR
		Frequency (MHz)		824.7	836.5	848.3	
1.4M	QPSK	1	0	23.23	23.20	23.26	0
		1	2	23.24	23.32	23.35	0
		1	5	23.61	23.57	23.70	0
		3	0	23.25	23.29	23.38	0
		3	1	23.21	23.25	23.33	0
		3	3	23.18	23.34	23.32	0
		6	0	22.29	22.25	22.40	1
	16QAM	1	0	21.92	22.01	22.01	1
		1	2	22.19	22.28	22.32	1
		1	5	22.37	22.48	22.53	1
		3	0	22.25	22.21	22.34	1
		3	1	22.21	22.28	22.34	1
		3	3	22.25	22.38	22.35	1
		6	0	21.15	21.22	21.33	2

LTE Band 12							
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		23060	23095	23130	
		Frequency (MHz)		704	707.5	711	
10M	QPSK	1	0	23.72	23.66	23.82	0
		1	24	23.78	23.68	23.88	0
		1	49	23.61	23.54	23.75	0
		25	0	22.74	22.69	22.83	1
		25	12	22.67	22.70	22.80	1
		25	25	22.65	22.60	22.78	1
		50	0	22.75	22.75	22.86	1
	16QAM	1	0	22.52	22.50	22.67	1
		1	24	23.12	23.14	23.25	1
		1	49	22.89	22.79	22.99	1
		25	0	21.78	21.76	21.88	2
		25	12	21.74	21.74	21.84	2
		25	25	21.68	21.66	21.83	2
		50	0	21.85	21.80	21.96	2
BW	MCS Index	Channel		23060	23095	23130	3GPP MPR
		Frequency (MHz)		704	707.5	711	
5M	QPSK	1	0	23.67	23.59	23.77	0
		1	12	23.76	23.60	23.86	0
		1	24	23.56	23.46	23.74	0
		12	0	22.70	22.64	22.78	1
		12	6	22.59	22.69	22.75	1
		12	13	22.61	22.55	22.77	1
		25	0	22.69	22.73	22.81	1
	16QAM	1	0	22.45	22.45	22.65	1
		1	12	23.04	23.12	23.20	1
		1	24	22.87	22.71	22.97	1
		12	0	21.70	21.70	21.80	2
		12	6	21.68	21.72	21.78	2
		12	13	21.61	21.61	21.81	2
		25	0	21.79	21.73	21.91	2

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		23060	23095	23130	
		Frequency (MHz)		704	707.5	711	
3M	QPSK	1	0	23.66	23.64	23.76	0
		1	7	23.71	23.63	23.86	0
		1	14	23.55	23.47	23.70	0
		8	0	22.67	22.64	22.81	1
		8	3	22.59	22.68	22.74	1
		8	7	22.57	22.59	22.76	1
		15	0	22.71	22.70	22.78	1
	16QAM	1	0	22.44	22.49	22.65	1
		1	7	23.07	23.09	23.21	1
		1	14	22.87	22.71	22.98	1
		8	0	21.70	21.72	21.83	2
		8	3	21.71	21.68	21.82	2
		8	7	21.66	21.59	21.78	2
		15	0	21.79	21.72	21.94	2
BW	MCS Index	Channel		23060	23095	23130	3GPP MPR
		Frequency (MHz)		704	707.5	711	
1.4M	QPSK	1	0	23.64	23.62	23.77	0
		1	2	23.75	23.62	23.86	0
		1	5	23.59	23.47	23.70	0
		3	0	23.68	23.61	23.81	0
		3	1	23.66	23.61	23.72	0
		3	3	23.60	23.52	23.72	0
		6	0	22.74	22.69	22.84	1
	16QAM	1	0	22.47	22.43	22.62	1
		1	2	23.10	23.06	23.23	1
		1	5	22.84	22.71	22.98	1
		3	0	22.74	22.71	22.83	1
		3	1	22.66	22.73	22.79	1
		3	3	22.64	22.61	22.82	1
		6	0	21.79	21.78	21.91	2

LTE Band 66							
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		132072	132322	132572	
		Frequency (MHz)		1720	1745	1770	
20M	QPSK	1	0	22.80	23.09	22.81	0
		1	50	23.06	23.33	23.12	0
		1	99	23.02	23.26	23.04	0
		50	0	22.01	22.28	22.07	1
		50	25	21.79	22.10	21.82	1
		50	50	21.64	21.96	21.71	1
		100	0	21.89	22.13	21.86	1
	16QAM	1	0	21.86	22.18	21.93	1
		1	50	21.92	22.17	21.94	1
		1	99	21.85	22.04	21.87	1
		50	0	20.96	21.25	21.00	2
		50	25	20.79	21.01	20.81	2
		50	50	20.75	20.95	20.73	2
		100	0	20.91	21.14	20.96	2
BW	MCS Index	Channel		132047	132322	132597	3GPP MPR
		Frequency (MHz)		1717.5	1745	1772.5	
15M	QPSK	1	0	22.74	23.07	22.75	0
		1	37	22.99	23.28	23.10	0
		1	74	22.96	23.19	22.99	0
		36	0	21.94	22.23	22.05	1
		36	19	21.71	22.08	21.76	1
		36	39	21.56	21.95	21.69	1
		75	0	21.85	22.08	21.78	1
	16QAM	1	0	21.78	22.17	21.91	1
		1	37	21.87	22.12	21.90	1
		1	74	21.83	21.96	21.86	1
		36	0	20.88	21.21	20.95	2
		36	19	20.76	20.95	20.79	2
		36	39	20.73	20.88	20.68	2
		75	0	20.85	21.06	20.94	2

BW	MCS Index	Channel		132022	132322	132622	3GPP MPR
		Frequency (MHz)		1715	1745	1775	
10M	QPSK	1	0	22.72	23.05	22.76	0
		1	24	23.04	23.25	23.11	0
		1	49	22.94	23.22	22.99	0
		25	0	21.98	22.22	22.05	1
		25	12	21.77	22.03	21.77	1
		25	25	21.58	21.88	21.69	1
		50	0	21.88	22.11	21.78	1
	16QAM	1	0	21.79	22.10	21.87	1
		1	24	21.89	22.11	21.92	1
		1	49	21.83	21.97	21.82	1
		25	0	20.90	21.17	20.98	2
		25	12	20.77	20.93	20.80	2
		25	25	20.67	20.91	20.68	2
		50	0	20.89	21.06	20.95	2
BW	**MCS Index**	**Channel**		**131997**	**132322**	**132647**	**3GPP MPR**
		Frequency (MHz)		**1712.5**	**1745**	**1777.5**	
5M	QPSK	1	0	22.75	23.02	22.76	0
		1	12	23.04	23.25	23.10	0
		1	24	22.97	23.18	23.03	0
		12	0	21.97	22.23	22.02	1
		12	6	21.71	22.09	21.77	1
		12	13	21.60	21.91	21.70	1
		25	0	21.83	22.11	21.81	1
	16QAM	1	0	21.79	22.13	21.91	1
		1	12	21.84	22.15	21.89	1
		1	24	21.83	21.96	21.85	1
		12	0	20.88	21.19	20.92	2
		12	6	20.73	20.99	20.75	2
		12	13	20.68	20.90	20.71	2
		25	0	20.85	21.07	20.91	2

BW	MCS Index	Channel		131987	132322	132657	3GPP MPR
		Frequency (MHz)		1711.5	1745	1778.5	
3M	QPSK	1	0	22.74	23.04	22.80	0
		1	7	23.05	23.31	23.07	0
		1	14	22.94	23.19	23.02	0
		8	0	22.00	22.24	22.04	1
		8	3	21.76	22.09	21.76	1
		8	7	21.60	21.91	21.69	1
		15	0	21.83	22.11	21.83	1
	16QAM	1	0	21.84	22.10	21.92	1
		1	7	21.84	22.13	21.89	1
		1	14	21.82	21.98	21.85	1
		8	0	20.95	21.20	20.92	2
		8	3	20.73	20.98	20.77	2
		8	7	20.73	20.88	20.68	2
		15	0	20.85	21.06	20.94	2
BW	**MCS Index**	**Channel**		**131979**	**132322**	**132665**	**3GPP MPR**
		Frequency (MHz)		**1710.7**	**1745**	**1779.3**	
1.4M	QPSK	1	0	22.72	23.05	22.76	0
		1	2	23.03	23.27	23.10	0
		1	5	23.00	23.19	22.99	0
		3	0	22.95	23.11	23.05	0
		3	1	22.78	23.08	22.74	0
		3	3	22.59	22.88	22.65	0
		6	0	21.88	22.07	21.84	1
	16QAM	1	0	21.81	22.11	21.88	1
		1	2	21.90	22.09	21.92	1
		1	5	21.80	21.96	21.86	1
		3	0	21.92	22.20	21.95	1
		3	1	21.71	22.00	21.76	1
		3	3	21.71	21.90	21.72	1
		6	0	20.85	21.12	20.91	2

LTE Band 71							
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		133222	133322	133372	
		Frequency (MHz)		673	683	688	
20M	QPSK	1	0	22.66	22.81	22.98	0
		1	50	23.11	23.24	23.34	0
		1	99	22.58	22.73	22.91	0
		50	0	21.68	21.79	21.93	1
		50	25	21.77	21.93	22.01	1
		50	50	22.00	22.13	22.29	1
		100	0	21.84	22.02	22.14	1
	16QAM	1	0	21.79	21.87	22.07	1
		1	50	22.06	22.24	22.36	1
		1	99	21.96	22.07	22.24	1
		50	0	20.73	20.83	20.93	2
		50	25	20.79	20.96	21.08	2
		50	50	20.76	20.85	21.00	2
		100	0	20.81	20.93	21.12	2
BW	MCS Index	Channel		133197	133297	133397	3GPP MPR
		Frequency (MHz)		670.5	680.5	690.5	
15M	QPSK	1	0	22.60	22.76	22.97	0
		1	37	23.10	23.22	23.29	0
		1	74	22.50	22.66	22.89	0
		36	0	21.67	21.75	21.90	1
		36	19	21.74	21.92	21.95	1
		36	39	21.96	22.08	22.27	1
		75	0	21.78	22.00	22.11	1
	16QAM	1	0	21.77	21.79	22.06	1
		1	37	21.98	22.20	22.31	1
		1	74	21.93	22.01	22.22	1
		36	0	20.72	20.78	20.85	2
		36	19	20.73	20.93	21.04	2
		36	39	20.74	20.78	20.95	2
		75	0	20.75	20.85	21.10	2

BW	MCS Index	Channel		133172	133272	133422	3GPP MPR
		Frequency (MHz)		668	678	693	
10M	QPSK	1	0	22.58	22.77	22.93	0
		1	24	23.09	23.16	23.33	0
		1	49	22.50	22.69	22.86	0
		25	0	21.65	21.73	21.91	1
		25	12	21.75	21.86	21.96	1
		25	25	21.94	22.05	22.27	1
		50	0	21.83	22.00	22.06	1
	16QAM	1	0	21.72	21.79	22.01	1
		1	24	22.03	22.18	22.34	1
		1	49	21.94	22.00	22.19	1
		25	0	20.67	20.75	20.91	2
		25	12	20.77	20.88	21.07	2
		25	25	20.68	20.81	20.95	2
		50	0	20.79	20.85	21.11	2
BW	MCS Index	Channel		133147	133247	133447	3GPP MPR
		Frequency (MHz)		665.5	675.5	695.5	
5M	QPSK	1	0	22.61	22.74	22.93	0
		1	12	23.09	23.16	23.32	0
		1	24	22.53	22.65	22.90	0
		12	0	21.64	21.74	21.88	1
		12	6	21.69	21.92	21.96	1
		12	13	21.96	22.08	22.28	1
		25	0	21.78	22.00	22.09	1
	16QAM	1	0	21.72	21.82	22.05	1
		1	12	21.98	22.22	22.31	1
		1	24	21.94	21.99	22.22	1
		12	0	20.65	20.77	20.85	2
		12	6	20.73	20.94	21.02	2
		12	13	20.69	20.80	20.98	2
		25	0	20.75	20.86	21.07	2

4.6 SAR Testing Results

4.6.1 SAR Test Reduction Considerations

<KDB 447498 D01, General RF Exposure Guidance>

Testing of other required channels within the operating mode of a frequency band is not required when the reported SAR for the mid-band or highest output power channel is:

(1) ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz

(2) ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz

(3) ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz

<KDB 941225 D05, SAR Evaluation Considerations for LTE Devices>

(1) QPSK with 1 RB and 50% RB allocation

Start with the largest channel bandwidth and measure SAR, using the RB offset and required test channel combination with the highest maximum output power among RB offsets at the upper edge, middle and lower edge of each required test channel. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all three RB offset configurations for that required test channel.

(2) QPSK with 100% RB allocation

SAR is not required when the highest maximum output power for 100% RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.

(3) Higher order modulations

SAR is required only when the highest maximum output power for the configuration in the higher order modulation is > 1/2 dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 1.45 W/kg.

(4) Other channel bandwidth

SAR is required when the highest maximum output power of the smaller channel bandwidth is > 1/2 dB higher than the equivalent channel configurations in the largest channel bandwidth configuration or the reported SAR of a configuration for the largest channel bandwidth is > 1.45 W/kg.

4.6.2 SAR Results for Body-worn Exposure Condition (Separation Distance is 2.0 cm Gap)

Plot No.	Band	Mode	Test Position	Ch.	RB#	RB Offset	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Power Drift (dB)	Measured SAR-1g (W/kg)	Scaling Factor	Scaled SAR-1g (W/kg)
	LTE 2	QPSK20M	Front Face	18700	1	50	23	22.69	0.1	0.502	1.07	0.54
	LTE 2	QPSK20M	Rear Face	18700	1	50	23	22.69	0.07	0.176	1.07	0.19
	LTE 2	QPSK20M	Left Side	18700	1	50	23	22.69	0.06	0.960	1.07	1.03
	LTE 2	QPSK20M	Right Side	18700	1	50	23	22.69	-0.02	0.035	1.07	0.04
	LTE 2	QPSK20M	Top Side	18700	1	50	23	22.69	0.07	0.177	1.07	0.19
	LTE 2	QPSK20M	Front Face	18700	50	25	22	21.65	0.12	0.382	1.08	0.41
	LTE 2	QPSK20M	Rear Face	18700	50	25	22	21.65	0.06	0.137	1.08	0.15
	LTE 2	QPSK20M	Left Side	18700	50	25	22	21.65	0.01	0.736	1.08	0.79
	LTE 2	QPSK20M	Right Side	18700	50	25	22	21.65	0.01	0.018	1.08	0.02
	LTE 2	QPSK20M	Top Side	18700	50	25	22	21.65	0.11	0.139	1.08	0.15
	LTE 2	QPSK20M	Left Side	18900	1	50	23	22.51	0.04	1.120	1.12	1.25
P1	LTE 2	QPSK20M	Left Side	19100	1	50	23	22.46	0.03	1.210	1.13	**1.37**
	LTE 2	QPSK20M	Left Side	18700	100	0	22	21.54	-0.05	0.739	1.11	0.82
	LTE 5	QPSK10M	Front Face	20600	1	49	25	23.74	0.08	0.048	1.34	0.06
	LTE 5	QPSK10M	Rear Face	20600	1	49	25	23.74	0.07	0.020	1.34	0.03
	LTE 5	QPSK10M	Left Side	20600	1	49	25	23.74	0.02	0.016	1.34	0.02
	LTE 5	QPSK10M	Right Side	20600	1	49	25	23.74	0.02	0.002	1.34	0.00
	LTE 5	QPSK10M	Top Side	20600	1	49	25	23.74	0.07	0.010	1.34	0.01
	LTE 5	QPSK10M	Front Face	20600	25	0	24	22.39	0.05	0.035	1.45	0.05
	LTE 5	QPSK10M	Rear Face	20600	25	0	24	22.39	0.01	0.015	1.45	0.02
	LTE 5	QPSK10M	Left Side	20600	25	0	24	22.39	0.02	0.012	1.45	0.02
	LTE 5	QPSK10M	Right Side	20600	25	0	24	22.39	0.17	0.001	1.45	0.00
	LTE 5	QPSK10M	Top Side	20600	25	0	24	22.39	0.02	0.009	1.45	0.01
P2	LTE 5	QPSK10M	Front Face	20450	1	49	25	23.63	-0.09	0.053	1.37	**0.07**
	LTE 5	QPSK10M	Front Face	20525	1	49	25	23.65	0.16	0.040	1.36	0.06
	LTE 12	QPSK10M	Front Face	23130	1	24	25	23.88	-0.03	0.219	1.29	0.28
	LTE 12	QPSK10M	Rear Face	23130	1	24	25	23.88	-0.05	0.109	1.29	0.14
	LTE 12	QPSK10M	Left Side	23130	1	24	25	23.88	-0.04	0.043	1.29	0.06
	LTE 12	QPSK10M	Right Side	23130	1	24	25	23.88	-0.02	0.022	1.29	0.03
	LTE 12	QPSK10M	Top Side	23130	1	24	25	23.88	0.16	0.067	1.29	0.09
	LTE 12	QPSK10M	Front Face	23130	25	0	24	22.83	0.02	0.226	1.31	0.30
	LTE 12	QPSK10M	Rear Face	23130	25	0	24	22.83	0.06	0.108	1.31	0.14
	LTE 12	QPSK10M	Left Side	23130	25	0	24	22.83	0.05	0.035	1.31	0.05

	LTE 12	QPSK10M	Right Side	23130	25	0	24	22.83	0.05	0.019	1.31	0.02
	LTE 12	QPSK10M	Top Side	23130	25	0	24	22.83	0.09	0.058	1.31	0.08
P3	LTE 12	QPSK10M	Front Face	23060	1	24	25	23.78	0.06	0.298	1.32	**0.39**
	LTE 12	QPSK10M	Front Face	23095	1	24	25	23.68	0.08	0.282	1.36	0.38
	LTE 66	QPSK20M	Front Face	132322	1	50	23.5	23.33	-0.02	0.344	1.04	0.36
	LTE 66	QPSK20M	Rear Face	132322	1	50	23.5	23.33	0	0.263	1.04	0.27
	LTE 66	QPSK20M	Left Side	132322	1	50	23.5	23.33	0.05	0.894	1.04	0.93
	LTE 66	QPSK20M	Right Side	132322	1	50	23.5	23.33	0.16	0.038	1.04	0.04
	LTE 66	QPSK20M	Top Side	132322	1	50	23.5	23.33	0.07	0.143	1.04	0.15
	LTE 66	QPSK20M	Front Face	132322	50	0	22.5	22.28	0.08	0.285	1.05	0.30
	LTE 66	QPSK20M	Rear Face	132322	50	0	22.5	22.28	0.05	0.224	1.05	0.24
	LTE 66	QPSK20M	Left Side	132322	50	0	22.5	22.28	0.05	0.752	1.05	0.79
	LTE 66	QPSK20M	Right Side	132322	50	0	22.5	22.28	0.09	0.028	1.05	0.03
	LTE 66	QPSK20M	Top Side	132322	50	0	22.5	22.28	0.07	0.095	1.05	0.10
P4	LTE 66	QPSK20M	Left Side	132072	1	50	23.5	23.06	0.19	0.957	1.11	**1.06**
	LTE 66	QPSK20M	Left Side	132572	1	50	23.5	23.12	-0.02	0.935	1.09	1.02
	LTE 66	QPSK20M	Left Side	132322	100	0	22.5	22.13	0.10	0.763	1.09	0.83
	LTE 71	QPSK20M	Front Face	133372	1	50	23.5	23.34	0.07	0.214	1.04	0.22
	LTE 71	QPSK20M	Rear Face	133372	1	50	23.5	23.34	0.12	0.106	1.04	0.11
	LTE 71	QPSK20M	Left Side	133372	1	50	23.5	23.34	0.13	0.054	1.04	0.06
	LTE 71	QPSK20M	Right Side	133372	1	50	23.5	23.34	0.05	0.021	1.04	0.02
	LTE 71	QPSK20M	Top Side	133372	1	50	23.5	23.34	0.02	0.055	1.04	0.06
	LTE 71	QPSK20M	Front Face	133372	50	50	22.5	22.29	0.2	0.159	1.05	0.17
	LTE 71	QPSK20M	Rear Face	133372	50	50	22.5	22.29	-0.07	0.077	1.05	0.08
	LTE 71	QPSK20M	Left Side	133372	50	50	22.5	22.29	0.03	0.038	1.05	0.04
	LTE 71	QPSK20M	Right Side	133372	50	50	22.5	22.29	0.07	0.015	1.05	0.02
	LTE 71	QPSK20M	Top Side	133372	50	50	22.5	22.29	0.04	0.038	1.05	0.04
P5	LTE 71	QPSK20M	Front Face	133222	1	50	23.5	23.11	0.02	0.222	1.09	**0.24**
	LTE 71	QPSK20M	Front Face	133322	1	50	23.5	23.24	0.12	0.202	1.06	0.21

4.6.3 SAR Results for Extremity Exposure Condition (Separation Distance is 0 cm Gap)

Plot No.	Band	Mode	Test Position	Ch.	RB#	RB Offset	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Power Drift (dB)	Measured SAR-10g (W/kg)	Scaling Factor	Scaled SAR-10g (W/kg)
	LTE 2	QPSK20M	Front Face	18700	1	50	23	22.69	0.3	3.170	1.07	3.40
	LTE 2	QPSK20M	Rear Face	18700	1	50	23	22.69	0.05	0.610	1.07	0.66
	LTE 2	QPSK20M	Left Side	18700	1	50	23	22.69	-0.06	1.240	1.07	1.33
	LTE 2	QPSK20M	Right Side	18700	1	50	23	22.69	0.05	0.170	1.07	0.18
	LTE 2	QPSK20M	Top Side	18700	1	50	23	22.69	-0.03	1.030	1.07	1.11
	LTE 2	QPSK20M	Front Face	18700	50	25	22	21.65	0.02	2.280	1.08	2.47
	LTE 2	QPSK20M	Rear Face	18700	50	25	22	21.65	0.02	0.520	1.08	0.56
	LTE 2	QPSK20M	Left Side	18700	50	25	22	21.65	-0.04	0.918	1.08	1.00
	LTE 2	QPSK20M	Right Side	18700	50	25	22	21.65	0.07	0.138	1.08	0.15
	LTE 2	QPSK20M	Top Side	18700	50	25	22	21.65	0.01	0.787	1.08	0.85
	LTE 2	QPSK20M	Front Face	18900	1	50	23	22.51	-0.06	2.940	1.12	3.29
P6	LTE 2	QPSK20M	Front Face	19100	1	50	23	22.46	0.11	3.240	1.13	**3.67**
	LTE 2	QPSK20M	Front Face	18900	50	25	22	21.48	0.04	2.360	1.13	2.66
	LTE 2	QPSK20M	Front Face	19100	50	25	22	21.38	0.07	2.520	1.15	2.91
	LTE 2	QPSK20M	Front Face	18700	100	0	22	21.54	-0.04	2.470	1.11	2.75
	LTE 5	QPSK10M	Front Face	20600	1	49	25	23.74	0.05	0.308	1.34	0.41
	LTE 5	QPSK10M	Rear Face	20600	1	49	25	23.74	0.06	0.096	1.34	0.13
	LTE 5	QPSK10M	Left Side	20600	1	49	25	23.74	0.03	0.144	1.34	0.19
	LTE 5	QPSK10M	Right Side	20600	1	49	25	23.74	0.09	0.014	1.34	0.02
	LTE 5	QPSK10M	Top Side	20600	1	49	25	23.74	0.08	0.059	1.34	0.08
	LTE 5	QPSK10M	Front Face	20600	25	0	24	22.39	0.04	0.270	1.45	0.39
	LTE 5	QPSK10M	Rear Face	20600	25	0	24	22.39	0.02	0.072	1.45	0.10
	LTE 5	QPSK10M	Left Side	20600	25	0	24	22.39	0.05	0.110	1.45	0.16
	LTE 5	QPSK10M	Right Side	20600	25	0	24	22.39	0.09	0.003	1.45	0.00
	LTE 5	QPSK10M	Top Side	20600	25	0	24	22.39	0.05	0.048	1.45	0.07
P7	LTE 5	QPSK10M	Front Face	20450	1	49	25	23.63	0.13	0.414	1.37	**0.57**
	LTE 5	QPSK10M	Front Face	20525	1	49	25	23.65	0.18	0.364	1.36	0.50
	LTE 12	QPSK10M	Front Face	23130	1	24	25	23.88	-0.07	0.648	1.29	0.84
	LTE 12	QPSK10M	Rear Face	23130	1	24	25	23.88	-0.02	0.332	1.29	0.43
	LTE 12	QPSK10M	Left Side	23130	1	24	25	23.88	-0.02	0.177	1.29	0.23
	LTE 12	QPSK10M	Right Side	23130	1	24	25	23.88	-0.04	0.135	1.29	0.17
	LTE 12	QPSK10M	Top Side	23130	1	24	25	23.88	-0.06	0.344	1.29	0.45
	LTE 12	QPSK10M	Front Face	23130	25	0	24	22.83	0.01	0.450	1.31	0.59
	LTE 12	QPSK10M	Rear Face	23130	25	0	24	22.83	-0.02	0.335	1.31	0.44

	LTE 12	QPSK10M	Left Side	23130	25	0	24	22.83	-0.04	0.130	1.31	0.17
	LTE 12	QPSK10M	Right Side	23130	25	0	24	22.83	0.12	0.121	1.31	0.16
	LTE 12	QPSK10M	Top Side	23130	25	0	24	22.83	0.13	0.324	1.31	0.42
P8	LTE 12	QPSK10M	Front Face	23060	1	24	25	23.78	-0.16	0.707	1.32	**0.94**
	LTE 12	QPSK10M	Front Face	23095	1	24	25	23.68	-0.04	0.539	1.36	0.73
	LTE 66	QPSK20M	Front Face	132322	1	50	23.5	23.33	0.03	2.750	1.04	2.86
	LTE 66	QPSK20M	Rear Face	132322	1	50	23.5	23.33	0.02	0.790	1.04	0.82
	LTE 66	QPSK20M	Left Side	132322	1	50	23.5	23.33	-0.2	2.270	1.04	2.36
	LTE 66	QPSK20M	Right Side	132322	1	50	23.5	23.33	0.03	0.317	1.04	0.33
	LTE 66	QPSK20M	Top Side	132322	1	50	23.5	23.33	0.16	0.812	1.04	0.84
	LTE 66	QPSK20M	Front Face	132322	50	0	22.5	22.28	0.1	1.970	1.05	2.07
	LTE 66	QPSK20M	Rear Face	132322	50	0	22.5	22.28	0.02	0.668	1.05	0.70
	LTE 66	QPSK20M	Left Side	132322	50	0	22.5	22.28	-0.06	2.020	1.05	2.12
	LTE 66	QPSK20M	Right Side	132322	50	0	22.5	22.28	0.04	0.290	1.05	0.31
	LTE 66	QPSK20M	Top Side	132322	50	0	22.5	22.28	0.01	0.700	1.05	0.74
	LTE 66	QPSK20M	Front Face	132072	1	50	23.5	23.06	0.02	2.050	1.11	2.27
P9	LTE 66	QPSK20M	Front Face	132572	1	50	23.5	23.12	0.05	2.940	1.09	**3.21**
	LTE 66	QPSK20M	Left Side	132072	1	50	23.5	23.06	0.04	2.530	1.11	2.80
	LTE 66	QPSK20M	Left Side	132572	1	50	23.5	23.12	-0.07	2.210	1.09	2.41
	LTE 66	QPSK20M	Front Face	132072	50	0	22.5	22.01	0.15	1.730	1.12	1.94
	LTE 66	QPSK20M	Front Face	132572	50	0	22.5	22.07	0.02	2.060	1.10	2.27
	LTE 66	QPSK20M	Left Side	132072	50	0	22.5	22.01	-0.16	2.050	1.12	2.29
	LTE 66	QPSK20M	Left Side	132572	50	0	22.5	22.07	-0.02	1.920	1.10	2.12
	LTE 66	QPSK20M	Front Face	132322	100	0	22.5	22.13	0.02	1.920	1.09	2.09
	LTE 66	QPSK20M	Left Side	132322	100	0	22.5	22.13	-0.04	1.910	1.09	2.08
	LTE 71	QPSK20M	Front Face	133372	1	50	23.5	23.34	0.09	0.611	1.04	0.63
	LTE 71	QPSK20M	Rear Face	133372	1	50	23.5	23.34	-0.03	0.349	1.04	0.36
	LTE 71	QPSK20M	Left Side	133372	1	50	23.5	23.34	-0.02	0.261	1.04	0.27
	LTE 71	QPSK20M	Right Side	133372	1	50	23.5	23.34	0.04	0.298	1.04	0.31
	LTE 71	QPSK20M	Top Side	133372	1	50	23.5	23.34	0.02	0.342	1.04	0.35
	LTE 71	QPSK20M	Front Face	133372	50	50	22.5	22.29	-0.18	0.547	1.05	0.57
	LTE 71	QPSK20M	Rear Face	133372	50	50	22.5	22.29	0.02	0.256	1.05	0.27
	LTE 71	QPSK20M	Left Side	133372	50	50	22.5	22.29	0.065	0.194	1.05	0.20
	LTE 71	QPSK20M	Right Side	133372	50	50	22.5	22.29	0.03	0.195	1.05	0.20
	LTE 71	QPSK20M	Top Side	133372	50	50	22.5	22.29	0.05	0.253	1.05	0.27
	LTE 71	QPSK20M	Front Face	133222	1	50	23.5	23.11	0.03	0.743	1.09	0.81
P10	LTE 71	QPSK20M	Front Face	133322	1	50	23.5	23.24	0.07	1.320	1.06	**1.40**

4.6.4 SAR Measurement Variability

According to KDB 865664 D01, SAR measurement variability was assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media are required for SAR measurements in a frequency band, the variability measurement procedures should be applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. Alternatively, if the highest measured SAR for both head and body tissue-equivalent media are ≤ 1.45 W/kg and the ratio of these highest SAR values, i.e., largest divided by smallest value, is ≤ 1.10, the highest SAR configuration for either head or body tissue-equivalent medium may be used to perform the repeated measurement. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

SAR repeated measurement procedure:

1. When the highest measured SAR is < 0.80 W/kg, repeated measurement is not required.
2. When the highest measured SAR is >= 0.80 W/kg, repeat that measurement once.
3. If the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20, or when the original or repeated measurement is >= 1.45 W/kg, perform a second repeated measurement.
4. If the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20, and the original, first or second repeated measurement is >= 1.5 W/kg, perform a third repeated measurement.

<Body Condition>

Band	Test Position	Ch.	Original Measured SAR-1g (W/kg)	1st Repeated SAR-1g (W/kg)	L/S Ratio	2nd Repeated SAR-1g (W/kg)	L/S Ratio	3rd Repeated SAR-1g (W/kg)	L/S Ratio
LTE 2	Left Side	19100	1.37	1.35	1.01	N/A	N/A	N/A	N/A
LTE 66	Left Side	132072	1.06	1.05	1.01	N/A	N/A	N/A	N/A

<Extremity Condition>

Band	Test Position	Ch.	Original Measured SAR-1g (W/kg)	1st Repeated SAR-1g (W/kg)	L/S Ratio	2nd Repeated SAR-1g (W/kg)	L/S Ratio	3rd Repeated SAR-1g (W/kg)	L/S Ratio
LTE 2	Front Face	19100	3.67	3.66	1.00	N/A	N/A	N/A	N/A
LTE 66	Left Side	132072	3.21	3.18	1.01	N/A	N/A	N/A	N/A

Test Engineer： ShunXin Hou, and ChengKai Wang

5. Calibration of Test Equipment

Equipment	Manufacturer	Model	SN	Cal. Date	Cal. Interval
System Validation Dipole	SPEAG	750MHz	1200	Oct.27,2021	1 Year
System Validation Dipole	SPEAG	835MHz	4d265	Oct.18,2021	1 Year
System Validation Dipole	SPEAG	1750MHz	1176	Oct.19,2021	1 Year
System Validation Dipole	SPEAG	1950MHz	1229	Oct.28,2021	1 Year
Dielectric Probe Kit	SPEAG	DAK-3.5	1119	Feb.28,2022	1 Year
Dosimetric E-Field Probe	SPEAG	EX3DV4	7612	Jan.27,2022	1 Year
Data Acquisition Electronics	SPEAG	DAE4	1633	Oct.26,2021	1 Year
Universal Radio Communication Tester	R&S	CMW500	169210	Jul.28,2021	1 Year
Power Amplifier	Mimi-Circuits	ZHL-42w	15542	N/A	N/A
Power Amplifier	Mimi-Circuits	ZVE-8G+	363901119	N/A	N/A
Power Meter	Rohde&Schwarz	NRX	102380	Feb.15,2022	1 Year
Power Sensor	Rohde&Schwarz	NRP6A	102942	Feb.15,2022	1 Year
Power Sensor	Rohde&Schwarz	NRP6A	102943	Feb.15,2022	1 Year
ESG Analog Signal Generator	Rohde&Schwarz	SMB100A03	182185	Feb.16,2022	1 Year
Electronic Thermometer	Anymetre	JR912	SZ01	Jul.30,2021	1 Year

6. Measurement Uncertainty

According to KDB 865664 D01, SAR measurement uncertainty analysis is required in SAR reports only when the highest measured SAR in a frequency band is ⩾ 1.5 W/kg for 1-g SAR, and ⩾ 3.75 W/kg for 10-g SAR. The procedures described in IEEE Std 1528-2013should be applied. The expanded SAR measurement uncertainty must be ⩽ 30%, for a confidence interval of k = 2. When the highest measured SAR within a frequency band is < 1.5 W/kg for 1-g and < 3.75 W/kg for 10-g, the extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval. Hence, the measurement uncertainty analysis is not required in this SAR report because the test result met the condition.

7. Information on the Testing Laboratories

We, Huarui 7layers High Technology (Suzhou) Co., Ltd., were founded in 2020 to provide our best service in EMC, Radio, Telecom and Safety consultation.

If you have any comments, please feel free to contact us at the following:

Add: Tower N, Innovation Center, 88 Zuyi Road, High-tech District, Suzhou City, Anhui Province
Tel: +86 13910007241

The road map of all our labs can be found in our web site also
Web: http://www.7Layers.com
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Appendix A. SAR Plots of System Verification

The plots for system verification with largest deviation for each SAR system combination are shown as follows.

Test Laboratory: ritt 7 Layers SAR/HAC Testing Lab Date: 06/13/2022

System Check_750MHz_220613

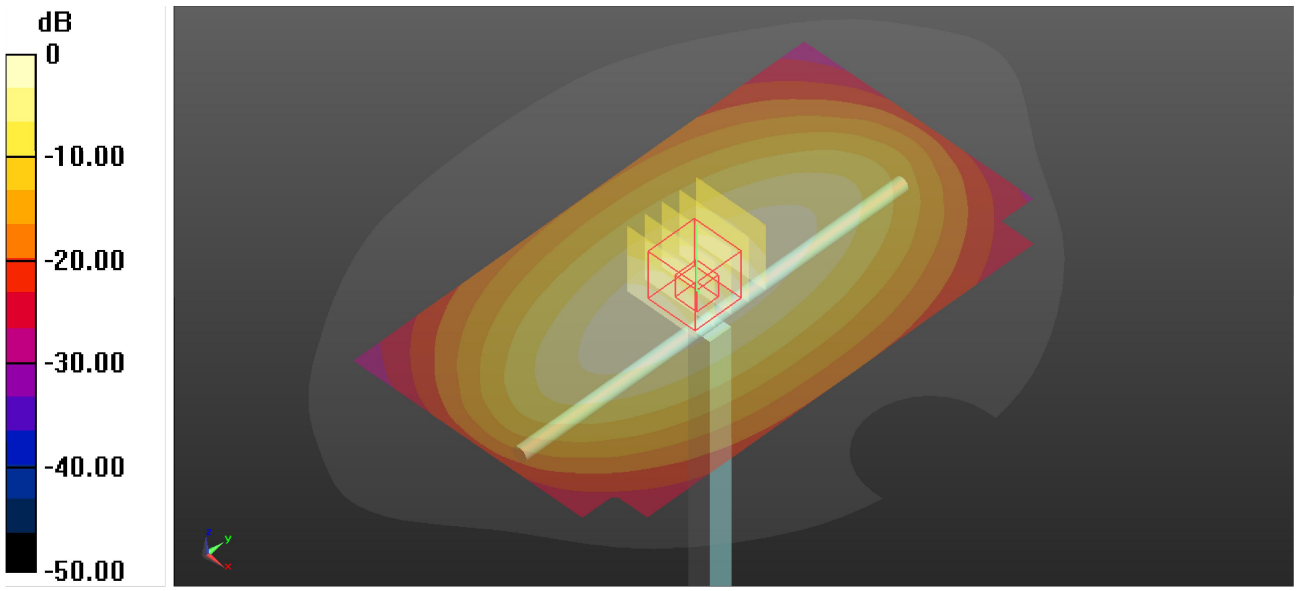
DUT: Dipole 750 MHz ; Type: D750V3; SN:1200

Communication System: CW; Frequency: 750 MHz;Duty Cycle: 1:1
Medium: HSL750_0613 Medium parameters used: f = 750 MHz; σ = 0.865 S/m; ε_r = 42.01; ρ = 1000 kg/m^3
Ambient Temperature：23.5℃; Liquid Temperature：22.3℃

DASY5 Configuration:
- Probe: EX3DV4 - SN7612; ConvF(11.02, 11.02, 11.02) @ 750 MHz; Calibrated: 01/27/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1633; Calibrated: 10/26/2021
- Phantom: Twin-SAM; Type: QD 000 P41 Ax; Serial: 2018
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Pin=250mW/Area Scan (81x141x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.20 W/kg

Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 49.87 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 3.03 W/kg
SAR(1 g) = 2.11 W/kg; SAR(10 g) = 1.38 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 2.21 W/kg



0 dB = 2.21 W/kg

Test Laboratory: ritt 7 Layers SAR/HAC Testing Lab Date: 06/09/2022

System Check_835MHz_220609

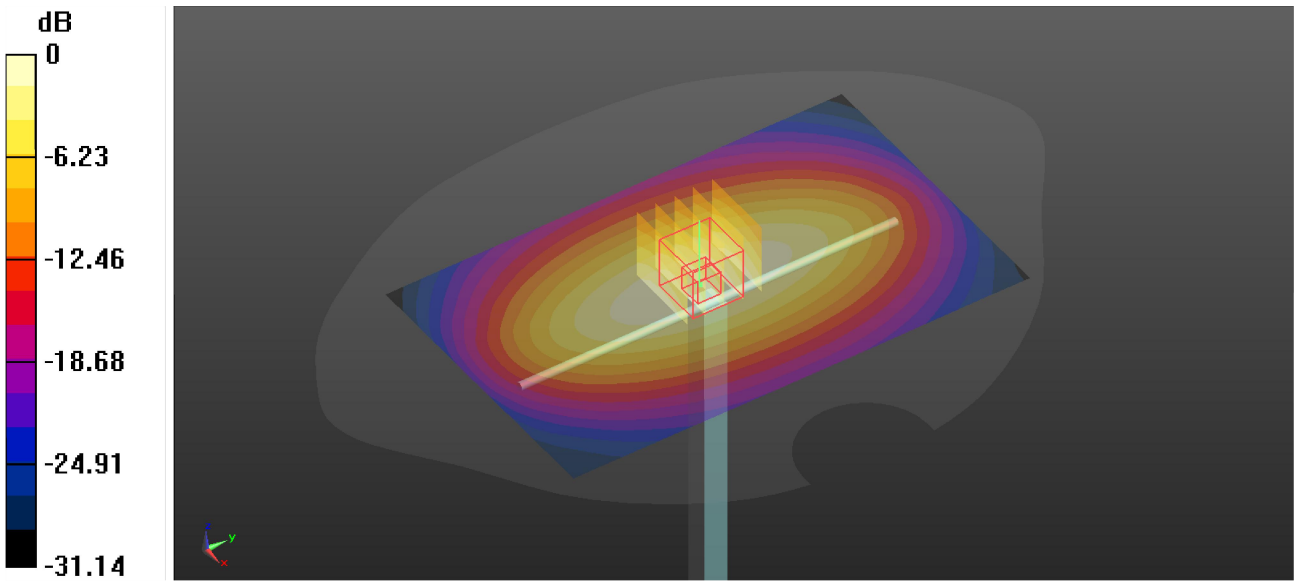
DUT: Dipole 835 MHz D835V2 ;Type:D835V2;SN:4d265

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: HSL835_0609 Medium parameters used: f = 835 MHz; σ = 0.912 S/m; ε_r = 43.08; ρ = 1000 kg/m^3
Ambient Temperature：23.3℃; Liquid Temperature：22.2℃

DASY5 Configuration:
- Probe: EX3DV4 - SN7612; ConvF(10.57, 10.57, 10.57) @ 835 MHz; Calibrated: 01/27/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1633; Calibrated: 10/26/2021
- Phantom: Twin-SAM; Type: QD 000 P41 Ax; Serial: 2018
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Pin=250mW/Area Scan (81x131x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.67 W/kg

Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 53.63 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.68 W/kg
SAR(1 g) = 2.47 W/kg; SAR(10 g) = 1.62 W/kg
Maximum value of SAR (measured) = 2.67 W/kg



0 dB = 2.67 W/kg

Test Laboratory: ritt 7 Layers SAR/HAC Testing Lab Date: 06/10/2022

System Check_1750MHz_220610

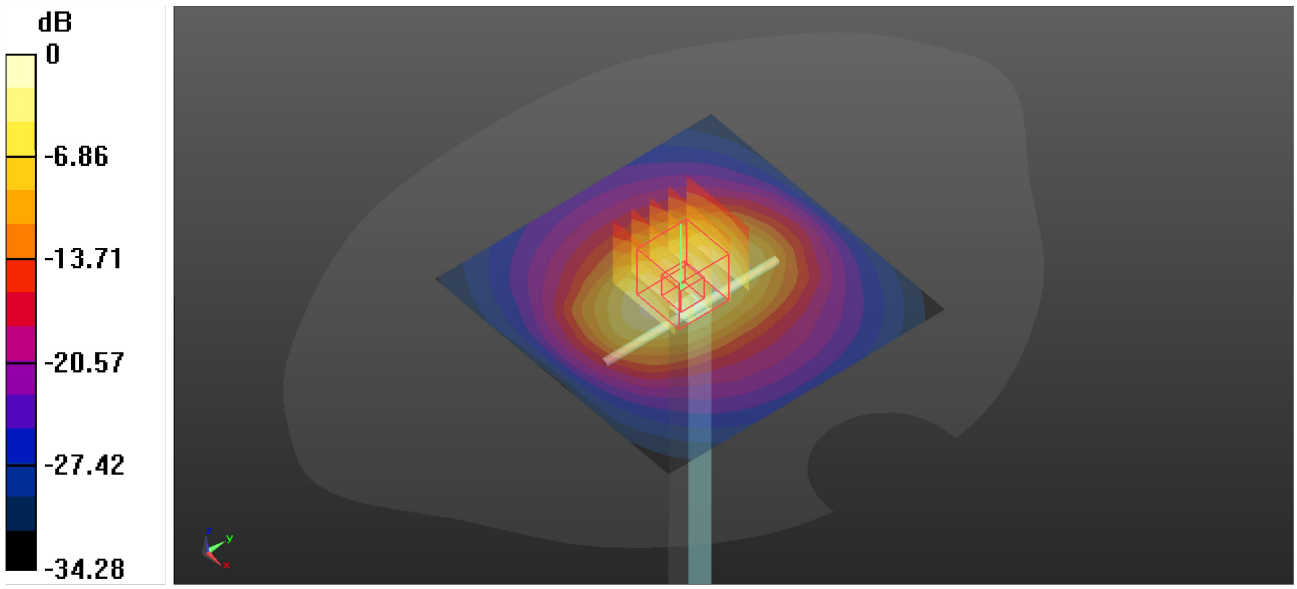
DUT: Dipole 1750 MHz; Type: D1750V2;SN:1176

Communication System: CW; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium: HSL1750_0610 Medium parameters used: f = 1750 MHz; σ = 1.316 S/m; ε_r = 39.288; ρ = 1000 kg/m^3
Ambient Temperature：23.0℃; Liquid Temperature：22.1℃

DASY5 Configuration:
- Probe: EX3DV4 - SN7612; ConvF(8.9, 8.9, 8.9) @ 1750 MHz; Calibrated: 01/27/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1633; Calibrated: 10/26/2021
- Phantom: Twin-SAM; Type: QD 000 P41 Ax; Serial: 2018
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Pin=250mW/Area Scan (81x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 9.81 W/kg

Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 83.31 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 15.7 W/kg
SAR(1 g) = 8.82 W/kg; SAR(10 g) = 4.74 W/kg
Maximum value of SAR (measured) = 9.83 W/kg



0 dB = 9.83 W/kg

Test Laboratory: ritt 7 Layers SAR/HAC Testing Lab Date: 06/09/2022

System Check_1950MHz_220609

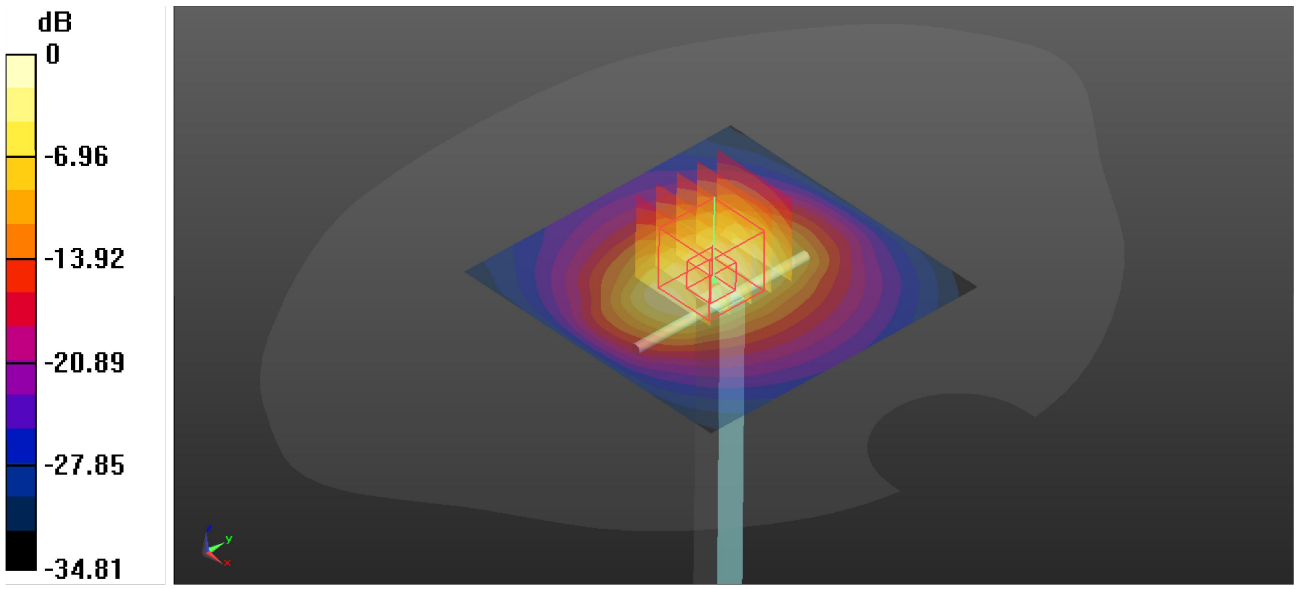
DUT: Dipole 1950; Type: D1950V3;SN:1229

Communication System: CW; Frequency: 1950 MHz;Duty Cycle: 1:1
Medium: HSL1950_0609 Medium parameters used: f = 1950 MHz; σ = 1.381 S/m; ε_r = 40.213; ρ = 1000 kg/m^3
Ambient Temperature：23.3℃; Liquid Temperature：22.2℃

DASY5 Configuration:
- Probe: EX3DV4 - SN7612; ConvF(8.73, 8.73, 8.73) @ 1950 MHz; Calibrated: 01/27/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1633; Calibrated: 10/26/2021
- Phantom: Twin-SAM; Type: QD 000 P41 Ax; Serial: 2018
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Pin=250mW/Area Scan (71x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 12.0 W/kg

Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 89.03 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 19.2 W/kg
SAR(1 g) = 10.3 W/kg; SAR(10 g) = 5.25 W/kg
Maximum value of SAR (measured) = 11.6 W/kg



0 dB = 11.6 W/kg

Appendix B. SAR Plots of SAR Measurement

The SAR plots for highest measured SAR in each exposure configuration, wireless mode and frequency band combination, and measured SAR > 1.5 W/kg are shown as follows.

Test Laboratory: ritt 7 Layers SAR/HAC Testing Lab Date: 06/09/2022

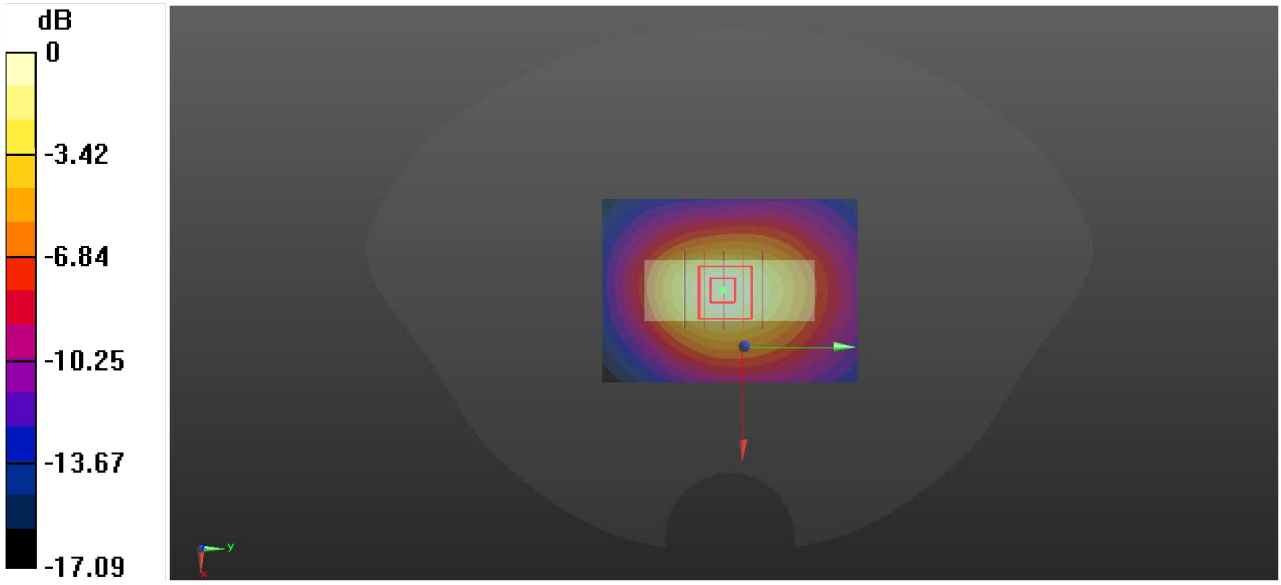
P01 LTE B2_QPSK20M_Left Side_20mm_Ch19100_1RB_OS50

Communication System: LTE; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: HSL1950_0609 Medium parameters used: f = 1900 MHz; σ = 1.373 S/m; ε_r = 40.271; ρ = 1000 kg/m^3
Ambient Temperature：23.3℃; Liquid Temperature：22.2℃

DASY5 Configuration:
- Probe: EX3DV4 - SN7612; ConvF(8.73, 8.73, 8.73) @ 1900 MHz; Calibrated: 01/27/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1633; Calibrated: 10/26/2021
- Phantom: Twin-SAM; Type: QD 000 P41 Ax; Serial: 2018
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

-Area Scan (51x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.84 W/kg

-Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 29.49 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 2.08 W/kg
SAR(1 g) = 1.21 W/kg; SAR(10 g) = 0.705 W/kg
Maximum value of SAR (measured) = 1.76 W/kg



0 dB = 1.76 W/kg

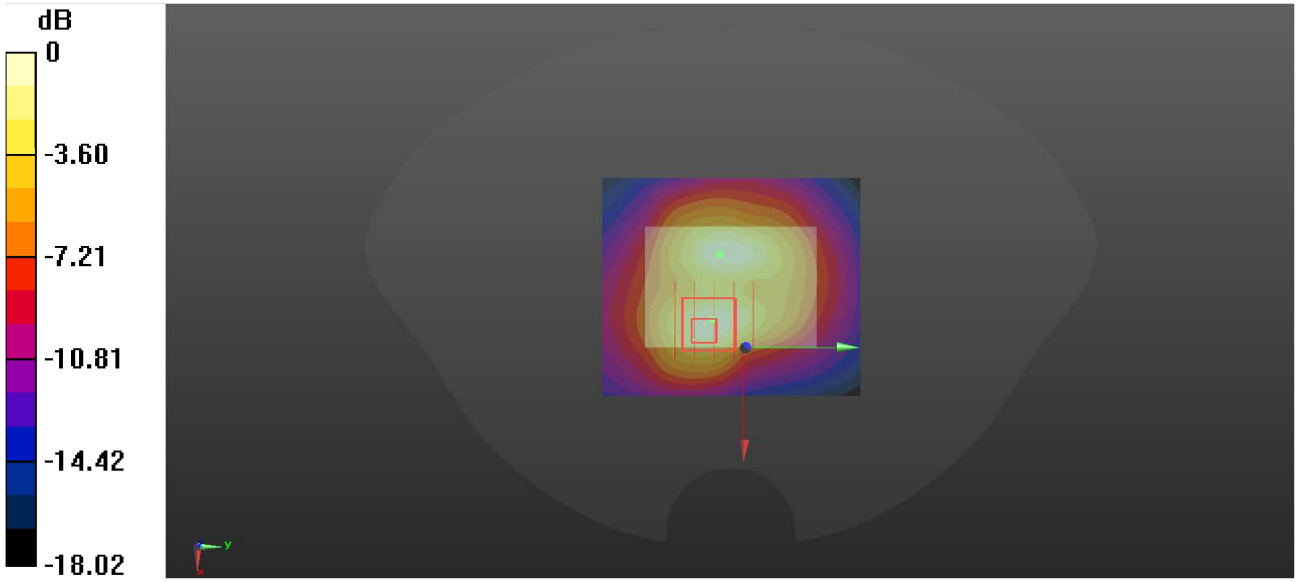
P02 LTE B5_QPSK10M_Front Face_20mm_Ch20450_1RB_OS49

Communication System: LTE; Frequency: 829 MHz;Duty Cycle: 1:1
Medium: HSL835_0609 Medium parameters used: f = 829 MHz; σ = 0.909 S/m; ε_r = 43.04; ρ = 1000 kg/m^3
Ambient Temperature：23.3℃; Liquid Temperature：22.2℃

DASY5 Configuration:
- Probe: EX3DV4 - SN7612; ConvF(10.57, 10.57, 10.57) @ 829 MHz; Calibrated: 01/27/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1633; Calibrated: 10/26/2021
- Phantom: Twin-SAM; Type: QD 000 P41 Ax; Serial: 2018
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

-Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.0589 W/kg

-Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.079 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.120 W/kg
SAR(1 g) = 0.053 W/kg; SAR(10 g) = 0.026 W/kg
Maximum value of SAR (measured) = 0.0608 W/kg



0 dB = 0.608 W/kg

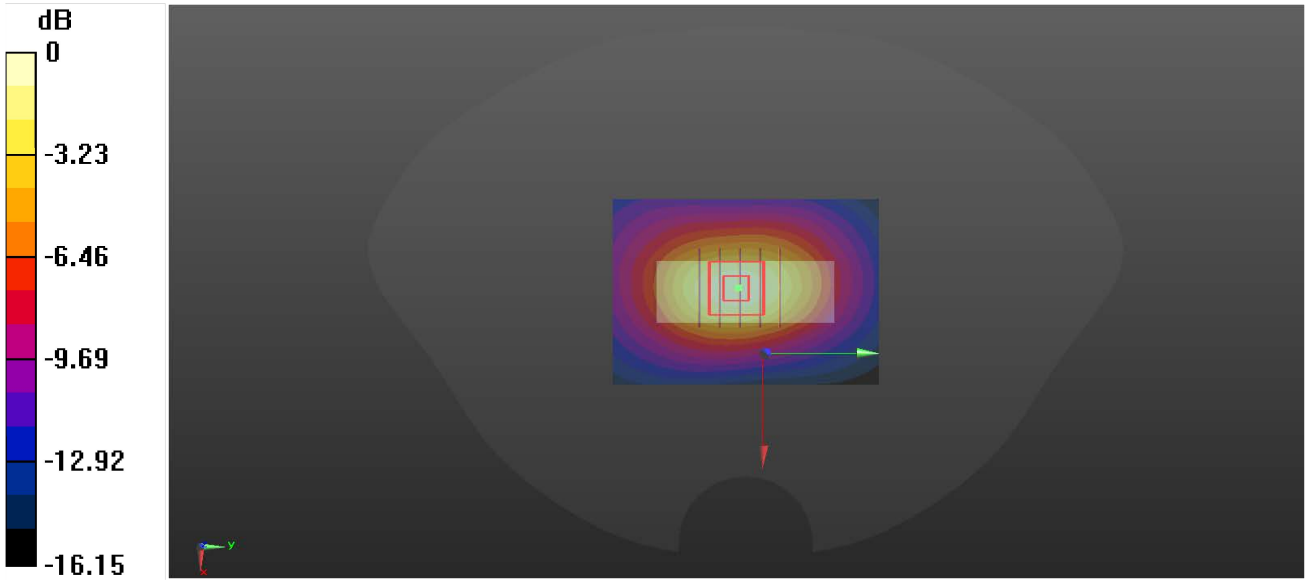
P03 LTE B12_QPSK10M_Front Face_20mm_Ch23060_1RB_OS24

Communication System: LTE; Frequency: 704 MHz;Duty Cycle: 1:1
Medium: HSL750_0613 Medium parameters used: f = 704 MHz; σ = 0.865 S/m; ε_r = 41.391; ρ = 1000 kg/m^3
Ambient Temperature：23.5℃; Liquid Temperature：22.3℃

DASY5 Configuration:
- Probe: EX3DV4 - SN7612; ConvF(11.02, 11.02, 11.02) @ 704 MHz; Calibrated: 01/27/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1633; Calibrated: 10/26/2021
- Phantom: Twin-SAM; Type: QD 000 P41 Ax; Serial: 2018
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

-Area Scan (61x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.405 W/kg

-Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.84 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.477 W/kg
SAR(1 g) = 0.298 W/kg; SAR(10 g) = 0.198 W/kg
Maximum value of SAR (measured) = 0.404 W/kg



0 dB = 0.404 W/kg

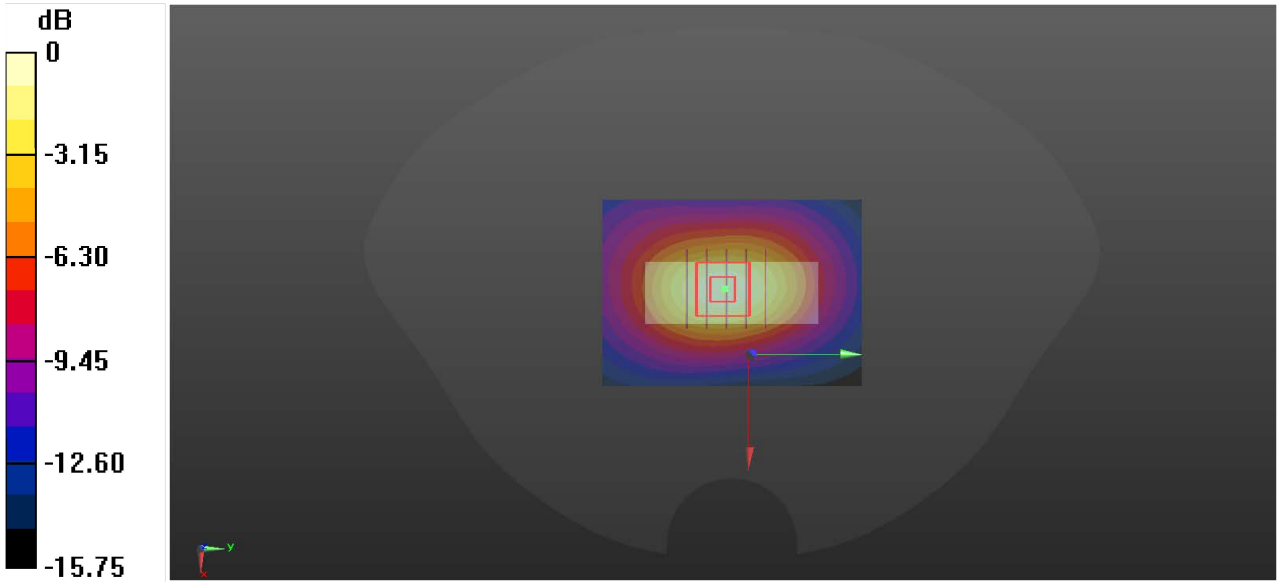
P04 LTE B66_QPSK20M_Left Side_20mm_Ch132072_1RB_OS50

Communication System: LTE; Frequency: 1720 MHz;Duty Cycle: 1:1
Medium: HSL1750_0610 Medium parameters used: f = 1720 MHz; σ = 1.325 S/m; ε_r = 39.298; ρ = 1000 kg/m^3
Ambient Temperature：23.0℃; Liquid Temperature：22.1℃

DASY5 Configuration:
- Probe: EX3DV4 - SN7612; ConvF(8.9, 8.9, 8.9) @ 1720 MHz; Calibrated: 01/27/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1633; Calibrated: 10/26/2021
- Phantom: Twin-SAM; Type: QD 000 P41 Ax; Serial: 2018
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

-Area Scan (51x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.43 W/kg

-Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.16 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 1.64 W/kg
SAR(1 g) = 0.957 W/kg; SAR(10 g) = 0.551 W/kg
Maximum value of SAR (measured) = 1.39 W/kg



0 dB = 1.39 W/kg

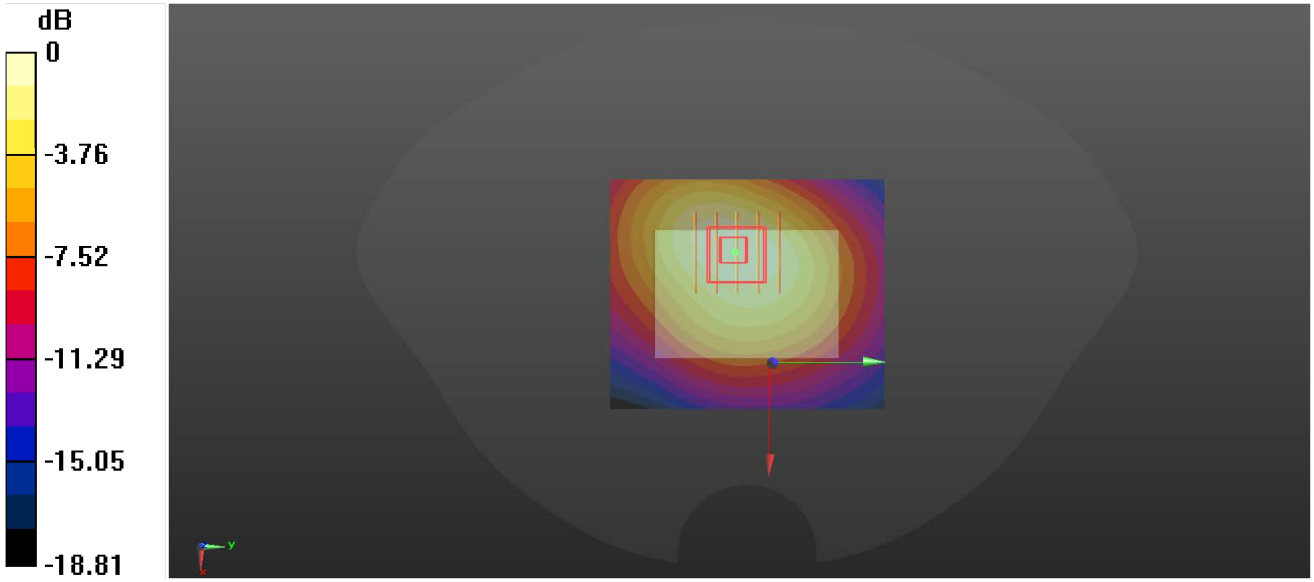
P05 LTE B71_QPSK20M_Front Face_20mm_Ch133222_1RB_OS50

Communication System: LTE; Frequency: 673 MHz;Duty Cycle: 1:1
Medium: HSL750_0613 Medium parameters used: f = 673 MHz; σ = 0.916 S/m; ε_r = 42.348; ρ = 1000 kg/m^3
Ambient Temperature：23.5℃; Liquid Temperature：22.3℃

DASY5 Configuration:
- Probe: EX3DV4 - SN7612; ConvF(11.02, 11.02, 11.02) @ 673 MHz; Calibrated: 01/27/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1633; Calibrated: 10/26/2021
- Phantom: Twin-SAM; Type: QD 000 P41 Ax; Serial: 2018
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

-Area Scan (61x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.303 W/kg

-Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.24 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.359 W/kg
SAR(1 g) = 0.222 W/kg; SAR(10 g) = 0.146 W/kg
Maximum value of SAR (measured) = 0.303 W/kg



0 dB = 0.303 W/kg

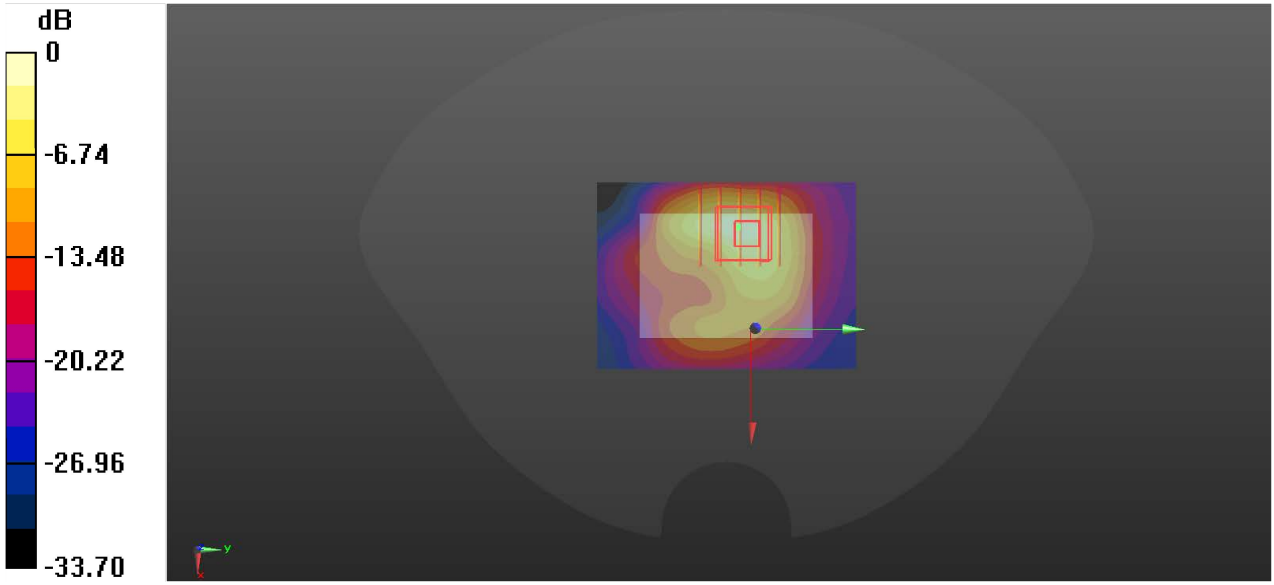
P06 LTE B2_QPSK20M_Front Face_0mm_Ch19100_1RB_OS50

Communication System: LTE; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: HSL1950_0609 Medium parameters used: f = 1900 MHz; σ = 1.373 S/m; ε_r = 40.271; ρ = 1000 kg/m^3
Ambient Temperature：23.3℃; Liquid Temperature：22.2℃

DASY5 Configuration:
- Probe: EX3DV4 - SN7612; ConvF(8.73, 8.73, 8.73) @ 1900 MHz; Calibrated: 01/27/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1633; Calibrated: 10/26/2021
- Phantom: Twin-SAM; Type: QD 000 P41 Ax; Serial: 2018
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

-Area Scan (51x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 11.2 W/kg

-Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.76 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 19.2 W/kg
SAR(1 g) = 7.73 W/kg; SAR(10 g) = 3.24 W/kg
Maximum value of SAR (measured) = 12.9 W/kg



0 dB = 12.9 W/kg

Test Laboratory: ritt 7 Layers SAR/HAC Testing Lab Date: 06/09/2022

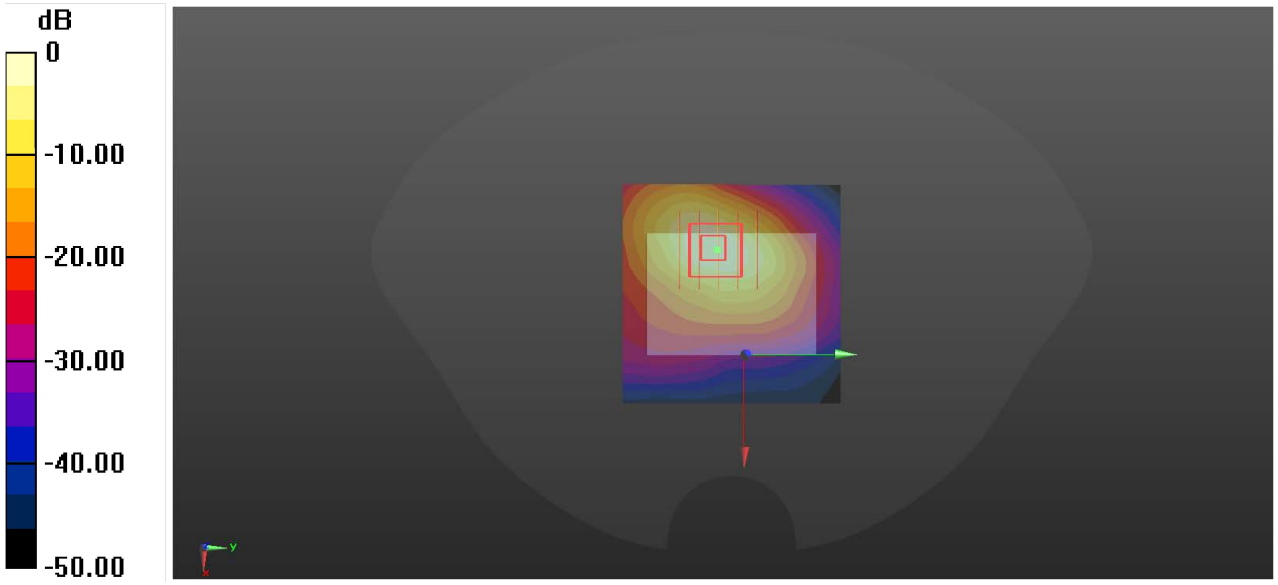
P07 LTE B5_QPSK10M_Front Face_0mm_Ch20525_1RB_OS49

Communication System: LTE; Frequency: 829 MHz;Duty Cycle: 1:1
Medium: HSL835_0609 Medium parameters used : f = 829 MHz; σ = 0.909 S/m; ε_r = 43.04; ρ = 1000 kg/m^3
Ambient Temperature：23.3℃; Liquid Temperature：22.2℃

DASY5 Configuration:
- Probe: EX3DV4 - SN7612; ConvF(10.57, 10.57, 10.57) @ 836.5 MHz; Calibrated: 01/27/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1633; Calibrated: 10/26/2021
- Phantom: Twin-SAM; Type: QD 000 P41 Ax; Serial: 2018
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

-Area Scan (61x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.00 W/kg

-Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.55 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 2.22 W/kg
SAR(1 g) = 0.911 W/kg; SAR(10 g) = 0.414 W/kg
Maximum value of SAR (measured) = 1.86 W/kg



0 dB = 1.86 W/kg

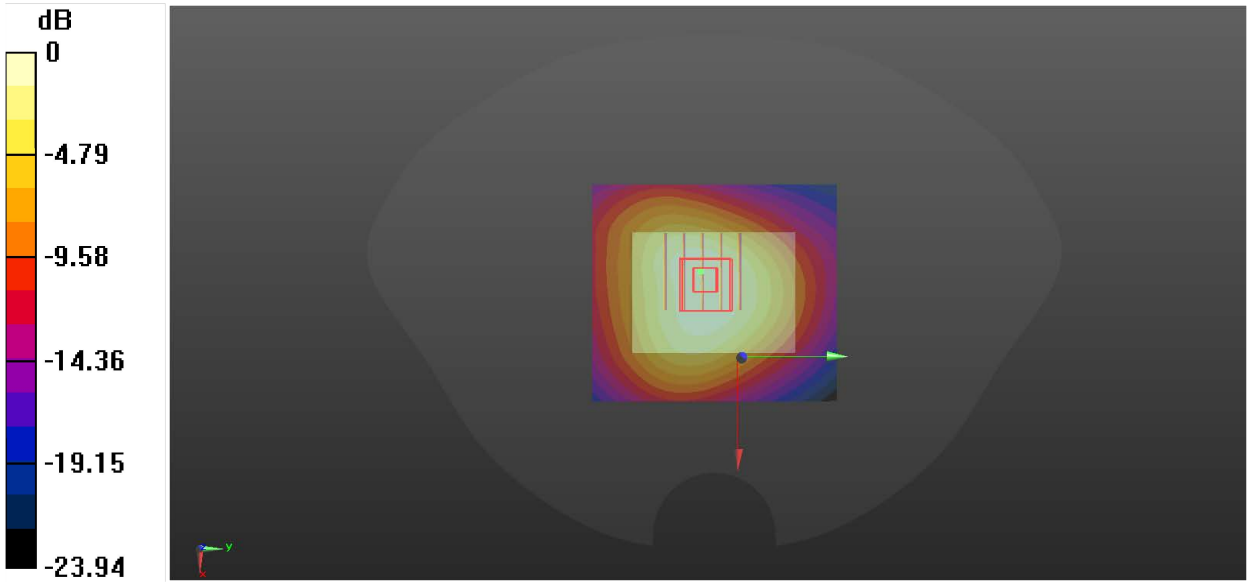
P08 LTE B12_QPSK10M_Front Face_0mm_Ch23060_1RB_OS24

Communication System: LTE; Frequency: 704 MHz;Duty Cycle: 1:1
Medium: HSL750_0613 Medium parameters used: f = 704 MHz; σ = 0.865 S/m; ε_r = 38.391; ρ = 1000 kg/m^3
Ambient Temperature：23.5℃; Liquid Temperature：22.3℃

DASY5 Configuration:
- Probe: EX3DV4 - SN7612; ConvF(11.02, 11.02, 11.02) @ 711 MHz; Calibrated: 01/27/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1633; Calibrated: 10/26/2021
- Phantom: Twin-SAM; Type: QD 000 P41 Ax; Serial: 2018
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

-Area Scan (41x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.07 W/kg

-Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 30.01 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 4.35 W/kg
SAR(1 g) = 1.61 W/kg; SAR(10 g) = 0.707 W/kg
Maximum value of SAR (measured) = 1.87 W/kg



0 dB = 1.87 W/kg

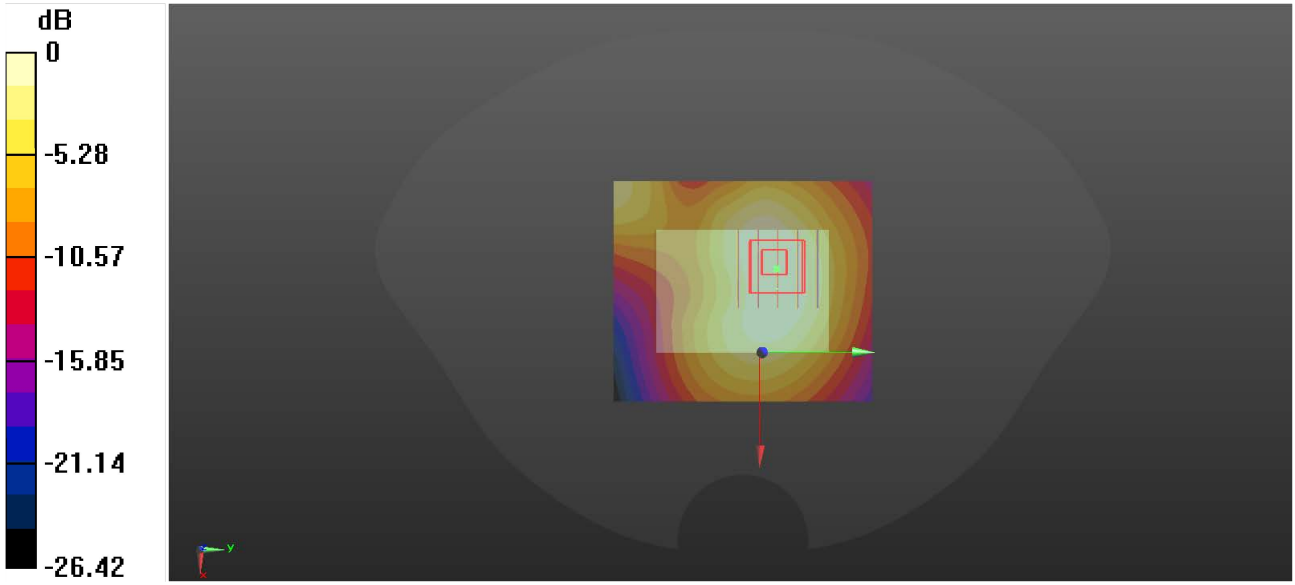
P09 LTE B66_QPSK20M_Front Face_0mm_Ch132572_1RB_OS50

Communication System: LTE; Frequency: 1770 MHz;Duty Cycle: 1:1
Medium: HSL1750_0610 Medium parameters used: f = 1770 MHz; σ = 1.366 S/m; ε_r = 39.115; ρ = 1000 kg/m^3
Ambient Temperature：23.0℃; Liquid Temperature：22.1℃

DASY5 Configuration:
- Probe: EX3DV4 - SN7612; ConvF(8.9, 8.9, 8.9) @ 1745 MHz; Calibrated: 01/27/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1633; Calibrated: 10/26/2021
- Phantom: Twin-SAM; Type: QD 000 P41 Ax; Serial: 2018
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

-Area Scan (51x81x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 7.68 W/kg

-Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 32.63 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 15.2 W/kg
SAR(1 g) = 6.53 W/kg; SAR(10 g) = 2.94 W/kg
Maximum value of SAR (measured) = 7.70 W/kg



0 dB = 7.70 W/kg

Test Laboratory: ritt 7 Layers SAR/HAC Testing Lab Date: 06/13/2022

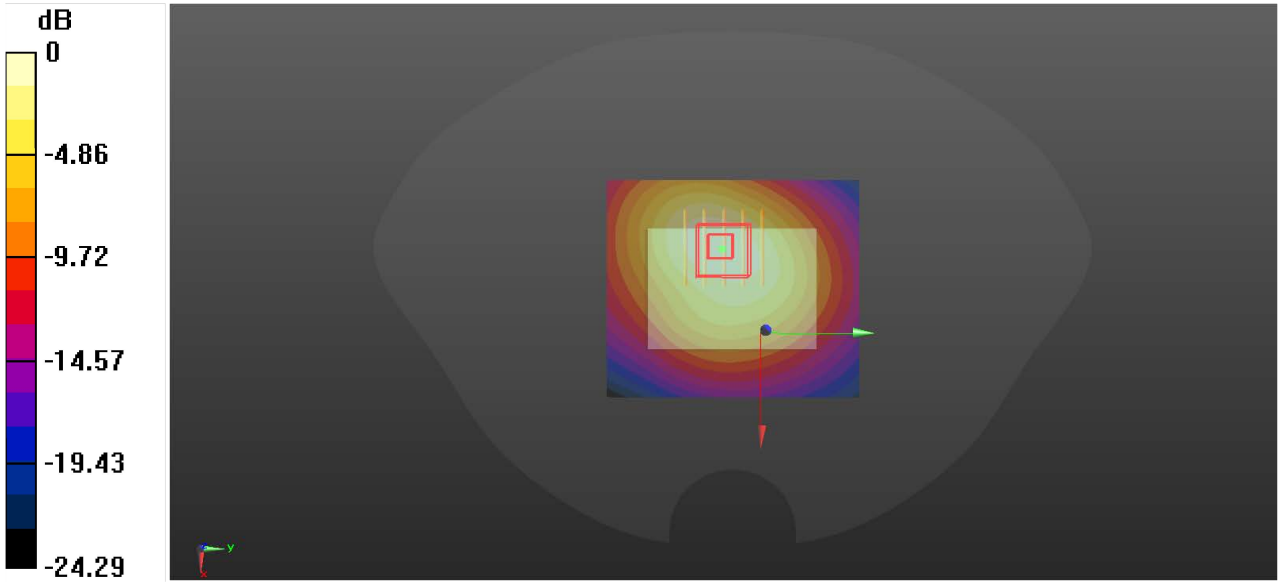
P10 LTE B71_QPSK20M_Front Face_0mm_Ch133322_1RB_OS50

Communication System: LTE; Frequency: 683 MHz;Duty Cycle: 1:1
Medium: HSL750_0613 Medium parameters used : f = 683 MHz; σ = 0.916 S/m; ε_r = 42.048; ρ = 1000 kg/m^3
Ambient Temperature：23.5℃; Liquid Temperature：22.3℃

DASY5 Configuration:
- Probe: EX3DV4 - SN7612; ConvF(11.02, 11.02, 11.02) @ 683 MHz; Calibrated: 01/27/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1633; Calibrated: 10/26/2021
- Phantom: Twin-SAM; Type: QD 000 P41 Ax; Serial: 2018
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

-Area Scan (51x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.76 W/kg

-Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 29.61 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 7.11 W/kg
SAR(1 g) = 2.83 W/kg; SAR(10 g) = 1.32 W/kg
Maximum value of SAR (measured) = 3.24 W/kg



0 dB = 3.24 W/kg

Appendix C. Calibration Certificate for Probe and Dipole

The SPEAG calibration certificates are shown as follows.