FCC SAR Test Report

APPLICANT	: Zebra Technologies Corporation
EQUIPMENT	: Enterprise Mobile
BRAND NAME	: Zebra
MODEL NAME	: EM45B1
FCC ID	: UZ7EM45B1
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.

Approved by: Si Zhang

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 E. Conducted RF Output Power Table
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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA460508-02	Rev. 01	Initial issue of report.	Dec. 16, 2024

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **Zebra Technologies Corporation, Enterprise Mobile, EM45B1,** are as follows.

Highest 1g SAR Summary						
Equipment Class	Frequency Band		Head (Separation 0mm)	Hotspot (Separation 10mm)	Body-worn (Separation 15mm)	Highest Simultaneous Transmission
			1g SAR (W/kg)			1g SAR (W/kg)
Licensed	GSM	GSM850	1.07	0.93	0.52	1.59
		GSM1900	1.09	1.16	0.31	
	WCDMA	WCDMA II	1.09	1.08	0.58	
		WCDMA IV	1.10	1.09	0.67	
		WCDMA V	1.08	0.62	0.48	
	LTE	LTE Band 2	1.10	1.14	0.53	
		LTE Band 7	1.09	1.10	0.67	
		LTE Band 13	1.07	0.63	0.35	
		LTE Band 17	1.09	0.61	0.39	
		LTE Band 26/5	1.09	0.67	0.27	
		LTE Band 66/4	1.10	**1.18**	0.59	
		LTE Band 71	1.08	0.61	0.39	
		LTE Band 41/38	1.09	1.09	0.61	
		LTE Band 42	1.09	0.83	0.51	
	5G NR	FR1 n2	1.07	1.09	0.57	
		FR1 n7	1.08	1.10	0.99	
		FR1 n26/5	1.09	0.60	0.38	
		FR1 n66	1.09	1.08	0.65	
		FR1 n71	1.08	0.53	0.35	
		FR1 n41/38	1.08	1.08	0.78	
		FR1 n77/78	1.09	1.10	0.76	
DTS	WLAN	2.4GHz WLAN	**1.18**	1.14	0.49	1.59
NII		5GHz WLAN	1.10	1.09	**1.18**	1.59
6CD		6GHz WLAN	0.82		0.24	1.58
DSS	Bluetooth	2.4GHz Bluetooth	0.12	<0.10	<0.10	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	WCDMA	WCDMA II	3.07	3.99
		WCDMA IV	2.99	
	LTE	LTE Band 2	2.88	
		LTE Band 7	3.13	
		LTE Band 66/4	2.82	
		LTE Band 41/38	3.17	
	FR1	FR1 n2	3.08	
		FR1 n7	3.09	
		FR1 n66	3.03	
		FR1 n41/38	**3.18**	
		FR1 n77/78	3.08	
DTS	WLAN	2.4GHz WLAN	3.16	3.99
NII		5GHz WLAN	2.96	3.99
6CD		6GHz WLAN	0.43	3.82
DXX	NFC	NFC	<0.10	3.99

Equipment Class	Frequency Band	Head	Body-worn	Product Specific
		Measured APD (W/m^2)	Measured APD (W/m^2)	Measured APD (W/m^2)
6CD	6GHz WLAN	4.04	1.42	5.83
Date of Testing:		2024/10/18 ~ 2024/10/28		

Remark:

1. This device supports LTE B4 / B5 / B38 and B66 / B26 / B41. Since the supported frequency span for LTE B4 / B5 / B38 falls completely within the supports frequency span for LTE B66 / 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 B66 / B26 / B41.
2. This device supports 5GNR n5/n38/n78 and n26/n41/n77. Since the supported frequency span for 5GNR n5/n38/n78 falls completely within the supports frequency span for n26/n41/n77, both 5GNR bands have the same target power, and both 5GNR bands share the same transmission path; therefore, SAR was only assessed for n26/n41/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.
	SAR02-KS, SAR04-KS, SAR07-KS	CN1257	314309

Applicant	
Company Name	Zebra Technologies Corporation
Address	3 Overlook Point, Lincolnshire, IL 60069 USA

Manufacturer	
Company Name	Zebra Technologies Corporation
Address	3 Overlook Point, Lincolnshire, IL 60069 USA

3. Data Reuse Approach

3.1 Introduction Section

This application re-uses data collected on a similar device, FCC ID: UZ7EM45B2 (reference model) and FCC ID: UZ7EM45B1 (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.

Per KDB 484596 D01 v02r03, the deviation of variant model 1g SAR and 10g SAR spot check result was no larger than 3 dB, the WWAN/WLAN/BT 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: UZ7EM45B1

3.2 Model Difference Information

The **main** difference between FCC ID: UZ7EM45B2 and FCC ID: UZ7EM45B1 is as below:

- Antenna 1 removed WWAN TX & RFID function，keep supported Low bands and Middle bands RX function.

ther differences and all the details of similarity and difference can be found in the confidential documents (EM45B1_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	UZ7EM45B2	Original Grant	FA460508	UZ7EM45B1	Spot check
		WCDMA	B2/4/5	UZ7EM45B2	Original Grant	FA460508	UZ7EM45B1	Spot check
		LTE	B2/4/5/7/13/17/26/ 66/71/38/41/42	UZ7EM45B2	Original Grant	FA460508	UZ7EM45B1	Spot check
		5GNR FR1	n2/5/7/26/66/71/ 38/41/77/78	UZ7EM45B2	Original Grant	FA460508	UZ7EM45B1	Spot check
	DTS	BLE/ WiFi	2400~2483.5	UZ7EM45B2	Original Grant	FA460508	UZ7EM45B1	Spot check
	NII	Wi-Fi	5150 ~ 5250 5250 ~ 5350 5470 ~ 5725 5725 ~ 5850	UZ7EM45B2	Original Grant	FA460508	UZ7EM45B1	Spot check
	6CD	Wi-Fi	5925 ~ 6425 6425 ~ 6525 6525 ~ 6875 6875 ~ 7125	UZ7EM45B2	Original Grant	FA460508C	UZ7EM45B1	Spot check for SAR, full test for PD
	DSS	Bluetooth	2400~2483.5	UZ7EM45B2	Original Grant	FA460508	UZ7EM45B1	Spot check
	DXX	NFC	13.56	UZ7EM45B2	Original Grant	FA460508A	UZ7EM45B1	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 941225 D01 3G SAR Procedures v03r01
- FCC KDB 941225 D05 SAR for LTE Devices v02r05
- FCC KDB 941225 D05A Rel.10 LTE SAR Test Guidance v01r02
- FCC KDB 941225 D06 Hotspot Mode SAR v02r01
- FCC KDB 484596 D01 Referencing Test Data v02r03

5. Equipment Under Test (EUT) Information

5.1 General Information

Product Feature & Specification	
Equipment Name	Enterprise Mobile
Brand Name	Zebra
Model Name	EM45B1
FCC ID	UZ7EM45B1
IMEI Code	IMEI1: 350332150060294 IMEI2: 350332150063942
Wireless Technology and Frequency Range	GSM850: 824 MHz ~ 849 MHz GSM1900: 1850 MHz ~ 1910 MHz WCDMA Band II: 1850 MHz ~ 1910 MHz WCDMA Band IV: 1710 MHz ~ 1755 MHz WCDMA Band V: 824 MHz ~ 849 MHz LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 13: 777 MHz ~ 787 MHz LTE Band 17: 704 MHz ~ 716 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 LTE Band 66: 1710 MHz ~ 1780 MHz LTE Band 71: 663 MHz ~ 698 MHz 5G NR n2 : 1850 MHz ~ 1910 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 n66 : 1710 MHz ~ 1780 MHz 5G NR n71 : 663 MHz ~ 698 MHz 5G NR n77: 3450 MHz ~ 3550 MHz, 3700 MHz ~ 3980 MHz 5G NR n78: 3450 MHz ~ 3550 MHz, 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 WLAN 6GHz U-NII 5: 5925 MHz ~ 6425 MHz WLAN 6GHz U-NII 6: 6425 MHz ~ 6525 MHz WLAN 6GHz U-NII 7: 6525 MHz ~ 6875 MHz WLAN 6GHz U-NII 8: 6875 MHz ~ 7125 MHz Bluetooth: 2402 MHz ~ 2480 MHz NFC : 13.56 MHz
Mode	GSM/GPRS/EGPRS RMC/AMR 12.2Kbps HSDPA HSUPA DC-HSDPA HSPA+ (16QAM uplink is not supported) LTE: QPSK, 16QAM, 64QAM, 256QAM 5G NR: DFT-s-OFDM/CP-OFDM, Pi/2 BPSK/QPSK/16QAM/64QAM/256QAM WLAN 2.4GHz 802.11b/g/n HT20 WLAN 2.4GHz 802.11ac VHT20 WLAN 2.4GHz 802.11ax HE20

	WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80/VHT160 WLAN 5GHz 802.11ax HE20/HE40/HE80/HE160 WLAN 6GHz 802.11a/ax HE20/HE40/HE80/HE160 Bluetooth BR/EDR/LE NFC: ASK
HW Version	DV
SW Version	14-24-09.00-UG-U00-PRD-ATH-04
MFD	09DEC24
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 WLAN supports WiFi Direct (GC only). WLAN 6GHz has no hotspot function.
4. This device supports dual SIM dual standby. The WWAN radio transmission will be enabled by either one SIM at a time (single active).
5. The device implements 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. And the device will invoke corresponding work scenarios power level base on frequency bands/antennas, which can refer to power table at original report.
6. For WLAN when transmit simultaneous with WWAN, power reduction will be activated to head body-worn, hotspot and extremity exposure condition.
7. This device supports HPUE mode for 5GNR n77/n78, since HPUE mode is with higher power, so power class 2 was chosen to perform full SAR testing and power class 2 SAR can represent power class 3 SAR.
8. For 5G NR bands test, using FTM (Factory Test Mode) with default 100% duty cycle transmission to perform SAR testing.
9. 5G NR n77/n78 supports UL MIMO mode.
10. The device support DBS (Dual Band Simultaneous) function, when the device 2.4GHz and 5GHz or 6GHz transmit at the same time the device will limit different output power for simultaneous transmission compliance.
11. This device has one EM45 Protective Case that does not contain metal components and any electronic circuitry, it has no effect on RF exposure and does not require evaluation for SAR.
12. Power density test report for WLAN 6GHz U-NII-5/6/7/8 will be separately submitted.
13. 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	n2	FDD	15	5, 10, 15, 20
	n5	FDD	15	5, 10, 15, 20
	n7	FDD	15	5, 10, 15, 20, 25, 30, 40
	n66	FDD	15	5, 10, 15, 20, 30, 40
	n71	FDD	15	5, 10, 15, 20
	n38	TDD	30	20, 30, 40
	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	n2	FDD	15	5, 10, 15, 20
	n5	FDD	15	5, 10, 15, 20
	n7	FDD	15	5, 10, 15, 20, 25, 30, 40
	n26	FDD	15	5, 10, 15, 20
	n66	FDD	15	5, 10, 15, 20, 30, 40
	n71	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

Specification of Accessory				
AC Adapter 1 (Type C Wall Charger 1)	**Brand Name**	Zebra	**Model**	SAWA-102-22520A
			Part Number	PWR-WUA5V45W1US
AC Adapter 2 (Type A Wall Charger 2)	**Brand Name**	Zebra	**Model**	SAWA-65-20005A
			Part Number	PWR-WUA5V12W0US
Battery 1	**Brand Name**	Zebra	**Model**	BT-000501
			Part Number	BT-000501-2000
Earphone 1 (Wired headset USB-C)	**Brand Name**	Zebra	**Part Number**	HDST-USBC-PTT1-01
Earphone 2 (Rugged Bluetooth Headset)	**Brand Name**	Zebra	**Part Number**	HS3100-OTH
Earphone 3 (3.5mm PTT Headset)	**Brand Name**	Zebra	**Part Number**	HDST-35MM-PTT1-02
Earphone 4 (Rugged Headset)	**Brand Name**	Zebra	**Part Number**	HS2100-OTH
3.5mm to 3.5mm audio connector	**Brand Name**	Zebra	**Part Number**	CBL-HS2100-3MS1-01
Type C-Audio Cable (Type C to 3.5mm)	**Brand Name**	Zebra	**Part Number**	ADP-USBC-35MM1-01
USB Cable 1 (USB-C to C Cable)	**Brand Name**	Zebra	**Part Number**	CBL-EC5X-USBC3A-01
USB Cable 2 (USB-A to C Cable)	**Brand Name**	Zebra	**Part Number**	CBL-TC5X-USBC2A-01
EM45 Protective Case	**Brand Name**	Zebra	**Part Number**	SG-EM45EXO2-01

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>UZ7EM45B1</td></tr>
<tr><td>Equipment Name</td><td>Enterprise Mobile</td></tr>
<tr><td>Operating Frequency Range of each LTE transmission band</td><td>LTE Band 2: 1850 MHz ~ 1910 MHz
LTE Band 4: 1710 MHz ~ 1755 MHz
LTE Band 5: 824 MHz ~ 849 MHz
LTE Band 7: 2500 MHz ~ 2570 MHz
LTE Band 13: 777 MHz ~ 787 MHz
LTE Band 17: 704 MHz ~ 716 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
LTE Band 66: 1710 MHz ~ 1780 MHz
LTE Band 71: 663 MHz ~ 698 MHz</td></tr>
<tr><td>Channel Bandwidth</td><td>LTE Band 2:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 4:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 5:1.4MHz, 3MHz, 5MHz, 10MHz
LTE Band 7: 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 13: 5MHz, 10MHz
LTE Band 17: 5MHz, 10MHz
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
LTE Band 66:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 71: 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</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 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 original report and appendix E.</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 original report and appendix E.</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 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 4												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	19957	1710.7	19965	1711.5	19975	1712.5	20000	1715	20025	1717.5	20050	1720
M	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5
H	20393	1754.3	20385	1753.5	20375	1752.5	20350	1750	20325	1747.5	20300	1745
LTE Band 5								
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20407	824.7	20415	825.5	20425	826.5	20450	829
M	20525	836.5	20525	836.5	20525	836.5	20525	836.5
H	20643	848.3	20635	847.5	20625	846.5	20600	844
LTE Band 7								
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20775	2502.5	20800	2505	20825	2507.5	20850	2510
M	21100	2535	21100	2535	21100	2535	21100	2535
H	21425	2567.5	21400	2565	21375	2562.5	21350	2560
LTE Band 13				
	Bandwidth 5 MHz		Bandwidth 10 MHz	
	Channel #	Freq.(MHz)	Channel #	Freq.(MHz)
L	23205	779.5	23230	782
M	23230	782		
H	23255	784.5		
LTE Band 17				
	Bandwidth 5 MHz		Bandwidth 10 MHz	
	Channel #	Freq.(MHz)	Channel #	Freq. (MHz)
L	23755	706.5	23780	709
M	23790	710	23790	710
H	23825	713.5	23800	711
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

LTE Band 66												
	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	131979	1710.7	131987	1711.5	131997	1712.5	132022	1715	132047	1717.5	132072	1720
M	132322	1745	132322	1745	132322	1745	132322	1745	132322	1745	132322	1745
H	132665	1779.3	132657	1778.5	132647	1777.5	132622	1775	132597	1772.5	132572	1770

LTE Band 71								
	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	133147	665.5	133172	668	133197	670.5	133222	673
M	133247	675.5	133272	678	133297	680.5	133322	683
H	133447	695.5	133422	693	133397	690.5	133372	688

5.3 General 5G NR SAR Test and Reporting Considerations

5G NR Information	
Operating Frequency Range of each 5G NR transmission band	5G NR n2 : 1850 MHz ~ 1910 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 n66 : 1710 MHz ~ 1780 MHz 5G NR n71 : 663 MHz ~ 698 MHz 5G NR n77: 3450 MHz ~ 3550 MHz, 3700 MHz ~ 3980 MHz 5G NR n78: 3450 MHz ~ 3550 MHz, 3700 MHz ~ 3800 MHz
Channel Bandwidth	The detail please refers to section 5.1 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 n2	LTE B7
LTE Anchor Bands for n5	LTE B2/7/66
LTE Anchor Bands for n7	LTE B2/5/66
LTE Anchor Bands for n38	LTE B5
LTE Anchor Bands for n66	LTE B5/7
LTE Anchor Bands for n71	LTE B2
LTE Anchor Bands for n77	LTE B7/41
LTE Anchor Bands for n78	LTE B2/5/7/38/41/66

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

NR Band 2

	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	370500	1852.5	371000	1855	371500	1857.5	372000	1860
M	376000	1880	376000	1880	376000	1880	376000	1880
H	381500	1907.5	381000	1905	380500	1902.5	380000	1900

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 66

	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz		Bandwidth 30MHz		Bandwidth 40MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	342500	1712.5	343000	1715	343500	1717.5	344000	1720	345000	1725	346000	1730
M	349000	1745	349000	1745	349000	1745	349000	1745	349000	1745	349000	1745
H	355500	1777.5	355000	1775	354500	1772.5	354000	1770	353000	1765	352000	1760

NR Band 71								
	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	133100	665.5	133600	668	134100	670.5	134600	673
M	136100	680.5	136100	680.5	136100	680.5	136100	680.5
H	139100	695.5	138600	693	138100	690.5	137600	688

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	500202	2501.01	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	537000	2685	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	664668	3970.02	664334	3965.01	664000	3960	663668	3955.02	663334	3950.01	663000	3945	662668	3940.02	662334	3935.01	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 <3450 MHz ~ 3550 MHz >

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	630668	3460.02	631000	3465	631334	3470.01	631668	3475.02	632000	3480	632334	3485.01	632668	3490.02	633000	3495		
M	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01
H	636000	3540	635668	3535.02	635334	3530.01	635000	3525	634668	3520.02	634334	3515.01	634000	3510	633668	3505.02		

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	630668	3460.02	631000	3465	631334	3470.01	631668	3475.02	632000	3480	632334	3485.01	632668	3490.02	633000	3495		
M	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01
H	636000	3540	635668	3535.02	635334	3530.01	635000	3525	634668	3520.02	634334	3515.01	634000	3510	633668	3505.02		

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	1.0

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	Hotspot DSI 1	Body-Worn& Extremity DSI 0	Pmax*
GSM850	Ant 0	22.1	27.3	24.0	24.0
GSM1900	Ant 2	19.4	22.6	21.0	21.0
WCDMA II	Ant 2	19.3	21.1	23.0	23.0
WCDMA IV	Ant 2	19.2	22.1	23.2	23.0
WCDMA V	Ant 0	21.7	27.2	23.0	23.0
LTE Band 71	Ant 0	21.8	27.6	23.0	23.0
LTE Band 13	Ant 0	21.7	27.4	23.0	23.0
LTE Band 17	Ant 0	21.8	27.4	23.0	23.0
LTE Band 26(5)	Ant 0	21.3	28.0	23.0	23.0
LTE Band 66(4)	Ant 2	19.2	21.7	23.4	23.0
LTE Band 66(4)	Ant 5	30.3	22.8	23.0	23.0
LTE Band 2	Ant 2	19.2	20.7	23.3	23.0
LTE Band 7	Ant 3	16.6	19.9	21.4	24.0
LTE Band 41(38)	Ant 3	15.7	19.2	20.6	21.0
LTE Band 42	Ant 4	14	22.2	21.0	21.0
FR1 n71	Ant 0	21.7	26.4	23.0	23.0
FR1 n26(5)	Ant 0	22.2	26.7	23.0	23.0
FR1 n66	Ant 2	18.9	21.5	23.1	23.0
FR1 n2	Ant 2	18.6	20.8	22.7	23.0
FR1 n7	Ant 3	15.5	19.2	20.5	24.0
FR1 n41(38)	Ant 3	15.4	20.2	20.1	23.0
FR1 n41	Ant 0	16	25.2	23.0	23.0
FR1 n41	Ant 5	32.3	21.1	20.3	21.0
FR1 n41	Ant 6	24.4	20.7	20.8	21.0
FR1 n77(78) Part 27O	Ant 2	16.1	22.0	22.8	22.0
FR1 n77(78) Part 27Q	Ant 2	16.1	22.0	22.8	22.0
FR1 n77(78) HPUE Part 27O	Ant 2	16.1	22.0	22.8	23.5
FR1 n77(78) HPUE Part 27Q	Ant 2	16.1	22.0	22.8	23.5
FR1 n77(78) Part 27O	Ant 3	17.9	19.6	19.6	22.0
FR1 n77(78) Part 27Q	Ant 3	17.9	19.6	19.6	22.0
FR1 n77(78) HPUE Part 27O	Ant 3	17.9	19.6	19.6	23.5
FR1 n77(78) HPUE Part 27Q	Ant 3	17.9	19.6	19.6	23.5
FR1 n77(78) Part 27O	Ant 4	15.2	22.2	23.9	23.0
FR1 n77(78) Part 27Q	Ant 4	15.2	22.2	23.9	23.0
FR1 n77(78) HPUE Part 27O	Ant 4	15.2	22.2	23.9	26.0
FR1 n77(78) HPUE Part 27Q	Ant 4	15.2	22.2	23.9	26.0
FR1 n77(78) Part 27O	Ant 6	24.4	19.7	19.5	23.0
FR1 n77(78) Part 27Q	Ant 6	24.4	19.7	19.5	23.0
FR1 n77(78) HPUE Part 27O	Ant 6	24.4	19.7	19.5	26.0
FR1 n77(78) HPUE Part 27Q	Ant 6	24.4	19.7	19.5	26.0

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. RF Exposure Limits

7.1 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.

7.2 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.

8. Specific Absorption Rate (SAR)

8.1 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.

8.2 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:

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

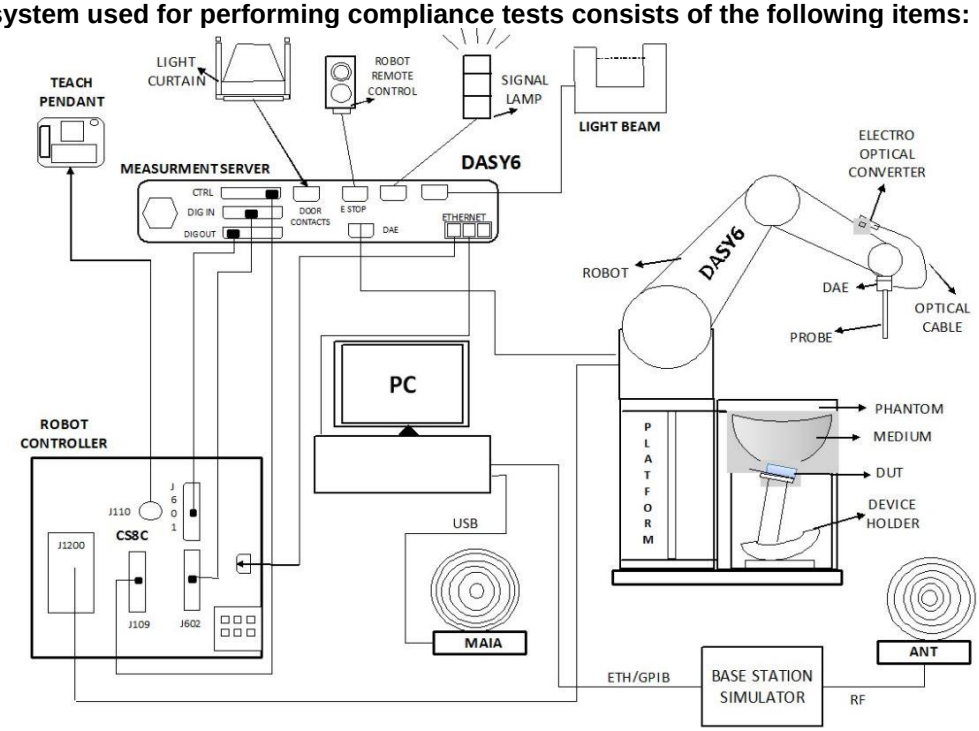
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

9. System Description and Setup

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



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running Win7 or Win10 and the DASY5 or 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.

9.1 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	4 MHz – 10 GHz Linearity: ±0.2 dB (30 MHz – 10 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

9.2 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.

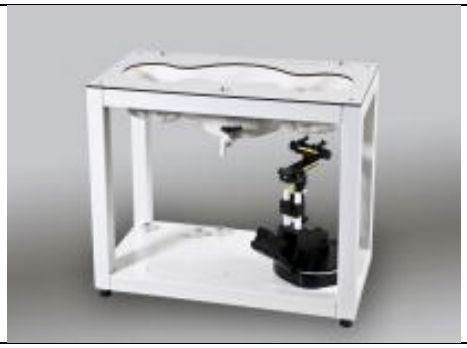
The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

Photo of DAE

9.3 Phantom

<SAM Twin Phantom>

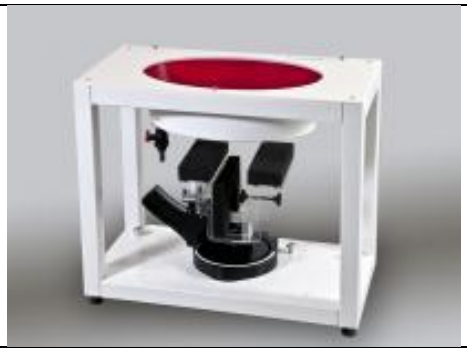
Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm
Filling Volume	Approx. 25 liters
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet
Measurement Areas	Left Hand, Right Hand, Flat Phantom



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.

9.4 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

10. 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

10.1 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

10.2 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.

10.3 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.	

10.4 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.

10.5 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.

10.6 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.

11. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	750MHz System Validation Kit	D750V3	1087	2022/2/24	2025/2/22
SPEAG	835MHz System Validation Kit	D835V2	4d298	2024/1/26	2025/1/25
SPEAG	1750MHz System Validation Kit	D1750V2	1090	2022/2/24	2025/2/22
SPEAG	1900MHz System Validation Kit	D1900V2	5d118	2022/3/30	2025/3/28
SPEAG	2450MHz System Validation Kit	D2450V2	1095	2024/2/8	2025/2/7
SPEAG	2600MHz System Validation Kit	D2600V2	1112	2023/12/18	2024/12/17
SPEAG	3500MHz System Validation Kit	D3500V2	1037	2023/11/20	2024/11/19
SPEAG	3900MHz System Validation Kit	D3900V2	1048	2023/3/9	2026/3/8
SPEAG	5000MHz System Validation Kit	D5GHzV2	1113	2022/9/23	2025/9/21
SPEAG	6500MHz System Validation Kit	D6.5GHzV2	1031	2023/2/22	2026/2/21
SPEAG	13MHz System Validation Kit	CLA13	1023	2024/1/22	2025/1/21
SPEAG	Data Acquisition Electronics	DAE4	1279	2024/8/20	2025/8/19
SPEAG	Data Acquisition Electronics	DAE4	1649	2024/7/3	2025/7/2
SPEAG	Dosimetric E-Field Probe	EX3DV4	3857	2024/1/22	2025/1/21
SPEAG	Dosimetric E-Field Probe	EX3DV4	7706	2024/1/24	2025/1/23
SPEAG	SAM Twin Phantom	SAM Twin	TP-1842	NCR	NCR
SPEAG	SAM Twin Phantom	SAM Twin	TP-2024	NCR	NCR
SPEAG	ELI Phantom	ELI V8.0	TP-2135	NCR	NCR
CHIGO	Thermo-Hygrometer	HTC-1	55009	2024/1/4	2025/1/3
Testo	Thermo-Hygrometer	HTC-1	55011	2024/1/4	2025/1/3
SPEAG	Phone Positioner	N/A	N/A	NCR	NCR
Rohde & Schwarz	Signal Generator	SMB100A	100455	2024/1/2	2025/1/1
Rohde & Schwarz	Vector Signal Generator	SMBV100A	258305	2024/1/2	2025/1/1
Anritsu	Radio Communication Analyzer	MT8821C	6262306175	2024/7/4	2025/7/3
Agilent	ENA Series Network Analyzer	E5071C	MY46112129	2024/7/4	2025/7/3
SPEAG	Dielectric Probe Kit	DAK-3.5	1071	2024/2/19	2025/2/18
SPEAG	Dielectric Probe Kit	DAK-12	1170	2023/10/25	2024/10/24
Anritsu	Vector Signal Generator	MG3710A	6201682672	2024/1/2	2025/1/1
Rohde & Schwarz	Power Sensor	NRP50S	101385	2024/10/15	2025/10/14
Rohde & Schwarz	Power Meter	NRVD	102081	2024/7/4	2025/7/3
Rohde & Schwarz	Power Sensor	NRV-Z5	100538	2024/7/4	2025/7/3
Rohde & Schwarz	Power Sensor	NRV-Z5	100539	2024/7/4	2025/7/3
R&S	BLUETOOTH TESTER	CBT	101246	2024/7/4	2025/7/3
Rohde & Schwarz	Spectrum Analyzer	FSV7	101631	2024/10/11	2025/10/10
TES	DIGITAC THERMOMETER	TYPE-K	220305411	2024/1/4	2025/1/3
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	
BONN	POWER AMPLIFIER	BLMA 0830-3	087193A	Note 1	
BONN	POWER AMPLIFIER	BLMA 2060-2	087193B	Note 1	
Agilent	Dual Directional Coupler	778D	20500	Note 1	
Agilent	Dual Directional Coupler	11691D	MY48151020	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.

12. System Verification

12.1 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.

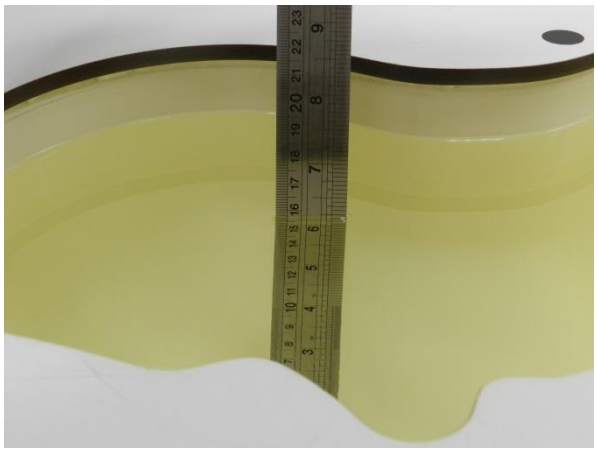


Fig 11.1 Photo of Liquid Height for Head SAR

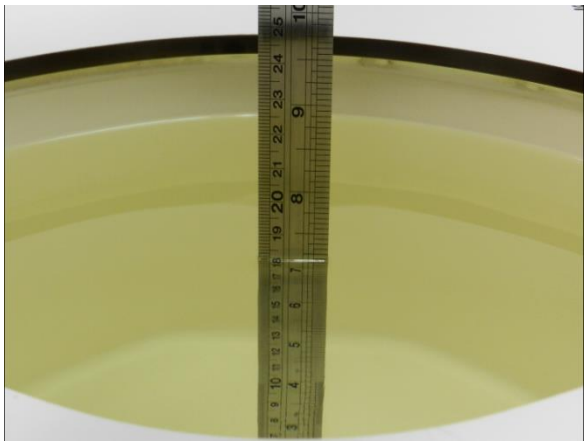


Fig 11.2 Photo of Liquid Height for Body SAR

12.2 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
750	Head	22.6	0.893	41.141	0.89	41.90	0.34	-1.81	±5	2024/10/18
835	Head	22.6	0.922	40.883	0.90	41.50	2.44	-1.49	±5	2024/10/19
1750	Head	22.6	1.342	39.569	1.37	40.10	-2.04	-1.32	±5	2024/10/20
1900	Head	22.6	1.407	40.219	1.40	40.00	0.50	0.55	±5	2024/10/21
2600	Head	22.6	1.880	38.191	1.96	39.00	-4.08	-2.07	±5	2024/10/22
3500	Head	22.8	2.787	39.602	2.91	37.90	-4.23	4.49	±5	2024/10/23
3900	Head	22.8	3.281	37.612	3.32	37.50	-1.17	0.30	±5	2024/10/24
2450	Head	22.7	1.781	40.614	1.80	39.20	-1.06	3.61	±5	2024/10/25
5250	Head	22.7	4.694	35.722	4.71	35.90	-0.34	-0.50	±5	2024/10/26
5600	Head	22.7	5.107	35.090	5.07	35.50	0.73	-1.15	±5	2024/10/27
5750	Head	22.7	5.278	34.805	5.22	35.40	1.11	-1.68	±5	2024/10/28
6500	Head	22.8	6.15	34.7	6.07	34.50	1.32	0.58	±5	2024/10/21
13	Head	22.6	0.757	53.7	0.75	55.00	0.93	-2.36	±5	2024/10/24

12.3 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 (%)
2024/10/18	750	Head	50	1087	3857	1279	0.452	8.58	9.04	5.36
2024/10/19	835	Head	50	4d298	3857	1279	0.492	9.89	9.84	-0.51
2024/10/20	1750	Head	50	1090	3857	1279	1.950	37.00	39	5.41
2024/10/21	1900	Head	50	5d118	3857	1279	1.820	39.30	36.4	-7.38
2024/10/22	2600	Head	50	1112	3857	1279	2.960	55.10	59.2	7.44
2024/10/23	3500	Head	50	1037	3857	1279	3.520	65.40	70.4	7.65
2024/10/24	3900	Head	50	1048	3857	1279	3.600	69.10	72	4.20
2024/10/25	2450	Head	50	1095	3857	1279	2.540	52.60	50.8	-3.42
2024/10/26	5250	Head	50	1113	3857	1279	3.980	81.50	79.6	-2.33
2024/10/27	5600	Head	50	1113	3857	1279	4.030	82.60	80.6	-2.42
2024/10/28	5750	Head	50	1113	3857	1279	4.220	80.80	84.4	4.46
2024/10/21	6500	Head	50	1031	7706	1649	14.9	297.00	298	0.34
2024/10/24	13	Head	250	1023	7706	1649	0.143	0.621	0.572	-7.74

<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 (%)
2024/10/18	750	Head	50	1087	3857	1279	0.261	5.65	5.22	-7.61
2024/10/19	835	Head	50	4d298	3857	1279	0.321	6.45	6.42	-0.47
2024/10/20	1750	Head	50	1090	3857	1279	0.988	19.50	19.76	1.33
2024/10/21	1900	Head	50	5d118	3857	1279	0.975	20.40	19.5	-4.41
2024/10/22	2600	Head	50	1112	3857	1279	1.230	24.80	24.6	-0.81
2024/10/23	3500	Head	50	1037	3857	1279	1.330	24.70	26.6	7.69
2024/10/24	3900	Head	50	1048	3857	1279	1.240	24.10	24.8	2.90
2024/10/25	2450	Head	50	1095	3857	1279	1.210	24.70	24.2	-2.02
2024/10/26	5250	Head	50	1113	3857	1279	1.250	23.30	25	7.30
2024/10/27	5600	Head	50	1113	3857	1279	1.270	23.70	25.4	7.17
2024/10/28	5750	Head	50	1113	3857	1279	1.200	23.00	24	4.35
2024/10/21	6500	Head	50	1031	7706	1649	2.63	54.80	52.6	-4.01
2024/10/24	13	Head	250	1023	7706	1649	0.090	0.335	0.36	5.88

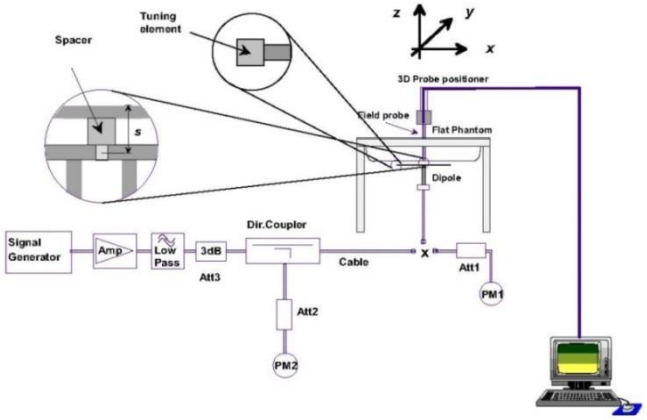


Fig 11.3.1 System Performance Check Setup

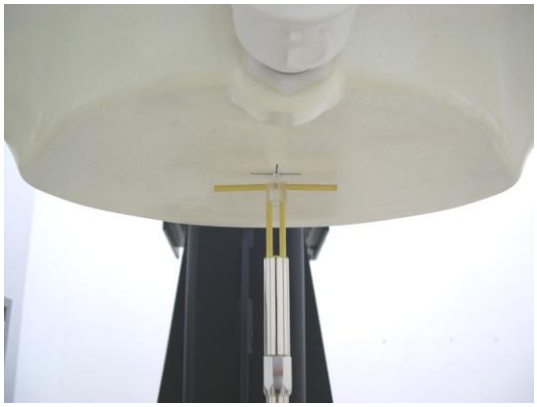


Fig 11.3.2 Setup Photo

Fig 11.3.3 Setup Photo

13. RF Exposure Positions

13.1 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.

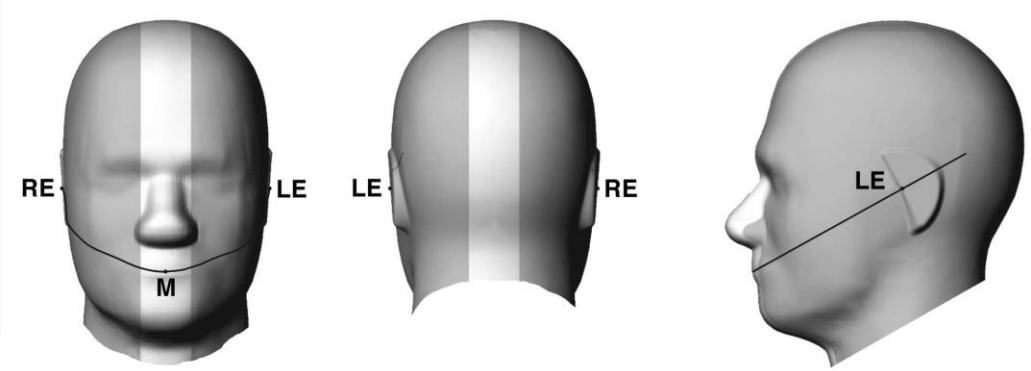


Fig 12.1.1 Front, back, and side views of SAM twin phantom

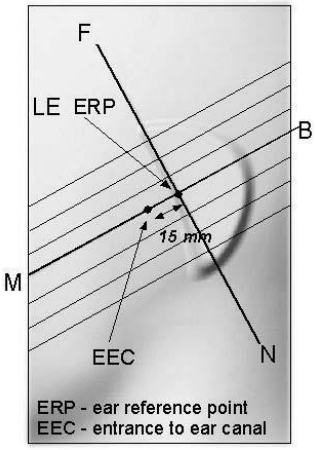


Fig 12.1.2 Close-up side view of phantom showing the ear region.

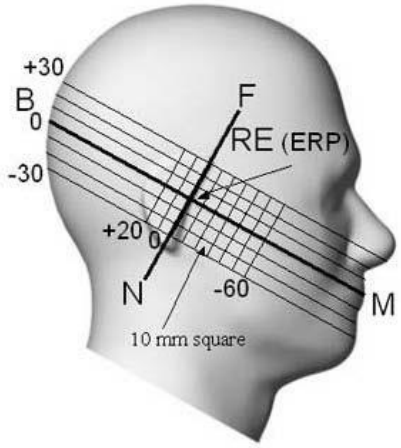


Fig 12.1.3 Side view of the phantom showing relevant markings and seven cross-sectional plane locations

13.2 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.

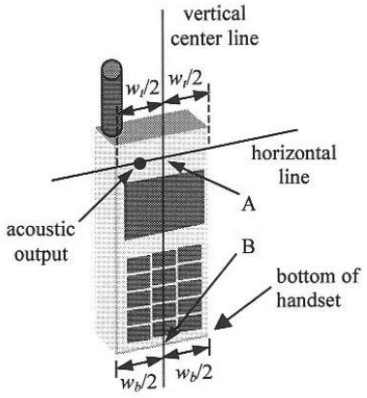


Fig 12.2.1 Handset vertical and horizontal reference lines—"fixed case

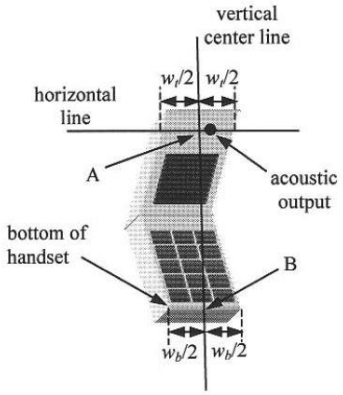


Fig 12.2.2 Handset vertical and horizontal reference lines—"clam-shell case"

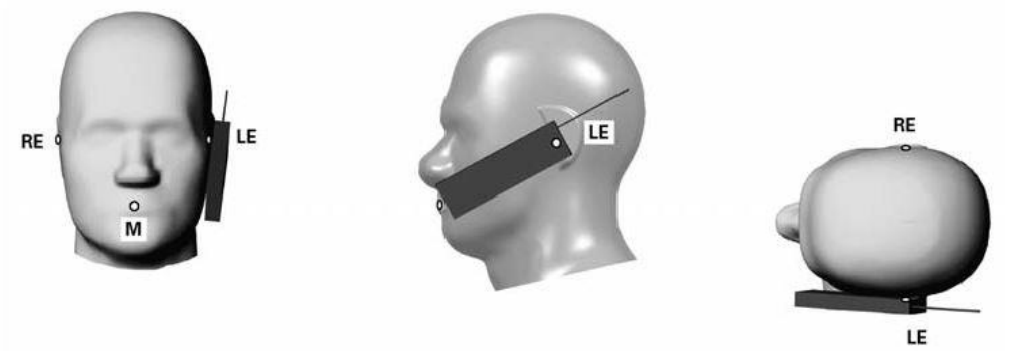


Fig 12.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

13.3 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

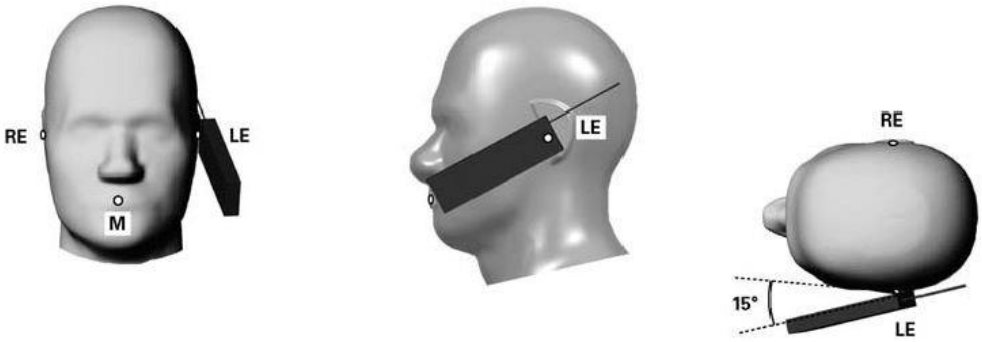


Fig 12.3.1 Tilt position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which define the Reference Plane for handset positioning, are indicated.

13.4 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.

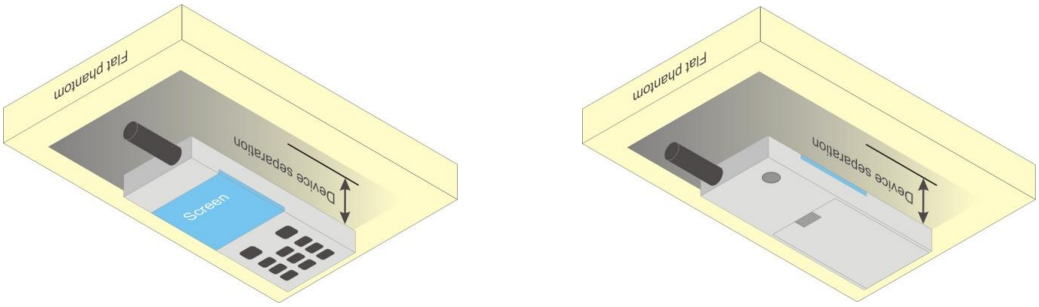


Fig 12.4 Body Worn Position

13.5 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.

13.6 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.

14. Conducted RF Output Power (Unit: dBm)

The detailed conducted power table can refer to Appendix E.

15. Antenna Location

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

16. Spot Check SAR Results

General Note:

1. According to section 3.3, spot check conducted power test against the variant project based on the worst-case SAR condition from the original project was performed in this filing to demonstrate the test data from original project remains representative for the variant project. Detail Conducted power measurement referred to appendix E.
2. 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.
3. Per KDB 484596 D01 v02r03, the variant filings must demonstrate that the referenced test data remain valid for the variant device by including spot-check measurements that meet the following criteria:
   a. Spot-check measurements shall be made in correspondence to the worst-case scenario reported in the reference device filing, i.e., for those conditions that are the closest to non-compliance
   b. Spot-check measurements, while being always compliant with the applicable rule part(s) for the test under consideration, may show a deviation ddB from the reference data no larger than 3 dB:
   $$d_{dB} = | VdB – RdB | \leq 3\ dB \quad (1)$$
   where between VdB, the variant spot-check level in dB, and RdB is the corresponding measurement level in dB for the reference model.
4. The Spot check results showed that Deviation of the SAR results did not exceed 3dB, therefore referring to the guidance in the KDB inquiry, SAR data reuse is justified.
5. 1st as parent model, 2nd as variant model.

DSI status description：

The device has the following DSI state which used at different exposure condition.

This WWAN bands enabled with Qualcomm Smart Transmit feature which located at chapter 6. The default power is Pmax power, When Plimit power higher than Pmax power, the output power will be limited at Pmax, and so the SAR will use Pmax power to do the testing.

Exposure Condition	DSI	Trigger Conditions
Head	DSI2	Receiver on
Body Worn/Extremity	DSI0	Receiver Off + Hotspot Off
Hotspot	DSI1	Receiver Off + Hotspot On

16.1 Head SAR

Plot No.	No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Deviation
750MHz																						
	1st	LTE Band 71	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 0	DSI 2	133322	683	21.40	22.80	1.380	-	-	-0.09	0.783	1.081	0.18
01	2nd	LTE Band 71	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 0	DSI 2	133322	683	21.29	22.80	1.416	-	-	0.13	0.733	**1.038**	
	1st	LTE Band 13	10M	QPSK	1	0	-	Right Cheek	0mm	Ant 0	DSI 2	23230	782	21.34	22.70	1.368	-	-	-0.02	0.784	1.072	0.04
02	2nd	LTE Band 13	10M	QPSK	1	0	-	Right Cheek	0mm	Ant 0	DSI 2	23230	782	21.29	22.70	1.384	-	-	-0.01	0.768	**1.063**	
	1st	LTE Band 17	10M	QPSK	1	0	-	Right Cheek	0mm	Ant 0	DSI 2	23790	710	21.87	22.80	1.239	-	-	0.08	0.883	1.094	0.26
03	2nd	LTE Band 17	10M	QPSK	1	0	-	Right Cheek	0mm	Ant 0	DSI 2	23790	710	21.79	22.80	1.262	-	-	-0.02	0.816	**1.030**	
	1st	FR1 n71	20M	QPSK	1	1	DFT-SCS-15KHz	Right Cheek	0mm	Ant 0	DSI 2	136100	680.5	21.84	22.70	1.219	-	-	-0.01	0.888	1.082	0.12
04	2nd	FR1 n71	20M	QPSK	1	1	DFT-SCS-15KHz	Right Cheek	0mm	Ant 0	DSI 2	136100	680.5	21.89	22.70	1.205	-	-	0.05	0.874	**1.053**	
835MHz																						
	1st	GSM850	-	-	-	-	GPRS (4 Tx slots)	Right Cheek	0mm	Ant 0	DSI 2	251	848.8	25.24	26.10	1.219	-	-	0.02	0.877	1.069	0.00
05	2nd	GSM850	-	-	-	-	GPRS (4 Tx slots)	Right Cheek	0mm	Ant 0	DSI 2	251	848.8	25.11	26.10	1.256	-	-	-0.09	0.850	**1.068**	
	1st	WCDMA V	-	-	-	-	RMC 12.2Kbps	Right Cheek	0mm	Ant 0	DSI 2	4182	836.4	21.20	22.70	1.413	-	-	0.01	0.766	1.082	0.01
06	2nd	WCDMA V	-	-	-	-	RMC 12.2Kbps	Right Cheek	0mm	Ant 0	DSI 2	4182	836.4	21.45	22.70	1.334	-	-	-0.09	0.810	**1.080**	
	1st	LTE Band 26	15M	QPSK	1	0	-	Right Cheek	0mm	Ant 0	DSI 2	26865	831.5	20.87	22.30	1.390	-	-	-0.03	0.784	1.090	0.52
07	2nd	LTE Band 26	15M	QPSK	1	0	-	Right Cheek	0mm	Ant 0	DSI 2	26865	831.5	20.75	22.30	1.429	-	-	-0.04	0.677	**0.967**	
	1st	FR1 n26	20M	QPSK	50	28	-	Right Cheek	0mm	Ant 0	DSI 2	166300	831.5	22.11	23.20	1.285	-	-	-0.02	0.848	1.090	0.02
08	2nd	FR1 n26	20M	QPSK	50	28	-	Right Cheek	0mm	Ant 0	DSI 2	166300	831.5	22.34	23.20	1.219	-	-	-0.09	0.889	**1.084**	
1750MHz																						
	1st	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Left Cheek	0mm	Ant 2	DSI 2	1513	1752.6	19.15	20.20	1.274	-	-	0.01	0.860	1.095	0.33
09	2nd	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Left Cheek	0mm	Ant 2	DSI 2	1513	1752.6	19.45	20.20	1.189	-	-	-0.06	0.854	**1.015**	
	1st	LTE Band 66	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 2	DSI 2	132572	1770	18.84	20.20	1.368	-	-	0.02	0.801	1.096	0.20
10	2nd	LTE Band 66	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 2	DSI 2	132572	1770	19.39	20.20	1.205	-	-	0.15	0.869	**1.047**	
	1st	LTE Band 66	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 5	DSI 2	132322	1745	22.85	24.00	1.303	-	-	-0.09	0.155	0.202	2.56
	2nd	LTE Band 66	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 5	DSI 2	132322	1745	22.74	24.00	1.337	-	-	-0.02	0.084	0.112	
	1st	FR1 n66	40M	QPSK	108	54	DFT-SCS-15KHz	Left Cheek	0mm	Ant 2	DSI 2	349000	1745	18.89	19.90	1.262	-	-	0.01	0.861	1.086	0.06
11	2nd	FR1 n66	40M	QPSK	108	54	DFT-SCS-15KHz	Left Cheek	0mm	Ant 2	DSI 2	349000	1745	19.23	19.90	1.167	-	-	0.08	0.917	**1.070**	
1900MHz																						
	1st	GSM1900	-	-	-	-	GPRS (2 Tx slots)	Left Cheek	0mm	Ant 2	DSI 2	512	1850.2	25.04	26.40	1.368	-	-	0.01	0.797	1.090	0.10
12	2nd	GSM1900	-	-	-	-	GPRS (2 Tx slots)	Left Cheek	0mm	Ant 2	DSI 2	512	1850.2	24.88	26.40	1.419	-	-	0.09	0.751	**1.066**	
	1st	WCDMA II	-	-	-	-	RMC 12.2Kbps	Left Cheek	0mm	Ant 2	DSI 2	9262	1852.4	18.68	20.30	1.452	-	-	-0.06	0.747	1.085	0.06
13	2nd	WCDMA II	-	-	-	-	RMC 12.2Kbps	Left Cheek	0mm	Ant 2	DSI 2	9262	1852.4	19.08	20.30	1.324	-	-	-0.09	0.809	**1.071**	
	1st	LTE Band 2	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 2	DSI 2	18700	1860	19.10	20.20	1.288	-	-	-0.12	0.850	1.095	0.03
14	2nd	LTE Band 2	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 2	DSI 2	18700	1860	19.43	20.20	1.194	-	-	0.02	0.911	**1.088**	
	1st	FR1 n2	20M	QPSK	1	1	DFT-SCS-15KHz	Left Cheek	0mm	Ant 2	DSI 2	372000	1860	18.32	19.60	1.343	-	-	-0.01	0.798	1.072	0.34
15	2nd	FR1 n2	20M	QPSK	1	1	DFT-SCS-15KHz	Left Cheek	0mm	Ant 2	DSI 2	372000	1860	18.20	19.60	1.380	-	-	0.18	0.719	**0.992**	
2600MHz																						
	1st	LTE Band 7	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 3	DSI 2	21100	2535	16.65	17.60	1.245	-	-	-0.01	0.879	1.094	0.10
16	2nd	LTE Band 7	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 3	DSI 2	21100	2535	16.57	17.60	1.268	-	-	-0.04	0.844	**1.070**	
	1st	LTE Band 41	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 3	DSI 2	41490	2680	17.15	18.70	1.429	62.9	1.006	-0.08	0.761	1.094	0.32
17	2nd	LTE Band 41	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 3	DSI 2	41490	2680	17.06	18.70	1.459	62.9	1.006	-0.09	0.693	**1.017**	
	1st	FR1 n7	40M	QPSK	108	54	DFT-SCS-15KHz	Right Cheek	0mm	Ant 3	DSI 2	507000	2535	15.66	16.50	1.213	-	-	0.01	0.893	1.084	1.09
18	2nd	FR1 n7	40M	QPSK	108	54	DFT-SCS-15KHz	Right Cheek	0mm	Ant 3	DSI 2	507000	2535	15.42	16.50	1.282	-	-	-0.07	0.658	**0.844**	
	1st	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Right Cheek	0mm	Ant 3	DSI 2	518598	2592.99	15.30	16.40	1.288	-	-	-0.04	0.834	1.074	0.43
19	2nd	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Right Cheek	0mm	Ant 3	DSI 2	518598	2592.99	15.19	16.40	1.321	-	-	-0.09	0.736	**0.972**	
	1st	FR1 n41	100M	QPSK	135	69	DFT-SCS-30KHz	Right Cheek	0mm	Ant 0	DSI 2	518598	2592.99	15.70	17.00	1.349	-	-	0.15	0.798	1.076	1.90
	2nd	FR1 n41	100M	QPSK	135	69	DFT-SCS-30KHz	Right Cheek	0mm	Ant 0	DSI 2	518598	2592.99	15.61	17.00	1.377	-	-	0.02	0.504	0.694	
	1st	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Left Cheek	0mm	Ant 5	DSI 2	518598	2592.99	21.23	22.00	1.194	-	-	0.08	0.068	0.081	0.28
	2nd	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Left Cheek	0mm	Ant 5	DSI 2	518598	2592.99	21.14	22.00	1.219	-	-	-0.01	0.062	0.076	

	1st	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Left Cheek	0mm	Ant 6	DSI 2	518598	2592.99	21.28	22.00	1.180	-	-	0.08	0.424	0.500	0.55
	2nd	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Left Cheek	0mm	Ant 6	DSI 2	518598	2592.99	21.59	22.00	1.099	-	-	-0.09	0.516	0.567	
3500MHz																						
	1st	LTE Band 42	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 4	DSI 2	42990	3540	16.18	17.00	1.208	62.9	1.006	0.02	0.894	1.086	0.35
20	2nd	LTE Band 42	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 4	DSI 2	42990	3540	16.08	17.00	1.236	62.9	1.006	0.07	0.807	**1.003**	
	1st	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Right Cheek	0mm	Ant 2	DSI 2	656000	3840	15.78	17.10	1.355	-	-	-0.06	0.799	1.083	1.70
	2nd	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Right Cheek	0mm	Ant 2	DSI 2	656000	3840	15.60	17.10	1.413	-	-	-0.01	0.519	0.733	
	1st	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Right Cheek	0mm	Ant 2	DSI 2	633334	3500.01	15.69	17.10	1.384	-	-	0.06	0.676	0.935	1.15
	2nd	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Right Cheek	0mm	Ant 2	DSI 2	633334	3500.01	15.50	17.10	1.445	-	-	0.09	0.496	0.717	
	1st	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Right Cheek	0mm	Ant 3	DSI 2	656000	3840	17.85	18.90	1.274	-	-	-0.09	0.648	0.825	0.04
	2nd	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Right Cheek	0mm	Ant 3	DSI 2	656000	3840	18.16	18.90	1.186	-	-	-0.12	0.690	0.818	
	1st	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Right Cheek	0mm	Ant 3	DSI 2	633334	3500.01	17.82	18.90	1.282	-	-	-0.09	0.846	1.085	1.39
	2nd	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Right Cheek	0mm	Ant 3	DSI 2	633334	3500.01	18.11	18.90	1.199	-	-	0.08	0.657	0.788	
	1st	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Left Cheek	0mm	Ant 4	DSI 2	656000	3840	15.20	16.20	1.259	-	-	-0.02	0.862	1.085	0.00
21	2nd	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Left Cheek	0mm	Ant 4	DSI 2	656000	3840	15.63	16.20	1.140	-	-	0.08	0.951	**1.084**	
	1st	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Left Cheek	0mm	Ant 4	DSI 2	633334	3500.01	15.22	16.20	1.253	-	-	-0.04	0.353	0.442	0.67
	2nd	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Left Cheek	0mm	Ant 4	DSI 2	633334	3500.01	15.64	16.20	1.138	-	-	0.02	0.333	0.379	
	1st	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Left Cheek	0mm	Ant 6	DSI 2	656000	3840	24.08	25.40	1.355	-	-	-0.06	0.807	1.094	0.05
	2nd	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Left Cheek	0mm	Ant 6	DSI 2	656000	3840	24.01	25.40	1.377	-	-	-0.02	0.785	1.081	
	1st	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Left Cheek	0mm	Ant 6	DSI 2	633334	3500.01	24.03	25.40	1.371	-	-	-0.03	0.515	0.706	0.39
	2nd	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Left Cheek	0mm	Ant 6	DSI 2	633334	3500.01	23.99	25.40	1.384	-	-	0	0.466	0.645	

Plot No.	No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Deviation
2450MHz																		
	1st	WLAN2.4GHz	802.11b 1Mbps	Right Cheek	0mm	Ant 7+9(7)	Standalone Non DBS	6	2437	15.79	17.50	1.483	98.35	1.017	-0.09	0.783	1.181	0.73
22	2nd	WLAN2.4GHz	802.11b 1Mbps	Right Cheek	0mm	Ant 7+9(7)	Standalone Non DBS	6	2437	15.75	17.50	1.496	98.35	1.017	0.13	0.656	**0.998**	
	1st	WLAN2.4GHz	802.11b 1Mbps	Right Cheek	0mm	Ant 9	Standalone Non DBS	1	2412	16.40	18.00	1.445	98.35	1.017	0.01	0.766	1.126	0.81
	2nd	WLAN2.4GHz	802.11b 1Mbps	Right Cheek	0mm	Ant 9	Standalone Non DBS	1	2412	16.38	18.00	1.452	98.35	1.017	0.01	0.633	0.935	
	1st	Bluetooth	1Mbps	Left Tilted	0mm	Ant 7	Full Power	39	2441	9.23	11.00	1.504	76.93	1.083	-0.17	0.071	0.116	0.15
23	2nd	Bluetooth	1Mbps	Left Tilted	0mm	Ant 7	Full Power	39	2441	9.88	11.00	1.294	76.93	1.083	0.04	0.080	**0.112**	
5000MHz																		
	1st	WLAN5.3GHz	802.11ac-VHT160 MCS0	Left Cheek	0mm	Ant 8+10(10)	Standalone Non DBS	50	5250	13.56	15.00	1.393	100	1.000	0.09	0.783	1.091	0.15
24	2nd	WLAN5.3GHz	802.11ac-VHT160 MCS0	Left Cheek	0mm	Ant 8+10(10)	Standalone Non DBS	50	5250	13.88	15.00	1.294	100	1.000	-0.12	0.814	**1.053**	
	1st	WLAN5.5GHz	802.11ac-VHT160 MCS0	Left Cheek	0mm	Ant 8+10(10)	Standalone Non DBS	114	5570	13.41	15.00	1.442	100	1.000	0.06	0.763	1.100	1.15
25	2nd	WLAN5.5GHz	802.11ac-VHT160 MCS0	Left Cheek	0mm	Ant 8+10(10)	Standalone Non DBS	114	5570	13.35	15.00	1.462	100	1.000	0.19	0.577	**0.844**	
	1st	WLAN5.8GHz	802.11ac-VHT80 MCS0	Left Cheek	0mm	Ant 8+10(8)	Standalone Non DBS	155	5775	15.15	16.50	1.365	100	1.000	0.06	0.732	0.999	0.08
26	2nd	WLAN5.8GHz	802.11ac-VHT80 MCS0	Left Cheek	0mm	Ant 8+10(8)	Standalone Non DBS	155	5775	15.84	16.50	1.164	100	1.000	-0.05	0.843	**0.981**	

Plot No.	No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured APD (W/m^2)	Deviation
6000MHz																			
	1st	WLAN6GHz	802.11ax-HE160 MCS0	Left Cheek	0mm	Ant 8+10(10)	Standalone Non DBS	47	6185	13.62	15.00	1.374	100	1.000	-0.12	0.596	0.819	4.04	1.49
93	2nd	WLAN6GHz	802.11ax-HE160 MCS0	Left Cheek	0mm	Ant 8+10(10)	Standalone Non DBS	47	6185	13.51	15.00	1.409	100	1.000	-0.1	0.412	**0.581**	**2.75**	

16.2 Hotspot SAR

Plot No.	No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Deviation
750MHz																						
	1st	LTE Band 71	20M	QPSK	1	0	-	Back	10mm	Ant 0	DSI 1	133322	683	22.98	24.00	1.265	-	-	-0.02	0.293	0.371	2.17
27	2nd	LTE Band 71	20M	QPSK	1	0	-	Back	10mm	Ant 0	DSI 1	133322	683	22.51	24.00	1.409	-	-	0.02	0.434	**0.612**	
	1st	LTE Band 13	10M	QPSK	1	0	-	Back	10mm	Ant 0	DSI 1	23230	782	22.78	24.00	1.324	-	-	-0.01	0.296	0.392	2.08
28	2nd	LTE Band 13	10M	QPSK	1	0	-	Back	10mm	Ant 0	DSI 1	23230	782	22.63	24.00	1.371	-	-	-0.14	0.462	**0.633**	
	1st	LTE Band 17	10M	QPSK	1	0	-	Back	10mm	Ant 0	DSI 1	23790	710	22.75	24.00	1.334	-	-	-0.02	0.293	0.391	1.96
29	2nd	LTE Band 17	10M	QPSK	1	0	-	Back	10mm	Ant 0	DSI 1	23790	710	22.56	24.00	1.393	-	-	-0.08	0.441	**0.614**	
	1st	FR1 n71	20M	QPSK	50	28	DFT-SCS-15KHz	Back	10mm	Ant 0	DSI 1	136100	680.5	23.07	24.00	1.239	-	-	0.03	0.429	0.531	0.06
30	2nd	FR1 n71	20M	QPSK	50	28	DFT-SCS-15KHz	Back	10mm	Ant 0	DSI 1	136100	680.5	23.21	24.00	1.199	-	-	-0.03	0.437	**0.524**	
835MHz																						
	1st	GSM850	-	-	-	-	GPRS (2 Tx slots)	Top Side	10mm	Ant 0	DSI 1	189	836.4	29.70	31.00	1.349	-	-	-0.01	0.372	0.502	2.66
31	2nd	GSM850	-	-	-	-	GPRS (2 Tx slots)	Top Side	10mm	Ant 0	DSI 1	189	836.4	29.68	31.00	1.355	-	-	0.05	0.684	**0.927**	
	1st	WCDMA V	-	-	-	-	RMC 12.2Kbps	Back	10mm	Ant 0	DSI 1	4182	836.4	23.02	24.00	1.253	-	-	-0.02	0.330	0.414	1.72
32	2nd	WCDMA V	-	-	-	-	RMC 12.2Kbps	Back	10mm	Ant 0	DSI 1	4182	836.4	22.87	24.00	1.297	-	-	-0.02	0.474	**0.615**	
	1st	LTE Band 26	15M	QPSK	1	0	-	Top Side	10mm	Ant 0	DSI 1	26865	831.5	23.04	24.00	1.247	-	-	-0.02	0.274	0.342	2.90
33	2nd	LTE Band 26	15M	QPSK	1	0	-	Top Side	10mm	Ant 0	DSI 1	26865	831.5	22.35	24.00	1.462	-	-	0.07	0.456	**0.667**	
	1st	FR1 n26	20M	QPSK	50	28	-	Back	10mm	Ant 0	DSI 1	166300	831.5	22.78	24.00	1.324	-	-	0.01	0.365	0.483	0.95
34	2nd	FR1 n26	20M	QPSK	50	28	-	Back	10mm	Ant 0	DSI 1	166300	831.5	23.16	24.00	1.213	-	-	-0.08	0.495	**0.601**	
1750MHz																						
	1st	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Left Side	10mm	Ant 2	DSI 1	1413	1732.6	22.20	23.10	1.230	-	-	0.02	0.886	1.090	0.01
35	2nd	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Left Side	10mm	Ant 2	DSI 1	1413	1732.6	22.53	23.10	1.140	-	-	0.02	0.954	**1.088**	
	1st	LTE Band 66	20M	QPSK	1	0	-	Left Side	10mm	Ant 2	DSI 1	132572	1770	21.69	22.70	1.262	-	-	0.01	0.935	1.180	0.00
36	2nd	LTE Band 66	20M	QPSK	1	0	-	Left Side	10mm	Ant 2	DSI 1	132572	1770	21.62	22.70	1.282	-	-	0.15	0.921	**1.181**	
	1st	LTE Band 66	20M	QPSK	1	0	-	Bottom Side	10mm	Ant 5	DSI 1	132572	1770	22.78	23.80	1.265	-	-	0.01	0.860	1.088	0.76
	2nd	LTE Band 66	20M	QPSK	1	0	-	Bottom Side	10mm	Ant 5	DSI 1	132572	1770	22.69	23.80	1.291	-	-	0.07	0.708	0.914	
	1st	FR1 n66	40M	QPSK	1	1	DFT-SCS-15KHz	Left Side	10mm	Ant 2	DSI 1	349000	1745	21.51	22.50	1.256	-	-	0.03	0.860	1.080	0.75
37	2nd	FR1 n66	40M	QPSK	1	1	DFT-SCS-15KHz	Left Side	10mm	Ant 2	DSI 1	349000	1745	21.42	22.50	1.282	-	-	0.13	0.709	**0.909**	
1900MHz																						
	1st	GSM1900	-	-	-	-	GPRS (2 Tx slots)	Left Side	10mm	Ant 2	DSI 1	661	1880	26.76	28.00	1.330	-	-	0.03	0.563	0.749	1.90
38	2nd	GSM1900	-	-	-	-	GPRS (2 Tx slots)	Left Side	10mm	Ant 2	DSI 1	661	1880	26.51	28.00	1.409	-	-	0.07	0.824	**1.161**	
	1st	WCDMA II	-	-	-	-	RMC 12.2Kbps	Left Side	10mm	Ant 2	DSI 1	9400	1880	20.98	22.10	1.294	-	-	0.03	0.834	1.079	2.00
39	2nd	WCDMA II	-	-	-	-	RMC 12.2Kbps	Left Side	10mm	Ant 2	DSI 1	9400	1880	22.64	22.10	0.883	-	-	0.13	0.771	**0.681**	
	1st	LTE Band 2	20M	QPSK	1	0	-	Left Side	10mm	Ant 2	DSI 1	18700	1860	20.82	21.70	1.225	-	-	0.01	0.894	1.095	0.18
40	2nd	LTE Band 2	20M	QPSK	1	0	-	Left Side	10mm	Ant 2	DSI 1	18700	1860	20.70	21.70	1.259	-	-	0.19	0.907	**1.142**	
	1st	FR1 n2	20M	QPSK	1	1	DFT-SCS-15KHz	Left Side	10mm	Ant 2	DSI 1	372000	1860	20.85	21.80	1.245	-	-	0.01	0.875	1.089	0.04
41	2nd	FR1 n2	20M	QPSK	1	1	DFT-SCS-15KHz	Left Side	10mm	Ant 2	DSI 1	372000	1860	20.74	21.80	1.276	-	-	0.13	0.845	**1.079**	
2600MHz																						
	1st	LTE Band 7	20M	QPSK	1	0	-	Left Side	10mm	Ant 3	DSI 1	21350	2560	20.15	20.90	1.189	-	-	-0.03	0.921	1.095	0.04
42	2nd	LTE Band 7	20M	QPSK	1	0	-	Left Side	10mm	Ant 3	DSI 1	21350	2560	20.28	20.90	1.153	-	-	0.08	0.941	**1.085**	
	1st	LTE Band 41	20M	QPSK	1	0	-	Left Side	10mm	Ant 3	DSI 1	41490	2680	21.13	22.20	1.279	62.9	1.006	-0.02	0.844	1.086	0.03
43	2nd	LTE Band 41	20M	QPSK	1	0	-	Left Side	10mm	Ant 3	DSI 1	41490	2680	21.21	22.20	1.256	62.9	1.006	0.05	0.854	**1.079**	
	1st	FR1 n7	40M	QPSK	108	54	DFT-SCS-15KHz	Left Side	10mm	Ant 3	DSI 1	507000	2535	19.21	20.20	1.256	-	-	-0.01	0.872	1.095	0.70
44	2nd	FR1 n7	40M	QPSK	108	54	DFT-SCS-15KHz	Left Side	10mm	Ant 3	DSI 1	507000	2535	19.09	20.20	1.291	-	-	0.08	0.722	**0.932**	
	1st	FR1 n41	100M	QPSK	135	69	DFT-SCS-30KHz	Left Side	10mm	Ant 3	DSI 1	518598	2592.99	19.86	21.20	1.361	-	-	-0.04	0.793	1.080	0.07
	2nd	FR1 n41	100M	QPSK	135	69	DFT-SCS-30KHz	Left Side	10mm	Ant 3	DSI 1	518598	2592.99	19.77	21.20	1.390	-	-	0.02	0.765	1.063	
	1st	FR1 n41	100M	QPSK	135	69	DFT-SCS-30KHz	Back	10mm	Ant 0	DSI 1	518598	2592.99	22.42	24.00	1.439	-	-	-0.16	0.475	0.683	0.44
	2nd	FR1 n41	100M	QPSK	135	69	DFT-SCS-30KHz	Back	10mm	Ant 0	DSI 1	518598	2592.99	22.63	24.00	1.371	-	-	0.17	0.551	0.755	
	1st	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Bottom Side	10mm	Ant 5	DSI 1	518598	2592.99	21.23	22.00	1.194	-	-	0.09	0.896	1.070	0.02
45	2nd	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Bottom Side	10mm	Ant 5	DSI 1	518598	2592.99	21.13	22.00	1.222	-	-	0.15	0.872	**1.065**	

	1st	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Left Side	10mm	Ant 6	DSI 1	518598	2592.99	20.81	21.70	1.227	-	-	0.03	0.873	1.072	2.41
	2nd	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Left Side	10mm	Ant 6	DSI 1	518598	2592.99	20.71	21.70	1.256	-	-	0.13	0.490	0.615	
3500MHz																						
	1st	LTE Band 42	20M	QPSK	1	0	-	Front	10mm	Ant 4	DSI 1	42590	3500	22.64	24.00	1.368	62.9	1.006	-0.13	0.602	0.828	0.07
46	2nd	LTE Band 42	20M	QPSK	1	0	-	Front	10mm	Ant 4	DSI 1	42590	3500	22.99	24.00	1.262	62.9	1.006	0.05	0.642	**0.815**	
	1st	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Front	10mm	Ant 2	DSI 1	656000	3840	21.63	23.00	1.371	-	-	0.06	0.781	1.071	0.25
	2nd	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Front	10mm	Ant 2	DSI 1	656000	3840	21.16	23.00	1.528	-	-	0.01	0.662	1.011	
	1st	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Front	10mm	Ant 2	DSI 1	633334	3500.01	21.36	23.00	1.459	-	-	0.01	0.663	0.967	2.45
	2nd	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Front	10mm	Ant 2	DSI 1	633334	3500.01	21.15	23.00	1.531	-	-	-0.04	0.359	0.550	
	1st	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Left Side	10mm	Ant 3	DSI 1	656000	3840	19.38	20.60	1.324	-	-	-0.09	0.815	1.079	0.89
	2nd	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Left Side	10mm	Ant 3	DSI 1	656000	3840	19.25	20.60	1.365	-	-	0.06	0.645	0.880	
	1st	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Left Side	10mm	Ant 3	DSI 1	633334	3500.01	19.22	20.60	1.374	-	-	0.02	0.799	1.098	0.21
47	2nd	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Left Side	10mm	Ant 3	DSI 1	633334	3500.01	19.16	20.60	1.393	-	-	0.06	0.751	**1.046**	
	1st	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Front	10mm	Ant 4	DSI 1	656000	3840	22.10	23.20	1.288	-	-	-0.05	0.845	1.089	2.55
	2nd	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Front	10mm	Ant 4	DSI 1	656000	3840	21.97	23.20	1.327	-	-	0.05	0.456	0.605	
	1st	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Front	10mm	Ant 4	DSI 1	633334	3500.01	21.79	23.20	1.384	-	-	0.05	0.577	0.798	0.22
	2nd	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Front	10mm	Ant 4	DSI 1	633334	3500.01	21.71	23.20	1.409	-	-	-0.04	0.596	0.840	
	1st	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Left Side	10mm	Ant 6	DSI 1	656000	3840	19.51	20.70	1.315	-	-	0.01	0.822	1.081	2.91
	2nd	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Left Side	10mm	Ant 6	DSI 1	656000	3840	19.63	20.70	1.279	-	-	0.09	0.432	0.553	
	1st	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Left Side	10mm	Ant 6	DSI 1	633334	3500.01	19.36	20.70	1.361	-	-	0.01	0.761	1.036	1.87
	2nd	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Left Side	10mm	Ant 6	DSI 1	633334	3500.01	19.45	20.70	1.334	-	-	0.03	0.505	0.673	

Plot No.	No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Deviation
2450MHz																		
	1st	WLAN2.4GHz	802.11b 1Mbps	Top Side	10mm	Ant 7+9(9)	Standalone Non DBS	1	2412	18.25	20.00	1.496	98.35	1.017	-0.03	0.752	1.144	1.49
48	2nd	WLAN2.4GHz	802.11b 1Mbps	Top Side	10mm	Ant 7+9(9)	Standalone Non DBS	1	2412	18.22	20.00	1.507	98.35	1.017	0.07	0.530	**0.812**	
	1st	WLAN2.4GHz	802.11b 1Mbps	Right Side	10mm	Ant 9	Standalone Non DBS	11	2462	19.69	21.50	1.517	98.35	1.017	0.01	0.518	0.799	2.03
	2nd	WLAN2.4GHz	802.11b 1Mbps	Right Side	10mm	Ant 9	Standalone Non DBS	11	2462	19.67	21.50	1.524	98.35	1.017	0.07	0.323	0.501	
	1st	Bluetooth	1Mbps	Top Side	10mm	Ant 7	Full Power	39	2441	9.23	11.00	1.504	76.93	1.083	-0.15	0.021	0.034	2.09
49	2nd	Bluetooth	1Mbps	Top Side	10mm	Ant 7	Full Power	39	2441	9.88	11.00	1.294	76.93	1.083	0.01	0.015	**0.021**	
5000MHz																		
	1st	WLAN5.2GHz	802.11a 6Mbps	Back	10mm	Ant 8+10(8)	Standalone Non DBS	48	5240	18.41	20.00	1.442	99.32	1.007	-0.05	0.728	1.057	0.20
50	2nd	WLAN5.2GHz	802.11a 6Mbps	Back	10mm	Ant 8+10(8)	Standalone Non DBS	48	5240	18.57	20.00	1.390	99.32	1.007	-0.06	0.721	**1.009**	
	1st	WLAN5.8GHz	802.11a 6Mbps	Back	10mm	Ant 8+10(8)	Standalone Non DBS	165	5825	18.94	20.50	1.432	99.32	1.007	-0.06	0.754	1.088	0.06
51	2nd	WLAN5.8GHz	802.11a 6Mbps	Back	10mm	Ant 8+10(8)	Standalone Non DBS	165	5825	19.11	20.50	1.377	99.32	1.007	0.09	0.774	**1.073**	

16.3 Body Worn Accessory SAR

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Deviation
750MHz																					
	LTE Band 71	20M	QPSK	1	0	-	Back	15mm	Ant 0	DSI 0	133322	683	22.98	24.00	1.265	-	-	-0.05	0.167	0.211	2.61
52	LTE Band 71	20M	QPSK	1	0	-	Back	15mm	Ant 0	DSI 0	133322	683	22.51	24.00	1.409	-	-	0.01	0.273	**0.385**	
	LTE Band 13	10M	QPSK	1	0	-	Back	15mm	Ant 0	DSI 0	23230	782	22.78	24.00	1.324	-	-	-0.17	0.157	0.208	2.26
53	LTE Band 13	10M	QPSK	1	0	-	Back	15mm	Ant 0	DSI 0	23230	782	22.63	24.00	1.371	-	-	-0.06	0.255	**0.350**	
	LTE Band 17	10M	QPSK	1	0	-	Back	15mm	Ant 0	DSI 0	23790	710	22.75	24.00	1.334	-	-	-0.16	0.146	0.195	2.98
54	LTE Band 17	10M	QPSK	1	0	-	Back	15mm	Ant 0	DSI 0	23790	710	22.56	24.00	1.393	-	-	0.01	0.278	**0.387**	
	FR1 n71	20M	QPSK	50	28	DFT-SCS-15KHz	Back	15mm	Ant 0	DSI 0	136100	680.5	23.07	24.00	1.239	-	-	-0.07	0.259	0.321	0.38
55	FR1 n71	20M	QPSK	50	28	DFT-SCS-15KHz	Back	15mm	Ant 0	DSI 0	136100	680.5	23.21	24.00	1.199	-	-	0.12	0.292	**0.350**	
835MHz																					
	GSM850	-	-	-	-	GPRS (2 Tx slots)	Back	15mm	Ant 0	DSI 0	189	836.4	29.70	31.00	1.349	-	-	-0.07	0.200	0.270	2.87
56	GSM850	-	-	-	-	GPRS (2 Tx slots)	Back	15mm	Ant 0	DSI 0	189	836.4	29.68	31.00	1.355	-	-	-0.02	0.386	**0.523**	
	WCDMA V	-	-	-	-	RMC 12.2Kbps	Back	15mm	Ant 0	DSI 0	4182	836.4	23.02	24.00	1.253	-	-	-0.03	0.215	0.269	2.51
57	WCDMA V	-	-	-	-	RMC 12.2Kbps	Back	15mm	Ant 0	DSI 0	4182	836.4	22.87	24.00	1.297	-	-	-0.07	0.369	**0.479**	
	LTE Band 26	15M	QPSK	1	0	-	Back	15mm	Ant 0	DSI 0	26865	831.5	23.04	24.00	1.247	-	-	0.01	0.171	0.213	1.05
58	LTE Band 26	15M	QPSK	1	0	-	Back	15mm	Ant 0	DSI 0	26865	831.5	22.35	24.00	1.462	-	-	-0.01	0.185	**0.271**	
	FR1 n26	20M	QPSK	50	28	-	Back	15mm	Ant 0	DSI 0	166300	831.5	22.78	24.00	1.324	-	-	-0.03	0.172	0.228	2.16
59	FR1 n26	20M	QPSK	50	28	-	Back	15mm	Ant 0	DSI 0	166300	831.5	23.16	24.00	1.213	-	-	-0.07	0.309	**0.375**	
1750MHz																					
	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Back	15mm	Ant 2	DSI 0	1413	1732.6	22.79	24.00	1.321	-	-	0.01	0.508	0.671	0.02
60	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Back	15mm	Ant 2	DSI 0	1413	1732.6	22.53	24.00	1.403	-	-	-0.11	0.476	**0.668**	
	LTE Band 66	20M	QPSK	1	0	-	Back	15mm	Ant 2	DSI 0	132322	1745	22.85	24.00	1.303	-	-	0.01	0.452	0.589	0.16
61	LTE Band 66	20M	QPSK	1	0	-	Back	15mm	Ant 2	DSI 0	132322	1745	23.02	24.00	1.253	-	-	-0.15	0.453	**0.568**	
	LTE Band 66	20M	QPSK	1	0	-	Back	15mm	Ant 5	DSI 0	132322	1745	22.89	24.00	1.291	-	-	-0.07	0.396	0.511	0.26
	LTE Band 66	20M	QPSK	1	0	-	Back	15mm	Ant 5	DSI 0	132322	1745	22.74	24.00	1.337	-	-	-0.18	0.406	0.543	
	FR1 n66	40M	QPSK	108	54	DFT-SCS-15KHz	Back	15mm	Ant 2	DSI 0	349000	1745	22.77	24.00	1.327	-	-	-0.05	0.459	0.609	0.25
62	FR1 n66	40M	QPSK	108	54	DFT-SCS-15KHz	Back	15mm	Ant 2	DSI 0	349000	1745	23.04	24.00	1.247	-	-	-0.09	0.517	**0.645**	
1900MHz																					
	GSM1900	-	-	-	-	GPRS (2 Tx slots)	Back	15mm	Ant 2	DSI 0	661	1880	26.76	28.00	1.330	-	-	0.01	0.187	0.249	0.91
63	GSM1900	-	-	-	-	GPRS (2 Tx slots)	Back	15mm	Ant 2	DSI 0	661	1880	26.51	28.00	1.409	-	-	-0.05	0.218	**0.307**	
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Back	15mm	Ant 2	DSI 0	9400	1880	22.46	24.00	1.426	-	-	-0.03	0.404	0.576	0.22
64	WCDMA II	-	-	-	-	RMC 12.2Kbps	Back	15mm	Ant 2	DSI 0	9400	1880	22.64	24.00	1.368	-	-	0.02	0.401	**0.548**	
	LTE Band 2	20M	QPSK	1	0	-	Back	15mm	Ant 2	DSI 0	18900	1880	22.84	24.00	1.306	-	-	-0.02	0.404	0.528	0.75
65	LTE Band 2	20M	QPSK	1	0	-	Back	15mm	Ant 2	DSI 0	18900	1880	22.98	24.00	1.265	-	-	0.04	0.351	**0.444**	
	FR1 n2	20M	QPSK	50	28	DFT-SCS-15KHz	Back	15mm	Ant 2	DSI 0	376000	1880	22.65	23.70	1.274	-	-	-0.17	0.421	0.536	0.28
66	FR1 n2	20M	QPSK	50	28	DFT-SCS-15KHz	Back	15mm	Ant 2	DSI 0	376000	1880	22.55	23.70	1.303	-	-	0.09	0.439	**0.572**	
2600MHz																					
	LTE Band 7	20M	QPSK	1	0	-	Back	15mm	Ant 3	DSI 0	21100	2535	21.12	22.40	1.343	-	-	-0.05	0.422	0.567	0.72
67	LTE Band 7	20M	QPSK	1	0	-	Back	15mm	Ant 3	DSI 0	21100	2535	21.05	22.40	1.365	-	-	-0.09	0.491	**0.670**	
	LTE Band 41	20M	QPSK	1	0	-	Back	15mm	Ant 3	DSI 0	40620	2593	22.06	23.60	1.426	62.9	1.006	-0.01	0.349	0.501	0.83
68	LTE Band 41	20M	QPSK	1	0	-	Back	15mm	Ant 3	DSI 0	40620	2593	21.96	23.60	1.459	62.9	1.006	0.08	0.413	**0.606**	
	FR1 n7	40M	QPSK	1	1	DFT-SCS-15KHz	Back	15mm	Ant 3	DSI 0	507000	2535	20.55	21.50	1.245	-	-	-0.03	0.799	0.994	2.54
69	FR1 n7	40M	QPSK	1	1	DFT-SCS-15KHz	Back	15mm	Ant 3	DSI 0	507000	2535	20.55	21.50	1.245	-	-	-0.06	0.445	**0.554**	
	FR1 n41	100M	QPSK	135	69	DFT-SCS-30KHz	Back	15mm	Ant 3	DSI 0	518598	2592.99	19.68	21.10	1.387	-	-	0.02	0.561	0.778	2.37
70	FR1 n41	100M	QPSK	135	69	DFT-SCS-30KHz	Back	15mm	Ant 3	DSI 0	518598	2592.99	19.60	21.10	1.413	-	-	0.16	0.319	**0.451**	
	FR1 n41	100M	QPSK	135	69	DFT-SCS-30KHz	Back	15mm	Ant 0	DSI 0	518598	2592.99	22.42	24.00	1.439	-	-	-0.07	0.198	0.285	1.40
	FR1 n41	100M	QPSK	135	69	DFT-SCS-30KHz	Back	15mm	Ant 0	DSI 0	518598	2592.99	22.63	24.00	1.371	-	-	0.18	0.287	0.393	
	FR1 n41	100M	QPSK	135	69	DFT-SCS-30KHz	Back	15mm	Ant 5	DSI 0	518598	2592.99	20.34	21.30	1.247	-	-	-0.08	0.248	0.309	0.68
	FR1 n41	100M	QPSK	135	69	DFT-SCS-30KHz	Back	15mm	Ant 5	DSI 0	518598	2592.99	20.23	21.30	1.279	-	-	0.03	0.206	0.264	

	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Back	15mm	Ant 6	DSI 0	518598	2592.99	20.81	21.80	1.256	-	-	0.08	0.264	0.332	0.28
	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Back	15mm	Ant 6	DSI 0	518598	2592.99	20.73	21.80	1.279	-	-	0.18	0.277	0.354	
3500MHz																					
	LTE Band 42	20M	QPSK	1	0	-	Front	15mm	Ant 4	DSI 0	42590	3500	22.64	24.00	1.368	62.9	1.006	-0.05	0.367	0.505	0.08
71	LTE Band 42	20M	QPSK	1	0	-	Front	15mm	Ant 4	DSI 0	42590	3500	22.19	24.00	1.517	62.9	1.006	-0.04	0.325	**0.496**	
	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Front	15mm	Ant 2	DSI 0	656000	3840	22.73	23.80	1.279	-	-	-0.05	0.496	0.635	0.27
	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Front	15mm	Ant 2	DSI 0	656000	3840	22.68	23.80	1.294	-	-	-0.06	0.461	0.597	
	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Front	15mm	Ant 2	DSI 0	633334	3500.01	22.81	23.80	1.256	-	-	-0.05	0.285	0.358	0.89
	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Front	15mm	Ant 2	DSI 0	633334	3500.01	22.72	23.80	1.282	-	-	-0.09	0.228	0.292	
	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Back	15mm	Ant 3	DSI 0	656000	3840	19.38	20.60	1.324	-	-	0.09	0.236	0.313	0.42
	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Back	15mm	Ant 3	DSI 0	656000	3840	19.24	20.60	1.368	-	-	-0.05	0.252	0.345	
	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Back	15mm	Ant 3	DSI 0	633334	3500.01	19.27	20.60	1.358	-	-	-0.07	0.273	0.371	0.72
	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Back	15mm	Ant 3	DSI 0	633334	3500.01	19.19	20.60	1.384	-	-	-0.04	0.227	0.314	
	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Front	15mm	Ant 4	DSI 0	656000	3840	23.66	24.90	1.330	-	-	-0.02	0.443	0.589	0.84
	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Front	15mm	Ant 4	DSI 0	656000	3840	23.79	24.90	1.291	-	-	-0.2	0.376	0.485	
	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Front	15mm	Ant 4	DSI 0	633334	3500.01	23.48	24.90	1.387	-	-	-0.05	0.515	0.714	0.27
72	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Front	15mm	Ant 4	DSI 0	633334	3500.01	23.56	24.90	1.361	-	-	0.07	0.558	**0.760**	
	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Back	15mm	Ant 6	DSI 0	656000	3840	19.51	20.50	1.256	-	-	0.13	0.242	0.304	1.10
	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Back	15mm	Ant 6	DSI 0	656000	3840	19.44	20.50	1.276	-	-	-0.2	0.185	0.236	
	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Back	15mm	Ant 6	DSI 0	633334	3500.01	19.39	20.50	1.291	-	-	-0.03	0.181	0.234	1.65
	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Back	15mm	Ant 6	DSI 0	633334	3500.01	19.33	20.50	1.309	-	-	-0.07	0.122	0.160	

Plot No.	No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Deviation
2450MHz																		
	1st	WLAN2.4GHz	802.11b 1Mbps	Back	15mm	Ant 7+9(9)	Standalone Non DBS	11	2462	19.69	21.50	1.517	98.35	1.017	0.01	0.317	0.489	1.42
73	2nd	WLAN2.4GHz	802.11b 1Mbps	Back	15mm	Ant 7+9(9)	Standalone Non DBS	11	2462	19.67	21.50	1.524	98.35	1.017	-0.18	0.228	**0.353**	
	1st	WLAN2.4GHz	802.11b 1Mbps	Back	15mm	Ant 9	Standalone Non DBS	11	2462	19.69	21.50	1.517	98.35	1.017	0.06	0.229	0.353	0.45
	2nd	WLAN2.4GHz	802.11b 1Mbps	Back	15mm	Ant 9	Standalone Non DBS	11	2462	19.67	21.50	1.524	98.35	1.017	-0.18	0.205	0.318	
	1st	Bluetooth	1Mbps	Back	15mm	Ant 7	Full Power	39	2441	9.23	11.00	1.504	76.93	1.079	0.08	0.011	0.018	0.25
74	2nd	Bluetooth	1Mbps	Back	15mm	Ant 7	Full Power	39	2441	9.88	11.00	1.294	76.93	1.079	0.08	0.012	**0.017**	
5000MHz																		
	1st	WLAN5.3GHz	802.11a 6Mbps	Back	15mm	Ant 8+10(10)	Standalone Non DBS	64	5320	19.81	21.50	1.476	99.32	1.007	-0.08	0.473	0.703	1.68
75	2nd	WLAN5.3GHz	802.11a 6Mbps	Back	15mm	Ant 8+10(10)	Standalone Non DBS	64	5320	20.15	21.50	1.365	99.32	1.007	-0.07	0.754	**1.036**	
	1st	WLAN5.5GHz	802.11a 6Mbps	Back	15mm	Ant 8+10(10)	Standalone Non DBS	116	5580	18.81	20.50	1.476	99.32	1.007	0.01	0.742	1.103	0.03
76	2nd	WLAN5.5GHz	802.11a 6Mbps	Back	15mm	Ant 8+10(10)	Standalone Non DBS	116	5580	18.96	20.50	1.426	99.32	1.007	-0.09	0.763	**1.095**	
	1st	WLAN5.8GHz	802.11a 6Mbps	Back	15mm	Ant 8+10(10)	Standalone Non DBS	149	5745	18.35	20.00	1.462	99.32	1.007	-0.03	0.801	1.180	0.56
77	2nd	WLAN5.8GHz	802.11a 6Mbps	Back	15mm	Ant 8+10(10)	Standalone Non DBS	149	5745	19.08	20.00	1.236	99.32	1.007	-0.03	0.834	**1.038**	

Plot No.	No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured APD (W/m^2)	Deviation
6000MHz																			
	1st	WLAN6GHz	802.11ax-HE160 MCS0	Back	15mm	Ant 8+10(8)	Standalone Non DBS	15	6025	11.25	13.00	1.496	100	1.000	-0.08	0.159	0.238	1.42	0.19
94	2nd	WLAN6GHz	802.11ax-HE160 MCS0	Back	15mm	Ant 8+10(8)	Standalone Non DBS	15	6025	11.19	13.00	1.517	100	1.000	-0.01	0.150	**0.228**	**1.30**	

16.4 Product specific 10g SAR

Plot No.	No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)	Deviation
1750MHz																						
	1st	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Left Side	0mm	Ant 2	DSI 0	1312	1712.4	22.61	24.00	1.377	-	-	0.17	2.170	2.989	0.04
78	2nd	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Left Side	0mm	Ant 2	DSI 0	1312	1712.4	22.81	24.00	1.315	-	-	0.05	2.25	**2.959**	
	1st	LTE Band 66	20M	QPSK	1	0	-	Left Side	0mm	Ant 2	DSI 0	132072	1720	22.64	24.00	1.368	-	-	0.19	2.060	2.818	0.06
79	2nd	LTE Band 66	20M	QPSK	1	0	-	Left Side	0mm	Ant 2	DSI 0	132072	1720	22.84	24.00	1.306	-	-	0.01	2.13	**2.782**	
	1st	FR1 n66	40M	QPSK	1	1	DFT-SCS-15KHz	Left Side	0mm	Ant 2	DSI 0	349000	1745	22.81	24.00	1.315	-	-	0.04	2.300	3.025	0.69
80	2nd	FR1 n66	40M	QPSK	1	1	DFT-SCS-15KHz	Left Side	0mm	Ant 2	DSI 0	349000	1745	23.13	24.00	1.222	-	-	0.05	2.110	**2.578**	
1900MHz																						
	1st	WCDMA II	-	-	-	-	RMC 12.2Kbps	Left Side	0mm	Ant 2	DSI 0	9400	1880	22.46	24.00	1.426	-	-	-0.02	2.150	3.065	0.14
81	2nd	WCDMA II	-	-	-	-	RMC 12.2Kbps	Left Side	0mm	Ant 2	DSI 0	9400	1880	22.64	24.00	1.368	-	-	0.08	2.17	**2.968**	
	1st	LTE Band 2	20M	QPSK	1	0	-	Left Side	0mm	Ant 2	DSI 0	19100	1900	22.79	24.00	1.321	-	-	0.01	2.180	2.880	0.09
82	2nd	LTE Band 2	20M	QPSK	1	0	-	Left Side	0mm	Ant 2	DSI 0	19100	1900	22.84	24.00	1.306	-	-	0.07	2.16	**2.821**	
	1st	FR1 n2	20M	QPSK	50	28	DFT-SCS-15KHz	Left Side	0mm	Ant 2	DSI 0	380000	1900	22.41	23.70	1.346	-	-	0.02	2.290	3.082	0.22
83	2nd	FR1 n2	20M	QPSK	50	28	DFT-SCS-15KHz	Left Side	0mm	Ant 2	DSI 0	380000	1900	22.34	23.70	1.368	-	-	0.08	2.140	**2.927**	
2600MHz																						
	1st	LTE Band 7	20M	QPSK	1	0	-	Front	0mm	Ant 3	DSI 0	21350	2560	20.89	22.40	1.416	-	-	-0.17	2.210	3.129	0.45
84	2nd	LTE Band 7	20M	QPSK	1	0	-	Front	0mm	Ant 3	DSI 0	21350	2560	20.75	22.40	1.462	-	-	0.04	1.93	**2.822**	
	1st	LTE Band 41	20M	QPSK	1	0	-	Left Side	0mm	Ant 3	DSI 0	41490	2680	21.74	23.60	1.535	62.9	1.006	0.01	2.050	3.165	0.05
85	2nd	LTE Band 41	20M	QPSK	1	0	-	Left Side	0mm	Ant 3	DSI 0	41490	2680	21.64	23.60	1.570	62.9	1.006	0.15	1.98	**3.128**	
	1st	FR1 n7	40M	QPSK	1	1	DFT-SCS-15KHz	Left Side	0mm	Ant 3	DSI 0	507000	2535	20.55	21.50	1.245	-	-	0.01	2.480	3.086	0.83
86	2nd	FR1 n7	40M	QPSK	1	1	DFT-SCS-15KHz	Left Side	0mm	Ant 3	DSI 0	507000	2535	20.55	21.50	1.245	-	-	0.01	2.050	**2.551**	
	1st	FR1 n41	100M	QPSK	135	69	DFT-SCS-30KHz	Left Side	0mm	Ant 3	DSI 0	518598	2592.99	19.68	21.10	1.387	-	-	0.03	2.290	3.176	1.42
	2nd	FR1 n41	100M	QPSK	135	69	DFT-SCS-30KHz	Left Side	0mm	Ant 3	DSI 0	518598	2592.99	19.60	21.10	1.413	-	-	0.03	1.620	2.288	
	1st	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Bottom Side	0mm	Ant 5	DSI 0	518598	2592.99	20.55	21.30	1.189	-	-	0.05	2.550	3.031	0.43
	2nd	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Bottom Side	0mm	Ant 5	DSI 0	518598	2592.99	20.42	21.30	1.225	-	-	0.06	2.240	2.743	
	1st	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Left Side	0mm	Ant 6	DSI 0	518598	2592.99	20.81	21.80	1.256	-	-	0.04	2.440	3.065	0.25
87	2nd	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Left Side	0mm	Ant 6	DSI 0	518598	2592.99	20.73	21.80	1.279	-	-	0.03	2.260	**2.891**	
3500MHz																						
	1st	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Front	0mm	Ant 2	DSI 0	656000	3840	22.73	23.80	1.279	-	-	0.01	2.410	3.083	0.44
88	2nd	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Front	0mm	Ant 2	DSI 0	656000	3840	22.68	23.80	1.294	-	-	0.02	2.150	**2.783**	
	1st	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Left Side	0mm	Ant 3	DSI 0	656000	3840	19.38	20.60	1.324	-	-	0.02	1.620	2.145	0.45
	2nd	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Left Side	0mm	Ant 3	DSI 0	656000	3840	19.24	20.60	1.368	-	-	0.08	1.740	2.380	
	1st	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Left Side	0mm	Ant 3	DSI 0	633334	3500.01	19.27	20.60	1.358	-	-	0.09	2.270	3.083	0.62
	2nd	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Left Side	0mm	Ant 3	DSI 0	633334	3500.01	19.19	20.60	1.384	-	-	-0.05	1.930	2.670	
	1st	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Front	0mm	Ant 4	DSI 0	656000	3840	23.66	24.90	1.330	-	-	-0.09	1.860	2.475	0.42
	2nd	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Front	0mm	Ant 4	DSI 0	656000	3840	23.79	24.90	1.291	-	-	-0.01	2.110	2.724	
	1st	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Left Side	0mm	Ant 6	DSI 0	656000	3840	19.51	20.50	1.256	-	-	0.03	2.040	2.562	2.65
	2nd	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Left Side	0mm	Ant 6	DSI 0	656000	3840	19.44	20.50	1.276	-	-	-0.06	1.090	1.391	
	1st	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Left Side	0mm	Ant 6	DSI 0	633334	3500.01	19.54	20.50	1.247	-	-	0.03	2.430	3.031	1.38
	2nd	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Left Side	0mm	Ant 6	DSI 0	633334	3500.01	19.44	20.50	1.276	-	-	0.05	1.730	2.208	

Plot No.	No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)	Deviation
2450MHz																		
	1st	WLAN2.4GHz	802.11b 1Mbps	Top Side	0mm	Ant 7+9(7)	Standalone Non DBS	1	2412	19.52	21.00	1.406	98.35	1.017	0.01	2.210	3.160	0.71
89	2nd	WLAN2.4GHz	802.11b 1Mbps	Top Side	0mm	Ant 7+9(7)	Standalone Non DBS	1	2412	19.50	21.00	1.413	98.35	1.017	0.02	1.87	**2.686**	
5000MHz																		
	1st	WLAN5.3GHz	802.11a 6Mbps	Right Side	0mm	Ant 8+10(8)	Standalone Non DBS	64	5320	19.81	21.50	1.476	99.32	1.007	-0.02	1.790	2.660	0.01
90	2nd	WLAN5.3GHz	802.11a 6Mbps	Right Side	0mm	Ant 8+10(8)	Standalone Non DBS	64	5320	20.15	21.50	1.365	99.32	1.007	0.02	1.930	**2.652**	
	1st	WLAN5.5GHz	802.11a 6Mbps	Top Side	0mm	Ant 8+10(10)	Standalone Non DBS	124	5620	18.72	20.50	1.507	99.32	1.007	0.02	1.950	2.959	0.62
91	2nd	WLAN5.5GHz	802.11a 6Mbps	Top Side	0mm	Ant 8+10(10)	Standalone Non DBS	124	5620	18.87	20.50	1.455	99.32	1.007	0.09	1.750	**2.565**	
	1st	WLAN5.8GHz	802.11a 6Mbps	Back	0mm	Ant 8+10(10)	Standalone Non DBS	149	5745	18.35	20.00	1.462	99.32	1.007	0.11	1.270	1.870	0.07
92	2nd	WLAN5.8GHz	802.11a 6Mbps	Back	0mm	Ant 8+10(10)	Standalone Non DBS	149	5745	19.08	20.00	1.236	99.32	1.007	-0.06	1.480	**1.842**	

Plot No.	No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)	Measured APD (W/m^2)	Deviation
6000MHz																			
	1st	WLAN6GHz	802.11ax-HE160 MCS0	Back	0mm	Ant 8+10(8)	Standalone Non DBS	15	6025	11.25	13.00	1.496	100	1.000	0.18	0.290	0.434	5.83	2.31
95	2nd	WLAN6GHz	802.11ax-HE160 MCS0	Back	0mm	Ant 8+10(8)	Standalone Non DBS	15	6025	11.19	13.00	1.517	100	1.000	0.08	0.168	**0.255**	**3.98**	

Plot No.	No.	Band	Mode	Test Position	Gap (mm)	Freq. (MHz)	Power Drift (dB)	Measured 10g SAR (W/kg)	Deviation
13MHz									
	1st	NFC	ASK	Back	0mm	13.56	-0.04	0.076	0.55
96	2nd	NFC	ASK	Back	0mm	13.56	0.04	**0.067**	

16.5 Repeated SAR Measurement

<1g>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Ratio	Reported 1g SAR (W/kg)
1st	FR1 n71	20M	QPSK	1	1	DFT-SCS-15KHz	Right Cheek	0mm	Ant 0	DSI 2	136100	680.5	21.89	22.70	1.205	-	-	0.05	0.874	1	1.053
2nd	FR1 n71	20M	QPSK	1	1	DFT-SCS-15KHz	Right Cheek	0mm	Ant 0	DSI 2	136100	680.5	21.89	22.70	1.205	-	-	0.01	0.861	1.015	1.038
1st	FR1 n26	20M	QPSK	50	28	DFT-SCS-15KHz	Right Cheek	0mm	Ant 0	DSI 2	166300	831.5	22.34	23.20	1.219	-	-	-0.09	0.889	1	1.084
2nd	FR1 n26	20M	QPSK	50	28	DFT-SCS-15KHz	Right Cheek	0mm	Ant 0	DSI 2	166300	831.5	22.34	23.20	1.219	-	-	-0.09	0.845	1.052	1.030
1st	LTE Band 42	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 4	DSI 2	42990	3540	16.08	17.00	1.236	62.9	1.006	0.07	0.807	1	1.003
2nd	LTE Band 42	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 4	DSI 2	42990	3540	16.08	17.00	1.236	62.9	1.006	0.07	0.801	1.007	0.996
1st	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Left Cheek	0mm	Ant 4	DSI 2	656000	3840	15.63	16.20	1.140	-	-	0.08	0.951	1	1.084
2nd	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Left Cheek	0mm	Ant 4	DSI 2	656000	3840	15.63	16.20	1.140	-	-	-0.02	0.923	1.030	1.052
1st	WLAN5.3GHz	-	-	-	-	802.11ac-VHT160 MCS0	Left Cheek	0mm	Ant 8+10(10)	Standalone Non DBS	50	5250	13.88	15.00	1.294	100	1.000	-0.12	0.814	1	1.053
2nd	WLAN5.3GHz	-	-	-	-	802.11ac-VHT160 MCS0	Left Cheek	0mm	Ant 8+10(10)	Standalone Non DBS	50	5250	13.88	15.00	1.294	100	1.000	-0.09	0.802	1.015	1.038
1st	WLAN5.5GHz	-	-	-	-	802.11ac-VHT80 MCS0	Left Cheek	0mm	Ant 8+10(8)	Standalone Non DBS	155	5775	15.84	16.50	1.164	100	1.000	-0.05	0.843	1	0.981
2nd	WLAN5.5GHz	-	-	-	-	802.11ac-VHT80 MCS0	Left Cheek	0mm	Ant 8+10(8)	Standalone Non DBS	155	5775	15.84	16.50	1.164	100	1.000	0.02	0.827	1.019	0.963
1st	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Left Side	10mm	Ant 2	DSI 1	1413	1732.6	22.53	23.10	1.140	-	-	0.02	0.954	1	1.088
2nd	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Left Side	10mm	Ant 2	DSI 1	1413	1732.6	22.53	23.10	1.140	-	-	0.02	0.931	1.025	1.062
1st	LTE Band 2	20M	QPSK	1	0	-	Left Side	10mm	Ant 2	DSI 1	18700	1860	20.70	21.70	1.259	-	-	0.19	0.907	1	1.142
2nd	LTE Band 2	20M	QPSK	1	0	-	Left Side	10mm	Ant 2	DSI 1	18700	1860	20.70	21.70	1.259	-	-	-0.01	0.862	1.052	1.085
1st	LTE Band 7	20M	QPSK	1	0	-	Left Side	10mm	Ant 3	DSI 1	21350	2560	20.28	20.90	1.153	-	-	0.08	0.941	1	1.085
2nd	LTE Band 7	20M	QPSK	1	0	-	Left Side	10mm	Ant 3	DSI 1	21350	2560	20.28	20.90	1.153	-	-	-0.02	0.923	1.020	1.065

<10g>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Ratio	Reported 10g SAR (W/kg)
1st	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Left Side	0mm	Ant 2	DSI 0	1312	1712.4	22.81	24.00	1.315	0.05	2.25	1	2.959
2nd	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Left Side	0mm	Ant 2	DSI 0	1312	1712.4	22.81	24.00	1.315	0.02	2.12	1.061	2.788
1st	WCDMA II	-	-	-	-	RMC 12.2Kbps	Left Side	0mm	Ant 2	DSI 0	9400	1880	22.64	24.00	1.368	0.08	2.17	1	2.968
2nd	WCDMA II	-	-	-	-	RMC 12.2Kbps	Left Side	0mm	Ant 2	DSI 0	9400	1880	22.64	24.00	1.368	0.02	2.06	1.053	2.818
1st	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Left Side	0mm	Ant 6	DSI 0	518598	2592.99	20.73	21.80	1.279	0.03	2.260	1	2.891
2nd	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Left Side	0mm	Ant 6	DSI 0	518598	2592.99	20.73	21.80	1.279	0.09	2.150	1.051	2.751
1st	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Front	0mm	Ant 2	DSI 0	656000	3840	22.68	23.80	1.294	0.02	2.150	1	2.783
2nd	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Front	0mm	Ant 2	DSI 0	656000	3840	22.68	23.80	1.294	-0.09	2.070	1.039	2.679

General Note:

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

17. Simultaneous Transmission Analysis

No.	Simultaneous Transmission Configurations	Portable Handset			
		Head	Body-worn	Hotspot	Product specific 10g SAR
1.	WLAN2.4GHz+ Bluetooth	Yes	Yes	Yes	Yes
2.	WLAN5GHz+ Bluetooth	Yes	Yes	Yes	Yes
3.	WLAN6GHz+ Bluetooth	Yes	Yes	Yes	Yes
4.	WLAN2.4GHz+ WLAN5GHz	Yes	Yes	Yes	Yes
5.	WLAN2.4GHz+ WLAN6GHz	Yes	Yes		Yes
6.	WLAN2.4GHz+ WLAN5GHz + Bluetooth	Yes	Yes	Yes	Yes
7.	WLAN2.4GHz+ WLAN6GHz + Bluetooth	Yes	Yes		Yes
8.	WWAN + WLAN2.4GHz+ Bluetooth	Yes	Yes	Yes	Yes
9.	WWAN + WLAN5GHz+ Bluetooth	Yes	Yes	Yes	Yes
10.	WWAN + WLAN6GHz+ Bluetooth	Yes	Yes		Yes
11.	WWAN + WLAN2.4GHz+ WLAN5GHz	Yes	Yes	Yes	Yes
12.	WWAN + WLAN2.4GHz+ WLAN6GHz	Yes	Yes		Yes
13.	WWAN + WLAN2.4GHz+ WLAN5GHz + Bluetooth	Yes	Yes	Yes	Yes
14.	WWAN + WLAN2.4GHz+ WLAN6GHz + Bluetooth	Yes	Yes		Yes
15.	WLAN2.4GHz+ Bluetooth+ NFC				Yes
16.	WLAN5GHz+ Bluetooth+ NFC				Yes
17.	WLAN6GHz+ Bluetooth+ NFC				Yes
18.	WLAN2.4GHz+ WLAN5GHz+ NFC				Yes
19.	WLAN2.4GHz+ WLAN6GHz+ NFC				Yes
20.	WLAN2.4GHz+ WLAN5GHz + Bluetooth+ NFC				Yes
21.	WLAN2.4GHz+ WLAN6GHz + Bluetooth+ NFC				Yes
22.	WWAN + WLAN2.4GHz+ Bluetooth+ NFC				Yes
23.	WWAN + WLAN5GHz+ Bluetooth+ NFC				Yes
24.	WWAN + WLAN6GHz+ Bluetooth+ NFC				Yes
25.	WWAN + WLAN2.4GHz+ WLAN5GHz+ NFC				Yes
26.	WWAN + WLAN2.4GHz+ WLAN6GHz+ NFC				Yes
27.	WWAN + WLAN2.4GHz+ WLAN5GHz + Bluetooth+ NFC				Yes
28.	WWAN + WLAN2.4GHz+ WLAN6GHz + 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 and EN-DC combination.
3. The 2.4GHz/5GHz/6GHz WLAN can transmit in SISO/MIMO antenna mode and MIMO SAR can represent SISO SAR.
4. EUT will choose each GSM, WCDMA, LTE and 5GNR according to the network signal condition; therefore, they will not operate simultaneously at any moment.
5. 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.
6. This device 2.4GHz WLAN support hotspot operation and Bluetooth support tethering applications.
7. 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 WLAN supports WLAN Direct (GC only).
8. The worst case 5 GHz WLAN SAR for each configuration was used for SAR summation.
9. According to the EUT characteristic, WLAN 2.4GHz Chain 0 and Bluetooth share the same antenna path and cannot transmit simultaneously, WLAN 2.4GHz Chain 1 and Bluetooth can transmit simultaneously.
10. According to the EUT characteristic, WLAN 5GHz/6GHz and Bluetooth can transmit simultaneously.
11. According to the EUT characteristic, WLAN 5GHz/6GHz and WLAN 2.4GHz can transmit simultaneously.
12. NFC can transmit simultaneously with other Radios in extremity exposure condition.
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.
16. The WLAN6GHz Sim-Tx analysis guidance with other transmitters was based on SAR test results. The simultaneous transmission and test exemption analysis were compliant with KDB 447498 D01. For the device does not support FR2 or other MPE field measurement, therefore section 17 in the SAR report has no TER analysis according to KDB 987594 requirement.

17.1 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.

17.2 MIMO SAR Test condition and verification

General Note:

1. Smart Transmit EFS v20 (or lower) uses SISO Plimit to calculate RF exposure from MIMO transmission scenario. Therefore, if MIMO is supported for WWAN technologies (including 5G sub6 NR), below procedure should be performed for validity of Smart Transmit operation:
   1) Below procedure should also be performed for Smart Transmit EFS v21 (or higher) if MIMO Plimit is not populated in the EFS but MIMO operation is supported for antennas belonging to the same antenna group (refer to Section 4.2.5 of of Qualcomm's document 80-W2112-4).
2. Measure SAR for supported MIMO scenarios in FTM mode with each of the MIMO antennas set to transmit continuously at *Ptest* = minimum {*Plimit(i), Pmax(i); i*=1 to *n* MIMO antennas}, where *Plimit(i)* is the power level entered in the Smart Transmit EFS for antenna *i* under the corresponding tech/band/DSI. For Smart Transmit to ensure the compliance in MIMO transmission scenario, the below criteria should be met for measured MIMO SAR (i.e., highest peak spatial-average SAR from the measurement):

$$reported\ SAR_{MIMO} = Measured\ MIMO\ SAR_{MIMO}\ at\ (\ P_{test}\ + device\ total\ uncertainty\ ) \leq calc.SAR$$

   Where $calc.SAR\ = \sum_{i=1}^{n}\left[SAR\_design\_target\ * 10^{\left(\frac{total\ uncertainty + P_{test} - P_{limit}(i) - backoff(i)}{10}\right)}\right]$

   Here,

   - *n* is number of MIMO antennas (in case of 2x2MIMO, n=2).
   - *Plimit(i)* is EFS *Plimit* for antenna *i* ϵ MIMO for a given tech/band/DSI. *Plimit* corresponds to *SAR_design_target.*
   - *backoff(i)* is backoff from *SAR_design_target* used for the *i*th antenna's *Plimit* to meet TER with external radios (i.e., radios outside of Smart Transmit control). If EFS *Plimit* of antenna *i* corresponds to *SAR_design_target*, then *backoff(i)* = 0 in the above equation.
   - *Ptest* (i.e., power level used for MIMO SAR measurement, MIMO.SAR @*Ptest*) = min {*Plimit(i)*, Pmax*(i)*, *i* = 1 to n MIMO antenna}. To further clarify, *Ptest* = min {*Plimit(i), SISO.Pmax(i)*, *MIMO.Pmax*, *i*= 1 to n antenna ϵ MIMO}, where, *Plimit* corresponds to *SAR_design_target*; *SISO.Pmax* and *MIMO.Pmax* correspond to the maximum output power (nominal levels without device uncertainty) that device is capable; here, *Ptest* is nominal power level, not measured level.
3. If the $reported\ SARMIMO$ does not meet the above condition, then *Plimit(i)* for each of the MIMO antenna in the Smart Transmit EFS should be reduced by *10*log10[*$reported\ SARMIMO$ */calc.SAR]* dB.
4. Per Qualcomm's document guideline, 5GNR FR1 MIMO Plimit is not populated in the EFS file, but MIMO operation is supported for antennas belonging to the same antenna group, the detail 5GNR FR1 MIMO analysis results please referred to appendix G.

Conclusion:

1. The Spot check results from chapter 16.1 to 16.4, showed that Deviation of the SAR results did not exceed 3dB, SAR data reuse is justified.
2. For simultaneously transmission SAR analysis, Simultaneous transmission analysis for the WWAN/WLAN/BT bands and each position are based on max SAR results chosen between the original SAR results (Sporton SAR report no.: FA460508) and Spot check results.

17.3 Head Exposure Conditions

WWAN Band	Exposure Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
		WWAN	WLAN2.4GHz Ant 9 Standalone Non DBS	WLAN2.4GHz Ant 9 Standalone DBS only	WLAN2.4GHz Ant 9 Simultaneous Non DBS	WLAN2.4GHz Ant 9 Simultaneous DBS	WLAN2.4GHz Ant 7+9 Standalone Non DBS	WLAN2.4GHz Ant 7+9 Standalone DBS only	WLAN2.4GHz Ant 7+9 Simultaneous Non DBS	WLAN2.4GHz Ant 7+9 Simultaneous DBS	WLAN5GHz Ant 8+10 Standalone Non DBS	WLAN5GHz Ant 8+10 Standalone DBS only	WLAN5GHz Ant 8+10 Simultaneous Non DBS	WLAN5GHz Ant 8+10 Simultaneous DBS	Bluetooth Ant 7	WLAN6GHz Ant 8+10 Standalone Non DBS	WLAN6GHz Ant 8+10 Standalone DBS only	WLAN6GHz Ant 8+10 Simultaneous Non DBS	WLAN6GHz Ant 8+10 Simultaneous DBS
		1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)
All Bands	Right Cheek	1.094	1.126	0.524	0.382	0.197	1.181	0.569	0.390	0.186	0.444	0.561	0.336	0.188	0.064	0.484	0.552	0.331	0.180
	Right Tilted	1.037	0.086	0.524	0.382	0.197	0.887	0.569	0.390	0.186	0.414	0.561	0.336	0.188	0.070	0.614	0.552	0.331	0.180
	Left Cheek	1.096	0.466	0.524	0.382	0.197	0.999	0.569	0.390	0.186	1.100	0.561	0.336	0.188	0.108	0.819	0.552	0.331	0.180
	Left Tilted	0.737	0.115	0.524	0.382	0.197	0.986	0.569	0.390	0.186	0.783	0.561	0.336	0.188	0.116	0.718	0.552	0.331	0.180

WWAN Band	Exposure Position	2+14	10+14	15+14	7+11	7+16	3+11+14	3+16+14	1+8	1+12+14	1+17+14	1+4+14	1+9+13	1+9+18	1+5+13+14	1+5+18+14
		Summed	Summed	Summed	Summed	Summed	Summed	Summed	Summed	Summed	Summed	Summed	Summed	Summed	Summed	Summed
		1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)
All Bands	Right Cheek	1.19	0.51	0.55	1.13	1.12	1.15	1.14	1.48	1.49	1.49	1.54	1.47	1.46	1.54	1.54
	Right Tilted	0.16	0.48	0.68	1.13	1.12	1.16	1.15	1.43	1.44	1.44	1.49	1.41	1.40	1.49	1.48
	Left Cheek	0.57	1.21	0.93	1.13	1.12	1.19	1.18	1.49	1.54	1.54	1.59	1.47	1.46	**1.59**	**1.58**
	Left Tilted	0.23	0.90	0.83	1.13	1.12	1.20	1.19	1.13	1.19	1.18	1.24	1.11	1.10	1.24	1.23

17.4 Hotspot Exposure Conditions

WWAN Band	Exposure Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14
		WWAN	WLAN2.4GHz Ant 9 Standalone Non DBS	WLAN2.4GHz Ant 9 Standalone DBS only	WLAN2.4GHz Ant 9 Simultaneous Non DBS	WLAN2.4GHz Ant 9 Simultaneous DBS	WLAN2.4GHz Ant 7+9 Standalone Non DBS	WLAN2.4GHz Ant 7+9 Standalone DBS only	WLAN2.4GHz Ant 7+9 Simultaneous Non DBS	WLAN2.4GHz Ant 7+9 Simultaneous DBS	WLAN5GHz Ant 8+10 Standalone Non DBS	WLAN5GHz Ant 8+10 Standalone DBS only	WLAN5GHz Ant 8+10 Simultaneous Non DBS	WLAN5GHz Ant 8+10 Simultaneous DBS	Bluetooth Ant 7
		1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)
All Bands	Front	1.089	0.586	0.586	0.371	0.168	0.403	0.558	0.375	0.180	0.753	0.545	0.380	0.193	0.002
	Back	1.088	0.693	0.693	0.371	0.168	0.520	0.558	0.375	0.180	1.088	0.545	0.380	0.193	0.024
	Left side	1.181			0.371	0.168	0.159	0.558	0.375	0.180	0.241	0.545	0.380	0.193	0.002
	Right side	0.799	0.799	0.799	0.371	0.168	0.654	0.558	0.375	0.180	0.709	0.545	0.380	0.193	0.002
	Top side	1.144			0.371	0.168	1.144	0.558	0.375	0.180	0.929	0.545	0.380	0.193	0.034
	Bottom side	1.088	0.097	0.097	0.371	0.168									

WWAN Band	Exposure Position	2+14	10+14	7+11	3+11+14	1+8	1+12+14	1+4+14	1+9+13	1+5+13+14	1+14
		Summed	Summed	Summed	Summed	Summed	Summed	Summed	Summed	Summed	Summed
		1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)
All Bands	Front	0.59	0.76	1.10	1.13	1.46	1.47	1.46	1.46	1.45	1.09
	Back	0.72	1.11	1.10	1.26	1.46	1.49	1.48	1.46	1.47	1.11
	Left side	0.00	0.24	1.10	0.55	1.56	1.56	1.55	1.55	1.54	1.18
	Right side	0.80	0.71	1.10	1.35	1.17	1.18	1.17	1.17	1.16	0.80
	Top side	0.03	0.96	1.10	0.58	1.52	1.56	1.55	1.52	1.54	1.18
	Bottom side	0.10	0.00	0.00	0.10	1.09	1.09	1.46	1.09	1.26	1.09

17.5 Body-Worn Accessory Exposure Conditions

WWAN Band	Exposure Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
		WWAN	WLAN2.4GHz Ant 9 Standalone Non DBS	WLAN2.4GHz Ant 9 Standalone DBS only	WLAN2.4GHz Ant 9 Simultaneous Non DBS	WLAN2.4GHz Ant 9 Simultaneous DBS	WLAN2.4GHz Ant 7+9 Standalone Non DBS	WLAN2.4GHz Ant 7+9 Standalone DBS only	WLAN2.4GHz Ant 7+9 Simultaneous Non DBS	WLAN2.4GHz Ant 7+9 Simultaneous DBS	WLAN5GHz Ant 8+10 Standalone Non DBS	WLAN5GHz Ant 8+10 Standalone DBS only	WLAN5GHz Ant 8+10 Simultaneous Non DBS	WLAN5GHz Ant 8+10 Simultaneous DBS	Bluetooth Ant 7	WLAN6GHz Ant 8+10 Standalone Non DBS	WLAN6GHz Ant 8+10 Standalone DBS only	WLAN6GHz Ant 8+10 Simultaneous Non DBS	WLAN6GHz Ant 8+10 Simultaneous DBS
		1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)
All Bands	Front	0.953	0.313	0.156	0.156	0.156	0.410	0.196	0.196	0.196	0.470	0.547	0.398	0.183	0.002	0.072	0.072	0.072	0.072
	Back	0.994	0.353	0.156	0.156	0.156	0.489	0.196	0.196	0.196	1.180	0.547	0.398	0.183	0.022	0.238	0.238	0.238	0.238

WWAN Band	Exposure Position	2+14	10+14	15+14	7+11	7+16	3+11+14	3+16+14	1+8	1+12+14	1+17+14	1+4+14	1+9+13	1+9+18	1+5+13+14	1+5+18+14	1+14	1+5+18
		Summed	Summed	Summed	Summed	Summed	Summed	Summed	Summed	Summed	Summed	Summed	Summed	Summed	Summed	Summed	Summed	Summed
		1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)
All Bands	Front	0.32	0.47	0.07	0.74	0.27	0.71	0.23	1.15	1.35	1.03	1.11	1.33	1.22	1.29	1.18	0.96	1.18
	Back	0.38	1.20	0.26	0.74	0.43	0.73	0.42	1.19	1.41	1.25	1.17	1.37	1.43	1.36	1.41	1.02	1.39

17.6 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.

WWAN Band	Exposure Position	1	2	3	4	5	6	7	8	9	10	11	12	13	15
		WWAN	WLAN2.4GHz Ant 7+9 Standalone Non DBS	WLAN2.4GHz Ant 7+9 Standalone DBS only	WLAN2.4GHz Ant 7+9 Simultaneous Non DBS	WLAN2.4GHz Ant 7+9 Simultaneous DBS	WLAN5GHz Ant 8+10 Standalone Non DBS	WLAN5GHz Ant 8+10 Standalone DBS only	WLAN5GHz Ant 8+10 Simultaneous Non DBS	WLAN5GHz Ant 8+10 Simultaneous DBS	WLAN6GHz Ant 8+10 Standalone Non DBS	WLAN6GHz Ant 8+10 Standalone DBS only	WLAN6GHz Ant 8+10 Simultaneous Non DBS	WLAN6GHz Ant 8+10 Simultaneous DBS	NFC
		10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)
All Bands	Front	3.129	3.160	1.493	0.809	0.349	1.336	1.511	0.812	0.465	0.172	0.172	0.172	0.172	0.002
	Back	2.670	3.160	1.493	0.809	0.349	2.670	1.511	0.812	0.465	0.434	0.434	0.434	0.434	0.076
	Left side	3.176	3.160	1.493	0.809	0.349	0.397	1.511	0.812	0.465	0.049	0.049	0.049	0.049	0.001
	Right side	2.660	3.160	1.493	0.809	0.349	2.660	1.511	0.812	0.465	0.121	0.121	0.121	0.049	0.001
	Top side	3.160	3.160	1.493	0.809	0.349	2.959	1.511	0.812	0.465	0.311	0.311	0.311	0.311	0.001
	Bottom side	3.031													0.001

WWAN Band	Exposure Position	6+15	3+7+15	3+11+15	1+4+15	1+8+15	1+12+15	1+5+9+15	1+5+13+15	2+15	10+15
		Summed	Summed	Summed	Summed	Summed	Summed	Summed	Summed	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)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)
All Bands	Front	1.34	3.01	1.67	3.94	3.94	3.30	3.95	3.65	3.16	0.17
	Back	2.75	3.08	2.00	3.56	3.56	3.18	3.56	3.53	3.24	0.51
	Left side	0.40	3.01	1.54	3.99	3.99	3.23	**3.99**	3.58	3.16	0.05
	Right side	2.66	3.01	1.62	3.47	3.47	2.78	3.48	3.06	3.16	0.12
	Top side	2.96	3.01	1.81	3.97	3.97	3.47	3.98	**3.82**	3.16	0.31
	Bottom side	0.00	0.00	0.00	3.03	3.03	3.03	3.03	3.03	0.00	0.00

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

18. 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.

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%**

19. 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] 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

[5] SPEAG DASY System Handbook

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

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

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

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

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

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

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

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

[15] FCC KDB 484596 D01 v02r03, “Test Reductions Via Data Referencing”, Mar. 2024

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