FCC SAR TEST REPORT

FCC ID	:	**QYLEM9190F**
Equipment	:	**WWAN Module**
Brand Name	:	**Getac**
Model Name	:	**EM9190**
Applicant	:	**Getac Technology Corporation. 5F., Building A, No. 209, Sec.1, Nangang Rd.,Nangang Dist., Taipei City 11568, Taiwan, R.O.C.**
Standard	:	**FCC 47 CFR Part 2 (2.1093)**

The product was installed into Tablet PC (Brand Name: Getac, Model Name: F110, F110G6, F110-Ex, F110-631) during test.

The product was received on Sep. 08, 2021 and testing was started from Sep. 09, 2021 and completed on Oct. 20, 2021. 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. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Cona Huang

Approved by: Cona Huang / Deputy Manager

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History of this test report

Report No.	Version	Description	Issued Date
FA182625B	01	Initial issue of report	Oct. 25, 2021

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for Getac Technology Corporation., WWAN Module, EM9190, are as follows.

Equipment Class	Frequency Band		Highest SAR Summary Body (Separation 0mm) 1g SAR (W/kg)	Highest Simultaneous Transmission 1g SAR (W/kg)
Licensed	WCDMA	WCDMA II	1.12	1.35
		WCDMA IV	1.19	
		WCDMA V	0.68	
	LTE	LTE Band 7	0.93	
		LTE Band 12 / 17	0.31	
		LTE Band 13	0.44	
		LTE Band 14	0.48	
		LTE Band 2 / 25	1.18	
		LTE Band 5 / 26	0.65	
		LTE Band 38 / 41	0.93	
		LTE Band 48	1.17	
		LTE Band 4 / 66	1.17	
		LTE Band 71	0.32	
		FR1 n2	1.05	
		FR1 n5	0.69	
		FR1 n66	1.05	
		FR1 n71	0.32	
Date of Testing:			2021/9/9 ~ 2021/10/20	

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 3786) 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) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013 and FCC KDB publications.

Reviewed by: Jason Wang
Report Producer: Paula Chen

2. Guidance Applied

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

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2013
- FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
- FCC KDB 865664 D02 SAR Reporting v01r02
- FCC KDB 447498 D01 General RF Exposure Guidance v06
- FCC KDB 616217 D04 SAR for laptop and tablets v01r02
- FCC KDB 941225 D01 3G SAR Procedures v03r01
- FCC KDB 941225 D05 SAR for LTE Devices v02r05
- FCC KDB 941225 D05A Rel.10 LTE SAR Test Guidance v01r02

3. Equipment Under Test (EUT) Information

3.1 General Information

Product Feature & Specification	
Equipment Name	WWAN Module
Brand Name	Getac
Model Name	EM9190
FCC ID	QYLEM9190F
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 (Rx only) LTE Band 38: 2570 MHz ~ 2620 MHz LTE Band 41: 2496 MHz ~ 2690 MHz LTE Band 48: 3550 MHz ~ 3700 MHz LTE Band 66: 1710 MHz ~ 1780 MHz LTE Band 71: 663 MHz ~ 698 MHz 5G NR n2 : 1850 MHz ~ 1910 MHz 5G NR n5 : 824 MHz ~ 849 MHz 5G NR n66 : 1710 MHz ~ 1780 MHz 5G NR n71 : 663 MHz ~ 698 MHz
Mode	RMC 12.2Kbps HSDPA HSUPA DC-HSDPA LTE: QPSK, 16QAM, 64QAM 5G NR: DFT-s-OFDM/CP-OFDM, Pi/2 BPSK/QPSK/16QAM/64QAM/256QAM
Remark: 1. This device has two kinds of SKU; the detail comparison as following table, RF exposure evaluation is selected SKU B for main test.	

Host Information	
Equipment Name	Tablet PC
Brand Name	Getac
Model Name	F110, F110G6, F110-Ex, F110-631
EUT Stage	Production Unit
Integrated WLAN Module	Brand Name: Intel Model Name: AX201NGW
Wireless Technology and Frequency Range	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 Bluetooth: 2400 MHz ~ 2483.5 MHz
Mode	WLAN: 802.11a/b/g/n/ac/ax HT20/HT40/VHT20/VHT40/VHT80/VHT160/HE20/HE40/HE80/HE160 Bluetooth BR/EDR/LE
Remark: 1. The Intel AX201NGW WLAN/Bluetooth module is also integrated into this host, WLAN/Bluetooth power and WLAN SAR testing data, which can be referred to Sporton SAR Test Report, Report No.: FA111325(FCC ID: QYLAX201NG) and these results are used simultaneous transmission analysis.	

Sample List		
SKU	SKU A	SKU B
CPU	i5-1135G7 (Non Vpro)	i7-1165G7 (Vpro)
DDR	Kingston DDR4-3200 32GB	Kingston DDR4-3200 32GB
SSD	512GB	1TB
PANEL	Full HD AUO	Full HD AUO
DIGITIZER	N/A	EMRright Digitizer
OPTION BAY	2D Barcode Reader	RS232 + LAN
Expansion Bay	Smart Card	Smart Card
Right side option	NXP RFID(PN7462)	Finger Print
WLAN/BT	Intel AX201	Intel AX201
WWAN(4G)	EM9190	EM9190
GPS/GNS	EM9190	EM9190
Rear 8M Camera	Support	Support
Webcam FHD	Not Support	Not Support
IR Webcam	Support	Support
USB3.2 Gen2 x 1 Type-A	Support	Support
Type-C (thunder bolt)	Support	Support
Audio/MIC	Support	Support

3.2 General LTE SAR Test and Reporting Considerations

Summarized necessary items addressed in KDB 941225 D05 v02r05	
FCC ID	QYLEM9190F
Equipment Name	WWAN Module
Operating Frequency Range of each LTE transmission band	LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz LTE Band 14: 788 MHz ~ 798 MHz LTE Band 17: 704 MHz ~ 716 MHz LTE Band 25: 1850 MHz ~ 1915 MHz LTE Band 26: 814 MHz ~ 849 MHz LTE Band 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 38: 5MHz, 10MHz, 15MHz, 20MHz LTE Band 41: 5MHz, 10MHz, 15MHz, 20MHz LTE Band 48: 5MHz, 10MHz, 15MHz, 20MHz LTE Band 66:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 71: 5MHz, 10MHz, 15MHz, 20MHz
uplink modulations used	QPSK / 16QAM / 64QAM
LTE Voice / Data requirements	Data only
LTE MPR permanently built-in by design	**Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3**
LTE A-MPR	In the base station simulator configuration, Network Setting value is set to NS_01 to disable A-MPR during SAR testing and the LTE SAR tests was transmitting on all TTI frames (Maximum TTI)
Spectrum plots for RB configuration	A properly configured base station simulator was used for the SAR and power measurement; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.
LTE Carrier Aggregation Combinations	Inter-Band and Intra-Band possible combinations and the detail power measurement please referred to section 12.
LTE Carrier Aggregation Additional Information	This device supports maximum of 5 carriers in the downlink and 4 carriers in the uplink. Additional following LTE Release features are not supported: Relay, HetNet, Enhanced MIMO, eICI, WiFi Offloading, MDH, eMBMA, Cross-Carrier Scheduling, Enhanced SC-FDMA.

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

Transmission (H, M, L) channel numbers and frequencies in each LTE band												
LTE Band 2												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	18607	1850.7	18615	1851.5	18625	1852.5	18650	1855	18675	1857.5	18700	1860
M	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880
H	19193	1909.3	19185	1908.5	19175	1907.5	19150	1905	19125	1902.5	19100	1900
LTE Band 4												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	19957	1710.7	19965	1711.5	19975	1712.5	20000	1715	20025	1717.5	20050	1720
M	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5
H	20393	1754.3	20385	1753.5	20375	1752.5	20350	1750	20325	1747.5	20300	1745
LTE Band 5												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)				
L	20407	824.7	20415	825.5	20425	826.5	20450	829				
M	20525	836.5	20525	836.5	20525	836.5	20525	836.5				
H	20643	848.3	20635	847.5	20625	846.5	20600	844				
LTE Band 7												
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)				
L	20775	2502.5	20800	2505	20825	2507.5	20850	2510				
M	21100	2535	21100	2535	21100	2535	21100	2535				
H	21425	2567.5	21400	2565	21375	2562.5	21350	2560				
LTE Band 12												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)				
L	23017	699.7	23025	700.5	23035	701.5	23060	704				
M	23095	707.5	23095	707.5	23095	707.5	23095	707.5				
H	23173	715.3	23165	714.5	23155	713.5	23130	711				
LTE Band 13												
	Bandwidth 5 MHz				Bandwidth 10 MHz							
	Channel #		Freq.(MHz)		Channel #		Freq.(MHz)					
L	23205		779.5		23230		782					
M	23230		782									
H	23255		784.5									
LTE Band 14												
	Bandwidth 5 MHz				Bandwidth 10 MHz							
	Channel #		Channel #		Channel #		Freq.(MHz)					
L	23305		790.5		23330		793					
M	23330		793									
H	23355		795.5									
LTE Band 17												
	Bandwidth 5 MHz				Bandwidth 10 MHz							
	Channel #		Freq.(MHz)		Channel #		Freq. (MHz)					
L	23755		706.5		23780		709					
M	23790		710		23790		710					
H	23825		713.5		23800		711					
LTE Band 25												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	26047	1850.7	26055	1851.5	26065	1852.5	26090	1855	26115	1857.5	26140	1860
M	26340	1880	26340	1880	26340	1880	26340	1880	26340	1880	26340	1880
H	26683	1914.3	26675	1913.5	26665	1912.5	26640	1910	26615	1907.5	26590	1905

LTE Band 26										
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	26697	814.7	26705	815.5	26715	816.5	26740	819	26765	821.5
M	26865	831.5	26865	831.5	26865	831.5	26865	831.5	26865	831.5
H	27033	848.3	27025	847.5	27015	846.5	26990	844	26965	841.5

LTE Band 38								
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	37775	2572.5	37800	2575	37825	2577.5	37850	2580
M	38000	2595	38000	2595	38000	2595	38000	2595
H	38225	2617.5	38200	2615	38175	2612.5	38150	2610

LTE Band 41								
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	39675	2498.5	39700	2501	39725	2503.5	39750	2506
L M	40148	2545.8	40160	2547	40173	2548.3	40185	2549.5
M	40620	2593	40620	2593	40620	2593	40620	2593
H M	41093	2640.3	41080	2639	41068	2637.8	41055	2636.5
H	41565	2687.5	41540	2685	41515	2682.5	41490	2680

LTE Band 48								
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	55265	3552.5	55290	3555	55315	3557.5	55340	3560
L M	55810	3607	55815	3607.5	55820	3608	55830	3609
M H	56170	3643	56165	3642.5	56160	3642	56150	3641
H	56715	3697.5	56690	3695	56665	3692.5	56640	3690

LTE Band 66												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	131979	1710.7	131987	1711.5	131997	1712.5	132022	1715	132047	1717.5	132072	1720
M	132322	1745	132322	1745	132322	1745	132322	1745	132322	1745	132322	1745
H	132665	1779.3	132657	1778.5	132647	1777.5	132622	1775	132597	1772.5	132572	1770

LTE Band 71								
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	133147	665.5	133172	668	133197	670.5	133222	673
M	133297	680.5	133297	680.5	133297	680.5	133297	680.5
H	133447	695.5	133422	693	133397	690.5	133372	688

3.3 General 5G NR SAR Test and Reporting Considerations

5G NR Information	
FCC ID	QYLEM9190F
Equipment Name	WWAN Module
Operating Frequency Range of each 5G NR transmission band	5G NR n2: 1850 MHz ~ 1910 MHz 5G NR n5: 824 MHz ~ 849 MHz 5G NR n66: 1710 MHz ~ 1780 MHz 5G NR n71: 663 MHz ~ 698 MHz
Channel Bandwidth	5G NR n2: 5MHz, 10MHz, 15MHz, 20MHz 5G NR n5: 5MHz, 10MHz, 15MHz, 20MHz 5G NR n66: 5MHz, 10MHz, 15MHz, 20MHz, 30MHz, 40MHz 5G NR n71: 5MHz, 10MHz, 15MHz, 20MHz
SCS	FDD: SCS15KHz, TDD: SCS30KHz
uplink modulations used	DFT-s-OFDM: PI/2 BPSK / QPSK / 16QAM / 64QAM / 256QAM CP-OFDM QPSK / 16QAM / 64QAM / 256QAM
A-MPR (Additional MPR) disabled for SAR Testing?	Yes
LTE Anchor Bands for n2	LTE B5/12
LTE Anchor Bands for n5	LTE B2/7/66
LTE Anchor Bands for n66	LTE B5/12/13
LTE Anchor Bands for n71	LTE B2/7/66

NR Band 2

	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	370500	1852.5	371000	1855	371500	1857.5	372000	1860
M	376000	1880	376000	1880	376000	1880	376000	1880
H	381500	1907.5	381000	1905	380500	1902.5	380000	1900

NR Band 5

	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	165300	826.5	165800	829	166300	831.5	166800	834
M	167300	836.5	167300	836.5	167300	836.5	167300	836.5
H	169300	846.5	168800	844	168300	841.5	167800	839

NR Band 66

	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz		Bandwidth 30MHz		Bandwidth 40MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	342500	1712.5	343000	1715	343500	1717.5	344000	1720	345000	1725	346000	1730
M	349000	1745	349000	1745	349000	1745	349000	1745	349000	1745	349000	1745
H	355500	1777.5	355000	1775	354500	1772.5	354000	1770	353000	1765	352000	1760

NR Band 71

	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	133100	665.5	133600	668	13410	670.5	134600	673
M	136100	680.5	136100	680.5	136100	680.5	136100	680.5
H	139100	695.5	138600	693	13810	690.5	137600	688

4. Smart Transmit feature for RF Exposure compliance

The FCC RF exposure limit is defined based on time-averaged RF exposure. The product implements Qualcomm Smart Transmit feature which controls the instantaneous transmitting power for WWAN transmitter to ensure the product in compliance with FCC RF exposure limit over a defined time window, for SAR (transmit frequency ≤ 6GHz). To control and manage transmitting power in real time and to ensure at all times the time-averaged RF exposure is compliant to the regulation requirement.

This report describes the procedures for the SAR char generation, and the parameters obtained from SAR characterization (referred to as SAR char, respectively) will be used as input for Smart Transmit. SAR char will be entered via the Embedded File System (EFS) to enable the Smart Transmit Feature.

<Terminologies in this report>

P_{limit}	The time-averaged RF power which corresponds to SAR_design_targer.
P_{max}	Maximum target power level
SAR_design_target:	The design target for SAR compliance. It should be less than regulatory power density limit to account for all device design related uncertainties.
SAR char	P_{limit} for all the technologies/bands for all applicable DSI

<SAR Characterization>

SAR char must be generated to cover all radio configurations and usage scenarios that the wireless device supports for operating at 6 GHz or below. It will then be used as input for Smart Transmit to control and manage RF exposure for f < 6 GHz.

<SAR design target and uncertainty>

Exposure conditions	SAR design target	W/kg
Bottom of Laptop	1g SAR design target	0.95

Item	Uncertainty dB (k=2)
Total uncertainty	1.0

To account for total uncertainty, SAR_design_target should be determined as:

$$SAR\_design\_target < SAR_{regulatory\_limit} \times 10^{\frac{-total\ uncertainty}{10}}$$

The Smart Transmit algorithm maintains the time-averaged transmit power, in turn, time-averaged RF exposure of SAR_design_target, below the predefined time-averaged power limit, for each characterized technology and band.

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

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

Band	Antenna	Duty cycle	P limit (dBm) time-average power	P Max* (dBm) time-average power
WCDMA B2	Main	100.00%	20.90	23.50
WCDMA B4	Main	100.00%	19.00	23.50
WCDMA B5	Main	100.00%	25.90	23.50
LTE B7	Main	100.00%	20.30	23.00
LTE B12/17	Main	100.00%	28.80	23.00
LTE B13	Main	100.00%	27.30	23.00
LTE B14	Main	100.00%	26.90	23.00
LTE B25/2	Main	100.00%	21.10	23.00
LTE B26/5	Main	100.00%	25.60	23.00
LTE B40	Main	63.30%	22.90	21.00
LTE B41/B38 PC3	Main	63.30%	18.90	20.80
LTE B41 PC2	Main	43.30%		20.70
LTE B48	Main	63.30%	21.10	21.00
LTE B66/4	Main	100.00%	19.50	23.00
LTE B71	Main	100.00%	28.60	23.00
FR1 n2	Main	100.00%	20.40	22.50
FR1 n5	Main	100.00%	24.80	22.50
FR1 n66	Main	100.00%	19.00	22.50
FR1 n71	Main	100.00%	28.10	22.50

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

6. Specific Absorption Rate (SAR)

6.1 Introduction

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

6.2 SAR Definition

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

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

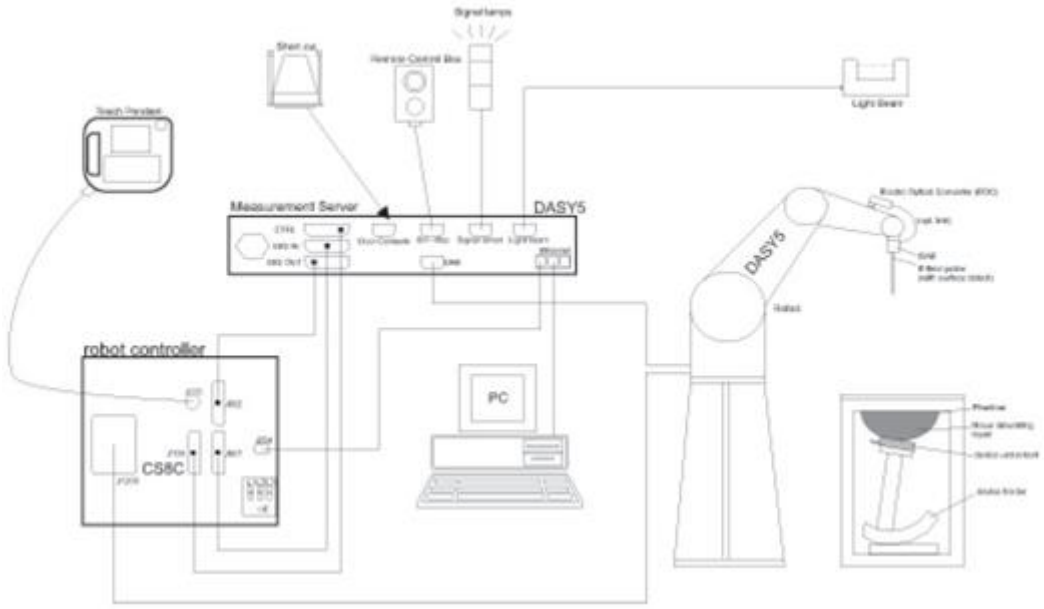
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

7. System Description and Setup

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



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

7.1 Test Site Location

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

Test Site	EMC & Wireless Communications Laboratory		Wensan Laboratory		
Test Site Location	TW1190 No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan		TW3786 No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan		
Test Site No.	SAR01-HY	SAR03-HY	SAR08-HY	SAR09-HY	SAR15-HY
	SAR04-HY	SAR05-HY	SAR11-HY	SAR12-HY	
	SAR06-HY	SAR10-HY	SAR13-HY	SAR14-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	10 MHz – 4 GHz; Linearity: ±0.2 dB (30 MHz – 4 GHz)	
Directivity	±0.2 dB in TSL (rotation around probe axis) ±0.3 dB in TSL (rotation normal to probe axis)	
Dynamic Range	5 µW/g – >100 mW/g; Linearity: ±0.2 dB	
Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: 3.9 mm (body: 12 mm) Distance from probe tip to dipole centers: 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	10 MHz – >6 GHz Linearity: ±0.2 dB (30 MHz – 6 GHz)	
Directivity	±0.3 dB in TSL (rotation around probe axis) ±0.5 dB in TSL (rotation normal to probe axis)	
Dynamic Range	10 µW/g – >100 mW/g Linearity: ±0.2 dB (noise: typically <1 µW/g)	
Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: 2.5 mm (body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	

7.3 Data Acquisition Electronics (DAE)

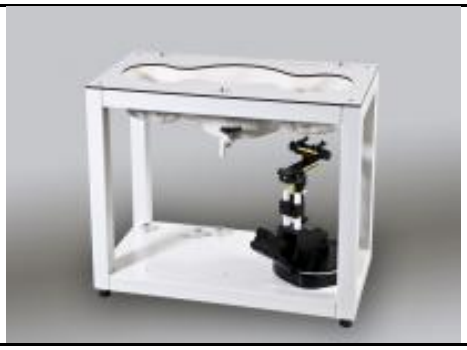
The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an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

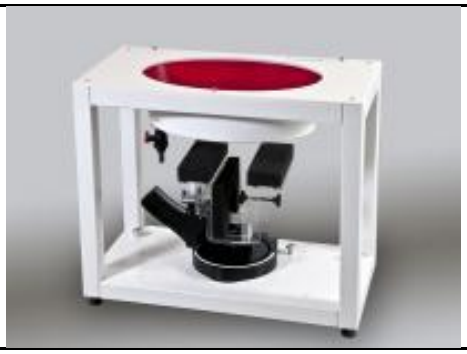
7.4 Phantom

<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:

<Conducted power measurement>

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

<SAR measurement>

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

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

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

8.1 Spatial Peak SAR Evaluation

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

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

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

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

8.2 Power Reference Measurement

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

8.3 Area Scan

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

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

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

8.4 Zoom Scan

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

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

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

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

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

8.5 Volume Scan Procedures

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

8.6 Power Drift Monitoring

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

9. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	750MHz System Validation Kit(2)	D750V3	1107	Mar. 08, 2019	Mar. 05, 2022
SPEAG	835MHz System Validation Kit(2)	D835V2	4d167	Nov. 25, 2019	Nov. 23, 2021
SPEAG	1750MHz System Validation Kit(2)	D1750V2	1112	Mar. 07, 2019	Mar. 04, 2022
SPEAG	1900MHz System Validation Kit(2)	D1900V2	5d041	Aug. 19, 2021	Aug. 16, 2024
SPEAG	2600MHz System Validation Kit(2)	D2600V2	1078	Mar. 06, 2019	Mar. 03, 2022
SPEAG	3500MHz System Validation Kit(2)	D3500V2	1014	Jan. 29, 2019	Jan. 26, 2022
SPEAG	3700MHz System Validation Kit(2)	D3700V2	1006	Mar. 05, 2019	Mar. 02, 2022
SPEAG	Data Acquisition Electronics	DAE4	656	Jan. 22, 2021	Jan. 21, 2022
SPEAG	Data Acquisition Electronics	DAE4	1399	Feb. 16, 2021	Feb. 15, 2022
SPEAG	Data Acquisition Electronics	DAE4	1512	Feb. 11, 2021	Feb. 10, 2022
SPEAG	Data Acquisition Electronics	DAE4	1647	Jan. 07, 2021	Jan. 06, 2022
SPEAG	Dosimetric E-Field Probe	EX3DV4	3728	Feb. 23, 2021	Feb. 22, 2022
SPEAG	Dosimetric E-Field Probe	EX3DV4	3931	Oct. 22, 2020	Oct. 21, 2021
SPEAG	Dosimetric E-Field Probe	EX3DV4	3898	Jun. 24, 2021	Jun. 23, 2022
SPEAG	Dosimetric E-Field Probe	EX3DV4	3578	Jun. 23, 2021	Jun. 22, 2022
Testo	Hygro meter	608-H1	45196600	Nov. 10, 2020	Nov. 09, 2021
Testo	Hygro meter	608-H1	45207528	Nov. 10, 2020	Nov. 09, 2021
RCPTWN	Thermometer	HTC-1	TM685-1	Nov. 10, 2020	Nov. 09, 2021
Anritsu	Radio Communication Analyzer	MT8821C	6201341950	Nov. 10, 2020	Nov. 09, 2021
Keysight	Wireless Communication Test Set	E5515C	MY50266977	May. 12, 2021	May. 11, 2022
SPEAG	Device Holder	N/A	N/A	N/A	N/A
Anritsu	Signal Generator	MG3710A	6201502524	Nov. 11, 2020	Nov. 10, 2021
Keysight	ENA Network Analyzer	E5071C	MY46316648	Jul. 22, 2021	Jul. 21, 2022
SPEAG	Dielectric Probe Kit	DAK-3.5	1146	Jul. 14, 2021	Jul. 13, 2022
LINE SEIKI	Digital Thermometer	DTM3000-spezial	2942	Nov. 06, 2020	Nov. 05, 2021
Anritsu	Power Meter	ML2495A	1419002	Aug. 18, 2021	Aug. 17, 2022
Anritsu	Power Sensor	MA2411B	1911176	Aug. 18, 2021	Aug. 17, 2022
Anritsu	Power Meter	ML2495A	1804003	Oct. 21, 2020	Oct. 20, 2021
Anritsu	Power Sensor	MA2411B	1726150	Oct. 21, 2020	Oct. 20, 2021
Anritsu	Spectrum Analyzer	MS2830A	6201396378	Jul. 16, 2021	Jul. 15, 2022
Anritsu	Spectrum Analyzer	N9010A	MY53470118	Jan. 15, 2021	Jan. 14, 2022
Mini-Circuits	Power Amplifier	ZVE-8G+	6418	Oct. 21, 2020	Oct. 20, 2021
Mini-Circuits	Power Amplifier	ZHL-42W+	715701915	May. 11, 2021	May. 10, 2022
ATM	Dual Directional Coupler	C122H-10	P610410z-02	Note 1	
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℃ to 25℃, 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℃ to 25℃ and within ± 2℃ of the temperature when the tissue parameters are characterized. The tissue dielectric measurement system must be calibrated before use. The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements.
The liquid tissue depth was at least 15cm in the phantom for all SAR testing

<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
750	22.5	0.899	41.741	0.89	41.90	1.01	-0.38	±5	2021/9/10
835	22.3	0.895	41.945	0.90	41.50	-0.56	1.07	±5	2021/9/9
1750	22.3	1.370	40.741	1.37	40.10	0.00	1.60	±5	2021/10/5
1900	22.3	1.447	39.193	1.40	40.00	3.36	-2.02	±5	2021/10/5
2600	22.7	2.014	38.594	1.96	39.00	2.76	-1.04	±5	2021/10/6
3500	22.5	2.874	36.898	2.91	37.90	-1.24	-2.64	±5	2021/9/10
3500	22.5	2.914	37.108	2.91	37.90	0.14	-2.09	±5	2021/9/14
3500	22.3	2.976	37.586	2.91	37.90	2.27	-0.83	±5	2021/10/20
3700	22.5	3.070	36.579	3.12	37.70	-1.60	-2.97	±5	2021/9/10
3700	22.7	3.109	37.397	3.12	37.70	-0.35	-0.80	±5	2021/10/8

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 (%)
SAR14	2021/9/10	750	50	D750V3-1107	EX3DV4 - SN3578	DAE4 Sn1512	0.389	8.32	7.78	-6.49
SAR14	2021/9/9	835	50	D835V2-4d167	EX3DV4 - SN3578	DAE4 Sn1512	0.467	9.55	9.34	-2.20
SAR12	2021/10/5	1750	50	D1750V2-1112	EX3DV4 - SN3931	DAE4 Sn1647	1.710	36.70	34.2	-6.81
SAR12	2021/10/5	1900	50	D1900V2-5d041	EX3DV4 - SN3931	DAE4 Sn1647	1.980	40.20	39.6	-1.49
SAR12	2021/10/6	2600	50	D2600V2-1078	EX3DV4 - SN3931	DAE4 Sn1647	2.860	57.60	57.2	-0.69
SAR14	2021/9/10	3500	50	D3500V2-1014	EX3DV4 - SN3578	DAE4 Sn1512	3.140	67.90	62.8	-7.51
SAR14	2021/9/14	3500	50	D3500V2-1014	EX3DV4 - SN3578	DAE4 Sn656	3.170	67.90	63.4	-6.63
SAR09	2021/10/20	3500	50	D3500V2-1014	EX3DV4 - SN3728	DAE4 Sn1399	3.22	67.90	64.4	-5.15
SAR14	2021/9/10	3700	50	D3700V2-1006	EX3DV4 - SN3578	DAE4 Sn1512	3.210	67.30	64.2	-4.61
SAR11	2021/10/8	3700	50	D3700V2-1006	EX3DV4 - SN3898	DAE4 Sn1647	3.340	67.30	66.8	-0.74

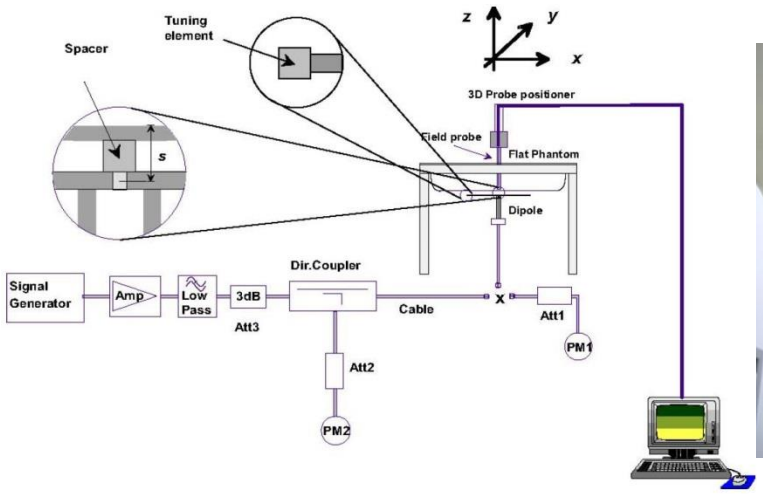


Fig 8.3.1 System Performance Check Setup

Fig 8.3.2 Setup Photo

11. UMTS/CDMA/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 DC-HSDPA, the device was configured according to the H-Set 12, Fixed Reference Channel (FRC) configuration in Table C.8.1.12 of 3GPP TS 34.121-1, with the primary and the secondary serving HS-DSCH Cell enabled during the power measurement.

A summary of these settings are illustrated below:

HSDPA Setup Configuration:

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

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

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

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

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

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

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

Setup Configuration

HSUPA Setup Configuration:

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

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

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (Note 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	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed}1: 47/15 β_{ed}2: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15	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 Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c. For sub-test 5, Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 5/15 with β_{hs} = 5/15 * β_c.

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

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

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

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

C.8.1.12 Fixed Reference Channel Definition H-Set 12

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

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

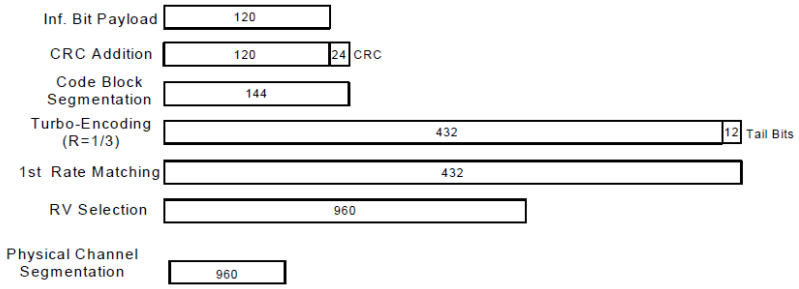


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

Setup Configuration

<WCDMA Conducted Power>

General Note:

1. Per KDB 941225 D01v03r01, 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 ≤ ¼ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA / DC-HSDPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA, and according to the following RF output power, the output power results of the secondary modes (HSUPA, HSDPA, DC-HSDPA) are less than ¼ dB higher than the primary modes; therefore, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA.

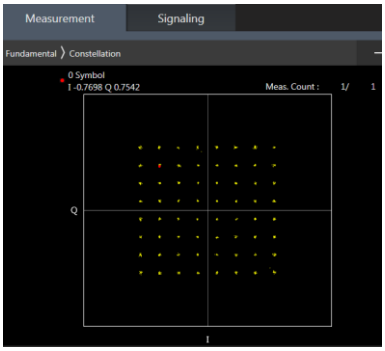
Band		WCDMA II			Tune-up Limit (dBm)	WCDMA IV			Tune-up Limit (dBm)	WCDMA V			Tune-up Limit (dBm)
TX Channel		9262	9400	9538		1312	1413	1513		4132	4182	4233	
Rx Channel		9662	9800	9938		1537	1638	1738		4357	4407	4458	
Frequency (MHz)		1852.4	1880	1907.6		1712.4	1732.6	1752.6		826.4	836.4	846.6	
3GPP Rel 99	RMC 12.2Kbps	20.52	20.64	20.49	21.90	19.70	19.41	19.47	20.40	23.43	23.23	23.00	24.50
3GPP Rel 6	HSDPA Subtest-1	19.55	19.65	19.50	20.90	18.59	18.41	18.48	19.40	22.42	22.23	21.84	23.50
3GPP Rel 6	HSDPA Subtest-2	19.55	19.64	19.50	20.90	18.59	18.41	18.43	19.40	22.42	22.23	22.00	23.50
3GPP Rel 6	HSDPA Subtest-3	19.05	19.14	19.00	20.40	18.03	17.92	17.92	18.90	21.91	21.75	21.50	23.00
3GPP Rel 6	HSDPA Subtest-4	19.05	19.16	19.01	20.40	18.03	17.83	17.91	18.90	21.89	21.73	21.49	23.00
3GPP Rel 8	DC-HSDPA Subtest-1	19.55	19.59	19.41	20.90	18.53	18.31	18.44	19.40	22.40	22.23	21.74	23.50
3GPP Rel 8	DC-HSDPA Subtest-2	19.49	19.63	19.47	20.90	18.50	18.37	18.35	19.40	22.40	22.20	21.92	23.50
3GPP Rel 8	DC-HSDPA Subtest-3	18.95	19.13	18.93	20.40	17.93	17.91	17.90	18.90	21.87	21.65	21.41	23.00
3GPP Rel 8	DC-HSDPA Subtest-4	18.96	19.16	18.99	20.40	17.93	17.81	17.88	18.90	21.79	21.68	21.46	23.00
3GPP Rel 6	HSUPA Subtest-1	19.53	19.65	19.51	20.90	18.45	18.40	18.25	19.40	21.70	21.64	21.51	23.50
3GPP Rel 6	HSUPA Subtest-2	17.52	17.63	17.49	18.90	16.37	16.23	16.26	17.40	20.32	20.13	19.88	21.50
3GPP Rel 6	HSUPA Subtest-3	18.52	18.62	18.52	19.90	17.38	17.19	17.26	18.40	20.80	20.68	20.50	22.50
3GPP Rel 6	HSUPA Subtest-4	17.55	17.66	17.53	18.90	16.39	16.20	16.26	17.40	20.44	20.15	19.89	21.50
3GPP Rel 6	HSUPA Subtest-5	19.50	19.60	19.50	20.90	18.40	18.20	18.30	19.40	22.44	22.23	22.00	23.50

<LTE Conducted Power>

General Note:

1. Anritsu MT8820C base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r05, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
4. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r05, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
6. Per KDB 941225 D05v02r05, 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
7. Per KDB 941225 D05v02r05, Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
8. For LTE B12/B26/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 ≤ the larger band to qualify for the SAR test exclusion
   b. the channel bandwidth and other operating parameters for the smaller band are fully supported by the larger band
10. According to 2017 TCB workshop, for 16QAM, 64QAM should be verified by checking the signal constellation with a call box to avoid incorrect maximum power levels due to MPR and other requirements associated with signal modulation, and the following figure is taken from the "Fundamental Measurement >> Modulation Analysis >> constellation" mode of the device connect to the MT8821C base station, therefore, the device 64QAM and 16QAM signal modulation are correct.

16QAM



64QAM

<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	20.77	20.68	20.83	22.1
20	QPSK	1	49	20.35	20.46	20.35	
20	QPSK	1	99	20.38	20.42	20.36	
20	QPSK	50	0	20.55	20.54	20.63	22.1
20	QPSK	50	24	20.40	20.50	20.53	
20	QPSK	50	50	20.54	20.47	20.53	
20	QPSK	100	0	20.53	20.52	20.56	
20	16QAM	1	0	20.74	20.72	20.79	22.1
20	16QAM	1	49	20.68	20.78	20.69	
20	16QAM	1	99	20.39	20.40	20.45	
20	16QAM	50	0	20.35	20.42	20.38	22.1
20	16QAM	50	24	20.47	20.46	20.48	
20	16QAM	50	50	20.48	20.52	20.45	
20	16QAM	100	0	20.44	20.43	20.45	
20	64QAM	1	0	20.52	20.56	20.58	21.1
20	64QAM	1	49	20.55	20.58	20.52	
20	64QAM	1	99	20.62	20.54	20.50	
20	64QAM	50	0	19.39	19.44	19.38	21
20	64QAM	50	24	19.49	19.47	19.49	
20	64QAM	50	50	19.50	19.55	19.47	
20	64QAM	100	0	19.46	19.45	19.47	
Channel				18675	18900	19125	Tune-up limit (dBm)
Frequency (MHz)				1857.5	1880	1902.5	
15	QPSK	1	0	20.77	20.75	20.58	22.1
15	QPSK	1	37	20.31	20.36	20.26	
15	QPSK	1	74	20.34	20.32	20.29	
15	QPSK	36	0	20.37	20.46	20.46	22.1
15	QPSK	36	20	20.48	20.52	20.44	
15	QPSK	36	39	20.49	20.58	20.51	
15	QPSK	75	0	20.51	20.48	20.47	
15	16QAM	1	0	20.71	20.70	20.70	22.1
15	16QAM	1	37	20.60	20.78	20.66	
15	16QAM	1	74	20.30	20.38	20.39	
15	16QAM	36	0	20.28	20.41	20.34	22.1
15	16QAM	36	20	20.39	20.43	20.44	
15	16QAM	36	39	20.45	20.44	20.38	
15	16QAM	75	0	20.39	20.39	20.35	
15	64QAM	1	0	20.42	20.46	20.51	21.1
15	64QAM	1	37	20.48	20.52	20.42	
15	64QAM	1	74	20.60	20.54	20.44	
15	64QAM	36	0	19.38	19.36	19.35	21
15	64QAM	36	20	19.43	19.37	19.47	
15	64QAM	36	39	19.44	19.47	19.38	
15	64QAM	75	0	19.46	19.37	19.42	
Channel				18650	18900	19150	Tune-up limit (dBm)
Frequency (MHz)				1855	1880	1905	
10	QPSK	1	0	20.67	20.81	20.65	22.1
10	QPSK	1	25	20.34	20.37	20.30	
10	QPSK	1	49	20.38	20.39	20.28	
10	QPSK	25	0	20.41	20.49	20.46	22.1
10	QPSK	25	12	20.46	20.45	20.51	
10	QPSK	25	25	20.51	20.62	20.53	
10	QPSK	50	0	20.45	20.49	20.51	
10	16QAM	1	0	20.73	20.70	20.72	22.1
10	16QAM	1	25	20.61	20.77	20.65	
10	16QAM	1	49	20.29	20.36	20.35	
10	16QAM	25	0	20.35	20.36	20.37	22.1

10	16QAM	25	12	20.43	20.43	20.40	
10	16QAM	25	25	20.41	20.48	20.43	
10	16QAM	50	0	20.36	20.43	20.36	
10	64QAM	1	0	20.48	20.48	20.49	
10	64QAM	1	25	20.52	20.55	20.43	21.1
10	64QAM	1	49	20.53	20.44	20.50	
10	64QAM	25	0	19.32	19.43	19.33	
10	64QAM	25	12	19.46	19.46	19.39	21
10	64QAM	25	25	19.47	19.45	19.38	
10	64QAM	50	0	19.46	19.44	19.44	
Channel				18625	18900	19175	Tune-up limit (dBm)
Frequency (MHz)				1852.5	1880	1907.5	
5	QPSK	1	0	20.68	20.75	20.62	
5	QPSK	1	12	20.31	20.43	20.30	22.1
5	QPSK	1	24	20.32	20.33	20.28	
5	QPSK	12	0	20.43	20.41	20.43	
5	QPSK	12	7	20.47	20.50	20.49	22.1
5	QPSK	12	13	20.54	20.53	20.47	
5	QPSK	25	0	20.46	20.43	20.54	
5	16QAM	1	0	20.68	20.68	20.69	
5	16QAM	1	12	20.63	20.70	20.68	22.1
5	16QAM	1	24	20.35	20.37	20.39	
5	16QAM	12	0	20.32	20.42	20.35	
5	16QAM	12	7	20.39	20.38	20.46	22.1
5	16QAM	12	13	20.38	20.49	20.44	
5	16QAM	25	0	20.42	20.33	20.45	
5	64QAM	1	0	20.51	20.51	20.48	
5	64QAM	1	12	20.55	20.50	20.49	21.1
5	64QAM	1	24	20.53	20.53	20.50	
5	64QAM	12	0	19.38	19.39	19.35	
5	64QAM	12	7	19.47	19.37	19.46	21
5	64QAM	12	13	19.49	19.51	19.42	
5	64QAM	25	0	19.39	19.43	19.40	
Channel				18615	18900	19185	Tune-up limit (dBm)
Frequency (MHz)				1851.5	1880	1908.5	
3	QPSK	1	0	20.75	20.75	20.63	
3	QPSK	1	8	20.33	20.46	20.26	22.1
3	QPSK	1	14	20.28	20.34	20.35	
3	QPSK	8	0	20.37	20.42	20.38	
3	QPSK	8	4	20.54	20.44	20.46	22.1
3	QPSK	8	7	20.51	20.62	20.50	
3	QPSK	15	0	20.48	20.48	20.56	
3	16QAM	1	0	20.66	20.72	20.71	
3	16QAM	1	8	20.60	20.77	20.61	22.1
3	16QAM	1	14	20.34	20.38	20.40	
3	16QAM	8	0	20.28	20.32	20.36	
3	16QAM	8	4	20.39	20.43	20.43	22.1
3	16QAM	8	7	20.39	20.44	20.40	
3	16QAM	15	0	20.40	20.33	20.38	
3	64QAM	1	0	20.44	20.52	20.53	
3	64QAM	1	8	20.53	20.57	20.44	21.1
3	64QAM	1	14	20.55	20.48	20.47	
3	64QAM	8	0	19.35	19.36	19.31	
3	64QAM	8	4	19.46	19.38	19.43	21
3	64QAM	8	7	19.48	19.48	19.43	
3	64QAM	15	0	19.38	19.41	19.45	
Channel				18607	18900	19193	Tune-up limit (dBm)
Frequency (MHz)				1850.7	1880	1909.3	
1.4	QPSK	1	0	20.72	20.76	20.64	
1.4	QPSK	1	3	20.30	20.37	20.25	22.1
1.4	QPSK	1	5	20.31	20.40	20.27	
1.4	QPSK	3	0	20.41	20.43	20.38	

1.4	QPSK	3	1	20.48	20.54	20.43	
1.4	QPSK	3	3	20.46	20.57	20.46	
1.4	QPSK	6	0	20.48	20.52	20.53	22.1
1.4	16QAM	1	0	20.68	20.62	20.74	
1.4	16QAM	1	3	20.58	20.71	20.63	
1.4	16QAM	1	5	20.29	20.31	20.38	22.1
1.4	16QAM	3	0	20.33	20.39	20.38	
1.4	16QAM	3	1	20.40	20.39	20.43	
1.4	16QAM	3	3	20.45	20.43	20.39	
1.4	16QAM	6	0	20.37	20.33	20.36	22.1
1.4	64QAM	1	0	20.42	20.55	20.51	
1.4	64QAM	1	3	20.49	20.49	20.45	
1.4	64QAM	1	5	20.57	20.53	20.49	21.1
1.4	64QAM	3	0	19.31	19.44	19.35	
1.4	64QAM	3	1	19.43	19.45	19.45	
1.4	64QAM	3	3	19.43	19.49	19.42	
1.4	64QAM	6	0	19.45	19.44	19.39	21

<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	
Frequency (MHz)				1720	1732.5	1745	
20	QPSK	1	0	19.42	19.30	19.22	
20	QPSK	1	49	18.86	18.71	18.67	19.9
20	QPSK	1	99	18.85	18.72	18.67	
20	QPSK	50	0	19.16	19.04	18.91	
20	QPSK	50	24	19.06	18.96	18.91	19.9
20	QPSK	50	50	18.95	18.87	18.84	
20	QPSK	100	0	18.98	18.98	18.89	
20	16QAM	1	0	19.07	18.94	18.88	
20	16QAM	1	49	19.24	19.09	19.04	19.9
20	16QAM	1	99	19.21	19.07	19.03	
20	16QAM	50	0	19.18	19.06	18.94	
20	16QAM	50	24	19.05	18.97	18.95	19.9
20	16QAM	50	50	18.96	18.89	18.86	
20	16QAM	100	0	19.00	18.99	18.92	
20	64QAM	1	0	19.33	19.21	19.09	
20	64QAM	1	49	19.10	18.97	18.93	19.9
20	64QAM	1	99	19.08	18.98	18.95	
20	64QAM	50	0	19.21	19.06	18.95	
20	64QAM	50	24	19.06	19.00	18.95	19.9
20	64QAM	50	50	18.98	18.90	18.88	
20	64QAM	100	0	19.01	19.00	18.95	
Channel				20025	20175	20325	Tune-up limit (dBm)
Frequency (MHz)				1717.5	1732.5	1747.5	
15	QPSK	1	0	19.41	19.20	19.17	
15	QPSK	1	37	18.82	18.62	18.58	19.9
15	QPSK	1	74	18.76	18.72	18.61	
15	QPSK	36	0	19.07	18.94	18.85	
15	QPSK	36	20	19.04	18.90	18.88	19.9
15	QPSK	36	39	18.86	18.87	18.82	
15	QPSK	75	0	18.93	18.93	18.83	
15	16QAM	1	0	19.04	18.94	18.84	
15	16QAM	1	37	19.23	19.08	18.94	19.9
15	16QAM	1	74	19.13	19.04	18.97	
15	16QAM	36	0	19.10	19.05	18.90	
15	16QAM	36	20	19.00	18.91	18.95	19.9
15	16QAM	36	39	18.88	18.88	18.84	
15	16QAM	75	0	18.90	18.90	18.86	
15	64QAM	1	0	19.27	19.19	18.99	19.9
15	64QAM	1	37	19.06	18.92	18.83	

15	64QAM	1	74	19.07	18.94	18.91	
15	64QAM	36	0	19.15	19.06	18.85	19.9
15	64QAM	36	20	19.06	18.98	18.89	
15	64QAM	36	39	18.90	18.89	18.86	
15	64QAM	75	0	19.01	18.94	18.88	
Channel				20000	20175	20350	Tune-up limit (dBm)
Frequency (MHz)				1715	1732.5	1750	
10	QPSK	1	0	19.39	19.22	19.16	19.9
10	QPSK	1	25	18.82	18.65	18.58	
10	QPSK	1	49	18.75	18.65	18.60	
10	QPSK	25	0	19.11	19.02	18.87	19.9
10	QPSK	25	12	19.02	18.86	18.90	
10	QPSK	25	25	18.90	18.77	18.81	
10	QPSK	50	0	18.88	18.93	18.80	
10	16QAM	1	0	19.02	18.84	18.85	19.9
10	16QAM	1	25	19.19	19.08	18.94	
10	16QAM	1	49	19.13	19.04	18.93	
10	16QAM	25	0	19.17	18.96	18.84	19.9
10	16QAM	25	12	19.00	18.95	18.94	
10	16QAM	25	25	18.96	18.79	18.81	
10	16QAM	50	0	18.95	18.97	18.84	
10	64QAM	1	0	19.24	19.11	19.06	19.9
10	64QAM	1	25	19.06	18.91	18.93	
10	64QAM	1	49	19.08	18.88	18.86	
10	64QAM	25	0	19.11	19.04	18.91	19.9
10	64QAM	25	12	19.02	18.94	18.85	
10	64QAM	25	25	18.97	18.87	18.78	
10	64QAM	50	0	18.91	18.96	18.90	
Channel				19975	20175	20375	Tune-up limit (dBm)
Frequency (MHz)				1712.5	1732.5	1752.5	
5	QPSK	1	0	19.36	19.26	19.21	19.9
5	QPSK	1	12	18.82	18.67	18.61	
5	QPSK	1	24	18.84	18.67	18.64	
5	QPSK	12	0	19.12	19.03	18.81	19.9
5	QPSK	12	7	18.97	18.90	18.88	
5	QPSK	12	13	18.92	18.85	18.75	
5	QPSK	25	0	18.88	18.89	18.87	
5	16QAM	1	0	18.99	18.93	18.83	19.9
5	16QAM	1	12	19.18	19.02	18.97	
5	16QAM	1	24	19.20	19.03	19.01	
5	16QAM	12	0	19.09	19.02	18.88	19.9
5	16QAM	12	7	18.98	18.88	18.87	
5	16QAM	12	13	18.87	18.80	18.81	
5	16QAM	25	0	18.93	18.95	18.88	
5	64QAM	1	0	19.28	19.12	19.03	19.9
5	64QAM	1	12	19.00	18.97	18.88	
5	64QAM	1	24	18.98	18.98	18.85	
5	64QAM	12	0	19.11	18.96	18.91	19.9
5	64QAM	12	7	18.99	18.96	18.91	
5	64QAM	12	13	18.90	18.84	18.79	
5	64QAM	25	0	18.94	18.90	18.85	
Channel				19965	20175	20385	Tune-up limit (dBm)
Frequency (MHz)				1711.5	1732.5	1753.5	
3	QPSK	1	0	19.37	19.29	19.16	19.9
3	QPSK	1	8	18.84	18.71	18.66	
3	QPSK	1	14	18.85	18.68	18.59	
3	QPSK	8	0	19.16	18.96	18.84	19.9
3	QPSK	8	4	19.04	18.91	18.86	
3	QPSK	8	7	18.91	18.81	18.84	
3	QPSK	15	0	18.97	18.94	18.82	
3	16QAM	1	0	18.97	18.86	18.81	19.9
3	16QAM	1	8	19.14	19.03	18.99	

3	16QAM	1	14	19.15	19.01	19.01	
3	16QAM	8	0	19.16	19.06	18.88	19.9
3	16QAM	8	4	18.95	18.93	18.88	
3	16QAM	8	7	18.91	18.87	18.81	
3	16QAM	15	0	18.93	18.90	18.83	
3	64QAM	1	0	19.33	19.20	19.04	19.9
3	64QAM	1	8	19.02	18.93	18.89	
3	64QAM	1	14	19.01	18.92	18.95	
3	64QAM	8	0	19.17	19.02	18.93	19.9
3	64QAM	8	4	19.04	18.96	18.94	
3	64QAM	8	7	18.90	18.84	18.82	
3	64QAM	15	0	18.92	18.94	18.91	
Channel				19957	20175	20393	Tune-up limit (dBm)
Frequency (MHz)				1710.7	1732.5	1754.3	
1.4	QPSK	1	0	19.32	19.25	19.13	19.9
1.4	QPSK	1	3	18.83	18.65	18.59	
1.4	QPSK	1	5	18.76	18.65	18.61	
1.4	QPSK	3	0	19.10	18.94	18.81	
1.4	QPSK	3	1	19.06	18.95	18.83	
1.4	QPSK	3	3	18.85	18.87	18.77	
1.4	QPSK	6	0	18.88	18.95	18.88	19.9
1.4	16QAM	1	0	19.03	18.84	18.88	19.9
1.4	16QAM	1	3	19.21	18.99	18.98	
1.4	16QAM	1	5	19.12	19.02	18.97	
1.4	16QAM	3	0	19.15	19.00	18.90	
1.4	16QAM	3	1	19.02	18.91	18.88	
1.4	16QAM	3	3	18.95	18.89	18.82	
1.4	16QAM	6	0	18.92	18.95	18.83	19.9
1.4	64QAM	1	0	18.86	18.80	18.62	18.9
1.4	64QAM	1	3	18.70	18.56	18.49	
1.4	64QAM	1	5	18.68	18.55	18.48	
1.4	64QAM	3	0	18.78	18.65	18.51	
1.4	64QAM	3	1	18.62	18.55	18.48	
1.4	64QAM	3	3	18.52	18.41	18.44	
1.4	64QAM	6	0	18.52	18.54	18.54	18.8

<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	22.60	22.64	22.36	24
10	QPSK	1	25	22.25	22.27	22.06	
10	QPSK	1	49	22.27	22.37	22.06	
10	QPSK	25	0	21.33	21.48	21.16	23
10	QPSK	25	12	21.21	21.46	21.13	
10	QPSK	25	25	21.19	21.39	21.03	
10	QPSK	50	0	21.21	21.46	21.12	
10	16QAM	1	0	21.63	21.76	21.45	23
10	16QAM	1	25	21.57	21.65	21.30	
10	16QAM	1	49	21.39	21.59	21.47	
10	16QAM	25	0	20.30	20.42	20.17	22
10	16QAM	25	12	20.24	20.44	20.13	
10	16QAM	25	25	20.16	20.40	20.07	
10	16QAM	50	0	20.23	20.44	20.15	
10	64QAM	1	0	20.57	20.60	20.38	22
10	64QAM	1	25	20.16	20.26	20.18	
10	64QAM	1	49	20.22	20.37	20.12	
10	64QAM	25	0	19.27	19.36	19.31	21
10	64QAM	25	12	19.00	19.18	19.09	
10	64QAM	25	25	19.28	19.05	19.00	

10	64QAM	50	0	19.08	19.18	19.01	
Channel				20425	20525	20625	Tune-up limit (dBm)
Frequency (MHz)				826.5	836.5	846.5	
5	QPSK	1	0	22.58	22.54	22.26	24
5	QPSK	1	12	22.17	22.25	22.02	
5	QPSK	1	24	22.23	22.27	22.01	
5	QPSK	12	0	21.30	21.46	21.09	23
5	QPSK	12	7	21.20	21.46	21.09	
5	QPSK	12	13	21.19	21.34	21.03	
5	QPSK	25	0	21.13	21.39	21.08	
5	16QAM	1	0	21.55	21.66	21.37	23
5	16QAM	1	12	21.50	21.56	21.27	
5	16QAM	1	24	21.38	21.52	21.46	
5	16QAM	12	0	20.22	20.41	20.10	22
5	16QAM	12	7	20.16	20.35	20.11	
5	16QAM	12	13	20.16	20.40	20.04	
5	16QAM	25	0	20.14	20.43	20.07	
5	64QAM	1	0	20.55	20.52	20.33	22
5	64QAM	1	12	20.11	20.19	20.15	
5	64QAM	1	24	20.16	20.31	20.03	
5	64QAM	12	0	19.19	19.36	19.23	21
5	64QAM	12	7	19.03	19.08	19.09	
5	64QAM	12	13	19.27	19.05	19.03	
5	64QAM	25	0	19.03	19.08	19.02	
Channel				20415	20525	20635	Tune-up limit (dBm)
Frequency (MHz)				825.5	836.5	847.5	
3	QPSK	1	0	22.50	22.46	22.21	24
3	QPSK	1	8	22.12	22.23	22.03	
3	QPSK	1	14	22.20	22.18	22.08	
3	QPSK	8	0	21.23	21.41	21.07	23
3	QPSK	8	4	21.16	21.43	21.03	
3	QPSK	8	7	21.11	21.32	21.19	
3	QPSK	15	0	21.03	21.33	21.00	
3	16QAM	1	0	21.54	21.62	21.29	23
3	16QAM	1	8	21.48	21.48	21.19	
3	16QAM	1	14	21.28	21.49	21.44	
3	16QAM	8	0	20.19	20.31	20.00	22
3	16QAM	8	4	20.15	20.32	20.09	
3	16QAM	8	7	20.16	20.34	20.01	
3	16QAM	15	0	20.07	20.36	20.03	
3	64QAM	1	0	20.47	20.49	20.29	22
3	64QAM	1	8	20.07	20.15	20.06	
3	64QAM	1	14	20.13	20.27	20.02	
3	64QAM	8	0	19.25	19.29	19.17	21
3	64QAM	8	4	19.02	19.04	19.06	
3	64QAM	8	7	19.30	19.02	19.00	
3	64QAM	15	0	19.05	19.03	19.01	
Channel				20407	20525	20643	Tune-up limit (dBm)
Frequency (MHz)				824.7	836.5	848.3	
1.4	QPSK	1	0	22.57	22.59	22.26	24
1.4	QPSK	1	3	22.20	22.21	22.03	
1.4	QPSK	1	5	22.21	22.29	22.02	
1.4	QPSK	3	0	22.55	22.56	22.31	
1.4	QPSK	3	1	22.19	22.23	22.05	
1.4	QPSK	3	3	22.19	22.33	22.01	
1.4	QPSK	6	0	21.11	21.42	21.09	23
1.4	16QAM	1	0	21.62	21.72	21.35	23
1.4	16QAM	1	3	21.55	21.61	21.24	
1.4	16QAM	1	5	21.34	21.59	21.37	
1.4	16QAM	3	0	21.59	21.70	21.42	
1.4	16QAM	3	1	21.52	21.65	21.26	
1.4	16QAM	3	3	21.29	21.57	21.43	

1.4	16QAM	6	0	20.21	20.42	20.09	22
1.4	64QAM	1	0	20.57	20.57	20.36	22
1.4	64QAM	1	3	20.07	20.24	20.15	
1.4	64QAM	1	5	20.15	20.32	20.12	
1.4	64QAM	3	0	20.53	20.51	20.37	
1.4	64QAM	3	1	20.14	20.21	20.14	
1.4	64QAM	3	3	20.16	20.32	20.10	
1.4	64QAM	6	0	19.04	19.13	19.01	21

<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	
Frequency (MHz)				2510	2535	2560	
20	QPSK	1	0	19.74	19.89	19.77	21.3
20	QPSK	1	49	19.69	19.84	19.72	
20	QPSK	1	99	19.51	19.66	19.54	
20	QPSK	50	0	19.73	19.88	19.78	21.3
20	QPSK	50	24	19.72	19.85	19.75	
20	QPSK	50	50	19.73	19.84	19.76	
20	QPSK	100	0	19.71	19.86	19.74	
20	16QAM	1	0	19.73	19.88	19.76	21.3
20	16QAM	1	49	19.69	19.84	19.72	
20	16QAM	1	99	19.50	19.65	19.53	
20	16QAM	50	0	19.69	19.84	19.72	21.3
20	16QAM	50	24	19.71	19.86	19.74	
20	16QAM	50	50	19.72	19.87	19.75	
20	16QAM	100	0	19.68	19.83	19.71	
20	64QAM	1	0	19.65	19.80	19.68	20.3
20	64QAM	1	49	19.62	19.77	19.65	
20	64QAM	1	99	19.47	19.62	19.50	
20	64QAM	50	0	19.52	19.67	19.55	20.3
20	64QAM	50	24	19.46	19.61	19.49	
20	64QAM	50	50	19.45	19.60	19.48	
20	64QAM	100	0	19.35	19.50	19.38	
Channel				20825	21100	21375	Tune-up limit (dBm)
Frequency (MHz)				2507.5	2535	2562.5	
15	QPSK	1	0	19.68	19.83	19.72	21.3
15	QPSK	1	37	19.64	19.75	19.68	
15	QPSK	1	74	19.45	19.63	19.44	
15	QPSK	36	0	19.65	19.78	19.76	21.3
15	QPSK	36	20	19.67	19.79	19.71	
15	QPSK	36	39	19.72	19.81	19.67	
15	QPSK	75	0	19.67	19.80	19.71	
15	16QAM	1	0	19.72	19.85	19.73	21.3
15	16QAM	1	37	19.68	19.78	19.67	
15	16QAM	1	74	19.45	19.55	19.47	
15	16QAM	36	0	19.69	19.78	19.65	21.3
15	16QAM	36	20	19.66	19.80	19.71	
15	16QAM	36	39	19.71	19.86	19.75	
15	16QAM	75	0	19.64	19.78	19.69	
15	64QAM	1	0	19.65	19.80	19.66	20.3
15	64QAM	1	37	19.55	19.77	19.64	
15	64QAM	1	74	19.46	19.60	19.49	
15	64QAM	36	0	19.46	19.62	19.52	20.3
15	64QAM	36	20	19.41	19.60	19.44	
15	64QAM	36	39	19.35	19.59	19.42	
15	64QAM	75	0	19.35	19.43	19.38	
Channel				20800	21100	21400	Tune-up limit (dBm)
Frequency (MHz)				2505	2535	2565	
10	QPSK	1	0	19.65	19.77	19.70	21.3

10	QPSK	1	25	19.62	19.69	19.62	
10	QPSK	1	49	19.42	19.57	19.35	
10	QPSK	25	0	19.64	19.74	19.66	21.3
10	QPSK	25	12	19.62	19.72	19.71	
10	QPSK	25	25	19.69	19.74	19.59	
10	QPSK	50	0	19.65	19.79	19.66	
10	16QAM	1	0	19.64	19.85	19.69	21.3
10	16QAM	1	25	19.60	19.74	19.60	
10	16QAM	1	49	19.41	19.52	19.40	
10	16QAM	25	0	19.63	19.78	19.57	21.3
10	16QAM	25	12	19.66	19.73	19.69	
10	16QAM	25	25	19.65	19.83	19.72	
10	16QAM	50	0	19.54	19.77	19.63	
10	64QAM	1	0	19.57	19.70	19.62	20.3
10	64QAM	1	25	19.53	19.68	19.55	
10	64QAM	1	49	19.38	19.57	19.40	
10	64QAM	25	0	19.40	19.62	19.49	20.3
10	64QAM	25	12	19.41	19.56	19.39	
10	64QAM	25	25	19.35	19.51	19.32	
10	64QAM	50	0	19.29	19.41	19.29	
Channel				20775	21100	21425	Tune-up limit (dBm)
Frequency (MHz)				2502.5	2535	2567.5	
5	QPSK	1	0	19.58	19.72	19.68	21.3
5	QPSK	1	12	19.61	19.63	19.53	
5	QPSK	1	24	19.40	19.54	19.30	
5	QPSK	12	0	19.62	19.67	19.63	21.3
5	QPSK	12	7	19.56	19.69	19.61	
5	QPSK	12	13	19.60	19.67	19.53	
5	QPSK	25	0	19.57	19.78	19.62	
5	16QAM	1	0	19.54	19.79	19.69	21.3
5	16QAM	1	12	19.55	19.64	19.53	
5	16QAM	1	24	19.33	19.51	19.38	
5	16QAM	12	0	19.57	19.75	19.51	21.3
5	16QAM	12	7	19.61	19.73	19.61	
5	16QAM	12	13	19.58	19.82	19.72	
5	16QAM	25	0	19.50	19.74	19.54	
5	64QAM	1	0	19.49	19.60	19.58	20.3
5	64QAM	1	12	19.47	19.60	19.46	
5	64QAM	1	24	19.31	19.52	19.39	
5	64QAM	12	0	19.36	19.52	19.44	20.3
5	64QAM	12	7	19.40	19.48	19.36	
5	64QAM	12	13	19.32	19.51	19.22	
5	64QAM	25	0	19.19	19.32	19.20	

<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	
Frequency (MHz)				704	707.5	711	
10	QPSK	1	0	22.45	22.56	22.66	24
10	QPSK	1	25	22.36	22.39	22.48	
10	QPSK	1	49	22.15	22.27	22.34	
10	QPSK	25	0	21.52	21.63	21.72	23
10	QPSK	25	12	21.44	21.55	21.57	
10	QPSK	25	25	21.34	21.44	21.52	
10	QPSK	50	0	21.48	21.57	21.57	
10	16QAM	1	0	21.53	21.62	21.72	23
10	16QAM	1	25	21.72	21.80	21.86	
10	16QAM	1	49	21.86	21.99	22.05	
10	16QAM	25	0	20.33	20.42	20.52	22
10	16QAM	25	12	20.47	20.56	20.57	

10	16QAM	25	25	20.52	20.64	20.71	
10	16QAM	50	0	20.48	20.57	20.59	
10	64QAM	1	0	20.40	20.45	20.58	22
10	64QAM	1	25	20.60	20.74	20.56	
10	64QAM	1	49	20.69	20.59	20.54	
10	64QAM	25	0	19.35	19.34	19.40	21
10	64QAM	25	12	19.52	19.50	19.40	
10	64QAM	25	25	19.41	19.44	19.66	
10	64QAM	50	0	19.45	19.52	19.58	
Channel				23035	23095	23155	Tune-up limit (dBm)
Frequency (MHz)				701.5	707.5	713.5	
5	QPSK	1	0	22.42	22.46	22.61	24
5	QPSK	1	12	22.26	22.34	22.41	
5	QPSK	1	24	22.05	22.19	22.25	
5	QPSK	12	0	21.50	21.53	21.62	23
5	QPSK	12	7	21.43	21.54	21.47	
5	QPSK	12	13	21.25	21.44	21.43	
5	QPSK	25	0	21.42	21.48	21.53	
5	16QAM	1	0	21.51	21.53	21.69	23
5	16QAM	1	12	21.63	21.78	21.80	
5	16QAM	1	24	21.81	21.94	22.04	
5	16QAM	12	0	20.30	20.32	20.43	22
5	16QAM	12	7	20.44	20.55	20.51	
5	16QAM	12	13	20.42	20.56	20.68	
5	16QAM	25	0	20.44	20.53	20.50	
5	64QAM	1	0	20.34	20.36	20.53	22
5	64QAM	1	12	20.51	20.64	20.50	
5	64QAM	1	24	20.59	20.57	20.46	
5	64QAM	12	0	19.31	19.29	19.39	21
5	64QAM	12	7	19.49	19.49	19.33	
5	64QAM	12	13	19.40	19.35	19.64	
5	64QAM	25	0	19.38	19.42	19.52	
Channel				23025	23095	23165	Tune-up limit (dBm)
Frequency (MHz)				700.5	707.5	714.5	
3	QPSK	1	0	22.41	22.38	22.57	24
3	QPSK	1	8	22.23	22.29	22.36	
3	QPSK	1	14	22.05	22.18	22.21	
3	QPSK	8	0	21.45	21.49	21.62	23
3	QPSK	8	4	21.39	21.51	21.44	
3	QPSK	8	7	21.19	21.35	21.33	
3	QPSK	15	0	21.40	21.40	21.43	
3	16QAM	1	0	21.42	21.44	21.62	23
3	16QAM	1	8	21.57	21.70	21.72	
3	16QAM	1	14	21.81	21.94	21.94	
3	16QAM	8	0	20.28	20.32	20.37	22
3	16QAM	8	4	20.34	20.50	20.43	
3	16QAM	8	7	20.40	20.55	20.68	
3	16QAM	15	0	20.38	20.46	20.43	
3	64QAM	1	0	20.31	20.33	20.44	22
3	64QAM	1	8	20.45	20.64	20.50	
3	64QAM	1	14	20.59	20.47	20.41	
3	64QAM	8	0	19.24	19.24	19.31	21
3	64QAM	8	4	19.45	19.47	19.30	
3	64QAM	8	7	19.35	19.33	19.57	
3	64QAM	15	0	19.28	19.42	19.52	
Channel				23017	23095	23173	Tune-up limit (dBm)
Frequency (MHz)				699.7	707.5	715.3	
1.4	QPSK	1	0	22.23	22.51	22.71	24
1.4	QPSK	1	3	22.21	22.61	22.62	
1.4	QPSK	1	5	22.32	22.56	22.68	
1.4	QPSK	3	0	22.25	22.52	22.58	
1.4	QPSK	3	1	22.27	22.60	22.71	

1.4	QPSK	3	3	22.35	22.57	22.55	
1.4	QPSK	6	0	21.52	21.63	21.82	23
1.4	16QAM	1	0	21.62	21.83	22.01	
1.4	16QAM	1	3	21.73	21.92	22.12	
1.4	16QAM	1	5	21.75	21.84	22.18	23
1.4	16QAM	3	0	21.68	21.56	22.20	
1.4	16QAM	3	1	21.65	21.69	21.92	
1.4	16QAM	3	3	21.58	21.60	21.85	
1.4	16QAM	6	0	21.72	21.79	21.99	22
1.4	64QAM	1	0	20.55	20.75	20.92	
1.4	64QAM	1	3	20.65	20.81	20.85	
1.4	64QAM	1	5	20.48	20.71	20.93	22
1.4	64QAM	3	0	20.45	20.69	21.03	
1.4	64QAM	3	1	20.46	20.71	20.85	
1.4	64QAM	3	3	20.35	20.60	20.73	
1.4	64QAM	6	0	19.35	19.45	19.85	21

<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		
Frequency (MHz)					782		
10	QPSK	1	0		22.46		
10	QPSK	1	25		22.36		24
10	QPSK	1	49		22.33		
10	QPSK	25	0		21.46		
10	QPSK	25	12		21.43		23
10	QPSK	25	25		21.41		
10	QPSK	50	0		21.46		
10	16QAM	1	0		21.78		
10	16QAM	1	25		21.62		23
10	16QAM	1	49		21.68		
10	16QAM	25	0		20.48		
10	16QAM	25	12		20.45		22
10	16QAM	25	25		20.51		
10	16QAM	50	0		20.51		
10	64QAM	1	0		20.60		
10	64QAM	1	25		20.62		22
10	64QAM	1	49		20.57		
10	64QAM	25	0		19.53		
10	64QAM	25	12		19.53		21
10	64QAM	25	25		19.54		
10	64QAM	50	0		19.49		
Channel				23205	23230	23255	Tune-up limit (dBm)
Frequency (MHz)				779.5	782	784.5	
5	QPSK	1	0	22.37	22.38	22.37	
5	QPSK	1	12	22.22	22.26	22.26	24
5	QPSK	1	24	22.19	22.15	22.23	
5	QPSK	12	0	21.36	21.37	21.29	
5	QPSK	12	7	21.33	21.32	21.24	23
5	QPSK	12	13	21.23	21.30	21.28	
5	QPSK	25	0	21.31	21.34	21.29	
5	16QAM	1	0	21.62	21.67	21.59	
5	16QAM	1	12	21.53	21.48	21.48	23
5	16QAM	1	24	21.58	21.58	21.49	
5	16QAM	12	0	20.35	20.36	20.30	
5	16QAM	12	7	20.33	20.29	20.27	22
5	16QAM	12	13	20.41	20.33	20.40	
5	16QAM	25	0	20.34	20.38	20.37	
5	64QAM	1	0	20.46	20.52	20.50	22
5	64QAM	1	12	20.49	20.54	20.46	

5	64QAM	1	24	20.48	20.46	20.42	
5	64QAM	12	0	19.39	19.39	19.36	21
5	64QAM	12	7	19.44	19.41	19.38	
5	64QAM	12	13	19.38	19.38	19.38	
5	64QAM	25	0	19.31	19.33	19.37	

<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		22.38		24
10	QPSK	1	25		22.30		
10	QPSK	1	49		22.24		
10	QPSK	25	0		21.33		23
10	QPSK	25	12		21.30		
10	QPSK	25	25		21.26		
10	QPSK	50	0		21.29		
10	16QAM	1	0		21.67		23
10	16QAM	1	25		21.61		
10	16QAM	1	49		21.53		
10	16QAM	25	0		20.27		22
10	16QAM	25	12		20.34		
10	16QAM	25	25		20.34		
10	16QAM	50	0		20.29		
10	64QAM	1	0		20.53		22
10	64QAM	1	25		20.55		
10	64QAM	1	49		20.45		
10	64QAM	25	0		19.35		21
10	64QAM	25	12		19.34		
10	64QAM	25	25		19.30		
10	64QAM	50	0		19.33		
Channel				23305	23330	23355	Tune-up limit (dBm)
Frequency (MHz)				790.5	793	795.5	
5	QPSK	1	0	22.32	22.24	22.19	24
5	QPSK	1	12	22.19	22.07	22.08	
5	QPSK	1	24	22.12	22.01	22.03	
5	QPSK	12	0	21.26	21.11	21.05	23
5	QPSK	12	7	21.18	21.08	21.01	
5	QPSK	12	13	21.16	21.09	21.03	
5	QPSK	25	0	21.18	21.14	21.03	
5	16QAM	1	0	21.55	21.52	21.45	23
5	16QAM	1	12	21.45	21.41	21.32	
5	16QAM	1	24	21.43	21.33	21.25	
5	16QAM	12	0	20.20	20.07	20.08	22
5	16QAM	12	7	20.25	20.19	20.07	
5	16QAM	12	13	20.18	20.10	20.06	
5	16QAM	25	0	20.22	20.09	20.00	
5	64QAM	1	0	20.41	20.38	20.26	22
5	64QAM	1	12	20.44	20.35	20.33	
5	64QAM	1	24	20.30	20.28	20.20	
5	64QAM	12	0	19.22	19.18	19.14	21
5	64QAM	12	7	19.25	19.10	19.07	
5	64QAM	12	13	19.18	19.15	19.05	
5	64QAM	25	0	19.22	19.13	19.08	

<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	23800	

Frequency (MHz)				709	710	711	
10	QPSK	1	0	22.51	22.60	22.53	24
10	QPSK	1	25	22.35	22.40	22.38	
10	QPSK	1	49	22.18	22.23	22.27	
10	QPSK	25	0	21.64	21.68	21.65	23
10	QPSK	25	12	21.47	21.48	21.53	
10	QPSK	25	25	21.31	21.35	21.38	
10	QPSK	50	0	21.44	21.53	21.51	
10	16QAM	1	0	21.56	21.59	21.65	23
10	16QAM	1	25	21.74	21.79	21.82	
10	16QAM	1	49	21.98	21.98	21.90	
10	16QAM	25	0	20.33	20.33	20.37	22
10	16QAM	25	12	20.46	20.47	20.50	
10	16QAM	25	25	20.64	20.67	20.68	
10	16QAM	50	0	20.49	20.48	20.48	
10	64QAM	1	0	20.42	20.45	20.51	22
10	64QAM	1	25	20.72	20.68	20.71	
10	64QAM	1	49	20.84	20.90	20.77	
10	64QAM	25	0	19.35	19.39	19.40	21
10	64QAM	25	12	19.51	19.55	19.55	
10	64QAM	25	25	19.66	19.67	19.69	
10	64QAM	50	0	19.50	19.46	19.54	
Channel				23755	23790	23825	Tune-up limit (dBm)
Frequency (MHz)				706.5	710	713.5	
5	QPSK	1	0	22.44	22.58	22.44	24
5	QPSK	1	12	22.28	22.31	22.38	
5	QPSK	1	24	22.16	22.18	22.23	
5	QPSK	12	0	21.55	21.65	21.58	23
5	QPSK	12	7	21.45	21.40	21.44	
5	QPSK	12	13	21.26	21.28	21.28	
5	QPSK	25	0	21.42	21.52	21.41	
5	16QAM	1	0	21.56	21.55	21.64	23
5	16QAM	1	12	21.66	21.76	21.80	
5	16QAM	1	24	21.88	21.93	21.80	
5	16QAM	12	0	20.24	20.26	20.28	22
5	16QAM	12	7	20.45	20.38	20.48	
5	16QAM	12	13	20.55	20.62	20.66	
5	16QAM	25	0	20.39	20.46	20.45	
5	64QAM	1	0	20.40	20.36	20.46	22
5	64QAM	1	12	20.69	20.67	20.71	
5	64QAM	1	24	20.79	20.80	20.70	
5	64QAM	12	0	19.35	19.30	19.37	21
5	64QAM	12	7	19.42	19.53	19.53	
5	64QAM	12	13	19.58	19.62	19.60	
5	64QAM	25	0	19.42	19.46	19.52	

<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	
Frequency (MHz)				1860	1880	1905	
20	QPSK	1	0	20.69	20.77	20.69	22.1
20	QPSK	1	49	20.27	20.36	20.24	
20	QPSK	1	99	20.31	20.39	20.24	
20	QPSK	50	0	20.49	20.58	20.44	22.1
20	QPSK	50	24	20.40	20.48	20.41	
20	QPSK	50	50	20.46	20.52	20.40	
20	QPSK	100	0	20.50	20.55	20.40	
20	16QAM	1	0	20.33	20.38	20.36	22.1
20	16QAM	1	49	20.65	20.75	20.67	
20	16QAM	1	99	20.65	20.73	20.67	

20	16QAM	50	0	20.30	20.39	20.31	22.1
20	16QAM	50	24	20.41	20.47	20.32	
20	16QAM	50	50	20.36	20.42	20.35	
20	16QAM	100	0	20.39	20.44	20.32	
20	64QAM	1	0	20.43	20.51	20.48	21.1
20	64QAM	1	49	20.45	20.52	20.45	
20	64QAM	1	99	20.43	20.58	19.54	
20	64QAM	50	0	19.32	19.41	19.26	21.1
20	64QAM	50	24	19.42	19.50	19.36	
20	64QAM	50	50	19.28	19.46	19.10	
20	64QAM	100	0	19.39	19.46	19.14	
Channel				26115	26340	26615	Tune-up limit (dBm)
Frequency (MHz)				1857.5	1880	1907.5	
15	QPSK	1	0	20.73	20.65	20.57	22.1
15	QPSK	1	37	20.16	20.20	20.36	
15	QPSK	1	74	20.48	20.22	20.22	
15	QPSK	36	0	20.53	20.68	20.51	22.1
15	QPSK	36	20	20.66	20.62	20.29	
15	QPSK	36	39	20.50	20.52	20.59	
15	QPSK	75	0	20.54	20.43	20.44	
15	16QAM	1	0	20.35	20.29	20.38	22.1
15	16QAM	1	37	20.60	20.61	20.76	
15	16QAM	1	74	20.54	20.48	20.53	
15	16QAM	36	0	20.11	20.25	20.22	22.1
15	16QAM	36	20	20.30	20.66	20.33	
15	16QAM	36	39	20.56	20.37	20.17	
15	16QAM	75	0	20.37	20.33	20.23	
15	64QAM	1	0	20.39	20.45	20.65	21.1
15	64QAM	1	37	20.43	20.51	20.49	
15	64QAM	1	74	20.39	20.71	19.45	
15	64QAM	36	0	19.18	19.60	19.32	21.1
15	64QAM	36	20	19.38	19.48	19.22	
15	64QAM	36	39	19.18	19.33	19.12	
15	64QAM	75	0	19.39	19.53	19.12	
Channel				26090	26340	26640	Tune-up limit (dBm)
Frequency (MHz)				1855	1880	1910	
10	QPSK	1	0	20.70	20.72	20.68	22.1
10	QPSK	1	25	20.16	20.25	20.30	
10	QPSK	1	49	20.43	20.53	20.18	
10	QPSK	25	0	20.56	20.65	20.36	22.1
10	QPSK	25	12	20.68	20.56	20.37	
10	QPSK	25	25	20.66	20.40	20.34	
10	QPSK	50	0	20.69	20.73	20.21	
10	16QAM	1	0	20.14	20.31	20.43	22.1
10	16QAM	1	25	20.46	20.63	20.73	
10	16QAM	1	49	20.64	20.69	20.47	
10	16QAM	25	0	20.49	20.47	20.45	22.1
10	16QAM	25	12	20.48	20.29	20.26	
10	16QAM	25	25	20.31	20.48	20.38	
10	16QAM	50	0	20.54	20.52	20.52	
10	64QAM	1	0	20.52	20.48	20.49	21.1
10	64QAM	1	25	20.37	20.56	20.34	
10	64QAM	1	49	20.41	20.39	19.73	
10	64QAM	25	0	19.52	19.53	19.18	21.1
10	64QAM	25	12	19.30	19.44	19.18	
10	64QAM	25	25	19.14	19.56	19.11	
10	64QAM	50	0	19.21	19.42	19.03	
Channel				26065	26340	26665	Tune-up limit (dBm)
Frequency (MHz)				1852.5	1880	1912.5	
5	QPSK	1	0	20.71	20.68	20.71	22.1
5	QPSK	1	12	20.27	20.39	20.10	
5	QPSK	1	24	20.51	20.40	20.34	

5	QPSK	12	0	20.43	20.39	20.40	22.1
5	QPSK	12	7	20.39	20.46	20.40	
5	QPSK	12	13	20.39	20.47	20.58	
5	QPSK	25	0	20.38	20.48	20.55	
5	16QAM	1	0	20.29	20.51	20.56	22.1
5	16QAM	1	12	20.77	20.57	20.73	
5	16QAM	1	24	20.57	20.62	20.67	
5	16QAM	12	0	20.11	20.56	20.29	22.1
5	16QAM	12	7	20.39	20.58	20.12	
5	16QAM	12	13	20.47	20.41	20.44	
5	16QAM	25	0	20.33	20.30	20.18	
5	64QAM	1	0	20.37	20.66	20.39	21.1
5	64QAM	1	12	20.29	20.41	20.63	
5	64QAM	1	24	20.42	20.69	19.58	
5	64QAM	12	0	19.44	19.59	19.32	21.1
5	64QAM	12	7	19.28	19.66	19.30	
5	64QAM	12	13	19.20	19.47	19.06	
5	64QAM	25	0	19.19	19.61	19.21	
Channel				26055	26340	26675	Tune-up limit (dBm)
Frequency (MHz)				1851.5	1880	1913.5	
3	QPSK	1	0	20.49	20.76	20.52	22.1
3	QPSK	1	8	20.30	20.44	20.15	
3	QPSK	1	14	20.39	20.42	20.10	
3	QPSK	8	0	20.59	20.58	20.25	22.1
3	QPSK	8	4	20.35	20.43	20.54	
3	QPSK	8	7	20.57	20.72	20.24	
3	QPSK	15	0	20.50	20.59	20.55	
3	16QAM	1	0	20.29	20.19	20.53	22.1
3	16QAM	1	8	20.58	20.61	20.55	
3	16QAM	1	14	20.72	20.71	20.63	
3	16QAM	8	0	20.42	20.32	20.46	22.1
3	16QAM	8	4	20.28	20.40	20.29	
3	16QAM	8	7	20.56	20.55	20.40	
3	16QAM	15	0	20.44	20.58	20.18	
3	64QAM	1	0	20.35	20.47	20.65	21.1
3	64QAM	1	8	20.59	20.40	20.55	
3	64QAM	1	14	20.41	20.76	19.64	
3	64QAM	8	0	19.45	19.57	19.16	21.1
3	64QAM	8	4	19.36	19.70	19.32	
3	64QAM	8	7	19.24	19.51	18.90	
3	64QAM	15	0	19.30	19.59	18.94	
Channel				26047	26340	26683	Tune-up limit (dBm)
Frequency (MHz)				1850.7	1880	1914.3	
1.4	QPSK	1	0	20.76	20.73	20.71	22.1
1.4	QPSK	1	3	20.38	20.35	20.18	
1.4	QPSK	1	5	20.30	20.34	20.43	
1.4	QPSK	3	0	20.20	20.37	20.49	
1.4	QPSK	3	1	20.37	20.64	20.60	
1.4	QPSK	3	3	20.58	20.67	20.61	
1.4	QPSK	6	0	20.31	20.75	20.24	22.1
1.4	16QAM	1	0	20.46	20.24	20.52	22.1
1.4	16QAM	1	3	20.73	20.68	20.51	
1.4	16QAM	1	5	20.54	20.67	20.76	
1.4	16QAM	3	0	20.48	20.57	20.21	
1.4	16QAM	3	1	20.27	20.33	20.38	
1.4	16QAM	3	3	20.16	20.29	20.15	
1.4	16QAM	6	0	20.42	20.61	20.32	22.1
1.4	64QAM	1	0	20.42	20.37	20.36	21.1
1.4	64QAM	1	3	20.30	20.65	20.42	
1.4	64QAM	1	5	20.30	20.59	19.35	
1.4	64QAM	3	0	19.37	19.53	19.28	
1.4	64QAM	3	1	19.62	19.68	19.22	

1.4	64QAM	3	3	19.14	19.61	19.32	
1.4	64QAM	6	0	19.34	19.35	19.24	21

<LTE Band 26>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				26765	26865	26965	
Frequency (MHz)				821.5	831.5	841.5	
15	QPSK	1	0	22.48	22.24	22.11	24
15	QPSK	1	37	22.27	22.17	22.09	
15	QPSK	1	74	22.18	22.05	22.02	
15	QPSK	36	0	21.50	21.32	21.20	23
15	QPSK	36	20	21.47	21.28	21.12	
15	QPSK	36	39	21.45	21.19	21.04	
15	QPSK	75	0	21.49	21.27	21.17	
15	16QAM	1	0	21.72	21.58	21.41	23
15	16QAM	1	37	21.62	21.49	21.23	
15	16QAM	1	74	21.49	21.30	21.05	
15	16QAM	36	0	20.47	20.34	20.21	22
15	16QAM	36	20	20.49	20.25	20.10	
15	16QAM	36	39	20.40	20.18	20.03	
15	16QAM	75	0	20.49	20.28	20.15	
15	64QAM	1	0	20.16	20.42	20.33	22
15	64QAM	1	37	20.31	20.37	20.02	
15	64QAM	1	74	20.22	20.05	20.03	
15	64QAM	36	0	19.02	19.31	19.27	21
15	64QAM	36	20	19.18	19.30	19.11	
15	64QAM	36	39	19.17	19.27	18.73	
15	64QAM	75	0	19.10	19.28	18.96	
Channel				26740	26865	26990	Tune-up limit (dBm)
Frequency (MHz)				819	831.5	844	
10	QPSK	1	0	22.45	22.38	22.12	24
10	QPSK	1	25	22.40	22.26	22.09	
10	QPSK	1	49	22.33	22.18	22.02	
10	QPSK	25	0	21.54	21.36	21.16	23
10	QPSK	25	12	21.60	21.34	21.12	
10	QPSK	25	25	21.52	21.25	21.05	
10	QPSK	50	0	21.59	21.35	21.09	
10	16QAM	1	0	21.88	21.73	21.48	23
10	16QAM	1	25	21.83	21.64	21.37	
10	16QAM	1	49	21.71	21.60	21.26	
10	16QAM	25	0	20.48	20.33	20.14	22
10	16QAM	25	12	20.60	20.37	20.16	
10	16QAM	25	25	20.56	20.29	20.05	
10	16QAM	50	0	20.58	20.33	20.14	
10	64QAM	1	0	20.04	20.60	20.41	22
10	64QAM	1	25	20.45	20.61	20.03	
10	64QAM	1	49	20.43	20.48	20.31	
10	64QAM	25	0	19.05	19.42	19.04	21
10	64QAM	25	12	19.21	19.36	18.94	
10	64QAM	25	25	19.20	19.30	18.60	
10	64QAM	50	0	19.11	19.38	18.82	
Channel				26715	26865	27015	Tune-up limit (dBm)
Frequency (MHz)				816.5	831.5	846.5	
5	QPSK	1	0	22.36	22.32	22.02	24
5	QPSK	1	12	22.30	22.25	22.03	
5	QPSK	1	24	22.30	22.08	22.07	
5	QPSK	12	0	21.49	21.32	21.08	23
5	QPSK	12	7	21.54	21.27	21.08	
5	QPSK	12	13	21.44	21.16	21.00	
5	QPSK	25	0	21.49	21.29	21.00	

5	16QAM	1	0	21.83	21.73	21.44	23
5	16QAM	1	12	21.76	21.59	21.28	
5	16QAM	1	24	21.68	21.59	21.16	
5	16QAM	12	0	20.40	20.25	20.11	22
5	16QAM	12	7	20.56	20.28	20.15	
5	16QAM	12	13	20.47	20.28	20.00	
5	16QAM	25	0	20.50	20.28	20.07	
5	64QAM	1	0	20.03	20.52	20.36	22
5	64QAM	1	12	20.44	20.53	20.17	
5	64QAM	1	24	20.34	20.39	20.29	
5	64QAM	12	0	19.00	19.33	19.01	21
5	64QAM	12	7	19.18	19.27	18.84	
5	64QAM	12	13	19.19	19.29	18.53	
5	64QAM	25	0	19.07	19.31	18.73	
Channel				26705	26865	27025	Tune-up limit (dBm)
Frequency (MHz)				815.5	831.5	847.5	
3	QPSK	1	0	22.33	22.30	22.06	24
3	QPSK	1	8	22.22	22.24	22.01	
3	QPSK	1	14	22.23	22.00	22.07	
3	QPSK	8	0	21.47	21.32	21.01	23
3	QPSK	8	4	21.50	21.24	21.06	
3	QPSK	8	7	21.41	21.07	21.05	
3	QPSK	15	0	21.48	21.22	21.02	
3	16QAM	1	0	21.83	21.65	21.40	23
3	16QAM	1	8	21.70	21.52	21.24	
3	16QAM	1	14	21.68	21.57	21.12	
3	16QAM	8	0	20.36	20.23	20.10	22
3	16QAM	8	4	20.51	20.20	20.10	
3	16QAM	8	7	20.42	20.21	20.04	
3	16QAM	15	0	20.41	20.22	20.08	
3	64QAM	1	0	20.02	20.42	20.32	22
3	64QAM	1	8	20.43	20.51	20.07	
3	64QAM	1	14	20.28	20.36	20.25	
3	64QAM	8	0	19.38	19.28	19.00	21
3	64QAM	8	4	19.16	19.22	18.78	
3	64QAM	8	7	19.15	19.28	18.49	
3	64QAM	15	0	19.04	19.28	18.73	
Channel				26697	26865	27033	Tune-up limit (dBm)
Frequency (MHz)				814.7	831.5	848.3	
1.4	QPSK	1	0	22.40	22.21	22.11	24
1.4	QPSK	1	3	22.19	22.08	22.07	
1.4	QPSK	1	5	22.14	22.00	22.00	
1.4	QPSK	3	0	22.46	22.17	22.05	
1.4	QPSK	3	1	22.23	22.07	22.06	
1.4	QPSK	3	3	22.18	22.02	22.04	
1.4	QPSK	6	0	21.43	21.24	21.07	23
1.4	16QAM	1	0	21.66	21.58	21.35	23
1.4	16QAM	1	3	21.58	21.41	21.15	
1.4	16QAM	1	5	21.45	21.27	21.03	
1.4	16QAM	3	0	21.72	21.51	21.33	
1.4	16QAM	3	1	21.53	21.46	21.17	
1.4	16QAM	3	3	21.44	21.26	21.04	
1.4	16QAM	6	0	20.46	20.24	20.08	22
1.4	64QAM	1	0	20.08	20.40	20.32	22
1.4	64QAM	1	3	20.29	20.31	20.03	
1.4	64QAM	1	5	20.16	20.04	20.03	
1.4	64QAM	3	0	20.06	20.42	20.32	
1.4	64QAM	3	1	20.25	20.35	20.08	
1.4	64QAM	3	3	20.15	20.01	20.05	
1.4	64QAM	6	0	19.00	19.26	19.10	21

<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	20.10	19.91	19.92	20.5
20	QPSK	1	49	19.63	19.47	19.54	
20	QPSK	1	99	19.57	19.51	19.46	
20	QPSK	50	0	19.78	19.63	19.67	20.5
20	QPSK	50	24	19.77	19.62	19.62	
20	QPSK	50	50	19.75	19.58	19.64	
20	QPSK	100	0	19.74	19.58	19.64	
20	16QAM	1	0	19.76	19.60	19.56	20.5
20	16QAM	1	49	19.99	19.74	19.88	
20	16QAM	1	99	19.95	19.79	19.81	
20	16QAM	50	0	19.81	19.64	19.66	20.5
20	16QAM	50	24	19.78	19.61	19.65	
20	16QAM	50	50	19.74	19.56	19.68	
20	16QAM	100	0	19.75	19.58	19.63	
20	64QAM	1	0	20.02	19.82	19.76	20.5
20	64QAM	1	49	19.80	19.66	19.79	
20	64QAM	1	99	19.87	19.76	19.75	
20	64QAM	50	0	19.84	19.67	19.67	20.5
20	64QAM	50	24	19.82	19.64	19.68	
20	64QAM	50	50	19.78	19.57	19.71	
20	64QAM	100	0	19.79	19.59	19.66	
Channel				132047	132322	132597	Tune-up limit (dBm)
Frequency (MHz)				1717.5	1745	1772.5	
15	QPSK	1	0	20.03	19.73	19.75	20.5
15	QPSK	1	37	19.54	19.30	19.44	
15	QPSK	1	74	19.46	19.44	19.44	
15	QPSK	36	0	19.72	19.43	19.49	20.5
15	QPSK	36	20	19.60	19.58	19.45	
15	QPSK	36	39	19.72	19.44	19.59	
15	QPSK	75	0	19.54	19.46	19.60	
15	16QAM	1	0	19.60	19.56	19.36	20.5
15	16QAM	1	37	19.90	19.66	19.68	
15	16QAM	1	74	19.82	19.75	19.77	
15	16QAM	36	0	19.67	19.64	19.61	20.5
15	16QAM	36	20	19.68	19.51	19.64	
15	16QAM	36	39	19.57	19.53	19.57	
15	16QAM	75	0	19.71	19.44	19.48	
15	64QAM	1	0	19.87	19.69	19.75	20.5
15	64QAM	1	37	19.61	19.46	19.60	
15	64QAM	1	74	19.69	19.62	19.61	
15	64QAM	36	0	19.72	19.49	19.60	20.5
15	64QAM	36	20	19.77	19.60	19.56	
15	64QAM	36	39	19.66	19.56	19.52	
15	64QAM	75	0	19.60	19.40	19.51	
Channel				132022	132322	132622	Tune-up limit (dBm)
Frequency (MHz)				1715	1745	1775	
10	QPSK	1	0	19.96	19.85	19.90	20.5
10	QPSK	1	25	19.52	19.40	19.54	
10	QPSK	1	49	19.46	19.39	19.38	
10	QPSK	25	0	19.72	19.55	19.46	20.5
10	QPSK	25	12	19.63	19.49	19.56	
10	QPSK	25	25	19.69	19.48	19.59	
10	QPSK	50	0	19.68	19.41	19.56	
10	16QAM	1	0	19.66	19.57	19.50	20.5
10	16QAM	1	25	19.97	19.63	19.70	
10	16QAM	1	49	19.76	19.70	19.81	
10	16QAM	25	0	19.68	19.57	19.58	20.5

10	16QAM	25	12	19.75	19.53	19.57	
10	16QAM	25	25	19.61	19.55	19.54	
10	16QAM	50	0	19.59	19.38	19.43	
10	64QAM	1	0	19.99	19.77	19.64	
10	64QAM	1	25	19.80	19.58	19.73	20.5
10	64QAM	1	49	19.76	19.76	19.72	
10	64QAM	25	0	19.82	19.62	19.50	
10	64QAM	25	12	19.66	19.61	19.60	20.5
10	64QAM	25	25	19.70	19.41	19.62	
10	64QAM	50	0	19.63	19.59	19.46	
Channel				131997	132322	132647	Tune-up limit (dBm)
Frequency (MHz)				1712.5	1745	1777.5	
5	QPSK	1	0	19.91	19.89	19.80	
5	QPSK	1	12	19.52	19.45	19.43	20.5
5	QPSK	1	24	19.54	19.34	19.36	
5	QPSK	12	0	19.59	19.52	19.58	
5	QPSK	12	7	19.70	19.60	19.42	20.5
5	QPSK	12	13	19.73	19.55	19.63	
5	QPSK	25	0	19.74	19.48	19.47	
5	16QAM	1	0	19.57	19.53	19.44	
5	16QAM	1	12	19.89	19.62	19.76	20.5
5	16QAM	1	24	19.88	19.70	19.61	
5	16QAM	12	0	19.70	19.59	19.54	
5	16QAM	12	7	19.71	19.54	19.49	20.5
5	16QAM	12	13	19.68	19.40	19.54	
5	16QAM	25	0	19.62	19.49	19.61	
5	64QAM	1	0	19.88	19.67	19.63	
5	64QAM	1	12	19.71	19.57	19.60	20.5
5	64QAM	1	24	19.81	19.71	19.67	
5	64QAM	12	0	19.81	19.47	19.54	
5	64QAM	12	7	19.80	19.57	19.49	20.5
5	64QAM	12	13	19.73	19.45	19.54	
5	64QAM	25	0	19.77	19.59	19.66	
Channel				131987	132322	132657	Tune-up limit (dBm)
Frequency (MHz)				1711.5	1745	1778.5	
3	QPSK	1	0	19.95	19.87	19.82	
3	QPSK	1	8	19.63	19.39	19.45	20.5
3	QPSK	1	14	19.45	19.38	19.32	
3	QPSK	8	0	19.76	19.63	19.61	
3	QPSK	8	4	19.60	19.46	19.44	20.5
3	QPSK	8	7	19.64	19.52	19.63	
3	QPSK	15	0	19.70	19.45	19.44	
3	16QAM	1	0	19.61	19.41	19.49	
3	16QAM	1	8	19.94	19.69	19.87	20.5
3	16QAM	1	14	19.80	19.61	19.76	
3	16QAM	8	0	19.76	19.50	19.65	
3	16QAM	8	4	19.66	19.49	19.53	20.5
3	16QAM	8	7	19.58	19.39	19.49	
3	16QAM	15	0	19.65	19.58	19.56	
3	64QAM	1	0	19.90	19.62	19.75	
3	64QAM	1	8	19.66	19.52	19.69	20.5
3	64QAM	1	14	19.75	19.74	19.71	
3	64QAM	8	0	19.79	19.63	19.55	
3	64QAM	8	4	19.69	19.64	19.48	20.5
3	64QAM	8	7	19.75	19.46	19.58	
3	64QAM	15	0	19.59	19.50	19.54	
Channel				131979	132322	132665	Tune-up limit (dBm)
Frequency (MHz)				1710.7	1745	1779.3	
1.4	QPSK	1	0	19.98	19.83	19.92	
1.4	QPSK	1	3	19.55	19.31	19.42	20.5
1.4	QPSK	1	5	19.50	19.45	19.35	
1.4	QPSK	3	0	19.78	19.46	19.51	

1.4	QPSK	3	1	19.73	19.62	19.61	
1.4	QPSK	3	3	19.58	19.50	19.56	
1.4	QPSK	6	0	19.72	19.42	19.59	20.5
1.4	16QAM	1	0	19.56	19.54	19.40	
1.4	16QAM	1	3	19.97	19.61	19.87	
1.4	16QAM	1	5	19.85	19.59	19.77	20.5
1.4	16QAM	3	0	19.77	19.54	19.49	
1.4	16QAM	3	1	19.67	19.51	19.59	
1.4	16QAM	3	3	19.74	19.54	19.58	
1.4	16QAM	6	0	19.57	19.45	19.60	20.5
1.4	64QAM	1	0	19.90	19.69	19.58	
1.4	64QAM	1	3	19.76	19.48	19.59	
1.4	64QAM	1	5	19.84	19.64	19.62	19.5
1.4	64QAM	3	0	19.65	19.55	19.47	
1.4	64QAM	3	1	19.72	19.48	19.59	
1.4	64QAM	3	3	19.64	19.41	19.64	
1.4	64QAM	6	0	19.62	19.50	19.49	19.4

<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	133322	133372	
Frequency (MHz)				673	683	688	
20	QPSK	1	0	22.53	22.31	22.26	
20	QPSK	1	49	22.34	22.21	22.15	24
20	QPSK	1	99	22.16	22.17	22.06	
20	QPSK	50	0	21.49	21.33	21.24	
20	QPSK	50	24	21.45	21.34	21.23	23
20	QPSK	50	50	21.36	21.28	21.21	
20	QPSK	100	0	21.42	21.35	21.23	
20	16QAM	1	0	21.85	21.65	21.57	
20	16QAM	1	49	21.67	21.58	21.48	23
20	16QAM	1	99	21.50	21.47	21.45	
20	16QAM	50	0	20.49	20.31	20.27	
20	16QAM	50	24	20.48	20.35	20.24	22
20	16QAM	50	50	20.36	20.28	20.24	
20	16QAM	100	0	20.44	20.32	20.20	
20	64QAM	1	0	20.68	20.59	20.40	
20	64QAM	1	49	20.45	20.49	20.34	22
20	64QAM	1	99	20.32	20.31	20.30	
20	64QAM	50	0	19.40	19.34	19.26	
20	64QAM	50	24	19.36	19.35	19.24	21
20	64QAM	50	50	19.38	19.28	19.23	
20	64QAM	100	0	19.18	19.34	19.24	
Channel				133197	133297	133397	Tune-up limit (dBm)
Frequency (MHz)				670.5	680.5	690.5	
15	QPSK	1	0	22.44	22.23	22.20	
15	QPSK	1	37	22.27	22.19	22.10	24
15	QPSK	1	74	22.06	22.13	22.05	
15	QPSK	36	0	21.40	21.27	21.21	
15	QPSK	36	20	21.43	21.32	21.18	23
15	QPSK	36	39	21.32	21.27	21.18	
15	QPSK	75	0	21.36	21.31	21.23	
15	16QAM	1	0	21.76	21.64	21.48	
15	16QAM	1	37	21.63	21.56	21.38	23
15	16QAM	1	74	21.44	21.42	21.38	
15	16QAM	36	0	20.43	20.28	20.21	
15	16QAM	36	20	20.41	20.28	20.24	22
15	16QAM	36	39	20.30	20.21	20.22	
15	16QAM	75	0	20.43	20.26	20.17	
15	64QAM	1	0	20.63	20.55	20.32	22

15	64QAM	1	37	20.45	20.46	20.33	
15	64QAM	1	74	20.31	20.23	20.24	
15	64QAM	36	0	19.35	19.32	19.16	21
15	64QAM	36	20	19.30	19.26	19.15	
15	64QAM	36	39	19.33	19.28	19.18	
15	64QAM	75	0	19.18	19.27	19.22	
Channel				133172	133272	133422	Tune-up limit (dBm)
Frequency (MHz)				668	678	693	
10	QPSK	1	0	22.43	22.33	22.13	24
10	QPSK	1	25	22.34	22.21	22.07	
10	QPSK	1	49	22.30	22.17	22.04	
10	QPSK	25	0	21.58	21.32	21.17	23
10	QPSK	25	12	21.54	21.40	21.31	
10	QPSK	25	25	21.45	21.33	21.22	
10	QPSK	50	0	21.54	21.39	21.18	
10	16QAM	1	0	21.64	21.67	21.55	23
10	16QAM	1	25	21.74	21.63	21.48	
10	16QAM	1	49	21.71	21.54	21.47	
10	16QAM	25	0	20.59	20.32	20.15	22
10	16QAM	25	12	20.55	20.39	20.33	
10	16QAM	25	25	20.46	20.32	20.18	
10	16QAM	50	0	20.55	20.36	20.18	
10	64QAM	1	0	20.56	20.53	20.35	22
10	64QAM	1	25	20.45	20.50	20.32	
10	64QAM	1	49	20.16	20.45	20.34	
10	64QAM	25	0	19.33	19.31	19.15	21
10	64QAM	25	12	19.30	19.24	19.09	
10	64QAM	25	25	19.26	19.27	19.17	
10	64QAM	50	0	19.14	19.21	19.16	
Channel				133147	133247	133447	Tune-up limit (dBm)
Frequency (MHz)				665.5	675.5	695.5	
5	QPSK	1	0	22.35	22.32	22.09	24
5	QPSK	1	12	22.27	22.18	22.00	
5	QPSK	1	24	22.28	22.11	22.02	
5	QPSK	12	0	21.56	21.32	21.15	23
5	QPSK	12	7	21.54	21.37	21.30	
5	QPSK	12	13	21.37	21.30	21.12	
5	QPSK	25	0	21.52	21.30	21.09	
5	16QAM	1	0	21.63	21.60	21.46	23
5	16QAM	1	12	21.71	21.59	21.42	
5	16QAM	1	24	21.68	21.48	21.43	
5	16QAM	12	0	20.59	20.26	20.14	22
5	16QAM	12	7	20.47	20.39	20.27	
5	16QAM	12	13	20.39	20.29	20.12	
5	16QAM	25	0	20.49	20.26	20.10	
5	64QAM	1	0	20.49	20.49	20.31	22
5	64QAM	1	12	20.44	20.42	20.23	
5	64QAM	1	24	20.06	20.45	20.25	
5	64QAM	12	0	19.22	19.26	19.10	21
5	64QAM	12	7	19.24	19.16	19.07	
5	64QAM	12	13	19.15	19.21	19.13	
5	64QAM	25	0	19.18	19.23	19.18	

<TDD LTE SAR Measurement>

TDD LTE configuration setup for SAR measurement

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

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

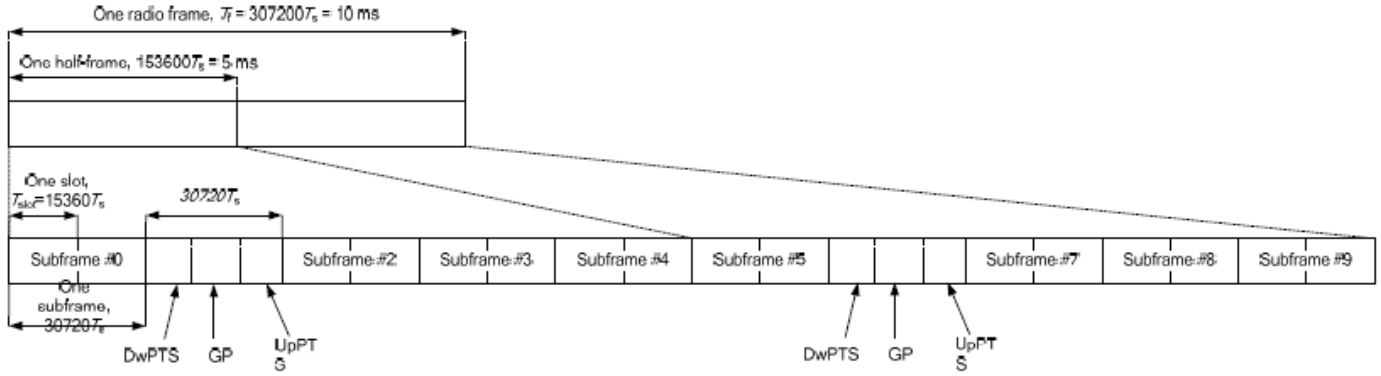


Figure 4.2-1: Frame structure type 2 (for 5 ms switch-point periodicity).

Table 4.2-2: Uplink-downlink configurations.

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

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

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

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

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

The highest duty factor is resulted from:

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

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

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

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

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

<LTE Band 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	
Frequency (MHz)				2580	2595	2610	
20	QPSK	1	0	20.63	20.57	20.53	21.9
20	QPSK	1	49	20.43	20.45	20.42	
20	QPSK	1	99	20.40	20.43	20.44	
20	QPSK	50	0	20.60	20.59	20.58	21.9
20	QPSK	50	24	20.58	20.52	20.51	
20	QPSK	50	50	20.57	20.59	20.52	
20	QPSK	100	0	20.61	20.55	20.50	
20	16QAM	1	0	20.59	20.61	20.55	21.9
20	16QAM	1	49	20.53	20.51	20.50	
20	16QAM	1	99	20.54	20.56	20.53	
20	16QAM	50	0	20.56	20.58	20.55	21.8
20	16QAM	50	24	20.47	20.45	20.45	
20	16QAM	50	50	20.62	20.62	20.61	
20	16QAM	100	0	20.61	20.56	20.53	
20	64QAM	1	0	20.35	20.28	20.21	21.8
20	64QAM	1	49	20.27	20.24	20.20	
20	64QAM	1	99	20.28	20.25	20.24	
20	64QAM	50	0	19.57	19.59	19.57	20.8
20	64QAM	50	24	19.67	19.57	19.54	
20	64QAM	50	50	19.61	19.62	19.61	
20	64QAM	100	0	19.62	19.56	19.55	
Channel				37825	38000	38175	Tune-up limit (dBm)
Frequency (MHz)				2577.5	2595	2612.5	
15	QPSK	1	0	20.58	20.52	20.44	21.9
15	QPSK	1	37	20.37	20.40	20.38	
15	QPSK	1	74	20.35	20.43	20.38	
15	QPSK	36	0	20.54	20.49	20.57	21.9
15	QPSK	36	20	20.48	20.46	20.49	
15	QPSK	36	39	20.49	20.55	20.44	
15	QPSK	75	0	20.59	20.51	20.41	
15	16QAM	1	0	20.57	20.53	20.45	21.9
15	16QAM	1	37	20.46	20.46	20.44	
15	16QAM	1	74	20.53	20.50	20.46	
15	16QAM	36	0	20.54	20.50	20.49	21.8
15	16QAM	36	20	20.42	20.42	20.38	
15	16QAM	36	39	20.62	20.57	20.58	
15	16QAM	75	0	20.52	20.49	20.47	
15	64QAM	1	0	20.30	20.19	20.12	21.8
15	64QAM	1	37	20.26	20.20	20.19	
15	64QAM	1	74	20.20	20.15	20.15	
15	64QAM	36	0	19.47	19.57	19.53	20.8
15	64QAM	36	20	19.58	19.57	19.46	
15	64QAM	36	39	19.58	19.53	19.57	
15	64QAM	75	0	19.59	19.47	19.52	
Channel				37800	38000	38200	Tune-up limit (dBm)
Frequency (MHz)				2575	2595	2615	
10	QPSK	1	0	20.49	20.47	20.43	21.9
10	QPSK	1	25	20.34	20.38	20.31	
10	QPSK	1	49	20.28	20.37	20.38	
10	QPSK	25	0	20.46	20.41	20.50	21.9
10	QPSK	25	12	20.41	20.44	20.48	
10	QPSK	25	25	20.40	20.49	20.42	
10	QPSK	50	0	20.51	20.47	20.38	
10	16QAM	1	0	20.47	20.53	20.38	21.9
10	16QAM	1	25	20.37	20.42	20.44	
10	16QAM	1	49	20.51	20.46	20.43	
10	16QAM	25	0	20.51	20.48	20.44	21.8

10	16QAM	25	12	20.36	20.41	20.33	
10	16QAM	25	25	20.55	20.53	20.51	
10	16QAM	50	0	20.45	20.46	20.37	
10	64QAM	1	0	20.26	20.13	20.09	
10	64QAM	1	25	20.16	20.11	20.16	21.8
10	64QAM	1	49	20.19	20.12	20.10	
10	64QAM	25	0	19.40	19.53	19.43	
10	64QAM	25	12	19.49	19.55	19.37	
10	64QAM	25	25	19.52	19.47	19.54	20.8
10	64QAM	50	0	19.53	19.47	19.52	
Channel				37775	38000	38225	Tune-up limit (dBm)
Frequency (MHz)				2572.5	2595	2617.5	
5	QPSK	1	0	20.43	20.37	20.39	
5	QPSK	1	12	20.28	20.31	20.26	21.9
5	QPSK	1	24	20.27	20.33	20.33	
5	QPSK	12	0	20.40	20.31	20.46	
5	QPSK	12	7	20.32	20.41	20.47	
5	QPSK	12	13	20.34	20.49	20.37	21.9
5	QPSK	25	0	20.50	20.47	20.35	
5	16QAM	1	0	20.37	20.52	20.31	
5	16QAM	1	12	20.30	20.40	20.37	21.9
5	16QAM	1	24	20.44	20.41	20.41	
5	16QAM	12	0	20.41	20.48	20.36	
5	16QAM	12	7	20.36	20.41	20.29	
5	16QAM	12	13	20.45	20.50	20.47	21.8
5	16QAM	25	0	20.41	20.38	20.36	
5	64QAM	1	0	20.19	20.05	20.07	
5	64QAM	1	12	20.09	20.06	20.15	21.8
5	64QAM	1	24	20.19	20.09	20.04	
5	64QAM	12	0	19.35	19.53	19.33	
5	64QAM	12	7	19.48	19.55	19.37	
5	64QAM	12	13	19.49	19.43	19.54	20.8
5	64QAM	25	0	19.50	19.38	19.43	

<LTE Band 41>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Low Middle Ch. / Freq.	Power Middle Ch. / Freq.	Power High Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				39750	40185	40620	41055	41490	
Frequency (MHz)				2506	2549.5	2593	2636.5	2680	
20	QPSK	1	0	20.29	20.37	20.48	20.52	20.34	
20	QPSK	1	49	20.08	20.22	20.30	20.29	20.07	21.9
20	QPSK	1	99	20.09	20.18	20.38	20.36	20.03	
20	QPSK	50	0	20.30	20.36	20.46	20.47	20.27	
20	QPSK	50	24	20.21	20.28	20.45	20.44	20.23	
20	QPSK	50	50	20.25	20.34	20.40	20.43	20.17	21.9
20	QPSK	100	0	20.28	20.37	20.47	20.45	20.22	
20	16QAM	1	0	20.15	20.24	20.41	20.38	20.25	
20	16QAM	1	49	20.16	20.22	20.34	20.35	20.12	21.9
20	16QAM	1	99	20.22	20.25	20.43	20.46	20.10	
20	16QAM	50	0	20.25	20.35	20.40	20.49	20.32	
20	16QAM	50	24	20.29	20.39	20.48	20.50	20.24	
20	16QAM	50	50	20.28	20.36	20.49	20.49	20.19	21.9
20	16QAM	100	0	20.30	20.36	20.47	20.51	20.25	
20	64QAM	1	0	20.04	20.08	20.16	20.14	20.14	
20	64QAM	1	49	19.85	20.03	20.09	20.11	19.87	20.9
20	64QAM	1	99	20.00	20.06	20.15	20.20	19.78	
20	64QAM	50	0	19.25	19.32	19.42	19.49	19.30	
20	64QAM	50	24	19.30	19.39	19.50	19.50	19.25	
20	64QAM	50	50	19.27	19.37	19.48	19.48	19.18	20.9
20	64QAM	100	0	19.29	19.37	19.50	19.48	19.25	
Channel				39725	40173	40620	41068	41515	Tune-up limit (dBm)
Frequency (MHz)				2503.5	2548.3	2593	2637.8	2682.5	

15	QPSK	1	0	20.26	20.36	20.46	20.46	20.31	21.90
15	QPSK	1	37	20.03	20.21	20.20	20.28	20.03	
15	QPSK	1	74	20.05	20.15	20.28	20.26	19.98	
15	QPSK	36	0	20.22	20.36	20.41	20.42	20.19	21.9
15	QPSK	36	20	20.19	20.20	20.42	20.37	20.16	
15	QPSK	36	39	20.19	20.26	20.37	20.43	20.09	
15	QPSK	75	0	20.19	20.37	20.44	20.35	20.22	
15	16QAM	1	0	20.11	20.23	20.38	20.31	20.20	21.9
15	16QAM	1	37	20.06	20.13	20.31	20.35	20.09	
15	16QAM	1	74	20.20	20.23	20.43	20.37	20.02	
15	16QAM	36	0	20.24	20.34	20.39	20.49	20.25	21.9
15	16QAM	36	20	20.19	20.34	20.38	20.48	20.19	
15	16QAM	36	39	20.22	20.32	20.48	20.49	20.09	
15	16QAM	75	0	20.28	20.27	20.44	20.44	20.16	
15	64QAM	1	0	19.99	19.98	20.06	20.07	20.04	20.9
15	64QAM	1	37	19.85	20.02	20.02	20.01	19.80	
15	64QAM	1	74	19.96	19.98	20.07	20.13	19.78	
15	64QAM	36	0	19.19	19.28	19.41	19.47	19.23	20.9
15	64QAM	36	20	19.30	19.30	19.50	19.49	19.21	
15	64QAM	36	39	19.26	19.37	19.38	19.41	19.11	
15	64QAM	75	0	19.29	19.31	19.43	19.45	19.18	
Channel				39700	40160	40620	41080	41540	Tune-up limit (dBm)
Frequency (MHz)				2501	2547	2593	2639	2685	
10	QPSK	1	0	20.21	20.28	20.44	20.46	20.27	21.90
10	QPSK	1	25	19.96	20.12	20.11	20.26	19.95	
10	QPSK	1	49	19.99	20.14	20.23	20.17	19.95	
10	QPSK	25	0	20.21	20.30	20.37	20.37	20.12	21.9
10	QPSK	25	12	20.13	20.19	20.38	20.27	20.13	
10	QPSK	25	25	20.11	20.26	20.36	20.42	20.06	
10	QPSK	50	0	20.12	20.29	20.37	20.33	20.21	
10	16QAM	1	0	20.10	20.20	20.31	20.29	20.15	21.9
10	16QAM	1	25	20.01	20.10	20.24	20.27	20.00	
10	16QAM	1	49	20.13	20.15	20.38	20.28	19.95	
10	16QAM	25	0	20.19	20.24	20.34	20.47	20.20	21.9
10	16QAM	25	12	20.14	20.34	20.31	20.48	20.11	
10	16QAM	25	25	20.20	20.28	20.41	20.45	20.02	
10	16QAM	50	0	20.26	20.17	20.44	20.38	20.12	
10	64QAM	1	0	19.93	19.97	20.05	19.97	20.00	20.9
10	64QAM	1	25	19.78	20.02	19.94	19.94	19.74	
10	64QAM	1	49	19.94	19.91	20.01	20.08	19.72	
10	64QAM	25	0	19.17	19.26	19.37	19.42	19.18	20.9
10	64QAM	25	12	19.28	19.24	19.42	19.43	19.18	
10	64QAM	25	25	19.21	19.28	19.31	19.37	19.04	
10	64QAM	50	0	19.23	19.21	19.39	19.35	19.11	
Channel				39675	40148	40620	41093	41565	Tune-up limit (dBm)
Frequency (MHz)				2498.5	2545.8	2593	2640.30	2687.5	
5	QPSK	1	0	20.18	20.19	20.34	20.42	20.24	21.90
5	QPSK	1	12	19.94	20.03	20.06	20.18	19.99	
5	QPSK	1	24	19.95	20.09	20.16	20.07	19.96	
5	QPSK	12	0	20.20	20.20	20.35	20.33	20.03	21.9
5	QPSK	12	7	20.09	20.19	20.35	20.20	20.09	
5	QPSK	12	13	20.09	20.26	20.27	20.35	20.06	
5	QPSK	25	0	20.11	20.24	20.35	20.32	20.15	
5	16QAM	1	0	20.03	20.15	20.31	20.21	20.08	21.9
5	16QAM	1	12	19.91	20.08	20.20	20.17	19.93	
5	16QAM	1	24	20.10	20.12	20.37	20.25	19.94	
5	16QAM	12	0	20.15	20.16	20.29	20.37	20.20	21.9
5	16QAM	12	7	20.07	20.25	20.28	20.48	20.04	
5	16QAM	12	13	20.10	20.25	20.35	20.42	19.99	
5	16QAM	25	0	20.22	20.09	20.38	20.38	20.08	
5	64QAM	1	0	19.85	19.92	20.04	19.94	19.98	20.9
5	64QAM	1	12	19.77	20.01	19.93	19.89	19.73	

5	64QAM	1	24	19.90	19.81	19.96	20.07	19.65	
5	64QAM	12	0	19.08	19.25	19.33	19.38	19.16	20.9
5	64QAM	12	7	19.23	19.17	19.38	19.36	19.08	
5	64QAM	12	13	19.20	19.18	19.21	19.31	18.98	
5	64QAM	25	0	19.17	19.20	19.33	19.31	19.09	

<LTE Band 41_HPUE>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Low Middle Ch. / Freq.	Power Middle Ch. / Freq.	Power High Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				39750	40185	40620	41055	41490	
Frequency (MHz)				2506	2549.5	2593	2636.5	2680	
20	QPSK	1	0	22.02	22.02	22.12	22.28	21.96	23.5
20	QPSK	1	49	21.55	21.64	21.63	21.99	21.68	
20	QPSK	1	99	21.58	21.63	21.76	21.93	21.66	
20	QPSK	50	0	21.80	21.89	21.88	22.27	22.00	23.5
20	QPSK	50	24	21.86	21.95	21.96	22.19	21.98	
20	QPSK	50	50	21.87	21.94	21.95	22.08	21.90	
20	QPSK	100	0	21.88	21.96	21.97	22.20	21.96	
20	16QAM	1	0	21.65	21.67	21.76	22.21	21.86	23.5
20	16QAM	1	49	21.95	21.98	21.98	22.19	22.05	
20	16QAM	1	99	21.99	21.99	22.06	22.18	22.04	
20	16QAM	50	0	21.87	21.89	21.91	22.19	22.02	23.5
20	16QAM	50	24	21.92	21.97	21.98	22.15	21.99	
20	16QAM	50	50	21.89	21.94	21.96	22.17	21.93	
20	16QAM	100	0	21.91	21.94	21.95	22.15	21.98	
20	64QAM	1	0	21.87	21.89	21.89	21.39	21.91	22.5
20	64QAM	1	49	21.71	21.85	21.88	22.05	21.44	
20	64QAM	1	99	21.81	21.83	21.98	22.03	20.60	
20	64QAM	50	0	21.15	21.20	21.23	21.64	20.73	22.5
20	64QAM	50	24	21.22	21.25	21.27	21.61	20.51	
20	64QAM	50	50	21.20	21.25	21.27	21.52	20.54	
20	64QAM	100	0	21.22	21.27	21.27	21.53	20.51	
Channel				39725	40173	40620	41068	41515	Tune-up limit (dBm)
Frequency (MHz)				2503.5	2548.3	2593	2637.8	2682.5	
15	QPSK	1	0	21.99	21.93	22.05	22.19	21.96	23.50
15	QPSK	1	37	21.58	21.58	21.61	21.98	21.58	
15	QPSK	1	74	21.58	21.54	21.71	21.83	21.66	
15	QPSK	36	0	21.75	21.85	21.86	22.17	22.00	23.5
15	QPSK	36	20	21.81	21.85	21.87	22.15	21.96	
15	QPSK	36	39	21.78	21.84	21.89	21.98	21.89	
15	QPSK	75	0	21.88	21.86	21.90	22.11	21.92	
15	16QAM	1	0	21.61	21.62	21.66	22.14	21.78	23.5
15	16QAM	1	37	21.88	21.89	21.94	22.18	22.03	
15	16QAM	1	74	21.94	21.95	21.98	22.17	21.99	
15	16QAM	36	0	21.86	21.89	21.88	22.15	21.96	23.5
15	16QAM	36	20	21.85	21.94	21.94	22.07	21.93	
15	16QAM	36	39	21.83	21.86	21.93	22.15	21.90	
15	16QAM	75	0	21.89	21.84	21.85	22.12	21.94	
15	64QAM	1	0	21.83	21.80	21.83	21.34	21.82	22.5
15	64QAM	1	37	21.61	21.80	21.81	21.95	21.40	
15	64QAM	1	74	21.79	21.78	21.96	21.97	20.58	
15	64QAM	36	0	21.10	21.14	21.18	21.63	20.71	22.5
15	64QAM	36	20	21.18	21.16	21.17	21.51	20.58	
15	64QAM	36	39	21.10	21.25	21.20	21.51	20.55	
15	64QAM	75	0	21.22	21.21	21.21	21.51	20.51	
Channel				39700	40160	40620	41080	41540	Tune-up limit (dBm)
Frequency (MHz)				2501	2547	2593	2639	2685	
10	QPSK	1	0	21.89	21.84	21.96	22.16	21.94	23.50
10	QPSK	1	25	21.51	21.51	21.58	21.91	21.58	
10	QPSK	1	49	21.50	21.56	21.65	21.79	21.62	
10	QPSK	25	0	21.69	21.81	21.81	22.15	21.90	23.5

10	QPSK	25	12	21.77	21.84	21.84	22.12	21.92	
10	QPSK	25	25	21.78	21.75	21.85	21.90	21.88	
10	QPSK	50	0	21.86	21.85	21.84	22.02	21.91	
10	16QAM	1	0	21.52	21.58	21.57	22.09	21.75	
10	16QAM	1	25	21.81	21.81	21.90	22.11	21.97	23.5
10	16QAM	1	49	21.88	21.88	21.93	22.14	21.98	
10	16QAM	25	0	21.79	21.82	21.81	22.15	21.94	
10	16QAM	25	12	21.78	21.94	21.87	22.05	21.85	23.5
10	16QAM	25	25	21.81	21.86	21.89	22.09	21.80	
10	16QAM	50	0	21.85	21.77	21.78	22.08	21.91	
10	64QAM	1	0	21.80	21.72	21.76	21.32	21.72	
10	64QAM	1	25	21.55	21.77	21.81	21.89	21.31	22.5
10	64QAM	1	49	21.69	21.75	21.88	21.89	20.54	
10	64QAM	25	0	21.10	21.08	21.12	21.54	20.66	
10	64QAM	25	12	21.10	21.15	21.13	21.42	20.57	22.5
10	64QAM	25	25	21.06	21.22	21.16	21.42	20.54	
10	64QAM	50	0	21.17	21.11	21.13	21.49	20.58	
Channel				39675	40148	40620	41093	41565	Tune-up limit (dBm)
Frequency (MHz)				2498.5	2545.8	2593	2640.30	2687.5	
5	QPSK	1	0	21.83	21.75	21.94	22.15	21.92	
5	QPSK	1	12	21.55	21.58	21.52	21.84	21.53	23.50
5	QPSK	1	24	21.59	21.56	21.55	21.73	21.53	
5	QPSK	12	0	21.67	21.76	21.71	22.08	21.83	
5	QPSK	12	7	21.74	21.78	21.81	22.03	21.88	23.5
5	QPSK	12	13	21.74	21.70	21.82	21.81	21.85	
5	QPSK	25	0	21.77	21.77	21.82	21.95	21.87	
5	16QAM	1	0	21.53	21.52	21.54	22.04	21.72	
5	16QAM	1	12	21.71	21.78	21.87	22.03	21.95	23.5
5	16QAM	1	24	21.78	21.82	21.87	22.12	21.93	
5	16QAM	12	0	21.77	21.82	21.71	22.08	21.89	
5	16QAM	12	7	21.73	21.84	21.86	22.05	21.78	23.5
5	16QAM	12	13	21.74	21.82	21.79	22.05	21.71	
5	16QAM	25	0	21.77	21.71	21.71	22.00	21.88	
5	64QAM	1	0	21.74	21.72	21.68	21.30	21.62	
5	64QAM	1	12	21.54	21.74	21.81	21.81	21.28	22.5
5	64QAM	1	24	21.68	21.65	21.78	21.87	20.53	
5	64QAM	12	0	21.05	21.07	21.11	21.51	20.62	
5	64QAM	12	7	21.07	21.15	21.08	21.33	20.54	22.5
5	64QAM	12	13	21.05	21.17	21.09	21.34	20.55	
5	64QAM	25	0	21.13	21.05	21.12	21.44	20.55	

<LTE Band 48>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Low Middle Ch. / Freq.	Power High Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				55340	55830	56150	56640	
Frequency (MHz)				3560	3609	3641	3690	
20	QPSK	1	0	22.36	22.16	22.11	22.13	24
20	QPSK	1	49	22.20	22.09	22.00	22.08	
20	QPSK	1	99	22.14	22.00	22.04	22.09	
20	QPSK	50	0	21.39	21.20	21.10	21.11	23
20	QPSK	50	24	21.28	21.07	21.08	21.04	
20	QPSK	50	50	21.19	21.00	21.01	21.02	
20	QPSK	100	0	21.27	21.09	21.05	21.01	
20	16QAM	1	0	21.45	21.29	21.17	21.19	23
20	16QAM	1	49	21.23	21.05	21.04	21.03	
20	16QAM	1	99	21.30	21.04	21.02	21.08	
20	16QAM	50	0	20.42	20.26	20.13	20.11	22
20	16QAM	50	24	20.30	20.12	20.09	20.04	
20	16QAM	50	50	20.23	20.05	20.01	20.07	
20	16QAM	100	0	20.28	20.11	20.07	20.02	
20	64QAM	1	0	20.14	20.06	20.03	20.08	22
20	64QAM	1	49	20.37	20.20	20.07	20.14	
20	64QAM	1	99	20.15	20.07	20.01	20.05	
20	64QAM	50	0	19.41	19.25	19.13	19.12	21
20	64QAM	50	24	19.30	19.12	19.08	19.04	
20	64QAM	50	50	19.25	19.04	19.01	19.05	
20	64QAM	100	0	19.28	19.08	19.07	19.04	
Channel				55315	55820	56160	56665	Tune-up limit (dBm)
Frequency (MHz)				3557.5	3608	3642	3692.5	
15	QPSK	1	0	22.34	22.26	22.16	22.17	24
15	QPSK	1	37	22.23	22.16	22.04	22.13	
15	QPSK	1	74	22.16	22.08	22.07	22.09	
15	QPSK	36	0	21.41	21.24	21.18	21.16	23
15	QPSK	36	20	21.37	21.08	21.10	21.04	
15	QPSK	36	39	21.23	21.09	21.06	21.06	
15	QPSK	75	0	21.34	21.15	21.11	21.05	
15	16QAM	1	0	21.45	21.33	21.17	21.28	23
15	16QAM	1	37	21.23	21.07	21.07	21.06	
15	16QAM	1	74	21.36	21.14	21.02	21.10	
15	16QAM	36	0	20.47	20.31	20.21	20.13	22
15	16QAM	36	20	20.38	20.17	20.12	20.13	
15	16QAM	36	39	20.28	20.05	20.06	20.13	
15	16QAM	75	0	20.33	20.21	20.14	20.04	
15	64QAM	1	0	20.18	20.07	20.09	20.12	22
15	64QAM	1	37	20.40	20.20	20.14	20.24	
15	64QAM	1	74	20.25	20.11	20.04	20.13	
15	64QAM	36	0	19.46	19.25	19.21	19.19	21
15	64QAM	36	20	19.30	19.20	19.11	19.09	
15	64QAM	36	39	19.26	19.10	19.04	19.12	
15	64QAM	75	0	19.33	19.18	19.14	19.11	
Channel				55290	55815	56165	56690	Tune-up limit (dBm)
Frequency (MHz)				3555	3607.5	3642.5	3695	
10	QPSK	1	0	22.33	22.26	22.18	22.23	24
10	QPSK	1	25	22.24	22.18	22.01	22.09	
10	QPSK	1	49	22.18	22.00	22.10	22.19	
10	QPSK	25	0	21.48	21.21	21.12	21.17	23
10	QPSK	25	12	21.35	21.11	21.10	21.12	
10	QPSK	25	25	21.20	21.08	21.07	21.09	
10	QPSK	50	0	21.33	21.18	21.05	21.11	
10	16QAM	1	0	21.47	21.37	21.18	21.24	23
10	16QAM	1	25	21.29	21.10	21.11	21.09	
10	16QAM	1	49	21.30	21.07	21.11	21.09	
10	16QAM	25	0	20.45	20.36	20.16	20.12	22

10	16QAM	25	12	20.36	20.16	20.14	20.06	
10	16QAM	25	25	20.25	20.14	20.07	20.09	
10	16QAM	50	0	20.31	20.12	20.11	20.06	
10	64QAM	1	0	20.19	20.16	20.08	20.14	22
10	64QAM	1	25	20.43	20.24	20.11	20.15	
10	64QAM	1	49	20.25	20.16	20.10	20.11	
10	64QAM	25	0	19.51	19.27	19.21	19.19	21
10	64QAM	25	12	19.32	19.21	19.18	19.05	
10	64QAM	25	25	19.26	19.11	19.04	19.14	
10	64QAM	50	0	19.28	19.15	19.09	19.07	
Channel				55265	55810	56170	56715	Tune-up limit (dBm)
Frequency (MHz)				3552.5	3607	3643	3697.5	
5	QPSK	1	0	22.32	22.18	22.13	22.14	24
5	QPSK	1	12	22.29	22.15	22.01	22.15	
5	QPSK	1	24	22.18	22.05	22.06	22.10	
5	QPSK	12	0	21.43	21.22	21.17	21.21	23
5	QPSK	12	7	21.37	21.08	21.18	21.05	
5	QPSK	12	13	21.23	21.05	21.06	21.11	
5	QPSK	25	0	21.28	21.10	21.08	21.03	
5	16QAM	1	0	21.45	21.33	21.27	21.21	23
5	16QAM	1	12	21.33	21.11	21.07	21.13	
5	16QAM	1	24	21.40	21.09	21.02	21.17	
5	16QAM	12	0	20.50	20.28	20.14	20.18	22
5	16QAM	12	7	20.30	20.22	20.19	20.11	
5	16QAM	12	13	20.26	20.11	20.02	20.16	
5	16QAM	25	0	20.38	20.21	20.13	20.03	
5	64QAM	1	0	20.19	20.16	20.08	20.08	22
5	64QAM	1	12	20.43	20.24	20.11	20.23	
5	64QAM	1	24	20.17	20.16	20.09	20.10	
5	64QAM	12	0	19.50	19.25	19.19	19.20	21
5	64QAM	12	7	19.37	19.12	19.09	19.06	
5	64QAM	12	13	19.34	19.07	19.06	19.12	
5	64QAM	25	0	19.30	19.17	19.09	19.05	

12. DL/UL carrier aggregation

<LTE Carrier Aggregation combinations>

General Note:

1. This device supports Carrier Aggregation on downlink only for inter and intra band, Uplink CA is not supported. For the device supports combination bands and configurations are according to 3GPP.
2. In applying the existing power measurement procedure of KDB 941225 D05A for DL CA SAR test exclusion, only the subset with the largest number of combinations of the frequency band and CCs in each row need consideration, and that configurations require power measurement should be highlighted in the below table.

2CC Downlink Carrier Aggregation				3CC Downlink Carrier Aggregation			
Number	Combination	Restriction	Covered by Measurement Superset	Number	Combination	Restriction	Covered by Measurement Superset
1	CA_12A-12A		2CC-2	1	CA_12A-30A-66A		4CC-1
2	CA_12A-25A			2	CA_12A-66A-66A		3CC-1
3	CA_12A-30A		3CC-1	3	CA_12A-66C		3CC-1
4	CA_12A-66A		3CC-1	4	CA_12B-66A		3CC-1
5	CA_12B		2CC-2	5	CA_13A-48A-66A		4CC-3
6	CA_13A-48A		3CC-5	6	CA_12A-48C		
7	CA_13A-66A		3CC-5	7	CA_13A-66A-66A		3CC-5
8	CA_14A-30A		3CC-10	8	CA_13A-66B		3CC-5
9	CA_14A-66A		3CC-10	9	CA_13A-66C		3CC-5
10	CA_25A-25A		3CC-12	10	CA_14A-30A-66A		4CC-13
11	CA_25A-26A		3CC-12	11	CA_14A-66A-66A		3CC-10
12	CA_25A-41A		3CC-15	12	CA_25A-25A-25A		3CC-12
13	CA_26A-41A		3CC-15	13	CA_25A-25A-26A		3CC-15
14	CA_2A-12A		3CC-22	14	CA_25A-25A-41A		3CC-15
15	CA_2A-13A		3CC-23	15	CA_25A-26A-41A		4CC-16
16	CA_2A-14A		3CC-24	16	CA_25A-41C		3CC-15
17	CA_2A-17A			17	CA_26A-41C		3CC-15
18	CA_2A-2A		3CC-19	18	CA_2A-13A-48A		4CC-23
19	CA_2A-30A		3CC-25	19	CA_2A-13A-66A		4CC-23
20	CA_2A-48A		3CC-32	20	CA_2A-14A-30A		4CC-28
21	CA_2A-4A		3CC-39	21	CA_2A-14A-66A		4CC-28
22	CA_2A-5A		3CC-39	22	CA_2A-2A-12A		3CC-42
23	CA_2A-66A		3CC-45	23	CA_2A-2A-13A		3CC-19
24	CA_2A-71A		3CC-40	24	CA_2A-2A-14A		3CC-20
25	CA_2A-7A		3CC-30	25	CA_2A-2A-30A		3CC-31
26	CA_2C		3CC-30	26	CA_2A-2A-4A		3CC-35
27	CA_30A-66A		3CC-96	27	CA_2A-2A-5A		3CC-39
28	CA_38C		2CC-50	28	CA_2A-2A-66A		3CC-45
29	CA_41A-41A		3CC-63	29	CA_2A-2A-71A		3CC-40
30	CA_41A-42A		3CC-63	30	CA_2A-2A-7A		3CC-41
31	CA_41A-48A			31	CA_2A-30A-66A		4CC-18
32	CA_41C		3CC-63	32	CA_2A-48A-48A		3CC-33
33	CA_42A-42A		3CC-63	33	CA_2A-48A-66A		4CC-23
34	CA_42C		3CC-63	34	CA_2A-48C		3CC-44
35	CA_48A-48A		2CC-31	35	CA_2A-4A-12A		4CC-38
36	CA_48A-66A		3CC-69	36	CA_2A-4A-13A		4CC-39
37	CA_48A-71A		3CC-70	37	CA_2A-4A-30A		4CC-63
38	CA_48C		2CC-31	38	CA_2A-4A-4A		3CC-35
39	CA_4A-12A		3CC-79	39	CA_2A-4A-5A		4CC-41
40	CA_4A-13A		3CC-83	40	CA_2A-4A-71A		4CC-42
41	CA_4A-30A		3CC-79	41	CA_2A-4A-7A		4CC-65
42	CA_4A-48A		4CC-113	42	CA_2A-5A-12A		4CC-43
43	CA_4A-4A		2CC-39	43	CA_2A-5A-30A		4CC-44
44	CA_4A-5A		2CC-39	44	CA_2A-5A-48A		4CC-72

45	CA_4A-17A			45	CA_2A-5A-66A		4CC-45
46	CA_4A-71A		3CC-40	46	CA_2A-5A-7A		
47	CA_5A-12A		3CC-42	47	CA_2A-5B		3CC-46
48	CA_5A-25A			48	CA_2A-66A-66A		3CC-33
49	CA_5A-30A		3CC-43	49	CA_2A-66A-71A		4CC-48
50	CA_5A-38A			50	CA_2A-66B		3CC-33
51	CA_5A-41A			51	CA_2A-66C		3CC-33
52	CA_5A-48A		3CC-44	52	CA_2A-7A-12A		4CC-141
53	CA_5A-5A		2CC-54	53	CA_2A-7A-66A		4CC-85
54	CA_5A-66A		3CC-45	54	CA_2A-7A-7A		3CC-53
55	CA_5A-7A		3CC-46	55	CA_2A-7C		3CC-53
56	CA_5B		2CC-54	56	CA_2C-12A		3CC-42
57	CA_66A-66A		2CC-54	57	CA_2C-30A		3CC-43
58	CA_66A-71A		3CC-108	58	CA_2C-5A		3CC-43
59	CA_66B		2CC-54	59	CA_2C-66A		3CC-45
60	CA_66C		2CC-54	60	CA_30A-66A-66A		3CC-31
61	CA_7A-12A		3CC-52	61	CA_41A-41A-41A		3CC-63
62	CA_7A-42A			62	CA_41A-41C		3CC-63
63	CA_7A-66A		3CC-113	63	CA_41A-42A-42A		5CC-39
64	CA_7A-7A		3CC-52	64	CA_41A-42C		3CC-63
65	CA_7B		3CC-52	65	CA_41C-42A		3CC-63
66	CA_7C		3CC-52	66	CA_41D		3CC-63
				67	CA_42A-42C		3CC-63
				68	CA_42D		3CC-63
				69	CA_48A-48A-66A		4CC-53
				70	CA_48A-48A-71A		
				71	CA_48A-48C		3CC-69
				72	CA_48A-66A-66A		3CC-69
				73	CA_48A-66B		3CC-69
				74	CA_48A-66C		3CC-69
				75	CA_48C-66A		3CC-69
				76	CA_48C-71A		3CC-70
				77	CA_48D		3CC-69
				78	CA_4A-12A-12A		3CC-79
				79	CA_4A-12A-30A		4CC-58
				80	CA_4A-12B		3CC-79
				81	CA_4A-48C		4CC-113
				82	CA_4A-4A-12A		3CC-79
				83	CA_4A-4A-13A		4CC-113
				84	CA_4A-4A-30A		3CC-79
				85	CA_4A-4A-5A		3CC-88
				86	CA_4A-4A-71A		4CC-42
				87	CA_4A-4A-7A		3CC-91
				88	CA_4A-5A-12A		4CC-62
				89	CA_4A-5A-30A		5CC-31
				90	CA_4A-5B		3CC-88
				91	CA_4A-7A-12A		4CC-65
				92	CA_4A-7A-7A		3CC-91
				93	CA_4A-7C		3CC-91
				94	CA_5A-12A-66A		5CC-21
				95	CA_5A-12B		3CC-94
				96	CA_5A-30A-66A		5CC-22
				97	CA_5A-48A-48A		4CC-72
				98	CA_5A-48C		3CC-97
				99	CA_5A-5A-66A		3CC-96
				100	CA_5A-66A-66A		3CC-96

				101	CA_5A-66B		3CC-96
				102	CA_5A-66C		3CC-96
				103	CA_5A-7A-7A		3CC-46
				104	CA_5A-7C		3CC-103
				105	CA_5B-30A		3CC-96
				106	CA_5B-66A		3CC-96
				107	CA_66A-66A-66A		3CC-113
				108	CA_66A-66A-71A		4CC-83
				109	CA_66A-66B		3CC-113
				110	CA_66A-66C		3CC-113
				111	CA_66C-71A		3CC-108
				112	CA_66D		3CC-113
				113	CA_7A-12A-66A		4CC-85
				114	CA_7A-12B		3CC-113
				115	CA_7A-66A-66A		3CC-113
				116	CA_7C-66A		3CC-113
				117	CA_7A-7A-13A		4CC-142
				118	CA_2A-12A-12A		3CC-119
				119	CA_2A-12A-30A		4CC-18
				120	CA_2A-12A-66A		4CC-18
				121	CA_2A-12B		3CC-119

4CC Downlink Carrier Aggregation				5CC Downlink Carrier Aggregation			
Number	Combination	Restriction	Covered by Measurement Superset	Number	Combination	Restriction	Covered by Measurement Superset
1	CA_12A-30A-66A-66A		4CC-18	1	CA_13A-48A-48D		5CC-7
2	CA_12B-66A-66A		4CC-1	2	CA_13A-48C-48C		5CC-1
3	CA_13A-48A-48A-66A		4CC-23	3	CA_13A-48E		5CC-1
4	CA_13A-48A-48C		4CC-3	4	CA_25A-25A-41D		
5	CA_13A-48A-66B		4CC-3	5	CA_2A-12A-30A-66A-66A		
6	CA_13A-48A-66C		4CC-3	6	CA_2A-12B-66A-66A		5CC-5
7	CA_13A-48C-66A		4CC-3	7	CA_2A-13A-48A-48A-66A		
8	CA_13A-48D		4CC-3	8	CA_2A-13A-48A-48C		5CC-7
9	CA_13A-66A-66A-66A		4CC-3	9	CA_2A-13A-48C-66A		5CC-7
10	CA_13A-66A-66B		4CC-3	10	CA_2A-13A-48D		5CC-7
11	CA_13A-66A-66C		4CC-3	11	CA_2A-13A-66A-66B		5CC-7
12	CA_13A-66D		4CC-3	12	CA_2A-13A-66A-66C		5CC-7
13	CA_14A-30A-66A-66A		4CC-28	13	CA_2A-13A-66D		5CC-7
14	CA_14A-66A-66A-66A		4CC-13	14	CA_2A-14A-30A-66A-66A		
15	CA_25A-25A-41C		4CC-16	15	CA_2A-14A-66A-66A-66A		5CC-14
16	CA_25A-26A-41C			16	CA_2A-2A-12A-30A-66A		5CC-5
17	CA_25A-41D		4CC-16	17	CA_2A-2A-12A-66A-66A		5CC-5
18	CA_2A-12A-30A-66A		5CC-5	18	CA_2A-2A-12B-66A		5CC-5
19	CA_2A-12A-66A-66A		4CC-18	19	CA_2A-2A-14A-30A-66A		5CC-14
20	CA_2A-12A-66C		4CC-18	20	CA_2A-2A-14A-66A-66A		5CC-14
21	CA_2A-12B-66A		4CC-18	21	CA_2A-2A-5A-12A-66A		
22	CA_2A-13A-48A-48A		4CC-23	22	CA_2A-2A-5A-30A-66A		
23	CA_2A-13A-48A-66A		5CC-7	23	CA_2A-2A-5A-66A-66A		5CC-21
24	CA_2A-13A-48C		4CC-23	24	CA_2A-2A-5A-66B		5CC-21
25	CA_2A-13A-66A-66A		4CC-23	25	CA_2A-2A-5A-66C		5CC-21
26	CA_2A-13A-66B		4CC-23	26	CA_2A-2A-7A-12A-66A		
27	CA_2A-13A-66C		4CC-23	27	CA_2A-48A-48D		5CC-29
28	CA_2A-14A-30A-66A		5CC-14	28	CA_2A-48C-48C		5CC-29
29	CA_2A-14A-66A-66A		4CC-28	29	CA_2A-48D-66A		
30	CA_2A-2A-12A-12A		4CC-18	30	CA_2A-48E		5CC-29
31	CA_2A-2A-12A-30A		4CC-18	31	CA_2A-4A-5B-30A		

32	CA_2A-2A-12A-66A		4CC-18	32	CA_2A-5A-30A-66A-66A		
33	CA_2A-2A-12B		4CC-18	33	CA_2A-5B-30A-66A		5CC-32
34	CA_2A-2A-13A-66A		4CC-23	34	CA_2A-5B-66A-66A		5CC-32
35	CA_2A-2A-14A-30A		4CC-28	35	CA_2A-5B-66B		5CC-32
36	CA_2A-2A-14A-66A		4CC-28	36	CA_2A-5B-66C		5CC-32
37	CA_2A-2A-30A-66A		4CC-28	37	CA_2A-7A-12B-66A		
38	CA_2A-2A-4A-12A		4CC-62	38	CA_2C-5B-30A		5CC-32
39	CA_2A-2A-4A-13A			39	CA_41A-42C-42C		
40	CA_2A-2A-4A-4A		4CC-38	40	CA_41C-41D		5CC-39
41	CA_2A-2A-4A-5A		4CC-62	41	CA_41D-42C		5CC-39
42	CA_2A-2A-4A-71A			42	CA_48A-48C-66B		5CC-43
43	CA_2A-2A-5A-12A		4CC-62	43	CA_48A-48C-66C		5CC-52
44	CA_2A-2A-5A-30A		4CC-63	44	CA_48A-48D-66A		5CC-43
45	CA_2A-2A-5A-66A		4CC-68	45	CA_48C-48C-66A		5CC-43
46	CA_2A-2A-5B		4CC-43	46	CA_48C-48D		5CC-43
47	CA_2A-2A-66A-66A		4CC-48	47	CA_48E-66A		5CC-43
48	CA_2A-2A-66A-71A			48	CA_48F		5CC-43
49	CA_2A-2A-66B		4CC-48	49	CA_4A-48E		
50	CA_2A-2A-66C		4CC-48	50	CA_4A-4A-5B-30A		5CC-31
51	CA_2A-2A-7A-66A		4CC-85	51	CA_5A-48A-48D		5CC-52
52	CA_2A-30A-66A-66A		4CC-70	52	CA_5A-48D-66A		
53	CA_2A-48A-48A-66A		4CC-72	53	CA_5B-30A-66A-66A		5CC-22
54	CA_2A-48A-48C		4CC-53	54	CA_5B-66A-66B		5CC-53
55	CA_2A-48C-66A		4CC-53	55	CA_5B-66A-66C		5CC-53
56	CA_2A-48D		4CC-53	56	CA_2A-7C-66A-66A		5CC-57
57	CA_2A-4A-12A-12A		4CC-62	57	CA_2A-7A-7A-66A-66A		5CC-26
58	CA_2A-4A-12A-30A			58	CA_2A-48A-48C-66A		5CC-7
59	CA_2A-4A-12B		4CC-58	59	CA_13A-48E-66A		5CC-7
60	CA_2A-4A-4A-12A		4CC-62				
61	CA_2A-4A-4A-5A		4CC-62				
62	CA_2A-4A-5A-12A						
63	CA_2A-4A-5A-30A		5CC-31				
64	CA_2A-4A-5B		4CC-62				
65	CA_2A-4A-7A-12A						
66	CA_2A-4A-7A-7A		4CC-65				
67	CA_2A-4A-7C		4CC-65				
68	CA_2A-5A-12A-66A		5CC-21				
69	CA_2A-5A-12B		4CC-62				
70	CA_2A-5A-30A-66A		5CC-22				
71	CA_2A-5A-48A-48A		4CC-72				
72	CA_2A-5A-48A-66A						
73	CA_2A-5A-48C		4CC-72				
74	CA_2A-5A-66A-66A		4CC-72				
75	CA_2A-5A-66B		4CC-72				
76	CA_2A-5A-66C		4CC-72				
77	CA_2A-5B-30A		4CC-70				
78	CA_2A-5B-66A		4CC-70				
79	CA_2A-66A-66A-66A		4CC-70				
80	CA_2A-66A-66A-71A		4CC-48				
81	CA_2A-66A-66B		4CC-70				
82	CA_2A-66A-66C		4CC-70				
83	CA_2A-66C-71A		4CC-80				
84	CA_2A-66D		4CC-70				
85	CA_2A-7A-12A-66A		5CC-26				
86	CA_2A-7A-12B		4CC-85				
87	CA_2A-7A-66A-66A		4CC-85				

88	CA_2C-12A-30A		4CC-58				
89	CA_2C-5A-30A		4CC-70				
90	CA_2C-66A-66A		4CC-70				
91	CA_41A-41A-41C		4CC-93				
92	CA_41A-41D		4CC-93				
93	CA_41A-42D		5CC-39				
94	CA_41C-41C		4CC-93				
95	CA_41C-42C		4CC-93				
96	CA_41D-42A		4CC-93				
97	CA_41E		4CC-93				
98	CA_42A-42D		4CC-93				
99	CA_42C-42C		4CC-93				
100	CA_42E		4CC-93				
101	CA_48A-48A-66A-66A		4CC-123				
102	CA_48A-48A-66B		4CC-101				
103	CA_48A-48A-66C		4CC-101				
104	CA_48A-48C-66A		4CC-101				
105	CA_48A-48D		4CC-101				
106	CA_48A-66A-66A-66A		4CC-101				
107	CA_48C-48C		4CC-101				
108	CA_48C-66A-66A		4CC-101				
109	CA_48C-66B		4CC-101				
110	CA_48C-66C		4CC-101				
111	CA_48D-66A		4CC-101				
112	CA_48E		4CC-101				
113	CA_4A-13A-48C						
114	CA_4A-48D		4CC-113				
115	CA_4A-4A-12A-12A		4CC-116				
116	CA_4A-4A-12A-30A		4CC-58				
117	CA_4A-4A-12B		4CC-116				
118	CA_4A-4A-5A-12A		4CC-62				
119	CA_4A-4A-5A-30A		4CC-63				
120	CA_4A-4A-5B		4CC-119				
121	CA_4A-5B-30A		4CC-119				
122	CA_5A-30A-66A-66A		4CC-70				
123	CA_5A-48A-48A-66A		4CC-72				
124	CA_5A-48D		4CC-123				
125	CA_5A-5A-66A-66A		4CC-123				
126	CA_5A-5A-66B		4CC-123				
127	CA_5A-5A-66C		4CC-123				
128	CA_5A-66A-66B		4CC-123				
129	CA_5A-66A-66C		4CC-123				
130	CA_5A-66D		4CC-123				
131	CA_5B-30A-66A		4CC-122				
132	CA_5B-66A-66A		4CC-122				
133	CA_5B-66B		4CC-122				
134	CA_5B-66C		4CC-122				
135	CA_7A-12B-66A		4CC-85				
136	CA_7C-66A-66A		4CC-135				
137	CA_4A-5A-12B		4CC-62				
138	CA_2A-7C-66A		4CC-85				
139	CA_2A-48A-66A-66A		4CC-53				
140	CA_7A-7A-66A-66A		4CC-135				
141	CA_2A-2A-7A-12A		4CC-65				
142	CA_2A-7A-7A-13A						
143	CA_4A-48A-48C		4CC-113				

<Power verification when LTE Carrier Aggregation Active>

General Note:

i. According to KDB941225 D05A v01r02, Uplink maximum output power measurement with downlink carrier aggregation active should be measured, using the highest output channel measured without downlink carrier aggregation, to confirm that uplink maximum output power with downlink carrier aggregation active remains within the specified tune-up tolerance limits and not more than ¼ dB higher than the maximum output measured without downlink carrier aggregation active.

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

iii. The device supports downlink two carrier aggregation. For power measurement were control and acknowledge data is sent on uplink channels that operate identical to specifications when downlink carrier aggregation is inactive.

iv. Selected highest measured power when downlink carrier aggregation is inactive for conducted power comparison with downlink carrier aggregation is active, to confirm that when downlink carrier aggregation is active uplink maximum output power remains within the specified tune-up tolerance limits and not more than ¼ dB higher than the maximum output power measured when downlink carrier aggregation inactive.

v. For non-contiguous intra-band CA, the SCC selected to provide maximum separation from the PCC and must remain fully within the downlink transmission band.

vi. For Intra-band, contiguous CA, the downlink channels selected to perform the uplink power measurement must satisfy 3GPP channel spacing (5.4.1A of 3GPP TS 36.521 or equivalent) and channel bandwidth (5.4.2A) requirements.

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

<Two Carrier power verification>

Configure	PCC							SCC				Power		CA Configuration (BCS)
	LTE Band	BW (MHz)	UL Freq. (MHz)	UL Channel	Mod.	UL# RB	UL RB Offset	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	With CA Tx.Power (dBm)	W/O CA Tx.Power (dBm)	
Inter-Band	2	20	1900	19100	QPSK	1	0	17	10	740	5790	22.15	22.22	CA_2A-17A
	4	20	1720	20050	QPSK	1	0	17	10	740	5790	22.13	22.30	CA_4A-17A
	5	10	836.5	20525	QPSK	1	0	25	20	1990	8640	22.56	22.64	CA_5A-25A
	5	10	836.5	20525	QPSK	1	0	38	20	2610	38150	22.60	22.64	CA_5A-38A
	7	20	2535	21100	QPSK	1	0	42	20	3590	43490	22.51	22.53	CA_7A-42A
	12	10	711	23130	QPSK	1	0	25	20	1960	8340	22.59	22.66	CA_12A-25A
	41	20	2636.5	41055	QPSK	1	0	48	20	3560	55340	22.45	22.51	CA_41A-48A
	5	10	836.5	20525	QPSK	1	0	41	20	2680	41490	22.58	22.64	CA_5A-41A

<Three Carrier power verification>

Configure	PCC							SCC1				SCC2				Power		CA Configuration (BCS)
	LTE Band	BW (MHz)	UL Freq. (MHz)	UL Channel	Mod.	UL# RB	UL RB Offset	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	With CA Tx.Power (dBm)	W/O CA Tx.Power (dBm)	
Inter-Band	2	20	1900	19100	QPSK	1	0	5	10	881.5	2525	7	20.00	2655	3100	22.15	22.22	CA_2A-5A-7A
	12	10	711	23130	QPSK	1	0	48	20	3560	55340	48	20.00	3579.8	55538	22.26	22.66	CA_12A-48C
	48	20	3560	55340	QPSK	1	0	48	20	3579.8	55538	71	20.00	637	68786	22.08	22.36	CA_48C-71A

<Four Carrier power verification>

Configure	PCC							SCC1				SCC2				SCC3				Power		CA Configuration (BCS)
	LTE Band	BW (MHz)	UL Freq. (MHz)	UL Channel	Mod.	UL# RB	UL RB Offset	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	With CA Tx.Power (dBm)	W/O CA Tx.Power (dBm)	
Inter-Band	25	20	1880	26340	QPSK	1	0	26	15	876.5	8865	41	20	2593	40620	41	20	2612.8	40818	22.11	22.24	CA_25A-26A-41C
	2	20	1900	19100	QPSK	1	0	2	5	1932.5	625	4	20	2132.5	2175	13	10	751	5230	22.14	22.22	CA_2A-2A-4A-13A
	2	20	1900	19100	QPSK	1	0	2	5	1932.5	625	4	20	2132.5	2175	71	20	637	68786	22.18	22.22	CA_2A-2A-4A-71A
	2	20	1900	19100	QPSK	1	0	2	5	1932.5	625	66	20	2155	66886	71	20	637	68786	22.21	22.22	CA_2A-2A-66A-71A
	2	20	1900	19100	QPSK	1	0	4	20	2132.5	2175	12	10	737.5	5095	30	10	2355	9820	22.09	22.22	CA_2A-4A-12A-30A
	2	20	1900	19100	QPSK	1	0	4	20	2132.5	2175	5	10	881.5	2525	12	10	737.5	5095	22.01	22.22	CA_2A-4A-5A-12A
	2	20	1900	19100	QPSK	1	0	4	20	2132.5	2175	7	20	2655	3100	12	10	737.5	5095	22.10	22.22	CA_2A-4A-7A-12A
	2	20	1900	19100	QPSK	1	0	5	10	881.5	2525	48	20	3560	55340	66	10	2155	66886	22.13	22.22	CA_2A-5A-48A-66A
	4	20	1720	20050	QPSK	1	0	13	10	751	5230	48	20	3560	55340	48	20.00	3579.8	55538	22.28	22.30	CA_4A-13A-48C
	2	20	1900	19100	QPSK	1	0	7	20	2630	2850	7	5	2687.5	3425	13	10	751	5230	22.11	22.22	CA_2A-7A-7A-13A

<Five Carrier power verification>

Configure	PCC							SCC1				SCC2				SCC3				SCC4				Power		CA Configuration (BCS)
	LTE Band	BW (MHz)	UL Freq. (MHz)	UL Channel	Mod.	UL# RB	UL RB Offset	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	With CA Tx.Power (dBm)	W/O CA Tx.Power (dBm)	
Inter-Band	2	20	1900	19100	QPSK	1	0	12	10	737.5	5095	30	10	2355	9820	66	20	2120	66536	66	5	2197.5	67311	22.18	22.22	CA_2A-12A-30A-66A-66A
	2	20	1900	19100	QPSK	1	0	13	10	751	5230	48	20	3560	55340	48	5	3697.5	56715	66	20	2155	66886	22.05	22.22	CA_2A-13A-48A-48A-66A
	2	20	1900	19100	QPSK	1	0	14	10	763	5330	30	10	2355	9820	66	20	2120	66536	66	5	2197.5	67311	22.11	22.22	CA_2A-14A-30A-66A-66A
	2	20	1900	19100	QPSK	1	0	2	5	1932.5	625	5	10	881.5	2525	12	10	737.5	5095	66	20	2155	66886	22.08	22.22	CA_2A-2A-5A-12A-66A
	2	20	1900	19100	QPSK	1	0	2	5	1932.5	625	5	10	881.5	2525	30	10	2355	9820	66	20	2155	66886	22.04	22.22	CA_2A-2A-5A-30A-66A
	2	20	1900	19100	QPSK	1	0	48	20	3600	55740	48	20	3619.8	55938	48	20	3639.6	56136	66	20	2155	66886	22.17	22.22	CA_2A-48D-66A
	2	20	1900	19100	QPSK	1	0	4	20	2132.5	2175	5	10	874	2450	5	10	883.9	2600	30	10	2355	9820	22.06	22.22	CA_2A-4A-5B-30A
	2	20	1900	19100	QPSK	1	0	5	10	881.5	2525	30	10	2355	9820	66	20	2120	66536	66	5	2197.5	67311	22.08	22.22	CA_2A-5A-30A-66A-66A
	2	20	1900	19100	QPSK	1	0	7	20	2655	3100	12	10	740	5120	12	5	732.8	5048	66	20	2155	66886	22.11	22.22	CA_2A-7A-12B-66A
	4	20	1720	20050	QPSK	1	0	48	20	3580.6	35546	48	20	3600.4	35744	48	20	3620.2	35942	48	20	3640	36140	22.28	22.30	CA_4A-48E
	5	10	836.5	20525	QPSK	1	0	48	20	3600	55740	48	20	3619.8	55938	48	20	3639.6	56136	66	20	2155	66886	22.58	22.64	CA_5A-48D-66A
	25	20	1880	26340	QPSK	1	0	25	5	1992.5	8665	41	20	2593	40620	41	20	2612.8	40818	41	20	2632.6	41016	22.11	22.24	CA_25A-25A-41D
	41	20	2636.5	41055	QPSK	1	0	42	20	3541	43000	42	20	3739	43198	42	5	3452.5	42115	42	20	3464.2	42232	22.45	22.51	CA_41A-42C-42C
	2	20	1900	19100	QPSK	1	0	12	10	737.5	5095	30	10	2355	9820	66	20	2120	66536	66	5	2197.5	67311	22.18	22.22	CA_2A-12A-30A-66A-66A

<LTE Uplink carrier aggregation>

2CC Uplink Carrier Aggregation	
Number	Combination
1	7C
2	41C
3	48C

<Intra-band>

General Note:

i. The device supports intra-band uplink carrier aggregation for LTE B7/B41/B48 with a maximum of two 20MHz component carriers. For intra band contiguous carrier aggregation scenarios, 3GPP 36.101 table 6.2.2A-1 specifies that the aggregate maximum allowed output power is equivalent to the single carrier scenario. 3GPP 36.101 6.2.3A allows for several dB of MPR to be applied when not-contiguous RB allocation is implemented. The conducted power and MPR setting in this device are permanently implemented pre 3GPP requirement.

ii. The device supports uplink carrier aggregation with a maximum of two 20MHz component carriers. For intra band contiguous carrier aggregation scenarios, 3GPP 36.101 table 6.2.2A-1 specifies that the aggregate maximum allowed output power is equivalent to the single carrier scenario. 3GPP 36.101 6.2.3A allows for several dB of MPR to be applied when not-contiguous RB allocation is implemented. The conducted power and MPR setting in this device are permanently implemented pre the 3GPP requirement.

iii. According TCB workshop, the output power with uplink CA active was measured for the configuration with the highest reported SAR with single carrier for each exposure condition. The power was measured with wideband signal integration over both component carriers.

iv. Additional SAR measurement for LTE UL CA whit other DL CA combinations active were not required since the maximum output power for this configuration was not > 0.25dB higher than the maximum output power for UL CA active.

CA_7C									
Combination 20MHz+20MHz (100RB+100RB)									
PCC Channel	SCC Channel	Modulation	PCC		SCC		Total RB Size	Target MPR Level (dB)	Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset				
20850	21048	QPSK	1	0	0	0	1	0	19.78	21.3
21100	20902	QPSK	1	0	1	99	2	0	19.72	21.3
21350	21152	QPSK	1	0	1	99	2	0	19.75	21.3

CA_41C									
Combination 20MHz+20MHz (100RB+100RB)									
PCC Channel	SCC Channel	Modulation	PCC		SCC		Total RB Size	Target MPR Level (dB)	Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset				
39750	39948	QPSK	1	0	0	0	1	0	20.45	21.9
40185	39987	QPSK	1	0	1	99	2	0	20.42	21.9
40620	40422	QPSK	1	0	1	99	2	0	20.48	21.9
41055	40857	QPSK	1	0	1	99	2	0	20.42	21.9
41490	41292	QPSK	1	0	1	99	2	0	20.46	21.9

CA_48C									
Combination 20MHz+20MHz (100RB+100RB)									
PCC Channel	SCC Channel	Modulation	PCC		SCC		Total RB Size	Target MPR Level (dB)	Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset				
55340	55538	QPSK	1	0	0	0	1	0	22.34	24
55830	55632	QPSK	1	0	1	99	2	0	22.31	24
56150	55952	QPSK	1	0	1	99	2	0	22.29	24
56640	56442	QPSK	1	0	1	99	2	0	22.35	24

13. 5G NR Output Power (Unit: dBm)

General Note:

1. Referencing the procedure in KDB 941225, the test procedures are outlined as below
   a. For DFT-OFDM output power measurement, full measurement was done for Pi/2 BPSK and QPSK and for the largest supported bandwidth, repeat test for 16QAM/64QAM/256QAM under 1RB 1Offset configuration. For smaller bandwidth, measure conducted power for Pi/2 BPSK and 1RB 1Offset configuration.
   b. According to the tune-up, CP-OFDM output power is not ½ dB higher than DFT-OFDM mode, and the reported SAR of DFT-OFDM mode reported SAR is ≤ 1.45 W/kg, SAR test and thus conducted power for CP-OFDM mode is not required.
   c. To start SAR test for the largest channel bandwidth for PI/2 BPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel. Also do SAR test for 50% RB allocation for PI/2 BPSK SAR testing using 1RB PI/2 BPSK allocation procedure
   d. For PI/2 BPSK with 100% RB allocation, SAR test is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
   e. For higher modulation QPSK/16QAM/64QAM/256QAM, according to tune-up document the power level is not ½ dB higher than the same configuration in PI/2 BPSK, also reported SAR for the PI/2 BPSK configuration is less than 1.45 W/kg, QPSK/16QAM/64QAM/256QAM SAR testing are not required.
   f. Smaller bandwidth output power for each RB allocation configuration for this device is not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg, smaller bandwidth SAR testing is not required for this device
2. Due to test setup limitations, SAR testing for NR was performed using Factory Test Mode software to establish the connection and perform SAR with 100% transmission.

<3GPP 38.101 MPR for EN-DC>

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

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

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

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

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

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

<EN-DC combination>

Exposure position	NR Band	Combination
Body	N2	DC_12A_n2A/DC_5A_n2A
	N5	DC_2A_n5A/DC_66A_n5A
	N66	DC_13A_n66A/DC_5A_n66A/DC_12A_n66A
	N71	DC_2A_n71A/DC_66A_n71A

<n2>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				372000	376000	380000	
Frequency (MHz)				1860	1880	1900	
20	PI/2 BPSK	1	1	20.57	20.54	20.70	
20	PI/2 BPSK	1	53	20.41	20.48	20.32	21.4
20	PI/2 BPSK	1	104	20.33	20.46	20.24	
20	PI/2 BPSK	50	0	20.52	20.63	20.65	21.4
20	PI/2 BPSK	50	28	20.50	20.43	20.41	21.4
20	PI/2 BPSK	50	56	20.33	20.46	20.24	21.4
20	PI/2 BPSK	100	0	20.22	20.21	20.25	
20	QPSK	1	1	20.31	20.44	20.22	
20	QPSK	1	53	20.44	20.57	20.35	21.4
20	QPSK	1	104	20.28	20.41	20.19	
20	QPSK	50	0	20.44	20.57	20.35	21.4
20	QPSK	50	28	20.42	20.55	20.33	21.4
20	QPSK	50	56	20.20	20.33	20.11	21.4
20	QPSK	100	0	20.33	20.46	20.24	
20	16QAM	1	1	20.18	20.31	20.09	21.4
20	64QAM	1	1	19.92	20.05	19.83	21.0
20	256QAM	1	1	17.67	17.80	17.58	19.0
Channel				371500	376000	380500	Tune-up limit (dBm)
Frequency (MHz)				1857.5	1880	1902.5	
15	PI/2 BPSK	1	1	20.57	20.57	20.57	21.4
Channel				371000	376000	381000	Tune-up limit (dBm)
Frequency (MHz)				1855	1880	1905	
10	PI/2 BPSK	1	1	20.57	20.57	20.57	21.4
Channel				370500	376000	381500	Tune-up limit (dBm)
Frequency (MHz)				1852.5	1880	1907.5	
5	PI/2 BPSK	1	1	20.57	20.57	20.57	21.4

<n5>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				166800	167300	167800	
Frequency (MHz)				834	836.5	839	
20	PI/2 BPSK	1	1	22.90	22.93	22.84	23.5
20	PI/2 BPSK	1	53	22.68	22.72	22.61	
20	PI/2 BPSK	1	104	22.39	22.51	22.37	
20	PI/2 BPSK	50	0	22.64	22.74	22.56	23.0
20	PI/2 BPSK	50	28	22.24	22.28	22.16	23.5
20	PI/2 BPSK	50	56	22.04	22.16	22.00	23.0
20	PI/2 BPSK	100	0	22.15	22.22	22.08	
20	QPSK	1	1	22.75	22.82	22.69	23.5
20	QPSK	1	53	22.70	22.74	22.58	
20	QPSK	1	104	22.54	22.58	22.47	
20	QPSK	50	0	21.60	21.72	21.63	22.5
20	QPSK	50	28	22.57	22.69	22.53	23.5
20	QPSK	50	56	21.52	21.62	21.51	22.5
20	QPSK	100	0	21.58	21.62	21.44	
20	16QAM	1	1	21.80	21.84	21.67	22.5
20	64QAM	1	1	20.15	20.21	20.08	21.0
20	256QAM	1	1	18.07	18.13	18.05	19.0
Channel				166300	167300	168300	Tune-up limit (dBm)
Frequency (MHz)				831.5	836.5	841.5	
15	PI/2 BPSK	1	1	22.90	22.87	22.78	23.5
Channel				165800	167300	168800	Tune-up limit (dBm)
Frequency (MHz)				829	836.5	844	
10	PI/2 BPSK	1	1	22.85	22.88	22.74	23.5
Channel				165300	167300	169300	Tune-up limit (dBm)
Frequency (MHz)				826.5	836.5	846.5	
5	PI/2 BPSK	1	1	22.88	22.86	22.80	23.5

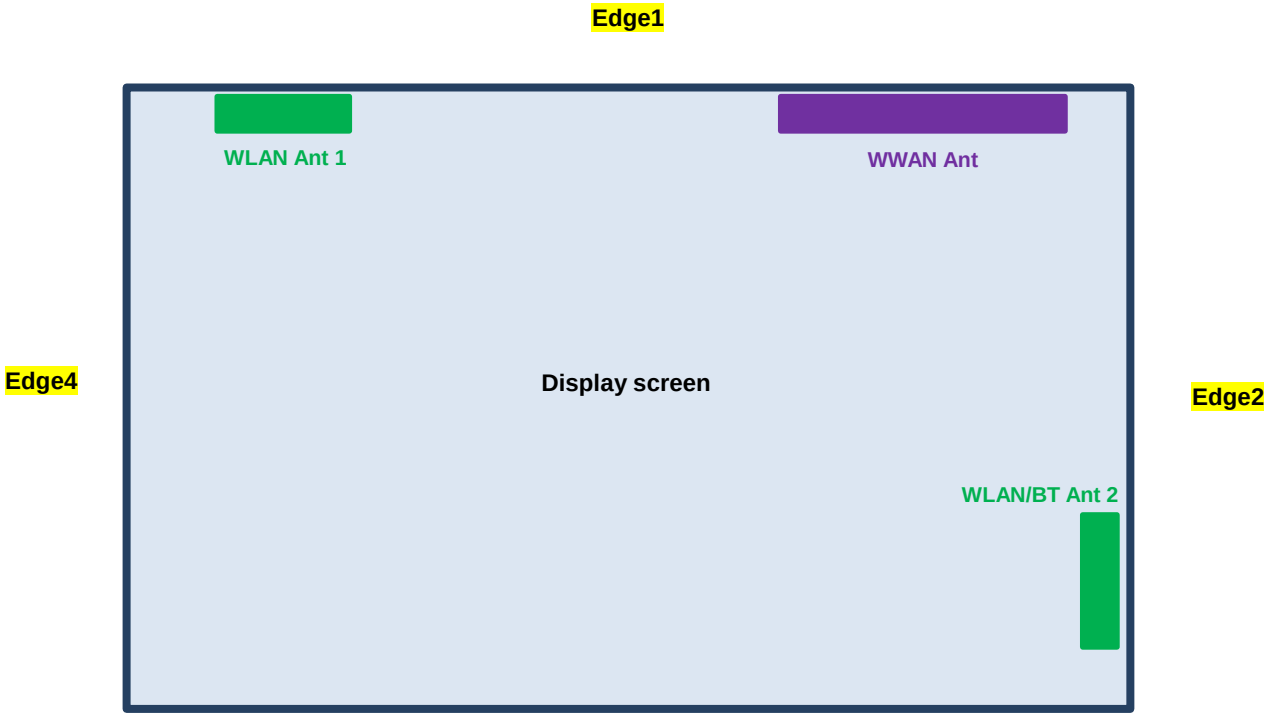
<n66>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				346000	349000	352000	
Frequency (MHz)				1730	1745	1760	
40	PI/2 BPSK	1	1	19.13	19.03	18.99	
40	PI/2 BPSK	1	108	18.99	18.83	18.91	20.0
40	PI/2 BPSK	1	214	18.90	18.96	19.12	
40	PI/2 BPSK	108	0	18.98	18.79	18.81	20.0
40	PI/2 BPSK	108	54	18.95	18.86	18.84	20.0
40	PI/2 BPSK	108	108	18.90	18.93	18.89	20.0
40	PI/2 BPSK	216	0	18.97	18.88	18.87	
40	QPSK	1	1	19.07	18.90	18.87	
40	QPSK	1	108	18.97	18.75	18.86	20.0
40	QPSK	1	214	18.82	18.89	19.06	
40	QPSK	108	0	19.01	18.83	18.83	20.0
40	QPSK	108	54	18.92	18.85	18.80	20.0
40	QPSK	108	108	18.93	18.91	18.88	20.0
40	QPSK	216	0	18.98	18.87	18.87	
40	16QAM	1	1	19.06	19.01	18.97	20.0
40	64QAM	1	1	19.04	18.98	18.96	20.0
40	256QAM	1	1	18.91	18.75	18.60	19.0
Channel				345000	349000	353000	Tune-up limit (dBm)
Frequency (MHz)				1725	1745	1765	
30	PI/2 BPSK	1	1	19.15	19.03	18.89	20.0
Channel				344500	349000	353500	Tune-up limit (dBm)
Frequency (MHz)				1722.5	1745	1767.5	
25	PI/2 BPSK	1	1	19.06	19.01	19.02	20.0
Channel				344000	349000	354000	Tune-up limit (dBm)
Frequency (MHz)				1720	1745	1770	
20	PI/2 BPSK	1	1	19.15	19.07	18.93	20.0
Channel				343500	349000	354500	Tune-up limit (dBm)
Frequency (MHz)				1717.5	1745	1772.5	
15	PI/2 BPSK	1	1	19.15	19.03	18.89	20.0
Channel				343000	349000	355000	Tune-up limit (dBm)
Frequency (MHz)				1715	1745	1775	
10	PI/2 BPSK	1	1	19.12	19.02	18.84	20.0
Channel				342500	349000	355500	Tune-up limit (dBm)
Frequency (MHz)				1712.5	1745	1777.5	
5	PI/2 BPSK	1	1	19.06	19.01	19.02	20.0

<n71>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				134600	136100	137600	
Frequency (MHz)				673	680.5	688	
20	PI/2 BPSK	1	1	23.12	22.86	22.75	23.5
20	PI/2 BPSK	1	53	22.86	22.74	22.54	
20	PI/2 BPSK	1	104	22.68	22.53	22.39	
20	PI/2 BPSK	50	0	22.79	22.60	22.40	23.0
20	PI/2 BPSK	50	28	22.45	22.27	22.06	23.5
20	PI/2 BPSK	50	56	22.12	22.00	21.87	23.0
20	PI/2 BPSK	100	0	22.27	22.13	21.95	
20	QPSK	1	1	23.11	22.94	22.75	23.5
20	QPSK	1	53	22.95	22.81	22.63	
20	QPSK	1	104	22.83	22.63	22.48	
20	QPSK	50	0	21.82	21.71	21.53	22.5
20	QPSK	50	28	22.78	22.63	22.44	23.5
20	QPSK	50	56	21.65	21.50	21.29	22.5
20	QPSK	100	0	21.76	21.58	21.42	
20	16QAM	1	1	21.90	21.79	21.65	22.5
20	64QAM	1	1	20.76	20.57	20.46	21.0
20	256QAM	1	1	18.42	18.24	18.03	19.0
Channel				134100	136100	138100	Tune-up limit (dBm)
Frequency (MHz)				670.5	680.5	690.5	
15	PI/2 BPSK	1	1	22.99	22.85	22.73	23.5
Channel				133600	136100	138600	Tune-up limit (dBm)
Frequency (MHz)				668	680.5	693	
10	PI/2 BPSK	1	1	23.02	22.85	22.67	23.5
Channel				133100	136100	139100	Tune-up limit (dBm)
Frequency (MHz)				665.5	680.5	695.5	
5	PI/2 BPSK	1	1	23.04	22.82	22.75	23.5

14. Antenna Location



Front View

The separation distance for antenna to edge :

Antenna	To Edge1 (mm)	To Edge2 (mm)	To Edge3 (mm)	To Edge4 (mm)
WWAN Antenna	5	35	190	205
WLAN Antenna 1	2.6	253	195	30
WLAN/BT Antenna 2	142	1.8	32	302

<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:
   [(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)] ·[√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR
   - f(GHz) is the RF channel transmit frequency in GHz
   - Power and distance are rounded to the nearest mW and mm before calculation
   - The result is rounded to one decimal place for comparison
6. Per KDB 447498 D01v06, at 100 MHz to 6 GHz and for *test separation distances* > 50 mm, the SAR test exclusion threshold is determined according to the following
   a) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm)·(f(MHz)/150)] mW, at 100 MHz to 1500 MHz
   b) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm)·10] mW at > 1500 MHz and ≤ 6 GHz
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 7	LTE Band 12/17	LTE Band 13	LTE Band 14	LTE Band 2/25	LTE Band 5/26	LTE Band 4/66	LTE Band 71	LTE Band 38/41	LTE Band 48	FR1 N2	FR1 N5	FR1 N66	FR1 N71
	Calculated Frequency (MHz)	846	1750	1907	2567	715	784	795	1914	848	1779	695	2687	3697	1907	846	1777	695
	Maximum power (dBm)	24.5	20.4	21.9	21.3	24.0	24.0	24.0	22.1	24.0	20.5	24.0	21.9	24.0	21.4	23.5	20.0	23.5
	Maximum rated power(mW)	281.84	109.65	154.88	134.90	251.19	251.19	251.19	162.18	251.19	112.20	251.19	154.88	251.19	138.04	223.87	100.00	223.87
Bottom Face	Separation distance(mm)	5.0																
	exclusion threshold	51.9	29.0	42.8	43.2	42.5	44.5	44.8	44.9	46.3	29.9	41.9	50.8	96.6	38.1	41.2	26.7	37.3
	Testing required?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Edge 1	Separation distance(mm)	5.0																
	exclusion threshold	51.9	29.0	42.8	43.2	42.5	44.5	44.8	44.9	46.3	29.9	41.9	50.8	96.6	61.8	41.2	26.7	37.3
	Testing required?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Edge 2	Separation distance(mm)	35.0																
	exclusion threshold	7.4	4.1	6.1	6.2	6.1	6.4	6.4	6.4	6.6	4.3	6.0	7.3	13.8	8.8	5.9	3.8	5.3
	Testing required?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Edge 3	Separation distance(mm)	190.0																
	exclusion threshold	953.0	1513.0	1509.0	1494.0	845.0	901.0	910.0	1508.0	954.0	1512.0	829.0	1492.0	1478.0	1509.0	953.0	1513.0	829.0
	Testing required?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Edge 4	Separation distance(mm)	205.0																
	exclusion threshold	1037.0	1663.0	1659.0	1644.0	916.0	980.0	990.0	1658.0	1039.0	1662.0	898.0	1642.0	1628.0	1659.0	1037.0	1663.0	898.0
	Testing required?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

15. SAR Test Results

General Note:

1. Per KDB 447498 D01v06, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   b. For WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
   c. For TDD LTE SAR measurement, the duty cycle 1:1.59 (62.9 %) was used perform testing and considering the theoretical duty cycle of 63.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 62.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix 63.3%/62.9% = 1.006 is applied to scale-up the measured SAR result. The Reported TDD LTE SAR = measured SAR (W/kg)* Tune-up Scaling Factor* scaling factor for extended cyclic prefix.
2. Per KDB 447498 D01v06, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the *reported* 1-g or 10-g SAR for the mid-band or highest output power channel is:
   - ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
   - ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
   - ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
3. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.

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 ≤ ¼ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA / DC-HSDPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA, and according to the following RF output power, the output power results of the secondary modes (HSUPA, HSDPA, DC-HSDPA) are less than ¼ 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 ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
5. Per KDB 941225 D05v02r05, Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
6. For LTE B12/B26/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 ≤ 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.

5G NR Note:

1. Referencing the procedure in KDB 941225, the test procedures are outlined as below:
   a. To start SAR test for the largest channel bandwidth for PI/2 BPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel. Also do SAR test for 50% RB allocation for PI/2 BPSK SAR testing using 1RB PI/2 BPSK allocation procedure
   b. For PI/2 BPSK with 100% RB allocation, SAR test is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
   c. For higher modulation QPSK/16QAM/64QAM/256QAM, according to tune-up document the power level is not ½ dB higher than the same configuration in PI/2 BPSK, also reported SAR for the PI/2 BPSK configuration is less than 1.45 W/kg, QPSK/16QAM/64QAM/256QAM SAR testing are not required.
   d. Smaller bandwidth output power for each RB allocation configuration for this device is not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg, smaller bandwidth SAR testing is not required for this device
   e. Due to test setup limitations, SAR testing for NR was performed using Factory Test Mode software to establish the connection and perform SAR with 100% transmission.

15.1 Body SAR

<WCDMA SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WCDMA II	RMC 12.2Kbps	Bottom Face	0mm	9400	1880	20.64	21.90	1.337	-0.04	0.256	0.342
	WCDMA II	RMC 12.2Kbps	Edge1	0mm	9400	1880	20.64	21.90	1.337	-0.08	0.810	1.083
	WCDMA II	RMC 12.2Kbps	Edge1	0mm	9262	1852.4	20.52	21.90	1.374	-0.09	0.799	1.098
01	WCDMA II	RMC 12.2Kbps	Edge1	0mm	9538	1907.6	20.49	21.90	1.384	-0.06	0.808	1.118
	WCDMA II	RMC 12.2Kbps	Edge2	0mm	9400	1880	20.64	21.90	1.337	-0.12	0.064	0.086
	WCDMA IV	RMC 12.2Kbps	Bottom Face	0mm	1312	1712.4	19.70	20.40	1.175	-0.1	0.320	0.376
02	WCDMA IV	RMC 12.2Kbps	Edge1	0mm	1312	1712.4	19.70	20.40	1.175	-0.1	1.010	1.187
	WCDMA IV	RMC 12.2Kbps	Edge1	0mm	1413	1732.6	19.70	20.40	1.256	-0.11	0.829	1.041
	WCDMA IV	RMC 12.2Kbps	Edge1	0mm	1513	1752.6	19.41	20.40	1.239	-0.09	0.739	0.915
	WCDMA IV	RMC 12.2Kbps	Edge2	0mm	1312	1712.4	19.47	20.40	1.175	-0.19	0.056	0.066
	WCDMA V	RMC 12.2Kbps	Bottom Face	0mm	4132	826.4	23.43	24.50	1.279	-0.07	0.153	0.196
03	WCDMA V	RMC 12.2Kbps	Edge1	0mm	4132	826.4	23.43	24.50	1.279	-0.14	0.535	0.684
	WCDMA V	RMC 12.2Kbps	Edge1	0mm	4182	836.4	23.23	24.50	1.340	-0.08	0.467	0.626
	WCDMA V	RMC 12.2Kbps	Edge1	0mm	4233	846.6	23.00	24.50	1.413	0.11	0.475	0.671
	WCDMA V	RMC 12.2Kbps	Edge2	0mm	4132	826.4	23.43	24.50	1.279	-0.15	0.108	0.138

<FDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 7	20M	QPSK	1	0	Bottom Face	0mm	21100	2535	19.89	21.30	1.384	0.01	0.283	0.392
	LTE Band 7	20M	QPSK	50	0	Bottom Face	0mm	21100	2535	19.88	21.30	1.387	-0.15	0.234	0.325
	LTE Band 7	20M	QPSK	1	0	Edge1	0mm	21100	2535	19.89	21.30	1.384	-0.03	0.608	0.841
	LTE Band 7	20M	QPSK	1	0	Edge1	0mm	20850	2510	19.74	21.30	1.432	-0.07	0.617	0.884
04	LTE Band 7	20M	QPSK	1	0	Edge1	0mm	21350	2560	19.77	21.30	1.422	-0.02	0.652	0.927
	LTE Band 7	20M	QPSK	50	0	Edge1	0mm	21100	2535	19.88	21.30	1.387	-0.07	0.626	0.868
	LTE Band 7	20M	QPSK	100	0	Edge1	0mm	21100	2535	19.86	21.30	1.393	0.06	0.488	0.680
	LTE Band 7	20M	QPSK	1	0	Edge2	0mm	21100	2535	19.89	21.30	1.384	0.09	0.045	0.062
	LTE Band 7	20M	QPSK	50	0	Edge2	0mm	21100	2535	19.88	21.30	1.387	-0.01	0.036	0.050
	LTE Band7C	20M	QPSK	1	0	Edge1	0mm	20850+21048	2510	19.78	21.30	1.419	0.04	0.595	0.844
	LTE Band 12	10M	QPSK	1	0	Bottom Face	0mm	23095	707.5	22.56	24.00	1.393	-0.08	0.087	0.121
	LTE Band 12	10M	QPSK	25	0	Bottom Face	0mm	23095	707.5	21.63	23.00	1.371	0.12	0.072	0.099
05	LTE Band 12	10M	QPSK	1	0	Edge1	0mm	23095	707.5	22.56	24.00	1.393	-0.16	0.221	0.308
	LTE Band 12	10M	QPSK	25	0	Edge1	0mm	23095	707.5	21.63	23.00	1.371	0.09	0.173	0.237
	LTE Band 12	10M	QPSK	1	0	Edge2	0mm	23095	707.5	22.56	24.00	1.393	-0.07	0.001	0.001
	LTE Band 12	10M	QPSK	25	0	Edge2	0mm	23095	707.5	21.63	23.00	1.371	0.15	0.001	0.001
	LTE Band 13	10M	QPSK	1	0	Bottom Face	0mm	23230	782	22.46	24.00	1.426	-0.09	0.067	0.096
	LTE Band 13	10M	QPSK	25	0	Bottom Face	0mm	23230	782	21.46	23.00	1.426	0.16	0.056	0.080
06	LTE Band 13	10M	QPSK	1	0	Edge1	0mm	23230	782	22.46	24.00	1.426	-0.11	0.311	0.443
	LTE Band 13	10M	QPSK	25	0	Edge1	0mm	23230	782	21.46	23.00	1.426	0.08	0.247	0.352
	LTE Band 13	10M	QPSK	1	0	Edge2	0mm	23230	782	22.46	24.00	1.426	0.04	0.001	0.001
	LTE Band 13	10M	QPSK	25	0	Edge2	0mm	23230	782	21.46	23.00	1.426	-0.16	0.001	0.001
	LTE Band 14	10M	QPSK	1	0	Bottom Face	0mm	23330	793	22.38	24.00	1.452	0.01	0.076	0.110
	LTE Band 14	10M	QPSK	25	0	Bottom Face	0mm	23330	793	21.33	23.00	1.469	0.06	0.061	0.090
07	LTE Band 14	10M	QPSK	1	0	Edge1	0mm	23330	793	22.38	24.00	1.452	-0.07	0.328	0.476
	LTE Band 14	10M	QPSK	25	0	Edge1	0mm	23330	793	21.33	23.00	1.469	-0.08	0.226	0.332
	LTE Band 14	10M	QPSK	1	0	Edge2	0mm	23330	793	22.38	24.00	1.452	0.04	0.001	0.001
	LTE Band 14	10M	QPSK	25	0	Edge2	0mm	23330	793	21.33	23.00	1.469	-0.07	0.001	0.001

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 25	20M	QPSK	1	0	Bottom Face	0mm	26340	1880	20.77	22.10	1.358	-0.14	0.261	0.355
	LTE Band 25	20M	QPSK	50	0	Bottom Face	0mm	26340	1880	20.58	22.10	1.419	-0.08	0.266	0.377
	LTE Band 25	20M	QPSK	1	0	Edge1	0mm	26340	1880	20.77	22.10	1.358	-0.11	0.769	1.045
	LTE Band 25	20M	QPSK	1	0	Edge1	0mm	26140	1860	20.69	22.10	1.384	-0.09	0.771	1.067
	LTE Band 25	20M	QPSK	1	0	Edge1	0mm	26590	1905	20.69	22.10	1.384	-0.11	0.791	1.094
	LTE Band 25	20M	QPSK	50	0	Edge1	0mm	26340	1880	20.58	22.10	1.419	-0.07	0.780	1.107
	LTE Band 25	20M	QPSK	50	0	Edge1	0mm	26140	1860	20.49	22.10	1.449	-0.01	0.773	1.120
08	LTE Band 25	20M	QPSK	50	0	Edge1	0mm	26590	1905	20.44	22.10	1.466	-0.13	0.806	1.181
	LTE Band 25	20M	QPSK	100	0	Edge1	0mm	26340	1880	20.55	22.10	1.429	-0.11	0.803	1.147
	LTE Band 25	20M	QPSK	1	0	Edge2	0mm	26340	1880	20.77	22.10	1.358	-0.16	0.058	0.079
	LTE Band 25	20M	QPSK	50	0	Edge2	0mm	26340	1880	20.58	22.10	1.419	-0.06	0.059	0.084
	LTE Band 26	15M	QPSK	1	0	Bottom Face	0mm	26865	831.5	22.24	24.00	1.500	-0.03	0.135	0.202
	LTE Band 26	15M	QPSK	36	0	Bottom Face	0mm	26865	831.5	21.32	23.00	1.472	0.11	0.112	0.165
09	LTE Band 26	15M	QPSK	1	0	Edge1	0mm	26865	831.5	22.24	24.00	1.500	-0.07	0.435	0.652
	LTE Band 26	15M	QPSK	36	0	Edge1	0mm	26865	831.5	21.32	23.00	1.472	0.08	0.352	0.518
	LTE Band 26	15M	QPSK	1	0	Edge2	0mm	26865	831.5	22.24	24.00	1.500	-0.13	0.086	0.129
	LTE Band 26	15M	QPSK	36	0	Edge2	0mm	26865	831.5	21.32	23.00	1.472	0.15	0.069	0.102
	LTE Band 66	20M	QPSK	1	0	Bottom Face	0mm	132072	1720	20.10	20.50	1.096	-0.15	0.354	0.388
	LTE Band 66	20M	QPSK	50	0	Bottom Face	0mm	132072	1720	19.78	20.50	1.180	-0.05	0.354	0.418
	LTE Band 66	20M	QPSK	1	0	Edge1	0mm	132072	1720	20.10	20.50	1.096	-0.05	1.010	1.107
	LTE Band 66	20M	QPSK	1	0	Edge1	0mm	132322	1745	19.91	20.50	1.146	-0.08	0.843	0.966
	LTE Band 66	20M	QPSK	1	0	Edge1	0mm	132572	1770	19.92	20.50	1.143	0.01	0.742	0.848
10	LTE Band 66	20M	QPSK	50	0	Edge1	0mm	132072	1720	19.78	20.50	1.180	-0.02	0.994	1.173
	LTE Band 66	20M	QPSK	50	0	Edge1	0mm	132322	1745	19.63	20.50	1.222	-0.04	0.824	1.007
	LTE Band 66	20M	QPSK	50	0	Edge1	0mm	132572	1770	19.67	20.50	1.211	0.04	0.771	0.933
	LTE Band 66	20M	QPSK	100	0	Edge1	0mm	132072	1720	19.74	20.50	1.191	0.03	0.949	1.130
	LTE Band 66	20M	QPSK	1	0	Edge2	0mm	132072	1720	20.10	20.50	1.096	-0.12	0.056	0.061
	LTE Band 66	20M	QPSK	50	0	Edge2	0mm	132072	1720	19.78	20.50	1.180	0.07	0.056	0.066
	LTE Band 71	20M	QPSK	1	0	Bottom Face	0mm	133322	683	22.31	24.00	1.476	-0.02	0.110	0.162
	LTE Band 71	20M	QPSK	50	24	Bottom Face	0mm	133322	683	21.34	23.00	1.466	-0.03	0.086	0.126
11	LTE Band 71	20M	QPSK	1	0	Edge1	0mm	133322	683	22.31	24.00	1.476	-0.09	0.219	0.323
	LTE Band 71	20M	QPSK	50	24	Edge1	0mm	133322	683	21.34	23.00	1.466	-0.15	0.187	0.274
	LTE Band 71	20M	QPSK	1	0	Edge2	0mm	133322	683	22.31	24.00	1.476	0.02	0.001	0.002
	LTE Band 71	20M	QPSK	50	24	Edge2	0mm	133322	683	21.34	23.00	1.466	0.06	0.001	0.002

<TDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 41	20M	QPSK	1	0	Bottom Face	0mm	41055	2636.5	20.52	21.90	1.374	62.9	1.006	-0.12	0.291	0.402
	LTE Band 41	20M	QPSK	50	0	Bottom Face	0mm	41055	2636.5	20.47	21.90	1.390	62.9	1.006	-0.17	0.286	0.400
	LTE Band 41	20M	QPSK	1	0	Edge1	0mm	41055	2636.5	20.52	21.90	1.374	62.9	1.006	-0.1	0.609	0.842
	LTE Band 41	20M	QPSK	1	0	Edge1	0mm	39750	2506	20.29	21.90	1.449	62.9	1.006	-0.06	0.440	0.641
	LTE Band 41	20M	QPSK	1	0	Edge1	0mm	40185	2549.5	20.37	21.90	1.422	62.9	1.006	-0.15	0.440	0.630
	LTE Band 41	20M	QPSK	1	0	Edge1	0mm	40620	2593	20.48	21.90	1.387	62.9	1.006	-0.17	0.542	0.756
	LTE Band 41	20M	QPSK	1	0	Edge1	0mm	41490	2680	20.34	21.90	1.432	62.9	1.006	-0.15	0.618	0.890
	LTE Band 41	20M	QPSK	50	0	Edge1	0mm	41055	2636.5	20.47	21.90	1.390	62.9	1.006	-0.02	0.627	0.877
	LTE Band 41	20M	QPSK	50	0	Edge1	0mm	39750	2506	20.30	21.90	1.445	62.9	1.006	-0.02	0.457	0.665
	LTE Band 41	20M	QPSK	50	0	Edge1	0mm	40185	2549.5	20.36	21.90	1.426	62.9	1.006	-0.11	0.461	0.661
	LTE Band 41	20M	QPSK	50	0	Edge1	0mm	40620	2593	20.46	21.90	1.393	62.9	1.006	-0.19	0.561	0.786
12	LTE Band 41	20M	QPSK	50	0	Edge1	0mm	41490	2680	20.27	21.90	1.455	62.9	1.006	-0.17	0.632	0.925
	LTE Band 41	20M	QPSK	100	0	Edge1	0mm	41055	2636.5	20.45	21.90	1.396	62.9	1.006	-0.07	0.624	0.877
	LTE Band 41	20M	QPSK	1	0	Edge2	0mm	41055	2636.5	20.52	21.90	1.374	62.9	1.006	0	0.007	0.010
	LTE Band 41	20M	QPSK	50	0	Edge2	0mm	41055	2636.5	20.47	21.90	1.390	62.9	1.006	0.09	0.006	0.008
	LTE Band 41_HPUE	20M	QPSK	50	0	Edge1	0mm	41490	2680	22.00	23.50	1.413	42.9	1.009	-0.04	0.560	0.798
	LTE Band 41C	20M	QPSK	1	0	Edge1	0mm	40620+40422	2593	20.48	21.90	1.387	62.9	1.006	0.06	0.592	0.826
	LTE Band 48	20M	QPSK	1	0	Bottom Face	0mm	55340	3560	22.36	24.00	1.459	62.9	1.006	-0.11	0.445	0.653
	LTE Band 48	20M	QPSK	50	0	Bottom Face	0mm	55340	3560	21.39	23.00	1.449	62.9	1.006	0.08	0.360	0.525
13	LTE Band 48	20M	QPSK	1	0	Edge1	0mm	55340	3560	22.36	24.00	1.459	62.9	1.006	-0.02	0.796	1.168
	LTE Band 48	20M	QPSK	1	0	Edge1	0mm	55830	3609	22.16	24.00	1.528	62.9	1.006	-0.12	0.632	0.971
	LTE Band 48	20M	QPSK	1	0	Edge1	0mm	56150	3641	22.11	24.00	1.545	62.9	1.006	-0.17	0.545	0.847
	LTE Band 48	20M	QPSK	1	0	Edge1	0mm	56640	3690	22.13	24.00	1.538	62.9	1.006	-0.17	0.545	0.843
	LTE Band 48	20M	QPSK	50	0	Edge1	0mm	55340	3560	21.39	23.00	1.449	62.9	1.006	-0.19	0.653	0.952
	LTE Band 48	20M	QPSK	50	0	Edge1	0mm	55830	3609	21.20	23.00	1.514	62.9	1.006	-0.14	0.505	0.769
	LTE Band 48	20M	QPSK	50	0	Edge1	0mm	56150	3641	21.10	23.00	1.549	62.9	1.006	-0.02	0.437	0.681
	LTE Band 48	20M	QPSK	50	0	Edge1	0mm	56640	3690	21.11	23.00	1.545	62.9	1.006	-0.12	0.461	0.717
	LTE Band 48	20M	QPSK	100	0	Edge1	0mm	55340	3560	21.27	23.00	1.489	62.9	1.006	-0.05	0.641	0.960
	LTE Band 48	20M	QPSK	1	0	Edge2	0mm	55340	3560	22.36	24.00	1.459	62.9	1.006	0.11	0.061	0.090
	LTE Band 48	20M	QPSK	50	0	Edge2	0mm	55340	3560	21.39	23.00	1.449	62.9	1.006	-0.16	0.154	0.224
	LTE Band 48C	20M	QPSK	1	0	Edge1	0mm	56640+56442	3690	22.35	24.00	1.462	62.9	1.006	0.09	0.749	1.102

<5G NR SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	FR1 n2	20M	BPSK	1	1	Bottom Face	0mm	380000	1900	20.70	21.40	1.175	-0.03	0.220	0.258
	FR1 n2	20M	BPSK	50	0	Bottom Face	0mm	380000	1900	20.65	21.40	1.189	0.05	0.222	0.264
	FR1 n2	20M	BPSK	1	1	Edge1	0mm	380000	1900	20.70	21.40	1.175	-0.15	0.808	0.949
	FR1 n2	20M	BPSK	1	1	Edge1	0mm	372000	1860	20.57	21.40	1.211	-0.16	0.820	0.993
	FR1 n2	20M	BPSK	1	1	Edge1	0mm	376000	1880	20.54	21.40	1.219	-0.08	0.805	0.981
	FR1 n2	20M	BPSK	50	0	Edge1	0mm	380000	1900	20.65	21.40	1.189	-0.01	0.800	0.951
	FR1 n2	20M	BPSK	50	0	Edge1	0mm	372000	1860	20.52	21.40	1.225	-0.09	0.795	0.974
	FR1 n2	20M	BPSK	50	0	Edge1	0mm	376000	1880	20.63	21.40	1.194	-0.13	0.803	0.959
14	FR1 n2	20M	BPSK	100	0	Edge1	0mm	380000	1900	20.25	21.40	1.303	-0.11	0.806	1.050
	FR1 n2	20M	BPSK	1	1	Edge2	0mm	380000	1900	20.70	21.40	1.175	-0.01	0.064	0.075
	FR1 n2	20M	BPSK	50	0	Edge2	0mm	380000	1900	20.65	21.40	1.189	-0.03	0.063	0.075
	FR1 n5	20M	BPSK	1	1	Bottom Face	0mm	167300	836.5	22.93	23.50	1.140	-0.05	0.145	0.165
	FR1 n5	20M	BPSK	50	28	Bottom Face	0mm	167300	836.5	22.28	23.50	1.324	0.04	0.147	0.195
	FR1 n5	20M	BPSK	1	1	Edge1	0mm	167300	836.5	22.93	23.50	1.140	-0.09	0.454	0.518
15	FR1 n5	20M	BPSK	50	28	Edge1	0mm	167300	836.5	22.28	23.50	1.324	0.02	0.524	0.694
	FR1 n5	20M	BPSK	1	1	Edge2	0mm	167300	836.5	22.93	23.50	1.140	0.11	0.107	0.122
	FR1 n5	20M	BPSK	50	28	Edge2	0mm	167300	836.5	22.28	23.50	1.324	-0.03	0.092	0.122
	FR1 n66	40M	BPSK	1	1	Bottom Face	0mm	349000	1745	19.03	20.00	1.250	-0.06	0.274	0.343
	FR1 n66	40M	BPSK	108	0	Bottom Face	0mm	349000	1745	18.79	20.00	1.321	-0.06	0.278	0.367
16	FR1 n66	40M	BPSK	1	1	Edge1	0mm	349000	1745	19.03	20.00	1.250	-0.02	0.841	1.051
	FR1 n66	40M	BPSK	108	0	Edge1	0mm	349000	1745	18.79	20.00	1.321	-0.14	0.758	1.002
	FR1 n66	40M	BPSK	216	0	Edge1	0mm	349000	1745	18.88	20.00	1.294	-0.1	0.715	0.925
	FR1 n66	40M	BPSK	1	1	Edge2	0mm	349000	1745	19.03	20.00	1.250	-0.06	0.054	0.068
	FR1 n66	40M	BPSK	108	0	Edge2	0mm	349000	1745	18.79	20.00	1.321	-0.17	0.059	0.078
	FR1 n71	20M	BPSK	1	1	Bottom Face	0mm	136100	680.5	22.86	23.50	1.159	-0.09	0.112	0.130
	FR1 n71	20M	BPSK	50	28	Bottom Face	0mm	136100	680.5	22.27	23.50	1.327	-0.07	0.090	0.119
	FR1 n71	20M	BPSK	1	1	Edge1	0mm	136100	680.5	22.86	23.50	1.159	-0.16	0.241	0.279
17	FR1 n71	20M	BPSK	50	28	Edge1	0mm	136100	680.5	22.27	23.50	1.327	0.04	0.244	0.324
	FR1 n71	20M	BPSK	1	1	Edge2	0mm	136100	680.5	22.86	23.50	1.159	-0.06	0.001	0.001
	FR1 n71	20M	BPSK	50	28	Edge2	0mm	136100	680.5	22.27	23.50	1.327	-0.19	0.013	0.017

15.2 Repeated SAR Measurement

No.	Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Ratio	Reported 1g SAR (W/kg)
1st	WCDMA IV	RMC 12.2Kbps	Edge1	0mm	1312	1712.4	19.70	20.40	1.175	-0.1	1.010	-	1.187
2nd	WCDMA IV	RMC 12.2Kbps	Edge1	0mm	1312	1712.4	19.70	20.40	1.175	-0.05	0.967	1.044	1.136
1st	FR1 n2	20M_BPSK_1_1	Edge1	0mm	372000	1860	20.57	21.40	1.211	-0.16	0.820	-	0.993
2nd	FR1 n2	20M_BPSK_1_1	Edge1	0mm	372000	1860	20.57	21.40	1.211	-0.15	0.791	1.037	0.958

General Note:

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

16. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Body
1.	WWAN + FR1 + 2.4GHz WLAN Ant 1 + 2.4GHz WLAN Ant 2	Yes
2.	WWAN + FR1 + 2.4GHz WLAN Ant 1 + Bluetooth Ant 2	Yes
3.	WWAN + FR1 +5GHz WLAN Ant 1+ 5GHz WLAN Ant 2+ Bluetooth Ant 2	Yes

General Note:

1. The Intel AX201NGW WLAN/Bluetooth module is also integrated into this host, WLAN/Bluetooth power and WLAN SAR testing data, which can be referred to Sporton SAR Test Report, Report No.: FA111325(FCC ID: QYLAX201NG) and these results are used simultaneous transmission analysis.
2. The Scaled SAR summation is calculated based on the same configuration and test position.
3. Per KDB 447498 D01v06, simultaneous transmission SAR is compliant if,
   i) Scalar SAR summation < 1.6W/kg.
   ii) SPLSR = (SAR1 + SAR2)^1.5 / (min. separation distance, mm), and the peak separation distance is determined from the square root of $[(x1-x2)^2 + (y1-y2)^2 + (z1-z2)^2]$, where (x1, y1, z1) and (x2, y2, z2) are the coordinates of the extrapolated peak SAR locations in the zoom scan.
   iii) If SPLSR ≤ 0.04, simultaneously transmission SAR measurement is not necessary.
   iv) Simultaneously transmission SAR measurement, and the reported multi-band SAR < 1.6W/kg.
   v) The SPLSR calculated results please refer to section 16.3.

16.1 5G NR + LTE + WLAN + BT Sim-Tx analysis

In 5G NR + LTE + WLAN + BT simultaneous transmission, 5G NR and LTE transmission are managed and controlled by Qualcomm® Smart Transmit, while the RF exposure from WLAN and BT radios is managed using legacy approach, i.e., through a fixed power back-off if needed.
Since WLAN and BT do not employ time-averaging, 1gSAR and 10gSAR measurement for WLAN and BT need to be conducted at their corresponding rated power following current FCC test procedures to determine reported SAR values.
Smart Transmit current implementation assumes hotspots from 5G NR and LTE are collocated. Therefore, for a total of 100% exposure margin, if LTE uses x%, then the exposure margin left for 5G NR is capped to (100-x)%. Thus, the compliance equation for LTE + 5G NR is

*x% * A + (100-x)% * B ≤ 1.0,*

Where, A is normalized reported time-averaged SAR exposure ratio from LTE, and A ≤ 1.0; B is normalized reported time-averaged exposure ratio from 5G NR (i.e., PD exposure for 5G FR2 or SAR exposure for 5G FR1), and B ≤1.0.
Let C = normalized reported SAR exposure ratio from WLAN+BT, then for compliance,

*x% * A + (100-x)% * B + C ≤ 1.0* (1)

x% * A + (100-x)% * B ≤ x% * max(A, B) + (100-x)% * max(A, B) ≤ max(A, B)

*x% * A + (100-x)% * B + C ≤ max(A, B) + C ≤ 1.0* (2)

if A + C ≤ 1.0 and B + C ≤ 1.0 can be proven, then “x% * A + (100-x)% * B + C ≤ 1.0”. Therefore simultaneous transmission analysis for 5G NR + LTE + WLAN + BT can be performed in two steps

Step 1: Prove total exposure ratio (TER) of LTE + WLAN + BT < 1
Step 2: Prove total exposure ratio (TER) of 5G NR + WLAN + BT < 1

16.2 Body Exposure Conditions

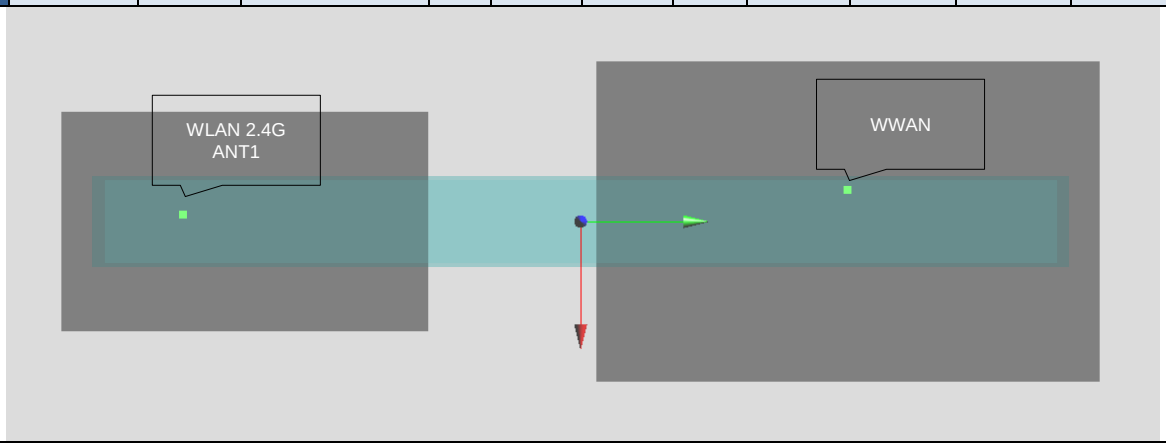
Exposure Position	1	2	3	4	5	6	1+2+3 Summed 1g SAR (W/kg)	1+2+6 Summed 1g SAR (W/kg)	1+4+5+6 Summed 1g SAR (W/kg)	1+2+3 / 1+2+6 SPLSR	1+2+3 / 1+2+6 Case No	1+4+5+6 SPLSR	1+4+5+6 Case No
	MAX WWAN	2.4GHz WLAN Ant 1	2.4GHz WLAN Ant 2	5GHz WLAN Ant 1	5GHz WLAN Ant 2	Bluetooth Ant 2							
	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)							
Bottom Face at 0mm	0.653	0.063	0.096	0.090	0.109	0.001	**0.812**	**0.717**	**0.853**				
Edge1 at 0mm	1.187	0.533		1.169			**1.720**	**1.720**	**2.356**	**0.01**	**Case 1**	**0.02**	**Case 2**
Edge2 at 0mm	0.224		1.130		0.908	0.127	**1.354**	**0.351**	**1.259**				

16.3 SPLSR Evaluation and Analysis

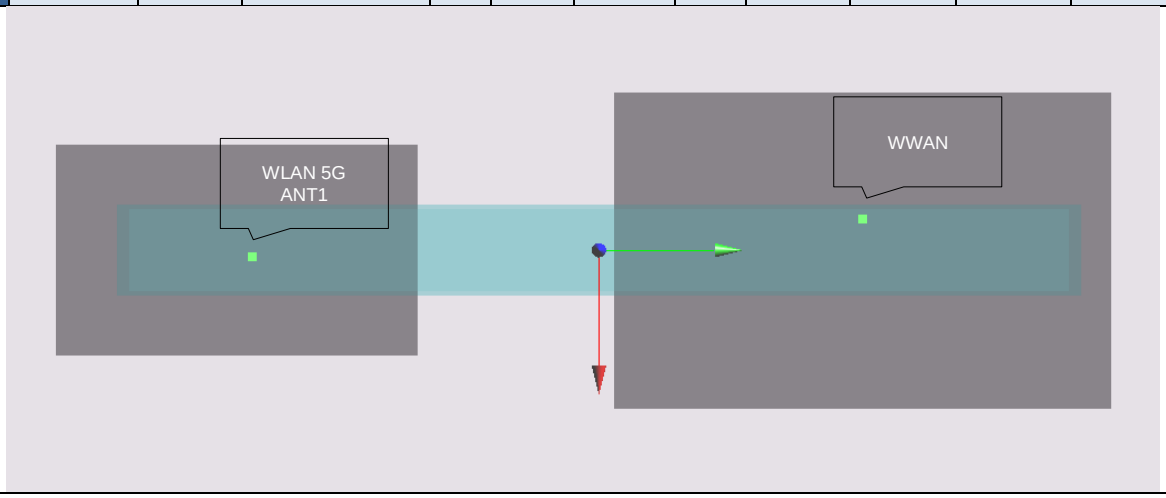
General Note:

1. SPLSR = $(SAR_1 + SAR_2)^{1.5}$ / (*min. separation distance, mm*). If SPLSR ≤ 0.04, simultaneously transmission SAR measurement is not necessary
2. 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	SAR peak location (mm)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				(mm)	X	Y	Z				
	WCDMA IV	Edge 1	1.187	0mm	-10.50	92.3	0.4	226.9	1.72	0.01	Not required
	WLAN2.4GHz		0.533	0mm	-2.4	-134.4	-4.04				



Case 2	Band	Position	SAR (W/kg)	Gap	SAR peak location (mm)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				(mm)	X	Y	Z				
	WCDMA IV	Edge 1	1.187	0mm	-10.5	92.3	0.4	208.5	2.36	0.02	Not required
	WLAN5GHz		1.169	0mm	2	-115.8	0.54				



Test Engineer：Jeff Tsao, Luke Lee and Kevin Guo

17. Uncertainty Assessment

Per KDB 865664 D01 SAR measurement 100MHz to 6GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg and the measured 10-g SAR within a frequency band is < 3.75 W/kg. The expanded SAR measurement uncertainty must be ≤ 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.

18. References

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

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

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

[4] SPEAG DASY System Handbook

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

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

[7] FCC KDB 941225 D05 v02r05, “SAR Evaluation Considerations for LTE Devices”, Dec 2015

[8] FCC KDB 941225 D05A v01r02, “Rel. 10 LTE SAR Test Guidance and KDB Inquiries”, Oct 2015

[9] FCC KDB 616217 D04 v01r02, “SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers”, Oct 2015

[10] FCC KDB 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.

[11] FCC KDB 865664 D02 v01r02, “RF Exposure Compliance Reporting and Documentation Considerations” Oct 2015.