

# FCC SAR Test Report

**APPLICANT** : vivo Mobile Communication Co., Ltd.  
**EQUIPMENT** : Mobile Phone  
**BRAND NAME** : vivo  
**MODEL NAME** : V2145  
**FCC ID** : 2AUCY-V2145  
**STANDARD** : FCC 47 CFR PART 2 (2.1093)

We, Sporton International Inc. (Shenzhen), 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. (Shenzhen), the test report shall not be reproduced except in full.



Approved by: Si Zhang

**Sporton International Inc. (Shenzhen)**

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People's Republic of China**



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### 1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **vivo Mobile Communication Co., Ltd. , Mobile Phone, V2145**, are as follows.

Highest 1g SAR Summary						
Equipment Class	Frequency Band		Head (Separation 0mm)	Hotspot (Separation 10mm)	Body-worn (Separation 15mm)	Highest Simultaneous Transmission 1g SAR (W/kg)
			1g SAR (W/kg)			
Licensed	GSM	GSM850	0.53	0.33	0.29	1.38
		GSM1900	0.65	0.55	0.32	
	CDMA	CDMA BC0	0.75	0.50	0.31	
	WCDMA	WCDMA V	0.51	0.61	0.33	
		WCDMA IV	0.74	0.56	0.49	
		WCDMA II	0.79	0.57	0.35	
	LTE	LTE Band 12	0.66	0.49	0.24	
		LTE Band 13	0.64	0.65	0.49	
		LTE Band 17	0.68	0.52	0.22	
		LTE Band 5	0.52	0.56	0.31	
		LTE Band 18	0.71	0.57	0.27	
		LTE Band 19	0.74	0.59	0.33	
		LTE Band 26	0.38	0.53	0.33	
		LTE Band 4	0.73	0.53	0.36	
		LTE Band 66	0.76	0.53	0.34	
		LTE Band 2	0.83	0.48	0.29	
		LTE Band 7	0.82	0.40	0.29	
		LTE Band 38	0.61	<b>0.69</b>	0.29	
		LTE Band 41	0.59	<b>0.69</b>	0.28	
		LTE Band 42	0.52	0.51	<b>0.51</b>	
		FR1	FR1 n5	0.46	0.42	
	FR1 n66		0.77	0.41	0.30	
	FR1 n2		0.59	0.28	0.25	
FR1 n7	0.78		0.45	0.31		
FR1 n38	0.83		0.59	0.28		
FR1 n41	<b>0.91</b>		0.46	0.25		
FR1 n77	0.50		0.32	<0.10		
FR1 n78	0.51		0.35	<0.10		
DTS	WLAN	2.4GHz WLAN	0.27	0.27	0.11	1.33
NII		5GHz WLAN	0.47	0.31	0.43	1.38
DSS	Bluetooth	2.4GHz Bluetooth	0.39	<0.10	<0.10	1.38



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	0.84	3.75
	WCDMA	Band IV	0.88	
		Band II	0.80	
	LTE	LTE Band 4	1.00	
		LTE Band 66	0.95	
		LTE Band 2	0.87	
		LTE Band 7	1.46	
		LTE Band 42	1.90	
	FR1	FR1 n66	0.94	
		FR1 n2	0.56	
		FR1 n7	1.15	
		FR1 n38	1.38	
		FR1 n77	0.94	
		FR1 n78	0.84	
NII	WLAN	5GHz WLAN	<b>2.83</b>	3.75
Date of Testing:			2022/3/23~2022/4/21	

**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. (Shenzhen) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

Testing Laboratory			
Test Firm	Sporton International Inc. (Shenzhen)		
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055 People's Republic of China TEL: +86-755-86379589 FAX: +86-755-86379595		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	SAR02-SZ	CN1256	421272

Applicant	
Company Name	vivo Mobile Communication Co., Ltd.
Address	No.1, vivo Road, Chang'an, Dongguan, Guangdong, China

Manufacturer	
Company Name	vivo Mobile Communication Co., Ltd.
Address	No.1, vivo Road, Chang'an, Dongguan, Guangdong, China

## 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
- FCC KDB 616217 D04 SAR for laptop and tablets v01r02



### 4. Equipment Under Test (EUT) Information

#### 4.1 General Information

Product Feature & Specification	
Equipment Name	Mobile Phone
Brand Name	vivo
Model Name	V2145
FCC ID	2AUCY-V2145
IMEI Code	SIM1: 868488069971727 SIM2: 868488069971735
Wireless Technology and Frequency Range	GSM850: 824 MHz ~ 849 MHz GSM1900: 1850 MHz ~ 1910 MHz WCDMA Band II: 1850 MHz ~ 1910 MHz WCDMA Band IV: 1710 MHz ~ 1755 MHz WCDMA Band V: 824 MHz ~ 849 MHz CDMA2000 BC0: 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 13: 777 MHz ~ 787 MHz LTE Band 17: 704 MHz ~ 716 MHz LTE Band 18: 815 MHz ~ 830 MHz LTE Band 19: 830 MHz ~ 845 MHz LTE Band 26: 814 MHz ~ 849 MHz LTE Band 38: 2570 MHz ~ 2620 MHz LTE Band 41: 2496 MHz ~ 2690 MHz LTE Band 42: 3450 MHz ~ 3550 MHz LTE Band 66: 1710 MHz ~ 1780 MHz 5G NR n2 : 1850 MHz ~ 1910 MHz 5G NR n5 : 824 MHz ~ 849 MHz 5G NR n7 : 2500 MHz ~ 2570 MHz 5G NR n38 : 2570 MHz ~ 2620 MHz 5G NR n41 : 2496 MHz ~ 2690 MHz 5G NR n66 : 1710 MHz ~ 1780 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 ~ 5720MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz WPC: 125KHz ~ 146 KHz NFC : 13.56 MHz
Mode	GSM/GPRS/EGPRS RMC/AMR 12.2Kbps HSDPA HSUPA DC-HSDPA HSPA+(16QAM uplink is not supported) CDMA2000 : 1xRTT LTE: QPSK/ 16QAM / 64QAM / 256QAM(Downlink Only) 5G NR: DFT-s-OFDM (PI/2 BPSK/ QPSK / 16QAM / 64QAM / 256QAM) CP-OFDM (QPSK / 16QAM / 64QAM / 256QAM) WLAN 2.4GHz 802.11b/g/n/ax HT20/HE20 WLAN 5GHz 802.11a/n/ac HT20/HT40/VHT20/VHT40/VHT80/VHT160 WLAN 5GHz 802.11ax HE20/HE40/HE80/HE160 Bluetooth BR/EDR/LE WPC: ASK NFC: ASK



<b>HW Version</b>	MP_0.1
<b>SW Version</b>	PD2185BF_EX_A_12.0.9.2.W30.V000L1
<b>GSM / (E)GPRS Transfer mode</b>	Class B – EUT cannot support Packet Switched and Circuit Switched Network simultaneously but can automatically switch between Packet and Circuit Switched Network.
<b>EUT Stage</b>	Production Unit

**Remark:**

- 802.11n-HT40 is not supported in 2.4GHz WLAN.
- This device supports VoIP in GPRS, EGPRS, WCDMA and LTE (e.g. for 3rd-party VoIP), LTE supports VoLTE operation.
- This device does not support DTM operation and support GRPS/EGRPS mode up to multi-slot class 33.
- This device WLAN 2.4GHz supports hotspot operation and Bluetooth support tethering applications.
- This device 2.4GHz WLAN/5.2GHz WLAN/5.8GHz WLAN support hotspot operation, and 5.2GHz WLAN/5.8GHz WLAN supports WiFi Direct (GC/GO), and 5.3GHz / 5.5GHz supports WiFi Direct (GC only).
- This device has NFC operations, the NFC antenna is integrated into the device for this model, therefore, all SAR test were performed with the device which already incorporates the NFC antenna. A diagram showing the location of the antenna can be found in the operational description. According to FCC KDB publication 447498 D01v06, transmitters are consider to be operating simultaneously when there is overlapping transmission, with the exception of transmission during network hand-offs with maximum hand-off duration less than 30 seconds.
- For dual SIM card mobile has two SIM slots and supports dual SIM dual standby. The WWAN radio transmission will be enabled by either one SIM at a time (single active). After pre-scan two SIM cards power, we found test result of the SIM1 was the worse, so we chose SIM1 slot to perform all tests.
- The device implements Proximity sensors/receiver/hotspot detect mechanism trigger reduced power for the power management for SAR compliance at different exposure conditions (head, hotspot, body, and extremity). The device will invoke corresponding work scenarios power level base on frequency bands/antennas, which can refer to appendix E. Power table (full power: Default power; DSI 4: P-sensor off power/receiver off; DSI 2/3: receiver on head power; DSI 8: hotspot on hotspot power; DSI 5: P-sensor on extremity for Ant 12/13).
- For WWAN transmitter, while the device WWAN is transmitting simultaneously with the WLAN/Bluetooth antenna, when earpiece receiver worked, reduced power will be active. While the device WWAN is transmitting simultaneously with the WLAN/Bluetooth antenna, when earpiece receiver is not worked, reduced power will be active.
- For 5G NR test, using FTM (Factory Test Mode) to perform SAR with default 100% transmission.
- 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.
- 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.
- For 5G NR EN-DC modes, standalone SAR performed for 5G NR band with the maximum power, EN-DC SAR summed 5G NR standalone SAR and LTE standalone SAR, the result of EN-DC SAR is more conservatively.
- RF exposure report for WPC (Wireless power charging) will be separately submitted.
- This device supports 5G NR FR1 bands as following table, including NSA mode and SA mode.

**<5G NR>**

Mode	Band	Duplex	SCS(KHz)	Bandwidths(BW)
SA	n2	FDD	15	5, 10, 15, 20
	n5	FDD	15	5, 10, 15, 20
	n7	FDD	15	5, 10, 15, 20
	n66	FDD	15	5, 10, 15, 20, 30
	n38	TDD	30	20, 30, 40
	n41	TDD	30	20, 30, 40, 50, 60, 70, 80, 90, 100
	n77	TDD	30	20, 30, 40, 60, 80, 100
NSA	n78	TDD	30	20, 30, 40, 50, 60, 70, 80, 90, 100
	n5	FDD	15	5, 10, 15, 20
	n7	FDD	15	5, 10, 15, 20
	n66	FDD	15	5, 10, 15, 20, 30





**4.2 General LTE SAR Test and Reporting Considerations**

Summarized necessary items addressed in KDB 941225 D05 v02r05																																																															
FCC ID	2AUCY-V2145																																																														
Equipment Name	Mobile 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 13: 777 MHz ~ 787 MHz LTE Band 17: 704 MHz ~ 716 MHz LTE Band 18: 815 MHz ~ 830 MHz LTE Band 19: 830 MHz ~ 845 MHz LTE Band 26: 814 MHz ~ 849 MHz LTE Band 38: 2570 MHz ~ 2620 MHz LTE Band 41: 2496 MHz ~ 2690 MHz LTE Band 42: 3450 MHz ~ 3550 MHz LTE Band 66: 1710 MHz ~ 1780 MHz																																																														
Channel Bandwidth	LTE Band 2: 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 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 13: 5MHz, 10MHz LTE Band 17: 5MHz, 10MHz LTE Band 18: 5MHz, 10MHz, 15MHz LTE Band 19: 5MHz, 10MHz, 15MHz LTE Band 26: 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz LTE Band 38: 5MHz, 10MHz, 15MHz, 20MHz LTE Band 41: 5MHz, 10MHz, 15MHz, 20MHz LTE Band 42: 5MHz, 10MHz, 15MHz, 20MHz LTE Band 66: 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz																																																														
Uplink Modulations used	QPSK / 16QAM / 64QAM / 256 QAM (Downlink only)																																																														
LTE Voice / Data requirements	Voice and Data																																																														
LTE Release Version	R15, category 13																																																														
CA Support	Yes, Uplink and Downlink																																																														
LTE MPR permanently built-in by design	<p><b>Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3</b></p> <table border="1"> <thead> <tr> <th rowspan="2">Modulation</th> <th colspan="6">Channel bandwidth / Transmission bandwidth (N<sub>RB</sub>)</th> <th rowspan="2">MPR (dB)</th> </tr> <tr> <th>1.4 MHz</th> <th>3.0 MHz</th> <th>5 MHz</th> <th>10 MHz</th> <th>15 MHz</th> <th>20 MHz</th> </tr> </thead> <tbody> <tr> <td>QPSK</td> <td>&gt; 5</td> <td>&gt; 4</td> <td>&gt; 8</td> <td>&gt; 12</td> <td>&gt; 16</td> <td>&gt; 18</td> <td>≤ 1</td> </tr> <tr> <td>16 QAM</td> <td>≤ 5</td> <td>≤ 4</td> <td>≤ 8</td> <td>≤ 12</td> <td>≤ 16</td> <td>≤ 18</td> <td>≤ 1</td> </tr> <tr> <td>16 QAM</td> <td>&gt; 5</td> <td>&gt; 4</td> <td>&gt; 8</td> <td>&gt; 12</td> <td>&gt; 16</td> <td>&gt; 18</td> <td>≤ 2</td> </tr> <tr> <td>64 QAM</td> <td>≤ 5</td> <td>≤ 4</td> <td>≤ 8</td> <td>≤ 12</td> <td>≤ 16</td> <td>≤ 18</td> <td>≤ 2</td> </tr> <tr> <td>64 QAM</td> <td>&gt; 5</td> <td>&gt; 4</td> <td>&gt; 8</td> <td>&gt; 12</td> <td>&gt; 16</td> <td>&gt; 18</td> <td>≤ 3</td> </tr> <tr> <td>256 QAM</td> <td colspan="6" style="text-align: center;">≥ 1</td> <td>≤ 5</td> </tr> </tbody> </table>	Modulation	Channel bandwidth / Transmission bandwidth (N <sub>RB</sub> )						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
Modulation	Channel bandwidth / Transmission bandwidth (N <sub>RB</sub> )						MPR (dB)																																																								
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256 QAM	≥ 1						≤ 5																																																								
LTE A-MPR	In the base station simulator configuration, Network Setting value is set to NS_01 to disable A-MPR during SAR testing and the LTE SAR tests was transmitting on all TTI frames (Maximum TTI)																																																														
Spectrum plots for RB configuration	A properly configured base station simulator was used for the SAR and power measurement; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.																																																														
Power reduction applied to satisfy SAR compliance	Yes, when operating in Proximity sensors/receiver/hotspot detect mechanism trigger reduction power applied to satisfy SAR compliance the detail please referred to section 13.																																																														
LTE Carrier Aggregation Combinations	Intra-Band and Inter-Band possible combinations and the detail power verification please referred to section 13.																																																														
LTE Carrier Aggregation Additional Information	(1) This device supports LTE Carrier Aggregation (CA) in the uplink for LTE 7C /38C/41C with two component carriers in the uplink. SAR Measurements and conducted powers were evaluated per FCC Guidance. (2) This device supports maximum of 5 carriers in the downlink and 2 carriers in the uplink. 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 13												
	Bandwidth 5 MHz				Bandwidth 10 MHz				Bandwidth 15 MHz			
	Channel #		Freq.(MHz)		Channel #		Freq.(MHz)		Channel #		Freq.(MHz)	
L	23205		779.5		23230		782		23230		782	
M	23230		782									
H	23255		784.5									
LTE Band 17												
	Bandwidth 5 MHz				Bandwidth 10 MHz				Bandwidth 15 MHz			
	Channel #		Freq.(MHz)		Channel #		Freq.(MHz)		Channel #		Freq.(MHz)	
L	23755		706.5		23780		709		23780		709	
M	23790		710		23790		710		23790		710	
H	23825		713.5		23800		711		23800		711	
LTE Band 18												
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 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	23875	817.5	23900	820	23925	822.5	23925	822.5	23925	822.5	23925	822.5
M	23925	822.5	23925	822.5	23925	822.5	23925	822.5	23925	822.5	23925	822.5
H	23975	827.5	23950	825	23975	827.5	23975	827.5	23975	827.5	23975	827.5



LTE Band 19												
	Bandwidth 5 MHz			Bandwidth 10 MHz			Bandwidth 15 MHz					
	Ch. #	Freq. (MHz)		Ch. #	Freq. (MHz)		Ch. #	Freq. (MHz)				
L	24025	832.5		24050	835							
M	24075	837.5		24075	837.5		24075	837.5				
H	24125	842.5		24100	840							
LTE Band 26												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz			
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	26697	814.7	26705	815.5	26715	816.5	26740	819	26765	821.5		
M	26865	831.5	26865	831.5	26865	831.5	26865	831.5	26865	831.5	26865	831.5
H	27033	848.3	27025	847.5	27015	846.5	26990	844	26965	841.5		
LTE Band 38												
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)		
L	37775	2572.5	37800	2575	37825	2577.5	37850	2580				
M	38000	2595	38000	2595	38000	2595	38000	2595				
H	38225	2617.5	38200	2615	38175	2612.5	38150	2610				
LTE Band 41												
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)		
L	39675	2498.5	39700	2501	39725	2503.5	39750	2506				
LM	40148	2545.8	40160	2547	40173	2548.3	40185	2549.5				
M	40620	2593	40620	2593	40620	2593	40620	2593				
HM	41093	2640.3	41080	2639	41068	2637.8	41055	2636.5				
H	41565	2687.5	41540	2685	41515	2682.5	41490	2680				
LTE Band 66												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	131979	1710.7	131987	1711.5	131997	1712.5	132022	1715	132047	1717.5	132072	1720
M	132322	1745	132322	1745	132322	1745	132322	1745	132322	1745	132322	1745
H	132665	1779.3	132657	1778.5	132647	1777.5	132622	1775	132597	1772.5	132572	1770
LTE Band 42												
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)		
L	42115	3452.5	42140	3455	42165	3457.5	42190	3460				
M	42590	3500	42590	3500	42590	3500	42590	3500				
H	43065	3547.5	43040	3545	43015	3542.5	42990	3540				

4.3 General 5G NR SAR Test and Reporting Considerations

5G NR Information	
Operating Frequency Range of each 5G NR transmission band	5G NR n2 : 1850 MHz ~ 1910 MHz 5G NR n5: 824 MHz ~ 849 MHz 5G NR n7 : 2500 MHz ~ 2570 MHz 5G NR n38 : 2570 MHz ~ 2620 MHz 5G NR n41 : 2496 MHz ~ 2690 MHz 5G NR n66: 1710 MHz ~ 1780 MHz 5G NR n77: 3450 MHz ~ 3550 MHz, 3700 MHz ~ 3980 MHz 5G NR n78: 3450 MHz ~ 3550 MHz, 3700 MHz ~ 3800 MHz
Channel Bandwidth	5G NR n2: 5MHz, 10MHz, 15MHz, 20MHz 5G NR n5: 5MHz, 10MHz, 15MHz, 20MHz 5G NR n7: 5MHz, 10MHz, 15MHz, 20MHz 5G NR n38: 20MHz, 30MHz, 40MHz 5G NR n41: 20MHz, 30MHz, 40MHz, 50MHz, 60MHz, 70MHz, 80MHz, 90MHz, 100MHz 5G NR n66: 5MHz, 10MHz, 15MHz, 20MHz, 30MHz 5G NR n77: 20MHz, 30MHz, 40MHz, 60MHz, 80MHz, 100MHz 5G NR n78: 20MHz, 30MHz, 40MHz, 50MHz, 60MHz, 70MHz, 80MHz, 90MHz, 100MHz
SCS	FDD: SCS15KHz, TDD: SCS30KHz
uplink modulations used	DFT-s-OFDM: PI/2 BPSK / QPSK / 16QAM / 64QAM / 256QAM CP-OFDM QPSK / 16QAM / 64QAM / 256QAM
A-MPR (Additional MPR) disabled for SAR Testing?	Yes
LTE Anchor Bands for n5	LTE B7
LTE Anchor Bands for n7	LTE B66
LTE Anchor Bands for n66	LTE B2/5/7
LTE Anchor Bands for n78	LTE B2/4/5/7/38/41/66

Transmission (H, M, L) channel numbers and frequencies in each 5G NR band										
NR Band 2										
	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz			
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)		
L	370500	1852.5	371000	1855	371500	1857.5	372000	1860		
M	376000	1880	376000	1880	376000	1880	376000	1880		
H	381500	1907.5	381000	1905	380500	1902.5	380000	1900		
NR Band 5										
	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz			
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)		
L	165300	826.5	165800	829	166300	831.5	166800	834		
M	167300	836.5	167300	836.5	167300	836.5	167300	836.5		
H	169300	846.5	168800	844	168300	841.5	167800	839		
NR Band 7										
	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz			
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)		
L	500500	2502.5	501000	2505	501500	2507.5	502000	2510		
M	507000	2535	507000	2535	507000	2535	507000	2535		
H	513500	2567.5	513000	2565	512500	2562.5	512000	2560		
NR Band 66										
	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz		Bandwidth 30MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L		1712.5	343000	1715	343500	1717.5	344000	1720	345000	1725
M	349000	1745	349000	1745	349000	1745	349000	1745	349000	1745
H	355500	1777.5	355000	1775	354500	1772.5	354000	1770	353000	1765
NR Band 38										
	Bandwidth 20MHz		Bandwidth 30MHz				Bandwidth 40MHz			
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)		
L	516000	2580	517002	2585.01	518004	2590.02	519006	2595.03		
M	519000	2595	519000	2595	519000	2595	519000	2595		
H	522000	2610	520998	2604.99	519996	2599.98	518994	2594.97		

NR Band 41																		
	Bandwidth 20MHz		Bandwidth 30MHz		Bandwidth 40MHz		Bandwidth 50MHz		Bandwidth 60MHz		Bandwidth 70MHz		Bandwidth 80MHz		Bandwidth 90MHz		Bandwidth 100MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	501204	2506.02	502200	2511	503202	2516.01	504204	2521.02	505200	2526	506202	2531.01	507204	2536.02	508200	2541	509202	2546.01
M	518598	2592.99	518598	2592.99	518598	2592.99	518598	2592.99	518598	2592.99	518598	2592.99	518598	2592.99	518598	2592.99	518598	2592.99
H	535998	2679.99	534996	2674.98	534000	2670	532998	2664.99	531996	2659.98	531000	2655	529998	2649.99	528996	2644.98	528000	2640



NR Band 77												
	Bandwidth 20MHz		Bandwidth30MHz		Bandwidth 40MHz		Bandwidth 60MHz		Bandwidth 80MHz		Bandwidth100MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	647334	3710.01	647668	3715.02	648000	3720	648668	3730.02	649334	3740.01	650000	3750
M	656000	3840	656000	3840	656000	3840	656000	3840	656000	3840	656000	3840
H	664666	3969.99	664332	3964.98	664000	3960	663332	3949.98	662666	3939.99	662000	3930

NR Band 78																		
	Bandwidth 20MHz		Bandwidth 30MHz		Bandwidth 40MHz		Bandwidth 50MHz		Bandwidth 60MHz		Bandwidth 70MHz		Bandwidth 80MHz		Bandwidth 90MHz		Bandwidth100MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	647334	3710.01	647668	3715.02	648000	3720	648334	3725.01	648668	3730.02	649000	3735	649334	3740.01	649668	3745.02		
M	650000	3750	650000	3750	650000	3750	650000	3750	650000	3750	650000	3750	650000	3750	650000	3750	650000	3750
H	652668	3790.02	652334	3785.01	652000	3780	651668	3775.02	651334	3770.01	651000	3765	650668	3760.02	650334	3755.01		

For <3450 MHz ~ 3550 MHz >

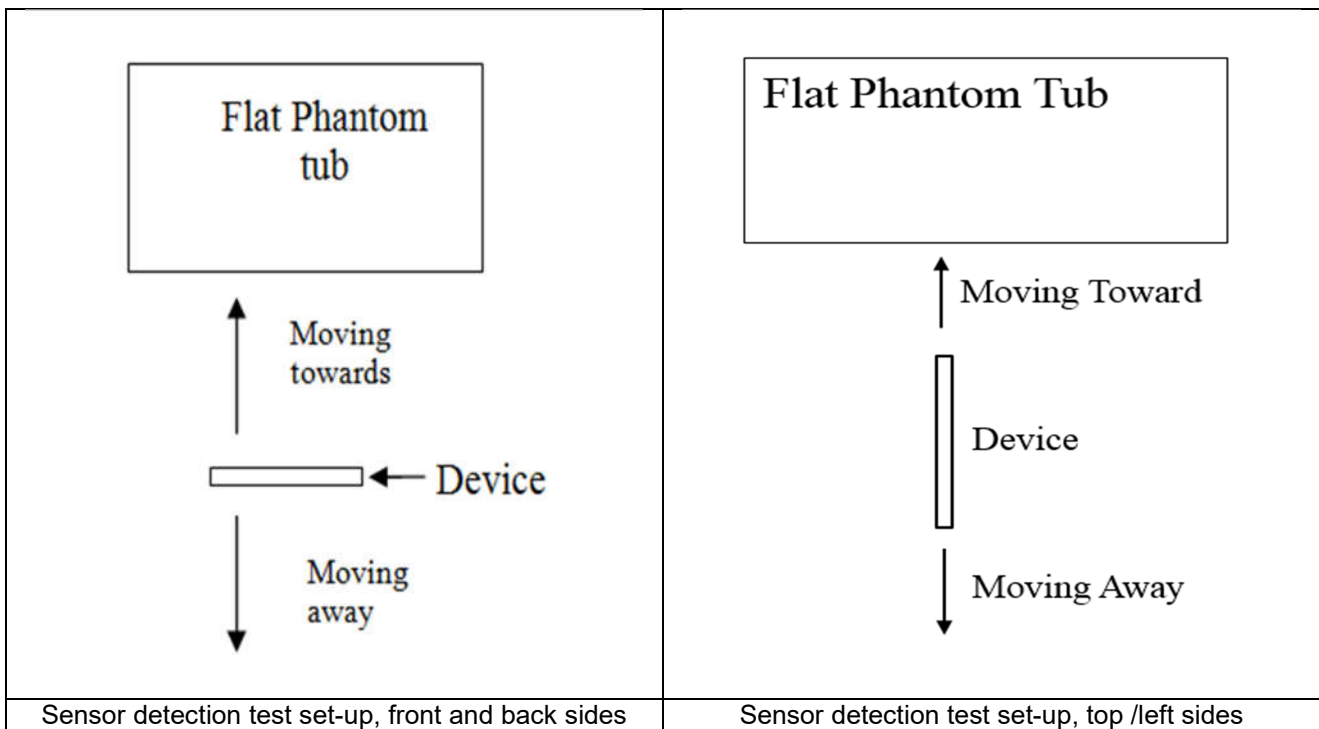
NR Band 77												
	Bandwidth 20MHz		Bandwidth30MHz		Bandwidth 40MHz		Bandwidth 60MHz		Bandwidth 80MHz		Bandwidth100MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	630668	3460.02	631000	3465	631334	3470.01	632000	3480	632668	3490.02		
M	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01
H	636000	3540	635668	3534.99	635332	3529.98	634666	3519.99	634000	3510		

NR Band 78																		
	Bandwidth 20MHz		Bandwidth 30MHz		Bandwidth 40MHz		Bandwidth 50MHz		Bandwidth 60MHz		Bandwidth 70MHz		Bandwidth 80MHz		Bandwidth 90MHz		Bandwidth100MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	630668	3460.02	631000	3465	631334	3470.01	631668	3475.02	632000	3480	632334	3485.01	632668	3490.02	633000	3495		
M	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01	633334	3500.01
H	636000	3540	635666	3534.99	635332	3529.98	635000	3525	634666	3519.99	634332	3514.98	634000	3510	633666	3504.99		

## 5. Proximity Sensor Triggering Test

### 5.1 Proximity sensor triggering distances(Per KDB616217§6.2)

1. Proximity sensor triggering distance testing was performed according to the procedures outlined in KDB 616217 D04 section 6.2, and EUT moving further away from the flat phantom and EUT moving toward the flat phantom were both assessed and the tissue-equivalent medium for highest frequency (3980MHz) and lowest (1750MHz) frequency was used for proximity sensor triggering testing.
2. Capacitive proximity sensors placed coincident with antenna elements at the left and right corners of the top ends of the phone are utilized to determine when the device comes in proximity of the user's body or finger or hand at the front or back or top or left sides of the device. The output power will reduce to body worn power level when top and bottom sensor pad be detected.
3. The device employs proximity sensors that detect the presence of the user's body or handheld states at the front, back, top, left sides of the device. When front, back, top, left sides of body condition or handheld states is detected reduced power will be active. The data shown in the sections below shows the distance(s).
4. For verification of compliance of power reduction scheme, additional SAR testing with EUT transmitting at full RF power at a conservative trigger distance -1mm was performed.



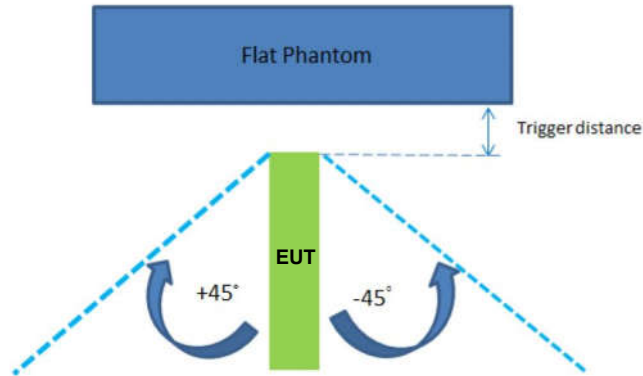
### <P-Sensor>

#### Antenna 12&13:

Proximity Sensor Trigger Distance (mm)								
Position	Front		Back		Left Side		Top Side	
	Moving towards	Moving away	Moving towards	Moving away	Moving towards	Moving away	Moving towards	Moving away
Minimum	8	8	11	11	13	13	12	12

**5.2 proximity sensor triggering (KDB 616217 D04 section 6.4):**

The influence of Phone tilt angles to proximity sensor triggering was determined by positioning each Phone edge that contains a transmitting antenna, perpendicular to the flat phantom, at above separation distance. Rotating the Phone around the edge next to the phantom in  $\leq 10^\circ$  increments until the Phone is  $\pm 45^\circ$  from the vertical position at  $0^\circ$ , and the maximum output power remains in the reduced mode.



**Antenna 12&13:**

The Sensor Trigger Distance (mm)		
Position	Left Side	Top Side
Minimum	13	12

## **6. RF Exposure Limits**

### **6.1 Uncontrolled Environment**

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

### **6.2 Controlled Environment**

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

**Limits for Occupational/Controlled Exposure (W/kg)**

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

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

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

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



## **7. Specific Absorption Rate (SAR)**

### **7.1 Introduction**

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

### **7.2 SAR Definition**

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

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

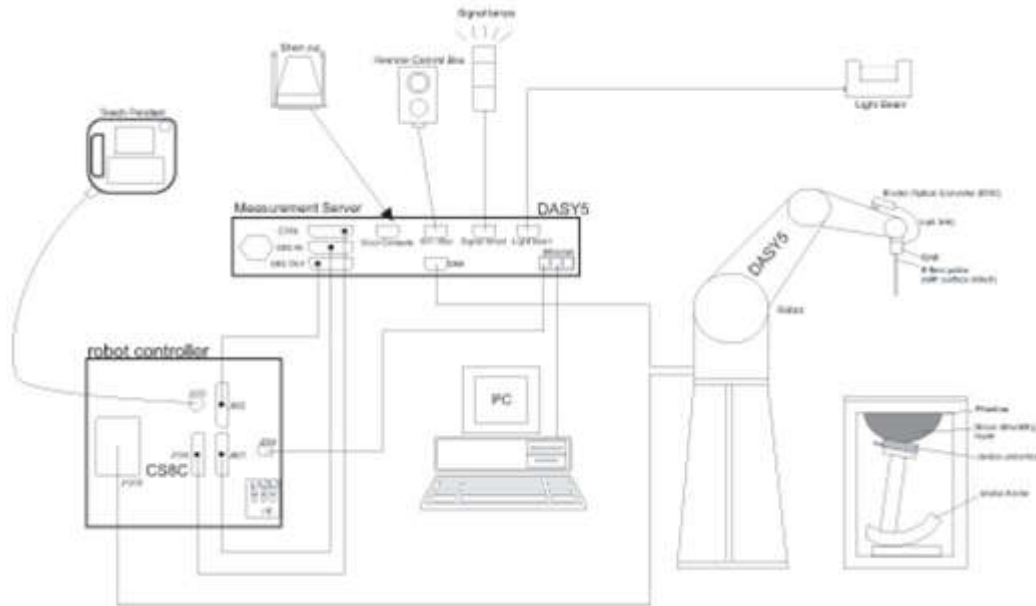
SAR is expressed in units of Watts per kilogram (W/kg)

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

Where:  $\sigma$  is the conductivity of the tissue,  $\rho$  is the mass density of the tissue and E is the RMS electrical field strength.

## 8. System Description and Setup

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




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


**8.1 E-Field Probe**

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

**<ES3DV3 Probe>**

<b>Construction</b>	Symmetric design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
<b>Frequency</b>	10 MHz – 4 GHz; Linearity: ±0.2 dB (30 MHz – 4 GHz)	
<b>Directivity</b>	±0.2 dB in TSL (rotation around probe axis) ±0.3 dB in TSL (rotation normal to probe axis)	
<b>Dynamic Range</b>	5 µW/g – >100 mW/g; Linearity: ±0.2 dB	
<b>Dimensions</b>	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>**

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

**8.2 Data Acquisition Electronics (DAE)**

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


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



**Photo of DAE**


**8.3 Phantom**

**<SAM Twin Phantom>**

<b>Shell Thickness</b>	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm	
<b>Filling Volume</b>	Approx. 25 liters	
<b>Dimensions</b>	Length: 1000 mm; Width: 500 mm; Height: adjustable feet	
<b>Measurement Areas</b>	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>**

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

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

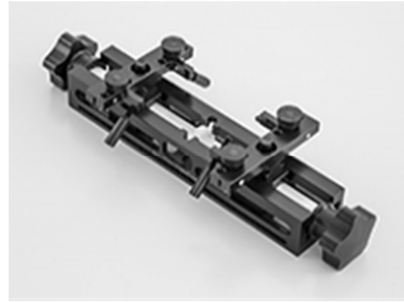
## 8.4 Device Holder

### <Mounting Device for Hand-Held Transmitter>

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



Mounting Device for Hand-Held Transmitters



Mounting Device Adaptor for Wide-Phones

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

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



Mounting Device for Laptops

## 9. Measurement Procedures

The measurement procedures are as follows:

### <Conducted power measurement>

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

### <SAR measurement>

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

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

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

### 9.1 Spatial Peak SAR Evaluation

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

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

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

- (a) Extraction of the measured data (grid and values) from the Zoom Scan
- (b) Calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
- (c) Generation of a high-resolution mesh within the measured volume
- (d) Interpolation of all measured values 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

**9.2 Power Reference Measurement**

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

**9.3 Area Scan**

The area scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum found in the scanned area, within a range of the global maximum. The range (in dB) 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° ± 1°	20° ± 1°
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 ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

### 9.4 Zoom Scan

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

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

		≤ 3 GHz	> 3 GHz	
Maximum zoom scan spatial resolution: $\Delta x_{Zoom}$ , $\Delta y_{Zoom}$		$\leq 2$ GHz: $\leq 8$ mm 2 – 3 GHz: $\leq 5$ mm*	3 – 4 GHz: $\leq 5$ mm* 4 – 6 GHz: $\leq 4$ mm*	
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$	$\leq 5$ mm	3 – 4 GHz: $\leq 4$ mm 4 – 5 GHz: $\leq 3$ mm 5 – 6 GHz: $\leq 2$ mm	
	graded grid	$\Delta z_{Zoom}(1)$ : between 1 <sup>st</sup> two points closest to phantom surface	$\leq 4$ mm	3 – 4 GHz: $\leq 3$ mm 4 – 5 GHz: $\leq 2.5$ mm 5 – 6 GHz: $\leq 2$ mm
		$\Delta z_{Zoom}(n>1)$ : between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z	$\geq 30$ mm	3 – 4 GHz: $\geq 28$ mm 4 – 5 GHz: $\geq 25$ mm 5 – 6 GHz: $\geq 22$ mm	
Note: $\delta$ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details. * When zoom scan is required and the <i>reported</i> SAR from the <i>area scan based 1-g SAR estimation</i> procedures of KDB 447498 is $\leq 1.4$ W/kg, $\leq 8$ mm, $\leq 7$ mm and $\leq 5$ mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

### 9.5 Volume Scan Procedures

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

### 9.6 Power Drift Monitoring

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





### 10. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	750MHz System Validation Kit	D750V3	1099	Dec. 15, 2021	Dec. 14, 2022
SPEAG	835MHz System Validation Kit	D835V2	4d162	Dec. 17, 2021	Dec. 16, 2022
SPEAG	1750MHz System Validation Kit	D1750V2	1137	Oct. 19, 2021	Oct. 18, 2022
SPEAG	1900MHz System Validation Kit	D1900V2	5d182	Dec. 20, 2021	Dec. 19, 2022
SPEAG	2450MHz System Validation Kit	D2450V2	924	Sep. 02, 2020	Sep. 01, 2023
SPEAG	2600MHz System Validation Kit	D2600V2	1070	Dec. 20, 2021	Dec. 19, 2022
SPEAG	3500MHz System Validation Kit	D3500V2	1037	Nov. 25, 2020	Nov. 24, 2023
SPEAG	3700MHz System Validation Kit	D3700V2	1008	Nov. 25, 2020	Nov. 24, 2023
SPEAG	3900MHz System Validation Kit	D3900V2	1048	May 04, 2020	May. 03, 2023
SPEAG	5000MHz System Validation Kit	D5GHzV2	1113	Sep. 24, 2019	Sep. 22, 2022
SPEAG	Data Acquisition Electronics	DAE4	910	Jul. 15, 2021	Jul. 14, 2022
SPEAG	Data Acquisition Electronics	DAE4	715	Dec. 29, 2021	Dec. 28, 2022
SPEAG	Dosimetric E-Field Probe	EX3DV4	3819	Apr. 30, 2021	Apr. 29, 2022
SPEAG	Dosimetric E-Field Probe	ES3DV3	3282	Nov. 04, 2021	Nov. 03, 2022
SPEAG	SAM Twin Phantom	QD 000 P40 CD	1670	NCR	NCR
SPEAG	Phone Positioner	N/A	N/A	NCR	NCR
Anritsu	Radio communication analyzer	MT8820C	6201563813	Dec. 28, 2021	Dec. 27, 2022
Anritsu	Radio communication analyzer	MT8821C	6262314715	Jun. 29, 2021	Jun. 28, 2022
Anritsu	Radio communication analyzer	MT8821C	6272278319	Jun. 29, 2021	Jun. 28, 2022
Agilent	Wireless Communication Test Set	E5515C	MY50267224	Jul. 14, 2021	Jul. 13, 2022
Keysight	Network Analyzer	E5071C	MY46523671	Oct. 25, 2021	Oct. 24, 2022
Speag	Dielectric Assessment KIT	DAK-3.5	1138	Jun. 09, 2021	Jun. 08, 2022
Agilent	Signal Generator	N5181A	MY50145381	Dec. 28, 2021	Dec. 27, 2022
Anritsu	Power Sensor	MA2411B	1306099	Sep. 29, 2021	Sep. 28, 2022
Anritsu	Power Meter	ML2495A	1349001	Sep. 29, 2021	Sep. 28, 2022
Anritsu	Power Sensor	MA2411B	1542004	Dec. 28, 2021	Dec. 27, 2022
Anritsu	Power Meter	ML2495A	1339473	Dec. 28, 2021	Dec. 27, 2022
R&S	Power Sensor	NRP8S	109228	Apr. 09, 2021	Apr. 08, 2022
R&S	Power Sensor	NRP8S	109228	Apr. 07, 2022	Apr. 06, 2023
R&S	Spectrum Analyzer	FSP7	100818	Jul. 14, 2021	Jul. 13, 2022
TES	Hygrometer	1310	200505600	Jul. 17, 2021	Jul. 16, 2022
Anymetre	Thermo-Hygrometer	JR593	2020062101	Jul. 17, 2021	Jul. 16, 2022
SPEAG	Device Holder	N/A	N/A	N/A	N/A
AR	Amplifier	5S1G4	0333096	Note 1	
AR	Amplifier	5S1G4	0333096	Note 1	
mini-circuits	Amplifier	ZVE-3W-83+	599201528	Note 1	
mini-circuits	Amplifier	ZVE-3W-83+	599201528	Note 1	
ARRA	Power Divider	A3200-2	N/A	Note 1	
ET Industries	Dual Directional Coupler	C-058-10	N/A	Note 1	
Weinschel	Attenuator 1	3M-10	N/A	Note 1	
Weinschel	Attenuator 2	3M-20	N/A	Note 1	

**Note:**

1. Prior to system verification and validation, the path loss from the signal generator to the system check source and the power meter, which includes the amplifier, cable, attenuator and directional coupler, was measured by the network analyzer. The reading of the power meter was offset by the path loss difference between the path to the power meter and the path to the system check source to monitor the actual power level fed to the system check source.
2. The dipole calibration interval can be extended to 3 years with justification according to KDB 865664 D01. The dipoles are also not physically damaged, or repaired during the interval. The justification data in appendix C can be found which the return loss is < -20dB, within 20% of prior calibration, the impedance is within 5 ohm of prior calibration for each dipole.

## 11. System Verification

### 11.1 Tissue Simulating Liquids

For the measurement of the field distribution inside the SAM phantom with DASY, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 10.1. 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. 10.2.

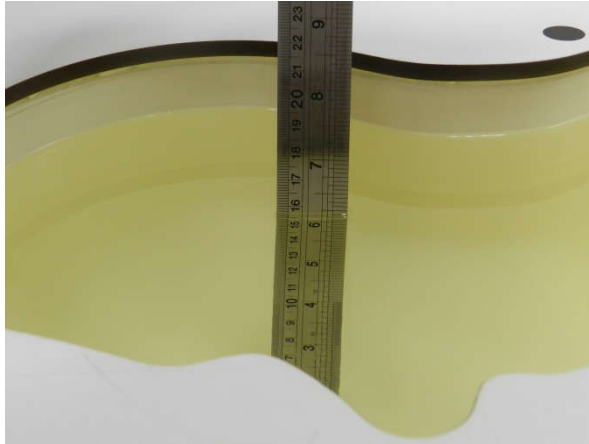


Fig 10.1 Photo of Liquid Height for Head SAR

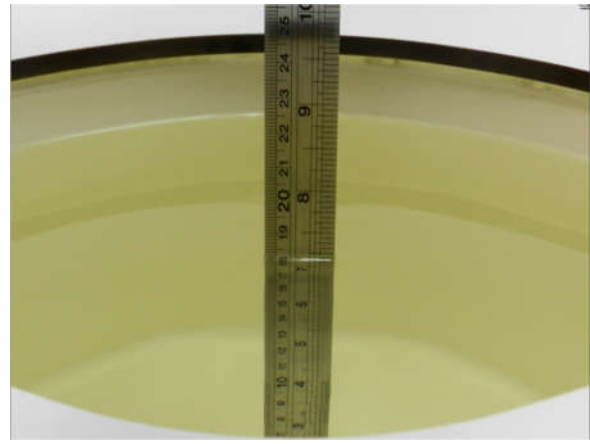


Fig 10.2 Photo of Liquid Height for Body SAR

### 11.2 Tissue Verification

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

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity ( $\sigma$ )	Permittivity ( $\epsilon_r$ )
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 <sub>r</sub> )	Conductivity Target (σ)	Permittivity Target (ε <sub>r</sub> )	Delta (σ) (%)	Delta (ε <sub>r</sub> ) (%)	Limit (%)	Date
750	Head	22.4	0.886	41.532	0.89	41.90	-0.45	-0.88	±5	2022/03/23
750	Head	22.5	0.887	40.873	0.89	41.90	-0.34	-2.45	±5	2022/03/24
750	Head	22.3	0.891	42.520	0.89	41.90	0.11	1.48	±5	2022/04/08
835	Head	22.4	0.913	40.859	0.90	41.50	1.44	-1.54	±5	2022/03/25
835	Head	22.3	0.901	40.721	0.90	41.50	0.11	-1.88	±5	2022/03/26
835	Head	22.6	0.926	42.221	0.90	41.50	2.89	1.74	±5	2022/04/09
1750	Head	22.6	1.404	40.106	1.37	40.10	2.48	0.01	±5	2022/03/27
1750	Head	22.5	1.407	40.710	1.37	40.10	2.70	1.52	±5	2022/03/28
1750	Head	22.5	1.412	40.226	1.37	40.10	3.07	0.31	±5	2022/04/10
1900	Head	22.3	1.417	40.994	1.40	40.00	1.21	2.49	±5	2022/04/10
1900	Head	22.6	1.439	40.038	1.40	40.00	2.79	0.09	±5	2022/04/11
1900	Head	22.3	1.433	40.818	1.40	40.00	2.36	2.04	±5	2022/04/20
2450	Head	22.2	1.821	37.950	1.80	39.20	1.17	-3.19	±5	2022/04/11
2450	Head	22.2	1.809	37.604	1.80	39.20	0.50	-4.07	±5	2022/04/12
2600	Head	22.4	2.056	37.587	1.96	39.00	4.90	-3.62	±5	2022/04/12
2600	Head	22.1	2.053	37.984	1.96	39.00	4.74	-2.61	±5	2022/04/13
2600	Head	22.3	1.989	37.665	1.96	39.00	1.48	-3.42	±5	2022/04/21
3500	Head	22.6	2.813	39.758	2.91	37.90	-3.33	4.90	±5	2022/04/13
3500	Head	22.5	2.891	36.653	2.91	37.90	-0.65	-3.29	±5	2022/04/14
3700	Head	22.8	3.010	36.788	3.12	37.70	-3.53	-2.42	±5	2022/04/14
3700	Head	22.5	3.139	38.760	3.12	37.70	0.61	2.81	±5	2022/04/15
3900	Head	22.1	3.196	36.353	3.33	37.51	-4.02	-3.08	±5	2022/04/15
3900	Head	22.2	3.312	38.560	3.33	37.51	-0.54	2.80	±5	2022/04/16
5250	Head	22.5	4.597	36.241	4.71	35.95	-2.40	0.81	±5	2022/04/16
5250	Head	22.3	4.853	35.417	4.71	35.95	3.04	-1.48	±5	2022/04/17
5600	Head	22.6	4.954	35.793	5.07	35.50	-2.29	0.83	±5	2022/04/17
5600	Head	22.1	5.233	34.724	5.07	35.50	3.21	-2.19	±5	2022/04/18
5750	Head	22.2	5.119	35.497	5.22	35.35	-1.93	0.42	±5	2022/04/18
5750	Head	22.7	5.389	34.460	5.22	35.35	3.24	-2.52	±5	2022/04/19



11.3 System Performance Check Results

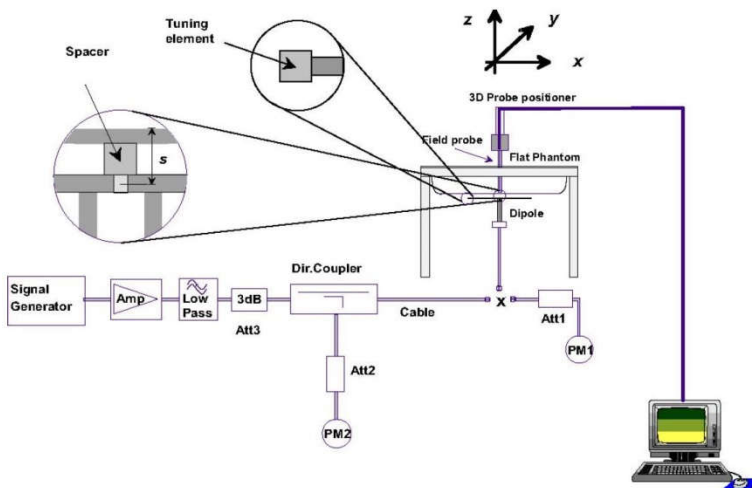
Comparing to the original SAR value provided by SPEAG, the verification data should be within its specification of 10 %. Below table shows the target SAR and measured SAR after normalized to 1W input power. The table below indicates the system performance check can meet the variation criterion and the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

<1g>

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 2022/03/23 to 2022/04/19.

<10g>

Date	Frequency (MHz)	Tissue Type	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 10g SAR (W/kg)	Targeted 10g SAR (W/kg)	Normalized 10g SAR (W/kg)	Deviation (%)
2022/03/23	750	Head	250	1099	3282	910	1.490	5.65	5.96	5.49
2022/03/24	750	Head	250	1099	3282	910	1.430	5.65	5.72	1.24
2022/04/08	750	Head	250	1099	3282	910	1.510	5.65	6.04	6.90
2022/03/25	835	Head	250	4d162	3282	910	1.650	6.26	6.6	5.43
2022/03/26	835	Head	250	4d162	3282	910	1.640	6.26	6.56	4.79
2022/04/09	835	Head	250	4d162	3282	910	1.520	6.26	6.08	-2.88
2022/03/27	1750	Head	250	1137	3282	910	5.210	19.20	20.84	8.54
2022/03/28	1750	Head	250	1137	3282	910	4.620	19.20	18.48	-3.75
2022/04/10	1750	Head	250	1137	3282	910	4.560	19.20	18.24	-5.00
2022/04/10	1900	Head	250	5d182	3282	910	5.390	20.20	21.56	6.73
2022/04/11	1900	Head	250	5d182	3282	910	5.240	20.20	20.96	3.76
2022/04/20	1900	Head	250	5d182	3282	910	5.230	20.20	20.92	3.56
2022/04/11	2450	Head	250	924	3282	910	5.620	24.00	22.48	-6.33
2022/04/12	2450	Head	250	924	3282	910	6.010	24.00	24.04	0.17
2022/04/12	2600	Head	250	1070	3282	910	6.100	24.60	24.4	-0.81
2022/04/13	2600	Head	250	1070	3282	910	6.650	24.60	26.6	8.13
2022/04/21	2600	Head	250	1070	3282	910	6.560	24.60	26.24	6.67
2022/04/13	3500	Head	100	1037	3819	715	2.750	25.40	27.5	8.27
2022/04/14	3500	Head	100	1037	3819	715	2.460	25.40	24.6	-3.15
2022/04/14	3700	Head	100	1008	3819	715	2.350	24.40	23.5	-3.69
2022/04/15	3700	Head	100	1008	3819	715	2.470	24.40	24.7	1.23
2022/04/15	3900	Head	100	1048	3819	715	2.650	24.40	26.5	8.61
2022/04/16	3900	Head	100	1048	3819	715	2.270	24.40	22.7	-6.97
2022/04/16	5250	Head	100	1113	3819	715	2.190	23.10	21.9	-5.19
2022/04/17	5250	Head	100	1113	3819	715	2.350	23.10	23.5	1.73
2022/04/17	5600	Head	100	1113	3819	715	2.330	23.80	23.3	-2.10
2022/04/18	5600	Head	100	1113	3819	715	2.190	23.80	21.9	-7.98
2022/04/18	5750	Head	100	1113	3819	715	2.330	22.80	23.3	2.19
2022/04/19	5750	Head	100	1113	3819	715	2.420	22.80	24.2	6.14



**Fig 10.3.1 System Performance Check Setup**



**Fig 10.3.2 Setup Photo**

## 12. RF Exposure Positions

### 12.1 Ear and handset reference point

Figure 11.1.1 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 11.1.2 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 11.1.3). 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 11.1.2. The ear truncation is introduced to preclude the ear lobe from interfering with handset tilt, which could lead to unstable positioning at the cheek.

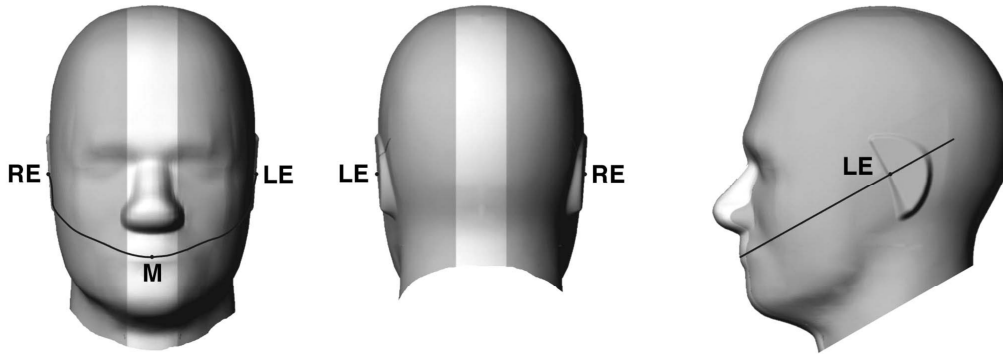


Fig 11.1.1 Front, back, and side views of SAM twin phantom

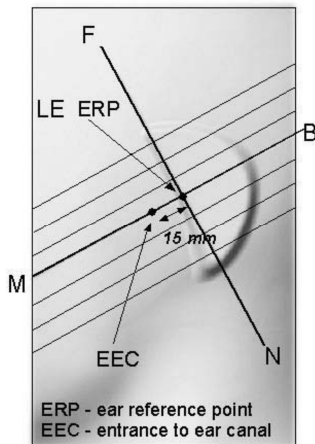


Fig 11.1.2 Close-up side view of phantom showing the ear region.

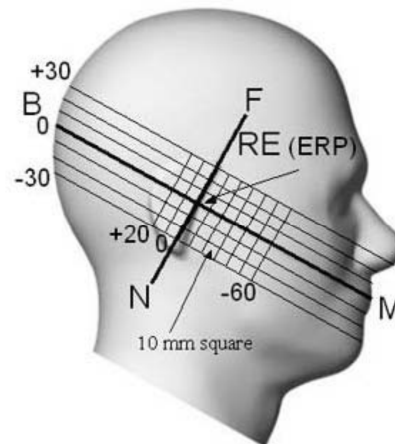


Fig 11.1.3 Side view of the phantom showing relevant markings and seven cross-sectional plane locations

## 12.2 Definition of the cheek position

1. Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece (flip cover), open the cover. If the handset can transmit with the cover closed, both configurations must be tested.
2. Define two imaginary lines on the handset—the vertical centerline and the horizontal line. The vertical centerline passes through two points on the front side of the handset—the midpoint of the width  $w_t$  of the handset at the level of the acoustic output (point A in Figure 11.2.1 and Figure 11.2.2), 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 11.2.1). 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 11.2.2), 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 11.2.3), 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 11.2.3. The actual rotation angles should be documented in the test report.

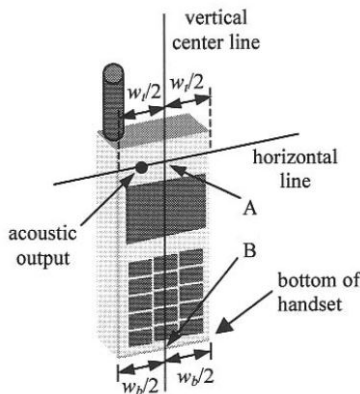


Fig 11.2.1 Handset vertical and horizontal reference lines—"fixed case"

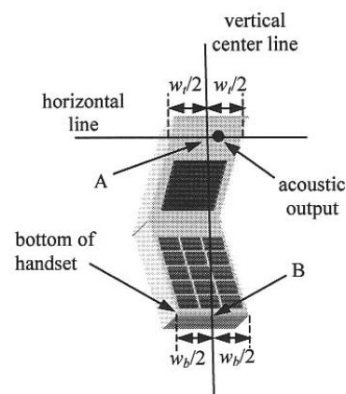


Fig 11.2.2 Handset vertical and horizontal reference lines—"clam-shell case"

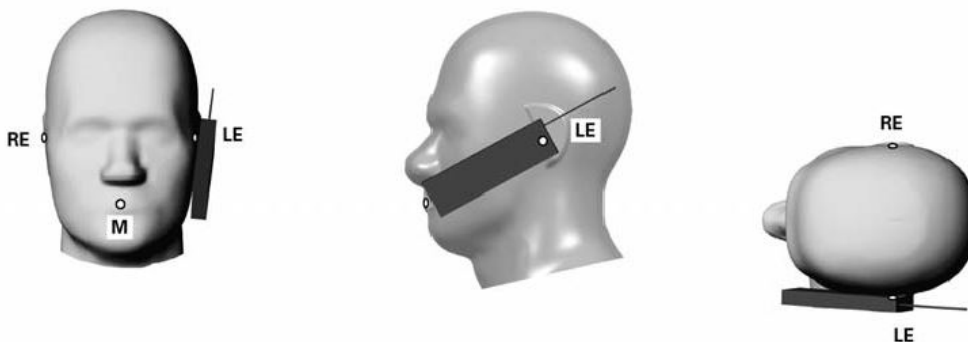
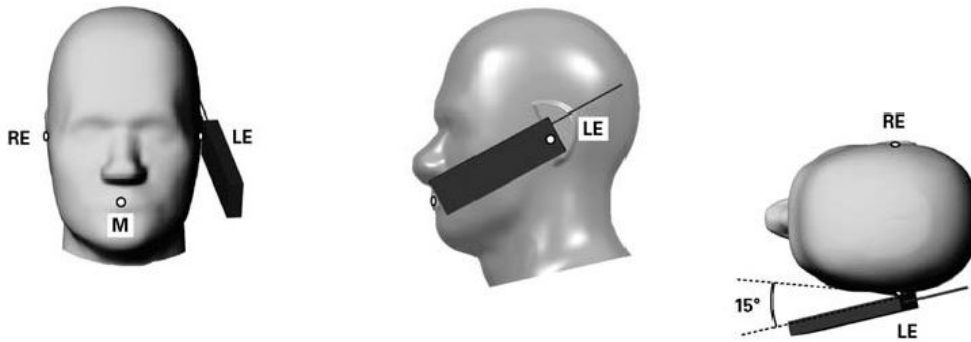


Fig 11.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

**12.3 Definition of the tilt position**

1. Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece (flip cover), open the cover. If the handset can transmit with the cover closed, both configurations must be tested.
2. While maintaining the orientation of the handset, move the handset away from the pinna along the line passing through RE and LE far enough to allow a rotation of the handset away from the cheek by 15°.
3. Rotate the handset around the horizontal line by 15°.
4. While maintaining the orientation of the handset, move the handset towards the phantom on the line passing through RE and LE until any part of the handset touches the ear. The tilt position is obtained when the contact point is on the pinna. See Figure 11.3.1. 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 11.3.1 Tilt position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which define the Reference Plane for handset positioning, are indicated.**



## 12.4 Body Worn Accessory

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 11.4). Per KDB648474 D04v01r03, body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB 447498 D01v06 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for body-worn accessory, measured without a headset connected to the handset is  $> 1.2 \text{ W/kg}$ , the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a handset attached to the handset.

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

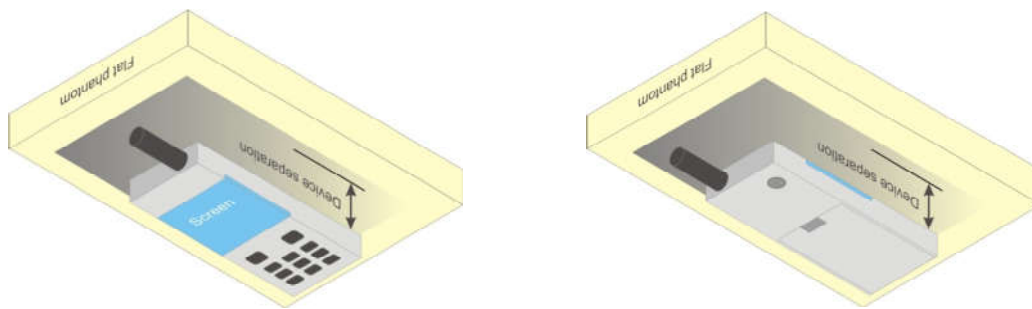


Fig 11.4 Body Worn Position



## **12.5 Product Specific 10g SAR Exposure**

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

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

## **12.6 Wireless Router**

Some battery-operated handsets have the capability to transmit and receive user through simultaneous transmission of WIFI simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC KDB Publication 941225 D06 v02r01 where SAR test considerations for handsets ( $L \times W \geq 9$  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.



### **13. Conducted RF Output Power (Unit: dBm)**

The detailed conducted power table can refer to Appendix E.

#### **<GSM Conducted Power>**

##### **General Note:**

1. Per KDB 447498 D01v06, the maximum output power channel is used for SAR testing and for further SAR test reduction.
2. Per KDB 941225 D01v03r01, for SAR test reduction for GSM / GPRS / EDGE modes is determined by the source-based time-averaged output power including tune-up tolerance. The mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested.
3. Other configurations of GSM / GPRS / EDGE are considered as secondary modes. The 3G SAR test reduction procedure is applied, when the maximum output power and tune-up tolerance specified for production units in a secondary mode is  $\leq \frac{1}{4}$  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.
3. For DC-HSDPA, the device was configured according to the H-Set 12, Fixed Reference Channel (FRC) configuration in Table C.8.1.12 of 3GPP TS 34.121-1, with the primary and the secondary serving HS-DSCH Cell enabled during the power measurement.

A summary of these settings are illustrated below:

#### **HSDPA Setup Configuration:**

- a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
- b. The RF path losses were compensated into the measurements.
- c. A call was established between EUT and Base Station with following setting:
  - i. Set Gain Factors ( $\beta_c$  and  $\beta_d$ ) 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:  $\beta$  values for transmitter characteristics tests with HS-DPCCH

Sub-test	$\beta_c$	$\beta_d$	$\beta_d$ (SF)	$\beta_c/\beta_d$	$\beta_{HS}$ (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:  $\Delta_{ACK}$ ,  $\Delta_{NACK}$  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,  $\Delta_{ACK}$  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 DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Note 4: For subtest 2 the  $\beta_c/\beta_d$  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 ( $\beta_c$  and  $\beta_d$ ) 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-TFCl
  - viii. Confirm that E-TFCl is equal to the target E-TFCl of 75 for sub-test 1, and other subtest's E-TFCl
- d. The transmitted maximum output power was recorded.

**Table C.11.1.3:  $\beta$  values for transmitter characteristics tests with HS-DPCCH and E-DCH**

Sub-test	$\beta_c$	$\beta_d$	$\beta_d$ (SF)	$\beta_c/\beta_d$	$\beta_{HS}$ (Note1)	$\beta_{ec}$	$\beta_{ed}$ (Note 4) (Note 5)	$\beta_{ed}$ (SF)	$\beta_{ed}$ (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2) (Note 6)	AG Index (Note 5)	E-TFCl
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	$\beta_{ed1}: 47/15$ $\beta_{ed2}: 47/15$	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15	0	-	-	5/15	5/15	47/15	4	1	1.0	0.0	12	67

Note 1: For sub-test 1 to 4,  $\Delta_{ACK}$ ,  $\Delta_{NACK}$  and  $\Delta_{CQI} = 30/15$  with  $\beta_{tx} = 30/15 * \beta_c$ . For sub-test 5,  $\Delta_{ACK}$ ,  $\Delta_{NACK}$  and  $\Delta_{CQI} = 5/15$  with  $\beta_{tx} = 5/15 * \beta_c$ .

Note 2: CM = 1 for  $\beta_c/\beta_d = 12/15$ ,  $\beta_{HS}/\beta_c = 24/15$ . For all other combinations of DPDCCH, DPCCH, HS-DPCCH, E-DPCCH and E-DPCCH the MPR is based on the relative CM difference.

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

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

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

Note 6: For subtests 2, 3 and 4, UE may perform E-DPCCH 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  $\leq 1.2$  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.

**<CDMA2000 Conducted Power>**

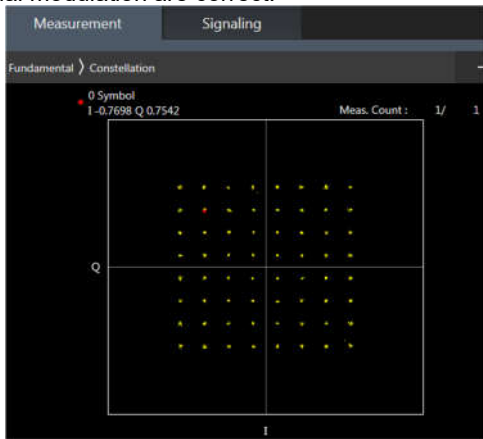
**General Note:**

1. Per KDB 941225 D01v03r01, SAR for head exposure is measured in RC3 with the handset configured to transmit at full rate in SO55.
2. Per KDB 941225 D01v03r01, in Hotspot mode EUT is treated as data device and SAR is tested with RC3 TDSO/SO32 as the primary mode.
3. Per KDB 941225 D01v03r01, for Body-worn accessory SAR is measured in RC3 with the handset configured in TDSO/SO32 to transmit at full rate on FCH only with all other code channels disabled. The body-worn accessory procedures in KDB Publication 447498 are applied. The 3G SAR test reduction procedure is applied to the multiple code channel configuration (FCH+SCH), with FCH only as the primary mode.

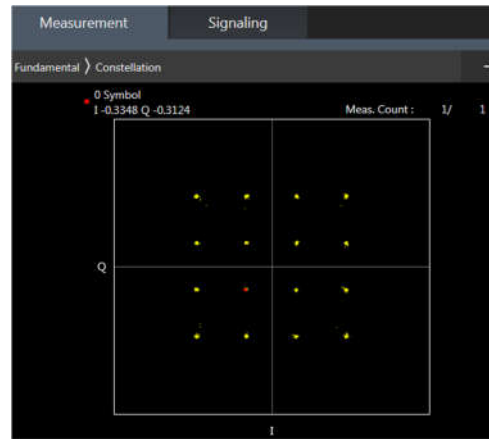
**<LTE Conducted Power>**

**General Note:**

1. Anritsu MT8820C base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r05, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
4. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r05, for QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are  $\leq 0.8$  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  $\leq 1.45$  W/kg; Per KDB 941225 D05v02r05, 16QAM 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  $\leq 1.45$  W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
8. For LTE 4 / B5 / B12 / B17 / 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. According to 2017 TCB workshop, for 64 QAM and 16 QAM should be verified by checking the signal constellation with a call box to avoid incorrect maximum power levels due to MPR and other requirements associated with signal modulation, and the following figure is taken from the "Fundamental Measurement >> Modulation Analysis >> constellation" mode of the device connect to the MT8821C base station, therefore, the device 64QAM and 16QAM signal modulation are correct.



**64QAM**



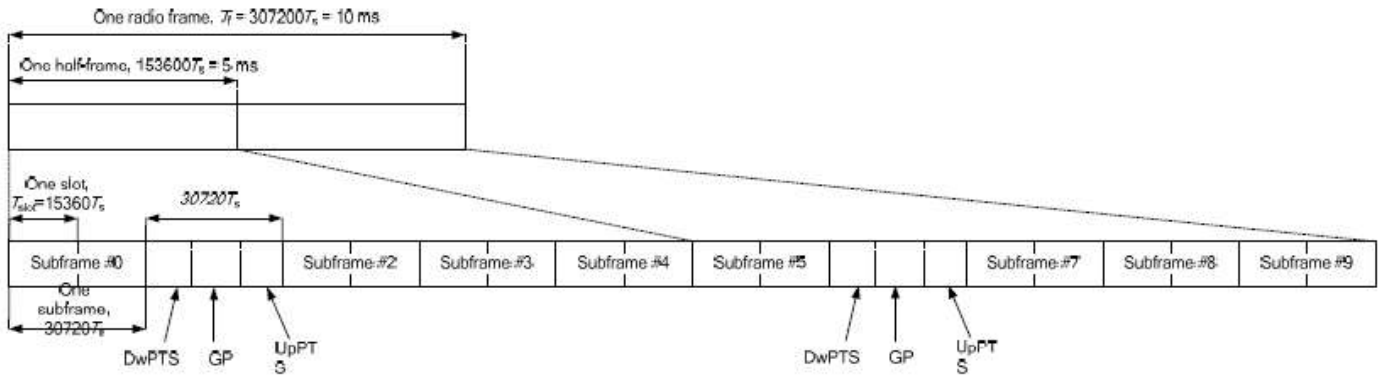
**16QAM**

**<TDD LTE SAR Measurement>**

TDD LTE configuration setup for SAR measurement

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

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



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

**Table 4.2-2: Uplink-downlink configurations.**

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

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

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



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

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

The highest duty factor is resulted from:

- 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.

**<LTE Carrier Aggregation>**

**General Note:**

1. This device supports Carrier Aggregation on downlink for inter and intra band. For the device supports bands and bandwidths and configurations are provided as follow table was according to 3GPP.
2. In applying the existing power measurement procedures of KDB 941225 D05A for DL CA SAR test exclusion, only the subset with the largest number of combinations of frequency bands and CCs in each row need combination, and for this device that all the configurations were choose to power measurement.
3. All permutations exist. No restrictions on Pcell & Scell combinations. Only LTE Band 29A is limited to Scell.

2CC Downlink Carrier Aggregation				3CC Downlink Carrier Aggregation			
Number	Combination	4X4 MIMO	Covered by Measurement Superset	Number	Combination	4X4 MIMO	Covered by Measurement Superset
1	CA_7C	7C		1	CA_2A-7A-7A	/	
2	CA_38C	38C		2	CA_7A-66A-66A	/	
3	CA_41C	41C		3	CA_2A-7C	/	
4	CA_66C	66C		4	CA_4A-7C	4A,7A,4A-7C	
5	CA_4A-4A	4A,4A-4A		5	CA_5A-7C	7C	
6	CA_7A-7A	7A,7A-7A		6	CA_41D	41D	
7	CA_41A-41A	41A,41A-41A		7	CA_12A-66A-66A	66A,66A-66A	
8	CA_66A-66A	66A,66A-66A		8	CA_41A-41A-41A	41A,41A-41A-41A	
9	CA_2A-4A	4A		9	CA_5A-66A-66A	66A,66A-66A	
10	CA_2A-5A	/		10	CA_5A-7A-66A	/	
11	CA_2A-7A	/					
12	CA_4A-5A	4A					
13	CA_4A-7A	4A,7A					
14	CA_5A-7A	7A					
15	CA_7A-32A	7A					
16	CA_2C	/					
17	CA_4A-12A	4A					
18	CA_4A-17A	4A					
19	CA_5A-41A	41A					
20	CA_5A-66A	66A					
21	CA_2A-66A	66A					
22	CA_7A-66A	/					

4CC Downlink Carrier Aggregation				5CC Downlink Carrier Aggregation			
Number	Combination	4X4 MIMO	Covered by Measurement Superset	Number	Combination	4X4 MIMO	Covered by Measurement Superset
1	CA_41E	/		1	CA_5A-7C-66A-66A	/	
2	CA_7C-66A-66A	/					
3	CA_5A-7A-66A-66A	/					
4	CA_5A-7C-66A	/					

**LTE 4x4 MIMO (Downlink)**

This device supports downlink 4x4 MIMO operations for LTE Bands 4/7/38/41/66 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 4/7/38/41/66

**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 five 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 Carrier Aggregation Conducted Power (Uplink)**

2CC Uplink Carrier Aggregation				
Number	Combination	Antenna		
1	7C	Ant13	Ant31	Ant25
2	38C	Ant13	Ant31	Ant25
3	41C	Ant13	Ant31	Ant25

**<Intra-band>**

**General Note:**

- i. The device supports intra-band uplink carrier aggregation for LTE B7/B38/B41 with a maximum of two 20MHz component carriers. For intra band contiguous carrier aggregation scenarios, 3GPP 36.101 table 6.2.2A-1 specifies that the aggregate maximum allowed output power is equivalent to the single carrier scenario. 3GPP 36.101 6.2.3A allows for several dB of MPR to be applied when not-contiguous RB allocation is implemented. The conducted power and MPR setting in this device are permanently implemented pre 3GPP requirement.
- ii. The device supports uplink carrier aggregation with a maximum of two 20MHz component carriers. For intra band contiguous carrier aggregation scenarios, 3GPP 36.101 table 6.2.2A-1 specifies that the aggregate maximum allowed output power is equivalent to the single carrier scenario. 3GPP 36.101 6.2.3A allows for several dB of MPR to be applied when not-contiguous RB allocation is implemented. The conducted power and MPR setting in this device are permanently implemented pre the 3GPP requirement.
- iii. According TCB workshop, the output power with uplink CA active was measured for the configuration with the highest reported SAR with single carrier for each exposure condition. The power was measured with wideband signal integration over both component carriers.
- iv. Additional SAR measurement for LTE UL CA with other DL CA combinations active were not required since the maximum output power for this configuration was not > 0.25dB higher than the maximum output power for UL CA active

**5G NR Output Power (Unit: dBm)**

**General Note:**

1. 5G NR n5 / n7 / n66 / n78 is NSA mode.
2. 5G NR n2 / n5 / n7 / n66 / n38 / n41 / n77 / n78 is SA mode.
3. For 5G NR test procedure was following step similar FCC KDB 941225 D05:
  - a. For DFT-OFDM and CP-OFDM output power measurement reduction, according to 38.101 maximum power reduction for power class2 and 3, the CP-OFDM mode will not higher than DFT-OFDM mode, therefore, similar FCC KDB 941225 D05 procedure for other modulation output power for each RB allocation configuration is > not ½ dB higher than the same configuration in DFT-s PI/2 BPSK and the reported SAR for the DFT-s PI/2 BPSK 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 PI/2 BPSK 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 PI/2 BPSK SAR testing follows 1RB PI/2 BPSK allocation procedure
  - e. PI/2 BPSK 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. QPSK/16QAM/64QAM/256QAM output powers according to 3GPP MPR will not ½ dB higher than the same configuration in PI/2 BPSK, also reported SAR for the PI/2 BPSK configuration is less than 1.45 W/kg, QPSK/16QAM/64QAM/256QAM SAR testing are not required.
  - g. Smaller bandwidth output power for each RB allocation configuration for this device will not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg, smaller bandwidth SAR testing is not required for this device
4. For 5G NR test, using FTM (Factory Test Mode) to perform SAR with default 100% transmission.
5. 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.
6. For 5G NR EN-DC modes, standalone SAR performed for 5G NR band with the maximum power, EN-DC SAR summed 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	$\leq 3.5^1$	$\leq 1.2^1$	$\leq 0.2^1$
		$\leq 0.5^2$	$\leq 0.5^2$	0 <sup>2</sup>
	QPSK	$\leq 1$		0
	16 QAM	$\leq 2$		$\leq 1$
	64 QAM		$\leq 2.5$	
	256 QAM		$\leq 4.5$	
CP-OFDM	QPSK	$\leq 3$		$\leq 1.5$
	16 QAM	$\leq 3$		$\leq 2$
	64 QAM		$\leq 3.5$	
	256 QAM		$\leq 6.5$	

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	$\leq 3.5$	$\leq 0.5$	0
	QPSK	$\leq 3.5$	$\leq 1$	0
	16 QAM	$\leq 3.5$	$\leq 2$	$\leq 1$
	64 QAM	$\leq 3.5$		$\leq 2.5$
	256 QAM		$\leq 4.5$	
CP-OFDM	QPSK	$\leq 3.5$	$\leq 3$	$\leq 1.5$
	16 QAM	$\leq 3.5$	$\leq 3$	$\leq 2$
	64 QAM		$\leq 3.5$	
	256 QAM		$\leq 6.5$	



<EN-DC combination and combine Total Power>

EN-DC configuration	NR TX	LTE TX
DC_7A_n5A	Ant 11	Ant 13/31/25
	Ant 41	
DC_66A_n7A	Ant 13	Ant 31/25
DC_2A_n66A	Ant 13	Ant 31/25
DC_5A_n66A	Ant 13	Ant 11/41
DC_7A_n66A	Ant 13	Ant 31/25
DC_2A_n78A	Ant 12	Ant 13/31
	Ant 24	
	Ant 101	
	Ant 103	
DC_4A_n78A	Ant 12	Ant 13/31/25
	Ant 24	
	Ant 101	
	Ant 103	
DC_5A_n78A	Ant 12	Ant 11/41
	Ant 24	
	Ant 101	
	Ant 103	
DC_7A_n78A	Ant 12	Ant 13/31/25
	Ant 24	
	Ant 101	
	Ant 103	
DC_38A_n78A	Ant 12	Ant 13/31/25
	Ant 24	
	Ant 101	
	Ant 103	
DC_41A_n78A	Ant 12	Ant 13/31/25
	Ant 24	
	Ant 101	
	Ant 103	
DC_66A_n78A	Ant 12	Ant 13/31/25
	Ant 24	
	Ant 101	
	Ant 103	



<WLAN Conducted Power>

General Note:

1. For each antenna, transmit power in SISO operation is larger than (or equal to) the power in MIMO operation, RF exposure compliance of MIMO mode can be deduced from the compliance simultaneous transmission of antennas operating in SISO mode.
2. Per KDB 248227 D01v02r02, the simultaneous SAR provisions in KDB publication 447498 should be applied to determine simultaneous transmission SAR test exclusion for WiFi MIMO. If the sum of 1g single transmission chain SAR measurements is < 1.6W/kg and SAR peak to location ratio  $\leq 0.04$ , no additional SAR measurements for MIMO.
3. 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, for each frequency band or when MIMO mode was not performed, due to for each antenna, transmit power in SISO operation is larger than (or equal to) the power in MIMO operation, RF exposure compliance of MIMO mode can be deduced from the compliance simultaneous transmission of antennas operating in SISO mode. Additional output power measurements were not necessary.
4. 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.
5. 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).
6. 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.
7. 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  $\leq 0.4$  W/kg, further SAR measurement is not required for the other test positions in that exposure configuration and 802.11 transmission mode combinations within the frequency band or aggregated band.
  - b. When the reported SAR of the test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position on the highest maximum output power channel, until the report SAR is  $\leq 0.8$  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  $\leq 1.2$  W/kg or all required channels are tested.
8. For modes with the same maximum output power, the guidance from section 5.3.2 a) of FCC KDB Publication 248227 D01 should be applied, with 802.11ax being considered as the highest 802.11 mode for the appropriate frequency bands
9. When SAR testing for 802.11ax is required



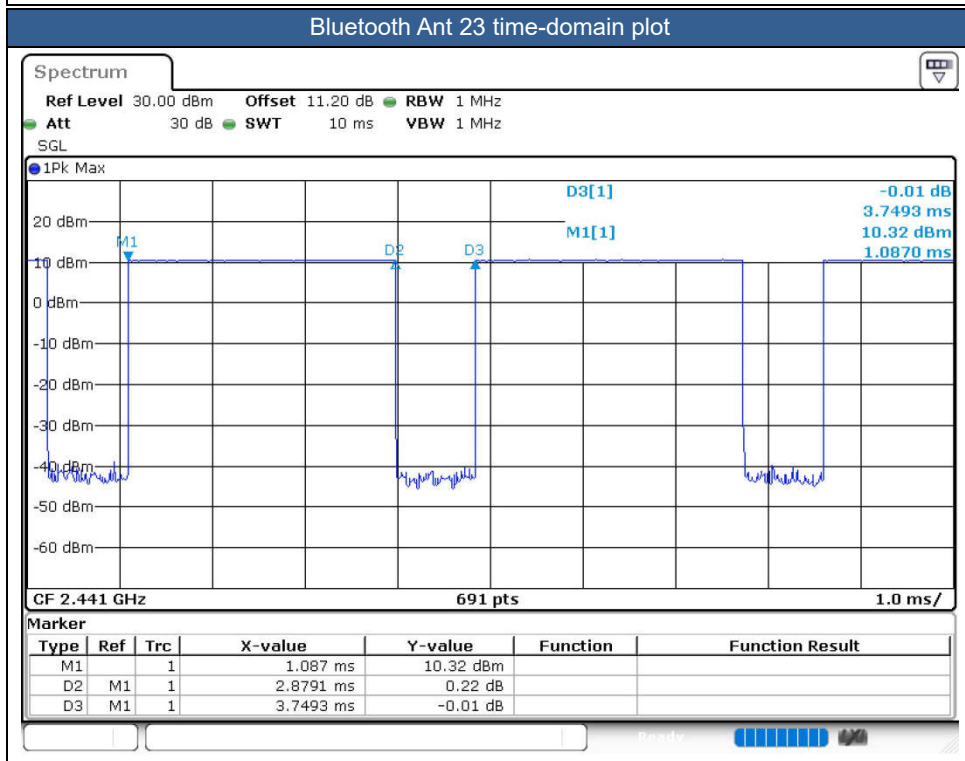
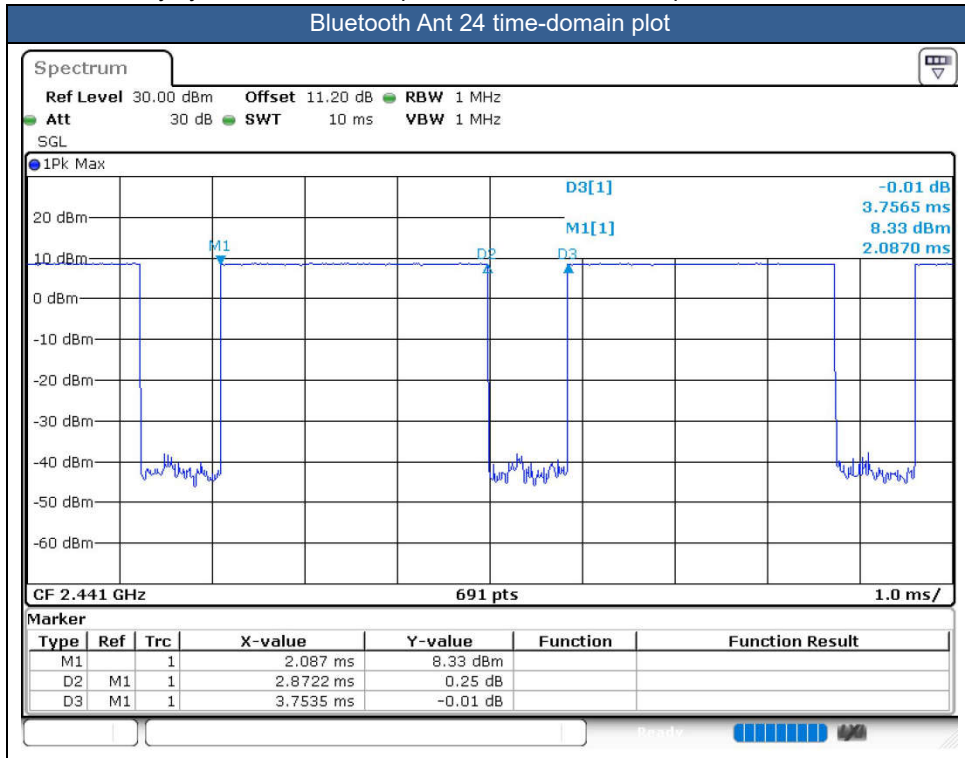
- a. If the maximum output power is highest for OFDMA scenarios, choose the tone size with the maximum number of tones and the highest maximum output power
- b. Otherwise, consider the fully allocated channel for SAR testing
- c. When SAR testing is required on RU sizes less than the fully allocated channel, use the RU number closest to the middle of the channel, choosing the higher RU number when two RUs are equidistant to the middle of the channel



<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 76.52%(Ant 24) and 76.79%(Ant 23) see as following figure, according to 2016 Oct. TCB workshop for Bluetooth SAR scaling need further consideration and the maximum duty cycle is 100%, therefore the actual duty cycle will be scaled up to 100% for Bluetooth reported SAR calculation.





## **14. Antenna Location**

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

## 15. SAR Test Results

### General Note:

1. Per KDB 447498 D01v06, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
  - a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
  - b. For SAR testing of WLAN signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle)"
  - c. For WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)\*Tune-up Scaling Factor
  - d. For WLAN/Bluetooth: Reported SAR(W/kg)= Measured SAR(W/kg)\* Duty Cycle scaling factor \* Tune-up scaling factor
  - e. 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 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:
  - $\leq 0.8$  W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is  $\leq 100$  MHz
  - $\leq 0.6$  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
  - $\leq 0.4$  W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is  $\geq 200$  MHz
3. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is  $\geq 0.8$ W/kg.
4. Per KDB 648474 D04v01r03, when the reported SAR for a body-worn accessory measured without a headset connected to the handset is  $\leq 1.2$  W/kg, SAR testing with a headset connected to the handset is not required.
5. Per KDB648474 D04v01r03, for smart phones with a display diagonal dimension > 15cm or an overall diagonal dimension > 16cm, when hotspot mode applies, 10-g product specific SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg, in this report all the hotspot mode results are < 1.2W/kg.
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 (for handheld on state, the maximum full power means reduced power), including tolerance, allowed for phablet modes to compare with the 1.2 W/kg SAR test reduction threshold.
  - a. For this device SAR for WWAN transmitter scaled to maximum output power mode for product specific 10g SAR is higher than 1.2W/kg of WCDMA Band II/IV, LTE Band 2/4/7/66/42, and 5G NR n2/5/7/77/78, therefore product specific 10g SAR is necessary.
  - b. WLAN 5.3/5.5GHz tested the product specific 10g SAR since it has no hotspot mode.
  - c. When 10-g product specific 10g SAR is considered, SAR thresholds is specified in the procedures for SAR test reduction and exclusion should be multiplied by 2.5.
7. For distance SAR and non-distance SAR, always chose higher SAR to do co-located analysis.
8. The following table "n/a" means the measured SAR is too small to find the 1g cube SAR.

### GSM Note:

1. Per KDB 941225 D01v03r01, for SAR test reduction for GSM / GPRS / EDGE modes is determined by the source-based time-averaged output power including tune-up tolerance. The mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested.
2. Other configurations of GSM / GPRS / EDGE are considered as secondary modes. The 3G SAR test reduction procedure is applied, when the maximum output power and tune-up tolerance specified for production units in a secondary mode is  $\leq 1/4$  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  $\leq 1.2$  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 / DC-HSDPA) are less than  $\frac{1}{4}$  dB higher than the primary modes; therefore, SAR measurement is not required for HSDPA / HSUPA.

**CDMA Note:**

1. Per KDB 941225 D01v03r01, SAR for next to the ear head exposure is measured in RC3 with the handset configured to transmit at full rate in SO55.
2. Per KDB 941225 D01v03r01, in Hotspot mode EUT is treated as data device and SAR is tested with RC3 TDSO/SO32 as the primary mode.
3. Per KDB 941225 D01v03r01, for Body-worn accessory SAR is measured in RC3 with the handset configured in TDSO/SO32 to transmit at full rate on FCH only with all other code channels disabled. The body-worn accessory procedures in KDB Publication 447498 are applied. The 3G SAR test reduction procedure is applied to the multiple code channel configuration (FCH+SCH), with FCH only as the primary mode.

**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  $\leq 0.8$  W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is  $> 1.45$  W/kg, the remaining required test channels must also be tested.
4. Per KDB 941225 D05v02r05, 16QAM/64QAM output power for each RB allocation configuration is  $>$  not  $\frac{1}{2}$  dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is  $\leq 1.45$  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  $\leq 1.45$  W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
6. For LTE B4 / B5 / B12 / B17 / 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.

**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 PI/2 BPSK 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 PI/2 BPSK SAR testing follows 1RB PI/2 BPSK allocation procedure.
- c. PI/2 BPSK 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  $\leq 0.8$  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. QPSK/16QAM/64QAM/256QAM output powers according to 3GPP MPR will not  $\frac{1}{2}$  dB higher than the same configuration in PI/2 BPSK, also reported SAR for the PI/2 BPSK configuration is less than 1.45 W/kg, QPSK/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  $\leq 1.45$  W/kg, smaller bandwidth SAR testing is not required for this device

**WLAN/Bluetooth Note:**

1. Per KDB 248227 D01v02r02, for 2.4GHz 802.11g/n SAR testing is not required when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is  $\leq 1.2$  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  $\leq 1.2$  W/kg, SAR is not required for U-NII-1 band.
3. When the reported SAR of the test position is  $> 0.4$  W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position on the highest maximum output power channel, until the report SAR is  $\leq 0.8$  W/kg or all required test position are tested.
4. For all positions / configurations, when the reported SAR is  $> 0.8$  W/kg, SAR is measured for these test positions / configurations on the subsequent next highest measured output power channel(s) until the reported SAR is  $\leq 1.2$  W/kg or all required channels are tested.
5. During SAR testing the WLAN transmission was verified using a spectrum analyzer.
6. SISO and MIMO all supported by WLAN2.4GHz/WLAN5GHz, for SISO mode power is less than per chain power of MIMO mode.
7. 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 antennas respectively to calculate sum of the power for MIMO mode
8. Only chose MIMO power to perform SAR testing.

**SRS (Sounding Reference Signal) description:**

If one or more receive antennas are used as SRS as dedicated antennas, i.e., the antenna(s) is used for receive and Sound Reference Signal transmission (SRS) only (not traffic transmission), then the SAR measurement at P<sub>limit</sub> for SAR as dedicated antenna(s) can be performed using FTM mode with CW modulation (as SRS could operate at very low duty cycle in online mode). Reported SAR for SRS dedicated antenna can be calculated by scaling the measured SAR at P<sub>limit</sub> to a Tx power corresponding to worst-case SRS duty cycle \* P<sub>max</sub>, then reported SAR for SRS = measured SAR @ P<sub>limit</sub> \*  $10^{\lceil \min\{(\text{reported } P_{\text{max\_dBm}} + 10 \cdot \log_{10}(\text{duty\_cycle}); \text{reported } P_{\text{limit\_dBm}}) - \text{measured } P_{\text{limit\_dBm}}\} / 10 \rceil}$ . The worst-case SRS duty cycle is 8.5% (Declared by Manufacturer).



15.1 Head SAR

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
<b>750MHz</b>																				
	LTE Band 12	10M	QPSK	1	0	-	Right Cheek	0mm	Ant 11	DSI 2/3	23095	707.5	22.86	24.00	1.300	-	-	-0.04	0.299	0.389
	LTE Band 12	10M	QPSK	1	0	-	Right Tilted	0mm	Ant 11	DSI 2/3	23095	707.5	22.86	24.00	1.300	-	-	0.15	0.046	0.060
	LTE Band 12	10M	QPSK	1	0	-	Left Cheek	0mm	Ant 11	DSI 2/3	23095	707.5	22.86	24.00	1.300	-	-	0.04	0.405	0.527
	LTE Band 12	10M	QPSK	1	0	-	Left Tilted	0mm	Ant 11	DSI 2/3	23095	707.5	22.86	24.00	1.300	-	-	0.13	0.051	0.066
	LTE Band 12	10M	QPSK	25	0	-	Right Cheek	0mm	Ant 11	DSI 2/3	23095	707.5	22.78	24.00	1.324	-	-	0.01	0.300	0.397
	LTE Band 12	10M	QPSK	25	0	-	Right Tilted	0mm	Ant 11	DSI 2/3	23095	707.5	22.78	24.00	1.324	-	-	-0.13	0.048	0.064
01	LTE Band 12	10M	QPSK	25	0	-	Left Cheek	0mm	Ant 11	DSI 2/3	23095	707.5	22.78	24.00	1.324	-	-	-0.11	0.501	<b>0.663</b>
	LTE Band 12	10M	QPSK	25	0	-	Left Tilted	0mm	Ant 11	DSI 2/3	23095	707.5	22.78	24.00	1.324	-	-	0.13	0.056	0.074
	LTE Band 12	10M	QPSK	1	0	-	Right Cheek	0mm	Ant 41	DSI 2/3	23095	707.5	23.78	25.20	1.387	-	-	0.04	0.081	0.112
	LTE Band 12	10M	QPSK	1	0	-	Right Tilted	0mm	Ant 41	DSI 2/3	23095	707.5	23.78	25.20	1.387	-	-	-	n/a	n/a
	LTE Band 12	10M	QPSK	1	0	-	Left Cheek	0mm	Ant 41	DSI 2/3	23095	707.5	23.78	25.20	1.387	-	-	-0.11	0.051	0.071
	LTE Band 12	10M	QPSK	1	0	-	Left Tilted	0mm	Ant 41	DSI 2/3	23095	707.5	23.78	25.20	1.387	-	-	-	n/a	n/a
	LTE Band 12	10M	QPSK	25	0	-	Right Cheek	0mm	Ant 41	DSI 2/3	23095	707.5	22.75	24.20	1.396	-	-	-0.19	0.061	0.085
	LTE Band 12	10M	QPSK	25	0	-	Right Tilted	0mm	Ant 41	DSI 2/3	23095	707.5	22.75	24.20	1.396	-	-	-	n/a	n/a
	LTE Band 12	10M	QPSK	25	0	-	Left Cheek	0mm	Ant 41	DSI 2/3	23095	707.5	22.75	24.20	1.396	-	-	0.01	0.043	0.060
	LTE Band 12	10M	QPSK	25	0	-	Left Tilted	0mm	Ant 41	DSI 2/3	23095	707.5	22.75	24.20	1.396	-	-	-	n/a	n/a
	LTE Band 13	10M	QPSK	1	0	-	Right Cheek	0mm	Ant 11	DSI 2/3	23230	782	22.88	24.00	1.294	-	-	-0.03	0.311	0.402
	LTE Band 13	10M	QPSK	1	0	-	Right Tilted	0mm	Ant 11	DSI 2/3	23230	782	22.88	24.00	1.294	-	-	0.11	0.044	0.057
	LTE Band 13	10M	QPSK	1	0	-	Left Cheek	0mm	Ant 11	DSI 2/3	23230	782	22.88	24.00	1.294	-	-	-0.15	0.438	0.567
	LTE Band 13	10M	QPSK	1	0	-	Left Tilted	0mm	Ant 11	DSI 2/3	23230	782	22.88	24.00	1.294	-	-	0.08	0.054	0.070
	LTE Band 13	10M	QPSK	25	0	-	Right Cheek	0mm	Ant 11	DSI 2/3	23230	782	22.80	24.00	1.318	-	-	-0.18	0.329	0.434
	LTE Band 13	10M	QPSK	25	0	-	Right Tilted	0mm	Ant 11	DSI 2/3	23230	782	22.80	24.00	1.318	-	-	0.16	0.053	0.070
02	LTE Band 13	10M	QPSK	25	0	-	Left Cheek	0mm	Ant 11	DSI 2/3	23230	782	22.80	24.00	1.318	-	-	-0.11	0.486	<b>0.641</b>
	LTE Band 13	10M	QPSK	25	0	-	Left Tilted	0mm	Ant 11	DSI 2/3	23230	782	22.80	24.00	1.318	-	-	-0.02	0.055	0.073
	LTE Band 13	10M	QPSK	1	0	-	Right Cheek	0mm	Ant 41	DSI 2/3	23230	782	23.94	25.30	1.368	-	-	-0.17	0.213	0.291
	LTE Band 13	10M	QPSK	1	0	-	Right Tilted	0mm	Ant 41	DSI 2/3	23230	782	23.94	25.30	1.368	-	-	-0.15	0.092	0.126
	LTE Band 13	10M	QPSK	1	0	-	Left Cheek	0mm	Ant 41	DSI 2/3	23230	782	23.94	25.30	1.368	-	-	0.13	0.105	0.144
	LTE Band 13	10M	QPSK	1	0	-	Left Tilted	0mm	Ant 41	DSI 2/3	23230	782	23.94	25.30	1.368	-	-	0.13	0.074	0.101
	LTE Band 13	10M	QPSK	25	0	-	Right Cheek	0mm	Ant 41	DSI 2/3	23230	782	22.82	24.30	1.406	-	-	0.14	0.155	0.218
	LTE Band 13	10M	QPSK	25	0	-	Right Tilted	0mm	Ant 41	DSI 2/3	23230	782	22.82	24.30	1.406	-	-	0.11	0.073	0.103
	LTE Band 13	10M	QPSK	25	0	-	Left Cheek	0mm	Ant 41	DSI 2/3	23230	782	22.82	24.30	1.406	-	-	-0.1	0.081	0.114
	LTE Band 13	10M	QPSK	25	0	-	Left Tilted	0mm	Ant 41	DSI 2/3	23230	782	22.82	24.30	1.406	-	-	-0.17	0.060	0.084
	LTE Band 17	10M	QPSK	1	0	-	Right Cheek	0mm	Ant 11	DSI 2/3	23790	710	22.77	24.00	1.327	-	-	0.19	0.300	0.398
	LTE Band 17	10M	QPSK	1	0	-	Right Tilted	0mm	Ant 11	DSI 2/3	23790	710	22.77	24.00	1.327	-	-	-0.07	0.048	0.064
	LTE Band 17	10M	QPSK	1	0	-	Left Cheek	0mm	Ant 11	DSI 2/3	23790	710	22.77	24.00	1.327	-	-	0.13	0.405	0.538
	LTE Band 17	10M	QPSK	1	0	-	Left Tilted	0mm	Ant 11	DSI 2/3	23790	710	22.77	24.00	1.327	-	-	0.06	0.055	0.073
	LTE Band 17	10M	QPSK	25	0	-	Right Cheek	0mm	Ant 11	DSI 2/3	23790	710	22.76	24.00	1.330	-	-	0.1	0.326	0.434
	LTE Band 17	10M	QPSK	25	0	-	Right Tilted	0mm	Ant 11	DSI 2/3	23790	710	22.76	24.00	1.330	-	-	0.12	0.054	0.072
03	LTE Band 17	10M	QPSK	25	0	-	Left Cheek	0mm	Ant 11	DSI 2/3	23790	710	22.76	24.00	1.330	-	-	0.07	0.511	<b>0.680</b>
	LTE Band 17	10M	QPSK	25	0	-	Left Tilted	0mm	Ant 11	DSI 2/3	23790	710	22.76	24.00	1.330	-	-	0.14	0.059	0.078
	LTE Band 17	10M	QPSK	1	0	-	Right Cheek	0mm	Ant 41	DSI 2/3	23790	710	23.75	25.00	1.334	-	-	-0.14	0.080	0.106
	LTE Band 17	10M	QPSK	1	0	-	Right Tilted	0mm	Ant 41	DSI 2/3	23790	710	23.75	25.00	1.334	-	-	-	n/a	n/a
	LTE Band 17	10M	QPSK	1	0	-	Left Cheek	0mm	Ant 41	DSI 2/3	23790	710	23.75	25.00	1.334	-	-	-0.03	0.053	0.071
	LTE Band 17	10M	QPSK	1	0	-	Left Tilted	0mm	Ant 41	DSI 2/3	23790	710	23.75	25.00	1.334	-	-	-	n/a	n/a
	LTE Band 17	10M	QPSK	25	0	-	Right Cheek	0mm	Ant 41	DSI 2/3	23790	710	22.88	24.00	1.294	-	-	0.01	0.066	0.085
	LTE Band 17	10M	QPSK	25	0	-	Right Tilted	0mm	Ant 41	DSI 2/3	23790	710	22.88	24.00	1.294	-	-	-	n/a	n/a
	LTE Band 17	10M	QPSK	25	0	-	Left Cheek	0mm	Ant 41	DSI 2/3	23790	710	22.88	24.00	1.294	-	-	0.04	0.045	0.058
	LTE Band 17	10M	QPSK	25	0	-	Left Tilted	0mm	Ant 41	DSI 2/3	23790	710	22.88	24.00	1.294	-	-	-	n/a	n/a
<b>835MHz</b>																				
	GSM850	-	-	-	-	GPRS(1 Tx slots)	Right Cheek	0mm	Ant 11	DSI 2	189	836.4	29.59	31.50	1.552	-	-	0.09	0.239	0.371



Table with columns for frequency bands (GSM850, CDMA BC0, WCDMA V, LTE Band 5, LTE Band 18), modulation (QPSK), power (10M, 15M), and SAR values (DSI 2/3, 189, 836.4, 29.59, 31.50, 1.552, etc.).



	LTE Band 19	15M	QPSK	1	0	-	Right Cheek	0mm	Ant 11	DSI 2/3	24075	837.5	20.63	21.50	1.222	-	-	0.19	0.242	0.296
	LTE Band 19	15M	QPSK	1	0	-	Right Tilted	0mm	Ant 11	DSI 2/3	24075	837.5	20.63	21.50	1.222	-	-	0.01	0.042	0.051
	LTE Band 19	15M	QPSK	1	0	-	Left Cheek	0mm	Ant 11	DSI 2/3	24075	837.5	20.63	21.50	1.222	-	-	-0.09	0.577	0.705
	LTE Band 19	15M	QPSK	1	0	-	Left Tilted	0mm	Ant 11	DSI 2/3	24075	837.5	20.63	21.50	1.222	-	-	0.08	0.048	0.059
	LTE Band 19	15M	QPSK	36	0	-	Right Cheek	0mm	Ant 11	DSI 2/3	24075	837.5	20.53	21.50	1.250	-	-	0.04	0.254	0.318
	LTE Band 19	15M	QPSK	36	0	-	Right Tilted	0mm	Ant 11	DSI 2/3	24075	837.5	20.53	21.50	1.250	-	-	-0.18	0.045	0.056
09	LTE Band 19	15M	QPSK	36	0	-	Left Cheek	0mm	Ant 11	DSI 2/3	24075	837.5	20.53	21.50	1.250	-	-	0.12	0.594	<b>0.743</b>
	LTE Band 19	15M	QPSK	36	0	-	Left Tilted	0mm	Ant 11	DSI 2/3	24075	837.5	20.53	21.50	1.250	-	-	0.14	0.051	0.064
	LTE Band 19	15M	QPSK	1	0	-	Right Cheek	0mm	Ant 41	DSI 2/3	24075	837.5	23.70	25.00	1.349	-	-	0.04	0.153	0.206
	LTE Band 19	15M	QPSK	1	0	-	Right Tilted	0mm	Ant 41	DSI 2/3	24075	837.5	23.70	25.00	1.349	-	-	0.11	0.069	0.093
	LTE Band 19	15M	QPSK	1	0	-	Left Cheek	0mm	Ant 41	DSI 2/3	24075	837.5	23.70	25.00	1.349	-	-	0.17	0.110	0.148
	LTE Band 19	15M	QPSK	1	0	-	Left Tilted	0mm	Ant 41	DSI 2/3	24075	837.5	23.70	25.00	1.349	-	-	0.01	0.066	0.089
	LTE Band 19	15M	QPSK	36	0	-	Right Cheek	0mm	Ant 41	DSI 2/3	24075	837.5	22.64	24.00	1.368	-	-	-0.11	0.133	0.182
	LTE Band 19	15M	QPSK	36	0	-	Right Tilted	0mm	Ant 41	DSI 2/3	24075	837.5	22.64	24.00	1.368	-	-	0.13	0.060	0.083
	LTE Band 19	15M	QPSK	36	0	-	Left Cheek	0mm	Ant 41	DSI 2/3	24075	837.5	22.64	24.00	1.368	-	-	0.14	0.095	0.130
	LTE Band 19	15M	QPSK	36	0	-	Left Tilted	0mm	Ant 41	DSI 2/3	24075	837.5	22.64	24.00	1.368	-	-	-0.11	0.058	0.079
	LTE Band 26	15M	QPSK	1	0	-	Right Cheek	0mm	Ant 11	DSI 2/3	26865	831.5	19.52	20.50	1.253	-	-	-0.07	0.176	0.221
	LTE Band 26	15M	QPSK	1	0	-	Right Tilted	0mm	Ant 11	DSI 2/3	26865	831.5	19.52	20.50	1.253	-	-	-	n/a	n/a
	LTE Band 26	15M	QPSK	1	0	-	Left Cheek	0mm	Ant 11	DSI 2/3	26865	831.5	19.52	20.50	1.253	-	-	-0.05	0.258	0.323
	LTE Band 26	15M	QPSK	1	0	-	Left Tilted	0mm	Ant 11	DSI 2/3	26865	831.5	19.52	20.50	1.253	-	-	-	n/a	n/a
	LTE Band 26	15M	QPSK	36	0	-	Right Cheek	0mm	Ant 11	DSI 2/3	26865	831.5	19.49	20.50	1.262	-	-	0.05	0.184	0.232
	LTE Band 26	15M	QPSK	36	0	-	Right Tilted	0mm	Ant 11	DSI 2/3	26865	831.5	19.49	20.50	1.262	-	-	-	n/a	n/a
10	LTE Band 26	15M	QPSK	36	0	-	Left Cheek	0mm	Ant 11	DSI 2/3	26865	831.5	19.49	20.50	1.262	-	-	0.02	0.298	<b>0.376</b>
	LTE Band 26	15M	QPSK	36	0	-	Left Tilted	0mm	Ant 11	DSI 2/3	26865	831.5	19.49	20.50	1.262	-	-	-	n/a	n/a
	LTE Band 26	15M	QPSK	1	0	-	Right Cheek	0mm	Ant 41	DSI 2/3	26865	831.5	22.86	24.00	1.300	-	-	-0.09	0.114	0.148
	LTE Band 26	15M	QPSK	1	0	-	Right Tilted	0mm	Ant 41	DSI 2/3	26865	831.5	22.86	24.00	1.300	-	-	-	n/a	n/a
	LTE Band 26	15M	QPSK	1	0	-	Left Cheek	0mm	Ant 41	DSI 2/3	26865	831.5	22.86	24.00	1.300	-	-	0.07	0.093	0.121
	LTE Band 26	15M	QPSK	1	0	-	Left Tilted	0mm	Ant 41	DSI 2/3	26865	831.5	22.86	24.00	1.300	-	-	0.09	0.044	0.057
	LTE Band 26	15M	QPSK	36	0	-	Right Cheek	0mm	Ant 41	DSI 2/3	26865	831.5	21.86	23.00	1.300	-	-	0.11	0.048	0.062
	LTE Band 26	15M	QPSK	36	0	-	Right Tilted	0mm	Ant 41	DSI 2/3	26865	831.5	21.86	23.00	1.300	-	-	-	n/a	n/a
	LTE Band 26	15M	QPSK	36	0	-	Left Cheek	0mm	Ant 41	DSI 2/3	26865	831.5	21.86	23.00	1.300	-	-	-0.01	0.041	0.053
	LTE Band 26	15M	QPSK	36	0	-	Left Tilted	0mm	Ant 41	DSI 2/3	26865	831.5	21.86	23.00	1.300	-	-	-	n/a	n/a
	FR1 n5	20M	BPSK	1	1	DFT-15	Right Cheek	0mm	Ant 11	DSI 2	167300	836.5	20.31	21.00	1.172	-	-	0.03	0.254	0.298
	FR1 n5	20M	BPSK	1	1	DFT-15	Right Tilted	0mm	Ant 11	DSI 2	167300	836.5	20.31	21.00	1.172	-	-	-	n/a	n/a
	FR1 n5	20M	BPSK	1	1	DFT-15	Left Cheek	0mm	Ant 11	DSI 2	167300	836.5	20.31	21.00	1.172	-	-	0.05	0.297	0.348
	FR1 n5	20M	BPSK	1	1	DFT-15	Left Tilted	0mm	Ant 11	DSI 2	167300	836.5	20.31	21.00	1.172	-	-	-0.04	0.043	0.050
	FR1 n5	20M	BPSK	50	28	DFT-15	Right Cheek	0mm	Ant 11	DSI 2	167300	836.5	20.18	21.00	1.208	-	-	-0.04	0.260	0.314
	FR1 n5	20M	BPSK	50	28	DFT-15	Right Tilted	0mm	Ant 11	DSI 2	167300	836.5	20.18	21.00	1.208	-	-	-	n/a	n/a
11	FR1 n5	20M	BPSK	50	28	DFT-15	Left Cheek	0mm	Ant 11	DSI 2	167300	836.5	20.18	21.00	1.208	-	-	-0.03	0.379	<b>0.458</b>
	FR1 n5	20M	BPSK	50	28	DFT-15	Left Tilted	0mm	Ant 11	DSI 2	167300	836.5	20.18	21.00	1.208	-	-	-0.02	0.044	0.053
	FR1 n5	20M	BPSK	1	1	DFT-15	Right Cheek	0mm	Ant 11	DSI 3	167300	836.5	19.71	20.50	1.199	-	-	-0.13	0.229	0.275
	FR1 n5	20M	BPSK	1	1	DFT-15	Right Tilted	0mm	Ant 11	DSI 3	167300	836.5	19.71	20.50	1.199	-	-	-	n/a	n/a
	FR1 n5	20M	BPSK	1	1	DFT-15	Left Cheek	0mm	Ant 11	DSI 3	167300	836.5	19.71	20.50	1.199	-	-	-0.18	0.260	0.312
	FR1 n5	20M	BPSK	1	1	DFT-15	Left Tilted	0mm	Ant 11	DSI 3	167300	836.5	19.71	20.50	1.199	-	-	-	n/a	n/a
	FR1 n5	20M	BPSK	50	28	DFT-15	Right Cheek	0mm	Ant 11	DSI 3	167300	836.5	19.64	20.50	1.219	-	-	-0.11	0.228	0.278
	FR1 n5	20M	BPSK	50	28	DFT-15	Right Tilted	0mm	Ant 11	DSI 3	167300	836.5	19.64	20.50	1.219	-	-	-	n/a	n/a
	FR1 n5	20M	BPSK	50	28	DFT-15	Left Cheek	0mm	Ant 11	DSI 3	167300	836.5	19.64	20.50	1.219	-	-	-0.11	0.325	0.396
	FR1 n5	20M	BPSK	50	28	DFT-15	Left Tilted	0mm	Ant 11	DSI 3	167300	836.5	19.64	20.50	1.219	-	-	-	n/a	n/a
	FR1 n5	20M	BPSK	1	1	DFT-15	Right Cheek	0mm	Ant 41	DSI 2/3	167300	836.5	23.74	24.50	1.191	-	-	-0.14	0.169	0.201
	FR1 n5	20M	BPSK	1	1	DFT-15	Right Tilted	0mm	Ant 41	DSI 2/3	167300	836.5	23.74	24.50	1.191	-	-	-0.05	0.084	0.100
	FR1 n5	20M	BPSK	1	1	DFT-15	Left Cheek	0mm	Ant 41	DSI 2/3	167300	836.5	23.74	24.50	1.191	-	-	-0.07	0.108	0.129
	FR1 n5	20M	BPSK	1	1	DFT-15	Left Tilted	0mm	Ant 41	DSI 2/3	167300	836.5	23.74	24.50	1.191	-	-	-0.19	0.079	0.094
	FR1 n5	20M	BPSK	50	28	DFT-15	Right Cheek	0mm	Ant 41	DSI 2/3	167300	836.5	23.67	24.50	1.211	-	-	-0.06	0.138	0.167
	FR1 n5	20M	BPSK	50	28	DFT-15	Right Tilted	0mm	Ant 41	DSI 2/3	167300	836.5	23.67	24.50	1.211	-	-	0.13	0.075	0.091
	FR1 n5	20M	BPSK	50	28	DFT-15	Left Cheek	0mm	Ant 41	DSI 2/3	167300	836.5	23.67	24.50	1.211	-	-	-0.04	0.095	0.115





Table with columns: FR1 n5, 20M, BPSK, 50, 28, DFT-15, Left Tilted, 0mm, Ant 41, DSI 2/3, 167300, 836.5, 23.67, 24.50, 1.211, -, -, -0.18, 0.066, 0.080. Includes sub-headers for 1750MHz and rows for WCDMA IV and LTE Band 4/66.



**FCC SAR Test Report**

**Report No. : FA212202**

	LTE Band 66	20M	QPSK	50	0	-	Right Tilted	0mm	Ant 25	DSI 2/3	132322	1745	16.42	17.50	1.282	-	-	-	n/a	n/a
	LTE Band 66	20M	QPSK	50	0	-	Left Cheek	0mm	Ant 25	DSI 2/3	132322	1745	16.42	17.50	1.282	-	-	0.02	0.301	0.386
	LTE Band 66	20M	QPSK	50	0	-	Left Tilted	0mm	Ant 25	DSI 2/3	132322	1745	16.42	17.50	1.282	-	-	-0.08	0.031	0.040
	FR1 n66	30M	BPSK	1	1	DFT-15	Right Cheek	0mm	Ant 13	DSI 2	349000	1745	14.92	15.80	1.225	-	-	-0.12	0.441	0.540
	FR1 n66	30M	BPSK	1	1	DFT-15	Right Tilted	0mm	Ant 13	DSI 2	349000	1745	14.92	15.80	1.225	-	-	0.14	0.529	0.648
	FR1 n66	30M	BPSK	1	1	DFT-15	Left Cheek	0mm	Ant 13	DSI 2	349000	1745	14.92	15.80	1.225	-	-	0.17	0.338	0.414
	FR1 n66	30M	BPSK	1	1	DFT-15	Left Tilted	0mm	Ant 13	DSI 2	349000	1745	14.92	15.80	1.225	-	-	-0.1	0.470	0.576
	FR1 n66	30M	BPSK	80	40	DFT-15	Right Cheek	0mm	Ant 13	DSI 2	349000	1745	14.88	15.80	1.236	-	-	-0.01	0.413	0.510
15	FR1 n66	30M	BPSK	80	40	DFT-15	Right Tilted	0mm	Ant 13	DSI 2	349000	1745	14.88	15.80	1.236	-	-	0.09	0.620	<b>0.766</b>
	FR1 n66	30M	BPSK	80	40	DFT-15	Left Cheek	0mm	Ant 13	DSI 2	349000	1745	14.88	15.80	1.236	-	-	-0.12	0.333	0.412
	FR1 n66	30M	BPSK	80	40	DFT-15	Left Tilted	0mm	Ant 13	DSI 2	349000	1745	14.88	15.80	1.236	-	-	-0.13	0.435	0.538
	FR1 n66	30M	BPSK	1	1	DFT-15	Right Cheek	0mm	Ant 13	DSI 3	349000	1745	14.09	14.80	1.178	-	-	-0.01	0.331	0.390
	FR1 n66	30M	BPSK	1	1	DFT-15	Right Tilted	0mm	Ant 13	DSI 3	349000	1745	14.09	14.80	1.178	-	-	-0.13	0.411	0.484
	FR1 n66	30M	BPSK	1	1	DFT-15	Left Cheek	0mm	Ant 13	DSI 3	349000	1745	14.09	14.80	1.178	-	-	-0.07	0.255	0.300
	FR1 n66	30M	BPSK	1	1	DFT-15	Left Tilted	0mm	Ant 13	DSI 3	349000	1745	14.09	14.80	1.178	-	-	-0.17	0.351	0.413
	FR1 n66	30M	BPSK	80	40	DFT-15	Right Cheek	0mm	Ant 13	DSI 3	349000	1745	13.96	14.80	1.213	-	-	0.17	0.321	0.389
	FR1 n66	30M	BPSK	80	40	DFT-15	Right Tilted	0mm	Ant 13	DSI 3	349000	1745	13.96	14.80	1.213	-	-	0.08	0.493	0.598
	FR1 n66	30M	BPSK	80	40	DFT-15	Left Cheek	0mm	Ant 13	DSI 3	349000	1745	13.96	14.80	1.213	-	-	0.04	0.262	0.318
	FR1 n66	30M	BPSK	80	40	DFT-15	Left Tilted	0mm	Ant 13	DSI 3	349000	1745	13.96	14.80	1.213	-	-	0.04	0.351	0.426
	FR1 n66	30M	BPSK	1	1	DFT-15	Right Cheek	0mm	Ant 31	DSI 2/3	349000	1745	23.38	24.50	1.294	-	-	0.19	0.123	0.159
	FR1 n66	30M	BPSK	1	1	DFT-15	Right Tilted	0mm	Ant 31	DSI 2/3	349000	1745	23.38	24.50	1.294	-	-	-0.08	0.089	0.115
	FR1 n66	30M	BPSK	1	1	DFT-15	Left Cheek	0mm	Ant 31	DSI 2/3	349000	1745	23.38	24.50	1.294	-	-	0.15	0.074	0.096
	FR1 n66	30M	BPSK	1	1	DFT-15	Left Tilted	0mm	Ant 31	DSI 2/3	349000	1745	23.38	24.50	1.294	-	-	0.18	0.062	0.080
	FR1 n66	30M	BPSK	80	40	DFT-15	Right Cheek	0mm	Ant 31	DSI 2/3	349000	1745	23.25	24.50	1.334	-	-	-0.12	0.148	0.197
	FR1 n66	30M	BPSK	80	40	DFT-15	Right Tilted	0mm	Ant 31	DSI 2/3	349000	1745	23.25	24.50	1.334	-	-	-0.07	0.090	0.120
	FR1 n66	30M	BPSK	80	40	DFT-15	Left Cheek	0mm	Ant 31	DSI 2/3	349000	1745	23.25	24.50	1.334	-	-	-0.15	0.076	0.101
	FR1 n66	30M	BPSK	80	40	DFT-15	Left Tilted	0mm	Ant 31	DSI 2/3	349000	1745	23.25	24.50	1.334	-	-	-0.07	0.067	0.089
	FR1 n66	30M	BPSK	1	1	DFT-15	Right Cheek	0mm	Ant 25	DSI 2	349000	1745	18.12	18.80	1.169	-	-	0.17	0.250	0.292
	FR1 n66	30M	BPSK	1	1	DFT-15	Right Tilted	0mm	Ant 25	DSI 2	349000	1745	18.12	18.80	1.169	-	-	0.14	0.051	0.060
	FR1 n66	30M	BPSK	1	1	DFT-15	Left Cheek	0mm	Ant 25	DSI 2	349000	1745	18.12	18.80	1.169	-	-	0.01	0.313	0.366
	FR1 n66	30M	BPSK	1	1	DFT-15	Left Tilted	0mm	Ant 25	DSI 2	349000	1745	18.12	18.80	1.169	-	-	0.1	0.079	0.092
	FR1 n66	30M	BPSK	80	40	DFT-15	Right Cheek	0mm	Ant 25	DSI 2	349000	1745	18.04	18.80	1.191	-	-	0.12	0.253	0.301
	FR1 n66	30M	BPSK	80	40	DFT-15	Right Tilted	0mm	Ant 25	DSI 2	349000	1745	18.04	18.80	1.191	-	-	-0.12	0.052	0.062
	FR1 n66	30M	BPSK	80	40	DFT-15	Left Cheek	0mm	Ant 25	DSI 2	349000	1745	18.04	18.80	1.191	-	-	0.09	0.337	0.401
	FR1 n66	30M	BPSK	80	40	DFT-15	Left Tilted	0mm	Ant 25	DSI 2	349000	1745	18.04	18.80	1.191	-	-	0.02	0.075	0.089
	FR1 n66	30M	BPSK	1	1	DFT-15	Right Cheek	0mm	Ant 25	DSI 3	349000	1745	17.22	17.80	1.143	-	-	-0.13	0.211	0.241
	FR1 n66	30M	BPSK	1	1	DFT-15	Right Tilted	0mm	Ant 25	DSI 3	349000	1745	17.22	17.80	1.143	-	-	-0.04	0.042	0.048
	FR1 n66	30M	BPSK	1	1	DFT-15	Left Cheek	0mm	Ant 25	DSI 3	349000	1745	17.22	17.80	1.143	-	-	0.1	0.267	0.305
	FR1 n66	30M	BPSK	1	1	DFT-15	Left Tilted	0mm	Ant 25	DSI 3	349000	1745	17.22	17.80	1.143	-	-	-0.04	0.063	0.072
	FR1 n66	30M	BPSK	80	40	DFT-15	Right Cheek	0mm	Ant 25	DSI 3	349000	1745	16.96	17.80	1.213	-	-	-0.13	0.189	0.229
	FR1 n66	30M	BPSK	80	40	DFT-15	Right Tilted	0mm	Ant 25	DSI 3	349000	1745	16.96	17.80	1.213	-	-	-	n/a	n/a
	FR1 n66	30M	BPSK	80	40	DFT-15	Left Cheek	0mm	Ant 25	DSI 3	349000	1745	16.96	17.80	1.213	-	-	0.07	0.289	0.351
	FR1 n66	30M	BPSK	80	40	DFT-15	Left Tilted	0mm	Ant 25	DSI 3	349000	1745	16.96	17.80	1.213	-	-	-0.05	0.062	0.075
<b>1900MHz</b>																				
	GSM1900					EDGE(4 Tx slots)	Right Cheek	0mm	Ant 13	DSI 2	661	1880	17.31	18.50	1.315	-	-	-0.05	0.347	0.456
16	GSM1900					EDGE(4 Tx slots)	Right Tilted	0mm	Ant 13	DSI 2	661	1880	17.31	18.50	1.315	-	-	-0.05	0.496	<b>0.652</b>
	GSM1900					EDGE(4 Tx slots)	Left Cheek	0mm	Ant 13	DSI 2	661	1880	17.31	18.50	1.315	-	-	0.16	0.303	0.399
	GSM1900					EDGE(4 Tx slots)	Left Tilted	0mm	Ant 13	DSI 2	661	1880	17.31	18.50	1.315	-	-	0.14	0.375	0.493
	GSM1900					EDGE(4 Tx slots)	Right Cheek	0mm	Ant 13	DSI 3	661	1880	16.73	17.50	1.194	-	-	0.15	0.301	0.359
	GSM1900					EDGE(4 Tx slots)	Right Tilted	0mm	Ant 13	DSI 3	661	1880	16.73	17.50	1.194	-	-	-0.12	0.426	0.509
	GSM1900					EDGE(4 Tx slots)	Left Cheek	0mm	Ant 13	DSI 3	661	1880	16.73	17.50	1.194	-	-	-0.11	0.261	0.312
	GSM1900					EDGE(4 Tx slots)	Left Tilted	0mm	Ant 13	DSI 3	661	1880	16.73	17.50	1.194	-	-	0.17	0.325	0.388
	GSM1900					GPRS(3 Tx slots)	Right Cheek	0mm	Ant 31	DSI 2/3	661	1880	26.42	28.00	1.439	-	-	-0.02	0.057	0.081
	GSM1900					GPRS(3 Tx slots)	Right Tilted	0mm	Ant 31	DSI 2/3	661	1880	26.42	28.00	1.439	-	-	-	n/a	n/a
	GSM1900					GPRS(3 Tx slots)	Left Cheek	0mm	Ant 31	DSI 2/3	661	1880	26.42	28.00	1.439	-	-	-0.04	0.043	0.062



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	GSM1900				GPRS(3 Tx slots)	Left Tilted	0mm	Ant 31	DSI 2/3	661	1880	26.42	28.00	1.439	-	-	-	n/a	n/a	
	WCDMA II				RMC 12.2Kbps	Right Cheek	0mm	Ant 13	DSI 2/3	9400	1880	13.23	15.00	1.503	-	-	-0.19	0.390	0.586	
17	WCDMA II				RMC 12.2Kbps	Right Tilted	0mm	Ant 13	DSI 2/3	9400	1880	13.23	15.00	1.503	-	-	-0.02	0.527	<b>0.792</b>	
	WCDMA II				RMC 12.2Kbps	Left Cheek	0mm	Ant 13	DSI 2/3	9400	1880	13.23	15.00	1.503	-	-	-0.02	0.281	0.422	
	WCDMA II				RMC 12.2Kbps	Left Tilted	0mm	Ant 13	DSI 2/3	9400	1880	13.23	15.00	1.503	-	-	-0.12	0.364	0.547	
	WCDMA II				RMC 12.2Kbps	Right Cheek	0mm	Ant 31	DSI 2/3	9400	1880	24.20	25.30	1.288	-	-	-0.12	0.100	0.129	
	WCDMA II				RMC 12.2Kbps	Right Tilted	0mm	Ant 31	DSI 2/3	9400	1880	24.20	25.30	1.288	-	-	0.13	0.089	0.115	
	WCDMA II				RMC 12.2Kbps	Left Cheek	0mm	Ant 31	DSI 2/3	9400	1880	24.20	25.30	1.288	-	-	0.03	0.065	0.084	
	WCDMA II				RMC 12.2Kbps	Left Tilted	0mm	Ant 31	DSI 2/3	9400	1880	24.20	25.30	1.288	-	-	-0.11	0.050	0.064	
	LTE Band 2	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 13	DSI 2/3	18900	1880	13.39	14.50	1.291	-	-	0.02	0.301	0.389
	LTE Band 2	20M	QPSK	1	0	-	Right Tilted	0mm	Ant 13	DSI 2/3	18900	1880	13.39	14.50	1.291	-	-	-0.15	0.535	0.691
	LTE Band 2	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 13	DSI 2/3	18900	1880	13.39	14.50	1.291	-	-	0.11	0.252	0.325
	LTE Band 2	20M	QPSK	1	0	-	Left Tilted	0mm	Ant 13	DSI 2/3	18900	1880	13.39	14.50	1.291	-	-	0.11	0.364	0.470
	LTE Band 2	20M	QPSK	50	0	-	Right Cheek	0mm	Ant 13	DSI 2/3	18900	1880	13.35	14.50	1.303	-	-	-0.14	0.329	0.429
18	LTE Band 2	20M	QPSK	50	0	-	Right Tilted	0mm	Ant 13	DSI 2/3	18900	1880	13.35	14.50	1.303	-	-	-0.02	0.639	<b>0.833</b>
	LTE Band 2	20M	QPSK	50	0	-	Left Cheek	0mm	Ant 13	DSI 2/3	18900	1880	13.35	14.50	1.303	-	-	-0.19	0.260	0.339
	LTE Band 2	20M	QPSK	50	0	-	Left Tilted	0mm	Ant 13	DSI 2/3	18900	1880	13.35	14.50	1.303	-	-	-0.01	0.379	0.494
	LTE Band 2	20M	QPSK	50	0	-	Right Tilted	0mm	Ant 13	DSI 2/3	18700	1860	13.27	14.50	1.327	-	-	-0.03	0.459	0.609
	LTE Band 2	20M	QPSK	50	0	-	Right Tilted	0mm	Ant 13	DSI 2/3	19100	1900	13.26	14.50	1.330	-	-	-0.13	0.486	0.647
	LTE Band 2	20M	QPSK	100	0	-	Right Tilted	0mm	Ant 13	DSI 2/3	18900	1880	13.29	14.50	1.321	-	-	-0.07	0.501	0.662
	LTE Band 2	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 31	DSI 2/3	18900	1880	23.28	24.50	1.324	-	-	-0.12	0.084	0.111
	LTE Band 2	20M	QPSK	1	0	-	Right Tilted	0mm	Ant 31	DSI 2/3	18900	1880	23.28	24.50	1.324	-	-	-	n/a	n/a
	LTE Band 2	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 31	DSI 2/3	18900	1880	23.28	24.50	1.324	-	-	0.02	0.045	0.060
	LTE Band 2	20M	QPSK	1	0	-	Left Tilted	0mm	Ant 31	DSI 2/3	18900	1880	23.28	24.50	1.324	-	-	-	n/a	n/a
	LTE Band 2	20M	QPSK	50	0	-	Right Cheek	0mm	Ant 31	DSI 2/3	18900	1880	22.15	23.50	1.365	-	-	-0.02	0.058	0.079
	LTE Band 2	20M	QPSK	50	0	-	Right Tilted	0mm	Ant 31	DSI 2/3	18900	1880	22.15	23.50	1.365	-	-	-	n/a	n/a
	LTE Band 2	20M	QPSK	50	0	-	Left Cheek	0mm	Ant 31	DSI 2/3	18900	1880	22.15	23.50	1.365	-	-	-0.03	0.043	0.059
	LTE Band 2	20M	QPSK	50	0	-	Left Tilted	0mm	Ant 31	DSI 2/3	18900	1880	22.15	23.50	1.365	-	-	-	n/a	n/a
	FR1 n2	20M	BPSK	1	1	DFT-15	Right Cheek	0mm	Ant 13	DSI 2	376000	1880	13.25	14.30	1.274	-	-	-0.07	0.301	0.383
	FR1 n2	20M	BPSK	1	1	DFT-15	Right Tilted	0mm	Ant 13	DSI 2	376000	1880	13.25	14.30	1.274	-	-	0.07	0.383	0.488
	FR1 n2	20M	BPSK	1	1	DFT-15	Left Cheek	0mm	Ant 13	DSI 2	376000	1880	13.25	14.30	1.274	-	-	0.15	0.232	0.295
	FR1 n2	20M	BPSK	1	1	DFT-15	Left Tilted	0mm	Ant 13	DSI 2	376000	1880	13.25	14.30	1.274	-	-	0.04	0.331	0.422
	FR1 n2	20M	BPSK	50	28	DFT-15	Right Cheek	0mm	Ant 13	DSI 2	376000	1880	13.12	14.30	1.312	-	-	-0.09	0.324	0.425
19	FR1 n2	20M	BPSK	50	28	DFT-15	Right Tilted	0mm	Ant 13	DSI 2	376000	1880	13.12	14.30	1.312	-	-	-0.05	0.453	<b>0.594</b>
	FR1 n2	20M	BPSK	50	28	DFT-15	Left Cheek	0mm	Ant 13	DSI 2	376000	1880	13.12	14.30	1.312	-	-	0.03	0.252	0.331
	FR1 n2	20M	BPSK	50	28	DFT-15	Left Tilted	0mm	Ant 13	DSI 2	376000	1880	13.12	14.30	1.312	-	-	0.09	0.345	0.453
	FR1 n2	20M	BPSK	1	1	DFT-15	Right Cheek	0mm	Ant 13	DSI 3	376000	1880	12.25	13.30	1.274	-	-	0.05	0.241	0.307
	FR1 n2	20M	BPSK	1	1	DFT-15	Right Tilted	0mm	Ant 13	DSI 3	376000	1880	12.25	13.30	1.274	-	-	0.07	0.303	0.386
	FR1 n2	20M	BPSK	1	1	DFT-15	Left Cheek	0mm	Ant 13	DSI 3	376000	1880	12.25	13.30	1.274	-	-	0.19	0.185	0.236
	FR1 n2	20M	BPSK	1	1	DFT-15	Left Tilted	0mm	Ant 13	DSI 3	376000	1880	12.25	13.30	1.274	-	-	-0.11	0.254	0.323
	FR1 n2	20M	BPSK	50	28	DFT-15	Right Cheek	0mm	Ant 13	DSI 3	376000	1880	12.18	13.30	1.294	-	-	0.16	0.257	0.333
	FR1 n2	20M	BPSK	50	28	DFT-15	Right Tilted	0mm	Ant 13	DSI 3	376000	1880	12.18	13.30	1.294	-	-	-0.05	0.352	0.456
	FR1 n2	20M	BPSK	50	28	DFT-15	Left Cheek	0mm	Ant 13	DSI 3	376000	1880	12.18	13.30	1.294	-	-	-0.09	0.195	0.252
	FR1 n2	20M	BPSK	50	28	DFT-15	Left Tilted	0mm	Ant 13	DSI 3	376000	1880	12.18	13.30	1.294	-	-	0.04	0.276	0.357
	FR1 n2	20M	BPSK	1	1	DFT-15	Right Cheek	0mm	Ant 31	DSI 2/3	376000	1880	22.71	23.50	1.199	-	-	-0.03	0.067	0.080
	FR1 n2	20M	BPSK	1	1	DFT-15	Right Tilted	0mm	Ant 31	DSI 2/3	376000	1880	22.71	23.50	1.199	-	-	-	n/a	n/a
	FR1 n2	20M	BPSK	1	1	DFT-15	Left Cheek	0mm	Ant 31	DSI 2/3	376000	1880	22.71	23.50	1.199	-	-	0.02	0.043	0.052
	FR1 n2	20M	BPSK	1	1	DFT-15	Left Tilted	0mm	Ant 31	DSI 2/3	376000	1880	22.71	23.50	1.199	-	-	-	n/a	n/a
	FR1 n2	20M	BPSK	50	28	DFT-15	Right Cheek	0mm	Ant 31	DSI 2/3	376000	1880	22.63	23.50	1.222	-	-	0.14	0.058	0.071
	FR1 n2	20M	BPSK	50	28	DFT-15	Right Tilted	0mm	Ant 31	DSI 2/3	376000	1880	22.63	23.50	1.222	-	-	-	n/a	n/a
	FR1 n2	20M	BPSK	50	28	DFT-15	Left Cheek	0mm	Ant 31	DSI 2/3	376000	1880	22.63	23.50	1.222	-	-	0.06	0.032	0.039
	FR1 n2	20M	BPSK	50	28	DFT-15	Left Tilted	0mm	Ant 31	DSI 2/3	376000	1880	22.63	23.50	1.222	-	-	-	n/a	n/a
<b>2450MHz</b>																				
	WLAN2.4GHz	-	-	-	-	802.11b 1Mbps	Right Cheek	0mm	Ant 24+23	Reduced Level 2	6	2437	13.51	15.00	1.408	100	1.000	0.13	0.117	0.165
	WLAN2.4GHz	-	-	-	-	802.11b 1Mbps	Right Tilted	0mm	Ant 24+23	Reduced Level 2	6	2437	13.51	15.00	1.408	100	1.000	0.05	0.072	0.102



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20	WLAN2.4GHz	-	-	-	-	802.11b 1Mbps	Left Cheek	0mm	Ant 24+23	Reduced Level 2	6	2437	13.51	15.00	1.408	100	1.000	0.14	0.191	<b>0.269</b>
	WLAN2.4GHz	-	-	-	-	802.11b 1Mbps	Left Tilted	0mm	Ant 24+23	Reduced Level 2	6	2437	13.51	15.00	1.408	100	1.000	-0.16	0.184	0.259
	Bluetooth	-	-	-	-	DH5 1Mbps	Right Cheek	0mm	Ant 24	Full	39	2441	10.70	12.00	1.349	76.52	1.307	-0.11	0.025	0.044
	Bluetooth	-	-	-	-	DH5 1Mbps	Right Tilted	0mm	Ant 24	Full	39	2441	10.70	12.00	1.349	76.52	1.307	0.1	0.009	0.016
	Bluetooth	-	-	-	-	DH5 1Mbps	Left Cheek	0mm	Ant 24	Full	39	2441	10.70	12.00	1.349	76.52	1.307	-0.16	0.058	0.103
	Bluetooth	-	-	-	-	DH5 1Mbps	Left Tilted	0mm	Ant 24	Full	39	2441	10.70	12.00	1.349	76.52	1.307	0.07	0.013	0.022
	Bluetooth	-	-	-	-	DH5 1Mbps	Right Cheek	0mm	Ant 23	Full	39	2441	13.40	14.50	1.288	76.79	1.302	0.05	0.052	0.087
	Bluetooth	-	-	-	-	DH5 1Mbps	Right Tilted	0mm	Ant 23	Full	39	2441	13.40	14.50	1.288	76.79	1.302	0.04	0.057	0.096
21	Bluetooth	-	-	-	-	DH5 1Mbps	Left Cheek	0mm	Ant 23	Full	39	2441	13.40	14.50	1.288	76.79	1.302	-0.16	0.233	<b>0.391</b>
	Bluetooth	-	-	-	-	DH5 1Mbps	Left Tilted	0mm	Ant 23	Full	39	2441	13.40	14.50	1.288	76.79	1.302	-0.01	0.096	0.161
<b>2600MHz</b>																				
	LTE Band 7	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 13	DSI 2/3	21100	2535	13.58	14.00	1.102	-	-	0.01	0.577	0.636
	LTE Band 7	20M	QPSK	1	0	-	Right Tilted	0mm	Ant 13	DSI 2/3	21100	2535	13.58	14.00	1.102	-	-	0.05	0.711	0.783
	LTE Band 7	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 13	DSI 2/3	21100	2535	13.58	14.00	1.102	-	-	0.12	0.170	0.187
	LTE Band 7	20M	QPSK	1	0	-	Left Tilted	0mm	Ant 13	DSI 2/3	21100	2535	13.58	14.00	1.102	-	-	-0.12	0.175	0.193
	LTE Band 7	20M	QPSK	50	0	-	Right Cheek	0mm	Ant 13	DSI 2/3	21100	2535	13.56	14.00	1.107	-	-	-0.06	0.586	0.648
22	LTE Band 7	20M	QPSK	50	0	-	Right Tilted	0mm	Ant 13	DSI 2/3	21100	2535	13.56	14.00	1.107	-	-	0.05	0.740	<b>0.819</b>
	LTE Band 7C	20M	QPSK	1	0	-	Right Tilted	0mm	Ant 13	DSI 2/3	21100	2535	13.59	14.00	1.099	-	-	0.11	0.465	0.511
	LTE Band 7	20M	QPSK	50	0	-	Left Cheek	0mm	Ant 13	DSI 2/3	21100	2535	13.56	14.00	1.107	-	-	0.18	0.182	0.201
	LTE Band 7	20M	QPSK	50	0	-	Left Tilted	0mm	Ant 13	DSI 2/3	21100	2535	13.56	14.00	1.107	-	-	-0.07	0.179	0.198
	LTE Band 7	20M	QPSK	50	0	-	Right Tilted	0mm	Ant 13	DSI 2/3	20850	2510	13.38	14.00	1.153	-	-	-0.16	0.611	0.705
	LTE Band 7	20M	QPSK	50	0	-	Right Tilted	0mm	Ant 13	DSI 2/3	21350	2560	13.55	14.00	1.109	-	-	-0.11	0.603	0.669
	LTE Band 7	20M	QPSK	100	0	-	Right Tilted	0mm	Ant 13	DSI 2/3	21100	2535	13.43	14.00	1.140	-	-	0.15	0.632	0.721
	LTE Band 7	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 31	DSI 2/3	21100	2535	23.65	25.00	1.365	-	-	0.18	0.067	0.091
	LTE Band 7	20M	QPSK	1	0	-	Right Tilted	0mm	Ant 31	DSI 2/3	21100	2535	23.65	25.00	1.365	-	-	-0.1	0.068	0.093
	LTE Band 7	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 31	DSI 2/3	21100	2535	23.65	25.00	1.365	-	-	-0.19	0.060	0.082
	LTE Band 7	20M	QPSK	1	0	-	Left Tilted	0mm	Ant 31	DSI 2/3	21100	2535	23.65	25.00	1.365	-	-	0.13	0.071	0.097
	LTE Band 7C	20M	QPSK	1	0	-	Left Tilted	0mm	Ant 31	DSI 2/3	21100	2535	23.59	25.00	1.384	-	-	-0.17	0.058	0.080
	LTE Band 7	20M	QPSK	50	0	-	Right Cheek	0mm	Ant 31	DSI 2/3	21100	2535	22.74	24.00	1.337	-	-	-0.12	0.065	0.087
	LTE Band 7	20M	QPSK	50	0	-	Right Tilted	0mm	Ant 31	DSI 2/3	21100	2535	22.74	24.00	1.337	-	-	-0.14	0.060	0.080
	LTE Band 7	20M	QPSK	50	0	-	Left Cheek	0mm	Ant 31	DSI 2/3	21100	2535	22.74	24.00	1.337	-	-	0.11	0.051	0.068
	LTE Band 7	20M	QPSK	50	0	-	Left Tilted	0mm	Ant 31	DSI 2/3	21100	2535	22.74	24.00	1.337	-	-	0.14	0.057	0.076
	LTE Band 7	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 25	DSI 2/3	21100	2535	17.49	18.50	1.262	-	-	0.11	0.301	0.380
	LTE Band 7	20M	QPSK	1	0	-	Right Tilted	0mm	Ant 25	DSI 2/3	21100	2535	17.49	18.50	1.262	-	-	-0.01	0.041	0.052
	LTE Band 7	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 25	DSI 2/3	21100	2535	17.49	18.50	1.262	-	-	-0.09	0.194	0.245
	LTE Band 7	20M	QPSK	1	0	-	Left Tilted	0mm	Ant 25	DSI 2/3	21100	2535	17.49	18.50	1.262	-	-	-	n/a	n/a
	LTE Band 7	20M	QPSK	50	0	-	Right Cheek	0mm	Ant 25	DSI 2/3	21100	2535	17.45	18.50	1.274	-	-	0.19	0.414	0.527
	LTE Band 7C	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 25	DSI 2/3	21100	2535	17.57	18.50	1.239	-	-	0.1	0.374	0.463
	LTE Band 7	20M	QPSK	50	0	-	Right Tilted	0mm	Ant 25	DSI 2/3	21100	2535	17.45	18.50	1.274	-	-	-0.01	0.053	0.067
	LTE Band 7	20M	QPSK	50	0	-	Left Cheek	0mm	Ant 25	DSI 2/3	21100	2535	17.45	18.50	1.274	-	-	0.12	0.195	0.248
	LTE Band 7	20M	QPSK	50	0	-	Left Tilted	0mm	Ant 25	DSI 2/3	21100	2535	17.45	18.50	1.274	-	-	-0.16	0.045	0.057
	LTE Band 38	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 13	DSI 2/3	38000	2595	15.13	15.70	1.140	62.9	1.006	0.16	0.432	0.496
	LTE Band 38	20M	QPSK	1	0	-	Right Tilted	0mm	Ant 13	DSI 2/3	38000	2595	15.13	15.70	1.140	62.9	1.006	0.03	0.468	0.537
	LTE Band 38	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 13	DSI 2/3	38000	2595	15.13	15.70	1.140	62.9	1.006	0.05	0.156	0.179
	LTE Band 38	20M	QPSK	1	0	-	Left Tilted	0mm	Ant 13	DSI 2/3	38000	2595	15.13	15.70	1.140	62.9	1.006	-0.17	0.131	0.150
	LTE Band 38	20M	QPSK	50	0	-	Right Cheek	0mm	Ant 13	DSI 2/3	38000	2595	14.92	15.70	1.197	62.9	1.006	0.13	0.457	0.550
23	LTE Band 38	20M	QPSK	50	0	-	Right Tilted	0mm	Ant 13	DSI 2/3	38000	2595	14.92	15.70	1.197	62.9	1.006	0.11	0.504	<b>0.607</b>
	LTE Band 38C	20M	QPSK	1	0	-	Right Tilted	0mm	Ant 13	DSI 2/3	37901	2585.1	14.32	15.70	1.374	62.9	1.006	0.16	0.371	0.513
	LTE Band 38	20M	QPSK	50	0	-	Left Cheek	0mm	Ant 13	DSI 2/3	38000	2595	14.92	15.70	1.197	62.9	1.006	0.11	0.164	0.197
	LTE Band 38	20M	QPSK	50	0	-	Left Tilted	0mm	Ant 13	DSI 2/3	38000	2595	14.92	15.70	1.197	62.9	1.006	0.01	0.142	0.171
	LTE Band 38	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 31	DSI 2/3	38000	2595	23.79	25.00	1.321	62.9	1.006	-	n/a	n/a
	LTE Band 38	20M	QPSK	1	0	-	Right Tilted	0mm	Ant 31	DSI 2/3	38000	2595	23.79	25.00	1.321	62.9	1.006	-	n/a	n/a
	LTE Band 38	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 31	DSI 2/3	38000	2595	23.79	25.00	1.321	62.9	1.006	-	n/a	n/a
	LTE Band 38	20M	QPSK	1	0	-	Left Tilted	0mm	Ant 31	DSI 2/3	38000	2595	23.79	25.00	1.321	62.9	1.006	-0.13	0.020	0.026
	LTE Band 38C	20M	QPSK	1	0	-	Left Tilted	0mm	Ant 31	DSI 2/3	37901	2585.1	23.75	25.00	1.334	62.9	1.006	0.01	0.010	0.013



											+38099+2604.9									
	LTE Band 38	20M	QPSK	50	0	-	Right Cheek	0mm	Ant 31	DSI 2/3	38000	2595	22.77	24.00	1.327	62.9	1.006	-	n/a	n/a
	LTE Band 38	20M	QPSK	50	0	-	Right Tilted	0mm	Ant 31	DSI 2/3	38000	2595	22.77	24.00	1.327	62.9	1.006	-	n/a	n/a
	LTE Band 38	20M	QPSK	50	0	-	Left Cheek	0mm	Ant 31	DSI 2/3	38000	2595	22.77	24.00	1.327	62.9	1.006	-	n/a	n/a
	LTE Band 38	20M	QPSK	50	0	-	Left Tilted	0mm	Ant 31	DSI 2/3	38000	2595	22.77	24.00	1.327	62.9	1.006	-	n/a	n/a
	LTE Band 38	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 25	DSI 2/3	38000	2595	20.03	21.00	1.250	62.9	1.006	-0.11	0.321	0.404
	LTE Band 38	20M	QPSK	1	0	-	Right Tilted	0mm	Ant 25	DSI 2/3	38000	2595	20.03	21.00	1.250	62.9	1.006	0.14	0.045	0.057
	LTE Band 38	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 25	DSI 2/3	38000	2595	20.03	21.00	1.250	62.9	1.006	0.07	0.210	0.264
	LTE Band 38	20M	QPSK	1	0	-	Left Tilted	0mm	Ant 25	DSI 2/3	38000	2595	20.03	21.00	1.250	62.9	1.006	-0.03	0.047	0.059
	LTE Band 38	20M	QPSK	50	0	-	Right Cheek	0mm	Ant 25	DSI 2/3	38000	2595	19.85	21.00	1.303	62.9	1.006	0.13	0.438	0.574
	LTE Band 38C	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 25	DSI 2/3	37901 +38099	2585.1 +2604.9	19.58	21.00	1.387	62.9	1.006	0.04	0.374	0.522
	LTE Band 38	20M	QPSK	50	0	-	Right Tilted	0mm	Ant 25	DSI 2/3	38000	2595	19.85	21.00	1.303	62.9	1.006	-0.04	0.048	0.063
	LTE Band 38	20M	QPSK	50	0	-	Left Cheek	0mm	Ant 25	DSI 2/3	38000	2595	19.85	21.00	1.303	62.9	1.006	-0.1	0.212	0.278
	LTE Band 38	20M	QPSK	50	0	-	Left Tilted	0mm	Ant 25	DSI 2/3	38000	2595	19.85	21.00	1.303	62.9	1.006	0.02	0.058	0.076
24	LTE Band 41	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 13	DSI 2/3	40620	2593	15.06	15.50	1.107	62.9	1.006	0.05	0.526	<b>0.586</b>
	LTE Band 41C	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 13	DSI 2/3	40620 +40422	2593 +2573.2	14.25	15.50	1.334	62.9	1.006	-0.07	0.353	0.474
	LTE Band 41	20M	QPSK	1	0	-	Right Tilted	0mm	Ant 13	DSI 2/3	40620	2593	15.06	15.50	1.107	62.9	1.006	-0.14	0.365	0.406
	LTE Band 41	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 13	DSI 2/3	40620	2593	15.06	15.50	1.107	62.9	1.006	-0.07	0.151	0.168
	LTE Band 41	20M	QPSK	1	0	-	Left Tilted	0mm	Ant 13	DSI 2/3	40620	2593	15.06	15.50	1.107	62.9	1.006	0.04	0.132	0.147
	LTE Band 41	20M	QPSK	50	0	-	Right Cheek	0mm	Ant 13	DSI 2/3	40620	2593	14.87	15.50	1.156	62.9	1.006	-0.01	0.501	0.583
	LTE Band 41	20M	QPSK	50	0	-	Right Tilted	0mm	Ant 13	DSI 2/3	40620	2593	14.87	15.50	1.156	62.9	1.006	0.03	0.360	0.419
	LTE Band 41	20M	QPSK	50	0	-	Left Cheek	0mm	Ant 13	DSI 2/3	40620	2593	14.87	15.50	1.156	62.9	1.006	-0.01	0.149	0.173
	LTE Band 41	20M	QPSK	50	0	-	Left Tilted	0mm	Ant 13	DSI 2/3	40620	2593	14.87	15.50	1.156	62.9	1.006	0.04	0.130	0.151
	LTE Band 41	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 31	DSI 2/3	40620	2593	23.82	25.00	1.312	62.9	1.006	-	n/a	n/a
	LTE Band 41	20M	QPSK	1	0	-	Right Tilted	0mm	Ant 31	DSI 2/3	40620	2593	23.82	25.00	1.312	62.9	1.006	-	n/a	n/a
	LTE Band 41	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 31	DSI 2/3	40620	2593	23.82	25.00	1.312	62.9	1.006	-	n/a	n/a
	LTE Band 41	20M	QPSK	1	0	-	Left Tilted	0mm	Ant 31	DSI 2/3	40620	2593	23.82	25.00	1.312	62.9	1.006	-0.02	0.029	0.039
	LTE Band 41C	20M	QPSK	1	0	-	Left Tilted	0mm	Ant 31	DSI 2/3	40620 +40422	2593 +2573.2	23.83	25.00	1.309	62.9	1.006	-0.09	0.024	0.032
	LTE Band 41	20M	QPSK	50	0	-	Right Cheek	0mm	Ant 31	DSI 2/3	40620	2593	22.79	24.00	1.321	62.9	1.006	-	n/a	n/a
	LTE Band 41	20M	QPSK	50	0	-	Right Tilted	0mm	Ant 31	DSI 2/3	40620	2593	22.79	24.00	1.321	62.9	1.006	-	n/a	n/a
	LTE Band 41	20M	QPSK	50	0	-	Left Cheek	0mm	Ant 31	DSI 2/3	40620	2593	22.79	24.00	1.321	62.9	1.006	-	n/a	n/a
	LTE Band 41	20M	QPSK	50	0	-	Left Tilted	0mm	Ant 31	DSI 2/3	40620	2593	22.79	24.00	1.321	62.9	1.006	-	n/a	n/a
	LTE Band 41	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 25	DSI 2/3	40620	2593	20.45	21.50	1.274	62.9	1.006	0.1	0.316	0.405
	LTE Band 41	20M	QPSK	1	0	-	Right Tilted	0mm	Ant 25	DSI 2/3	40620	2593	20.45	21.50	1.274	62.9	1.006	0.08	0.055	0.070
	LTE Band 41	20M	QPSK	1	0	-	Left Cheek	0mm	Ant 25	DSI 2/3	40620	2593	20.45	21.50	1.274	62.9	1.006	0.04	0.231	0.296
	LTE Band 41	20M	QPSK	1	0	-	Left Tilted	0mm	Ant 25	DSI 2/3	40620	2593	20.45	21.50	1.274	62.9	1.006	-0.09	0.052	0.067
	LTE Band 41	20M	QPSK	50	0	-	Right Cheek	0mm	Ant 25	DSI 2/3	40620	2593	20.30	21.50	1.318	62.9	1.006	-0.05	0.410	0.544
	LTE Band 41C	20M	QPSK	1	0	-	Right Cheek	0mm	Ant 25	DSI 2/3	40620 +40422	2593 +2573.2	19.97	21.50	1.422	62.9	1.006	0.15	0.364	0.521
	LTE Band 41	20M	QPSK	50	0	-	Right Tilted	0mm	Ant 25	DSI 2/3	40620	2593	20.30	21.50	1.318	62.9	1.006	0.09	0.057	0.076
	LTE Band 41	20M	QPSK	50	0	-	Left Cheek	0mm	Ant 25	DSI 2/3	40620	2593	20.30	21.50	1.318	62.9	1.006	-0.17	0.234	0.310
	LTE Band 41	20M	QPSK	50	0	-	Left Tilted	0mm	Ant 25	DSI 2/3	40620	2593	20.30	21.50	1.318	62.9	1.006	-0.05	0.053	0.070
25	FR1 n7	20M	BPSK	1	1	DFT-15	Right Cheek	0mm	Ant 13	DSI 2	507000	2535	13.83	14.70	1.222	-	-	-0.08	0.634	<b>0.775</b>
	FR1 n7	20M	BPSK	1	1	DFT-15	Right Tilted	0mm	Ant 13	DSI 2	507000	2535	13.83	14.70	1.222	-	-	-0.02	0.408	0.498
	FR1 n7	20M	BPSK	1	1	DFT-15	Left Cheek	0mm	Ant 13	DSI 2	507000	2535	13.83	14.70	1.222	-	-	0.15	0.216	0.264
	FR1 n7	20M	BPSK	1	1	DFT-15	Left Tilted	0mm	Ant 13	DSI 2	507000	2535	13.83	14.70	1.222	-	-	0.18	0.203	0.248
	FR1 n7	20M	BPSK	50	28	DFT-15	Right Cheek	0mm	Ant 13	DSI 2	507000	2535	13.69	14.70	1.262	-	-	-0.01	0.601	0.758
	FR1 n7	20M	BPSK	50	28	DFT-15	Right Tilted	0mm	Ant 13	DSI 2	507000	2535	13.69	14.70	1.262	-	-	0.04	0.354	0.447
	FR1 n7	20M	BPSK	50	28	DFT-15	Left Cheek	0mm	Ant 13	DSI 2	507000	2535	13.69	14.70	1.262	-	-	-0.17	0.205	0.259
	FR1 n7	20M	BPSK	50	28	DFT-15	Left Tilted	0mm	Ant 13	DSI 2	507000	2535	13.69	14.70	1.262	-	-	0.08	0.201	0.254
	FR1 n7	20M	BPSK	1	1	DFT-15	Right Cheek	0mm	Ant 13	DSI 3	507000	2535	13.23	14.20	1.250	-	-	-0.02	0.564	0.705
	FR1 n7	20M	BPSK	1	1	DFT-15	Right Tilted	0mm	Ant 13	DSI 3	507000	2535	13.23	14.20	1.250	-	-	-0.04	0.345	0.431
	FR1 n7	20M	BPSK	1	1	DFT-15	Left Cheek	0mm	Ant 13	DSI 3	507000	2535	13.23	14.20	1.250	-	-	-0.1	0.194	0.243
	FR1 n7	20M	BPSK	1	1	DFT-15	Left Tilted	0mm	Ant 13	DSI 3	507000	2535	13.23	14.20	1.250	-	-	0.11	0.190	0.238
	FR1 n7	20M	BPSK	50	28	DFT-15	Right Cheek	0mm	Ant 13	DSI 3	507000	2535	13.21	14.20	1.256	-	-	-0.19	0.532	0.668
	FR1 n7	20M	BPSK	50	28	DFT-15	Right Tilted	0mm	Ant 13	DSI 3	507000	2535	13.21	14.20	1.256	-	-	-0.09	0.321	0.403



	FR1 n7	20M	BPSK	50	28	DFT-15	Left Cheek	0mm	Ant 13	DSI 3	507000	2535	13.21	14.20	1.256	-	-	0.17	0.181	0.227
	FR1 n7	20M	BPSK	50	28	DFT-15	Left Tilted	0mm	Ant 13	DSI 3	507000	2535	13.21	14.20	1.256	-	-	0.16	0.175	0.220
	FR1 n7	20M	BPSK	1	1	DFT-15	Right Cheek	0mm	Ant 31	DSI 2/3	507000	2535	23.36	24.30	1.242	-	-	-0.03	0.043	0.053
	FR1 n7	20M	BPSK	1	1	DFT-15	Right Tilted	0mm	Ant 31	DSI 2/3	507000	2535	23.36	24.30	1.242	-	-	0.16	0.047	0.058
	FR1 n7	20M	BPSK	1	1	DFT-15	Left Cheek	0mm	Ant 31	DSI 2/3	507000	2535	23.36	24.30	1.242	-	-	-	n/a	n/a
	FR1 n7	20M	BPSK	1	1	DFT-15	Left Tilted	0mm	Ant 31	DSI 2/3	507000	2535	23.36	24.30	1.242	-	-	0.05	0.052	0.065
	FR1 n7	20M	BPSK	50	28	DFT-15	Right Cheek	0mm	Ant 31	DSI 2/3	507000	2535	23.09	24.30	1.321	-	-	-0.03	0.039	0.052
	FR1 n7	20M	BPSK	50	28	DFT-15	Right Tilted	0mm	Ant 31	DSI 2/3	507000	2535	23.09	24.30	1.321	-	-	-0.06	0.041	0.054
	FR1 n7	20M	BPSK	50	28	DFT-15	Left Cheek	0mm	Ant 31	DSI 2/3	507000	2535	23.09	24.30	1.321	-	-	-	n/a	n/a
	FR1 n7	20M	BPSK	50	28	DFT-15	Left Tilted	0mm	Ant 31	DSI 2/3	507000	2535	23.09	24.30	1.321	-	-	-0.04	0.048	0.063
	FR1 n7	20M	BPSK	1	1	DFT-15	Right Cheek	0mm	Ant 25	DSI 2	507000	2535	16.42	17.20	1.197	-	-	0.02	0.203	0.243
	FR1 n7	20M	BPSK	1	1	DFT-15	Right Tilted	0mm	Ant 25	DSI 2	507000	2535	16.42	17.20	1.197	-	-	0.03	0.047	0.056
	FR1 n7	20M	BPSK	1	1	DFT-15	Left Cheek	0mm	Ant 25	DSI 2	507000	2535	16.42	17.20	1.197	-	-	0.18	0.159	0.190
	FR1 n7	20M	BPSK	1	1	DFT-15	Left Tilted	0mm	Ant 25	DSI 2	507000	2535	16.42	17.20	1.197	-	-	-	n/a	n/a
	FR1 n7	20M	BPSK	50	28	DFT-15	Right Cheek	0mm	Ant 25	DSI 2	507000	2535	16.26	17.20	1.242	-	-	-0.08	0.184	0.228
	FR1 n7	20M	BPSK	50	28	DFT-15	Right Tilted	0mm	Ant 25	DSI 2	507000	2535	16.26	17.20	1.242	-	-	-0.03	0.032	0.040
	FR1 n7	20M	BPSK	50	28	DFT-15	Left Cheek	0mm	Ant 25	DSI 2	507000	2535	16.26	17.20	1.242	-	-	0.09	0.136	0.169
	FR1 n7	20M	BPSK	50	28	DFT-15	Left Tilted	0mm	Ant 25	DSI 2	507000	2535	16.26	17.20	1.242	-	-	-	n/a	n/a
	FR1 n7	20M	BPSK	1	1	DFT-15	Right Cheek	0mm	Ant 25	DSI 3	507000	2535	15.82	16.70	1.225	-	-	0.02	0.156	0.191
	FR1 n7	20M	BPSK	1	1	DFT-15	Right Tilted	0mm	Ant 25	DSI 3	507000	2535	15.82	16.70	1.225	-	-	-	n/a	n/a
	FR1 n7	20M	BPSK	1	1	DFT-15	Left Cheek	0mm	Ant 25	DSI 3	507000	2535	15.82	16.70	1.225	-	-	0.16	0.115	0.141
	FR1 n7	20M	BPSK	1	1	DFT-15	Left Tilted	0mm	Ant 25	DSI 3	507000	2535	15.82	16.70	1.225	-	-	-	n/a	n/a
	FR1 n7	20M	BPSK	50	28	DFT-15	Right Cheek	0mm	Ant 25	DSI 3	507000	2535	15.59	16.70	1.291	-	-	0.15	0.147	0.190
	FR1 n7	20M	BPSK	50	28	DFT-15	Right Tilted	0mm	Ant 25	DSI 3	507000	2535	15.59	16.70	1.291	-	-	-	n/a	n/a
	FR1 n7	20M	BPSK	50	28	DFT-15	Left Cheek	0mm	Ant 25	DSI 3	507000	2535	15.59	16.70	1.291	-	-	-0.14	0.103	0.133
	FR1 n7	20M	BPSK	50	28	DFT-15	Left Tilted	0mm	Ant 25	DSI 3	507000	2535	15.59	16.70	1.291	-	-	-	n/a	n/a
26	FR1 n38	40M	BPSK	1	1	DFT-30	Right Cheek	0mm	Ant 13	DSI 2	519000	2595	13.65	14.70	1.274	-	-	-0.05	0.651	<b>0.829</b>
	FR1 n38	40M	BPSK	1	1	DFT-30	Right Tilted	0mm	Ant 13	DSI 2	519000	2595	13.65	14.70	1.274	-	-	-0.17	0.487	0.620
	FR1 n38	40M	BPSK	1	1	DFT-30	Left Cheek	0mm	Ant 13	DSI 2	519000	2595	13.65	14.70	1.274	-	-	-0.08	0.206	0.262
	FR1 n38	40M	BPSK	1	1	DFT-30	Left Tilted	0mm	Ant 13	DSI 2	519000	2595	13.65	14.70	1.274	-	-	-0.07	0.196	0.250
	FR1 n38	40M	BPSK	1	1	DFT-30	Right Cheek	0mm	Ant 13	DSI 2	518004	2590.02	13.56	14.70	1.300	-	-	0.1	0.555	0.722
	FR1 n38	40M	BPSK	1	1	DFT-30	Right Cheek	0mm	Ant 13	DSI 2	519996	2599.98	13.42	14.70	1.343	-	-	0.19	0.608	0.816
	FR1 n38	40M	BPSK	50	28	DFT-30	Right Cheek	0mm	Ant 13	DSI 2	519000	2595	13.46	14.70	1.330	-	-	-0.06	0.558	0.742
	FR1 n38	40M	BPSK	50	28	DFT-30	Right Tilted	0mm	Ant 13	DSI 2	519000	2595	13.46	14.70	1.330	-	-	-0.02	0.456	0.607
	FR1 n38	40M	BPSK	50	28	DFT-30	Left Cheek	0mm	Ant 13	DSI 2	519000	2595	13.46	14.70	1.330	-	-	-0.08	0.184	0.245
	FR1 n38	40M	BPSK	50	28	DFT-30	Left Tilted	0mm	Ant 13	DSI 2	519000	2595	13.46	14.70	1.330	-	-	0.17	0.175	0.233
	FR1 n38	40M	BPSK	100	0	DFT-30	Right Cheek	0mm	Ant 13	DSI 2	519000	2595	13.42	14.70	1.343	-	-	-0.12	0.597	0.802
	FR1 n38	40M	BPSK	1	1	DFT-30	Right Cheek	0mm	Ant 13	DSI 3	519000	2595	13.12	14.20	1.282	-	-	-0.09	0.517	0.663
	FR1 n38	40M	BPSK	1	1	DFT-30	Right Tilted	0mm	Ant 13	DSI 3	519000	2595	13.12	14.20	1.282	-	-	-0.1	0.404	0.518
	FR1 n38	40M	BPSK	1	1	DFT-30	Left Cheek	0mm	Ant 13	DSI 3	519000	2595	13.12	14.20	1.282	-	-	0.04	0.189	0.242
	FR1 n38	40M	BPSK	1	1	DFT-30	Left Tilted	0mm	Ant 13	DSI 3	519000	2595	13.12	14.20	1.282	-	-	0.12	0.161	0.206
	FR1 n38	40M	BPSK	50	28	DFT-30	Right Tilted	0mm	Ant 13	DSI 3	519000	2595	12.99	14.20	1.321	-	-	0.13	0.326	0.431
	FR1 n38	40M	BPSK	50	28	DFT-30	Left Cheek	0mm	Ant 13	DSI 3	519000	2595	12.99	14.20	1.321	-	-	0.16	0.182	0.240
	FR1 n38	40M	BPSK	50	28	DFT-30	Left Tilted	0mm	Ant 13	DSI 3	519000	2595	12.99	14.20	1.321	-	-	-0.02	0.154	0.203
	FR1 n38	40M	BPSK	1	1	DFT-30	Right Cheek	0mm	Ant 31	DSI 2/3	519000	2595	23.99	25.00	1.262	-	-	-0.02	0.045	0.057
	FR1 n38	40M	BPSK	1	1	DFT-30	Right Tilted	0mm	Ant 31	DSI 2/3	519000	2595	23.99	25.00	1.262	-	-	0.05	0.039	0.049
	FR1 n38	40M	BPSK	1	1	DFT-30	Left Cheek	0mm	Ant 31	DSI 2/3	519000	2595	23.99	25.00	1.262	-	-	-	n/a	n/a
	FR1 n38	40M	BPSK	1	1	DFT-30	Left Tilted	0mm	Ant 31	DSI 2/3	519000	2595	23.99	25.00	1.262	-	-	-0.14	0.048	0.060
	FR1 n38	40M	BPSK	50	28	DFT-30	Right Cheek	0mm	Ant 31	DSI 2/3	519000	2595	23.78	25.00	1.324	-	-	-0.02	0.041	0.054
	FR1 n38	40M	BPSK	50	28	DFT-30	Right Tilted	0mm	Ant 31	DSI 2/3	519000	2595	23.78	25.00	1.324	-	-	-0.11	0.038	0.050
	FR1 n38	40M	BPSK	50	28	DFT-30	Left Cheek	0mm	Ant 31	DSI 2/3	519000	2595	23.78	25.00	1.324	-	-	-	n/a	n/a
	FR1 n38	40M	BPSK	50	28	DFT-30	Left Tilted	0mm	Ant 31	DSI 2/3	519000	2595	23.78	25.00	1.324	-	-	-0.11	0.044	0.058
	FR1 n38	40M	BPSK	1	1	DFT-30	Right Cheek	0mm	Ant 25	DSI 2	519000	2595	15.78	17.00	1.324	-	-	0.02	0.384	0.509
	FR1 n38	40M	BPSK	1	1	DFT-30	Right Tilted	0mm	Ant 25	DSI 2	519000	2595	15.78	17.00	1.324	-	-	-	n/a	n/a
	FR1 n38	40M	BPSK	1	1	DFT-30	Left Cheek	0mm	Ant 25	DSI 2	519000	2595	15.78	17.00	1.324	-	-	-0.19	0.161	0.213
	FR1 n38	40M	BPSK	1	1	DFT-30	Left Tilted	0mm	Ant 25	DSI 2	519000	2595	15.78	17.00	1.324	-	-	-0.06	0.042	0.056