FCC SAR Test Report

APPLICANT	: Motorola Mobility LLC
EQUIPMENT	: Mobile Cellular Phone
BRAND NAME	: Motorola
MODEL NAME	: XT2435-2
FCC ID	: IHDT56AM5
STANDARD	: FCC 47 CFR Part 2 (2.1093)

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

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

Si Zhang

Approved by: Si Zhang

ACCREDITED
Cert #5145.02

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

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA352916-19	Rev. 01	Initial issue of report.	Jun. 21, 2024
FA352916-19	Rev. 02	1. Update 5G NR table in section 4.1; 2. Added LTE Anchor Bands for n77 in section 4.3; 3. Added note 1), 2) on page55 in section 15.	Jun. 25, 2024

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **Motorola Mobility LLC, Mobile Cellular Phone, XT2435-2,** are as follows.

Highest 1g SAR Summary						
Equipment Class	Frequency Band		Head (Separation 0mm)	Hotspot (Separation 5mm)	Body-worn (Separation 5mm)	Highest Simultaneous Transmission 1g SAR (W/kg)
			1g SAR (W/kg)			
Licensed	GSM	GSM850	0.24	1.14	0.77	1.59
		GSM1900	<0.10	0.95	0.80	
	WCDMA	WCDMA II	<0.10	0.77	1.06	
		WCDMA V	0.28	1.02	1.01	
	LTE	LTE Band 2	0.11	0.706	0.89	
		LTE Band 7	0.49	0.81	0.81	
		LTE Band 26/5	0.24	0.89	0.89	
		LTE Band 66	0.68	0.94	0.87	
		LTE Band 41/38	0.71	**1.26**	**1.26**	
		LTE Band 42	0.75	0.62	0.70	
	5G NR	FR1 n7	0.42	0.96	0.95	
		FR1 n26/5	0.17	0.79	0.76	
		FR1 n41/38	0.59	0.39	0.61	
		FR1 n77/78	0.65	0.83	1.08	
DTS	WLAN	2.4GHz WLAN	0.72	0.58	1.15	1.59
NII		5GHz WLAN	**1.02**	0.70	1.15	1.59
DSS	Bluetooth	2.4GHz Bluetooth	0.45	0.33	0.22	1.59

Highest 10g SAR Summary				
Equipment Class	Frequency Band		Product Specific 10g SAR (W/kg) (Separation 0mm)	Highest Simultaneous Transmission 10g SAR (W/kg)
Licensed	GSM	GSM850	**3.31**	3.69
		GSM1900	2.93	
	WCDMA	WCDMA II	2.99	
		WCDMA V	1.58	
	LTE	LTE Band 2	1.93	
		LTE Band 7	2.20	
		LTE Band 66	2.81	
		LTE Band 41/38	1.83	
		LTE Band 42	1.90	
	5G NR	FR1 n7	1.31	
		FR1 n41/38	1.84	
		FR1 n77/78	2.50	
DTS	WLAN	2.4GHz WLAN	1.58	3.69
NII		5GHz WLAN	1.90	3.69
DXX	NFC	13.56MHz	<0.10	3.69
Date of Testing:			2024/5/28 ~ 2024/6/5	

Remark:

1. This device supports LTE B5/B38 and B26/B41. Since the supported frequency span for LTE 5/B38 falls completely within the supports frequency span for LTE B26/B41, both LTE bands have the same target power, and both LTE bands share the same transmission path; therefore, SAR was only assessed for LTE B26/B41.
2. This device supports FR1 n5 / n38 / n78 and FR1 n26 / n41 / n77. Since the supported frequency span for FR1 n5 / n38 / n78 falls completely within the supports frequency span for FR1 n26 / n41 / n77, both FR1 bands have the same target power, and both FR1 bands share the same transmission path; therefore, SAR was only assessed for FR1 n26 / n41 / n77.
3. This is a variant report for XT2435-2, the difference is that please refer to the XT2435-2_Operational Description of Product Equality Declaration exhibit submitted. According to the difference, only enabled WLAN2.4G 802.11n HT40 and LTE Band 66 via software, the following bands performed full SAR testing, all other bands only worst cases from original test report (Sporton Report Number FA352916-01) were verified for the differences.

Exposure Condition	Full Test Bands
Head	LTE Band 66, WLAN 5.8GHz
Hotspot	GSM850, LTE Band 66, 5G NR n77 ant 2, WLAN 5.8GHz
Body worn	LTE Band 66, 5G NR n77 ant 7, WLAN 5.3GHz/5.8GHz
Extremity	GSM850, LTE Band 66, 5G NR n77 ant 7, WLAN 5.8GHz

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, SAR07-KS,	CN1257	314309

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

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

3. Guidance Applied

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

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2013
- IEC/IEEE 62209-1528:2020
- FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
- FCC KDB 865664 D02 SAR Reporting v01r02
- FCC KDB 447498 D01 General RF Exposure Guidance v06
- FCC KDB 648474 D04 SAR Evaluation Considerations for Wireless Handsets v01r03
- FCC KDB 248227 D01 802.11 Wi-Fi SAR v02r02
- FCC KDB 616217 D04 SAR for laptop and tablets v01r02
- FCC KDB 941225 D01 3G SAR Procedures v03r01
- FCC KDB 941225 D05 SAR for LTE Devices v02r05
- FCC KDB 941225 D05A Rel.10 LTE SAR Test Guidance v01r02
- FCC KDB 941225 D06 Hotspot Mode SAR v02r01

4. Equipment Under Test (EUT) Information

4.1 General Information

Product Feature & Specification	
Equipment Name	Mobile Cellular Phone
Brand Name	Motorola
Model Name	XT2435-2
FCC ID	IHDT56AM5
IMEI Code	Sample 1: IMEI 1: 352159390003174 IMEI 2: 352159390003182 Sample 2: IMEI 1: 352159390007456 IMEI 2: 352159390007464 Sample 3: IMEI 1: 352159390004834 IMEI 2: 352159390004842
Wireless Technology and Frequency Range	GSM850: 824 MHz ~ 849 MHz GSM1900: 1850 MHz ~ 1910 MHz WCDMA Band II: 1850 MHz ~ 1910 MHz WCDMA Band V: 824 MHz ~ 849 MHz LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 26: 814 MHz ~ 849 MHz LTE Band 66: 1710 MHz ~ 1780 MHz LTE Band 38: 2570 MHz ~ 2620 MHz LTE Band 41: 2496 MHz ~ 2690 MHz LTE Band 42: 3450 MHz ~ 3550 MHz 5G NR n5 : 824 MHz ~ 849 MHz 5G NR n7 : 2500 MHz ~ 2570 MHz 5G NR n26 : 814 MHz ~ 849 MHz 5G NR n38 : 2570 MHz ~ 2620 MHz 5G NR n41 : 2496 MHz ~ 2690 MHz 5G NR n77 : 3700 MHz ~ 3980 MHz 5G NR n78 : 3700 MHz ~ 3800 MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5720 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz NFC: 13.56 MHz
Mode	GSM/GPRS/EGPRS AMR / RMC 12.2Kbps HSDPA HSUPA DC-HSDPA HSPA+ (16QAM uplink is supported) LTE: QPSK, 16QAM, 64QAM 5G NR : CP-OFDM / DFT-s-OFDM, PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM WLAN 2.4GHz : 802.11b/g/n HT20/HT40 WLAN 5GHz : 802.11a/n/ac HT20/HT40/VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE NFC:ASK
HW Version	DVT1
SW Version	U3UT34.4
GSM / (E)GPRS Transfer mode	Class B – EUT cannot support Packet Switched and Circuit Switched Network simultaneously but can automatically switch between Packet and Circuit Switched Network.

EUT Stage	Identical Prototype

Remark:

1. This device supports VoIP in GPRS, EGPRS, WCDMA and LTE (e.g. for 3rd-party VoIP), LTE supports VoLTE operation.
2. This device 2.4GHz WLAN support hotspot operation and Bluetooth support tethering applications.
3. This device 5.2GHz WLAN/5.8GHz WLAN support hotspot operation, and 5.2GHz WLAN/5.8GHz WLAN supports WiFi Direct (GC/GO), and 5.3GHz / 5.5GHz supports WiFi Direct (GC only).
4. This device does not support DTM operation and supports GPRS/EGPRS mode up to multi-slot class 12.
5. There are two different types of EUT. They all are dual SIM card mobile: one is all P-SIM; the other is P-SIM + eSIM. The others are the same including circuit design, PCB board, structure and all components, so chose dual SIM card mobile to perform all tests. The WWAN radio transmission will be enabled by either one SIM at a time (single active).
6. The device implements Proximity sensors/receiver detect mechanism/hotspot trigger reduced power for the power management for SAR compliance at different exposure conditions (head, body-worn, hotspot, extremity). The device will invoke corresponding work scenarios power level base on frequency bands/antennas, which can refer to appendix E. power table.
7. For WLAN when transmit simultaneous with WWAN, power reduction will be activated to head. For WLAN when transmit simultaneous with WWAN and Proximity sensors trigger, power reduction will be activated to body-worn and Handheld.
8. For some WWAN bands, sensor on power level is higher than hotspot power level, so front/back sensor on SAR can represent hotspot conservatively.
9. This device supports HPUE for LTE Band 41 with class 2 level, HPUE power has been measured separately. For HPUE power is higher than power class 3 but with lower duty cycle, the maximum average power for class 2 and class 3 is almost the same, so we chose power class 3 full SAR testing and power class 2 verify the worst case of power class 3 SAR.
10. 5GNR n77/n78 supports HPUE mode, HPUE power and SAR testing performed separately.
11. For 5GNR n77/n78 HPUE with higher power, so we chose power class 2 full SAR testing and power class 2 SAR can represent power class 3 SAR.
12. For 5GNR test, using FTM (Factory Test Mode) to perform SAR with default 100% transmission.
13. For 5GNR FDD/TDD supports SCS15KHz and SCS30KHz, after verification for 30KHz at FDD power level is less than 15KHz at FDD power level, also verification for 15KHz at TDD power level is less than 30KHz at TDD power level, so only show 15KHz at FDD power and 30KHz at TDD power, and chose higher power which is SCS15KHz for FDD bands and SCS30KHz for TDD bands to perform SAR testing.
14. There are three samples, the different between them refer to the XT2435-2_Operational Description of Product Equality Declaration which is exhibit separately. According to the differences, we choose sample 1 to perform full SAR testing and sample 2/3 to verify the worst case of sample 1.
15. For 5GNR EN-DC mode, standalone SAR performed for 5GNR NSA band with the maximum power, EN-DC SAR summed EN-DC mode 5GNR standalone SAR and LTE standalone SAR, the result of EN-DC SAR is more conservatively.
16. This device supports 5GNR FR1 bands as following table, including NSA mode and SA mode. NSA and SA mode performed SAR separately.

<5G NR>

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

			30	10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100
	n78	TDD	15	10, 15, 20, 30, 40, 50
			30	10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100

4.2 General LTE SAR Test and Reporting Considerations

Summarized necessary items addressed in KDB 941225 D05 v02r05	
FCC ID	IHDT56AM5
Equipment Name	Mobile Cellular Phone
Operating Frequency Range of each LTE transmission band	LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 26: 814 MHz ~ 849 MHz LTE Band 38: 2570 MHz ~ 2620 MHz LTE Band 41: 2496 MHz ~ 2690 MHz LTE Band 42: 3450 MHz ~ 3550 MHz LTE Band 66: 1710 MHz ~ 1780 MHz
Channel Bandwidth	LTE Band 2:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 5:1.4MHz, 3MHz, 5MHz, 10MHz LTE Band 7: 5MHz, 10MHz, 15MHz, 20MHz LTE Band 26:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz LTE Band 38: 5MHz, 10MHz, 15MHz, 20MHz LTE Band 41: 5MHz, 10MHz, 15MHz, 20MHz LTE Band 42: 5MHz, 10MHz, 15MHz, 20MHz LTE Band 66:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz
uplink modulations used	QPSK / 16QAM / 64QAM
LTE Voice / Data requirements	Voice and Data
LTE Release Version	R15, Cat13
CA Support	Supported, Uplink and Downlink
LTE MPR permanently built-in by design	**Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3** Modulation | Channel bandwidth / Transmission bandwidth (N_{RB}) | MPR (dB) 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz QPSK | > 5 | > 4 | > 8 | > 12 | > 16 | > 18 | ≤ 1 16 QAM | ≤ 5 | ≤ 4 | ≤ 8 | ≤ 12 | ≤ 16 | ≤ 18 | ≤ 1 16 QAM | > 5 | > 4 | > 8 | > 12 | > 16 | > 18 | ≤ 2 64 QAM | ≤ 5 | ≤ 4 | ≤ 8 | ≤ 12 | ≤ 16 | ≤ 18 | ≤ 2 64 QAM | > 5 | > 4 | > 8 | > 12 | > 16 | > 18 | ≤ 3 256 QAM | ≥ 1 | ≤ 5
LTE A-MPR	In the base station simulator configuration, Network Setting value is set to NS_01 to disable A-MPR during SAR testing and the LTE SAR tests was transmitting on all TTI frames (Maximum TTI)
Spectrum plots for RB configuration	A properly configured base station simulator was used for the SAR and power measurement; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.
Power reduction applied to satisfy SAR compliance	Yes, when operating in Proximity sensors/receiver/hotspot detect mechanism, head/body -worn /hotspot/extremity will trigger reduced power for some bands applied to satisfy SAR compliance, the detail please referred to section 12.
LTE Carrier Aggregation Combinations	Inter-Band and Intra-Band possible combinations and the detail power verification please referred to section 12.
LTE Carrier Aggregation Additional Information	1. This device supports LTE Carrier Aggregation (CA) in the uplink for intra-band and inter-band with two component carriers in the uplink. SAR Measurements and conducted powers were evaluated per FCC Guidance. 2. This device supports maximum of 3 carriers in the downlink and 2 carriers in the uplink.

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

LTE Band 2

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

LTE Band 5

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

LTE Band 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 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 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

<3450 MHz ~ 3550 MHz>

LTE Band 42

	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	42115	3452.5	42140	3455	42165	3457.5	42190	3460
M	42590	3500	42590	3500	42590	3500	42590	3500
H	43065	3547.5	43040	3545	43015	3542.5	42990	3540

<For LTE Overlap Bands Description>

1) LTE Bands BW

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

2) LTE Bands tune up:

Band	Antenna	Head ECI 2 Receiver on Tune-up Limit	Body Worn ECI 3 Sensor on Tune-up Limit	Hotspot ECI 7 Tune-up Limit	Extremity ECI 6 Handheld Tune-up Limit	Sensor Off ECI 4 Tune-up Limit	Default Tune-up Limit
LTE Band 5	Ant 0	24.0	24.0	24.0	24.0	24.0	24.0
LTE Band 26	Ant 0	24.0	24.0	24.0	24.0	24.0	24.0

Band	Antenna	Head ECI 2 Receiver on Tune-up Limit	Body Worn ECI 3 Sensor on Tune-up Limit	Hotspot ECI 7 Tune-up Limit	Extremity ECI 6 Handheld Tune-up Limit	Sensor Off ECI 4 Tune-up Limit	Default Tune-up Limit
LTE Band 38	Ant 1	24.0	20.0	20.0	21.0	21.0	24.0
LTE Band 41	Ant 1	24.0	20.0	20.0	21.0	21.0	24.0

Band	Antenna	Head ECI 2 Receiver on Tune-up Limit	Body Worn ECI 3 Sensor on Tune-up Limit	Hotspot ECI 7 Tune-up Limit	Extremity ECI 6 Handheld Tune-up Limit	Sensor Off ECI 4 Tune-up Limit	Default Tune-up Limit
LTE Band 38	Ant 4	16.0	17.0	13.0	21.5	24.0	24.0
LTE Band 41	Ant 4	14.5	15.5	11.5	20.0	24.0	24.0

Note: For some bands/antennas at some exposure conditions which cannot be covered were fully tested for RF exposure compliance.

4.3 General 5G NR SAR Test and Reporting Considerations

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

Transmission (H, M, L) channel numbers and frequencies in each 5G NR band										
NR Band 5 SCS15KHz										
	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz		Bandwidth 25MHz	
	Ch. #	Freq. (MHz)	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	167300	836.5
H	169300	846.5	168800	844	168300	841.5	167800	839		

NR Band 5 SCS30KHz								
	Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz		Bandwidth 25MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	165800	829	166300	831.5	166800	834		
M	167300	836.5	167300	836.5	167300	836.5	167300	836.5
H	168800	844	168300	841.5	167800	839		

NR Band 7 SCS15KHz																
	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz		Bandwidth 25MHz		Bandwidth 30MHz		Bandwidth 40MHz		Bandwidth 50MHz	
	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	500500	2502.5	501000	2505	501500	2507.5	502000	2510	502500	2512.5	503000	2515	504000	2520	505000	2525
M	507000	2535	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	509000	2545

NR Band 7 SCS30KHz														
	Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz		Bandwidth 25MHz		Bandwidth 30MHz		Bandwidth 40MHz		Bandwidth 50MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	501000	2505	501500	2507.5	502000	2510	502500	2512.5	503000	2515	504000	2520	505000	2525
M	507000	2535	507000	2535	507000	2535	507000	2535	507000	2535	507000	2535	507000	2535
H	513000	2565	512500	2562.5	512000	2560	511500	2557.5	511000	2555	510000	2550	509000	2545

NR Band 26 SCS15KHz								
	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 26 SCS30KHz						
	Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	163800	819	164300	821.5	164800	824
M	166300	831.5	166300	831.5	166300	831.5
H	168800	844	168300	841.5	167800	839

NR Band 38 SCS15KHz														
	Bandwidth 5MHz		Bandwidth10MHz		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	514500	2572.5	515004	2575.02	515502	2577.51	516000	2580	516504	2582.52	517002	2585.01	518004	2590.02
M	519000	2595	519000	2595	519000	2595	519000	2595	519000	2595	519000	2595	519000	2595
H	523500	2617.5	522996	2614.98	522498	2612.49	522000	2610	521496	2607.48	520998	2604.99	519996	2599.98

NR Band 38 SCS30KHz												
	Bandwidth10MHz		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)
L	515004	2575.02	515502	2577.51	516000	2580	516504	2582.52	517002	2585.01	518004	2590.02
M	519000	2595	519000	2595	519000	2595	519000	2595	519000	2595	519000	2595
H	522996	2614.98	522498	2612.49	522000	2610	521496	2607.48	520998	2604.99	519996	2599.98

NR Band 41 SCS15KHz												
	Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz		Bandwidth 30MHz		Bandwidth 40MHz		Bandwidth 50MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	500202	2501.01	500700	2503.5	501204	2506.02	502200	2511	503202	2516.01	504204	2521.02
M	518598	2592.99	518598	2592.99	518598	2592.99	518598	2592.99	518598	2592.99	518598	2592.99
H	537000	2685	536496	2682.48	535998	2679.99	534996	2674.98	534000	2670	532998	2664.99

NR Band 41 SCS30KHz																						
	Bandwidth 10MHz		Bandwidth 15MHz		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)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	500202	2501.01	500700	2503.5	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	518598	2592.99	518598	2592.99
H	537000	2685	536496	2682.48	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 SCS15KHz												
	Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz		Bandwidth 30MHz		Bandwidth 40MHz		Bandwidth 50MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	647000	3705	647168	3707.52	647334	3710.01	647668	3715.02	648000	3720	648334	3725.01
M	656000	3840	656000	3840	656000	3840	656000	3840.00	656000	3840	656000	3840
H	665000	3975	664834	3972.51	664668	3970.02	664334	3965.01	664000	3960	663668	3955.02

NR Band 77 SCS30KHz																						
	Bandwidth 10MHz		Bandwidth 15MHz		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)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	647000	3705	647168	3707.52	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	656000	3840	656000	3840.00	656000	3840	656000	3840	656000	3840	656000	3840	656000	3840	656000	3840	656000	3840
H	665000	3975	664834	3972.51	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 SCS15KHz												
	Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz		Bandwidth 30MHz		Bandwidth 40MHz		Bandwidth 50MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	647000	3705	647168	3707.52	647334	3710.01	647668	3715.02	648000	3720	648334	3725.01
M	650000	3750	650000	3750	650000	3750	650000	3750.00	650000	3750	650000	3750
H	653000	3795	652834	3792.51	652668	3790.02	652334	3785.01	652000	3780	651668	3775.02

NR Band 78 SCS30KHz																						
	Bandwidth 10MHz		Bandwidth 15MHz		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)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	647000	3705	647168	3707.52	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	650000	3750	650000	3750.00	650000	3750	650000	3750	650000	3750	650000	3750	650000	3750	650000	3750	650000	3750
H	653000	3795	652834	3792.51	652668	3790.02	652334	3785.01	652000	3780	651668	3775.02	651334	3770.01	651000	3765	650668	3760.02	650334	3755.01		

<For NR Overlap Bands Description>

1) NR Bands BW

Mode	Band	Duplex	SCS(KHz)	Bandwidths(BW)
NSA	N5	FDD	15	5, 10, 15, 20,25
	N38	TDD	30	10,15,20,25, 30, 40
	n41	TDD	30	10,15,20, 30, 40, 50, 60,70, 80, 90, 100
	n78	TDD	30	10,15,20, 30, 40, 50, 60,70, 80, 90, 100
SA	N5	FDD	15	5, 10, 15, 20,25
	N26	FDD	15	5, 10, 15, 20
	N38	TDD	30	10,15,20,25, 30, 40
	n41	TDD	30	10,15,20, 30, 40, 50, 60,70, 80, 90, 100
	n77	TDD	30	10,15,20, 30, 40, 50, 60,70, 80, 90, 100
	n78	TDD	30	10,15,20, 30, 40, 50, 60,70, 80, 90, 100

2) NR Bands Tune up:

Band	Antenna	Head ECI 2 Receiver on Tune-up Limit	Body Worn ECI 3 Sensor on Tune-up Limit	Hotspot ECI 7 Tune-up Limit	Extremity ECI 6 Handheld Tune-up Limit	Sensor Off ECI 4 Tune-up Limit	Default Tune-up Limit
5G NR n5 SA	Ant 0	24.0	24.0	24.0	24.0	24.0	24.0
5G NR n26 SA	Ant 0	24.0	24.0	24.0	24.0	24.0	24.0

Band	Antenna	Head ECI 2 Receiver on Tune-up Limit	Body Worn ECI 3 Sensor on Tune-up Limit	Hotspot ECI 7 Tune-up Limit	Extremity ECI 6 Handheld Tune-up Limit	Sensor Off ECI 4 Tune-up Limit	Default Tune-up Limit
5G NR n38 SA	Ant 4	16.0	15.5	12.5	20.5	24.0	24.0
5G NR n41 SA	Ant 4	16.0	15.5	12.5	20.5	24.0	24.0
5G NR n38 NSA	Ant 4	16.0	15.5	12.5	20.5	24.0	24.0
5G NR n41 NSA	Ant 4	16.0	15.5	12.5	20.5	24.0	24.0

Band	Antenna	Head ECI 2 Receiver on Tune-up Limit	Body Worn ECI 3 Sensor on Tune-up Limit	Hotspot ECI 7 Tune-up Limit	Extremity ECI 6 Handheld Tune-up Limit	Sensor Off ECI 4 Tune-up Limit	Default Tune-up Limit
5G NR n77 PC3 SA	Ant 1	22.5	22.5	22.5	22.5	22.5	22.5
5G NR n78 PC3 SA	Ant 1	22.5	22.5	22.5	22.5	22.5	22.5
5G NR n77 PC2 SA	Ant 1	23.5	23.5	23.5	23.5	23.5	23.5
5G NR n78 PC2 SA	Ant 1	23.5	23.5	23.5	23.5	23.5	23.5

Band	Antenna	Head ECI 2 Receiver on Tune-up Limit	Body Worn ECI 3 Sensor on Tune-up Limit	Hotspot ECI 7 Tune-up Limit	Extremity ECI 6 Handheld Tune-up Limit	Sensor Off ECI 4 Tune-up Limit	Default Tune-up Limit
5G NR n77 PC3 SA	Ant 2	23.0	18.0	15.0	20.0	20.0	23.0
5G NR n78 PC3 SA	Ant 2	23.0	18.0	15.0	20.0	20.0	23.0
5G NR n77 PC2 SA	Ant 2	24.5	18.0	15.0	20.0	20.0	24.5
5G NR n78 PC2 SA	Ant 2	24.5	18.0	15.0	20.0	20.0	24.5

Band	Antenna	Head ECI 2 Receiver on Tune-up Limit	Body Worn ECI 3 Sensor on Tune-up Limit	Hotspot ECI 7 Tune-up Limit	Extremity ECI 6 Handheld Tune-up Limit	Sensor Off ECI 4 Tune-up Limit	Default Tune-up Limit
5G NR n77 PC3 SA	Ant 5	16.5	16.5	14.0	19.0	24.0	24.0
5G NR n78 PC3 SA	Ant 5	16.5	16.5	14.0	19.0	24.0	24.0
5G NR n77 PC2 SA	Ant 5	16.5	16.5	14.0	19.0	26.5	26.5
5G NR n78 PC2 SA	Ant 5	16.5	16.5	14.0	19.0	26.5	26.5

Band	Antenna	Head ECI 2 Receiver on Tune-up Limit	Body Worn ECI 3 Sensor on Tune-up Limit	Hotspot ECI 7 Tune-up Limit	Extremity ECI 6 Handheld Tune-up Limit	Sensor Off ECI 4 Tune-up Limit	Default Tune-up Limit
5G NR n77 PC3 SA	Ant 7	19.0	18.5	16.5	22.5	22.5	22.5
5G NR n78 PC3 SA	Ant 7	19.0	18.5	16.5	22.5	22.5	22.5
5G NR n77 PC2 SA	Ant 7	19.0	18.5	16.5	24.5	24.5	24.5
5G NR n78 PC2 SA	Ant 7	19.0	18.5	16.5	24.5	24.5	24.5

5. RF Exposure Limits

5.1 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.

5.2 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.

6. Specific Absorption Rate (SAR)

6.1 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.

6.2 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:

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

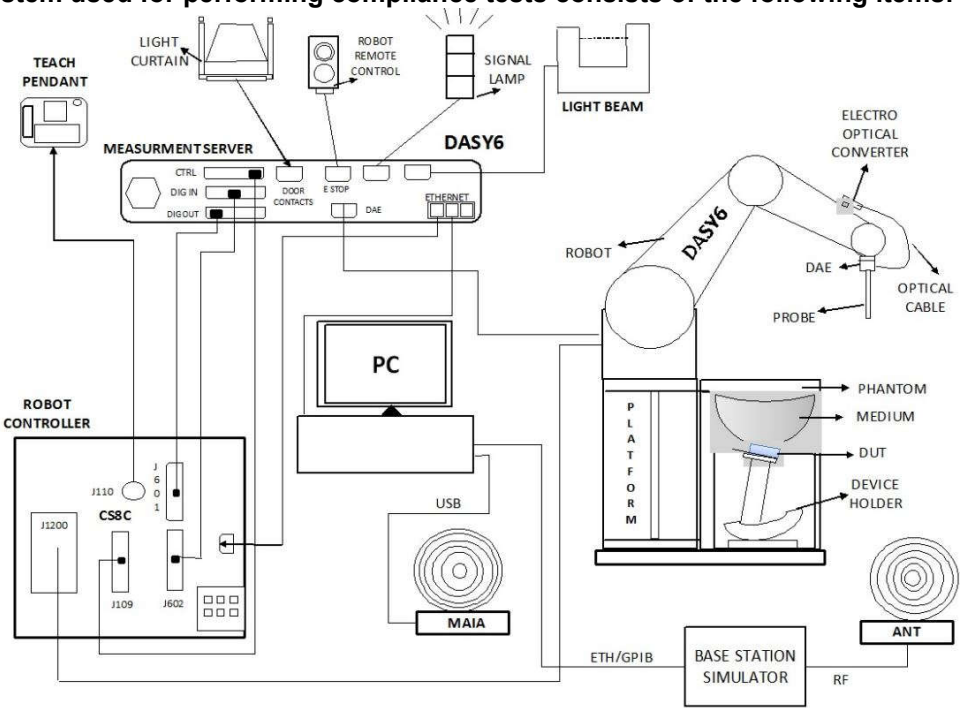
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

7. 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 Window 7 or Window 10 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.

7.1 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

7.2 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

7.3 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

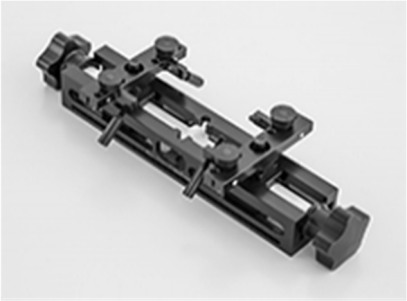
The ELI phantom is intended for compliance testing of handheld and body-mounted wireless devices or for evaluating transmitters operating at low frequencies. ELI is fully compatible with standard and all known tissue simulating liquids.

7.4 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

8. 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

8.1 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

8.2 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.

8.3 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.	

8.4 Zoom Scan

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

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

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

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

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

8.5 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.

8.6 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.

9. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	835MHz System Validation Kit	D835V2	4d091	2022/8/19	2025/8/18
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	3700MHz System Validation Kit	D3700V2	1008	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	2025/9/22
SPEAG	13MHz System Validation Kit	CLA13	1023	2024/1/22	2025/1/21
SPEAG	Data Acquisition Electronics	DAE4	1650	2023/9/13	2024/9/12
SPEAG	Data Acquisition Electronics	DAE4	1338	2024/3/18	2025/3/17
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	ELI Phantom	ELI V8.0	TP-2135	NCR	NCR
Rohde & Schwarz	Vector Signal Generator	SMBV100A	258305	2024/1/2	2025/1/1
Testo	Thermo-Hygrometer	608-H1	1241332126	2023/7/10	2024/7/9
SPEAG	Phone Positioner	N/A	N/A	NCR	NCR
Anritsu	Radio Communication Analyzer	MT8821C	6262306175	2023/7/5	2024/7/4
Agilent	ENA Series Network Analyzer	E5071C	MY46111157	2023/7/5	2024/7/4
SPEAG	Dielectric Probe Kit	DAK-3.5	1144	2023/8/17	2024/8/16
SPEAG	Dielectric Probe Kit	DAK-12	1173	2023/9/20	2024/9/19
Anritsu	Vector Signal Generator	MG3710A	6201682672	2024/1/2	2025/1/1
Rohde & Schwarz	Power Meter	NRVD	102081	2023/7/5	2024/7/4
Rohde & Schwarz	Power Sensor	NRV-Z5	100538	2023/7/5	2024/7/4
Rohde & Schwarz	Power Sensor	NRV-Z5	100539	2023/7/5	2024/7/4
R&S	BLUETOOTH TESTER	CBT	100641	2024/1/2	2025/1/1
Rohde & Schwarz	Spectrum Analyzer	FSV7	101631	2023/10/11	2024/10/10
TES	DIGITAC THERMOMETER	1310	220305411	2023/7/8	2024/7/7
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.

10. System Verification

10.1 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.

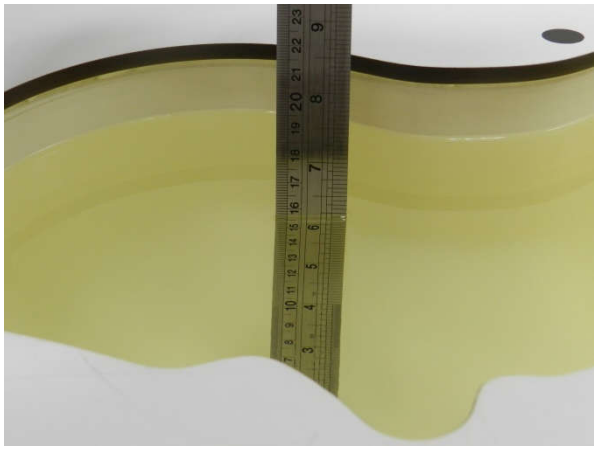


Fig 11.1 Photo of Liquid Height for Head SAR

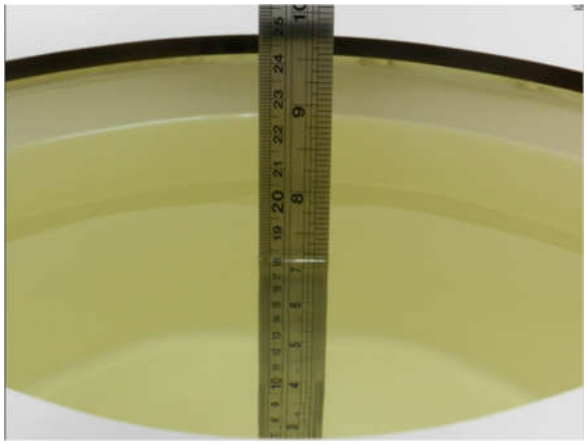


Fig 11.2 Photo of Liquid Height for Body SAR

10.2 Tissue Verification

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

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

Simulating Liquid for 5GHz, Manufactured by SPEAG

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

<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Tissue Type	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
835	Head	22.6	0.912	41.936	0.90	41.50	1.33	1.05	±5	2024/5/28
1900	Head	22.8	1.407	40.199	1.40	40.00	0.50	0.50	±5	2024/5/29
2600	Head	22.7	2.032	40.368	1.96	39.00	3.67	3.51	±5	2024/5/30
3500	Head	22.5	2.810	38.712	2.91	37.90	-3.44	2.14	±5	2024/5/31
3900	Head	22.8	3.171	38.038	3.32	37.50	-4.49	1.43	±5	2024/6/1
2450	Head	22.8	1.744	39.267	1.80	39.20	-3.11	0.17	±5	2024/6/2
5250	Head	22.8	4.573	35.720	4.71	35.90	-2.91	-0.50	±5	2024/6/3
5600	Head	22.6	4.946	35.101	5.07	35.50	-2.45	-1.12	±5	2024/6/4
5750	Head	22.7	5.105	34.869	5.22	35.40	-2.20	-1.50	±5	2024/6/5
3700	Head	22.7	2.991	38.382	3.12	37.70	-4.13	1.81	±5	2024/6/5
1750	Head	22.6	1.316	40.213	1.37	40.10	-3.94	0.28	±5	2024/6/5
1750	Head	22.5	1.370	41.289	1.37	40.10	0.00	2.97	±5	2024/6/5
13	Head	22.8	0.748	53.800	0.75	55.00	-0.27	-2.18	±5	2024/5/29

10.3 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 (%)
2024/5/28	835	Head	50	4d091	3857	1650	0.477	9.45	9.54	0.95
2024/5/29	1900	Head	50	5d118	3857	1650	1.810	39.30	36.2	-7.89
2024/5/30	2600	Head	50	1112	3857	1650	2.830	55.10	56.6	2.72
2024/5/31	3500	Head	50	1037	3857	1650	3.110	65.40	62.2	-4.89
2024/6/1	3900	Head	50	1048	3857	1650	3.270	69.10	65.4	-5.35
2024/6/2	2450	Head	50	1095	3857	1650	2.670	52.60	53.4	1.52
2024/6/3	5250	Head	50	1113	3857	1650	4.170	81.50	83.4	2.33
2024/6/4	5600	Head	50	1113	3857	1650	4.460	82.60	89.2	7.99
2024/6/5	5750	Head	50	1113	3857	1650	4.080	80.80	81.6	0.99
2024/6/5	3700	Head	50	1008	3857	1650	3.350	67.20	67	-0.30
2024/6/5	1750	Head	50	1090	3857	1650	1.770	37.00	35.4	-4.32
2024/6/5	1750	Head	50	1090	3857	1650	1.810	37.00	36.2	-2.16

<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 (%)
2024/5/28	835	Head	50	4d091	3857	1650	0.313	6.22	6.26	0.64
2024/5/29	1900	Head	50	5d118	3857	1650	0.958	20.40	19.16	-6.08
2024/5/30	2600	Head	50	1112	3857	1650	1.280	24.80	25.6	3.23
2024/5/31	3500	Head	50	1037	3857	1650	1.260	24.70	25.2	2.02
2024/6/1	3900	Head	50	1048	3857	1650	1.150	24.10	23	-4.56
2024/6/2	2450	Head	50	1095	3857	1650	1.260	24.70	25.2	2.02
2024/6/3	5250	Head	50	1113	3857	1650	1.220	23.30	24.4	4.72
2024/6/4	5600	Head	50	1113	3857	1650	1.260	23.70	25.2	6.33
2024/6/5	5750	Head	50	1113	3857	1650	1.180	23.00	23.6	2.61
2024/6/5	3700	Head	50	1008	3857	1650	1.240	24.40	24.8	1.64
2024/6/5	1750	Head	50	1090	3857	1650	0.948	19.50	18.96	-2.77
2024/6/5	1750	Head	50	1090	3857	1650	0.956	19.50	19.12	-1.95
2024/5/29	13	Head	250	1023	7706	1338	0.090	0.335	0.36	5.88

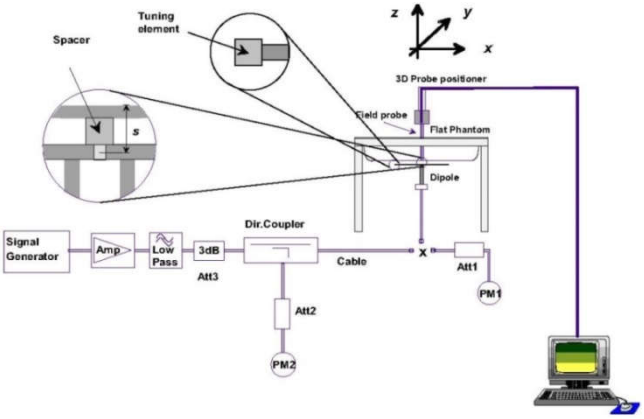


Fig 11.3.1 System Performance Check Setup

Fig 11.3.2 Setup Photo

Fig 11.3.3 Setup Photo

11. RF Exposure Positions

11.1 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.

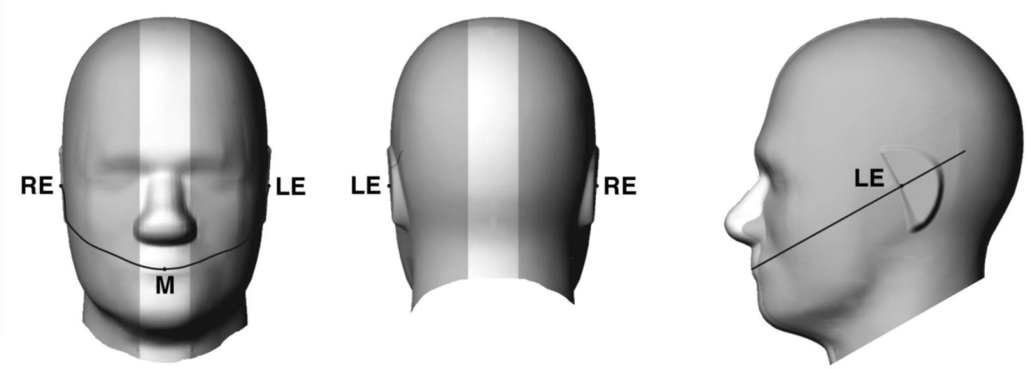


Fig 12.1.1 Front, back, and side views of SAM twin phantom

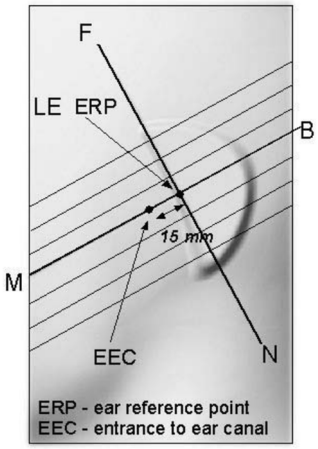


Fig 12.1.2 Close-up side view of phantom showing the ear region.

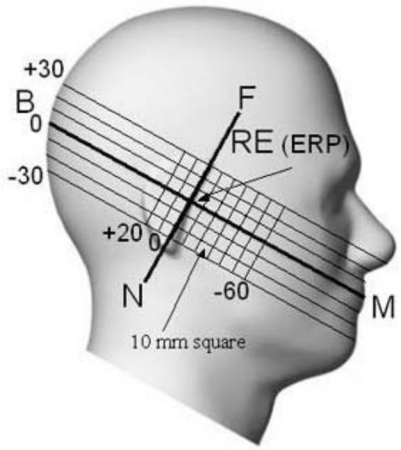


Fig 12.1.3 Side view of the phantom showing relevant markings and seven cross-sectional plane locations

11.2 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.

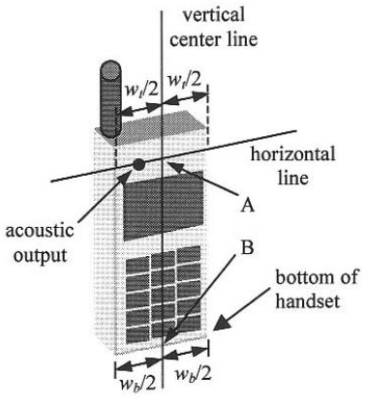


Fig 12.2.1 Handset vertical and horizontal reference lines—"fixed case

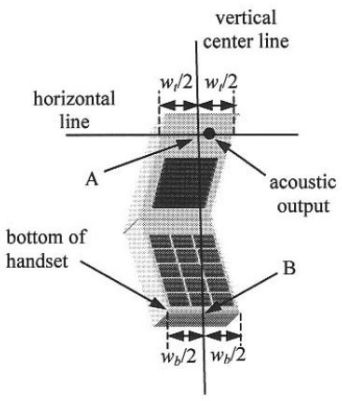


Fig 12.2.2 Handset vertical and horizontal reference lines—"clam-shell case"

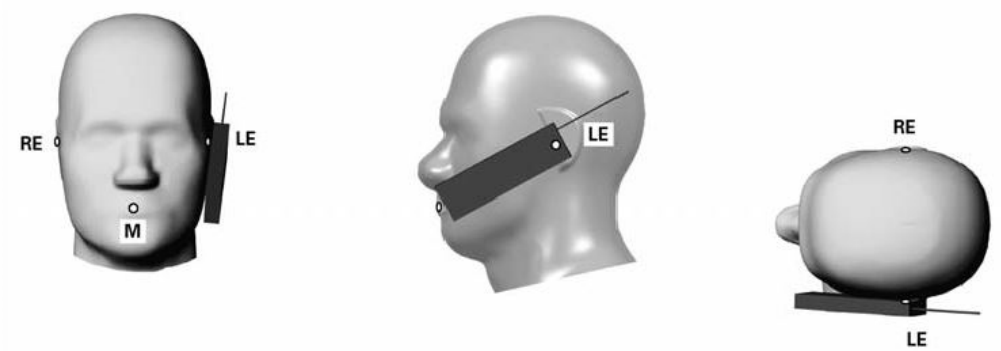


Fig 12.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

11.3 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

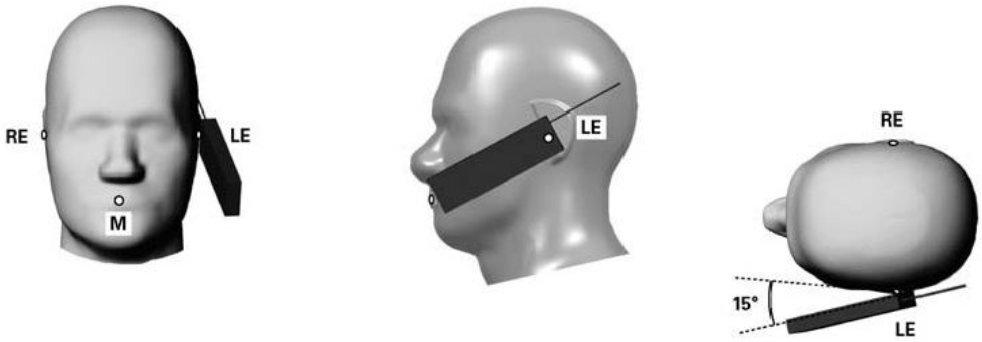


Fig 12.3.1 Tilt position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which define the Reference Plane for handset positioning, are indicated.

11.4 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.

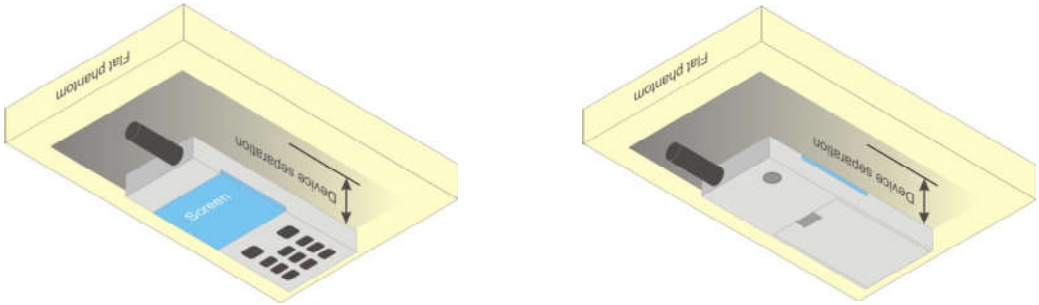


Fig 12.4 Body Worn Position

11.5 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.

11.6 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.

12. Conducted RF Output Power (Unit: dBm)

The detailed conducted power table can refer to Appendix E.

<GSM Conducted Power>

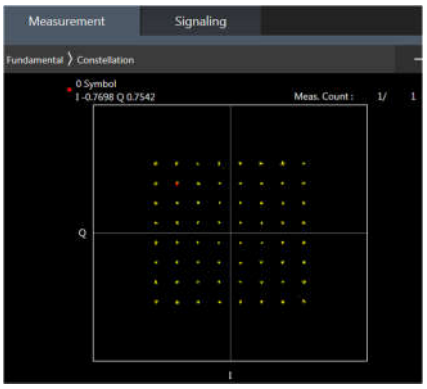
1. Per KDB 447498 D01v06, the maximum output power channel is used for SAR testing and for further SAR test reduction.
2. Per KDB 941225 D01v03r01, for SAR test reduction for GSM / GPRS / EDGE modes is determined by the source-based time-averaged output power including tune-up tolerance. The mode with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

<LTE Conducted Power>

General Note:

1. Anritsu MT8820C base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r05, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
4. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r05, for QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
6. Per KDB 941225 D05v02r05, 16QAM/64QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM/64QAM SAR testing is not required.
7. Per KDB 941225 D05v02r05, smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
8. For LTE B5 / B26 / B38 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.
9. LTE B5 / B38 SAR test was covered by B26 / B41; according to April 2015 TCB workshop, SAR test for overlapping LTE bands can be reduced if
   a. the maximum output power, including tolerance, for the smaller band is ≤ the larger band to qualify for the SAR test exclusion
   b. the channel bandwidth and other operating parameters for the smaller band are fully supported by the larger band
10. According to May 2017 TCB workshop, for 16QAM and 64QAM should be verified by checking the signal constellation with a call box to avoid incorrect maximum power levels due to MPR and other requirements associated with signal modulation, and the following figure is taken from the "Fundamental Measurement >> Modulation Analysis >> constellation" mode of the device connect to the MT8821C base station, therefore, the device 64QAM and 16QAM signal modulation are correct.

16QAM



64QAM

<LTE Carrier Aggregation>

The detailed LTE Carrier Aggregation conducted power table can refer to Appendix F.

General Note:

1. This device supports Carrier Aggregation on downlink for inter and intra band. For the device supports bands and bandwidths and configurations are provided as follow table was according to 3GPP.
2. In applying the existing power measurement procedures of KDB 941225 D05A for DL CA SAR test exclusion, only the subset with the largest number of combinations of frequency bands and CCs in each row need combination, and for this device that all the configurations were choose to power measurement.
3. The gray color table is covered by other combinations and no need to verify power

2CC Downlink Carrier Aggregation				3CC Downlink Carrier Aggregation			
Number	Combination	4X4 MIMO	Covered by Measurement Superset	Number	Combination	4X4 MIMO	Covered by Measurement Superset
1	CA_38C	38C, 38A		1	CA_41A-41A-41A	41A	
2	CA_41A-41A	41A-41A, 41A	3CC#1	2	CA_41A-41C	41A	
3	CA_41C	41C, 41A	3CC#2	3	CA_41D		
4	CA_5A-7A	7A		4			
5	CA_7A-7A	7A-7A, 7A		5			
6	CA_7B	7B, 7A		6			
7	CA_7C	7C, 7A		7			
8	CA_66A-66A						
9	CA_66B						
10	CA_66C						

LTE Carrier Aggregation Conducted Power (Downlink)

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

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

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

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

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

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

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

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

LTE 4x4 MIMO (Downlink)

This device supports downlink 4x4 MIMO operations for LTE Band 7/38/41/42 only. Uplink transmission is limited to a single output stream. Power measurements were performed with downlink 4x4 MIMO active for the configuration with highest measured maximum conducted power with 4x4 downlink MIMO inactive measured among the channel bandwidth, modulation, and RB combinations in each frequency band.

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

4X4 MIMO	Band
	LTE Band 7/38/41/42

LTE Carrier Aggregation Conducted Power (Uplink)

LTE Uplink CA	2CC Uplink Carrier Aggregation
Intra-band	Antenna Tx
CA_7C	Ant 1
CA_38C	Ant 4
CA_66B	Ant0
CA_66C	Ant0

<Intra-band>

General Note:

i. The device supports intra-band uplink carrier aggregation for LTE B7/38/66 with a maximum of two uplink component carriers. For intra band contiguous carrier aggregation scenarios, 3GPP 36.101 table 6.2.2A-1 specifies that the aggregate maximum allowed output power is equivalent to the single carrier scenario. 3GPP 36.101 6.2.3A allows for several dB of MPR to be applied when not-contiguous RB allocation is implemented. The conducted power and MPR setting in this device are permanently implemented pre 3GPP requirement.

ii. The device supports uplink carrier aggregation with a maximum of two uplink component carriers. For intra band contiguous carrier aggregation scenarios, 3GPP 36.101 table 6.2.2A-1 specifies that the aggregate maximum allowed output power is equivalent to the single carrier scenario. 3GPP 36.101 6.2.3A allows for several dB of MPR to be applied when not-contiguous RB allocation is implemented. The conducted power and MPR setting in this device are permanently implemented pre the 3GPP requirement.

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

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

v. LTE CA_66B test was covered by CA_66C; therefore, SAR was only assessed for CA_66C.

5G NR Output Power (Unit: dBm)

General Note:

1. 5G NR n5/n78 is NSA mode.
2. 5G NR n5/n7/n26/n38/n41/n77/n78 is SA mode.
3. For 5G NR test procedure was following step similar FCC KDB 941225 D05:
   a. For DFT-OFDM and CP-OFDM output power measurement reduction, according to 38.101 maximum power reduction for power class2 and 3, the CP-OFDM mode will not higher than DFT-OFDM mode, therefore, similar FCC KDB 941225 D05 procedure for other modulation output power for each RB allocation configuration is > not ½ dB higher than the same configuration in DFT-s QPSK and the reported SAR for the DFT-s QPSK configuration is ≤ 1.45 W/kg; CP-OFDM testing is not required.
   b. For DFT-OFDM output power measurement reduction, according to 38.101 maximum power reduction for power class2 and 3, for 16QAM/64QAM/256QAM and smaller bandwidth output power will spot check largest channel bandwidth worst RB configuration to ensure the 16QAM/64QAM/256QAM and smaller bandwidth output power will not ½ dB higher than the same configuration in the largest supported bandwidth.
   c. SAR testing start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel
   d. 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure
   e. QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested
   f. PI/2 BPSK/16QAM/64QAM/256QAM output powers according to 3GPP MPR will not ½ dB higher than the same configuration in QPSK, also reported SAR for the QPSK configuration is less than 1.45 W/kg, PI/2 BPSK /16QAM/64QAM/256QAM SAR testing are not required.
   g. Smaller bandwidth output power for each RB allocation configuration for this device will not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg, smaller bandwidth SAR testing is not required for this device
4. For 5GNR test, using FTM (Factory Test Mode) to perform SAR with default 100% transmission.
5. NSA and SA mode should perform SAR separately. For the maximum power of NSA mode is the same as SA total power level, so SA SAR can represent NSA mode SAR.
6. 5GNR NSA mode, the power level is the same as 5GNR SA mode, so 5GNR NSA mode and SA mode power table only show one time.
7. 5G NR supports CP-OFDM and DFT-s-OFDM modulation, for DFT-s-OFDM power is higher than CP-OFDM, so only show DFT-s-OFDM power table and chose DFT-s-OFDM to perform SAR testing.
8. For DFT-s-OFDM and CP-OFDM output power measurement reduction, according to 38.101 maximum power reduction for the CP-OFDM mode will not higher than DFT-s-OFDM mode, therefore, CP-OFDM measurement is unnecessary.
9. For 5GNR EN-DC mode, standalone SAR performed for 5GNR NSA band with the maximum power, EN-DC SAR summed EN-DC mode 5GNR standalone SAR and LTE standalone SAR, the result of EN-DC SAR is more conservatively.

<3GPP 38.101 MPR for EN-DC>

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

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

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

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

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

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

<EN-DC combination>

ENDC	Antenna Tx	
	LTE TX	NR TX
DC_7A_n5A	Ant4	Ant0
DC_5A_n78A	Ant0	Ant5
DC_7A_n78A	Ant1	Ant5
DC_38A_n78A	Ant1	Ant5
DC_41A_n78A	Ant1	Ant5
DC_7A_n77A	Ant1	Ant5

<WLAN Conducted Power>

General Note:

1. The maximum output power specified for production units are determined for all applicable 802.11 transmission modes in each standalone and aggregated frequency band. Maximum output power is measured for the highest maximum output power configuration(s) in each frequency band according to the default power measurement procedures. For "Not required", SAR Test reduction was applied from KDB 248227 guidance, Sec. 2.1, b), 1) when the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration. Additional output power measurements were not necessary.
2. Per KDB 248227 D01v02r02, SAR test reduction is determined according to 802.11 transmission mode configurations and certain exposure conditions with multiple test positions. In the 2.4 GHz band, separate SAR procedures are applied to DSSS and OFDM configurations to simplify DSSS test requirements. For OFDM, in both 2.4 and 5 GHz bands, an initial test configuration must be determined for each standalone and aggregated frequency band, according to the transmission mode configuration with the highest maximum output power specified for production units to perform SAR measurements. If the same highest maximum output power applies to different combinations of channel bandwidths, modulations and data rates, additional procedures are applied to determine which test configurations require SAR measurement. When applicable, an initial test position may be applied to reduce the number of SAR measurements required for next to the ear, UMPC mini-tablet or hotspot mode configurations with multiple test positions.
3. For 2.4 GHz 802.11b DSSS, either the initial test position procedure for multiple exposure test positions or the DSSS procedure for fixed exposure position is applied; these are mutually exclusive. For 2.4 GHz and 5 GHz OFDM configurations, the initial test configuration is applied to measure SAR using either the initial test position procedure for multiple exposure test position configurations or the initial test configuration procedures for fixed exposure test conditions. Based on the reported SAR of the measured configurations and maximum output power of the transmission mode configurations that are not included in the initial test configuration, the subsequent test configuration and initial test position procedures are applied to determine if SAR measurements are required for the remaining OFDM transmission configurations. In general, the number of test channels that require SAR measurement is minimized based on maximum output power measured for the test sample(s).
4. For OFDM transmission configurations in the 2.4 GHz and 5 GHz bands, When the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel for each frequency band.
5. DSSS and OFDM configurations are considered separately according to the required SAR procedures. SAR is measured in the initial test position using the 802.11 transmission mode configuration required by the DSSS procedure or initial test configuration and subsequent test configuration(s) according to the OFDM procedures.18 The initial test position procedure is described in the following:
   a. When the reported SAR of the initial test position is ≤ 0.4 W/kg, further SAR measurement is not required for the other test positions in that exposure configuration and 802.11 transmission mode combinations within the frequency band or aggregated band.
   b. When the reported SAR of the test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position on the highest maximum output power channel, until the report SAR is ≤ 0.8 W/kg or all required test position are tested.
   c. For all positions/configurations, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.

13. Antenna Location

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

14. SAR Test Results

14.1 Head SAR

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Sample	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
835MHz																					
01	GSM850	-	-	-	-	GPRS (4 Tx slots)	Right Cheek	0mm	Ant 0	ECI 2	189	836.4	1	29.05	30.50	1.396	-	-	0.09	0.170	**0.237**
02	WCDMA V	-	-	-	-	RMC 12.2Kbps	Right Cheek	0mm	Ant 0	ECI 2	4182	836.4	1	22.86	24.00	1.300	-	-	-0.09	0.215	**0.280**
03	LTE Band 26	15M	QPSK	1	0	-	Right Cheek	0mm	Ant 0	ECI 2	26865	831.5	1	22.82	24.00	1.312	-	-	0.02	0.179	**0.235**
04	FR1 n26	20M	QPSK	50	28	DFT-SCS-15KHz	Right Cheek	0mm	Ant 0	ECI 2	166300	831.5	1	22.68	24.00	1.355	-	-	-0.05	0.126	**0.171**
05	FR1 n5	25M	QPSK	1	1	DFT-SCS-15KHz	Right Cheek	0mm	Ant 0	ECI 2	167300	836.5	1	22.88	24.00	1.294	-	-	-0.04	0.115	**0.149**
1750MHz																					
	LTE Band 66	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 0	ECI2	132322	1745	1	22.74	24.00	1.337	-	-	0.19	0.089	0.119
	LTE Band 66C	20M	QPSK	1	99	-	Right Cheek	0mm	Ant 0	ECI2	132322+ 132520	1745+ 1764.8	1	22.65	24.00	1.365	-	-	0.08	0.077	0.105
	LTE Band 66	20M	QPSK	50	0	-	Right Cheek	0mm	Ant 0	ECI2	132322	1745	1	21.96	23.00	1.271	-	-	0.01	0.067	0.085
	LTE Band 66	20M	QPSK	1	0	-	Right Tilted	0mm	Ant 0	ECI2	132322	1745	1	22.74	24.00	1.337	-	-	0.03	0.051	0.068
	LTE Band 66	20M	QPSK	50	0	-	Right Tilted	0mm	Ant 0	ECI2	132322	1745	1	21.96	23.00	1.271	-	-	-0.08	0.041	0.052
	LTE Band 66	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 0	ECI2	132322	1745	1	22.74	24.00	1.337	-	-	-0.08	0.071	0.095
	LTE Band 66	20M	QPSK	50	0	-	Left Cheek	0mm	Ant 0	ECI2	132322	1745	1	21.96	23.00	1.271	-	-	0.1	0.056	0.071
	LTE Band 66	20M	QPSK	1	0	-	Left Tilted	0mm	Ant 0	ECI2	132322	1745	1	22.74	24.00	1.337	-	-	-0.18	0.048	0.064
	LTE Band 66	20M	QPSK	50	0	-	Left Tilted	0mm	Ant 0	ECI2	132322	1745	1	21.96	23.00	1.271	-	-	0.1	0.038	0.048
	LTE Band 66	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 4	ECI2	132322	1745	1	19.63	20.50	1.222	-	-	0.12	0.451	0.551
	LTE Band 66	20M	QPSK	50	0	-	Right Cheek	0mm	Ant 4	ECI2	132322	1745	1	19.60	20.50	1.230	-	-	0.08	0.369	0.454
06	LTE Band 66	20M	QPSK	1	0	-	Right Tilted	0mm	Ant 4	ECI2	132322	1745	1	19.63	20.50	1.222	-	-	0.09	0.558	**0.682**
	LTE Band 66	20M	QPSK	1	0	-	Right Tilted	0mm	Ant 4	ECI2	132322	1745	2	19.63	20.50	1.222	-	-	0.03	0.522	0.638
	LTE Band 66	20M	QPSK	1	0	-	Right Tilted	0mm	Ant 4	ECI2	132322	1745	3	19.63	20.50	1.222	-	-	0.05	0.460	0.562
	LTE Band 66	20M	QPSK	50	0	-	Right Tilted	0mm	Ant 4	ECI2	132322	1745	1	19.60	20.50	1.230	-	-	-0.05	0.519	0.639
	LTE Band 66	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 4	ECI2	132322	1745	1	19.63	20.50	1.222	-	-	0.17	0.309	0.378
	LTE Band 66	20M	QPSK	50	0	-	Left Cheek	0mm	Ant 4	ECI2	132322	1745	1	19.60	20.50	1.230	-	-	-0.05	0.249	0.306
	LTE Band 66	20M	QPSK	1	0	-	Left Tilted	0mm	Ant 4	ECI2	132322	1745	1	19.63	20.50	1.222	-	-	0.01	0.342	0.418
	LTE Band 66	20M	QPSK	50	0	-	Left Tilted	0mm	Ant 4	ECI2	132322	1745	1	19.60	20.50	1.230	-	-	0.1	0.285	0.351
1900MHz																					
07	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Left Cheek	0mm	Ant 0	ECI 2	661	1880	1	25.03	26.50	1.403	-	-	0.07	0.052	**0.073**
08	WCDMA II	-	-	-	-	RMC 12.2Kbps	Left Cheek	0mm	Ant 0	ECI 2	9400	1880	1	22.59	24.00	1.384	-	-	0.06	0.067	**0.093**
09	LTE Band 2	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 0	ECI 2	18900	1880	1	22.48	24.00	1.419	-	-	0.01	0.077	**0.109**
2600MHz																					
	LTE Band 7	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 1	ECI 2	21100	2535	1	23.02	24.00	1.253	-	-	0.07	0.383	0.480
10	LTE Band 7	20M	QPSK	1	0	-	Right Tilted	0mm	Ant 4	ECI 2	21350	2560	1	13.39	14.50	1.291	-	-	0.03	0.379	**0.489**
11	LTE Band 38	20M	QPSK	1	0	-	Right Tilted	0mm	Ant 4	ECI 2	38000	2595	1	14.83	16.00	1.309	62.9	1.006	0.01	0.537	**0.707**
	LTE Band 41	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 1	ECI 2	40620	2593	1	22.94	24.00	1.276	-	-	0.04	0.336	0.429
12	LTE Band 41 _HPUE	20M	QPSK	1	0	-	Right Tilted	0mm	Ant 4	ECI 2	41055	2636.5	1	16.56	17.50	1.242	42.9	1.009	0.09	0.476	**0.596**
13	FR1 n7	50M	QPSK	135	68	DFT-SCS-15KHz	Left Cheek	0mm	Ant 1	ECI 2	507000	2535	1	22.82	24.00	1.312	-	-	0.01	0.318	**0.417**
14	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Right Tilted	0mm	Ant 4	ECI 2	518598	2592.99	1	15.00	16.00	1.259	-	-	0.13	0.472	**0.594**
3500MHz																					
15	LTE Band 42	20M	QPSK	1	0	-	Left Tilted	0mm	Ant 5	ECI 2	42190	3460	1	15.94	17.50	1.432	62.9	1.006	0.03	0.518	**0.746**
	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Left Cheek	0mm	Ant 1	ECI 2	656000	3840	1	21.50	23.50	1.585	-	-	-0.05	0.076	0.120
	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Right Cheek	0mm	Ant 2	ECI 2	656000	3840	1	22.57	24.50	1.560	-	-	-0.19	0.155	0.242
16	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Left Tilted	0mm	Ant 5	ECI 2	656000	3840	1	15.83	16.50	1.167	-	-	-0.04	0.556	**0.649**
	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Left Tilted	0mm	Ant 7	ECI 2	656000	3840	1	18.83	19.00	1.040	-	-	0.04	0.405	0.421

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Sample	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
WIFI&BT																	
17	WLAN2.4GHz	802.11b 1Mbps	Left Tilted	0mm	Ant 6	standalone	6	2437	1	16.91	17.50	1.146	100	1.000	-0.15	0.627	**0.718**
18	Bluetooth	1Mbps	Left Tilted	0mm	Ant 6	Full Power	0	2402	1	14.61	15.50	1.227	76.73	1.086	0.02	0.334	**0.445**
19	WLAN5.3GHz	802.11ac-VHT80 MCS0	Left Cheek	0mm	Ant 6	standalone	58	5290	1	14.25	16.00	1.496	100	1.000	0.02	0.529	**0.792**
20	WLAN5.5GHz	802.11n-HT40 MCS0	Left Cheek	0mm	Ant 6	standalone	142	5710	1	15.39	17.00	1.449	100	1.000	0.02	0.545	**0.790**
	WLAN5.8GHz	802.11a 6Mbps	Right Cheek	0mm	Ant 6	standalone	149	5745	1	16.51	18.00	1.409	100	1.000	0.08	0.425	0.599
	WLAN5.8GHz	802.11a 6Mbps	Right Tilted	0mm	Ant 6	standalone	149	5745	1	16.51	18.00	1.409	100	1.000	0.01	0.488	0.688
	WLAN5.8GHz	802.11a 6Mbps	Left Cheek	0mm	Ant 6	standalone	149	5745	1	16.51	18.00	1.409	100	1.000	0.03	0.570	0.803
	WLAN5.8GHz	802.11a 6Mbps	Left Cheek	0mm	Ant 6	standalone	157	5785	1	16.45	18.00	1.429	100	1.000	-0.08	0.537	0.767
	WLAN5.8GHz	802.11a 6Mbps	Left Tilted	0mm	Ant 6	standalone	149	5745	1	16.51	18.00	1.409	100	1.000	-0.08	0.655	0.923
21	WLAN5.8GHz	802.11a 6Mbps	Left Tilted	0mm	Ant 6	standalone	157	5785	1	16.45	18.00	1.429	100	1.000	-0.05	0.715	**1.022**
	WLAN5.8GHz	802.11a 6Mbps	Left Tilted	0mm	Ant 6	standalone	157	5785	2	16.45	18.00	1.429	100	1.000	0.01	0.704	1.006
	WLAN5.8GHz	802.11a 6Mbps	Left Tilted	0mm	Ant 6	standalone	157	5785	3	16.45	18.00	1.429	100	1.000	0.06	0.609	0.870
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Right Cheek	0mm	Ant 6	Simultaneous	155	5775	1	11.39	12.50	1.291	100	1.000	0.1	0.142	0.183
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Right Tilted	0mm	Ant 6	Simultaneous	155	5775	1	11.39	12.50	1.291	100	1.000	0.12	0.163	0.210
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Left Cheek	0mm	Ant 6	Simultaneous	155	5775	1	11.39	12.50	1.291	100	1.000	0.08	0.190	0.245
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Left Tilted	0mm	Ant 6	Simultaneous	155	5775	1	11.39	12.50	1.291	100	1.000	-0.17	0.239	0.309

14.2 Hotspot SAR

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Sample	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
835MHz																					
	GSM850	-	-	-	-	GPRS (4 Tx slots)	Front	5mm	Ant 0	ECI7	189	836.4	1	25.25	26.50	1.334	-	-	-0.05	0.445	0.593
22	GSM850	-	-	-	-	GPRS (4 Tx slots)	Back	5mm	Ant 0	ECI7	189	836.4	1	25.25	26.50	1.334	-	-	-0.11	0.855	**1.140**
	GSM850	-	-	-	-	GPRS (4 Tx slots)	Back	5mm	Ant 0	ECI7	189	836.4	2	25.25	26.50	1.334	-	-	0.06	0.812	1.083
	GSM850	-	-	-	-	GPRS (4 Tx slots)	Back	5mm	Ant 0	ECI7	189	836.4	3	25.25	26.50	1.334	-	-	0.06	0.695	0.927
	GSM850	-	-	-	-	GPRS (4 Tx slots)	Back	5mm	Ant 0	ECI7	128	824.2	1	25.12	26.50	1.374	-	-	0.18	0.619	0.851
	GSM850	-	-	-	-	GPRS (4 Tx slots)	Back	5mm	Ant 0	ECI7	251	848.8	1	24.97	26.50	1.422	-	-	0.14	0.788	1.121
	GSM850	-	-	-	-	GPRS (4 Tx slots)	Left Side	5mm	Ant 0	ECI7	189	836.4	1	25.25	26.50	1.334	-	-	-0.17	0.162	0.216
	GSM850	-	-	-	-	GPRS (4 Tx slots)	Right Side	5mm	Ant 0	ECI7	189	836.4	1	25.25	26.50	1.334	-	-	0.17	0.339	0.452
	GSM850	-	-	-	-	GPRS (4 Tx slots)	Bottom Side	5mm	Ant 0	ECI7	189	836.4	1	25.25	26.50	1.334	-	-	-0.05	0.718	0.957
	GSM850	-	-	-	-	GPRS (4 Tx slots)	Bottom Side	5mm	Ant 0	ECI7	128	824.2	1	25.12	26.50	1.374	-	-	0.01	0.705	0.969
	GSM850	-	-	-	-	GPRS (4 Tx slots)	Bottom Side	5mm	Ant 0	ECI7	251	848.8	1	24.97	26.50	1.422	-	-	0.1	0.781	1.111
23	WCDMA V	-	-	-	-	RMC 12.2Kbps	Back	5mm	Ant 0	ECI 7	4233	846.6	1	21.27	22.50	1.327	-	-	0.01	0.766	**1.017**
24	LTE Band 26	15M	QPSK	1	0	-	Back	5mm	Ant 0	ECI 7	26865	831.5	1	22.82	24.00	1.312	-	-	-0.04	0.678	**0.890**
25	FR1 n26	20M	QPSK	50	28	DFT-SCS-15KHz	Back	5mm	Ant 0	ECI 7	166300	831.5	1	22.68	24.00	1.355	-	-	-0.18	0.585	**0.793**
26	FR1 n5	25M	QPSK	1	1	DFT-SCS-15KHz	Back	5mm	Ant 0	ECI 7	167300	836.5	1	22.88	24.00	1.294	-	-	-0.07	0.487	**0.630**
1750MHz																					
	LTE Band 66	20M	QPSK	1	0	-	Front	5mm	Ant 0	ECI7	132322	1745	1	16.24	17.50	1.337	-	-	0.03	0.304	0.406
	LTE Band 66	20M	QPSK	50	0	-	Front	5mm	Ant 0	ECI7	132322	1745	1	16.22	17.50	1.343	-	-	0.01	0.239	0.321
	LTE Band 66	20M	QPSK	1	0	-	Back	5mm	Ant 0	ECI7	132322	1745	1	16.24	17.50	1.337	-	-	0.08	0.526	0.703
	LTE Band 66	20M	QPSK	50	0	-	Back	5mm	Ant 0	ECI7	132322	1745	1	16.22	17.50	1.343	-	-	0.14	0.423	0.568
	LTE Band 66	20M	QPSK	1	0	-	Left Side	5mm	Ant 0	ECI7	132322	1745	1	16.24	17.50	1.337	-	-	-0.09	0.036	0.048
	LTE Band 66	20M	QPSK	50	0	-	Left Side	5mm	Ant 0	ECI7	132322	1745	1	16.22	17.50	1.343	-	-	0.01	0.029	0.039
	LTE Band 66	20M	QPSK	1	0	-	Right Side	5mm	Ant 0	ECI7	132322	1745	1	16.24	17.50	1.337	-	-	0.08	0.036	0.048
	LTE Band 66	20M	QPSK	50	0	-	Right Side	5mm	Ant 0	ECI7	132322	1745	1	16.22	17.50	1.343	-	-	0.08	0.029	0.039
	LTE Band 66	20M	QPSK	1	0	-	Bottom Side	5mm	Ant 0	ECI7	132322	1745	1	16.24	17.50	1.337	-	-	-0.05	0.666	0.890
	LTE Band 66	20M	QPSK	1	0	-	Bottom Side	5mm	Ant 0	ECI7	132072	1720	1	16.18	17.50	1.355	-	-	-0.03	0.604	0.819
27	LTE Band 66	20M	QPSK	1	0	-	Bottom Side	5mm	Ant 0	ECI7	132572	1770	1	16.21	17.50	1.346	-	-	0.05	0.701	**0.943**
	LTE Band 66C	20M	QPSK	1	0	-	Bottom Side	5mm	Ant 0	ECI7	132572+ 132374	1770+ 1750.2	1	16.12	17.50	1.374	-	-	-0.12	0.636	0.874
	LTE Band 66	20M	QPSK	1	0	-	Bottom Side	5mm	Ant 0	ECI7	132572	1770	2	16.21	17.50	1.346	-	-	0.09	0.655	0.882
	LTE Band 66	20M	QPSK	1	0	-	Bottom Side	5mm	Ant 0	ECI7	132572	1770	3	16.21	17.50	1.346	-	-	0.06	0.623	0.838
	LTE Band 66	20M	QPSK	50	0	-	Bottom Side	5mm	Ant 0	ECI7	132322	1745	1	16.22	17.50	1.343	-	-	0.01	0.521	0.700
	LTE Band 66	20M	QPSK	50	0	-	Bottom Side	5mm	Ant 0	ECI7	132072	1720	1	16.10	17.50	1.380	-	-	-0.07	0.478	0.660
	LTE Band 66	20M	QPSK	50	0	-	Bottom Side	5mm	Ant 0	ECI7	132572	1770	1	16.16	17.50	1.361	-	-	-0.12	0.546	0.743
	LTE Band 66	20M	QPSK	100	0	-	Bottom Side	5mm	Ant 0	ECI7	132322	1745	1	16.17	17.50	1.358	-	-	-0.16	0.512	0.695
	LTE Band 66	20M	QPSK	1	0	-	Front	5mm	Ant 4	ECI7	132322	1745	1	18.55	19.50	1.245	-	-	0.03	0.225	0.280
	LTE Band 66	20M	QPSK	50	0	-	Front	5mm	Ant 4	ECI7	132322	1745	1	18.53	19.50	1.250	-	-	0.04	0.179	0.224
	LTE Band 66	20M	QPSK	1	0	-	Back	5mm	Ant 4	ECI7	132322	1745	1	18.55	19.50	1.245	-	-	0.02	0.375	0.467
	LTE Band 66	20M	QPSK	50	0	-	Back	5mm	Ant 4	ECI7	132322	1745	1	18.53	19.50	1.250	-	-	0.02	0.299	0.374
	LTE Band 66	20M	QPSK	1	0	-	Left Side	5mm	Ant 4	ECI7	132322	1745	1	18.55	19.50	1.245	-	-	0.04	0.065	0.081
	LTE Band 66	20M	QPSK	50	0	-	Left Side	5mm	Ant 4	ECI7	132322	1745	1	18.53	19.50	1.250	-	-	0.02	0.050	0.063
	LTE Band 66	20M	QPSK	1	0	-	Top Side	5mm	Ant 4	ECI7	132322	1745	1	18.55	19.50	1.245	-	-	-0.05	0.458	0.570
	LTE Band 66	20M	QPSK	50	0	-	Top Side	5mm	Ant 4	ECI7	132322	1745	1	18.53	19.50	1.250	-	-	0.06	0.303	0.379
1900MHz																					
28	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Bottom Side	5mm	Ant 0	ECI 7	512	1850.2	1	18.31	19.50	1.315	-	-	-0.09	0.725	**0.954**
29	WCDMA II	-	-	-	-	RMC 12.2Kbps	Bottom Side	5mm	Ant 0	ECI 7	9400	1880	1	14.16	15.50	1.361	-	-	0.01	0.565	**0.769**
30	LTE Band 2	20M	QPSK	1	0	-	Bottom Side	5mm	Ant 0	ECI 7	19100	1900	1	13.45	15.00	1.429	-	-	0.16	0.494	**0.706**
2600MHz																					
31	LTE Band 7	20M	QPSK	1	0	-	Back	5mm	Ant 1	ECI 7	20850	2510	1	18.03	19.00	1.250	-	-	-0.06	0.651	**0.814**
	LTE Band 7	20M	QPSK	1	0	-	Top Side	5mm	Ant 4	ECI 7	21100	2535	1	11.38	12.50	1.294	-	-	0.02	0.288	0.373

32	LTE Band 38	20M	QPSK	1	0	-	Top Side	5mm	Ant 4	ECI 7	38000	2595	1	11.92	13.00	1.282	62.9	1.006	0.02	0.355	**0.458**
33	LTE Band 41	20M	QPSK	1	0	-	Back	5mm	Ant 1	ECI 7	41055	2636.5	1	18.81	20.00	1.315	-	-	0.08	0.959	**1.261**
	LTE Band 41	20M	QPSK	1	0	-	Back	5mm	Ant 1	ECI 3	41055	2636.5	2	18.81	20.00	1.315	-	-	0.01	0.932	1.226
	LTE Band 41	20M	QPSK	1	0	-	Back	5mm	Ant 1	ECI 3	41055	2636.5	3	18.81	20.00	1.315	-	-	0.05	0.825	1.085
	LTE Band 41	20M	QPSK	1	0	-	Front	5mm	Ant 1	ECI 7	40620	2593	1	18.90	20.00	1.288	-	-	0.09	0.421	0.542
	LTE Band 41 _HPUE	20M	QPSK	1	0	-	Top Side	5mm	Ant 4	ECI 7	41055	2636.5	1	13.36	14.50	1.300	42.9	1.009	0.08	0.350	0.459
34	FR1 n7	50M	QPSK	135	68	DFT-SCS-15KHz	Back	5mm	Ant 1	ECI7	507000	2535	1	18.39	19.50	1.291	-	-	0.17	0.740	**0.956**
35	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Top Side	5mm	Ant 4	ECI 7	518598	2592.99	1	11.46	12.50	1.271	-	-	0.01	**0.304**	**0.386**
3500MHz																					
36	LTE Band 42	20M	QPSK	1	0		Back	5mm	Ant 5	ECI 7	42990	3540	1	14.31	16.00	1.476	62.9	1.006	0.04	0.417	**0.619**
37	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 1	ECI 7	656000	3840	1	21.50	23.50	1.585	-	-	-0.01	0.522	**0.827**
	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 1	ECI 7	656000	3840	2	21.50	23.50	1.585	-	-	0.06	0.504	0.799
	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 1	ECI 7	656000	3840	3	21.50	23.50	1.585	-	-	0.09	0.511	0.810
	FR1 n77	100M	QPSK	1	137	DFT-SCS-30KHz	Front	5mm	Ant 2	ECI 7	656000	3840	1	13.56	15.00	1.393	-	-	0.08	0.024	0.033
	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Front	5mm	Ant 2	ECI 7	656000	3840	1	13.49	15.00	1.416	-	-	0.01	0.031	0.044
	FR1 n77	100M	QPSK	1	137	DFT-SCS-30KHz	Back	5mm	Ant 2	ECI 7	656000	3840	1	13.56	15.00	1.393	-	-	0.03	0.312	0.435
	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 2	ECI 7	656000	3840	1	13.49	15.00	1.416	-	-	0.16	0.442	0.626
	FR1 n77	100M	QPSK	1	137	DFT-SCS-30KHz	Left Side	5mm	Ant 2	ECI 7	656000	3840	1	13.56	15.00	1.393	-	-	-0.08	0.148	0.206
	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Left Side	5mm	Ant 2	ECI 7	656000	3840	1	13.49	15.00	1.416	-	-	-0.08	0.185	0.262
	FR1 n77	100M	QPSK	1	137	DFT-SCS-30KHz	Top Side	5mm	Ant 2	ECI 7	656000	3840	1	13.56	15.00	1.393	-	-	0.1	0.016	0.022
	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Top Side	5mm	Ant 2	ECI 7	656000	3840	1	13.49	15.00	1.416	-	-	-0.18	0.020	0.028
	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 5	ECI 7	656000	3840	1	12.39	14.00	1.449	-	-	0.07	0.377	0.546
	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 7	ECI 7	656000	3840	1	16.32	16.50	1.042	-	-	-0.15	0.472	0.492

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Sample	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
WIFI&BT																	
38	WLAN2.4GHz	802.11b 1Mbps	Top Side	5mm	Ant 6	standalone	11	2462	1	14.11	15.50	1.377	100	1.000	0.19	0.418	**0.576**
39	Bluetooth	1Mbps	Top Side	5mm	Ant 6	Full Power	0	2402	1	14.61	15.50	1.227	76.73	1.086	-0.09	0.244	**0.325**
40	WLAN5.2GHz	802.11ac-VHT80 MCS0	Top Side	5mm	Ant 6	standalone	42	5210	1	13.38	15.00	1.452	100	1.000	0.01	0.348	**0.505**
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Front	5mm	Ant 6	standalone	155	5775	1	8.77	10.00	1.327	100	1.000	0.07	0.061	0.081
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Back	5mm	Ant 6	standalone	155	5775	1	8.77	10.00	1.327	100	1.000	-0.01	0.356	0.473
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Right Side	5mm	Ant 6	standalone	155	5775	1	8.77	10.00	1.327	100	1.000	0.05	0.098	0.130
41	WLAN5.8GHz	802.11ac-VHT80 MCS0	Top Side	5mm	Ant 6	standalone	155	5775	1	8.77	10.00	1.327	100	1.000	-0.01	0.525	**0.697**

14.3 Body Worn Accessory SAR

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Headset	Power State	Ch.	Freq. (MHz)	Sample	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
835MHz																						
42	GSM850	-	-	-	-	GPRS (4 Tx slots)	Back	5mm	Ant 0	-	ECI 3	189	836.4	1	26.23	27.50	1.340	-	-	-0.04	0.577	**0.773**
43	WCDMA V	-	-	-	-	RMC 12.2Kbps	Back	5mm	Ant 0	-	ECI 3	4233	846.6	1	21.32	22.50	1.312	-	-	0.01	0.766	**1.005**
44	LTE Band 26	15M	QPSK	1	0	-	Back	5mm	Ant 0	-	ECI 3	26865	831.5	1	22.82	24.00	1.312	-	-	-0.04	0.678	**0.890**
45	FR1 n26	20M	QPSK	50	28	DFT-SCS-15KHz	Back	5mm	Ant 0	-	ECI 3	166300	831.5	1	22.89	24.00	1.291	-	-	-0.18	0.585	**0.755**
46	FR1 n5	25M	QPSK	1	1	DFT-SCS-15KHz	Back	5mm	Ant 0	-	ECI 3	167300	836.5	1	22.88	24.00	1.294	-	-	-0.07	0.487	**0.630**
1750MHz																						
	LTE Band 66	20M	QPSK	1	0	-	Front	5mm	Ant 0	-	ECI3	132322	1745	1	17.30	18.50	1.318	-	-	0.04	0.340	0.448
	LTE Band 66	20M	QPSK	50	0	-	Front	5mm	Ant 0	-	ECI3	132322	1745	1	17.28	18.50	1.324	-	-	0.19	0.267	0.354
	LTE Band 66	20M	QPSK	1	0	-	Back	5mm	Ant 0	-	ECI3	132322	1745	1	17.30	18.50	1.318	-	-	0.02	0.607	0.800
	LTE Band 66	20M	QPSK	1	0	-	Back	5mm	Ant 0	-	ECI3	132072	1720	1	17.22	18.50	1.343	-	-	0.08	0.499	0.670
47	LTE Band 66	20M	QPSK	1	0	-	Back	5mm	Ant 0	-	ECI3	132572	1770	1	17.14	18.50	1.368	-	-	0.09	0.638	**0.873**
	LTE Band 66C	20M	QPSK	1	0	-	Back	5mm	Ant 0	-	ECI3	132572+ 132374	1770+ 1750.2	1	17.06	18.50	1.393	-	-	0.01	0.590	0.822
	LTE Band 66	20M	QPSK	50	0	-	Back	5mm	Ant 0	-	ECI3	132322	1745	1	17.28	18.50	1.324	-	-	0.18	0.472	0.625
	LTE Band 66	20M	QPSK	50	0	-	Back	5mm	Ant 0	-	ECI3	132072	1720	1	17.18	18.50	1.355	-	-	-0.16	0.400	0.542
	LTE Band 66	20M	QPSK	50	0	-	Back	5mm	Ant 0	-	ECI3	132572	1770	1	17.15	18.50	1.365	-	-	0.02	0.504	0.688
	LTE Band 66	20M	QPSK	100	0	-	Back	5mm	Ant 0	-	ECI3	132322	1745	1	17.22	18.50	1.343	-	-	0.1	0.458	0.615
	LTE Band 66	20M	QPSK	1	0	-	Front	12mm	Ant 0	-	ECI4	132322	1745	1	22.74	24.00	1.337	-	-	-0.06	0.454	0.607
	LTE Band 66	20M	QPSK	1	0	-	Back	17mm	Ant 0	-	ECI4	132572	1770	1	22.69	24.00	1.352	-	-	-0.06	0.446	0.603
	LTE Band 66	20M	QPSK	1	0	-	Front	5mm	Ant 4	-	ECI3	132322	1745	1	20.02	21.00	1.253	-	-	0.08	0.259	0.325
	LTE Band 66	20M	QPSK	50	0	-	Front	5mm	Ant 4	-	ECI3	132322	1745	1	19.64	20.50	1.219	-	-	0.03	0.206	0.251
	LTE Band 66	20M	QPSK	1	0	-	Back	5mm	Ant 4	-	ECI3	132322	1745	1	20.02	21.00	1.253	-	-	-0.04	0.506	0.634
	LTE Band 66	20M	QPSK	50	0	-	Back	5mm	Ant 4	-	ECI3	132322	1745	1	19.64	20.50	1.219	-	-	0.02	0.345	0.421
	LTE Band 66	20M	QPSK	1	0	-	Front	12mm	Ant 4	-	ECI4	132322	1745	1	20.50	21.50	1.259	-	-	0.11	0.099	0.125
	LTE Band 66	20M	QPSK	1	0	-	Back	17mm	Ant 4	-	ECI4	132322	1745	1	20.50	21.50	1.259	-	-	0.07	0.075	0.094
1900MHz																						
48	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Back	5mm	Ant 0	-	ECI 3	512	1850.2	1	18.35	19.50	1.303	-	-	0.15	0.616	**0.803**
49	WCDMA II	-	-	-	-	RMC 12.2Kbps	Back	5mm	Ant 0	-	ECI 3	9400	1880	1	15.71	17.00	1.346	-	-	-0.02	0.785	**1.057**
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Back	5mm	Ant 0	-	ECI 3	9400	1880	2	15.71	17.00	1.346	-	-	0.01	0.754	1.015
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Back	5mm	Ant 0	-	ECI 3	9400	1880	3	15.71	17.00	1.346	-	-	0.01	0.665	0.895
50	LTE Band 2	20M	QPSK	1	0	-	Back	5mm	Ant 0	-	ECI 3	19100	1900	1	15.20	16.50	1.349	-	-	0.08	0.659	**0.889**
2600MHz																						
51	LTE Band 7	20M	QPSK	1	0	-	Back	5mm	Ant 1	-	ECI 3	20850	2510	1	18.03	19.00	1.250	-	-	-0.06	0.651	**0.814**
	LTE Band 7	20M	QPSK	1	0	-	Back	5mm	Ant 4	-	ECI 3	21350	2560	1	15.89	17.00	1.291	-	-	0.09	0.618	0.798
	LTE Band 7	20M	QPSK	1	0	-	Back	5mm	Ant 4	-	ECI 3	21350	2560	2	15.89	17.00	1.291	-	-	0.01	0.602	0.777
	LTE Band 7	20M	QPSK	1	0	-	Back	5mm	Ant 4	-	ECI 3	21350	2560	3	15.89	17.00	1.291	-	-	0.06	0.615	0.794
52	LTE Band 38	20M	QPSK	1	0	-	Back	5mm	Ant 4	-	ECI 3	38000	2595	1	15.80	17.00	1.318	62.9	1.006	0.03	0.562	**0.745**
	LTE Band 41 _HPUE	20M	QPSK	1	0	-	Back	5mm	Ant 4	-	ECI 3	41055	2636.5	1	17.32	18.50	1.312	42.9	1.009	0.02	0.481	0.637
53	LTE Band 41	20M	QPSK	1	0	-	Back	5mm	Ant 1	-	ECI 3	41055	2636.5	1	18.81	20.00	1.315	-	-	0.08	0.959	**1.261**
	LTE Band 41	20M	QPSK	1	0	-	Back	5mm	Ant 1	-	ECI 3	41055	2636.5	2	18.81	20.00	1.315	-	-	0.01	0.932	1.226
	LTE Band 41	20M	QPSK	1	0	-	Back	5mm	Ant 1	-	ECI 3	41055	2636.5	3	18.81	20.00	1.315	-	-	0.05	0.825	1.085
	LTE Band 41	20M	QPSK	1	0	-	Front	5mm	Ant 1	-	ECI 3	40620	2593	1	18.90	20.00	1.288	-	-	0.09	0.421	0.542
54	FR1 n7	50M	QPSK	135	68	DFT-SCS-15KHz	Back	5mm	Ant 1	-	ECI 3	507000	2535	1	18.41	19.50	1.285	-	-	0.17	0.740	**0.951**
55	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Back	5mm	Ant 4	-	ECI 3	518598	2592.99	1	14.56	15.50	1.242	-	-	0.09	0.493	**0.612**
3500MHz																						
56	LTE Band 42	20M	QPSK	1	0	-	Back	5mm	Ant 5	-	ECI 3	42990	3540	1	15.78	17.50	1.486	62.9	1.006	0.05	0.466	**0.697**
	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 1	-	ECI 3	656000	3840	1	21.51	23.50	1.581	-	-	-0.01	0.522	0.825
57	FR1 n77	100M	QPSK	270	0	DFT-SCS-30KHz	Back	5mm	Ant 2	-	ECI 3	656000	3840	1	16.44	18.00	1.432	-	-	-0.14	0.754	**1.080**
	FR1 n77	100M	QPSK	270	0	DFT-SCS-30KHz	Back	5mm	Ant 2	-	ECI 3	656000	3840	2	16.44	18.00	1.432	-	-	0.05	0.712	1.020
	FR1 n77	100M	QPSK	270	0	DFT-SCS-30KHz	Back	5mm	Ant 2	-	ECI 3	656000	3840	3	16.44	18.00	1.432	-	-	0.06	0.725	1.038

	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 5	-	ECI 3	656000	3840	1	14.88	16.50	1.452	-	-	0.09	0.563	0.818
	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 5	-	ECI 3	656000	3840	2	14.88	16.50	1.452	-	-	0.03	0.535	0.777
	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 5	-	ECI 3	656000	3840	3	14.88	16.50	1.452	-	-	0.01	0.502	0.729
	FR1 n77	100M	QPSK	1	137	DFT-SCS-30KHz	Front	5mm	Ant 7	-	ECI 3	656000	3840	1	18.00	18.50	1.122	-	-	0.15	0.272	0.305
	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Front	5mm	Ant 7	-	ECI 3	656000	3840	1	17.96	18.50	1.132	-	-	-0.04	0.334	0.378
	FR1 n77	100M	QPSK	1	137	DFT-SCS-30KHz	Back	5mm	Ant 7	-	ECI 3	656000	3840	1	18.00	18.50	1.122	-	-	0.13	0.627	0.704
	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 7	-	ECI 3	656000	3840	1	17.96	18.50	1.132	-	-	0.01	0.794	0.899
	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 7	-	ECI 3	656000	3840	2	17.96	18.50	1.132	-	-	0.06	0.755	0.855
	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 7	-	ECI 3	656000	3840	3	17.96	18.50	1.132	-	-	0.01	0.567	0.642
	FR1 n77	100M	QPSK	270	0	DFT-SCS-30KHz	Back	5mm	Ant 7	-	ECI 3	656000	3840	1	17.86	18.50	1.159	-	-	0.06	0.606	0.702
	FR1 n77	100M	QPSK	1	137	DFT-SCS-30KHz	Front	12mm	Ant 7	-	ECI 4	656000	3840	1	23.97	24.50	1.130	-	-	0.03	0.151	0.171
	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Front	12mm	Ant 7	-	ECI 4	656000	3840	1	23.93	24.50	1.140	-	-	-0.16	0.161	0.184
	FR1 n77	100M	QPSK	1	137	DFT-SCS-30KHz	Back	17mm	Ant 7	-	ECI 4	656000	3840	1	23.97	24.50	1.130	-	-	0.01	0.290	0.328
	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Back	17mm	Ant 7	-	ECI 4	656000	3840	1	23.93	24.50	1.140	-	-	0.05	0.299	0.341

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Headset	Power State	Ch.	Freq. (MHz)	Sample	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
							WLAN&BT											
58	WLAN2.4GHz	802.11b 1Mbps	Back	5mm	Ant 6	-	Standalone	11	2462	1	19.11	20.50	1.377	100	1.000	0.02	0.838	**1.154**
	WLAN2.4GHz	802.11b 1Mbps	Back	5mm	Ant 6	-	Standalone	11	2462	2	19.11	20.50	1.377	100	1.000	0.06	0.801	1.103
	WLAN2.4GHz	802.11b 1Mbps	Back	5mm	Ant 6	-	Standalone	11	2462	3	19.11	20.50	1.377	100	1.000	0.09	0.811	1.117
59	Bluetooth	1Mbps	Back	5mm	Ant 6	-	Full Power	0	2402	1	14.61	15.50	1.227	76.73	1.086	0.09	0.161	**0.215**
	WLAN5.3GHz	802.11a 6Mbps	Front	5mm	Ant 6	-	Standalone	56	5280	1	16.45	18.00	1.429	100	1.000	0.08	0.729	1.042
	WLAN5.3GHz	802.11a 6Mbps	Front	5mm	Ant 6	-	Standalone	60	5300	1	16.42	18.00	1.439	100	1.000	0.01	0.759	1.092
	WLAN5.3GHz	802.11a 6Mbps	Back	5mm	Ant 6	-	Standalone	56	5280	1	16.45	18.00	1.429	100	1.000	0.03	0.655	0.936
60	WLAN5.3GHz	802.11a 6Mbps	Back	5mm	Ant 6	-	Standalone	60	5300	1	16.42	18.00	1.439	100	1.000	0.06	0.798	**1.148**
	WLAN5.3GHz	802.11a 6Mbps	Back	5mm	Ant 6	-	Standalone	60	5300	2	16.42	18.00	1.439	100	1.000	-0.08	0.717	1.032
	WLAN5.3GHz	802.11a 6Mbps	Back	5mm	Ant 6	-	Standalone	60	5300	3	16.42	18.00	1.439	100	1.000	0.06	0.778	1.119
	WLAN5.3GHz	802.11a 6Mbps	Front	12mm	Ant 6	-	Full Power	56	5280	1	18.51	20.00	1.409	100	1.000	0.1	0.254	0.358
	WLAN5.3GHz	802.11a 6Mbps	Back	17mm	Ant 6	-	Full Power	56	5280	1	18.51	20.00	1.409	100	1.000	-0.18	0.154	0.217
	WLAN5.3GHz	802.11ac-VHT80 MCS0	Front	5mm	Ant 6	-	Simultaneous	58	5290	1	12.41	14.00	1.442	100	1.000	0.1	0.255	0.368
	WLAN5.3GHz	802.11ac-VHT80 MCS0	Back	5mm	Ant 6	-	Simultaneous	58	5290	1	12.41	14.00	1.442	100	1.000	0.12	0.272	0.392
61	WLAN5.5GHz	802.11ac-VHT80 MCS0	Back	5mm	Ant 6	-	Standalone	138	5690	1	12.66	14.00	1.361	100	1.000	0.01	0.763	**1.039**
	WLAN5.5GHz	802.11ac-VHT80 MCS0	Back	5mm	Ant 6	-	Standalone	138	5690	2	12.66	14.00	1.361	100	1.000	0.06	0.715	0.973
	WLAN5.5GHz	802.11ac-VHT80 MCS0	Back	5mm	Ant 6	-	Standalone	138	5690	3	12.66	14.00	1.361	100	1.000	0.09	0.705	0.960
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Front	5mm	Ant 6	-	Standalone	155	5775	1	12.33	13.50	1.309	100	1.000	0.08	0.143	0.187
62	WLAN5.8GHz	802.11ac-VHT80 MCS0	Back	5mm	Ant 6	-	Standalone	155	5775	1	12.33	13.50	1.309	100	1.000	-0.09	0.831	**1.088**
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Back	5mm	Ant 6	-	Standalone	155	5775	2	12.33	13.50	1.309	100	1.000	-0.09	0.817	1.070
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Back	5mm	Ant 6	-	Standalone	155	5775	3	12.33	13.50	1.309	100	1.000	0.06	0.791	1.036
	WLAN5.8GHz	802.11a 6Mbps	Front	12mm	Ant 6		Full Power	149	5745	1	17.59	19.00	1.384	100	1.000	-0.17	0.123	0.170
	WLAN5.8GHz	802.11a 6Mbps	Back	17mm	Ant 6		Full Power	149	5745	1	17.59	19.00	1.384	100	1.000	-0.03	0.461	0.638
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Front	5mm	Ant 6	-	Simultaneous	155	5775	1	8.37	9.50	1.297	100	1.000	0.14	0.060	0.078
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Back	5mm	Ant 6	-	Simultaneous	155	5775	1	8.37	9.50	1.297	100	1.000	0.11	0.329	0.427

14.4 Product specific 10g SAR

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Sample	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
835MHz																					
	GSM850	-	-	-	-	GPRS (4 Tx slots)	Back	0mm	Ant 0	ECI6	189	836.4	1	28.33	29.50	1.309	-	-	-0.17	1.13	1.479
	GSM850	-	-	-	-	GPRS (4 Tx slots)	Bottom Side	0mm	Ant 0	ECI6	189	836.4	1	28.33	29.50	1.309	-	-	0.04	2.42	3.168
63	GSM850	-	-	-	-	GPRS (4 Tx slots)	Bottom Side	0mm	Ant 0	ECI6	128	824.2	1	28.19	29.50	1.352	-	-	0.02	2.45	**3.313**
	GSM850	-	-	-	-	GPRS (4 Tx slots)	Bottom Side	0mm	Ant 0	ECI6	128	824.2	2	28.19	29.50	1.352	-	-	0.01	2.32	3.137
	GSM850	-	-	-	-	GPRS (4 Tx slots)	Bottom Side	0mm	Ant 0	ECI6	128	824.2	3	28.19	29.50	1.352	-	-	0.02	1.76	2.380
	GSM850	-	-	-	-	GPRS (4 Tx slots)	Bottom Side	0mm	Ant 0	ECI6	251	848.8	1	28.09	29.50	1.384	-	-	-0.01	2.23	3.085
	GSM850	-	-	-	-	GPRS (4 Tx slots)	Back	16mm	Ant 0	ECI4	189	836.4	1	29.32	30.50	1.312	-	-	-0.08	0.306	0.402
	GSM850	-	-	-	-	GPRS (4 Tx slots)	Bottom Side	13mm	Ant 0	ECI4	128	824.2	1	29.26	30.50	1.330	-	-	0.05	0.121	0.161
64	WCDMA V	-	-	-	-	RMC 12.2Kbps	Bottom Side	0mm	Ant 0	ECI 6	4233	846.6	1	21.27	22.50	1.327	-	-	-0.18	1.19	**1.580**
1750MHz																					
	LTE Band 66	20M	QPSK	1	0	-	Front	0mm	Ant 0	ECI6	132322	1745	1	20.20	21.50	1.349	-	-	-0.17	1.06	1.430
	LTE Band 66	20M	QPSK	50	0	-	Front	0mm	Ant 0	ECI6	132322	1745	1	20.18	21.50	1.355	-	-	-0.15	0.853	1.156
	LTE Band 66	20M	QPSK	1	0	-	Back	0mm	Ant 0	ECI6	132322	1745	1	20.20	21.50	1.349	-	-	-0.12	1.20	1.619
	LTE Band 66	20M	QPSK	50	0	-	Back	0mm	Ant 0	ECI6	132322	1745	1	20.18	21.50	1.355	-	-	0.08	0.97	1.308
	LTE Band 66	20M	QPSK	1	0	-	Bottom Side	0mm	Ant 0	ECI6	132322	1745	1	20.20	21.50	1.349	-	-	0.16	1.99	2.684
	LTE Band 66	20M	QPSK	1	0	-	Bottom Side	0mm	Ant 0	ECI6	132072	1720	1	20.18	21.50	1.355	-	-	-0.09	1.88	2.548
65	LTE Band 66	20M	QPSK	1	0	-	Bottom Side	0mm	Ant 0	ECI6	132572	1770	1	20.18	21.50	1.355	-	-	0.04	2.07	**2.805**
	LTE Band 66C	20M	QPSK	1	0	-	Bottom Side	0mm	Ant 0	ECI6	132572+ 132374	1770+ 1750.2	1	20.02	21.50	1.406	-	-	0.01	1.97	2.770
	LTE Band 66	20M	QPSK	1	0	-	Bottom Side	0mm	Ant 0	ECI6	132572	1770	2	20.18	21.50	1.355	-	-	0.14	1.95	2.643
	LTE Band 66	20M	QPSK	1	0	-	Bottom Side	0mm	Ant 0	ECI6	132572	1770	3	20.18	21.50	1.355	-	-	0.01	2.01	2.724
	LTE Band 66	20M	QPSK	50	0	-	Bottom Side	0mm	Ant 0	ECI6	132322	1745	1	20.18	21.50	1.355	-	-	0.04	1.58	2.141
	LTE Band 66	20M	QPSK	50	0	-	Bottom Side	0mm	Ant 0	ECI6	132072	1720	1	20.03	21.50	1.403	-	-	-0.06	1.50	2.104
	LTE Band 66	20M	QPSK	50	0	-	Bottom Side	0mm	Ant 0	ECI6	132572	1770	1	20.10	21.50	1.380	-	-	-0.11	1.64	2.264
	LTE Band 66	20M	QPSK	100	0	-	Bottom Side	0mm	Ant 0	ECI6	132322	1745	1	20.15	21.50	1.365	-	-	0.01	1.55	2.115
	LTE Band 66	20M	QPSK	1	0	-	Front	9mm	Ant 0	ECI4	132322	1745	1	22.74	24.00	1.337	-	-	0.04	0.464	0.620
	LTE Band 66	20M	QPSK	1	0	-	Back	16mm	Ant 0	ECI4	132322	1745	1	22.74	24.00	1.337	-	-	0.03	0.331	0.442
	LTE Band 66	20M	QPSK	1	0	-	Bottom Side	13mm	Ant 0	ECI4	132572	1770	1	22.69	24.00	1.352	-	-	0.08	0.487	0.658
1900MHz																					
66	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Bottom Side	0mm	Ant 0	ECI 6	512	1850.2	1	22.70	24.00	1.349	-	-	0.09	2.17	**2.927**
67	WCDMA II	-	-	-	-	RMC 12.2Kbps	Bottom Side	0mm	Ant 0	ECI 6	9262	1852.4	1	17.91	19.50	1.442	-	-	0.07	2.07	**2.985**
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Bottom Side	0mm	Ant 0	ECI 6	9262	1852.4	2	17.91	19.50	1.442	-	-	0.01	2.01	2.899
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Bottom Side	0mm	Ant 0	ECI 6	9262	1852.4	3	17.91	19.50	1.442	-	-	0.06	2.03	2.927
68	LTE Band 2	20M	QPSK	1	0	-	Bottom Side	0mm	Ant 0	ECI 6	19100	1900	1	15.81	17.00	1.315	-	-	0.02	1.47	**1.933**
2600MHz																					
69	LTE Band 7	20M	QPSK	1	0	-	Back	0mm	Ant 1	ECI 6	20850	2510	1	18.98	20.00	1.265	-	-	-0.03	1.74	**2.201**
	LTE Band 7	20M	QPSK	1	0	-	Back	0mm	Ant 1	ECI 6	20850	2510	2	18.98	20.00	1.265	-	-	0.01	1.66	2.099
	LTE Band 7	20M	QPSK	1	0	-	Back	0mm	Ant 1	ECI 6	20850	2510	3	18.98	20.00	1.265	-	-	0.01	1.28	1.619
	LTE Band 7	20M	QPSK	1	0	-	Top Side	0mm	Ant 4	ECI 6	21100	2535	1	18.02	19.00	1.253	-	-	-0.03	1.21	1.516
70	LTE Band 38	20M	QPSK	1	0	-	Back	0mm	Ant 4	ECI 6	38000	2595	1	20.41	21.50	1.285	62.9	1.006	-0.06	1.090	**1.409**
	LTE Band 41	20M	QPSK	1	0	-	Back	0mm	Ant 1	ECI 6	39750	2506	1	20.00	21.00	1.259	-	-	0.04	1.27	1.599
71	LTE Band 41 _HPUE	20M	QPSK	1	0	-	Back	0mm	Ant 4	ECI 6	41055	2636.5	1	21.84	23.00	1.306	42.9	1.009	-0.08	1.39	**1.832**
72	FR1 n7	50M	QPSK	1	1	DFT-SCS-15KHz	Back	0mm	Ant 1	ECI6	507000	2535	1	18.93	20.00	1.279	-	-	0.15	1.02	**1.305**
73	FR1 n41	100M	QPSK	135	69	DFT-SCS-30KHz	Back	0mm	Ant 4	ECI 6	518598	2592.99	1	19.46	20.50	1.271	-	-	-0.06	1.45	**1.842**
	FR1 n41	100M	QPSK	135	69	DFT-SCS-30KHz	Back	0mm	Ant 4	ECI 6	518598	2592.99	2	19.46	20.50	1.271	-	-	0.03	1.26	1.601
	FR1 n41	100M	QPSK	135	69	DFT-SCS-30KHz	Back	0mm	Ant 4	ECI 6	518598	2592.99	3	19.46	20.50	1.271	-	-	0.05	1.36	1.728
3500MHz																					
74	LTE Band 42	20M	QPSK	1	0	-	Back	0mm	Ant 5	ECI 6	42990	3540	1	19.70	21.50	1.514	62.9	1.006	0.11	1.25	**1.903**

	LTE Band 42	20M	QPSK	1	0	-	Back	0mm	Ant 5	ECI 6	42990	3540	2	19.70	21.50	1.514	62.9	1.006	0.04	1.15	1.751
	LTE Band 42	20M	QPSK	1	0	-	Back	0mm	Ant 5	ECI 6	42990	3540	3	19.70	21.50	1.514	62.9	1.006	0.08	0.98	1.491
	FR1 n77	100M	QPSK	270	0	DFT-SCS-30KHz	Back	0mm	Ant 2	ECI 4	656000	3840	1	18.14	20.00	1.535	-	-	0.1	1.100	1.688
	FR1 n77	100M	QPSK	270	0	DFT-SCS-30KHz	Back	0mm	Ant 2	ECI 4	656000	3840	2	18.14	20.00	1.535	-	-	0.01	1.020	1.565
	FR1 n77	100M	QPSK	270	0	DFT-SCS-30KHz	Back	0mm	Ant 2	ECI 4	656000	3840	3	18.14	20.00	1.535	-	-	0.06	1.080	1.657
	FR1 n77	100M	QPSK	270	0	DFT-SCS-30KHz	Back	0mm	Ant 5	ECI 6	656000	3840	1	18.42	19.00	1.143	-	-	0.09	1.750	2.000
	FR1 n77	100M	QPSK	1	137	DFT-SCS-30KHz	Front	0mm	Ant 7	ECI 4	656000	3840	1	23.97	24.50	1.130	-	-	0.12	1.150	1.299
	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Front	0mm	Ant 7	ECI 4	656000	3840	1	23.93	24.50	1.140	-	-	0.08	1.370	1.562
	FR1 n77	100M	QPSK	1	137	DFT-SCS-30KHz	Back	0mm	Ant 7	ECI 4	656000	3840	1	23.97	24.50	1.130	-	-	-0.17	1.550	1.751
	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Back	0mm	Ant 7	ECI 4	656000	3840	1	23.93	24.50	1.140	-	-	-0.03	1.710	1.950
	FR1 n77	100M	QPSK	1	137	DFT-SCS-30KHz	Right Side	0mm	Ant 7	ECI 4	656000	3840	1	23.97	24.50	1.130	-	-	0.14	1.850	2.090
75	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Right Side	0mm	Ant 7	ECI 4	656000	3840	1	23.93	24.50	1.140	-	-	-0.11	2.190	**2.497**
	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Right Side	0mm	Ant 7	ECI 4	656000	3840	2	23.93	24.50	1.140	-	-	0.06	2.050	2.338
	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Right Side	0mm	Ant 7	ECI 4	656000	3840	3	23.93	24.50	1.140	-	-	0.01	1.890	2.155
	FR1 n77	100M	QPSK	270	0	DFT-SCS-30KHz	Right Side	0mm	Ant 7	ECI 4	656000	3840	1	22.88	23.50	1.153	-	-	0.14	1.490	1.719

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Sample	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
2450 MHz																	
76	WLAN2.4GHz	802.11b 1Mbps	Top Side	0mm	Ant 6	Full Power	11	2462	1	19.11	20.50	1.377	100	1.000	0.08	1.150	**1.584**
	WLAN2.4GHz	802.11b 1Mbps	Top Side	0mm	Ant 6	Full Power	11	2462	2	19.11	20.50	1.377	100	1.000	0.03	1.020	1.405
	WLAN2.4GHz	802.11b 1Mbps	Top Side	0mm	Ant 6	Full Power	11	2462	3	19.11	20.50	1.377	100	1.000	0.08	1.080	1.487
5000MHz																	
77	WLAN5.2GHz	802.11a 6Mbps	Top Side	0mm	Ant 6	Full Power	44	5220	1	17.91	19.50	1.442	100	1.000	-0.1	1.010	**1.457**
78	WLAN5.3GHz	802.11a 6Mbps	Top Side	0mm	Ant 6	Full Power	56	5280	1	18.50	20.00	1.413	100	1.000	-0.1	1.160	**1.639**
	WLAN5.3GHz	802.11a 6Mbps	Top Side	0mm	Ant 6	Full Power	56	5280	2	18.50	20.00	1.413	100	1.000	0.06	1.050	1.483
	WLAN5.3GHz	802.11a 6Mbps	Top Side	0mm	Ant 6	Full Power	56	5280	3	18.50	20.00	1.413	100	1.000	0.01	1.070	1.511
79	WLAN5.5GHz	802.11a 6Mbps	Top Side	0mm	Ant 6	Full Power	100	5500	1	17.56	19.00	1.393	100	1.000	0.04	1.060	**1.477**
	WLAN5.8GHz	802.11a 6Mbps	Back	0mm	Ant 6	Full Power	149	5745	1	17.55	19.00	1.396	100	1.000	0.01	1.050	1.466
80	WLAN5.8GHz	802.11a 6Mbps	Top Side	0mm	Ant 6	Full Power	149	5745	1	17.55	19.00	1.396	100	1.000	0.06	1.360	**1.899**
	WLAN5.8GHz	802.11a 6Mbps	Top Side	0mm	Ant 6	Full Power	149	5745	2	17.55	19.00	1.396	100	1.000	0.03	1.250	1.745
	WLAN5.8GHz	802.11a 6Mbps	Top Side	0mm	Ant 6	Full Power	149	5745	3	17.55	19.00	1.396	100	1.000	0.01	1.330	1.857
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Back	0mm	Ant 6	Simultaneous	155	5775	1	14.21	15.50	1.346	100	1.000	-0.02	0.611	0.822
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Top Side	0mm	Ant 6	Simultaneous	155	5775	1	14.21	15.50	1.346	100	1.000	-0.01	0.745	1.003

Plot No.	Band	Mode	Test Position	Gap (mm)	Freq. (MHz)	Sample	Power Drift (dB)	Measured 10g SAR (W/kg)
81	NFC	ASK	Back	0mm	13.56	1	0.01	**0.016**

14.5 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)	Sample	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Ratio	Reported 1g SAR (W/kg)
1st	GSM850	-	-	-	-	GPRS (4 Tx slots)	Back	5mm	Ant 0	ECI7	189	836.4	1	25.25	26.50	1.334	-	-	-0.11	0.855	1.0	1.140
2nd	GSM850	-	-	-	-	GPRS (4 Tx slots)	Back	5mm	Ant 0	ECI7	189	836.4	1	25.25	26.50	1.334	-	-	0.09	0.822	1.040	1.096
1st	LTE Band 41	20M	QPSK	1	0	-	Back	5mm	Ant 1	ECI 3	41055	2636.5	1	18.81	20.00	1.315	-	-	0.08	0.959	1.0	1.261
2nd	LTE Band 41	20M	QPSK	1	0	-	Back	5mm	Ant 1	ECI 3	41055	2636.5	1	18.81	20.00	1.315	-	-	0.06	0.925	1.037	1.217
1st	WLAN2.4GHz	-	-	-	-	802.11b 1Mbps	Back	5mm	Ant 6	Standalone	11	2462	1	19.11	20.50	1.377	100	1.000	0.02	0.838	1	1.154
2nd	WLAN2.4GHz	-	-	-	-	802.11b 1Mbps	Back	5mm	Ant 6	Standalone	11	2462	1	19.11	20.50	1.377	100	1.000	0.06	0.814	1.029	1.121
1st	WLAN5.8GHz	-	-	-	-	802.11ac-VHT80 MCS0	Back	5mm	Ant 6	Standalone	155	5775	1	12.33	13.50	1.309	100	1.000	-0.09	0.831	1	1.088
2nd	WLAN5.8GHz	-	-	-	-	802.11ac-VHT80 MCS0	Back	5mm	Ant 6	Standalone	155	5775	1	12.33	13.50	1.309	100	1.000	0.06	0.822	1.011	1.076

<10g>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Sample	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Ratio	Reported 10g SAR (W/kg)
1st	GSM850	-	-	-	-	GPRS (4 Tx slots)	Bottom Side	0mm	Ant 0	ECI6	128	824.2	1	28.19	29.50	1.352	-	-	0.02	2.45	1	3.313
2nd	GSM850	-	-	-	-	GPRS (4 Tx slots)	Bottom Side	0mm	Ant 0	ECI6	128	824.2	1	28.19	29.50	1.352	-	-	0.06	2.36	1.038	3.191
1st	LTE Band 66	20M	QPSK	1	0	-	Bottom Side	0mm	Ant 0	ECI6	132572	1770	1	20.18	21.50	1.355	-	-	0.04	2.07	1	2.805
2nd	LTE Band 66	20M	QPSK	1	0	-	Bottom Side	0mm	Ant 0	ECI6	132572	1770	1	20.18	21.50	1.355	-	-	0.01	2.01	1.030	2.724
1st	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Bottom Side	0mm	Ant 0	ECI 6	512	1850.2	1	22.70	24.00	1.349	-	-	0.09	2.17	1	2.927
2nd	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Bottom Side	0mm	Ant 0	ECI 6	512	1850.2	1	22.70	24.00	1.349	-	-	0.03	2.05	1.059	2.765
1st	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Right Side	0mm	Ant 7	ECI 4	656000	3840	1	23.93	24.50	1.140	-	-	-0.11	2.190	1	2.497
2nd	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Right Side	0mm	Ant 7	ECI 4	656000	3840	1	23.93	24.50	1.140	-	-	0.09	2.080	1.053	2.372

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.

15. Simultaneous Transmission Analysis

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

General Note:

1. This device supports VoIP in GPRS, EGPRS, WCDMA, LTE and 5GNR (e.g. for 3rd-party VoIP), LTE supports VoLTE operation.
2. WWAN above includes 5G NR bands and EN-DC combination.
3. EUT will choose each GSM, WCDMA, LTE and 5GNR according to the network signal condition; therefore, they will not operate simultaneously at any moment.
4. This device 2.4GHz WLAN support hotspot operation and Bluetooth support tethering applications.
5. This device 5.2GHz WLAN/5.8GHz WLAN support hotspot operation, and 5.2GHz WLAN/5.8GHz WLAN supports WLAN Direct (GC/GO), and 5.3GHz / 5.5GHz supports WLAN Direct (GC only).
6. According to the EUT characteristic, WLAN 5GHz and Bluetooth can not transmit simultaneously.
7. According to the EUT characteristic, WLAN 5GHz and WLAN 2.4GHz can not transmit simultaneously.
8. WLAN 2.4GHz and Bluetooth share the same antenna and they cannot transmit simultaneously.
9. NFC can transmit simultaneously with other Radios in extremity exposure condition.
10. The worst case 5 GHz WLAN SAR for each configuration was used for SAR summation.
11. For Headset SAR and non-Headset SAR always chose higher SAR to do co-located analysis.
12. For 5GNR EN-DC mode, standalone SAR performed for 5GNR NSA band with the maximum power, EN-DC SAR summed EN-DC mode 5GNR standalone SAR and LTE standalone SAR, the result of EN-DC SAR is more conservatively.
13. When stand-alone SAR is not required for a transmitter or antenna, its SAR is considered zero in the SAR summing process to assess Multi-band transmission SAR compliance.
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.

General Note: For the verified maximum SAR from chapter 14.1 to 14.4, when the SAR test results were less than original SAR results (Sporton SAR report no.: FA352916-01), there is no need to consider co-located SAR for original report had been performed conservatively. For the SAR results were higher than original SAR results and full tested bands, they were evaluated to do simultaneous transmission analysis with WLAN/BT.

1) This variant report adds DC_7A_n77A combination for XT2435-2, and the Original application supports DC_7A_n78A combination, and their EN-DC Configuration as following table.

ENDC	Antenna Tx	
	LTE TX	NR TX
DC_7A_n78A	Ant 1	Ant 5
DC_7A_n77A	Ant 1	Ant 5

2) Since the supported frequency span for 5GNR n78 falls completely within the support's frequency span for 5GNR n77, both 5GNR bands have the same target power, and both 5GNR bands share the same transmission path, so the original filing was used to determine simultaneous transmission compliance as it is more conservative.

15.1 Head Exposure Conditions

WWAN Band	Exposure Position	1	2	3	4	1+2	1+3	1+4
		WWAN	WLAN2.4GHz Ant 6	WLAN5GHz Ant 6	Bluetooth Ant 6	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)
LTE Band 66 Ant 0	Right Cheek	0.119	0.095	0.339	0.124	0.21	0.46	0.24
	Right Tilted	0.068	0.119	0.371	0.158	0.19	0.44	0.23
	Left Cheek	0.095	0.299	0.404	0.393	0.39	0.50	0.49
	Left Tilted	0.064	0.372	0.366	0.473	0.44	0.43	0.54
LTE Band 66 Ant 4	Right Cheek	0.551	0.095	0.339	0.124	0.65	0.89	0.68
	Right Tilted	0.682	0.119	0.371	0.158	0.80	1.05	0.84
	Left Cheek	0.378	0.299	0.404	0.393	0.68	0.78	0.77
	Left Tilted	0.418	0.372	0.366	0.473	0.79	0.78	0.89

15.2 Hotspot Exposure Conditions

WWAN Band	Exposure Position	1	2	3	4	1+2	1+3	1+4
		WWAN	WLAN2.4G Ant 6	WLAN5G Ant 6	Bluetooth Ant 6	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)
LTE Band 66 Ant 0	Front	0.406	0.245	0.395	0.183	0.65	0.80	0.59
	Back	0.703	0.408	0.487	0.310	1.11	1.19	1.01
	Left side	0.048				0.05	0.05	0.05
	Right side	0.048	0.220	0.415	0.151	0.27	0.46	0.20
	Top side		0.652	0.705	0.490	0.65	0.71	0.49
	Bottom side	0.943				0.94	0.94	0.94
LTE Band 66 Ant 4	Front	0.280	0.245	0.395	0.183	0.53	0.68	0.46
	Back	0.467	0.408	0.487	0.310	0.88	0.95	0.78
	Left side	0.081				0.08	0.08	0.08
	Right side		0.220	0.415	0.151	0.22	0.42	0.15
	Top side	0.570	0.652	0.705	0.490	1.22	1.28	1.06
	Bottom side					0.00	0.00	0.00

15.3 Body-Worn Accessory Exposure Conditions

WWAN Band	Exposure Position	1	2	3	4	1+2	1+3	1+4
		WWAN	WLAN2.4G Ant 6	WLAN5G Ant 6	Bluetooth Ant 6	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)
FR1 n77 Ant 7	Front	0.378	0.318	0.383	0.260	0.696	0.761	0.638
	Back	0.899	0.440	0.431	0.443	1.339	1.330	1.342
LTE Band 66 Ant0	Front	0.448	0.318	0.383	0.260	0.766	0.831	0.708
	Back	0.873	0.440	0.431	0.443	1.313	1.304	1.316
LTE Band 66 Ant4	Front	0.325	0.318	0.383	0.260	0.643	0.708	0.585
	Back	0.634	0.440	0.431	0.443	1.074	1.065	1.077

Sensor-Off

WWAN Band	Exposure Position	1	2	3	4	1+2	1+3	1+4
		WWAN	WLAN2.4G Ant 6	WLAN5G Ant 6	Bluetooth Ant 6	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)
LTE Band 66 Ant 0	Front at 12mm	0.607	0.244	0.389	0.013	0.85	1.00	0.62
	Back at 17mm	0.603	0.125	0.654	0.042	0.73	1.26	0.65

15.4 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	5	1+2+5	1+3+5	1+5
		WWAN	WLAN2.4G Ant 6	WLAN5G Ant 6	NFC	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)
FR1 n77 Ant 7	Front	1.562		0.809	0.001	1.56	2.37	1.56
	Back	1.950	0.868	0.863	0.022	2.84	2.84	1.97
	Left side					0.00	0.00	0.00
	Right side	2.497		0.843		2.50	3.34	2.50
	Top side		1.179	1.025		1.18	1.03	0.00
	Bottom side				0.010	0.01	0.01	0.01
LTE Band 66 Ant 0	Front	0.620		0.809	0.001	0.62	1.43	0.62
	Back	0.442	0.868	0.863	0.022	1.33	1.33	0.46
	Left side					0.00	0.00	0.00
	Right side			0.843		0.00	0.84	0.00
	Top side		1.179	1.025		1.18	1.03	0.00
	Bottom side	0.658			0.010	0.67	0.67	0.67

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

16. Uncertainty Assessment

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

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

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

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

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

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

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

(b) κ is the coverage factor

Standard Uncertainty for Assumed Distribution

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

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

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

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

17. References

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

[4] SPEAG DASY System Handbook

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

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

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

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

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

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

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