

FCC SAR Test Report

APPLICANT : vivo Mobile Communication Co., Ltd.
EQUIPMENT : Mobile Phone
BRAND NAME : vivo
MODEL NAME : V2242
FCC ID : 2AUCY-V2242
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, V2242**, 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	0.85	0.54	0.30	1.40
		GSM1900	0.89	0.64	0.33	
	WCDMA	WCDMA II	0.95	0.72	0.88	
		WCDMA IV	0.65	0.65	0.57	
		WCDMA V	0.77	0.48	0.26	
	LTE	LTE Band 2	0.91	0.95	0.62	
		LTE Band 7	0.84	0.94	0.89	
		LTE Band 12/17	0.73	0.21	0.17	
		LTE Band 13	0.54	0.20	0.14	
		LTE Band 26/5/18/19	0.91	0.33	0.17	
LTE Band 41/38		0.92	0.85	0.98		
DTS	WLAN	2.4GHz WLAN	0.51	0.34	0.14	1.28
NII		5GHz WLAN	0.61	0.86	0.51	1.40
DSS	Bluetooth	2.4GHz Bluetooth	0.26	<0.10	<0.10	1.40

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	2.64	3.84
	WCDMA	WCDMA II	2.66	
		WCDMA IV	2.41	
	LTE	LTE Band 2	3.09	
		LTE Band 7	1.76	
		LTE Band 41/38	1.77	
NII	WLAN	5GHz WLAN	3.00	3.84

Date of Testing: 2023/1/16 ~ 2023/2/8

Remark:

- This device supports LTE B17 / B4 / B38 and B12 / B66 / B41. Since the supported frequency span for LTE B17 / B4 / B38 falls completely within the supports frequency span for B12 / B66, both LTE bands have the same target power, and both LTE bands share the same transmission path; therefore, SAR was only assessed for B12 / B66 / B41.
- This device supports LTE B5 / B18 / B19 and B26. Since the supported frequency span for LTE B5 / B18 / B19 falls completely within the supports frequency span for B26, both LTE bands have the same target power, and both LTE bands share the same transmission path; therefore, SAR was only assessed for LTE B26.

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.
	SAR05-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	V2242
FCC ID	2AUCY-V2242
IMEI Code	868848060193490
Wireless Technology and Frequency Range	GSM850: 824 MHz ~ 849 MHz GSM1900: 1850 MHz ~ 1910 MHz WCDMA Band II: 1850 MHz ~ 1910 MHz WCDMA Band IV: 1710 MHz ~ 1755 MHz WCDMA Band V: 824 MHz ~ 849 MHz LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 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 66: 1710 MHz ~ 1780 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
Mode	GSM/GPRS/EGPRS RMC/AMR 12.2Kbps HSDPA HSUPA DC-HSDPA HSPA+(16QAM uplink is supported) LTE: QPSK/ 16QAM / 64QAM / 256QAM (Downlink Only) WLAN 2.4GHz 802.11b/g/n HT20 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE
HW Version	MP_0.1
SW Version	PD2268EF_EX_A_13.0.4.5.W30
GSM / (E)GPRS Transfer mode	Class B – EUT cannot support Packet Switched and Circuit Switched Network simultaneously but can automatically switch between Packet and Circuit Switched Network.
EUT Stage	Production Unit
Remark:	<ol style="list-style-type: none"> 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 12. This device WLAN 2.4GHz supports hotspot operation and Bluetooth support tethering applications. This device 5.2GHz WLAN/5.8GHz WLAN support hotspot operation, and 5.2GHz WLAN/5.8GHz WLAN supports WiFi Direct (GC/GO), and 5.3GHz / 5.5GHz supports WiFi Direct (GC only). 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). It uses the receiver to indicate whether the user is making a call in head scenario or not. The selection between head and body power levels is based on the receiver detection mechanism. It can determine proximity to head or body and set the

relevant power level for 2G&3G&4G and Wi-Fi antennas accordingly. The device will invoke corresponding work scenarios power level base on frequency bands/antennas, which can refer to appendix E and the detail DSI descriptions of below table.

DSI	Trigger Conditions	Antenna No.	Exposure conditions	
DSI 2	Receiver on	all Ant	Head Standalone	Head all Position
DSI 3	Receiver on + WLAN	all Ant	Head Simultaneous	Head all Position
DSI 4	Receiver off/Sensor on	Ant 13	Extremity Standalone	See by section 5
	Receiver off	Ant 31	Body-worn/Extremity Standalone	No Sensor Position
DSI 5	Receiver off/Sensor on +WLAN	Ant 13	Extremity Simultaneous	See by section 5
	Receiver off +WLAN	Ant 31	Body-worn/Extremity Simultaneous	Body all Position
DSI 6	Receiver off/Sensor off + WLAN	Ant 13	Extremity Simultaneous	No Sensor Position
	Hotspot On	all Ant	Hotspot Standalone/ Simultaneous	Body all Position
DSI 7	Receiver off/Sensor off	Ant 13	Sensor Trigger Distance -1mm	See by section 5
	Receiver off/Sensor off	Ant 13	Body-worn/Extremity Standalone	No Sensor Position

6. For WLAN transmitter, while the device WWAN is transmitting simultaneously with the WLAN/Bluetooth antenna, the device power will be reduced power at body-worn, hotspot and extremity conditions.



4.2 General LTE SAR Test and Reporting Considerations

Summarized necessary items addressed in KDB 941225 D05 v02r05																																																															
FCC ID	2AUCY-V2242																																																														
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 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 66:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz																																																														
Uplink Modulations used	QPSK / 16QAM / 64QAM																																																														
LTE Voice / Data requirements	Voice and Data																																																														
LTE Release Version	R12, category 13																																																														
CA Support	Yes, Uplink and Downlink																																																														
LTE MPR permanently built-in by design	<p>Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3</p> <table border="1"> <thead> <tr> <th rowspan="2">Modulation</th> <th colspan="6">Channel bandwidth / Transmission bandwidth (N_{RB})</th> <th rowspan="2">MPR (dB)</th> </tr> <tr> <th>1.4 MHz</th> <th>3.0 MHz</th> <th>5 MHz</th> <th>10 MHz</th> <th>15 MHz</th> <th>20 MHz</th> </tr> </thead> <tbody> <tr> <td>QPSK</td> <td>> 5</td> <td>> 4</td> <td>> 8</td> <td>> 12</td> <td>> 16</td> <td>> 18</td> <td>≤ 1</td> </tr> <tr> <td>16 QAM</td> <td>≤ 5</td> <td>≤ 4</td> <td>≤ 8</td> <td>≤ 12</td> <td>≤ 16</td> <td>≤ 18</td> <td>≤ 1</td> </tr> <tr> <td>16 QAM</td> <td>> 5</td> <td>> 4</td> <td>> 8</td> <td>> 12</td> <td>> 16</td> <td>> 18</td> <td>≤ 2</td> </tr> <tr> <td>64 QAM</td> <td>≤ 5</td> <td>≤ 4</td> <td>≤ 8</td> <td>≤ 12</td> <td>≤ 16</td> <td>≤ 18</td> <td>≤ 2</td> </tr> <tr> <td>64 QAM</td> <td>> 5</td> <td>> 4</td> <td>> 8</td> <td>> 12</td> <td>> 16</td> <td>> 18</td> <td>≤ 3</td> </tr> <tr> <td>256 QAM</td> <td colspan="6">≥ 1</td> <td>≤ 5</td> </tr> </tbody> </table>	Modulation	Channel bandwidth / Transmission bandwidth (N _{RB})						MPR (dB)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1	16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1	16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2	64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2	64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3	256 QAM	≥ 1						≤ 5
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64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3																																																								
256 QAM	≥ 1						≤ 5																																																								
LTE A-MPR	In the base station simulator configuration, Network Setting value is set to NS_01 to disable A-MPR during SAR testing and the LTE SAR tests was transmitting on all TTI frames (Maximum TTI)																																																														
Spectrum plots for RB configuration	A properly configured base station simulator was used for the SAR and power measurement; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.																																																														
Power reduction applied to satisfy SAR compliance	Yes, when operating in Proximity sensors/receiver/hotspot detect mechanism 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 intra-band with two component carriers in the uplink. SAR Measurements and conducted powers were evaluated per FCC Guidance. (2) This device supports maximum of 2 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					
	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				
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				
LTE Band 7												
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20775	2502.5	20800	2505	20825	2507.5	20850	2510				
M	21100	2535	21100	2535	21100	2535	21100	2535	21100	2535	21100	2535
H	21425	2567.5	21400	2565	21375	2562.5	21350	2560				
LTE Band 12												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	23017	699.7	23025	700.5	23035	701.5	23060	704				
M	23095	707.5	23095	707.5	23095	707.5	23095	707.5	23095	707.5	23095	707.5
H	23173	715.3	23165	714.5	23155	713.5	23130	711				
LTE Band 13												
	Bandwidth 5 MHz				Bandwidth 10 MHz							
	Channel #		Freq.(MHz)		Channel #		Freq.(MHz)		Channel #		Freq.(MHz)	
L	23205		779.5		23230		782					
M	23230		782									
H	23255		784.5									
LTE Band 17												
	Bandwidth 5 MHz				Bandwidth 10 MHz							
	Channel #		Freq.(MHz)		Channel #		Freq. (MHz)		Channel #		Freq. (MHz)	
L	23755		706.5		23780		709					
M	23790		710		23790		710					
H	23825		713.5		23800		711					



LTE Band 18												
	Bandwidth 5 MHz			Bandwidth 10 MHz			Bandwidth 15 MHz					
	Ch. #	Freq. (MHz)		Ch. #	Freq. (MHz)		Ch. #	Freq. (MHz)		Ch. #	Freq. (MHz)	
L	23875	817.5		23900	820		23925	822.5				
M	23925	822.5		23925	822.5							
H	23975	827.5		23950	825							
LTE Band 19												
	Bandwidth 5 MHz			Bandwidth 10 MHz			Bandwidth 15 MHz					
	Ch. #	Freq. (MHz)		Ch. #	Freq. (MHz)		Ch. #	Freq. (MHz)		Ch. #	Freq. (MHz)	
L	24025	832.5		24050	835		24075	837.5				
M	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		
H	27033	848.3	27025	847.5	27015	846.5	26990	844	26965	841.5		
LTE Band 38												
	Bandwidth 5 MHz			Bandwidth 10 MHz			Bandwidth 15 MHz			Bandwidth 20 MHz		
	Ch. #	Freq. (MHz)		Ch. #	Freq. (MHz)		Ch. #	Freq. (MHz)		Ch. #	Freq. (MHz)	
L	37775	2572.5		37800	2575		37825	2577.5		37850	2580	
M	38000	2595		38000	2595		38000	2595		38000	2595	
H	38225	2617.5		38200	2615		38175	2612.5		38150	2610	
LTE Band 41												
	Bandwidth 5 MHz			Bandwidth 10 MHz			Bandwidth 15 MHz			Bandwidth 20 MHz		
	Ch. #	Freq. (MHz)		Ch. #	Freq. (MHz)		Ch. #	Freq. (MHz)		Ch. #	Freq. (MHz)	
L	39675	2498.5		39700	2501		39725	2503.5		39750	2506	
LM	40148	2545.8		40160	2547		40173	2548.3		40185	2549.5	
M	40620	2593		40620	2593		40620	2593		40620	2593	
HM	41093	2640.3		41080	2639		41068	2637.8		41055	2636.5	
H	41565	2687.5		41540	2685		41515	2682.5		41490	2680	
LTE Band 66												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	131979	1710.7	131987	1711.5	131997	1712.5	132022	1715	132047	1717.5	132072	1720
M	132322	1745	132322	1745	132322	1745	132322	1745	132322	1745	132322	1745
H	132665	1779.3	132657	1778.5	132647	1777.5	132622	1775	132597	1772.5	132572	1770

For LTE Overlap Bands Description>

1) LTE Bands BW

Band	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
LTE Band 4	Yes	Yes	Yes	Yes	Yes	Yes
LTE Band 66	Yes	Yes	Yes	Yes	Yes	Yes
LTE Band 12	Yes	Yes	Yes	Yes		
LTE Band 17			Yes	Yes		
LTE Band 5	Yes	Yes	Yes	Yes		
LTE Band 18			Yes	Yes	Yes	
LTE Band 19			Yes	Yes	Yes	
LTE Band 26	Yes	Yes	Yes	Yes	Yes	
LTE Band 38			Yes	Yes	Yes	Yes
LTE Band 41			Yes	Yes	Yes	Yes

2) LTE Bands tune up:

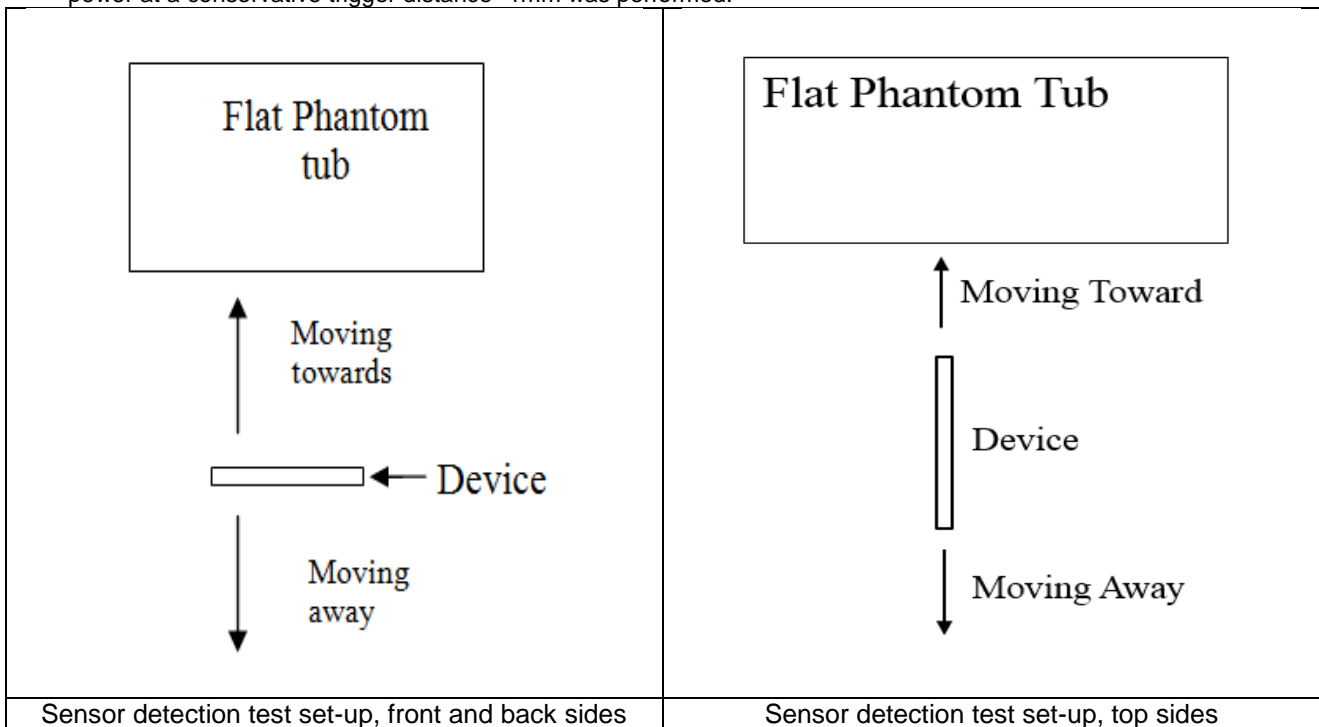
TX. freq.	Ant	Full (Default)	DSI 2	DSI 3	DSI 4	DSI 5	DSI 6	DSI 7
		max.	max.	max.	max.	max.	max.	max.
		tune up limit	tune up limit	tune up limit	tune up limit	tune up limit	tune up limit	tune up limit
		(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)
LTE Band 17	13	24.00	24.00	24.00	24.00	24.00	24.00	24.00
LTE Band 12	13	24.00	24.00	24.00	24.00	24.00	24.00	24.00
LTE Band 17	31	24.00	24.00	24.00	24.00	24.00	24.00	
LTE Band 12	31	24.00	24.00	24.00	24.00	24.00	24.00	
LTE Band 5	13	24.50	23.00	22.00	24.50	24.50	24.50	24.50
LTE Band 18	13	24.50	23.00	22.00	24.50	24.50	24.50	24.50
LTE Band 19	13	24.50	22.50	21.50	24.50	24.50	24.50	24.50
LTE Band 26	13	24.50	23.00	22.00	24.50	24.50	24.50	24.50
LTE Band 5	31	24.00	24.00	24.00	24.00	24.00	24.00	
LTE Band 18	31	24.00	24.00	24.00	24.00	24.00	24.00	
LTE Band 19	31	24.00	24.00	24.00	24.00	24.00	24.00	
LTE Band 26	31	24.00	24.00	24.00	24.00	24.00	24.00	
LTE Band 4	13	24.50	16.50	15.50	21.50	20.00	20.00	24.50
LTE Band 66	13	24.50	16.00	15.00	21.50	18.00	18.00	24.50
LTE Band 4	31	24.00	24.00	24.00	22.00	20.50	20.50	
LTE Band 66	31	24.00	24.00	24.00	22.00	20.50	20.50	
LTE Band 38	13	25.00	17.00	16.00	20.50	19.00	19.00	25.00
LTE Band 41	13	25.00	15.50	14.50	19.50	18.00	18.00	24.50
LTE Band 38	31	24.50	24.50	24.50	24.50	24.00	24.00	
LTE Band 41	31	24.50	24.50	24.50	24.50	24.00	24.00	

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

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 (2600MHz) and lowest (1750MHz) frequency was used for proximity sensor triggering testing.
2. Capacitive proximity sensors placed coincident with antenna elements at the left 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 sides of the device. When front, back, top sides of body condition or handheld states are 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.



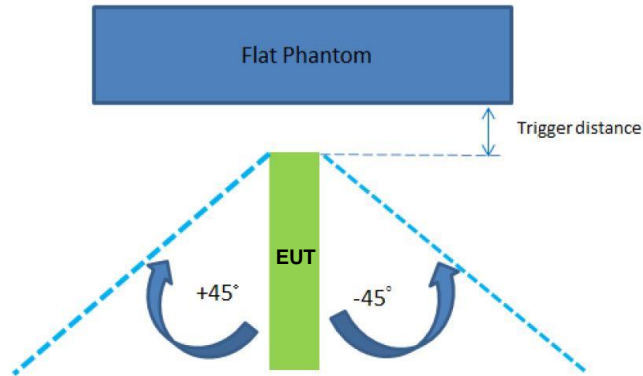
<P-Sensor>

Antenna 13

Proximity Sensor Trigger Distance (mm)						
Position	Front		Back		Top Side	
	Moving towards	Moving away	Moving towards	Moving away	Moving towards	Moving away
Minimum	8	8	12	12	15	15

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° , and the maximum output power remains in the reduced mode.



The Sensor Trigger Distance (mm)	
Position	Top Side for Antenna 13
Minimum	15

6. RF Exposure Limits

6.1 Uncontrolled Environment

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

6.2 Controlled Environment

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

Limits for Occupational/Controlled Exposure (W/kg)

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

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

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

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

7. Specific Absorption Rate (SAR)

7.1 Introduction

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

7.2 SAR Definition

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

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

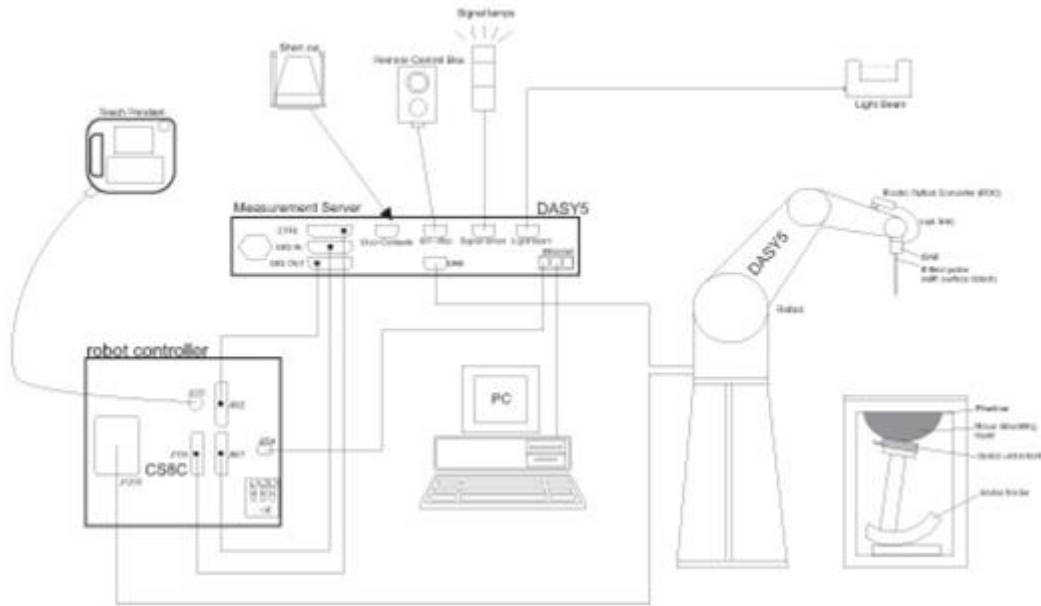
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

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.

<EX3DV4 Probe>

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

8.2 Data Acquisition Electronics (DAE)

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


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



Photo of DAE


8.3 Phantom

<SAM Twin Phantom>

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

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

<ELI Phantom>

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

The ELI phantom is intended for compliance testing of handheld and body-mounted wireless devices or for evaluating transmitters operating at low frequencies. ELI 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 dB0 is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE standard 1528 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan), if only one zoom scan follows the area scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of zoom scans has to be increased accordingly.

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

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 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: $\Delta x_{Zoom}, \Delta y_{Zoom}$		≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*	
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$	≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm	
	graded grid	$\Delta z_{Zoom}(1)$: between 1 st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z	≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm	
Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details. * When zoom scan is required and the <i>reported</i> SAR from the <i>area scan based 1-g SAR estimation</i> procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

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, 2024
SPEAG	835MHz System Validation Kit	D835V2	4d162	Dec. 17, 2021	Dec. 16, 2024
SPEAG	1750MHz System Validation Kit	D1750V2	1137	Oct. 19, 2021	Oct. 18, 2024
SPEAG	1900MHz System Validation Kit	D1900V2	5d182	Dec. 20, 2021	Dec. 19, 2024
SPEAG	2450MHz System Validation Kit	D2450V2	924	Sep. 02, 2020	Aug. 31, 2023
SPEAG	2600MHz System Validation Kit	D2600V2	1070	Dec. 20, 2021	Dec. 19, 2024
SPEAG	5000MHz System Validation Kit	D5GHzV2	1341	Dec. 13, 2021	Dec. 12, 2024
SPEAG	Data Acquisition Electronics	DAE4	1386	Jun. 30, 2022	Jun. 29, 2023
SPEAG	Dosimetric E-Field Probe	EX3DV4	7641	Apr. 11, 2022	Apr. 10, 2023
SPEAG	SAM Twin Phantom	QD 000 P41 AA	2035	NCR	NCR
SPEAG	Phone Positioner	N/A	N/A	NCR	NCR
Anritsu	Radio communication analyzer	MT8820C	6201300653	Jul. 07, 2022	Jul. 06, 2023
Anritsu	Radio communication analyzer	MT8821C	6262314715	Jun. 27, 2022	Jun. 26, 2023
Agilent	Wireless Communication Test Set	E5515C	MY50267224	Jul. 07, 2022	Jul. 06, 2023
Keysight	Network Analyzer	E5071C	MY46523671	Oct. 17, 2022	Oct. 16, 2023
Speag	Dielectric Assessment KIT	DAK3.5	1144	Aug. 15, 2022	Aug. 14, 2023
Agilent	Signal Generator	N5181A	MY50145381	Dec. 27, 2022	Dec. 26, 2023
Anritsu	Power Sensor	MA2411B	1306099	Oct. 17, 2022	Oct. 16, 2023
Anritsu	Power Meter	ML2495A	1349001	Oct. 17, 2022	Oct. 16, 2023
Anritsu	Power Sensor	MA2411B	1542004	Dec. 27, 2022	Dec. 26, 2023
Anritsu	Power Meter	ML2495A	1339473	Dec. 27, 2022	Dec. 26, 2023
R&S	CBT BLUETOOTH TESTER	CBT	100963	Dec. 27, 2022	Dec. 26, 2023
R&S	Spectrum Analyzer	FSP7	100818	Jul. 07, 2022	Jul. 06, 2023
TES	Hygrometer	1310	200505600	Jul. 12, 2022	Jul. 11, 2023
Anymetre	Thermo-Hygrometer	JR593	2020062101	Jul. 12, 2022	Jul. 11, 2023
AR	Amplifier	5S1G4	0333096	Note 1	
Mini-Circuits	Amplifier	ZVE-3W-83+	599201528	Note 1	
Mini-Circuits	Amplifier	ZVA-183W-S+	726202215	Note 1	
SPEAG	Device Holder	N/A	N/A	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	

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.

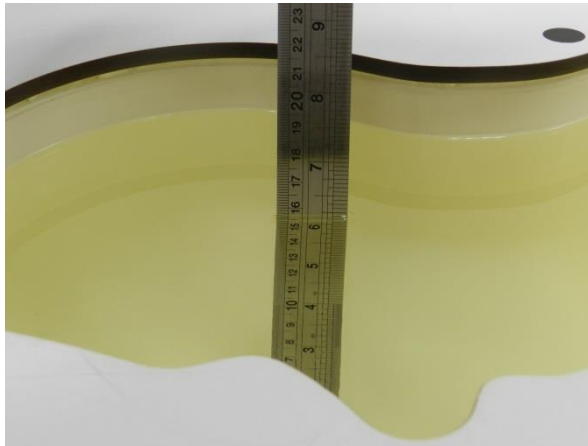


Fig 10.1 Photo of Liquid Height for Head SAR

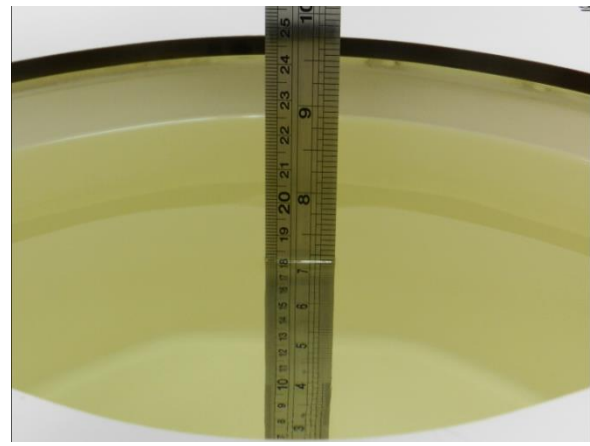


Fig 10.2 Photo of Liquid Height for Body SAR

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 (σ)	Permittivity (ϵ_r)
For Head								
750	41.1	57.0	0.2	1.4	0.2	0	0.89	41.9
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
1800, 1900	55.2	0	0	0.3	0	44.5	1.40	40.0
2450	55.0	0	0	0	0	45.0	1.80	39.2
2600	54.8	0	0	0.1	0	45.1	1.96	39.0

Simulating Liquid for 5GHz, Manufactured by SPEAG

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

<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Tissue Type	Liquid Temp. (°C)	Conductivity (σ)	Permittivity (ε _r)	Conductivity Target (σ)	Permittivity Target (ε _r)	Delta (σ) (%)	Delta (ε _r) (%)	Limit (%)	Date
750	Head	22.4	0.886	41.534	0.89	41.90	-0.45	-0.87	±5	2023/1/16
750	Head	22.5	0.893	41.008	0.89	41.90	0.34	-2.13	±5	2023/1/31
835	Head	22.3	0.915	41.980	0.90	41.50	1.67	1.16	±5	2023/1/17
835	Head	22.3	0.919	41.524	0.90	41.50	2.11	0.06	±5	2023/2/1
1750	Head	22.6	1.378	40.204	1.37	40.10	0.58	0.26	±5	2023/1/18
1750	Head	22.4	1.339	39.213	1.37	40.10	-2.26	-2.21	±5	2023/2/2
1900	Head	22.2	1.427	41.191	1.40	40.00	1.93	2.98	±5	2023/1/19
1900	Head	22.5	1.448	39.105	1.40	40.00	3.43	-2.24	±5	2023/2/3
2450	Head	22.6	1.825	39.664	1.80	39.20	1.39	1.18	±5	2023/1/20
2450	Head	22.3	1.789	39.418	1.80	39.20	-0.61	0.56	±5	2023/2/4
2600	Head	22.1	2.056	37.284	1.96	39.00	4.90	-4.40	±5	2023/1/21
2600	Head	22.2	1.899	39.208	1.96	39.00	-3.11	0.53	±5	2023/2/5
5250	Head	22.9	4.595	36.652	4.71	35.95	-2.44	1.95	±5	2023/1/28
5250	Head	22.7	4.564	35.647	4.71	35.95	-3.10	-0.84	±5	2023/2/6
5600	Head	22.6	5.125	35.435	5.07	35.50	1.08	-0.18	±5	2023/1/29
5600	Head	22.8	4.986	35.465	5.07	35.50	-1.66	-0.10	±5	2023/2/7
5750	Head	22.6	5.009	36.365	5.22	35.35	-4.04	2.87	±5	2023/1/30
5750	Head	22.4	5.383	35.944	5.22	35.35	3.12	1.68	±5	2023/2/8

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>

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 (%)
2023/1/16	750	Head	250	1099	7641	1386	2.200	8.540	8.8	3.04
2023/1/31	750	Head	250	1099	7641	1386	2.070	8.540	8.28	-3.04
2023/1/17	835	Head	250	4d162	7641	1386	2.480	9.640	9.92	2.90
2023/2/1	835	Head	250	4d162	7641	1386	2.560	9.640	10.24	6.22
2023/1/18	1750	Head	250	1137	7641	1386	9.160	36.500	36.64	0.38
2023/2/2	1750	Head	250	1137	7641	1386	9.370	36.500	37.48	2.68
2023/1/19	1900	Head	250	5d182	7641	1386	9.550	39.600	38.2	-3.54
2023/2/3	1900	Head	250	5d182	7641	1386	9.210	39.600	36.84	-6.97
2023/1/20	2450	Head	250	924	7641	1386	12.000	51.400	48	-6.61
2023/2/4	2450	Head	250	924	7641	1386	11.800	51.400	47.2	-8.17
2023/1/21	2600	Head	250	1070	7641	1386	14.000	56.200	56	-0.36
2023/2/5	2600	Head	250	1070	7641	1386	13.200	56.200	52.8	-6.05
2023/1/28	5250	Head	100	1341	7641	1386	7.580	80.700	75.8	-6.07
2023/2/6	5250	Head	100	1341	7641	1386	7.730	80.700	77.3	-4.21
2023/1/29	5600	Head	100	1341	7641	1386	8.140	84.500	81.4	-3.67
2023/2/7	5600	Head	100	1341	7641	1386	8.040	84.500	80.4	-4.85
2023/1/30	5750	Head	100	1341	7641	1386	7.670	80.600	76.7	-4.84
2023/2/8	5750	Head	100	1341	7641	1386	7.480	80.600	74.8	-7.20

<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 (%)
2023/1/16	750	Head	250	1099	7641	1386	1.480	5.650	5.92	4.78
2023/1/31	750	Head	250	1099	7641	1386	1.390	5.650	5.56	-1.59
2023/1/17	835	Head	250	4d162	7641	1386	1.510	6.260	6.04	-3.51
2023/2/1	835	Head	250	4d162	7641	1386	1.630	6.260	6.52	4.15
2023/1/18	1750	Head	250	1137	7641	1386	4.850	19.200	19.4	1.04
2023/2/2	1750	Head	250	1137	7641	1386	4.960	19.200	19.84	3.33
2023/1/19	1900	Head	250	5d182	7641	1386	5.110	20.200	20.44	1.19
2023/2/3	1900	Head	250	5d182	7641	1386	4.880	20.200	19.52	-3.37
2023/1/20	2450	Head	250	924	7641	1386	5.750	24.000	23	-4.17
2023/2/4	2450	Head	250	924	7641	1386	5.520	24.000	22.08	-8.00
2023/1/21	2600	Head	250	1070	7641	1386	6.070	24.600	24.28	-1.30
2023/2/5	2600	Head	250	1070	7641	1386	5.980	24.600	23.92	-2.76
2023/1/28	5250	Head	100	1341	7641	1386	2.180	23.100	21.8	-5.63
2023/2/6	5250	Head	100	1341	7641	1386	2.220	23.100	22.2	-3.90
2023/1/29	5600	Head	100	1341	7641	1386	2.360	24.000	23.6	-1.67
2023/2/7	5600	Head	100	1341	7641	1386	2.420	24.000	24.2	0.83
2023/1/30	5750	Head	100	1341	7641	1386	2.190	22.700	21.9	-3.52
2023/2/8	5750	Head	100	1341	7641	1386	2.190	22.700	21.9	-3.52

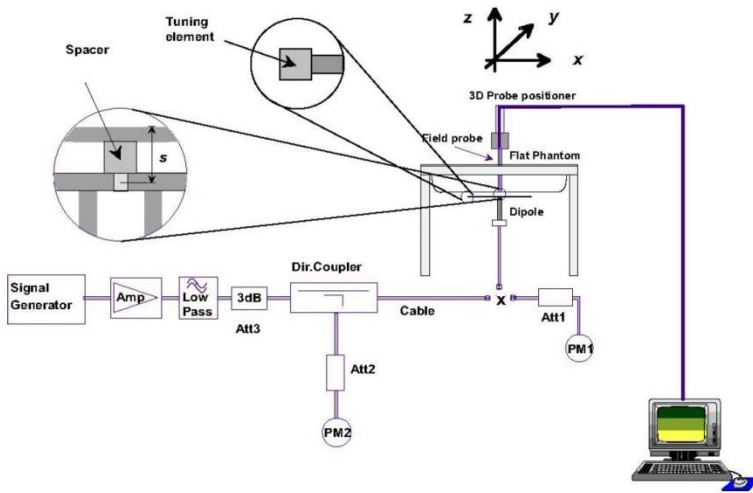


Fig 10.3.1 System Performance Check Setup



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.

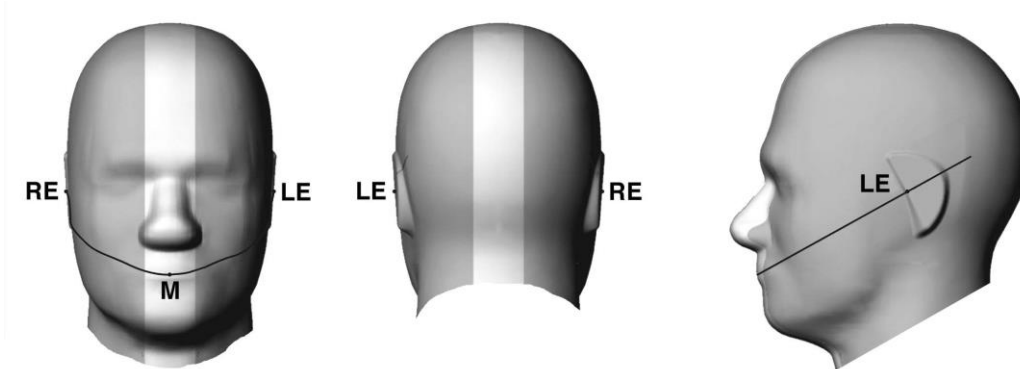


Fig 11.1.1 Front, back, and side views of SAM twin phantom

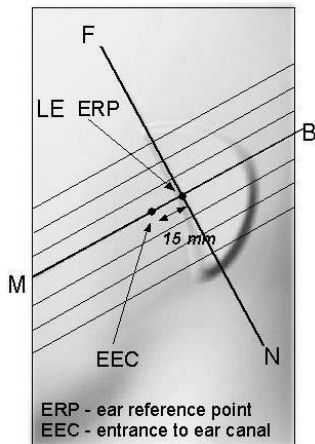


Fig 11.1.2 Close-up side view of phantom showing the ear region.

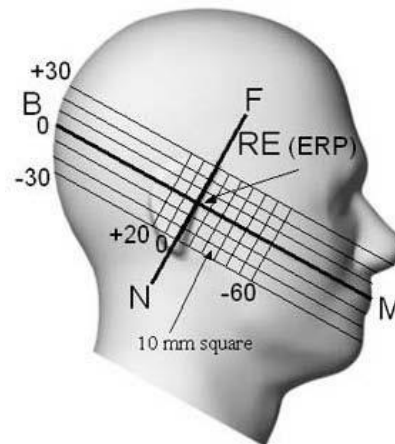


Fig 11.1.3 Side view of the phantom showing relevant markings and seven cross-sectional plane locations

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.

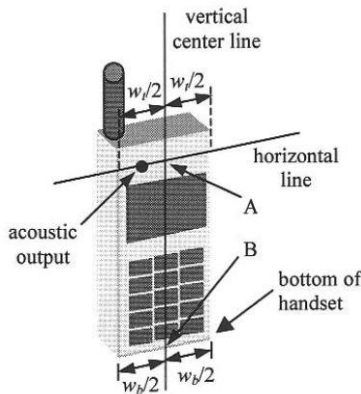


Fig 11.2.1 Handset vertical and horizontal reference lines—“fixed case”

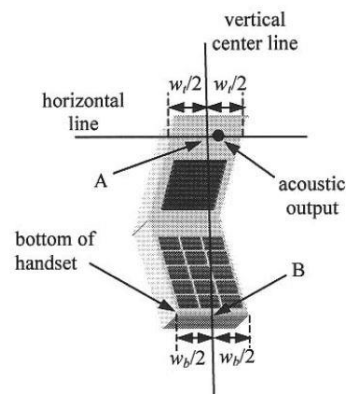


Fig 11.2.2 Handset vertical and horizontal reference lines—“clam-shell case”

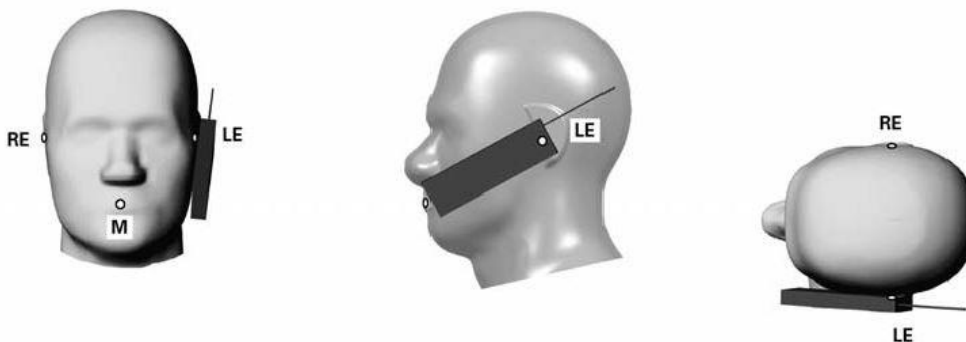


Fig 11.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

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

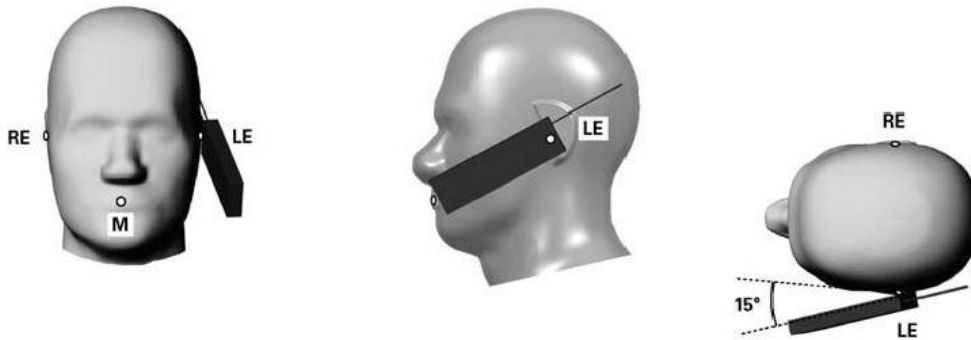


Fig 11.3.1 Tilt position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which define the Reference Plane for handset positioning, are indicated.

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 D01 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.

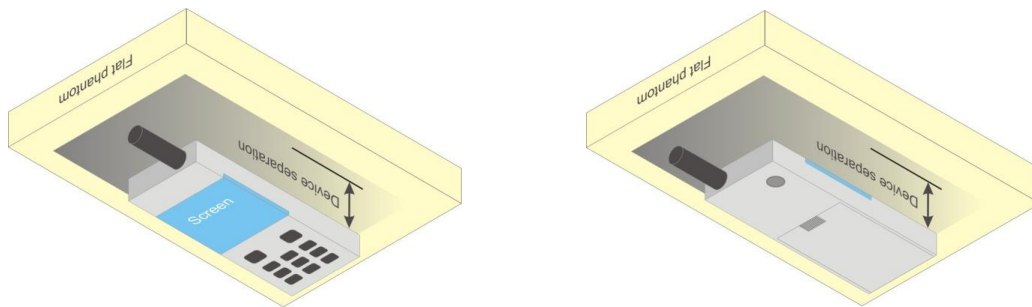


Fig 11.4 Body Worn Position



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

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

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 D01 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 D01, 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 HSPA+ devices supporting 16 QAM in the uplink, power measurements procedure is according to the configurations in Table C.11.1.4 of 3GPP TS 34.121-1.
4. For DC-HSDPA, the device was configured according to the H-Set 12, Fixed Reference Channel (FRC) configuration in Table C.8.1.12 of 3GPP TS 34.121-1, with the primary and the secondary serving HS-DSCH Cell enabled during the power measurement.

A summary of these settings are illustrated below:

HSDPA Setup Configuration:

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

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

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

Note 1: Δ_{ACK} , Δ_{NACK} and $\Delta_{CQI} = 30/15$ with $\beta_{HS} = 30/15 * \beta_c$.

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

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

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

Setup Configuration

HSUPA Setup Configuration:

- a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
- b. The RF path losses were compensated into the measurements.
- c. A call was established between EUT and Base Station with following setting * :
 - i. Call Configs = 5.2B, 5.9B, 5.10B, and 5.13.2B with QPSK
 - ii. Set the Gain Factors (β_c and β_d) and parameters (AG Index) were set according to each specific sub-test in the following table, C11.1.3, quoted from the TS 34.121
 - iii. Set Cell Power = -86 dBm
 - iv. Set Channel Type = 12.2k + HSPA
 - v. Set UE Target Power
 - vi. Power Ctrl Mode= Alternating bits
 - vii. Set and observe the E-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: β values for transmitter characteristics tests with HS-DPCCH and E-DCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (Note 4) (Note 5)	β_{ed} (SF)	β_{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2) (Note 6)	AG Index (Note 5)	E-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, Δ_{ACK} , Δ_{NACK} and $\Delta_{CQI} = 30/15$ with $\beta_{hs} = 30/15 * \beta_c$. For sub-test 5, Δ_{ACK} , Δ_{NACK} and $\Delta_{CQI} = 5/15$ with $\beta_{hs} = 5/15 * \beta_c$.

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

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

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

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

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

Setup Configuration

DC-HSDPA 3GPP release 8 Setup Configuration:

- a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration below
- b. The RF path losses were compensated into the measurements.
- c. A call was established between EUT and Base Station with following setting:
 - i. Set RMC 12.2Kbps + HSDPA mode.
 - ii. Set Cell Power = -25 dBm
 - iii. Set HS-DSCH Configuration Type to FRC (H-set 12, QPSK)
 - iv. Select HSDPA Uplink Parameters
 - v. Set Gain Factors (β_c and β_d) and parameters were set according to each Specific sub-test in the following table, C10.1.4, quoted from the TS 34.121
 - a). Subtest 1: $\beta_c/\beta_d=2/15$
 - b). Subtest 2: $\beta_c/\beta_d=12/15$
 - c). Subtest 3: $\beta_c/\beta_d=15/8$
 - d). Subtest 4: $\beta_c/\beta_d=15/4$
 - vi. Set Delta ACK, Delta NACK and Delta CQI = 8
 - vii. Set Ack-Nack Repetition Factor to 3
 - viii. Set CQI Feedback Cycle (k) to 4 ms
 - ix. Set CQI Repetition Factor to 2
 - x. Power Ctrl Mode = All Up bits
- d. The transmitted maximum output power was recorded.

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

C.8.1.12 Fixed Reference Channel Definition H-Set 12

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

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

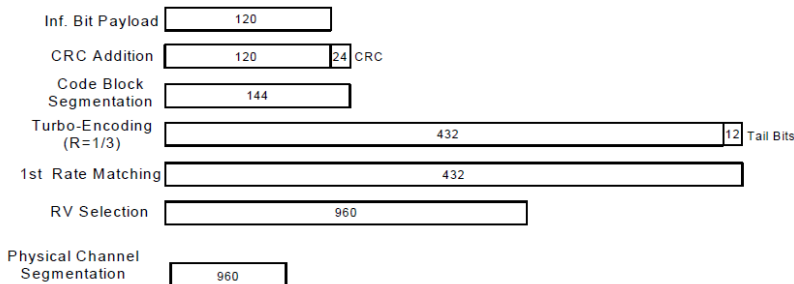


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

Setup Configuration

HSPA+ 3GPP release 7 (uplink category 7) 16QAM, 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 = 5.2E:HSPA+:UL with 16QAM
 - ii. Set the Gain Factors (β_c and β_d) and parameters (AG Index) were set according to each specific sub-test in the following table, C11.1.4, quoted from the TS 34.121-1 s5.2E
 - iii. Set Channel Parm
 - iv. Set Cell Power = -86 dBm
 - v. Set Channel Type = HSPA
 - vi. Set UE Target Power =21 dBm
 - vii. Power Ctrl Mode= All Up Bits
 - viii. Set Manual Uplink DPCH Bc/Bd = Manual
 - ix. Set Manual Uplink DPCH Bc and Bd=15,15(for 34.121-1 v8.10.0 table C11.1.4 sub-test 1)
 - x. Set HSPA Conn DL Channel Levels
 - xi. Set HS-SCCH Configs
 - xii. Set RB Test Mode Setup
 - xiii. Set Common HSUPA Parameters
 - xiv. Set Serving Grant
 - xv. Confirm that E-TFCl is equal to the target E-TFCl of 105 for sub-test 1, and other subtest's E-TFCl
- d. The transmitted maximum output power was recorded.

Table C.11.1.4: β values for transmitter characteristics tests with HS-DPCCH and E-DCH with 16QAM

Sub-test	β_c (Note 3)	β_d	β_{HS} (Note 1)	β_{ec}	β_{ed} (2xSF2) (Note 4)	β_{ed} (2xSF4) (Note 4)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 4)	E-TFCl (Note 5)	E-TFCl (boost)
1	1	0	30/15	30/15	β_{ed1} : 30/15 β_{ed2} : 30/15	β_{ed3} : 24/15 β_{ed4} : 24/15	3.5	2.5	14	105	105

Note 1: $\Delta_{ACK}, \Delta_{NACK}$ and $\Delta_{CQI} = 30/15$ with $\beta_{HS} = 30/15 * \beta_c$.

Note 2: CM = 3.5 and the MPR is based on the relative CM difference, MPR = MAX(CM-1,0).

Note 3: DPDCH is not configured, therefore the β_c is set to 1 and $\beta_d = 0$ by default.

Note 4: β_{ed} can not be set directly; it is set by Absolute Grant Value.

Note 5: All the sub-tests require the UE to transmit 2SF2+2SF4 16QAM EDCH and they apply for UE using E-DPDCH category 7. E-DCH TTI is set to 2ms TTI and E-DCH table index = 2. To support these E-DCH configurations DPDCH is not allocated. The UE is signaled to use the extrapolation algorithm.

Setup Configuration

<WCDMA Conducted Power>

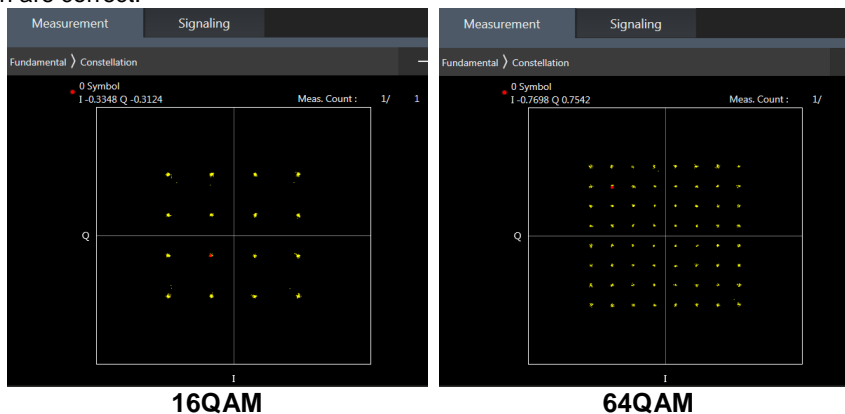
General Note:

1. Per KDB 941225 D01v03r01, for SAR testing is measured using a 12.2 kbps RMC with TPC bits configured to all "1's".
2. Per KDB 941225 D01v03r01, RMC 12.2kbps setting is used to evaluate SAR. The maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA / DC-HSDPA / HSPA+ 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 / DC-HSDPA / HSPA+ to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA / HSPA+, and according to the following RF output power, the output power results of the secondary modes (HSDPA / HSUPA / DC-HSDPA / HSPA+) are less than $1/4$ dB higher than the primary modes; therefore, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA / HSPA+.

<LTE Conducted Power>

General Note:

1. Anritsu MT8820C base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r05, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
4. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r05, for QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
6. Per KDB 941225 D05v02r05, 16QAM/256QAM output power for each RB allocation configuration is $>$ not $\frac{1}{2}$ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM/256QAM SAR testing is not required.
7. Per KDB 941225 D05v02r05, smaller bandwidth output power for each RB allocation configuration is $>$ not $\frac{1}{2}$ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
8. For LTE B4 / B5 / B12 / B17 / B26 / B38 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.
9. LTE B17 / B4 / B5/B18/B19 SAR test was covered by B12 / B66 / B26; according to April 2015 TCB workshop, SAR test for overlapping LTE bands can be reduced if
 - a. the maximum output power, including tolerance, for the smaller band is \leq the larger band to qualify for the SAR test exclusion
 - b. the channel bandwidth and other operating parameters for the smaller band are fully supported by the larger band
10. According to May 2017 TCB workshop, for 16QAM and 64QAM should be verified by checking the signal constellation with a call box to avoid incorrect maximum power levels due to MPR and other requirements associated with signal modulation, and the following figure is taken from the "Fundamental Measurement >> Modulation Analysis >> constellation" mode of the device connect to the MT8821C base station, therefore, the device 64QAM and 16QAM signal modulation are correct.



<TDD LTE SAR Measurement>

TDD LTE configuration setup for SAR measurement

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

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

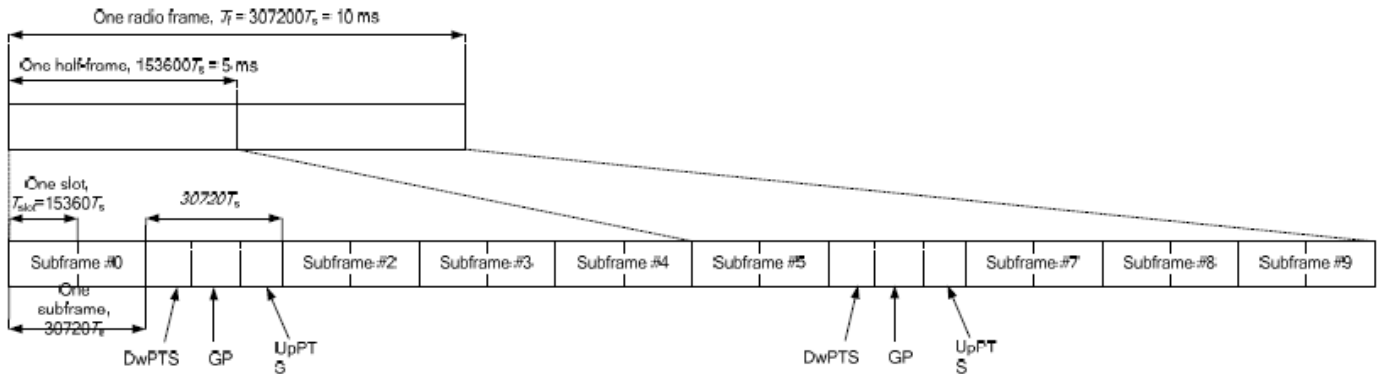


Figure 4.2-1: Frame structure type 2 (for 5 ms switch-point periodicity).

Table 4.2-2: Uplink-downlink configurations.

Uplink-downlink configuration	Downlink-to-Uplink Switch-point periodicity	Subframe number									
		0	1	2	3	4	5	6	7	8	9
0	5 ms	D	S	U	U	U	D	S	U	U	U
1	5 ms	D	S	U	U	D	D	S	U	U	D
2	5 ms	D	S	U	D	D	D	S	U	D	D
3	10 ms	D	S	U	U	U	D	D	D	D	D
4	10 ms	D	S	U	U	D	D	D	D	D	D
5	10 ms	D	S	U	D	D	D	D	D	D	D
6	5 ms	D	S	U	U	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 · Ts	2192 · Ts	2560 · Ts	7680 · Ts	2192 · Ts	2560 · Ts
1	19760 · Ts			20480 · Ts		
2	21952 · Ts			23040 · Ts		
3	24144 · Ts			25600 · Ts		
4	26336 · Ts			7680 · Ts	4384 · Ts	5120 · Ts
5	6592 · Ts	4384 · Ts	5120 · Ts	20480 · Ts		
6	19760 · Ts			23040 · Ts		
7	21952 · Ts			12800 · Ts		
8	24144 · Ts			-	-	-
9	13168 · Ts			-	-	-

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

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

The highest duty factor is resulted from:

- 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.

2CC Downlink Carrier Aggregation			
Number	Combination	4X4 MIMO	Covered by
			Measurement Superset
1	CA_7C		
2	CA_38C		
3	CA_41C		
4	CA_66C		
5	CA_4A-4A		
6	CA_7A-7A		
7	CA_41A-41A		
8	CA_66A-66A		

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 two 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	CA_7C	Ant 13/31
2	CA_41C	Ant 13/31

<Intra-band>

General Note:

- i. The device supports intra-band uplink carrier aggregation for LTE B7/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 Nov. 2017 TCB workshop, the output power with uplink CA active was measured for the configuration with the highest reported SAR with single carrier for each exposure condition. The power was measured with wideband signal integration over both component carriers.
- iv. Additional SAR measurement for LTE UL CA 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

<WLAN Conducted Power>

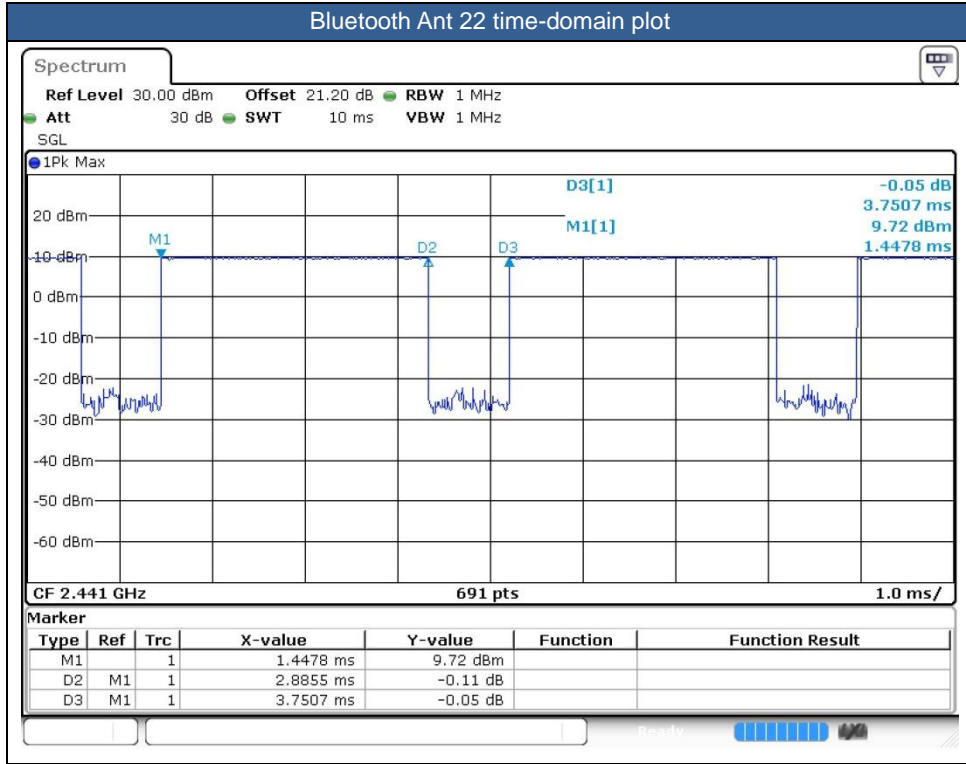
General Note:

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

<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 76.93% see as following figure, according to Oct. 2016 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 D01, 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/Bluetooth 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 D01, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the *reported* 1-g or 10-g SAR for the mid-band or highest output power channel is:
 - ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
 - ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
 - ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
3. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
4. Per KDB 648474 D04v01r03, when the reported SAR for a body-worn accessory measured without a headset connected to the handset is ≤ 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. 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). It uses the receiver to indicate whether the user is making a call in head scenario or not. The selection between head and body power levels is based on the receiver detection mechanism. It can determine proximity to head or body and set the relevant power level for 2G&3G&4G and Wi-Fi antennas accordingly. The device will invoke corresponding work scenarios power level base on frequency bands/antennas, which can refer to power table at appendix E.
7. For WLAN transmitter, while the device WWAN is transmitting simultaneously with the WLAN/Bluetooth antenna, the device power will be reduced power at body-worn and extremity conditions.
8. 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 GSM1900, WCDMA Band II/IV, LTE Band 2/4/7/38/41/66, and WLAN 5.8GHz 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.
9. For distance SAR and non-distance SAR always chose higher SAR to do co-located analysis.

**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 $\leq \frac{1}{4}$ dB higher than the primary mode, SAR measurement is not required for the secondary mode.

WCDMA Note:

1. Per KDB 941225 D01v03r01, for SAR testing is measured using a 12.2 kbps RMC with TPC bits configured to all "1's".
2. Per KDB 941225 D01v03r01, RMC 12.2kbps setting is used to evaluate SAR. The maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA / DC-HSDPA / HSPA+ 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 / DC-HSDPA / HSPA+ to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA / HSPA+, and according to the following RF output power, the output power results of the secondary modes (HSDPA / HSUPA / DC-HSDPA / HSPA+) are less than $\frac{1}{4}$ dB higher than the primary modes; therefore, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA / HSPA+.

LTE Note:

1. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
2. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
3. Per KDB 941225 D05v02r05, for QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
4. Per KDB 941225 D05v02r05, 16QAM/64QAM output power for each RB allocation configuration is $>$ not $\frac{1}{2}$ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM/64QAM SAR testing is not required.
5. Per KDB 941225 D05v02r05, smaller bandwidth output power for each RB allocation configuration is $>$ not $\frac{1}{2}$ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
6. For LTE B4 / B5 / B12 / B17 / B26 / B38 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.
7. LTE B17 / B4 / B5/B18/B19 SAR test was covered by B12 / B66 / B26; according to April 2015 TCB workshop, SAR test for overlapping LTE bands can be reduced if
 - a. the maximum output power, including tolerance, for the smaller band is \leq the larger band to qualify for the SAR test exclusion
 - b. the channel bandwidth and other operating parameters for the smaller band are fully supported by the larger band



WLAN/Bluetooth Note:

1. Per KDB 248227 D01v02r02, for 2.4GHz 802.11g/n SAR testing is not required when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.
2. Per KDB 248227 D01v02r02, U-NII-1 SAR testing is not required when the U-NII-2A band highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band.
3. When the reported SAR of the test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position on the highest maximum output power channel, until the report SAR is ≤ 0.8 W/kg or all required test position are tested.
4. For all positions / configurations, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions / configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.
5. During SAR testing the WLAN transmission was verified using a spectrum analyzer.



15.1 Head SAR

Table with columns: 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). Rows are grouped by frequency: 750MHz, 835MHz, and GSM850.



Table with columns for WCDMA/LTE bands, modulation, power, and SAR measurements. Includes a section for 1750MHz. Values include RMC 12.2Kbps, Right/Left Cheek/Tilted, Ant 13, DSI 2/3, and SAR values like 0.911, 0.648, 0.847.



	LTE Band 4	20M	QPSK	1	49	-	Right Cheek	0mm	Ant 13	DSI 3	20175	1732.5	14.60	15.50	1.230	-	-	-0.08	0.456	0.561
	LTE Band 4	20M	QPSK	1	49	-	Right Tilted	0mm	Ant 13	DSI 3	20175	1732.5	14.60	15.50	1.230	-	-	-0.05	0.522	0.642
	LTE Band 4	20M	QPSK	1	49	-	Left Cheek	0mm	Ant 13	DSI 3	20175	1732.5	14.60	15.50	1.230	-	-	-0.15	0.285	0.351
	LTE Band 4	20M	QPSK	1	49	-	Left Tilted	0mm	Ant 13	DSI 3	20175	1732.5	14.60	15.50	1.230	-	-	0.10	0.352	0.433
	LTE Band 4	20M	QPSK	50	24	-	Right Cheek	0mm	Ant 13	DSI 3	20175	1732.5	14.57	15.50	1.239	-	-	0.10	0.448	0.555
	LTE Band 4	20M	QPSK	50	24	-	Right Tilted	0mm	Ant 13	DSI 3	20175	1732.5	14.57	15.50	1.239	-	-	-0.13	0.514	0.637
	LTE Band 4	20M	QPSK	50	24	-	Left Cheek	0mm	Ant 13	DSI 3	20175	1732.5	14.57	15.50	1.239	-	-	0.12	0.283	0.351
	LTE Band 4	20M	QPSK	50	24	-	Left Tilted	0mm	Ant 13	DSI 3	20175	1732.5	14.57	15.50	1.239	-	-	-0.05	0.351	0.435
	LTE Band 66	20M	QPSK	1	49	-	Right Cheek	0mm	Ant 13	DSI 2	132322	1745	15.25	16.00	1.189	-	-	-0.02	0.458	0.544
	LTE Band 66	20M	QPSK	1	49	-	Right Tilted	0mm	Ant 13	DSI 2	132322	1745	15.25	16.00	1.189	-	-	-0.11	0.675	0.802
	LTE Band 66	20M	QPSK	1	49	-	Left Cheek	0mm	Ant 13	DSI 2	132322	1745	15.25	16.00	1.189	-	-	0.10	0.346	0.411
	LTE Band 66	20M	QPSK	1	49	-	Left Tilted	0mm	Ant 13	DSI 2	132322	1745	15.25	16.00	1.189	-	-	0.10	0.406	0.483
	LTE Band 66	20M	QPSK	1	49	-	Right Tilted	0mm	Ant 13	DSI 2	132072	1720	15.22	16.00	1.197	-	-	-0.03	0.571	0.683
08	LTE Band 66	20M	QPSK	1	49	-	Right Tilted	0mm	Ant 13	DSI 2	132572	1770	15.24	16.00	1.191	-	-	0.16	0.700	0.834
	LTE Band 66	20M	QPSK	50	24	-	Right Cheek	0mm	Ant 13	DSI 2	132322	1745	15.24	16.00	1.191	-	-	0.02	0.437	0.521
	LTE Band 66	20M	QPSK	50	24	-	Right Tilted	0mm	Ant 13	DSI 2	132322	1745	15.24	16.00	1.191	-	-	-0.07	0.645	0.768
	LTE Band 66	20M	QPSK	50	24	-	Left Cheek	0mm	Ant 13	DSI 2	132322	1745	15.24	16.00	1.191	-	-	-0.05	0.330	0.393
	LTE Band 66	20M	QPSK	50	24	-	Left Tilted	0mm	Ant 13	DSI 2	132322	1745	15.24	16.00	1.191	-	-	-0.12	0.388	0.462
	LTE Band 66	20M	QPSK	100	0	-	Right Tilted	0mm	Ant 13	DSI 2	132322	1745	15.19	16.00	1.205	-	-	0.09	0.606	0.730
	LTE Band 66	20M	QPSK	1	49	-	Right Cheek	0mm	Ant 13	DSI 3	132322	1745	14.30	15.00	1.175	-	-	-0.08	0.351	0.412
	LTE Band 66	20M	QPSK	1	49	-	Right Tilted	0mm	Ant 13	DSI 3	132322	1745	14.30	15.00	1.175	-	-	-0.01	0.502	0.590
	LTE Band 66	20M	QPSK	1	49	-	Left Cheek	0mm	Ant 13	DSI 3	132322	1745	14.30	15.00	1.175	-	-	0.05	0.227	0.267
	LTE Band 66	20M	QPSK	1	49	-	Left Tilted	0mm	Ant 13	DSI 3	132322	1745	14.30	15.00	1.175	-	-	0.02	0.278	0.327
	LTE Band 66	20M	QPSK	50	24	-	Right Cheek	0mm	Ant 13	DSI 3	132322	1745	14.29	15.00	1.178	-	-	-0.05	0.343	0.404
	LTE Band 66	20M	QPSK	50	24	-	Right Tilted	0mm	Ant 13	DSI 3	132322	1745	14.29	15.00	1.178	-	-	-0.15	0.475	0.559
	LTE Band 66	20M	QPSK	50	24	-	Left Cheek	0mm	Ant 13	DSI 3	132322	1745	14.29	15.00	1.178	-	-	0.01	0.222	0.261
	LTE Band 66	20M	QPSK	50	24	-	Left Tilted	0mm	Ant 13	DSI 3	132322	1745	14.29	15.00	1.178	-	-	-0.07	0.272	0.320
	LTE Band 66	20M	QPSK	1	49	-	Right Cheek	0mm	Ant 31	DSI 2/3	132322	1745	23.35	24.00	1.161	-	-	-0.16	0.088	0.102
	LTE Band 66	20M	QPSK	1	49	-	Right Tilted	0mm	Ant 31	DSI 2/3	132322	1745	23.35	24.00	1.161	-	-	-0.14	0.084	0.098
	LTE Band 66	20M	QPSK	1	49	-	Left Cheek	0mm	Ant 31	DSI 2/3	132322	1745	23.35	24.00	1.161	-	-	0.10	0.125	0.145
	LTE Band 66	20M	QPSK	1	49	-	Left Tilted	0mm	Ant 31	DSI 2/3	132322	1745	23.35	24.00	1.161	-	-	-0.05	0.082	0.095
	LTE Band 66	20M	QPSK	50	24	-	Right Cheek	0mm	Ant 31	DSI 2/3	132322	1745	22.25	23.00	1.189	-	-	-0.05	0.071	0.084
	LTE Band 66	20M	QPSK	50	24	-	Right Tilted	0mm	Ant 31	DSI 2/3	132322	1745	22.25	23.00	1.189	-	-	0.10	0.070	0.083
	LTE Band 66	20M	QPSK	50	24	-	Left Cheek	0mm	Ant 31	DSI 2/3	132322	1745	22.25	23.00	1.189	-	-	0.05	0.102	0.121
	LTE Band 66	20M	QPSK	50	24	-	Left Tilted	0mm	Ant 31	DSI 2/3	132322	1745	22.25	23.00	1.189	-	-	-0.05	0.064	0.076
1900MHz																				
	GSM1900	-	-	-	-	EDGE (2 Tx slots)	Right Cheek	0mm	Ant 13	DSI 2	512	1850.2	23.47	23.50	1.007	-	-	0.16	0.660	0.665
	GSM1900	-	-	-	-	EDGE (2 Tx slots)	Right Tilted	0mm	Ant 13	DSI 2	512	1850.2	23.47	23.50	1.007	-	-	0.01	0.813	0.819
	GSM1900	-	-	-	-	EDGE (2 Tx slots)	Left Cheek	0mm	Ant 13	DSI 2	512	1850.2	23.47	23.50	1.007	-	-	-0.09	0.406	0.409
	GSM1900	-	-	-	-	EDGE (2 Tx slots)	Left Tilted	0mm	Ant 13	DSI 2	512	1850.2	23.47	23.50	1.007	-	-	0.13	0.489	0.492
	GSM1900	-	-	-	-	EDGE (2 Tx slots)	Right Tilted	0mm	Ant 13	DSI 2	661	1880	23.14	23.50	1.086	-	-	-0.16	0.644	0.700
09	GSM1900	-	-	-	-	EDGE (2 Tx slots)	Right Tilted	0mm	Ant 13	DSI 2	810	1909.8	23.05	23.50	1.109	-	-	-0.10	0.800	0.887
	GSM1900	-	-	-	-	EDGE (2 Tx slots)	Right Cheek	0mm	Ant 13	DSI 3	512	1850.2	22.38	22.50	1.028	-	-	0.08	0.502	0.516
	GSM1900	-	-	-	-	EDGE (2 Tx slots)	Right Tilted	0mm	Ant 13	DSI 3	512	1850.2	22.38	22.50	1.028	-	-	-0.08	0.633	0.651
	GSM1900	-	-	-	-	EDGE (2 Tx slots)	Left Cheek	0mm	Ant 13	DSI 3	512	1850.2	22.38	22.50	1.028	-	-	-0.14	0.320	0.329
	GSM1900	-	-	-	-	EDGE (2 Tx slots)	Left Tilted	0mm	Ant 13	DSI 3	512	1850.2	22.38	22.50	1.028	-	-	0.10	0.399	0.410
	GSM1900	-	-	-	-	GPRS(3 Tx slots)	Right Cheek	0mm	Ant 31	DSI 2/3	661	1880	25.63	26.50	1.222	-	-	0.08	0.045	0.055
	GSM1900	-	-	-	-	GPRS(3 Tx slots)	Right Tilted	0mm	Ant 31	DSI 2/3	661	1880	25.63	26.50	1.222	-	-	-0.02	0.037	0.045
	GSM1900	-	-	-	-	GPRS(3 Tx slots)	Left Cheek	0mm	Ant 31	DSI 2/3	661	1880	25.63	26.50	1.222	-	-	-0.05	0.055	0.067
	GSM1900	-	-	-	-	GPRS(3 Tx slots)	Left Tilted	0mm	Ant 31	DSI 2/3	661	1880	25.63	26.50	1.222	-	-	0.10	0.046	0.056
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Right Cheek	0mm	Ant 13	DSI 2	9400	1880	15.16	16.00	1.213	-	-	0.07	0.492	0.597
10	WCDMA II	-	-	-	-	RMC 12.2Kbps	Right Tilted	0mm	Ant 13	DSI 2	9400	1880	15.16	16.00	1.213	-	-	-0.15	0.782	0.949
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Left Cheek	0mm	Ant 13	DSI 2	9400	1880	15.16	16.00	1.213	-	-	0.11	0.360	0.437
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Left Tilted	0mm	Ant 13	DSI 2	9400	1880	15.16	16.00	1.213	-	-	-0.02	0.454	0.551
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Right Tilted	0mm	Ant 13	DSI 2	9262	1852.4	15.10	16.00	1.230	-	-	0.06	0.657	0.808
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Right Tilted	0mm	Ant 13	DSI 2	9538	1907.6	15.12	16.00	1.225	-	-	-0.01	0.666	0.816



	WCDMA II	-	-	-	-	RMC 12.2Kbps	Right Cheek	0mm	Ant 13	DSI 3	9400	1880	14.14	15.00	1.219	-	-	0.01	0.410	0.500
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Right Tilted	0mm	Ant 13	DSI 3	9400	1880	14.14	15.00	1.219	-	-	0.14	0.595	0.725
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Left Cheek	0mm	Ant 13	DSI 3	9400	1880	14.14	15.00	1.219	-	-	-0.13	0.276	0.336
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Left Tilted	0mm	Ant 13	DSI 3	9400	1880	14.14	15.00	1.219	-	-	-0.10	0.323	0.394
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Right Cheek	0mm	Ant 31	DSI 2/3	9400	1880	23.32	24.00	1.169	-	-	0.04	0.083	0.097
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Right Tilted	0mm	Ant 31	DSI 2/3	9400	1880	23.32	24.00	1.169	-	-	0.11	0.081	0.095
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Left Cheek	0mm	Ant 31	DSI 2/3	9400	1880	23.32	24.00	1.169	-	-	0.07	0.104	0.122
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Left Tilted	0mm	Ant 31	DSI 2/3	9400	1880	23.32	24.00	1.169	-	-	-0.15	0.087	0.102
	LTE Band 2	20M	QPSK	1	49	-	Right Cheek	0mm	Ant 13	DSI 2	18900	1880	14.71	15.60	1.227	-	-	-0.02	0.507	0.622
	LTE Band 2	20M	QPSK	1	49	-	Right Tilted	0mm	Ant 13	DSI 2	18900	1880	14.71	15.60	1.227	-	-	-0.04	0.715	0.878
	LTE Band 2	20M	QPSK	1	49	-	Left Cheek	0mm	Ant 13	DSI 2	18900	1880	14.71	15.60	1.227	-	-	0.04	0.320	0.393
	LTE Band 2	20M	QPSK	1	49	-	Left Tilted	0mm	Ant 13	DSI 2	18900	1880	14.71	15.60	1.227	-	-	0.03	0.389	0.477
	LTE Band 2	20M	QPSK	1	49	-	Right Tilted	0mm	Ant 13	DSI 2	18700	1860	14.53	15.60	1.279	-	-	-0.14	0.558	0.714
	LTE Band 2	20M	QPSK	1	49	-	Right Tilted	0mm	Ant 13	DSI 2	19100	1900	14.53	15.60	1.279	-	-	-0.09	0.560	0.716
	LTE Band 2	20M	QPSK	50	24	-	Right Cheek	0mm	Ant 13	DSI 2	18900	1880	14.66	15.60	1.242	-	-	-0.13	0.504	0.626
11	LTE Band 2	20M	QPSK	50	24	-	Right Tilted	0mm	Ant 13	DSI 2	18900	1880	14.66	15.60	1.242	-	-	0.15	0.729	0.905
	LTE Band 2	20M	QPSK	50	24	-	Left Cheek	0mm	Ant 13	DSI 2	18900	1880	14.66	15.60	1.242	-	-	0.08	0.317	0.394
	LTE Band 2	20M	QPSK	50	24	-	Left Tilted	0mm	Ant 13	DSI 2	18900	1880	14.66	15.60	1.242	-	-	0.07	0.386	0.479
	LTE Band 2	20M	QPSK	50	24	-	Right Tilted	0mm	Ant 13	DSI 2	18700	1860	14.51	15.60	1.285	-	-	-0.03	0.560	0.720
	LTE Band 2	20M	QPSK	50	24	-	Right Tilted	0mm	Ant 13	DSI 2	19100	1900	14.53	15.60	1.279	-	-	0.13	0.563	0.720
	LTE Band 2	20M	QPSK	100	0	-	Right Tilted	0mm	Ant 13	DSI 2	18900	1880	14.54	15.60	1.276	-	-	-0.13	0.548	0.699
	LTE Band 2	20M	QPSK	1	49	-	Right Cheek	0mm	Ant 13	DSI 3	18900	1880	13.74	14.60	1.219	-	-	-0.06	0.404	0.492
	LTE Band 2	20M	QPSK	1	49	-	Right Tilted	0mm	Ant 13	DSI 3	18900	1880	13.74	14.60	1.219	-	-	0.03	0.541	0.659
	LTE Band 2	20M	QPSK	1	49	-	Left Cheek	0mm	Ant 13	DSI 3	18900	1880	13.74	14.60	1.219	-	-	-0.15	0.257	0.313
	LTE Band 2	20M	QPSK	1	49	-	Left Tilted	0mm	Ant 13	DSI 3	18900	1880	13.74	14.60	1.219	-	-	0.09	0.308	0.375
	LTE Band 2	20M	QPSK	50	24	-	Right Cheek	0mm	Ant 13	DSI 3	18900	1880	13.62	14.60	1.253	-	-	-0.13	0.404	0.506
	LTE Band 2	20M	QPSK	50	24	-	Right Tilted	0mm	Ant 13	DSI 3	18900	1880	13.62	14.60	1.253	-	-	0.09	0.555	0.695
	LTE Band 2	20M	QPSK	50	24	-	Left Cheek	0mm	Ant 13	DSI 3	18900	1880	13.62	14.60	1.253	-	-	0.12	0.255	0.320
	LTE Band 2	20M	QPSK	50	24	-	Left Tilted	0mm	Ant 13	DSI 3	18900	1880	13.62	14.60	1.253	-	-	0.10	0.308	0.386
	LTE Band 2	20M	QPSK	1	49	-	Right Cheek	0mm	Ant 31	DSI 2/3	18900	1880	23.46	24.00	1.132	-	-	0.15	0.085	0.096
	LTE Band 2	20M	QPSK	1	49	-	Right Tilted	0mm	Ant 31	DSI 2/3	18900	1880	23.46	24.00	1.132	-	-	0.10	0.083	0.094
	LTE Band 2	20M	QPSK	1	49	-	Left Cheek	0mm	Ant 31	DSI 2/3	18900	1880	23.46	24.00	1.132	-	-	0.03	0.110	0.125
	LTE Band 2	20M	QPSK	1	49	-	Left Tilted	0mm	Ant 31	DSI 2/3	18900	1880	23.46	24.00	1.132	-	-	0.12	0.087	0.099
	LTE Band 2	20M	QPSK	50	24	-	Right Cheek	0mm	Ant 31	DSI 2/3	18900	1880	22.41	23.00	1.146	-	-	-0.04	0.070	0.080
	LTE Band 2	20M	QPSK	50	24	-	Right Tilted	0mm	Ant 31	DSI 2/3	18900	1880	22.41	23.00	1.146	-	-	0.15	0.068	0.078
	LTE Band 2	20M	QPSK	50	24	-	Left Cheek	0mm	Ant 31	DSI 2/3	18900	1880	22.41	23.00	1.146	-	-	0.13	0.091	0.104
	LTE Band 2	20M	QPSK	50	24	-	Left Tilted	0mm	Ant 31	DSI 2/3	18900	1880	22.41	23.00	1.146	-	-	-0.04	0.071	0.081
2600MHz																				
	LTE Band 7	20M	QPSK	1	49	-	Right Cheek	0mm	Ant 13	DSI 2	21100	2535	12.90	13.50	1.148	-	-	0.09	0.492	0.565
12	LTE Band 7	20M	QPSK	1	49	-	Right Tilted	0mm	Ant 13	DSI 2	21100	2535	12.90	13.50	1.148	-	-	-0.04	0.734	0.843
	LTE Band 7C	20M	QPSK	1	49	-	Right Tilted	0mm	Ant 13	DSI 2	21100+20929	2535+2517.9	12.81	13.50	1.172	-	-	0.01	0.638	0.748
	LTE Band 7	20M	QPSK	1	49	-	Left Cheek	0mm	Ant 13	DSI 2	21100	2535	12.90	13.50	1.148	-	-	0.16	0.237	0.272
	LTE Band 7	20M	QPSK	1	49	-	Left Tilted	0mm	Ant 13	DSI 2	21100	2535	12.90	13.50	1.148	-	-	-0.07	0.311	0.357
	LTE Band 7	20M	QPSK	1	49	-	Right Tilted	0mm	Ant 13	DSI 2	20850	2510	12.85	13.50	1.161	-	-	0.08	0.685	0.796
	LTE Band 7	20M	QPSK	1	49	-	Right Tilted	0mm	Ant 13	DSI 2	21350	2560	12.84	13.50	1.164	-	-	-0.11	0.642	0.747
	LTE Band 7	20M	QPSK	50	24	-	Right Cheek	0mm	Ant 13	DSI 2	21100	2535	12.88	13.50	1.153	-	-	-0.11	0.482	0.556
	LTE Band 7	20M	QPSK	50	24	-	Right Tilted	0mm	Ant 13	DSI 2	21100	2535	12.88	13.50	1.153	-	-	-0.02	0.721	0.832
	LTE Band 7	20M	QPSK	50	24	-	Left Cheek	0mm	Ant 13	DSI 2	21100	2535	12.88	13.50	1.153	-	-	0.04	0.235	0.271
	LTE Band 7	20M	QPSK	50	24	-	Left Tilted	0mm	Ant 13	DSI 2	21100	2535	12.88	13.50	1.153	-	-	-0.03	0.305	0.352
	LTE Band 7	20M	QPSK	50	24	-	Right Tilted	0mm	Ant 13	DSI 2	20850	2510	12.87	13.50	1.156	-	-	-0.10	0.680	0.786
	LTE Band 7	20M	QPSK	50	24	-	Right Tilted	0mm	Ant 13	DSI 2	21350	2560	12.83	13.50	1.167	-	-	-0.15	0.629	0.734
	LTE Band 7	20M	QPSK	100	0	-	Right Tilted	0mm	Ant 13	DSI 2	21100	2535	12.86	13.50	1.159	-	-	-0.12	0.645	0.747
	LTE Band 7	20M	QPSK	1	49	-	Right Cheek	0mm	Ant 13	DSI 3	21100	2535	11.86	12.50	1.159	-	-	-0.05	0.391	0.453
	LTE Band 7	20M	QPSK	1	49	-	Right Tilted	0mm	Ant 13	DSI 3	21100	2535	11.86	12.50	1.159	-	-	0.05	0.583	0.676
	LTE Band 7C	20M	QPSK	1	49	-	Right Tilted	0mm	Ant 13	DSI 3	21100+20929	2535+2517.9	11.85	12.50	1.161	-	-	0.07	0.515	0.598
	LTE Band 7	20M	QPSK	1	49	-	Left Cheek	0mm	Ant 13	DSI 3	21100	2535	11.86	12.50	1.159	-	-	0.02	0.188	0.218



Table with columns: LTE Band, Modulation, Power, Frequency, Location, Antenna, DSI, Power Spectral Density, SAR values (1g, 2g, 3g, 4g, 5g, 6g, 7g, 8g, 9g, 10g, 11g, 12g, 13g, 14g, 15g, 16g, 17g, 18g, 19g, 20g). Includes rows for bands 7, 7C, 38, 41, and 41C.



FCC SAR Test Report

Report No. : FA311104

LTE Band 41	20M	QPSK	50	24	-	Left Cheek	0mm	Ant 13	DSI 3	40620	2593	13.82	14.50	1.169	62.9	1.006	-0.07	0.126	0.148
LTE Band 41	20M	QPSK	50	24	-	Left Tilted	0mm	Ant 13	DSI 3	40620	2593	13.82	14.50	1.169	62.9	1.006	0.01	0.167	0.196
LTE Band 41	20M	QPSK	1	49	-	Right Cheek	0mm	Ant 31	DSI 2/3	40620	2593	24.05	24.50	1.109	62.9	1.006	0.16	0.248	0.277
LTE Band 41C	20M	QPSK	1	49	-	Right Cheek	0mm	Ant 31	DSI 2/3	40620+40422	2593+2573.2	23.96	24.50	1.132	62.9	1.006	0.05	0.228	0.260
LTE Band 41	20M	QPSK	1	49	-	Right Tilted	0mm	Ant 31	DSI 2/3	40620	2593	24.05	24.50	1.109	62.9	1.006	-0.16	0.139	0.155
LTE Band 41	20M	QPSK	1	49	-	Left Cheek	0mm	Ant 31	DSI 2/3	40620	2593	24.05	24.50	1.109	62.9	1.006	-0.07	0.128	0.143
LTE Band 41	20M	QPSK	1	49	-	Left Tilted	0mm	Ant 31	DSI 2/3	40620	2593	24.05	24.50	1.109	62.9	1.006	0.13	0.099	0.110
LTE Band 41	20M	QPSK	50	24	-	Right Cheek	0mm	Ant 31	DSI 2/3	40620	2593	23.10	23.50	1.096	62.9	1.006	-0.09	0.199	0.220
LTE Band 41	20M	QPSK	50	24	-	Right Tilted	0mm	Ant 31	DSI 2/3	40620	2593	23.10	23.50	1.096	62.9	1.006	-0.16	0.114	0.126
LTE Band 41	20M	QPSK	50	24	-	Left Cheek	0mm	Ant 31	DSI 2/3	40620	2593	23.10	23.50	1.096	62.9	1.006	0.16	0.105	0.116
LTE Band 41	20M	QPSK	50	24	-	Left Tilted	0mm	Ant 31	DSI 2/3	40620	2593	23.10	23.50	1.096	62.9	1.006	0.14	0.082	0.090

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
WIFI/BT																
	Bluetooth	DH5 1Mbps	Right Cheek	0mm	Ant 22	Full	78	2480	10.50	12.00	1.413	76.93	1.300	0.03	0.051	0.093
	Bluetooth	DH5 1Mbps	Right Tilted	0mm	Ant 22	Full	78	2480	10.50	12.00	1.413	76.93	1.300	0.15	0.062	0.113
15	Bluetooth	DH5 1Mbps	Left Cheek	0mm	Ant 22	Full	78	2480	10.50	12.00	1.413	76.93	1.300	0.10	0.143	0.263
	Bluetooth	DH5 1Mbps	Left Tilted	0mm	Ant 22	Full	78	2480	10.50	12.00	1.413	76.93	1.300	0.01	0.137	0.252
	WLAN2.4GHz	802.11b 1Mbps	Right Cheek	0mm	Ant 22	Receiver on	1	2412	13.70	15.00	1.349	100	1.000	0.16	0.107	0.144
	WLAN2.4GHz	802.11b 1Mbps	Right Tilted	0mm	Ant 22	Receiver on	1	2412	13.70	15.00	1.349	100	1.000	0.08	0.121	0.163
16	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	0mm	Ant 22	Receiver on	1	2412	13.70	15.00	1.349	100	1.000	0.07	0.381	0.514
	WLAN2.4GHz	802.11b 1Mbps	Left Tilted	0mm	Ant 22	Receiver on	1	2412	13.70	15.00	1.349	100	1.000	0.14	0.190	0.256
	WLAN5.3GHz	802.11ac-VHT80 MCS0	Right Cheek	0mm	Ant 22	Receiver on	58	5290	11.05	13.00	1.567	89.92	1.112	0.05	0.093	0.162
	WLAN5.3GHz	802.11ac-VHT80 MCS0	Right Tilted	0mm	Ant 22	Receiver on	58	5290	11.05	13.00	1.567	89.92	1.112	0.02	0.113	0.197
17	WLAN5.3GHz	802.11ac-VHT80 MCS0	Left Cheek	0mm	Ant 22	Receiver on	58	5290	11.05	13.00	1.567	89.92	1.112	0.12	0.251	0.437
	WLAN5.3GHz	802.11ac-VHT80 MCS0	Left Tilted	0mm	Ant 22	Receiver on	58	5290	11.05	13.00	1.567	89.92	1.112	0.07	0.180	0.314
	WLAN5.5GHz	802.11ac-VHT80 MCS0	Right Cheek	0mm	Ant 22	Receiver on	122	5610	10.18	12.00	1.521	89.92	1.112	0.13	0.080	0.135
	WLAN5.5GHz	802.11ac-VHT80 MCS0	Right Tilted	0mm	Ant 22	Receiver on	122	5610	10.18	12.00	1.521	89.92	1.112	-0.02	0.106	0.179
18	WLAN5.5GHz	802.11ac-VHT80 MCS0	Left Cheek	0mm	Ant 22	Receiver on	122	5610	10.18	12.00	1.521	89.92	1.112	0.13	0.277	0.468
	WLAN5.5GHz	802.11ac-VHT80 MCS0	Left Tilted	0mm	Ant 22	Receiver on	122	5610	10.18	12.00	1.521	89.92	1.112	-0.04	0.162	0.274
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Right Cheek	0mm	Ant 22	Receiver on	155	5775	10.11	12.00	1.545	89.92	1.112	-0.10	0.069	0.119
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Right Tilted	0mm	Ant 22	Receiver on	155	5775	10.11	12.00	1.545	89.92	1.112	-0.12	0.064	0.110
19	WLAN5.8GHz	802.11ac-VHT80 MCS0	Left Cheek	0mm	Ant 22	Receiver on	155	5775	10.11	12.00	1.545	89.92	1.112	0.15	0.356	0.612
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Left Tilted	0mm	Ant 22	Receiver on	155	5775	10.11	12.00	1.545	89.92	1.112	0.06	0.135	0.232



15.2 Hotspot SAR

Table with columns: 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). Rows include LTE Band 12, LTE Band 13, GSM850, and WCDMA V.



	WCDMA V	-	-	-	-	RMC 12.2Kbps	Back	10mm	Ant 31	DSI 6	4182	836.4	23.26	24.00	1.186	-	-	-0.14	0.130	0.154
	WCDMA V	-	-	-	-	RMC 12.2Kbps	Left Side	10mm	Ant 31	DSI 6	4182	836.4	23.26	24.00	1.186	-	-	-0.07	0.066	0.078
	WCDMA V	-	-	-	-	RMC 12.2Kbps	Right Side	10mm	Ant 31	DSI 6	4182	836.4	23.26	24.00	1.186	-	-	-0.16	0.070	0.083
	WCDMA V	-	-	-	-	RMC 12.2Kbps	Bottom Side	10mm	Ant 31	DSI 6	4182	836.4	23.26	24.00	1.186	-	-	-0.10	0.044	0.052
24	LTE Band 26	15M	QPSK	1	37	-	Front	10mm	Ant 13	DSI 6	26865	831.5	23.71	24.50	1.199	-	-	0.14	0.170	0.204
	LTE Band 26	15M	QPSK	1	37	-	Back	10mm	Ant 13	DSI 6	26865	831.5	23.71	24.50	1.199	-	-	0.15	0.275	0.330
	LTE Band 26	15M	QPSK	1	37	-	Left Side	10mm	Ant 13	DSI 6	26865	831.5	23.71	24.50	1.199	-	-	-0.12	0.082	0.098
	LTE Band 26	15M	QPSK	1	37	-	Top Side	10mm	Ant 13	DSI 6	26865	831.5	23.71	24.50	1.199	-	-	0.13	0.112	0.134
	LTE Band 26	15M	QPSK	36	20	-	Front	10mm	Ant 13	DSI 6	26865	831.5	22.72	23.50	1.197	-	-	0.09	0.135	0.162
	LTE Band 26	15M	QPSK	36	20	-	Back	10mm	Ant 13	DSI 6	26865	831.5	22.72	23.50	1.197	-	-	-0.13	0.238	0.285
	LTE Band 26	15M	QPSK	36	20	-	Left Side	10mm	Ant 13	DSI 6	26865	831.5	22.72	23.50	1.197	-	-	-0.07	0.070	0.084
	LTE Band 26	15M	QPSK	36	20	-	Top Side	10mm	Ant 13	DSI 6	26865	831.5	22.72	23.50	1.197	-	-	-0.15	0.096	0.115
	LTE Band 26	15M	QPSK	1	37	-	Front	10mm	Ant 31	DSI 6	26865	831.5	23.15	24.00	1.216	-	-	-0.02	0.079	0.096
	LTE Band 26	15M	QPSK	1	37	-	Back	10mm	Ant 31	DSI 6	26865	831.5	23.15	24.00	1.216	-	-	0.08	0.126	0.153
	LTE Band 26	15M	QPSK	1	37	-	Left Side	10mm	Ant 31	DSI 6	26865	831.5	23.15	24.00	1.216	-	-	0.10	0.059	0.072
	LTE Band 26	15M	QPSK	1	37	-	Right Side	10mm	Ant 31	DSI 6	26865	831.5	23.15	24.00	1.216	-	-	-0.12	0.060	0.073
	LTE Band 26	15M	QPSK	1	37	-	Bottom Side	10mm	Ant 31	DSI 6	26865	831.5	23.15	24.00	1.216	-	-	-0.05	0.055	0.067
	LTE Band 26	15M	QPSK	36	20	-	Front	10mm	Ant 31	DSI 6	26865	831.5	22.05	23.00	1.245	-	-	-0.04	0.074	0.092
	LTE Band 26	15M	QPSK	36	20	-	Back	10mm	Ant 31	DSI 6	26865	831.5	22.05	23.00	1.245	-	-	-0.12	0.118	0.147
	LTE Band 26	15M	QPSK	36	20	-	Left Side	10mm	Ant 31	DSI 6	26865	831.5	22.05	23.00	1.245	-	-	-0.16	0.055	0.068
LTE Band 26	15M	QPSK	36	20	-	Right Side	10mm	Ant 31	DSI 6	26865	831.5	22.05	23.00	1.245	-	-	-0.05	0.056	0.070	
LTE Band 26	15M	QPSK	36	20	-	Bottom Side	10mm	Ant 31	DSI 6	26865	831.5	22.05	23.00	1.245	-	-	-0.06	0.051	0.063	
1750MHz																				
	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Front	10mm	Ant 13	DSI 6	1413	1732.6	18.97	20.00	1.268	-	-	-0.01	0.308	0.390
	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Back	10mm	Ant 13	DSI 6	1413	1732.6	18.97	20.00	1.268	-	-	0.03	0.298	0.378
	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Left Side	10mm	Ant 13	DSI 6	1413	1732.6	18.97	20.00	1.268	-	-	0.04	0.057	0.072
25	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Top Side	10mm	Ant 13	DSI 6	1413	1732.6	18.97	20.00	1.268	-	-	-0.12	0.511	0.648
	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Front	10mm	Ant 31	DSI 6	1413	1732.6	19.65	20.50	1.216	-	-	0.07	0.265	0.322
	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Back	10mm	Ant 31	DSI 6	1413	1732.6	19.65	20.50	1.216	-	-	-0.13	0.366	0.445
	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Left Side	10mm	Ant 31	DSI 6	1413	1732.6	19.65	20.50	1.216	-	-	0.12	0.046	0.056
	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Right Side	10mm	Ant 31	DSI 6	1413	1732.6	19.65	20.50	1.216	-	-	-0.10	0.133	0.162
	WCDMA IV	-	-	-	-	RMC 12.2Kbps	Bottom Side	10mm	Ant 31	DSI 6	1413	1732.6	19.65	20.50	1.216	-	-	0.09	0.467	0.568
	LTE Band 4	20M	QPSK	1	49	-	Front	10mm	Ant 13	DSI 6	20175	1732.5	19.09	20.00	1.233	-	-	0.06	0.311	0.383
	LTE Band 4	20M	QPSK	1	49	-	Back	10mm	Ant 13	DSI 6	20175	1732.5	19.09	20.00	1.233	-	-	-0.01	0.302	0.372
	LTE Band 4	20M	QPSK	1	49	-	Left Side	10mm	Ant 13	DSI 6	20175	1732.5	19.09	20.00	1.233	-	-	-0.12	0.055	0.068
	LTE Band 4	20M	QPSK	1	49	-	Top Side	10mm	Ant 13	DSI 6	20175	1732.5	19.09	20.00	1.233	-	-	0.13	0.476	0.587
	LTE Band 4	20M	QPSK	50	24	-	Front	10mm	Ant 13	DSI 6	20175	1732.5	19.08	20.00	1.236	-	-	-0.07	0.314	0.388
	LTE Band 4	20M	QPSK	50	24	-	Back	10mm	Ant 13	DSI 6	20175	1732.5	19.08	20.00	1.236	-	-	0.02	0.303	0.374
	LTE Band 4	20M	QPSK	50	24	-	Left Side	10mm	Ant 13	DSI 6	20175	1732.5	19.08	20.00	1.236	-	-	0.03	0.056	0.069
26	LTE Band 4	20M	QPSK	50	24	-	Top Side	10mm	Ant 13	DSI 6	20175	1732.5	19.08	20.00	1.236	-	-	0.02	0.484	0.598
	LTE Band 66	20M	QPSK	1	49	-	Front	10mm	Ant 13	DSI 6	132322	1745	17.17	18.00	1.211	-	-	0.08	0.274	0.332
	LTE Band 66	20M	QPSK	1	49	-	Back	10mm	Ant 13	DSI 6	132322	1745	17.17	18.00	1.211	-	-	-0.06	0.248	0.300
	LTE Band 66	20M	QPSK	1	49	-	Left Side	10mm	Ant 13	DSI 6	132322	1745	17.17	18.00	1.211	-	-	-0.14	0.047	0.057
	LTE Band 66	20M	QPSK	1	49	-	Top Side	10mm	Ant 13	DSI 6	132322	1745	17.17	18.00	1.211	-	-	0.04	0.413	0.500
	LTE Band 66	20M	QPSK	50	24	-	Front	10mm	Ant 13	DSI 6	132322	1745	17.15	18.00	1.216	-	-	0.02	0.279	0.339
	LTE Band 66	20M	QPSK	50	24	-	Back	10mm	Ant 13	DSI 6	132322	1745	17.15	18.00	1.216	-	-	0.16	0.254	0.309
	LTE Band 66	20M	QPSK	50	24	-	Left Side	10mm	Ant 13	DSI 6	132322	1745	17.15	18.00	1.216	-	-	-0.06	0.049	0.060
	LTE Band 66	20M	QPSK	50	24	-	Top Side	10mm	Ant 13	DSI 6	132322	1745	17.15	18.00	1.216	-	-	-0.01	0.423	0.514
	LTE Band 66	20M	QPSK	1	49	-	Front	10mm	Ant 31	DSI 6	132322	1745	19.85	20.50	1.161	-	-	0.11	0.314	0.365
	LTE Band 66	20M	QPSK	1	49	-	Back	10mm	Ant 31	DSI 6	132322	1745	19.85	20.50	1.161	-	-	0.08	0.443	0.515
	LTE Band 66	20M	QPSK	1	49	-	Left Side	10mm	Ant 31	DSI 6	132322	1745	19.85	20.50	1.161	-	-	0.13	0.045	0.052
	LTE Band 66	20M	QPSK	1	49	-	Right Side	10mm	Ant 31	DSI 6	132322	1745	19.85	20.50	1.161	-	-	-0.03	0.106	0.123
	LTE Band 66	20M	QPSK	1	49	-	Bottom Side	10mm	Ant 31	DSI 6	132322	1745	19.85	20.50	1.161	-	-	-0.14	0.538	0.625
LTE Band 66	20M	QPSK	50	24	-	Front	10mm	Ant 31	DSI 6	132322	1745	19.84	20.50	1.164	-	-	-0.03	0.318	0.370	
LTE Band 66	20M	QPSK	50	24	-	Back	10mm	Ant 31	DSI 6	132322	1745	19.84	20.50	1.164	-	-	-0.06	0.455	0.530	
LTE Band 66	20M	QPSK	50	24	-	Left Side	10mm	Ant 31	DSI 6	132322	1745	19.84	20.50	1.164	-	-	-0.07	0.047	0.055	



FCC SAR Test Report

Report No. : FA311104

Table with columns for LTE Band, Modulation, Power, Frequency, Slot, Side, Antenna, and SAR values. Includes sub-sections for 1900MHz and 2600MHz.



FCC SAR Test Report

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	LTE Band 7	20M	QPSK	50	24	-	Top Side	10mm	Ant 13	DSI 6	20850	2510	14.83	15.50	1.167	-	-	-0.03	0.783	0.914
	LTE Band 7	20M	QPSK	50	24	-	Top Side	10mm	Ant 13	DSI 6	21350	2560	14.85	15.50	1.161	-	-	0.15	0.693	0.805
	LTE Band 7	20M	QPSK	100	0	-	Top Side	10mm	Ant 13	DSI 6	21100	2535	14.89	15.50	1.151	-	-	-0.10	0.748	0.861
	LTE Band 7	20M	QPSK	1	49	-	Front	10mm	Ant 31	DSI 6	21100	2535	21.15	22.00	1.216	-	-	-0.06	0.556	0.676
	LTE Band 7	20M	QPSK	1	49	-	Back	10mm	Ant 31	DSI 6	21100	2535	21.15	22.00	1.216	-	-	0.10	0.641	0.780
	LTE Band 7C	20M	QPSK	1	49	-	Back	10mm	Ant 31	DSI 6	21100+20929	2535+2517.9	21.08	22.00	1.236	-	-	0.07	0.495	0.612
	LTE Band 7	20M	QPSK	1	49	-	Left Side	10mm	Ant 31	DSI 6	21100	2535	21.15	22.00	1.216	-	-	0.10	0.123	0.150
	LTE Band 7	20M	QPSK	1	49	-	Right Side	10mm	Ant 31	DSI 6	21100	2535	21.15	22.00	1.216	-	-	0.10	0.356	0.433
	LTE Band 7	20M	QPSK	1	49	-	Bottom Side	10mm	Ant 31	DSI 6	21100	2535	21.15	22.00	1.216	-	-	0.02	0.370	0.450
	LTE Band 7	20M	QPSK	50	24	-	Front	10mm	Ant 31	DSI 6	21100	2535	21.13	22.00	1.222	-	-	0.10	0.467	0.571
	LTE Band 7	20M	QPSK	50	24	-	Back	10mm	Ant 31	DSI 6	21100	2535	21.13	22.00	1.222	-	-	0.03	0.539	0.659
	LTE Band 7	20M	QPSK	50	24	-	Left Side	10mm	Ant 31	DSI 6	21100	2535	21.13	22.00	1.222	-	-	-0.15	0.101	0.123
	LTE Band 7	20M	QPSK	50	24	-	Right Side	10mm	Ant 31	DSI 6	21100	2535	21.13	22.00	1.222	-	-	0.01	0.289	0.353
	LTE Band 7	20M	QPSK	50	24	-	Bottom Side	10mm	Ant 31	DSI 6	21100	2535	21.13	22.00	1.222	-	-	0.13	0.303	0.370
	LTE Band 38	20M	QPSK	1	49	-	Front	10mm	Ant 13	DSI 6	38000	2595	18.40	19.00	1.148	62.9	1.006	0.03	0.172	0.199
	LTE Band 38	20M	QPSK	1	49	-	Back	10mm	Ant 13	DSI 6	38000	2595	18.40	19.00	1.148	62.9	1.006	-0.06	0.342	0.395
	LTE Band 38	20M	QPSK	1	49	-	Left Side	10mm	Ant 13	DSI 6	38000	2595	18.40	19.00	1.148	62.9	1.006	0.11	0.087	0.100
	LTE Band 38	20M	QPSK	1	49	-	Top Side	10mm	Ant 13	DSI 6	38000	2595	18.40	19.00	1.148	62.9	1.006	0.16	0.711	0.821
	LTE Band 38	20M	QPSK	50	24	-	Front	10mm	Ant 13	DSI 6	38000	2595	18.36	19.00	1.159	62.9	1.006	-0.16	0.176	0.205
	LTE Band 38	20M	QPSK	50	24	-	Back	10mm	Ant 13	DSI 6	38000	2595	18.36	19.00	1.159	62.9	1.006	-0.08	0.350	0.408
	LTE Band 38	20M	QPSK	50	24	-	Left Side	10mm	Ant 13	DSI 6	38000	2595	18.36	19.00	1.159	62.9	1.006	0.13	0.088	0.103
32	LTE Band 38	20M	QPSK	50	24	-	Top Side	10mm	Ant 13	DSI 6	38000	2595	18.36	19.00	1.159	62.9	1.006	-0.13	0.717	0.836
	LTE Band 38	20M	QPSK	100	0	-	Top Side	10mm	Ant 13	DSI 6	38000	2595	18.35	19.00	1.161	62.9	1.006	0.14	0.688	0.804
	LTE Band 41	20M	QPSK	1	49	-	Front	10mm	Ant 13	DSI 6	40620	2593	17.41	18.00	1.146	62.9	1.006	0.09	0.136	0.157
	LTE Band 41	20M	QPSK	1	49	-	Back	10mm	Ant 13	DSI 6	40620	2593	17.41	18.00	1.146	62.9	1.006	0.08	0.276	0.318
	LTE Band 41	20M	QPSK	1	49	-	Left Side	10mm	Ant 13	DSI 6	40620	2593	17.41	18.00	1.146	62.9	1.006	0.10	0.070	0.081
	LTE Band 41	20M	QPSK	1	49	-	Top Side	10mm	Ant 13	DSI 6	40620	2593	17.41	18.00	1.146	62.9	1.006	0.11	0.647	0.746
33	LTE Band 41	20M	QPSK	1	49	-	Top Side	10mm	Ant 13	DSI 6	39750	2506	17.36	18.00	1.159	62.9	1.006	-0.10	0.726	0.846
	LTE Band 41C	20M	QPSK	1	49	-	Top Side	10mm	Ant 13	DSI 6	39750+39948	2506+2525.8	17.27	18.00	1.183	62.9	1.006	0.07	0.705	0.839
	LTE Band 41	20M	QPSK	1	49	-	Top Side	10mm	Ant 13	DSI 6	40185	2549.5	17.20	18.00	1.202	62.9	1.006	0.07	0.665	0.804
	LTE Band 41	20M	QPSK	1	49	-	Top Side	10mm	Ant 13	DSI 6	41055	2636.5	17.40	18.00	1.148	62.9	1.006	0.02	0.615	0.710
	LTE Band 41	20M	QPSK	1	49	-	Top Side	10mm	Ant 13	DSI 6	41490	2680	17.35	18.00	1.161	62.9	1.006	0.07	0.563	0.658
	LTE Band 41	20M	QPSK	50	24	-	Front	10mm	Ant 13	DSI 6	40620	2593	17.39	18.00	1.151	62.9	1.006	0.11	0.134	0.155
	LTE Band 41	20M	QPSK	50	24	-	Back	10mm	Ant 13	DSI 6	40620	2593	17.39	18.00	1.151	62.9	1.006	0.01	0.272	0.315
	LTE Band 41	20M	QPSK	50	24	-	Left Side	10mm	Ant 13	DSI 6	40620	2593	17.39	18.00	1.151	62.9	1.006	0.07	0.068	0.079
	LTE Band 41	20M	QPSK	50	24	-	Top Side	10mm	Ant 13	DSI 6	40620	2593	17.39	18.00	1.151	62.9	1.006	-0.05	0.636	0.736
	LTE Band 41	20M	QPSK	50	24	-	Top Side	10mm	Ant 13	DSI 6	39750	2506	17.35	18.00	1.161	62.9	1.006	0.05	0.716	0.837
	LTE Band 41	20M	QPSK	50	24	-	Top Side	10mm	Ant 13	DSI 6	40185	2549.5	17.15	18.00	1.216	62.9	1.006	-0.12	0.653	0.799
	LTE Band 41	20M	QPSK	50	24	-	Top Side	10mm	Ant 13	DSI 6	41055	2636.5	17.30	18.00	1.175	62.9	1.006	-0.03	0.600	0.709
	LTE Band 41	20M	QPSK	50	24	-	Top Side	10mm	Ant 13	DSI 6	41490	2680	17.34	18.00	1.164	62.9	1.006	-0.11	0.546	0.639
	LTE Band 41	20M	QPSK	100	0	-	Top Side	10mm	Ant 13	DSI 6	40620	2593	17.36	18.00	1.159	62.9	1.006	0.14	0.608	0.709
	LTE Band 41	20M	QPSK	1	49	-	Front	10mm	Ant 31	DSI 6	40620	2593	23.56	24.00	1.107	62.9	1.006	0.12	0.356	0.396
	LTE Band 41	20M	QPSK	1	49	-	Back	10mm	Ant 31	DSI 6	40620	2593	23.56	24.00	1.107	62.9	1.006	0.15	0.536	0.597
	LTE Band 41C	20M	QPSK	1	49	-	Back	10mm	Ant 31	DSI 6	40620+40422	2593+2573.2	23.49	24.00	1.125	62.9	1.006	0.09	0.383	0.433
	LTE Band 41	20M	QPSK	1	49	-	Left Side	10mm	Ant 31	DSI 6	40620	2593	23.56	24.00	1.107	62.9	1.006	0.11	0.064	0.071
	LTE Band 41	20M	QPSK	1	49	-	Right Side	10mm	Ant 31	DSI 6	40620	2593	23.56	24.00	1.107	62.9	1.006	-0.10	0.248	0.276
	LTE Band 41	20M	QPSK	1	49	-	Bottom Side	10mm	Ant 31	DSI 6	40620	2593	23.56	24.00	1.107	62.9	1.006	0.15	0.349	0.389
	LTE Band 41	20M	QPSK	50	24	-	Front	10mm	Ant 31	DSI 6	40620	2593	23.10	23.50	1.096	62.9	1.006	-0.08	0.289	0.319
	LTE Band 41	20M	QPSK	50	24	-	Back	10mm	Ant 31	DSI 6	40620	2593	23.10	23.50	1.096	62.9	1.006	-0.13	0.455	0.502
	LTE Band 41	20M	QPSK	50	24	-	Left Side	10mm	Ant 31	DSI 6	40620	2593	23.10	23.50	1.096	62.9	1.006	0.09	0.051	0.056
	LTE Band 41	20M	QPSK	50	24	-	Right Side	10mm	Ant 31	DSI 6	40620	2593	23.10	23.50	1.096	62.9	1.006	0.11	0.227	0.250
	LTE Band 41	20M	QPSK	50	24	-	Bottom Side	10mm	Ant 31	DSI 6	40620	2593	23.10	23.50	1.096	62.9	1.006	0.16	0.271	0.299



Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
WIFI/BT																
	Bluetooth	DH5 1Mbps	Front	10mm	Ant 22	Full	78	2480	10.50	12.00	1.413	76.93	1.300	0.02	0.022	0.040
34	Bluetooth	DH5 1Mbps	Back	10mm	Ant 22	Full	78	2480	10.50	12.00	1.413	76.93	1.300	-0.14	0.029	0.053
	Bluetooth	DH5 1Mbps	Right Side	10mm	Ant 22	Full	78	2480	10.50	12.00	1.413	76.93	1.300	0.04	0.021	0.038
	Bluetooth	DH5 1Mbps	Top Side	10mm	Ant 22	Full	78	2480	10.50	12.00	1.413	76.93	1.300	0.07	0.025	0.045
	WLAN2.4GHz	802.11b 1Mbps	Front	10mm	Ant 22	Full	1	2412	18.80	20.00	1.318	100	1.000	-0.11	0.146	0.192
35	WLAN2.4GHz	802.11b 1Mbps	Back	10mm	Ant 22	Full	1	2412	18.80	20.00	1.318	100	1.000	-0.14	0.257	0.339
	WLAN2.4GHz	802.11b 1Mbps	Right Side	10mm	Ant 22	Full	1	2412	18.80	20.00	1.318	100	1.000	-0.12	0.133	0.175
	WLAN2.4GHz	802.11b 1Mbps	Top Side	10mm	Ant 22	Full	1	2412	18.80	20.00	1.318	100	1.000	0.08	0.249	0.328
	WLAN5.2GHz	802.11n-HT40 MCS0	Front	10mm	Ant 22	Reduced	46	5230	15.79	17.50	1.484	94.92	1.054	0.08	0.208	0.325
	WLAN5.2GHz	802.11n-HT40 MCS0	Back	10mm	Ant 22	Reduced	46	5230	15.79	17.50	1.484	94.92	1.054	0.04	0.197	0.308
	WLAN5.2GHz	802.11n-HT40 MCS0	Right Side	10mm	Ant 22	Reduced	46	5230	15.79	17.50	1.484	94.92	1.054	-0.03	0.249	0.389
36	WLAN5.2GHz	802.11n-HT40 MCS0	Top Side	10mm	Ant 22	Reduced	46	5230	15.79	17.50	1.484	94.92	1.054	0.01	0.257	0.402
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Front	10mm	Ant 22	Reduced	155	5775	12.66	14.50	1.528	89.92	1.112	-0.12	0.134	0.228
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Back	10mm	Ant 22	Reduced	155	5775	12.66	14.50	1.528	89.92	1.112	0.10	0.130	0.221
37	WLAN5.8GHz	802.11ac-VHT80 MCS0	Right Side	10mm	Ant 22	Reduced	155	5775	12.66	14.50	1.528	89.92	1.112	-0.03	0.506	0.860
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Top Side	10mm	Ant 22	Reduced	155	5775	12.66	14.50	1.528	89.92	1.112	0.14	0.116	0.197



15.3 Body Worn Accessory SAR

Table with columns: 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). Rows are grouped by frequency bands: 750MHz, 835MHz, 1750MHz, and 1900MHz.



Table with columns for frequency bands (GSM1900, WCDMA II, LTE Band 2, etc.), modulation schemes (QPSK), power (20M), and various test parameters. Includes a section for 2600MHz bands. Values include power spectral density, field strength, and SAR values.

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
WIFI/BT																
	Bluetooth	DH5 1Mbps	Front	15mm	Ant 22	Full	78	2480	10.50	12.00	1.413	76.93	1.300	0.05	0.003	0.006
51	Bluetooth	DH5 1Mbps	Back	15mm	Ant 22	Full	78	2480	10.50	12.00	1.413	76.93	1.300	0.15	0.010	0.018
	WLAN2.4GHz	802.11b 1Mbps	Front	15mm	Ant 22	Full	1	2412	18.80	20.00	1.318	100	1.000	-0.08	0.091	0.120
52	WLAN2.4GHz	802.11b 1Mbps	Back	15mm	Ant 22	Full	1	2412	18.80	20.00	1.318	100	1.000	0.12	0.108	0.142
	WLAN 5.3GHz	802.11a 6Mbps	Front	15mm	Ant 22	Full	60	5300	18.08	20.00	1.555	97.46	1.026	-0.10	0.216	0.345
53	WLAN 5.3GHz	802.11a 6Mbps	Back	15mm	Ant 22	Full	60	5300	18.08	20.00	1.555	97.46	1.026	0.14	0.319	0.509
	WLAN 5.3GHz	802.11n-HT40 MCS0	Front	15mm	Ant 22	Simultaneous	54	5270	15.64	17.50	1.536	94.92	1.054	-0.03	0.160	0.259
	WLAN 5.3GHz	802.11n-HT40 MCS0	Back	15mm	Ant 22	Simultaneous	54	5270	15.64	17.50	1.536	94.92	1.054	-0.16	0.198	0.321
	WLAN 5.5GHz	802.11n-HT40 MCS0	Front	15mm	Ant 22	Full	110	5550	15.79	17.50	1.483	94.92	1.054	0.13	0.131	0.205
54	WLAN 5.5GHz	802.11n-HT40 MCS0	Back	15mm	Ant 22	Full	110	5550	15.79	17.50	1.483	94.92	1.054	-0.12	0.208	0.325
	WLAN 5.5GHz	802.11n-HT40 MCS0	Front	15mm	Ant 22	Simultaneous	110	5550	14.71	16.50	1.510	94.92	1.054	-0.07	0.103	0.164
	WLAN 5.5GHz	802.11n-HT40 MCS0	Back	15mm	Ant 22	Simultaneous	110	5550	14.71	16.50	1.510	94.92	1.054	-0.16	0.168	0.267
	WLAN 5.8GHz	802.11n-HT40 MCS0	Front	15mm	Ant 22	Full	151	5755	15.86	17.50	1.459	94.92	1.054	0.07	0.179	0.275
55	WLAN 5.8GHz	802.11n-HT40 MCS0	Back	15mm	Ant 22	Full	151	5755	15.86	17.50	1.459	94.92	1.054	0.12	0.212	0.326
	WLAN 5.8GHz	802.11ac-VHT80 MCS0	Front	15mm	Ant 22	Simultaneous	155	5775	12.66	14.50	1.528	89.92	1.112	0.09	0.086	0.146
	WLAN 5.8GHz	802.11ac-VHT80 MCS0	Back	15mm	Ant 22	Simultaneous	155	5775	12.66	14.50	1.528	89.92	1.112	-0.06	0.102	0.173



15.4 Product specific 10g SAR

Table with columns: 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 10g SAR (W/kg), Reported 10g SAR (W/kg). Rows are grouped by frequency bands: 1750MHz, 1900MHz, and 2000MHz.



Table with columns for test parameters (Band, Modulation, Power, etc.) and SAR results (Front, Back, Top Side, etc.). Includes rows for WCDMA II, LTE Band 2, and LTE Band 7/38/41. Specific rows are highlighted in yellow (e.g., row 61, 62, 63, 64).



LTE Band 41C	20M	QPSK	1	49	-	Back	0mm	Ant 13	DSI 4	40620+40422	2593+2573.2	18.80	19.50	1.175	62.9	1.006	0.07	0.980	1.158
LTE Band 41	20M	QPSK	1	49	-	Top Side	0mm	Ant 13	DSI 4	40620	2593	18.91	19.50	1.146	62.9	1.006	-0.04	0.946	1.090
LTE Band 41	20M	QPSK	1	49	-	Back	11mm	Ant 13	DSI 7	40620	2593	23.84	24.50	1.164	62.9	1.006	0.16	0.356	0.417
LTE Band 41	20M	QPSK	1	49	-	Top Side	14mm	Ant 13	DSI 7	40620	2593	23.84	24.50	1.164	62.9	1.006	0.07	0.443	0.519
LTE Band 41	20M	QPSK	50	24	-	Back	0mm	Ant 13	DSI 4	40620	2593	18.86	19.50	1.159	62.9	1.006	-0.04	1.000	1.166
LTE Band 41	20M	QPSK	50	24	-	Top Side	0mm	Ant 13	DSI 4	40620	2593	18.86	19.50	1.159	62.9	1.006	0.07	0.922	1.075
LTE Band 41	20M	QPSK	1	49	-	Back	0mm	Ant 13	DSI 5	40620	2593	17.41	18.00	1.146	62.9	1.006	0.10	0.755	0.870
LTE Band 41C	20M	QPSK	1	49	-	Back	0mm	Ant 13	DSI 5	40620+40422	2593+2573.2	17.30	18.00	1.175	62.9	1.006	0.04	0.730	0.863
LTE Band 41	20M	QPSK	1	49	-	Top Side	0mm	Ant 13	DSI 5	40620	2593	17.41	18.00	1.146	62.9	1.006	0.14	0.642	0.740
LTE Band 41	20M	QPSK	50	24	-	Back	0mm	Ant 13	DSI 5	40620	2593	17.39	18.00	1.151	62.9	1.006	0.03	0.741	0.858
LTE Band 41	20M	QPSK	50	24	-	Top Side	0mm	Ant 13	DSI 5	40620	2593	17.39	18.00	1.151	62.9	1.006	0.06	0.632	0.732

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
WIFI																
	WLAN5.3GHz	802.11a 6Mbps	Front	0mm	Ant 22	Full	60	5300	18.08	20.00	1.555	97.46	1.026	-0.11	0.880	1.404
	WLAN5.3GHz	802.11a 6Mbps	Back	0mm	Ant 22	Full	60	5300	18.08	20.00	1.555	97.46	1.026	-0.09	0.501	0.799
	WLAN5.3GHz	802.11a 6Mbps	Right Side	0mm	Ant 22	Full	60	5300	18.08	20.00	1.555	97.46	1.026	0.10	0.540	0.862
	WLAN5.3GHz	802.11a 6Mbps	Top Side	0mm	Ant 22	Full	60	5300	18.08	20.00	1.555	97.46	1.026	-0.10	1.290	2.059
65	WLAN5.3GHz	802.11a 6Mbps	Top Side	0mm	Ant 22	Full	52	5260	18.06	20.00	1.563	97.46	1.026	-0.14	1.870	2.998
	WLAN5.3GHz	802.11a 6Mbps	Top Side	0mm	Ant 22	Full	56	5280	18.02	19.50	1.406	97.46	1.026	0.11	1.530	2.207
	WLAN5.3GHz	802.11a 6Mbps	Top Side	0mm	Ant 22	Full	64	5320	16.08	18.00	1.555	97.46	1.026	-0.06	0.831	1.326
	WLAN5.3GHz	802.11n-HT40 MCS0	Front	0mm	Ant 22	Simultaneous	54	5270	15.64	17.50	1.536	94.92	1.054	0.09	0.472	0.764
	WLAN5.3GHz	802.11n-HT40 MCS0	Back	0mm	Ant 22	Simultaneous	54	5270	15.64	17.50	1.536	94.92	1.054	-0.14	0.252	0.408
	WLAN5.3GHz	802.11n-HT40 MCS0	Right Side	0mm	Ant 22	Simultaneous	54	5270	15.64	17.50	1.536	94.92	1.054	0.16	0.382	0.618
	WLAN5.3GHz	802.11n-HT40 MCS0	Top Side	0mm	Ant 22	Simultaneous	54	5270	15.64	17.50	1.536	94.92	1.054	-0.10	1.020	1.651
	WLAN5.5GHz	802.11n-HT40 MCS0	Front	0mm	Ant 22	Full	110	5550	15.79	17.50	1.483	94.92	1.054	-0.14	0.438	0.684
	WLAN5.5GHz	802.11n-HT40 MCS0	Back	0mm	Ant 22	Full	110	5550	15.79	17.50	1.483	94.92	1.054	-0.05	0.390	0.609
66	WLAN5.5GHz	802.11n-HT40 MCS0	Right Side	0mm	Ant 22	Full	110	5550	15.79	17.50	1.483	94.92	1.054	-0.09	0.899	1.405
	WLAN5.5GHz	802.11n-HT40 MCS0	Top Side	0mm	Ant 22	Full	110	5550	15.79	17.50	1.483	94.92	1.054	-0.11	0.791	1.236
	WLAN5.5GHz	802.11n-HT40 MCS0	Front	0mm	Ant 22	Simultaneous	110	5550	14.71	16.50	1.510	94.92	1.054	-0.12	0.348	0.554
	WLAN5.5GHz	802.11n-HT40 MCS0	Back	0mm	Ant 22	Simultaneous	110	5550	14.71	16.50	1.510	94.92	1.054	0.04	0.310	0.493
	WLAN5.5GHz	802.11n-HT40 MCS0	Right Side	0mm	Ant 22	Simultaneous	110	5550	14.71	16.50	1.510	94.92	1.054	-0.08	0.711	1.132
	WLAN5.5GHz	802.11n-HT40 MCS0	Top Side	0mm	Ant 22	Simultaneous	110	5550	14.71	16.50	1.510	94.92	1.054	-0.15	0.427	0.680
67	WLAN5.8GHz	802.11n-HT40 MCS0	Right Side	0mm	Ant 22	Full	151	5755	15.86	17.50	1.459	94.92	1.054	0.10	1.780	2.737
	WLAN5.8GHz	802.11n-HT40 MCS0	Right Side	0mm	Ant 22	Full	159	5795	15.83	17.50	1.469	94.92	1.054	-0.01	1.730	2.678
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Right Side	0mm	Ant 22	Simultaneous	155	5775	12.66	14.50	1.528	89.92	1.112	0.10	0.882	1.498



15.1 Repeated SAR Measurement

<1g>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Ratio	Reported 1g SAR (W/kg)
1st	GSM1900	-	-	-	-	EDGE (2 Tx slots)	Right Tilted	0mm	Ant 13	DSI 2	512	1850.2	23.47	23.50	1.007	-	-	0.01	0.813	1	0.819
2nd	GSM1900	-	-	-	-	EDGE (2 Tx slots)	Right Tilted	0mm	Ant 13	DSI 2	512	1850.2	23.47	23.50	1.007	-	-	0.03	0.810	1.004	0.816
1st	LTE Band 38	20M	QPSK	1	49	-	Back	15mm	Ant 13	DSI 7	38000	2595	24.33	25.00	1.167	62.9	1.006	0.06	0.838	1	0.984
2nd	LTE Band 38	20M	QPSK	1	49	-	Back	15mm	Ant 13	DSI 7	38000	2595	24.33	25.00	1.167	62.9	1.006	0.04	0.822	1.019	0.965

<10g>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Ratio	Reported 10g SAR (W/kg)
1st	LTE Band 4	20M	QPSK	50	24	-	Top Side	0mm	Ant 13	DSI 4	20175	1732.5	20.59	21.50	1.233	-	-	0.08	2.380	1	2.935
2nd	LTE Band 4	20M	QPSK	50	24	-	Top Side	0mm	Ant 13	DSI 4	20175	1732.5	20.59	21.50	1.233	-	-	0.04	2.310	1.030	2.848
1st	LTE Band 2	20M	QPSK	50	24	-	Top Side	0mm	Ant 13	DSI 4	19100	1900	19.50	20.60	1.288	-	-	-0.09	2.400	1	3.092
2nd	LTE Band 2	20M	QPSK	50	24	-	Top Side	0mm	Ant 13	DSI 4	19100	1900	19.50	20.60	1.288	-	-	-0.05	2.360	1.017	3.040

General Note:

1. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is $\geq 0.8W/kg$.
2. Per KDB 865664 D01v01r04, if the ratio among the repeated measurement is ≤ 1.2 and the measured SAR $< 1.45W/kg$, only one repeated measurement is required.
3. Per KDB 865664 D01v01r04, if the extremity repeated SAR is necessary, the same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds. The ratio is the difference in percentage between original and repeated *measured* SAR.
4. All measurement SAR result is scaled-up to account for tune-up tolerance and is compliant.

16. Simultaneous Transmission Analysis

No.	Simultaneous Transmission Configurations	Portable Handset			
		Head	Body-worn	Hotspot	Product specific 10g SAR
1.	WWAN + 2.4GHz WLAN	Yes	Yes	Yes	Yes
2.	WWAN + 5GHz WLAN	Yes	Yes	Yes	Yes
3.	WWAN + Bluetooth	Yes	Yes	Yes	Yes
4.	5GHz WLAN + Bluetooth	Yes	Yes	Yes	Yes
5.	WWAN + 5GHz WLAN + Bluetooth	Yes	Yes	Yes	Yes

General Note:

1. This device supports VoIP in GPRS, EGPRS, WCDMA and LTE (e.g. for 3rd-party VoIP), and LTE supports VoLTE function.
2. EUT will choose each GSM, WCDMA, and LTE according to the network signal condition; therefore, they will not operate simultaneously at any moment.
3. This device WLAN 2.4GHz supports hotspot operation and Bluetooth support tethering applications.
4. This device 5.2GHz WLAN/5.8GHz WLAN support hotspot operation, and 5.2GHz WLAN/5.8GHz WLAN supports WiFi Direct (GC/GO), and 5.3GHz / 5.5GHz supports WiFi Direct (GC only).
5. The worst case 5 GHz WLAN SAR for each configuration was used for SAR summation.
6. WLAN 2.4GHz and Bluetooth share the same antenna, and cannot transmit simultaneously.
7. According to the EUT characteristic, WLAN 5GHz and Bluetooth can transmit simultaneously.
8. According to the EUT characteristic, WLAN 5GHz and WLAN 2.4GHz cannot transmit simultaneously.
9. For simultaneously analysis, since the SAR summation of 3 transmitters can cover others combination of 2 transmitters, therefore in this section did not additional to evaluate 2TX combination of simultaneously transmission.
10. For standalone WWAN, always choose the highest SAR among all WWAN bands within the selected antennas for each test exposure position to perform simultaneous transmission analysis with WLAN/BT. This is the worst co-located analysis and can represent each bands.
11. For distance SAR and non-distance SAR always chose higher SAR to do co-located analysis.
12. The reported SAR summation is calculated based on the same configuration and test position
13. Per KDB 447498 D01, simultaneous transmission SAR is compliant if,
 - i) 1g Scalar SAR summation < 1.6W/kg and 10g Scalar SAR summation < 4.0W/kg.
 - ii) $SPLSR = (SAR1 + SAR2)^{1.5} / (\text{min. separation distance, mm})$, and the peak separation distance is determined from the square root of $[(x1-x2)^2 + (y1-y2)^2 + (z1-z2)^2]$, where (x1, y1, z1) and (x2, y2, z2) are the coordinates of the extrapolated peak SAR locations in the zoom scan.
 - iii) If $SPLSR \leq 0.04$ for 1g SAR and $SPLSR \leq 0.10$ for 10g SAR, simultaneously transmission SAR measurement is not necessary.
 - iv) Simultaneously transmission SAR measurement, and the reported multi-band 1g SAR < 1.6W/kg and 10g SAR < 4.0W/kg.

16.1 Head Exposure Conditions

WWAN Band	Exposure Position	1	3	10	17	1+3 Summed 1g SAR (W/kg)	1+10+17 Summed 1g SAR (W/kg)
		WWAN 1g SAR (W/kg)	WLAN2.4GHz Ant 22 1g SAR (W/kg)	WLAN5GHz Ant 22 1g SAR (W/kg)	Bluetooth Ant 22 1g SAR (W/kg)		
All Bands Ant 13	Right Cheek	0.752	0.144	0.162	0.093	0.90	1.01
	Right Tilted	0.731	0.163	0.197	0.113	0.89	1.04
	Left Cheek	0.528	0.514	0.612	0.263	1.04	1.40
	Left Tilted	0.505	0.256	0.314	0.252	0.76	1.07
All Bands Ant 31	Right Cheek	0.394	0.144	0.162	0.093	0.54	0.65
	Right Tilted	0.241	0.163	0.197	0.113	0.40	0.55
	Left Cheek	0.190	0.514	0.612	0.263	0.70	1.07
	Left Tilted	0.163	0.256	0.314	0.252	0.42	0.73

16.2 Hotspot Exposure Conditions

WWAN Band	Exposure Position	1	3	10	17	1+3 Summed 1g SAR (W/kg)	1+10+17 Summed 1g SAR (W/kg)
		WWAN 1g SAR (W/kg)	WLAN2.4GHz Ant 22 1g SAR (W/kg)	WLAN5GHz Ant 22 1g SAR (W/kg)	Bluetooth Ant 22 1g SAR (W/kg)		
All Bands Ant 13	Front	0.402	0.192	0.325	0.040	0.59	0.77
	Back	0.542	0.339	0.308	0.053	0.88	0.90
	Left side	0.178				0.18	0.18
	Right side		0.175	0.860	0.038	0.18	0.90
	Top side	0.950	0.328	0.402	0.045	1.28	1.40
	Bottom side					0.00	0.00
All Bands Ant 31	Front	0.676	0.192	0.325	0.040	0.87	1.04
	Back	0.780	0.339	0.308	0.053	1.12	1.14
	Left side	0.150				0.15	0.15
	Right side	0.433	0.175	0.860	0.038	0.61	1.33
	Top side		0.328	0.402	0.045	0.33	0.45
	Bottom side	0.654				0.65	0.65



16.3 Body-Worn Accessory Exposure Conditions

WWAN Band	Exposure Position	1	3	10	17	1+3 Summed 1g SAR (W/kg)	1+10+17 Summed 1g SAR (W/kg)
		WWAN 1g SAR (W/kg)	WLAN2.4GHz Ant 22 1g SAR (W/kg)	WLAN5GHz Ant 22 1g SAR (W/kg)	Bluetooth Ant 22 1g SAR (W/kg)		
All Bands Ant 13	Front	0.595	0.120	0.259	0.006	0.72	0.86
	Back	0.984	0.142	0.321	0.018	1.13	1.32
All Bands Ant 31	Front	0.298	0.120	0.259	0.006	0.42	0.56
	Back	0.379	0.142	0.321	0.018	0.52	0.72

16.4 Product specific 10g SAR Exposure Conditions

Note: For WLAN2.4GHz /Bluetooth Product specific 10g stand-alone SAR is not required for a transmitter or antenna, due to 1g hotspot SAR is <1.2W/kg.

WWAN Band	Exposure Position	1	10	1+10 Summed 10g SAR (W/kg)
		WWAN 10g SAR (W/kg)	WLAN5GHz Ant 22 10g SAR (W/kg)	
All Bands Ant 13	Front	1.429	0.764	2.19
	Back	1.332	0.493	1.83
	Left side			0.00
	Right side		1.498	1.50
	Top side	2.185	1.651	3.84
	Bottom side			0.00

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17. Uncertainty Assessment

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

18. References

- [1] FCC 47 CFR Part 2 “Frequency Allocations and Radio Treaty Matters; General Rules and Regulations”
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- [6] FCC KDB 447498 D01 v06, “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”, Oct 2015.
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- [10] FCC KDB 941225 D05A v01r02, “Rel. 10 LTE SAR Test Guidance and KDB Inquiries”, Oct 2015
- [11] FCC KDB 941225 D06 v02r01, “SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities”, Oct 2015.
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- [13] FCC KDB 865664 D02 v01r02, “RF Exposure Compliance Reporting and Documentation Considerations” Oct 2015.
- [14] FCC KDB 616217 D04 v01r02, “SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers”, Oct 2015

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