

FCC SAR Test Report

APPLICANT : Shenzhen Tinno Mobile Technology Corp.
EQUIPMENT : Smart Phone
MODEL NAME : U626AA
FCC ID : XD6U626AA
STANDARD : FCC 47 CFR Part 2 (2.1093)

We, Sporton International Inc. (Shenzhen), would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Shenzhen), the test report shall not be reproduced except in full.

Hank Huang

Reviewed by: Hank Huang / Supervisor

Johnny Chen

Approved by: Johnny Chen / Manager



Sporton International Inc. (Shenzhen)

1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055
People's Republic of China



Table of Contents

1. Statement of Compliance	4
2. Administration Data	5
3. Guidance Applied	5
4. Equipment Under Test (EUT) Information	6
4.1 General Information	6
4.2 General LTE SAR Test and Reporting Considerations	7
5. RF Exposure Limits	9
5.1 Uncontrolled Environment	9
5.2 Controlled Environment	9
6. Specific Absorption Rate (SAR)	10
6.1 Introduction	10
6.2 SAR Definition	10
7. System Description and Setup	11
7.1 E-Field Probe	12
7.2 Data Acquisition Electronics (DAE)	12
7.3 Phantom	13
7.4 Device Holder	14
8. Measurement Procedures	15
8.1 Spatial Peak SAR Evaluation	15
8.2 Power Reference Measurement	16
8.3 Area Scan	16
8.4 Zoom Scan	17
8.5 Volume Scan Procedures	17
8.6 Power Drift Monitoring	17
9. Test Equipment List	18
10. System Verification	19
10.1 Tissue Simulating Liquids	19
10.2 Tissue Verification	20
10.3 System Performance Check Results	21
11. RF Exposure Positions	23
11.1 Ear and handset reference point	23
11.2 Definition of the cheek position	24
11.3 Definition of the tilt position	25
11.4 Body Worn Accessory	26
11.5 Product Specific 10g SAR Exposure	27
11.6 Wireless Router	27
12. Conducted RF Output Power (Unit: dBm)	28
13. Antenna Location	31
14. SAR Test Results	32
14.1 Head SAR	34
14.2 Hotspot SAR	36
14.3 Body Worn Accessory SAR	39
14.4 Product Specific SAR	41
14.5 Repeated SAR Measurement	42
15. Simultaneous Transmission Analysis	43
15.1 Head Exposure Conditions	44
15.2 Hotspot Exposure Conditions	45
15.3 Body-Worn Accessory Exposure Conditions	46
15.4 Product Specific Exposure Conditions	46
16. Uncertainty Assessment	47
17. References	48
Appendix A. Plots of System Performance Check	
Appendix B. Plots of High SAR Measurement	
Appendix C. DASY Calibration Certificate	
Appendix D. Test Setup Photos	
Appendix E. Conducted RF Output Power Table	



Sporton International Inc. (Shenzhen)

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **Shenzhen Tinno Mobile Technology Corp., Smart Phone, U626AA**, are as follows.

Technology Corp, Smart Phone, C2020A, are as follows:

Highest 1g SAR Summary						
Equipment Class	Frequency Band		Head (Separation 0mm)	Hotspot (Separation 10mm)	Body-worn (Separation 15mm)	Highest Simultaneous Transmission 1g SAR (W/kg)
			1g SAR (W/kg)			
Licensed	LTE	LTE Band 12	0.28	0.49	0.45	1.58
		LTE Band 14	0.42	0.53	0.49	
		LTE Band 5	0.45	0.57	0.50	
		LTE Band 4	0.17	1.10	0.68	
		LTE Band 2	0.25	1.01	0.71	
		LTE Band 30	0.21	1.12	0.66	
DTS	WLAN	2.4GHz WLAN	1.19	1.09	0.50	1.53
NII		5GHz WLAN	0.44	0.60	0.83	1.58
DSS	Bluetooth	2.4GHz Bluetooth	0.34	0.12	<0.10	1.58
Highest 10g SAR Summary						
Equipment Class	Frequency Band		Product Specific 10g SAR (W/kg) (Separation 0mm)		Highest Simultaneous Transmission 10g SAR (W/kg)	
License	LTE	LTE Band 4	3.45		3.84	
		LTE Band 2	3.30			
		LTE Band 30	3.05			
NII	WLAN	5GHz WLAN	0.87		3.84	
Date of Testing:			2022/1/18 ~ 2022/1/28			

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg for Partial-Body 1g SAR, 4.0 W/kg for Product Specific 10g SAR) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013 and FCC KDB publications.

2. Administration Data

Sporton International Inc. (Shenzhen) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

Testing Laboratory			
Test Firm	Sporton International Inc. (Shenzhen)		
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055 People's Republic of China TEL: +86-755-86379589 FAX: +86-755-86379595		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	SAR05-SZ	CN1256	421272

Applicant	
Company Name	Shenzhen Tinno Mobile Technology Corp.
Address	TINNO Building, No.33, Xiandong Rd, Xili, Nanshan District, Shenzhen, Guangdong Province, PRC

Manufacturer	
Company Name	Shenzhen Tinno Mobile Technology Corp.
Address	TINNO Building, No.33, Xiandong Rd, Xili, Nanshan District, Shenzhen, Guangdong Province, PRC

3. Guidance Applied

The Specific Absorption Rate (SAR) testing specification, method, and procedure for this device is in accordance with the following standards:

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2013
- FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
- FCC KDB 865664 D02 SAR Reporting v01r02
- FCC KDB 447498 D01 General RF Exposure Guidance v06
- FCC KDB 648474 D04 SAR Evaluation Considerations for Wireless Handsets v01r03
- FCC KDB 248227 D01 802.11 Wi-Fi SAR v02r02
- FCC KDB 941225 D05 SAR for LTE Devices v02r05
- FCC KDB 941225 D06 Hotspot Mode SAR v02r01

4. Equipment Under Test (EUT) Information

4.1 General Information

Product Feature & Specification	
Equipment Name	Smart Phone
Model Name	U626AA
FCC ID	XD6U626AA
IMEI Code	866289050019100
Wireless Technology and Frequency Range	LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 14: 788 MHz ~ 798 MHz LTE Band 30: 2305 MHz ~ 2315 MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5700 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Mode	LTE: QPSK, 16QAM, 64QAM WLAN 2.4GHz 802.11b/g/n HT20 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE
HW Version	V1.0
SW Version	U626AAV01.02.10
EUT Stage	Identical Prototype
Remark: 802.11n-HT40 is not supported in 2.4GHz WLAN. - This device supports VoIP in LTE (e.g. for 3rd-party VoIP), LTE supports VoLTE operation. - This device 2.4GHz WLAN support hotspot operation and Bluetooth support tethering applications. - This device 5.2GHz WLAN/5.8GHz WLAN support hotspot operation, and 5.2GHz WLAN/5.8GHz WLAN supports WiFi Direct (GC/GO), and 5.3GHz / 5.5GHz supports WiFi Direct (GC only). - The device implements the power management and receiver detection/hotspot mode for SAR compliance at different exposure conditions (head, body-worn, hotspot, and extremity) and the details about the power management decision are provided in the operational description. And the device will invoke corresponding work scenarios power level base on frequency bands/antennas, which can refer to power table at appendix E. - For Some WWAN bands, full power level higher than receiver off reduced power level, so front/back full power SAR can represent Body-worn receiver off SAR conservatively.	

4.2 General LTE SAR Test and Reporting Considerations

Summarized necessary items addressed in KDB 941225 D05 v02r05								
FCC ID	XD6U626AA							
Equipment Name	Smart Phone							
Operating Frequency Range of each LTE transmission band	LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 14: 788 MHz ~ 798 MHz LTE Band 30: 2305 MHz ~ 2315 MHz							
Channel Bandwidth	LTE Band 2:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 4:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 5:1.4MHz, 3MHz, 5MHz, 10MHz LTE Band 12:1.4MHz, 3MHz, 5MHz, 10MHz LTE Band 14: 5MHz, 10MHz LTE Band 30: 5MHz, 10MHz							
uplink modulations used	QPSK / 16QAM / 64QAM							
LTE Voice / Data requirements	Voice and Data							
LTE Release Version	R11, Cat4							
CA Support	Not Supported							
LTE MPR permanently built-in by design	Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3							
	Modulation	Channel bandwidth / Transmission bandwidth (N _{RB})						MPR (dB)
		1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
	QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
	16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
	16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2
	64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2
	64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3
	256 QAM	≥ 1						≤ 5
LTE A-MPR	In the base station simulator configuration, Network Setting value is set to NS_01 to disable A-MPR during SAR testing and the LTE SAR tests was transmitting on all TTI frames (Maximum TTI)							
Spectrum plots for RB configuration	A properly configured base station simulator was used for the SAR and power measurement; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.							
Power reduction applied to satisfy SAR compliance	Yes, when operating in receiver/hotspot detect mechanism, head/ body-worn/hotspot/ extremity will trigger reduced power for some WWAN bands applied to satisfy SAR compliance, the detail please referred to section 12.							

Transmission (H, M, L) channel numbers and frequencies in each LTE band												
LTE Band 2												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	18607	1850.7	18615	1851.5	18625	1852.5	18650	1855	18675	1857.5	18700	1860
M	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880
H	19193	1909.3	19185	1908.5	19175	1907.5	19150	1905	19125	1902.5	19100	1900
LTE Band 4												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	19957	1710.7	19965	1711.5	19975	1712.5	20000	1715	20025	1717.5	20050	1720
M	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5
H	20393	1754.3	20385	1753.5	20375	1752.5	20350	1750	20325	1747.5	20300	1745
LTE Band 5												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20407	824.7	20415	825.5	20425	826.5	20450	829				
M	20525	836.5	20525	836.5	20525	836.5	20525	836.5				
H	20643	848.3	20635	847.5	20625	846.5	20600	844				
LTE Band 12												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	23017	699.7	23025	700.5	23035	701.5	23060	704				
M	23095	707.5	23095	707.5	23095	707.5	23095	707.5				
H	23173	715.3	23165	714.5	23155	713.5	23130	711				
LTE Band 14												
	Bandwidth 5 MHz				Bandwidth 10 MHz							
	Channel #		Channel #		Channel #		Freq.(MHz)					
L	23305		790.5		23330		793					
M	23330		793									
H	23355		795.5									
LTE Band 30												
	Bandwidth 5 MHz				Bandwidth 10 MHz							
	Channel #		Freq.(MHz)		Channel #		Freq.(MHz)					
L	27685		2307.5		27710		2310					
M	27710		2310									
H	27735		2312.5									

5. RF Exposure Limits

5.1 Uncontrolled Environment

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

5.2 Controlled Environment

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. The exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Limits for Occupational/Controlled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.4	8.0	20.0

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

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.08	1.6	4.0

Whole-Body SAR is averaged over the entire body, partial-body SAR is averaged over any 1gram of tissue defined as a tissue volume in the shape of a cube. SAR for hands, wrists, feet and ankles is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.

6. Specific Absorption Rate (SAR)

6.1 Introduction

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.

6.2 SAR Definition

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:

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

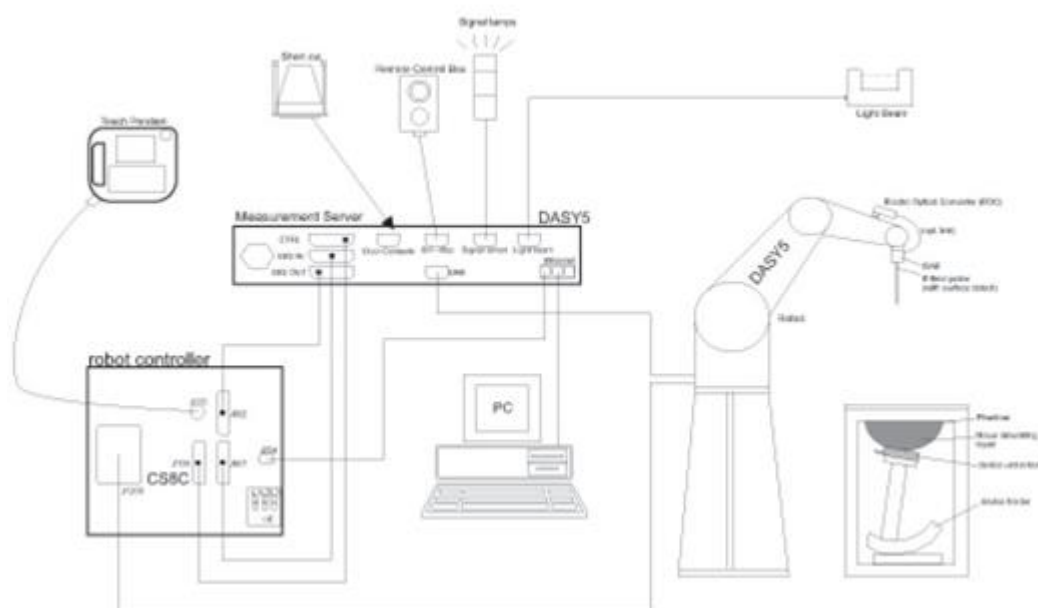
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

7. System Description and Setup

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



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP or Win7 and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

7.1 E-Field Probe

The SAR measurement is conducted with the dosimetric probe (manufactured by SPEAG). 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. This probe has a built in optical surface detection system to prevent from collision with phantom.

<EX3DV4 Probe>

Construction	Symmetric design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	10 MHz – >6 GHz Linearity: ± 0.2 dB (30 MHz – 6 GHz)	
Directivity	± 0.3 dB in TSL (rotation around probe axis) ± 0.5 dB in TSL (rotation normal to probe axis)	
Dynamic Range	10 μ W/g – >100 mW/g Linearity: ± 0.2 dB (noise: typically <1 μ W/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	

7.2 Data Acquisition Electronics (DAE)

The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.

The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.



Photo of DAE

7.3 Phantom

<SAM Twin Phantom>

Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm	
Filling Volume	Approx. 25 liters	
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet	
Measurement Areas	Left Hand, Right Hand, Flat Phantom	

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

<ELI Phantom>

Shell Thickness	2 ± 0.2 mm (sagging: <1%)	
Filling Volume	Approx. 30 liters	
Dimensions	Major ellipse axis: 600 mm Minor axis: 400 mm	

The ELI phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI4 is fully compatible with standard and all known tissue simulating liquids.

7.4 Device Holder

<Mounting Device for Hand-Held Transmitter>

In combination with the Twin SAM V5.0/V5.0c or ELI phantoms, the Mounting Device for Hand-Held Transmitters enables rotation of the mounted transmitter device to specified spherical coordinates. At the heads, the rotation axis is at the ear opening. Transmitter devices can be easily and accurately positioned according to IEC 62209-1, IEEE 1528, FCC, or other specifications. The device holder can be locked for positioning at different phantom sections (left head, right head, flat). And upgrade kit to Mounting Device to enable easy mounting of wider devices like big smart-phones, e-books, small tablets, etc. It holds devices with width up to 140 mm.



Mounting Device for Hand-Held Transmitters



Mounting Device Adaptor for Wide-Phones

<Mounting Device for Laptops and other Body-Worn Transmitters>

The extension is lightweight and made of POM, acrylic glass and foam. It fits easily on the upper part of the mounting device in place of the phone positioned. The extension is fully compatible with the SAM Twin and ELI phantoms.



Mounting Device for Laptops

8. Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

- (a) For WWAN power measurement, use base station simulator to configure EUT WWAN transmission in conducted connection with RF cable, at maximum power in each supported wireless interface and frequency band.
- (b) Read the WWAN RF power level from the base station simulator.
- (c) For WLAN/BT power measurement, use engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power in each supported wireless interface and frequency band
- (d) Connect EUT RF port through RF cable to the power meter, and measure WLAN/BT output power

<SAR measurement>

- (a) Use base station simulator to configure EUT WWAN transmission in radiated connection, and engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power, in the highest power channel.
- (b) Place the EUT in the positions as Appendix D demonstrates.
- (c) Set scan area, grid size and other setting on the DASY software.
- (d) Measure SAR results for the highest power channel on each testing position.
- (e) Find out the largest SAR result on these testing positions of each band
- (f) Measure SAR results for other channels in worst SAR testing position if the reported SAR of highest power channel is larger than 0.8 W/kg

According to the 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

8.1 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 from 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

8.2 Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

8.3 Area Scan

The area scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE standard 1528 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan), if only one zoom scan follows the area scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of zoom scans has to be increased accordingly.

Area scan parameters extracted from FCC KDB 865664 D01v01r04 SAR measurement 100 MHz to 6 GHz.

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

8.4 Zoom Scan

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

Zoom scan parameters extracted from FCC KDB 865664 D01v01r04 SAR measurement 100 MHz to 6 GHz.

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

8.5 Volume Scan Procedures

The volume scan is used to 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.

8.6 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 drifts more than 5%, the SAR will be retested.

9. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	750MHz System Validation Kit	D750V3	1087	Mar. 27, 2019	Mar. 24, 2022
SPEAG	835MHz System Validation Kit	D835V2	4d258	May 07, 2020	May 06, 2023
SPEAG	1750MHz System Validation Kit	D1750V2	1090	Mar. 27, 2019	Mar. 25, 2022
SPEAG	1900MHz System Validation Kit	D1900V2	5d170	Mar. 26, 2019	Mar. 24, 2022
SPEAG	2300MHz System Validation Kit	D2300V2	1056	Oct. 20, 2021	Oct. 19, 2022
SPEAG	2450MHz System Validation Kit	D2450V2	924	Sep. 02, 2020	Sep. 01, 2023
SPEAG	5000MHz System Validation Kit	D5GHzV2	1113	Sep. 24, 2019	Sep. 22, 2022
SPEAG	Data Acquisition Electronics	DAE4	1437	Oct. 26, 2021	Oct. 25, 2022
SPEAG	Dosimetric E-Field Probe	EX3DV4	7576	Apr. 26, 2021	Apr. 25, 2022
SPEAG	SAM Twin Phantom	QD 000 P41 AA	2035	NCR	NCR
SPEAG	Phone Positioner	N/A	N/A	NCR	NCR
Anritsu	Radio communication analyzer	MT8820C	6201300653	Jul. 14, 2021	Jul. 13, 2022
Anritsu	Radio communication analyzer	MT8821C	6201588577	Apr. 08, 2021	Apr. 07, 2022
Agilent	Wireless Communication Test Set	E5515C	MY50267224	Jul. 14, 2021	Jul. 13, 2022
Keysight	Network Analyzer	E5071C	MY46523671	Oct. 25, 2021	Oct. 24, 2022
Speag	Dielectric Assessment KIT	DAK-3.5	1138	Jun. 09, 2021	Jun. 08, 2022
Agilent	Signal Generator	N5181A	MY50145381	Dec. 28, 2021	Dec. 27, 2022
Anritsu	Power Sensor	MA2411B	1306099	Sep. 29, 2021	Sep. 28, 2022
Anritsu	Power Meter	ML2495A	1349001	Sep. 29, 2021	Sep. 28, 2022
Anritsu	Power Sensor	MA2411B	1542004	Dec. 28, 2021	Dec. 27, 2022
Anritsu	Power Meter	ML2495A	1339473	Dec. 28, 2021	Dec. 27, 2022
R&S	Power Sensor	NRP8S	109228	Apr. 09, 2021	Apr. 08, 2022
R&S	CBT BLUETOOTH TESTER	CBT	100963	Dec. 28, 2021	Dec. 27, 2022
R&S	Spectrum Analyzer	FSP7	100818	Jul. 14, 2021	Jul. 13, 2022
TES	Hygrometer	1310	200505600	Jul. 17, 2021	Jul. 16, 2022
Anymetre	Thermo-Hygrometer	JR593	2020062101	Jul. 17, 2021	Jul. 16, 2022
SPEAG	Device Holder	N/A	N/A	N/A	N/A
AR	Amplifier	5S1G4	0333096	Note 1	
mini-circuits	Amplifier	ZVE-3W-83+	599201528	Note 1	
ARRA	Power Divider	A3200-2	N/A	Note 1	
ET Industries	Dual Directional Coupler	C-058-10	N/A	Note 1	
Weinschel	Attenuator 1	3M-10	N/A	Note 1	
Weinschel	Attenuator 2	3M-20	N/A	Note 1	

Note:

- Prior to system verification and validation, the path loss from the signal generator to the system check source and the power meter, which includes the amplifier, cable, attenuator and directional coupler, was measured by the network analyzer. The reading of the power meter was offset by the path loss difference between the path to the power meter and the path to the system check source to monitor the actual power level fed to the system check.
- Referring to KDB 865664 D01v01r04, the dipole calibration interval can be extended to 3 years with justification. The dipoles are also not physically damaged, or repaired during the interval.
- The justification data of dipole can be found in appendix C. The return loss is < -20dB, within 20% of prior calibration, the impedance is within 5 ohm of prior calibration.

10. System Verification

10.1 Tissue Simulating Liquids

For the measurement of the field distribution inside the SAM phantom with DASY, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. 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, which is shown in Fig. 11.1. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 11.2.

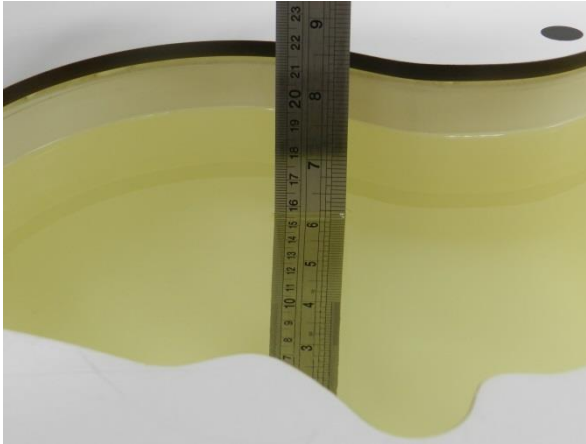


Fig 11.1 Photo of Liquid Height for Head SAR

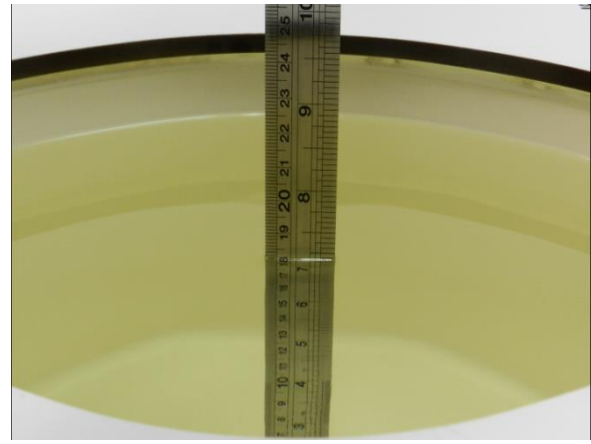


Fig 11.2 Photo of Liquid Height for Body SAR

10.2 Tissue Verification

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity (σ)	Permittivity (ϵ_r)
For Head								
750	41.1	57.0	0.2	1.4	0.2	0	0.89	41.9
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
1800, 1900	55.2	0	0	0.3	0	44.5	1.40	40.0
2450	55.0	0	0	0	0	45.0	1.80	39.2
2600	54.8	0	0	0.1	0	45.1	1.96	39.0

Simulating Liquid for 5GHz, Manufactured by SPEAG

Ingredients	(% by weight)
Water	64~78%
Mineral oil	11~18%
Emulsifiers	9~15%
Additives and Salt	2~3%

<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Tissue Type	Liquid Temp. (°C)	Conductivity (σ)	Permittivity (ϵ_r)	Conductivity Target (σ)	Permittivity Target (ϵ_r)	Delta (σ) (%)	Delta (ϵ_r) (%)	Limit (%)	Date
750	Head	22.3	0.886	41.534	0.89	41.90	-0.45	-0.87	±5	2022/1/18
835	Head	22.6	0.915	41.529	0.90	41.50	1.67	0.07	±5	2022/1/19
1750	Head	22.5	1.355	38.395	1.37	40.10	-1.09	-4.25	±5	2022/1/20
1750	Head	22.6	1.378	41.340	1.37	40.10	0.58	3.09	±5	2022/1/25
1900	Head	22.2	1.415	40.527	1.40	40.00	1.07	1.32	±5	2022/1/19
1900	Head	22.5	1.460	40.597	1.40	40.00	4.29	1.49	±5	2022/1/26
2300	Head	22.7	1.736	40.425	1.67	39.50	3.95	2.34	±5	2022/1/20
2300	Head	22.4	1.601	39.084	1.67	39.50	-4.13	-1.05	±5	2022/1/27
2450	Head	22.4	1.825	39.664	1.80	39.20	1.39	1.18	±5	2022/1/21
2450	Head	22.1	1.850	38.855	1.80	39.20	2.78	-0.88	±5	2022/1/28
5250	Head	22.5	4.626	37.038	4.71	35.95	-1.78	3.03	±5	2022/1/22
5600	Head	22.2	5.034	36.508	5.07	35.50	-0.71	2.84	±5	2022/1/24
5750	Head	22.5	5.203	36.253	5.22	35.35	-0.33	2.55	±5	2022/1/23

10.3 System Performance Check Results

Comparing to the original SAR value provided by SPEAG, the verification data should be within its specification of 10 %. Below table shows the target SAR and measured SAR after normalized to 1W input power. The table below indicates the system performance check can meet the variation criterion and the plots can be referred to Appendix A of this report.

<1g SAR>

Date	Frequency (MHz)	Tissue Type	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)
2022/1/18	750	Head	250	1087	7576	1437	2.040	8.36	8.16	-2.39
2022/1/19	835	Head	250	4d258	7576	1437	2.310	9.44	9.24	-2.12
2022/1/20	1750	Head	250	1090	7576	1437	8.600	36.40	34.4	-5.49
2022/1/25	1750	Head	250	1090	7576	1437	8.740	36.40	34.96	-3.96
2022/1/19	1900	Head	250	5d170	7576	1437	9.660	39.00	38.64	-0.92
2022/1/26	1900	Head	250	5d170	7576	1437	9.960	39.00	39.84	2.15
2022/1/20	2300	Head	250	1056	7576	1437	11.900	48.80	47.6	-2.46
2022/1/27	2300	Head	250	1056	7576	1437	11.300	48.80	45.2	-7.38
2022/1/21	2450	Head	250	924	7576	1437	13.400	51.40	53.6	4.28
2022/1/28	2450	Head	250	924	7576	1437	13.600	51.40	54.4	5.84
2022/1/22	5250	Head	100	1113	7576	1437	7.680	80.50	76.8	-4.60
2022/1/24	5600	Head	100	1113	7576	1437	7.950	83.40	79.5	-4.68
2022/1/23	5750	Head	100	1113	7576	1437	7.530	80.00	75.3	-5.88

<10g SAR>

Date	Frequency (MHz)	Tissue Type	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 10g SAR (W/kg)	Targeted 10g SAR (W/kg)	Normalized 10g SAR (W/kg)	Deviation (%)
2022/1/18	750	Head	250	1087	7576	1437	1.360	5.65	5.44	-3.72
2022/1/19	835	Head	250	4d258	7576	1437	1.520	6.13	6.08	-0.82
2022/1/20	1750	Head	250	1090	7576	1437	4.640	19.20	18.56	-3.33
2022/1/25	1750	Head	250	1090	7576	1437	4.720	19.20	18.88	-1.67
2022/1/19	1900	Head	250	5d170	7576	1437	5.000	20.30	20	-1.48
2022/1/26	1900	Head	250	5d170	7576	1437	5.160	20.30	20.64	1.67
2022/1/20	2300	Head	250	1056	7576	1437	5.880	22.80	23.52	3.16
2022/1/27	2300	Head	250	1056	7576	1437	5.340	22.80	21.36	-6.32
2022/1/21	2450	Head	250	924	7576	1437	6.500	24.00	26	8.33
2022/1/28	2450	Head	250	924	7576	1437	6.590	24.00	26.36	9.83
2022/1/22	5250	Head	100	1113	7576	1437	2.220	23.10	22.2	-3.90
2022/1/24	5600	Head	100	1113	7576	1437	2.310	23.80	23.1	-2.94
2022/1/23	5750	Head	100	1113	7576	1437	2.160	22.80	21.6	-5.26

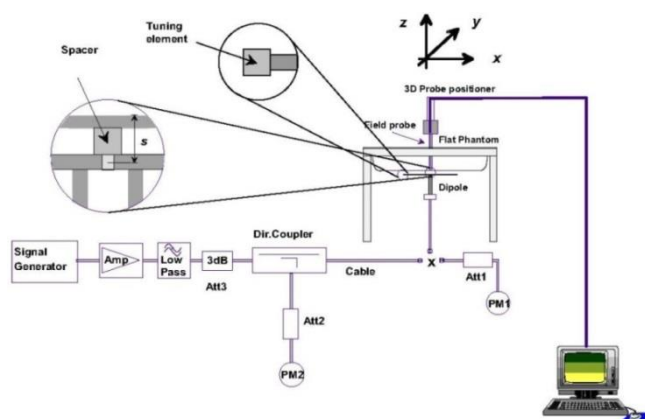


Fig 11.3.1 System Performance Check Setup



Fig 11.3.2 Setup Photo

11. RF Exposure Positions

11.1 Ear and handset reference point

Figure 12.1.1 shows the front, back, and side views of the SAM phantom. The center-of-mouth reference point is labeled "M," the left ear reference point (ERP) is marked "LE," and the right ERP is marked "RE." Each ERP is 15 mm along the B-M (back-mouth) line behind the entrance-to-ear-canal (EEC) point, as shown in Figure 12.1.2 The Reference Plane is defined as passing through the two ear reference points and point M. The line N-F (neck-front), also called the reference pivoting line, is normal to the Reference Plane and perpendicular to both a line passing through RE and LE and the B-M line (see Figure 12.1.3). Both N-F and B-M lines should be marked on the exterior of the phantom shell to facilitate handset positioning. Posterior to the N-F line the ear shape is a flat surface with 6 mm thickness at each ERP, and forward of the N-F line the ear is truncated, as illustrated in Figure 12.1.2. The ear truncation is introduced to preclude the ear lobe from interfering with handset tilt, which could lead to unstable positioning at the cheek.

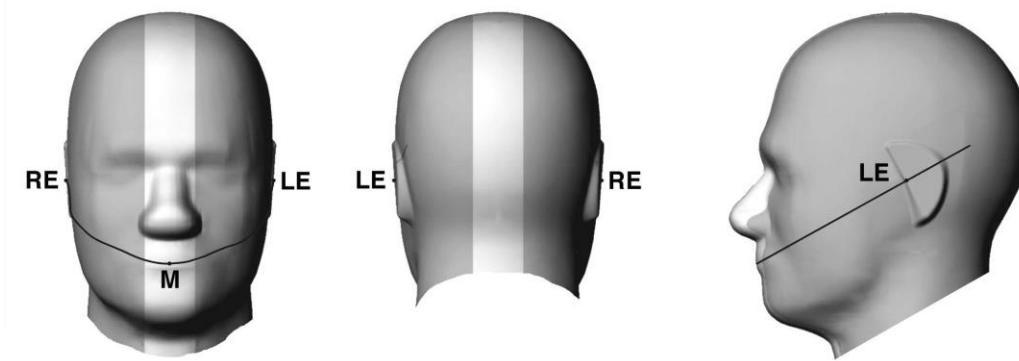


Fig 12.1.1 Front, back, and side views of SAM twin phantom

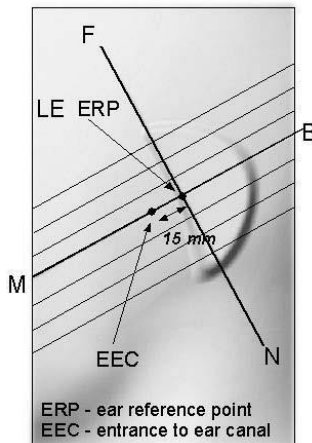


Fig 12.1.2 Close-up side view of phantom showing the ear region.

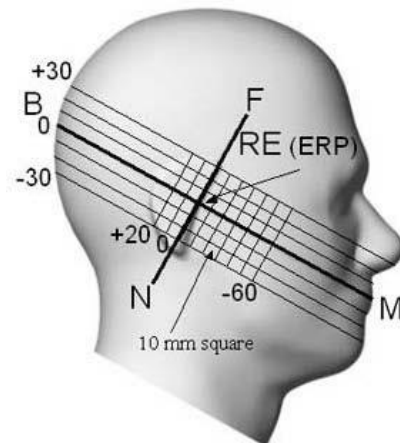


Fig 12.1.3 Side view of the phantom showing relevant markings and seven cross-sectional plane locations

11.2 Definition of the cheek position

1. Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece (flip cover), open the cover. If the handset can transmit with the cover closed, both configurations must be tested.
2. Define two imaginary lines on the handset—the vertical centerline and the horizontal line. The vertical centerline passes through two points on the front side of the handset—the midpoint of the width w_t of the handset at the level of the acoustic output (point A in Figure 12.2.1 and Figure 12.2.2), and the midpoint of the width w_b of the bottom of the handset (point B). The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output (see Figure 12.2.1). The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the handset. Also note that the vertical centerline is not necessarily parallel to the front face of the handset (see Figure 12.2.2), especially for clamshell handsets, handsets with flip covers, and other irregularly-shaped handsets.
3. Position the handset close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure 12.2.3), such that the plane defined by the vertical centerline and the horizontal line of the handset is approximately parallel to the sagittal plane of the phantom.
4. Translate the handset towards the phantom along the line passing through RE and LE until handset point A touches the pinna at the ERP.
5. While maintaining the handset in this plane, rotate it around the LE-RE line until the vertical centerline is in the plane normal to the plane containing B-M and N-F lines, i.e., the Reference Plane.
6. Rotate the handset around the vertical centerline until the handset (horizontal line) is parallel to the N-F line.
7. While maintaining the vertical centerline in the Reference Plane, keeping point A on the line passing through RE and LE, and maintaining the handset contact with the pinna, rotate the handset about the N-F line until any point on the handset is in contact with a phantom point below the pinna on the cheek. See Figure 12.2.3. The actual rotation angles should be documented in the test report.

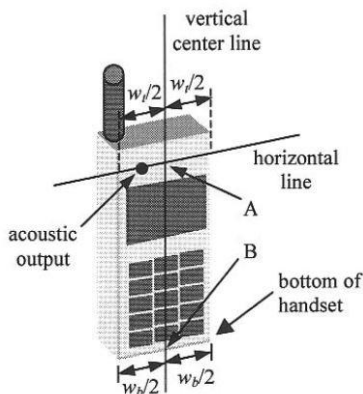


Fig 12.2.1 Handset vertical and horizontal reference lines—"fixed case"

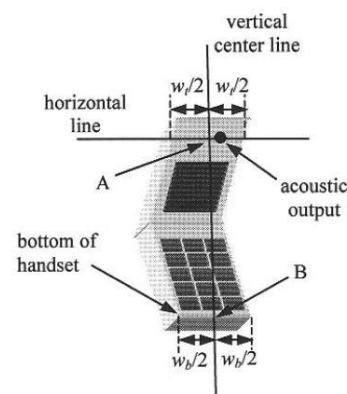


Fig 12.2.2 Handset vertical and horizontal reference lines—"clam-shell case"

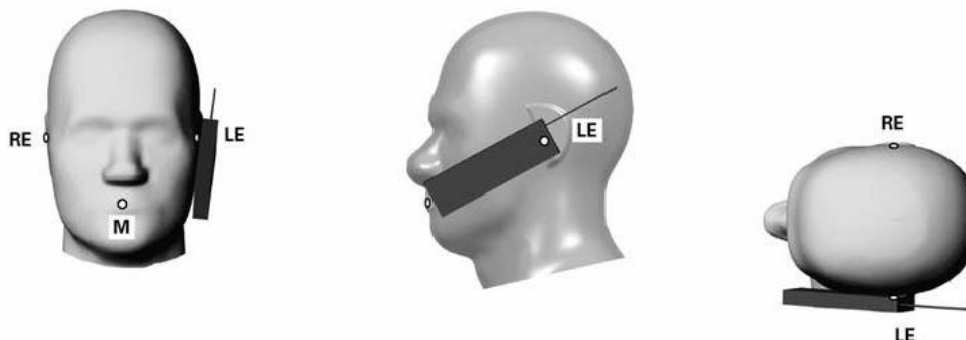


Fig 12.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

11.3 Definition of the tilt position

1. Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece (flip cover), open the cover. If the handset can transmit with the cover closed, both configurations must be tested.
2. While maintaining the orientation of the handset, move the handset away from the pinna along the line passing through RE and LE far enough to allow a rotation of the handset away from the cheek by 15°.
3. Rotate the handset around the horizontal line by 15°.
4. While maintaining the orientation of the handset, move the handset towards the phantom on the line passing through RE and LE until any part of the handset touches the ear. The tilt position is obtained when the contact point is on the pinna. See Figure 12.3.1. If contact occurs at any location other than the pinna, e.g., the antenna at the back of the phantom head, the angle of the handset should be reduced. In this case, the tilt position is obtained if any point on the handset is in contact with the pinna and a second point

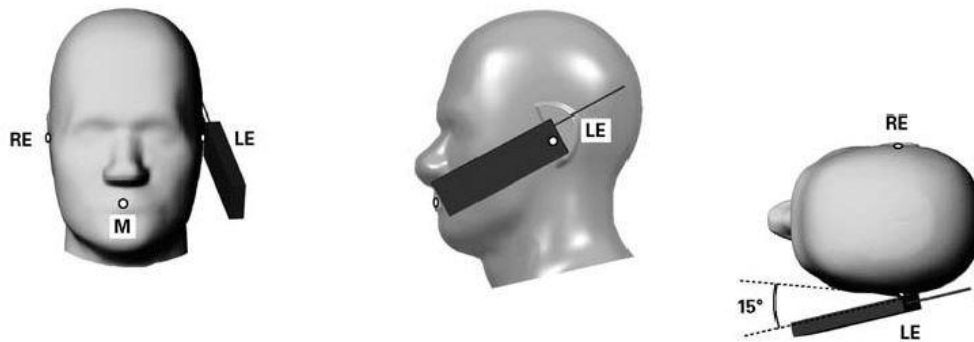


Fig 12.3.1 Tilt position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which define the Reference Plane for handset positioning, are indicated.

11.4 Body Worn Accessory

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 12.4). Per KDB648474 D04v01r03, body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB 447498 D01v06 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for body-worn accessory, measured without a headset connected to the handset is $> 1.2 \text{ W/kg}$, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a handset attached to the handset.

Accessories for body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are test with the device with each accessory. If multiple accessories share an identical metallic component (i.e. the same metallic belt-clip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

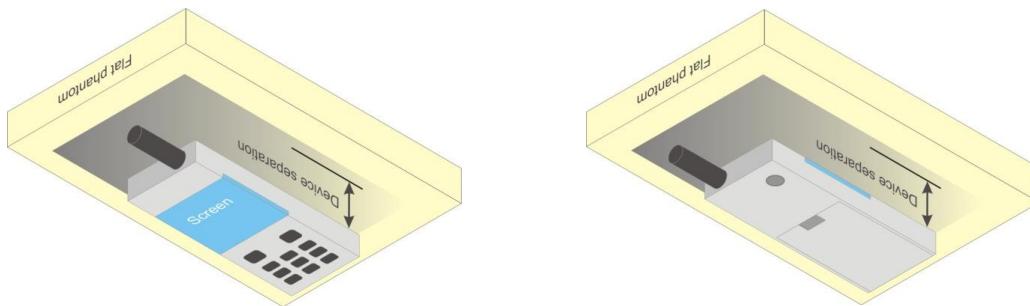


Fig 12.4 Body Worn Position

11.5 Product Specific 10g SAR Exposure

For smart phones with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm that provide similar mobile web access and multimedia support found in mini-tablets or UMPC mini-tablets that support voice calls next to the ear, According to KDB648474 D04v01r03, the following phablet procedures should be applied to evaluate SAR compliance for each applicable wireless modes and frequency band. Devices marketed as phablets, regardless of form factors and operating characteristics must be tested as a phablet to determine SAR compliance

1. The normally required head and body-worn accessory SAR test procedures for handsets, including hotspot mode, must be applied.
2. The UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna located at ≤ 25 mm from that surface or edge, in direct contact with a flat phantom, for 10-g extremity SAR according to the body-equivalent tissue dielectric parameters in KDB 865664 to address interactive hand use exposure conditions.6 The UMPC mini-tablet 1-g SAR at 5 mm is not required. When hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg.

11.6 Wireless Router

Some battery-operated handsets have the capability to transmit and receive user through simultaneous transmission of WIFI simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC KDB Publication 941225 D06 v02r01 where SAR test considerations for handsets ($L \times W \geq 9$ cm x 5 cm) are based on a composite test separation distance of 10mm from the front, back and edges of the device containing transmitting antennas within 2.5cm of their edges, determined from general mixed use conditions for this type of devices. Since the hotspot SAR results may overlap with the body-worn accessory SAR requirements, the more conservative configurations can be considered, thus excluding some body-worn accessory SAR tests.

When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of both the WIFI transmitter and another licensed transmitter. Both transmitters often do not transmit at the same transmitting frequency and thus cannot be evaluated for SAR under actual use conditions due to the limitations of the SAR assessment probes. Therefore, SAR must be evaluated for each frequency transmission and mode separately and spatially summed with the WIFI transmitter according to FCC KDB Publication 447498 D01v06 publication procedures. The "Portable Hotspot" feature on the handset was NOT activated during SAR assessments, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal at a time.

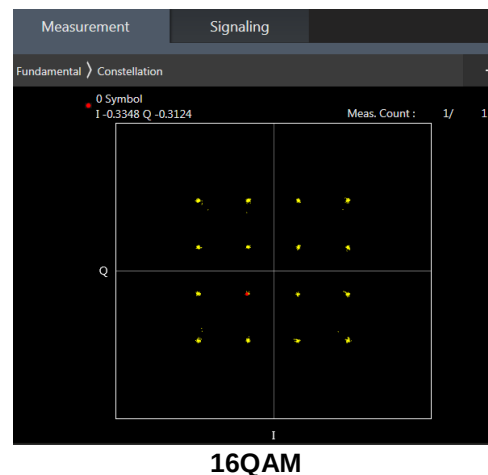
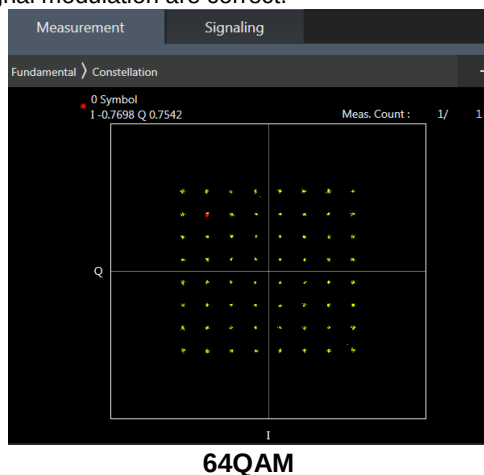
12. Conducted RF Output Power (Unit: dBm)

The detailed conducted power table can refer to Appendix E.

<LTE Conducted Power>

General Note:

1. Anritsu MT8820C base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r05, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
4. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r05, for 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.
6. Per KDB 941225 D05v02r05, 16QAM/64QAM output power for each RB allocation configuration is $>$ not $\frac{1}{2}$ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM/64QAM SAR testing is not required.
7. Per KDB 941225 D05v02r05, smaller bandwidth output power for each RB allocation configuration is $>$ not $\frac{1}{2}$ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
8. For LTE B4 / B5 / B12, the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.
9. According to 2017 TCB workshop, for 64 QAM and 16 QAM should be verified by checking the signal constellation with a call box to avoid incorrect maximum power levels due to MPR and other requirements associated with signal modulation, and the following figure is taken from the "Fundamental Measurement >> Modulation Analysis >> constellation" mode of the device connect to the MT8821C base station, therefore, the device 64QAM and 16QAM signal modulation are correct.



<WLAN Conducted Power>

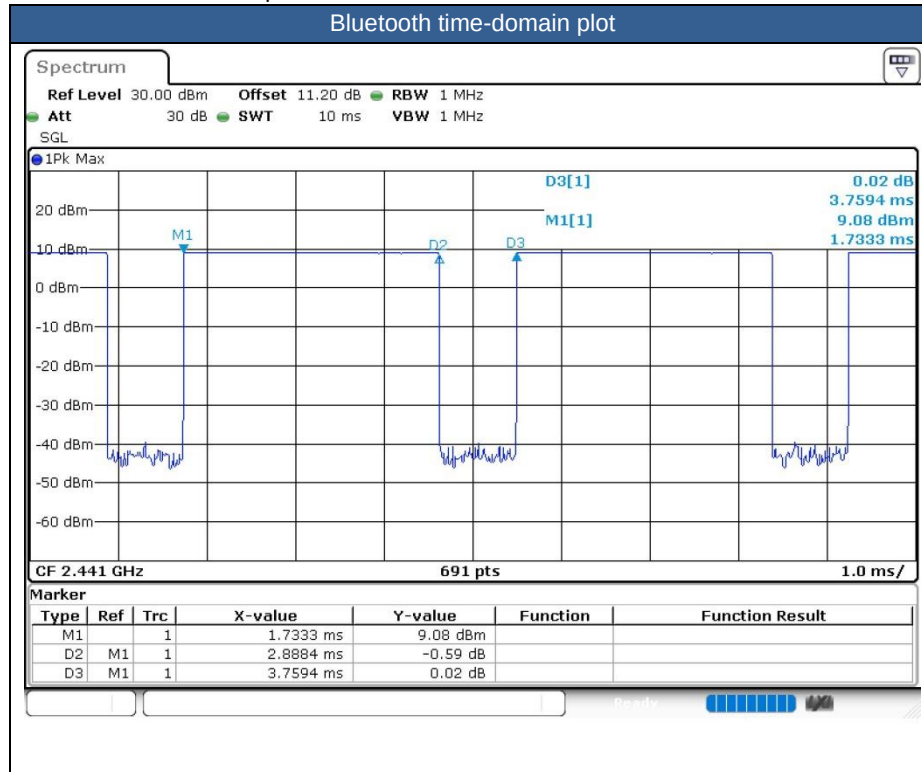
General Note:

1. Per KDB 248227 D01v02r02, SAR test reduction is determined according to 802.11 transmission mode configurations and certain exposure conditions with multiple test positions. In the 2.4 GHz band, separate SAR procedures are applied to DSSS and OFDM configurations to simplify DSSS test requirements. For OFDM, in both 2.4 and 5 GHz bands, an initial test configuration must be determined for each standalone and aggregated frequency band, according to the transmission mode configuration with the highest maximum output power specified for production units to perform SAR measurements. If the same highest maximum output power applies to different combinations of channel bandwidths, modulations and data rates, additional procedures are applied to determine which test configurations require SAR measurement. When applicable, an initial test position may be applied to reduce the number of SAR measurements required for next to the ear, UMPC mini-tablet or hotspot mode configurations with multiple test positions.
2. For 2.4 GHz 802.11b DSSS, either the initial test position procedure for multiple exposure test positions or the DSSS procedure for fixed exposure position is applied; these are mutually exclusive. For 2.4 GHz and 5 GHz OFDM configurations, the initial test configuration is applied to measure SAR using either the initial test position procedure for multiple exposure test position configurations or the initial test configuration procedures for fixed exposure test conditions. Based on the reported SAR of the measured configurations and maximum output power of the transmission mode configurations that are not included in the initial test configuration, the subsequent test configuration and initial test position procedures are applied to determine if SAR measurements are required for the remaining OFDM transmission configurations. In general, the number of test channels that require SAR measurement is minimized based on maximum output power measured for the test sample(s).
3. For OFDM transmission configurations in the 2.4 GHz and 5 GHz bands, 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 for each frequency band.
4. DSSS and OFDM configurations are considered separately according to the required SAR procedures. SAR is measured in the initial test position using the 802.11 transmission mode configuration required by the DSSS procedure or initial test configuration and subsequent test configuration(s) according to the OFDM procedures.¹⁸ The initial test position procedure is described in the following:
 - a. When the reported SAR of the initial test position is ≤ 0.4 W/kg, further SAR measurement is not required for the other test positions in that exposure configuration and 802.11 transmission mode combinations within the frequency band or aggregated band.
 - b. When the reported SAR of the test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position to measure the subsequent next closest/smallest test separation distance and maximum coupling test position on the highest maximum output power channel, until the report SAR is ≤ 0.8 W/kg or all required test position are tested.
 - c. For all positions/configurations, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.

<2.4GHz Bluetooth>

General Note:

1. For 2.4GHz Bluetooth SAR testing was selected 1Mbps, due to its highest average power.
2. The Bluetooth duty cycle is 76.83 % as following figure, according to 2016 Oct. TCB workshop for Bluetooth SAR scaling need further consideration and the maximum duty cycle is 100%, therefore the actual duty cycle will be scaled up to 100% for Bluetooth reported SAR calculation





13. Antenna Location

The detailed antenna location information can refer to SAR Test Setup Photos.

14. SAR Test Results

General Note:

1. Per KDB 447498 D01v06, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
 - a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
 - b. For SAR testing of BT/WLAN signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle)"
 - c. For WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
 - d. For BT/WLAN: Reported SAR(W/kg)= Measured SAR(W/kg)* Duty Cycle scaling factor * Tune-up scaling factor
2. Per KDB 447498 D01v06, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the *reported* 1-g or 10-g SAR for the mid-band or highest output power channel is:
 - ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
 - ≤ 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
 - ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
3. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required when the measured SAR is ≥ 0.8 W/kg. Per KDB 865664 D01v01r04, if the extremity repeated SAR is necessary, the same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds.
4. The device implements the power management and receiver detection/hotspot mode for SAR compliance at different exposure conditions (head, body-worn, hotspot, and extremity) and the details about the power management decision are provided in the operational description. And the device will invoke corresponding work scenarios power level base on frequency bands/antennas, which can refer to power table at appendix E.
5. Per KDB648474 D04v01r03, for smart phones with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm, when hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg, however, when power reduction applies to hotspot mode the measured SAR must be scaled to the maximum output power, including tolerance, allowed for phablet modes to compare with the 1.2 W/kg SAR test reduction threshold.
 - a. For this device SAR for WWAN transmitter scaled to maximum output power mode for product specific 10g SAR is higher than 1.2 W/kg of LTE Band2/4/30, therefore product specific 10g SAR is necessary.
 - b. WLAN 5.3/5.5GHz tested the product specific 10g SAR since it has no hotspot mode.
 - c. When 10-g product specific 10g SAR is considered, SAR thresholds is specified in the procedures for SAR test reduction and exclusion should be multiplied by 2.5.
6. For Some WWAN bands, full power level higher than receiver off reduced power level, so front/back full power SAR can represent Body-worn receiver off SAR conservatively

LTE Note:

1. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
2. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
3. Per KDB 941225 D05v02r05, for 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.
4. Per KDB 941225 D05v02r05, 16QAM/64QAM output power for each RB allocation configuration is $> \text{not } \frac{1}{2}$ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM/64QAM SAR testing is not required.
5. Per KDB 941225 D05v02r05, smaller bandwidth output power for each RB allocation configuration is $> \text{not } \frac{1}{2}$ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
6. For LTE B4 / B5 / B12, the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

WLAN Note:

1. Per KDB 248227 D01v02r02, for 2.4GHz 802.11g/n SAR testing is not required when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.
2. Per KDB 248227 D01v02r02, U-NII-1 SAR testing is not required when the U-NII-2A band highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band.
3. When the reported SAR of the test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position on the highest maximum output power channel, until the report SAR is ≤ 0.8 W/kg or all required test position are tested.
4. For all positions / configurations, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions / configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.
5. During SAR testing the WLAN transmission was verified using a spectrum analyzer.



14.1 Head SAR

<FDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
01	LTE Band 12	10M	QPSK	1	25	Right Cheek	0mm	Full	23095	707.5	24.29	25.50	1.321	-0.15	0.211	0.279
	LTE Band 12	10M	QPSK	1	25	Right Tilted	0mm	Full	23095	707.5	24.29	25.50	1.321	-0.05	0.109	0.144
	LTE Band 12	10M	QPSK	1	25	Left Cheek	0mm	Full	23095	707.5	24.29	25.50	1.321	0.1	0.188	0.248
	LTE Band 12	10M	QPSK	1	25	Left Tilted	0mm	Full	23095	707.5	24.29	25.50	1.321	0.04	0.100	0.132
	LTE Band 12	10M	QPSK	25	12	Right Cheek	0mm	Full	23095	707.5	23.39	24.50	1.291	-0.15	0.158	0.204
	LTE Band 12	10M	QPSK	25	12	Right Tilted	0mm	Full	23095	707.5	23.39	24.50	1.291	0.08	0.087	0.112
	LTE Band 12	10M	QPSK	25	12	Left Cheek	0mm	Full	23095	707.5	23.39	24.50	1.291	0.05	0.150	0.194
	LTE Band 12	10M	QPSK	25	12	Left Tilted	0mm	Full	23095	707.5	23.39	24.50	1.291	-0.15	0.080	0.103
	LTE Band 14	10M	QPSK	1	25	Right Cheek	0mm	Full	23330	793	24.35	25.50	1.303	0.1	0.265	0.345
	LTE Band 14	10M	QPSK	1	25	Right Tilted	0mm	Full	23330	793	24.35	25.50	1.303	-0.13	0.179	0.233
02	LTE Band 14	10M	QPSK	1	25	Left Cheek	0mm	Full	23330	793	24.35	25.50	1.303	0.11	0.324	0.422
	LTE Band 14	10M	QPSK	1	25	Left Tilted	0mm	Full	23330	793	24.35	25.50	1.303	-0.09	0.166	0.216
	LTE Band 14	10M	QPSK	25	12	Right Cheek	0mm	Full	23330	793	23.34	24.50	1.306	-0.08	0.214	0.280
	LTE Band 14	10M	QPSK	25	12	Right Tilted	0mm	Full	23330	793	23.34	24.50	1.306	0.09	0.142	0.185
	LTE Band 14	10M	QPSK	25	12	Left Cheek	0mm	Full	23330	793	23.34	24.50	1.306	0.08	0.215	0.281
	LTE Band 14	10M	QPSK	25	12	Left Tilted	0mm	Full	23330	793	23.34	24.50	1.306	0.16	0.137	0.179
03	LTE Band 5	10M	QPSK	1	25	Right Cheek	0mm	Full	20525	836.5	24.45	25.50	1.274	-0.07	0.355	0.452
	LTE Band 5	10M	QPSK	1	25	Right Tilted	0mm	Full	20525	836.5	24.45	25.50	1.274	0.04	0.198	0.252
	LTE Band 5	10M	QPSK	1	25	Left Cheek	0mm	Full	20525	836.5	24.45	25.50	1.274	0	0.300	0.382
	LTE Band 5	10M	QPSK	1	25	Left Tilted	0mm	Full	20525	836.5	24.45	25.50	1.274	0.05	0.185	0.236
	LTE Band 5	10M	QPSK	25	12	Right Cheek	0mm	Full	20525	836.5	23.38	24.50	1.294	-0.14	0.239	0.309
	LTE Band 5	10M	QPSK	25	12	Right Tilted	0mm	Full	20525	836.5	23.38	24.50	1.294	0.13	0.155	0.201
	LTE Band 5	10M	QPSK	25	12	Left Cheek	0mm	Full	20525	836.5	23.38	24.50	1.294	0	0.237	0.307
	LTE Band 5	10M	QPSK	25	12	Left Tilted	0mm	Full	20525	836.5	23.38	24.50	1.294	-0.08	0.146	0.189
04	LTE Band 4	20M	QPSK	1	49	Right Cheek	0mm	Full	20175	1732.5	24.07	25.00	1.239	-0.11	0.137	0.170
	LTE Band 4	20M	QPSK	1	49	Right Tilted	0mm	Full	20175	1732.5	24.07	25.00	1.239	0.08	0.044	0.055
	LTE Band 4	20M	QPSK	1	49	Left Cheek	0mm	Full	20175	1732.5	24.07	25.00	1.239	0.04	0.093	0.115
	LTE Band 4	20M	QPSK	1	49	Left Tilted	0mm	Full	20175	1732.5	24.07	25.00	1.239	-0.05	0.053	0.066
	LTE Band 4	20M	QPSK	50	24	Right Cheek	0mm	Full	20175	1732.5	23.08	24.00	1.236	-0.05	0.109	0.135
	LTE Band 4	20M	QPSK	50	24	Right Tilted	0mm	Full	20175	1732.5	23.08	24.00	1.236	0.08	0.026	0.032
	LTE Band 4	20M	QPSK	50	24	Left Cheek	0mm	Full	20175	1732.5	23.08	24.00	1.236	-0.1	0.069	0.085
	LTE Band 4	20M	QPSK	50	24	Left Tilted	0mm	Full	20175	1732.5	23.08	24.00	1.236	-0.1	0.043	0.053
05	LTE Band 2	20M	QPSK	1	49	Right Cheek	0mm	Full	18900	1880	24.12	25.00	1.225	-0.01	0.201	0.246
	LTE Band 2	20M	QPSK	1	49	Right Tilted	0mm	Full	18900	1880	24.12	25.00	1.225	-0.06	0.080	0.098
	LTE Band 2	20M	QPSK	1	49	Left Cheek	0mm	Full	18900	1880	24.12	25.00	1.225	-0.07	0.129	0.158
	LTE Band 2	20M	QPSK	1	49	Left Tilted	0mm	Full	18900	1880	24.12	25.00	1.225	-0.06	0.120	0.147
	LTE Band 2	20M	QPSK	50	24	Right Cheek	0mm	Full	18900	1880	23.13	24.00	1.222	0.06	0.125	0.153
	LTE Band 2	20M	QPSK	50	24	Right Tilted	0mm	Full	18900	1880	23.13	24.00	1.222	0.15	0.060	0.073
	LTE Band 2	20M	QPSK	50	24	Left Cheek	0mm	Full	18900	1880	23.13	24.00	1.222	0.1	0.103	0.126
	LTE Band 2	20M	QPSK	50	24	Left Tilted	0mm	Full	18900	1880	23.13	24.00	1.222	-0.16	0.098	0.120
06	LTE Band 30	10M	QPSK	1	25	Right Cheek	0mm	Full	27710	2310	23.12	24.00	1.225	-0.16	0.175	0.214
	LTE Band 30	10M	QPSK	1	25	Right Tilted	0mm	Full	27710	2310	23.12	24.00	1.225	0.12	0.104	0.127
	LTE Band 30	10M	QPSK	1	25	Left Cheek	0mm	Full	27710	2310	23.12	24.00	1.225	0.08	0.107	0.131
	LTE Band 30	10M	QPSK	1	25	Left Tilted	0mm	Full	27710	2310	23.12	24.00	1.225	-0.11	0.128	0.157
	LTE Band 30	10M	QPSK	25	12	Right Cheek	0mm	Full	27710	2310	22.06	23.00	1.242	-0.06	0.123	0.153
	LTE Band 30	10M	QPSK	25	12	Right Tilted	0mm	Full	27710	2310	22.06	23.00	1.242	0.08	0.080	0.099
	LTE Band 30	10M	QPSK	25	12	Left Cheek	0mm	Full	27710	2310	22.06	23.00	1.242	-0.12	0.080	0.099
	LTE Band 30	10M	QPSK	25	12	Left Tilted	0mm	Full	27710	2310	22.06	23.00	1.242	-0.1	0.100	0.124

<WLAN2.4G SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WLAN2.4GHz	802.11b 1Mbps	Right Cheek	0mm	Reduced	6	2437	13.20	14.50	1.349	100	1.000	0.06	0.227	0.306
	WLAN2.4GHz	802.11b 1Mbps	Right Tilted	0mm	Reduced	6	2437	13.20	14.50	1.349	100	1.000	0.05	0.297	0.401
	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	0mm	Reduced	6	2437	13.20	14.50	1.349	100	1.000	0.01	0.727	0.981
	WLAN2.4GHz	802.11b 1Mbps	Left Tilted	0mm	Reduced	6	2437	13.20	14.50	1.349	100	1.000	0.09	0.802	1.082
	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	0mm	Reduced	1	2412	13.10	14.50	1.380	100	1.000	0.09	0.742	1.024
	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	0mm	Reduced	11	2462	13.10	14.50	1.380	100	1.000	0.01	0.667	0.921
07	WLAN2.4GHz	802.11b 1Mbps	Left Tilted	0mm	Reduced	1	2412	13.10	14.50	1.380	100	1.000	0.03	0.860	1.187
	WLAN2.4GHz	802.11b 1Mbps	Left Tilted	0mm	Reduced	11	2462	13.10	14.50	1.380	100	1.000	-0.06	0.723	0.998

<WLAN5G SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WLAN5.3GHz	802.11n-HT40 MCS0	Right Cheek	0mm	Full	54	5270	15.88	16.50	1.153	100	1.000	0.1	0.155	0.179
	WLAN5.3GHz	802.11n-HT40 MCS0	Right Tilted	0mm	Full	54	5270	15.88	16.50	1.153	100	1.000	-0.11	0.200	0.231
	WLAN5.3GHz	802.11n-HT40 MCS0	Left Cheek	0mm	Full	54	5270	15.88	16.50	1.153	100	1.000	-0.11	0.210	0.242
08	WLAN5.3GHz	802.11n-HT40 MCS0	Left Tilted	0mm	Full	54	5270	15.88	16.50	1.153	100	1.000	0.1	0.216	0.249
	WLAN5.5GHz	802.11n-HT40 MCS0	Right Cheek	0mm	Full	110	5550	15.87	16.50	1.156	100	1.000	-0.07	0.229	0.265
	WLAN5.5GHz	802.11n-HT40 MCS0	Right Tilted	0mm	Full	110	5550	15.87	16.50	1.156	100	1.000	0.05	0.308	0.356
	WLAN5.5GHz	802.11n-HT40 MCS0	Left Cheek	0mm	Full	110	5550	15.87	16.50	1.156	100	1.000	-0.05	0.339	0.392
09	WLAN5.5GHz	802.11n-HT40 MCS0	Left Tilted	0mm	Full	110	5550	15.87	16.50	1.156	100	1.000	-0.02	0.377	0.436
	WLAN5.8GHz	802.11n-HT40 MCS0	Right Cheek	0mm	Full	151	5755	15.94	16.50	1.138	100	1.000	0.06	0.248	0.282
	WLAN5.8GHz	802.11n-HT40 MCS0	Right Tilted	0mm	Full	151	5755	15.94	16.50	1.138	100	1.000	0.16	0.328	0.373
	WLAN5.8GHz	802.11n-HT40 MCS0	Left Cheek	0mm	Full	151	5755	15.94	16.50	1.138	100	1.000	-0.02	0.279	0.317
10	WLAN5.8GHz	802.11n-HT40 MCS0	Left Tilted	0mm	Full	151	5755	15.94	16.50	1.138	100	1.000	0.09	0.377	0.429

<Bluetooth SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	Bluetooth	DH5 1Mbps	Right Cheek	0mm	Full	0	2402	9.20	10.00	1.202	76.83	1.302	-0.11	0.057	0.089
	Bluetooth	DH5 1Mbps	Right Tilted	0mm	Full	0	2402	9.20	10.00	1.202	76.83	1.302	0.02	0.088	0.138
	Bluetooth	DH5 1Mbps	Left Cheek	0mm	Full	0	2402	9.20	10.00	1.202	76.83	1.302	-0.09	0.213	0.333
11	Bluetooth	DH5 1Mbps	Left Tilted	0mm	Full	0	2402	9.20	10.00	1.202	76.83	1.302	-0.04	0.216	0.338



14.2 Hotspot SAR

<FDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 12	10M	QPSK	1	25	Front	10mm	Full	23095	707.5	24.29	25.50	1.321	-0.02	0.373	0.493
12	LTE Band 12	10M	QPSK	1	25	Back	10mm	Full	23095	707.5	24.29	25.50	1.321	-0.04	0.374	0.494
	LTE Band 12	10M	QPSK	1	25	Left Side	10mm	Full	23095	707.5	24.29	25.50	1.321	-0.07	0.282	0.373
	LTE Band 12	10M	QPSK	1	25	Right Side	10mm	Full	23095	707.5	24.29	25.50	1.321	0.03	0.325	0.429
	LTE Band 12	10M	QPSK	1	25	Bottom Side	10mm	Full	23095	707.5	24.29	25.50	1.321	-0.11	0.064	0.085
	LTE Band 12	10M	QPSK	25	12	Front	10mm	Full	23095	707.5	23.39	24.50	1.291	-0.01	0.242	0.312
	LTE Band 12	10M	QPSK	25	12	Back	10mm	Full	23095	707.5	23.39	24.50	1.291	-0.1	0.294	0.380
	LTE Band 12	10M	QPSK	25	12	Left Side	10mm	Full	23095	707.5	23.39	24.50	1.291	0.11	0.223	0.288
	LTE Band 12	10M	QPSK	25	12	Right Side	10mm	Full	23095	707.5	23.39	24.50	1.291	-0.02	0.255	0.329
	LTE Band 12	10M	QPSK	25	12	Bottom Side	10mm	Full	23095	707.5	23.39	24.50	1.291	-0.09	0.056	0.072
	LTE Band 14	10M	QPSK	1	25	Front	10mm	Full	23330	793	24.35	25.50	1.303	0.1	0.295	0.384
13	LTE Band 14	10M	QPSK	1	25	Back	10mm	Full	23330	793	24.35	25.50	1.303	0.1	0.407	0.530
	LTE Band 14	10M	QPSK	1	25	Left Side	10mm	Full	23330	793	24.35	25.50	1.303	0.03	0.271	0.353
	LTE Band 14	10M	QPSK	1	25	Right Side	10mm	Full	23330	793	24.35	25.50	1.303	0	0.308	0.401
	LTE Band 14	10M	QPSK	1	25	Bottom Side	10mm	Full	23330	793	24.35	25.50	1.303	-0.14	0.090	0.117
	LTE Band 14	10M	QPSK	25	12	Front	10mm	Full	23330	793	23.34	24.50	1.306	0.12	0.242	0.316
	LTE Band 14	10M	QPSK	25	12	Back	10mm	Full	23330	793	23.34	24.50	1.306	0	0.307	0.401
	LTE Band 14	10M	QPSK	25	12	Left Side	10mm	Full	23330	793	23.34	24.50	1.306	-0.05	0.218	0.285
	LTE Band 14	10M	QPSK	25	12	Right Side	10mm	Full	23330	793	23.34	24.50	1.306	0.13	0.246	0.321
	LTE Band 14	10M	QPSK	25	12	Bottom Side	10mm	Full	23330	793	23.34	24.50	1.306	0.12	0.076	0.099
	LTE Band 5	10M	QPSK	1	25	Front	10mm	Full	20525	836.5	24.45	25.50	1.274	-0.03	0.297	0.378
14	LTE Band 5	10M	QPSK	1	25	Back	10mm	Full	20525	836.5	24.45	25.50	1.274	0.06	0.447	0.569
	LTE Band 5	10M	QPSK	1	25	Left Side	10mm	Full	20525	836.5	24.45	25.50	1.274	-0.16	0.271	0.345
	LTE Band 5	10M	QPSK	1	25	Right Side	10mm	Full	20525	836.5	24.45	25.50	1.274	0.07	0.288	0.367
	LTE Band 5	10M	QPSK	1	25	Bottom Side	10mm	Full	20525	836.5	24.45	25.50	1.274	-0.12	0.052	0.066
	LTE Band 5	10M	QPSK	25	12	Front	10mm	Full	20525	836.5	23.38	24.50	1.294	0.09	0.239	0.309
	LTE Band 5	10M	QPSK	25	12	Back	10mm	Full	20525	836.5	23.38	24.50	1.294	-0.16	0.309	0.400
	LTE Band 5	10M	QPSK	25	12	Left Side	10mm	Full	20525	836.5	23.38	24.50	1.294	0.11	0.219	0.283
	LTE Band 5	10M	QPSK	25	12	Right Side	10mm	Full	20525	836.5	23.38	24.50	1.294	-0.04	0.232	0.300
	LTE Band 5	10M	QPSK	25	12	Bottom Side	10mm	Full	20525	836.5	23.38	24.50	1.294	0.16	0.042	0.054
	LTE Band 4	20M	QPSK	1	49	Front	10mm	Reduced	20175	1732.5	19.61	20.50	1.227	-0.08	0.405	0.497
	LTE Band 4	20M	QPSK	1	49	Back	10mm	Reduced	20175	1732.5	19.61	20.50	1.227	0.16	0.633	0.777
	LTE Band 4	20M	QPSK	1	49	Left Side	10mm	Reduced	20175	1732.5	19.61	20.50	1.227	-0.09	0.028	0.034
	LTE Band 4	20M	QPSK	1	49	Right Side	10mm	Reduced	20175	1732.5	19.61	20.50	1.227	-0.03	0.049	0.060
	LTE Band 4	20M	QPSK	1	49	Bottom Side	10mm	Reduced	20175	1732.5	19.61	20.50	1.227	-0.02	0.887	1.089
	LTE Band 4	20M	QPSK	50	24	Front	10mm	Reduced	20175	1732.5	19.58	20.50	1.236	0.05	0.397	0.491
	LTE Band 4	20M	QPSK	50	24	Back	10mm	Reduced	20175	1732.5	19.58	20.50	1.236	-0.06	0.612	0.756
	LTE Band 4	20M	QPSK	50	24	Left Side	10mm	Reduced	20175	1732.5	19.58	20.50	1.236	-0.1	0.029	0.036
	LTE Band 4	20M	QPSK	50	24	Right Side	10mm	Reduced	20175	1732.5	19.58	20.50	1.236	0.14	0.051	0.063
15	LTE Band 4	20M	QPSK	50	24	Bottom Side	10mm	Reduced	20175	1732.5	19.58	20.50	1.236	-0.16	0.892	1.102
	LTE Band 4	20M	QPSK	100	0	Bottom Side	10mm	Reduced	20175	1732.5	19.55	20.50	1.245	-0.08	0.856	1.065
	LTE Band 2	20M	QPSK	1	49	Front	10mm	Reduced	18900	1880	21.21	22.00	1.199	0.06	0.401	0.481
	LTE Band 2	20M	QPSK	1	49	Back	10mm	Reduced	18900	1880	21.21	22.00	1.199	-0.06	0.493	0.591
	LTE Band 2	20M	QPSK	1	49	Left Side	10mm	Reduced	18900	1880	21.21	22.00	1.199	-0.03	0.127	0.152
	LTE Band 2	20M	QPSK	1	49	Right Side	10mm	Reduced	18900	1880	21.21	22.00	1.199	-0.05	0.074	0.089
16	LTE Band 2	20M	QPSK	1	49	Bottom Side	10mm	Reduced	18900	1880	21.21	22.00	1.199	0.14	0.843	1.011
	LTE Band 2	20M	QPSK	1	49	Bottom Side	10mm	Reduced	18700	1860	21.18	22.00	1.208	0.05	0.830	1.002
	LTE Band 2	20M	QPSK	1	49	Bottom Side	10mm	Reduced	19100	1900	21.14	22.00	1.219	-0.13	0.819	0.998
	LTE Band 2	20M	QPSK	50	24	Front	10mm	Reduced	18900	1880	21.20	22.00	1.202	0.13	0.388	0.466
	LTE Band 2	20M	QPSK	50	24	Back	10mm	Reduced	18900	1880	21.20	22.00	1.202	0.13	0.488	0.587



FCC SAR Test Report

Report No. : FA1N0415

	LTE Band 2	20M	QPSK	50	24	Left Side	10mm	Reduced	18900	1880	21.20	22.00	1.202	0.11	0.121	0.145
	LTE Band 2	20M	QPSK	50	24	Right Side	10mm	Reduced	18900	1880	21.20	22.00	1.202	0.03	0.071	0.085
	LTE Band 2	20M	QPSK	50	24	Bottom Side	10mm	Reduced	18900	1880	21.20	22.00	1.202	0.15	0.838	1.007
	LTE Band 2	20M	QPSK	50	24	Bottom Side	10mm	Reduced	18700	1860	21.15	22.00	1.216	0.14	0.816	0.992
	LTE Band 2	20M	QPSK	50	24	Bottom Side	10mm	Reduced	19100	1900	21.12	22.00	1.225	-0.05	0.808	0.989
	LTE Band 2	20M	QPSK	100	0	Bottom Side	10mm	Reduced	18900	1880	21.17	22.00	1.211	-0.05	0.809	0.979
	LTE Band 30	10M	QPSK	1	25	Front	10mm	Reduced	27710	2310	20.21	21.00	1.199	-0.07	0.483	0.579
	LTE Band 30	10M	QPSK	1	25	Back	10mm	Reduced	27710	2310	20.21	21.00	1.199	-0.03	0.711	0.853
	LTE Band 30	10M	QPSK	1	25	Left Side	10mm	Reduced	27710	2310	20.21	21.00	1.199	-0.05	0.080	0.096
	LTE Band 30	10M	QPSK	1	25	Right Side	10mm	Reduced	27710	2310	20.21	21.00	1.199	0.11	0.135	0.162
17	LTE Band 30	10M	QPSK	1	25	Bottom Side	10mm	Reduced	27710	2310	20.21	21.00	1.199	0.03	0.930	1.116
	LTE Band 30	10M	QPSK	25	12	Front	10mm	Reduced	27710	2310	20.20	21.00	1.202	0.09	0.478	0.575
	LTE Band 30	10M	QPSK	25	12	Back	10mm	Reduced	27710	2310	20.20	21.00	1.202	-0.03	0.699	0.840
	LTE Band 30	10M	QPSK	25	12	Left Side	10mm	Reduced	27710	2310	20.20	21.00	1.202	0.07	0.076	0.091
	LTE Band 30	10M	QPSK	25	12	Right Side	10mm	Reduced	27710	2310	20.20	21.00	1.202	-0.12	0.134	0.161
	LTE Band 30	10M	QPSK	25	12	Bottom Side	10mm	Reduced	27710	2310	20.20	21.00	1.202	-0.12	0.923	1.110
	LTE Band 30	10M	QPSK	50	0	Back	10mm	Reduced	27710	2310	20.02	21.00	1.253	-0.16	0.670	0.840
	LTE Band 30	10M	QPSK	50	0	Bottom Side	10mm	Reduced	27710	2310	20.02	21.00	1.253	-0.13	0.868	1.088

<WLAN2.4 SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WLAN2.4GHz	802.11b 1Mbps	Front	10mm	Full	6	2437	18.50	19.50	1.259	100	1.000	-0.06	0.312	0.393
	WLAN2.4GHz	802.11b 1Mbps	Back	10mm	Full	6	2437	18.50	19.50	1.259	100	1.000	0.11	0.536	0.675
	WLAN2.4GHz	802.11b 1Mbps	Left Side	10mm	Full	6	2437	18.50	19.50	1.259	100	1.000	-0.13	0.049	0.062
	WLAN2.4GHz	802.11b 1Mbps	Right Side	10mm	Full	6	2437	18.50	19.50	1.259	100	1.000	-0.11	0.152	0.191
	WLAN2.4GHz	802.11b 1Mbps	Top Side	10mm	Full	6	2437	18.50	19.50	1.259	100	1.000	0.05	0.722	0.909
18	WLAN2.4GHz	802.11b 1Mbps	Top Side	10mm	Full	1	2412	18.50	19.50	1.259	100	1.000	-0.09	0.865	1.089
	WLAN2.4GHz	802.11b 1Mbps	Top Side	10mm	Full	11	2462	18.50	19.50	1.259	100	1.000	0.15	0.635	0.799

<WLAN5G SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WLAN5.2GHz	802.11n-HT40 MCS0	Front	10mm	Full	46	5230	15.82	16.50	1.169	100	1.000	0.03	0.060	0.070
19	WLAN5.2GHz	802.11n-HT40 MCS0	Back	10mm	Full	46	5230	15.82	16.50	1.169	100	1.000	-0.01	0.493	0.577
	WLAN5.2GHz	802.11n-HT40 MCS0	Left Side	10mm	Full	46	5230	15.82	16.50	1.169	100	1.000	-0.1	0.140	0.164
	WLAN5.2GHz	802.11n-HT40 MCS0	Right Side	10mm	Full	46	5230	15.82	16.50	1.169	100	1.000	-0.06	0.239	0.280
	WLAN5.2GHz	802.11n-HT40 MCS0	Top Side	10mm	Full	46	5230	15.82	16.50	1.169	100	1.000	-0.1	0.253	0.296
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Front	10mm	Reduced	155	5775	13.44	14.50	1.276	100	1.000	0.06	0.054	0.069
20	WLAN5.8GHz	802.11ac-VHT80 MCS0	Back	10mm	Reduced	155	5775	13.44	14.50	1.276	100	1.000	0.01	0.468	0.597
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Left Side	10mm	Reduced	155	5775	13.44	14.50	1.276	100	1.000	-0.03	0.053	0.068
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Right Side	10mm	Reduced	155	5775	13.44	14.50	1.276	100	1.000	-0.13	0.112	0.143
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Top Side	10mm	Reduced	155	5775	13.44	14.50	1.276	100	1.000	0.13	0.399	0.509

<Bluetooth SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	Bluetooth	DH5 1Mbps	Front	10mm	Full	0	2402	9.20	10.00	1.202	76.83	1.302	0.11	0.048	0.075
	Bluetooth	DH5 1Mbps	Back	10mm	Full	0	2402	9.20	10.00	1.202	76.83	1.302	0.07	0.070	0.109
	Bluetooth	DH5 1Mbps	Left Side	10mm	Full	0	2402	9.20	10.00	1.202	76.83	1.302	0.1	0.002	0.003
	Bluetooth	DH5 1Mbps	Right Side	10mm	Full	0	2402	9.20	10.00	1.202	76.83	1.302	0.13	0.024	0.038
21	Bluetooth	DH5 1Mbps	Top Side	10mm	Full	0	2402	9.20	10.00	1.202	76.83	1.302	0.14	0.074	0.116

14.3 Body Worn Accessory SAR

<FDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 12	10M	QPSK	1	25	Front	15mm	Full	23095	707.5	24.29	25.50	1.321	0.06	0.296	0.391
22	LTE Band 12	10M	QPSK	1	25	Back	15mm	Full	23095	707.5	24.29	25.50	1.321	0.14	0.337	0.445
	LTE Band 12	10M	QPSK	25	12	Front	15mm	Full	23095	707.5	23.39	24.50	1.291	-0.13	0.229	0.296
	LTE Band 12	10M	QPSK	25	12	Back	15mm	Full	23095	707.5	23.39	24.50	1.291	-0.12	0.269	0.347
	LTE Band 14	10M	QPSK	1	25	Front	15mm	Full	23330	793	24.35	25.50	1.303	-0.13	0.294	0.383
23	LTE Band 14	10M	QPSK	1	25	Back	15mm	Full	23330	793	24.35	25.50	1.303	0.02	0.378	0.493
	LTE Band 14	10M	QPSK	25	12	Front	15mm	Full	23330	793	23.34	24.50	1.306	0.07	0.240	0.313
	LTE Band 14	10M	QPSK	25	12	Back	15mm	Full	23330	793	23.34	24.50	1.306	-0.12	0.280	0.366
	LTE Band 5	10M	QPSK	1	25	Front	15mm	Full	20525	836.5	24.45	25.50	1.274	-0.15	0.276	0.351
24	LTE Band 5	10M	QPSK	1	25	Back	15mm	Full	20525	836.5	24.45	25.50	1.274	0.02	0.393	0.500
	LTE Band 5	10M	QPSK	25	12	Front	15mm	Full	20525	836.5	23.38	24.50	1.294	0.09	0.222	0.287
	LTE Band 5	10M	QPSK	25	12	Back	15mm	Full	20525	836.5	23.38	24.50	1.294	0.08	0.255	0.330
	LTE Band 4	20M	QPSK	1	49	Front	15mm	Reduced	20175	1732.5	22.03	23.00	1.250	0.06	0.326	0.408
25	LTE Band 4	20M	QPSK	1	49	Back	15mm	Reduced	20175	1732.5	22.03	23.00	1.250	0.01	0.546	0.683
	LTE Band 4	20M	QPSK	50	24	Front	15mm	Reduced	20175	1732.5	22.01	23.00	1.256	-0.1	0.321	0.403
	LTE Band 4	20M	QPSK	50	24	Back	15mm	Reduced	20175	1732.5	22.01	23.00	1.256	0.02	0.542	0.681
	LTE Band 2	20M	QPSK	1	49	Front	15mm	Full	18900	1880	24.12	25.00	1.225	-0.01	0.442	0.541
26	LTE Band 2	20M	QPSK	1	49	Back	15mm	Full	18900	1880	24.12	25.00	1.225	0.04	0.576	0.705
	LTE Band 2	20M	QPSK	50	24	Front	15mm	Full	18900	1880	23.13	24.00	1.222	-0.16	0.349	0.426
	LTE Band 2	20M	QPSK	50	24	Back	15mm	Full	18900	1880	23.13	24.00	1.222	-0.07	0.399	0.487
	LTE Band 30	10M	QPSK	1	25	Front	15mm	Full	27710	2310	23.12	24.00	1.225	0.03	0.384	0.470
27	LTE Band 30	10M	QPSK	1	25	Back	15mm	Full	27710	2310	23.12	24.00	1.225	-0.01	0.540	0.661
	LTE Band 30	10M	QPSK	25	12	Front	15mm	Full	27710	2310	22.06	23.00	1.242	0.07	0.304	0.377
	LTE Band 30	10M	QPSK	25	12	Back	15mm	Full	27710	2310	22.06	23.00	1.242	0.02	0.391	0.485



<WLAN2.4G SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WLAN2.4GHz	802.11b 1Mbps	Front	15mm	Full	6	2437	18.50	19.50	1.259	100	1.000	-0.14	0.140	0.176
28	WLAN2.4GHz	802.11b 1Mbps	Back	15mm	Full	6	2437	18.50	19.50	1.259	100	1.000	-0.11	0.397	0.500

<WLAN5G SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WLAN5.3GHz	802.11n-HT40 MCS0	Front	15mm	Full	54	5270	15.88	16.50	1.153	100	1.000	0.04	0.013	0.015
29	WLAN5.3GHz	802.11n-HT40 MCS0	Back	15mm	Full	54	5270	15.88	16.50	1.153	100	1.000	0.07	0.330	0.381
	WLAN5.5GHz	802.11n-HT40 MCS0	Front	15mm	Full	110	5550	15.87	16.50	1.156	100	1.000	0.08	0.092	0.106
30	WLAN5.5GHz	802.11n-HT40 MCS0	Back	15mm	Full	110	5550	15.87	16.50	1.156	100	1.000	-0.08	0.495	0.572
	WLAN5.8GHz	802.11n-HT40 MCS0	Front	15mm	Full	151	5755	15.94	16.50	1.138	100	1.000	0.06	0.113	0.129
31	WLAN5.8GHz	802.11n-HT40 MCS0	Back	15mm	Full	151	5755	15.94	16.50	1.138	100	1.000	0.11	0.725	0.825
	WLAN5.8GHz	802.11n-HT40 MCS0	Back	15mm	Full	159	5795	15.91	16.50	1.146	100	1.000	0.02	0.638	0.731

<Bluetooth SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	Bluetooth	DH5 1Mbps	Front	15mm	Full	0	2402	9.20	10.00	1.202	76.83	1.302	0.08	0.023	0.036
32	Bluetooth	DH5 1Mbps	Back	15mm	Full	0	2402	9.20	10.00	1.202	76.83	1.302	0.06	0.033	0.051

14.4 Product Specific SAR

<FDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
	LTE Band 4	20M	QPSK	1	49	Front	0mm	Reduced	20175	1732.5	22.03	23.00	1.250	0.14	1.790	2.238
	LTE Band 4	20M	QPSK	1	49	Back	0mm	Reduced	20175	1732.5	22.03	23.00	1.250	-0.02	2.330	2.913
	LTE Band 4	20M	QPSK	1	49	Bottom Side	0mm	Reduced	20175	1732.5	22.03	23.00	1.250	-0.1	2.640	3.301
	LTE Band 4	20M	QPSK	50	24	Front	0mm	Reduced	20175	1732.5	22.01	23.00	1.256	0.12	1.830	2.299
	LTE Band 4	20M	QPSK	50	24	Back	0mm	Reduced	20175	1732.5	22.01	23.00	1.256	-0.01	2.370	2.977
33	LTE Band 4	20M	QPSK	50	24	Bottom Side	0mm	Reduced	20175	1732.5	22.01	23.00	1.256	-0.03	2.750	3.454
	LTE Band 4	20M	QPSK	100	0	Front	0mm	Reduced	20175	1732.5	22.00	23.00	1.259	0.12	1.820	2.291
	LTE Band 4	20M	QPSK	100	0	Back	0mm	Reduced	20175	1732.5	22.00	23.00	1.259	-0.07	2.350	2.958
	LTE Band 4	20M	QPSK	100	0	Bottom Side	0mm	Reduced	20175	1732.5	22.00	23.00	1.259	-0.12	2.730	3.437
	LTE Band 2	20M	QPSK	1	49	Back	0mm	Reduced	18900	1880	23.13	24.00	1.222	-0.11	1.970	2.407
	LTE Band 2	20M	QPSK	1	49	Back	0mm	Reduced	18700	1860	23.02	24.00	1.253	-0.16	1.910	2.393
	LTE Band 2	20M	QPSK	1	49	Back	0mm	Reduced	19100	1900	23.08	24.00	1.236	0.05	1.890	2.336
	LTE Band 2	20M	QPSK	1	49	Bottom Side	0mm	Reduced	18900	1880	23.13	24.00	1.222	-0.16	2.480	3.030
34	LTE Band 2	20M	QPSK	1	49	Bottom Side	0mm	Reduced	18700	1860	23.02	24.00	1.253	0.02	2.630	3.296
	LTE Band 2	20M	QPSK	1	49	Bottom Side	0mm	Reduced	19100	1900	23.08	24.00	1.236	0.12	2.350	2.904
	LTE Band 2	20M	QPSK	50	24	Back	0mm	Reduced	18900	1880	23.12	24.00	1.225	-0.12	1.940	2.376
	LTE Band 2	20M	QPSK	50	24	Back	0mm	Reduced	18700	1860	22.99	24.00	1.262	-0.04	1.860	2.347
	LTE Band 2	20M	QPSK	50	24	Back	0mm	Reduced	19100	1900	23.11	24.00	1.227	-0.04	1.830	2.246
	LTE Band 2	20M	QPSK	50	24	Bottom Side	0mm	Reduced	18900	1880	23.12	24.00	1.225	-0.16	2.420	2.964
	LTE Band 2	20M	QPSK	50	24	Bottom Side	0mm	Reduced	18700	1860	22.99	24.00	1.262	-0.12	2.590	3.268
	LTE Band 2	20M	QPSK	50	24	Bottom Side	0mm	Reduced	19100	1900	23.11	24.00	1.227	-0.07	2.280	2.799
	LTE Band 2	20M	QPSK	100	0	Back	0mm	Reduced	18900	1880	23.10	24.00	1.230	0.02	1.890	2.325
	LTE Band 2	20M	QPSK	100	0	Bottom Side	0mm	Reduced	18900	1880	23.10	24.00	1.230	0.07	2.380	2.928
	LTE Band 30	10M	QPSK	1	25	Back	0mm	Reduced	27710	2310	21.18	22.00	1.208	-0.15	2.310	2.790
	LTE Band 30	10M	QPSK	1	25	Bottom Side	0mm	Reduced	27710	2310	21.18	22.00	1.208	-0.16	2.480	2.995
	LTE Band 30	10M	QPSK	25	12	Back	0mm	Reduced	27710	2310	21.10	22.00	1.230	-0.08	2.290	2.817
35	LTE Band 30	10M	QPSK	25	12	Bottom Side	0mm	Reduced	27710	2310	21.10	22.00	1.230	0.05	2.480	3.051
	LTE Band 30	10M	QPSK	50	0	Back	0mm	Reduced	27710	2310	21.08	22.00	1.236	0.01	2.250	2.781
	LTE Band 30	10M	QPSK	50	0	Bottom Side	0mm	Reduced	27710	2310	21.08	22.00	1.236	0	2.410	2.979

<WLAN5G SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
	WLAN5.3GHz	802.11n-HT40 MCS0	Front	0mm	Full	54	5270	15.88	16.50	1.153	100	1.000	-0.12	0.108	0.125
36	WLAN5.3GHz	802.11n-HT40 MCS0	Back	0mm	Full	54	5270	15.88	16.50	1.153	100	1.000	-0.08	0.600	0.692
	WLAN5.3GHz	802.11n-HT40 MCS0	Left Side	0mm	Full	54	5270	15.88	16.50	1.153	100	1.000	-0.12	0.030	0.035
	WLAN5.3GHz	802.11n-HT40 MCS0	Right Side	0mm	Full	54	5270	15.88	16.50	1.153	100	1.000	0.11	0.149	0.172
	WLAN5.3GHz	802.11n-HT40 MCS0	Top Side	0mm	Full	54	5270	15.88	16.50	1.153	100	1.000	0.11	0.545	0.629
	WLAN5.5GHz	802.11n-HT40 MCS0	Front	0mm	Full	110	5550	15.87	16.50	1.156	100	1.000	-0.02	0.136	0.157
37	WLAN5.5GHz	802.11n-HT40 MCS0	Back	0mm	Full	110	5550	15.87	16.50	1.156	100	1.000	-0.14	0.748	0.865
	WLAN5.5GHz	802.11n-HT40 MCS0	Left Side	0mm	Full	110	5550	15.87	16.50	1.156	100	1.000	-0.12	0.058	0.067
	WLAN5.5GHz	802.11n-HT40 MCS0	Right Side	0mm	Full	110	5550	15.87	16.50	1.156	100	1.000	0.13	0.213	0.246
	WLAN5.5GHz	802.11n-HT40 MCS0	Top Side	0mm	Full	110	5550	15.87	16.50	1.156	100	1.000	0.11	0.722	0.835



14.5 Repeated SAR Measurement

<1g>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Ratio	Reported 1g SAR (W/kg)
1st	LTE Band 4	20M	QPSK	50	24	-	Bottom Side	10mm	Reduced	20175	1732.5	19.58	20.50	1.236	-	1.000	-0.16	0.892	1	1.102
2nd	LTE Band 4	20M	QPSK	50	24	-	Bottom Side	10mm	Reduced	20175	1732.5	19.58	20.50	1.236	-	1.000	0.02	0.887	1.006	1.096
1st	LTE Band 2	20M	QPSK	1	49	-	Bottom Side	10mm	Reduced	18900	1880	21.21	22.00	1.199	-	1.000	0.14	0.843	1	1.011
2nd	LTE Band 2	20M	QPSK	1	49	-	Bottom Side	10mm	Reduced	18900	1880	21.21	22.00	1.199	-	1.000	0.03	0.837	1.007	1.004
1st	LTE Band 30	10M	QPSK	1	25	-	Bottom Side	10mm	Reduced	27710	2310	20.21	21.00	1.199	-	1.000	0.03	0.930	1	1.116
2nd	LTE Band 30	10M	QPSK	1	25	-	Bottom Side	10mm	Reduced	27710	2310	20.21	21.00	1.199	-	1.000	0.01	0.912	1.020	1.094
1st	WLAN2.4GHz	-	-	-	-	802.11b 1Mbps	Top Side	10mm	Full	1	2412	18.50	19.50	1.259	100	1.000	-0.09	0.865	1	1.089
2nd	WLAN2.4GHz	-	-	-	-	802.11b 1Mbps	Top Side	10mm	Full	1	2412	18.50	19.50	1.259	100	1.000	0.01	0.860	1.006	1.083

<10g>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Ratio	Reported 10g SAR (W/kg)
1st	LTE Band 4	20M	QPSK	50	24	Bottom Side	0mm	Reduced	20175	1732.5	22.01	23.00	1.256	-0.03	2.750	1	3.454
2nd	LTE Band 4	20M	QPSK	50	24	Bottom Side	0mm	Reduced	20175	1732.5	22.01	23.00	1.256	0.04	2.720	1.011	3.416
1st	LTE Band 2	20M	QPSK	1	49	Bottom Side	0mm	Reduced	18700	1860	23.02	24.00	1.253	0.02	2.630	1	3.296
2nd	LTE Band 2	20M	QPSK	1	49	Bottom Side	0mm	Reduced	18700	1860	23.02	24.00	1.253	0.09	2.610	1.008	3.271
1st	LTE Band 30	10M	QPSK	25	12	Bottom Side	0mm	Reduced	27710	2310	21.10	22.00	1.230	0.05	2.480	1	3.051
2nd	LTE Band 30	10M	QPSK	25	12	Bottom Side	0mm	Reduced	27710	2310	21.10	22.00	1.230	-0.02	2.430	1.021	2.990

General Note:

1. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥ 0.8 W/kg.
2. Per KDB 865664 D01v01r04, if the ratio among the repeated measurement is ≤ 1.2 and the measured SAR < 1.45 W/kg, only one repeated measurement is required.
3. Per KDB 865664 D01v01r04, if the extremity repeated SAR is necessary, the same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds.
4. The ratio is the difference in percentage between original and repeated *measured* SAR.
5. All measurement SAR result is scaled-up to account for tune-up tolerance and is compliant.

15. Simultaneous Transmission Analysis

No.	Simultaneous Transmission Configurations	Portable Handset			
		Head	Body-worn	Hotspot	Product specific 10g SAR
1.	WWAN + WLAN2.4GHz	Yes	Yes	Yes	Yes
2.	WWAN + WLAN5GHz	Yes	Yes	Yes	Yes
3.	WWAN + Bluetooth	Yes	Yes	Yes	Yes
4.	WLAN5GHz + Bluetooth	Yes	Yes	Yes	Yes
5.	WWAN + WLAN5GHz + Bluetooth	Yes	Yes	Yes	Yes

General Note:

1. This device supports VoIP in LTE (e.g. for 3rd-party VoIP), LTE supports VoLTE operation.
2. This device 2.4GHz WLAN support hotspot operation and Bluetooth support tethering applications.
3. This device 5.2GHz WLAN/5.8GHz WLAN support hotspot operation, and 5.2GHz WLAN/5.8GHz WLAN supports WLAN Direct (GC/GO), and 5.3GHz / 5.5GHz supports WLAN Direct (GC only).
4. WIFI 5.3/5.5GHz has no hotspot function.
5. The worst case 5 GHz WLAN SAR for each configuration was used for SAR summation.
6. WLAN 2.4GHz and Bluetooth share the same antenna so can't transmit simultaneously.
7. According to the EUT characteristic, WLAN 5GHz and 2.4GHz can't transmit simultaneously.
8. According to the EUT characteristic, WLAN 5GHz and Bluetooth can transmit simultaneously.
9. The maximum SAR summation is calculated based on the same configuration and test position.
10. For simultaneously analysis, since the SAR summation of 3 transmitters can cover others combination of 2 transmitters, therefore in this section did not additional to evaluate 2TX combination of simultaneously transmission.
11. Per KDB 447498 D01v06, simultaneous transmission SAR is compliant if,
 - i) 1g Scalar SAR summation < 1.6W/kg and 10g Scalar SAR summation < 4.0W/kg.
 - ii) $SPLSR = (SAR1 + SAR2)^{1.5} / (\min. \text{ separation distance, mm})$, and the peak separation distance is determined from the square root of $[(x1-x2)^2 + (y1-y2)^2 + (z1-z2)^2]$, where (x1, y1, z1) and (x2, y2, z2) are the coordinates of the extrapolated peak SAR locations in the zoom scan.
 - iii) If $SPLSR \leq 0.04$ for 1g SAR and $SPLSR \leq 0.10$ for 10g SAR, simultaneously transmission SAR measurement is not necessary.
 - iv) Simultaneously transmission SAR measurement, and the reported multi-band 1g SAR < 1.6W/kg and 10g SAR < 4.0W/kg.

15.1 Head Exposure Conditions

WWAN Band	Exposure Position	1	3	6	9	1+3	1+6+9
		WWAN 1g SAR (W/kg)	2.4GHz WLAN 1g SAR (W/kg)	5GHz WLAN 1g SAR (W/kg)	Bluetooth 1g SAR (W/kg)	Summed 1g SAR (W/kg)	Summed 1g SAR (W/kg)
LTE Band 12	Right Cheek	0.279	0.306	0.282	0.089	0.59	0.65
	Right Tilted	0.144	0.401	0.373	0.138	0.55	0.66
	Left Cheek	0.248	1.024	0.392	0.333	1.27	0.97
	Left Tilted	0.132	1.187	0.436	0.338	1.32	0.91
LTE Band 14	Right Cheek	0.345	0.306	0.282	0.089	0.65	0.72
	Right Tilted	0.233	0.401	0.373	0.138	0.63	0.74
	Left Cheek	0.422	1.024	0.392	0.333	1.45	1.15
	Left Tilted	0.216	1.187	0.436	0.338	1.40	0.99
LTE Band 5	Right Cheek	0.452	0.306	0.282	0.089	0.76	0.82
	Right Tilted	0.252	0.401	0.373	0.138	0.65	0.76
	Left Cheek	0.382	1.024	0.392	0.333	1.41	1.11
	Left Tilted	0.236	1.187	0.436	0.338	1.42	1.01
LTE Band 4	Right Cheek	0.170	0.306	0.282	0.089	0.48	0.54
	Right Tilted	0.055	0.401	0.373	0.138	0.46	0.57
	Left Cheek	0.115	1.024	0.392	0.333	1.14	0.84
	Left Tilted	0.066	1.187	0.436	0.338	1.25	0.84
LTE Band 2	Right Cheek	0.246	0.306	0.282	0.089	0.55	0.62
	Right Tilted	0.098	0.401	0.373	0.138	0.50	0.61
	Left Cheek	0.158	1.024	0.392	0.333	1.18	0.88
	Left Tilted	0.147	1.187	0.436	0.338	1.33	0.92
LTE Band 30	Right Cheek	0.214	0.306	0.282	0.089	0.52	0.59
	Right Tilted	0.127	0.401	0.373	0.138	0.53	0.64
	Left Cheek	0.131	1.024	0.392	0.333	1.16	0.86
	Left Tilted	0.157	1.187	0.436	0.338	1.34	0.93

15.2 Hotspot Exposure Conditions

WWAN Band	Exposure Position	1	3	6	9	1+3	1+6+9
		WWAN 1g SAR (W/kg)	2.4GHz WLAN 1g SAR (W/kg)	5GHz WLAN 1g SAR (W/kg)	Bluetooth 1g SAR (W/kg)	Summed 1g SAR (W/kg)	Summed 1g SAR (W/kg)
LTE Band 12	Front	0.493	0.393	0.070	0.075	0.89	0.64
	Back	0.494	0.675	0.597	0.109	1.17	1.20
	Left side	0.373	0.062	0.164	0.003	0.44	0.54
	Right side	0.429	0.191	0.280	0.038	0.62	0.75
	Top side		1.089	0.509	0.116	1.09	0.63
	Bottom side	0.085				0.09	0.09
LTE Band 14	Front	0.384	0.393	0.070	0.075	0.78	0.53
	Back	0.530	0.675	0.597	0.109	1.21	1.24
	Left side	0.353	0.062	0.164	0.003	0.42	0.52
	Right side	0.401	0.191	0.280	0.038	0.59	0.72
	Top side		1.089	0.509	0.116	1.09	0.63
	Bottom side	0.117				0.12	0.12
LTE Band 5	Front	0.378	0.393	0.070	0.075	0.77	0.52
	Back	0.569	0.675	0.597	0.109	1.24	1.28
	Left side	0.345	0.062	0.164	0.003	0.41	0.51
	Right side	0.367	0.191	0.280	0.038	0.56	0.69
	Top side		1.089	0.509	0.116	1.09	0.63
	Bottom side	0.066				0.07	0.07
LTE Band 4	Front	0.497	0.393	0.070	0.075	0.89	0.64
	Back	0.777	0.675	0.597	0.109	1.45	1.48
	Left side	0.036	0.062	0.164	0.003	0.10	0.20
	Right side	0.063	0.191	0.280	0.038	0.25	0.38
	Top side		1.089	0.509	0.116	1.09	0.63
	Bottom side	1.102				1.10	1.10
LTE Band 2	Front	0.481	0.393	0.070	0.075	0.87	0.63
	Back	0.591	0.675	0.597	0.109	1.27	1.30
	Left side	0.152	0.062	0.164	0.003	0.21	0.32
	Right side	0.089	0.191	0.280	0.038	0.28	0.41
	Top side		1.089	0.509	0.116	1.09	0.63
	Bottom side	1.011				1.01	1.01
LTE Band 30	Front	0.579	0.393	0.070	0.075	0.97	0.72
	Back	0.853	0.675	0.597	0.109	1.53	1.56
	Left side	0.096	0.062	0.164	0.003	0.16	0.26
	Right side	0.162	0.191	0.280	0.038	0.35	0.48
	Top side		1.089	0.509	0.116	1.09	0.63
	Bottom side	1.116				1.12	1.12

15.3 Body-Worn Accessory Exposure Conditions

WWAN Band	Exposure Position	1	3	6	9	1+3	1+6+9
		WWAN 1g SAR (W/kg)	2.4GHz WLAN 1g SAR (W/kg)	5GHz WLAN 1g SAR (W/kg)	Bluetooth 1g SAR (W/kg)	Summed 1g SAR (W/kg)	Summed 1g SAR (W/kg)
LTE Band 12	Front	0.391	0.176	0.129	0.036	0.57	0.56
	Back	0.445	0.500	0.825	0.051	0.95	1.32
LTE Band 14	Front	0.383	0.176	0.129	0.036	0.56	0.55
	Back	0.493	0.500	0.825	0.051	0.99	1.37
LTE Band 5	Front	0.351	0.176	0.129	0.036	0.53	0.52
	Back	0.500	0.500	0.825	0.051	1.00	1.38
LTE Band 4	Front	0.408	0.176	0.129	0.036	0.58	0.57
	Back	0.683	0.500	0.825	0.051	1.18	1.56
LTE Band 2	Front	0.541	0.176	0.129	0.036	0.72	0.71
	Back	0.705	0.500	0.825	0.051	1.21	1.58
LTE Band 30	Front	0.470	0.176	0.129	0.036	0.65	0.64
	Back	0.661	0.500	0.825	0.051	1.16	1.54

15.4 Product Specific Exposure Conditions

WWAN Band	Exposure Position	1	5	1+5
		WWAN 10g SAR (W/kg)	5GHz WLAN 10g SAR (W/kg)	Summed 10g SAR (W/kg)
LTE Band 4	Front	2.299	0.157	2.46
	Back	2.977	0.865	3.84
	Left side		0.067	0.07
	Right side		0.246	0.25
	Top side		0.835	0.84
	Bottom side	3.454		3.45
LTE Band 2	Front		0.157	0.16
	Back	2.407	0.865	3.27
	Left side		0.067	0.07
	Right side		0.246	0.25
	Top side		0.835	0.84
	Bottom side	3.296		3.30
LTE Band 30	Front		0.157	0.16
	Back	2.817	0.865	3.68
	Left side		0.067	0.07
	Right side		0.246	0.25
	Top side		0.835	0.84
	Bottom side	3.051		3.05

Note: For Bluetooth Product specific 10g stand-alone SAR is not required for a transmitter or antenna, due to 1g hotspot SAR is <1.2W/kg.

Test Engineer : Kevin Xu, David Dai, Bin He

16. Uncertainty Assessment

Per KDB 865664 D01 SAR measurement 100MHz to 6GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg and the measured 10-g SAR within a frequency band is < 3.75 W/kg. The expanded SAR measurement uncertainty must be $\leq 30\%$, for a confidence interval of $k = 2$. If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval. For this device, the highest measured 1-g SAR is less 1.5W/kg and highest measured 10-g SAR is less 3.75W/kg. Therefore, the measurement uncertainty table is not required in this report.

17. References

- [1] FCC 47 CFR Part 2 “Frequency Allocations and Radio Treaty Matters; General Rules and Regulations”
- [2] ANSI/IEEE Std. C95.1-1992, “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz”, September 1992
- [3] IEEE Std. 1528-2013, “IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”, Sep 2013
- [4] SPEAG DASY System Handbook
- [5] FCC KDB 865664 D01 v01r04, “SAR Measurement Requirements for 100 MHz to 6 GHz”, Aug 2015.
- [6] FCC KDB 865664 D02 v01r02, “RF Exposure Compliance Reporting and Documentation Considerations” Oct 2015.
- [7] FCC KDB 447498 D01 v06, “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”, Oct 2015
- [8] FCC KDB 648474 D04 v01r03, “SAR Evaluation Considerations for Wireless Handsets”, Oct 2015.
- [9] FCC KDB 248227 D01 v02r02, “SAR Guidance for IEEE 802.11 (WiFi) Transmitters”, Oct 2015.
- [10] FCC KDB 941225 D05 v02r05, “SAR Evaluation Considerations for LTE Devices”, Dec 2015
- [11] FCC KDB 941225 D06 v02r01, “SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities”, Oct 2015.

-----THE END-----



Appendix A. Plots of System Performance Check

The plots are shown as follows.

System Check_Head_750MHz

DUT: D750V3-SN:1087

Communication System: UID 0, CW (0); Frequency: 750 MHz; Duty Cycle: 1:1

Medium: HSL_750_220118 Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.886 \text{ S/m}$; $\epsilon_r = 41.534$; $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 23.6 °C; Liquid Temperature : 22.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7576; ConvF(10.47, 10.47, 10.47); Calibrated: 2021/4/26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2021/10/26
- Phantom: Twin-SAM V8.0 (Left); Type: QD 000 P41 AA; Serial: 2035
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) = 3.51 W/kg

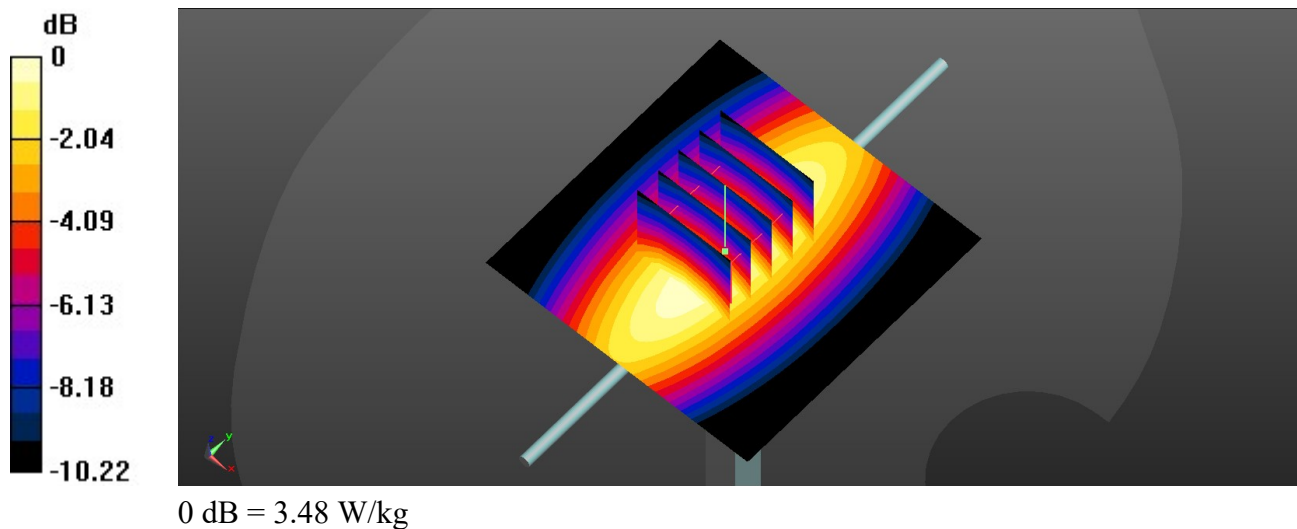
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 66.72 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 3.94 W/kg

SAR(1 g) = 2.04 W/kg; SAR(10 g) = 1.36 W/kg

Maximum value of SAR (measured) = 3.48 W/kg



System Check_Head_835MHz

DUT: D835V2-SN:4d258

Communication System: UID 0, CW (0); Frequency: 835 MHz; Duty Cycle: 1:1

Medium: HSL_835_220119 Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.915 \text{ S/m}$; $\epsilon_r = 41.529$; $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 23.7°C ; Liquid Temperature : 22.6°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7576; ConvF(10.19, 10.19, 10.19); Calibrated: 2021/4/26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2021/10/26
- Phantom: Twin-SAM V8.0 (Left); Type: QD 000 P41 AA; Serial: 2035
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) = 3.07 W/kg

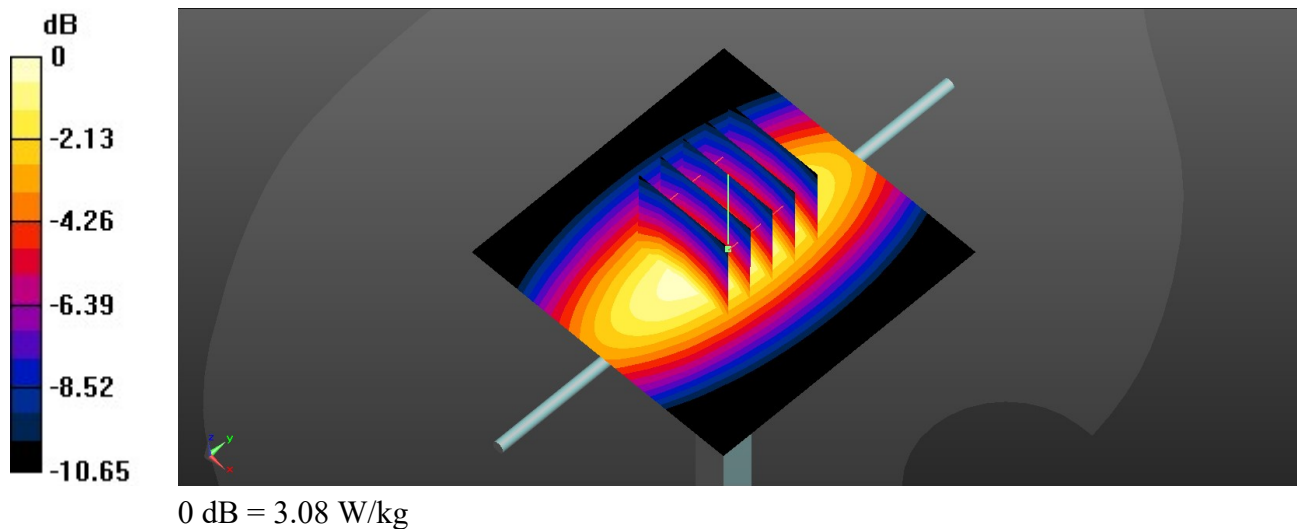
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 60.96 V/m ; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 3.50 W/kg

SAR(1 g) = 2.31 W/kg ; SAR(10 g) = 1.52 W/kg

Maximum value of SAR (measured) = 3.08 W/kg



System Check_Head_1750MHz

DUT: D1750V2-SN:1090

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium: HSL_1750_220120 Medium parameters used: $f = 1750$ MHz; $\sigma = 1.355$ S/m; $\epsilon_r = 38.395$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.3 °C; Liquid Temperature : 22.5 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7576; ConvF(8.73, 8.73, 8.73); Calibrated: 2021/4/26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2021/10/26
- Phantom: Twin-SAM V8.0 (Left); Type: QD 000 P41 AA; Serial: 2035
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Pin=250mW/Area Scan (61x71x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 13.9 W/kg

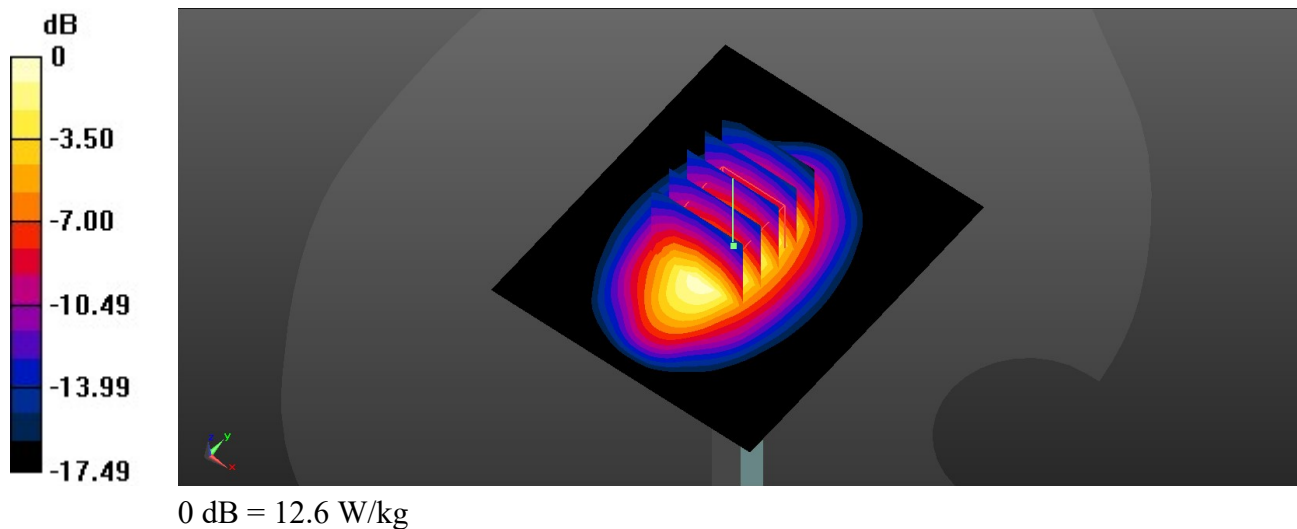
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 104.6 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 15.3 W/kg

SAR(1 g) = 8.6 W/kg; SAR(10 g) = 4.64 W/kg

Maximum value of SAR (measured) = 12.6 W/kg



System Check_Head_1750MHz

DUT: D1750V2-SN:1090

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium: HSL_1750_220125 Medium parameters used: $f = 1750$ MHz; $\sigma = 1.378$ S/m; $\epsilon_r = 41.34$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.3 °C; Liquid Temperature : 22.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7576; ConvF(8.73, 8.73, 8.73); Calibrated: 2021/4/26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2021/10/26
- Phantom: Twin-SAM V8.0 (Left); Type: QD 000 P41 AA; Serial: 2035
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Pin=250mW/Area Scan (61x71x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 14.2 W/kg

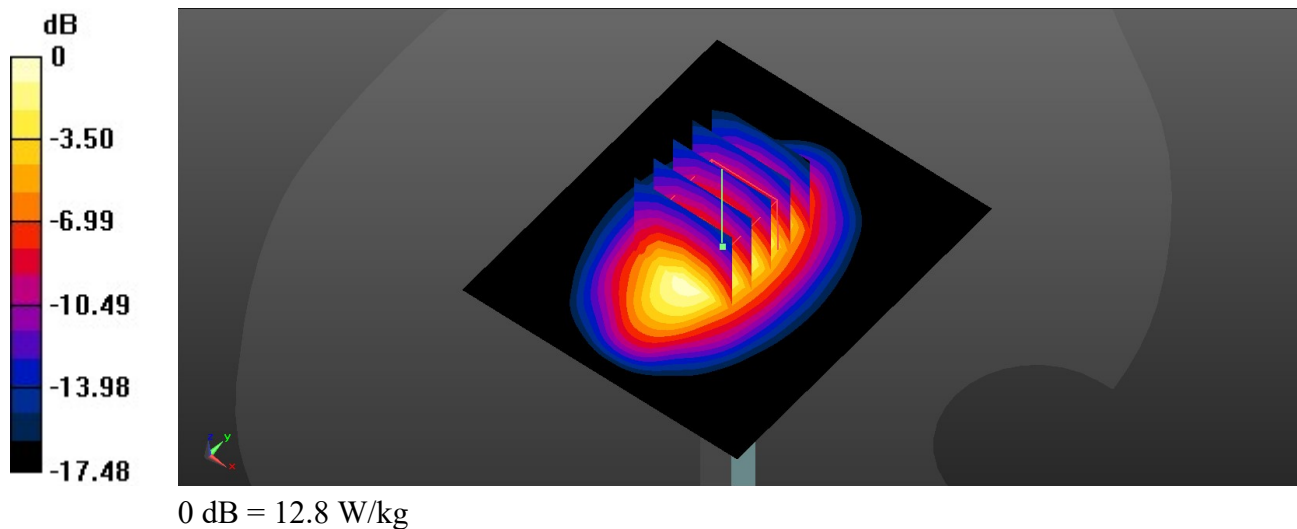
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 104.6 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 15.6 W/kg

SAR(1 g) = 8.74 W/kg; SAR(10 g) = 4.72 W/kg

Maximum value of SAR (measured) = 12.8 W/kg



System Check_Head_1900MHz

DUT: D1900V2-SN:5d170

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: HSL_1900_220119 Medium parameters used: $f = 1900$ MHz; $\sigma = 1.415$ S/m; $\epsilon_r = 40.527$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.2 °C; Liquid Temperature : 22.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7576; ConvF(8.33, 8.33, 8.33); Calibrated: 2021/4/26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2021/10/26
- Phantom: Twin-SAM V8.0 (Left); Type: QD 000 P41 AA; Serial: 2035
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 15.1 W/kg

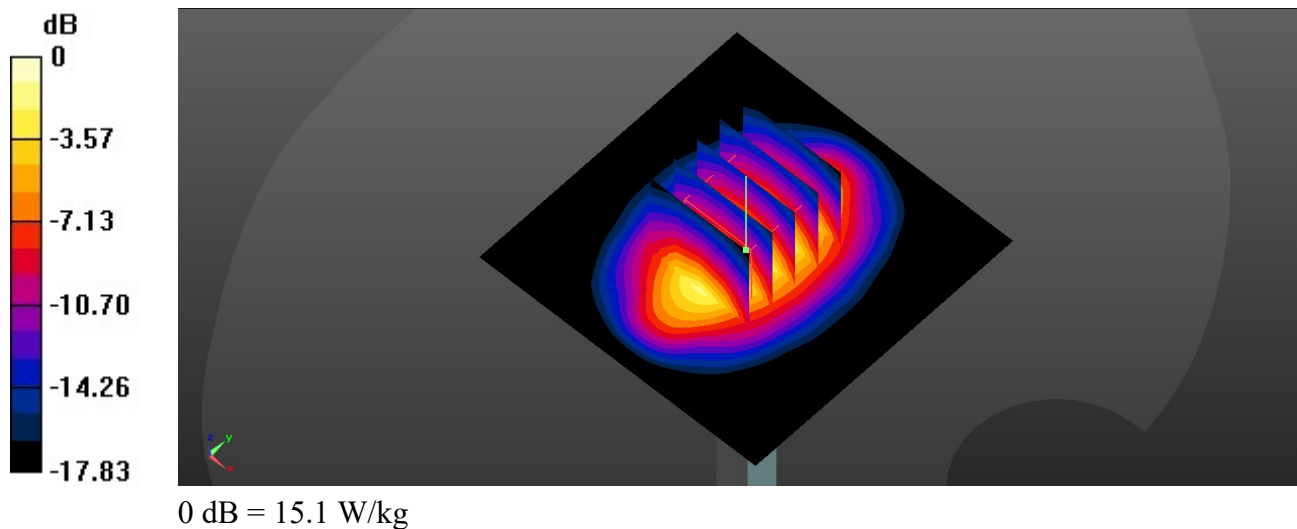
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 107.4 V/m; Power Drift = -0.16 dB

Peak SAR (extrapolated) = 18.1 W/kg

SAR(1 g) = 9.66 W/kg; SAR(10 g) = 5 W/kg

Maximum value of SAR (measured) = 15.1 W/kg



System Check_Head_1900MHz

DUT: D1900V2-SN:5d170

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: HSL_1900_220126 Medium parameters used: $f = 1900$ MHz; $\sigma = 1.46$ S/m; $\epsilon_r = 40.597$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.7 °C; Liquid Temperature : 22.5 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7576; ConvF(8.33, 8.33, 8.33); Calibrated: 2021/4/26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2021/10/26
- Phantom: Twin-SAM V8.0 (Left); Type: QD 000 P41 AA; Serial: 2035
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 15.6 W/kg

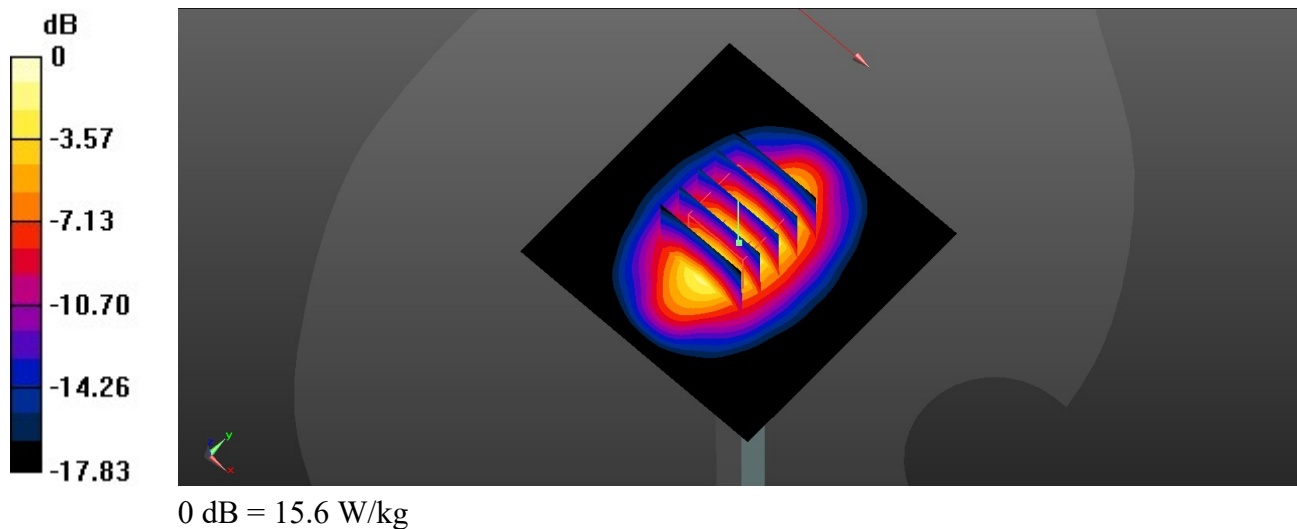
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 107.4 V/m; Power Drift = -0.16 dB

Peak SAR (extrapolated) = 18.7 W/kg

SAR(1 g) = 9.96 W/kg; SAR(10 g) = 5.16 W/kg

Maximum value of SAR (measured) = 15.6 W/kg



System Check_Head_2300MHz

DUT: D2300V2-SN:1056

Communication System: UID 0, CW (0); Frequency: 2300 MHz; Duty Cycle: 1:1

Medium: HSL_2300_220120 Medium parameters used: $f = 2300$ MHz; $\sigma = 1.736$ S/m; $\epsilon_r = 40.425$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.4 °C; Liquid Temperature : 22.7 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7576; ConvF(7.91, 7.91, 7.91); Calibrated: 2021/4/26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2021/10/26
- Phantom: Twin-SAM V8.0 (Left); Type: QD 000 P41 AA; Serial: 2035
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Pin=250mW/Area Scan (81x81x1): Interpolated grid: $dx=1.200$ mm, $dy=1.200$ mm

Maximum value of SAR (interpolated) = 25.3 W/kg

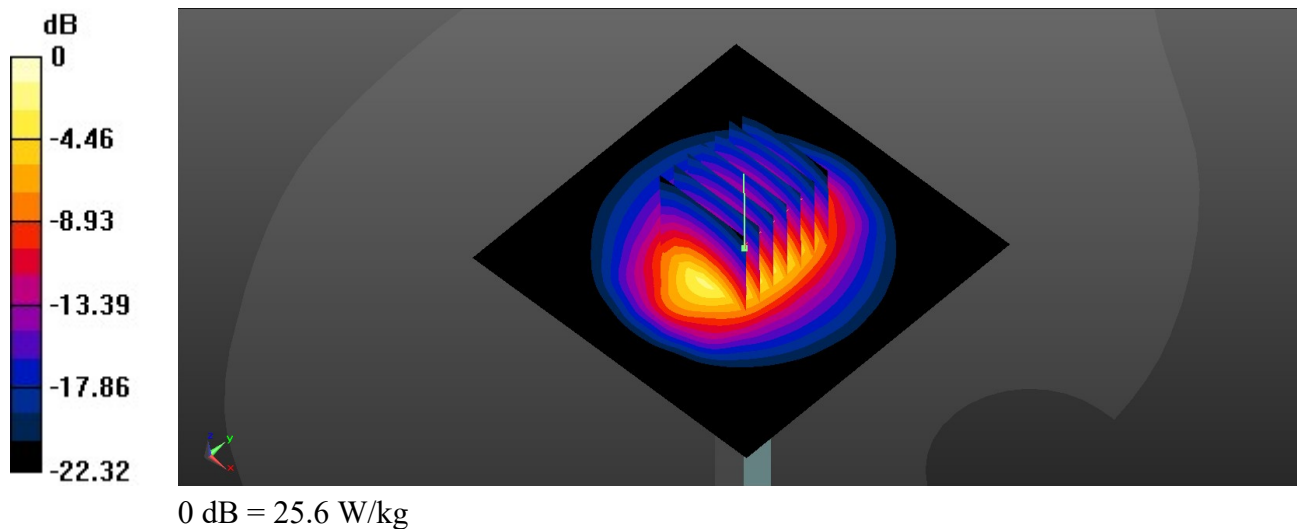
Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 125.4 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 32.2 W/kg

SAR(1 g) = 11.9 W/kg; SAR(10 g) = 5.88 W/kg

Maximum value of SAR (measured) = 25.6 W/kg



System Check_Head_2300MHz

DUT: D2300V2-SN:1056

Communication System: UID 0, CW (0); Frequency: 2300 MHz; Duty Cycle: 1:1

Medium: HSL_2300_220127 Medium parameters used: $f = 2300$ MHz; $\sigma = 1.601$ S/m; $\epsilon_r = 39.084$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.4 °C; Liquid Temperature : 22.4 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7576; ConvF(7.91, 7.91, 7.91); Calibrated: 2021/4/26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2021/10/26
- Phantom: Twin-SAM V8.0 (Left); Type: QD 000 P41 AA; Serial: 2035
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Pin=250mW/Area Scan (81x81x1): Interpolated grid: $dx=1.200$ mm, $dy=1.200$ mm

Maximum value of SAR (interpolated) = 23.4 W/kg

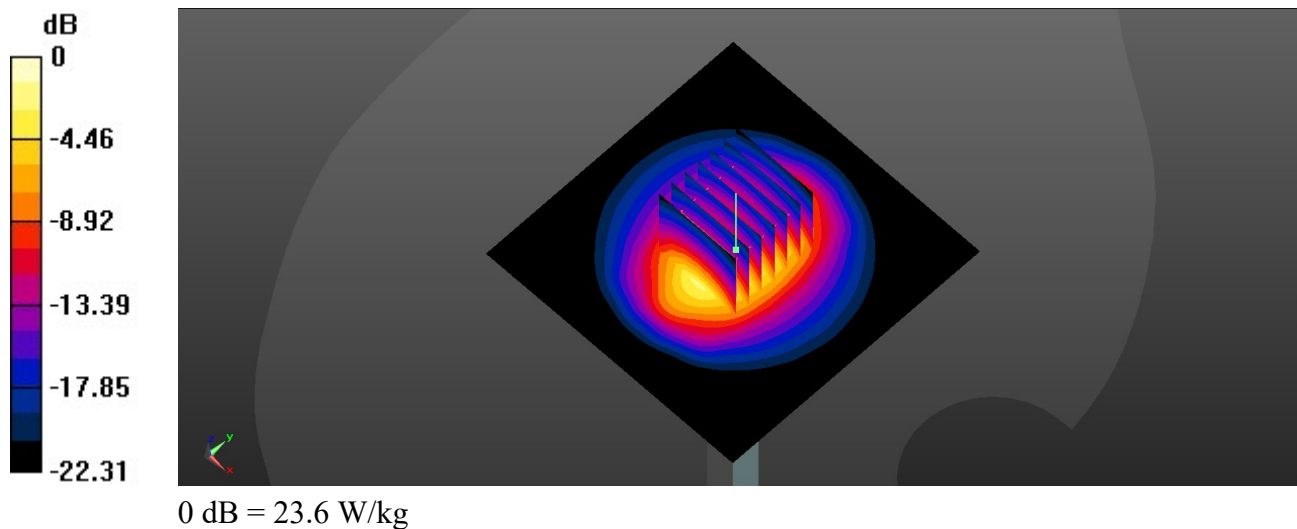
Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 125.4 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 29.7 W/kg

SAR(1 g) = 11.3 W/kg; SAR(10 g) = 5.34 W/kg

Maximum value of SAR (measured) = 23.6 W/kg



System Check_Head_2450MHz

DUT: D2450V2-SN:924

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: HSL_2450_220121 Medium parameters used: $f = 2450$ MHz; $\sigma = 1.825$ S/m; $\epsilon_r = 39.664$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.4 °C; Liquid Temperature : 22.4 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7576; ConvF(7.67, 7.67, 7.67); Calibrated: 2021/4/26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2021/10/26
- Phantom: Twin-SAM V8.0 (Left); Type: QD 000 P41 AA; Serial: 2035
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Pin=250mW/Area Scan (81x81x1): Interpolated grid: $dx=1.200$ mm, $dy=1.200$ mm

Maximum value of SAR (interpolated) = 25.2 W/kg

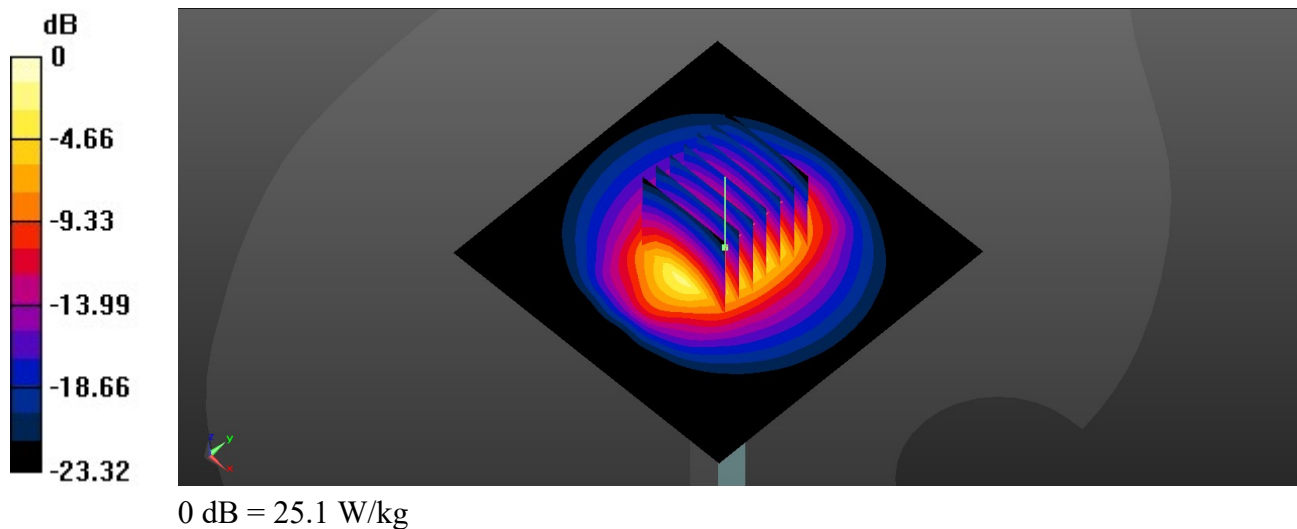
Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 121.9 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 31.8 W/kg

SAR(1 g) = 13.4 W/kg; SAR(10 g) = 6.5 W/kg

Maximum value of SAR (measured) = 25.1 W/kg



System Check_Head_2450MHz

DUT: D2450V2-SN:924

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: HSL_2450_220128 Medium parameters used: $f = 2450$ MHz; $\sigma = 1.85$ S/m; $\epsilon_r = 38.855$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.3 °C; Liquid Temperature : 22.1 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7576; ConvF(7.67, 7.67, 7.67); Calibrated: 2021/4/26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2021/10/26
- Phantom: Twin-SAM V8.0 (Left); Type: QD 000 P41 AA; Serial: 2035
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Pin=250mW/Area Scan (81x81x1): Interpolated grid: $dx=1.200$ mm, $dy=1.200$ mm

Maximum value of SAR (interpolated) = 25.6 W/kg

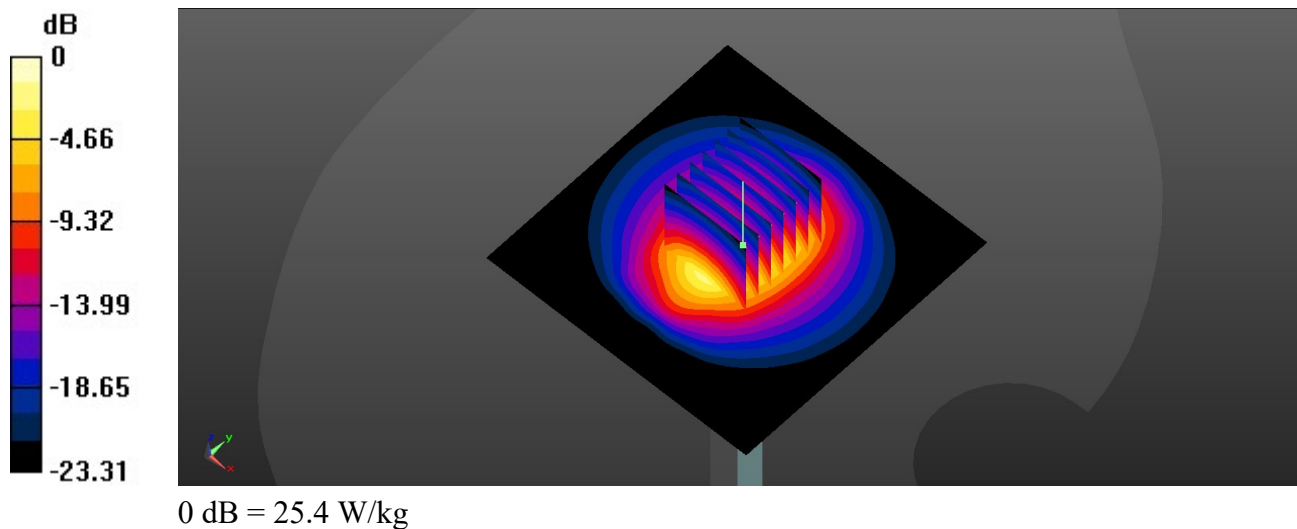
Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 121.9 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 32.2 W/kg

SAR(1 g) = 13.6 W/kg; SAR(10 g) = 6.59 W/kg

Maximum value of SAR (measured) = 25.4 W/kg



System Check_Head_5250MHz

DUT: D5GHzV2-SN:1113

Communication System: UID 0, CW; Frequency: 5250 MHz; Duty Cycle: 1:1

Medium: HSL_5250_220122 Medium parameters used: $f = 5250$ MHz; $\sigma = 4.626$ S/m; $\epsilon_r = 37.038$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.5 °C; Liquid Temperature : 22.5 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7576; ConvF(5.17, 5.17, 5.17); Calibrated: 2021/4/26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2021/10/26
- Phantom: Twin-SAM V8.0 (Left); Type: QD 000 P41 AA; Serial: 2035
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Pin=100mW/Area Scan (71x71x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 15.8 W/kg

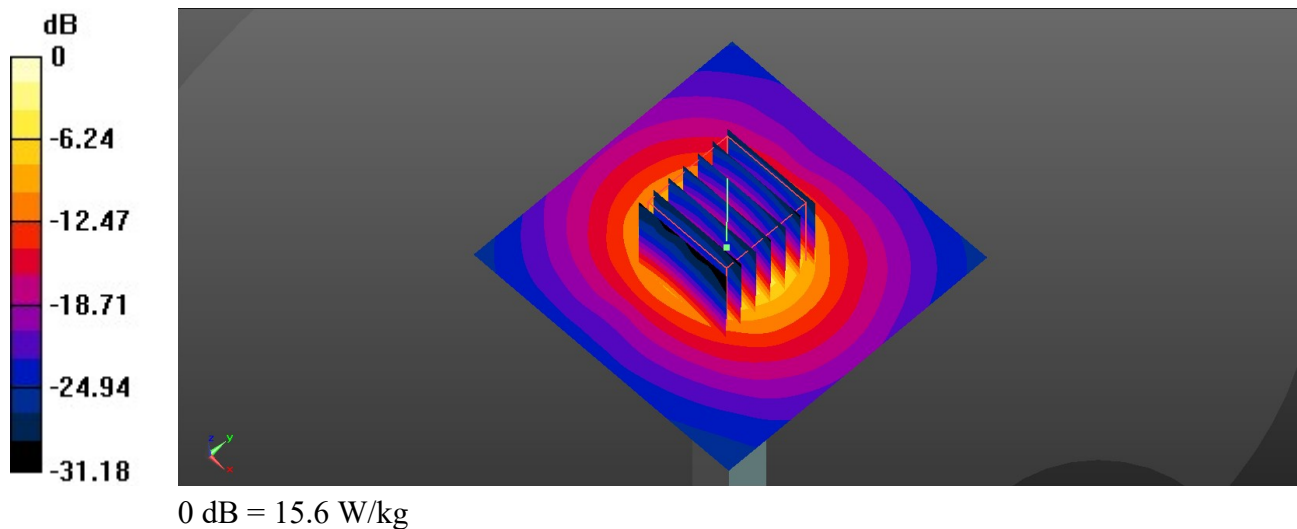
Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 65.24 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 27.1 W/kg

SAR(1 g) = 7.68 W/kg; SAR(10 g) = 2.22 W/kg

Maximum value of SAR (measured) = 15.6 W/kg



System Check_Head_5600MHz

DUT: D5GHzV2-SN:1113

Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1

Medium: HSL_5600_220124 Medium parameters used: $f = 5600$ MHz; $\sigma = 5.034$ S/m; $\epsilon_r = 36.508$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.3 °C; Liquid Temperature : 22.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7576; ConvF(4.6, 4.6, 4.6); Calibrated: 2021/4/26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2021/10/26
- Phantom: Twin-SAM V8.0 (Left); Type: QD 000 P41 AA; Serial: 2035
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Pin=100mW/Area Scan (71x71x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 20.0 W/kg

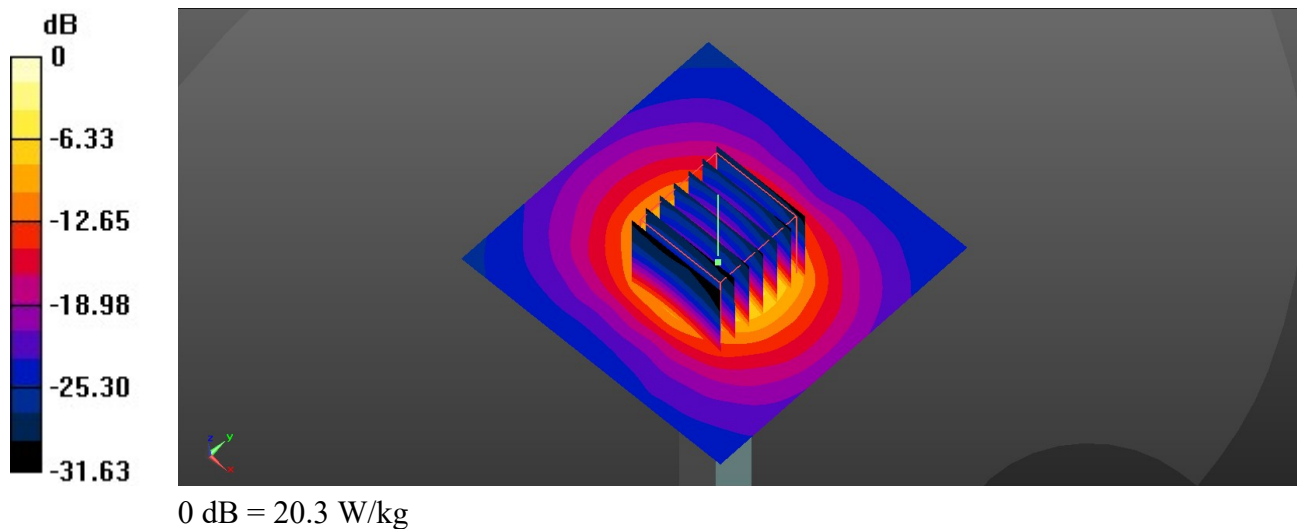
Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 69.69 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 36.2 W/kg

SAR(1 g) = 7.95 W/kg; SAR(10 g) = 2.31 W/kg

Maximum value of SAR (measured) = 20.3 W/kg



System Check_Head_5750MHz

DUT: D5GHzV2-SN:1113

Communication System: UID 0, CW; Frequency: 5750 MHz; Duty Cycle: 1:1

Medium: HSL_5750_220123 Medium parameters used: $f = 5750$ MHz; $\sigma = 5.203$ S/m; $\epsilon_r = 36.253$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.7 °C; Liquid Temperature : 22.5 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7576; ConvF(4.75, 4.75, 4.75); Calibrated: 2021/4/26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1437; Calibrated: 2021/10/26
- Phantom: Twin-SAM V8.0 (Left); Type: QD 000 P41 AA; Serial: 2035
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Pin=100mW/Area Scan (71x71x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 17.7 W/kg

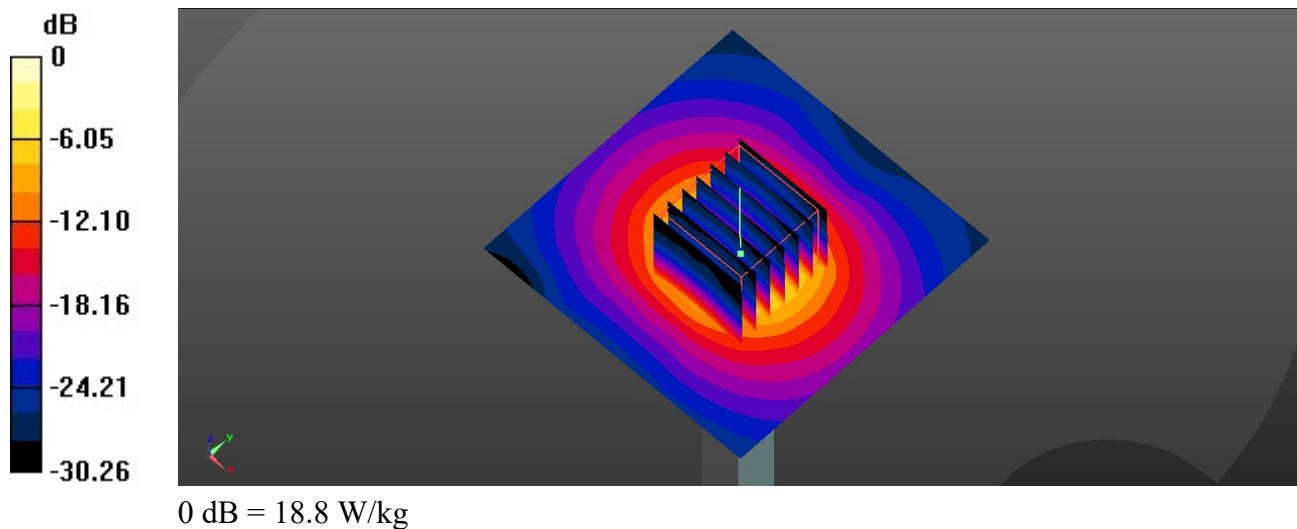
Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 64.45 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 34.8 W/kg

SAR(1 g) = 7.53 W/kg; SAR(10 g) = 2.16 W/kg

Maximum value of SAR (measured) = 18.8 W/kg





Appendix B. Plots of High SAR Measurement

The plots are shown as follows.