

FCC SAR Test Report

APPLICANT : FCNT LLC.
EQUIPMENT : Mobile cellular phone
BRAND NAME : arrows We2 Plus
MODEL NAME : F-51E
FCC ID : 2BEPUFMP193
STANDARD : FCC 47 CFR Part 2 (2.1093)

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

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



Approved by: Si Zhang

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA3D0607	Rev. 01	Initial issue of report.	May 24, 2024

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **FCNT LLC., Mobile cellular phone, F-51E**, are as follows.

Highest 1g SAR Summary						
Equipment Class	Frequency Band		Head (Separation 0mm)	Hotspot (Separation 5mm)	Body-worn (Separation 5mm)	Highest Simultaneous Transmission 1g SAR (W/kg)
			1g SAR (W/kg)			
Licensed	GSM	GSM850	0.86	0.99	0.99	1.59
		GSM1900	0.85	0.89	0.73	
	WCDMA	Band V	0.89	0.69	0.92	
	LTE	LTE Band 2	0.89	0.80	1.28	
		LTE Band 4	0.84	0.77	1.25	
		LTE Band 5	0.87	0.98	1.01	
		LTE Band 7	0.89	0.78	1.16	
		LTE Band 12	0.71	0.77	0.77	
		LTE Band 41/38	0.89	0.93	0.88	
	FR1	LTE Band 42	0.95	0.68	0.90	
FR1 n77/n78		0.88	1.43	1.12		
DTS	WLAN	2.4GHz WLAN	1.34	0.58	1.41	1.57
NII		5GHz WLAN	1.14		1.13	1.59
DSS	Bluetooth	2.4GHz Bluetooth	0.25	0.10	0.10	1.59

Highest 10g SAR Summary				
Equipment Class	Frequency Band		Product Specific 10g SAR (W/kg) (Separation 0mm)	Highest Simultaneous Transmission 10g SAR (W/kg)
Licensed	GSM	GSM1900	1.23	3.28
	WCDMA	Band V	1.11	
	LTE	LTE Band 2	2.13	
		LTE Band 4	1.94	
		LTE Band 7	1.60	
		LTE Band 41/38	1.09	
	FR1	FR1 n77/n78	2.88	
DTS	WLAN	WLAN2.4GHz	1.66	3.28
NII		WLAN5GHz	1.24	3.26

Date of Testing: 2024/3/23 ~ 2024/4/18

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.
- This device supports 5GNR n78 and 5GNR n77. Since the supported frequency span for 5GNR n78 falls completely within the supports frequency span for 5GNR n77, both LTE bands have the same target power, and both 5GNR bands share the same transmission path; therefore, SAR was only assessed for 5GNR n77.

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

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

2. Administration Data

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

Testing Laboratory			
Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	SAR03-KS, SAR07-KS	CN1257	314309

Applicant	
Company Name	FCNT LLC.
Address	Sanki Yamato Bldg. 3F, 7-10-1, Chuorinkan, Yamato-shi, Kanagawa, 242-0007, Japan

Manufacturer	
Company Name	FCNT LLC.
Address	Sanki Yamato Bldg. 3F, 7-10-1, Chuorinkan, Yamato-shi, Kanagawa, 242-0007, Japan

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	Mobile cellular phone
Brand Name	arrows We2 Plus
Model Name	F-51E
FCC ID	2BEPUFMP193
IMEI Code	IMEI 1: 354713660048349 IMEI 2: 354713660048356
Wireless Technology and Frequency Range	GSM850: 824 MHz ~ 849 MHz GSM1900: 1850 MHz ~ 1910 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 42: 3450 MHz ~ 3550 MHz 5G NR n77: 3450 MHz ~ 3550 MHz; 3700 MHz ~ 3980 MHz 5G NR n78: 3450 MHz ~ 3550 MHz; 3700 MHz ~ 3800 MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5720 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz WLAN 6GHz U-NII-5: 5925 MHz ~ 6425 MHz WLAN 6GHz U-NII-6: 6425 MHz ~ 6525 MHz WLAN 6GHz U-NII-7: 6525 MHz ~ 6875 MHz WLAN 6GHz U-NII-8: 6875 MHz ~ 7125 MHz Bluetooth: 2402 MHz ~ 2480 MHz NFC: 13.56 MHz
Mode	GSM/GPRS RMC/AMR 12.2Kbps HSDPA/HSUPA 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 2.4GHz 802.11ax HE20/HE40 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac/ax VHT20/VHT40/VHT80/VHT160/HE20/HE40/HE80/HE160 WLAN 6GHz 802.11a WLAN 6GHz 802.11ax HE20/HE40/HE80/HE160 Bluetooth BR/EDR/LE NFC: ASK
HW Version	V4
SW Version	Nagoya_QN7021A_Fac_V011
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:	
<ol style="list-style-type: none"> This device supports VoIP in GPRS, WCDMA, LTE and 5GNR (e.g. for 3rd-party VoIP), LTE supports VoLTE operation. This device 2.4GHz WLAN support hotspot operation and Bluetooth support tethering applications. This device 5GHz/6GHz WLAN not support hotspot operation. 	



4. This device does not support DTM operation and supports GPRS mode up to multi-slot class 33.
5. The 2.4GHz/5GHz/6GHz WLAN can transmit in SISO and MIMO antenna mode.
6. For dual SIM card mobile has single SIM slots + eSIM (electronic SIM) and supports dual SIM dual standby. The WWAN radio transmission will be enabled by either one SIM at a time (single active).
7. The device implements hotspot/receiver detect mechanism reduced power for the power management for SAR compliance at different exposure conditions (head, body-worn, hotspot, extremity). The device will invoke corresponding work scenarios power level base on frequency bands/antennas, which can refer to power table at appendix E.
8. For WLAN transmitter, while the device WLAN is transmitting simultaneously with the WWAN/BT antenna, the device power will be reduced power at head, body-worn and extremity exposure conditions.
9. LTE Band 41 supports HPUE, HPUE power and SAR testing performed separately.
10. LTE Band 41 HPUE with higher power, For HPUE power is higher than power class 3 but with lower duty cycle, the maximum average power for class 2 and class 3 is almost the same, so we chose power class 3 full SAR testing and power class 2 verified the worst case of power class 3 SAR.
11. For 5G NR test, using FTM (Factory Test Mode) to perform SAR with default 100% transmission.
12. This device has NFC function and the NFC SAR report will be separately submitted.
13. SAR and Power density test report for WLAN 6GHz U-NII-5/6/7/8 will be separately submitted. About co-located SAR with WWAN/Bluetooth always chose higher SAR of WLAN5GHz U-NII-1/2A/2C/3 and WLAN 6GHz U-NII-5/6/7/8.
14. This device supports 5G NR FR1 bands as following table, including SA and NSA mode.

<5G NR>

Mode	Band	Duplex	SCS(KHz)	Bandwidths(BW)
NSA	n77	TDD	30	20, 40, 100
	n78	TDD	30	20, 40, 80, 100
SA	n78	TDD	30	20, 40, 80, 100

4.2 General LTE SAR Test and Reporting Considerations

Summarized necessary items addressed in KDB 941225 D05 v02r05								
FCC ID	2BEPUFMP193							
Equipment Name	Mobile cellular phone							
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 42: 3450 MHz ~ 3550 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 42: 5MHz, 10MHz, 15MHz, 20MHz							
uplink modulations used	QPSK / 16QAM / 64QAM							
LTE Voice / Data requirements	Voice and Data							
LTE Release Version	R16, Cat11							
CA Support	Yes, 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.							
LTE Carrier Aggregation Combinations	Intra-Band and Inter-Band possible combinations and the detail power verification please referred to section 12.							
LTE Carrier Aggregation Additional Information	This device supports maximum of 4 carriers in the downlink. Additional following LTE Release features are not supported: Relay, HetNet, Enhanced MIMO, eICI, WiFi Offloading, MDH, eMBMA, Cross-Carrier Scheduling, Enhanced SC-FDMA.							



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		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	20407	824.7	20415	825.5	20425	826.5	20450	829	20450	829	20450	829
M	20525	836.5	20525	836.5	20525	836.5	20525	836.5	20525	836.5	20525	836.5
H	20643	848.3	20635	847.5	20625	846.5	20600	844	20600	844	20600	844
LTE Band 7												
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 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	20775	2502.5	20800	2505	20825	2507.5	20850	2510	20850	2510	20850	2510
M	21100	2535	21100	2535	21100	2535	21100	2535	21100	2535	21100	2535
H	21425	2567.5	21400	2565	21375	2562.5	21350	2560	21350	2560	21350	2560
LTE Band 12												
	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	23017	699.7	23025	700.5	23035	701.5	23060	704	23060	704	23060	704
M	23095	707.5	23095	707.5	23095	707.5	23095	707.5	23095	707.5	23095	707.5
H	23173	715.3	23165	714.5	23155	713.5	23130	711	23130	711	23130	711
LTE Band 38												
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 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	37775	2572.5	37800	2575	37825	2577.5	37850	2580	37850	2580	37850	2580
M	38000	2595	38000	2595	38000	2595	38000	2595	38000	2595	38000	2595
H	38225	2617.5	38200	2615	38175	2612.5	38150	2610	38150	2610	38150	2610
LTE Band 41												
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 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	39675	2498.5	39700	2501	39725	2503.5	39750	2506	39750	2506	39750	2506
LM	40148	2545.8	40160	2547	40173	2548.3	40185	2549.5	40185	2549.5	40185	2549.5
M	40620	2593	40620	2593	40620	2593	40620	2593	40620	2593	40620	2593
HM	41093	2640.3	41080	2639	41068	2637.8	41055	2636.5	41055	2636.5	41055	2636.5
H	41565	2687.5	41540	2685	41515	2682.5	41490	2680	41490	2680	41490	2680
LTE Band 42												
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 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	42115	3452.5	42140	3455	42165	3457.5	42190	3460	42190	3460	42190	3460
M	42590	3500	42590	3500	42590	3500	42590	3500	42590	3500	42590	3500
H	43065	3547.5	43040	3545	43015	3542.5	42990	3540	42990	3540	42990	3540

<For LTE Overlap Bands Description>

1) LTE Bands BW

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

2) LTE Bands tune up:

Band	Antenna	Head Receiver On Tune-up Limit	Body-worn& Extremity Receiver Off Tune-up Limit	Hotspot Tune-up Limit	Default Tune-up Limit
LTE Band 38	Ant 1	24.00	24.00	24.00	24.00
LTE Band 41	Ant 1	24.00	24.00	24.00	24.00
LTE Band 41 HPUE	Ant 1	26.00	26.00	26.00	26.00

Band	Antenna	Head Receiver On Tune-up Limit	Body-worn& Extremity Receiver Off Tune-up Limit	Hotspot Tune-up Limit	Default Tune-up Limit
LTE Band 38	Ant 4	19.00	19.50	17.50	24.00
LTE Band 41	Ant 4	19.00	19.50	17.50	24.00
LTE Band 41 HPUE	Ant 4	21.00	21.50	19.50	26.00

4.3 General 5G NR SAR Test and Reporting Considerations

5G NR Information	
Operating Frequency Range of each 5G NR transmission band	5G NR n77: 3450 MHz ~ 3550 MHz; 3700 MHz ~ 3980 MHz 5G NR n78: 3450 MHz ~ 3550 MHz; 3700 MHz ~ 3800 MHz
Channel Bandwidth	The detail please refers to section 4.1 5G NR FR1 bands table.
SCS	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 n77	LTE B41
LTE Anchor Bands for n78	LTE B41

NR Band 77						
	Bandwidth 20MHz		Bandwidth 40MHz		Bandwidth 100MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	647334	3710.01	648000	3720	650000	3750
M	656000	3840	656000	3840	656000	3840
H	664668	3970.02	664000	3960	662000	3930

NR Band 78								
	Bandwidth 20MHz		Bandwidth 40MHz		Bandwidth 80MHz		Bandwidth 100MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	647334	3710.01	648000	3720	649334	3740.01		
M	650000	3750	650000	3750	650000	3750	650000	3750
H	652668	3790.02	652000	3780	650668	3760.02		

For <3450 MHz ~ 3550 MHz >

NR Band 77						
	Bandwidth 20MHz		Bandwidth 40MHz		Bandwidth 100MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	630668	3460.02	631334	3470.01		
M	633334	3500.01	633334	3500.01	633334	3500.01
H	636000	3540	635334	3530.01		

NR Band 78								
	Bandwidth 20MHz		Bandwidth 40MHz		Bandwidth 80MHz		Bandwidth 100MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	630668	3460.02	631334	3470.01	632668	3490.02		
M	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01
H	636000	3540	635334	3530.01	634000	3510		

<For NR Overlap Bands Description>

1) NR Bands BW

Band	20 MHz	40 MHz	80 MHz	100 MHz
FR1 n77	Yes	Yes		Yes
FR1 n78	Yes	Yes	Yes	Yes

2) NR Bands Tune up:

Band	Antenna	Head	Body-worn& Extremity	Hotspot	Default
		Receiver On	Receiver Off		Tune-up Limit
5G NR n77	Ant 2	21.00	19.50	14.00	24.50
5G NR n78	Ant 2	21.00	19.50	14.00	24.50
5G NR n77	Ant 5	16.50	20.00	15.00	23.00
5G NR n78	Ant 5	16.50	20.00	15.00	23.00
5G NR n77	Ant 7	16.00	19.00	18.00	21.50
5G NR n78	Ant 7	16.00	19.00	18.00	21.50
5G NR n77	Ant 10	19.50	19.50	19.00	19.50
5G NR n78	Ant 10	19.50	19.50	19.00	19.50

5. RF Exposure Limits

5.1 Uncontrolled Environment

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

5.2 Controlled Environment

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

Limits for Occupational/Controlled Exposure (W/kg)

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

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

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

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

6. Specific Absorption Rate (SAR)

6.1 Introduction

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

6.2 SAR Definition

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

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

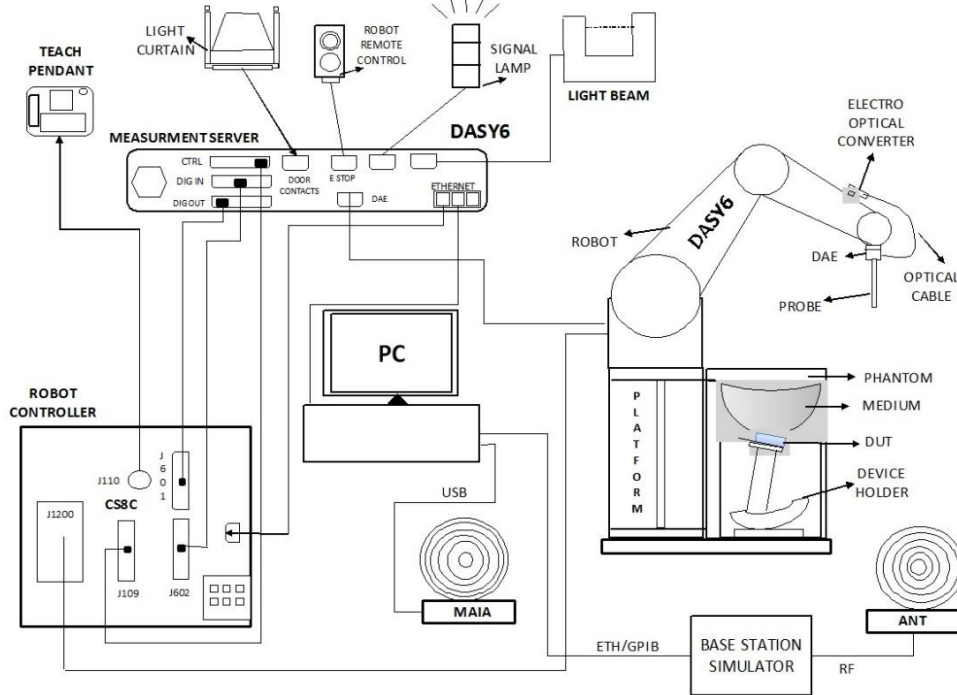
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

7. System Description and Setup

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




- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running Win7 or Win10 and the DASY5 or DASY6 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.


7.1 E-Field Probe

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

<ES3DV3 Probe>

Construction	Symmetric design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	10 MHz – 4 GHz; Linearity: ±0.2 dB (30 MHz – 4 GHz)	
Directivity	±0.2 dB in TSL (rotation around probe axis) ±0.3 dB in TSL (rotation normal to probe axis)	
Dynamic Range	5 µW/g – >100 mW/g; Linearity: ±0.2 dB	
Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: 3.9 mm (body: 12 mm) Distance from probe tip to dipole centers: 3.0 mm	

<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	

7.2 Data Acquisition Electronics (DAE)

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


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



Photo of DAE

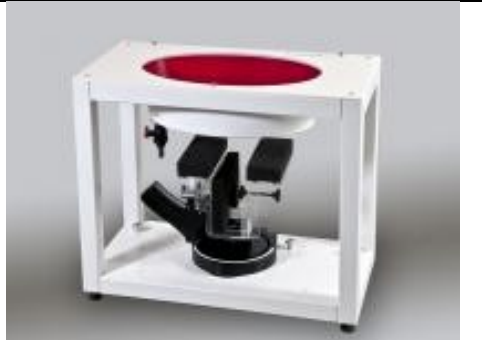
7.3 Phantom

<SAM Twin Phantom>

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

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

<ELI Phantom>

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

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

7.4 Device Holder

<Mounting Device for Hand-Held Transmitter>

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



Mounting Device for Hand-Held Transmitters



Mounting Device Adaptor for Wide-Phones

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

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



Mounting Device for Laptops

8. Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

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

<SAR measurement>

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

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

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

8.1 Spatial Peak SAR Evaluation

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

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

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

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

8.2 Power Reference Measurement

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

8.3 Area Scan

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

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

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
Maximum area scan spatial resolution: $\Delta x_{Area}, \Delta y_{Area}$	≤ 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 \leq the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

8.4 Zoom Scan

Zoom scans are used to 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 whose 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 1 st two points closest to phantom surface	≤ 4 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
<p>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.</p> <p>* When zoom scan is required and the <i>reported</i> SAR from the <i>area scan based 1-g SAR estimation</i> 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.</p>			

8.5 Volume Scan Procedures

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

8.6 Power Drift Monitoring

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



9. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	750MHz System Validation Kit	D750V3	1087	2022/2/24	2025/2/22
SPEAG	835MHz System Validation Kit	D835V2	4d091	2022/8/19	2025/8/18
SPEAG	1750MHz System Validation Kit	D1750V2	1090	2022/2/24	2025/2/22
SPEAG	1900MHz System Validation Kit	D1900V2	5d118	2022/3/30	2025/3/28
SPEAG	2450MHz System Validation Kit	D2450V2	1040	2023/4/25	2024/4/24
SPEAG	2600MHz System Validation Kit	D2600V2	1112	2023/12/18	2024/12/17
SPEAG	3500MHz System Validation Kit	D3500V2	1037	2023/11/20	2024/11/19
SPEAG	3700MHz System Validation Kit	D3700V2	1008	2023/11/20	2026/11/19
SPEAG	3900MHz System Validation Kit	D3900V2	1048	2023/3/9	2026/3/8
SPEAG	5000MHz System Validation Kit	D5GHzV2	1113	2022/9/23	2025/9/22
SPEAG	Data Acquisition Electronics	DAE4	1650	2023/9/13	2024/9/12
SPEAG	Data Acquisition Electronics	DAE4	1649	2023/4/24	2024/4/23
SPEAG	Dosimetric E-Field Probe	ES3DV3	3293	2023/11/30	2024/11/29
SPEAG	Dosimetric E-Field Probe	EX3DV4	3857	2024/1/22	2025/1/21
SPEAG	Dosimetric E-Field Probe	EX3DV4	7706	2024/1/24	2025/1/23
SPEAG	SAM Twin Phantom	SAM Twin	TP-1697	NCR	NCR
SPEAG	SAM Twin Phantom	SAM Twin	TP-2024	NCR	NCR
Testo	Thermo-Hygrometer	608-H1	1241332126	2023/7/10	2024/7/9
SPEAG	Phone Positioner	N/A	N/A	NCR	NCR
Rohde & Schwarz	Signal Generator	SMB100A	100455	2024/1/2	2025/1/1
Keysight	Preamplifier	83017A	MY57280111	2023/7/5	2024/7/4
Anritsu	Radio Communication Analyzer	MT8821C	6262306175	2023/7/5	2024/7/4
Agilent	ENA Series Network Analyzer	E5071C	MY46111157	2023/7/5	2024/7/4
SPEAG	Dielectric Probe Kit	DAK-3.5	1144	2023/8/17	2024/8/16
Anritsu	Vector Signal Generator	MG3710A	6201682672	2024/1/2	2025/1/1
Rohde & Schwarz	Power Meter	NRVD	102081	2023/7/5	2024/7/4
Rohde & Schwarz	Power Sensor	NRV-Z5	100538	2023/7/5	2024/7/4
Rohde & Schwarz	Power Sensor	NRV-Z5	100539	2023/7/5	2024/7/4
Rohde & Schwarz	Power Sensor	NRP50S	101385	2023/10/11	2024/10/10
R&S	BLUETOOTH TESTER	CBT	101246	2023/5/15	2024/5/14
Rohde & Schwarz	Spectrum Analyzer	FSV7	101631	2023/10/11	2024/10/10
TES	DIGITAC THERMOMETER	1310	220305411	2023/7/8	2024/7/7
ARRA	Power Divider	A3200-2	N/A		Note 1
MCL	Attenuation1	BW-S10W5+	N/A		Note 1
MCL	Attenuation2	BW-S10W5+	N/A		Note 1
MCL	Attenuation3	BW-S10W5+	N/A		Note 1
BONN	POWER AMPLIFIER	BLMA 0830-3	087193A		Note 1
BONN	POWER AMPLIFIER	BLMA 2060-2	087193B		Note 1
Agilent	Dual Directional Coupler	778D	20500		Note 1
Agilent	Dual Directional Coupler	11691D	MY48151020		Note 1

Note:

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

10. System Verification

10.1 Tissue Simulating Liquids

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

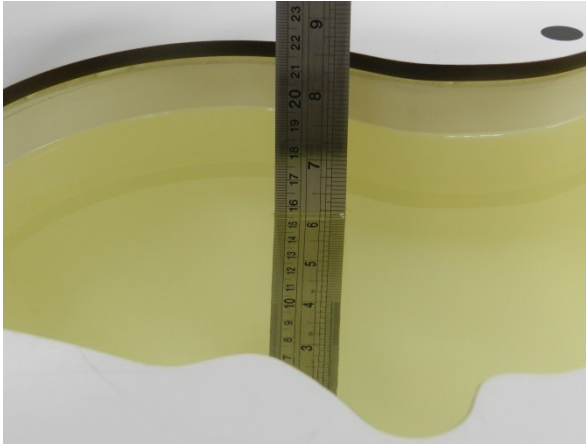


Fig 11.1 Photo of Liquid Height for Head SAR

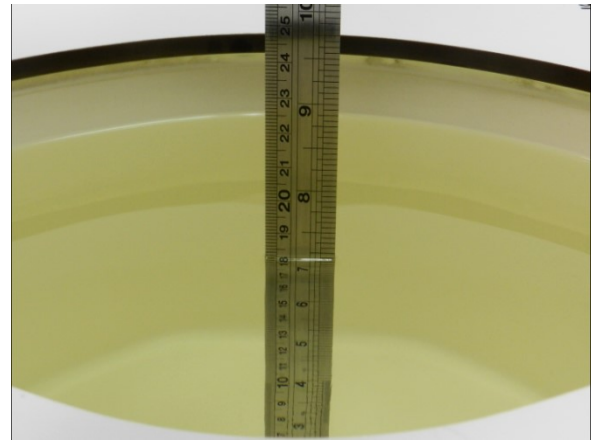


Fig 11.2 Photo of Liquid Height for Body SAR

10.2 Tissue Verification

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

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity (σ)	Permittivity (ε _r)
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	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. (°C)	Conductivity (σ)	Permittivity (ε _r)	Conductivity Target (σ)	Permittivity Target (ε _r)	Delta (σ) (%)	Delta (ε _r) (%)	Limit (%)	Date
750	Head	22.6	0.888	42.261	0.89	41.90	-0.22	0.86	±5	2024/3/23
835	Head	22.8	0.911	41.927	0.90	41.50	1.22	1.03	±5	2024/3/24
1750	Head	22.7	1.316	40.206	1.37	40.10	-3.94	0.26	±5	2024/3/25
1900	Head	22.9	1.406	40.191	1.40	40.00	0.43	0.48	±5	2024/3/26
2600	Head	22.6	1.880	39.196	1.96	39.00	-4.08	0.50	±5	2024/3/27
750	Head	22.9	0.906	42.768	0.89	41.90	1.80	2.07	±5	2024/3/28
835	Head	22.6	0.936	42.529	0.90	41.50	4.00	2.48	±5	2024/3/29
1750	Head	22.7	1.344	38.993	1.37	40.10	-1.90	-2.76	±5	2024/3/30
1900	Head	22.8	1.427	38.737	1.40	40.00	1.93	-3.16	±5	2024/3/31
2600	Head	22.7	1.979	40.629	1.96	39.00	0.97	4.18	±5	2024/4/1
3500	Head	22.9	2.788	39.594	2.91	37.90	-4.19	4.47	±5	2024/4/2
2450	Head	22.7	1.805	38.557	1.80	39.20	0.28	-1.64	±5	2024/4/4
5250	Head	22.8	4.562	35.992	4.71	35.90	-3.14	0.26	±5	2024/4/5
5600	Head	22.7	4.960	35.440	5.07	35.50	-2.17	-0.17	±5	2024/4/6
5750	Head	22.8	5.131	35.243	5.22	35.40	-1.70	-0.44	±5	2024/4/7
2450	Head	22.6	1.840	39.300	1.80	39.20	2.22	0.26	±5	2024/4/4
5250	Head	22.7	4.660	36.700	4.71	35.90	-1.06	2.23	±5	2024/4/5
5600	Head	22.7	5.070	36.000	5.07	35.50	0.00	1.41	±5	2024/4/6
5750	Head	22.7	5.240	35.800	5.22	35.40	0.38	1.13	±5	2024/4/7
3900	Head	22.6	3.229	38.414	3.32	37.50	-2.74	2.44	±5	2024/4/3
3700	Head	22.9	2.994	38.681	3.12	37.70	-4.04	2.60	±5	2024/4/18



10.3 System Performance Check Results

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

Table with 11 columns: 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 (%). Rows contain test data from 2024/3/23 to 2024/4/18.

<10g SAR>

Date	Frequency (MHz)	Tissue Type	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 10g SAR (W/kg)	Targeted 10g SAR (W/kg)	Normalized 10g SAR (W/kg)	Deviation (%)
2024/3/23	750	Head	50	1087	3293	1650	0.260	5.65	5.2	-7.96
2024/3/24	835	Head	50	4d091	3293	1650	0.315	6.22	6.3	1.29
2024/3/25	1750	Head	50	1090	3293	1650	0.899	19.50	17.98	-7.79
2024/3/26	1900	Head	50	5d118	3293	1650	0.958	20.40	19.16	-6.08
2024/3/27	2600	Head	50	1112	3293	1650	1.180	24.80	23.6	-4.84
2024/3/28	750	Head	50	1087	3293	1650	0.267	5.65	5.34	-5.49
2024/3/29	835	Head	50	4d091	3293	1650	0.333	6.22	6.66	7.07
2024/3/30	1750	Head	50	1090	3293	1650	0.907	19.50	18.14	-6.97
2024/3/31	1900	Head	50	5d118	3293	1650	0.972	20.40	19.44	-4.71
2024/4/1	2600	Head	50	1112	3293	1650	1.190	24.80	23.8	-4.03
2024/4/2	3500	Head	50	1037	3857	1650	1.230	24.70	24.6	-0.40
2024/4/4	2450	Head	50	1040	3857	1650	1.140	24.60	22.8	-7.32
2024/4/5	5250	Head	50	1113	3857	1650	1.090	23.30	21.8	-6.44
2024/4/6	5600	Head	50	1113	3857	1650	1.150	23.70	23	-2.95
2024/4/7	5750	Head	50	1113	3857	1650	1.060	23.00	21.2	-7.83
2024/4/4	2450	Head	50	1040	7706	1649	1.280	24.60	25.6	4.07
2024/4/5	5250	Head	50	1113	7706	1649	1.180	23.30	23.6	1.29
2024/4/6	5600	Head	50	1113	7706	1649	1.260	23.70	25.2	6.33
2024/4/7	5750	Head	50	1113	7706	1649	1.150	23.00	23	0.00
2024/4/3	3900	Head	50	1048	3857	1650	1.190	24.10	23.8	-1.24
2024/4/18	3700	Head	50	1008	3857	1650	1.210	24.40	24.2	-0.82

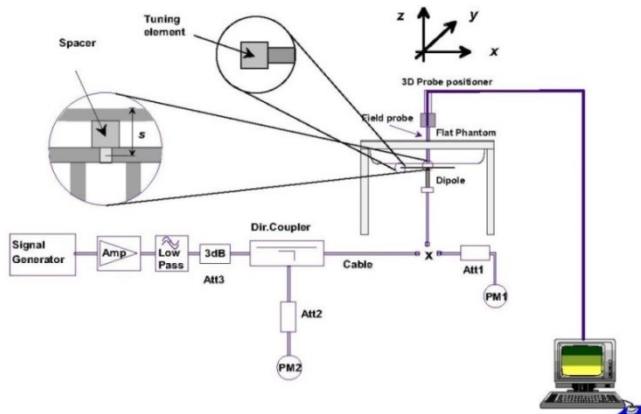


Fig 11.3.1 System Performance Check Setup



Fig 11.3.2 Setup Photo

11. RF Exposure Positions

11.1 Ear and handset reference point

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

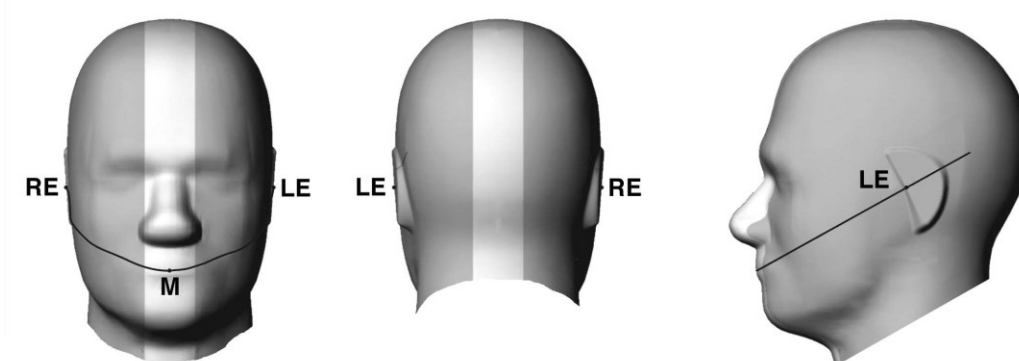


Fig 12.1.1 Front, back, and side views of SAM twin phantom

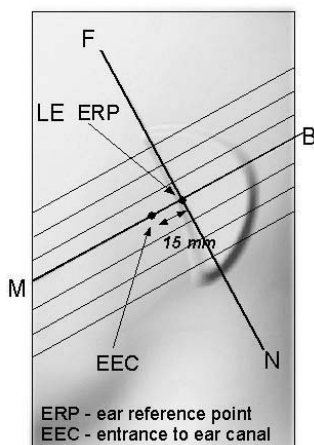


Fig 12.1.2 Close-up side view of phantom showing the ear region.

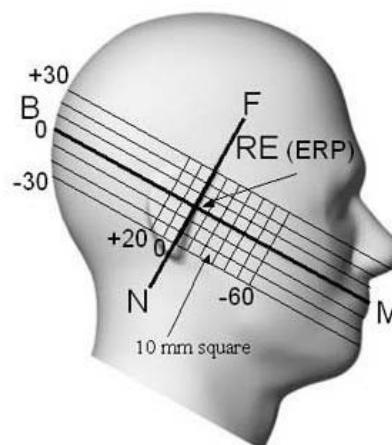


Fig 12.1.3 Side view of the phantom showing relevant markings and seven cross-sectional plane locations

11.2 Definition of the cheek position

1. Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece (flip cover), open the cover. If the handset can transmit with the cover closed, both configurations must be tested.
2. Define two imaginary lines on the handset—the vertical centerline and the horizontal line. The vertical centerline passes through two points on the front side of the handset—the midpoint of the width w_t 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 w_b of the bottom of the handset (point B). The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output (see Figure 12.2.1). The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily parallel to the front face of the handset (see Figure 12.2.2), especially for clamshell handsets, handsets with flip covers, and other irregularly-shaped handsets.
3. Position the handset close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure 12.2.3), such that the plane defined by the vertical centerline and the horizontal line of the handset is approximately parallel to the sagittal plane of the phantom.
4. Translate the handset towards the phantom along the line passing through RE and LE until handset point A touches the pinna at the ERP.
5. While maintaining the handset in this plane, rotate it around the LE-RE line until the vertical centerline is in the plane normal to the plane containing B-M and N-F lines, i.e., the Reference Plane.
6. Rotate the handset around the vertical centerline until the handset (horizontal line) is parallel to the N-F line.
7. While maintaining the vertical centerline in the Reference Plane, keeping point A on the line passing through RE and LE, and maintaining the handset contact with the pinna, rotate the handset about the N-F line until any point on the handset is in contact with a phantom point below the pinna on the cheek. See Figure 12.2.3. The actual rotation angles should be documented in the test report.

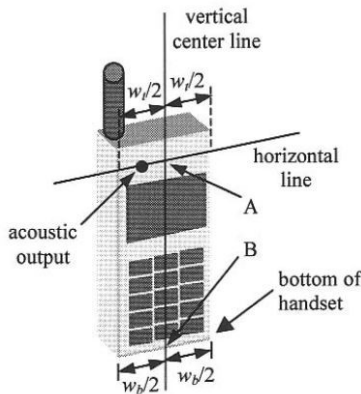


Fig 12.2.1 Handset vertical and horizontal reference lines—“fixed case”

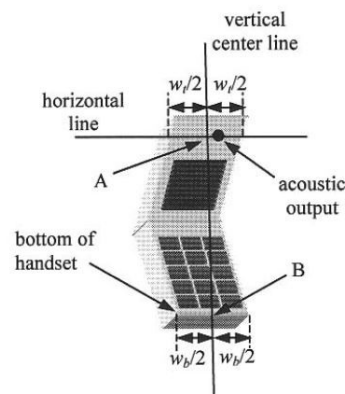


Fig 12.2.2 Handset vertical and horizontal reference lines—“clam-shell case”

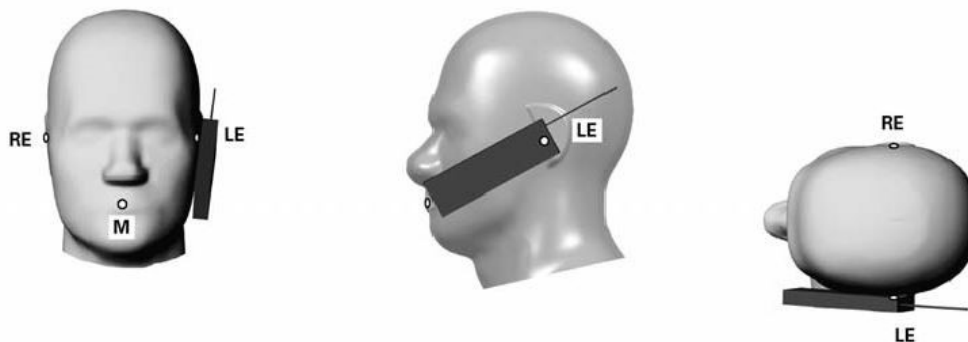


Fig 12.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

11.3 Definition of the tilt position

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

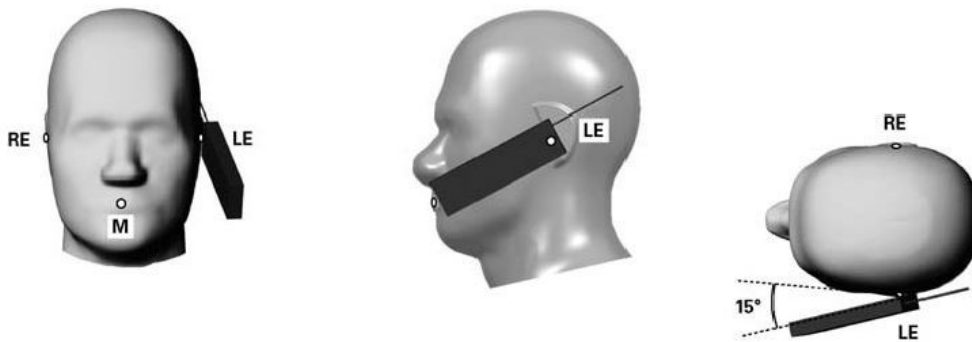


Fig 12.3.1 Tilt position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which define the Reference Plane for handset positioning, are indicated.

11.4 Body Worn Accessory

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 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 $> 1.2 \text{ W/kg}$, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

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

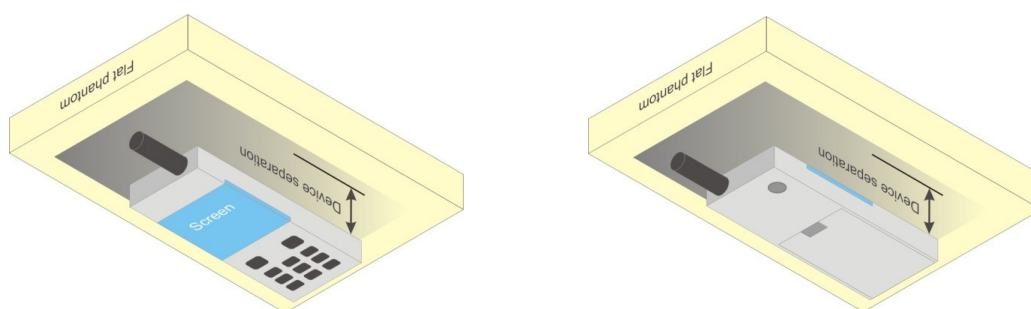


Fig 12.4 Body Worn Position

11.5 Product Specific 10g SAR Exposure

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

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

11.6 Wireless Router

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

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



12. Conducted RF Output Power (Unit: dBm)

The detailed conducted power table can refer to Appendix E.

<GSM Conducted Power>

1. Per KDB 447498 D01v06, the maximum output power channel is used for SAR testing and for further SAR test reduction.
2. Per KDB 941225 D01v03r01, for SAR test reduction for GSM / GPRS 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 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 $\leq \frac{1}{4}$ 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.

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} (Note 1, 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 $\Delta_{CQI} = 30/15$ with $\beta_{HS} = 30/15 * \beta_c$.

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 $\Delta_{NACK} = 30/15$ with $\beta_{HS} = 30/15 * \beta_c$, and $\Delta_{CQI} = 24/15$ with $\beta_{HS} = 24/15 * \beta_c$.

Note 3: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{HS}/\beta_c = 24/15$. For all other combinations of DPDCCH, 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 $\beta_c = 11/15$ and $\beta_d = 15/15$.

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	209/25	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1} : 47/15 β_{ed2} : 47/15	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 $\Delta_{CQI} = 30/15$ with $\beta_{hs} = 30/15 * \beta_c$. For sub-test 5, Δ_{ACK} , Δ_{NACK} and $\Delta_{CQI} = 5/15$ with $\beta_{hs} = 5/15 * \beta_c$.

Note 2: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. 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, TF0) to $\beta_c = 10/15$ and $\beta_d = 15/15$.

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

<WCDMA Conducted Power>

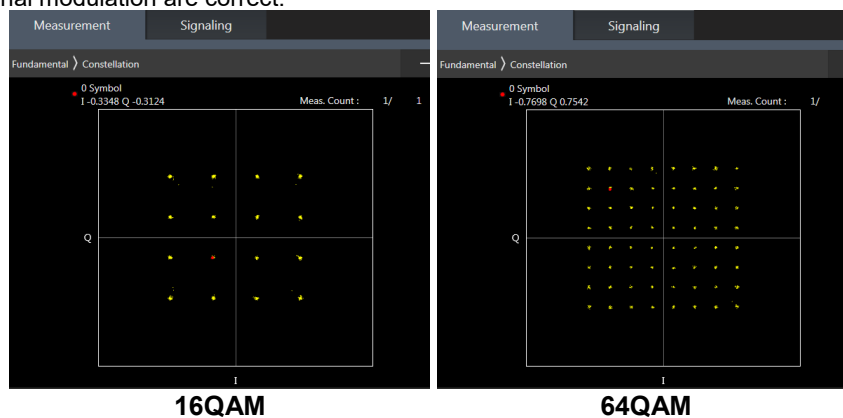
General Note:

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 is $\leq 1/4$ 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 to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA, and according to the following RF output power, the output power results of the secondary modes (HSDPA / HSUPA) are less than $1/4$ dB higher than the primary modes; therefore, SAR measurement is not required for HSDPA / HSUPA.

<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 output power for each RB allocation configuration is $>$ not $\frac{1}{2}$ 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 $\frac{1}{2}$ 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 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.
9. LTE band 38 SAR test was covered by Band 41; according to April 2015 TCB workshop, SAR test for overlapping LTE bands can be reduced if
 - a. the maximum output power, including tolerance, for the smaller band is \leq the larger band to qualify for the SAR test exclusion
 - b. the channel bandwidth and other operating parameters for the smaller band are fully supported by the larger band
10. According to May 2017 TCB workshop, for 16QAM and 64QAM should be verified by checking the signal constellation with a call box to avoid incorrect maximum power levels due to MPR and other requirements associated with signal modulation, and the following figure is taken from the "Fundamental Measurement >> Modulation Analysis >> constellation" mode of the device connect to the MT8821C base station, therefore, the device 64QAM and 16QAM signal modulation are correct.



<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.

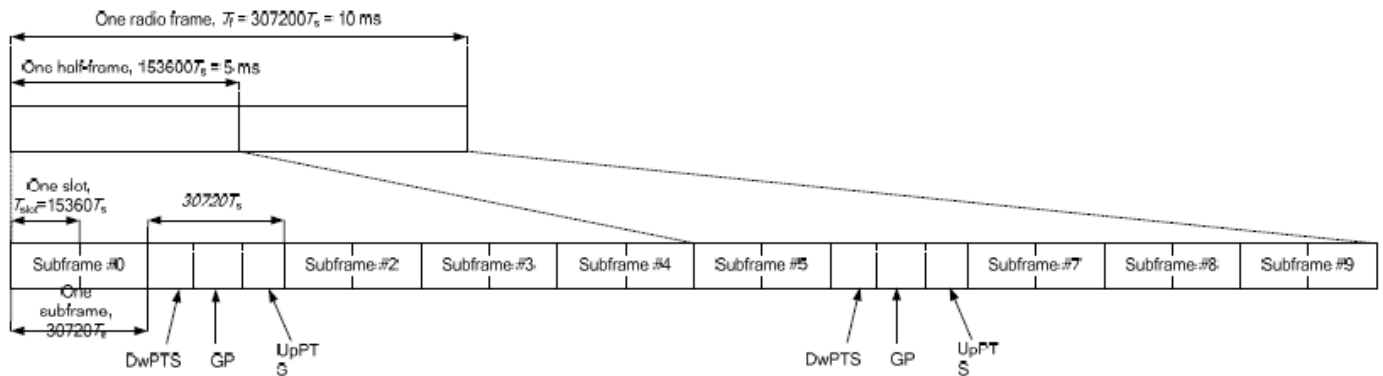


Figure 4.2-1: Frame structure type 2 (for 5 ms switch-point periodicity).

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	D	S	U	U	D	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 · Ts	2192 · Ts	2560 · Ts	7680 · Ts	2192 · Ts	2560 · Ts	
1	19760 · Ts			20480 · Ts			
2	21952 · Ts			23040 · Ts			
3	24144 · Ts			25600 · Ts			
4	26336 · Ts	4384 · Ts	5120 · Ts	7680 · Ts	4384 · Ts	5120 · Ts	
5	6592 · Ts			20480 · Ts			
6	19760 · Ts			23040 · Ts			
7	21952 · Ts			12800 · Ts			
8	24144 · Ts			-			-
9	13168 · Ts	-	-	-	-	-	

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

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

The highest duty factor is resulted from:

For LTE TDD Power class 2

- i. Uplink-downlink configuration: 1. In a half-frame consisted of 5 subframes, uplink operation is in 2 uplink subframes and 1 special subframe.
- ii. special subframe configuration: 5-9 for normal cyclic prefix in downlink, 4-7 for extended cyclic prefix in downlink
- iii. for special subframe with extended cyclic prefix in uplink, the total uplink duty factor in one half-frame is: $(2+0.167)/5 = 43.3\%$
- iv. for special subframe with normal cyclic prefix in uplink, the total uplink duty factor in one half-frame is: $(2+0.143)/5 = 42.9\%$
- v. For TDD LTE SAR measurement, the duty cycle 1:2.33 (42.9 %) was used perform testing and considering the theoretical duty cycle of 43.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 42.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix $43.3\%/42.9\% = 1.009$ is applied to scale-up the measured SAR result. The scaled TDD LTE SAR = measured SAR (W/kg)* Tune-up Scaling Factor* scaling factor for extended cyclic prefix.

For LTE TDD Power class 3

- i. Uplink-downlink configuration: 0. In a half-frame consisted of 5 subframes, 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.

The device can adjust uplink/downlink configuration automatically according to the transmitting power class level, as followings:

LTE TDD Band	Power Class level	support uplink/downlink configuration
LTE Band 41	> 23	1,2,3,4,5
	=23	0,1,2,3,4,5,6
	< 23	0,1,2,3,4,5,6

<LTE Carrier Aggregation>

General Note:

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

2CC Downlink Carrier Aggregation				3CC Downlink Carrier Aggregation				4CC Downlink Carrier Aggregation			
Number	Combination	4X4 MIMO	Covered by Measurement Superset	Number	Combination	4X4 MIMO	Covered by Measurement Superset	Number	Combination	4X4 MIMO	Covered by Measurement Superset
1	CA_41A-42A	41A		1	CA_41A-42C	41A		1	CA_41C-42C	41A	
2	CA_41C	41A	3CC-2	2	CA_41C-42A	41A					
3	CA_42C		3CC-1	3							

LTE Carrier Aggregation Conducted Power (Downlink)

- i. According to KDB941225 D05A v01r02, Uplink maximum output power measurement with downlink carrier aggregation active should be measured, using the highest output channel measured without downlink carrier aggregation, to confirm that uplink maximum output power with downlink carrier aggregation active remains within the specified tune-up tolerance limits and not more than ¼ dB higher than the maximum output measured without downlink carrier aggregation active.
- ii. Uplink maximum output power with downlink carrier aggregation active does not show more than ¼ dB higher than the maximum output power without downlink carrier aggregation active, therefore SAR evaluation with downlink carrier aggregation active can be excluded.
- iii. The device supports downlink four carrier aggregation. For power measurement were control and acknowledge data is sent on uplink channels that operate identical to specifications when downlink carrier aggregation is inactive.
- iv. Selected highest measured power when downlink carrier aggregation is inactive for conducted power comparison with downlink carrier aggregation is active, to confirm that when downlink carrier aggregation is active uplink maximum output power remains within the specified tune-up tolerance limits and not more than ¼ dB higher than the maximum output power measured when downlink carrier aggregation inactive.
- v. For inter-band CA, the SCC selected highest bandwidth and near the middle of its transmission band. For SCC DL RB size and offset will base on the PCC corresponding RB allocation.
- vi. For non-contiguous intra-band CA, the SCC selected to provide maximum separation from the PCC and must remain fully within the downlink transmission band.
- vii. For Intra-band, contiguous CA, the downlink channels selected to perform the uplink power measurement must satisfy 3GPP channel spacing (5.4.1A of 3GPP TS 36.521 or equivalent) and channel bandwidth (5.4.2A) requirements.

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



LTE 4x4 MIMO (Downlink)

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

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

4X4 MIMO	Band
	LTE Band 41

5G NR Output Power (Unit: dBm)

General Note:

1. 5G NR n77/n78 is NSA mode and 5G NR n78 is SA mode.
2. 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
3. For 5G NR test, using FTM (Factory Test Mode) to perform SAR with default 100% transmission.
4. 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.
5. 5G NR NSA mode, the power level is the same as 5G NR SA mode, so 5G NR NSA mode and SA mode power table only show one time.
6. 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.
7. 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.
8. For 5G NR EN-DC mode, standalone SAR performed for 5G NR NSA band with the maximum power, EN-DC SAR summed EN-DC mode 5G NR standalone SAR and LTE standalone SAR, the result of EN-DC SAR is more conservatively.

<3GPP 38.101 MPR for EN-DC>

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

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

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

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

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

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

<EN-DC combination>

ENDC	Main Antenna Tx	
	LTE TX	NR TX
DC_41A_n77A	ANT1	ANT2
DC_41A_n78A	ANT1	ANT2

<WLAN Conducted Power>

General Note:

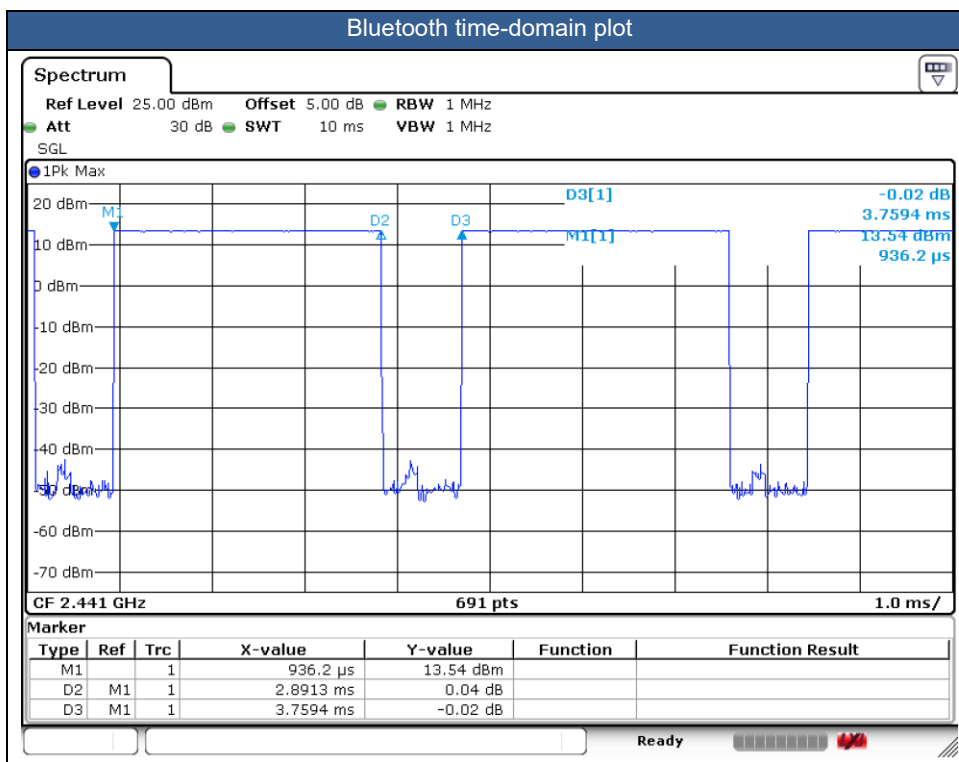
1. The maximum output power specified for production units are determined for all applicable 802.11 transmission modes in each standalone and aggregated frequency band. Maximum output power is measured for the highest maximum output power configuration(s) in each frequency band according to the default power measurement procedures. For "Not required", SAR Test reduction was applied from KDB 248227 guidance, Sec. 2.1, b), 1) when the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration. Additional output power measurements were not necessary.
2. Per KDB 248227 D01v02r02, SAR test reduction is determined according to 802.11 transmission mode configurations and certain exposure conditions with multiple test positions. In the 2.4 GHz band, separate SAR procedures are applied to DSSS and OFDM configurations to simplify DSSS test requirements. For OFDM, in both 2.4 and 5 GHz bands, an initial test configuration must be determined for each standalone and aggregated frequency band, according to the transmission mode configuration with the highest maximum output power specified for production units to perform SAR measurements. If the same highest maximum output power applies to different combinations of channel bandwidths, modulations and data rates, additional procedures are applied to determine which test configurations require SAR measurement. When applicable, an initial test position may be applied to reduce the number of SAR measurements required for next to the ear, UMPC mini-tablet or hotspot mode configurations with multiple test positions.
3. For 2.4 GHz 802.11b DSSS, either the initial test position procedure for multiple exposure test positions or the DSSS procedure for fixed exposure position is applied; these are mutually exclusive. For 2.4 GHz and 5 GHz OFDM configurations, the initial test configuration is applied to measure SAR using either the initial test position procedure for multiple exposure test position configurations or the initial test configuration procedures for fixed exposure test conditions. Based on the reported SAR of the measured configurations and maximum output power of the transmission mode configurations that are not included in the initial test configuration, the subsequent test configuration and initial test position procedures are applied to determine if SAR measurements are required for the remaining OFDM transmission configurations. In general, the number of test channels that require SAR measurement is minimized based on maximum output power measured for the test sample(s).
4. For OFDM transmission configurations in the 2.4 GHz and 5 GHz bands, When the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel for each frequency band.
5. DSSS and OFDM configurations are considered separately according to the required SAR procedures. SAR is measured in the initial test position using the 802.11 transmission mode configuration required by the DSSS procedure or initial test configuration and subsequent test configuration(s) according to the OFDM procedures.18 The initial test position procedure is described in the following:
 - a. When the reported SAR of the initial test position is ≤ 0.4 W/kg, further SAR measurement is not required for the other test positions in that exposure configuration and 802.11 transmission mode combinations within the frequency band or aggregated band.
 - b. When the reported SAR of the test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position to measure the subsequent next closest/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.
6. 802.11 ax supports both full tone size mode and partial tone size mode, after verification on partial tone size mode that partial size tone mode power will not be higher than full tone size mode, therefore, full tone mode power was chosen to be measured in this report.
7. SISO and MIMO all supported by WLAN2.4GHz/WLAN5GHz, for SISO mode power is less than per chain power of MIMO mode. For WLAN SISO & MIMO mode, the whole testing has assessed only MIMO mode by referring to their higher conducted power, so only chose MIMO mode to perform SAR testing.
8. For the conducted power measurement is MIMO chains transmitting simultaneously and measured the separately conducted power for both chains and then based on the conducted power of two SISO antennas respectively to calculate sum of the power for MIMO mode.



<2.4GHz Bluetooth>

General Note:

1. For 2.4GHz Bluetooth SAR testing was selected 1Mbps, due to its highest average power.
2. The Bluetooth duty cycle is 76.91% as following figure, for Bluetooth SAR scaling need further consideration and the theoretical duty cycle is 83.3%, therefore the actual duty cycle will be scaled up to 100% for Bluetooth reported SAR calculation.





13. Antenna Location

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

14. SAR Test Results

General Note:

1. Per KDB 447498 D01v06, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
 - a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
 - b. For SAR testing of WLAN signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle)".
 - c. For SAR testing of Bluetooth signal with 83.3% theoretical duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle) *83.3%".
 - d. For WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
 - e. For BT/WLAN: Reported SAR(W/kg)= Measured SAR(W/kg)* Duty Cycle scaling factor * Tune-up scaling factor
 - f. 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 = measured SAR (W/kg)* Tune-up Scaling Factor* scaling factor for extended cyclic prefix.
 - g. For TDD LTE SAR measurement of power class 2, the duty cycle 1:2.33 (42.9 %) was used perform testing and considering the theoretical duty cycle of 43.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 42.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix 43.3%/42.9% = 1.009 is applied to scale-up the measured SAR result. The reported TDD LTE SAR (W/kg) = measured SAR (W/kg)* Tune-up Scaling Factor* scaling factor for extended cyclic prefix.
2. Per KDB 447498 D01v06, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the *reported* 1-g or 10-g SAR for the mid-band or highest output power channel is:
 - ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
 - ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
 - ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
3. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required when the measured SAR is ≥ 0.8W/kg. Per KDB 865664 D01v01r04, if the extremity repeated SAR is necessary, the same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds.
4. The device implements hotspot/receiver detect mechanism reduced power for the power management for SAR compliance at different exposure conditions (head, body-worn, hotspot, extremity). The device will invoke corresponding work scenarios power level base on frequency bands/antennas, which can refer to power table at appendix E.
5. For WLAN transmitter, while the device WLAN is transmitting simultaneously with the WWAN/BT antenna, the device power will be reduced power at head, body-worn and extremity exposure conditions.
6. Per KDB648474 D04v01r03, for smart phones with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm, when hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg, however, when power reduction applies to hotspot mode the measured SAR must be scaled to the maximum output power, including tolerance, allowed for phablet modes to compare with the 1.2 W/kg SAR test reduction threshold.
 - a. For this device SAR for WWAN/WLAN transmitter scaled to maximum output power mode for product specific 10g SAR is higher than 1.2W/kg of GSM1900, WCDMA Band V, LTE Band 2/4/7/38/41/42, 5G NR n78 and WLAN 2.4GHz therefore product specific 10g SAR is necessary.
 - b. WLAN 5.3/5.5/5.8GHz 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 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 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 $\leq \frac{1}{4}$ 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 is $\leq \frac{1}{4}$ 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 to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA, and according to the following RF output power, the output power results of the secondary modes (HSDPA / HSUPA) are less than $\frac{1}{4}$ dB higher than the primary modes; therefore, SAR measurement is not required for HSDPA / HSUPA.

LTE Note:

1. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
2. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
3. Per KDB 941225 D05v02r05, for QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
4. Per KDB 941225 D05v02r05, 16QAM output power for each RB allocation configuration is $>$ not $\frac{1}{2}$ 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 $\frac{1}{2}$ 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 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 band 38 SAR test was covered by Band 41; according to April 2015 TCB workshop, SAR test for overlapping LTE bands can be reduced if
 - a. the maximum output power, including tolerance, for the smaller band is \leq 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:

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 $\frac{1}{2}$ 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 $\frac{1}{2}$ 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 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 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. Per KDB 248227 D01v02r02, when SAR measurement is required for at least one of the two U-NII bands and the highest reported SAR adjusted by the ratio of specified maximum output power of aggregated to standalone band is < 1.2 W/kg, SAR is not required for the 160 MHz channel.
4. 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 closest/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.
5. 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.
6. During SAR testing the WLAN transmission was verified using a spectrum analyzer.
7. SISO and MIMO all supported by WLAN2.4GHz/WLAN5GHz, for SISO mode power is less than per chain power of MIMO mode. For WLAN SISO & MIMO mode, the whole testing has assessed only MIMO mode by referring to their higher conducted power, so only chose MIMO mode to perform SAR testing.
8. For determination of the scaling factor for report SAR of MIMO mode, if the hot spots are separated the scaling factors are individually determined from each transmit chain. Further simplification chose the worse SAR value and the worst scaling factor from each transmit chain perform reported SAR calculation conservatively. If the hot spots are not spatially separated, the scaling factor is determined from the worst number of each transmit chain.



FCC SAR Test Report

Report No. : FA3D0607

Table with columns for Band, Power, Modulation, Frequency, SAR, etc. Includes sections for 1750MHz, 1900MHz, and 2600MHz.



FCC SAR Test Report

Report No. : FA3D0607

FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Right Cheek	0mm	Ant 7	Receiver on	656000	3840	15.06	16.00	1.242	0.08	0.158	0.196
FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Right Tilted	0mm	Ant 7	Receiver on	656000	3840	15.12	16.00	1.225	0	0.104	0.13
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Right Tilted	0mm	Ant 7	Receiver on	656000	3840	15.06	16.00	1.242	-0.13	0.110	0.137
FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Left Cheek	0mm	Ant 7	Receiver on	656000	3840	15.12	16.00	1.225	0.05	0.716	0.877
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Left Cheek	0mm	Ant 7	Receiver on	656000	3840	15.06	16.00	1.242	-0.1	0.616	0.765
FR1 n77	100M	QPSK	270	0	DFT-SCS-30KHz	Left Cheek	0mm	Ant 7	Receiver on	656000	3840	15.03	16.00	1.250	-0.07	0.616	0.770
FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Left Tilted	0mm	Ant 7	Receiver on	656000	3840	15.12	16.00	1.225	0.11	0.261	0.320
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Left Tilted	0mm	Ant 7	Receiver on	656000	3840	15.06	16.00	1.242	-0.17	0.249	0.309
FR1 n77	100M	QPSK	270	0	DFT-SCS-30KHz	Left Tilted	0mm	Ant 7	Receiver on	656000	3840	15.03	16.00	1.250	0.01	0.244	0.305
FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Right Cheek	0mm	Ant 7	Receiver on	633332	3499.98	15.22	16.00	1.197	0.11	0.127	0.152
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Right Cheek	0mm	Ant 7	Receiver on	633332	3499.98	15.18	16.00	1.208	-0.07	0.139	0.168
FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Right Tilted	0mm	Ant 7	Receiver on	633332	3499.98	15.22	16.00	1.197	0.18	0.136	0.163
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Right Tilted	0mm	Ant 7	Receiver on	633332	3499.98	15.18	16.00	1.208	0.12	0.151	0.182
FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Left Cheek	0mm	Ant 7	Receiver on	633332	3499.98	15.22	16.00	1.197	0.08	0.314	0.376
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Left Cheek	0mm	Ant 7	Receiver on	633332	3499.98	15.18	16.00	1.208	0.07	0.289	0.349
FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Left Tilted	0mm	Ant 7	Receiver on	633332	3499.98	15.22	16.00	1.197	0.14	0.219	0.262
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Left Tilted	0mm	Ant 7	Receiver on	633332	3499.98	15.18	16.00	1.208	-0.03	0.239	0.289
FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Right Cheek	0mm	Ant 10	Receiver on	656000	3840	18.85	19.50	1.161	0.11	0.142	0.165
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Right Cheek	0mm	Ant 10	Receiver on	656000	3840	18.64	19.50	1.219	0.07	0.107	0.130
FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Right Tilted	0mm	Ant 10	Receiver on	656000	3840	18.85	19.50	1.161	-0.04	0.071	0.082
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Right Tilted	0mm	Ant 10	Receiver on	656000	3840	18.64	19.50	1.219	-0.18	0.051	0.062
FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Left Cheek	0mm	Ant 10	Receiver on	656000	3840	18.85	19.50	1.161	-0.13	0.098	0.114
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Left Cheek	0mm	Ant 10	Receiver on	656000	3840	18.64	19.50	1.219	-0.13	0.076	0.093
FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Left Tilted	0mm	Ant 10	Receiver on	656000	3840	18.85	19.50	1.161	0	0.113	0.131
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Left Tilted	0mm	Ant 10	Receiver on	656000	3840	18.64	19.50	1.219	-0.04	0.083	0.101
FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Right Cheek	0mm	Ant 10	Receiver on	633332	3499.98	18.64	19.50	1.219	-0.09	0.205	0.250
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Right Cheek	0mm	Ant 10	Receiver on	633332	3499.98	18.41	19.50	1.285	0.05	0.178	0.229
FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Right Tilted	0mm	Ant 10	Receiver on	633332	3499.98	18.64	19.50	1.219	0.13	0.090	0.110
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Right Tilted	0mm	Ant 10	Receiver on	633332	3499.98	18.41	19.50	1.285	0	0.083	0.107
FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Left Cheek	0mm	Ant 10	Receiver on	633332	3499.98	18.64	19.50	1.219	-0.12	0.118	0.144
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Left Cheek	0mm	Ant 10	Receiver on	633332	3499.98	18.41	19.50	1.285	0.15	0.105	0.135
FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Left Tilted	0mm	Ant 10	Receiver on	633332	3499.98	18.64	19.50	1.219	-0.05	0.143	0.174
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Left Tilted	0mm	Ant 10	Receiver on	633332	3499.98	18.41	19.50	1.285	-0.07	0.127	0.16



Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
2450MHz																
	WLAN2.4GHz	802.11b 1Mbps	Right Cheek	0mm	Ant 6+8(6)	Receiver on	1	2412	15.75	17.50	1.496	100	1.000	-0.17	0.492	0.736
	WLAN2.4GHz	802.11b 1Mbps	Right Tilted	0mm	Ant 6+8(6)	Receiver on	1	2412	15.75	17.50	1.496	100	1.000	0.17	0.548	0.820
	WLAN2.4GHz	802.11b 1Mbps	Right Tilted	0mm	Ant 6+8(6)	Receiver on	11	2462	15.77	17.50	1.489	100	1.000	0.17	0.558	0.831
	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	0mm	Ant 6+8(6)	Receiver on	1	2412	15.75	17.50	1.496	100	1.000	0.04	0.896	1.341
12	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	0mm	Ant 6+8(6)	Receiver on	11	2462	15.77	17.50	1.489	100	1.000	0.06	0.902	1.343
	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	0mm	Ant 6+8(6)	Simultaneous	11	2462	11.82	13.50	1.472	100	1.000	0.04	0.283	0.417
	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	0mm	Ant 6+8(6)	Receiver on	6	2437	15.63	17.50	1.538	100	1.000	0.1	0.677	1.041
	WLAN2.4GHz	802.11b 1Mbps	Left Tilted	0mm	Ant 6+8(6)	Receiver on	1	2412	15.75	17.50	1.496	100	1.000	0.07	0.812	1.215
	WLAN2.4GHz	802.11b 1Mbps	Left Tilted	0mm	Ant 6+8(6)	Receiver on	11	2462	15.77	17.50	1.489	100	1.000	0.01	0.831	1.238
	WLAN2.4GHz	802.11b 1Mbps	Left Tilted	0mm	Ant 6+8(6)	Receiver on	6	2437	15.63	17.50	1.538	100	1.000	0.01	0.726	1.117
	WLAN2.4GHz	802.11n-HT40 MCS0	Left Cheek	0mm	Ant 6+8(6)	Receiver on	6	2437	15.54	17.00	1.400	100	1.000	0.08	0.653	0.914
	WLAN2.4GHz	802.11n-HT40 MCS0	Left Cheek	0mm	Ant 6+8(6)	Receiver on	3	2422	15.61	17.50	1.545	100	1.000	0.01	0.638	0.986
	WLAN2.4GHz	802.11n-HT40 MCS0	Left Tilted	0mm	Ant 6+8(6)	Receiver on	6	2437	15.54	17.00	1.400	100	1.000	0.03	0.712	0.997
	WLAN2.4GHz	802.11n-HT40 MCS0	Left Tilted	0mm	Ant 6+8(6)	Receiver on	3	2422	15.61	17.50	1.545	100	1.000	-0.08	0.658	1.017
	Bluetooth	1Mbps	Right Cheek	0mm	Ant 6	Full	39	2441	9.39	10.50	1.291	76.91	1.083	0.14	0.029	0.041
	Bluetooth	1Mbps	Right Tilted	0mm	Ant 6	Full	39	2441	9.39	10.50	1.291	76.91	1.083	0.03	0.029	0.041
13	Bluetooth	1Mbps	Left Cheek	0mm	Ant 6	Full	39	2441	9.39	10.50	1.291	76.91	1.083	0.07	0.180	0.252
	Bluetooth	1Mbps	Left Tilted	0mm	Ant 6	Full	39	2441	9.39	10.50	1.291	76.91	1.083	0.1	0.044	0.062
5000MHz																
	WLAN5.2GHz	802.11ac-VHT80 MCS0	Right Cheek	0mm	Ant 5+7(5)	Receiver on	58	5290	9.86	11.00	1.300	100	1.000	-0.17	0.536	0.697
	WLAN5.2GHz	802.11ac-VHT80 MCS0	Right Tilted	0mm	Ant 5+7(5)	Receiver on	58	5290	9.86	11.00	1.300	100	1.000	0.04	0.477	0.620
14	WLAN5.2GHz	802.11ac-VHT80 MCS0	Left Cheek	0mm	Ant 5+7(5)	Receiver on	58	5290	9.86	11.00	1.300	100	1.000	0.03	0.876	1.139
	WLAN5.2GHz	802.11ac-VHT80 MCS0	Left Cheek	0mm	Ant 5+7(5)	Simultaneous	58	5290	6.13	7.50	1.371	100	1.000	0.09	0.267	0.366
	WLAN5.2GHz	802.11ac-VHT80 MCS0	Left Tilted	0mm	Ant 5+7(5)	Receiver on	58	5290	9.86	11.00	1.300	100	1.000	-0.01	0.722	0.939
	WLAN5.5GHz	802.11ac-VHT80 MCS0	Right Cheek	0mm	Ant 5+7(5)	Receiver on	122	5610	12.63	14.00	1.371	100	1.000	-0.09	0.339	0.465
	WLAN5.5GHz	802.11ac-VHT80 MCS0	Right Tilted	0mm	Ant 5+7(5)	Receiver on	122	5610	12.63	14.00	1.371	100	1.000	-0.08	0.319	0.437
15	WLAN5.5GHz	802.11ac-VHT80 MCS0	Left Cheek	0mm	Ant 5+7(5)	Receiver on	122	5610	12.63	14.00	1.371	100	1.000	0.07	0.702	0.962
	WLAN5.5GHz	802.11ac-VHT80 MCS0	Left Cheek	0mm	Ant 5+7(5)	Simultaneous	122	5610	8.72	10.00	1.343	100	1.000	-0.03	0.233	0.313
	WLAN5.5GHz	802.11ac-VHT80 MCS0	Left Tilted	0mm	Ant 5+7(5)	Receiver on	122	5610	12.63	14.00	1.371	100	1.000	0.12	0.513	0.703
	WLAN5.5GHz	802.11ac-VHT80 MCS0	Left Cheek	0mm	Ant 5+7(5)	Receiver on	138	5690	12.33	14.00	1.469	100	1.000	0.18	0.592	0.870
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Right Cheek	0mm	Ant 5+7(5)	Receiver on	155	5775	12.39	14.00	1.449	100	1.000	-0.08	0.515	0.746
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Right Tilted	0mm	Ant 5+7(5)	Receiver on	155	5775	12.39	14.00	1.449	100	1.000	0.05	0.497	0.720
16	WLAN5.8GHz	802.11ac-VHT80 MCS0	Left Cheek	0mm	Ant 5+7(5)	Receiver on	155	5775	12.39	14.00	1.449	100	1.000	0.18	0.787	1.140
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Left Cheek	0mm	Ant 5+7(5)	Simultaneous	155	5775	6.48	8.00	1.419	100	1.000	0.04	0.112	0.159
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Left Tilted	0mm	Ant 5+7(5)	Receiver on	155	5775	12.39	14.00	1.449	100	1.000	0.06	0.757	1.097



14.2 Hotspot SAR

Table with columns: Plot No., Band, BW (MHz), Modulation, RB Size, RB offset, Mode, Test Position, Gap (mm), Antenna, Power Reduction, Ch., Freq. (MHz), Average Power (dBm), Tune-Up Limit (dBm), Tune-up Scaling Factor, Duty Cycle %, Duty Cycle Scaling Factor, Power Drift (dB), Measured 1g SAR (W/kg), Reported 1g SAR (W/kg). Rows include 750MHz, 835MHz, and WCDMA V bands.



FCC SAR Test Report

Report No. : FA3D0607

Table with columns for Frequency Band, Modulation, Power, Slots, Exposure, Location, Antenna, and SAR values. Includes sub-sections for 1750MHz and 1900MHz.



FCC SAR Test Report

Report No. : FA3D0607

	LTE Band 41	20M	QPSK	1	0	-	Bottom Side	5mm	Ant 1	Hotspot	41490	2680	22.55	24.00	1.396	62.9	1.006	0.17	0.460	0.646
	LTE Band 41	20M	QPSK	50	0	-	Bottom Side	5mm	Ant 1	Hotspot	40620	2593	21.59	23.00	1.384	62.9	1.006	0.02	0.461	0.642
	LTE Band 41	20M	QPSK	50	0	-	Bottom Side	5mm	Ant 1	Hotspot	39750	2506	21.37	23.00	1.455	62.9	1.006	0	0.492	0.720
	LTE Band 41	20M	QPSK	50	0	-	Bottom Side	5mm	Ant 1	Hotspot	40185	2549.5	21.58	23.00	1.387	62.9	1.006	0.18	0.497	0.693
	LTE Band 41	20M	QPSK	50	0	-	Bottom Side	5mm	Ant 1	Hotspot	41055	2636.5	21.46	23.00	1.426	62.9	1.006	-0.11	0.385	0.552
	LTE Band 41	20M	QPSK	50	0	-	Bottom Side	5mm	Ant 1	Hotspot	41490	2680	21.48	23.00	1.419	62.9	1.006	-0.05	0.366	0.522
	LTE Band 41	20M	QPSK	100	0	-	Bottom Side	5mm	Ant 1	Hotspot	40620	2593	21.56	23.00	1.393	62.9	1.006	-0.04	0.471	0.660
25	LTE Band 41_HPUE	20M	QPSK	1	0	-	Bottom Side	5mm	Ant 1	Hotspot	40185	2549.5	24.59	26.00	1.384	42.9	1.009	0.06	0.666	0.930
	LTE Band 41	20M	QPSK	1	0	-	Front	5mm	Ant 4	Hotspot	40620	2593	16.07	17.50	1.390	62.9	1.006	0	0.286	0.400
	LTE Band 41	20M	QPSK	50	0	-	Front	5mm	Ant 4	Hotspot	40620	2593	16.05	17.50	1.396	62.9	1.006	0.16	0.232	0.326
	LTE Band 41	20M	QPSK	1	0	-	Back	5mm	Ant 4	Hotspot	40620	2593	16.07	17.50	1.390	62.9	1.006	0.08	0.401	0.561
	LTE Band 41	20M	QPSK	50	0	-	Back	5mm	Ant 4	Hotspot	40620	2593	16.05	17.50	1.396	62.9	1.006	0.11	0.385	0.541
	LTE Band 41	20M	QPSK	1	0	-	Left Side	5mm	Ant 4	Hotspot	40620	2593	16.07	17.50	1.390	62.9	1.006	0.18	0.053	0.074
	LTE Band 41	20M	QPSK	50	0	-	Left Side	5mm	Ant 4	Hotspot	40620	2593	16.05	17.50	1.396	62.9	1.006	0.12	0.042	0.059
	LTE Band 41	20M	QPSK	1	0	-	Right Side	5mm	Ant 4	Hotspot	40620	2593	16.07	17.50	1.390	62.9	1.006	0.07	0.040	0.056
	LTE Band 41	20M	QPSK	50	0	-	Right Side	5mm	Ant 4	Hotspot	40620	2593	16.05	17.50	1.396	62.9	1.006	0.15	0.031	0.044
	LTE Band 41	20M	QPSK	1	0	-	Top Side	5mm	Ant 4	Hotspot	40620	2593	16.07	17.50	1.390	62.9	1.006	0.02	0.568	0.794
	LTE Band 41	20M	QPSK	1	0	-	Top Side	5mm	Ant 4	Hotspot	39750	2506	16.00	17.50	1.413	62.9	1.006	0.14	0.362	0.514
	LTE Band 41	20M	QPSK	1	0	-	Top Side	5mm	Ant 4	Hotspot	40185	2549.5	16.02	17.50	1.406	62.9	1.006	-0.03	0.536	0.758
	LTE Band 41	20M	QPSK	1	0	-	Top Side	5mm	Ant 4	Hotspot	41055	2636.5	15.97	17.50	1.422	62.9	1.006	-0.14	0.504	0.721
	LTE Band 41	20M	QPSK	1	0	-	Top Side	5mm	Ant 4	Hotspot	41490	2680	16.00	17.50	1.413	62.9	1.006	0.17	0.390	0.554
	LTE Band 41	20M	QPSK	50	0	-	Top Side	5mm	Ant 4	Hotspot	40620	2593	16.05	17.50	1.396	62.9	1.006	0.11	0.458	0.643
	LTE Band 41	20M	QPSK	50	0	-	Top Side	5mm	Ant 4	Hotspot	39750	2506	16.01	17.50	1.409	62.9	1.006	0.07	0.289	0.410
	LTE Band 41	20M	QPSK	50	0	-	Top Side	5mm	Ant 4	Hotspot	40185	2549.5	16.02	17.50	1.406	62.9	1.006	-0.04	0.433	0.612
	LTE Band 41	20M	QPSK	50	0	-	Top Side	5mm	Ant 4	Hotspot	41055	2636.5	15.94	17.50	1.432	62.9	1.006	-0.18	0.390	0.562
	LTE Band 41	20M	QPSK	50	0	-	Top Side	5mm	Ant 4	Hotspot	41490	2680	15.89	17.50	1.449	62.9	1.006	-0.13	0.315	0.459
	LTE Band 41	20M	QPSK	100	0	-	Top Side	5mm	Ant 4	Hotspot	40620	2593	16.01	17.50	1.409	62.9	1.006	-0.13	0.454	0.644
	LTE Band 41_HPUE	20M	QPSK	1	0	-	Top Side	5mm	Ant 4	Hotspot	40620	2593	18.10	19.50	1.380	42.9	1.009	0.02	0.600	0.836
3500MHz																				
	LTE Band 42	20M	QPSK	1	0	-	Front	5mm	Ant 2	Hotspot	42590	3500	15.12	16.50	1.374	62.9	1.006	0.04	0.170	0.235
	LTE Band 42	20M	QPSK	50	0	-	Front	5mm	Ant 2	Hotspot	42590	3500	15.06	16.50	1.393	62.9	1.006	0.14	0.166	0.233
	LTE Band 42	20M	QPSK	1	0	-	Back	5mm	Ant 2	Hotspot	42590	3500	15.12	16.50	1.374	62.9	1.006	-0.06	0.222	0.307
	LTE Band 42	20M	QPSK	50	0	-	Back	5mm	Ant 2	Hotspot	42590	3500	15.06	16.50	1.393	62.9	1.006	-0.09	0.149	0.209
	LTE Band 42	20M	QPSK	1	0	-	Left Side	5mm	Ant 2	Hotspot	42590	3500	15.12	16.50	1.374	62.9	1.006	0.09	0.486	0.672
26	LTE Band 42	20M	QPSK	1	0	-	Left Side	5mm	Ant 2	Hotspot	42190	3460	15.06	16.50	1.393	62.9	1.006	0.04	0.488	0.684
	LTE Band 42	20M	QPSK	1	0	-	Left Side	5mm	Ant 2	Hotspot	42990	3540	15.07	16.50	1.390	62.9	1.006	0.13	0.452	0.632
	LTE Band 42	20M	QPSK	50	0	-	Left Side	5mm	Ant 2	Hotspot	42590	3500	15.06	16.50	1.393	62.9	1.006	-0.08	0.472	0.662
	LTE Band 42	20M	QPSK	50	0	-	Left Side	5mm	Ant 2	Hotspot	42190	3460	15.03	16.50	1.403	62.9	1.006	0.08	0.412	0.581
	LTE Band 42	20M	QPSK	50	0	-	Left Side	5mm	Ant 2	Hotspot	42990	3540	14.91	16.50	1.442	62.9	1.006	-0.04	0.380	0.551
	LTE Band 42	20M	QPSK	100	0	-	Left Side	5mm	Ant 2	Hotspot	42590	3500	15.05	16.50	1.396	62.9	1.006	0.12	0.403	0.566
	LTE Band 42	20M	QPSK	1	0	-	Top Side	5mm	Ant 2	Hotspot	42590	3500	15.12	16.50	1.374	62.9	1.006	0.09	0.020	0.028
	LTE Band 42	20M	QPSK	50	0	-	Top Side	5mm	Ant 2	Hotspot	42590	3500	15.06	16.50	1.393	62.9	1.006	-0.02	0.016	0.022



FCC SAR Test Report

Report No. : FA3D0607

Table with 20 columns: Plot No., Band, BW (MHz), Modulation, RB Size, RB offset, Mode, Test Position, Gap (mm), Antenna, Power Reduction, Ch., Freq. (MHz), Power Setting, Average Power (dBm), Tune-Up Limit (dBm), Tune-up Scaling Factor, Power Drift (dB), Measured 1g SAR (W/kg), Reported 1g SAR (W/kg). It contains 60 rows of test data.

Sporton International Inc. (Kunshan)

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FCC ID : 2BEPUFMP193

Issued Date : May 24, 2024

Form version. : 200414



FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Left Side	5mm	Ant 7	Hotspot	633332	3499.98	195	17.17	18.00	1.211	-0.07	0.027	0.033	
FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Right Side	5mm	Ant 7	Hotspot	633332	3499.98	195	17.18	18.00	1.208	-0.08	0.182	0.220	
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Right Side	5mm	Ant 7	Hotspot	633332	3499.98	195	17.17	18.00	1.211	0.12	0.219	0.265	
FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Top Side	5mm	Ant 7	Hotspot	633332	3499.98	195	17.18	18.00	1.208	-0.07	0.245	0.296	
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Top Side	5mm	Ant 7	Hotspot	633332	3499.98	195	17.17	18.00	1.211	-0.05	0.248	0.300	
FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Bottom Side	5mm	Ant 7	Hotspot	633332	3499.98	195	17.18	18.00	1.208	0.13	0.000	0.000	
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Bottom Side	5mm	Ant 7	Hotspot	633332	3499.98	195	17.17	18.00	1.211	-0.03	0.015	0.018	
FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Front	5mm	Ant 10	Hotspot	656000	3840	225	18.46	19.00	1.132	0.06	0.358	0.405	
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Front	5mm	Ant 10	Hotspot	656000	3840	225	18.43	19.00	1.140	-0.04	0.365	0.416	
FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Back	5mm	Ant 10	Hotspot	656000	3840	225	18.46	19.00	1.132	0.17	0.760	0.861	
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 10	Hotspot	656000	3840	225	18.43	19.00	1.140	0.06	0.731	0.834	
FR1 n77	100M	QPSK	270	0	DFT-SCS-30KHz	Back	5mm	Ant 10	Hotspot	656000	3840	225	17.59	18.50	1.233	0.01	0.691	0.852	
FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Left Side	5mm	Ant 10	Hotspot	656000	3840	225	18.46	19.00	1.132	-0.11	0.000	0.000	
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Left Side	5mm	Ant 10	Hotspot	656000	3840	225	18.43	19.00	1.140	0.03	0.000	0.000	
FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Right Side	5mm	Ant 10	Hotspot	656000	3840	225	18.46	19.00	1.132	0.09	1.120	1.268	
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Right Side	5mm	Ant 10	Hotspot	656000	3840	225	18.43	19.00	1.140	0.15	1.180	1.345	
FR1 n77	100M	QPSK	270	0	DFT-SCS-30KHz	Right Side	5mm	Ant 10	Hotspot	656000	3840	225	17.59	18.50	1.233	-0.08	1.120	1.381	
FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Top Side	5mm	Ant 10	Hotspot	656000	3840	225	18.46	19.00	1.132	0.06	0.037	0.042	
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Top Side	5mm	Ant 10	Hotspot	656000	3840	225	18.43	19.00	1.140	0.15	0.042	0.048	
FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Bottom Side	5mm	Ant 10	Hotspot	656000	3840	225	18.46	19.00	1.132	-0.08	0.162	0.183	
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Bottom Side	5mm	Ant 10	Hotspot	656000	3840	225	18.43	19.00	1.140	-0.05	0.166	0.189	
FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Front	5mm	Ant 10	Hotspot	633332	3499.98	225	18.21	19.00	1.199	-0.09	0.544	0.653	
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Front	5mm	Ant 10	Hotspot	633332	3499.98	225	18.12	19.00	1.225	0	0.483	0.591	
FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Back	5mm	Ant 10	Hotspot	633332	3499.98	225	18.21	19.00	1.199	0.14	0.895	1.074	
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 10	Hotspot	633332	3499.98	225	18.12	19.00	1.225	-0.15	0.809	0.991	
FR1 n77	100M	QPSK	270	0	DFT-SCS-30KHz	Back	5mm	Ant 10	Hotspot	633332	3499.98	225	17.44	18.50	1.276	0.02	0.799	1.020	
FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Left Side	5mm	Ant 10	Hotspot	633332	3499.98	225	18.21	19.00	1.199	-0.03	0.024	0.029	
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Left Side	5mm	Ant 10	Hotspot	633332	3499.98	225	18.12	19.00	1.225	-0.16	0.028	0.034	
27	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Right Side	5mm	Ant 10	Hotspot	633332	3499.98	225	18.21	19.00	1.199	0.08	1.190	1.427
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Right Side	5mm	Ant 10	Hotspot	633332	3499.98	225	18.12	19.00	1.225	0	1.020	1.249	
FR1 n77	100M	QPSK	270	0	DFT-SCS-30KHz	Right Side	5mm	Ant 10	Hotspot	633332	3499.98	225	17.44	18.50	1.276	-0.04	0.968	1.236	
FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Top Side	5mm	Ant 10	Hotspot	633332	3499.98	225	18.21	19.00	1.199	0.17	0.048	0.058	
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Top Side	5mm	Ant 10	Hotspot	633332	3499.98	225	18.12	19.00	1.225	0.18	0.000	0.000	
FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Bottom Side	5mm	Ant 10	Hotspot	633332	3499.98	225	18.21	19.00	1.199	0.03	0.404	0.485	
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Bottom Side	5mm	Ant 10	Hotspot	633332	3499.98	225	18.12	19.00	1.225	0.01	0.390	0.478	

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
2450MHz																
	WLAN2.4GHz	802.11b 1Mbps	Front	5mm	Ant 6+8(6)	Hotspot	11	2462	13.84	15.50	1.466	100	1.000	-0.15	0.270	0.396
28	WLAN2.4GHz	802.11b 1Mbps	Back	5mm	Ant 6+8(6)	Hotspot	11	2462	13.84	15.50	1.466	100	1.000	-0.05	0.393	0.576
	WLAN2.4GHz	802.11b 1Mbps	Left Side	5mm	Ant 6+8(6)	Hotspot	11	2462	13.84	15.50	1.466	100	1.000	0.11	0.000	0.000
	WLAN2.4GHz	802.11b 1Mbps	Right Side	5mm	Ant 6+8(6)	Hotspot	11	2462	13.84	15.50	1.466	100	1.000	-0.08	0.337	0.494
	WLAN2.4GHz	802.11b 1Mbps	Top Side	5mm	Ant 6+8(6)	Hotspot	11	2462	13.84	15.50	1.466	100	1.000	-0.17	0.255	0.374
	Bluetooth	1Mbps	Front	5mm	Ant 6	Full	39	2441	9.39	10.50	1.291	76.91	1.083	0.16	0.052	0.073
29	Bluetooth	1Mbps	Back	5mm	Ant 6	Full	39	2441	9.39	10.50	1.291	76.91	1.083	0.07	0.070	0.098
	Bluetooth	1Mbps	Left Side	5mm	Ant 6	Full	39	2441	9.39	10.50	1.291	76.91	1.083	-0.06	0.000	0.000
	Bluetooth	1Mbps	Right Side	5mm	Ant 6	Full	39	2441	9.39	10.50	1.291	76.91	1.083	0.02	0.029	0.041
	Bluetooth	1Mbps	Top Side	5mm	Ant 6	Full	39	2441	9.39	10.50	1.291	76.91	1.083	-0.16	0.066	0.092



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Table with columns for band, power, modulation, MPE, SAR, and other parameters. Includes rows for GSM1900, LTE Band 2, and 2600MHz bands.



FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Back	5mm	Ant 10	Receiver off	656000	3840	18.85	19.50	1.161	-0.18	0.708	0.822
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 10	Receiver off	656000	3840	18.64	19.50	1.219	-0.08	0.672	0.819
FR1 n77	100M	QPSK	270	0	DFT-SCS-30KHz	Back	5mm	Ant 10	Receiver off	656000	3840	17.59	18.50	1.233	-0.06	0.551	0.679
FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Front	5mm	Ant 10	Receiver off	633332	3499.98	18.64	19.50	1.219	0.16	0.562	0.685
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Front	5mm	Ant 10	Receiver off	633332	3499.98	18.41	19.50	1.285	0.01	0.499	0.641
40 FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Back	5mm	Ant 10	Receiver off	633332	3499.98	18.64	19.50	1.219	-0.05	0.917	1.118
FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Back	5mm	Ant 10	Receiver off	633332	3499.98	18.41	19.50	1.285	0.13	0.835	1.073
FR1 n77	100M	QPSK	270	0	DFT-SCS-30KHz	Back	5mm	Ant 10	Receiver off	633332	3499.98	17.44	18.50	1.276	0.12	0.804	1.026

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Headset	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	
2450MHz																		
	WLAN2.4GHz	802.11b 1Mbps	Front	5mm	Ant 6+8(6)	-	Receiver off	11	2462	18.05	19.50	1.396	100	1.000	-0.02	0.886	1.237	
	WLAN2.4GHz	802.11b 1Mbps	Front	5mm	Ant 6+8(6)	-	Receiver off	6	2437	17.82	19.50	1.472	100	1.000	0.06	0.769	1.132	
	WLAN2.4GHz	802.11b 1Mbps	Front	5mm	Ant 6+8(6)	-	Receiver off	1	2412	17.71	19.50	1.510	100	1.000	0.01	0.759	1.146	
	WLAN2.4GHz	802.11b 1Mbps	Front	5mm	Ant 6+8(6)	Headset	Receiver off	11	2462	18.05	19.50	1.396	100	1.000	0.01	0.844	1.179	
	WLAN2.4GHz	802.11n-HT40 MCS0	Front	5mm	Ant 6+8(8)	-	Receiver off	6	2437	17.50	19.00	1.413	100	1.000	0.09	0.697	0.985	
	WLAN2.4GHz	802.11n-HT40 MCS0	Front	5mm	Ant 6+8(6)	-	Receiver off	9	2452	16.26	18.00	1.493	100	1.000	0.04	0.582	0.869	
41	WLAN2.4GHz	802.11b 1Mbps	Back	5mm	Ant 6+8(6)	-	Receiver off	11	2462	18.05	19.50	1.396	100	1.000	-0.01	1.010	1.410	
	WLAN2.4GHz	802.11b 1Mbps	Back	5mm	Ant 6+8(6)	-	Receiver off	6	2437	17.82	19.50	1.472	100	1.000	-0.1	0.741	1.091	
	WLAN2.4GHz	802.11b 1Mbps	Back	5mm	Ant 6+8(6)	-	Receiver off	1	2412	17.71	19.50	1.510	100	1.000	0.03	0.738	1.114	
	WLAN2.4GHz	802.11b 1Mbps	Back	5mm	Ant 6+8(6)	Headset	Receiver off	11	2462	18.05	19.50	1.396	100	1.000	0.06	0.959	1.339	
	WLAN2.4GHz	802.11n-HT40 MCS0	Back	5mm	Ant 6+8(8)	-	Receiver off	6	2437	17.50	19.00	1.413	100	1.000	-0.02	0.679	0.959	
	WLAN2.4GHz	802.11n-HT40 MCS0	Back	5mm	Ant 6+8(6)	-	Receiver off	9	2452	16.26	18.00	1.493	100	1.000	0.07	0.568	0.848	
	WLAN2.4GHz	802.11b 1Mbps	Front	5mm	Ant 6+8(6)	-	Simultaneous	11	2462	11.82	13.50	1.472	100	1.000	0.01	0.177	0.261	
	WLAN2.4GHz	802.11b 1Mbps	Back	5mm	Ant 6+8(6)	-	Simultaneous	11	2462	11.82	13.50	1.472	100	1.000	0.11	0.190	0.280	
	Bluetooth	1Mbps	Front	5mm	Ant 6	-	Full	39	2441	9.39	10.50	1.291	76.91	1.083	0.16	0.052	0.073	
42	Bluetooth	1Mbps	Back	5mm	Ant 6	-	Full	39	2441	9.39	10.50	1.291	76.91	1.083	0.07	0.070	0.098	
5000MHz																		
43	WLAN5.3GHz	802.11n-HT40 MCS0	Front	5mm	Ant 5+7(7)	-	Receiver off	54	5270	15.53	17.00	1.403	100	1.000	0.11	0.807	1.132	
	WLAN5.3GHz	802.11n-HT40 MCS0	Front	5mm	Ant 5+7(5)	-	Receiver off	62	5310	10.67	12.50	1.524	100	1.000	0.06	0.315	0.480	
	WLAN5.3GHz	802.11ac-VHT80 MCS0	Front	5mm	Ant 5+7(5)	-	Simultaneous	58	5290	6.13	7.50	1.371	100	1.000	-0.04	0.117	0.160	
	WLAN5.3GHz	802.11n-HT40 MCS0	Back	5mm	Ant 5+7(7)	-	Receiver off	54	5270	15.53	17.00	1.403	100	1.000	0.19	0.691	0.969	
	WLAN5.3GHz	802.11n-HT40 MCS0	Back	5mm	Ant 5+7(5)	-	Receiver off	62	5310	10.67	12.50	1.524	100	1.000	0.07	0.268	0.408	
	WLAN5.3GHz	802.11ac-VHT80 MCS0	Back	5mm	Ant 5+7(5)	-	Simultaneous	58	5290	6.13	7.50	1.371	100	1.000	0.04	0.087	0.119	
	WLAN5.5GHz	802.11ac-VHT80 MCS0	Front	5mm	Ant 5+7(5)	-	Receiver off	122	5610	12.63	14.00	1.371	100	1.000	0.07	0.439	0.602	
	WLAN5.5GHz	802.11ac-VHT80 MCS0	Front	5mm	Ant 5+7(5)	-	Simultaneous	122	5610	8.72	10.00	1.343	100	1.000	-0.17	0.175	0.235	
44	WLAN5.5GHz	802.11ac-VHT80 MCS0	Back	5mm	Ant 5+7(5)	-	Receiver off	122	5610	12.63	14.00	1.371	100	1.000	-0.03	0.784	1.075	
	WLAN5.5GHz	802.11ac-VHT80 MCS0	Back	5mm	Ant 5+7(5)	-	Simultaneous	122	5610	8.72	10.00	1.343	100	1.000	0.09	0.288	0.387	
	WLAN5.5GHz	802.11ac-VHT80 MCS0	Back	5mm	Ant 5+7(5)	-	Receiver off	138	5690	12.33	14.00	1.469	100	1.000	0.03	0.613	0.900	
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Front	5mm	Ant 5+7(5)	-	Receiver off	155	5775	9.43	11.00	1.435	100	1.000	-0.15	0.285	0.409	
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Front	5mm	Ant 5+7(5)	-	Simultaneous	155	5775	6.48	8.00	1.419	100	1.000	0.1	0.143	0.203	
45	WLAN5.8GHz	802.11ac-VHT80 MCS0	Back	5mm	Ant 5+7(5)	-	Receiver off	155	5775	9.43	11.00	1.435	100	1.000	-0.03	0.784	1.125	
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Back	5mm	Ant 5+7(5)	-	Simultaneous	155	5775	6.48	8.00	1.419	100	1.000	0.06	0.271	0.385	



14.4 Product Specific SAR

Table with 19 columns: Plot No., Band, BW (MHz), Modulation, RB Size, RB offset, Mode, Test Position, Gap (mm), Antenna, Power Reduction, Ch., Freq. (MHz), Average Power (dBm), Tune-Up Limit (dBm), Tune-up Scaling Factor, Duty Cycle %, Duty Cycle Scaling Factor, Power Drift (dB), Measured 10g SAR (W/kg), Reported 10g SAR (W/kg). Rows include 835MHz, 1750MHz, 1900MHz, 2600MHz, and 3500MHz bands.

Table with 19 columns: Plot No., Band, BW (MHz), Modulation, RB Size, RB offset, Mode, Test Position, Gap (mm), Antenna, Power Reduction, Ch., Freq. (MHz), Power Setting, Average Power (dBm), Tune-Up Limit (dBm), Tune-up Scaling Factor, Power Drift (dB), Measured 10g SAR (W/kg), Reported 10g SAR (W/kg). Rows include FR1 n77 100M and 135 69 DFT-SCS-30KHz configurations.



Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
2450MHz																
54	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	Ant 6+8(6)	Receiver off	11	2462	18.05	19.50	1.396	100	1.000	0.13	1.190	1.662
	WLAN2.4GHz	802.11b 1Mbps	Right Side	0mm	Ant 6+8(6)	Receiver off	11	2462	18.05	19.50	1.396	100	1.000	0.06	1.130	1.578
5000MHz																
	WLAN5.3GHz	802.11n-HT40 MCS0	Front	0mm	Ant 5+7(7)	Receiver off	54	5270	15.53	17.00	1.403	100	1.000	0.08	0.607	0.852
55	WLAN5.3GHz	802.11n-HT40 MCS0	Back	0mm	Ant 5+7(7)	Receiver off	54	5270	15.53	17.00	1.403	100	1.000	0.04	0.882	1.237
	WLAN5.2GHz	802.11ac-VHT80 MCS0	Back	0mm	Ant 5+7(5)	Simultaneous	58	5290	6.13	7.50	1.371	100	1.000	0.04	0.121	0.166
	WLAN5.3GHz	802.11n-HT40 MCS0	Left Side	0mm	Ant 5+7(7)	Receiver off	54	5270	15.53	17.00	1.403	100	1.000	0.01	0.000	0.000
	WLAN5.3GHz	802.11n-HT40 MCS0	Right Side	0mm	Ant 5+7(7)	Receiver off	54	5270	15.53	17.00	1.403	100	1.000	0.03	0.756	1.061
	WLAN5.3GHz	802.11n-HT40 MCS0	Top Side	0mm	Ant 5+7(7)	Receiver off	54	5270	15.53	17.00	1.403	100	1.000	-0.08	0.572	0.802
	WLAN5.5GHz	802.11ac-VHT80 MCS0	Front	0mm	Ant 5+7(5)	Receiver off	122	5610	12.63	14.00	1.371	100	1.000	0.08	0.529	0.725
56	WLAN5.5GHz	802.11ac-VHT80 MCS0	Back	0mm	Ant 5+7(5)	Receiver off	122	5610	12.63	14.00	1.371	100	1.000	-0.03	0.783	1.073
	WLAN5.5GHz	802.11ac-VHT80 MCS0	Back	0mm	Ant 5+7(5)	Simultaneous	122	5610	8.72	10.00	1.343	100	1.000	0.09	0.266	0.357
	WLAN5.5GHz	802.11ac-VHT80 MCS0	Left Side	0mm	Ant 5+7(5)	Receiver off	122	5610	12.63	14.00	1.371	100	1.000	0.01	0.030	0.041
	WLAN5.5GHz	802.11ac-VHT80 MCS0	Right Side	0mm	Ant 5+7(5)	Receiver off	122	5610	12.63	14.00	1.371	100	1.000	0.03	0.581	0.796
	WLAN5.5GHz	802.11ac-VHT80 MCS0	Top Side	0mm	Ant 5+7(5)	Receiver off	122	5610	12.63	14.00	1.371	100	1.000	-0.08	0.377	0.517
	WLAN5.5GHz	802.11ac-VHT80 MCS0	Back	0mm	Ant 5+7(5)	Receiver off	138	5690	12.33	14.00	1.469	100	1.000	0.1	0.614	0.902
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Front	0mm	Ant 5+7(5)	Receiver off	155	5775	9.43	11.00	1.435	100	1.000	-0.18	0.333	0.478
57	WLAN5.8GHz	802.11ac-VHT80 MCS0	Back	0mm	Ant 5+7(5)	Receiver off	155	5775	9.43	11.00	1.435	100	1.000	0.05	0.573	0.823
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Back	0mm	Ant 5+7(5)	Simultaneous	155	5775	6.48	8.00	1.419	100	1.000	0.05	0.267	0.379
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Left Side	0mm	Ant 5+7(5)	Receiver off	155	5775	9.43	11.00	1.435	100	1.000	0.1	0.025	0.036
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Right Side	0mm	Ant 5+7(5)	Receiver off	155	5775	9.43	11.00	1.435	100	1.000	0.12	0.404	0.580
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Top Side	0mm	Ant 5+7(5)	Receiver off	155	5775	9.43	11.00	1.435	100	1.000	0.08	0.199	0.286



14.5 Repeated SAR Measurement

<1g>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Ratio	Reported 1g SAR (W/kg)
1st	WLAN5.2GHz	-	-	-	-	802.11ac-VHT80 MCS0	Left Cheek	0mm	Ant 5+7(5)	Receiver on	58	5290	9.86	11.00	1.300	100	1.000	0.03	0.876	1	1.139
2nd	WLAN5.2GHz	-	-	-	-	802.11ac-VHT80 MCS0	Left Cheek	0mm	Ant 5+7(5)	Receiver on	58	5290	9.86	11.00	1.300	100	1.000	0.05	0.862	1.016	1.121
1st	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Right Side	5mm	Ant 10	Hotspot	656000	3840	18.43	19.00	1.140	-	-	0.15	1.180	1	1.345
2nd	FR1 n77	100M	QPSK	135	69	DFT-SCS-30KHz	Right Side	5mm	Ant 10	Hotspot	656000	3840	18.43	19.00	1.140	-	-	0.01	1.050	1.124	1.197
1st	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Right Side	5mm	Ant 10	Hotspot	633332	3499.98	18.21	19.00	1.199	-	-	0.08	1.190	1	1.427
2nd	FR1 n77	100M	QPSK	1	1	DFT-SCS-30KHz	Right Side	5mm	Ant 10	Hotspot	633332	3499.98	18.21	19.00	1.199	-	-	0.04	1.080	1.102	1.295
1st	LTE Band 4	20M	QPSK	1	0	-	Front	5mm	Ant 1	Receiver off	20175	1732.5	22.63	24.00	1.371	-	-	0.03	0.909	1	1.246
2nd	LTE Band 4	20M	QPSK	1	0	-	Front	5mm	Ant 1	Receiver off	20175	1732.5	22.63	24.00	1.371	-	-	0.01	0.858	1.059	1.176
1st	LTE Band 2	20M	QPSK	1	0	-	Front	5mm	Ant 1	Receiver off	18900	1880	21.51	23.00	1.409	-	-	-0.02	0.905	1	1.275
2nd	LTE Band 2	20M	QPSK	1	0	-	Front	5mm	Ant 1	Receiver off	18900	1880	21.51	23.00	1.409	-	-	0.06	0.858	1.055	1.209
1st	LTE Band 7	20M	QPSK	1	0	-	Front	5mm	Ant 1	Receiver off	20850	2510	22.40	24.00	1.445	-	-	-0.09	0.800	1	1.156
2nd	LTE Band 7	20M	QPSK	1	0	-	Front	5mm	Ant 1	Receiver off	20850	2510	22.40	24.00	1.445	-	-	0.05	0.792	1.010	1.145
1st	WLAN2.4GHz	-	-	-	-	802.11b 1Mbps	Back	5mm	Ant 6+8(6)	Receiver off	11	2462	18.05	19.50	1.396	100	1.000	-0.01	1.010	1	1.410
2nd	WLAN2.4GHz	-	-	-	-	802.11b 1Mbps	Back	5mm	Ant 6+8(6)	Receiver off	11	2462	18.05	19.50	1.396	100	1.000	0.06	0.993	1.020	1.387

<10g>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Ratio	Reported 10g SAR (W/kg)
1st	LTE Band 42	20M	QPSK	1	0		Left Side	0mm	Ant 2	Receiver off	42590	3500	19.62	21.00	1.374	62.9	1.006	0.08	2.080	1	2.875
2nd	LTE Band 42	20M	QPSK	1	0		Left Side	0mm	Ant 2	Receiver off	42590	3500	19.62	21.00	1.374	62.9	1.006	0.03	1.960	1.061	2.709

General Note:

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

14.6 TDD LTE Linearity Data Analysis

General Note:

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

LTE B41-Linearity Data for Head Ant 1			LTE B41-Linearity Data for Head Ant 4		
	LTE B41 (Power Class 3)	LTE B41 (Power Class 2)		LTE B41 (Power Class 3)	LTE B41 (Power Class 2)
Maximum Tune up Power (dBm)	24.00	26.00	Maximum Tune up Power (dBm)	19.00	21.00
Reported 1g SAR (W/kg)	0.100	0.104	Reported 1g SAR (W/kg)	0.872	0.892
Duty Cycle	63.30%	43.30%	Duty Cycle	63.30%	43.30%
Frame Averaged (mW)	159.00	172.38	Frame Averaged (mW)	50.28	54.51
Linearity SAR (W/kg)	0.108		Linearity SAR (W/kg)	0.945	
% deviation from expected linearity		-4.07%	% deviation from expected linearity		-5.65%
LTE B41-Linearity Data for Body-worn Ant 1			LTE B41-Linearity Data for Body-worn Ant 4		
	LTE B41 (Power Class 3)	LTE B41 (Power Class 2)		LTE B41 (Power Class 3)	LTE B41 (Power Class 2)
Maximum Tune up Power (dBm)	24.00	26.00	Maximum Tune up Power (dBm)	19.50	21.50
Reported 1g SAR (W/kg)	0.783	0.826	Reported 1g SAR (W/kg)	0.838	0.881
Duty Cycle	63.30%	43.30%	Duty Cycle	63.30%	43.30%
Frame Averaged (mW)	159.00	172.38	Frame Averaged (mW)	56.42	61.16
Linearity SAR (W/kg)	0.849		Linearity SAR (W/kg)	0.909	
% deviation from expected linearity		-2.70%	% deviation from expected linearity		-3.03%
LTE B41-Linearity Data for Hotspot Ant 1			LTE B41-Linearity Data for Hotspot Ant 4		
	LTE B41 (Power Class 3)	LTE B41 (Power Class 2)		LTE B41 (Power Class 3)	LTE B41 (Power Class 2)
Maximum Tune up Power (dBm)	24.00	26.00	Maximum Tune up Power (dBm)	17.50	19.50
Reported 1g SAR (W/kg)	0.871	0.927	Reported 1g SAR (W/kg)	0.794	0.833
Duty Cycle	63.30%	43.30%	Duty Cycle	63.30%	43.30%
Frame Averaged (mW)	159.00	172.38	Frame Averaged (mW)	35.60	38.59
Linearity SAR (W/kg)	0.944		Linearity SAR (W/kg)	0.861	
% deviation from expected linearity		-1.83%	% deviation from expected linearity		-3.23%
LTE B41-Linearity Data for Extremity Ant 4					
	LTE B41 (Power Class 3)	LTE B41 (Power Class 2)			
Maximum Tune up Power (dBm)	19.50	21.50			
Reported 10g SAR (W/kg)	0.940	1.089			
Duty Cycle	63.30%	43.30%			
Frame Averaged (mW)	56.42	61.16			
Linearity SAR (W/kg)	1.019				
% deviation from expected linearity		6.86%			

15. Simultaneous Transmission Analysis

No.	Simultaneous Transmission Configurations	Portable Handset			
		Head	Body-worn	Hotspot	Product specific 10g SAR
1.	WWAN + WLAN2.4GHz	Yes	Yes	Yes	Yes
2.	WWAN + WLAN5GHz	Yes	Yes		Yes
3.	WWAN + WLAN6GHz	Yes	Yes		Yes
4.	WWAN + Bluetooth	Yes	Yes	Yes	Yes
5.	WLAN5GHz+ Bluetooth	Yes	Yes		Yes
6.	WLAN6GHz+ Bluetooth	Yes	Yes		Yes
7.	WWAN + WLAN5GHz+ Bluetooth	Yes	Yes		Yes
8.	WWAN + WLAN6GHz+ Bluetooth	Yes	Yes		Yes
9.	WWAN + WLAN2.4GHz + NFC				Yes
10.	WWAN + WLAN5GHz + NFC				Yes
11.	WWAN + WLAN6GHz + NFC				Yes
12.	WWAN + Bluetooth + NFC				Yes
13.	WLAN5GHz+ Bluetooth + NFC				Yes
14.	WLAN6GHz+ Bluetooth + NFC				Yes
15.	WWAN + WLAN5GHz+ Bluetooth + NFC				Yes
16.	WWAN + WLAN6GHz+ Bluetooth + NFC				Yes

General Note:

- This device supports VoIP in GPRS, WCDMA, LTE and 5GNR (e.g. for 3rd-party VoIP), LTE supports VoLTE operation.
- WWAN above includes 5G NR bands and EN-DC combination.
- EUT will choose each GSM, WCDMA, LTE and 5GNR according to the network signal condition; therefore, they will not operate simultaneously at any moment.
- This device 2.4GHz WLAN support hotspot operation and Bluetooth support tethering applications.
- This device 5GHz/6GHz WLAN not support hotspot operation.
- The worst case 5 GHz WLAN SAR for each configuration was used for SAR summation.
- WLAN 2.4GHz and Bluetooth share the same antenna so can't transmit simultaneously.
- According to the EUT characteristic, WLAN 5GHz/6GHz and Bluetooth can transmit simultaneously.
- According to the EUT characteristic, WLAN 5GHz/6GHz and WLAN 2.4GHz can't transmit simultaneously.
- According to the EUT characteristic, WLAN 5GHz and WLAN 6GHz can't transmit simultaneously.
- NFC can transmit simultaneously with other Radios in extremity exposure condition.
- For Headset SAR and non-Headset SAR always chose higher SAR to do co-located analysis.
- The maximum SAR summation is calculated based on the same configuration and test position.
- For standalone WWAN, always choose the highest SAR among all WWAN bands within the selected antenna for each exposure position to perform simultaneous transmission analysis with WLAN/BT. This is the worst co-located analysis and can represent each band.
- Per KDB 447498 D01v06, simultaneous transmission SAR is compliant if,
 - 1g Scalar SAR summation < 1.6W/kg and 10g Scalar SAR summation < 4.0W/kg.
 - $SPLSR = (SAR1 + SAR2)^{1.5} / (\text{min. separation distance, mm})$, 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.
 - If $SPLSR \leq 0.04$ for 1g SAR and $SPLSR \leq 0.10$ for 10g SAR, simultaneously transmission SAR measurement is not necessary.
 - Simultaneously transmission SAR measurement, and the reported multi-band 1g SAR < 1.6W/kg and 10g SAR < 4.0W/kg.
 - The SPLSR calculated results please refer to section 15.5.



15.1 Head Exposure Conditions

WWAN Band	Exposure Position	1	2	3	4	5	1+2	1+3+5	1+4+5
		WWAN	WLAN2.4GHz Ant 6+8	WLAN5GHz Ant 5+7	WLAN6GHz Ant 5+7	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)	1g SAR (W/kg)
All Bands Ant0	Right Cheek	0.179	0.417	0.366	0.340	0.041	0.60	0.59	0.56
	Right Tilted	0.080	0.417	0.366	0.340	0.041	0.50	0.49	0.46
	Left Cheek	0.259	0.417	0.366	0.340	0.252	0.68	0.88	0.85
	Left Tilted	0.145	0.417	0.366	0.340	0.062	0.56	0.57	0.55
All Bands Ant1	Right Cheek	0.157	0.417	0.366	0.340	0.041	0.57	0.56	0.54
	Right Tilted	0.108	0.417	0.366	0.340	0.041	0.53	0.52	0.49
	Left Cheek	0.166	0.417	0.366	0.340	0.252	0.58	0.78	0.76
	Left Tilted	0.069	0.417	0.366	0.340	0.062	0.49	0.50	0.47
All Bands Ant2	Right Cheek	0.950	0.417	0.366	0.340	0.041	1.37	1.36	1.33
	Right Tilted	0.460	0.417	0.366	0.340	0.041	0.88	0.87	0.84
	Left Cheek	0.935	0.417	0.366	0.340	0.252	1.35	1.55	1.53
	Left Tilted	0.234	0.417	0.366	0.340	0.062	0.65	0.66	0.64
All Bands Ant4	Right Cheek	0.887	0.417	0.366	0.340	0.041	1.30	1.29	1.27
	Right Tilted	0.893	0.417	0.366	0.340	0.041	1.31	1.30	1.27
	Left Cheek	0.556	0.417	0.366	0.340	0.252	0.97	1.17	1.15
	Left Tilted	0.540	0.417	0.366	0.340	0.062	0.96	0.97	0.94
All Bands Ant5	Right Cheek	0.706	0.417	0.366	0.340	0.041	1.12	1.11	1.09
	Right Tilted	0.818	0.417	0.366	0.340	0.041	1.24	1.23	1.20
	Left Cheek	0.744	0.417	0.366	0.340	0.252	1.16	1.36	1.34
	Left Tilted	0.860	0.417	0.366	0.340	0.062	1.28	1.29	1.26
All Bands Ant7	Right Cheek	0.227	0.417	0.366	0.340	0.041	0.64	0.63	0.61
	Right Tilted	0.182	0.417	0.366	0.340	0.041	0.60	0.59	0.56
	Left Cheek	0.877	0.417	0.366	0.340	0.252	1.29	1.50	1.47
	Left Tilted	0.320	0.417	0.366	0.340	0.062	0.74	0.75	0.72
All Bands Ant10	Right Cheek	0.250	0.417	0.366	0.340	0.041	0.67	0.66	0.63
	Right Tilted	0.110	0.417	0.366	0.340	0.041	0.53	0.52	0.49
	Left Cheek	0.144	0.417	0.366	0.340	0.252	0.56	0.76	0.74
	Left Tilted	0.174	0.417	0.366	0.340	0.062	0.59	0.60	0.58

<ENDC>

WWAN Band	FR1 Band	Exposure Position	1	2	3	4	5	6	1+2+3	1+2+4+6	1+2+5+6
			WWAN	FR1	WLAN2.4GHz Ant 6+8	WLAN5GHz Ant 5+7	WLAN6GHz Ant 5+7	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)	1g SAR (W/kg)	1g SAR (W/kg)
LTE Band 41 Ant 1	FR1 n77 Ant 2	Right Cheek	0.104	0.662	0.417	0.366	0.340	0.041	1.18	1.17	1.15
		Right Tilted	0.067	0.448	0.417	0.366	0.340	0.041	0.93	0.92	0.90
		Left Cheek	0.096	0.880	0.417	0.366	0.340	0.252	1.39	1.59	1.57
		Left Tilted		0.209	0.417	0.366	0.340	0.062	0.63	0.64	0.61



15.2 Hotspot Exposure Conditions

WWAN Band	Exposure Position	1	2	3	1+2	1+3	Case No.
		WWAN	WLAN2.4GHz Ant 6+8	Bluetooth Ant 6	Summed	Summed	
		1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	
All Bands Ant0	Front	0.762	0.396	0.073	1.16	0.84	
	Back	0.992	0.576	0.098	1.57	1.09	
	Left side	0.647			0.65	0.65	
	Right side	0.168	0.494	0.041	0.66	0.21	
	Top side		0.374	0.092	0.37	0.09	
	Bottom side	0.720			0.72	0.72	
All Bands Ant1	Front	0.783	0.396	0.073	1.18	0.86	
	Back	0.478	0.576	0.098	1.05	0.58	
	Left side	0.159			0.16	0.16	
	Right side	0.381	0.494	0.041	0.88	0.42	
	Top side		0.374	0.092	0.37	0.09	
	Bottom side	0.930			0.93	0.93	
All Bands Ant2	Front	0.235	0.396	0.073	0.63	0.31	
	Back	0.307	0.576	0.098	0.88	0.41	
	Left side	0.684			0.68	0.68	
	Right side		0.494	0.041	0.49	0.04	
	Top side	0.028	0.374	0.092	0.40	0.12	
	Bottom side				0.00	0.00	
All Bands Ant4	Front	0.507	0.396	0.073	0.90	0.58	
	Back	0.733	0.576	0.098	1.31	0.83	
	Left side	0.426			0.43	0.43	
	Right side	0.110	0.494	0.041	0.60	0.15	
	Top side	0.892	0.374	0.092	1.27	0.98	
	Bottom side				0.00	0.00	
All Bands Ant5	Front	0.272	0.396	0.073	0.67	0.35	
	Back	0.333	0.576	0.098	0.91	0.43	
	Left side	0.038			0.04	0.04	
	Right side	0.104	0.494	0.041	0.60	0.15	
	Top side	0.667	0.374	0.092	1.04	0.76	
	Bottom side				0.00	0.00	
All Bands Ant7	Front	0.179	0.396	0.073	0.58	0.25	
	Back	0.249	0.576	0.098	0.83	0.35	
	Left side	0.025			0.03	0.03	
	Right side	0.199	0.494	0.041	0.69	0.24	
	Top side	0.225	0.374	0.092	0.60	0.32	
	Bottom side	0.014			0.01	0.01	
FR1 n77 Ant10	Front	0.653	0.396	0.073	1.05	0.73	
	Back	1.074	0.576	0.098	1.65	1.17	9
	Left side	0.034			0.03	0.03	
	Right side	1.427	0.494	0.041	1.92	1.47	10
	Top side	0.058	0.374	0.092	0.43	0.15	
	Bottom side	0.485			0.49	0.49	

<ENDC>

WWAN Band	WWAN Band	Exposure Position	1	2	3	4	1+2+3	1+2+4
			WWAN	FR1	WLAN2.4GHz Ant 6+8	Bluetooth Ant 6	Summed	Summed
			1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)
LTE Band 41 Ant 1	FR1 n77 Ant 2	Front	0.783	0.253	0.396	0.073	1.43	1.11
		Back	0.478	0.260	0.576	0.098	1.31	0.84
		Left side	0.159	0.676			0.84	0.84
		Right side	0.143		0.494	0.041	0.64	0.18
		Top side		0.029	0.374	0.092	0.40	0.12
		Bottom side	0.927				0.93	0.93



15.3 Body-Worn Accessory Exposure Conditions

WWAN Band	Exposure Position	1	2	3	4	5	1+2	1+3+5	1+4+5	Case No.
		WWAN	WLAN2.4GHz Ant 6+8	WLAN5GHz Ant 5+7	WLAN6GHz Ant 5+7	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)	1g SAR (W/kg)	
All Bands Ant0	Front	0.762	0.261	0.235	0.398	0.073	1.02	1.07	1.23	
	Back	0.992	0.280	0.387	0.398	0.098	1.27	1.48	1.49	
All Bands Ant2	Front	0.706	0.261	0.235	0.398	0.073	0.97	1.01	1.18	
	Back	0.898	0.280	0.387	0.398	0.098	1.18	1.38	1.39	
All Bands Ant4	Front	0.707	0.261	0.235	0.398	0.073	0.97	1.02	1.18	
	Back	1.010	0.280	0.387	0.398	0.098	1.29	1.50	1.51	
All Bands Ant5	Front	0.738	0.261	0.235	0.398	0.073	1.00	1.05	1.21	
	Back	0.901	0.280	0.387	0.398	0.098	1.18	1.39	1.40	
All Bands Ant7	Front	0.858	0.261	0.235	0.398	0.073	1.12	1.17	1.33	
	Back	0.453	0.280	0.387	0.398	0.098	0.73	0.94	0.95	
FR1 n78 Ant10	Front	0.685	0.261	0.235	0.398	0.073	0.95	0.99	1.16	
	Back	1.118	0.280	0.387	0.398	0.098	1.40	1.60	1.61	6,7
GSM1900 Ant1	Front	0.610	0.261	0.235	0.398	0.073	0.87	0.92	1.08	
	Back	0.554	0.280	0.387	0.398	0.098	0.83	1.04	1.05	
LTE Band 2 Ant1	Front	1.275	0.261	0.235	0.136	0.073	1.54	1.58	1.48	
	Back	0.599	0.280	0.387	0.398	0.098	0.88	1.08	1.10	
LTE Band 4 Ant1	Front	1.246	0.261	0.235	0.136	0.073	1.51	1.55	1.46	
	Back	0.801	0.280	0.387	0.398	0.098	1.08	1.29	1.30	
LTE Band 7 Ant1	Front	1.156	0.261	0.235	0.136	0.073	1.42	1.46	1.37	
	Back	0.765	0.280	0.387	0.398	0.098	1.05	1.25	1.26	
LTE Band 41 Ant1	Front	0.826	0.261	0.235	0.398	0.073	1.09	1.13	1.30	
	Back	0.478	0.280	0.387	0.398	0.098	0.76	0.96	0.97	

<ENDC>

WWAN Band	FR1 Band	Exposure Position	1	2	3	4	5	6	1+2+3	1+2+4+6	1+2+5+6	SPLSR
			WWAN	FR1	WLAN2.4GHz Ant 6+8	WLAN5GHz Ant 5+7	WLAN6GHz Ant 5+7	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)	1g SAR (W/kg)	1g SAR (W/kg)	
LTE Band 41 Ant 1	FR1 n77 Ant 2	Front	0.826	0.617	0.261	0.235	0.136	0.073	1.70	1.75	1.65	1,2,3
		Back	0.478	0.813	0.280	0.387	0.398	0.098	1.57	1.78	1.79	4,5



15.4 Product Specific Exposure Conditions

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

WWAN Band	Exposure Position	1	2	3	4	5	1+2+5	1+3+5	1+4+5
		WWAN	WLAN2.4GHz Ant 6+8	WLAN5GHz Ant 5+7	WLAN6GHz Ant 5+7	NFC	Summed	Summed	Summed
		10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)
All Bands Ant0	Front			0.379	0.401	0.001	0.00	0.38	0.40
	Back		1.662	0.379	0.401	0.025	1.69	0.40	0.43
	Left side			0.379	0.401	0.001	0.00	0.38	0.40
	Right side			0.379	0.401	0.001	0.00	0.38	0.40
	Top side			0.379	0.401	0.001	0.00	0.38	0.40
	Bottom side			0.379	0.401	0.001	0.00	0.38	0.40
All Bands Ant1	Front	2.128		0.379	0.401	0.001	2.13	2.51	2.53
	Back		1.662	0.379	0.401	0.025	1.69	0.40	0.43
	Left side			0.379	0.401	0.001	0.00	0.38	0.40
	Right side			0.379	0.401	0.001	0.00	0.38	0.40
	Top side			0.379	0.401	0.001	0.00	0.38	0.40
	Bottom side	1.810		0.379	0.401	0.001	1.81	2.19	2.21
All Bands Ant2	Front			0.379	0.401	0.001	0.00	0.38	0.40
	Back		1.662	0.379	0.401	0.025	1.69	0.40	0.43
	Left side	2.875		0.379	0.401	0.001	2.88	3.26	3.28
	Right side			0.379	0.401	0.001	0.00	0.38	0.40
	Top side			0.379	0.401	0.001	0.00	0.38	0.40
	Bottom side			0.379	0.401	0.001	0.00	0.38	0.40
All Bands Ant4	Front			0.379	0.401	0.001	0.00	0.38	0.40
	Back	1.076	1.662	0.379	0.401	0.025	2.76	1.48	1.50
	Left side			0.379	0.401	0.001	0.00	0.38	0.40
	Right side			0.379	0.401	0.001	0.00	0.38	0.40
	Top side	1.944		0.379	0.401	0.001	1.95	2.32	2.35
	Bottom side			0.379	0.401	0.001	0.00	0.38	0.40
All Bands Ant5	Front			0.379	0.401	0.001	0.00	0.38	0.40
	Back		1.662	0.379	0.401	0.025	1.69	0.40	0.43
	Left side			0.379	0.401	0.001	0.00	0.38	0.40
	Right side			0.379	0.401	0.001	0.00	0.38	0.40
	Top side	1.616		0.379	0.401	0.001	1.62	2.00	2.02
	Bottom side			0.379	0.401	0.001	0.00	0.38	0.40
All Bands Ant7	Front			0.379	0.401	0.001	0.00	0.38	0.40
	Back		1.662	0.379	0.401	0.025	1.69	0.40	0.43
	Left side			0.379	0.401	0.001	0.00	0.38	0.40
	Right side			0.379	0.401	0.001	0.00	0.38	0.40
	Top side			0.379	0.401	0.001	0.00	0.38	0.40
	Bottom side			0.379	0.401	0.001	0.00	0.38	0.40
All Bands Ant10	Front			0.379	0.401	0.001	0.00	0.38	0.40
	Back	1.597	1.662	0.379	0.401	0.025	3.28	2.00	2.02
	Left side			0.379	0.401	0.001	0.00	0.38	0.40
	Right side	1.451		0.379	0.401	0.001	1.45	1.83	1.85
	Top side			0.379	0.401	0.001	0.00	0.38	0.40
	Bottom side			0.379	0.401	0.001	0.00	0.38	0.40

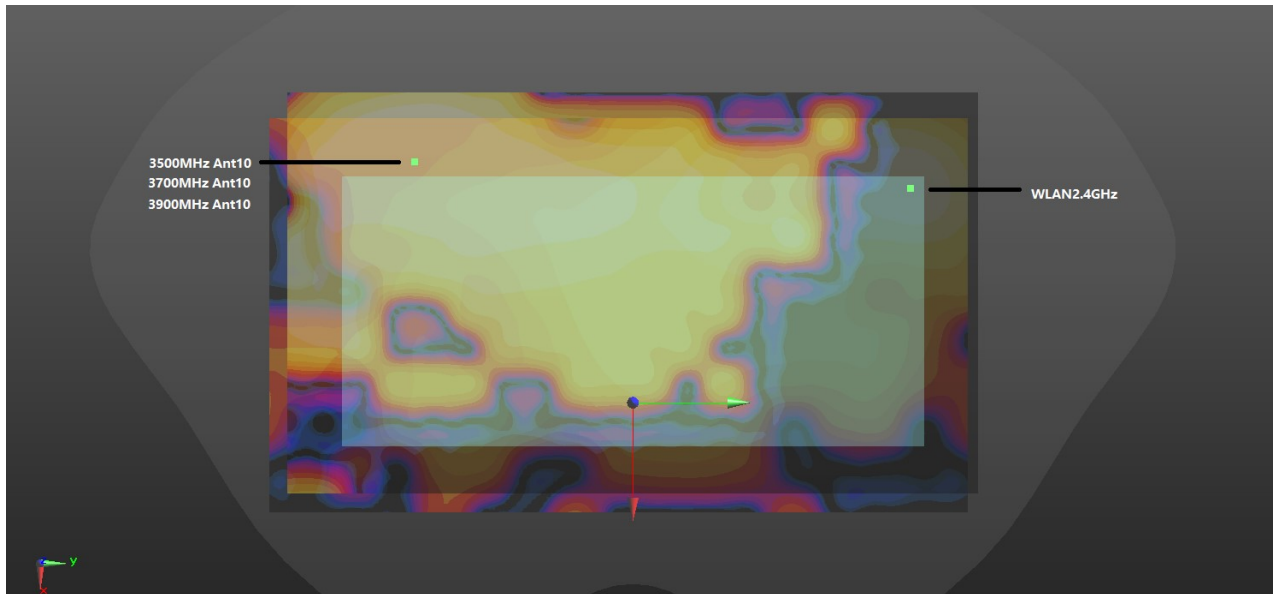
<ENDC>

WWAN Band	FR1 Band	Exposure Position	1	2	3	4	5	6	1+2+3+6	1+2+4+6	1+2+5+6
			WWAN	FR1	WLAN2.4GHz Ant 6+8	WLAN5GHz Ant 5+7	WLAN6GHz Ant 5+7	NFC	Summed	Summed	Summed
			10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)
LTE Band 41 Ant 1	FR1 n77 Ant 2	Front				0.379	0.401	0.001	0.00	0.38	0.40
		Back			1.662	0.379	0.401	0.025	1.69	0.40	0.43
		Left side		2.764		0.379	0.401	0.001	2.77	3.14	3.17
		Right side				0.379	0.401	0.001	0.00	0.38	0.40
		Top side				0.379	0.401	0.001	0.00	0.38	0.40
		Bottom side				0.379	0.401	0.001	0.00	0.38	0.40

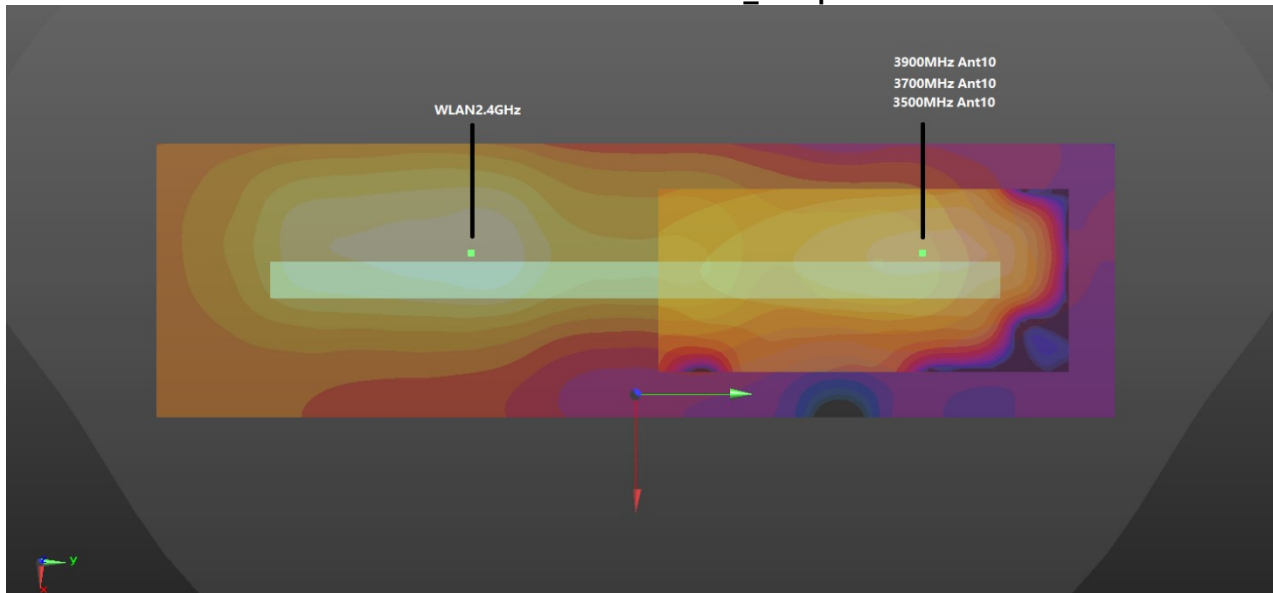
15.5 SPLSR Evaluation and Analysis

General Note:

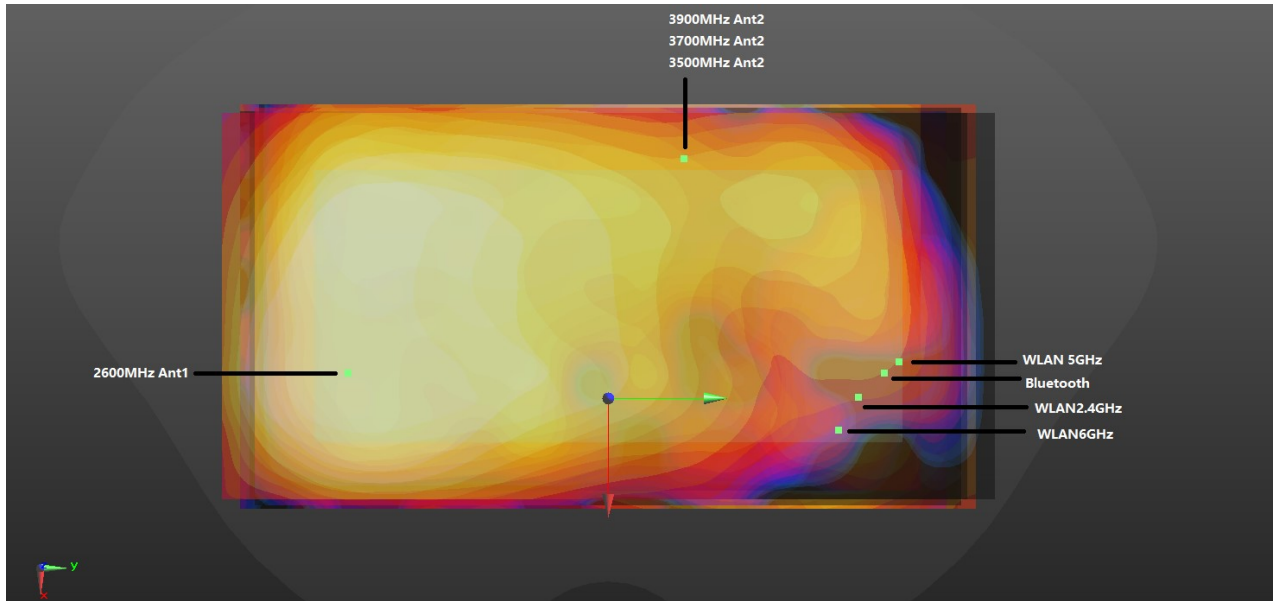
1. When standalone SAR is measured for both antennas in the pair, the peak location separation distance is computed by the square root of $[(x1-x2)^2 + (y1-y2)^2 + (z1-z2)^2]$, where $(x1, y1, z1)$ and $(x2, y2, z2)$ are the coordinates in the area scans or extrapolated peak SAR locations in the zoom scans, as appropriate.
2. $SPLSR = (SAR1 + SAR2)1.5 / (\text{min. separation distance, mm})$. If $SPLSR \leq 0.04$ for 1g SAR, simultaneously transmission SAR measurement is not necessary.
3. The detail hotspot point for each transmitter in each exposure condition are showing as below figure and the minimum 3D distance for each sum combination is used for SPLSR analysis.



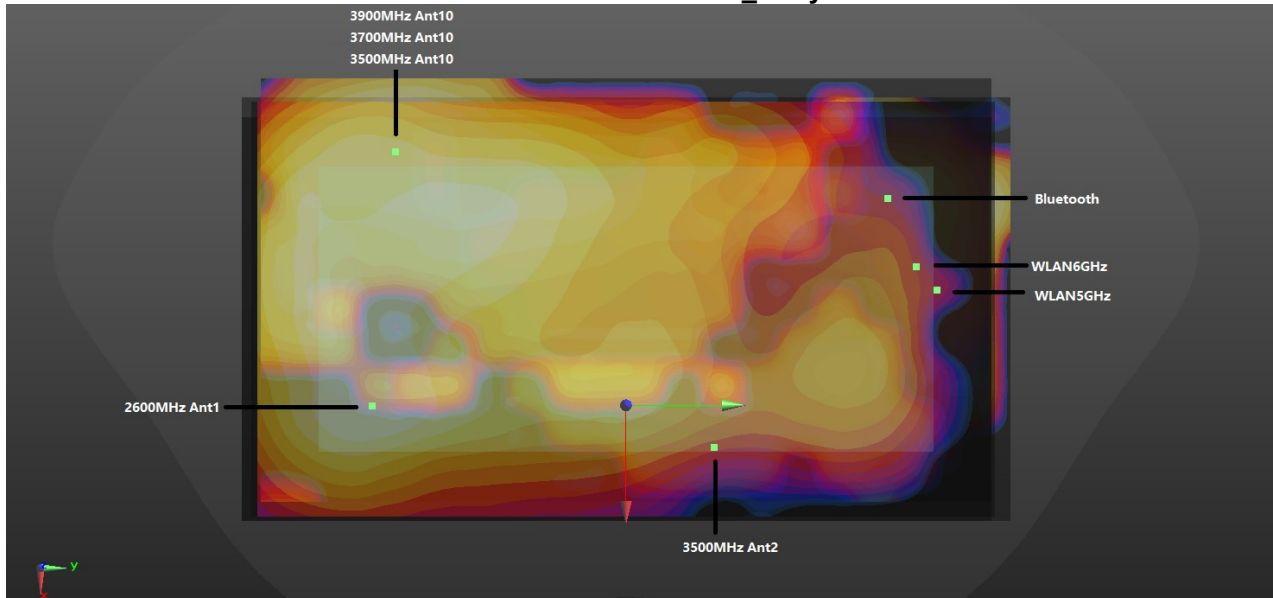
WWAN+WLAN Back 5mm_Hotspot



WWAN+WLAN Right Side 5mm_Hotspot



WWAN+WLAN Front 5mm -1_Body-worn



WWAN+WLAN Back 5mm_Body-worn



For Hotspot

Case	Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (mm)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
					X	Y	Z				
Case 9	FR1 n77	Back	1.074	5mm	-41	-60.8	-3.28	137.3	1.65	0.02	Not required
	WLAN2.4GHz		0.576	5mm	-34.8	76.4	-1.84				
Case 10	FR1 n77	Right side	1.427	5mm	-6	65.4	-3.12	107.8	1.92	0.02	Not required
	WLAN2.4GHz		0.494	5mm	-6	-42.4	-3.41				

For Body-worn

Case	Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (mm)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
					X	Y	Z				
Case 1	LTE Band 41_HPUE	Front	0.826	5mm	15	-75.8	-3.31	113.9	1.70	0.02	Not required
	FR1 n77		0.617	5mm	-43.2	22.1	-3.48				
	WLAN2.4GHz		0.261	5mm	22.8	72	-2.92				
Case 2	LTE Band 41_HPUE	Front	0.826	5mm	15	-75.8	-3.31	113.9	1.75	0.02	Not required
	FR1 n77		0.617	5mm	-43.2	22.1	-3.48				
	WLAN5GHz		0.235	5mm	14.2	81.4	-1.56				
	Bluetooth		0.073	5mm	22.8	73.4	-2.57				
Case 3	LTE Band 41_HPUE	Front	0.826	5mm	15	-75.8	-3.31	113.9	1.65	0.02	Not required
	FR1 n77		0.617	5mm	-43.2	22.1	-3.48				
	WLAN6GHz		0.136	5mm	37.2	61.9	-2.76				
	Bluetooth		0.073	5mm	22.8	73.4	-2.57				
Case 4	LTE Band 41	Back	0.478	5mm	23.2	-66	-3.34	90.5	1.78	0.03	Not required
	FR1 n77		0.813	5mm	34.4	23.8	-3.09				
	WLAN5GHz		0.387	5mm	-1.8	82.6	1.67				
	Bluetooth		0.098	5mm	-28.8	71.1	-3.23				
Case 5	LTE Band 41	Back	0.478	5mm	23.2	-66	-3.34	90.5	1.79	0.03	Not required
	FR1 n77		0.813	5mm	34.4	23.8	-3.09				
	WLAN6GHz		0.398	5mm	-1.4	75.5	-3.01				
	Bluetooth		0.098	5mm	-28.8	71.1	-3.23				
Case 6	FR1 n77	Back	1.118	5mm	-41	-60.8	-3.28	132.5	1.60	0.02	Not required
	WLAN5GHz		0.387	5mm	-1.8	82.6	1.67				
	Bluetooth		0.098	5mm	-28.8	71.1	-3.23				
Case 7	FR1 n77	Back	1.118	5mm	-41	-60.8	-3.28	132.5	1.61	0.02	Not required
	WLAN6GHz		0.398	5mm	-1.8	82.6	1.67				
	Bluetooth		0.098	5mm	-28.8	71.1	-3.23				

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



16. Uncertainty Assessment

Per KDB 865664 D01 SAR measurement 100MHz to 6GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg and the measured 10-g SAR within a frequency band is < 3.75 W/kg. The expanded SAR measurement uncertainty must be $\leq 30\%$, 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.

17. 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.

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