FCC SAR Test Report

APPLICANT	:	**Xiaomi Communications Co., Ltd.**
EQUIPMENT	:	**Mobile Phone**
BRAND NAME	:	**Redmi**
MODEL NAME	:	**M2003J15SS**
FCC ID	:	**2AFZZJ15SS**
STANDARD	:	**FCC 47 CFR PART 2 (2.1093)** **ANSI/IEEE C95.1-1992** **IEEE 1528-2013**

The product was received on Mar. 10, 2020 and testing was started from Mar. 31, 2020 and completed on Apr. 09, 2020. We, Sporton International (Kunshan) 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 test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (Kunshan) Inc., the test report shall not be reproduced except in full.

Rose Wang

Reviewed by: Rose Wang / Supervisor

Kat Yin

Approved by: Kat Yin / Manager

ilac-MRA

ACCREDITED
Cert #5145.02

Sporton International (Kunshan) Inc.
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People's Republic of China

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA031004	Rev. 01	Initial issue of report	Apr. 23, 2020

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **Xiaomi Communications Co., Ltd., Mobile Phone, M2003J15SS,** are as follows.

Highest Standalone 1g SAR Summary						Highest Simultaneous Transmission 1g SAR (W/kg)
Equipment Class	Frequency Band		Head (Separation 0mm)	Hotspot (Separation 10mm)	Body-worn (Separation 10mm)	
			1g SAR (W/kg)			
Licensed	GSM	GSM850	0.71	0.37	0.37	1.54
		GSM1900	<0.10	0.43	0.30	
	WCDMA	Band II	0.19	0.50	0.32	
		Band IV	0.17	1.05	1.05	
		Band V	0.70	0.43	0.43	
	LTE	Band 2	0.18	0.73	0.69	
		Band 4	0.13	**1.09**	**1.09**	
		Band 5	0.75	0.28	0.28	
		Band 7	0.25	0.80	0.71	
		Band 41/ Band 38	0.15	0.62	0.62	
DTS	WLAN	2.4GHz WLAN	0.71	0.28	0.28	1.37
NII		5GHz WLAN	**0.84**	0.79	0.66	1.54
DSS	Bluetooth	Bluetooth	<0.10	<0.10	<0.10	1.54

Highest 10g SAR Summary			
Equipment Class	Frequency Band		Product Specific 10g SAR (W/kg) (Separation 0mm)
NII	WLAN	5GHz WLAN	**1.41**
Date of Testing:			2020/3/31~2020/4/9

Remark:
This device supports both LTE B38 and B41. Since the supported frequency span for LTE B38 falls completely within the supports frequency span for LTE B41, both LTE bands have the same target power, and both LTE bands share the same transmission path; therefore, SAR was only assessed for LTE B41

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

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

2. Administration Data

Sporton International (Kunshan) Inc. is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Testing Laboratory		
Test Firm	Sporton International (Kunshan) Inc.	
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958	
Test Site No.	FCC Designation No.	FCC Test Firm Registration No.
	CN1257	314309

Applicant	
Company Name	Xiaomi Communications Co., Ltd.
Address	#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085

Manufacturer	
Company Name	Xiaomi Communications Co., Ltd.
Address	#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085

3. Guidance Applied

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

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2013
- FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
- FCC KDB 865664 D02 SAR Reporting v01r02
- FCC KDB 447498 D01 General RF Exposure Guidance v06
- FCC KDB 648474 D04 SAR Evaluation Considerations for Wireless Handsets v01r03
- FCC KDB 248227 D01 802.11 Wi-Fi SAR v02r02
- FCC KDB 941225 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 616217 D04 SAR for laptop and tablets v01r02

4. Equipment Under Test (EUT) Information

4.1 General Information

Product Feature & Specification	
Equipment Name	Mobile Phone
Brand Name	Redmi
Model Name	M2003J15SS
FCC ID	2AFZZJ15SS
IMEI Code	SIM1: 867406040001258 SIM2: 867406040011257
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 38: 2572.5 MHz ~ 2617.5 MHz LTE Band 41: 2537.5 MHz ~ 2652.5 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 ~ 5805 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Mode	GSM/GPRS/EGPRS RMC/AMR 12.2Kbps HSDPA HSUPA DC-HSDPA HSPA+ LTE: QPSK, 16QAM, 64QAM WLAN 2.4GHz : 802.11b/g/n HT20 WLAN 5GHz : 802.11a/n/ac HT20/HT40/VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE
HW Version	P2
SW Version	MIUI11
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. 802.11n-HT40 is not supported in 2.4GHz WLAN.
2. WLAN operation in 5600 MHz ~ 5650 MHz is notched.
3. This device supports VoIP in GPRS, EGPRS, WCDMA and LTE (e.g. for 3rd-party VoIP), LTE supports VoLTE operation.
4. This device does not support DTM operation and support GRPS/EGRPS mode up to multi-slot class 12.
5. This device WLAN 2.4GHz supports hotspot operation and Bluetooth support tethering applications.
6. This device 2.4GHz WLAN/5.2GHz WLAN/5.8GHz WLAN support hotspot operation, and 5.2GHz WLAN/5.8GHz WLAN supports WiFi Direct (GC/GO), and 5.3GHz / 5.5GHz supports WiFi Direct (GC only).
7. For dual SIM card mobile has two SIM slots and supports dual SIM dual standby. The WWAN radio transmission will be enabled by either one SIM at a time (single active). After pre-scan two SIM cards power, we found test result of the SIM1 was the worse, so we chose SIM1 slot to perform all tests.
8. This device has two WWAN transmit antennas. WWAN bottom antenna is located at the bottom edge of the device, and WWAN top antenna is located at the left side of top edge of the device which can refer to antenna location chapter. Top antenna frequency bands include GSM850, WCDMA Band V and LTE Band 5, Bottom antenna frequency bands include GSM850/1900, WCDMA Band II/IV/V and LTE Band 2/4/5/7/38/41, and they can't transmit simultaneously.

9. For WWAN Top/Bottom antenna, when the phone is in talking mode and receiver worked, the EUT will invoke corresponding work scenarios power level (receiver on power).
10. For WWAN Top/Bottom antenna, when receiver not worked, the phone away from head and near to body, the EUT will invoke corresponding work scenarios power level (receiver off power).
11. The device employs proximity sensors that detect the presence of the user's body also a finger or hand at the front, back or bottom faces of the device. When front or back or bottom face of body condition is detected, reduced power (sensor on power) will be active all WWAN bands for Bottom WWAN antenna.
12. There are three types of EUT, the difference between them is different capacity for memory, they have no effect on SAR distribution, so only choose sample 1 to perform full testing.

4.2 General LTE SAR Test and Reporting Considerations

<table>
<tr><th colspan="2">Summarized necessary items addressed in KDB 941225 D05 v02r05</th></tr>
<tr><td>FCC ID</td><td>2AFZZJ15SS</td></tr>
<tr><td>Equipment Name</td><td>Mobile Phone</td></tr>
<tr><td>Operating Frequency Range of each LTE transmission band</td><td>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 38: 2572.5 MHz ~ 2617.5 MHz
LTE Band 41: 2537.5 MHz ~ 2652.5 MHz</td></tr>
<tr><td>Channel Bandwidth</td><td>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 38: 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 41: 5MHz, 10MHz, 15MHz, 20MHz</td></tr>
<tr><td>Uplink Modulations used</td><td>QPSK / 16QAM / 64QAM</td></tr>
<tr><td>LTE Voice / Data requirements</td><td>Voice and Data</td></tr>
<tr><td>LTE Release Version</td><td>R11, Cat 7</td></tr>
<tr><td>CA Support</td><td>Yes, Uplink and Downlink</td></tr>
<tr><td>LTE MPR permanently built-in by design</td><td>
Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3
<table>
<tr><th rowspan="2">Modulation</th><th colspan="6">Channel bandwidth / Transmission bandwidth (NRB)</th><th rowspan="2">MPR (dB)</th></tr>
<tr><th>1.4 MHz</th><th>3.0 MHz</th><th>5 MHz</th><th>10 MHz</th><th>15 MHz</th><th>20 MHz</th></tr>
<tr><td>QPSK</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 1</td></tr>
<tr><td>16 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 1</td></tr>
<tr><td>16 QAM</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 2</td></tr>
<tr><td>64 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 2</td></tr>
<tr><td>64 QAM</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 3</td></tr>
<tr><td>256 QAM</td><td colspan="6">≥ 1</td><td>≤ 5</td></tr>
</table>
</td></tr>
<tr><td>LTE A-MPR</td><td>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)</td></tr>
<tr><td>Spectrum plots for RB configuration</td><td>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.</td></tr>
<tr><td>Power reduction applied to satisfy SAR compliance</td><td>Yes,
1. The device employs proximity sensors that detect the presence of the user’s body at the front or back or bottom faces of the device. When front or back of body worn condition is detected, reduced power will be active all WWAN bands.
2. When front or back or bottom of handheld condition is detected, reduced power will be active all WWAN bands.</td></tr>
<tr><td>LTE Carrier Aggregation Combinations</td><td>Inter-Band and Intra-Band possible combinations and the detail power verification please referred to section 13.</td></tr>
<tr><td>LTE Carrier Aggregation Additional Information</td><td>1. This device supports LTE Carrier Aggregation (CA) in the uplink for LTE 7C/38C with two component carriers in the uplink. SAR Measurements and conducted powers were evaluated per FCC Guidance.
2. 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.</td></tr>
</table>

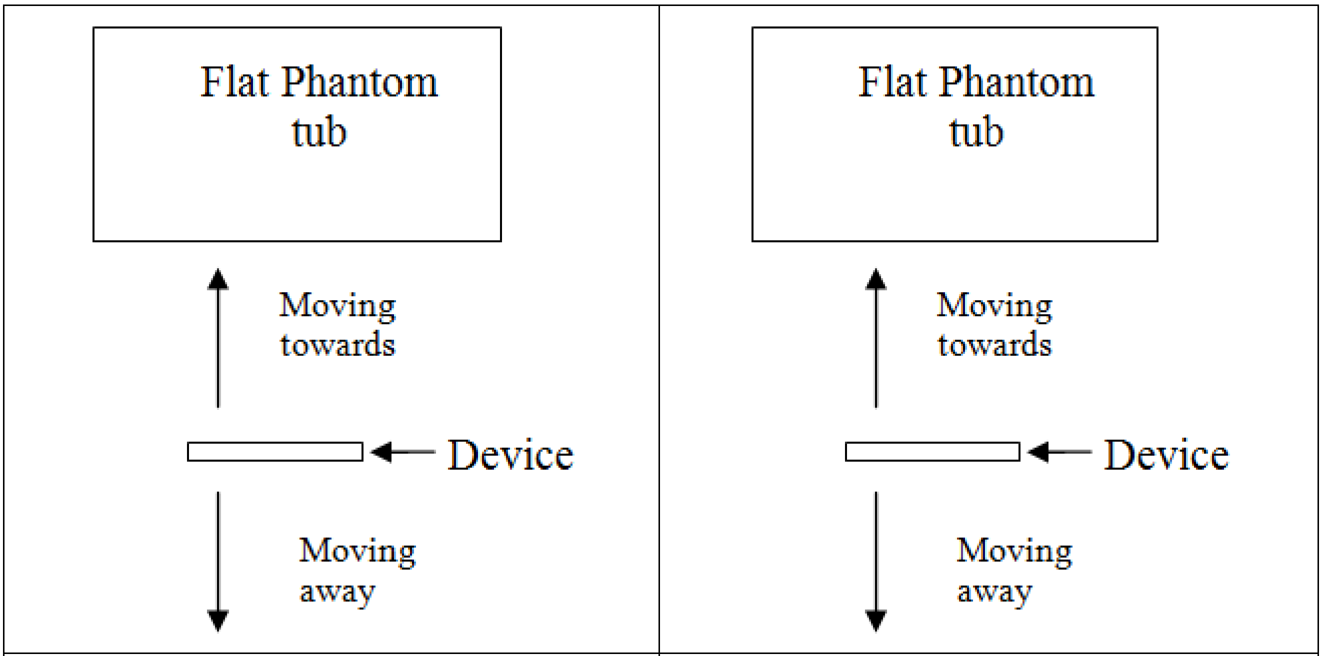
Transmission (H, M, L) channel numbers and frequencies in each LTE band												
LTE Band 2												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	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 38								
	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	37775	2572.5	37800	2575	37825	2577.5	37850	2580
M	38000	2595	38000	2595	38000	2595	38000	2595
H	38225	2617.5	38200	2615	38175	2612.5	38150	2610
H	41565	2687.5	41540	2685	41515	2682.5	41490	2680
LTE Band 41								
	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	40065	2537.5	40090	2540	40115	2542.5	40140	2545
LM	40385	2569.5	40390	2570	40395	2570.5	40400	2571
HM	40705	2601.5	40690	2600	40685	2599.5	40670	2598
H	41215	2652.5	41190	2650	41165	2647.5	41140	2645

5. Proximity Sensor Triggering Test

5.1 Proximity sensor triggering distances(Per KDB616217§6.2)

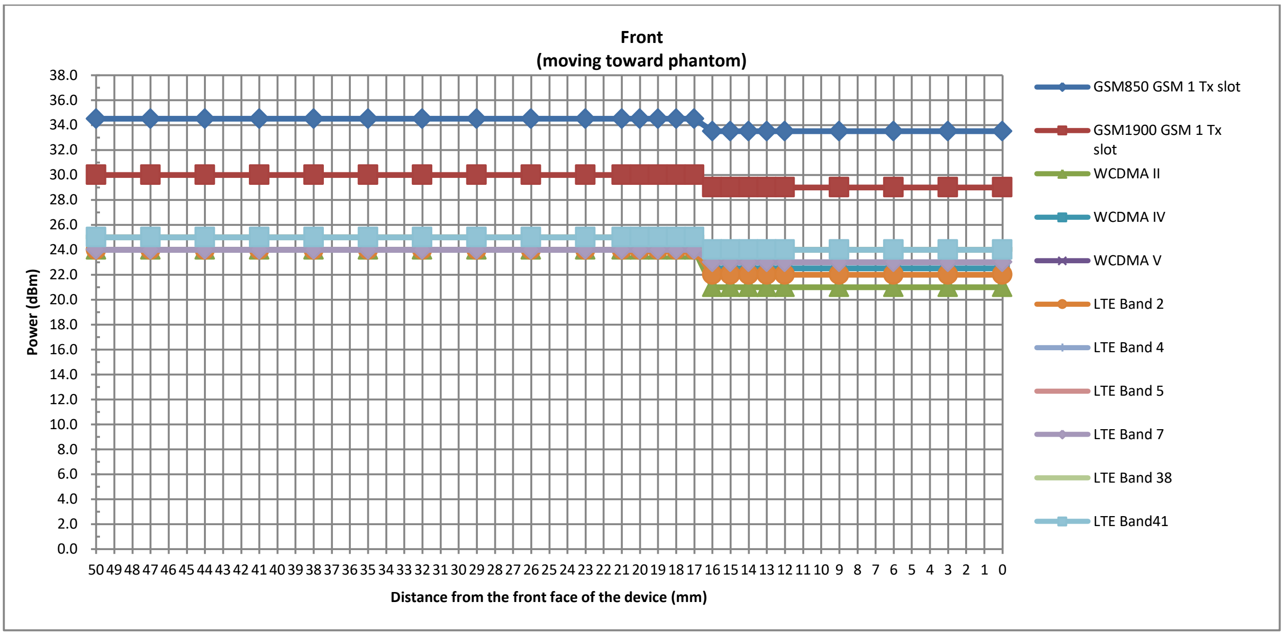
1. Proximity sensor triggering distance testing was performed according to the procedures outlined in KDB 616217 D04 section 6.2, and EUT moving further away from the flat phantom and EUT moving toward the flat phantom were both assessed and the tissue-equivalent medium for highest frequency (2600MHz) and lowest (835MHz) frequency was used for proximity sensor triggering testing.
2. Capacitive proximity sensor placed coincident with antenna elements at the bottom end of the phone are utilized to determine when the device comes in proximity of the user's body at the front, back or bottom side surface of the device. There is no need to do sensor coverage testing for the proximity sensor is designed to support sufficient detection range and sensitivity to cover regions of the sensors in all applicable directions since the proximity sensor entirely covers the antenna.
3. The device employs proximity sensors that detect the presence of the user's body also a finger or hand at the front, back or bottom faces of the device. When front or back or bottom face of body condition is detected, reduced power (sensor on power)will be active all WWAN bands for Bottom WWAN antenna.
4. The sensors used to detect the proximity of the user's finger or hand at the front, back or bottom side surface of the device use a detection threshold distance. The data shown in the sections below shows the distance(s).
5. For verification of compliance of power reduction scheme, additional SAR testing with EUT transmitting at full RF power at a conservative trigger distance was performed:
   Front: 15 mm
   Back: 15 mm (declared by manufacturer)
   Bottom side: 15 mm (declared by manufacturer)

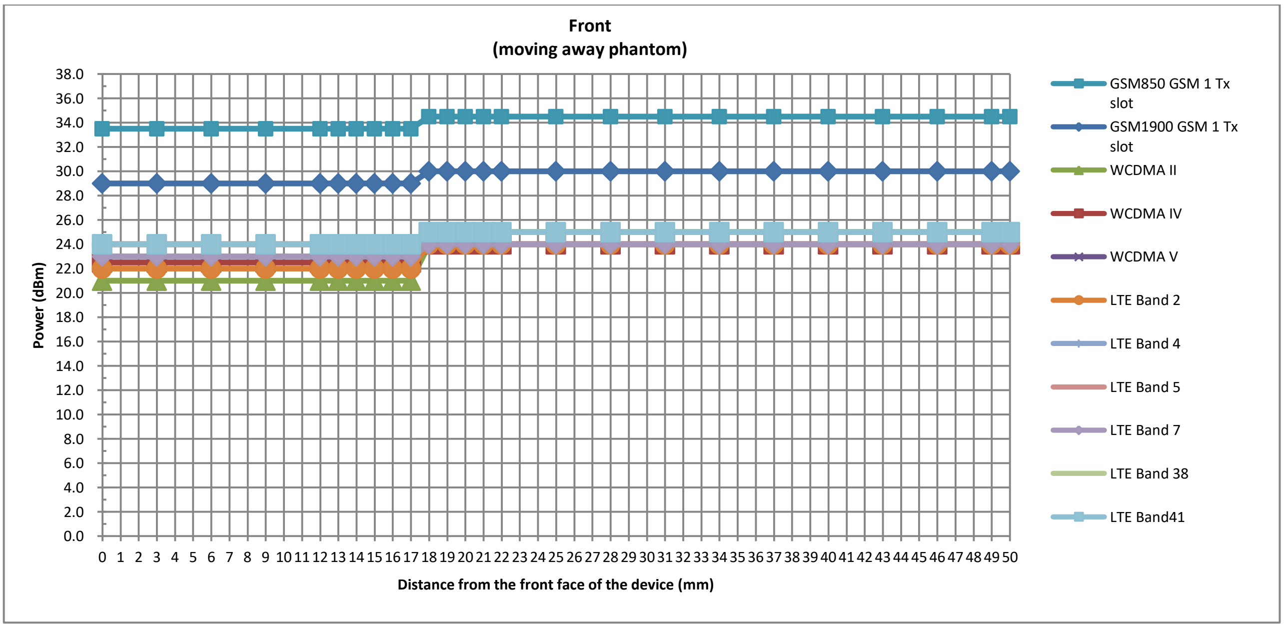


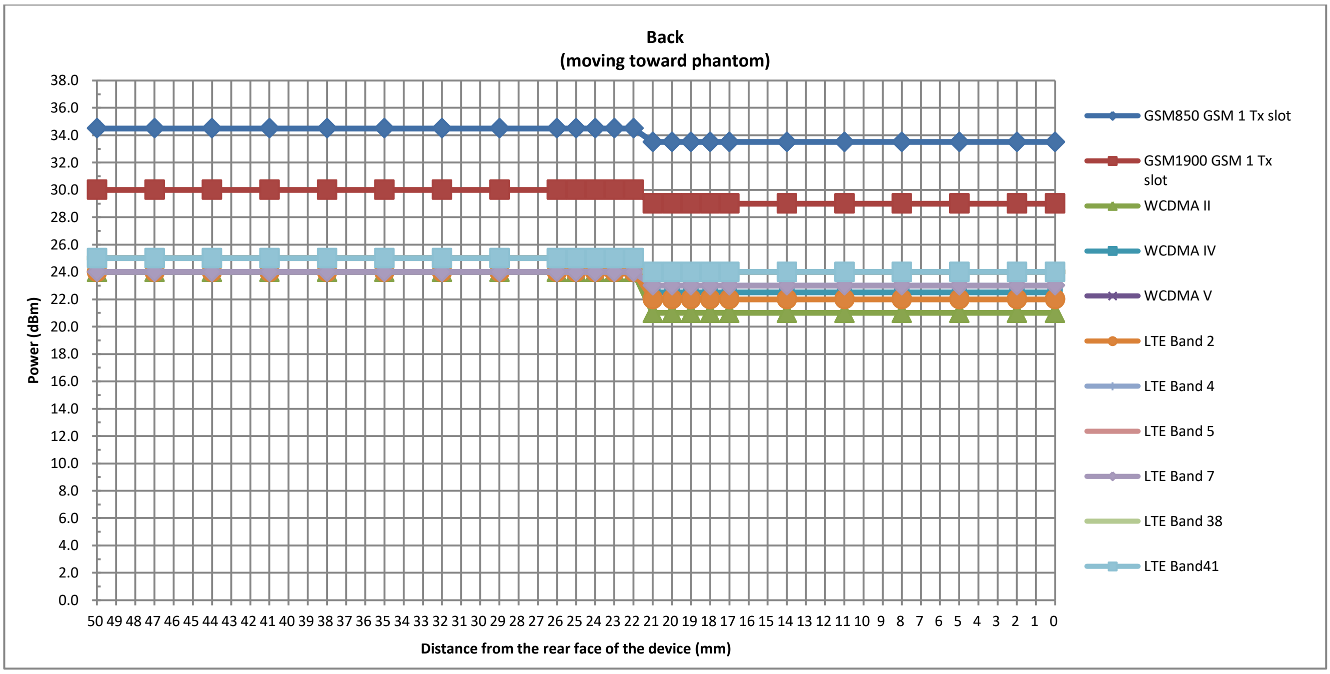
Sensor detection test set-up, front and back faces | Sensor detection test set-up, bottom side

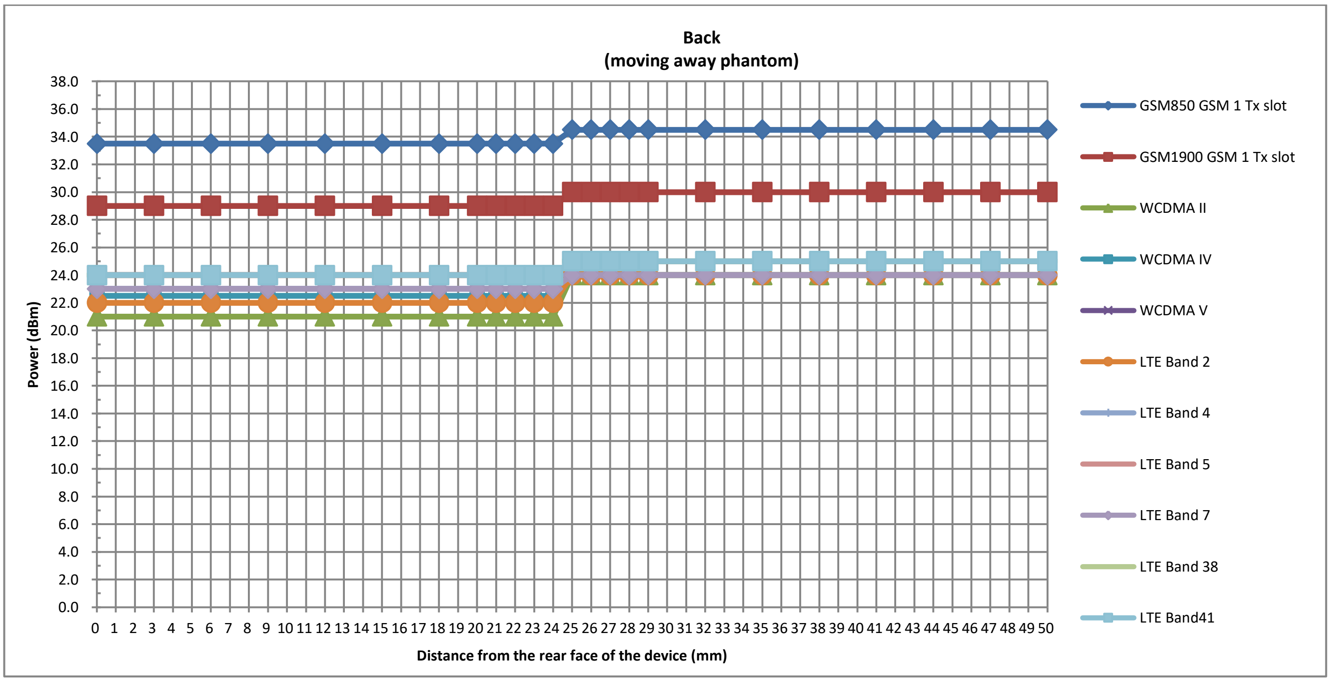
Proximity Sensor Triggering Distance (mm)						
Position	Front		Back		Bottom Side	
	Moving towards	Moving away	Moving towards	Moving away	Moving towards	Moving away
Minimum	16	17	21	24	26	27

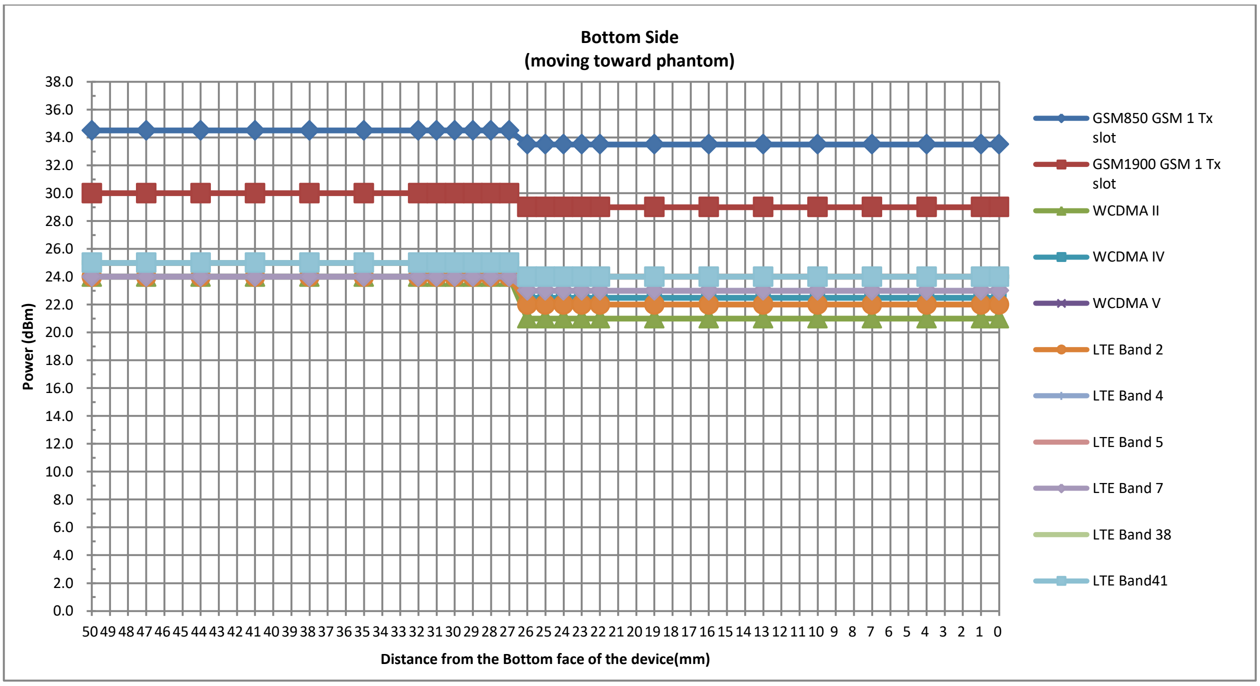
<u><Sensor Trigger Distance and Measured Power></u>

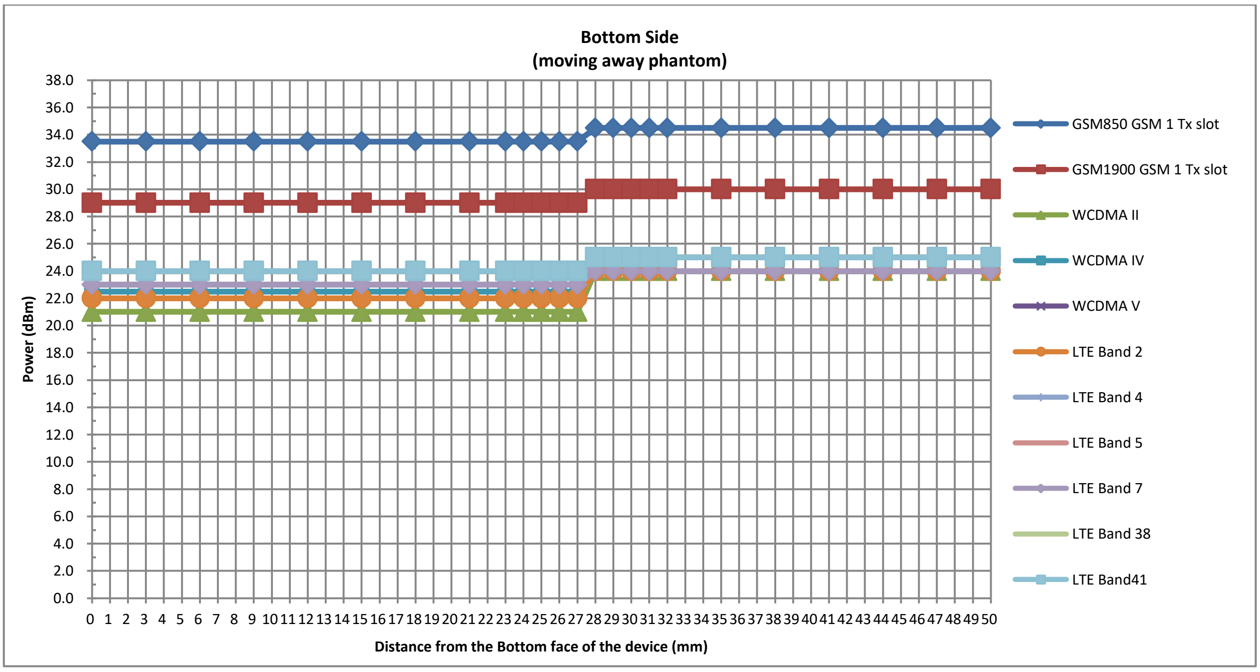





Back
(moving toward phantom)
Power (dBm)
Distance from the rear face of the device (mm)
GSM850 GSM 1 Tx slot
GSM1900 GSM 1 Tx slot
WCDMA II
WCDMA IV
WCDMA V
LTE Band 2
LTE Band 4
LTE Band 5
LTE Band 7
LTE Band 38
LTE Band41

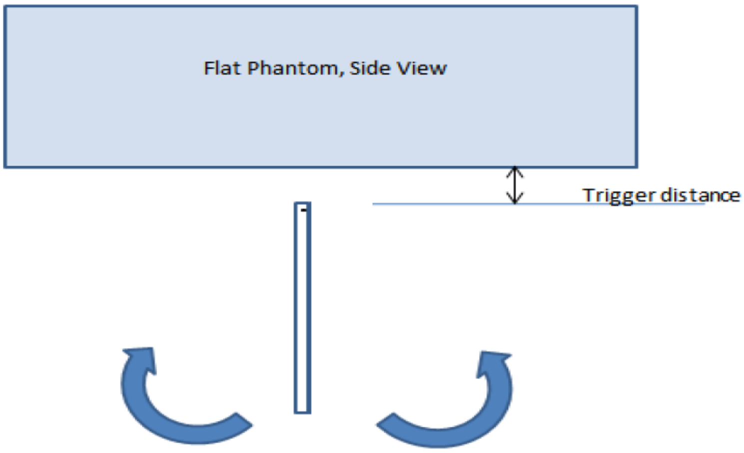

Back
(moving away phantom)
Power (dBm)
Distance from the rear face of the device (mm)
GSM850 GSM 1 Tx slot
GSM1900 GSM 1 Tx slot
WCDMA II
WCDMA IV
WCDMA V
LTE Band 2
LTE Band 4
LTE Band 5
LTE Band 7
LTE Band 38
LTE Band41


Bottom Side
(moving toward phantom)
Power (dBm)
Distance from the Bottom face of the device(mm)
GSM850 GSM 1 Tx slot
GSM1900 GSM 1 Tx slot
WCDMA II
WCDMA IV
WCDMA V
LTE Band 2
LTE Band 4
LTE Band 5
LTE Band 7
LTE Band 38
LTE Band41


Bottom Side
(moving away phantom)
Power (dBm)
Distance from the Bottom face of the device (mm)
GSM850 GSM 1 Tx slot
GSM1900 GSM 1 Tx slot
WCDMA II
WCDMA IV
WCDMA V
LTE Band 2
LTE Band 4
LTE Band 5
LTE Band 7
LTE Band 38
LTE Band41

5.2 Tilt angle influences to proximity sensor triggering(Per KDB616217 §6.4)

The DUT was positioned directly below the flat phantom at the minimum measured trigger distance with bottom side parallel to the base of the flat phantom for each band.
The EUT was rotated about bottom side for angles up to +/- 45°. If the output power increased during the rotation the DUT was moved 1mm toward the phantom and the rotation repeated. This procedure was repeated until the power remained reduced for all angles up to +/- 45°.



Proximity Sensor Coverage Assesment(Bottom Side)

Table: Summary of Tablet Tilt Angle Influence to Proximity Sensor Triggering (Bottom Side)

Main ant Band(MHz)	Minimum trigger distance at which power reduction was maintained over ±45°	Power Reduction Status										
		-45°	-35°	-25°	-15°	-5°	0°	5°	15°	25°	35°	45°
GSM850	26mm	on	on	on	on	on	on	on	on	on	on	on
GSM1900	26mm	on	on	on	on	on	on	on	on	on	on	on
WCDMA Band II	26mm	on	on	on	on	on	on	on	on	on	on	on
WCDMA Band IV	26mm	on	on	on	on	on	on	on	on	on	on	on
WCDMA Band V	26mm	on	on	on	on	on	on	on	on	on	on	on
LTE Band 2	26mm	on	on	on	on	on	on	on	on	on	on	on
LTE Band 4	26mm	on	on	on	on	on	on	on	on	on	on	on
LTE Band 5	26mm	on	on	on	on	on	on	on	on	on	on	on
LTE Band 7	26mm	on	on	on	on	on	on	on	on	on	on	on
LTE Band 38	26mm	on	on	on	on	on	on	on	on	on	on	on
LTE Band 41	26mm	on	on	on	on	on	on	on	on	on	on	on

Conclusion: As is shown from the validation data, it can be ensured that the proximity sensor can be valid triggered for the DUT tilt coverage exposure condition.

6. RF Exposure Limits

6.1 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.

6.2 Controlled Environment

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

Limits for Occupational/Controlled Exposure (W/kg)

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

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

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

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

7. Specific Absorption Rate (SAR)

7.1 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.

7.2 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:

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

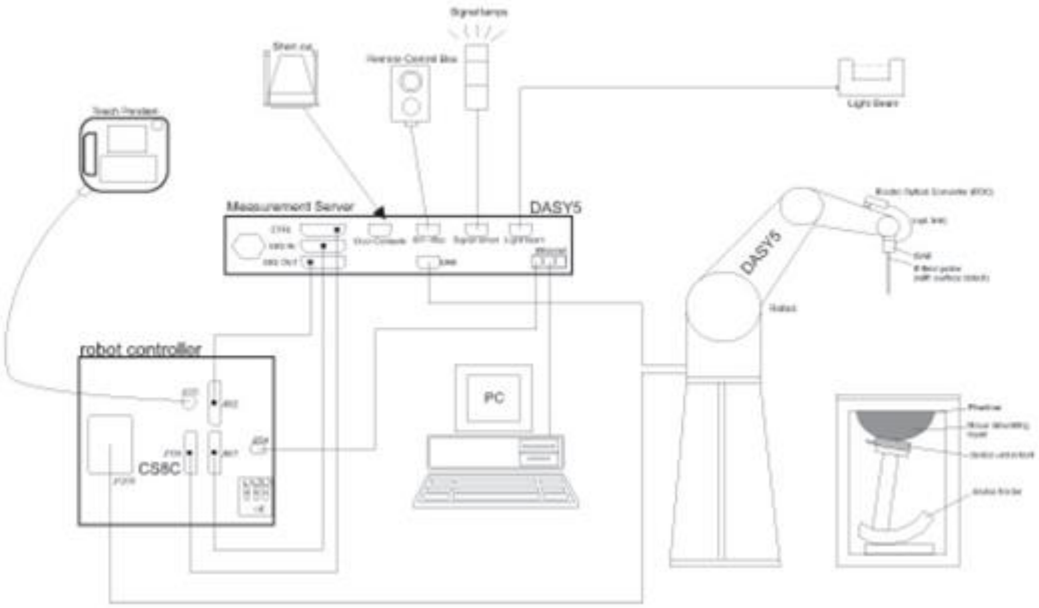
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

8. 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.

8.1 E-Field Probe

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

<EX3DV4 Probe>

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

8.2 Data Acquisition Electronics (DAE)

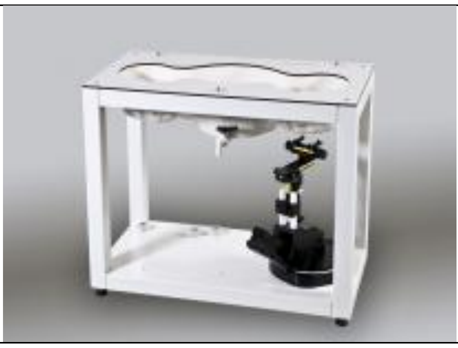
The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.
The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

Photo of DAE

8.3 Phantom

<SAM Twin Phantom>

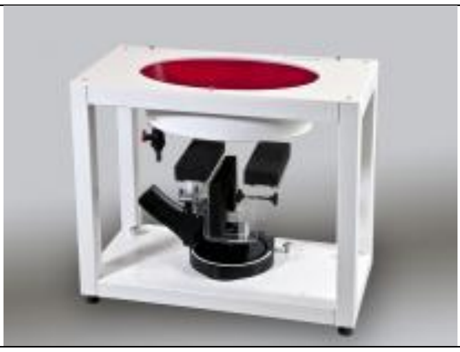
Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm
Filling Volume	Approx. 25 liters
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet
Measurement Areas	Left Hand, Right Hand, Flat Phantom



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.

8.4 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

9. 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

9.1 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

9.2 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.

9.3 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.

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

9.4 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.

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

9.5 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.

9.6 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.

10. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	835MHz System Validation Kit	D835V2	4d151	2019/3/27	2022/3/26
SPEAG	1750MHz System Validation Kit	D1750V2	1090	2019/3/27	2022/3/26
SPEAG	1900MHz System Validation Kit	D1900V2	5d170	2019/3/26	2022/3/25
SPEAG	2450MHz System Validation Kit	D2450V2	908	2019/3/25	2022/3/24
SPEAG	2600MHz System Validation Kit	D2600V2	1061	2018/12/7	2021/12/6
SPEAG	5000MHz System Validation Kit	D5GHzV2	1113	2019/9/24	2020/9/23
SPEAG	Data Acquisition Electronics	DAE4	1338	2019/11/20	2020/11/19
SPEAG	Dosimetric E-Field Probe	EX3DV4	3843	2019/9/26	2020/9/25
SPEAG	SAM Twin Phantom	QD 000 P40 CB	TP-1697	NCR	NCR
SPEAG	Phone Positioner	N/A	N/A	NCR	NCR
Anritsu	Radio Communication Analyzer	MT8821C	6201432831	2019/4/17	2020/4/16
Agilent	Wireless Communication Test Set	E5515C	MY52102706	2019/4/17	2020/4/16
Agilent	ENA Series Network Analyzer	E5071C	MY46111157	2019/4/17	2020/4/16
SPEAG	Dielectric Probe Kit	DAK-3.5	1071	2019/10/28	2020/10/27
Anritsu	Vector Signal Generator	MG3710A	6201682672	2020/1/8	2021/1/7
R&S	Power Meter	NRVD	102081	2019/8/15	2020/8/14
R&S	Power Sensor	NRV-Z5	100538	2019/8/14	2020/8/13
R&S	Power Sensor	NRV-Z5	100539	2019/8/14	2020/8/13
R&S	CBT BLUETOOTH TESTER	CBT	101641	2020/1/8	2021/1/7
EXA	Spectrum Analyzer	FSV7	101631	2020/1/8	2021/1/7
Testo	Hygrometer	608-H1	1241332088	2020/1/8	2021/1/7
FLUKE	DIGITAC THERMOMETER	51II	97240029	2019/8/15	2020/8/14
ARRA	Power Divider	A3200-2	N/A	Note	
MCL	Attenuation1	BW-S10W5+	N/A	Note	
MCL	Attenuation2	BW-S10W5+	N/A	Note	
MCL	Attenuation3	BW-S10W5+	N/A	Note	
BONN	POWER AMPLIFIER	BLMA 0830-3	087193A	Note	
BONN	POWER AMPLIFIER	BLMA 2060-2	087193B	Note	
Agilent	Dual Directional Coupler	778D	20500	Note	
Agilent	Dual Directional Coupler	11691D	MY48151020	Note	

Note:
Prior to system verification and validation, the path loss from the signal generator to the system check source and the power meter, which includes the amplifier, cable, attenuator and directional coupler, was measured by the network analyzer. The reading of the power meter was offset by the path loss difference between the path to the power meter and the path to the system check source to monitor the actual power level fed to the system check source.

11. System Verification

11.1 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.

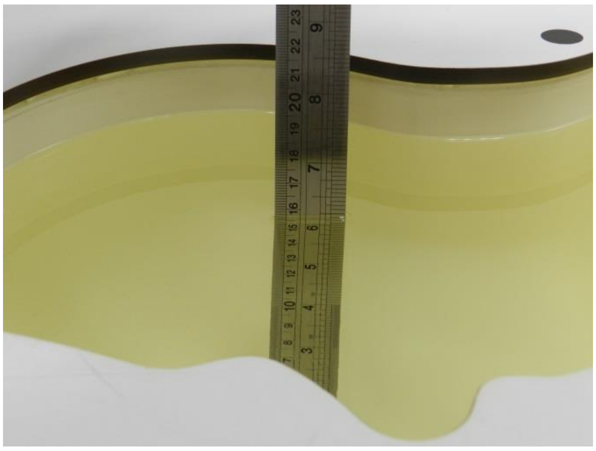


Fig 10.1Photo of Liquid Height for Head SAR

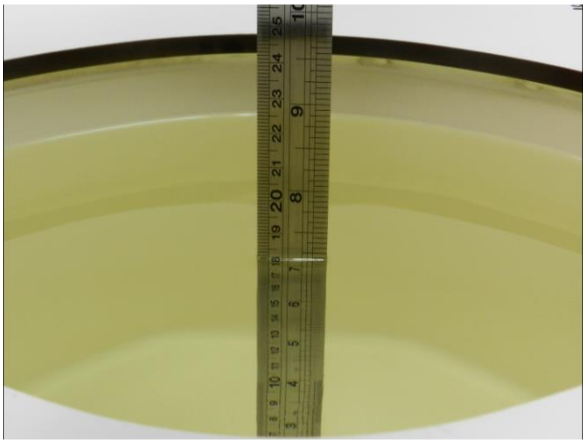


Fig 10.2 Photo of Liquid Height for Body SAR

11.2 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)
For Head								
835	40.3	57.9	0.2	1.4	0.2	0	0.90	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)	Tissue Type	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
835	Head	22.7	0.921	41.319	0.90	41.50	2.33	-0.44	±5	2020/3/31
1750	Head	22.8	1.347	41.059	1.37	40.10	-1.68	2.39	±5	2020/4/1
1900	Head	22.8	1.441	40.487	1.40	40.00	2.93	1.22	±5	2020/4/3
2450	Head	22.5	1.794	40.925	1.80	39.20	-0.33	4.40	±5	2020/4/4
2600	Head	22.4	1.962	40.351	1.96	39.00	0.10	3.46	±5	2020/4/5
5250	Head	22.9	4.595	36.400	4.71	35.90	-2.44	1.39	±5	2020/4/7
5600	Head	22.8	4.984	35.824	5.07	35.50	-1.70	0.91	±5	2020/4/8
5750	Head	22.7	5.160	35.569	5.22	35.40	-1.15	0.48	±5	2020/4/9

11.3 System Performance Check Results

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

<1g SAR>

Date	Frequency (MHz)	Tissue Type	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)
2020/3/31	835	Head	250	4d151	3843	1338	2.14	9.30	8.56	-7.96
2020/4/1	1750	Head	250	1090	3843	1338	9.20	36.40	36.8	1.10
2020/4/3	1900	Head	250	5d170	3843	1338	10.70	39.00	42.8	9.74
2020/4/4	2450	Head	250	908	3843	1338	12.40	52.80	49.6	-6.06
2020/4/5	2600	Head	250	1061	3843	1338	13.20	57.70	52.8	-8.49
2020/4/7	5250	Head	100	1113	3843	1338	7.38	80.50	73.8	-8.32
2020/4/8	5600	Head	100	1113	3843	1338	7.62	83.40	76.2	-8.63
2020/4/9	5750	Head	100	1113	3843	1338	7.32	80.00	73.2	-8.50

<10g SAR>

Date	Frequency (MHz)	Tissue Type	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 10g SAR (W/kg)	Targeted 10g SAR (W/kg)	Normalized 10g SAR (W/kg)	Deviation (%)
2020/4/7	5250	Head	100	1113	3843	1338	2.16	23.10	21.6	-6.49
2020/4/8	5600	Head	100	1113	3843	1338	2.26	23.80	22.6	-5.04

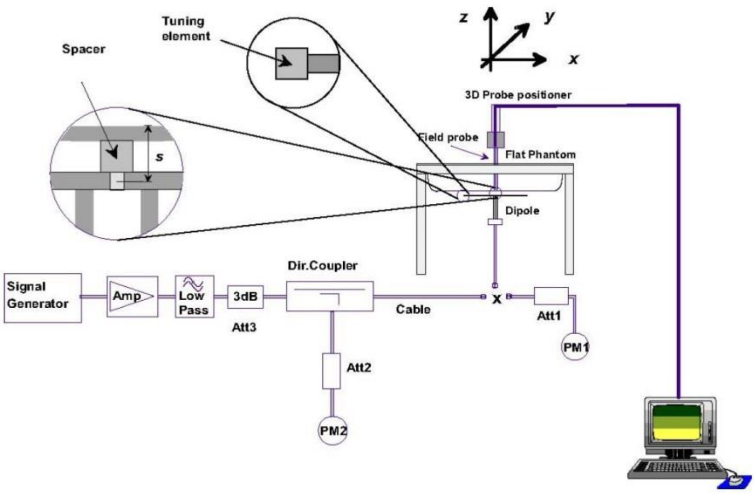


Fig 10.3.1 System Performance Check Setup

Fig 10.3.2 Setup Photo

12. RF Exposure Positions

12.1 Ear and handset reference point

Figure 11.1.1 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 11.1.2 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 11.1.3). 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 11.1.2. The ear truncation is introduced to preclude the ear lobe from interfering with handset tilt, which could lead to unstable positioning at the cheek.

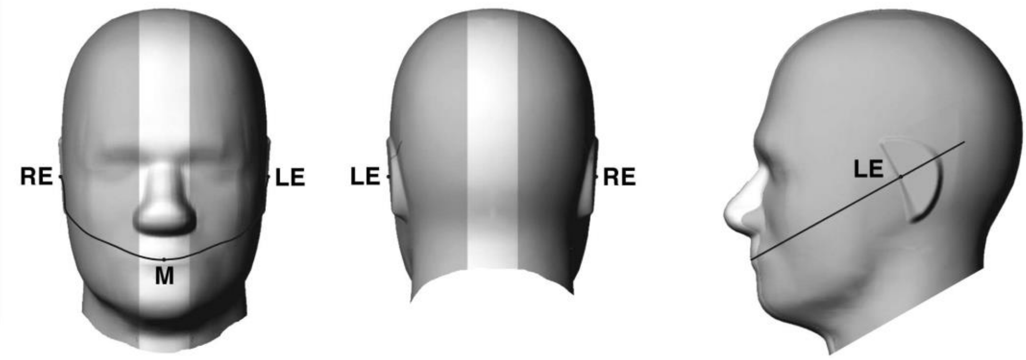


Fig 11.1.1 Front, back, and side views of SAM twin phantom

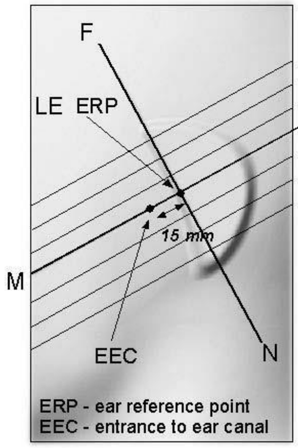


Fig 11.1.2 Close-up side view of phantom showing the ear region.

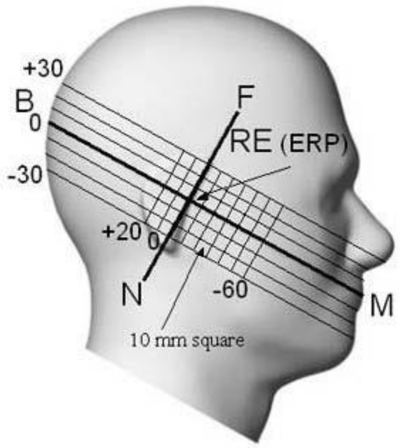


Fig 11.1.3 Side view of the phantom showing relevant markings and seven cross-sectional plane locations

12.2 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 11.2.1 and Figure 11.2.2), 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 11.2.1). 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 11.2.2), 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 11.2.3), 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 11.2.3. The actual rotation angles should be documented in the test report.

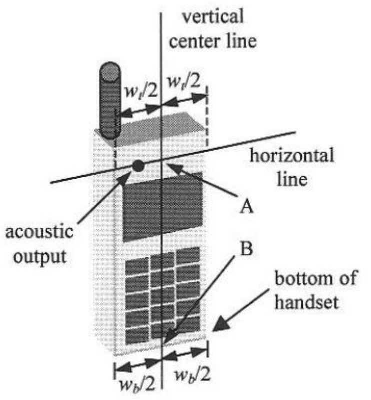


Fig 11.2.1 Handset vertical and horizontal reference lines—"fixed case

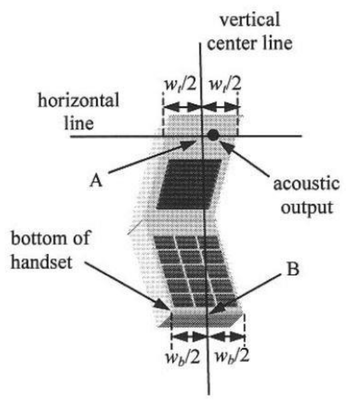


Fig 11.2.2 Handset vertical and horizontal reference lines—"clam-shell case"

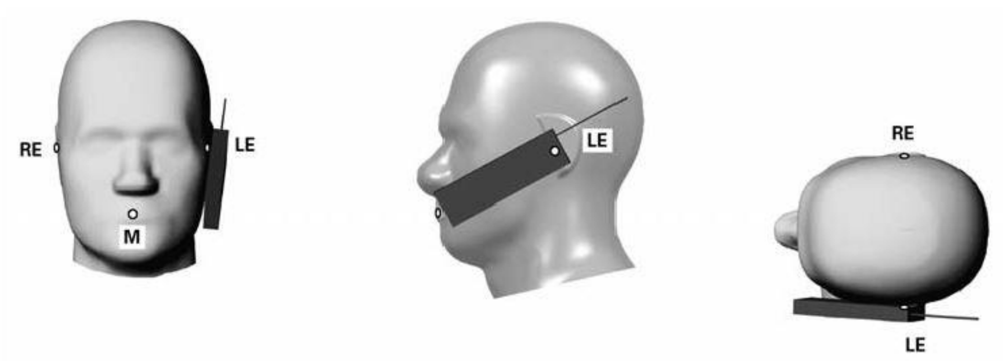


Fig 11.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

12.3 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 11.3.1. 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

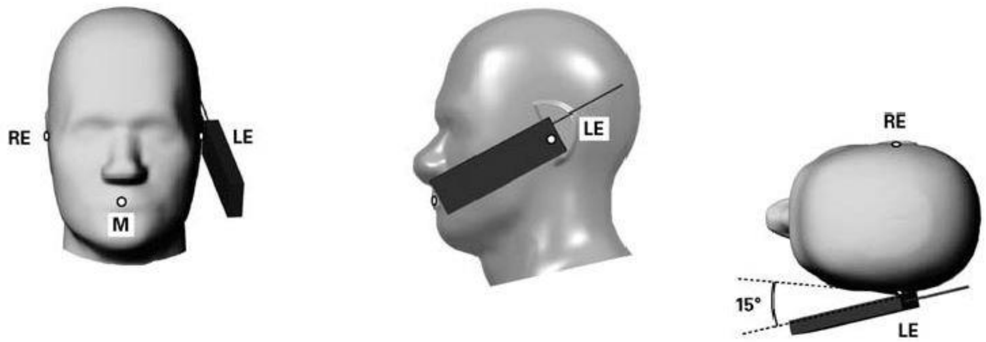


Fig 11.3.1 Tilt position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which define the Reference Plane for handset positioning, are indicated.

12.4 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 11.4). 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.

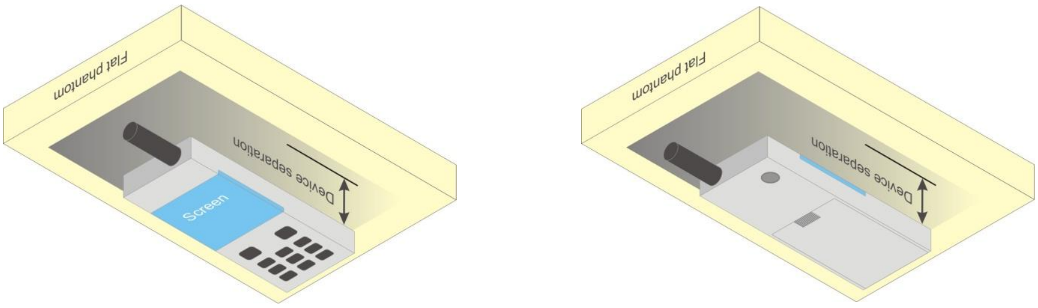


Fig 11.4 Body Worn Position

12.5 Product Specific 10g SAR Exposure

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

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

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

12.6 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.

13. Conducted RF Output Power (Unit: dBm)

The detailed conducted power table can refer to Appendix E.

<GSM Conducted Power>

General Note:

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 (1Tx 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.

<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.
3. For DC-HSDPA, the device was configured according to the H-Set 12, Fixed Reference Channel (FRC) configuration in Table C.8.1.12 of 3GPP TS 34.121-1, with the primary and the secondary serving HS-DSCH Cell enabled during the power measurement.

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	β_{ed}1: 47/15 β_{ed}2: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15	0	-	-	5/15	5/15	47/15	4	1	1.0	0.0	12	67

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

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

DC-HSDPA 3GPP release 8 Setup Configuration:

a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration below
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 RMC 12.2Kbps + HSDPA mode.
   ii. Set Cell Power = -25 dBm
   iii. Set HS-DSCH Configuration Type to FRC (H-set 12, QPSK)
   iv. Select HSDPA Uplink Parameters
   v. Set Gain Factors (β_c and β_d) and parameters were set according to each Specific sub-test in the following table, C10.1.4, quoted from the TS 34.121
      a). Subtest 1: β_c/β_d=2/15
      b). Subtest 2: β_c/β_d=12/15
      c). Subtest 3: β_c/β_d=15/8
      d). Subtest 4: β_c/β_d=15/4
   vi. Set Delta ACK, Delta NACK and Delta CQI = 8
   vii. Set Ack-Nack Repetition Factor to 3
   viii. Set CQI Feedback Cycle (k) to 4 ms
   ix. Set CQI Repetition Factor to 2
   x. Power Ctrl Mode = All Up bits
d. The transmitted maximum output power was recorded.

The following tests were conducted according to the test requirements outlines in 3GPP TS 34.121 specification.
A summary of these settings are illustrated below:

C.8.1.12 Fixed Reference Channel Definition H-Set 12

Table C.8.1.12: Fixed Reference Channel H-Set 12

Parameter	Unit	Value
Nominal Avg. Inf. Bit Rate	kbps	60
Inter-TTI Distance	TTI's	1
Number of HARQ Processes	Processes	6
Information Bit Payload (N_{INF})	Bits	120
Number Code Blocks	Blocks	1
Binary Channel Bits Per TTI	Bits	960
Total Available SML's in UE	SML's	19200
Number of SML's per HARQ Proc.	SML's	3200
Coding Rate		0.15
Number of Physical Channel Codes	Codes	1
Modulation		QPSK
Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table. Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used.		

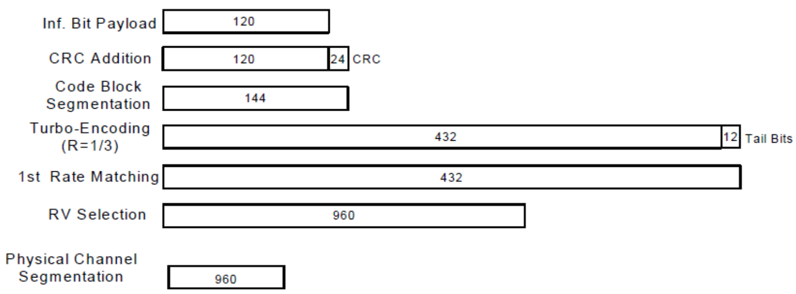


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

Setup Configuration

HSPA+ 3GPP release 7 (uplink category 7) 16QAM, 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 = 5.2E:HSPA+:UL with 16QAM
   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, C11.1.4, quoted from the TS 34.121-1 s5.2E
   iii. Set Channel Parms
   iv. Set Cell Power = -86 dBm
   v. Set Channel Type = HSPA
   vi. Set UE Target Power =21 dBm
   vii. Power Ctrl Mode= All Up Bits
   viii. Set Manual Uplink DPCH Bc/Bd = Manual
   ix. Set Manual Uplink DPCH Bc and Bd=15,15(for 34.121-1 v8.10.0 table C11.1.4 sub-test 1)
   x. Set HSPA Conn DL Channel Levels
   xi. Set HS-SCCH Configs
   xii. Set RB Test Mode Setup
   xiii. Set Common HSUPA Parameters
   xiv. Set Serving Grant
   xv. Confirm that E-TFCI is equal to the target E-TFCI of 105 for sub-test 1, and other subtest's E-TFCI
d. The transmitted maximum output power was recorded.

Table C.11.1.4: β values for transmitter characteristics tests with HS-DPCCH and E-DCH with 16QAM

Sub-test	β_c (Note3)	β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (2xSF2) (Note 4)	β_{ed} (2xSF4) (Note 4)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 4)	E-TFCI (Note 5)	E-TFCI (boost)
1	1	0	30/15	30/15	β_{ed}1: 30/15 β_{ed}2: 30/15	β_{ed}3: 24/15 β_{ed}4: 24/15	3.5	2.5	14	105	105

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

Setup Configuration

<WCDMA Conducted Power>

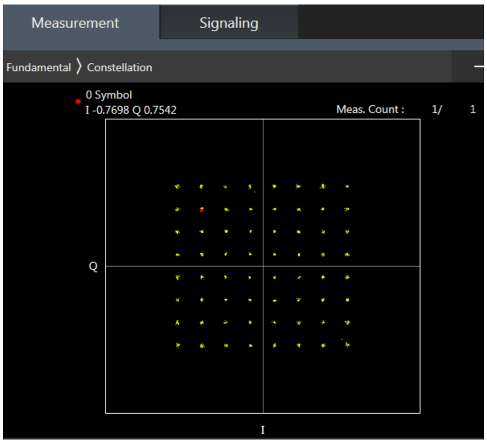
General Note:

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 / DC-HSDPA / HSPA+ 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 / DC-HSDPA / HSPA+ to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA / HSPA+, and according to the following RF output power, the output power results of the secondary modes (HSDPA / HSUPA / DC-HSDPA / HSPA+) are less than ¼ dB higher than the primary modes; therefore, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA / HSPA+.

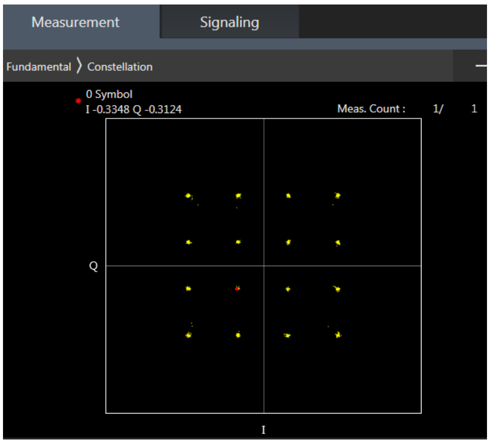
<LTE Conducted Power>

General Note:

1. Anritsu MT8821C 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 / B5 / B38 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 38 SAR test was covered by Band 41; 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 64QAM and 16QAM 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

<TDD LTE SAR Measurement>

TDD LTE configuration setup for SAR measurement

SAR was tested with a fixed periodic duty factor according to the highest transmission duty factor implemented for the device and supported by 3GPP.

a. 3GPP TS 36.211 section 4.2 for Type 2 Frame Structure and Table 4.2-2 for uplink-downlink configurations
b. “special subframe S” contains both uplink and downlink transmissions, it has been taken into consideration to determine the transmission duty factor according to the worst case uplink and downlink cyclic prefix requirements for UpPTS
c. Establishing connections with base station simulators ensure a consistent means for testing SAR and recommended for evaluating SAR. The Anritsu MT8820C (firmware: #22.52#004) was used for LTE output power measurements and SAR testing.

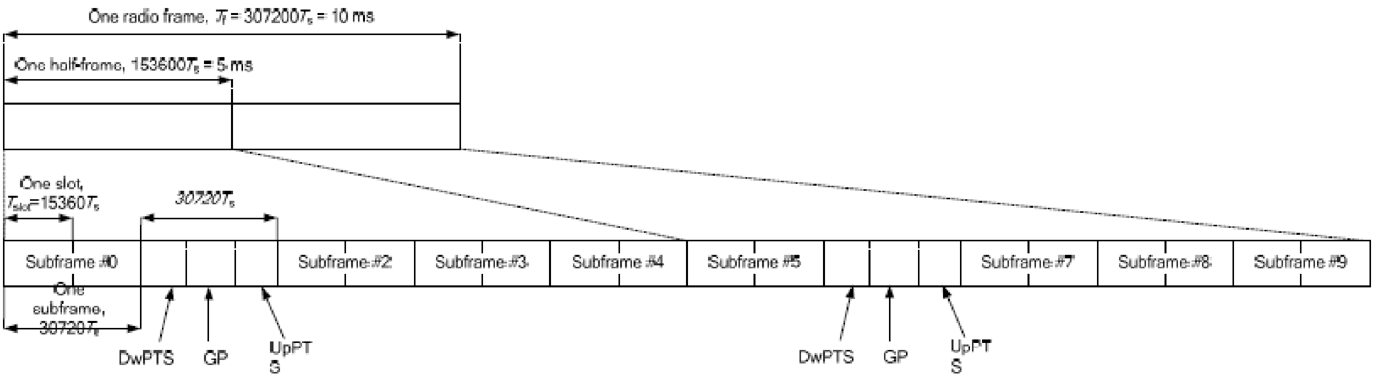


Figure 4.2-1: Frame structure type 2 (for 5 ms switch-point periodicity).

Table 4.2-2: Uplink-downlink configurations.

Uplink-downlink configuration	Downlink-to-Uplink Switch-point periodicity	Subframe number									
		0	1	2	3	4	5	6	7	8	9
0	5 ms	D	S	U	U	U	D	S	U	U	U
1	5 ms	D	S	U	U	D	D	S	U	U	D
2	5 ms	D	S	U	D	D	D	S	U	D	D
3	10 ms	D	S	U	U	U	D	D	D	D	D
4	10 ms	D	S	U	U	D	D	D	D	D	D
5	10 ms	D	S	U	D	D	D	D	D	D	D
6	5 ms	D	S	U	U	U	D	S	U	U	D

Table 4.2-1: Configuration of special subframe (lengths of DwPTS/GP/UpPTS).

Special subframe configuration	Normal cyclic prefix in downlink			Extended cyclic prefix in downlink		
	DwPTS	UpPTS		DwPTS	UpPTS	
		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
0	$6592 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$	$7680 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$
1	$19760 \cdot T_s$			$20480 \cdot T_s$		
2	$21952 \cdot T_s$			$23040 \cdot T_s$		
3	$24144 \cdot T_s$			$25600 \cdot T_s$		
4	$26336 \cdot T_s$			$7680 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$
5	$6592 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$	$20480 \cdot T_s$		
6	$19760 \cdot T_s$			$23040 \cdot T_s$		
7	$21952 \cdot T_s$			$12800 \cdot T_s$		
8	$24144 \cdot T_s$			-	-	-
9	$13168 \cdot T_s$			-	-	-

Special subframe (30720·T_s): Normal cyclic prefix in downlink (UpPTS)			
	Special subframe configuration	**Normal cyclic prefix in uplink**	**Extended cyclic prefix in uplink**
Uplink duty factor in one special subframe	**0~4**	7.13%	8.33%
	5~9	14.3%	16.7%

Special subframe(30720·T_s): Extended cyclic prefix in downlink (UpPTS)			
	Special subframe configuration	**Normal cyclic prefix in uplink**	**Extended cyclic prefix in uplink**
Uplink duty factor in one special subframe	**0~3**	7.13%	8.33%
	4~7	14.3%	16.7%

The highest duty factor is resulted from:

For LTE Band 41 Power class 3

i. Uplink-downlink configuration: 0. In a half-frame consisted of 5 subfames, uplink operation is in 3 uplink subframes and 1 special subframe.
ii. special subframe configuration: 5-9 for normal cyclic prefix in downlink, 4-7 for extended cyclic prefix in downlink
iii. for special subframe with extended cyclic prefix in uplink, the total uplink duty factor in one half-frame is: (3+0.167)/5 = 63.3%
iv. for special subframe with normal cyclic prefix in uplink, the total uplink duty factor in one half-frame is: (3+0.143)/5 = 62.9%
v. For TDD LTE SAR measurement, the duty cycle 1:1.59 (62.9 %) was used perform testing and considering the theoretical duty cycle of 63.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 62.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix 63.3%/62.9% = 1.006 is applied to scale-up the measured SAR result. The scaled TDD LTE SAR = measured SAR (W/kg)* Tune-up Scaling Factor* scaling factor for extended cyclic prefix.

<LTE Carrier Aggregation>

General Note:

1. This device supports Carrier Aggregation on downlink for CA_7C /CA_38Cand uplink for CA_7C/ CA_38C. For the device supports bands and bandwidths and configurations are provided as follow table was according to 3GPP.
2. In applying the existing power measurement procedures of KDB 941225 D05A for DL CA SAR test exclusion, only the subset with the largest number of combinations of frequency bands and CCs in each row need combination, and for this device that all the configurations were choose to power measurement.
3. All permutations exist. No restrictions on Pcell & Scell combinations.

Index	2CC	Restriction	Completely Covered by Measurement Superset
2CC #1	CA_7C		No
2CC #2	CA_38C		No

LTE Carrier Aggregation Conducted Power (Downlink)

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. 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 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.

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

LTE Carrier Aggregation Conducted Power (Uplink)

1. This device supports uplink carrier aggregation for LTE CA_7C, CA_38C 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. For the non-contiguously allocated resource blocks which the MPR level is determined by various RB separation and RB sizes requirement, and the allowed MPR levels, settings and the conducted powers are permanently implemented in this device per the 3GPP 36.36.101 section 6.2.3A.1.3 requirements.
2. According to November 2017 TCB workshop, the output power with uplink CA active was measured for the high / middle / low channel configuration with the highest reported SAR for each exposure condition, the power was measured with wideband signal integration over both component carriers.
3. In applying the power measurement procedures of KDB 941225 D05A for DL CA to qualify for UL SAR test exclusion, power measurement is required only for the subset in each row with the largest combination of frequency bands and CCs
4. Maximum output power measurement is required for each UL CA configuration for the required test channels described in KDB 941225 D05. The required test channel should be associated with the UL PCC. For channels at the ends of a frequency band, the SCC and subsequent CCs are added to the side within the transmission band. Otherwise, the CCs should be added alternatively to either side of the PCC.

<Power Measurement Setup>

<WLAN Conducted Power>

General Note:

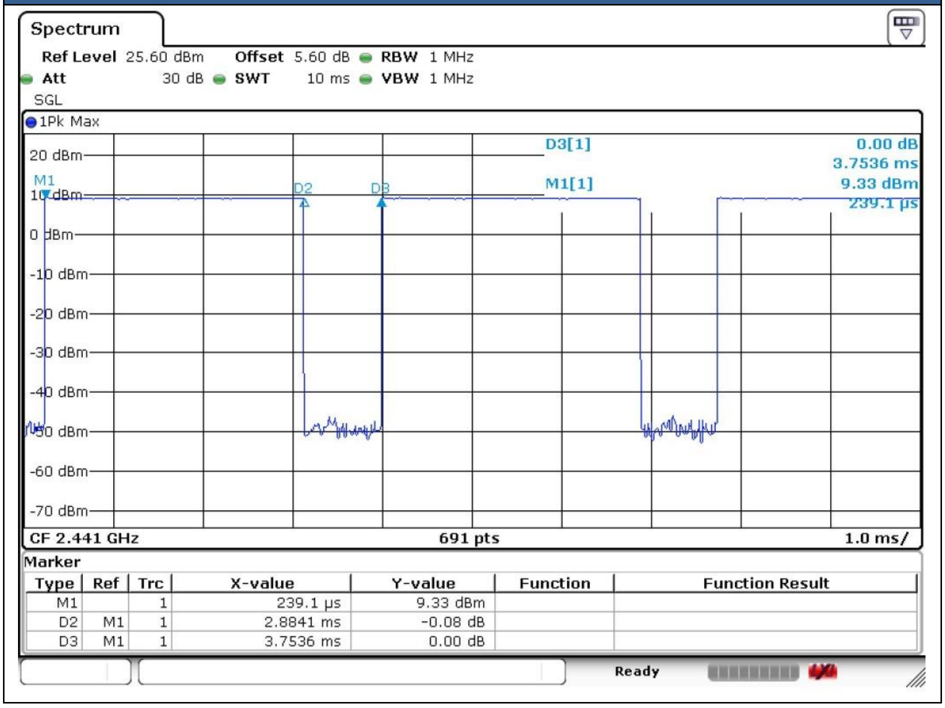
1. Per KDB 248227 D01v02r02, SAR test reduction is determined according to 802.11 transmission mode configurations and certain exposure conditions with multiple test positions. In the 2.4 GHz band, separate SAR procedures are applied to DSSS and OFDM configurations to simplify DSSS test requirements. 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 Bluetooth>

General Note:

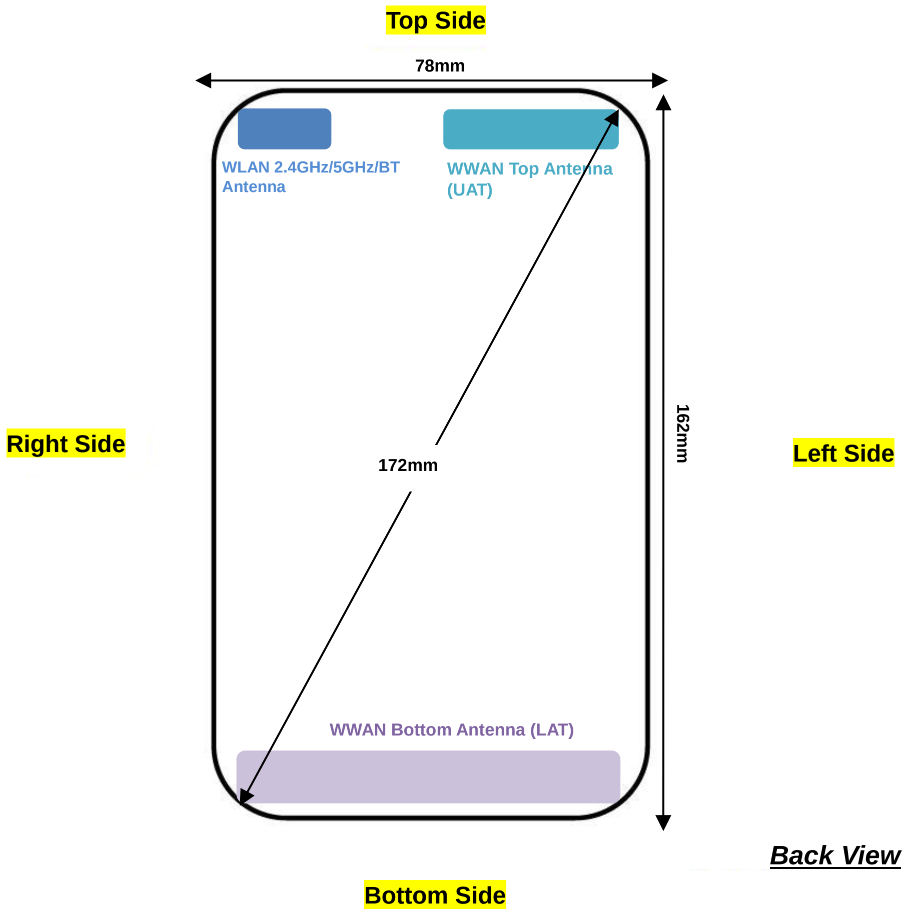
1. For 2.4GHz Bluetooth SAR testing was selected 1Mbps, due to its highest average power.
2. The Bluetooth duty cycle is 76.84% as following figure, according to 2016 Oct. TCB workshop for Bluetooth SAR scaling need further consideration and the theoretical duty cycle is 83.3%, therefore the actual duty cycle will be scaled up to the theoretical value of Bluetooth reported SAR calculation.

Bluetooth time-domain plot



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	239.1 µs	9.33 dBm		
D2	M1	1	2.8841 ms	-0.08 dB		
D3	M1	1	3.7536 ms	0.00 dB		

14. Antenna Location



Antenna	Support Band
WWAN Top Antenna	GSM: 850 WCDMA: B5 LTE: B5
WWAN Bottom Antenna	GSM: 850 / 1900 WCDMA: B2 / B4 / B5 LTE: B2 / B4 / B5 / B7 / B38 / B41
WLAN 2.4GHz/5GHz/BT Antenna	WLAN 2.4GHz WLAN 5GHz Bluetooth

Distance of the Antenna to the EUT surface/edge						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
WWAN Top Antenna(UAT)	≤ 25mm	≤ 25mm	≤ 25mm	>25mm	>25mm	≤ 25mm
WWAN Bottom Antenna(LAT)	≤ 25mm	≤ 25mm	>25mm	≤ 25mm	≤ 25mm	≤ 25mm
WLAN 2.4GHz/5GHz/BT	≤ 25mm	≤ 25mm	≤ 25mm	>25mm	≤ 25mm	>25mm

Distance of the Antenna to the EUT surface/edge						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
WWAN Top Antenna(UAT)	Yes	Yes	Yes	No	No	Yes
WWAN Bottom Antenna(LAT)	Yes	Yes	No	Yes	Yes	Yes
WLAN 2.4GHz/5GHz/BT	Yes	Yes	Yes	No	Yes	No

General Note:
Referring to KDB 941225 D06 v02r01, when the overall device length and width are ≥ 9cm*5cm, the test distance is 10 mm. SAR must be measured for all sides and surfaces with a transmitting antenna located within 25mm from that surface or edge.

15. 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
   e. For TDD LTE SAR measurement, the duty cycle 1:1.59 (62.9 %) was used perform testing and considering the theoretical duty cycle of 63.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 62.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix 63.3%/62.9% = 1.006 is applied to scale-up the measured SAR result. The Reported TDD LTE SAR = measured SAR (W/kg)* Tune-up Scaling Factor* scaling factor for extended cyclic prefix.
2. 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.
3. Per KDB648474 D04v01r03, for smart phones with a display diagonal dimension > 15cm or an overall diagonal dimension > 16cm, when hotspot mode applies, 10-g product specific SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg, in this report all the hotspot mode results are < 1.2W/kg.
4. For 5.3GHz / 5.5GHz WLAN product specific SAR is necessary too, due to an overall diagonal dimension is > 16cm.
5. This device has two WWAN transmit antennas. WWAN bottom antenna is located at the bottom edge of the device, and WWAN top antenna is located at the left side of top edge of the device which can refer to antenna location chapter. Top antenna frequency bands include GSM850, WCDMA Band V and LTE Band 5, Bottom antenna frequency bands include GSM850/1900, WCDMA Band II/IV/V and LTE Band 2/4/5/7/38/41, and they can't transmit simultaneously.
6. For WWAN Top/Bottom antenna, when the phone is in talking mode and receiver worked, the EUT will invoke corresponding work scenarios power level (receiver on power).
7. For WWAN Top/Bottom antenna, when receiver not worked, the phone away from head and near to body, the EUT will invoke corresponding work scenarios power level (receiver off power).
8. The device employs proximity sensors that detect the presence of the user's body also a finger or hand at the front, back or bottom faces of the device. When front or back or bottom face of body condition is detected, reduced power (sensor on power) will be active all WWAN bands for Bottom WWAN antenna.
9. There are three types of EUT, the difference between them is different capacity for memory, they have no effect on SAR distribution, so only choose sample 1 to perform full testing.
10. UAT means top antenna, LAT means bottom antenna.
11. For verification of compliance of power reduction scheme, additional SAR testing with EUT transmitting at full RF power at a conservative trigger distance was performed for body worn:
    Front: 15 mm
    Back: 15 mm (declared by manufacturer)
    Bottom side: 15 mm (declared by manufacturer)

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 (1Tx slots) for GSM850/GSM1900 are 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.

WCDMA 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 / DC-HSDPA / HSPA+ 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 / DC-HSDPA / HSPA+ to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA / HSPA+, and according to the following RF output power, the output power results of the secondary modes (HSDPA / HSUPA / DC-HSDPA / HSPA+) are less than ¼ dB higher than the primary modes; therefore, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA / HSPA+.

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 B4 / B5 / B38 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 B38 SAR test was covered by LTE B38; 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

WLAN/Bluetooth 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. 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.
3. 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.
4. During SAR testing the WLAN transmission was verified using a spectrum analyzer.
5. Bluetooth and WLAN share the same antenna, with similar work frequency, so for Bluetooth SAR testing, we chose the worst positon of WLAN to perform.

15.1 Head SAR

<GSM SAR>

Plot No.	Band	Mode	Test Position	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
01	GSM850-UAT	GPRS 1 Tx slot	Right Cheek	Receiver On	189	836.4	32.48	34.00	1.419	0.05	0.497	**0.705**
	GSM850-UAT	GPRS 1 Tx slot	Right Tilted	Receiver On	189	836.4	32.48	34.00	1.419	-0.09	0.415	0.589
	GSM850-UAT	GPRS 1 Tx slot	Left Cheek	Receiver On	189	836.4	32.48	34.00	1.419	-0.02	0.434	0.616
	GSM850-UAT	GPRS 1 Tx slot	Left Tilted	Receiver On	189	836.4	32.48	34.00	1.419	-0.02	0.295	0.419
	GSM850-LAT	GPRS 1 Tx slot	Right Cheek	Receiver On	189	836.4	33.13	34.50	1.371	0.05	0.034	0.046
	GSM850-LAT	GPRS 1 Tx slot	Right Tilted	Receiver On	189	836.4	33.13	34.50	1.371	0.04	0.014	0.019
	GSM850-LAT	GPRS 1 Tx slot	Left Cheek	Receiver On	189	836.4	33.13	34.50	1.371	0.08	0.028	0.039
	GSM850-LAT	GPRS 1 Tx slot	Left Tilted	Receiver On	189	836.4	33.13	34.50	1.371	0.09	0.012	0.016
	GSM1900-LAT	GPRS 1 Tx slot	Right Cheek	Receiver On	661	1880	29.90	30.00	1.023	0.06	0.061	0.062
	GSM1900-LAT	GPRS 1 Tx slot	Right Tilted	Receiver On	661	1880	29.90	30.00	1.023	-0.01	0.015	0.016
02	GSM1900-LAT	GPRS 1 Tx slot	Left Cheek	Receiver On	661	1880	29.90	30.00	1.023	-0.15	0.067	**0.068**
	GSM1900-LAT	GPRS 1 Tx slot	Left Tilted	Receiver On	661	1880	29.90	30.00	1.023	0.08	0.057	0.058

<WCDMA SAR>

Plot No.	Band	Mode	Test Position	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WCDMA II-LAT	RMC 12.2Kbps	Right Cheek	Receiver On	9400	1880	23.39	24.00	1.151	0.01	0.143	0.165
	WCDMA II-LAT	RMC 12.2Kbps	Right Tilted	Receiver On	9400	1880	23.39	24.00	1.151	0.02	0.092	0.105
03	WCDMA II-LAT	RMC 12.2Kbps	Left Cheek	Receiver On	9400	1880	23.39	24.00	1.151	0.08	0.168	**0.193**
	WCDMA II-LAT	RMC 12.2Kbps	Left Tilted	Receiver On	9400	1880	23.39	24.00	1.151	-0.07	0.135	0.155
04	WCDMA IV-LAT	RMC 12.2Kbps	Right Cheek	Receiver On	1413	1732.6	23.20	24.00	1.202	0.08	0.138	**0.166**
	WCDMA IV-LAT	RMC 12.2Kbps	Right Tilted	Receiver On	1413	1732.6	23.20	24.00	1.202	0.06	0.058	0.070
	WCDMA IV-LAT	RMC 12.2Kbps	Left Cheek	Receiver On	1413	1732.6	23.20	24.00	1.202	-0.04	0.075	0.090
	WCDMA IV-LAT	RMC 12.2Kbps	Left Tilted	Receiver On	1413	1732.6	23.20	24.00	1.202	0.02	0.069	0.083
05	WCDMA V-UAT	RMC 12.2Kbps	Right Cheek	Receiver On	4182	836.4	23.70	24.00	1.072	-0.06	0.652	**0.699**
	WCDMA V-UAT	RMC 12.2Kbps	Right Tilted	Receiver On	4182	836.4	23.70	24.00	1.072	0.02	0.500	0.536
	WCDMA V-UAT	RMC 12.2Kbps	Left Cheek	Receiver On	4182	836.4	23.70	24.00	1.072	0.12	0.516	0.553
	WCDMA V-UAT	RMC 12.2Kbps	Left Tilted	Receiver On	4182	836.4	23.70	24.00	1.072	0.05	0.414	0.444
	WCDMA V-LAT	RMC 12.2Kbps	Right Cheek	Receiver On	4182	836.4	24.54	25.00	1.112	0.05	0.172	0.191
	WCDMA V-LAT	RMC 12.2Kbps	Right Tilted	Receiver On	4182	836.4	24.54	25.00	1.112	-0.05	0.094	0.104
	WCDMA V-LAT	RMC 12.2Kbps	Left Cheek	Receiver On	4182	836.4	24.54	25.00	1.112	0.06	0.161	0.179
	WCDMA V-LAT	RMC 12.2Kbps	Left Tilted	Receiver On	4182	836.4	24.54	25.00	1.112	0.03	0.077	0.085

<FDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
06	LTE Band 2-LAT	20M	QPSK	1	0	Right Cheek	Receiver On	18900	1880	22.84	24.00	1.306	0.05	0.137	**0.179**
	LTE Band 2-LAT	20M	QPSK	50	0	Right Cheek	Receiver On	18900	1880	21.79	23.00	1.321	0.06	0.118	0.156
	LTE Band 2-LAT	20M	QPSK	1	0	Right Tilted	Receiver On	18900	1880	22.84	24.00	1.306	0.07	0.084	0.109
	LTE Band 2-LAT	20M	QPSK	50	0	Right Tilted	Receiver On	18900	1880	21.79	23.00	1.321	-0.02	0.074	0.098
	LTE Band 2-LAT	20M	QPSK	1	0	Left Cheek	Receiver On	18900	1880	22.84	24.00	1.306	0.08	0.119	0.155
	LTE Band 2-LAT	20M	QPSK	50	0	Left Cheek	Receiver On	18900	1880	21.79	23.00	1.321	0.02	0.099	0.130
	LTE Band 2-LAT	20M	QPSK	1	0	Left Tilted	Receiver On	18900	1880	22.84	24.00	1.306	0.01	0.110	0.144
	LTE Band 2-LAT	20M	QPSK	50	0	Left Tilted	Receiver On	18900	1880	21.79	23.00	1.321	0.08	0.099	0.130
07	LTE Band 4-LAT	20M	QPSK	1	0	Right Cheek	Receiver On	20175	1732.5	22.73	24.00	1.340	0.09	0.100	**0.134**
	LTE Band 4-LAT	20M	QPSK	50	0	Right Cheek	Receiver On	20175	1732.5	21.59	23.00	1.384	0.09	0.093	0.128
	LTE Band 4-LAT	20M	QPSK	1	0	Right Tilted	Receiver On	20175	1732.5	22.73	24.00	1.340	0.01	0.054	0.072
	LTE Band 4-LAT	20M	QPSK	50	0	Right Tilted	Receiver On	20175	1732.5	21.59	23.00	1.384	0.04	0.052	0.072
	LTE Band 4-LAT	20M	QPSK	1	0	Left Cheek	Receiver On	20175	1732.5	22.73	24.00	1.340	-0.06	0.074	0.099
	LTE Band 4-LAT	20M	QPSK	50	0	Left Cheek	Receiver On	20175	1732.5	21.59	23.00	1.384	0.01	0.065	0.090
	LTE Band 4-LAT	20M	QPSK	1	0	Left Tilted	Receiver On	20175	1732.5	22.73	24.00	1.340	-0.05	0.054	0.073
	LTE Band 4-LAT	20M	QPSK	50	0	Left Tilted	Receiver On	20175	1732.5	21.59	23.00	1.384	0.01	0.046	0.064
	LTE Band 5-UAT	10M	QPSK	1	0	Right Cheek	Receiver On	20525	836.5	23.38	24.00	1.153	0.05	0.630	0.727
08	LTE Band 5-UAT	10M	QPSK	25	0	Right Cheek	Receiver On	20525	836.5	23.17	24.00	1.211	-0.05	0.615	**0.745**
	LTE Band 5-UAT	10M	QPSK	1	0	Right Tilted	Receiver On	20525	836.5	23.38	24.00	1.153	-0.06	0.597	0.689
	LTE Band 5-UAT	10M	QPSK	25	0	Right Tilted	Receiver On	20525	836.5	23.17	24.00	1.211	-0.09	0.598	0.724
	LTE Band 5-UAT	10M	QPSK	1	0	Left Cheek	Receiver On	20525	836.5	23.38	24.00	1.153	0.14	0.505	0.582
	LTE Band 5-UAT	10M	QPSK	25	0	Left Cheek	Receiver On	20525	836.5	23.17	24.00	1.211	0.03	0.526	0.637
	LTE Band 5-UAT	10M	QPSK	1	0	Left Tilted	Receiver On	20525	836.5	23.38	24.00	1.153	-0.03	0.430	0.496
	LTE Band 5-UAT	10M	QPSK	25	0	Left Tilted	Receiver On	20525	836.5	23.17	24.00	1.211	-0.02	0.441	0.534
	LTE Band 5-LAT	10M	QPSK	1	0	Right Cheek	Receiver On	20525	836.5	23.54	24.00	1.112	0.1	0.121	0.135
	LTE Band 5-LAT	10M	QPSK	25	0	Right Cheek	Receiver On	20525	836.5	23.40	24.00	1.148	0.07	0.136	0.156
	LTE Band 5-LAT	10M	QPSK	1	0	Right Tilted	Receiver On	20525	836.5	23.54	24.00	1.112	-0.02	0.057	0.063
	LTE Band 5-LAT	10M	QPSK	25	0	Right Tilted	Receiver On	20525	836.5	23.40	24.00	1.148	-0.01	0.058	0.067
	LTE Band 5-LAT	10M	QPSK	1	0	Left Cheek	Receiver On	20525	836.5	23.54	24.00	1.112	0.12	0.116	0.129
	LTE Band 5-LAT	10M	QPSK	25	0	Left Cheek	Receiver On	20525	836.5	23.40	24.00	1.148	0.17	0.119	0.137
	LTE Band 5-LAT	10M	QPSK	1	0	Left Tilted	Receiver On	20525	836.5	23.54	24.00	1.112	0.1	0.067	0.075
	LTE Band 5-LAT	10M	QPSK	25	0	Left Tilted	Receiver On	20525	836.5	23.40	24.00	1.148	0.07	0.058	0.066
	LTE Band 7-LAT	20M	QPSK	1	0	Right Cheek	Receiver On	21100	2535	22.90	24.00	1.288	0.11	0.136	0.175
	LTE Band 7-LAT	20M	QPSK	50	0	Right Cheek	Receiver On	21100	2535	21.73	23.00	1.340	0.09	0.104	0.139
	LTE Band 7-LAT	20M	QPSK	1	0	Right Tilted	Receiver On	21100	2535	22.90	24.00	1.288	0.01	0.118	0.152
	LTE Band 7-LAT	20M	QPSK	50	0	Right Tilted	Receiver On	21100	2535	21.73	23.00	1.340	0.01	0.094	0.126
09	LTE Band 7-LAT	20M	QPSK	1	0	Left Cheek	Receiver On	21100	2535	22.90	24.00	1.288	0.08	0.194	**0.250**
	LTE Band 7-LAT	20M	QPSK	1	0	Left Cheek	Receiver On	21100+20902	2535+2515.5	22.38	24.00	1.452	0.02	0.134	0.195
	LTE Band 7-LAT	20M	QPSK	50	0	Left Cheek	Receiver On	21100	2535	21.73	23.00	1.340	0.02	0.171	0.229
	LTE Band 7-LAT	20M	QPSK	1	0	Left Tilted	Receiver On	21100	2535	22.90	24.00	1.288	0.07	0.160	0.206
	LTE Band 7-LAT	20M	QPSK	50	0	Left Tilted	Receiver On	21100	2535	21.73	23.00	1.340	0.08	0.128	0.171

<TDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 41-LAT	20M	QPSK	1	0	Right Cheek	Receiver On	40140	2545	23.15	24.00	1.216	62.9	1.006	0.18	0.080	0.097
	LTE Band 41-LAT	20M	QPSK	50	0	Right Cheek	Receiver On	40140	2545	22.75	24.00	1.334	62.9	1.006	0.13	0.079	0.106
	LTE Band 41-LAT	20M	QPSK	1	0	Right Tilted	Receiver On	40140	2545	23.15	24.00	1.216	62.9	1.006	0.15	0.066	0.081
	LTE Band 41-LAT	20M	QPSK	50	0	Right Tilted	Receiver On	40140	2545	22.75	24.00	1.334	62.9	1.006	0.16	0.068	0.091
10	LTE Band 41-LAT	20M	QPSK	1	0	Left Cheek	Receiver On	40140	2545	23.15	24.00	1.216	62.9	1.006	0	0.120	0.147
	LTE Band 38-LAT	20M	QPSK	1	0	Left Cheek	Receiver On	37901+38099	2585.1+2604.9	22.32	24.00	1.472	62.9	1.006	-0.03	0.092	0.136
	LTE Band 41-LAT	20M	QPSK	50	0	Left Cheek	Receiver On	40140	2545	22.75	24.00	1.334	62.9	1.006	0.15	0.108	0.145
	LTE Band 41-LAT	20M	QPSK	1	0	Left Tilted	Receiver On	40140	2545	23.15	24.00	1.216	62.9	1.006	0.14	0.109	0.133
	LTE Band 41-LAT	20M	QPSK	50	0	Left Tilted	Receiver On	40140	2545	22.75	24.00	1.334	62.9	1.006	0.17	0.099	0.132

<WLAN 2.4GHz SAR>

Plot No.	Band	Mode	Test Position	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	6	2437	14.82	16.50	1.472	100	1.000	-0.05	0.242	0.356
	WLAN2.4GHz	802.11b 1Mbps	Right Tilted	6	2437	14.82	16.50	1.472	100	1.000	-0.05	0.264	0.389
11	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	6	2437	14.82	16.50	1.472	100	1.000	-0.03	0.484	0.713
	WLAN2.4GHz	802.11b 1Mbps	Left Tilted	6	2437	14.82	16.50	1.472	100	1.000	0.04	0.472	0.695

<Bluetooth SAR>

Plot No.	Band	Mode	Test Position	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)
12	Bluetooth	1Mbps	Left Cheek	39	2441	8.84	10.00	1.306	76.84	1.084	0.09	0.040	0.056

<WLAN 5GHz SAR>

Plot No.	Band	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WLAN5.3GHz	802.11a 6Mbps	Right Cheek	60	5300	16.14	17.00	1.219	96.97	1.031	0.05	0.353	0.444
	WLAN5.3GHz	802.11a 6Mbps	Right Tilted	60	5300	16.14	17.00	1.219	96.97	1.031	0.01	0.549	0.690
	WLAN5.3GHz	802.11a 6Mbps	Left Cheek	60	5300	16.14	17.00	1.219	96.97	1.031	0.09	0.670	0.842
	WLAN5.3GHz	802.11a 6Mbps	Left Cheek	64	5320	16.02	17.00	1.253	96.97	1.031	0.01	0.562	0.726
	WLAN5.3GHz	802.11a 6Mbps	Left Tilted	60	5300	16.14	17.00	1.219	96.97	1.031	0.04	0.665	0.836
13	WLAN5.3GHz	802.11a 6Mbps	Left Tilted	64	5320	16.02	17.00	1.253	96.97	1.031	0.04	0.653	0.844
	WLAN5.5GHz	802.11a 6Mbps	Right Cheek	116	5580	14.46	16.00	1.426	96.97	1.031	0.14	0.265	0.389
	WLAN5.5GHz	802.11a 6Mbps	Right Tilted	116	5580	14.46	16.00	1.426	96.97	1.031	0.03	0.378	0.556
	WLAN5.5GHz	802.11a 6Mbps	Left Cheek	116	5580	14.46	16.00	1.426	96.97	1.031	0.04	0.516	0.758
14	WLAN5.5GHz	802.11a 6Mbps	Left Tilted	116	5580	14.46	16.00	1.426	96.97	1.031	0.04	0.573	0.842
	WLAN5.5GHz	802.11a 6Mbps	Left Tilted	100	5500	14.41	16.00	1.442	96.97	1.031	0.12	0.562	0.836
	WLAN5.8GHz	802.11a 6Mbps	Right Cheek	161	5805	12.22	14.00	1.507	96.97	1.031	0.01	0.126	0.196
	WLAN5.8GHz	802.11a 6Mbps	Right Tilted	161	5805	12.22	14.00	1.507	96.97	1.031	0.09	0.190	0.295
	WLAN5.8GHz	802.11a 6Mbps	Left Cheek	161	5805	12.22	14.00	1.507	96.97	1.031	0.03	0.254	0.395
15	WLAN5.8GHz	802.11a 6Mbps	Left Tilted	161	5805	12.22	14.00	1.507	96.97	1.031	0.05	0.307	0.477

15.2 Hotspot SAR

<GSM SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	GSM850-UAT	GPRS 1 Tx slot	Front	10	Receiver Off	189	836.4	32.49	33.50	1.262	-0.02	0.097	0.122
	GSM850-UAT	GPRS 1 Tx slot	Back	10	Receiver Off	189	836.4	32.49	33.50	1.262	-0.03	0.191	0.241
	GSM850-UAT	GPRS 1 Tx slot	Left Side	10	Receiver Off	189	836.4	32.49	33.50	1.262	0.08	0.110	0.139
	GSM850-UAT	GPRS 1 Tx slot	Top Side	10	Receiver Off	189	836.4	32.49	33.50	1.262	0.06	0.133	0.168
	GSM850-LAT	GPRS 1 Tx slot	Front	10	Sensor On	189	836.4	32.41	33.50	1.285	-0.02	0.137	0.176
16	GSM850-LAT	GPRS 1 Tx slot	Back	10	Sensor On	189	836.4	32.41	33.50	1.285	-0.01	0.284	**0.365**
	GSM850-LAT	GPRS 1 Tx slot	Left Side	10	Receiver Off	189	836.4	33.13	34.50	1.371	0.04	0.164	0.225
	GSM850-LAT	GPRS 1 Tx slot	Right Side	10	Receiver Off	189	836.4	33.13	34.50	1.371	0.06	0.195	0.267
	GSM850-LAT	GPRS 1 Tx slot	Bottom Side	10	Sensor On	189	836.4	32.41	33.50	1.285	-0.06	0.165	0.212
	GSM1900-LAT	GPRS 1 Tx slot	Front	10	Sensor On	661	1880	28.85	29.00	1.035	0.05	0.154	0.159
	GSM1900-LAT	GPRS 1 Tx slot	Back	10	Sensor On	661	1880	28.85	29.00	1.035	-0.06	0.285	0.295
	GSM1900-LAT	GPRS 1 Tx slot	Left Side	10	Sensor Off	661	1880	29.90	30.00	1.023	-0.01	0.125	0.128
	GSM1900-LAT	GPRS 1 Tx slot	Right Side	10	Sensor Off	661	1880	29.90	30.00	1.023	0.01	0.049	0.050
17	GSM1900-LAT	GPRS 1 Tx slot	Bottom Side	10	Sensor On	661	1880	28.85	29.00	1.035	0.01	0.414	**0.429**

<WCDMA SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WCDMA II-LAT	RMC 12.2Kbps	Front	10	Sensor On	9400	1880	20.41	21.00	1.146	0.06	0.194	0.222
	WCDMA II-LAT	RMC 12.2Kbps	Back	10	Sensor On	9400	1880	20.41	21.00	1.146	-0.05	0.281	0.322
	WCDMA II-LAT	RMC 12.2Kbps	Left Side	10	Receiver Off	9400	1880	23.39	24.00	1.151	0.08	0.243	0.280
	WCDMA II-LAT	RMC 12.2Kbps	Right Side	10	Receiver Off	9400	1880	23.39	24.00	1.151	0.05	0.114	0.131
18	WCDMA II-LAT	RMC 12.2Kbps	Bottom Side	10	Sensor On	9400	1880	20.41	21.00	1.146	0.03	0.432	**0.495**
	WCDMA IV-LAT	RMC 12.2Kbps	Front	10	Sensor On	1413	1732.6	22.21	22.50	1.069	-0.08	0.200	0.214
	WCDMA IV-LAT	RMC 12.2Kbps	Back	10	Sensor On	1413	1732.6	22.21	22.50	1.069	-0.01	0.937	1.002
19	WCDMA IV-LAT	RMC 12.2Kbps	Back	10	Sensor On	1312	1712.4	22.16	22.50	1.081	-0.03	0.974	**1.053**
	WCDMA IV-LAT	RMC 12.2Kbps	Back	10	Sensor On	1513	1752.6	22.15	22.50	1.084	0.09	0.817	0.886
	WCDMA IV-LAT	RMC 12.2Kbps	Left Side	10	Receiver Off	1413	1732.6	23.20	24.00	1.202	-0.05	0.220	0.264
	WCDMA IV-LAT	RMC 12.2Kbps	Right Side	10	Receiver Off	1413	1732.6	23.20	24.00	1.202	0.04	0.122	0.147
	WCDMA IV-LAT	RMC 12.2Kbps	Bottom Side	10	Sensor On	1413	1732.6	22.21	22.50	1.069	0.02	0.680	0.727
	WCDMA IV-LAT	RMC 12.2Kbps	Bottom Side	10	Sensor On	1312	1712.4	22.16	22.50	1.081	0.05	0.665	0.719
	WCDMA IV-LAT	RMC 12.2Kbps	Bottom Side	10	Sensor On	1513	1752.6	22.15	22.50	1.084	-0.08	0.661	0.716
	WCDMA V-UAT	RMC 12.2Kbps	Front	10	Receiver Off	4182	836.4	23.70	24.00	1.072	0	0.128	0.137
	WCDMA V-UAT	RMC 12.2Kbps	Back	10	Receiver Off	4182	836.4	23.70	24.00	1.072	-0.03	0.181	0.194
	WCDMA V-UAT	RMC 12.2Kbps	Left Side	10	Receiver Off	4182	836.4	23.70	24.00	1.072	0.03	0.110	0.118
	WCDMA V-UAT	RMC 12.2Kbps	Top Side	10	Receiver Off	4182	836.4	23.70	24.00	1.072	0.09	0.022	0.023
	WCDMA V-LAT	RMC 12.2Kbps	Front	10	Sensor On	4182	836.4	23.59	24.00	1.099	-0.04	0.203	0.223
20	WCDMA V-LAT	RMC 12.2Kbps	Back	10	Sensor On	4182	836.4	23.59	24.00	1.099	-0.05	0.389	**0.428**
	WCDMA V-LAT	RMC 12.2Kbps	Left Side	10	Receiver Off	4182	836.4	24.54	25.00	1.112	0.05	0.146	0.162
	WCDMA V-LAT	RMC 12.2Kbps	Right Side	10	Receiver Off	4182	836.4	24.54	25.00	1.112	0.01	0.103	0.115
	WCDMA V-LAT	RMC 12.2Kbps	Bottom Side	10	Sensor On	4182	836.4	23.59	24.00	1.099	0.04	0.263	0.289

<FDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 2-LAT	20M	QPSK	1	0	Front	10	Sensor On	18900	1880	20.78	22.00	1.324	0.05	0.169	0.224
	LTE Band 2-LAT	20M	QPSK	50	0	Front	10	Sensor On	18900	1880	20.68	22.00	1.355	-0.04	0.179	0.243
	LTE Band 2-LAT	20M	QPSK	1	0	Back	10	Sensor On	18900	1880	20.78	22.00	1.324	0.01	0.501	0.663
	LTE Band 2-LAT	20M	QPSK	50	0	Back	10	Sensor On	18900	1880	20.68	22.00	1.355	-0.05	0.511	0.693
	LTE Band 2-LAT	20M	QPSK	1	0	Left Side	10	Receiver Off	18900	1880	22.84	24.00	1.306	0.06	0.194	0.253
	LTE Band 2-LAT	20M	QPSK	50	0	Left Side	10	Receiver Off	18900	1880	21.79	23.00	1.321	0.05	0.157	0.207
	LTE Band 2-LAT	20M	QPSK	1	0	Right Side	10	Receiver Off	18900	1880	22.84	24.00	1.306	-0.06	0.104	0.136
	LTE Band 2-LAT	20M	QPSK	50	0	Right Side	10	Receiver Off	18900	1880	21.79	23.00	1.321	0.09	0.081	0.106
	LTE Band 2-LAT	20M	QPSK	1	0	Bottom Side	10	Sensor On	18900	1880	20.78	22.00	1.324	-0.04	0.541	0.716
21	LTE Band 2-LAT	20M	QPSK	50	0	Bottom Side	10	Sensor On	18900	1880	20.68	22.00	1.355	-0.01	0.536	**0.726**
	LTE Band 4-LAT	20M	QPSK	1	0	Front	10	Sensor On	20175	1732.5	21.82	23.00	1.312	0.04	0.169	0.222
	LTE Band 4-LAT	20M	QPSK	50	0	Front	10	Sensor On	20175	1732.5	21.68	23.00	1.355	-0.08	0.178	0.241
	LTE Band 4-LAT	20M	QPSK	1	0	Back	10	Sensor On	20175	1732.5	21.82	23.00	1.312	0.04	0.816	1.071
	LTE Band 4-LAT	20M	QPSK	50	0	Back	10	Sensor On	20175	1732.5	21.68	23.00	1.355	-0.01	0.780	1.057
22	LTE Band 4-LAT	20M	QPSK	100	0	Back	10	Sensor On	20175	1732.5	21.82	23.00	1.312	-0.02	0.831	**1.090**
	LTE Band 4-LAT	20M	QPSK	1	0	Left Side	10	Receiver Off	20175	1732.5	22.73	24.00	1.340	0.09	0.149	0.200
	LTE Band 4-LAT	20M	QPSK	50	0	Left Side	10	Receiver Off	20175	1732.5	21.59	23.00	1.384	0.06	0.150	0.208
	LTE Band 4-LAT	20M	QPSK	1	0	Right Side	10	Receiver Off	20175	1732.5	22.73	24.00	1.340	-0.04	0.100	0.134
	LTE Band 4-LAT	20M	QPSK	50	0	Right Side	10	Receiver Off	20175	1732.5	21.59	23.00	1.384	0.05	0.089	0.124
	LTE Band 4-LAT	20M	QPSK	1	0	Bottom Side	10	Sensor On	20175	1732.5	21.82	23.00	1.312	-0.03	0.714	0.937
	LTE Band 4-LAT	20M	QPSK	50	0	Bottom Side	10	Sensor On	20175	1732.5	21.68	23.00	1.355	0.02	0.702	0.951
	LTE Band 4-LAT	20M	QPSK	100	0	Bottom Side	10	Sensor On	20175	1732.5	21.82	23.00	1.312	-0.08	0.745	0.978
	LTE Band 5-UAT	10M	QPSK	1	0	Front	10	Receiver Off	20525	836.5	23.38	24.00	1.153	0	0.139	0.160
	LTE Band 5-UAT	10M	QPSK	25	0	Front	10	Receiver Off	20525	836.5	23.17	24.00	1.211	0	0.144	0.174
	LTE Band 5-UAT	10M	QPSK	1	0	Back	10	Receiver Off	20525	836.5	23.38	24.00	1.153	-0.01	0.244	0.281
	LTE Band 5-UAT	10M	QPSK	25	0	Back	10	Receiver Off	20525	836.5	23.17	24.00	1.211	0.18	0.217	0.263
	LTE Band 5-UAT	10M	QPSK	1	0	Left Side	10	Receiver Off	20525	836.5	23.38	24.00	1.153	0.01	0.133	0.153
	LTE Band 5-UAT	10M	QPSK	25	0	Left Side	10	Receiver Off	20525	836.5	23.17	24.00	1.211	0	0.140	0.169
	LTE Band 5-UAT	10M	QPSK	1	0	Top Side	10	Receiver Off	20525	836.5	23.38	24.00	1.153	-0.05	0.162	0.187
	LTE Band 5-UAT	10M	QPSK	25	0	Top Side	10	Receiver Off	20525	836.5	23.17	24.00	1.211	-0.04	0.167	0.202
	LTE Band 5-LAT	10M	QPSK	1	0	Front	10	Sensor On	20525	836.5	23.54	24.00	1.112	-0.01	0.120	0.133
	LTE Band 5-LAT	10M	QPSK	25	0	Front	10	Sensor On	20525	836.5	23.40	24.00	1.148	0.01	0.126	0.145
	LTE Band 5-LAT	10M	QPSK	1	0	Back	10	Sensor On	20525	836.5	23.54	24.00	1.112	-0.02	0.247	0.275
23	LTE Band 5-LAT	10M	QPSK	25	0	Back	10	Sensor On	20525	836.5	23.40	24.00	1.148	-0.03	0.245	**0.281**
	LTE Band 5-LAT	10M	QPSK	1	0	Left Side	10	Receiver Off	20525	836.5	24.35	25.00	1.161	0.01	0.133	0.154
	LTE Band 5-LAT	10M	QPSK	25	0	Left Side	10	Receiver Off	20525	836.5	23.34	24.00	1.164	0.03	0.105	0.122
	LTE Band 5-LAT	10M	QPSK	1	0	Right Side	10	Receiver Off	20525	836.5	24.35	25.00	1.161	0.01	0.188	0.218
	LTE Band 5-LAT	10M	QPSK	25	0	Right Side	10	Receiver Off	20525	836.5	23.34	24.00	1.164	0.01	0.153	0.178
	LTE Band 5-LAT	10M	QPSK	1	0	Bottom Side	10	Sensor On	20525	836.5	23.54	24.00	1.112	0.1	0.155	0.172
	LTE Band 5-LAT	10M	QPSK	25	0	Bottom Side	10	Sensor On	20525	836.5	23.40	24.00	1.148	0.09	0.166	0.191
	LTE Band 7-LAT	20M	QPSK	1	0	Front	10	Sensor On	21100	2535	21.90	23.00	1.288	0.14	0.436	0.562
	LTE Band 7-LAT	20M	QPSK	50	0	Front	10	Sensor On	21100	2535	21.79	23.00	1.321	0.15	0.337	0.445
	LTE Band 7-LAT	20M	QPSK	1	0	Back	10	Sensor On	21100	2535	21.90	23.00	1.288	0.06	0.551	0.710
	LTE Band 7-LAT	20M	QPSK	1	0	Back	10	Sensor On	21100+20902	2535+2515.5	21.68	23.00	1.355	0.01	0.501	0.679
	LTE Band 7-LAT	20M	QPSK	50	0	Back	10	Sensor On	21100	2535	21.79	23.00	1.321	-0.19	0.521	0.688
	LTE Band 7-LAT	20M	QPSK	1	0	Left Side	10	Receiver Off	21100	2535	22.90	24.00	1.288	0.08	0.470	0.605
	LTE Band 7-LAT	20M	QPSK	50	0	Left Side	10	Receiver Off	21100	2535	21.73	23.00	1.340	0.09	0.370	0.496
	LTE Band 7-LAT	20M	QPSK	1	0	Right Side	10	Receiver Off	21100	2535	22.90	24.00	1.288	-0.02	0.185	0.238
	LTE Band 7-LAT	20M	QPSK	50	0	Right Side	10	Receiver Off	21100	2535	21.73	23.00	1.340	-0.02	0.141	0.189
24	LTE Band 7-LAT	20M	QPSK	1	0	Bottom Side	10	Sensor On	21100	2535	21.90	23.00	1.288	0.06	0.619	**0.797**
	LTE Band 7-LAT	20M	QPSK	1	0	Bottom Side	10	Sensor On	21100+20902	2535+2515.5	21.68	23.00	1.355	0.03	0.575	0.779
	LTE Band 7-LAT	20M	QPSK	50	0	Bottom Side	10	Sensor On	21100	2535	21.79	23.00	1.321	0.09	0.601	0.794
	LTE Band 7-LAT	20M	QPSK	100	0	Bottom Side	10	Sensor On	21100	2535	21.68	23.00	1.355	0.09	0.502	0.680

<TDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 41-LAT	20M	QPSK	1	0	Front	10	Sensor On	40140	2545	23.15	24.00	1.216	62.9	1.006	0.17	0.254	0.311
	LTE Band 41-LAT	20M	QPSK	50	0	Front	10	Sensor On	40140	2545	22.75	24.00	1.334	62.9	1.006	0.14	0.255	0.342
	LTE Band 41-LAT	20M	QPSK	1	0	Back	10	Sensor On	40140	2545	23.15	24.00	1.216	62.9	1.006	-0.04	0.445	0.544
25	LTE Band 41-LAT	20M	QPSK	50	0	Back	10	Sensor On	40140	2545	22.75	24.00	1.334	62.9	1.006	-0.05	0.459	0.616
	LTE Band 38-LAT	20M	QPSK	50	0	Back	10	Sensor On	37901+38099	2585.1+2604.9	22.32	24.00	1.472	62.9	1.006	-0.03	0.092	0.136
	LTE Band 41-LAT	20M	QPSK	1	0	Left Side	10	Receiver Off	40140	2545	23.99	25.00	1.262	62.9	1.006	0.04	0.401	0.509
	LTE Band 41-LAT	20M	QPSK	50	0	Left Side	10	Receiver Off	40140	2545	22.93	24.00	1.279	62.9	1.006	0.01	0.389	0.501
	LTE Band 41-LAT	20M	QPSK	1	0	Right Side	10	Receiver Off	40140	2545	23.99	25.00	1.262	62.9	1.006	0.04	0.106	0.135
	LTE Band 41-LAT	20M	QPSK	50	0	Right Side	10	Receiver Off	40140	2545	22.93	24.00	1.279	62.9	1.006	0.14	0.083	0.106
	LTE Band 41-LAT	20M	QPSK	1	0	Bottom Side	10	Sensor On	40140	2545	23.15	24.00	1.216	62.9	1.006	0.11	0.381	0.466
	LTE Band 41-LAT	20M	QPSK	50	0	Bottom Side	10	Sensor On	40140	2545	22.75	24.00	1.334	62.9	1.006	0.09	0.382	0.512

<WLAN 2.4GHz 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	10	6	2437	14.82	16.50	1.472	100	1.000	0.03	0.124	0.183
26	WLAN2.4GHz	802.11b 1Mbps	Back	10	6	2437	14.82	16.50	1.472	100	1.000	0.05	0.189	0.278
	WLAN2.4GHz	802.11b 1Mbps	Right Side	10	6	2437	14.82	16.50	1.472	100	1.000	0.15	0.118	0.174
	WLAN2.4GHz	802.11b 1Mbps	Top Side	10	6	2437	14.82	16.50	1.472	100	1.000	0.04	0.010	0.015

<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)
27	Bluetooth	1Mbps	Back	10	39	2441	8.84	10.00	1.306	76.84	1.084	-0.01	0.007	0.010

<WLAN 5GHz 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)
	WLAN5.2GHz	802.11a 6Mbps	Front	10	48	5240	16.08	17.00	1.236	96.97	1.031	-0.03	0.141	0.180
	WLAN5.2GHz	802.11a 6Mbps	Back	10	48	5240	16.08	17.00	1.236	96.97	1.031	-0.05	0.521	0.664
	WLAN5.2GHz	802.11a 6Mbps	Right Side	10	48	5240	16.08	17.00	1.236	96.97	1.031	0.04	0.154	0.196
28	WLAN5.2GHz	802.11a 6Mbps	Top Side	10	48	5240	16.08	17.00	1.236	96.97	1.031	0.02	0.618	0.787
	WLAN5.8GHz	802.11a 6Mbps	Front	10	161	5805	12.22	14.00	1.507	96.97	1.031	-0.19	0.081	0.126
	WLAN5.8GHz	802.11a 6Mbps	Back	10	161	5805	12.22	14.00	1.507	96.97	1.031	0.09	0.125	0.194
	WLAN5.8GHz	802.11a 6Mbps	Right Side	10	161	5805	12.22	14.00	1.507	96.97	1.031	0.04	0.120	0.186
29	WLAN5.8GHz	802.11a 6Mbps	Top Side	10	161	5805	12.22	14.00	1.507	96.97	1.031	0	0.221	0.343

15.3 Body Worn Accessory SAR

<GSM SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	GSM850-UAT	GPRS 1 Tx slot	Front	10	Receiver Off	189	836.4	32.49	33.50	1.262	-0.02	0.097	0.122
	GSM850-UAT	GPRS 1 Tx slot	Back	10	Receiver Off	189	836.4	32.49	33.50	1.262	-0.03	0.191	0.241
	GSM850-LAT	GPRS 1 Tx slot	Front	10	Sensor On	189	836.4	32.41	33.50	1.285	-0.02	0.137	0.176
30	GSM850-LAT	GPRS 1 Tx slot	Back	10	Sensor On	189	836.4	32.41	33.50	1.285	-0.01	0.284	0.365
	GSM1900-LAT	GPRS 1 Tx slot	Front	10	Sensor On	661	1880	28.85	29.00	1.035	0.05	0.154	0.159
31	GSM1900-LAT	GPRS 1 Tx slot	Back	10	Sensor On	661	1880	28.85	29.00	1.035	-0.06	0.285	0.295

<WCDMA SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WCDMA II-LAT	RMC 12.2Kbps	Front	10	Sensor On	9400	1880	20.41	21.00	1.146	0.06	0.194	0.222
32	WCDMA II-LAT	RMC 12.2Kbps	Back	10	Sensor On	9400	1880	20.41	21.00	1.146	-0.05	0.281	0.322
	WCDMA IV-LAT	RMC 12.2Kbps	Front	10	Sensor On	1413	1732.6	22.21	22.50	1.069	-0.08	0.200	0.214
	WCDMA IV-LAT	RMC 12.2Kbps	Back	10	Sensor On	1413	1732.6	22.21	22.50	1.069	-0.01	0.937	1.002
33	WCDMA IV-LAT	RMC 12.2Kbps	Back	10	Sensor On	1312	1712.4	22.16	22.50	1.081	-0.03	0.974	1.053
	WCDMA IV-LAT	RMC 12.2Kbps	Back	10	Sensor On	1513	1752.6	22.15	22.50	1.084	0.09	0.817	0.886
	WCDMA V-UAT	RMC 12.2Kbps	Front	10	Receiver Off	4182	836.4	23.70	24.00	1.072	0	0.128	0.137
	WCDMA V-UAT	RMC 12.2Kbps	Back	10	Receiver Off	4182	836.4	23.70	24.00	1.072	-0.03	0.181	0.194
	WCDMA V-LAT	RMC 12.2Kbps	Front	10	Sensor On	4182	836.4	23.59	24.00	1.099	-0.04	0.203	0.223
34	WCDMA V-LAT	RMC 12.2Kbps	Back	10	Sensor On	4182	836.4	23.59	24.00	1.099	-0.05	0.389	0.428

<FDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 2-LAT	20M	QPSK	1	0	Front	10	Sensor On	18900	1880	20.78	22.00	1.324	0.05	0.169	0.224
	LTE Band 2-LAT	20M	QPSK	50	0	Front	10	Sensor On	18900	1880	20.68	22.00	1.355	-0.04	0.179	0.243
	LTE Band 2-LAT	20M	QPSK	1	0	Back	10	Sensor On	18900	1880	20.78	22.00	1.324	0.01	0.501	0.663
35	LTE Band 2-LAT	20M	QPSK	50	0	Back	10	Sensor On	18900	1880	20.68	22.00	1.355	-0.05	0.511	0.693
	LTE Band 4-LAT	20M	QPSK	1	0	Front	10	Sensor On	20175	1732.5	21.82	23.00	1.312	0.04	0.169	0.222
	LTE Band 4-LAT	20M	QPSK	50	0	Front	10	Sensor On	20175	1732.5	21.68	23.00	1.355	-0.08	0.178	0.241
	LTE Band 4-LAT	20M	QPSK	1	0	Back	10	Sensor On	20175	1732.5	21.82	23.00	1.312	0.04	0.816	1.071
	LTE Band 4-LAT	20M	QPSK	50	0	Back	10	Sensor On	20175	1732.5	21.68	23.00	1.355	-0.01	0.780	1.057
36	LTE Band 4-LAT	20M	QPSK	100	0	Back	10	Sensor On	20175	1732.5	21.82	23.00	1.312	-0.02	0.831	1.090
	LTE Band 5-UAT	10M	QPSK	1	0	Front	10	Receiver Off	20525	836.5	23.38	24.00	1.153	0	0.139	0.160
	LTE Band 5-UAT	10M	QPSK	25	0	Front	10	Receiver Off	20525	836.5	23.17	24.00	1.211	0	0.144	0.174
	LTE Band 5-UAT	10M	QPSK	1	0	Back	10	Receiver Off	20525	836.5	23.38	24.00	1.153	-0.01	0.244	0.281
	LTE Band 5-UAT	10M	QPSK	25	0	Back	10	Receiver Off	20525	836.5	23.17	24.00	1.211	0.18	0.217	0.263
	LTE Band 5-LAT	10M	QPSK	1	0	Front	10	Sensor On	20525	836.5	23.54	24.00	1.112	-0.01	0.120	0.133
	LTE Band 5-LAT	10M	QPSK	25	0	Front	10	Sensor On	20525	836.5	23.40	24.00	1.148	0.01	0.126	0.145
	LTE Band 5-LAT	10M	QPSK	1	0	Back	10	Sensor On	20525	836.5	23.54	24.00	1.112	-0.02	0.247	0.275
37	LTE Band 5-LAT	10M	QPSK	25	0	Back	10	Sensor On	20525	836.5	23.40	24.00	1.148	-0.03	0.245	0.281
	LTE Band 7-LAT	20M	QPSK	1	0	Front	10	Sensor On	21100	2535	21.90	23.00	1.288	0.14	0.436	0.562
	LTE Band 7-LAT	20M	QPSK	50	0	Front	10	Sensor On	21100	2535	21.79	23.00	1.321	0.15	0.337	0.445
38	LTE Band 7-LAT	20M	QPSK	1	0	Back	10	Sensor On	21100	2535	21.90	23.00	1.288	0.06	0.551	0.710
	LTE Band 7-LAT	20M	QPSK	1	0	Back	10	Sensor On	21100+20902	2535+2515.5	21.68	23.00	1.355	0.01	0.501	0.679
	LTE Band 7-LAT	20M	QPSK	50	0	Back	10	Sensor On	21100	2535	21.79	23.00	1.321	-0.19	0.521	0.688

<TDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 41-LAT	20M	QPSK	1	0	Front	10	Sensor On	40140	2545	23.15	24.00	1.216	62.9	1.006	0.17	0.254	0.311
	LTE Band 41-LAT	20M	QPSK	50	0	Front	10	Sensor On	40140	2545	22.75	24.00	1.334	62.9	1.006	0.14	0.255	0.342
	LTE Band 41-LAT	20M	QPSK	1	0	Back	10	Sensor On	40140	2545	23.15	24.00	1.216	62.9	1.006	-0.04	0.445	0.544
39	LTE Band 41-LAT	20M	QPSK	50	0	Back	10	Sensor On	40140	2545	22.75	24.00	1.334	62.9	1.006	-0.05	0.459	**0.616**
	LTE Band 38-LAT	20M	QPSK	50	0	Back	10	Sensor On	37901+38099	2585.1+2604.9	22.43	24.00	1.435	62.9	1.006	0.02	0.402	0.581

<WLAN 2.4GHz 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	10	6	2437	14.82	16.50	1.472	100	1.000	0.03	0.124	0.183
40	WLAN2.4GHz	802.11b 1Mbps	Back	10	6	2437	14.82	16.50	1.472	100	1.000	0.05	0.189	**0.278**

<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)
41	Bluetooth	1Mbps	Back	10	39	2441	8.84	10.00	1.306	76.84	1.084	-0.01	0.007	**0.010**

<WLAN 5GHz 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)
	WLAN5.2GHz	802.11a 6Mbps	Front	10	48	5240	16.08	17.00	1.236	96.97	1.031	-0.03	0.141	0.180
42	WLAN5.2GHz	802.11a 6Mbps	Back	10	48	5240	16.08	17.00	1.236	96.97	1.031	-0.05	0.521	**0.664**
	WLAN5.3GHz	802.11a 6Mbps	Front	10	60	5300	16.14	17.00	1.219	96.97	1.031	-0.02	0.191	0.240
43	WLAN5.3GHz	802.11a 6Mbps	Back	10	60	5300	16.14	17.00	1.219	96.97	1.031	0	0.464	**0.583**
	WLAN5.5GHz	802.11a 6Mbps	Front	10	116	5580	14.46	16.00	1.426	96.97	1.031	0.08	0.139	0.204
44	WLAN5.5GHz	802.11a 6Mbps	Back	10	116	5580	14.46	16.00	1.426	96.97	1.031	0.06	0.328	**0.482**
	WLAN5.8GHz	802.11a 6Mbps	Front	10	161	5805	12.22	14.00	1.507	96.97	1.031	-0.19	0.081	0.126
45	WLAN5.8GHz	802.11a 6Mbps	Back	10	161	5805	12.22	14.00	1.507	96.97	1.031	0.09	0.125	**0.194**

15.5 Product Specific SAR

<WLAN 5GHz 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)
	WLAN5.3GHz	802.11a 6Mbps	Front	0	60	5300	16.14	17.00	1.219	96.97	1.031	0.01	0.257	0.323
	WLAN5.3GHz	802.11a 6Mbps	Back	0	60	5300	16.14	17.00	1.219	96.97	1.031	0.05	0.778	0.978
	WLAN5.3GHz	802.11a 6Mbps	Right Side	0	60	5300	16.14	17.00	1.219	96.97	1.031	0.03	0.210	0.264
46	WLAN5.3GHz	802.11a 6Mbps	Top Side	0	60	5300	16.14	17.00	1.219	96.97	1.031	-0.02	1.100	**1.382**
	WLAN5.5GHz	802.11a 6Mbps	Front	0	116	5580	14.46	16.00	1.426	96.97	1.031	0.02	0.237	0.348
	WLAN5.5GHz	802.11a 6Mbps	Back	0	116	5580	14.46	16.00	1.426	96.97	1.031	0.04	0.660	0.970
	WLAN5.5GHz	802.11a 6Mbps	Right Side	0	116	5580	14.46	16.00	1.426	96.97	1.031	0.08	0.249	0.366
47	WLAN5.5GHz	802.11a 6Mbps	Top Side	0	116	5580	14.46	16.00	1.426	96.97	1.031	-0.06	0.961	**1.412**

15.6 Verified Distance SAR for Proximity Sensor Off

<GSM SAR>

Band	Mode	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
GSM850-LAT	GPRS 1 Tx slot	Front	15	Sensor Off	189	836.4	33.13	34.50	1.371	0.01	0.118	0.162
GSM850-LAT	GPRS 1 Tx slot	Back	15	Sensor Off	189	836.4	33.13	34.50	1.371	0.02	0.204	0.280
GSM850-LAT	GPRS 1 Tx slot	Bottom Side	15	Sensor Off	189	836.4	33.13	34.50	1.371	0.03	0.062	0.085
GSM1900-LAT	GPRS 1 Tx slot	Front	15	Sensor Off	661	1880	29.90	30.00	1.023	0.08	0.089	0.091
GSM1900-LAT	GPRS 1 Tx slot	Back	15	Sensor Off	661	1880	29.90	30.00	1.023	0.04	0.173	0.177
GSM1900-LAT	GPRS 1 Tx slot	Bottom Side	15	Sensor Off	661	1880	29.90	30.00	1.023	-0.02	0.187	0.191

<WCDMA SAR>

Band	Mode	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
WCDMA II-LAT	RMC 12.2Kbps	Front	15	Sensor Off	9400	1880	23.39	24.00	1.151	-0.01	0.186	0.214
WCDMA II-LAT	RMC 12.2Kbps	Back	15	Sensor Off	9400	1880	23.39	24.00	1.151	0.09	0.265	0.305
WCDMA II-LAT	RMC 12.2Kbps	Bottom Side	15	Sensor Off	9400	1880	23.39	24.00	1.151	-0.02	0.421	0.484
WCDMA IV-LAT	RMC 12.2Kbps	Front	15	Sensor Off	1413	1732.6	23.20	24.00	1.202	0.04	0.167	0.201
WCDMA IV-LAT	RMC 12.2Kbps	Back	15	Sensor Off	1413	1732.6	23.20	24.00	1.202	0.01	0.403	0.485
WCDMA IV-LAT	RMC 12.2Kbps	Bottom Side	15	Sensor Off	1413	1732.6	23.20	24.00	1.202	0.01	0.420	0.505
WCDMA V-LAT	RMC 12.2Kbps	Front	15	Sensor Off	4182	836.4	24.54	25.00	1.112	-0.05	0.173	0.192
WCDMA V-LAT	RMC 12.2Kbps	Back	15	Sensor Off	4182	836.4	24.54	25.00	1.112	-0.02	0.209	0.232
WCDMA V-LAT	RMC 12.2Kbps	Bottom Side	15	Sensor Off	4182	836.4	24.54	25.00	1.112	0.01	0.088	0.098

<FDD LTE SAR>

Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
LTE Band 2-LAT	20M	QPSK	1	0	Front	15	Sensor Off	18900	1880	22.84	24.00	1.306	0.07	0.155	0.202
LTE Band 2-LAT	20M	QPSK	1	0	Back	15	Sensor Off	18900	1880	22.84	24.00	1.306	0.04	0.247	0.323
LTE Band 2-LAT	20M	QPSK	1	0	Bottom Side	15	Sensor Off	18900	1880	22.84	24.00	1.306	0.08	0.344	0.449
LTE Band 4-LAT	20M	QPSK	1	0	Front	15	Sensor Off	20175	1732.5	22.73	24.00	1.340	-0.07	0.130	0.174
LTE Band 4-LAT	20M	QPSK	1	0	Back	15	Sensor Off	20175	1732.5	22.73	24.00	1.340	0.01	0.367	0.492
LTE Band 4-LAT	20M	QPSK	1	0	Bottom Side	15	Sensor Off	20175	1732.5	22.73	24.00	1.340	0.03	0.378	0.506
LTE Band 5-LAT	10M	QPSK	1	0	Front	15	Sensor Off	20525	836.5	24.35	25.00	1.161	0.02	0.108	0.125
LTE Band 5-LAT	10M	QPSK	1	0	Back	15	Sensor Off	20525	836.5	24.35	25.00	1.161	0	0.170	0.197
LTE Band 5-LAT	10M	QPSK	1	0	Bottom Side	15	Sensor Off	20525	836.5	24.35	25.00	1.161	-0.01	0.064	0.074
LTE Band 7-LAT	20M	QPSK	1	0	Front	15	Sensor Off	21100	2535	22.90	24.00	1.288	0.07	0.250	0.322
LTE Band 7-LAT	20M	QPSK	1	0	Back	15	Sensor Off	21100	2535	22.90	24.00	1.288	-0.16	0.227	0.292
LTE Band 7-LAT	20M	QPSK	1	0	Bottom Side	15	Sensor Off	21100	2535	22.90	24.00	1.288	-0.07	0.257	0.331

<TDD LTE SAR>

Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
LTE Band 41-LAT	20M	QPSK	1	0	Front	15	Sensor Off	40140	2545	23.99	25.00	1.262	62.9	1.006	0.15	0.197	0.250
LTE Band 41-LAT	20M	QPSK	1	0	Back	15	Sensor Off	40140	2545	23.99	25.00	1.262	62.9	1.006	-0.06	0.230	0.292
LTE Band 41-LAT	20M	QPSK	1	0	Bottom Side	15	Sensor Off	40140	2545	23.99	25.00	1.262	62.9	1.006	-0.01	0.186	0.236

15.7 Repeated SAR Measurement

No.	Band	Mode	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Ratio	Reported 1g SAR (W/kg)
1st	WCDMA IV-LAT	RMC 12.2Kbps	Back	10	Sensor On	1312	1712.4	22.16	22.50	1.081	1.000	-0.03	0.974	1	1.053
2nd	WCDMA IV-LAT	RMC 12.2Kbps	Back	10	Sensor On	1312	1712.4	22.16	22.50	1.081	1.000	0.02	0.968	1.006	1.047

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.
5. This application is a variant report, we only chose new WCDMA BIV band to perform repeated SAR, although other bands also larger than 0.8W/Kg, the measured SAR are all less than original application.

16. Simultaneous Transmission Analysis

No.	Simultaneous Transmission Configurations	Portable Handset			
		Head	Body-worn	Hotspot	Product specific
1.	GSM Voice + Bluetooth	Yes	Yes		Yes
2.	GPRS/EDGE + Bluetooth	Yes	Yes	Yes	Yes
3.	WCDMA + Bluetooth	Yes	Yes	Yes	Yes
4.	LTE + Bluetooth	Yes	Yes	Yes	Yes
5.	GSM Voice + 2.4GHz WLAN	Yes	Yes		Yes
6.	GPRS/EDGE + 2.4GHz WLAN	Yes	Yes	Yes	Yes
7.	WCDMA +2.4GHz WLAN	Yes	Yes	Yes	Yes
8.	LTE + 2.4GHz WLAN	Yes	Yes	Yes	Yes
9.	GSM Voice + WLAN5.3/5.5GHz	Yes	Yes		Yes
10.	GPRS/EDGE + WLAN5.3/5.5GHz	Yes	Yes		Yes
11.	WCDMA + WLAN5.3/5.5GHz	Yes	Yes		Yes
12.	LTE + WLAN5.3/5.5GHz	Yes	Yes		Yes
13.	GSM Voice + WLAN5.2/5.8GHz	Yes	Yes		Yes
14.	GPRS/EDGE + WLAN5.2/5.8GHz	Yes	Yes	Yes	Yes
15.	WCDMA + WLAN5.2/5.8GHz	Yes	Yes	Yes	Yes
16.	LTE + WLAN5.2/5.8GHz	Yes	Yes	Yes	Yes
17.	WLAN5.3/5.5GHz + Bluetooth	Yes	Yes		Yes
18.	GSM Voice + WLAN5.3/5.5GHz + Bluetooth	Yes	Yes		Yes
19.	GPRS/EDGE + WLAN5.3/5.5GHz + Bluetooth	Yes	Yes		Yes
20.	WCDMA + WLAN5.3/5.5GHz + Bluetooth	Yes	Yes		Yes
21.	LTE + WLAN5.3/5.5GHz + Bluetooth	Yes	Yes		Yes
22.	WLAN5.2/5.8GHz + Bluetooth	Yes	Yes	Yes	Yes
23.	GSM Voice + WLAN5.2/5.8GHz + Bluetooth	Yes	Yes		Yes
24.	GPRS/EDGE + WLAN5.2/5.8GHz + Bluetooth	Yes	Yes	Yes	Yes
25.	WCDMA + WLAN5.2/5.8GHz + Bluetooth	Yes	Yes	Yes	Yes
26.	LTE + WLAN5.2/5.8GHz + Bluetooth	Yes	Yes	Yes	Yes

General Note:

1. This device supports VoIP in GPRS, EGPRS, WCDMA and LTE (e.g. for 3rd-party VoIP), and LTE supports VoLTE function.
2. EUT will choose each GSM, WCDMA and LTE according to the network signal condition; therefore, they will not operate simultaneously at any moment.
3. This device WLAN 2.4GHz supports hotspot operation and Bluetooth support tethering applications.
4. WLAN 2.4GHz and Bluetooth share the same antenna so can't transmit simultaneously.
5. WLAN 5GHz and Bluetooth can transmit simultaneously.
6. 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.
7. For simultaneously analysis, since the SAR summation of 3 transmitters can cover others combination of 2 transmitters, therefore in this section did not additional to evaluate 2TX combination of simultaneously transmission.
8. All licensed modes share the same antenna part and cannot transmit simultaneously.
9. The reported SAR summation is calculated based on the same configuration and test position
10. 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.

16.1 Head Exposure Conditions

UAT means top antenna, LAT means bottom antenna

WWAN Band		Exposure Position	1	2	3	4	1+2 Summed 1g SAR (W/kg)	1+3+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)		
GSM	GSM850-UAT	Right Cheek	0.705	0.356	0.444	0.056	1.06	1.21
		Right Tilted	0.589	0.389	0.690	0.056	0.98	1.34
		Left Cheek	0.616	0.713	0.842	0.056	1.33	1.51
		Left Tilted	0.419	0.695	0.844	0.056	1.11	1.32
	GSM850-LAT	Right Cheek	0.046	0.356	0.444	0.056	0.40	0.55
		Right Tilted	0.019	0.389	0.690	0.056	0.41	0.77
		Left Cheek	0.039	0.713	0.842	0.056	0.75	0.94
		Left Tilted	0.016	0.695	0.844	0.056	0.71	0.92
	GSM1900-LAT	Right Cheek	0.062	0.356	0.444	0.056	0.42	0.56
		Right Tilted	0.016	0.389	0.690	0.056	0.41	0.76
		Left Cheek	0.068	0.713	0.842	0.056	0.78	0.97
		Left Tilted	0.058	0.695	0.844	0.056	0.75	0.96
WCDMA	WCDMA II-LAT	Right Cheek	0.165	0.356	0.444	0.056	0.52	0.67
		Right Tilted	0.105	0.389	0.690	0.056	0.49	0.85
		Left Cheek	0.193	0.713	0.842	0.056	0.91	1.09
		Left Tilted	0.155	0.695	0.844	0.056	0.85	1.06
	WCDMA IV-LAT	Right Cheek	0.166	0.356	0.444	0.056	0.52	0.67
		Right Tilted	0.070	0.389	0.690	0.056	0.46	0.82
		Left Cheek	0.090	0.713	0.842	0.056	0.80	0.99
		Left Tilted	0.083	0.695	0.844	0.056	0.78	0.98
	WCDMA V-UAT	Right Cheek	0.699	0.356	0.444	0.056	1.06	1.20
		Right Tilted	0.536	0.389	0.690	0.056	0.93	1.28
		Left Cheek	0.553	0.713	0.842	0.056	1.27	1.45
		Left Tilted	0.444	0.695	0.844	0.056	1.14	1.34
	WCDMA V-LAT	Right Cheek	0.191	0.356	0.444	0.056	0.55	0.69
		Right Tilted	0.104	0.389	0.690	0.056	0.49	0.85
		Left Cheek	0.179	0.713	0.842	0.056	0.89	1.08
		Left Tilted	0.085	0.695	0.844	0.056	0.78	0.99

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+4 Summed 1g SAR (W/kg)
LTE	LTE Band 2-LAT	Right Cheek	0.179	0.356	0.444	0.056	0.54	0.68
		Right Tilted	0.109	0.389	0.690	0.056	0.50	0.86
		Left Cheek	0.155	0.713	0.842	0.056	0.87	1.05
		Left Tilted	0.144	0.695	0.844	0.056	0.84	1.04
	LTE Band 4-LAT	Right Cheek	0.134	0.356	0.444	0.056	0.49	0.63
		Right Tilted	0.072	0.389	0.690	0.056	0.46	0.82
		Left Cheek	0.099	0.713	0.842	0.056	0.81	1.00
		Left Tilted	0.073	0.695	0.844	0.056	0.77	0.97
	LTE Band 5-UAT	Right Cheek	0.745	0.356	0.444	0.056	1.10	1.25
		Right Tilted	0.724	0.389	0.690	0.056	1.11	1.47
		Left Cheek	0.637	0.713	0.842	0.056	1.35	1.54
		Left Tilted	0.534	0.695	0.844	0.056	1.23	1.43
	LTE Band 5-LAT	Right Cheek	0.156	0.356	0.444	0.056	0.51	0.66
		Right Tilted	0.067	0.389	0.690	0.056	0.46	0.81
		Left Cheek	0.137	0.713	0.842	0.056	0.85	1.04
		Left Tilted	0.075	0.695	0.844	0.056	0.77	0.98
	LTE Band 7-LAT	Right Cheek	0.175	0.356	0.444	0.056	0.53	0.68
		Right Tilted	0.152	0.389	0.690	0.056	0.54	0.90
		Left Cheek	0.250	0.713	0.842	0.056	0.96	1.15
		Left Tilted	0.206	0.695	0.844	0.056	0.90	1.11
	LTE Band 41-LAT	Right Cheek	0.106	0.356	0.444	0.056	0.46	0.61
		Right Tilted	0.091	0.389	0.690	0.056	0.48	0.84
		Left Cheek	0.147	0.713	0.842	0.056	0.86	1.05
		Left Tilted	0.133	0.695	0.844	0.056	0.83	1.03

16.2 Hotspot Exposure Conditions

UAT means top antenna, LAT means bottom antenna

WWAN Band		Exposure Position	1	2	3	4	1+2	1+3+4		
			WWAN	2.4GHz WLAN	5GHz WLAN	Bluetooth	Summed 1g SAR (W/kg)	Summed 1g SAR (W/kg)	Case No	SPLSR
			1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)				
GSM	GSM850-UAT	Front	0.122	0.183	0.180	0.010	0.31	0.31		
		Back	0.241	0.278	0.664	0.010	0.52	0.92		
		Left side	0.139				0.14	0.14		
		Right side		0.174	0.196	0.010	0.17	0.21		
		Top side	0.168	0.015	0.787	0.010	0.18	0.97		
		Bottom side					0.00	0.00		
	GSM850-LAT	Front	0.176	0.183	0.180	0.010	0.36	0.37		
		Back	0.365	0.278	0.664	0.010	0.64	1.04		
		Left side	0.225				0.23	0.23		
		Right side	0.267	0.174	0.196	0.010	0.44	0.47		
		Top side		0.015	0.787	0.010	0.02	0.80		
		Bottom side	0.212				0.21	0.21		
	GSM1900-LAT	Front	0.159	0.183	0.180	0.010	0.34	0.35		
		Back	0.295	0.278	0.664	0.010	0.57	0.97		
		Left side	0.128				0.13	0.13		
		Right side	0.050	0.174	0.196	0.010	0.22	0.26		
		Top side		0.015	0.787	0.010	0.02	0.80		
		Bottom side	0.429				0.43	0.43		
WCDMA	WCDMA II-LAT	Front	0.222	0.183	0.180	0.010	0.41	0.41		
		Back	0.322	0.278	0.664	0.010	0.60	1.00		
		Left side	0.280				0.28	0.28		
		Right side	0.131	0.174	0.196	0.010	0.31	0.34		
		Top side		0.015	0.787	0.010	0.02	0.80		
		Bottom side	0.495				0.50	0.50		
	WCDMA IV-LAT	Front	0.214	0.183	0.180	0.010	0.40	0.46		
		Back	1.053	0.278	0.664	0.010	1.33	**1.73**	**#01**	**0.02**
		Left side	0.264				0.26	0.26		
		Right side	0.147	0.174	0.196	0.010	0.32	0.35		
		Top side		0.015	0.787	0.010	0.02	0.80		
		Bottom side	0.727				0.73	0.73		
	WCDMA V-UAT	Front	0.137	0.183	0.180	0.010	0.32	0.33		
		Back	0.194	0.278	0.664	0.010	0.47	0.87		
		Left side	0.118				0.12	0.12		
		Right side		0.174	0.196	0.010	0.17	0.21		
		Top side	0.023	0.015	0.787	0.010	0.04	0.82		
		Bottom side					0.00	0.00		
	WCDMA V-LAT	Front	0.223	0.183	0.180	0.010	0.41	0.41		
		Back	0.428	0.278	0.664	0.010	0.71	1.10		
		Left side	0.162				0.16	0.16		
		Right side	0.115	0.174	0.196	0.010	0.29	0.32		
		Top side		0.015	0.787	0.010	0.02	0.80		
		Bottom side	0.289				0.29	0.29		

WWAN Band		Exposure Position	1	2	3	4	1+2	1+3+4		
			WWAN	2.4GHz WLAN	5GHz WLAN	Bluetooth	Summed 1g SAR (W/kg)	Summed 1g SAR (W/kg)	Case No	SPLSR
			1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)				
LTE	LTE Band 2-LAT	Front	0.243	0.183	0.180	0.010	0.43	0.43		
		Back	0.693	0.278	0.664	0.010	0.97	1.37		
		Left side	0.253				0.25	0.25		
		Right side	0.136	0.174	0.196	0.010	0.31	0.34		
		Top side		0.015	0.787	0.010	0.02	0.80		
		Bottom side	0.726				0.73	0.73		
	LTE Band 4-LAT	Front	0.241	0.183	0.180	0.010	0.42	0.43		
		Back	1.090	0.278	0.664	0.010	1.37	**1.76**	**#02**	**0.02**
		Left side	0.208				0.21	0.21		
		Right side	0.134	0.174	0.196	0.010	0.31	0.34		
		Top side		0.015	0.787	0.010	0.02	0.80		
		Bottom side	0.978				0.98	0.98		
	LTE Band 5-UAT	Front	0.174	0.183	0.180	0.010	0.36	0.36		
		Back	0.281	0.278	0.664	0.010	0.56	0.96		
		Left side	0.169				0.17	0.17		
		Right side		0.174	0.196	0.010	0.17	0.21		
		Top side	0.202	0.015	0.787	0.010	0.22	1.00		
		Bottom side					0.00	0.00		
	LTE Band 5-LAT	Front	0.145	0.183	0.180	0.010	0.33	0.34		
		Back	0.281	0.278	0.664	0.010	0.56	0.96		
		Left side	0.154				0.15	0.15		
		Right side	0.218	0.174	0.196	0.010	0.39	0.42		
		Top side		0.015	0.787	0.010	0.02	0.80		
		Bottom side	0.191				0.19	0.19		
	LTE Band 7-LAT	Front	0.562	0.183	0.180	0.010	0.75	0.81		
		Back	0.710	0.278	0.664	0.010	0.99	1.38		
		Left side	0.605				0.61	0.61		
		Right side	0.238	0.174	0.196	0.010	0.41	0.44		
		Top side		0.015	0.787	0.010	0.02	0.80		
		Bottom side	0.797				0.80	0.80		
	LTE Band 41-LAT	Front	0.342	0.183	0.180	0.010	0.53	0.53		
		Back	0.616	0.278	0.664	0.010	0.89	1.29		
		Left side	0.509				0.51	0.51		
		Right side	0.135	0.174	0.196	0.010	0.31	0.34		
		Top side		0.015	0.787	0.010	0.02	0.80		
		Bottom side	0.512				0.51	0.51		

16.3 Body-Worn Accessory Exposure Conditions

UAT means top antenna, LAT means bottom antenna

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+4 Summed 1g SAR (W/kg)	1+3+4 Case No	1+3+4 SPLSR
GSM	GSM850-UAT	Front	0.122	0.183	0.240	0.010	0.31	0.37		
		Back	0.241	0.278	0.664	0.010	0.52	0.92		
	GSM850-LAT	Front	0.176	0.183	0.240	0.010	0.36	0.43		
		Back	0.365	0.278	0.664	0.010	0.64	1.04		
	GSM1900-LAT	Front	0.159	0.183	0.240	0.010	0.34	0.41		
		Back	0.295	0.278	0.664	0.010	0.57	0.97		
WCDMA	WCDMA II-LAT	Front	0.222	0.183	0.240	0.010	0.41	0.47		
		Back	0.322	0.278	0.664	0.010	0.60	1.00		
	WCDMA IV-LAT	Front	0.214	0.183	0.240	0.010	0.40	0.46		
		Back	1.053	0.278	0.664	0.010	1.33	**1.73**	**#01**	**0.02**
	WCDMA V-UAT	Front	0.137	0.183	0.240	0.010	0.32	0.39		
		Back	0.194	0.278	0.664	0.010	0.47	0.87		
	WCDMA V-LAT	Front	0.223	0.183	0.240	0.010	0.41	0.47		
		Back	0.428	0.278	0.664	0.010	0.71	1.10		
LTE	LTE Band 2-LAT	Front	0.243	0.183	0.240	0.010	0.43	0.49		
		Back	0.693	0.278	0.664	0.010	0.97	1.37		
	LTE Band 4-LAT	Front	0.241	0.183	0.240	0.010	0.42	0.49		
		Back	1.090	0.278	0.664	0.010	1.37	**1.76**	**#02**	**0.02**
	LTE Band 5-UAT	Front	0.174	0.183	0.240	0.010	0.36	0.42		
		Back	0.281	0.278	0.664	0.010	0.56	0.96		
	LTE Band 5-LAT	Front	0.145	0.183	0.240	0.010	0.33	0.40		
		Back	0.281	0.278	0.664	0.010	0.56	0.96		
	LTE Band 7-LAT	Front	0.562	0.183	0.240	0.010	0.75	0.81		
		Back	0.710	0.278	0.664	0.010	0.99	1.38		
	LTE Band 41-LAT	Front	0.342	0.183	0.240	0.010	0.53	0.59		
		Back	0.616	0.278	0.664	0.010	0.89	1.29		

16.4 Verified Distance SAR for Proximity Sensor Off

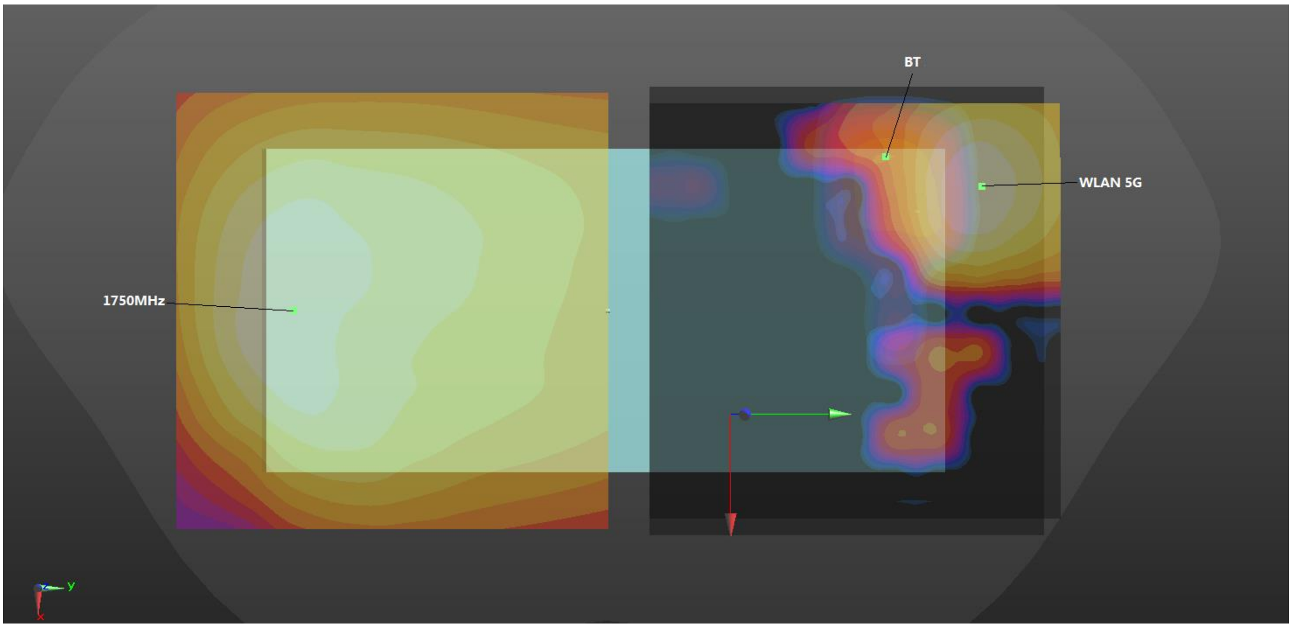
WWAN Band		Exposure Position	1 WWAN 1g SAR (W/kg)	2 2.4GHz WLAN 1g SAR (W/kg)	3 5GHz WLAN 1g SAR (W/kg)	4 Bluetooth 1g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)	1+3+4 Summed 1g SAR (W/kg)
GSM	GSM850-LAT	Front at 15mm	0.162	0.183	0.240	0.010	0.35	0.41
		Back at 15mm	0.280	0.278	0.664	0.010	0.56	0.95
		Bottom at15mm	0.085				0.09	0.09
	GSM1900-LAT	Front at 15mm	0.091	0.183	0.240	0.010	0.27	0.34
		Back at 15mm	0.177	0.278	0.664	0.010	0.46	0.85
		Bottom at15mm	0.191				0.19	0.19
WCDMA	WCDMA II-LAT	Front at 15mm	0.214	0.183	0.240	0.010	0.40	0.46
		Back at 15mm	0.305	0.278	0.664	0.010	0.58	0.98
		Bottom at15mm	0.484				0.48	0.48
	WCDMA IV-LAT	Front at 15mm	0.201	0.183	0.240	0.010	0.38	0.45
		Back at 15mm	0.485	0.278	0.664	0.010	0.76	1.16
		Bottom at15mm	0.505				0.51	0.51
	WCDMA V-LAT	Front at 15mm	0.192	0.183	0.240	0.010	0.38	0.44
		Back at 15mm	0.232	0.278	0.664	0.010	0.51	0.91
		Bottom at15mm	0.098				0.10	0.10
LTE	LTE Band 2-LAT	Front at 15mm	0.202	0.183	0.240	0.010	0.39	0.45
		Back at 15mm	0.323	0.278	0.664	0.010	0.60	1.00
		Bottom at15mm	0.449				0.45	0.45
	LTE Band 4-LAT	Front at 15mm	0.174	0.183	0.240	0.010	0.36	0.42
		Back at 15mm	0.492	0.278	0.664	0.010	0.77	1.17
		Bottom at15mm	0.506				0.51	0.51
	LTE Band 5-LAT	Front at 15mm	0.125	0.183	0.240	0.010	0.31	0.38
		Back at 15mm	0.197	0.278	0.664	0.010	0.48	0.87
		Bottom at15mm	0.074				0.07	0.07
	LTE Band 7-LAT	Front at 15mm	0.322	0.183	0.240	0.010	0.51	0.57
		Back at 15mm	0.292	0.278	0.664	0.010	0.57	0.97
		Bottom at15mm	0.331				0.33	0.33
	LTE Band 41-LAT	Front at 15mm	0.250	0.183	0.240	0.010	0.43	0.50
		Back at 15mm	0.292	0.278	0.664	0.010	0.57	0.97
		Bottom at15mm	0.236				0.24	0.24

Note: WLAN/Bluetooth using 10mm SAR performed co-located with WWAN SAR analysis more conservatively.

16.5 SPLSR Evaluation and Analysis

General Note:

1. When standalone SAR is measured for both antennas in the pair, the peak location separation distance is computed by the square root of [(x1−x2)2 + (y1−y2)2 + (z1−z2)2], where (x1, y1, z1) and (x2, y2, z2) are the coordinates in the area scans or extrapolated peak SAR locations in the zoom scans, as appropriate.
2. SPLSR = (SAR1 + SAR2)1.5 / (min. separation distance, mm). If SPLSR ≤ 0.04 for 1g SAR and SPLSR ≤ 0.10 for 10g SAR, simultaneously transmission SAR measurement is not necessary.
3. The following table analysis is always using the sum SAR (WWAN+WLAN5GHz+Bluetooth), the peak SAR location distance, one is WWAN to WLAN5GHz, another is WWAN to Bluetooth. When perform peak SAR distance WWAN to WLAN5GHz, assuming Bluetooth SAR added totally. WWAN and Bluetooth analysis is the same.



Back (10mm)

Hotspot/Body-Worn 10mm												
	Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (mm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 1	WCDMA IV-LAT	Back	1.053	10mm	0	-78.1	1.8	136.3	1.73	0.02	Not required
	WLAN5GHz		0.664	10mm	-28.6	88	-0.59				
	Bluetooth		0.01	10mm	-35.2	53.6	1.57				
	WCDMA IV-LAT	Back	1.053	10mm	0	-78.1	1.8	168.6	1.73	0.01	Not required
	Bluetooth		0.01	10mm	-35.2	53.6	1.57				
	WLAN5GHz		0.664	10mm	-28.6	88	-0.59				
	Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (mm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 2	LTE Band 4-LAT	Back	1.090	10mm	1.4	-76.6	1.8	135.2	1.76	0.02	Not required
	WLAN5GHz		0.664	10mm	-28.6	88	-0.59				
	Bluetooth		0.01	10mm	-35.2	53.6	1.57				
	LTE Band 4-LAT	Back	1.090	10mm	1.4	-76.6	1.8	167.3	1.76	0.01	Not required
	Bluetooth		0.01	10mm	-35.2	53.6	1.57				
	WLAN5GHz		0.664	10mm	-28.6	88	-0.59				

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17. 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.

18. References

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

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

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

[4] SPEAG DASY System Handbook

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

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

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

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

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

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

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

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

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

[14] FCC KDB 616217 D04 v01r02, “SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers”, Oct 2015

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