

FCC SAR TEST REPORT

FCC ID : 2AJN7-TP00172AL
Equipment : Notebook Computer
Brand Name : Lenovo
Model Name : TP00172A, TP00172B
Applicant : LC Future Center Limited Taiwan Branch
7F., No.780, Beian Rd., Zhongshan Dist.,
Taipei 104, Taiwan
Manufacturer : Lenovo Ireland International Limited
Viscount House, 6/7 Fitzwilliam Square
East, Dublin, D02 Y447, Ireland
Standard : FCC 47 CFR Part 2 (2.1093)

Equipment : Rolling Wireless RW101R-GL and Intel BE211D2W tested inside of Notebook Computer.

The product was received on Nov. 26, 2025 and testing was started from Dec. 01, 2025 and completed on Dec. 09, 2025. 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
FA5N2608B	01	Initial issue of report	Mar. 23, 2026

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) for LC Future Center Limited Taiwan Branch, Notebook Computer, TP00172A, TP00172B, are as follows.

Equipment Class	Frequency Band	Highest SAR Summary	Highest Body Simultaneous Transmission 1g SAR (W/kg)
		Body (Separation 0mm)	
		1g SAR (W/kg)	
Licensed	WCDMA II	1.19	1.19
	WCDMA IV	1.19	
	WCDMA V	0.62	
	LTE Band 7	0.79	
	LTE Band 12/17	0.55	
	LTE Band 13	0.63	
	LTE Band 14	0.65	
	LTE Band 2/25	1.19	
	LTE Band 5/26	0.76	
	LTE Band 30	1.06	
	LTE Band 38/41	0.83	
	LTE Band 48	1.19	
	LTE Band 4/66	1.18	
	LTE Band 71	0.53	
Date of Testing:		2025/12/01 ~ 2025/12/09	

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: Daisy Peng

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



3. Equipment Under Test (EUT) Information

3.1 General Information

Product Feature & Specification	
Equipment Name	Notebook Computer
Brand Name	Lenovo
Model Name	TP00172A, TP00172B
FCC ID	2AJN7-TP00172AL
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 WLAN 2.4 GHz Band: 2400 MHz ~ 2483.5 MHz WLAN 5.2 GHz Band: 5150 MHz ~ 5250 MHz WLAN 5.3 GHz Band: 5250 MHz ~ 5350 MHz WLAN 5.6 GHz Band: 5470 MHz ~ 5725 MHz WLAN 5.8 GHz Band: 5725 MHz ~ 5850 MHz WLAN 5.9 GHz Band: 5850 MHz ~ 5895 MHz WLAN 6GHz Band: 5925 MHz ~ 6425 MHz, 6425 MHz ~ 6525 MHz, 6525 MHz ~ 6875 MHz, 6875 MHz ~ 7125 MHz Bluetooth: 2400 MHz ~ 2483.5 MHz NFC : 13.56 MHz
Mode	RMC/AMR 12.2Kbps HSDPA HSUPA DC-HSDPA LTE: QPSK, 16QAM WLAN: 802.11a/b/g/n/ac/ax HT20/HT40/VHT20/VHT40/VHT80/VHT160/HE20/HE40/HE80/HE160/EHT20/EHT40/EHT80/EHT160/EHT320 Bluetooth BR/EDR/LE NFC: ASK
EUT Stage	Production Unit
Remark: 1. The Intel BE211D2W (FCC ID: PD9BE211D2) may integrated into this host, the Sim-Tx compliance with WWAN operation was addressed in section 13. 2. There are two kinds of antenna vendor, RF exposure evaluation selects Speed as the main test, ATC/AWAN will spot check worst case found in Speed.	

WWAN Antenna Information				
Main Antenna	Manufacturer	Amphenol	Peak gain(dBi)	1.98
	Part number	DC33002BE20	Type	PIFA
	Manufacturer	SPEED	Peak gain(dBi)	1.98
	Part number	DC33002BV20	Type	PIFA

WLAN Antenna Information					
Antenna 1	Manufacturer	SPEEDWIRE			
	Antenna Type	PIFA Antenna		PIFA Antenna	
	Part number	DC33002BV10		DC33002BV10	
	Peak gain (dbi)	Main Antenna :		Aux Antenna :	
		BT/WLAN(2.4G):	1.88 dBi	BT/WLAN(2.4G):	1.76 dBi
		WLAN(5G B1):	2.57 dBi	WLAN(5G B1):	2.55 dBi
		WLAN(5G B2):	2.66 dBi	WLAN(5G B2):	2.41 dBi
		WLAN(5G B3):	3.30 dBi	WLAN(5G B3):	3.48 dBi
		WLAN(5G B4):	3.32 dBi	WLAN(5G B4):	3.67 dBi
		UNII-4	3.13 dBi	UNII-4	3.33 dBi
		UNII-5	2.56 dBi	UNII-5	3.21 dBi
		UNII-6	3.06 dBi	UNII-6	3.72 dBi
		UNII-7	2.41 dBi	UNII-7	3.73 dBi
		UNII-8	1.75 dBi	UNII-8	3.97 dBi
Antenna 2	Manufacturer	Amphenol Taiwan Corporation			
	Antenna Type	PIFA Antenna		PIFA Antenna	
	Part number	DC33002BE10		DC33002BE10	
	Peak gain (dbi)	Main Antenna :		Aux Antenna :	
		BT/WLAN(2.4G):	1.88 dBi	BT/WLAN(2.4G):	1.76 dBi
		WLAN(5G B1):	2.57 dBi	WLAN(5G B1):	2.55 dBi
		WLAN(5G B2):	2.66 dBi	WLAN(5G B2):	2.41 dBi
		WLAN(5G B3):	3.30 dBi	WLAN(5G B3):	3.48 dBi
		WLAN(5G B4):	3.32 dBi	WLAN(5G B4):	3.67 dBi
		UNII-4	3.13 dBi	UNII-4	3.33 dBi
		UNII-5	2.56 dBi	UNII-5	3.21 dBi
		UNII-6	3.06 dBi	UNII-6	3.72 dBi
		UNII-7	2.41 dBi	UNII-7	3.73 dBi
		UNII-8	1.75 dBi	UNII-8	3.97 dBi
Antenna 3	Manufacturer	AWAN			
	Antenna Type	PIFA Antenna		PIFA Antenna	
	Part number	DC33002BL10		DC33002BL10	
	Peak gain (dbi)	Main Antenna :		Aux Antenna :	
		BT/WLAN(2.4G):	1.88 dBi	BT/WLAN(2.4G):	1.76 dBi
		WLAN(5G B1):	2.57 dBi	WLAN(5G B1):	2.55 dBi
		WLAN(5G B2):	2.66 dBi	WLAN(5G B2):	2.41 dBi
		WLAN(5G B3):	3.30 dBi	WLAN(5G B3):	3.48 dBi
		WLAN(5G B4):	3.32 dBi	WLAN(5G B4):	3.67 dBi
		UNII-4	3.13 dBi	UNII-4	3.33 dBi
		UNII-5	2.56 dBi	UNII-5	3.21 dBi
		UNII-6	3.06 dBi	UNII-6	3.72 dBi
		UNII-7	2.41 dBi	UNII-7	3.73 dBi
		UNII-8	1.75 dBi	UNII-8	3.97 dBi
Antenna 4	Manufacturer	SPEEDWIRE			
	Antenna Type	PIFA Antenna		PIFA Antenna	
	Part number	DC33002BV00		DC33002BV00	
	Peak gain (dbi)	Main Antenna :		Aux Antenna :	
		BT/WLAN(2.4G):	1.89 dBi	BT/WLAN(2.4G):	1.85 dBi
		WLAN(5G B1):	2.58 dBi	WLAN(5G B1):	2.61 dBi

		WLAN(5G B2):	2.33 dBi	WLAN(5G B2):	2.52 dBi
		WLAN(5G B3):	3.83 dBi	WLAN(5G B3):	3.41 dBi
		WLAN(5G B4):	3.74 dBi	WLAN(5G B4):	3.32 dBi
		UNII-4	2.00 dBi	UNII-4	3.26 dBi
		UNII-5	3.22 dBi	UNII-5	3.21 dBi
		UNII-6	2.15 dBi	UNII-6	3.72 dBi
		UNII-7	1.77 dBi	UNII-7	2.85 dBi
		UNII-8	1.22 dBi	UNII-8	3.97 dBi
Antenna 5	Manufacturer	ATC			
	Antenna Type	PIFA Antenna		PIFA Antenna	
	Part number	DC33002BE00		DC33002BE00	
	Peak gain (dbi)	Main Antenna :		Aux Antenna :	
		BT/WLAN(2.4G):	1.89 dBi	BT/WLAN(2.4G):	1.85 dBi
		WLAN(5G B1):	2.58 dBi	WLAN(5G B1):	2.61 dBi
		WLAN(5G B2):	2.33 dBi	WLAN(5G B2):	2.52 dBi
		WLAN(5G B3):	3.83 dBi	WLAN(5G B3):	3.41 dBi
		WLAN(5G B4):	3.74 dBi	WLAN(5G B4):	3.32 dBi
		UNII-4	2.00 dBi	UNII-4	3.26 dBi
		UNII-5	3.22 dBi	UNII-5	3.21 dBi
		UNII-6	2.15 dBi	UNII-6	3.72 dBi
		UNII-7	1.77 dBi	UNII-7	2.85 dBi
		UNII-8	1.22 dBi	UNII-8	3.97 dBi
Antenna 6	Manufacturer	AWAN			
	Antenna Type	PIFA Antenna		PIFA Antenna	
	Part number	DC33002BL00		DC33002BL00	
	Peak gain (dbi)	Main Antenna :		Aux Antenna :	
		BT/WLAN(2.4G):	1.89 dBi	BT/WLAN(2.4G):	1.85 dBi
		WLAN(5G B1):	2.58 dBi	WLAN(5G B1):	2.61 dBi
		WLAN(5G B2):	2.33 dBi	WLAN(5G B2):	2.52 dBi
		WLAN(5G B3):	3.83 dBi	WLAN(5G B3):	3.41 dBi
		WLAN(5G B4):	3.74 dBi	WLAN(5G B4):	3.32 dBi
		UNII-4	2.00 dBi	UNII-4	3.26 dBi
		UNII-5	3.22 dBi	UNII-5	3.21 dBi
		UNII-6	2.15 dBi	UNII-6	3.72 dBi
		UNII-7	1.77 dBi	UNII-7	2.85 dBi
		UNII-8	1.22 dBi	UNII-8	3.97 dBi

3.2 General LTE SAR Test and Reporting Considerations

Summarized necessary items addressed in KDB 941225 D05 v02r05																																																																													
FCC ID	2AJN7-TP00172AL																																																																												
Equipment Name	Notebook Computer																																																																												
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																																																																												
LTE Voice / Data requirements	Data only																																																																												
LTE MPR permanently built-in by design	<table><tr><th colspan="8">Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3</th></tr><tr><th rowspan="2">Modulation</th><th colspan="6">Channel bandwidth / Transmission bandwidth (N_{RB})</th><th rowspan="2">MPR (dB)</th></tr><tr><th>1.4 MHz</th><th>3.0 MHz</th><th>5 MHz</th><th>10 MHz</th><th>15 MHz</th><th>20 MHz</th></tr><tr><td>QPSK</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 1</td></tr><tr><td>16 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 1</td></tr><tr><td>16 QAM</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 2</td></tr><tr><td>64 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 2</td></tr><tr><td>64 QAM</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 3</td></tr><tr><td>256 QAM</td><td colspan="6">≥ 1</td><td>≤ 5</td></tr></table>							Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3								Modulation	Channel bandwidth / Transmission bandwidth (N _{RB})						MPR (dB)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1	16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1	16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2	64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2	64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3	256 QAM	≥ 1						≤ 5
Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3																																																																													
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	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz																																																																							
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1																																																																						
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1																																																																						
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2																																																																						
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2																																																																						
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3																																																																						
256 QAM	≥ 1						≤ 5																																																																						
LTE A-MPR	In the base station simulator configuration, Network Setting value is set to NS_01 to disable A-MPR during SAR testing and the LTE SAR tests was transmitting on all TTI frames (Maximum TTI)																																																																												
Spectrum plots for RB configuration	A properly configured base station simulator was used for the SAR and power measurement; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.																																																																												



FCC SAR TEST REPORT

Report No. : FA5N2608B

Transmission (H, M, L) channel numbers and frequencies in each LTE band												
LTE Band 2												
	Bandwidth 1.4MHz		Bandwidth 3MHz		Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz	
	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 1.4MHz		Bandwidth 3MHz		Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz	
	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 1.4MHz		Bandwidth 3MHz		Bandwidth 5MHz		Bandwidth 10MHz					
	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	826.5	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	846.5	20600	844	20600	844
LTE Band 7												
	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz					
	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	2507.5	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	2562.5	21350	2560	21350	2560
LTE Band 12												
	Bandwidth 1.4MHz		Bandwidth 3MHz		Bandwidth 5MHz		Bandwidth 10MHz					
	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	701.5	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	23115	713.5	23130	713.5	23130	711	23130	711
LTE Band 13												
	Bandwidth 5MHz				Bandwidth 10MHz							
	Ch. #		Freq. (MHz)		Ch. #		Freq. (MHz)		Ch. #		Freq. (MHz)	
L	23205		779.5		23230		782		782			
M	23230		782									
H	23255		784.5									
LTE Band 14												
	Bandwidth 5MHz				Bandwidth 10MHz							
	Ch. #		Freq. (MHz)		Ch. #		Freq. (MHz)		Ch. #		Freq. (MHz)	
L	23305		790.5		23330		793		793			
M	23330		793									
H	23355		795.5									
LTE Band 17												
	Bandwidth 5MHz				Bandwidth 10MHz							
	Ch. #		Freq. (MHz)		Ch. #		Freq. (MHz)		Ch. #		Freq. (MHz)	
L	23755		706.5		23780		706.5		23780		709	
M	23790		710		23790		710		23790		710	
H	23825		713.5		23800		713.5		23800		711	
LTE Band 25												
	Bandwidth 1.4MHz		Bandwidth 3MHz		Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz	
	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_FCC												
	Bandwidth 1.4MHz		Bandwidth 3MHz		Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz			
	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	816.5	26740	819	26765	821.5
M	26865	831.5	26865	831.5	26865	831.5	26865	831.5	26865	831.5	26865	831.5
H	27033	848.3	27025	847.5	27015	846.5	26990	846.5	26990	844	26965	841.5
LTE Band 30												
	Bandwidth 5MHz				Bandwidth 10MHz							
	Ch. #		Freq. (MHz)		Ch. #		Freq. (MHz)		Ch. #		Freq. (MHz)	
L	27685		2307.5		27710		2310		2310			
M	27710		2310									
H	27735		2312.5									
LTE Band 66												
	Bandwidth 1.4MHz		Bandwidth 3MHz		Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)



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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 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz					
	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	133222	673	133222	673
M	133297	680.5	133297	680.5	133297	680.5	133297	680.5	133297	680.5	133297	680.5
H	133447	695.5	133422	693	133397	690.5	133372	688	133372	688	133372	688
LTE Band 38												
	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	37775	2572.5	37800	2575	37825	2577.5	37850	2580	37850	2580	37850	2580
M	38000	2595	38000	2595	38000	2595	38000	2595	38000	2595	38000	2595
H	38225	2617.5	38200	2615	38175	2612.5	38150	2610	38150	2610	38150	2610
LTE Band 41 FCC												
	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	39675	2498.5	39700	2501	39725	2503.5	39750	2506	39750	2506	39750	2506
LMM	40148	2545.8	40160	2547	40173	2548.3	40185	2549.5	40185	2549.5	40185	2549.5
M	40620	2593	40620	2593	40620	2593	40620	2593	40620	2593	40620	2593
HMM	41093	2640.3	41080	2639	41068	2637.8	41055	2636.5	41055	2636.5	41055	2636.5
H	41565	2687.5	41540	2685	41515	2682.5	41490	2680	41490	2680	41490	2680
LTE Band 48												
	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz					
	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	55340	3560	55340	3560
LMM	55810	3607	55815	3607.5	55820	3608	55830	3609	55830	3609	55830	3609
M	55990	3625	55990	3625	55990	3625	55990	3625	55990	3625	55990	3625
HMM	56170	3643	56165	3642.5	56160	3642	56150	3641	56150	3641	56150	3641
H	56715	3697.5	56690	3695	56665	3692.5	56640	3690	56640	3690	56640	3690

4. Smart Transmit feature for RF Exposure compliance

The Smart Transmit algorithm maintains the time-averaged transmit power, in turn, time-averaged RF exposure of SAR_design_target or PD_design_target, below the predefined time-averaged power limit (i.e., input.power.limit for 5G mmW NR), for each characterized technology and band (refer to RF exposure part0 report)

Smart Transmit allows the device to transmit at higher power instantaneously, as high as P_{max}, when needed, but enforces power limiting to maintain time-averaged transmit power to P_{limit}. Below table shows P_{limit} EFS settings and maximum tune up output power P_{max} configured for this EUT for various transmit conditions (Device State Index DSI).

<P_{limit} for supported technologies and bands (P_{limit} in EFS file)>

Wireless Technology	Antenna	Duty cycle	1g SAR design target (W/kg)	P _{limit}	P _{max} (dBm)	Tolerance (dB)
WCDMA_B2	Main	100%	0.95	16.7	23.5	1
WCDMA_B4	Main	100%	0.95	17.7	23.5	1
WCDMA_B5	Main	100%	0.95	18.5	23.5	1
LTE_B2	Main	100%	0.95	16.7	23.0	1
LTE_B4	Main	100%	0.95	17.6	23.0	1
LTE_B5	Main	100%	0.95	19	24.0	1
LTE_B7	Main	100%	0.95	16.5	23.0	1
LTE_B12	Main	100%	0.95	19.8	24.0	1
LTE_B13	Main	100%	0.95	19.3	24.0	1
LTE_B14	Main	100%	0.95	19.2	24.0	1
LTE_B17	Main	100%	0.95	19.8	24.0	1
LTE_B25	Main	100%	0.95	16.7	23.0	1
LTE_B26	Main	100%	0.95	19	24.0	1
LTE_B30	Main	100%	0.95	17.3	22.0	1
LTE_B38	Main	63.3%	0.95	16.3	21.0	1
LTE_B41	Main	63.3%	0.95	16.3	21.0	1
LTE_B48	Main	63.3%	0.95	15.4	19.0	1
LTE_B66	Main	100%	0.95	17.6	23.0	1
LTE_B71	Main	100%	0.95	20.2	24.0	1

*P_{max} is used for RF tune up procedure. The maximum allowed output power is equal to P_{max} + 1dB uncertainty.

**All P_{limit} power levels entered in the Table correspond to average power levels after accounting for duty cycle in the case TDD modulation schemes (for e.g., GSM & LTE TDD & NR TDD).

The max allowed output power is the P_{limit} + 1dB device uncertainty, and if P_{limit} is higher than P_{max}, the device output power will be P_{max} instead.

5. RF Exposure Limits

5.1 Uncontrolled Environment

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

5.2 Controlled Environment

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

Limits for Occupational/Controlled Exposure (W/kg)

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

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

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

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

5.3 RF Exposure limit for above 6GHz

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

Peak Spatially Averaged Power Density was evaluated over a circular area of 4cm² per interim FCC Guidance for near-field power density evaluations per October 2018 TCB Workshop notes

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f ²)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

6. Specific Absorption Rate (SAR)

6.1 Introduction

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

6.2 SAR Definition

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

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

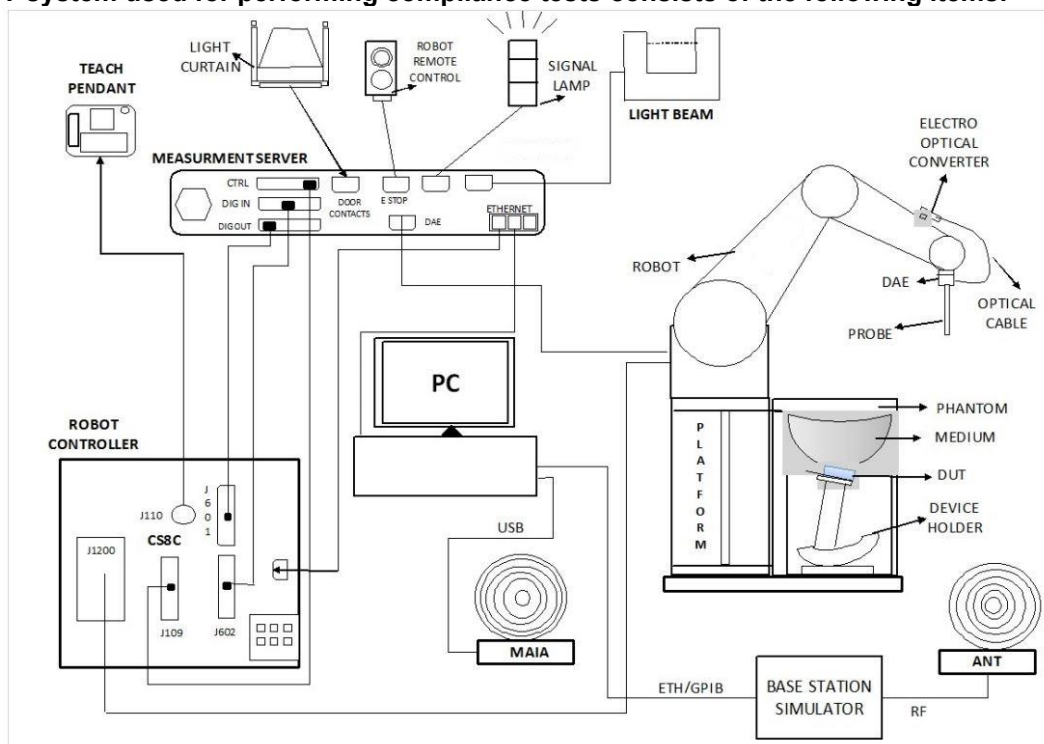
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

7. System Description and Setup

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



- 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.

7.1 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.

Laboratory	EMC & Wireless Communications Laboratory		Wensan Laboratory				
Test Site Location	TW1190 No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333		TW3786 No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010				
Test Site No.	SAR01-HY	SAR03-HY	SAR08-HY	SAR09-HY	SAR15-HY	SAR18-HY	SAR21-HY
	SAR04-HY	SAR05-HY	SAR11-HY	SAR12-HY	SAR16-HY	SAR19-HY	SAR22-HY
	SAR06-HY	SAR10-HY	SAR13-HY	SAR14-HY	SAR17-HY	SAR20-HY	

7.2 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>

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

<EX3DV4 Probe>

Construction	Symmetric design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	4 MHz – >6 GHz Linearity: ± 0.2 dB (30 MHz – 6 GHz)	
Directivity	± 0.3 dB in TSL (rotation around probe axis) ± 0.5 dB in TSL (rotation normal to probe axis)	
Dynamic Range	10 μ W/g – >100 mW/g Linearity: ± 0.2 dB (noise: typically <1 μ W/g)	
Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: 2.5 mm (body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	

7.3 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.

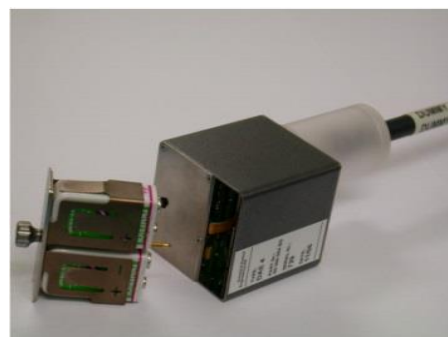


Fig 5.1 Photo of DAE

7.4 Phantom

<SAM Twin Phantom>

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

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

<ELI Phantom>

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

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

7.5 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

8. 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

8.1 Spatial Peak SAR Evaluation

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

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

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

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

8.2 Power Reference Measurement

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

8.3 Area Scan

The area scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum found in the scanned area, within a range of the global maximum. The range (in 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	$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
Maximum area scan spatial resolution: Δx_{Area} , Δy_{Area}	≤ 2 GHz: ≤ 15 mm $2 - 3$ GHz: ≤ 12 mm	$3 - 4$ GHz: ≤ 12 mm $4 - 6$ GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be $\leq$ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

8.4 Zoom Scan

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

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

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

8.5 Volume Scan Procedures

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

8.6 Power Drift Monitoring

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

9. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Last Cal.	Due Date
SPEAG	750MHz System Validation Kit	D750V3	1117	Mar. 12, 2025	Mar. 11, 2026
SPEAG	835MHz System Validation Kit ⁽²⁾	D835V2	499	Aug. 22, 2024	Aug. 20, 2026
SPEAG	1750MHz System Validation Kit	D1750V2	1112	Feb. 20, 2025	Feb. 19, 2026
SPEAG	1900MHz System Validation Kit	D1900V2	5d185	Jun. 11, 2025	Jun. 10, 2026
SPEAG	2300MHz System Validation Kit ⁽²⁾	D2300V2	1006	Jan. 14, 2025	Jan. 13, 2026
SPEAG	2600MHz System Validation Kit ⁽²⁾	D2600V2	1008	Aug. 15, 2024	Aug. 13, 2026
SPEAG	3500MHz System Validation Kit ⁽²⁾	D3500V2	1014	Jan. 15, 2025	Jan. 14, 2026
SPEAG	3700MHz System Validation Kit	D3700V2	1006	Jun. 12, 2025	Jun. 11, 2026
SPEAG	Data Acquisition Electronics	DAE4	1776	Feb. 12, 2025	Feb. 11, 2026
SPEAG	Data Acquisition Electronics	DAE4	661	May. 19, 2025	May. 18, 2026
SPEAG	Data Acquisition Electronics	DAE4	1805	May. 21, 2025	May. 20, 2026
SPEAG	Dosimetric E-Field Probe	EX3DV4	7694	Oct. 23, 2025	Oct. 22, 2026
SPEAG	Dosimetric E-Field Probe	EX3DV4	7791	Feb. 19, 2025	Feb. 18, 2026
SPEAG	Dosimetric E-Field Probe	EX3DV4	7814	Jun. 19, 2025	Jun. 18, 2026
SPEAG	Dielectric Probe Kit	DAK-3.5	1270	May. 19, 2025	May. 18, 2026
Testo	Hygro meter	608-H1	45196600	Nov. 04, 2025	Nov. 03, 2026
Testo	Hygro meter	608-H1	45207528	Nov. 04, 2025	Nov. 03, 2026
Anritsu	Radio Communication Analyzer	MT8821C	6201074414	Aug. 19, 2025	Aug. 18, 2026
SPEAG	Device Holder	N/A	N/A	N/A	N/A
Anritsu	Signal Generator	MG3710A	6201502524	Sep. 24, 2025	Sep. 23, 2026
Keysight	ENA Network Analyzer	E5071C	MY46104758	Oct. 14, 2025	Oct. 13, 2026
LINE SEIKI	Digital Thermometer	DTM3000-spezial	3902	Feb. 19, 2025	Feb. 18, 2026
Anritsu	Power Meter	ML2496A	2119003	Jul. 14, 2025	Jul. 13, 2026
R&S	Power Sensor	NRP8S	109687	Sep. 22, 2025	Sep. 21, 2026
Anritsu	Spectrum Analyzer	N9010A	MY53470118	Sep. 09, 2025	Sep. 08, 2026
Mini-Circuits	Power Amplifier	ZVE-8G+	D120604	Oct. 17, 2025	Oct. 16, 2026
ATM	Dual Directional Coupler	C122H-10	P610410z-02	N/A	N/A
Warison	Directional Coupler	WCOU-10-50S-10	WR889BMC4B1	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.

10. System Verification

10.1 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 $\pm 2^\circ\text{C}$ 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

The SPEAG Dasy Measurement system implement a SAR error compensation algorithm as documented in IEEE Std 1528-2013 to automatically compensate the measured SAR results for deviations between the measured and required tissue dielectric parameters, according to KDB 865664 D01 and IEC/IEEE 62209-1528, the tolerance for "Delta (σ)" and "Delta (ϵ_r)" can be relaxed to $\pm 10\%$

<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Liquid Temp (°C)	Conductivity (σ)	Permittivity (ϵ_r)	Conductivity Target (σ)	Permittivity Target (ϵ_r)	Delta (σ) (%)	Delta (ϵ_r) (%)	Limit (%)	Date
750	22.5	0.844	45.6	0.89	41.9	-5.17	8.83	± 10.0	2025-12-03
750	22.6	0.893	42.6	0.89	41.9	0.34	1.67	± 10.0	2025-12-06
835	22.6	0.923	42.4	0.9	41.5	2.56	2.17	± 10.0	2025-12-06
1750	22.2	1.35	41.3	1.37	40.1	-1.46	2.99	± 10.0	2025-12-02
1750	22.9	1.36	40.7	1.37	40.1	-0.73	1.50	± 10.0	2025-12-07
1900	22.2	1.45	41.2	1.4	40.0	3.57	3.00	± 10.0	2025-12-02
1900	22.9	1.44	40.4	1.4	40.0	2.86	1.00	± 10.0	2025-12-07
2300	22.1	1.71	39.9	1.67	39.5	2.40	1.01	± 10.0	2025-12-01
2300	22.2	1.72	40.5	1.67	39.5	2.99	2.53	± 10.0	2025-12-02
2300	22.8	1.73	39.9	1.67	39.5	3.59	1.01	± 10.0	2025-12-08
2600	22.1	1.94	39.4	1.96	39.0	-1.02	1.03	± 10.0	2025-12-01
2600	22.2	1.95	40.1	1.96	39.0	-0.51	2.82	± 10.0	2025-12-02
2600	22.8	1.96	39.4	1.96	39.0	0.00	1.03	± 10.0	2025-12-08
3500	22.1	2.74	37.7	2.91	37.9	-5.84	-0.53	± 10.0	2025-12-09
3700	22.1	2.92	37.4	3.12	37.7	-6.41	-0.80	± 10.0	2025-12-09

10.2 System Performance Check Results

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

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 (%)
SAR18	2025-12-03	750	250.00	D750V3 - 1117	EX3DV4 - SN7694	DAE4 Sn1805	2.030	8.600	8.120	-5.58
SAR17	2025-12-06	750	250.00	D750V3 - 1117	EX3DV4 - SN7791	DAE4 Sn661	2.180	8.600	8.720	1.40
SAR17	2025-12-06	835	250.00	D835V2 - 499	EX3DV4 - SN7791	DAE4 Sn661	2.360	9.440	9.440	0.00
SAR19	2025-12-02	1750	50.00	D1750V2 - 1112	EX3DV4 - SN7814	DAE4 Sn1776	1.780	36.300	35.600	-1.93
SAR17	2025-12-07	1750	250.00	D1750V2 - 1112	EX3DV4 - SN7791	DAE4 Sn661	8.740	36.300	34.960	-3.69
SAR19	2025-12-02	1900	50.00	D1900V2 - 5d185	EX3DV4 - SN7814	DAE4 Sn1776	1.880	39.600	37.600	-5.05
SAR17	2025-12-07	1900	250.00	D1900V2 - 5d185	EX3DV4 - SN7791	DAE4 Sn661	9.570	39.600	38.280	-3.33
SAR18	2025-12-01	2300	50.00	D2300V2 - 1006	EX3DV4 - SN7694	DAE4 Sn1805	2.390	48.200	47.800	-0.83
SAR19	2025-12-02	2300	50.00	D2300V2 - 1006	EX3DV4 - SN7814	DAE4 Sn1776	2.320	48.200	46.400	-3.73
SAR17	2025-12-08	2300	250.00	D2300V2 - 1006	EX3DV4 - SN7791	DAE4 Sn661	11.500	48.200	46.000	-4.56
SAR18	2025-12-01	2600	50.00	D2600V2 - 1008	EX3DV4 - SN7694	DAE4 Sn1805	2.760	55.700	55.200	-0.90
SAR19	2025-12-02	2600	50.00	D2600V2 - 1008	EX3DV4 - SN7814	DAE4 Sn1776	2.670	55.700	53.400	-4.13
SAR17	2025-12-08	2600	250.00	D2600V2 - 1008	EX3DV4 - SN7791	DAE4 Sn661	13.100	55.700	52.400	-5.92
SAR17	2025-12-09	3500	100.00	D3500V2 - 1014	EX3DV4 - SN7791	DAE4 Sn661	6.080	65.700	60.800	-7.46
SAR17	2025-12-09	3700	100.00	D3700V2 - 1006	EX3DV4 - SN7791	DAE4 Sn661	6.420	69.900	64.200	-8.15

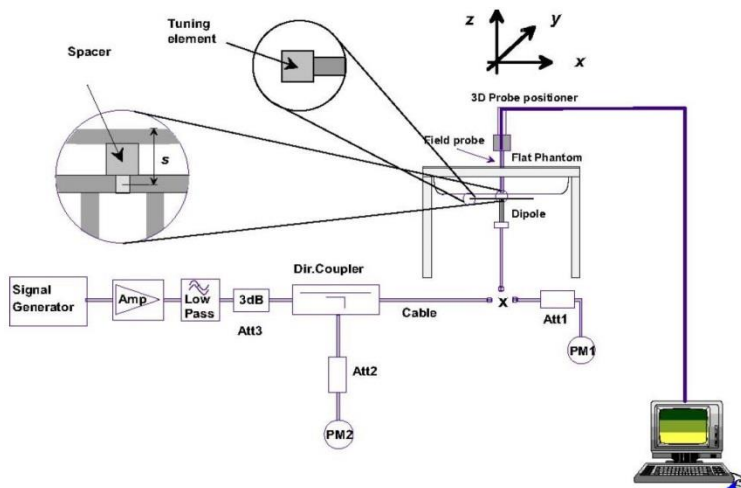


Fig 8.3.1 System Performance Check Setup



Fig 8.3.2 Setup Photo

11. UMTS/LTE Output Power (Unit: dBm)

<WCDMA Conducted Power>

1. The following tests were conducted according to the test requirements outlines in 3GPP TS 34.121 specification.
2. The procedures in KDB 941225 D01v03r01 are applied for 3GPP Rel. 6 HSPA to configure the device in the required sub-test mode(s) to determine SAR test exclusion.
3. For HSPA+ devices supporting 16 QAM in the uplink, power measurements procedure is according to the configurations in Table C.11.1.4 of 3GPP TS 34.121-1.
4. For DC-HSDPA, the device was configured according to the H-Set 12, Fixed Reference Channel (FRC) configuration in Table C.8.1.12 of 3GPP TS 34.121-1, with the primary and the secondary serving HS-DSCH Cell enabled during the power measurement.

A summary of these settings are illustrated below:

HSDPA Setup Configuration:

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

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

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

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

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

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

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

Setup Configuration

HSUPA Setup Configuration:

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

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

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note 1)	β_{ec}	β_{ed} (Note 4) (Note 5)	β_{ed} (SF)	β_{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2) (Note 6)	AG Index (Note 5)	E-TFCI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/25	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1} : 47/15 β_{ed2} : 47/15	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15	0	-	-	5/15	5/15	47/15	4	1	1.0	0.0	12	67

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

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

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

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

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

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

Setup Configuration

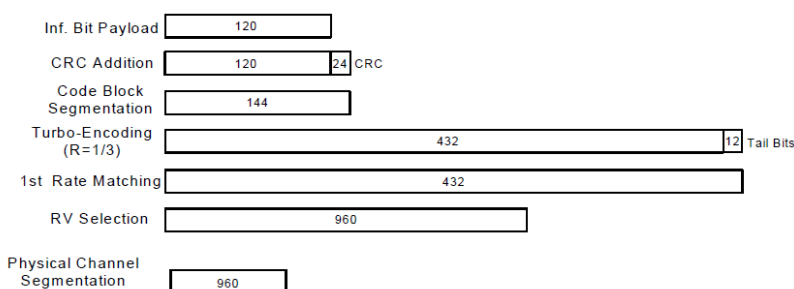
DC-HSDPA 3GPP release 8 Setup Configuration:

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

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

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

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


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

<WCDMA Conducted Power>
General Note:

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

【WCDMA II】

TX Channel		9262	9400	9538	Tune-up Limit (dBm)
Frequency (MHz)		1852.4	1880	1907.6	
3GPP Rel 99	RMC 12.2Kbps	16.69	16.70	16.75	17.70
3GPP Rel 6	HSDPA Subtest-1	15.78	15.71	15.80	16.70
3GPP Rel 6	HSDPA Subtest-2	15.73	15.73	15.75	16.70
3GPP Rel 6	HSDPA Subtest-3	15.20	15.27	15.26	16.20
3GPP Rel 6	HSDPA Subtest-4	15.30	15.26	15.23	16.20
3GPP Rel 8	DC-HSDPA Subtest-1	15.73	15.68	15.74	16.70
3GPP Rel 8	DC-HSDPA Subtest-2	15.69	15.69	15.70	16.70
3GPP Rel 8	DC-HSDPA Subtest-3	15.16	15.22	15.21	16.20
3GPP Rel 8	DC-HSDPA Subtest-4	15.26	15.20	15.18	16.20
3GPP Rel 6	HSUPA Subtest-1	14.71	14.72	14.75	16.70
3GPP Rel 6	HSUPA Subtest-2	13.71	13.81	13.63	14.70
3GPP Rel 6	HSUPA Subtest-3	14.74	14.72	14.63	15.70
3GPP Rel 6	HSUPA Subtest-4	13.76	13.66	13.72	14.70
3GPP Rel 6	HSUPA Subtest-5	15.70	15.60	15.60	16.70

【WCDMA IV】

TX Channel		1312	1413	1513	Tune-up Limit (dBm)
Frequency (MHz)		1712.4	1732.6	1752.6	
3GPP Rel 99	RMC 12.2Kbps	17.18	17.30	17.36	18.70
3GPP Rel 6	HSDPA Subtest-1	16.26	16.35	16.35	17.70
3GPP Rel 6	HSDPA Subtest-2	16.28	16.25	16.38	17.70
3GPP Rel 6	HSDPA Subtest-3	15.78	15.74	15.93	17.20
3GPP Rel 6	HSDPA Subtest-4	15.63	15.82	15.88	17.20
3GPP Rel 8	DC-HSDPA Subtest-1	16.20	16.29	16.29	17.70
3GPP Rel 8	DC-HSDPA Subtest-2	16.24	16.20	16.33	17.70
3GPP Rel 8	DC-HSDPA Subtest-3	15.73	15.69	15.88	17.20
3GPP Rel 8	DC-HSDPA Subtest-4	15.58	15.79	15.83	17.20
3GPP Rel 6	HSUPA Subtest-1	15.76	15.75	15.78	17.70
3GPP Rel 6	HSUPA Subtest-2	14.28	14.29	14.40	15.70
3GPP Rel 6	HSUPA Subtest-3	15.20	15.73	15.34	16.70
3GPP Rel 6	HSUPA Subtest-4	14.26	14.33	14.38	15.70
3GPP Rel 6	HSUPA Subtest-5	16.00	16.20	16.30	17.70

【WCDMA V】

TX Channel		4132	4182	4233	Tune-up Limit (dBm)
Frequency (MHz)		826.4	836.4	846.6	
3GPP Rel 99	RMC 12.2Kbps	18.36	18.71	18.37	19.50
3GPP Rel 6	HSDPA Subtest-1	17.38	17.64	17.37	18.50
3GPP Rel 6	HSDPA Subtest-2	17.39	17.68	17.36	18.50
3GPP Rel 6	HSDPA Subtest-3	16.84	17.21	16.89	18.00
3GPP Rel 6	HSDPA Subtest-4	16.79	17.18	16.99	18.00
3GPP Rel 8	DC-HSDPA Subtest-1	17.34	17.61	17.31	18.50
3GPP Rel 8	DC-HSDPA Subtest-2	17.34	17.65	17.31	18.50
3GPP Rel 8	DC-HSDPA Subtest-3	16.78	17.18	16.84	18.00
3GPP Rel 8	DC-HSDPA Subtest-4	16.75	17.13	16.94	18.00
3GPP Rel 6	HSUPA Subtest-1	17.40	17.74	17.44	18.50
3GPP Rel 6	HSUPA Subtest-2	15.39	15.70	15.49	16.50
3GPP Rel 6	HSUPA Subtest-3	16.34	16.67	16.41	17.50
3GPP Rel 6	HSUPA Subtest-4	15.42	15.65	15.42	16.50
3GPP Rel 6	HSUPA Subtest-5	17.30	17.60	17.30	18.50

<LTE Conducted Power>**General Note:**

1. A Base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r05, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
4. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r05, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
6. Per KDB 941225 D05v02r05, 16QAM output power for each RB allocation configuration is $>$ not $\frac{1}{2}$ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
7. Per KDB 941225 D05v02r05, Smaller bandwidth output power for each RB allocation configuration is $>$ not $\frac{1}{2}$ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
8. For LTE B4/B5/B12/B17/B26/B38/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 2/4/5/17/38 SAR test was covered by Band 25/66/26/12/41; 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

<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.

- 3GPP TS 36.211 section 4.2 for Type 2 Frame Structure and Table 4.2-2 for uplink-downlink configurations
- “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
- Establishing connections with base station simulators ensure a consistent means for testing SAR and recommended for evaluating SAR. The Base station simulator was used for LTE output power measurements and SAR testing.

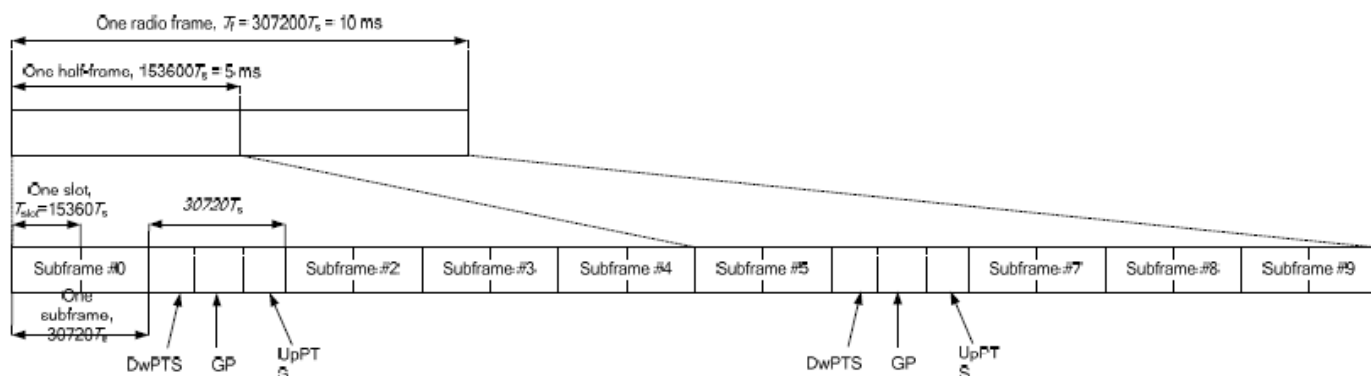


Figure 4.2-1: Frame structure type 2 (for 5 ms switch-point periodicity).

Table 4.2-2: Uplink-downlink configurations.

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

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

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

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

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

The highest duty factor is resulted from:

- Uplink-downlink configuration: 0. In a half-frame consisted of 5 subframes, uplink operation is in 3 uplink subframes and 1 special subframe.
- special subframe configuration: 5-9 for normal cyclic prefix in downlink, 4-7 for extended cyclic prefix in downlink
- for special subframe with extended cyclic prefix in uplink, the total uplink duty factor in one half-frame is:
 $(3+0.167)/5 = 63.3\%$
- for special subframe with normal cyclic prefix in uplink, the total uplink duty factor in one half-frame is:
 $(3+0.143)/5 = 62.9\%$
- For TDD LTE SAR measurement, the duty cycle 1:1.59 (62.9 %) was used perform testing and considering the theoretical duty cycle of 63.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 62.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix $63.3\%/62.9\% = 1.006$ is applied to scale-up the measured SAR result. The scaled TDD LTE SAR = measured SAR (W/kg)* Tune-up Scaling Factor* scaling factor for extended cyclic prefix.

【LTE Band 2】

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	17.22	17.09	17.18	17.70
20	QPSK	1	49	17.20	17.08	17.15	17.70
20	QPSK	1	99	17.15	17.05	17.15	17.70
20	QPSK	50	0	17.28	17.21	17.25	17.70
20	QPSK	50	24	17.27	17.14	17.10	17.70
20	QPSK	50	50	17.23	17.19	17.08	17.70
20	QPSK	100	0	17.25	17.20	17.24	17.70
20	16QAM	1	0	17.12	17.01	17.05	17.70
20	16QAM	1	49	17.21	17.07	16.90	17.70
20	16QAM	1	99	17.18	17.15	16.94	17.70
20	16QAM	50	0	17.22	17.11	17.08	17.70
20	16QAM	50	24	17.18	17.10	17.07	17.70
20	16QAM	50	50	17.05	17.11	17.06	17.70
20	16QAM	100	0	17.12	17.10	17.11	17.70
Channel				18675	18900	19125	
Frequency (MHz)				1857.5	1880	1902.5	
15	QPSK	1	0	17.18	16.95	17.09	17.70
15	QPSK	1	37	17.14	17.03	17.09	17.70
15	QPSK	1	74	17.12	16.97	17.02	17.70
15	QPSK	36	0	17.17	17.08	17.11	17.70
15	QPSK	36	20	17.13	17.03	17.07	17.70
15	QPSK	36	39	17.11	17.14	17.01	17.70
15	QPSK	75	0	17.11	17.09	17.17	17.70
15	16QAM	1	0	17.02	16.98	16.99	17.70
15	16QAM	1	37	17.12	17.03	16.87	17.70
15	16QAM	1	74	17.09	17.11	16.86	17.70
15	16QAM	36	0	17.12	17.06	16.94	17.70
15	16QAM	36	20	17.04	16.95	16.95	17.70
15	16QAM	36	39	16.91	17.07	16.92	17.70
15	16QAM	75	0	16.99	17.02	17.04	17.70
Channel				18650	18900	19150	
Frequency (MHz)				1855	1880	1905	
10	QPSK	1	0	17.18	17.07	17.07	17.70
10	QPSK	1	25	17.16	17.07	17.01	17.70
10	QPSK	1	49	17.12	16.93	17.13	17.70
10	QPSK	25	0	17.17	17.18	17.13	17.70
10	QPSK	25	12	17.20	17.11	16.98	17.70
10	QPSK	25	25	17.20	17.15	17.03	17.70
10	QPSK	50	0	17.11	17.18	17.11	17.70
10	16QAM	1	0	17.01	16.88	16.99	17.70
10	16QAM	1	25	17.07	16.97	16.79	17.70
10	16QAM	1	49	17.10	17.08	16.92	17.70
10	16QAM	25	0	17.14	17.06	17.02	17.70
10	16QAM	25	12	17.11	17.08	16.96	17.70
10	16QAM	25	25	16.92	17.09	16.95	17.70
10	16QAM	50	0	17.00	17.07	17.01	17.70
Channel				18625	18900	19175	
Frequency (MHz)				1852.5	1880	1907.5	
5	QPSK	1	0	17.13	17.05	17.08	17.70
5	QPSK	1	12	17.19	16.95	17.04	17.70
5	QPSK	1	24	17.14	16.94	17.12	17.70
5	QPSK	12	0	17.23	17.15	17.22	17.70
5	QPSK	12	7	17.13	17.09	16.96	17.70
5	QPSK	12	13	17.19	17.08	17.01	17.70
5	QPSK	25	0	17.22	17.16	17.13	17.70
5	16QAM	1	0	17.07	16.87	17.03	17.70
5	16QAM	1	12	17.17	17.05	16.77	17.70
5	16QAM	1	24	17.07	17.02	16.85	17.70
5	16QAM	12	0	17.19	17.02	16.94	17.70
5	16QAM	12	7	17.16	17.02	17.05	17.70
5	16QAM	12	13	16.91	17.02	17.03	17.70
5	16QAM	25	0	17.02	17.06	17.01	17.70
Channel				18615	18900	19185	
Frequency (MHz)				1851.5	1880	1908.5	
3	QPSK	1	0	17.20	17.01	17.06	17.70
3	QPSK	1	8	17.17	17.05	17.07	17.70
3	QPSK	1	14	17.05	17.04	17.10	17.70

3	QPSK	8	0	17.18	17.16	17.12	17.70
3	QPSK	8	4	17.13	17.00	17.00	17.70
3	QPSK	8	7	17.12	17.13	17.02	17.70
3	QPSK	15	0	17.22	17.18	17.23	17.70
3	16QAM	1	0	17.01	16.97	16.99	17.70
3	16QAM	1	8	17.18	16.97	16.75	17.70
3	16QAM	1	14	17.06	17.08	16.88	17.70
3	16QAM	8	0	17.09	16.99	17.04	17.70
3	16QAM	8	4	17.11	17.00	17.00	17.70
3	16QAM	8	7	17.03	17.00	16.98	17.70
3	16QAM	15	0	17.10	17.05	17.07	17.70
Channel				18607	18900	19193	Tune-up limit (dBm)
Frequency (MHz)				1850.7	1880	1909.3	
1.4	QPSK	1	0	17.19	17.01	16.95	17.70
1.4	QPSK	1	3	17.27	17.17	17.10	17.70
1.4	QPSK	1	5	17.26	17.13	17.04	17.70
1.4	QPSK	3	0	17.24	17.17	17.11	17.70
1.4	QPSK	3	1	17.23	17.18	17.14	17.70
1.4	QPSK	3	3	17.27	17.12	17.11	17.70
1.4	QPSK	6	0	17.18	17.13	17.04	17.70
1.4	16QAM	1	0	17.27	17.20	17.18	17.70
1.4	16QAM	1	3	17.27	17.18	17.23	17.70
1.4	16QAM	1	5	17.25	17.20	17.22	17.70
1.4	16QAM	3	0	17.23	17.15	17.19	17.70
1.4	16QAM	3	1	17.16	17.16	17.23	17.70
1.4	16QAM	3	3	17.22	17.19	17.22	17.70
1.4	16QAM	6	0	17.21	17.13	17.16	17.70

【LTE Band 4】

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				20050	20175	20300	Tune-up limit (dBm)
Frequency (MHz)				1720	1732.5	1745	
20	QPSK	1	0	17.43	17.42	17.41	18.60
20	QPSK	1	49	17.41	17.23	17.26	18.60
20	QPSK	1	99	17.33	17.29	17.13	18.60
20	QPSK	50	0	17.50	17.46	17.45	18.60
20	QPSK	50	24	17.49	17.45	17.43	18.60
20	QPSK	50	50	17.48	17.38	17.21	18.60
20	QPSK	100	0	17.49	17.45	17.44	18.60
20	16QAM	1	0	17.31	17.49	17.43	18.60
20	16QAM	1	49	17.40	17.36	17.42	18.60
20	16QAM	1	99	17.25	17.42	17.41	18.60
20	16QAM	50	0	17.50	17.44	17.44	18.60
20	16QAM	50	24	17.37	17.41	17.44	18.60
20	16QAM	50	50	17.34	17.42	17.34	18.60
20	16QAM	100	0	17.44	17.39	17.44	18.60
Channel				20025	20175	20325	Tune-up limit (dBm)
Frequency (MHz)				1717.5	1732.5	1747.5	
15	QPSK	1	0	17.31	17.29	17.37	18.60
15	QPSK	1	37	17.32	17.18	17.19	18.60
15	QPSK	1	74	17.22	17.26	17.00	18.60
15	QPSK	36	0	17.40	17.40	17.37	18.60
15	QPSK	36	20	17.43	17.36	17.30	18.60
15	QPSK	36	39	17.41	17.32	17.20	18.60
15	QPSK	75	0	17.44	17.38	17.30	18.60
15	16QAM	1	0	17.17	17.36	17.40	18.60
15	16QAM	1	37	17.30	17.27	17.34	18.60
15	16QAM	1	74	17.18	17.31	17.39	18.60
15	16QAM	36	0	17.47	17.37	17.41	18.60
15	16QAM	36	20	17.24	17.29	17.35	18.60
15	16QAM	36	39	17.33	17.31	17.31	18.60
15	16QAM	75	0	17.32	17.36	17.36	18.60
Channel				20000	20175	20350	Tune-up limit (dBm)
Frequency (MHz)				1715	1732.5	1750	
10	QPSK	1	0	17.35	17.29	17.31	18.60
10	QPSK	1	25	17.26	17.13	17.23	18.60
10	QPSK	1	49	17.28	17.23	17.05	18.60
10	QPSK	25	0	17.47	17.45	17.37	18.60
10	QPSK	25	12	17.45	17.32	17.33	18.60
10	QPSK	25	25	17.46	17.28	17.18	18.60
10	QPSK	50	0	17.34	17.44	17.33	18.60
10	16QAM	1	0	17.30	17.36	17.36	18.60

10	16QAM	1	25	17.33	17.33	17.35	18.60
10	16QAM	1	49	17.24	17.36	17.27	18.60
10	16QAM	25	0	17.48	17.36	17.30	18.60
10	16QAM	25	12	17.33	17.33	17.29	18.60
10	16QAM	25	25	17.22	17.33	17.23	18.60
10	16QAM	50	0	17.37	17.25	17.33	18.60
Channel				19975	20175	20375	Tune-up limit (dBm)
Frequency (MHz)				1712.5	1732.5	1752.5	
5	QPSK	1	0	17.39	17.28	17.36	18.60
5	QPSK	1	12	17.37	17.09	17.22	18.60
5	QPSK	1	24	17.24	17.25	17.10	18.60
5	QPSK	12	0	17.39	17.32	17.36	18.60
5	QPSK	12	7	17.48	17.31	17.36	18.60
5	QPSK	12	13	17.36	17.27	17.19	18.60
5	QPSK	25	0	17.44	17.39	17.33	18.60
5	16QAM	1	0	17.21	17.41	17.32	18.60
5	16QAM	1	12	17.31	17.33	17.31	18.60
5	16QAM	1	24	17.13	17.40	17.32	18.60
5	16QAM	12	0	17.42	17.38	17.37	18.60
5	16QAM	12	7	17.22	17.40	17.32	18.60
5	16QAM	12	13	17.23	17.34	17.21	18.60
5	16QAM	25	0	17.33	17.36	17.34	18.60
Channel				19965	20175	20385	Tune-up limit (dBm)
Frequency (MHz)				1711.5	1732.5	1753.5	
3	QPSK	1	0	17.29	17.27	17.32	18.60
3	QPSK	1	8	17.32	17.20	17.20	18.60
3	QPSK	1	14	17.30	17.25	17.06	18.60
3	QPSK	8	0	17.38	17.39	17.40	18.60
3	QPSK	8	4	17.37	17.33	17.29	18.60
3	QPSK	8	7	17.34	17.34	17.11	18.60
3	QPSK	15	0	17.36	17.33	17.42	18.60
3	16QAM	1	0	17.25	17.39	17.34	18.60
3	16QAM	1	8	17.33	17.22	17.35	18.60
3	16QAM	1	14	17.19	17.32	17.31	18.60
3	16QAM	8	0	17.39	17.34	17.42	18.60
3	16QAM	8	4	17.36	17.38	17.41	18.60
3	16QAM	8	7	17.27	17.38	17.22	18.60
3	16QAM	15	0	17.38	17.36	17.39	18.60
Channel				19957	20175	20393	Tune-up limit (dBm)
Frequency (MHz)				1710.7	1732.5	1754.3	
1.4	QPSK	1	0	17.40	17.30	17.14	18.60
1.4	QPSK	1	3	17.35	17.44	17.32	18.60
1.4	QPSK	1	5	17.34	17.23	17.21	18.60
1.4	QPSK	3	0	17.44	17.35	17.24	18.60
1.4	QPSK	3	1	17.38	17.45	17.35	18.60
1.4	QPSK	3	3	17.37	17.42	17.31	18.60
1.4	QPSK	6	0	17.37	17.31	17.22	18.60
1.4	16QAM	1	0	17.42	17.45	17.30	18.60
1.4	16QAM	1	3	17.45	17.39	17.35	18.60
1.4	16QAM	1	5	17.30	17.43	17.44	18.60
1.4	16QAM	3	0	17.46	17.28	17.31	18.60
1.4	16QAM	3	1	17.46	17.27	17.42	18.60
1.4	16QAM	3	3	17.45	17.31	17.26	18.60
1.4	16QAM	6	0	17.45	17.23	17.41	18.60

【LTE Band 5】

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				20450	20525	20600	
Frequency (MHz)				829	836.5	844	
10	QPSK	1	0	18.18	18.32	18.49	20.00
10	QPSK	1	25	18.13	18.31	18.35	20.00
10	QPSK	1	49	18.17	18.25	18.17	20.00
10	QPSK	25	0	18.34	18.45	18.48	20.00
10	QPSK	25	12	18.30	18.44	18.42	20.00
10	QPSK	25	25	18.33	18.41	18.30	20.00
10	QPSK	50	0	18.32	18.41	18.46	20.00
10	16QAM	1	0	18.27	18.43	18.48	20.00
10	16QAM	1	25	18.31	18.44	18.46	20.00
10	16QAM	1	49	18.13	18.33	18.42	20.00
10	16QAM	25	0	18.33	18.41	18.47	20.00
10	16QAM	25	12	18.30	18.42	18.38	20.00
10	16QAM	25	25	18.21	18.41	18.47	20.00

10	16QAM	50	0	18.24	18.40	18.39	20.00
Channel				20425	20525	20625	Tune-up limit
Frequency (MHz)				826.5	836.5	846.5	(dBm)
5	QPSK	1	0	18.09	18.28	18.35	20.00
5	QPSK	1	12	18.07	18.26	18.32	20.00
5	QPSK	1	24	18.10	18.24	18.03	20.00
5	QPSK	12	0	18.26	18.40	18.44	20.00
5	QPSK	12	7	18.19	18.41	18.35	20.00
5	QPSK	12	13	18.22	18.29	18.18	20.00
5	QPSK	25	0	18.27	18.29	18.34	20.00
5	16QAM	1	0	18.13	18.30	18.46	20.00
5	16QAM	1	12	18.18	18.41	18.40	20.00
5	16QAM	1	24	18.00	18.29	18.33	20.00
5	16QAM	12	0	18.31	18.28	18.40	20.00
5	16QAM	12	7	18.22	18.34	18.23	20.00
5	16QAM	12	13	18.17	18.28	18.43	20.00
5	16QAM	25	0	18.21	18.25	18.28	20.00
Channel				20415	20525	20635	Tune-up limit
Frequency (MHz)				825.5	836.5	847.5	(dBm)
3	QPSK	1	0	18.14	18.22	18.43	20.00
3	QPSK	1	8	18.09	18.18	18.33	20.00
3	QPSK	1	14	18.10	18.17	18.09	20.00
3	QPSK	8	0	18.25	18.39	18.35	20.00
3	QPSK	8	4	18.23	18.30	18.30	20.00
3	QPSK	8	7	18.21	18.37	18.27	20.00
3	QPSK	15	0	18.22	18.38	18.38	20.00
3	16QAM	1	0	18.21	18.29	18.46	20.00
3	16QAM	1	8	18.17	18.38	18.43	20.00
3	16QAM	1	14	18.01	18.19	18.30	20.00
3	16QAM	8	0	18.24	18.36	18.43	20.00
3	16QAM	8	4	18.19	18.29	18.33	20.00
3	16QAM	8	7	18.14	18.40	18.42	20.00
3	16QAM	15	0	18.19	18.26	18.27	20.00
Channel				20407	20525	20643	Tune-up limit
Frequency (MHz)				824.7	836.5	848.3	(dBm)
1.4	QPSK	1	0	18.08	18.37	18.31	20.00
1.4	QPSK	1	3	18.11	18.41	18.36	20.00
1.4	QPSK	1	5	18.03	18.39	18.36	20.00
1.4	QPSK	3	0	18.08	18.40	18.30	20.00
1.4	QPSK	3	1	18.12	18.42	18.37	20.00
1.4	QPSK	3	3	18.07	18.42	18.45	20.00
1.4	QPSK	6	0	18.13	18.43	18.38	20.00
1.4	16QAM	1	0	18.19	18.37	18.45	20.00
1.4	16QAM	1	3	18.33	18.44	18.48	20.00
1.4	16QAM	1	5	18.02	18.43	18.47	20.00
1.4	16QAM	3	0	18.18	18.32	18.38	20.00
1.4	16QAM	3	1	18.15	18.41	18.31	20.00
1.4	16QAM	3	3	18.21	18.40	18.21	20.00
1.4	16QAM	6	0	18.17	18.38	18.42	20.00

【LTE Band 7】

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				20850	21100	21350	Tune-up limit (dBm)
Frequency (MHz)				2510	2535	2560	
20	QPSK	1	0	16.62	16.59	16.66	17.50
20	QPSK	1	49	16.53	16.54	16.64	17.50
20	QPSK	1	99	16.57	16.58	16.65	17.50
20	QPSK	50	0	16.65	16.73	16.80	17.50
20	QPSK	50	24	16.54	16.59	16.71	17.50
20	QPSK	50	50	16.54	16.62	16.77	17.50
20	QPSK	100	0	16.64	16.62	16.79	17.50
20	16QAM	1	0	16.57	16.71	16.71	17.50
20	16QAM	1	49	16.64	16.93	16.72	17.50
20	16QAM	1	99	16.54	16.72	16.79	17.50
20	16QAM	50	0	16.61	16.52	16.73	17.50
20	16QAM	50	24	16.59	16.64	16.74	17.50
20	16QAM	50	50	16.62	16.70	16.76	17.50
20	16QAM	100	0	16.52	16.62	16.77	17.50
Channel				20825	21100	21375	Tune-up limit
Frequency (MHz)				2507.5	2535	2562.5	(dBm)
15	QPSK	1	0	16.50	16.57	16.62	17.50
15	QPSK	1	37	16.40	16.41	16.59	17.50

15	QPSK	1	74	16.45	16.50	16.56	17.50
15	QPSK	36	0	16.63	16.59	16.75	17.50
15	QPSK	36	20	16.50	16.51	16.66	17.50
15	QPSK	36	39	16.41	16.56	16.62	17.50
15	QPSK	75	0	16.61	16.61	16.66	17.50
15	16QAM	1	0	16.45	16.64	16.57	17.50
15	16QAM	1	37	16.51	16.84	16.60	17.50
15	16QAM	1	74	16.43	16.60	16.66	17.50
15	16QAM	36	0	16.54	16.47	16.63	17.50
15	16QAM	36	20	16.57	16.50	16.66	17.50
15	16QAM	36	39	16.57	16.69	16.67	17.50
15	16QAM	75	0	16.38	16.49	16.75	17.50
Channel				20800	21100	21400	Tune-up limit (dBm)
Frequency (MHz)				2505	2535	2565	
10	QPSK	1	0	16.59	16.56	16.63	17.50
10	QPSK	1	25	16.46	16.50	16.54	17.50
10	QPSK	1	49	16.47	16.56	16.52	17.50
10	QPSK	25	0	16.64	16.67	16.68	17.50
10	QPSK	25	12	16.47	16.45	16.65	17.50
10	QPSK	25	25	16.48	16.50	16.65	17.50
10	QPSK	50	0	16.56	16.56	16.70	17.50
10	16QAM	1	0	16.42	16.63	16.57	17.50
10	16QAM	1	25	16.55	16.87	16.68	17.50
10	16QAM	1	49	16.47	16.68	16.77	17.50
10	16QAM	25	0	16.56	16.48	16.64	17.50
10	16QAM	25	12	16.48	16.52	16.69	17.50
10	16QAM	25	25	16.50	16.59	16.74	17.50
10	16QAM	50	0	16.50	16.51	16.72	17.50
Channel				20775	21100	21425	Tune-up limit (dBm)
Frequency (MHz)				2502.5	2535	2567.5	
5	QPSK	1	0	16.51	16.49	16.53	17.50
5	QPSK	1	12	16.40	16.40	16.50	17.50
5	QPSK	1	24	16.51	16.45	16.53	17.50
5	QPSK	12	0	16.56	16.63	16.77	17.50
5	QPSK	12	7	16.39	16.47	16.66	17.50
5	QPSK	12	13	16.46	16.55	16.76	17.50
5	QPSK	25	0	16.59	16.53	16.77	17.50
5	16QAM	1	0	16.50	16.64	16.59	17.50
5	16QAM	1	12	16.54	16.87	16.68	17.50
5	16QAM	1	24	16.42	16.58	16.72	17.50
5	16QAM	12	0	16.57	16.40	16.60	17.50
5	16QAM	12	7	16.49	16.58	16.69	17.50
5	16QAM	12	13	16.60	16.60	16.73	17.50
5	16QAM	25	0	16.48	16.55	16.72	17.50

【LTE Band 12】

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				23060	23095	23130	Tune-up limit (dBm)
Frequency (MHz)				704	707.5	711	
10	QPSK	1	0	19.77	19.73	19.65	20.80
10	QPSK	1	25	19.64	19.71	19.59	20.80
10	QPSK	1	49	19.75	19.72	19.61	20.80
10	QPSK	25	0	19.82	19.78	19.72	20.80
10	QPSK	25	12	19.73	19.75	19.69	20.80
10	QPSK	25	25	19.70	19.72	19.71	20.80
10	QPSK	50	0	19.80	19.76	19.70	20.80
10	16QAM	1	0	19.71	19.74	19.67	20.80
10	16QAM	1	25	19.74	19.77	19.70	20.80
10	16QAM	1	49	19.76	19.75	19.71	20.80
10	16QAM	25	0	19.78	19.76	19.67	20.80
10	16QAM	25	12	19.75	19.77	19.69	20.80
10	16QAM	25	25	19.78	19.69	19.65	20.80
10	16QAM	50	0	19.79	19.71	19.69	20.80
Channel				23035	23095	23115	Tune-up limit (dBm)
Frequency (MHz)				701.5	707.5	713.5	
5	QPSK	1	0	19.73	19.66	19.57	20.80
5	QPSK	1	12	19.51	19.67	19.47	20.80
5	QPSK	1	24	19.66	19.62	19.49	20.80
5	QPSK	12	0	19.75	19.75	19.59	20.80
5	QPSK	12	7	19.62	19.72	19.66	20.80
5	QPSK	12	13	19.59	19.67	19.57	20.80
5	QPSK	25	0	19.69	19.74	19.56	20.80

5	16QAM	1	0	19.61	19.73	19.57	20.80
5	16QAM	1	12	19.64	19.72	19.59	20.80
5	16QAM	1	24	19.66	19.61	19.66	20.80
5	16QAM	12	0	19.69	19.67	19.57	20.80
5	16QAM	12	7	19.72	19.70	19.56	20.80
5	16QAM	12	13	19.65	19.56	19.62	20.80
5	16QAM	25	0	19.71	19.56	19.66	20.80
Channel				23025	23095	23165	Tune-up limit (dBm)
Frequency (MHz)				700.5	707.5	714.5	
3	QPSK	1	0	19.75	19.70	19.52	20.80
3	QPSK	1	8	19.57	19.66	19.51	20.80
3	QPSK	1	14	19.69	19.66	19.56	20.80
3	QPSK	8	0	19.77	19.72	19.69	20.80
3	QPSK	8	4	19.66	19.72	19.65	20.80
3	QPSK	8	7	19.66	19.63	19.68	20.80
3	QPSK	15	0	19.75	19.64	19.64	20.80
3	16QAM	1	0	19.63	19.72	19.66	20.80
3	16QAM	1	8	19.62	19.74	19.55	20.80
3	16QAM	1	14	19.71	19.68	19.57	20.80
3	16QAM	8	0	19.74	19.63	19.59	20.80
3	16QAM	8	4	19.70	19.75	19.56	20.80
3	16QAM	8	7	19.74	19.56	19.56	20.80
3	16QAM	15	0	19.72	19.66	19.54	20.80
Channel				23017	23095	23173	Tune-up limit (dBm)
Frequency (MHz)				699.7	707.5	715.3	
1.4	QPSK	1	0	19.71	19.59	19.69	20.80
1.4	QPSK	1	3	19.73	19.67	19.66	20.80
1.4	QPSK	1	5	19.75	19.66	19.70	20.80
1.4	QPSK	3	0	19.72	19.64	19.69	20.80
1.4	QPSK	3	1	19.76	19.71	19.65	20.80
1.4	QPSK	3	3	19.74	19.67	19.65	20.80
1.4	QPSK	6	0	19.75	19.67	19.70	20.80
1.4	16QAM	1	0	19.80	19.76	19.66	20.80
1.4	16QAM	1	3	19.81	19.77	19.71	20.80
1.4	16QAM	1	5	19.77	19.69	19.71	20.80
1.4	16QAM	3	0	19.74	19.73	19.70	20.80
1.4	16QAM	3	1	19.79	19.67	19.66	20.80
1.4	16QAM	3	3	19.76	19.71	19.69	20.80
1.4	16QAM	6	0	19.74	19.72	19.62	20.80

【LTE Band 13】

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel					23230		Tune-up limit (dBm)
Frequency (MHz)					782		
10	QPSK	1	0		18.55		20.30
10	QPSK	1	25		18.45		20.30
10	QPSK	1	49		18.47		20.30
10	QPSK	25	0		18.73		20.30
10	QPSK	25	12		18.65		20.30
10	QPSK	25	25		18.73		20.30
10	QPSK	50	0		18.67		20.30
10	16QAM	1	0		18.70		20.30
10	16QAM	1	25		18.71		20.30
10	16QAM	1	49		18.69		20.30
10	16QAM	25	0		18.68		20.30
10	16QAM	25	12		18.65		20.30
10	16QAM	25	25		18.64		20.30
10	16QAM	50	0		18.68		20.30
Channel				23205	23230	23255	Tune-up limit (dBm)
Frequency (MHz)				779.5	782	784.5	
5	QPSK	1	0	18.50	18.46	18.46	20.30
5	QPSK	1	12	18.36	18.37	18.36	20.30
5	QPSK	1	24	18.42	18.39	18.40	20.30
5	QPSK	12	0	18.66	18.68	18.65	20.30
5	QPSK	12	7	18.57	18.57	18.57	20.30
5	QPSK	12	13	18.65	18.66	18.68	20.30
5	QPSK	25	0	18.60	18.62	18.59	20.30
5	16QAM	1	0	18.61	18.63	18.62	20.30
5	16QAM	1	12	18.61	18.63	18.63	20.30
5	16QAM	1	24	18.59	18.60	18.61	20.30
5	16QAM	12	0	18.58	18.63	18.60	20.30
5	16QAM	12	7	18.56	18.57	18.56	20.30

5	16QAM	12	13	18.54	18.58	18.58	20.30
5	16QAM	25	0	18.58	18.62	18.61	20.30

【LTE Band 14】

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel					23330		
Frequency (MHz)					793		
10	QPSK	1	0		18.33		20.20
10	QPSK	1	25		18.23		20.20
10	QPSK	1	49		18.24		20.20
10	QPSK	25	0		18.25		20.20
10	QPSK	25	12		18.23		20.20
10	QPSK	25	25		18.21		20.20
10	QPSK	50	0		18.22		20.20
10	16QAM	1	0		18.32		20.20
10	16QAM	1	25		18.30		20.20
10	16QAM	1	49		18.28		20.20
10	16QAM	25	0		18.20		20.20
10	16QAM	25	12		18.28		20.20
10	16QAM	25	25		18.24		20.20
10	16QAM	50	0		18.28		20.20
Channel				23305	23330	23355	Tune-up limit
Frequency (MHz)				790.5	793	795.5	(dBm)
5	QPSK	1	0	18.26	18.27	18.26	20.20
5	QPSK	1	12	18.24	18.26	18.25	20.20
5	QPSK	1	24	18.22	18.25	18.23	20.20
5	QPSK	12	0	18.25	18.20	18.22	20.20
5	QPSK	12	7	18.23	18.24	18.24	20.20
5	QPSK	12	13	18.24	18.21	18.25	20.20
5	QPSK	25	0	18.23	18.24	18.23	20.20
5	16QAM	1	0	18.26	18.26	18.22	20.20
5	16QAM	1	12	18.21	18.20	18.22	20.20
5	16QAM	1	24	18.22	18.21	18.20	20.20
5	16QAM	12	0	18.21	18.21	18.24	20.20
5	16QAM	12	7	18.23	18.23	18.21	20.20
5	16QAM	12	13	18.20	18.22	18.23	20.20
5	16QAM	25	0	18.21	18.20	18.23	20.20

【LTE Band 17】

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel					23780	23790	
Frequency (MHz)					709	710	
10	QPSK	1	0	19.70	19.67	19.69	20.80
10	QPSK	1	25	19.69	19.55	19.65	20.80
10	QPSK	1	49	19.63	19.61	19.61	20.80
10	QPSK	25	0	19.73	19.74	19.75	20.80
10	QPSK	25	12	19.72	19.72	19.66	20.80
10	QPSK	25	25	19.64	19.66	19.68	20.80
10	QPSK	50	0	19.72	19.73	19.74	20.80
10	16QAM	1	0	19.69	19.67	19.70	20.80
10	16QAM	1	25	19.70	19.73	19.68	20.80
10	16QAM	1	49	19.72	19.66	19.73	20.80
10	16QAM	25	0	19.68	19.73	19.72	20.80
10	16QAM	25	12	19.72	19.70	19.74	20.80
10	16QAM	25	25	19.69	19.71	19.71	20.80
10	16QAM	50	0	19.70	19.72	19.72	20.80
Channel				23755	23790	23825	Tune-up limit
Frequency (MHz)				706.5	710	713.5	(dBm)
5	QPSK	1	0	19.56	19.61	19.54	20.80
5	QPSK	1	12	19.55	19.45	19.52	20.80
5	QPSK	1	24	19.51	19.56	19.49	20.80
5	QPSK	12	0	19.70	19.61	19.73	20.80
5	QPSK	12	7	19.68	19.70	19.61	20.80
5	QPSK	12	13	19.58	19.65	19.57	20.80
5	QPSK	25	0	19.60	19.59	19.60	20.80



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5	16QAM	1	0	19.60	19.62	19.66	20.80
5	16QAM	1	12	19.64	19.64	19.62	20.80
5	16QAM	1	24	19.66	19.57	19.67	20.80
5	16QAM	12	0	19.66	19.66	19.58	20.80
5	16QAM	12	7	19.65	19.56	19.66	20.80
5	16QAM	12	13	19.59	19.65	19.58	20.80
5	16QAM	25	0	19.66	19.61	19.70	20.80

【LTE Band 25】

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				26140	26340	26590	Tune-up limit (dBm)
Frequency (MHz)				1860	1880	1905	
20	QPSK	1	0	17.29	17.21	17.19	17.70
20	QPSK	1	49	17.27	17.15	17.18	17.70
20	QPSK	1	99	17.22	17.20	17.09	17.70
20	QPSK	50	0	17.28	17.27	17.24	17.70
20	QPSK	50	24	17.24	17.21	17.22	17.70
20	QPSK	50	50	17.27	17.25	17.20	17.70
20	QPSK	100	0	17.26	17.25	17.23	17.70
20	16QAM	1	0	17.19	17.20	17.18	17.70
20	16QAM	1	49	17.22	17.16	17.22	17.70
20	16QAM	1	99	17.25	17.24	17.18	17.70
20	16QAM	50	0	17.06	17.26	17.23	17.70
20	16QAM	50	24	17.26	17.21	17.19	17.70
20	16QAM	50	50	17.25	17.23	17.16	17.70
20	16QAM	100	0	17.18	17.15	17.14	17.70
Channel				26115	26340	26615	Tune-up limit (dBm)
Frequency (MHz)				1857.5	1880	1907.5	
15	QPSK	1	0	17.22	17.10	17.12	17.70
15	QPSK	1	37	17.21	17.04	17.07	17.70
15	QPSK	1	74	17.14	17.15	17.03	17.70
15	QPSK	36	0	17.25	17.16	17.19	17.70
15	QPSK	36	20	17.14	17.15	17.07	17.70
15	QPSK	36	39	17.25	17.24	17.15	17.70
15	QPSK	75	0	17.24	17.11	17.20	17.70
15	16QAM	1	0	17.12	17.06	17.06	17.70
15	16QAM	1	37	17.12	17.02	17.18	17.70
15	16QAM	1	74	17.20	17.22	17.15	17.70
15	16QAM	36	0	17.05	17.21	17.19	17.70
15	16QAM	36	20	17.23	17.13	17.08	17.70
15	16QAM	36	39	17.12	17.17	17.12	17.70
15	16QAM	75	0	17.09	17.13	17.07	17.70
Channel				26090	26340	26640	Tune-up limit (dBm)
Frequency (MHz)				1855	1880	1910	
10	QPSK	1	0	17.14	17.11	17.13	17.70
10	QPSK	1	25	17.23	17.10	17.11	17.70
10	QPSK	1	49	17.13	17.13	17.03	17.70
10	QPSK	25	0	17.22	17.12	17.13	17.70
10	QPSK	25	12	17.18	17.18	17.08	17.70
10	QPSK	25	25	17.24	17.15	17.16	17.70
10	QPSK	50	0	17.13	17.19	17.17	17.70
10	16QAM	1	0	17.12	17.07	17.06	17.70
10	16QAM	1	25	17.08	17.13	17.18	17.70
10	16QAM	1	49	17.21	17.12	17.11	17.70
10	16QAM	25	0	16.94	17.23	17.15	17.70
10	16QAM	25	12	17.11	17.15	17.06	17.70
10	16QAM	25	25	17.12	17.10	17.10	17.70
10	16QAM	50	0	17.15	17.09	17.01	17.70
Channel				26065	26340	26665	Tune-up limit (dBm)
Frequency (MHz)				1852.5	1880	1912.5	
5	QPSK	1	0	17.19	17.11	17.17	17.70
5	QPSK	1	12	17.13	17.02	17.16	17.70
5	QPSK	1	24	17.09	17.10	17.02	17.70
5	QPSK	12	0	17.25	17.19	17.15	17.70
5	QPSK	12	7	17.13	17.10	17.11	17.70
5	QPSK	12	13	17.15	17.14	17.15	17.70
5	QPSK	25	0	17.14	17.14	17.15	17.70
5	16QAM	1	0	17.04	17.08	17.11	17.70
5	16QAM	1	12	17.17	17.03	17.19	17.70
5	16QAM	1	24	17.16	17.11	17.14	17.70
5	16QAM	12	0	17.01	17.16	17.17	17.70
5	16QAM	12	7	17.17	17.11	17.12	17.70

5	16QAM	12	13	17.21	17.19	17.03	17.70
5	16QAM	25	0	17.10	17.05	17.03	17.70
Channel				26055	26340	26675	Tune-up limit
Frequency (MHz)				1851.5	1880	1913.5	(dBm)
3	QPSK	1	0	17.17	17.17	17.11	17.70
3	QPSK	1	8	17.15	17.00	17.04	17.70
3	QPSK	1	14	17.12	17.17	17.04	17.70
3	QPSK	8	0	17.16	17.26	17.21	17.70
3	QPSK	8	4	17.10	17.16	17.09	17.70
3	QPSK	8	7	17.19	17.15	17.15	17.70
3	QPSK	15	0	17.19	17.19	17.18	17.70
3	16QAM	1	0	17.17	17.17	17.17	17.70
3	16QAM	1	8	17.09	17.12	17.16	17.70
3	16QAM	1	14	17.21	17.11	17.11	17.70
3	16QAM	8	0	17.02	17.18	17.15	17.70
3	16QAM	8	4	17.13	17.12	17.10	17.70
3	16QAM	8	7	17.13	17.09	17.02	17.70
3	16QAM	15	0	17.15	17.03	17.06	17.70
Channel				26047	26340	26683	Tune-up limit
Frequency (MHz)				1850.7	1880	1914.3	(dBm)
1.4	QPSK	1	0	17.12	17.16	16.94	17.70
1.4	QPSK	1	3	17.21	17.17	17.14	17.70
1.4	QPSK	1	5	17.17	17.15	17.09	17.70
1.4	QPSK	3	0	17.21	17.26	17.13	17.70
1.4	QPSK	3	1	17.27	17.24	17.17	17.70
1.4	QPSK	3	3	17.20	17.26	17.09	17.70
1.4	QPSK	6	0	17.21	17.26	17.06	17.70
1.4	16QAM	1	0	17.21	17.24	17.21	17.70
1.4	16QAM	1	3	17.26	17.21	17.23	17.70
1.4	16QAM	1	5	17.23	17.19	17.22	17.70
1.4	16QAM	3	0	17.28	17.22	17.16	17.70
1.4	16QAM	3	1	17.20	17.26	17.21	17.70
1.4	16QAM	3	3	17.25	17.15	17.16	17.70
1.4	16QAM	6	0	17.25	17.17	17.13	17.70

【LTE Band 26_FCC (814~849MHz)】

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				26765	26865	26965	
Frequency (MHz)				821.5	831.5	841.5	
15	QPSK	1	0	18.46	18.59	18.49	20.00
15	QPSK	1	37	18.30	18.35	18.42	20.00
15	QPSK	1	74	18.26	18.46	18.47	20.00
15	QPSK	36	0	18.47	18.60	18.51	20.00
15	QPSK	36	20	18.46	18.52	18.50	20.00
15	QPSK	36	39	18.45	18.49	18.42	20.00
15	QPSK	75	0	18.45	18.54	18.50	20.00
15	16QAM	1	0	18.46	18.59	18.49	20.00
15	16QAM	1	37	18.45	18.58	18.50	20.00
15	16QAM	1	74	18.43	18.55	18.48	20.00
15	16QAM	36	0	18.34	18.52	18.49	20.00
15	16QAM	36	20	18.42	18.56	18.46	20.00
15	16QAM	36	39	18.45	18.53	18.46	20.00
15	16QAM	75	0	18.43	18.55	18.43	20.00
Channel				26740	26865	26990	Tune-up limit
Frequency (MHz)				819	831.5	844	(dBm)
10	QPSK	1	0	18.39	18.57	18.47	20.00
10	QPSK	1	25	18.25	18.27	18.29	20.00
10	QPSK	1	49	18.23	18.44	18.41	20.00
10	QPSK	25	0	18.45	18.58	18.38	20.00
10	QPSK	25	12	18.34	18.45	18.38	20.00
10	QPSK	25	25	18.30	18.46	18.32	20.00
10	QPSK	50	0	18.36	18.41	18.38	20.00
10	16QAM	1	0	18.32	18.55	18.37	20.00
10	16QAM	1	25	18.32	18.51	18.43	20.00
10	16QAM	1	49	18.39	18.50	18.33	20.00
10	16QAM	25	0	18.22	18.39	18.43	20.00
10	16QAM	25	12	18.37	18.44	18.37	20.00
10	16QAM	25	25	18.31	18.45	18.35	20.00
10	16QAM	50	0	18.36	18.40	18.34	20.00
Channel				26715	26865	27015	Tune-up limit
Frequency (MHz)				816.5	831.5	846.5	(dBm)
5	QPSK	1	0	18.34	18.53	18.35	20.00

5	QPSK	1	12	18.22	18.24	18.27	20.00
5	QPSK	1	24	18.20	18.40	18.43	20.00
5	QPSK	12	0	18.39	18.48	18.45	20.00
5	QPSK	12	7	18.39	18.51	18.45	20.00
5	QPSK	12	13	18.38	18.38	18.33	20.00
5	QPSK	25	0	18.37	18.45	18.46	20.00
5	16QAM	1	0	18.39	18.57	18.36	20.00
5	16QAM	1	12	18.43	18.57	18.44	20.00
5	16QAM	1	24	18.37	18.53	18.41	20.00
5	16QAM	12	0	18.25	18.51	18.44	20.00
5	16QAM	12	7	18.30	18.47	18.33	20.00
5	16QAM	12	13	18.32	18.39	18.34	20.00
5	16QAM	25	0	18.30	18.53	18.42	20.00
Channel				26705	26865	27025	Tune-up limit (dBm)
Frequency (MHz)				815.5	831.5	847.5	
3	QPSK	1	0	18.44	18.50	18.47	20.00
3	QPSK	1	8	18.18	18.28	18.30	20.00
3	QPSK	1	14	18.14	18.37	18.44	20.00
3	QPSK	8	0	18.40	18.45	18.37	20.00
3	QPSK	8	4	18.34	18.40	18.44	20.00
3	QPSK	8	7	18.43	18.43	18.32	20.00
3	QPSK	15	0	18.34	18.46	18.47	20.00
3	16QAM	1	0	18.39	18.54	18.42	20.00
3	16QAM	1	8	18.38	18.45	18.47	20.00
3	16QAM	1	14	18.30	18.45	18.41	20.00
3	16QAM	8	0	18.33	18.41	18.36	20.00
3	16QAM	8	4	18.31	18.54	18.44	20.00
3	16QAM	8	7	18.43	18.47	18.34	20.00
3	16QAM	15	0	18.41	18.47	18.34	20.00
Channel				26697	26865	27033	Tune-up limit (dBm)
Frequency (MHz)				814.7	831.5	848.3	
1.4	QPSK	1	0	18.42	18.37	18.42	20.00
1.4	QPSK	1	3	18.37	18.39	18.38	20.00
1.4	QPSK	1	5	18.36	18.42	18.38	20.00
1.4	QPSK	3	0	18.37	18.40	18.43	20.00
1.4	QPSK	3	1	18.44	18.42	18.43	20.00
1.4	QPSK	3	3	18.45	18.41	18.46	20.00
1.4	QPSK	6	0	18.39	18.39	18.37	20.00
1.4	16QAM	1	0	18.45	18.58	18.44	20.00
1.4	16QAM	1	3	18.36	18.39	18.50	20.00
1.4	16QAM	1	5	18.42	18.36	18.50	20.00
1.4	16QAM	3	0	18.35	18.46	18.39	20.00
1.4	16QAM	3	1	18.41	18.59	18.45	20.00
1.4	16QAM	3	3	18.45	18.47	18.46	20.00
1.4	16QAM	6	0	18.41	18.46	18.44	20.00

【LTE Band 30】

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel					27710		
Frequency (MHz)					2310		
10	QPSK	1	0		17.54		18.30
10	QPSK	1	25		17.49		18.30
10	QPSK	1	49		17.44		18.30
10	QPSK	25	0		17.71		18.30
10	QPSK	25	12		17.66		18.30
10	QPSK	25	25		17.68		18.30
10	QPSK	50	0		17.70		18.30
10	16QAM	1	0		17.59		18.30
10	16QAM	1	25		17.69		18.30
10	16QAM	1	49		17.68		18.30
10	16QAM	25	0		17.69		18.30
10	16QAM	25	12		17.65		18.30
10	16QAM	25	25		17.67		18.30
10	16QAM	50	0		17.68		18.30
Channel				27685	27710	27735	Tune-up limit (dBm)
Frequency (MHz)				2307.5	2310	2312.5	
5	QPSK	1	0	17.44	17.42	17.44	18.30
5	QPSK	1	12	17.43	17.40	17.43	18.30
5	QPSK	1	24	17.34	17.37	17.37	18.30
5	QPSK	12	0	17.61	17.62	17.61	18.30
5	QPSK	12	7	17.61	17.60	17.56	18.30
5	QPSK	12	13	17.59	17.61	17.63	18.30
5	QPSK	25	0	17.63	17.63	17.60	18.30



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5	16QAM	1	0	17.51	17.52	17.52	18.30
5	16QAM	1	12	17.64	17.63	17.62	18.30
5	16QAM	1	24	17.59	17.62	17.60	18.30
5	16QAM	12	0	17.60	17.60	17.60	18.30
5	16QAM	12	7	17.57	17.56	17.56	18.30
5	16QAM	12	13	17.60	17.57	17.59	18.30
5	16QAM	25	0	17.62	17.63	17.62	18.30

【LTE Band 38】

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				37850	38000	38150	Tune-up limit (dBm)
Frequency (MHz)				2580	2595	2610	
20	QPSK	1	0	19.27	19.12	19.14	19.30
20	QPSK	1	49	18.96	19.09	19.08	19.30
20	QPSK	1	99	19.03	19.11	19.12	19.30
20	QPSK	50	0	19.26	19.09	19.23	19.30
20	QPSK	50	24	18.96	19.07	19.08	19.30
20	QPSK	50	50	19.03	19.04	19.12	19.30
20	QPSK	100	0	19.16	19.11	19.22	19.30
20	16QAM	1	0	19.25	19.07	19.05	19.30
20	16QAM	1	49	19.17	19.09	19.17	19.30
20	16QAM	1	99	19.11	19.11	19.12	19.30
20	16QAM	50	0	19.25	18.99	19.08	19.30
20	16QAM	50	24	19.12	19.07	19.16	19.30
20	16QAM	50	50	19.08	19.06	19.14	19.30
20	16QAM	100	0	19.07	19.02	19.15	19.30
Channel				37825	38000	38175	Tune-up limit (dBm)
Frequency (MHz)				2577.5	2595	2612.5	
15	QPSK	1	0	19.18	19.04	19.07	19.30
15	QPSK	1	37	18.83	18.95	18.97	19.30
15	QPSK	1	74	18.90	18.97	19.03	19.30
15	QPSK	36	0	19.19	19.03	19.21	19.30
15	QPSK	36	20	18.87	19.05	18.95	19.30
15	QPSK	36	39	18.92	19.01	19.08	19.30
15	QPSK	75	0	19.14	18.99	19.12	19.30
15	16QAM	1	0	19.15	19.00	18.95	19.30
15	16QAM	1	37	19.08	19.08	19.05	19.30
15	16QAM	1	74	19.01	19.01	18.99	19.30
15	16QAM	36	0	19.22	18.93	19.06	19.30
15	16QAM	36	20	19.00	18.99	19.08	19.30
15	16QAM	36	39	18.98	19.03	19.02	19.30
15	16QAM	75	0	19.06	18.97	19.04	19.30
Channel				37800	38000	38200	Tune-up limit (dBm)
Frequency (MHz)				2575	2595	2615	
10	QPSK	1	0	19.21	18.97	19.08	19.30
10	QPSK	1	25	18.92	18.94	19.00	19.30
10	QPSK	1	49	18.89	19.01	19.11	19.30
10	QPSK	25	0	19.16	19.01	19.15	19.30
10	QPSK	25	12	18.93	19.00	18.96	19.30
10	QPSK	25	25	19.01	19.03	19.08	19.30
10	QPSK	50	0	19.05	19.00	19.09	19.30
10	16QAM	1	0	19.19	19.01	18.97	19.30
10	16QAM	1	25	19.09	19.01	19.13	19.30
10	16QAM	1	49	18.98	19.08	19.10	19.30
10	16QAM	25	0	19.13	18.90	18.96	19.30
10	16QAM	25	12	19.01	18.95	19.10	19.30
10	16QAM	25	25	19.07	18.96	19.04	19.30
10	16QAM	50	0	19.01	18.96	19.05	19.30
Channel				37775	38000	38225	Tune-up limit (dBm)
Frequency (MHz)				2572.5	2595	2617.5	
5	QPSK	1	0	19.13	19.10	19.06	19.30
5	QPSK	1	12	18.94	19.01	18.98	19.30
5	QPSK	1	24	18.89	19.02	19.07	19.30
5	QPSK	12	0	19.25	18.94	19.09	19.30
5	QPSK	12	7	18.83	18.96	18.96	19.30
5	QPSK	12	13	18.94	19.02	19.08	19.30
5	QPSK	25	0	19.02	18.99	19.09	19.30
5	16QAM	1	0	19.18	18.99	19.01	19.30
5	16QAM	1	12	19.07	18.96	19.09	19.30
5	16QAM	1	24	19.01	19.08	19.04	19.30
5	16QAM	12	0	19.22	18.98	18.94	19.30
5	16QAM	12	7	19.08	19.04	19.14	19.30



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5	16QAM	12	13	19.03	19.05	19.01	19.30
5	16QAM	25	0	18.94	18.90	19.12	19.30

【LTE Band 41_FCC (2496~2690MHz)】

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power Middle Ch. / Freq.	Power 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	18.86	19.01	19.03	19.18	19.19	19.30
20	QPSK	1	49	18.82	18.86	18.99	19.15	19.18	19.30
20	QPSK	1	99	18.85	18.97	19.02	19.11	19.12	19.30
20	QPSK	50	0	18.96	19.07	19.12	19.22	19.27	19.30
20	QPSK	50	24	18.83	18.85	19.06	19.19	19.21	19.30
20	QPSK	50	50	18.92	18.91	19.02	19.18	19.26	19.30
20	QPSK	100	0	18.95	19.01	19.11	19.21	19.26	19.30
20	16QAM	1	0	18.93	18.89	18.89	19.21	19.20	19.30
20	16QAM	1	49	18.95	18.88	19.11	19.14	19.24	19.30
20	16QAM	1	99	18.94	18.94	19.07	19.13	19.26	19.30
20	16QAM	50	0	18.85	18.94	19.02	19.18	19.20	19.30
20	16QAM	50	24	18.92	18.87	19.10	19.16	19.25	19.30
20	16QAM	50	50	18.91	18.94	19.00	19.21	19.24	19.30
20	16QAM	100	0	18.86	18.83	19.11	19.13	19.23	19.30
Channel				39725	40173	40620	41068	41515	
Frequency (MHz)				2503.5	2548.3	2593	2637.8	2682.5	
15	QPSK	1	0	18.81	18.93	18.89	19.07	19.09	19.30
15	QPSK	1	37	18.80	18.85	18.85	19.09	19.05	19.30
15	QPSK	1	74	18.77	18.88	18.94	18.97	18.98	19.30
15	QPSK	36	0	18.95	18.94	19.03	19.09	19.13	19.30
15	QPSK	36	20	18.80	18.73	18.98	19.13	19.16	19.30
15	QPSK	36	39	18.79	18.89	18.93	19.08	19.15	19.30
15	QPSK	75	0	18.85	18.92	19.00	19.07	19.18	19.30
15	16QAM	1	0	18.90	18.83	18.87	19.08	19.15	19.30
15	16QAM	1	37	18.87	18.79	18.97	19.03	19.17	19.30
15	16QAM	1	74	18.82	18.83	18.92	19.02	19.16	19.30
15	16QAM	36	0	18.83	18.81	18.99	19.12	19.07	19.30
15	16QAM	36	20	18.85	18.77	18.98	19.06	19.11	19.30
15	16QAM	36	39	18.85	18.86	18.89	19.12	19.10	19.30
15	16QAM	75	0	18.75	18.76	19.01	18.99	19.11	19.30
Channel				39700	40160	40620	41080	41540	
Frequency (MHz)				2501	2547	2593	2639	2685	
10	QPSK	1	0	18.83	18.91	19.00	19.04	19.13	19.30
10	QPSK	1	25	18.67	18.71	18.98	19.07	19.16	19.30
10	QPSK	1	49	18.76	18.91	18.95	19.08	19.08	19.30
10	QPSK	25	0	18.82	18.97	19.02	19.08	19.19	19.30
10	QPSK	25	12	18.71	18.84	18.94	19.15	19.19	19.30
10	QPSK	25	25	18.83	18.84	18.92	19.09	19.18	19.30
10	QPSK	50	0	18.91	18.93	19.04	19.13	19.16	19.30
10	16QAM	1	0	18.81	18.76	18.85	19.18	19.14	19.30
10	16QAM	1	25	18.91	18.87	18.99	19.08	19.18	19.30
10	16QAM	1	49	18.80	18.82	19.02	19.10	19.21	19.30
10	16QAM	25	0	18.80	18.82	18.98	19.14	19.13	19.30
10	16QAM	25	12	18.87	18.84	19.03	19.09	19.20	19.30
10	16QAM	25	25	18.86	18.83	18.94	19.14	19.18	19.30
10	16QAM	50	0	18.74	18.76	19.05	19.06	19.10	19.30
Channel				39675	40148	40620	41093	41565	
Frequency (MHz)				2498.5	2545.8	2593	2640.3	2687.5	
5	QPSK	1	0	18.77	18.91	18.97	19.16	19.09	19.30
5	QPSK	1	12	18.77	18.72	18.92	19.11	19.15	19.30
5	QPSK	1	24	18.76	18.94	18.96	18.97	18.99	19.30
5	QPSK	12	0	18.82	18.97	19.05	19.09	19.26	19.30
5	QPSK	12	7	18.72	18.74	18.95	19.08	19.13	19.30
5	QPSK	12	13	18.90	18.85	18.98	19.16	19.22	19.30
5	QPSK	25	0	18.90	18.99	19.09	19.19	19.24	19.30
5	16QAM	1	0	18.90	18.77	18.75	19.06	19.15	19.30
5	16QAM	1	12	18.83	18.79	19.01	19.02	19.13	19.30
5	16QAM	1	24	18.79	18.81	18.95	19.05	19.23	19.30
5	16QAM	12	0	18.81	18.90	18.94	19.15	19.08	19.30
5	16QAM	12	7	18.81	18.85	19.00	19.11	19.19	19.30
5	16QAM	12	13	18.86	18.93	18.88	19.16	19.10	19.30
5	16QAM	25	0	18.77	18.78	19.04	19.05	19.21	19.30

【LTE Band 48 _FCC_ Part 96】

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power Middle Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				55340	55830	55990	56150	56640	18.40
Frequency (MHz)				3560	3609	3625	3641	3690	
20	QPSK	1	0	17.41	17.46	17.40	17.29	17.56	18.40
20	QPSK	1	49	17.27	17.24	17.22	17.15	17.55	18.40
20	QPSK	1	99	17.14	17.24	17.17	17.07	17.52	18.40
20	QPSK	50	0	17.37	17.38	17.31	17.23	17.55	18.40
20	QPSK	50	24	17.28	17.28	17.16	17.20	17.51	18.40
20	QPSK	50	50	17.19	17.22	17.18	17.09	17.52	18.40
20	QPSK	100	0	17.34	17.35	17.25	17.18	17.51	18.40
20	16QAM	1	0	17.40	17.37	17.35	17.22	17.46	18.40
20	16QAM	1	49	17.21	17.25	17.30	17.18	17.41	18.40
20	16QAM	1	99	17.37	17.14	17.18	17.30	17.39	18.40
20	16QAM	50	0	17.29	17.42	17.32	17.28	17.31	18.40
20	16QAM	50	24	17.39	17.35	17.33	17.16	17.39	18.40
20	16QAM	50	50	17.31	17.29	17.25	17.27	17.28	18.40
20	16QAM	100	0	17.33	17.29	17.27	17.21	17.34	18.40
Channel				55315	55820	55990	56160	56665	18.40
Frequency (MHz)				3557.5	3608	3625	3642	3692.5	
15	QPSK	1	0	17.39	17.43	17.37	17.16	17.50	18.40
15	QPSK	1	37	17.21	17.12	17.12	17.03	17.52	18.40
15	QPSK	1	74	17.12	17.13	17.13	16.94	17.42	18.40
15	QPSK	36	0	17.32	17.24	17.20	17.19	17.46	18.40
15	QPSK	36	20	17.23	17.24	17.02	17.18	17.40	18.40
15	QPSK	36	39	17.12	17.19	17.09	16.98	17.50	18.40
15	QPSK	75	0	17.23	17.28	17.16	17.13	17.43	18.40
15	16QAM	1	0	17.35	17.23	17.30	17.20	17.40	18.40
15	16QAM	1	37	17.18	17.11	17.28	17.11	17.35	18.40
15	16QAM	1	74	17.32	17.07	17.14	17.23	17.30	18.40
15	16QAM	36	0	17.15	17.33	17.27	17.22	17.28	18.40
15	16QAM	36	20	17.30	17.30	17.27	17.07	17.26	18.40
15	16QAM	36	39	17.23	17.15	17.18	17.24	17.19	18.40
15	16QAM	75	0	17.26	17.22	17.13	17.12	17.21	18.40
Channel				55290	55815	55990	56165	56690	18.40
Frequency (MHz)				3555	3607.5	3625	3642.5	3695	
10	QPSK	1	0	17.36	17.42	17.39	17.17	17.46	18.40
10	QPSK	1	25	17.14	17.15	17.17	17.03	17.53	18.40
10	QPSK	1	49	17.02	17.14	17.10	16.99	17.45	18.40
10	QPSK	25	0	17.35	17.30	17.17	17.16	17.53	18.40
10	QPSK	25	12	17.23	17.27	17.03	17.09	17.39	18.40
10	QPSK	25	25	17.14	17.16	17.16	16.99	17.46	18.40
10	QPSK	50	0	17.32	17.31	17.21	17.08	17.46	18.40
10	16QAM	1	0	17.32	17.24	17.24	17.10	17.45	18.40
10	16QAM	1	25	17.17	17.22	17.18	17.17	17.28	18.40
10	16QAM	1	49	17.28	17.02	17.04	17.22	17.30	18.40
10	16QAM	25	0	17.24	17.31	17.17	17.25	17.17	18.40
10	16QAM	25	12	17.29	17.33	17.27	17.08	17.35	18.40
10	16QAM	25	25	17.25	17.22	17.20	17.24	17.15	18.40
10	16QAM	50	0	17.30	17.17	17.19	17.08	17.33	18.40
Channel				55265	55810	55990	56170	56715	18.40
Frequency (MHz)				3552.5	3607	3625	3643	3697.5	
5	QPSK	1	0	17.35	17.33	17.27	17.27	17.53	18.40
5	QPSK	1	12	17.21	17.12	17.21	17.03	17.42	18.40
5	QPSK	1	24	17.04	17.17	17.15	17.01	17.44	18.40
5	QPSK	12	0	17.23	17.32	17.25	17.20	17.51	18.40
5	QPSK	12	7	17.19	17.21	17.06	17.07	17.44	18.40
5	QPSK	12	13	17.14	17.11	17.10	16.96	17.40	18.40
5	QPSK	25	0	17.24	17.25	17.21	17.14	17.45	18.40
5	16QAM	1	0	17.37	17.28	17.33	17.12	17.34	18.40
5	16QAM	1	12	17.20	17.21	17.23	17.09	17.34	18.40
5	16QAM	1	24	17.25	16.99	17.07	17.28	17.32	18.40
5	16QAM	12	0	17.24	17.39	17.25	17.26	17.18	18.40
5	16QAM	12	7	17.30	17.25	17.23	17.12	17.36	18.40
5	16QAM	12	13	17.19	17.27	17.18	17.23	17.13	18.40
5	16QAM	25	0	17.29	17.16	17.26	17.20	17.27	18.40

【LTE Band 66】

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	17.30	17.34	17.47	18.60
20	QPSK	1	49	17.27	17.33	17.46	18.60
20	QPSK	1	99	17.01	17.25	17.35	18.60
20	QPSK	50	0	17.22	17.30	17.43	18.60
20	QPSK	50	24	17.21	17.21	17.42	18.60
20	QPSK	50	50	17.12	17.19	17.40	18.60
20	QPSK	100	0	17.22	17.28	17.42	18.60
20	16QAM	1	0	17.27	17.27	17.46	18.60
20	16QAM	1	49	17.29	17.33	17.41	18.60
20	16QAM	1	99	17.10	17.30	17.39	18.60
20	16QAM	50	0	17.27	17.23	17.39	18.60
20	16QAM	50	24	17.19	17.15	17.46	18.60
20	16QAM	50	50	17.23	17.32	17.38	18.60
20	16QAM	100	0	17.19	17.22	17.45	18.60
Channel				132047	132322	132597	
Frequency (MHz)				1717.5	1745	1772.5	
15	QPSK	1	0	17.16	17.20	17.41	18.60
15	QPSK	1	37	17.18	17.20	17.41	18.60
15	QPSK	1	74	16.91	17.20	17.30	18.60
15	QPSK	36	0	17.08	17.24	17.29	18.60
15	QPSK	36	20	17.14	17.12	17.34	18.60
15	QPSK	36	39	16.98	17.11	17.34	18.60
15	QPSK	75	0	17.10	17.21	17.29	18.60
15	16QAM	1	0	17.21	17.17	17.45	18.60
15	16QAM	1	37	17.22	17.27	17.31	18.60
15	16QAM	1	74	16.95	17.28	17.35	18.60
15	16QAM	36	0	17.12	17.21	17.34	18.60
15	16QAM	36	20	17.12	17.04	17.36	18.60
15	16QAM	36	39	17.16	17.17	17.29	18.60
15	16QAM	75	0	17.11	17.13	17.36	18.60
Channel				132022	132322	132622	
Frequency (MHz)				1715	1745	1775	
10	QPSK	1	0	17.28	17.20	17.36	18.60
10	QPSK	1	25	17.21	17.24	17.33	18.60
10	QPSK	1	49	16.93	17.22	17.26	18.60
10	QPSK	25	0	17.13	17.16	17.35	18.60
10	QPSK	25	12	17.14	17.09	17.27	18.60
10	QPSK	25	25	17.06	17.10	17.30	18.60
10	QPSK	50	0	17.15	17.27	17.36	18.60
10	16QAM	1	0	17.24	17.13	17.42	18.60
10	16QAM	1	25	17.26	17.28	17.34	18.60
10	16QAM	1	49	17.09	17.25	17.34	18.60
10	16QAM	25	0	17.12	17.18	17.33	18.60
10	16QAM	25	12	17.17	17.08	17.41	18.60
10	16QAM	25	25	17.08	17.22	17.33	18.60
10	16QAM	50	0	17.17	17.11	17.37	18.60
Channel				131997	132322	132647	
Frequency (MHz)				1712.5	1745	1777.5	
5	QPSK	1	0	17.25	17.29	17.38	18.60
5	QPSK	1	12	17.18	17.19	17.43	18.60
5	QPSK	1	24	16.87	17.21	17.24	18.60
5	QPSK	12	0	17.14	17.22	17.41	18.60
5	QPSK	12	7	17.19	17.11	17.34	18.60
5	QPSK	12	13	17.03	17.17	17.26	18.60
5	QPSK	25	0	17.16	17.26	17.31	18.60
5	16QAM	1	0	17.21	17.25	17.37	18.60
5	16QAM	1	12	17.25	17.32	17.36	18.60
5	16QAM	1	24	17.03	17.22	17.27	18.60
5	16QAM	12	0	17.14	17.18	17.34	18.60
5	16QAM	12	7	17.06	17.11	17.42	18.60
5	16QAM	12	13	17.16	17.28	17.27	18.60
5	16QAM	25	0	17.12	17.08	17.39	18.60
Channel				131987	132322	132657	
Frequency (MHz)				1711.5	1745	1778.5	
3	QPSK	1	0	17.21	17.20	17.33	18.60
3	QPSK	1	8	17.20	17.24	17.33	18.60
3	QPSK	1	14	16.86	17.21	17.32	18.60
3	QPSK	8	0	17.15	17.27	17.32	18.60
3	QPSK	8	4	17.09	17.15	17.35	18.60
3	QPSK	8	7	17.01	17.06	17.37	18.60

3	QPSK	15	0	17.20	17.17	17.33	18.60
3	16QAM	1	0	17.14	17.25	17.44	18.60
3	16QAM	1	8	17.26	17.26	17.38	18.60
3	16QAM	1	14	16.98	17.18	17.36	18.60
3	16QAM	8	0	17.18	17.17	17.37	18.60
3	16QAM	8	4	17.05	17.10	17.42	18.60
3	16QAM	8	7	17.16	17.25	17.30	18.60
3	16QAM	15	0	17.17	17.16	17.42	18.60
Channel				131979	132322	132665	Tune-up limit
Frequency (MHz)				1710.7	1745	1779.3	(dBm)
1.4	QPSK	1	0	17.15	17.26	17.35	18.60
1.4	QPSK	1	3	17.22	17.31	17.37	18.60
1.4	QPSK	1	5	17.09	17.22	17.43	18.60
1.4	QPSK	3	0	17.16	17.25	17.35	18.60
1.4	QPSK	3	1	17.14	17.29	17.46	18.60
1.4	QPSK	3	3	17.13	17.25	17.37	18.60
1.4	QPSK	6	0	17.14	17.27	17.39	18.60
1.4	16QAM	1	0	17.26	17.25	17.37	18.60
1.4	16QAM	1	3	17.29	17.33	17.31	18.60
1.4	16QAM	1	5	17.27	17.32	17.39	18.60
1.4	16QAM	3	0	17.23	17.28	17.45	18.60
1.4	16QAM	3	1	17.24	17.32	17.46	18.60
1.4	16QAM	3	3	17.21	17.26	17.45	18.60
1.4	16QAM	6	0	17.20	17.21	17.39	18.60

【LTE Band 71】

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				133222	133297	133372	
Frequency (MHz)				673	680.5	688	
20	QPSK	1	0	20.25	20.29	20.43	21.20
20	QPSK	1	49	20.16	20.24	20.35	21.20
20	QPSK	1	99	20.17	20.21	20.41	21.20
20	QPSK	50	0	20.37	20.40	20.44	21.20
20	QPSK	50	24	20.35	20.33	20.40	21.20
20	QPSK	50	50	20.36	20.38	20.43	21.20
20	QPSK	100	0	20.36	20.39	20.43	21.20
20	16QAM	1	0	20.27	20.27	20.35	21.20
20	16QAM	1	49	20.34	20.35	20.43	21.20
20	16QAM	1	99	20.33	20.39	20.60	21.20
20	16QAM	50	0	20.32	20.31	20.43	21.20
20	16QAM	50	24	20.31	20.32	20.35	21.20
20	16QAM	50	50	20.35	20.32	20.42	21.20
20	16QAM	100	0	20.32	20.34	20.41	21.20
Channel				133197	133297	133397	Tune-up limit
Frequency (MHz)				670.5	680.5	690.5	(dBm)
15	QPSK	1	0	20.18	20.16	20.40	21.20
15	QPSK	1	37	20.14	20.11	20.34	21.20
15	QPSK	1	74	20.10	20.14	20.34	21.20
15	QPSK	36	0	20.29	20.33	20.41	21.20
15	QPSK	36	20	20.25	20.23	20.37	21.20
15	QPSK	36	39	20.21	20.30	20.39	21.20
15	QPSK	75	0	20.32	20.28	20.40	21.20
15	16QAM	1	0	20.22	20.18	20.29	21.20
15	16QAM	1	37	20.25	20.28	20.36	21.20
15	16QAM	1	74	20.31	20.26	20.52	21.20
15	16QAM	36	0	20.19	20.23	20.42	21.20
15	16QAM	36	20	20.27	20.19	20.26	21.20
15	16QAM	36	39	20.31	20.27	20.28	21.20
15	16QAM	75	0	20.22	20.24	20.33	21.20
Channel				133172	133297	133422	Tune-up limit
Frequency (MHz)				668	680.5	693	(dBm)
10	QPSK	1	0	20.19	20.22	20.38	21.20
10	QPSK	1	25	20.10	20.20	20.25	21.20
10	QPSK	1	49	20.05	20.11	20.29	21.20
10	QPSK	25	0	20.31	20.26	20.29	21.20
10	QPSK	25	12	20.32	20.23	20.32	21.20
10	QPSK	25	25	20.30	20.37	20.34	21.20
10	QPSK	50	0	20.31	20.36	20.31	21.20
10	16QAM	1	0	20.12	20.21	20.34	21.20
10	16QAM	1	25	20.27	20.27	20.38	21.20
10	16QAM	1	49	20.29	20.25	20.48	21.20
10	16QAM	25	0	20.22	20.23	20.34	21.20



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10	16QAM	25	12	20.28	20.26	20.23	21.20
10	16QAM	25	25	20.26	20.25	20.29	21.20
10	16QAM	50	0	20.19	20.20	20.34	21.20
Channel				133147	133297	133447	Tune-up limit
Frequency (MHz)				665.5	680.5	695.5	(dBm)
5	QPSK	1	0	20.23	20.20	20.41	21.20
5	QPSK	1	12	20.11	20.18	20.24	21.20
5	QPSK	1	24	20.08	20.19	20.32	21.20
5	QPSK	12	0	20.22	20.35	20.39	21.20
5	QPSK	12	7	20.21	20.31	20.36	21.20
5	QPSK	12	13	20.24	20.35	20.34	21.20
5	QPSK	25	0	20.29	20.32	20.37	21.20
5	16QAM	1	0	20.12	20.17	20.29	21.20
5	16QAM	1	12	20.30	20.26	20.40	21.20
5	16QAM	1	24	20.18	20.31	20.48	21.20
5	16QAM	12	0	20.22	20.26	20.36	21.20
5	16QAM	12	7	20.17	20.24	20.27	21.20
5	16QAM	12	13	20.22	20.20	20.39	21.20
5	16QAM	25	0	20.26	20.30	20.33	21.20

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:

$$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR}$$
 - 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
7. The below table, exemption limits for routine evaluation based on frequency and separation distance was according to SAR-based Exemption – §1.1307(b)(3)(i)(B).

Exposure Position	Wireless Interface	WCDMA Band V	WCDMA Band IV	WCDMA Band II	LTE Band 71	LTE Band 12/17	LTE Band 13	LTE Band 14	LTE Band 26/5	LTE Band 66/4	LTE Band 25/2	LTE Band 30	LTE Band 7	LTE Band 41/38	LTE Band 48
	Calculated Frequency (MHz)	846	1750	1907	695	715	784	795	848	1779	1914	2312	2567	2687	3697
	Maximum power (dBm)	24.5	24.5	24.5	25.0	25.0	25.0	25.0	25.0	24.0	24.0	24.0	24.0	24.0	22.0
	Maximum rated power(mW)	281.84	281.84	281.84	316.23	316.23	316.23	316.23	316.23	251.19	251.19	251.19	251.19	251.19	158.49
Bottom Side	Separation distance(mm)	5.0													
	exclusion threshold	51.9	74.6	77.8	52.7	53.5	56.0	56.4	58.2	67.0	69.5	76.4	80.5	82.4	61.0
	Testing required?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

12. SAR Test Results

General Note:

1. Per KDB 447498 D01v06, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
 - a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
 - b. For SAR testing of WLAN signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle)"
 - c. For WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
 - d. For TDD LTE SAR measurement, the duty cycle 1:1.59 (62.9 %) was used perform testing and considering the theoretical duty cycle of 63.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 62.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix 63.3%/62.9% = 1.006 is applied to scale-up the measured SAR result. The Reported TDD LTE SAR = measured SAR (W/kg)* Tune-up Scaling Factor* scaling factor for extended cyclic prefix.
2. Per KDB 447498 D01v06, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the *reported* 1-g or 10-g SAR for the mid-band or highest output power channel is:
 - ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
 - ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
 - ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
3. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥ 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 $\leq \frac{1}{4}$ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA / DC-HSDPA to RMC12.2Kbps and the adjusted SAR is ≤ 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 (HSDPA / HSUPA / DC-HSDPA) are less than $\frac{1}{4}$ dB higher than the primary modes; therefore, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA.

LTE Note:

1. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
2. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
3. Per KDB 941225 D05v02r05, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is ≤ 1.45 W/kg, the remaining required test channels must also be tested.
4. Per KDB 941225 D05v02r05, 16QAM output power for each RB allocation configuration is not $\frac{1}{2}$ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
5. Per KDB 941225 D05v02r05, Smaller bandwidth output power for each RB allocation configuration is not $\frac{1}{2}$ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
6. For LTE B4/B5/B12/B17/B26/B38/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.
7. LTE band 2/4/5/17/38 SAR test was covered by Band 25/66/26/12/41; according to TCB workshop, SAR test for overlapping LTE bands can be reduced if
 - a. The maximum output power, including tolerance, for the smaller band is $\leq$ 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.

**12.1 Body SAR**

【WCDMA SAR】

Plot No	Band	Mode	Test Position	Gap (mm)	Antenna	Ch.	Freq. (MHz)	Sample	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	WCDMA II	RMC 12.2Kbps	Bottom Side	0mm	Main	9538	1907.6	SPEED	16.75	17.70	1.245	0.08	0.800	0.996
	WCDMA II	RMC 12.2Kbps	Bottom Side	0mm	Main	9262	1852.4	SPEED	16.69	17.70	1.262	0.15	0.874	1.103
	WCDMA II	RMC 12.2Kbps	Bottom Side	0mm	Main	9400	1880	SPEED	16.70	17.70	1.259	0.16	0.821	1.034
	WCDMA II	RMC 12.2Kbps	Bottom Side	0mm	Main	9262	1852.4	AWAN	16.69	17.70	1.262	0.01	0.942	1.189
	WCDMA II	RMC 12.2Kbps	Bottom Side	0mm	Main	9400	1880	AWAN	16.70	17.70	1.259	0.06	0.904	1.138
	WCDMA II	RMC 12.2Kbps	Bottom Side	0mm	Main	9538	1907.6	AWAN	16.75	17.70	1.245	0.19	0.859	1.069
	WCDMA II	RMC 12.2Kbps	Bottom Side	0mm	Main	9262	1852.4	ATC	16.69	17.70	1.262	0.09	0.832	1.050
	WCDMA II	RMC 12.2Kbps	Bottom Side	0mm	Main	9400	1880	ATC	16.70	17.70	1.259	0.18	0.814	1.025
	WCDMA II	RMC 12.2Kbps	Bottom Side	0mm	Main	9538	1907.6	ATC	16.75	17.70	1.245	-0.17	0.777	0.967
02	WCDMA IV	RMC 12.2Kbps	Bottom Side	0mm	Main	1513	1752.6	SPEED	17.36	18.70	1.361	0.13	0.783	1.066
	WCDMA IV	RMC 12.2Kbps	Bottom Side	0mm	Main	1312	1712.4	SPEED	17.18	18.70	1.419	0.01	0.684	0.971
	WCDMA IV	RMC 12.2Kbps	Bottom Side	0mm	Main	1413	1732.6	SPEED	17.30	18.70	1.38	0.13	0.732	1.010
	WCDMA IV	RMC 12.2Kbps	Bottom Side	0mm	Main	1513	1752.6	AWAN	17.36	18.70	1.361	0.04	0.877	1.194
	WCDMA IV	RMC 12.2Kbps	Bottom Side	0mm	Main	1312	1712.4	AWAN	17.18	18.70	1.419	-0.05	0.773	1.097
	WCDMA IV	RMC 12.2Kbps	Bottom Side	0mm	Main	1413	1732.6	AWAN	17.30	18.70	1.38	0.11	0.831	1.147
	WCDMA IV	RMC 12.2Kbps	Bottom Side	0mm	Main	1513	1752.6	ATC	17.36	18.70	1.361	-0.16	0.704	0.958
	WCDMA IV	RMC 12.2Kbps	Bottom Side	0mm	Main	1312	1712.4	ATC	17.18	18.70	1.419	0.05	0.604	0.857
	WCDMA IV	RMC 12.2Kbps	Bottom Side	0mm	Main	1413	1732.6	ATC	17.30	18.70	1.38	0.09	0.691	0.954
03	WCDMA V	RMC 12.2Kbps	Bottom Side	0mm	Main	4182	836.4	SPEED	18.71	19.50	1.199	-0.05	0.480	0.576
	WCDMA V	RMC 12.2Kbps	Bottom Side	0mm	Main	4182	836.4	AWAN	18.71	19.50	1.199	0.00	0.518	0.621
	WCDMA V	RMC 12.2Kbps	Bottom Side	0mm	Main	4182	836.4	ATC	18.71	19.50	1.199	-0.15	0.472	0.566



【LTE SAR】

Plot No	Band	BW	Modulation	RB Size	RB Offset	Test Position	Gap (mm)	Antenna	Ch.	Freq. (MHz)	Sample	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 7	20M	QPSK	1	0	Bottom Side	0mm	Main	21350	2560	SPEED	16.66	17.50	1.213			-0.01	0.623	0.756
	LTE Band 7	20M	QPSK	50	0	Bottom Side	0mm	Main	21350	2560	SPEED	16.80	17.50	1.175			-0.05	0.662	0.778
04	LTE Band 7	20M	QPSK	50	0	Bottom Side	0mm	Main	21350	2560	AWAN	16.80	17.50	1.175			-0.02	0.676	0.794
	LTE Band 7	20M	QPSK	50	0	Bottom Side	0mm	Main	21350	2560	ATC	16.80	17.50	1.175			0.03	0.656	0.771
05	LTE Band 12	10M	QPSK	1	0	Bottom Side	0mm	Main	23095	707.5	SPEED	19.73	20.80	1.279			0.01	0.427	0.546
	LTE Band 12	10M	QPSK	25	0	Bottom Side	0mm	Main	23095	707.5	SPEED	19.78	20.80	1.265			0.06	0.384	0.486
	LTE Band 12	10M	QPSK	1	0	Bottom Side	0mm	Main	23095	707.5	AWAN	19.73	20.80	1.279			0.14	0.365	0.467
	LTE Band 12	10M	QPSK	1	0	Bottom Side	0mm	Main	23095	707.5	ATC	19.73	20.80	1.279			-0.13	0.319	0.408
	LTE Band 13	10M	QPSK	1	0	Bottom Side	0mm	Main	23230	782	SPEED	18.55	20.30	1.496			0.05	0.360	0.539
	LTE Band 13	10M	QPSK	25	0	Bottom Side	0mm	Main	23230	782	SPEED	18.73	20.30	1.435			-0.00	0.384	0.551
06	LTE Band 13	10M	QPSK	25	0	Bottom Side	0mm	Main	23230	782	AWAN	18.73	20.30	1.435			0.02	0.441	0.633
	LTE Band 13	10M	QPSK	25	0	Bottom Side	0mm	Main	23230	782	ATC	18.73	20.30	1.435			-0.00	0.374	0.537
	LTE Band 14	10M	QPSK	1	0	Bottom Side	0mm	Main	23330	793	SPEED	18.33	20.20	1.538			0.17	0.349	0.537
	LTE Band 14	10M	QPSK	25	0	Bottom Side	0mm	Main	23330	793	SPEED	18.25	20.20	1.567			0.19	0.356	0.558
07	LTE Band 14	10M	QPSK	25	0	Bottom Side	0mm	Main	23330	793	AWAN	18.25	20.20	1.567			-0.00	0.417	0.653
	LTE Band 14	10M	QPSK	25	0	Bottom Side	0mm	Main	23330	793	ATC	18.25	20.20	1.567			0.09	0.355	0.556
	LTE Band 25	20M	QPSK	1	0	Bottom Side	0mm	Main	26140	1860	SPEED	17.29	17.70	1.099			-0.13	0.879	0.966
	LTE Band 25	20M	QPSK	1	0	Bottom Side	0mm	Main	26340	1880	SPEED	17.21	17.70	1.119			0.17	0.842	0.942
	LTE Band 25	20M	QPSK	1	0	Bottom Side	0mm	Main	26590	1905	SPEED	17.19	17.70	1.125			0.13	0.793	0.892
	LTE Band 25	20M	QPSK	50	0	Bottom Side	0mm	Main	26140	1860	SPEED	17.28	17.70	1.102			0.06	0.888	0.979
	LTE Band 25	20M	QPSK	50	0	Bottom Side	0mm	Main	26340	1880	SPEED	17.27	17.70	1.104			-0.17	0.827	0.913
	LTE Band 25	20M	QPSK	50	0	Bottom Side	0mm	Main	26590	1905	SPEED	17.24	17.70	1.112			0.02	0.806	0.896
	LTE Band 25	20M	QPSK	100	0	Bottom Side	0mm	Main	26140	1860	SPEED	17.26	17.70	1.107			-0.05	0.868	0.961
08	LTE Band 25	20M	QPSK	50	0	Bottom Side	0mm	Main	26140	1860	AWAN	17.28	17.70	1.102			0.05	1.080	1.190
	LTE Band 25	20M	QPSK	50	0	Bottom Side	0mm	Main	26340	1880	AWAN	17.27	17.70	1.104			-0.14	1.030	1.137
	LTE Band 25	20M	QPSK	50	0	Bottom Side	0mm	Main	26590	1905	AWAN	17.24	17.70	1.112			0.07	0.993	1.104
	LTE Band 25	20M	QPSK	50	0	Bottom Side	0mm	Main	26140	1860	ATC	17.28	17.70	1.102			0.03	0.851	0.938
	LTE Band 25	20M	QPSK	50	0	Bottom Side	0mm	Main	26340	1880	ATC	17.27	17.70	1.104			-0.05	0.860	0.949
	LTE Band 25	20M	QPSK	50	0	Bottom Side	0mm	Main	26590	1905	ATC	17.24	17.70	1.112			0.03	0.851	0.946
	LTE Band 26	15M	QPSK	1	0	Bottom Side	0mm	Main	26865	831.5	SPEED	18.59	20.00	1.384			-0.05	0.387	0.536
	LTE Band 26	15M	QPSK	36	0	Bottom Side	0mm	Main	26865	831.5	SPEED	18.60	20.00	1.38			0.04	0.391	0.540
09	LTE Band 26	15M	QPSK	36	0	Bottom Side	0mm	Main	26865	831.5	AWAN	18.60	20.00	1.38			0.09	0.553	0.763
	LTE Band 26	15M	QPSK	36	0	Bottom Side	0mm	Main	26865	831.5	ATC	18.60	20.00	1.38			0.11	0.483	0.667
	LTE Band 30	10M	QPSK	1	0	Bottom Side	0mm	Main	27710	2310	SPEED	17.54	18.30	1.191			-0.06	0.760	0.905
	LTE Band 30	10M	QPSK	25	0	Bottom Side	0mm	Main	27710	2310	SPEED	17.71	18.30	1.146			0.02	0.758	0.869
	LTE Band 30	10M	QPSK	50	0	Bottom Side	0mm	Main	27710	2310	SPEED	17.70	18.30	1.148			-0.10	0.758	0.870
10	LTE Band 30	10M	QPSK	1	0	Bottom Side	0mm	Main	27710	2310	AWAN	17.54	18.30	1.191			-0.08	0.890	1.060
	LTE Band 30	10M	QPSK	1	0	Bottom Side	0mm	Main	27710	2310	ATC	17.54	18.30	1.191			-0.15	0.837	0.997
	LTE Band 66	20M	QPSK	1	0	Bottom Side	0mm	Main	132572	1770	SPEED	17.47	18.60	1.297			-0.15	0.708	0.918
	LTE Band 66	20M	QPSK	1	0	Bottom Side	0mm	Main	132072	1720	SPEED	17.30	18.60	1.349			0.02	0.588	0.793
	LTE Band 66	20M	QPSK	1	0	Bottom Side	0mm	Main	132322	1745	SPEED	17.34	18.60	1.337			-0.18	0.649	0.868
	LTE Band 66	20M	QPSK	50	0	Bottom Side	0mm	Main	132572	1770	SPEED	17.43	18.60	1.309			0.02	0.734	0.961
	LTE Band 66	20M	QPSK	50	0	Bottom Side	0mm	Main	132072	1720	SPEED	17.22	18.60	1.374			0.01	0.599	0.823
	LTE Band 66	20M	QPSK	50	0	Bottom Side	0mm	Main	132322	1745	SPEED	17.30	18.60	1.349			-0.08	0.637	0.859
	LTE Band 66	20M	QPSK	100	0	Bottom Side	0mm	Main	132572	1770	SPEED	17.42	18.60	1.312			-0.16	0.727	0.954
11	LTE Band 66	20M	QPSK	50	0	Bottom Side	0mm	Main	132572	1770	AWAN	17.43	18.60	1.309			0.18	0.901	1.179
	LTE Band 66	20M	QPSK	50	0	Bottom Side	0mm	Main	132072	1720	AWAN	17.22	18.60	1.374			-0.06	0.727	0.999
	LTE Band 66	20M	QPSK	50	0	Bottom Side	0mm	Main	132322	1745	AWAN	17.30	18.60	1.349			-0.09	0.807	1.089
	LTE Band 66	20M	QPSK	50	0	Bottom Side	0mm	Main	132572	1770	ATC	17.43	18.60	1.309			0.18	0.657	0.860
	LTE Band 66	20M	QPSK	50	0	Bottom Side	0mm	Main	132072	1720	ATC	17.22	18.60	1.374			-0.10	0.539	0.741
	LTE Band 66	20M	QPSK	50	0	Bottom Side	0mm	Main	132322	1745	ATC	17.30	18.60	1.349			0.00	0.608	0.820
	LTE Band 71	20M	QPSK	1	0	Bottom Side	0mm	Main	133297	680.5	SPEED	20.29	21.20	1.233			-0.14	0.373	0.460
12	LTE Band 71	20M	QPSK	50	0	Bottom Side	0mm	Main	133297	680.5	SPEED	20.40	21.20	1.202			0.02	0.444	0.534
	LTE Band 71	20M	QPSK	50	0	Bottom Side	0mm	Main	133297	680.5	AWAN	20.40	21.20	1.202			-0.02	0.341	0.410
	LTE Band 71	20M	QPSK	50	0	Bottom Side	0mm	Main	133297	680.5	ATC	20.40	21.20	1.202			-0.12	0.299	0.359
	LTE Band 41	20M	QPSK	1	0	Bottom Side	0mm	Main	41490	2680	SPEED	19.19	19.30	1.026	62.9	1.006	-0.18	0.765	0.790
	LTE Band 41	20M	QPSK	1	0	Bottom Side	0mm	Main	39750	2506	SPEED	18.86	19.30	1.107	62.9	1.006	-0.14	0.545	0.607
	LTE Band 41	20M	QPSK	1	0	Bottom Side	0mm	Main	40185	2549.5	SPEED	19.01	19.30	1.069	62.9	1.006	-0.07	0.625	0.672
	LTE Band 41	20M	QPSK	1	0	Bottom Side	0mm	Main	40620	2593	SPEED	19.03	19.30	1.064	62.9	1.006	0.13	0.700	0.749
	LTE Band 41	20M	QPSK	1	0	Bottom Side	0mm	Main	41055	2636.5	SPEED	19.18	19.30	1.028	62.9	1.006	-0.17	0.776	0.803
	LTE Band 41	20M	QPSK	50	0	Bottom Side	0mm	Main	41490	2680	SPEED	19.27	19.30	1.007	62.9	1.006	0.06	0.783	0.793
	LTE Band 41	20M	QPSK	50	0	Bottom Side	0mm	Main	39750	2506	SPEED	18.96	19.30	1.081	62.9	1.006	0.03	0.564	0.613
	LTE Band 41	20M	QPSK	50	0	Bottom Side	0mm	Main	40185	2549.5	SPEED	19.07	19.30	1.054	62.9	1.006	-0.05	0.646	0.685
	LTE Band 41	20M	QPSK	50	0	Bottom Side	0mm	Main	40620	2593	SPEED	19.12	19.30	1.042	62.9	1.006	-0.01	0.723	0.758
	LTE Band 41	20M	QPSK	50	0	Bottom Side	0mm	Main	41055	2636.5	SPEED	19.22	19.30	1.019	62.9	1.006	0.09	0.799	0.819
	LTE Band 41	20M	QPSK	100	0	Bottom Side	0mm	Main	41490	2680	SPEED	19.26	19.30	1.009	62.9	1.006	-0.18	0.784	0.796
	LTE Band 41	20M	QPSK	50	0	Bottom Side	0mm	Main	41055	2636.5	AWAN	19.22	19.30	1.019	62.9	1.006	-0.12	0.808	0.828
	LTE Band 41	20M	QPSK	50	0	Bottom Side	0mm	Main	39750	2506	AWAN	18.96	19.30	1.081	62.9	1.006	0.06	0.568	0.618



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	LTE Band 41	20M	QPSK	50	0	Bottom Side	0mm	Main	40185	2549.5	AWAN	19.07	19.30	1.054	62.9	1.006	0.04	0.652	0.691
	LTE Band 41	20M	QPSK	50	0	Bottom Side	0mm	Main	40620	2593	AWAN	19.12	19.30	1.042	62.9	1.006	0.17	0.730	0.765
13	LTE Band 41	20M	QPSK	50	0	Bottom Side	0mm	Main	41490	2680	AWAN	19.27	19.30	1.007	62.9	1.006	0.00	0.823	0.834
	LTE Band 41	20M	QPSK	50	0	Bottom Side	0mm	Main	41055	2636.5	ATC	19.22	19.30	1.019	62.9	1.006	-0.07	0.768	0.787
	LTE Band 41	20M	QPSK	50	0	Bottom Side	0mm	Main	39750	2506	ATC	18.96	19.30	1.081	62.9	1.006	-0.18	0.573	0.623
	LTE Band 41	20M	QPSK	50	0	Bottom Side	0mm	Main	40185	2549.5	ATC	19.07	19.30	1.054	62.9	1.006	-0.14	0.645	0.684
	LTE Band 41	20M	QPSK	50	0	Bottom Side	0mm	Main	40620	2593	ATC	19.12	19.30	1.042	62.9	1.006	0.08	0.708	0.742
	LTE Band 41	20M	QPSK	50	0	Bottom Side	0mm	Main	41490	2680	ATC	19.27	19.30	1.007	62.9	1.006	0.09	0.769	0.779
	LTE Band 48	20M	QPSK	1	0	Bottom Side	0mm	Main	56640	3690	SPEED	17.56	18.40	1.213	62.9	1.006	0.15	0.948	1.157
	LTE Band 48	20M	QPSK	1	0	Bottom Side	0mm	Main	55340	3560	SPEED	17.41	18.40	1.256	62.9	1.006	-0.00	0.590	0.745
	LTE Band 48	20M	QPSK	1	0	Bottom Side	0mm	Main	55830	3609	SPEED	17.46	18.40	1.242	62.9	1.006	0.09	0.763	0.953
	LTE Band 48	20M	QPSK	1	0	Bottom Side	0mm	Main	55990	3625	SPEED	17.40	18.40	1.259	62.9	1.006	0.11	0.838	1.061
	LTE Band 48	20M	QPSK	1	0	Bottom Side	0mm	Main	56150	3641	SPEED	17.29	18.40	1.291	62.9	1.006	-0.19	0.877	1.139
	LTE Band 48	20M	QPSK	50	0	Bottom Side	0mm	Main	56640	3690	SPEED	17.55	18.40	1.216	62.9	1.006	-0.08	0.956	1.169
	LTE Band 48	20M	QPSK	50	0	Bottom Side	0mm	Main	55340	3560	SPEED	17.37	18.40	1.268	62.9	1.006	0.10	0.607	0.774
	LTE Band 48	20M	QPSK	50	0	Bottom Side	0mm	Main	55830	3609	SPEED	17.38	18.40	1.265	62.9	1.006	0.07	0.807	1.027
	LTE Band 48	20M	QPSK	50	0	Bottom Side	0mm	Main	55990	3625	SPEED	17.31	18.40	1.285	62.9	1.006	0.09	0.862	1.114
14	LTE Band 48	20M	QPSK	50	0	Bottom Side	0mm	Main	56150	3641	SPEED	17.23	18.40	1.309	62.9	1.006	0.02	0.901	1.186
	LTE Band 48	20M	QPSK	100	0	Bottom Side	0mm	Main	56640	3690	SPEED	17.51	18.40	1.227	62.9	1.006	-0.01	0.940	1.160
	LTE Band 48	20M	QPSK	50	0	Bottom Side	0mm	Main	56150	3641	AWAN	17.23	18.40	1.309	62.9	1.006	0.02	0.887	1.168
	LTE Band 48	20M	QPSK	50	0	Bottom Side	0mm	Main	55340	3560	AWAN	17.37	18.40	1.268	62.9	1.006	-0.04	0.639	0.815
	LTE Band 48	20M	QPSK	50	0	Bottom Side	0mm	Main	55830	3609	AWAN	17.38	18.40	1.265	62.9	1.006	0.18	0.799	1.017
	LTE Band 48	20M	QPSK	50	0	Bottom Side	0mm	Main	55990	3625	AWAN	17.31	18.40	1.285	62.9	1.006	-0.19	0.854	1.104
	LTE Band 48	20M	QPSK	50	0	Bottom Side	0mm	Main	56640	3690	AWAN	17.55	18.40	1.216	62.9	1.006	0.08	0.948	1.160
	LTE Band 48	20M	QPSK	50	0	Bottom Side	0mm	Main	56150	3641	ATC	17.23	18.40	1.309	62.9	1.006	0.00	0.648	0.853
	LTE Band 48	20M	QPSK	50	0	Bottom Side	0mm	Main	55340	3560	ATC	17.37	18.40	1.268	62.9	1.006	0.02	0.451	0.575
	LTE Band 48	20M	QPSK	50	0	Bottom Side	0mm	Main	55830	3609	ATC	17.38	18.40	1.265	62.9	1.006	-0.05	0.564	0.718
	LTE Band 48	20M	QPSK	50	0	Bottom Side	0mm	Main	55990	3625	ATC	17.31	18.40	1.285	62.9	1.006	-0.09	0.610	0.789
	LTE Band 48	20M	QPSK	50	0	Bottom Side	0mm	Main	56640	3690	ATC	17.55	18.40	1.216	62.9	1.006	-0.01	0.680	0.832

12.2 Repeated SAR Measurement

【Repeat SAR 1g - FCC】

No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Sample	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)	Ratio
1st	LTE Band 66	20M_QPSK_50_0	Bottom Side	0.0	Main	DSI 1	132572	1770	AWAN	17.43	18.60	1.309			0.18	0.901	1.179	-
2nd	LTE Band 66	20M_QPSK_50_0	Bottom Side	0.0	Main	DSI 1	132572	1770	AWAN	17.43	18.60	1.309			0.11	0.888	1.162	1.01
1st	LTE Band 25	20M_QPSK_50_0	Bottom Side	0.0	Main	DSI 1	26140	1860	AWAN	17.28	17.70	1.102			0.05	1.080	1.190	-
2nd	LTE Band 25	20M_QPSK_50_0	Bottom Side	0.0	Main	DSI 1	26140	1860	AWAN	17.28	17.70	1.102			0.08	1.050	1.157	1.03
1st	LTE Band 30	10M_QPSK_1_0	Bottom Side	0.0	Main	DSI 1	27710	2310	AWAN	17.54	18.30	1.191			-0.08	0.890	1.060	-
2nd	LTE Band 30	10M_QPSK_1_0	Bottom Side	0.0	Main	DSI 1	27710	2310	AWAN	17.54	18.30	1.191			0.01	0.878	1.046	1.01
1st	LTE Band 41	20M_QPSK_50_0	Bottom Side	0.0	Main	DSI 1	41490	2680	AWAN	19.27	19.30	1.007	62.9	1.006	0.00	0.823	0.834	-
2nd	LTE Band 41	20M_QPSK_50_0	Bottom Side	0.0	Main	DSI 1	41490	2680	AWAN	19.27	19.30	1.007	62.9	1.006	0.07	0.806	0.817	1.02
1st	LTE Band 48	20M_QPSK_50_0	Bottom Side	0.0	Main	DSI 1	56640	3690	SPEED	17.55	18.40	1.216	62.9	1.006	-0.08	0.956	1.169	-
2nd	LTE Band 48	20M_QPSK_50_0	Bottom Side	0.0	Main	DSI 1	56640	3690	SPEED	17.55	18.40	1.216	62.9	1.006	-0.18	0.932	1.140	1.03

General Note:

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

13. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Body
1.	WWAN + WLAN Main Ant + WLAN/BT Aux Ant	Yes

General Note:

- The WiFi/BT SAR of 1.59 W/kg was used conservatively for the purpose of simultaneous transmission analysis. For the WLAN main and WLAN Aux Sim-Tx analysis include in WLAN SAR report. In this report only, assessment WWAN to each WLAN/BT antenna.
- The Scaled SAR summation is calculated based on the same configuration and test position.
- Per KDB 447498 D01v06, simultaneous transmission SAR is compliant if,
 - Scalar SAR summation < 1.6W/kg.
 - $SPLSR = (SAR_1 + SAR_2)^{1.5} / (\text{min. separation distance, mm})$, and the peak separation distance is determined from the square root of $[(x_1-x_2)^2 + (y_1-y_2)^2 + (z_1-z_2)^2]$, where (x_1, y_1, z_1) and (x_2, y_2, z_2) are the coordinates of the extrapolated peak SAR locations in the zoom scan.
 - If $SPLSR \leq 0.04$, simultaneously transmission SAR measurement is not necessary.
 - Simultaneously transmission SAR measurement, and the reported multi-band SAR < 1.6W/kg.
 - The SPLSR calculated results please refer to section 13.2.

13.1 Body Exposure Conditions

Exposure Position	1	2	3	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)	SPLSR	Case No
	WWAN Main 1g SAR (W/kg)	WLAN Main 1g SAR (W/kg)	WLAN/BT Aux 1g SAR (W/kg)				
Bottom Side at 0mm	1.194	1.590	1.590	2.784	2.784	0.020	Case 1

13.2 SPLSR Evaluation and Analysis

General Note:

- $SPLSR = (SAR_1 + SAR_2)^{1.5} / (\text{min. separation distance, mm})$. If $SPLSR \leq 0.04$, simultaneously transmission SAR measurement is not necessary
- The detail hotspot point for each transmitter in each exposure condition are showing as below figure and the minimum 3D distance for each sum combination is used for SPLSR analysis.

Case 1	Band	Position	SAR (W/kg)	Gap (mm)	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 1	WWAN Main	Bottom Side	1.194	0mm	225.0	2.78	0.02	Not required
	WLAN Main		1.59	0mm				
	WWAN Main	Bottom Side	1.194	0mm	215.0	2.78	0.02	Not required
	WLAN/BT Aux		1.59	0mm				

Test Engineer : Harry Hsu

14. 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.

15. 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 616217 D04 v01r02, "SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers", Oct 2015
- [9] FCC KDB 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.
- [10] FCC KDB 865664 D02 v01r02, "RF Exposure Compliance Reporting and Documentation Considerations" Oct 2015.