



Report No.: HK1811161631E

FCC TEST REPORT

Test report
On Behalf of
SOTEN TECHNOLOGY (HONGKONG) CO., LIMITED
For
Rugged Tablet
Model No.: T101, S101, K101, S70V2, T60

FCC ID: 2AI62T101

Prepared for : SOTEN TECHNOLOGY (HONGKONG) CO., LIMITED
FLAT/RM A 20/F KIU FU COMMERCIAL BLDG 300 LOCKHART ROAD WAN CHAI HK

Prepared By : Shenzhen HUAKE Testing Technology Co., Ltd.
1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China

Date of Test: Nov. 13, 2018 ~ Jan. 14, 2019

Date of Report: Jan. 15, 2019

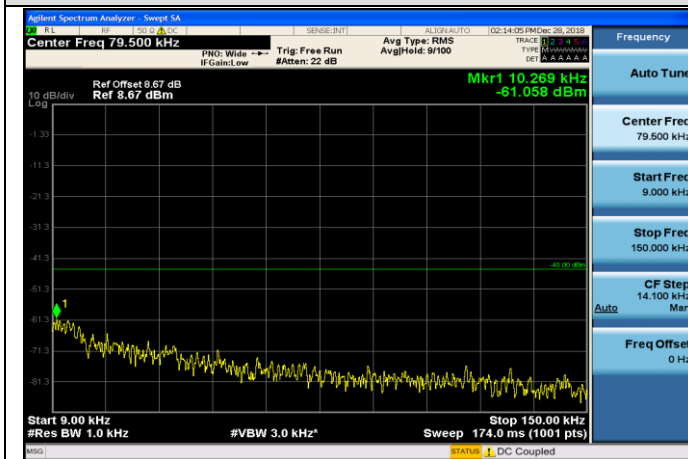
Report Number: HK1811161631E



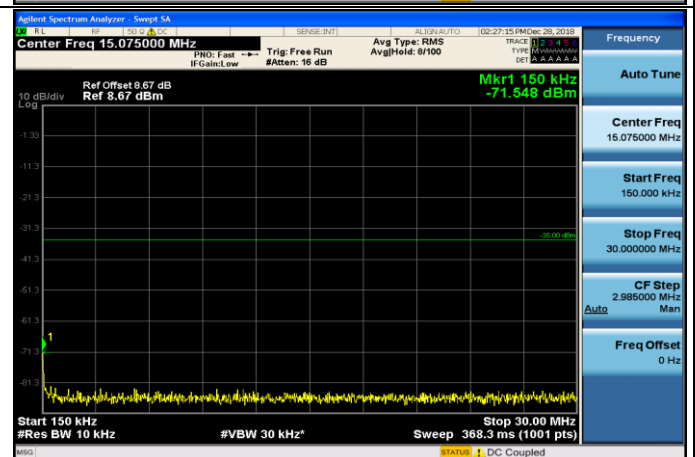
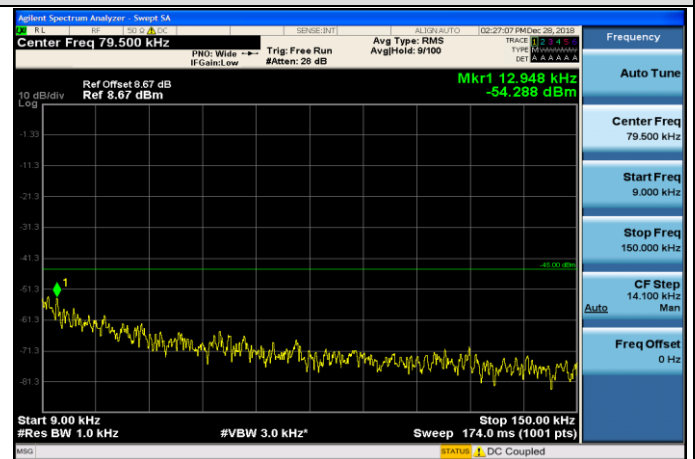
TEST PLOTS FOR CONDUCTED SPURIOUS EMISSION

LTE BAND 7

1.4MHz_LCH_QPSK_1RB#0



20MHz_LCH_QPSK_1RB#0



**TEST RESULT CERTIFICATION**

Applicant's name : SOTEN TECHNOLOGY (HONGKONG) CO., LIMITED
Address..... : FLAT/RM A 20/F KIU FU COMMERCIAL BLDG 300 LOCKHART
ROAD WAN CHAI HK

Manufacture's Name : Shenzhen SOTEN Technology Co., Ltd.
10th Floor,2nd Building,BaiWang Research and development
Address..... : building, No. 5308 Shahe west road,Xili,Nanshan district,ShenZhen,
China

Factory Name : Shenzhen SOTEN Technology Co., Ltd.
10th Floor,2nd Building,BaiWang Research and development
Address..... : building, No. 5308 Shahe west road,Xili,Nanshan district,ShenZhen,
China

Product description : Rugged Tablet
Brand name : HUGEROCK
Mode name : T101, S101, K101, S70V2, T60
Test model name : T101
Difference description : All the same except for the model name.

Standards : FCC Part 24: PERSONAL COMMUNICATIONS SERVICES
FCC Part 27: MISCELLANEOUS WIRELESS COMMUNICATIONS
SERVICES

This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen HUAKE Testing Technology Co., Ltd. is acknowledged as copyright owner and source of the material. Shenzhen HUAKE Testing Technology Co., Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

Date of Test

Date (s) of performance of tests..... : **Nov. 13, 2018 ~ Jan. 14, 2019**

Date of Issue : **Jan. 15, 2019**

Test Result..... : **Pass**



Testing Engineer : Gary Qian
(Gary Qian)

Technical Manager : Eden Hu
(Eden Hu)

Authorized Signatory : Jason Zhou
(Jason Zhou)



Revision History

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Jan. 15, 2019	Valid	Initial Release



TABLE OF CONTENTS

1. TEST STANDARDS	7
2. SUMMARY	8
2.1 PRODUCT DESCRIPTION	8
2.2 RELATED SUBMITTAL(S) / GRANT (S)	9
2.3 TEST METHODOLOGY	9
2.4 TEST FACILITY	10
2.5 SPECIAL ACCESSORIES	11
2.6 EQUIPMENT MODIFICATIONS	11
3. SYSTEM TEST CONFIGURATION	12
3.1 EUT CONFIGURATION	12
3.2 EUT EXERCISE	12
3.3 GENERAL TECHNICAL REQUIREMENTS	12
3.4 CONFIGURATION OF EUT SYSTEM	13
4. SUMMARY OF TEST RESULTS	14
5. DESCRIPTION OF TEST MODES	15
6. OUTPUT POWER	17
6.1 CONDUCTED OUTPUT POWER	17
6.2 RADIATED OUTPUT POWER	29
6.3. PEAK-TO-AVERAGE RATIO	37
7. SPURIOUS EMISSION	51
7.1 CONDUCTED SPURIOUS EMISSION	51
7.2 RADIATED SPURIOUS EMISSION	53
8. FREQUENCY STABILITY	58
8.1 MEASUREMENT METHOD	58
8.2 PROVISIONS APPLICABLE	59
8.3 MEASUREMENT RESULT (WORST)	60
9. OCCUPIED BANDWIDTH	62
9.1 MEASUREMENT METHOD	62
9.2 PROVISIONS APPLICABLE	62
9.3 MEASUREMENT RESULT	62
10. EMISSION BANDWIDTH	67
10.1 MEASUREMENT METHOD	67
10.2 PROVISIONS APPLICABLE	67
10.3 MEASUREMENT RESULT	67
11. BAND EDGE	72
11.1 MEASUREMENT METHOD	72



11.2 PROVISIONS APPLICABLE 72

11.3 MEASUREMENT RESULT..... 72

APPENDIX A TEST PLOTS FOR CONDUCTED SPURIOUS EMISSION 73

APPENDIX B TEST PLOTS FOR OCCUPIED BANDWIDTH (99%) 79

APPENDIX C TEST PLOTS FOR BAND EDGES 89

APPENDIX D PHOTOGRAPHS OF TEST SETUP 99



1. TEST STANDARDS

The tests were performed according to following standards:

[FCC Part 24](#) :PUBLIC MOBILE SERVICES

[FCC Part 27](#) : MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES

[TIA/EIA 603 D June 2010](#): Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

[47 CFR FCC Part 15 Subpart B](#): - Unintentional Radiators

[FCC Part 2](#): FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

[KDB971168 D01:v02r02](#) MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS

[ANSI C63.4:2014](#): Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz



2. SUMMARY

2.1 PRODUCT DESCRIPTION

A major technical description of EUT is described as following:

Product Designation:	Rugged Tablet			
Model Name	T101			
Hardware Version	T101-MainBoard-P3			
Software Version	T101-20181026-Q			
Radio System Type:	LTE			
Frequency Bands:	<input checked="" type="checkbox"/> FDD Band 2 <input checked="" type="checkbox"/> FDD Band 7 (U.S. Bands) <input checked="" type="checkbox"/> FDD Band 3 <input checked="" type="checkbox"/> FDD Band 7 (Non-U.S. Bands)			
Frequency Range	LTE Band 2	Transmission (TX): 1850 to 1909.9 MHz		
		Receiving (RX): 1930 to 1989.9 MHz		
	LTE Band 7	Transmission (TX): 2500 to 2569.9 MHz		
		Receiving (RX): 2620 to 2689.9 MHz		
Supported Channel Bandwidth	LTE Band 2	<input checked="" type="checkbox"/> 1.4 MHz <input checked="" type="checkbox"/> 3 MHz <input checked="" type="checkbox"/> 5 MHz <input checked="" type="checkbox"/> 10 MHz <input checked="" type="checkbox"/> 15 MHz <input checked="" type="checkbox"/> 20 MHz		
	LTE Band 7	<input checked="" type="checkbox"/> 5 MHz <input checked="" type="checkbox"/> 10 MHz <input checked="" type="checkbox"/> 15 MHz <input checked="" type="checkbox"/> 20 MHz		
Antenna:	PCB Antenna			
Type of Modulation	QPSK/16QAM			
Antenna gain:	0.85dBi(LTE band 2), 0.88dBi (LTE band 7)			
Diversity Antenna gain:	0.74dBi(LTE band 2), 0.79dBi (LTE band 7)			
Power Supply:	DC 3.7V by battery			
Single Card:	GSM/WCDMA/LTE Card Slot			
Power Class	3			
Extreme Vol. Limits:	DC3.1V to 4.3 V (Normal: 3.7 V)			
Temperature range	-10℃ to +50℃			
Note1: The High Voltage DC4.3V and Low Voltage DC3.1V were declared by manufacturer, The EUT couldn't be operating normally with higher or lower voltage..				



2.2 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2AI62T101**, filing to comply with the Part 24 and Part 27 requirements

2.3 TEST METHODOLOGY

The radiated emission testing was performed according to the procedures of ANSI/TIA-603-E-2016, and FCC KDB 971168 D01 Power Means License Digital Systems V03R01.

**2.4 TEST FACILITY**

Site	Shenzhen HUAKE Testing Technology Co., Ltd.
Location	1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China
Designation Number	CN1229
Test Firm Registration Number : 616276	

ALL TEST EQUIPMENT LIST

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
LISN	ENV216	R&S	HKE-059	2018/12/27	2019/12/26
LISN	R&S	ENV216	HKE-002	2018/12/27	2019/12/26
Broadband antenna	Schwarzbeck	VULB 9163	HKE-012	2018/12/27	2019/12/26
Receiver	R&S	ESCI 7	HKE-010	2018/12/27	2019/12/26
Spectrum analyzer	Agilent	N9020A	HKE-048	2018/12/27	2019/12/26
RF automatic control unit	Tonscend	JS0806-2	HKE-060	2018/12/27	2019/12/26
Horn antenna	Schwarzbeck	9120D	HKE-013	2018/12/27	2019/12/26
Loop antenna	Schwarzbeck	FMZB 1519 B	HKE-014	2018/12/27	2019/12/26
Preamplifier	EMCI	EMC051845SE	HKE-015	2018/12/27	2019/12/26
Preamplifier	Agilent	83051A	HKE-016	2018/12/27	2019/12/26
Temperature and humidity meter	Boyang	HTC-1	HKE-075	2018/12/27	2019/12/26
High pass filter unit	Tonscend	JS0806-F	HKE-055	2018/12/27	2019/12/26
RF cable	Times	1-40G	HKE-034	2018/12/27	2019/12/26
Power meter	Agilent	E4419B	HKE-085	2018/12/27	2019/12/26
Power Sensor	Agilent	E9300A	HKE-086	2018/12/27	2019/12/26
Wireless Communication Test Set	R&S	CMU200	HKE-026	2018/12/27	2019/12/26



2.5 SPECIAL ACCESSORIES

The battery was supplied by the applicant were used as accessories and being tested with EUT intended for FCC grant together.

2.6 EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.



3. SYSTEM TEST CONFIGURATION

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commission's requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The Transmitter was operated in the maximum output power mode through Communication Tester. The TX frequency was fixed which was for the purpose of the measurements.

3.3 GENERAL TECHNICAL REQUIREMENTS

Item Number	Item Description		FCC Rules
1	Output Power	Conducted output power	2.1046/24.232(c)
		Radiated output power	/27.50(d)(4)/ 27.50(h)(2)
2	Peak-to-Average Ratio	Peak-to-Average Ratio	24.232(d)
3	Spurious Emission	Conducted spurious emission	2.1051/22.917(a)/24.238(a)
		Radiated spurious emission	27.53(h)/ 27.53(g)
4	Frequency Stability		2.1055/22.355/24.235/27.54
5	Occupied Bandwidth		2.1049 (h)(i)
6	Band Edge		2.1051/22.917(a)/24.238(a) 27.53(h)/ 27.53(g)

Note: Testing was performed by configuring EUT to maximum output power status, the declared output power class for different.



3.4 CONFIGURATION OF EUT SYSTEM

Fig. 2-1 Configuration of EUT System

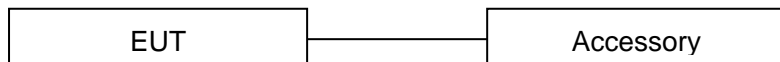


Table 2-1 Equipment Used in EUT System

Item	Equipment	Model No.	ID or Specification	Remark
1	Rugged Tablet	T101	2AI62T101	EUT
2	Adapter	8395-UW01-1070	DC 5.3V 2.0A	Accessory
3	Battery	47206128	DC3.7V/ 14600mAh	Accessory
4	USB	N/A	N/A	Accessory

***Note: All the accessories have been used during the test. The following “EUT” in setup diagram means EUT system.

**4. SUMMARY OF TEST RESULTS**

Item Number	Item Description		FCC Rules	Result
1	Output Power	Conducted Output Power	2.1046/22.913(a)(2)/24.232(c)/ 27.50(d)(4)/ 27.50(h)(2)	Pass
		Radiated Output Power		
2	Peak-to-Average Ratio	Peak-to-Average Ratio	24.232(d)	Pass
3	Spurious Emission	Conducted Spurious Emission	2.1051/24.238(a) 27.53(h)/ 27.53(g)	Pass
		Radiated Spurious Emission		
4	Frequency Stability		2.1055/24.235/27.54	Pass
5	Occupied Bandwidth		2.1049 (h)(i)	Pass
6	Band Edge		2.1051/24.238(a) 27.53(h) /27.53(g)	Pass



5. DESCRIPTION OF TEST MODES

During the testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication Tester (CMW 500) to ensure max power transmission and proper modulation. Three channels (The top channel, the middle channel and the bottom channel) were chosen for testing on both LTE frequency band.

The worst condition was recorded in the test report if no other modes test data.

Test Mode	Test Modes Description
LTE	LTE system, QPSK modulation
LTE	LTE system, 16QAM modulation

Test Mode	TX / RX	RF Channel		
		Low (B)	Middle (M)	High (T)
LTE Band 2	TX (1.4M)	Channel 18607	Channel 18900	Channel 19193
		1850.7 MHz	1880 MHz	1909.3 MHz
	TX (3M)	Channel 18615	Channel 18900	Channel 19185
		1851.5 MHz	1880 MHz	1908.5 MHz
	TX (5M)	Channel 18625	Channel 18900	Channel 19175
		1852.5 MHz	1880 MHz	1907.5 MHz
	TX (10M)	Channel 18650	Channel 18900	Channel 19150
		1855.0 MHz	1880 MHz	1905.0 MHz
	TX (15M)	Channel 18675	Channel 18900	Channel 19125
		1857.5 MHz	1880 MHz	1902.5 MHz
	TX (20M)	Channel 18700	Channel 18900	Channel 19100
		1860.0 MHz	1880 MHz	1900.0 MHz
	RX (1.4M)	Channel 607	Channel 900	Channel 1193
		1930.7 MHz	1960 MHz	1989.3 MHz
	RX (3M)	Channel 615	Channel 900	Channel 1185
		1931.5 MHz	1960 MHz	1988.5 MHz
	RX (5M)	Channel 625	Channel 900	Channel 1175
		1932.5 MHz	1960 MHz	1987.5 MHz
	RX (10M)	Channel 650	Channel 900	Channel 1150
		1935 MHz	1960 MHz	1985 MHz
	RX (15M)	Channel 675	Channel 900	Channel 1125
		1937.5 MHz	1960 MHz	1982.5 MHz
	RX (20M)	Channel 700	Channel 900	Channel 1100
		1940.0 MHz	1960 MHz	1980 MHz



Test Mode	TX / RX	RF Channel		
		Low (B)	Middle (M)	High (T)
LTE Band 7	TX (5M)	Channel 20775	Channel 21100	Channel 21425
		2502.5 MHz	2535 MHz	2567.5 MHz
	TX (10M)	Channel 20800	Channel 21100	Channel 21400
		2505.0 MHz	2535 MHz	2565 MHz
	TX (15M)	Channel 20825	Channel 21100	Channel 21275
		2507.5 MHz	2535 MHz	2562.5 MHz
	TX (20M)	Channel 20850	Channel 21100	Channel 21350
		2510.0 MHz	2535 MHz	2560 MHz
	RX (5M)	Channel 2775	Channel 3100	Channel 3425
		2622.5 MHz	2655 MHz	2687.5 MHz
	RX (10M)	Channel 2800	Channel 3100	Channel 3400
		2625.0 MHz	2655 MHz	2685 MHz
	RX (15M)	Channel 2825	Channel 3100	Channel 3375
		2627.5 MHz	2655 MHz	2682.5 MHz
	RX (20M)	Channel 2850	Channel 3100	Channel 3350
		2630.0 MHz	2655 MHz	2680.0 MHz



6. OUTPUT POWER

6.1 CONDUCTED OUTPUT POWER

6.1.1 MEASUREMENT METHOD

The EUT is coupled to the SS with attenuator through power splitter; the RF load attached to EUT antenna terminal is 50ohm, the path loss as the factor is calibrated to correct the reading. A system simulator was used to establish communication with the EUT , Its parameters were set to force the EUT transmitting at maximum output power. The measured power in the radio frequency on the transmitter output terminals shall be reported. The measurements were performed on all modes at 3 typical channels (the Top Channel, the Middle Channel and the Bottom Channel) for each band.

6.1.2 Measurement Result

Conducted Output Power Limits		
Mode	Average Power	Tolerance(dB)
LTE	23 dBm (0.2W)	± 2.7



LTE Band 2

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
20MHz	18700	1860.0	QPSK	1	0	0	21.32
				1	49	0	21.29
				1	99	0	21.39
				50	0	1	20.24
				50	25	1	20.19
				50	49	1	20.29
				100	0	1	20.23
			16QAM	1	0	1	20.56
				1	49	1	20.62
				1	99	1	20.57
				50	0	2	19.24
				50	25	2	19.26
				50	49	2	19.28
				100	0	2	19.31
	18900	1880.0	QPSK	1	0	0	21.41
				1	49	0	21.24
				1	99	0	21.08
				50	0	1	20.12
				50	25	1	20.08
				50	49	1	20.10
				100	0	1	20.16
			16QAM	1	0	1	20.73
				1	49	1	20.64
				1	99	1	20.47
				50	0	2	19.20
				50	25	2	19.13
				50	49	2	19.14
				100	0	2	19.18
	19100	1900.0	QPSK	1	0	0	20.93
				1	49	0	20.76
				1	99	0	21.04
				50	0	1	20.08
				50	25	1	20.01
				50	49	1	20.05
				100	0	1	20.01
			16QAM	1	0	1	20.29
				1	49	1	20.31
				1	99	1	20.34
				50	0	2	19.05
				50	25	2	19.10
				50	49	2	19.07
				100	0	2	19.05



BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
15MHz	18675	1857.5	QPSK	1	0	0	21.20
				1	37	0	21.17
				1	74	0	21.18
				36	0	1	20.14
				36	16	1	20.20
				36	35	1	20.22
				75	0	1	20.23
			16QAM	1	0	1	20.52
				1	37	1	20.43
				1	74	1	20.47
				36	0	2	19.19
				36	16	2	19.22
				36	35	2	19.23
				75	0	2	19.26
	18900	1880.0	QPSK	1	0	0	21.22
				1	37	0	21.12
				1	74	0	20.96
				36	0	1	20.10
				36	16	1	20.04
				36	35	1	20.08
				75	0	1	20.16
			16QAM	1	0	1	20.50
				1	37	1	20.41
				1	74	1	20.29
				36	0	2	19.08
				36	16	2	19.03
				36	35	2	19.10
				75	0	2	19.18
	19125	1902.5	QPSK	1	0	0	20.92
				1	37	0	20.96
				1	74	0	21.06
				36	0	1	20.15
				36	16	1	20.17
				36	35	1	20.19
				75	0	1	20.13
			16QAM	1	0	1	20.23
				1	37	1	20.32
				1	74	1	20.35
				36	0	2	19.12
				36	16	2	19.08
				36	35	2	19.15
				75	0	2	19.08



BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
10MHz	18650	1855.0	QPSK	1	0	0	21.16
				1	24	0	21.17
				1	49	0	21.14
				25	0	1	20.18
				25	12	1	20.21
				25	25	1	20.23
				50	0	1	20.24
			16QAM	1	0	1	20.51
				1	24	1	20.46
				1	49	1	20.47
				25	0	2	19.17
				25	12	2	19.20
				25	25	2	19.27
				50	0	2	19.29
	18900	1880.0	QPSK	1	0	0	21.21
				1	24	0	21.14
				1	49	0	20.99
				25	0	1	20.01
				25	12	1	20.05
				25	25	1	20.06
				50	0	1	20.07
			16QAM	1	0	1	20.59
				1	24	1	20.38
				1	49	1	20.41
				25	0	2	19.14
				25	12	2	19.11
				25	25	2	19.12
				50	0	2	19.14
	19150	1905.0	QPSK	1	0	0	20.96
				1	24	0	21.05
				1	49	0	21.04
				25	0	1	20.06
				25	12	1	20.09
				25	25	1	20.05
				50	0	1	19.99
			16QAM	1	0	1	20.15
				1	24	1	20.17
				1	49	1	20.30
				25	0	2	19.04
				25	12	2	19.02
				25	25	2	19.03
				50	0	2	19.02



BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
5MHz	18625	1852.5	QPSK	1	0	0	21.21
				1	12	0	21.15
				1	24	0	21.20
				12	0	1	20.20
				12	6	1	20.19
				12	11	1	20.23
				25	0	1	20.22
			16QAM	1	0	1	20.50
				1	12	1	20.49
				1	24	1	20.51
				12	0	2	19.24
				12	6	2	19.26
				12	11	2	19.34
				25	0	2	19.26
	18900	1880.0	QPSK	1	0	0	21.16
				1	12	0	21.08
				1	24	0	21.03
				12	0	1	20.14
				12	6	1	20.10
				12	11	1	20.09
				25	0	1	20.05
			16QAM	1	0	1	20.41
				1	12	1	20.37
				1	24	1	20.30
				12	0	2	19.19
				12	6	2	19.12
				12	11	2	19.22
				25	0	2	19.09
	19175	1907.5	QPSK	1	0	0	21.11
				1	12	0	21.09
				1	24	0	21.05
				12	0	1	20.17
				12	6	1	20.04
				12	11	1	20.07
				25	0	1	20.02
			16QAM	1	0	1	20.22
				1	12	1	20.19
				1	24	1	20.23
				12	0	2	19.09
				12	6	2	19.17
				12	11	2	19.12
				25	0	2	19.07



BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	M P R	Average power (dBm)
3MHz	18615	1851.5	QPSK	1	0	0	21.05
				1	7	0	21.09
				1	14	0	21.11
				8	0	1	20.00
				8	4	1	20.06
				8	7	1	20.16
				15	0	1	20.17
			16QAM	1	0	1	20.38
				1	7	1	20.34
				1	14	1	20.42
				8	0	2	19.18
				8	4	2	19.20
				8	7	2	19.28
				15	0	2	19.17
	18900	1880.0	QPSK	1	0	0	21.04
				1	7	0	21.06
				1	14	0	20.97
				8	0	1	20.03
				8	4	1	20.09
				8	7	1	20.05
				15	0	1	20.05
			16QAM	1	0	1	20.40
				1	7	1	20.37
				1	14	1	20.36
				8	0	2	19.06
				8	4	2	19.03
				8	7	2	19.07
				15	0	2	19.06
	19185	1908.5	QPSK	1	0	0	21.00
				1	7	0	21.02
				1	14	0	20.98
				8	0	1	20.04
				8	4	1	20.04
				8	7	1	20.03
				15	0	1	20.03
			16QAM	1	0	1	20.21
				1	7	1	20.18
				1	14	1	20.24
				8	0	2	19.04
				8	4	2	19.07
				8	7	2	19.02
				15	0	2	19.07



BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
1.4MHz	18607	1850.7	QPSK	1	0	0	21.07
				1	2	0	21.03
				1	5	0	21.08
				3	0	0	21.13
				3	1	0	21.17
				3	2	0	21.18
				6	0	1	20.12
			16QAM	1	0	1	20.36
				1	2	1	20.37
				1	5	1	20.41
				3	0	1	20.22
				3	1	1	20.26
				3	2	1	20.30
				6	0	2	19.17
	18900	1880.0	QPSK	1	0	0	21.02
				1	2	0	20.03
				1	5	0	21.02
				3	0	0	21.15
				3	1	0	21.07
				3	2	0	21.06
				6	0	1	20.03
			16QAM	1	0	1	20.37
				1	2	1	20.15
				1	5	1	20.37
				3	0	1	20.14
				3	1	1	20.09
				3	2	1	20.07
				6	0	2	19.03
	19193	1909.3	QPSK	1	0	0	21.00
				1	2	0	21.04
				1	5	0	21.02
				3	0	0	21.08
				3	1	0	21.11
				3	2	0	21.08
				6	0	1	20.02
			16QAM	1	0	1	20.24
				1	2	1	20.28
				1	5	1	20.26
				3	0	1	20.15
				3	1	1	20.18
				3	2	1	20.14
				6	0	2	19.18



LTE Band 7

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
20MHz	20850	2510	QPSK	1	0	0	22.41
				1	49	0	22.45
				1	99	0	22.59
				50	0	1	21.91
				50	25	1	21.82
				50	49	1	21.95
				100	0	1	21.53
			16QAM	1	0	1	21.24
				1	49	1	21.64
				1	99	1	21.78
				50	0	2	20.67
				50	25	2	20.82
				50	49	2	20.88
				100	0	2	20.79
	21100	2535	QPSK	1	0	0	22.40
				1	49	0	22.41
				1	99	0	22.47
				50	0	1	21.87
				50	25	1	22.04
				50	49	1	21.94
				100	0	1	21.38
			16QAM	1	0	1	21.88
				1	49	1	21.73
				1	99	1	21.85
				50	0	2	20.77
				50	25	2	20.58
				50	49	2	20.48
				100	0	2	20.15
	21350	2560	QPSK	1	0	0	22.19
				1	49	0	22.61
				1	99	0	22.64
				50	0	1	21.87
				50	25	1	22.05
				50	49	1	22.12
				100	0	1	22.03
			16QAM	1	0	1	20.85
				1	49	1	20.82
				1	99	1	20.81
				50	0	2	20.71
				50	25	2	20.64
				50	49	2	20.85
				100	0	2	20.61



BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
15MHz	20825	2507.5	QPSK	1	0	0	22.28
				1	37	0	22.43
				1	74	0	22.59
				36	0	1	21.34
				36	16	1	22.03
				36	35	1	22.12
				75	0	1	21.86
			16QAM	1	0	1	21.49
				1	37	1	21.23
				1	74	1	21.86
				36	0	2	21.05
				36	16	2	21.13
				36	35	2	21.14
				75	0	2	20.84
	21100	2535	QPSK	1	0	0	22.27
				1	37	0	22.18
				1	74	0	22.19
				36	0	1	21.41
				36	16	1	21.34
				36	35	1	21.45
				75	0	1	21.29
			16QAM	1	0	1	21.57
				1	37	1	21.51
				1	74	1	21.63
				36	0	2	20.41
				36	16	2	20.53
				36	35	2	20.23
				75	0	2	20.20
	21375	2562.5	QPSK	1	0	0	22.39
				1	37	0	22.32
				1	74	0	22.43
				36	0	1	21.85
				36	16	1	21.69
				36	35	1	21.87
				75	0	1	22.16
			16QAM	1	0	1	22.09
				1	37	1	21.22
				1	74	1	21.30
				36	0	2	20.94
				36	16	2	20.81
				36	35	2	20.70
				75	0	2	20.69



BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
10MHz	20800	2505	QPSK	1	0	0	22.15
				1	24	0	22.34
				1	49	0	22.52
				25	0	1	21.41
				25	12	1	21.37
				25	25	1	21.48
				50	0	1	21.37
			16QAM	1	0	1	21.40
				1	24	1	21.67
				1	49	1	21.78
				25	0	2	20.43
				25	12	2	20.28
				25	25	2	20.45
				50	0	2	20.34
	21100	2535	QPSK	1	0	0	22.21
				1	24	0	22.16
				1	49	0	22.18
				25	0	1	21.36
				25	12	1	21.21
				25	25	1	21.17
				50	0	1	21.17
			16QAM	1	0	1	21.50
				1	24	1	21.52
				1	49	1	21.50
				25	0	2	20.34
				25	12	2	20.39
				25	25	2	20.14
				50	0	2	20.15
	21400	2565	QPSK	1	0	0	22.51
				1	24	0	22.39
				1	49	0	22.32
				25	0	1	21.37
				25	12	1	21.41
				25	25	1	21.43
				50	0	1	21.47
			16QAM	1	0	1	21.75
				1	24	1	21.67
				1	49	1	21.59
				25	0	2	20.27
				25	12	2	20.33
				25	25	2	20.41
				50	0	2	20.47



BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
5MHz	20775	2502.5	QPSK	1	0	0	22.24
				1	12	0	22.20
				1	24	0	22.32
				12	0	1	21.18
				12	6	1	21.29
				12	13	1	21.33
				25	0	1	21.23
			16QAM	1	0	1	21.38
				1	12	1	21.46
				1	24	1	21.55
				12	0	2	20.24
				12	6	2	20.26
				12	13	2	20.33
				25	0	2	20.20
	21100	2535	QPSK	1	0	0	22.27
				1	12	0	22.18
				1	24	0	22.19
				12	0	1	21.25
				12	6	1	21.31
				12	13	1	21.20
				25	0	1	21.17
			16QAM	1	0	1	21.43
				1	12	1	21.39
				1	24	1	21.34
				12	0	2	20.31
				12	6	2	20.29
				12	13	2	20.24
				25	0	2	20.13
	21425	2567.5	QPSK	1	0	0	22.55
				1	12	0	22.41
				1	24	0	22.34
				12	0	1	21.38
				12	6	1	21.34
				12	13	1	21.40
				25	0	1	21.40
			16QAM	1	0	1	21.71
				1	12	1	21.62
				1	24	1	21.51
				12	0	2	20.32
				12	6	2	20.36
				12	13	2	20.38
				25	0	2	20.41



According to 3GPP 36.521 sub-clause 6.2.3.3, the maximum output power is allowed to be reduced by following the table.

Table 6.2.3.3-1: Maximum Power Reduction (MPR) for Power Class 3

Modulation	Channel bandwidth / Transmission bandwidth configuration [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

The device supports MPR to solve linearity issues (ACLR or SEM) due to the higher peak-to average ratios (PAR) of the HSUPA signal. This prevents saturating the full range of the TX DAC inside of device and provides a reduced power output to the RF transceiver chip according to the Cubic Metric (For PRACH, PUCCH and SRS transmission, the allowed MPR is according to that specified for PUSCH QPSK modulation for the corresponding transmission bandwidth.).

When PRACH, PUCCH are present the beta gains on those channels are reduced firsts to try to get the power under the allowed limit. If the beta gains are lowered as far as possible, then a hard limiting is applied at the maximum allowed level.

For each subframe, the MPR is evaluated per slot and given by the maximum value taken over the transmission(s) within the slot, the maximum MPR over the two slots is then applied for the entire subframe.

For the UE maximum output power modified by MPR, the power limits specified in subclause 6.2.5.3 apply. The normative reference for this requirement is TS 36.101 clause 6.2.3.

The end effect is that the DUT output power is identical to the case where there is no MPR in the device.



6.2 RADIATED OUTPUT POWER

6.2.1 MEASUREMENT METHOD

The measurements procedures specified in ANSI/TIA-603-E-2016 were applied.

1In an anechoic antenna test chamber, a half-wave dipole antenna for the frequency band of interest is placed at the reference centre of the chamber. An RF Signal source for the frequency band of interest is connected to the dipole with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A known (measured) power (P_{in}) is applied to the input of the dipole, and the power received (P_r) at the chamber's probe antenna is recorded.

2The substitution method is used. Substitution values at each frequency are measured before and saved to the test software. A "reference path loss" is established as $AR_{pl} = P_{in} + 2.15 - P_r$. The AR_{pl} is the attenuation of "reference path loss", and including the gain of receive antenna, the cable loss and the air loss. The measurement results are obtained as described below: $Power = P_{Mea} + AR_{pl}$

3The EUT is substituted for the dipole at the reference centre of the chamber and a scan is performed to obtain the radiation pattern.

4From the radiation pattern, the co-ordinates where the maximum antenna gain occurs are identified.

5The EUT is then put into continuously transmitting mode at its maximum power level.

6Power mode measurements are performed with the receiving antenna placed at the coordinates determined in Step 3 to determine the output power as defined in Rule 27.50(d)(4). The "reference path loss" from Step1 is added to this result.

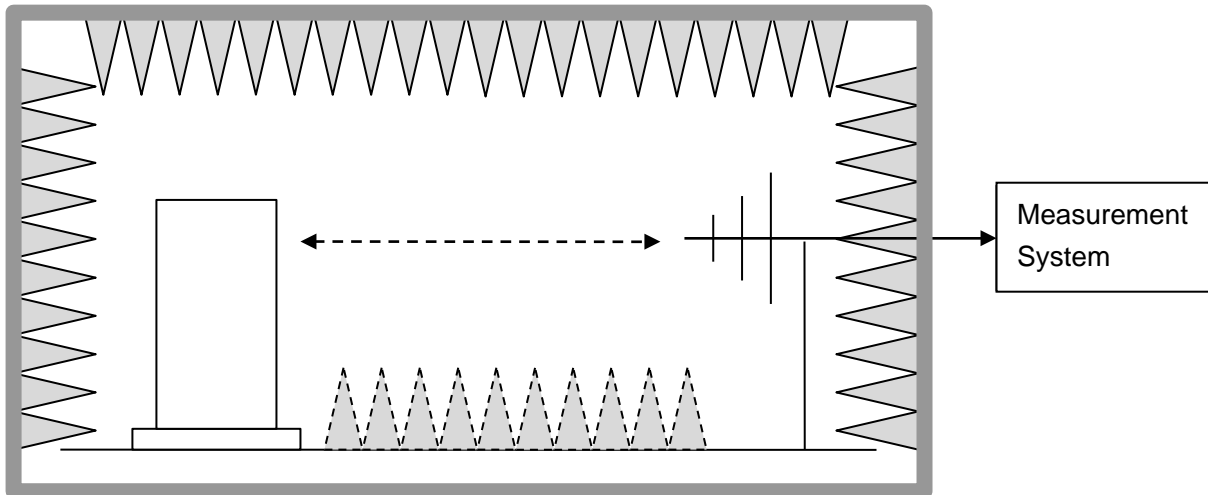
7This value is EIRP since the measurement is calibrated using a half-wave dipole antenna of known gain (2.15 dBi) and known input power (P_{in}).

8ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15dBi..$

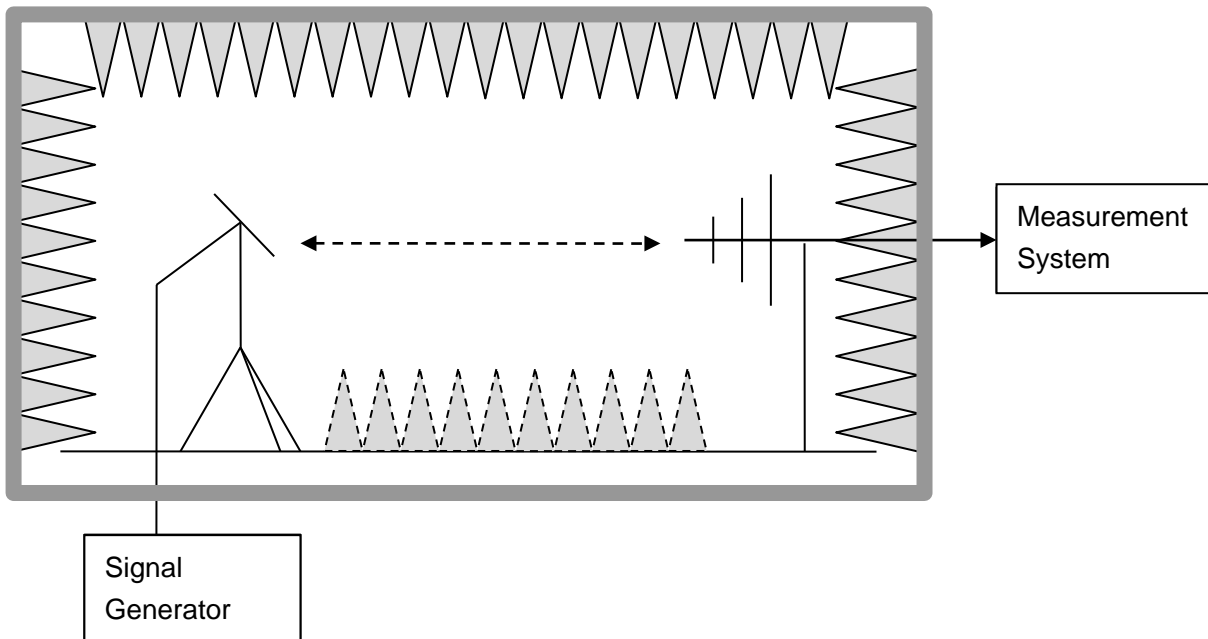
Test Setup

NOTE: Effective radiated power (ERP) refers to the radiation power output of the EUT, assuming all emissions are radiated from half-wave dipole antennas.

Step 1: Pre-test



Step 2: Substitution method to verify the maximum ERP



**6.2.2 PROVISIONS APPLICABLE**

This is the test for the maximum radiated power from the EUT. Rule Part 24.232(c) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p."

Mode	FCC Part Section(s)	Nominal Peak Power
LTE Band 2	24.232(c)	$\leq 33\text{dBm}$ (2W)
LTE Band 7	27.50(i)(2)	$\leq 33\text{dBm}$ (2W)

**6.2.3 MEASUREMENT RESULT****EIRP for LTE Band 2**

Frequency	Channel Bandwidth	Mode.	RB	Substituted level	Antenna Polarization	Antenna Gain correction	Cable Loss	Absolute Level	Limit (dBm)
1850.7	1.4	QPSK	1/0	12.81	V	7.95	0.79	19.97	33
1880.0	1.4	QPSK	1/0	12.36	V	7.95	0.79	19.52	33
1909.3	1.4	QPSK	1/0	12.8	V	7.95	0.79	19.96	33
1850.7	1.4	QPSK	1/0	12.33	H	7.95	0.79	19.49	33
1880.0	1.4	QPSK	1/0	12.53	H	7.95	0.79	19.69	33
1909.3	1.4	QPSK	1/0	12.8	H	7.95	0.79	19.96	33
1850.7	1.4	16-QAM	1/5	12.08	V	7.95	0.79	19.24	33
1880.0	1.4	16-QAM	1/0	12.84	V	7.95	0.79	20	33
1909.3	1.4	16-QAM	1/0	10.63	V	7.95	0.79	17.79	33
1850.7	1.4	16-QAM	1/5	12.35	H	7.95	0.79	19.51	33
1880.0	1.4	16-QAM	1/0	11.32	H	7.95	0.79	18.48	33
1909.3	1.4	16-QAM	1/0	11.14	H	7.95	0.79	18.3	33
1851.5	3	QPSK	1/0	11.08	V	7.95	0.79	18.24	33
1880.0	3	QPSK	1/0	12.93	V	7.95	0.79	20.09	33
1908.5	3	QPSK	1/0	12.83	V	7.95	0.79	19.99	33
1851.5	3	QPSK	1/0	12.39	H	7.95	0.79	19.55	33
1880.0	3	QPSK	1/0	10.85	H	7.95	0.79	18.01	33
1908.5	3	QPSK	1/0	10.37	H	7.95	0.79	17.53	33
1851.5	3	16-QAM	1/0	11.29	V	7.95	0.79	18.45	33
1880.0	3	16-QAM	1/0	10.85	V	7.95	0.79	18.01	33
1908.5	3	16-QAM	1/0	11.18	V	7.95	0.79	18.34	33
1851.5	3	16-QAM	1/0	11.24	H	7.95	0.79	18.4	33
1880.0	3	16-QAM	1/0	12.13	H	7.95	0.79	19.29	33
1908.5	3	16-QAM	1/0	12.43	H	7.95	0.79	19.59	33
1852.5	5	QPSK	1/0	12.27	V	7.95	0.79	19.43	33
1880.0	5	QPSK	1/0	12.63	V	7.95	0.79	19.79	33
1907.5	5	QPSK	1/24	11.93	V	7.95	0.79	19.09	33
1852.5	5	QPSK	1/0	11.91	H	7.95	0.79	19.07	33
1880.0	5	QPSK	1/0	11.95	H	7.95	0.79	19.11	33
1907.5	5	QPSK	1/24	11.97	H	7.95	0.79	19.13	33
1852.5	5	16-QAM	1/0	12.22	V	7.95	0.79	19.38	33
1880.0	5	16-QAM	1/0	12.35	V	7.95	0.79	19.51	33
1907.5	5	16-QAM	1/24	10.79	V	7.95	0.79	17.95	33



1852.5	5	16-QAM	1/0	11.17	H	7.95	0.79	18.33	33
1880.0	5	16-QAM	1/0	12.19	H	7.95	0.79	19.35	33
1907.5	5	16-QAM	1/24	11.24	H	7.95	0.79	18.4	33
1855	10	QPSK	1/0	11.3	V	7.95	0.79	18.46	33
1880	10	QPSK	1/49	11.03	V	7.95	0.79	18.19	33
1905	10	QPSK	1/0	11.36	V	7.95	0.79	18.52	33
1855	10	QPSK	1/0	11.28	H	7.95	0.79	18.44	33
1880	10	QPSK	1/49	12.24	H	7.95	0.79	19.4	33
1905	10	QPSK	1/0	11.88	H	7.95	0.79	19.04	33
1855	10	16-QAM	1/0	12.71	V	7.95	0.79	19.87	33
1880	10	16-QAM	1/49	11.56	V	7.95	0.79	18.72	33
1905	10	16-QAM	1/0	12.4	V	7.95	0.79	19.56	33
1855	10	16-QAM	1/0	11.96	H	7.95	0.79	19.12	33
1880	10	16-QAM	1/49	12.56	H	7.95	0.79	19.72	33
1905	10	16-QAM	1/0	12.53	H	7.95	0.79	19.69	33
1857.5	15	QPSK	1/0	11.86	V	7.95	0.79	16.2	33
1880	15	QPSK	1/74	11.51	V	7.95	0.79	16.85	33
1902.5	15	QPSK	1/0	11.75	V	7.95	0.79	17.91	33
1857.5	15	QPSK	1/0	11.7	H	7.95	0.79	16.44	33
1880	15	QPSK	1/74	12.13	H	7.95	0.79	15.91	33
1902.5	15	QPSK	1/0	12.15	H	7.95	0.79	16.75	33
1857.5	15	16-QAM	1/0	11.77	V	7.95	0.79	17.17	33
1880	15	16-QAM	1/74	11.92	V	7.95	0.79	16.26	33
1902.5	15	16-QAM	1/0	12.12	V	7.95	0.79	16.36	33
1857.5	15	16-QAM	1/0	12.14	H	7.95	0.79	16.74	33
1880	15	16-QAM	1/74	11.57	H	7.95	0.79	17.35	33
1902.5	15	16-QAM	1/0	11.62	H	7.95	0.79	18.16	33
1860	20	QPSK	1/99	11.54	V	7.95	0.79	18.34	33
1880	20	QPSK	1/99	11.74	V	7.95	0.79	17.98	33
1900	20	QPSK	1/0	12.19	V	7.95	0.79	15.93	33
1860	20	QPSK	1/99	11.6	H	7.95	0.79	17.42	33
1880	20	QPSK	1/99	11.94	H	7.95	0.79	17.9	33
1900	20	QPSK	1/0	11.67	H	7.95	0.79	16.85	33
1860	20	16-QAM	1/99	12.11	V	7.95	0.79	17.87	33
1880	20	16-QAM	1/99	12.38	V	7.95	0.79	16.48	33
1900	20	16-QAM	1/0	12.68	V	7.95	0.79	14.72	33
1860	20	16-QAM	1/99	12.32	H	7.95	0.79	15.68	33



1880	20	16-QAM	1/99	13.07	H	7.95	0.79	16.21	33
1900	20	16-QAM	1/0	12.71	H	7.95	0.79	16.07	33

**EIRP for LTE Band 7**

Frequency	Channel Bandwidth	Mode.	RB	Substituted level	Antenna Polarization	Antenna Gain correction	Cable Loss	Absolute Level	Limit (dBm)
2502.5	5	QPSK	1/0	12.23	V	8.23	1.12	19.34	33
2535	5	QPSK	1/0	12.62	V	8.23	1.12	19.73	33
2567.5	5	QPSK	1/24	11.27	V	8.23	1.12	18.38	33
2502.5	5	QPSK	1/0	12.51	H	8.23	1.12	19.62	33
2535	5	QPSK	1/0	12.46	H	8.23	1.12	19.57	33
2567.5	5	QPSK	1/24	10.89	H	8.23	1.12	18	33
2502.5	5	16-QAM	1/0	11.91	V	8.23	1.12	19.02	33
2535	5	16-QAM	1/0	11.53	V	8.23	1.12	18.64	33
2567.5	5	16-QAM	1/24	11.68	V	8.23	1.12	18.79	33
2502.5	5	16-QAM	1/0	10.88	H	8.23	1.12	17.99	33
2535	5	16-QAM	1/0	12.9	H	8.23	1.12	20.01	33
2567.5	5	16-QAM	1/24	11.33	H	8.23	1.12	18.44	33
2505	10	QPSK	1/0	11.38	V	8.23	1.12	18.49	33
2535	10	QPSK	1/49	12.3	V	8.23	1.12	19.41	33
2565	10	QPSK	1/0	12.5	V	8.23	1.12	19.61	33
2505	10	QPSK	1/0	11.95	H	8.23	1.12	19.06	33
2535	10	QPSK	1/49	12.36	H	8.23	1.12	19.47	33
2565	10	QPSK	1/0	11.7	H	8.23	1.12	18.81	33
2505	10	16-QAM	1/0	11.43	V	8.23	1.12	18.54	33
2535	10	16-QAM	1/49	12.89	V	8.23	1.12	20	33
2565	10	16-QAM	1/0	12.14	V	8.23	1.12	19.25	33
2505	10	16-QAM	1/0	12.44	H	8.23	1.12	19.55	33
2535	10	16-QAM	1/49	12.08	H	8.23	1.12	19.19	33
2565	10	16-QAM	1/0	11.83	H	8.23	1.12	18.94	33
2507.5	15	QPSK	1/0	12.47	V	8.23	1.12	19.58	33
2535	15	QPSK	1/74	12.62	V	8.23	1.12	19.73	33
2562.5	15	QPSK	1/0	12.27	V	8.23	1.12	19.38	33
2507.5	15	QPSK	1/0	12.51	H	8.23	1.12	19.62	33
2535	15	QPSK	1/74	12.46	H	8.23	1.12	19.57	33
2562.5	15	QPSK	1/0	10.89	H	8.23	1.12	18	33
2507.5	15	16-QAM	1/0	11.91	V	8.23	1.12	19.02	33
2535	15	16-QAM	1/74	12.53	V	8.23	1.12	19.64	33
2562.5	15	16-QAM	1/0	11.68	V	8.23	1.12	18.79	33
2507.5	15	16-QAM	1/0	10.88	H	8.23	1.12	17.99	33
2535	15	16-QAM	1/74	12.9	H	8.23	1.12	20.01	33
2562.5	15	16-QAM	1/0	11.33	H	8.23	1.12	18.44	33



2510	20	QPSK	1/99	11.38	V	8.23	1.12	18.49	33
2535	20	QPSK	1/99	12.3	V	8.23	1.12	19.41	33
2560	20	QPSK	1/0	12.5	V	8.23	1.12	19.61	33
2510	20	QPSK	1/99	11.95	H	8.23	1.12	19.06	33
2535	20	QPSK	1/99	12.36	H	8.23	1.12	19.47	33
2560	20	QPSK	1/0	11.7	H	8.23	1.12	18.81	33
2510	20	16-QAM	1/99	11.43	V	8.23	1.12	18.54	33
2535	20	16-QAM	1/99	12.89	V	8.23	1.12	20	33
2560	20	16-QAM	1/0	11.14	V	8.23	1.12	18.25	33
2510	20	16-QAM	1/99	12.44	H	8.23	1.12	19.55	33
2535	20	16-QAM	1/99	12.08	H	8.23	1.12	19.19	33
2560	20	16-QAM	1/0	11.83	H	8.23	1.12	18.94	33

Note: Above is the worst mode data.



6.3. PEAK-TO-AVERAGE RATIO

6.3.1 MEASUREMENT METHOD

The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB. The PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that PAPR will not exceed 13 dB for more than 0.1 percent of the time or other Commission approved procedure. The measurement must be performed using a signal corresponding to the highest PAPR expected during periods of continuous transmission.

According to KDB 971168 D01v03 - Section 5.7:

- a) Refer to instrument's analyzer instruction manual for details on how to use the power statistics /CCDF function;
- b) Set resolution/measurement bandwidth \geq signal's occupied bandwidth;
- c) Set the number of counts to a value that stabilizes the measured CCDF curve;
- d) Set the measurement interval to 1 ms
- e) Record the maximum PAPR level associated with a probability of 0.1%

6.3.2 PROVISIONS APPLICABLE

This is the test for the Peak-to-Average Ratio from the EUT.

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

**6.3.3 MEASUREMENT RESULT****LTE Band 2****Channel Bandwidth: 1.4 MHz**

Channel Bandwidth: 1.4 MHz						
Modulation	Channel	RB Configuration		Peak-to-Average Ratio (dB)	Limit (dB)	Verdict
		Size	Offset			
QPSK	LCH	1	0	1.79	<13	PASS
		1	3	1.80	<13	PASS
		1	5	1.82	<13	PASS
		3	0	1.74	<13	PASS
		3	2	1.81	<13	PASS
		3	3	1.82	<13	PASS
		6	0	2.45	<13	PASS
	MCH	1	0	1.61	<13	PASS
		1	3	1.61	<13	PASS
		1	5	1.62	<13	PASS
		3	0	1.63	<13	PASS
		3	2	1.64	<13	PASS
		3	3	1.65	<13	PASS
		6	0	2.25	<13	PASS
	HCH	1	0	1.77	<13	PASS
		1	3	1.80	<13	PASS
		1	5	1.82	<13	PASS
		3	0	1.73	<13	PASS
		3	2	1.76	<13	PASS
		3	3	1.77	<13	PASS
		6	0	2.43	<13	PASS
16QAM	LCH	1	0	2.48	<13	PASS
		1	3	2.44	<13	PASS
		1	5	2.4	<13	PASS
		3	0	2.41	<13	PASS
		3	2	2.43	<13	PASS
		3	3	2.44	<13	PASS
		6	0	3.15	<13	PASS
	MCH	1	0	2.23	<13	PASS
		1	3	2.24	<13	PASS
		1	5	2.25	<13	PASS
		3	0	2.27	<13	PASS
		3	2	2.29	<13	PASS
		3	3	2.3	<13	PASS



		6	0	2.96	<13	PASS
	HCH	1	0	2.32	<13	PASS
		1	3	2.35	<13	PASS
		1	5	2.37	<13	PASS
		3	0	2.33	<13	PASS
		3	2	2.36	<13	PASS
		3	3	2.37	<13	PASS
		6	0	3.11	<13	PASS

Channel Bandwidth: 3 MHz

Channel Bandwidth: 3 MHz						
Modulation	Channel	RB Configuration		Peak-to-Average Ratio [dB]	Limit [dB]	Verdict
		Size	Offset			
QPSK	LCH	1	0	1.81	<13	PASS
		1	7	1.84	<13	PASS
		1	14	1.9	<13	PASS
		8	0	1.96	<13	PASS
		8	4	2.23	<13	PASS
		8	7	2.58	<13	PASS
		15	0	2.78	<13	PASS
	MCH	1	0	1.63	<13	PASS
		1	7	1.6	<13	PASS
		1	14	1.58	<13	PASS
		8	0	1.97	<13	PASS
		8	4	2.05	<13	PASS
		8	7	2.33	<13	PASS
		15	0	2.57	<13	PASS
	HCH	1	0	1.68	<13	PASS
		1	7	1.73	<13	PASS
		1	14	1.78	<13	PASS
		8	0	2.22	<13	PASS
		8	4	2.35	<13	PASS
		8	7	2.5	<13	PASS
		15	0	2.66	<13	PASS
16QAM	LCH	1	0	2.4	<13	PASS
		1	7	2.42	<13	PASS
		1	14	2.45	<13	PASS



		8	0	3.01	<13	PASS
		8	4	3.15	<13	PASS
		8	7	3.26	<13	PASS
		15	0	3.49	<13	PASS
	MCH	1	0	2.23	<13	PASS
		1	7	2.25	<13	PASS
		1	14	2.26	<13	PASS
		8	0	2.84	<13	PASS
		8	4	2.88	<13	PASS
		8	7	2.92	<13	PASS
		15	0	3.24	<13	PASS
	HCH	1	0	2.25	<13	PASS
		1	7	2.32	<13	PASS
		1	14	2.35	<13	PASS
		8	0	3.09	<13	PASS
		8	4	3.12	<13	PASS
		8	7	3.18	<13	PASS
		15	0	3.35	<13	PASS

Channel Bandwidth: 5 MHz

Channel Bandwidth: 5 MHz						
Modulation	Channel	RB Configuration		Peak-to-Average Ratio [dB]	Limit [dB]	Verdict
		Size	Offset			
QPSK	LCH	1	0	1.82	<13	PASS
		1	12	1.92	<13	PASS
		1	24	1.98	<13	PASS
		12	0	2.54	<13	PASS
		12	6	2.63	<13	PASS
		12	13	2.71	<13	PASS
		25	0	3.17	<13	PASS
	MCH	1	0	1.7	<13	PASS
		1	12	1.69	<13	PASS
		1	24	1.67	<13	PASS
		12	0	2.32	<13	PASS
		12	6	2.35	<13	PASS
		12	13	2.38	<13	PASS
		25	0	2.95	<13	PASS



	HCH	1	0	1.55	<13	PASS
		1	12	1.62	<13	PASS
		1	24	1.73	<13	PASS
		12	0	2.03	<13	PASS
		12	6	2.47	<13	PASS
		12	13	2.59	<13	PASS
		25	0	3.01	<13	PASS
16QAM	LCH	1	0	2.38	<13	PASS
		1	12	2.48	<13	PASS
		1	24	2.58	<13	PASS
		12	0	3.21	<13	PASS
		12	6	3.34	<13	PASS
		12	13	3.44	<13	PASS
		25	0	3.77	<13	PASS
	MCH	1	0	2.12	<13	PASS
		1	12	2.19	<13	PASS
		1	24	2.24	<13	PASS
		12	0	2.72	<13	PASS
		12	6	2.93	<13	PASS
		12	13	3.08	<13	PASS
		25	0	3.52	<13	PASS
	HCH	1	0	1.99	<13	PASS
		1	12	2.14	<13	PASS
		1	24	2.26	<13	PASS
		12	0	3.06	<13	PASS
		12	6	3.17	<13	PASS
		12	13	3.24	<13	PASS
		25	0	3.56	<13	PASS

**Channel Bandwidth: 10 MHz**

Channel Bandwidth: 10 MHz						
Modulation	Channel	RB Configuration		Peak-to-Average Ratio [dB]	Limit [dB]	Verdict
		Size	Offset			
QPSK	LCH	1	0	1.75	<13	PASS
		1	24	1.77	<13	PASS
		1	49	1.81	<13	PASS
		25	0	2.84	<13	PASS
		25	12	2.97	<13	PASS
		25	25	3.02	<13	PASS
		50	0	3.22	<13	PASS
	MCH	1	0	1.62	<13	PASS
		1	24	1.59	<13	PASS
		1	49	1.53	<13	PASS
		25	0	2.23	<13	PASS
		25	12	2.51	<13	PASS
		25	25	2.69	<13	PASS
		50	0	2.91	<13	PASS
	HCH	1	0	1.31	<13	PASS
		1	24	1.68	<13	PASS
		1	49	1.88	<13	PASS
		25	0	2.52	<13	PASS
		25	12	2.68	<13	PASS
		25	25	2.7	<13	PASS
		50	0	2.93	<13	PASS
16QAM	LCH	1	0	2.44	<13	PASS
		1	24	2.4	<13	PASS
		1	49	2.44	<13	PASS
		25	0	3.22	<13	PASS
		25	12	3.49	<13	PASS
		25	25	3.66	<13	PASS
		50	0	3.83	<13	PASS
	MCH	1	0	2.17	<13	PASS
		1	24	2.14	<13	PASS
		1	49	2.17	<13	PASS
		25	0	3.03	<13	PASS
		25	12	3.17	<13	PASS



		25	25	3.28	<13	PASS
		50	0	3.54	<13	PASS
	HCH	1	0	1.95	<13	PASS
		1	24	2.28	<13	PASS
		1	49	2.58	<13	PASS
		25	0	3.05	<13	PASS
		25	12	3.24	<13	PASS
		25	25	3.35	<13	PASS
		50	0	3.5	<13	PASS

Channel Bandwidth: 15 MHz

Channel Bandwidth: 15 MHz						
Modulation	Channel	RB Configuration		Peak-to-Average Ratio [dB]	Limit [dB]	Verdict
		Size	Offset			
QPSK	LCH	1	0	1.78	<13	PASS
		1	37	1.64	<13	PASS
		1	74	1.59	<13	PASS
		37	0	2.94	<13	PASS
		37	18	2.99	<13	PASS
		37	38	3.03	<13	PASS
		75	0	3.85	<13	PASS
	MCH	1	0	1.67	<13	PASS
		1	37	1.61	<13	PASS
		1	74	1.51	<13	PASS
		37	0	2.36	<13	PASS
		37	18	2.71	<13	PASS
		37	38	2.8	<13	PASS
		75	0	3.63	<13	PASS
	HCH	1	0	1.32	<13	PASS
		1	37	1.52	<13	PASS
		1	74	1.69	<13	PASS
		37	0	2.15	<13	PASS
		37	18	2.47	<13	PASS
		37	38	2.76	<13	PASS
		75	0	3.44	<13	PASS
16QAM	LCH	1	0	2.4	<13	PASS
		1	37	2.31	<13	PASS
		1	74	2.23	<13	PASS
		37	0	3.06	<13	PASS



		37	18	3.63	<13	PASS
		37	38	3.79	<13	PASS
		75	0	4.42	<13	PASS
	MCH	1	0	2.19	<13	PASS
		1	37	2.11	<13	PASS
		1	74	2.06	<13	PASS
		37	0	3.09	<13	PASS
		37	18	3.27	<13	PASS
		37	38	3.44	<13	PASS
		75	0	4.22	<13	PASS
		1	0	1.81	<13	PASS
	HCH	1	37	2.03	<13	PASS
		1	74	2.31	<13	PASS
		37	0	3.12	<13	PASS
		37	18	3.34	<13	PASS
		37	38	3.42	<13	PASS
		75	0	4.04	<13	PASS

Channel Bandwidth: 20 MHz

Channel Bandwidth: 20 MHz						
Modulation	Channel	RB Configuration		Peak-to-Average Ratio [dB]	Limit [dB]	Verdict
		Size	Offset			
QPSK	LCH	1	0	1.82	<13	PASS
		1	49	1.74	<13	PASS
		1	99	1.65	<13	PASS
		50	0	3.02	<13	PASS
		50	25	3.16	<13	PASS
		50	50	3.23	<13	PASS
		100	0	4.08	<13	PASS
	MCH	1	0	1.64	<13	PASS
		1	49	1.57	<13	PASS
		1	99	1.39	<13	PASS
		50	0	3.03	<13	PASS
		50	25	3.08	<13	PASS
		50	50	3.11	<13	PASS
		100	0	3.9	<13	PASS
	HCH	1	0	1.32	<13	PASS
		1	49	1.66	<13	PASS
		1	99	1.75	<13	PASS
		50	0	2.87	<13	PASS



16QAM		50	25	2.91	<13	PASS
		50	50	2.96	<13	PASS
		100	0	3.74	<13	PASS
	LCH	1	0	2.27	<13	PASS
		1	49	2.26	<13	PASS
		1	99	2.25	<13	PASS
		50	0	3.65	<13	PASS
		50	25	3.72	<13	PASS
		50	50	3.85	<13	PASS
		100	0	4.6	<13	PASS
	MCH	1	0	2.14	<13	PASS
		1	49	2.02	<13	PASS
		1	99	1.94	<13	PASS
		50	0	3.07	<13	PASS
		50	25	3.42	<13	PASS
		50	50	3.63	<13	PASS
		100	0	4.45	<13	PASS
	HCH	1	0	1.9	<13	PASS
		1	49	2.2	<13	PASS
		1	99	2.4	<13	PASS
		50	0	3.09	<13	PASS
		50	25	3.38	<13	PASS
		50	50	3.56	<13	PASS
		100	0	4.23	<13	PASS



LTE BAND 7
Channel Bandwidth: 5 MHz

Channel Bandwidth: 5 MHz						
Modulation	Channel	RB Configuration		Peak-to-Average Ratio [dB]	Limit [dB]	Verdict
		Size	Offset			
QPSK	LCH	1	0	1.87	<13	PASS
		1	12	1.91	<13	PASS
		1	24	1.96	<13	PASS
		12	0	2.45	<13	PASS
		12	6	2.63	<13	PASS
		12	13	2.8	<13	PASS
		25	0	3.19	<13	PASS
	MCH	1	0	1.08	<13	PASS
		1	12	1.16	<13	PASS
		1	24	1.23	<13	PASS
		12	0	1.07	<13	PASS
		12	6	1.38	<13	PASS
		12	13	1.65	<13	PASS
		25	0	2.41	<13	PASS
	HCH	1	0	1.65	<13	PASS
		1	12	1.77	<13	PASS
		1	24	1.97	<13	PASS
		12	0	2.84	<13	PASS
		12	6	2.96	<13	PASS
		12	13	3.1	<13	PASS
		25	0	3.46	<13	PASS
16QAM	LCH	1	0	2.49	<13	PASS
		1	12	2.47	<13	PASS
		1	24	2.48	<13	PASS
		12	0	3.18	<13	PASS
		12	6	3.26	<13	PASS
		12	13	3.46	<13	PASS
		25	0	3.85	<13	PASS
	MCH	1	0	1.51	<13	PASS
		1	12	1.62	<13	PASS
		1	24	1.68	<13	PASS
		12	0	2.06	<13	PASS
		12	6	2.29	<13	PASS
		12	13	2.38	<13	PASS
		25	0	2.73	<13	PASS



	HCH	1	0	2.71	<13	PASS
		1	12	2.78	<13	PASS
		1	24	2.84	<13	PASS
		12	0	3.11	<13	PASS
		12	6	3.27	<13	PASS
		12	13	3.33	<13	PASS
		25	0	3.96	<13	PASS

Channel Bandwidth: 10 MHz

Channel Bandwidth: 10 MHz						
Modulation	Channel	RB Configuration		Peak-to-Average Ratio [dB]	Limit [dB]	Verdict
		Size	Offset			
QPSK	LCH	1	0	1.81	<13	PASS
		1	24	1.95	<13	PASS
		1	49	2.08	<13	PASS
		25	0	3.43	<13	PASS
		25	12	3.59	<13	PASS
		25	25	3.66	<13	PASS
		50	0	3.54	<13	PASS
	MCH	1	0	0.9	<13	PASS
		1	24	1.33	<13	PASS
		1	49	1.63	<13	PASS
		25	0	2.04	<13	PASS
		25	12	2.37	<13	PASS
		25	25	2.59	<13	PASS
		50	0	2.69	<13	PASS
	HCH	1	0	1.46	<13	PASS
		1	24	1.99	<13	PASS
		1	49	2.05	<13	PASS
		25	0	3.02	<13	PASS
		25	12	3.14	<13	PASS
		25	25	3.17	<13	PASS
		50	0	3.32	<13	PASS
16QAM	LCH	1	0	3.2	<13	PASS
		1	24	3.34	<13	PASS
		1	49	3.44	<13	PASS
		25	0	3.21	<13	PASS
		25	12	3.53	<13	PASS
		25	25	3.68	<13	PASS



	MCH	50	0	3.8	<13	PASS
		1	0	2.03	<13	PASS
		1	24	2.09	<13	PASS
		1	49	2.13	<13	PASS
		25	0	3.01	<13	PASS
		25	12	3.25	<13	PASS
		25	25	3.38	<13	PASS
		50	0	3.03	<13	PASS
	HCH	1	0	2.78	<13	PASS
		1	24	2.7	<13	PASS
		1	49	2.62	<13	PASS
		25	0	3.95	<13	PASS
		25	12	4.07	<13	PASS
		25	25	4.11	<13	PASS
		50	0	4.01	<13	PASS

Channel Bandwidth: 15 MHz

Channel Bandwidth: 15 MHz						
Modulation	Channel	RB Configuration		Peak-to-Average Ratio [dB]	Limit [dB]	Verdict
		Size	Offset			
QPSK	LCH	1	0	2.35	<13	PASS
		1	37	2.27	<13	PASS
		1	74	2.16	<13	PASS
		37	0	3.44	<13	PASS
		37	18	3.53	<13	PASS
		37	38	3.57	<13	PASS
		75	0	4.15	<13	PASS
	MCH	1	0	1.37	<13	PASS
		1	37	1.55	<13	PASS
		1	74	1.68	<13	PASS
		37	0	2.46	<13	PASS
		37	18	2.68	<13	PASS
		37	38	2.73	<13	PASS
		75	0	3.36	<13	PASS
	HCH	1	0	2.09	<13	PASS
		1	37	2.07	<13	PASS
		1	74	2.05	<13	PASS
		37	0	3.07	<13	PASS
		37	18	3.21	<13	PASS



		37	38	3.31	<13	PASS
		75	0	3.97	<13	PASS
16QAM	LCH	1	0	2.68	<13	PASS
		1	37	2.94	<13	PASS
		1	74	3.03	<13	PASS
		37	0	3.97	<13	PASS
		37	18	4.08	<13	PASS
		37	38	4.13	<13	PASS
		75	0	4.74	<13	PASS
	MCH	1	0	2.02	<13	PASS
		1	37	2.22	<13	PASS
		1	74	2.31	<13	PASS
		37	0	3.11	<13	PASS
		37	18	3.25	<13	PASS
		37	38	3.37	<13	PASS
		75	0	3.96	<13	PASS
	HCH	1	0	2.62	<13	PASS
		1	37	2.58	<13	PASS
		1	74	2.54	<13	PASS
		37	0	3.89	<13	PASS
		37	18	4.01	<13	PASS
		37	38	4.04	<13	PASS
		75	0	4.52	<13	PASS

Channel Bandwidth: 20 MHz

Channel Bandwidth: 20 MHz						
Modulation	Channel	RB Configuration		Peak-to-Average Ratio [dB]	Limit [dB]	Verdict
		Size	Offset			
QPSK	LCH	1	0	2.06	<13	PASS
		1	49	2.01	<13	PASS
		1	99	1.92	<13	PASS
		50	0	3.24	<13	PASS
		50	25	3.52	<13	PASS
		50	50	3.66	<13	PASS
		100	0	4.38	<13	PASS
	MCH	1	0	1.47	<13	PASS
		1	49	1.66	<13	PASS
		1	99	1.8	<13	PASS
		50	0	2.97	<13	PASS



		50	25	3.02	<13	PASS
		50	50	3.05	<13	PASS
		100	0	3.68	<13	PASS
	HCH	1	0	2.09	<13	PASS
		1	49	2.07	<13	PASS
		1	99	2.06	<13	PASS
		50	0	3.47	<13	PASS
		50	25	3.49	<13	PASS
		50	50	3.53	<13	PASS
		100	0	4.22	<13	PASS
16QAM	LCH	1	0	2.83	<13	PASS
		1	49	2.73	<13	PASS
		1	99	2.56	<13	PASS
		50	0	4.17	<13	PASS
		50	25	4.25	<13	PASS
		50	50	4.29	<13	PASS
		100	0	4.97	<13	PASS
	MCH	1	0	2.04	<13	PASS
		1	49	2.19	<13	PASS
		1	99	2.35	<13	PASS
		50	0	3.32	<13	PASS
		50	25	3.47	<13	PASS
		50	50	3.64	<13	PASS
		100	0	4.22	<13	PASS
	HCH	1	0	2.65	<13	PASS
		1	49	2.64	<13	PASS
		1	99	2.62	<13	PASS
		50	0	4.02	<13	PASS
		50	25	4.11	<13	PASS
		50	50	4.18	<13	PASS
		100	0	4.75	<13	PASS



7. SPURIOUS EMISSION

7.1 CONDUCTED SPURIOUS EMISSION

7.1.1 MEASUREMENT METHOD

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

The minimum permissible attenuation level of any spurious emission is $43 + \log_{10}(P[\text{Watts}])$, where P is the transmitter power in Watts.

For Band 7:

- (i) $40 + 10 \log_{10} p$ from the channel edges to 5 MHz away
- (ii) $43 + 10 \log_{10} p$ between 5 MHz and X MHz from the channel edges, and
- (iii) $55 + 10 \log_{10} p$ at X MHz and beyond from the channel edges

Test Procedure Used

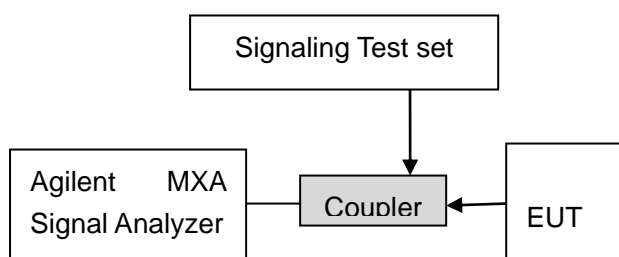
KDB 971168 D01v03 – Section 6.0

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to at least $10 \times$ the fundamental frequency (separated into at least two plots per channel)
2. Detector = RMS
3. Trace mode = max hold
4. Sweep time = auto couple
5. The trace was allowed to stabilize
6. Please see test notes below for RBW and VBW settings

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



Test Instrument & Measurement Setup

shall be attenuated below the transmitter power (P, in Watts) by at least $43 + 10 \log_{10}(P)$ dB. For all power levels



+30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

Test Note

Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and 1 MHz or greater for frequencies greater than 1 GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

7.1.2 MEASUREMENT RESULT

PLEASE REFER TO: APPENDIX A TEST PLOTS FOR CONDUCTED SPURIOUS EMISSION

Note: 1. No emission found in standby or receive mode, no recording in this report.



7.2 RADIATED SPURIOUS EMISSION

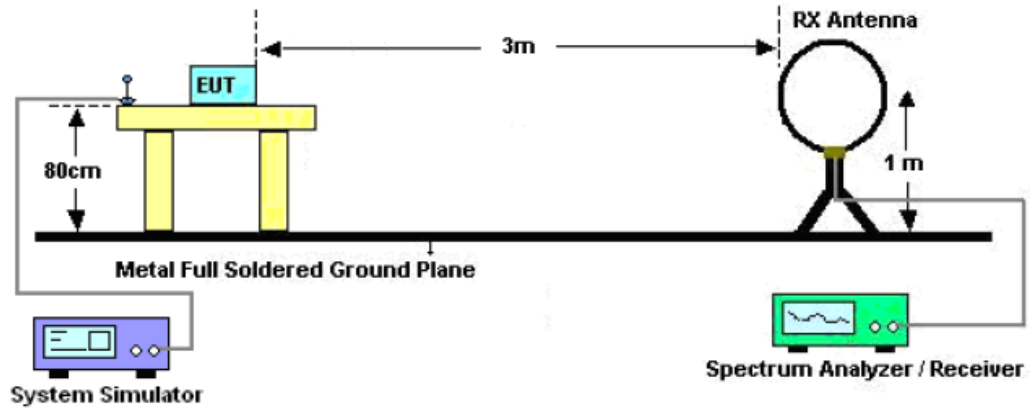
7.2.1. MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

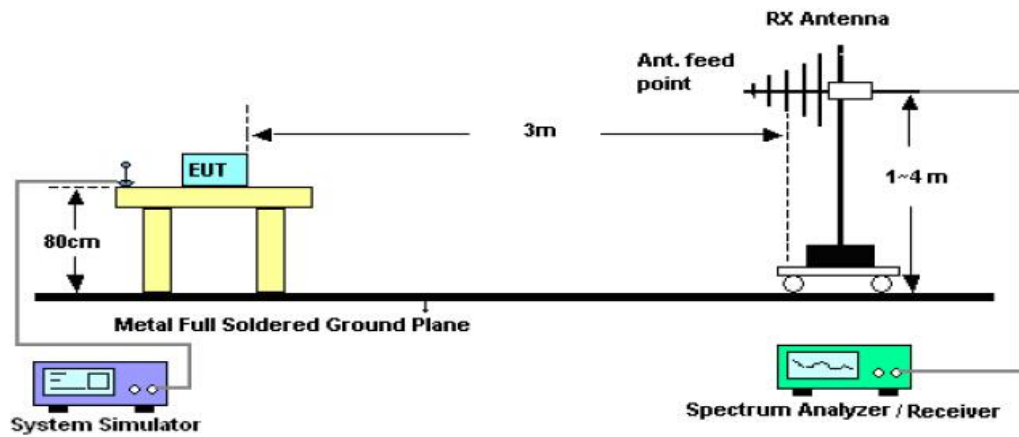


7.2.2. TEST SETUP

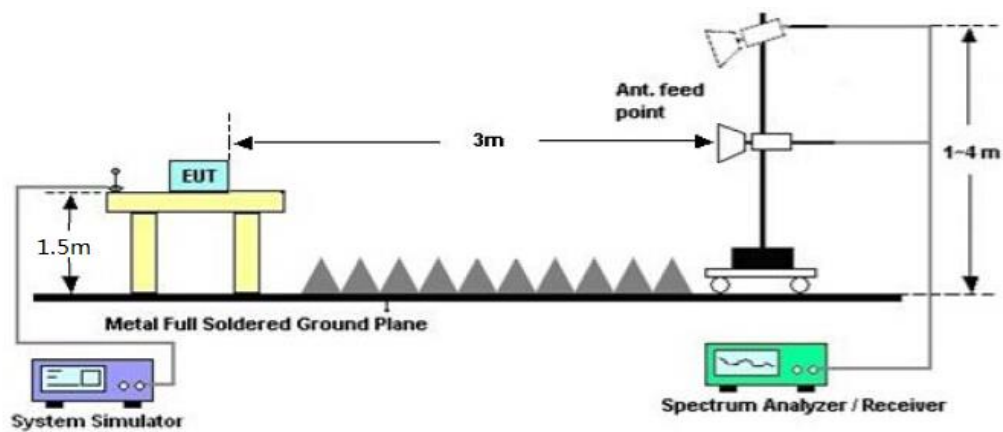
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz





7.2.3 PROVISIONS APPLICABLE

(a) On any frequency outside a licensee's frequency block (e.g. A, D, B, etc.) within the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P , in Watts) by at least $43 + 10 \log(P)$ dB. The specification that emissions shall be attenuated below the transmitter power (P) by at least $43 + 10 \log(P)$ dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

Note: Only record the worst condition of each test mode:

**7.2.4 MEASUREMENT RESULT****LTE Band 2****Low channel**

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
3720	V	-52.00	-13	-39.00
886.45	V	-61.16	-13	-48.16
352.14	V	-60.59	-13	-47.59
3720	H	-51.63	-13	-38.63
748.56	H	-61.05	-13	-48.05
453.11	H	-61.56	-13	-48.56

Middle channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
3760	V	-51.88	-13	-38.88
689.45	V	-62.25	-13	-49.25
435.11	V	-61.69	-13	-48.69
3760	H	-52.69	-13	-39.69
714.51	H	-62.00	-13	-49.00
512.33	H	-61.33	-13	-48.33

High channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
3800	V	-53.07	-13	-40.07
744.36	V	-62.28	-13	-49.28
365.89	V	-61.76	-13	-48.76
3800	H	-52.74	-13	-39.74
697.66	H	-60.93	-13	-47.93
398.45	H	-61.26	-13	-48.26

**LTE Band 7****Low channel**

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
3440	V	-52.04	-25	-39.04
785.42	V	-61.38	-25	-48.38
658.36	V	-61.99	-25	-48.99
3440	H	-52.87	-25	-39.87
694.12	H	-60.89	-25	-47.89
458.63	H	-62.03	-25	-49.03

Middle channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
3465	V	-52.13	-25	-39.13
682.16	V	-61.41	-25	-48.41
398.66	V	-61.91	-25	-48.91
3465	H	-52.91	-25	-39.91
596.32	H	-60.94	-25	-47.94
400.25	H	-61.93	-25	-48.93

High channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
3490	V	-52.11	-25	-39.11
498.69	V	-59.42	-25	-46.42
258.47	V	-61.96	-25	-48.96
3490	H	-52.95	-25	-39.95
450.55	H	-60.99	-25	-47.99
226.45	H	-61.98	-25	-48.98

Note: 1. Margin = Emission Level -Limit

2. (30MHz-26GHz) Below 30MHZ no Spurious found and above is the worst mode data



8. FREQUENCY STABILITY

8.1 MEASUREMENT METHOD

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a "call mode". This is accomplished with the use of R&S CMW500 DIGITAL RADIO COMMUNICATION TESTER.

1Measure the carrier frequency at room temperature.

2Subject the EUT to overnight soak at -10°C. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on channel 20175 for LTE band 4 measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.

3Repeat the above measurements at 10°C increments from -10°C to +50°C. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.

4Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1 1/2 hours unpowered, to allow any self-heating to stabilize, before continuing.

5Subject the EUT to overnight soak at +50°C.

6With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.

7Repeat the above measurements at 10°C increments from +50°C to -10°C. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.

8At all temperature levels hold the temperature to +/- 0.5°C during the measurement procedure.



8.2 PROVISIONS APPLICABLE

8.2.1 For Hand carried battery powered equipment

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-E-2016. The frequency stability of the transmitter is measured by:

- a.) Temperature: The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.
- b.) Primary Supply Voltage: The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

For Part 22, the frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ (± 2.5 ppm) of the center frequency. For Part 24 and Part 27, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

8.2.2 For equipment powered by primary supply voltage

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

**8.3 MEASUREMENT RESULT (WORST)****LTE Band 2**

Middle Channel, $f_0 = 1880$ MHz			
Temperature (°C)	Power Supplied (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
-10	3.7	-2.49	0.00
0		1.75	0.00
10		3.13	0.00
20		-1.33	0.00
30		0.50	0.00
40		0.54	0.00
50		1.70	0.00
25	4.3	2.10	0.00
	3.1	-2.60	0.00

Note: Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

The EUT doesn't work below -10°C

LTE Band 7

Middle Channel, $f_0 = 2535.0$ MHz			
Temperature (°C)	Power Supplied (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
-10	3.7	5.51	0.00
0		5.51	0.00
10		5.01	0.00
20		4.21	0.00
30		3.09	0.00
40		2.10	0.00
50		2.63	0.00
25	4.3	2.85	0.00
	3.1	4.85	0.00

Note: Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that channels at the band edge would remain in-band when



the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

The EUT doesn't work below -10°C



9. OCCUPIED BANDWIDTH

9.1 MEASUREMENT METHOD

The test set up and general procedure is similar to conducted peak output power test. Only different for setting the measurement configuration of the measuring instrument of Spectrum Analyzer.

9.2 PROVISIONS APPLICABLE

The emission bandwidth is defined as two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power

9.3 MEASUREMENT RESULT

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. All modes of operation were investigated and the worst case configuration results are reported in this section.

**LTE Band 2****Channel Bandwidth: 1.4 MHz**

Channel Bandwidth: 1.4 MHz					
Modulation	Channel	RB Configuration		Occupied Bandwidth(MHz)	Verdict
		Size	Offset		
QPSK	LCH	6	0	1.1128	PASS
	MCH	6	0	1.1148	PASS
	HCH	6	0	1.1022	PASS
16QAM	LCH	6	0	1.0987	PASS
	MCH	6	0	1.1100	PASS
	HCH	6	0	1.0936	PASS

Channel Bandwidth: 3 MHz

Channel Bandwidth: 3 MHz					
Modulation	Channel	RB Configuration		Occupied Bandwidth(MHz)	Verdict
		Size	Offset		
QPSK	LCH	15	0	2.7039	PASS
	MCH	15	0	2.7129	PASS
	HCH	15	0	2.7033	PASS
16QAM	LCH	15	0	2.7022	PASS
	MCH	15	0	2.7066	PASS
	HCH	15	0	2.6994	PASS

Channel Bandwidth: 5 MHz

Channel Bandwidth: 5 MHz					
Modulation	Channel	RB Configuration		Occupied Bandwidth(MHz)	Verdict
		Size	Offset		
QPSK	LCH	25	0	4.5108	PASS
	MCH	25	0	4.5158	PASS
	HCH	25	0	4.5120	PASS
16QAM	LCH	25	0	4.5121	PASS
	MCH	25	0	4.5196	PASS
	HCH	25	0	4.5072	PASS

**Channel Bandwidth: 10 MHz**

Channel Bandwidth: 10 MHz					
Modulation	Channel	RB Configuration		Occupied Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	50	0	8.9866	PASS
	MCH	50	0	9.0023	PASS
	HCH	50	0	9.0165	PASS
16QAM	LCH	50	0	8.9953	PASS
	MCH	50	0	9.0029	PASS
	HCH	50	0	9.0048	PASS

Channel Bandwidth: 15 MHz

Channel Bandwidth: 15 MHz					
Modulation	Channel	RB Configuration		Occupied Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	75	0	13.517	PASS
	MCH	75	0	13.554	PASS
	HCH	75	0	13.623	PASS
16QAM	LCH	75	0	13.494	PASS
	MCH	75	0	13.539	PASS
	HCH	75	0	13.575	PASS

Channel Bandwidth: 20 MHz

Channel Bandwidth: 20 MHz					
Modulation	Channel	RB Configuration		Occupied Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	100	0	17.958	PASS
	MCH	100	0	17.998	PASS
	HCH	100	0	17.985	PASS
16QAM	LCH	100	0	17.962	PASS
	MCH	100	0	17.983	PASS
	HCH	100	0	17.970	PASS

**LTE Band 7****Channel Bandwidth: 5MHz**

Channel Bandwidth: 5 MHz					
Modulation	Channel	RB Configuration		Occupied Bandwidth(MHz)	Verdict
		Size	Offset		
QPSK	LCH	25	0	4.4967	PASS
	MCH	25	0	4.5282	PASS
	HCH	25	0	4.5133	PASS
16QAM	LCH	25	0	4.5026	PASS
	MCH	25	0	4.5346	PASS
	HCH	25	0	4.5040	PASS

Channel Bandwidth: 10 MHz

Channel Bandwidth: 10 MHz					
Modulation	Channel	RB Configuration		Occupied Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	50	0	9.0161	PASS
	MCH	50	0	9.3270	PASS
	HCH	50	0	9.0268	PASS
16QAM	LCH	50	0	9.0006	PASS
	MCH	50	0	9.2387	PASS
	HCH	50	0	9.0046	PASS

**Channel Bandwidth: 15 MHz**

Channel Bandwidth: 15 MHz					
Modulation	Channel	RB Configuration		Occupied Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	75	0	13.559	PASS
	MCH	75	0	14.986	PASS
	HCH	75	0	13.540	PASS
16QAM	LCH	75	0	13.515	PASS
	MCH	75	0	14.232	PASS
	HCH	75	0	13.488	PASS

Channel Bandwidth: 20 MHz

Channel Bandwidth: 20 MHz					
Modulation	Channel	RB Configuration		Occupied Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	100	0	17.995	PASS
	MCH	100	0	18.047	PASS
	HCH	100	0	17.968	PASS
16QAM	LCH	100	0	17.995	PASS
	MCH	100	0	17.982	PASS
	HCH	100	0	17.934	PASS

Note: Please refers to Appendix B for compliance test plots for Occupied Bandwidth (99%)



10. EMISSION BANDWIDTH

10.1 MEASUREMENT METHOD

The test set up and general procedure is similar to conducted peak output power test. Only different for setting the measurement configuration of the measuring instrument of Spectrum Analyzer.

10.2 PROVISIONS APPLICABLE

The emission bandwidth is defined as two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power.

10.3 MEASUREMENT RESULT

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. All modes of operation were investigated and the worst case configuration results are reported in this section.

**LTE Band 2****Channel Bandwidth: 1.4 MHz**

Channel Bandwidth: 1.4 MHz					
Modulation	Channel	RB Configuration		26dB Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	6	0	2.279	PASS
	MCH	6	0	2.164	PASS
	HCH	6	0	2.166	PASS
16QAM	LCH	6	0	2.009	PASS
	MCH	6	0	2.087	PASS
	HCH	6	0	2.129	PASS

Channel Bandwidth: 3 MHz

Channel Bandwidth: 3 MHz					
Modulation	Channel	RB Configuration		26dB Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	15	0	4.604	PASS
	MCH	15	0	5.240	PASS
	HCH	15	0	4.201	PASS
16QAM	LCH	15	0	4.915	PASS
	MCH	15	0	7.013	PASS
	HCH	15	0	8.242	PASS

Channel Bandwidth: 5 MHz

Channel Bandwidth: 5 MHz					
Modulation	Channel	RB Configuration		26dB Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	25	0	7.556	PASS
	MCH	25	0	9.201	PASS
	HCH	25	0	8.344	PASS
16QAM	LCH	25	0	6.787	PASS
	MCH	25	0	7.013	PASS
	HCH	25	0	8.242	PASS

**Channel Bandwidth: 10 MHz**

Channel Bandwidth: 10 MHz					
Modulation	Channel	RB Configuration		26dB Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	50	0	15.85	PASS
	MCH	50	0	16.09	PASS
	HCH	50	0	16.60	PASS
16QAM	LCH	50	0	14.85	PASS
	MCH	50	0	15.99	PASS
	HCH	50	0	16.16	PASS

Channel Bandwidth: 15 MHz

Channel Bandwidth: 15 MHz					
Modulation	Channel	RB Configuration		26dB Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	75	0	28.55	PASS
	MCH	75	0	28.70	PASS
	HCH	75	0	25.70	PASS
16QAM	LCH	75	0	25.47	PASS
	MCH	75	0	28.62	PASS
	HCH	75	0	26.42	PASS

Channel Bandwidth: 20 MHz

Channel Bandwidth: 20 MHz					
Modulation	Channel	RB Configuration		26dB Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	100	0	28.51	PASS
	MCH	100	0	31.08	PASS
	HCH	100	0	31.85	PASS
16QAM	LCH	100	0	28.75	PASS
	MCH	100	0	33.95	PASS
	HCH	100	0	34.35	PASS

**LTE Band 7****Channel Bandwidth: 5 MHz**

Channel Bandwidth: 5MHz					
Modulation	Channel	RB Configuration		26dB Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	25	0	6.157	PASS
	MCH	25	0	8.767	PASS
	HCH	25	0	9.012	PASS
16QAM	LCH	25	0	5.525	PASS
	MCH	25	0	8.064	PASS
	HCH	25	0	7.304	PASS

Channel Bandwidth: 10 MHz

Channel Bandwidth: 10MHz					
Modulation	Channel	RB Configuration		26dB Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	50	0	18.44	PASS
	MCH	50	0	19.86	PASS
	HCH	50	0	18.85	PASS
16QAM	LCH	50	0	18.07	PASS
	MCH	50	0	19.18	PASS
	HCH	50	0	18.46	PASS

**Channel Bandwidth: 15 MHz**

Channel Bandwidth: 15MHz					
Modulation	Channel	RB Configuration		26dB Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	75	0	29.29	PASS
	MCH	75	0	29.03	PASS
	HCH	75	0	28.59	PASS
16QAM	LCH	75	0	28.60	PASS
	MCH	75	0	29.34	PASS
	HCH	75	0	25.32	PASS

Channel Bandwidth: 20 MHz

Channel Bandwidth: 20MHz					
Modulation	Channel	RB Configuration		26dB Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	100	0	36.49	PASS
	MCH	100	0	37.92	PASS
	HCH	100	0	35.92	PASS
16QAM	LCH	100	0	36.12	PASS
	MCH	100	0	31.29	PASS
	HCH	100	0	28.93	PASS

Note: Please refers to Appendix B for compliance test plots for emission bandwidth (-26dBc).



11. BAND EDGE

11.1 MEASUREMENT METHOD

The test set up and general procedure is similar to conducted peak output power test. Only different for setting the measurement configuration of the measuring instrument of Spectrum Analyzer.

11.2 PROVISIONS APPLICABLE

As Specified in FCC rules of §2.1051 §24.238(a) §27.53(g) §27.53(h) §27.53(m)
KDB 971168 D01v03 – Section 6.0

11.3 MEASUREMENT RESULT

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequency. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

The minimum permissible attenuation level of any spurious emission is $43 + \log_{10}(P[\text{Watts}])$, where P is the transmitter power in Watts.

For Band 7:

- (i) $40 + 10 \log_{10} p$ from the channel edges to 5 MHz away
- (ii) $43 + 10 \log_{10} p$ between 5 MHz and X MHz from the channel edges, and
- (iii) $55 + 10 \log_{10} p$ at X MHz and beyond from the channel edges

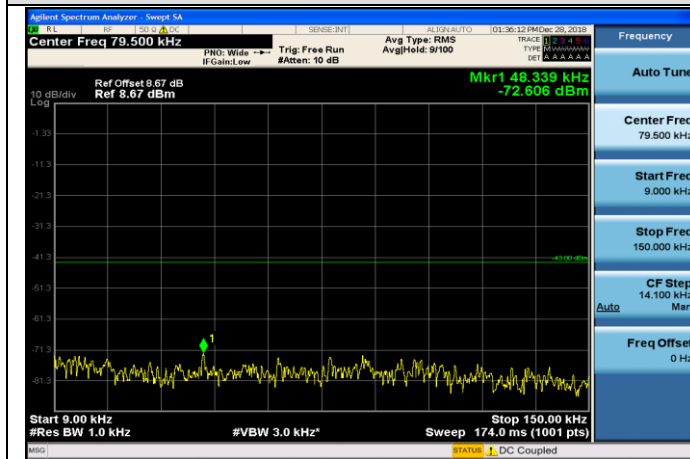
Please refers to Appendix C for compliance test plots for band edge



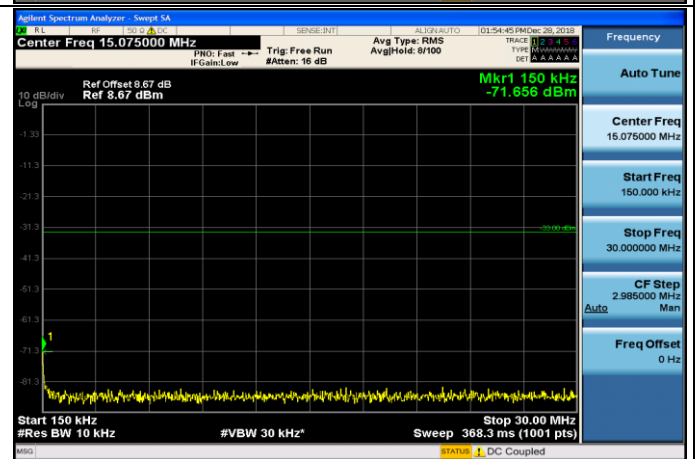
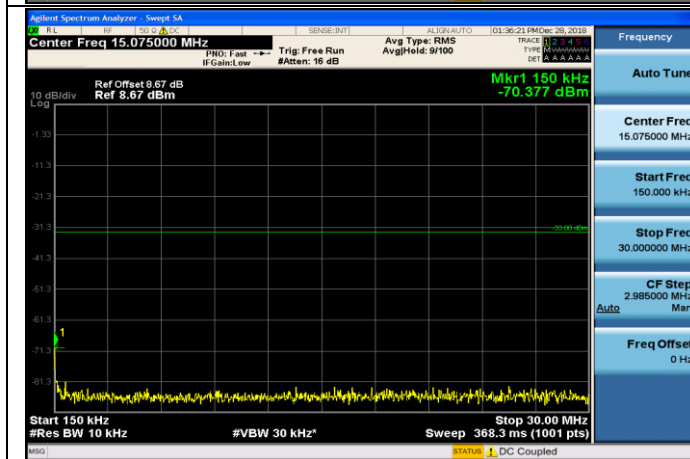
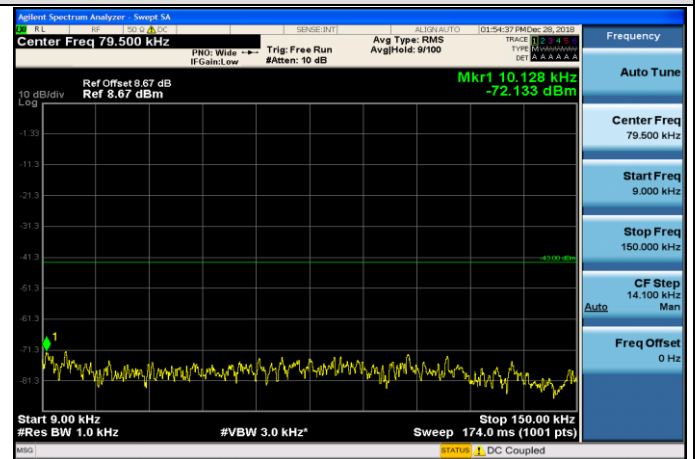
APPENDIX A TEST PLOTS FOR CONDUCTED SPURIOUS EMISSION

LTE BAND 2

1.4MHz_LCH_QPSK_1RB#0



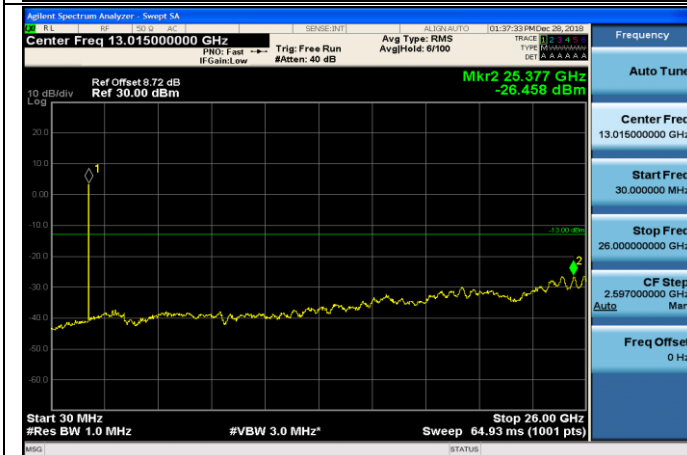
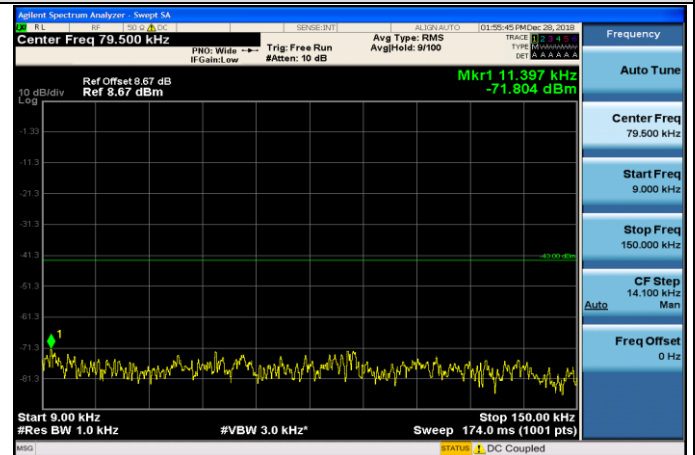
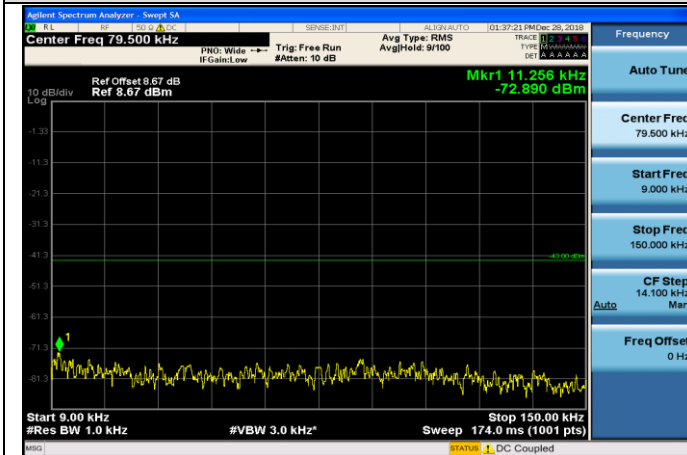
20MHz_LCH_QPSK_1RB#0





1.4MHz_MCH_QPSK_1RB#0

20MHz_MCH_QPSK_1RB#0





1.4MHz_HCH_QPSK_1RB#0

20MHz_HCH_QPSK_1RB#0

