FCC SAR Test Report

APPLICANT	: Motorola Mobility LLC
EQUIPMENT	: Mobile Cellular Phone
BRAND NAME	: Motorola
MODEL NAME	: XT2363-3
FCC ID	: IHDT56AQ2
STANDARD	: FCC 47 CFR Part 2 (2.1093)

We, Sporton International Inc. (Kunshan), would like to declare that the tested sample has been evaluated in accordance with the test procedures given in 47 CFR Part 2.1093 and FCC KDB and has been in compliance with the applicable technical standards.

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

Si Zhang

Approved by: Si Zhang

ACCREDITED Cert #5145.02

Sporton International Inc. (Kunshan)
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China

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Appendix D. Test Setup Photos
Appendix E. Conducted RF Output Power Table
Appendix F. Power reduction mechanism verification

Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA392114-01	Rev. 01	Initial issue of report.	Nov. 10, 2023
FA392114-01	Rev. 02	Removed WCDMA B4 information on Page 18	Nov. 13, 2023

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **Motorola Mobility LLC, Mobile Cellular Phone, XT2363-3,** are as follows.

Highest 1g SAR Summary						
Equipment Class	Frequency Band		Head (Separation 0mm)	Hotspot (Separation 5mm)	Body-worn (Separation 5mm)	Highest Simultaneous Transmission
			1g SAR (W/kg)			1g SAR (W/kg)
Licensed	GSM	GSM850	0.49	1.31	1.31	1.59
		GSM1900	0.20	**1.37**	1.30	
	WCDMA	WCDMA II	0.15	1.28	1.27	
		WCDMA V	0.46	1.23	1.23	
	LTE	LTE Band 7	0.91	1.28	1.28	
		LTE Band 2	0.11	1.27	1.29	
		LTE Band 26/5	0.25	1.06	1.06	
		LTE Band 41/38	0.94	1.28	1.28	
		LTE Band 42	0.93	0.62	0.93	
	5G NR	FR1 n7	0.71	1.28	1.28	
		FR1 n26/n5	0.22	0.75	0.75	
		FR1 n41/38	0.92	0.62	0.95	
		FR1 n77/n78	0.92	0.89	0.93	
DTS	WLAN	2.4GHz WLAN	**1.30**	0.73	**1.39**	1.52
NII		5GHz WLAN	1.13	0.74	1.18	1.59
DSS	Bluetooth	2.4GHz Bluetooth	0.43	0.39	0.39	1.59

Highest 10g SAR Summary				
Equipment Class	Frequency Band		Product Specific 10g SAR (W/kg) (Separation 0mm)	Highest Simultaneous Transmission 10g SAR (W/kg)
Licensed	GSM	GSM850	3.20	3.93
		GSM1900	**3.21**	
	WCDMA	WCDMA II	**3.21**	
		WCDMA V	2.28	
	LTE	LTE Band 7	3.16	
		LTE Band 2	**3.21**	
		LTE Band 41/38	3.20	
		LTE Band 42	2.49	
	5G NR	FR1 n7	3.18	
		FR1 n41/38	2.48	
		FR1 n77/n78	2.46	
DTS	WLAN	2.4GHz WLAN	1.80	3.88
NII		5GHz WLAN	3.18	3.93
DXX	NFC	NFC	<0.10	3.93
Date of Testing:			2023/10/09 ~ 2023/11/16	

Remark:
1. This device supports LTE B5 / B38 and B26 / B41. Since the supported frequency span for LTE B5 / B38 falls completely within the supports frequency span for LTE B26 / 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 B26 / B41.
2. This device supports 5GNR n38/n5/n78 and n41/n26/n77. Since the supported frequency span for 5GNR n38/n5/n78 falls completely within the supports frequency span for n41/n26/n77, both 5GNR bands have the same target power, and both 5GNR bands share the same transmission path; therefore, SAR was only assessed for n41/n26/n77.

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

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

2. Administration Data

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

Testing Laboratory			
Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	SAR07-KS	CN1257	314309

Applicant	
Company Name	Motorola Mobility LLC
Address	222 W,Merchandise Mart Plaza, Chicago IL 60654 USA

Manufacturer	
Company Name	Motorola Mobility LLC
Address	222 W,Merchandise Mart Plaza, Chicago IL 60654 USA

3. Data Reuse Approach

3.1 Introduction Section

This application re-uses data collected on a similar device, FCC ID: IHDT56AQ1 (reference model) and FCC ID: IHDT56AQ2 (variant model). Due to the same design are identical between parent model and variant model, SAR data reuse is requested and spot check data in this report is used to justify the SAR data reuse.

For variant model 1g SAR and 10g spot check SAR result does not exceed 30% and 1g SAR < 1.2W/kg, 10g SAR < 3.0W/kg of the reference model, the WWAN/WLAN max SAR summary was always choose the higher SAR between parent model and variant model.

The applicant should take full responsibility that the test data as referenced in this report represent compliance for this FCC ID: IHDT56AQ2

3.2 Model Difference Information

The **main** difference between FCC ID: IHDT56AQ1 and FCC ID: IHDT56AQ2 is as below:

- Remove WCDMA IV, LTE B4/12/13/17/25/66 and 5G NR n2/n66
- Add LTE B20/32 and 5G NR n8/n20/n77.

Other differences and all the details of similarity and difference can be found in the confidential documents (XT2363-3_Operational Description of Product Equality Declaration).

3.3 Reference detail Section

Rule Part	Equipment Class	Wireless Technology	Frequency Band (MHz)	FCC ID (Reference)	Type Grant/ Permissive Change	Reference Title	FCC ID Filling (Variant)	Test on the variant
Part 2.1093	PCE	GSM	GSM850/1900	IHDT56AQ1	Original Grant	FA392114	IHDT56AQ2	Spot check
		WCDMA	B2/5	IHDT56AQ1	Original Grant	FA392114	IHDT56AQ2	Spot check
		LTE	B2/5/7/26/38/41/42	IHDT56AQ1	Original Grant	FA392114	IHDT56AQ2	Spot check
		5G NR	n5/n7/n26/n38/n41	IHDT56AQ1	Original Grant	FA392114	IHDT56AQ2	Spot check
		5G NR	n77/n78				IHDT56AQ2	Full Test
	DTS	BLE/ Wi-Fi	2400~2483.5	IHDT56AQ1	Original Grant	FA392114	IHDT56AQ2	Spot check
	NII	Wi-Fi	5150 ~ 5250 5250 ~ 5350 5470 ~ 5725 5725 ~ 5850	IHDT56AQ1	Original Grant	FA392114	IHDT56AQ2	Spot check
	DSS	Bluetooth	2400~2483.5	IHDT56AQ1	Original Grant	FA392114	IHDT56AQ2	Spot check
	DXX	NFC	13.56	IHDT56AQ1	Original Grant	FA392114A	IHDT56AQ2	Spot check

4. 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
- IEC/IEEE 62209-1528:2020
- 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 616217 D04 SAR for laptop and tablets v01r02
- 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

5. Equipment Under Test (EUT) Information

5.1 General Information

Product Feature & Specification	
Equipment Name	Mobile Cellular Phone
Brand Name	Motorola
Model Name	XT2363-3
FCC ID	IHDT56AQ2
IMEI Code	Sample 1: IMEI 1: 352643330019671 IMEI 2: 352643330019689 Sample 2: IMEI 1: 352643330027799 IMEI 2: 352643330027807 Sample 3: IMEI 1: 352643330028557 IMEI 2: 352643330028565
Wireless Technology and Frequency Range	GSM850: 824 MHz ~ 849 MHz GSM1900: 1850 MHz ~ 1910 MHz WCDMA Band II: 1850 MHz ~ 1910 MHz WCDMA Band V: 824 MHz ~ 849 MHz LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 26: 814 MHz ~ 849 MHz LTE Band 38: 2570 MHz ~ 2620 MHz LTE Band 41: 2496 MHz ~ 2690 MHz LTE Band 42: 3450 MHz ~3550 MHz 5G NR n5: 824 MHz ~ 849 MHz 5G NR n7: 2500 MHz ~ 2570 MHz 5G NR n26 : 814 MHz ~ 849 MHz 5G NR n38 : 2570 MHz ~ 2620 MHz 5G NR n41 : 2496 MHz ~ 2690 MHz 5G NR n77: 3700 MHz ~ 3980 MHz 5G NR n78: 3700 MHz ~ 3800 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 ~ 5720 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz NFC: 13.56 MHz
Mode	GSM/GPRS/EGPRS RMC/AMR 12.2Kbps HSDPA HSUPA HSPA+(16QAM uplink is supported) LTE: QPSK, 16QAM, 64QAM, 256QAM 5G NR : CP-OFDM / DFT-s-OFDM, PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE NFC: ASK
HW Version	DVT2
SW Version	UUG34.30
GSM / (E)GPRS Transfer mode	Class B – EUT cannot support Packet Switched and Circuit Switched Network simultaneously but can automatically switch between Packet and Circuit Switched Network.
EUT Stage	Identical Prototype

Remark:

1. This device supports VoIP in GPRS, EGPRS, WCDMA and LTE (e.g. for 3rd-party VoIP), LTE supports VoLTE operation.
2. This device 2.4GHz WLAN support hotspot operation and Bluetooth support tethering applications.
3. This device 5.2GHz WLAN/5.8GHz WLAN support hotspot operation, and 5.2GHz WLAN/5.8GHz WLAN supports WiFi Direct (GC/GO), and 5.3GHz / 5.5GHz supports WiFi Direct (GC only).
4. This device does not support DTM operation and supports GPRS/EGPRS mode up to multi-slot class 12.
5. For dual SIM card mobile has single SIM slots + eSIM (electronic SIM) and supports dual SIM dual standby. The WWAN radio transmission will be enabled by either one SIM at a time (single active).
6. The device implements the power management and proximity sensor /receiver detection/hotspot mode for SAR compliance at different exposure conditions (head, body-worn, hotspot, extremity) and the Qualcomm smart transmit will manage to ensure the power level not exceeding the associated power table. Details about the power management decision and sensor detection are provided in the operational description. And the device will invoke corresponding work scenarios power level base on frequency bands/antennas, which can refer to power table at appendix E.
7. For WLAN/BT when transmit simultaneous with WWAN, power reduction will be activated to head. For WLAN when transmit simultaneous with WWAN and Proximity sensors trigger, power reduction will be activated to body-worn and Handheld.
8. This device supports HPUE for LTE Band 41 and 5G NR n77/n78 with class 2 level, HPUE power has been measured separately. For HPUE power is higher than power class 3 but with lower duty cycle, the maximum average power for class 2 and class 3 is almost the same, so we chose power class 3 full SAR testing and power class 2 verify the worst case of power class 3 SAR.
9. For 5G NR n77/n78 HPUE, duty cycle is 50% considered in SAR testing. For 5G NR other bands test, using FTM (Factory Test Mode) to perform SAR with default 100% transmission.
10. There are three samples, the different between them refer to the XT2363-3_Operational Description of Product Equality Declaration which is exhibit separately. According to the differences, we choose sample 1 to perform full SAR testing and sample 2/3 to verify the worst case of sample 1.
11. This device supports 5GNR FR1 bands as following table, including NSA mode and SA mode. NSA and SA mode performed SAR separately.

<5G NR>

Mode	Band	Duplex	SCS(KHz)	Bandwidths(BW)
NSA	n5	FDD	15	5, 10, 15, 20
	n41	TDD	30	20, 30, 40, 50, 60, 70, 80, 90, 100
	n77	TDD	30	20, 30, 40, 50, 60, 70, 80, 90, 100
	n78	TDD	30	20, 30, 40, 50, 60, 70, 80, 90, 100
SA	n5	FDD	15	5, 10, 15, 20
	n7	FDD	15	5, 10, 15, 20, 25, 30, 40
	n26	FDD	15	5, 10, 15, 20
	n38	TDD	30	20, 30, 40
	n41	TDD	30	20, 30, 40, 50, 60, 70, 80, 90, 100
	n77	TDD	30	20, 30, 40, 50, 60, 70, 80, 90, 100
	n78	TDD	30	20, 30, 40, 50, 60, 70, 80, 90, 100

5.2 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>IHDT56AQ2</td></tr>
<tr><td>Equipment Name</td><td>Mobile Cellular Phone</td></tr>
<tr><td>Operating Frequency Range of each LTE transmission band</td><td>LTE Band 2: 1850 MHz ~ 1910 MHz
LTE Band 5: 824 MHz ~ 849 MHz
LTE Band 7: 2500 MHz ~ 2570 MHz
LTE Band 26: 814 MHz ~ 849 MHz
LTE Band 38: 2570 MHz ~ 2620 MHz
LTE Band 41: 2496 MHz ~ 2690 MHz
LTE Band 42: 3450 MHz ~3550 MHz</td></tr>
<tr><td>Channel Bandwidth</td><td>LTE Band 2:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 5:1.4MHz, 3MHz, 5MHz, 10MHz
LTE Band 7: 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 26:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz
LTE Band 38: 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 41: 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 42: 5MHz, 10MHz, 15MHz, 20MHz</td></tr>
<tr><td>uplink modulations used</td><td>QPSK / 16QAM / 64QAM / 256QAM</td></tr>
<tr><td>LTE Voice / Data requirements</td><td>Voice and Data</td></tr>
<tr><td>LTE Release Version</td><td>R15, Cat18</td></tr>
<tr><td>CA Support</td><td>Supported, 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 (N_{RB})</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, when operating in Proximity sensors/receiver/hotspot detect mechanism, head/body -worn /hotspot/extremity will trigger reduced power for some bands applied to satisfy SAR compliance, the detail please referred to section 15</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 15.</td></tr>
<tr><td>LTE Carrier Aggregation Additional Information</td><td>1. This device supports LTE Carrier Aggregation (CA) in the uplink for intra-band and inter-band with two component carriers in the uplink. SAR Measurements and conducted powers were evaluated per FCC Guidance.
2. This device supports maximum of 4 carriers in the downlink and 2 carriers in the uplink.</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 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 26										
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	26697	814.7	26705	815.5	26715	816.5	26740	819	26765	821.5
M	26865	831.5	26865	831.5	26865	831.5	26865	831.5	26865	831.5
H	27033	848.3	27025	847.5	27015	846.5	26990	844	26965	841.5

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

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	39675	2498.5	39700	2501	39725	2503.5	39750	2506
LM	40148	2545.8	40160	2547	40173	2548.3	40185	2549.5
M	40620	2593	40620	2593	40620	2593	40620	2593
HM	41093	2640.3	41080	2639	41068	2637.8	41055	2636.5
H	41565	2687.5	41540	2685	41515	2682.5	41490	2680

LTE Band 42								
	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	42115	3452.5	42140	3455	42165	3457.5	42190	3460
M	42590	3500	42590	3500	42590	3500	42590	3500
H	43065	3547.5	43040	3545	43015	3542.5	42990	3540

<For LTE Overlap Bands Description>

1) LTE Bands BW

Band	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
LTE Band 5	Yes	Yes	Yes	Yes		
LTE Band 26	Yes	Yes	Yes	Yes	Yes	
LTE Band 38			Yes	Yes	Yes	Yes
LTE Band 41			Yes	Yes	Yes	Yes

2) LTE Bands tune up:

Band	Antenna	Head DSI 2 Tune-up Limit	Body Worn DSI 3 Tune-up Limit	Hotspot DSI 7 Tune-up Limit	Extremity DSI 6 Tune-up Limit	Sensor Off DSI4 Tune-up Limit	Default Tune-up Limit
LTE Band 5	Ant 0	24	24	24	24	24	24
LTE Band 26	Ant 0	24	24	24	24	24	24

Band	Antenna	Head DSI 2 Tune-up Limit	Body Worn DSI 3 Tune-up Limit	Hotspot DSI 7 Tune-up Limit	Extremity DSI 6 Tune-up Limit	Sensor Off DSI4 Tune-up Limit	Default Tune-up Limit
LTE Band 38	Ant 4	21.3	18.7	16	22.3	24	24
LTE Band 41	Ant 4	21.3	18.7	16	22.3	24	24

Band	Antenna	Head DSI 2 Tune-up Limit	Body Worn DSI 3 Tune-up Limit	Hotspot DSI 7 Tune-up Limit	Extremity DSI 6 Tune-up Limit	Sensor Off DSI4 Tune-up Limit	Default Tune-up Limit
LTE Band 38	Ant 1	24	20.7	20.7	22.6	24	24
LTE Band 41	Ant 1	24	20.7	20.7	22.6	24	24

5.3 General 5G NR SAR Test and Reporting Considerations

5G NR Information	
Operating Frequency Range of each 5G NR transmission band	5G NR n5: 824 MHz ~ 849 MHz 5G NR n7: 2500 MHz ~ 2570 MHz 5G NR n26 : 814 MHz ~ 849 MHz 5G NR n38 : 2570 MHz ~ 2620 MHz 5G NR n41 : 2496 MHz ~ 2690 MHz 5G NR n77: 3700 MHz ~ 3980 MHz 5G NR n78: 3700 MHz ~ 3800 MHz
Channel Bandwidth	The detail please refers to section 4.1 5GNR FR1 bands table.
SCS	FDD: SCS15KHz, TDD: SCS30KHz
uplink modulations used	DFT-s-OFDM: PI/2 BPSK / QPSK / 16QAM / 64QAM / 256QAM CP-OFDM: QPSK / 16QAM / 64QAM / 256QAM
A-MPR (Additional MPR) disabled for SAR Testing?	Yes
LTE Anchor Bands for n5	LTE B7
LTE Anchor Bands for n41	LTE B5
LTE Anchor Bands for n77	LTE B7
LTE Anchor Bands for n78	LTE B5/7/38/41

Transmission (H, M, L) channel numbers and frequencies in each 5G NR band

NR Band 5

	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	165300	826.5	165800	829	166300	831.5	166800	834
M	167300	836.5	167300	836.5	167300	836.5	167300	836.5
H	169300	846.5	168800	844	168300	841.5	167800	839

NR Band 7

	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz		Bandwidth 25MHz		Bandwidth 30MHz		Bandwidth 40MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	500500	2502.5	501000	2505	501500	2507.5	502000	2510	502500	2512.5	503000	2515	504000	2520
M	507000	2535	507000	2535	507000	2535	507000	2535	507000	2535	507000	2535	507000	2535
H	513500	2567.5	513000	2565	512500	2562.5	512000	2560	511500	2557.5	511000	2555	510000	2550

NR Band 26

	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	163300	816.5	163800	819	164300	821.5	164800	824
M	166300	831.5	166300	831.5	166300	831.5	166300	831.5
H	169300	846.5	168800	844	168300	841.5	167800	839

NR Band 38

	Bandwidth 20MHz		Bandwidth 30MHz		Bandwidth 40MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	516000	2580	517002	2585.01	518004	2590.02
M	519000	2595	519000	2595	519000	2595
H	522000	2610	520998	2604.99	519996	2599.98

NR Band 41

	Bandwidth 20MHz		Bandwidth 30MHz		Bandwidth 40MHz		Bandwidth 50MHz		Bandwidth 60MHz		Bandwidth 70MHz		Bandwidth 80MHz		Bandwidth 90MHz		Bandwidth 100MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	501204	2506.02	502200	2511	503202	2516.01	504204	2521.02	505200	2526	506202	2531.01	507204	2536.02	508200	2541	509202	2546.01
M	518598	2592.99	518598	2592.99	518598	2592.99	518598	2592.99	518598	2592.99	518598	2592.99	518598	2592.99	518598	2592.99	518598	2592.99
H	535998	2679.99	534996	2674.98	534000	2670	532998	2664.99	531996	2659.98	531000	2655	529998	2649.99	528996	2644.98	528000	2640

NR Band 77																				
	Bandwidth 20MHz		Bandwidth 30MHz		Bandwidth 40MHz		Bandwidth 50MHz		Bandwidth 60MHz		Bandwidth 70MHz		Bandwidth 80MHz		Bandwidth 90MHz		Bandwidth 100MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	647334	3710.01	647668	3715.02	648000	3720	648334	3725.01	648668	3730.02	649000	3735	649334	3740.01	649668	3745.02	650000	3750
M	656000	3840	656000	3840.00	656000	3840	656000	3840	656000	3840	656000	3840	656000	3840	656000	3840	656000	3840
H	664666	3969.99	664332	3964.98	664000	3960	663666	3954.99	663332	3949.98	663000	3945	662666	3939.99	662332	3934.98	662000	3930

NR Band 78																		
	Bandwidth 20MHz		Bandwidth 30MHz		Bandwidth 40MHz		Bandwidth 50MHz		Bandwidth 60MHz		Bandwidth 70MHz		Bandwidth 80MHz		Bandwidth 90MHz		Bandwidth 100MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	647334	3710.01	647668	3715.02	648000	3720	648334	3725.01	648668	3730.02	649000	3735	649334	3740.01	649668	3745.02		
M	650000	3750	650000	3750.00	650000	3750	650000	3750	650000	3750	650000	3750	650000	3750	650000	3750	650000	3750
H	652668	3790.02	652334	3785.01	652000	3780	651668	3775.02	651334	3770.01	651000	3765	650668	3760.02	650334	3755.01		

<For NR Overlap Bands Description>

1) NR Bands BW

Mode	Band	Duplex	SCS(KHz)	Bandwidths(BW)
NSA	N5	FDD	15	5,10,15,20
	N38	TDD	30	20,30,40
	N41	TDD	30	20,30,40,50,60,70,80,90,100
SA	N5	FDD	15	5,10,15,20
	N26	FDD	15	5,10,15,20
	N38	TDD	30	20,30,40
	N41	TDD	30	20,30,40,50,60,70,80,90,100

2) NR Bands Tune up:

Band	Antenna	Head DSI 2 Tune-up Limit	Body Worn DSI 3 Tune-up Limit	Hotspot DSI 7 Tune-up Limit	Extremity DSI 6 Tune-up Limit	Sensor Off DSI4 Tune-up Limit	Default Tune-up Limit
5G NR n5	Ant 0	24	24	24	24	24	24
5G NR n26	Ant 0	24	24	24	24	24	24

Band	Antenna	Head DSI 2 Tune-up Limit	Body Worn DSI 3 Tune-up Limit	Hotspot DSI 7 Tune-up Limit	Extremity DSI 6 Tune-up Limit	Sensor Off DSI4 Tune-up Limit	Default Tune-up Limit
5G NR n38	Ant 4	17.9	16.1	13.7	20.1	24	24
5G NR n41	Ant 4	17.9	16.1	13.7	20.1	24	24

Band	Antenna	Head DSI 2 Tune-up Limit	Body Worn DSI 3 Tune-up Limit	Hotspot DSI 7 Tune-up Limit	Extremity DSI 6 Tune-up Limit	Sensor Off DSI4 Tune-up Limit	Default Tune-up Limit
5G NR n77 NSA/SA	Ant 5	17.7	18.3	15.7	17.8	24	24
5G NR n78 NSA/SA	Ant 5	17.7	18.3	15.7	17.8	24	24
5G NR n77 HPUE NSA/SA	Ant 5	20.7	21.3	18.7	20.8	27	27
5G NR n78 HPUE NSA/SA	Ant 5	20.7	21.3	18.7	20.8	27	27

Band	Antenna	Head DSI 2 Tune-up Limit	Body Worn DSI 3 Tune-up Limit	Hotspot DSI 7 Tune-up Limit	Extremity DSI 6 Tune-up Limit	Sensor Off DSI4 Tune-up Limit	Default Tune-up Limit
5G NR n77 NSA/SA	Ant 1	20.5	20.5	20.5	20.5	20.5	20.5
5G NR n78 NSA/SA	Ant 1	20.5	20.5	20.5	20.5	20.5	20.5
5G NR n77 HPUE NSA/SA	Ant 1	23.5	23.5	23.5	23.5	23.5	23.5
5G NR n78 HPUE NSA/SA	Ant 1	23.5	23.5	23.5	23.5	23.5	23.5

Band	Antenna	Head DSI 2 Tune-up Limit	Body Worn DSI 3 Tune-up Limit	Hotspot DSI 7 Tune-up Limit	Extremity DSI 6 Tune-up Limit	Sensor Off DSI4 Tune-up Limit	Default Tune-up Limit
5G NR n77 NSA/SA	Ant 2	22.5	19.1	17	22.5	22.5	22.5
5G NR n78 NSA/SA	Ant 2	22.5	19.1	17	22.5	22.5	22.5
5G NR n77 HPUE NSA/SA	Ant 2	25.5	22.1	20	25.5	25.5	25.5
5G NR n78 HPUE NSA/SA	Ant 2	25.5	22.1	20	25.5	25.5	25.5

Band	Antenna	Head DSI 2 Tune-up Limit	Body Worn DSI 3 Tune-up Limit	Hotspot DSI 7 Tune-up Limit	Extremity DSI 6 Tune-up Limit	Sensor Off DSI4 Tune-up Limit	Default Tune-up Limit
5G NR n77 NSA/SA	Ant 8	20.5	18.6	17.6	20.5	20.5	20.5
5G NR n78 NSA/SA	Ant 8	20.5	18.6	17.6	20.5	20.5	20.5
5G NR n77 HPUE NSA/SA	Ant 8	23.5	21.6	20.6	23.5	23.5	23.5
5G NR n78 HPUE NSA/SA	Ant 8	23.5	21.6	20.6	23.5	23.5	23.5

6. Smart Transmit feature for RF Exposure compliance

The RF exposure limit is defined based on time-averaged RF exposure. The product implements Qualcomm Smart Transmit feature which controls the instantaneous transmitting power for WWAN transmitter to ensure the product in compliance with RF exposure limit over a defined time window, for SAR (transmit frequency ≤ 6GHz). To control and manage transmitting power in real time and to ensure at all times the time-averaged RF exposure is compliant to the regulation requirement.

Note that WLAN/BT operations are not enabled with Smart Transmit.

This report describes the procedures for the SAR char generation, and the parameters obtained from SAR characterization (referred to as SAR char, respectively) will be used as input for Smart Transmit. SAR char will be entered via the Embedded File System (EFS) to enable the Smart Transmit Feature.

<Terminologies in this report>

P_{limit}	The time-averaged RF power which corresponds to SAR_design_target.
P_{max}	Maximum target power level
SAR_design_target:	The design target for SAR compliance. It should be less than regulatory SAR limit to account for all device design related uncertainty.
SAR char	P_{limit} for all the technologies/bands for all applicable DSI

<SAR Characterization>

SAR char must be generated to cover all radio configurations and usage scenarios that the wireless device supports for operating at 6 GHz or below. It will then be used as input for Smart Transmit to control and manage RF exposure for f < 6 GHz.

<SAR design target and uncertainty>

Item	Uncertainty dB (k=2)
Total uncertainty	1.5

To account for total uncertainty, SAR_design_target should be determined as:

$$SAR\_design\_target < SAR_{regulatory\_limit} \times 10^{\frac{-total\ uncertainty}{10}}$$

The Smart Transmit algorithm maintains the time-averaged transmit power, in turn, time-averaged RF exposure of SAR_design_target, below the predefined time-averaged power limit, for each characterized technology and band.

Smart Transmit allows the device to transmit at higher power instantaneously, as high as Pmax, when needed, but enforces power limiting to maintain time-averaged transmit power to Plimit. Below table shows Plimit EFS settings and maximum tune up output power Pmax configured for this EUT for various transmit conditions (Device State Index DSI).

<P_{limit} for supported technologies and bands (P_{limit} in EFS file)>

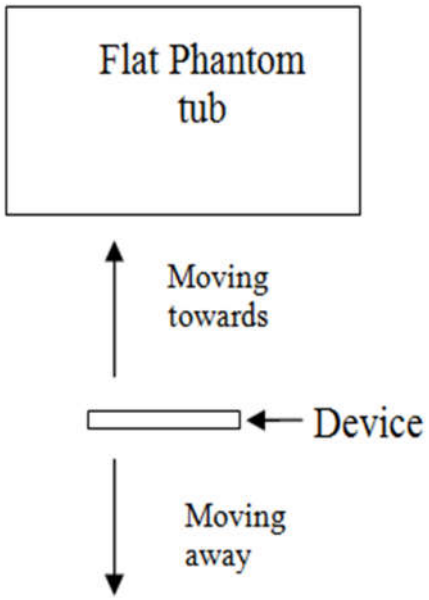
Band	Antenna	Head DSI 2	Body-Worn DSI 3	Hotspot DSI 7	Extremity DSI 6	Sensor off DSI 4	Pmax*
GSM850	Ant 0	25.7	24.5	24.5	24.6	24.5	24.5
GSM1900	Ant 0	30.2	17.1	15.8	18.5	21.5	21.5
WCDMA II	Ant 0	32.8	18.7	16.3	20.1	23.0	23.0
WCDMA V	Ant 0	28.8	24.2	24.2	26.1	23.0	23.0
LTE Band 2	Ant 0	33.9	19.5	16.7	20.1	23.0	23.0
LTE Band 26(5)	Ant 0	30	26.9	26.9	23.0	23.0	23.0
LTE Band 7	Ant 1	24.3	17.7	17.7	20.4	23.0	23.0
LTE Band 7	Ant 4	17.5	15.9	13.7	19.2	23.0	23.0
LTE Band 41(38)	Ant 1	27.5	17.7	17.7	19.6	21.0	21.0
LTE Band 41(38)	Ant 4	18.3	15.7	13.0	19.3	22.4	21.0
LTE Band 41 HPUE	Ant 4	18.3	15.7	13.0	19.3	22.4	22.4
LTE Band 42	Ant 5	13.8	16.5	14.8	19.7	21.0	21.0
FR1 n26(5)	Ant 0	31.2	26.0	26.0	23.0	23.0	23.0
FR1 n7	Ant 1	27.9	16.9	16.9	20.0	23.0	23.0
FR1 n41(38)	Ant 4	16.9	15.1	12.7	19.1	23.0	23.0
FR1 n77/78 Part27O	Ant 5	16.7	17.3	14.7	16.8	23.0	23.0
FR1 n77/78 Part27O HPUE	Ant 5	16.7	17.3	14.7	16.8	23.0	23.0
FR1 n77/78 Part27O	Ant 1	27	21.2	21.2	19.5	19.5	19.5
FR1 n77/78 Part27O HPUE	Ant 1	27.2	21.1	21.1	19.5	19.5	19.5
FR1 n77/78 Part27O	Ant 2	28.4	18.1	16.0	22.0	21.5	21.5
FR1 n77/78 Part27O HPUE	Ant 2	28.5	18.1	16.0	21.7	21.5	21.5
FR1 n77/78 Part27O	Ant 8	30.2	17.6	16.6	23.2	19.5	19.5
FR1 n77/78 Part27O HPUE	Ant 8	30.3	17.6	16.6	24.0	19.5	19.5

Note:
1) *P_{max} is used for RF tune up procedure. The maximum allowed output power is equal to Pmax + 1.0 dB device uncertainty.
2) All Plimit power levels entered in the Table correspond to average power levels after accounting for duty cycle in the case TDD modulation schemes (for e.g., GSM & LTE TDD & NR TDD).
3) The max allowed output power is the Plimit + 1.0 dB device uncertainty, and if Plimit is higher than Pmax, the device output power will be Pmax instead.

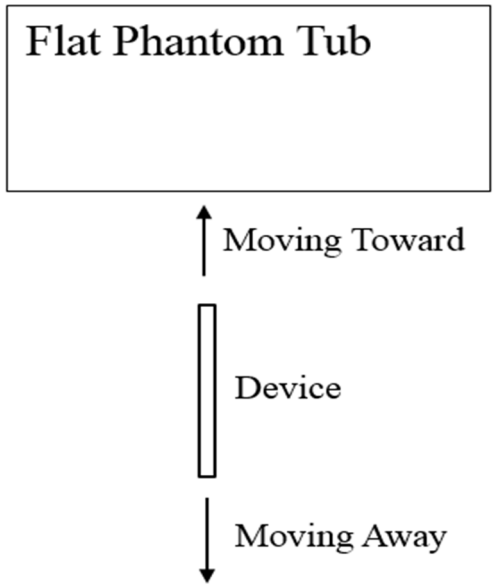
7. Proximity Sensor Triggering Test

<Proximity Sensor Triggering Distance>:

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 (5850MHz) and lowest (835MHz) frequency was used for proximity sensor triggering testing.
2. Capacitive proximity sensors placed coincident with antenna elements at the top and bottom ends of the phone are utilized to determine when the device comes in proximity of the user's body at the front or back of the device.
3. The output power will reduce to body worn power level when top and bottom sensor pad be detected.
4. The sensors used to detect the proximity of the user's body at the front or back surface of the device use a detection threshold distance. The data shown in the sections below shows the distance(s). When front or back body worn condition is detected reduced power will be active.
5. The device employs proximity sensors also can detect the presence of the user's a finger or hand when handheld state at the front/back/top/bottom/left/right sides of the device. When front/back/top/bottom/left/right sides of handheld condition is detected reduced power will be active.
6. For verification of compliance of power reduction scheme, additional SAR testing with EUT transmitting at full RF power at a conservative trigger distance -1mm was performed:



Sensor/Handheld detection test set-up, Front and Back sides



Handheld detection test set-up, Left Side, Right Side, Bottom Side and Top Side

<P-Sensor>

Proximity Sensor Triggering Distance (mm)				
Position	Front		Back	
	Moving towards	Moving away	Moving towards	Moving away
Minimum	12	17	18	23

<Handheld for ANT0>

Proximity Sensor Triggering Distance (mm)								
Position	Front		Back		Right Side		Bottom Side	
	Moving towards	Moving away	Moving towards	Moving away	Moving towards	Moving away	Moving towards	Moving away
Minimum	10	15	19	24	3	8	22	26

<Handheld for ANT 1>

Proximity Sensor Triggering Distance (mm)								
Position	Front		Back		Left Side		Bottom Side	
	Moving towards	Moving away	Moving towards	Moving away	Moving towards	Moving away	Moving towards	Moving away
Minimum	7	12	14	20	8	14	13	18

<Handheld for ANT 4>

Proximity Sensor Triggering Distance (mm)								
Position	Front		Back		Left Side		Top Side	
	Moving towards	Moving away	Moving towards	Moving away	Moving towards	Moving away	Moving towards	Moving away
Minimum	9	14	13	18	7	12	16	21

<Handheld for ANT 5>

Proximity Sensor Triggering Distance (mm)						
Position	Front		Back		Top Side	
	Moving towards	Moving away	Moving towards	Moving away	Moving towards	Moving away
Minimum	4	9	10	15	11	17

<Handheld for ANT 6>

Proximity Sensor Triggering Distance (mm)								
Position	Front		Back		Right Side		Top Side	
	Moving towards	Moving away	Moving towards	Moving away	Moving towards	Moving away	Moving towards	Moving away
Minimum	6	11	14	19	8	14	14	19

8. RF Exposure Limits

8.1 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.

8.2 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.

9. Specific Absorption Rate (SAR)

9.1 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.

9.2 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:

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

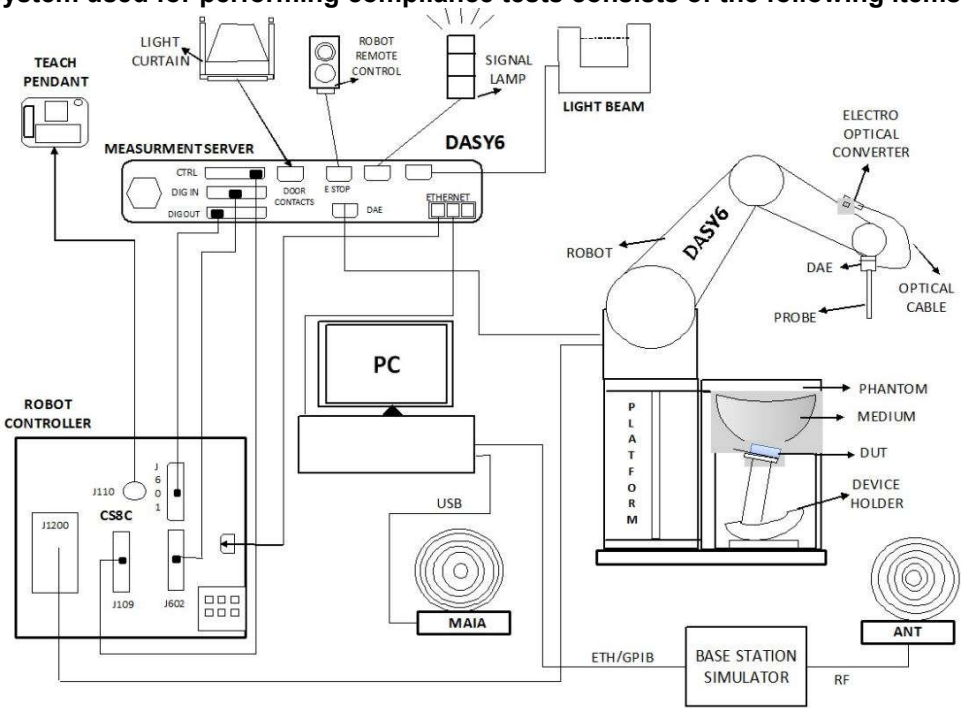
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

10. System Description and Setup

The DASY5 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 Win7 or Win10 and the DASY6 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.

10.1 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

10.2 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

10.3 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

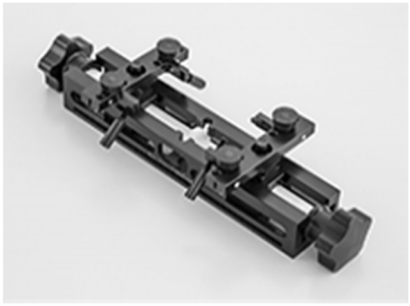
The ELI phantom is intended for compliance testing of handheld and body-mounted wireless devices or for evaluating transmitters operating at low frequencies. ELI is fully compatible with standard and all known tissue simulating liquids.

10.4 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

11. 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

11.1 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

11.2 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.

11.3 Area Scan

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

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

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

11.4 Zoom Scan

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

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

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

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

* When zoom scan is required and the *reported* SAR from the *area scan based 1-g SAR estimation* procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

11.5 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.

11.6 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.

12. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	13MHz System Validation Kit	CLA13	1020	2023/5/11	2024/5/10
SPEAG	835MHz System Validation Kit	D835V2	4d091	2022/8/19	2025/8/18
SPEAG	1900MHz System Validation Kit	D1900V2	5d118	2022/3/30	2025/3/29
SPEAG	2450MHz System Validation Kit	D2450V2	1040	2023/4/25	2026/4/24
SPEAG	2600MHz System Validation Kit	D2600V2	1061	2020/11/26	2023/11/24
SPEAG	3500MHz System Validation Kit	D3500V2	1037	2020/11/25	2023/11/23
SPEAG	3700MHz System Validation Kit	D3700V2	1008	2020/11/25	2023/11/24
SPEAG	3900MHz System Validation Kit	D3900V2	1048	2023/3/9	2026/3/8
SPEAG	5000MHz System Validation Kit	D5GHzV2	1113	2022/9/23	2025/9/22
SPEAG	Data Acquisition Electronics	DAE4	1303	2022/11/24	2023/11/23
SPEAG	Data Acquisition Electronics	DAE4	1691	2022/12/12	2023/12/11
SPEAG	Dosimetric E-Field Probe	EX3DV4	7706	2023/1/26	2024/1/25
SPEAG	Phone Positioner	N/A	N/A	NCR	NCR
SPEAG	SAM Twin Phantom	SAM Twin	TP-2024	NCR	NCR
SPEAG	ELI4 Phantom	ELI V8.0	TP-2151	NCR	NCR
CHIGO	Thermo-Hygrometer	HTC-1	55011	2023/1/8	2024/1/7
Anritsu	Radio Communication Analyzer	MT8821C	6262306175	2023/7/5	2024/7/4
Agilent	ENA Series Network Analyzer	E5071C	MY46111157	2023/7/5	2024/7/4
SPEAG	Dielectric Probe Kit	DAK-3.5	1071	2023/2/20	2024/2/19
SPEAG	Dielectric Probe Kit	DAK-12	1173	2023/9/20	2024/9/19
Anritsu	Vector Signal Generator	MG3710A	6201682672	2023/1/5	2024/1/4
Rohde & Schwarz	Power Meter	NRVD	102081	2023/7/5	2024/7/4
Rohde & Schwarz	Power Sensor	NRV-Z5	100538	2023/7/5	2024/7/4
Rohde & Schwarz	Power Sensor	NRV-Z5	100539	2023/7/5	2024/7/4
Rohde & Schwarz	Vector Signal Generator	SMBV100A	258305	2023/1/5	2024/1/4
R&S	BLUETOOTH TESTER	CBT	101246	2023/5/15	2024/5/14
Rohde & Schwarz	Spectrum Analyzer	FSV7	101631	2023/10/11	2024/10/10
BONN	POWER AMPLIFIER	BLMA 0830-3	087193A	Note 1	
BONN	POWER AMPLIFIER	BLMA 2060-2	087193B	Note 1	
TES	DIGITAC THERMOMETER	1310	220305411	Note 1	
Agilent	Dual Directional Coupler	778D	20500	Note 1	
Agilent	Dual Directional Coupler	11691D	MY48151020	Note 1	
ARRA	Power Divider	A3200-2	N/A	Note 1	
MCL	Attenuation1	BW-S10W5+	N/A	Note 1	
MCL	Attenuation2	BW-S10W5+	N/A	Note 1	
MCL	Attenuation3	BW-S10W5+	N/A	Note 1	

Note:

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

13. System Verification

13.1 Tissue Simulating Liquids

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

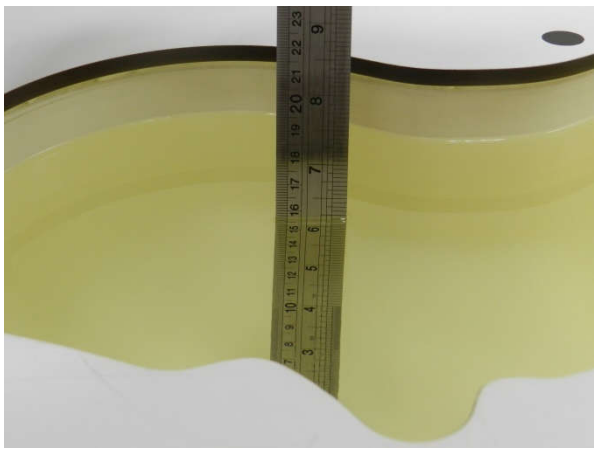


Fig 11.1 Photo of Liquid Height for Head SAR

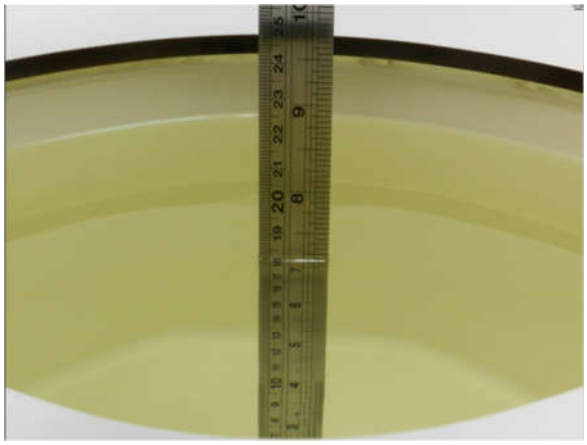


Fig 11.2 Photo of Liquid Height for Body SAR

13.2 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								
750	41.1	57.0	0.2	1.4	0.2	0	0.89	41.9
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
1800, 1900, 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	22.8	0.924	41.4	0.90	41.50	2.64	-0.14	±5	2023/10/17
1900	Head	22.9	1.43	39.8	1.40	40.00	2.14	-0.50	±5	2023/10/18
2450	Head	22.6	1.86	38.4	1.80	39.20	3.33	-2.04	±5	2023/10/19
2600	Head	22.6	1.96	40.4	1.96	39.00	0.00	3.59	±5	2023/10/20
3500	Head	22.9	2.88	38.5	2.91	37.90	-1.03	1.58	±5	2023/10/21
3700	Head	22.8	3.08	38.0	3.12	37.70	-1.28	0.80	±5	2023/10/21
3900	Head	22.9	3.28	37.6	3.32	37.50	-1.20	0.27	±5	2023/10/22
5250	Head	22.9	4.57	35.5	4.71	35.90	-2.97	-1.11	±5	2023/10/24
5600	Head	22.9	4.95	34.8	5.07	35.50	-2.37	-1.97	±5	2023/10/25
5750	Head	22.9	5.13	34.6	5.22	35.40	-1.72	-2.26	±5	2023/10/26
835	Head	22.8	0.915	41.3	0.90	41.50	1.67	-0.48	±5	2023/10/27
1900	Head	22.9	1.45	39.9	1.40	40.00	3.57	-0.25	±5	2023/10/28
2450	Head	22.6	1.85	39.1	1.80	39.20	2.78	-0.26	±5	2023/10/29
2600	Head	22.6	1.93	39.0	1.96	39.00	-1.53	0.00	±5	2023/10/30
3500	Head	22.9	2.80	39.0	2.91	37.90	-3.78	2.90	±5	2023/10/31
3700	Head	22.7	2.98	38.6	3.12	37.70	-4.49	2.39	±5	2023/10/31
3900	Head	22.9	3.25	37.8	3.32	37.50	-2.11	0.80	±5	2023/11/1
5250	Head	22.9	4.56	35.0	4.71	35.90	-3.18	-2.51	±5	2023/11/3
5600	Head	22.9	4.95	34.4	5.07	35.50	-2.37	-3.10	±5	2023/11/4
5750	Head	22.9	5.12	34.1	5.22	35.40	-1.92	-3.67	±5	2023/11/6
13	Head	22.8	0.757	53.700	0.75	55.00	0.93	-2.36	±5	2023/10/9

13.3 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 (%)
2023/10/17	835	Head	50	4d091	7706	1303	0.472	9.45	9.44	-0.11
2023/10/18	1900	Head	50	5d118	7706	1303	2.03	39.30	40.6	3.31
2023/10/19	2450	Head	50	1040	7706	1303	2.55	52.70	51	-3.23
2023/10/20	2600	Head	50	1061	7706	1303	2.67	56.60	53.4	-5.65
2023/10/21	3500	Head	50	1037	7706	1303	3.21	68.00	64.2	-5.59
2023/10/21	3700	Head	50	1008	7706	1303	3.22	67.60	64.4	-4.73
2023/10/22	3900	Head	50	1048	7706	1303	3.29	69.10	65.8	-4.78
2023/10/24	5250	Head	50	1113	7706	1303	3.87	81.50	77.4	-5.03
2023/10/25	5600	Head	50	1113	7706	1303	3.88	82.60	77.6	-6.05
2023/10/26	5750	Head	50	1113	7706	1303	3.79	80.80	75.8	-6.19
2023/10/27	835	Head	50	4d091	7706	1303	0.465	9.45	9.3	-1.59
2023/10/28	1900	Head	50	5d118	7706	1303	2.06	39.30	41.2	4.83
2023/10/29	2450	Head	50	1040	7706	1303	2.53	52.70	50.6	-3.98
2023/10/30	2600	Head	50	1061	7706	1303	2.64	56.60	52.8	-6.71
2023/10/31	3500	Head	50	1037	7706	1303	3.19	68.00	63.8	-6.18
2023/10/31	3700	Head	50	1008	7706	1303	3.32	67.60	66.4	-1.78
2023/11/1	3900	Head	50	1048	7706	1303	3.31	69.10	66.2	-4.20
2023/11/3	5250	Head	50	1113	7706	1303	3.82	81.50	76.4	-6.26
2023/11/4	5600	Head	50	1113	7706	1303	3.87	82.60	77.4	-6.30
2023/11/6	5750	Head	50	1113	7706	1303	3.81	80.80	76.2	-5.69
2023/10/9	13	Head	250	1020	7706	1691	0.141	0.563	0.564	0.71

<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 (%)
2023/10/17	835	Head	50	4d091	7706	1303	0.305	6.22	6.1	-1.93
2023/10/18	1900	Head	50	5d118	7706	1303	1.04	20.40	20.8	1.96
2023/10/19	2450	Head	50	1040	7706	1303	1.19	24.60	23.8	-3.25
2023/10/20	2600	Head	50	1061	7706	1303	1.20	25.10	24	-4.38
2023/10/21	3500	Head	50	1037	7706	1303	1.23	25.40	24.6	-3.15
2023/10/21	3700	Head	50	1008	7706	1303	1.19	24.40	23.8	-2.46
2023/10/22	3900	Head	50	1048	7706	1303	1.17	24.10	23.4	-2.90
2023/10/24	5250	Head	50	1113	7706	1303	1.09	23.30	21.8	-6.44
2023/10/25	5600	Head	50	1113	7706	1303	1.11	23.70	22.2	-6.33
2023/10/26	5750	Head	50	1113	7706	1303	1.08	23.00	21.6	-6.09
2023/10/27	835	Head	50	4d091	7706	1303	0.301	6.22	6.02	-3.22
2023/10/28	1900	Head	50	5d118	7706	1303	1.06	20.40	21.2	3.92
2023/10/29	2450	Head	50	1040	7706	1303	1.18	24.60	23.6	-4.07
2023/10/30	2600	Head	50	1061	7706	1303	1.19	25.10	23.8	-5.18
2023/10/31	3500	Head	50	1037	7706	1303	1.20	25.40	24	-5.51
2023/10/31	3700	Head	50	1008	7706	1303	1.23	24.40	24.6	0.82
2023/11/1	3900	Head	50	1048	7706	1303	1.17	24.10	23.4	-2.90
2023/11/3	5250	Head	50	1113	7706	1303	1.09	23.30	21.8	-6.44
2023/11/4	5600	Head	50	1113	7706	1303	1.11	23.70	22.2	-6.33
2023/11/6	5750	Head	50	1113	7706	1303	1.09	23.00	21.8	-5.22
2023/10/9	13	Head	250	1020	7706	1691	0.094	0.347	0.376	7.43

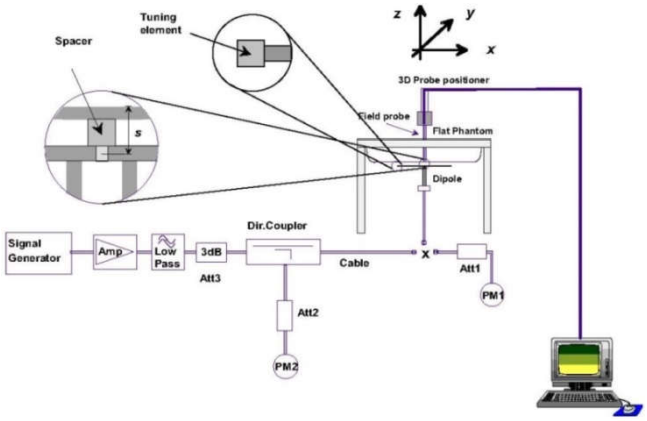


Fig 11.3.1 System Performance Check Setup

Fig 11.3.2 Setup Photo

Fig 11.3.2 Setup Photo

14. RF Exposure Positions

14.1 Ear and handset reference point

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

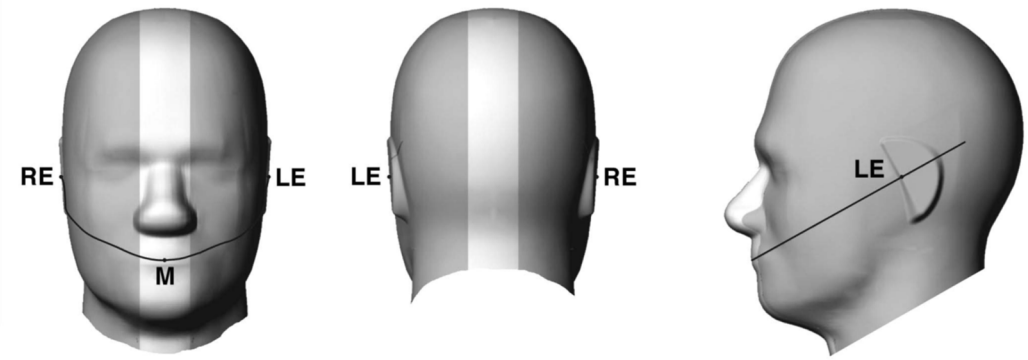


Fig 12.1.1 Front, back, and side views of SAM twin phantom

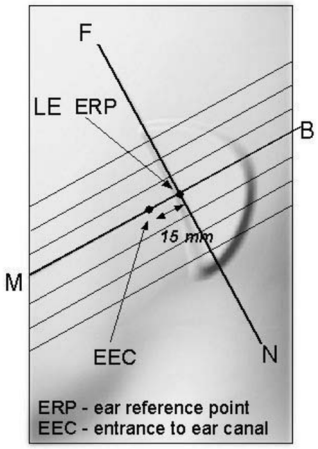


Fig 12.1.2 Close-up side view of phantom showing the ear region.

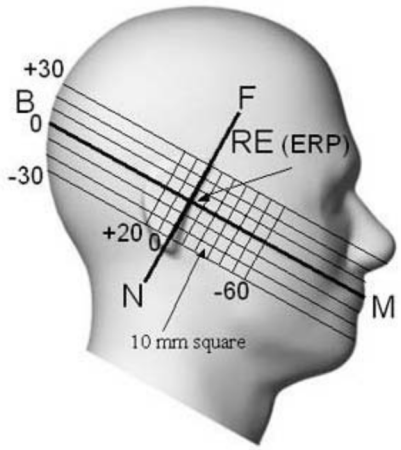


Fig 12.1.3 Side view of the phantom showing relevant markings and seven cross-sectional plane locations

14.2 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 12.2.1 and Figure 12.2.2), 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 12.2.1). The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily parallel to the front face of the handset (see Figure 12.2.2), especially for clamshell handsets, handsets with flip covers, and other irregularly-shaped handsets.
3. Position the handset close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure 12.2.3), such that the plane defined by the vertical centerline and the horizontal line of the handset is approximately parallel to the sagittal plane of the phantom.
4. Translate the handset towards the phantom along the line passing through RE and LE until handset point A touches the pinna at the ERP.
5. While maintaining the handset in this plane, rotate it around the LE-RE line until the vertical centerline is in the plane normal to the plane containing B-M and N-F lines, i.e., the Reference Plane.
6. Rotate the handset around the vertical centerline until the handset (horizontal line) is parallel to the N-F line.
7. While maintaining the vertical centerline in the Reference Plane, keeping point A on the line passing through RE and LE, and maintaining the handset contact with the pinna, rotate the handset about the N-F line until any point on the handset is in contact with a phantom point below the pinna on the cheek. See Figure 12.2.3. The actual rotation angles should be documented in the test report.

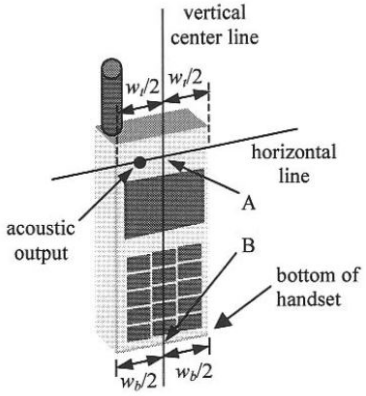


Fig 12.2.1 Handset vertical and horizontal reference lines—"fixed case

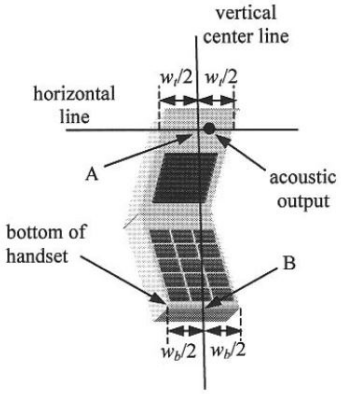


Fig 12.2.2 Handset vertical and horizontal reference lines—"clam-shell case"

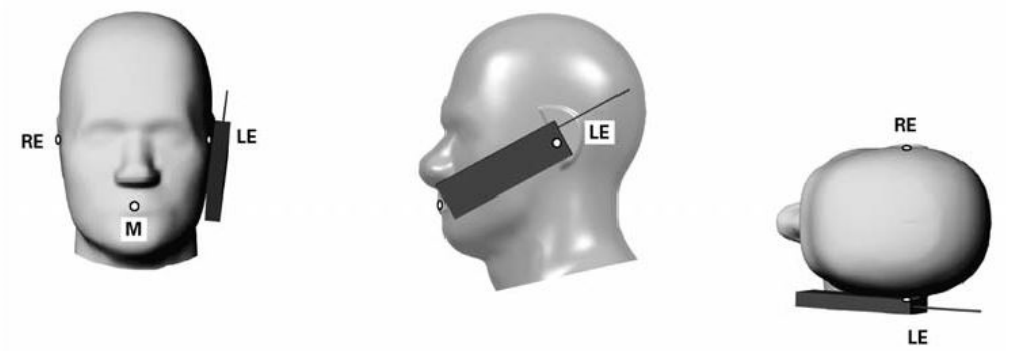


Fig 12.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

14.3 Definition of the tilt position

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

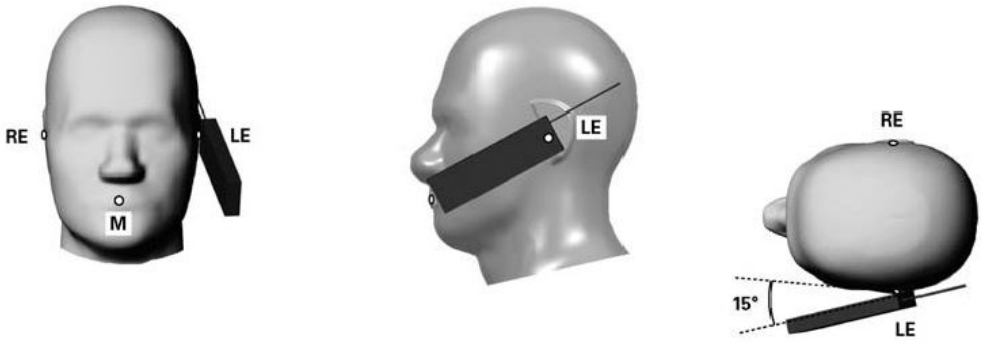


Fig 12.3.1 Tilt position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which define the Reference Plane for handset positioning, are indicated.

14.4 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. 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.

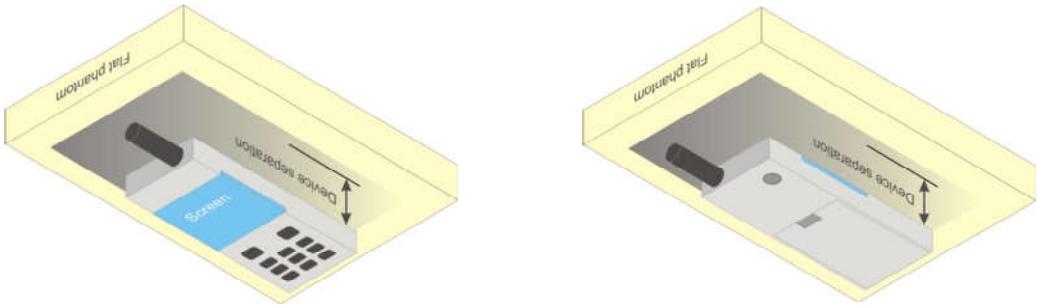


Fig 12.4 Body Worn Position

14.5 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 can provide similar mobile web access and multimedia support found in mini-tablets or UMPC mini-tablets and 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.

14.6 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.

15. Conducted RF Output Power (Unit: dBm)

The detailed conducted power table can refer to Appendix E.

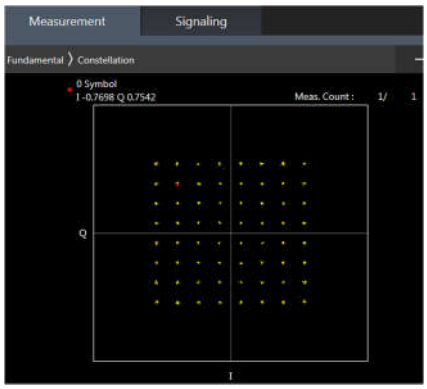
<LTE Conducted Power>

General Note:

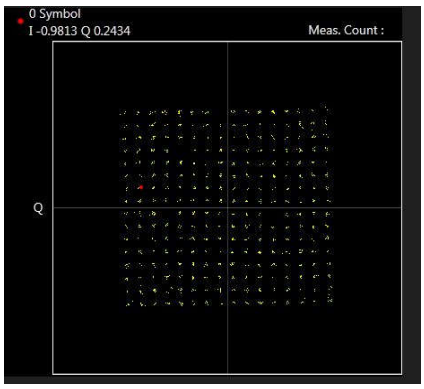
1. Anritsu MT8820C base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r05, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
4. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r05, for QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
6. Per KDB 941225 D05v02r05, 16QAM/64QAM/256QAM 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/64QAM/256QAM 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 B5 / B26 / 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 B5 / B38 SAR test was covered by B26 / B41; 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 May 2017 TCB workshop, for 16QAM and 64QAM, 256QAM 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 256QAM, 64QAM and 16QAM signal modulation are correct.

16QAM



64QAM



256QAM

<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.

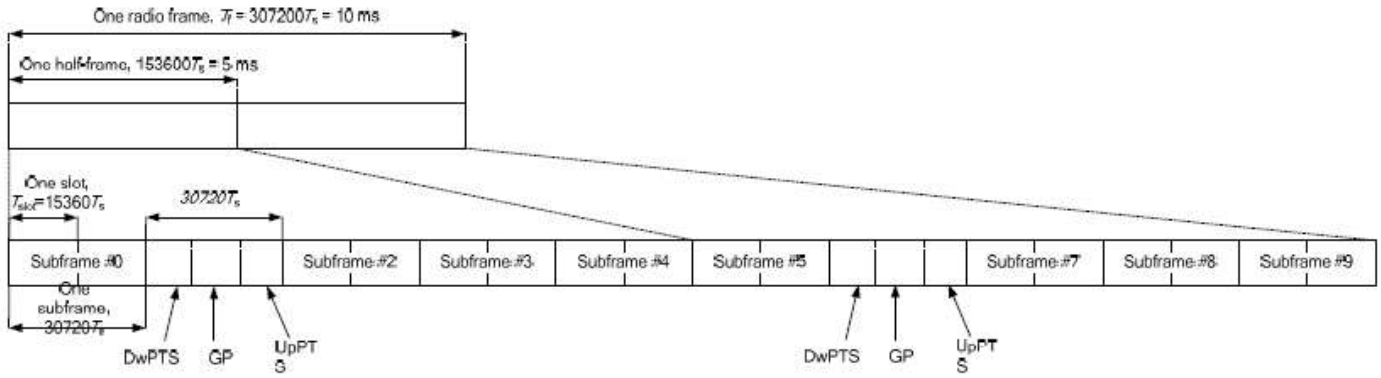


Figure 4.2-1: Frame structure type 2 (for 5 ms switch-point periodicity).

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 TDD Power class 2

i. Uplink-downlink configuration: 1. In a half-frame consisted of 5 subfames, uplink operation is in 2 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: (2+0.167)/5 = 43.3%
iv. for special subframe with normal cyclic prefix in uplink, the total uplink duty factor in one half-frame is: (2+0.143)/5 = 42.9%
v. For TDD LTE SAR measurement, the duty cycle 1:2.33 (42.9 %) was used perform testing and considering the theoretical duty cycle of 43.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 42.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix 43.3%/42.9% = 1.009 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.

For LTE TDD 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 inter and intra band. 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. The gray color table is covered by other combinations and no need to verify power.

2CC Downlink Carrier Aggregation			3CC Downlink Carrier Aggregation			4CC Downlink Carrier Aggregation		
Number	Combination	Covered by Measurement Superset	Number	Combination	Covered by Measurement Superset	Number	Combination	Covered by Measurement Superset
1	CA_41A-41A	3CC-1	1	CA_41A-41A-41A		1	CA_41A-41A-41C	
2	CA_41C	3CC-2	2	CA_41A-41C	3CC-2	2	CA_41A-41D	
3	CA_5A-7A		3	CA_41D	3CC-2	3	CA_41C-41C	
4	CA_7A-7A					4	CA_41E	
5	CA_7B							
6	CA_7C							
7	CA_38C							

LTE Carrier Aggregation Conducted Power (Downlink)

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

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

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

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

v. For inter-band CA, the SCC selected highest bandwidth and near the middle of its transmission band. For SCC DL RB size and offset will base on the PCC corresponding RB allocation.

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

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

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

LTE 4x4 MIMO (Downlink)

This device supports downlink 4x4 MIMO operations for LTE Band 7/38/41 only. Uplink transmission is limited to a single output stream. Power measurements were performed with downlink 4x4 MIMO active for the configuration with highest measured maximum conducted power with 4x4 downlink MIMO inactive measured among the channel bandwidth, modulation, and RB combinations in each frequency band.

Per FCC Guidance, SAR for downlink 4x4 MIMO was not needed since the maximum average output power in 4x4 downlink MIMO mode was not > 0.25 dB higher than the maximum output power with downlink 4x4 MIMO inactive. When carrier aggregation is applicable, power measurements were performed with the downlink carrier aggregation and 4x4 DL MIMO active for the configuration with highest measured maximum conducted power with downlink carrier aggregation inactive measured among the channel bandwidth, modulation, and RB combinations in each frequency band.

4X4 MIMO	Band
	LTE Band 7/38/41

LTE Carrier Aggregation Conducted Power (Uplink)

LTE Uplink CA	2CC Uplink Carrier Aggregation
Intra-band	Antenna Tx
CA_38C	Ant 4
CA_41C	Ant 4
CA_7C	Ant 1

<Intra-band>

General Note:

i. The device supports intra-band uplink carrier aggregation for LTE B7/66/38 with a maximum of two uplink 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. 3GPP 36.101 6.2.3A allows for several dB of MPR to be applied when not-contiguous RB allocation is implemented. The conducted power and MPR setting in this device are permanently implemented pre 3GPP requirement.

ii. The device supports uplink carrier aggregation with a maximum of two uplink 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. 3GPP 36.101 6.2.3A allows for several dB of MPR to be applied when not-contiguous RB allocation is implemented. The conducted power and MPR setting in this device are permanently implemented pre the 3GPP requirement.

iii. According Nov. 2017 TCB workshop, the output power with uplink CA active was measured for the configuration with the highest reported SAR with single carrier for each exposure condition. The power was measured with wideband signal integration over both component carriers.

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

<Inter-band uplink carrier aggregation consideration>

LTE Uplink CA	2CC Uplink Carrier Aggregation
Inter-band	Antenna Tx
CA_5A-7A	Ant 0 + Ant 4

General Note:

1. The single carrier of inter band CA uplink power level is the same as Non-CA standalone LTE power level.
2. The product implements Qualcomm Smart Transmit feature which controls the instantaneous transmitting power for WWAN transmitter to ensure the product in compliance with FCC RF exposure limit over a defined time window, for SAR (transmit frequency ≤ 6GHz). To control and manage transmitting power in real time and to ensure at all times the time-averaged RF exposure is compliant to the regulation requirement.
3. For LTE inter-band CA mode, Qualcomm Smart Transmit algorithm in WWAN adds directly the time-averaged RF exposure between two LTE bands. Smart Transmit algorithm controls the total RF exposure base on LTE inter CA bands to not exceed FCC limit. In Part 1 Report, simultaneous transmission compliance was evaluated with other Radios (WLAN or BT) using standalone LTE SAR mode.

5G NR Output Power (Unit: dBm)

General Note:

1. 5G NR n5/n7/n26 /n38/n41/n77/n78 is SA mode.
2. 5G NR n5/n41/n77/n78 is NSA mode.
3. For 5G NR test procedure was following step similar FCC KDB 941225 D05:
   a. For DFT-OFDM and CP-OFDM output power measurement reduction, according to 38.101 maximum power reduction for power class2 and 3, the CP-OFDM mode will not higher than DFT-OFDM mode, therefore, similar FCC KDB 941225 D05 procedure for other modulation output power for each RB allocation configuration is > not ½ dB higher than the same configuration in DFT-s QPSK and the reported SAR for the DFT-s QPSK configuration is ≤ 1.45 W/kg; CP-OFDM testing is not required.
   b. For DFT-OFDM output power measurement reduction, according to 38.101 maximum power reduction for power class2 and 3, for 16QAM/64QAM/256QAM and smaller bandwidth output power will spot check largest channel bandwidth worst RB configuration to ensure the 16QAM/64QAM/256QAM and smaller bandwidth output power will not ½ dB higher than the same configuration in the largest supported bandwidth.
   c. SAR testing 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
   d. 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure
   e. 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
   f. PI/2 BPSK/16QAM/64QAM/256QAM output powers according to 3GPP MPR will not ½ dB higher than the same configuration in QPSK, also reported SAR for the QPSK configuration is less than 1.45 W/kg, PI/2 BPSK /16QAM/64QAM/256QAM SAR testing are not required.
   g. Smaller bandwidth output power for each RB allocation configuration for this device will 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, smaller bandwidth SAR testing is not required for this device
4. For 5G NR n77/n78 HPUE, duty cycle is 50% considered in SAR testing. For 5G NR other bands test, using FTM (Factory Test Mode) to perform SAR with default 100% transmission.
5. 5G NR supports CP-OFDM and DFT-s-OFDM modulation, for DFT-s-OFDM power is higher than CP-OFDM, so only show DFT-s-OFDM power table and chose DFT-s-OFDM to perform SAR testing.
6. For DFT-s-OFDM and CP-OFDM output power measurement reduction, according to 38.101 maximum power reduction for the CP-OFDM mode will not higher than DFT-s-OFDM mode, therefore, CP-OFDM measurement is unnecessary.
7. NSA and SA mode should perform SAR separately. For the maximum power of NSA mode is the same as SA total power level, so SA SAR can represent NSA mode SAR.
8. 5GNR NSA mode, the power level is the same as 5GNR SA mode, so 5GNR NSA mode and SA mode power table only show one time.
9. This device supports HPUE for 5G NR n77/n78 with class 2 level, HPUE power has been measured separately. For HPUE power is higher than power class 3 but with lower duty cycle, the maximum average power for class 2 and class 3 is almost the same, so we chose power class 3 full SAR testing and power class 2 verify the worst case of power class 3 SAR.

<3GPP 38.101 MPR for EN-DC>

Table 6.2.2-1 Maximum power reduction (MPR) for power class 3

Modulation		MPR (dB)		
		Edge RB allocations	Outer RB allocations	Inner RB allocations
DFT-s-OFDM	Pi/2 BPSK	≤ 3.5[1]	≤ 1.2[1]	≤ 0.2[1]
		≤ 0.5[2]	≤ 0.5[2]	0[2]
	QPSK	≤ 1		0
	16 QAM	≤ 2		≤ 1
	64 QAM	≤ 2.5		
	256 QAM	≤ 4.5		
CP-OFDM	QPSK	≤ 3		≤ 1.5
	16 QAM	≤ 3		≤ 2
	64 QAM	≤ 3.5		
	256 QAM	≤ 6.5		

NOTE 1: Applicable for UE operating in TDD mode with Pi/2 BPSK modulation and UE indicates support for UE capability *powerBoosting-pi2BPSK* and if the IE *powerBoostPi2BPSK* is set to 1 and 40 % or less slots in radio frame are used for UL transmission for bands n40, n41, n77, n78 and n79. The reference power of 0 dB MPR is 26 dBm.

NOTE 2: Applicable for UE operating in FDD mode, or in TDD mode in bands other than n40, n41, n77, n78 and n79 with Pi/2 BPSK modulation and if the IE *powerBoostPi2BPSK* is set to 0 and if more than 40 % of slots in radio frame are used for UL transmission for bands n40, n41, n77, n78 and n79.

Table 6.2.2-2 Maximum power reduction (MPR) for power class 2

Modulation		MPR (dB)		
		Edge RB allocations	Outer RB allocations	Inner RB allocations
DFT-s-OFDM	Pi/2 BPSK	≤ 3.5	≤ 0.5	0
	QPSK	≤ 3.5	≤ 1	0
	16 QAM	≤ 3.5	≤ 2	≤ 1
	64 QAM	≤ 3.5	≤ 2.5	
	256 QAM	≤ 4.5		
CP-OFDM	QPSK	≤ 3.5	≤ 3	≤ 1.5
	16 QAM	≤ 3.5	≤ 3	≤ 2
	64 QAM	≤ 3.5		
	256 QAM	≤ 6.5		

<EN-DC combination>

ENDC	Main Antenna Tx	
	LTE TX	NR TX
DC_38A_n78A	ANT1	ANT5
DC_41A_n78A	ANT1	ANT5
DC_5A_n41A	ANT0	ANT4
DC_5A_n78A	ANT0	ANT5
DC_7A_n5A	ANT4	ANT0
DC_7A_n78A	ANT1	ANT5
DC_7A_n77A	ANT1	ANT5

16. Antenna Location

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

17. Spot Check SAR Test Results

Spot Check General Note:

1. SAR spot check verification on the worst cases from the original model was performed to demonstrate the test data from original model remains representative for the variant model.
2. If the 1-g SAR spot check result “does not exceed 30%, but larger than 1.2 W/kg”, more spot check on the next-higher exposure position until the spot check result does not exceed 1.2 W/kg. Similarly, if the 10-g SAR spot check result “does not exceed 30%, but larger than 3.0 W/kg”, more spot check on the next-higher exposure position until the spot check result does not exceed 3.0 W/kg.
3. The Spot check results showed that deviation of the SAR results did not exceed 30%, therefore referring to the guidance in the KDB inquiry, SAR data reuse is justified.
4. 1st as parent model, 2nd as variant model.

General Note:

1. Per KDB 447498 D01v06, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   b. For SAR testing of BT/WLAN signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle)"
   c. For WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
   d. For BT/WLAN: Reported SAR(W/kg)= Measured SAR(W/kg)* Duty Cycle scaling factor * Tune-up scaling factor
   e. For TDD LTE SAR measurement of power class 3, 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 (W/kg) = Measured SAR (W/kg)* Tune-up Scaling Factor* scaling factor for extended cyclic prefix.
2. Per KDB 447498 D01v06, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the *reported* 1-g or 10-g SAR for the mid-band or highest output power channel is:
   - ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
   - ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
   - ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
3. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required when the measured SAR is ≥ 0.8W/kg. Per KDB 865664 D01v01r04, if the extremity repeated SAR is necessary, the same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds.
4. The device implements the power management and proximity sensor /receiver detection/hotspot mode for SAR compliance at different exposure conditions (head, body-worn, hotspot, extremity) and the Qualcomm smart transmit will manage to ensure the power level not exceeding the associated power table. Details about the power management decision and sensor detection are provided in the operational description. And the device will invoke corresponding work scenarios power level base on frequency bands/antennas, which can refer to power table at appendix E.
5. For WLAN/BT when transmit simultaneous with WWAN, power reduction will be activated to head. For WLAN/BT when transmit simultaneous with WWAN and Proximity sensors trigger, power reduction will be activated to body-worn and Handheld.
6. This device supports HPUE for LTE Band 41 and 5G NR n77/n78 with class 2 level, HPUE power has been measured separately. For HPUE power is higher than power class 3 but with lower duty cycle, the maximum average power for class 2 and class 3 is almost the same, so we chose power class 3 full SAR testing and power class 2 verify the worst case of power class 3 SAR.
7. For 5G NR n77/n78 HPUE, duty cycle is 50% considered in SAR testing. For 5G NR other bands test, using FTM (Factory Test Mode) to perform SAR with default 100% transmission.
8. Per KDB648474 D04v01r03, for smart phones with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm, when hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg, however, when power reduction applies to hotspot mode the measured SAR must be scaled to the maximum output power, including tolerance, allowed for phablet modes to compare with the 1.2 W/kg SAR test reduction threshold.

a. For this device SAR for WWAN/WLAN transmitter scaled to maximum output power mode for product specific 10g SAR is higher than 1.2W/kg of GSM850/1900, WCDMA Band II/V, LTE Band 2/7/38/41/42, 5GNR n7/n41/n77/n78, WLAN2.4/5.2/5.8GHz, therefore product specific 10g SAR is necessary.
b. WLAN 5.3/5.5GHz tested the product specific 10g SAR since it has no hotspot mode.
c. When 10-g product specific 10g SAR is considered, SAR thresholds is specified in the procedures for SAR test reduction and exclusion should be multiplied by 2.5.

9. Although the headset SAR is greater than 0.8 W/kg, the headset SAR verified the worst of the non-headset SAR and less than non-headset SAR, so there is no need to be tested other channels.
10. According to Nov. 2017 TCB workshop, when the reported 1gSAR for UL CA configuration is <1.2 W/kg, UL CA 1gSAR is not required for all required test channels (PCC based).

LTE Note:

1. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
2. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
3. Per KDB 941225 D05v02r05, for QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
4. Per KDB 941225 D05v02r05, 16QAM/64QAM/256QAM 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/64QAM/256QAM 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 B5 / B26 / 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 B/B5 / B38 SAR test was covered by B26 / B41; 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

5G NR Note:

1. For 5G NR test procedure was following step similar FCC KDB 941225 D05:
   a. SAR testing 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.
   b. 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure
   c. 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.
   d. PI/2 BPSK/16QAM/64QAM/256QAM output powers according to 3GPP MPR will not ½ dB higher than the same configuration in QPSK, also reported SAR for the QPSK configuration is less than 1.45 W/kg, PI/2 BPSK /16QAM/64QAM/256QAM SAR testing are not required.
   e. Smaller bandwidth output power for each RB allocation configuration for this device will 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, smaller bandwidth SAR testing is not required for this device
   f. For 5G FR1 n5 /n7/n26/n66/n38/n41/n78 the maximum bandwidth does not support three non-overlapping channels, 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.

17.1 Head SAR

Plot No.	Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Sample	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)	Deviation
835MHz																							
	1st	GSM850	-	-	-	-	GPRS (2 Tx slots)	Right Cheek	0mm	Ant 0	DSI 2	189	836.4	1	30.38	31.50	1.294	-	-	-0.06	0.379	0.491	-0.41%
01	2nd	GSM850	-	-	-	-	GPRS (2 Tx slots)	Right Cheek	0mm	Ant 0	DSI 2	189	836.4	1	30.38	31.50	1.294	-	-	-0.06	0.378	**0.489**	
	1st	WCDMA V	-	-	-	-	RMC 12.2Kbps	Right Cheek	0mm	Ant 0	DSI 2	4182	836.4	1	23.16	24.00	1.213	-	-	-0.14	0.379	0.460	-20.87%
02	2nd	WCDMA V	-	-	-	-	RMC 12.2Kbps	Right Cheek	0mm	Ant 0	DSI 2	4182	836.4	1	23.16	24.00	1.213	-	-	-0.04	0.300	**0.364**	
	1st	LTE Band 26	15M	QPSK	1	0	-	Right Cheek	0mm	Ant 0	DSI 2	26865	831.5	1	23.25	24.00	1.189	-	-	0.06	0.214	0.254	-0.39%
03	2nd	LTE Band 26	15M	QPSK	1	0	-	Right Cheek	0mm	Ant 0	DSI 2	26865	831.5	1	23.25	24.00	1.189	-	-	-0.07	0.213	**0.253**	
	1st	FR1 n26	20M	QPSK	50	28	DFT-SCS-15KHz	Right Cheek	0mm	Ant 0	DSI 2	166300	831.5	1	23.42	24.00	1.143	-	-	0.01	0.192	0.219	-0.46%
04	2nd	FR1 n26	20M	QPSK	50	28	DFT-SCS-15KHz	Right Cheek	0mm	Ant 0	DSI 2	166300	831.5	1	23.42	24.00	1.143	-	-	-0.01	0.191	**0.218**	
1900MHz																							
	1st	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Right Cheek	0mm	Ant 0	DSI 2	661	1880	1	24.25	25.50	1.334	-	-	0.06	0.148	0.197	0.00%
05	2nd	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Right Cheek	0mm	Ant 0	DSI 2	661	1880	1	24.25	25.50	1.334	-	-	-0.08	0.148	**0.197**	
	1st	WCDMA II	-	-	-	-	RMC 12.2Kbps	Right Cheek	0mm	Ant 0	DSI 2	9400	1880	1	23.17	24.00	1.211	-	-	-0.12	0.122	0.148	-2.03%
06	2nd	WCDMA II	-	-	-	-	RMC 12.2Kbps	Right Cheek	0mm	Ant 0	DSI 2	9400	1880	1	23.17	24.00	1.211	-	-	0.07	0.120	**0.145**	
	1st	LTE Band 25	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 0	DSI 2	26340	1880	1	22.85	24.00	1.303	-	-	-0.11	0.084	0.109	-5.50%
07	2nd	LTE Band 2	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 0	DSI 2	18900	1880	1	22.85	24.00	1.303	-	-	-0.12	0.079	**0.103**	
2600MHz																							
	1st	LTE Band 7	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 1	DSI 2	21100	2535	1	23.13	24.00	1.222	-	-	0.02	0.669	0.817	-1.47%
	2nd	LTE Band 7	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 1	DSI 2	21100	2535	1	23.13	24.00	1.222	-	-	-0.03	0.659	0.805	
	1st	LTE Band 7	20M	QPSK	1	0	-	Right Tilted	0mm	Ant 4	DSI 2	21100	2535	1	17.35	18.50	1.303	-	-	0.16	0.701	0.914	-3.50%
08	2nd	LTE Band 7	20M	QPSK	1	0	-	Right Tilted	0mm	Ant 4	DSI 2	21100	2535	1	17.35	18.50	1.303	-	-	-0.07	0.677	**0.882**	
	1st	LTE Band 41	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 1	DSI 2	40620	2593	1	22.93	24.00	1.279	62.9	1.006	0.03	0.577	0.743	-8.08%
	2nd	LTE Band 41	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 1	DSI 2	40620	2593	1	22.93	24.00	1.279	62.9	1.006	0.07	0.531	0.683	
	1st	LTE Band 41	20M	QPSK	1	0	-	Right Tilted	0mm	Ant 4	DSI 2	39750	2506	1	20.22	21.30	1.282	62.9	1.006	-0.08	0.725	0.935	-6.74%
09	2nd	LTE Band 41	20M	QPSK	1	0	-	Right Tilted	0mm	Ant 4	DSI 2	39750	2506	1	20.22	21.30	1.282	62.9	1.006	0.1	0.676	**0.872**	
	2nd	LTE Band 41 HPUE	20M	QPSK	1	0	-	Right Tilted	0mm	Ant 4	DSI 2	39750	2506	1	21.89	22.90	1.262	42.9	1.009	-0.05	0.677	0.862	
	2nd	LTE Band 41C	20M	QPSK	1	99	-	Right Tilted	0mm	Ant 4	DSI 2	39750+ 39948	2506+ 2525.8	1	19.89	21.30	1.384	62.9	1.006	0.05	0.613	0.853	
	1st	FR1 n7	40M	QPSK	1	1	DFT-SCS-15KHz	Left Cheek	0mm	Ant 1	DSI 2	507000	2535	1	23.38	24.00	1.153	-	-	-0.06	0.617	0.712	-4.35%
10	2nd	FR1 n7	40M	QPSK	1	1	DFT-SCS-15KHz	Left Cheek	0mm	Ant 1	DSI 2	507000	2535	1	23.38	24.00	1.153	-	-	0.02	0.590	**0.681**	
	1st	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Right Tilted	0mm	Ant 4	DSI 2	518598	2592.99	1	16.95	17.90	1.245	-	-	-0.03	0.735	0.915	-1.09%
11	2nd	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Right Tilted	0mm	Ant 4	DSI 2	518598	2592.99	1	16.95	17.90	1.245	-	-	0.06	0.727	**0.905**	
3500MHz																							
	1st	LTE Band 42	20M	QPSK	1	0	-	Left Tilted	0mm	Ant 5	DSI 2	42190	3460	1	15.78	16.80	1.265	62.9	1.006	0.06	0.732	0.931	-1.07%
12	2nd	LTE Band 42	20M	QPSK	1	0	-	Left Tilted	0mm	Ant 5	DSI 2	42190	3460	1	15.78	16.80	1.265	62.9	1.006	-0.01	0.724	**0.921**	
	2nd	LTE Band 42	20M	QPSK	1	0	-	Left Tilted	0mm	Ant 5	DSI 2	42190	3460	2	15.78	16.80	1.265	62.9	1.006	0.02	0.688	0.875	
	2nd	LTE Band 42	20M	QPSK	1	0	-	Left Tilted	0mm	Ant 5	DSI 2	42190	3460	3	15.78	16.80	1.265	62.9	1.006	0.1	0.691	0.879	
3700MHz~3900MHz																							
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Right Cheek	0mm	Ant 5	DSI 2	656000	3840	1	16.55	17.70	1.303	-	-	0.12	0.444	0.579	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Right Cheek	0mm	Ant 5	DSI 2	656000	3840	1	16.47	17.70	1.327	-	-	0.03	0.453	0.601	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Right Tilted	0mm	Ant 5	DSI 2	656000	3840	1	16.55	17.70	1.303	-	-	0.16	0.541	0.705	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Right Tilted	0mm	Ant 5	DSI 2	656000	3840	1	16.47	17.70	1.327	-	-	-0.1	0.537	0.713	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Left Cheek	0mm	Ant 5	DSI 2	656000	3840	1	16.55	17.70	1.303	-	-	0.18	0.607	0.791	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Left Cheek	0mm	Ant 5	DSI 2	656000	3840	1	16.47	17.70	1.327	-	-	-0.1	0.555	0.737	
13	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Left Tilted	0mm	Ant 5	DSI 2	656000	3840	1	16.55	17.70	1.303	-	-	-0.02	0.706	**0.920**	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Left Tilted	0mm	Ant 5	DSI 2	656000	3840	1	16.47	17.70	1.327	-	-	-0.09	0.661	0.877	
	2nd	FR1 n77 Part 27O	100M	QPSK	270	0	DFT-SCS-30KHz	Left Tilted	0mm	Ant 5	DSI 2	656000	3840	1	16.45	17.70	1.334	-	-	-0.08	0.650	0.867	
	2nd	FR1 n77 Part 27O HPUE	100M	QPSK	1	1	DFT-SCS-30KHz	Left Tilted	0mm	Ant 5	DSI 2	656000	3840	1	19.45	20.70	1.334	50	1.000	0.02	0.683	0.911	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Right Cheek	0mm	Ant 1	DSI 2	656000	3840	1	19.68	20.50	1.208	-	-	0.08	0.108	0.130	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Right Cheek	0mm	Ant 1	DSI 2	656000	3840	1	19.63	20.50	1.222	-	-	0.01	0.074	0.090	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Right Tilted	0mm	Ant 1	DSI 2	656000	3840	1	19.68	20.50	1.208	-	-	0.03	0.112	0.135	

	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Right Tilted	0mm	Ant 1	DSI 2	656000	3840	1	19.63	20.50	1.222	-	-	-0.08	0.087	0.106	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Left Cheek	0mm	Ant 1	DSI 2	656000	3840	1	19.68	20.50	1.208	-	-	-0.08	0.190	0.229	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Left Cheek	0mm	Ant 1	DSI 2	656000	3840	1	19.63	20.50	1.222	-	-	0.1	0.130	0.159	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Left Tilted	0mm	Ant 1	DSI 2	656000	3840	1	19.68	20.50	1.208	-	-	-0.18	0.071	0.086	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Left Tilted	0mm	Ant 1	DSI 2	656000	3840	1	19.63	20.50	1.222	-	-	0.1	0.065	0.079	
	2nd	FR1 n77 Part 27O HPUE	100M	QPSK	1	1	DFT-SCS-30KHz	Left Cheek	0mm	Ant 1	DSI 2	656000	3840	1	22.62	23.50	1.225	50	1.000	0.12	0.176	0.216	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Right Cheek	0mm	Ant 2	DSI 2	656000	3840	1	21.36	22.50	1.300	-	-	0.08	0.143	0.186	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Right Cheek	0mm	Ant 2	DSI 2	656000	3840	1	21.28	22.50	1.324	-	-	-0.17	0.120	0.159	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Right Tilted	0mm	Ant 2	DSI 2	656000	3840	1	21.36	22.50	1.300	-	-	-0.03	0.126	0.164	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Right Tilted	0mm	Ant 2	DSI 2	656000	3840	1	21.28	22.50	1.324	-	-	0.14	0.108	0.143	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Left Cheek	0mm	Ant 2	DSI 2	656000	3840	1	21.36	22.50	1.300	-	-	0.11	0.088	0.114	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Left Cheek	0mm	Ant 2	DSI 2	656000	3840	1	21.28	22.50	1.324	-	-	-0.05	0.064	0.085	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Left Tilted	0mm	Ant 2	DSI 2	656000	3840	1	21.36	22.50	1.300	-	-	0.18	0.061	0.079	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Left Tilted	0mm	Ant 2	DSI 2	656000	3840	1	21.28	22.50	1.324	-	-	0.14	0.055	0.073	
	2nd	FR1 n77 Part 27O HPUE	100M	QPSK	1	1	DFT-SCS-30KHz	Right Cheek	0mm	Ant 2	DSI 2	656000	3840	1	24.25	25.50	1.334	50	1.000	-0.17	0.139	0.185	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Right Cheek	0mm	Ant 8	DSI 2	656000	3840	1	19.44	20.50	1.276	-	-	-0.05	0.026	0.033	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Right Cheek	0mm	Ant 8	DSI 2	656000	3840	1	19.35	20.50	1.303	-	-	0.01	0.034	0.044	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Right Tilted	0mm	Ant 8	DSI 2	656000	3840	1	19.44	20.50	1.276	-	-	0.1	0.044	0.056	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Right Tilted	0mm	Ant 8	DSI 2	656000	3840	1	19.35	20.50	1.303	-	-	-0.17	0.050	0.065	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Left Cheek	0mm	Ant 8	DSI 2	656000	3840	1	19.44	20.50	1.276	-	-	0.04	0.038	0.049	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Left Cheek	0mm	Ant 8	DSI 2	656000	3840	1	19.35	20.50	1.303	-	-	-0.01	0.044	0.057	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Left Tilted	0mm	Ant 8	DSI 2	656000	3840	1	19.44	20.50	1.276	-	-	-0.08	0.052	0.066	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Left Tilted	0mm	Ant 8	DSI 2	656000	3840	1	19.35	20.50	1.303	-	-	0.05	0.060	0.078	
	2nd	FR1 n77 Part 27O HPUE	100M	QPSK	135	69	DFT-SCS-30KHz	Left Tilted	0mm	Ant 8	DSI 2	656000	3840	1	22.31	23.50	1.315	50	1.000	0.06	0.058	0.076	

Plot No.	Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Sample	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)	Deviation
WLAN/BT																			
	1st	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	0mm	Ant 6	Standalone	1	2412	1	18.79	20.00	1.321	98.6	1.014	0.02	0.968	1.297	-7.48%
14	2nd	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	0mm	Ant 6	Standalone	1	2412	1	18.79	20.00	1.321	98.6	1.014	0.02	0.896	**1.200**	
	2nd	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	0mm	Ant 6	Standalone	1	2412	2	18.79	20.00	1.321	98.6	1.014	-0.03	0.812	1.088	
	2nd	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	0mm	Ant 6	Standalone	1	2412	3	18.79	20.00	1.321	98.6	1.014	-0.01	0.861	1.154	
	1st	WLAN2.4GHz	802.11b 1Mbps	Left Tilted	0mm	Ant 6	Standalone	1	2412	1	18.79	20.00	1.321	98.6	1.014	0.02	0.690	0.924	-4.44%
	2nd	WLAN2.4GHz	802.11b 1Mbps	Left Tilted	0mm	Ant 6	Standalone	1	2412	1	18.79	20.00	1.321	98.6	1.014	0.01	0.659	0.883	
	1st	Bluetooth	1Mbps	Left Cheek	0mm	Ant 6	Full power	39	2441	1	16.86	18.00	1.300	76.99	1.082	0.08	0.308	0.433	-0.69%
15	2nd	Bluetooth	1Mbps	Left Cheek	0mm	Ant 6	Full power	39	2441	1	16.86	18.00	1.300	76.99	1.082	0.05	0.306	**0.430**	
	1st	WLAN5.3GHz	802.11n-HT40 MCS0	Left Tilted	0mm	Ant 6	Standalone	62	5310	1	14.40	16.00	1.445	96.24	1.039	0.01	0.743	1.116	-2.15%
16	2nd	WLAN5.3GHz	802.11n-HT40 MCS0	Left Tilted	0mm	Ant 6	Standalone	62	5310	1	14.40	16.00	1.445	96.24	1.039	0.05	0.727	**1.092**	
	2nd	WLAN5.3GHz	802.11n-HT40 MCS0	Left Tilted	0mm	Ant 6	Standalone	62	5310	2	14.40	16.00	1.445	96.24	1.039	0.05	0.622	0.934	
	2nd	WLAN5.3GHz	802.11n-HT40 MCS0	Left Tilted	0mm	Ant 6	Standalone	62	5310	3	14.40	16.00	1.445	96.24	1.039	0.06	0.643	0.966	
	1st	WLAN5.5GHz	802.11ac-VHT80 MCS0	Left Tilted	0mm	Ant 6	Standalone	138	5690	1	13.30	14.50	1.318	92.92	1.076	0.01	0.788	1.118	-11.18%
17	2nd	WLAN5.5GHz	802.11ac-VHT80 MCS0	Left Tilted	0mm	Ant 6	Standalone	138	5690	1	13.30	14.50	1.318	92.92	1.076	0.06	0.700	**0.993**	
	1st	WLAN5.8GHz	802.11ac-VHT80 MCS0	Left Tilted	0mm	Ant 6	Standalone	155	5775	1	13.21	14.50	1.346	92.92	1.076	0.04	0.782	1.132	-3.45%
18	2nd	WLAN5.8GHz	802.11ac-VHT80 MCS0	Left Tilted	0mm	Ant 6	Standalone	155	5775	1	13.21	14.50	1.346	92.92	1.076	0.02	0.755	**1.093**	

17.2 Hotspot SAR

Plot No.	Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Sample	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)	Deviation
835MHz																							
	1st	GSM850	-	-	-	-	GPRS (2 Tx slots)	Back	5mm	Ant 0	DSI 7	189	836.4	1	30.38	31.50	1.294	-	-	-0.02	1.010	1.307	
19	2nd	GSM850	-	-	-	-	GPRS (2 Tx slots)	Back	5mm	Ant 0	DSI 7	189	836.4	1	30.38	31.50	1.294	-	-	-0.06	1.000	**1.294**	-0.99%
	2nd	GSM850	-	-	-	-	GPRS (2 Tx slots)	Back	5mm	Ant 0	DSI 7	189	836.4	2	30.38	31.50	1.294	-	-	0.13	0.899	1.163	
	2nd	GSM850	-	-	-	-	GPRS (2 Tx slots)	Back	5mm	Ant 0	DSI 7	189	836.4	3	30.38	31.50	1.294	-	-	0.12	0.966	1.250	
	1st	GSM850	-	-	-	-	GPRS (2 Tx slots)	Bottom Side	5mm	Ant 0	DSI 7	251	848.8	1	30.38	31.50	1.294	-	-	-0.03	0.944	1.222	-2.70%
	2nd	GSM850	-	-	-	-	GPRS (2 Tx slots)	Bottom Side	5mm	Ant 0	DSI 7	251	848.8	1	30.38	31.50	1.294	-	-	0.09	0.919	1.189	
	1st	WCDMA V	-	-	-	-	RMC 12.2Kbps	Back	5mm	Ant 0	DSI 7	4182	836.4	1	23.16	24.00	1.213	-	-	-0.01	1.010	1.226	-2.04%
20	2nd	WCDMA V	-	-	-	-	RMC 12.2Kbps	Back	5mm	Ant 0	DSI 7	4182	836.4	1	23.16	24.00	1.213	-	-	-0.01	0.990	**1.201**	
	1st	WCDMA V	-	-	-	-	RMC 12.2Kbps	Bottom Side	5mm	Ant 0	DSI 7	4132	826.4	1	23.12	24.00	1.225	-	-	0.06	0.939	1.150	-1.91%
	2nd	WCDMA V	-	-	-	-	RMC 12.2Kbps	Bottom Side	5mm	Ant 0	DSI 7	4132	826.4	1	23.12	24.00	1.225	-	-	0.01	0.921	1.128	
	1st	LTE Band 26	15M	QPSK	1	0	-	Back	5mm	Ant 0	DSI 7	26865	831.5	1	23.25	24.00	1.189	-	-	0.01	0.891	1.059	
21	2nd	LTE Band 26	15M	QPSK	1	0	-	Back	5mm	Ant 0	DSI 7	26865	831.5	1	23.25	24.00	1.189	-	-	0.02	0.851	**1.011**	-4.53%
	1st	FR1 n26	20M	QPSK	1	1	DFT-SCS-15KHz	Back	5mm	Ant 0	DSI 7	166300	831.5	1	23.55	24.00	1.109	-	-	-0.02	0.674	0.748	-1.60%
22	2nd	FR1 n26	20M	QPSK	1	1	DFT-SCS-15KHz	Back	5mm	Ant 0	DSI 7	166300	831.5	1	23.55	24.00	1.109	-	-	-0.15	0.664	**0.736**	
1900MHz																							
	1st	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Bottom Side	5mm	Ant 0	DSI 7	512	1850.2	1	18.25	19.80	1.429	-	-	-0.06	0.958	1.369	
23	2nd	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Bottom Side	5mm	Ant 0	DSI 7	512	1850.2	1	18.25	19.80	1.429	-	-	0.05	0.946	**1.352**	-1.24%
	2nd	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Bottom Side	5mm	Ant 0	DSI 7	512	1850.2	2	18.25	19.80	1.429	-	-	0.06	0.916	1.309	
	2nd	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Bottom Side	5mm	Ant 0	DSI 7	512	1850.2	3	18.25	19.80	1.429	-	-	0.02	0.930	1.329	
	1st	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Back	5mm	Ant 0	DSI 7	661	1880	1	18.52	19.80	1.343	-	-	0.04	0.488	0.655	-1.37%
	2nd	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Back	5mm	Ant 0	DSI 7	661	1880	1	18.52	19.80	1.343	-	-	0.09	0.481	0.646	
	1st	WCDMA II	-	-	-	-	RMC 12.2Kbps	Bottom Side	5mm	Ant 0	DSI 7	9262	1852.4	1	16.23	17.30	1.279	-	-	0.01	0.997	1.276	-3.84%
24	2nd	WCDMA II	-	-	-	-	RMC 12.2Kbps	Bottom Side	5mm	Ant 0	DSI 7	9262	1852.4	1	16.23	17.30	1.279	-	-	-0.01	0.959	**1.227**	
	1st	WCDMA II	-	-	-	-	RMC 12.2Kbps	Back	5mm	Ant 0	DSI 7	9400	1880	1	16.25	17.30	1.274	-	-	-0.02	0.774	0.986	-3.04%
	2nd	WCDMA II	-	-	-	-	RMC 12.2Kbps	Back	5mm	Ant 0	DSI 7	9400	1880	1	16.25	17.30	1.274	-	-	0.09	0.751	0.956	
	1st	LTE Band 25	20M	QPSK	1	0	-	Bottom Side	5mm	Ant 0	DSI 7	26140	1860	1	16.45	17.70	1.334	-	-	0.01	0.954	1.272	-2.52%
25	2nd	LTE Band 2	20M	QPSK	1	0	-	Bottom Side	5mm	Ant 0	DSI 7	18900	1880	1	16.45	17.70	1.334	-	-	-0.02	0.930	**1.240**	
	1st	LTE Band 25	20M	QPSK	1	0	-	Back	5mm	Ant 0	DSI 7	26340	1880	1	16.50	17.70	1.318	-	-	0.1	0.548	0.722	-2.35%
	2nd	LTE Band 2	20M	QPSK	1	0	-	Back	5mm	Ant 0	DSI 7	18900	1880	1	16.45	17.70	1.334	-	-	0.08	0.529	0.705	
2600MHz																							
	1st	LTE Band 7	20M	QPSK	1	0	-	Back	5mm	Ant 1	DSI 7	21100	2535	1	17.72	18.70	1.253	-	-	0.12	1.020	1.278	-3.60%
26	2nd	LTE Band 7	20M	QPSK	1	0	-	Back	5mm	Ant 1	DSI 7	21100	2535	1	17.72	18.70	1.253	-	-	0.05	0.983	**1.232**	
	1st	LTE Band 7	20M	QPSK	1	0	-	Left Side	5mm	Ant 1	DSI 7	21100	2535	1	17.72	18.70	1.253	-	-	-0.02	0.543	0.680	-5.59%
	2nd	LTE Band 7	20M	QPSK	1	0	-	Left Side	5mm	Ant 1	DSI 7	21100	2535	1	17.72	18.70	1.253	-	-	0.02	0.512	0.642	
	1st	LTE Band 7	20M	QPSK	1	0	-	Back	5mm	Ant 4	DSI 7	21100	2535	1	13.30	14.70	1.380	-	-	0.01	0.445	0.614	-1.14%
	2nd	LTE Band 7	20M	QPSK	1	0	-	Back	5mm	Ant 4	DSI 7	21100	2535	1	13.30	14.70	1.380	-	-	-0.07	0.440	0.607	
	1st	LTE Band 41	20M	QPSK	1	0	-	Back	5mm	Ant 1	DSI 7	41055	2636.5	1	19.38	20.70	1.355	62.9	1.006	-0.1	0.940	1.282	-0.16%
27	2nd	LTE Band 41	20M	QPSK	1	0	-	Back	5mm	Ant 1	DSI 7	41055	2636.5	1	19.38	20.70	1.355	62.9	1.006	-0.11	0.939	**1.280**	
	2nd	LTE Band 41	20M	QPSK	1	0	-	Back	5mm	Ant 1	DSI 7	41055	2636.5	2	19.38	20.70	1.355	62.9	1.006	0.02	0.931	1.269	
	2nd	LTE Band 41	20M	QPSK	1	0	-	Back	5mm	Ant 1	DSI 7	41055	2636.5	3	19.38	20.70	1.355	62.9	1.006	0.03	0.916	1.249	
	1st	LTE Band 41	20M	QPSK	1	0	-	Left Side	5mm	Ant 1	DSI 7	40185	2549.5	1	19.34	20.70	1.368	62.9	1.006	-0.02	0.542	0.746	-0.27%
	2nd	LTE Band 41	20M	QPSK	1	0	-	Left Side	5mm	Ant 1	DSI 7	40185	2549.5	1	19.34	20.70	1.368	62.9	1.006	0.09	0.541	0.744	
	1st	LTE Band 41	20M	QPSK	1	0	-	Back	5mm	Ant 4	DSI 7	39750	2506	1	14.85	16.00	1.303	62.9	1.006	0.03	0.478	0.627	-5.90%
	2nd	LTE Band 41	20M	QPSK	1	0	-	Back	5mm	Ant 4	DSI 7	39750	2506	1	14.85	16.00	1.303	62.9	1.006	0.03	0.450	0.590	
		LTE Band 41 HPUE	20M	QPSK	1	0	-	Back	5mm	Ant 4	DSI 7	39750	2506	1	16.42	17.60	1.312	42.9	1.009	-0.04	0.445	0.589	
		LTE Band 41C	20M	QPSK	1	99	-	Back	5mm	Ant 4	DSI 7	39750+ 39948	2506+ 2525.8	1	14.79	16.00	1.321	62.9	1.006	0.01	0.433	0.576	
	1st	FR1 n7	40M	QPSK	108	54	DFT-SCS-15KHz	Back	5mm	Ant 1	DSI 7	507000	2535	1	16.72	17.90	1.312	-	-	-0.15	0.977	1.282	-2.03%
28	2nd	FR1 n7	40M	QPSK	108	54	DFT-SCS-15KHz	Back	5mm	Ant 1	DSI 7	507000	2535	1	16.72	17.90	1.312	-	-	-0.06	0.957	**1.256**	
	1st	FR1 n7	40M	QPSK	1	1	DFT-SCS-15KHz	Left Side	5mm	Ant 1	DSI 7	507000	2535	1	16.75	17.90	1.303	-	-	0.03	0.582	0.758	-1.85%

	2nd	FR1 n7	40M	QPSK	1	1	DFT-SCS-15KHz	Left Side	5mm	Ant 1	DSI 7	507000	2535	1	16.75	17.90	1.303	-	-	0.05	0.571	0.744	
	1st	FR1 n41	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 4	DSI 7	518598	2592.99	1	12.42	13.70	1.343	-	-	-0.03	0.463	0.622	-1.61%
29	2nd	FR1 n41	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 4	DSI 7	518598	2592.99	1	12.42	13.70	1.343	-	-	-0.01	0.456	**0.612**	
3500MHz																							
	1st	LTE Band 42	20M	QPSK	1	0	-	Top Side	5mm	Ant 5	DSI 7	42590	3500	1	16.75	17.80	1.274	62.9	1.006	0.03	0.487	0.624	-5.29%
30	2nd	LTE Band 42	20M	QPSK	1	0	-	Top Side	5mm	Ant 5	DSI 7	42590	3500	1	16.75	17.80	1.274	62.9	1.006	-0.09	0.461	**0.591**	
3700MHz~3900MHz																							
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Front	5mm	Ant 5	DSI 7	656000	3840	1	14.08	15.70	1.452	-	-	-0.11	0.140	0.203	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Front	5mm	Ant 5	DSI 7	656000	3840	1	13.94	15.70	1.500	-	-	-0.12	0.141	0.211	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Back	5mm	Ant 5	DSI 7	656000	3840	1	14.08	15.70	1.452	-	-	-0.16	0.306	0.444	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 5	DSI 7	656000	3840	1	13.94	15.70	1.500	-	-	-0.02	0.344	0.516	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Left Side	5mm	Ant 5	DSI 7	656000	3840	1	14.08	15.70	1.452	-	-	-0.09	0.016	0.023	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Left Side	5mm	Ant 5	DSI 7	656000	3840	1	13.94	15.70	1.500	-	-	0.11	0.010	0.015	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Right Side	5mm	Ant 5	DSI 7	656000	3840	1	14.08	15.70	1.452	-	-	-0.05	0.065	0.094	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Right Side	5mm	Ant 5	DSI 7	656000	3840	1	13.94	15.70	1.500	-	-	-0.08	0.070	0.105	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Top Side	5mm	Ant 5	DSI 7	656000	3840	1	14.08	15.70	1.452	-	-	0.05	0.376	0.546	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Top Side	5mm	Ant 5	DSI 7	656000	3840	1	13.94	15.70	1.500	-	-	0.06	0.412	0.618	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Front	5mm	Ant 1	DSI 7	656000	3840	1	19.68	20.50	1.208	-	-	0.01	0.343	0.414	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Front	5mm	Ant 1	DSI 7	656000	3840	1	19.63	20.50	1.222	-	-	0.01	0.336	0.411	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Back	5mm	Ant 1	DSI 7	656000	3840	1	19.68	20.50	1.208	-	-	-0.09	0.711	0.859	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 1	DSI 7	656000	3840	1	19.63	20.50	1.222	-	-	-0.06	0.658	0.804	
	2nd	FR1 n77 Part 27O	100M	QPSK	270	0	DFT-SCS-30KHz	Back	5mm	Ant 1	DSI 7	656000	3840	1	18.61	19.50	1.227	-	-	0.06	0.589	0.723	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Left Side	5mm	Ant 1	DSI 7	656000	3840	1	19.68	20.50	1.208	-	-	-0.09	0.251	0.303	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Left Side	5mm	Ant 1	DSI 7	656000	3840	1	19.63	20.50	1.222	-	-	-0.17	0.232	0.283	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Bottom Side	5mm	Ant 1	DSI 7	656000	3840	1	19.68	20.50	1.208	-	-	0.18	0.343	0.414	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Bottom Side	5mm	Ant 1	DSI 7	656000	3840	1	19.63	20.50	1.222	-	-	-0.17	0.358	0.437	
31	2nd	FR1 n77 Part 27O HPUE	100M	QPSK	1	1	DFT-SCS-30KHz	Back	5mm	Ant 1	DSI 7	656000	3840	1	22.62	23.50	1.225	50	1.000	-0.08	0.727	**0.890**	
	2nd	FR1 n77 Part 27O HPUE	100M	QPSK	1	1	DFT-SCS-30KHz	Back	5mm	Ant 1	DSI 7	656000	3840	2	22.62	23.50	1.225	50	1.000	0.02	0.685	0.839	
	2nd	FR1 n77 Part 27O HPUE	100M	QPSK	1	1	DFT-SCS-30KHz	Back	5mm	Ant 1	DSI 7	656000	3840	3	22.62	23.50	1.225	50	1.000	0.01	0.662	0.811	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Front	5mm	Ant 2	DSI 7	656000	3840	1	16.35	17.00	1.161	-	-	0.05	0.036	0.042	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Front	5mm	Ant 2	DSI 7	656000	3840	1	16.18	17.00	1.208	-	-	0.02	0.048	0.058	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Back	5mm	Ant 2	DSI 7	656000	3840	1	16.35	17.00	1.161	-	-	-0.04	0.539	0.626	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 2	DSI 7	656000	3840	1	16.18	17.00	1.208	-	-	-0.13	0.505	0.610	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Left Side	5mm	Ant 2	DSI 7	656000	3840	1	16.35	17.00	1.161	-	-	0.06	0.170	0.197	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Left Side	5mm	Ant 2	DSI 7	656000	3840	1	16.18	17.00	1.208	-	-	0.06	0.145	0.175	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Top Side	5mm	Ant 2	DSI 7	656000	3840	1	16.35	17.00	1.161	-	-	-0.04	0.039	0.045	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Top Side	5mm	Ant 2	DSI 7	656000	3840	1	16.18	17.00	1.208	-	-	-0.15	0.044	0.053	
	2nd	FR1 n77 Part 27O HPUE	100M	QPSK	1	1	DFT-SCS-30KHz	Back	5mm	Ant 2	DSI 7	656000	3840	1	19.22	20.00	1.197	50	1.000	-0.02	0.513	0.614	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Front	5mm	Ant 8	DSI 7	656000	3840	1	16.49	17.60	1.291	-	-	-0.11	0.021	0.027	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Front	5mm	Ant 8	DSI 7	656000	3840	1	16.41	17.60	1.315	-	-	-0.16	0.032	0.042	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Back	5mm	Ant 8	DSI 7	656000	3840	1	16.49	17.60	1.291	-	-	0.03	0.484	0.625	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 8	DSI 7	656000	3840	1	16.41	17.60	1.315	-	-	-0.15	0.408	0.537	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Right Side	5mm	Ant 8	DSI 7	656000	3840	1	16.49	17.60	1.291	-	-	-0.14	0.047	0.061	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Right Side	5mm	Ant 8	DSI 7	656000	3840	1	16.41	17.60	1.315	-	-	-0.19	0.049	0.064	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Top Side	5mm	Ant 8	DSI 7	656000	3840	1	16.49	17.60	1.291	-	-	0.01	0.027	0.035	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Top Side	5mm	Ant 8	DSI 7	656000	3840	1	16.41	17.60	1.315	-	-	0.06	0.039	0.051	
	2nd	FR1 n77 Part 27O HPUE	100M	QPSK	1	1	DFT-SCS-30KHz	Back	5mm	Ant 8	DSI 7	656000	3840	1	19.38	20.60	1.324	50	1.000	0.05	0.466	0.617	

Plot No.	Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Sample	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)	Deviation
WLAN/BT																			
	1st	WLAN2.4GHz	802.11b 1Mbps	Back	5mm	Ant 6	Hotspot	1	2412	1	15.91	17.00	1.285	98.6	1.014	-0.05	0.558	0.727	-4.81%
32	2nd	WLAN2.4GHz	802.11b 1Mbps	Back	5mm	Ant 6	Hotspot	1	2412	1	15.91	17.00	1.285	98.6	1.014	0.01	0.531	**0.692**	
	1st	Bluetooth	1Mbps	Back	5mm	Ant 6	Full power	39	2441	1	16.86	18.00	1.300	76.99	1.082	-0.07	0.277	0.390	-15.13%
33	2nd	Bluetooth	1Mbps	Back	5mm	Ant 6	Full power	39	2441	1	16.86	18.00	1.300	76.99	1.082	0.04	0.235	**0.331**	
	1st	WLAN5.2GHz	802.11ac-VHT80 MCS0	Top Side	5mm	Ant 6	Hotspot	42	5210	1	11.03	12.00	1.250	92.92	1.076	-0.04	0.529	0.712	-3.09%
34	2nd	WLAN5.2GHz	802.11ac-VHT80 MCS0	Top Side	5mm	Ant 6	Hotspot	42	5210	1	11.03	12.00	1.250	92.92	1.076	0.04	0.513	**0.690**	
	2nd	WLAN5.2GHz	802.11ac-VHT80 MCS0	Top Side	5mm	Ant 6	Hotspot	42	5210	2	11.03	12.00	1.250	92.92	1.076	0.01	0.489	0.658	
	2nd	WLAN5.2GHz	802.11ac-VHT80 MCS0	Top Side	5mm	Ant 6	Hotspot	42	5210	3	11.03	12.00	1.250	92.92	1.076	-0.01	0.474	0.638	
	1st	WLAN5.8GHz	802.11ac-VHT80 MCS0	Top Side	5mm	Ant 6	Hotspot	155	5775	1	9.84	11.00	1.306	92.92	1.076	0.03	0.527	0.741	
35	2nd	WLAN5.8GHz	802.11ac-VHT80 MCS0	Top Side	5mm	Ant 6	Hotspot	155	5775	1	9.84	11.00	1.306	92.92	1.076	0.02	0.514	**0.722**	-2.56%

17.3 Body Worn Accessory SAR

Plot No.	Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Sample	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)	Deviation
835MHz																							
	1st	GSM850	-	-	-	-	GPRS (2 Tx slots)	Back	5mm	Ant 0	DSI 3	189	836.4	1	30.38	31.50	1.294	-	-	-0.02	1.010	1.307	-0.99%
36	2nd	GSM850	-	-	-	-	GPRS (2 Tx slots)	Back	5mm	Ant 0	DSI 3	189	836.4	1	30.38	31.50	1.294	-	-	-0.06	1.000	**1.294**	
	2nd	GSM850	-	-	-	-	GPRS (2 Tx slots)	Back	5mm	Ant 0	DSI 3	189	836.4	2	30.38	31.50	1.294	-	-	0.13	0.899	1.163	
	2nd	GSM850	-	-	-	-	GPRS (2 Tx slots)	Back	5mm	Ant 0	DSI 3	189	836.4	3	30.38	31.50	1.294	-	-	0.12	0.966	1.250	
	1st	GSM850	-	-	-	-	GPRS (2 Tx slots)	Front	5mm	Ant 0	DSI 3	189	836.4	1	30.38	31.50	1.294	-	-	0.02	0.538	0.696	-3.30%
	2nd	GSM850	-	-	-	-	GPRS (2 Tx slots)	Front	5mm	Ant 0	DSI 3	189	836.4	1	30.38	31.50	1.294	-	-	0.05	0.520	0.673	
	1st	WCDMA V	-	-	-	-	RMC 12.2Kbps	Back	5mm	Ant 0	DSI 3	4182	836.4	1	23.16	24.00	1.213	-	-	-0.01	1.010	1.226	-2.04%
37	2nd	WCDMA V	-	-	-	-	RMC 12.2Kbps	Back	5mm	Ant 0	DSI 3	4182	836.4	1	23.16	24.00	1.213	-	-	-0.01	0.990	**1.201**	
	1st	WCDMA V	-	-	-	-	RMC 12.2Kbps	Front	5mm	Ant 0	DSI 3	4182	836.4	1	23.16	24.00	1.213	-	-	0.03	0.513	0.622	-2.41%
	2nd	WCDMA V	-	-	-	-	RMC 12.2Kbps	Front	5mm	Ant 0	DSI 3	4182	836.4	1	23.16	24.00	1.213	-	-	0.01	0.500	0.607	
	1st	LTE Band 26	15M	QPSK	1	0		Back	5mm	Ant 0	DSI 3	26865	831.5	1	23.25	24.00	1.189	-	-	0.01	0.891	1.059	-4.53%
38	2nd	LTE Band 26	15M	QPSK	1	0		Back	5mm	Ant 0	DSI 3	26865	831.5	1	23.25	24.00	1.189	-	-	0.02	0.851	**1.011**	
	1st	FR1 n26	20M	QPSK	1	1	DFT-SCS-15KHz	Back	5mm	Ant 0	DSI 3	166300	831.5	1	23.55	24.00	1.109	-	-	-0.02	0.674	0.748	-1.60%
39	2nd	FR1 n26	20M	QPSK	1	1	DFT-SCS-15KHz	Back	5mm	Ant 0	DSI 3	166300	831.5	1	23.55	24.00	1.109	-	-	-0.15	0.664	**0.736**	
1900MHz																							
	1st	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Back	5mm	Ant 0	DSI 3	512	1850.2	1	19.92	21.10	1.312	-	-	-0.07	0.992	1.302	-0.15%
40	2nd	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Back	5mm	Ant 0	DSI 3	512	1850.2	1	19.92	21.10	1.312	-	-	-0.01	0.991	**1.300**	
	1st	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Front	5mm	Ant 0	DSI 3	661	1880	1	19.97	21.10	1.297	-	-	0.02	0.455	0.590	-0.17%
	2nd	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Front	5mm	Ant 0	DSI 3	661	1880	1	19.97	21.10	1.297	-	-	0.09	0.454	0.589	
	1st	WCDMA II	-	-	-	-	RMC 12.2Kbps	Back	5mm	Ant 0	DSI 3	9262	1852.4	1	18.75	19.70	1.245	-	-	-0.07	1.020	1.269	-2.44%
41	2nd	WCDMA II	-	-	-	-	RMC 12.2Kbps	Back	5mm	Ant 0	DSI 3	9262	1852.4	1	18.75	19.70	1.245	-	-	-0.01	0.995	**1.238**	
	1st	WCDMA II	-	-	-	-	RMC 12.2Kbps	Front	5mm	Ant 0	DSI 3	9400	1880	1	18.80	19.70	1.230	-	-	-0.03	0.451	0.555	-2.70%
	2nd	WCDMA II	-	-	-	-	RMC 12.2Kbps	Front	5mm	Ant 0	DSI 3	9400	1880	1	18.80	19.70	1.230	-	-	0.07	0.439	0.540	
	1st	LTE Band 25	20M	QPSK	1	0	-	Back	5mm	Ant 0	DSI 3	26340	1880	1	19.43	20.50	1.279	-	-	-0.04	1.010	1.292	-2.32%
42	2nd	LTE Band 2	20M	QPSK	1	0	-	Back	5mm	Ant 0	DSI 3	18900	1880	1	19.46	20.50	1.271	-	-	-0.02	0.993	**1.262**	
	1st	LTE Band 25	20M	QPSK	1	0	-	Front	5mm	Ant 0	DSI 3	26140	1860	1	19.46	20.50	1.271	-	-	0.03	0.432	0.549	-1.09%
	2nd	LTE Band 2	20M	QPSK	1	0	-	Front	5mm	Ant 0	DSI 3	18700	1860	1	19.33	20.50	1.309	-	-	0.09	0.415	0.543	
2600MHz																							
	1st	LTE Band 7	20M	QPSK	1	0	-	Back	5mm	Ant 1	DSI 3	21100	2535	1	17.72	18.70	1.253	-	-	0.12	1.020	1.278	-3.60%
43	2nd	LTE Band 7	20M	QPSK	1	0	-	Back	5mm	Ant 1	DSI 3	21100	2535	1	17.72	18.70	1.253	-	-	0.05	0.983	**1.232**	
	1st	LTE Band 7	20M	QPSK	1	0	-	Front	5mm	Ant 1	DSI 3	21100	2535	1	17.72	18.70	1.253	-	-	0.09	0.510	0.639	-3.44%
	2nd	LTE Band 7	20M	QPSK	1	0	-	Front	5mm	Ant 1	DSI 3	21100	2535	1	17.72	18.70	1.253	-	-	0.01	0.492	0.617	
	1st	LTE Band 7	20M	QPSK	1	0	-	Back	5mm	Ant 4	DSI 3	21350	2560	1	15.85	16.90	1.274	-	-	0.01	0.735	0.936	-1.18%
	2nd	LTE Band 7	20M	QPSK	1	0	-	Back	5mm	Ant 4	DSI 3	21350	2560	1	15.85	16.90	1.274	-	-	0.01	0.726	0.925	
	1st	LTE Band 41	20M	QPSK	1	0	-	Back	5mm	Ant 1	DSI 3	41055	2636.5	1	19.38	20.70	1.355	62.9	1.006	-0.1	0.940	1.282	-0.16%
44	2nd	LTE Band 41	20M	QPSK	1	0	-	Back	5mm	Ant 1	DSI 3	41055	2636.5	1	19.38	20.70	1.355	62.9	1.006	-0.11	0.939	**1.280**	
	2nd	LTE Band 41	20M	QPSK	1	0	-	Back	5mm	Ant 1	DSI 3	41055	2636.5	2	19.38	20.70	1.355	62.9	1.006	0.02	0.931	1.269	
	2nd	LTE Band 41	20M	QPSK	1	0	-	Back	5mm	Ant 1	DSI 3	41055	2636.5	3	19.38	20.70	1.355	62.9	1.006	0.03	0.916	1.249	
	1st	LTE Band 41	20M	QPSK	1	0	-	Front	5mm	Ant 1	DSI 3	39750	2506	1	19.32	20.70	1.374	62.9	1.006	0.01	0.537	0.742	-4.04%
	2nd	LTE Band 41	20M	QPSK	1	0	-	Front	5mm	Ant 1	DSI 3	39750	2506	1	19.32	20.70	1.374	62.9	1.006	0.02	0.515	0.712	
	1st	LTE Band 41	20M	QPSK	1	0	-	Back	5mm	Ant 4	DSI 3	39750	2506	1	17.77	18.70	1.239	62.9	1.006	-0.02	0.739	0.921	-7.27%
	2nd	LTE Band 41	20M	QPSK	1	0	-	Back	5mm	Ant 4	DSI 3	39750	2506	1	17.77	18.70	1.239	62.9	1.006	-0.01	0.685	0.854	
	2nd	LTE Band 41 HPUE	20M	QPSK	1	0	-	Back	5mm	Ant 4	DSI 3	39750	2506	1	19.23	20.30	1.279	42.9	1.009	0.01	0.635	0.820	
	2nd	LTE Band 41C	20M	QPSK	1	99	-	Back	5mm	Ant 4	DSI 3	39750+ 39948	2506+ 2525.8	1	17.52	18.70	1.312	62.9	1.006	0.06	0.621	0.820	
	1st	FR1 n7	40M	QPSK	108	54	DFT-SCS-15KHz	Back	5mm	Ant 1	DSI 3	507000	2535	1	16.72	17.90	1.312	-	-	-0.15	0.977	1.282	-2.03%
45	2nd	FR1 n7	40M	QPSK	108	54	DFT-SCS-15KHz	Back	5mm	Ant 1	DSI 3	507000	2535	1	16.72	17.90	1.312	-	-	-0.06	0.957	**1.256**	
	1st	FR1 n7	40M	QPSK	108	54	DFT-SCS-15KHz	Front	5mm	Ant 1	DSI 3	507000	2535	1	16.72	17.90	1.312	-	-	0.02	0.570	0.748	-6.15%
	2nd	FR1 n7	40M	QPSK	108	54	DFT-SCS-15KHz	Front	5mm	Ant 1	DSI 3	507000	2535	1	16.72	17.90	1.312	-	-	0.01	0.535	0.702	
	1st	FR1 n41	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 4	DSI 3	518598	2592.99	1	14.95	16.10	1.303	-	-	-0.06	0.728	0.949	-2.00%

46	2nd	FR1 n41	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 4	DSI 3	518598	2592.99	1	14.95	16.10	1.303	-	-	0.03	0.714	**0.930**	
	2nd	FR1 n41	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 4	DSI 3	518598	2592.99	2	14.95	16.10	1.303	-	-	-0.03	0.711	0.927	
	2nd	FR1 n41	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 4	DSI 3	518598	2592.99	3	14.95	16.10	1.303	-	-	-0.15	0.668	0.871	
3500MHz																								
	1st	LTE Band 42	20M	QPSK	1	0	-	Back	5mm	Ant 5	DSI 3	42990	3540	1	18.74	19.50	1.191	62.9	1.006	0.01	0.775	0.929	
47	2nd	LTE Band 42	20M	QPSK	1	0	-	Back	5mm	Ant 5	DSI 3	42990	3540	1	18.74	19.50	1.191	62.9	1.006	0.08	0.767	**0.919**	-1.08%
3700MHz~3900MHz																								
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Front	5mm	Ant 5	DSI 3	656000	3840	1	17.54	18.30	1.191	-	-	0.19	0.308	0.367	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Front	5mm	Ant 5	DSI 3	656000	3840	1	17.43	18.30	1.222	-	-	0.07	0.312	0.381	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Back	5mm	Ant 5	DSI 3	656000	3840	1	17.54	18.30	1.191	-	-	0.03	0.675	0.804	
48	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 5	DSI 3	656000	3840	1	17.43	18.30	1.222	-	-	0.06	0.759	**0.927**	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 5	DSI 3	656000	3840	2	17.43	18.30	1.222	-	-	0.02	0.740	0.904	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 5	DSI 3	656000	3840	3	17.43	18.30	1.222	-	-	0.03	0.678	0.828	
	2nd	FR1 n77 Part 27O	100M	QPSK	270	0	DFT-SCS-30KHz	Back	5mm	Ant 5	DSI 3	656000	3840	1	17.41	18.30	1.227	-	-	-0.15	0.733	0.900	
	2nd	FR1 n77 Part 27O HPUE	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 5	DSI 3	656000	3840	1	20.45	21.30	1.216	50	1.000	0.01	0.747	0.908	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Front	11mm	Ant 5	DSI 4	656000	3840	1	23.02	24.00	1.253	-	-	0.03	0.641	0.803	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Front	11mm	Ant 5	DSI 4	656000	3840	1	22.91	24.00	1.285	-	-	0.06	0.629	0.808	
	2nd	FR1 n77 Part 27O	100M	QPSK	270	0	DFT-SCS-30KHz	Front	11mm	Ant 5	DSI 4	656000	3840	1	22.04	23.00	1.247	-	-	0.09	0.487	0.607	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Back	17mm	Ant 5	DSI 4	656000	3840	1	22.91	24.00	1.285	-	-	0.01	0.501	0.644	
	2nd	FR1 n77 Part 27O HPUE	100M	QPSK	135	69	DFT-SCS-30KHz	Front	11mm	Ant 5	DSI 4	656000	3840	1	25.83	27.00	1.309	50	1.000	0.06	0.609	0.797	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Front	5mm	Ant 1	DSI 3	656000	3840	1	19.68	20.50	1.208	-	-	0.01	0.343	0.414	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Front	5mm	Ant 1	DSI 3	656000	3840	1	19.63	20.50	1.222	-	-	0.01	0.336	0.411	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Back	5mm	Ant 1	DSI 3	656000	3840	1	19.68	20.50	1.208	-	-	-0.09	0.711	0.859	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 1	DSI 3	656000	3840	1	19.63	20.50	1.222	-	-	-0.06	0.658	0.804	
	2nd	FR1 n77 Part 27O	100M	QPSK	270	0	DFT-SCS-30KHz	Back	5mm	Ant 1	DSI 3	656000	3840	1	18.61	19.50	1.227	-	-	0.06	0.589	0.723	
	2nd	FR1 n77 Part 27O HPUE	100M	QPSK	1	1	DFT-SCS-30KHz	Back	5mm	Ant 1	DSI 3	656000	3840	1	22.62	23.50	1.225	50	1.000	-0.08	0.727	0.890	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Front	5mm	Ant 2	DSI 3	656000	3840	1	18.11	19.10	1.256	-	-	0.18	0.047	0.059	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Front	5mm	Ant 2	DSI 3	656000	3840	1	17.94	19.10	1.306	-	-	-0.04	0.062	0.081	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Back	5mm	Ant 2	DSI 3	656000	3840	1	18.11	19.10	1.256	-	-	-0.13	0.735	0.923	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Back	5mm	Ant 2	DSI 3	656000	3840	2	18.11	19.10	1.256	-	-	0.02	0.726	0.912	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Back	5mm	Ant 2	DSI 3	656000	3840	3	18.11	19.10	1.256	-	-	0.01	0.724	0.909	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 2	DSI 3	656000	3840	1	17.94	19.10	1.306	-	-	-0.08	0.692	0.904	
	2nd	FR1 n77 Part 27O	100M	QPSK	270	0	DFT-SCS-30KHz	Back	5mm	Ant 2	DSI 3	656000	3840	1	17.90	19.10	1.318	-	-	-0.13	0.697	0.919	
	2nd	FR1 n77 Part 27O HPUE	100M	QPSK	1	1	DFT-SCS-30KHz	Back	5mm	Ant 2	DSI 3	656000	3840	1	21.20	22.10	1.230	50	1.000	-0.17	0.740	0.910	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Front	11mm	Ant 2	DSI 4	656000	3840	1	21.28	22.50	1.324	-	-	0.06	0.289	0.383	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Back	17mm	Ant 2	DSI 4	656000	3840	1	21.36	22.50	1.300	-	-	0.03	0.431	0.560	
	2nd	FR1 n77 Part 27O HPUE	100M	QPSK	1	1	DFT-SCS-30KHz	Back	17mm	Ant 2	DSI 4	656000	3840	1	24.25	25.50	1.334	50	1.000	0.01	0.416	0.555	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Front	5mm	Ant 8	DSI 3	656000	3840	1	17.50	18.60	1.288	-	-	-0.03	0.032	0.041	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Front	5mm	Ant 8	DSI 3	656000	3840	1	17.41	18.60	1.315	-	-	-0.03	0.047	0.062	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Back	5mm	Ant 8	DSI 3	656000	3840	1	17.50	18.60	1.288	-	-	0.03	0.713	0.919	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Back	5mm	Ant 8	DSI 3	656000	3840	2	17.50	18.60	1.288	-	-	0.06	0.685	0.882	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Back	5mm	Ant 8	DSI 3	656000	3840	3	17.50	18.60	1.288	-	-	0.01	0.634	0.817	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 8	DSI 3	656000	3840	1	17.41	18.60	1.315	-	-	0.08	0.685	0.901	
	2nd	FR1 n77 Part 27O	100M	QPSK	270	0	DFT-SCS-30KHz	Back	5mm	Ant 8	DSI 3	656000	3840	1	17.39	18.60	1.321	-	-	0.02	0.685	0.905	
	2nd	FR1 n77 Part 27O HPUE	100M	QPSK	1	1	DFT-SCS-30KHz	Back	5mm	Ant 8	DSI 3	656000	3840	1	20.53	21.60	1.279	50	1.000	0.05	0.712	0.911	
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Front	11mm	Ant 8	DSI 4	656000	3840	1	19.35	20.50	1.303	-	-	0.01	0.036	0.047	
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Back	17mm	Ant 8	DSI 4	656000	3840	1	19.44	20.50	1.276	-	-	0.02	0.526	0.671	
	2nd	FR1 n77 Part 27O HPUE	100M	QPSK	1	1	DFT-SCS-30KHz	Back	17mm	Ant 8	DSI 4	656000	3840	1	22.33	23.50	1.309	50	1.000	-0.08	0.503	0.659	

Plot No.	Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Sample	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)	Deviation
WLAN/BT																			
	1st	WLAN2.4GHz	802.11b 1Mbps	Back	5mm	Ant 6	Standalone	1	2412	1	18.79	20.00	1.321	98.6	1.014	0.08	1.040	1.393	
49	2nd	WLAN2.4GHz	802.11b 1Mbps	Back	5mm	Ant 6	Standalone	1	2412	1	18.79	20.00	1.321	98.6	1.014	0.01	0.985	**1.320**	-5.24%
	2nd	WLAN2.4GHz	802.11b 1Mbps	Back	5mm	Ant 6	Standalone	1	2412	2	18.79	20.00	1.321	98.6	1.014	0.01	0.805	1.079	
	2nd	WLAN2.4GHz	802.11b 1Mbps	Back	5mm	Ant 6	Standalone	1	2412	3	18.79	20.00	1.321	98.6	1.014	0.08	0.940	1.259	
	1st	WLAN2.4GHz	802.11b 1Mbps	Front	5mm	Ant 6	Standalone	1	2412	1	18.79	20.00	1.321	98.6	1.014	0.02	0.571	0.765	-5.62%
	2nd	WLAN2.4GHz	802.11b 1Mbps	Front	5mm	Ant 6	Standalone	1	2412	1	18.79	20.00	1.321	98.6	1.014	0.09	0.539	0.722	
	1st	Bluetooth	1Mbps	Back	5mm	Ant 6	Full power	39	2441	1	16.86	18.00	1.300	76.99	1.082	-0.07	0.277	0.390	-15.13%
50	2nd	Bluetooth	1Mbps	Back	5mm	Ant 6	Full power	39	2441	1	16.86	18.00	1.300	76.99	1.082	0.04	0.235	**0.331**	
	1st	WLAN5.3GHz	802.11n-HT40 MCS0	Back	5mm	Ant 6	Standalone	62	5310	1	14.40	16.00	1.445	96.24	1.039	0.07	0.769	1.155	-9.52%
51	2nd	WLAN5.3GHz	802.11n-HT40 MCS0	Back	5mm	Ant 6	Standalone	62	5310	1	14.40	16.00	1.445	96.24	1.039	0.01	0.696	**1.045**	
	1st	WLAN5.5GHz	802.11ac-VHT80 MCS0	Back	5mm	Ant 6	Standalone	138	5690	1	13.63	15.00	1.371	92.92	1.076	0.01	0.784	1.156	
52	2nd	WLAN5.5GHz	802.11ac-VHT80 MCS0	Back	5mm	Ant 6	Standalone	138	5690	1	13.63	15.00	1.371	92.92	1.076	0.01	0.760	**1.121**	-3.03%
	2nd	WLAN5.5GHz	802.11ac-VHT80 MCS0	Back	5mm	Ant 6	Standalone	138	5690	2	13.63	15.00	1.371	92.92	1.076	0.02	0.608	0.897	
	2nd	WLAN5.5GHz	802.11ac-VHT80 MCS0	Back	5mm	Ant 6	Standalone	138	5690	3	13.63	15.00	1.371	92.92	1.076	0.06	0.627	0.925	
	1st	WLAN5.8GHz	802.11ac-VHT80 MCS0	Back	5mm	Ant 6	Standalone	155	5775	1	13.21	14.50	1.346	92.92	1.076	0.05	0.814	1.179	
53	2nd	WLAN5.8GHz	802.11ac-VHT80 MCS0	Back	5mm	Ant 6	Standalone	155	5775	1	13.21	14.50	1.346	92.92	1.076	0.01	0.790	**1.144**	-2.97%
	2nd	WLAN5.8GHz	802.11ac-VHT80 MCS0	Back	5mm	Ant 6	Standalone	155	5775	2	13.21	14.50	1.346	92.92	1.076	-0.06	0.783	1.134	
	2nd	WLAN5.8GHz	802.11ac-VHT80 MCS0	Back	5mm	Ant 6	Standalone	155	5775	3	13.21	14.50	1.346	92.92	1.076	-0.04	0.750	1.086	

17.4 Product specific 10g SAR

Plot No.	Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Sample	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)	Deviation
835MHz																							
	1st	GSM850	-	-	-	-	GPRS (2 Tx slots)	Bottom Side	0mm	Ant 0	DSI 6	128	824.2	1	30.27	31.50	1.327	-	-	0.04	2.410	3.199	
54	2nd	GSM850	-	-	-	-	GPRS (2 Tx slots)	Bottom Side	0mm	Ant 0	DSI 6	128	824.2	1	30.27	31.50	1.327	-	-	0.03	2.400	**3.186**	-0.41%
	2nd	GSM850	-	-	-	-	GPRS (2 Tx slots)	Bottom Side	0mm	Ant 0	DSI 6	128	824.2	2	30.27	31.50	1.327	-	-	0.02	1.960	2.602	
	2nd	GSM850	-	-	-	-	GPRS (2 Tx slots)	Bottom Side	0mm	Ant 0	DSI 6	128	824.2	3	30.27	31.50	1.327	-	-	0.04	2.030	2.695	
	1st	GSM850	-	-	-	-	GPRS (2 Tx slots)	Back	0mm	Ant 0	DSI 6	189	836.4	1	30.38	31.50	1.294	-	-	0.18	1.850	2.394	-2.17%
	2nd	GSM850	-	-	-	-	GPRS (2 Tx slots)	Back	0mm	Ant 0	DSI 6	189	836.4	1	30.38	31.50	1.294	-	-	0.07	1.810	2.342	
	1st	WCDMA V	-	-	-	-	RMC 12.2Kbps	Bottom Side	0mm	Ant 0	DSI 6	4182	836.4	1	23.16	24.00	1.213	-	-	0.01	1.880	2.281	-2.63%
55	2nd	WCDMA V	-	-	-	-	RMC 12.2Kbps	Bottom Side	0mm	Ant 0	DSI 6	4182	836.4	1	23.16	24.00	1.213	-	-	0.03	1.830	**2.221**	
	1st	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Bottom Side	0mm	Ant 0	DSI 6	512	1850.2	1	21.38	22.50	1.294	-	-	-0.14	2.480	3.210	-3.64%
56	2nd	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Bottom Side	0mm	Ant 0	DSI 6	512	1850.2	1	21.38	22.50	1.294	-	-	0.03	2.390	**3.093**	
	1st	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Back	0mm	Ant 0	DSI 6	512	1850.2	1	21.38	22.50	1.294	-	-	0.06	1.800	2.330	-3.91%
	2nd	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Back	0mm	Ant 0	DSI 6	512	1850.2	1	21.38	22.50	1.294	-	-	0.09	1.730	2.239	
	1st	WCDMA II	-	-	-	-	RMC 12.2Kbps	Bottom Side	0mm	Ant 0	DSI 6	9262	1852.4	1	19.98	21.10	1.294	-	-	0.01	2.480	3.210	
57	2nd	WCDMA II	-	-	-	-	RMC 12.2Kbps	Bottom Side	0mm	Ant 0	DSI 6	9262	1852.4	1	19.98	21.10	1.294	-	-	0.02	2.440	**3.158**	-1.62%
	2nd	WCDMA II	-	-	-	-	RMC 12.2Kbps	Bottom Side	0mm	Ant 0	DSI 6	9262	1852.4	2	19.98	21.10	1.294	-	-	0.07	2.270	2.938	
	2nd	WCDMA II	-	-	-	-	RMC 12.2Kbps	Bottom Side	0mm	Ant 0	DSI 6	9262	1852.4	3	19.98	21.10	1.294	-	-	-0.18	2.160	2.795	
	1st	WCDMA II	-	-	-	-	RMC 12.2Kbps	Back	0mm	Ant 0	DSI 6	9262	1852.4	1	19.98	21.10	1.294	-	-	0.03	1.750	2.265	-2.30%
	2nd	WCDMA II	-	-	-	-	RMC 12.2Kbps	Back	0mm	Ant 0	DSI 6	9262	1852.4	1	19.98	21.10	1.294	-	-	0.09	1.710	2.213	
	1st	LTE Band 25	20M	QPSK	1	0	-	Bottom Side	0mm	Ant 0	DSI 6	26140	1860	1	19.95	21.10	1.303	-	-	0.04	2.460	3.206	-5.30%
58	2nd	LTE Band 2	20M	QPSK	1	0	-	Bottom Side	0mm	Ant 0	DSI 6	18900	1880	1	19.95	21.10	1.303	-	-	0.04	2.330	**3.036**	
	1st	LTE Band 25	20M	QPSK	1	0	-	Back	0mm	Ant 0	DSI 6	26340	1880	1	20.00	21.10	1.288	-	-	-0.01	1.510	1.945	-5.30%
	2nd	LTE Band 2	20M	QPSK	1	0	-	Back	0mm	Ant 0	DSI 6	18900	1880	1	19.94	21.10	1.306	-	-	0.08	1.410	1.842	
2600MHz																							
	1st	LTE Band 7	20M	QPSK	1	0	-	Back	0mm	Ant 1	DSI 6	20850	2510	1	20.28	21.40	1.294	-	-	-0.09	2.440	3.158	-18.05%
59	2nd	LTE Band 7	20M	QPSK	1	0	-	Back	0mm	Ant 1	DSI 6	20850	2510	1	20.28	21.40	1.294	-	-	-0.09	2.000	**2.588**	
	1st	LTE Band 7	20M	QPSK	1	0	-	Left Side	0mm	Ant 1	DSI 6	21100	2535	1	20.30	21.40	1.288	-	-	0.06	1.550	1.997	-15.47%
	2nd	LTE Band 7	20M	QPSK	1	0	-	Left Side	0mm	Ant 1	DSI 6	21100	2535	1	20.30	21.40	1.288	-	-	0.01	1.310	1.688	
	1st	LTE Band 7	20M	QPSK	1	0	-	Top Side	0mm	Ant 4	DSI 6	20850	2510	1	19.35	20.20	1.216	-	-	0.04	2.010	2.445	-2.99%
	2nd	LTE Band 7	20M	QPSK	1	0	-	Top Side	0mm	Ant 4	DSI 6	20850	2510	1	19.35	20.20	1.216	-	-	-0.02	1.950	2.372	
	1st	LTE Band 41	20M	QPSK	1	0	-	Back	0mm	Ant 1	DSI 6	41490	2680	1	22.42	23.60	1.312	62.9	1.006	-0.02	2.420	3.195	
60	2nd	LTE Band 41	20M	QPSK	1	0	-	Back	0mm	Ant 1	DSI 6	41490	2680	1	21.42	22.60	1.312	62.9	1.006	0.01	2.350	**3.102**	-2.91%
	2nd	LTE Band 41	20M	QPSK	1	0	-	Back	0mm	Ant 1	DSI 6	41490	2680	2	21.42	22.60	1.312	62.9	1.006	-0.02	2.290	3.023	
	2nd	LTE Band 41	20M	QPSK	1	0	-	Back	0mm	Ant 1	DSI 6	41490	2680	3	21.42	22.60	1.312	62.9	1.006	0.06	2.140	2.825	
	1st	LTE Band 41	20M	QPSK	1	0	-	Left Side	0mm	Ant 1	DSI 6	41490	2680	1	21.42	22.60	1.312	62.9	1.006	-0.02	1.710	2.257	-2.92%
	2nd	LTE Band 41	20M	QPSK	1	0	-	Left Side	0mm	Ant 1	DSI 6	41490	2680	1	21.42	22.60	1.312	62.9	1.006	0.01	1.660	2.191	
	1st	LTE Band 41	20M	QPSK	1	0	-	Top Side	0mm	Ant 4	DSI 6	39750	2506	1	21.22	22.30	1.282	62.9	1.006	0.14	1.920	2.477	
	2nd	LTE Band 41	20M	QPSK	1	0	-	Top Side	0mm	Ant 4	DSI 6	39750	2506	1	21.22	22.30	1.282	62.9	1.006	-0.03	1.850	2.387	
	2nd	LTE Band 41 HPUE	20M	QPSK	1	0	-	Top Side	0mm	Ant 4	DSI 6	39750	2506	1	22.65	23.90	1.334	42.9	1.009	-0.08	1.750	2.355	-3.63%
	2nd	LTE Band 41C	20M	QPSK	1	99	-	Top Side	0mm	Ant 4	DSI 6	39750+ 39948	2506+ 2525.8	1	21.10	22.30	1.318	62.9	1.006	0.05	1.760	2.334	
	1st	FR1 n7	40M	QPSK	1	1	DFT-SCS-15KHz	Back	0mm	Ant 1	DSI 6	507000	2535	1	19.71	21.00	1.346	-	-	-0.04	2.360	3.176	-2.96%
61	2nd	FR1 n7	40M	QPSK	1	1	DFT-SCS-15KHz	Back	0mm	Ant 1	DSI 6	507000	2535	1	19.71	21.00	1.346	-	-	-0.06	2.290	**3.082**	
	1st	FR1 n7	40M	QPSK	1	1	DFT-SCS-15KHz	Left Side	0mm	Ant 1	DSI 6	507000	2535	1	19.71	21.00	1.346	-	-	0.06	1.640	2.207	-2.45%
	2nd	FR1 n7	40M	QPSK	1	1	DFT-SCS-15KHz	Left Side	0mm	Ant 1	DSI 6	507000	2535	1	19.71	21.00	1.346	-	-	0.01	1.600	2.153	
	1st	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Top Side	0mm	Ant 4	DSI 6	518598	2592.99	1	18.95	20.10	1.303	-	-	0.09	1.900	2.476	
62	2nd	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Top Side	0mm	Ant 4	DSI 6	518598	2592.99	1	18.95	20.10	1.303	-	-	-0.09	1.850	**2.411**	-2.63%
	2nd	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Top Side	0mm	Ant 4	DSI 6	518598	2592.99	2	18.95	20.10	1.303	-	-	0.02	1.740	2.268	
	2nd	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Top Side	0mm	Ant 4	DSI 6	518598	2592.99	3	18.95	20.10	1.303	-	-	0.01	1.680	2.189	
3500MHz																							
	1st	LTE Band 42	20M	QPSK	1	0	-	Top Side	0mm	Ant 5	DSI 6	42990	3540	1	21.74	22.70	1.247	62.9		-0.09	1.980	2.485	-1.53%

63	2nd	LTE Band 42	20M	QPSK	1	0	-	Top Side	0mm	Ant 5	DSI 6	42990	3540	1	21.74	22.70	1.247	62.9	1.006	-0.11	1.950	**2.447**
	2nd	LTE Band 42	20M	QPSK	1	0	-	Top Side	0mm	Ant 5	DSI 6	42990	3540	2	21.74	22.70	1.247	62.9	1.006	0.01	1.900	2.384
	2nd	LTE Band 42	20M	QPSK	1	0	-	Top Side	0mm	Ant 5	DSI 6	42990	3540	3	21.74	22.70	1.247	62.9	1.006	0.06	1.910	2.397
3700MHz~3900MHz																						
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Front	0mm	Ant 5	DSI 6	656000	3840	1	16.55	17.80	1.334	-	-	-0.15	0.323	0.431
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Front	0mm	Ant 5	DSI 6	656000	3840	1	16.47	17.80	1.358	-	-	0.02	0.358	0.486
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Back	0mm	Ant 5	DSI 6	656000	3840	1	16.55	17.80	1.334	-	-	0.16	0.613	0.817
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Back	0mm	Ant 5	DSI 6	656000	3840	1	16.47	17.80	1.358	-	-	0.13	0.602	0.818
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Top Side	0mm	Ant 5	DSI 6	656000	3840	1	16.55	17.80	1.334	-	-	0.02	1.680	2.240
64	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Top Side	0mm	Ant 5	DSI 6	656000	3840	1	16.47	17.80	1.358	-	-	0.08	1.810	**2.459**
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Top Side	0mm	Ant 5	DSI 6	656000	3840	2	16.47	17.80	1.358	-	-	0.02	1.730	2.350
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Top Side	0mm	Ant 5	DSI 6	656000	3840	3	16.47	17.80	1.358	-	-	0.01	1.760	2.391
	2nd	FR1 n77 Part 27O	100M	QPSK	270	0	DFT-SCS-30KHz	Top Side	0mm	Ant 5	DSI 6	656000	3840	1	16.45	17.80	1.365	-	-	0.16	1.790	2.443
	2nd	FR1 n77 Part 27O HPUE	100M	QPSK	135	69	DFT-SCS-30KHz	Top Side	0mm	Ant 5	DSI 6	656000	3840	1	19.41	20.80	1.377	50	1.000	-0.03	1.730	2.383
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Front	3mm	Ant 5	DSI 4	656000	3840	1	22.91	24.00	1.285	-	-	0.03	0.955	1.227
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Back	9mm	Ant 5	DSI 4	656000	3840	1	22.91	24.00	1.285	-	-	0.04	0.593	0.762
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Top Side	10mm	Ant 5	DSI 4	656000	3840	1	22.91	24.00	1.285	-	-	-0.02	0.523	0.672
	2nd	FR1 n77 Part 27O HPUE	100M	QPSK	135	69	DFT-SCS-30KHz	Front	3mm	Ant 5	DSI 4	656000	3840	1	25.83	27.00	1.309	50	1.000	0.01	0.946	1.238
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Back	0mm	Ant 2	DSI 6	656000	3840	1	21.36	22.50	1.300	-	-	0.1	1.650	2.145
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Back	0mm	Ant 2	DSI 6	656000	3840	1	21.28	22.50	1.324	-	-	-0.09	1.700	2.251
	2nd	FR1 n77 Part 27O	100M	QPSK	270	0	DFT-SCS-30KHz	Back	0mm	Ant 2	DSI 6	656000	3840	1	20.32	21.50	1.312	-	-	0.04	1.480	1.942
	2nd	FR1 n77 Part 27O HPUE	100M	QPSK	135	69	DFT-SCS-30KHz	Back	0mm	Ant 2	DSI 6	656000	3840	1	24.16	25.50	1.361	50	1.000	0.13	1.730	2.355
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Back	0mm	Ant 2	DSI 6	656000	3840	2	24.16	25.50	1.361	50	1.000	0.02	1.620	2.206
	2nd	FR1 n77 Part 27O HPUE	100M	QPSK	135	69	DFT-SCS-30KHz	Back	0mm	Ant 2	DSI 6	656000	3840	3	24.16	25.50	1.361	50	1.000	0.06	1.530	2.083
	2nd	FR1 n77 Part 27O	100M	QPSK	1	1	DFT-SCS-30KHz	Back	0mm	Ant 8	DSI 6	656000	3840	1	19.44	20.50	1.276	-	-	0.02	0.777	0.992
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Back	0mm	Ant 8	DSI 6	656000	3840	1	19.35	20.50	1.303	-	-	-0.08	0.798	1.040
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Back	0mm	Ant 8	DSI 6	656000	3840	2	19.35	20.50	1.303	-	-	0.06	0.641	0.835
	2nd	FR1 n77 Part 27O	100M	QPSK	135	69	DFT-SCS-30KHz	Back	0mm	Ant 8	DSI 6	656000	3840	3	19.35	20.50	1.303	-	-	0.01	0.629	0.820
	2nd	FR1 n77 Part 27O HPUE	100M	QPSK	135	69	DFT-SCS-30KHz	Back	0mm	Ant 8	DSI 6	656000	3840	1	22.31	23.50	1.315	50	1.000	0.01	0.762	1.002

Plot No.	Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Sample	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)	Deviation
WLAN/BT																			
	1st	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	Ant 6	Full power	1	2412	1	19.35	20.50	1.303	98.6	1.014	-0.05	1.360	1.797	
65	2nd	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	Ant 6	Full power	1	2412	1	19.35	20.50	1.303	98.6	1.014	0.03	1.290	**1.705**	-5.12%
	2nd	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	Ant 6	Full power	1	2412	2	19.35	20.50	1.303	98.6	1.014	0.05	1.010	1.335	
	2nd	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	Ant 6	Full power	1	2412	3	19.35	20.50	1.303	98.6	1.014	0.05	1.180	1.559	
	1st	WLAN5.2GHz	802.11a 6Mbps	Top Side	0mm	Ant 6	Full power	36	5180	1	18.00	19.50	1.413	98.25	1.018	-0.02	2.210	3.178	
66	2nd	WLAN5.2GHz	802.11a 6Mbps	Top Side	0mm	Ant 6	Full power	36	5180	1	18.00	19.50	1.413	98.25	1.018	0.01	2.200	**3.164**	-0.44%
	2nd	WLAN5.2GHz	802.11a 6Mbps	Top Side	0mm	Ant 6	Full power	36	5180	2	18.00	19.50	1.413	98.25	1.018	0.03	2.050	2.948	
	2nd	WLAN5.2GHz	802.11a 6Mbps	Top Side	0mm	Ant 6	Full power	36	5180	3	18.00	19.50	1.413	98.25	1.018	-0.02	2.120	3.048	
	1st	WLAN5.2GHz	802.11a 6Mbps	Back	0mm	Ant 6	Full power	44	5220	1	18.19	19.50	1.352	98.25	1.018	0.06	1.540	2.120	-0.66%
	2nd	WLAN5.2GHz	802.11a 6Mbps	Back	0mm	Ant 6	Full power	44	5220	1	18.19	19.50	1.352	98.25	1.018	0.01	1.530	2.106	
	1st	WLAN5.3GHz	802.11a 6Mbps	Top Side	0mm	Ant 6	Full power	60	5300	1	18.43	20.00	1.435	98.25	1.018	-0.03	1.860	2.718	
67	2nd	WLAN5.3GHz	802.11a 6Mbps	Top Side	0mm	Ant 6	Full power	60	5300	1	18.43	20.00	1.435	98.25	1.018	0.03	1.790	**2.616**	-3.75%
	2nd	WLAN5.3GHz	802.11a 6Mbps	Top Side	0mm	Ant 6	Full power	60	5300	2	18.43	20.00	1.435	98.25	1.018	0.01	1.680	2.455	
	2nd	WLAN5.3GHz	802.11a 6Mbps	Top Side	0mm	Ant 6	Full power	60	5300	3	18.43	20.00	1.435	98.25	1.018	0.06	1.470	2.148	
	1st	WLAN5.5GHz	802.11a 6Mbps	Top Side	0mm	Ant 6	Standalone	100	5500	1	17.60	19.00	1.380	98.25	1.018	-0.12	2.260	3.176	
68	2nd	WLAN5.5GHz	802.11a 6Mbps	Top Side	0mm	Ant 6	Standalone	100	5500	1	17.60	19.00	1.380	98.25	1.018	0.02	2.190	**3.077**	-3.12%
	2nd	WLAN5.5GHz	802.11a 6Mbps	Top Side	0mm	Ant 6	Standalone	100	5500	2	17.60	19.00	1.380	98.25	1.018	0.01	2.090	2.937	
	2nd	WLAN5.5GHz	802.11a 6Mbps	Top Side	0mm	Ant 6	Standalone	100	5500	3	17.60	19.00	1.380	98.25	1.018	0.06	1.880	2.642	
	1st	WLAN5.5GHz	802.11a 6Mbps	Back	0mm	Ant 6	Standalone	100	5500	1	17.60	19.00	1.380	98.25	1.018	-0.03	1.630	2.291	-3.10%
	2nd	WLAN5.5GHz	802.11a 6Mbps	Back	0mm	Ant 6	Standalone	100	5500	1	17.60	19.00	1.380	98.25	1.018	0.09	1.580	2.220	
	1st	WLAN5.8GHz	802.11a 6Mbps	Top Side	0mm	Ant 6	Standalone	149	5745	1	17.33	19.00	1.469	98.25	1.018	-0.01	2.110	3.155	
69	2nd	WLAN5.8GHz	802.11a 6Mbps	Top Side	0mm	Ant 6	Standalone	149	5745	1	17.33	19.00	1.469	98.25	1.018	0.03	2.020	**3.021**	-4.25%
	2nd	WLAN5.8GHz	802.11a 6Mbps	Top Side	0mm	Ant 6	Standalone	149	5745	2	17.33	19.00	1.469	98.25	1.018	0.07	1.830	2.737	
	2nd	WLAN5.8GHz	802.11a 6Mbps	Top Side	0mm	Ant 6	Standalone	149	5745	3	17.33	19.00	1.469	98.25	1.018	0.06	1.740	2.602	
	1st	WLAN5.8GHz	802.11a 6Mbps	Back	0mm	Ant 6	Standalone	157	5785	1	17.50	19.00	1.413	98.25	1.018	0.06	1.650	2.373	-4.26%
	2nd	WLAN5.8GHz	802.11a 6Mbps	Back	0mm	Ant 6	Standalone	157	5785	1	17.50	19.00	1.413	98.25	1.018	0.01	1.580	2.272	

Plot No.	Plot No.	Band	Mode	Test Position	Gap (mm)	Freq. (MHz)	Sample	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)	Deviation
	1st	NFC	ASK	Back	0mm	13.56	1	0.02	0.019	0.019	-10.53%
70	2nd	NFC	ASK	Back	0mm	13.56	1	-0.02	0.017	**0.017**	

17.5 TDD LTE and NR Linearity Data Analysis

General Note:
This device support Power Class 2 and Power Class 3 operations for LTE Band 41/5GNR n77/n78. The highest available duty cycle for Power Class 2 operation is 43.3% using UL-DL configuration 1. Per FCC Guidance based on the device behavior, all SAR tests were performed using Power Class 3. Power Class 2 is tested using the highest SAR test configuration in Power Class 3 for each LTE configuration and exposure condition combination, according to the highest time averaged power for all applicable uplink-downlink configurations in Power Class 2. When the reported SAR vs. output power is linearly scaled with < 10% discrepancy between power classes and all reported SAR are < 1.4 W/kg for 1g and < 3.5 W/kg for 10g, Separate SAR testing for Power Class 2 is not required.

LTE Band 41(HPUE) Ant 4-Linearity Data for Head			FR1 n77(78) Part 27O Ant 5-Linearity Data for Head		
	LTE Band 41 (Power Class 3)	LTE Band 41 (Power Class 2)		LTE Band 77 (Power Class 3)	LTE Band 77 (Power Class 2)
Maximum Tune up Power (dBm)	21.30	22.90	Maximum Tune up Power (dBm)	17.70	20.70
Reported 1g SAR (W/kg)	0.872	0.862	Reported 1g SAR (W/kg)	0.920	0.911
Duty Cycle	63.30%	43.30%	Duty Cycle	100.00%	50.00%
Frame Averaged (mW)	85.39	84.43	Frame Averaged (mW)	58.88	58.74
Linearity SAR (W/kg)	0.862		Linearity SAR (W/kg)	0.918	
% deviation from expected linearity		-0.02%	% deviation from expected linearity		-0.74%
LTE Band 41(HPUE) Ant 4-Linearity Data for Body-worn			**FR1 n77(78) Part 27O Ant 5-Linearity Data for Body-worn**		
	LTE Band 41 (Power Class 3)	LTE Band 41 (Power Class 2)		LTE Band 77 (Power Class 3)	LTE Band 77 (Power Class 2)
Maximum Tune up Power (dBm)	18.70	20.30	Maximum Tune up Power (dBm)	18.30	21.30
Reported 1g SAR (W/kg)	0.854	0.820	Reported 1g SAR (W/kg)	0.927	0.908
Duty Cycle	63.30%	43.30%	Duty Cycle	100.00%	50.00%
Frame Averaged (mW)	46.92	46.40	Frame Averaged (mW)	67.61	67.45
Linearity SAR (W/kg)	0.844		Linearity SAR (W/kg)	0.925	
% deviation from expected linearity		-2.89%	% deviation from expected linearity		-1.82%
LTE Band 41(HPUE) Ant 4-Linearity Data for Hotspot			**FR1 n77(78) Part 27O Ant 5-Linearity Data for Hotspot**		
	LTE Band 41 (Power Class 3)	LTE Band 41 (Power Class 2)		LTE Band 77 (Power Class 3)	LTE Band 77 (Power Class 2)
Maximum Tune up Power (dBm)	16.00	17.60	Maximum Tune up Power (dBm)	15.70	18.70
Reported 1g SAR (W/kg)	0.590	0.589	Reported 1g SAR (W/kg)	0.618	0.609
Duty Cycle	63.30%	43.30%	Duty Cycle	100.00%	50.00%
Frame Averaged (mW)	25.20	24.92	Frame Averaged (mW)	37.15	37.07
Linearity SAR (W/kg)	0.583		Linearity SAR (W/kg)	0.617	
% deviation from expected linearity		0.97%	% deviation from expected linearity		-1.22%
LTE Band 41(HPUE) Ant 4-Linearity Data for Extremity SAR			**FR1 n77(78) Part 27O Ant 5-Linearity Data for Extremity SAR**		
	LTE Band 41 (Power Class 3)	LTE Band 41 (Power Class 2)		LTE Band 77 (Power Class 3)	LTE Band 77 (Power Class 2)
Maximum Tune up Power (dBm)	22.30	23.90	Maximum Tune up Power (dBm)	17.80	20.80
Reported 10g SAR (W/kg)	2.387	2.355	Reported 10g SAR (W/kg)	2.459	2.383
Duty Cycle	63.30%	43.30%	Duty Cycle	100.00%	50.00%
Frame Averaged (mW)	107.50	106.29	Frame Averaged (mW)	60.26	60.11
Linearity SAR (W/kg)	2.360		Linearity SAR (W/kg)	2.453	
% deviation from expected linearity		-0.22%	% deviation from expected linearity		-2.86%

FR1 n77(78) Part 27O Ant 1-Linearity Data for Head		
	LTE Band 77 (Power Class 3)	LTE Band 77 (Power Class 2)
Maximum Tune up Power (dBm)	20.50	23.50
Reported 1g SAR (W/kg)	0.229	0.216
Duty Cycle	100.00%	50.00%
Frame Averaged (mW)	112.20	111.94
Linearity SAR (W/kg)	0.228	
% deviation from expected linearity		-5.45%

FR1 n77(78) Part 27O Ant 2-Linearity Data for Head		
	LTE Band 77 (Power Class 3)	LTE Band 77 (Power Class 2)
Maximum Tune up Power (dBm)	22.50	25.50
Reported 1g SAR (W/kg)	0.186	0.185
Duty Cycle	100.00%	50.00%
Frame Averaged (mW)	177.83	177.41
Linearity SAR (W/kg)	0.186	
% deviation from expected linearity		-0.30%

FR1 n77(78) Part 27O Ant 1-Linearity Data for Body-worn		
	LTE Band 77 (Power Class 3)	LTE Band 77 (Power Class 2)
Maximum Tune up Power (dBm)	20.50	23.50
Reported 1g SAR (W/kg)	0.859	0.890
Duty Cycle	100.00%	50.00%
Frame Averaged (mW)	112.20	111.94
Linearity SAR (W/kg)	0.857	
% deviation from expected linearity		3.85%

FR1 n77(78) Part 27O Ant 2-Linearity Data for Body-worn		
	LTE Band 77 (Power Class 3)	LTE Band 77 (Power Class 2)
Maximum Tune up Power (dBm)	19.10	22.10
Reported 1g SAR (W/kg)	0.923	0.910
Duty Cycle	100.00%	50.00%
Frame Averaged (mW)	81.28	81.09
Linearity SAR (W/kg)	0.921	
% deviation from expected linearity		-1.17%

FR1 n77(78) Part 27O Ant 1-Linearity Data for Hotspot		
	LTE Band 77 (Power Class 3)	LTE Band 77 (Power Class 2)
Maximum Tune up Power (dBm)	20.50	23.50
Reported 1g SAR (W/kg)	0.859	0.890
Duty Cycle	100.00%	50.00%
Frame Averaged (mW)	112.20	111.94
Linearity SAR (W/kg)	0.857	
% deviation from expected linearity		3.85%

FR1 n77(78) Part 27O Ant 2-Linearity Data for Hotspot		
	LTE Band 77 (Power Class 3)	LTE Band 77 (Power Class 2)
Maximum Tune up Power (dBm)	17.00	20.00
Reported 1g SAR (W/kg)	0.626	0.614
Duty Cycle	100.00%	50.00%
Frame Averaged (mW)	50.12	50.00
Linearity SAR (W/kg)	0.625	
% deviation from expected linearity		-1.68%

FR1 n77(78) Part 27O Ant 2-Linearity Data for Extremity SAR		
	LTE Band 77 (Power Class 3)	LTE Band 77 (Power Class 2)
Maximum Tune up Power (dBm)	22.50	25.50
Reported 10g SAR (W/kg)	2.251	2.355
Duty Cycle	100.00%	50.00%
Frame Averaged (mW)	177.83	177.41
Linearity SAR (W/kg)	2.246	
% deviation from expected linearity		4.87%

FR1 n77(78) Part 27O Ant 8-Linearity Data for Head		
	LTE Band 77 (Power Class 3)	LTE Band 77 (Power Class 2)
Maximum Tune up Power (dBm)	20.50	23.50
Reported 1g SAR (W/kg)	0.078	0.076
Duty Cycle	100.00%	50.00%
Frame Averaged (mW)	112.20	111.94
Linearity SAR (W/kg)	0.078	
% deviation from expected linearity		-2.33%

FR1 n77(78) Part 27O Ant 8-Linearity Data for Body-worn		
	LTE Band 77 (Power Class 3)	LTE Band 77 (Power Class 2)
Maximum Tune up Power (dBm)	18.60	21.60
Reported 1g SAR (W/kg)	0.919	0.911
Duty Cycle	100.00%	50.00%
Frame Averaged (mW)	72.44	72.27
Linearity SAR (W/kg)	0.917	
% deviation from expected linearity		-0.64%

FR1 n77(78) Part 27O Ant 8-Linearity Data for Hotspot		
	LTE Band 77 (Power Class 3)	LTE Band 77 (Power Class 2)

Maximum Tune up Power (dBm)	17.60	20.60
Reported 1g SAR (W/kg)	0.625	0.617
Duty Cycle	100.00%	50.00%
Frame Averaged (mW)	57.54	57.41
Linearity SAR (W/kg)	0.624	
% deviation from expected linearity		-1.05%

FR1 n77(78) Part 27O Ant 8-Linearity Data for Extremity SAR

	LTE Band 77 (Power Class 3)	LTE Band 77 (Power Class 2)
Maximum Tune up Power (dBm)	20.50	23.50
Reported 10g SAR (W/kg)	1.040	1.002
Duty Cycle	100.00%	50.00%
Frame Averaged (mW)	112.20	111.94
Linearity SAR (W/kg)	1.038	
% deviation from expected linearity		-3.43%

FR1 n77(78) Part 27O Ant 5-Linearity Data for Body-worn

	LTE Band 77 (Power Class 3)	LTE Band 77 (Power Class 2)
Maximum Tune up Power (dBm)	24.00	27.00
Reported 1g SAR (W/kg)	0.808	0.797
Duty Cycle	100.00%	50.00%
Frame Averaged (mW)	251.19	250.59
Linearity SAR (W/kg)	0.806	
% deviation from expected linearity		-1.13%

FR1 n77(78) Part 27O Ant 2-Linearity Data for Body-worn

	LTE Band 77 (Power Class 3)	LTE Band 77 (Power Class 2)
Maximum Tune up Power (dBm)	22.50	25.50
Reported 1g SAR (W/kg)	0.560	0.555
Duty Cycle	100.00%	50.00%
Frame Averaged (mW)	177.83	177.41
Linearity SAR (W/kg)	0.559	
% deviation from expected linearity		-0.66%

FR1 n77(78) Part 27O Ant 8-Linearity Data for Body-worn

	LTE Band 77 (Power Class 3)	LTE Band 77 (Power Class 2)
Maximum Tune up Power (dBm)	20.50	23.50
Reported 1g SAR (W/kg)	0.671	0.659
Duty Cycle	100.00%	50.00%
Frame Averaged (mW)	112.20	111.94
Linearity SAR (W/kg)	0.669	
% deviation from expected linearity		-1.56%

FR1 n77(78) Part 27O Ant 5-Linearity Data for Extremity SAR

	LTE Band 77 (Power Class 3)	LTE Band 77 (Power Class 2)
Maximum Tune up Power (dBm)	24.00	27.00
Reported 10g SAR (W/kg)	1.227	1.238
Duty Cycle	100.00%	50.00%
Frame Averaged (mW)	251.19	250.59
Linearity SAR (W/kg)	1.224	
% deviation from expected linearity		1.14%

18. Simultaneous Transmission Analysis

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

General Note:

1. This device supports VoIP in GPRS, EGPRS, WCDMA and LTE (e.g. for 3rd-party VoIP), LTE supports VoLTE operation.
2. WWAN above includes 5G NR bands.
3. EUT will choose each GSM, WCDMA, LTE and 5GNR according to the network signal condition; therefore, they will not operate simultaneously at any moment.
4. For EN-DC mode, Qualcomm Smart Transmit algorithm in WWAN adds directly the time-averaged RF exposure from 4G(LTE) and time-averaged RF exposure from 5G NR. Smart Transmit algorithm controls the total RF exposure from both 4G and 5G NR to not exceed FCC limit. Therefore, simultaneous transmission compliance between 4G+5G NR operation is demonstrated in the Part 2 Report during algorithm validation. In Part 1 Report, simultaneous transmission compliance was evaluated individually with other Radios (WLAN or BT) using one of 4G or 5G NR.
5. This device 2.4GHz WLAN support hotspot operation and Bluetooth support tethering applications.
6. This device 5.2GHz WLAN/5.8GHz WLAN support hotspot operation, and 5.2GHz WLAN/5.8GHz WLAN supports WLAN Direct (GC/GO), and 5.3GHz / 5.5GHz supports WLAN Direct (GC only).
7. The worst case 5 GHz WLAN SAR for each configuration was used for SAR summation.
8. WLAN 2.4GHz and Bluetooth share the same antenna, and they cannot transmit simultaneously.
9. According to the EUT characteristic, WLAN 5GHz and Bluetooth can transmit simultaneously.
10. According to the EUT characteristic, WLAN 5GHz and WLAN 2.4GHz can't transmit simultaneously.
11. NFC can transmit simultaneously with other Radios in extremity exposure condition.
12. For Headset SAR and non-Headset SAR always chose higher SAR to do co-located analysis.
13. For standalone WWAN, always choose the highest SAR among the selected WWAN bands within the selected antenna for head each exposure position to perform simultaneous transmission analysis with WLAN/BT. This is the worst co-located analysis and can represent each bands.
14. The maximum SAR summation is calculated based on the same configuration and test position.
15. Per KDB 447498 D01v06, simultaneous transmission SAR is compliant if,
    i) 1g Scalar SAR summation < 1.6W/kg and 10g Scalar SAR summation < 4.0W/kg.
    ii) SPLSR = (SAR1 + SAR2)^1.5 / (min. 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 for 1g SAR and SPLSR≤ 0.10 for 10g SAR, simultaneously transmission SAR measurement is not necessary.
    iv) Simultaneously transmission SAR measurement, and the reported multi-band 1g SAR < 1.6W/kg and 10g SAR < 4.0W/kg.
    v) The SPLSR calculated results please refer to section 17.6.

18.1 5G NR + LTE + WLAN + BT Sim-Tx analysis

In 5G NR + LTE + WLAN + BT simultaneous transmission, 5G NR and LTE transmission are managed and controlled by Qualcomm® Smart Transmit, while the RF exposure from WLAN and BT radios is managed using legacy approach, i.e., through a fixed power back-off if needed.

Since WLAN and BT do not employ time-averaging, 1gSAR and 10gSAR measurement for WLAN and BT need to be conducted at their corresponding rated power following current FCC test procedures to determine reported SAR values.

Smart Transmit current implementation assumes hotspots from 5G NR and LTE are collocated. Therefore, for a total of 100% exposure margin, if LTE uses x%, then the exposure margin left for 5G NR is capped to (100-x)%. Thus, the compliance equation for LTE + 5G NR is

*x% * A + (100-x)% * B ≤ 1.0,*

Where, A is normalized reported time-averaged SAR exposure ratio from LTE, and A ≤ 1.0; B is normalized reported time-averaged exposure ratio from 5G NR (i.e. SAR exposure for 5G FR1), and B ≤1.0.

Let C = normalized reported SAR exposure ratio from WLAN+BT, then for compliance,

*x% * A + (100-x)% * B + C ≤ 1.0* (1)

x% * A + (100-x)% * B ≤ x% * max(A, B) + (100-x)% * max(A, B) ≤ max(A, B)

*x% * A + (100-x)% * B + C ≤ max(A, B) + C ≤ 1.0* (2)

If A + C ≤ 1.0 and B + C ≤ 1.0 can be proven, then “x% * A + (100-x)% * B + C ≤ 1.0”. Therefore simultaneous transmission analysis for 5G NR + LTE + WLAN + BT can be performed in two steps

Step 1: Prove total exposure ratio (TER) of LTE + WLAN + BT < 1
Step 2: Prove total exposure ratio (TER) of 5G NR + WLAN + BT < 1

Else, if A + C > 1.0 and/or B + C > 1.0, then the followings need to hold true for compliance:
i. A and C are decoupled based on the SPLSR criteria, and
ii. (100-x)% * B + C ≤ 1.0, and
iii. x% * A + (100-x)% * B ≤ 1.0
Note iii. is covered in Part 2 report; i. and ii. should be addressed in Part 2 report.

Above analysis is also apply to LTE inter-band uplink, LTE1 + LTE2 + WLAN + BT simultaneous transmission, so inter-band uplink CA no need to do additional simultaneously analysis again. Only required comply with total exposure ratio (TER) of LTE + WLAN + BT < 1.

Conclusion:

1. For the verified maximum SAR from chapter 17.1 to 17.4, when the SAR test results were less than original SAR results (Sporton SAR report no.: FA392114), there is no need to consider co-located SAR for original report had been performed conservatively. For the SAR results were higher than original SAR results and full test bands, they were evaluated to do simultaneous transmission analysis with WLAN/BT.

18.2 Head Exposure Conditions

WWAN Band	Exposure Position	1	2	3	4	1+2	1+3+4
		WWAN	WLAN2.4GHz Ant 6	WLAN5GHz Ant 6	Bluetooth Ant 6	Summed	Summed
		1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)
FR1 n77 Part 27O Ant 5	Right Cheek	0.601	0.180	0.235	0.058	0.78	0.89
	Right Tilted	0.713	0.137	0.288	0.051	0.85	1.05
	Left Cheek	0.791	0.387	0.318	0.144	1.18	1.25
	Left Tilted	0.920	0.315	0.371	0.113	1.24	1.40
FR1 n77 Part 27O Ant 1	Right Cheek	0.130	0.180	0.235	0.058	0.31	0.42
	Right Tilted	0.135	0.137	0.288	0.051	0.27	0.47
	Left Cheek	0.229	0.387	0.318	0.144	0.62	0.69
	Left Tilted	0.086	0.315	0.371	0.113	0.40	0.57
FR1 n77 Part 27O Ant 2	Right Cheek	0.186	0.180	0.235	0.058	0.37	0.48
	Right Tilted	0.164	0.137	0.288	0.051	0.30	0.50
	Left Cheek	0.114	0.387	0.318	0.144	0.50	0.58
	Left Tilted	0.079	0.315	0.371	0.113	0.39	0.56
FR1 n77 Part 27O Ant 8	Right Cheek	0.044	0.180	0.235	0.058	0.22	0.34
	Right Tilted	0.065	0.137	0.288	0.051	0.20	0.40
	Left Cheek	0.057	0.387	0.318	0.144	0.44	0.52
	Left Tilted	0.078	0.315	0.371	0.113	0.39	0.56

18.3 Hotspot Exposure Conditions

WWAN Band	Exposure Position	1	2	3	4	1+2	1+3+4	SPLSR
		WWAN	WLAN2.4GHz Ant 6	WLAN5GHz Ant 6	Bluetooth Ant 6	Summed	Summed	
		1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	
FR1 n77 Part 27O Ant 5	Front	0.211	0.400	0.240	0.068	0.61	0.52	
	Back	0.516	0.727	0.621	0.147	1.24	1.28	
	Left side	0.023				0.02	0.02	
	Right side	0.105	0.512	0.242	0.080	0.62	0.43	
	Top side	0.618	0.421	0.741	0.068	1.04	1.43	
	Bottom side					0.00	0.00	
FR1 n77 Part 27O Ant 1	Front	0.414	0.400	0.240	0.068	0.81	0.72	
	Back	0.890	0.727	0.621	0.147	**1.62**	**1.66**	**1/2**
	Left side	0.303				0.30	0.30	
	Right side		0.512	0.242	0.080	0.51	0.32	
	Top side		0.421	0.741	0.068	0.42	0.81	
	Bottom side	0.437				0.44	0.44	
FR1 n77 Part 27O Ant 2	Front	0.058	0.400	0.240	0.068	0.46	0.37	
	Back	0.626	0.727	0.621	0.147	**1.35**	1.39	
	Left side	0.197				0.20	0.20	
	Right side		0.512	0.242	0.080	0.51	0.32	
	Top side	0.053	0.421	0.741	0.068	0.47	0.86	
	Bottom side					0.00	0.00	
FR1 n77 Part 27O Ant 8	Front	0.042	0.400	0.240	0.068	0.44	0.35	
	Back	0.625	0.727	0.621	0.147	1.35	1.39	
	Left side					0.00	0.00	
	Right side	0.064	0.512	0.242	0.080	0.58	0.39	
	Top side	0.051	0.421	0.741	0.068	0.47	0.86	
	Bottom side					0.00	0.00	

18.4 Body-Worn Accessory Exposure Conditions

WWAN Band	Exposure Position	1	2	3	4	1+2	1+3+4
		WWAN	WLAN2.4GHz Ant 6	WLAN5GHz Ant 6	Bluetooth Ant 6	Summed	Summed
		1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)
FR1 n77 Part 27O Ant 5	Front	0.381	0.167	0.276	0.068	0.55	0.73
	Back	0.927	0.378	0.374	0.147	1.31	**1.45**
FR1 n77 Part 27O Ant 1	Front	0.414	0.167	0.276	0.068	0.58	0.76
	Back	0.890	0.378	0.374	0.147	1.27	1.41
FR1 n77 Part 27O Ant 2	Front	0.081	0.167	0.276	0.068	0.25	0.43
	Back	0.923	0.378	0.374	0.147	1.30	1.44
FR1 n77 Part 27O Ant 8	Front	0.062	0.167	0.276	0.068	0.23	0.41
	Back	0.919	0.378	0.374	0.147	1.30	1.44

Sensor off

WWAN Band	Exposure Position	1	2	3	4	1+2	1+3+4
		WWAN	WLAN2.4GHz Ant 6	WLAN5GHz Ant 6	Bluetooth Ant 6	Summed	Summed
		1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)
FR1 n77 Part 27O Ant 5	Front	0.808	0.222	0.568	0.069	1.03	1.45
	Back	0.644	0.148	0.635	0.058	0.79	1.34
FR1 n77 Part 27O Ant 2	Front	0.383	0.222	0.568	0.069	0.61	1.02
	Back	0.560	0.148	0.635	0.058	0.71	1.25
FR1 n77 Part 27O Ant 8	Front	0.047	0.222	0.568	0.069	0.27	0.68
	Back	0.671	0.148	0.635	0.058	0.82	1.36

18.5 Product specific 10g SAR Exposure Conditions

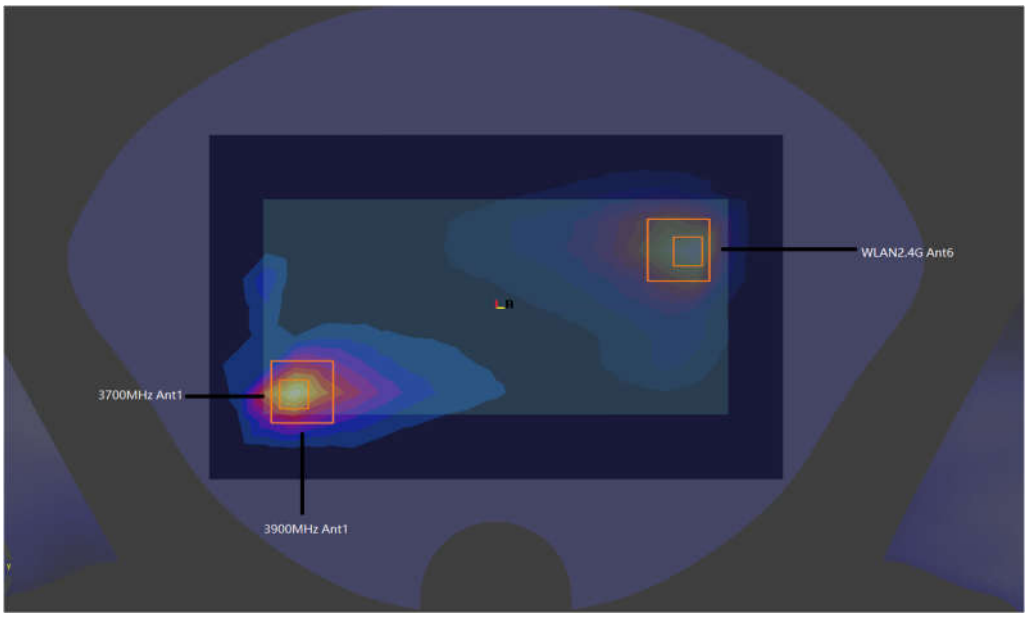
Remark:
1. For Bluetooth Product specific 10g stand-alone SAR is not required for a transmitter or antenna, due to 1g hotspot SAR is <1.2W/kg.
2. The unit of SAR evaluation is W/kg.

WWAN Band	Exposure Position	1	2	3	4	1+2+4	1+3+4
		WWAN	WLAN2.4GHz Ant 6	WLAN5GHz Ant 6	NFC	Summed	Summed
		10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)
FR1 n77 Part 27O Ant 5	Front	0.486		0.652	0.003	0.49	1.14
	Back	0.818	0.982	0.717	0.019	1.82	1.55
	Left side		0.993		0.003	1.00	0.00
	Right side			0.251	0.002	0.00	0.25
	Top side	2.459		0.982	0.001	2.46	**3.44**
	Bottom side				0.001	0.00	0.00
FR1 n77 Part 27O Ant 1	Front			0.652	0.003	0.00	0.66
	Back		0.982	0.717	0.019	1.00	0.74
	Left side		0.993		0.003	1.00	0.00
	Right side		0.993	0.251	0.002	1.00	0.25
	Top side		0.993	0.982	0.001	0.99	0.98
	Bottom side				0.001	0.00	0.00
FR1 n77 Part 27O Ant 2	Front			0.652	0.003	0.00	0.66
	Back	2.355	0.982	0.717	0.019	**3.36**	3.09
	Left side		0.993		0.003	1.00	0.00
	Right side			0.251	0.002	0.00	0.25
	Top side			0.982	0.001	0.00	0.98
	Bottom side				0.001	0.00	0.00
FR1 n77 Part 27O Ant 8	Front			0.652	0.003	0.00	0.66
	Back	1.040	0.982	0.717	0.019	2.04	1.78
	Left side		0.993		0.003	1.00	0.00
	Right side		0.993	0.251	0.002	1.00	0.25
	Top side		0.993	0.982	0.001	0.99	0.98
	Bottom side				0.001	0.00	0.00

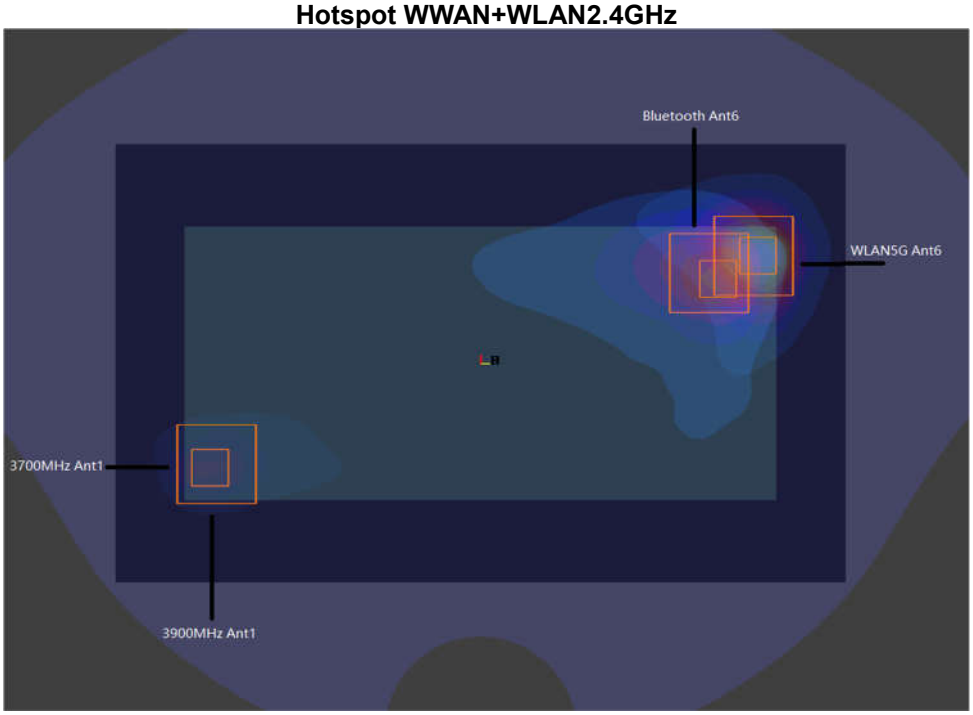
18.6 SPLSR Evaluation and Analysis

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, simultaneously transmission SAR measurement is not necessary.
3. Per April 2022 TCB Workshop, instead of doing a small volume scan over a co-located antenna pair, used summing the SAR values of the co-located pair and using that value in SPLSR calculation. In the calculation used the minimum distance between the spatially separated antenna and the closest antenna of the co-located antenna pair to be conservative.



Hotspot WWAN+WLAN2.4GHz



Hotspot WWAN+WLAN5GHz +BT

For Hotspot:

Case 1	Band	Position	SAR (W/kg)	Gap	SAR peak location (mm)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				(mm)	X	Y	Z				
	FR1 n77 Ant 1	Back	0.89	5mm	6.8	-70	-204	148.4	1.62	0.01	Not required
	WLAN2.4GHz Ant 6		0.727	5mm	-50.2	67	-204				
Case 2	**Band**	**Position**	**SAR (W/kg)**	**Gap**	**SAR peak location (mm)**			**3D distance (mm)**	**Summed SAR (W/kg)**	**SPLSR Results**	**Simultaneous SAR**
				(mm)	X	Y	Z				
	FR1 n77 Ant 1	Back	0.89	5mm	6.8	-70	-204	160.4	1.66	0.01	Not required
	WLAN5GHz Ant 6		0.621	5mm	-55	78	-204				
	Bluetooth Ant 6		0.147	5mm							
	FR1 n77 Ant 1	Back	0.89	5mm	6.8	-70	-204	150.3	1.66	0.01	Not required
	WLAN5GHz Ant 6		0.621	5mm							
	Bluetooth Ant 6		0.147	5mm	-48	70	-204				

Test Engineer：Martin Li, Varus Wang, Light Wang, Ricky Gu

19. 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.

Declaration of Conformity:
The test results with all measurement uncertainty excluded is 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.

The component of uncertainly may generally be categorized according to the methods used to evaluate them. The evaluation of uncertainly by the statistical analysis of a series of observations is termed a Type An evaluation of uncertainty. The evaluation of uncertainty by means other than the statistical analysis of a series of observation is termed a Type B evaluation of uncertainty. Each component of uncertainty, however evaluated, is represented by an estimated standard deviation, termed standard uncertainty, which is determined by the positive square root of the estimated variance.

A Type A evaluation of standard uncertainty may be based on any valid statistical method for treating data. This includes calculating the standard deviation of the mean of a series of independent observations; using the method of least squares to fit a curve to the data in order to estimate the parameter of the curve and their standard deviations; or carrying out an analysis of variance in order to identify and quantify random effects in certain kinds of measurement.

A type B evaluation of standard uncertainty is typically based on scientific judgment using all of the relevant information available. These may include previous measurement data, experience, and knowledge of the behavior and properties of relevant materials and instruments, manufacture's specification, data provided in calibration reports and uncertainties assigned to reference data taken from handbooks. Broadly speaking, the uncertainty is either obtained from an outdoor source or obtained from an assumed distribution, such as the normal distribution, rectangular or triangular distributions indicated in table below.

Uncertainty Distributions	Normal	Rectangular	Triangular	U-Shape
Multi-plying Factor[a]	1/k[b]	$1/\sqrt{3}$	$1/\sqrt{6}$	$1/\sqrt{2}$

(a) standard uncertainty is determined as the product of the multiplying factor and the estimated range of variations in the measured quantity

(b) κ is the coverage factor

Standard Uncertainty for Assumed Distribution

The combined standard uncertainty of the measurement result represents the estimated standard deviation of the result. It is obtained by combining the individual standard uncertainties of both Type A and Type B evaluation using the usual "root-sum-squares" (RSS) methods of combining standard deviations by taking the positive square root of the estimated variances.

Expanded uncertainty is a measure of uncertainty that defines an interval about the measurement result within which the measured value is confidently believed to lie. It is obtained by multiplying the combined standard uncertainty by a coverage factor. Typically, the coverage factor ranges from 2 to 3. Using a coverage factor allows the true value of a measured quantity to be specified with a defined probability within the specified uncertainty range. For purpose of this document, a coverage factor two is used, which corresponds to confidence interval of about 95 %. The DASY uncertainty Budget is shown in the following tables.

The judgment of conformity in the report is based on the measurement results excluding the measurement uncertainty.

Uncertainty Budget According to IEC/IEEE 62209-1528 (Frequency band: 4 MHz - 10 GHz range)							
Error Description	**Uncert. Value (±%)**	**Prob. Dist.**	**Div.**	**(Ci) 1g**	**(Ci) 10g**	**Standard Uncertainty (1g) (±%)**	**Standard Uncertainty (10g) (±%)**
Measurement System errors							
Probe calibration	18.6	N	2	1	1	9.3	9.3
Probe calibration drift	1.7	R	1.732	1	1	1.0	1.0
Probe linearity and detection Limit	4.7	R	1.732	1	1	2.7	2.7
Broadband signal	2.8	R	1.732	1	1	1.6	1.6
Probe isotropy	7.6	R	1.732	1	1	4.4	4.4
Other probe and data acquisition errors	2.4	N	1	1	1	2.4	2.4
RF ambient and noise	1.8	N	1	1	1	1.8	1.8
Probe positioning errors	0.006	N	1	0.5	0.5	0.0	0.0
Data processing errors	4.0	N	1	1	1	4.0	4.0
Phantom and Device Errors							
Measurement of phantom conductivity (σ)	2.5	N	1	0.78	0.71	2.0	1.8
Temperature effects (medium)	5.4	R	1.732	0.78	0.71	2.4	2.2
Shell permittivity	14.0	R	1.732	0.5	0.5	4.0	4.0
Distance between the radiating element of the DUT and the phantom medium	2.0	N	1	2	2	4.0	4.0
Repeatability of positioning the DUT or source against the phantom	1.0	N	1	1	1	1.0	1.0
Device holder effects	3.6	N	1	1	1	3.6	3.6
Effect of operating mode on probe sensitivity	2.4	R	1.732	1	1	1.4	1.4
Time-average SAR	1.7	R	1.732	1	1	1.0	1.0
Variation in SAR due to drift in output of DUT	2.5	N	1	1	1	2.5	2.5
Validation antenna uncertainty (validation measurement only)	0.0	N	1	1	1	0.0	0.0
Uncertainty in accepted power (validation measurement only)	0.0	N	1	1	1	0.0	0.0
Correction to the SAR results							
Phantom deviation from target (ε´,σ)	1.9	N	1	1	0.84	1.9	1.6
SAR scaling	0.0	R	1.732	1	1	0.0	0.0
Combined Std. Uncertainty						**14.5%**	**14.4%**
Coverage Factor for 95 %						**K=2**	**K=2**
Expanded STD Uncertainty						**29.0%**	**28.8%**

20. 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 648474 D04 v01r03, “SAR Evaluation Considerations for Wireless Handsets”, Oct 2015.

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

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

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

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

[15] IEC/IEEE 62209-1528:2020, “Measurement procedure for the assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Part 1528: Human models, instrumentation, and procedures (Frequency range of 4 MHz to 10 GHz)”, Oct. 2020

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