FCC SAR Test Report

APPLICANT	:	**FairPhone B.V.**
EQUIPMENT	:	**Fairphone 4 5G**
BRAND NAME	:	**FAIRPHONE**
MODEL NAME	:	**FP4**
FCC ID	:	**2AUWUFP4**
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 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

ilac-MRA ACCREDITED Cert #5145.02

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA152403-02	Rev. 01	Initial issue of report.	Apr. 08, 2022

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **FairPhone B.V., Fairphone 4 5G, FP4,** are as follows.

Highest 1g SAR Summary						
Equipment Class	Frequency Band		Head (Separation 0mm)	Hotspot (Separation 10mm)	Body-worn (Separation 10mm)	Highest Simultaneous Transmission 1g SAR (W/kg)
			1g SAR (W/kg)			
Licensed	GSM	GSM850	0.92	0.47	0.47	1.33
		GSM1900	0.94	0.43	0.43	
	WCDMA	Band II	0.93	0.69	0.69	
		Band IV	0.93	0.72	**0.72**	
		Band V	0.94	0.50	0.50	
	LTE	Band 2	0.94	0.69	0.69	
		Band 4	0.93	0.60	0.47	
		Band 5	0.93	0.44	0.44	
		Band 7	0.18	0.67	0.33	
		Band 12	0.84	0.48	0.47	
		Band 41/38	0.14	0.67	0.38	
		Band 71	0.90	0.45	0.45	
	5G NR	n5	**0.98**	0.39	0.39	
		n71	0.84	0.42	0.39	
		n77	0.94	**0.87**	0.38	
		n78	0.91	0.65	0.42	
DTS	WLAN	2.4GHz WLAN	0.14	0.38	0.38	1.10
NII		5GHz WLAN	0.40	0.29	0.32	1.33
DSS	Bluetooth	2.4GHz Bluetooth	<0.10	0.10	0.10	1.01

Highest 10g SAR Summary				
Equipment Class	Frequency Band		Product Specific 10g SAR (W/kg) (Separation 0mm)	Highest Simultaneous Transmission 10g SAR (W/kg)
Licensed	LTE	Band 7	**2.19**	2.19
	5G NR	n77	2.10	
		n78	2.17	
NII	WLAN	5GHz WLAN	0.66	2.19
Date of Testing:			2022/3/2 ~ 2022/3/20	

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

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

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

2. Administration Data

Sporton International 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 FAX : +86-512-57900958		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	SAR07-KS	CN1257	314309

Applicant	
Company Name	FairPhone B.V.
Address	Van Diemenstraat 200, 1013 CP, Amsterdam, The Netherlands

Manufacturer	
Company Name	FairPhone B.V.
Address	Van Diemenstraat 200, 1013 CP, Amsterdam, The Netherlands

3. Guidance Applied

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

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

4. Equipment Under Test (EUT) Information

4.1 General Information

Product Feature & Specification	
Equipment Name	Fairphone 4 5G
Brand Name	FAIRPHONE
Model Name	FP4
FCC ID	2AUWUFP4
IMEI Code	355870090102457
Wireless Technology and Frequency Range	GSM850: 824 MHz ~ 849 MHz GSM1900: 1850 MHz ~ 1910 MHz WCDMA Band II: 1850 MHz ~ 1910 MHz WCDMA Band IV: 1710 MHz ~ 1755 MHz WCDMA Band V: 824 MHz ~ 849 MHz LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 38: 2570 MHz ~ 2620 MHz LTE Band 41: 2496 MHz ~ 2690 MHz LTE Band 71: 663 MHz ~ 698 MHz 5G NR n5: 824 MHz ~ 849 MHz 5G NR n71 : 663 MHz ~ 698 MHz 5G NR n77: 3450 MHz ~ 3550 MHz, 3700 MHz ~ 3980 MHz 5G NR n78: 3450 MHz ~ 3550 MHz, 3700 MHz ~ 3800 MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5700 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz NFC: 13.56 MHz
Mode	GSM/GPRS/EGPRS RMC/AMR 12.2Kbps HSDPA HSUPA DC-HSDPA HSPA+(16QAM uplink is not 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 HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE NFC: ASK
HW Version	1.0
SW Version	FP4.FC1G.A.017-userdebug.20210804
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 33.

5. This device has Single SIM card slot + eSIM. For Single SIM card slot + eSIM mobile supports Dual SIM Dual standby. The WWAN radio transmission will be enabled by either one SIM at a time (single active). We chose Single SIM card mobile to perform all tests.
6. The device implements the power management and receiver detection/hotspot mode for SAR compliance at different exposure conditions (head, body-worn, hotspot, extremity) and the Qualcomm smart transmit will manage to ensure the power level not exceeding the associated power table. And the device will invoke corresponding work scenarios power level base on frequency bands/antennas, which can refer to power table at appendix E.
7. 5G NR n78 supports HPUE, HPUE power and SAR testing performed separately.
8. 5GNR n78 HUPE with higher power, 5GNR n78 HUPE SAR can represent power class 3 level SAR.
9. NSA and SA mode should perform SAR separately. For the maximum power of NSA mode is the same as SA total power level, so NSA SAR can represent SA mode SAR.
10. 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.
11. 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.
12. 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.
13. This device supports 5GNR FR1 bands as following table, including NSA mode and SA mode. NSA and SA mode performed SAR separately.

<5G NR>

Mode	Band	Duplex	SCS(KHz)	Bandwidths(BW)
NSA	n5	FDD	15	5, 10, 15, 20
	n71	FDD	15	5, 10, 15, 20
	n77	TDD	30	20, 40, 50, 60,70, 80, 90, 100
	n78	TDD	30	20, 30, 40, 50, 60, 70, 80, 90, 100
SA	n77	TDD	30	20, 40, 50, 60,70, 80, 90, 100
	n78	TDD	30	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	2AUWUFP4
Equipment Name	Fairphone 4 5G
Operating Frequency Range of each LTE transmission band	LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 38: 2570 MHz ~ 2620 MHz LTE Band 41: 2496 MHz ~ 2690 MHz LTE Band 71: 663 MHz ~ 698 MHz
Channel Bandwidth	LTE Band 2:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 4:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 5:1.4MHz, 3MHz, 5MHz, 10MHz LTE Band 7: 5MHz, 10MHz, 15MHz, 20MHz LTE Band 12:1.4MHz, 3MHz, 5MHz, 10MHz LTE Band 38: 5MHz, 10MHz, 15MHz, 20MHz LTE Band 41: 5MHz, 10MHz, 15MHz, 20MHz LTE Band 71: 5MHz, 10MHz, 15MHz, 20MHz
uplink modulations used	QPSK / 16QAM / 64QAM
LTE Voice / Data requirements	Voice and Data
LTE Release Version	R15, Cat18
CA Support	Supported, Downlink only
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 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 13.
LTE Carrier Aggregation Combinations	Inter-Band and Intra-Band possible combinations and the detail power verification please referred to section 13.
LTE Carrier Aggregation Additional Information	This device supports maximum of 3 carriers in the downlink.

Transmission (H, M, L) channel numbers and frequencies in each LTE band												
LTE Band 2												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	18607	1850.7	18615	1851.5	18625	1852.5	18650	1855	18675	1857.5	18700	1860
M	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880
H	19193	1909.3	19185	1908.5	19175	1907.5	19150	1905	19125	1902.5	19100	1900
LTE Band 4												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	19957	1710.7	19965	1711.5	19975	1712.5	20000	1715	20025	1717.5	20050	1720
M	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5
H	20393	1754.3	20385	1753.5	20375	1752.5	20350	1750	20325	1747.5	20300	1745
LTE Band 5												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)				
L	20407	824.7	20415	825.5	20425	826.5	20450	829				
M	20525	836.5	20525	836.5	20525	836.5	20525	836.5				
H	20643	848.3	20635	847.5	20625	846.5	20600	844				
LTE Band 7												
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)				
L	20775	2502.5	20800	2505	20825	2507.5	20850	2510				
M	21100	2535	21100	2535	21100	2535	21100	2535				
H	21425	2567.5	21400	2565	21375	2562.5	21350	2560				
LTE Band 12												
	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	23017	699.7	23025	700.5	23035	701.5	23060	704				
M	23095	707.5	23095	707.5	23095	707.5	23095	707.5				
H	23173	715.3	23165	714.5	23155	713.5	23130	711				

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 71								
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	133147	665.5	133172	668	133197	670.5	133222	673
M	133247	675.5	133272	678	133297	680.5	133322	683
H	133447	695.5	133422	693	133397	690.5	133372	688

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 n71 : 663 MHz ~ 698 MHz 5G NR n77: 3450 MHz ~ 3550 MHz, 3700 MHz ~ 3980 MHz 5G NR n78: 3450 MHz ~ 3550 MHz, 3700 MHz ~ 3800 MHz
Channel Bandwidth	5G NR n5: 5MHz, 10MHz, 15MHz, 20MHz 5G NR n71: 5MHz, 10MHz, 15MHz, 20MHz 5G NR n77: 20MHz, 40MHz, 50MHz, 60MHz, 70MHz, 80MHz, 90MHz, 100MHz 5G NR n78: 20MHz, 30MHz, 40MHz, 50MHz, 60MHz, 70MHz, 80MHz, 90MHz, 100MHz
SCS	FDD: SCS15KHz, TDD: SCS30KHz
uplink modulations used	DFT-s-OFDM: PI/2 BPSK / QPSK / 16QAM / 64QAM / 256QAM CP-OFDM: QPSK / 16QAM / 64QAM / 256QAM
A-MPR (Additional MPR) disabled for SAR Testing?	Yes
LTE Anchor Bands for n5	LTE B7
LTE Anchor Bands for n71	LTE B2/7
LTE Anchor Bands for n77	LTE B7
LTE Anchor Bands for n78	LTE B7/38/41

Transmission (H, M, L) channel numbers and frequencies in each 5G NR band								
NR Band 5								
	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	165300	826.5	165800	829	166300	831.5	166800	834
M	167300	836.5	167300	836.5	167300	836.5	167300	836.5
H	169300	846.5	168800	844	168300	841.5	167800	839

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

NR Band 77																
	Bandwidth 20MHz		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)
L	647334	3710.01	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	656000	3840	656000	3840	656000	3840	656000	3840
H	664668	3970.02	664000	3960	663668	3955.02	663334	3950.01	663000	3945	662668	3940.02	662334	3935.01	662000	3930

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

For <3450 MHz ~ 3550 MHz >

NR Band 77																
	Bandwidth 20MHz		Bandwidth 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)
L	630668	3460.02	631334	3470.01	631668	3475.02	632000	3480	632334	3485.01	632668	3490.02	633000	3495		
M	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01
H	636000	3540	635334	3530.01	635000	3525	634668	3520.02	634334	3515.01	634000	3510	633668	3505.02		

NR Band 78																		
	Bandwidth 20MHz		Bandwidth 30MHz		Bandwidth 40MHz		Bandwidth 50MHz		Bandwidth 60MHz		Bandwidth 70MHz		Bandwidth 80MHz		Bandwidth 90MHz		Bandwidth 100MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	630668	3460.02	631000	3465	631334	3470.01	631668	3475.02	632000	3480	632334	3485.01	632668	3490.02	633000	3495		
M	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01
H	636000	3540	635668	3535.02	635334	3530.01	635000	3525	634668	3520.02	634334	3515.01	634000	3510	633668	3505.02		

5. Smart Transmit feature for RF Exposure compliance

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

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

<Terminologies in this report>

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

<SAR Characterization>

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

<SAR design target and uncertainty>

	Uncertainty dB (k=2)
Sub6 radio TxAGC	1.0
Device to device variation	1.2
Total uncertainty	1.49

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

$$SAR_design_target < SAR_{regulatory_limit} \times 10^{\frac{-total\ uncertainty}{10}}$$

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

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

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

Band	Duty Cycle %	Antenna	Head DSI 3	Body-Worn&Hotspot&Extremity DSI 1	Pmax*
GSM850 (2 Tx slots)	25	Ant 0	24.1	27.5	24.5
GSM1900 (2 Tx slots)	25	Ant 3	19.4	24.9	21.5
WCDMA II	100	Ant 3	18.0	24.8	23.5
WCDMA IV	100	Ant 3	18.3	24.6	23.5
WCDMA V	100	Ant 0	23.6	27.2	24.5
LTE Band 2	100	Ant 3	18.6	24.3	23.0
LTE Band 4	100	Ant 3	19.2	24.9	23.0
LTE Band 5	100	Ant 0	23.2	27.3	24.0
LTE Band 7	100	Ant 1	30.6	20.0	23.5
LTE Band 12	100	Ant 0	24.5	26.9	24.0
LTE Band 71	100	Ant 0	24.2	27.2	24.0
LTE Band 41(38)	63.3	Ant 1	29.7	22.7	21.5
5G NR n5	100	Ant 0	22.9	27.3	23.5
5G NR n71	100	Ant 0	22.6	27.0	23.5
5G NR n77(78)	100	Ant 4	20.4	20.4	23.5
5G NR n78(HPUE)	100	Ant 4	20.4	20.4	26.0
5G NR n77(78) Part 27O	100	Ant 7	21.3	26.7	16.0
5G NR n77(78) Part 27Q	100	Ant 7	21.3	26.7	18.5
5G NR n78(HPUE) Part 27O	100	Ant 7	28.1	25.9	17.0
5G NR n78(HPUE) Part 27Q	100	Ant 7	28.1	25.9	21.5

Note: 1) *P_{max} is used for RF tune up procedure. The maximum allowed output power is equal to Pmax + 1.0 dB uncertainty.
2) All P_{limit} power levels entered in the Table correspond to average power levels after accounting for duty cycle in the case TDD modulation schemes (for e.g., GSM & LTE TDD).
3) The max allowed output power is the Plimit + 1.0 dB device uncertainty, and if Plimit is higher than Pmax, the device output power will be Pmax instead.
4) 5G NR n77/n78 ant 7 support SRS (Sounding Reference Signal) functionality.

6. RF Exposure Limits

6.1 Uncontrolled Environment

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

6.2 Controlled Environment

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

Limits for Occupational/Controlled Exposure (W/kg)

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

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

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

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

7. Specific Absorption Rate (SAR)

7.1 Introduction

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

7.2 SAR Definition

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

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

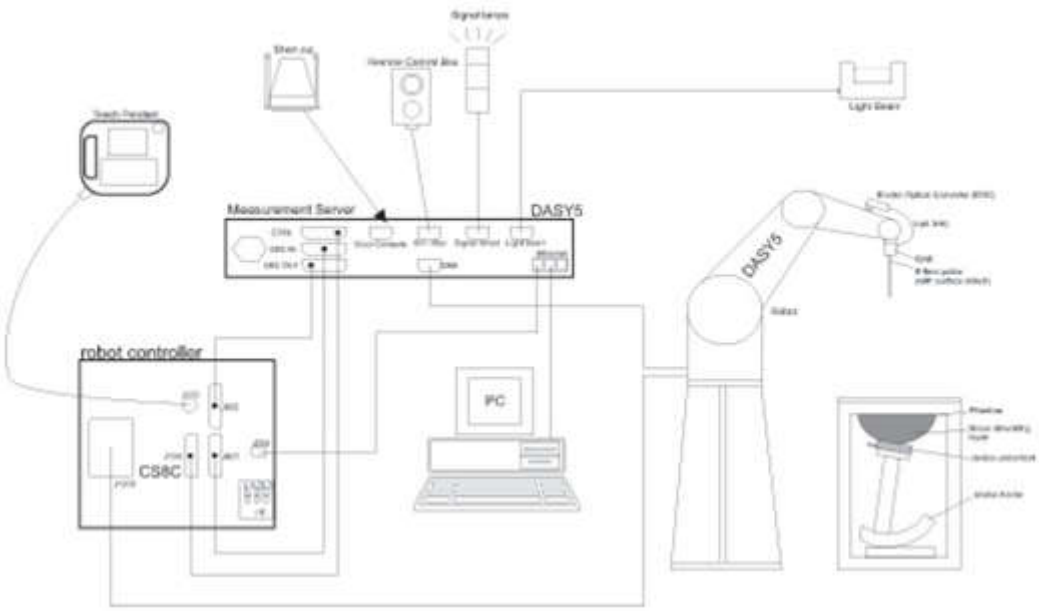
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

8. System Description and Setup

The DASY5 system used for performing compliance tests consists of the following items:



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

8.1 E-Field Probe

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

<EX3DV4 Probe>

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

8.2 Data Acquisition Electronics (DAE)

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

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

Photo of DAE

8.3 Phantom

<SAM Twin Phantom>

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

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

<ELI Phantom>

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

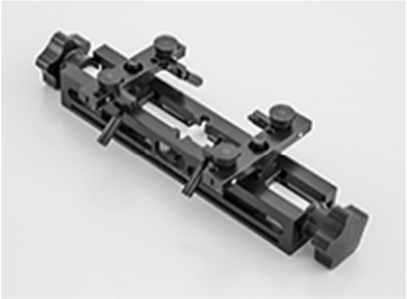
The ELI phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI4 is fully compatible with standard and all known tissue simulating liquids.

8.4 Device Holder

<Mounting Device for Hand-Held Transmitter>

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

Mounting Device for Hand-Held Transmitters



Mounting Device Adaptor for Wide-Phones

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

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

Mounting Device for Laptops

9. Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

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

<SAR measurement>

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

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

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

9.1 Spatial Peak SAR Evaluation

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

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

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

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

9.2 Power Reference Measurement

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

9.3 Area Scan

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

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

	≤ 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.	

9.4 Zoom Scan

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

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

			≤ 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.

9.5 Volume Scan Procedures

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing. When all volume scan were completed, the software, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

9.6 Power Drift Monitoring

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

10. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	750MHz System Validation Kit	D750V3	1087	2019/3/27	2022/3/24
SPEAG	835MHz System Validation Kit	D835V2	4d258	2020/5/7	2023/5/6
SPEAG	1750MHz System Validation Kit	D1750V2	1090	2019/3/27	2022/3/25
SPEAG	1900MHz System Validation Kit	D1900V2	5d170	2019/3/26	2022/3/24
SPEAG	2450MHz System Validation Kit	D2450V2	908	2019/3/25	2022/3/23
SPEAG	2600MHz System Validation Kit	D2600V2	1061	2020/11/26	2023/11/25
SPEAG	3500MHz System Validation Kit	D3500V2	1037	2020/11/25	2023/11/24
SPEAG	3700MHz System Validation Kit	D3700V2	1008	2020/11/25	2023/11/24
SPEAG	3900MHz System Validation Kit	D3900V2	1048	2020/5/14	2023/5/13
SPEAG	5000MHz System Validation Kit	D5GHzV2	1113	2019/9/24	2022/9/22
SPEAG	Data Acquisition Electronics	DAE4	1650	2021/6/9	2022/6/8
SPEAG	Dosimetric E-Field Probe	EX3DV4	3935	2021/4/29	2022/4/28
SPEAG	SAM Twin Phantom	SAM Twin	TP-2024	NCR	NCR
SPEAG	Phone Positioner	N/A	N/A	NCR	NCR
Anritsu	Radio Communication Analyzer	MT8821C	6201432831	2021/4/13	2022/4/12
Agilent	ENA Series Network Analyzer	E5071C	MY46106933	2021/7/31	2022/7/30
SPEAG	Dielectric Probe Kit	DAK-3.5	1138	2021/6/9	2022/6/8
Anritsu	Vector Signal Generator	MG3710A	6201682672	2022/1/6	2023/1/5
Rohde & Schwarz	Power Meter	NRVD	102081	2021/8/12	2022/8/11
Rohde & Schwarz	Power Sensor	NRV-Z5	100538	2021/8/12	2022/8/11
Rohde & Schwarz	Power Sensor	NRV-Z5	100539	2021/8/12	2022/8/11
R&S	CBT BLUETOOTH TESTER	CBT	101246	2021/4/12	2022/4/11
EXA	Spectrum Analyzer	FSV7	101631	2021/10/14	2022/10/13
FLUKE	DIGITAC THERMOMETER	51II	97240029	2021/8/13	2022/8/12
Testo	Thermo-Hygrometer	608-H1	1241332102	2022/1/6	2023/1/5
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.

11. System Verification

11.1 Tissue Simulating Liquids

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

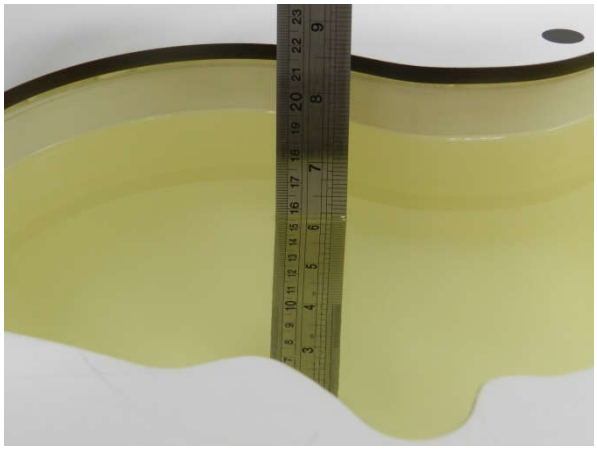


Fig 11.1 Photo of Liquid Height for Head SAR

Fig 11.2 Photo of Liquid Height for Body SAR

11.2 Tissue Verification

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

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

Simulating Liquid for 5GHz, Manufactured by SPEAG

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

<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Tissue Type	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
750	Head	22.7	0.906	42.762	0.89	41.90	1.80	2.06	±5	2022/3/2
835	Head	22.9	0.935	42.525	0.90	41.50	3.89	2.47	±5	2022/3/2
1750	Head	22.8	1.409	40.678	1.37	40.10	2.85	1.44	±5	2022/3/3
1900	Head	22.7	1.422	39.228	1.40	40.00	1.57	-1.93	±5	2022/3/3
2450	Head	22.7	1.820	39.224	1.80	39.20	1.11	0.06	±5	2022/3/4
2600	Head	22.8	2.011	40.592	1.96	39.00	2.60	4.08	±5	2022/3/4
3500	Head	22.9	2.787	39.107	2.91	37.90	-4.23	3.18	±5	2022/3/5
3700	Head	22.7	3.033	38.161	3.12	37.70	-2.79	1.22	±5	2022/3/6
3900	Head	22.7	3.247	37.754	3.32	37.50	-2.20	0.68	±5	2022/3/6
5250	Head	22.9	4.649	36.233	4.71	35.90	-1.30	0.93	±5	2022/3/6
5600	Head	22.8	4.995	35.613	5.07	35.50	-1.48	0.32	±5	2022/3/7
5750	Head	22.6	5.226	35.309	5.22	35.40	0.11	-0.26	±5	2022/3/7
750	Head	22.8	0.902	41.632	0.89	41.90	1.35	-0.64	±5	2022/3/8
835	Head	22.8	0.931	41.367	0.90	41.50	3.44	-0.32	±5	2022/3/10
1750	Head	22.7	1.380	39.991	1.37	40.10	0.73	-0.27	±5	2022/3/12
1900	Head	22.8	1.458	39.790	1.40	40.00	4.14	-0.53	±5	2022/3/13
2450	Head	22.7	1.810	38.621	1.80	39.20	0.56	-1.48	±5	2022/3/14
2600	Head	22.9	1.927	38.323	1.96	39.00	-1.68	-1.74	±5	2022/3/15
3500	Head	22.9	2.849	38.660	2.91	37.90	-2.10	2.01	±5	2022/3/15
3700	Head	22.7	3.043	38.220	3.12	37.70	-2.47	1.38	±5	2022/3/17
3900	Head	22.7	3.346	37.817	3.32	37.50	0.78	0.85	±5	2022/3/17
5250	Head	22.6	4.603	35.922	4.71	35.90	-2.27	0.06	±5	2022/3/18
5600	Head	22.9	4.998	35.375	5.07	35.50	-1.42	-0.35	±5	2022/3/19
5750	Head	22.8	5.163	35.184	5.22	35.40	-1.09	-0.61	±5	2022/3/20

11.3 System Performance Check Results

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

<1g SAR>

Date	Frequency (MHz)	Tissue Type	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)
2022/3/2	750	Head	50	1087	3935	1650	0.432	8.36	8.64	3.35
2022/3/2	835	Head	50	4d258	3935	1650	0.483	9.44	9.66	2.33
2022/3/3	1750	Head	50	1090	3935	1650	1.810	36.40	36.2	-0.55
2022/3/3	1900	Head	50	5d170	3935	1650	1.910	39.00	38.2	-2.05
2022/3/4	2450	Head	50	908	3935	1650	2.460	52.80	49.2	-6.82
2022/3/4	2600	Head	50	1061	3935	1650	2.650	56.60	53	-6.36
2022/3/5	3500	Head	50	1037	3935	1650	3.220	68.00	64.4	-5.29
2022/3/6	3700	Head	50	1008	3935	1650	3.310	67.60	66.2	-2.07
2022/3/6	3900	Head	50	1048	3935	1650	3.410	70.20	68.2	-2.85
2022/3/6	5250	Head	50	1113	3935	1650	3.760	80.50	75.2	-6.58
2022/3/7	5600	Head	50	1113	3935	1650	3.870	83.40	77.4	-7.19
2022/3/7	5750	Head	50	1113	3935	1650	3.900	80.00	78	-2.50
2022/3/8	750	Head	50	1087	3935	1650	0.430	8.36	8.6	2.87
2022/3/10	835	Head	50	4d258	3935	1650	0.483	9.44	9.66	2.33
2022/3/12	1750	Head	50	1090	3935	1650	1.780	36.40	35.6	-2.20
2022/3/13	1900	Head	50	5d170	3935	1650	1.960	39.00	39.2	0.51
2022/3/14	2450	Head	50	908	3935	1650	2.480	52.80	49.6	-6.06
2022/3/15	2600	Head	50	1061	3935	1650	2.680	56.60	53.6	-5.30
2022/3/15	3500	Head	50	1037	3935	1650	3.210	68.00	64.2	-5.59
2022/3/17	3700	Head	50	1008	3935	1650	3.220	67.60	64.4	-4.73
2022/3/17	3900	Head	50	1048	3935	1650	3.450	70.20	69	-1.71
2022/3/18	5250	Head	50	1113	3935	1650	3.720	80.50	74.4	-7.58
2022/3/19	5600	Head	50	1113	3935	1650	3.900	83.40	78	-6.47
2022/3/20	5750	Head	50	1113	3935	1650	3.880	80.00	77.6	-3.00

<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 (%)
2022/3/2	750	Head	50	1087	3935	1650	0.285	5.65	5.7	0.88
2022/3/2	835	Head	50	4d258	3935	1650	0.320	6.13	6.4	4.40
2022/3/3	1750	Head	50	1090	3935	1650	0.973	19.20	19.46	1.35
2022/3/3	1900	Head	50	5d170	3935	1650	0.993	20.30	19.86	-2.17
2022/3/4	2450	Head	50	908	3935	1650	1.150	24.20	23	-4.96
2022/3/4	2600	Head	50	1061	3935	1650	1.220	25.10	24.4	-2.79
2022/3/5	3500	Head	50	1037	3935	1650	1.310	25.40	26.2	3.15
2022/3/6	3700	Head	50	1008	3935	1650	1.250	24.40	25	2.46
2022/3/6	3900	Head	50	1048	3935	1650	1.150	24.40	23	-5.74
2022/3/6	5250	Head	50	1113	3935	1650	1.210	23.10	24.2	4.76
2022/3/7	5600	Head	50	1113	3935	1650	1.110	23.80	22.2	-6.72
2022/3/7	5750	Head	50	1113	3935	1650	1.230	22.80	24.6	7.89
2022/3/8	750	Head	50	1087	3935	1650	0.284	5.65	5.68	0.53
2022/3/10	835	Head	50	4d258	3935	1650	0.319	6.13	6.38	4.08
2022/3/12	1750	Head	50	1090	3935	1650	0.957	19.20	19.14	-0.31
2022/3/13	1900	Head	50	5d170	3935	1650	1.020	20.30	20.4	0.49
2022/3/14	2450	Head	50	908	3935	1650	1.180	24.20	23.6	-2.48
2022/3/15	2600	Head	50	1061	3935	1650	1.190	25.10	23.8	-5.18
2022/3/15	3500	Head	50	1037	3935	1650	1.230	25.40	24.6	-3.15
2022/3/17	3700	Head	50	1008	3935	1650	1.210	24.40	24.2	-0.82
2022/3/17	3900	Head	50	1048	3935	1650	1.160	24.40	23.2	-4.92
2022/3/18	5250	Head	50	1113	3935	1650	1.240	23.10	24.8	7.36
2022/3/19	5600	Head	50	1113	3935	1650	1.180	23.80	23.6	-0.84
2022/3/20	5750	Head	50	1113	3935	1650	1.210	22.80	24.2	6.14

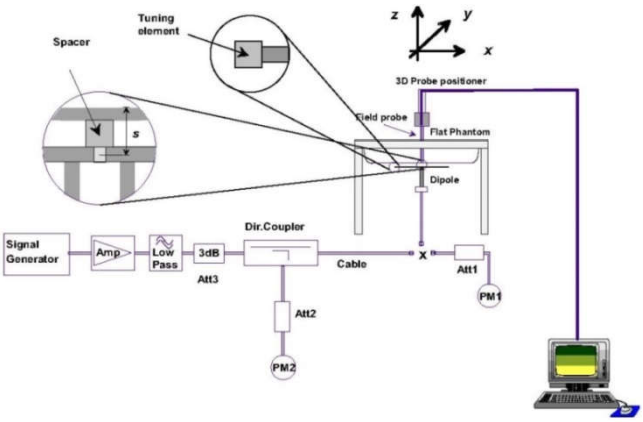


Fig 11.3.1 System Performance Check Setup

Fig 11.3.2 Setup Photo

12. RF Exposure Positions

12.1 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.

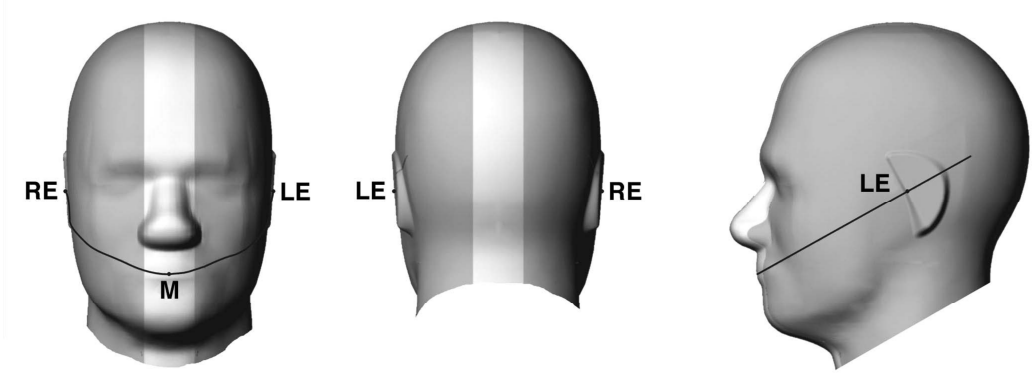


Fig 12.1.1 Front, back, and side views of SAM twin phantom

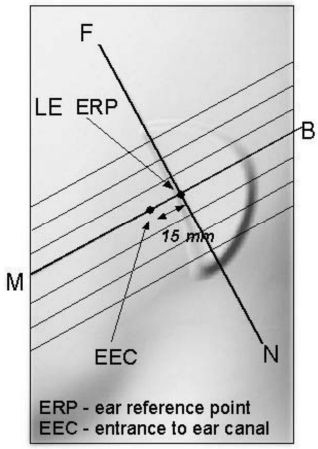


Fig 12.1.2 Close-up side view of phantom showing the ear region.

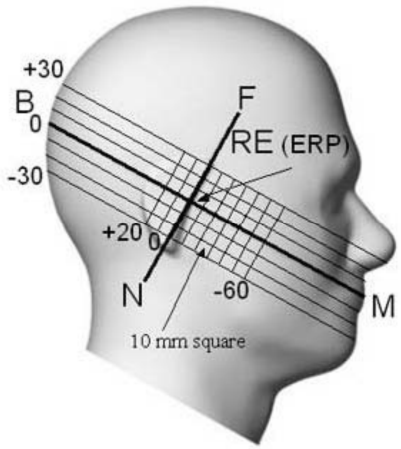


Fig 12.1.3 Side view of the phantom showing relevant markings and seven cross-sectional plane locations

12.2 Definition of the cheek position

1. Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece (flip cover), open the cover. If the handset can transmit with the cover closed, both configurations must be tested.
2. Define two imaginary lines on the handset—the vertical centerline and the horizontal line. The vertical centerline passes through two points on the front side of the handset—the midpoint of the width wt of the handset at the level of the acoustic output (point A in Figure 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.

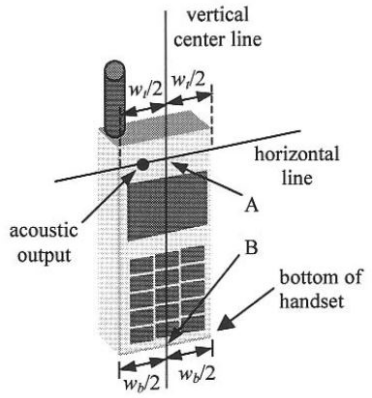


Fig 12.2.1 Handset vertical and horizontal reference lines—"fixed case

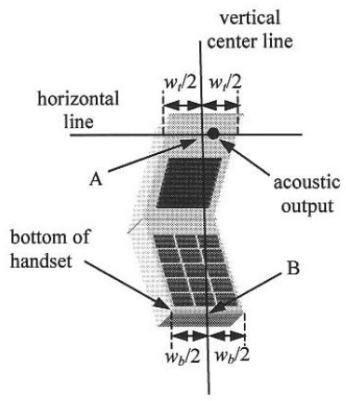


Fig 12.2.2 Handset vertical and horizontal reference lines—"clam-shell case"

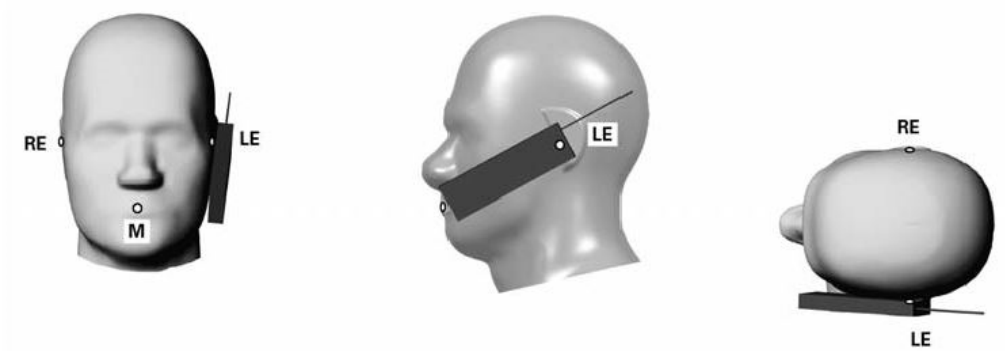


Fig 12.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

12.3 Definition of the tilt position

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

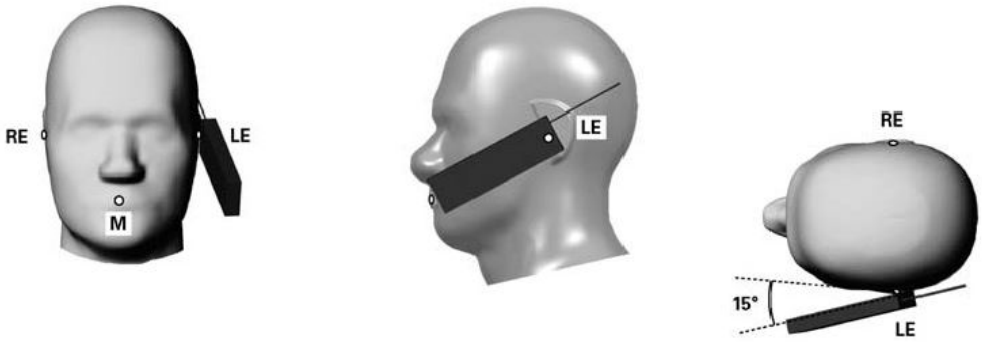


Fig 12.3.1 Tilt position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which define the Reference Plane for handset positioning, are indicated.

12.4 Body Worn Accessory

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 12.4). Per KDB648474 D04v01r03, body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB 447498 D01v06 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for body-worn accessory, measured without a headset connected to the handset is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a handset attached to the handset.

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

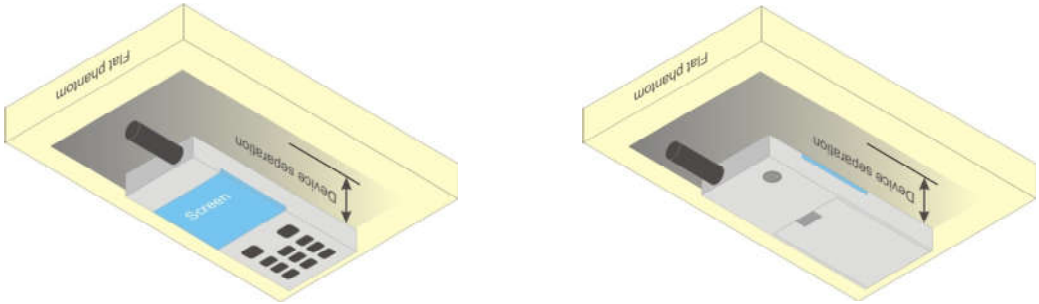


Fig 12.4 Body Worn Position

12.5 Product Specific 10g SAR Exposure

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

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

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

12.6 Wireless Router

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

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

13. Conducted RF Output Power (Unit: dBm)

The detailed conducted power table can refer to Appendix E.

<GSM Conducted Power>

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.

<WCDMA Conducted Power>

1. The following tests were conducted according to the test requirements outlines in 3GPP TS 34.121 specification.
2. The procedures in KDB 941225 D01v03r01 are applied for 3GPP Rel. 6 HSPA to configure the device in the required sub-test mode(s) to determine SAR test exclusion.
3. For DC-HSDPA, the device was configured according to the H-Set 12, Fixed Reference Channel (FRC) configuration in Table C.8.1.12 of 3GPP TS 34.121-1, with the primary and the secondary serving HS-DSCH Cell enabled during the power measurement.

A summary of these settings are illustrated below:

HSDPA Setup Configuration:

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

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

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

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

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

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

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

Setup Configuration

HSUPA Setup Configuration:

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

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

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

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

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

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

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

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

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

Setup Configuration

DC-HSDPA 3GPP release 8 Setup Configuration:

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

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

C.8.1.12 Fixed Reference Channel Definition H-Set 12

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

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

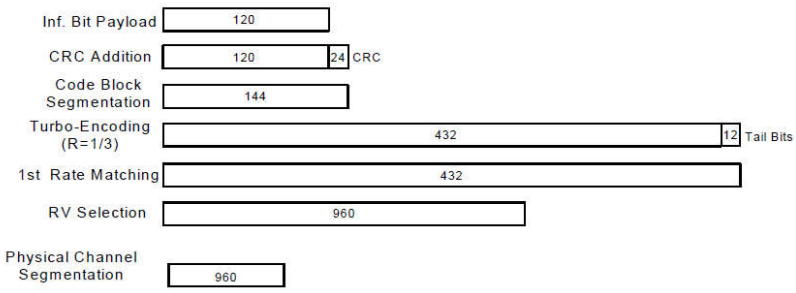


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

Setup Configuration

<WCDMA Conducted Power>

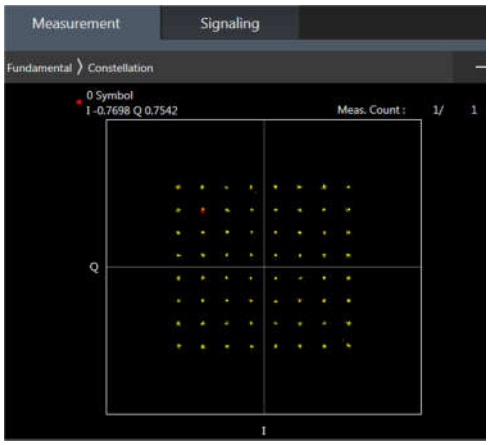
General Note:

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

<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 B4 / B5 / B12 / B38 / B71 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 B38 SAR test was covered by 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 2017 TCB workshop, for 64 QAM and 16 QAM should be verified by checking the signal constellation with a call box to avoid incorrect maximum power levels due to MPR and other requirements associated with signal modulation, and the following figure is taken from the "Fundamental Measurement >> Modulation Analysis >> constellation" mode of the device connect to the MT8821C base station, therefore, the device 64QAM and 16QAM signal modulation are correct.



64QAM

16QAM

<TDD LTE SAR Measurement>

TDD LTE configuration setup for SAR measurement

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

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

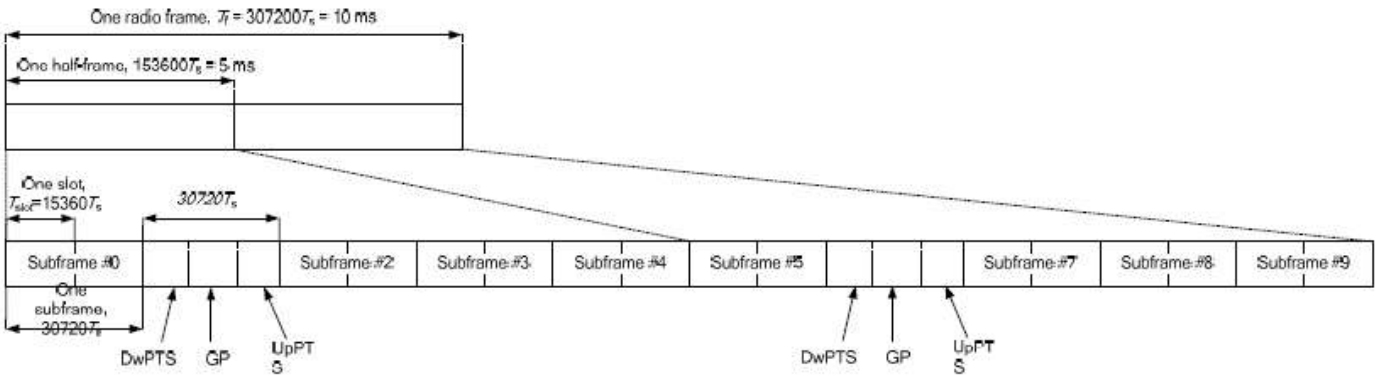


Figure 4.2-1: Frame structure type 2 (for 5 ms switch-point periodicity).

Table 4.2-2: Uplink-downlink configurations.

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

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

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

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

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

The highest duty factor is resulted from:

i. Uplink-downlink configuration: 0. In a half-frame consisted of 5 subfames, uplink operation is in 3 uplink subframes and 1 special subframe.

ii. special subframe configuration: 5-9 for normal cyclic prefix in downlink, 4-7 for extended cyclic prefix in downlink

iii. for special subframe with extended cyclic prefix in uplink, the total uplink duty factor in one half-frame is: (3+0.167)/5 = 63.3%

iv. for special subframe with normal cyclic prefix in uplink, the total uplink duty factor in one half-frame is: (3+0.143)/5 = 62.9%

v. For TDD LTE SAR measurement, the duty cycle 1:1.59 (62.9 %) was used perform testing and considering the theoretical duty cycle of 63.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 62.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix 63.3%/62.9% = 1.006 is applied to scale-up the measured SAR result. The scaled TDD LTE SAR = measured SAR (W/kg)* Tune-up Scaling Factor* scaling factor for extended cyclic prefix.

<LTE Carrier Aggregation>

General Note:

1. This device supports Carrier Aggregation on downlink for inter and intra band. For the device supports bands and bandwidths and configurations are provided as follow table was according to 3GPP.
2. In applying the existing power measurement procedures of KDB 941225 D05A for DL CA SAR test exclusion, only the subset with the largest number of combinations of frequency bands and CCs in each row need combination, and for this device that all the configurations were choose to power measurement.
3. All permutations exist. No restrictions on Pcell & Scell combinations.
4. 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	Number	Combination
1	CA_41A-41A	1	CA_5A_7A_7A
2	CA_41C	2	CA_41A_41A_41A
3	CA_5A-7A		
4	CA_7A-7A		
5	CA_7C		

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.

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

LTE 4x4 MIMO (Downlink)

This device supports downlink 4x4 MIMO operations for LTE Bands 7 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

5G NR Output Power (Unit: dBm)

General Note:

1. 5G NR n5 / n71 / n77 / n78 is NSA mode.
2. 5G NR 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-QPSK and the reported SAR for the DFT-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. 5G NR n78 supports HPUE, HPUE power and SAR testing performed separately.
5. 5GNR n78 HUPE with higher power, 5GNR n78 HUPE SAR can represent power class 3 level SAR.
6. 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.
7. 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.
8. 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.
9. 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.

<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		

Inter Band EN-DC Configuration

FR 1	ENDC	4G UL	5G-NR UL
n5	DC_7A_n5A	ANT1	ANT0
n71	DC_2A_n71A	ANT3	ANT0
	DC_7A_n71A	ANT1	ANT0
n77	DC_7A_n77A	ANT1	ANT4
n78	DC_7A_n78A	ANT1	ANT4
	DC_38A_n78A	ANT1	ANT4
	DC_41A_n78A	ANT1	ANT4

<WLAN Conducted Power>

General Note:

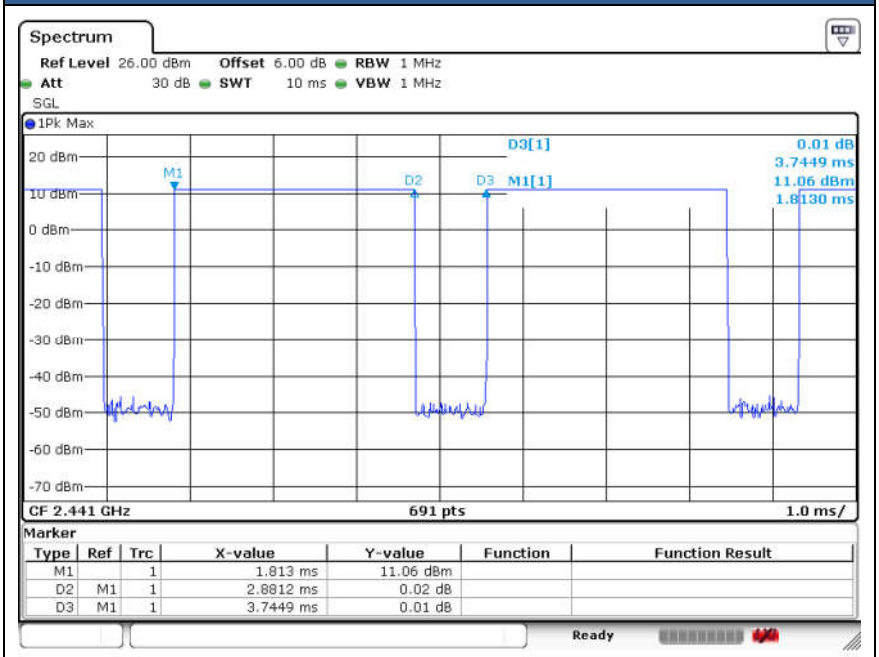
1. Per KDB 248227 D01v02r02, SAR test reduction is determined according to 802.11 transmission mode configurations and certain exposure conditions with multiple test positions. In the 2.4 GHz band, separate SAR procedures are applied to DSSS and OFDM configurations to simplify DSSS test requirements.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

<2.4GHz Bluetooth>

General Note:

1. For 2.4GHz Bluetooth SAR testing was selected 1Mbps, due to its highest average power.
2. The Bluetooth duty cycle are 76.94 % as following figure, according to 2016 Oct. TCB workshop for Bluetooth SAR scaling need further consideration and the maximum duty cycle is 100%, therefore the actual duty cycle will be scaled up to100% for Bluetooth reported SAR calculation

Bluetooth time-domain plot



14. Antenna Location

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

15. SAR Test Results

General Note:

1. Per KDB 447498 D01v06, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   b. For SAR testing of BT/WLAN signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle)"
   c. For WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
   d. For BT/WLAN: Reported SAR(W/kg)= Measured SAR(W/kg)* Duty Cycle scaling factor * Tune-up scaling factor
   e. For TDD LTE SAR measurement of power class 3, the duty cycle 1:1.59 (62.9 %) was used perform testing and considering the theoretical duty cycle of 63.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 62.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix 63.3%/62.9% = 1.006 is applied to scale-up the measured SAR result. The reported TDD LTE SAR (W/kg) = Measured SAR (W/kg)* Tune-up Scaling Factor* scaling factor for extended cyclic prefix.
2. Per KDB 447498 D01v06, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the *reported* 1-g or 10-g SAR for the mid-band or highest output power channel is:
   - ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
   - ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
   - ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
3. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required when the measured SAR is ≥ 0.8W/kg. Per KDB 865664 D01v01r04, if the extremity repeated SAR is necessary, the same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds.
4. This device has Single SIM card slot + eSIM. For Single SIM card slot + eSIM mobile supports Dual SIM Dual standby. The WWAN radio transmission will be enabled by either one SIM at a time (single active). We chose Single SIM card mobile to perform all tests.
5. The device implements the power management and receiver detection/hotspot mode for SAR compliance at different exposure conditions (head, body-worn, hotspot, extremity) and the Qualcomm smart transmit will manage to ensure the power level not exceeding the associated power table. And the device will invoke corresponding work scenarios power level base on frequency bands/antennas, which can refer to power table at appendix E.
6. 5G NR n78 supports HPUE, HPUE power and SAR testing performed separately.
7. 5GNR n78 HUPE with higher power, 5GNR n78 HUPE SAR can represent power class 3 level SAR.
8. NSA and SA mode should perform SAR separately. For the maximum power of NSA mode is the same as SA total power level, so NSA SAR can represent SA mode SAR.
9. 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.
10. 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.
11. 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.
12. This device supports 5GNR FR1 bands as following table, including NSA mode and SA mode. NSA and SA mode performed SAR separately.
13. Per KDB648474 D04v01r03, for smart phones with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm, when hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg, however, when power reduction applies to hotspot mode the measured SAR must be scaled to the maximum output power, including tolerance, allowed for phablet modes to compare with the 1.2 W/kg SAR test reduction threshold.
    a. For this device SAR for WWAN transmitter scaled to maximum output power mode for product specific 10g SAR is higher than 1.2W/kg of LTE Band 7, 5GNR n77/n78, therefore product specific 10g SAR is necessary.
    b. WLAN 5.3/5.5GHz tested the product specific 10g SAR since it has no hotspot mode.
    c. When 10-g product specific 10g SAR is considered, SAR thresholds is specified in the procedures for SAR test reduction and exclusion should be multiplied by 2.5.

GSM Note:

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

WCDMA Note:

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

LTE Note:

1. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
2. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
3. Per KDB 941225 D05v02r05, for QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
4. Per KDB 941225 D05v02r05, 16QAM/64QAM 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.
5. Per KDB 941225 D05v02r05, smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
6. For LTE B4 / B5 / B12/ B38 / B71 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.
7. LTE B38 SAR test was covered by LTE B41; according to April 2015 TCB workshop, SAR test for overlapping LTE bands can be reduced if
   a. the maximum output power, including tolerance, for the smaller band is ≤ the larger band to qualify for the SAR test exclusion
   b. the channel bandwidth and other operating parameters for the smaller band are fully supported by the larger band

5G NR Note:

1. For 5G NR test procedure was following step similar FCC KDB 941225 D05:
   a. SAR testing start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
   b. 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure
   c. QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
   d. PI/2 BPSK/16QAM/64QAM/256QAM output powers according to 3GPP MPR will not ½ dB higher than the same configuration in QPSK, also reported SAR for the QPSK configuration is less than 1.45 W/kg, PI/2 BPSK /16QAM/64QAM/256QAM SAR testing are not required.
   e. Smaller bandwidth output power for each RB allocation configuration for this device will not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg, smaller bandwidth SAR testing is not required for this device
   f. For 5G FR1 n5/n71/n77 the maximum bandwidth does not support three non-overlapping channels, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

WLAN/Bluetooth Note:

1. Per KDB 248227 D01v02r02, for 2.4GHz 802.11g/n SAR testing is not required when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.
2. Per KDB 248227 D01v02r02, U-NII-1 SAR testing is not required when the U-NII-2A band highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band.
3. When the reported SAR of the test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position on the highest maximum output power channel, until the report SAR is ≤ 0.8 W/kg or all required test position are tested.
4. For all positions / configurations, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions / configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.
5. During SAR testing the WLAN transmission was verified using a spectrum analyzer.
6. Based on WLAN2.4GHz and Bluetooth share the same, so Bluetooth RF exposure evaluation chose the worst position of WLAN 2.4GHz to perform Bluetooth SAR test, and used this Bluetooth SAR value conservatively represent other position do co-located analysis with WWAN.

DSI status description：

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

This WWAN bands enabled with Qualcomm Smart Transmit feature which located at chapter 5. The default power is Pmax power, When Plimit power higher than Pmax power, the output power will be limited at Pmax, and so the SAR will use Pmax power to do the testing.

Exposure Condition	DSI	Trigger conditions
Head SAR	DSI 3	Earpiece On
Body worn Mode SAR	DSI 1	Earpiece Off
Hotspot Mode SAR	DSI 1	Earpiece Off
Extremity(Handheld) SAR	DSI 1	Earpiece Off

15.1 Head SAR

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
								750MHz										
01	LTE Band 12	10M	QPSK	1	0	-	Right Cheek	0mm	Ant 0	DSI 3	23095	707.5	24.12	25.00	1.225	-0.03	0.686	**0.840**
	LTE Band 12	10M	QPSK	25	0	-	Right Cheek	0mm	Ant 0	DSI 3	23095	707.5	23.10	24.00	1.230	0.16	0.553	0.680
	LTE Band 12	10M	QPSK	50	0	-	Right Cheek	0mm	Ant 0	DSI 3	23095	707.5	22.94	24.00	1.276	0.18	0.550	0.702
	LTE Band 12	10M	QPSK	1	0	-	Right Tilted	0mm	Ant 0	DSI 3	23095	707.5	24.12	25.00	1.225	0.08	0.558	0.683
	LTE Band 12	10M	QPSK	25	0	-	Right Tilted	0mm	Ant 0	DSI 3	23095	707.5	23.10	24.00	1.230	0.01	0.449	0.552
	LTE Band 12	10M	QPSK	1	0	-	Left Cheek	0mm	Ant 0	DSI 3	23095	707.5	24.12	25.00	1.225	-0.05	0.503	0.616
	LTE Band 12	10M	QPSK	25	0	-	Left Cheek	0mm	Ant 0	DSI 3	23095	707.5	23.10	24.00	1.230	0.15	0.412	0.507
	LTE Band 12	10M	QPSK	1	0	-	Left Tilted	0mm	Ant 0	DSI 3	23095	707.5	24.12	25.00	1.225	-0.18	0.406	0.497
	LTE Band 12	10M	QPSK	25	0	-	Left Tilted	0mm	Ant 0	DSI 3	23095	707.5	23.10	24.00	1.230	-0.01	0.327	0.402
02	LTE Band 71	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 0	DSI 3	133322	683	24.02	25.00	1.253	0.19	0.718	**0.900**
	LTE Band 71	20M	QPSK	50	0	-	Right Cheek	0mm	Ant 0	DSI 3	133322	683	23.10	24.00	1.230	0.04	0.558	0.686
	LTE Band 71	20M	QPSK	100	0	-	Right Cheek	0mm	Ant 0	DSI 3	133322	683	22.99	24.00	1.262	0.03	0.501	0.632
	LTE Band 71	20M	QPSK	1	0	-	Right Tilted	0mm	Ant 0	DSI 3	133322	683	24.02	25.00	1.253	0.08	0.601	0.753
	LTE Band 71	20M	QPSK	50	0	-	Right Tilted	0mm	Ant 0	DSI 3	133322	683	23.10	24.00	1.230	-0.16	0.468	0.576
	LTE Band 71	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 0	DSI 3	133322	683	24.02	25.00	1.253	0.03	0.637	0.798
	LTE Band 71	20M	QPSK	50	0	-	Left Cheek	0mm	Ant 0	DSI 3	133322	683	23.10	24.00	1.230	0.05	0.501	0.616
	LTE Band 71	20M	QPSK	1	0	-	Left Tilted	0mm	Ant 0	DSI 3	133322	683	24.02	25.00	1.253	-0.12	0.435	0.545
	LTE Band 71	20M	QPSK	50	0	-	Left Tilted	0mm	Ant 0	DSI 3	133322	683	23.10	24.00	1.230	0.18	0.336	0.413
03	FR1 n71	20M	QPSK	1	1	DFT-15	Right Cheek	0mm	Ant 0	DSI 3	136100	680.5	22.53	23.60	1.279	-0.06	0.655	**0.838**
	FR1 n71	20M	QPSK	50	28	DFT-15	Right Cheek	0mm	Ant 0	DSI 3	136100	680.5	22.42	23.60	1.312	0.08	0.471	0.618
	FR1 n71	20M	QPSK	100	0	DFT-15	Right Cheek	0mm	Ant 0	DSI 3	136100	680.5	22.31	23.50	1.315	-0.05	0.483	0.635
	FR1 n71	20M	QPSK	1	1	DFT-15	Right Tilted	0mm	Ant 0	DSI 3	136100	680.5	22.53	23.60	1.279	0.04	0.450	0.576
	FR1 n71	20M	QPSK	50	28	DFT-15	Right Tilted	0mm	Ant 0	DSI 3	136100	680.5	22.42	23.60	1.312	0.08	0.381	0.500
	FR1 n71	20M	QPSK	1	1	DFT-15	Left Cheek	0mm	Ant 0	DSI 3	136100	680.5	22.53	23.60	1.279	0.04	0.474	0.606
	FR1 n71	20M	QPSK	50	28	DFT-15	Left Cheek	0mm	Ant 0	DSI 3	136100	680.5	22.42	23.60	1.312	0.09	0.430	0.564
	FR1 n71	20M	QPSK	1	1	DFT-15	Left Tilted	0mm	Ant 0	DSI 3	136100	680.5	22.53	23.60	1.279	-0.02	0.372	0.476
	FR1 n71	20M	QPSK	50	28	DFT-15	Left Tilted	0mm	Ant 0	DSI 3	136100	680.5	22.42	23.60	1.312	0.03	0.374	0.491
								835MHz										
04	GSM850	-	-	-	-	GPRS (2 Tx slots)	Right Cheek	0mm	Ant 0	DSI 3	189	836.4	30.31	31.10	1.199	-0.03	0.767	**0.920**
	GSM850	-	-	-	-	GPRS (2 Tx slots)	Right Cheek	0mm	Ant 0	DSI 3	128	824.2	30.28	31.10	1.208	0.08	0.636	0.768
	GSM850	-	-	-	-	GPRS (2 Tx slots)	Right Cheek	0mm	Ant 0	DSI 3	251	848.8	30.26	31.10	1.213	-0.05	0.496	0.602
	GSM850	-	-	-	-	GPRS (2 Tx slots)	Right Tilted	0mm	Ant 0	DSI 3	189	836.4	30.31	31.10	1.199	0.04	0.661	0.793
	GSM850	-	-	-	-	GPRS (2 Tx slots)	Left Cheek	0mm	Ant 0	DSI 3	189	836.4	30.31	31.10	1.199	0.04	0.587	0.704
	GSM850	-	-	-	-	GPRS (2 Tx slots)	Left Tilted	0mm	Ant 0	DSI 3	189	836.4	30.31	31.10	1.199	0.08	0.568	0.681
	WCDMA V	-	-	-	-	RMC 12.2Kbps	Right Cheek	0mm	Ant 0	DSI 3	4182	836.4	23.73	24.60	1.222	0.05	0.738	0.902
05	WCDMA V	-	-	-	-	RMC 12.2Kbps	Right Cheek	0mm	Ant 0	DSI 3	4132	826.4	23.71	24.60	1.227	0.03	0.769	**0.944**
	WCDMA V	-	-	-	-	RMC 12.2Kbps	Right Cheek	0mm	Ant 0	DSI 3	4233	846.6	23.65	24.60	1.245	0.04	0.695	0.865
	WCDMA V	-	-	-	-	RMC 12.2Kbps	Right Tilted	0mm	Ant 0	DSI 3	4182	836.4	23.73	24.60	1.222	0.03	0.671	0.820
	WCDMA V	-	-	-	-	RMC 12.2Kbps	Right Tilted	0mm	Ant 0	DSI 3	4132	826.4	23.71	24.60	1.227	0.05	0.664	0.815
	WCDMA V	-	-	-	-	RMC 12.2Kbps	Right Tilted	0mm	Ant 0	DSI 3	4233	846.6	23.65	24.60	1.245	0.08	0.640	0.796
	WCDMA V	-	-	-	-	RMC 12.2Kbps	Left Cheek	0mm	Ant 0	DSI 3	4182	836.4	23.73	24.60	1.222	-0.12	0.613	0.749
	WCDMA V	-	-	-	-	RMC 12.2Kbps	Left Tilted	0mm	Ant 0	DSI 3	4182	836.4	23.73	24.60	1.222	0.04	0.538	0.657
06	LTE Band 5	10M	QPSK	1	0	-	Right Cheek	0mm	Ant 0	DSI 3	20525	836.5	23.21	24.20	1.256	0.05	0.743	**0.933**
	LTE Band 5	10M	QPSK	25	0	-	Right Cheek	0mm	Ant 0	DSI 3	20525	836.5	23.16	24.00	1.213	0.05	0.586	0.711
	LTE Band 5	10M	QPSK	50	0	-	Right Cheek	0mm	Ant 0	DSI 3	20525	836.5	23.09	24.00	1.233	0.08	0.638	0.787
	LTE Band 5	10M	QPSK	1	0	-	Right Tilted	0mm	Ant 0	DSI 3	20525	836.5	23.21	24.20	1.256	-0.12	0.697	0.875
	LTE Band 5	10M	QPSK	25	0	-	Right Tilted	0mm	Ant 0	DSI 3	20525	836.5	23.16	24.00	1.213	0.08	0.570	0.692
	LTE Band 5	10M	QPSK	50	0	-	Right Tilted	0mm	Ant 0	DSI 3	20525	836.5	23.09	24.00	1.233	-0.05	0.562	0.693
	LTE Band 5	10M	QPSK	1	0	-	Left Cheek	0mm	Ant 0	DSI 3	20525	836.5	23.21	24.20	1.256	0.04	0.600	0.754

	LTE Band 5	10M	QPSK	25	0	-	Left Cheek	0mm	Ant 0	DSI 3	20525	836.5	23.16	24.00	1.213	0.04	0.497	0.603
	LTE Band 5	10M	QPSK	1	0	-	Left Tilted	0mm	Ant 0	DSI 3	20525	836.5	23.21	24.20	1.256	0.03	0.555	0.697
	LTE Band 5	10M	QPSK	25	0	-	Left Tilted	0mm	Ant 0	DSI 3	20525	836.5	23.16	24.00	1.213	0.05	0.445	0.540
07	FR1 n5	20M	QPSK	1	1	DFT-15	Right Cheek	0mm	Ant 0	DSI 3	167300	836.5	22.52	23.90	1.374	-0.06	0.711	**0.977**
	FR1 n5	20M	QPSK	50	28	DFT-15	Right Cheek	0mm	Ant 0	DSI 3	167300	836.5	22.46	23.90	1.393	0.08	0.590	0.822
	FR1 n5	20M	QPSK	100	0	DFT-15	Right Cheek	0mm	Ant 0	DSI 3	167300	836.5	22.41	23.50	1.285	0.09	0.607	0.780
	FR1 n5	20M	QPSK	1	1	DFT-15	Right Tilted	0mm	Ant 0	DSI 3	167300	836.5	22.52	23.90	1.374	0.18	0.532	0.731
	FR1 n5	20M	QPSK	50	28	DFT-15	Right Tilted	0mm	Ant 0	DSI 3	167300	836.5	22.46	23.90	1.393	0.06	0.497	0.692
	FR1 n5	20M	QPSK	1	1	DFT-15	Left Cheek	0mm	Ant 0	DSI 3	167300	836.5	22.52	23.90	1.374	0.03	0.508	0.698
	FR1 n5	20M	QPSK	50	28	DFT-15	Left Cheek	0mm	Ant 0	DSI 3	167300	836.5	22.46	23.90	1.393	0.03	0.501	0.698
	FR1 n5	20M	QPSK	1	1	DFT-15	Left Tilted	0mm	Ant 0	DSI 3	167300	836.5	22.52	23.90	1.374	-0.13	0.433	0.595
	FR1 n5	20M	QPSK	50	28	DFT-15	Left Tilted	0mm	Ant 0	DSI 3	167300	836.5	22.46	23.90	1.393	0.05	0.416	0.580

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
1750MHz																				
	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Right Cheek	0mm	Ant 3	DSI 3	1413	1732.6	18.52	19.30	1.197	-	-	0.09	0.715	0.856
	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Right Cheek	0mm	Ant 3	DSI 3	1312	1712.4	18.37	19.30	1.239	-	-	0.18	0.633	0.784
08	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Right Cheek	0mm	Ant 3	DSI 3	1513	1752.6	18.51	19.30	1.199	-	-	0.07	0.774	**0.928**
	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Right Tilted	0mm	Ant 3	DSI 3	1413	1732.6	18.52	19.30	1.197	-	-	-0.02	0.343	0.410
	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Left Cheek	0mm	Ant 3	DSI 3	1413	1732.6	18.52	19.30	1.197	-	-	0.18	0.242	0.290
	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Left Tilted	0mm	Ant 3	DSI 3	1413	1732.6	18.52	19.30	1.197	-	-	0.03	0.180	0.215
	LTE Band 4	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 3	DSI 3	20175	1732.5	19.45	20.20	1.189	-	-	0.06	0.747	0.888
	LTE Band 4	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 3	DSI 3	20050	1720	19.38	20.20	1.208	-	-	0.01	0.661	0.798
09	LTE Band 4	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 3	DSI 3	20300	1745	19.41	20.20	1.199	-	-	-0.02	0.772	**0.926**
	LTE Band 4	20M	QPSK	50	0	-	Right Cheek	0mm	Ant 3	DSI 3	20175	1732.5	19.27	20.20	1.239	-	-	0.08	0.643	0.797
	LTE Band 4	20M	QPSK	100	0	-	Right Cheek	0mm	Ant 3	DSI 3	20175	1732.5	19.21	20.20	1.256	-	-	0.06	0.636	0.799
	LTE Band 4	20M	QPSK	1	0	-	Right Tilted	0mm	Ant 3	DSI 3	20175	1732.5	19.45	20.20	1.189	-	-	0.03	0.281	0.334
	LTE Band 4	20M	QPSK	50	0	-	Right Tilted	0mm	Ant 3	DSI 3	20175	1732.5	19.27	20.20	1.239	-	-	0.03	0.230	0.285
	LTE Band 4	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 3	DSI 3	20175	1732.5	19.45	20.20	1.189	-	-	0.05	0.259	0.308
	LTE Band 4	20M	QPSK	50	0	-	Left Cheek	0mm	Ant 3	DSI 3	20175	1732.5	19.27	20.20	1.239	-	-	-0.03	0.212	0.263
	LTE Band 4	20M	QPSK	1	0	-	Left Tilted	0mm	Ant 3	DSI 3	20175	1732.5	19.45	20.20	1.189	-	-	0.04	0.195	0.232
	LTE Band 4	20M	QPSK	50	0	-	Left Tilted	0mm	Ant 3	DSI 3	20175	1732.5	19.27	20.20	1.239	-	-	0.09	0.159	0.197
1900MH																				
	GSM1900	-	-	-	-	GPRS (2 Tx slots)	Right Cheek	0mm	Ant 3	DSI 3	661	1880	25.63	26.40	1.194	-	-	0.06	0.715	0.854
10	GSM1900	-	-	-	-	GPRS (2 Tx slots)	Right Cheek	0mm	Ant 3	DSI 3	512	1850.2	25.60	26.40	1.202	-	-	-0.03	0.781	**0.939**
	GSM1900	-	-	-	-	GPRS (2 Tx slots)	Right Cheek	0mm	Ant 3	DSI 3	810	1909.8	25.27	26.40	1.297	-	-	-0.01	0.650	0.843
	GSM1900	-	-	-	-	GPRS (2 Tx slots)	Right Tilted	0mm	Ant 3	DSI 3	661	1880	25.63	26.40	1.194	-	-	0.03	0.242	0.289
	GSM1900	-	-	-	-	GPRS (2 Tx slots)	Left Cheek	0mm	Ant 3	DSI 3	661	1880	25.63	26.40	1.194	-	-	0.05	0.164	0.196
	GSM1900	-	-	-	-	GPRS (2 Tx slots)	Left Tilted	0mm	Ant 3	DSI 3	661	1880	25.63	26.40	1.194	-	-	-0.03	0.101	0.121
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Right Cheek	0mm	Ant 3	DSI 3	9400	1880	18.24	19.00	1.191	-	-	0.09	0.685	0.816
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Right Cheek	0mm	Ant 3	DSI 3	9262	1852.4	18.16	19.00	1.213	-	-	0.02	0.734	0.891
11	WCDMA II	-	-	-	-	RMC 12.2Kbps	Right Cheek	0mm	Ant 3	DSI 3	9538	1907.6	18.11	19.00	1.227	-	-	0.08	0.754	**0.925**
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Right Tilted	0mm	Ant 3	DSI 3	9400	1880	18.24	19.00	1.191	-	-	0.09	0.220	0.262
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Left Cheek	0mm	Ant 3	DSI 3	9400	1880	18.24	19.00	1.191	-	-	0.03	0.202	0.240
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Left Tilted	0mm	Ant 3	DSI 3	9400	1880	18.24	19.00	1.191	-	-	0.03	0.098	0.117
	LTE Band 2	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 3	DSI 3	18900	1880	18.88	19.60	1.180	-	-	-0.03	0.752	0.888
	LTE Band 2	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 3	DSI 3	18700	1860	18.73	19.60	1.222	-	-	0.06	0.749	0.915
12	LTE Band 2	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 3	DSI 3	19100	1900	18.72	19.60	1.225	-	-	0.02	0.766	**0.938**
	LTE Band 2	20M	QPSK	50	0	-	Right Cheek	0mm	Ant 3	DSI 3	18900	1880	18.80	19.60	1.202	-	-	0.09	0.600	0.721
	LTE Band 2	20M	QPSK	100	0	-	Right Cheek	0mm	Ant 3	DSI 3	18900	1880	18.85	19.60	1.189	-	-	0.05	0.607	0.721
	LTE Band 2	20M	QPSK	1	0	-	Right Tilted	0mm	Ant 3	DSI 3	18900	1880	18.88	19.60	1.180	-	-	0.02	0.229	0.270
	LTE Band 2	20M	QPSK	50	0	-	Right Tilted	0mm	Ant 3	DSI 3	18900	1880	18.80	19.60	1.202	-	-	0.09	0.196	0.236
	LTE Band 2	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 3	DSI 3	18900	1880	18.88	19.60	1.180	-	-	0.04	0.209	0.247
	LTE Band 2	20M	QPSK	50	0	-	Left Cheek	0mm	Ant 3	DSI 3	18900	1880	18.80	19.60	1.202	-	-	0.18	0.168	0.202

	LTE Band 2	20M	QPSK	1	0	-	Left Tilted	0mm	Ant 3	DSI 3	18900	1880	18.88	19.60	1.180	-	-	0.11	0.102	0.120
	LTE Band 2	20M	QPSK	50	0	-	Left Tilted	0mm	Ant 3	DSI 3	18900	1880	18.80	19.60	1.202	-	-	0.04	0.085	0.102
2600MHz																				
	LTE Band 7	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 1	DSI 3	21100	2535	23.49	24.50	1.262	-	-	0.02	0.101	0.127
	LTE Band 7	20M	QPSK	50	0	-	Right Cheek	0mm	Ant 1	DSI 3	21100	2535	22.53	23.50	1.250	-	-	0.04	0.082	0.103
	LTE Band 7	20M	QPSK	1	0	-	Right Tilted	0mm	Ant 1	DSI 3	21100	2535	23.49	24.50	1.262	-	-	0.18	0.097	0.122
	LTE Band 7	20M	QPSK	50	0	-	Right Tilted	0mm	Ant 1	DSI 3	21100	2535	22.53	23.50	1.250	-	-	0.11	0.078	0.098
13	LTE Band 7	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 1	DSI 3	21100	2535	23.49	24.50	1.262	-	-	0.04	0.144	**0.182**
	LTE Band 7	20M	QPSK	50	0	-	Left Cheek	0mm	Ant 1	DSI 3	21100	2535	22.53	23.50	1.250	-	-	0.1	0.113	0.141
	LTE Band 7	20M	QPSK	1	0	-	Left Tilted	0mm	Ant 1	DSI 3	21100	2535	23.49	24.50	1.262	-	-	0.05	0.055	0.069
	LTE Band 7	20M	QPSK	50	0	-	Left Tilted	0mm	Ant 1	DSI 3	21100	2535	22.53	23.50	1.250	-	-	0.15	0.044	0.055
	LTE Band 41	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 1	DSI 3	40620	2593	23.75	24.50	1.189	62.9	1.006	0.04	0.088	0.105
	LTE Band 41	20M	QPSK	50	0	-	Right Cheek	0mm	Ant 1	DSI 3	40620	2593	22.70	23.50	1.202	62.9	1.006	0.02	0.075	0.091
	LTE Band 41	20M	QPSK	1	0	-	Right Tilted	0mm	Ant 1	DSI 3	40620	2593	23.75	24.50	1.189	62.9	1.006	0.02	0.071	0.085
	LTE Band 41	20M	QPSK	50	0	-	Right Tilted	0mm	Ant 1	DSI 3	40620	2593	22.70	23.50	1.202	62.9	1.006	0.05	0.057	0.069
14	LTE Band 41	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 1	DSI 3	40620	2593	23.75	24.50	1.189	62.9	1.006	0.04	0.118	**0.141**
	LTE Band 41	20M	QPSK	50	0	-	Left Cheek	0mm	Ant 1	DSI 3	40620	2593	22.70	23.50	1.202	62.9	1.006	0.02	0.090	0.109
	LTE Band 41	20M	QPSK	1	0	-	Left Tilted	0mm	Ant 1	DSI 3	40620	2593	23.75	24.50	1.189	62.9	1.006	0.09	0.047	0.056
	LTE Band 41	20M	QPSK	50	0	-	Left Tilted	0mm	Ant 1	DSI 3	40620	2593	22.70	23.50	1.202	62.9	1.006	0.16	0.038	0.046

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
3500MHz																		
	FR1 n77	100M	QPSK	1	1	DFT-30	Right Cheek	0mm	Ant 4	DSI 3	656000	3840	20.51	21.40	1.227	0.11	0.294	0.361
	FR1 n77	100M	QPSK	135	69	DFT-30	Right Cheek	0mm	Ant 4	DSI 3	656000	3840	20.46	21.40	1.242	0.17	0.263	0.326
	FR1 n77	100M	QPSK	1	1	DFT-30	Right Tilted	0mm	Ant 4	DSI 3	656000	3840	20.51	21.40	1.227	0.05	0.149	0.183
	FR1 n77	100M	QPSK	135	69	DFT-30	Right Tilted	0mm	Ant 4	DSI 3	656000	3840	20.46	21.40	1.242	0.04	0.154	0.191
	FR1 n77	100M	QPSK	1	1	DFT-30	Left Cheek	0mm	Ant 4	DSI 3	656000	3840	20.51	21.40	1.227	0.05	0.313	0.384
	FR1 n77	100M	QPSK	135	69	DFT-30	Left Cheek	0mm	Ant 4	DSI 3	656000	3840	20.46	21.40	1.242	-0.09	0.384	0.477
	FR1 n77	100M	QPSK	1	1	DFT-30	Left Tilted	0mm	Ant 4	DSI 3	656000	3840	20.51	21.40	1.227	0.06	0.028	0.035
	FR1 n77	100M	QPSK	135	69	DFT-30	Left Tilted	0mm	Ant 4	DSI 3	656000	3840	20.46	21.40	1.242	0.02	0.078	0.097
	FR1 n77	100M	QPSK	1	1	DFT-30	Right Cheek	0mm	Ant 4	DSI 3	633334	3500.01	20.41	21.40	1.256	0.03	0.613	0.769
	FR1 n77	100M	QPSK	135	69	DFT-30	Right Cheek	0mm	Ant 4	DSI 3	633334	3500.01	20.21	21.40	1.315	-0.15	0.566	0.744
	FR1 n77	100M	QPSK	1	1	DFT-30	Right Tilted	0mm	Ant 4	DSI 3	633334	3500.01	20.41	21.40	1.256	0.05	0.188	0.236
	FR1 n77	100M	QPSK	135	69	DFT-30	Right Tilted	0mm	Ant 4	DSI 3	633334	3500.01	20.21	21.40	1.315	-0.04	0.152	0.200
17	FR1 n77	100M	QPSK	1	1	DFT-30	Left Cheek	0mm	Ant 4	DSI 3	633334	3500.01	20.41	21.40	1.256	-0.09	0.746	**0.937**
	FR1 n77	100M	QPSK	135	69	DFT-30	Left Cheek	0mm	Ant 4	DSI 3	633334	3500.01	20.21	21.40	1.315	0.11	0.644	0.847
	FR1 n77	100M	QPSK	270	0	DFT-30	Left Cheek	0mm	Ant 4	DSI 3	633334	3500.01	20.15	21.40	1.334	0.03	0.432	0.576
	FR1 n77	100M	QPSK	1	1	DFT-30	Left Tilted	0mm	Ant 4	DSI 3	633334	3500.01	20.41	21.40	1.256	0.04	0.104	0.131
	FR1 n77	100M	QPSK	135	69	DFT-30	Left Tilted	0mm	Ant 4	DSI 3	633334	3500.01	20.21	21.40	1.315	-0.07	0.082	0.108
	FR1 n77	100M	QPSK	1	1	DFT-30	Right Cheek	0mm	Ant 7	DSI 3	656000	3840	16.51	17.00	1.119	-0.06	0.013	0.015
	FR1 n77	100M	QPSK	135	69	DFT-30	Right Cheek	0mm	Ant 7	DSI 3	656000	3840	16.24	17.00	1.191	0.14	0.010	0.012
	FR1 n77	100M	QPSK	1	1	DFT-30	Right Tilted	0mm	Ant 7	DSI 3	656000	3840	16.51	17.00	1.119	-0.16	0.011	0.012
	FR1 n77	100M	QPSK	135	69	DFT-30	Right Tilted	0mm	Ant 7	DSI 3	656000	3840	16.24	17.00	1.191	-0.17	0.000	0.000
	FR1 n77	100M	QPSK	1	1	DFT-30	Left Cheek	0mm	Ant 7	DSI 3	656000	3840	16.51	17.00	1.119	0.04	0.011	0.012
	FR1 n77	100M	QPSK	135	69	DFT-30	Left Cheek	0mm	Ant 7	DSI 3	656000	3840	16.24	17.00	1.191	0.18	0.011	0.013
	FR1 n77	100M	QPSK	1	1	DFT-30	Left Tilted	0mm	Ant 7	DSI 3	656000	3840	16.51	17.00	1.119	0.04	0.011	0.012
	FR1 n77	100M	QPSK	135	69	DFT-30	Left Tilted	0mm	Ant 7	DSI 3	656000	3840	16.24	17.00	1.191	0.09	0.010	0.012
	FR1 n77	100M	QPSK	1	1	DFT-30	Right Cheek	0mm	Ant 7	DSI 3	633334	3500.01	18.77	19.50	1.183	-0.04	0.250	0.296
	FR1 n77	100M	QPSK	135	69	DFT-30	Right Cheek	0mm	Ant 7	DSI 3	633334	3500.01	18.33	19.50	1.309	-0.17	0.305	0.399
	FR1 n77	100M	QPSK	1	1	DFT-30	Right Tilted	0mm	Ant 7	DSI 3	633334	3500.01	18.77	19.50	1.183	0.04	0.194	0.230
	FR1 n77	100M	QPSK	135	69	DFT-30	Right Tilted	0mm	Ant 7	DSI 3	633334	3500.01	18.33	19.50	1.309	0.05	0.255	0.334
	FR1 n77	100M	QPSK	1	1	DFT-30	Left Cheek	0mm	Ant 7	DSI 3	633334	3500.01	18.77	19.50	1.183	-0.07	0.232	0.274
	FR1 n77	100M	QPSK	135	69	DFT-30	Left Cheek	0mm	Ant 7	DSI 3	633334	3500.01	18.33	19.50	1.309	-0.06	0.374	0.490
	FR1 n77	100M	QPSK	1	1	DFT-30	Left Tilted	0mm	Ant 7	DSI 3	633334	3500.01	18.77	19.50	1.183	0.03	0.176	0.208
	FR1 n77	100M	QPSK	135	69	DFT-30	Left Tilted	0mm	Ant 7	DSI 3	633334	3500.01	18.33	19.50	1.309	0.15	0.232	0.304

	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Right Cheek	0mm	Ant 4	DSI 3	650000	3750	20.27	21.40	1.297	0.05	0.222	0.288
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Right Cheek	0mm	Ant 4	DSI 3	650000	3750	20.11	21.40	1.346	-0.04	0.244	0.328
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Right Tilted	0mm	Ant 4	DSI 3	650000	3750	20.27	21.40	1.297	-0.09	0.078	0.101
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Right Tilted	0mm	Ant 4	DSI 3	650000	3750	20.11	21.40	1.346	0.06	0.086	0.116
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Left Cheek	0mm	Ant 4	DSI 3	650000	3750	20.27	21.40	1.297	-0.14	0.610	0.791
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Left Cheek	0mm	Ant 4	DSI 3	650000	3750	20.11	21.40	1.346	0.01	0.534	0.719
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Left Tilted	0mm	Ant 4	DSI 3	650000	3750	20.27	21.40	1.297	0.03	0.042	0.054
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Left Tilted	0mm	Ant 4	DSI 3	650000	3750	20.11	21.40	1.346	0.05	0.042	0.057
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Right Cheek	0mm	Ant 4	DSI 3	633334	3500.01	20.34	21.40	1.276	0.04	0.258	0.330
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Right Cheek	0mm	Ant 4	DSI 3	633334	3500.01	20.17	21.40	1.327	-0.01	0.284	0.377
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Right Tilted	0mm	Ant 4	DSI 3	633334	3500.01	20.34	21.40	1.276	0.05	0.091	0.116
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Right Tilted	0mm	Ant 4	DSI 3	633334	3500.01	20.17	21.40	1.327	0.03	0.100	0.133
18	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Left Cheek	0mm	Ant 4	DSI 3	633334	3500.01	20.34	21.40	1.276	0.02	0.710	**0.906**
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Left Cheek	0mm	Ant 4	DSI 3	633334	3500.01	20.17	21.40	1.327	0.09	0.621	0.825
	FR1 n78 HPUE	100M	QPSK	270	0	DFT-30	Left Cheek	0mm	Ant 4	DSI 3	633334	3500.01	20.10	21.40	1.349	-0.08	0.610	0.823
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Left Tilted	0mm	Ant 4	DSI 3	633334	3500.01	20.34	21.40	1.276	-0.03	0.049	0.063
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Left Tilted	0mm	Ant 4	DSI 3	633334	3500.01	20.17	21.40	1.327	0.02	0.051	0.068
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Right Cheek	0mm	Ant 7	DSI 3	650000	3750	17.08	18.00	1.236	0.07	0.016	0.020
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Right Cheek	0mm	Ant 7	DSI 3	650000	3750	16.92	18.00	1.282	-0.08	0.019	0.024
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Right Tilted	0mm	Ant 7	DSI 3	650000	3750	17.08	18.00	1.236	0.02	0.014	0.017
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Right Tilted	0mm	Ant 7	DSI 3	650000	3750	16.92	18.00	1.282	0.02	0.015	0.019
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Left Cheek	0mm	Ant 7	DSI 3	650000	3750	17.08	18.00	1.236	0.08	0.018	0.022
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Left Cheek	0mm	Ant 7	DSI 3	650000	3750	16.92	18.00	1.282	0.03	0.020	0.026
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Left Tilted	0mm	Ant 7	DSI 3	650000	3750	17.08	18.00	1.236	0.07	0.019	0.023
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Left Tilted	0mm	Ant 7	DSI 3	650000	3750	16.92	18.00	1.282	0.01	0.016	0.021
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Right Cheek	0mm	Ant 7	DSI 3	633334	3500.01	21.84	22.50	1.164	0.08	0.106	0.123
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Right Cheek	0mm	Ant 7	DSI 3	633334	3500.01	21.81	22.50	1.172	0.03	0.173	0.203
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Right Tilted	0mm	Ant 7	DSI 3	633334	3500.01	21.84	22.50	1.164	0.07	0.089	0.104
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Right Tilted	0mm	Ant 7	DSI 3	633334	3500.01	21.81	22.50	1.172	0.11	0.123	0.144
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Left Cheek	0mm	Ant 7	DSI 3	633334	3500.01	21.84	22.50	1.164	0.07	0.110	0.128
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Left Cheek	0mm	Ant 7	DSI 3	633334	3500.01	21.81	22.50	1.172	-0.15	0.162	0.190
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Left Tilted	0mm	Ant 7	DSI 3	633334	3500.01	21.84	22.50	1.164	0.09	0.073	0.085
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Left Tilted	0mm	Ant 7	DSI 3	633334	3500.01	21.81	22.50	1.172	0.07	0.121	0.142

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
						WLAN/Bluetooth										
	WLAN2.4GHz	802.11b 1Mbps	Right Cheek	0mm	Ant 6	Full	11	2462	17.76	18.50	1.186	100	1.000	-0.15	0.050	0.059
	WLAN2.4GHz	802.11b 1Mbps	Right Tilted	0mm	Ant 6	Full	11	2462	17.76	18.50	1.186	100	1.000	0.09	0.028	0.034
19	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	0mm	Ant 6	Full	11	2462	17.76	18.50	1.186	100	1.000	-0.03	0.117	**0.139**
	WLAN2.4GHz	802.11b 1Mbps	Left Tilted	0mm	Ant 6	Full	11	2462	17.76	18.50	1.186	100	1.000	0.01	0.067	0.079
20	Bluetooth	1Mbps	Left Cheek	0mm	Ant 6	Full	0	2402	12.61	14.00	1.377	76.94	1.300	0.01	0.017	**0.030**
	WLAN5.3GHz	802.11ac-VHT80 MCS0	Right Cheek	0mm	Ant 6	Full	58	5290	14.98	16.50	1.535	92.49	1.081	0.03	0.112	0.186
	WLAN5.3GHz	802.11ac-VHT80 MCS0	Right Tilted	0mm	Ant 6	Full	58	5290	14.98	16.50	1.535	92.49	1.081	0.01	0.087	0.144
21	WLAN5.3GHz	802.11ac-VHT80 MCS0	Left Cheek	0mm	Ant 6	Full	58	5290	14.98	16.50	1.535	92.49	1.081	0.02	0.238	**0.395**
	WLAN5.3GHz	802.11ac-VHT80 MCS0	Left Tilted	0mm	Ant 6	Full	58	5290	14.98	16.50	1.535	92.49	1.081	0.02	0.192	0.318
	WLAN5.5GHz	802.11a 6Mbps	Right Cheek	0mm	Ant 6	Full	132	5660	18.00	19.50	1.413	98.28	1.018	0.06	0.039	0.056
	WLAN5.5GHz	802.11a 6Mbps	Right Tilted	0mm	Ant 6	Full	132	5660	18.00	19.50	1.413	98.28	1.018	0.01	0.034	0.048
22	WLAN5.5GHz	802.11a 6Mbps	Left Cheek	0mm	Ant 6	Full	132	5660	18.00	19.50	1.413	98.28	1.018	0.08	0.225	**0.324**
	WLAN5.5GHz	802.11a 6Mbps	Left Tilted	0mm	Ant 6	Full	132	5660	18.00	19.50	1.413	98.28	1.018	0.05	0.123	0.177
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Right Cheek	0mm	Ant 6	Full	155	5775	16.22	17.50	1.409	92.49	1.081	0.06	0.070	0.107
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Right Tilted	0mm	Ant 6	Full	155	5775	16.22	17.50	1.409	92.49	1.081	0.04	0.066	0.100
23	WLAN5.8GHz	802.11ac-VHT80 MCS0	Left Cheek	0mm	Ant 6	Full	155	5775	16.22	17.50	1.409	92.49	1.081	0.01	0.224	**0.341**
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Left Tilted	0mm	Ant 6	Full	155	5775	16.22	17.50	1.409	92.49	1.081	0.06	0.117	0.178

15.2 Hotspot SAR

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
									750MHz									
	LTE Band 12	10M	QPSK	1	0	-	Front	10mm	Ant 0	DSI 1	23095	707.5	24.12	25.00	1.225	-0.02	0.386	0.473
	LTE Band 12	10M	QPSK	25	0	-	Front	10mm	Ant 0	DSI 1	23095	707.5	23.10	24.00	1.230	0.03	0.294	0.362
	LTE Band 12	10M	QPSK	1	0	-	Back	10mm	Ant 0	DSI 1	23095	707.5	24.12	25.00	1.225	0.06	0.303	0.371
	LTE Band 12	10M	QPSK	25	0	-	Back	10mm	Ant 0	DSI 1	23095	707.5	23.10	24.00	1.230	0.09	0.250	0.308
24	LTE Band 12	10M	QPSK	1	0	-	Left Side	10mm	Ant 0	DSI 1	23095	707.5	24.12	25.00	1.225	-0.03	0.391	**0.479**
	LTE Band 12	10M	QPSK	25	0	-	Left Side	10mm	Ant 0	DSI 1	23095	707.5	23.10	24.00	1.230	0.06	0.336	0.413
	LTE Band 12	10M	QPSK	1	0	-	Right Side	10mm	Ant 0	DSI 1	23095	707.5	24.12	25.00	1.225	0.01	0.138	0.169
	LTE Band 12	10M	QPSK	25	0	-	Right Side	10mm	Ant 0	DSI 1	23095	707.5	23.10	24.00	1.230	0.04	0.105	0.129
	LTE Band 12	10M	QPSK	1	0	-	Top Side	10mm	Ant 0	DSI 1	23095	707.5	24.12	25.00	1.225	-0.03	0.288	0.353
	LTE Band 12	10M	QPSK	25	0	-	Top Side	10mm	Ant 0	DSI 1	23095	707.5	23.10	24.00	1.230	0.02	0.247	0.304
25	LTE Band 71	20M	QPSK	1	0	-	Front	10mm	Ant 0	DSI 1	133322	683	24.02	25.00	1.253	0.01	0.357	**0.447**
	LTE Band 71	20M	QPSK	50	0	-	Front	10mm	Ant 0	DSI 1	133322	683	23.10	24.00	1.230	0.09	0.332	0.408
	LTE Band 71	20M	QPSK	1	0	-	Back	10mm	Ant 0	DSI 1	133322	683	24.02	25.00	1.253	0.1	0.347	0.435
	LTE Band 71	20M	QPSK	50	0	-	Back	10mm	Ant 0	DSI 1	133322	683	23.10	24.00	1.230	0.13	0.276	0.340
	LTE Band 71	20M	QPSK	1	0	-	Left Side	10mm	Ant 0	DSI 1	133322	683	24.02	25.00	1.253	0.03	0.356	0.446
	LTE Band 71	20M	QPSK	50	0	-	Left Side	10mm	Ant 0	DSI 1	133322	683	23.10	24.00	1.230	0.13	0.335	0.412
	LTE Band 71	20M	QPSK	1	0	-	Right Side	10mm	Ant 0	DSI 1	133322	683	24.02	25.00	1.253	0.05	0.148	0.185
	LTE Band 71	20M	QPSK	50	0	-	Right Side	10mm	Ant 0	DSI 1	133322	683	23.10	24.00	1.230	0.08	0.131	0.161
	LTE Band 71	20M	QPSK	1	0	-	Top Side	10mm	Ant 0	DSI 1	133322	683	24.02	25.00	1.253	0.02	0.308	0.386
	LTE Band 71	20M	QPSK	50	0	-	Top Side	10mm	Ant 0	DSI 1	133322	683	23.10	24.00	1.230	0.08	0.243	0.299
	FR1 n71	20M	QPSK	1	1	DFT-15	Front	10mm	Ant 0	DSI 1	136100	680.5	23.44	24.50	1.276	0.08	0.248	0.317
	FR1 n71	20M	QPSK	50	28	DFT-15	Front	10mm	Ant 0	DSI 1	136100	680.5	23.36	24.50	1.300	0.02	0.231	0.300
	FR1 n71	20M	QPSK	1	1	DFT-15	Back	10mm	Ant 0	DSI 1	136100	680.5	23.44	24.50	1.276	0.08	0.308	0.393
	FR1 n71	20M	QPSK	50	28	DFT-15	Back	10mm	Ant 0	DSI 1	136100	680.5	23.36	24.50	1.300	-0.01	0.254	0.330
	FR1 n71	20M	QPSK	1	1	DFT-15	Left Side	10mm	Ant 0	DSI 1	136100	680.5	23.44	24.50	1.276	0.01	0.010	0.013
26	FR1 n71	20M	QPSK	50	28	DFT-15	Left Side	10mm	Ant 0	DSI 1	136100	680.5	23.36	24.50	1.300	0.08	0.319	**0.415**
	FR1 n71	20M	QPSK	1	1	DFT-15	Right Side	10mm	Ant 0	DSI 1	136100	680.5	23.44	24.50	1.276	0.08	0.120	0.153
	FR1 n71	20M	QPSK	50	28	DFT-15	Right Side	10mm	Ant 0	DSI 1	136100	680.5	23.36	24.50	1.300	0.02	0.150	0.195
	FR1 n71	20M	QPSK	1	1	DFT-15	Top Side	10mm	Ant 0	DSI 1	136100	680.5	23.44	24.50	1.276	0.08	0.020	0.026
	FR1 n71	20M	QPSK	50	28	DFT-15	Top Side	10mm	Ant 0	DSI 1	136100	680.5	23.36	24.50	1.300	0.09	0.080	0.104
									835MHz									
27	GSM850	-	-	-	-	GPRS (2 Tx slots)	Front	10mm	Ant 0	DSI 1	189	836.4	30.76	31.50	1.186	-0.07	0.393	**0.466**
	GSM850	-	-	-	-	GPRS (2 Tx slots)	Back	10mm	Ant 0	DSI 1	189	836.4	30.76	31.50	1.186	0.08	0.334	0.396
	GSM850	-	-	-	-	GPRS (2 Tx slots)	Left Side	10mm	Ant 0	DSI 1	189	836.4	30.76	31.50	1.186	0.09	0.371	0.440
	GSM850	-	-	-	-	GPRS (2 Tx slots)	Right Side	10mm	Ant 0	DSI 1	189	836.4	30.76	31.50	1.186	0.01	0.124	0.147
	GSM850	-	-	-	-	GPRS (2 Tx slots)	Top Side	10mm	Ant 0	DSI 1	189	836.4	30.76	31.50	1.186	0.08	0.381	0.452
28	WCDMA V	-	-	-	-	RMC 12.2Kbps	Front	10mm	Ant 0	DSI 1	4182	836.4	24.46	25.50	1.271	-0.03	0.394	**0.501**
	WCDMA V	-	-	-	-	RMC 12.2Kbps	Back	10mm	Ant 0	DSI 1	4182	836.4	24.46	25.50	1.271	0.02	0.328	0.417
	WCDMA V	-	-	-	-	RMC 12.2Kbps	Left Side	10mm	Ant 0	DSI 1	4182	836.4	24.46	25.50	1.271	0.09	0.357	0.454
	WCDMA V	-	-	-	-	RMC 12.2Kbps	Right Side	10mm	Ant 0	DSI 1	4182	836.4	24.46	25.50	1.271	0.01	0.087	0.111
	WCDMA V	-	-	-	-	RMC 12.2Kbps	Top Side	10mm	Ant 0	DSI 1	4182	836.4	24.46	25.50	1.271	0.08	0.367	0.466
29	LTE Band 5	10M	QPSK	1	0	-	Front	10mm	Ant 0	DSI 1	20525	836.5	24.05	25.00	1.245	0.01	0.350	**0.436**
	LTE Band 5	10M	QPSK	25	0	-	Front	10mm	Ant 0	DSI 1	20525	836.5	23.22	24.00	1.197	0.05	0.304	0.364
	LTE Band 5	10M	QPSK	1	0	-	Back	10mm	Ant 0	DSI 1	20525	836.5	24.05	25.00	1.245	0.06	0.289	0.360
	LTE Band 5	10M	QPSK	25	0	-	Back	10mm	Ant 0	DSI 1	20525	836.5	23.22	24.00	1.197	0.09	0.235	0.281
	LTE Band 5	10M	QPSK	1	0	-	Left Side	10mm	Ant 0	DSI 1	20525	836.5	24.05	25.00	1.245	0.13	0.278	0.346
	LTE Band 5	10M	QPSK	25	0	-	Left Side	10mm	Ant 0	DSI 1	20525	836.5	23.22	24.00	1.197	0.01	0.249	0.298
	LTE Band 5	10M	QPSK	1	0	-	Right Side	10mm	Ant 0	DSI 1	20525	836.5	24.05	25.00	1.245	0.08	0.068	0.085
	LTE Band 5	10M	QPSK	25	0	-	Right Side	10mm	Ant 0	DSI 1	20525	836.5	23.22	24.00	1.197	0.03	0.000	0.000

	LTE Band 5	10M	QPSK	1	0	-	Top Side	10mm	Ant 0	DSI 1	20525	836.5	24.05	25.00	1.245	0.11	0.306	0.381
	LTE Band 5	10M	QPSK	25	0	-	Top Side	10mm	Ant 0	DSI 1	20525	836.5	23.22	24.00	1.197	0.09	0.254	0.304
	FR1 n5	20M	QPSK	1	1	DFT-15	Front	10mm	Ant 0	DSI 1	167300	836.5	23.56	24.50	1.242	0.02	0.282	0.350
30	FR1 n5	20M	QPSK	50	28	DFT-15	Front	10mm	Ant 0	DSI 1	167300	836.5	23.47	24.50	1.268	0.04	0.307	**0.389**
	FR1 n5	20M	QPSK	1	1	DFT-15	Back	10mm	Ant 0	DSI 1	167300	836.5	23.56	24.50	1.242	0.04	0.232	0.288
	FR1 n5	20M	QPSK	50	28	DFT-15	Back	10mm	Ant 0	DSI 1	167300	836.5	23.47	24.50	1.268	0.07	0.235	0.298
	FR1 n5	20M	QPSK	1	1	DFT-15	Left Side	10mm	Ant 0	DSI 1	167300	836.5	23.56	24.50	1.242	0.12	0.248	0.308
	FR1 n5	20M	QPSK	50	28	DFT-15	Left Side	10mm	Ant 0	DSI 1	167300	836.5	23.47	24.50	1.268	0.15	0.264	0.335
	FR1 n5	20M	QPSK	1	1	DFT-15	Right Side	10mm	Ant 0	DSI 1	167300	836.5	23.56	24.50	1.242	0.02	0.058	0.072
	FR1 n5	20M	QPSK	50	28	DFT-15	Right Side	10mm	Ant 0	DSI 1	167300	836.5	23.47	24.50	1.268	0.09	0.069	0.087
	FR1 n5	20M	QPSK	1	1	DFT-15	Top Side	10mm	Ant 0	DSI 1	167300	836.5	23.56	24.50	1.242	0.05	0.246	0.305
	FR1 n5	20M	QPSK	50	28	DFT-15	Top Side	10mm	Ant 0	DSI 1	167300	836.5	23.47	24.50	1.268	0.08	0.275	0.349
1750MHz																		
	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Front	10mm	Ant 3	DSI 1	1413	1732.6	23.52	24.50	1.253	0.02	0.405	0.508
31	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Back	10mm	Ant 3	DSI 1	1413	1732.6	23.52	24.50	1.253	-0.07	0.575	**0.721**
	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Left Side	10mm	Ant 3	DSI 1	1413	1732.6	23.52	24.50	1.253	-0.07	0.510	0.639
	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Top Side	10mm	Ant 3	DSI 1	1413	1732.6	23.52	24.50	1.253	0.09	0.254	0.318
	LTE Band 4	20M	QPSK	1	0	-	Front	10mm	Ant 3	DSI 1	20175	1732.5	22.86	24.00	1.300	0.09	0.297	0.386
	LTE Band 4	20M	QPSK	50	0	-	Front	10mm	Ant 3	DSI 1	20175	1732.5	21.92	23.00	1.282	0.05	0.246	0.315
	LTE Band 4	20M	QPSK	1	0	-	Back	10mm	Ant 3	DSI 1	20175	1732.5	22.86	24.00	1.300	0.04	0.359	0.467
	LTE Band 4	20M	QPSK	50	0	-	Back	10mm	Ant 3	DSI 1	20175	1732.5	21.92	23.00	1.282	0.08	0.328	0.421
32	LTE Band 4	20M	QPSK	1	0	-	Left Side	10mm	Ant 3	DSI 1	20175	1732.5	22.86	24.00	1.300	-0.05	0.462	**0.601**
	LTE Band 4	20M	QPSK	50	0	-	Left Side	10mm	Ant 3	DSI 1	20175	1732.5	21.92	23.00	1.282	-0.07	0.380	0.487
	LTE Band 4	20M	QPSK	1	0	-	Top Side	10mm	Ant 3	DSI 1	20175	1732.5	22.86	24.00	1.300	0.09	0.170	0.221
	LTE Band 4	20M	QPSK	50	0	-	Top Side	10mm	Ant 3	DSI 1	20175	1732.5	21.92	23.00	1.282	0.08	0.169	0.217

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
1900MHz																				
	GSM1900	-	-	-	-	GPRS (2 Tx slots)	Front	10mm	Ant 3	DSI 1	661	1880	27.49	28.50	1.262	-	-	0.05	0.226	0.285
33	GSM1900	-	-	-	-	GPRS (2 Tx slots)	Back	10mm	Ant 3	DSI 1	661	1880	27.49	28.50	1.262	-	-	-0.06	0.338	**0.426**
	GSM1900	-	-	-	-	GPRS (2 Tx slots)	Left Side	10mm	Ant 3	DSI 1	661	1880	27.49	28.50	1.262	-	-	0.08	0.320	0.404
	GSM1900	-	-	-	-	GPRS (2 Tx slots)	Top Side	10mm	Ant 3	DSI 1	661	1880	27.49	28.50	1.262	-	-	0.09	0.093	0.117
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Front	10mm	Ant 3	DSI 1	9400	1880	23.57	24.50	1.239	-	-	0.09	0.340	0.421
34	WCDMA II	-	-	-	-	RMC 12.2Kbps	Back	10mm	Ant 3	DSI 1	9400	1880	23.57	24.50	1.239	-	-	0.07	0.553	**0.685**
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Left Side	10mm	Ant 3	DSI 1	9400	1880	23.57	24.50	1.239	-	-	0.08	0.498	0.617
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Top Side	10mm	Ant 3	DSI 1	9400	1880	23.57	24.50	1.239	-	-	0.09	0.163	0.202
	LTE Band 2	20M	QPSK	1	0	-	Front	10mm	Ant 3	DSI 1	18900	1880	22.88	24.00	1.294	-	-	0.08	0.342	0.443
	LTE Band 2	20M	QPSK	50	0	-	Front	10mm	Ant 3	DSI 1	18900	1880	21.77	23.00	1.327	-	-	0.09	0.282	0.374
35	LTE Band 2	20M	QPSK	1	0	-	Back	10mm	Ant 3	DSI 1	18900	1880	22.88	24.00	1.294	-	-	0.02	0.529	**0.685**
	LTE Band 2	20M	QPSK	50	0	-	Back	10mm	Ant 3	DSI 1	18900	1880	21.77	23.00	1.327	-	-	0.09	0.410	0.544
	LTE Band 2	20M	QPSK	1	0	-	Left Side	10mm	Ant 3	DSI 1	18900	1880	22.88	24.00	1.294	-	-	0.05	0.504	0.652
	LTE Band 2	20M	QPSK	50	0	-	Left Side	10mm	Ant 3	DSI 1	18900	1880	21.77	23.00	1.327	-	-	0.04	0.414	0.550
	LTE Band 2	20M	QPSK	1	0	-	Top Side	10mm	Ant 3	DSI 1	18900	1880	22.88	24.00	1.294	-	-	-0.07	0.181	0.234
	LTE Band 2	20M	QPSK	50	0	-	Top Side	10mm	Ant 3	DSI 1	18900	1880	21.77	23.00	1.327	-	-	-0.07	0.160	0.212
2600MHz																				
	LTE Band 7	20M	QPSK	1	0	-	Front	10mm	Ant 1	DSI 1	21100	2535	20.15	21.00	1.216	-	-	0.05	0.270	0.328
	LTE Band 7	20M	QPSK	50	0	-	Front	10mm	Ant 1	DSI 1	21100	2535	20.09	21.00	1.233	-	-	0.04	0.229	0.282
	LTE Band 7	20M	QPSK	1	0	-	Back	10mm	Ant 1	DSI 1	21100	2535	20.15	21.00	1.216	-	-	0.11	0.266	0.324
	LTE Band 7	20M	QPSK	50	0	-	Back	10mm	Ant 1	DSI 1	21100	2535	20.09	21.00	1.233	-	-	0.01	0.215	0.265
	LTE Band 7	20M	QPSK	1	0	-	Left Side	10mm	Ant 1	DSI 1	21100	2535	20.15	21.00	1.216	-	-	0.07	0.315	0.383
	LTE Band 7	20M	QPSK	50	0	-	Left Side	10mm	Ant 1	DSI 1	21100	2535	20.09	21.00	1.233	-	-	0.08	0.261	0.322
36	LTE Band 7	20M	QPSK	1	0	-	Bottom Side	10mm	Ant 1	DSI 1	21100	2535	20.15	21.00	1.216	-	-	-0.06	0.547	**0.665**
	LTE Band 7	20M	QPSK	50	0	-	Bottom Side	10mm	Ant 1	DSI 1	21100	2535	20.09	21.00	1.233	-	-	0.02	0.417	0.514
	LTE Band 41	20M	QPSK	1	0	-	Front	10mm	Ant 1	DSI 1	40620	2593	23.75	24.50	1.189	62.9	1.006	0.16	0.317	0.379

	LTE Band 41	20M	QPSK	50	0	-	Front	10mm	Ant 1	DSI 1	40620	2593	22.70	23.50	1.202	62.9	1.006	0.01	0.284	0.343
	LTE Band 41	20M	QPSK	1	0	-	Back	10mm	Ant 1	DSI 1	40620	2593	23.75	24.50	1.189	62.9	1.006	0.08	0.308	0.368
	LTE Band 41	20M	QPSK	50	0	-	Back	10mm	Ant 1	DSI 1	40620	2593	22.70	23.50	1.202	62.9	1.006	-0.01	0.269	0.325
	LTE Band 41	20M	QPSK	1	0	-	Left Side	10mm	Ant 1	DSI 1	40620	2593	23.75	24.50	1.189	62.9	1.006	0.02	0.356	0.426
	LTE Band 41	20M	QPSK	50	0	-	Left Side	10mm	Ant 1	DSI 1	40620	2593	22.70	23.50	1.202	62.9	1.006	0.09	0.297	0.359
37	LTE Band 41	20M	QPSK	1	0	-	Bottom Side	10mm	Ant 1	DSI 1	40620	2593	23.75	24.50	1.189	62.9	1.006	0.03	0.557	**0.666**
	LTE Band 41	20M	QPSK	50	0	-	Bottom Side	10mm	Ant 1	DSI 1	40620	2593	22.70	23.50	1.202	62.9	1.006	0.03	0.543	0.657

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
									3500MHz									
	FR1 n77	100M	QPSK	1	1	DFT-30	Front	10mm	Ant 4	DSI 1	656000	3840	20.46	21.40	1.242	0.11	0.134	0.166
	FR1 n77	100M	QPSK	135	69	DFT-30	Front	10mm	Ant 4	DSI 1	656000	3840	20.40	21.40	1.259	0.1	0.127	0.160
	FR1 n77	100M	QPSK	1	1	DFT-30	Back	10mm	Ant 4	DSI 1	656000	3840	20.46	21.40	1.242	-0.06	0.251	0.312
	FR1 n77	100M	QPSK	135	69	DFT-30	Back	10mm	Ant 4	DSI 1	656000	3840	20.40	21.40	1.259	0.02	0.231	0.291
	FR1 n77	100M	QPSK	1	1	DFT-30	Left Side	10mm	Ant 4	DSI 1	656000	3840	20.46	21.40	1.242	0.04	0.403	0.500
	FR1 n77	100M	QPSK	135	69	DFT-30	Left Side	10mm	Ant 4	DSI 1	656000	3840	20.40	21.40	1.259	0.13	0.359	0.452
	FR1 n77	100M	QPSK	1	1	DFT-30	Front	10mm	Ant 4	DSI 1	633334	3500.01	20.41	21.40	1.256	0.11	0.208	0.261
	FR1 n77	100M	QPSK	135	69	DFT-30	Front	10mm	Ant 4	DSI 1	633334	3500.01	20.21	21.40	1.315	0.09	0.187	0.246
	FR1 n77	100M	QPSK	1	1	DFT-30	Back	10mm	Ant 4	DSI 1	633334	3500.01	20.41	21.40	1.256	-0.04	0.303	0.381
	FR1 n77	100M	QPSK	135	69	DFT-30	Back	10mm	Ant 4	DSI 1	633334	3500.01	20.21	21.40	1.315	0.01	0.233	0.306
40	FR1 n77	100M	QPSK	1	1	DFT-30	Left Side	10mm	Ant 4	DSI 1	633334	3500.01	20.41	21.40	1.256	0.08	0.693	**0.870**
	FR1 n77	100M	QPSK	135	69	DFT-30	Left Side	10mm	Ant 4	DSI 1	633334	3500.01	20.21	21.40	1.315	-0.03	0.568	0.747
	FR1 n77	100M	QPSK	270	0	DFT-30	Left Side	10mm	Ant 4	DSI 1	633334	3500.01	20.15	21.40	1.334	0.02	0.497	0.663
	FR1 n77	100M	QPSK	1	1	DFT-30	Front	10mm	Ant 7	DSI 1	656000	3840	16.51	17.00	1.119	0.11	0.021	0.024
	FR1 n77	100M	QPSK	135	69	DFT-30	Front	10mm	Ant 7	DSI 1	656000	3840	16.24	17.00	1.191	0.09	0.027	0.032
	FR1 n77	100M	QPSK	1	1	DFT-30	Back	10mm	Ant 7	DSI 1	656000	3840	16.51	17.00	1.119	0.03	0.052	0.058
	FR1 n77	100M	QPSK	135	69	DFT-30	Back	10mm	Ant 7	DSI 1	656000	3840	16.24	17.00	1.191	0.03	0.044	0.052
	FR1 n77	100M	QPSK	1	1	DFT-30	Right Side	10mm	Ant 7	DSI 1	656000	3840	16.51	17.00	1.119	0.11	0.019	0.021
	FR1 n77	100M	QPSK	135	69	DFT-30	Right Side	10mm	Ant 7	DSI 1	656000	3840	16.24	17.00	1.191	-0.04	0.017	0.020
	FR1 n77	100M	QPSK	1	1	DFT-30	Top Side	10mm	Ant 7	DSI 1	656000	3840	16.51	17.00	1.119	0.01	0.021	0.024
	FR1 n77	100M	QPSK	135	69	DFT-30	Top Side	10mm	Ant 7	DSI 1	656000	3840	16.24	17.00	1.191	0.11	0.021	0.025
	FR1 n77	100M	QPSK	1	1	DFT-30	Front	10mm	Ant 7	DSI 1	633334	3500.01	18.77	19.50	1.183	0.11	0.032	0.038
	FR1 n77	100M	QPSK	135	69	DFT-30	Front	10mm	Ant 7	DSI 1	633334	3500.01	18.33	19.50	1.309	0.09	0.036	0.047
	FR1 n77	100M	QPSK	1	1	DFT-30	Back	10mm	Ant 7	DSI 1	633334	3500.01	18.77	19.50	1.183	-0.07	0.120	0.142
	FR1 n77	100M	QPSK	135	69	DFT-30	Back	10mm	Ant 7	DSI 1	633334	3500.01	18.33	19.50	1.309	0.04	0.110	0.144
	FR1 n77	100M	QPSK	1	1	DFT-30	Right Side	10mm	Ant 7	DSI 1	633334	3500.01	18.77	19.50	1.183	0.09	0.033	0.039
	FR1 n77	100M	QPSK	135	69	DFT-30	Right Side	10mm	Ant 7	DSI 1	633334	3500.01	18.33	19.50	1.309	-0.07	0.029	0.038
	FR1 n77	100M	QPSK	1	1	DFT-30	Top Side	10mm	Ant 7	DSI 1	633334	3500.01	18.77	19.50	1.183	0.01	0.043	0.051
	FR1 n77	100M	QPSK	135	69	DFT-30	Top Side	10mm	Ant 7	DSI 1	633334	3500.01	18.33	19.50	1.309	0.01	0.042	0.055
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Front	10mm	Ant 4	DSI 1	650000	3750	20.28	21.40	1.294	0.11	0.161	0.208
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Front	10mm	Ant 4	DSI 1	650000	3750	20.11	21.40	1.346	0.09	0.138	0.186
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Back	10mm	Ant 4	DSI 1	650000	3750	20.28	21.40	1.294	-0.07	0.315	0.408
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Back	10mm	Ant 4	DSI 1	650000	3750	20.11	21.40	1.346	0.01	0.223	0.300
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Left Side	10mm	Ant 4	DSI 1	650000	3750	20.28	21.40	1.294	0.08	0.461	0.597
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Left Side	10mm	Ant 4	DSI 1	650000	3750	20.11	21.40	1.346	0.01	0.387	0.521
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Front	10mm	Ant 4	DSI 1	633334	3500.01	20.34	21.40	1.276	0.01	0.232	0.296
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Front	10mm	Ant 4	DSI 1	633334	3500.01	20.17	21.40	1.327	0.07	0.163	0.216
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Back	10mm	Ant 4	DSI 1	633334	3500.01	20.34	21.40	1.276	0.05	0.331	0.423
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Back	10mm	Ant 4	DSI 1	633334	3500.01	20.17	21.40	1.327	0.04	0.241	0.320
41	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Left Side	10mm	Ant 4	DSI 1	633334	3500.01	20.34	21.40	1.276	0.01	0.508	**0.648**
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Left Side	10mm	Ant 4	DSI 1	633334	3500.01	20.17	21.40	1.327	0.03	0.396	0.526
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Front	10mm	Ant 7	DSI 1	650000	3750	17.08	18.00	1.236	-0.07	0.019	0.023
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Front	10mm	Ant 7	DSI 1	650000	3750	16.92	18.00	1.282	0.08	0.017	0.022
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Back	10mm	Ant 7	DSI 1	650000	3750	17.08	18.00	1.236	0.01	0.056	0.069
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Back	10mm	Ant 7	DSI 1	650000	3750	16.92	18.00	1.282	0.04	0.072	0.092

	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Right Side	10mm	Ant 7	DSI 1	650000	3750	17.08	18.00	1.236	0.01	0.021	0.026
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Right Side	10mm	Ant 7	DSI 1	650000	3750	16.92	18.00	1.282	-0.07	0.031	0.040
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Top Side	10mm	Ant 7	DSI 1	650000	3750	17.08	18.00	1.236	0.08	0.019	0.023
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Top Side	10mm	Ant 7	DSI 1	650000	3750	16.92	18.00	1.282	0.01	0.026	0.033
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Front	10mm	Ant 7	DSI 1	633334	3500.01	21.84	22.50	1.164	0.11	0.148	0.172
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Front	10mm	Ant 7	DSI 1	633334	3500.01	21.81	22.50	1.172	0.05	0.127	0.149
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Back	10mm	Ant 7	DSI 1	633334	3500.01	21.84	22.50	1.164	-0.06	0.290	0.338
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Back	10mm	Ant 7	DSI 1	633334	3500.01	21.81	22.50	1.172	-0.06	0.269	0.315
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Right Side	10mm	Ant 7	DSI 1	633334	3500.01	21.84	22.50	1.164	0.13	0.025	0.029
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Right Side	10mm	Ant 7	DSI 1	633334	3500.01	21.81	22.50	1.172	0.09	0.035	0.041
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Top Side	10mm	Ant 7	DSI 1	633334	3500.01	21.84	22.50	1.164	0.08	0.106	0.123
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Top Side	10mm	Ant 7	DSI 1	633334	3500.01	21.81	22.50	1.172	0.01	0.088	0.103

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
WLAN/Bluetooth																
	WLAN2.4GHz	802.11b 1Mbps	Front	10mm	Ant 6	Full	11	2462	17.76	18.50	1.186	100	1.000	0.06	0.016	0.019
42	WLAN2.4GHz	802.11b 1Mbps	Back	10mm	Ant 6	Full	11	2462	17.76	18.50	1.186	100	1.000	0.02	0.319	**0.378**
	WLAN2.4GHz	802.11b 1Mbps	Right Side	10mm	Ant 6	Full	11	2462	17.76	18.50	1.186	100	1.000	0.06	0.115	0.136
	WLAN2.4GHz	802.11b 1Mbps	Top Side	10mm	Ant 6	Full	11	2462	17.76	18.50	1.186	100	1.000	0.04	0.009	0.011
43	Bluetooth	1Mbps	Back	10mm	Ant 6	Full	0	2402	12.61	14.00	1.377	76.94	1.300	0.06	0.056	**0.100**
	WLAN5.2GHz	802.11ac-VHT80 MCS0	Front	10mm	Ant 6	Full	42	5210	14.89	16.50	1.449	92.49	1.081	0.01	0.035	0.055
44	WLAN5.2GHz	802.11ac-VHT80 MCS0	Back	10mm	Ant 6	Full	42	5210	14.89	16.50	1.449	92.49	1.081	0.01	0.129	**0.202**
	WLAN5.2GHz	802.11ac-VHT80 MCS0	Right Side	10mm	Ant 6	Full	42	5210	14.89	16.50	1.449	92.49	1.081	0.01	0.042	0.066
	WLAN5.2GHz	802.11ac-VHT80 MCS0	Top Side	10mm	Ant 6	Full	42	5210	14.89	16.50	1.449	92.49	1.081	0.03	0.017	0.026
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Front	10mm	Ant 6	Full	155	5775	16.22	17.50	1.343	92.49	1.081	0.03	0.040	0.058
45	WLAN5.8GHz	802.11ac-VHT80 MCS0	Back	10mm	Ant 6	Full	155	5775	16.22	17.50	1.343	92.49	1.081	0.06	0.200	**0.290**
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Right Side	10mm	Ant 6	Full	155	5775	16.22	17.50	1.343	92.49	1.081	0.01	0.104	0.151
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Top Side	10mm	Ant 6	Full	155	5775	16.22	17.50	1.343	92.49	1.081	0.02	0.028	0.041

15.3 Body Worn Accessory SAR

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
750MHz																		
46	LTE Band 12	10M	QPSK	1	0	-	Front	10mm	Ant 0	DSI 1	23095	707.5	24.12	25.00	1.225	-0.02	0.386	**0.473**
	LTE Band 12	10M	QPSK	25	0	-	Front	10mm	Ant 0	DSI 1	23095	707.5	23.10	24.00	1.230	0.03	0.294	0.362
	LTE Band 12	10M	QPSK	1	0	-	Back	10mm	Ant 0	DSI 1	23095	707.5	24.12	25.00	1.225	0.06	0.303	0.371
	LTE Band 12	10M	QPSK	25	0	-	Back	10mm	Ant 0	DSI 1	23095	707.5	23.10	24.00	1.230	0.09	0.250	0.308
47	LTE Band 71	20M	QPSK	1	0	-	Front	10mm	Ant 0	DSI 1	133322	683	24.02	25.00	1.253	0.01	0.357	**0.447**
	LTE Band 71	20M	QPSK	50	0	-	Front	10mm	Ant 0	DSI 1	133322	683	23.10	24.00	1.230	0.09	0.332	0.408
	LTE Band 71	20M	QPSK	1	0	-	Back	10mm	Ant 0	DSI 1	133322	683	24.02	25.00	1.253	0.1	0.347	0.435
	LTE Band 71	20M	QPSK	50	0	-	Back	10mm	Ant 0	DSI 1	133322	683	23.10	24.00	1.230	0.13	0.276	0.340
	FR1 n71	20M	QPSK	1	1	DFT-15	Front	10mm	Ant 0	DSI 1	136100	680.5	23.44	24.50	1.276	0.08	0.248	0.317
	FR1 n71	20M	QPSK	50	28	DFT-15	Front	10mm	Ant 0	DSI 1	136100	680.5	23.36	24.50	1.300	0.02	0.231	0.300
48	FR1 n71	20M	QPSK	1	1	DFT-15	Back	10mm	Ant 0	DSI 1	136100	680.5	23.44	24.50	1.276	-0.01	0.308	**0.393**
	FR1 n71	20M	QPSK	50	28	DFT-15	Back	10mm	Ant 0	DSI 1	136100	680.5	23.36	24.50	1.300	-0.01	0.254	0.330
835MHz																		
49	GSM850	-	-	-	-	GPRS (2 Tx slots)	Front	10mm	Ant 0	DSI 1	189	836.4	30.76	31.50	1.186	-0.07	0.393	**0.466**
	GSM850	-	-	-	-	GPRS (2 Tx slots)	Back	10mm	Ant 0	DSI 1	189	836.4	30.76	31.50	1.186	0.08	0.334	0.396
50	WCDMA V	-	-	-	-	RMC 12.2Kbps	Front	10mm	Ant 0	DSI 1	4182	836.4	24.46	25.50	1.271	-0.03	0.394	**0.501**
	WCDMA V	-	-	-	-	RMC 12.2Kbps	Back	10mm	Ant 0	DSI 1	4182	836.4	24.46	25.50	1.271	0.02	0.328	0.417
51	LTE Band 5	10M	QPSK	1	0	-	Front	10mm	Ant 0	DSI 1	20525	836.5	24.05	25.00	1.245	0.01	0.350	**0.436**
	LTE Band 5	10M	QPSK	25	0	-	Front	10mm	Ant 0	DSI 1	20525	836.5	23.22	24.00	1.197	0.05	0.304	0.364
	LTE Band 5	10M	QPSK	1	0	-	Back	10mm	Ant 0	DSI 1	20525	836.5	24.05	25.00	1.245	0.06	0.289	0.360
	LTE Band 5	10M	QPSK	25	0	-	Back	10mm	Ant 0	DSI 1	20525	836.5	23.22	24.00	1.197	0.09	0.235	0.281
	FR1 n5	20M	QPSK	1	1	DFT-15	Front	10mm	Ant 0	DSI 1	167300	836.5	23.56	24.50	1.242	0.02	0.282	0.350
52	FR1 n5	20M	QPSK	50	28	DFT-15	Front	10mm	Ant 0	DSI 1	167300	836.5	23.47	24.50	1.268	0.04	0.307	**0.389**
	FR1 n5	20M	QPSK	1	1	DFT-15	Back	10mm	Ant 0	DSI 1	167300	836.5	23.56	24.50	1.242	0.04	0.232	0.288
	FR1 n5	20M	QPSK	50	28	DFT-15	Back	10mm	Ant 0	DSI 1	167300	836.5	23.47	24.50	1.268	0.07	0.235	0.298
1750MHz																		
	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Front	10mm	Ant 3	DSI 1	1413	1732.6	23.52	24.50	1.253	0.02	0.405	0.508
53	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Back	10mm	Ant 3	DSI 1	1413	1732.6	23.52	24.50	1.253	-0.07	0.575	**0.721**
	LTE Band 4	20M	QPSK	1	0	-	Front	10mm	Ant 3	DSI 1	20175	1732.5	22.86	24.00	1.300	0.09	0.297	0.386
	LTE Band 4	20M	QPSK	50	0	-	Front	10mm	Ant 3	DSI 1	20175	1732.5	21.92	23.00	1.282	0.05	0.246	0.315
54	LTE Band 4	20M	QPSK	1	0	-	Back	10mm	Ant 3	DSI 1	20175	1732.5	22.86	24.00	1.300	0.04	0.359	**0.467**
	LTE Band 4	20M	QPSK	50	0	-	Back	10mm	Ant 3	DSI 1	20175	1732.5	21.92	23.00	1.282	0.08	0.328	0.421

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
1900MHz																				
	GSM1900	-	-	-	-	GPRS (2 Tx slots)	Front	10mm	Ant 3	DSI 1	661	1880	27.49	28.50	1.262	-	-	0.05	0.226	0.285
55	GSM1900	-	-	-	-	GPRS (2 Tx slots)	Back	10mm	Ant 3	DSI 1	661	1880	27.49	28.50	1.262	-	-	-0.06	0.338	**0.426**
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Front	10mm	Ant 3	DSI 1	9400	1880	23.57	24.50	1.239	-	-	0.09	0.340	0.421
56	WCDMA II	-	-	-	-	RMC 12.2Kbps	Back	10mm	Ant 3	DSI 1	9400	1880	23.57	24.50	1.239	-	-	0.07	0.553	**0.685**
	LTE Band 2	20M	QPSK	1	0	-	Front	10mm	Ant 3	DSI 1	18900	1880	22.88	24.00	1.294	-	-	0.08	0.342	0.443
	LTE Band 2	20M	QPSK	50	0	-	Front	10mm	Ant 3	DSI 1	18900	1880	21.77	23.00	1.327	-	-	0.09	0.282	0.374
57	LTE Band 2	20M	QPSK	1	0	-	Back	10mm	Ant 3	DSI 1	18900	1880	22.88	24.00	1.294	-	-	0.02	0.529	**0.685**
	LTE Band 2	20M	QPSK	50	0	-	Back	10mm	Ant 3	DSI 1	18900	1880	21.77	23.00	1.327	-	-	0.09	0.410	0.544
2600MHz																				
58	LTE Band 7	20M	QPSK	1	0	-	Front	10mm	Ant 1	DSI 1	21100	2535	20.15	21.00	1.216	-	-	0.05	0.270	**0.328**
	LTE Band 7	20M	QPSK	50	0	-	Front	10mm	Ant 1	DSI 1	21100	2535	20.09	21.00	1.233	-	-	0.04	0.229	0.282
	LTE Band 7	20M	QPSK	1	0	-	Back	10mm	Ant 1	DSI 1	21100	2535	20.15	21.00	1.216	-	-	0.11	0.266	0.324
	LTE Band 7	20M	QPSK	50	0	-	Back	10mm	Ant 1	DSI 1	21100	2535	20.09	21.00	1.233	-	-	0.01	0.215	0.265
59	LTE Band 41	20M	QPSK	1	0	-	Front	10mm	Ant 1	DSI 1	40620	2593	23.75	24.50	1.189	62.9	1.006	0.16	0.317	**0.379**
	LTE Band 41	20M	QPSK	50	0	-	Front	10mm	Ant 1	DSI 1	40620	2593	22.70	23.50	1.202	62.9	1.006	0.01	0.284	0.343
	LTE Band 41	20M	QPSK	1	0	-	Back	10mm	Ant 1	DSI 1	40620	2593	23.75	24.50	1.189	62.9	1.006	0.08	0.308	0.368
	LTE Band 41	20M	QPSK	50	0	-	Back	10mm	Ant 1	DSI 1	40620	2593	22.70	23.50	1.202	62.9	1.006	-0.01	0.269	0.325
3500MHz																				
	FR1 n77	100M	QPSK	1	1	DFT-30	Front	10mm	Ant 4	DSI 1	656000	3840	20.46	21.40	1.242	-	-	0.11	0.134	0.166
	FR1 n77	100M	QPSK	135	69	DFT-30	Front	10mm	Ant 4	DSI 1	656000	3840	20.40	21.40	1.259	-	-	0.1	0.127	0.160
	FR1 n77	100M	QPSK	1	1	DFT-30	Back	10mm	Ant 4	DSI 1	656000	3840	20.46	21.40	1.242	-	-	-0.06	0.251	0.312
	FR1 n77	100M	QPSK	135	69	DFT-30	Back	10mm	Ant 4	DSI 1	656000	3840	20.40	21.40	1.259	-	-	0.02	0.231	0.291
	FR1 n77	100M	QPSK	1	1	DFT-30	Front	10mm	Ant 4	DSI 1	633334	3500.01	20.41	21.40	1.256	-	-	0.11	0.208	0.261
	FR1 n77	100M	QPSK	135	69	DFT-30	Front	10mm	Ant 4	DSI 1	633334	3500.01	20.21	21.40	1.315	-	-	0.09	0.187	0.246
62	FR1 n77	100M	QPSK	1	1	DFT-30	Back	10mm	Ant 4	DSI 1	633334	3500.01	20.41	21.40	1.256	-	-	-0.04	0.303	**0.381**
	FR1 n77	100M	QPSK	135	69	DFT-30	Back	10mm	Ant 4	DSI 1	633334	3500.01	20.21	21.40	1.315	-	-	0.01	0.233	0.306
	FR1 n77	100M	QPSK	1	1	DFT-30	Front	10mm	Ant 7	DSI 1	656000	3840	16.51	17.00	1.119	-	-	0.11	0.021	0.024
	FR1 n77	100M	QPSK	135	69	DFT-30	Front	10mm	Ant 7	DSI 1	656000	3840	16.24	17.00	1.191	-	-	0.09	0.027	0.032
	FR1 n77	100M	QPSK	1	1	DFT-30	Back	10mm	Ant 7	DSI 1	656000	3840	16.51	17.00	1.119	-	-	0.03	0.052	0.058
	FR1 n77	100M	QPSK	135	69	DFT-30	Back	10mm	Ant 7	DSI 1	656000	3840	16.24	17.00	1.191	-	-	0.03	0.044	0.052
	FR1 n77	100M	QPSK	1	1	DFT-30	Front	10mm	Ant 7	DSI 1	633334	3500.01	18.77	19.50	1.183	-	-	0.11	0.032	0.038
	FR1 n77	100M	QPSK	135	69	DFT-30	Front	10mm	Ant 7	DSI 1	633334	3500.01	18.33	19.50	1.309	-	-	0.09	0.036	0.047
	FR1 n77	100M	QPSK	1	1	DFT-30	Back	10mm	Ant 7	DSI 1	633334	3500.01	18.77	19.50	1.183	-	-	-0.07	0.120	0.142
	FR1 n77	100M	QPSK	135	69	DFT-30	Back	10mm	Ant 7	DSI 1	633334	3500.01	18.33	19.50	1.309	-	-	0.04	0.110	0.144
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Front	10mm	Ant 4	DSI 1	650000	3750	20.28	21.40	1.294	-	-	0.11	0.161	0.208
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Front	10mm	Ant 4	DSI 1	650000	3750	20.11	21.40	1.346	-	-	0.09	0.138	0.186
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Back	10mm	Ant 4	DSI 1	650000	3750	20.28	21.40	1.294	-	-	-0.07	0.315	0.408
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Back	10mm	Ant 4	DSI 1	650000	3750	20.11	21.40	1.346	-	-	0.01	0.223	0.300
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Front	10mm	Ant 4	DSI 1	633334	3500.01	20.34	21.40	1.276	-	-	0.01	0.232	0.296
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Front	10mm	Ant 4	DSI 1	633334	3500.01	20.17	21.40	1.327	-	-	0.07	0.163	0.216
63	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Back	10mm	Ant 4	DSI 1	633334	3500.01	20.34	21.40	1.276	-	-	0.05	0.331	**0.423**
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Back	10mm	Ant 4	DSI 1	633334	3500.01	20.17	21.40	1.327	-	-	0.04	0.241	0.320
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Front	10mm	Ant 7	DSI 1	650000	3750	17.08	18.00	1.236	-	-	-0.07	0.019	0.023
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Front	10mm	Ant 7	DSI 1	650000	3750	16.92	18.00	1.282	-	-	0.08	0.017	0.022
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Back	10mm	Ant 7	DSI 1	650000	3750	17.08	18.00	1.236	-	-	0.01	0.056	0.069
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Back	10mm	Ant 7	DSI 1	650000	3750	16.92	18.00	1.282	-	-	0.04	0.072	0.092
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Front	10mm	Ant 7	DSI 1	633334	3500.01	21.84	22.50	1.164	-	-	0.09	0.148	0.172
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Front	10mm	Ant 7	DSI 1	633334	3500.01	21.81	22.50	1.172	-	-	-0.07	0.127	0.149
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Back	10mm	Ant 7	DSI 1	633334	3500.01	21.84	22.50	1.164	-	-	0.01	0.290	0.338
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Back	10mm	Ant 7	DSI 1	633334	3500.01	21.81	22.50	1.172	-	-	0.02	0.269	0.315

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
WLAN/Bluetooth																
	WLAN2.4GHz	802.11b 1Mbps	Front	10mm	Ant 6	Full	11	2462	17.76	18.50	1.186	100	1.000	0.06	0.016	0.019
64	WLAN2.4GHz	802.11b 1Mbps	Back	10mm	Ant 6	Full	11	2462	17.76	18.50	1.186	100	1.000	0.02	0.319	**0.378**
65	Bluetooth	1Mbps	Back	10mm	Ant 6	Full	0	2402	12.61	14.00	1.378	76.94	1.300	0.06	0.056	**0.100**
	WLAN5.3GHz	802.11ac-VHT80 MCS0	Front	10mm	Ant 6	Full	58	5290	14.98	16.50	1.419	92.49	1.081	0.01	0.025	0.038
66	WLAN5.3GHz	802.11ac-VHT80 MCS0	Back	10mm	Ant 6	Full	58	5290	14.98	16.50	1.419	92.49	1.081	0.01	0.134	**0.206**
	WLAN5.5GHz	802.11a 6Mbps	Front	10mm	Ant 6	Full	132	5660	18.00	19.50	1.413	98.28	1.018	0.11	0.083	0.119
67	WLAN5.5GHz	802.11a 6Mbps	Back	10mm	Ant 6	Full	132	5660	18.00	19.50	1.413	98.28	1.018	-0.01	0.224	**0.322**
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Front	10mm	Ant 6	Full	155	5775	16.22	17.50	1.343	92.49	1.081	0.06	0.040	0.058
68	WLAN5.8GHz	802.11ac-VHT80 MCS0	Back	10mm	Ant 6	Full	155	5775	16.22	17.50	1.343	92.49	1.081	0.06	0.200	**0.290**

15.4 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)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
2600MHz																		
	LTE Band 7	20M	QPSK	1	0	-	Bottom Side	0mm	Ant 1	DSI 1	21100	2535	20.15	21.00	1.216	0.04	1.690	2.055
69	LTE Band 7	20M	QPSK	1	0	-	Bottom Side	0mm	Ant 1	DSI 1	20850	2510	19.91	21.00	1.285	0.09	1.700	**2.185**
	LTE Band 7	20M	QPSK	1	0	-	Bottom Side	0mm	Ant 1	DSI 1	21350	2560	20.06	21.00	1.242	0.09	1.630	2.024
	LTE Band 7	20M	QPSK	50	0	-	Bottom Side	0mm	Ant 1	DSI 1	21100	2535	20.09	21.00	1.233	0.02	1.570	1.936
	LTE Band 7	20M	QPSK	100	0	-	Bottom Side	0mm	Ant 1	DSI 1	21100	2535	20.05	21.00	1.245	0.04	1.530	1.904
3500MHz																		
72	FR1 n77	100M	QPSK	1	1	DFT-30	Left Side	0mm	Ant 4	DSI 1	633334	3500.01	20.41	21.40	1.256	0.01	1.670	**2.098**
	FR1 n77	100M	QPSK	135	69	DFT-30	Left Side	0mm	Ant 4	DSI 1	633334	3500.01	20.21	21.40	1.315	0.06	1.590	2.091
	FR1 n77	100M	QPSK	270	0	DFT-30	Left Side	0mm	Ant 4	DSI 1	633334	3500.01	20.15	21.40	1.334	0.08	1.430	1.907
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Back	0mm	Ant 4	DSI 1	650000	3750	20.28	21.40	1.294	0.09	1.070	1.385
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Back	0mm	Ant 4	DSI 1	650000	3750	20.11	21.40	1.346	0.01	0.875	1.178
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Left Side	0mm	Ant 4	DSI 1	650000	3750	20.28	21.40	1.294	0.08	1.580	2.045
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Left Side	0mm	Ant 4	DSI 1	650000	3750	20.11	21.40	1.346	-0.07	1.340	1.803
	FR1 n78 HPUE	100M	QPSK	270	0	DFT-30	Left Side	0mm	Ant 4	DSI 1	650000	3750	20.04	21.40	1.368	0.03	1.290	1.764
	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Back	0mm	Ant 4	DSI 1	633334	3500.01	20.34	21.40	1.276	0.09	1.150	1.468
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Back	0mm	Ant 4	DSI 1	633334	3500.01	20.17	21.40	1.327	0.01	0.963	1.278
73	FR1 n78 HPUE	100M	QPSK	1	1	DFT-30	Left Side	0mm	Ant 4	DSI 1	633334	3500.01	20.34	21.40	1.276	0.08	1.700	**2.170**
	FR1 n78 HPUE	100M	QPSK	135	69	DFT-30	Left Side	0mm	Ant 4	DSI 1	633334	3500.01	20.17	21.40	1.327	-0.07	1.450	1.925
	FR1 n78 HPUE	100M	QPSK	270	0	DFT-30	Left Side	0mm	Ant 4	DSI 1	633334	3500.01	20.10	21.40	1.349	-0.07	1.420	1.916

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
WLAN																
	WLAN5.3GHz	802.11ac-VHT80 MCS0	Front	0mm	Ant 6	Full	58	5290	14.98	16.50	1.419	92.49	1.081	0.1	0.122	0.188
74	WLAN5.3GHz	802.11ac-VHT80 MCS0	Back	0mm	Ant 6	Full	58	5290	14.98	16.50	1.419	92.49	1.081	0.01	0.429	**0.658**
	WLAN5.3GHz	802.11ac-VHT80 MCS0	Right Side	0mm	Ant 6	Full	58	5290	14.98	16.50	1.419	92.49	1.081	0.03	0.240	0.368
	WLAN5.3GHz	802.11ac-VHT80 MCS0	Top Side	0mm	Ant 6	Full	58	5290	14.98	16.50	1.419	92.49	1.081	0.05	0.064	0.098
	WLAN5.5GHz	802.11a 6Mbps	Front	0mm	Ant 6	Full	132	5660	18.00	19.50	1.413	98.28	1.018	0.06	0.100	0.144
75	WLAN5.5GHz	802.11a 6Mbps	Back	0mm	Ant 6	Full	132	5660	18.00	19.50	1.413	98.28	1.018	0.01	0.380	**0.547**
	WLAN5.5GHz	802.11a 6Mbps	Right Side	0mm	Ant 6	Full	132	5660	18.00	19.50	1.413	98.28	1.018	0.05	0.157	0.226
	WLAN5.5GHz	802.11a 6Mbps	Top Side	0mm	Ant 6	Full	132	5660	18.00	19.50	1.413	98.28	1.018	-0.02	0.035	0.050

16. 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

General Note:

1. This device supports VoIP in GPRS, EGPRS, WCDMA and LTE (e.g. for 3rd-party VoIP), LTE supports VoLTE operation.
2. WWAN above includes 5G NR bands.
3. EUT will choose each GSM, WCDMA, LTE and 5GNR according to the network signal condition; therefore, they will not operate simultaneously at any moment.
4. For EN-DC mode, Qualcomm Smart Transmit algorithm in WWAN adds directly the time-averaged RF exposure from 4G(LTE) and time-averaged RF exposure from 5G NR. Smart Transmit algorithm controls the total RF exposure from both 4G and 5G NR to not exceed FCC limit. Therefore, simultaneous transmission compliance between 4G+5G NR operation is demonstrated in the Part 2 Report during algorithm validation. In Part 1 Report, simultaneous transmission compliance was evaluated individually with other Radios (WLAN or BT) using one of 4G or 5G NR.
5. This device 2.4GHz WLAN support hotspot operation and Bluetooth support tethering applications.
6. This device 5.2GHz WLAN/5.8GHz WLAN support hotspot operation, and 5.2GHz WLAN/5.8GHz WLAN supports WLAN Direct (GC/GO), and 5.3GHz / 5.5GHz supports WLAN Direct (GC only).
7. The worst case 5 GHz WLAN SAR for each configuration was used for SAR summation.
8. WLAN 2.4GHz and Bluetooth share the same antenna so can't transmit simultaneously.
9. According to the EUT characteristic, WLAN 5GHz and Bluetooth cannot transmit simultaneously.
10. According to the EUT characteristic, WLAN 5GHz and WLAN 2.4GHz cannot transmit simultaneously.
11. The maximum SAR summation is calculated based on the same configuration and test position.
12. Per KDB 447498 D01v06, simultaneous transmission SAR is compliant if,
    i) 1g Scalar SAR summation < 1.6W/kg and 10g Scalar SAR summation < 4.0W/kg.
    ii) SPLSR = (SAR1 + SAR2)^1.5 / (min. separation distance, mm), and the peak separation distance is determined from the square root of [(x1-x2)2 + (y1-y2)2 + (z1-z2)2], where (x1, y1, z1) and (x2, y2, z2) are the coordinates of the extrapolated peak SAR locations in the zoom scan.
    iii) If SPLSR ≤ 0.04 for 1g SAR and SPLSR≤ 0.10 for 10g SAR , simultaneously transmission SAR measurement is not necessary.
    iv) Simultaneously transmission SAR measurement, and the reported multi-band 1g SAR < 1.6W/kg and 10g SAR < 4.0W/kg.

16.1 5G NR + LTE + WLAN + BT Sim-Tx analysis

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

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

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

$x\% * A + (100-x)\% * B \leq 1.0,$

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

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

$x\% * A + (100-x)\% * B + C \leq 1.0$ (1)

$x\% * A + (100-x)\% * B \leq x\% * \max(A, B) + (100-x)\% * \max(A, B) \leq \max(A, B)$

$x\% * A + (100-x)\% * B + C \leq \max(A, B) + C \leq 1.0$ (2)

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

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

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

16.2 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)
GSM	GSM850 Ant 0	Right Cheek	0.920	0.059	0.186	0.030	0.98	1.11	0.95
		Right Tilted	0.793	0.034	0.144	0.030	0.83	0.94	0.82
		Left Cheek	0.704	0.139	0.395	0.030	0.84	1.10	0.73
		Left Tilted	0.681	0.079	0.318	0.030	0.76	1.00	0.71
	GSM1900 Ant 3	Right Cheek	0.939	0.059	0.186	0.030	1.00	1.13	0.97
		Right Tilted	0.289	0.034	0.144	0.030	0.32	0.43	0.32
		Left Cheek	0.196	0.139	0.395	0.030	0.34	0.59	0.23
		Left Tilted	0.121	0.079	0.318	0.030	0.20	0.44	0.15
WCDMA	WCDMA II Ant 3	Right Cheek	0.925	0.059	0.186	0.030	0.98	1.11	0.96
		Right Tilted	0.262	0.034	0.144	0.030	0.30	0.41	0.29
		Left Cheek	0.240	0.139	0.395	0.030	0.38	0.64	0.27
		Left Tilted	0.117	0.079	0.318	0.030	0.20	0.44	0.15
	WCDMA IV Ant 3	Right Cheek	0.928	0.059	0.186	0.030	0.99	1.11	0.96
		Right Tilted	0.410	0.034	0.144	0.030	0.44	0.55	0.44
		Left Cheek	0.290	0.139	0.395	0.030	0.43	0.69	0.32
		Left Tilted	0.215	0.079	0.318	0.030	0.29	0.53	0.25
	WCDMA V Ant 0	Right Cheek	0.944	0.059	0.186	0.030	1.00	1.13	0.97
		Right Tilted	0.820	0.034	0.144	0.030	0.85	0.96	0.85
		Left Cheek	0.749	0.139	0.395	0.030	0.89	1.14	0.78
		Left Tilted	0.657	0.079	0.318	0.030	0.74	0.98	0.69
LTE	LTE Band 2 Ant 3	Right Cheek	0.938	0.059	0.186	0.030	1.00	1.12	0.97
		Right Tilted	0.270	0.034	0.144	0.030	0.30	0.41	0.30
		Left Cheek	0.247	0.139	0.395	0.030	0.39	0.64	0.28
		Left Tilted	0.120	0.079	0.318	0.030	0.20	0.44	0.15
	LTE Band 4 Ant 3	Right Cheek	0.926	0.059	0.186	0.030	0.99	1.11	0.96
		Right Tilted	0.334	0.034	0.144	0.030	0.37	0.48	0.36
		Left Cheek	0.308	0.139	0.395	0.030	0.45	0.70	0.34
		Left Tilted	0.232	0.079	0.318	0.030	0.31	0.55	0.26
	LTE Band 5 Ant 0	Right Cheek	0.933	0.059	0.186	0.030	0.99	1.12	0.96
		Right Tilted	0.875	0.034	0.144	0.030	0.91	1.02	0.91
		Left Cheek	0.754	0.139	0.395	0.030	0.89	1.15	0.78
		Left Tilted	0.697	0.079	0.318	0.030	0.78	1.02	0.73
	LTE Band 7 Ant 1	Right Cheek	0.127	0.059	0.186	0.030	0.19	0.31	0.16
		Right Tilted	0.122	0.034	0.144	0.030	0.16	0.27	0.15
		Left Cheek	0.182	0.139	0.395	0.030	0.32	0.58	0.21
		Left Tilted	0.069	0.079	0.318	0.030	0.15	0.39	0.10
	LTE Band 12 Ant 0	Right Cheek	0.840	0.059	0.186	0.030	0.90	1.03	0.87
		Right Tilted	0.683	0.034	0.144	0.030	0.72	0.83	0.71
		Left Cheek	0.616	0.139	0.395	0.030	0.76	1.01	0.65
		Left Tilted	0.497	0.079	0.318	0.030	0.58	0.82	0.53
	LTE Band 41 Ant 1	Right Cheek	0.105	0.059	0.186	0.030	0.16	0.29	0.14
		Right Tilted	0.085	0.034	0.144	0.030	0.12	0.23	0.12
		Left Cheek	0.141	0.139	0.395	0.030	0.28	0.54	0.17
		Left Tilted	0.056	0.079	0.318	0.030	0.14	0.37	0.09
	LTE Band 71 Ant 0	Right Cheek	0.900	0.059	0.186	0.030	0.96	1.09	0.93
		Right Tilted	0.753	0.034	0.144	0.030	0.79	0.90	0.78
		Left Cheek	0.798	0.139	0.395	0.030	0.94	1.19	0.83
		Left Tilted	0.545	0.079	0.318	0.030	0.62	0.86	0.58

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)
FR1 n5 Ant 0	Right Cheek	0.977	0.059	0.186	0.030	1.04	1.16	**1.01**
	Right Tilted	0.731	0.034	0.144	0.030	0.77	0.88	0.76
	Left Cheek	0.698	0.139	0.395	0.030	0.84	1.09	0.73
	Left Tilted	0.595	0.079	0.318	0.030	0.67	0.91	0.63
FR1 n71 Ant 0	Right Cheek	0.838	0.059	0.186	0.030	0.90	1.02	0.87
	Right Tilted	0.576	0.034	0.144	0.030	0.61	0.72	0.61
	Left Cheek	0.606	0.139	0.395	0.030	0.75	1.00	0.64
	Left Tilted	0.491	0.079	0.318	0.030	0.57	0.81	0.52
FR1 n77 Ant 4	Right Cheek	0.769	0.059	0.186	0.030	0.83	0.96	0.80
	Right Tilted	0.236	0.034	0.144	0.030	0.27	0.38	0.27
	Left Cheek	0.937	0.139	0.395	0.030	1.08	**1.33**	0.97
	Left Tilted	0.131	0.079	0.318	0.030	0.21	0.45	0.16
FR1 n77 Ant 7	Right Cheek	0.399	0.059	0.186	0.030	0.46	0.59	0.43
	Right Tilted	0.334	0.034	0.144	0.030	0.37	0.48	0.36
	Left Cheek	0.490	0.139	0.395	0.030	0.63	0.89	0.52
	Left Tilted	0.304	0.079	0.318	0.030	0.38	0.62	0.33
FR1 n78 HPUE Ant 4	Right Cheek	0.377	0.059	0.186	0.030	0.44	0.56	0.41
	Right Tilted	0.133	0.034	0.144	0.030	0.17	0.28	0.16
	Left Cheek	0.906	0.139	0.395	0.030	1.05	1.30	0.94
	Left Tilted	0.068	0.079	0.318	0.030	0.15	0.39	0.10
FR1 n78 HPUE Ant 7	Right Cheek	0.203	0.059	0.186	0.030	0.26	0.39	0.23
	Right Tilted	0.144	0.034	0.144	0.030	0.18	0.29	0.17
	Left Cheek	0.190	0.139	0.395	0.030	0.33	0.59	0.22
	Left Tilted	0.142	0.079	0.318	0.030	0.22	0.46	0.17

16.3 Hotspot Exposure Conditions

WWAN Band	Exposure Position	1 WWAN 1g SAR (W/kg)	2 WLAN2.4GHz Ant 6 1g SAR (W/kg)	3 WLAN5GHz Ant 6 1g SAR (W/kg)	4 Bluetooth Ant 6 1g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)	1+4 Summed 1g SAR (W/kg)
GSM850 Ant 0	Front	0.466	0.019	0.058	0.100	0.49	0.52	0.57
	Back	0.396	0.378	0.290	0.100	0.77	0.69	0.50
	Left side	0.440				0.44	0.44	0.44
	Right side	0.147	0.136	0.151	0.100	0.28	0.30	0.25
	Top side	0.452	0.011	0.041	0.100	0.46	0.49	0.55
	Bottom side					0.00	0.00	0.00
GSM1900 Ant 3	Front	0.285	0.019	0.058	0.100	0.30	0.34	0.39
	Back	0.426	0.378	0.290	0.100	0.80	0.72	0.53
	Left side	0.404				0.40	0.40	0.40
	Right side		0.136	0.151	0.100	0.14	0.15	0.10
	Top side	0.117	0.011	0.041	0.100	0.13	0.16	0.22
	Bottom side					0.00	0.00	0.00
WCDMA II Ant 3	Front	0.421	0.019	0.058	0.100	0.44	0.48	0.52
	Back	0.685	0.378	0.290	0.100	1.06	0.98	0.79
	Left side	0.617				0.62	0.62	0.62
	Right side		0.136	0.151	0.100	0.14	0.15	0.10
	Top side	0.202	0.011	0.041	0.100	0.21	0.24	0.30
	Bottom side					0.00	0.00	0.00
WCDMA IV Ant 3	Front	0.508	0.019	0.058	0.100	0.53	0.57	0.61
	Back	0.721	0.378	0.290	0.100	**1.10**	1.01	0.82
	Left side	0.639				0.64	0.64	0.64
	Right side		0.136	0.151	0.100	0.14	0.15	0.10
	Top side	0.318	0.011	0.041	0.100	0.33	0.36	0.42
	Bottom side					0.00	0.00	0.00
WCDMA V Ant 0	Front	0.501	0.019	0.058	0.100	0.52	0.56	0.60
	Back	0.417	0.378	0.290	0.100	0.80	0.71	0.52
	Left side	0.454				0.45	0.45	0.45
	Right side	0.111	0.136	0.151	0.100	0.25	0.26	0.21
	Top side	0.466	0.011	0.041	0.100	0.48	0.51	0.57
	Bottom side					0.00	0.00	0.00
LTE Band 2 Ant 3	Front	0.443	0.019	0.058	0.100	0.46	0.50	0.54
	Back	0.685	0.378	0.290	0.100	1.06	0.98	0.79
	Left side	0.652				0.65	0.65	0.65
	Right side		0.136	0.151	0.100	0.14	0.15	0.10
	Top side	0.234	0.011	0.041	0.100	0.25	0.28	0.33
	Bottom side					0.00	0.00	0.00
LTE Band 4 Ant 3	Front	0.386	0.019	0.058	0.100	0.41	0.44	0.49
	Back	0.467	0.378	0.290	0.100	0.85	0.76	0.57
	Left side	0.601				0.60	0.60	0.60
	Right side		0.136	0.151	0.100	0.14	0.15	0.10
	Top side	0.221	0.011	0.041	0.100	0.23	0.26	0.32
	Bottom side					0.00	0.00	0.00
LTE Band 5 Ant 0	Front	0.436	0.019	0.058	0.100	0.46	0.49	0.54
	Back	0.360	0.378	0.290	0.100	0.74	0.65	0.46
	Left side	0.346				0.35	0.35	0.35
	Right side	0.085	0.136	0.151	0.100	0.22	0.24	0.19
	Top side	0.381	0.011	0.041	0.100	0.39	0.42	0.48
	Bottom side					0.00	0.00	0.00
LTE Band 7	Front	0.328	0.019	0.058	0.100	0.35	0.39	0.43

Ant 1	Back	0.324	0.378	0.290	0.100	0.70	0.61	0.42
	Left side	0.383				0.38	0.38	0.38
	Right side		0.136	0.151	0.100	0.14	0.15	0.10
	Top side		0.011	0.041	0.100	0.01	0.04	0.10
	Bottom side	0.665				0.67	0.67	0.67
LTE Band 12 Ant 0	Front	0.473	0.019	0.058	0.100	0.49	0.53	0.57
	Back	0.371	0.378	0.290	0.100	0.75	0.66	0.47
	Left side	0.479				0.48	0.48	0.48
	Right side	0.169	0.136	0.151	0.100	0.31	0.32	0.27
	Top side	0.353	0.011	0.041	0.100	0.36	0.39	0.45
	Bottom side					0.00	0.00	0.00
LTE Band 41 Ant 1	Front	0.379	0.019	0.058	0.100	0.40	0.44	0.48
	Back	0.368	0.378	0.290	0.100	0.75	0.66	0.47
	Left side	0.426				0.43	0.43	0.43
	Right side		0.136	0.151	0.100	0.14	0.15	0.10
	Top side		0.011	0.041	0.100	0.01	0.04	0.10
	Bottom side	0.666				0.67	0.67	0.67
LTE Band 71 Ant 0	Front	0.447	0.019	0.058	0.100	0.47	0.51	0.55
	Back	0.435	0.378	0.290	0.100	0.81	0.73	0.54
	Left side	0.446				0.45	0.45	0.45
	Right side	0.185	0.136	0.151	0.100	0.32	0.34	0.29
	Top side	0.386	0.011	0.041	0.100	0.40	0.43	0.49
	Bottom side					0.00	0.00	0.00

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)
FR1 n5 Ant 0	Front	0.389	0.019	0.058	0.100	0.41	0.45	0.49
	Back	0.298	0.378	0.290	0.100	0.68	0.59	0.40
	Left side	0.335				0.34	0.34	0.34
	Right side	0.087	0.136	0.151	0.100	0.22	0.24	0.19
	Top side	0.349	0.011	0.041	0.100	0.36	0.39	0.45
	Bottom side					0.00	0.00	0.00
FR1 n71 Ant 0	Front	0.317	0.019	0.058	0.100	0.34	0.38	0.42
	Back	0.393	0.378	0.290	0.100	0.77	0.68	0.49
	Left side	0.415				0.42	0.42	0.42
	Right side	0.195	0.136	0.151	0.100	0.33	0.35	0.30
	Top side	0.104	0.011	0.041	0.100	0.12	0.15	0.20
	Bottom side					0.00	0.00	0.00
FR1 n77 Ant 4	Front	0.261	0.019	0.058	0.100	0.28	0.32	0.36
	Back	0.381	0.378	0.290	0.100	0.76	0.67	0.48
	Left side	0.870				0.87	0.87	0.87
	Right side		0.136	0.151	0.100	0.14	0.15	0.10
	Top side		0.011	0.041	0.100	0.01	0.04	0.10
	Bottom side					0.00	0.00	0.00
FR1 n77 Ant 7	Front	0.047	0.019	0.058	0.100	0.07	0.11	0.15
	Back	0.144	0.378	0.290	0.100	0.52	0.43	0.24
	Left side					0.00	0.00	0.00
	Right side	0.039	0.136	0.151	0.100	0.18	0.19	0.14
	Top side	0.055	0.011	0.041	0.100	0.07	0.10	0.16
	Bottom side					0.00	0.00	0.00
FR1 n78 HPUE Ant 4	Front	0.296	0.019	0.058	0.100	0.32	0.35	0.40
	Back	0.423	0.378	0.290	0.100	0.80	0.71	0.52
	Left side	0.648				0.65	0.65	0.65
	Right side		0.136	0.151	0.100	0.14	0.15	0.10
	Top side		0.011	0.041	0.100	0.01	0.04	0.10
	Bottom side					0.00	0.00	0.00
FR1 n78 HPUE Ant 7	Front	0.172	0.019	0.058	0.100	0.19	0.23	0.27
	Back	0.338	0.378	0.290	0.100	0.72	0.63	0.44
	Left side					0.00	0.00	0.00
	Right side	0.041	0.136	0.151	0.100	0.18	0.19	0.14
	Top side	0.123	0.011	0.041	0.100	0.13	0.16	0.22
	Bottom side					0.00	0.00	0.00

16.4 Body-Worn Accessory 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)
GSM850 Ant 0	Front	0.466	0.019	0.119	0.100	0.49	0.59	0.57
	Back	0.396	0.378	0.322	0.100	0.77	0.72	0.50
GSM1900 Ant 3	Front	0.285	0.019	0.119	0.100	0.30	0.40	0.39
	Back	0.426	0.378	0.322	0.100	0.80	0.75	0.53
WCDMA II Ant 3	Front	0.421	0.019	0.119	0.100	0.44	0.54	0.52
	Back	0.685	0.378	0.322	0.100	1.06	1.01	0.79
WCDMA IV Ant 3	Front	0.508	0.019	0.119	0.100	0.53	0.63	0.61
	Back	0.721	0.378	0.322	0.100	1.10	1.04	0.82
WCDMA V Ant 0	Front	0.501	0.019	0.119	0.100	0.52	0.62	0.60
	Back	0.417	0.378	0.322	0.100	0.80	0.74	0.52
LTE Band 2 Ant 3	Front	0.443	0.019	0.119	0.100	0.46	0.56	0.54
	Back	0.685	0.378	0.322	0.100	1.06	1.01	0.79
LTE Band 4 Ant 3	Front	0.386	0.019	0.119	0.100	0.41	0.51	0.49
	Back	0.467	0.378	0.322	0.100	0.85	0.79	0.57
LTE Band 5 Ant 0	Front	0.436	0.019	0.119	0.100	0.46	0.56	0.54
	Back	0.360	0.378	0.322	0.100	0.74	0.68	0.46
LTE Band 7 Ant 1	Front	0.328	0.019	0.119	0.100	0.35	0.45	0.43
	Back	0.324	0.378	0.322	0.100	0.70	0.65	0.42
LTE Band 12 Ant 0	Front	0.473	0.019	0.119	0.100	0.49	0.59	0.57
	Back	0.371	0.378	0.322	0.100	0.75	0.69	0.47
LTE Band 41 Ant 1	Front	0.379	0.019	0.119	0.100	0.40	0.50	0.48
	Back	0.368	0.378	0.322	0.100	0.75	0.69	0.47
LTE Band 71 Ant 0	Front	0.447	0.019	0.119	0.100	0.47	0.57	0.55
	Back	0.435	0.378	0.322	0.100	0.81	0.76	0.54

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)
FR1 n5 Ant 0	Front at 10mm	0.389	0.019	0.119	0.100	0.41	0.51	0.49
	Back at 10mm	0.298	0.378	0.322	0.100	0.68	0.62	0.40
FR1 n71 Ant 0	Front at 10mm	0.317	0.019	0.119	0.100	0.34	0.44	0.42
	Back at 10mm	0.393	0.378	0.322	0.100	0.77	0.72	0.49
FR1 n77 Ant 4	Front at 10mm	0.261	0.019	0.119	0.100	0.28	0.38	0.36
	Back at 10mm	0.381	0.378	0.322	0.100	0.76	0.70	0.48
FR1 n77 Ant 7	Front at 10mm	0.047	0.019	0.119	0.100	0.07	0.17	0.15
	Back at 10mm	0.144	0.378	0.322	0.100	0.52	0.47	0.24
FR1 n78 HPUE Ant 4	Front at 10mm	0.296	0.019	0.119	0.100	0.32	0.42	0.40
	Back at 10mm	0.423	0.378	0.322	0.100	0.80	0.75	0.52
FR1 n78 HPUE Ant 7	Front at 10mm	0.172	0.019	0.119	0.100	0.19	0.29	0.27
	Back at 10mm	0.338	0.378	0.322	0.100	0.72	0.66	0.44

16.5 Product specific 10g SAR Exposure Conditions

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

WWAN Band	Exposure Position	1	3	1+3
		WWAN	WLAN5GHz Ant 6	**Summed**
		10g SAR (W/kg)	10g SAR (W/kg)	**10g SAR (W/kg)**
LTE Band 7 Ant 1	Front		0.188	0.19
	Back		0.658	0.66
	Left side			0.00
	Right side		0.368	0.37
	Top side		0.098	0.10
	Bottom side	2.185		**2.19**

WWAN Band	Exposure Position	1	3	1+3
		WWAN	WLAN5GHz Ant 6	Summed
		10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)
FR1 n77 Ant 4	Front at 0mm		0.188	0.19
	Back at 0mm		0.658	0.66
	Left side at 0mm	2.098		2.10
	Right side at 0mm		0.368	0.37
	Top side at 0mm		0.098	0.10
	Bottom side at 0mm			0.00
FR1 n78 HPUE Ant 4	Front at 0mm		0.188	0.19
	Back at 0mm	1.468	0.658	2.13
	Left side at 0mm	2.170		2.17
	Right side at 0mm		0.368	0.37
	Top side at 0mm		0.098	0.10
	Bottom side at 0mm			0.00

Test Engineer : Light Wang, Martin Li, Ricky Gu

17. Uncertainty Assessment

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

18. References

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

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

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

[4] SPEAG DASY System Handbook

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

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

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

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

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

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

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

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

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

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

Appendix A. Plots of System Performance Check

The plots are shown as follows.