

# FCC SAR TEST REPORT

**FCC ID** : ZMOFM350GL  
**Equipment** : 5G Module  
**Brand Name** : Fibocom  
**Model Name** : FM350-GL  
**Applicant** : Fibocom Wireless Inc.  
1101, Tower A, Building 6, Shenzhen  
International Innovation Valley, Dashi 1st Rd,  
Nanshan, Shenzhen, China  
**Standard** : FCC 47 CFR Part 2 (2.1093)

The product was installed into Notebook Computer (Brand Name: HP, Model Name: HSN-I49C-3) during test.

The product was received on Dec. 29, 2022 and testing was started from Jan. 10, 2023 and completed on Feb. 07, 2023. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample provide by manufacturer and the test data has been evaluated in accordance with the test procedures given in 47 CFR Part 2.1093 and FCC KDB and has been pass the FCC requirement.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. Laboratory, the test report shall not be reproduced except in full.



Approved by: Cona Huang / Deputy Manager



**Sporton International Inc. Wensan Laboratory**

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### History of this test report

Report No.	Version	Description	Issued Date
FA2D2603-01	01	Initial issue of report	Feb. 24, 2023



1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) for Fibocom Wireless Inc., 5G Module, FM350-GL, are as follows.

Table with columns: Equipment Class, Frequency Band, Highest SAR Summary (Body, 1g SAR), Highest Simultaneous Transmission 1g SAR. Includes rows for LTE and FR1 bands and a Date of Testing row.

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation and the FCC designation No.TW3786 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC test. This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg for Partial-Body 1g SAR) 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.

Reviewed by: Jason Wang
Report Producer: Paula Chen

2. Guidance Applied

The Specific Absorption Rate (SAR) testing specification, method, and procedure for this device is in accordance with the following standards, the below KDB standard may not including in the TAF code without accreditation.

- 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 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



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

#### 3.1 General Information

Product Feature & Specification	
Equipment Name	5G Module
Brand Name	Fibocom
Model Name	FM350-GL
FCC ID	ZMOFM350GL
Wireless Technology and Frequency Range	WCDMA Band II: 1850 MHz ~ 1910 MHz WCDMA Band IV: 1710 MHz ~ 1755 MHz WCDMA Band V: 824 MHz ~ 849 MHz LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz LTE Band 14: 788 MHz ~ 798 MHz LTE Band 17: 704 MHz ~ 716 MHz LTE Band 25: 1850 MHz ~ 1915 MHz LTE Band 26: 814 MHz ~ 849 MHz LTE Band 30: 2305 MHz ~ 2315 MHz LTE Band 38: 2570 MHz ~ 2620 MHz LTE Band 41: 2496 MHz ~ 2690 MHz LTE Band 48: 3550 MHz ~ 3700 MHz LTE Band 66: 1710 MHz ~ 1780 MHz LTE Band 71: 663 MHz ~ 698 MHz 5G NR n2 : 1850 MHz ~ 1910 MHz 5G NR n5 : 824 MHz ~ 849 MHz 5G NR n7 : 2500 MHz ~ 2570 MHz 5G NR n25 : 1850 MHz ~ 1915 MHz 5G NR n30 : 2305 MHz ~ 2315 MHz 5G NR n38 : 2570 MHz ~ 2620 MHz 5G NR n41 : 2496 MHz ~ 2690 MHz 5G NR n66 : 1710 MHz ~ 1780 MHz 5G NR n71 : 663 MHz ~ 698 MHz 5G NR n77: 3700 MHz ~ 3980 MHz, 3450MHz ~ 3550MHz 5G NR n78: 3700 MHz ~ 3800 MHz, 3450MHz ~ 3550MHz
Mode	RMC 12.2Kbps HSDPA HSUPA DC-HSDPA HSPA+ (16QAM uplink) LTE: QPSK, 16QAM, 64QAM, 256QAM 5G NR: DFT-s-OFDM/CP-OFDM, Pi/2 BPSK/QPSK/16QAM/64QAM/256QAM
<b>Remark:</b>	
<ol style="list-style-type: none"> <li>This device has two antenna vendors; RF exposure evaluation selects Vendor 1 as the main test, Vendor 2 will spot check worst case found in Vendor 1.</li> <li>The transmit antennas support ant 5 and ant 8, due to ant 5 located at the top of panel which the distance of antenna to human body is over 20cm refer to page 69, SAR is not required for ant 5.</li> <li>When the EN-DC is active only operating at WWAN Ant 5 and Ant 8 antenna combination and the Sim-Tx analysis include in section14.</li> </ol>	

Host Information	
Equipment Name	Notebook Computer
Brand Name	HP
Model Name	HSN-I49C-3
EUT Stage	Production Unit



Antenna Information				
Vendor 1 (Ant5 TX/RX) 6036B0306201 (81ELA215.G01)	Ant. Type	PIFA	Peak Gain	WCDMA Band II: 2.59 WCDMA Band IV: 1.97 WCDMA Band V: 0.40 LTE Band 2: 2.59 LTE Band 4: 1.97 LTE Band 5: 0.40 LTE Band 7: 2.28 LTE Band 12: -1.14 LTE Band 13: 1.85 LTE Band 14: 1.74 LTE Band 17: -1.14 LTE Band 25: 2.59 LTE Band 26: 0.40 LTE Band 30: 1.33 LTE Band 38: 1.84 LTE Band 41: 1.84 LTE Band 66: 1.97 LTE Band 71: -3.87 5G NR n2 : 2.59 5G NR n5 : 0.40 5G NR n7 : 2.28 5G NR n25 : 2.59 5G NR n30 : 1.33 5G NR n38 : 1.84 5G NR n41: 1.84 5G NR n66 : 1.97 5G NR n71: -3.87 5G NR n77: 1.92 5G NR n78: 1.92
Vendor 1 (Ant8 TX/RX) 6036B0306401 (81EABL15.G09)	Ant. Type	PIFA	Peak Gain	LTE Band 2: 1.93 LTE Band 4: 0.64 LTE Band 7: 0.64 LTE Band 25: 1.93 LTE Band 30: 2.98 LTE Band 41: 0.78 LTE Band 48: 2.97 LTE Band 66: 0.64 5G NR n2 : 1.93 5G NR n38 : 0.16 5G NR n41: 0.78 5G NR n66 : 0.64 5G NR n77: 2.97 5G NR n78: 2.97



Antenna Information				
Vendor 2 (Ant5 TX/RX) 6036B0310901 (00-3302700050)	Ant. Type	PIFA	Peak Gain	WCDMA Band II: 1.99 WCDMA Band IV: -0.30 WCDMA Band V: -1.59 LTE Band 2: 1.99 LTE Band 4: -0.30 LTE Band 5: -1.59 LTE Band 7: 0.92 LTE Band 12: -1.29 LTE Band 13: -1.75 LTE Band 14: -2.25 LTE Band 17: -1.29 LTE Band 25: 1.99 LTE Band 26: -1.59 LTE Band 30: -0.93 LTE Band 38: 0.58 LTE Band 41: 0.92 LTE Band 66: -0.30 LTE Band 71: -3.16 5G NR n2 : 1.99 5G NR n5 : -1.59 5G NR n7 : 0.92 5G NR n25 : 1.99 5G NR n30 : -0.93 5G NR n38 : 0.58 5G NR n41: 0.92 5G NR n66 : -0.30 5G NR n71: -3.16 5G NR n77: 0 5G NR n78: -0.94
Vendor 2 (Ant8 TX/RX) 6036B0308801 (00-2602749150)	Ant. Type	PIFA	Peak Gain	LTE Band 2: -6.04 LTE Band 4: -4.30 LTE Band 7: -3.65 LTE Band 25: -6.04 LTE Band 30: -2.19 LTE Band 41: -3.58 LTE Band 48: -5.13 LTE Band 66: -4.30 5G NR n2 : -6.04 5G NR n38 : -4.79 5G NR n41: -3.58 5G NR n66 : -4.30 5G NR n77: -3.90 5G NR n78: -3.90



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

Summarized necessary items addressed in KDB 941225 D05 v02r05																																																															
FCC ID	ZMOFM350GL																																																														
Equipment Name	5G Module																																																														
Operating Frequency Range of each LTE transmission band	LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz LTE Band 14: 788 MHz ~ 798 MHz LTE Band 17: 704 MHz ~ 716 MHz LTE Band 25: 1850 MHz ~ 1915 MHz LTE Band 26: 814 MHz ~ 849 MHz LTE Band 30: 2305 MHz ~ 2315 MHz LTE Band 38: 2570 MHz ~ 2620 MHz LTE Band 41: 2496 MHz ~ 2690 MHz LTE Band 48: 3550 MHz ~ 3700 MHz LTE Band 66: 1710 MHz ~ 1780 MHz LTE Band 71: 663 MHz ~ 698 MHz																																																														
Channel Bandwidth	LTE Band 2: 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 4: 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 5: 1.4MHz, 3MHz, 5MHz, 10MHz LTE Band 7: 5MHz, 10MHz, 15MHz, 20MHz LTE Band 12: 1.4MHz, 3MHz, 5MHz, 10MHz LTE Band 13: 5MHz, 10MHz LTE Band 14: 5MHz, 10MHz LTE Band 17: 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 38: 5MHz, 10MHz, 15MHz, 20MHz LTE Band 41: 5MHz, 10MHz, 15MHz, 20MHz LTE Band 48: 5MHz, 10MHz, 15MHz, 20MHz LTE Band 66: 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 71: 5MHz, 10MHz, 15MHz, 20MHz																																																														
uplink modulations used	QPSK / 16QAM / 64QAM / 256QAM																																																														
LTE Voice / Data requirements	Data only																																																														
LTE MPR permanently built-in by design	<p><b>Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3</b></p> <table border="1"> <thead> <tr> <th rowspan="2">Modulation</th> <th colspan="6">Channel bandwidth / Transmission bandwidth (N<sub>RB</sub>)</th> <th rowspan="2">MPR (dB)</th> </tr> <tr> <th>1.4 MHz</th> <th>3.0 MHz</th> <th>5 MHz</th> <th>10 MHz</th> <th>15 MHz</th> <th>20 MHz</th> </tr> </thead> <tbody> <tr> <td>QPSK</td> <td>&gt; 5</td> <td>&gt; 4</td> <td>&gt; 8</td> <td>&gt; 12</td> <td>&gt; 16</td> <td>&gt; 18</td> <td>≤ 1</td> </tr> <tr> <td>16 QAM</td> <td>≤ 5</td> <td>≤ 4</td> <td>≤ 8</td> <td>≤ 12</td> <td>≤ 16</td> <td>≤ 18</td> <td>≤ 1</td> </tr> <tr> <td>16 QAM</td> <td>&gt; 5</td> <td>&gt; 4</td> <td>&gt; 8</td> <td>&gt; 12</td> <td>&gt; 16</td> <td>&gt; 18</td> <td>≤ 2</td> </tr> <tr> <td>64 QAM</td> <td>≤ 5</td> <td>≤ 4</td> <td>≤ 8</td> <td>≤ 12</td> <td>≤ 16</td> <td>≤ 18</td> <td>≤ 2</td> </tr> <tr> <td>64 QAM</td> <td>&gt; 5</td> <td>&gt; 4</td> <td>&gt; 8</td> <td>&gt; 12</td> <td>&gt; 16</td> <td>&gt; 18</td> <td>≤ 3</td> </tr> <tr> <td>256 QAM</td> <td colspan="6">≥ 1</td> <td>≤ 5</td> </tr> </tbody> </table>	Modulation	Channel bandwidth / Transmission bandwidth (N <sub>RB</sub> )						MPR (dB)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1	16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1	16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2	64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2	64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3	256 QAM	≥ 1						≤ 5
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64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3																																																								
256 QAM	≥ 1						≤ 5																																																								
LTE A-MPR	In the base station simulator configuration, Network Setting value is set to NS_01 to disable A-MPR during SAR testing and the LTE SAR tests was transmitting on all TTI frames (Maximum TTI)																																																														
Spectrum plots for RB configuration	A properly configured base station simulator was used for the SAR and power measurement; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.																																																														
LTE Carrier Aggregation Combinations	Inter-Band and Intra-Band possible combinations and the detail power measurement please referred to section 10.																																																														
LTE Carrier Aggregation Additional Information	This device supports maximum of 5 carriers in the downlink and 2 carriers in the uplink. Additional following LTE Release features are not supported: Relay, HetNet, Enhanced MIMO, eICl, WiFi Offloading, MDH, eMBMA, Cross-Carrier Scheduling, Enhanced SC-FDMA.																																																														





Transmission (H, M, L) channel numbers and frequencies in each LTE band												
LTE Band 2												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	18607	1850.7	18615	1851.5	18625	1852.5	18650	1855	18675	1857.5	18700	1860
M	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880
H	19193	1909.3	19185	1908.5	19175	1907.5	19150	1905	19125	1902.5	19100	1900
LTE Band 4												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	19957	1710.7	19965	1711.5	19975	1712.5	20000	1715	20025	1717.5	20050	1720
M	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5
H	20393	1754.3	20385	1753.5	20375	1752.5	20350	1750	20325	1747.5	20300	1745
LTE Band 5												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20407	824.7	20415	825.5	20425	826.5	20450	829	20450	829	20450	829
M	20525	836.5	20525	836.5	20525	836.5	20525	836.5	20525	836.5	20525	836.5
H	20643	848.3	20635	847.5	20625	846.5	20600	844	20600	844	20600	844
LTE Band 7												
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20775	2502.5	20800	2505	20825	2507.5	20850	2510	20850	2510	20850	2510
M	21100	2535	21100	2535	21100	2535	21100	2535	21100	2535	21100	2535
H	21425	2567.5	21400	2565	21375	2562.5	21350	2560	21350	2560	21350	2560
LTE Band 12												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	23017	699.7	23025	700.5	23035	701.5	23060	704	23060	704	23060	704
M	23095	707.5	23095	707.5	23095	707.5	23095	707.5	23095	707.5	23095	707.5
H	23173	715.3	23165	714.5	23155	713.5	23130	711	23130	711	23130	711
LTE Band 13												
	Bandwidth 5 MHz				Bandwidth 10 MHz				Bandwidth 10 MHz			
	Channel #		Freq.(MHz)		Channel #		Freq.(MHz)		Channel #		Freq.(MHz)	
L	23205		779.5		23230		782		23230		782	
M	23230		782		23230		782		23230		782	
H	23255		784.5		23230		782		23230		782	
LTE Band 14												
	Bandwidth 5 MHz				Bandwidth 10 MHz				Bandwidth 10 MHz			
	Channel #		Channel #		Channel #		Freq.(MHz)		Channel #		Freq.(MHz)	
L	23305		790.5		23330		793		23330		793	
M	23330		793		23330		793		23330		793	
H	23355		795.5		23330		793		23330		793	
LTE Band 17												
	Bandwidth 5 MHz				Bandwidth 10 MHz				Bandwidth 10 MHz			
	Channel #		Freq.(MHz)		Channel #		Freq. (MHz)		Channel #		Freq. (MHz)	
L	23755		706.5		23780		709		23780		709	
M	23790		710		23790		710		23790		710	
H	23825		713.5		23800		711		23800		711	



LTE Band 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)	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 38												
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	37775	2572.5	37800	2575	37825	2577.5	37850	2580				
M	38000	2595	38000	2595	38000	2595	38000	2595				
H	38225	2617.5	38200	2615	38175	2612.5	38150	2610				
LTE Band 41												
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	39675	2498.5	39700	2501	39725	2503.5	39750	2506				
L	40148	2545.8	40160	2547	40173	2548.3	40185	2549.5				
M	40620	2593	40620	2593	40620	2593	40620	2593				
H	41093	2640.3	41080	2639	41068	2637.8	41055	2636.5				
H	41565	2687.5	41540	2685	41515	2682.5	41490	2680				
LTE Band 48												
	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	55265	3552.5	55290	3555	55315	3557.5	55340	3560				
L	55810	3607	55815	3607.5	55820	3608	55830	3609				
M	56170	3643	56165	3642.5	56160	3642	56150	3641				
H	56715	3697.5	56690	3695	56665	3692.5	56640	3690				
LTE Band 66												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	131979	1710.7	131987	1711.5	131997	1712.5	132022	1715	132047	1717.5	132072	1720
M	132322	1745	132322	1745	132322	1745	132322	1745	132322	1745	132322	1745
H	132665	1779.3	132657	1778.5	132647	1777.5	132622	1775	132597	1772.5	132572	1770
LTE Band 71												
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	133147	665.5	133172	668	133197	670.5	133222	673				
M	133297	680.5	133297	680.5	133297	680.5	133297	680.5				
H	133447	695.5	133422	693	133397	690.5	133372	688				



**3.3 General 5G NR SAR Test and Reporting Considerations**

5G NR Information								
FCC ID	ZMOFM350GL							
Equipment Name	5G Module							
Operating Frequency Range of each 5G NR transmission band	5G NR n2: 1850 MHz ~ 1910 MHz 5G NR n5: 824 MHz ~ 849 MHz 5G NR n7: 2500 MHz ~ 2570 MHz 5G NR n25: 1850 MHz ~ 1915 MHz 5G NR n30 : 2305 MHz ~ 2315 MHz 5G NR n38: 2570 MHz ~ 2620 MHz 5G NR n41: 2496 MHz ~ 2690 MHz 5G NR n66: 1710 MHz ~ 1780 MHz 5G NR n71: 663 MHz ~ 698 MHz 5G NR n77: 3700 MHz ~ 3980 MHz, 3450MHz ~ 3550MHz 5G NR n78: 3700 MHz ~ 3800 MHz, 3450MHz ~ 3550MHz							
Channel Bandwidth	5G NR n2: 5MHz, 10MHz, 15MHz, 20MHz 5G NR n5: 5MHz, 10MHz, 15MHz, 20MHz 5G NR n7: 5MHz, 10MHz, 15MHz, 20MHz 5G NR n25: 5MHz, 10MHz, 15MHz, 20MHz 5G NR n30: 5MHz, 10MHz 5G NR n38: 10MHz, 15MHz, 20MHz 5G NR n41: 10MHz, 15MHz, 30MHz, 40MHz, 50MHz, 80MHz, 100MHz 5G NR n66: 5MHz, 10MHz, 15MHz, 20MHz, 40MHz 5G NR n71: 5MHz, 10MHz, 15MHz, 20MHz 5G NR n77/n78: 10MHz, 15MHz, 20MHz, 40MHz, 50MHz, 60MHz, 80MHz, 100MHz							
SCS	FDD: SCS15KHz, TDD: SCS30KHz							
uplink modulations used	DFT-s-OFDM: PI/2 BPSK / QPSK / 16QAM / 64QAM / 256QAM CP-OFDM QPSK / 16QAM / 64QAM / 256QAM							
A-MPR (Additional MPR) disabled for SAR Testing?	Yes							
LTE Anchor Bands for n2	LTE B5/12/13/14							
LTE Anchor Bands for n5	LTE B2/7/30/48/66							
LTE Anchor Bands for n41	LTE B2/41/66							
LTE Anchor Bands for n66	LTE B5/12/13/48							
LTE Anchor Bands for n71	LTE B2/66							
LTE Anchor Bands for n77	LTE B2/5/12/13/14/30/41/66							
LTE Anchor Bands for n78	LTE B2/5/7/38							
NR Band 2								
	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	370500	1852.5	371000	1855	371500	1857.5	372000	1860
M	376000	1880	376000	1880	376000	1880	376000	1880
H	381500	1907.5	381000	1905	380500	1902.5	380000	1900
NR Band 5								
	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	165300	826.5	165800	829	166300	831.5	166800	834
M	167300	836.5	167300	836.5	167300	836.5	167300	836.5
H	169300	846.5	168800	844	168300	841.5	167800	839
NR Band 7								
	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	500500	2502.5	501000	2505	501500	2507.5	502000	2510
M	507000	2535	507000	2535	507000	2535	507000	2535
H	513500	2567.5	513000	2565	512500	2562.5	512000	2560
NR Band 25								
	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	370500	1852.5	371000	1855	371500	1857.5	372000	1860
M	376500	1882.5	376500	1882.5	376500	1882.5	376500	1882.5
H	382500	1912.5	382000	1910	381500	1907.5	381000	1905



NR Band 30																
Bandwidth 5MHz						Bandwidth 10MHz										
Ch. #		Freq. (MHz)				Ch. #				Freq. (MHz)						
L	461500	2307.5				462000				2310						
M	462000	2310														
H	462500	2312.5														
NR Band 38																
Bandwidth 10MHz				Bandwidth 15MHz				Bandwidth 20MHz								
Ch. #		Freq. (MHz)		Ch. #		Freq. (MHz)		Ch. #		Freq. (MHz)						
L	515004	2575.02		515502		2577.51		516000		2580						
M	519000	2595		519000		2595		519000		2595						
H	522996	2614.98		522498		2612.49		522000		2610						
NR Band 41																
Bandwidth10MHz		Bandwidth15MHz		Bandwidth30MHz		Bandwidth 40MHz		Bandwidth 50MHz		Bandwidth 80MHz		Bandwidth100MHz				
Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)			
L	500202	2501.01	500700	2503.5	502200	2511	503202	2516.01	504204	2521.02	507204	2536.02	509202	2546.01		
M	518598	2592.99	518598	2592.99	518598	2592.99	518598	2592.99	518598	2592.99	518598	2592.99	518598	2592.99		
H	537000	2685	536496	2682.48	534996	2674.98	534000	2670	532998	2664.99	529998	2649.99	528000	2640		
NR Band 66																
Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz		Bandwidth 40MHz								
Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)							
L	342500	1712.5	343000	1715	343500	1717.5	344000	1720	346000	1730						
M	349000	1745	349000	1745	349000	1745	349000	1745	349000	1745						
H	355500	1777.5	355000	1775	354500	1772.5	354000	1770	352000	1760						
NR Band 71																
Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz										
Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)									
L	133100	665.5	133600	668	13410	670.5	134600	673								
M	136100	680.5	136100	680.5	136100	680.5	136100	680.5								
H	139100	695.5	138600	693	13810	690.5	137600	688								
NR Band 77 (3700MHz – 3980MHz)																
Bandwidth10MHz		Bandwidth15MHz		Bandwidth 20MHz		Bandwidth 40MHz		Bandwidth 50MHz		Bandwidth 60MHz		Bandwidth 80MHz		Bandwidth100MHz		
Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	
L	647000	3705	647168	3707.52	647334	3710.01	648000	3720	648334	3725.01	648668	3730.02	649334	3740.01	650000	3750
M	656000	3840	656000	3840	656000	3840	656000	3840	656000	3840	656000	3840	656000	3840	656000	3840
H	665000	3975	664832	3972.48	664666	3969.99	664000	3960	663666	3954.99	663332	3949.98	662666	3939.99	662000	3930
NR Band 78 (3700MHz – 3800MHz)																
Bandwidth10MHz		Bandwidth15MHz		Bandwidth 20MHz		Bandwidth 40MHz		Bandwidth 50MHz		Bandwidth 60MHz		Bandwidth 80MHz		Bandwidth100MHz		
Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	
L	647000	3705	647168	3707.52	647334	3710.01	648000	3720	648334	3725.01	648668	3730.02	649334	3740.01	650000	3750
M	650000	3750	650000	3750	650000	3750	650000	3750	650000	3750	650000	3750	650000	3750	650000	3750
H	653000	3795	652832	3792.48	652666	3789.99	652000	3780	651666	3774.99	651332	3769.98	650666	3759.99	650000	3750
NR Band 77/78(3450MHz ~ 3550MHz)																
Bandwidth10MHz		Bandwidth15MHz		Bandwidth 20MHz		Bandwidth 40MHz		Bandwidth 50MHz		Bandwidth 60MHz		Bandwidth 80MHz		Bandwidth100MHz		
Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	
L	630334	3455.01	630500	3457.5	630668	3460.02	631334	3470.01	631668	3475.02	632000	3480	632668	3490.02	633332	3499.98
M	633332	3499.98	633332	3499.98	633332	3499.98	633332	3499.98	633332	3499.98	633332	3499.98	633332	3499.98	633332	3499.98
H	636332	3544.98	636166	3542.49	636000	3540	635332	3529.98	635000	3525	634666	3519.99	634000	3510	633332	3499.98



## 4. RF Exposure Limits

### 4.1 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.

### 4.2 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.



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

### **5.1 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.

### **5.2 SAR Definition**

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

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

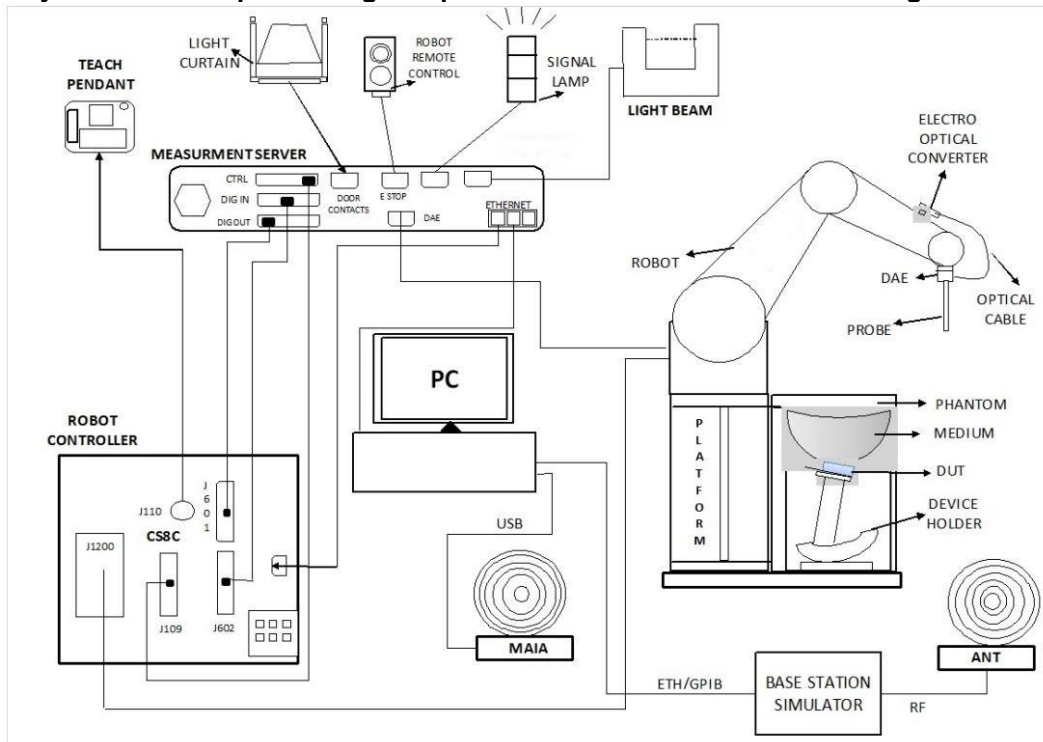
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

## 6. System Description and Setup

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



- The DASY system in SAR Configuration is shown above
- 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 windows software and the DASY 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.

### 6.1 Test Site Location


The SAR measurement facilities used to collect data are within both Sporton Lab list below test site location are accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 1190 and 3786) and the FCC designation No. TW1190 and TW3786 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC test.

Test Site	EMC & Wireless Communications Laboratory		Wensan Laboratory		
Test Site Location	TW1190 No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan		TW3786 No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan		
Test Site No.	SAR01-HY	SAR03-HY	SAR08-HY	SAR09-HY	SAR15-HY
	SAR04-HY	SAR05-HY	SAR11-HY	SAR12-HY	SAR16-HY
	SAR06-HY	SAR10-HY	SAR13-HY	SAR14-HY	SAR17-HY


**6.2 E-Field Probe**

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

**<ES3DV3 Probe>**

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

**<EX3DV4 Probe>**

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

**6.3 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**




**6.4 Phantom**

**<SAM Twin Phantom>**

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

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

**<ELI Phantom>**

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

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

## **6.5 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

## **7. Measurement Procedures**

The measurement procedures are as follows:

- (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

### **7.1 Spatial Peak SAR Evaluation**

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

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

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

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

**7.2 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.

**7.3 Area Scan**

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

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

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

**7.4 Zoom Scan**

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

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

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

**7.5 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.

**7.6 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.



### 8. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	1750MHz System Validation Kit	D1750V2	1112	Jun. 22, 2022	Jun. 21, 2023
SPEAG	1900MHz System Validation Kit	D1900V2	5d185	Jun. 17, 2022	Jun. 16, 2023
SPEAG	2300MHz System Validation Kit	D2300V2	1088	Jul. 13, 2021	Jul. 11, 2023
SPEAG	2600MHz System Validation Kit	D2600V2	1078	Jun. 23, 2022	Jun. 22, 2023
SPEAG	2600MHz System Validation Kit	D2600V2	1089	Mar. 24, 2022	Mar. 23, 2023
SPEAG	3500MHz System Validation Kit	D3500V2	1014	Jan. 17, 2022	Jan. 15, 2024
SPEAG	3500MHz System Validation Kit	D3500V2	1036	Mar. 23, 2022	Mar. 22, 2023
SPEAG	3700MHz System Validation Kit	D3700V2	1006	Jun. 20, 2022	Jun. 19, 2023
SPEAG	3900MHz System Validation Kit	D3900V2	1017	Apr. 22, 2022	Apr. 21, 2023
SPEAG	3900MHz System Validation Kit	D3900V2	1092	Sep. 05, 2022	Sep. 04, 2023
SPEAG	Data Acquisition Electronics	DAE4	699	Feb. 24, 2022	Feb. 23, 2023
SPEAG	Data Acquisition Electronics	DAE4	1399	Feb. 28, 2022	Feb. 27, 2023
SPEAG	Data Acquisition Electronics	DAE4	1694	Nov. 18, 2022	Nov. 17, 2023
SPEAG	Data Acquisition Electronics	DAE4	1707	Dec. 15, 2022	Dec. 14, 2023
SPEAG	Dosimetric E-Field Probe	EX3DV4	3931	Oct. 31, 2022	Oct. 30, 2023
SPEAG	Dosimetric E-Field Probe	EX3DV4	3976	Jan. 27, 2022	Jan. 26, 2023
SPEAG	Dosimetric E-Field Probe	EX3DV4	7590	Mar. 28, 2022	Mar. 27, 2023
SPEAG	Dosimetric E-Field Probe	EX3DV4	7694	Nov. 15, 2022	Nov. 14, 2023
RCPTWN	Thermometer	HTC-1	TM685-1	Jun. 27, 2022	Jun. 26, 2023
RCPTWN	Thermometer	HTC-1	TM560-2	Mar. 15, 2022	Mar. 14, 2023
Anritsu	Radio Communication Analyzer	MT8821C	6201341950	Oct. 31, 2022	Oct. 30, 2023
Keysight	Wireless Communication Test Set	E5515C	MY50267236	Mar. 02, 2022	Mar. 01, 2023
SPEAG	Device Holder	N/A	N/A	N/A	N/A
Anritsu	Signal Generator	MG3710A	6201502524	Oct. 12, 2022	Oct. 11, 2023
Keysight	ENA Network Analyzer	E5071C	MY46104758	Sep. 22, 2022	Sep. 21, 2023
SPEAG	Dielectric Probe Kit	DAK-3.5	1126	Sep. 28, 2022	Sep. 27, 2023
LINE SEIKI	Digital Thermometer	DTM3000-spezial	2942	Oct. 31, 2022	Oct. 30, 2023
Anritsu	Power Meter	ML2495A	1419002	Aug. 16, 2022	Aug. 15, 2023
Anritsu	Power Meter	ML2495A	1804003	Oct. 17, 2022	Oct. 16, 2023
Anritsu	Power Sensor	MA2411B	1726150	Oct. 17, 2022	Oct. 16, 2023
Anritsu	Power Sensor	MA2411B	1911334	Jun. 22, 2022	Jun. 21, 2023
Anritsu	Spectrum Analyzer	MS2830A	6201396378	Jul. 21, 2022	Jul. 20, 2023
Agilent	Spectrum Analyzer	E4408B	MY44211028	Aug. 19, 2021	Aug. 17, 2023
Mini-Circuits	Power Amplifier	ZVE-8G+	6418	Oct. 14, 2022	Oct. 13, 2023
Mini-Circuits	Power Amplifier	ZVE-8G+	479102029	Sep. 15, 2022	Sep. 14, 2023
ATM	Dual Directional Coupler	C122H-10	P610410z-02	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	

**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.
2. The dipole calibration interval can be extended to 3 years with justification according to KDB 865664 D01. The dipoles are also not physically damaged, or repaired during the interval. The justification data in appendix C can be found which the return loss is < -20dB, within 20% of prior calibration, the impedance is within 5 ohm of prior calibration for each dipole.



### 9. System Verification

#### 9.1 Tissue Verification

The tissue dielectric parameters of tissue-equivalent media used for SAR measurements must be characterized within a temperature range of 18°C to 25°C, measured with calibrated instruments and apparatuses, such as network analyzers and temperature probes. The temperature of the tissue-equivalent medium during SAR measurement must also be within 18°C to 25°C and within ± 2°C of the temperature when the tissue parameters are characterized. The tissue dielectric measurement system must be calibrated before use. The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements.

The liquid tissue depth was at least 15cm in the phantom for all SAR testing.

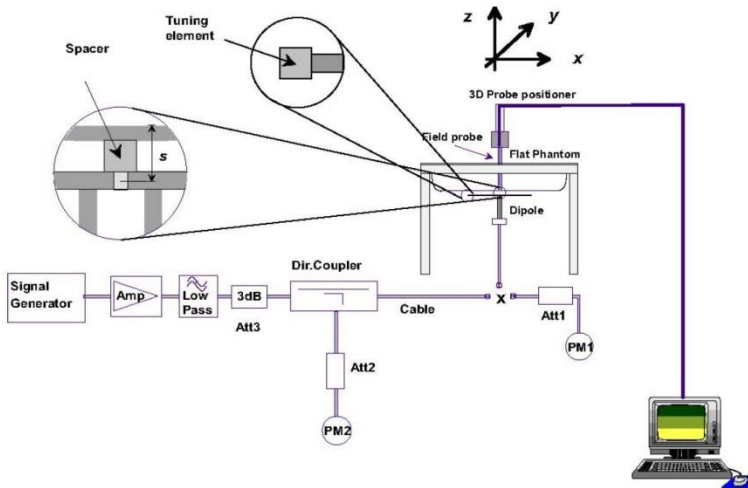
#### <Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Liquid Temp. (°C)	Conductivity (σ)	Permittivity (ε <sub>r</sub> )	Conductivity Target (σ)	Permittivity Target (ε <sub>r</sub> )	Delta (σ) (%)	Delta (ε <sub>r</sub> ) (%)	Limit (%)	Date
1750	22.7	1.370	40.500	1.37	40.10	0.00	1.00	±5	2023/1/12
1750	22.5	1.350	40.500	1.37	40.10	-1.46	1.00	±5	2023/2/1
1900	22.2	1.420	40.700	1.40	40.00	1.43	1.75	±5	2023/1/10
1900	22.7	1.450	38.900	1.40	40.00	3.57	-2.75	±5	2023/1/12
2300	22.7	1.670	39.900	1.67	39.50	0.00	1.01	±5	2023/1/13
2600	22.2	1.980	38.600	1.96	39.00	1.02	-1.03	±5	2023/1/10
2600	22.3	1.960	38.100	1.96	39.00	0.00	-2.31	±5	2023/1/11
2600	22.5	2.010	38.648	1.96	39.00	2.55	-0.90	±5	2023/1/19
2600	22.5	1.970	38.100	1.96	39.00	0.51	-2.31	±5	2023/2/7
3500	22.2	2.980	38.200	2.91	37.90	2.41	0.79	±5	2023/1/10
3500	22.7	3.000	38.400	2.91	37.90	3.09	1.32	±5	2023/1/13
3500	22.5	2.970	38.500	2.91	37.90	2.06	1.58	±5	2023/2/1
3500	22.5	2.970	38.500	2.91	37.90	2.06	1.58	±5	2023/2/1
3500	22.5	3.010	38.900	2.91	37.90	3.44	2.64	±5	2023/2/7
3700	22.7	3.210	38.300	3.12	37.70	2.88	1.59	±5	2023/1/13
3700	22.5	3.180	38.300	3.12	37.70	1.92	1.59	±5	2023/2/1
3700	22.5	3.180	38.300	3.12	37.70	1.92	1.59	±5	2023/2/1
3700	22.5	3.230	38.700	3.12	37.70	3.53	2.65	±5	2023/2/7
3900	22.2	3.410	37.900	3.33	37.51	2.40	1.04	±5	2023/1/10
3900	22.5	3.400	38.100	3.33	37.51	2.10	1.57	±5	2023/2/1
3900	22.5	3.440	38.500	3.33	37.51	3.30	2.64	±5	2023/2/7

**9.2 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.

Test Site	Date	Frequency (MHz)	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 (%)
SAR16	2023/1/12	1750	50	D1750V2-1112	EX3DV4 - SN3976	DAE4 Sn699	1.760	36.900	35.2	-4.61
SAR15	2023/2/1	1750	50	D1750V2-1112	EX3DV4 - SN7590	DAE4 Sn1399	1.730	36.900	34.6	-6.23
SAR16	2023/1/10	1900	50	D1900V2-5d185	EX3DV4 - SN3976	DAE4 Sn1399	1.860	39.000	37.2	-4.62
SAR16	2023/1/12	1900	50	D1900V2-5d185	EX3DV4 - SN3976	DAE4 Sn699	1.940	39.000	38.8	-0.51
SAR16	2023/1/13	2300	50	D2300V2-1088	EX3DV4 - SN3976	DAE4 Sn699	2.410	49.700	48.2	-3.02
SAR16	2023/1/10	2600	50	D2600V2-1078	EX3DV4 - SN3976	DAE4 Sn1399	2.690	55.400	53.8	-2.89
SAR16	2023/1/11	2600	50	D2600V2-1078	EX3DV4 - SN3976	DAE4 Sn699	2.700	55.400	54	-2.53
SAR14	2023/1/19	2600	50	D2600V2-1089	EX3DV4 - SN3931	DAE4 Sn1707	2.960	55.400	59.2	6.86
SAR08	2023/2/7	2600	50	D2600V2-1078	EX3DV4 - SN7694	DAE4 Sn1694	2.670	55.400	53.4	-3.61
SAR16	2023/1/10	3500	50	D3500V2-1014	EX3DV4 - SN3976	DAE4 Sn1399	3.500	67.200	70	4.17
SAR16	2023/1/13	3500	50	D3500V2-1036	EX3DV4 - SN3976	DAE4 Sn699	3.510	67.400	70.2	4.15
SAR15	2023/2/1	3500	50	D3500V2-1036	EX3DV4 - SN7590	DAE4 Sn1399	3.180	67.400	63.6	-5.64
SAR14	2023/2/1	3500	50	D3500V2-1036	EX3DV4 - SN3931	DAE4 Sn1707	3.310	67.400	66.2	-1.78
SAR08	2023/2/7	3500	50	D3500V2-1014	EX3DV4 - SN7694	DAE4 Sn1694	3.330	67.200	66.6	-0.89
SAR16	2023/1/13	3700	50	D3700V2-1006	EX3DV4 - SN3976	DAE4 Sn699	3.480	65.600	69.6	6.10
SAR15	2023/2/1	3700	50	D3700V2-1006	EX3DV4 - SN7590	DAE4 Sn1399	3.130	65.600	62.6	-4.57
SAR14	2023/2/1	3700	50	D3700V2-1006	EX3DV4 - SN3931	DAE4 Sn1707	3.310	65.600	66.2	0.91
SAR08	2023/2/7	3700	50	D3700V2-1006	EX3DV4 - SN7694	DAE4 Sn1694	3.190	65.600	63.8	-2.74
SAR16	2023/1/10	3900	50	D3900V2-1092	EX3DV4 - SN3976	DAE4 Sn1399	3.220	68.300	64.4	-5.71
SAR14	2023/2/1	3900	50	D3900V2-1092	EX3DV4 - SN3931	DAE4 Sn1707	3.140	68.300	62.8	-8.05
SAR08	2023/2/7	3900	50	D3900V2-1017-3900	EX3DV4 - SN7694	DAE4 Sn1694	3.370	68.700	67.4	-1.89



**Fig 8.3.1 System Performance Check Setup**



**Fig 8.3.2 Setup Photo**





## **10. LTE Output Power (Unit: dBm)**

### **<LTE Conducted Power>**

#### **General Note:**

1. Anritsu MT8820C base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r05, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
4. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r05, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are  $\leq 0.8$  W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is  $> 1.45$  W/kg, the remaining required test channels must also be tested.
6. Per KDB 941225 D05v02r05, 16QAM output power for each RB allocation configuration is  $>$  not  $\frac{1}{2}$  dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is  $\leq 1.45$  W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
7. Per KDB 941225 D05v02r05, Smaller bandwidth output power for each RB allocation configuration is  $>$  not  $\frac{1}{2}$  dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is  $\leq 1.45$  W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
8. For LTE B4/B5/B12/B17/B26/B38/B71 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.
9. LTE band 4/5/17/38 SAR test was covered by Band 66/26/12/41; according to April 2015 TCB workshop, SAR test for overlapping LTE bands can be reduced if
  - a. the maximum output power, including tolerance, for the smaller band is  $\leq$  the larger band to qualify for the SAR test exclusion
  - b. the channel bandwidth and other operating parameters for the smaller band are fully supported by the larger band



<LTE Band 2 Ant 8>							
BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				18700	18900	19100	
Frequency (MHz)				1860	1880	1900	
20	QPSK	1	0	22.31	22.25	22.23	23
20	QPSK	1	49	22.33	22.26	22.35	
20	QPSK	1	99	22.15	22.11	22.29	
20	QPSK	50	0	21.26	21.21	21.35	22
20	QPSK	50	24	21.30	21.25	21.40	
20	QPSK	50	50	21.27	21.27	21.29	
20	QPSK	100	0	21.27	21.21	21.32	
20	16QAM	1	0	21.40	21.39	21.38	22
20	16QAM	1	49	21.45	21.30	21.48	
20	16QAM	1	99	21.30	21.24	21.37	
20	16QAM	50	0	20.25	20.18	20.33	21
20	16QAM	50	24	20.26	20.25	20.36	
20	16QAM	50	50	20.25	20.25	20.30	
20	16QAM	100	0	20.25	20.19	20.29	
20	64QAM	1	0	20.38	20.23	20.31	21
20	64QAM	1	49	20.44	20.23	20.44	
20	64QAM	1	99	20.23	20.12	20.35	
20	64QAM	50	0	19.25	19.21	19.32	20
20	64QAM	50	24	19.26	19.26	19.37	
20	64QAM	50	50	19.27	19.24	19.28	
20	64QAM	100	0	19.22	19.19	19.30	
20	256QAM	1	0	17.57	17.58	17.58	18
20	256QAM	1	49	17.77	17.70	17.75	
20	256QAM	1	99	17.64	17.59	17.72	
20	256QAM	50	0	17.60	17.47	17.69	18
20	256QAM	50	24	17.62	17.57	17.67	
20	256QAM	50	50	17.61	17.61	17.71	
20	256QAM	100	0	17.63	17.57	17.70	
Channel				18675	18900	19125	Tune-up limit (dBm)
Frequency (MHz)				1857.5	1880	1902.5	
15	QPSK	1	0	22.26	22.16	22.17	23
15	QPSK	1	37	22.20	22.13	22.30	
15	QPSK	1	74	22.21	22.09	22.25	
15	QPSK	36	0	21.17	21.08	21.17	22
15	QPSK	36	20	21.10	21.27	21.32	
15	QPSK	36	39	21.29	21.25	21.13	
15	QPSK	75	0	21.24	21.18	21.33	
15	16QAM	1	0	21.28	21.36	21.34	22
15	16QAM	1	37	21.48	21.38	21.38	
15	16QAM	1	74	21.20	21.24	21.18	
15	16QAM	36	0	20.15	20.10	20.28	21
15	16QAM	36	20	20.24	20.11	20.28	
15	16QAM	36	39	20.16	20.06	20.18	
15	16QAM	75	0	20.07	20.19	20.29	
15	64QAM	1	0	20.31	20.14	20.26	21
15	64QAM	1	37	20.41	20.27	20.25	
15	64QAM	1	74	20.23	20.16	20.29	
15	64QAM	36	0	19.32	19.25	19.28	20
15	64QAM	36	20	19.09	19.20	19.22	
15	64QAM	36	39	19.20	19.18	19.27	
15	64QAM	75	0	19.21	19.19	19.23	
15	256QAM	1	0	17.37	17.50	17.39	18
15	256QAM	1	37	17.58	17.58	17.73	
15	256QAM	1	74	17.62	17.51	17.53	
15	256QAM	36	0	17.58	17.41	17.59	18
15	256QAM	36	20	17.60	17.50	17.47	
15	256QAM	36	39	17.48	17.50	17.53	



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15	256QAM	75	0	17.57	17.43	17.70	
Channel				18650	18900	19150	Tune-up limit
Frequency (MHz)				1855	1880	1905	(dBm)
10	QPSK	1	0	22.17	22.20	22.27	23
10	QPSK	1	25	22.31	22.23	22.31	
10	QPSK	1	49	22.16	22.03	22.12	
10	QPSK	25	0	21.24	21.15	21.35	22
10	QPSK	25	12	21.16	21.24	21.36	
10	QPSK	25	25	21.18	21.19	21.22	
10	QPSK	50	0	21.14	21.14	21.16	22
10	16QAM	1	0	21.31	21.43	21.25	
10	16QAM	1	25	21.30	21.30	21.39	
10	16QAM	1	49	21.28	21.31	21.35	21
10	16QAM	25	0	20.18	20.14	20.42	
10	16QAM	25	12	20.20	20.15	20.23	
10	16QAM	25	25	20.21	20.16	20.23	21
10	16QAM	50	0	20.28	20.10	20.22	
10	64QAM	1	0	20.45	20.19	20.20	
10	64QAM	1	25	20.36	20.15	20.31	21
10	64QAM	1	49	20.23	20.07	20.41	
10	64QAM	25	0	19.28	19.14	19.17	
10	64QAM	25	12	19.24	19.21	19.35	20
10	64QAM	25	25	19.20	19.12	19.27	
10	64QAM	50	0	19.15	19.29	19.31	
10	256QAM	1	0	17.48	17.58	17.42	18
10	256QAM	1	25	17.72	17.54	17.70	
10	256QAM	1	49	17.56	17.52	17.67	
10	256QAM	25	0	17.47	17.30	17.50	18
10	256QAM	25	12	17.45	17.52	17.62	
10	256QAM	25	25	17.61	17.59	17.64	
10	256QAM	50	0	17.52	17.47	17.52	
Channel				18625	18900	19175	Tune-up limit
Frequency (MHz)				1852.5	1880	1907.5	(dBm)
5	QPSK	1	0	22.22	22.11	22.09	23
5	QPSK	1	12	22.22	22.28	22.19	
5	QPSK	1	24	22.01	22.09	22.22	
5	QPSK	12	0	21.19	21.14	21.24	22
5	QPSK	12	7	21.16	21.18	21.33	
5	QPSK	12	13	21.14	21.20	21.27	
5	QPSK	25	0	21.13	21.22	21.28	22
5	16QAM	1	0	21.39	21.27	21.34	
5	16QAM	1	12	21.39	21.17	21.35	
5	16QAM	1	24	21.21	21.12	21.40	21
5	16QAM	12	0	20.24	20.04	20.40	
5	16QAM	12	7	20.15	20.34	20.30	
5	16QAM	12	13	20.24	20.29	20.37	21
5	16QAM	25	0	20.25	20.07	20.14	
5	64QAM	1	0	20.26	20.18	20.16	
5	64QAM	1	12	20.26	20.21	20.30	21
5	64QAM	1	24	20.05	20.11	20.19	
5	64QAM	12	0	19.24	19.26	19.17	
5	64QAM	12	7	19.19	19.21	19.38	20
5	64QAM	12	13	19.31	19.08	19.31	
5	64QAM	25	0	19.20	19.10	19.12	
5	256QAM	1	0	17.42	17.49	17.47	18
5	256QAM	1	12	17.60	17.63	17.73	
5	256QAM	1	24	17.47	17.50	17.66	
5	256QAM	12	0	17.56	17.45	17.64	18
5	256QAM	12	7	17.48	17.53	17.54	
5	256QAM	12	13	17.44	17.43	17.61	
5	256QAM	25	0	17.62	17.42	17.58	



Channel				18615	18900	19185	Tune-up limit (dBm)
Frequency (MHz)				1851.5	1880	1908.5	
3	QPSK	1	0	22.32	22.30	22.21	23
3	QPSK	1	8	22.26	22.18	22.23	
3	QPSK	1	14	22.00	22.16	22.31	
3	QPSK	8	0	21.16	21.23	21.35	22
3	QPSK	8	4	21.25	21.08	21.36	
3	QPSK	8	7	21.29	21.14	21.15	
3	QPSK	15	0	21.22	21.21	21.26	22
3	16QAM	1	0	21.30	21.21	21.46	
3	16QAM	1	8	21.42	21.20	21.45	
3	16QAM	1	14	21.25	21.17	21.33	21
3	16QAM	8	0	20.33	20.00	20.30	
3	16QAM	8	4	20.14	20.19	20.41	
3	16QAM	8	7	20.27	20.24	20.25	21
3	16QAM	15	0	20.17	20.11	20.26	
3	64QAM	1	0	20.35	20.27	20.25	
3	64QAM	1	8	20.34	20.17	20.45	21
3	64QAM	1	14	20.11	20.04	20.41	
3	64QAM	8	0	19.15	19.11	19.38	
3	64QAM	8	4	19.21	19.28	19.33	20
3	64QAM	8	7	19.16	19.34	19.20	
3	64QAM	15	0	19.22	19.13	19.25	
3	256QAM	1	0	17.41	17.40	17.41	18
3	256QAM	1	8	17.74	17.50	17.71	
3	256QAM	1	14	17.60	17.46	17.70	
3	256QAM	8	0	17.45	17.29	17.62	18
3	256QAM	8	4	17.54	17.51	17.49	
3	256QAM	8	7	17.48	17.42	17.52	
3	256QAM	15	0	17.51	17.39	17.65	
Channel				18607	18900	19193	Tune-up limit (dBm)
Frequency (MHz)				1850.7	1880	1909.3	
1.4	QPSK	1	0	22.05	22.03	22.22	23
1.4	QPSK	1	3	22.09	22.05	22.24	
1.4	QPSK	1	5	22.06	22.03	22.21	
1.4	QPSK	3	0	22.06	22.06	22.25	
1.4	QPSK	3	1	22.06	22.06	22.24	
1.4	QPSK	3	3	22.07	22.04	22.25	22
1.4	QPSK	6	0	21.05	21.04	21.22	
1.4	16QAM	1	0	21.32	21.26	21.43	22
1.4	16QAM	1	3	21.34	21.30	21.44	
1.4	16QAM	1	5	21.31	21.27	21.44	
1.4	16QAM	3	0	21.05	21.06	21.24	
1.4	16QAM	3	1	21.07	21.05	21.24	
1.4	16QAM	3	3	21.05	21.01	21.21	21
1.4	16QAM	6	0	20.31	20.30	20.48	
1.4	64QAM	1	0	20.42	20.36	20.53	21
1.4	64QAM	1	3	20.40	20.35	20.50	
1.4	64QAM	1	5	20.41	20.37	20.51	
1.4	64QAM	3	0	20.37	20.34	20.49	
1.4	64QAM	3	1	20.38	20.34	20.50	
1.4	64QAM	3	3	20.37	20.30	20.49	20
1.4	64QAM	6	0	19.22	19.19	19.34	
1.4	256QAM	1	0	17.38	17.48	17.42	18
1.4	256QAM	1	3	17.59	17.57	17.70	
1.4	256QAM	1	5	17.48	17.46	17.52	
1.4	256QAM	3	0	17.51	17.41	17.58	
1.4	256QAM	3	1	17.44	17.52	17.60	
1.4	256QAM	3	3	17.61	17.44	17.69	
1.4	256QAM	6	0	17.61	17.51	17.50	18



<LTE Band 4 Ant 8>							
BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				20050	20175	20300	
Frequency (MHz)				1720	1732.5	1745	
20	QPSK	1	0	22.25	22.29	22.33	24
20	QPSK	1	49	22.29	22.37	22.27	
20	QPSK	1	99	22.20	22.21	22.10	
20	QPSK	50	0	21.22	21.37	21.25	23
20	QPSK	50	24	21.35	21.36	21.32	
20	QPSK	50	50	21.25	21.39	21.27	
20	QPSK	100	0	21.26	21.34	21.27	23
20	16QAM	1	0	21.44	21.49	21.59	
20	16QAM	1	49	21.49	21.62	21.56	
20	16QAM	1	99	21.42	21.47	21.35	22
20	16QAM	50	0	20.14	20.38	20.27	
20	16QAM	50	24	20.37	20.31	20.29	
20	16QAM	50	50	20.23	20.36	20.27	22
20	16QAM	100	0	20.27	20.31	20.24	
20	64QAM	1	0	20.35	20.37	20.46	
20	64QAM	1	49	20.42	20.48	20.43	22
20	64QAM	1	99	20.34	20.33	20.20	
20	64QAM	50	0	19.18	19.35	19.22	
20	64QAM	50	24	19.31	19.36	19.34	21
20	64QAM	50	50	19.20	19.38	19.19	
20	64QAM	100	0	19.24	19.32	19.22	
20	256QAM	1	0	17.18	17.24	17.26	19
20	256QAM	1	49	17.29	17.45	17.30	
20	256QAM	1	99	17.29	17.33	17.24	
20	256QAM	50	0	17.08	17.35	17.13	19
20	256QAM	50	24	17.20	17.29	17.21	
20	256QAM	50	50	17.18	17.27	17.29	
20	256QAM	100	0	17.05	17.35	17.26	
Channel				20025	20175	20325	Tune-up limit (dBm)
Frequency (MHz)				1717.5	1732.5	1747.5	
15	QPSK	1	0	22.17	22.23	22.21	24
15	QPSK	1	37	22.16	22.22	22.33	
15	QPSK	1	74	22.11	22.04	22.16	
15	QPSK	36	0	21.21	21.41	21.17	23
15	QPSK	36	20	21.32	21.31	21.20	
15	QPSK	36	39	21.25	21.29	21.13	
15	QPSK	75	0	21.28	21.30	21.28	23
15	16QAM	1	0	21.51	21.47	21.48	
15	16QAM	1	37	21.46	21.59	21.51	
15	16QAM	1	74	21.33	21.51	21.36	22
15	16QAM	36	0	20.11	20.45	20.15	
15	16QAM	36	20	20.30	20.28	20.19	
15	16QAM	36	39	20.28	20.32	20.16	22
15	16QAM	75	0	20.24	20.35	20.30	
15	64QAM	1	0	20.33	20.23	20.31	
15	64QAM	1	37	20.42	20.38	20.29	22
15	64QAM	1	74	20.32	20.27	20.20	
15	64QAM	36	0	19.03	19.35	19.10	
15	64QAM	36	20	19.39	19.44	19.31	21
15	64QAM	36	39	19.08	19.33	19.20	
15	64QAM	75	0	19.20	19.36	19.25	
15	256QAM	1	0	17.13	17.15	17.21	19
15	256QAM	1	37	17.19	17.38	17.24	
15	256QAM	1	74	17.25	17.25	17.15	
15	256QAM	36	0	17.05	17.26	17.07	19
15	256QAM	36	20	17.16	17.26	17.11	
15	256QAM	36	39	17.17	17.26	17.27	



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**Report No. : FA2D2603-01**

15	256QAM	75	0	17.04	17.34	17.16	
Channel				20000	20175	20350	Tune-up limit (dBm)
Frequency (MHz)				1715	1732.5	1750	
10	QPSK	1	0	22.16	22.16	22.31	24
10	QPSK	1	25	22.23	22.30	22.15	
10	QPSK	1	49	22.16	22.19	22.13	
10	QPSK	25	0	21.32	21.25	21.33	23
10	QPSK	25	12	21.28	21.31	21.33	
10	QPSK	25	25	21.19	21.47	21.15	
10	QPSK	50	0	21.27	21.25	21.19	23
10	16QAM	1	0	21.31	21.49	21.63	
10	16QAM	1	25	21.45	21.56	21.50	
10	16QAM	1	49	21.44	21.47	21.23	22
10	16QAM	25	0	20.08	20.33	20.21	
10	16QAM	25	12	20.40	20.34	20.19	
10	16QAM	25	25	20.18	20.37	20.21	22
10	16QAM	50	0	20.20	20.19	20.13	
10	64QAM	1	0	20.32	20.37	20.42	
10	64QAM	1	25	20.36	20.39	20.38	22
10	64QAM	1	49	20.39	20.18	20.27	
10	64QAM	25	0	19.12	19.29	19.26	
10	64QAM	25	12	19.30	19.39	19.39	21
10	64QAM	25	25	19.17	19.30	19.11	
10	64QAM	50	0	19.19	19.28	19.27	
10	256QAM	1	0	17.08	17.23	17.20	19
10	256QAM	1	25	17.24	17.44	17.30	
10	256QAM	1	49	17.28	17.32	17.18	
10	256QAM	25	0	17.03	17.34	17.04	19
10	256QAM	25	12	17.17	17.20	17.20	
10	256QAM	25	25	17.15	17.17	17.19	
10	256QAM	50	0	17.03	17.32	17.16	
Channel				19975	20175	20375	Tune-up limit (dBm)
Frequency (MHz)				1712.5	1732.5	1752.5	
5	QPSK	1	0	22.26	22.23	22.23	24
5	QPSK	1	12	22.23	22.28	22.22	
5	QPSK	1	24	22.14	22.18	22.07	
5	QPSK	12	0	21.13	21.41	21.11	23
5	QPSK	12	7	21.38	21.38	21.20	
5	QPSK	12	13	21.15	21.28	21.36	
5	QPSK	25	0	21.34	21.31	21.18	23
5	16QAM	1	0	21.35	21.29	21.49	
5	16QAM	1	12	21.36	21.64	21.54	
5	16QAM	1	24	21.35	21.41	21.34	22
5	16QAM	12	0	20.09	20.40	20.22	
5	16QAM	12	7	20.41	20.22	20.18	
5	16QAM	12	13	20.24	20.28	20.17	22
5	16QAM	25	0	20.18	20.19	20.24	
5	64QAM	1	0	20.23	20.26	20.31	
5	64QAM	1	12	20.34	20.40	20.39	22
5	64QAM	1	24	20.29	20.31	20.11	
5	64QAM	12	0	19.12	19.23	19.20	
5	64QAM	12	7	19.26	19.30	19.26	21
5	64QAM	12	13	19.29	19.24	19.10	
5	64QAM	25	0	19.22	19.30	19.17	
5	256QAM	1	0	17.13	17.14	17.17	19
5	256QAM	1	12	17.22	17.42	17.29	
5	256QAM	1	24	17.20	17.29	17.20	
5	256QAM	12	0	17.01	17.33	17.09	19
5	256QAM	12	7	17.12	17.19	17.21	
5	256QAM	12	13	17.10	17.24	17.29	
5	256QAM	25	0	17.04	17.35	17.16	



Channel				19965	20175	20385	Tune-up limit (dBm)
Frequency (MHz)				1711.5	1732.5	1753.5	
3	QPSK	1	0	22.29	22.23	22.32	24
3	QPSK	1	8	22.33	22.34	22.27	
3	QPSK	1	14	22.11	22.20	22.02	
3	QPSK	8	0	21.06	21.41	21.25	23
3	QPSK	8	4	21.37	21.25	21.22	
3	QPSK	8	7	21.22	21.35	21.17	
3	QPSK	15	0	21.17	21.19	21.20	23
3	16QAM	1	0	21.42	21.45	21.56	
3	16QAM	1	8	21.51	21.57	21.47	
3	16QAM	1	14	21.47	21.50	21.29	22
3	16QAM	8	0	20.02	20.29	20.23	
3	16QAM	8	4	20.43	20.33	20.23	
3	16QAM	8	7	20.12	20.30	20.25	22
3	16QAM	15	0	20.26	20.20	20.29	
3	64QAM	1	0	20.37	20.31	20.44	
3	64QAM	1	8	20.44	20.46	20.40	22
3	64QAM	1	14	20.17	20.25	20.16	
3	64QAM	8	0	19.08	19.23	19.22	
3	64QAM	8	4	19.29	19.23	19.23	21
3	64QAM	8	7	19.19	19.37	19.12	
3	64QAM	15	0	19.12	19.31	19.12	
3	256QAM	1	0	17.18	17.19	17.18	19
3	256QAM	1	8	17.25	17.40	17.27	
3	256QAM	1	14	17.29	17.32	17.18	
3	256QAM	8	0	17.08	17.34	17.07	19
3	256QAM	8	4	17.20	17.28	17.14	
3	256QAM	8	7	17.10	17.22	17.22	
3	256QAM	15	0	17.04	17.28	17.24	
Channel				19957	20175	20393	Tune-up limit (dBm)
Frequency (MHz)				1710.7	1732.5	1754.3	
1.4	QPSK	1	0	22.08	22.19	22.07	24
1.4	QPSK	1	3	22.11	22.20	22.10	
1.4	QPSK	1	5	22.08	22.18	22.07	
1.4	QPSK	3	0	22.11	22.18	22.09	23
1.4	QPSK	3	1	22.10	22.17	22.09	
1.4	QPSK	3	3	22.12	22.18	22.09	
1.4	QPSK	6	0	21.31	21.36	21.27	23
1.4	16QAM	1	0	21.15	21.24	21.12	23
1.4	16QAM	1	3	21.17	21.27	21.15	
1.4	16QAM	1	5	21.17	21.26	21.12	
1.4	16QAM	3	0	21.12	21.16	21.07	22
1.4	16QAM	3	1	21.11	21.17	21.09	
1.4	16QAM	3	3	21.11	21.16	21.07	
1.4	16QAM	6	0	20.18	20.22	20.13	22
1.4	64QAM	1	0	20.21	20.33	20.18	22
1.4	64QAM	1	3	20.00	20.13	20.01	
1.4	64QAM	1	5	20.23	20.31	20.17	
1.4	64QAM	3	0	20.20	20.27	20.18	21
1.4	64QAM	3	1	20.20	20.27	20.16	
1.4	64QAM	3	3	20.19	20.26	20.17	
1.4	64QAM	6	0	19.04	19.09	19.03	21
1.4	256QAM	1	0	17.18	17.17	17.24	19
1.4	256QAM	1	3	17.21	17.35	17.20	
1.4	256QAM	1	5	17.22	17.32	17.21	
1.4	256QAM	3	0	17.04	17.28	17.06	19
1.4	256QAM	3	1	17.20	17.19	17.15	
1.4	256QAM	3	3	17.11	17.20	17.19	
1.4	256QAM	6	0	17.02	17.33	17.20	19



<LTE Band 7 Ant 8>							
BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				20850	21100	21350	
Frequency (MHz)				2510	2535	2560	
20	QPSK	1	0	21.36	21.48	21.59	22
20	QPSK	1	49	21.31	21.45	21.58	
20	QPSK	1	99	21.29	21.41	21.57	
20	QPSK	50	0	21.04	21.22	21.33	22
20	QPSK	50	24	20.87	21.03	21.11	
20	QPSK	50	50	20.85	21.01	21.09	
20	QPSK	100	0	21.08	21.23	21.30	22
20	16QAM	1	0	21.13	21.26	21.38	
20	16QAM	1	49	21.17	21.27	21.36	
20	16QAM	1	99	21.16	21.26	21.31	21
20	16QAM	50	0	20.02	20.19	20.31	
20	16QAM	50	24	19.79	19.97	20.10	
20	16QAM	50	50	19.89	20.00	20.06	21
20	16QAM	100	0	20.05	20.18	20.27	
20	64QAM	1	0	20.03	20.12	20.23	
20	64QAM	1	49	20.00	20.12	20.21	21
20	64QAM	1	99	19.98	20.09	20.19	
20	64QAM	50	0	18.97	19.14	19.29	
20	64QAM	50	24	18.82	18.97	19.02	20
20	64QAM	50	50	18.87	18.95	19.03	
20	64QAM	100	0	19.05	19.17	19.28	
20	256QAM	1	0	17.19	17.44	17.51	18
20	256QAM	1	49	17.40	17.56	17.60	
20	256QAM	1	99	17.33	17.45	17.52	
20	256QAM	50	0	17.26	17.49	17.57	18
20	256QAM	50	24	17.26	17.48	17.54	
20	256QAM	50	50	17.33	17.41	17.54	
20	256QAM	100	0	17.33	17.44	17.56	
Channel				20825	21100	21375	Tune-up limit (dBm)
Frequency (MHz)				2507.5	2535	2562.5	
15	QPSK	1	0	21.28	21.39	21.52	22
15	QPSK	1	37	21.30	21.25	21.47	
15	QPSK	1	74	21.23	21.38	21.45	
15	QPSK	36	0	20.97	21.21	21.13	22
15	QPSK	36	20	20.68	20.92	20.97	
15	QPSK	36	39	20.77	20.97	20.97	
15	QPSK	75	0	21.01	21.05	21.23	22
15	16QAM	1	0	21.06	21.15	21.29	
15	16QAM	1	37	21.13	21.21	21.23	
15	16QAM	1	74	20.99	21.17	21.13	21
15	16QAM	36	0	19.97	20.02	20.18	
15	16QAM	36	20	19.59	19.90	19.92	
15	16QAM	36	39	19.73	19.96	19.88	21
15	16QAM	75	0	19.87	20.17	20.11	
15	64QAM	1	0	19.91	20.11	20.11	
15	64QAM	1	37	19.80	19.95	20.20	21
15	64QAM	1	74	19.93	19.98	20.06	
15	64QAM	36	0	18.80	18.94	19.24	
15	64QAM	36	20	18.73	18.83	18.97	20
15	64QAM	36	39	18.82	18.83	19.02	
15	64QAM	75	0	18.99	19.02	19.24	
15	256QAM	1	0	17.16	17.37	17.46	18
15	256QAM	1	37	17.38	17.55	17.58	
15	256QAM	1	74	17.31	17.39	17.47	
15	256QAM	36	0	17.22	17.41	17.53	18
15	256QAM	36	20	17.17	17.43	17.51	
15	256QAM	36	39	17.31	17.40	17.46	





**FCC SAR TEST REPORT**

**Report No. : FA2D2603-01**

15	256QAM	75	0	17.33	17.41	17.46	
Channel				20800	21100	21400	Tune-up limit (dBm)
Frequency (MHz)				2505	2535	2565	
10	QPSK	1	0	21.32	21.48	21.54	22
10	QPSK	1	25	21.23	21.38	21.40	
10	QPSK	1	49	21.14	21.26	21.38	
10	QPSK	25	0	21.01	21.13	21.13	22
10	QPSK	25	12	20.78	20.84	21.06	
10	QPSK	25	25	20.80	20.99	20.99	
10	QPSK	50	0	20.89	21.14	21.10	22
10	16QAM	1	0	20.95	21.14	21.36	
10	16QAM	1	25	21.10	21.12	21.17	
10	16QAM	1	49	21.12	21.25	21.31	21
10	16QAM	25	0	19.88	20.04	20.31	
10	16QAM	25	12	19.67	19.80	20.01	
10	16QAM	25	25	19.83	19.86	19.95	21
10	16QAM	50	0	19.86	20.13	20.09	
10	64QAM	1	0	19.83	20.12	20.19	
10	64QAM	1	25	19.89	19.98	20.01	20
10	64QAM	1	49	19.80	19.90	20.15	
10	64QAM	25	0	18.86	19.13	19.16	
10	64QAM	25	12	18.70	18.89	18.88	18
10	64QAM	25	25	18.70	18.77	18.93	
10	64QAM	50	0	18.92	18.97	19.11	
10	256QAM	1	0	17.18	17.43	17.45	18
10	256QAM	1	25	17.30	17.54	17.52	
10	256QAM	1	49	17.32	17.37	17.50	
10	256QAM	25	0	17.26	17.41	17.52	18
10	256QAM	25	12	17.20	17.41	17.54	
10	256QAM	25	25	17.27	17.40	17.51	
10	256QAM	50	0	17.28	17.42	17.47	
Channel				20775	21100	21425	Tune-up limit (dBm)
Frequency (MHz)				2502.5	2535	2567.5	
5	QPSK	1	0	21.26	21.31	21.53	22
5	QPSK	1	12	21.12	21.40	21.54	
5	QPSK	1	24	21.10	21.34	21.48	
5	QPSK	12	0	20.91	21.12	21.24	22
5	QPSK	12	7	20.81	20.94	20.91	
5	QPSK	12	13	20.78	20.98	20.97	
5	QPSK	25	0	20.92	21.19	21.10	22
5	16QAM	1	0	21.03	21.16	21.37	
5	16QAM	1	12	21.06	21.17	21.16	
5	16QAM	1	24	21.02	21.25	21.12	21
5	16QAM	12	0	20.02	20.18	20.30	
5	16QAM	12	7	19.69	19.87	19.90	
5	16QAM	12	13	19.69	19.86	19.94	21
5	16QAM	25	0	19.97	20.07	20.11	
5	64QAM	1	0	19.89	20.02	20.09	
5	64QAM	1	12	20.00	20.00	20.21	20
5	64QAM	1	24	19.78	20.08	20.02	
5	64QAM	12	0	18.88	19.03	19.17	
5	64QAM	12	7	18.63	18.86	18.98	18
5	64QAM	12	13	18.68	18.80	18.87	
5	64QAM	25	0	18.97	19.09	19.12	
5	256QAM	1	0	17.16	17.42	17.45	18
5	256QAM	1	12	17.31	17.54	17.57	
5	256QAM	1	24	17.23	17.43	17.43	
5	256QAM	12	0	17.21	17.41	17.50	18
5	256QAM	12	7	17.20	17.39	17.46	
5	256QAM	12	13	17.31	17.37	17.47	
5	256QAM	25	0	17.28	17.36	17.53	



<LTE Band 25 Ant 8>							
BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				26140	26340	26590	
Frequency (MHz)				1860	1880	1905	
20	QPSK	1	0	19.30	19.42	19.43	20
20	QPSK	1	49	19.38	19.42	19.65	
20	QPSK	1	99	19.39	19.45	19.67	
20	QPSK	50	0	19.31	19.15	19.46	20
20	QPSK	50	24	19.35	19.28	19.51	
20	QPSK	50	50	19.38	19.34	19.52	
20	QPSK	100	0	19.25	19.28	19.47	
20	16QAM	1	0	19.41	19.53	19.57	20
20	16QAM	1	49	19.62	19.51	19.62	
20	16QAM	1	99	19.42	19.47	19.65	
20	16QAM	50	0	19.30	19.15	19.49	20
20	16QAM	50	24	19.31	19.24	19.45	
20	16QAM	50	50	19.29	19.31	19.50	
20	16QAM	100	0	19.23	19.24	19.41	
20	64QAM	1	0	19.31	19.37	19.45	20
20	64QAM	1	49	19.43	19.36	19.61	
20	64QAM	1	99	19.24	19.30	19.64	
20	64QAM	50	0	18.77	18.66	18.99	19.5
20	64QAM	50	24	18.81	18.75	19.03	
20	64QAM	50	50	18.77	18.86	18.93	
20	64QAM	100	0	18.72	18.74	18.94	
20	256QAM	1	0	17.15	17.27	17.34	18
20	256QAM	1	49	17.35	17.29	17.49	
20	256QAM	1	99	17.18	17.30	17.56	
20	256QAM	50	0	17.23	17.07	17.34	18
20	256QAM	50	24	17.25	17.16	17.43	
20	256QAM	50	50	17.26	17.26	17.36	
20	256QAM	100	0	17.21	17.15	17.34	
Channel				26115	26340	26615	
Frequency (MHz)				1857.5	1880	1907.5	
15	QPSK	1	0	19.16	19.36	19.26	20
15	QPSK	1	37	19.34	19.26	19.52	
15	QPSK	1	74	19.20	19.25	19.58	
15	QPSK	36	0	19.21	18.96	19.42	20
15	QPSK	36	20	19.15	19.28	19.45	
15	QPSK	36	39	19.30	19.29	19.42	
15	QPSK	75	0	19.20	19.18	19.27	
15	16QAM	1	0	19.32	19.51	19.55	20
15	16QAM	1	37	19.54	19.40	19.50	
15	16QAM	1	74	19.34	19.33	19.54	
15	16QAM	36	0	19.20	19.10	19.43	20
15	16QAM	36	20	19.27	19.24	19.34	
15	16QAM	36	39	19.18	19.19	19.43	
15	16QAM	75	0	19.20	19.23	19.30	
15	64QAM	1	0	19.23	19.27	19.41	20
15	64QAM	1	37	19.33	19.34	19.42	
15	64QAM	1	74	19.09	19.15	19.49	
15	64QAM	36	0	18.62	18.46	18.96	19.5
15	64QAM	36	20	18.66	18.68	19.03	
15	64QAM	36	39	18.72	18.73	18.77	
15	64QAM	75	0	18.69	18.60	18.78	
15	256QAM	1	0	17.08	17.17	17.29	18
15	256QAM	1	37	17.27	17.20	17.44	
15	256QAM	1	74	17.12	17.28	17.54	
15	256QAM	36	0	17.23	17.04	17.28	18
15	256QAM	36	20	17.21	17.12	17.43	
15	256QAM	36	39	17.16	17.19	17.36	



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15	256QAM	75	0	17.17	17.10	17.27	
Channel				26090	26340	26640	Tune-up limit
Frequency (MHz)				1855	1880	1910	(dBm)
10	QPSK	1	0	19.25	19.37	19.40	20
10	QPSK	1	25	19.21	19.26	19.63	
10	QPSK	1	49	19.22	19.38	19.64	
10	QPSK	25	0	19.18	19.06	19.31	20
10	QPSK	25	12	19.16	19.16	19.38	
10	QPSK	25	25	19.26	19.33	19.47	
10	QPSK	50	0	19.17	19.14	19.41	20
10	16QAM	1	0	19.29	19.49	19.54	
10	16QAM	1	25	19.61	19.42	19.58	
10	16QAM	1	49	19.22	19.33	19.58	20
10	16QAM	25	0	19.22	19.06	19.32	
10	16QAM	25	12	19.29	19.09	19.45	
10	16QAM	25	25	19.13	19.18	19.50	20
10	16QAM	50	0	19.17	19.10	19.37	
10	64QAM	1	0	19.16	19.32	19.43	
10	64QAM	1	25	19.23	19.34	19.41	20
10	64QAM	1	49	19.24	19.27	19.44	
10	64QAM	25	0	18.68	18.59	18.82	
10	64QAM	25	12	18.67	18.71	19.00	19.5
10	64QAM	25	25	18.72	18.78	18.80	
10	64QAM	50	0	18.66	18.73	18.74	
10	256QAM	1	0	17.06	17.26	17.25	18
10	256QAM	1	25	17.34	17.25	17.43	
10	256QAM	1	49	17.12	17.23	17.55	
10	256QAM	25	0	17.23	16.97	17.30	18
10	256QAM	25	12	17.15	17.08	17.41	
10	256QAM	25	25	17.21	17.22	17.28	
10	256QAM	50	0	17.11	17.10	17.30	
Channel				26065	26340	26665	Tune-up limit
Frequency (MHz)				1852.5	1880	1912.5	(dBm)
5	QPSK	1	0	19.11	19.42	19.35	20
5	QPSK	1	12	19.28	19.32	19.47	
5	QPSK	1	24	19.24	19.36	19.53	
5	QPSK	12	0	19.21	18.98	19.27	20
5	QPSK	12	7	19.30	19.27	19.34	
5	QPSK	12	13	19.37	19.14	19.33	
5	QPSK	25	0	19.12	19.22	19.47	20
5	16QAM	1	0	19.25	19.36	19.38	
5	16QAM	1	12	19.62	19.46	19.46	
5	16QAM	1	24	19.38	19.40	19.54	20
5	16QAM	12	0	19.23	19.02	19.36	
5	16QAM	12	7	19.30	19.24	19.45	
5	16QAM	12	13	19.25	19.13	19.39	20
5	16QAM	25	0	19.20	19.24	19.21	
5	64QAM	1	0	19.15	19.28	19.27	
5	64QAM	1	12	19.42	19.22	19.49	20
5	64QAM	1	24	19.19	19.29	19.46	
5	64QAM	12	0	18.69	18.54	18.80	
5	64QAM	12	7	18.64	18.55	18.98	19.5
5	64QAM	12	13	18.61	18.79	18.77	
5	64QAM	25	0	18.69	18.64	18.94	
5	256QAM	1	0	17.14	17.26	17.30	18
5	256QAM	1	12	17.28	17.24	17.44	
5	256QAM	1	24	17.14	17.29	17.55	
5	256QAM	12	0	17.17	17.05	17.33	18
5	256QAM	12	7	17.19	17.11	17.36	
5	256QAM	12	13	17.17	17.24	17.31	
5	256QAM	25	0	17.13	17.11	17.31	
Channel				26055	26340	26675	Tune-up limit



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Frequency (MHz)				1851.5	1880	1913.5	(dBm)
3	QPSK	1	0	19.26	19.24	19.39	20
3	QPSK	1	8	19.29	19.29	19.65	
3	QPSK	1	14	19.20	19.32	19.60	
3	QPSK	8	0	19.24	18.96	19.30	20
3	QPSK	8	4	19.31	19.26	19.39	
3	QPSK	8	7	19.24	19.30	19.44	
3	QPSK	15	0	19.24	19.15	19.43	20
3	16QAM	1	0	19.31	19.45	19.41	
3	16QAM	1	8	19.49	19.47	19.55	
3	16QAM	1	14	19.33	19.44	19.60	20
3	16QAM	8	0	19.18	18.97	19.31	
3	16QAM	8	4	19.25	19.17	19.33	
3	16QAM	8	7	19.26	19.18	19.48	20
3	16QAM	15	0	19.05	19.04	19.36	
3	64QAM	1	0	19.29	19.23	19.35	
3	64QAM	1	8	19.35	19.32	19.44	20
3	64QAM	1	14	19.19	19.22	19.59	
3	64QAM	8	0	18.71	18.53	18.99	
3	64QAM	8	4	18.70	18.65	18.95	19.5
3	64QAM	8	7	18.59	18.71	18.73	
3	64QAM	15	0	18.70	18.74	18.90	
3	256QAM	1	0	17.15	17.18	17.24	18
3	256QAM	1	8	17.32	17.28	17.45	
3	256QAM	1	14	17.17	17.30	17.56	
3	256QAM	8	0	17.20	17.01	17.24	18
3	256QAM	8	4	17.19	17.09	17.39	
3	256QAM	8	7	17.17	17.24	17.34	
3	256QAM	15	0	17.21	17.08	17.26	
Channel				26047	26340	26683	Tune-up limit
Frequency (MHz)				1850.7	1880	1914.3	(dBm)
1.4	QPSK	1	0	19.16	19.19	19.53	20
1.4	QPSK	1	3	19.18	19.20	19.54	
1.4	QPSK	1	5	19.13	19.21	19.54	
1.4	QPSK	3	0	19.21	19.23	19.56	
1.4	QPSK	3	1	19.20	19.23	19.58	
1.4	QPSK	3	3	19.22	19.23	19.57	20
1.4	QPSK	6	0	19.22	19.23	19.57	20
1.4	16QAM	1	0	19.50	19.47	19.65	20
1.4	16QAM	1	3	19.52	19.53	19.66	
1.4	16QAM	1	5	19.51	19.59	19.64	
1.4	16QAM	3	0	19.21	19.25	19.58	
1.4	16QAM	3	1	19.21	19.24	19.59	
1.4	16QAM	3	3	19.23	19.25	19.58	20
1.4	16QAM	6	0	19.31	19.32	19.62	20
1.4	64QAM	1	0	19.35	19.38	19.63	20
1.4	64QAM	1	3	19.34	19.37	19.61	
1.4	64QAM	1	5	19.31	19.41	19.65	
1.4	64QAM	3	0	19.32	19.36	19.61	
1.4	64QAM	3	1	19.35	19.36	19.61	
1.4	64QAM	3	3	19.34	19.34	19.62	19.5
1.4	64QAM	6	0	18.71	18.71	19.04	19.5
1.4	256QAM	1	0	17.12	17.23	17.33	18
1.4	256QAM	1	3	17.30	17.25	17.45	
1.4	256QAM	1	5	17.10	17.23	17.56	
1.4	256QAM	3	0	17.23	16.97	17.31	
1.4	256QAM	3	1	17.17	17.12	17.33	
1.4	256QAM	3	3	17.24	17.26	17.34	18
1.4	256QAM	6	0	17.14	17.06	17.28	18



<LTE Band 30 Ant 8>							
BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				27710			
Frequency (MHz)				2310			
10	QPSK	1	0		20.87		22
10	QPSK	1	25		20.73		
10	QPSK	1	49		20.70		
10	QPSK	25	0		19.92		21
10	QPSK	25	12		19.95		
10	QPSK	25	25		19.73		
10	QPSK	50	0		19.93		
10	16QAM	1	0		20.20		21
10	16QAM	1	25		19.94		
10	16QAM	1	49		20.08		
10	16QAM	25	0		18.96		20
10	16QAM	25	12		18.91		
10	16QAM	25	25		18.76		
10	16QAM	50	0		18.86		
10	64QAM	1	0		19.11		20
10	64QAM	1	25		18.96		
10	64QAM	1	49		18.99		
10	64QAM	25	0		17.96		19
10	64QAM	25	12		17.88		
10	64QAM	25	25		17.75		
10	64QAM	50	0		17.87		
10	256QAM	1	0		16.19		17
10	256QAM	1	25		16.08		
10	256QAM	1	49		15.95		
10	256QAM	25	0		15.85		17
10	256QAM	25	12		15.93		
10	256QAM	25	25		15.78		
10	256QAM	50	0		15.81		
Channel				27685	27710	27735	Tune-up limit (dBm)
Frequency (MHz)				2307.5	2310	2312.5	
5	QPSK	1	0	20.65	20.57	20.55	22
5	QPSK	1	12	20.57	20.56	20.54	
5	QPSK	1	24	20.55	20.53	20.52	
5	QPSK	12	0	19.55	19.56	19.61	21
5	QPSK	12	7	19.53	19.53	19.51	
5	QPSK	12	13	19.49	19.44	19.47	
5	QPSK	25	0	19.57	19.52	19.53	
5	16QAM	1	0	19.94	19.86	19.76	21
5	16QAM	1	12	19.84	19.81	19.77	
5	16QAM	1	24	19.80	19.77	19.77	
5	16QAM	12	0	18.54	18.59	18.57	20
5	16QAM	12	7	18.52	18.49	18.48	
5	16QAM	12	13	18.47	18.46	18.41	
5	16QAM	25	0	18.57	18.54	18.53	
5	64QAM	1	0	18.81	18.75	18.72	20
5	64QAM	1	12	18.75	18.73	18.70	
5	64QAM	1	24	18.65	18.67	18.68	
5	64QAM	12	0	17.55	17.57	17.59	19
5	64QAM	12	7	17.55	17.53	17.51	
5	64QAM	12	13	17.53	17.47	17.42	
5	64QAM	25	0	17.57	17.53	17.50	
5	256QAM	1	0	16.19	16.26	16.23	17
5	256QAM	1	12	16.00	15.99	16.03	
5	256QAM	1	24	16.05	16.04	15.89	
5	256QAM	12	0	15.95	15.89	15.81	17
5	256QAM	12	7	15.91	15.95	15.94	
5	256QAM	12	13	15.75	15.78	15.82	
5	256QAM	25	0	15.73	15.77	15.78	



<LTE Band 66 Ant 8>							
BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				132072	132322	132572	
Frequency (MHz)				1720	1745	1770	
20	QPSK	1	0	22.20	22.17	22.17	24
20	QPSK	1	49	22.26	22.18	22.24	
20	QPSK	1	99	22.10	22.02	22.04	
20	QPSK	50	0	21.28	21.21	21.27	23
20	QPSK	50	24	21.25	21.20	21.26	
20	QPSK	50	50	21.27	21.02	21.17	
20	QPSK	100	0	21.19	21.11	21.16	
20	16QAM	1	0	21.33	21.38	21.41	23
20	16QAM	1	49	21.47	21.38	21.46	
20	16QAM	1	99	21.30	21.24	21.27	
20	16QAM	50	0	20.22	20.19	20.12	22
20	16QAM	50	24	20.23	20.20	20.26	
20	16QAM	50	50	20.24	20.02	20.10	
20	16QAM	100	0	20.17	20.13	20.11	
20	64QAM	1	0	20.25	20.31	20.29	22
20	64QAM	1	49	20.36	20.30	20.35	
20	64QAM	1	99	20.21	20.15	20.18	
20	64QAM	50	0	19.18	19.17	19.13	21
20	64QAM	50	24	19.21	19.17	19.24	
20	64QAM	50	50	19.26	19.10	19.12	
20	64QAM	100	0	19.16	19.10	19.10	
20	256QAM	1	0	17.38	17.37	17.39	19
20	256QAM	1	49	17.54	17.46	17.57	
20	256QAM	1	99	17.46	17.42	17.53	
20	256QAM	50	0	17.45	17.32	17.30	19
20	256QAM	50	24	17.47	17.40	17.50	
20	256QAM	50	50	17.49	17.25	17.45	
20	256QAM	100	0	17.46	17.31	17.40	
Channel				132047	132322	132597	
Frequency (MHz)				1717.5	1745	1772.5	
15	QPSK	1	0	22.14	22.15	22.11	24
15	QPSK	1	37	22.24	22.15	22.22	
15	QPSK	1	74	22.02	22.02	22.03	
15	QPSK	36	0	21.22	21.15	21.22	23
15	QPSK	36	20	21.24	21.10	21.17	
15	QPSK	36	39	21.23	21.08	21.17	
15	QPSK	75	0	21.11	21.05	21.11	
15	16QAM	1	0	21.31	21.31	21.39	23
15	16QAM	1	37	21.47	21.31	21.41	
15	16QAM	1	74	21.24	21.15	21.24	
15	16QAM	36	0	20.18	20.09	20.07	22
15	16QAM	36	20	20.20	20.10	20.19	
15	16QAM	36	39	20.16	20.09	20.03	
15	16QAM	75	0	20.17	20.12	20.06	
15	64QAM	1	0	20.17	20.26	20.24	22
15	64QAM	1	37	20.28	20.23	20.29	
15	64QAM	1	74	20.13	20.09	20.18	
15	64QAM	36	0	19.13	19.10	19.07	21
15	64QAM	36	20	19.11	19.13	19.15	
15	64QAM	36	39	19.21	19.04	19.08	
15	64QAM	75	0	19.16	19.08	19.05	
15	256QAM	1	0	17.28	17.34	17.29	19
15	256QAM	1	37	17.54	17.40	17.51	
15	256QAM	1	74	17.46	17.35	17.53	
15	256QAM	36	0	17.43	17.32	17.27	19
15	256QAM	36	20	17.38	17.31	17.41	
15	256QAM	36	39	17.40	17.16	17.38	



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15	256QAM	75	0	17.44	17.28	17.38	
Channel				132022	132322	132622	Tune-up limit
Frequency (MHz)				1715	1745	1775	(dBm)
10	QPSK	1	0	22.18	22.11	22.10	24
10	QPSK	1	25	22.20	22.08	22.21	
10	QPSK	1	49	22.08	22.01	22.05	
10	QPSK	25	0	21.24	21.18	21.17	23
10	QPSK	25	12	21.23	21.10	21.19	
10	QPSK	25	25	21.17	21.08	21.08	
10	QPSK	50	0	21.10	21.06	21.06	23
10	16QAM	1	0	21.32	21.33	21.36	
10	16QAM	1	25	21.37	21.28	21.39	
10	16QAM	1	49	21.26	21.16	21.20	22
10	16QAM	25	0	20.16	20.15	20.08	
10	16QAM	25	12	20.19	20.16	20.25	
10	16QAM	25	25	20.15	20.09	20.03	22
10	16QAM	50	0	20.16	20.06	20.09	
10	64QAM	1	0	20.20	20.28	20.19	
10	64QAM	1	25	20.35	20.25	20.31	22
10	64QAM	1	49	20.20	20.14	20.15	
10	64QAM	25	0	19.15	19.14	19.12	
10	64QAM	25	12	19.13	19.15	19.24	21
10	64QAM	25	25	19.25	19.02	19.10	
10	64QAM	50	0	19.13	19.09	19.01	
10	256QAM	1	0	17.29	17.35	17.32	19
10	256QAM	1	25	17.53	17.44	17.48	
10	256QAM	1	49	17.45	17.34	17.46	
10	256QAM	25	0	17.40	17.30	17.27	19
10	256QAM	25	12	17.37	17.39	17.43	
10	256QAM	25	25	17.41	17.24	17.43	
10	256QAM	50	0	17.45	17.30	17.38	
Channel				131997	132322	132647	Tune-up limit
Frequency (MHz)				1712.5	1745	1777.5	(dBm)
5	QPSK	1	0	22.18	22.14	22.15	24
5	QPSK	1	12	22.22	22.15	22.22	
5	QPSK	1	24	22.06	22.09	22.09	
5	QPSK	12	0	21.23	21.17	21.18	23
5	QPSK	12	7	21.16	21.15	21.20	
5	QPSK	12	13	21.20	21.02	21.11	
5	QPSK	25	0	21.15	21.10	21.15	23
5	16QAM	1	0	21.24	21.34	21.40	
5	16QAM	1	12	21.46	21.31	21.37	
5	16QAM	1	24	21.22	21.20	21.18	22
5	16QAM	12	0	20.13	20.12	20.02	
5	16QAM	12	7	20.16	20.12	20.16	
5	16QAM	12	13	20.23	20.03	20.07	22
5	16QAM	25	0	20.17	20.03	20.11	
5	64QAM	1	0	20.19	20.31	20.28	
5	64QAM	1	12	20.30	20.20	20.30	22
5	64QAM	1	24	20.13	20.15	20.12	
5	64QAM	12	0	19.12	19.10	19.13	
5	64QAM	12	7	19.15	19.15	19.14	21
5	64QAM	12	13	19.18	19.03	19.04	
5	64QAM	25	0	19.16	19.02	19.03	
5	256QAM	1	0	17.38	17.28	17.29	19
5	256QAM	1	12	17.53	17.42	17.51	
5	256QAM	1	24	17.41	17.40	17.48	
5	256QAM	12	0	17.37	17.29	17.29	19
5	256QAM	12	7	17.40	17.34	17.50	
5	256QAM	12	13	17.43	17.16	17.36	
5	256QAM	25	0	17.44	17.25	17.34	
Channel				131987	132322	132657	Tune-up limit



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Frequency (MHz)				1711.5	1745	1778.5	(dBm)
3	QPSK	1	0	22.19	22.09	22.10	24
3	QPSK	1	8	22.22	22.16	22.17	
3	QPSK	1	14	22.06	22.08	22.00	
3	QPSK	8	0	21.22	21.16	21.26	23
3	QPSK	8	4	21.18	21.10	21.23	
3	QPSK	8	7	21.23	21.00	21.10	
3	QPSK	15	0	21.10	21.02	21.11	23
3	16QAM	1	0	21.28	21.36	21.33	
3	16QAM	1	8	21.43	21.36	21.41	
3	16QAM	1	14	21.26	21.14	21.19	22
3	16QAM	8	0	20.18	20.13	20.05	
3	16QAM	8	4	20.13	20.13	20.19	
3	16QAM	8	7	20.14	20.01	20.04	22
3	16QAM	15	0	20.11	20.05	20.04	
3	64QAM	1	0	20.21	20.31	20.21	
3	64QAM	1	8	20.31	20.26	20.33	22
3	64QAM	1	14	20.20	20.05	20.08	
3	64QAM	8	0	19.15	19.11	19.09	
3	64QAM	8	4	19.13	19.09	19.17	21
3	64QAM	8	7	19.18	19.08	19.05	
3	64QAM	15	0	19.09	19.05	19.09	
3	256QAM	1	0	17.32	17.30	17.33	19
3	256QAM	1	8	17.54	17.44	17.50	
3	256QAM	1	14	17.44	17.36	17.47	
3	256QAM	8	0	17.37	17.27	17.20	19
3	256QAM	8	4	17.44	17.37	17.41	
3	256QAM	8	7	17.47	17.17	17.39	
3	256QAM	15	0	17.36	17.29	17.37	
Channel				131979	132322	132665	Tune-up limit
Frequency (MHz)				1710.7	1745	1779.3	(dBm)
1.4	QPSK	1	0	22.20	22.08	22.16	24
1.4	QPSK	1	3	22.24	22.16	22.14	
1.4	QPSK	1	5	22.03	22.06	22.07	
1.4	QPSK	3	0	22.18	22.07	22.12	
1.4	QPSK	3	1	22.17	22.10	22.16	
1.4	QPSK	3	3	22.07	22.06	22.04	23
1.4	QPSK	6	0	21.19	21.01	21.15	
1.4	16QAM	1	0	21.32	21.32	21.34	23
1.4	16QAM	1	3	21.43	21.36	21.36	
1.4	16QAM	1	5	21.23	21.23	21.21	
1.4	16QAM	3	0	21.24	21.31	21.40	
1.4	16QAM	3	1	21.45	21.38	21.46	
1.4	16QAM	3	3	21.29	21.19	21.20	22
1.4	16QAM	6	0	20.08	20.07	20.03	
1.4	64QAM	1	0	20.23	20.28	20.28	22
1.4	64QAM	1	3	20.26	20.21	20.28	
1.4	64QAM	1	5	20.18	20.08	20.18	
1.4	64QAM	3	0	20.21	20.28	20.29	
1.4	64QAM	3	1	20.36	20.22	20.30	
1.4	64QAM	3	3	20.16	20.05	20.18	21
1.4	64QAM	6	0	19.16	19.02	19.08	
1.4	256QAM	1	0	17.30	17.29	17.29	19
1.4	256QAM	1	3	17.49	17.39	17.51	
1.4	256QAM	1	5	17.41	17.32	17.48	
1.4	256QAM	3	0	17.44	17.27	17.23	
1.4	256QAM	3	1	17.43	17.37	17.44	
1.4	256QAM	3	3	17.44	17.17	17.37	19
1.4	256QAM	6	0	17.39	17.23	17.37	

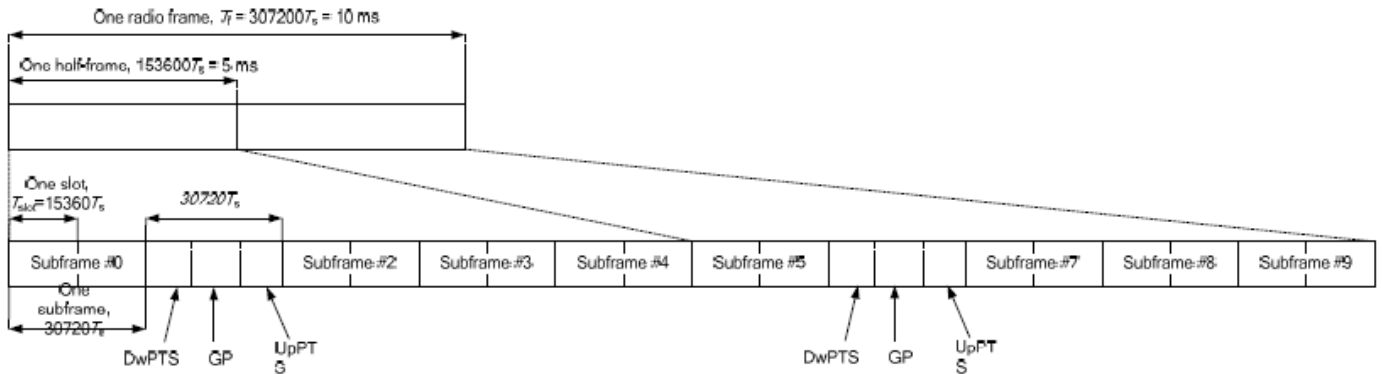


**<TDD LTE SAR Measurement>**

TDD LTE configuration setup for SAR measurement

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

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



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

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

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

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

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



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

The highest duty factor is resulted from:

- i. Uplink-downlink configuration: 0. In a half-frame consisted of 5 subframes, uplink operation is in 3 uplink subframes and 1 special subframe.
- ii. special subframe configuration: 5-9 for normal cyclic prefix in downlink, 4-7 for extended cyclic prefix in downlink
- iii. for special subframe with extended cyclic prefix in uplink, the total uplink duty factor in one half-frame is:  $(3+0.167)/5 = 63.3\%$
- iv. for special subframe with normal cyclic prefix in uplink, the total uplink duty factor in one half-frame is:  $(3+0.143)/5 = 62.9\%$
- v. For TDD LTE SAR measurement, the duty cycle 1:1.59 (62.9 %) was used perform testing and considering the theoretical duty cycle of 63.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 62.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix  $63.3\%/62.9\% = 1.006$  is applied to scale-up the measured SAR result. The scaled TDD LTE SAR = measured SAR (W/kg)\* Tune-up Scaling Factor\* scaling factor for extended cyclic prefix.
- vi. The device supports Power Class 3 uplink-downlink configurations 0 and 6, and Power Class 2 uplink-downlink configurations 1 to 5 operations for LTE Band 41.
- vii. The highest available duty cycle for Power Class 2 operation is 43.3% using UL-DL configuration 1, for Power Class 3 operation is 63.3% using UL-DL configuration 0. Per FCC Guidance, all SAR tests were performed using Power Class 3. SAR with Power Class 2 at the available duty factor was additionally performed for the Power Class 3 configuration with the highest SAR among all exposure condition.



<LTE Band 41 Ant 8>									
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)
Channel				39750	40185	40620	41055	41490	
Frequency (MHz)				2506	2549.5	2593	2636.5	2680	
20	QPSK	1	0	22.11	22.48	22.55	22.71	22.59	24
20	QPSK	1	49	22.53	22.52	22.79	22.74	22.77	
20	QPSK	1	99	22.48	22.38	22.77	22.50	22.32	
20	QPSK	50	0	21.30	21.45	21.71	21.77	21.69	23
20	QPSK	50	24	21.46	21.46	21.78	21.71	21.70	
20	QPSK	50	50	21.58	21.49	21.89	21.79	21.76	
20	QPSK	100	0	21.43	21.48	21.77	21.69	21.70	23
20	16QAM	1	0	21.18	21.66	21.69	21.80	21.72	
20	16QAM	1	49	21.50	21.51	21.83	21.80	21.86	
20	16QAM	1	99	21.65	21.46	21.87	21.58	21.42	22
20	16QAM	50	0	20.33	20.58	20.72	20.80	20.82	
20	16QAM	50	24	20.44	20.51	20.81	20.77	20.79	
20	16QAM	50	50	20.59	20.41	20.84	20.63	20.66	22
20	16QAM	100	0	20.46	20.52	20.77	20.71	20.70	
20	64QAM	1	0	20.18	20.38	20.37	20.51	20.43	
20	64QAM	1	49	20.24	20.22	20.57	20.52	20.58	22
20	64QAM	1	99	20.35	20.14	20.56	20.26	20.17	
20	64QAM	50	0	19.29	19.58	19.67	19.79	19.81	
20	64QAM	50	24	19.46	19.48	19.77	19.76	19.81	21
20	64QAM	50	50	19.52	19.39	19.84	19.61	19.62	
20	64QAM	100	0	19.44	19.49	19.75	19.71	19.71	
20	256QAM	1	0	17.07	17.56	17.62	17.91	17.59	19
20	256QAM	1	49	17.42	17.38	17.70	17.81	17.72	
20	256QAM	1	99	17.57	17.28	17.73	17.39	17.29	
20	256QAM	50	0	17.47	17.71	17.90	18.13	17.94	19
20	256QAM	50	24	17.61	17.60	17.90	18.03	17.88	
20	256QAM	50	50	17.71	17.51	17.95	17.87	17.71	
20	256QAM	100	0	17.55	17.57	17.87	17.92	17.79	
Channel				39725	40173	40620	41068	41515	
Frequency (MHz)				2503.5	2548.3	2593	2637.8	2682.5	Tune-up limit (dBm)
15	QPSK	1	0	22.05	22.36	22.43	22.56	22.46	24.00
15	QPSK	1	37	22.35	22.41	22.62	22.57	22.61	
15	QPSK	1	74	22.48	22.36	22.60	22.49	22.13	
15	QPSK	36	0	21.12	21.36	21.67	21.70	21.53	23
15	QPSK	36	20	21.32	21.30	21.73	21.66	21.59	
15	QPSK	36	39	21.57	21.36	21.87	21.73	21.65	
15	QPSK	75	0	21.41	21.37	21.69	21.57	21.70	23
15	16QAM	1	0	21.02	21.55	21.69	21.60	21.63	
15	16QAM	1	37	21.42	21.51	21.78	21.71	21.78	
15	16QAM	1	74	21.49	21.30	21.74	21.51	21.36	22
15	16QAM	36	0	20.23	20.50	20.52	20.78	20.76	
15	16QAM	36	20	20.38	20.51	20.68	20.67	20.79	
15	16QAM	36	39	20.52	20.39	20.75	20.57	20.46	22
15	16QAM	75	0	20.38	20.52	20.74	20.64	20.54	
15	64QAM	1	0	20.18	20.26	20.30	20.36	20.42	
15	64QAM	1	37	20.20	20.10	20.46	20.49	20.46	22
15	64QAM	1	74	20.33	20.08	20.54	20.17	20.15	
15	64QAM	36	0	19.26	19.50	19.64	19.63	19.76	
15	64QAM	36	20	19.42	19.36	19.77	19.64	19.70	21
15	64QAM	36	39	19.48	19.37	19.79	19.47	19.57	
15	64QAM	75	0	19.38	19.34	19.74	19.62	19.60	



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15	256QAM	1	0	17.11	17.57	17.58	17.88	17.55	19
15	256QAM	1	37	17.35	17.43	17.72	17.83	17.67	
15	256QAM	1	74	17.67	17.24	17.63	17.44	17.24	
15	256QAM	36	0	17.57	17.68	17.82	18.16	17.90	19
15	256QAM	36	20	17.65	17.67	17.81	18.01	17.86	
15	256QAM	36	39	17.70	17.58	17.94	17.92	17.76	
15	256QAM	75	0	17.61	17.67	17.85	17.92	17.76	Tune-up limit (dBm)
Channel				39700	40160	40620	41080	41540	
Frequency (MHz)				2501	2547	2593	2639	2685	
10	QPSK	1	0	22.03	22.46	22.46	22.53	22.59	24
10	QPSK	1	25	22.50	22.48	22.68	22.61	22.71	
10	QPSK	1	49	22.43	22.38	22.60	22.34	22.14	
10	QPSK	25	0	21.17	21.33	21.68	21.71	21.59	23
10	QPSK	25	12	21.30	21.37	21.66	21.60	21.59	
10	QPSK	25	25	21.40	21.37	21.83	21.70	21.75	
10	QPSK	50	0	21.39	21.47	21.71	21.56	21.68	23
10	16QAM	1	0	21.08	21.46	21.63	21.69	21.61	
10	16QAM	1	25	21.41	21.31	21.63	21.75	21.78	
10	16QAM	1	49	21.52	21.32	21.87	21.41	21.29	22
10	16QAM	25	0	20.29	20.53	20.59	20.65	20.79	
10	16QAM	25	12	20.30	20.38	20.62	20.68	20.67	
10	16QAM	25	25	20.46	20.29	20.70	20.57	20.61	22
10	16QAM	50	0	20.46	20.37	20.73	20.58	20.50	
10	64QAM	1	0	20.12	20.19	20.21	20.48	20.29	
10	64QAM	1	25	20.22	20.11	20.48	20.43	20.58	22
10	64QAM	1	49	20.21	20.02	20.38	20.23	20.14	
10	64QAM	25	0	19.22	19.55	19.59	19.72	19.74	
10	64QAM	25	12	19.46	19.40	19.73	19.68	19.62	21
10	64QAM	25	25	19.34	19.22	19.74	19.44	19.55	
10	64QAM	50	0	19.36	19.48	19.67	19.53	19.65	
10	256QAM	1	0	17.15	17.64	17.60	17.95	17.54	19
10	256QAM	1	25	17.37	17.43	17.73	17.88	17.62	
10	256QAM	1	49	17.63	17.31	17.63	17.46	17.23	
10	256QAM	25	0	17.54	17.76	17.98	18.18	17.99	19
10	256QAM	25	12	17.55	17.70	17.84	18.10	17.91	
10	256QAM	25	25	17.63	17.45	17.85	17.95	17.64	
10	256QAM	50	0	17.56	17.57	17.77	17.84	17.83	Tune-up limit (dBm)
Channel				39675	40148	40620	41093	41565	
Frequency (MHz)				2498.5	2545.8	2593	2640.30	2687.5	
5	QPSK	1	0	22.07	22.28	22.53	22.68	22.40	24.00
5	QPSK	1	12	22.52	22.49	22.69	22.72	22.68	
5	QPSK	1	24	22.41	22.21	22.77	22.45	22.13	
5	QPSK	12	0	21.10	21.27	21.66	21.69	21.55	23
5	QPSK	12	7	21.41	21.46	21.78	21.70	21.57	
5	QPSK	12	13	21.54	21.49	21.81	21.78	21.63	
5	QPSK	25	0	21.38	21.37	21.72	21.53	21.70	23
5	16QAM	1	0	21.03	21.58	21.51	21.77	21.57	
5	16QAM	1	12	21.45	21.33	21.64	21.68	21.79	
5	16QAM	1	24	21.54	21.35	21.73	21.56	21.23	22
5	16QAM	12	0	20.14	20.46	20.58	20.78	20.65	
5	16QAM	12	7	20.29	20.40	20.73	20.74	20.69	
5	16QAM	12	13	20.41	20.36	20.83	20.56	20.64	22
5	16QAM	25	0	20.42	20.34	20.60	20.63	20.64	
5	64QAM	1	0	20.13	20.32	20.27	20.42	20.42	
5	64QAM	1	12	20.18	20.11	20.37	20.38	20.48	22
5	64QAM	1	24	20.15	20.01	20.39	20.22	20.11	



5	64QAM	12	0	19.15	19.42	19.47	19.78	19.62	21
5	64QAM	12	7	19.46	19.38	19.77	19.75	19.74	
5	64QAM	12	13	19.34	19.34	19.73	19.43	19.42	
5	64QAM	25	0	19.44	19.43	19.70	19.63	19.52	19
5	256QAM	1	0	17.17	17.50	17.66	18.01	17.62	
5	256QAM	1	12	17.42	17.37	17.70	17.73	17.72	
5	256QAM	1	24	17.61	17.20	17.74	17.46	17.20	19
5	256QAM	12	0	17.43	17.74	17.85	18.04	17.90	
5	256QAM	12	7	17.60	17.59	17.93	18.09	17.91	
5	256QAM	12	13	17.74	17.49	18.05	17.86	17.73	
5	256QAM	25	0	17.58	17.51	17.96	17.85	17.75	

<LTE Band 41 HPUE Ant 8>									
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)
Channel				39750	40185	40620	41055	41490	
Frequency (MHz)				2506	2549.5	2593	2636.5	2680	
20	QPSK	1	0	25.18	25.45	25.55	25.70	25.59	27
20	QPSK	1	49	25.51	25.49	25.67	25.74	25.78	
20	QPSK	1	99	25.46	25.35	25.23	25.57	25.71	
20	QPSK	50	0	24.46	24.55	24.73	24.79	24.77	26
20	QPSK	50	24	24.58	24.53	24.71	24.77	24.84	
20	QPSK	50	50	24.67	24.61	24.74	24.85	24.91	
20	QPSK	100	0	24.55	24.56	24.72	24.79	24.82	26
20	16QAM	1	0	24.33	24.77	24.86	24.95	24.87	
20	16QAM	1	49	24.71	24.63	24.96	24.98	25.04	
20	16QAM	1	99	24.78	24.60	24.54	24.77	24.96	
20	16QAM	50	0	23.47	23.65	23.87	23.90	23.77	
20	16QAM	50	24	23.61	23.57	23.86	23.89	23.87	25
20	16QAM	50	50	23.67	23.52	23.66	23.75	23.91	
20	16QAM	100	0	23.57	23.58	23.75	23.79	23.86	
20	64QAM	1	0	23.26	23.67	23.73	23.83	23.74	25
20	64QAM	1	49	23.59	23.53	23.88	23.87	23.91	
20	64QAM	1	99	23.67	23.46	23.42	23.65	23.84	
20	64QAM	50	0	22.42	22.62	22.83	22.88	22.73	24
20	64QAM	50	24	22.53	22.50	22.78	22.82	22.82	
20	64QAM	50	50	22.65	22.44	22.65	22.68	22.90	
20	64QAM	100	0	22.53	22.55	22.72	22.72	22.79	
20	256QAM	1	0	20.21	20.69	20.65	20.99	20.72	
20	256QAM	1	49	20.55	20.50	20.81	20.92	20.85	22
20	256QAM	1	99	20.67	20.36	20.34	20.48	20.87	
20	256QAM	50	0	20.49	20.75	20.90	21.13	20.90	
20	256QAM	50	24	20.63	20.61	20.86	20.98	20.90	22
20	256QAM	50	50	20.72	20.48	20.75	20.84	20.94	
20	256QAM	100	0	20.55	20.57	20.76	20.91	20.86	
Channel				39725	40173	40620	41068	41515	
Frequency (MHz)				2503.5	2548.3	2593	2637.8	2682.5	
15	QPSK	1	0	25.13	25.35	25.52	25.50	25.36	27
15	QPSK	1	37	25.43	25.48	25.67	25.66	25.52	
15	QPSK	1	74	25.41	25.16	25.62	25.51	25.06	
15	QPSK	36	0	24.36	24.53	24.66	24.74	24.56	26
15	QPSK	36	20	24.50	24.43	24.80	24.69	24.54	
15	QPSK	36	39	24.50	24.44	24.78	24.73	24.70	
15	QPSK	75	0	24.46	24.51	24.79	24.60	24.55	26
15	16QAM	1	0	24.29	24.62	24.76	24.77	24.68	
15	16QAM	1	37	24.55	24.46	24.95	24.97	24.90	



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15	16QAM	1	74	24.62	24.47	24.90	24.77	24.36	
15	16QAM	36	0	23.44	23.60	23.62	23.83	23.69	25
15	16QAM	36	20	23.59	23.54	23.79	23.73	23.78	
15	16QAM	36	39	23.55	23.52	23.85	23.60	23.64	
15	16QAM	75	0	23.51	23.39	23.71	23.69	23.73	
15	64QAM	1	0	23.11	23.60	23.59	23.72	23.61	25
15	64QAM	1	37	23.52	23.42	23.73	23.76	23.83	
15	64QAM	1	74	23.56	23.28	23.84	23.56	23.39	
15	64QAM	36	0	22.38	22.53	22.63	22.69	22.65	24
15	64QAM	36	20	22.48	22.44	22.76	22.68	22.75	
15	64QAM	36	39	22.53	22.38	22.75	22.58	22.50	
15	64QAM	75	0	22.39	22.37	22.63	22.66	22.53	
15	256QAM	1	0	20.18	20.71	20.78	21.08	20.62	22
15	256QAM	1	37	20.56	20.42	20.79	20.83	20.72	
15	256QAM	1	74	20.57	20.31	20.81	20.45	20.39	
15	256QAM	36	0	20.57	20.67	20.99	21.21	20.84	22
15	256QAM	36	20	20.54	20.60	20.95	20.96	20.89	
15	256QAM	36	39	20.70	20.57	21.02	20.84	20.70	
15	256QAM	75	0	20.46	20.56	20.78	21.00	20.85	
Channel				39700	40160	40620	41080	41540	Tune-up limit (dBm)
Frequency (MHz)				2501	2547	2593	2639	2685	
10	QPSK	1	0	25.13	25.38	25.56	25.70	25.40	27
10	QPSK	1	25	25.43	25.36	25.61	25.73	25.63	
10	QPSK	1	49	25.45	25.16	25.55	25.46	25.21	
10	QPSK	25	0	24.45	24.42	24.59	24.67	24.66	26
10	QPSK	25	12	24.50	24.36	24.80	24.68	24.69	
10	QPSK	25	25	24.67	24.45	24.79	24.65	24.72	
10	QPSK	50	0	24.44	24.53	24.79	24.59	24.61	
10	16QAM	1	0	24.13	24.76	24.76	24.95	24.76	26
10	16QAM	1	25	24.56	24.56	24.93	24.93	24.86	
10	16QAM	1	49	24.63	24.58	24.77	24.66	24.35	
10	16QAM	25	0	23.37	23.49	23.68	23.89	23.87	25
10	16QAM	25	12	23.56	23.46	23.85	23.83	23.79	
10	16QAM	25	25	23.64	23.34	23.79	23.66	23.64	
10	16QAM	50	0	23.47	23.57	23.75	23.72	23.60	
10	64QAM	1	0	23.23	23.55	23.60	23.74	23.67	25
10	64QAM	1	25	23.57	23.44	23.87	23.86	23.81	
10	64QAM	1	49	23.50	23.34	23.64	23.61	23.22	
10	64QAM	25	0	22.34	22.58	22.64	22.81	22.70	24
10	64QAM	25	12	22.44	22.42	22.65	22.82	22.72	
10	64QAM	25	25	22.48	22.28	22.85	22.59	22.57	
10	64QAM	50	0	22.53	22.53	22.76	22.70	22.64	
10	256QAM	1	0	20.14	20.78	20.74	20.94	20.72	22
10	256QAM	1	25	20.56	20.41	20.82	20.83	20.82	
10	256QAM	1	49	20.69	20.46	20.94	20.44	20.30	
10	256QAM	25	0	20.47	20.84	20.98	21.07	20.87	22
10	256QAM	25	12	20.68	20.71	21.00	20.89	20.82	
10	256QAM	25	25	20.79	20.49	20.92	20.88	20.67	
10	256QAM	50	0	20.63	20.63	20.94	20.86	20.82	
Channel				39675	40148	40620	41093	41565	Tune-up limit (dBm)
Frequency (MHz)				2498.5	2545.8	2593	2640.30	2687.5	
5	QPSK	1	0	25.15	25.27	25.56	25.52	25.47	27
5	QPSK	1	12	25.34	25.36	25.73	25.73	25.53	
5	QPSK	1	24	25.30	25.22	25.52	25.41	25.17	
5	QPSK	12	0	24.40	24.43	24.73	24.73	24.53	26
5	QPSK	12	7	24.43	24.35	24.73	24.64	24.55	



5	QPSK	12	13	24.54	24.48	24.80	24.84	24.61	
5	QPSK	25	0	24.35	24.42	24.63	24.61	24.53	
5	16QAM	1	0	24.15	24.64	24.80	24.77	24.83	26
5	16QAM	1	12	24.53	24.57	24.89	24.80	24.77	
5	16QAM	1	24	24.72	24.45	24.89	24.77	24.44	
5	16QAM	12	0	23.38	23.63	23.61	23.90	23.74	25
5	16QAM	12	7	23.47	23.40	23.86	23.72	23.66	
5	16QAM	12	13	23.63	23.32	23.89	23.73	23.65	
5	16QAM	25	0	23.51	23.40	23.70	23.74	23.75	
5	64QAM	1	0	23.14	23.48	23.55	23.78	23.60	25
5	64QAM	1	12	23.49	23.47	23.89	23.84	23.86	
5	64QAM	1	24	23.54	23.26	23.76	23.57	23.40	
5	64QAM	12	0	22.25	22.59	22.54	22.73	22.80	24
5	64QAM	12	7	22.52	22.33	22.67	22.78	22.70	
5	64QAM	12	13	22.54	22.39	22.83	22.66	22.53	
5	64QAM	25	0	22.49	22.43	22.78	22.53	22.70	
5	256QAM	1	0	20.28	20.78	20.64	20.96	20.63	22
5	256QAM	1	12	20.57	20.55	20.86	20.85	20.72	
5	256QAM	1	24	20.63	20.29	20.81	20.41	20.37	
5	256QAM	12	0	20.49	20.82	20.98	21.17	20.84	22
5	256QAM	12	7	20.62	20.71	20.96	21.04	20.89	
5	256QAM	12	13	20.72	20.44	21.03	20.82	20.76	
5	256QAM	25	0	20.48	20.47	20.80	20.83	20.75	



<LTE Band 48 Ant 8>								
BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Low Middle Ch. / Freq.	Power High Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				55340	55830	56150	56640	
Frequency (MHz)				3560	3609	3641	3690	
20	QPSK	1	0	19.20	19.32	19.51	19.21	20
20	QPSK	1	49	19.21	19.34	19.52	19.22	
20	QPSK	1	99	19.09	19.01	19.28	18.91	
20	QPSK	50	0	19.22	19.38	19.57	19.30	20
20	QPSK	50	24	19.19	19.31	19.51	19.28	
20	QPSK	50	50	19.14	19.24	19.44	19.14	
20	QPSK	100	0	19.17	19.29	19.49	19.19	20
20	16QAM	1	0	19.27	19.46	19.40	19.40	
20	16QAM	1	49	19.41	19.38	19.46	19.33	
20	16QAM	1	99	19.35	19.18	19.31	19.04	19
20	16QAM	50	0	18.46	18.44	18.48	18.24	
20	16QAM	50	24	18.44	18.35	18.53	18.21	
20	16QAM	50	50	18.34	18.29	18.38	18.09	19
20	16QAM	100	0	18.23	18.31	18.42	18.14	
20	64QAM	1	0	17.61	18.13	18.26	17.97	
20	64QAM	1	49	18.23	18.08	18.23	17.87	19
20	64QAM	1	99	18.11	17.77	18.01	17.62	
20	64QAM	50	0	17.41	17.33	17.45	17.09	
20	64QAM	50	24	17.44	17.22	17.48	16.96	18
20	64QAM	50	50	17.32	17.17	17.37	16.85	
20	64QAM	100	0	17.27	17.27	17.41	16.95	
20	256QAM	1	0	15.67	15.82	15.72	15.66	17
20	256QAM	1	49	15.74	15.90	15.77	15.88	
20	256QAM	1	99	15.76	15.73	15.70	15.84	
20	256QAM	50	0	15.95	16.09	15.98	15.99	17
20	256QAM	50	24	15.96	16.09	16.03	16.05	
20	256QAM	50	50	15.96	16.01	15.98	16.09	
20	256QAM	100	0	15.92	16.01	15.95	15.97	
Channel				55315	55820	56160	56665	Tune-up limit (dBm)
Frequency (MHz)				3557.5	3608	3642	3692.5	
15	QPSK	1	0	19.08	19.17	19.38	19.05	20
15	QPSK	1	37	19.11	19.30	19.50	19.17	
15	QPSK	1	74	19.07	18.95	19.11	18.72	
15	QPSK	36	0	19.22	19.27	19.43	19.16	20
15	QPSK	36	20	19.07	19.19	19.46	19.12	
15	QPSK	36	39	19.13	19.12	19.29	19.02	
15	QPSK	75	0	19.06	19.17	19.45	19.09	20
15	16QAM	1	0	19.14	19.45	19.28	19.31	
15	16QAM	1	37	19.34	19.27	19.42	19.25	
15	16QAM	1	74	19.33	19.16	19.14	19.01	19
15	16QAM	36	0	18.39	18.37	18.34	18.14	
15	16QAM	36	20	18.37	18.19	18.39	18.13	
15	16QAM	36	39	18.23	18.21	18.36	18.07	19
15	16QAM	75	0	18.14	18.30	18.36	18.04	
15	64QAM	1	0	17.58	17.94	18.17	17.85	
15	64QAM	1	37	18.07	17.88	18.05	17.76	19
15	64QAM	1	74	18.11	17.64	18.00	17.43	
15	64QAM	36	0	17.27	17.28	17.39	17.09	
15	64QAM	36	20	17.43	17.16	17.42	16.86	18
15	64QAM	36	39	17.26	16.99	17.34	16.82	
15	64QAM	75	0	17.22	17.20	17.30	16.83	
15	256QAM	1	0	15.59	15.87	15.69	15.58	17
15	256QAM	1	37	15.79	15.88	15.81	15.95	
15	256QAM	1	74	15.84	15.71	15.62	15.74	
15	256QAM	36	0	15.96	16.00	16.05	16.07	17
15	256QAM	36	20	16.06	16.14	16.05	15.95	
15	256QAM	36	39	15.93	16.10	15.94	16.03	





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15	256QAM	75	0	15.94	16.11	15.97	16.03	Tune-up limit (dBm)
Channel				55290	55815	56165	56690	
Frequency (MHz)				3555	3607.5	3642.5	3695	20
10	QPSK	1	0	19.18	19.12	19.45	19.14	
10	QPSK	1	25	19.08	19.29	19.34	19.03	20
10	QPSK	1	49	19.06	18.95	19.21	18.85	
10	QPSK	25	0	19.09	19.25	19.41	19.20	20
10	QPSK	25	12	19.14	19.25	19.43	19.16	
10	QPSK	25	25	19.08	19.18	19.43	18.97	20
10	QPSK	50	0	19.15	19.26	19.31	19.02	
10	16QAM	1	0	19.07	19.40	19.24	19.30	20
10	16QAM	1	25	19.39	19.27	19.39	19.16	
10	16QAM	1	49	19.15	19.14	19.27	18.89	19
10	16QAM	25	0	18.41	18.37	18.46	18.16	
10	16QAM	25	12	18.41	18.30	18.47	18.13	19
10	16QAM	25	25	18.24	18.11	18.29	18.09	
10	16QAM	50	0	18.13	18.30	18.30	18.03	19
10	64QAM	1	0	17.44	18.06	18.23	17.85	
10	64QAM	1	25	18.19	18.07	18.03	17.81	18
10	64QAM	1	49	17.97	17.73	17.88	17.44	
10	64QAM	25	0	17.39	17.19	17.41	17.03	18
10	64QAM	25	12	17.36	17.03	17.43	16.86	
10	64QAM	25	25	17.32	17.00	17.35	16.66	17
10	64QAM	50	0	17.07	17.23	17.39	16.80	
10	256QAM	1	0	15.58	15.74	15.75	15.74	17
10	256QAM	1	25	15.80	15.82	15.85	15.80	
10	256QAM	1	49	15.68	15.83	15.77	15.80	17
10	256QAM	25	0	15.89	16.13	16.00	16.01	
10	256QAM	25	12	15.87	16.05	15.93	16.11	17
10	256QAM	25	25	15.96	15.96	15.88	16.16	
10	256QAM	50	0	15.97	15.97	16.01	15.92	Tune-up limit (dBm)
Channel				55265	55810	56170	56715	
Frequency (MHz)				3552.5	3607	3643	3697.5	20
5	QPSK	1	0	19.10	19.16	19.33	19.12	
5	QPSK	1	12	19.16	19.18	19.45	19.07	20
5	QPSK	1	24	18.89	18.97	19.27	18.75	
5	QPSK	12	0	19.16	19.26	19.40	19.26	20
5	QPSK	12	7	19.09	19.23	19.47	19.23	
5	QPSK	12	13	19.01	19.07	19.44	18.95	20
5	QPSK	25	0	19.07	19.13	19.39	19.12	
5	16QAM	1	0	19.16	19.29	19.30	19.35	20
5	16QAM	1	12	19.22	19.32	19.31	19.24	
5	16QAM	1	24	19.29	19.05	19.28	19.04	19
5	16QAM	12	0	18.41	18.36	18.45	18.11	
5	16QAM	12	7	18.35	18.18	18.33	18.20	19
5	16QAM	12	13	18.24	18.24	18.35	17.97	
5	16QAM	25	0	18.12	18.22	18.22	18.13	19
5	64QAM	1	0	17.58	17.98	18.10	17.77	
5	64QAM	1	12	18.17	17.92	18.20	17.75	18
5	64QAM	1	24	17.92	17.58	17.96	17.47	
5	64QAM	12	0	17.28	17.18	17.34	16.95	18
5	64QAM	12	7	17.41	17.07	17.39	16.92	
5	64QAM	12	13	17.32	17.04	17.27	16.75	17
5	64QAM	25	0	17.12	17.19	17.22	16.92	
5	256QAM	1	0	15.72	15.80	15.80	15.56	17
5	256QAM	1	12	15.70	15.85	15.86	15.90	
5	256QAM	1	24	15.74	15.64	15.80	15.83	17
5	256QAM	12	0	15.86	16.03	15.98	16.04	
5	256QAM	12	7	16.03	16.15	16.12	16.02	17
5	256QAM	12	13	15.86	15.99	16.03	16.18	
5	256QAM	25	0	15.90	16.01	15.85	15.90	



<LTE Carrier Aggregation combinations>

General Note:

1. This device supports Carrier Aggregation on downlink only for inter and intra band. For the device supports combination bands and configurations are according to 3GPP.
2. In applying the existing power measurement procedure of KDB 941225 D05A for DL CA SAR test exclusion, only the subset with the largest number of combinations of the frequency band and CCs in each row need consideration, and that configurations require power measurement should be highlighted in the below table.

2CC Downlink Carrier Aggregation			3CC Downlink Carrier Aggregation			4CC Downlink Carrier Aggregation			5CC Downlink Carrier Aggregation		
NO.	Combination	Covered by measurement superset	NO.	Combination	Covered by measurement superset	NO.	Combination	Covered by measurement superset	NO.	Combination	Covered by measurement superset
	2A-2A			2A-2A-4A			2A-2A-4A-4A			2A-2A-5A-66A-66A	
	2A-4A			2A-2A-5A			2A-2A-4A-5A			2A-2A-5A-66B	
	2A-5A			2A-2A-12A			2A-2A-4A-12A			2A-2A-5A-66C	
	2A-7A			2A-2A-13A			2A-2A-4A-71A			2A-2A-12A-30A-66A	
	2A-12A			2A-2A-14A			2A-2A-5A-66A			2A-2A-12A-66A-66A	
	2A-13A			2A-2A-30A			2A-2A-12A-30A			2A-2A-13A-66A-66A	
	2A-14A			2A-2A-66A			2A-2A-12A-66A			2A-2A-13A-66B	
	2A-30A			2A-2A-71A			2A-2A-13A-66A			2A-2A-14A-30A-66A	
	2A-48A			2A-4A-4A			2A-2A-14A-30A			2A-2A-14A-66A-66A	
	2A-66A			2A-4A-5A			2A-2A-14A-66A			2A-5A-48A-48A-66A	
	2A-71A			2A-4A-7A			2A-2A-30A-66A			2A-5A-48A-48C	
	4A-4A			2A-4A-12A			2A-2A-66A-66A			2A-5A-48C-66A	
	4A-5A			2A-4A-13A			2A-2A-66A-71A			2A-5A-48D	
	4A-7A			2A-4A-30A			2A-2A-66B			2A-5B-30A-66A	
	4A-12A			2A-4A-71A			2A-2A-66C			2A-5B-66A-66A	
	4A-13A			2A-5A-30A			2A-4A-4A-5A			2A-5B-66B	
	4A-30A			2A-5A-48A			2A-4A-4A-12A			2A-5B-66C	
	4A-71A			2A-5A-66A			2A-4A-5A-30A			2A-12A-30A-66A-66A	
	5A-5A			2A-5B			2A-4A-5B			2A-13A-48A-48A-66A	
	5A-7A			2A-12A-30A			2A-4A-12A-30A			2A-13A-48A-48C	
	5A-30A			2A-12A-66A			2A-5A-30A-66A			2A-13A-48C-66A	
	5A-48A			2A-13A-48A			2A-5A-48A-48A			2A-13A-48D	
	5A-66A			2A-13A-66A			2A-5A-48A-66A			2A-14A-30A-66A-66A	
	7A-7A			2A-14A-30A			2A-5A-48C			2A-14A-66A-66A-66A	
	12A-30A			2A-14A-66A			2A-5A-66A-66A			2A-48A-48C-66A	
	12A-66A			2A-30A-66A			2A-5A-66B			2A-48A-48D	
	13A-48A			2A-48A-48A			2A-5A-66C			2A-48C-48C	
	13A-66A			2A-48A-66A			2A-5B-30A			2A-48D-66A	
	14A-30A			2A-48C			2A-5B-66A			2A-48E	
	14A-66A			2A-66A-66A			2A-12A-30A-66A			5A-48A-48C-66A	
	25A-25A			2A-66A-71A			2A-12A-66A-66A			5A-48A-48D	
	25A-26A			2A-66B			2A-12A-66C			5A-48C-48C	
	26A-41A			2A-66C			2A-13A-48A-48A			5A-48D-66A	
	30A-66A			2C-66A			2A-13A-48A-66A			5A-48E	
	38C			4A-4A-5A			2A-13A-48C			13A-48A-48C-66A	
	41A-41A			4A-4A-12A			2A-13A-66A-66A			13A-48C-48C	
	41C			4A-4A-13A			2A-13A-66B			13A-48C-66B	
	48A-48A			4A-4A-30A			2A-13A-66C			13A-48C-66C	
	48A-66A			4A-4A-71A			2A-14A-30A-66A			13A-48D-66A	
	48C			4A-5A-30A			2A-14A-66A-66A			13A-48E	
	66A-66A			4A-5B			2A-30A-66A-66A			41F	
	66A-71A			4A-12A-30A			2A-48A-48A-66A			48A-48A-48D	
	66B			5A-5A-66A			2A-48A-48C			48A-48C-48C	
	66C			5A-7A-7A			2A-48C-66A			48A-48C-66B	
	25A-41A			5A-30A-66A			2A-48D			48A-48C-66C	
	4A-17A			5A-48A-48A			2A-66A-66A-66A			48A-48D-66A	



			5A-48A-66A		2A-66A-66A-71A		48C-48C-66A	
			5A-48C		2A-66C-71A		48C-66A-66A-66A	
			5A-66A-66A		2C-66A-66A		48E-66A	
			5A-66B		4A-4A-5B		48F	
			5A-66C		4A-4A-12A-30A		2A-5A-5A-66A-66A	
			5B-30A		5A-5A-66A-66A		2A-2A-5B-66A	
			5B-66A		5A-5A-66B			
			12A-30A-66A		5A-5A-66C			
			12A-66A-66A		5A-48A-48A-66A			
			13A-48A-48A		5A-48A-48C			
			13A-48A-66A		5A-48C-66A			
			13A-48C		5A-48D			
			13A-66A-66A		5B-30A-66A			
			13A-66B		5B-66A-66A			
			13A-66C		5B-66B			
			14A-30A-66A		5B-66C			
			14A-66A-66A		12A-30A-66A-66A			
			26A-41C		12A-66C			
			30A-66A-66A		13A-48A-48A-66A			
			41A-41C		13A-48A-48C			
			41D		13A-48A-66B			
			48A-48A-48A		13A-48A-66C			
			48A-48A-66A		13A-48C-66A			
			48A-48C		13A-48D			
			48A-66A-66A		14A-30A-66A-66A			
			48A-66B		14A-66A-66A-66A			
			48A-66C		30A-66A-66A-66A			
			48C-66A		41A-41D			
			48D		41C-41C			
			66A-66A-66A		41E			
			66A-66A-71A		48A-48A-48C			
			66A-66C		48A-48A-66A-66A			
			66C-71A		48A-48A-66B			
			2A-5A-5A		48A-48A-66C			
			25A-41C		48A-48C-66A			
					48A-48D			
					48A-66A-66A-66A			
					48C-48C			
					48C-66A-66A			
					48C-66B			
					48C-66C			
					48D-66A			
					48E			
					2A-2A-5A-30A			
					2A-5A-5A-66A			
					5A-30A-66A-66A			
					13A-66A-66A-66A			
					25A-41D			
					2A-2A-5B			

**<Power verification when LTE Carrier Aggregation Active>**

**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 supports downlink two carrier aggregation. For power measurement were control and acknowledge data is sent on uplink channels that operate identical to specifications when downlink carrier aggregation is inactive.
- iv. Selected highest measured power when downlink carrier aggregation is inactive for conducted power comparison with downlink carrier aggregation is active, to confirm that when downlink carrier aggregation is active uplink maximum output power remains within the specified tune-up tolerance limits and not more than ¼ dB higher than the maximum output power measured when downlink carrier aggregation inactive.
- v. For non-contiguous intra-band CA, the SCC selected to provide maximum separation from the PCC and must remain fully within the downlink transmission band.
- vi. For Intra-band, contiguous CA, the downlink channels selected to perform the uplink power measurement must satisfy 3GPP channel spacing (5.4.1A of 3GPP TS 36.521 or equivalent) and channel bandwidth (5.4.2A) requirements.

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

**<Two Carrier power verification>**

Configure		PCC						SCC				Power		
		LTE Band	BW (MHz)	UL Freq. (MHz)	UL Channel	Mod.	UL# RB	UL RB Offset	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	With CA Tx.Power (dBm)	W/O CA Tx.Power (dBm)
Inter-Band		25	20	1880	26340	QPSK	1	0	26	15	876.5	8865	23.79	23.87
		4	20	1732.5	20175	QPSK	1	0	17	10	740	5790	23.49	23.89
Intra-Band	Contiguous	38	20	2595	38000	QPSK	1	1	38	20	2614.80	38198	23.83	23.85

**<Three Carrier power verification>**

Configure	PCC							SCC1				SCC2				Power	
	LTE Band	BW (MHz)	UL Freq. (MHz)	UL Channel	Mod.	UL# RB	UL RB Offset	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	With CA Tx.Power (dBm)	W/O CA Tx.Power (dBm)
Inter-Band	2	20	1860	18700	QPSK	1	0	4	20	2132.5	2175	7	20	2655	3100	23.56	23.86
	2	20	1860	18700	QPSK	1	0	4	20	2132.5	2175	13	10	751	5230	23.56	23.86
	5	10	836.5	20525	QPSK	1	0	7	20	2630	2850	7	5	2687.5	3425	24.15	24.17
	26	15	821.5	26765	QPSK	1	0	41	20	2593	40620	41	20	2612.8	40818	24.13	24.29



<Four Carrier power verification>

Configure	PCC							SCC1				SCC2				SCC3				Power	
	LTE Band	BW (MHz)	UL Freq. (MHz)	UL Channel	Mod.	UL# RB	UL RB Offset	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	With CA Tx.Power (dBm)	W/O CA Tx.Power (dBm)
Inter-Band	2	20	1860	18700	QPSK	1	0	2	5	1987.5	1175	4	20	2132.5	2175	71	20	634.5	68761	23.79	23.86
	2	20	1860	18700	QPSK	1	0	2	5	1987.5	1175	66	20	2155	66886	71	20	634.5	68761	23.47	23.86
	2	20	1860	18700	QPSK	1	0	4	20	2132.5	2175	5	10	881.5	2525	30	10	2355	9820	23.53	23.86
	2	20	1860	18700	QPSK	1	0	4	20	2132.5	2175	12	10	737.5	5095	30	10	2355	9820	23.70	23.86
	2	20	1880	18900	QPSK	1	0	66	20	2155	66886	66	20	2139.8	66734	71	20	634.5	68761	23.52	23.86
	48	20	3560	55340	QPSK	1	0	48	20	3579.8	55538	66	20	2155	66886	66	20	2164.8	67084	21.53	21.90
	48	20	3560	55340	QPSK	1	0	48	20	3579.8	55538	48	20	3599.6	55736	66	20	2155	66886	21.51	21.90
	25	20	1880	26340	QPSK	1	0	41	20	2593	40620	41	20	2612.8	2175	41	20	2636.2	41052	23.60	23.87

<Five Carrier power verification>

Configure	PCC							SCC1				SCC2				SCC3				SCC4		Power			
	LTE Band	BW (MHz)	UL Freq. (MHz)	UL Channel	Mod.	UL# RB	UL RB Offset	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	With CA Tx.Power (dBm)	W/O CA Tx.Power (dBm)
Inter-Band	2	20	1860	18700	QPSK	1	0	2	5	1987.5	1175	12	10	737.5	5095	30	10	2355	9820	66	20	2155	66886	23.50	23.86
	2	20	1860	18700	QPSK	1	0	2	5	1987.5	1175	14	10	763	5330	30	10	2355	9820	66	20	2155	66886	23.66	23.86
	2	20	1860	18700	QPSK	1	0	5	10	881.5	2525	48	20	3625	55990	48	20	3644.8	56188	66	20	2155	66886	23.58	23.86
	2	20	1860	18700	QPSK	1	0	5	10	881.5	2525	5	10	891.4	2624	30	10	2355	9820	66	20	2155	66886	23.83	23.86
	2	20	1860	18700	QPSK	1	0	12	10	737.5	5095	30	10	2355	9820	66	20	2139.8	66734	66	5	2197.5	67311	23.50	23.86
	2	20	1860	18700	QPSK	1	0	13	10	751	5230	48	20	3625	55990	48	20	3648.6	56226	66	20	2139.8	66734	23.66	23.86
	2	20	1860	18700	QPSK	1	0	14	10	763	5330	30	10	2355	9820	66	20	2155	66886	66	20	2164.8	67084	23.48	23.86



<LTE Uplink carrier aggregation>

2CC Uplink Carrier Aggregation	
Number	Combination
	Ant 8
1	41C
2	48C

<Intra-band>

General Note:

- i. The device supports intra-band uplink carrier aggregation for LTE B5/B7/B66/B38/B41/B48 with a maximum of two 20MHz component carriers. For intra band contiguous carrier aggregation scenarios, 3GPP 36.101 table 6.2.2A-1 specifies that the aggregate maximum allowed output power is equivalent to the single carrier scenario. 3GPP 36.101 6.2.3A allows for several dB of MPR to be applied when not-contiguous RB allocation is implemented. The conducted power and MPR setting in this device are permanently implemented pre 3GPP requirement.
- ii. The device supports uplink carrier aggregation with a maximum of two 20MHz component carriers. For intra band contiguous carrier aggregation scenarios, 3GPP 36.101 table 6.2.2A-1 specifies that the aggregate maximum allowed output power is equivalent to the single carrier scenario. 3GPP 36.101 6.2.3A allows for several dB of MPR to be applied when not-contiguous RB allocation is implemented. The conducted power and MPR setting in this device are permanently implemented pre the 3GPP requirement.
- iii. According TCB workshop, the output power with uplink CA active was measured for the configuration with the highest reported SAR with single carrier for each exposure condition. The power was measured with wideband signal integration over both component carriers.
- iv. Additional SAR measurement for LTE UL CA whit other DL CA combinations active were not required since the maximum output power for this configuration was not > 0.25dB higher than the maximum output power for UL CA active.

CA_41C_Ant 8										
Combination 20MHz+20MHz (100RB+100RB)										
PCC Channel	SCC Channel	Modulation	PCC		SCC		Total RB Size	Target MPR Level (dB)	Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset				
39750	39948	QPSK	1	0	0	0	1	0	22.06	24
40185	39987	QPSK	1	0	0	0	1	0	22.72	24
40620	40422	QPSK	1	0	0	0	1	0	22.7	24
41055	40857	QPSK	1	0	0	0	1	0	22.97	24
41490	41292	QPSK	1	0	0	0	1	0	22.83	24

CA_41C (HPUE) _Ant 8										
Combination 20MHz+20MHz (100RB+100RB)										
PCC Channel	SCC Channel	Modulation	PCC		SCC		Total RB Size	Target MPR Level (dB)	Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset				
39750	39948	QPSK	1	0	0	0	1	0	25.03	27
40185	39987	QPSK	1	0	0	0	1	0	25.57	27
40620	40422	QPSK	1	0	0	0	1	0	25.48	27
41055	40857	QPSK	1	0	0	0	1	0	25.28	27
41490	41292	QPSK	1	0	0	0	1	0	25.16	27

CA_48C_Ant 8										
Combination 20MHz+20MHz (100RB+100RB)										
PCC Channel	SCC Channel	Modulation	PCC		SCC		Total RB Size	Target MPR Level (dB)	Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset				
55340	55538	QPSK	1	0	0	0	1	0	19.25	20
55830	55632	QPSK	1	0	1	99	2	0	19.18	20
56150	55952	QPSK	1	0	1	99	2	0	19.05	20
56640	56442	QPSK	1	0	1	99	2	0	19.12	20



## **11. 5G NR Output Power (Unit: dBm)**

### **General Note:**

1. The device support SCS 15KHz and 30KHz for NR FDD and TDD and have the same maximum power, in this report only select SCS 15KHz for NR FDD and SCS 30KHz for NR TDD power measurement, due to SCS 15KHz for FDD and SCS 30KHz for TDD have highest support bandwidth, and the NR SAR is < 1g SAR 1.45W/kg. Output power and SAR measurement for SCS30KHz for FDD and SCS15KHz for TDD shall be not necessary.
2. Referencing the procedure in KDB 941225, the test procedures are outlined as below
  - a. For DFT-OFDM output power measurement, full measurement was done for Pi/2 BPSK and QPSK and for the largest supported bandwidth, repeat test for 16QAM/64QAM/256QAM under 1RB 1Offset configuration. For smaller bandwidth, measure conducted power for Pi/2 BPSK and 1RB 1Offset configuration.
  - b. According to the tune-up, CP-OFDM output power is not ½ dB higher than DFT-OFDM mode, and the reported SAR of DFT-OFDM mode reported SAR is ≤ 1.45 W/kg, SAR test and thus conducted power for CP-OFDM mode is not required.
  - c. To start SAR test for the largest channel bandwidth for Pi/2 BPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel. Also do SAR test for 50% RB allocation for Pi/2 BPSK SAR testing using 1RB Pi/2 BPSK allocation procedure
  - d. For Pi/2 BPSK with 100% RB allocation, SAR test 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.
  - e. For higher modulation QPSK/16QAM/64QAM/256QAM, according to tune-up document the power level is not ½ dB higher than the same configuration in Pi/2 BPSK, also reported SAR for the Pi/2 BPSK configuration is less than 1.45 W/kg, QPSK/16QAM/64QAM/256QAM SAR testing are not required.
  - f. Smaller bandwidth output power for each RB allocation configuration for this device 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, smaller bandwidth SAR testing is not required for this device
  - g. The NR n41/66/77 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth.

**<3GPP 38.101 MPR for EN-DC>**

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

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

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

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

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

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





<FR1 n2 Ant 8>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				372000	376000	380000	
Frequency (MHz)				1860	1880	1900	
20	PI/2 BPSK	1	1	22.54	22.33	22.50	23.5
20	PI/2 BPSK	1	53	22.51	22.60	22.51	
20	PI/2 BPSK	1	104	22.50	22.58	22.59	
20	PI/2 BPSK	50	0	21.91	21.94	21.87	23.0
20	PI/2 BPSK	50	28	22.59	22.67	22.63	23.5
20	PI/2 BPSK	50	56	22.05	22.23	22.33	23.0
20	PI/2 BPSK	100	0	22.06	22.10	22.10	
20	QPSK	1	1	22.28	22.30	22.33	23.5
20	QPSK	1	53	22.47	22.62	22.57	
20	QPSK	1	104	22.46	22.55	22.60	
20	QPSK	50	0	21.31	21.38	21.28	22.5
20	QPSK	50	28	22.51	22.62	22.57	23.5
20	QPSK	50	56	21.55	21.68	21.67	22.5
20	QPSK	100	0	21.61	21.56	21.48	
20	16QAM	1	1	21.10	21.27	21.18	22.5
20	64QAM	1	1	19.53	19.52	19.53	21.0
20	256QAM	1	1	18.14	17.98	18.04	19.0
Channel				371500	376000	380500	Tune-up limit (dBm)
Frequency (MHz)				1857.5	1880	1902.5	
15	PI/2 BPSK	1	1	22.37	22.24	22.32	23.5
Channel				371000	376000	381000	Tune-up limit (dBm)
Frequency (MHz)				1855	1880	1905	
10	PI/2 BPSK	1	1	22.26	22.35	22.25	23.5
Channel				370500	376000	381500	Tune-up limit (dBm)
Frequency (MHz)				1852.5	1880	1907.5	
5	PI/2 BPSK	1	1	22.35	22.20	22.39	23.5



<FR1 n66 Ant 8>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				346000	349000	352000	Tune-up limit (dBm)
Frequency (MHz)				1730	1745	1760	
40	PI/2 BPSK	1	1	22.12	22.24	22.49	23.0
40	PI/2 BPSK	1	108	22.58	22.69	22.68	
40	PI/2 BPSK	1	214	22.14	22.25	22.28	
40	PI/2 BPSK	108	0	22.00	22.04	22.00	22.5
40	PI/2 BPSK	108	54	22.65	22.70	22.62	23.0
40	PI/2 BPSK	108	108	21.93	21.98	21.87	22.5
40	PI/2 BPSK	216	0	22.01	22.14	22.37	
40	QPSK	1	1	22.21	22.23	22.13	23.0
40	QPSK	1	108	22.58	22.68	22.65	
40	QPSK	1	214	22.24	22.27	22.21	
40	QPSK	108	0	21.55	21.56	21.50	22.0
40	QPSK	108	54	22.61	22.69	22.61	23.0
40	QPSK	108	108	21.43	21.53	21.44	22.0
40	QPSK	216	0	21.57	21.67	21.63	
40	16QAM	1	1	21.12	21.22	21.10	22.0
40	64QAM	1	1	19.54	19.50	19.48	20.5
40	256QAM	1	1	17.89	17.98	18.23	18.5
Channel				344000	349000	354000	Tune-up limit (dBm)
Frequency (MHz)				1720	1745	1770	
20	PI/2 BPSK	1	1	22.29	22.28	22.03	23.0
Channel				343500	349000	354500	Tune-up limit (dBm)
Frequency (MHz)				1717.5	1745	1772.5	
15	PI/2 BPSK	1	1	22.12	22.13	22.10	23.0
Channel				343000	349000	355000	Tune-up limit (dBm)
Frequency (MHz)				1715	1745	1775	
10	PI/2 BPSK	1	1	22.18	22.25	22.18	23.0
Channel				342500	349000	355500	Tune-up limit (dBm)
Frequency (MHz)				1712.5	1745	1777.5	
5	PI/2 BPSK	1	1	22.28	22.27	22.30	23.0



<FR1 n38 Ant 8>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				516500	519000	521500	Tune-up limit (dBm)
Frequency (MHz)				2582.5	2595	2607.5	
20	PI/2 BPSK	1	1	21.40	21.69	21.59	22.5
20	PI/2 BPSK	1	26	21.51	21.93	21.62	22.5
20	PI/2 BPSK	1	49	21.35	21.71	21.42	22.5
20	PI/2 BPSK	25	0	21.47	21.80	21.58	22.5
20	PI/2 BPSK	25	13	21.48	21.83	21.60	22.5
20	PI/2 BPSK	25	26	21.42	21.77	21.64	22.5
20	PI/2 BPSK	50	0	21.50	21.84	21.61	22.5
20	QPSK	1	1	21.39	21.67	21.63	22.5
20	QPSK	1	26	21.48	21.82	21.66	
20	QPSK	1	49	21.35	21.69	21.05	
20	QPSK	25	0	21.40	21.73	21.51	22.5
20	QPSK	25	13	21.44	21.73	21.52	
20	QPSK	25	26	21.33	21.68	21.63	
20	QPSK	50	0	21.46	21.78	21.60	22.5
20	16QAM	1	1	21.38	21.63	21.63	22.5
20	64QAM	1	1	21.43	21.76	21.59	22.5
20	256QAM	1	1	17.99	18.00	18.00	19.0
Channel				515500	519000	522500	Tune-up limit (dBm)
Frequency (MHz)				2577.5	2595	2612.5	
15	PI/2 BPSK	1	1	21.83	21.88	21.85	22.5
Channel				515000	519000	523000	Tune-up limit (dBm)
Frequency (MHz)				2575	2595	2615	
10	PI/2 BPSK	1	1	21.85	21.89	21.79	22.5



**<FR1 n41 / n41 HPUE Ant 8>**

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				509202	518598	528000	
Frequency (MHz)				2546.01	2592.99	2640	
100	PI/2 BPSK	1	1	20.68	20.52	20.45	22.0
100	PI/2 BPSK	1	137	20.91	20.97	20.57	
100	PI/2 BPSK	1	271	20.36	20.56	20.00	
100	PI/2 BPSK	135	0	21.25	21.34	21.28	21.5
100	PI/2 BPSK	135	69	21.50	21.55	21.48	22.0
100	PI/2 BPSK	135	138	21.28	21.46	21.42	21.5
100	PI/2 BPSK	270	0	21.26	21.45	21.44	
100	QPSK	1	1	20.25	20.51	20.36	22.0
100	QPSK	1	137	20.99	20.86	20.31	
100	QPSK	1	271	20.41	20.49	20.46	
100	QPSK	135	0	21.26	21.37	21.10	22.0
100	QPSK	135	69	21.28	21.54	21.34	
100	QPSK	135	138	21.33	21.47	21.49	
100	QPSK	270	0	21.00	21.00	20.94	21.0
100	16QAM	1	1	20.53	20.47	20.41	21.0
100	64QAM	1	1	19.50	19.50	19.46	20.5
100	256QAM	1	1	20.29	20.20	20.25	20.5
Channel				507204	518598	529998	Tune-up limit (dBm)
Frequency (MHz)				2536.02	2592.99	2649.99	
80	PI/2 BPSK	1	1	20.54	20.53	20.34	22.0
Channel				504204	518598	532998	Tune-up limit (dBm)
Frequency (MHz)				2521.02	2592.99	2664.99	
50	PI/2 BPSK	1	1	20.48	21.26	20.40	22.0
Channel				503202	518598	534000	Tune-up limit (dBm)
Frequency (MHz)				2516.01	2592.99	2670	
40	PI/2 BPSK	1	1	20.21	21.17	20.28	22.0
Channel				502200	518598	534996	Tune-up limit (dBm)
Frequency (MHz)				2511	2592.99	2674.98	
30	PI/2 BPSK	1	1	20.68	20.48	20.36	22.0
Channel				500700	518598	536496	Tune-up limit (dBm)
Frequency (MHz)				2503.5	2592.99	2682.48	
15	PI/2 BPSK	1	1	20.58	21.37	20.34	22.0
Channel				500202	518598	537000	Tune-up limit (dBm)
Frequency (MHz)				2501.01	2592.99	2685	
10	PI/2 BPSK	1	1	20.36	21.21	20.27	22.0



**<FR1 n77 / n77 HPUE Ant 8> (Part 270)**

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				650000	656000	662000	
Frequency (MHz)				3750	3840	3930	
100	PI/2 BPSK	1	1	16.91	16.72	17.03	18.5
100	PI/2 BPSK	1	137	17.48	17.26	17.35	
100	PI/2 BPSK	1	271	17.11	16.94	16.92	
100	PI/2 BPSK	135	0	17.33	17.17	17.34	18.5
100	PI/2 BPSK	135	69	17.53	17.37	17.44	18.5
100	PI/2 BPSK	135	138	17.36	17.28	17.36	18.5
100	PI/2 BPSK	270	0	17.39	17.32	17.42	
100	QPSK	1	1	16.91	16.77	16.97	18.5
100	QPSK	1	137	17.41	17.30	17.37	
100	QPSK	1	271	17.52	16.93	17.02	
100	QPSK	135	0	17.10	17.16	17.33	18.5
100	QPSK	135	69	17.36	17.35	17.43	
100	QPSK	135	138	17.25	17.25	17.32	
100	QPSK	270	0	17.22	17.22	17.29	18.5
100	16QAM	1	1	16.69	16.75	16.72	18.5
100	64QAM	1	1	16.56	16.50	16.50	18.5
100	256QAM	1	1	16.70	16.95	17.08	18.5
Channel				649334	656000	662666	Tune-up limit (dBm)
Frequency (MHz)				3740.01	3840	3939.99	
80	PI/2 BPSK	1	1	16.92	17.01	16.97	18.5
Channel				648668	656000	663332	Tune-up limit (dBm)
Frequency (MHz)				3730.02	3840	3949.98	
60	PI/2 BPSK	1	1	16.97	17.06	17.18	18.5
Channel				648334	656000	663666	Tune-up limit (dBm)
Frequency (MHz)				3725.01	3840	3954.99	
50	PI/2 BPSK	1	1	17.02	17.11	17.06	18.5
Channel				648000	656000	664000	Tune-up limit (dBm)
Frequency (MHz)				3720	3840	3960	
40	PI/2 BPSK	1	1	17.12	16.92	17.04	18.5
Channel				647334	656000	664666	Tune-up limit (dBm)
Frequency (MHz)				3710.01	3840	3969.99	
20	PI/2 BPSK	1	1	17.19	17.27	17.09	18.5
Channel				647168	656000	664832	Tune-up limit (dBm)
Frequency (MHz)				3707.52	3840	3972.48	
15	PI/2 BPSK	1	1	17.07	17.32	17.04	18.5
Channel				647000	656000	665000	Tune-up limit (dBm)
Frequency (MHz)				3705	3840	3975	
10	PI/2 BPSK	1	1	17.11	17.37	17.13	18.5



**<FR1 n77 / n77 HPUE Ant 8> (Part 27Q)**

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel					633332		18.5
Frequency (MHz)					3499.98		
100	PI/2 BPSK	1	1		16.89		18.5
100	PI/2 BPSK	1	137		17.40		
100	PI/2 BPSK	1	271		17.02		18.5
100	PI/2 BPSK	135	0		17.25		
100	PI/2 BPSK	135	69		17.44		18.5
100	PI/2 BPSK	135	138		17.26		
100	PI/2 BPSK	270	0		17.32		18.5
100	QPSK	1	1		16.81		
100	QPSK	1	137		17.35		18.5
100	QPSK	1	271		16.90		
100	QPSK	135	0		17.25		18.5
100	QPSK	135	69		17.43		
100	QPSK	135	138		17.18		18.5
100	QPSK	270	0		17.25		
100	16QAM	1	1		16.74		18.5
100	64QAM	1	1		16.50		
100	256QAM	1	1		16.94		18.5
Channel				632668	633332	634000	18.5
Frequency (MHz)				3490.02	3499.98	3510	
80	PI/2 BPSK	1	1	17.23	17.12	17.22	18.5
Channel				632000	633332	634666	18.5
Frequency (MHz)				3480	3499.98	3519.99	
60	PI/2 BPSK	1	1	17.26	17.14	17.10	18.5
Channel				631668	633332	635000	18.5
Frequency (MHz)				3475.02	3499.98	3525	
50	PI/2 BPSK	1	1	17.25	17.17	17.22	18.5
Channel				631334	633332	635332	18.5
Frequency (MHz)				3470.01	3499.98	3529.98	
40	PI/2 BPSK	1	1	17.19	16.95	17.25	18.5
Channel				630668	633332	636000	18.5
Frequency (MHz)				3460.02	3499.98	3540	
20	PI/2 BPSK	1	1	17.08	17.19	17.13	18.5
Channel				630500	633332	636166	18.5
Frequency (MHz)				3457.5	3499.98	3542.49	
15	PI/2 BPSK	1	1	17.20	17.25	17.15	18.5
Channel				630334	633332	636332	18.5
Frequency (MHz)				3455.01	3499.98	3544.98	
10	PI/2 BPSK	1	1	17.17	17.26	17.16	18.5



**<FR1 n78 Ant 8> (FCC Part 270)**

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel					650000		19.0
Frequency (MHz)					3750		
100	PI/2 BPSK	1	1		17.03		19.0
100	PI/2 BPSK	1	137		17.63		
100	PI/2 BPSK	1	271		17.24		
100	PI/2 BPSK	135	0		17.50		19.0
100	PI/2 BPSK	135	69		17.71		19.0
100	PI/2 BPSK	135	138		17.50		19.0
100	PI/2 BPSK	270	0		17.50		
100	QPSK	1	1		17.09		19.0
100	QPSK	1	137		17.66		
100	QPSK	1	271		17.22		
100	QPSK	135	0		17.53		19.0
100	QPSK	135	69		17.70		
100	QPSK	135	138		17.63		
100	QPSK	270	0		17.59		19.0
100	16QAM	1	1		17.03		19.0
100	64QAM	1	1		17.00		19.0
100	256QAM	1	1		17.22		19.0
Channel				649334	650000	650666	19.0
Frequency (MHz)				3740.01	3750	3759.99	
80	PI/2 BPSK	1	1	17.30	17.31	17.23	19.0
Channel				648668	650000	651332	19.0
Frequency (MHz)				3730.02	3750	3769.98	
60	PI/2 BPSK	1	1	17.17	17.21	17.26	19.0
Channel				648334	650000	651666	19.0
Frequency (MHz)				3725.01	3750	3774.99	
50	PI/2 BPSK	1	1	17.25	17.19	17.21	19.0
Channel				648000	650000	652000	19.0
Frequency (MHz)				3720	3750	3780	
40	PI/2 BPSK	1	1	17.10	17.01	17.03	19.0
Channel				647334	650000	652666	19.0
Frequency (MHz)				3710.01	3750	3789.99	
20	PI/2 BPSK	1	1	17.44	17.43	17.39	19.0
Channel				647168	650000	652832	19.0
Frequency (MHz)				3707.52	3750	3792.48	
15	PI/2 BPSK	1	1	17.59	17.50	17.53	19.0
Channel				647000	650000	653000	19.0
Frequency (MHz)				3705	3750	3795	
10	PI/2 BPSK	1	1	17.54	17.57	17.56	19.0



**<FR1 n78 HPUE Ant 8> (Part 270)**

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel					650000		
Frequency (MHz)					3750		
100	PI/2 BPSK	1	1		18.12		20.0
100	PI/2 BPSK	1	137		18.66		
100	PI/2 BPSK	1	271		18.22		
100	PI/2 BPSK	135	0		18.51		20.0
100	PI/2 BPSK	135	69		18.72		20.0
100	PI/2 BPSK	135	138		18.46		20.0
100	PI/2 BPSK	270	0		18.58		
100	QPSK	1	1		18.10		20.0
100	QPSK	1	137		18.59		
100	QPSK	1	271		18.20		
100	QPSK	135	0		18.44		20.0
100	QPSK	135	69		18.71		
100	QPSK	135	138		18.55		
100	QPSK	270	0		18.54		20.0
100	16QAM	1	1		18.12		20.0
100	64QAM	1	1		18.00		20.0
100	256QAM	1	1		18.14		20.0
Channel				649334	650000	650666	Tune-up limit (dBm)
Frequency (MHz)				3740.01	3750	3759.99	
80	PI/2 BPSK	1	1	18.42	18.35	18.27	20.0
Channel				648668	650000	651332	Tune-up limit (dBm)
Frequency (MHz)				3730.02	3750	3769.98	
60	PI/2 BPSK	1	1	18.15	18.20	18.13	20.0
Channel				648334	650000	651666	Tune-up limit (dBm)
Frequency (MHz)				3725.01	3750	3774.99	
50	PI/2 BPSK	1	1	18.02	18.12	18.21	20.0
Channel				648000	650000	652000	Tune-up limit (dBm)
Frequency (MHz)				3720	3750	3780	
40	PI/2 BPSK	1	1	18.14	18.11	18.09	20.0
Channel				647334	650000	652666	Tune-up limit (dBm)
Frequency (MHz)				3710.01	3750	3789.99	
20	PI/2 BPSK	1	1	18.61	18.50	18.59	20.0
Channel				647168	650000	652832	Tune-up limit (dBm)
Frequency (MHz)				3707.52	3750	3792.48	
15	PI/2 BPSK	1	1	18.65	18.60	18.51	20.0
Channel				647000	650000	653000	Tune-up limit (dBm)
Frequency (MHz)				3705	3750	3795	
10	PI/2 BPSK	1	1	18.62	18.65	18.55	20.0





**<FR1 n78 Ant 8> (Part 27Q)**

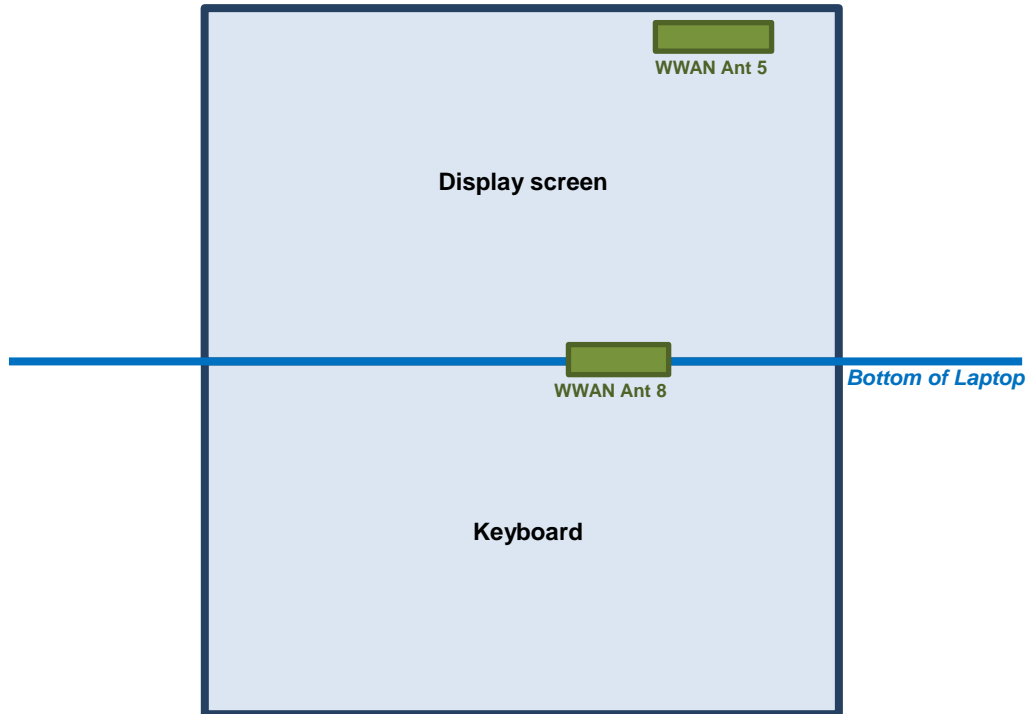
BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel					633332		
Frequency (MHz)					3499.98		
100	PI/2 BPSK	1	1		17.01		19.0
100	PI/2 BPSK	1	137		17.55		
100	PI/2 BPSK	1	271		17.04		
100	PI/2 BPSK	135	0		17.44		19.0
100	PI/2 BPSK	135	69		17.67		19.0
100	PI/2 BPSK	135	138		17.41		19.0
100	PI/2 BPSK	270	0		17.47		
100	QPSK	1	1		17.03		19.0
100	QPSK	1	137		17.52		
100	QPSK	1	271		17.05		
100	QPSK	135	0		17.49		19.0
100	QPSK	135	69		17.66		
100	QPSK	135	138		17.50		
100	QPSK	270	0		17.53		19.0
100	16QAM	1	1		16.99		19.0
100	64QAM	1	1		17.00		19.0
100	256QAM	1	1		17.18		19.0
Channel				632668	633332	634000	Tune-up limit (dBm)
Frequency (MHz)				3490.02	3499.98	3510	
80	PI/2 BPSK	1	1	17.27	17.29	17.31	19.0
Channel				632000	633332	634666	Tune-up limit (dBm)
Frequency (MHz)				3480	3499.98	3519.99	
60	PI/2 BPSK	1	1	17.18	17.16	17.20	19.0
Channel				631668	633332	635000	Tune-up limit (dBm)
Frequency (MHz)				3475.02	3499.98	3525	
50	PI/2 BPSK	1	1	17.29	17.23	17.27	19.0
Channel				631334	633332	635332	Tune-up limit (dBm)
Frequency (MHz)				3470.01	3499.98	3529.98	
40	PI/2 BPSK	1	1	17.06	17.02	17.08	19.0
Channel				630668	633332	636000	Tune-up limit (dBm)
Frequency (MHz)				3460.02	3499.98	3540	
20	PI/2 BPSK	1	1	17.40	17.35	17.39	19.0
Channel				630500	633332	636166	Tune-up limit (dBm)
Frequency (MHz)				3457.5	3499.98	3542.49	
15	PI/2 BPSK	1	1	17.37	17.42	17.43	19.0
Channel				630334	633332	636332	Tune-up limit (dBm)
Frequency (MHz)				3455.01	3499.98	3544.98	
10	PI/2 BPSK	1	1	17.50	17.49	17.47	19.0



<FR1 n78 HPUE Ant 8> (Part 27Q)

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel					633332		
Frequency (MHz)					3499.98		
100	PI/2 BPSK	1	1		18.09		20.0
100	PI/2 BPSK	1	137		18.48		
100	PI/2 BPSK	1	271		18.11		
100	PI/2 BPSK	135	0		18.46		20.0
100	PI/2 BPSK	135	69		18.67		20.0
100	PI/2 BPSK	135	138		18.42		20.0
100	PI/2 BPSK	270	0		18.48		
100	QPSK	1	1		18.00		20.0
100	QPSK	1	137		18.56		
100	QPSK	1	271		18.08		
100	QPSK	135	0		18.49		20.0
100	QPSK	135	69		18.66		
100	QPSK	135	138		18.47		
100	QPSK	270	0		18.56		20.0
100	16QAM	1	1		18.03		20.0
100	64QAM	1	1		18.00		20.0
100	256QAM	1	1		18.16		20.0
Channel				632668	633332	634000	Tune-up limit (dBm)
Frequency (MHz)				3490.02	3499.98	3510	
80	PI/2 BPSK	1	1	18.37	18.35	18.42	20.0
Channel				632000	633332	634666	Tune-up limit (dBm)
Frequency (MHz)				3480	3499.98	3519.99	
60	PI/2 BPSK	1	1	18.07	18.09	18.17	20.0
Channel				631668	633332	635000	Tune-up limit (dBm)
Frequency (MHz)				3475.02	3499.98	3525	
50	PI/2 BPSK	1	1	18.18	18.16	18.26	20.0
Channel				631334	633332	635332	Tune-up limit (dBm)
Frequency (MHz)				3470.01	3499.98	3529.98	
40	PI/2 BPSK	1	1	18.07	18.00	18.03	20.0
Channel				630668	633332	636000	Tune-up limit (dBm)
Frequency (MHz)				3460.02	3499.98	3540	
20	PI/2 BPSK	1	1	18.31	18.33	18.29	20.0
Channel				630500	633332	636166	Tune-up limit (dBm)
Frequency (MHz)				3457.5	3499.98	3542.49	
15	PI/2 BPSK	1	1	18.51	18.47	18.45	20.0
Channel				630334	633332	636332	Tune-up limit (dBm)
Frequency (MHz)				3455.01	3499.98	3544.98	
10	PI/2 BPSK	1	1	18.22	18.26	18.32	20.0

## 12. Antenna Location



The separation distance for antenna to edge :

Antenna	To Bottom of Laptop (mm)
WWAN Antenna 5	211.35
WWAN Antenna 8	12.38



**<SAR test exclusion table>**

**General Note:**

1. The below table, when the distance is < 50 mm exclusion threshold is "Ratio", when the distance is > 50 mm exclusion threshold is "mW"
2. Maximum power is the source-based time-average power and represents the maximum RF output power among production units
3. Per KDB 447498 D01v06, for larger devices, the test separation distance of adjacent edge configuration is determined by the closest separation between the antenna and the user.
4. Per KDB 447498 D01v06, standalone SAR test exclusion threshold is applied; If the test separation distance is < 5mm, 5mm is used to determine SAR exclusion threshold.
5. Per KDB 447498 D01v06, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:
  - $[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$  for 1-g SAR and ≤ 7.5 for 10-g extremity SAR
    - f(GHz) is the RF channel transmit frequency in GHz
    - Power and distance are rounded to the nearest mW and mm before calculation
    - The result is rounded to one decimal place for comparison
6. Per KDB 447498 D01v06, at 100 MHz to 6 GHz and for *test separation distances* > 50 mm, the SAR test exclusion threshold is determined according to the following
  - a) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm) · ( f(MHz)/150)] mW, at 100 MHz to 1500 MHz
  - b) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm) · 10] mW at > 1500 MHz and ≤ 6 GHz

**WWAN Ant 5**

Exposure Position	Wireless Interface	WCDMA Band V	WCDMA Band IV	WCDMA Band II	LTE Band 71 / n71	LTE Band 12	LTE Band 13	LTE Band 14	LTE Band 17	LTE Band 5 / n5	LTE Band 26	LTE Band 4	LTE Band 66 / n66	LTE Band 2 / n2	LTE Band 25 / n25	LTE Band 30 / n30	LTE Band 7 / n7	LTE Band 38 / n38	LTE Band 41 / n41	LTE Band n77	LTE Band n78
	Calculated Frequency (MHz)	846	1750	1907	695	715	784	795	713	848	848	1754	1779	1909	1914	2312	2567	2617	2687	3650	3650
Maximum power (dBm)	24.5	24.5	24.5	24.0	24.0	24.0	24.0	24.0	24.0	25.0	25.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
Maximum rated power(mW)	281.84	281.84	281.84	251.19	251.19	251.19	251.19	251.19	316.23	316.23	251.19	251.19	251.19	251.19	251.19	251.19	251.19	251.19	251.19	251.19	251.19
Bottom of Laptop	Separation distance(mm)	211.4																			
exclusion threshold		1073.0	1727.0	1722.0	928.0	946.0	1013.0	1023.0	945.0	1075.0	1075.0	1727.0	1726.0	1722.0	1722.0	1712.0	1707.0	1706.0	1705.0	1692.0	1692.0
Testing required?		No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

**WWAN Ant 8**

Exposure Position	Wireless Interface	LTE Band 4	LTE Band 66 / n66	LTE Band 2 / n2	LTE Band 25	LTE Band 30	LTE Band 7	LTE Band 41 / n41	LTE Band 48	LTE Band n77	LTE Band n78
	Calculated Frequency (MHz)	1754	1779	1909	1914	2312	2567	2687	3697	3650	3650
Maximum power (dBm)	24.0	24.0	23.0	20.0	22.0	22.0	24.0	20.0	18.5	19.0	
Maximum rated power(mW)	251.19	251.19	199.53	100.00	158.49	158.49	251.19	100.00	70.79	79.43	
Bottom of Laptop	Separation distance(mm)	12.4									
exclusion threshold		26.9	27.1	22.3	11.2	19.5	20.5	33.3	15.5	10.9	12.3
Testing required?		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes



## 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: Reported SAR(W/kg)= Measured SAR(W/kg)\*Tune-up Scaling Factor
  - c. 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:
  - $\leq 0.8$  W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is  $\leq 100$  MHz
  - $\leq 0.6$  W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
  - $\leq 0.4$  W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is  $\geq 200$  MHz
3. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is  $\geq 0.8$ W/kg.

### UMTS Note:

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

### LTE Note:

1. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
2. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
3. Per KDB 941225 D05v02r05, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are  $\leq 0.8$  W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is  $> 1.45$  W/kg, the remaining required test channels must also be tested.
4. Per KDB 941225 D05v02r05, 16QAM output power for each RB allocation configuration is  $>$  not  $1/2$  dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is  $\leq 1.45$  W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
5. Per KDB 941225 D05v02r05, Smaller bandwidth output power for each RB allocation configuration is  $>$  not  $1/2$  dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is  $\leq 1.45$  W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
6. For LTE B4/B5/B12/B17/B26/B38/B71 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.



**5G NR Note:**

1. Referencing the procedure in KDB 941225, the test procedures are outlined as below:
  - a. To start SAR test for the largest channel bandwidth for PI/2 BPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel. Also do SAR test for 50% RB allocation for PI/2 BPSK SAR testing using 1RB PI/2 BPSK allocation procedure
  - b. For PI/2 BPSK with 100% RB allocation, SAR test is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are  $\leq 0.8$  W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is  $> 1.45$  W/kg, the remaining required test channels must also be tested.
  - c. For higher modulation QPSK/16QAM/64QAM/256QAM, according to tune-up document the power level is not  $\frac{1}{2}$  dB higher than the same configuration in PI/2 BPSK, also reported SAR for the PI/2 BPSK configuration is less than 1.45 W/kg, QPSK/16QAM/64QAM/256QAM SAR testing are not required.
  - d. Smaller bandwidth output power for each RB allocation configuration for this device is not  $\frac{1}{2}$  dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is  $\leq 1.45$  W/kg, smaller bandwidth SAR testing is not required for this device
  - e. For 5G FR1 n41/n77, the maximum channel bandwidth does not support three non-overlapping channels in the frequency band, the middle channel of the group of overlapping channels were selected for testing.
  - f. Due to test setup limitations, SAR testing for NR was performed using Factory Test Mode software to establish the connection and perform SAR with 100% transmission. And only for TDD power class2 was performed using Factory Test Mode software to establish the connection and perform SAR with 50% transmission

**13.1 Body SAR**

**<FDD LTE SAR>**

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Antenna Vendor	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)
01	LTE Band 2_Ant 8	20M	QPSK	1	49	Bottom of Laptop	0mm	Vendor 1	19100	1900	22.35	23.00	1.161	0	0.959	1.114
	LTE Band 2_Ant 8	20M	QPSK	1	49	Bottom of Laptop	0mm	Vendor 1	18700	1860	22.33	23.00	1.167	0.03	0.783	0.914
	LTE Band 2_Ant 8	20M	QPSK	1	49	Bottom of Laptop	0mm	Vendor 1	18900	1880	22.26	23.00	1.186	0.05	0.825	0.978
	LTE Band 2_Ant 8	20M	QPSK	50	24	Bottom of Laptop	0mm	Vendor 1	19100	1900	21.40	22.00	1.148	-0.06	0.763	0.876
	LTE Band 2_Ant 8	20M	QPSK	50	24	Bottom of Laptop	0mm	Vendor 1	18700	1860	21.30	22.00	1.175	-0.08	0.703	0.826
	LTE Band 2_Ant 8	20M	QPSK	50	50	Bottom of Laptop	0mm	Vendor 1	18900	1880	21.27	22.00	1.183	0.09	0.739	0.874
	LTE Band 2_Ant 8	20M	QPSK	100	0	Bottom of Laptop	0mm	Vendor 1	19100	1900	21.32	22.00	1.169	0.02	0.695	0.813
	LTE Band 2_Ant 8	20M	QPSK	1	49	Bottom of Laptop	0mm	Vendor 2	19100	1900	22.35	23.00	1.161	0.04	0.356	0.413
	LTE Band 7_Ant 8	20M	QPSK	1	0	Bottom of Laptop	0mm	Vendor 1	21350	2560	21.59	22.00	1.099	0.03	0.375	0.412
	LTE Band 7_Ant 8	20M	QPSK	1	0	Bottom of Laptop	0mm	Vendor 1	20850	2510	21.36	22.00	1.159	0.06	0.324	0.375
	LTE Band 7_Ant 8	20M	QPSK	1	0	Bottom of Laptop	0mm	Vendor 1	21100	2535	21.48	22.00	1.127	0.01	0.321	0.362
	LTE Band 7_Ant 8	20M	QPSK	50	0	Bottom of Laptop	0mm	Vendor 1	21350	2560	21.33	22.00	1.167	0.15	0.345	0.403
02	LTE Band 7_Ant 8	20M	QPSK	1	0	Bottom of Laptop	0mm	Vendor 2	21350	2560	21.59	22.00	1.099	0.06	0.484	0.532
03	LTE Band 25_Ant 8	20M	QPSK	1	99	Bottom of Laptop	0mm	Vendor 1	26590	1905	19.67	20.00	1.079	0.06	0.392	0.423
	LTE Band 25_Ant 8	20M	QPSK	1	99	Bottom of Laptop	0mm	Vendor 1	26140	1860	19.39	20.00	1.151	0.07	0.321	0.369
	LTE Band 25_Ant 8	20M	QPSK	1	99	Bottom of Laptop	0mm	Vendor 1	26340	1880	19.45	20.00	1.135	0.1	0.340	0.386
	LTE Band 25_Ant 8	20M	QPSK	50	50	Bottom of Laptop	0mm	Vendor 1	26590	1905	19.52	20.00	1.117	0.02	0.377	0.421
	LTE Band 25_Ant 8	20M	QPSK	1	99	Bottom of Laptop	0mm	Vendor 2	26590	1905	19.67	20.00	1.079	0.02	0.178	0.192
04	LTE Band 30_Ant 8	10M	QPSK	1	0	Bottom of Laptop	0mm	Vendor 1	27710	2310	20.87	22.00	1.297	-0.01	0.524	0.680
	LTE Band 30_Ant 8	10M	QPSK	25	12	Bottom of Laptop	0mm	Vendor 1	27710	2310	19.95	21.00	1.274	0.03	0.410	0.522
	LTE Band 30_Ant 8	10M	QPSK	1	0	Bottom of Laptop	0mm	Vendor 2	27710	2310	20.87	22.00	1.297	0.08	0.246	0.319
	LTE Band 66_Ant 8	20M	QPSK	1	49	Bottom of Laptop	0mm	Vendor 1	132072	1720	22.26	24.00	1.493	0.06	0.459	0.685
05	LTE Band 66_Ant 8	20M	QPSK	1	49	Bottom of Laptop	0mm	Vendor 1	132322	1745	22.18	24.00	1.521	0.02	0.520	0.791
	LTE Band 66_Ant 8	20M	QPSK	1	49	Bottom of Laptop	0mm	Vendor 1	132572	1770	22.24	24.00	1.500	0.01	0.470	0.705
	LTE Band 66_Ant 8	20M	QPSK	50	0	Bottom of Laptop	0mm	Vendor 1	132072	1720	21.28	23.00	1.486	0.12	0.346	0.514
	LTE Band 66_Ant 8	20M	QPSK	1	49	Bottom of Laptop	0mm	Vendor 2	132322	1745	22.18	24.00	1.521	-0.04	0.280	0.426



<TDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Antenna Vendor	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_Ant 8	20M	QPSK	1	49	Bottom of Laptop	0mm	Vendor 1	40620	2593	22.79	24.00	1.321	62.9	1.006	0.06	0.212	0.282
	LTE Band 41_Ant 8	20M	QPSK	1	49	Bottom of Laptop	0mm	Vendor 1	39750	2506	22.53	24.00	1.403	62.9	1.006	0.15	0.208	0.294
	LTE Band 41_Ant 8	20M	QPSK	1	49	Bottom of Laptop	0mm	Vendor 1	40185	2549.5	22.52	24.00	1.406	62.9	1.006	-0.15	0.218	0.308
	LTE Band 41_Ant 8	20M	QPSK	1	49	Bottom of Laptop	0mm	Vendor 1	41055	2636.5	22.74	24.00	1.337	62.9	1.006	-0.06	0.247	0.332
	LTE Band 41_Ant 8	20M	QPSK	1	49	Bottom of Laptop	0mm	Vendor 1	41490	2680	22.77	24.00	1.327	62.9	1.006	0.07	0.294	0.393
	LTE Band 41_Ant 8	20M	QPSK	50	50	Bottom of Laptop	0mm	Vendor 1	40620	2593	21.89	23.00	1.291	62.9	1.006	0.02	0.168	0.218
	LTE Band 41C_Ant 8	20M	QPSK	1	0	Bottom of Laptop	0mm	Vendor 1	41055	2636.5	22.97	24.00	1.268	62.9	1.006	0.04	0.255	0.325
	LTE Band 41_HPUE_Ant 8	20M	QPSK	1	49	Bottom of Laptop	0mm	Vendor 1	41490	2680	25.78	27.00	1.324	42.9	1.009	-0.03	0.239	0.319
	LTE Band 41C_HPUE_Ant 8	20M	QPSK	1	0	Bottom of Laptop	0mm	Vendor 1	40185	2549.5	25.57	27.00	1.390	42.9	1.009	0.03	0.218	0.306
	LTE Band 41_Ant 8	20M	QPSK	1	49	Bottom of Laptop	0mm	Vendor 2	41490	2680	22.77	24.00	1.327	62.9	1.006	0.02	0.333	0.445
06	LTE Band 41_HPUE_Ant 8	20M	QPSK	1	49	Bottom of Laptop	0mm	Vendor 2	41490	2680	25.78	27.00	1.324	42.9	1.009	0.02	0.415	0.555
	LTE Band 48_Ant 8	20M	QPSK	1	49	Bottom of Laptop	0mm	Vendor 1	56150	3641	19.52	20.00	1.117	62.9	1.006	-0.16	0.836	0.939
	LTE Band 48_Ant 8	20M	QPSK	1	49	Bottom of Laptop	0mm	Vendor 1	55340	3560	19.21	20.00	1.199	62.9	1.006	-0.02	0.730	0.881
07	LTE Band 48_Ant 8	20M	QPSK	1	49	Bottom of Laptop	0mm	Vendor 1	55830	3609	19.34	20.00	1.164	62.9	1.006	0	0.809	0.947
	LTE Band 48_Ant 8	20M	QPSK	1	49	Bottom of Laptop	0mm	Vendor 1	56640	3690	19.22	20.00	1.197	62.9	1.006	-0.18	0.763	0.919
	LTE Band 48_Ant 8	20M	QPSK	50	0	Bottom of Laptop	0mm	Vendor 1	56150	3641	19.57	20.00	1.104	62.9	1.006	0.12	0.842	0.935
	LTE Band 48_Ant 8	20M	QPSK	50	0	Bottom of Laptop	0mm	Vendor 1	55340	3560	19.22	20.00	1.197	62.9	1.006	-0.18	0.738	0.888
	LTE Band 48_Ant 8	20M	QPSK	50	0	Bottom of Laptop	0mm	Vendor 1	55830	3609	19.38	20.00	1.153	62.9	1.006	-0.07	0.810	0.940
	LTE Band 48_Ant 8	20M	QPSK	50	0	Bottom of Laptop	0mm	Vendor 1	56640	3690	19.30	20.00	1.175	62.9	1.006	-0.07	0.772	0.912
	LTE Band 48_Ant 8	20M	QPSK	100	0	Bottom of Laptop	0mm	Vendor 1	56150	3641	19.49	20.00	1.125	62.9	1.006	0.06	0.708	0.801
	LTE Band 48C_Ant 8	20M	QPSK	1	0	Bottom of Laptop	0mm	Vendor 1	55340	3560	19.25	20.00	1.189	62.9	1.006	-0.01	0.761	0.910
	LTE Band 48C_Ant 8	20M	QPSK	1	0	Bottom of Laptop	0mm	Vendor 1	55830	3560	19.18	20.00	1.208	62.9	1.006	-0.01	0.691	0.840
	LTE Band 48C_Ant 8	20M	QPSK	1	0	Bottom of Laptop	0mm	Vendor 1	56150	3560	19.05	20.00	1.245	62.9	1.006	-0.01	0.752	0.941
	LTE Band 48C_Ant 8	20M	QPSK	1	0	Bottom of Laptop	0mm	Vendor 1	56640	3560	19.12	20.00	1.225	62.9	1.006	-0.01	0.722	0.889
	LTE Band 48_Ant 8	20M	QPSK	1	49	Bottom of Laptop	0mm	Vendor 2	55830	3609	19.34	20.00	1.164	62.9	1.006	-0.14	0.566	0.663



<5G NR SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Antenna Vendor	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)
	FR1 n2_Ant 8	20M	BPSK	1	53	Bottom of Laptop	0mm	Vendor 1	376000	1880	22.60	23.50	1.230	0.08	0.721	0.887
	FR1 n2_Ant 8	20M	BPSK	1	1	Bottom of Laptop	0mm	Vendor 1	372000	1860	22.54	23.50	1.247	0.11	0.699	0.872
	FR1 n2_Ant 8	20M	BPSK	1	104	Bottom of Laptop	0mm	Vendor 1	380000	1900	22.59	23.50	1.233	0.06	0.708	0.873
	FR1 n2_Ant 8	20M	BPSK	50	28	Bottom of Laptop	0mm	Vendor 1	376000	1880	22.67	23.50	1.211	0.04	0.719	0.870
	FR1 n2_Ant 8	20M	BPSK	50	28	Bottom of Laptop	0mm	Vendor 1	372000	1860	22.59	23.50	1.233	0.06	0.685	0.845
	FR1 n2_Ant 8	20M	BPSK	50	28	Bottom of Laptop	0mm	Vendor 1	380000	1900	22.63	23.50	1.222	0.11	0.671	0.820
	FR1 n2_Ant 8	20M	BPSK	100	0	Bottom of Laptop	0mm	Vendor 1	376000	1880	22.10	23.00	1.230	-0.08	0.605	0.744
08	FR1 n2_Ant 8	20M	BPSK	1	104	Bottom of Laptop	0mm	Vendor 2	380000	1900	22.59	23.50	1.233	0	0.738	0.910
	FR1 n2_Ant 8	20M	BPSK	1	53	Bottom of Laptop	0mm	Vendor 2	376000	1880	22.60	23.50	1.230	-0.02	0.733	0.902
	FR1 n2_Ant 8	20M	BPSK	1	1	Bottom of Laptop	0mm	Vendor 2	372000	1860	22.54	23.50	1.247	0.05	0.722	0.901
	FR1 n66_Ant 8	40M	BPSK	1	108	Bottom of Laptop	0mm	Vendor 1	349000	1745	22.69	23.00	1.074	0.06	0.420	0.451
09	FR1 n66_Ant 8	40M	BPSK	108	54	Bottom of Laptop	0mm	Vendor 1	349000	1745	22.70	23.00	1.072	-0.04	0.440	0.471
	FR1 n66_Ant 8	40M	BPSK	108	54	Bottom of Laptop	0mm	Vendor 2	349000	1745	22.70	23.00	1.072	-0.03	0.434	0.465
	FR1 n38_Ant 8	20M	BPSK	1	26	Bottom of Laptop	0mm	Vendor 1	519000	2595	21.93	22.50	1.140	0.13	0.368	0.420
	FR1 n38_Ant 8	20M	BPSK	25	13	Bottom of Laptop	0mm	Vendor 1	519000	2595	21.83	22.00	1.040	0.08	0.369	0.384
10	FR1 n38_Ant 8	20M	BPSK	1	26	Bottom of Laptop	0mm	Vendor 2	519000	2595	21.93	22.50	1.140	-0.06	0.384	0.438
	FR1 n41_Ant 8	100M	BPSK	1	137	Bottom of Laptop	0mm	Vendor 1	518598	2592.99	20.97	22.00	1.268	0.03	0.375	0.475
	FR1 n41_Ant 8	100M	BPSK	135	69	Bottom of Laptop	0mm	Vendor 1	518598	2592.99	21.55	22.00	1.109	0.08	0.386	0.428
11	FR1 n41_Ant 8	100M	BPSK	1	137	Bottom of Laptop	0mm	Vendor 2	518598	2592.99	20.97	22.00	1.268	0.05	0.434	0.550
	FR1 n77_HPUE_Ant 8	100M	BPSK	1	137	Bottom of Laptop	0mm	Vendor 1	656000	3840	17.26	18.50	1.330	0.13	0.566	0.753
	FR1 n77_HPUE_Ant 8	100M	BPSK	135	69	Bottom of Laptop	0mm	Vendor 1	656000	3840	17.37	18.50	1.297	0.05	0.566	0.734
	FR1 n77_HPUE_Ant 8	100M	BPSK	1	137	Bottom of Laptop	0mm	Vendor 2	656000	3840	17.26	18.50	1.330	-0.02	0.542	0.721
12	FR1 n77_HPUE_Ant 8	100M	BPSK	1	137	Bottom of Laptop	0mm	Vendor 1	633332	3499.98	17.40	18.50	1.288	0.19	0.595	0.767
	FR1 n77_HPUE_Ant 8	100M	BPSK	135	69	Bottom of Laptop	0mm	Vendor 1	633332	3499.98	17.44	18.50	1.276	0.08	0.595	0.759
	FR1 n77_HPUE_Ant 8	100M	BPSK	1	137	Bottom of Laptop	0mm	Vendor 2	633332	3499.98	17.40	18.50	1.288	0	0.420	0.541
13	FR1 n78_HPUE_Ant 8	100M	BPSK	1	137	Bottom of Laptop	0mm	Vendor 1	650000	3750	18.66	20.00	1.361	0.02	0.868	1.182
	FR1 n78_HPUE_Ant 8	100M	BPSK	135	69	Bottom of Laptop	0mm	Vendor 1	650000	3750	18.72	20.00	1.343	0.05	0.867	1.164
	FR1 n78_HPUE_Ant 8	100M	BPSK	270	0	Bottom of Laptop	0mm	Vendor 1	650000	3750	18.58	20.00	1.387	0.06	0.844	1.170
	FR1 n78_HPUE_Ant 8	100M	BPSK	1	137	Bottom of Laptop	0mm	Vendor 2	650000	3750	18.66	20.00	1.361	-0.01	0.649	0.884
	FR1 n78_HPUE_Ant 8	100M	BPSK	1	137	Bottom of Laptop	0mm	Vendor 1	633332	3499.98	18.48	20.00	1.419	0.1	0.742	1.053
	FR1 n78_HPUE_Ant 8	100M	BPSK	135	69	Bottom of Laptop	0mm	Vendor 1	633332	3499.98	18.67	20.00	1.358	0.09	0.712	0.967
	FR1 n78_HPUE_Ant 8	100M	BPSK	270	0	Bottom of Laptop	0mm	Vendor 1	633332	3499.98	18.48	20.00	1.419	0.05	0.681	0.966
	FR1 n78_HPUE_Ant 8	100M	BPSK	1	137	Bottom of Laptop	0mm	Vendor 2	633332	3499.98	18.48	20.00	1.419	0	0.594	0.843





**13.2 Repeated SAR Measurement**

No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Antenna Vendor	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 2_Ant 8	20M	QPSK	1	49	Bottom of Laptop	0mm	Vendor 1	19100	1900	22.35	23.00	1.161	0	0.959	-	1.114
2nd	LTE Band 2_Ant 8	20M	QPSK	1	49	Bottom of Laptop	0mm	Vendor 1	19100	1900	22.35	23.00	1.161	0.09	0.942	1.018	1.094
1st	FR1 n78_HPUE_Ant 8	100M	BPSK	1	137	Bottom of Laptop	0mm	Vendor 1	650000	3750	18.66	20.00	1.361	0.02	0.868	-	1.182
2nd	FR1 n78_HPUE_Ant 8	100M	BPSK	1	137	Bottom of Laptop	0mm	Vendor 1	650000	3750	18.66	20.00	1.361	-0.05	0.849	1.022	1.156

**General Note:**

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

**13.3 LTE Band 41 Power Class 2 and Power Class 3 Linearity**

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

Use PC3 power level and SAR to estimated PC2 SAR linearly, and check if the deviation from the measured PC2 SAR is  $< 10\%$

	LTE Band 41_Ant 8 (Power Class 3)	LTE Band 41_Ant 8 (Power Class 2)
Maximum Tune up Power (dBm)	24	27
Reported 1g SAR (W/kg)	0.445	0.555
Duty Cycle	63.30%	43.30%
Frame Averaged (mW)	159.00	217.01
Linearity SAR(W/kg)	0.61	
% deviation from expected linearity		-8.62%

**14. Simultaneous Transmission Analysis**

NO.	Simultaneous Transmission Configurations	Body
1.	WWAN Ant 5 + WWAN Ant 8	Yes

**General Note:**

1. For WWAN Ant 5 transmit antenna to bottom of laptop is higher than 200mm, when the separation distance is > 50mm, an estimated 1g SAR 0.4W/kg for each transmit antenna is using for Sim-Tx analysis.
2. The Sim-Tx analysis for EN-DC active is choose the worst case standalone SAR from the WWAN main antenna within the exposure positions, regardless of whether the EN-DC combinations. Therefore, the following summations represent the absolute worst cases for simultaneous transmission for this device and it is conservative.
3. The Scaled SAR summation is calculated based on the same configuration and test position.
4. Per KDB 447498 D01v06, simultaneous transmission SAR is compliant if,
  - i) Scalar SAR summation < 1.6W/kg.
  - ii)  $SPLSR = (SAR1 + SAR2)^{1.5} / (\text{min. separation distance, mm})$ , and the peak separation distance is determined from the square root of  $[(x1-x2)^2 + (y1-y2)^2 + (z1-z2)^2]$ , where (x1, y1, z1) and (x2, y2, z2) are the coordinates of the extrapolated peak SAR locations in the zoom scan.
  - iii) If  $SPLSR \leq 0.04$ , simultaneously transmission SAR measurement is not necessary.
  - iv) Simultaneously transmission SAR measurement, and the reported multi-band SAR < 1.6W/kg.

**14.1 Body Exposure Conditions**

Exposure Position	1	2	1+2 Summed 1g SAR (W/kg)
	Maximum WWAN Ant 5	Maximum WWAN Ant 8	
	Estimate 1g SAR (W/kg)	1g SAR (W/kg)	
Bottom of Laptop at 0mm	0.400	1.182	<b>1.582</b>

**Test Engineer :** Jerry Hsu, Randy Lin, Shane Song and Chris Yang



## **15. Uncertainty Assessment**

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

### Declaration of Conformity:

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

### Comments and Explanations:

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

## **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 447498 D01 v06, "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies", Oct 2015
- [6] FCC KDB 941225 D01 v03r01, "3G SAR MEAUREMENT PROCEDURES", Oct 2015
- [7] FCC KDB 941225 D05 v02r05, "SAR Evaluation Considerations for LTE Devices", Dec 2015
- [8] FCC KDB 941225 D05A v01r02, "Rel. 10 LTE SAR Test Guidance and KDB Inquiries", Oct 2015
- [9] FCC KDB 616217 D04 v01r02, "SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers", Oct 2015
- [10] FCC KDB 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.
- [11] FCC KDB 865664 D02 v01r02, "RF Exposure Compliance Reporting and Documentation Considerations" Oct 2015.