FCC SAR TEST REPORT

FCC ID	:	**2AUWUFAIRPHONE3**
Equipment	:	**Smart Phone**
Brand Name	:	**Fairphone**
Model Name	:	**Fairphone 3**
Marketing Name	:	**Fairphone 3**
Applicant	:	**FairPhone B.V. Jollemanhof 17, 1019 GW, Amsterdam, the Netherlands**
Manufacturer	:	**FairPhone B.V. Jollemanhof 17, 1019 GW, Amsterdam, the Netherlands**
Standard	:	**FCC 47 CFR Part 2 (2.1093) ANSI/IEEE C95.1-1992 IEEE 1528-2013**

The product was received on Oct. 31, 2019 and testing was started from Nov. 09, 2019 and completed on Nov. 09, 2019. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Cona Huang

Approved by: Cona Huang / Deputy Manager

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Table of Contents

1. Statement of Compliance **4**
2. Guidance Applied **4**
3. Equipment Under Test (EUT) Information **5**
3.1 General Information 5
3.2 General LTE SAR Test and Reporting Considerations 6
4. RF Exposure Limits **8**
4.1 Uncontrolled Environment 8
4.2 Controlled Environment 8
5. Specific Absorption Rate (SAR) **9**
5.1 Introduction 9
5.2 SAR Definition 9
6. System Description and Setup **10**
6.1 E-Field Probe 11
6.2 Data Acquisition Electronics (DAE) 11
6.3 Phantom 12
6.4 Device Holder 13
7. Measurement Procedures **14**
7.1 Spatial Peak SAR Evaluation 14
7.2 Power Reference Measurement 15
7.3 Area Scan 15
7.4 Zoom Scan 16
7.5 Volume Scan Procedures 16
7.6 Power Drift Monitoring 16
8. Test Equipment List **17**
9. System Verification **18**
9.1 Tissue Simulating Liquids 18
9.2 Tissue Verification 19
9.3 System Performance Check Results 20
10. RF Exposure Positions **21**
10.1 Ear and handset reference point 21
10.2 Definition of the cheek position 22
10.3 Definition of the tilt position 23
10.4 Body Worn Accessory 24
10.5 Product Specific Exposure 25
10.6 Wireless Router 25
11. Conducted RF Output Power (Unit: dBm) **26**
12. Antenna Location **51**
13. SAR Test Results **52**
13.1 Head SAR 54
13.2 Hotspot SAR 57
13.3 Body Worn Accessory SAR 60
13.4 Product Specific SAR 63
13.5 Repeated SAR Measurement 63
14. Simultaneous Transmission Analysis **64**
14.1 Head Exposure Conditions 65
14.2 Hotspot Exposure Conditions 66
14.3 Body-Worn Accessory Exposure Conditions 68
14.4 Product Specific Exposure Conditions 69
15. Uncertainty Assessment **70**
16. References **70**
Appendix A. Plots of System Performance Check
Appendix B. Plots of High SAR Measurement
Appendix C. DASY Calibration Certificate
Appendix D. Test Setup Photos

History of this test report

Report No.	Version	Description	Issued Date
FA9O2328	01	Initial issue of report	Jan. 02, 2020

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for FairPhone B.V., Smart Phone, Fairphone 3, are as follows.

Equipment Class	Frequency Band	Highest SAR Summary				Highest Simultaneous Transmission 1g SAR (W/kg)
		Head (Separation 0mm)	Body-worn (Separation 10mm)	Hotspot (Separation 10mm)	Product Specific (Separation 0mm)	
		1g SAR (W/kg)			10g SAR (W/kg)	
Licensed	GSM850	0.23	0.31	0.29		1.48
	GSM1900	0.28	0.75	0.75		
	WCDMA II	0.49	1.11	1.11		
	WCDMA IV	0.60	0.99	0.99		
	WCDMA V	0.44	0.51	0.51		
	LTE Band 2	0.50	1.14	1.14		
	LTE Band 4	0.48	0.97	0.97		
	LTE Band 7	0.35	0.80	1.14		
	LTE Band 13	0.54	0.67	0.67		
	LTE Band 5 / 26	0.40	0.42	0.42		
DTS	2.4GHz WLAN	0.22	0.13	0.13		1.27
NII	5GHz WLAN	0.16	0.33	0.29	1.44	1.48
DSS	Bluetooth	0.02	0.01	0.01		1.15
Date of Testing:		2019/11/9 ~ 2019/12/4				

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 1190) and the FCC designation No. TW1190 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC test. This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg for Partial-Body 1g SAR, 4.0 W/kg for Product Specific 10g SAR) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013 and FCC KDB publications

Reviewed by: Jason Wang
Report Producer: Wan Liu

2. Guidance Applied

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

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2013
- FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
- FCC KDB 865664 D02 SAR Reporting v01r02
- FCC KDB 447498 D01 General RF Exposure Guidance v06
- FCC KDB 648474 D04 SAR Evaluation Considerations for Wireless Handsets v01r03
- FCC KDB 248227 D01 802.11 Wi-Fi SAR v02r02
- FCC KDB 941225 D01 3G SAR Procedures v03r01
- FCC KDB 941225 D05 SAR for LTE Devices v02r05
- FCC KDB 941225 D05A Rel.10 LTE SAR Test Guidance v01r02
- FCC KDB 941225 D06 Hotspot Mode SAR v02r01
- FCC KDB 941225 D07 UMPC Mini Tablet v01r02

3. Equipment Under Test (EUT) Information

3.1 General Information

Product Feature & Specification	
Equipment Name	Smart Phone
Brand Name	Fairphone
Model Name	Fairphone 3
Marketing Name	Fairphone 3
FCC ID	2AUWUFAIRPHONE3
IMEI Code	357811090339242
Wireless Technology and Frequency Range	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz WCDMA Band IV: 1712.4 MHz ~ 1752.6 MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz LTE Band 2: 1850.7 MHz ~ 1909.3 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 7: 2502.5 MHz ~ 2567.5 MHz LTE Band 13: 779.5 MHz ~ 784.5 MHz LTE Band 26: 814.7 MHz ~ 848.3 MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5700 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz NFC : 13.56 MHz
Mode	GSM/GPRS/EGPRS RMC/AMR 12.2Kbps HSDPA HSUPA LTE: QPSK, 16QAM, 64QAM WLAN: 802.11a/b/g/n/ac HT20 / HT40 / VHT20 / VHT40 / VHT80 Bluetooth BR/EDR/LE NFC:ASK
GSM / (E)GPRS Transfer mode	Class B – EUT cannot support Packet Switched and Circuit Switched Network simultaneously but can automatically switch between Packet and Circuit Switched Network.
EUT Stage	Identical Prototype
Remark: 1. This device WLAN 2.4GHz / 5.2GHz / 5.8GHz supports Hotspot operation and Bluetooth support tethering applications.	

3.2 General LTE SAR Test and Reporting Considerations

Summarized necessary items addressed in KDB 941225 D05 v02r05	
FCC ID	2AUWUFAIRPHONE3
Equipment Name	Smart Phone
Operating Frequency Range of each LTE transmission band	LTE Band 2: 1850.7 MHz ~ 1909.3 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 7: 2502.5 MHz ~ 2567.5 MHz LTE Band 13: 779.5 MHz ~ 784.5 MHz LTE Band 26: 814.7 MHz ~ 848.3 MHz
Channel Bandwidth	LTE Band 2:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 4:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 5:1.4MHz, 3MHz, 5MHz, 10MHz LTE Band 7: 5MHz, 10MHz, 15MHz, 20MHz LTE Band 13: 5MHz, 10MHz LTE Band 26:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz
uplink modulations used	QPSK / 16QAM / 64QAM
LTE Voice / Data requirements	Voice and Data
LTE MPR permanently built-in by design	**Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3** Modulation | Channel bandwidth / Transmission bandwidth (N_{RB}) | MPR (dB) 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz QPSK | > 5 | > 4 | > 8 | > 12 | > 16 | > 18 | ≤ 1 16 QAM | ≤ 5 | ≤ 4 | ≤ 8 | ≤ 12 | ≤ 16 | ≤ 18 | ≤ 1 16 QAM | > 5 | > 4 | > 8 | > 12 | > 16 | > 18 | ≤ 2 64 QAM | ≤ 5 | ≤ 4 | ≤ 8 | ≤ 12 | ≤ 16 | ≤ 18 | ≤ 2 64 QAM | > 5 | > 4 | > 8 | > 12 | > 16 | > 18 | ≤ 3 256 QAM | ≥ 1 | ≤ 5
LTE A-MPR	In the base station simulator configuration, Network Setting value is set to NS_01 to disable A-MPR during SAR testing and the LTE SAR tests was transmitting on all TTI frames (Maximum TTI)
Spectrum plots for RB configuration	A properly configured base station simulator was used for the SAR and power measurement; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.
LTE Carrier Aggregation Combinations	Inter-Band and Intra-Band possible combinations and the detail power measurement please referred to section 11.
LTE Carrier Aggregation Additional Information	1. This device supports maximum of 2 carriers in the downlink and 2 carriers in the uplink. Additional following LTE Release features are not supported: Relay, HetNet, Enhanced MIMO, eICI, WiFi Offloading, MDH, eMBMA, Cross-Carrier Scheduling, Enhanced SC-FDMA.

Transmission (H, M, L) channel numbers and frequencies in each LTE band

LTE Band 2

	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	18607	1850.7	18615	1851.5	18625	1852.5	18650	1855	18675	1857.5	18700	1860
M	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880
H	19193	1909.3	19185	1908.5	19175	1907.5	19150	1905	19125	1902.5	19100	1900

LTE Band 4

	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	19957	1710.7	19965	1711.5	19975	1712.5	20000	1715	20025	1717.5	20050	1720
M	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5
H	20393	1754.3	20385	1753.5	20375	1752.5	20350	1750	20325	1747.5	20300	1745

LTE Band 5

	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20407	824.7	20415	825.5	20425	826.5	20450	829
M	20525	836.5	20525	836.5	20525	836.5	20525	836.5
H	20643	848.3	20635	847.5	20625	846.5	20600	844

LTE Band 7

	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20775	2502.5	20800	2505	20825	2507.5	20850	2510
M	21100	2535	21100	2535	21100	2535	21100	2535
H	21425	2567.5	21400	2565	21375	2562.5	21350	2560

LTE Band 13

	Bandwidth 5 MHz		Bandwidth 10 MHz	
	Channel #	Freq.(MHz)	Channel #	Freq.(MHz)
L	23205	779.5	23230	782
M	23230	782		
H	23255	784.5		

LTE Band 26

	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	26697	814.7	26705	815.5	26715	816.5	26740	819	26765	821.5
M	26865	831.5	26865	831.5	26865	831.5	26865	831.5	26865	831.5
H	27033	848.3	27025	847.5	27015	846.5	26990	844	26965	841.5

4. RF Exposure Limits

4.1 Uncontrolled Environment

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

4.2 Controlled Environment

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

Limits for Occupational/Controlled Exposure (W/kg)

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

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

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

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

5. Specific Absorption Rate (SAR)

5.1 Introduction

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

5.2 SAR Definition

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

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

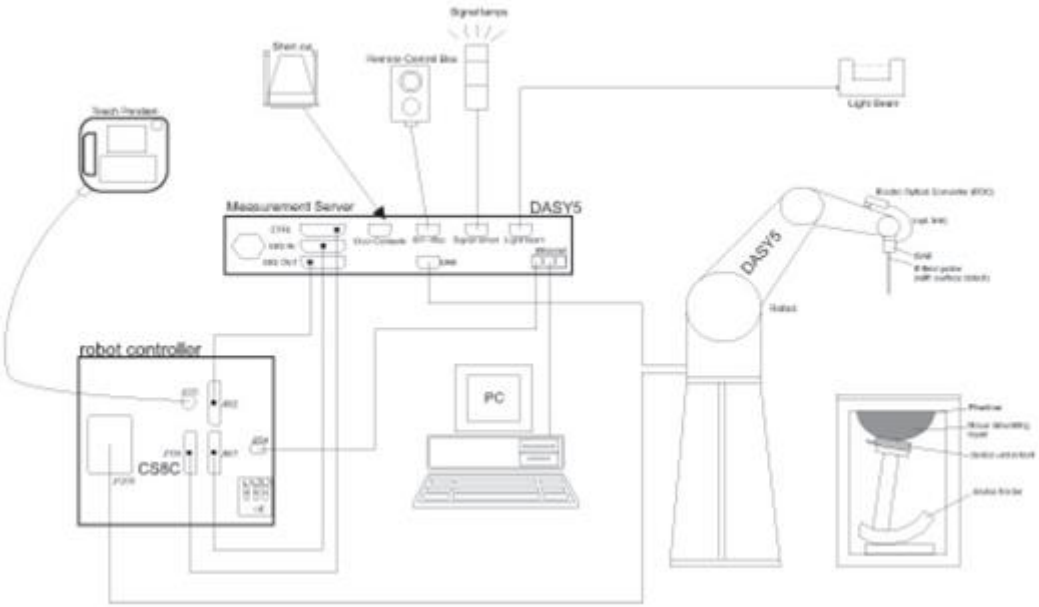
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

6. System Description and Setup

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



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

6.1 E-Field Probe

The SAR measurement is conducted with the dosimetric probe (manufactured by SPEAG).The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency. This probe has a built in optical surface detection system to prevent from collision with phantom.

<ES3DV3 Probe>

Construction	Symmetric design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	10 MHz – 4 GHz; Linearity: ±0.2 dB (30 MHz – 4 GHz)	
Directivity	±0.2 dB in TSL (rotation around probe axis) ±0.3 dB in TSL (rotation normal to probe axis)	
Dynamic Range	5 µW/g – >100 mW/g; Linearity: ±0.2 dB	
Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: 3.9 mm (body: 12 mm) Distance from probe tip to dipole centers: 3.0 mm	

<EX3DV4 Probe>

Construction	Symmetric design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	10 MHz – >6 GHz Linearity: ±0.2 dB (30 MHz – 6 GHz)	
Directivity	±0.3 dB in TSL (rotation around probe axis) ±0.5 dB in TSL (rotation normal to probe axis)	
Dynamic Range	10 µW/g – >100 mW/g Linearity: ±0.2 dB (noise: typically <1 µW/g)	
Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: 2.5 mm (body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	

6.2 Data Acquisition Electronics (DAE)

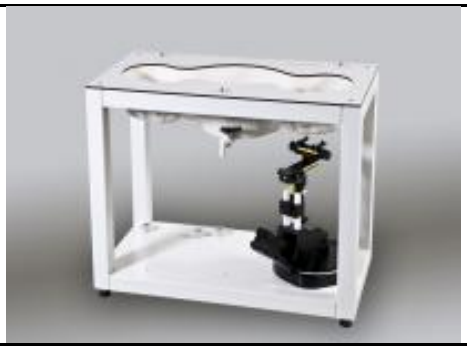
The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an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

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

Fig 5.1 Photo of DAE

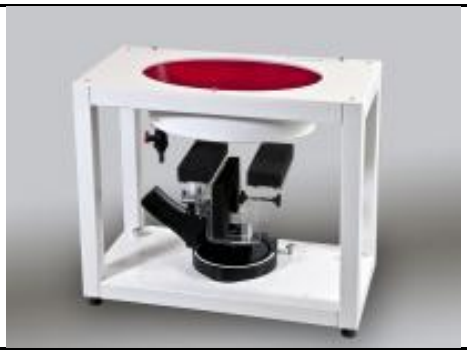
6.3 Phantom

<SAM Twin Phantom>

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

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

<ELI Phantom>

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

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

6.4 Device Holder

<Mounting Device for Hand-Held Transmitter>

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

Mounting Device for Hand-Held Transmitters

Mounting Device Adaptor for Wide-Phones

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

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

Mounting Device for Laptops

7. Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

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

<SAR measurement>

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

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

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

7.1 Spatial Peak SAR Evaluation

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

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

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

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

7.2 Power Reference Measurement

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

7.3 Area Scan

The area scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum found in the scanned area, within a range of the global maximum. The range (in dB0 is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE standard 1528 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan), if only one zoom scan follows the area scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of zoom scans has to be increased accordingly.

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

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

7.4 Zoom Scan

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

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

			≤ 3 GHz	> 3 GHz
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.

* When zoom scan is required and the *reported* SAR from the *area scan based 1-g SAR estimation* procedures of KDB 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.

7.5 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 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing. When all volume scan were completed, the software, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

7.6 Power Drift Monitoring

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

8. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	750MHz System Validation Kit	D750V3	1107	Mar. 08, 2019	Mar. 07, 2020
SPEAG	835MHz System Validation Kit	D835V2	4d167	Mar. 08, 2019	Mar. 07, 2020
SPEAG	1750MHz System Validation Kit	D1750V2	1112	Mar. 07, 2019	Mar. 06, 2020
SPEAG	1900MHz System Validation Kit	D1900V2	5d185	Mar. 07, 2019	Mar. 06, 2020
SPEAG	2450MHz System Validation Kit	D2450V2	929	Mar. 06, 2019	Mar. 05, 2020
SPEAG	2600MHz System Validation Kit	D2600V2	1008	Aug. 31, 2018	Aug. 30, 2020
SPEAG	5GHz System Validation Kit	D5GHzV2	1006	Sep. 27, 2018	Sep. 26, 2020
SPEAG	Data Acquisition Electronics	DAE3	577	Sep. 17, 2019	Sep. 16, 2020
SPEAG	Data Acquisition Electronics	DAE4	316	Jan. 03, 2019	Jan. 02, 2020
SPEAG	Data Acquisition Electronics	DAE4	853	Jul. 18, 2019	Jul. 17, 2020
SPEAG	Data Acquisition Electronics	DAE4	1311	Aug. 27, 2019	Aug. 26, 2020
SPEAG	Dosimetric E-Field Probe	ES3DV3	3124	Jan. 15, 2019	Jan. 14, 2020
SPEAG	Dosimetric E-Field Probe	ES3DV3	3270	Sep. 25, 2019	Sep. 24, 2020
SPEAG	Dosimetric E-Field Probe	EX3DV4	3925	Sep. 20, 2019	Sep. 19, 2020
SPEAG	Dosimetric E-Field Probe	EX3DV4	7346	Apr. 25, 2019	Apr. 24, 2020
Testo	Hygro meter	608-H1	34893240	Nov. 07, 2019	Nov. 06, 2020
Testo	Hygro meter	608-H1	34913912	Nov. 07, 2019	Nov. 06, 2020
Anritsu	Radio Communication Analyzer	MT8821C	6201341950	Apr. 21, 2019	Apr. 20, 2020
Agilent	Wireless Communication Test Set	E5515C	MY50267236	Apr. 01, 2019	Mar. 31, 2020
R&S	BT Base Station	CBT32	100522	Mar. 18, 2019	Mar. 17, 2020
SPEAG	Device Holder	N/A	N/A	N/A	N/A
Anritsu	Signal Generator	MG3710A	6201502524	Dec. 11, 2018	Dec. 10, 2019
Agilent	ENA Network Analyzer	E5071C	MY46104758	Sep. 06, 2019	Sep. 05, 2020
SPEAG	Dielectric Probe Kit	DAK-3.5	1126	Sep. 18, 2019	Sep. 17, 2020
LINE SEIKI	Digital Thermometer	DTM3000-spezial	3169	Sep. 10, 2019	Sep. 09, 2020
Anritsu	Power Meter	ML2495A	1036004	Aug. 08, 2019	Aug. 07, 2020
Anritsu	Power Sensor	MA2411B	1027253	Aug. 08, 2019	Aug. 07, 2020
Anritsu	Power Meter	ML2495A	1419002	May. 29, 2019	May. 28, 2020
Anritsu	Power Sensor	MA2411B	1339124	May. 29, 2019	May. 28, 2020
Agilent	Spectrum Analyzer	E4408B	MY44211028	Aug. 27, 2019	Aug. 26, 2020
Anritsu	Spectrum Analyzer	MS2830A	6201396378	Jun. 27, 2019	Jun. 26, 2020
Mini-Circuits	Power Amplifier	ZHL-42W+	321501827	Aug. 12, 2019	Aug. 11, 2020
Mini-Circuits	Power Amplifier	ZHL-42W+	715701915	May. 10, 2019	May. 09, 2020
ATM	Dual Directional Coupler	C122H-10	P610410z-02	Note 1	
Woken	Attenuator 1	WK0602-XX	N/A	Note 1	
PE	Attenuator 2	PE7005-10	N/A	Note 1	
PE	Attenuator 3	PE7005- 3	N/A	Note 1	

General Note:

1. Prior to system verification and validation, the path loss from the signal generator to the system check source and the power meter, which includes the amplifier, cable, attenuator and directional coupler, was measured by the network analyzer. The reading of the power meter was offset by the path loss difference between the path to the power meter and the path to the system check source to monitor the actual power level fed to the system check source.
2. Referring to KDB 865664 D01v01r04, the dipole calibration interval can be extended to 3 years with justification. The dipoles are also not physically damaged, or repaired during the interval.
3. The justification data of dipole D2600V2, SN: 1008, D5GHzV2, SN: 1006 can be found in appendix C. The return loss is < -20dB, within 20% of prior calibration, the impedance is within 5 ohm of prior calibration.

9. System Verification

9.1 Tissue Simulating Liquids

For the measurement of the field distribution inside the SAM phantom with DASY, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 10.1. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 10.2.

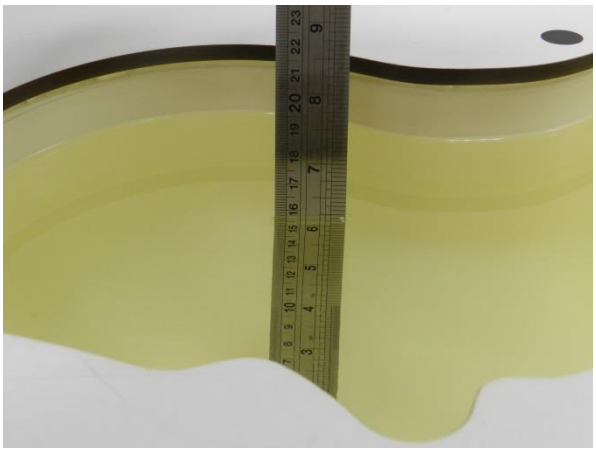


Fig 10.1Photo of Liquid Height for Head SAR

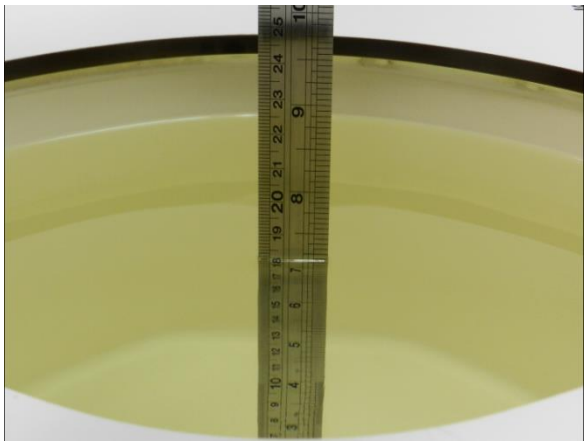


Fig 10.2 Photo of Liquid Height for Body SAR

9.2 Tissue Verification

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

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity (σ)	Permittivity (εr)
750	41.1	57.0	0.2	1.4	0.2	0	0.89	41.9
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
900	40.3	57.9	0.2	1.4	0.2	0	0.97	41.5
1800, 1900, 2000	55.2	0	0	0.3	0	44.5	1.40	40.0
2450	55.0	0	0	0	0	45.0	1.80	39.2
2600	54.8	0	0	0.1	0	45.1	1.96	39.0

Simulating Liquid for 5GHz, Manufactured by SPEAG

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

<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
750	22.2	0.898	43.043	0.89	41.90	0.90	2.73	±5	2019/11/9
750	22.3	0.903	43.070	0.89	41.90	1.46	2.79	±5	2019/11/12
835	22.3	0.878	41.866	0.90	41.50	-2.44	0.88	±5	2019/11/9
835	22.3	0.877	42.500	0.90	41.50	-2.56	2.41	±5	2019/11/11
835	22.5	0.880	42.565	0.90	41.50	-2.22	2.57	±5	2019/11/19
1750	22.6	1.335	38.273	1.37	40.10	-2.55	-4.56	±5	2019/11/20
1900	22.2	1.403	40.798	1.40	40.00	0.21	2.00	±5	2019/11/11
1900	22.7	1.413	40.395	1.40	40.00	0.93	0.99	±5	2019/12/2
1900	22.5	1.415	39.184	1.40	40.00	1.07	-2.04	±5	2019/12/3
2450	22.9	1.750	38.963	1.80	39.20	-2.78	-0.60	±5	2019/11/25
2600	22.7	1.928	37.856	1.96	39.00	-1.63	-2.93	±5	2019/12/4
5250	22.5	4.626	36.506	4.71	35.95	-1.78	1.55	±5	2019/11/25
5600	22.3	4.950	36.492	5.07	35.50	-2.37	2.79	±5	2019/11/26
5750	22.3	5.107	36.358	5.22	35.35	-2.16	2.85	±5	2019/11/26

9.3 System Performance Check Results

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

Date	Frequency (MHz)	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)
2019/11/9	750	250	D750V3-1107	ES3DV3 - SN3270	DAE3 Sn577	2.13	8.32	8.52	2.40
2019/11/12	750	250	D750V3-1107	ES3DV3 - SN3270	DAE3 Sn577	2.15	8.32	8.6	3.37
2019/11/9	835	250	D835V2-4d167	ES3DV3 - SN3270	DAE3 Sn577	2.24	9.50	8.96	-5.68
2019/11/11	835	250	D835V2-4d167	ES3DV3 - SN3270	DAE3 Sn577	2.37	9.50	9.48	-0.21
2019/11/19	835	250	D835V2-4d167	EX3DV4 - SN3925	DAE4 Sn1311	2.38	9.50	9.52	0.21
2019/11/20	1750	250	D1750V2-1112	EX3DV4 - SN3925	DAE4 Sn1311	9.05	36.70	36.2	-1.36
2019/11/11	1900	250	D1900V2-5d185	ES3DV3 - SN3270	DAE3 Sn577	9.26	39.40	37.04	-5.99
2019/12/2	1900	250	D1900V2-5d185	ES3DV3 - SN3124	DAE4 Sn316	10.50	39.40	42	6.60
2019/12/3	1900	250	D1900V2-5d185	EX3DV4 - SN3925	DAE4 Sn1311	9.12	39.40	36.48	-7.41
2019/11/25	2450	250	D2450V2-929	ES3DV3 - SN3124	DAE4 Sn316	12.10	52.10	48.4	-7.10
2019/12/4	2600	250	D2600V2-1008	EX3DV4 - SN3925	DAE4 Sn1311	14.50	56.40	58	2.84
2019/11/25	5250	100	D5GHzV2-1006-5250	EX3DV4 - SN7346	DAE4 Sn853	7.90	80.70	79	-2.11
2019/11/26	5600	100	D5GHzV2-1006-5600	EX3DV4 - SN7346	DAE4 Sn853	8.15	83.30	81.5	-2.16
2019/11/26	5750	100	D5GHzV2-1006-5750	EX3DV4 - SN7346	DAE4 Sn853	7.73	80.40	77.3	-3.86

Date	Frequency (MHz)	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 10g SAR (W/kg)	Targeted 10g SAR (W/kg)	Normalized 10g SAR (W/kg)	Deviation (%)
2019/11/25	5250	100	D5GHzV2-1006-5250	EX3DV4 - SN7346	DAE4 Sn853	2.19	23.20	21.9	-5.60
2019/11/26	5600	100	D5GHzV2-1006-5600	EX3DV4 - SN7346	DAE4 Sn853	2.26	23.80	22.6	-5.04
2019/11/26	5750	100	D5GHzV2-1006-5750	EX3DV4 - SN7346	DAE4 Sn853	2.17	22.90	21.7	-5.24

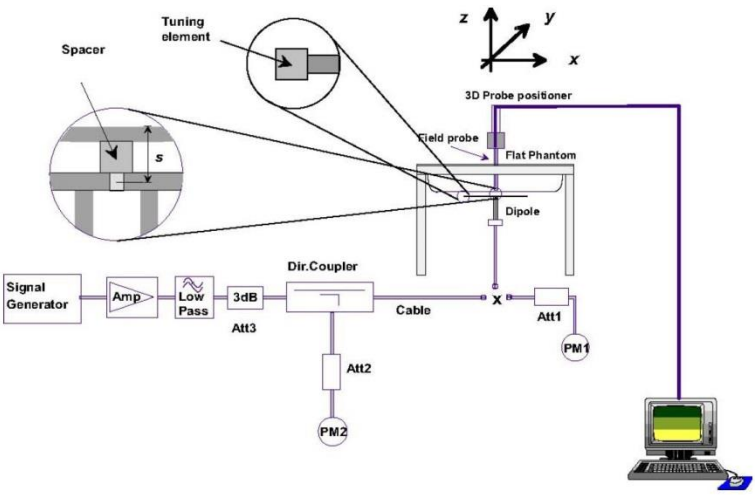


Fig 8.3.1 System Performance Check Setup

Fig 8.3.2 Setup Photo

10. RF Exposure Positions

10.1 Ear and handset reference point

Figure 9.1.1 shows the front, back, and side views of the SAM phantom. The center-of-mouth reference point is labeled “M,” the left ear reference point (ERP) is marked “LE,” and the right ERP is marked “RE.” Each ERP is 15 mm along the B-M (back-mouth) line behind the entrance-to-ear-canal (EEC) point, as shown in Figure 9.1.2 The Reference Plane is defined as passing through the two ear reference points and point M. The line N-F (neck-front), also called the reference pivoting line, is normal to the Reference Plane and perpendicular to both a line passing through RE and LE and the B-M line (see Figure 9.1.3). Both N-F and B-M lines should be marked on the exterior of the phantom shell to facilitate handset positioning. Posterior to the N-F line the ear shape is a flat surface with 6 mm thickness at each ERP, and forward of the N-F line the ear is truncated, as illustrated in Figure 9.1.2. The ear truncation is introduced to preclude the ear lobe from interfering with handset tilt, which could lead to unstable positioning at the cheek.

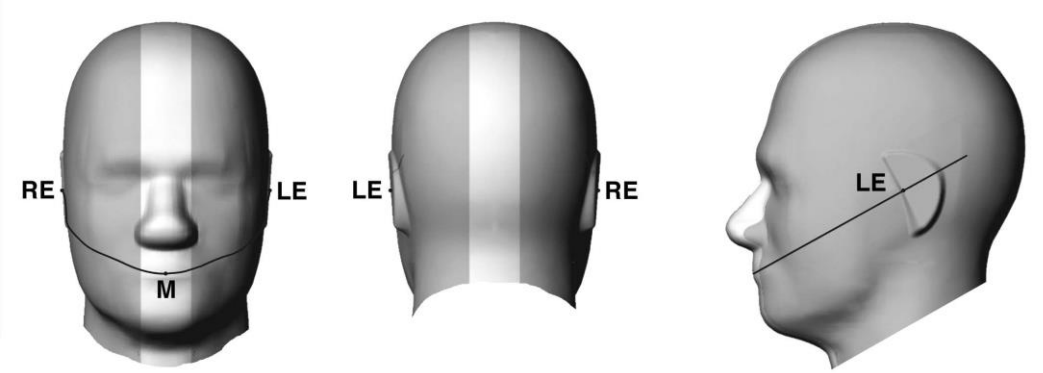


Fig 9.1.1 Front, back, and side views of SAM twin phantom

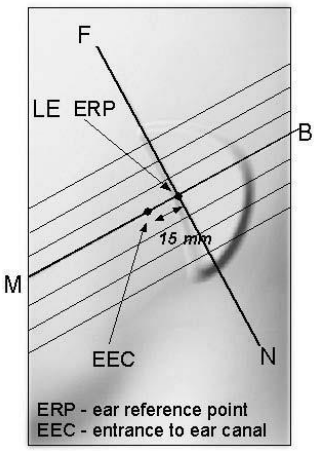


Fig 9.1.2 Close-up side view of phantom showing the ear region.

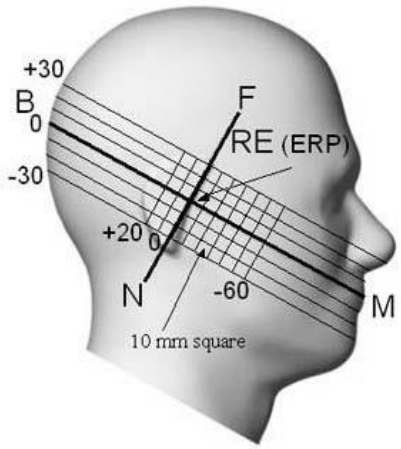


Fig 9.1.3 Side view of the phantom showing relevant markings and seven cross-sectional plane locations

10.2 Definition of the cheek position

1. Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece (flip cover), open the cover. If the handset can transmit with the cover closed, both configurations must be tested.
2. Define two imaginary lines on the handset—the vertical centerline and the horizontal line. The vertical centerline passes through two points on the front side of the handset—the midpoint of the width wt of the handset at the level of the acoustic output (point A in Figure 9.2.1 and Figure 9.2.2), and the midpoint of the width wb of the bottom of the handset (point B). The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output (see Figure 9.2.1). The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily parallel to the front face of the handset (see Figure 9.2.2), especially for clamshell handsets, handsets with flip covers, and other irregularly-shaped handsets.
3. Position the handset close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure 9.2.3), such that the plane defined by the vertical centerline and the horizontal line of the handset is approximately parallel to the sagittal plane of the phantom.
4. Translate the handset towards the phantom along the line passing through RE and LE until handset point A touches the pinna at the ERP.
5. While maintaining the handset in this plane, rotate it around the LE-RE line until the vertical centerline is in the plane normal to the plane containing B-M and N-F lines, i.e., the Reference Plane.
6. Rotate the handset around the vertical centerline until the handset (horizontal line) is parallel to the N-F line.
7. While maintaining the vertical centerline in the Reference Plane, keeping point A on the line passing through RE and LE, and maintaining the handset contact with the pinna, rotate the handset about the N-F line until any point on the handset is in contact with a phantom point below the pinna on the cheek. See Figure 9.2.3. The actual rotation angles should be documented in the test report.

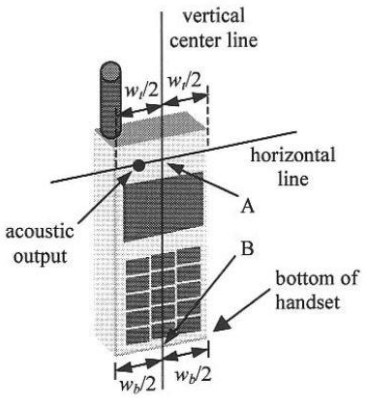


Fig 9.2.1 Handset vertical and horizontal reference lines—"fixed case

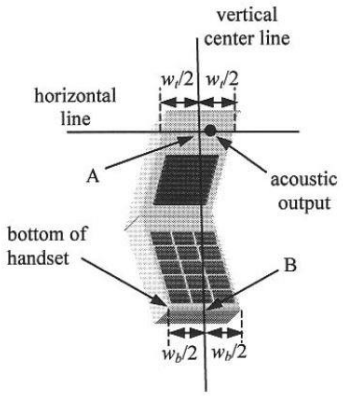


Fig 9.2.2 Handset vertical and horizontal reference lines—"clam-shell case"

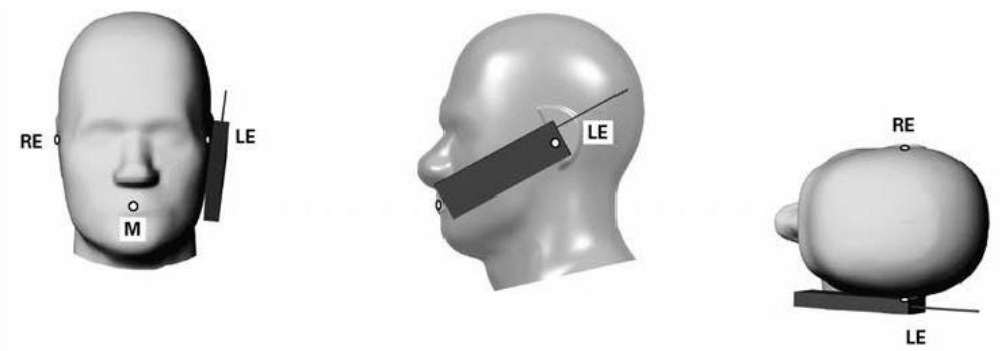


Fig 9.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

10.3 Definition of the tilt position

1. Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece (flip cover), open the cover. If the handset can transmit with the cover closed, both configurations must be tested.
2. While maintaining the orientation of the handset, move the handset away from the pinna along the line passing through RE and LE far enough to allow a rotation of the handset away from the cheek by 15°.
3. Rotate the handset around the horizontal line by 15°.
4. While maintaining the orientation of the handset, move the handset towards the phantom on the line passing through RE and LE until any part of the handset touches the ear. The tilt position is obtained when the contact point is on the pinna. See Figure 9.3.1. If contact occurs at any location other than the pinna, e.g., the antenna at the back of the phantom head, the angle of the handset should be reduced. In this case, the tilt position is obtained if any point on the handset is in contact with the pinna and a second point

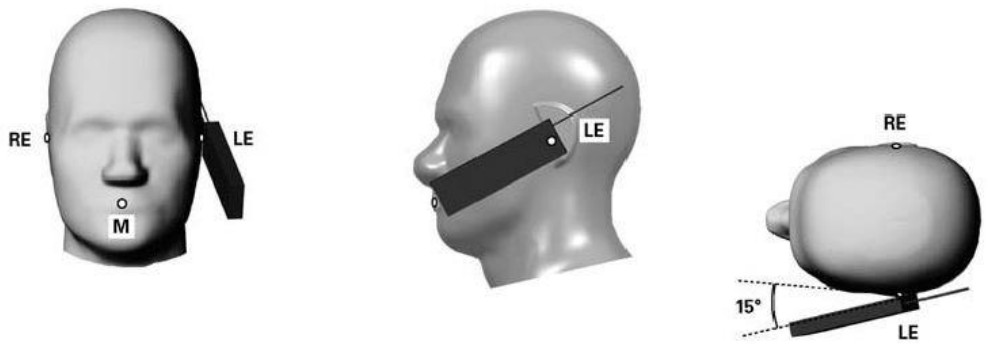


Fig 9.3.1 Tilt position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which define the Reference Plane for handset positioning, are indicated.

10.4 Body Worn Accessory

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 9.4). Per KDB648474 D04v01r03, body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB 447498 D01v06 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for body-worn accessory, measured without a headset connected to the handset is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a handset attached to the handset.

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

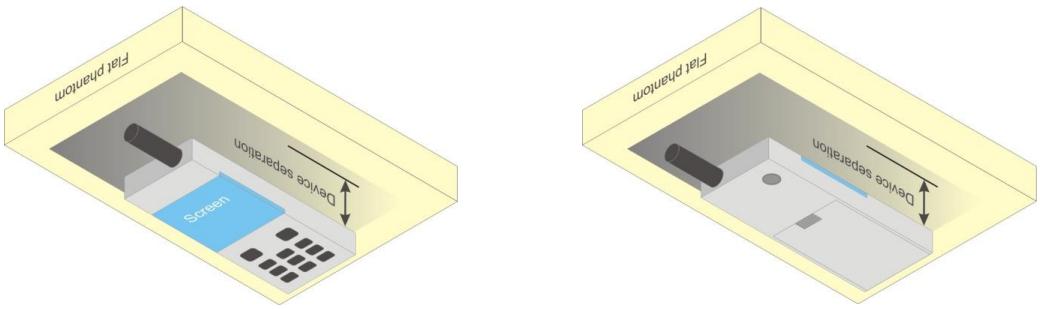


Fig 9.4 Body Worn Position

10.5 Product Specific Exposure

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

1. The normally required head and body-worn accessory SAR test procedures for handsets, including hotspot mode, must be applied.

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

10.6 Wireless Router

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

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

11. Conducted RF Output Power (Unit: dBm)

<GSM Conducted Power>

1. Per KDB 447498 D01v06, the maximum output power channel is used for SAR testing and for further SAR test reduction.
2. Per KDB 941225 D01v03r01, for SAR test reduction for GSM / GPRS / EDGE modes is determined by the source-based time-averaged output power including tune-up tolerance. The mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested. Therefore, the GPRS (4Tx slots) for GSM850/GSM1900 is considered as the primary mode.
3. Other configurations of GSM / GPRS / EDGE are considered as secondary modes. The 3G SAR test reduction procedure is applied, when the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode, SAR measurement is not required for the secondary mode

GSM850	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
TX Channel	128	189	251		128	189	251	
Frequency (MHz)	824.2	836.4	848.8		824.2	836.4	848.8	
GSM 1 Tx slot	32.82	32.95	32.99	34.00	23.82	23.95	23.99	25.00
GPRS 1 Tx slot	32.88	32.99	33.00	34.00	23.88	23.99	24.00	25.00
GPRS 2 Tx slots	29.14	29.25	29.27	31.00	23.14	23.25	23.27	25.00
GPRS 3 Tx slots	27.64	27.69	27.75	29.20	23.38	23.43	23.49	24.94
GPRS 4 Tx slots	26.36	26.56	26.54	28.00	23.36	23.56	23.54	25.00
EDGE 1 Tx slot	26.25	26.44	26.48	28.00	17.25	17.44	17.48	19.00
EDGE 2 Tx slots	23.65	23.61	23.62	25.00	17.65	17.61	17.62	19.00
EDGE 3 Tx slots	22.39	22.47	22.44	23.20	18.13	18.21	18.18	18.94
EDGE 4 Tx slots	21.37	21.47	21.67	22.00	18.37	18.47	18.67	19.00

GSM1900	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
TX Channel	512	661	810		512	661	810	
Frequency (MHz)	1850.2	1880	1909.8		1850.2	1880	1909.8	
GSM 1 Tx slot	30.05	30.00	30.18	31.00	21.05	21.00	21.18	22.00
GPRS 1 Tx slot	30.13	30.05	30.21	31.00	21.13	21.05	21.21	22.00
GPRS 2 Tx slots	27.20	27.20	27.10	28.00	21.20	21.20	21.10	22.00
GPRS 3 Tx slots	25.55	25.47	25.39	26.20	21.29	21.21	21.13	21.94
GPRS 4 Tx slots	24.15	24.04	24.03	25.00	21.15	21.04	21.03	22.00
EDGE 1 Tx slot	25.55	25.56	25.64	27.00	16.55	16.56	16.64	18.00
EDGE 2 Tx slots	22.95	22.56	22.57	24.00	16.95	16.56	16.57	18.00
EDGE 3 Tx slots	20.99	20.70	20.71	22.20	16.73	16.44	16.45	17.94
EDGE 4 Tx slots	19.96	19.64	19.63	21.00	16.96	16.64	16.63	18.00

<WCDMA Conducted Power>

1. The following tests were conducted according to the test requirements outlines in 3GPP TS 34.121 specification.
2. The procedures in KDB 941225 D01v03r01 are applied for 3GPP Rel. 6 HSPA to configure the device in the required sub-test mode(s) to determine SAR test exclusion.

A summary of these settings are illustrated below:

HSDPA Setup Configuration:

a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
b. The RF path losses were compensated into the measurements.
c. A call was established between EUT and Base Station with following setting:
   i. Set Gain Factors (β_c and β_d) and parameters were set according to each
   ii. Specific sub-test in the following table, C10.1.4, quoted from the TS 34.121
   iii. Set RMC 12.2Kbps + HSDPA mode.
   iv. Set Cell Power = -86 dBm
   v. Set HS-DSCH Configuration Type to FRC (H-set 1, QPSK)
   vi. Select HSDPA Uplink Parameters
   vii. Set Delta ACK, Delta NACK and Delta CQI = 8
   viii. Set Ack-Nack Repetition Factor to 3
   ix. Set CQI Feedback Cycle (k) to 4 ms
   x. Set CQI Repetition Factor to 2
   xi. Power Ctrl Mode = All Up bits
d. The transmitted maximum output power was recorded.

Table C.10.1.4: β values for transmitter characteristics tests with HS-DPCCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (Note 4)	15/15 (Note 4)	64	12/15 (Note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c.

Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, Δ_{ACK} and Δ_{NACK} = 30/15 with β_{hs} = 30/15 * β_c, and Δ_{CQI} = 24/15 with β_{hs} = 24/15 * β_c.

Note 3: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Note 4: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 11/15 and β_d = 15/15.

Setup Configuration

HSUPA Setup Configuration:

a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
b. The RF path losses were compensated into the measurements.
c. A call was established between EUT and Base Station with following setting * :
   i. Call Configs = 5.2B, 5.9B, 5.10B, and 5.13.2B with QPSK
   ii. Set the Gain Factors (β_c and β_d) and parameters (AG Index) were set according to each specific sub-test in the following table, C11.1.3, quoted from the TS 34.121
   iii. Set Cell Power = -86 dBm
   iv. Set Channel Type = 12.2k + HSPA
   v. Set UE Target Power
   vi. Power Ctrl Mode= Alternating bits
   vii. Set and observe the E-TFCI
   viii. Confirm that E-TFCI is equal to the target E-TFCI of 75 for sub-test 1, and other subtest's E-TFCI
d. The transmitted maximum output power was recorded.

Table C.11.1.3: β values for transmitter characteristics tests with HS-DPCCH and E-DCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (Note 4) (Note 5)	β_{ed} (SF)	β_{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2) (Note 6)	AG Index (Note 5)	E-TFCI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	$\beta_{ed}1$: 47/15 $\beta_{ed}2$: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15	0	-	-	5/15	5/15	47/15	4	1	1.0	0.0	12	67

Note 1: For sub-test 1 to 4, Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c . For sub-test 5, Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 5/15 with β_{hs} = 5/15 * β_c .

Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.

Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 10/15 and β_d = 15/15.

Note 4: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.

Note 5: β_{ed} can not be set directly; it is set by Absolute Grant Value.

Note 6: For subtests 2, 3 and 4, UE may perform E-DPDCH power scaling at max power which could results in slightly smaller MPR values.

Setup Configuration

<WCDMA Conducted Power>

General Note:

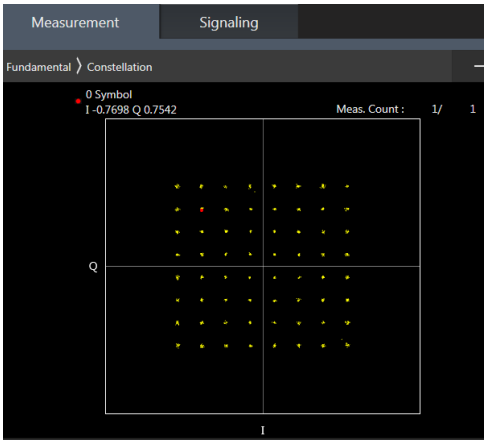
1. Per KDB 941225 D01v03r01, for SAR testing is measured using a 12.2 kbps RMC with TPC bits configured to all "1's".
2. Per KDB 941225 D01v03r01, RMC 12.2kbps setting is used to evaluate SAR. The maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA is ≤ ¼ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA, and according to the following RF output power, the output power results of the secondary modes (HSUPA, HSDPA) are less than ¼ dB higher than the primary modes; therefore, SAR measurement is not required for HSDPA / HSUPA.

Band		WCDMA II			Tune-up Limit (dBm)	WCDMA IV			Tune-up Limit (dBm)	WCDMA V			Tune-up Limit (dBm)
TX Channel		9262	9400	9538		1312	1413	1513		4132	4182	4233	
Rx Channel		9662	9800	9938		1537	1638	1738		4357	4407	4458	
Frequency (MHz)		1852.4	1880	1907.6		1712.4	1732.6	1752.6		826.4	836.4	846.6	
3GPP Rel 99	AMR 12.2Kbps	21.80	21.77	21.82	22.50	23.08	23.01	23.05	24.00	22.73	22.71	22.77	24.00
3GPP Rel 99	RMC 12.2Kbps	21.81	21.78	21.85	22.50	23.15	23.12	23.14	24.00	22.78	22.75	22.82	24.00
3GPP Rel 6	HSDPA Subtest-1	20.65	20.67	20.71	21.50	21.94	21.99	22.04	23.00	21.72	21.77	21.82	23.00
3GPP Rel 6	HSDPA Subtest-2	20.65	20.73	20.68	21.50	21.92	22.03	22.07	23.00	21.71	21.78	21.86	23.00
3GPP Rel 6	HSDPA Subtest-3	20.19	20.19	20.30	21.00	21.56	21.52	21.59	22.50	21.22	21.16	21.30	22.50
3GPP Rel 6	HSDPA Subtest-4	20.17	20.31	20.27	21.00	21.55	21.54	21.61	22.50	21.21	21.20	21.31	22.50
3GPP Rel 6	HSUPA Subtest-1	20.70	20.78	20.74	21.50	21.93	22.11	22.02	23.00	21.71	21.68	21.82	23.00
3GPP Rel 6	HSUPA Subtest-2	18.66	18.83	18.70	19.50	20.05	20.02	20.00	21.00	19.71	19.65	19.78	21.00
3GPP Rel 6	HSUPA Subtest-3	19.77	19.82	19.77	20.50	21.06	21.04	21.00	22.00	20.73	20.66	20.83	22.00
3GPP Rel 6	HSUPA Subtest-4	18.74	18.76	18.70	19.50	20.04	20.00	20.01	21.00	19.68	19.64	19.80	21.00
3GPP Rel 6	HSUPA Subtest-5	20.80	20.80	20.75	21.50	22.10	22.00	21.60	23.00	21.70	21.70	21.80	23.00

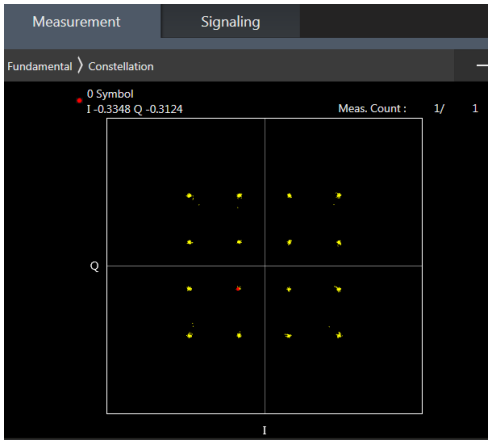
<LTE Conducted Power>

General Note:

1. Anritsu MT8820C base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r05, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
4. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r05, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
6. Per KDB 941225 D05v02r05, 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
7. Per KDB 941225 D05v02r05, Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
8. For LTE B4 / B26 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.
9. LTE band 5 SAR test was covered by Band 26; according to April 2015 TCB workshop, SAR test for overlapping LTE bands can be reduced if
   a. the maximum output power, including tolerance, for the smaller band is ≤ the larger band to qualify for the SAR test exclusion
   b. the channel bandwidth and other operating parameters for the smaller band are fully supported by the larger band
10. According to 2017 TCB workshop, for 64 QAM and 16 QAM should be verified by checking the signal constellation with a call box to avoid incorrect maximum power levels due to MPR and other requirements associated with signal modulation, and the following figure is taken from the "Fundamental Measurement >> Modulation Analysis >> constellation" mode of the device connect to the MT8821C base station, therefore, the device 64QAM and 16QAM signal modulation are correct.



64QAM



16QAM

<LTE Band 2>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				18700	18900	19100		
Frequency (MHz)				1860	1880	1900		
20	QPSK	1	0	22.04	22.19	22.07	23	0
20	QPSK	1	49	21.66	21.89	21.93		
20	QPSK	1	99	21.59	21.73	21.68		
20	QPSK	50	0	20.95	21.05	21.04	22	1
20	QPSK	50	24	20.83	21.03	21.04		
20	QPSK	50	50	20.79	20.84	20.85		
20	QPSK	100	0	20.97	20.85	21.01		
20	16QAM	1	0	21.26	21.47	21.34	22	1
20	16QAM	1	49	20.99	21.12	21.16		
20	16QAM	1	99	20.90	21.04	20.96		
20	16QAM	50	0	19.98	20.01	20.10	21	2
20	16QAM	50	24	19.87	20.05	20.01		
20	16QAM	50	50	19.80	19.89	19.89		
20	16QAM	100	0	19.91	19.96	20.02		
20	64QAM	1	0	20.19	20.40	20.24	21	2
20	64QAM	1	49	19.86	20.06	20.08		
20	64QAM	1	99	19.79	19.92	19.93		
20	64QAM	50	0	18.94	19.02	19.06	20	3
20	64QAM	50	24	18.89	19.05	19.02		
20	64QAM	50	50	18.76	18.92	18.93		
20	64QAM	100	0	18.93	18.88	19.05		
Channel				18675	18900	19125	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1857.5	1880	1902.5		
15	QPSK	1	0	22.05	21.18	22.18	23	0
15	QPSK	1	37	21.73	21.74	21.79		
15	QPSK	1	74	22.01	22.12	22.13		
15	QPSK	36	0	20.95	21.08	21.02	22	1
15	QPSK	36	20	20.94	21.05	20.98		
15	QPSK	36	39	20.86	21.02	21.03		
15	QPSK	75	0	20.89	21.04	21.06		
15	16QAM	1	0	21.39	21.55	21.50	22	1
15	16QAM	1	37	21.05	21.15	21.19		
15	16QAM	1	74	21.31	21.38	21.37		
15	16QAM	36	0	19.96	20.09	20.02	21	2
15	16QAM	36	20	19.90	20.03	19.96		
15	16QAM	36	39	19.87	19.99	19.99		
15	16QAM	75	0	19.93	20.03	20.09		
15	64QAM	1	0	20.27	20.50	20.41	21	2
15	64QAM	1	37	19.81	20.03	19.98		
15	64QAM	1	74	20.20	20.28	20.29		
15	64QAM	36	0	19.01	19.12	19.06	20	3
15	64QAM	36	20	18.93	19.07	19.00		
15	64QAM	36	39	18.91	19.04	19.06		
15	64QAM	75	0	18.96	19.00	19.04		
Channel				18650	18900	19150	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1855	1880	1905		
10	QPSK	1	0	22.03	21.99	21.94	23	0
10	QPSK	1	25	21.87	21.84	21.78		
10	QPSK	1	49	21.91	21.91	21.85		
10	QPSK	25	0	20.91	20.93	20.82	22	1
10	QPSK	25	12	20.89	20.90	20.79		

10	QPSK	25	25	20.92	20.94	20.81		
10	QPSK	50	0	20.85	20.89	20.76		
10	16QAM	1	0	21.32	21.25	21.25	22	1
10	16QAM	1	25	21.02	21.14	21.00		
10	16QAM	1	49	21.16	21.19	21.10		
10	16QAM	25	0	19.85	19.89	19.82	21	2
10	16QAM	25	12	19.94	19.92	19.75		
10	16QAM	25	25	19.90	19.92	19.76		
10	16QAM	50	0	19.91	19.95	19.83		
10	64QAM	1	0	20.24	20.28	20.20	21	2
10	64QAM	1	25	20.12	20.09	19.98		
10	64QAM	1	49	20.12	20.12	20.03		
10	64QAM	25	0	18.91	18.88	18.84	20	3
10	64QAM	25	12	18.90	18.92	18.79		
10	64QAM	25	25	18.94	18.96	18.80		
10	64QAM	50	0	18.93	18.94	18.83		
Channel				18625	18900	19175	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1852.5	1880	1907.5		
5	QPSK	1	0	22.07	22.06	21.96	23	0
5	QPSK	1	12	21.81	21.84	21.72		
5	QPSK	1	24	21.84	21.87	21.73		
5	QPSK	12	0	20.97	20.96	20.89	22	1
5	QPSK	12	7	20.90	20.95	20.77		
5	QPSK	12	13	20.90	20.89	20.74		
5	QPSK	25	0	20.92	20.95	20.86		
5	16QAM	1	0	21.27	21.22	21.16	22	1
5	16QAM	1	12	21.13	21.17	21.02		
5	16QAM	1	24	21.09	21.19	21.01		
5	16QAM	12	0	19.95	19.96	19.92	21	2
5	16QAM	12	7	19.90	19.96	19.83		
5	16QAM	12	13	19.98	19.86	19.80		
5	16QAM	25	0	19.88	19.91	19.81		
5	64QAM	1	0	20.16	20.22	20.13	21	2
5	64QAM	1	12	19.96	20.10	19.89		
5	64QAM	1	24	20.07	20.09	19.91		
5	64QAM	12	0	19.00	18.97	18.95	20	3
5	64QAM	12	7	18.96	18.99	18.86		
5	64QAM	12	13	18.97	18.92	18.84		
5	64QAM	25	0	18.94	18.94	18.84		
Channel				18615	18900	19185	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1851.5	1880	1908.5		
3	QPSK	1	0	21.96	21.99	21.85	23	0
3	QPSK	1	8	21.77	21.77	21.68		
3	QPSK	1	14	21.83	21.89	21.82		
3	QPSK	8	0	20.82	20.87	20.78	22	1
3	QPSK	8	4	20.80	20.84	20.79		
3	QPSK	8	7	20.88	20.88	20.76		
3	QPSK	15	0	20.78	20.88	20.69		
3	16QAM	1	0	21.26	21.22	21.15	22	1
3	16QAM	1	8	20.95	21.04	20.93		
3	16QAM	1	14	21.06	21.18	21.00		
3	16QAM	8	0	19.79	19.89	19.75	21	2
3	16QAM	8	4	19.93	19.88	19.70		
3	16QAM	8	7	19.88	19.84	19.71		
3	16QAM	15	0	19.86	19.85	19.77		
3	64QAM	1	0	20.18	20.27	20.19	21	2

3	64QAM	1	8	20.12	20.08	19.94		
3	64QAM	1	14	20.04	20.05	19.97		
3	64QAM	8	0	18.84	18.82	18.84	20	3
3	64QAM	8	4	18.81	18.83	18.71		
3	64QAM	8	7	18.92	18.86	18.70		
3	64QAM	15	0	18.92	18.93	18.80		
Channel				18607	18900	19193	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1850.7	1880	1909.3		
1.4	QPSK	1	0	21.88	21.92	21.80	23	0
1.4	QPSK	1	3	21.85	21.87	21.78		
1.4	QPSK	1	5	21.73	21.80	21.70		
1.4	QPSK	3	0	21.86	21.87	21.69		
1.4	QPSK	3	1	21.84	21.92	21.73		
1.4	QPSK	3	3	21.82	21.83	21.68		
1.4	QPSK	6	0	20.90	20.92	20.75	22	1
1.4	16QAM	1	0	21.09	21.07	20.96	22	1
1.4	16QAM	1	3	21.13	21.15	21.01		
1.4	16QAM	1	5	21.02	21.02	20.93		
1.4	16QAM	3	0	20.85	20.88	20.73		
1.4	16QAM	3	1	20.90	20.91	20.76		
1.4	16QAM	3	3	20.80	20.86	20.69		
1.4	16QAM	6	0	19.93	19.95	19.84	21	2
1.4	64QAM	1	0	19.99	20.07	19.91	21	2
1.4	64QAM	1	3	20.09	20.10	19.98		
1.4	64QAM	1	5	19.94	19.98	19.88		
1.4	64QAM	3	0	19.99	20.01	19.90		
1.4	64QAM	3	1	19.99	20.07	19.94		
1.4	64QAM	3	3	19.99	19.96	19.88		
1.4	64QAM	6	0	18.89	18.90	18.71	20	3

<LTE Band 4>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20050	20175	20300		
Frequency (MHz)				1720	1732.5	1745		
20	QPSK	1	0	23.20	23.16	23.11	24	0
20	QPSK	1	49	23.05	23.09	23.00		
20	QPSK	1	99	23.18	23.13	23.10		
20	QPSK	50	0	22.25	22.24	22.17	23	1
20	QPSK	50	24	22.11	22.23	22.14		
20	QPSK	50	50	22.10	22.17	22.04		
20	QPSK	100	0	22.04	22.19	22.13		
20	16QAM	1	0	22.61	22.58	22.47	23	1
20	16QAM	1	49	22.44	22.60	22.45		
20	16QAM	1	99	22.51	22.61	22.40		
20	16QAM	50	0	21.13	21.22	21.18	22	2
20	16QAM	50	24	21.11	21.28	21.10		
20	16QAM	50	50	21.15	21.19	21.06		
20	16QAM	100	0	21.17	21.18	21.08		
20	64QAM	1	0	21.46	21.46	21.29	22	2
20	64QAM	1	49	21.37	21.50	21.32		
20	64QAM	1	99	21.37	21.46	21.24		
20	64QAM	50	0	20.18	20.24	20.18	21	3
20	64QAM	50	24	20.15	20.28	20.10		
20	64QAM	50	50	20.18	20.20	20.07		
20	64QAM	100	0	20.15	20.11	20.07		
Channel				20025	20175	20325	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1717.5	1732.5	1747.5		
15	QPSK	1	0	23.04	23.00	22.99	24	0
15	QPSK	1	37	22.99	23.08	23.00		
15	QPSK	1	74	23.14	23.14	23.05		
15	QPSK	36	0	22.24	22.26	22.15	23	1
15	QPSK	36	20	22.14	22.22	22.15		
15	QPSK	36	39	22.14	22.12	22.09		
15	QPSK	75	0	22.16	22.29	22.11		
15	16QAM	1	0	22.76	22.70	22.67	23	1
15	16QAM	1	37	22.39	22.48	22.35		
15	16QAM	1	74	22.56	22.57	22.45		
15	16QAM	36	0	21.32	21.31	21.19	22	2
15	16QAM	36	20	21.19	21.27	21.19		
15	16QAM	36	39	21.13	21.20	21.10		
15	16QAM	75	0	21.13	21.32	21.14		
15	64QAM	1	0	21.60	21.57	21.50	22	2
15	64QAM	1	37	21.29	21.35	21.29		
15	64QAM	1	74	21.41	21.37	21.22		
15	64QAM	36	0	20.33	20.30	20.22	21	3
15	64QAM	36	20	20.21	20.29	20.13		
15	64QAM	36	39	20.17	20.19	20.11		
15	64QAM	75	0	20.09	20.23	20.13		
Channel				20000	20175	20350	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1715	1732.5	1750		
10	QPSK	1	0	23.09	23.15	23.10	24	0
10	QPSK	1	25	22.66	22.70	22.68		
10	QPSK	1	49	23.10	23.15	23.03		
10	QPSK	25	0	21.77	21.86	21.82	23	1
10	QPSK	25	12	21.75	21.78	21.76		

10	QPSK	25	25	21.86	21.89	21.89		
10	QPSK	50	0	21.78	21.86	21.84		
10	16QAM	1	0	22.44	22.36	22.45	23	1
10	16QAM	1	25	22.11	22.05	22.12		
10	16QAM	1	49	22.60	22.51	22.52		
10	16QAM	25	0	20.79	20.81	20.80	22	2
10	16QAM	25	12	20.73	20.75	20.78		
10	16QAM	25	25	20.86	20.88	20.88		
10	16QAM	50	0	20.84	20.84	20.84		
10	64QAM	1	0	21.37	21.28	21.37	22	2
10	64QAM	1	25	20.86	20.90	20.90		
10	64QAM	1	49	21.52	21.39	21.38		
10	64QAM	25	0	19.77	19.81	19.76	21	3
10	64QAM	25	12	19.78	19.78	19.76		
10	64QAM	25	25	19.90	19.88	19.89		
10	64QAM	50	0	19.90	19.89	19.86		
Channel				19975	20175	20375	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1712.5	1732.5	1752.5		
5	QPSK	1	0	23.03	23.02	23.07	24	0
5	QPSK	1	12	22.60	22.68	22.58		
5	QPSK	1	24	22.72	22.67	22.67		
5	QPSK	12	0	21.86	21.79	21.81	23	1
5	QPSK	12	7	21.74	21.81	21.73		
5	QPSK	12	13	21.76	21.68	21.75		
5	QPSK	25	0	21.76	21.80	21.77		
5	16QAM	1	0	22.12	22.22	22.18	23	1
5	16QAM	1	12	22.02	22.09	22.08		
5	16QAM	1	24	21.96	22.02	22.06		
5	16QAM	12	0	20.95	20.82	20.87	22	2
5	16QAM	12	7	20.87	20.82	20.80		
5	16QAM	12	13	20.90	20.77	20.79		
5	16QAM	25	0	20.74	20.78	20.74		
5	64QAM	1	0	21.18	21.16	21.08	22	2
5	64QAM	1	12	21.03	20.95	21.03		
5	64QAM	1	24	20.92	20.93	20.93		
5	64QAM	12	0	19.94	19.85	19.84	21	3
5	64QAM	12	7	19.85	19.82	19.82		
5	64QAM	12	13	19.88	19.74	19.77		
5	64QAM	25	0	19.75	19.79	19.74		
Channel				19965	20175	20385	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1711.5	1732.5	1753.5		
3	QPSK	1	0	23.15	23.14	23.15	24	0
3	QPSK	1	8	22.72	22.74	22.73		
3	QPSK	1	14	22.72	22.62	22.62		
3	QPSK	8	0	21.73	21.70	21.76	23	1
3	QPSK	8	4	21.68	21.73	21.71		
3	QPSK	8	7	21.66	21.78	21.67		
3	QPSK	15	0	21.72	21.79	21.77		
3	16QAM	1	0	21.86	22.00	22.04	23	1
3	16QAM	1	8	21.79	22.07	22.00		
3	16QAM	1	14	21.87	21.93	21.96		
3	16QAM	8	0	20.94	20.89	20.88	22	2
3	16QAM	8	4	20.88	20.82	20.81		
3	16QAM	8	7	20.87	20.89	20.78		
3	16QAM	15	0	20.70	20.75	20.75		
3	64QAM	1	0	21.09	20.98	21.01	22	2

3	64QAM	1	8	20.92	20.99	20.98		
3	64QAM	1	14	20.92	20.90	20.86		
3	64QAM	8	0	19.89	19.78	19.80	21	3
3	64QAM	8	4	19.84	19.82	19.81		
3	64QAM	8	7	19.83	19.77	19.79		
3	64QAM	15	0	19.75	19.73	19.76		
Channel				19957	20175	20393	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1710.7	1732.5	1754.3		
1.4	QPSK	1	0	23.05	23.07	23.04	24	0
1.4	QPSK	1	3	22.68	22.76	22.66		
1.4	QPSK	1	5	22.60	22.64	22.54		
1.4	QPSK	3	0	22.73	22.69	22.66		
1.4	QPSK	3	1	22.76	22.74	22.69		
1.4	QPSK	3	3	22.71	22.68	22.64		
1.4	QPSK	6	0	21.72	21.68	21.73	23	1
1.4	16QAM	1	0	21.83	21.93	21.97	23	1
1.4	16QAM	1	3	21.96	22.02	22.04		
1.4	16QAM	1	5	21.84	21.98	21.98		
1.4	16QAM	3	0	21.83	21.76	21.73		
1.4	16QAM	3	1	21.91	21.80	21.84		
1.4	16QAM	3	3	21.86	21.74	21.79		
1.4	16QAM	6	0	20.75	20.75	20.77	22	2
1.4	64QAM	1	0	21.02	20.91	20.88	22	2
1.4	64QAM	1	3	20.99	20.95	20.91		
1.4	64QAM	1	5	20.97	20.91	20.85		
1.4	64QAM	3	0	20.83	20.79	20.78		
1.4	64QAM	3	1	20.88	20.85	20.87		
1.4	64QAM	3	3	20.82	20.85	20.80		
1.4	64QAM	6	0	19.71	19.69	19.70	21	3

<LTE Band 5>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20450	20525	20600		
Frequency (MHz)				829	836.5	844		
10	QPSK	1	0	23.02	23.13	23.12	24	0
10	QPSK	1	25	22.63	22.74	22.71		
10	QPSK	1	49	23.03	23.11	23.12		
10	QPSK	25	0	21.76	21.82	21.84	23	1
10	QPSK	25	12	21.78	21.86	21.88		
10	QPSK	25	25	21.77	21.87	21.85		
10	QPSK	50	0	21.85	21.86	21.87		
10	16QAM	1	0	22.04	22.06	22.17	23	1
10	16QAM	1	25	21.95	22.16	22.04		
10	16QAM	1	49	22.30	22.41	22.30		
10	16QAM	25	0	20.74	20.75	20.82	22	2
10	16QAM	25	12	20.79	20.81	20.83		
10	16QAM	25	25	20.78	20.84	20.90		
10	16QAM	50	0	20.80	20.89	20.77		
10	64QAM	1	0	20.99	21.06	21.19	22	2
10	64QAM	1	25	20.84	21.08	20.94		
10	64QAM	1	49	21.24	21.34	21.29		
10	64QAM	25	0	19.72	19.72	19.82	21	3
10	64QAM	25	12	19.79	19.86	19.83		
10	64QAM	25	25	19.79	19.89	19.89		
10	64QAM	50	0	19.83	19.89	19.79		
Channel				20425	20525	20625	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				826.5	836.5	846.5		
5	QPSK	1	0	22.99	23.00	23.00	24	0
5	QPSK	1	12	22.55	22.63	22.63		
5	QPSK	1	24	22.61	22.70	22.68		
5	QPSK	12	0	21.68	21.82	21.79	23	1
5	QPSK	12	7	21.71	21.84	21.78		
5	QPSK	12	13	21.72	21.82	21.78		
5	QPSK	25	0	21.73	21.80	21.73		
5	16QAM	1	0	21.94	22.00	22.03	23	1
5	16QAM	1	12	21.86	22.01	22.00		
5	16QAM	1	24	21.98	22.04	21.98		
5	16QAM	12	0	20.75	20.82	20.82	22	2
5	16QAM	12	7	20.76	20.87	20.84		
5	16QAM	12	13	20.78	20.90	20.82		
5	16QAM	25	0	20.74	20.78	20.77		
5	64QAM	1	0	20.87	21.01	21.03	22	2
5	64QAM	1	12	20.86	21.12	20.94		
5	64QAM	1	24	20.93	21.05	20.96		
5	64QAM	12	0	19.78	19.85	19.81	21	3
5	64QAM	12	7	19.78	19.88	19.79		
5	64QAM	12	13	19.79	19.89	19.82		
5	64QAM	25	0	19.73	19.76	19.75		
Channel				20415	20525	20635	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				825.5	836.5	847.5		
3	QPSK	1	0	22.99	23.12	22.96	24	0
3	QPSK	1	8	22.59	22.72	22.72		
3	QPSK	1	14	22.54	22.68	22.64		
3	QPSK	8	0	21.67	21.70	21.72	23	1
3	QPSK	8	4	21.67	21.76	21.76		

3	QPSK	8	7	21.69	21.74	21.66		
3	QPSK	15	0	21.69	21.80	21.75		
3	16QAM	1	0	21.78	21.92	21.96	23	1
3	16QAM	1	8	21.84	21.97	21.93		
3	16QAM	1	14	21.84	21.97	21.83		
3	16QAM	8	0	20.73	20.84	20.78	22	2
3	16QAM	8	4	20.75	20.85	20.83		
3	16QAM	8	7	20.77	20.81	20.83		
3	16QAM	15	0	20.67	20.82	20.79		
3	64QAM	1	0	20.81	20.92	20.94	22	2
3	64QAM	1	8	20.85	20.97	20.93		
3	64QAM	1	14	20.78	20.93	20.85		
3	64QAM	8	0	19.63	19.80	19.76	21	3
3	64QAM	8	4	19.66	19.87	19.81		
3	64QAM	8	7	19.68	19.76	19.74		
3	64QAM	15	0	19.69	19.82	19.77		
Channel				20407	20525	20643	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				824.7	836.5	848.3		
1.4	QPSK	1	0	22.52	23.00	22.99	24	0
1.4	QPSK	1	3	22.52	22.70	22.64		
1.4	QPSK	1	5	22.43	22.61	22.60		
1.4	QPSK	3	0	22.43	22.75	22.65		
1.4	QPSK	3	1	22.51	22.72	22.69		
1.4	QPSK	3	3	22.52	22.70	22.66		
1.4	QPSK	6	0	21.54	21.74	21.67	23	1
1.4	16QAM	1	0	21.83	21.97	21.86	23	1
1.4	16QAM	1	3	21.85	21.96	21.88		
1.4	16QAM	1	5	21.80	21.88	21.81		
1.4	16QAM	3	0	21.55	21.85	21.70		
1.4	16QAM	3	1	21.61	21.86	21.74		
1.4	16QAM	3	3	21.56	21.77	21.72		
1.4	16QAM	6	0	20.64	20.85	20.77	22	2
1.4	64QAM	1	0	20.73	20.98	20.87	22	2
1.4	64QAM	1	3	20.78	20.93	20.85		
1.4	64QAM	1	5	20.76	20.88	20.85		
1.4	64QAM	3	0	20.69	20.87	20.79		
1.4	64QAM	3	1	20.68	20.92	20.84		
1.4	64QAM	3	3	20.66	20.84	20.77		
1.4	64QAM	6	0	19.53	19.76	19.67	21	3

<LTE Band 7>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20850	21100	21350		
Frequency (MHz)				2510	2535	2560		
20	QPSK	1	0	22.71	22.58	22.61	23.5	0
20	QPSK	1	49	22.53	22.35	22.41		
20	QPSK	1	99	22.64	22.46	22.60		
20	QPSK	50	0	21.61	21.40	21.51	22.5	1
20	QPSK	50	24	21.58	21.41	21.50		
20	QPSK	50	50	21.60	21.45	21.52		
20	QPSK	100	0	21.54	21.50	21.46		
20	16QAM	1	0	22.09	21.93	21.92	22.5	1
20	16QAM	1	49	21.88	21.71	21.88		
20	16QAM	1	99	22.04	21.76	21.90		
20	16QAM	50	0	20.57	20.45	20.57	21.5	2
20	16QAM	50	24	20.57	20.48	20.50		
20	16QAM	50	50	20.57	20.51	20.52		
20	16QAM	100	0	20.60	20.44	20.53		
20	64QAM	1	0	20.95	20.79	20.77	21.5	2
20	64QAM	1	49	20.75	20.52	20.67		
20	64QAM	1	99	20.89	20.61	20.83		
20	64QAM	50	0	19.56	19.43	19.60	20.5	3
20	64QAM	50	24	19.61	19.40	19.53		
20	64QAM	50	50	19.63	19.45	19.56		
20	64QAM	100	0	19.63	19.42	19.48		
Channel				20825	21100	21375	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2507.5	2535	2562.5		
15	QPSK	1	0	22.60	22.52	22.54	23.5	0
15	QPSK	1	37	22.48	22.41	22.37		
15	QPSK	1	74	22.55	22.59	22.56		
15	QPSK	36	0	21.63	21.54	21.51	22.5	1
15	QPSK	36	20	21.67	21.56	21.56		
15	QPSK	36	39	21.61	21.52	21.54		
15	QPSK	75	0	21.62	21.54	21.49		
15	16QAM	1	0	22.04	21.94	21.89	22.5	1
15	16QAM	1	37	21.90	21.79	21.82		
15	16QAM	1	74	22.03	21.90	21.90		
15	16QAM	36	0	20.72	20.54	20.54	21.5	2
15	16QAM	36	20	20.76	20.59	20.56		
15	16QAM	36	39	20.75	20.57	20.58		
15	16QAM	75	0	20.71	20.58	20.57		
15	64QAM	1	0	20.93	20.75	20.77	21.5	2
15	64QAM	1	37	20.96	20.71	20.66		
15	64QAM	1	74	20.91	20.74	20.75		
15	64QAM	36	0	19.78	19.57	19.57	20.5	3
15	64QAM	36	20	19.81	19.58	19.55		
15	64QAM	36	39	19.78	19.56	19.56		
15	64QAM	75	0	19.75	19.54	19.53		
Channel				20800	21100	21400	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2505	2535	2565		
10	QPSK	1	0	22.28	22.25	22.35	23.5	0
10	QPSK	1	25	22.00	22.02	22.01		
10	QPSK	1	49	22.14	22.25	22.23		
10	QPSK	25	0	21.10	21.13	21.10	22.5	1
10	QPSK	25	12	21.12	21.04	21.03		

10	QPSK	25	25	21.11	21.06	21.12		
10	QPSK	50	0	21.14	21.06	21.06		
10	16QAM	1	0	21.65	21.54	21.64	22.5	1
10	16QAM	1	25	21.42	21.32	21.36		
10	16QAM	1	49	21.49	21.52	21.54		
10	16QAM	25	0	20.09	20.14	20.08	21.5	2
10	16QAM	25	12	20.10	20.03	20.02		
10	16QAM	25	25	20.05	20.04	20.09		
10	16QAM	50	0	20.15	20.06	20.06		
10	64QAM	1	0	20.53	20.51	20.57	21.5	2
10	64QAM	1	25	20.29	20.22	20.23		
10	64QAM	1	49	20.38	20.41	20.38		
10	64QAM	25	0	19.08	19.11	19.06	20.5	3
10	64QAM	25	12	19.13	19.06	19.05		
10	64QAM	25	25	19.09	19.09	19.13		
10	64QAM	50	0	19.16	19.06	19.09		
Channel				20775	21100	21425	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2502.5	2535	2567.5		
5	QPSK	1	0	22.09	22.14	22.11	23.5	0
5	QPSK	1	12	21.92	21.98	22.01		
5	QPSK	1	24	22.03	22.04	22.08		
5	QPSK	12	0	21.13	21.00	21.10	22.5	1
5	QPSK	12	7	21.03	21.06	21.04		
5	QPSK	12	13	21.06	21.02	21.04		
5	QPSK	25	0	21.07	21.03	21.08		
5	16QAM	1	0	21.45	21.45	21.41	22.5	1
5	16QAM	1	12	21.35	21.34	21.33		
5	16QAM	1	24	21.40	21.34	21.41		
5	16QAM	12	0	20.21	20.11	20.13	21.5	2
5	16QAM	12	7	20.10	20.10	20.13		
5	16QAM	12	13	20.10	20.09	20.11		
5	16QAM	25	0	20.03	20.06	20.09		
5	64QAM	1	0	20.38	20.34	20.33	21.5	2
5	64QAM	1	12	20.25	20.20	20.26		
5	64QAM	1	24	20.26	20.28	20.27		
5	64QAM	12	0	19.22	19.09	19.13	20.5	3
5	64QAM	12	7	19.13	19.12	19.11		
5	64QAM	12	13	19.14	19.11	19.09		
5	64QAM	25	0	19.07	19.06	19.08		

<LTE Band 13>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel					23230			
Frequency (MHz)					782			
10	QPSK	1	0		22.92		24	0
10	QPSK	1	25		22.39			
10	QPSK	1	49		22.71			
10	QPSK	25	0		21.62		23	1
10	QPSK	25	12		21.64			
10	QPSK	25	25		21.54			
10	QPSK	50	0		21.61			
10	16QAM	1	0		22.20		23	1
10	16QAM	1	25		21.85			
10	16QAM	1	49		22.00			
10	16QAM	25	0		20.58		22	2
10	16QAM	25	12		20.61			
10	16QAM	25	25		20.53			
10	16QAM	50	0		20.58			
10	64QAM	1	0		21.13		22	2
10	64QAM	1	25		20.45			
10	64QAM	1	49		20.85			
10	64QAM	25	0		19.60		21	3
10	64QAM	25	12		19.64			
10	64QAM	25	25		19.54			
10	64QAM	50	0		19.61			
Channel				23205	23230	23255	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				779.5	782	784.5		
5	QPSK	1	0	22.58	22.54	22.57	24	0
5	QPSK	1	12	22.45	22.44	22.37		
5	QPSK	1	24	22.43	22.45	22.52		
5	QPSK	12	0	21.52	21.59	21.55	23	1
5	QPSK	12	7	21.53	21.51	21.52		
5	QPSK	12	13	21.57	21.48	21.49		
5	QPSK	25	0	21.65	21.60	21.58		
5	16QAM	1	0	21.89	21.86	21.87	23	1
5	16QAM	1	12	21.70	21.71	21.67		
5	16QAM	1	24	21.77	21.78	21.82		
5	16QAM	12	0	20.59	20.66	20.58	22	2
5	16QAM	12	7	20.57	20.59	20.58		
5	16QAM	12	13	20.64	20.50	20.55		
5	16QAM	25	0	20.55	20.59	20.51		
5	64QAM	1	0	20.83	20.74	20.77	22	2
5	64QAM	1	12	20.69	20.76	20.76		
5	64QAM	1	24	20.63	20.68	20.67		
5	64QAM	12	0	19.58	19.72	19.57	21	3
5	64QAM	12	7	19.57	19.60	19.56		
5	64QAM	12	13	19.67	19.55	19.59		
5	64QAM	25	0	19.64	19.57	19.56		

<LTE Band 26>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				26765	26865	26965		
Frequency (MHz)				821.5	831.5	841.5		
15	QPSK	1	0	23.69	23.83	23.67	24	0
15	QPSK	1	37	23.22	23.18	22.88		
15	QPSK	1	74	23.73	23.60	23.24		
15	QPSK	36	0	22.65	22.45	22.25	23	1
15	QPSK	36	20	22.35	22.29	21.98		
15	QPSK	36	39	22.25	22.19	21.83		
15	QPSK	75	0	22.38	22.35	22.07		
15	16QAM	1	0	22.87	22.75	22.56	23	1
15	16QAM	1	37	22.48	22.40	22.13		
15	16QAM	1	74	22.98	22.89	22.53		
15	16QAM	36	0	21.60	21.49	21.21	22	2
15	16QAM	36	20	21.29	21.30	21.00		
15	16QAM	36	39	21.22	21.16	20.83		
15	16QAM	75	0	21.44	21.33	21.09		
15	64QAM	1	0	21.79	21.70	21.51	22	2
15	64QAM	1	37	21.58	21.69	21.26		
15	64QAM	1	74	21.89	21.85	21.47		
15	64QAM	36	0	20.64	20.51	20.21	21	3
15	64QAM	36	20	20.31	20.28	20.01		
15	64QAM	36	39	20.24	20.19	19.88		
15	64QAM	75	0	20.33	20.28	20.08		
Channel				26740	26865	26990	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				819	831.5	844		
10	QPSK	1	0	23.53	23.54	23.74	24	0
10	QPSK	1	25	23.01	22.73	22.69		
10	QPSK	1	49	23.02	23.15	22.89		
10	QPSK	25	0	21.88	21.91	21.85	23	1
10	QPSK	25	12	21.93	21.91	21.83		
10	QPSK	25	25	21.94	21.90	21.82		
10	QPSK	50	0	21.90	21.93	21.85		
10	16QAM	1	0	22.33	22.26	22.23	23	1
10	16QAM	1	25	22.11	22.02	21.95		
10	16QAM	1	49	22.25	22.42	21.96		
10	16QAM	25	0	20.86	20.88	20.82	22	2
10	16QAM	25	12	20.87	20.85	20.81		
10	16QAM	25	25	20.90	20.90	20.79		
10	16QAM	50	0	20.98	20.95	20.84		
10	64QAM	1	0	21.27	21.22	21.16	22	2
10	64QAM	1	25	21.07	21.00	20.92		
10	64QAM	1	49	21.24	21.34	21.05		
10	64QAM	25	0	19.84	19.89	19.88	21	3
10	64QAM	25	12	19.93	19.89	19.82		
10	64QAM	25	25	19.96	19.91	19.85		
10	64QAM	50	0	20.02	19.93	19.84		
Channel				26715	26865	27015	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				816.5	831.5	846.5		
5	QPSK	1	0	23.50	23.26	23.42	24	0
5	QPSK	1	12	22.77	22.78	22.66		
5	QPSK	1	24	22.80	22.79	22.63		
5	QPSK	12	0	21.91	21.85	21.81	23	1
5	QPSK	12	7	21.84	21.87	21.79		

5	QPSK	12	13	21.86	21.85	21.73		
5	QPSK	25	0	21.87	21.84	21.77		
5	16QAM	1	0	22.12	22.06	22.00	23	1
5	16QAM	1	12	22.03	21.99	21.92		
5	16QAM	1	24	22.17	22.07	21.84		
5	16QAM	12	0	20.97	20.86	20.80	22	2
5	16QAM	12	7	20.87	20.91	20.79		
5	16QAM	12	13	20.89	20.84	20.73		
5	16QAM	25	0	20.79	20.85	20.76		
5	64QAM	1	0	21.08	21.05	20.94	22	2
5	64QAM	1	12	21.12	20.97	20.86		
5	64QAM	1	24	21.14	21.03	20.81		
5	64QAM	12	0	19.93	19.87	19.85	21	3
5	64QAM	12	7	19.89	19.91	19.80		
5	64QAM	12	13	19.90	19.88	19.77		
5	64QAM	25	0	19.79	19.78	19.77		
Channel				26705	26865	27025	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				815.5	831.5	847.5		
3	QPSK	1	0	23.51	23.30	23.37	24	0
3	QPSK	1	8	22.85	22.80	22.65		
3	QPSK	1	14	22.70	22.71	22.55		
3	QPSK	8	0	21.90	21.83	21.69	23	1
3	QPSK	8	4	21.92	21.86	21.72		
3	QPSK	8	7	21.77	21.79	21.69		
3	QPSK	15	0	21.92	21.84	21.70		
3	16QAM	1	0	22.03	22.01	21.91	23	1
3	16QAM	1	8	22.15	22.04	21.94		
3	16QAM	1	14	22.00	21.98	21.84		
3	16QAM	8	0	20.97	20.88	20.80	22	2
3	16QAM	8	4	20.98	20.90	20.76		
3	16QAM	8	7	20.87	20.93	20.73		
3	16QAM	15	0	20.91	20.85	20.71		
3	64QAM	1	0	20.93	20.95	20.86	22	2
3	64QAM	1	8	21.23	21.03	20.84		
3	64QAM	1	14	20.97	20.97	20.75		
3	64QAM	8	0	19.94	19.88	19.74	21	3
3	64QAM	8	4	19.97	19.85	19.76		
3	64QAM	8	7	19.84	19.84	19.71		
3	64QAM	15	0	19.89	19.81	19.71		
Channel				26697	26865	27033	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				814.7	831.5	848.3		
1.4	QPSK	1	0	23.38	23.28	23.33	24	0
1.4	QPSK	1	3	22.78	22.71	22.61		
1.4	QPSK	1	5	22.70	22.69	22.52		
1.4	QPSK	3	0	22.78	22.75	22.58		
1.4	QPSK	3	1	22.80	22.75	22.60		
1.4	QPSK	3	3	22.78	22.72	22.56		
1.4	QPSK	6	0	21.82	21.79	21.64	23	1
1.4	16QAM	1	0	21.98	21.95	21.84	23	1
1.4	16QAM	1	3	22.07	21.99	21.88		
1.4	16QAM	1	5	22.02	21.93	21.80		
1.4	16QAM	3	0	21.84	21.81	21.64		
1.4	16QAM	3	1	21.87	21.80	21.66		
1.4	16QAM	3	3	21.81	21.79	21.56		
1.4	16QAM	6	0	20.96	20.86	20.69	22	2
1.4	64QAM	1	0	20.94	20.95	20.81	22	2

1.4	64QAM	1	3	20.94	20.90	20.77		
1.4	64QAM	1	5	21.01	20.91	20.70		
1.4	64QAM	3	0	20.91	20.85	20.73		
1.4	64QAM	3	1	20.93	20.91	20.77		
1.4	64QAM	3	3	20.92	20.85	20.70		
1.4	64QAM	6	0	19.83	19.75	19.62	21	3

<LTE Carrier Aggregation combinations>

General Note:

1. This device supports Carrier Aggregation on downlink only for inter and intra band, and uplink for intra band. For the device supports combination bands and configurations are according to 3GPP.
2. In applying the existing power measurement procedure of KDB 941225 D05A for DL CA SAR test exclusion, only the subset with the largest number of combinations of the frequency band and CCs in each row need consideration, and that configurations require power measurement should be highlighted in the below table.
3. All permutations exist. No restrictions on Pcell & Scell combinations. Only LTE Band 29A is limited to Scell.

	Intra-Band Contigous
Band 7	CA_7C

<Power verification when LTE Carrier Aggregation Active>

General Note:

i. According to KDB941225 D05A v01r02, Uplink maximum output power measurement with downlink carrier aggregation active should be measured, using the highest output channel measured without downlink carrier aggregation, to confirm that uplink maximum output power with downlink carrier aggregation active remains within the specified tune-up tolerance limits and not more than ¼ dB higher than the maximum output measured without downlink carrier aggregation active.

ii. Uplink maximum output power with downlink carrier aggregation active does not show more than ¼ dB higher than the maximum output power without downlink carrier aggregation active, therefore SAR evaluation with downlink carrier aggregation active can be excluded.

iii. The device supports downlink two carrier aggregation. For power measurement were control and acknowledge data is sent on uplink channels that operate identical to specifications when downlink carrier aggregation is inactive.

iv. Selected highest measured power when downlink carrier aggregation is inactive for conducted power comparison with downlink carrier aggregation is active, to confirm that when downlink carrier aggregation is active uplink maximum output power remains within the specified tune-up tolerance limits and not more than ¼ dB higher than the maximum output power measured when downlink carrier aggregation inactive.

v. For non-contiguous intra-band CA, the SCC selected to provide maximum separation from the PCC and must remain fully within the downlink transmission band.

vi. According TCB workshop, the output power with uplink CA active was measured for the configuration with the highest reported SAR with single carrier for each exposure condition. The power was measured with wideband signal integration over both component carriers.

vii. For Intra-band, contiguous CA, the downlink channels selected to perform the uplink power measurement must satisfy 3GPP channel spacing (5.4.1A of 3GPP TS 36.521 or equivalent) and channel bandwidth (5.4.2A) requirements.

$$\text{Nominal channel spacing} = \left\lfloor \frac{BW_{Channel(1)} + BW_{Channel(2)} - 0.1\left|BW_{Channel(1)} - BW_{Channel(2)}\right|}{0.6} \right\rfloor 0.3 \ \ [\text{MHz}]$$

<Two Carrier power verification>

Configure		PCC							SCC				Power	
		LTE Band	BW (MHz)	UL Freq. (MHz)	UL Channel	Mod.	UL# RB	UL RB Offset	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	With CA Tx.Power (dBm)	W/O CA Tx.Power (dBm)
Intra-Band	Contiguous	7	20	2510	20850	QPSK	1	0	7	20	2649.80	3048	22.68	22.71

<Intra-Band uplink Carrier Aggregation>

General Note:

i. The device supports intra-band uplink carrier aggregation for LTE B7 with a maximum of two 20MHz component carriers. For intra band contiguous carrier aggregation scenarios, 3GPP 36.101 table 6.2.2A-1 specifies that the aggregate maximum allowed output power is equivalent to the single carrier scenario.

ii. According TCB workshop, the output power with uplink CA active was measured for the configuration with the highest reported SAR with single carrier for each exposure condition. The power was measured with wideband signal integration over both component carriers.

iii. Additional SAR measurement for LTE UL CA whit other DL CA combinations active were not required since the maximum output power for this configuration was not > 0.25dB higher than the maximum output power for UL CA active.

CA_7C										
Combination 20MHz+20MHz (100RB+100RB)										
PCC Channel	SCC Channel	Modulation	PCC		SCC		Total RB Size	Target MPR Level (dB)	Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset				
20850	21048	QPSK	1	0	0	0	1	0	19.65	23.5
21100	20902	QPSK	1	0	1	99	2	0	22.54	23.5
21350	21152	QPSK	1	0	1	99	2	0	20.78	23.5

<WLAN Conducted Power>

General Note:

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

<2.4GHz WLAN>

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
2.4GHz WLAN	802.11b 1Mbps	1	2412	17.90	18.00	97.45
		6	2437	17.80	18.00	
		11	2462	17.80	18.00	
	802.11g 6Mbps	1	2412	14.00	14.00	86.62
		6	2437	13.80	14.00	
		11	2462	12.80	14.00	
	802.11n-HT20 MCS0	1	2412	13.70	14.00	86.44
		6	2437	13.80	14.00	
		11	2462	12.30	14.00	
	802.11n-HT40 MCS0	3	2422	13.90	14.00	85.96
		6	2437	13.90	14.00	
		9	2452	11.20	14.00	

<5GHz WLAN>

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.2GHz WLAN	802.11a 6Mbps	36	5180	13.80	14.00	87.26
		40	5200	13.80	14.00	
		44	5220	13.90	14.00	
		48	5240	13.80	14.00	
	802.11n-HT20 MCS0	36	5180	13.90	14.00	86.39
		40	5200	13.80	14.00	
		44	5220	13.70	14.00	
		48	5240	13.60	14.00	
	802.11n-HT40 MCS0	38	5190	13.80	14.00	88.44
		46	5230	14.00	14.00	
	802.11ac-VHT20 MCS0	36	5180	13.80	14.00	87.44
		40	5200	13.60	14.00	
		44	5220	13.60	14.00	
		48	5240	13.50	14.00	
	802.11ac-VHT40 MCS0	38	5190	13.70	14.00	88.89
		46	5230	13.90	14.00	
	802.11ac-VHT80 MCS0	42	5210	11.60	12.00	86.21

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.3GHz WLAN	802.11a 6Mbps	52	5260	13.70	14.00	87.26
		56	5280	13.60	14.00	
		60	5300	13.70	14.00	
		64	5320	13.60	14.00	
	802.11n-HT20 MCS0	52	5260	13.80	14.00	86.39
		56	5280	13.70	14.00	
		60	5300	13.70	14.00	
		64	5320	13.60	14.00	
	802.11n-HT40 MCS0	54	5270	14.00	14.00	88.44
		62	5310	13.90	14.00	
	802.11ac-VHT20 MCS0	52	5260	13.70	14.00	87.44
		56	5280	13.60	14.00	
		60	5300	13.60	14.00	
		64	5320	13.50	14.00	
	802.11ac-VHT40 MCS0	54	5270	13.90	14.00	88.89
		62	5310	13.80	14.00	
	802.11ac-VHT80 MCS0	58	5290	11.60	12.00	86.21

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.5GHz WLAN	802.11a 6Mbps	100	5500	14.00	14.00	87.26
		116	5580	13.70	14.00	
		124	5620	13.60	14.00	
		132	5660	13.50	14.00	
		140	5700	13.80	14.00	
	802.11n-HT20 MCS0	100	5500	13.80	14.00	86.39
		116	5580	14.00	14.00	
		124	5620	13.90	14.00	
		132	5660	13.80	14.00	
		140	5700	13.90	14.00	
	802.11n-HT40 MCS0	102	5510	13.70	14.00	88.44
		110	5550	13.60	14.00	
		126	5630	13.60	14.00	
		134	5670	13.60	14.00	
	802.11ac-VHT20 MCS0	100	5500	13.70	14.00	87.44
		116	5580	13.90	14.00	
		124	5620	13.80	14.00	
		132	5660	13.70	14.00	
		140	5700	13.80	14.00	
	802.11ac-VHT40 MCS0	102	5510	13.60	14.00	88.89
		110	5550	13.50	14.00	
		126	5630	13.50	14.00	
		134	5670	13.50	14.00	
	802.11ac-VHT80 MCS0	106	5530	12.00	12.00	86.21
		122	5610	12.00	12.00	

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.8GHz WLAN	802.11a 6Mbps	149	5745	13.60	14.00	87.26
		157	5785	13.60	14.00	
		165	5825	13.70	14.00	
	802.11n-HT20 MCS0	149	5745	13.50	14.00	86.39
		157	5785	13.60	14.00	
		165	5825	13.70	14.00	
	802.11n-HT40 MCS0	151	5755	13.80	14.00	88.44
		159	5795	13.60	14.00	
	802.11ac-VHT20 MCS0	149	5745	13.80	14.00	87.44
		157	5785	13.90	14.00	
		165	5825	14.00	14.00	
	802.11ac-VHT40 MCS0	151	5755	13.70	14.00	88.89
		159	5795	13.50	14.00	
	802.11ac-VHT80 MCS0	155	5775	11.90	12.00	86.21

<2.4GHz Bluetooth>

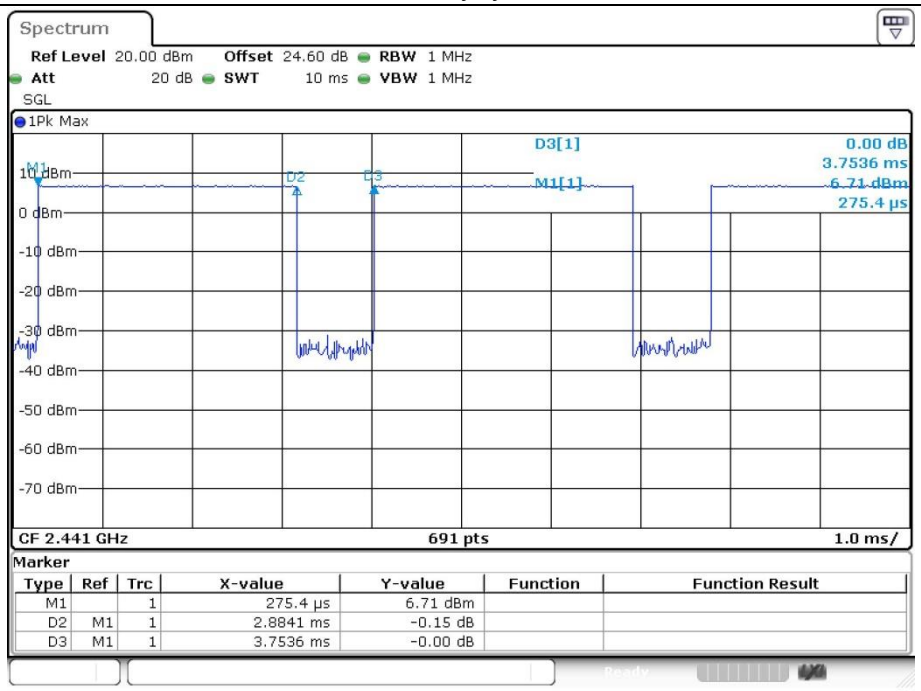
Mode	Channel	Frequency (MHz)	Average power (dBm)		
			1Mbps	2Mbps	3Mbps
BR / EDR	CH 00	2402	5.19	2.96	2.98
	CH 39	2441	6.68	4.49	4.49
	CH 78	2480	6.10	3.88	3.89
Tune-up Limit			7.00	7.00	7.00

Mode	Channel	Frequency (MHz)	Average power (dBm)
			GFSK
LE	CH 00	2402	0.90
	CH 19	2440	1.50
	CH 39	2480	1.20
Tune-up Limit			1.50

General Note:

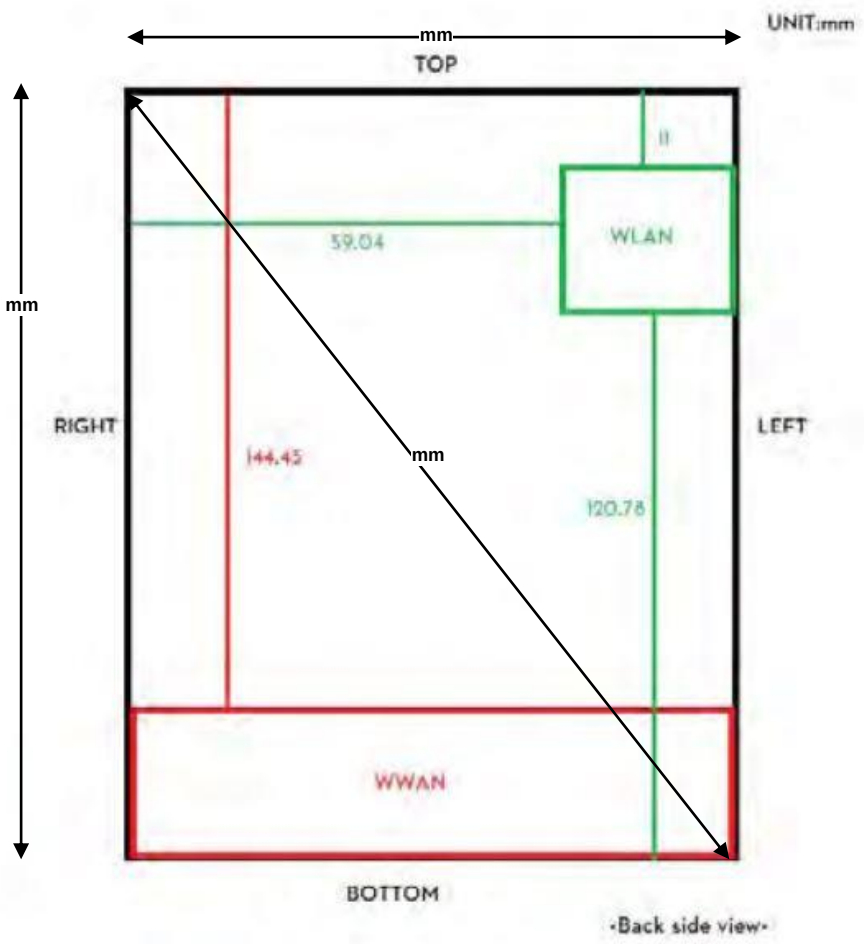
1. For 2.4GHz Bluetooth SAR testing was selected 1Mbps due to its highest average power and duty cycle is 76.84% considered in SAR testing, and the duty cycle would be scaled to theoretical 83.3% in reported SAR calculation.

BT Duty cycle



12. Antenna Location

<Mobile Phone>



Distance of the Antenna to the EUT surface/edge						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
WWAN Main	≤ 25mm	≤ 25mm	>25mm	≤ 25mm	≤ 25mm	≤ 25mm
BT&WLAN	≤ 25mm	≤ 25mm	≤ 25mm	>25mm	>25mm	≤ 25mm

Positions for SAR tests; Hotspot mode						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
WWAN Main	Yes	Yes	No	Yes	Yes	Yes
BT&WLAN	Yes	Yes	Yes	No	No	Yes

General Note:

1. Referring to KDB 941225 D06 v02r01, when the overall device length and width are < 9cm*5cm, the test distance is 5 mm. SAR must be measured for all sides and surfaces.

13. SAR Test Results

General Note:

1. Per KDB 447498 D01v06, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   b. For SAR testing of WLAN signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle)"
   c. For WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
   d. For WLAN/Bluetooth: Reported SAR(W/kg)= Measured SAR(W/kg)* Duty Cycle scaling factor * Tune-up scaling factor
2. Per KDB 447498 D01v06, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the *reported* 1-g or 10-g SAR for the mid-band or highest output power channel is:
   - ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
   - ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
   - ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
3. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
4. Per KDB 648474 D04v01r03, when the reported SAR for a body-worn accessory measured without a headset connected to the handset is ≤ 1.2 W/kg, SAR testing with a headset connected to the handset is not required.
5. For 5.3GHz / 5.5GHz WLAN product specific SAR is necessary too, due to an overall diagonal dimension is > 16cm, for others wireless were not necessary due to the hotspot SAR is < 1.2W/kg.

GSM Note:

1. Per KDB 941225 D01v03r01, for SAR test reduction for GSM / GPRS / EDGE modes is determined by the source-based time-averaged output power including tune-up tolerance. The mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested. Therefore, the GPRS (4Tx slots) for GSM850/GSM1900 is considered as the primary mode.
2. Other configurations of GSM / GPRS / EDGE are considered as secondary modes. The 3G SAR test reduction procedure is applied, when the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode, SAR measurement is not required for the secondary mode.

UMTS Note:

1. Per KDB 941225 D01v03r01, for SAR testing is measured using a 12.2 kbps RMC with TPC bits configured to all “1’s”.
2. Per KDB 941225 D01v03r01, RMC 12.2kbps setting is used to evaluate SAR. The maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA is ≤ ¼ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA, and according to the following RF output power, the output power results of the secondary modes (HSUPA, HSDPA) are less than ¼ dB higher than the primary modes; therefore, SAR measurement is not required for HSDPA / HSUPA.

LTE Note:

1. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
2. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
3. Per KDB 941225 D05v02r05, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
4. Per KDB 941225 D05v02r05, 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
5. Per KDB 941225 D05v02r05, Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
6. For LTE B26 / B4 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.
7. LTE band 5 SAR test was covered by Band 26; according to TCB workshop, SAR test for overlapping LTE bands can be reduced if
   a. The maximum output power, including tolerance, for the smaller band is ≤ the larger band to qualify for the SAR test exclusion.
   b. The channel bandwidth and other operating parameters for the smaller band are fully supported by the larger band.

WLAN Note:

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

13.1 Head SAR

<GSM SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	GSM850	GPRS (4Tx slots)	Right Cheek	0mm	189	836.4	26.56	28.00	1.393	0.03	0.123	0.171
	GSM850	GPRS (4Tx slots)	Right Tilted	0mm	189	836.4	26.56	28.00	1.393	-0.03	0.080	0.111
	GSM850	GPRS (4Tx slots)	Left Cheek	0mm	189	836.4	26.56	28.00	1.393	0.03	0.141	0.196
01	GSM850	GPRS (4Tx slots)	Left Cheek	0mm	128	824.2	26.36	28.00	1.459	0.04	0.160	0.233
	GSM850	GPRS (4Tx slots)	Left Cheek	0mm	251	848.8	26.54	28.00	1.400	0.12	0.146	0.204
	GSM850	GPRS (4Tx slots)	Left Tilted	0mm	189	836.4	26.56	28.00	1.393	0	0.077	0.107
	GSM1900	GPRS (4Tx slots)	Right Cheek	0mm	512	1850.2	24.15	25.00	1.216	0.12	0.212	0.258
02	GSM1900	GPRS (4Tx slots)	Right Cheek	0mm	661	1880	24.04	25.00	1.247	0.13	0.225	0.281
	GSM1900	GPRS (4Tx slots)	Right Cheek	0mm	810	1909.8	24.03	25.00	1.250	0.11	0.220	0.275
	GSM1900	GPRS (4Tx slots)	Right Tilted	0mm	512	1850.2	24.15	25.00	1.216	0.06	0.134	0.163
	GSM1900	GPRS (4Tx slots)	Left Cheek	0mm	512	1850.2	24.15	25.00	1.216	0.1	0.204	0.248
	GSM1900	GPRS (4Tx slots)	Left Tilted	0mm	512	1850.2	24.15	25.00	1.216	0.05	0.118	0.144

<WCDMA SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WCDMA II	RMC 12.2Kbps	Right Cheek	0mm	9538	1907.6	21.85	22.50	1.161	-0.05	0.405	0.470
	WCDMA II	RMC 12.2Kbps	Right Cheek	0mm	9262	1852.4	21.81	22.50	1.172	-0.09	0.368	0.431
03	WCDMA II	RMC 12.2Kbps	Right Cheek	0mm	9400	1880	21.78	22.50	1.180	0.01	0.416	0.491
	WCDMA II	RMC 12.2Kbps	Right Tilted	0mm	9538	1907.6	21.85	22.50	1.161	-0.04	0.221	0.257
	WCDMA II	RMC 12.2Kbps	Left Cheek	0mm	9538	1907.6	21.85	22.50	1.161	0.02	0.372	0.432
	WCDMA II	RMC 12.2Kbps	Left Tilted	0mm	9538	1907.6	21.85	22.50	1.161	0.03	0.208	0.242
	WCDMA IV	RMC 12.2Kbps	Right Cheek	0mm	1312	1712.4	23.15	24.00	1.216	0.15	0.295	0.359
	WCDMA IV	RMC 12.2Kbps	Right Tilted	0mm	1312	1712.4	23.15	24.00	1.216	-0.07	0.213	0.259
	WCDMA IV	RMC 12.2Kbps	Left Cheek	0mm	1312	1712.4	23.15	24.00	1.216	0.06	0.323	0.393
	WCDMA IV	RMC 12.2Kbps	Left Cheek	0mm	1413	1732.6	23.12	24.00	1.225	0.1	0.438	0.536
04	WCDMA IV	RMC 12.2Kbps	Left Cheek	0mm	1513	1752.6	23.14	24.00	1.219	0.09	0.489	0.596
	WCDMA IV	RMC 12.2Kbps	Left Tilted	0mm	1312	1712.4	23.15	24.00	1.216	-0.03	0.215	0.261
	WCDMA V	RMC 12.2Kbps	Right Cheek	0mm	4233	846.6	22.82	24.00	1.312	0.04	0.276	0.362
	WCDMA V	RMC 12.2Kbps	Right Tilted	0mm	4233	846.6	22.82	24.00	1.312	0.09	0.152	0.199
	WCDMA V	RMC 12.2Kbps	Left Cheek	0mm	4233	846.6	22.82	24.00	1.312	-0.03	0.312	0.409
05	WCDMA V	RMC 12.2Kbps	Left Cheek	0mm	4132	826.4	22.78	24.00	1.324	0.04	0.335	0.444
	WCDMA V	RMC 12.2Kbps	Left Cheek	0mm	4182	836.4	22.75	24.00	1.334	0.04	0.320	0.427
	WCDMA V	RMC 12.2Kbps	Left Tilted	0mm	4233	846.6	22.82	24.00	1.312	0.08	0.152	0.199

<LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 2	20M	QPSK	1	0	Right Cheek	0mm	18900	1880	22.19	23.00	1.205	-0.18	0.368	0.443
	LTE Band 2	20M	QPSK	50	0	Right Cheek	0mm	18900	1880	21.05	22.00	1.245	0.03	0.290	0.361
	LTE Band 2	20M	QPSK	1	0	Right Tilted	0mm	18900	1880	22.19	23.00	1.205	-0.04	0.239	0.288
	LTE Band 2	20M	QPSK	50	0	Right Tilted	0mm	18900	1880	21.05	22.00	1.245	-0.02	0.185	0.230
	LTE Band 2	20M	QPSK	1	0	Left Cheek	0mm	18900	1880	22.19	23.00	1.205	-0.03	0.396	0.477
06	LTE Band 2	20M	QPSK	1	0	Left Cheek	0mm	18700	1860	22.04	23.00	1.247	-0.11	0.402	0.501
	LTE Band 2	20M	QPSK	1	0	Left Cheek	0mm	19100	1900	22.07	23.00	1.239	0.03	0.403	0.499
	LTE Band 2	20M	QPSK	50	0	Left Cheek	0mm	18900	1880	21.05	22.00	1.245	-0.03	0.317	0.395
	LTE Band 2	20M	QPSK	1	0	Left Tilted	0mm	18900	1880	22.19	23.00	1.205	0.05	0.216	0.260
	LTE Band 2	20M	QPSK	50	0	Left Tilted	0mm	18900	1880	21.05	22.00	1.245	-0.08	0.170	0.212
07	LTE Band 4	20M	QPSK	1	0	Right Cheek	0mm	20175	1732.5	23.16	24.00	1.213	0.1	0.393	0.477
	LTE Band 4	20M	QPSK	50	0	Right Cheek	0mm	20175	1732.5	22.24	23.00	1.191	0.19	0.324	0.386
	LTE Band 4	20M	QPSK	1	0	Right Tilted	0mm	20175	1732.5	23.16	24.00	1.213	-0.17	0.241	0.292
	LTE Band 4	20M	QPSK	50	0	Right Tilted	0mm	20175	1732.5	22.24	23.00	1.191	-0.04	0.190	0.226
	LTE Band 4	20M	QPSK	1	0	Left Cheek	0mm	20175	1732.5	23.16	24.00	1.213	0.13	0.364	0.442
	LTE Band 4	20M	QPSK	50	0	Left Cheek	0mm	20175	1732.5	22.24	23.00	1.191	0.09	0.280	0.334
	LTE Band 4	20M	QPSK	1	0	Left Tilted	0mm	20175	1732.5	23.16	24.00	1.213	-0.04	0.281	0.341
	LTE Band 4	20M	QPSK	50	0	Left Tilted	0mm	20175	1732.5	22.24	23.00	1.191	-0.08	0.222	0.264
08	LTE Band 7	20M	QPSK	1	0	Right Cheek	0mm	20850	2510	22.71	23.50	1.199	0.05	0.294	0.353
	LTE Band 7	20M	QPSK	1	0	Right Cheek	0mm	21100	2535	22.58	23.50	1.236	-0.1	0.278	0.344
	LTE Band 7	20M	QPSK	1	0	Right Cheek	0mm	21350	2560	22.61	23.50	1.227	0.12	0.275	0.338
	LTE Band 7	20M	QPSK	50	0	Right Cheek	0mm	20850	2510	21.61	22.50	1.227	0.15	0.216	0.265
	LTE Band 7C	20M	QPSK	1	0	Right Cheek	0mm	21100	2535	22.54	23.50	1.247	-0.06	0.271	0.338
	LTE Band 7	20M	QPSK	1	0	Right Tilted	0mm	20850	2510	22.71	23.50	1.199	0.13	0.092	0.110
	LTE Band 7	20M	QPSK	50	0	Right Tilted	0mm	20850	2510	21.61	22.50	1.227	-0.01	0.065	0.080
	LTE Band 7	20M	QPSK	1	0	Left Cheek	0mm	20850	2510	22.71	23.50	1.199	-0.06	0.152	0.182
	LTE Band 7	20M	QPSK	50	0	Left Cheek	0mm	20850	2510	21.61	22.50	1.227	-0.16	0.121	0.149
	LTE Band 7	20M	QPSK	1	0	Left Tilted	0mm	20850	2510	22.71	23.50	1.199	-0.06	0.120	0.144
	LTE Band 7	20M	QPSK	50	0	Left Tilted	0mm	20850	2510	21.61	22.50	1.227	-0.09	0.088	0.108
	LTE Band 13	10M	QPSK	1	0	Right Cheek	0mm	23230	782	22.92	24.00	1.282	0.11	0.385	0.494
	LTE Band 13	10M	QPSK	25	12	Right Cheek	0mm	23230	782	21.64	23.00	1.368	0.07	0.269	0.368
	LTE Band 13	10M	QPSK	1	0	Right Tilted	0mm	23230	782	22.92	24.00	1.282	-0.02	0.200	0.256
	LTE Band 13	10M	QPSK	25	12	Right Tilted	0mm	23230	782	21.64	23.00	1.368	0.06	0.140	0.191
09	LTE Band 13	10M	QPSK	1	0	Left Cheek	0mm	23230	782	22.92	24.00	1.282	0.03	0.419	0.537
	LTE Band 13	10M	QPSK	25	12	Left Cheek	0mm	23230	782	21.64	23.00	1.368	0.05	0.301	0.412
	LTE Band 13	10M	QPSK	1	0	Left Tilted	0mm	23230	782	22.92	24.00	1.282	0	0.245	0.314
	LTE Band 13	10M	QPSK	25	12	Left Tilted	0mm	23230	782	21.64	23.00	1.368	0.04	0.173	0.237
	LTE Band 26	15M	QPSK	1	0	Right Cheek	0mm	26865	831.5	23.83	24.00	1.040	0	0.307	0.319
	LTE Band 26	15M	QPSK	36	0	Right Cheek	0mm	26865	831.5	22.45	23.00	1.135	0.05	0.253	0.287
	LTE Band 26	15M	QPSK	1	0	Right Tilted	0mm	26865	831.5	23.83	24.00	1.040	0.01	0.197	0.205
	LTE Band 26	15M	QPSK	36	0	Right Tilted	0mm	26865	831.5	22.45	23.00	1.135	0	0.155	0.176
10	LTE Band 26	15M	QPSK	1	0	Left Cheek	0mm	26865	831.5	23.83	24.00	1.040	-0.05	0.383	0.398
	LTE Band 26	15M	QPSK	36	0	Left Cheek	0mm	26865	831.5	22.45	23.00	1.135	-0.03	0.303	0.344
	LTE Band 26	15M	QPSK	1	0	Left Tilted	0mm	26865	831.5	23.83	24.00	1.040	-0.05	0.214	0.223
	LTE Band 26	15M	QPSK	36	0	Left Tilted	0mm	26865	831.5	22.45	23.00	1.135	0.05	0.170	0.193

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WLAN2.4GHz	802.11b 1Mbps	Right Cheek	0mm	1	2412	17.90	18.00	1.023	97.45	1.026	-0.18	0.141	0.148
	WLAN2.4GHz	802.11b 1Mbps	Right Cheek	0mm	6	2437	17.80	18.00	1.047	97.45	1.026	-0.14	0.123	0.132
11	WLAN2.4GHz	802.11b 1Mbps	Right Cheek	0mm	11	2462	17.80	18.00	1.047	97.45	1.026	-0.06	0.200	0.215
	WLAN2.4GHz	802.11b 1Mbps	Right Tilted	0mm	1	2412	17.90	18.00	1.023	97.45	1.026	-0.04	0.074	0.078
	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	0mm	1	2412	17.90	18.00	1.023	97.45	1.026	-0.06	0.093	0.098
	WLAN2.4GHz	802.11b 1Mbps	Left Tilted	0mm	1	2412	17.90	18.00	1.023	97.45	1.026	-0.05	0.076	0.080
12	WLAN5GHz	802.11n-HT40 MCS0	Right Cheek	0mm	54	5270	14.00	14.00	1.000	88.44	1.131	-0.07	0.143	0.162
	WLAN5GHz	802.11n-HT40 MCS0	Right Cheek	0mm	62	5310	13.90	14.00	1.023	88.44	1.131	0.17	0.114	0.132
	WLAN5GHz	802.11n-HT40 MCS0	Right Tilted	0mm	54	5270	14.00	14.00	1.000	88.44	1.131	-0.12	0.102	0.115
	WLAN5GHz	802.11n-HT40 MCS0	Left Cheek	0mm	54	5270	14.00	14.00	1.000	88.44	1.131	-0.14	0.101	0.114
	WLAN5GHz	802.11n-HT40 MCS0	Left Tilted	0mm	54	5270	14.00	14.00	1.000	88.44	1.131	-0.15	0.099	0.112
13	WLAN5GHz	802.11n-HT40 MCS0	Right Cheek	0mm	102	5510	13.70	14.00	1.072	88.44	1.131	0.12	0.060	0.073
	WLAN5GHz	802.11n-HT40 MCS0	Right Cheek	0mm	110	5550	13.60	14.00	1.096	88.44	1.131	0.04	0.041	0.051
	WLAN5GHz	802.11n-HT40 MCS0	Right Cheek	0mm	126	5630	13.60	14.00	1.096	88.44	1.131	0.05	0.052	0.064
	WLAN5GHz	802.11n-HT40 MCS0	Right Cheek	0mm	134	5670	13.60	14.00	1.096	88.44	1.131	-0.07	0.053	0.066
	WLAN5GHz	802.11n-HT40 MCS0	Right Tilted	0mm	102	5510	13.70	14.00	1.072	88.44	1.131	-0.03	0.046	0.056
	WLAN5GHz	802.11n-HT40 MCS0	Left Cheek	0mm	102	5510	13.70	14.00	1.072	88.44	1.131	-0.09	0.058	0.070
	WLAN5GHz	802.11n-HT40 MCS0	Left Tilted	0mm	102	5510	13.70	14.00	1.072	88.44	1.131	0.01	0.057	0.069
14	WLAN5GHz	802.11n-HT40 MCS0	Right Cheek	0mm	151	5755	13.80	14.00	1.047	88.44	1.131	0.06	0.074	0.088
	WLAN5GHz	802.11n-HT40 MCS0	Right Cheek	0mm	159	5795	13.60	14.00	1.096	88.44	1.131	-0.13	0.061	0.076
	WLAN5GHz	802.11n-HT40 MCS0	Right Tilted	0mm	151	5755	13.80	14.00	1.047	88.44	1.131	-0.05	0.021	0.025
	WLAN5GHz	802.11n-HT40 MCS0	Left Cheek	0mm	151	5755	13.80	14.00	1.047	88.44	1.131	-0.1	0.019	0.023
	WLAN5GHz	802.11n-HT40 MCS0	Left Tilted	0mm	151	5755	13.80	14.00	1.047	88.44	1.131	-0.03	0.017	0.020

<Bluetooth SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	Bluetooth	1Mbps	Right Cheek	0mm	39	2441	6.68	7.00	1.077	76.84	1.084	0.03	0.009	0.010
	Bluetooth	1Mbps	Right Cheek	0mm	0	2402	5.19	7.00	1.517	76.84	1.084	0.09	0.005	0.007
15	Bluetooth	1Mbps	Right Cheek	0mm	78	2480	6.10	7.00	1.231	76.84	1.084	0.02	0.012	0.016
	Bluetooth	1Mbps	Right Tilted	0mm	39	2441	6.68	7.00	1.077	76.84	1.084	-0.03	0.005	0.006
	Bluetooth	1Mbps	Left Cheek	0mm	39	2441	6.68	7.00	1.077	76.84	1.084	0.05	0.004	0.005
	Bluetooth	1Mbps	Left Tilted	0mm	39	2441	6.68	7.00	1.077	76.84	1.084	0.03	0.004	0.005

13.2 Hotspot SAR

<GSM SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measure1g SAR (W/kg)	Reported 1g SAR (W/kg)
	GSM850	GPRS (4Tx slots)	Front	10mm	189	836.4	26.56	28.00	1.393	-0.18	0.152	0.212
	GSM850	GPRS (4Tx slots)	Back	10mm	189	836.4	26.56	28.00	1.393	-0.17	0.200	0.279
	GSM850	GPRS (4Tx slots)	Left Side	10mm	189	836.4	26.56	28.00	1.393	-0.02	0.203	0.283
16	GSM850	GPRS (4Tx slots)	Left Side	10mm	128	824.2	26.36	28.00	1.459	0.1	0.197	0.287
	GSM850	GPRS (4Tx slots)	Left Side	10mm	251	848.8	26.54	28.00	1.400	0	0.166	0.232
	GSM850	GPRS (4Tx slots)	Right Side	10mm	189	836.4	26.56	28.00	1.393	-0.1	0.112	0.156
	GSM850	GPRS (4Tx slots)	Bottom Side	10mm	189	836.4	26.56	28.00	1.393	0.19	0.165	0.230
	GSM1900	GPRS (4Tx slots)	Front	10mm	512	1850.2	24.15	25.00	1.216	-0.02	0.447	0.544
	GSM1900	GPRS (4Tx slots)	Back	10mm	512	1850.2	24.15	25.00	1.216	0.04	0.545	0.663
	GSM1900	GPRS (4Tx slots)	Back	10mm	661	1880	24.04	25.00	1.247	0.02	0.555	0.692
17	GSM1900	GPRS (4Tx slots)	Back	10mm	810	1909.8	24.03	25.00	1.250	0.02	0.601	0.751
	GSM1900	GPRS (4Tx slots)	Left Side	10mm	512	1850.2	24.15	25.00	1.216	0.05	0.144	0.175
	GSM1900	GPRS (4Tx slots)	Right Side	10mm	512	1850.2	24.15	25.00	1.216	-0.1	0.283	0.344
	GSM1900	GPRS (4Tx slots)	Bottom Side	10mm	512	1850.2	24.15	25.00	1.216	-0.02	0.439	0.534

<WCDMA SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measure1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WCDMA II	RMC 12.2Kbps	Front	10mm	9538	1907.6	21.85	22.50	1.161	-0.11	0.776	0.901
	WCDMA II	RMC 12.2Kbps	Front	10mm	9262	1852.4	21.81	22.50	1.172	-0.17	0.724	0.849
	WCDMA II	RMC 12.2Kbps	Front	10mm	9400	1880	21.78	22.50	1.180	-0.17	0.776	0.916
18	WCDMA II	RMC 12.2Kbps	Back	10mm	9538	1907.6	21.85	22.50	1.161	-0.14	0.956	1.110
	WCDMA II	RMC 12.2Kbps	Back	10mm	9262	1852.4	21.81	22.50	1.172	0.01	0.849	0.995
	WCDMA II	RMC 12.2Kbps	Back	10mm	9400	1880	21.78	22.50	1.180	0.01	0.926	1.093
	WCDMA II	RMC 12.2Kbps	Left Side	10mm	9538	1907.6	21.85	22.50	1.161	-0.14	0.278	0.323
	WCDMA II	RMC 12.2Kbps	Right Side	10mm	9538	1907.6	21.85	22.50	1.161	-0.09	0.497	0.577
	WCDMA II	RMC 12.2Kbps	Bottom Side	10mm	9538	1907.6	21.85	22.50	1.161	-0.15	0.735	0.854
	WCDMA II	RMC 12.2Kbps	Bottom Side	10mm	9262	1852.4	21.81	22.50	1.172	-0.16	0.695	0.815
	WCDMA II	RMC 12.2Kbps	Bottom Side	10mm	9400	1880	21.78	22.50	1.180	-0.11	0.734	0.866
	WCDMA IV	RMC 12.2Kbps	Front	10mm	1312	1712.4	23.15	24.00	1.216	-0.18	0.664	0.808
	WCDMA IV	RMC 12.2Kbps	Front	10mm	1413	1732.6	23.12	24.00	1.225	-0.04	0.730	0.894
19	WCDMA IV	RMC 12.2Kbps	Front	10mm	1513	1752.6	23.14	24.00	1.219	-0.06	0.813	0.991
	WCDMA IV	RMC 12.2Kbps	Back	10mm	1312	1712.4	23.15	24.00	1.216	-0.03	0.622	0.756
	WCDMA IV	RMC 12.2Kbps	Left Side	10mm	1312	1712.4	23.15	24.00	1.216	0.07	0.250	0.304
	WCDMA IV	RMC 12.2Kbps	Right Side	10mm	1312	1712.4	23.15	24.00	1.216	0.07	0.393	0.478
	WCDMA IV	RMC 12.2Kbps	Bottom Side	10mm	1312	1712.4	23.15	24.00	1.216	0.11	0.551	0.670
	WCDMA V	RMC 12.2Kbps	Front	10mm	4233	846.6	22.82	24.00	1.312	0.01	0.262	0.344
	WCDMA V	RMC 12.2Kbps	Back	10mm	4233	846.6	22.82	24.00	1.312	-0.06	0.357	0.468
20	WCDMA V	RMC 12.2Kbps	Back	10mm	4132	826.4	22.78	24.00	1.324	-0.06	0.382	0.506
	WCDMA V	RMC 12.2Kbps	Back	10mm	4182	836.4	22.75	24.00	1.334	-0.08	0.365	0.487
	WCDMA V	RMC 12.2Kbps	Left Side	10mm	4233	846.6	22.82	24.00	1.312	-0.07	0.355	0.466
	WCDMA V	RMC 12.2Kbps	Right Side	10mm	4233	846.6	22.82	24.00	1.312	-0.06	0.226	0.297
	WCDMA V	RMC 12.2Kbps	Bottom Side	10mm	4233	846.6	22.82	24.00	1.312	-0.18	0.284	0.373

<LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measure1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 2	20M	QPSK	1	0	Front	10mm	18900	1880	22.19	23.00	1.205	-0.13	0.825	0.994
	LTE Band 2	20M	QPSK	1	0	Front	10mm	18700	1860	22.04	23.00	1.247	-0.03	0.798	0.995
	LTE Band 2	20M	QPSK	1	0	Front	10mm	19100	1900	22.07	23.00	1.239	-0.15	0.823	1.020
	LTE Band 2	20M	QPSK	50	0	Front	10mm	18900	1880	21.05	22.00	1.245	-0.11	0.701	0.872
	LTE Band 2	20M	QPSK	50	0	Front	10mm	18700	1860	20.95	22.00	1.274	-0.08	0.623	0.793
	LTE Band 2	20M	QPSK	50	0	Front	10mm	19100	1900	21.04	22.00	1.247	-0.09	0.723	0.902
	LTE Band 2	20M	QPSK	100	0	Front	10mm	19100	1900	21.01	22.00	1.256	-0.08	0.721	0.906
	LTE Band 2	20M	QPSK	1	0	Back	10mm	18900	1880	22.19	23.00	1.205	-0.03	0.901	1.086
	LTE Band 2	20M	QPSK	1	0	Back	10mm	18700	1860	22.04	23.00	1.247	0.06	0.845	1.054
21	LTE Band 2	20M	QPSK	1	0	Back	10mm	19100	1900	22.07	23.00	1.239	-0.04	0.922	1.142
	LTE Band 2	20M	QPSK	50	0	Back	10mm	18900	1880	21.05	22.00	1.245	-0.07	0.696	0.866
	LTE Band 2	20M	QPSK	50	0	Back	10mm	18700	1860	20.95	22.00	1.274	-0.09	0.647	0.824
	LTE Band 2	20M	QPSK	50	0	Back	10mm	19100	1900	21.04	22.00	1.247	-0.04	0.740	0.923
	LTE Band 2	20M	QPSK	100	0	Back	10mm	19100	1900	21.01	22.00	1.256	-0.05	0.757	0.951
	LTE Band 2	20M	QPSK	1	0	Left Side	10mm	18900	1880	22.19	23.00	1.205	0.1	0.289	0.348
	LTE Band 2	20M	QPSK	50	0	Left Side	10mm	18900	1880	21.05	22.00	1.245	-0.08	0.226	0.281
	LTE Band 2	20M	QPSK	1	0	Right Side	10mm	18900	1880	22.19	23.00	1.205	-0.09	0.527	0.635
	LTE Band 2	20M	QPSK	50	0	Right Side	10mm	18900	1880	21.05	22.00	1.245	-0.14	0.414	0.515
	LTE Band 2	20M	QPSK	1	0	Bottom Side	10mm	18900	1880	22.19	23.00	1.205	-0.15	0.732	0.882
	LTE Band 2	20M	QPSK	1	0	Bottom Side	10mm	18700	1860	22.04	23.00	1.247	-0.17	0.689	0.859
	LTE Band 2	20M	QPSK	1	0	Bottom Side	10mm	19100	1900	22.07	23.00	1.239	-0.1	0.733	0.908
	LTE Band 2	20M	QPSK	50	0	Bottom Side	10mm	18900	1880	21.05	22.00	1.245	-0.16	0.586	0.729
	LTE Band 2	20M	QPSK	100	0	Bottom Side	10mm	19100	1900	21.01	22.00	1.256	-0.14	0.613	0.770
22	LTE Band 4	20M	QPSK	1	0	Front	10mm	20175	1732.5	23.16	24.00	1.213	-0.04	0.803	0.974
	LTE Band 4	20M	QPSK	50	0	Front	10mm	20175	1732.5	22.24	23.00	1.191	-0.11	0.657	0.783
	LTE Band 4	20M	QPSK	100	0	Front	10mm	20175	1732.5	22.19	23.00	1.205	-0.08	0.641	0.772
	LTE Band 4	20M	QPSK	1	0	Back	10mm	20175	1732.5	23.16	24.00	1.213	-0.14	0.650	0.789
	LTE Band 4	20M	QPSK	50	0	Back	10mm	20175	1732.5	22.24	23.00	1.191	-0.07	0.520	0.619
	LTE Band 4	20M	QPSK	1	0	Left Side	10mm	20175	1732.5	23.16	24.00	1.213	0.02	0.269	0.326
	LTE Band 4	20M	QPSK	50	0	Left Side	10mm	20175	1732.5	22.24	23.00	1.191	-0.01	0.222	0.264
	LTE Band 4	20M	QPSK	1	0	Right Side	10mm	20175	1732.5	23.16	24.00	1.213	0.14	0.418	0.507
	LTE Band 4	20M	QPSK	50	0	Right Side	10mm	20175	1732.5	22.24	23.00	1.191	0.13	0.337	0.401
	LTE Band 4	20M	QPSK	1	0	Bottom Side	10mm	20175	1732.5	23.16	24.00	1.213	0	0.598	0.726
	LTE Band 4	20M	QPSK	50	0	Bottom Side	10mm	20175	1732.5	22.24	23.00	1.191	-0.15	0.472	0.562
	LTE Band 7	20M	QPSK	1	0	Front	10mm	20850	2510	22.71	23.50	1.199	-0.04	0.538	0.645
	LTE Band 7	20M	QPSK	50	0	Front	10mm	20850	2510	21.61	22.50	1.227	-0.12	0.398	0.489
	LTE Band 7	20M	QPSK	1	0	Back	10mm	20850	2510	22.71	23.50	1.199	-0.13	0.663	0.795
	LTE Band 7	20M	QPSK	50	0	Back	10mm	20850	2510	21.61	22.50	1.227	-0.01	0.489	0.600
	LTE Band 7	20M	QPSK	1	0	Left Side	10mm	20850	2510	22.71	23.50	1.199	0.07	0.105	0.126
	LTE Band 7	20M	QPSK	50	0	Left Side	10mm	20850	2510	21.61	22.50	1.227	-0.08	0.080	0.098
	LTE Band 7	20M	QPSK	1	0	Right Side	10mm	20850	2510	22.71	23.50	1.199	-0.15	0.332	0.398
	LTE Band 7	20M	QPSK	50	0	Right Side	10mm	20850	2510	21.61	22.50	1.227	-0.13	0.243	0.298
23	LTE Band 7	20M	QPSK	1	0	Bottom Side	10mm	20850	2510	22.71	23.50	1.199	0.16	0.949	1.138
	LTE Band 7	20M	QPSK	1	0	Bottom Side	10mm	21100	2535	22.58	23.50	1.236	0.12	0.884	1.093
	LTE Band 7	20M	QPSK	1	0	Bottom Side	10mm	21350	2560	22.61	23.50	1.227	0.05	0.823	1.010
	LTE Band 7	20M	QPSK	50	0	Bottom Side	10mm	20850	2510	21.61	22.50	1.227	0.05	0.707	0.868
	LTE Band 7	20M	QPSK	50	50	Bottom Side	10mm	21100	2535	21.45	22.50	1.274	0.07	0.662	0.843
	LTE Band 7	20M	QPSK	50	50	Bottom Side	10mm	21350	2560	21.52	22.50	1.253	0.12	0.654	0.820
	LTE Band 7	20M	QPSK	100	0	Bottom Side	10mm	20850	2510	21.54	22.50	1.247	0.04	0.736	0.918
	LTE Band 7C	20M	QPSK	1	0	Bottom Side	10mm	21100	2535	22.54	23.50	1.247	0.05	0.871	1.086

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measure1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 13	10M	QPSK	1	0	Front	10mm	23230	782	22.92	24.00	1.282	-0.01	0.513	0.658
	LTE Band 13	10M	QPSK	25	12	Front	10mm	23230	782	21.64	23.00	1.368	-0.01	0.358	0.490
24	LTE Band 13	10M	QPSK	1	0	Back	10mm	23230	782	22.92	24.00	1.282	-0.03	0.522	0.669
	LTE Band 13	10M	QPSK	25	12	Back	10mm	23230	782	21.64	23.00	1.368	-0.08	0.393	0.538
	LTE Band 13	10M	QPSK	1	0	Left Side	10mm	23230	782	22.92	24.00	1.282	-0.15	0.355	0.455
	LTE Band 13	10M	QPSK	25	12	Left Side	10mm	23230	782	21.64	23.00	1.368	-0.11	0.274	0.375
	LTE Band 13	10M	QPSK	1	0	Right Side	10mm	23230	782	22.92	24.00	1.282	-0.1	0.284	0.364
	LTE Band 13	10M	QPSK	25	12	Right Side	10mm	23230	782	21.64	23.00	1.368	-0.07	0.217	0.297
	LTE Band 13	10M	QPSK	1	0	Bottom Side	10mm	23230	782	22.92	24.00	1.282	-0.14	0.262	0.336
	LTE Band 13	10M	QPSK	25	12	Bottom Side	10mm	23230	782	21.64	23.00	1.368	-0.14	0.215	0.294
	LTE Band 26	15M	QPSK	1	0	Front	10mm	26865	831.5	23.83	24.00	1.040	0	0.363	0.377
	LTE Band 26	15M	QPSK	36	0	Front	10mm	26865	831.5	22.45	23.00	1.135	0.09	0.286	0.325
	LTE Band 26	15M	QPSK	1	0	Back	10mm	26865	831.5	23.83	24.00	1.040	-0.1	0.407	0.423
	LTE Band 26	15M	QPSK	36	0	Back	10mm	26865	831.5	22.45	23.00	1.135	0	0.329	0.373
25	LTE Band 26	15M	QPSK	1	0	Left Side	10mm	26865	831.5	23.83	24.00	1.040	0.1	0.408	0.424
	LTE Band 26	15M	QPSK	36	0	Left Side	10mm	26865	831.5	22.45	23.00	1.135	0.07	0.329	0.373
	LTE Band 26	15M	QPSK	1	0	Right Side	10mm	26865	831.5	23.83	24.00	1.040	0.01	0.285	0.296
	LTE Band 26	15M	QPSK	36	0	Right Side	10mm	26865	831.5	22.45	23.00	1.135	-0.07	0.228	0.259
	LTE Band 26	15M	QPSK	1	0	Bottom Side	10mm	26865	831.5	23.83	24.00	1.040	-0.18	0.335	0.348
	LTE Band 26	15M	QPSK	36	0	Bottom Side	10mm	26865	831.5	22.45	23.00	1.135	-0.19	0.269	0.305

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measure1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WLAN2.4GHz	802.11b 1Mbps	Front	10mm	1	2412	17.90	18.00	1.023	97.45	1.026	-0.16	0.038	0.040
	WLAN2.4GHz	802.11b 1Mbps	Back	10mm	1	2412	17.90	18.00	1.023	97.45	1.026	-0.19	0.093	0.098
	WLAN2.4GHz	802.11b 1Mbps	Back	10mm	6	2437	17.80	18.00	1.047	97.45	1.026	-0.19	0.081	0.087
26	WLAN2.4GHz	802.11b 1Mbps	Back	10mm	11	2462	17.80	18.00	1.047	97.45	1.026	-0.19	0.122	0.131
	WLAN2.4GHz	802.11b 1Mbps	Left Side	10mm	1	2412	17.90	18.00	1.023	97.45	1.026	0.12	0.087	0.091
	WLAN2.4GHz	802.11b 1Mbps	Top Side	10mm	1	2412	17.90	18.00	1.023	97.45	1.026	-0.18	0.019	0.020
	WLAN5GHz	802.11n-HT40 MCS0	Front	10mm	46	5230	14.00	14.00	1.000	88.44	1.131	-0.19	0.006	0.007
27	WLAN5GHz	802.11n-HT40 MCS0	Back	10mm	46	5230	14.00	14.00	1.000	88.44	1.131	0.1	0.187	0.211
	WLAN5GHz	802.11n-HT40 MCS0	Back	10mm	38	5190	13.80	14.00	1.047	88.44	1.131	-0.17	0.177	0.210
	WLAN5GHz	802.11n-HT40 MCS0	Left Side	10mm	46	5230	14.00	14.00	1.000	88.44	1.131	-0.18	0.101	0.114
	WLAN5GHz	802.11n-HT40 MCS0	Top Side	10mm	46	5230	14.00	14.00	1.000	88.44	1.131	-0.1	0.005	0.005
	WLAN5GHz	802.11n-HT40 MCS0	Front	10mm	151	5755	13.80	14.00	1.047	88.44	1.131	-0.05	0.022	0.026
28	WLAN5GHz	802.11n-HT40 MCS0	Back	10mm	151	5755	13.80	14.00	1.047	88.44	1.131	-0.04	0.247	0.293
	WLAN5GHz	802.11n-HT40 MCS0	Back	10mm	159	5795	13.60	14.00	1.096	88.44	1.131	0.18	0.192	0.238
	WLAN5GHz	802.11n-HT40 MCS0	Left Side	10mm	151	5755	13.80	14.00	1.047	88.44	1.131	-0.18	0.151	0.179
	WLAN5GHz	802.11n-HT40 MCS0	Top Side	10mm	151	5755	13.80	14.00	1.047	88.44	1.131	-0.14	0.023	0.027

<Bluetooth SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measure1g SAR (W/kg)	Reported 1g SAR (W/kg)
	Bluetooth	1Mbps	Front	10mm	39	2441	6.68	7.00	1.077	76.84	1.084	0.03	0.001	0.001
	Bluetooth	1Mbps	Back	10mm	39	2441	6.68	7.00	1.077	76.84	1.084	-0.14	0.006	0.007
	Bluetooth	1Mbps	Back	10mm	0	2402	5.19	7.00	1.517	76.84	1.084	0.01	0.001	0.002
29	Bluetooth	1Mbps	Back	10mm	78	2480	6.10	7.00	1.231	76.84	1.084	0.03	0.006	0.008
	Bluetooth	1Mbps	Left Side	10mm	39	2441	6.68	7.00	1.077	76.84	1.084	0.11	0.005	0.006
	Bluetooth	1Mbps	Top Side	10mm	39	2441	6.68	7.00	1.077	76.84	1.084	0.16	0.001	0.001

13.3 Body Worn Accessory SAR

<GSM SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	GSM850	GPRS (4Tx slots)	Front	10mm	189	836.4	26.56	28.00	1.393	-0.18	0.152	0.212
	GSM850	GPRS (4Tx slots)	Back	10mm	189	836.4	26.56	28.00	1.393	-0.17	0.200	0.279
30	GSM850	GPRS (4Tx slots)	Back	10mm	128	824.2	26.36	28.00	1.459	-0.09	0.215	0.314
	GSM850	GPRS (4Tx slots)	Back	10mm	251	848.8	26.54	28.00	1.400	-0.08	0.188	0.263
	GSM1900	GPRS (4Tx slots)	Front	10mm	512	1850.2	24.15	25.00	1.216	-0.02	0.447	0.544
	GSM1900	GPRS (4Tx slots)	Back	10mm	512	1850.2	24.15	25.00	1.216	0.04	0.545	0.663
	GSM1900	GPRS (4Tx slots)	Back	10mm	661	1880	24.04	25.00	1.247	0.02	0.555	0.692
31	GSM1900	GPRS (4Tx slots)	Back	10mm	810	1909.8	24.03	25.00	1.250	0.02	0.601	0.751

<WCDMA SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WCDMA II	RMC 12.2Kbps	Front	10mm	9538	1907.6	21.85	22.50	1.161	-0.11	0.776	0.901
	WCDMA II	RMC 12.2Kbps	Front	10mm	9262	1852.4	21.81	22.50	1.172	-0.17	0.724	0.849
	WCDMA II	RMC 12.2Kbps	Front	10mm	9400	1880	21.78	22.50	1.180	-0.17	0.776	0.916
32	WCDMA II	RMC 12.2Kbps	Back	10mm	9538	1907.6	21.85	22.50	1.161	-0.14	0.956	1.110
	WCDMA II	RMC 12.2Kbps	Back	10mm	9262	1852.4	21.81	22.50	1.172	0.01	0.849	0.995
	WCDMA II	RMC 12.2Kbps	Back	10mm	9400	1880	21.78	22.50	1.180	0.01	0.926	1.093
	WCDMA IV	RMC 12.2Kbps	Front	10mm	1312	1712.4	23.15	24.00	1.216	-0.18	0.664	0.808
	WCDMA IV	RMC 12.2Kbps	Front	10mm	1413	1732.6	23.12	24.00	1.225	-0.04	0.730	0.894
33	WCDMA IV	RMC 12.2Kbps	Front	10mm	1513	1752.6	23.14	24.00	1.219	-0.06	0.813	0.991
	WCDMA IV	RMC 12.2Kbps	Back	10mm	1312	1712.4	23.15	24.00	1.216	-0.03	0.622	0.756
	WCDMA V	RMC 12.2Kbps	Front	10mm	4233	846.6	22.82	24.00	1.312	0.01	0.262	0.344
	WCDMA V	RMC 12.2Kbps	Back	10mm	4233	846.6	22.82	24.00	1.312	-0.06	0.357	0.468
34	WCDMA V	RMC 12.2Kbps	Back	10mm	4132	826.4	22.78	24.00	1.324	-0.06	0.382	0.506
	WCDMA V	RMC 12.2Kbps	Back	10mm	4182	836.4	22.75	24.00	1.334	-0.08	0.365	0.487

<LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 2	20M	QPSK	1	0	Front	10mm	18900	1880	22.19	23.00	1.205	-0.13	0.825	0.994
	LTE Band 2	20M	QPSK	1	0	Front	10mm	18700	1860	22.04	23.00	1.247	-0.03	0.798	0.995
	LTE Band 2	20M	QPSK	1	0	Front	10mm	19100	1900	22.07	23.00	1.239	-0.15	0.823	1.020
	LTE Band 2	20M	QPSK	50	0	Front	10mm	18900	1880	21.05	22.00	1.245	-0.11	0.701	0.872
	LTE Band 2	20M	QPSK	50	0	Front	10mm	18700	1860	20.95	22.00	1.274	-0.08	0.623	0.793
	LTE Band 2	20M	QPSK	50	0	Front	10mm	19100	1900	21.04	22.00	1.247	-0.09	0.723	0.902
	LTE Band 2	20M	QPSK	100	0	Front	10mm	19100	1900	21.01	22.00	1.256	-0.08	0.721	0.906
	LTE Band 2	20M	QPSK	1	0	Back	10mm	18900	1880	22.19	23.00	1.205	-0.03	0.901	1.086
	LTE Band 2	20M	QPSK	1	0	Back	10mm	18700	1860	22.04	23.00	1.247	0.06	0.845	1.054
35	LTE Band 2	20M	QPSK	1	0	Back	10mm	19100	1900	22.07	23.00	1.239	-0.04	0.922	1.142
	LTE Band 2	20M	QPSK	50	0	Back	10mm	18900	1880	21.05	22.00	1.245	-0.07	0.696	0.866
	LTE Band 2	20M	QPSK	50	0	Back	10mm	18700	1860	20.95	22.00	1.274	-0.09	0.647	0.824
	LTE Band 2	20M	QPSK	50	0	Back	10mm	19100	1900	21.04	22.00	1.247	-0.04	0.740	0.923
	LTE Band 2	20M	QPSK	100	0	Back	10mm	19100	1900	21.01	22.00	1.256	-0.05	0.757	0.951
36	LTE Band 4	20M	QPSK	1	0	Front	10mm	20175	1732.5	23.16	24.00	1.213	-0.04	0.803	0.974
	LTE Band 4	20M	QPSK	50	0	Front	10mm	20175	1732.5	22.24	23.00	1.191	-0.11	0.657	0.783
	LTE Band 4	20M	QPSK	100	0	Front	10mm	20175	1732.5	22.19	23.00	1.205	-0.08	0.641	0.772
	LTE Band 4	20M	QPSK	1	0	Back	10mm	20175	1732.5	23.16	24.00	1.213	-0.14	0.650	0.789
	LTE Band 4	20M	QPSK	50	0	Back	10mm	20175	1732.5	22.24	23.00	1.191	-0.07	0.520	0.619
	LTE Band 7	20M	QPSK	1	0	Front	10mm	20850	2510	22.71	23.50	1.199	-0.04	0.538	0.645
	LTE Band 7	20M	QPSK	50	0	Front	10mm	20850	2510	21.61	22.50	1.227	-0.12	0.398	0.489
37	LTE Band 7	20M	QPSK	1	0	Back	10mm	20850	2510	22.71	23.50	1.199	-0.13	0.663	0.795
	LTE Band 7	20M	QPSK	1	0	Back	10mm	21100	2535	22.58	23.50	1.236	0.06	0.632	0.781
	LTE Band 7	20M	QPSK	1	0	Back	10mm	21350	2560	22.61	23.50	1.227	0.01	0.611	0.750
	LTE Band 7	20M	QPSK	50	0	Back	10mm	20850	2510	21.61	22.50	1.227	-0.01	0.489	0.600
	LTE Band 13	10M	QPSK	1	0	Front	10mm	23230	782	22.92	24.00	1.282	-0.01	0.513	0.658
	LTE Band 13	10M	QPSK	25	12	Front	10mm	23230	782	21.64	23.00	1.368	-0.01	0.358	0.490
38	LTE Band 13	10M	QPSK	1	0	Back	10mm	23230	782	22.92	24.00	1.282	-0.03	0.522	0.669
	LTE Band 13	10M	QPSK	25	12	Back	10mm	23230	782	21.64	23.00	1.368	-0.08	0.393	0.538
	LTE Band 26	15M	QPSK	1	0	Front	10mm	26865	831.5	23.83	24.00	1.040	0	0.363	0.377
	LTE Band 26	15M	QPSK	36	0	Front	10mm	26865	831.5	22.45	23.00	1.135	0.09	0.286	0.325
39	LTE Band 26	15M	QPSK	1	0	Back	10mm	26865	831.5	23.83	24.00	1.040	-0.1	0.407	0.423
	LTE Band 26	15M	QPSK	36	0	Back	10mm	26865	831.5	22.45	23.00	1.135	0	0.329	0.373

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WLAN2.4GHz	802.11b 1Mbps	Front	10mm	1	2412	17.90	18.00	1.023	97.45	1.026	-0.16	0.038	0.040
	WLAN2.4GHz	802.11b 1Mbps	Back	10mm	1	2412	17.90	18.00	1.023	97.45	1.026	-0.19	0.093	0.098
	WLAN2.4GHz	802.11b 1Mbps	Back	10mm	6	2437	17.80	18.00	1.047	97.45	1.026	-0.19	0.081	0.087
40	WLAN2.4GHz	802.11b 1Mbps	Back	10mm	11	2462	17.80	18.00	1.047	97.45	1.026	-0.19	0.122	0.131
	WLAN5GHz	802.11n-HT40 MCS0	Front	10mm	54	5270	14.00	14.00	1.000	88.44	1.131	-0.19	0.009	0.010
	WLAN5GHz	802.11n-HT40 MCS0	Back	10mm	54	5270	14.00	14.00	1.000	88.44	1.131	0.17	0.196	0.222
41	WLAN5GHz	802.11n-HT40 MCS0	Back	10mm	62	5310	13.90	14.00	1.023	88.44	1.131	-0.02	0.207	0.240
	WLAN5GHz	802.11n-HT40 MCS0	Front	10mm	102	5510	13.70	14.00	1.072	88.44	1.131	-0.16	0.005	0.006
	WLAN5GHz	802.11n-HT40 MCS0	Back	10mm	102	5510	13.70	14.00	1.072	88.44	1.131	-0.12	0.200	0.242
	WLAN5GHz	802.11n-HT40 MCS0	Back	10mm	110	5550	13.60	14.00	1.096	88.44	1.131	-0.1	0.200	0.248
	WLAN5GHz	802.11n-HT40 MCS0	Back	10mm	126	5630	13.60	14.00	1.096	88.44	1.131	-0.13	0.238	0.295
42	WLAN5GHz	802.11n-HT40 MCS0	Back	10mm	134	5670	13.60	14.00	1.096	88.44	1.131	-0.07	0.269	0.334
	WLAN5GHz	802.11n-HT40 MCS0	Front	10mm	151	5755	13.80	14.00	1.047	88.44	1.131	-0.05	0.022	0.026
43	WLAN5GHz	802.11n-HT40 MCS0	Back	10mm	151	5755	13.80	14.00	1.047	88.44	1.131	-0.04	0.247	0.293
	WLAN5GHz	802.11n-HT40 MCS0	Back	10mm	159	5795	13.60	14.00	1.096	88.44	1.131	0.18	0.192	0.238

<Bluetooth SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	Bluetooth	1Mbps	Front	10mm	39	2441	6.68	7.00	1.077	76.84	1.084	0.03	0.001	0.001
	Bluetooth	1Mbps	Back	10mm	39	2441	6.68	7.00	1.077	76.84	1.084	-0.14	0.006	0.007
	Bluetooth	1Mbps	Back	10mm	0	2402	5.19	7.00	1.517	76.84	1.084	0.01	0.001	0.002
44	Bluetooth	1Mbps	Back	10mm	78	2480	6.10	7.00	1.231	76.84	1.084	0.03	0.006	0.008

13.4 Product Specific SAR

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
	WLAN5GHz	802.11n-HT40 MCS0	Front	0mm	54	5270	14.00	14.00	1.000	88.44	1.131	-0.11	0.051	0.058
45	WLAN5GHz	802.11n-HT40 MCS0	Back	0mm	54	5270	14.00	14.00	1.000	88.44	1.131	-0.15	1.270	1.436
	WLAN5GHz	802.11n-HT40 MCS0	Back	0mm	62	5310	13.90	14.00	1.023	88.44	1.131	-0.13	1.220	1.412
	WLAN5GHz	802.11n-HT40 MCS0	Left Side	0mm	54	5270	14.00	14.00	1.000	88.44	1.131	0.06	0.365	0.413
	WLAN5GHz	802.11n-HT40 MCS0	Top Side	0mm	54	5270	14.00	14.00	1.000	88.44	1.131	-0.13	0.027	0.031
	WLAN5GHz	802.11n-HT40 MCS0	Front	0mm	102	5510	13.70	14.00	1.072	88.44	1.131	-0.15	0.011	0.013
	WLAN5GHz	802.11n-HT40 MCS0	Back	0mm	102	5510	13.70	14.00	1.072	88.44	1.131	-0.09	0.630	0.763
46	WLAN5GHz	802.11n-HT40 MCS0	Back	0mm	110	5550	13.60	14.00	1.096	88.44	1.131	-0.12	0.645	0.800
	WLAN5GHz	802.11n-HT40 MCS0	Back	0mm	126	5630	13.60	14.00	1.096	88.44	1.131	-0.12	0.644	0.799
	WLAN5GHz	802.11n-HT40 MCS0	Back	0mm	134	5670	13.60	14.00	1.096	88.44	1.131	-0.18	0.632	0.784
	WLAN5GHz	802.11n-HT40 MCS0	Left Side	0mm	102	5510	13.70	14.00	1.072	88.44	1.131	-0.08	0.172	0.208
	WLAN5GHz	802.11n-HT40 MCS0	Top Side	0mm	102	5510	13.70	14.00	1.072	88.44	1.131	-0.14	0.011	0.013

13.5 Repeated SAR Measurement

No.	Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Ratio	Reported 1g SAR (W/kg)
1st	WCDMA II	RMC 12.2Kbps	Back	10mm	9538	1907.6	21.85	22.50	1.161	-0.14	0.956	-	1.110
2nd	WCDMA II	RMC 12.2Kbps	Back	10mm	9538	1907.6	21.85	22.50	1.161	0.06	0.946	1.01	1.099
1st	WCDMA IV	RMC 12.2Kbps	Front	10mm	1513	1752.6	23.14	24.00	1.219	-0.06	0.813	-	0.991
2nd	WCDMA IV	RMC 12.2Kbps	Front	10mm	1513	1752.6	23.14	24.00	1.219	-0.01	0.806	1.01	0.983
1st	LTE Band 7	20M_QPSK_1_0	Bottom Side	10mm	20850	2510	22.71	23.50	1.199	0.16	0.949	-	1.138
2nd	LTE Band 7	20M_QPSK_1_0	Bottom Side	10mm	20850	2510	22.71	23.50	1.199	0.13	0.935	1.01	1.122

General Note:

1. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
2. Per KDB 865664 D01v01r04, if the ratio among the repeated measurement is ≤ 1.2 and the measured SAR <1.45W/kg, only one repeated measurement is required.
3. The ratio is the difference in percentage between original and repeated *measured SAR*.
4. All measurement SAR result is scaled-up to account for tune-up tolerance and is compliant.

14. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Portable Handset			
		Head	Body-worn	Hotspot	Product Specific
1.	GSM Voice + WLAN2.4GHz	Yes	Yes		Yes
2.	GPRS/EDGE + WLAN2.4GHz	Yes	Yes	Yes	Yes
3.	WCDMA + WLAN2.4GHz	Yes	Yes	Yes	Yes
4.	LTE + WLAN2.4GHz	Yes	Yes	Yes	Yes
5.	GSM Voice + Bluetooth	Yes	Yes		Yes
6.	GPRS/EDGE + Bluetooth	Yes	Yes	Yes	Yes
7.	WCDMA+ Bluetooth	Yes	Yes	Yes	Yes
8.	LTE + Bluetooth	Yes	Yes	Yes	Yes
9.	GSM Voice + WLAN5GHz	Yes	Yes		Yes
10.	GPRS/EDGE + WLAN5GHz	Yes	Yes	Yes	Yes
11.	WCDMA + WLAN5GHz	Yes	Yes	Yes	Yes
12.	LTE + WLAN5GHz	Yes	Yes	Yes	Yes

General Note:

1. This device WLAN 2.4GHz / 5.2GHz / 5.8GHz supports Hotspot operation and Bluetooth support tethering applications.
2. WLAN and Bluetooth share the same antenna, and cannot transmit simultaneously.
3. All licensed modes share the same antenna part and cannot transmit simultaneously.
4. EUT will choose either WLAN 2.4GHz or WLAN 5GHz according to the network signal condition; therefore, 2.4GHz WLAN and 5GHz WLAN will not operate simultaneously at any moment.
5. The Scaled SAR summation is calculated based on the same configuration and test position.
6. Per KDB 447498 D01v06, simultaneous transmission SAR is compliant if,
   i) Scalar SAR summation < 1.6W/kg.
   ii) SPLSR = (SAR1 + SAR2)^1.5 / (min. separation distance, mm), and the peak separation distance is determined from the square root of [(x1-x2)2 + (y1-y2)2 + (z1-z2)2], where (x1, y1, z1) and (x2, y2, z2) are the coordinates of the extrapolated peak SAR locations in the zoom scan.
   iii) If SPLSR ≤ 0.04, simultaneously transmission SAR measurement is not necessary.
   iv) Simultaneously transmission SAR measurement, and the reported multi-band SAR < 1.6W/kg.

14.1 Head Exposure Conditions

WWAN Band		Exposure Position	1	2	3	4	1+2	1+3	1+4
			WWAN	2.4GHz WLAN	5GHz WLAN	Bluetooth	**Summed**	**Summed**	**Summed**
			1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	**1g SAR (W/kg)**	**1g SAR (W/kg)**	**1g SAR (W/kg)**
GSM	GSM850	Right Cheek	0.171	0.215	0.162	0.016	**0.386**	**0.333**	**0.187**
		Right Tilted	0.111	0.078	0.115	0.006	**0.189**	**0.226**	**0.117**
		Left Cheek	0.233	0.098	0.114	0.005	**0.331**	**0.347**	**0.238**
		Left Tilted	0.107	0.080	0.112	0.005	**0.187**	**0.219**	**0.112**
	GSM1900	Right Cheek	0.281	0.215	0.162	0.016	**0.496**	**0.443**	**0.297**
		Right Tilted	0.163	0.078	0.115	0.006	**0.241**	**0.278**	**0.169**
		Left Cheek	0.248	0.098	0.114	0.005	**0.346**	**0.362**	**0.253**
		Left Tilted	0.144	0.080	0.112	0.005	**0.224**	**0.256**	**0.149**
WCDMA	WCDMA II	Right Cheek	0.491	0.215	0.162	0.016	**0.706**	**0.653**	**0.507**
		Right Tilted	0.257	0.078	0.115	0.006	**0.335**	**0.372**	**0.263**
		Left Cheek	0.432	0.098	0.114	0.005	**0.530**	**0.546**	**0.437**
		Left Tilted	0.242	0.080	0.112	0.005	**0.322**	**0.354**	**0.247**
	WCDMA IV	Right Cheek	0.359	0.215	0.162	0.016	**0.574**	**0.521**	**0.375**
		Right Tilted	0.259	0.078	0.115	0.006	**0.337**	**0.374**	**0.265**
		Left Cheek	0.596	0.098	0.114	0.005	**0.694**	**0.710**	**0.601**
		Left Tilted	0.261	0.080	0.112	0.005	**0.341**	**0.373**	**0.266**
	WCDMA V	Right Cheek	0.362	0.215	0.162	0.016	**0.577**	**0.524**	**0.378**
		Right Tilted	0.199	0.078	0.115	0.006	**0.277**	**0.314**	**0.205**
		Left Cheek	0.444	0.098	0.114	0.005	**0.542**	**0.558**	**0.449**
		Left Tilted	0.199	0.080	0.112	0.005	**0.279**	**0.311**	**0.204**
LTE	LTE Band 2	Right Cheek	0.443	0.215	0.162	0.016	**0.658**	**0.605**	**0.459**
		Right Tilted	0.288	0.078	0.115	0.006	**0.366**	**0.403**	**0.294**
		Left Cheek	0.501	0.098	0.114	0.005	**0.599**	**0.615**	**0.506**
		Left Tilted	0.260	0.080	0.112	0.005	**0.340**	**0.372**	**0.265**
	LTE Band 4	Right Cheek	0.477	0.215	0.162	0.016	**0.692**	**0.639**	**0.493**
		Right Tilted	0.292	0.078	0.115	0.006	**0.370**	**0.407**	**0.298**
		Left Cheek	0.442	0.098	0.114	0.005	**0.540**	**0.556**	**0.447**
		Left Tilted	0.341	0.080	0.112	0.005	**0.421**	**0.453**	**0.346**
	LTE Band 7	Right Cheek	0.353	0.215	0.162	0.016	**0.568**	**0.515**	**0.369**
		Right Tilted	0.110	0.078	0.115	0.006	**0.188**	**0.225**	**0.116**
		Left Cheek	0.182	0.098	0.114	0.005	**0.280**	**0.296**	**0.187**
		Left Tilted	0.144	0.080	0.112	0.005	**0.224**	**0.256**	**0.149**
	LTE Band 13	Right Cheek	0.494	0.215	0.162	0.016	**0.709**	**0.656**	**0.510**
		Right Tilted	0.256	0.078	0.115	0.006	**0.334**	**0.371**	**0.262**
		Left Cheek	0.537	0.098	0.114	0.005	**0.635**	**0.651**	**0.542**
		Left Tilted	0.314	0.080	0.112	0.005	**0.394**	**0.426**	**0.319**
	LTE Band 26	Right Cheek	0.319	0.215	0.162	0.016	**0.534**	**0.481**	**0.335**
		Right Tilted	0.205	0.078	0.115	0.006	**0.283**	**0.320**	**0.211**
		Left Cheek	0.398	0.098	0.114	0.005	**0.496**	**0.512**	**0.403**
		Left Tilted	0.223	0.080	0.112	0.005	**0.303**	**0.335**	**0.228**

14.2 Hotspot Exposure Conditions

WWAN Band		Exposure Position	1 WWAN 1g SAR (W/kg)	2 2.4GHz WLAN 1g SAR (W/kg)	3 5GHz WLAN 1g SAR (W/kg)	4 Bluetooth 1g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)	1+4 Summed 1g SAR (W/kg)
GSM	GSM850	Front	0.212	0.040	0.026	0.001	**0.252**	**0.238**	**0.213**
		Back	0.279	0.131	0.293	0.008	**0.410**	**0.572**	**0.287**
		Left side	0.287	0.091	0.179	0.006	**0.378**	**0.466**	**0.293**
		Right side	0.156				**0.156**	**0.156**	**0.156**
		Top side		0.020	0.027	0.001	**0.020**	**0.027**	**0.001**
		Bottom side	0.230				**0.230**	**0.230**	**0.230**
	GSM1900	Front	0.544	0.040	0.026	0.001	**0.584**	**0.570**	**0.545**
		Back	0.751	0.131	0.293	0.008	**0.882**	**1.044**	**0.759**
		Left side	0.175	0.091	0.179	0.006	**0.266**	**0.354**	**0.181**
		Right side	0.344				**0.344**	**0.344**	**0.344**
		Top side		0.020	0.027	0.001	**0.020**	**0.027**	**0.001**
		Bottom side	0.534				**0.534**	**0.534**	**0.534**
WCDMA	WCDMA II	Front	0.916	0.040	0.026	0.001	**0.956**	**0.942**	**0.917**
		Back	1.110	0.131	0.293	0.008	**1.241**	**1.403**	**1.118**
		Left side	0.323	0.091	0.179	0.006	**0.414**	**0.502**	**0.329**
		Right side	0.577				**0.577**	**0.577**	**0.577**
		Top side		0.020	0.027	0.001	**0.020**	**0.027**	**0.001**
		Bottom side	0.866				**0.866**	**0.866**	**0.866**
	WCDMA IV	Front	0.991	0.040	0.026	0.001	**1.031**	**1.017**	**0.992**
		Back	0.756	0.131	0.293	0.008	**0.887**	**1.049**	**0.764**
		Left side	0.304	0.091	0.179	0.006	**0.395**	**0.483**	**0.310**
		Right side	0.478				**0.478**	**0.478**	**0.478**
		Top side		0.020	0.027	0.001	**0.020**	**0.027**	**0.001**
		Bottom side	0.670				**0.670**	**0.670**	**0.670**
	WCDMA V	Front	0.344	0.040	0.026	0.001	**0.384**	**0.370**	**0.345**
		Back	0.506	0.131	0.293	0.008	**0.637**	**0.799**	**0.514**
		Left side	0.466	0.091	0.179	0.006	**0.557**	**0.645**	**0.472**
		Right side	0.297				**0.297**	**0.297**	**0.297**
		Top side		0.020	0.027	0.001	**0.020**	**0.027**	**0.001**
		Bottom side	0.373				**0.373**	**0.373**	**0.373**

WWAN Band		Exposure Position	1	2	3	4	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)	1+4 Summed 1g SAR (W/kg)
			WWAN	2.4GHz WLAN	5GHz WLAN	Bluetooth			
			1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)			
LTE	LTE Band 2	Front	1.020	0.040	0.026	0.001	**1.060**	**1.046**	**1.021**
		Back	1.142	0.131	0.293	0.008	**1.273**	**1.435**	**1.150**
		Left side	0.348	0.091	0.179	0.006	**0.439**	**0.527**	**0.354**
		Right side	0.635				**0.635**	**0.635**	**0.635**
		Top side		0.020	0.027	0.001	**0.020**	**0.027**	**0.001**
		Bottom side	0.908				**0.908**	**0.908**	**0.908**
	LTE Band 4	Front	0.974	0.040	0.026	0.001	**1.014**	**1.000**	**0.975**
		Back	0.789	0.131	0.293	0.008	**0.920**	**1.082**	**0.797**
		Left side	0.326	0.091	0.179	0.006	**0.417**	**0.505**	**0.332**
		Right side	0.507				**0.507**	**0.507**	**0.507**
		Top side		0.020	0.027	0.001	**0.020**	**0.027**	**0.001**
		Bottom side	0.726				**0.726**	**0.726**	**0.726**
	LTE Band 7	Front	0.645	0.040	0.026	0.001	**0.685**	**0.671**	**0.646**
		Back	0.795	0.131	0.293	0.008	**0.926**	**1.088**	**0.803**
		Left side	0.126	0.091	0.179	0.006	**0.217**	**0.305**	**0.132**
		Right side	0.398				**0.398**	**0.398**	**0.398**
		Top side		0.020	0.027	0.001	**0.020**	**0.027**	**0.001**
		Bottom side	1.138				**1.138**	**1.138**	**1.138**
	LTE Band 13	Front	0.658	0.040	0.026	0.001	**0.698**	**0.684**	**0.659**
		Back	0.669	0.131	0.293	0.008	**0.800**	**0.962**	**0.677**
		Left side	0.455	0.091	0.179	0.006	**0.546**	**0.634**	**0.461**
		Right side	0.364				**0.364**	**0.364**	**0.364**
		Top side		0.020	0.027	0.001	**0.020**	**0.027**	**0.001**
		Bottom side	0.336				**0.336**	**0.336**	**0.336**
	LTE Band 26	Front	0.377	0.040	0.026	0.001	**0.417**	**0.403**	**0.378**
		Back	0.423	0.131	0.293	0.008	**0.554**	**0.716**	**0.431**
		Left side	0.424	0.091	0.179	0.006	**0.515**	**0.603**	**0.430**
		Right side	0.296				**0.296**	**0.296**	**0.296**
		Top side		0.020	0.027	0.001	**0.020**	**0.027**	**0.001**
		Bottom side	0.348				**0.348**	**0.348**	**0.348**

14.3 Body-Worn Accessory Exposure Conditions

WWAN Band		Exposure Position	1 WWAN 1g SAR (W/kg)	2 2.4GHz WLAN 1g SAR (W/kg)	3 5GHz WLAN 1g SAR (W/kg)	4 Bluetooth 1g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)	1+4 Summed 1g SAR (W/kg)
GSM	GSM850	Front	0.212	0.040	0.026	0.001	**0.252**	**0.238**	**0.213**
		Back	0.314	0.131	0.334	0.008	**0.445**	**0.648**	**0.322**
	GSM1900	Front	0.544	0.040	0.026	0.001	**0.584**	**0.570**	**0.545**
		Back	0.751	0.131	0.334	0.008	**0.882**	**1.085**	**0.759**
WCDMA	WCDMA II	Front	0.916	0.040	0.026	0.001	**0.956**	**0.942**	**0.917**
		Back	1.110	0.131	0.334	0.008	**1.241**	**1.444**	**1.118**
	WCDMA IV	Front	0.991	0.040	0.026	0.001	**1.031**	**1.017**	**0.992**
		Back	0.756	0.131	0.334	0.008	**0.887**	**1.090**	**0.764**
	WCDMA V	Front	0.344	0.040	0.026	0.001	**0.384**	**0.370**	**0.345**
		Back	0.506	0.131	0.334	0.008	**0.637**	**0.840**	**0.514**
LTE	LTE Band 2	Front	1.020	0.040	0.026	0.001	**1.060**	**1.046**	**1.021**
		Back	1.142	0.131	0.334	0.008	**1.273**	**1.476**	**1.150**
	LTE Band 4	Front	0.974	0.040	0.026	0.001	**1.014**	**1.000**	**0.975**
		Back	0.789	0.131	0.334	0.008	**0.920**	**1.123**	**0.797**
	LTE Band 7	Front	0.645	0.040	0.026	0.001	**0.685**	**0.671**	**0.646**
		Back	0.795	0.131	0.334	0.008	**0.926**	**1.129**	**0.803**
	LTE Band 13	Front	0.658	0.040	0.026	0.001	**0.698**	**0.684**	**0.659**
		Back	0.669	0.131	0.334	0.008	**0.800**	**1.003**	**0.677**
	LTE Band 26	Front	0.377	0.040	0.026	0.001	**0.417**	**0.403**	**0.378**
		Back	0.423	0.131	0.334	0.008	**0.554**	**0.757**	**0.431**

14.4 Product Specific Exposure Conditions

Exposure Position	1	2	3	4	1+2 Summed 10g SAR (W/kg)	1+3 Summed 10g SAR (W/kg)	1+4 Summed 10g SAR (W/kg)
	WWAN	2.4GHz WLAN	5GHz WLAN	Bluetooth			
	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)			
Front			0.058		**0.000**	**0.058**	**0.000**
Back			1.436		**0.000**	**1.436**	**0.000**
Left side			0.413		**0.000**	**0.413**	**0.000**
Right side					**0.000**	**0.000**	**0.000**
Top side			0.031		**0.000**	**0.031**	**0.000**

Remark:

1. According to KDB 648474 D04v01r03, for WWAN / 2.4GHz WLAN / Bluetooth SAR was excluded, due to Hotspot SAR was < 1.2W/kg.
2. According to KDB 941225 D06 v02r01, for 5GHz WLAN SAR was excluded for that position, due to transmitting antenna located larger 25mm from that surface or edge

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15. Uncertainty Assessment

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

16. References

[1] FCC 47 CFR Part 2 “Frequency Allocations and Radio Treaty Matters; General Rules and Regulations”

[2] ANSI/IEEE Std. C95.1-1992, “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz”, September 1992

[3] IEEE Std. 1528-2013, “IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”, Sep 2013

[4] SPEAG DASY System Handbook

[5] FCC KDB 248227 D01 v02r02, “SAR Guidance for IEEE 802.11 (WiFi) Transmitters”, Oct 2015.

[6] FCC KDB 447498 D01 v06, “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”, Oct 2015

[7] FCC KDB 648474 D04 v01r03, “SAR Evaluation Considerations for Wireless Handsets”, Oct 2015.

[8] FCC KDB 941225 D01 v03r01, “3G SAR MEAUREMENT PROCEDURES”, Oct 2015

[9] FCC KDB 941225 D05 v02r05, “SAR Evaluation Considerations for LTE Devices”, Dec 2015

[10] FCC KDB 941225 D05A v01r02, “Rel. 10 LTE SAR Test Guidance and KDB Inquiries”, Oct 2015

[11] FCC KDB 941225 D06 v02r01, "SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities", Oct 2015.

[12] FCC KDB 941225 D07 v01r02, " SAR Evaluation Procedures for UMPC Mini-Tablet Devices", Oct 2015.

[13] FCC KDB 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.

[14] FCC KDB 865664 D02 v01r02, “RF Exposure Compliance Reporting and Documentation Considerations” Oct 2015.