FCC SAR Test Report

Report No.	:	**SA180907C24**
Applicant	:	**Getac Technology Corporation.**
Address	:	**5F., Building A, No. 209, Sec.1, Nangang Rd., Nangang Dist., Taipei City 11568, Taiwan, R.O.C.**
Product	:	**Wireless Module**
FCC ID	:	**QYLEM7455V**
Brand	:	**Sierra wireless Inc.**
Model No.	:	**EM7455**
Standards	:	**FCC 47 CFR Part 2 (2.1093), IEEE C95.1:1992, IEEE Std 1528:2013 KDB 865664 D01 v01r04, KDB 865664 D02 v01r02, KDB 248227 D01 v02r02 KDB 447498 D01 v06, KDB 616217 D04 v01r02 KDB 941225 D01 v03r01, KDB 941225 D05 v02r05**
Sample Received Date	:	**Mar. 23, 2018**
Date of Testing	:	**Mar. 23, 2018 ~ Sep. 22, 2018**
Lab Address	:	**No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan, R.O.C.**
Test Location	:	**No. 19, Hwa Ya 2nd Rd, Wen Hwa Vil, Kwei Shan Dist., Taoyuan City 33383, Taiwan (R.O.C)**

CERTIFICATION: The above equipment have been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch – Lin Kou Laboratories**, 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 TAF or any government agencies.

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FCC Accredited No.: TW0003

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Release Control Record

Report No.	Reason for Change	Date Issued
SA180907C24	Initial release	Sep. 28, 2018

1. Summary of Maximum SAR Value

Equipment Class	Mode	Laptop PC Mode Highest SAR-1g Body Tested at 0 mm (W/kg)	Tablet PC Mode Highest SAR-1g Body Tested at 0 mm (W/kg)
PCB	WCDMA II	N/A	1.18
	WCDMA IV	N/A	0.99
	WCDMA V	N/A	1.10
	LTE 2 / 25	N/A	1.15
	LTE 4	N/A	1.14
	LTE 5 / 26	N/A	1.14
	LTE 7	N/A	0.99
	LTE 12	N/A	0.82
	LTE 13	N/A	1.06
	LTE 41	N/A	0.95
DTS	2.4G WLAN	N/A	0.44
NII	5.3G WLAN	N/A	0.87
	5.6G WLAN	N/A	0.86
	5.8G WLAN	N/A	0.68
DSS	Bluetooth	N/A	0.03
DXX	NFC	N/A	N/A

Highest Simultaneous Transmission SAR	Laptop PC Mode Highest SAR-1g Body Tested at 0 mm (W/kg)	Tablet PC Mode Highest SAR-1g Body Tested at 0 mm (W/kg)
	N/A	1.58

Note:

1. The SAR criteria **(Head & Body: SAR-1g 1.6 W/kg, and 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. This device supports both LTE band 25 and band 2. The frequency span of LTE band 25 can completely cover LTE band 2, and they has the same tune-up power. SAR was tested for LTE band 25 only.
3. This device supports both LTE band 26 and band 5. The frequency span of LTE band 26 can completely cover LTE band 5, and they has the same tune-up power. SAR was tested for LTE band 26 only.

2. Description of Equipment Under Test

EUT Type	Wireless Module
FCC ID	QYLEM7455V
Brand Name	Sierra wireless Inc.
Model Name	EM7455
Tx Frequency Bands (Unit: MHz)	WCDMA Band II : 1852.4 ~ 1907.6 WCDMA Band IV : 1712.4 ~ 1752.6 WCDMA Band V : 826.4 ~ 846.6 LTE Band 2 : 1850.7 ~ 1909.3 (BW: 1.4M, 3M, 5M, 10M, 15M, 20M) LTE Band 4 : 1710.7 ~ 1754.3 (BW: 1.4M, 3M, 5M, 10M, 15M, 20M) LTE Band 5 : 824.7 ~ 848.3 (BW: 1.4M, 3M, 5M, 10M) LTE Band 7 : 2502.5 ~ 2567.5 (BW: 5M, 10M, 15M, 20M) LTE Band 12 : 699.7 ~ 715.3 (BW: 1.4M, 3M, 5M, 10M) LTE Band 13 : 779.5 ~ 784.5 (BW: 5M, 10M) LTE Band 25 : 1850.7 ~ 1914.3 (BW: 1.4M, 3M, 5M, 10M, 15M, 20M) LTE Band 26 : 814.7 ~ 848.3 (BW: 1.4M, 3M, 5M, 10M, 15M) LTE Band 41 : 2498.5 ~ 2687.5 (BW: 5M, 10M, 15M, 20M) NFC : 13.56
Uplink Modulations	WCDMA : QPSK LTE : QPSK, 16QAM NFC : ASK
Maximum Tune-up Conducted Power (Unit: dBm)	Please refer to section 4.6.1 of this report
Antenna Type	WWAN: Fixed Internal Antenna
EUT Stage	Identical Prototype

Note:

1. The EUT is authorized for use in specific End-product. Please refer to below for more details.

Product	Brand	Model
Notebook	Getac	V110

2. The WLAN module (Brand: Intel, Model: 8265NGW) was installed in the End-product. The specification is listed as below.

WLAN module (Brand: Intel, Model: 8265NGW)	
Tx Frequency Bands (Unit: MHz)	WLAN : 2412 ~ 2462, 5180 ~ 5240, 5260 ~ 5320, 5500 ~ 5700, 5745 ~ 5825 Bluetooth : 2402 ~ 2480
Uplink Modulations	802.11b : DSSS 802.11a/g/n/ac : OFDM Bluetooth : GFSK, π/4-DQPSK, 8-DPSK
Antenna Type	WLAN/BT: PIFA Antenna
FCC ID	Contains ID: QYL8265NG

3. 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.

List of Accessory:

Battery	**Brand Name**	Getac Technology Corp.
	Model Name	BP3S1P2100-S
	Power Rating	11.1Vdc, 2100mAh
	Type	Li-ion
WWAN Module	**Brand Name**	Sierra wireless Inc.
	Model Name	EM7455
WLAN Module	**Brand Name**	Intel
	Model Name	8265NGW

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 DASY52 System

DASY52 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 DASY52 software defined. The DASY52 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.

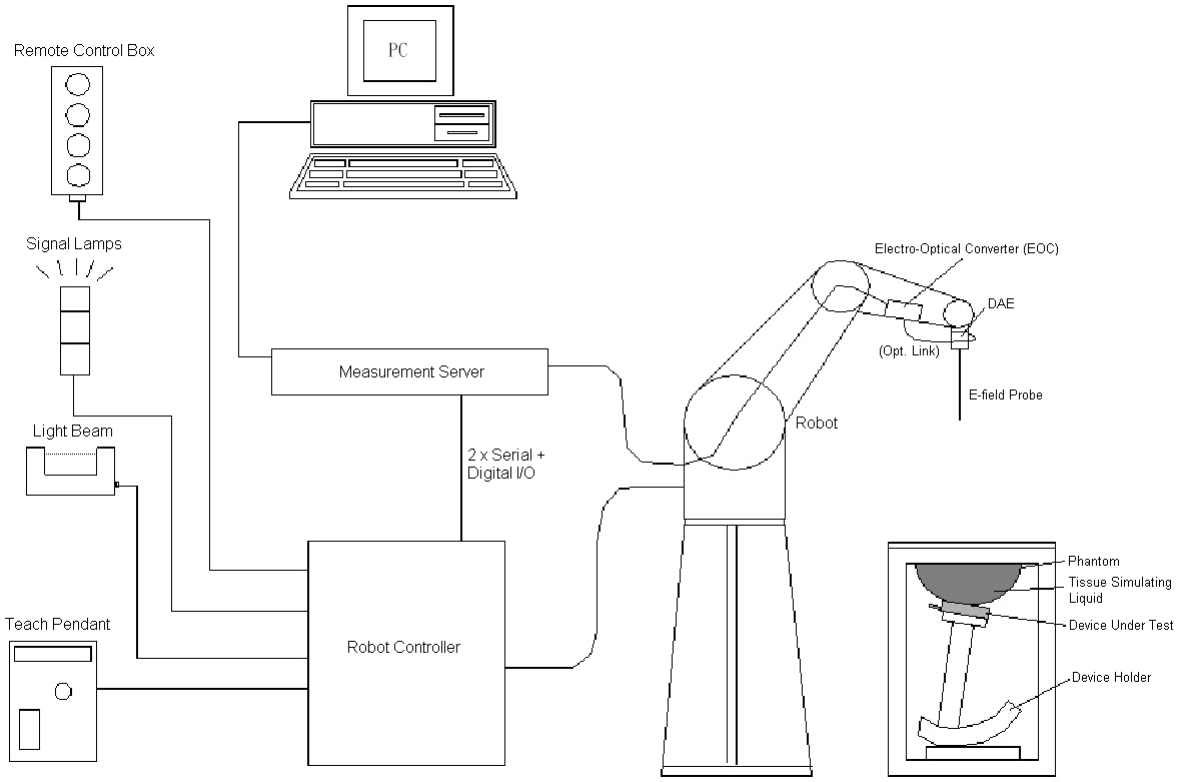


Fig-3.1 SPEAG DASY52 System Setup

3.2.1 Robot

The DASY52 systems use the high precision robots from Stäubli SA (France). For the 6-axis controller system, the robot controller version of 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 SPEAG DASY52 System

3.2.2 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

Model	ET3DV6
Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection system. Built-in shielding against static charges. PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Frequency	10 MHz to 2.3 GHz; Linearity: ± 0.2 dB
Directivity	± 0.2 dB in TSL (rotation around probe axis) ± 0.4 dB in TSL (rotation normal to probe axis)
Dynamic Range	5 µW/g to 100 mW/g; Linearity: ± 0.2 dB
Dimensions	Overall length: 337 mm (Tip: 16 mm) Tip diameter: 6.8 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.7 mm

3.2.3 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

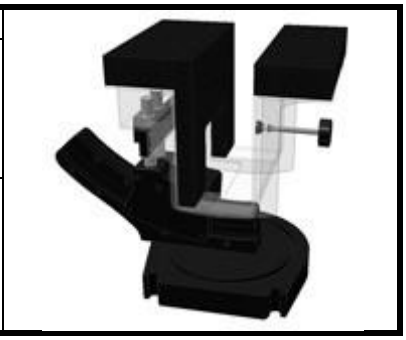
3.2.4 Phantoms

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

3.2.5 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	

3.2.6 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)	

3.2.7 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.

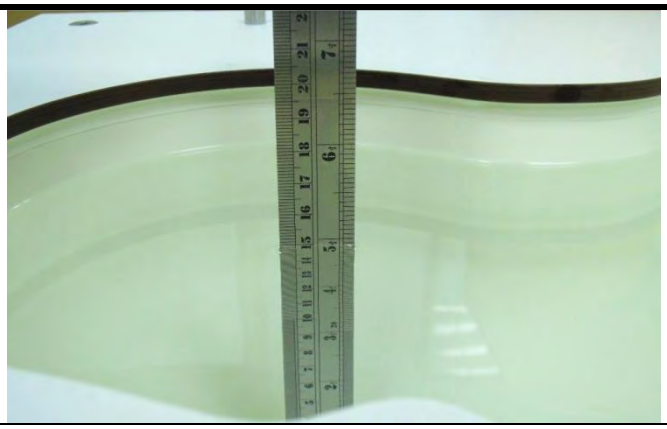
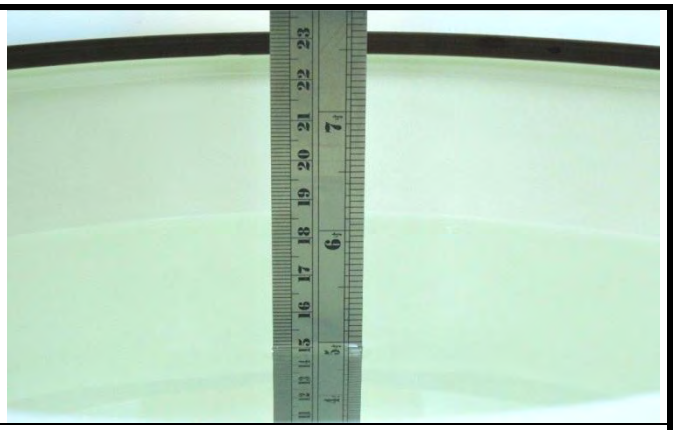
	

Photo of Liquid Height for Head Position	**Photo of Liquid Height for Body Position**

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
For Body				
750	55.5	52.7 ~ 58.3	0.96	0.91 ~ 1.01
835	55.2	52.4 ~ 58.0	0.97	0.92 ~ 1.02
900	55.0	52.3 ~ 57.8	1.05	1.00 ~ 1.10
1450	54.0	51.3 ~ 56.7	1.30	1.24 ~ 1.37
1640	53.8	51.1 ~ 56.5	1.40	1.33 ~ 1.47
1750	53.4	50.7 ~ 56.1	1.49	1.42 ~ 1.56
1800	53.3	50.6 ~ 56.0	1.52	1.44 ~ 1.60
1900	53.3	50.6 ~ 56.0	1.52	1.44 ~ 1.60
2000	53.3	50.6 ~ 56.0	1.52	1.44 ~ 1.60
2300	52.9	50.3 ~ 55.5	1.81	1.72 ~ 1.90
2450	52.7	50.1 ~ 55.3	1.95	1.85 ~ 2.05
2600	52.5	49.9 ~ 55.1	2.16	2.05 ~ 2.27
3500	51.3	48.7 ~ 53.9	3.31	3.14 ~ 3.48
5200	49.0	46.6 ~ 51.5	5.30	5.04 ~ 5.57
5300	48.9	46.5 ~ 51.3	5.42	5.15 ~ 5.69
5500	48.6	46.2 ~ 51.0	5.65	5.37 ~ 5.93
5600	48.5	46.1 ~ 50.9	5.77	5.48 ~ 6.06
5800	48.2	45.8 ~ 50.6	6.00	5.70 ~ 6.30

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	-	8.0	-	0.2	-	20.0	71.8	-
H5G	-	-	-	-	-	17.2	65.5	17.3
B750	0.2	-	0.2	0.8	48.8	-	50.0	-
B835	0.2	-	0.2	0.9	48.5	-	50.2	-
B900	0.2	-	0.2	0.9	48.2	-	50.5	-
B1450	-	34.0	-	0.3	-	-	65.7	-
B1640	-	32.5	-	0.3	-	-	67.2	-
B1750	-	31.0	-	0.2	-	-	68.8	-
B1800	-	29.5	-	0.4	-	-	70.1	-
B1900	-	29.5	-	0.3	-	-	70.2	-
B2000	-	30.0	-	0.2	-	-	69.8	-
B2300	-	31.0	-	0.1	-	-	68.9	-
B2450	-	31.4	-	0.1	-	-	68.5	-
B2600	-	31.8	-	0.1	-	-	68.1	-
B3500	-	28.8	-	0.1	-	-	71.1	-
B5G	-	-	-	-	-	10.7	78.6	10.7

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.

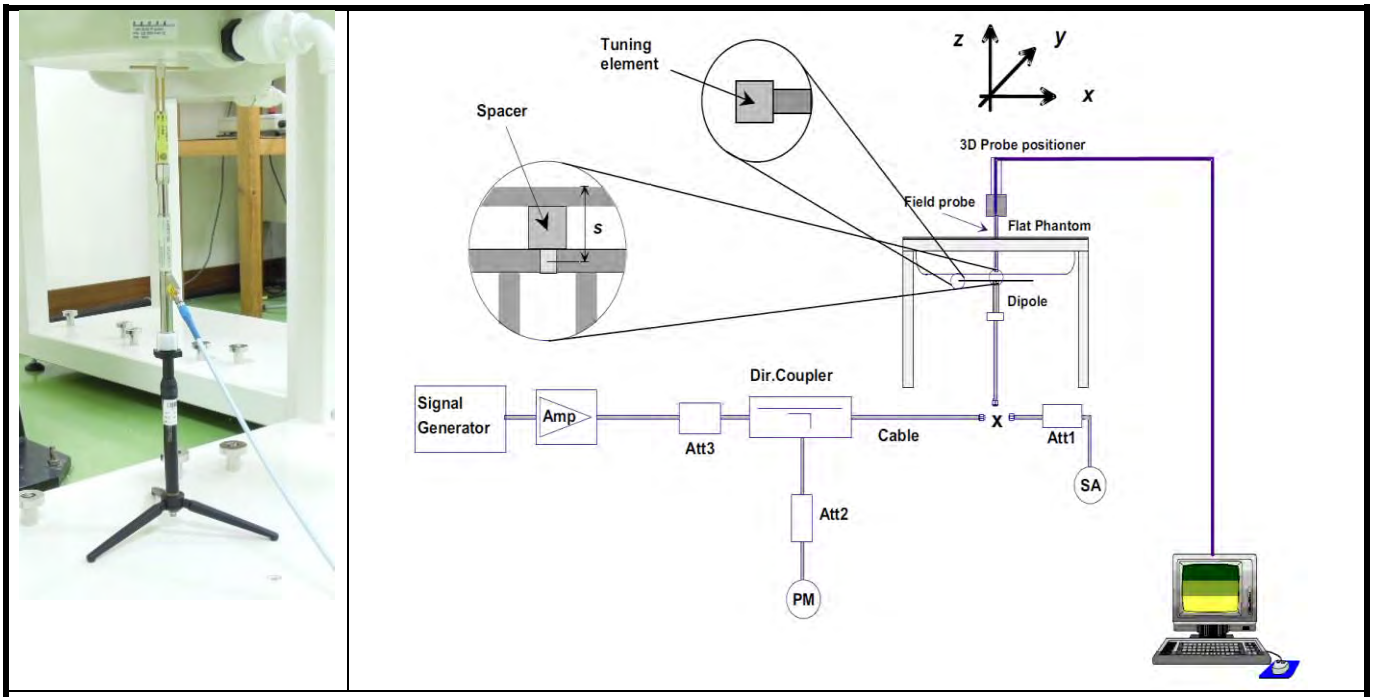


Fig-3.3 System Verification Setup

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

3.4.1 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.

3.4.2 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.

3.4.3 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.

3.4.4 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

3.4.5 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>

For WWAN SAR testing, the EUT was linked and controlled by base station emulator. Communication between the EUT and the emulator was established by air link. The distance between the EUT and the communicating antenna of the emulator is larger than 50 cm and the output power radiated from the emulator antenna is at least 30 dB smaller than the output power of EUT. The EUT was set from the emulator to radiate maximum output power during SAR testing.

<Considerations Related to WCDMA for Setup and Testing>

Release 5 HSDPA Data Devices

The 3G SAR test reduction procedure is applied to body SAR with 12.2 kbps RMC as the primary mode. Otherwise, body SAR for HSDPA is measured using an FRC with H-Set 1 in Sub-test 1 and a 12.2 kbps RMC configured in Test Loop Mode 1, for the highest reported SAR configuration in 12.2 kbps RMC without HSDPA. HSDPA is configured according to the applicable UE category of a test device. The number of HS-DSCH / HS-PDSCHs, HARQ processes, minimum inter-TTI interval, transport block sizes and RV coding sequence are defined by the H-set. To maintain a consistent test configuration and stable transmission conditions, QPSK is used in the H-set for SAR testing. HS-DPCCH should be configured with a CQI feedback cycle of 4 ms and a CQI repetition factor of 2 to maintain a constant rate of active CQI slots. DPCCH and DPDCH gain factors (β_c, β_d), and HS-DPCCH power offset parameters (Δ_{ACK}, Δ_{NACK}, Δ_{CQI}) are set according to values indicated in below. The CQI value is determined by the UE category, transport block size, number of HS-PDSCHs and modulation used in the H-set.

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (1)(2)	CM (3) (dB)	MPR (3) (dB)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (4)	15/15 (4)	64	12/15 (4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{HS} = 30/15 * β_c.
Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, Δ_{ACK} and Δ_{NACK} = 30/15 with β_{HS} = 30/15 * β_c, and Δ_{CQI} = 24/15 with β_{HS} = 24/15 * β_c.
Note 3: CM = 1 for β_c/β_d = 12/15, β_{HS}/β_c = 24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.
Note 4: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 11/15 and β_d = 15/15.

Release 6 HSUPA Data Devices

The 3G SAR test reduction procedure is applied to body SAR with 12.2 kbps RMC as the primary mode. Otherwise, body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set 1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 and power control algorithm 2, according to the highest reported body SAR configuration in 12.2 kbps RMC without HSPA. When VOIP applies to head exposure, the 3G SAR test reduction procedure is applied with 12.2 kbps RMC as the primary mode. Otherwise, the same HSPA configuration used for body SAR measurements are applied to head exposure testing. Due to inner loop power control requirements in HSPA, a communication test set is required for output power and SAR tests. The 12.2 kbps RMC, FRC H-set 1 and E-DCH configurations for HSPA are configured according to the β values indicated in below.

Sub-test	β_c	β_d	β_d (SF)	β_c / β_d	β_{HS} (1)	β_{ec}	β_{ed} (4)(5)	β_{ed} (SF)	β_{ed} (Codes)	CM (2) (dB)	MPR (2)(6) (dB)	AG (5) Index	E-TFCI
1	11/15 (3)	15/15 (3)	64	11/15 (3)	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed}1: 47/15 β_{ed}2: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15	0	-	-	5/15	5/15	47/15	4	1	1.0	0.0	12	67

Note 1: For sub-test 1 to 4, Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{HS} = 30/15 * β_c. For sub-test 5, Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 5/15 with β_{HS} = 5/15 * β_c.
Note 2: CM = 1 for β_c/β_d = 12/15, β_{HS}/β_c = 24/15. For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.
Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 10/15 and β_d = 15/15.
Note 4: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.
Note 5: β_{ed} can not be set directly; it is set by Absolute Grant Value.
Note 6: For subtests 2, 3 and 4, UE may perform E-DPDCH power scaling at max power which could results in slightly smaller MPR values.

HSPA+ SAR Guidance

The 3G SAR test reduction procedure is applied to HSPA+ (uplink) with 12.2 kbps RMC as the primary mode. Otherwise, when SAR is required for Rel. 6 HSPA, SAR is required for Rel. 7 HSPA+. Power is measured for HSPA+ that supports uplink 16QAM according to configurations in Table C.11.1.4 of 3GPP TS 34.121-1 to determine SAR test reduction.

Sub-test	β_c (3)	β_d	β_{HS} (1)	β_{ec}	β_{ed} (4) (2xSF2)	β_{ed} (4) (2xSF4)	CM (2) (dB)	MPR (2) (dB)	AG (4) Index	E-TFCI (5)	E-TFCI (boost)
1	1	0	30/15	30/15	β_{ed}1: 30/15 β_{ed}2: 30/15	β_{ed}3: 24/15 β_{ed}4: 24/15	3.5	2.5	14	105	105

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{HS} = 30/15 * β_c.
Note 2: CM = 3.5 and the MPR is based on the relative CM difference, MPR = MAX(CM-1,0).
Note 3: DPDCH is not configured, therefore the β_c is set to 1 and β_d = 0 by default.
Note 4: β_{ed} can not be set directly; it is set by Absolute Grant Value.
Note 5: All the sub-tests require the UE to transmit 2SF2+2SF4 16QAM EDCH and they apply for UE using E-DPDCH category 7. E-DCH TTI is set to 2ms TTI and E-DCH table index = 2. To support these E-DCH configurations DPDCH is not allocated. The UE is signalled to use the extrapolation algorithm.

DC-HSDPA SAR Guidance

The 3G SAR test reduction procedure is applied to DC-HSDPA with 12.2 kbps RMC as the primary mode. Otherwise, when SAR is required for Rel. 5 HSDPA, SAR is required for Rel. 8 DC-HSDPA. Power is measured for DC-HSDPA according to the H-Set 12, FRC configuration in Table C.8.1.12 of 3GPP TS 34.121-1 to determine SAR test reduction. A primary and a secondary serving HS-DSCH Cell are required to perform the power measurement and for the results to be acceptable.

<Considerations Related to LTE for Setup and Testing>

This device contains LTE transmitter which follows 3GPP standards, is category 3, supports both QPSK and QAM 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 and QAM 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**		
7			**V**	**V**	**V**	**V**
12	**V**	**V**	**V**	**V**		
13			**V**	**V**		
25	**V**	**V**	**V**	**V**	**V**	**V**
26	**V**	**V**	**V**	**V**	**V**	
41			**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.

LTE Band	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	
12	**QPSK**	**> 5**	**> 4**	**> 8**	**> 12**	**> 16**	**> 18**	**1**
	16QAM	**<= 5**	**<= 4**	**<= 8**	**<= 12**	**<= 16**	**<= 18**	**1**
	16QAM	**> 5**	**> 4**	**> 8**	**> 12**	**> 16**	**> 18**	**2**

LTE Band	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	
2, 4, 5, 7, 13, 25, 26, 41	**QPSK**	**> 5**	**> 4**	**> 8**	**> 12**	**> 16**	**> 18**	**0**
	16QAM	**<= 5**	**<= 4**	**<= 8**	**<= 12**	**<= 16**	**<= 18**	**0**
	16QAM	**> 5**	**> 4**	**> 8**	**> 12**	**> 16**	**> 18**	**0**

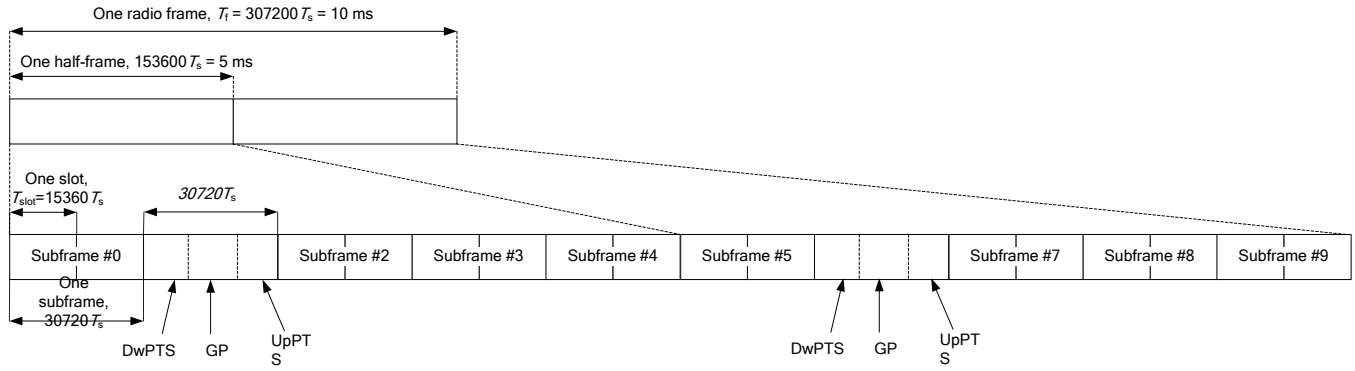
Note: MPR is according to the standard and implemented in the circuit (mandatory).

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.

TDD-LTE Setup Configurations

According to KDB 941225 D05, SAR testing for TDD-LTE device 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 TDD-LTE configurations. The TDD-LTE of this device supports frame structure type 2 defined in 3GPP TS 36.211 section 4.2, and the frame structure configuration can be referred to below.



3GPP TS 36.211 Figure 4.2-1: Frame Structure Type 2

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 • Ts	2192 • Ts	2560 • Ts	7680 • Ts	2192 • Ts	2560 • Ts
1	19760 • Ts			20480 • Ts		
2	21952 • Ts			23040 • Ts		
3	24144 • Ts			25600 • Ts		
4	26336 • Ts			7680 • Ts	4384 • Ts	5120 • Ts
5	6592 • Ts	4384 • Ts	5120 • Ts	20480 • Ts		
6	19760 • Ts			23040 • Ts		
7	21952 • Ts			12800 • Ts		
8	24144 • Ts			-	-	-
9	13168 • Ts			-	-	-

3GPP TS 36.211 Table 4.2-1: Configuration of Special Subframe

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

3GPP TS 36.211 Table 4.2-2: Uplink-Downlink Configurations

The variety of different TD-LTE uplink-downlink configurations allows a network operator to allocate the network's capacity between uplink and downlink traffic to meet the needs of the network. The uplink duty cycle of these seven configurations can readily be computed and shown in below.

UL-DL Configuration	0	1	2	3	4	5	6
Highest Duty-Cycle	63.33%	43.33%	23.33%	31.67%	21.67%	11.67%	53.33%

Considering the highest transmission duty cycle, TDD-LTE was tested using Uplink-Downlink Configuration 0 with 6 uplink subframe and 2 special subframe. The special subframe was set to special subframe configuration 7 using extended cyclic prefix uplink. Therefore, SAR testing for TDD-LTE was performed at the maximum output power with highest transmission duty cycle of 63.33%.

LTE Downlink Carrier Aggregation (CA) Setup Configurations

LTE Carrier Aggregation (CA) was defined in 3GPP release 10 and higher. The LTE device in CA mode has one Primary Component Carrier (PCC) and one or more Secondary Component Carriers (SCC). PCC acts as the anchor carrier and can optionally cross-schedule data transmission on SCC. The RRC connection is only handled by one cell, the PCC for downlink and uplink communications. After making a data connection to the PCC, the LTE device adds the SCC on the downlink only. All uplink communications and acknowledgements remain identical to release 8 specifications on the PCC. The combinations of downlink carrier aggregation supported by this device are listed in below.

LTE CA Configurations and Bandwidth Combination Sets defined for Intra-Band Contiguous CA

Downlink CA Configuration	Component carriers in order of increasing carrier frequency		Maximum Aggregated Bandwidth (MHz)	Bandwidth Combination Set
	Channel bandwidths for carrier-1 (MHz)	Channel bandwidths for carrier-2 (MHz)		
CA_7C	15	15	40	0
	20	20		
	10	20	40	1
	15	15, 20		
	20	10, 15, 20		
	15	10, 15	40	3
	20	15, 20		
CA_41C	10	20	40	0
	15	15, 20		
	20	10, 15, 20		
	5, 10	20	40	1
	15	15, 20		
	20	5, 10, 15, 20		
	10	15, 20	40	2
	15	10, 15, 20		
	20	10, 15, 20		
	10	20	40	3
	20	20		

LTE CA Configurations and Bandwidth Combination Sets defined for Intra-Band Non-Contiguous CA

Downlink CA Configuration	Component Carriers in order of Increasing Carrier Frequency		Maximum Aggregated Bandwidth (MHz)	Bandwidth Combination Set
	Channel Bandwidths for Carrier-1 (MHz)	Channel Bandwidths for Carrier-2 (MHz)		
CA_2A-2A	5, 10, 15, 20	5, 10, 15, 20	40	0
CA_4A-4A	5, 10, 15, 20	5, 10, 15, 20	40	0
	5, 10	5, 10	20	1

LTE CA Configurations and Bandwidth Combination Sets defined for Inter-Band CA (Two Bands)

Downlink CA Configuration	Component carriers in order of increasing carrier frequency		Maximum Aggregated Bandwidth (MHz)	Bandwidth Combination Set
	Channel bandwidths for carrier-1 (MHz)	Channel bandwidths for carrier-2 (MHz) Channel bandwidths for carrier-3 (MHz)		
CA_2A-5A	2	5, 10, 15, 20	40	0
	5	5, 10		
	2	5, 10		
	5	5, 10		
CA_2A-12A	2	5, 10, 15, 20	30	0
	12	5, 10		
	2	5, 10, 15, 20	30	1
	12	3, 5, 10		
	2	5, 10	20	2
	12	5, 10		
CA_2A-13A	2	5, 10, 15, 20	30	0
	13	10		
	2	5, 10	20	1
	13	10		
CA_2C-29A	2	Refer to CA_2C (BCS0)	50	0
	29	5,10		
CA_4A-5A	4	5, 10	20	0
	5	5, 10		
	4	5, 10, 15, 20	30	1
	5	5, 10		
CA_4A-12A	4	1.4, 3, 5, 10	20	0
	12	5, 10		
	4	1.4, 3, 5, 10, 15, 20	30	1
	12	5, 10		
	4	5, 10, 15, 20	30	2
	12	3, 5, 10		
	4	5, 10	20	3
	12	5, 10		
	4	5, 10, 15, 20	30	4
	12	5, 10		
	4	5, 10, 15	20	5
	12	5		
CA_4A-13A	4	5, 10, 15, 20	30	0
	13	10		
	4	5, 10	20	1
	13	10		
CA_4A-29A	4	5, 10	20	0
	29	3, 5, 10		
	4	5, 10	20	1
	29	5, 10		
	4	5, 10, 15, 20	30	2
	29	5, 10		

<SAR Test Exclusion Evaluations for LTE Downlink CA>

According to Nov 2017 TCB Workshop, SAR test exclusion for LTE downlink Carrier Aggregation is determined by power measurements according to the number of component carriers (CCs) supported by the product implementation. The downlink Carrier Aggregation configurations are tabulated in separate columns. DL CA would be listed in the columns corresponding to Intra Band contiguous, Intra Band Non-contiguous, 2bands/2CCs. The CA/CC combinations in each columns are sorted so that frequency bands listed in subsequent columns on each row are ascending subsets, as following LTE Downlink CA table ; i.e., columns to the right correspond to increasing umber of frequency bands and CCs.

	Intra Band		Inter Band
LTE Downlink CA-Configure	**Contiguous**	**Non-Contiguous**	**2 Bands / 2CC**
		CA_2A_2A	CA_2A_5A
			CA_2A_12A
			CA_2A_13A
			CA_2A_29A
		CA_4A_4A	CA_4A_5A
			CA_4A_12A
			CA_4A_13A
			CA_4A_29A
		CA_7A_7A	
		CA_41A_41A	
	CA_7C		
	CA_41C		

<Considerations Related to WLAN for Setup and Testing>

In general, various vendor specific external test software and chipset based internal test modes are typically used for SAR measurement. These chipset based test mode utilities are generally hardware and manufacturer dependent, and often include substantial flexibility to reconfigure or reprogram a device. A Wi-Fi device must be configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools for SAR measurement. The test frequencies established using test mode must correspond to the actual channel frequencies. When 802.11 frame gaps are accounted for in the transmission, a maximum transmission duty factor of 92 - 96% is typically achievable in most test mode configurations. A minimum transmission duty factor of 85% is required to avoid certain hardware and device implementation issues related to wide range SAR scaling. In addition, a periodic transmission duty factor is required for current generation SAR systems to measure SAR correctly. The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit.

According to KDB 248227 D01, this device has installed WLAN engineering testing software which can provide continuous transmitting RF signal. During WLAN SAR testing, this device was operated to transmit continuously at the maximum transmission duty with specified transmission mode, operating frequency, lowest data rate, and maximum output power.

Initial Test Configuration

An initial test configuration is determined for OFDM transmission modes in 2.4 GHz and 5 GHz bands according to the channel bandwidth, modulation and data rate combination(s) with the highest maximum output power specified

for production units in each standalone and aggregated frequency band. When the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration, for each frequency band.

Subsequent Test Configuration

SAR measurement requirements for the remaining 802.11 transmission mode configurations that have not been tested in the initial test configuration are determined separately for each standalone and aggregated frequency band, in each exposure condition, according to the maximum output power specified for production units. Additional power measurements may be required to determine if SAR measurements are required for subsequent highest output power channels in a subsequent test configuration. When the highest reported SAR for the initial test configuration according to the initial test position or fixed exposure position requirements, is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for that subsequent test configuration.

SAR Test Configuration and Channel Selection

When multiple channel bandwidth configurations in a frequency band have the same specified maximum output power, the initial test configuration is using largest channel bandwidth, lowest order modulation, lowest data rate, and lowest order 802.11 mode (i.e., 802.11a is chosen over 802.11n then 802.11ac or 802.11g is chosen over 802.11n). After an initial test configuration is determined, if multiple test channels have the same measured maximum output power, the channel chosen for SAR measurement is determined according to the following.

1) The channel closest to mid-band frequency is selected for SAR measurement.

2) For channels with equal separation from mid-band frequency; for example, high and low channels or two mid-band channels, the higher frequency (number) channel is selected for SAR measurement.

Test Reduction for U-NII-1 (5.2 GHz) and U-NII-2A (5.3 GHz) Bands

For devices that operate in both U-NII bands using the same transmitter and antenna(s), SAR test reduction is determined according to the following.

1) When the same maximum output power is specified for both bands, begin SAR measurement in U-NII-2A band by applying the OFDM SAR requirements. If the highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band for that configuration (802.11 mode and exposure condition).

2) When different maximum output power is specified for the bands, begin SAR measurement in the band with higher specified maximum output power. The highest reported SAR for the tested configuration is adjusted by the ratio of lower to higher specified maximum output power for the two bands. When the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for the band with lower maximum output power in that test configuration.

<Considerations Related to Bluetooth for Setup and Testing>

This device has installed Bluetooth engineering testing software which can provide continuous transmitting RF signal. During Bluetooth SAR testing, this device was operated to transmit continuously at the maximum transmission duty with specified transmission mode, operating frequency, lowest data rate, and maximum output power.

4.2 EUT Testing Position

4.2.1 Body Exposure Conditions

For full-size tablet, according to KDB 616217 D04, SAR evaluation is required for back surface and edges of the devices. The back surface and edges of the tablet are tested with the tablet touching the phantom. Exposures from antennas through the front surface of the display section of a tablet are generally limited to the user's hands. Exposures to hands for typical consumer transmitters used in tablets are not expected to exceed the extremity SAR limit; therefore, SAR evaluation for the front surface of tablet display screens are generally not necessary. When voice mode is supported on a tablet and it is limited to speaker mode or headset operations only, additional SAR testing for this type of voice use is not required.

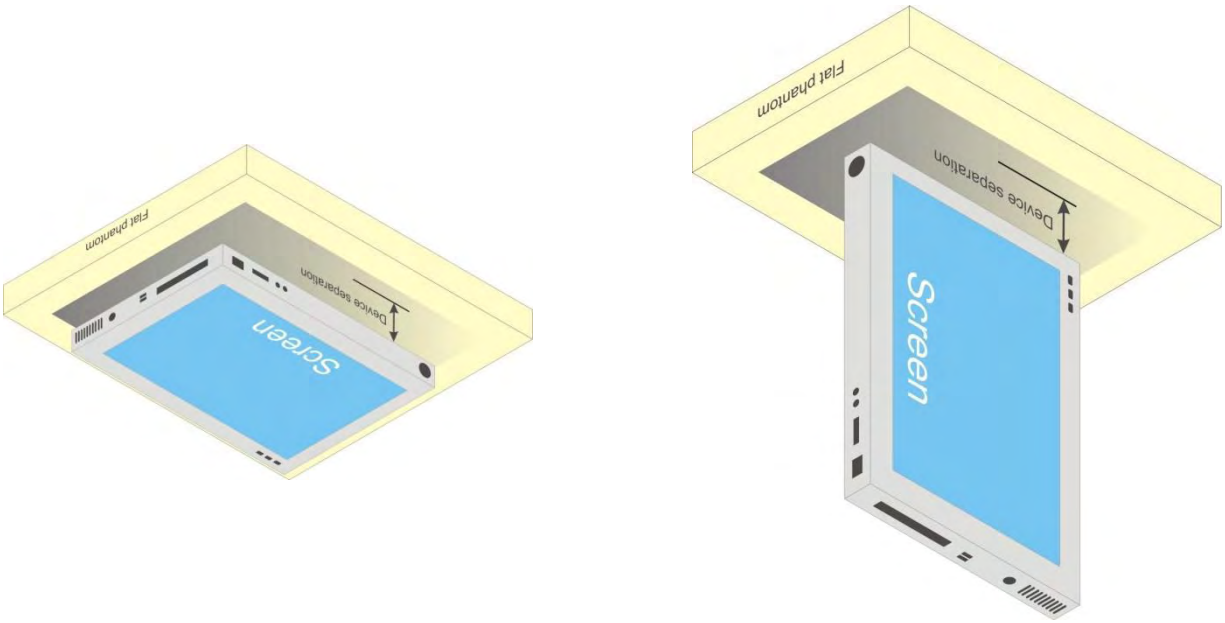


Fig-4.1 Illustration for Tablet Setup

4.2.2 SAR Test Exclusion Evaluations

According to KDB 447498 D01, the SAR test exclusion condition is based on source-based time-averaged maximum conducted output power, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions. The SAR exclusion threshold is determined by the following formula.

1. For the test separation distance <= 50 mm

$$\frac{\textbf{Max. Tune up Power}_{(mW)}}{\textbf{Min. Test Separation Distance}_{(mm)}} \times \sqrt{f_{(GHz)}} \leq \textbf{3.0 for SAR-1g, ≤ 7.5 for SAR-10g}$$

When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

2. For the test separation distance > 50 mm, and the frequency at 100 MHz to 1500 MHz

$$\left[(\text{Threshold at 50 mm in Step 1}) + (\text{Test Separation Distance} - 50\text{ mm}) \times \left(\frac{f_{(MHz)}}{150}\right)\right]_{(mW)}$$

3. For the test separation distance > 50 mm, and the frequency at > 1500 MHz to 6 GHz

$$[(\text{Threshold at 50 mm in Step 1}) + (\text{Test Separation Distance} - 50\text{ mm}) \times 10]_{(mW)}$$

Laptop PC:

<For WLAN Ant-0>

Mode	Max. Tune-up Power (dBm)	Max. Tune-up Power (mW)	Body-Worn		
			Ant. to Surface (mm)	Calculated Result	Require SAR Testing?
WLAN 2.4G	20.3	107.15	183	1426 mW	No
WLAN 5.2G	20.8	120.23	183	1396 mW	No
WLAN 5.3G	20.8	120.23	183	1395 mW	No
WLAN 5.6G	20.8	120.23	183	1393 mW	No
WLAN 5.8G	20.8	120.23	183	1392 mW	No

<For WLAN Ant-1>

Mode	Max. Tune-up Power (dBm)	Max. Tune-up Power (mW)	Body-Worn		
			Ant. to Surface (mm)	Calculated Result	Require SAR Testing?
WLAN 2.4G	20.3	107.15	183	1426 mW	No
WLAN 5.2G	20.8	120.23	183	1396 mW	No
WLAN 5.3G	20.8	120.23	183	1395 mW	No
WLAN 5.6G	20.8	120.23	183	1393 mW	No
WLAN 5.8G	20.8	120.23	183	1392 mW	No
BT	12.0	15.85	183	1425 mW	No

<For WLAN Ant-0 + Ant-1>

Mode	Max. Tune-up Power (dBm)	Max. Tune-up Power (mW)	Body-Worn		
			Ant. to Surface (mm)	Calculated Result	Require SAR Testing?
WLAN 2.4G	21.8	151.36	183	1426 mW	No
WLAN 5.2G	22.3	169.82	183	1396 mW	No
WLAN 5.3G	22.3	169.82	183	1395 mW	No
WLAN 5.6G	23.3	213.8	183	1393 mW	No
WLAN 5.8G	23.8	239.88	183	1392 mW	No

Tablet

<For WWAN Ant-0>

Mode	Max. Tune-up Power (dBm)	Max. Tune-up Power (mW)	Rear Face			Left Side			Right Side			Top Side			Bottom Side		
			Ant. to Surface (mm)	Calculated Result	Require SAR Testing?	Ant. to Surface (mm)	Calculated Result	Require SAR Testing?	Ant. to Surface (mm)	Calculated Result	Require SAR Testing?	Ant. to Surface (mm)	Calculated Result	Require SAR Testing?	Ant. to Surface (mm)	Calculated Result	Require SAR Testing?
WCDMA II	18.5	251	5	19.61	Yes	30	3.27	Yes	210	1709 mW	No	5	19.61	Yes	213	1739 mW	No
WCDMA IV	20.5	251	5	29.65	Yes	30	4.94	Yes	210	1713 mW	No	5	29.65	Yes	213	1743 mW	No
WCDMA V	21	251	5	23.19	Yes	30	3.86	Yes	210	1066 mW	No	5	23.19	Yes	213	1083 mW	No
LTE 4	21	251	5	33.38	Yes	30	5.56	Yes	210	1713 mW	No	5	33.38	Yes	213	1743 mW	No
LTE 7	17	200	5	16.03	Yes	30	2.67	No	210	1694 mW	No	5	16.03	Yes	213	1724 mW	No
LTE 12	24	251	5	42.48	Yes	30	7.08	Yes	210	941 mW	No	5	42.48	Yes	213	955 mW	No
LTE 13	22.5	251	5	31.58	Yes	30	5.26	Yes	210	1009 mW	No	5	31.58	Yes	213	1024 mW	No
LTE 25	19	251	5	21.86	Yes	30	3.64	Yes	210	1708 mW	No	5	21.86	Yes	213	1738 mW	No
LTE 26	22	251	5	29.12	Yes	30	4.85	Yes	210	1068 mW	No	5	29.12	Yes	213	1085 mW	No
LTE 41	19	200	5	25.91	Yes	30	4.32	Yes	210	1691 mW	No	5	25.91	Yes	213	1721 mW	No

Note:

1. When separation distance <= 50 mm and the calculated result shown in above table is <= 3.0 for SAR-1g exposure condition, or <= 7.5 for SAR-10g exposure condition, the SAR testing exclusion is applied.
2. When separation distance > 50 mm and the device output power is less than the calculated result (power threshold, mW) shown in above table, the SAR testing exclusion is applied.

<For WLAN Ant-0>

Mode	Max. Tune-up Power (dBm)	Max. Tune-up Power (mW)	Rear Face			Left Side			Right Side			Top Side			Bottom Side		
			Ant. to Surface (mm)	Calculated Result	Require SAR Testing?	Ant. to Surface (mm)	Calculated Result	Require SAR Testing?	Ant. to Surface (mm)	Calculated Result	Require SAR Testing?	Ant. to Surface (mm)	Calculated Result	Require SAR Testing?	Ant. to Surface (mm)	Calculated Result	Require SAR Testing?
WLAN 2.4G	20.3	107.15	5	34	**Yes**	2	33.63	**Yes**	283	2426 mW	No	68	276 mW	No	131	906 mW	No
WLAN 5.2G	20.8	120.23	5	55	**Yes**	2	55.04	**Yes**	283	2396 mW	No	68	246 mW	No	131	876 mW	No
WLAN 5.3G	20.8	120.23	5	56	**Yes**	2	55.46	**Yes**	283	2395 mW	No	68	245 mW	No	131	875 mW	No
WLAN 5.6G	20.8	120.23	5	57	**Yes**	2	57.41	**Yes**	283	2393 mW	No	68	243 mW	No	131	873 mW	No
WLAN 5.8G	20.8	120.23	5	58	**Yes**	2	58.04	**Yes**	283	2392 mW	No	68	242 mW	No	131	872 mW	No

<For WLAN Ant-1/BT>

Mode	Max. Tune-up Power (dBm)	Max. Tune-up Power (mW)	Rear Face			Left Side			Right Side			Top Side			Bottom Side		
			Ant. to Surface (mm)	Calculated Result	Require SAR Testing?	Ant. to Surface (mm)	Calculated Result	Require SAR Testing?	Ant. to Surface (mm)	Calculated Result	Require SAR Testing?	Ant. to Surface (mm)	Calculated Result	Require SAR Testing?	Ant. to Surface (mm)	Calculated Result	Require SAR Testing?
WLAN 2.4G	20.3	107.15	5	34	**Yes**	283	2426 mW	No	2	33.63	**Yes**	68	276 mW	No	131	906 mW	No
WLAN 5.2G	20.8	120.23	5	55	**Yes**	283	2396 mW	No	2	55.04	**Yes**	68	246 mW	No	131	876 mW	No
WLAN 5.3G	20.8	120.23	5	56	**Yes**	283	2395 mW	No	2	55.46	**Yes**	68	245 mW	No	131	875 mW	No
WLAN 5.6G	20.8	120.23	5	57	**Yes**	283	2393 mW	No	2	57.41	**Yes**	68	243 mW	No	131	873 mW	No
WLAN 5.8G	20.8	120.23	5	58	**Yes**	283	2392 mW	No	2	58.04	**Yes**	68	242 mW	No	131	872 mW	No
BT	12.0	15.85	5	5	**Yes**	283	2425 mW	No	2	4.99	**Yes**	68	275 mW	No	131	905 mW	No

<For WLAN Ant-0 + Ant-1>

Mode	Max. Tune-up Power (dBm)	Max. Tune-up Power (mW)	Rear Face			Left Side			Right Side			Top Side			Bottom Side		
			Ant. to Surface (mm)	Calculated Result	Require SAR Testing?	Ant. to Surface (mm)	Calculated Result	Require SAR Testing?	Ant. to Surface (mm)	Calculated Result	Require SAR Testing?	Ant. to Surface (mm)	Calculated Result	Require SAR Testing?	Ant. to Surface (mm)	Calculated Result	Require SAR Testing?
WLAN 2.4G	21.8	151.36	5	48	**Yes**	2	47.50	**Yes**	2	47.50	**Yes**	68	276 mW	No	131	906 mW	No
WLAN 5.2G	22.3	169.82	5	78	**Yes**	2	77.75	**Yes**	2	77.75	**Yes**	68	246 mW	No	131	876 mW	No
WLAN 5.3G	22.3	169.82	5	78	**Yes**	2	78.34	**Yes**	2	78.34	**Yes**	68	245 mW	No	131	875 mW	No
WLAN 5.6G	23.3	213.8	5	102	**Yes**	2	102.09	**Yes**	2	102.09	**Yes**	68	243 mW	No	131	873 mW	No
WLAN 5.8G	23.8	239.88	5	116	**Yes**	2	115.79	**Yes**	2	115.79	**Yes**	68	242 mW	No	131	872 mW	No

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 (%)
Sep. 22, 2018	Body	750	23.4	0.964	53.688	0.96	55.5	0.42	-3.26
Sep. 22, 2018	Body	835	23.4	1.001	55.293	0.97	55.2	3.20	0.17
Sep. 22, 2018	Body	1750	23.4	1.43	51.419	1.49	53.4	-4.03	-3.71
Sep. 22, 2018	Body	1900	23.5	1.567	51.026	1.52	53.3	3.09	-4.27
Mar. 23, 2018	Body	2450	23.2	2.014	50.654	1.95	52.7	3.28	-3.88
Mar. 26, 2018	Body	2450	23.3	2.022	50.687	1.95	52.7	3.69	-3.82
Sep. 21, 2018	Body	2600	23.5	2.193	51.248	2.16	52.5	1.53	-2.38
Mar. 23, 2018	Body	5250	23.2	5.482	46.96	5.36	48.9	2.28	-3.97
Mar. 26, 2018	Body	5250	23.3	5.397	47.023	5.36	48.9	0.69	-3.84
Mar. 26, 2018	Body	5600	23.3	5.843	46.493	5.77	48.5	1.27	-4.14
Mar. 26, 2018	Body	5800	23.3	6.104	46.118	6	48.2	1.73	-4.32

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 Validation

The SAR measurement system was validated according to procedures in KDB 865664 D01. The validation status in tabulated summary is as below.

Test Date	Probe S/N	Calibration Point		Measured Conductivity (σ)	Measured Permittivity (ε_r)	Validation for CW			Validation for Modulation		
						Sensitivity Range	Probe Linearity	Probe Isotropy	Modulation Type	Duty Factor	PAR
Sep. 22, 2018	7472	Body	750	0.964	53.688	Pass	Pass	Pass	N/A	N/A	N/A
Sep. 22, 2018	7472	Body	835	1.001	55.293	Pass	Pass	Pass	N/A	N/A	N/A
Sep. 22, 2018	7472	Body	1750	1.43	51.419	Pass	Pass	Pass	N/A	N/A	N/A
Sep. 22, 2018	7472	Body	1900	1.567	51.026	Pass	Pass	Pass	N/A	N/A	N/A
Mar. 23, 2018	3650	Body	2450	2.014	50.654	Pass	Pass	Pass	OFDM	N/A	Pass
Mar. 26, 2018	3820	Body	2450	2.022	50.687	Pass	Pass	Pass	OFDM	N/A	Pass
Sep. 21, 2018	7472	Body	2600	2.193	51.248	Pass	Pass	Pass	N/A	N/A	N/A
Mar. 23, 2018	3650	Body	5250	5.482	46.96	Pass	Pass	Pass	OFDM	N/A	Pass
Mar. 26, 2018	3820	Body	5250	5.397	47.023	Pass	Pass	Pass	OFDM	N/A	Pass
Mar. 26, 2018	3820	Body	5600	5.843	46.493	Pass	Pass	Pass	OFDM	N/A	Pass
Mar. 26, 2018	3820	Body	5800	6.104	46.118	Pass	Pass	Pass	OFDM	N/A	Pass

4.5 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
Sep. 22, 2018	Body	750	8.62	2.32	9.28	7.66	1013	7472	679
Sep. 22, 2018	Body	835	9.64	2.43	9.72	0.83	4d121	7472	679
Sep. 22, 2018	Body	1750	36.90	9.38	37.52	1.68	1055	7472	679
Sep. 22, 2018	Body	1900	40.20	9.88	39.52	-1.69	5d036	7472	679
Mar. 23, 2018	Body	2450	49.70	12.4	49.60	-0.20	737	3650	861
Mar. 26, 2018	Body	2450	49.70	13.2	52.80	6.24	737	3820	917
Sep. 21, 2018	Body	2600	55.30	14.60	58.40	5.61	1020	7472	679
Mar. 23, 2018	Body	5250	76.50	7.43	74.30	-2.88	1019	3650	861
Mar. 26, 2018	Body	5250	76.50	7.47	74.70	-2.35	1019	3820	917
Mar. 26, 2018	Body	5600	79.70	8.5	85.00	6.65	1019	3820	917
Mar. 26, 2018	Body	5800	76.90	8.29	82.90	7.80	1019	3820	917

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.

4.6 Maximum Output Power

4.6.1 Maximum Target Conducted Power

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

Mode	WCDMA Band II	WCDMA Band IV	WCDMA Band V
RMC 12.2K	18.5	20.5	21.0
HSDPA / HSUPA / DC-HSDPA	17.5	19.5	20.0

Mode	LTE 2	LTE 4	LTE 5
Maximum Target Power	18.5	21.0	21.5

Mode	LTE 7	LTE 12	LTE 13
Maximum Target Power	17.0	24.0	22.5

Mode	LTE 25	LTE 26	LTE 41
Maximum Target Power	19.0	22.0	19.0

<WLAN 2.4G>

Mode	Channel	Frequency (MHz)	Ant-0	Ant-1	Ant-0 + Ant-1
802.11b	1	2412	18.8	18.3	N/A
	6	2437	20.3	20.3	N/A
	11	2462	18.8	19.3	N/A
802.11g	1	2412	16.8	18.3	N/A
	6	2437	20.3	20.8	N/A
	11	2462	17.3	18.3	N/A
802.11n (HT20)	1	2412	16.8	16.8	18.3
	6	2437	20.3	20.8	21.8
	11	2462	16.3	17.3	18.8
802.11n (HT40)	3	2422	13.3	15.8	16.3
	6	2437	16.3	16.3	18.3
	9	2452	15.3	15.3	16.3

<WLAN 5.2G>

Mode	Channel	Frequency (MHz)	Ant-0	Ant-1	Ant-0 + Ant-1
802.11a	36	5180	17.8	18.3	N/A
	40	5200	20.8	20.8	N/A
	44	5220	20.8	20.8	N/A
	48	5240	20.8	20.8	N/A
802.11n (HT20)	36	5180	18.3	17.8	19.3
	40	5200	20.8	20.3	22.3
	44	5220	20.8	20.8	22.3
	48	5240	20.8	20.8	22.3
802.11n (HT40)	38	5190	17.3	17.3	15.3
	46	5230	20.8	20.8	22.3
802.11ac (VHT80)	42	5210	13.3	13.3	13.3

<WLAN 5.3G>

Mode	Channel	Frequency (MHz)	Ant-0	Ant-1	Ant-0 + Ant-1
802.11a	52	5260	20.8	20.8	N/A
	56	5280	20.8	20.3	N/A
	60	5300	20.8	20.3	N/A
	64	5320	17.3	17.8	N/A
802.11n (HT20)	52	5260	20.8	20.3	22.3
	56	5280	20.8	20.3	22.3
	60	5300	20.8	20.3	22.3
	64	5320	17.3	17.3	16.3
802.11n (HT40)	54	5270	20.8	19.8	22.3
	62	5310	13.3	14.3	14.8
802.11ac (VHT80)	58	5290	11.8	12.3	12.3

<WLAN 5.6G>

Mode	Channel	Frequency (MHz)	Ant-0	Ant-1	Ant-0 + Ant-1
802.11a	100	5500	17.8	18.3	N/A
	116	5580	20.3	20.3	N/A
	120	5600	20.3	20.3	N/A
	124	5620	20.3	20.3	N/A
	132	5660	20.3	20.3	N/A
	140	5700	18.3	18.8	N/A
802.11n (HT20)	100	5500	17.8	17.8	19.3
	116	5580	20.3	20.3	22.3
	120	5600	20.3	20.3	22.3
	124	5620	20.3	20.3	22.3
	132	5660	20.3	20.3	21.3
	140	5700	17.8	18.3	18.8
	144	5720	19.3	19.8	21.3
802.11n (HT40)	102	5510	18.8	16.3	15.8
	110	5550	20.8	20.8	21.3
	118	5590	20.8	20.8	23.3
	126	5630	20.8	20.8	22.8
	134	5670	19.3	19.3	20.8
	142	5710	19.8	20.8	22.8
802.11ac (VHT80)	106	5530	12.8	15.8	13.8
	122	5610	19.8	18.3	20.3
	138	5690	19.8	20.3	23.3

<WLAN 5.8G>

Mode	Channel	Frequency (MHz)	Ant-0	Ant-1	Ant-0 + Ant-1
802.11a	149	5745	20.3	20.8	N/A
	153	5765	20.8	20.8	N/A
	157	5785	20.8	20.8	N/A
	161	5805	20.8	20.8	N/A
	165	5825	20.8	20.3	N/A
802.11n (HT20)	149	5745	20.3	20.3	23.3
	153	5765	20.3	20.8	23.8
	157	5785	20.3	20.8	23.8
	161	5805	20.3	20.8	23.8
	165	5825	20.3	20.3	22.8
802.11n (HT40)	151	5755	20.8	20.8	21.8
	159	5795	20.8	20.8	23.8
802.11ac (VHT80)	155	5775	18.8	17.8	19.8

<Bluetooth>

Mode	Channel	Frequency (MHz)	Tune-up
Bluetooth EDR	0	2402	12.0
	39	2441	12.0
	78	2480	12.0
Bluetooth LE	0	2402	8.3
	19	2440	9.3
	39	2480	9.3

4.6.2 Measured Conducted Power Result

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

Tablet PC

Band	WCDMA Band II			WCDMA Band IV			WCDMA Band V			3GPP MPR (dB)
Channel	9262	9400	9538	1312	1413	1513	4132	4182	4233	
Frequency (MHz)	1852.4	1880.0	1907.6	1712.4	1732.6	1752.6	826.4	836.4	846.6	
RMC 12.2K	17.88	**17.90**	17.70	20.46	**20.49**	20.36	20.17	20.15	**20.35**	-
HSDPA Subtest-1	17.09	17.13	16.59	19.16	19.43	19.41	19.82	19.88	19.75	1
HSDPA Subtest-2	16.56	16.43	17.10	19.37	19.31	19.36	19.86	19.80	19.72	1
HSDPA Subtest-3	17.10	17.09	17.10	19.44	19.45	19.44	19.83	19.77	19.69	1
HSDPA Subtest-4	17.07	17.10	17.08	19.41	19.35	19.35	19.71	19.65	19.57	1
DC-HSDPA Subtest-1	16.46	16.79	16.40	19.03	19.25	19.02	19.75	19.81	19.68	1
DC-HSDPA Subtest-2	16.40	16.78	16.41	19.15	19.21	19.08	19.79	19.73	19.65	1
DC-HSDPA Subtest-3	16.26	16.59	16.26	19.01	19.05	19.00	19.76	19.70	19.62	1
DC-HSDPA Subtest-4	16.25	16.58	16.27	19.01	19.04	19.02	19.64	19.58	19.50	1
HSUPA Subtest-1	16.69	16.65	16.86	17.88	17.83	17.72	19.96	19.85	19.79	1
HSUPA Subtest-2	16.15	16.17	16.17	18.31	18.30	18.21	19.26	19.15	19.15	1
HSUPA Subtest-3	15.66	15.77	15.77	18.12	18.09	18.02	18.87	18.76	18.74	1
HSUPA Subtest-4	16.05	16.36	16.35	18.42	18.35	18.60	19.47	19.35	19.32	1
HSUPA Subtest-5	17.13	17.15	17.17	19.48	19.49	19.42	19.77	19.85	19.82	1

LTE Band 2															
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		20050	20175	20300				Channel		20025	20175	20325	
		Frequency (MHz)		1720.0	1732.5	1745.0				Frequency (MHz)		1717.5	1732.5	1747.5	
20M	QPSK	1	0	18.45	18.50	18.46	0	15M	QPSK	1	0	18.37	18.42	18.31	0
		1	50	18.40	18.43	18.41	0			1	37	18.45	18.46	18.41	0
		1	99	18.29	18.32	18.30	0			1	74	18.29	18.24	18.25	0
		50	0	18.46	18.49	18.47	0			36	0	18.39	18.42	18.38	0
		50	25	18.43	18.46	18.44	0			36	19	18.41	18.40	18.43	0
		50	50	18.35	18.38	18.36	0			36	39	18.35	18.38	18.27	0
		100	0	18.38	18.41	18.39	0			75	0	18.36	18.40	18.33	0
	16QAM	1	0	18.40	18.43	18.38	0		16QAM	1	0	18.34	18.37	18.36	0
		1	50	18.34	18.36	18.32	0			1	37	18.33	18.32	18.29	0
		1	99	18.29	18.28	18.22	0			1	74	18.23	18.16	18.27	0
		50	0	18.42	18.46	18.37	0			36	0	18.36	18.37	18.39	0
		50	25	18.34	18.36	18.44	0			36	19	18.24	18.39	18.41	0
		50	50	18.26	18.29	18.31	0			36	39	18.27	18.25	18.26	0
		100	0	18.35	18.35	18.39	0			75	0	18.24	18.33	18.33	0
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		20000	20175	20350				Channel		19975	20175	20375	
		Frequency (MHz)		1715.0	1732.5	1750.0				Frequency (MHz)		1712.5	1732.5	1752.5	
10M	QPSK	1	0	18.35	18.41	18.37	0	5M	QPSK	1	0	18.32	18.33	18.39	0
		1	24	18.44	18.40	18.46	0			1	12	18.36	18.47	18.40	0
		1	49	18.19	18.23	18.25	0			1	24	18.21	18.32	18.26	0
		25	0	18.39	18.44	18.37	0			12	0	18.36	18.47	18.47	0
		25	12	18.43	18.40	18.36	0			12	6	18.35	18.43	18.35	0
		25	25	18.33	18.32	18.33	0			12	13	18.31	18.33	18.31	0
		50	0	18.28	18.36	18.33	0			25	0	18.34	18.36	18.38	0
	16QAM	1	0	18.22	18.19	18.30	0		16QAM	1	0	18.24	18.40	18.31	0
		1	24	18.18	18.32	18.36	0			1	12	18.26	18.40	18.23	0
		1	49	18.01	18.13	18.20	0			1	24	18.15	18.13	18.04	0
		25	0	18.34	18.33	18.40	0			12	0	18.19	18.38	18.30	0
		25	12	18.22	18.23	18.23	0			12	6	18.19	18.28	18.17	0
		25	25	18.27	18.16	18.15	0			12	13	18.18	18.25	18.15	0
		50	0	18.28	18.26	18.20	0			25	0	18.20	18.32	18.19	0
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		19965	20175	20385				Channel		19957	20175	20393	
		Frequency (MHz)		1711.5	1732.5	1753.5				Frequency (MHz)		1710.7	1732.5	1754.3	
3M	QPSK	1	0	18.38	18.38	18.38	0	1.4M	QPSK	1	0	18.30	18.36	18.38	0
		1	7	18.44	18.43	18.46	0			1	2	18.45	18.47	18.38	0
		1	14	18.28	18.24	18.24	0			1	5	18.27	18.30	18.20	0
		8	0	18.44	18.41	18.43	0			3	0	18.38	18.40	18.45	0
		8	3	18.36	18.42	18.40	0			3	1	18.34	18.41	18.36	0
		8	7	18.30	18.34	18.32	0			3	3	18.27	18.34	18.35	0
		15	0	18.31	18.37	18.35	0			6	0	18.35	18.35	18.33	0
	16QAM	1	0	18.30	18.29	18.23	0		16QAM	1	0	18.31	18.41	18.35	0
		1	7	18.27	18.34	18.14	0			1	2	18.24	18.30	18.38	0
		1	14	18.20	18.20	18.10	0			1	5	18.12	18.08	18.13	0
		8	0	18.29	18.27	18.22	0			3	0	18.19	18.20	18.37	0
		8	3	18.23	18.30	18.34	0			3	1	18.29	18.23	18.22	0
		8	7	18.34	18.24	18.26	0			3	3	18.27	18.25	18.03	0
		15	0	18.25	18.19	18.28	0			6	0	18.23	18.21	18.27	0

LTE Band 4

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		20050	20175	20300				Channel		20025	20175	20325	
		Frequency (MHz)		1720.0	1732.5	1745.0				Frequency (MHz)		1717.5	1732.5	1747.5	
20M	QPSK	1	0	**20.76**	20.68	20.53	0	15M	QPSK	1	0	20.63	20.66	20.44	0
		1	50	20.68	20.65	20.50	0			1	37	20.65	20.63	20.41	0
		1	99	20.30	20.27	20.12	0			1	74	20.24	20.24	20.05	0
		50	0	**20.74**	20.73	20.58	0			36	0	20.71	20.69	20.50	0
		50	25	20.73	20.70	20.55	0			36	19	20.66	20.72	20.54	0
		50	50	20.62	20.59	20.44	0			36	39	20.56	20.59	20.38	0
		100	**0**	**20.71**	20.68	20.53	0			75	0	20.64	20.65	20.53	0
	16QAM	1	0	20.62	20.66	20.49	0		16QAM	1	0	20.62	20.56	20.42	0
		1	50	20.59	20.64	20.42	0			1	37	20.57	20.49	20.49	0
		1	99	20.21	20.27	20.07	0			1	74	20.17	20.27	20.02	0
		50	0	20.66	20.66	20.58	0			36	0	20.59	20.61	20.46	0
		50	25	20.69	20.63	20.46	0			36	19	20.69	20.55	20.44	0
		50	50	20.56	20.52	20.34	0			36	39	20.50	20.60	20.29	0
		100	0	20.64	20.65	20.48	0			75	0	20.59	20.58	20.41	0
BW	**MCS Index**	**RB Size**	**RB Offset**	**Low**	**Mid**	**High**	**3GPP MPR (dB)**	**BW**	**MCS Index**	**RB Size**	**RB Offset**	**Low**	**Mid**	**High**	**3GPP MPR (dB)**
		Channel		20000	20175	20350				Channel		19975	20175	20375	
		Frequency (MHz)		1715.0	1732.5	1750.0				Frequency (MHz)		1712.5	1732.5	1752.5	
10M	QPSK	1	0	20.62	20.65	20.47	0	5M	QPSK	1	0	20.59	20.71	20.43	0
		1	24	20.65	20.59	20.46	0			1	12	20.56	20.58	20.43	0
		1	49	20.20	20.25	20.03	0			1	24	20.19	20.28	20.11	0
		25	0	20.69	20.66	20.50	0			12	0	20.68	20.71	20.58	0
		25	12	20.69	20.65	20.54	0			12	6	20.66	20.63	20.45	0
		25	25	20.51	20.52	20.40	0			12	13	20.54	20.54	20.36	0
		50	0	20.68	20.67	20.45	0			25	0	20.66	20.65	20.45	0
	16QAM	1	0	20.54	20.67	20.46	0		16QAM	1	0	20.67	20.57	20.40	0
		1	24	20.63	20.60	20.38	0			1	12	20.58	20.58	20.42	0
		1	49	20.14	20.12	20.01	0			1	24	20.25	20.14	19.97	0
		25	0	20.61	20.69	20.44	0			12	0	20.66	20.72	20.50	0
		25	12	20.60	20.58	20.45	0			12	6	20.52	20.68	20.43	0
		25	25	20.49	20.52	20.37	0			12	13	20.49	20.53	20.41	0
		50	0	20.62	20.62	20.48	0			25	0	20.66	20.54	20.41	0
BW	**MCS Index**	**RB Size**	**RB Offset**	**Low**	**Mid**	**High**	**3GPP MPR (dB)**	**BW**	**MCS Index**	**RB Size**	**RB Offset**	**Low**	**Mid**	**High**	**3GPP MPR (dB)**
		Channel		19965	20175	20385				Channel		19957	20175	20393	
		Frequency (MHz)		1711.5	1732.5	1753.5				Frequency (MHz)		1710.7	1732.5	1754.3	
3M	QPSK	1	0	20.65	20.61	20.43	0	1.4M	QPSK	1	0	20.64	20.66	20.50	0
		1	7	20.60	20.61	20.41	0			1	2	20.65	20.59	20.46	0
		1	14	20.17	20.28	20.12	0			1	5	20.21	20.27	20.09	0
		8	0	20.73	20.67	20.53	0			3	0	20.65	20.70	20.53	0
		8	3	20.68	20.72	20.47	0			3	1	20.61	20.70	20.55	0
		8	7	20.55	20.58	20.37	0			3	3	20.50	20.62	20.38	0
		15	0	20.62	20.64	20.49	0			6	0	20.67	20.69	20.51	0
	16QAM	1	0	20.57	20.64	20.42	0		16QAM	1	0	20.50	20.61	20.33	0
		1	7	20.51	20.61	20.31	0			1	2	20.40	20.46	20.42	0
		1	14	20.12	20.10	20.00	0			1	5	20.05	20.14	19.97	0
		8	0	20.67	20.59	20.45	0			3	0	20.52	20.53	20.41	0
		8	3	20.53	20.67	20.46	0			3	1	20.46	20.67	20.31	0
		8	7	20.51	20.56	20.33	0			3	3	20.33	20.41	20.28	0
		15	0	20.48	20.67	20.49	0			6	0	20.54	20.54	20.39	0

LTE Band 5															
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		20000	20175	20350				Channel		19975	20175	20375	
		Frequency (MHz)		1715.0	1732.5	1750.0				Frequency (MHz)		1712.5	1732.5	1752.5	
10M	QPSK	1	0	21.38	21.22	21.20	0	5M	QPSK	1	0	21.33	21.14	21.20	0
		1	24	21.47	21.31	21.29	0			1	12	21.41	21.21	21.24	0
		1	49	21.35	21.19	21.17	0			1	24	21.33	21.16	21.17	0
		25	0	21.25	21.09	21.07	0			12	0	21.22	21.01	21.04	0
		25	12	21.34	21.18	21.16	0			12	6	21.26	21.08	21.08	0
		25	25	21.37	21.21	21.19	0			12	13	21.25	21.17	21.14	0
		50	0	21.32	21.17	21.15	0			25	0	21.27	21.16	21.15	0
	16QAM	1	0	21.37	21.22	21.11	0		16QAM	1	0	21.33	21.11	21.07	0
		1	24	21.45	21.30	21.22	0			1	12	21.43	21.23	21.24	0
		1	49	21.25	21.15	21.10	0			1	24	21.27	21.14	21.01	0
		25	0	21.21	21.06	20.99	0			12	0	21.12	20.95	20.98	0
		25	12	21.29	21.16	21.15	0			12	6	21.24	21.11	21.11	0
		25	25	21.29	21.12	21.13	0			12	13	21.31	21.05	21.18	0
		50	0	21.30	21.17	21.14	0			25	0	21.26	21.02	21.07	0
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		19965	20175	20385				Channel		19957	20175	20393	
		Frequency (MHz)		1711.5	1732.5	1753.5				Frequency (MHz)		1710.7	1732.5	1754.3	
3M	QPSK	1	0	21.35	21.20	21.18	0	1.4M	QPSK	1	0	21.37	21.22	21.20	0
		1	7	21.46	21.26	21.21	0			1	2	21.42	21.31	21.19	0
		1	14	21.27	21.12	21.14	0			1	5	21.30	21.13	21.07	0
		8	0	21.21	21.02	21.07	0			3	0	21.19	21.04	21.02	0
		8	3	21.29	21.09	21.11	0			3	1	21.33	21.15	21.10	0
		8	7	21.32	21.17	21.16	0			3	3	21.33	21.11	21.09	0
		15	0	21.27	21.10	21.14	0			6	0	21.29	21.13	21.10	0
	16QAM	1	0	21.34	21.03	20.95	0		16QAM	1	0	21.25	21.11	21.04	0
		1	7	21.26	21.16	21.07	0			1	2	21.29	21.12	21.17	0
		1	14	21.25	21.03	20.98	0			1	5	21.12	21.02	21.02	0
		8	0	21.17	20.93	20.84	0			3	0	21.03	20.93	20.94	0
		8	3	21.19	20.93	21.04	0			3	1	21.07	21.14	21.12	0
		8	7	21.25	21.07	20.91	0			3	3	21.23	21.07	20.99	0
		15	0	21.14	20.92	21.09	0			6	0	21.16	21.05	21.03	0

LTE Band 7																
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		20850	21100	21350				Channel		20825	21100	21375	
		Frequency (MHz)		2510.0	2535.0	2560.0				Frequency (MHz)		2507.5	2535.0	2562.5	
20M	QPSK	1	0	16.82	**16.92**	16.74	0	15M	QPSK	1	0	16.79	16.90	16.71	0
		1	50	16.74	16.90	16.66	0			1	37	16.71	16.87	16.63	0
		1	99	16.72	16.88	16.64	0			1	74	16.69	16.85	16.61	0
		50	0	16.66	16.82	16.58	0			36	0	16.63	16.79	16.55	0
		50	25	16.76	**16.92**	16.68	0			36	19	16.73	16.89	16.65	0
		50	50	16.58	16.74	16.50	0			36	39	16.55	16.71	16.47	0
		100	0	16.83	**16.85**	16.46	0			75	0	16.51	16.67	16.43	0
	16QAM	1	0	16.77	16.90	16.69	0		16QAM	1	0	16.74	16.90	16.66	0
		1	50	16.69	16.85	16.61	0			1	37	16.66	16.82	16.58	0
		1	99	16.67	16.83	16.59	0			1	74	16.64	16.80	16.56	0
		50	0	16.61	16.77	16.53	0			36	0	16.58	16.74	16.50	0
		50	25	16.71	16.87	16.63	0			36	19	16.68	16.84	16.60	0
		50	50	16.53	16.69	16.45	0			36	39	16.50	16.66	16.42	0
		100	0	16.49	16.65	16.41	0			75	0	16.46	16.62	16.38	0
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		20800	21100	21400				Channel		20775	21100	21425	
		Frequency (MHz)		2505.0	2535.0	2565.0				Frequency (MHz)		2502.5	2535.0	2567.5	
10M	QPSK	1	0	16.77	16.89	16.69	0	5M	QPSK	1	0	16.74	16.82	16.66	0
		1	24	16.69	16.85	16.61	0			1	12	16.66	16.82	16.58	0
		1	49	16.67	16.83	16.59	0			1	24	16.64	16.80	16.56	0
		25	0	16.61	16.77	16.53	0			12	0	16.58	16.74	16.50	0
		25	12	16.71	16.87	16.63	0			12	6	16.68	16.84	16.60	0
		25	25	16.53	16.69	16.45	0			12	13	16.50	16.66	16.42	0
		50	0	16.49	16.65	16.41	0			25	0	16.46	16.62	16.38	0
	16QAM	1	0	16.72	16.88	16.64	0		16QAM	1	0	16.69	16.85	16.61	0
		1	24	16.64	16.80	16.56	0			1	12	16.61	16.77	16.53	0
		1	49	16.62	16.78	16.54	0			1	24	16.59	16.75	16.51	0
		25	0	16.56	16.72	16.48	0			12	0	16.53	16.69	16.45	0
		25	12	16.66	16.82	16.58	0			12	6	16.63	16.79	16.55	0
		25	25	16.48	16.64	16.40	0			12	13	16.45	16.61	16.37	0
		50	0	16.44	16.60	16.36	0			25	0	16.41	16.57	16.33	0

LTE Band 12

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		23060	23095	23130				Channel		23035	23095	23155	
		Frequency (MHz)		704.0	707.5	711.0				Frequency (MHz)		701.5	707.5	713.5	
10M	QPSK	1	0	22.85	**22.94**	22.82	0	5M	QPSK	1	0	22.74	22.80	22.72	0
		1	24	22.79	22.88	22.76	0			1	12	22.58	22.73	22.55	0
		1	49	22.66	22.75	22.63	0			1	24	22.54	22.64	22.39	0
		25	0	21.64	21.73	21.61	1			12	0	21.45	21.60	21.38	1
		25	12	21.68	**21.77**	21.65	1			12	6	21.63	21.53	21.44	1
		25	25	21.59	21.68	21.56	1			12	13	21.49	21.53	21.42	1
		50	0	21.67	21.76	21.64	1			25	0	21.50	21.65	21.54	1
	16QAM	1	0	21.81	21.86	21.79	1		16QAM	1	0	21.72	21.77	21.56	1
		1	24	21.71	21.84	21.66	1			1	12	21.72	21.78	21.62	1
		1	49	21.64	21.74	21.54	1			1	24	21.57	21.62	21.46	1
		25	0	20.57	20.72	20.58	2			12	0	20.47	20.53	20.45	2
		25	12	20.67	20.67	20.62	2			12	6	20.47	20.61	20.55	2
		25	25	20.49	20.58	20.48	2			12	13	20.46	20.54	20.32	2
		50	0	20.67	20.66	20.63	2			25	0	20.36	20.55	20.48	2
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		23025	23095	23165				Channel		23017	23095	23173	
		Frequency (MHz)		700.5	707.5	714.5				Frequency (MHz)		699.7	707.5	715.3	
3M	QPSK	1	0	22.74	22.77	22.60	0	1.4M	QPSK	1	0	22.75	22.78	22.71	0
		1	7	22.69	22.79	22.55	0			1	2	22.72	22.67	22.67	0
		1	14	22.50	22.61	22.44	0			1	5	22.50	22.54	22.45	0
		8	0	21.44	21.64	21.42	1			3	0	22.45	22.61	22.48	0
		8	3	21.64	21.61	21.51	1			3	1	22.56	22.62	22.51	0
		8	7	21.55	21.64	21.51	1			3	3	22.46	22.53	22.43	0
		15	0	21.59	21.65	21.51	1			6	0	21.52	21.70	21.46	1
	16QAM	1	0	21.68	21.74	21.62	1		16QAM	1	0	21.70	21.72	21.54	1
		1	7	21.60	21.79	21.54	1			1	2	21.70	21.67	21.57	1
		1	14	21.59	21.64	21.51	1			1	5	21.46	21.49	21.31	1
		8	0	20.50	20.64	20.47	2			3	0	21.45	21.51	21.41	1
		8	3	20.39	20.63	20.54	2			3	1	21.54	21.56	21.41	1
		8	7	20.54	20.48	20.40	2			3	3	21.36	21.50	21.29	1
		15	0	20.43	20.55	20.37	2			6	0	20.50	20.55	20.48	2

LTE Band 13

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel			23230					Channel		23205	23230	23225	
		Frequency (MHz)			782.0					Frequency (MHz)		779.5	782.0	784.5	
10M	QPSK	1	0		21.4		0	5M	QPSK	1	0	21.36	21.38	21.31	0
		1	24		**21.55**		0			1	12	21.41	21.51	21.46	0
		1	49		21.33		0			1	24	21.13	21.23	21.23	0
		25	0		21.41		0			12	0	21.41	21.40	21.31	0
		25	12		**21.42**		0			12	6	21.28	21.35	21.27	0
		25	25		21.35		0			12	13	21.30	21.34	21.22	0
		50	0		**21.46**		0			25	0	21.41	21.43	21.42	0
	16QAM	1	0		21.33		0		16QAM	1	0	21.33	21.29	21.28	0
		1	24		21.50		0			1	12	21.40	21.45	21.29	0
		1	49		21.33		0			1	24	21.19	21.23	21.12	0
		25	0		21.34		0			12	0	21.37	21.23	21.19	0
		25	12		21.33		0			12	6	21.32	21.39	21.23	0
		25	25		21.27		0			12	13	21.13	21.25	21.25	0
		50	0		21.36		0			25	0	21.35	21.46	21.23	0

LTE Band 25

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		26140	26365	26590				Channel		26115	26365	26615	
		Frequency (MHz)		1860.0	1882.5	1905.0				Frequency (MHz)		1857.5	1882.5	1907.5	
20M	QPSK	1	0	18.83	18.81	18.87	0	15M	QPSK	1	0	18.81	18.74	18.77	0
		1	50	18.91	18.89	**18.95**	0			1	37	18.88	18.84	18.88	0
		1	99	18.67	18.65	18.71	0			1	74	18.63	18.57	18.66	0
		50	0	18.88	18.86	18.90	0			36	0	18.86	18.79	18.89	0
		50	25	18.88	18.86	**18.92**	0			36	19	18.80	18.85	18.91	0
		50	50	18.79	18.77	18.83	0			36	39	18.75	18.72	18.73	0
		100	0	18.89	18.87	**18.93**	0			75	0	18.85	18.81	18.88	0
	16QAM	1	0	18.79	18.73	18.83	0		16QAM	1	0	18.83	18.69	18.73	0
		1	50	18.86	18.79	18.93	0			1	37	18.82	18.77	18.90	0
		1	99	18.64	18.58	18.66	0			1	74	18.51	18.49	18.60	0
		50	0	18.85	18.82	18.85	0			36	0	18.72	18.73	18.81	0
		50	25	18.81	18.76	18.82	0			36	19	18.71	18.67	18.84	0
		50	50	18.79	18.68	18.74	0			36	39	18.65	18.66	18.79	0
		100	0	18.87	18.80	18.84	0			75	0	18.84	18.73	18.75	0
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		26090	26365	26640				Channel		26065	26365	26665	
		Frequency (MHz)		2855.0	1882.5	1910.0				Frequency (MHz)		1852.5	1882.5	1912.5	
10M	QPSK	1	0	18.69	18.74	18.73	0	5M	QPSK	1	0	18.73	18.65	18.77	0
		1	24	18.81	18.67	18.91	0			1	12	18.84	18.88	18.82	0
		1	49	18.57	18.58	18.53	0			1	24	18.50	18.42	18.63	0
		25	0	18.78	18.74	18.79	0			12	0	18.81	18.69	18.59	0
		25	12	18.77	18.63	18.78	0			12	6	18.76	18.75	18.72	0
		25	25	18.60	18.68	18.69	0			12	13	18.64	18.74	18.71	0
		50	0	18.78	18.80	18.90	0			25	0	18.77	18.79	18.68	0
	16QAM	1	0	18.75	18.65	18.65	0		16QAM	1	0	18.66	18.64	18.80	0
		1	24	18.73	18.64	18.70	0			1	12	18.73	18.70	18.80	0
		1	49	18.47	18.44	18.52	0			1	24	18.46	18.52	18.52	0
		25	0	18.71	18.66	18.80	0			12	0	18.62	18.70	18.65	0
		25	12	18.72	18.80	18.63	0			12	6	18.69	18.80	18.77	0
		25	25	18.65	18.67	18.73	0			12	13	18.59	18.69	18.69	0
		50	0	18.66	18.80	18.75	0			25	0	18.78	18.72	18.86	0
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		26055	26365	26675				Channel		26047	26365	26683	
		Frequency (MHz)		1851.5	1882.5	1913.5				Frequency (MHz)		1850.7	1882.5	1914.3	
3M	QPSK	1	0	18.66	18.76	18.84	0	1.4M	QPSK	1	0	18.79	18.76	18.77	0
		1	7	18.71	18.70	18.82	0			1	2	18.80	18.81	18.83	0
		1	14	18.55	18.56	18.63	0			1	5	18.52	18.49	18.53	0
		8	0	18.74	18.78	18.73	0			3	0	18.74	18.83	18.84	0
		8	3	18.72	18.82	18.78	0			3	1	18.84	18.70	18.77	0
		8	7	18.73	18.72	18.71	0			3	3	18.72	18.69	18.59	0
		15	0	18.87	18.79	18.88	0			6	0	18.72	18.69	18.77	0
	16QAM	1	0	18.69	18.68	18.69	0		16QAM	1	0	18.70	18.75	18.67	0
		1	7	18.78	18.69	18.88	0			1	2	18.74	18.67	18.67	0
		1	14	18.62	18.43	18.49	0			1	5	18.56	18.57	18.52	0
		8	0	18.70	18.80	18.85	0			3	0	18.67	18.53	18.87	0
		8	3	18.65	18.63	18.79	0			3	1	18.78	18.65	18.79	0
		8	7	18.56	18.55	18.67	0			3	3	18.64	18.61	18.71	0
		15	0	18.68	18.78	18.87	0			6	0	18.84	18.76	18.74	0

LTE Band 26

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		26765	26865	26965	
		Frequency (MHz)		821.5	831.5	841.5	
15M	QPSK	1	0	**21.65**	21.53	21.36	0
		1	37	21.29	21.17	21.00	0
		1	74	21.36	21.24	21.07	0
		36	0	**21.55**	21.43	21.26	0
		36	19	21.52	21.40	21.23	0
		36	39	21.47	21.35	21.18	0
		75	0	**21.53**	21.41	21.24	0
	16QAM	1	0	21.62	21.44	21.26	0
		1	37	21.25	21.15	20.94	0
		1	74	21.29	21.24	20.98	0
		36	0	21.53	21.34	21.23	0
		36	19	21.49	21.39	21.20	0
		36	39	21.42	21.33	21.11	0
		75	0	21.47	21.31	21.16	0

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		26740	26865	26990	
		Frequency (MHz)		819.0	831.5	844.0	
10M	QPSK	1	0	21.64	21.53	21.32	0
		1	24	21.22	21.17	20.96	0
		1	49	21.28	21.15	21.02	0
		25	0	21.48	21.42	21.17	0
		25	12	21.49	21.34	21.20	0
		25	25	21.37	21.32	21.13	0
		50	0	21.49	21.40	21.16	0
	16QAM	1	0	21.48	21.51	21.30	0
		1	24	21.27	21.09	20.91	0
		1	49	21.18	21.14	20.94	0
		25	0	21.45	21.30	21.14	0
		25	12	21.34	21.32	21.15	0
		25	25	21.34	21.27	21.13	0
		50	0	21.40	21.36	21.09	0

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		26715	26865	27015	
		Frequency (MHz)		816.5	831.5	846.5	
5M	QPSK	1	0	21.61	21.46	21.26	0
		1	12	21.20	21.12	20.93	0
		1	24	21.29	21.17	21.01	0
		12	0	21.46	21.35	21.21	0
		12	6	21.48	21.37	21.22	0
		12	13	21.42	21.26	21.16	0
		25	0	21.43	21.36	21.23	0
	16QAM	1	0	21.55	21.51	21.29	0
		1	12	21.23	21.10	20.81	0
		1	24	21.25	21.15	21.00	0
		12	0	21.37	21.32	21.14	0
		12	6	21.34	21.29	21.20	0
		12	13	21.41	21.21	21.07	0
		25	0	21.48	21.36	21.15	0

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		26705	26865	27025	
		Frequency (MHz)		815.5	831.5	847.5	
3M	QPSK	1	0	21.59	21.51	21.36	0
		1	7	21.29	21.12	20.93	0
		1	14	21.33	21.23	21.06	0
		8	0	21.45	21.40	21.19	0
		8	3	21.43	21.40	21.17	0
		8	7	21.37	21.28	21.13	0
		15	0	21.43	21.32	21.23	0
	16QAM	1	0	21.62	21.36	21.26	0
		1	7	21.12	21.04	20.83	0
		1	14	21.26	21.08	20.93	0
		8	0	21.42	21.32	21.22	0
		8	3	21.45	21.39	21.14	0
		8	7	21.39	21.19	21.04	0
		15	0	21.37	21.33	21.21	0

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		26697	26865	27033	
		Frequency (MHz)		814.7	831.5	848.3	
1.4M	QPSK	1	0	21.64	21.47	21.32	0
		1	2	21.27	21.09	20.96	0
		1	5	21.34	21.18	21.07	0
		3	0	21.49	21.39	21.26	0
		3	1	21.51	21.39	21.14	0
		3	3	21.46	21.35	21.08	0
		6	0	21.48	21.33	21.16	0
	16QAM	1	0	21.51	21.42	21.31	0
		1	2	21.13	21.11	20.85	0
		1	5	21.24	21.16	20.94	0
		3	0	21.46	21.34	21.17	0
		3	1	21.34	21.29	21.16	0
		3	3	21.36	21.24	21.15	0
		6	0	21.52	21.29	21.11	0

LTE Band 41

BW	MCS Index	RB Size	RB Offset	Low	Mid	Mid	Mid	High	3GPP MPR (dB)
		Channel		39750	40185	40620	41055	41490	
		Frequency (MHz)		2506.0	2549.5	2593.0	2636.5	2680.0	
20M	QPSK	1	0	18.90	18.92	18.83	18.69	18.92	0
		1	50	18.97	18.96	18.90	18.76	18.99	0
		1	99	18.70	18.70	18.63	18.49	18.72	0
		50	0	18.72	18.72	18.65	18.51	18.74	0
		50	25	18.86	18.86	18.79	18.65	18.88	0
		50	50	18.63	18.63	18.56	18.42	18.65	0
		100	0	18.53	18.53	18.46	18.32	18.55	0
	16QAM	1	0	18.86	18.88	18.79	18.65	18.88	0
		1	50	18.93	18.93	18.86	18.72	18.95	0
		1	99	18.66	18.66	18.59	18.45	18.68	0
		50	0	18.68	18.68	18.61	18.47	18.70	0
		50	25	18.82	18.82	18.75	18.61	18.84	0
		50	50	18.59	18.59	18.52	18.38	18.61	0
		100	0	18.49	18.49	18.42	18.28	18.51	0

BW	MCS Index	RB Size	RB Offset	Low	Mid	Mid	Mid	High	3GPP MPR (dB)
		Channel		39725	40173	40620	41068	41515	
		Frequency (MHz)		2503.5	2548.3	2593.0	2637.8	2682.5	
15M	QPSK	1	0	18.87	18.89	18.80	18.66	18.89	0
		1	37	18.94	18.94	18.87	18.73	18.96	0
		1	74	18.67	18.67	18.60	18.46	18.69	0
		36	0	18.69	18.69	18.62	18.48	18.71	0
		36	19	18.83	18.83	18.76	18.62	18.85	0
		36	39	18.60	18.60	18.53	18.39	18.62	0
		75	0	18.50	18.50	18.43	18.29	18.52	0
	16QAM	1	0	18.83	18.85	18.76	18.62	18.85	0
		1	37	18.90	18.90	18.83	18.69	18.92	0
		1	74	18.63	18.63	18.56	18.42	18.65	0
		36	0	18.65	18.65	18.58	18.44	18.67	0
		36	19	18.79	18.79	18.72	18.58	18.81	0
		36	39	18.56	18.56	18.49	18.35	18.58	0
		75	0	18.46	18.46	18.39	18.25	18.48	0

BW	MCS Index	RB Size	RB Offset	Low	Mid	Mid	Mid	High	3GPP MPR (dB)
		Channel		39700	40160	40620	41080	41540	
		Frequency (MHz)		2501.0	2547.0	2593.0	2639.0	2685.0	
10M	QPSK	1	0	18.84	18.86	18.77	18.63	18.86	0
		1	24	18.91	18.91	18.84	18.70	18.93	0
		1	49	18.64	18.64	18.57	18.43	18.66	0
		25	0	18.66	18.66	18.59	18.45	18.68	0
		25	12	18.80	18.80	18.73	18.59	18.82	0
		25	25	18.57	18.57	18.50	18.36	18.59	0
		50	0	18.47	18.47	18.40	18.26	18.49	0
	16QAM	1	0	18.80	18.82	18.73	18.59	18.82	0
		1	24	18.87	18.87	18.80	18.66	18.89	0
		1	49	18.60	18.60	18.53	18.39	18.62	0
		25	0	18.62	18.62	18.55	18.41	18.64	0
		25	12	18.76	18.76	18.69	18.55	18.78	0
		25	25	18.53	18.53	18.46	18.32	18.55	0
		50	0	18.43	18.43	18.36	18.22	18.45	0

BW	MCS Index	RB Size	RB Offset	Low	Mid	Mid	Mid	High	3GPP MPR (dB)
		Channel		39675	40148	40620	41093	41565	
		Frequency (MHz)		2498.5	2545.8	2593.0	2640.3	2687.5	
5M	QPSK	1	0	18.80	18.82	18.73	18.59	18.82	0
		1	12	18.87	18.87	18.80	18.66	18.89	0
		1	24	18.60	18.60	18.53	18.39	18.62	0
		12	0	18.62	18.62	18.55	18.41	18.64	0
		12	6	18.76	18.76	18.69	18.55	18.78	0
		12	13	18.53	18.53	18.46	18.32	18.55	0
		25	0	18.43	18.43	18.36	18.22	18.45	0
	16QAM	1	0	18.76	18.78	18.69	18.55	18.78	0
		1	12	18.83	18.83	18.76	18.62	18.85	0
		1	24	18.56	18.56	18.49	18.35	18.58	0
		12	0	18.58	18.58	18.51	18.37	18.60	0
		12	6	18.72	18.72	18.65	18.51	18.74	0
		12	13	18.49	18.49	18.42	18.28	18.51	0
		25	0	18.39	18.39	18.32	18.18	18.41	0

<WLAN 2.4G>

Mode	Channel	Frequency (MHz)	Average Power (Ant-0)	Average Power (Ant-1)	Average Power (Ant-0 + Ant-1)
802.11b	1	2412	18	17.83	N/A
	6	2437	19.77	19.75	N/A
	11	2462	18.27	18.24	N/A
802.11n (HT20)	1	2412	-	-	17.94
	6	2437	-	-	21.41
	11	2462	-	-	18.1

<WLAN 5.3G>

Mode	Channel	Frequency (MHz)	Average Power (Ant-0)	Average Power (Ant-1)	Average Power (Ant-0 + Ant-1)
802.11a	52	5260	-	20.01	N/A
	56	5280	-	19.81	N/A
	60	5300	-	19.72	N/A
	64	5320	-	17.04	N/A
802.11n (HT40)	54	5270	20.21	-	21.99
	62	5310	12.81	-	14.13

<WLAN 5.6G>

Mode	Channel	Frequency (MHz)	Average Power (Ant-0)	Average Power (Ant-1)	Average Power (Ant-0 + Ant-1)
802.11n (HT40)	102	5510	18.22	16.02	-
	110	5550	20.22	20.15	-
	118	5590	20.16	20.12	-
	126	5630	20.11	20.14	-
	134	5670	18.82	18.97	-
	142	5710	19.49	20.14	-
802.11ac (VHT80)	106	5530	-	-	13.43
	122	5610	-	-	20.17
	138	5690	-	-	22.72

<WLAN 5.8G>

Mode	Channel	Frequency (MHz)	Average Power (Ant-0)	Average Power (Ant-1)	Average Power (Ant-0 + Ant-1)
802.11n (HT40)	151	5755	20.51	20.17	21.64
	159	5795	20.23	20.48	23.43

<Bluetooth>

Mode	Channel	Frequency (MHz)	Average Power
Bluetooth EDR	0	2402	11.52
	39	2441	11.84
	78	2480	11.87
Bluetooth LE	0	2402	8.04
	19	2440	8.74
	39	2480	8.97

4.7 SAR Testing Results

4.7.1 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 D01, 3G SAR Measurement Procedures>

The mode tested for SAR is referred to as the primary mode. The equivalent modes considered for SAR test reduction are denoted as secondary modes. Both primary and secondary modes must be in the same frequency band. When the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ 1/4 dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode.

<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.

<Power Confirmation for SAR Test Exclusion for LTE Downlink CA>

According to KDB 941225 D05A, the uplink maximum output power below was measured with downlink CA active on the channel with highest measured maximum output power when downlink CA is inactive. The downlink SCC channel was paired with the uplink channel as normal operation. For intra-band contiguous CA, the downlink channel spacing between the component carriers was set to multiple of 300 kHz less than the nominal channel spacing per section 5.4.1A of 3GPP TS36.521. For intra-band non-contiguous CA, the downlink channel spacing between the component carriers was set to maximum separation from PCC and remain fully within the downlink transmission band. For Inter-band CA, the SCC downlink channel was set to near the middle of its transmission band.

Tablet PC

Power Measurements for Intra-Band Contiguous Downlink CA

CA Combination	PCC								SCC1				Power	
	LTE Band	BW (MHz)	UL Channel	UL Freq. (MHz)	RB Size	RB Offset	DL Channel	DL Freq. (MHz)	LTE Band	BW (MHz)	DL Channel	DL Freq. (MHz)	Single Carrier Tx Power (dBm)	Tx Power with DL-CA Active (dBm)
CA_7C	7	20	21100	2535	1	0	3100	2655	7	20	3298	2674.8	16.92	16.9
CA_41C	41	20	40620	2593	1	0	40620	2593	41	20	40818	2612.8	18.83	18.82

Power Measurements for Intra-Band Non-Contiguous Downlink CA

CA Combination	PCC								SCC1				Power	
	LTE Band	BW (MHz)	UL Channel	UL Freq. (MHz)	RB Size	RB Offset	DL Channel	DL Freq. (MHz)	LTE Band	BW (MHz)	DL Channel	DL Freq. (MHz)	Single Carrier Tx Power (dBm)	Tx Power with DL-CA Active (dBm)
CA_7A_7A	7	20	20850	2510	1	0	2850	2630	7	20	3350	2680	16.82	16.76
CA_41A_41A	41	20	39750	2506	1	0	39750	2506	41	20	41490	2680	18.90	18.87

Power Measurements for Inter-Band Downlink CA

CA Combination	PCC								SCC1				Power	
	LTE Band	BW (MHz)	UL Channel	UL Freq. (MHz)	RB Size	RB Offset	DL Channel	DL Freq. (MHz)	LTE Band	BW (MHz)	DL Channel	DL Freq. (MHz)	Single Carrier Tx Power (dBm)	Tx Power with DL-CA Active (dBm)
CA_2A_5A	7	20	21100	2535	1	0	3100	2655	7	20	3298	2674.8	16.92	16.9
CA_2A_12A	41	20	40620	2593	1	0	40620	2593	41	20	40818	2612.8	18.83	18.82
CA_2A_13A	7	20	20850	2510	1	0	2850	2630	7	20	3350	2680	16.82	16.76
CA_2A_29A	41	20	39750	2506	1	0	39750	2506	41	20	41490	2680	18.90	18.87
CA_4A_5A	2	20	18900	1880	1	0	900	1960	5	10	2525	881.5	18.50	18.45
CA_4A_12A	2	20	18900	1880	1	0	900	1960	12	10	5095	737.5	18.50	18.42
CA_4A_13A	2	20	18900	1880	1	0	900	1960	13	10	5230	751	18.50	18.45
CA_4A_29A	2	20	18900	1880	1	0	900	1960	29	10	9715	722.5	18.50	18.46
CA_2A_5A	4	20	20050	1720	1	0	2050	2120	5	10	2525	881.5	20.76	20.73

<KDB 248227 D01, SAR Guidance for Wi-Fi Transmitters>

(1) For handsets operating next to ear, hotspot mode or mini-tablet configurations, the initial test position procedures were applied. The test position with the highest extrapolated peak SAR will be used as the initial test position. When the reported SAR of initial test position is <= 0.4 W/kg, SAR testing for remaining test positions is not required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is <= 0.8 W/kg or all test positions are measured.

(2) For WLAN 2.4 GHz, the highest measured maximum output power channel for DSSS was selected for SAR measurement. When the reported SAR is <= 0.8 W/kg, no further SAR testing is required. Otherwise, SAR is evaluated at the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel. For OFDM modes (802.11g/n), SAR is not required when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and it is <= 1.2 W/kg.

(3) For WLAN 5 GHz, the initial test configuration was selected according to the transmission mode with the highest maximum output power. When the reported SAR of initial test configuration is > 0.8 W/kg, SAR is required for the subsequent highest measured output power channel until the reported SAR result is <= 1.2 W/kg or all required channels are measured. For other transmission modes, SAR is not required when the highest reported SAR for initial test configuration is adjusted by the ratio of subsequent test configuration to initial test configuration specified maximum output power and it is <= 1.2 W/kg.

(4) For WLAN MIMO mode, the power-based standalone SAR test exclusion or the sum of SAR provision in KDB 447498 to determine simultaneous transmission SAR test exclusion should be applied. Otherwise, SAR for MIMO mode will be measured with all applicable antennas transmitting simultaneously at the specified maximum output power of MIMO operation.

4.7.2 SAR Results for Body Exposure Condition (Tablet PC Mode, Test Separation Distance is 0 mm)

Plot No.	Band	Mode	Test Position	Ch.	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)
	WCDMA II	RMC12.2K	Rear Face	9400	18.5	17.90	1.15	-0.18	0.036	0.04
	WCDMA II	RMC12.2K	Left Side	9400	18.5	17.90	1.15	0.07	0.123	0.14
	WCDMA II	RMC12.2K	Top Side	9400	18.5	17.90	1.15	0.13	0.934	1.07
01	WCDMA II	RMC12.2K	Top Side	9262	18.5	17.88	1.15	0.08	1.03	**1.18**
	WCDMA II	RMC12.2K	Top Side	9538	18.5	17.70	1.20	-0.12	0.703	0.84
	WCDMA II	RMC12.2K	Top Side	9262	18.5	17.88	1.15	0.01	1	1.15
	WCDMA IV	RMC12.2K	Rear Face	1413	20.5	20.49	1.00	-0.01	0.050	0.05
	WCDMA IV	RMC12.2K	Left Side	1413	20.5	20.49	1.00	0.17	0.145	0.15
	WCDMA IV	RMC12.2K	Top Side	1413	20.5	20.49	1.00	-0.18	0.811	0.81
02	WCDMA IV	RMC12.2K	Top Side	1312	20.5	20.46	1.01	0.07	0.985	**0.99**
	WCDMA IV	RMC12.2K	Top Side	1513	20.5	20.36	1.03	0.03	0.728	0.75
	WCDMA IV	RMC12.2K	Top Side	1312	20.5	20.46	1.01	0.05	0.975	0.98
	WCDMA V	RMC12.2K	Rear Face	4233	21.0	20.35	1.16	0	0.001	0.00
	WCDMA V	RMC12.2K	Left Side	4233	21.0	20.35	1.16	0.12	0.036	0.04
03	WCDMA V	RMC12.2K	Top Side	4233	21.0	20.35	1.16	0.02	0.952	**1.10**
	WCDMA V	RMC12.2K	Top Side	4132	21.0	20.17	1.21	0.11	0.779	0.94
	WCDMA V	RMC12.2K	Top Side	4182	21.0	20.15	1.22	0.05	0.835	1.02
	WCDMA V	RMC12.2K	Top Side	4233	21.0	20.35	1.16	0.04	0.896	1.04

Note: The "< 0.001" means there is no SAR value or the SAR is too low to be measured.

Plot No.	Band	Mode	Test Position	Ch.	RB#	RB Offset	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)
	LTE 4	QPSK20M	Rear Face	20050	1	0	21.0	20.76	1.06	0.16	0.070	0.07
	LTE 4	QPSK20M	Left Side	20050	1	0	21.0	20.76	1.06	0.02	0.133	0.14
04	LTE 4	QPSK20M	Top Side	20050	1	0	21.0	20.76	1.06	0.01	1.08	**1.14**
	LTE 4	QPSK20M	Rear Face	20050	50	0	21.0	20.74	1.06	0	0.001	0.00
	LTE 4	QPSK20M	Left Side	20050	50	0	21.0	20.74	1.06	-0.12	0.103	0.11
	LTE 4	QPSK20M	Top Side	20050	50	0	21.0	20.74	1.06	0.08	1.040	1.10
	LTE 4	QPSK20M	Top Side	20175	1	0	21.0	20.68	1.08	-0.05	0.917	0.99
	LTE 4	QPSK20M	Top Side	20300	1	0	21.0	20.53	1.11	-0.11	0.730	0.81
	LTE 4	QPSK20M	Top Side	20175	50	0	21.0	20.73	1.06	-0.11	0.915	0.97
	LTE 4	QPSK20M	Top Side	20300	50	0	21.0	20.58	1.10	-0.18	0.770	0.85
	LTE 4	QPSK20M	Top Side	20050	100	0	21.0	20.71	1.07	0.18	0.943	1.01
	LTE 4	QPSK20M	Top Side	20050	1	0	21.0	20.76	1.06	0.03	1.07	1.13
	LTE 7	QPSK20M	Rear Face	21100	1	0	17.0	16.92	1.02	0	0.001	0.00
05	LTE 7	QPSK20M	Top Side	21100	1	0	17.0	16.92	1.02	0.09	0.973	**0.99**
	LTE 7	QPSK20M	Rear Face	21100	50	25	17.0	16.92	1.02	0	0.001	0.00
	LTE 7	QPSK20M	Top Side	21100	50	25	17.0	16.92	1.02	-0.13	0.957	0.98
	LTE 7	QPSK20M	Top Side	20850	1	0	17.0	16.82	1.04	-0.17	0.877	0.91
	LTE 7	QPSK20M	Top Side	21350	1	0	17.0	16.74	1.06	0.1	0.800	0.85
	LTE 7	QPSK20M	Top Side	20850	50	25	17.0	16.76	1.06	0.11	0.717	0.76
	LTE 7	QPSK20M	Top Side	21350	50	25	17.0	16.68	1.08	-0.1	0.743	0.80
	LTE 7	QPSK20M	Top Side	21100	100	0	17.0	16.85	1.04	-0.18	0.935	0.97
	LTE 7	QPSK20M	Top Side	21100	1	0	17.0	16.92	1.02	-0.1	0.965	0.98

Note: The "< 0.001" means there is no SAR value or the SAR is too low to be measured.

Plot No.	Band	Mode	Test Position	Ch.	RB#	RB Offset	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)
	LTE 12	QPSK10M	Rear Face	23095	1	0	24.0	22.94	1.28	0	0.001	0.00
	LTE 12	QPSK10M	Left Side	23095	1	0	24.0	22.94	1.28	0	0.001	0.00
06	LTE 12	QPSK10M	Top Side	23095	1	0	24.0	22.94	1.28	0.02	0.642	**0.82**
	LTE 12	QPSK10M	Rear Face	23095	25	12	23.0	21.77	1.33	0	0.001	0.00
	LTE 12	QPSK10M	Left Side	23095	25	12	23.0	21.77	1.33	0	0.001	0.00
	LTE 12	QPSK10M	Top Side	23095	25	12	23.0	21.77	1.33	0.14	0.481	0.64
	LTE 12	QPSK10M	Top Side	23060	1	0	24.0	22.85	1.30	-0.02	0.623	0.81
	LTE 12	QPSK10M	Top Side	23130	1	0	24.0	22.82	1.31	0.06	0.617	0.81
	LTE 13	QPSK10M	Rear Face	23230	1	24	22.5	21.55	1.24	0	0.001	0.00
	LTE 13	QPSK10M	Left Side	23230	1	24	22.5	21.55	1.24	0	0.001	0.00
07	LTE 13	QPSK10M	Top Side	23230	1	24	22.5	21.55	1.24	0.12	0.856	**1.06**
	LTE 13	QPSK10M	Rear Face	23230	25	12	22.5	21.42	1.28	0	0.001	0.00
	LTE 13	QPSK10M	Left Side	23230	25	12	22.5	21.42	1.28	0	0.001	0.00
	LTE 13	QPSK10M	Top Side	23230	25	12	22.5	21.42	1.28	0.04	0.615	0.79
	LTE 13	QPSK10M	Top Side	23230	50	0	22.5	21.46	1.27	0.11	0.609	0.77
	LTE 13	QPSK10M	Top Side	23230	1	24	22.5	21.55	1.24	0.05	0.849	1.05
	LTE 25	QPSK20M	Rear Face	26590	1	50	19.0	18.95	1.01	0	0.001	0.00
	LTE 25	QPSK20M	Left Side	26590	1	50	19.0	18.95	1.01	-0.17	0.101	0.10
	LTE 25	QPSK20M	Top Side	26590	1	50	19.0	18.95	1.01	-0.03	0.873	0.88
	LTE 25	QPSK20M	Rear Face	26590	50	25	19.0	18.92	1.02	0	0.001	0.00
	LTE 25	QPSK20M	Left Side	26590	50	25	19.0	18.92	1.02	0.1	0.087	0.09
	LTE 25	QPSK20M	Top Side	26590	50	25	19.0	18.92	1.02	-0.12	0.825	0.84
	LTE 25	QPSK20M	Top Side	26140	1	50	19.0	18.91	1.02	-0.08	1.090	1.11
08	LTE 25	QPSK20M	Top Side	26365	1	50	19.0	18.89	1.03	0.1	1.12	**1.15**
	LTE 25	QPSK20M	Top Side	26140	50	25	19.0	18.88	1.03	0.05	1.100	1.13
	LTE 25	QPSK20M	Top Side	26365	50	25	19.0	18.86	1.03	-0.13	1.060	1.09
	LTE 25	QPSK20M	Top Side	26590	100	0	19.0	18.93	1.02	0.02	0.879	0.90
	LTE 25	QPSK20M	Top Side	26365	1	50	19.0	18.89	1.03	0.07	1.11	1.14
	LTE 26	QPSK15M	Rear Face	26765	1	0	22.0	21.65	1.08	0	0.001	0.00
	LTE 26	QPSK15M	Left Side	26765	1	0	22.0	21.65	1.08	0	0.001	0.00
	LTE 26	QPSK15M	Top Side	26765	1	0	22.0	21.65	1.08	0.04	0.939	1.01
	LTE 26	QPSK15M	Rear Face	26765	36	0	22.0	21.55	1.11	0	0.001	0.00
	LTE 26	QPSK15M	Left Side	26765	36	0	22.0	21.55	1.11	0	0.001	0.00
	LTE 26	QPSK15M	Top Side	26765	36	0	22.0	21.55	1.11	-0.13	0.931	1.03
	LTE 26	QPSK15M	Top Side	26865	1	0	22.0	21.53	1.11	-0.05	0.971	1.08
09	LTE 26	QPSK15M	Top Side	26965	1	0	22.0	21.36	1.16	0.16	0.986	**1.14**
	LTE 26	QPSK15M	Top Side	26865	36	0	22.0	21.43	1.14	0.07	0.982	1.12
	LTE 26	QPSK15M	Top Side	26965	36	0	22.0	21.26	1.19	-0.03	0.947	1.13
	LTE 26	QPSK15M	Top Side	26765	75	0	22.0	21.53	1.11	-0.01	0.942	1.05
	LTE 26	QPSK15M	Top Side	26965	1	0	22.0	21.36	1.16	0.11	0.978	1.13
	LTE 41	QPSK20M	Rear Face	41490	1	50	19.0	18.99	1.00	0	0.001	0.00
	LTE 41	QPSK20M	Left Side	41490	1	50	19.0	18.99	1.00	0.06	0.034	0.03
	LTE 41	QPSK20M	Top Side	41490	1	50	19.0	18.99	1.00	0.14	0.856	0.86
	LTE 41	QPSK20M	Rear Face	41490	50	25	19.0	18.88	1.03	0	0.001	0.00
	LTE 41	QPSK20M	Left Side	41490	50	25	19.0	18.88	1.03	0	0.001	0.00
	LTE 41	QPSK20M	Top Side	41490	50	25	19.0	18.88	1.03	-0.08	0.337	0.35
	LTE 41	QPSK20M	Top Side	39750	1	50	19.0	18.97	1.01	0.13	0.855	0.86
10	LTE 41	QPSK20M	Top Side	40185	1	50	19.0	18.96	1.01	0.06	0.943	**0.95**
	LTE 41	QPSK20M	Top Side	40620	1	50	19.0	18.90	1.02	-0.07	0.198	0.20
	LTE 41	QPSK20M	Top Side	41055	1	50	19.0	18.76	1.06	-0.14	0.301	0.32
	LTE 41	QPSK20M	Top Side	41490	100	0	19.0	18.6	1.10	-0.06	0.346	0.38
	LTE 41	QPSK20M	Top Side	40185	1	50	19.0	18.96	1.01	0.06	0.93	0.94

Note: The "< 0.001" means there is no SAR value or the SAR is too low to be measured.

Plot No.	Band	Mode	Test Position	Ch.	Tx Antenna	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)
	WLAN2.4G	802.11b	Rear Face	6	Ant 0	20.3	19.77	1.13	0.00	<0.001	0.00
	WLAN2.4G	802.11b	Left Side	6	Ant 0	20.3	19.77	1.13	-0.18	0.343	0.39
	WLAN2.4G	802.11b	Rear Face	6	Ant 1	20.3	19.75	1.14	0.00	<0.001	0.00
11	WLAN2.4G	802.11b	Right Side	6	Ant 1	20.3	19.75	1.14	0.11	0.392	**0.44**
	WLAN2.4G	802.11n HT20	Rear Face	6	Ant 0+1	21.8	21.41	1.09	0.00	<0.001	0.00
	WLAN2.4G	802.11n HT20	Left Side	6	Ant 0+1	21.8	21.41	1.09	-0.13	0.271	0.30
	WLAN2.4G	802.11n HT20	Right Side	6	Ant 0+1	21.8	21.41	1.09	0.14	0.238	0.26
	WLAN2.4G	802.11b	Right Side	1	Ant 1	18.3	17.83	1.11	0.12	0.201	0.22
	WLAN2.4G	802.11b	Right Side	11	Ant 1	19.3	18.24	1.28	0.11	0.270	0.34
	WLAN5G	802.11n HT40	Rear Face	54	Ant 0	20.8	20.21	1.15	0.00	0.001	0.00
12	WLAN5G	802.11n HT40	Left Side	54	Ant 0	20.8	20.21	1.15	-0.17	0.760	**0.87**
	WLAN5G	802.11n HT40	Right Side	54	Ant 0	20.8	20.21	1.15	0.00	<0.001	0.00
	WLAN5G	802.11n HT40	Top Side	54	Ant 0	20.8	20.21	1.15	0.00	<0.001	0.00
	WLAN5G	802.11n HT40	Bottom Side	54	Ant 0	20.8	20.21	1.15	0.00	<0.001	0.00
	WLAN5G	802.11a	Rear Face	52	Ant 1	20.8	20.01	1.20	0.00	<0.001	0.00
	WLAN5G	802.11a	Left Side	52	Ant 1	20.8	20.01	1.20	0.00	<0.001	0.00
	WLAN5G	802.11a	Right Side	52	Ant 1	20.8	20.01	1.20	-0.15	0.614	0.74
	WLAN5G	802.11a	Top Side	52	Ant 1	20.8	20.01	1.20	0.00	<0.001	0.00
	WLAN5G	802.11a	Bottom Side	52	Ant 1	20.8	20.01	1.20	0.00	<0.001	0.00
	WLAN5G	802.11n HT40	Rear Face	54	Ant 0+1	22.3	21.99	1.07	0.00	<0.001	0.00
	WLAN5G	802.11n HT40	Left Side	54	Ant 0+1	22.3	21.99	1.07	0.11	0.384	0.41
	WLAN5G	802.11n HT40	Right Side	54	Ant 0+1	22.3	21.99	1.07	-0.16	0.605	0.65
	WLAN5G	802.11n HT40	Top Side	54	Ant 0+1	22.3	21.99	1.07	0.00	<0.001	0.00
	WLAN5G	802.11n HT40	Bottom Side	54	Ant 0+1	22.3	21.99	1.07	0.00	<0.001	0.00
	WLAN5G	802.11a	Left Side	62	Ant 0	13.3	12.81	1.12	0.15	0.138	0.15

Note: The "< 0.001" means there is no SAR value or the SAR is too low to be measured.

Plot No.	Band	Mode	Test Position	Ch.	Tx Antenna	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)
	WLAN5G	802.11n HT40	Rear Face	110	Ant 0	20.8	20.22	1.14	0.00	<0.001	0.00
	WLAN5G	802.11n HT40	Left Side	110	Ant 0	20.8	20.22	1.14	0.12	0.444	0.51
	WLAN5G	802.11n HT40	Right Side	110	Ant 0	20.8	20.22	1.14	0.00	<0.001	0.00
	WLAN5G	802.11n HT40	Top Side	110	Ant 0	20.8	20.22	1.14	0.00	<0.001	0.00
	WLAN5G	802.11n HT40	Bottom Side	110	Ant 0	20.8	20.22	1.14	0.00	<0.001	0.00
	WLAN5G	802.11n HT40	Rear Face	110	Ant 1	20.8	20.15	1.16	0.00	<0.001	0.00
	WLAN5G	802.11n HT40	Left Side	110	Ant 1	20.8	20.15	1.16	0.00	<0.001	0.00
13	WLAN5G	802.11n HT40	Right Side	110	Ant 1	20.8	20.15	1.16	-0.13	0.739	**0.86**
	WLAN5G	802.11n HT40	Top Side	110	Ant 1	20.8	20.15	1.16	0.00	<0.001	0.00
	WLAN5G	802.11n HT40	Bottom Side	110	Ant 1	20.8	20.15	1.16	0.00	<0.001	0.00
	WLAN5G	802.11ac VHT80	Rear Face	138	Ant 0+1	23.3	22.72	1.14	0.00	<0.001	0.00
	WLAN5G	802.11ac VHT80	Left Side	138	Ant 0+1	23.3	22.72	1.14	0.15	0.483	0.55
	WLAN5G	802.11ac VHT80	Right Side	138	Ant 0+1	23.3	22.72	1.14	-0.15	0.665	0.76
	WLAN5G	802.11ac VHT80	Top Side	138	Ant 0+1	23.3	22.72	1.14	0.00	<0.001	0.00
	WLAN5G	802.11ac VHT80	Bottom Side	138	Ant 0+1	23.3	22.72	1.14	0.00	<0.001	0.00
	WLAN5G	802.11n HT40	Right Side	102	Ant 1	16.3	16.02	1.07	0.15	0.299	0.32
	WLAN5G	802.11n HT40	Right Side	118	Ant 1	20.8	20.12	1.17	0.13	0.702	0.82
	WLAN5G	802.11n HT40	Right Side	126	Ant 1	20.8	20.14	1.16	0.11	0.709	0.83
	WLAN5G	802.11n HT40	Right Side	134	Ant 1	19.3	18.97	1.08	0.12	0.481	0.52
	WLAN5G	802.11n HT40	Right Side	142	Ant 1	20.8	20.14	1.16	0.15	0.677	0.79

Note: The "< 0.001" means there is no SAR value or the SAR is too low to be measured.

Plot No.	Band	Mode	Test Position	Ch.	Tx Antenna	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)
	WLAN5G	802.11n HT40	Rear Face	151	Ant 0	20.8	20.51	1.07	0.00	<0.001	0.00
	WLAN5G	802.11n HT40	Left Side	151	Ant 0	20.8	20.51	1.07	0.14	0.472	0.50
	WLAN5G	802.11n HT40	Right Side	151	Ant 0	20.8	20.51	1.07	0.00	<0.001	0.00
	WLAN5G	802.11n HT40	Top Side	151	Ant 0	20.8	20.51	1.07	0.00	<0.001	0.00
	WLAN5G	802.11n HT40	Bottom Side	151	Ant 0	20.8	20.51	1.07	0.00	<0.001	0.00
	WLAN5G	802.11n HT40	Rear Face	159	Ant 1	20.8	20.48	1.08	0.00	<0.001	0.00
	WLAN5G	802.11n HT40	Left Side	159	Ant 1	20.8	20.48	1.08	0.00	<0.001	0.00
	WLAN5G	802.11n HT40	Right Side	159	Ant 1	20.8	20.48	1.08	-0.12	0.567	0.61
	WLAN5G	802.11n HT40	Top Side	159	Ant 1	20.8	20.48	1.08	0.00	<0.001	0.00
	WLAN5G	802.11n HT40	Bottom Side	159	Ant 1	20.8	20.48	1.08	0.00	<0.001	0.00
	WLAN5G	802.11n HT40	Rear Face	159	Ant 0+1	23.8	23.43	1.09	0.00	<0.001	0.00
	WLAN5G	802.11n HT40	Left Side	159	Ant 0+1	23.8	23.43	1.09	0.11	0.466	0.51
14	WLAN5G	802.11n HT40	Right Side	159	Ant 0+1	23.8	23.43	1.09	-0.16	0.625	**0.68**
	WLAN5G	802.11n HT40	Top Side	159	Ant 0+1	23.8	23.43	1.09	0.00	<0.001	0.00
	WLAN5G	802.11n HT40	Bottom Side	159	Ant 0+1	23.8	23.43	1.09	0.00	<0.001	0.00
	WLAN5G	802.11n HT40	Right Side	151	Ant 0+1	21.8	21.64	1.04	0.13	0.392	0.41

Note: The "< 0.001" means there is no SAR value or the SAR is too low to be measured.

Plot No.	Band	Mode	Test Position	Ch.	Tx Antenna	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)
	BT	BR / EDR	Rear Face	39	Ant 1	12.0	11.84	1.04	0.00	<0.001	0.00
15	BT	BR / EDR	Right Side	39	Ant 1	12.0	11.84	1.04	-0.12	0.025	**0.03**
	BT	BR / EDR	Right Side	0	Ant 1	12.0	11.52	1.12	0.03	0.017	0.02
	BT	BR / EDR	Right Side	78	Ant 1	12.0	11.87	1.03	0.07	0.020	0.02

Note: The "< 0.001" means there is no SAR value or the SAR is too low to be measured.

4.7.3 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.

Band	Mode	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
WCDMA II	RMC12.2K	Top Side	9262	1.03	1	1.03	N/A	N/A	N/A	N/A
WCDMA IV	RMC12.2K	Top Side	1312	0.985	0.975	1.01	N/A	N/A	N/A	N/A
WCDMA V	RMC12.2K	Top Side	4233	0.952	0.896	1.01	N/A	N/A	N/A	N/A
LTE 4	QPSK20M	Top Side	20050	1.08	1.07	1.01	N/A	N/A	N/A	N/A
LTE 7	QPSK20M	Top Side	21100	0.973	0.965	1.01	N/A	N/A	N/A	N/A
LTE 13	QPSK10M	Top Side	23230	0.856	0.849	1.01	N/A	N/A	N/A	N/A
LTE 25	QPSK20M	Top Side	26365	1.12	1.11	1.01	N/A	N/A	N/A	N/A
LTE 26	QPSK15M	Top Side	26965	0.986	0.978	1.01	N/A	N/A	N/A	N/A
LTE 41	QPSK15M	Top Side	40185	0.94	0.93	1.01	N/A	N/A	N/A	N/A

4.7.4 Simultaneous Multi-band Transmission Evaluation

<Possibilities of Simultaneous Transmission>

The simultaneous transmission possibilities for this device are listed as below.

Simultaneous TX Combination	Capable Transmit Configurations	Body Exposure Condition
1	WCDMA + WLAN 2.4G	Yes
2	WCDMA + WLAN 5G	Yes
3	WCDMA + BT	Yes
4	LTE + WLAN 2.4G	Yes
5	LTE + WLAN 5G	Yes
6	LTE + BT	Yes

Note :

1. The WLAN 2.4G and WLAN 5G cannot transmit simultaneously.

<Estimated SAR Calculation>

According to KDB 447498 D01, when standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR was estimated according to following formula to result in substantially conservative SAR values of <= 0.4 W/kg to determine simultaneous transmission SAR test exclusion.

$$\text{Estimated SAR} = \frac{\text{Max. Tune up Power}_{(\text{mW})}}{\text{Min. Test Separation Distance}_{(\text{mm})}} \times \frac{\sqrt{f_{(\text{GHz})}}}{7.5}$$

If the minimum test separation distance is < 5 mm, a distance of 5 mm is used for estimated SAR calculation. When the test separation distance is > 50 mm, the 0.4 W/kg is used for SAR-1g.

Mode / Band	Frequency (GHz)	Max. Tune-up Power (dBm)	Test Position	Separation Distance (mm)	Estimated SAR (W/kg)
WCDMA II	1.9076	24.0	Body	5	0.40
WCDMA IV	1.7526	24.0	Body	5	0.40
WCDMA V	0.8466	24.0	Body	5	0.40
LTE 4	1.755	24.0	Body	5	0.40
LTE 7	2.57	23.0	Body	5	0.40
LTE 12	0.716	24.0	Body	5	0.40
LTE 13	0.787	24.0	Body	5	0.40
LTE 25	1.915	24.0	Body	5	0.40
LTE 26	0.849	24.0	Body	5	0.40
LTE 41	2.69	23.0	Body	5	0.40
WLAN (DTS)	2.462	21.8	Body	5	0.40
WLAN (NII)	5.24	22.3	Body	5	0.40
WLAN (NII)	5.32	22.3	Body	5	0.40
WLAN (NII)	5.7	23.3	Body	5	0.40
WLAN (NII)	5.825	23.8	Body	5	0.40
BT (DSS)	2.48	12.0	Body	5	0.40

Note:

1. The separation distance is determined from the outer housing of the EUT to the user.
2. When standalone SAR testing is not required, an estimated SAR can be applied to determine simultaneous transmission SAR test exclusion.

<SAR Summation Analysis>

Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneous transmitting antenna. When the sum of SAR_{1g} of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit (SAR_{1g} 1.6 W/kg), the simultaneous transmission SAR is not required. When the sum of SAR_{1g} is greater than the SAR limit (SAR_{1g} 1.6 W/kg), SAR test exclusion is determined by the SPLSR.

Tablet PC

No.	Conditions (SAR1+SAR2+SAR3)	Exposure Condition	Test Position	Max. SAR1	Max. SAR2	SAR Summation	SPLSR Analysis
1	WCDMA II + WLAN (DTS)	Body	Rear Face	0.04	0.00	0.04	Σ SAR < 1.6, Not required
			Left Side	0.14	0.39	0.53	Σ SAR < 1.6, Not required
			Right Side	0.40	0.44	0.84	Σ SAR < 1.6, Not required
			Top Side	1.18	0.40	1.58	Σ SAR < 1.6, Not required
			Bottom Side	0.40	0.40	0.80	Σ SAR < 1.6, Not required
2	WCDMA II + WLAN (NII)	Body	Rear Face	0.04	0.00	0.04	Σ SAR < 1.6, Not required
			Left Side	0.14	0.87	1.01	Σ SAR < 1.6, Not required
			Right Side	0.40	0.86	1.26	Σ SAR < 1.6, Not required
			Top Side	1.18	0.00	1.18	Σ SAR < 1.6, Not required
			Bottom Side	0.40	0.00	0.40	Σ SAR < 1.6, Not required
3	WCDMA II + BT (DSS)	Body	Rear Face	0.04	0.00	0.04	Σ SAR < 1.6, Not required
			Left Side	0.14	0.40	0.54	Σ SAR < 1.6, Not required
			Right Side	0.40	0.03	0.43	Σ SAR < 1.6, Not required
			Top Side	1.18	0.40	1.58	Σ SAR < 1.6, Not required
			Bottom Side	0.40	0.40	0.80	Σ SAR < 1.6, Not required

No.	Conditions (SAR1+SAR2+SAR3)	Exposure Condition	Test Position	Max. SAR1	Max. SAR2	SAR Summation	SPLSR Analysis
4	WCDMA IV + WLAN (DTS)	Body	Rear Face	0.05	0.00	0.05	Σ SAR < 1.6, Not required
			Left Side	0.15	0.39	0.54	Σ SAR < 1.6, Not required
			Right Side	0.40	0.44	0.84	Σ SAR < 1.6, Not required
			Top Side	0.99	0.40	1.39	Σ SAR < 1.6, Not required
			Bottom Side	0.40	0.40	0.80	Σ SAR < 1.6, Not required
5	WCDMA IV + WLAN (NII)	Body	Rear Face	0.05	0.00	0.05	Σ SAR < 1.6, Not required
			Left Side	0.15	0.87	1.02	Σ SAR < 1.6, Not required
			Right Side	0.40	0.86	1.26	Σ SAR < 1.6, Not required
			Top Side	0.99	0.00	0.99	Σ SAR < 1.6, Not required
			Bottom Side	0.40	0.00	0.40	Σ SAR < 1.6, Not required
6	WCDMA IV + BT (DSS)	Body	Rear Face	0.05	0.00	0.05	Σ SAR < 1.6, Not required
			Left Side	0.15	0.40	0.55	Σ SAR < 1.6, Not required
			Right Side	0.40	0.03	0.43	Σ SAR < 1.6, Not required
			Top Side	0.99	0.40	1.39	Σ SAR < 1.6, Not required
			Bottom Side	0.40	0.40	0.80	Σ SAR < 1.6, Not required

No.	Conditions (SAR1+SAR2+SAR3)	Exposure Condition	Test Position	Max. SAR1	Max. SAR2	SAR Summation	SPLSR Analysis
7	WCDMA V + WLAN (DTS)	Body	Rear Face	0.00	0.00	0.00	Σ SAR < 1.6, Not required
			Left Side	0.04	0.39	0.43	Σ SAR < 1.6, Not required
			Right Side	0.40	0.44	0.84	Σ SAR < 1.6, Not required
			Top Side	1.10	0.40	1.50	Σ SAR < 1.6, Not required
			Bottom Side	0.40	0.40	0.80	Σ SAR < 1.6, Not required
8	WCDMA V + WLAN (NII)	Body	Rear Face	0.00	0.00	0.00	Σ SAR < 1.6, Not required
			Left Side	0.04	0.87	0.91	Σ SAR < 1.6, Not required
			Right Side	0.40	0.86	1.26	Σ SAR < 1.6, Not required
			Top Side	1.10	0.00	1.1	Σ SAR < 1.6, Not required
			Bottom Side	0.40	0.00	0.40	Σ SAR < 1.6, Not required
9	WCDMA V + BT (DSS)	Body	Rear Face	0.00	0.00	0.00	Σ SAR < 1.6, Not required
			Left Side	0.04	0.40	0.44	Σ SAR < 1.6, Not required
			Right Side	0.40	0.03	0.43	Σ SAR < 1.6, Not required
			Top Side	1.10	0.40	1.50	Σ SAR < 1.6, Not required
			Bottom Side	0.40	0.40	0.80	Σ SAR < 1.6, Not required

No.	Conditions (SAR1+SAR2+SAR3)	Exposure Condition	Test Position	Max. SAR1	Max. SAR2	SAR Summation	SPLSR Analysis
10	LTE 4 + WLAN (DTS)	Body	Rear Face	0.07	0.00	0.07	Σ SAR < 1.6, Not required
			Left Side	0.14	0.39	0.53	Σ SAR < 1.6, Not required
			Right Side	0.40	0.44	0.84	Σ SAR < 1.6, Not required
			Top Side	1.14	0.40	1.54	Σ SAR < 1.6, Not required
			Bottom Side	0.40	0.40	0.80	Σ SAR < 1.6, Not required
11	LTE 4 + WLAN (NII)	Body	Rear Face	0.07	0.00	0.07	Σ SAR < 1.6, Not required
			Left Side	0.14	0.87	1.01	Σ SAR < 1.6, Not required
			Right Side	0.40	0.86	1.26	Σ SAR < 1.6, Not required
			Top Side	1.14	0.00	1.14	Σ SAR < 1.6, Not required
			Bottom Side	0.40	0.00	0.40	Σ SAR < 1.6, Not required
12	LTE 4 + BT (DSS)	Body	Rear Face	0.07	0.00	0.07	Σ SAR < 1.6, Not required
			Left Side	0.14	0.40	0.54	Σ SAR < 1.6, Not required
			Right Side	0.40	0.03	0.43	Σ SAR < 1.6, Not required
			Top Side	1.14	0.40	1.54	Σ SAR < 1.6, Not required
			Bottom Side	0.40	0.40	0.80	Σ SAR < 1.6, Not required

No.	Conditions (SAR1+SAR2+SAR3)	Exposure Condition	Test Position	Max. SAR1	Max. SAR2	SAR Summation	SPLSR Analysis
13	LTE 7 + WLAN (DTS)	Body	Rear Face	0.00	0.00	0.00	Σ SAR < 1.6, Not required
			Left Side	0.40	0.39	0.79	Σ SAR < 1.6, Not required
			Right Side	0.40	0.44	0.84	Σ SAR < 1.6, Not required
			Top Side	0.99	0.40	1.39	Σ SAR < 1.6, Not required
			Bottom Side	0.40	0.40	0.80	Σ SAR < 1.6, Not required
14	LTE 7 + WLAN (NII)	Body	Rear Face	0.00	0.00	0.00	Σ SAR < 1.6, Not required
			Left Side	0.40	0.87	1.27	Σ SAR < 1.6, Not required
			Right Side	0.40	0.86	1.26	Σ SAR < 1.6, Not required
			Top Side	0.99	0.00	0.99	Σ SAR < 1.6, Not required
			Bottom Side	0.40	0.00	0.40	Σ SAR < 1.6, Not required
15	LTE 7 + BT (DSS)	Body	Rear Face	0.00	0.00	0.00	Σ SAR < 1.6, Not required
			Left Side	0.40	0.40	0.80	Σ SAR < 1.6, Not required
			Right Side	0.40	0.03	0.43	Σ SAR < 1.6, Not required
			Top Side	0.99	0.40	1.39	Σ SAR < 1.6, Not required
			Bottom Side	0.40	0.40	0.80	Σ SAR < 1.6, Not required

No.	Conditions (SAR1+SAR2+SAR3)	Exposure Condition	Test Position	Max. SAR1	Max. SAR2	SAR Summation	SPLSR Analysis
16	LTE 12 + WLAN (DTS)	Body	Rear Face	0.00	0.00	0.00	Σ SAR < 1.6, Not required
			Left Side	0.00	0.39	0.39	Σ SAR < 1.6, Not required
			Right Side	0.40	0.44	0.84	Σ SAR < 1.6, Not required
			Top Side	0.82	0.40	1.22	Σ SAR < 1.6, Not required
			Bottom Side	0.40	0.40	0.80	Σ SAR < 1.6, Not required
17	LTE 12 + WLAN (NII)	Body	Rear Face	0.00	0.00	0.00	Σ SAR < 1.6, Not required
			Left Side	0.00	0.87	0.87	Σ SAR < 1.6, Not required
			Right Side	0.40	0.86	1.26	Σ SAR < 1.6, Not required
			Top Side	0.82	0.00	0.82	Σ SAR < 1.6, Not required
			Bottom Side	0.40	0.00	0.40	Σ SAR < 1.6, Not required
18	LTE 12 + BT (DSS)	Body	Rear Face	0.00	0.00	0.00	Σ SAR < 1.6, Not required
			Left Side	0.00	0.40	0.40	Σ SAR < 1.6, Not required
			Right Side	0.40	0.03	0.43	Σ SAR < 1.6, Not required
			Top Side	0.82	0.40	1.22	Σ SAR < 1.6, Not required
			Bottom Side	0.40	0.40	0.80	Σ SAR < 1.6, Not required

No.	Conditions (SAR1+SAR2+SAR3)	Exposure Condition	Test Position	Max. SAR1	Max. SAR2	SAR Summation	SPLSR Analysis
19	LTE 13 + WLAN (DTS)	Body	Rear Face	0.00	0.00	0.00	Σ SAR < 1.6, Not required
			Left Side	0.00	0.39	0.39	Σ SAR < 1.6, Not required
			Right Side	0.40	0.44	0.84	Σ SAR < 1.6, Not required
			Top Side	1.06	0.40	1.46	Σ SAR < 1.6, Not required
			Bottom Side	0.40	0.40	0.80	Σ SAR < 1.6, Not required
20	LTE 13 + WLAN (NII)	Body	Rear Face	0.00	0.00	0.00	Σ SAR < 1.6, Not required
			Left Side	0.00	0.87	0.87	Σ SAR < 1.6, Not required
			Right Side	0.40	0.86	1.26	Σ SAR < 1.6, Not required
			Top Side	1.06	0.00	1.06	Σ SAR < 1.6, Not required
			Bottom Side	0.40	0.00	0.40	Σ SAR < 1.6, Not required
21	LTE 13 + BT (DSS)	Body	Rear Face	0.00	0.00	0.00	Σ SAR < 1.6, Not required
			Left Side	0.00	0.40	0.40	Σ SAR < 1.6, Not required
			Right Side	0.40	0.03	0.43	Σ SAR < 1.6, Not required
			Top Side	1.06	0.40	1.46	Σ SAR < 1.6, Not required
			Bottom Side	0.40	0.40	0.80	Σ SAR < 1.6, Not required

No.	Conditions (SAR1+SAR2+SAR3)	Exposure Condition	Test Position	Max. SAR1	Max. SAR2	SAR Summation	SPLSR Analysis
22	LTE 25 + WLAN (DTS)	Body	Rear Face	0.00	0.00	0.00	Σ SAR < 1.6, Not required
			Left Side	0.10	0.39	0.49	Σ SAR < 1.6, Not required
			Right Side	0.40	0.44	0.84	Σ SAR < 1.6, Not required
			Top Side	1.15	0.40	1.55	Σ SAR < 1.6, Not required
			Bottom Side	0.40	0.40	0.80	Σ SAR < 1.6, Not required
23	LTE 25 + WLAN (NII)	Body	Rear Face	0.00	0.00	0.00	Σ SAR < 1.6, Not required
			Left Side	0.10	0.87	0.97	Σ SAR < 1.6, Not required
			Right Side	0.40	0.86	1.26	Σ SAR < 1.6, Not required
			Top Side	1.15	0.00	1.15	Σ SAR < 1.6, Not required
			Bottom Side	0.40	0.00	0.40	Σ SAR < 1.6, Not required
24	LTE 25 + BT (DSS)	Body	Rear Face	0.00	0.00	0.00	Σ SAR < 1.6, Not required
			Left Side	0.10	0.40	0.50	Σ SAR < 1.6, Not required
			Right Side	0.40	0.03	0.43	Σ SAR < 1.6, Not required
			Top Side	1.15	0.40	1.55	Σ SAR < 1.6, Not required
			Bottom Side	0.40	0.40	0.80	Σ SAR < 1.6, Not required

No.	Conditions (SAR1+SAR2+SAR3)	Exposure Condition	Test Position	Max. SAR1	Max. SAR2	SAR Summation	SPLSR Analysis
25	LTE 26 + WLAN (DTS)	Body	Rear Face	0.00	0.00	0.00	Σ SAR < 1.6, Not required
			Left Side	0.00	0.39	0.39	Σ SAR < 1.6, Not required
			Right Side	0.40	0.44	0.84	Σ SAR < 1.6, Not required
			Top Side	1.14	0.40	1.54	Σ SAR < 1.6, Not required
			Bottom Side	0.40	0.40	0.80	Σ SAR < 1.6, Not required
26	LTE 26 + WLAN (NII)	Body	Rear Face	0.00	0.00	0.00	Σ SAR < 1.6, Not required
			Left Side	0.00	0.87	0.87	Σ SAR < 1.6, Not required
			Right Side	0.40	0.86	1.26	Σ SAR < 1.6, Not required
			Top Side	1.14	0.00	1.14	Σ SAR < 1.6, Not required
			Bottom Side	0.40	0.00	0.40	Σ SAR < 1.6, Not required
27	LTE 26 + BT (DSS)	Body	Rear Face	0.00	0.00	0.00	Σ SAR < 1.6, Not required
			Left Side	0.00	0.40	0.40	Σ SAR < 1.6, Not required
			Right Side	0.40	0.03	0.43	Σ SAR < 1.6, Not required
			Top Side	1.14	0.40	1.54	Σ SAR < 1.6, Not required
			Bottom Side	0.40	0.40	0.80	Σ SAR < 1.6, Not required

No.	Conditions (SAR1+SAR2+SAR3)	Exposure Condition	Test Position	Max. SAR1	Max. SAR2	SAR Summation	SPLSR Analysis
28	LTE 41 + WLAN (DTS)	Body	Rear Face	0.00	0.00	0.00	Σ SAR < 1.6, Not required
			Left Side	0.03	0.39	0.42	Σ SAR < 1.6, Not required
			Right Side	0.40	0.44	0.84	Σ SAR < 1.6, Not required
			Top Side	0.95	0.40	1.35	Σ SAR < 1.6, Not required
			Bottom Side	0.40	0.40	0.80	Σ SAR < 1.6, Not required
29	LTE 41 + WLAN (NII)	Body	Rear Face	0.00	0.00	0.00	Σ SAR < 1.6, Not required
			Left Side	0.03	0.87	0.90	Σ SAR < 1.6, Not required
			Right Side	0.40	0.86	1.26	Σ SAR < 1.6, Not required
			Top Side	0.95	0.00	0.95	Σ SAR < 1.6, Not required
			Bottom Side	0.40	0.00	0.40	Σ SAR < 1.6, Not required
30	LTE 41 + BT (DSS)	Body	Rear Face	0.00	0.00	0.00	Σ SAR < 1.6, Not required
			Left Side	0.03	0.40	0.43	Σ SAR < 1.6, Not required
			Right Side	0.40	0.03	0.43	Σ SAR < 1.6, Not required
			Top Side	0.95	0.40	1.35	Σ SAR < 1.6, Not required
			Bottom Side	0.40	0.40	0.80	Σ SAR < 1.6, Not required

Test Engineer：James Chu, and Isaac Liao

5. Calibration of Test Equipment

Equipment	Manufacturer	Model	SN	Cal. Date	Cal. Interval
System Validation Dipole	SPEAG	D750V3	1013	Aug. 23, 2018	1 Year
System Validation Dipole	SPEAG	D835V2	4d121	Aug. 23, 2018	1 Year
System Validation Dipole	SPEAG	D1750V2	1055	Aug. 27, 2018	1 Year
System Validation Dipole	SPEAG	D1900V2	5d036	Jan. 18, 2018	1 Year
System Validation Dipole	SPEAG	D2450V2	737	Aug. 17, 2017	1 Year
System Validation Dipole	SPEAG	D2600V2	1020	Aug. 24, 2018	1 Year
System Validation Dipole	SPEAG	D5GHzV2	1019	Aug. 23, 2017	1 Year
Dosimetric E-Field Probe	SPEAG	EX3DV4	7472	Aug. 29, 2018	1 Year
Dosimetric E-Field Probe	SPEAG	EX3DV4	3820	Jun. 27, 2017	1 Year
Dosimetric E-Field Probe	SPEAG	ET3DV6	3650	Jul. 24, 2017	1 Year
Data Acquisition Electronics	SPEAG	DAE4	679	Mar. 05, 2018	1 Year
Data Acquisition Electronics	SPEAG	DAE4	861	May. 22, 2017	1 Year
Data Acquisition Electronics	SPEAG	DAE4	917	Dec. 14, 2017	1 Year
Universal Radio Communication Tester	Anritsu	MT8821C	6261786083	Dec. 21, 2017	1 Year
Spectrum Analyzer	R&S	FSL6	102006	Mar. 23, 2018	1 Year
ENA Series Network Analyzer	Agilent	E5071C	MY46214281	Jun. 08, 2018	1 Year
MXG Analong Signal Generator	Agilent	N5181A	MY50143868	Jul. 03, 2018	1 Year
Vector Signal Generator	Anritsu	MG3710A	6201599977	Mar. 16, 2018	1 Year
Power Meter	Anritsu	ML2495A	1218009	Jul. 03, 2018	1 Year
Power Sensor	Anritsu	MA2411B	1207252	Jul. 03, 2018	1 Year
Thermometer	YFE	YF-160A	130504591	Mar. 23, 2018	1 Year
Power Amplifier	AR	5S1G4	0339656	Sep. 10, 2018	1 Year
Power Amplifier	AR	15S1G6	0350544	Nov. 13, 2017	1 Year
Attenuator	MTJ	MTJ6011-03	N/A	Sep. 10, 2018	1 Year
Directional Coupler	Woken	0110A05602O-10	11122702	Sep. 10, 2018	1 Year
ELI Phantom	SPEAG	QD OVA 002 AA	1204	N/A	N/A

6. Measurement Uncertainty

Source of Uncertainty	Uncertainty (± %)	Probability Distribution	Divisor	Ci (1g)	Ci (10g)	Standard Uncertainty (± %, 1g)	Standard Uncertainty (± %, 10g)	Vi
Measurement System								
Probe Calibration	6.0	Normal	1	1	1	6.0	6.0	∞
Axial Isotropy	4.7	Rectangular	√3	√0.5	√0.5	1.9	1.9	∞
Hemispherical Isotropy	9.6	Rectangular	√3	√0.5	√0.5	3.9	3.9	∞
Boundary Effect	1.0	Rectangular	√3	1	1	0.6	0.6	∞
Linearity	4.7	Rectangular	√3	1	1	2.7	2.7	∞
Detection Limits	0.25	Rectangular	√3	1	1	0.14	0.14	∞
Probe Modulation Response	3.5	Rectangular	√3	1	1	2.0	2.0	∞
Readout Electronics	0.3	Normal	1	1	1	0.3	0.3	∞
Response Time	0.0	Rectangular	√3	1	1	0.0	0.0	∞
Integration Time	1.7	Rectangular	√3	1	1	1.0	1.0	∞
RF Ambient Conditions – Noise	3.0	Rectangular	√3	1	1	1.7	1.7	∞
RF Ambient Conditions – Reflections	3.0	Rectangular	√3	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	0.4	Rectangular	√3	1	1	0.2	0.2	∞
Probe Positioning with Respect to Phantom	2.9	Rectangular	√3	1	1	1.7	1.7	∞
Post-processing	2.0	Rectangular	√3	1	1	1.2	1.2	∞
Test Sample Related								
Test Sample Positioning	4.38 / 1.35	Normal	1	1	1	4.4	1.4	29
Device Holder Uncertainty	2.9 / 4.1	Normal	1	1	1	2.9	4.1	11
Power Drift of Measurement	5.0	Rectangular	√3	1	1	2.9	2.9	∞
Power Scaling	0.0	Rectangular	√3	1	1	0.0	0.0	∞
Phantom and Setup								
Phantom Uncertainty (Shape and Thickness Tolerances)	7.2	Rectangular	√3	1	1	4.2	4.2	∞
Liquid Conductivity (Temperature Uncertainty)	3.24	Rectangular	√3	0.78	0.71	1.5	1.3	∞
Liquid Conductivity (Measured)	2.88	Normal	1	0.78	0.71	2.2	2.0	43
Liquid Permittivity (Temperature Uncertainty)	1.13	Rectangular	√3	0.23	0.26	0.2	0.2	∞
Liquid Permittivity (Measured)	2.50	Normal	1	0.23	0.26	0.6	0.7	54
Combined Standard Uncertainty						± 11.8 %	± 11.3 %	
Expanded Uncertainty (K=2)						**± 23.6 %**	**± 22.6 %**	

Body SAR Uncertainty Budget for Frequency Range of 300 MHz to 3 GHz

Source of Uncertainty	Uncertainty (± %)	Probability Distribution	Divisor	Ci (1g)	Ci (10g)	Standard Uncertainty (± %, 1g)	Standard Uncertainty (± %, 10g)	Vi
Measurement System								
Probe Calibration	6.55	Normal	1	1	1	6.55	6.55	∞
Axial Isotropy	4.7	Rectangular	√3	0.7	0.7	1.9	1.9	∞
Hemispherical Isotropy	9.6	Rectangular	√3	0.7	0.7	3.9	3.9	∞
Boundary Effect	2.0	Rectangular	√3	1	1	1.2	1.2	∞
Linearity	4.7	Rectangular	√3	1	1	2.7	2.7	∞
Detection Limits	0.25	Rectangular	√3	1	1	0.14	0.14	∞
Probe Modulation Response	3.5	Rectangular	√3	1	1	2.0	2.0	∞
Readout Electronics	0.3	Normal	1	1	1	0.3	0.3	∞
Response Time	0.0	Rectangular	√3	1	1	0.0	0.0	∞
Integration Time	1.7	Rectangular	√3	1	1	1.0	1.0	∞
RF Ambient Conditions – Noise	3.0	Rectangular	√3	1	1	1.7	1.7	∞
RF Ambient Conditions – Reflections	3.0	Rectangular	√3	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	0.4	Rectangular	√3	1	1	0.2	0.2	∞
Probe Positioning with Respect to Phantom	6.7	Rectangular	√3	1	1	3.9	3.9	∞
Post-processing	4.0	Rectangular	√3	1	1	2.3	2.3	∞
Test Sample Related								
Test Sample Positioning	4.38 / 1.35	Normal	1	1	1	4.4	1.4	29
Device Holder Uncertainty	2.9 / 4.1	Normal	1	1	1	2.9	4.1	11
Power Drift of Measurement	5.0	Rectangular	√3	1	1	2.9	2.9	∞
Power Scaling	0.0	Rectangular	√3	1	1	0.0	0.0	∞
Phantom and Setup								
Phantom Uncertainty (Shape and Thickness Tolerances)	7.6	Rectangular	√3	1	1	4.4	4.4	∞
Liquid Conductivity (Temperature Uncertainty)	3.24	Rectangular	√3	0.78	0.71	1.5	1.3	∞
Liquid Conductivity (Measured)	2.88	Normal	1	0.78	0.71	2.2	2.0	43
Liquid Permittivity (Temperature Uncertainty)	1.13	Rectangular	√3	0.23	0.26	0.2	0.2	∞
Liquid Permittivity (Measured)	2.50	Normal	1	0.23	0.26	0.6	0.7	54
Combined Standard Uncertainty						± 12.8 %	± 12.4 %	
Expanded Uncertainty (K=2)						**± 25.6 %**	**± 24.8 %**	

Body SAR Uncertainty Budget for Frequency Range of 3 GHz to 6 GHz

7. Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

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

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The road map of all our labs can be found in our web site also.

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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: Bureau Veritas ADT SAR/HAC Testing Lab Date: 2018/09/22

System Check_B750_180922

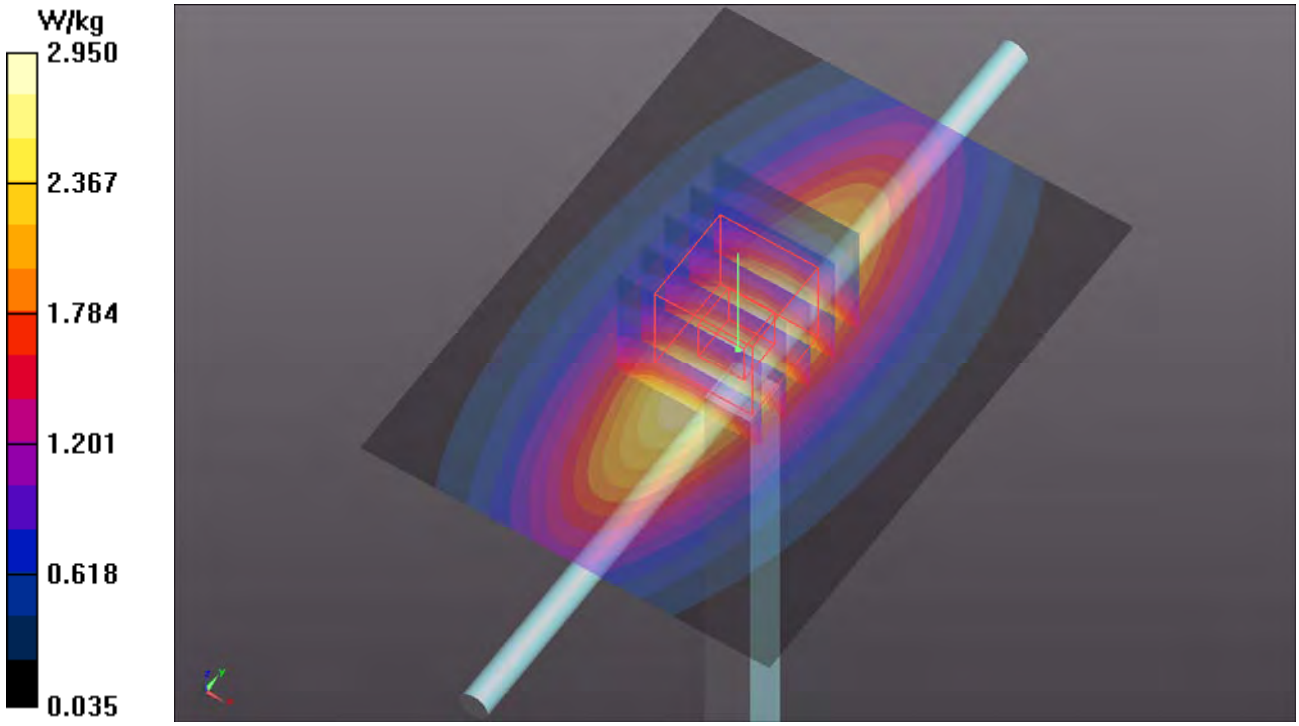
DUT: Dipole 750 MHz; Type: D750V3; SN: 1013

Communication System: CW; Frequency: 750 MHz;Duty Cycle: 1:1
Medium: B06T09N1_0922 Medium parameters used: f = 750 MHz; σ = 0.964 S/m; ε_r = 53.688; ρ = 1000 kg/m^3
Ambient Temperature：23.6 ℃ ； Liquid Temperature：23.4 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN7472; ConvF(10.66, 10.66, 10.66); Calibrated: 2018/08/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 2018/03/05
- Phantom: ELI Phantom_1204; Type: QDOVA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Pin=250mW/Area Scan (61x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.95 W/kg

Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 56.64 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 3.54 W/kg
SAR(1 g) = 2.32 W/kg; SAR(10 g) = 1.5 W/kg
Maximum value of SAR (measured) = 2.97 W/kg



Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab Date: 2018/09/22

System Check_B835_180922

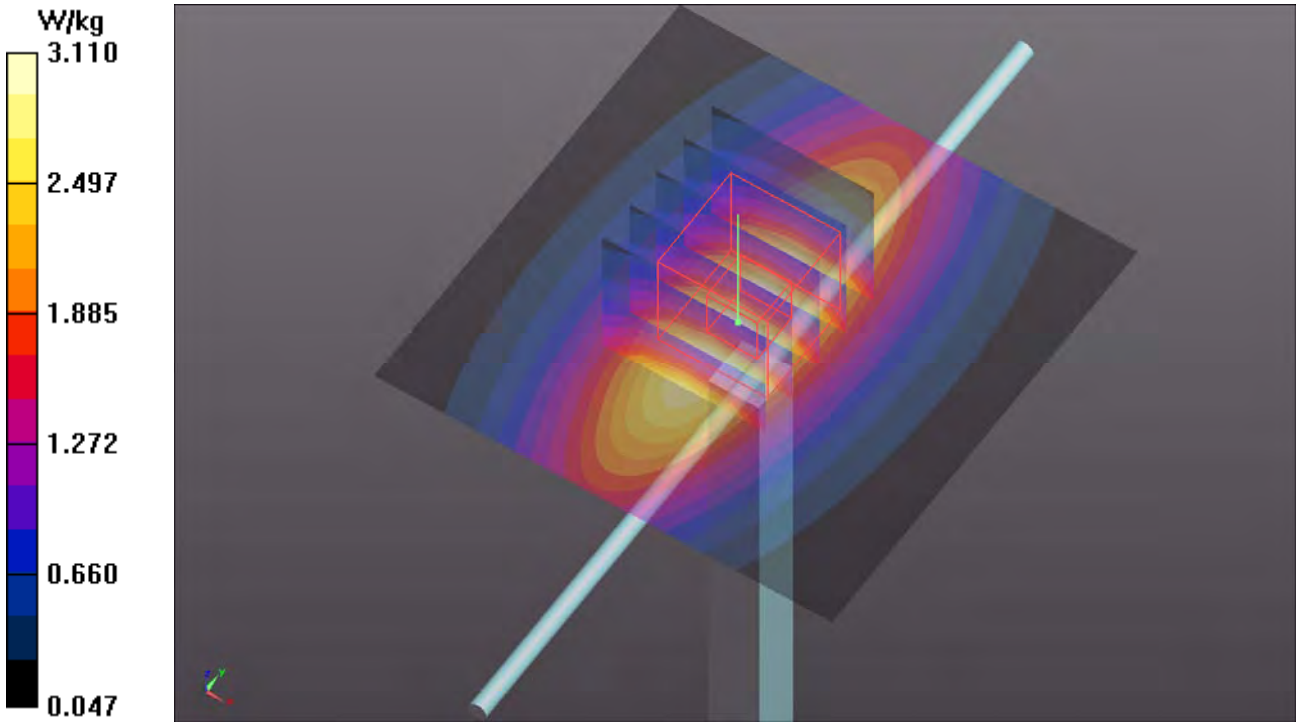
DUT: Dipole 835 MHz; Type: D835V2; SN: 4d121

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: B07T10N1_0922 Medium parameters used: f = 835 MHz; σ = 1.001 S/m; ε_r = 55.293; ρ = 1000 kg/m^3
Ambient Temperature：23.6 ℃ ； Liquid Temperature：23.4 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN7472; ConvF(10.35, 10.35, 10.35); Calibrated: 2018/08/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 2018/03/05
- Phantom: ELI Phantom_1204; Type: QDOVA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 3.11 W/kg

Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 53.75 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 3.70 W/kg
SAR(1 g) = 2.43 W/kg; SAR(10 g) = 1.55 W/kg
Maximum value of SAR (measured) = 3.12 W/kg



Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab Date: 2018/09/22

System Check_B1750_180922

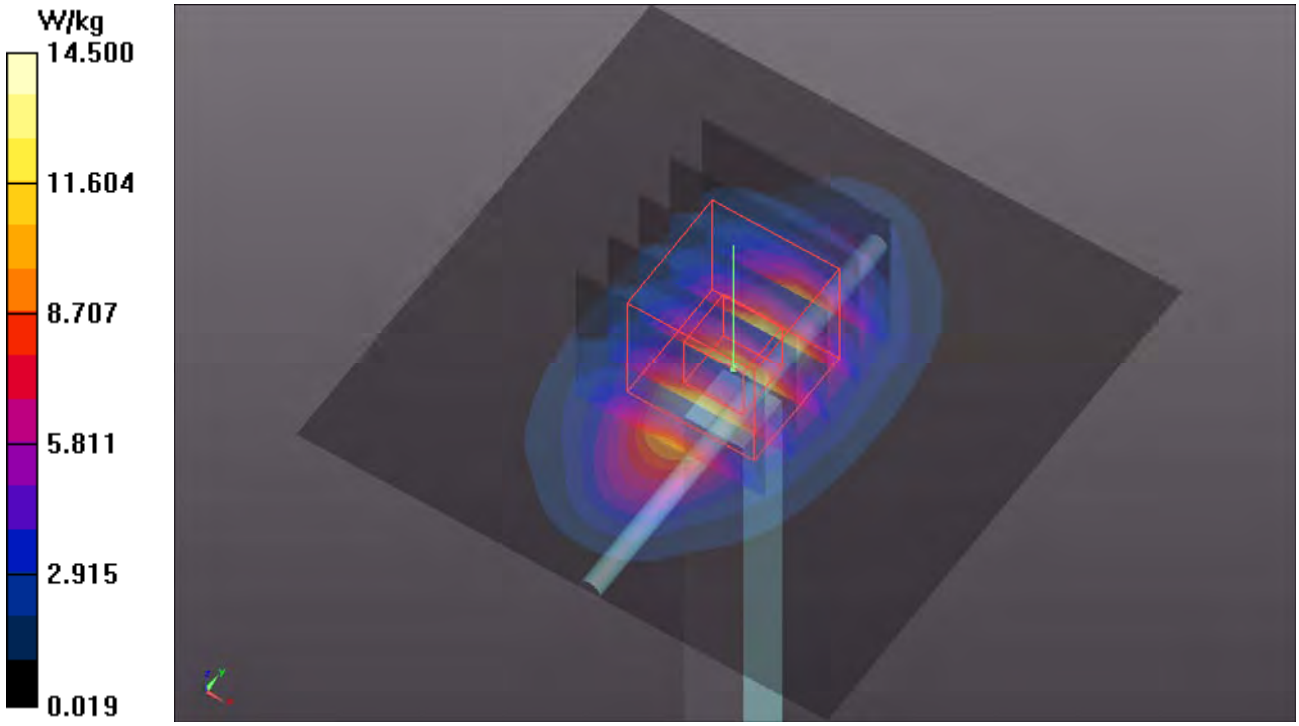
DUT: Dipole 1750 MHz; Type: D1750V2; SN: 1055

Communication System: CW; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium: B16T20N1_0922 Medium parameters used: f = 1750 MHz; σ = 1.43 S/m; ε_r = 51.419; ρ = 1000 kg/m^3
Ambient Temperature：23.7 ℃ ； Liquid Temperature：23.4 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN7472; ConvF(8.42, 8.42, 8.42); Calibrated: 2018/08/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 2018/03/05
- Phantom: ELI Phantom_1204; Type: QDOVA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 14.5 W/kg

Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 97.75 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 17.5 W/kg
SAR(1 g) = 9.38 W/kg; SAR(10 g) = 4.88 W/kg
Maximum value of SAR (measured) = 14.7 W/kg



Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab Date: 2018/09/22

System Check_B1900_180922

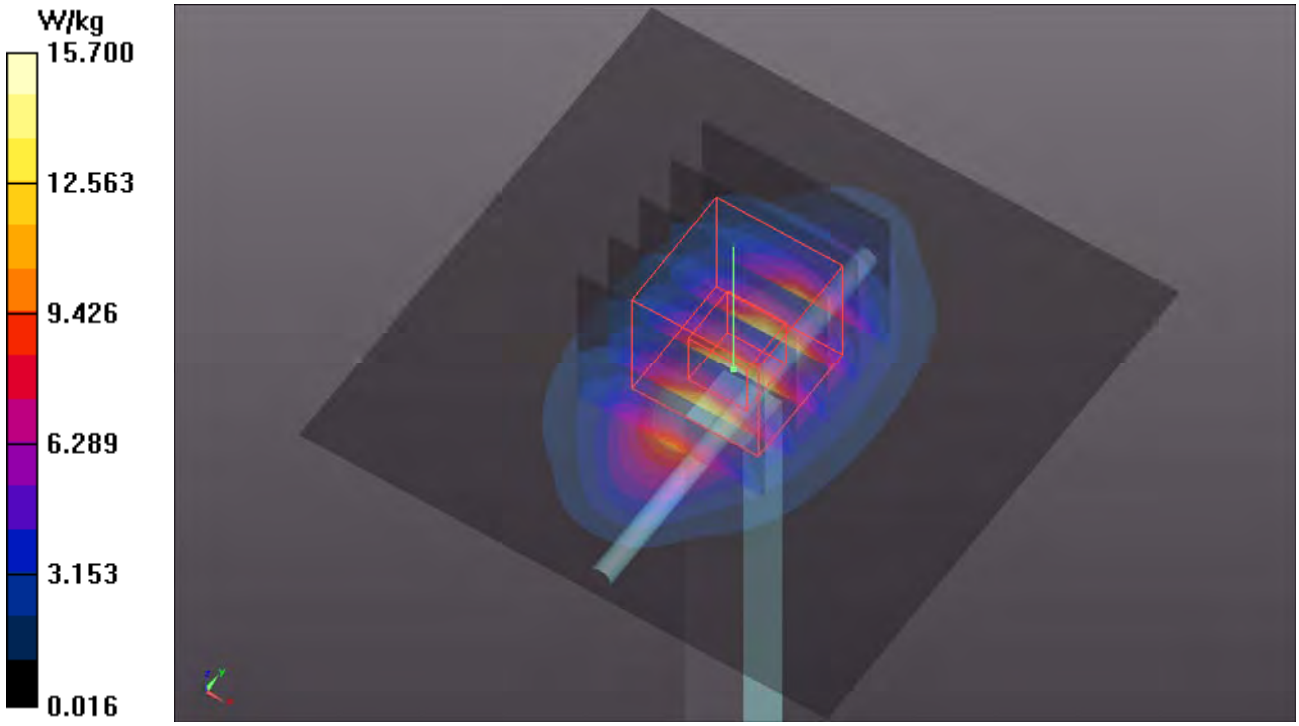
DUT: Dipole 1900 MHz; Type: D1900V2; SN: 5d036

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: B16T20N1_0922 Medium parameters used: f = 1900 MHz; σ = 1.567 S/m; ε_r = 51.026; ρ = 1000 kg/m^3
Ambient Temperature：23.7 ℃； Liquid Temperature：23.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN7472; ConvF(8.07, 8.07, 8.07); Calibrated: 2018/08/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 2018/03/05
- Phantom: ELI Phantom_1204; Type: QDOVA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 15.7 W/kg

Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 96.87 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 18.8 W/kg
SAR(1 g) = 9.88 W/kg; SAR(10 g) = 5.03 W/kg
Maximum value of SAR (measured) = 15.7 W/kg



System Check_B2450_180326

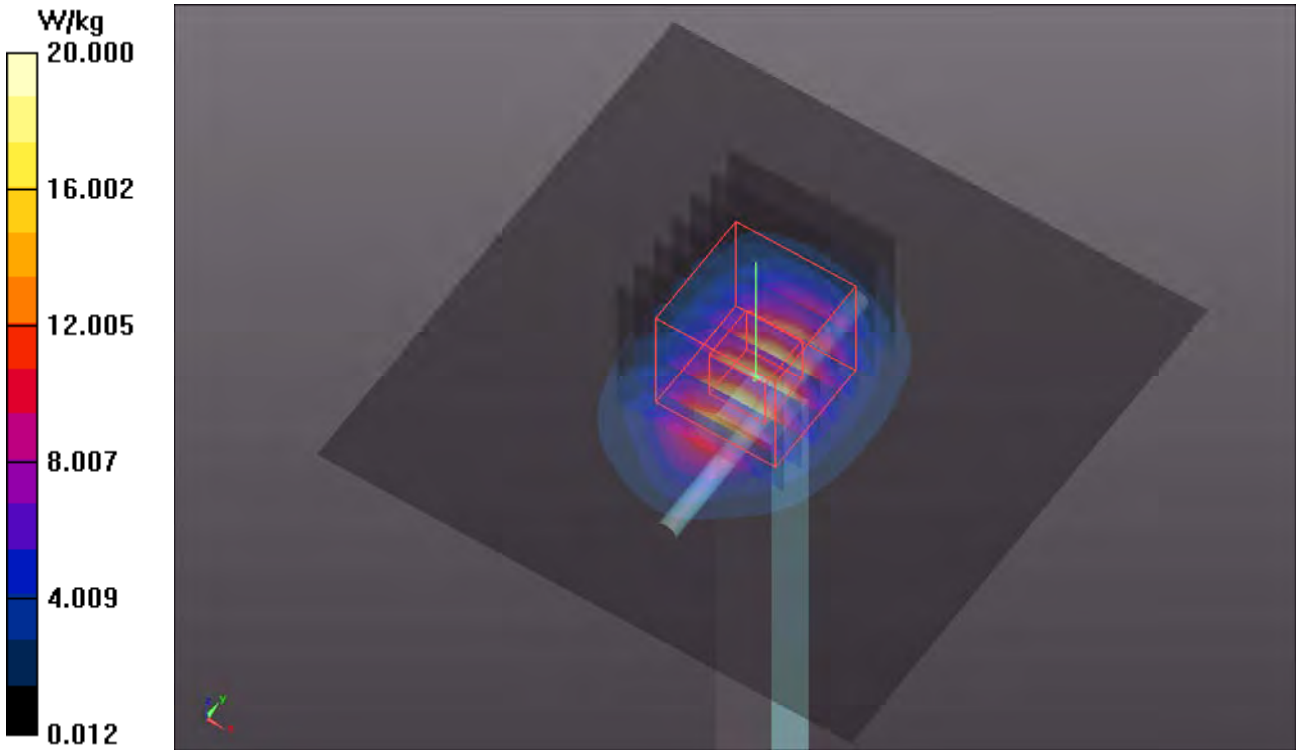
DUT: Dipole 2450 MHz; Type: D2450V2; SN: 737

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: B19T27N2_0326 Medium parameters used: f = 2450 MHz; σ = 2.022 S/m; ε_r = 50.687; ρ = 1000 kg/m^3
Ambient Temperature：23.6 ℃ ； Liquid Temperature：23.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3820; ConvF(7.1, 7.1, 7.1); Calibrated: 2017/06/27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn917; Calibrated: 2017/12/14
- Phantom: ELI Phantom_1206; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

Pin=250mW/Area Scan (81x81x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 20.0 W/kg

Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 100.7 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 26.4 W/kg
SAR(1 g) = 13.2 W/kg; SAR(10 g) = 6.18 W/kg
Maximum value of SAR (measured) = 20.0 W/kg



System Check_B2600_180921

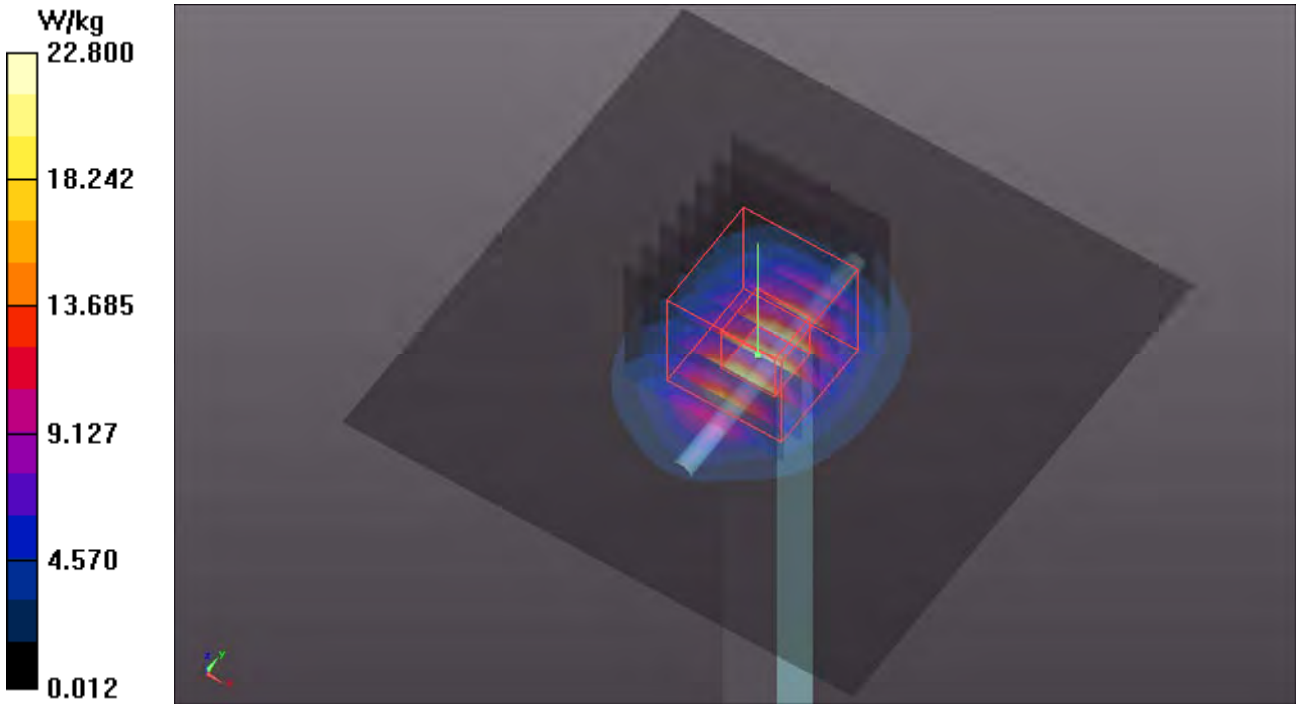
DUT: Dipole 2600 MHz; Type: D2600V2; SN: 1020

Communication System: CW; Frequency: 2600 MHz;Duty Cycle: 1:1
Medium: B19T27N1_0921 Medium parameters used: f = 2600 MHz; σ = 2.193 S/m; ε_r = 51.248; ρ = 1000 kg/m^3
Ambient Temperature：23.8 ℃ ； Liquid Temperature：23.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN7472; ConvF(7.7, 7.7, 7.7); Calibrated: 2018/08/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 2018/03/05
- Phantom: ELI Phantom_1204; Type: QDOVA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Pin=250mW/Area Scan (81x81x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 22.8 W/kg

Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 104.0 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 31.3 W/kg
SAR(1 g) = 14.6 W/kg; SAR(10 g) = 6.47 W/kg
Maximum value of SAR (measured) = 22.8 W/kg



System Check_B5250_180323

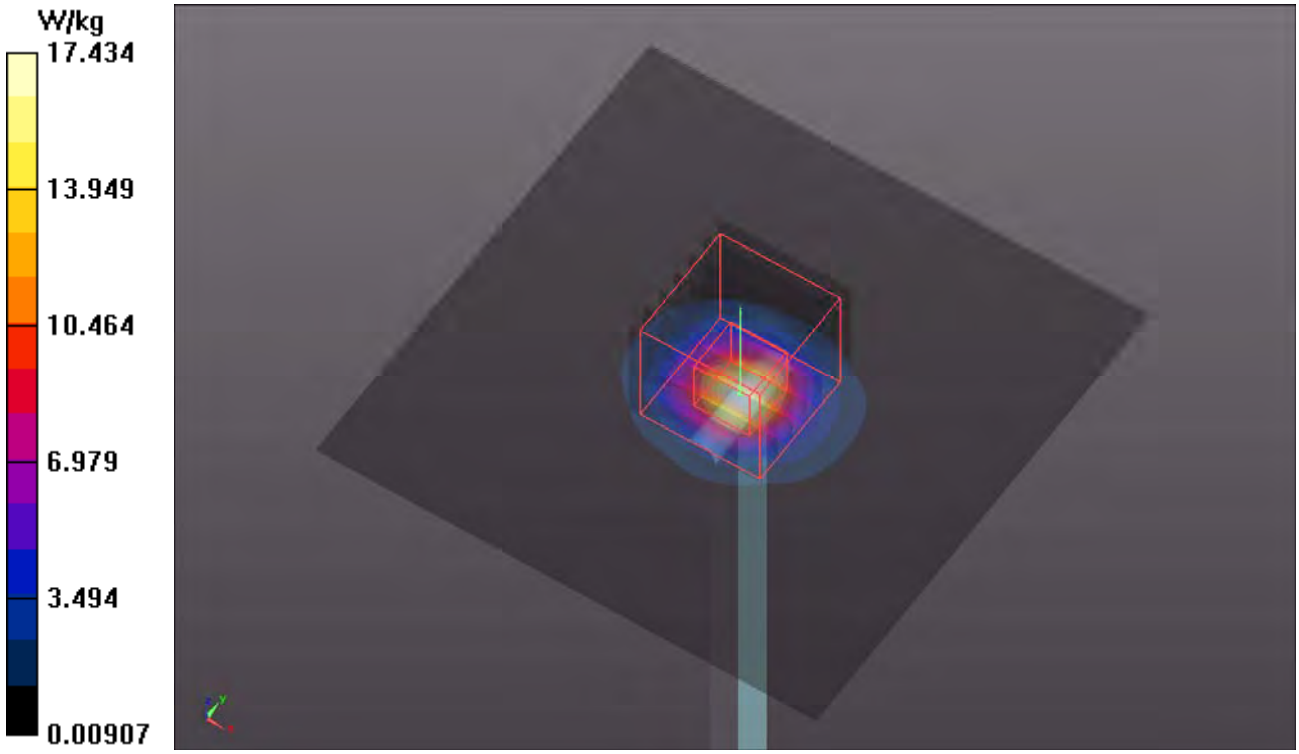
DUT: Dipole 5 GHz; Type: D5GHzV2; SN: 1019

Communication System: CW; Frequency: 5250 MHz;Duty Cycle: 1:1
Medium: B34T60N1_0323 Medium parameters used: f = 5250 MHz; σ = 5.482 S/m; ε_r = 46.96; ρ = 1000 kg/m^3
Ambient Temperature：23.5 ℃ ； Liquid Temperature：23.2 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(5.28, 5.28, 5.28); Calibrated: 2017/07/24;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2017/05/22
- Phantom: ELI Phantom_1206; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

Pin=100mW/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 17.4 W/kg

Pin=100mW/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 55.86 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 30.7 W/kg
SAR(1 g) = 7.43 W/kg; SAR(10 g) = 2.13 W/kg
Maximum value of SAR (measured) = 18.6 W/kg



System Check_B5600_180326

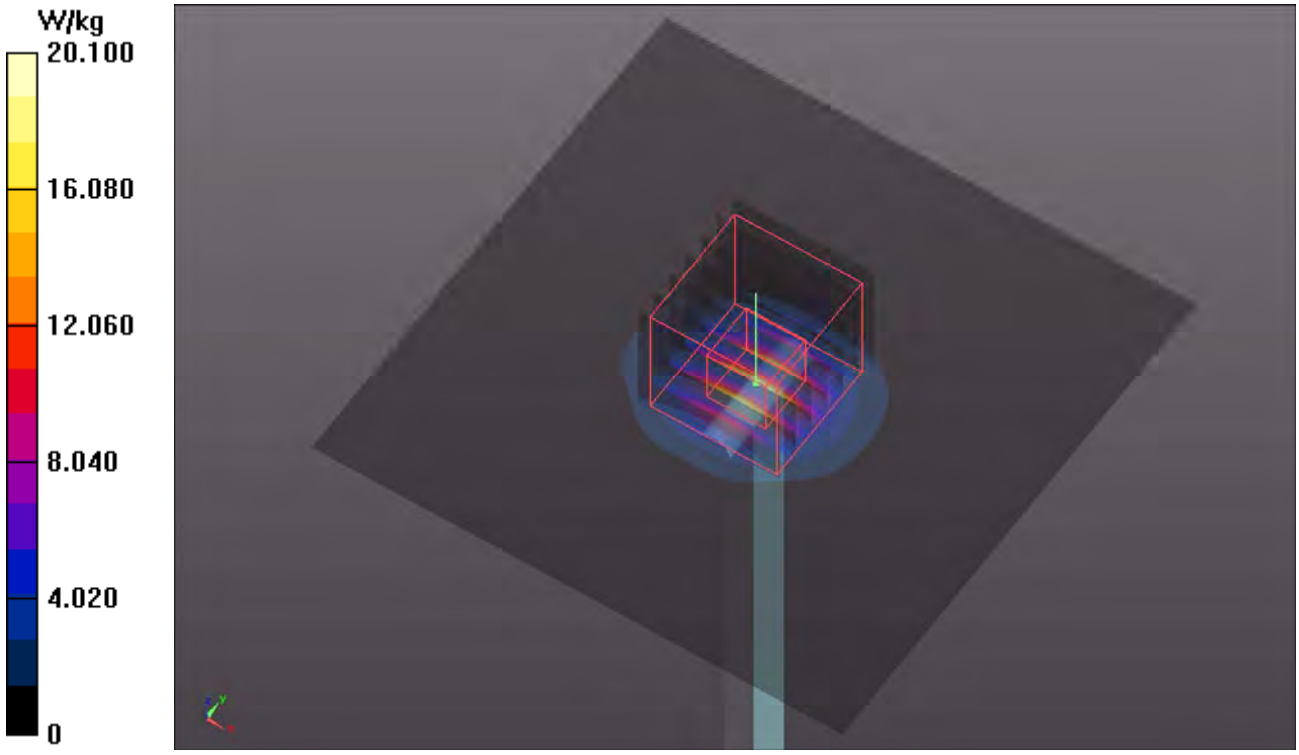
DUT: Dipole 5 GHz; Type: D5GHzV2; SN: 1019

Communication System: CW; Frequency: 5600 MHz;Duty Cycle: 1:1
Medium: B34T60N1_0326 Medium parameters used: f = 5600 MHz; σ = 5.843 S/m; ε_r = 46.493; ρ = 1000 kg/m^3
Ambient Temperature：23.6 ℃ ； Liquid Temperature：23.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3820; ConvF(3.8, 3.8, 3.8); Calibrated: 2017/06/27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn917; Calibrated: 2017/12/14
- Phantom: ELI Phantom_1206; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

Pin=100mW/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 20.1 W/kg

Pin=100mW/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 69.27 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 37.1 W/kg
SAR(1 g) = 8.5 W/kg; SAR(10 g) = 2.37 W/kg
Maximum value of SAR (measured) = 22.1 W/kg



System Check_B5800_180326

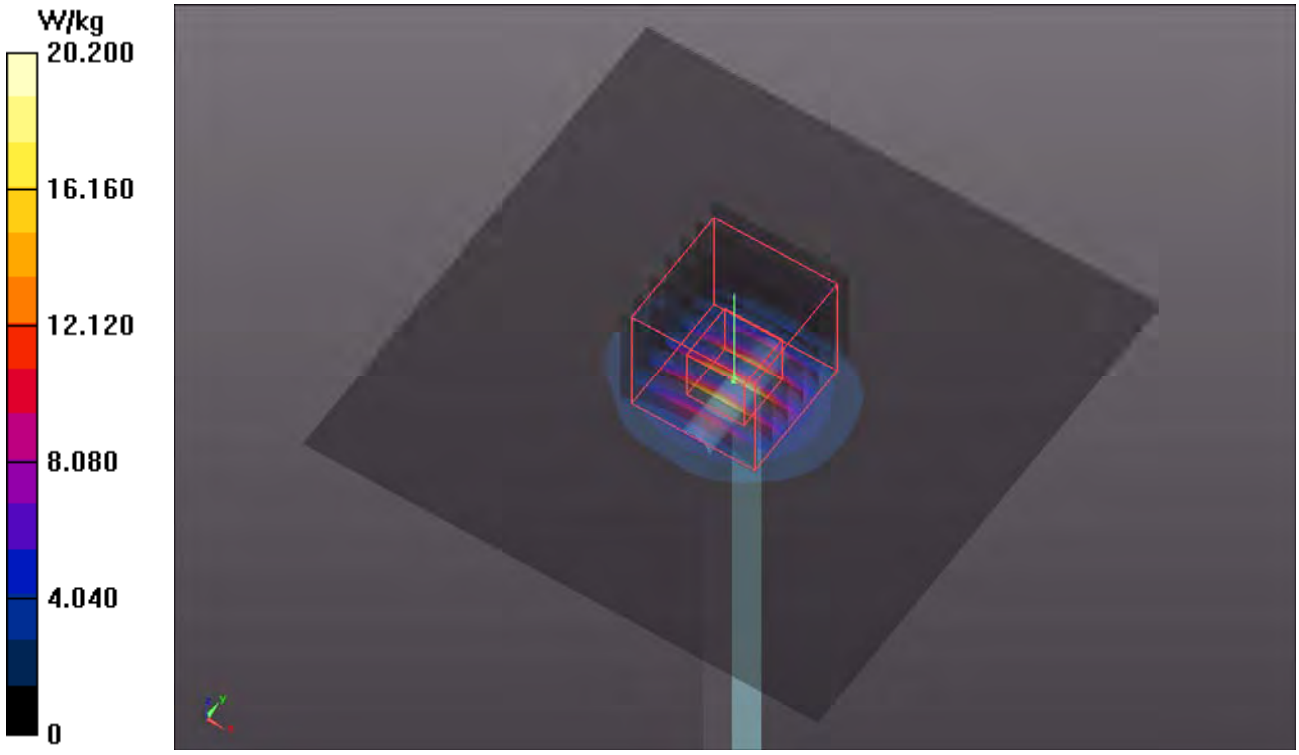
DUT: Dipole 5 GHz; Type: D5GHzV2; SN: 1019

Communication System: CW; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium: B34T60N1_0326 Medium parameters used: f = 5800 MHz; σ = 6.104 S/m; ε_r = 46.118; ρ = 1000 kg/m^3
Ambient Temperature：23.6 ℃ ； Liquid Temperature：23.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3820; ConvF(4.04, 4.04, 4.04); Calibrated: 2017/06/27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn917; Calibrated: 2017/12/14
- Phantom: ELI Phantom_1206; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

Pin=100mW/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 20.2 W/kg

Pin=100mW/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 67.98 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 38.4 W/kg
SAR(1 g) = 8.29 W/kg; SAR(10 g) = 2.26 W/kg
Maximum value of SAR (measured) = 22.1 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.

P01 WCDMA II_RMC12.2K_Top Side_0cm_Ch9262

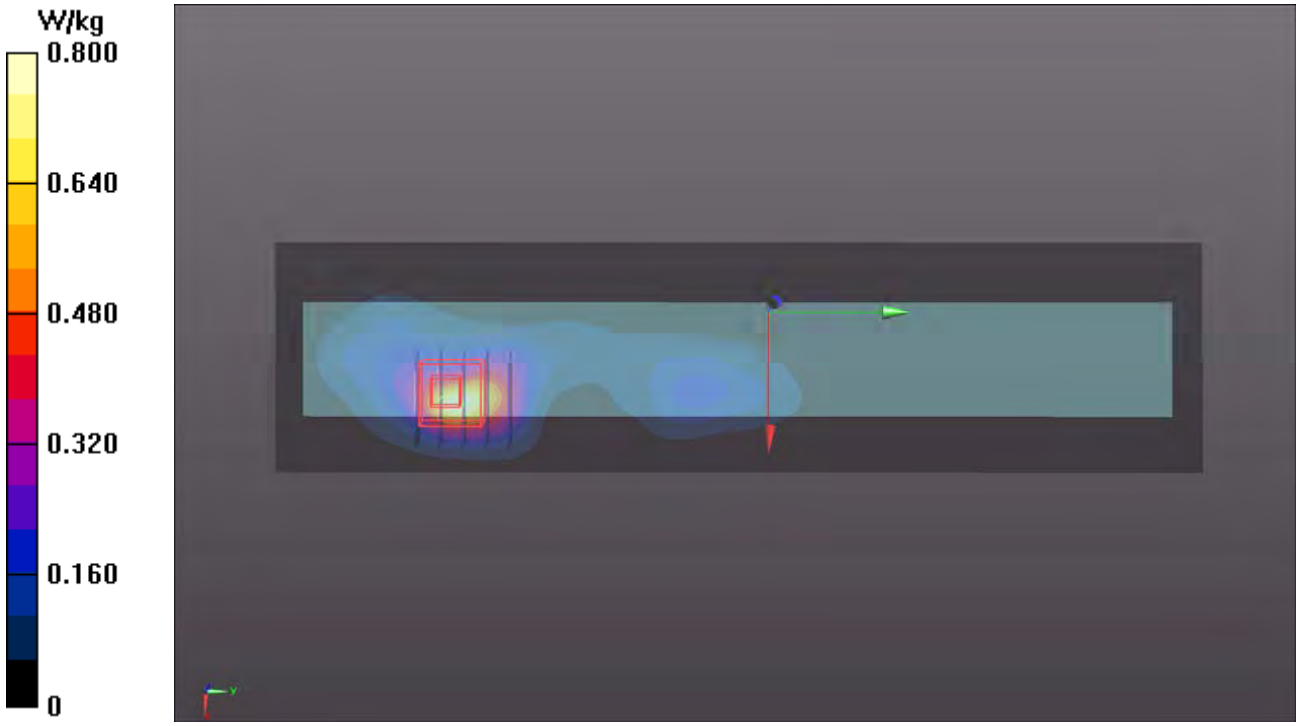
DUT: 180907C24

Communication System: WCDMA; Frequency: 1852.4 MHz;Duty Cycle: 1:1
Medium: B16T20N1_0922 Medium parameters used: f = 1852.4 MHz; σ = 1.527 S/m; ε_r = 51.122; ρ = 1000 kg/m^3
Ambient Temperature：23.7 ℃； Liquid Temperature：23.4 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN7472; ConvF(8.07, 8.07, 8.07); Calibrated: 2018/08/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 2018/03/05
- Phantom: ELI Phantom_1204; Type: QDOVA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

- Area Scan (61x221x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.800 W/kg

- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.58 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 2.42 W/kg
SAR(1 g) = 1.03 W/kg; SAR(10 g) = 0.442 W/kg
Maximum value of SAR (measured) = 1.39 W/kg



P02 WCDMA IV_RMC12.2K_Top Side_0cm_Ch1312

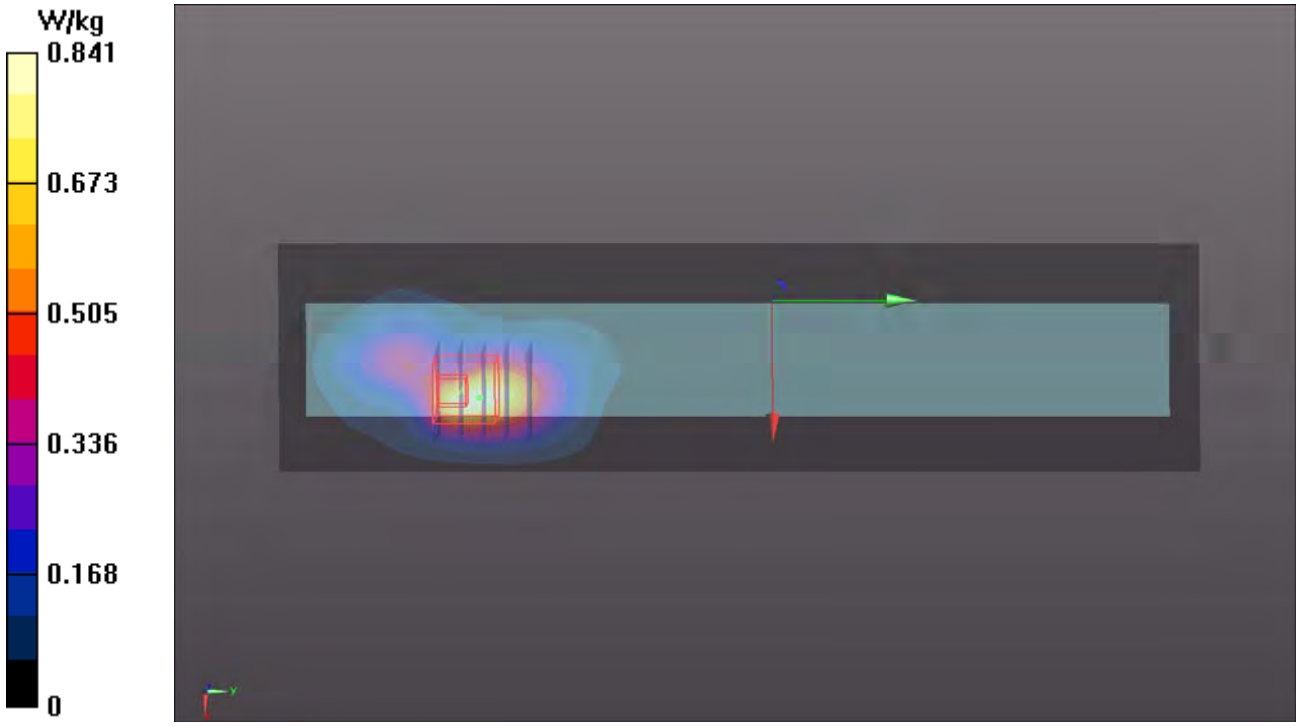
DUT: 180907C24

Communication System: WCDMA; Frequency: 1712.4 MHz;Duty Cycle: 1:1
Medium: B16T20N1_0922 Medium parameters used: f = 1712.4 MHz; σ = 1.396 S/m; ε_r = 51.5; ρ = 1000 kg/m^3
Ambient Temperature：23.6 ℃ ； Liquid Temperature：23.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN7472; ConvF(8.42, 8.42, 8.42); Calibrated: 2018/08/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 2018/03/05
- Phantom: ELI Phantom_1204; Type: QDOVA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

- Area Scan (61x221x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.841 W/kg

- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.20 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 2.25 W/kg
SAR(1 g) = 0.985 W/kg; SAR(10 g) = 0.463 W/kg
Maximum value of SAR (measured) = 1.71 W/kg



P03 WCDMA V_RMC12.2K_Top Side_0cm_Ch4233

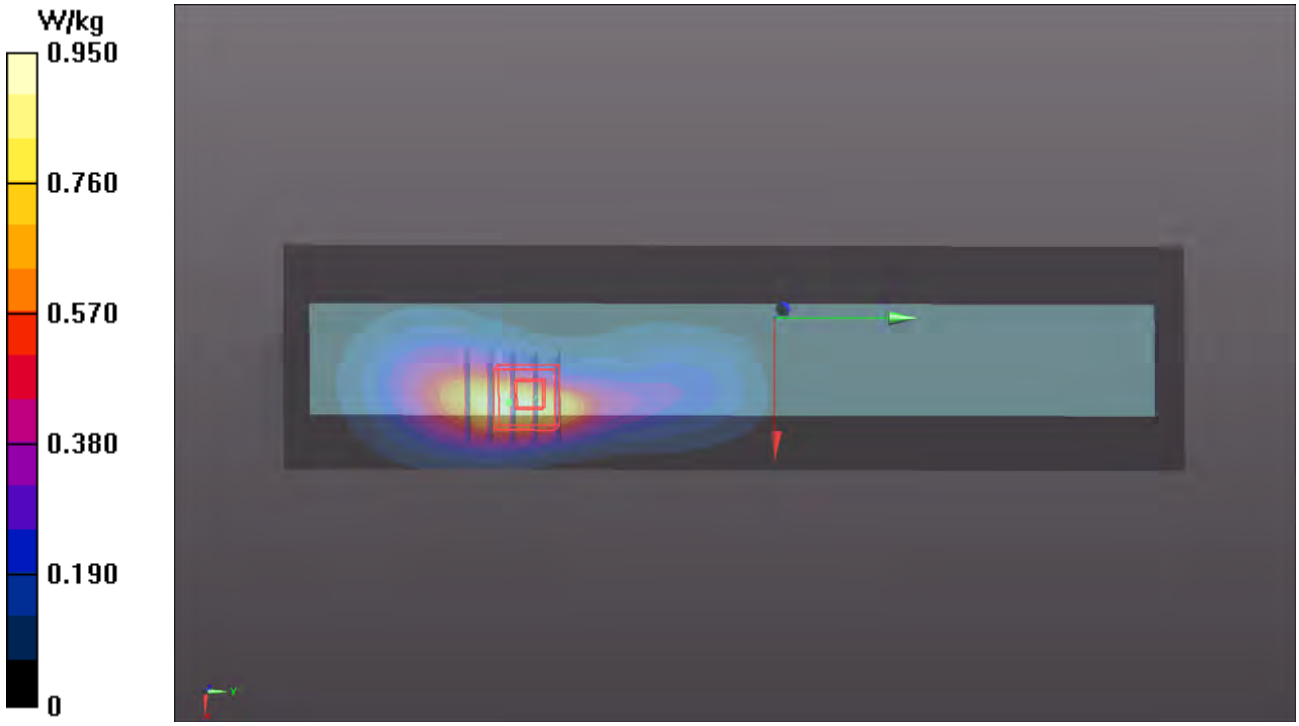
DUT: 180907C24

Communication System: WCDMA; Frequency: 846.6 MHz;Duty Cycle: 1:1
Medium: B07T10N1_0922 Medium parameters used: f = 847 MHz; σ = 1.012 S/m; ε_r = 55.219; ρ = 1000 kg/m^3
Ambient Temperature：23.6 ℃ ； Liquid Temperature：23.4 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN7472; ConvF(10.35, 10.35, 10.35); Calibrated: 2018/08/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 2018/03/05
- Phantom: ELI Phantom_1204; Type: QDOVA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

- Area Scan (61x221x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.950 W/kg

- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 28.62 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 2.09 W/kg
SAR(1 g) = 0.952 W/kg; SAR(10 g) = 0.458 W/kg
Maximum value of SAR (measured) = 1.38 W/kg



P04 LTE 4_QPSK20M_Top Side_0cm_Ch20050_1RB_OS0

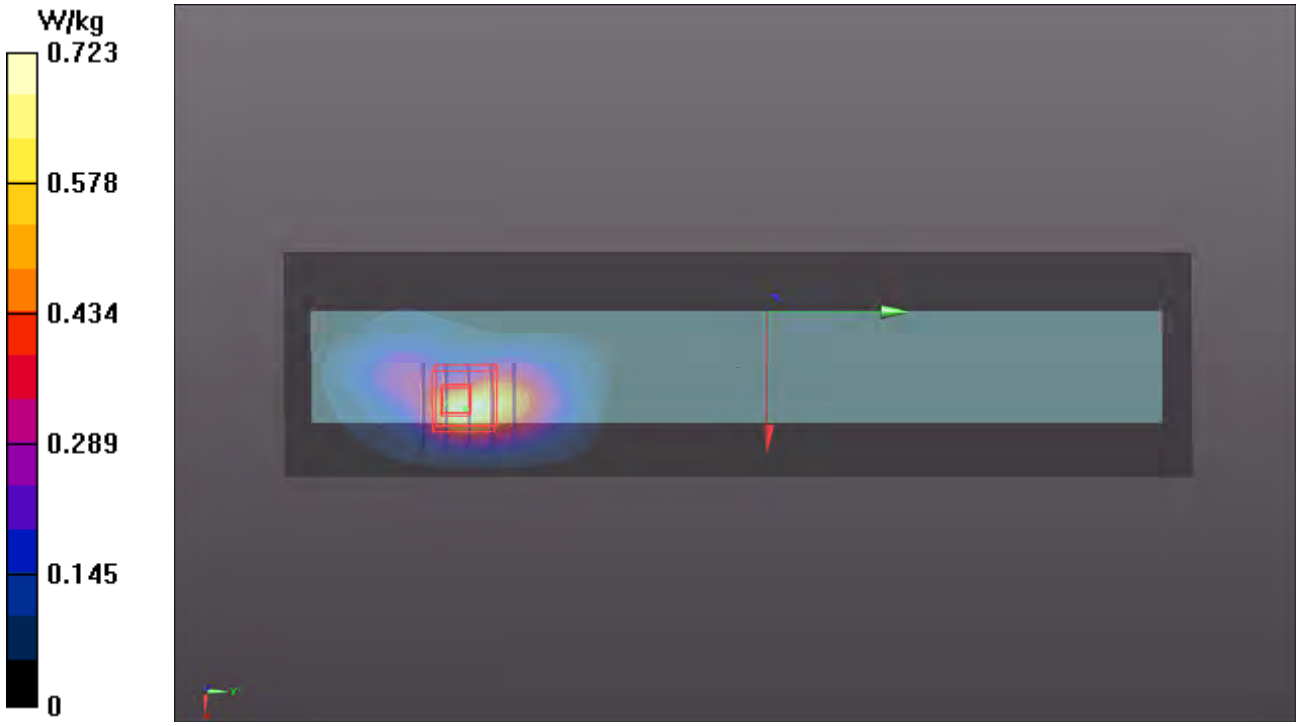
DUT: 180907C24

Communication System: LTE; Frequency: 1720 MHz;Duty Cycle: 1:1
Medium: B16T20N1_0922 Medium parameters used: f = 1720 MHz; σ = 1.403 S/m; ε_r = 51.483; ρ = 1000 kg/m^3
Ambient Temperature：23.7 ℃ ； Liquid Temperature：23.4 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN7472; ConvF(8.42, 8.42, 8.42); Calibrated: 2018/08/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 2018/03/05
- Phantom: ELI Phantom_1204; Type: QDOVA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

- Area Scan (61x221x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.723 W/kg

- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.97 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 2.32 W/kg
SAR(1 g) = 1.08 W/kg; SAR(10 g) = 0.506 W/kg
Maximum value of SAR (measured) = 1.66 W/kg



P05 LTE 7_QPSK20M_Top Side_0cm_Ch21100_1RB_OS0

DUT: 180907C24

Communication System: LTE; Frequency: 2535 MHz;Duty Cycle: 1:1
Medium: B19T27N1_0921 Medium parameters used: f = 2535 MHz; σ = 2.119 S/m; ε_r = 51.434; ρ = 1000 kg/m^3
Ambient Temperature：23.8 ℃ ； Liquid Temperature：23.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN7472; ConvF(7.7, 7.7, 7.7); Calibrated: 2018/08/29
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 2018/03/05
- Phantom: ELI Phantom_1204; Type: QDOVA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

- Area Scan (71x271x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.758 W/kg

- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.36 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 2.76 W/kg
SAR(1 g) = 0.973 W/kg; SAR(10 g) = 0.337 W/kg
Maximum value of SAR (measured) = 1.62 W/kg