Test Report

Applicant	:	ASUSTeK COMPUTER INC.
Applicant Address	:	1F., No. 15, Lide Rd., Beitou Dist., Taipei City 112, Taiwan
Product Name	:	LTE module
Trade Name	:	FIBOCOM
Model Number	:	L850-GL
Applicable Standard	:	47 CFR Part §2.1093
Received Date		Jun. 09, 2022
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Issued by

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Taiwan Accreditation Foundation accreditation number: 1330
Test Firm MRA designation number: TW0010

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Revision History

Rev.	Issue Date	Revisions	Revised By
00	Jun. 23, 2022	Initial Issue	Vivien Li
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1. General Information

1.1 Reference Testing Standards

Standard	Description	Version
47 CFR Part §2.1093	Radiofrequency radiation exposure evaluation: portable devices	-
IEC/IEEE 62209-1528	Measurement procedure for the assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Part 1528: Human models, instrumentation, and procedures (Frequency range of 4 MHz to 10 GHz)	2020
IEEE 1528	Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques	2013
IEEE C95.1	IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz	1992
KDB 248227 D01	SAR guidance for IEEE 802.11 (Wi-Fi) transmitters	v02r02
KDB 447498 D04	RF exposure procedures and equipment authorization policies for mobile and portable devices	v01
KDB 616217 D04	SAR evaluation considerations for laptop, notebook and tablet computers	v01r02
KDB 648474 D04	SAR evaluation considerations for wireless handsets	v01r03
KDB 865664 D01	SAR measurement requirement for 100 MHz to 6 GHz	v01r04
KDB 865664 D02	RF exposure compliance reporting and documentation considerations	v01r02
KDB 941225 D01	3G SAR measurement procedures	v03r01
KDB 941225 D05	SAR evaluation considerations for LTE devices	v02r05
KDB 941225 D05A	REL. 10 LTE SAR test guidance and KDB inquiries	v01r02
KDB 941225 D06	SAR evaluation procedures for portable devices with wireless router capabilities	v02r01
KDB 941225 D07	SAR evaluation procedures for UMPC mini-tablet devices	v01r02

2. Description of Device Under Test (DUT)

Applicant	ASUSTeK COMPUTER INC. 1F., No. 15, Lide Rd., Beitou Dist., Taipei City 112, Taiwan
Product Name	LTE module
Trade Name	FIBOCOM
Model Number	L850-GL
IMEI No.	863212030525296
FCC ID	MSQL850GL
Host Information	Product Name: Notebook PC Trade Name: ASUS Model Name: B3402FEA, B3402FE, B3408FEA, B3408FE All models are electrically identical, different model names are for marketing purpose.
Frequency Range	WCDMA Band II: 1852.4 - 1907.6 MHz WCDMA Band IV: 1712.4 - 1752.6 MHz WCDMA Band V: 826.4 - 846.6 MHz LTE Band 2: 1850.7 - 1909.3 MHz LTE Band 4: 1710.7 - 1754.3 MHz LTE Band 5: 824.7 - 848.3 MHz LTE Band 7: 2502.5 - 2567.5 MHz LTE Band 12: 699.7 - 715.3 MHz LTE Band 13: 779.5 - 784.5 MHz LTE Band 17: 706.5 - 713.5 MHz LTE Band 26: 814.7 - 848.3 MHz LTE Band 30: 2307.5 - 2312.5 MHz LTE Band 38: 2572.5 - 2617.5 MHz LTE Band 41: 2498.5 - 2687.5 MHz LTE Band 66: 1710.7 - 1779.3 MHz
Supported Modulations	WCDMA: RMC 12.2Kbps / HSPA+
	LTE: QPSK / 16QAM
Device Category	Portable Device

Note:

1. The above information of DUT was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

Antenna list：

Antenna Source	Chain No.	Manufacturer	Part No. (Vendor)	Type	Max. Gain (dBi)		
					Band	NB	PAD
1	Chain 0	INPAQ	HQ20604690000	PIFA Antenna	WCDMA Band II	0.34	0.07
					WCDMA Band IV	1.16	0.13
					WCDMA Band V	0.66	-2.33
					LTE Band 2	0.34	0.07
					LTE Band 4	1.16	0.13
					LTE Band 5	0.66	-2.33
					LTE Band 7	2.97	2.93
					LTE Band 12	0.7	-3.33
					LTE Band 13	2.39	-3.9
					LTE Band 17	2.17	-3.34
					LTE Band 26	0.34	-2.33
					LTE Band 30	2.43	1.09
					LTE Band 38	2.97	2.93
					LTE Band 41	2.97	2.93
					LTE Band 66	1.16	0.13
	Chain 1	INPAQ	HQ20604693000	PIFA Antenna	WCDMA Band II	---	---
					WCDMA Band IV	---	---
					WCDMA Band V	---	---
					LTE Band 2	---	---
					LTE Band 4	---	---
					LTE Band 5	---	---
					LTE Band 7	---	---
					LTE Band 12	1.54	-1.2
					LTE Band 13	2.31	0.11
					LTE Band 17	---	---
					LTE Band 26	1.6	-2.78
					LTE Band 30	2.38	0.81
					LTE Band 38	1.98	2.45
					LTE Band 41	1.98	2.45
					LTE Band 66	2.95	2.89

Note :
1. Antenna Source 1 (INPAQ antenna) and Antenna Source 2 (ZTX antenna) are the same type of antenna, only different in manufacturer.
2. The Chain 0 is connected to Main port / Chain 1 is connected to AUX port of module.

Antenna Source	Chain No.	Manufacturer	Part No. (Vendor)	Type	Max. Gain (dBi)		
					Band	NB	PAD
2	Chain 0	ZTX	HQ20604691000	PIFA Antenna	WCDMA Band II	0.12	-0.25
					WCDMA Band IV	0.66	-0.21
					WCDMA Band V	0.23	-2.59
					LTE Band 2	0.12	-0.25
					LTE Band 4	0.66	-0.21
					LTE Band 5	0.23	-2.59
					LTE Band 7	2.93	2.91
					LTE Band 12	0.32	-3.6
					LTE Band 13	1.97	-4.16
					LTE Band 17	1.85	-3.6
					LTE Band 26	0.23	-2.59
					LTE Band 30	1.95	0.64
					LTE Band 38	2.93	2.91
					LTE Band 41	2.93	2.91
					LTE Band 66	0.66	-0.21
	Chain 1	ZTX	HQ20604692000	PIFA Antenna	WCDMA Band II	---	---
					WCDMA Band IV	---	---
					WCDMA Band V	---	---
					LTE Band 2	---	---
					LTE Band 4	---	---
					LTE Band 5	---	---
					LTE Band 7	---	---
					LTE Band 12	1.14	-1.68
					LTE Band 13	1.91	-0.38
					LTE Band 17	---	---
					LTE Band 26	1.14	-3.18
					LTE Band 30	2.05	0.55
					LTE Band 38	1.59	2.11
					LTE Band 41	1.59	2.11
					LTE Band 66	2.84	2.83

Note :
3. Antenna Source 1 (INPAQ antenna) and Antenna Source 2 (ZTX antenna) are the same type of antenna, only different in manufacturer.
4. The Chain 0 is connected to Main port / Chain 1 is connected to AUX port of module.

3. Summary of Maximum Value

Equipment Class	Mode	Highest Reported SAR (Tablet/SKU1)		Highest Reported SAR (Notebook/SKU2)	
		Body standalone SAR_{1g} (W/kg)	Simultaneous Transmission SAR (W/kg)	Body standalone SAR_{1g} (W/kg)	Simultaneous Transmission SAR (W/kg)
Licensed	WCDMA Band II	0.95	1.59	0.95	1.19
	WCDMA Band IV	0.85		0.85	
	WCDMA Band V	0.72		0.72	
	LTE Band 2	1.15		1.15	
	LTE Band 5	0.83		0.83	
	LTE Band 7	1.01		0.78	
	LTE Band 12	1.14		1.14	
	LTE Band 13	0.98		0.98	
	LTE Band 17	0.95		0.95	
	LTE Band 26	0.90		0.90	
	LTE Band 30	1.08		1.04	
	LTE Band 41/38	0.72		0.39	
	LTE Band 66/4	0.98		0.98	
DTS	WLAN 2.4 GHz ANT Main	0.43	1.59	0.10	1.18
	WLAN 2.4 GHz ANT Aux	0.41		0.05	
NII	WLAN 5 GHz ANT Main	0.50	1.59	0.18	1.19
	WLAN 5 GHz ANT Aux	0.57		0.20	
DSS / DTS	Bluetooth ANT Aux	0.07	1.59	0.02	1.19

Note:

1. The SAR limit for general population / uncontrolled exposure is specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992.
2. The test procedures, as described in American National Standards, Institute ANSI/IEEE C95.1 were employed and they specify the maximum exposure limit of tissue for portable devices being used within 20 cm between user and EUT in the uncontrolled environment. A description of the product and operating configuration, detailed summary of the test results, methodology and procedures used in the equipment used are included within this test report.
3. This device has two kinds of SKU, SKU 1 is 360 convertible laptop computer, SKU 2 is laptop only. All circuit designs, circuit board and other related designs are electrically identical.
4. According to October 2014 TCB workshop SAR guidance for overlapping bands that support roaming using multiple frequency band indicator. This device supports LTE B4/66 and B38/41 Since the supported frequency span falls complerely wiinin the suppors frequency span, both LTE bands have the same target power, and both LTE bands share the same transmission path; therefore,SAR was assessed B41/66.
5. WLAN of the SAR value reference to the FCC ID " RAS-MT7921 " of the report no. 2109FS17 The Devices evaluated Spot Check, please see as below:10.8 Spot Check.
6. Per KDB 690783 D01, the highest reported SAR are rounded off to the 2nd decimal place.

4. Introduction

4.1 SAR Definition

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

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

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

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

Where：

σ = conductivity of the tissue (S/m)

ρ = mass density of the tissue (kg/m^3)

E = RMS electric field strength (V/m)

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

4.2 RF Exposure Limits

Table 1 Safety Limits for Controlled / Uncontrolled Environment Exposure

SAR Exposure Limit		
	General Population / Uncontrolled Exposure [1] (W/kg)	**Occupational / Controlled Exposure [2] (W/kg)**
Spatial Peak SAR [3] (head or Body)	1.60	8.00
Spatial Peak SAR [4] (Whole Body)	0.08	0.40
Spatial Peak SAR [5] (Hands / Feet / Ankle / Wrist)	4.00	20.00

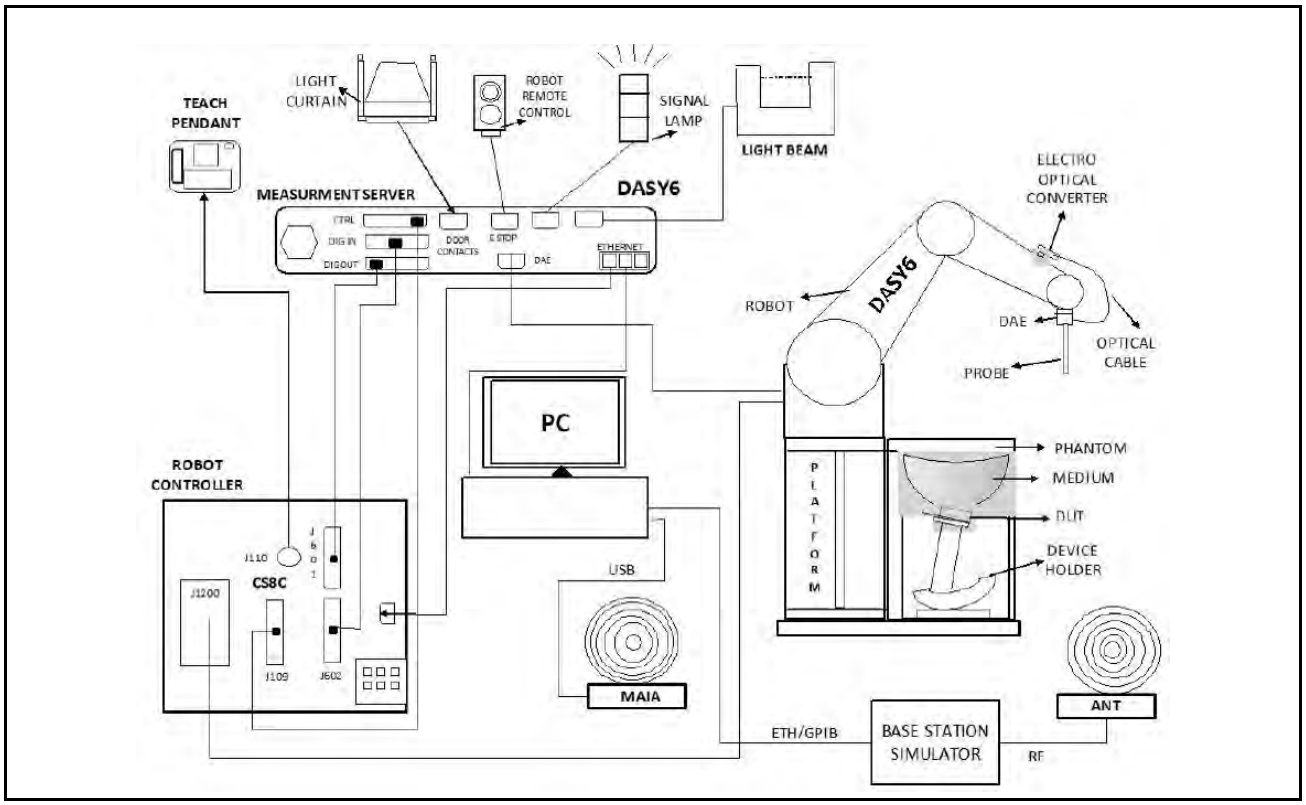
Notes：

1. **General Population / Uncontrolled Environments** are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.
2. **Occupational / Controlled Environments** are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation).
3. The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.
4. The Spatial Average value of the SAR averaged over the whole body.
5. The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

5. System Describtion

5.1 SAR Measurement System

The DASY6 system in cDASY6/DASY5 V5.2 SAR Configuration is shown below:



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

1. A standard high precision 6-axis robot (Stäubli TX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
2. An isotropic field probe optimized and calibrated for the targeted measurements.
3. A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
4. 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.
5. 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.
6. The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
7. A computer running Win7/Win8/Win10 professional operating system and the cDASY6 and DASY5 V5.2 software.
8. Remote controls with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
9. The phantom, the device holder and other accessories according to the targeted measurement.
10. Tissue simulating liquid mixed according to the given recipes.
11. The validation dipole has been calibrated within and the system performance check has been successful.

<DASY E-Field Probe System>

The SAR measurements were conducted with the dosimetric probe (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation. The probes is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multi-fiber line ending at the front of the probe tip. It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY software reads the reflection during a software approach and looks for the maximum using a 2nd order fitting. The approach is stopped when reaching the maximum.

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Frequency	4 MHz to 10 GHz Linearity: ± 0.2 dB (30 MHz to 10 GHz)
Directivity	±0.1 dB in TSL (rotation around probe axis) ±0.3 dB in TSL (rotation normal to probe axis)
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
Calibration	ISO/IEC 17025 calibration service available

EX3DV4 E-Field Probe	**Probe setup on robot**

<Data Acquisition Electronic (DAE) System>

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

<Robot>

Positioner	Stäubli Unimation Corp.	
Robot Model	TX90XL	
Number of Axes	6	
Nominal Load	5 kg	
Reach	1450 mm	
Repeatability	± 0.035 mm	

<Device Holder>

The DASY device holder is constructed of low-loss POM material having the following dielectric parameters: relative permittivity ε=3 and loss tangent δ=0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

Device Holder 1	Device Holder 2

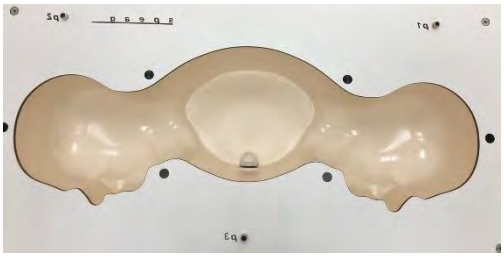
<Oval Flat Phantom – ELI>

The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (Oval Flat) phantom defined in IEEE 1528, IEC 62209-2 and IEC/IEEE 62209-1528. It enables the dosimetric evaluation of wireless portable device usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points with the robot.

Shell Thickness	2 ±0.2 mm	
Filling Volume	Approx. 30 liters	
Dimensions	190×600×400 mm (H × L × W)	

<SAM Phantom>

The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528, IEC 62209-1 and IEC/IEEE 62209-1528. It enables the dosimetric evaluation of left and right hand phone usage as well as body-mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.

Shell Thickness	2 ±0.2 mm	
Filling Volume	Approx. 25 liters	
Dimensions	Length: 1000 mm Width: 500 mm Height: adjustable feet	

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5.2 Tissue Simulating Liquids (TSL)

<Tissue Dielectric Parameters in IEC/IEEE 62209-1528>

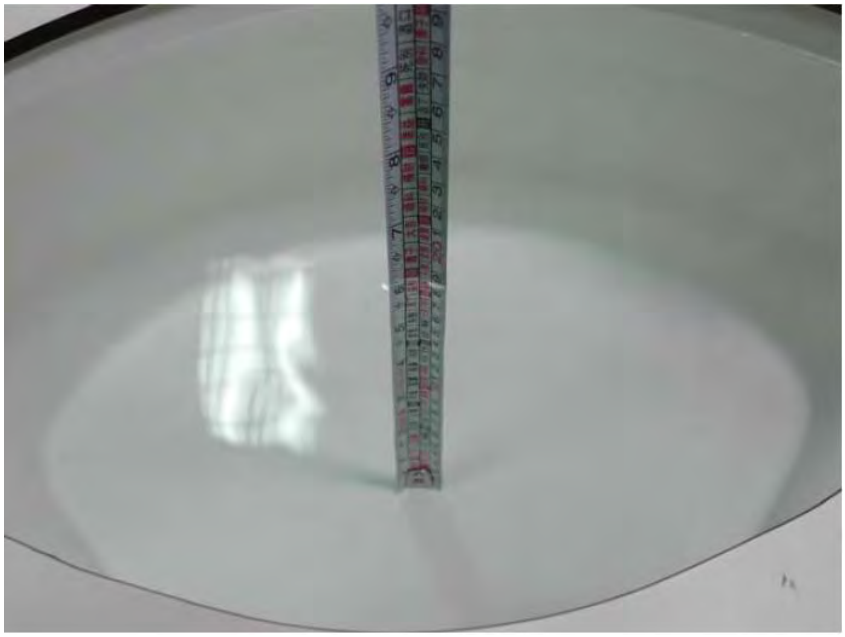
The following table incorporates the tissue dielectric parameters of head recommended by IEC/IEEE 62209-1528. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in human head. Other head and body tissue parameters that have not been specified are derived from the tissue dielectric parameters which computed by the 4-Cole-Cole equation according to the above-mentioned standards.

Table 2 Dielectric properties of the tissue-equivalent liquid material

Frequency (MHz)	Relative Permittivity (ε_r)	Conductivity (σ)
30	55.0	0.75
150	52.3	0.76
300	45.3	0.87
450	43.5	0.87
750	41.9	0.89
835	41.5	0.90
900	41.5	0.97
1450	40.5	1.20
1800	40.0	1.40
1900	40.0	1.40
1950	40.0	1.40
2000	40.0	1.40
2100	39.8	1.49
2450	39.2	1.80
2600	39.0	1.96
3000	38.5	2.40
3500	37.9	2.91
4000	37.4	3.43
4500	36.8	3.94
5000	36.2	4.45
5200	36.0	4.66
5400	35.8	4.86
5600	35.5	5.07
5800	35.3	5.27
6000	35.1	5.48
6500	34.5	6.07
7000	33.9	6.65
7500	33.3	7.24
8000	32.7	7.84
8500	32.1	8.46
9000	31.6	9.08
9500	31.0	9.71
10000	30.4	10.4

<Liquid Depth>

The depth of tissue-equivalent liquid in a phantom must be ≧ 15.0 cm to ensure that the probe is immersed sufficiently in the tissue medium.



Tissue-equivalent Liquid Height

<Test Site Environment>

Item	Requirement	Actual
Temperature (°C)	18 - 25	21 - 23

<Liquid Check>

1. The dielectric parameters of the liquids were verified prior to the SAR evaluation using a DAKS 3.5 Probe Kit.
2. The SAR testing with IEC tissue parameters as an alternative option to Head and body parameters. The head TSL were applied to body SAR tests with restrictions below:

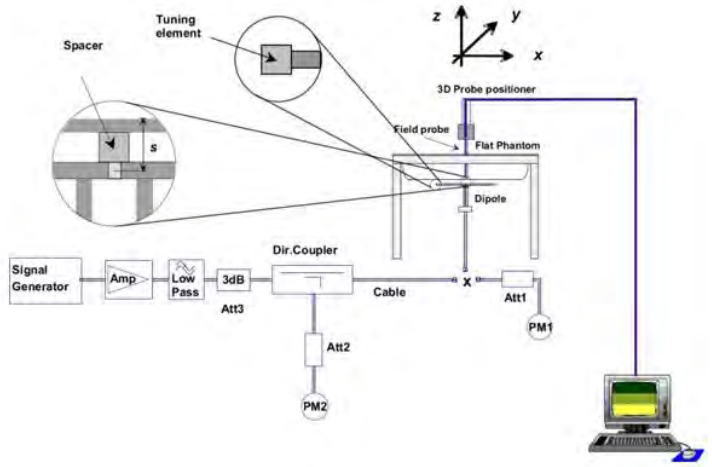
Tissue Temp (°C)	Head / Body	Frequency	Cond. σ	Perm. εr	target Cond. σ	target Perm. εr	σ (Delta)(%)	εr (Delta)(%)	Limit (%)	Date
22.4	Head	704 MHz	0.86	42.93	0.89	42.15	-2.68	1.86	±5	Jun. 13, 2022
22.4	Head	707.5 MHz	0.87	42.88	0.89	42.12	-2.38	1.81	±5	Jun. 13, 2022
22.4	Head	711 MHz	0.87	42.83	0.89	42.11	-1.88	1.71	±5	Jun. 13, 2022
22.4	Head	782 MHz	0.92	41.84	0.89	41.75	2.80	0.21	±5	Jun. 13, 2022
22.4	Head	709 MHz	0.87	42.86	0.89	42.12	-2.10	1.75	±5	Jun. 13, 2022
22.4	Head	710 MHz	0.87	42.85	0.89	42.11	-1.99	1.74	±5	Jun. 13, 2022
22.3	Head	826.4 MHz	0.91	42.28	0.90	41.54	0.89	1.79	±5	Jun. 14, 2022
22.3	Head	836.4 MHz	0.92	42.15	0.90	41.50	1.62	1.57	±5	Jun. 14, 2022
22.3	Head	846.6 MHz	0.93	42.00	0.91	41.50	1.42	1.22	±5	Jun. 14, 2022
22.3	Head	829 MHz	0.91	42.25	0.90	41.53	1.17	1.74	±5	Jun. 14, 2022
22.3	Head	836.5 MHz	0.92	42.15	0.90	41.50	1.63	1.57	±5	Jun. 14, 2022
22.3	Head	844 MHz	0.92	42.04	0.91	41.50	1.51	1.30	±5	Jun. 14, 2022
22.3	Head	821.5 MHz	0.90	42.33	0.90	41.57	0.49	1.83	±5	Jun. 14, 2022
22.3	Head	831.5 MHz	0.91	42.22	0.90	41.51	1.32	1.71	±5	Jun. 14, 2022
22.3	Head	841.5 MHz	0.92	42.08	0.91	41.50	1.59	1.39	±5	Jun. 14, 2022
22.4	Head	1712.4 MHz	1.32	39.40	1.35	40.13	-1.94	-1.83	±5	Jun. 15, 2022
22.4	Head	1732.6 MHz	1.34	39.35	1.36	40.10	-1.48	-1.87	±5	Jun. 15, 2022
22.4	Head	1752.6 MHz	1.36	39.28	1.37	40.07	-1.23	-1.98	±5	Jun. 15, 2022
22.4	Head	1720 MHz	1.33	39.38	1.35	40.11	-1.62	-1.83	±5	Jun. 15, 2022
22.4	Head	1732.5 MHz	1.34	39.35	1.36	40.10	-1.48	-1.87	±5	Jun. 15, 2022
22.4	Head	1745 MHz	1.35	39.30	1.37	40.08	-1.39	-1.95	±5	Jun. 15, 2022
22.4	Head	1720 MHz	1.33	39.38	1.35	40.11	-1.68	-1.83	±5	Jun. 15, 2022
22.4	Head	1745 MHz	1.35	39.30	1.37	40.08	-1.39	-1.95	±5	Jun. 15, 2022
22.4	Head	1770 MHz	1.37	39.20	1.38	40.04	-0.95	-2.11	±5	Jun. 15, 2022
22.2	Head	1852.4 MHz	1.34	40.05	1.40	40.00	-3.99	0.13	±5	Jun. 16, 2022
22.2	Head	1880 MHz	1.37	39.94	1.40	40.00	-1.97	-0.15	±5	Jun. 16, 2022
22.2	Head	1907.6 MHz	1.40	39.86	1.40	40.00	-0.11	-0.34	±5	Jun. 16, 2022
22.2	Head	1860 MHz	1.35	40.02	1.40	40.00	-3.41	0.04	±5	Jun. 16, 2022
22.2	Head	1880 MHz	1.37	39.94	1.40	40.00	-1.97	-0.15	±5	Jun. 16, 2022
22.2	Head	1900 MHz	1.39	39.88	1.40	40.00	-0.62	-0.29	±5	Jun. 16, 2022
22.3	Head	2510 MHz	1.87	39.15	1.86	39.12	0.25	0.09	±5	Jun. 17, 2022
22.3	Head	2535 MHz	1.89	39.11	1.89	39.09	0.10	0.05	±5	Jun. 17, 2022
22.3	Head	2560 MHz	1.91	39.02	1.92	39.05	-0.15	-0.08	±5	Jun. 17, 2022
22.3	Head	2310 MHz	1.65	39.86	1.68	39.44	-1.33	1.06	±5	Jun. 17, 2022
22.3	Head	2580 MHz	1.94	38.93	1.94	39.03	-0.15	-0.27	±5	Jun. 17, 2022
22.3	Head	2595 MHz	1.96	38.88	1.95	39.01	0.01	-0.35	±5	Jun. 17, 2022
22.3	Head	2610 MHz	1.97	38.83	1.97	38.99	0.13	-0.41	±5	Jun. 17, 2022
22.3	Head	2506 MHz	1.86	39.16	1.86	39.13	0.23	0.08	±5	Jun. 17, 2022
22.3	Head	2593 MHz	1.95	38.88	1.95	39.01	-0.02	-0.33	±5	Jun. 17, 2022
22.3	Head	2636.5 MHz	2.00	38.75	2.00	38.96	-0.01	-0.55	±5	Jun. 17, 2022
22.3	Head	2680 MHz	2.05	38.59	2.05	38.90	0.11	-0.81	±5	Jun. 17, 2022

6. System Verification

6.1 SAR System Verification

<Symmetric Dipoles for SAR System Verification>

Construction	Symmetrical dipole with λ/4 balun enables measurement of feed point impedance with NWA matched for use near flat phantoms filled with head simulating solutions Includes distance holder and tripod adaptor Calibration Calibrated SAR value for specified position and input power at the flat phantom in head simulating solutions.
Return Loss	> 20 dB at specified verification position.
Options	Dipoles for other frequencies or solutions and other calibration conditions are available upon request.



System Verification Setup Diagram

Validation Kit

6.1.1 SAR Verification Summary

Prior to the assessment, the validation data compared to the original value provided by SPEAG should be within its specifications of ±10%. The measured SAR will be normalized to 1 W input power. The result indicates the system check can meet the variation criterion and plots can be referred to Appendix B of this report.

Mixture Type	Frequency (MHz)	Power	Probe Model / Serial No.	Dipole Model / Serial No.	$SAR_{1\,g}$ (W/kg)	1 W Normalize $SAR_{1\,g}$ (W/kg)	1 W Target SAR1 g (W/kg)	$SAR_{10\,g}$ (W/kg)	1 W Normalize $SAR_{10\,g}$ (W/kg)	1 W Target $SAR_{10\,g}$ (W/kg)	Deviation 1 g (%)	Deviation 10 g (%)	Date
Head	750	24 dBm	EX3DV4 – SN3977	D750V3 – SN1004	2.13	8.48	8.43	1.43	5.69	5.55	0.6%	2.5%	Jun. 13, 2022
Head	835	24 dBm	EX3DV4 – SN3977	D835V2 – SN4d082	2.37	9.44	9.60	1.54	6.13	6.25	-1.7%	-1.9%	Jun. 14, 2022
Head	1800	24 dBm	EX3DV4 – SN3977	D1800V2 – SN2d122	9.51	37.86	38.70	4.92	19.59	20.20	-2.2%	-3.0%	Jun. 15, 2022
Head	1900	24 dBm	EX3DV4 – SN3977	D1900V2 – SN5d067	10.3	41.01	39.50	5.29	21.06	20.60	3.8%	2.2%	Jun. 16, 2022
Head	2300	24 dBm	EX3DV4 – SN3977	D2300V2 – SN1092	12.8	50.96	49.30	5.82	23.17	23.80	3.4%	-2.6%	Jun. 17, 2022
Head	2600	24 dBm	EX3DV4 – SN3977	D2600V2 – SN1007	14.1	56.13	55.40	6.42	25.56	24.40	1.3%	4.8%	Jun. 17, 2022

7. Test Equipment List

7.1 SAR Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Cal. Date	Cal.Period
SPEAG	750 MHz System Validation Kit	D750V3	1004	Oct 14, 2021	1 year
SPEAG	835 MHz System Validation Kit	D835V2	4d082	Oct 18, 2021	1 year
SPEAG	1800 MHz System Validation Kit	D1800V2	2d122	Dec 16, 2021	1 year
SPEAG	1900 MHz System Validation Kit	D1900V2	5d067	Dec 10, 2021	1 year
SPEAG	2300 MHz System Validation Kit	D2300V2	1092	Dec 13, 2021	1 year
SPEAG	2600 MHz System Validation Kit	D2600V2	1007	Oct 19, 2021	1 year
SPEAG	Dosimetric E-Field Probe	EX3DV4	3977	Jul 26, 2021	1 year
SPEAG	Data Acquisition Electronics	DAE4	779	Jul 30, 2021	1 year
SPEAG	Measurement Server	SE UMS 011 BB	1241	NCR	
SPEAG	Device Holder	N/A	N/A	NCR	
SPEAG	Phantom	ELI V4.0	1036	NCR	
SPEAG	Robot	Staubli TX90XL	F11/5G9EA1/A/01	NCR	
SPEAG	Software	DASY52 V52.10.4.1535	N/A	NCR	
SPEAG	Software	SEMCAD X V14.6.14(7501)	N/A	NCR	
R&S	Wireless Communication Test Set	CMU200	112387	Feb. 27, 2022	1 year
Anritsu	Radio Communication Analyzer	MT8821C	6272374573	Jan 13, 2022	1 year
Agilent	Wideband Radio Communication Tester	E5515C	MY47511156	Sep 09, 2021	1 year
SPEAG	Network Analyzer	DAKS_VNA R140	0140417	Jan 24, 2022	1 year
SPEAG	Dielectric Probe Kit	DAKS-3.5	1001	Jan 26, 2022	1 year
HILA	Digital Thermometer	TM-906A	1500033	Oct 29, 2021	1 year
Agilent	Power Sensor	8481H	3318A20779	May 26, 2022	1 year
Agilent	Power Meter	EDM Series E4418B	GB40206143	May 26, 2022	1 year
Agilent	Power Meter	N1911A	MY45101619	Dec 06, 2021	1 year
R&S	Power Sensor	NRP8S	111511	Dec 17, 2021	1 year
R&S	Power Sensor	NRP8S	111512	Dec 17, 2021	1 year
Agilent	Signal Generator	E8257D	MY44320425	Feb 15, 2022	1 year
Agilent	Spectrum Analyzer	E4446A	MY46180578	Sep 11, 2021	1 year
Mini-Circuits	Dual Directional Coupler	ZCDC20-5R263-S+	E69806	NCR	
Mini-Circuits	Power Amplifier	EMC014225P	980292	NCR	
Mini-Circuits	Power Amplifier	EMC2830P	980293	NCR	
EMCI	Power Amplifier	EMC0618-P	980833	NCR	
Attenuator	INMET	18AH-03	S180301	NCR	
Attenuator	INMET	18AH-10	S181001	NCR	
Attenuator	INMET	18AH-20	S182001	NCR	

Testing Engineer: Ted hsieh / Rocky Wang / Gary Chao

8. Measurement Procedure

8.1 SAR Measurement Procedure

The measurement procedures are as follows:

1. The DUT is installed engineering testing software that provides continuous transmitting signal.
2. Measure output power through RF cable and power meter
3. Set scan area, grid size and other setting on the DASY software
4. Find out the largest SAR result on these testing positions of each band
5. Measure SAR results for other channels in worst SAR testing position if the SAR of highest power channel is larger than 0.8 W/kg

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

1. Power reference measurement
2. Area scan
3. Zoom scan
4. Power drift measurement

8.1.1 Area & Zoom Scan Procedures

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan measures points and step size follow as below. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution.

The measure settings are referred to KDB 865664 D01v01r04 :

<table>
<tr><td colspan="3"></td><td>≤ 3 GHz</td><td>> 3 GHz</td></tr>
<tr><td colspan="3">Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5 mm ± 1 mm</td><td>½·δ·ln(2) mm ± 0.5 mm</td></tr>
<tr><td colspan="3">Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30° ± 1°</td><td>20° ± 1°</td></tr>
<tr><td colspan="3" rowspan="2">Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}</td><td>≤ 2 GHz: ≤ 15 mm
2 – 3 GHz: ≤ 12 mm</td><td>3 – 4 GHz: ≤ 12 mm
4 – 6 GHz: ≤ 10 mm</td></tr>
<tr><td colspan="2">When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.</td></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx_{Area}, Δy_{Area}</td><td>≤ 2 GHz: ≤ 8 mm
2 – 3 GHz: ≤ 5 mm*</td><td>3 – 4 GHz: ≤ 5 mm*
4 – 6 GHz: ≤ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{Zoom}(n)$</td><td>≤ 5 mm</td><td>3 – 4 GHz: ≤ 4 mm
4 – 5 GHz: ≤ 3 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td rowspan="2">Graded grid</td><td>$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>≤ 4 mm</td><td>3 – 4 GHz: ≤ 3 mm
4 – 5 GHz: ≤ 2.5 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">≤ 1.5·$\Delta z_{Zoom}(n-1)$ mm</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>≥ 30 mm</td><td>3 – 4 GHz: ≥ 28 mm
4 – 5 GHz: ≥ 25 mm
5 – 6 GHz: ≥ 22 mm</td></tr>
<tr><td colspan="5">Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see IEEE Std 1528-2013 for details.
* When zoom scan is required and the reported SAR from the area scan based 1-g SAR estimation procedures of KDB Publication 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</td></tr>
</table>

8.1.2 Volume Scan Procedures

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

8.1.3 Power Drift Monitoring

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

8.1.4 Spatial Peak SAR Evaluation

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

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

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

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

9. Measurement Uncertainty

9.1 SAR Measurement Uncertainty

Measurement Uncertainty (0.3-6 GHz)								
Uncertainty Component	**Tol.**	**Prob. Dist.**	**Div.**	**Ci - 1g**	**Ci - 10g**	**ui - 1g (%)**	**ui - 10g (%)**	**vi**
Measurement System								
Probe calibration	12.0	N	2	1	1	6.0	6.0	∞
Probe Calibration Drift	1.7	R	1.732	1	1	1.0	1.0	∞
Data acquisition	0.3	N	1	1	1	0.3	0.3	∞
Probe Linearity	4.7	R	1.732	1	1	2.7	2.7	∞
Broadband Signal	3.0	R	1.732	1	1	1.7	1.7	∞
Probe Isotropy	7.6	R	1.732	1	1	4.4	4.4	∞
RF Ambient	1.8	N	1	1	1	1.8	1.8	∞
Probe Positioning	0.2	N	1	0.14	0.14	0.0	0.0	∞
Data Processing	1.2	N	1	1	1	1.2	1.2	∞
Phantom and Device Errors								
Conductivity (meas.)DAK	2.5	N	1	0.78	0.71	2.0	1.8	∞
Conductivity (temp.)	3.3	R	1.732	0.78	0.71	1.5	1.4	∞
Phantom Shell Permittivity	14	R	1.732	0	0	0.0	0.0	∞
Distance DUT - TSL	2	N	1	2	2	4.0	4.0	∞
Device Positioning	1	N	1	1	1	1.0	1.0	∞
Device Holder	3.6	N	1	1	1	3.6	3.6	∞
DUT Modulation	2.4	R	1.732	1	1	1.4	1.4	∞
Time-average SAR	1.7	R	1.732	1	1	1.0	1.0	∞
DUT Drift	2.5	N	1	1	1	2.5	2.5	∞
Correction to the SAR Results								
Deviation to Target	1.9	N	1	1	0.84	1.9	1.6	∞
SAR scaling	0.0	R	1.732	1	1	0.0	0.0	∞
Combined Standard Uncertainty					RSS	11.0	10.9	
Expanded Uncertainty (95% confidence interval)					k =2	21.9	21.7	

Measurement Uncertainty (3-6 GHz)								
Uncertainty Component	**Tol.**	**Prob. Dist.**	**Div.**	**Ci - 1g**	**Ci - 10g**	**ui - 1g (%)**	**ui - 10g (%)**	**vi**
Measurement System								
Probe Calibration	13.1	N	2	1	1	6.55	6.55	∞
Probe Calibration Drift	1.7	R	1.732	1	1	1.0	1.0	∞
Data Acquisition	0.3	N	1	1	1	0.3	0.3	∞
Probe Linearity	4.7	R	1.732	1	1	2.7	2.7	∞
Broadband Signal	2.6	R	1.732	1	1	1.5	1.5	∞
Probe Isotropy	7.6	R	1.732	1	1	4.4	4.4	∞
RF Ambient	1.8	N	1	1	1	1.8	1.8	∞
Probe Positioning	0.2	N	1	0.33	0.33	0.1	0.1	∞
Data Processing	2.3	N	1	1	1	2.3	2.3	∞
Phantom and Device Errors								
Conductivity (meas.)DAK	2.5	N	1	0.78	0.71	2.0	1.8	∞
Conductivity (temp.)	3.4	R	1.732	0.78	0.71	1.5	1.4	∞
Phantom Shell Permittivity	14	R	1.732	0.25	0.25	2.0	2.0	∞
Distance DUT - TSL	2	N	1	2	2	4.0	4.0	∞
Device Positioning	1	N	1	1	1	1.0	1.0	∞
Device Holder	3.6	N	1	1	1	3.6	3.6	∞
DUT Modulation	2.4	R	1.732	1	1	1.4	1.4	∞
Time-average SAR	1.7	R	1.732	1	1	1.0	1.0	∞
DUT Drift	2.5	N	1	1	1	2.5	2.5	∞
Correction to the SAR Results								
Deviation to Target	1.9	N	1	1	0.84	1.9	1.6	∞
SAR scaling	0.0	R	1.732	1	1	0.0	0.0	∞
Combined Standard Uncertainty					RSS	11.6	11.5	
Expanded Uncertainty (95% confidence interval)					k =2	23.2	23.0	

Measurement Uncertainty (6-10 GHz)								
Uncertainty Component	**Tol.**	**Prob. Dist.**	**Div.**	**Ci - 1g**	**Ci - 10g**	**ui - 1g (%)**	**ui - 10g (%)**	**vi**
Measurement System								
Probe calibration	18.6	N	2	1	1	9.3	9.3	∞
Probe Calibration Drift	1.7	R	1.732	1	1	1.0	1.0	∞
Data Acquisition	0.3	N	1	1	1	0.3	0.3	∞
Probe Linearity	4.7	R	1.732	1	1	2.7	2.7	∞
Broadband Signal	2.8	R	1.732	1	1	1.6	1.6	∞
Probe Isotropy	7.6	R	1.732	1	1	4.4	4.4	∞
RF Ambient Condition	1.8	N	1	1	1	1.8	1.8	∞
Probe Positioning	0.2	N	1	0.67	0.67	0.1	0.1	∞
Data Processing	3.5	N	1	1	1	3.5	3.5	∞
Phantom and Device Errors								
Conductivity (meas.)DAK	2.5	N	1	0.78	0.71	2.0	1.8	∞
Conductivity (temp.)	2.4	R	1.732	0.78	0.71	1.1	1.0	∞
Phantom Shell Permittivity	14.0	R	1.732	0.5	0.5	4.0	4.0	∞
Distance DUT - TSL	2	N	1	2	2	4.0	4.0	∞
Device Positioning	1	N	1	1	1	1.0	1.0	∞
Device Holder	3.6	N	1	1	1	3.6	3.6	∞
DUT Modulation	2.4	R	1.732	1	1	1.4	1.4	∞
Time-average SAR	1.7	R	1.732	1	1	1.0	1.0	∞
DUT Drift	2.5	N	1	1	1	2.5	2.5	∞
Correction to the SAR Results								
Deviation to Target	1.9	N	1	1	0.84	1.9	1.6	∞
SAR scaling	0.0	R	1.732	1	1	0.0	0.0	∞
Combined Standard Uncertainty					RSS	14.0	13.9	
Expanded Uncertainty (95% confidence interval)					k =2	28.0	27.9	

10. Measurement Evaluation

10.1 Positioning of the DUT in Relation to the Phantom

The following measurement procedure shall be according to RSS-102 Supplementary procedures (SPR-001):

Unless the side(s)/edge(s) of the laptop type computer (laptop mode/tablet mode) containing the built-in antenna(s) was already tested against the flat phantom.

Industry Canada requires SAR measurements to be performed with the side(s)/edge(s) of the display screen containing the built-in antenna(s) pointing towards the flat phantom.

1. If the integrated antenna(s) are located in the back side of the display screen, the back side shall be facing towards the flat phantom at a distance not exceeding 25 mm.
2. If the integrated antenna(s) are installed along the edge(s) of the display screen, the edge(s) shall be facing towards the flat phantom at a distance not exceeding 25 mm.

According to KDB 616217 D04:

1. When antennas are incorporated in the keyboard section of a laptop computer, SAR is required for the bottom surface of the keyboard. Provided tablet use conditions are not supported by the laptop computer, SAR tests for bystander exposure from the edges of the keyboard.
2. Some 2-in-1 tablets may operate with the display folded on top of the keyboard. Most recent tablets are designed with an interactive display that may not require a physical keyboard. Both configurations are used in similar manners and require SAR evaluation for the back surface and edges of the tablet. For keyboards that can be unfolded like a laptop, the procedures for laptop platform should also be applied.

According to KDB 616217 D04:

1. SAR evaluation is required for back (bottom) surface and side edges of the devices.
2. Some 2-in-1 tablets may operate with the display folded on top of the keyboard. Most recent tablets are designed with an interactive display that may not require a physical keyboard. Both configurations are used in similar manners and require SAR evaluation for the back surface and edges of the tablet. For keyboards that can be unfolded like a laptop, SAR evaluation is required for the bottom surface of the keyboard.
3. SAR evaluation for the front surface of tablet display screens are generally not necessary, except for tablets that are designed to require continuous operations with the hand(s) next to the antenna.
4. When voice mode is supported on a tablet and it is limited to speaker mode or headset operations only, additional SAR testing for this type of voice use is not required.

10.2 SAR Testing Consideration

10.2.1 SAR Testing with GSM & UMTS

<KDB 941225 D01 General Requirement>

According to 3G SAR test reduction procedure in KDB 941225 D01, when the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ 0.25 dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode.

GSM SAR Measurement

The 3G SAR test reduction procedure is applied to EDGE (8-PSK) with GPRS/EDGE (GMSK) as the primary mode in conjuction with the test reduction procedure in KDB Publication 447498 D01.

WCDMA SAR Measurement

Head SAR for next to the ear head exposure is measured using a 12.2 kbps RMC with TPC bits configured to all “1’s”. The 3G SAR test reduction procedure is applied to AMR configurations with 12.2 kbps RMC as the primary mode.

Body-Worn Accessory SAR for body-worn accessory configurations is measured using a 12.2 kbps RMC with TPC bits configured to all “1’s”. The 3G SAR test reduction procedure is applied to other spreading codes and multiple $DPDCH_n$ configurations supported by the handset with 12.2 kbps RMC as the primary mode.

Rel. 5 HSDPA SAR Measurement

When voice transmission in next to the ear head exposure conditions is according to the “Haed SAR” part in “WCDMA SAR Measurement” of this document. SAR for body exposure configurations is according to the “Body-Worn Accessory SAR” part in “WCDMA SAR Measurement” of this document. The 3G SAR test reduction procedure is applied to HSDPA body SAR with 12.2 kbps RMC as the primary mode. Body SAR for HSDPA is measured using an FRC with H-Set 1 in Sub-test 1 and a 12.2 kbps RMC configured in Test Loop Mode 1, for the highest reported SAR configuration in 12.2 kbps RMC without HSDPA.

Rel. 6 HSPA (HSDPA/HSUPA) SAR Measurement

When voice transmission in next to the ear head exposure conditions is according to the “Haed SAR” part in “WCDMA SAR Measurement” of this document. SAR for body exposure configurations is according to the the “Body-Worn Accessory SAR” part in “WCDMA SAR Measurement” of this document. The 3G SAR test reduction procedure is applied to HSPA body SAR with 12.2 kbps RMC as the primary mode. Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set 1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 and power control algorithm 2, according to the highest reported body SAR configuration in 12.2 kbps RMC without HSPA.

When VOIP applies to head exposure, the 3G SAR test reduction procedure is applied with 12.2 kbps RMC as the primary mode; otherwise, the same HSPA configuration used for body SAR measurements are applied to head exposure testing.

Rel. 8 DC-HSDPA SAR Measurement

SAR is required for Rel. 8 DC-HSDPA when SAR is required for Rel. 5 HSDPA; otherwise, the 3G SAR test reduction procedure is applied to DC-HSDPA with 12.2 kbps RMC as the primary mode.

CDMA2000 SAR Measurement

Head SAR for next to the ear head exposure is measured in RC3 with the handset configured to transmit at full rate in SO55. The 3G SAR test reduction procedure is applied to RC1 with RC3 as the primary mode.

Body-worn accessory SAR is measured in RC3 with the handset configured in TDSO/SO32 to transmit at full rate on FCH only with all other code channels disabled. The body-worn accessory procedures in KDB Publication 447498 D01 are applied. The 3G SAR test reduction procedure is applied to the multiple code channel configuration (FCH+SCHn), with FCH only as the primary mode.

For handsets with Ev-Do capabilities, the 3G SAR test reduction procedure is applied to Ev-Do Rev. 0 with 1x RTT RC3 as the primary mode to determine body-worn accessory test requirements. When VOIP is supported by Ev-Do devices for next to the ear use, head exposure SAR is required.

The 3G SAR test reduction procedure is applied to 1x-Advanced with 1x RTT RC3 as the primary mode.

10.2.2 SAR Testing with LTE

<KDB 941225 D05 General requirements>

1. Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
2. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel.
3. When the highest reported SAR for 1 RB and 50% RB allocation are > 0.8 W/kg, SAR is measured for the highest output power channel in 100%RB.
4. When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all three RB offset configurations for that required test channel.
5. The procedures required for 1 RB allocation are applied to measure the SAR for QPSK with 50% RB allocation.
6. For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
7. SAR 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.
8. According to 5.3 of KDB 941225 D05, that about the test reduction for other channel bandwidth, if the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is > 0.5 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, then SAR need to test.
9. When a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing; therefore, the requirement for H, M, and L channels may not fully apply.
10. According to Apr. 2015 TCB workshop, for device supports overlapping bands, and both bands share the same transmission path and signal characteristics, SAR was only assessed for the band with the larger transmission frequency range.

    LTE band 4 and band 66, and LTE Band 4 is covered by LTE Band 66.

    LTE band 38 and band 41, and LTE band 38 is covered by LTE band 41.

10.2.3 Proximity Sensor Consideration

10.2.3.1 Proximity Sensor Evaluation

The device supports WWAN, WLAN, and Bluetooth capabilities. It is designed with a proximity sensor which can trigger/not trigger power reduction for WCDMA and LTE on Bottom Face, Side 2 and Bottom of Laptop of DUT for SAR compliance. The power reduction is not implemented in the other RF capability.

Due to the proximity sensor and antenna are colloacted, the procedure for determining antenna and proximity sensor coverage described in KDB 616217 is not required.

10.2.3.2 Procedures for determining proximity sensor triggering distances

The proximity sensor triggering distance was determined per KDB 616217 for rear face and applicable edge.

Summary for power verification per distance is tabulated in the below table.

Test position :	Bottom of laptop
Trigger distance:	15
Test distance:	14

<A> At least 20 mm away from the Phantom, moved toward the phantom in 3 mm steps until the sensor triggers.																					
<B> Moved back from the phantom by at least 5 mm, and again moved toward the phantom in 1 mm steps until it touches the phantom.																					
<C> Moving away from the phantom in 3 mm steps until the sensor release.																					
<D> Moved back from he phantom by at least 5 mm, and again moved away the phantom in 1 mm steps until it is at least 10 mm beyond the point.																					
Distance (mm)	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Trigger	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**X**	**X**	**X**	**X**	**X**

Note : “O” denotes that the proximity sensor is triggered.

Test position :	Bottom Face
Trigger distance:	15
Test distance:	14

<A> At least 20 mm away from the Phantom, moved toward the phantom in 3 mm steps until the sensor triggers.																					
<B> Moved back from the phantom by at least 5 mm, and again moved toward the phantom in 1 mm steps until it touches the phantom.																					
<C> Moving away from the phantom in 3 mm steps until the sensor release.																					
<D> Moved back from he phantom by at least 5 mm, and again moved away the phantom in 1 mm steps until it is at least 10 mm beyond the point.																					
Distance (mm)	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Trigger	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**X**	**X**	**X**	**X**	**X**

Note : “O” denotes that the proximity sensor is triggered.

Test position :	Side 2
Trigger distance:	15
Test distance:	14

<A> At least 20 mm away from the Phantom, moved toward the phantom in 3 mm steps until the sensor triggers.																					
<B> Moved back from the phantom by at least 5 mm, and again moved toward the phantom in 1 mm steps until it touches the phantom.																					
<C> Moving away from the phantom in 3 mm steps until the sensor release.																					
<D> Moved back from he phantom by at least 5 mm, and again moved away the phantom in 1 mm steps until it is at least 10 mm beyond the point.																					
Distance (mm)	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Trigger	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**X**	**X**	**X**	**X**	**X**

Note : “O” denotes that the proximity sensor is triggered.

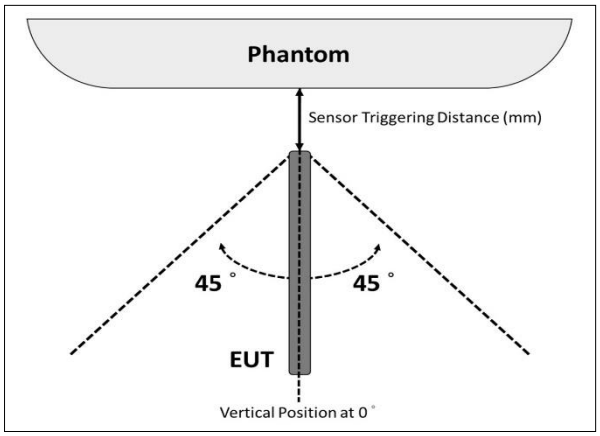
10.2.3.3 Procedures for determining tablet tilt angle influences to proximity sensor triggering

The influence of table tilt angles to proximity sensor triggering is determined by positioning each tablet edge that contains a transmitting antenna, perpendicular to the flat phantom, at the smallest sensor triggering test distance determined in KDB 616217. Summary for proximity sensor tilt angle influence is shown in below table.

Test position :	Side 2										
Test distance:	14										
Rotating the tablet around the edge next to the phantom in ≤ 10 degree increments until the tablet is ± 45 degree											
Distance (mm)	-45°	-40°	-30°	-20°	-10°	0°	10°	20°	30°	40°	45°
Trigger	O	O	O	O	O	O	O	O	O	O	O

Note : “O” denotes that the proximity sensor is triggered.

Side 2



10.2.3.4 Proximity sensor triggering testing summary

The smallest power sensor triggering distance is 15 mm for DUT.

For the influence of tilt angle, test performed at the above separation distance untill proximity sensor no longer release and the output power remained in reduced mode. The smallest separation distancce for tilt angle influence is 15 mm consequently, and then subtract 1 mm for SAR measurement.

Considering SAR compliance and the conservative distance for sensor triggering, SAR test with power reduction was performed at 0 mm for Bottom Face, Side 2 and Bottom of Laptop, and performed without power reduciton at 14 mm.

The power reduction is determinded by proximity sensor input, and the proximity sensor function is set by manual operation with engineering testing software during SAR measurement.

10.3 Conducted Power Measurements

Refer to Appendix A

10.4 Antenna location

Refer to Appendix E.

10.5 Test Results

10.5.1 SAR Test Result

Index.	Band	Modulation	Channel	Frequency (MHz)	Test Position	Spacing (mm)	SAR_{1g} (W/kg)	Meas. Conducted Power (dBm)	Tune-up (dBm)	Reported SAR_{1g} (W/kg)	Antenna Vendor	Power State
	WCDMA Band II	RMC12.2Kbps	9400	1880	Bottom of laptop	0	0.889	17.41	17.5	0.91	INPAQ	Power Reduce
	WCDMA Band II	RMC12.2Kbps	9262	1852.4	Bottom of laptop	0	0.869	17.39	17.5	0.89	INPAQ	Power Reduce
2	WCDMA Band II	RMC12.2Kbps	9538	1907.6	Bottom of laptop	0	0.918	17.37	17.5	0.95	INPAQ	Power Reduce
	WCDMA Band II	RMC12.2Kbps	9538	1907.6	Bottom of laptop	0	0.778	17.37	17.5	0.80	ZTX	Power Reduce
	WCDMA Band II	RMC12.2Kbps	9400	1880	Bottom of laptop	0	0.754	17.41	17.5	0.77	ZTX	Power Reduce
	WCDMA Band II	RMC12.2Kbps	9262	1852.4	Bottom of laptop	0	0.738	17.39	17.5	0.76	ZTX	Power Reduce
	WCDMA Band II	RMC12.2Kbps	9400	1880	Bottom of laptop	14	0.432	23.34	24.5	0.56	INPAQ	
	WCDMA Band II	RMC12.2Kbps	9400	1880	Back of display screen	25	0.01	23.34	24.5	0.01	INPAQ	
	WCDMA Band II	RMC12.2Kbps	9400	1880	Bottom Face	0	0.657	17.41	17.5	0.67	INPAQ	Power Reduce
	WCDMA Band II	RMC12.2Kbps	9400	1880	Bottom Face	14	0.386	23.34	24.5	0.50	INPAQ	
	WCDMA Band II	RMC12.2Kbps	9400	1880	Side 1	0	0.059	23.34	24.5	0.08	INPAQ	
	WCDMA Band II	RMC12.2Kbps	9400	1880	Side 2	0	0.488	17.41	17.5	0.50	INPAQ	Power Reduce
	WCDMA Band II	RMC12.2Kbps	9400	1880	Side 2	14	0.154	23.34	24.5	0.20	INPAQ	
	WCDMA Band II	RMC12.2Kbps	9400	1880	Side 3	0	0.01	23.34	24.5	0.01	INPAQ	
	WCDMA Band II	RMC12.2Kbps	9400	1880	Side 4	0	0.01	23.34	24.5	0.01	INPAQ	
	WCDMA Band IV	RMC12.2Kbps	1413	1732.6	Bottom of laptop	0	0.809	16.42	16.5	0.82	INPAQ	Power Reduce
14	WCDMA Band IV	RMC12.2Kbps	1312	1712.4	Bottom of laptop	0	0.83	16.39	16.5	0.85	INPAQ	Power Reduce
	WCDMA Band IV	RMC12.2Kbps	1312	1712.4	Bottom of laptop	0	0.717	16.39	16.5	0.74	ZTX	Power Reduce
	WCDMA Band IV	RMC12.2Kbps	1513	1752.6	Bottom of laptop	0	0.732	16.28	16.5	0.77	INPAQ	Power Reduce
	WCDMA Band IV	RMC12.2Kbps	1413	1732.6	Bottom of laptop	14	0.534	23.34	24.5	0.70	INPAQ	
	WCDMA Band IV	RMC12.2Kbps	1413	1732.6	Back of display screen	25	0.01	23.34	24.5	0.01	INPAQ	
	WCDMA Band IV	RMC12.2Kbps	1413	1732.6	Bottom Face	0	0.691	16.42	16.5	0.70	INPAQ	Power Reduce
	WCDMA Band IV	RMC12.2Kbps	1413	1732.6	Bottom Face	14	0.522	23.34	24.5	0.68	INPAQ	
	WCDMA Band IV	RMC12.2Kbps	1413	1732.6	Side 1	0	0.105	23.34	24.5	0.14	INPAQ	
	WCDMA Band IV	RMC12.2Kbps	1413	1732.6	Side 2	0	0.683	16.42	16.5	0.70	INPAQ	Power Reduce
	WCDMA Band IV	RMC12.2Kbps	1413	1732.6	Side 2	14	0.362	23.34	24.5	0.47	INPAQ	
	WCDMA Band IV	RMC12.2Kbps	1413	1732.6	Side 3	0	0.01	23.34	24.5	0.01	INPAQ	
	WCDMA Band IV	RMC12.2Kbps	1413	1732.6	Side 4	0	0.01	23.34	24.5	0.01	INPAQ	

Index.	Band	Modulation	Channel	Frequency (MHz)	Test Position	Spacing (mm)	SAR_{1g} (W/kg)	Meas. Conducted Power (dBm)	Tune-up (dBm)	Reported SAR_{1g} (W/kg)	Antenna Vendor	Power State
26	WCDMA Band V	RMC12.2Kbps	4182	836.4	Bottom of laptop	0	0.708	19.44	19.5	0.72	INPAQ	Power Reduce
	WCDMA Band V	RMC12.2Kbps	4182	836.4	Bottom of laptop	0	0.683	19.44	19.5	0.69	ZTX	Power Reduce
	WCDMA Band V	RMC12.2Kbps	4132	826.4	Bottom of laptop	0	0.487	18.47	19.5	0.62	INPAQ	Power Reduce
	WCDMA Band V	RMC12.2Kbps	4233	846.6	Bottom of laptop	0	0.474	18.28	19.5	0.63	INPAQ	Power Reduce
	WCDMA Band V	RMC12.2Kbps	4182	836.4	Bottom of laptop	14	0.345	23.41	24.5	0.44	INPAQ	
	WCDMA Band V	RMC12.2Kbps	4182	836.4	Back of display screen	25	0.01	23.41	24.5	0.01	INPAQ	
	WCDMA Band V	RMC12.2Kbps	4182	836.4	Bottom Face	0	0.551	19.44	19.5	0.56	INPAQ	Power Reduce
	WCDMA Band V	RMC12.2Kbps	4182	836.4	Bottom Face	14	0.228	23.41	24.5	0.29	INPAQ	
	WCDMA Band V	RMC12.2Kbps	4182	836.4	Side 1	0	0.14	23.41	24.5	0.18	INPAQ	
	WCDMA Band V	RMC12.2Kbps	4182	836.4	Side 2	0	0.322	19.44	19.5	0.33	INPAQ	Power Reduce
	WCDMA Band V	RMC12.2Kbps	4182	836.4	Side 2	14	0.051	23.41	24.5	0.07	INPAQ	
	WCDMA Band V	RMC12.2Kbps	4182	836.4	Side 3	0	0.01	23.41	24.5	0.01	INPAQ	
	WCDMA Band V	RMC12.2Kbps	4182	836.4	Side 4	0	0.01	23.41	24.5	0.01	INPAQ	

Index.	Band	Modulation	Channel	Frequency (MHz)	Bandwidth	RB Size	RB Offset	Test Position	Spacing (mm)	SAR_{1g} (W/kg)	Meas. Conducted Power (dBm)	Tune-up (dBm)	Reported SAR_{1g} (W/kg)	Antenna Vendor	Power State
	LTE Band 2	QPSK	18900	1880	20M	1	0	Bottom of laptop	0	1.02	18.89	19	1.05	INPAQ	Power Reduce
	LTE Band 2	QPSK	18700	1860	20M	1	0	Bottom of laptop	0	1	18.83	19	1.04	INPAQ	Power Reduce
36	LTE Band 2	QPSK	19100	1900	20M	1	0	Bottom of laptop	0	1.11	18.86	19	1.15	INPAQ	Power Reduce
	LTE Band 2	QPSK	19100	1900	20M	1	0	Bottom of laptop	0	1.05	18.86	19	1.08	ZTX	Power Reduce
	LTE Band 2	QPSK	18900	1880	20M	1	0	Bottom of laptop	0	0.979	18.89	19	1.00	ZTX	Power Reduce
	LTE Band 2	QPSK	18700	1860	20M	1	0	Bottom of laptop	0	0.96	18.83	19	1.00	ZTX	Power Reduce
	LTE Band 2	QPSK	18900	1880	20M	50	0	Bottom of laptop	0	0.854	17.86	18	0.88	INPAQ	Power Reduce
	LTE Band 2	QPSK	18700	1860	20M	50	0	Bottom of laptop	0	0.82	17.81	18	0.86	INPAQ	Power Reduce
	LTE Band 2	QPSK	19100	1900	20M	50	0	Bottom of laptop	0	0.869	17.84	18	0.90	INPAQ	Power Reduce
	LTE Band 2	QPSK	18900	1880	20M	100	0	Bottom of laptop	0	0.876	17.91	18	0.89	INPAQ	Power Reduce
	LTE Band 2	QPSK	18900	1880	20M	1	0	Bottom of laptop	14	0.475	22.58	24	0.66	INPAQ	
	LTE Band 2	QPSK	18900	1880	20M	50	0	Bottom of laptop	14	0.307	21.56	23	0.43	INPAQ	
	LTE Band 2	QPSK	18900	1880	20M	1	0	Back of display screen	25	0.01	22.58	24	0.01	INPAQ	
	LTE Band 2	QPSK	18900	1880	20M	50	0	Back of display screen	25	0.01	21.56	23	0.01	INPAQ	
	LTE Band 2	QPSK	18900	1880	20M	1	0	Bottom Face	0	0.724	18.89	19	0.74	INPAQ	Power Reduce
	LTE Band 2	QPSK	18900	1880	20M	50	0	Bottom Face	0	0.624	17.86	18	0.64	INPAQ	Power Reduce
	LTE Band 2	QPSK	18900	1880	20M	1	0	Bottom Face	14	0.229	22.58	24	0.32	INPAQ	
	LTE Band 2	QPSK	18900	1880	20M	50	0	Bottom Face	14	0.223	21.56	23	0.31	INPAQ	
	LTE Band 2	QPSK	18900	1880	20M	1	0	Side 1	0	0.071	22.58	24	0.10	INPAQ	
	LTE Band 2	QPSK	18900	1880	20M	50	0	Side 1	0	0.052	21.56	23	0.07	INPAQ	
	LTE Band 2	QPSK	18900	1880	20M	1	0	Side 2	0	0.651	18.89	19	0.67	INPAQ	Power Reduce
	LTE Band 2	QPSK	18900	1880	20M	50	0	Side 2	0	0.533	17.86	18	0.55	INPAQ	Power Reduce
	LTE Band 2	QPSK	18900	1880	20M	1	0	Side 2	14	0.144	22.58	24	0.20	INPAQ	
	LTE Band 2	QPSK	18900	1880	20M	50	0	Side 2	14	0.12	21.56	23	0.17	INPAQ	
	LTE Band 2	QPSK	18900	1880	20M	1	0	Side 3	0	0.01	22.58	24	0.01	INPAQ	
	LTE Band 2	QPSK	18900	1880	20M	50	0	Side 3	0	0.01	21.56	23	0.01	INPAQ	
	LTE Band 2	QPSK	18900	1880	20M	1	0	Side 4	0	0.01	22.58	24	0.01	INPAQ	
	LTE Band 2	QPSK	18900	1880	20M	50	0	Side 4	0	0.01	21.56	23	0.01	INPAQ	

Index.	Band	Modulation	Channel	Frequency (MHz)	Bandwidth	RB Size	RB Offset	Test Position	Spacing (mm)	SAR_{1g} (W/kg)	Meas. Conducted Power (dBm)	Tune-up (dBm)	Reported SAR_{1g} (W/kg)	Antenna Vendor	Power State
59	LTE Band 5	QPSK	20525	836.5	10M	1	0	Bottom of laptop	0	0.716	18.88	19.5	0.83	INPAQ	Power Reduce
	LTE Band 5	QPSK	20450	829	10M	1	0	Bottom of laptop	0	0.649	18.85	19.5	0.75	INPAQ	Power Reduce
	LTE Band 5	QPSK	20600	844	10M	1	0	Bottom of laptop	0	0.618	18.7	19.5	0.74	INPAQ	Power Reduce
	LTE Band 5	QPSK	20525	836.5	10M	1	0	Bottom of laptop	0	0.666	18.88	19.5	0.77	ZTX	Power Reduce
	LTE Band 5	QPSK	20450	829	10M	1	0	Bottom of laptop	0	0.603	18.85	19.5	0.70	ZTX	Power Reduce
	LTE Band 5	QPSK	20600	844	10M	1	0	Bottom of laptop	0	0.575	18.7	19.5	0.69	ZTX	Power Reduce
	LTE Band 5	QPSK	20525	836.5	10M	25	0	Bottom of laptop	0	0.524	17.74	18.5	0.62	INPAQ	Power Reduce
	LTE Band 5	QPSK	20525	836.5	10M	50	0	Bottom of laptop	0	0.511	17.6	18.5	0.63	INPAQ	Power Reduce
	LTE Band 5	QPSK	20525	836.5	10M	1	0	Bottom of laptop	14	0.358	22.57	24	0.50	INPAQ	
	LTE Band 5	QPSK	20525	836.5	10M	25	0	Bottom of laptop	14	0.27	21.33	23	0.40	INPAQ	
	LTE Band 5	QPSK	20525	836.5	10M	1	0	Back of display screen	25	0.01	22.57	24	0.01	INPAQ	
	LTE Band 5	QPSK	20525	836.5	10M	25	0	Back of display screen	25	0.01	21.33	23	0.01	INPAQ	
	LTE Band 5	QPSK	20525	836.5	10M	1	0	Bottom Face	0	0.544	18.88	19.5	0.63	INPAQ	Power Reduce
	LTE Band 5	QPSK	20525	836.5	10M	25	0	Bottom Face	0	0.425	17.74	18.5	0.51	INPAQ	Power Reduce
	LTE Band 5	QPSK	20525	836.5	10M	1	0	Bottom Face	14	0.214	22.57	24	0.30	INPAQ	
	LTE Band 5	QPSK	20525	836.5	10M	25	0	Bottom Face	14	0.139	21.33	23	0.20	INPAQ	
	LTE Band 5	QPSK	20525	836.5	10M	1	0	Side 1	0	0.159	22.57	24	0.22	INPAQ	
	LTE Band 5	QPSK	20525	836.5	10M	25	0	Side 1	0	0.128	21.33	23	0.19	INPAQ	
	LTE Band 5	QPSK	20525	836.5	10M	1	0	Side 2	0	0.296	18.88	19.5	0.34	INPAQ	Power Reduce
	LTE Band 5	QPSK	20525	836.5	10M	25	0	Side 2	0	0.233	17.74	18.5	0.28	INPAQ	Power Reduce
	LTE Band 5	QPSK	20525	836.5	10M	1	0	Side 2	14	0.215	22.57	24	0.30	INPAQ	
	LTE Band 5	QPSK	20525	836.5	10M	25	0	Side 2	14	0.174	21.33	23	0.26	INPAQ	
	LTE Band 5	QPSK	20525	836.5	10M	1	0	Side 3	0	0.01	22.57	24	0.01	INPAQ	
	LTE Band 5	QPSK	20525	836.5	10M	25	0	Side 3	0	0.01	21.33	23	0.01	INPAQ	
	LTE Band 5	QPSK	20525	836.5	10M	1	0	Side 4	0	0.01	22.57	24	0.01	INPAQ	
	LTE Band 5	QPSK	20525	836.5	10M	25	0	Side 4	0	0.01	21.33	23	0.01	INPAQ	

Index.	Band	Modulation	Channel	Frequency (MHz)	Bandwidth	RB Size	RB Offset	Test Position	Spacing (mm)	SAR_{1g} (W/kg)	Meas. Conducted Power (dBm)	Tune-up (dBm)	Reported SAR_{1g} (W/kg)	Antenna Vendor	Power State
	LTE Band 7	QPSK	21100	2535	20M	1	0	Bottom of laptop	0	0.653	15.06	15.5	0.72	INPAQ	Power Reduce
	LTE Band 7	QPSK	21100	2535	20M	50	0	Bottom of laptop	0	0.501	14.15	14.5	0.54	INPAQ	Power Reduce
	LTE Band 7	QPSK	21100	2535	20M	1	0	Bottom of laptop	14	0.592	22.83	24	0.78	INPAQ	
	LTE Band 7	QPSK	21100	2535	20M	50	0	Bottom of laptop	14	0.48	21.7	23	0.65	INPAQ	
	LTE Band 7	QPSK	21100	2535	20M	1	0	Back of display screen	25	0.01	22.83	24	0.01	INPAQ	
	LTE Band 7	QPSK	21100	2535	20M	50	0	Back of display screen	25	0.01	21.7	23	0.01	INPAQ	
	LTE Band 7	QPSK	21100	2535	20M	1	0	Bottom Face	0	0.744	15.06	15.5	0.82	INPAQ	Power Reduce
	LTE Band 7	QPSK	20850	2510	20M	1	0	Bottom Face	0	0.684	14.84	15.5	0.80	INPAQ	Power Reduce
77	LTE Band 7	QPSK	21350	2560	20M	1	0	Bottom Face	0	0.887	14.94	15.5	1.01	INPAQ	Power Reduce
	LTE Band 7	QPSK	21350	2560	20M	1	0	Bottom Face	0	0.871	14.94	15.5	0.99	ZTX	Power Reduce
	LTE Band 7	QPSK	21100	2535	20M	1	0	Bottom Face	0	0.654	15.06	15.5	0.72	ZTX	Power Reduce
	LTE Band 7	QPSK	20850	2510	20M	1	0	Bottom Face	0	0.644	14.84	15.5	0.75	ZTX	Power Reduce
	LTE Band 7	QPSK	21100	2535	20M	50	0	Bottom Face	0	0.582	14.15	14.5	0.63	INPAQ	Power Reduce
	LTE Band 7	QPSK	21100	2535	20M	100	0	Bottom Face	0	0.569	14.36	14.5	0.59	INPAQ	Power Reduce
	LTE Band 7	QPSK	21100	2535	20M	1	0	Bottom Face	14	0.347	22.83	24	0.45	INPAQ	
	LTE Band 7	QPSK	21100	2535	20M	50	0	Bottom Face	14	0.276	21.7	23	0.37	INPAQ	
	LTE Band 7	QPSK	21100	2535	20M	1	0	Side 1	0	0.155	22.83	24	0.20	INPAQ	
	LTE Band 7	QPSK	21100	2535	20M	50	0	Side 1	0	0.125	21.7	23	0.17	INPAQ	
	LTE Band 7	QPSK	21100	2535	20M	1	0	Side 2	0	0.623	15.06	15.5	0.69	INPAQ	Power Reduce
	LTE Band 7	QPSK	21100	2535	20M	50	0	Side 2	0	0.552	14.15	14.5	0.60	INPAQ	Power Reduce
	LTE Band 7	QPSK	21100	2535	20M	1	0	Side 2	14	0.286	22.83	24	0.37	INPAQ	
	LTE Band 7	QPSK	21100	2535	20M	50	0	Side 2	14	0.265	21.7	23	0.36	INPAQ	
	LTE Band 7	QPSK	21100	2535	20M	1	0	Side 3	0	0.01	22.83	24	0.01	INPAQ	
	LTE Band 7	QPSK	21100	2535	20M	50	0	Side 3	0	0.01	21.7	23	0.01	INPAQ	
	LTE Band 7	QPSK	21100	2535	20M	1	0	Side 4	0	0.01	22.83	24	0.01	INPAQ	
	LTE Band 7	QPSK	21100	2535	20M	50	0	Side 4	0	0.01	21.7	23	0.01	INPAQ	

Index.	Band	Modulation	Channel	Frequency (MHz)	Bandwidth	RB Size	RB Offset	Test Position	Spacing (mm)	SAR_{1g} (W/kg)	Meas. Conducted Power (dBm)	Tune-up (dBm)	Reported SAR_{1g} (W/kg)	Antenna Vendor	Power State
80	LTE Band 12	QPSK	23095	707.5	10M	1	0	Bottom of laptop	0	0.979	21.34	22	1.14	INPAQ	Power Reduce
	LTE Band 12	QPSK	23060	704	10M	1	49	Bottom of laptop	0	0.903	21.3	22	1.06	INPAQ	Power Reduce
	LTE Band 12	QPSK	23130	711	10M	1	49	Bottom of laptop	0	0.914	21.32	22	1.07	INPAQ	Power Reduce
	LTE Band 12	QPSK	23095	707.5	10M	1	0	Bottom of laptop	0	0.958	21.34	22	1.12	ZTX	Power Reduce
	LTE Band 12	QPSK	23060	704	10M	1	49	Bottom of laptop	0	0.884	21.3	22	1.04	ZTX	Power Reduce
	LTE Band 12	QPSK	23130	711	10M	1	49	Bottom of laptop	0	0.895	21.32	22	1.05	ZTX	Power Reduce
	LTE Band 12	QPSK	23060	704	10M	25	25	Bottom of laptop	0	0.701	20.46	21	0.79	INPAQ	Power Reduce
	LTE Band 12	QPSK	23095	707.5	10M	50	0	Bottom of laptop	0	0.661	20.27	21	0.78	INPAQ	Power Reduce
	LTE Band 12	QPSK	23095	707.5	10M	1	0	Bottom of laptop	14	0.149	22.61	24	0.21	INPAQ	
	LTE Band 12	QPSK	23095	707.5	10M	25	0	Bottom of laptop	14	0.114	21.65	23	0.16	INPAQ	
	LTE Band 12	QPSK	23095	707.5	10M	1	0	Back of display screen	25	0.01	22.61	24	0.01	INPAQ	
	LTE Band 12	QPSK	23095	707.5	10M	25	0	Back of display screen	25	0.01	21.65	23	0.01	INPAQ	
	LTE Band 12	QPSK	23095	707.5	10M	1	0	Bottom Face	0	0.862	21.34	22	1.00	INPAQ	Power Reduce
	LTE Band 12	QPSK	23060	704	10M	1	49	Bottom Face	0	0.824	21.3	22	0.97	INPAQ	Power Reduce
	LTE Band 12	QPSK	23130	711	10M	1	49	Bottom Face	0	0.821	21.32	22	0.96	INPAQ	Power Reduce
	LTE Band 12	QPSK	23060	704	10M	25	25	Bottom Face	0	0.683	20.46	21	0.77	INPAQ	Power Reduce
	LTE Band 12	QPSK	23095	707.5	10M	50	0	Bottom Face	0	0.663	20.27	21	0.78	INPAQ	Power Reduce
	LTE Band 12	QPSK	23095	707.5	10M	1	0	Bottom Face	14	0.267	22.61	24	0.37	INPAQ	
	LTE Band 12	QPSK	23095	707.5	10M	25	0	Bottom Face	14	0.208	21.65	23	0.28	INPAQ	
	LTE Band 12	QPSK	23095	707.5	10M	1	0	Side 1	0	0.112	22.61	24	0.15	INPAQ	
	LTE Band 12	QPSK	23095	707.5	10M	25	0	Side 1	0	0.085	21.65	23	0.12	INPAQ	
	LTE Band 12	QPSK	23095	707.5	10M	1	0	Side 2	0	0.352	21.34	22	0.41	INPAQ	Power Reduce
	LTE Band 12	QPSK	23060	707.5	10M	25	25	Side 2	0	0.271	20.46	21	0.31	INPAQ	Power Reduce
	LTE Band 12	QPSK	23095	707.5	10M	1	0	Side 2	14	0.01	22.61	24	0.01	INPAQ	
	LTE Band 12	QPSK	23095	707.5	10M	25	0	Side 2	14	0.01	21.65	23	0.01	INPAQ	
	LTE Band 12	QPSK	23095	707.5	10M	1	0	Side 3	0	0.01	22.61	24	0.01	INPAQ	
	LTE Band 12	QPSK	23095	707.5	10M	25	0	Side 3	0	0.01	21.65	23	0.01	INPAQ	
	LTE Band 12	QPSK	23095	707.5	10M	1	0	Side 4	0	0.01	22.61	24	0.01	INPAQ	
	LTE Band 12	QPSK	23095	707.5	10M	25	0	Side 4	0	0.01	21.65	23	0.01	INPAQ	

Index.	Band	Modulation	Channel	Frequency (MHz)	Bandwidth	RB Size	RB Offset	Test Position	Spacing (mm)	SAR_{1g} (W/kg)	Meas. Conducted Power (dBm)	Tune-up (dBm)	Reported SAR_{1g} (W/kg)	Antenna Vendor	Power State
100	LTE Band 13	QPSK	23230	782	10M	1	0	Bottom of laptop	0	0.91	20.18	20.5	0.98	INPAQ	Power Reduce
	LTE Band 13	QPSK	23230	782	10M	1	0	Bottom of laptop	0	0.829	20.18	20.5	0.89	ZTX	Power Reduce
	LTE Band 13	QPSK	23230	782	10M	25	0	Bottom of laptop	0	0.751	19.12	19.5	0.82	INPAQ	Power Reduce
	LTE Band 13	QPSK	23230	782	10M	50	0	Bottom of laptop	0	0.739	19.04	19.5	0.82	INPAQ	Power Reduce
	LTE Band 13	QPSK	23230	782	10M	1	0	Bottom of laptop	14	0.364	22.78	24	0.48	INPAQ	
	LTE Band 13	QPSK	23230	782	10M	25	0	Bottom of laptop	14	0.3	21.91	23	0.39	INPAQ	
	LTE Band 13	QPSK	23230	782	10M	1	0	Back of display screen	25	0.01	22.78	24	0.01	INPAQ	
	LTE Band 13	QPSK	23230	782	10M	25	0	Back of display screen	25	0.01	21.91	23	0.01	INPAQ	
	LTE Band 13	QPSK	23230	782	10M	1	0	Bottom Face	0	0.798	20.18	20.5	0.86	INPAQ	Power Reduce
	LTE Band 13	QPSK	23230	782	10M	25	0	Bottom Face	0	0.681	19.12	19.5	0.74	INPAQ	Power Reduce
	LTE Band 13	QPSK	23230	782	10M	50	0	Bottom Face	0	0.668	19.04	19.5	0.74	INPAQ	Power Reduce
	LTE Band 13	QPSK	23230	782	10M	1	0	Bottom Face	14	0.195	22.78	24	0.26	INPAQ	
	LTE Band 13	QPSK	23230	782	10M	25	0	Bottom Face	14	0.164	21.91	23	0.21	INPAQ	
	LTE Band 13	QPSK	23230	782	10M	1	0	Side 1	0	0.112	22.78	24	0.15	INPAQ	
	LTE Band 13	QPSK	23230	782	10M	25	0	Side 1	0	0.099	21.91	23	0.13	INPAQ	
	LTE Band 13	QPSK	23230	782	10M	1	0	Side 2	0	0.186	20.18	20.5	0.20	INPAQ	Power Reduce
	LTE Band 13	QPSK	23230	782	10M	25	0	Side 2	0	0.157	19.12	19.5	0.17	INPAQ	Power Reduce
	LTE Band 13	QPSK	23230	782	10M	1	0	Side 2	14	0.041	22.78	24	0.05	INPAQ	
	LTE Band 13	QPSK	23230	782	10M	25	0	Side 2	14	0.01	21.91	23	0.01	INPAQ	
	LTE Band 13	QPSK	23230	782	10M	1	0	Side 3	0	0.01	22.78	24	0.01	INPAQ	
	LTE Band 13	QPSK	23230	782	10M	25	0	Side 3	0	0.01	21.91	23	0.01	INPAQ	
	LTE Band 13	QPSK	23230	782	10M	1	0	Side 4	0	0.01	22.78	24	0.01	INPAQ	
	LTE Band 13	QPSK	23230	782	10M	25	0	Side 4	0	0.01	21.91	23	0.01	INPAQ	

Index.	Band	Modulation	Channel	Frequency (MHz)	Bandwidth	RB Size	RB Offset	Test Position	Spacing (mm)	SAR_{1g} (W/kg))	Meas. Conducted Power (dBm)	Tune-up (dBm)	Reported SAR_{1g} (W/kg)	Antenna Vendor	Power State
116	LTE Band 17	QPSK	23790	710	10M	1	0	Bottom of laptop	0	0.894	21.22	21.5	0.95	INPAQ	Power Reduce
	LTE Band 17	QPSK	23780	709	10M	1	0	Bottom of laptop	0	0.772	21.18	21.5	0.83	INPAQ	Power Reduce
	LTE Band 17	QPSK	23800	711	10M	1	0	Bottom of laptop	0	0.768	21.16	21.5	0.83	INPAQ	Power Reduce
	LTE Band 17	QPSK	23790	710	10M	1	0	Bottom of laptop	0	0.791	21.22	21.5	0.84	ZTX	Power Reduce
	LTE Band 17	QPSK	23780	709	10M	1	0	Bottom of laptop	0	0.683	21.18	21.5	0.74	ZTX	Power Reduce
	LTE Band 17	QPSK	23800	711	10M	1	0	Bottom of laptop	0	0.679	21.16	21.5	0.73	ZTX	Power Reduce
	LTE Band 17	QPSK	23790	710	10M	25	0	Bottom of laptop	0	0.646	20.28	20.5	0.68	INPAQ	Power Reduce
	LTE Band 17	QPSK	23790	710	10M	50	0	Bottom of laptop	0	0.591	20.2	20.5	0.63	INPAQ	Power Reduce
	LTE Band 17	QPSK	23790	710	10M	1	0	Bottom of laptop	14	0.239	22.61	24	0.33	INPAQ	
	LTE Band 17	QPSK	23790	710	10M	25	0	Bottom of laptop	14	0.201	21.66	23	0.27	INPAQ	
	LTE Band 17	QPSK	23790	710	10M	1	0	Back of display screen	25	0.01	22.61	24	0.01	INPAQ	
	LTE Band 17	QPSK	23790	710	10M	25	0	Back of display screen	25	0.01	21.66	23	0.01	INPAQ	
	LTE Band 17	QPSK	23790	710	10M	1	0	Bottom Face	0	0.742	21.22	21.5	0.79	INPAQ	Power Reduce
	LTE Band 17	QPSK	23790	710	10M	25	0	Bottom Face	0	0.628	20.28	20.5	0.66	INPAQ	Power Reduce
	LTE Band 17	QPSK	23790	710	10M	1	0	Bottom Face	14	0.187	22.61	24	0.26	INPAQ	
	LTE Band 17	QPSK	23790	710	10M	25	0	Bottom Face	14	0.157	21.66	23	0.21	INPAQ	
	LTE Band 17	QPSK	23790	710	10M	1	0	Side 1	0	0.099	22.61	24	0.14	INPAQ	
	LTE Band 17	QPSK	23790	710	10M	25	0	Side 1	0	0.08	21.66	23	0.11	INPAQ	
	LTE Band 17	QPSK	23790	710	10M	1	0	Side 2	0	0.226	21.22	21.5	0.24	INPAQ	Power Reduce
	LTE Band 17	QPSK	23790	710	10M	25	0	Side 2	0	0.165	20.28	20.5	0.17	INPAQ	Power Reduce
	LTE Band 17	QPSK	23790	710	10M	1	0	Side 2	14	0.125	22.61	24	0.17	INPAQ	
	LTE Band 17	QPSK	23790	710	10M	25	0	Side 2	14	0.091	21.66	23	0.12	INPAQ	
	LTE Band 17	QPSK	23790	710	10M	1	0	Side 3	0	0.01	22.61	24	0.01	INPAQ	
	LTE Band 17	QPSK	23790	710	10M	25	0	Side 3	0	0.01	21.66	23	0.01	INPAQ	
	LTE Band 17	QPSK	23790	710	10M	1	0	Side 4	0	0.01	22.61	24	0.01	INPAQ	
	LTE Band 17	QPSK	23790	710	10M	25	0	Side 4	0	0.01	21.66	23	0.01	INPAQ	

Index.	Band	Modulation	Channel	Frequency (MHz)	Bandwidth	RB Size	RB Offset	Test Position	Spacing (mm)	SAR_{1g} (W/kg)	Meas. Conducted Power (dBm)	Tune-up (dBm)	Reported SAR_{1g} (W/kg)	Antenna Vendor	Power State
	LTE Band 26	QPSK	26865	831.5	15M	1	0	Bottom of laptop	0	0.719	19.49	20	0.81	INPAQ	Power Reduce
	LTE Band 26	QPSK	26765	821.5	15M	1	37	Bottom of laptop	0	0.752	19.4	20	0.86	INPAQ	Power Reduce
119	LTE Band 26	QPSK	26965	841.5	15M	1	37	Bottom of laptop	0	0.769	19.33	20	0.90	INPAQ	Power Reduce
	LTE Band 26	QPSK	26965	841.5	15M	1	37	Bottom of laptop	0	0.735	19.33	20	0.86	ZTX	Power Reduce
	LTE Band 26	QPSK	26865	831.5	15M	1	0	Bottom of laptop	0	0.627	19.49	20	0.71	ZTX	Power Reduce
	LTE Band 26	QPSK	26765	821.5	15M	1	37	Bottom of laptop	0	0.647	19.4	20	0.74	ZTX	Power Reduce
	LTE Band 26	QPSK	26865	831.5	15M	36	19	Bottom of laptop	0	0.648	18.41	19	0.74	INPAQ	Power Reduce
	LTE Band 26	QPSK	26865	831.5	15M	75	0	Bottom of laptop	0	0.622	18.31	19	0.73	INPAQ	Power Reduce
	LTE Band 26	QPSK	26865	831.5	15M	1	0	Bottom of laptop	14	0.115	22.6	24	0.16	INPAQ	
	LTE Band 26	QPSK	26865	831.5	15M	36	0	Bottom of laptop	14	0.083	21.59	23	0.11	INPAQ	
	LTE Band 26	QPSK	26865	831.5	15M	1	0	Back of display screen	25	0.01	22.6	24	0.01	INPAQ	
	LTE Band 26	QPSK	26865	831.5	15M	36	0	Back of display screen	25	0.01	21.59	23	0.01	INPAQ	
	LTE Band 26	QPSK	26865	831.5	15M	1	0	Bottom Face	0	0.554	19.49	20	0.62	INPAQ	Power Reduce
	LTE Band 26	QPSK	26865	831.5	15M	36	19	Bottom Face	0	0.466	18.41	19	0.53	INPAQ	Power Reduce
	LTE Band 26	QPSK	26865	831.5	15M	1	0	Bottom Face	14	0.136	22.6	24	0.19	INPAQ	
	LTE Band 26	QPSK	26865	831.5	15M	36	0	Bottom Face	14	0.113	21.59	23	0.16	INPAQ	
	LTE Band 26	QPSK	26865	831.5	15M	1	0	Side 1	0	0.168	22.6	24	0.23	INPAQ	
	LTE Band 26	QPSK	26865	831.5	15M	36	0	Side 1	0	0.137	21.59	23	0.19	INPAQ	
	LTE Band 26	QPSK	26865	831.5	15M	1	0	Side 2	0	0.258	19.49	20	0.29	INPAQ	Power Reduce
	LTE Band 26	QPSK	26865	831.5	15M	36	19	Side 2	0	0.214	18.41	19	0.25	INPAQ	Power Reduce
	LTE Band 26	QPSK	26865	831.5	15M	1	0	Side 2	14	0.036	22.6	24	0.05	INPAQ	
	LTE Band 26	QPSK	26865	831.5	15M	36	0	Side 2	14	0.017	21.59	23	0.02	INPAQ	
	LTE Band 26	QPSK	26865	831.5	15M	1	0	Side 3	0	0.01	22.6	24	0.01	INPAQ	
	LTE Band 26	QPSK	26865	831.5	15M	36	0	Side 3	0	0.01	21.59	23	0.01	INPAQ	
	LTE Band 26	QPSK	26865	831.5	15M	1	0	Side 4	0	0.01	22.6	24	0.01	INPAQ	
	LTE Band 26	QPSK	26865	831.5	15M	36	0	Side 4	0	0.01	21.59	23	0.01	INPAQ	

Index.	Band	Modulation	Channel	Frequency (MHz)	Bandwidth	RB Size	RB Offset	Test Position	Spacing (mm)	SAR_{1g} (W/kg)	Meas. Conducted Power (dBm)	Tune-up (dBm)	Reported SAR_{1g} (W/kg)	Antenna Vendor	Power State
	LTE Band 30	QPSK	27710	2310	10M	1	0	Bottom of laptop	0	0.99	19.78	20	1.04	INPAQ	Power Reduce
	LTE Band 30	QPSK	27710	2310	10M	25	0	Bottom of laptop	0	0.843	18.75	19	0.89	INPAQ	Power Reduce
	LTE Band 30	QPSK	27710	2310	10M	50	0	Bottom of laptop	0	0.835	18.64	19	0.91	INPAQ	Power Reduce
	LTE Band 30	QPSK	27710	2310	10M	1	0	Bottom of laptop	14	0.127	22.42	24	0.18	INPAQ	
	LTE Band 30	QPSK	27710	2310	10M	25	0	Bottom of laptop	14	0.11	21.3	23	0.16	INPAQ	
	LTE Band 30	QPSK	27710	2310	10M	1	0	Back of display screen	25	0.01	22.42	24	0.01	INPAQ	
	LTE Band 30	QPSK	27710	2310	10M	25	0	Back of display screen	25	0.01	21.3	23	0.01	INPAQ	
157	LTE Band 30	QPSK	27710	2310	10M	1	0	Bottom Face	0	1.03	19.78	20	1.08	INPAQ	Power Reduce
	LTE Band 30	QPSK	27710	2310	10M	1	0	Bottom Face	0	1.01	19.78	20	1.06	ZTX	Power Reduce
	LTE Band 30	QPSK	27710	2310	10M	25	0	Bottom Face	0	0.874	18.75	19	0.93	INPAQ	Power Reduce
	LTE Band 30	QPSK	27710	2310	10M	50	0	Bottom Face	0	0.858	18.64	19	0.93	INPAQ	Power Reduce
	LTE Band 30	QPSK	27710	2310	10M	1	0	Bottom Face	14	0.259	22.42	24	0.37	INPAQ	
	LTE Band 30	QPSK	27710	2310	10M	25	0	Bottom Face	14	0.212	21.3	23	0.31	INPAQ	
	LTE Band 30	QPSK	27710	2310	10M	1	0	Side 1	0	0.115	22.42	24	0.17	INPAQ	
	LTE Band 30	QPSK	27710	2310	10M	25	0	Side 1	0	0.085	21.3	23	0.13	INPAQ	
	LTE Band 30	QPSK	27710	2310	10M	1	0	Side 2	0	0.409	19.78	20	0.43	INPAQ	Power Reduce
	LTE Band 30	QPSK	27710	2310	10M	25	0	Side 2	0	0.327	18.75	19	0.35	INPAQ	Power Reduce
	LTE Band 30	QPSK	27710	2310	10M	1	0	Side 2	14	0.061	22.42	24	0.09	INPAQ	
	LTE Band 30	QPSK	27710	2310	10M	25	0	Side 2	14	0.01	21.3	23	0.01	INPAQ	
	LTE Band 30	QPSK	27710	2310	10M	1	0	Side 3	0	0.01	22.42	24	0.01	INPAQ	
	LTE Band 30	QPSK	27710	2310	10M	25	0	Side 3	0	0.01	21.3	23	0.01	INPAQ	
	LTE Band 30	QPSK	27710	2310	10M	1	0	Side 4	0	0.01	22.42	24	0.01	INPAQ	
	LTE Band 30	QPSK	27710	2310	10M	25	0	Side 4	0	0.01	21.3	23	0.01	INPAQ	

Index.	Band	Modulation	Channel	Frequency (MHz)	Bandwidth	RB Size	RB Offset	Test Position	Spacing (mm)	SAR_{1g} (W/kg)	Meas. Conducted Power (dBm)	Tune-up (dBm)	Duty Cycle (%)	Reported SAR_{1g} (W/kg)	Antenna Vendor	Power State
	LTE Band 41	QPSK	40620	2593	20M	1	0	Bottom of laptop	0	0.352	16.76	17	62.9	0.37	INPAQ	Power Reduce
	LTE Band 41	QPSK	40620	2593	20M	50	0	Bottom of laptop	0	0.234	15.74	16	62.9	0.25	INPAQ	Power Reduce
	LTE Band 41	QPSK	40185	2549.5	20M	1	0	Bottom of laptop	14	0.289	22.67	24	62.9	0.39	INPAQ	
	LTE Band 41	QPSK	40185	2549.5	20M	50	0	Bottom of laptop	14	0.225	21.54	23	62.9	0.31	INPAQ	
	LTE Band 41	QPSK	40185	2549.5	20M	1	0	Back of display screen	25	0.01	22.67	24	62.9	0.01	INPAQ	
	LTE Band 41	QPSK	40185	2549.5	20M	50	0	Back of display screen	25	0.01	21.54	23	62.9	0.01	INPAQ	
	LTE Band 41	QPSK	40620	2593	20M	1	0	Bottom Face	0	0.622	16.76	17	62.9	0.66	INPAQ	Power Reduce
	LTE Band 41	QPSK	39750	2506	20M	1	0	Bottom Face	0	0.429	16.7	17	62.9	0.46	INPAQ	Power Reduce
	LTE Band 41	QPSK	40185	2549.5	20M	1	0	Bottom Face	0	0.617	16.71	17	62.9	0.66	INPAQ	Power Reduce
184	LTE Band 41	QPSK	41055	2636.5	20M	1	0	Bottom Face	0	0.673	16.68	17	62.9	0.72	INPAQ	Power Reduce
	LTE Band 41	QPSK	41490	2680	20M	1	0	Bottom Face	0	0.488	16.67	17	62.9	0.53	INPAQ	Power Reduce
	LTE Band 41	QPSK	41055	2636.5	20M	1	0	Bottom Face	0	0.667	16.68	17	62.9	0.72	ZTX	Power Reduce
	LTE Band 41	QPSK	39750	2506	20M	1	0	Bottom Face	0	0.425	16.7	17	62.9	0.46	ZTX	Power Reduce
	LTE Band 41	QPSK	40185	2549.5	20M	1	0	Bottom Face	0	0.611	16.71	17	62.9	0.65	ZTX	Power Reduce
	LTE Band 41	QPSK	41490	2680	20M	1	0	Bottom Face	0	0.484	16.67	17	62.9	0.52	ZTX	Power Reduce
	LTE Band 41	QPSK	40620	2593	20M	1	0	Bottom Face	0	0.617	16.76	17	62.9	0.65	ZTX	Power Reduce
	LTE Band 41	QPSK	40620	2593	20M	50	0	Bottom Face	0	0.464	15.74	16	62.9	0.49	INPAQ	Power Reduce
	LTE Band 41	QPSK	40620	2593	20M	100	0	Bottom Face	0	0.459	15.65	16	62.9	0.50	INPAQ	Power Reduce
	LTE Band 41	QPSK	40185	2549.5	20M	1	0	Bottom Face	14	0.177	22.67	24	62.9	0.24	INPAQ	
	LTE Band 41	QPSK	40185	2549.5	20M	50	0	Bottom Face	14	0.151	21.54	23	62.9	0.21	INPAQ	
	LTE Band 41	QPSK	40185	2549.5	20M	1	0	Side 1	0	0.048	22.67	24	62.9	0.07	INPAQ	
	LTE Band 41	QPSK	40185	2549.5	20M	50	0	Side 1	0	0.037	21.54	23	62.9	0.05	INPAQ	
	LTE Band 41	QPSK	40620	2593	20M	1	0	Side 2	0	0.433	16.76	17	62.9	0.46	INPAQ	Power Reduce
	LTE Band 41	QPSK	40620	2593	20M	50	0	Side 2	0	0.345	15.74	16	62.9	0.37	INPAQ	Power Reduce
	LTE Band 41	QPSK	40185	2549.5	20M	1	0	Side 2	14	0.086	22.67	24	62.9	0.12	INPAQ	
	LTE Band 41	QPSK	40185	2549.5	20M	50	0	Side 2	14	0.073	21.54	23	62.9	0.10	INPAQ	
	LTE Band 41	QPSK	40185	2549.5	20M	1	0	Side 3	0	0.01	22.67	24	62.9	0.01	INPAQ	
	LTE Band 41	QPSK	40185	2549.5	20M	50	0	Side 3	0	0.01	21.54	23	62.9	0.01	INPAQ	
	LTE Band 41	QPSK	40185	2549.5	20M	1	0	Side 4	0	0.01	22.67	24	62.9	0.01	INPAQ	
	LTE Band 41	QPSK	40185	2549.5	20M	50	0	Side 4	0	0.01	21.54	23	62.9	0.01	INPAQ	
164	LTE Band 38	QPSK	38000	2595	20M	1	0	Bottom Face	0	0.652	16.63	17	62.9	0.71	INPAQ	Power Reduce

Index.	Band	Modulation	Channel	Frequency (MHz)	Bandwidth	RB Size	RB Offset	Test Position	Spacing (mm)	SAR_{1g} (W/kg)	Meas. Conducted Power (dBm)	Tune-up (dBm)	Reported SAR_{1g} (W/kg)	Antenna Vendor	Power State
	LTE Band 66	QPSK	132322	1745	20M	1	0	Bottom of laptop	0	0.784	17.16	17.5	0.85	INPAQ	Power Reduce
202	LTE Band 66	QPSK	132072	1720	20M	1	99	Bottom of laptop	0	0.9	17.14	17.5	0.98	INPAQ	Power Reduce
	LTE Band 66	QPSK	132572	1770	20M	1	99	Bottom of laptop	0	0.714	17	17.5	0.80	INPAQ	Power Reduce
	LTE Band 66	QPSK	132072	1720	20M	1	99	Bottom of laptop	0	0.823	17.14	17.5	0.89	ZTX	Power Reduce
	LTE Band 66	QPSK	132322	1745	20M	1	0	Bottom of laptop	0	0.717	17.16	17.5	0.78	ZTX	Power Reduce
	LTE Band 66	QPSK	132572	1770	20M	1	99	Bottom of laptop	0	0.653	17	17.5	0.73	ZTX	Power Reduce
	LTE Band 66	QPSK	132322	1745	20M	50	50	Bottom of laptop	0	0.602	16.09	16.5	0.66	INPAQ	Power Reduce
	LTE Band 66	QPSK	132322	1745	20M	100	0	Bottom of laptop	0	0.591	15.94	16.5	0.67	INPAQ	Power Reduce
	LTE Band 66	QPSK	132322	1745	20M	1	0	Bottom of laptop	14	0.633	23.02	24	0.79	INPAQ	
	LTE Band 66	QPSK	132322	1745	20M	50	50	Bottom of laptop	14	0.499	22.09	23	0.62	INPAQ	
	LTE Band 66	QPSK	132322	1745	20M	1	0	Back of display screen	25	0.01	23.02	24	0.01	INPAQ	
	LTE Band 66	QPSK	132322	1745	20M	50	50	Back of display screen	25	0.01	22.09	23	0.01	INPAQ	
	LTE Band 66	QPSK	132322	1745	20M	1	0	Bottom Face	0	0.608	17.16	17.5	0.66	INPAQ	Power Reduce
	LTE Band 66	QPSK	132322	1745	20M	50	50	Bottom Face	0	0.561	16.09	16.5	0.62	INPAQ	Power Reduce
	LTE Band 66	QPSK	132322	1745	20M	1	0	Bottom Face	14	0.54	23.02	24	0.68	INPAQ	
	LTE Band 66	QPSK	132322	1745	20M	50	50	Bottom Face	14	0.459	22.09	23	0.57	INPAQ	
	LTE Band 66	QPSK	132322	1745	20M	1	0	Side 1	0	0.101	23.02	24	0.13	INPAQ	
	LTE Band 66	QPSK	132322	1745	20M	50	50	Side 1	0	0.081	22.09	23	0.10	INPAQ	
	LTE Band 66	QPSK	132322	1745	20M	1	0	Side 2	0	0.695	17.16	17.5	0.75	INPAQ	Power Reduce
	LTE Band 66	QPSK	132322	1745	20M	50	50	Side 2	0	0.533	16.09	16.5	0.59	INPAQ	Power Reduce
	LTE Band 66	QPSK	132322	1745	20M	1	0	Side 2	14	0.381	23.02	24	0.48	INPAQ	
	LTE Band 66	QPSK	132322	1745	20M	50	50	Side 2	14	0.313	22.09	23	0.39	INPAQ	
	LTE Band 66	QPSK	132322	1745	20M	1	0	Side 3	0	0.01	23.02	24	0.01	INPAQ	
	LTE Band 66	QPSK	132322	1745	20M	50	50	Side 3	0	0.01	22.09	23	0.01	INPAQ	
	LTE Band 66	QPSK	132322	1745	20M	1	0	Side 4	0	0.01	23.02	24	0.01	INPAQ	
	LTE Band 66	QPSK	132322	1745	20M	50	50	Side 4	0	0.01	22.09	23	0.01	INPAQ	
37	LTE Band 4	QPSK	20175	1732.5	20M	1	99	Bottom of laptop	0	0.798	16.67	17.5	0.97	INPAQ	Power Reduce

10.6 Measurement Variability

According to KDB 865664 D01v01r04, 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. When both head and body tissue-equivalent media are required for SAR measurements in a frequency band, the variability measurement procedures should be applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium.

The following procedures are applied to determine if repeated measurements are required:

1. The original highest measured Reported SAR 1-g is ≧ 0.80 W/kg, repeated that measurement once.
2. Perform a second repeated measurement the ratio of the largest to the smallest SAR for the original and first repeated measurements is <1.2 W/kg, or when the original or repeated measurement is ≧ 1.45 W/kg (~10% from the 1-g SAR limit).

Band	Modulation	Channel	Frequency (MHz)	Bandwidth	RB Size	RB Offset	Test Position	Spacing (mm)	Note	Original SAR_{1g} (W/kg)	First SAR_{1g} (W/kg)	First Ratio SAR_{1g}
WCDMA Band II	RMC12.2Kbps	9538	1907.6	-	-	-	Bottom of laptop	0	Index. #02_once	0.918	0.917	0.11%
WCDMA Band IV	RMC12.2Kbps	1312	1712.4	-	-	-	Bottom of laptop	0	Index. #14_once	0.83	0.812	2.17%
LTE Band 2	QPSK	19100	1900	20M	1	0	Bottom of laptop	0	Index. #36_once	1.11	1.05	5.41%
LTE Band 7	QPSK	21350	2560	20M	1	0	Bottom Face	0	Index. #77_once	0.887	0.871	1.80%
LTE Band 12	QPSK	23095	707.5	10M	1	0	Bottom of laptop	0	Index. #80_once	0.979	0.966	1.33%
LTE Band 13	QPSK	23230	782	10M	1	0	Bottom of laptop	0	Index. #100_once	0.91	0.904	0.66%
LTE Band 17	QPSK	23790	710	10M	1	0	Bottom of laptop	0	Index. #116_once	0.894	0.887	0.78%
LTE Band 30	QPSK	27710	2310	10M	1	0	Bottom Face	0	Index. #157_once	1.03	0.997	3.20%
LTE Band 66	QPSK	132072	1720	20M	1	99	Bottom of laptop	0	Index. #202_once	0.9	0.879	2.33%

10.7 Simultaneous Transmission Evaluation

10.7.1 Simultaneous Transmission Configurations

Condition(s)	Band					
	WWAN	WLAN 2.4 GHz ANT Main	WLAN 2.4 GHz ANT Aux	WLAN 5 GHz ANT Main	WLAN 5 GHz ANT Aux	Bluetooth
1	V	V	-	-	-	-
2	V	-	V	-	-	-
3	V	V	V	-	-	-
4	V	V	-	-	-	V
5	V	-	-	-	-	V
6	V	-	-	V	-	-
7	V	-	-	-	V	-
8	V	-	-	V	-	V
9	V	-	-	-	V	V
10	V	-	-	V	V	-
11	V	-	-	V	V	V

10.7.2 Simultaneous Transmission Result

When the sum of SAR_{1g} of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit, SAR test exclusion applies to that simultaneous transmission configuration.

The most conservative simultaneous transmission configurations in 10.7.1 were considered.

The sum of SAR_{1g} results is shown as below.

Per KDB 690783 D01, the reported SAR are rounded off to the 2nd decimal place.

WWAN Band	Exposure Position	1	2	3	4	5	6	1+2+3	1+2+6	1+4+5+6
		WWAN	WLAN 2.4 GHz ANT Main	WLAN 2.4 GHz ANT Aux	WLAN 5 GHz ANT Main	WLAN 5 GHz ANT Aux	Bluetooth ANT Aux	$\sum SAR_{1g}$ (W/kg)	$\sum SAR_{1g}$ (W/kg)	$\sum SAR_{1g}$ (W/kg)
		SAR_{1g} (W/kg)	SAR_{1g} (W/kg)	SAR_{1g} (W/kg)	SAR_{1g} (W/kg)	SAR_{1g} (W/kg)	SAR_{1g} (W/kg)			
WCDMA Band II	Bottom of laptop at 14 mm	0.56	0.01	0.01	0.01	0.01	0.02	0.58	0.59	0.60
	Bottom Face at 14 mm	0.50	0.34	0.24	0.42	0.29	0.02	1.08	0.86	1.23
	side 2 at 14 mm	0.20	0.01	0.01	0.01	0.01	0.02	0.22	0.23	0.24
WCDMA Band IV	Bottom of laptop at 14 mm	0.70	0.01	0.01	0.01	0.01	0.02	0.72	0.73	0.74
	Bottom Face at 14 mm	0.68	0.34	0.24	0.42	0.29	0.02	1.26	1.04	1.41
	side 2 at 14 mm	0.47	0.01	0.01	0.01	0.01	0.02	0.49	0.50	0.51
WCDMA Band V	Bottom of laptop at 14 mm	0.44	0.01	0.01	0.01	0.01	0.02	0.46	0.47	0.48
	Bottom Face at 14 mm	0.29	0.34	0.24	0.42	0.29	0.02	0.87	0.65	1.02
	side 2 at 14 mm	0.07	0.01	0.01	0.01	0.01	0.02	0.09	0.10	0.11
LTE Band 2	Bottom of laptop at 14 mm	0.66	0.01	0.01	0.01	0.01	0.02	0.68	0.69	0.70
	Bottom Face at 14 mm	0.32	0.34	0.24	0.42	0.29	0.02	0.90	0.68	1.05
	side 2 at 14 mm	0.20	0.01	0.01	0.01	0.01	0.02	0.22	0.23	0.24
LTE Band 5	Bottom of laptop at 14 mm	0.50	0.01	0.01	0.01	0.01	0.02	0.52	0.53	0.54
	Bottom Face at 14 mm	0.30	0.34	0.24	0.42	0.29	0.02	0.88	0.66	1.03
	side 2 at 14 mm	0.30	0.01	0.01	0.01	0.01	0.02	0.32	0.33	0.34
LTE Band 7	Bottom of laptop at 14 mm	0.78	0.01	0.01	0.01	0.01	0.02	0.80	0.81	0.82
	Bottom Face at 14 mm	0.45	0.34	0.24	0.42	0.29	0.02	1.03	0.81	1.18
	side 2 at 14 mm	0.37	0.01	0.01	0.01	0.01	0.02	0.39	0.40	0.41
LTE Band 12	Bottom of laptop at 14 mm	0.21	0.01	0.01	0.01	0.01	0.02	0.23	0.24	0.25
	Bottom Face at 14 mm	0.37	0.34	0.24	0.42	0.29	0.02	0.95	0.73	1.10
	side 2 at 14 mm	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05
LTE Band 13	Bottom of laptop at 14 mm	0.48	0.01	0.01	0.01	0.01	0.02	0.50	0.51	0.52
	Bottom Face at 14 mm	0.26	0.34	0.24	0.42	0.29	0.02	0.84	0.62	0.99
	side 2 at 14 mm	0.05	0.01	0.01	0.01	0.01	0.02	0.07	0.08	0.09
LTE Band 17	Bottom of laptop at 14 mm	0.33	0.01	0.01	0.01	0.01	0.02	0.35	0.36	0.37
	Bottom Face at 14 mm	0.26	0.34	0.24	0.42	0.29	0.02	0.84	0.62	0.99
	side 2 at 14 mm	0.17	0.01	0.01	0.01	0.01	0.02	0.19	0.20	0.21
LTE Band 26	Bottom of laptop at 14 mm	0.16	0.01	0.01	0.01	0.01	0.02	0.18	0.19	0.20
	Bottom Face at 14 mm	0.19	0.34	0.24	0.42	0.29	0.02	0.77	0.55	0.92
	side 2 at 14 mm	0.05	0.01	0.01	0.01	0.01	0.02	0.07	0.08	0.09
LTE Band 30	Bottom of laptop at 14 mm	0.18	0.01	0.01	0.01	0.01	0.02	0.20	0.21	0.22
	Bottom Face at 14 mm	0.37	0.34	0.24	0.42	0.29	0.02	0.95	0.73	1.10
	side 2 at 14 mm	0.09	0.01	0.01	0.01	0.01	0.02	0.11	0.12	0.13
LTE Band 41	Bottom of laptop at 14 mm	0.39	0.01	0.01	0.01	0.01	0.02	0.41	0.42	0.43
	Bottom Face at 14 mm	0.24	0.34	0.24	0.42	0.29	0.02	0.82	0.60	0.97
	side 2 at 14 mm	0.12	0.01	0.01	0.01	0.01	0.02	0.14	0.15	0.16
LTE Band 66	Bottom of laptop at 14 mm	0.79	0.01	0.01	0.01	0.01	0.02	0.81	0.82	0.83
	Bottom Face at 14 mm	0.68	0.34	0.24	0.42	0.29	0.02	1.26	1.04	1.41
	side 2 at 14 mm	0.48	0.01	0.01	0.01	0.01	0.02	0.50	0.51	0.52

Note: The most conservative WLAN configurations at 0 mm were applied.

WWAN Band	Exposure Position	1	2	3	4	5	6	1+2+3	1+2+6	1+4+5+6
		WWAN	WLAN 2.4 GHz ANT Main	WLAN 2.4 GHz ANT Aux	WLAN 5 GHz ANT Main	WLAN 5 GHz ANT Aux	Bluetooth ANT Aux	$\sum SAR_{1g}$ (W/kg)	$\sum SAR_{1g}$ (W/kg)	$\sum SAR_{1g}$ (W/kg)
		SAR_{1g} (W/kg)	SAR_{1g} (W/kg)	SAR_{1g} (W/kg)	SAR_{1g} (W/kg)	SAR_{1g} (W/kg)	SAR_{1g} (W/kg)			
WCDMA Band II	Bottom Face at 0 mm	0.67	0.34	0.24	0.42	0.29	0.02	1.25	1.03	1.40
	side 1 at 0 mm	0.08	0.43	0.41	0.50	0.57	0.07	0.92	0.58	1.22
	side 2 at 0 mm	0.50	0.01	0.01	0.01	0.01	0.02	0.52	0.53	0.54
	side 3 at 0 mm	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05
	side 4 at 0 mm	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05
WCDMA Band IV	Bottom Face at 0 mm	0.70	0.34	0.24	0.42	0.29	0.02	1.28	1.06	1.43
	side 1 at 0 mm	0.14	0.43	0.41	0.50	0.57	0.07	0.98	0.64	1.28
	side 2 at 0 mm	0.70	0.01	0.01	0.01	0.01	0.02	0.72	0.73	0.74
	side 3 at 0 mm	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05
	side 4 at 0 mm	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05
WCDMA Band V	Bottom Face at 0 mm	0.56	0.34	0.24	0.42	0.29	0.02	1.14	0.92	1.29
	side 1 at 0 mm	0.18	0.43	0.41	0.50	0.57	0.07	1.02	0.68	1.32
	side 2 at 0 mm	0.33	0.01	0.01	0.01	0.01	0.02	0.35	0.36	0.37
	side 3 at 0 mm	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05
	side 4 at 0 mm	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05
LTE Band 2	Bottom Face at 0 mm	0.74	0.34	0.24	0.42	0.29	0.02	1.32	1.10	1.47
	side 1 at 0 mm	0.10	0.43	0.41	0.50	0.57	0.07	0.94	0.60	1.24
	side 2 at 0 mm	0.67	0.01	0.01	0.01	0.01	0.02	0.69	0.70	0.71
	side 3 at 0 mm	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05
	side 4 at 0 mm	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05
LTE Band 5	Bottom Face at 0 mm	0.63	0.34	0.24	0.42	0.29	0.02	1.21	0.99	1.36
	side 1 at 0 mm	0.22	0.43	0.41	0.50	0.57	0.07	1.06	0.72	1.36
	side 2 at 0 mm	0.34	0.01	0.01	0.01	0.01	0.02	0.36	0.37	0.38
	side 3 at 0 mm	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05
	side 4 at 0 mm	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05
LTE Band 7	Bottom Face at 0 mm	1.01	0.34	0.24	0.42	0.29	0.02	1.59	1.37	1.74
	side 1 at 0 mm	0.20	0.43	0.41	0.50	0.57	0.07	1.04	0.70	1.34
	side 2 at 0 mm	0.69	0.01	0.01	0.01	0.01	0.02	0.71	0.72	0.73
	side 3 at 0 mm	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05
	side 4 at 0 mm	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05

WWAN Band	Exposure Position	1	2	3	4	5	6	1+2+3	1+2+6	1+4+5+6
		WWAN	WLAN 2.4 GHz ANT Main	WLAN 2.4 GHz ANT Aux	WLAN 5 GHz ANT Main	WLAN 5 GHz ANT Aux	Bluetooth ANT Aux	$\sum SAR_{1g}$ (W/kg)	$\sum SAR_{1g}$ (W/kg)	$\sum SAR_{1g}$ (W/kg)
		SAR_{1g} (W/kg)	SAR_{1g} (W/kg)	SAR_{1g} (W/kg)	SAR_{1g} (W/kg)	SAR_{1g} (W/kg)	SAR_{1g} (W/kg)			
LTE Band 12	Bottom Face at 0 mm	1.00	0.34	0.24	0.42	0.29	0.02	1.58	1.36	1.73
	side 1 at 0 mm	0.15	0.43	0.41	0.50	0.57	0.07	0.99	0.65	1.29
	side 2 at 0 mm	0.41	0.01	0.01	0.01	0.01	0.02	0.43	0.44	0.45
	side 3 at 0 mm	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05
	side 4 at 0 mm	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05
LTE Band 13	Bottom Face at 0 mm	0.86	0.34	0.24	0.42	0.29	0.02	1.44	1.22	1.59
	side 1 at 0 mm	0.15	0.43	0.41	0.50	0.57	0.07	0.99	0.65	1.29
	side 2 at 0 mm	0.20	0.01	0.01	0.01	0.01	0.02	0.22	0.23	0.24
	side 3 at 0 mm	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05
	side 4 at 0 mm	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05
LTE Band 17	Bottom Face at 0 mm	0.79	0.34	0.24	0.42	0.29	0.02	1.37	1.15	1.52
	side 1 at 0 mm	0.14	0.43	0.41	0.50	0.57	0.07	0.98	0.64	1.28
	side 2 at 0 mm	0.24	0.01	0.01	0.01	0.01	0.02	0.26	0.27	0.28
	side 3 at 0 mm	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05
	side 4 at 0 mm	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05
LTE Band 26	Bottom Face at 0 mm	0.62	0.34	0.24	0.42	0.29	0.02	1.20	0.98	1.35
	side 1 at 0 mm	0.23	0.43	0.41	0.50	0.57	0.07	1.07	0.73	1.37
	side 2 at 0 mm	0.29	0.01	0.01	0.01	0.01	0.02	0.31	0.32	0.33
	side 3 at 0 mm	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05
	side 4 at 0 mm	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05
LTE Band 30	Bottom Face at 0 mm	1.08	0.34	0.24	0.42	0.29	0.02	1.66	1.44	1.81
	side 1 at 0 mm	0.17	0.43	0.41	0.50	0.57	0.07	1.01	0.67	1.31
	side 2 at 0 mm	0.43	0.01	0.01	0.01	0.01	0.02	0.45	0.46	0.47
	side 3 at 0 mm	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05
	side 4 at 0 mm	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05
LTE Band 41	Bottom Face at 0 mm	0.72	0.34	0.24	0.42	0.29	0.02	1.30	1.08	1.45
	side 1 at 0 mm	0.07	0.43	0.41	0.50	0.57	0.07	0.91	0.57	1.21
	side 2 at 0 mm	0.46	0.01	0.01	0.01	0.01	0.02	0.48	0.49	0.50
	side 3 at 0 mm	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05
	side 4 at 0 mm	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05
LTE Band 66	Bottom Face at 0 mm	0.66	0.34	0.24	0.42	0.29	0.02	1.24	1.02	1.39
	side 1 at 0 mm	0.13	0.43	0.41	0.50	0.57	0.07	0.97	0.63	1.27
	side 2 at 0 mm	0.75	0.01	0.01	0.01	0.01	0.02	0.77	0.78	0.79
	side 3 at 0 mm	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05
	side 4 at 0 mm	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05

WWAN Band	Exposure Position	1	2	3	4	5	6	1+2+3	1+2+6	1+4+5+6
		WWAN	WLAN 2.4 GHz ANT Main	WLAN 2.4 GHz ANT Aux	WLAN 5 GHz ANT Main	WLAN 5 GHz ANT Aux	Bluetooth ANT Aux	$\sum SAR_{1g}$ (W/kg)	$\sum SAR_{1g}$ (W/kg)	$\sum SAR_{1g}$ (W/kg)
		SAR_{1g} (W/kg)	SAR_{1g} (W/kg)	SAR_{1g} (W/kg)	SAR_{1g} (W/kg)	SAR_{1g} (W/kg)	SAR_{1g} (W/kg)			
WCDMA Band II	Bottom of laptop at 0 mm	0.95	0.01	0.01	0.01	0.01	0.02	0.97	0.98	0.99
	Back of display screen at 25 mm	0.01	0.10	0.05	0.18	0.20	0.02	0.16	0.13	0.41
WCDMA Band IV	Bottom of laptop at 0 mm	0.85	0.01	0.01	0.01	0.01	0.02	0.87	0.88	0.89
	Back of display screen at 25 mm	0.01	0.10	0.05	0.18	0.20	0.02	0.16	0.13	0.41
WCDMA Band V	Bottom of laptop at 0 mm	0.72	0.01	0.01	0.01	0.01	0.02	0.74	0.75	0.76
	Back of display screen at 25 mm	0.01	0.10	0.05	0.18	0.20	0.02	0.16	0.13	0.41
LTE Band 2	Bottom of laptop at 0 mm	1.15	0.01	0.01	0.01	0.01	0.02	1.17	1.18	1.19
	Back of display screen at 25 mm	0.01	0.10	0.05	0.18	0.20	0.02	0.16	0.13	0.41
LTE Band 5	Bottom of laptop at 0 mm	0.83	0.01	0.01	0.01	0.01	0.02	0.85	0.86	0.87
	Back of display screen at 25 mm	0.01	0.10	0.05	0.18	0.20	0.02	0.16	0.13	0.41
LTE Band 7	Bottom of laptop at 0 mm	0.72	0.01	0.01	0.01	0.01	0.02	0.74	0.75	0.76
	Back of display screen at 25 mm	0.01	0.10	0.05	0.18	0.20	0.02	0.16	0.13	0.41
LTE Band 12	Bottom of laptop at 0 mm	1.14	0.01	0.01	0.01	0.01	0.02	1.16	1.17	1.18
	Back of display screen at 25 mm	0.01	0.10	0.05	0.18	0.20	0.02	0.16	0.13	0.41
LTE Band 13	Bottom of laptop at 0 mm	0.98	0.01	0.01	0.01	0.01	0.02	1.00	1.01	1.02
	Back of display screen at 25 mm	0.01	0.10	0.05	0.18	0.20	0.02	0.16	0.13	0.41
LTE Band 17	Bottom of laptop at 0 mm	0.95	0.01	0.01	0.01	0.01	0.02	0.97	0.98	0.99
	Back of display screen at 25 mm	0.01	0.10	0.05	0.18	0.20	0.02	0.16	0.13	0.41
LTE Band 26	Bottom of laptop at 0 mm	0.90	0.01	0.01	0.01	0.01	0.02	0.92	0.93	0.94
	Back of display screen at 25 mm	0.01	0.10	0.05	0.18	0.20	0.02	0.16	0.13	0.41
LTE Band 30	Bottom of laptop at 0 mm	1.04	0.01	0.01	0.01	0.01	0.02	1.06	1.07	1.08
	Back of display screen at 25 mm	0.01	0.10	0.05	0.18	0.20	0.02	0.16	0.13	0.41
TE Band 41	Bottom of laptop at 0 mm	0.37	0.01	0.01	0.01	0.01	0.02	0.39	0.40	0.41
	Back of display screen at 25 mm	0.01	0.10	0.05	0.18	0.20	0.02	0.16	0.13	0.41
LTE Band 66	Bottom of laptop at 0 mm	0.98	0.01	0.01	0.01	0.01	0.02	1.00	1.01	1.02
	Back of display screen at 25 mm	0.01	0.10	0.05	0.18	0.20	0.02	0.16	0.13	0.41

10.7.3 SAR to peak location separation (SPLSR)

According to KDB 447498, when the sum of SAR is greater than the limit, SAR test exclusion is determined by the SAR to peak location separation ratio (SPLSR), and the simultaneously transmitting antennas must be considered one pair at a time. The ratio is determined by **$(SAR1+SAR2)^{1.5}$ / (separation distance between the peak SAR locations for the antenna pair, mm)**, round to two decimal digits, and must be ≦ 0.04 for all antenna pairs in the configuration to qualify for 1-g SAR test exclusion.

The SPLSR hotspot combination procedure in TCB workshop Nov. 2019 was applied when simultaneous transmission SAR is > 1.6 W/kg and antenna pair is co-located.

#1 WWAN + WLAN 2.4 GHz_ANT Main + WLAN 2.4 GHz_ANT Aux	**LTE 30 + WLAN 2.4 GHz ANT Main**					
	Band	Modulation	Frequency (MHz)	Position	Antenna	Peak location separation ratio
	LTE 30	QPSK	2310.000	Bottom Face	WWAN	0.02
	WLAN 2.4 GHz	802.11b	2437	Bottom Face	ANT Main	
	Reported SAR1 g (W/kg)	∑ Reported SAR_{1g} (W/Kg)	X (mm)	Y (mm)	Z (mm)	Antenna pair (mm)
	1.08	1.42	37.40	151.00	-0.13	83.55
	0.34		93.40	89.00	-0.01	
	LTE 30 + WLAN 2.4 GHz ANT Aux					
	Band	Modulation	Frequency (MHz)	Position	Antenna	Peak location separation ratio
	LTE 30	QPSK	2310.000	Bottom Face	WWAN	0.01
	WLAN 2.4 GHz	802.11b	2437	Bottom Face	ANT Aux	
	Reported SAR1 g (W/kg)	∑ Reported SAR_{1g} (W/Kg)	X (mm)	Y (mm)	Z (mm)	Antenna pair (mm)
	1.08	1.32	37.40	151.00	-0.13	233.88
	0.24		90.40	-76.80	0.13	
	WLAN 2.4 GHz ANT Main + WLAN 2.4 GHz ANT Aux					
	Band	Modulation	Frequency (MHz)	Position	Antenna	Peak location separation ratio
	WLAN 2.4 GHz	802.11b	2437	Bottom Face	ANT Main	0
	WLAN 2.4 GHz	802.11b	2437	Bottom Face	ANT Aux	
	Reported SAR1 g (W/kg)	∑ Reported SAR_{1g} (W/Kg)	X (mm)	Y (mm)	Z (mm)	Antenna pair (mm)
	0.34	0.58	93.40	89.00	-0.01	165.83
	0.24		90.40	-76.80	0.13	

#2 WWAN + WLAN 5 GHz_ANT Main + WLAN 5 GHz_ANT Aux +BT	**LTE 7 + WLAN 5 GHz ANT Main**					
	Band	Modulation	Frequency (MHz)	Position	Antenna	Peak location separation ratio
	LTE 7	QPSK	2560	Bottom Face	WWAN	0.02
	WLAN 5 GHz	802.11n HT40	5270	Bottom Face	ANT Main	
	Reported SAR1 g (W/kg)	∑ Reported $SAR_{1\,g}$ (W/Kg)	X (mm)	Y (mm)	Z (mm)	Antenna pair (mm)
	1.01	1.43	35.80	151.60	-0.08	78.73
	0.42		99.40	105.20	0.03	
	LTE 7 + WLAN 5 GHz+BT ANT Aux					
	Band	Modulation	Frequency (MHz)	Position	Antenna	Peak location separation ratio
	LTE 7	QPSK	2560	Bottom Face	WWAN	0.01
	WLAN 5 GHz+BT	802.11ac VHT80+GFSK	5775+2402	Bottom Face	ANT Aux	
	Reported SAR1 g (W/kg)	∑ Reported $SAR_{1\,g}$ (W/Kg)	X (mm)	Y (mm)	Z (mm)	Antenna pair (mm)
	1.01	1.32	35.80	151.60	-0.08	228.02
	0.31		102.00	-66.60	0.27	
	WLAN 5 GHz ANT Main + WLAN 5 GHz+BT ANT Aux					
	Band	Modulation	Frequency (MHz)	Position	Antenna	Peak location separation ratio
	WLAN 5 GHz	802.11n HT40	5270	Bottom Face	ANT Main	0
	WLAN 5 GHz+BT	802.11ac VHT80+GFSK	5775+2402	Bottom Face	ANT Aux	
	Reported SAR1 g (W/kg)	∑ Reported $SAR_{1\,g}$ (W/Kg)	X (mm)	Y (mm)	Z (mm)	Antenna pair (mm)
	0.42	0.73	99.40	105.20	0.03	171.82
	0.31		102.00	-66.60	0.27	

#3 WWAN + WLAN 5 GHz_ANT Main + WLAN 5 GHz_ANT Aux +BT	**LTE 12 + WLAN 5 GHz ANT Main**					
	Band	Modulation	Frequency (MHz)	Position	Antenna	Peak location separation ratio
	LTE 12	QPSK	707.500	Bottom Face	WWAN	0.03
	WLAN 5 GHz	802.11n HT40	5270	Bottom Face	ANT Main	
	Reported SAR1 g (W/kg)	∑ Reported $SAR_{1\,g}$ (W/Kg)	X (mm)	Y (mm)	Z (mm)	Antenna pair (mm)
	1	1.42	73.90	157.00	0.58	57.74
	0.42		99.40	105.20	0.03	
	LTE 12 + WLAN 5 GHz+BT ANT Aux					
	Band	Modulation	Frequency (MHz)	Position	Antenna	Peak location separation ratio
	LTE 12	QPSK	707.500	Bottom Face	WWAN	0.01
	WLAN 5 GHz+BT	802.11ac VHT80+GFSK	5775+2402	Bottom Face	ANT Aux	
	Reported SAR1 g (W/kg)	∑ Reported $SAR_{1\,g}$ (W/Kg)	X (mm)	Y (mm)	Z (mm)	Antenna pair (mm)
	1	1.31	73.90	157.00	0.58	225.36
	0.31		102.00	-66.60	0.27	
	WLAN 5 GHz ANT Main + WLAN 5 GHz+BT ANT Aux					
	Band	Modulation	Frequency (MHz)	Position	Antenna	Peak location separation ratio
	WLAN 5 GHz	802.11n HT40	5270	Bottom Face	ANT Main	0
	WLAN 5 GHz+BT	802.11ac VHT80+GFSK	5775+2402	Bottom Face	ANT Aux	
	Reported SAR1 g (W/kg)	∑ Reported $SAR_{1\,g}$ (W/Kg)	X (mm)	Y (mm)	Z (mm)	Antenna pair (mm)
	0.42	0.73	99.40	105.20	0.03	171.82
	0.31		102.00	-66.60	0.27	

#4 WWAN + WLAN 5 GHz_ANT Main + WLAN 5 GHz_ANT Aux +BT	**LTE 30 + WLAN 5 GHz ANT Main**					
	Band	Modulation	Frequency (MHz)	Position	Antenna	Peak location separation ratio
	LTE 30	QPSK	2310.000	Bottom Face	WWAN	0.02
	WLAN 5 GHz	802.11n HT40	5270	Bottom Face	ANT Main	
	Reported SAR1 g (W/kg)	∑ Reported $SAR_{1\,g}$ (W/Kg)	X (mm)	Y (mm)	Z (mm)	Antenna pair (mm)
	1.08	1.50	37.40	151.00	-0.13	77.08
	0.42		99.40	105.20	0.03	
	LTE 30 + WLAN 5 GHz+BT ANT Aux					
	Band	Modulation	Frequency (MHz)	Position	Antenna	Peak location separation ratio
	LTE 30	QPSK	2310.000	Bottom Face	WWAN	0.01
	WLAN 5 GHz+BT	802.11ac VHT80+GFSK	5775+2402	Bottom Face	ANT Aux	
	Reported SAR1 g (W/kg)	∑ Reported $SAR_{1\,g}$ (W/Kg)	X (mm)	Y (mm)	Z (mm)	Antenna pair (mm)
	1.08	1.39	37.40	151.00	-0.13	226.99
	0.31		102.00	-66.60	0.27	
	WLAN 5 GHz ANT Main + WLAN 5 GHz+BT ANT Aux					
	Band	Modulation	Frequency (MHz)	Position	Antenna	Peak location separation ratio
	WLAN 5 GHz	802.11n HT40	5270	Bottom Face	ANT Main	0
	WLAN 5 GHz+BT	802.11ac VHT80+GFSK	5775+2402	Bottom Face	ANT Aux	
	Reported SAR1 g (W/kg)	∑ Reported $SAR_{1\,g}$ (W/Kg)	X (mm)	Y (mm)	Z (mm)	Antenna pair (mm)
	0.42	0.73	99.40	105.20	0.03	171.82
	0.31		102.00	-66.60	0.27	

10.8 Spot Check

Band	Modulation	Channel	Frequency (MHz)	Test Position	Spacing (mm)	SAR_{1g} (W/kg)	Meas. Conducted Power (dBm)	Tune-up (dBm)	Duty Cycle (%)	Reported SAR_{1g} (W/kg)	Antenna	Deviation
WLAN 2.4 GHz	802.11b	1	2412	Side 1	0	0.406	17.34	17.5	99.15	0.43	Ant Main	
WLAN 2.4 GHz	802.11b	1	2412	Side 1	0	0.393	17.25	17.5	99.15	0.42	Ant Main	-2.33%
WLAN 2.4 GHz	802.11b	1	2412	Side 1	0	0.373	17.13	17.5	99.15	0.41	Ant Aux	
WLAN 2.4 GHz	802.11b	1	2412	Side 1	0	0.352	17.07	17.5	99.15	0.39	Ant Aux	-4.88%
Bluetooth	GFSK	0	2402	Side 1	0	0.042	10.23	11.5	76.51	0.07	Ant Aux	
Bluetooth	GFSK	0	2402	Side 1	0	0.041	10.63	11.5	76.51	0.07	Ant Aux	0.00%
WLAN 5 GHz	802.11n 40 MHz	54	5270	Side 1	0	0.472	15.82	16	99.35	0.50	Ant Main	
WLAN 5 GHz	802.11n HT40	54	5270	Side 1	0	0.475	15.95	16	99.35	0.48	Ant Main	-4.00%
										0.00		
WLAN 5 GHz	802.11n 40 MHz	54	5270	Side 1	0	0.315	15.69	16	99.35	0.34	Ant Aux	
WLAN 5 GHz	802.11n HT40	54	5270	Side 1	0	0.289	15.3	16	99.35	0.34	Ant Aux	0.00%
WLAN 5 GHz	802.11ac 80 MHz	138	5690	Side 1	0	0.473	15.98	16	99.22	0.48	Ant Main	
WLAN 5 GHz	802.11ac VHT80	138	5690	Side 1	0	0.465	15.95	16	99.22	0.47	Ant Main	-2.08%
WLAN 5 GHz	802.11ac 80 MHz	138	5690	Side 1	0	0.428	15.68	16	99.22	0.46	Ant Aux	
WLAN 5 GHz	802.11ac VHT80	138	5690	Side 1	0	0.413	15.55	16	99.22	0.46	Ant Aux	0.00%
WLAN 5 GHz	802.11ac 80 MHz	155	5775	Side 1	0	0.384	15.56	16	99.22	0.43	Ant Main	
WLAN 5 GHz	802.11ac VHT80	155	5775	Side 1	0	0.351	15.21	16	99.22	0.42	Ant Main	-2.33%
WLAN 5 GHz	802.11ac 80 MHz	155	5775	Side 1	0	0.519	15.62	16	99.22	0.57	Ant Aux	
WLAN 5 GHz	802.11ac VHT80	155	5775	Side 1	0	0.504	15.52	16	99.22	0.57	Ant Aux	0.00%

10.9 Requirements on the Uncertainty Evaluation

Decision Rule

■ Uncertainty is not included.

☐ Uncertainty is included.

The highest measured 1-g SAR is less than 1.5 W/kg and the highest measured 10-g SAR is less than 3.75 W/kg. Therefore, per KDB Publication 865664 D01, the extended measurement uncertainty analysis described in IEEE 1528-2013 and IEC/IEEE 62209-1528 is not required.

11. Conclusion

The SAR test values found for the device are below the maximum limit of 1.6 W/kg.

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