FCC SAR Test Report

APPLICANT	:	Sierra Wireless Inc
EQUIPMENT	:	PCIe wireless WAN card
BRAND NAME	:	SIERRA WIRELESS
MODEL NAME	:	EM7455
FCC ID	:	N7NEM7455-D3
STANDARD	:	FCC 47 CFR Part 2 (2.1093) ANSI/IEEE C95.1-1992 IEEE 1528-2013

The product was installed into Portable Computer (Brand Name DELL, Model Name: P67G) during test.

We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and had 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., the test report shall not be reproduced except in full.

Reviewed by: Eric Huang / Deputy Manager

Approved by: Jones Tsai / Manager

Testing Laboratory
1190

SPORTON INTERNATIONAL INC.
No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Taoyuan City, Taiwan (R.O.C.)

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA5O1610-03	Rev. 01	Initial issue of report	Jan. 13, 2016

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for Sierra Wireless Inc, PCIe wireless WAN card, EM7455, are as follows.

Equipment Class	Frequency Band	Highest SAR Summary	
		Body (Separation 0mm) 1g SAR (W/kg)	Simultaneous Transmission 1g SAR (W/kg)
PCB	WCDMA Band V	0.69	1.59
	WCDMA Band IV	1.07	
	WCDMA Band II	**1.19**	
	LTE Band 2		
	LTE Band 4	0.99	
	LTE Band 5		
	LTE Band 7	1.09	
	LTE Band 12	0.71	
	LTE Band 13	0.67	
	LTE Band 25	1.18	
	LTE Band 26	0.69	
	LTE Band 30	0.97	
	LTE Band 41	0.75	
Date of Testing:		2015/11/10~2015/12/22	

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) 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

Testing Laboratory	
Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978

Applicant	
Company Name	Sierra Wireless Inc
Address	13811 Wireless Way, Richmond, BC, N/A V6V 3A4, Canada

Manufacturer	
Company Name	Sierra Wireless Inc
Address	13811 Wireless Way, Richmond, BC, N/A V6V 3A4, Canada

3. Guidance Standard

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 248227 D01 802.11 Wi-Fi SAR v02r02
- FCC KDB 616217 D04 SAR for laptop and tablets v01r02
- FCC KDB 941225 D01 3G SAR Procedures v03r01
- FCC KDB 941225 D05 SAR for LTE Devices v02r05
- FCC KDB 941225 D05A Rel.10 LTE SAR Test Guidance v01r02

4. Equipment Under Test (EUT) Information

4.1 General Information

Product Feature & Specification	
Equipment Name	PCIe wireless WAN card
Brand Name	SIERRA WIRELESS
Model Name	EM7455
FCC ID	N7NEM7455-D3
Wireless Technology and Frequency Range	WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz WCDMA Band IV: 1712.4 MHz ~ 1752.6 MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz LTE Band 2: 1850.7 MHz ~ 1909.3 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 7: 2502.5 MHz ~ 2567.5 MHz LTE Band 12: 699.7 MHz ~ 715.3 MHz LTE Band 13: 779.5 MHz ~ 784.5 MHz LTE Band 25: 1850.7 MHz ~ 1914.3 MHz LTE Band 26: 814.7 MHz ~ 848.3 MHz LTE Band 30: 2307.5 MHz ~ 2312.5 MHz LTE Band 41: 2498.5 MHz ~ 2687.5 MHz
Mode	· RMC 12.2Kbps · HSDPA · HSUPA · DC-HSDPA · LTE: QPSK, 16QAM
EUT Stage	Identical Prototype
Remark: 1. WLAN/BT modules as follow will also integrated into the same host with EM7455, detail information as follow: (a) The WLAN/BT module, Broadcom BCM94350ZAE, FCC ID: QDS-BRCM1087 is also integrated into this host and the WLAN and Bluetooth SAR testing results are also used perform transmission simultaneous analysis which can be referred to RF Exposure Lab SAR Evaluation Report, Report No: FA5O1610-04. (b) The WLAN/BT module, Intel 8260NGW, FCC ID: PD98260NGU is also integrated into this host and the WLAN and Bluetooth SAR testing results are also used perform transmission simultaneous analysis which can be referred to RF Exposure Lab SAR Evaluation Report, Report No: SAR.20151209.	

Host Information						
Equipment Name		Portable Computer				
Brand Name		DELL				
Model Name		P67G				
Feature		NFC contains chipset BCM58102				
Sample 1	S/N	3807914100024	Housing material	Aluminum	Antenna Vender	Ethertronics Inc.
Sample 2		3806674100002		Carbon fiber		
Remark : 1. If host collocation battery 1 (34Wh), in this host also supports NFC function,but if collocation battery 2(43Wh) , in this host doesn't support NFC function						

Battery Information				
Battery 1	Brand Name	DELL	Model Name	XCNR3
	Power Rating	7.6Vdc,34 Wh	Type	Li-ion,
Battery 2	Brand Name	DELL	Model Name	P63NY
	Power Rating	7.6Vdc, 43 Wh	Type	Li-ion,

WWAN Antenna Information				
Ethertronics Inc	Parts Number	5002106		
	Ant. Type	PIFA		
	Peak Gain (dBi)	WCDMA Band II	1850~1910MHz :	-0.47
		LTE Band 2		
		WCDMA Band IV	1710~1755MHz :	-1.48
		LTE Band 4		
		WCDMA Band V	824~849MHz :	0.14
		LTE Band 5		
		LTE Band 7	2500~2570MHz :	1.43
		LTE Band 12	699~716MHz :	-0.14
		LTE Band 13	777~787MHz :	0.97
		LTE Band 25	1850~1915MHz :	-0.47
		LTE Band 26	814~849MHz :	0.16
		LTE Band 30	2305~2315MHz :	-1.27
		LTE Band 41	2496~2609MHz :	1.43

WLAN Antenna Information							
Ethertronics Inc.	Ant 1	Model No.	5002131		Ant 2	Model No.	5002137	
		Ant. Type	PIFA			Ant. Type	PIFA	
		Peak Gain (dBi)	2400~2483.5MHz :	1.48		Peak Gain (dBi)	2400~2483.5MHz :	2.6
			5150~5250MHz:	0.75			5150~5250MHz:	-0.79
			5250~5350MHz:	-0.04			5250~5350MHz:	-0.79
			5470~5725MHz:	0.01			5470~5725MHz:	-0.32
			5725~5850MHz:	0.2			5725~5850MHz:	-0.32

4.2 General LTE SAR Test and Reporting Considerations

<table>
<tr><th colspan="2">Summarized necessary items addressed in KDB 941225 D05 v02r05</th></tr>
<tr><td>FCC ID</td><td>N7NEM7455-D3</td></tr>
<tr><td>Equipment Name</td><td>PCIe wireless WAN card</td></tr>
<tr><td>Operating Frequency Range of each LTE transmission band</td><td>LTE Band 02: 1850.7 MHz ~ 1909.3 MHz
LTE Band 04: 1710.7 MHz ~ 1754.3 MHz
LTE Band 05: 824.7 MHz ~ 848.3 MHz
LTE Band 07: 2502.5 MHz ~ 2567.5 MHz
LTE Band 12: 699.7 MHz ~ 715.3 MHz
LTE Band 13: 779.5 MHz ~ 784.5 MHz
LTE Band 25: 1850.7 MHz ~ 1914.3 MHz
LTE Band 26: 814.7 MHz ~ 848.3 MHz
LTE Band 30: 2307.5 MHz ~ 2312.5 MHz
LTE Band 41: 2498.5 MHz ~ 2687.5 MHz</td></tr>
<tr><td>Channel Bandwidth</td><td>LTE Band 02:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 04:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 05:1.4MHz, 3MHz, 5MHz, 10MHz
LTE Band 07: 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 12:1.4MHz, 3MHz, 5MHz, 10MHz
LTE Band 13: 5MHz, 10MHz
LTE Band 25:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 26:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz
LTE Band 30: 5MHz, 10MHz
LTE Band 41: 5MHz, 10MHz, 15MHz, 20MHz</td></tr>
<tr><td>uplink modulations used</td><td>QPSK, and 16QAM</td></tr>
<tr><td>LTE Voice / Data requirements</td><td>Data only</td></tr>
<tr><td>LTE MPR permanently built-in by design</td><td>Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3
<table>
<tr><th rowspan="2">Modulation</th><th colspan="6">Channel bandwidth / Transmission bandwidth (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>
<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>
</table></td></tr>
<tr><td>LTE A-MPR</td><td>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)</td></tr>
<tr><td>Spectrum plots for RB configuration</td><td>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.</td></tr>
<tr><td>LTE Carrier Aggregation Combinations</td><td>Inter-Band and Intra-Band possible combinations as below page and the detail power verification please referred to page 50</td></tr>
<tr><td>LTE Carrier Aggregation Additional Information</td><td>This device does not support full CA features on 3GPP Release 10. Is supports a maximum of 2 carriers in the downlink only. All uplink communications are identical to the Release 8 Specifications. Uplink communications are done on the PCC. Due to carrier capability, only the combinations listed above are supported. The following LTE Release features are not supported: Relay, HetNet, Enhanced MIMO, eICI, WiFi Offloading, MDH, eMBMA, Cross-Carrier Scheduling, Enhanced SC-FDMA.</td></tr>
</table>

Inter-Band Combination																				
PCC		SCC	PCC		SCC	PCC		SCC	PCC		SCC	PCC		SCC	PCC		SCC	PCC		SCC
LTE B2	+	LTE B5	LTE B5	+	LTE B2	LTE B2	+	LTE 12	LTE B12	+	LTE B2	LTE B2	+	LTE B13	LTE B13	+	LTE B2	LTE B2	+	LTE B29
BW (MHz)	+	BW (MHz)	BW (MHz)	+	BW (MHz)	BW (MHz)	+	BW (MHz)	BW (MHz)	+	BW (MHz)	BW (MHz)	+	BW (MHz)	BW (MHz)	+	BW (MHz)	BW (MHz)	+	BW (MHz)
20	+	10	10	+	20	20	+	10	10	+	20	20	+	10	10	+	20	20	+	10
20	+	5	10	+	15	20	+	5	10	+	15	20	+	5	10	+	15	20	+	5
15	+	10	10	+	10	20	+	3	10	+	10	15	+	10	10	+	10	20	+	3
15	+	5	10	+	5	15	+	10	10	+	5	15	+	5	10	+	5	15	+	10
10	+	10	5	+	20	15	+	5	5	+	20	10	+	10	5	+	20	15	+	5
10	+	5	5	+	15	15	+	3	5	+	15	10	+	5	5	+	15	15	+	3
5	+	10	5	+	10	10	+	10	5	+	10	5	+	10	5	+	10	10	+	10
5	+	5	5	+	5	10	+	5	5	+	5	5	+	5	5	+	5	10	+	5
						10	+	3	3	+	20							10	+	3
						5	+	10	3	+	15							5	+	10
						5	+	5	3	+	10							5	+	5
						5	+	3	3	+	5							5	+	3

Inter-Band Combination																				
PCC		SCC	PCC		SCC	PCC		SCC	PCC		SCC	PCC		SCC	PCC		SCC	PCC		SCC
LTE B4	+	LTE B5	LTE B5	+	LTE B4	LTE B4	+	LTE B12	LTE B12	+	LTE B4	LTE B4	+	LTE B13	LTE B13	+	LTE B4	LTE B4	+	LTE B29
BW (MHz)	+	BW (MHz)	BW (MHz)	+	BW (MHz)	BW (MHz)	+	BW (MHz)	BW (MHz)	+	BW (MHz)	BW (MHz)	+	BW (MHz)	BW (MHz)	+	BW (MHz)	BW (MHz)	+	BW (MHz)
20	+	10	10	+	20	20	+	10	10	+	20	20	+	10	10	+	20	20	+	10
20	+	5	10	+	15	20	+	5	10	+	15	15	+	10	10	+	15	20	+	5
15	+	10	10	+	10	20	+	3	10	+	10	10	+	10	10	+	10	20	+	3
15	+	5	10	+	5	15	+	10	10	+	5	5	+	10	10	+	5	15	+	10
10	+	10	5	+	20	15	+	5	10	+	3							15	+	5
10	+	5	5	+	15	15	+	3	10	+	1.4							15	+	3
5	+	10	5	+	10	10	+	10	5	+	20							10	+	10
5	+	5	5	+	5	10	+	5	5	+	15							10	+	5
						10	+	3	5	+	10							10	+	3
						5	+	10	5	+	5							5	+	10
						5	+	5	5	+	3							5	+	5
						5	+	3	5	+	1.4							5	+	3
						3	+	10	3	+	20									
						3	+	5	3	+	15									
						3	+	3	3	+	10									
						1.4	+	10	3	+	5									
						1.4	+	5	3	+	3									
						1.4	+	3	3	+	1.4									

Inter-Band Combination														
PCC		SCC	PCC		SCC	PCC		SCC	PCC		SCC	PCC		SCC
LTE B5	+	LTE B30	LTE B30	+	LTE B5	LTE B12	+	LTE B30	LTE B30	+	LTE B12	LTE B30	+	LTE B29
BW (MHz)	+	BW (MHz)	BW (MHz)	+	BW (MHz)	BW (MHz)	+	BW (MHz)	BW (MHz)	+	BW (MHz)	BW (MHz)	+	BW (MHz)
10	+	10	10	+	10	10	+	10	10	+	10	10	+	10
10	+	5	10	+	5	10	+	5	10	+	5	10	+	5
5	+	10	5	+	10	5	+	10	5	+	10	5	+	10
5	+	5	5	+	5	5	+	5	5	+	5	5	+	5

Intra-Band Combination																	
Contiguous									Non-Contiguous								
PCC		SCC	PCC		SCC	PCC		SCC	PCC		SCC	PCC		SCC	PCC		SCC
LTE B2	+	LTE B2	LTE B7	+	LTE B7	LTE B41	+	LTE 41	LTE B2	+	LTE B2	LTE B7	+	LTE B7	LTE B41	+	LTE 41
BW (MHz)	+	BW (MHz)	BW (MHz)	+	BW (MHz)	BW (MHz)	+	BW (MHz)	BW (MHz)	+	BW (MHz)	BW (MHz)	+	BW (MHz)	BW (MHz)	+	BW (MHz)
20	+	20	20	+	20	20	+	20	20	+	20	20	+	20	20	+	20
20	+	15	20	+	15	20	+	15	20	+	15	15	+	20	20	+	15
20	+	10	20	+	10	20	+	10	20	+	10	15	+	15	20	+	10
20	+	5	15	+	20	20	+	5	20	+	5	10	+	15	15	+	20
15	+	20	15	+	15	15	+	20	15	+	20	10	+	10	15	+	15
15	+	15	10	+	20	15	+	15	15	+	15	5	+	15	15	+	10
15	+	10				10	+	20	15	+	10	20	+	15	10	+	20
10	+	20				5	+	20	15	+	5	15	+	10	10	+	15
10	+	15							10	+	20	15	+	5	10	+	10
5	+	20							10	+	15						
									10	+	10						
									10	+	5						
									5	+	20						
									5	+	15						
									5	+	10						
									5	+	5						

Transmission (H, M, L) channel numbers and frequencies in each LTE band												
LTE Band 2												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	18607	1850.7	18615	1851.5	18625	1852.5	18650	1855	18675	1857.5	18700	1860
M	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880
H	19193	1909.3	19185	1908.5	19175	1907.5	19150	1905	19125	1902.5	19100	1900
LTE Band 4												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	19957	1710.7	19965	1711.5	19975	1712.5	20000	1715	20025	1717.5	20050	1720
M	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5
H	20393	1754.3	20385	1753.5	20375	1752.5	20350	1750	20325	1747.5	20300	1745
LTE Band 5								
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20407	824.7	20415	825.5	20425	826.5	20450	829
M	20525	836.5	20525	836.5	20525	836.5	20525	836.5
H	20643	848.3	20635	847.5	20625	846.5	20600	844
LTE Band 7								
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20775	2502.5	20800	2505	20825	2507.5	20850	2510
M	21100	2535	21100	2535	21100	2535	21100	2535
H	21425	2567.5	21400	2565	21375	2562.5	21350	2560
LTE Band 12								
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	23017	699.7	23025	700.5	23035	701.5	23060	704
M	23095	707.5	23095	707.5	23095	707.5	23095	707.5
H	23173	715.3	23165	714.5	23155	713.5	23130	711
LTE Band 13				
	Bandwidth 5 MHz		Bandwidth 10 MHz	
	Channel #	Freq.(MHz)	Channel #	Freq.(MHz)
L	23205	779.5	23230	782
M	23230	782		
H	23255	784.5		
LTE Band 25												
	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	26047	1850.7	26055	1851.5	26065	1852.5	26090	1855	26115	1857.5	26140	1860
M	26340	1880	26340	1880	26340	1880	26340	1880	26340	1880	26340	1880
H	26683	1914.3	26675	1913.5	26665	1912.5	26640	1910	26615	1907.5	26590	1905
LTE Band 26										
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	26697	814.7	26705	815.5	26715	816.5	26740	819	26765	821.5
M	26865	831.5	26865	831.5	26865	831.5	26865	831.5	26865	831.5
H	27033	848.3	27025	847.5	27015	846.5	26990	844	26965	841.5

LTE Band 30				
	Bandwidth 5 MHz		Bandwidth 10 MHz	
	Channel #	Freq.(MHz)	Channel #	Freq.(MHz)
L	27685	2307.5	27710	2310
M	27710	2310		
H	27735	2312.5		

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	2590	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

5. RF Exposure Limits

5.1 Uncontrolled Environment

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

5.2 Controlled Environment

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

Limits for Occupational/Controlled Exposure (W/kg)

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

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

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

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

6. Specific Absorption Rate (SAR)

6.1 Introduction

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

6.2 SAR Definition

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

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

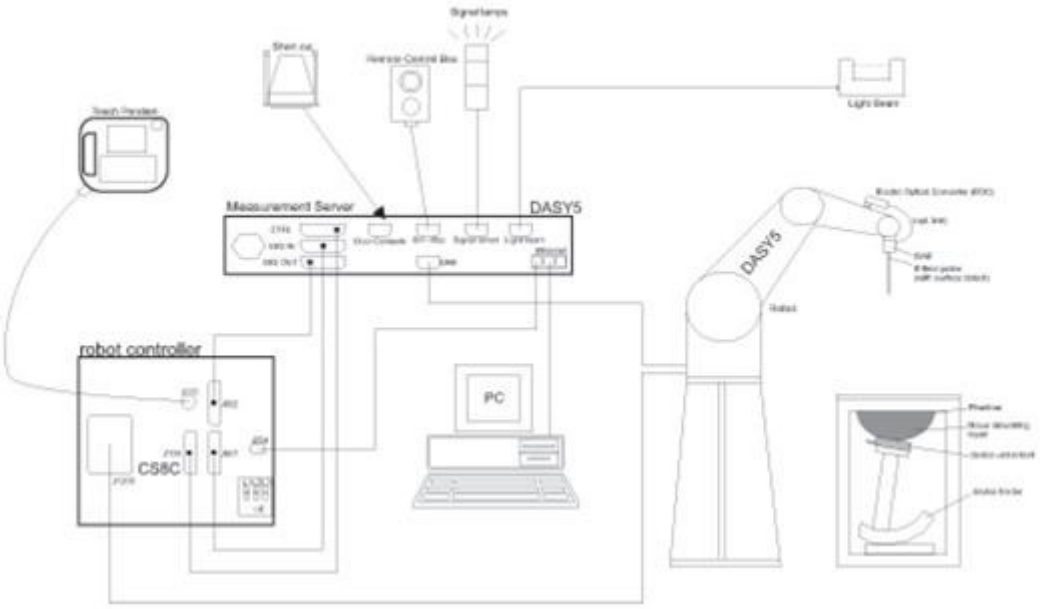
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

7. System Description and Setup

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



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

7.1 E-Field Probe

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

<ES3DV3 Probe>

Construction	Symmetric design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	10 MHz – 4 GHz; Linearity: ±0.2 dB (30 MHz – 4 GHz)	
Directivity	±0.2 dB in TSL (rotation around probe axis) ±0.3 dB in TSL (rotation normal to probe axis)	
Dynamic Range	5 µW/g – >100 mW/g; Linearity: ±0.2 dB	
Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: 3.9 mm (body: 12 mm) Distance from probe tip to dipole centers: 2.0 mm	

<EX3DV4 Probe>

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

7.2 Data Acquisition Electronics (DAE)

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

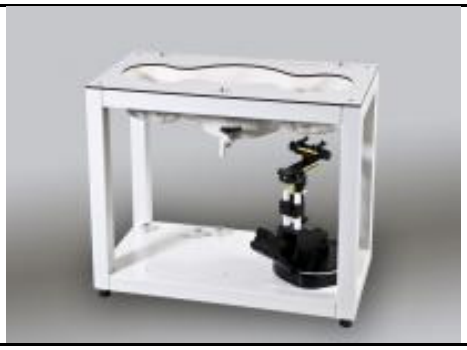
The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

Fig 5.1 Photo of DAE

7.3 Phantom

<SAM Twin Phantom>

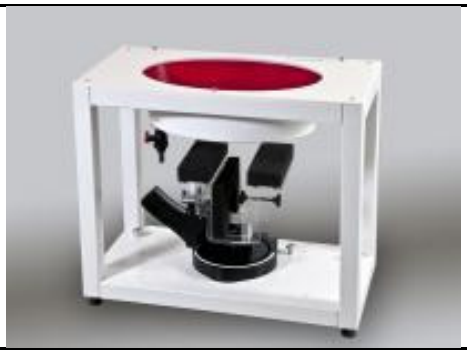
Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm
Filling Volume	Approx. 25 liters
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet
Measurement Areas	Left Hand, Right Hand, Flat Phantom



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

<ELI Phantom>

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



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

7.4 Device Holder

<Mounting Device for Hand-Held Transmitter>

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

Mounting Device for Hand-Held Transmitters

Mounting Device Adaptor for Wide-Phones

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

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

Mounting Device for Laptops

8. Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

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

<SAR measurement>

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

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

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

8.1 Spatial Peak SAR Evaluation

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

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

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

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

8.2 Power Reference Measurement

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

8.3 Area Scan

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

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

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

8.4 Zoom Scan

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

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

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

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

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

8.5 Volume Scan Procedures

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

8.6 Power Drift Monitoring

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

9. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	750MHz System Validation Kit	D750V3	1012	May. 28, 2015	May. 27, 2016
SPEAG	835MHz System Validation Kit	D835V2	499	Mar. 20, 2015	Mar. 19, 2016
SPEAG	1750MHz System Validation Kit	D1750V2	1112	Feb. 19, 2015	Feb. 18, 2016
SPEAG	1900MHz System Validation Kit	D1900V2	5d018	Jun. 23, 2015	Jun. 22, 2016
SPEAG	2300MHz System Validation Kit	D2300V2	1006	Jan. 27, 2015	Jan. 26, 2016
SPEAG	2450MHz System Validation Kit	D2450V2	736	Aug. 20, 2015	Aug. 19, 2016
SPEAG	2600MHz System Validation Kit	D2600V2	1008	Aug. 19, 2015	Aug. 18, 2016
SPEAG	5GHz System Validation Kit	D5GHzV2	1006	Oct. 06, 2015	Oct. 05, 2016
SPEAG	Data Acquisition Electronics	DAE4	778	Aug. 25, 2015	Aug. 24, 2016
SPEAG	Data Acquisition Electronics	DAE3	577	Sep. 24, 2015	Sep. 23, 2016
SPEAG	Data Acquisition Electronics	DAE3	495	May. 22, 2015	May. 21, 2016
SPEAG	Dosimetric E-Field Probe	ES3DV3	3270	Sep. 28, 2015	Sep. 27, 2016
SPEAG	Dosimetric E-Field Probe	EX3DV4	3931	Oct. 01, 2015	Sep. 30, 2016
SPEAG	Dosimetric E-Field Probe	EX3DV4	3925	May. 27, 2015	May. 26, 2016
WonDer	Thermometer	WD-5015	TM642	Oct. 16, 2015	Oct. 15, 2016
WonDer	Thermometer	WD-5015	TM281	Oct. 16, 2015	Oct. 15, 2016
Wisewind	Thermometer	HTC-1	TM560	Oct. 16, 2015	Oct. 15, 2016
Anritsu	Radio Communication Analyzer	MT8820C	6201074414	Feb. 06, 2015	Feb. 05, 2016
Agilent	Wireless Communication Test Set	E5515C	MY50266977	May. 14, 2015	May. 13, 2016
SPEAG	Device Holder	N/A	N/A	N/A	N/A
R&S	Signal Generator	MG3710A	6201502524	May. 25, 2015	May. 24, 2016
Agilent	ENA Network Analyzer	E5071C	MY46316648	Feb. 11, 2015	Feb. 10, 2016
SPEAG	Dielectric Probe Kit	DAK-3.5	1126	Jul. 21, 2015	Jul. 20, 2016
LINE SEIKI	Digital Thermometer	LKMelectronic	DTM3000SPEZIAL	Jul. 17, 2015	Jul. 16, 2016
Anritsu	Power Meter	ML2495A	1419002	May. 13, 2015	May. 12, 2016
Anritsu	Power Sensor	MA2411B	1339124	May. 13, 2015	May. 12, 2016
Anritsu	Spectrum Analyzer	MS2830A	6201396378	Jun. 17, 2015	Jun. 16, 2016
Agilent	Dual Directional Coupler	778D	50422	Note 1	
Woken	Attenuator 1	WK0602-XX	N/A	Note 1	
PE	Attenuator 2	PE7005-10	N/A	Note 1	
PE	Attenuator 3	PE7005- 3	N/A	Note 1	
AR	Power Amplifier	5S1G4M2	0328767	Note 1	
Mini-Circuits	Power Amplifier	ZVE-3W	162601250	Note 1	

General 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.

10. System Verification

10.1 Tissue Verification

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

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity (σ)	Permittivity (εr)
For Head								
750	41.1	57.0	0.2	1.4	0.2	0	0.89	41.9
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
900	40.3	57.9	0.2	1.4	0.2	0	0.97	41.5
1800, 1900, 2000	55.2	0	0	0.3	0	44.5	1.40	40.0
2450	55.0	0	0	0	0	45.0	1.80	39.2
2600	54.8	0	0	0.1	0	45.1	1.96	39.0
For Body								
750	51.7	47.2	0	0.9	0.1	0	0.96	55.5
835	50.8	48.2	0	0.9	0.1	0	0.97	55.2
900	50.8	48.2	0	0.9	0.1	0	1.05	55.0
1800, 1900, 2000	70.2	0	0	0.4	0	29.4	1.52	53.3
2450	68.6	0	0	0	0	31.4	1.95	52.7
2600	68.1	0	0	0.1	0	31.8	2.16	52.5

Simulating Liquid for 5GHz, Manufactured by SPEAG

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

<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Tissue Type	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
750	MSL	22.4	0.961	55.092	0.96	55.50	0.10	-0.74	±5	2015/11/12
835	MSL	22.6	1.000	56.458	0.97	55.20	3.09	2.28	±5	2015/11/11
1750	MSL	22.5	1.481	54.739	1.49	53.40	-0.60	2.51	±5	2015/11/11
1900	MSL	22.5	1.571	52.496	1.52	53.30	3.36	-1.51	±5	2015/11/11
2300	MSL	22.5	1.749	53.325	1.81	52.90	-3.37	0.80	±5	2015/11/12
2450	MSL	22.2	1.945	51.331	1.95	52.70	-0.26	-2.60	±5	2015/12/22
2600	MSL	22.5	2.223	51.324	2.16	52.50	2.92	-2.24	±5	2015/11/10
2600	MSL	22.5	2.159	51.599	2.16	52.50	-0.05	-1.72	±5	2015/11/12
5300	MSL	22.2	5.575	47.163	5.42	48.90	2.86	-3.55	±5	2015/12/21
5600	MSL	22.2	5.899	47.089	5.77	48.50	2.24	-2.91	±5	2015/12/21
5800	MSL	22.2	6.260	46.928	6.00	48.20	4.33	-2.64	±5	2015/12/21

10.2 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.

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 (%)
2015/11/12	750	MSL	250	D750V3-1012	ES3DV3 - SN3270	DAE4 Sn778	2.34	8.61	9.36	8.71
2015/11/11	835	MSL	250	D835V2-499	ES3DV3 - SN3270	DAE4 Sn778	2.40	9.30	9.6	3.23
2015/11/11	1750	MSL	250	D1750V2-1112	ES3DV3 - SN3270	DAE4 Sn778	9.77	37.10	39.08	5.34
2015/11/11	1900	MSL	250	D1900V2-5d018	ES3DV3 - SN3270	DAE4 Sn778	10.70	40.10	42.8	6.73
2015/11/12	2300	MSL	250	D2300V2-1006	EX3DV4 - SN3931	DAE3 Sn577	11.40	48.50	45.6	-5.98
2015/12/22	2450	MSL	250	D2450V2-736	ES3DV3 - SN3270	DAE4 Sn778	12.10	51.90	48.4	-6.74
2015/11/10	2600	MSL	250	D2600V2-1008	ES3DV3 - SN3270	DAE4 Sn778	14.20	55.80	56.8	1.79
2015/11/12	2600	MSL	250	D2600V2-1008	ES3DV3 - SN3270	DAE4 Sn778	13.80	55.80	55.2	-1.08
2015/12/21	5300	MSL	100	D5GHzV2-1006-5300	EX3DV4 - SN3925	DAE3 Sn495	8.50	79.50	85	6.92
2015/12/21	5600	MSL	100	D5GHzV2-1006-5600	EX3DV4 - SN3925	DAE3 Sn495	8.32	82.30	83.2	1.09
2015/12/21	5800	MSL	100	D5GHzV2-1006-5800	EX3DV4 - SN3925	DAE3 Sn495	8.13	79.00	81.3	2.91

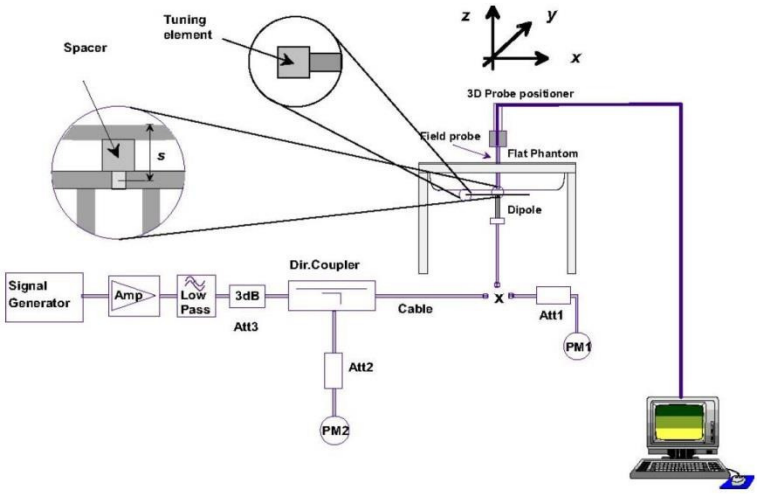


Fig 8.3.1 System Performance Check Setup

Fig 8.3.2 Setup Photo

11. Conducted RF Output Power (Unit: dBm)

<WCDMA Conducted Power>

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

A summary of these settings are illustrated below:

HSDPA Setup Configuration:

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

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

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

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

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

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

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

Setup Configuration

HSUPA Setup Configuration:

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

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

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (Note 5) (Note 6)	β_{ed} (SF)	β_{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 6)	E-TFCI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed}1: 47/15 β_{ed}2: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 (Note 4)	15/15 (Note 4)	64	15/15 (Note 4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c.
Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.
Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 10/15 and β_d = 15/15.
Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 14/15 and β_d = 15/15.
Note 5: 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 6: β_{ed} can not be set directly, it is set by Absolute Grant Value.

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: β_c/β_d=2/15
      b). Subtest 2: β_c/β_d=12/15
      c). Subtest 3: β_c/β_d=15/8
      d). Subtest 4: β_c/β_d=15/4
   vi. Set Delta ACK, Delta NACK and Delta CQI = 8
   vii. Set Ack-Nack Repetition Factor to 3
   viii. Set CQI Feedback Cycle (k) to 4 ms
   ix. Set CQI Repetition Factor to 2
   x. Power Ctrl Mode = All Up bits
d. The transmitted maximum output power was recorded.

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

C.8.1.12 Fixed Reference Channel Definition H-Set 12

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

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

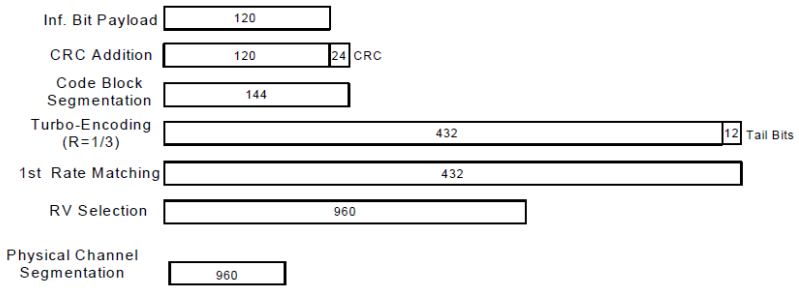


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

Setup Configuration

<WCDMA Conducted Power>

General Note:

1. Per KDB 941225 D01v03r01, SAR for Body exposure 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. If the maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA / DC-HSDPA is ≤ ¼ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA / DC-HSDPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA.

Band		WCDMA V			Tune-up Limit (dBm)	WCDMA II			Tune-up Limit (dBm)	WCDMA IV			Tune-up Limit (dBm)
TX Channel		4132	4182	4233		9262	9400	9538		1312	1413	1513	
Rx Channel		4357	4407	4458		9662	9800	9938		1537	1638	1738	
Frequency (MHz)		826.4	836.4	846.6		1852.4	1880	1907.6		1712.4	1732.6	1752.6	
3GPP Rel 99	AMR 12.2Kbps	23.11	23.22	22.96	24.00	23.00	23.12	23.02	24.00	22.95	23.10	22.84	24.00
3GPP Rel 99	RMC 12.2Kbps	23.14	23.23	22.95	24.00	23.02	23.13	23.00	24.00	22.96	23.12	22.88	24.00
3GPP Rel 6	HSDPA Subtest-1	22.15	22.02	22.01	24.00	22.03	22.14	22.02	24.00	22.20	22.04	22.06	24.00
3GPP Rel 6	HSDPA Subtest-2	22.17	22.01	22.03	24.00	22.02	22.17	22.00	24.00	22.32	22.05	22.08	24.00
3GPP Rel 6	HSDPA Subtest-3	21.70	21.54	21.52	23.50	21.56	21.69	21.65	23.50	21.76	21.56	21.55	23.50
3GPP Rel 6	HSDPA Subtest-4	21.71	21.52	21.54	23.50	21.51	21.64	21.64	23.50	21.74	21.55	21.54	23.50
3GPP Rel 8	DC-HSDPA Subtest-1	22.13	22.00	22.00	24.00	22.02	22.11	22.02	24.00	22.18	22.05	22.07	24.00
3GPP Rel 8	DC-HSDPA Subtest-2	22.15	22.01	22.02	24.00	22.03	22.15	22.05	24.00	22.28	22.06	22.09	24.00
3GPP Rel 8	DC-HSDPA Subtest-3	21.67	21.52	21.50	23.50	21.51	21.64	21.56	23.50	21.72	21.54	21.54	23.50
3GPP Rel 8	DC-HSDPA Subtest-4	21.69	21.51	21.53	23.50	21.50	21.63	21.55	23.50	21.77	21.55	21.56	23.50
3GPP Rel 6	HSUPA Subtest-1	22.10	22.05	22.04	24.00	22.09	22.14	22.01	24.00	22.17	22.03	22.13	24.00
3GPP Rel 6	HSUPA Subtest-2	21.14	21.01	20.98	22.00	21.50	21.50	21.34	22.00	20.75	20.65	20.57	22.00
3GPP Rel 6	HSUPA Subtest-3	21.14	21.02	21.03	23.00	21.07	21.07	21.06	23.00	21.30	21.25	21.07	23.00
3GPP Rel 6	HSUPA Subtest-4	21.70	21.54	21.48	22.00	21.45	21.42	21.34	22.00	20.83	20.81	20.62	22.00
3GPP Rel 6	HSUPA Subtest-5	22.15	22.06	22.04	24.00	22.01	22.12	22.00	24.00	22.40	22.09	22.18	24.00

<LTE Conducted Power>

General Note:

1. Anritsu MT8820C base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r05, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
4. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r05, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
6. Per KDB 941225 D05v02r05, 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
7. Per KDB 941225 D05v02r05, Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
8. For LTE B4 /B12 /B13 /B26 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r04, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.
9. LTE band 2/5 SAR test was covered by Band 25/26; according to April 2015 TCB workshop, SAR test for overlapping LTE bands can be reduced if
    a. the maximum output power, including tolerance, for the smaller band is ≤ the larger band to qualify for the SAR test exclusion
    b. the channel bandwidth and other operating parameters for the smaller band are fully supported by the larger band

<LTE Band 2>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				18700	18900	19100		
Frequency (MHz)				1860	1880	1900		
20	QPSK	1	0	23.44	23.49	23.40	24	0
20	QPSK	1	49	23.01	23.05	22.99		
20	QPSK	1	99	23.11	23.16	23.06		
20	QPSK	50	0	22.06	22.12	21.96	23	1
20	QPSK	50	24	21.90	21.81	21.63		
20	QPSK	50	50	21.93	21.69	21.65		
20	QPSK	100	0	21.99	22.05	21.86		
20	16QAM	1	0	22.23	22.33	22.25	23	1
20	16QAM	1	49	22.12	21.98	21.71		
20	16QAM	1	99	22.23	22.09	21.99		
20	16QAM	50	0	21.13	21.11	20.98	22	2
20	16QAM	50	24	20.82	20.81	20.58		
20	16QAM	50	50	20.76	20.65	20.58		
20	16QAM	100	0	21.01	20.99	20.79		
Channel				18675	18900	19125	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1857.5	1880	1902.5		
15	QPSK	1	0	23.30	23.44	23.36	24	0
15	QPSK	1	37	23.07	23.22	22.81		
15	QPSK	1	74	23.03	23.13	22.87		
15	QPSK	36	0	22.21	22.30	22.13	23	1
15	QPSK	36	20	22.02	22.13	22.00		
15	QPSK	36	39	22.00	22.03	21.80		
15	QPSK	75	0	22.05	22.14	22.00		
15	16QAM	1	0	22.31	22.37	22.38	23	1
15	16QAM	1	37	22.16	22.34	22.14		
15	16QAM	1	74	22.28	22.41	22.14		
15	16QAM	36	0	21.24	21.28	21.11	22	2
15	16QAM	36	20	21.00	21.08	20.99		
15	16QAM	36	39	20.96	21.02	20.78		
15	16QAM	75	0	21.06	21.17	21.03		
Channel				18650	18900	19150	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1855	1880	1905		
10	QPSK	1	0	23.17	23.11	23.12	24	0
10	QPSK	1	25	23.00	22.93	22.90		
10	QPSK	1	49	22.81	22.90	22.69		
10	QPSK	25	0	22.04	21.96	21.86	23	1
10	QPSK	25	12	21.96	21.92	21.76		
10	QPSK	25	25	21.80	21.88	21.70		
10	QPSK	50	0	21.91	21.84	21.80		
10	16QAM	1	0	22.42	22.37	22.33	23	1
10	16QAM	1	25	22.20	22.13	22.01		
10	16QAM	1	49	22.05	22.18	21.96		
10	16QAM	25	0	21.07	20.98	20.85	22	2
10	16QAM	25	12	20.97	20.93	20.75		
10	16QAM	25	25	20.82	20.88	20.72		
10	16QAM	50	0	20.89	20.86	20.80		

Channel				18625	18900	19175	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1852.5	1880	1907.5		
5	QPSK	1	0	23.05	22.91	22.98	24	0
5	QPSK	1	12	23.02	22.90	22.84		
5	QPSK	1	24	22.88	22.74	22.72		
5	QPSK	12	0	21.93	21.85	21.79	23	1
5	QPSK	12	7	21.98	21.86	21.76		
5	QPSK	12	13	21.91	21.89	21.77		
5	QPSK	25	0	21.95	21.87	21.74		
5	16QAM	1	0	22.32	22.19	22.23	23	1
5	16QAM	1	12	22.31	22.20	22.11		
5	16QAM	1	24	22.18	22.05	22.04		
5	16QAM	12	0	20.94	20.88	20.84	22	2
5	16QAM	12	7	20.96	20.86	20.78		
5	16QAM	12	13	20.91	20.89	20.78		
5	16QAM	25	0	20.96	20.87	20.72		
Channel				18615	18900	19185	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1851.5	1880	1908.5		
3	QPSK	1	0	23.04	22.87	22.81	24	0
3	QPSK	1	8	23.03	22.86	22.89		
3	QPSK	1	14	22.82	22.79	22.74		
3	QPSK	8	0	21.89	21.83	21.74	23	1
3	QPSK	8	4	21.91	21.88	21.78		
3	QPSK	8	7	21.85	21.87	21.76		
3	QPSK	15	0	21.88	21.84	21.75		
3	16QAM	1	0	22.33	22.08	21.96	23	1
3	16QAM	1	8	22.30	22.29	22.20		
3	16QAM	1	14	21.99	22.03	22.01		
3	16QAM	8	0	20.95	20.92	20.83	22	2
3	16QAM	8	4	20.95	20.92	20.84		
3	16QAM	8	7	20.93	20.92	20.82		
3	16QAM	15	0	20.92	20.87	20.81		
Channel				18607	18900	19193	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1850.7	1880	1909.3		
1.4	QPSK	1	0	22.91	22.84	22.82	24	0
1.4	QPSK	1	3	22.87	22.82	22.77		
1.4	QPSK	1	5	22.84	22.84	22.74		
1.4	QPSK	3	0	22.77	22.74	22.67		
1.4	QPSK	3	1	22.83	22.76	22.73		
1.4	QPSK	3	3	22.84	22.82	22.77		
1.4	QPSK	6	0	21.74	21.74	21.68	23	1
1.4	16QAM	1	0	22.11	22.08	22.01	23	1
1.4	16QAM	1	3	22.06	22.08	22.09		
1.4	16QAM	1	5	22.09	22.10	21.97		
1.4	16QAM	3	0	21.82	21.82	21.75		
1.4	16QAM	3	1	21.84	21.79	21.72		
1.4	16QAM	3	3	21.86	21.82	21.76		
1.4	16QAM	6	0	20.84	20.82	20.74	22	2

<LTE Band 4>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20050	20175	20300		
Frequency (MHz)				1720	1732.5	1745		
20	QPSK	1	0	23.36	23.43	23.17	24	0
20	QPSK	1	49	22.90	22.92	22.66		
20	QPSK	1	99	22.88	22.90	22.51		
20	QPSK	50	0	21.81	21.90	21.66	23	1
20	QPSK	50	24	21.62	21.72	21.49		
20	QPSK	50	50	21.59	21.66	21.52		
20	QPSK	100	0	21.69	21.74	21.42		
20	16QAM	1	0	22.30	22.36	22.29	23	1
20	16QAM	1	49	22.16	22.01	21.77		
20	16QAM	1	99	22.27	22.12	22.06		
20	16QAM	50	0	21.17	21.14	21.08	22	2
20	16QAM	50	24	20.86	20.84	20.66		
20	16QAM	50	50	20.80	20.68	20.69		
20	16QAM	100	0	21.05	21.02	20.85		
Channel				20025	20175	20325	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1717.5	1732.5	1747.5		
15	QPSK	1	0	23.33	23.35	23.21	24	0
15	QPSK	1	37	23.06	22.78	22.45		
15	QPSK	1	74	23.05	22.86	22.74		
15	QPSK	36	0	21.72	21.86	21.61	23	1
15	QPSK	36	20	21.63	21.77	21.52		
15	QPSK	36	39	21.60	21.56	21.49		
15	QPSK	75	0	21.73	21.69	21.45		
15	16QAM	1	0	22.70	22.78	22.39	23	1
15	16QAM	1	37	22.12	21.94	21.73		
15	16QAM	1	74	22.26	21.98	21.85		
15	16QAM	36	0	21.17	21.00	20.68	22	2
15	16QAM	36	20	20.90	20.78	20.58		
15	16QAM	36	39	20.84	20.59	20.50		
15	16QAM	75	0	21.04	20.81	20.59		
Channel				20000	20175	20350	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1715	1732.5	1750		
10	QPSK	1	0	23.07	23.04	22.76	24	0
10	QPSK	1	25	22.97	22.63	22.58		
10	QPSK	1	49	22.86	22.50	22.51		
10	QPSK	25	0	21.69	21.79	21.63	23	1
10	QPSK	25	12	21.60	21.72	21.55		
10	QPSK	25	25	21.62	21.59	21.50		
10	QPSK	50	0	21.55	21.46	21.45		
10	16QAM	1	0	22.44	22.22	21.95	23	1
10	16QAM	1	25	22.26	21.83	21.76		
10	16QAM	1	49	22.13	21.75	21.76		
10	16QAM	25	0	21.06	20.73	20.55	22	2
10	16QAM	25	12	20.97	20.72	20.53		
10	16QAM	25	25	20.92	20.57	20.46		
10	16QAM	50	0	21.00	20.62	20.56		

Channel				19975	20175	20375	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1712.5	1732.5	1752.5		
5	QPSK	1	0	23.06	22.80	22.64	24	0
5	QPSK	1	12	23.01	22.67	22.55		
5	QPSK	1	24	22.89	22.58	22.54		
5	QPSK	12	0	21.60	21.70	21.49	23	1
5	QPSK	12	7	21.55	21.66	21.51		
5	QPSK	12	13	21.53	21.60	21.53		
5	QPSK	25	0	21.49	21.52	21.46		
5	16QAM	1	0	22.30	22.02	21.88	23	1
5	16QAM	1	12	22.34	21.92	21.80		
5	16QAM	1	24	22.20	21.83	21.79		
5	16QAM	12	0	20.96	20.69	20.52	22	2
5	16QAM	12	7	20.99	20.60	20.48		
5	16QAM	12	13	20.90	20.58	20.38		
5	16QAM	25	0	20.96	20.48	20.47		
Channel				19965	20175	20385	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1711.5	1732.5	1753.5		
3	QPSK	1	0	23.04	22.66	22.46	24	0
3	QPSK	1	8	23.00	22.69	22.69		
3	QPSK	1	14	22.93	22.53	22.42		
3	QPSK	8	0	21.70	21.77	21.66	23	1
3	QPSK	8	4	21.59	21.62	21.49		
3	QPSK	8	7	21.44	21.55	21.50		
3	QPSK	15	0	21.53	21.55	21.61		
3	16QAM	1	0	22.17	21.91	21.62	23	1
3	16QAM	1	8	22.28	21.97	21.87		
3	16QAM	1	14	22.11	21.76	21.62		
3	16QAM	8	0	21.02	20.67	20.40	22	2
3	16QAM	8	4	20.98	20.57	20.50		
3	16QAM	8	7	20.92	20.61	20.45		
3	16QAM	15	0	20.92	20.57	20.45		
Channel				19957	20175	20393	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1710.7	1732.5	1754.3		
1.4	QPSK	1	0	23.05	22.83	22.70	24	0
1.4	QPSK	1	3	23.00	22.71	22.59		
1.4	QPSK	1	5	23.00	22.69	22.61		
1.4	QPSK	3	0	22.91	22.61	22.49		
1.4	QPSK	3	1	22.94	22.69	22.64		
1.4	QPSK	3	3	22.98	22.73	22.60		
1.4	QPSK	6	0	21.75	21.63	21.49	23	1
1.4	16QAM	1	0	22.31	22.00	21.80	23	1
1.4	16QAM	1	3	22.25	21.95	21.81		
1.4	16QAM	1	5	22.30	21.87	21.79		
1.4	16QAM	3	0	21.98	21.61	21.52		
1.4	16QAM	3	1	21.95	21.64	21.54		
1.4	16QAM	3	3	22.07	21.74	21.57		
1.4	16QAM	6	0	20.92	20.68	20.54	22	2

<LTE Band 5>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20450	20525	20600		
Frequency (MHz)				829	836.5	844		
10	QPSK	1	0	22.53	22.70	22.68	24	0
10	QPSK	1	25	22.50	22.55	22.53		
10	QPSK	1	49	22.40	22.39	22.20		
10	QPSK	25	0	21.49	21.65	21.59	23	1
10	QPSK	25	12	21.35	21.31	21.39		
10	QPSK	25	25	21.44	21.50	21.43		
10	QPSK	50	0	21.35	21.40	21.39		
10	16QAM	1	0	22.03	22.00	22.05	23	1
10	16QAM	1	25	22.06	22.07	21.93		
10	16QAM	1	49	21.85	21.75	21.69		
10	16QAM	25	0	20.66	20.60	20.58	22	2
10	16QAM	25	12	20.66	20.53	20.62		
10	16QAM	25	25	20.65	20.42	20.53		
10	16QAM	50	0	20.65	20.56	20.55		
Channel				20425	20525	20625	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				826.5	836.5	846.5		
5	QPSK	1	0	22.42	22.51	22.45	24	0
5	QPSK	1	12	22.39	22.26	22.33		
5	QPSK	1	24	22.32	22.21	22.21		
5	QPSK	12	0	21.27	21.25	21.38	23	1
5	QPSK	12	7	21.34	21.35	21.29		
5	QPSK	12	13	21.36	21.24	21.24		
5	QPSK	25	0	21.34	21.20	21.40		
5	16QAM	1	0	21.68	21.72	21.55	23	1
5	16QAM	1	12	21.66	21.63	21.69		
5	16QAM	1	24	21.65	21.41	21.47		
5	16QAM	12	0	20.28	20.29	20.43	22	2
5	16QAM	12	7	20.28	20.32	20.26		
5	16QAM	12	13	20.31	20.32	20.22		
5	16QAM	25	0	20.32	20.29	20.34		
Channel				20415	20525	20635	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				825.5	836.5	847.5		
3	QPSK	1	0	22.56	22.50	22.48	24	0
3	QPSK	1	8	22.49	22.46	22.39		
3	QPSK	1	14	22.23	22.22	22.09		
3	QPSK	8	0	21.19	21.22	21.17	23	1
3	QPSK	8	4	21.28	21.33	21.23		
3	QPSK	8	7	21.20	21.21	21.15		
3	QPSK	15	0	21.30	21.27	21.21		
3	16QAM	1	0	21.55	21.55	21.45	23	1
3	16QAM	1	8	21.77	21.67	21.71		
3	16QAM	1	14	21.50	21.49	21.35		
3	16QAM	8	0	20.25	20.30	20.23	22	2
3	16QAM	8	4	20.32	20.36	20.22		
3	16QAM	8	7	20.24	20.30	20.18		
3	16QAM	15	0	20.28	20.32	20.21		

Channel				20407	20525	20643	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				824.7	836.5	848.3		
1.4	QPSK	1	0	22.42	22.41	22.23	24	0
1.4	QPSK	1	3	22.37	22.37	22.18		
1.4	QPSK	1	5	22.22	22.18	22.08		
1.4	QPSK	3	0	22.18	22.24	22.07		
1.4	QPSK	3	1	22.23	22.28	22.09		
1.4	QPSK	3	3	22.19	22.28	22.12		
1.4	QPSK	6	0	21.12	21.17	21.02	23	1
1.4	16QAM	1	0	21.58	21.66	21.46	23	1
1.4	16QAM	1	3	21.73	21.67	21.55		
1.4	16QAM	1	5	21.64	21.61	21.36		
1.4	16QAM	3	0	21.26	21.31	21.20		
1.4	16QAM	3	1	21.26	21.24	21.14		
1.4	16QAM	3	3	21.29	21.29	21.22		
1.4	16QAM	6	0	20.19	20.25	20.07	22	2

<LTE Band 7>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20850	21100	21350		
Frequency (MHz)				2510	2535	2560		
20	QPSK	1	0	22.56	22.80	22.62	23	0
20	QPSK	1	49	22.54	22.74	22.59		
20	QPSK	1	99	22.52	22.73	22.61		
20	QPSK	50	0	21.68	21.77	21.65	22	1
20	QPSK	50	24	21.59	21.76	21.62		
20	QPSK	50	50	21.54	21.73	21.62		
20	QPSK	100	0	21.53	21.80	21.59		
20	16QAM	1	0	21.78	22.06	21.82	22	1
20	16QAM	1	49	21.83	22.15	21.74		
20	16QAM	1	99	21.53	21.68	21.54		
20	16QAM	50	0	20.62	20.93	20.64	21	2
20	16QAM	50	24	20.57	20.96	20.58		
20	16QAM	50	50	20.63	20.84	20.61		
20	16QAM	100	0	20.56	20.88	20.54		
Channel				20825	21100	21375	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2507.5	2535	2562.5		
15	QPSK	1	0	22.56	22.78	22.53	23	0
15	QPSK	1	37	22.64	22.74	22.56		
15	QPSK	1	74	22.53	22.70	22.54		
15	QPSK	36	0	21.75	21.96	21.79	22	1
15	QPSK	36	20	21.58	21.85	21.63		
15	QPSK	36	39	21.56	21.74	21.67		
15	QPSK	75	0	21.47	21.77	21.64		
15	16QAM	1	0	21.72	22.03	21.76	22	1
15	16QAM	1	37	21.87	21.90	21.72		
15	16QAM	1	74	21.60	21.85	21.71		
15	16QAM	36	0	20.66	20.92	20.79	21	2
15	16QAM	36	20	20.57	20.85	20.74		
15	16QAM	36	39	20.68	20.77	20.78		
15	16QAM	75	0	20.49	20.79	20.81		
Channel				20800	21100	21400	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2505	2535	2565		
10	QPSK	1	0	22.60	22.69	22.58	23	0
10	QPSK	1	25	22.49	22.63	22.62		
10	QPSK	1	49	22.53	22.52	22.59		
10	QPSK	25	0	21.53	21.76	21.67	22	1
10	QPSK	25	12	21.52	21.71	21.57		
10	QPSK	25	25	21.60	21.68	21.58		
10	QPSK	50	0	21.56	21.67	21.61		
10	16QAM	1	0	21.83	22.04	21.60	22	1
10	16QAM	1	25	21.76	21.92	21.53		
10	16QAM	1	49	21.66	21.73	21.58		
10	16QAM	25	0	20.63	20.80	20.58	21	2
10	16QAM	25	12	20.49	20.74	20.64		
10	16QAM	25	25	20.59	20.69	20.58		
10	16QAM	50	0	20.57	20.72	20.69		

Channel				20775	21100	21425	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2502.5	2535	2567.5		
5	QPSK	1	0	22.60	22.73	22.62	23	0
5	QPSK	1	12	22.56	22.66	22.57		
5	QPSK	1	24	22.61	22.64	22.68		
5	QPSK	12	0	21.51	21.70	21.68	22	1
5	QPSK	12	7	21.52	21.67	21.64		
5	QPSK	12	13	21.55	21.63	21.69		
5	QPSK	25	0	21.62	21.69	21.61		
5	16QAM	1	0	21.77	22.10	21.53	22	1
5	16QAM	1	12	21.90	22.07	21.67		
5	16QAM	1	24	21.67	21.81	21.54		
5	16QAM	12	0	20.50	20.67	20.55	21	2
5	16QAM	12	7	20.53	20.61	20.62		
5	16QAM	12	13	20.61	20.64	20.58		
5	16QAM	25	0	20.54	20.60	20.64		

<LTE Band 12>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				23060	23095	23130		
Frequency (MHz)				704	707.5	711		
10	QPSK	1	0	22.93	23.15	23.07	24	0
10	QPSK	1	25	22.85	22.90	22.82		
10	QPSK	1	49	22.81	22.89	22.77		
10	QPSK	25	0	21.95	22.06	21.94	23	1
10	QPSK	25	12	21.88	21.95	21.79		
10	QPSK	25	25	21.79	21.91	21.88		
10	QPSK	50	0	21.93	22.00	21.81		
10	16QAM	1	0	22.19	22.21	22.19	23	1
10	16QAM	1	25	22.15	22.20	22.18		
10	16QAM	1	49	22.11	22.09	22.11		
10	16QAM	25	0	20.80	20.84	20.96	22	2
10	16QAM	25	12	20.92	20.92	20.85		
10	16QAM	25	25	20.80	20.94	20.87		
10	16QAM	50	0	20.78	20.95	20.87		
Channel				23035	23095	23155	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				701.5	707.5	713.5		
5	QPSK	1	0	22.87	22.90	22.86	24	0
5	QPSK	1	12	22.86	22.89	22.76		
5	QPSK	1	24	22.84	22.88	22.78		
5	QPSK	12	0	21.79	21.88	21.74	23	1
5	QPSK	12	7	21.79	21.87	21.82		
5	QPSK	12	13	21.83	21.92	21.82		
5	QPSK	25	0	21.80	21.93	21.78		
5	16QAM	1	0	22.15	22.27	22.10	23	1
5	16QAM	1	12	22.23	22.25	22.17		
5	16QAM	1	24	22.06	22.13	22.10		
5	16QAM	12	0	20.75	20.89	20.75	22	2
5	16QAM	12	7	20.74	20.82	20.82		
5	16QAM	12	13	20.80	20.91	20.84		
5	16QAM	25	0	20.82	20.82	20.76		
Channel				23025	23095	23165	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				700.5	707.5	714.5		
3	QPSK	1	0	22.80	22.81	22.78	24	0
3	QPSK	1	8	22.78	22.79	22.05		
3	QPSK	1	14	22.71	22.75	22.68		
3	QPSK	8	0	21.78	21.84	21.76	23	1
3	QPSK	8	4	21.78	21.90	21.76		
3	QPSK	8	7	21.72	21.78	21.70		
3	QPSK	15	0	21.77	21.85	21.77		
3	16QAM	1	0	22.05	22.19	21.94	23	1
3	16QAM	1	8	22.16	22.12	22.16		
3	16QAM	1	14	21.96	22.01	21.96		
3	16QAM	8	0	20.89	20.87	20.84	22	2
3	16QAM	8	4	20.84	20.90	20.75		
3	16QAM	8	7	20.78	20.79	20.82		
3	16QAM	15	0	20.78	20.83	20.78		

Channel				23017	23095	23173	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				699.7	707.5	715.3		
1.4	QPSK	1	0	22.85	22.87	22.84	24	0
1.4	QPSK	1	3	22.83	22.79	22.74		
1.4	QPSK	1	5	22.84	22.86	22.86		
1.4	QPSK	3	0	22.75	22.78	22.78		
1.4	QPSK	3	1	22.82	22.79	22.83		
1.4	QPSK	3	3	22.80	22.81	22.79		
1.4	QPSK	6	0	21.81	21.73	21.66	23	1
1.4	16QAM	1	0	22.20	22.30	22.16	23	1
1.4	16QAM	1	3	22.17	22.16	22.20		
1.4	16QAM	1	5	22.29	22.24	22.20		
1.4	16QAM	3	0	21.83	21.76	21.83		
1.4	16QAM	3	1	21.87	21.78	21.79		
1.4	16QAM	3	3	21.89	21.91	21.77		
1.4	16QAM	6	0	20.87	20.83	20.70	22	2

<LTE Band 13>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				23230				
Frequency (MHz)				782				
10	QPSK	1	0	22.03			24	0
10	QPSK	1	25	22.71				
10	QPSK	1	49	22.83				
10	QPSK	25	0	21.77			23	1
10	QPSK	25	12	21.71				
10	QPSK	25	25	21.60				
10	QPSK	50	0	21.67				
10	16QAM	1	0	21.15			23	1
10	16QAM	1	25	22.03				
10	16QAM	1	49	21.92				
10	16QAM	25	0	20.67			22	2
10	16QAM	25	12	20.68				
10	16QAM	25	25	20.60				
10	16QAM	50	0	20.67				
Channel				23205	23230	23255	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				779.5	782	784.5		
5	QPSK	1	0	22.09	22.61	22.78	24	0
5	QPSK	1	12	22.66	22.57	22.66		
5	QPSK	1	24	22.70	22.56	22.69		
5	QPSK	12	0	21.52	21.52	21.64	23	1
5	QPSK	12	7	21.63	21.63	21.69		
5	QPSK	12	13	21.65	21.65	21.67		
5	QPSK	25	0	21.68	21.49	21.76		
5	16QAM	1	0	21.10	21.88	22.04	23	1
5	16QAM	1	12	21.98	22.04	22.09		
5	16QAM	1	24	21.91	21.83	21.93		
5	16QAM	12	0	20.48	20.51	20.62	22	2
5	16QAM	12	7	20.63	20.56	20.72		
5	16QAM	12	13	20.62	20.61	20.74		
5	16QAM	25	0	20.73	20.54	20.70		

<LTE Band 25>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				26140	26340	26590		
Frequency (MHz)				1860	1880	1905		
20	QPSK	1	0	23.29	23.30	23.06	24	0
20	QPSK	1	49	22.41	22.30	22.16		
20	QPSK	1	99	22.63	22.53	22.26		
20	QPSK	50	0	21.86	21.87	21.60	23	1
20	QPSK	50	24	21.64	21.41	21.31		
20	QPSK	50	50	21.47	21.41	21.20		
20	QPSK	100	0	21.65	21.67	21.48		
20	16QAM	1	0	22.38	22.39	22.31	23	1
20	16QAM	1	49	21.69	21.49	21.37		
20	16QAM	1	99	21.88	21.70	21.55		
20	16QAM	50	0	20.93	20.68	20.58	22	2
20	16QAM	50	24	20.59	20.45	20.28		
20	16QAM	50	50	20.43	20.40	20.21		
20	16QAM	100	0	20.69	20.53	20.49		
Channel				26115	26340	26615	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1857.5	1880	1907.5		
15	QPSK	1	0	23.08	22.87	23.01	24	0
15	QPSK	1	37	22.56	22.45	22.33		
15	QPSK	1	74	22.45	22.44	22.22		
15	QPSK	36	0	21.69	21.63	21.56	23	1
15	QPSK	36	20	21.48	21.44	21.27		
15	QPSK	36	39	21.40	21.39	21.17		
15	QPSK	75	0	21.54	21.54	21.41		
15	16QAM	1	0	22.28	22.13	22.18	23	1
15	16QAM	1	37	21.68	21.56	21.41		
15	16QAM	1	74	21.65	21.67	21.45		
15	16QAM	36	0	20.73	20.64	20.56	22	2
15	16QAM	36	20	20.50	20.41	20.25		
15	16QAM	36	39	20.39	20.38	20.13		
15	16QAM	75	0	20.58	20.57	20.38		
Channel				26090	26340	26640	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1855	1880	1910		
10	QPSK	1	0	22.87	22.80	22.69	24	0
10	QPSK	1	25	22.63	22.59	22.45		
10	QPSK	1	49	22.46	22.49	22.35		
10	QPSK	25	0	21.66	21.53	21.34	23	1
10	QPSK	25	12	21.54	21.54	21.41		
10	QPSK	25	25	21.47	21.46	21.33		
10	QPSK	50	0	21.59	21.58	21.41		
10	16QAM	1	0	22.10	22.09	21.92	23	1
10	16QAM	1	25	21.83	21.82	21.71		
10	16QAM	1	49	21.70	21.77	21.67		
10	16QAM	25	0	20.66	20.54	20.33	22	2
10	16QAM	25	12	20.58	20.55	20.40		
10	16QAM	25	25	20.48	20.50	20.32		
10	16QAM	50	0	20.58	20.56	20.41		

Channel				26065	26340	26665	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1852.5	1880	1912.5		
5	QPSK	1	0	22.47	22.37	22.44	24	0
5	QPSK	1	12	22.41	22.23	22.35		
5	QPSK	1	24	22.30	22.33	22.26		
5	QPSK	12	0	21.43	21.32	21.35	23	1
5	QPSK	12	7	21.49	21.27	21.46		
5	QPSK	12	13	21.43	21.27	21.32		
5	QPSK	25	0	21.25	21.24	21.40		
5	16QAM	1	0	21.83	21.68	21.72	23	1
5	16QAM	1	12	21.63	21.70	21.82		
5	16QAM	1	24	21.34	21.62	21.63		
5	16QAM	12	0	20.33	20.40	20.42	22	2
5	16QAM	12	7	20.24	20.31	20.45		
5	16QAM	12	13	20.19	20.32	20.33		
5	16QAM	25	0	20.35	20.32	20.41		
Channel				26055	26340	26675	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1851.5	1880	1913.5		
3	QPSK	1	0	22.44	22.39	22.45	24	0
3	QPSK	1	8	22.72	22.47	22.68		
3	QPSK	1	14	22.37	22.34	22.24		
3	QPSK	8	0	21.33	21.38	21.39	23	1
3	QPSK	8	4	21.38	21.34	21.40		
3	QPSK	8	7	21.34	21.27	21.24		
3	QPSK	15	0	21.33	21.25	21.26		
3	16QAM	1	0	21.58	21.53	21.51	23	1
3	16QAM	1	8	21.77	21.72	21.73		
3	16QAM	1	14	21.49	21.49	21.40		
3	16QAM	8	0	20.39	20.43	20.33	22	2
3	16QAM	8	4	20.46	20.39	20.34		
3	16QAM	8	7	20.43	20.39	20.29		
3	16QAM	15	0	20.38	20.30	20.25		
Channel				26047	26340	26683	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1850.7	1880	1914.3		
1.4	QPSK	1	0	22.69	22.61	22.57	24	0
1.4	QPSK	1	3	22.61	22.57	22.49		
1.4	QPSK	1	5	22.57	22.52	22.43		
1.4	QPSK	3	0	22.43	22.47	22.34		
1.4	QPSK	3	1	22.53	22.55	22.43		
1.4	QPSK	3	3	22.57	22.48	22.47		
1.4	QPSK	6	0	21.44	21.41	21.30	23	1
1.4	16QAM	1	0	21.80	21.80	21.80	23	1
1.4	16QAM	1	3	21.82	21.81	21.75		
1.4	16QAM	1	5	21.79	21.80	21.69		
1.4	16QAM	3	0	21.48	21.54	21.48		
1.4	16QAM	3	1	21.47	21.52	21.41		
1.4	16QAM	3	3	21.58	21.51	21.50		
1.4	16QAM	6	0	20.53	20.44	20.35	22	2

<LTE Band 26>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				26765	26865	26965		
Frequency (MHz)				821.5	831.5	841.5		
15	QPSK	1	0	22.74	23.10	22.87	24	0
15	QPSK	1	37	22.69	22.78	22.83		
15	QPSK	1	74	22.63	22.72	22.73		
15	QPSK	36	0	21.69	21.99	21.85	23	1
15	QPSK	36	20	21.59	21.92	21.79		
15	QPSK	36	39	21.55	21.94	21.77		
15	QPSK	75	0	21.65	21.87	21.80		
15	16QAM	1	0	22.14	22.19	22.18	23	1
15	16QAM	1	37	22.08	21.98	21.99		
15	16QAM	1	74	21.98	21.88	21.91		
15	16QAM	36	0	20.88	20.86	20.82	22	2
15	16QAM	36	20	20.83	20.78	20.83		
15	16QAM	36	39	20.69	20.61	20.64		
15	16QAM	75	0	20.81	20.78	20.78		
Channel				26740	26865	26990	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				819	831.5	844		
10	QPSK	1	0	22.94	22.96	22.75	24	0
10	QPSK	1	25	22.85	22.77	22.81		
10	QPSK	1	49	22.68	22.66	22.69		
10	QPSK	25	0	21.80	21.80	21.68	23	1
10	QPSK	25	12	21.78	21.71	21.79		
10	QPSK	25	25	21.78	21.59	21.64		
10	QPSK	50	0	21.76	21.72	21.72		
10	16QAM	1	0	22.25	22.27	22.05	23	1
10	16QAM	1	25	22.09	22.03	22.06		
10	16QAM	1	49	21.97	21.97	21.92		
10	16QAM	25	0	20.81	20.77	20.70	22	2
10	16QAM	25	12	20.77	20.66	20.78		
10	16QAM	25	25	20.76	20.58	20.62		
10	16QAM	50	0	20.71	20.68	20.67		
Channel				26715	26865	27015	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				816.5	831.5	846.5		
5	QPSK	1	0	22.80	22.85	22.65	24	0
5	QPSK	1	12	22.74	22.62	22.64		
5	QPSK	1	24	22.82	22.56	22.61		
5	QPSK	12	0	21.79	21.57	21.51	23	1
5	QPSK	12	7	21.87	21.64	21.60		
5	QPSK	12	13	21.75	21.46	21.61		
5	QPSK	25	0	21.73	21.57	21.61		
5	16QAM	1	0	22.00	22.09	21.90	23	1
5	16QAM	1	12	21.97	21.95	21.98		
5	16QAM	1	24	22.04	21.82	21.89		
5	16QAM	12	0	20.78	20.52	20.56	22	2
5	16QAM	12	7	20.85	20.59	20.62		
5	16QAM	12	13	20.72	20.43	20.60		
5	16QAM	25	0	20.74	20.53	20.55		

Channel				26705	26865	27025	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				815.5	831.5	847.5		
3	QPSK	1	0	22.93	22.94	22.70	24	0
3	QPSK	1	8	22.85	22.74	22.93		
3	QPSK	1	14	22.82	22.57	22.63		
3	QPSK	8	0	21.87	21.69	21.63	23	1
3	QPSK	8	4	21.89	21.67	21.74		
3	QPSK	8	7	21.81	21.59	21.68		
3	QPSK	15	0	21.87	21.66	21.65		
3	16QAM	1	0	22.12	22.14	21.93	23	1
3	16QAM	1	8	22.09	22.05	22.07		
3	16QAM	1	14	22.13	21.81	21.86		
3	16QAM	8	0	20.92	20.71	20.65	22	2
3	16QAM	8	4	20.94	20.69	20.68		
3	16QAM	8	7	20.88	20.59	20.68		
3	16QAM	15	0	20.84	20.62	20.63		
Channel				26697	26865	27033	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				814.7	831.5	848.3		
1.4	QPSK	1	0	22.89	22.97	22.76	24	0
1.4	QPSK	1	3	22.92	22.76	22.77		
1.4	QPSK	1	5	22.89	22.63	22.70		
1.4	QPSK	3	0	22.79	22.56	22.65		
1.4	QPSK	3	1	22.87	22.66	22.72		
1.4	QPSK	3	3	22.93	22.67	22.70		
1.4	QPSK	6	0	21.80	21.58	21.59	23	1
1.4	16QAM	1	0	22.13	22.18	21.98	23	1
1.4	16QAM	1	3	22.12	21.99	21.97		
1.4	16QAM	1	5	22.06	22.00	21.94		
1.4	16QAM	3	0	21.87	21.61	21.65		
1.4	16QAM	3	1	21.93	21.65	21.69		
1.4	16QAM	3	3	22.00	21.71	21.78		
1.4	16QAM	6	0	20.88	20.61	20.67	22	2

<LTE Band 30>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				27710				
Frequency (MHz)				2310				
10	QPSK	1	0	21.88			23	0
10	QPSK	1	25	21.80				
10	QPSK	1	49	21.55				
10	QPSK	25	0	20.76			22	1
10	QPSK	25	12	20.69				
10	QPSK	25	25	20.68				
10	QPSK	50	0	20.75				
10	16QAM	1	0	20.98			22	1
10	16QAM	1	25	21.02				
10	16QAM	1	49	20.73				
10	16QAM	25	0	19.61			21	2
10	16QAM	25	12	19.63				
10	16QAM	25	25	19.65				
10	16QAM	50	0	19.65				
Channel				27685	27710	27735	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2307.5	2310	2312.5		
5	QPSK	1	0	21.53	21.67	21.79	23	0
5	QPSK	1	12	21.56	21.72	21.77		
5	QPSK	1	24	21.55	21.65	21.64		
5	QPSK	12	0	20.53	20.59	20.71	22	1
5	QPSK	12	7	20.53	20.65	20.74		
5	QPSK	12	13	20.53	20.64	20.73		
5	QPSK	25	0	20.57	20.59	20.81		
5	16QAM	1	0	20.83	20.84	20.94	22	1
5	16QAM	1	12	20.80	20.88	20.89		
5	16QAM	1	24	20.86	20.90	20.93		
5	16QAM	12	0	19.61	19.70	19.86	21	2
5	16QAM	12	7	19.61	19.75	19.85		
5	16QAM	12	13	19.61	19.74	19.81		
5	16QAM	25	0	19.58	19.56	19.79		

<TDD LTE SAR Measurement>

TDD LTE configuration setup for SAR measurement

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

a. 3GPP TS 36.211 section 4.2 for Type 2 Frame Structure and Table 4.2-2 for uplink-downlink configurations

b. "special subframe S" contains both uplink and downlink transmissions, it has been taken into consideration to determine the transmission duty factor according to the worst case uplink and downlink cyclic prefix requirements for UpPTS

c. Establishing connections with base station simulators ensure a consistent means for testing SAR and recommended for evaluating SAR. The Anritsu MT8820C (firmware: #22.52#004) was used for LTE output power measurements and SAR testing.

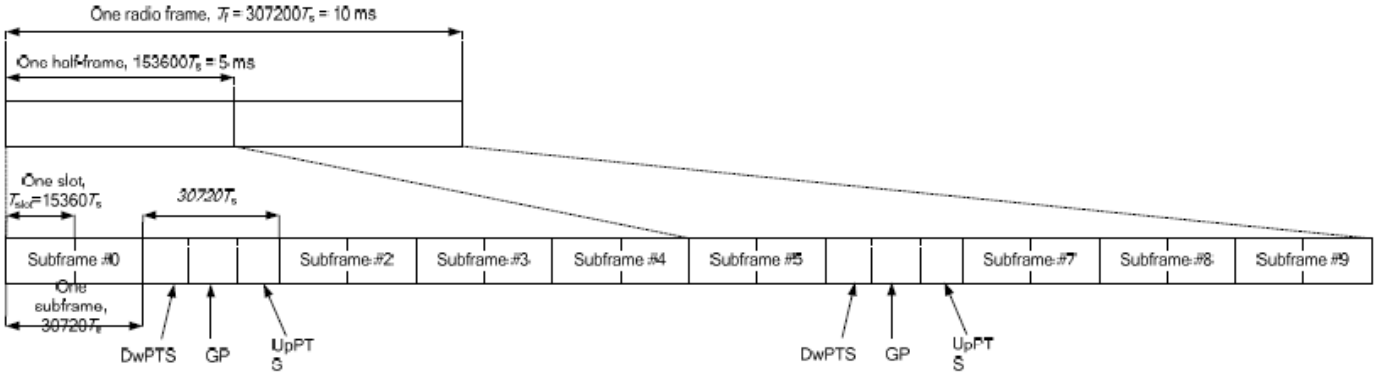


Figure 4.2-1: Frame structure type 2 (for 5 ms switch-point periodicity).

Table 4.2-2: Uplink-downlink configurations.

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

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

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

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

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

The highest duty factor is resulted from:

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

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

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

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

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

<LTE Band 41>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Low Middle Ch. / Freq.	Power Middle Ch. / Freq.	Power High Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				39750	40185	40620	41055	41490		
Frequency (MHz)				2506	2549.5	2593	2636.5	2680		
20	QPSK	1	0	21.14	21.19	21.21	22.13	21.52	23	0
20	QPSK	1	49	21.10	21.15	21.19	22.03	21.45		
20	QPSK	1	99	21.05	21.13	21.11	22.05	21.47		
20	QPSK	50	0	20.20	20.26	20.50	21.18	20.62	22	1
20	QPSK	50	24	20.13	20.14	20.44	21.12	20.60		
20	QPSK	50	50	20.09	20.11	20.38	21.09	20.39		
20	QPSK	100	0	20.14	20.12	20.41	21.07	20.46		
20	16QAM	1	0	20.30	20.26	20.63	20.96	20.66	22	1
20	16QAM	1	49	20.34	20.11	20.67	21.07	20.63		
20	16QAM	1	99	20.10	20.09	20.17	20.63	20.22		
20	16QAM	50	0	19.33	19.22	19.69	20.02	19.70	21	2
20	16QAM	50	24	19.28	19.07	19.69	20.05	19.67		
20	16QAM	50	50	19.05	19.07	19.39	19.87	19.49		
20	16QAM	100	0	19.20	19.06	19.57	19.94	19.51		
Channel				39725	40173	40620	41068	41515	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2503.5	2548.3	2593	2637.8	2682.5		
15	QPSK	1	0	21.16	21.18	21.19	22.10	21.39	23	0
15	QPSK	1	37	21.19	21.22	21.16	22.07	21.40		
15	QPSK	1	74	21.08	21.11	21.10	22.03	21.47		
15	QPSK	36	0	20.25	20.22	20.19	21.12	20.25	22	1
15	QPSK	36	20	20.22	20.09	20.17	21.09	20.23		
15	QPSK	36	39	20.15	20.06	20.09	21.06	20.18		
15	QPSK	75	0	20.03	20.08	20.09	21.02	20.16		
15	16QAM	1	0	20.20	20.26	20.23	21.06	20.36	22	1
15	16QAM	1	37	20.28	20.24	20.20	20.95	20.27		
15	16QAM	1	74	20.03	20.21	20.15	20.97	20.06		
15	16QAM	36	0	19.16	19.18	19.23	20.14	19.22	21	2
15	16QAM	36	20	19.17	19.11	19.17	20.09	19.22		
15	16QAM	36	39	19.12	19.08	19.06	20.05	19.16		
15	16QAM	75	0	19.16	19.12	19.13	20.10	19.12		
Channel				39700	40160	40620	41080	41540	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2501	2547	2593	2639	2685		
10	QPSK	1	0	21.09	21.14	21.21	22.05	21.31	23	0
10	QPSK	1	25	21.12	21.18	21.18	22.02	21.32		
10	QPSK	1	49	21.01	21.07	21.12	21.98	21.39		
10	QPSK	25	0	20.18	20.18	20.21	21.07	20.17	22	1
10	QPSK	25	12	20.15	20.05	20.19	21.04	20.15		
10	QPSK	25	25	20.08	20.02	20.11	21.01	20.10		
10	QPSK	50	0	20.05	20.04	20.11	20.97	20.08		
10	16QAM	1	0	20.13	20.22	20.25	21.01	20.28	22	1
10	16QAM	1	25	20.21	20.20	20.22	20.90	20.19		
10	16QAM	1	49	20.04	20.17	20.17	20.92	20.08		
10	16QAM	25	0	19.09	19.14	19.25	20.09	19.14	21	2
10	16QAM	25	12	19.10	19.07	19.19	20.04	19.14		
10	16QAM	25	25	19.05	19.04	19.08	20.00	19.08		
10	16QAM	50	0	19.09	19.08	19.15	20.05	19.10		

Channel				39675	40148	40620	41093	41565	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2498.5	2545.8	2593	2640.30	2687.5		
5	QPSK	1	0	21.13	21.21	21.31	22.02	21.33	23	0
5	QPSK	1	12	21.09	21.25	21.28	21.99	21.29		
5	QPSK	1	24	21.06	21.14	21.22	21.95	21.19		
5	QPSK	12	0	20.15	20.25	20.31	21.04	20.20	22	1
5	QPSK	12	7	20.12	20.12	20.29	21.01	20.13		
5	QPSK	12	13	20.05	20.09	20.21	20.98	20.10		
5	QPSK	25	0	20.02	20.11	20.21	20.94	20.15		
5	16QAM	1	0	20.10	20.29	20.35	20.98	20.30	22	1
5	16QAM	1	12	20.18	20.27	20.36	20.96	20.26		
5	16QAM	1	24	20.01	20.24	20.27	20.92	20.10		
5	16QAM	12	0	19.06	19.21	19.35	20.06	19.18	21	2
5	16QAM	12	7	19.07	19.14	19.29	20.05	19.11		
5	16QAM	12	13	19.02	19.11	19.18	19.97	19.05		
5	16QAM	25	0	19.06	19.15	19.25	20.02	19.12		

LTE Carrier Aggregation Conducted Power

General Note:

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.

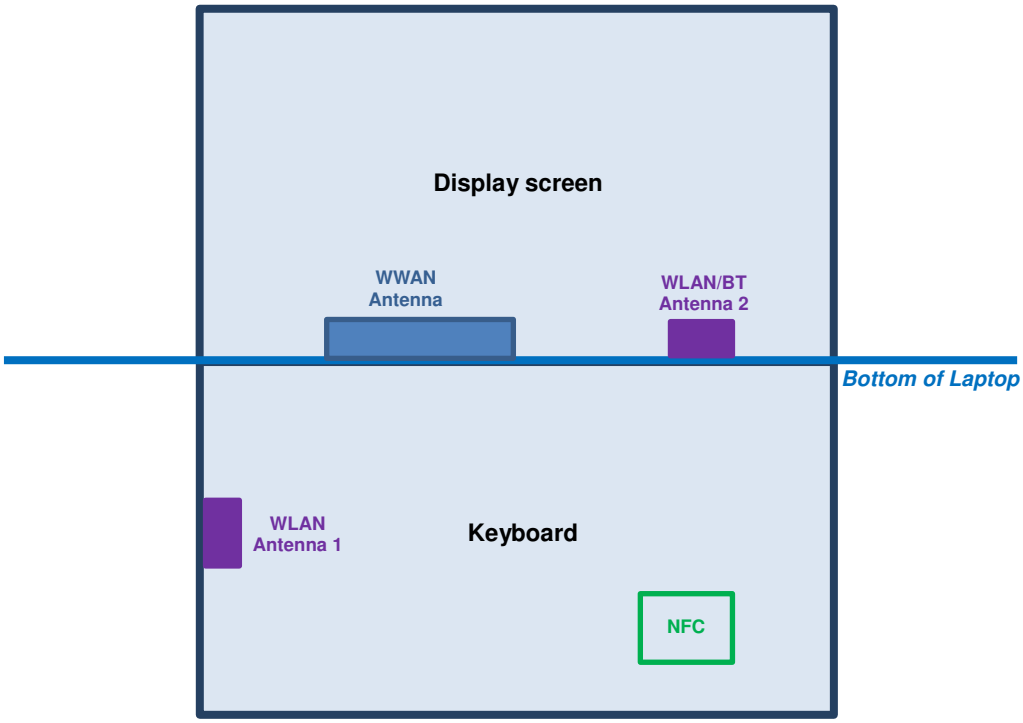
ii. Uplink maximum output power with downlink carrier aggregation active does not show more than ¼ dB higher than the maximum output power without downlink carrier aggregation active, therefore SAR evaluation with downlink carrier aggregation active can be excluded.

iii. The device only supports downlink carrier aggregation. Uplink carrier aggregation is not supported. Power measurements were performed with two DL carriers for the Release 8 configuration that had the highest output power across all bandwidths, channels and RB configuration for each band.

iv. During the carrier aggregation conducted power measurements we have attention to throughput traffic to make sure all the power measurement is corrected.

Configure		PCC						SCC				Power	
		LTE Band	BW (MHz)	Freq. (MHz)	Channel	UL# RB	UL RB Offset	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	LTE Rel 10 Tx.Power(dBm)	LTE Rel 8 Tx.Power(dBm)
Inter-Band		Band 2	20M	1880	18900	1	0	Band 5	10M	881.5	2525	23.42	23.48
		Band 5	10M	836.5	20525	1	0	Band 2	20M	1960	900	22.67	22.70
		Band 2	20M	1880	18900	1	0	Band 12	10M	737.5	5095	23.42	23.49
		Band 12	10M	707.5	23095	1	0	Band 2	20M	1960	900	23.07	23.15
		Band 2	20M	1880	18900	1	0	Band 13	10M	751	5230	23.44	23.47
		Band 13	10M	782	23230	1	49	Band 2	20M	1960	900	22.72	22.83
		Band 2	20M	1880	18900	1	0	Band 29	10M	722.5	9715	23.45	23.48
		Band 4	20M	1732.5	20175	1	0	Band 5	10M	881.5	2525	23.41	23.43
		Band 5	10M	836.5	20525	1	0	Band 4	20M	2132.5	2175	22.67	22.70
		Band 4	20M	1732.5	20175	1	0	Band 12	10M	737.5	5095	23.37	23.43
		Band 12	10M	707.5	23095	1	0	Band 4	20M	2132.5	2175	23.13	23.15
		Band 4	20M	1732.5	20175	1	0	Band 13	10M	751	5230	23.36	23.42
		Band 13	10M	782	23230	1	49	Band 4	20M	2132.5	2175	22.74	22.81
		Band 4	20M	1732.5	20175	1	0	Band 29	10M	722.5	9715	23.38	23.41
		Band 5	10M	836.5	20525	1	0	Band 30	10M	2355	9820	22.61	22.70
		Band 30	10M	2310	27710	1	0	Band 5	10M	881.5	2525	21.75	21.88
		Band 12	10M	707.5	23095	1	0	Band 30	10M	2355	9820	23.03	23.11
		Band 30	10M	2310	27710	1	0	Band 12	10M	737.5	5095	21.71	21.81
		Band 30	10M	711	23130	1	0	Band 29	10M	722.5	9715	21.68	21.83
Intra-Band	Contiguous	Band 2	20M	1880	18900	1	0	Band 2	20M	1980	1100	23.40	23.42
		Band 7	20M	2535	21100	1	0	Band 7	20M	2635	2900	22.74	22.80
		Band 41	20M	2593	40620	1	0	Band 41	20M	2573	40420	21.18	21.21
	Non-Contiguous	Band 2	20M	1860	18700	1	0	Band 2	20M	1980	1100	23.33	23.44
		Band 7	20M	2535	21100	1	0	Band 7	20M	2680	3350	22.68	22.80
		Band 41	20M	2680	41490	1	0	Band 41	20M	2506	39750	21.48	21.52

12. Antenna Location



13. SAR Test Results

General Note:

1. Per KDB 447498 D01v06, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   b. For WWAN/Bluetooth: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
   c. For WLAN: Reported SAR(W/kg)= Measured SAR(W/kg)* Duty Cycle scaling factor * Tune-up scaling factor
   d. 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 = measured SAR (W/kg)* Tune-up Scaling Factor* scaling factor for extended cyclic prefix.
2. Per KDB 447498 D01v06, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the *reported* 1-g or 10-g SAR for the mid-band or highest output power channel is:
   - ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
   - ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
   - ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
3. For additional battery, need repeat SAR testing at the worst position for each wireless mode and each band.

UMTS Note:

1. Per KDB 941225 D01v03r01, SAR for Body exposure 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. If the maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA / DC-HSDPA is ≤ ¼ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA / DC-HSDPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA.

LTE Note:

1. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
2. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
3. Per KDB 941225 D05v02r05, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
4. Per KDB 941225 D05v02r05, 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
5. Per KDB 941225 D05v02r05, Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
6. For LTE B4 /B12 /B13 /B26 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r04, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.
7. LTE band 2/5 SAR test was covered by Band 25 / 26; according to TCB workshop, SAR test for overlapping LTE bands can be reduced if
   a. The maximum output power, including tolerance, for the smaller band is ≤ the larger band to qualify for the SAR test exclusion.
   b. The channel bandwidth and other operating parameters for the smaller band are fully supported by the larger band.

13.1 Body SAR

General Note:
WWAN RF exposure test procedure as follow:
(a) Selected sample1 with battery1 as the main testing
(b) Sample2 spot check (a) worse case perform
(c) Battery2 spot check (a) / (b) worse case perform.

<WCDMA SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Sample	Battery	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WCDMA V	RMC 12.2Kbps	Bottom of Laptop	0mm	Sample1	Battery1	4182	836.4	23.23	24.00	1.194	-0.18	0.433	0.517
	WCDMA V	RMC 12.2Kbps	Bottom of Laptop	0mm	Sample1	Battery1	4132	826.4	23.14	24.00	1.219	-0.19	0.451	0.550
	WCDMA V	RMC 12.2Kbps	Bottom of Laptop	0mm	Sample1	Battery1	4233	846.6	22.95	24.00	1.274	-0.12	0.420	0.535
01	WCDMA V	RMC 12.2Kbps	Bottom of Laptop	0mm	Sample2	Battery1	4132	826.4	23.14	24.00	1.219	-0.11	0.562	0.685
	WCDMA V	RMC 12.2Kbps	Bottom of Laptop	0mm	Sample2	Battery2	4132	826.4	23.14	24.00	1.219	-0.18	0.481	0.586
	WCDMA IV	RMC 12.2Kbps	Bottom of Laptop	0mm	Sample1	Battery1	1413	1732.6	23.12	24.00	1.225	-0.1	0.750	0.918
	WCDMA IV	RMC 12.2Kbps	Bottom of Laptop	0mm	Sample1	Battery1	1312	1712.4	22.96	24.00	1.271	-0.16	0.798	1.014
02	WCDMA IV	RMC 12.2Kbps	Bottom of Laptop	0mm	Sample1	Battery1	1513	1752.6	22.88	24.00	1.294	-0.11	0.824	1.066
	WCDMA IV	RMC 12.2Kbps	Bottom of Laptop	0mm	Sample2	Battery1	1513	1752.6	22.88	24.00	1.294	0.05	0.811	1.050
	WCDMA IV	RMC 12.2Kbps	Bottom of Laptop	0mm	Sample1	Battery2	1513	1752.6	22.88	24.00	1.294	-0.05	0.778	1.007
	WCDMA II	RMC 12.2Kbps	Bottom of Laptop	0mm	Sample1	Battery1	9400	1880	23.13	24.00	1.222	-0.17	0.945	1.155
	WCDMA II	RMC 12.2Kbps	Bottom of Laptop	0mm	Sample1	Battery1	9262	1852.4	23.02	24.00	1.253	-0.13	0.885	1.109
03	WCDMA II	RMC 12.2Kbps	Bottom of Laptop	0mm	Sample1	Battery1	9538	1907.6	23.00	24.00	1.259	-0.13	0.946	1.191
	WCDMA II	RMC 12.2Kbps	Bottom of Laptop	0mm	Sample2	Battery1	9538	1907.6	23.00	24.00	1.259	0.06	0.694	0.874
	WCDMA II	RMC 12.2Kbps	Bottom of Laptop	0mm	Sample1	Battery2	9538	1907.6	23.00	24.00	1.259	-0.14	0.866	1.090

<FDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Sample	Battery	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 4	20M	QPSK	1	0	Bottom of Laptop	0mm	Sample1	Battery1	20175	1732.5	23.43	24.00	1.140	-0.11	0.816	0.930
	LTE Band 4	20M	QPSK	50	0	Bottom of Laptop	0mm	Sample1	Battery1	20175	1732.5	21.90	23.00	1.288	-0.08	0.674	0.868
	LTE Band 4	20M	QPSK	100	0	Bottom of Laptop	0mm	Sample1	Battery1	20175	1732.5	21.74	23.00	1.337	-0.12	0.673	0.900
04	LTE Band 4	20M	QPSK	1	0	Bottom of Laptop	0mm	Sample2	Battery1	20175	1732.5	23.43	24.00	1.140	-0.11	0.868	0.990
	LTE Band 4	20M	QPSK	1	0	Bottom of Laptop	0mm	Sample2	Battery2	20175	1732.5	23.43	24.00	1.140	-0.16	0.822	0.937
	LTE Band 7	20M	QPSK	1	0	Bottom of Laptop	0mm	Sample1	Battery1	21100	2535	22.80	23.00	1.047	-0.14	0.914	0.957
	LTE Band 7	20M	QPSK	1	0	Bottom of Laptop	0mm	Sample1	Battery1	20850	2510	22.56	23.00	1.107	-0.02	0.821	0.909
	LTE Band 7	20M	QPSK	1	0	Bottom of Laptop	0mm	Sample1	Battery1	21350	2560	22.62	23.00	1.091	0.09	0.935	1.020
	LTE Band 7	20M	QPSK	50	0	Bottom of Laptop	0mm	Sample1	Battery1	21100	2535	21.77	22.00	1.054	-0.16	0.774	0.816
	LTE Band 7	20M	QPSK	50	0	Bottom of Laptop	0mm	Sample1	Battery1	20850	2510	21.68	22.00	1.076	-0.18	0.660	0.710
	LTE Band 7	20M	QPSK	50	0	Bottom of Laptop	0mm	Sample1	Battery1	21350	2560	21.65	22.00	1.084	0.06	0.755	0.818
	LTE Band 7	20M	QPSK	100	0	Bottom of Laptop	0mm	Sample1	Battery1	21100	2535	21.80	22.00	1.047	-0.16	0.755	0.791
05	LTE Band 7	20M	QPSK	1	0	Bottom of Laptop	0mm	Sample2	Battery1	21350	2560	22.62	23.00	1.091	-0.09	1.000	1.091
	LTE Band 7	20M	QPSK	1	0	Bottom of Laptop	0mm	Sample2	Battery2	21350	2560	22.62	23.00	1.091	-0.19	0.991	1.082
	LTE Band 12	10M	QPSK	1	0	Bottom of Laptop	0mm	Sample1	Battery1	23095	707.5	23.15	24.00	1.216	0.15	0.580	0.705
	LTE Band 12	10M	QPSK	25	0	Bottom of Laptop	0mm	Sample1	Battery1	23095	707.5	22.06	23.00	1.242	0.11	0.453	0.562
06	LTE Band 12	10M	QPSK	1	0	Bottom of Laptop	0mm	Sample2	Battery1	23095	707.5	23.15	24.00	1.216	-0.14	0.582	0.708
	LTE Band 12	10M	QPSK	1	0	Bottom of Laptop	0mm	Sample2	Battery2	23095	707.5	23.15	24.00	1.216	-0.18	0.494	0.601
	LTE Band 13	10M	QPSK	1	49	Bottom of Laptop	0mm	Sample1	Battery1	23230	782	22.83	24.00	1.309	-0.14	0.449	0.588
	LTE Band 13	10M	QPSK	25	0	Bottom of Laptop	0mm	Sample1	Battery1	23230	782	21.77	23.00	1.327	-0.12	0.304	0.404
07	LTE Band 13	10M	QPSK	1	49	Bottom of Laptop	0mm	Sample2	Battery1	23230	782	22.83	24.00	1.309	-0.17	0.515	0.674
	LTE Band 13	10M	QPSK	1	49	Bottom of Laptop	0mm	Sample2	Battery2	23230	782	22.83	24.00	1.309	-0.17	0.447	0.585

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Sample	Battery	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 25	20M	QPSK	1	0	Bottom of Laptop	0mm	Sample1	Battery1	26340	1880	23.30	24.00	1.175	-0.1	1.000	1.175
	LTE Band 25	20M	QPSK	1	0	Bottom of Laptop	0mm	Sample1	Battery1	26140	1860	23.29	24.00	1.178	-0.02	1.000	1.178
08	LTE Band 25	20M	QPSK	1	0	Bottom of Laptop	0mm	Sample1	Battery1	26590	1905	23.06	24.00	1.242	-0.19	0.950	1.180
	LTE Band 25	20M	QPSK	50	0	Bottom of Laptop	0mm	Sample1	Battery1	26340	1880	21.87	23.00	1.297	-0.18	0.751	0.974
	LTE Band 25	20M	QPSK	50	0	Bottom of Laptop	0mm	Sample1	Battery1	26140	1860	21.86	23.00	1.300	-0.07	0.737	0.958
	LTE Band 25	20M	QPSK	50	0	Bottom of Laptop	0mm	Sample1	Battery1	26590	1905	21.60	23.00	1.380	-0.15	0.774	1.068
	LTE Band 25	20M	QPSK	100	0	Bottom of Laptop	0mm	Sample1	Battery1	26340	1880	21.67	23.00	1.358	-0.16	0.727	0.987
	LTE Band 25	20M	QPSK	1	0	Bottom of Laptop	0mm	Sample2	Battery1	26590	1905	23.06	24.00	1.242	-0.12	0.892	1.108
	LTE Band 25	20M	QPSK	1	0	Bottom of Laptop	0mm	Sample1	Battery2	26590	1905	23.06	24.00	1.242	-0.14	0.864	1.073
	LTE Band 26	15M	QPSK	1	0	Bottom of Laptop	0mm	Sample1	Battery1	26865	831.5	23.10	24.00	1.230	0.11	0.432	0.531
	LTE Band 26	15M	QPSK	36	0	Bottom of Laptop	0mm	Sample1	Battery1	26865	831.5	21.99	23.00	1.262	0.12	0.340	0.429
09	LTE Band 26	15M	QPSK	1	0	Bottom of Laptop	0mm	Sample2	Battery1	26865	831.5	23.10	24.00	1.230	-0.17	0.557	0.685
	LTE Band 26	15M	QPSK	1	0	Bottom of Laptop	0mm	Sample2	Battery2	26865	831.5	23.10	24.00	1.230	-0.15	0.472	0.581
	LTE Band 30	10M	QPSK	1	0	Bottom of Laptop	0mm	Sample1	Battery1	27710	2310	21.88	23.00	1.294	-0.09	0.595	0.770
	LTE Band 30	10M	QPSK	25	0	Bottom of Laptop	0mm	Sample1	Battery1	27710	2310	20.76	22.00	1.330	-0.06	0.504	0.671
10	LTE Band 30	10M	QPSK	1	0	Bottom of Laptop	0mm	Sample2	Battery1	27710	2310	21.88	23.00	1.294	-0.05	0.747	0.967
	LTE Band 30	10M	QPSK	1	0	Bottom of Laptop	0mm	Sample2	Battery2	27710	2310	21.88	23.00	1.294	-0.11	0.686	0.888

<TDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Sample	Battery	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)
	LTE Band 41	20M	QPSK	1	0	Bottom of Laptop	0mm	Sample1	Battery1	41055	2636.5	22.13	23.00	1.222	62.9	1.006	-0.17	0.520	0.639
	LTE Band 41	20M	QPSK	1	0	Bottom of Laptop	0mm	Sample1	Battery1	39750	2506	21.14	23.00	1.535	62.9	1.006	-0.17	0.375	0.579
	LTE Band 41	20M	QPSK	1	0	Bottom of Laptop	0mm	Sample1	Battery1	40185	2549.5	21.19	23.00	1.517	62.9	1.006	-0.05	0.433	0.661
	LTE Band 41	20M	QPSK	1	0	Bottom of Laptop	0mm	Sample1	Battery1	40620	2593	21.21	23.00	1.510	62.9	1.006	0.17	0.456	0.693
	LTE Band 41	20M	QPSK	1	0	Bottom of Laptop	0mm	Sample1	Battery1	41490	2680	21.52	23.00	1.406	62.9	1.006	0.07	0.427	0.604
	LTE Band 41	20M	QPSK	50	0	Bottom of Laptop	0mm	Sample1	Battery1	41055	2636.5	21.18	22.00	1.208	62.9	1.006	0.05	0.455	0.553
	LTE Band 41	20M	QPSK	100	0	Bottom of Laptop	0mm	Sample1	Battery1	41055	2636.5	21.07	22.00	1.239	62.9	1.006	0.13	0.436	0.543
11	LTE Band 41	20M	QPSK	1	0	Bottom of Laptop	0mm	Sample2	Battery1	40620	2593	21.21	23.00	1.510	62.9	1.006	-0.12	0.492	0.747
	LTE Band 41	20M	QPSK	1	0	Bottom of Laptop	0mm	Sample2	Battery2	40620	2593	21.21	23.00	1.510	62.9	1.006	-0.19	0.485	0.737

<WLAN SAR>

General Note:

1. Due to the Intel 8260NGW RF exposure was perform on the sample1 with battery1, FCC ID: PD98260NGU, report No.: SAR.20151209, added sample2 with battery2 WLAN SAR testing just verification original report worst case to ensure that the SAR measurements for both device are the same. The original report please refers appendix D.

Plot No.	Band	Mode	Test Position	Gap (mm)	Sample	Battery	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
12	WLAN2.4GHz	802.11b 1Mbps	Bottom of Laptop	0mm	Sample 2	Battery2	Ant 1	6	2437	15.00	15.00	1.000	-0.05	0.768	0.768
13	WLAN5GHz	802.11a 6Mbps	Bottom of Laptop	0mm	Sample 2	Battery2	Ant 1	56	5280	13.50	13.50	1.000	0.17	0.356	0.356
14	WLAN5GHz	802.11a 6Mbps	Bottom of Laptop	0mm	Sample 2	Battery2	Ant 2	116	5580	13.50	13.50	1.000	0.05	0.400	0.400
15	WLAN5GHz	802.11a 6Mbps	Bottom of Laptop	0mm	Sample 2	Battery2	Ant 1	165	5825	13.50	13.50	1.000	-0.05	0.429	0.429
16	Bluetooth	1Mbps	Bottom of Laptop	0mm	Sample 2	Battery2	Ant 2	39	2441	11.39	11.39	1.000	0.15	0.045	0.045

13.2 Repeated SAR Measurement

No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Sample	Battery	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Ratio	Reported 1g SAR (W/kg)
1st	LTE Band 4	20M	QPSK	1	0	Bottom of Laptop	0mm	Sample2	Battery1	20175	1732.5	23.43	24.00	1.140	-0.11	0.868		0.990
2nd	LTE Band 4	20M	QPSK	1	0	Bottom of Laptop	0mm	Sample2	Battery1	20175	1732.5	23.43	24.00	1.140	-0.06	0.817	1.06	0.932
1st	LTE Band 7	20M	QPSK	1	0	Bottom of Laptop	0mm	Sample2	Battery1	21350	2560	22.62	23.00	1.091	-0.09	1.000		1.091
2nd	LTE Band 7	20M	QPSK	1	0	Bottom of Laptop	0mm	Sample2	Battery1	21350	2560	22.62	23.00	1.091	-0.13	0.995	1.00	1.086
1st	LTE Band 25	20M	QPSK	1	0	Bottom of Laptop	0mm	Sample1	Battery1	26140	1860	23.29	24.00	1.178	-0.02	1.000		1.178
2nd	LTE Band 25	20M	QPSK	1	0	Bottom of Laptop	0mm	Sample1	Battery1	26140	1860	23.29	24.00	1.178	-0.04	0.919	1.09	1.082

General Note:

1. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
2. Per KDB 865664 D01v01r04, if the ratio among the repeated measurement is ≤ 1.2 and the measured SAR <1.45W/kg, only one repeated measurement is required.
3. 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.

14. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Body
1.	WCDMA + WLAN2.4GHz	Yes
2.	LTE + WLAN2.4GHz	Yes
3.	WCDMA+ Bluetooth	Yes
4.	LTE + Bluetooth	Yes
5.	WCDMA + WLAN5GHz	Yes
6.	LTE + WLAN5GHz	Yes

General Note:

1. The device will integrated into two difference WLAN/BT Module ,detail information as follow :
   i) The WLAN/BT module, Broadcom BCM94350ZAE, FCC ID: QDS-BRCM1087 is also integrated into this host and the WLAN and Bluetooth SAR testing results are also used perform transmission simultaneous analysis which can be referred to RF Exposure Lab SAR Evaluation Report, Report No: FA5O1610-04.
   ii) The WLAN/BT module, Intel 8260NGW, FCC ID: PD98260NGU is also integrated into this host and the WLAN and Bluetooth SAR testing results are also used perform transmission simultaneous analysis which can be referred to RF Exposure Lab SAR Evaluation Report, Report No: SAR.20151209.
2. The Scaled SAR summation is calculated based on the same configuration and test position.
3. Per KDB 447498 D01v06, simultaneous transmission SAR is compliant if,
   i) Scalar SAR summation < 1.6W/kg.
   ii) SPLSR = (SAR1 + SAR2)^1.5 / (min. separation distance, mm), and the peak separation distance is determined from the square root of [(x1-x2)2 + (y1-y2)2 + (z1-z2)2], where (x1, y1, z1) and (x2, y2, z2) are the coordinates of the extrapolated peak SAR locations in the zoom scan.
   iii) If SPLSR ≤ 0.04, simultaneously transmission SAR measurement is not necessary.
   iv) Simultaneously transmission SAR measurement, and the reported multi-band SAR < 1.6W/kg.
   v) The SPLSR calculated results please refer to section 14.2.

14.1 Body Exposure Conditions

<EM7455 with Broadcom BCM94350ZAE>

WWAN Band		Exposure Position	1 WWAN 1g SAR (W/kg)	2 2.4GHz WLAN Ant 1 1g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)	1+2 SPLSR	1+2 Case No
WCDMA	WCDMA V	Bottom of Laptop at 0 mm	0.685	0.997	**1.68**	**0.01**	**Case 1**
	WCDMA IV	Bottom of Laptop at 0 mm	1.066	0.997	**2.06**	**0.03**	**Case 2**
	WCDMA II	Bottom of Laptop at 0 mm	1.191	0.997	**2.19**	**0.03**	**Case 3**
LTE	LTE Band 4	Bottom of Laptop at 0 mm	0.990	0.997	**1.99**	**0.02**	**Case 4**
	LTE Band 7	Bottom of Laptop at 0 mm	1.091	0.997	**2.09**	**0.02**	**Case 5**
	LTE Band 12	Bottom of Laptop at 0 mm	0.708	0.997	**1.71**	**0.01**	**Case 6**
	LTE Band 13	Bottom of Laptop at 0 mm	0.674	0.997	**1.67**	**0.01**	**Case 7**
	LTE Band 25	Bottom of Laptop at 0 mm	1.180	0.997	**2.18**	**0.03**	**Case 8**
	LTE Band 26	Bottom of Laptop at 0 mm	0.685	0.997	**1.68**	**0.01**	**Case 9**
	LTE Band 30	Bottom of Laptop at 0 mm	0.967	0.997	**1.96**	**0.02**	**Case 10**
	LTE Band 41	Bottom of Laptop at 0 mm	0.747	0.997	**1.74**	**0.01**	**Case 11**

WWAN Band		Exposure Position	1 WWAN 1g SAR (W/kg)	3 2.4GHz WLAN Ant 2 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)	1+3 SPLSR	1+3 Case No
WCDMA	WCDMA V	Bottom of Laptop at 0 mm	0.685	0.152	**0.84**		
	WCDMA IV	Bottom of Laptop at 0 mm	1.066	0.152	**1.22**		
	WCDMA II	Bottom of Laptop at 0 mm	1.191	0.152	**1.34**		
LTE	LTE Band 4	Bottom of Laptop at 0 mm	0.990	0.152	**1.14**		
	LTE Band 7	Bottom of Laptop at 0 mm	1.091	0.152	**1.24**		
	LTE Band 12	Bottom of Laptop at 0 mm	0.708	0.152	**0.86**		
	LTE Band 13	Bottom of Laptop at 0 mm	0.674	0.152	**0.83**		
	LTE Band 25	Bottom of Laptop at 0 mm	1.180	0.152	**1.33**		
	LTE Band 26	Bottom of Laptop at 0 mm	0.685	0.152	**0.84**		
	LTE Band 30	Bottom of Laptop at 0 mm	0.967	0.152	**1.12**		
	LTE Band 41	Bottom of Laptop at 0 mm	0.747	0.152	**0.90**		

WWAN Band		Exposure Position	1	4	1+4 Summed 1g SAR (W/kg)	1+4 SPLSR	1+4 Case No
			WWAN	5GHz WLAN Ant 1			
			1g SAR (W/kg)	1g SAR (W/kg)			
WCDMA	WCDMA V	Bottom of Laptop at 0 mm	0.685	0.787	**1.47**		
	WCDMA IV	Bottom of Laptop at 0 mm	1.066	0.787	**1.85**	**0.02**	**Case 12**
	WCDMA II	Bottom of Laptop at 0 mm	1.191	0.787	**1.98**	**0.02**	**Case 13**
LTE	LTE Band 4	Bottom of Laptop at 0 mm	0.990	0.787	**1.78**	**0.02**	**Case 14**
	LTE Band 7	Bottom of Laptop at 0 mm	1.091	0.787	**1.88**	**0.02**	**Case 15**
	LTE Band 12	Bottom of Laptop at 0 mm	0.708	0.787	**1.50**		
	LTE Band 13	Bottom of Laptop at 0 mm	0.674	0.787	**1.46**		
	LTE Band 25	Bottom of Laptop at 0 mm	1.180	0.787	**1.97**	**0.02**	**Case 16**
	LTE Band 26	Bottom of Laptop at 0 mm	0.685	0.787	**1.47**		
	LTE Band 30	Bottom of Laptop at 0 mm	0.967	0.787	**1.75**	**0.02**	**Case 17**
	LTE Band 41	Bottom of Laptop at 0 mm	0.747	0.787	**1.53**		

WWAN Band		Exposure Position	1	5	1+5 Summed 1g SAR (W/kg)	1+5 SPLSR	1+5 Case No
			WWAN	5GHz WLAN Ant 2			
			1g SAR (W/kg)	1g SAR (W/kg)			
WCDMA	WCDMA V	Bottom of Laptop at 0 mm	0.685	0.531	**1.22**		
	WCDMA IV	Bottom of Laptop at 0 mm	1.066	0.531	**1.60**	**0.01**	**Case 18**
	WCDMA II	Bottom of Laptop at 0 mm	1.191	0.531	**1.72**	**0.01**	**Case 19**
LTE	LTE Band 4	Bottom of Laptop at 0 mm	0.990	0.531	**1.52**		
	LTE Band 7	Bottom of Laptop at 0 mm	1.091	0.531	**1.62**	**0.02**	**Case 20**
	LTE Band 12	Bottom of Laptop at 0 mm	0.708	0.531	**1.24**		
	LTE Band 13	Bottom of Laptop at 0 mm	0.674	0.531	**1.21**		
	LTE Band 25	Bottom of Laptop at 0 mm	1.180	0.531	**1.71**	**0.01**	**Case 21**
	LTE Band 26	Bottom of Laptop at 0 mm	0.685	0.531	**1.22**		
	LTE Band 30	Bottom of Laptop at 0 mm	0.967	0.531	**1.50**		
	LTE Band 41	Bottom of Laptop at 0 mm	0.747	0.531	**1.28**		

WWAN Band		Exposure Position	1	6	1+6 Summed 1g SAR (W/kg)	1+6 SPLSR	1+6 Case No
			WWAN	Bluetooth Ant 2			
			1g SAR (W/kg)	1g SAR (W/kg)			
WCDMA	WCDMA V	Bottom of Laptop at 0 mm	0.685	0.001	**0.69**		
	WCDMA IV	Bottom of Laptop at 0 mm	1.066	0.001	**1.07**		
	WCDMA II	Bottom of Laptop at 0 mm	1.191	0.001	**1.19**		
LTE	LTE Band 4	Bottom of Laptop at 0 mm	0.990	0.001	**0.99**		
	LTE Band 7	Bottom of Laptop at 0 mm	1.091	0.001	**1.09**		
	LTE Band 12	Bottom of Laptop at 0 mm	0.708	0.001	**0.71**		
	LTE Band 13	Bottom of Laptop at 0 mm	0.674	0.001	**0.68**		
	LTE Band 25	Bottom of Laptop at 0 mm	1.180	0.001	**1.18**		
	LTE Band 26	Bottom of Laptop at 0 mm	0.685	0.001	**0.69**		
	LTE Band 30	Bottom of Laptop at 0 mm	0.967	0.001	**0.97**		
	LTE Band 41	Bottom of Laptop at 0 mm	0.747	0.001	**0.75**		

<EM7455 with Intel 8260NGW>

WWAN Band		Exposure Position	1	2	1+2 Summed 1g SAR (W/kg)	1+2 SPLSR	1+2 Case No
			WWAN	2.4GHz WLAN Ant 1			
			1g SAR (W/kg)	1g SAR (W/kg)			
WCDMA	WCDMA V	Bottom of Laptop at 0 mm	0.685	0.840	**1.53**		
	WCDMA IV	Bottom of Laptop at 0 mm	1.066	0.840	**1.91**	**0.020**	**Case 22**
	WCDMA II	Bottom of Laptop at 0 mm	1.191	0.840	**2.03**	**0.030**	**Case 23**
LTE	LTE Band 4	Bottom of Laptop at 0 mm	0.990	0.840	**1.83**	**0.020**	**Case 24**
	LTE Band 7	Bottom of Laptop at 0 mm	1.091	0.840	**1.93**	**0.020**	**Case 25**
	LTE Band 12	Bottom of Laptop at 0 mm	0.708	0.840	**1.55**		
	LTE Band 13	Bottom of Laptop at 0 mm	0.674	0.840	**1.51**		
	LTE Band 25	Bottom of Laptop at 0 mm	1.180	0.840	**2.02**	**0.030**	**Case 26**
	LTE Band 26	Bottom of Laptop at 0 mm	0.685	0.840	**1.53**		
	LTE Band 30	Bottom of Laptop at 0 mm	0.967	0.840	**1.81**	**0.020**	**Case 27**
	LTE Band 41	Bottom of Laptop at 0 mm	0.747	0.840	**1.59**		

WWAN Band		Exposure Position	1	3	1+3 Summed 1g SAR (W/kg)	1+3 SPLSR	1+3 Case No
			WWAN	2.4GHz WLAN Ant 2			
			1g SAR (W/kg)	1g SAR (W/kg)			
WCDMA	WCDMA V	Bottom of Laptop at 0 mm	0.685	0.170	**0.86**		
	WCDMA IV	Bottom of Laptop at 0 mm	1.066	0.170	**1.24**		
	WCDMA II	Bottom of Laptop at 0 mm	1.191	0.170	**1.36**		
LTE	LTE Band 4	Bottom of Laptop at 0 mm	0.990	0.170	**1.16**		
	LTE Band 7	Bottom of Laptop at 0 mm	1.091	0.170	**1.26**		
	LTE Band 12	Bottom of Laptop at 0 mm	0.708	0.170	**0.88**		
	LTE Band 13	Bottom of Laptop at 0 mm	0.674	0.170	**0.84**		
	LTE Band 25	Bottom of Laptop at 0 mm	1.180	0.170	**1.35**		
	LTE Band 26	Bottom of Laptop at 0 mm	0.685	0.170	**0.86**		
	LTE Band 30	Bottom of Laptop at 0 mm	0.967	0.170	**1.14**		
	LTE Band 41	Bottom of Laptop at 0 mm	0.747	0.170	**0.92**		

WWAN Band		Exposure Position	1	4	1+4 Summed 1g SAR (W/kg)	1+4 SPLSR	1+4 Case No
			WWAN	5GHz WLAN Ant 1			
			1g SAR (W/kg)	1g SAR (W/kg)			
WCDMA	WCDMA V	Bottom of Laptop at 0 mm	0.685	0.490	**1.18**		
	WCDMA IV	Bottom of Laptop at 0 mm	1.066	0.490	**1.56**		
	WCDMA II	Bottom of Laptop at 0 mm	1.191	0.490	**1.68**	**0.020**	**Case 28**
LTE	LTE Band 4	Bottom of Laptop at 0 mm	0.990	0.490	**1.48**		
	LTE Band 7	Bottom of Laptop at 0 mm	1.091	0.490	**1.58**		
	LTE Band 12	Bottom of Laptop at 0 mm	0.708	0.490	**1.20**		
	LTE Band 13	Bottom of Laptop at 0 mm	0.674	0.490	**1.16**		
	LTE Band 25	Bottom of Laptop at 0 mm	1.180	0.490	**1.67**	**0.020**	**Case 29**
	LTE Band 26	Bottom of Laptop at 0 mm	0.685	0.490	**1.18**		
	LTE Band 30	Bottom of Laptop at 0 mm	0.967	0.490	**1.46**		
	LTE Band 41	Bottom of Laptop at 0 mm	0.747	0.490	**1.24**		

WWAN Band		Exposure Position	1	5	1+5 Summed 1g SAR (W/kg)	1+5 SPLSR	1+5 Case No
			WWAN	5GHz WLAN Ant 2			
			1g SAR (W/kg)	1g SAR (W/kg)			
WCDMA	WCDMA V	Bottom of Laptop at 0 mm	0.685	0.470	**1.16**		
	WCDMA IV	Bottom of Laptop at 0 mm	1.066	0.470	**1.54**		
	WCDMA II	Bottom of Laptop at 0 mm	1.191	0.470	**1.66**	**0.010**	**Case 30**
LTE	LTE Band 4	Bottom of Laptop at 0 mm	0.990	0.470	**1.46**		
	LTE Band 7	Bottom of Laptop at 0 mm	1.091	0.470	**1.56**		
	LTE Band 12	Bottom of Laptop at 0 mm	0.708	0.470	**1.18**		
	LTE Band 13	Bottom of Laptop at 0 mm	0.674	0.470	**1.14**		
	LTE Band 25	Bottom of Laptop at 0 mm	1.180	0.470	**1.65**	**0.010**	**Case 31**
	LTE Band 26	Bottom of Laptop at 0 mm	0.685	0.470	**1.16**		
	LTE Band 30	Bottom of Laptop at 0 mm	0.967	0.470	**1.44**		
	LTE Band 41	Bottom of Laptop at 0 mm	0.747	0.470	**1.22**		

WWAN Band		Exposure Position	1	6	1+6 Summed 1g SAR (W/kg)	1+6 SPLSR	1+6 Case No
			WWAN	Bluetooth Ant 2			
			1g SAR (W/kg)	1g SAR (W/kg)			
WCDMA	WCDMA V	Bottom of Laptop at 0 mm	0.685	0.130	**0.82**		
	WCDMA IV	Bottom of Laptop at 0 mm	1.066	0.130	**1.20**		
	WCDMA II	Bottom of Laptop at 0 mm	1.191	0.130	**1.32**		
LTE	LTE Band 4	Bottom of Laptop at 0 mm	0.990	0.130	**1.12**		
	LTE Band 7	Bottom of Laptop at 0 mm	1.091	0.130	**1.22**		
	LTE Band 12	Bottom of Laptop at 0 mm	0.708	0.130	**0.84**		
	LTE Band 13	Bottom of Laptop at 0 mm	0.674	0.130	**0.80**		
	LTE Band 25	Bottom of Laptop at 0 mm	1.180	0.130	**1.31**		
	LTE Band 26	Bottom of Laptop at 0 mm	0.685	0.130	**0.82**		
	LTE Band 30	Bottom of Laptop at 0 mm	0.967	0.130	**1.10**		
	LTE Band 41	Bottom of Laptop at 0 mm	0.747	0.130	**0.88**		

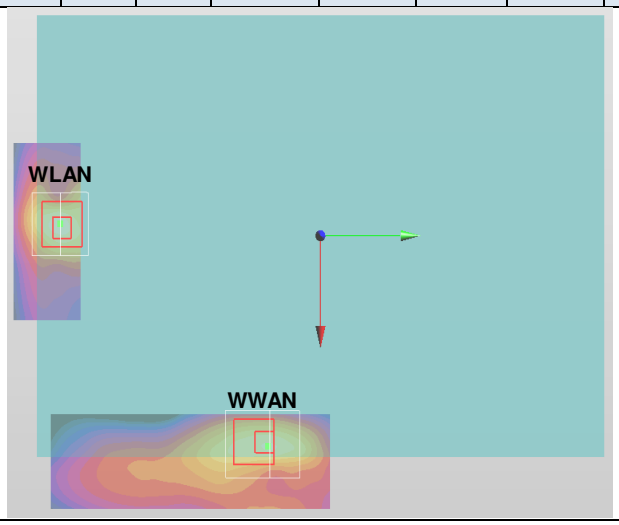
14.2 SPLSR Evaluation and Analysis

General Note:

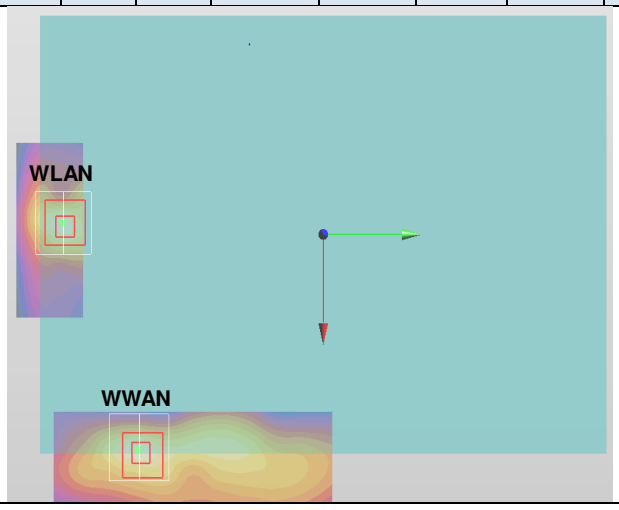
1. Either WLAN/Bluetooth module of FCC ID: QDS-BRCM1087 or WLAN/Bluetooth module of FCC ID: PD98260NGU would be integrated into this host, and the identical WLAN antenna is used for either one module integration
2. SPLSR = $(SAR_1 + SAR_2)^{1.5}$ / (*min. separation distance, mm*). If SPLSR ≤ 0.04, simultaneously transmission SAR measurement is not necessary

<EM7455 with Broadcom BCM94350ZAE>

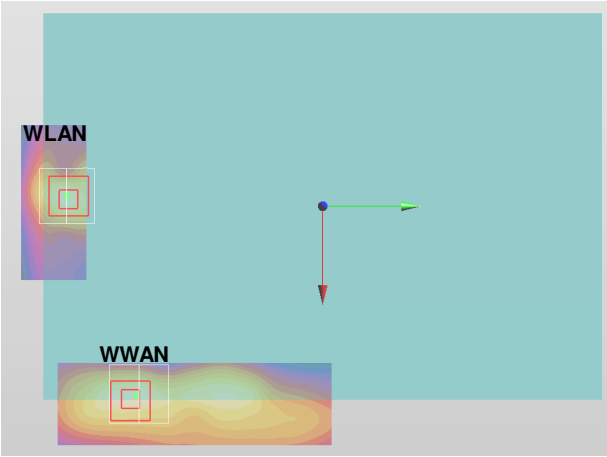
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 1	WCDMA V	Bottom of Laptop	0.685	0	0.099	-0.027	-0.181	154.1	1.68	0.01	Not required
	WLAN2.4GHz Ant 1		0.997	0	-0.00561	-0.14	-0.174				



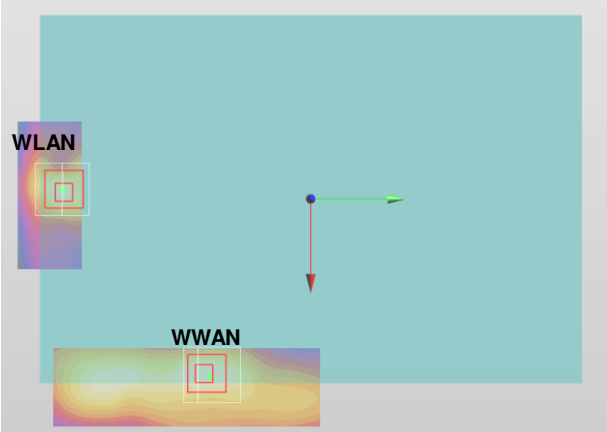
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 2	WCDMA IV	Bottom of Laptop	1.066	0	0.102	-0.099	-0.18	115.3	2.06	0.03	Not required
	WLAN2.4GHz Ant 1		0.997	0	-0.00561	-0.14	-0.174				



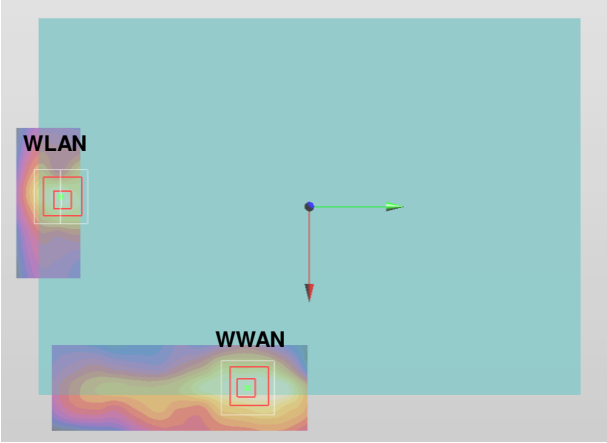
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 3	WCDMA II	Bottom of Laptop	1.191	0	0.102	-0.101	-0.18	114.6	2.19	0.03	Not required
	WLAN2.4GHz Ant 1		0.997	0	-0.00561	-0.14	-0.174				



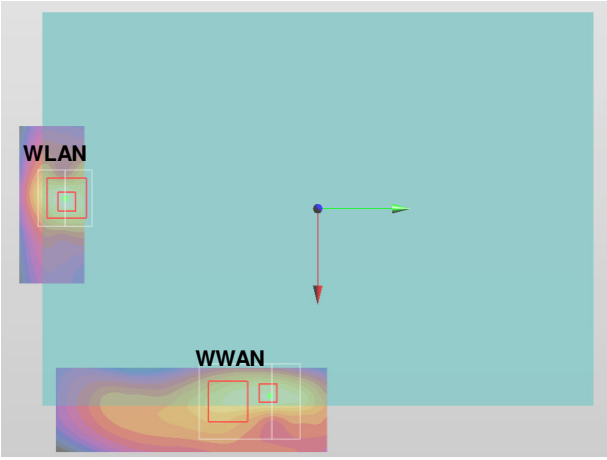
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 4	LTE Band 4	Bottom of Laptop	0.99	0	0.101	-0.0635	-0.18	131.4	1.99	0.02	Not required
	WLAN2.4GHz Ant 1		0.997	0	-0.00561	-0.14	-0.174				



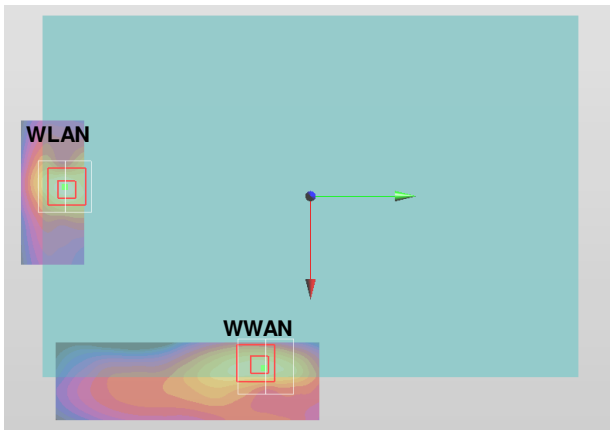
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 5	LTE Band 7	Bottom of Laptop	1.091	0	0.096	-0.0196	-0.18	157.7	2.09	0.02	Not required
	WLAN2.4GHz Ant 1		0.997	0	-0.00561	-0.14	-0.174				



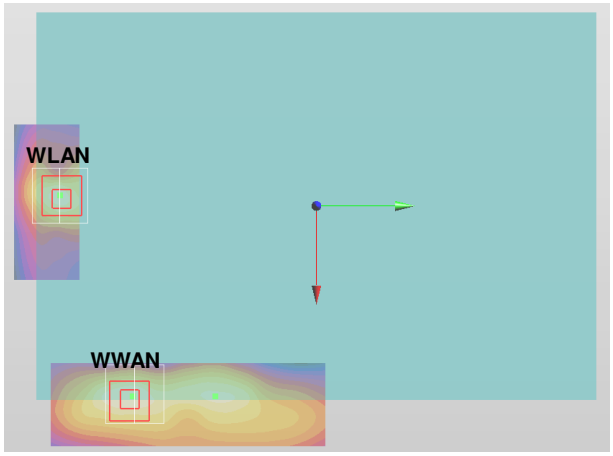
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 6	LTE Band 12	Bottom of Laptop	0.708	0	0.099	-0.0255	-0.181	155.2	1.71	0.01	Not required
	WLAN2.4GHz Ant 1		0.997	0	-0.00561	-0.14	-0.174				



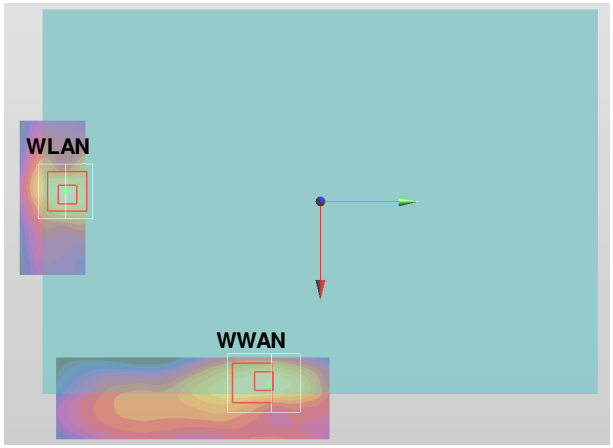
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 7	LTE Band 13	Bottom of Laptop	0.674	0	0.099	-0.0255	-0.181	155.2	1.67	0.01	Not required
	WLAN2.4GHz Ant 1		0.997	0	-0.00561	-0.14	-0.174				



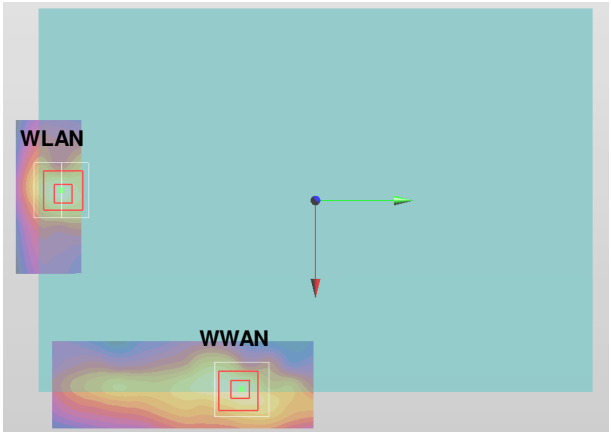
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 8	LTE Band 25	Bottom of Laptop	1.18	0	0.102	-0.099	-0.18	115.3	2.18	0.03	Not required
	WLAN2.4GHz Ant 1		0.997	0	-0.00561	-0.14	-0.174				



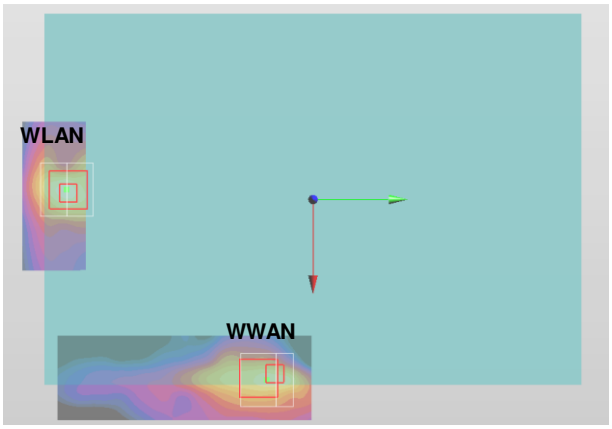
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 9	LTE Band 26	Bottom of Laptop	0.685	0	0.099	-0.027	-0.181	154.1	1.68	0.01	Not required
	WLAN2.4GHz Ant 1		0.997	0	-0.00561	-0.14	-0.174				



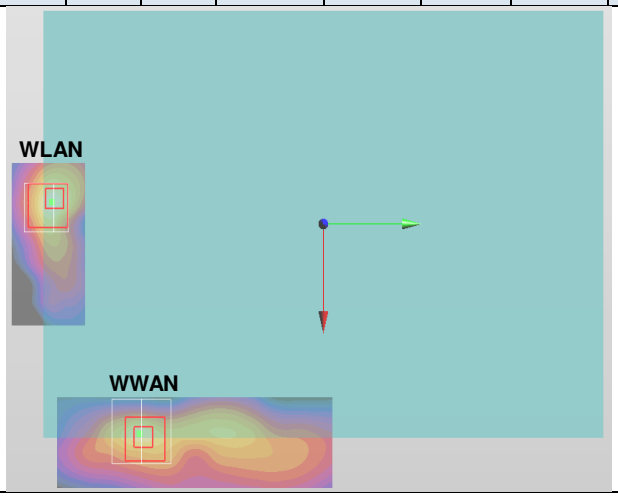
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 10	LTE Band 30	Bottom of Laptop	0.967	0	0.0984	-0.0556	-0.181	134.1	1.96	0.02	Not required
	WLAN2.4GHz Ant 1		0.997	0	-0.00561	-0.14	-0.174				



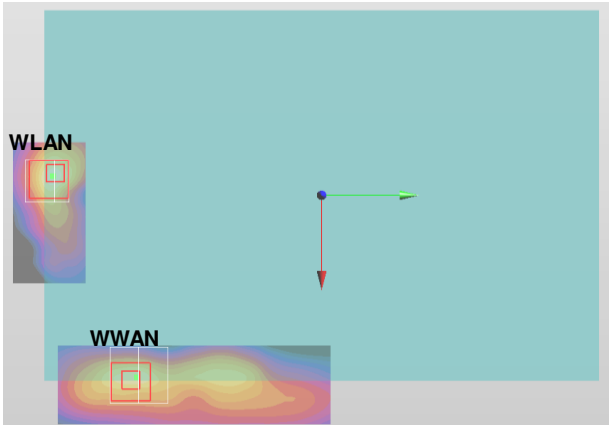
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 11	LTE Band 41	Bottom of Laptop	0.747	0	0.0972	-0.0212	-0.18	157.2	1.74	0.01	Not required
	WLAN2.4GHz Ant 1		0.997	0	-0.00561	-0.14	-0.174				



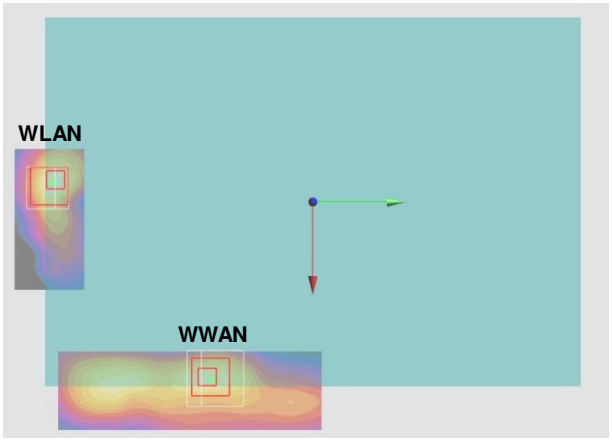
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 12	WCDMA IV	Bottom of Laptop	1.066	0	0.102	-0.099	-0.18	123.8	1.85	0.02	Not required
	WLAN5GHz Ant 1		0.787	0	-0.012	-0.147	-0.174				



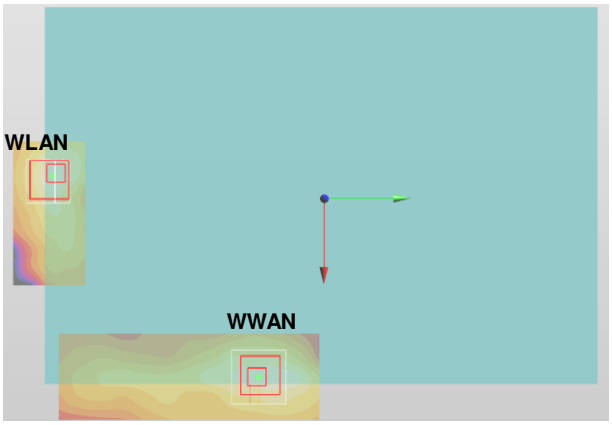
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 13	WCDMA II	Bottom of Laptop	1.191	0	0.102	-0.101	-0.18	123.1	1.98	0.02	Not required
	WLAN5GHz Ant 1		0.787	0	-0.012	-0.147	-0.174				



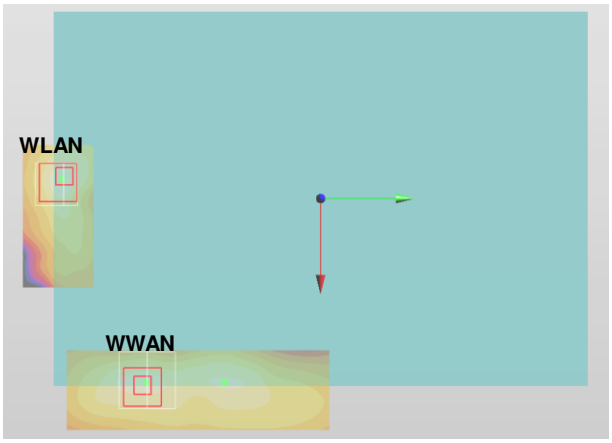
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 14	LTE Band 4	Bottom of Laptop	0.99	0	0.101	-0.0635	-0.18	140.6	1.78	0.02	Not required
	WLAN5GHz Ant 1		0.787	0	-0.012	-0.147	-0.174				



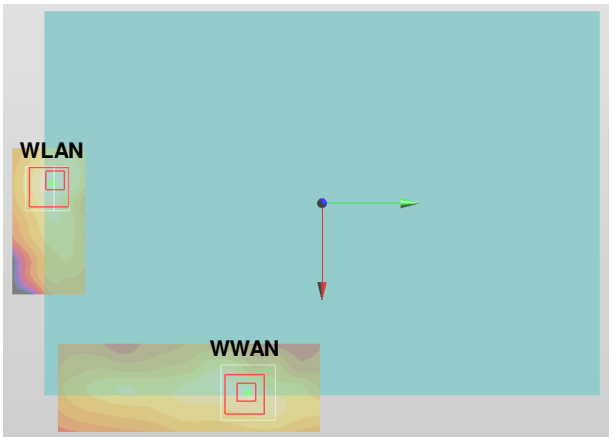
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 15	LTE Band 7	Bottom of Laptop	1.091	0	0.096	-0.0196	-0.18	167.1	1.88	0.02	Not required
	WLAN5GHz Ant 1		0.787	0	-0.012	-0.147	-0.174				



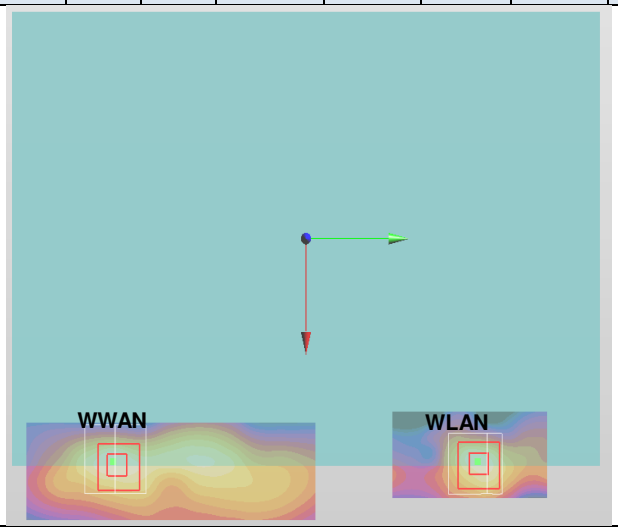
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 16	LTE Band 25	Bottom of Laptop	1.18	0	0.102	-0.099	-0.18	123.8	1.97	0.02	Not required
	WLAN5GHz Ant 1		0.787	0	-0.012	-0.147	-0.174				



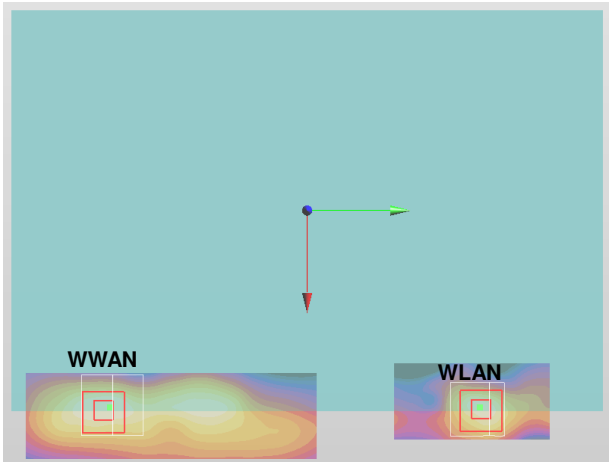
	Band	Position	SAR (W/kg)	Gap	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				(cm)	X	Y	Z				
Case 17	LTE Band 30	Bottom of Laptop	0.967	0	0.0984	-0.0556	-0.181	143.5	1.75	0.02	Not required
	WLAN5GHz Ant 1		0.787	0	-0.012	-0.147	-0.174				



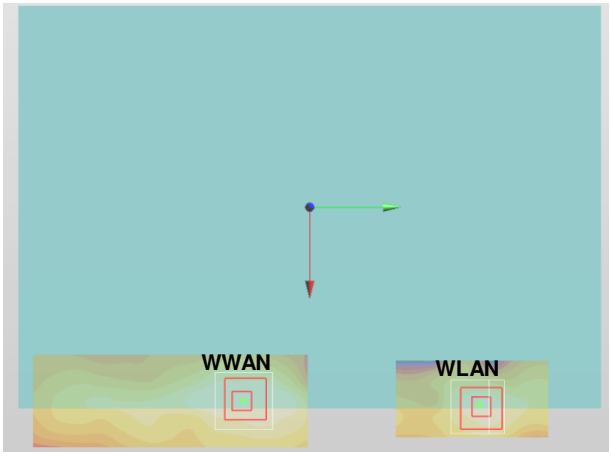
	Band	Position	SAR (W/kg)	Gap	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				(cm)	X	Y	Z				
Case 18	WCDMA IV	Bottom of Laptop	1.066	0	0.102	-0.099	-0.18	193.1	1.60	0.01	Not required
	WLAN5GHz Ant 2		0.531	0	0.106	0.094	-0.174				



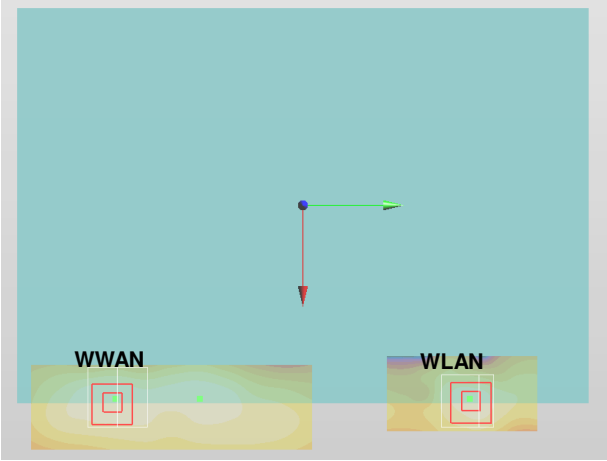
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 19	WCDMA II	Bottom of Laptop	1.191	0	0.102	-0.101	-0.18	195.1	1.72	0.01	Not required
	WLAN5GHz Ant 2		0.531	0	0.106	0.094	-0.174				



	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 20	LTE Band 7	Bottom of Laptop	1.091	0	0.096	-0.0196	-0.18	114.2	1.62	0.02	Not required
	WLAN5GHz Ant 2		0.531	0	0.106	0.094	-0.174				

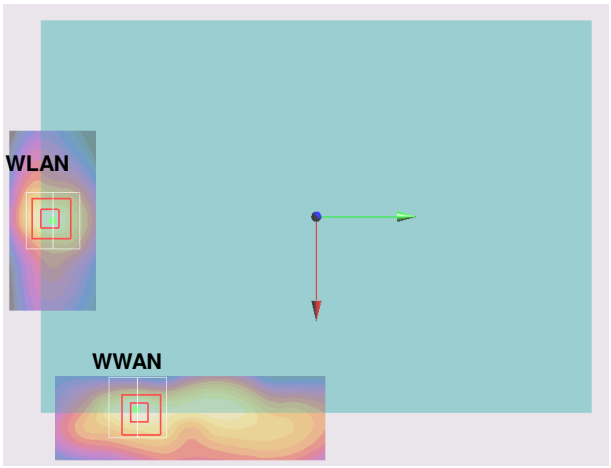


Case 21	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
	LTE Band 25	Bottom of Laptop	1.18	0	0.102	-0.099	-0.18	193.1	1.71	0.01	Not required
	WLAN5GHz Ant 2		0.531	0	0.106	0.094	-0.174				

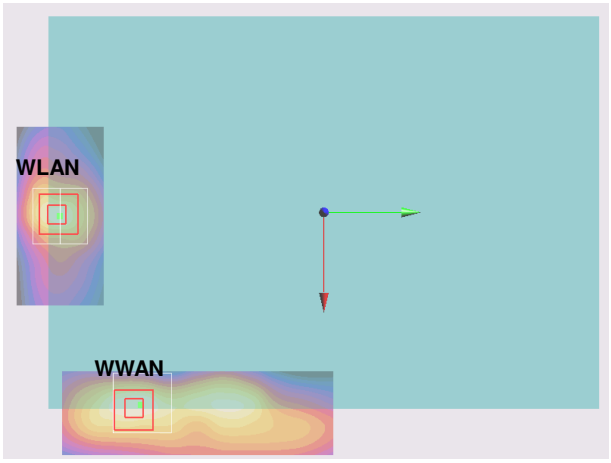


<EM7455 with Intel 8260NGW>

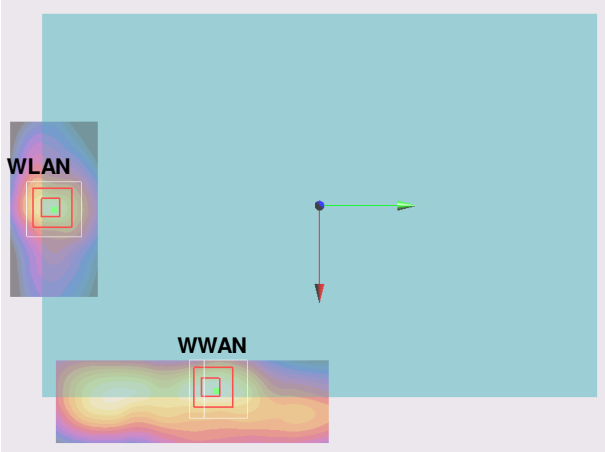
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 22	WCDMA IV	Bottom of Laptop	1.066	0	0.104	-0.099	-0.182	112.4	1.91	0.02	Not required
	WLAN2.4GHz Ant 1		0.84	0	0.002	-0.146	-0.177				



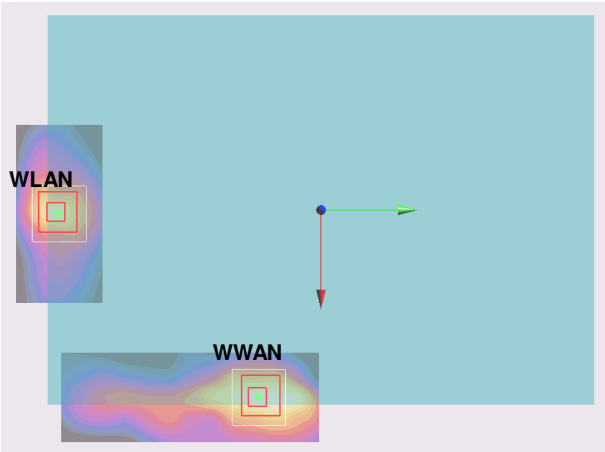
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 23	WCDMA II	Bottom of Laptop	1.191	0	0.104	-0.104	-0.182	110.4	2.03	0.03	Not required
	WLAN2.4GHz Ant 1		0.84	0	0.002	-0.146	-0.177				



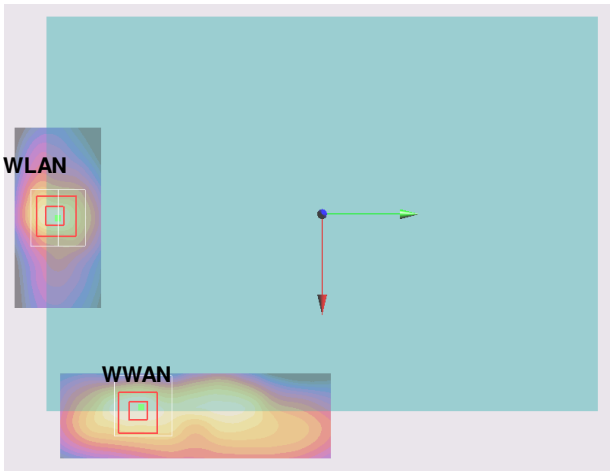
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 24	LTE Band 4	Bottom of Laptop	0.99	0	0.101	-0.062	-0.182	129.9	1.83	0.02	Not required
	WLAN2.4GHz Ant 1		0.84	0	0.002	-0.146	-0.177				



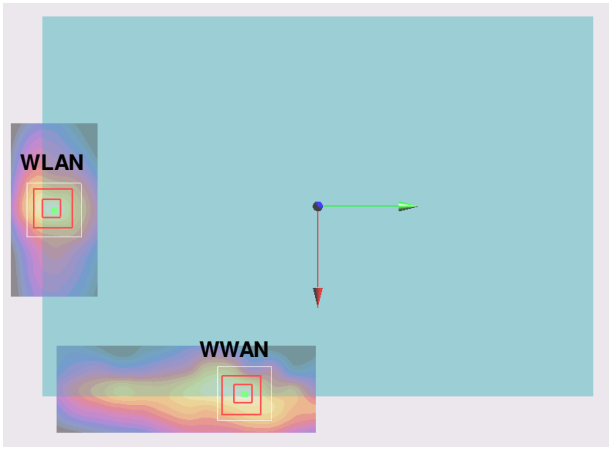
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 25	LTE Band 7	Bottom of Laptop	1.091	0	0.098	-0.02	-0.182	158.5	1.93	0.02	Not required
	WLAN2.4GHz Ant 1		0.84	0	0.002	-0.146	-0.177				



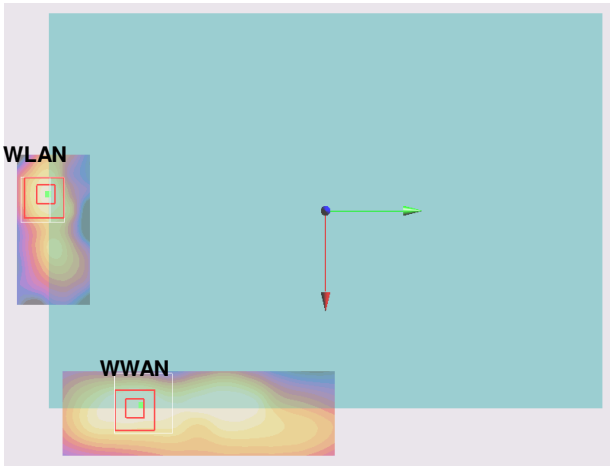
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 26	LTE Band 25	Bottom of Laptop	1.18	0	0.104	-0.101	-0.182	111.6	2.02	0.03	Not required
	WLAN2.4GHz Ant 1		0.84	0	0.002	-0.146	-0.177				



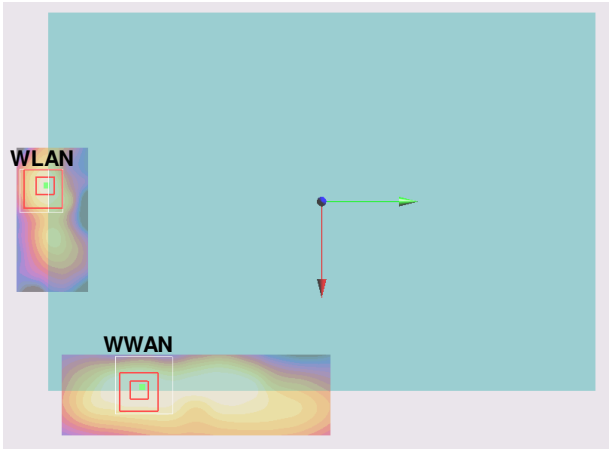
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 27	LTE Band 30	Bottom of Laptop	0.967	0	0.097	-0.056	-0.182	131.0	1.81	0.02	Not required
	WLAN2.4GHz Ant 1		0.84	0	0.002	-0.146	-0.177				



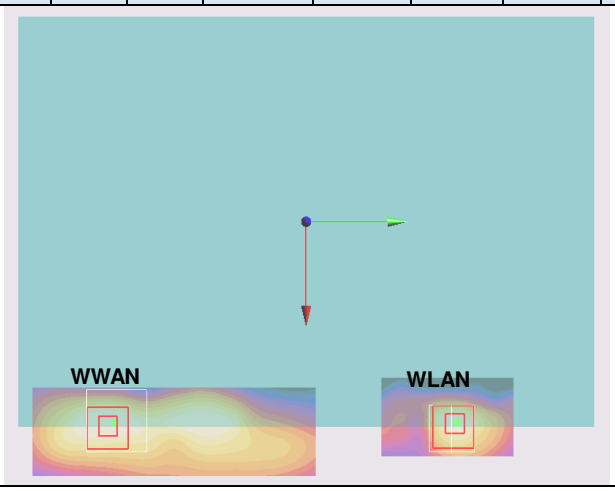
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 28	WCDMA II	Bottom of Laptop	1.191	0	0.104	-0.104	-0.182	123.7	1.68	0.02	Not required
	WLAN5GHz Ant 1		0.49	0	-0.009	-0.154	-0.177				



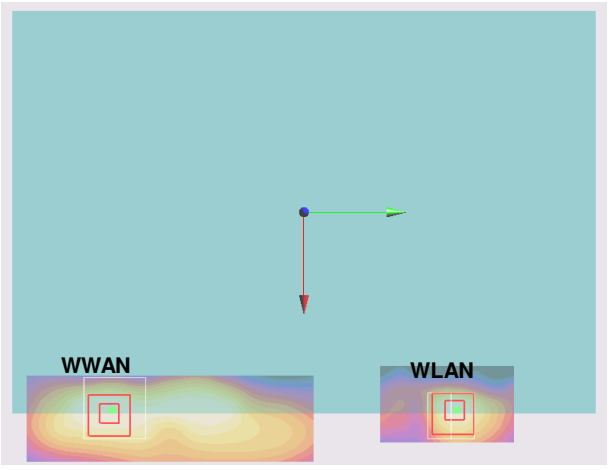
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 29	LTE Band 25	Bottom of Laptop	1.18	0	0.104	-0.101	-0.182	124.9	1.67	0.02	Not required
	WLAN5GHz Ant 1		0.49	0	-0.009	-0.154	-0.177				



	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 30	WCDMA II	Bottom of Laptop	1.191	0	0.104	-0.104	-0.182	183.1	1.66	0.01	Not required
	WLAN5GHz Ant 2		0.47	0	0.103	0.079	-0.177				



	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 31	LTE Band 25	Bottom of Laptop	1.18	0	0.104	-0.101	-0.182	180.1	1.65	0.01	Not required
	WLAN5GHz Ant 2		0.47	0	0.103	0.079	-0.177				



Test Engineer : Nick Yu Domo Hsiao Steven Chang Tommy Chen and Frank Wu

15. Uncertainty Assessment

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

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

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

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

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

(b) κ is the coverage factor

Table 15.1. Standard Uncertainty for Assumed Distribution

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

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

Error Description	Uncertainty Value (±%)	Probability	Divisor	(Ci) 1g	(Ci) 10g	Standard Uncertainty (1g) (±%)	Standard Uncertainty (10g) (±%)
Measurement System							
Probe Calibration	6.0	N	1	1	1	6.0	6.0
Axial Isotropy	4.7	R	1.732	0.7	0.7	1.9	1.9
Hemispherical Isotropy	9.6	R	1.732	0.7	0.7	3.9	3.9
Boundary Effects	1.0	R	1.732	1	1	0.6	0.6
Linearity	4.7	R	1.732	1	1	2.7	2.7
System Detection Limits	1.0	R	1.732	1	1	0.6	0.6
Modulation Response	3.2	R	1.732	1	1	1.8	1.8
Readout Electronics	0.3	N	1	1	1	0.3	0.3
Response Time	0.0	R	1.732	1	1	0.0	0.0
Integration Time	2.6	R	1.732	1	1	1.5	1.5
RF Ambient Noise	3.0	R	1.732	1	1	1.7	1.7
RF Ambient Reflections	3.0	R	1.732	1	1	1.7	1.7
Probe Positioner	0.4	R	1.732	1	1	0.2	0.2
Probe Positioning	2.9	R	1.732	1	1	1.7	1.7
Max. SAR Eval.	2.0	R	1.732	1	1	1.2	1.2
Test Sample Related							
Device Positioning	3.0	N	1	1	1	3.0	3.0
Device Holder	3.6	N	1	1	1	3.6	3.6
Power Drift	5.0	R	1.732	1	1	2.9	2.9
Power Scaling	0.0	R	1.732	1	1	0.0	0.0
Phantom and Setup							
Phantom Uncertainty	6.1	R	1.732	1	1	3.5	3.5
SAR correction	0.0	R	1.732	1	0.84	0.0	0.0
Liquid Conductivity Repeatability	0.2	N	1	0.78	0.71	0.1	0.1
Liquid Conductivity (target)	5.0	R	1.732	0.78	0.71	2.3	2.0
Liquid Conductivity (mea.)	2.5	R	1.732	0.78	0.71	1.1	1.0
Temp. unc. - Conductivity	3.4	R	1.732	0.78	0.71	1.5	1.4
Liquid Permittivity Repeatability	0.15	N	1	0.23	0.26	0.0	0.0
Liquid Permittivity (target)	5.0	R	1.732	0.23	0.26	0.7	0.8
Liquid Permittivity (mea.)	2.5	R	1.732	0.23	0.26	0.3	0.4
Temp. unc. - Permittivity	0.83	R	1.732	0.23	0.26	0.1	0.1
Combined Std. Uncertainty						11.4%	11.4%
Coverage Factor for 95 %						K=2	K=2
Expanded STD Uncertainty						22.9%	22.7%

Table 15.2. Uncertainty Budget for frequency range 300 MHz to 3 GHz

Error Description	Uncertainty Value (±%)	Probability	Divisor	(Ci) 1g	(Ci) 10g	Standard Uncertainty (1g) (±%)	Standard Uncertainty (10g) (±%)
Measurement System							
Probe Calibration	6.55	N	1	1	1	6.6	6.6
Axial Isotropy	4.7	R	1.732	0.7	0.7	1.9	1.9
Hemispherical Isotropy	9.6	R	1.732	0.7	0.7	3.9	3.9
Boundary Effects	2.0	R	1.732	1	1	1.2	1.2
Linearity	4.7	R	1.732	1	1	2.7	2.7
System Detection Limits	1.0	R	1.732	1	1	0.6	0.6
Modulation Response	3.2	R	1.732	1	1	1.8	1.8
Readout Electronics	0.3	N	1	1	1	0.3	0.3
Response Time	0.0	R	1.732	1	1	0.0	0.0
Integration Time	2.6	R	1.732	1	1	1.5	1.5
RF Ambient Noise	3.0	R	1.732	1	1	1.7	1.7
RF Ambient Reflections	3.0	R	1.732	1	1	1.7	1.7
Probe Positioner	0.4	R	1.732	1	1	0.2	0.2
Probe Positioning	6.7	R	1.732	1	1	3.9	3.9
Max. SAR Eval.	4.0	R	1.732	1	1	2.3	2.3
Test Sample Related							
Device Positioning	3.0	N	1	1	1	3.0	3.0
Device Holder	3.6	N	1	1	1	3.6	3.6
Power Drift	5.0	R	1.732	1	1	2.9	2.9
Power Scaling	0.0	R	1.732	1	1	0.0	0.0
Phantom and Setup							
Phantom Uncertainty	6.6	R	1.732	1	1	3.8	3.8
SAR correction	0.0	R	1.732	1	0.84	0.0	0.0
Liquid Conductivity Repeatability	0.2	N	1	0.78	0.71	0.1	0.1
Liquid Conductivity (target)	5.0	R	1.732	0.78	0.71	2.3	2.0
Liquid Conductivity (mea.)	2.5	R	1.732	0.78	0.71	1.1	1.0
Temp. unc. - Conductivity	3.4	R	1.732	0.78	0.71	1.5	1.4
Liquid Permittivity Repeatability	0.15	N	1	0.23	0.26	0.0	0.0
Liquid Permittivity (target)	5.0	R	1.732	0.23	0.26	0.7	0.8
Liquid Permittivity (mea.)	2.5	R	1.732	0.23	0.26	0.3	0.4
Temp. unc. - Permittivity	0.83	R	1.732	0.23	0.26	0.1	0.1
Combined Std. Uncertainty						12.5%	12.5%
Coverage Factor for 95 %						K=2	K=2
Expanded STD Uncertainty						25.0%	24.9%

Table 15.3. Uncertainty Budget for frequency range 3 GHz to 6 GHz

16. References

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

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

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

[4] SPEAG DASY System Handbook

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

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

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

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