中认信通
CHINA CERTIFICATION ICT CO., LTD (DONGGUAN)

ACCREDITED
TESTING LABORATORY
CERTIFICATE # 6356.01

SAR TEST REPORT

Applicant: **Tait International Limited**

Address: 245 Wooldridge Road, Harewood, P.O. Box 1645 Christchurch 8051 New Zealand

FCC ID: **CASTWXNFA**

IC: **737A-TWXNFA**

HVIN: **TWXNFA**

Product Name: **TWX500 series LTE Wearable Data device**

Model Number: **TWXNFA**

Standard(s): **47 CFR Part 2(2.1093)**
RSS-102 Issue 5 Amendment 1 (February 2, 2021)
IEC/IEEE 62209-1528:2020

The above equipment has been tested and found compliant with the requirement of the relative standards by China Certification ICT Co., Ltd (Dongguan)

Report Number: **CR21110026-20**

Date Of Issue: **2022-01-27**

Reviewed By: **Sun Zhong** Sun Zhong

Title: Manager

Test Laboratory: China Certification ICT Co., Ltd (Dongguan)
No. 113, Pingkang Road, Dalang Town, Dongguan,
Guangdong, China
Tel: +86-769-82016888

SAR TEST RESULTS SUMMARY

Operation Frequency Bands	Highest Reported 1g SAR (W/kg)			Limits (W/kg)
	Head(Face Up) (Gap 10mm)	Body-Worn (Gap 0mm)	Hotspot (Gap 10mm)	
WCDMA Band 2	0.61	0.47	/	**1.6**
WCDMA Band 4	**0.94**	0.39	/	
WCDMA Band 5	0.65	0.57	/	
LTE Band 2	0.57	0.39	/	
LTE Band 5	0.38	0.46	/	
LTE Band 12	0.46	0.40	/	
LTE Band 13	0.29	0.43	/	
LTE Band 14	0.39	0.44	/	
LTE Band 66&4	0.49	**0.60**	/	
LTE Band 71	0.57	0.39	/	
WLAN 2.4G	0.18	0.04	/	
WLAN 5.2G	0.59	0.02	/	
WLAN 5.3G	0.59	0.05	/	
WLAN 5.6G	0.40	0.06	/	
WLAN 5.8G	0.45	0.07	/	
Maximum Simultaneous Transmission SAR				
Items	**Head(Face Up)**	**Body-Worn**	**Hotspot**	**Limits(W/kg)**
Sum SAR(W/kg)	**1.53**	**0.72**	/	1.6
SPLSR	N/A	N/A	N/A	0.04
EUT Received Date:	2021/11/30			
Test Date:	2021/12/28 ~ 2022/01/26			
Test Result:	Pass			

Test Facility

The Test site used by China Certification ICT Co., Ltd (Dongguan) to collect test data is located on the No. 113, Pingkang Road, Dalang Town, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 442868, the FCC Designation No. : CN1314.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0123.

Declarations

China Certification ICT Co., Ltd (Dongguan) is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol "▲". Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

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CONTENTS

1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

Device Type:	Portable
Exposure Category:	Population / Uncontrolled
Antenna Type(s):	Internal Antenna
Body-Worn Accessories:	None
Operation modes:	WCDMA(R99 (Voice+Data), HSDPA/HSUPA), FDD-LTE, WLAN, Bluetooth
Frequency Band:	WCDMA Band 2: 1850-1910 MHz(TX); 1930-1990 MHz(RX) WCDMA Band 4: 1710-1755 MHz(TX), 2110-2155 MHz(RX) WCDMA Band 5: 824-849 MHz(TX); 869-894 MHz(RX) LTE Band 2: 1850-1910 MHz(TX); 1930-1990 MHz(RX) LTE Band 4: 1710-1755 MHz(TX) ; 2110-2155 MHz(RX) LTE Band 5: 824-849 MHz(TX); 869-894 MHz(RX) LTE Band 12: 699-716 MHz(TX); 729-746 MHz(RX) LTE Band 13: 777-787 MHz(TX); 746-756 MHz(RX) LTE Band 14: 788-798 MHz(TX); 758-768 MHz(RX) LTE Band 66: 1710-1780 MHz(TX) ; 2110-2180 MHz(RX) LTE Band 71: 663-698 MHz(TX); 617-652 MHz(RX) WLAN 2.4G: 2412-2462 MHz/2422-2452 MHz WLAN 5.2G: 5150 -5250 MHz WLAN 5.3G: 5250 -5350 MHz WLAN 5.6G: 5470 -5725 MHz WLAN 5.8G: 5725 -5850 MHz Bluetooth: 2402 -2480 MHz
Conducted RF Power:	WCDMA Band 2: 24.81 dBm; WCDMA Band 4: 25.16 dBm WCDMA Band 5: 25.19 dBm LTE Band 2: 24.91 dBm; LTE Band 4: 24.66 dBm LTE Band 5: 25.1 dBm; LTE Band 12: 24.64 dBm LTE Band 13: 24.89 dBm; LTE Band 14: 24.93 dBm LTE Band 66: 24.54 dBm; LTE Band 71: 24.73 dBm WLAN 2.4G: 16.73 dBm WLAN 5.2G: 12.79 dBm WLAN 5.3G: 11.96 dBm WLAN 5.6G: 11.46 dBm WLAN 5.8G: 10.43 dBm Bluetooth: 4.08 dBm BLE: 3.43 dBm
Rated Input Voltage:	DC 3.7V from battery or DC 5V from USB port
Serial Number:	CR21110026-SA-S1
Normal Operation:	Body Worn and Face Up

The EUT contain a LTE module:

Product Name:	LE910C4-NF
Manufacturer:	Telit Wireless Solutions Co., LTD
Mode No.:	LE910C4-NF
ID Number:	FCC ID: RI7LE910CXNF, IC: 5131A-LE910CXNF

Antenna information:

Antenna Name:	G/W/B-FPC	Main LDS Antenna	DIV-FPC
Description:	BT+Wifi+GPS (3 in 1)	Cellular Band Main Antenna	Cellular Band DIV Antenna
Model Number:	220-04209-05	007-89106-00	007-89107-00
Manufacturer:	Tait	Tait	Tait
Type:	Monopole	PIFA	PIFA
Dimensions (LxWxH, mm):	20.4x10.8x0.5	48x18.5x16.6	54.4x21.5x0.5
Input Impednace:	50	50	50
Antenna Gain (dBi) @ Freq (MHz):	0 @2400 3.6 @5000	-3.7 @600 – 700 -2.5 @700 - 730 -0.5 @740 - 900 0.4 @1710 - 2050 1.2 @2070 - 2170	(Receive only)

1.2.2 Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with FCC 47 CFR § 2.1093, IEEE 1528-2013, the following FCC Published RF exposure KDB procedures:

KDB 447498 D01 General RF Exposure Guidance v06
KDB 648474 D04 Handset SAR v01r03
KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
KDB 865664 D02 RF Exposure Reporting v01r02
KDB 941225 D01 3G SAR Procedures v03r01
KDB 941225 D05 SAR for LTE Devices v02r05
KDB 248227 D01 802 11 Wi-Fi SAR v02r02

TCB Workshop April 2019: RF Exposure Procedures

1.2.3 SAR Limts

FCC/IC Limit

EXPOSURE LIMITS	SAR (W/kg)	
	(General Population / Uncontrolled Exposure Environment)	(Occupational / Controlled Exposure Environment)
Spatial Average (averaged over the whole body)	0.08	0.4
Spatial Peak (averaged over any 1 g of tissue)	**1.60**	8.0
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)	4.0	20.0

Population/Uncontrolled Environments are defined as locations where there is the exposure of individual who have no knowledge or control of their exposure.

Occupational/Controlled Environments are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure (i.e. as a result of employment or occupation).

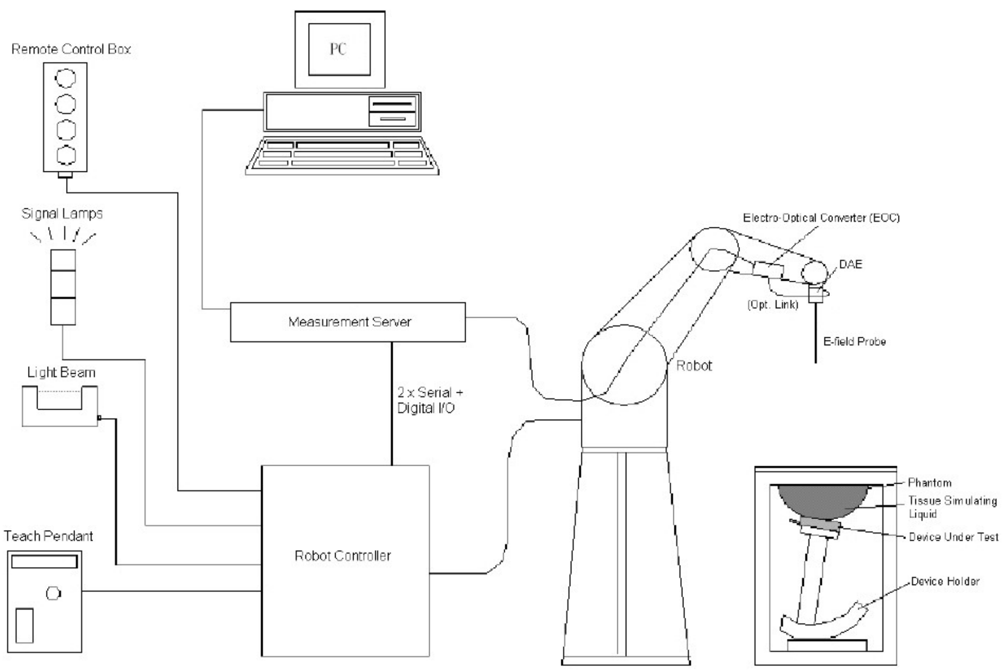
General Population/Uncontrolled environments Spatial Peak limit 1.6W/kg for 1g SAR applied to the EUT.

3. SAR MEASUREMENT SYSTEM

These measurements were performed with the automated near-field scanning system DASY5 from Schmid & Partner Engineering AG (SPEAG) which is the Fifth generation of the system shown in the figure hereinafter:

DASY5 System Description

The DASY5 system 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 application, 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 Win7 professional operating system and the DASY52 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.

DASY5 Measurement Server

The DASY5 measurement server is based on a PC/104 CPU board with a 400MHz Intel ULV Celeron, 128MB chip-disk and 128MB RAM. The necessary circuits for communication with the DAE4 (or DAE3) electronics box, as well as the 16 bit AD-converter system for optical detection and digital I/O interface are contained on the DASY5 I/O board, which is directly connected to the PC/104 bus of the CPU board.

The measurement server performs all real-time data evaluation of field measurements and surface detection, controls robot movements and handles safety operation. The PC operating system cannot interfere with these time critical processes. All connections are supervised by a watchdog, and disconnection of any of the cables to the measurement server will automatically disarm the robot and disable all program-controlled robot movements. Furthermore, the measurement server is equipped with an expansion port which is reserved for future applications. Please note that this expansion port does not have a standardized point out, and therefore only devices provided by SPEAG can be connected. Devices from any other supplier could seriously damage the measurement server.

Data Acquisition Electronics

The data acquisition electronics (DAE4) consist 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 with a 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 mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection.

The input impedance of both the DAE4 as well as of the DAE3 box is 200MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

EX3DV4 E-Field Probes

Frequency	10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 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 µW/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 µW/g)
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields); the only probe that enables compliance testing for frequencies up to 6 GHz with precision of better 30%.
Compatibility	DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI

Calibration Frequency Points for EX3DV4 E-Field Probes SN: 7522 Calibrated: 2021/4/19

Calibration Frequency Point(MHz)	Frequency Range(MHz)		Conversion Factor		
	From	To	X	Y	Z
750 Head	650	850	9.93	9.93	9.93
750 Body	650	850	9.87	9.87	9.87
900 Head	850	1000	9.39	9.39	9.39
900 Body	850	1000	9.31	9.31	9.31
1750 Head	1650	1850	8.16	8.16	8.16
1750 Body	1650	1850	7.83	7.83	7.83
1900 Head	1850	2000	7.94	7.94	7.94
1900 Body	1850	2000	7.66	7.66	7.66
2300 Head	2200	2400	7.61	7.61	7.61
2300 Body	2200	2400	7.45	7.45	7.45
2450 Head	2400	2550	7.25	7.25	7.25
2450 Body	2400	2550	7.29	7.29	7.29
2600 Head	2550	2700	7.05	7.05	7.05
2600 Body	2550	2700	7.01	7.01	7.01

Calibration Frequency Points for EX3DV4 E-Field Probes SN: 7329 Calibrated: 2021/12/31

Calibration Frequency Point(MHz)	Frequency Range(MHz)		Conversion Factor		
	From	To	X	Y	Z
750 Head	650	850	10.06	10.06	10.06
900 Head	850	1000	9.68	9.68	9.68
1450 Head	1350	1550	8.64	8.64	8.64
1750 Head	1650	1850	8.23	8.23	8.23
1900 Head	1850	2000	8.00	8.00	8.00
2100 Head	2000	2200	7.90	7.90	7.90
2300 Head	2200	2400	7.73	7.73	7.73
2450 Head	2400	2550	7.42	7.42	7.42
2600 Head	2550	2700	7.15	7.15	7.15
5200 Head	5090	5250	5.49	5.49	5.49
5300 Head	5250	5410	5.20	5.20	5.20
5600 Head	5490	5700	4.77	4.77	4.77
5800 Head	5700	5910	4.75	4.75	4.75

SAM Twin Phantom

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

The phantom table for the DASY systems based on the robots have the size of 100 x 50 x 85 cm (L x W x H).
For easy dislocation these tables have fork lift cut outs at the bottom.
The bottom plate contains three pairs of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. Only one device holder is necessary if two phantoms are used (e.g., for different liquids)

A white cover is provided to cover the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. Free space scans of devices on top of this phantom cover are possible. Three reference marks are provided on the phantom counter. These reference marks are used to teach the absolute phantom position relative to the robot.

Robots

The DASY5 system uses the high precision industrial robot. The robot offers the same features important for our application:

- High precision (repeatability 0.02mm)
- High reliability (industrial design)
- Low maintenance costs (virtually maintenance free due to direct drive gears; no belt drives)
- Jerk-free straight movements (brushless synchrony motors; no stepper motors)
- Low ELF interference (motor control fields shielded via the closed metallic construction shields)

The above mentioned robots are controlled by the Staubli CS8c robot controllers. All information regarding the use and maintenance of the robot arm and the robot controller is contained on the CDs delivered along with the robot. Paper manuals are available upon request direct from Staubli.

SAR Scan Pricedures

Step 1: 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. The minimum distance of probe sensors to surface is 1.4 mm. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

Step 2: Area Scans

Area scans are defined prior to the measurement process being executed with a user defined variable spacing between each measurement point (integral) allowing low uncertainty measurements to be conducted. Scans defined for FCC applications utilize a 15mm 2 step integral, with 1.5mm interpolation used to locate the peak SAR area used for zoom scan assessments.

Where the system identifies multiple SAR peaks (which are within 25% of peak value) the system will provide the user with the option of assessing each peak location individually for zoom scan averaging.

Area Scan Parameters extracted from IEC/IEEE 62209-1528:2020.

Table 3 – Area scan parameters

Parameter	DUT transmit frequency being tested	
	$f \le 3$ GHz	3 GHz $< f \le 10$ GHz
Maximum distance between the measured points (geometric centre of the sensors) and the inner phantom surface (z_{M1} in Figure 20 in mm)	5 ± 1	δ ln(2)/2 ± 0,5 [a]
Maximum spacing between adjacent measured points in mm (see O.8.3.1)[b]	20, or half of the corresponding zoom scan length, whichever is smaller	$60/f$, or half of the corresponding zoom scan length, whichever is smaller
Maximum angle between the probe axis and the phantom surface normal (α in Figure 20)[c]	5° (flat phantom only) 30° (other phantoms)	5° (flat phantom only) 20° (other phantoms)
Tolerance in the probe angle	1°	1°

[a] δ is the penetration depth for a plane-wave incident normally on a planar half-space.

[b] See Clause O.8 on how Δx and Δy may be selected for individual area scan requirements.

[c] The probe angle relative to the phantom surface normal is restricted due to the degradation in the measurement accuracy in fields with steep spatial gradients. The measurement accuracy decreases with increasing probe angle and increasing frequency. This is the reason for the tighter probe angle restriction at frequencies above 3 GHz.

Step 3: Zoom Scan (Cube Scan Averaging)

The averaging zoom scan volume utilized in the DASY5 software is in the shape of a cube and the side dimension of a 1 g or 10 g mass is dependent on the density of the liquid representing the simulated tissue. A density of 1000 kg/m^3 is used to represent the head and body tissue density and not the phantom liquid density, in order to be consistent with the definition of the liquid dielectric properties, i.e. the side length of the 1g cube is 10mm,with the side length of the 10g cube is 21.5mm.

Zoom Scan Parameters extracted from IEC/IEEE 62209-1528:2020.

Table 4 – Zoom scan parameters

Parameter	DUT transmit frequency being tested	
	$f \leq 3$ GHz	3 GHz $< f \leq 10$ GHz
Maximum distance between the closest measured points and the phantom surface (z_{M1} in Figure 20 and Table 3, in mm)	5	$\delta \ln(2)/2$ [a]
Maximum angle between the probe axis and the phantom surface normal (α in Figure 20)	5° (flat phantom only) 30° (other phantoms)	5° (flat phantom only) 20° (other phantoms)
Maximum spacing between measured points in the x- and y-directions (Δx and Δy, in mm)	8	$24 / f$ [b]
For uniform grids: Maximum spacing between measured points in the direction normal to the phantom shell (Δz_1 in Figure 20, in mm)	5	$10 / (f - 1)$
For graded grids: Maximum spacing between the two closest measured points in the direction normal to the phantom shell (Δz_1 in Figure 20, in mm)	4	$12 / f$
For graded grids: Maximum incremental increase in the spacing between measured points in the direction normal to the phantom shell ($R_z = \Delta z_2 / \Delta z_1$ in Figure 20)	1,5	1,5
Minimum edge length of the zoom scan volume in the x- and y-directions (L_z in O.8.3.2, in mm)	30	22
Minimum edge length of the zoom scan volume in the direction normal to the phantom shell (L_h in O.8.3.2 in mm)	30	22
Tolerance in the probe angle	1°	1°

[a] δ is the penetration depth for a plane-wave incident normally on a planar half-space.

[b] This is the maximum spacing allowed, which might not work for all circumstances.

Step 4: Power Drift Measurement

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

When the cube intersects with the surface of the phantom, it is oriented so that 3 vertices touch the surface of the shell or the center of a face is tangent to the surface. The face of the cube closest to the surface is modified in order to conform to the tangent surface.

The zoom scan integer steps can be user defined so as to reduce uncertainty, but normal practice for typical test applications (including FCC) utilize a physical step of 7 x7 x 7 (5mmx5mmx5mm) providing a volume of 30 mm in the X & Y & Z axis.

The head tissue dielectric parameters recommended by the IEC/IEEE 62209-1528:2020

Recommended Tissue Dielectric Parameters for Head liquid

Table 2 – Dielectric properties of the tissue-equivalent medium

Frequency MHz	Real part of the complex relative permittivity, ε_r'	Conductivity, σ S/m	Penetration depth (E-field), δ mm
4	*55,0*	*0,75*	293,0
13	*55,0*	*0,75*	165,5
30	55,0	0,75	112,8
150	52,3	0,76	62,0
300	45,3	0,87	46,1
450	43,5	0,87	43,0
750	*41,9*	*0,89*	39,8
835	41,5	0,90	39,0
900	41,5	0,97	36,2
1 450	40,5	1,20	28,6
1 800	40,0	1,40	24,3
1 900	40,0	1,40	24,3
1 950	40,0	1,40	24,3
2 000	40,0	1,40	24,3
2 100	*39,8*	*1,49*	22,8
2 450	39,2	1,80	18,7
2 600	*39,0*	*1,96*	17,2
3 000	38,5	2,40	14,0
3 500	*37,9*	*2,91*	11,4
4 000	*37,4*	*3,43*	10,0
4 500	*36,8*	*3,94*	9,7
5 000	*36,2*	*4,45*	1,5
5 200	*36,0*	*4,66*	8,4
5 400	*35,8*	*4,86*	8,1
5 600	*35,5*	*5,07*	7,5
5 800	35,3	5,27	7,3
6 000	*35,1*	*5,48*	7,0
6 500	*34,5*	*6,07*	6,7
7 000	*33,9*	*6,65*	6,4
7 500	*33,3*	*7,24*	6,1
8 000	*32,7*	*7,84*	5,9
8 500	*32,1*	*8,46*	5,3
9 000	*31,6*	*9,08*	4,8
9 500	*31,0*	*9,71*	4,4
10 000	*30,4*	*10,40*	4,0

NOTE For convenience, permittivity and conductivity values are linearly interpolated for frequencies that are not a part of the original data from Drossos et al. [2]. They are shown in italics in Table 2. The italicized values are linearly interpolated (below 5 800 MHz) or extrapolated (above 5 800 MHz) from the non-italicized values that are immediately above and below these values.

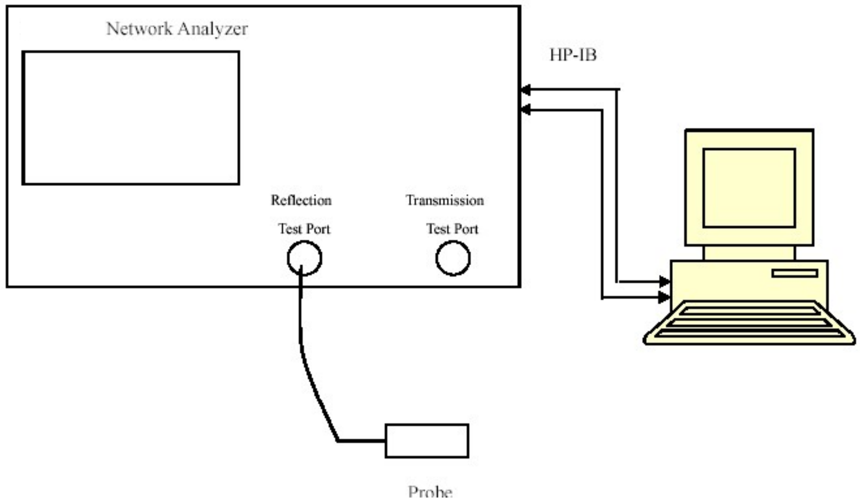
EQUIPMENT LIST AND CALIBRATION

Equipments List & Calibration Information

Equipment	Model	S/N	Calibration Date	Calibration Due Date
DASY5 Test Software	DASY52.10	N/A	NCR	NCR
DASY5 Measurement Server	DASY5 4.5.12	1567	NCR	NCR
Data Acquisition Electronics	DAE4	1354	2021/9/1	2022/8/31
E-Field Probe	EX3DV4	7522	2021/4/19	2022/4/18
E-Field Probe	EX3DV4	7329	2021/12/31	2022/12/30
Mounting Device	MD4HHTV5	BJPCTC0152	NCR	NCR
Twin SAM	Twin SAM V5.0	1412	NCR	NCR
Dipole, 750 MHz	D750V3	1167	2019/11/20	2022/11/19
Dipole, 1750 MHz	D1750V2	1141	2021/6/29	2024/6/28
Dipole, 1900 MHz	D1900V2	543	2019/10/15	2022/10/14
Dipole, 2450 MHz	D2450V2	971	2021/6/28	2024/6/27
Dipole,5GHz	D5GHzV2	1246	2019/11/19	2022/11/18
Simulated Tissue 750 MHz	TS-750	2009075001	Each Time	/
Simulated Tissue 1750 MHz	TS-1750	2003175001	Each Time	/
Simulated Tissue 1900 MHz	TS-1900	2003190001	Each Time	/
Simulated Tissue 2450 MHz	TS-2450	2003245001	Each Time	/
Simulated Tissue 5250 MHz	TS-5250	2001525001	Each Time	/
Simulated Tissue 5300 MHz	TS-5300	2001530001	Each Time	/
Simulated Tissue 5600 MHz	TS-5600	2001560001	Each Time	/
Simulated Tissue 5800 MHz	TS-5800	2001580001	Each Time	/
Network Analyzer	8753C	3033A02857	2021/9/12	2022/9/11
Dielectric assessment kit	1253	SM DAK 040 CA	NCR	NCR
synthesized signal generator	8665B	3438a00584	2021/9/12	2022/9/11
EPM Series Power Meter	E4419B	MY45103907	2021/5/9	2022/5/8
Power Amplifier	ZVA-183-S+	5969001149	NCR	NCR
Directional Coupler	441493	520Z	2021/9/15	2022/9/14
Attenuator	20dB, 100W	LN749	2021/9/15	2022/9/14
Attenuator	6dB, 150W	2754	2021/9/15	2022/9/14
R&S, universal Radio Communication Tester	CMU200	106891	2021/10/26	2022/10/25
Wideband Radio Communication Tester	CMW500	110479	2021/10/26	2022/10/25

SAR MEASUREMENT SYSTEM VERIFICATION

Liquid Verification



Liquid Verification Setup Block Diagram

Liquid Verification Results

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	Ơ (S/m)	ε_r	Ơ (S/m)	$\Delta\varepsilon_r$	ΔƠ (S/m)	
673	Simulated Tissue 750 MHz	42.411	0.856	42.31	0.88	0.24	-2.73	±10
680.5	Simulated Tissue 750 MHz	42.345	0.863	42.27	0.89	0.18	-3.03	±10
688	Simulated Tissue 750 MHz	42.233	0.868	42.23	0.89	0.01	-2.47	±10
704	Simulated Tissue 750 MHz	42.121	0.872	42.15	0.89	-0.07	-2.02	±10
707.5	Simulated Tissue 750 MHz	42.079	0.877	42.13	0.89	-0.12	-1.46	±10
711	Simulated Tissue 750 MHz	42.056	0.881	42.11	0.89	-0.13	-1.01	±10
750	Simulated Tissue 750 MHz	42.022	0.887	41.9	0.89	0.29	-0.34	±10
782	Simulated Tissue 750 MHz	41.81	0.895	41.75	0.89	0.14	0.56	±10
793	Simulated Tissue 750 MHz	41.633	0.904	41.7	0.9	-0.16	0.44	±10
826.4	Simulated Tissue 750 MHz	41.606	0.908	41.54	0.9	0.16	0.89	±10
829	Simulated Tissue 750 MHz	41.553	0.911	41.53	0.9	0.06	1.22	±10
836.5	Simulated Tissue 750 MHz	41.547	0.917	41.5	0.9	0.11	1.89	±10
836.6	Simulated Tissue 750 MHz	41.537	0.921	41.5	0.9	0.11	2.33	±10
844	Simulated Tissue 750 MHz	41.441	0.929	41.5	0.91	-0.14	2.09	±10
846.6	Simulated Tissue 750 MHz	41.419	0.934	41.5	0.91	-0.2	2.64	±10

**Liquid Verification above was performed on 2021/12/29.*

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	Ơ (S/m)	ε_r	Ơ (S/m)	$\Delta\varepsilon_r$	ΔƠ (S/m)	
1712.4	Simulated Tissue 1750 MHz	40.282	1.325	40.13	1.35	0.38	-1.85	±10
1720	Simulated Tissue 1750 MHz	40.255	1.334	40.13	1.35	0.31	-1.19	±10
1732.6	Simulated Tissue 1750 MHz	40.208	1.344	40.12	1.36	0.22	-1.18	±10
1745	Simulated Tissue 1750 MHz	40.176	1.352	40.1	1.37	0.19	-1.31	±10
1750	Simulated Tissue 1750 MHz	40.107	1.363	40.1	1.37	0.02	-0.51	±10
1752.6	Simulated Tissue 1750 MHz	40.053	1.369	40.09	1.37	-0.09	-0.07	±10
1770	Simulated Tissue 1750 MHz	39.974	1.374	40.06	1.38	-0.21	-0.43	±10

**Liquid Verification above was performed on 2021/12/28.*

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	Ơ (S/m)	ε_r	Ơ (S/m)	$\Delta\varepsilon_r$	ΔƠ (S/m)	
1852.4	Simulated Tissue 1900 MHz	39.968	1.385	40	1.4	-0.08	-1.07	±10
1860	Simulated Tissue 1900 MHz	39.944	1.389	40	1.4	-0.14	-0.79	±10
1880	Simulated Tissue 1900 MHz	39.927	1.397	40	1.4	-0.18	-0.21	±10
1900	Simulated Tissue 1900 MHz	39.921	1.405	40	1.4	-0.2	0.36	±10
1907.6	Simulated Tissue 1900 MHz	39.893	1.418	40	1.4	-0.27	1.29	±10

**Liquid Verification above was performed on 2021/12/30.*

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	Ơ (S/m)	ε_r	Ơ (S/m)	$\Delta\varepsilon_r$	ΔƠ (S/m)	
2412	Simulated Tissue 2450 MHz	39.403	1.784	39.28	1.77	0.31	0.79	±10
2437	Simulated Tissue 2450 MHz	39.279	1.798	39.23	1.79	0.12	0.45	±10
2450	Simulated Tissue 2450 MHz	39.141	1.812	39.2	1.8	-0.15	0.67	±10
2462	Simulated Tissue 2450 MHz	39.042	1.838	39.18	1.81	-0.35	1.55	±10

**Liquid Verification above was performed on 2021/12/29.*

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	Ơ (S/m)	ε_r	Ơ (S/m)	$\Delta\varepsilon_r$	ΔƠ (S/m)	
5180	Simulated Tissue 5250 MHz	36.236	4.581	36.02	4.64	0.6	-1.27	±10
5200	Simulated Tissue 5250 MHz	36.107	4.632	36	4.66	0.3	-0.6	±10
5240	Simulated Tissue 5250 MHz	35.842	4.706	35.96	4.7	-0.33	0.13	±10
5250	Simulated Tissue 5250 MHz	35.789	4.738	35.95	4.71	-0.45	0.59	±10

**Liquid Verification above was performed on 2022/01/26.*

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	Ơ (S/m)	ε_r	Ơ (S/m)	$\Delta\varepsilon_r$	ΔƠ (S/m)	
5260	Simulated Tissue 5300 MHz	35.855	4.692	35.94	4.72	-0.24	-0.59	±10
5280	Simulated Tissue 5300 MHz	35.901	4.707	35.92	4.74	-0.05	-0.7	±10
5300	Simulated Tissue 5300 MHz	35.937	4.783	35.9	4.76	0.1	0.48	±10
5320	Simulated Tissue 5300 MHz	35.965	4.801	35.88	4.78	0.24	0.44	±10

**Liquid Verification above was performed on 2022/01/26.*

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	Ơ (S/m)	ε_r	Ơ (S/m)	$\Delta\varepsilon_r$	ΔƠ (S/m)	
5500	Simulated Tissue 5600 MHz	35.741	4.823	35.65	4.97	0.26	-2.96	±10
5580	Simulated Tissue 5600 MHz	35.705	4.914	35.53	5.05	0.49	-2.69	±10
5600	Simulated Tissue 5600 MHz	35.682	5.048	35.5	5.07	0.51	-0.43	±10
5700	Simulated Tissue 5600 MHz	35.424	5.342	35.4	5.17	0.07	3.33	±10

**Liquid Verification above was performed on 2022/01/26.*

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	Ơ (S/m)	ε_r	Ơ (S/m)	$\Delta\varepsilon_r$	ΔƠ (S/m)	
5720	Simulated Tissue 5800 MHz	35.615	5.153	35.38	5.19	0.66	-0.71	±10
5745	Simulated Tissue 5800 MHz	35.469	5.175	35.36	5.22	0.31	-0.86	±10
5785	Simulated Tissue 5800 MHz	35.396	5.198	35.32	5.26	0.22	-1.18	±10
5800	Simulated Tissue 5800 MHz	35.242	5.204	35.3	5.27	-0.16	-1.25	±10
5825	Simulated Tissue 5800 MHz	35.186	5.268	35.28	5.3	-0.27	-0.6	±10

**Liquid Verification above was performed on 2022/01/26.*

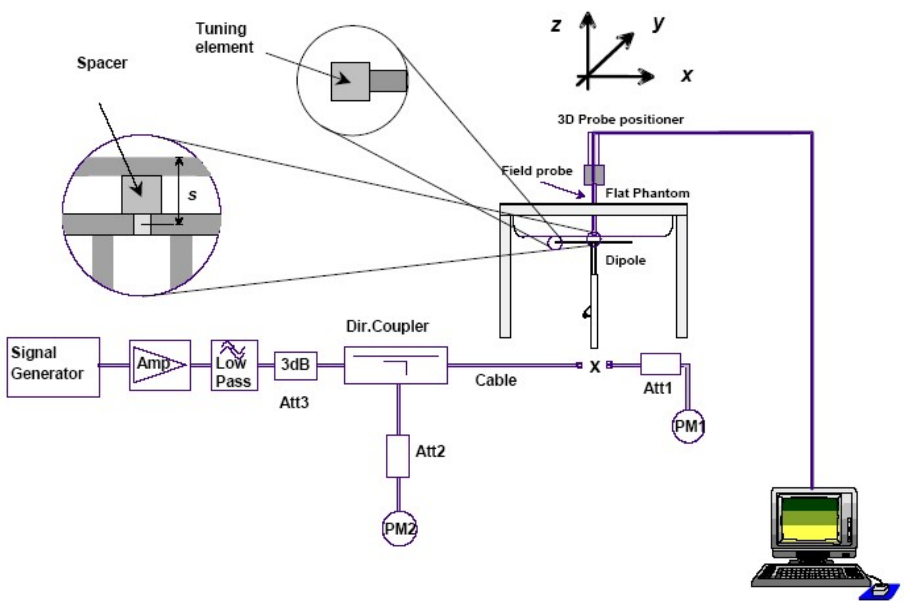
System Accuracy Verification

Prior to the assessment, the system validation kit was used to test whether the system was operating within its specifications of ±10%. The validation results are tabulated below. And also the corresponding SAR plot is attached as well in the SAR plots files.

The spacing distances *s* in the **System Verification Setup Block Diagram** is given by the following:

a) s = 15 mm ± 0,2 mm for 300 MHz ≤ f ≤ 1 000 MHz;
b) s = 10 mm ± 0,2 mm for 1 000 MHz < f ≤ 3 000 MHz;
c) s = 10 mm ± 0,2 mm for 3 000 MHz < f ≤ 6 000 MHz.

System Verification Setup Block Diagram



System Accuracy Check Results

Date	Frequency Band	Liquid Type	Input Power (mW)	Measured SAR (W/kg)		Normalized to 1W (W/kg)	Target Value (W/kg)	Delta (%)	Tolerance (%)
2021/12/29	750 MHz	Simulated Tissue 750 MHz	100	1g	0.854	8.54	8.38	1.91	±10
2021/12/28	1750 MHz	Simulated Tissue 1750 MHz	100	1g	3.69	36.9	36.1	2.22	±10
2021/12/30	1900 MHz	Simulated Tissue 1900 MHz	100	1g	3.85	38.5	40.2	-4.23	±10
2021/12/29	2450 MHz	Simulated Tissue 2450 MHz	100	1g	5.13	51.3	53.5	-4.11	±10
2022/01/26	5250 MHz	Simulated Tissue 5250 MHz	100	1g	7.71	77.1	75.0	2.8	±10
2022/01/26	5300 MHz	Simulated Tissue 5300 MHz	100	1g	7.83	78.3	77.2	1.42	±10
2022/01/26	5600 MHz	Simulated Tissue 5600 MHz	100	1g	8.26	82.6	79.8	3.51	±10

2022/01/26	5800 MHz	Simulated Tissue 5800 MHz	100	1g	7.88	78.8	77.9	1.16	±10

*The SAR values above are normalized to 1 Watt forward power.

SAR SYSTEM VALIDATION DATA

System Performance 750 MHz

DUT: D750V3; Type: 750 MHz; Serial: 1167

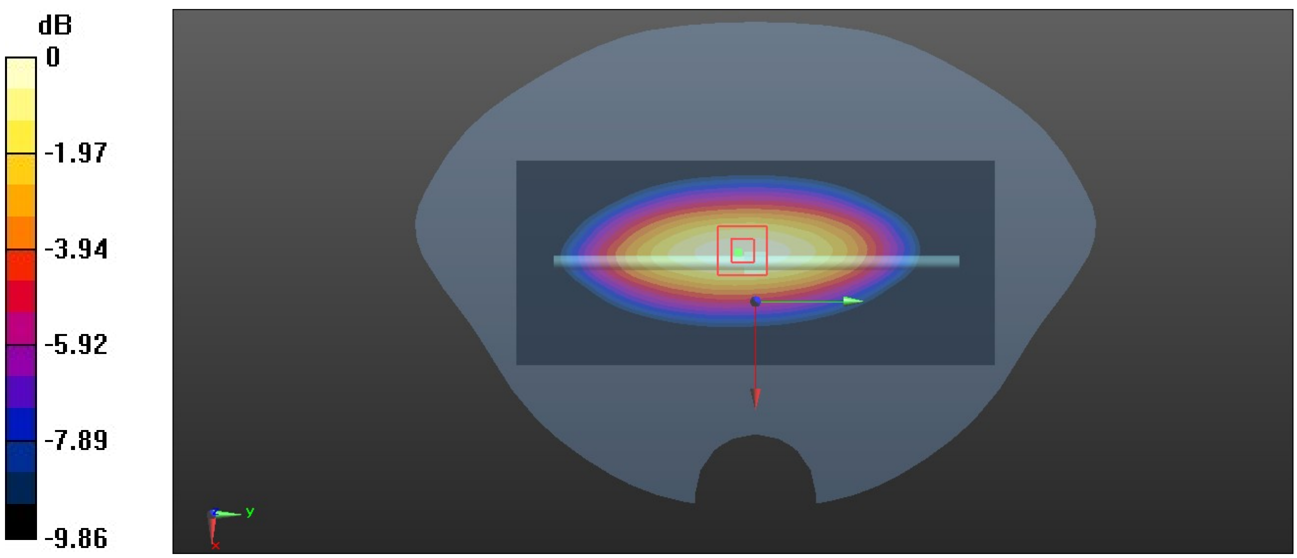
Communication System: CW; Frequency: 750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 750 MHz; σ = 0.887 S/m; ε_r = 42.022; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7522; ConvF(9.93, 9.93, 9.93) @ 750 MHz; Calibrated: 2021/4/19
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1354; Calibrated: 2021/9/1
- Phantom: Twin SAM; Type: Twin SAM V5.0; Serial: TP:1412
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Area Scan (61x141x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.16 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 30.64 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 1.38 W/kg
SAR(1 g) = 0.854 W/kg; SAR(10 g) = 0.558 W/kg
Maximum value of SAR (measured) = 1.19 W/kg



0 dB = 1.19 W/kg = 0.76 dBW/kg

System Performance 1750MHz

DUT: D1750V2; Type: 1750 MHz; Serial: 1141

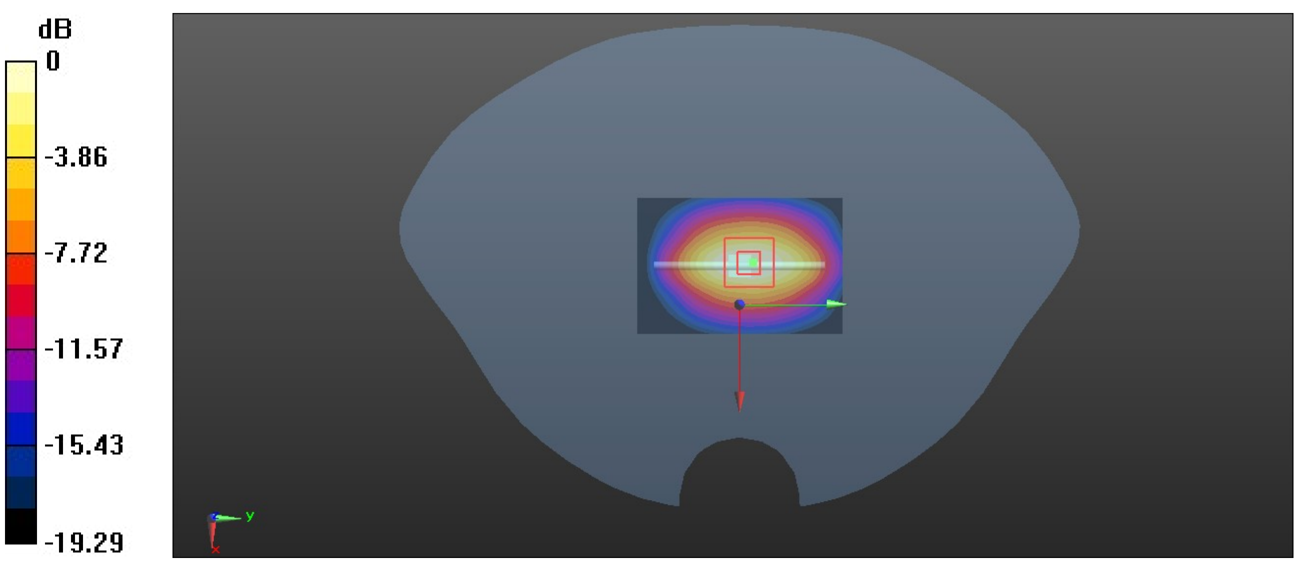
Communication System: CW; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1750 MHz; σ = 1.363 S/m; ε_r = 40.107; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7522; ConvF(8.16, 8.16, 8.16) @ 1750 MHz; Calibrated: 2021/4/19
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1354; Calibrated: 2021/9/1
- Phantom: Twin SAM; Type: Twin SAM V5.0; Serial: TP:1412
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Area Scan (41x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 5.96 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 54.23 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 6.59 W/kg
SAR(1 g) = 3.69 W/kg; SAR(10 g) = 1.95 W/kg
Maximum value of SAR (measured) = 5.53 W/kg



0 dB = 5.53 W/kg = 7.43 dBW/kg

System Performance 1900MHz

DUT: D1900V2; Type: 1900 MHz; Serial: 543

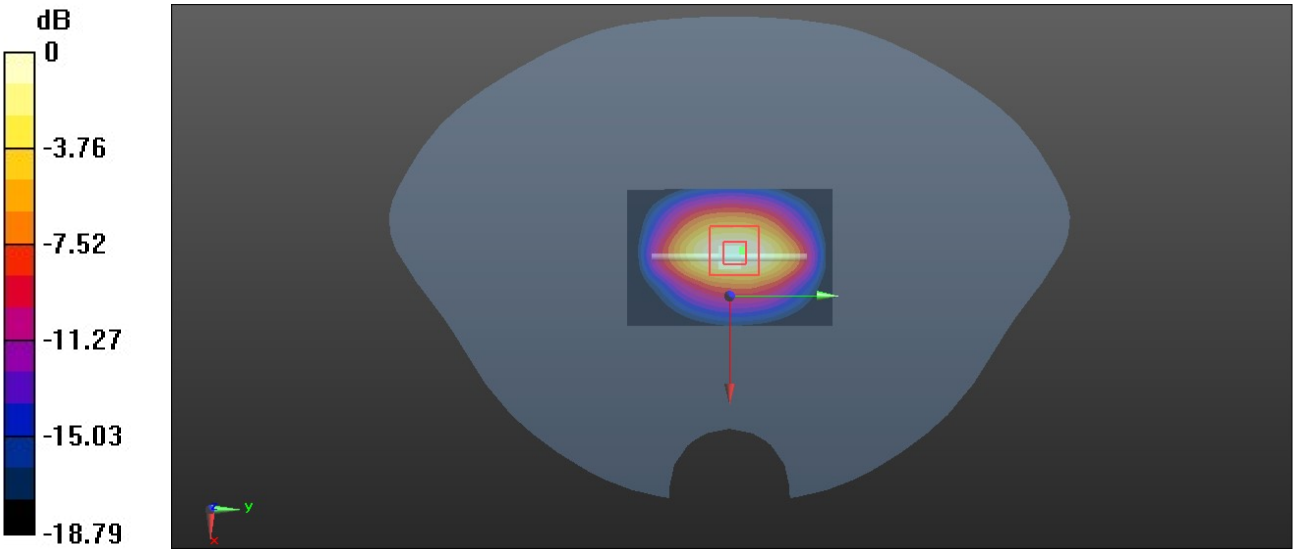
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.405 S/m; ε_r = 39.921; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7522; ConvF(7.94, 7.94, 7.94) @ 1900 MHz; Calibrated: 2021/4/19
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1354; Calibrated: 2021/9/1
- Phantom: Twin SAM; Type: Twin SAM V5.0; Serial: TP:1412
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Area Scan (41x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 5.97 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 52.52 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 6.74 W/kg
SAR(1 g) = 3.85 W/kg; SAR(10 g) = 1.99 W/kg
Maximum value of SAR (measured) = 5.56 W/kg



0 dB = 5.56 W/kg = 7.45 dBW/kg

System Performance 2450MHz

DUT: D2450V2; Type: 2450 MHz; Serial: 971

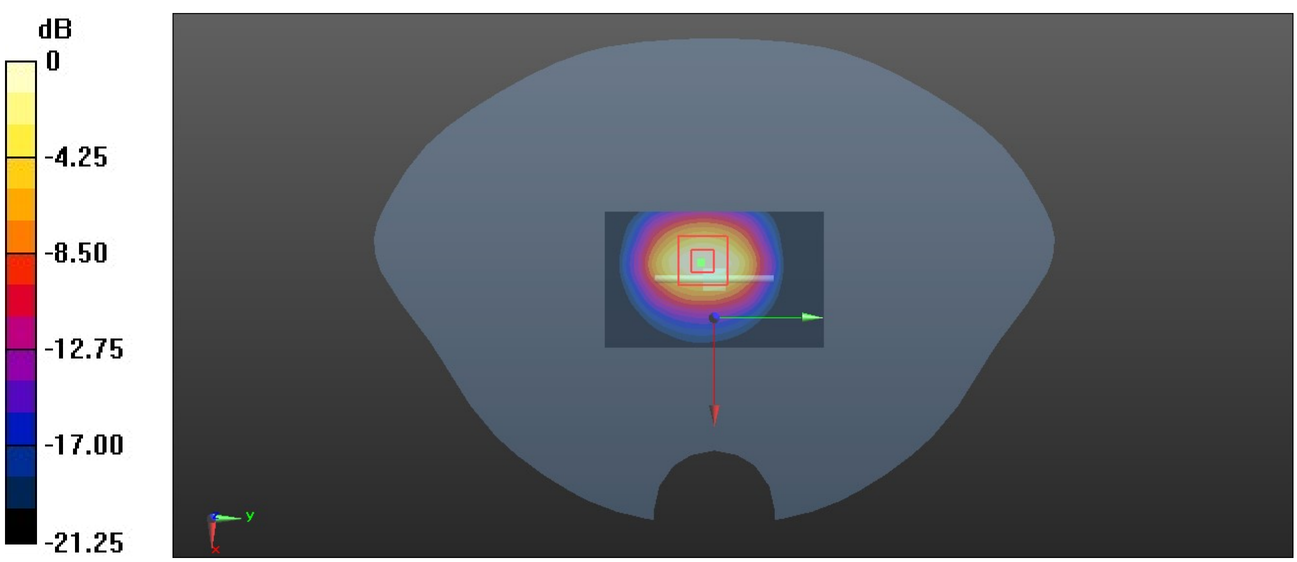
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.812 S/m; ε_r = 39.141; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7522; ConvF(7.25, 7.25, 7.25) @ 2450 MHz; Calibrated: 2021/4/19
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1354; Calibrated: 2021/9/1
- Phantom: Twin SAM; Type: Twin SAM V5.0; Serial: TP:1412
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Area Scan (51x81x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 8.78 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 44.72 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 10.2 W/kg
SAR(1 g) = 5.13 W/kg; SAR(10 g) = 2.36 W/kg
Maximum value of SAR (measured) = 8.27 W/kg



0 dB = 8.27 W/kg = 9.18 dBW/kg

System Performance 5250MHz

DUT: D5GHzV2; Type: 5250MHz; Serial: 1246

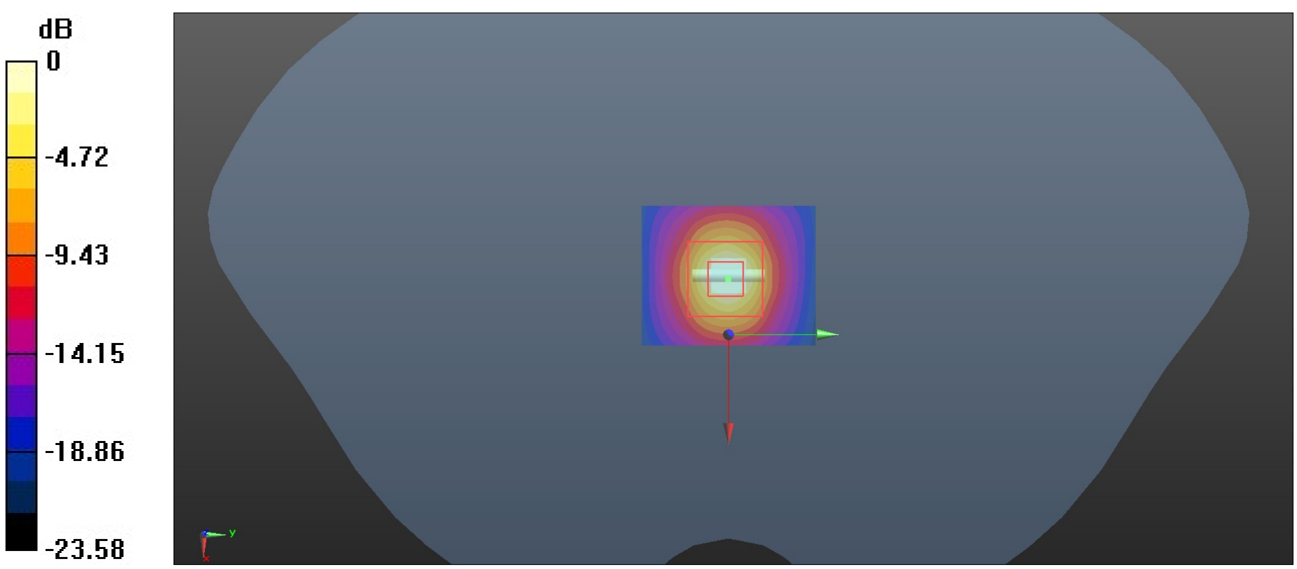
Communication System: CW; Frequency: 5250 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5250 MHz; σ = 4.738 S/m; ε_r = 35.789; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7329; ConvF(5.49, 5.49, 5.49) @ 5250 MHz; Calibrated: 2021/12/31
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1354; Calibrated: 2021/9/1
- Phantom: Twin SAM; Type: Twin SAM V5.0; Serial: TP:1412
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Area Scan (41x51x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 24.1 W/kg

Zoom Scan (8x8x16)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 44.76 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 37.2 W/kg
SAR(1 g) = 7.71 W/kg; SAR(10 g) = 2.19 W/kg
Maximum value of SAR (measured) = 22.1 W/kg



0 dB = 22.1 W/kg = 13.44 dBW/kg

System Performance 5300MHz

DUT: D5GHzV2; Type: 5300MHz; Serial: 1246

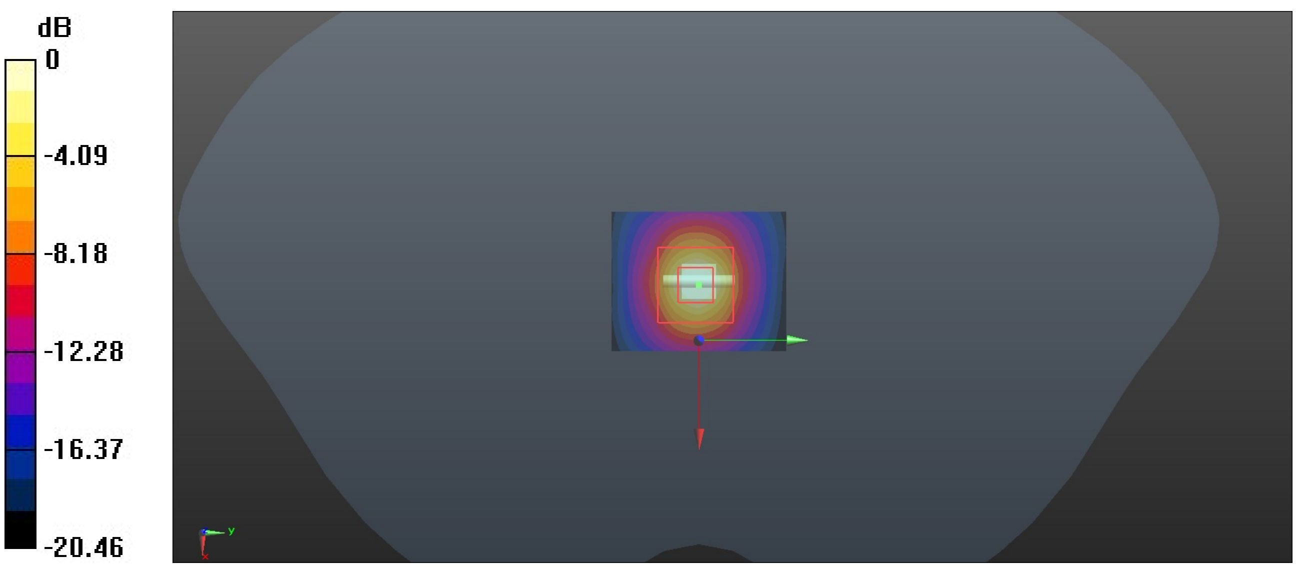
Communication System: CW; Frequency: 5300 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5300 MHz; σ = 4.783 S/m; ε_r = 35.937; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7329; ConvF(5.2, 5.2, 5.2) @ 5300 MHz; Calibrated: 2021/12/31
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1354; Calibrated: 2021/9/1
- Phantom: Twin SAM; Type: Twin SAM V5.0; Serial: TP:1412
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Area Scan (41x51x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 22.8 W/kg

Zoom Scan (8x8x16)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 43.81 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 36.1 W/kg
SAR(1 g) = 7.83 W/kg; SAR(10 g) = 2.27 W/kg
Maximum value of SAR (measured) = 21.2 W/kg



0 dB = 21.2 W/kg = 13.26 dBW/kg

System Performance 5600MHz

DUT: D5GHzV2; Type: 5600MHz; Serial: 1246

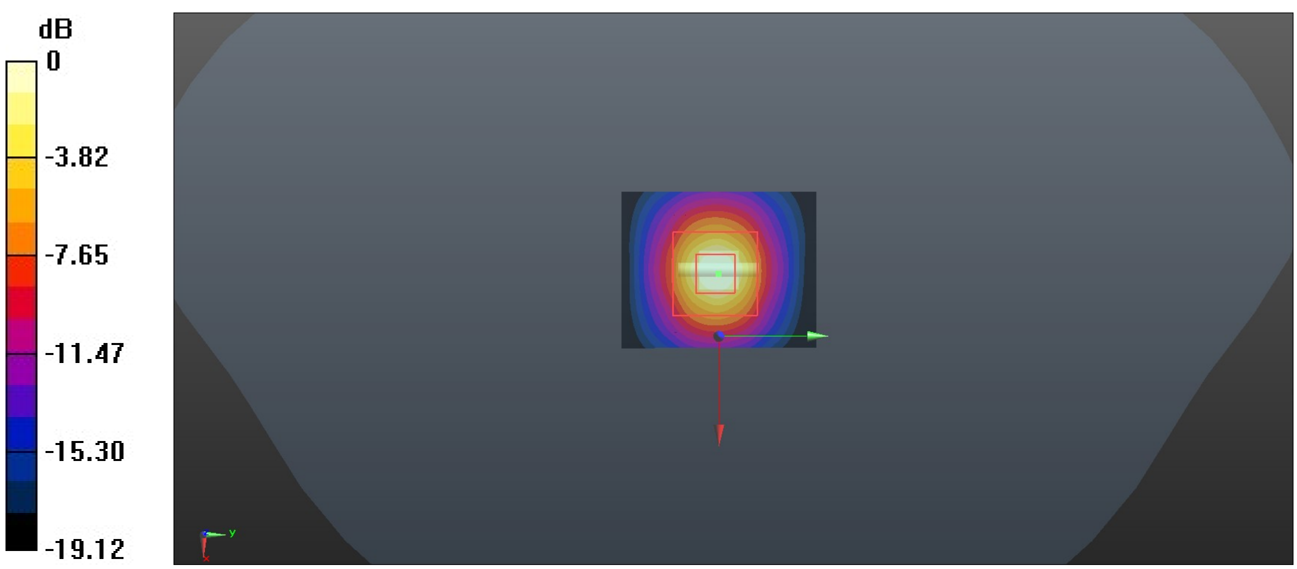
Communication System: CW; Frequency: 5600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5600 MHz; σ = 5.048 S/m; ε_r = 35.682; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7329; ConvF(4.77, 4.77, 4.77) @ 5600 MHz; Calibrated: 2021/12/31
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1354; Calibrated: 2021/9/1
- Phantom: Twin SAM; Type: Twin SAM V5.0; Serial: TP:1412
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Area Scan (41x51x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 25.3 W/kg

Zoom Scan (8x8x16)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 42.89 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 43.6 W/kg
SAR(1 g) = 8.26 W/kg; SAR(10 g) = 2.38 W/kg
Maximum value of SAR (measured) = 23.7 W/kg



0 dB = 23.7 W/kg = 13.75 dBW/kg

System Performance 5800MHz

DUT: D5GHzV2; Type: 5800MHz; Serial: 1246

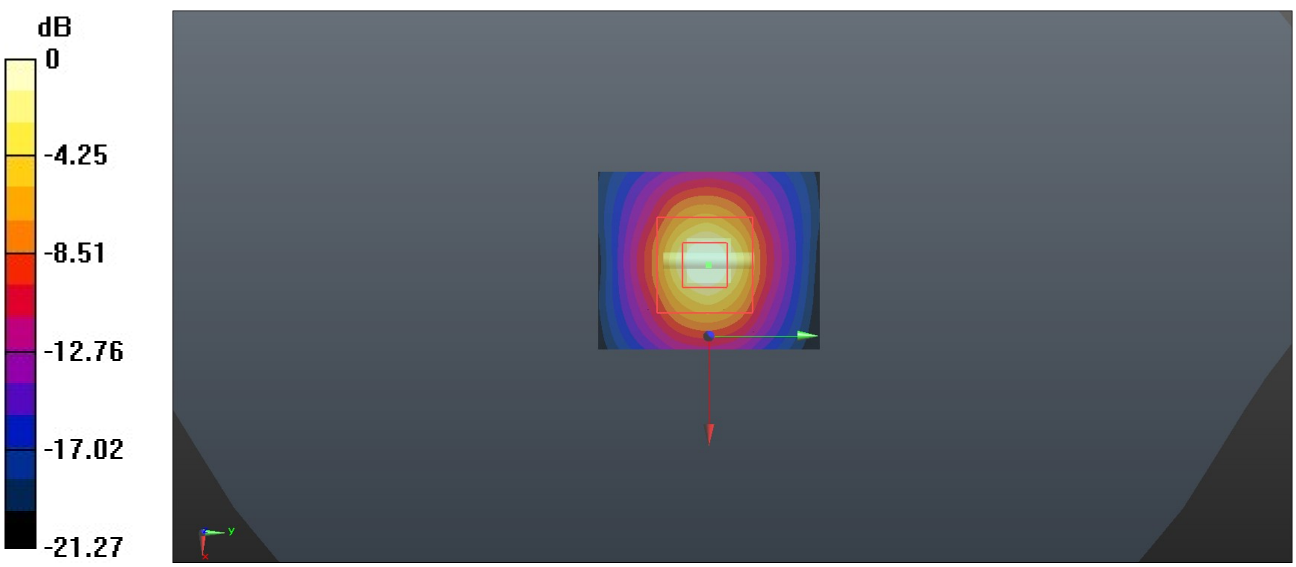
Communication System: CW; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5800 MHz; σ = 5.204 S/m; ε_r = 35.242; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7329; ConvF(4.75, 4.75, 4.75) @ 5800 MHz; Calibrated: 2021/12/31
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1354; Calibrated: 2021/9/1
- Phantom: Twin SAM; Type: Twin SAM V5.0; Serial: TP:1412
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Area Scan (41x51x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 23.6 W/kg

Zoom Scan (8x8x16)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 40.46 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 41.7 W/kg
SAR(1 g) = 7.88 W/kg; SAR(10 g) = 2.24 W/kg
Maximum value of SAR (measured) = 22.6 W/kg



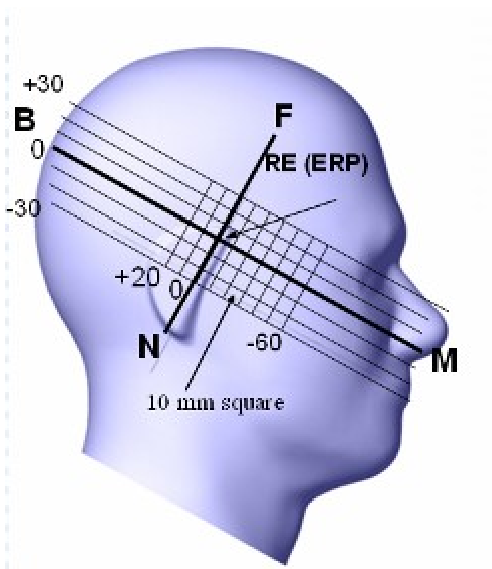
0 dB = 22.6 W/kg = 13.54 dBW/kg

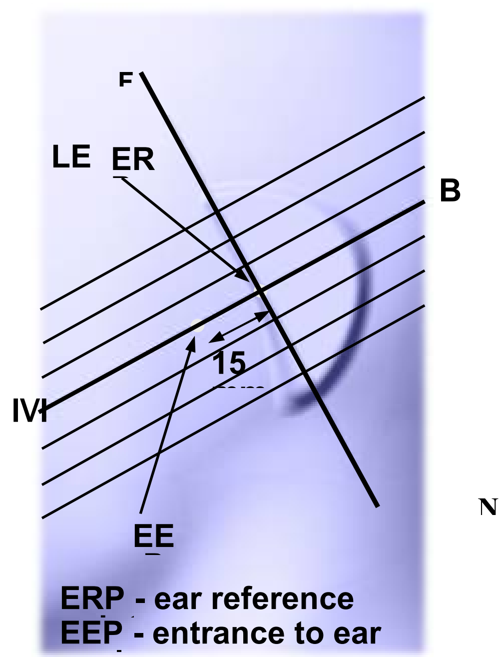
EUT TEST STRATEGY AND METHODOLOGY

Test Positions for Device Operating Next to a Person's Ear

This category includes most wireless handsets with fixed, retractable or internal antennas located toward the top half of the device, with or without a foldout, sliding or similar keypad cover. The handset should have its earpiece located within the upper ¼ of the device, either along the centerline or off-centered, as perceived by its users. This type of handset should be positioned in a normal operating position with the "test device reference point" located along the "vertical centerline" on the front of the device aligned to the "ear reference point". The "test device reference point" should be located at the same level as the center of the earpiece region. The "vertical centerline" should bisect the front surface of the handset at its top and bottom edges. A "ear reference point" is located on the outer surface of the head phantom on each ear spacer. It is located 1.5 cm above the center of the ear canal entrance in the "phantom reference plane" defined by the three lines joining the center of each "ear reference point" (left and right) and the tip of the mouth.

A handset should be initially positioned with the earpiece region pressed against the ear spacer of a head phantom. For the SCC-34/SC-2 head phantom, the device should be positioned parallel to the "N-F" line defined along the base of the ear spacer that contains the "ear reference point". For interim head phantoms, the device should be positioned parallel to the cheek for maximum RF energy coupling. The "test device reference point" is aligned to the "ear reference point" on the head phantom and the "vertical centerline" is aligned to the "phantom reference plane". This is called the "initial ear position". While maintaining these three alignments, the body of the handset is gradually adjusted to each of the following positions for evaluating SAR:





Cheek/Touch Position

The device is brought toward the mouth of the head phantom by pivoting against the "ear reference point" or along the "N-F" line for the SCC-34/SC-2 head phantom.

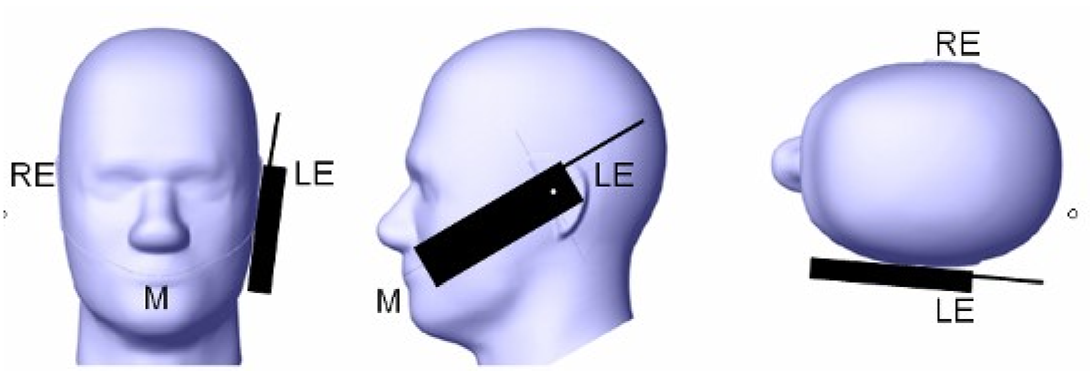
This test position is established:

When any point on the display, keypad or mouthpiece portions of the handset is in contact with the phantom.

(or) When any portion of a foldout, sliding or similar keypad cover opened to its intended self-adjusting normal use position is in contact with the cheek or mouth of the phantom.

For existing head phantoms – when the handset loses contact with the phantom at the pivoting point, rotation should continue until the device touches the cheek of the phantom or breaks its last contact from the ear spacer.

Cheek /Touch Position



Ear/Tilt Position

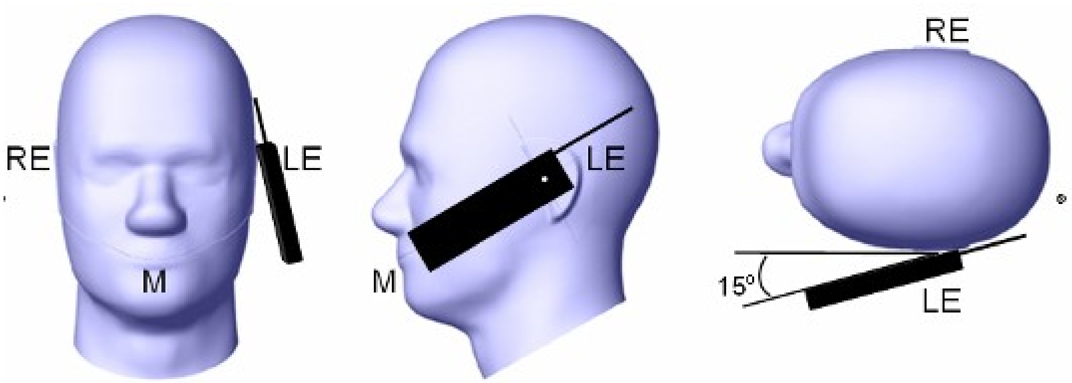
With the handset aligned in the "Cheek/Touch Position":

1) If the earpiece of the handset is not in full contact with the phantom's ear spacer (in the "Cheek/Touch position") and the peak SAR location for the "Cheek/Touch" position is located at the ear spacer region or corresponds to the earpiece region of the handset, the device should be returned to the "initial ear position" by rotating it away from the mouth until the earpiece is in full contact with the ear spacer.

2) (otherwise) The handset should be moved (translated) away from the cheek perpendicular to the line passes through both "ear reference points" (note: one of these ear reference points may not physically exist on a split head model) for approximate 2-3 cm. While it is in this position, the device handset is tilted away from the mouth with respect to the "test device reference point" until the inside angle between the vertical centerline on the front surface of the phone and the horizontal line passing through the ear reference point is by 15 80°. After the tilt, it is then moved (translated) back toward the head perpendicular to the line passes through both "ear reference points" until the device touches the phantom or the ear spacer. If the antenna touches the head first, the positioning process should be repeated with a tilt angle less than 15° so that the device and its antenna would touch the phantom simultaneously. This test position may require a device holder or positioner to achieve the translation and tilting with acceptable positioning repeatability.

If a device is also designed to transmit with its keypad cover closed for operating in the head position, such positions should also be considered in the SAR evaluation. The device should be tested on the left and right side of the head phantom in the “Cheek/Touch” and “Ear/Tilt” positions. When applicable, each configuration should be tested with the antenna in its fully extended and fully retracted positions. These test configurations should be tested at the high, middle and low frequency channels of each operating mode; for example, AMPS, CDMA, and TDMA. If the SAR measured at the middle channel for each test configuration (left, right, Cheek/Touch, Tilt/Ear, extended and retracted) is at least 2.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s). If the transmission band of the test device is less than 10 MHz, testing at the high and low frequency channels is optional.

Ear /Tilt 15° Position



Test positions for body-worn and other configurations

Body-worn operating configurations should be tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in normal use configurations. Devices with a headset output should be tested with a headset connected to the device. When multiple accessories that do not contain metallic components are supplied with the device, the device may be tested with only the accessory that dictates the closest spacing to the body. When multiple accessories that contain metallic components are supplied with the device, the device must be tested with each accessory that contains a unique metallic component. If multiple accessories share an identical metallic component (e.g., 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 must be tested.

Body-worn accessories may not always be supplied or available as options for some devices that are intended to be authorized for body-worn use. A separation distance of 1.5 cm between the back of the device and a flat phantom is recommended for testing body-worn SAR compliance under such circumstances. Other separation distances may be used, but they should not exceed 2.5 cm. In these cases, the device may use body-worn accessories that provide a separation distance greater than that tested for the device provided however that the accessory contains no metallic components.

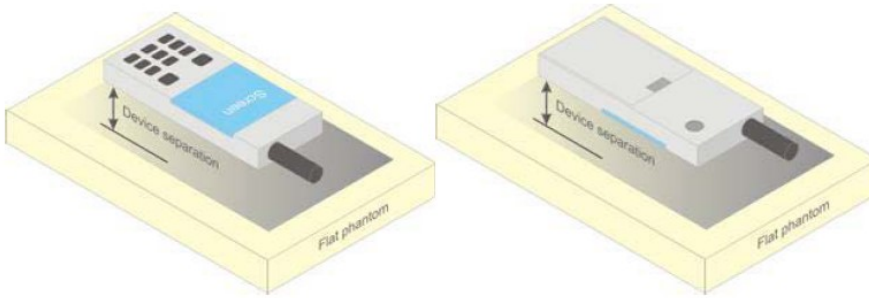


Figure 5 – Test positions for body-worn devices

Test Distance for SAR Evaluation

In this case the DUT(Device Under Test) is set directly against the phantom, the test distance is 0mm for Body Back mode; for Face Up mode the distance is 10 mm.

SAR Evaluation Procedure

The evaluation was performed with the following procedure:

Step 1: Measurement of the SAR value at a fixed location above the ear point or central position was used as a reference value for assessing the power drop. The SAR at this point is measured at the start of the test and then again at the end of the testing.

Step 2: The SAR distribution at the exposed side of the head was measured at a distance of 4 mm from the inner surface of the shell. The area covered the entire dimension of the head or radiating structures of the EUT, the horizontal grid spacing was 15 mm x 15 mm, and the SAR distribution was determined by integrated grid of 1.5mm x 1.5mm. Based on these data, the area of the maximum absorption was determined by spline interpolation. The first Area Scan covers the entire dimension of the EUT to ensure that the hotspot was correctly identified.

Step 3: Around this point, a volume of 30 mm x 30 mm x 30 mm was assessed by measuring 7x 7 x 7 points. On the basis of this data set, the spatial peak SAR value was evaluated under the following procedure:

1) The data at the surface were extrapolated, since the center of the dipoles is 1.2 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.3 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.

2) The maximum interpolated value was searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g or 10 g) were computed by the 3D-Spline interpolation algorithm. The 3D-Spline is composed of three one dimensional splines with the “Not a knot"-condition (in x, y and z-directions). The volume was integrated with the trapezoidal-algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the averages.

All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

Step 4: Re-measurement of the SAR value at the same location as in Step 1. If the value changed by more than 5%, the evaluation was repeated.

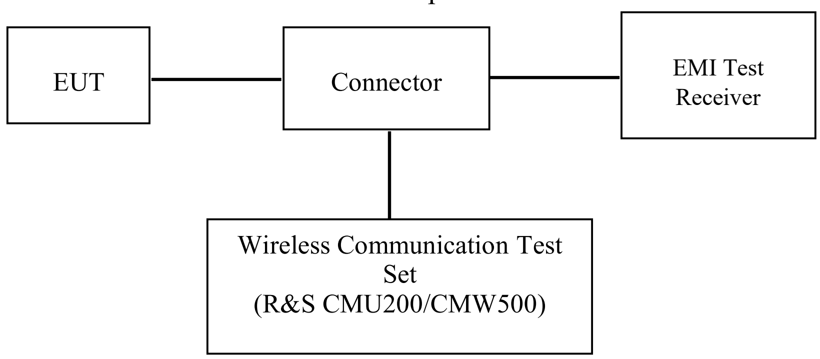
CONDUCTED OUTPUT POWER MEASUREMENT

Provision Applicable

The measured peak output power should be greater and within 5% than EMI measurement.

Test Procedure

The RF output of the transmitter was connected to the input of the EMI Test Receiver through Connector.



WCDMA/LTE

1.2 Description of Test Configuration

1.2.1 EUT Operation Condition:

EUT Operation Mode:	The system was configured for testing in each operation mode.
Equipment Modifications:	No
EUT Exercise Software:	No

The maximum power was configured per 3GPP Standard for each operation modes as below setting:

GSM/GPRS/EGPRS

Function: Menu select > GSM Mobile Station > GSM 850/1900
Press Connection control to choose the different menus
Press RESET > choose all the reset all settings
Connection Press Signal Off to turn off the signal and change settings
Network Support > GSM + GPRS or GSM + EGSM
Main Service > Packet Data
Service selection > Test Mode A – Auto Slot Config. off
MS Signal Press Slot Config Bottom on the right twice to select and change the number of time slots and power setting
> Slot configuration > Uplink/Gamma
> 33 dBm for GPRS 850
> 30 dBm for GPRS 1900
> 27 dBm for EGPRS 850
> 26 dBm for EGPRS 1900
BS Signal Enter the same channel number for TCH channel (test channel) and BCCH channel
Frequency Offset > + 0 Hz
Mode > BCCH and TCH

BCCH Level > -85 dBm (May need to adjust if link is not stable)
BCCH Channel > choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]

Channel Type > Off
P0 > 4 dB
Slot Config > Unchanged (if already set under MS signal)
TCH > choose desired test channel
Hopping > Off
Main Timeslot > 3
Network Coding Scheme > CS4 (GPRS) and MCS5 (EGPRS)

Bit Stream > 2E9-1 PSR Bit Stream
AF/RF Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input
Connection Press Signal on to turn on the signal and change settings

WCDMA-Release 99

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification. The EUT has a nominal maximum output power of 24dBm (+1.7/-3.7).

WCDMA General Settings	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	βc / βd	8/15

WCDMA HSDPA

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification.

	Mode	HSDPA	HSDPA	HSDPA	HSDPA
	Subset	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	Power Control Algorithm	Algorithm2			
	βc	2/15	12/15	15/15	15/15
	βd	1 /15	15/15	8/15	4/15
	βd (SF)	64			
	βc/ βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR(dB)	0	0	0.5	0.5
HSDPA Specific Settings	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	Ahs=βhs/ βc	30/15			

WCDMA HSUPA

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification.

	Mode	HSUPA	HSUPA	HSUPA	HSUPA	HSUPA
	Subset	**1**	**2**		**4**	**5**
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	βc	11/15	6/15	15/15	2/15	15/15
	βd	15/15	15/15	9/15	15/15	0
	βec	209/225	12/15	30 15	2/15	5/15
	βc/ βd	11/15	6/15	15/9	2/15	-
	βhs	22/15	12/15	30/15	4/15	5/15
	CM(dB)	1.0	3.0	2.0	3.0	1.0
	MPR(dB)	0	2	1	2	0
HSDPA Specific Settings	DACK	8				
	DNAK	8				
	DCQI	8				
	Ack-Nack repetition factor	3				
	CQI Feedback	4ms				
	CQI Repetition Factor	2				
	Ahs=βhs/ βc	30/15				
HSUPA Specific Settings	DE-DPCCH	6	8	8	5	7
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	21
	ETFCI	75	67	92	71	81
	Associated Max UL Data Rate k ps	242.1	174.9	482.8	205.8	308.9
	Reference E_FCls	E-TFCI 11 E E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO23 E-TFCI 75 E-TFCI PO26 E-TFCI 81 E-TFCI PO 27		E-TFCI 11 E-TFCI PO4 E-TFCI 92 E-TFCI PO 18	E-TFCI 11 E E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO23 E-TFCI 75 E-TFCI PO26 E-TFCI 81 E-TFCI PO 27	

LTE (FDD):

The following tests were conducted according to the test requirements in 3GPP TS36.101

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

UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101.

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3

Modulation	Channel bandwidth / Transmission bandwidth (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

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of "NS_01".

Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)

Network Signalling value	Requirements (sub-clause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	NA
NS_03	6.6.2.2.1	2, 4,10, 23, 25, 35, 36	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.2	41	5	>6	≤ 1
			10, 15, 20	See Table 6.2.4-4	
NS_05	6.6.3.3.1	1	10,15,20	≥ 50	≤ 1
NS_06	6.6.2.2.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.6-1	n/a
NS_07	6.6.2.2.3 6.6.3.3.2	13	10	Table 6.2.4-2	Table 6.2.4-2
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	Table 6.2.4-3
NS_11	6.6.2.2.1	23[1]	1.4, 3, 5, 10	Table 6.2.4-5	Table 6.2.4-5
..					
NS_32	-	-	-	-	-

Note 1: Applies to the lower block of Band 23, i.e. a carrier placed in the 2000-2010 MHz region.

Maximum Target Output Power

Max Target Power(dBm)			
Mode/Band	Channel		
	Low	Middle	High
WCDMA Band 2	25	25	25
HSDPA	25	25	25
HSUPA	25	25	25
WCDMA Band 4	25.3	25.3	25.3
HSDPA	25	25	25
HSUPA	25	25	25
WCDMA Band 5	25.3	25.3	25.3
HSDPA	25	25	25
HSUPA	25	25	25
LTE Band 2	25	25	25
LTE Band 4	25	25	25
LTE Band 5	25.2	25.2	25.2
LTE Band 12	25	25	25
LTE Band 13	25	25	25
LTE Band 14	25	25	25
LTE Band 66	25	25	25
LTE Band 71	25	25	25
WLAN 2.4G(802.11b)	16.8	16.8	16.8
WLAN 2.4G (802.11g)	14.7	14.7	14.7
WLAN 2.4G (802.11n HT20)	13	13	13
WLAN 2.4G (802.11n HT40)	12.4	12.4	12.4
WLAN 5.2G (802.11a)	12.9	12.9	12.9
WLAN 5.2G (802.11n ht20)	12.5	12.5	12.5
WLAN 5.2G (802.11n ht40)	12.2	/	12.2
WLAN 5.2G (802.11ac80)	/	8.9	/
WLAN 5.3G (802.11a)	12	12	12
WLAN 5.3G (802.11n ht20)	11.7	11.7	11.7
WLAN 5.3G (802.11n ht40)	12	/	12
WLAN 5.3G (802.11ac80)	/	6.4	/
WLAN 5.6G (802.11a)	11.6	11.6	11.6
WLAN 5.6G (802.11n ht20)	11.6	11.6	11.6
WLAN 5.6G (802.11n ht40)	10.4	10.4	10.4
WLAN 5.6G (802.11ac80)	7	7	7
WLAN 5.8G (802.11a)	10.5	10.5	10.5
WLAN 5.8G (802.11n ht20)	10.5	10.5	10.5
WLAN 5.8G (802.11n ht40)	6	/	6
WLAN 5.8G (802.11ac80)	/	6.5	/

Max Target Power(dBm)			
Mode/Band	Channel		
	Low	Middle	High
Bluetooth BDR/EDR	4.5	4.5	4.5
Bluetooth LE	4	4	4

Test Results:

WCDMA:
Results (12.2kbps RMC)

Band	Frequency (MHz)	RF Output Power (dBm)
WCDMA Band 2	1852.4	**24.81**
	1880	24.79
	1907.6	24.51
WCDMA Band 4	1712.4	24.62
	1732.6	25.15
	1752.6	**25.16**
WCDMA Band 5	826.4	**25.19**
	836.6	24.89
	846.6	24.75

Results (HSDPA)

Band	Frequency (MHz)	RF Output Power (dBm)			
		Subset 1	Subset 2	Subset 3	Subset 4
WCDMA Band 2	1852.4	22.20	22.19	22.12	22.16
	1880	21.91	21.89	21.89	21.90
	1907.6	21.71	21.76	21.69	21.77
WCDMA Band 4	1712.4	22.15	22.17	22.21	22.21
	1732.6	22.40	22.47	22.54	22.41
	1752.6	22.62	22.61	22.54	22.66
WCDMA Band 5	826.4	22.39	22.38	22.48	22.54
	836.6	22.33	22.31	22.23	22.39
	846.6	22.25	22.22	22.18	22.22

Results (HSUPA)

Band	Frequency (MHz)	RF Output Power (dBm)				
		Subset 1	Subset 2	Subset 3	Subset 4	Subset 5
WCDMA Band 2	1852.4	22.18	22.29	22.24	22.10	22.22
	1880	22.05	22.05	22.07	22.02	22.03
	1907.6	21.77	21.78	21.78	21.74	21.72
WCDMA Band 4	1712.4	22.27	22.24	22.25	22.12	22.27
	1732.6	22.31	22.30	22.38	22.48	22.47
	1752.6	22.64	22.49	22.52	22.44	22.57
WCDMA Band 5	826.4	22.39	22.49	22.44	22.42	22.53
	836.6	22.57	22.47	22.43	22.45	22.57
	846.6	22.28	22.43	22.43	22.36	22.33

Note:

1. The default test configuration is to measure SAR with an established radio link between the EUT and a communication test set using a 12.2 kbps RMC (reference measurement Channel) Configured in Test Loop Model 1.
2. KDB 941225 D01-Body SAR is not required for HSUPA/HSDPA when the maximum average output of each RF channel is less than ¼ dB higher than measured 12.2kbps RMC or the maximum SAR for 12.2kbps RMC is < 75% of SAR limit.

LTE Band 2:

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4M	QPSK	RB1#0	0	0	24.06	24.07	23.76
		RB1#3	0	0	24.37	24.24	24.01
		RB1#5	0	0	23.98	24.19	23.86
		RB3#0	1	1	24	24.15	23.86
		RB3#3	1	1	23.91	24.15	23.83
		RB6#0	1	1	22.92	23.07	22.74
	16-QAM	RB1#0	1	1	23.23	23.29	22.74
		RB1#3	1	1	23.18	23.32	22.61
		RB1#5	2	2	22.76	23.38	22.54
		RB3#0	2	2	23.07	23.38	22.81
		RB3#3	2	2	22.92	23.1	22.75
		RB6#0	2	2	22.09	21.85	21.44
3M	QPSK	RB1#0	0	0	23.88	24.13	23.83
		RB1#8	0	0	23.82	24.02	23.63
		RB1#14	0	0	23.87	23.91	23.7
		RB6#0	1	1	23.09	22.88	22.63
		RB6#9	1	1	22.97	22.94	22.77
		RB15#0	1	1	23.05	23.08	22.64
	16-QAM	RB1#0	1	1	23.35	23.16	22.73
		RB1#8	1	1	23.17	23.08	22.43
		RB1#14	1	1	23.14	22.99	22.45
		RB6#0	2	2	22.3	21.94	21.65
		RB6#9	2	2	22.2	21.98	21.62
		RB15#0	2	2	22	21.89	21.78
5M	QPSK	RB1#0	0	0	23.85	23.99	23.67
		RB1#13	0	0	24.05	23.92	23.66
		RB1#24	0	0	23.8	23.65	23.76
		RB15#0	1	1	23.06	23.01	22.82
		RB15#10	1	1	22.9	23	22.89
		RB25#0	1	1	22.9	23.06	22.76
	16-QAM	RB1#0	1	1	22.35	23.52	22.82
		RB1#13	1	1	22.25	23.51	22.52
		RB1#24	1	1	22.31	23.25	22.3
		RB15#0	2	2	22.06	22.23	21.81
		RB15#10	2	2	21.82	22.03	21.72
		RB25#0	2	2	22.16	21.97	21.93

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
10M	QPSK	RB1#0	0	0	23.95	23.98	23.98
		RB1#25	0	0	24.32	24.12	24.08
		RB1#49	1	1	24.15	23.94	23.86
		RB25#0	1	1	22.98	23.23	22.87
		RB25#25	1	1	22.89	23.07	22.88
		RB50#0	1	1	22.96	23	22.75
	16-QAM	RB1#0	1	1	23.25	23.51	22.56
		RB1#25	1	1	23.09	23.83	22.7
		RB1#49	1	1	23.36	22.98	22.43
		RB25#0	2	2	22.14	22.19	22.17
		RB25#25	2	2	22.05	22.12	21.91
		RB50#0	2	2	22.07	22.27	21.78
15M	QPSK	RB1#0	0	0	24	24.04	23.77
		RB1#38	0	0	23.93	24.21	23.97
		RB1#74	1	1	23.82	23.95	23.39
		RB36#0	1	1	22.86	23.2	22.92
		RB36#39	1	1	22.9	23.16	22.94
		RB75#0	1	1	22.96	23.03	22.73
	16-QAM	RB1#0	1	1	23.27	23.35	23.04
		RB1#38	1	1	23.16	23.51	23.09
		RB1#74	2	2	22.9	23.65	22.83
		RB36#0	2	2	22.03	22.02	21.95
		RB36#39	2	2	21.91	22.08	21.9
		RB75#0	2	2	22.13	22.22	21.82
20M	QPSK	RB1#0	0	0	24.85	**24.91**	24.87
		RB1#50	0	0	24.08	24.37	24.25
		RB1#99	0	0	24.05	24.21	23.97
		RB50#0	1	1	22.97	24.04	22.94
		RB50#50	1	1	22.82	23.14	22.94
		RB100#0	1	1	23.12	23.1	22.91
	16-QAM	RB1#0	1	1	23.36	22.94	23.5
		RB1#50	1	1	23.78	23.1	23.5
		RB1#99	2	2	23.51	22.61	23.22
		RB50#0	2	2	22.01	22.23	21.87
		RB50#50	2	2	22.09	22.25	21.85
		RB100#0	2	2	22.03	22.12	21.71

LTE Band 4:

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4M	QPSK	RB1#0	0	0	24.3	24.59	24.21
		RB1#3	0	0	24.07	**24.66**	24.59
		RB1#5	0	0	24.31	24.36	24.6
		RB3#0	1	1	24.22	24.59	24.55
		RB3#3	1	1	24.12	24.55	24.42
		RB6#0	1	1	23.1	23.55	23.27
	16-QAM	RB1#0	1	1	22.99	23.65	23.35
		RB1#3	1	1	23.05	23.59	23.48
		RB1#5	1	1	23.31	23.66	23.5
		RB3#0	2	2	23.24	23.64	23.64
		RB3#3	2	2	23.13	23.57	23.51
		RB6#0	2	2	22.08	22.59	22.15
3M	QPSK	RB1#0	0	0	23.99	24.57	24.48
		RB1#8	0	0	24.16	24.45	24.25
		RB1#14	1	1	24.39	24.59	24.57
		RB6#0	1	1	23.21	23.66	23.55
		RB6#9	1	1	23.27	23.62	23.44
		RB15#0	1	1	23.34	23.63	23.29
	16-QAM	RB1#0	1	1	23.41	23.65	23.35
		RB1#8	1	1	23.44	23.7	23.57
		RB1#14	2	2	23.24	23.68	23.08
		RB6#0	2	2	22.05	22.52	22.43
		RB6#9	2	2	22.09	22.84	22.32
		RB15#0	2	2	22.31	22.6	22.63
5M	QPSK	RB1#0	0	0	24.02	24.42	24.48
		RB1#13	0	0	24.22	24.62	24.43
		RB1#24	1	1	24.48	24.55	24.39
		RB15#0	1	1	23.31	23.49	23.69
		RB15#10	1	1	23.35	23.5	23.58
		RB25#0	1	1	23.22	23.58	23.56
	16-QAM	RB1#0	1	1	23.27	23.31	23.23
		RB1#13	1	1	23.79	23.56	23.4
		RB1#24	1	1	23.25	23.59	23.33
		RB15#0	2	2	22.18	22.58	22.62
		RB15#10	2	2	22.41	22.7	22.59
		RB25#0	2	2	22.34	22.66	22.57

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
10M	QPSK	RB1#0	0	0	23.98	24.45	24.48
		RB1#25	0	0	24.66	24.2	24.66
		RB1#49	0	0	24.45	23.47	24.31
		RB25#0	1	1	23.24	23.57	23.55
		RB25#25	1	1	23.38	23.5	23.69
		RB50#0	1	1	23.41	23.48	23.56
	16-QAM	RB1#0	1	1	23.49	23.47	23.67
		RB1#25	1	1	23.69	23.56	23.52
		RB1#49	2	2	23.2	23.54	23.47
		RB25#0	2	2	22.54	22.57	22.69
		RB25#25	2	2	22.52	22.57	22.61
		RB50#0	2	2	22.53	22.57	22.73
15M	QPSK	RB1#0	0	0	24.01	24.43	24.55
		RB1#38	0	0	24.66	24.35	24.63
		RB1#74	1	1	24.49	23.32	24.3
		RB36#0	1	1	23.22	23.59	23.57
		RB36#39	1	1	23.31	23.46	23.69
		RB75#0	1	1	23.49	23.48	23.66
	16-QAM	RB1#0	1	1	23.44	23.61	23.69
		RB1#38	1	1	23.59	23.54	23.47
		RB1#74	2	2	23.18	23.42	23.4
		RB36#0	2	2	22.58	22.51	22.59
		RB36#39	2	2	22.44	22.54	22.59
		RB75#0	2	2	22.36	22.55	22.58
20M	QPSK	RB1#0	0	0	23.94	24.41	24.46
		RB1#50	0	0	24.44	24.6	24.54
		RB1#99	1	1	24.22	24.35	24.5
		RB50#0	1	1	23.35	23.56	23.62
		RB50#50	1	1	23.36	23.55	23.65
		RB100#0	1	1	23.6	23.55	23.58
	16-QAM	RB1#0	1	1	22.79	23.53	23.09
		RB1#50	1	1	23.47	23.59	23.65
		RB1#99	2	2	23.25	23.31	22.92
		RB50#0	2	2	22.41	22.63	22.84
		RB50#50	2	2	22.69	22.62	22.76
		RB100#0	2	2	22.54	22.6	22.71

LTE Band 5:

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4M	QPSK	RB1#0	0	0	24.93	24.82	25.09
		RB1#3	0	0	24.83	**25.1**	24.63
		RB1#5	0	0	24.82	24.78	24.68
		RB3#0	1	1	24.84	24.26	24.89
		RB3#3	1	1	24.76	24.35	24.95
		RB6#0	1	1	23.73	23.4	23.69
	16-QAM	RB1#0	1	1	23.41	23.12	23.69
		RB1#3	1	1	23.68	23.24	23.81
		RB1#5	2	2	24.11	23.06	23.97
		RB3#0	2	2	23.98	23.1	23.6
		RB3#3	2	2	24.4	23.25	23.59
		RB6#0	2	2	23.19	22.14	22.82
3M	QPSK	RB1#0	0	0	25.07	24.04	24.89
		RB1#8	0	0	24.76	24.39	24.46
		RB1#14	1	1	24.94	24.42	24.86
		RB6#0	1	1	23.83	23.31	23.61
		RB6#9	1	1	23.88	23.27	23.67
		RB15#0	1	1	23.76	23.41	23.66
	16-QAM	RB1#0	1	1	24.24	23.45	23.87
		RB1#8	1	1	24.94	23.5	23.45
		RB1#14	2	2	24.85	23.66	23.18
		RB6#0	2	2	23.11	22.13	22.64
		RB6#9	2	2	22.88	22.28	22.61
		RB15#0	2	2	22.94	22.12	22.55
5M	QPSK	RB1#0	0	0	24.83	24.68	24.66
		RB1#13	0	0	24.69	24.86	24.64
		RB1#24	0	0	24.74	24.69	24.55
		RB15#0	1	1	24.84	24.28	24.9
		RB15#10	1	1	24.9	24.28	24.97
		RB25#0	1	1	23.86	23.25	23.76
	16-QAM	RB1#0	1	1	23.37	23.05	23.64
		RB1#13	1	1	23.82	23.29	23.86
		RB1#24	1	1	24.1	22.96	24.02
		RB15#0	2	2	24.05	23.08	23.6
		RB15#10	2	2	24.51	23.23	23.5
		RB25#0	2	2	23.22	22.16	22.81

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
10M	QPSK	RB1#0	0	0	24.62	24.37	24.36
		RB1#25	0	0	24.68	24.51	24.95
		RB1#49	1	1	24.23	24.47	24.81
		RB25#0	1	1	23.67	23.73	23.62
		RB25#25	1	1	23.76	23.85	23.48
		RB50#0	1	1	23.73	23.22	23.6
	16-QAM	RB1#0	1	1	24.34	23.6	23.15
		RB1#25	1	1	24.55	23.57	23.56
		RB1#49	2	2	23.6	24.3	23.41
		RB25#0	2	2	22.95	22.22	22.59
		RB25#25	2	2	22.77	22.59	22.89
		RB50#0	2	2	22.72	22.28	22.69

LTE Band 12:

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4M	QPSK	RB1#0	0	0	24.14	23.76	**24.64**
		RB1#3	0	0	24.16	24.2	24.61
		RB1#5	0	0	24.16	23.56	24.57
		RB3#0	1	1	23.76	23.81	24.5
		RB3#3	1	1	23.9	23.7	24.59
		RB6#0	1	1	22.8	22.78	23.44
	16-QAM	RB1#0	1	1	22.84	23.23	23.19
		RB1#3	1	1	22.81	23.34	23.45
		RB1#5	2	2	23	23.11	22.87
		RB3#0	2	2	22.98	23.03	23.33
		RB3#3	2	2	23.05	22.83	23.51
		RB6#0	2	2	21.62	22.02	22.74
3M	QPSK	RB1#0	0	0	24.44	24.1	24.4
		RB1#8	0	0	24.02	24.26	23.98
		RB1#14	0	0	24.09	24.08	24.07
		RB6#0	1	1	23.05	23.67	23.16
		RB6#9	1	1	23.08	23.77	23.06
		RB15#0	1	1	23.19	22.92	23.11
	16-QAM	RB1#0	1	1	23.41	22.79	23.48
		RB1#8	1	1	23.27	22.95	23.22
		RB1#14	1	1	23.46	23.12	23.43
		RB6#0	2	2	22.1	22.99	22.06
		RB6#9	2	2	22.51	23.06	22.56
		RB15#0	2	2	22.21	21.57	22.18
5M	QPSK	RB1#0	0	0	24.08	23.89	23.82
		RB1#13	0	0	24.19	23.55	24.29
		RB1#24	0	0	24.11	23.71	24.3
		RB15#0	1	1	23.75	23.55	23.05
		RB15#10	1	1	23.9	22.97	23.06
		RB25#0	1	1	22.96	22.78	23.16
	16-QAM	RB1#0	1	1	22.87	23.23	23.44
		RB1#13	1	1	22.86	22.56	23.73
		RB1#24	1	1	23.08	21.79	24.13
		RB15#0	2	2	23.04	21.84	22.08
		RB15#10	2	2	23.03	21.85	21.98
		RB25#0	2	2	22.7	21.8	22.17

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
10M	QPSK	RB1#0	0	0	24.52	24.42	24.59
		RB1#25	0	0	24.2	24.14	24.04
		RB1#49	1	1	23.52	24.05	24.14
		RB25#0	1	1	23.24	23.64	23.13
		RB25#25	1	1	23.14	22.9	22.94
		RB50#0	1	1	23.05	22.78	22.96
	16-QAM	RB1#0	1	1	23.56	23.02	22.95
		RB1#25	1	1	24.08	22.5	23.28
		RB1#49	1	1	22.87	23.06	23.61
		RB25#0	2	2	22.34	22.05	21.97
		RB25#25	2	2	22.44	22.12	22.54
		RB50#0	2	2	22.07	21.84	22.16

LTE Band 13:

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5M	QPSK	RB1#0	0	0	24.1	24.17	24.6
		RB1#13	0	0	24.2	24.61	24.36
		RB1#24	0	0	24.49	24.6	24.43
		RB15#0	1	1	23.33	23.68	23.67
		RB15#10	1	1	23.74	23.49	23.47
		RB25#0	1	1	23.44	23.68	23.44
	16-QAM	RB1#0	1	1	23.81	23.22	23.39
		RB1#13	1	1	23.91	23.85	23.55
		RB1#24	1	1	24.46	23.56	23.01
		RB15#0	2	2	22.44	22.26	22.53
		RB15#10	2	2	22.54	22.68	22.42
		RB25#0	2	2	22.36	22.68	22.46
10M	QPSK	RB1#0	0	0	/	24.02	/
		RB1#25	0	0	/	**24.89**	/
		RB1#49	1	1	/	24.36	/
		RB25#0	1	1	/	24.06	/
		RB25#25	1	1	/	23.41	/
		RB50#0	1	1	/	23.47	/
	16-QAM	RB1#0	1	1	/	23.51	/
		RB1#25	1	1	/	24.08	/
		RB1#49	1	1	/	23.38	/
		RB25#0	2	2	/	22.31	/
		RB25#25	2	2	/	22.55	/
		RB50#0	2	2	/	22.59	/

LTE Band 14:

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5M	QPSK	1#0	0	0	24.15	24.1	23.74
		1#12	0	0	24.1	24.14	23.98
		1#24	0	0	23.97	24.01	23.98
		12#0	1	1	23.34	23.3	23.22
		12#11	1	1	23.4	23.35	23.46
		25#0	1	1	23.26	23.26	23.41
	16-QAM	1#0	1	1	23.01	22.58	23.97
		1#12	1	1	23.05	23.38	24.07
		1#24	1	1	22.99	22.6	24.1
		12#0	2	2	22.08	22.26	22.38
		12#11	2	2	22.29	22.29	22.38
		25#0	2	2	22.25	22.22	22.07
10M	QPSK	1#0	0	0	/	24.08	/
		1#24	0	0	/	**24.93**	/
		1#49	0	0	/	24.18	/
		25#0	1	1	/	24.25	/
		25#24	1	1	/	23.4	/
		50#0	1	1	/	23.17	/
	16-QAM	1#0	1	1	/	23.79	/
		1#24	1	1	/	23.75	/
		1#49	1	1	/	23.51	/
		25#0	2	2	/	22.38	/
		25#24	2	2	/	22.33	/
		50#0	2	2	/	22.27	/

LTE Band 66:

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4M	QPSK	RB1#0	0	0	24.16	24.41	24.31
		RB1#3	0	0	24.05	24.4	24.12
		RB1#5	0	0	24.25	24.27	24.17
		RB3#0	1	1	24.05	24.14	24.21
		RB3#3	1	1	24.04	24.23	24.2
		RB6#0	1	1	22.92	23.17	22.99
	16-QAM	RB1#0	1	1	23.72	23.42	22.77
		RB1#3	1	1	23.27	23.42	23.34
		RB1#5	1	1	23.25	23.18	23.22
		RB3#0	2	2	23.14	23.34	23.08
		RB3#3	2	2	23.06	23.54	23.18
		RB6#0	2	2	21.95	22.04	21.95
3M	QPSK	RB1#0	0	0	23.92	24.53	24.16
		RB1#8	0	0	24.25	24.39	24.11
		RB1#14	1	1	24.13	**24.54**	24.15
		RB6#0	1	1	23.13	23.42	23.14
		RB6#9	1	1	23.09	23.57	23.12
		RB15#0	1	1	23.11	23.45	23.04
	16-QAM	RB1#0	1	1	23.59	23.6	23.06
		RB1#8	1	1	23.5	23.61	22.99
		RB1#14	2	2	23.46	23.55	22.89
		RB6#0	2	2	22.34	22.41	22.12
		RB6#9	2	2	22.33	22.33	22.15
		RB15#0	2	2	22.34	22.27	22.08
5M	QPSK	RB1#0	0	0	23.99	24.26	23.95
		RB1#13	0	0	24.27	24.42	24.07
		RB1#24	1	1	24.22	24.4	23.78
		RB15#0	1	1	23.12	23.21	23.02
		RB15#10	1	1	23.1	23.46	23.16
		RB25#0	1	1	23.02	23.41	22.99
	16-QAM	RB1#0	1	1	22.91	23.38	22.87
		RB1#13	1	1	22.95	23.23	23.58
		RB1#24	1	1	23.79	24.05	23.39
		RB15#0	2	2	22.19	22.3	22.24
		RB15#10	2	2	22.32	22.3	22.19
		RB25#0	2	2	21.97	22.36	22.27

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
10M	QPSK	RB1#0	0	0	23.88	24.54	23.91
		RB1#25	0	0	24.21	24.51	23.99
		RB1#49	0	0	24.28	24.43	23.9
		RB25#0	1	1	23.1	23.36	22.89
		RB25#25	1	1	23.21	23.53	22.95
		RB50#0	1	1	23.09	23.41	22.95
	16-QAM	RB1#0	1	1	23.38	23.36	23.07
		RB1#25	1	1	23.18	23.49	23.53
		RB1#49	2	2	23.52	23.09	22.88
		RB25#0	2	2	22.12	22.71	21.98
		RB25#25	2	2	22.26	22.58	22.19
		RB50#0	2	2	22.26	22.38	22.06
15M	QPSK	RB1#0	0	0	23.97	22.53	23.68
		RB1#38	0	0	24.45	22.52	23.68
		RB1#74	1	1	24.15	22.33	23.88
		RB36#0	1	1	23.03	23.37	23.1
		RB36#39	1	1	23.22	23.33	23.17
		RB75#0	1	1	23.07	23.26	23.02
	16-QAM	RB1#0	1	1	23.37	23.33	22.99
		RB1#38	1	1	23.52	23.63	22.95
		RB1#74	2	2	23.56	23.57	22.58
		RB36#0	2	2	22.06	23.36	21.97
		RB36#39	2	2	22.19	23.7	22.2
		RB75#0	2	2	22.19	22.4	22.08
20M	QPSK	RB1#0	0	0	23.86	24.15	24.14
		RB1#50	0	0	24.67	24.72	24.74
		RB1#99	1	1	23.98	24.11	24.23
		RB50#0	1	1	22.98	23.46	23.06
		RB50#50	1	1	23.31	24.24	23.2
		RB100#0	1	1	23.13	23.35	23.2
	16-QAM	RB1#0	1	1	22.82	23.41	22.99
		RB1#50	1	1	23.23	23.99	23.03
		RB1#99	2	2	23.27	23.53	22.75
		RB50#0	2	2	22.21	22.43	22.14
		RB50#50	2	2	22.23	22.46	22.14
		RB100#0	2	2	22.3	22.49	22.2

LTE Band 71:

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5M	QPSK	1#0	0	0	23.99	23.75	23.22
		1#12	0	0	24.29	23.68	23.4
		1#24	0	0	24.04	23.52	23.22
		12#0	1	1	23.32	22.87	22.62
		12#11	1	1	23.38	22.86	22.56
		25#0	1	1	23.31	22.73	22.65
	16-QAM	1#0	1	1	23.17	22.53	22.38
		1#12	1	1	23.02	23.45	22.61
		1#24	1	1	22.9	23	22.12
		12#0	2	2	22.29	21.86	21.51
		12#11	2	2	22.45	21.97	21.51
		25#0	2	2	22.32	21.94	21.59
10M	QPSK	1#0	0	0	24.3	24.33	23.38
		1#24	0	0	24.19	24.16	23.6
		1#49	0	0	24.21	23.83	23.32
		25#0	1	1	23.23	23.03	22.45
		25#24	1	1	23.32	23.06	22.63
		50#0	1	1	23.14	22.79	22.67
	16-QAM	1#0	1	1	23.36	22.99	22.17
		1#24	1	1	23.39	22.75	22.3
		1#49	1	1	23.29	22.44	22.62
		25#0	2	2	22.35	22.01	21.57
		25#24	2	2	22.39	22.79	21.56
		50#0	2	2	22.35	21.82	21.18
15M	QPSK	1#0	0	0	24.25	23.98	23.37
		1#37	0	0	24.25	23.66	23.56
		1#74	0	0	24.04	23.67	23.36
		36#0	1	1	23.24	22.99	22.76
		36#35	1	1	23.25	23.03	22.64
		75#0	1	1	23.08	22.77	22.48
	16-QAM	1#0	1	1	22.86	23.14	23.39
		1#37	1	1	22.9	23.18	22.52
		1#74	1	1	23.04	22.27	21.7
		36#0	2	2	22.26	21.98	21.52
		36#35	2	2	22.3	21.95	21.87
		75#0	2	2	22.19	21.91	21.54

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
20M	QPSK	1#0	0	0	**24.73**	24.37	24.22
		1#49	0	0	24.11	23.72	23.24
		1#99	0	0	23.43	23.38	23.32
		50#0	1	1	23.16	23.83	22.61
		50#49	1	1	23.11	22.89	22.75
		100#0	1	1	23.15	22.82	22.6
	16-QAM	1#0	1	1	23.04	22.78	22.6
		1#49	1	1	22.86	22.65	22.58
		1#99	1	1	22.48	21.71	21.69
		50#0	2	2	22.15	21.94	21.65
		50#49	2	2	22.24	21.9	21.68
		100#0	2	2	22.25	21.75	21.48

Note:

1. SAR for LTE band exposure configurations is measured according to the procedures of KDB 941225 D05 SAR for LTE Devices v02.
2. The CMW500 Wideband Radio Communication tester is used for LTE output power measurements and SAR testing. Closed loop power control is used to keep the radio transmitters the max output power during the test.
3. KDB941225D05v02- SAR for higher order modulation is required only when the highest maximum output power for the configuration in the higher order modulation is > ½ dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 1.45 W/kg.

WLAN 2.4G:

Mode	Channel frequency (MHz)	Data Rate	Max Average Output Power(dBm)
802.11b	2412	1Mbps	15.25
	2437		**16.73**
	2462		15.72
802.11g	2412	6Mbps	12.58
	2437		14.65
	2462		12.14
802.11n HT20	2412	MCS0	10.49
	2437		12.85
	2462		10.47
802.11n HT40	2422	MCS0	12.17
	2437		12.32
	2452		12.11

Wi-Fi 5.2G:

Mode	Channel frequency (MHz)	Data Rate	Max Average Output Power(dBm)
802.11a	5180	6Mbps	12.32
	5200		12.76
	5240		**12.79**
802.11n20	5180	MCS0	10.6
	5200		10.43
	5240		12.39
802.11n40	5190	MCS0	9.69
	5230		12.1
802.11ac80	5210	MCS0	8.78

Wi-Fi 5.3G:

Mode	Channel frequency (MHz)	Data Rate	Max Average Output Power(dBm)
802.11a	5260	6Mbps	**11.96**
	5280		11.94
	5320		11.92
802.11n20	5260	MCS0	11.34
	5280		11.56
	5320		8.69
802.11n40	5270	MCS0	11.89
	5310		8.81
802.11ac80	5290	MCS0	6.31

WLAN 5.6G:

Mode	Channel frequency (MHz)	Data Rate	Max Average Output Power(dBm)
802.11a	5500	6Mbps	10.91
	5580		**11.46**
	5700		10.6
	5720		10.69
802.11n20	5500	MCS0	9.28
	5580		11.41
	5700		9.95
	5720		11.44
802.11n40	5510	MCS0	8.71
	5590		10.29
	5670		8.59
	5710		9.08
802.11ac80	5530	MCS0	6.56
	5610		6.81
	5690		5.62

Wi-Fi 5.8G:

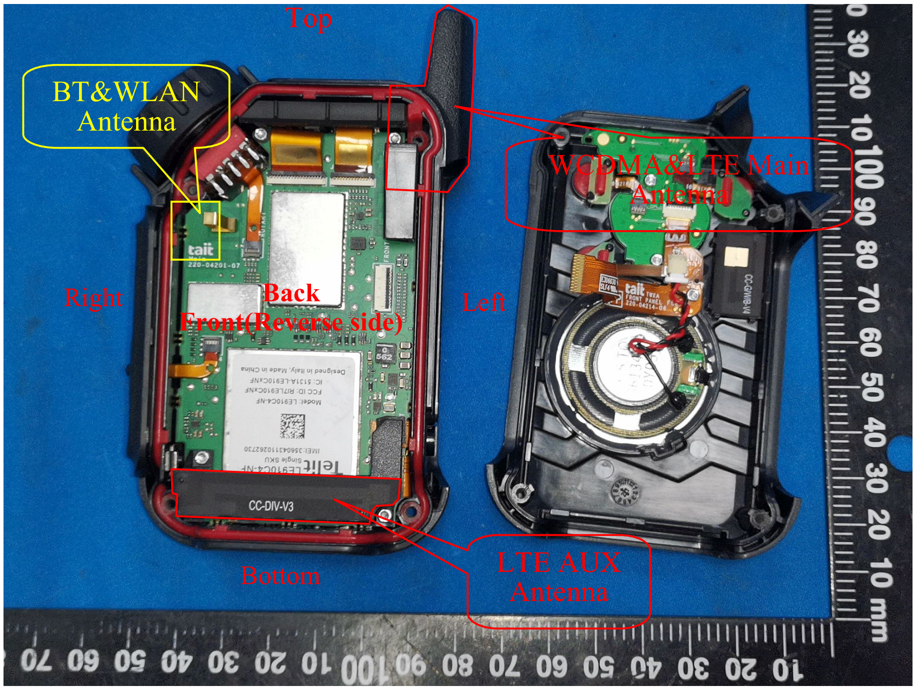
Mode	Channel frequency (MHz)	Data Rate	Max Average Output Power(dBm)
802.11a	5745	6Mbps	8.78
	5785		**10.43**
	5825		8.53
802.11n20	5745	MCS0	8.67
	5785		10.4
	5825		9
802.11n40	5755	MCS0	5.91
	5795		5.6
802.11ac80	5775	MCS0	6.34

Bluetooth:

Mode	Channel frequency (MHz)	RF Output Power (dBm)
BDR(GFSK)	2402	2.56
	2441	**4.08**
	2480	3.19
EDR(π/4-DQPSK)	2402	0.59
	2441	2.37
	2480	1.19
EDR(8DPSK)	2402	0.29
	2441	2.2
	2480	0.97
Bluetooth LE	2402	2.05
	2440	3.43
	2480	1.71

Standalone SAR test exclusion considerations

Antennas Location:



Note: The LTE DIV antenna can not transmit, and is receiving only.

Standalone SAR test exclusion considerations(KDB)

Mode	Frequency (MHz)	Output Power (dBm)	Output Power (mW)	Distance (mm)	Calculated value	Threshold (1-g)	SAR Test Exclusion
BT	2480	4.5	2.82	0	0.9	3	**YES**
Wi-Fi 2.4G	2462	16.8	47.86	0	15	3	No
Wi-Fi 5.2G	5240	12.9	19.5	0	8.9	3	No
Wi-Fi 5.3G	5320	12	15.85	0	7.3	3	No
Wi-Fi 5.6G	5720	11.6	14.45	0	6.9	3	No
Wi-Fi 5.8G	5825	10.5	11.22	0	5.4	3	No

Note: *The bluetooth based peak power for calculation, and Wi-Fi based average power for calculation.*

NOTE:

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤7.5 for 10-g extremity SAR, where

1. f(GHz) is the RF channel transmit frequency in GHz.
2. Power and distance are rounded to the nearest mW and mm before calculation.
3. The result is rounded to one decimal place for comparison.
4. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test Exclusion.

Standalone SAR test exclusion considerations(RSS-102)

Mode	Frequency (MHz)	Output Power (dBm)	Antenna Gain(dBi)	Output Power (mW)	Distance (mm)	Threshold (Power,mW)	SAR Test Exclusion
BT	2480	4.5	0	2.82	0	3.94	**YES**
Wi-Fi 2.4G	2462	16.8	0	47.86	0	3.98	No
Wi-Fi 5.2G	5240	12.9	3.6	44.7	0	1.24	No
Wi-Fi 5.3G	5320	12	3.6	36.3	0	1.21	No
Wi-Fi 5.6G	5720	11.6	3.6	33.1	0	1.04	No
Wi-Fi 5.8G	5825	10.5	3.6	25.7	0	1	No

Note: *The bluetooth based peak power for calculation, and Wi-Fi based average power for calculation.*

2.5.1 Exemption Limits for Routine Evaluation – SAR Evaluation

SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 1.

Table 1: SAR evaluation – Exemption limits for routine evaluation based on frequency and separation distance[4,5]

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of ≤5 mm	At separation distance of 10 mm	At separation distance of 15 mm	At separation distance of 20 mm	At separation distance of 25 mm
≤300	71 mW	101 mW	132 mW	162 mW	193 mW
450	52 mW	70 mW	88 mW	106 mW	123 mW
835	17 mW	30 mW	42 mW	55 mW	67 mW
1900	7 mW	10 mW	18 mW	34 mW	60 mW
2450	4 mW	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	1 mW	6 mW	15 mW	27 mW	41 mW

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of 30 mm	At separation distance of 35 mm	At separation distance of 40 mm	At separation distance of 45 mm	At separation distance of ≥50 mm
≤300	223 mW	254 mW	284 mW	315 mW	345 mW
450	141 mW	159 mW	177 mW	195 mW	213 mW
835	80 mW	92 mW	105 mW	117 mW	130 mW
1900	99 mW	153 mW	225 mW	316 mW	431 mW
2450	83 mW	123 mW	173 mW	235 mW	309 mW
3500	86 mW	124 mW	170 mW	225 mW	290 mW
5800	56 mW	71 mW	85 mW	97 mW	106 mW

Output power level shall be the higher of the maximum conducted or equivalent isotropically radiated power (e.i.r.p.) source-based, time-averaged output power. For controlled use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in Table 1 are multiplied by a

Standalone SAR estimation:

Mode	Frequency (MHz)	Output Power (dBm)	Output Power (mW)	Distance (mm)	Estimated 1-g (W/kg)
BT Head	2480	4.5	2.82	10	0.06
BT Body	2480	4.5	2.82	0	0.12

Note: *The bluetooth based Peak power for calculation.*

When standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:
[(max. power of channel, including tune-up tolerance , mW)/(min. test separation distance,mm)] · [√f(GHz)/x]
W/kg for test separation distances ≤50 mm;
where x = 7.5 for 1-g SAR.
When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test Exclusion

SAR MEASUREMENT RESULTS

This page summarizes the results of the performed dosimetric evaluation.

SAR Test Data

Environmental Conditions

Temperature:	22.3-23.4℃	22.4-23.0 ℃	22.5-23.6 ℃	22.5-23.3 ℃
Relative Humidity:	41 %	37 %	35 %	46 %
ATM Pressure:	102.1 kPa	101.2 kPa	101.3 kPa	101.1 kPa
Test Date:	2021/12/28	2021/12/29	2021/12/30	2022/01/26

Testing was performed by Karl Gong, Ken Zong, Way Li.

WCDMA Band 2:

EUT Position	Frequency (MHz)	Test Mode	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/kg), Limit=1.6W/kg				
					Scaled Factor	Meas. SAR	Scaled SAR	Corrected SAR	Plot
Face Up (10mm)	1852.4	RMC	24.81	25	1.045	0.579	0.605	**0.61**	**1#**
	1880	RMC	24.79	25	1.05	0.572	0.601	0.60	2#
	1907.6	RMC	24.51	25	1.119	0.514	0.575	0.58	3#
Body Back With Belt(0mm)	1852.4	RMC	/	/	/	/	/	/	/
	1880	RMC	24.79	25	1.05	0.445	0.467	0.47	4#
	1907.6	RMC	/	/	/	/	/	/	/

WCDMA Band 4:

EUT Position	Frequency (MHz)	Test Mode	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/kg), Limit=1.6W/kg				
					Scaled Factor	Meas. SAR	Scaled SAR	Corrected SAR	Plot
Face Up (10mm)	1712.4	RMC	24.62	25.3	1.169	0.695	0.812	0.82	5#
	1732.6	RMC	25.15	25.3	1.035	0.897	0.928	**0.94**	**6#**
	1752.6	RMC	25.16	25.3	1.033	0.8	0.826	0.83	7#
Body Back With Belt(0mm)	1712.4	RMC	/	/	/	/	/	/	/
	1732.6	RMC	25.15	25.3	1.035	0.376	0.389	0.39	8#
	1752.6	RMC	/	/	/	/	/	/	/

WCDMA Band 5:

EUT Position	Frequency (MHz)	Test Mode	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/kg), Limit=1.6W/kg				
					Scaled Factor	Meas. SAR	Scaled SAR	Corrected SAR	Plot
Face Up (10mm)	826.4	RMC	25.19	25.3	1.026	0.46	0.472	0.47	9#
	836.6	RMC	24.89	25.3	1.099	0.557	0.612	0.61	10#
	846.6	RMC	24.75	25.3	1.135	0.568	0.645	**0.65**	**11#**
Body Back With Belt(0mm)	826.4	RMC	/	/	/	/	/	/	/
	836.6	RMC	24.89	25.3	1.099	0.517	0.568	0.57	12#
	846.6	RMC	/	/	/	/	/	/	/

Note:

1. When the SAR value is less than half of the limit, testing for other channels are optional.
2. The EUT transmit and receive through the same antenna while testing SAR.
3. The default test configuration is to measure SAR with an established radio link between the EUT and a communication test set using a 12.2 kbps RMC (reference measurement Channel) Configured in Test Loop Model.
4. KDB 941225 D01-Body SAR is not required for HSUPA/HSDPA when the maximum average output of each RF channel is less than ¼ dB higher than measured 12.2kbps RMC or the maximum SAR for 12.2kbps RMC is < 75% of SAR limit.
5. When SAR or MPE is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance.

LTE Band 2:

EUT Position	Frequency (MHz)	Bandwidth (MHz)	Test Mode	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/kg), Limit=1.6W/kg				
						Scaled Factor	Meas. SAR	Scaled SAR	Corrected SAR	Plot
Face Up (10mm)	1860	20	1RB	24.85	25	1.035	0.544	0.563	**0.57**	**13#**
	1880	20	1RB	24.91	25	1.021	0.484	0.494	0.49	14#
	1900	20	1RB	24.87	25	1.03	0.526	0.542	0.54	15#
	1880	20	50%RB	24.04	25	1.247	0.373	0.465	0.47	16#
Body Back With Belt(0mm)	1860	20	1RB	/	/	/	/	/	/	/
	1880	20	1RB	24.91	25	1.021	0.386	0.394	0.39	17#
	1900	20	1RB	/	/	/	/	/	/	/
	1880	20	50%RB	24.04	25	1.247	0.306	0.382	0.38	18#

LTE Band 5:

EUT Position	Frequency (MHz)	Bandwidth (MHz)	Test Mode	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/kg), Limit=1.6W/kg				
						Scaled Factor	Meas. SAR	Scaled SAR	Corrected SAR	Plot
Face Up (10mm)	829	10	1RB	/	/	/	/	/	/	/
	836.5	10	1RB	24.51	25.2	1.172	0.315	0.369	0.37	19#
	844	10	1RB	/	/	/	/	/	/	/
	836.5	10	50%RB	23.85	25.2	1.365	0.28	0.382	0.38	20#
Body Back With Belt(0mm)	829	10	1RB	24.68	25.2	1.127	0.258	0.291	0.29	21#
	836.5	10	1RB	24.51	25.2	1.172	0.392	0.459	**0.46**	**22#**
	844	10	1RB	24.95	25.2	1.059	0.375	0.397	0.40	23#
	836.5	10	50%RB	23.85	25.2	1.365	0.321	0.438	0.44	24#

LTE Band 12:

EUT Position	Frequency (MHz)	Bandwidth (MHz)	Test Mode	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/kg), Limit=1.6W/kg				
						Scaled Factor	Meas. SAR	Scaled SAR	Corrected SAR	Plot
Face Up (10mm)	704	10	1RB	24.52	25	1.117	0.391	0.437	0.44	25#
	707.5	10	1RB	24.42	25	1.143	0.374	0.427	0.43	26#
	711	10	1RB	24.59	25	1.099	0.416	0.457	**0.46**	**27#**
	707.5	10	50%RB	23.84	25	1.306	0.312	0.407	0.41	28#
Body Back With Belt(0mm)	704	10	1RB	/	/	/	/	/	/	/
	707.5	10	1RB	24.42	25	1.143	0.344	0.393	0.40	29#
	711	10	1RB	/	/	/	/	/	/	/
	707.5	10	50%RB	23.84	25	1.306	0.271	0.354	0.36	30#

LTE Band 13:

EUT Position	Frequency (MHz)	Bandwidth (MHz)	Test Mode	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/kg), Limit=1.6W/kg				
						Scaled Factor	Meas. SAR	Scaled SAR	Corrected SAR	Plot
Face Up (10mm)	782	10	1RB	24.89	25	1.026	0.279	0.286	0.29	31#
	782	10	50%RB	24.06	25	1.242	0.228	0.283	0.28	32#
Body Back With Belt(0mm)	782	10	1RB	24.89	25	1.026	0.422	0.433	**0.43**	**33#**
	782	10	50%RB	24.06	25	1.242	0.343	0.426	0.43	34#

LTE Band 14:

EUT Position	Frequency (MHz)	Bandwidth (MHz)	Test Mode	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/kg), Limit=1.6W/kg				
						Scaled Factor	Meas. SAR	Scaled SAR	Corrected SAR	Plot
Face Up (10mm)	793	10	1RB	24.93	25	1.016	0.387	0.393	0.39	35#
	793	10	50%RB	24.25	25	1.189	0.292	0.347	0.35	36#
Body Back With Belt(0mm)	793	10	1RB	24.93	25	1.016	0.435	0.442	**0.44**	**37#**
	793	10	50%RB	24.25	25	1.189	0.342	0.407	0.41	38#

LTE Band 66&4:

EUT Position	Frequency (MHz)	Bandwidth (MHz)	Test Mode	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/kg), Limit=1.6W/kg				
						Scaled Factor	Meas. SAR	Scaled SAR	Corrected SAR	Plot
Face Up (10mm)	1720	20	1RB	/	/	/	/	/	/	/
	1745	20	1RB	24.72	25	1.067	0.433	0.462	0.47	39#
	1770	20	1RB	/	/	/	/	/	/	/
	1745	20	50%RB	24.24	25	1.191	0.41	0.488	0.49	40#
Body Back With Belt(0mm)	1720	20	1RB	24.67	25	1.079	0.485	0.523	0.53	41#
	1745	20	1RB	24.72	25	1.067	0.49	0.523	0.53	42#
	1770	20	1RB	24.74	25	1.062	0.565	0.6	**0.60**	**43#**
	1745	20	50%RB	24.24	25	1.191	0.433	0.516	0.52	44#

Note: The E-UTRA Operating Band 4 is a subset of band 66, and they are same in modulation type and rated output power, therefore, they were considered as one frequency band during SAR measurement.

LTE Band 71:

EUT Position	Frequency (MHz)	Bandwidth (MHz)	Test Mode	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/kg), Limit=1.6W/kg				
						Scaled Factor	Meas. SAR	Scaled SAR	Corrected SAR	Plot
Face Up (10mm)	673	20	1RB	24.73	25	1.064	0.45	0.479	0.49	45#
	680.5	20	1RB	24.37	25	1.156	0.483	0.558	**0.57**	**46#**
	688	20	1RB	24.22	25	1.197	0.424	0.508	0.52	47#
	680.5	20	50%RB	23.83	25	1.309	0.385	0.504	0.52	48#
Body Back With Belt(0mm)	673	20	1RB	/	/	/	/	/	/	/
	680.5	20	1RB	24.37	25	1.156	0.333	0.385	**0.39**	**49#**
	688	20	1RB	/	/	/	/	/	/	/
	680.5	20	50%RB	23.83	25	1.309	0.265	0.347	0.36	50#

Note:

1. SAR for LTE band exposure configurations is measured according to the procedures of KDB 941225 D05 SAR for LTE Devices v02.
2. KDB941225D05- 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 among RB offset the upper edge, middle and lower edge of each required test channel.
3. When the SAR value is less than half of the limit, testing for other channels are optional.
4. Worst case SAR for 50% RB allocation is selected to be tested.
5. KDB941225D05- 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.
6. KDB941225D05-For QPSK with 100% RB allocation, when the reported SAR measured for the Highest output power channel is <1.45 W/kg, tests for the remaining required test channels are optional.

7. KDB941225D05- other channel bandwidths SAR test is required when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is > ½ dB higher than the equivalent channel configurations in the largest channel bandwidth configuration or the reported SAR of a configuration for the largest channel bandwidth is > 1.45 W/kg.
8. KDB941225D05-SAR for higher order modulation is required only when the highest maximum output power for the configuration in the higher order modulation is > ½ dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 1.45 W/kg.

Wi-Fi 2.4G:

EUT Position	Frequency (MHz)	Test Mode	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/kg), Limit=1.6W/kg				
					Scaled Factor	Meas. SAR	Scaled SAR	Corrected SAR	Plot
Face Up (10mm)	2412	802.11b	15.25	16.8	1.429	0.127	0.181	**0.18**	**51#**
	2437	802.11b	16.73	16.8	1.016	0.116	0.118	0.12	52#
	2462	802.11b	15.72	16.8	1.282	0.116	0.149	0.15	53#
Body Back With Belt(0mm)	2412	802.11b	/	/	/	/	/	/	/
	2437	802.11b	16.73	16.8	1.016	0.042	0.043	0.04	54#
	2462	802.11b	/	/	/	/	/	/	/

Note:
1.When the SAR value is less than half of the limit, testing for other channels are optional.
2.When SAR or MPE is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance.
3.KDB 248227 D01-SAR measurement is not required for 2.4 GHz OFDM(801.11g/n20) when the highest reported SAR for DSSS(802.11b) is ≤ 1.2 W/kg, and the output power for DSSS is not less than that for OFDM.

WLAN 5.2G:

EUT Position	Frequency (MHz)	Test Mode	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/kg), Limit=1.6W/kg				
					Scaled Factor	Meas. SAR	Scaled SAR	Corrected SAR	Plot
Face Up (10mm)	5180	802.11a	12.32	12.9	1.143	0.520	0.594	**0.59**	**55#**
	5200	802.11a	12.76	12.9	1.033	0.517	0.534	0.53	56#
	5240	802.11a	12.79	12.9	1.026	0.501	0.514	0.51	57#
Body Back With Belt(0mm)	5180	802.11a	/	/	/	/	/	/	/
	5200	802.11a	12.76	12.9	1.033	0.023	0.024	0.02	58#
	5180	802.11a	/	/	/	/	/	/	/

WLAN 5.3G:

EUT Position	Frequency (MHz)	Test Mode	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/kg), Limit=1.6W/kg				
					Scaled Factor	Meas. SAR	Scaled SAR	Corrected SAR	Plot
Face Up (10mm)	5260	802.11a	11.96	12	1.009	0.563	0.568	0.57	59#
	5280	802.11a	11.94	12	1.014	0.532	0.539	0.54	60#
	5320	802.11a	11.92	12	1.019	0.583	0.594	**0.59**	**61#**
Body Back With Belt(0mm)	5260	802.11a	/	/	/	/	/	/	/
	5280	802.11a	11.94	12	1.014	0.047	0.048	0.05	62#
	5320	802.11a	/	/	/	/	/	/	/

WLAN 5.6G:

EUT Position	Frequency (MHz)	Test Mode	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/kg), Limit=1.6W/kg				
					Scaled Factor	Meas. SAR	Scaled SAR	Corrected SAR	Plot
Face Up (10mm)	5500	802.11a	10.91	11.6	1.256	0.309	0.388	0.39	63#
	5580	802.11a	11.46	11.6	1.033	0.352	0.364	0.36	64#
	5700	802.11a	10.6	11.6	1.259	0.317	0.399	**0.40**	**65#**
	5720	802.11a	10.69	11.6	1.233	0.294	0.363	0.36	66#
Body Back With Belt(0mm)	5500	802.11a	/	/	/	/	/	/	/
	5580	802.11a	11.46	11.6	1.033	0.055	0.057	0.06	67#
	5700	802.11a	/	/	/	/	/	/	/
	5720	802.11a	/	/	/	/	/	/	/

WLAN 5.8G:

EUT Position	Frequency (MHz)	Test Mode	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/kg), Limit=1.6W/kg				
					Scaled Factor	Meas. SAR	Scaled SAR	Corrected SAR	Plot
Face Up (10mm)	5745	802.11a	8.78	10.5	1.486	0.280	0.416	0.42	68#
	5785	802.11a	10.43	10.5	1.016	0.372	0.378	0.38	69#
	5825	802.11a	8.53	10.5	1.574	0.283	0.445	**0.45**	**70#**
Body Back With Belt(0mm)	5745	802.11a	/	/	/	/	/	/	/
	5785	802.11a	10.43	10.5	1.016	0.070	0.071	0.07	71#
	5825	802.11a	/	/	/	/	/	/	/

Note:

1.When the SAR value is less than half of the limit, testing for other channels are optional.

2.When SAR or MPE is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance.

Corrected SAR Evaluation

Annex F
(normative)

SAR correction for deviations of complex permittivity from targets

F.2 SAR correction formula

From [13] and [14], a linear relationship was found between the percent change in SAR (denoted ΔSAR) and the percent change in the permittivity and conductivity from the target values in Table 1 (denoted $\Delta\varepsilon_r$ and $\Delta\sigma$, respectively). This linear relationship agrees with the results of Kuster and Balzano [48] and Bit-Babik et al. [2]. The relationship is given by:

$$\Delta \text{SAR} = c_\varepsilon\ \Delta\varepsilon_r + c_\sigma\ \Delta\sigma \quad \text{(F.1)}$$

where

$c_\varepsilon = \partial(\Delta\text{SAR})/\partial(\Delta\varepsilon)$ is the coefficients representing the sensitivity of SAR to permittivity where SAR is normalized to output power;

$c_\sigma = \partial(\Delta\text{SAR})/\partial(\Delta\sigma)$ is the coefficients representing the sensitivity of SAR to conductivity, where SAR is normalized to output power.

The values of c_ε and c_σ have a simple relationship with frequency that can be described using polynomial equations. For the 1 g averaged SAR c_ε and c_σ are given by

$$c_\varepsilon = -7{,}854 \times 10^{-4} f^3 + 9{,}402 \times 10^{-3} f^2 - 2{,}742 \times 10^{-2} f - 0{,}202\,6 \quad \text{(F.2)}$$

$$c_\sigma = 9{,}804 \times 10^{-3} f^3 - 8{,}661 \times 10^{-2} f^2 + 2{,}981 \times 10^{-2} f + 0{,}782\,9 \quad \text{(F.3)}$$

where

f is the frequency in GHz.

For the 10 g averaged SAR, the variables c_ε and c_σ are given by:

$$c_\varepsilon = 3{,}456 \times 10^{-3} f^3 - 3{,}531 \times 10^{-2} f^2 + 7{,}675 \times 10^{-2} f - 0{,}186\,0 \quad \text{(F.4)}$$

$$c_\sigma = 4{,}479 \times 10^{-3} f^3 - 1{,}586 \times 10^{-2} f^2 - 0{,}197\,2 f + 0{,}771\,7 \quad \text{(F.5)}$$

Corrected SAR Evaluation Table

Frequency (MHz)	Liquid Type	C ε	△ ε r	C δ	△ δ	△SAR (%)
673	1g Head	-0.217	0.24	0.767	-2.73	-2.15
680.5	1g Head	-0.217	0.18	0.766	-3.03	-2.36
688	1g Head	-0.217	0.01	0.766	-2.47	-1.89
704	1g Head	-0.218	-0.07	0.764	-2.02	-1.53
707.5	1g Head	-0.218	-0.12	0.764	-1.46	-1.09
711	1g Head	-0.218	-0.13	0.764	-1.01	-0.74
750	1g Head	-0.218	0.29	0.761	-0.34	-0.32
782	1g Head	-0.219	0.14	0.758	0.56	0.39
793	1g Head	-0.219	-0.16	0.757	0.44	0.37
826.4	1g Head	-0.219	0.16	0.754	0.89	0.64
829	1g Head	-0.219	0.06	0.754	1.22	0.91
836.5	1g Head	-0.219	0.11	0.753	1.89	1.40
836.6	1g Head	-0.219	0.11	0.753	2.33	1.73
844	1g Head	-0.220	-0.14	0.752	2.09	1.60
846.6	1g Head	-0.220	-0.2	0.752	2.64	2.03

Frequency (MHz)	Liquid Type	C ε	△ ε r	C δ	△ δ	△SAR (%)
1712.4	1g Head	-0.226	0.38	0.629	-1.85	-1.25
1720	1g Head	-0.226	0.31	0.628	-1.19	-0.82
1732.6	1g Head	-0.226	0.22	0.626	-1.18	-0.79
1745	1g Head	-0.226	0.19	0.623	-1.31	-0.86
1750	1g Head	-0.226	0.02	0.622	-0.51	-0.32
1752.6	1g Head	-0.226	-0.09	0.622	-0.07	-0.02
1770	1g Head	-0.226	-0.21	0.619	-0.43	-0.22
1852.4	1g Head	-0.226	-0.08	0.603	-1.07	-0.63
1860	1g Head	-0.226	-0.14	0.602	-0.79	-0.44
1880	1g Head	-0.226	-0.18	0.598	-0.21	-0.08
1900	1g Head	-0.226	-0.2	0.594	0.36	0.26
1907.6	1g Head	-0.226	-0.27	0.593	1.29	0.83
2412	1g Head	-0.225	0.31	0.489	0.79	0.32
2437	1g Head	-0.225	0.12	0.483	0.45	0.19
2450	1g Head	-0.225	-0.15	0.480	0.67	0.36
2462	1g Head	-0.225	-0.35	0.478	1.55	0.82

Frequency (MHz)	Liquid Type	C ε	△ ε r	C δ	△ δ	△SAR (%)
5180	1g Head	-0.202	0.6	-0.024	-1.27	-0.09
5200	1g Head	-0.201	0.3	-0.026	-0.6	-0.05
5240	1g Head	-0.201	-0.33	-0.028	0.13	0.06
5250	1g Head	-0.201	-0.45	-0.029	0.59	0.07
5260	1g Head	-0.201	-0.24	-0.030	-0.59	0.07
5280	1g Head	-0.201	-0.05	-0.031	-0.7	0.03
5300	1g Head	-0.201	0.1	-0.032	0.48	-0.04
5320	1g Head	-0.201	0.24	-0.034	0.44	-0.06
5500	1g Head	-0.200	0.26	-0.042	-2.96	0.07
5580	1g Head	-0.199	0.49	-0.044	-2.69	0.02
5600	1g Head	-0.199	0.51	-0.045	-0.43	-0.08
5700	1g Head	-0.199	0.07	-0.046	3.33	-0.17
5720	1g Head	-0.199	0.66	-0.046	-0.71	-0.10
5745	1g Head	-0.199	0.31	-0.045	-0.86	-0.02
5785	1g Head	-0.199	0.22	-0.045	-1.18	0.01
5800	1g Head	-0.199	-0.16	-0.045	-1.25	0.09
5825	1g Head	-0.199	-0.27	-0.044	-0.6	0.08

$$\Delta SAR = c_\varepsilon \, \Delta\varepsilon_r + c_\sigma \, \Delta\sigma$$

where

f is the frequency in GHz.

Corrected SAR = Measured SAR * ((100 + (ΔSAR x -1)) /100)

SAR Measurement Variability

In accordance with published RF Exposure KDB procedure 865664 D01 SAR measurement 100 MHz to 6 GHz v01. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.
2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

Note: 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.

The Highest Measured SAR Configuration in Each Frequency Band

Head(Face Up)

SAR probe calibration point	Frequency Band	Freq.(MHz)	EUT Position	Meas. SAR (W/kg)		Largest to Smallest SAR Ratio
				Original	Repeated	
1750MHz (650-850MHz)	WCDMA Band 4	1732.6	Face Up	0.897	0.886	1.01

Body

SAR probe calibration point	Frequency Band	Freq.(MHz)	EUT Position	Meas. SAR (W/kg)		Largest to Smallest SAR Ratio
				Original	Repeated	
/	/	/	/	/	/	/

Note:

1. Second Repeated Measurement is not required since the ratio of the largest to smallest SAR for the original and first repeated measurement is not > 1.20.
2. The measured SAR results **do not** have to be scaled to the maximum tune-up tolerance to determine if repeated measurements are required.
3. SAR measurement variability must be assessed for each frequency band, which is determined by the **SAR probe calibration point and tissue-equivalent medium** used for the device measurements.

SAR SIMULTANEOUS TRANSMISSION DESCRIPTION

Simultaneous Transmission:

Description of Simultaneous Transmit Capabilities		
Transmitter Combination	**Simultaneous?**	**Hotspot?**
WWAN(WCDMA/LTE) + Bluetooth	√	×
WWAN(WCDMA/LTE) + WLAN 2.4G/5G	√	×
WLAN + Bluetooth	×	×

Simultaneous and Hotspot SAR test exclusion considerations:

Mode(SAR1+SAR2)	Position	Reported SAR(W/kg)		ΣSAR≤ 1.6W/kg
		SAR1	SAR2	
WCDMA Band 2+ Bluetooth	Face Up	0.61	0.06	0.67
	Body Back	0.47	0.12	0.59
WCDMA Band 4+ Bluetooth	Face Up	0.94	0.06	1
	Body Back	0.39	0.12	0.51
WCDMA Band 5+ Bluetooth	Face Up	0.65	0.06	0.71
	Body Back	0.57	0.12	0.69
LTE Band 2+ Bluetooth	Face Up	0.57	0.06	0.63
	Body Back	0.39	0.12	0.51
LTE Band 5+ Bluetooth	Face Up	0.38	0.06	0.44
	Body Back	0.46	0.12	0.58
LTE Band 12+ Bluetooth	Face Up	0.46	0.06	0.52
	Body Back	0.4	0.12	0.52
LTE Band 13+ Bluetooth	Face Up	0.29	0.06	0.35
	Body Back	0.43	0.12	0.55
LTE Band 14+ Bluetooth	Face Up	0.39	0.06	0.45
	Body Back	0.44	0.12	0.56
LTE Band 66&4+ Bluetooth	Face Up	0.49	0.06	0.55
	Body Back	0.6	0.12	**0.72**
LTE Band 71+ Bluetooth	Face Up	0.57	0.06	0.63
	Body Back	0.39	0.12	0.51

Mode(SAR1+SAR2)	Position	Reported SAR(W/kg)		ΣSAR≤ 1.6W/kg
		SAR1	SAR2	
WCDMA Band 2+ Wi-Fi 2.4G	Face Up	0.61	0.18	0.79
	Body Back	0.47	0.04	0.51
WCDMA Band 4+ Wi-Fi 2.4G	Face Up	0.94	0.18	**1.12**
	Body Back	0.39	0.04	0.43
WCDMA Band 5+ Wi-Fi 2.4G	Face Up	0.65	0.18	0.83
	Body Back	0.57	0.04	0.61
LTE Band 2+ Wi-Fi 2.4G	Face Up	0.57	0.18	0.75
	Body Back	0.39	0.04	0.43
LTE Band 5+ Wi-Fi 2.4G	Face Up	0.38	0.18	0.56
	Body Back	0.46	0.04	0.5
LTE Band 12+ Wi-Fi 2.4G	Face Up	0.46	0.18	0.64
	Body Back	0.4	0.04	0.44
LTE Band 13+ Wi-Fi 2.4G	Face Up	0.29	0.18	0.47
	Body Back	0.43	0.04	0.47
LTE Band 14+ Wi-Fi 2.4G	Face Up	0.39	0.18	0.57
	Body Back	0.44	0.04	0.48
LTE Band 66&4+ Wi-Fi 2.4G	Face Up	0.49	0.18	0.67
	Body Back	0.6	0.04	0.64
LTE Band 71+ Wi-Fi 2.4G	Face Up	0.57	0.18	0.75
	Body Back	0.39	0.04	0.43

Mode(SAR1+SAR2)	Position	Reported SAR(W/kg)		ΣSAR≤ 1.6W/kg
		SAR1	SAR2	
WCDMA Band 2+ Wi-Fi 5.2G	Face Up	0.61	0.59	1.20
	Body Back	0.47	0.02	0.49
WCDMA Band 4+ Wi-Fi 5.2G	Face Up	0.94	0.59	**1.53**
	Body Back	0.39	0.02	0.41
WCDMA Band 5+ Wi-Fi 5.2G	Face Up	0.65	0.59	1.24
	Body Back	0.57	0.02	0.59
LTE Band 2+ Wi-Fi 5.2G	Face Up	0.57	0.59	1.16
	Body Back	0.39	0.02	0.41
LTE Band 5+ Wi-Fi 5.2G	Face Up	0.38	0.59	0.97
	Body Back	0.46	0.02	0.48
LTE Band 12+ Wi-Fi 5.2G	Face Up	0.46	0.59	1.05
	Body Back	0.4	0.02	0.42
LTE Band 13+ Wi-Fi 5.2G	Face Up	0.29	0.59	0.88
	Body Back	0.43	0.02	0.45
LTE Band 14+ Wi-Fi 5.2G	Face Up	0.39	0.59	0.98
	Body Back	0.44	0.02	0.46
LTE Band 66&4+ Wi-Fi 5.2G	Face Up	0.49	0.59	1.08
	Body Back	0.6	0.02	0.62
LTE Band 71+ Wi-Fi 5.2G	Face Up	0.57	0.59	1.16
	Body Back	0.39	0.02	0.41

Mode(SAR1+SAR2)	Position	Reported SAR(W/kg)		ΣSAR≤ 1.6W/kg
		SAR1	SAR2	
WCDMA Band 2+ Wi-Fi 5.3G	Face Up	0.61	0.59	1.20
	Body Back	0.47	0.05	0.52
WCDMA Band 4+ Wi-Fi 5.3G	Face Up	0.94	0.59	**1.53**
	Body Back	0.39	0.05	0.44
WCDMA Band 5+ Wi-Fi 5.3G	Face Up	0.65	0.59	1.24
	Body Back	0.57	0.05	0.62
LTE Band 2+ Wi-Fi 5.3G	Face Up	0.57	0.59	1.16
	Body Back	0.39	0.05	0.44
LTE Band 5+ Wi-Fi 5.3G	Face Up	0.38	0.59	0.97
	Body Back	0.46	0.05	0.51
LTE Band 12+ Wi-Fi 5.3G	Face Up	0.46	0.59	1.05
	Body Back	0.4	0.05	0.45
LTE Band 13+ Wi-Fi 5.3G	Face Up	0.29	0.59	0.88
	Body Back	0.43	0.05	0.48
LTE Band 14+ Wi-Fi 5.3G	Face Up	0.39	0.59	0.98
	Body Back	0.44	0.05	0.49
LTE Band 66&4+ Wi-Fi 5.3G	Face Up	0.49	0.59	1.08
	Body Back	0.6	0.05	0.65
LTE Band 71+ Wi-Fi 5.3G	Face Up	0.57	0.59	1.16
	Body Back	0.39	0.05	0.44

Mode(SAR1+SAR2)	Position	Reported SAR(W/kg)		ΣSAR≤ 1.6W/kg
		SAR1	SAR2	
WCDMA Band 2+ Wi-Fi 5.6G	Face Up	0.61	0.40	1.01
	Body Back	0.47	0.06	0.53
WCDMA Band 4+ Wi-Fi 5.6G	Face Up	0.94	0.40	**1.34**
	Body Back	0.39	0.06	0.45
WCDMA Band 5+ Wi-Fi 5.6G	Face Up	0.65	0.40	1.05
	Body Back	0.57	0.06	0.63
LTE Band 2+ Wi-Fi 5.6G	Face Up	0.57	0.40	0.97
	Body Back	0.39	0.06	0.45
LTE Band 5+ Wi-Fi 5.6G	Face Up	0.38	0.40	0.78
	Body Back	0.46	0.06	0.52
LTE Band 12+ Wi-Fi 5.6G	Face Up	0.46	0.40	0.86
	Body Back	0.4	0.06	0.46
LTE Band 13+ Wi-Fi 5.6G	Face Up	0.29	0.40	0.69
	Body Back	0.43	0.06	0.49
LTE Band 14+ Wi-Fi 5.6G	Face Up	0.39	0.40	0.79
	Body Back	0.44	0.06	0.50
LTE Band 66&4+ Wi-Fi 5.6G	Face Up	0.49	0.40	0.89
	Body Back	0.6	0.06	0.66
LTE Band 71+ Wi-Fi 5.6G	Face Up	0.57	0.40	0.97
	Body Back	0.39	0.06	0.45

Mode(SAR1+SAR2)	Position	Reported SAR(W/kg)		ΣSAR≤ 1.6W/kg
		SAR1	SAR2	
WCDMA Band 2+ Wi-Fi 5.8G	Face Up	0.61	0.45	1.06
	Body Back	0.47	0.07	0.54
WCDMA Band 4+ Wi-Fi 5.8G	Face Up	0.94	0.45	**1.39**
	Body Back	0.39	0.07	0.46
WCDMA Band 5+ Wi-Fi 5.8G	Face Up	0.65	0.45	1.10
	Body Back	0.57	0.07	0.64
LTE Band 2+ Wi-Fi 5.8G	Face Up	0.57	0.45	1.02
	Body Back	0.39	0.07	0.46
LTE Band 5+ Wi-Fi 5.8G	Face Up	0.38	0.45	0.83
	Body Back	0.46	0.07	0.53
LTE Band 12+ Wi-Fi 5.8G	Face Up	0.46	0.45	0.91
	Body Back	0.4	0.07	0.47
LTE Band 13+ Wi-Fi 5.8G	Face Up	0.29	0.45	0.74
	Body Back	0.43	0.07	0.50
LTE Band 14+ Wi-Fi 5.8G	Face Up	0.39	0.45	0.84
	Body Back	0.44	0.07	0.51
LTE Band 66&4+ Wi-Fi 5.8G	Face Up	0.49	0.45	0.94
	Body Back	0.6	0.07	0.67
LTE Band 71+ Wi-Fi 5.8G	Face Up	0.57	0.45	1.02
	Body Back	0.39	0.07	0.46

Conclusion:

Sum of SAR:**ΣSAR ≤ 1.6 W/kg** for 1g Body SAR,therefore simultaneous transmission SAR with Volume Scans is **not required**.

SAR Plots

Please Refer to the Attachment.

APPENDIX A MEASUREMENT UNCERTAINTY

The uncertainty budget has been determined for the measurement system and is given in the following Table.

Measurement uncertainty evaluation for IEC/IEEE 62209-1528:2020 SAR test

Symbol	Input quantity X_i (source of uncertainty)	Ref.	Prob Dist.[a] PDF_i	Unc. $a(x_i)$	Div.[a] q_i	$u(x_i)=a(x_i)/q_i$	c_i	$u(y)=c_i \cdot u(x_i)$	v_i
	Measurement system errors								
CF	Probe calibration	8.4.1.1	N (k=2)	7.8	2	3.9	1	3.9	∞
CF_{drift}	Probe calibration drift	8.4.1.2	R	1.2	√3	0.7	1	0.7	∞
LIN	Probe linearity and detection limit	8.4.1.3	R	6.2	√3	3.6	1	3.6	∞
BBS	Boundary signal	8.4.1.4	R	1.4	√3	0.8	1	0.8	∞
ISO	Probe isotropy	8.4.1.5	R	10.2	√3	5.9	1	5.9	∞
DAE	Other probe and data acquistion errors	8.4.1.6	N	1.3	1	1.3	1	1.3	∞
AMB	RF ambient and noise	8.4.1.7	N	1.4	1	1.4	1	1.4	∞
Δ_{xyz}	Probe positioning errors	8.4.1.8	N	1.3	1	1.3	2/δ	1.5	
DAT	Data processing errors	8.4.1.9	N	2.6	1	2.6	1	2.6	∞
	Phantom and device(DUT or validation antenna)errors								
$LIQ(\sigma)$	Measurement of phantom conductivity(σ)	8.4.2.1	N	2.7	1	2.7	c_ε, c_σ	2.7	∞
$LIQ(T_c)$	Temperature effects(medium)	8.4.2.2	R	0.1	√3	0.07	c_ε, c_σ	0.07	∞
EPS	Shell permittivity	8.4.2.3	R	3.6	√3	2.1	See8.4.2.3	2.1	∞
DIS	Distance between the radiating element of the DUT and the phantom medium	8.4.2.4	N	4.7	1	4.7	2	9.4	∞
D_{xyz}	Repeatability of positioning the DUT or source against the phantom	8.4.2.5	N	2.3	1	2.3	1	2.3	5
H	Device holder effects	8.4.2.5	N	6.6	1	6.6	1	6.6	
MOD	Effect of operating mode on	8.4.2.7	R	8.8	√3	5.1	1	5.1	∞
TAS	Time-average SAR	8.4.2.8	R	2.4	√3	1.4	1	1.4	∞
RF_{drift}	Variation in SAR due to drift in output of DUT	8.4.2.9	N	1.2	1	1.2	1	1.2	
VAL	Validation antenna uncertainty(validation measurement only)	8.4.2.10	N	4.2	1	4.2	1	4.2	
P_{in}	Uncertainty in accepted power(validation measurement only)	8.4.2.11	N	4.8	1	4.8	1	4.8	
	Corrections to the SAR result(if applied)								
$C(\varepsilon',\sigma)$	Phantom deviation from target(ε',σ)	8.4.3.1	N	1.6	1	1.6	1	1.6	
$C(R)$	SAR scaling	8.4.3.2	R	5.0	√3	2.9	1	2.9	
$u(\Delta SAR)$	Combined uncertainty								
U	Expanded uncertainty and effective degrees of freedom						U=	27.8	$v$eff=

a Other probability distributions and divisors may be used if they better represent available knowledge of the quantities concerned.

APPENDIX B EUT TEST POSITION PHOTOS

Please Refer to the Attachment.

APPENDIX C CALIBRATION CERTIFICATES

Please Refer to the Attachment.

******* END OF REPORT *******