FCC Test Report

Report No.:AGC09966200405FE07

FCC ID	:	2AWFM-MARAPHONES-X1
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	Mara Phones X1
BRAND NAME	:	Mara Phones
MODEL NAME	:	Mara Phones X1
APPLICANT	:	Mara Phones Limited
DATE OF ISSUE	:	Jun. 05, 2020
STANDARD(S)	:	FCC Part27 Rules
REPORT VERSION	:	V1.0

Attestation of ***G***lobal ***C***ompliance (Shenzhen) Co., Ltd.

REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Jun. 05, 2020	Valid	Initial Release

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1.VERIFICATION OF COMPLIANCE

Applicant	Mara Phones Limited
Address	C/O SAFYR UTILIS LTD, 7th Floor, Tower 1, Nexteracom, Cybercity Ebene, 72201, Mauritius
Manufacturer	Mara Phones Rwanda Limited
Address	Plot No 2166, Kigali Special Economic Zone, Masoro, Ndera, Gasabo District, Kigali, Rwanda
Factory 1	Mara Phones Rwanda Limited
Address 1	Plot no 2166, Kigali Special Economic Zone, Masoro Ndera, Gasabo
Factory 2	Mara Phones South Africa (PTY) Limited
Address 2	Dube Trade Port, No.5 Umkhomazi Drive, ERF 618 La MercyDurban, KwaZulu-Natal, 4399, South Afric
Product Designation	Mara Phones X1
Brand Name	Mara Phones
Test Model	Mara Phones X1
Date of test	Apr. 09, 2020~Jun. 05, 2020
Deviation	None
Condition of Test Sample	Normal

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance(Shenzhen) Co., Ltd. The data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI/TIA-603-E-2016. The sample tested as described in this report is in compliance with the FCC Rules Part 24 and 27.The test results of this report relate only to the tested sample identified in this report.

Prepared By

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Jun. 05, 2020

Reviewed By

Max Zhang
(Reviewer)
Jun. 05, 2020

Approved By

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Jun. 05, 2020

2. GENERAL INFORMATION

2.1 PRODUCT DESCRIPTION

A major technical description of EUT is described as following:

Radio System Type:	LTE	
Frequency Bands	☒FDD Band 7 ☒TDD Band 38 ☒TDD Band 40 ☒TDD Band 41	
	LTE Band 7	Transmission (TX): 2500 to 2569.9MHz
		Receiving (RX): 2620 to 2689.9MHz
	LTE Band 38	Transmission (TX): 2570 to 2619.9MHz
		Receiving (RX): 2570 to 2619.9MHz
	LTE Band 40(1)	Transmission (TX): 2305 to 2315MHz
		Receiving (RX): 2305 to 2315MHz
	LTE Band 40(2)	Transmission (TX): 2350 to 2360MHz
		Receiving (RX): 2350 to 2360MHz
	LTE Band 41	Transmission (TX): 2560 to 2650MHz
		Receiving (RX): 2560 to 2650MHz
Supported Channel Bandwidth	LTE Band 7	☒ 5 MHz ☒ 10 MHz ☒ 15 MHz ☒ 20 MHz
	LTE Band 38	☒ 5 MHz ☒ 10 MHz ☒ 15 MHz ☒ 20 MHz
	LTE Band 40(1)	☒ 5 MHz ☒ 10 MHz
	LTE Band 40(2)	☒ 5 MHz ☒ 10 MHz
	LTE Band 41	☒ 5 MHz ☒ 10 MHz ☒ 15 MHz ☒ 20 MHz
Hardware Version	K6012Q_02	
Software Version	Mara_X1_d_V1.0_20200420	
Antenna:	PIFA Antenna	
Type of Modulation	QPSK/16QAM	
Antenna gain:	Band 7: 1.27dBi; Band 38: 1.36dBi; Band 40: 1.38dBi; Band 41: 1.27dBi;	
Diversity Antenna gain:	Band 7: 1.25dBi; Band 38: 1.34dBi; Band 40: 1.35dBi; Band 41: 1.25dBi;	
Power Supply:	DC 3.85V by battery	
Dual Card:	GSM/WCDMA/LTE Card Slot	
Power Class	3	
Extreme Vol. Limits:	DC3.27V to4.40V (Normal:3.85V)	
Temperature range	-10℃ to +40℃	
Note1: The High VoltageDC4.40Vand Low Voltage DC3.27Vwere declared by manufacturer, The EUT couldn't be operating normally with higher or lower voltage.		

2.3RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID:2AWFM-MARAPHONES-X1** ,filing to comply with the FCC Pant 27 requirements.

2.4 TEST METHODOLOGY

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

2.5 TEST FACILITY

TestSite	Attestation of Global Compliance(Shenzhen) Co., Ltd
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong,China
Designation Number	CN1259
FCC Test Firm Registration Number	975832
A2LA Cert. No.	5054.02
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA

ALL TEST EQUIPMENT LIST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESPI	101206	Jun.12, 2019	Jun.11, 2020
LISN	R&S	ESH2-Z5	100086	Aug.26, 2019	Aug.25, 2020
TEST RECEIVER	R&S	ESCI	10096	Jun.12, 2019	Jun.11, 2020
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec.18, 2019	Dec.17, 2020
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep. 21, 2019	Sep. 20, 2021
preamplifier	ChengYi	EMC184045SE	980508	Sep. 23, 2019	Sep. 22, 2020
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May.17, 2019	May.16, 2021
Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-205	Jun.12, 2019	Jun.11, 2020
ANTENNA	SCHWARZBECK	VULB9168	D69250	Sep.20, 2019	Sep.19, 2020
SIGNAL ANALYZER	Agilent	N9020A	MY52090123	Sep. 09, 2019	Sep. 08, 2020
USB Wideband Power Sensor	Agilent	U2021XA	MY54110007	Sep. 09, 2019	Sep. 08, 2020
Wireless communicationtest	R&S	CMW500	120909	Oct. 26, 2019	Oct. 25, 2020
Power Splitter	Agilent	11636A	34	Jun.12, 2019	Jun.11, 2020
Attenuator	JFW	50FHC-006-50	N/A	Jun.12, 2019	Jun.11, 2020

2.6 SPECIAL ACCESSORIES

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

2.7 EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

3. SYSTEM TEST CONFIGURATION

3.1EUT CONFIGURATION

The EUTconfiguration 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	2.1046/22.913(a)(2)/24.232(c)/ 27.50(d)(4)/ 27.50(h)(2)
		Radiated output power	
2	Peak-to-AverageRatio	Peak-to-Average Ratio	24.232(d) /27.50(d)
3	Spurious Emission	Conducted spurious emission	2.1051/22.917(a)/24.238(a) 27.53(h)/ 27.53(g)
		Radiated spurious emission	
4	Frequency Stability		2.1055/22.355/24.235/27.54
5	Occupied Bandwidth		2.1049 (h)(i)/24.238/27.53(a)(5)
6	Band Edge		2.1051/22.917(a)/24.238(a) 27.53(h)/ 27.53(g) /27.53(m)

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

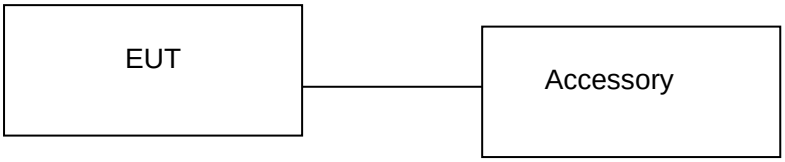


Table 2-1 Equipment Used in EUT System

Item	Equipment	Model No.	ID or Specification	Remark
1	Mara Phones X1	Mara Phones X1	FCC ID: 2AWFM-MARAPHONES-X1	EUT
2	Adapter(US)	HJ-0505000N2-US	Input: 100-240V 50~60Hz, 0.3A Output: DC 5.0V 1.5A	AE
3	Adapter(EU)	Mara	Input: 100-240V 50~60Hz, 0.3A Output: DC 5.0V 1.5A	AE
4	Battery	MPX1Z1	DC 3.85V 3900mAh	AE
5	USB Cable	N/A	N/A	AE
6	Earphone	N/A	N/A	AE

***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)/27.50(d)	Pass
3	Spurious Emission	Conducted Spurious Emission	2.1051/22.917(a)/24.238(a) 27.53(h)/ 27.53(g)	Pass
		Radiated Spurious Emission		
4	Frequency Stability		2.1055/22.355/24.235/27.54	Pass
5	Occupied Bandwidth		2.1049 (h)(i)/24.238/27.53(a)(5)	Pass
6	Band Edge		2.1051/22.917(a)/24.238(a) 27.53(h)/ 27.53(g) / 27.53(m)	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 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

Test Mode	TX / RX	RF Channel		
		Low (B)	Middle (M)	High (T)
LTE Band 38	TX (5M)	Channel 37775	Channel 38000	Channel 38225
		2572.5 MHz	2595.0 MHz	2617.5 MHz
	TX (10M)	Channel 37800	Channel 38000	Channel 38200
		2575.0 MHz	2595.0 MHz	2615.0 MHz
	TX (15M)	Channel 37825	Channel 38000	Channel 38175
		2577.5 MHz	2595.0 MHz	2612.5 MHz
	TX (20M)	Channel 37850	Channel 38000	Channel 38150
		2580.0 MHz	2595.0 MHz	2610.0 MHz
	RX (5M)	Channel 37775	Channel 38000	Channel 38225
		2572.5 MHz	2595.0 MHz	2617.5 MHz
	RX (10M)	Channel 37800	Channel 38000	Channel 38200
		2575.0 MHz	2595.0 MHz	2615.0 MHz
	RX (15M)	Channel 37825	Channel 38000	Channel 38175
		2577.5 MHz	2595.0 MHz	2612.5 MHz
	RX (20M)	Channel 37850	Channel 38000	Channel 38150
		2580.0 MHz	2595.0 MHz	2610.0 MHz

Test Mode	TX / RX	RF Channel		
		Low (B)	Middle (M)	High (T)
LTE Band 40(1)	TX (5M)	Channel 38725	Channel 38750	Channel 38775
		2302.5 MHz	2310 MHz	2312.5 MHz
	TX (10M)		Channel 38750	
			2310 MHz	
	RX (5M)	Channel 38725	Channel 38750	Channel 38775
		2302.5 MHz	2310 MHz	2312.5 MHz
	RX (10M)		Channel 38750	
			2310 MHz	
LTE Band 40(2)	TX (5M)	Channel 39175	Channel 39200	Channel 39225
		2352.5 MHz	2355 MHz	2357.5 MHz
	TX (10M)		Channel 39200	
			2355 MHz	
	RX (5M)	Channel 39175	Channel 39200	Channel 39225
		2352.5 MHz	2355 MHz	2357.5 MHz
	RX (10M)		Channel 39200	
			2355 MHz	

Test Mode	TX / RX	RF Channel		
		Low (B)	Middle (M)	High (T)
LTE Band 41	TX (5M)	Channel 40315	Channel 40740	Channel 41166
		2562.5 MHz	2605.0 MHz	2647.6 MHz
	TX (10M)	Channel 40340	Channel 40740	Channel 41141
		2565.0 MHz	2605.0 MHz	2645.1 MHz
	TX (15M)	Channel 40365	Channel 40740	Channel 41116
		2567.5 MHz	2605.0 MHz	2642.6 MHz
	TX (20M)	Channel 40390	Channel 40740	Channel 41091
		2570.0 MHz	2605.0 MHz	2640.1 MHz
	RX (5M)	Channel 40315	Channel 40740	Channel 41166
		2562.5 MHz	2605.0 MHz	2647.6 MHz
	RX (10M)	Channel 40340	Channel 40740	Channel 41141
		2565.0 MHz	2605.0 MHz	2645.1 MHz
	RX (15M)	Channel 40365	Channel 40740	Channel 41116
		2567.5 MHz	2605.0 MHz	2642.6 MHz
	RX (20M)	Channel 40390	Channel 40740	Channel 41091
		2570.0 MHz	2605.0 MHz	2640.1 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 usedto 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

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	22.93
				1	49	0	23.34
				1	99	0	23.03
				50	0	1	22.15
				50	25	1	22.12
				50	49	1	22.27
				100	0	1	22.24
			16QAM	1	0	1	21.99
				1	49	1	22.44
				1	99	1	22.10
				50	0	2	21.16
				50	25	2	21.17
				50	49	2	21.26
				100	0	2	21.32
	21100	2535	QPSK	1	0	0	23.69
				1	49	0	23.52
				1	99	0	23.29
				50	0	1	22.34
				50	25	1	22.34
				50	49	1	22.44
				100	0	1	22.38
			16QAM	1	0	1	22.16
				1	49	1	22.54
				1	99	1	22.35
				50	0	2	21.32
				50	25	2	21.34
				50	49	2	21.45
				100	0	2	21.43
	21350	2560	QPSK	1	0	0	23.26
				1	49	0	23.08
				1	99	0	23.42
				50	0	1	22.63
				50	25	1	22.62
				50	49	1	22.61
				100	0	1	22.60
			16QAM	1	0	1	22.49
				1	49	1	22.51
				1	99	1	22.63
				50	0	2	21.64
				50	25	2	21.61
				50	49	2	21.61
				100	0	2	21.69

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
15MHz	20825	2507.5	QPSK	1	0	0	23.04
				1	37	0	23.18
				1	74	0	23.08
				36	0	1	22.30
				36	16	1	22.30
				36	35	1	22.30
				75	0	1	22.26
			16QAM	1	0	1	22.30
				1	37	1	22.41
				1	74	1	22.32
				36	0	2	21.30
				36	16	2	21.32
				36	35	2	21.28
				75	0	2	21.24
	21100	2535	QPSK	1	0	0	23.15
				1	37	0	23.34
				1	74	0	23.30
				36	0	1	22.53
				36	16	1	22.53
				36	35	1	22.51
				75	0	1	22.51
			16QAM	1	0	1	22.34
				1	37	1	22.48
				1	74	1	22.50
				36	0	2	21.53
				36	16	2	21.50
				36	35	2	21.50
				75	0	2	21.47
	21375	2562.5	QPSK	1	0	0	23.40
				1	37	0	23.59
				1	74	0	23.52
				36	0	1	22.69
				36	16	1	22.68
				36	35	1	22.50
				75	0	1	22.31
			16QAM	1	0	1	22.27
				1	37	1	22.44
				1	74	1	22.26
				36	0	2	21.42
				36	16	2	21.51
				36	35	2	21.28
				75	0	2	21.61

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
10MHz	20800	2505	QPSK	1	0	0	23.12
				1	24	0	23.26
				1	49	0	23.19
				25	0	1	22.21
				25	12	1	22.20
				25	25	1	22.31
				50	0	1	22.29
			16QAM	1	0	1	22.31
				1	24	1	22.48
				1	49	1	22.38
				25	0	2	21.20
				25	12	2	21.20
				25	25	2	21.32
				50	0	2	21.33
	21100	2535	QPSK	1	0	0	23.28
				1	24	0	23.35
				1	49	0	23.36
				25	0	1	22.39
				25	12	1	22.39
				25	25	1	22.49
				50	0	1	22.43
			16QAM	1	0	1	22.48
				1	24	1	22.54
				1	49	1	22.58
				25	0	2	21.41
				25	12	2	21.41
				25	25	2	21.52
				50	0	2	21.47
	21400	2565	QPSK	1	0	0	23.54
				1	24	0	23.69
				1	49	0	23.62
				25	0	1	22.65
				25	12	1	22.67
				25	25	1	22.69
				50	0	1	22.67
			16QAM	1	0	1	22.46
				1	24	1	22.50
				1	49	1	22.30
				25	0	2	21.46
				25	12	2	21.58
				25	25	2	21.39
				50	0	2	21.23

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
5MHz	20775	2502.5	QPSK	1	0	0	23.23
				1	12	0	23.34
				1	24	0	23.24
				12	0	1	22.22
				12	6	1	22.21
				12	13	1	22.21
				25	0	1	22.22
			16QAM	1	0	1	22.26
				1	12	1	22.36
				1	24	1	22.28
				12	0	2	21.22
				12	6	2	21.21
				12	13	2	21.24
				25	0	2	21.30
	21100	2535	QPSK	1	0	0	23.32
				1	12	0	23.44
				1	24	0	23.34
				12	0	1	22.44
				12	6	1	22.44
				12	13	1	22.45
				25	0	1	22.43
			16QAM	1	0	1	22.04
				1	12	1	22.16
				1	24	1	22.08
				12	0	2	21.43
				12	6	2	21.45
				12	13	2	21.46
				25	0	2	21.53
	21425	2567.5	QPSK	1	0	0	23.42
				1	12	0	23.58
				1	24	0	23.50
				12	0	1	22.64
				12	6	1	22.67
				12	13	1	22.66
				25	0	1	22.64
			16QAM	1	0	1	22.56
				1	12	1	22.68
				1	24	1	22.55
				12	0	2	21.66
				12	6	2	21.65
				12	13	2	21.66
				25	0	2	21.58

LTE Band 38

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
20MHz	37850	2580	QPSK	1	0	0	23.33
				1	49	0	23.80
				1	99	0	23.50
				50	0	1	22.65
				50	25	1	22.67
				50	49	1	22.66
				100	0	1	22.66
			16QAM	1	0	1	22.42
				1	49	1	22.73
				1	99	1	22.60
				50	0	2	21.68
				50	25	2	21.68
				50	49	2	21.64
				100	0	2	21.69
	38000	2595	QPSK	1	0	0	23.36
				1	49	0	23.75
				1	99	0	23.50
				50	0	1	22.67
				50	25	1	22.67
				50	49	1	22.63
				100	0	1	22.68
			16QAM	1	0	1	22.44
				1	49	1	22.79
				1	99	1	22.55
				50	0	2	21.69
				50	25	2	21.67
				50	49	2	21.66
				100	0	2	21.69
	38150	2610	QPSK	1	0	0	23.36
				1	49	0	23.77
				1	99	0	23.50
				50	0	1	22.68
				50	25	1	22.67
				50	49	1	22.67
				100	0	1	22.65
			16QAM	1	0	1	22.43
				1	49	1	22.76
				1	99	1	22.56
				50	0	2	21.64
				50	25	2	21.68
				50	49	2	21.64
				100	0	2	21.71

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
15MHz	37825	2577.5	QPSK	1	0	0	23.36
				1	37	0	23.77
				1	74	0	23.49
				36	0	1	22.66
				36	16	1	22.67
				36	35	1	22.68
				75	0	1	22.69
			16QAM	1	0	1	22.44
				1	37	1	22.53
				1	74	1	22.53
				36	0	2	21.67
				36	16	2	21.67
				36	35	2	21.68
				75	0	2	21.76
	38000	2595	QPSK	1	0	0	23.36
				1	37	0	23.80
				1	74	0	23.49
				36	0	1	22.68
				36	16	1	22.64
				36	35	1	22.67
				75	0	1	22.73
			16QAM	1	0	1	22.46
				1	37	1	22.7
				1	74	1	22.58
				36	0	2	21.68
				36	16	2	21.66
				36	35	2	21.65
				75	0	2	21.75
	38175	2612.5	QPSK	1	0	0	23.32
				1	37	0	23.78
				1	74	0	23.48
				36	0	1	22.68
				36	16	1	22.68
				36	35	1	22.66
				75	0	1	22.72
			16QAM	1	0	1	22.39
				1	37	1	22.58
				1	74	1	22.56
				36	0	2	21.67
				36	16	2	21.68
				36	35	2	21.66
				75	0	2	21.74

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
10MHz	37800	2575	QPSK	1	0	0	23.33
				1	24	0	23.77
				1	49	0	23.49
				25	0	1	22.50
				25	12	1	22.51
				25	25	1	22.59
				50	0	1	22.69
			16QAM	1	0	1	22.42
				1	24	1	22.60
				1	49	1	22.54
				25	0	2	21.52
				25	12	2	21.52
				25	25	2	21.58
				50	0	2	21.65
	38000	2595	QPSK	1	0	0	23.35
				1	24	0	23.73
				1	49	0	23.50
				25	0	1	22.53
				25	12	1	22.52
				25	25	1	22.56
				50	0	1	22.69
			16QAM	1	0	1	22.43
				1	24	1	22.68
				1	49	1	22.54
				25	0	2	21.53
				25	12	2	21.52
				25	25	2	21.58
				50	0	2	21.64
	38200	2615	QPSK	1	0	0	23.34
				1	24	0	23.82
				1	49	0	23.50
				25	0	1	22.50
				25	12	1	22.52
				25	25	1	22.57
				50	0	1	22.68
			16QAM	1	0	1	22.41
				1	24	1	22.62
				1	49	1	22.59
				25	0	2	21.53
				25	12	2	21.54
				25	25	2	21.59
				50	0	2	21.67

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
5MHz	37775	2572.5	QPSK	1	0	0	23.32
				1	12	0	23.74
				1	24	0	23.48
				12	0	1	22.67
				12	6	1	22.65
				12	13	1	22.65
				25	0	1	22.52
			16QAM	1	0	1	22.41
				1	12	1	22.74
				1	24	1	22.57
				12	0	2	21.66
				12	6	2	21.62
				12	13	2	21.66
				25	0	2	21.51
	38000	2595	QPSK	1	0	0	23.35
				1	12	0	23.79
				1	24	0	23.49
				12	0	1	22.63
				12	6	1	22.67
				12	13	1	22.63
				25	0	1	22.52
			16QAM	1	0	1	22.45
				1	12	1	22.77
				1	24	1	22.55
				12	0	2	21.65
				12	6	2	21.68
				12	13	2	21.65
				25	0	2	21.52
	38225	2617.5	QPSK	1	0	0	23.34
				1	12	0	23.77
				1	24	0	23.45
				12	0	1	22.64
				12	6	1	22.64
				12	13	1	22.66
				25	0	1	22.50
			16QAM	1	0	1	22.41
				1	12	1	22.72
				1	24	1	22.51
				12	0	2	21.67
				12	6	2	21.65
				12	13	2	21.65
				25	0	2	21.51

LTE Band 40(1)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
10MHz	38750	2310.0	QPSK	1	0	0	22.77
				1	24	0	22.68
				1	49	0	22.99
				25	0	1	21.83
				25	12	1	21.69
				25	25	1	21.68
				50	0	1	21.73
			16QAM	1	0	0	21.54
				1	24	0	21.43
				1	49	0	21.75
				25	0	1	20.82
				25	12	1	20.75
				25	25	1	20.73
				50	0	1	20.84

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
5MHz	38725	2307.5	QPSK	1	0	0	22.60
				1	12	0	22.76
				1	24	0	22.65
				12	0	1	21.68
				12	6	1	21.62
				12	11	1	21.63
				25	0	1	21.69
			16QAM	1	0	1	21.53
				1	12	1	21.67
				1	24	1	21.57
				12	0	2	20.63
				12	6	2	20.68
				12	11	2	20.63
				25	0	2	20.69
	38750	2310.0	QPSK	1	0	0	22.57
				1	12	0	22.53
				1	24	0	22.73
				12	0	1	21.62
				12	6	1	21.70
				12	11	1	21.65
				25	0	1	21.63
			16QAM	1	0	1	21.76
				1	12	1	21.62
				1	24	1	21.66
				12	0	2	20.72
				12	6	2	20.67
				12	11	2	20.71
				25	0	2	20.63

	38775	2312.5	QPSK	1	0	0	22.78
				1	12	0	22.65
				1	24	0	22.60
				12	0	1	21.66
				12	6	1	21.72
				12	11	1	21.67
				25	0	1	21.67
			16QAM	1	0	1	21.68
				1	12	1	21.51
				1	24	1	21.54
				12	0	2	20.75
				12	6	2	20.70
				12	11	2	20.69
				25	0	2	20.75

LTE Band 40(2)

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
10MHz	39200	2355.0	QPSK	1	0	0	23.16
				1	24	0	22.89
				1	49	0	22.87
				25	0	1	21.91
				25	12	1	21.90
				25	25	1	21.91
				50	0	1	21.92
			16QAM	1	0	1	21.91
				1	24	1	21.73
				1	49	1	21.68
				25	0	2	20.94
				25	12	2	20.97
				25	25	2	20.96
				50	0	2	20.93

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
5MHz	39175	2352.5	QPSK	1	0	0	22.78
				1	12	0	22.68
				1	24	0	22.86
				12	0	1	21.82
				12	6	1	21.80
				12	11	1	21.84
				25	0	1	21.82
			16QAM	1	0	1	21.84
				1	12	1	21.91
				1	24	1	21.78
				12	0	2	20.90
				12	6	2	20.90
				12	11	2	20.87
				25	0	2	20.82
	39200	2355.0	QPSK	1	0	0	22.76
				1	12	0	22.86
				1	24	0	22.73
				12	0	1	21.83
				12	6	1	21.78
				12	11	1	21.84
				25	0	1	21.82
			16QAM	1	0	1	21.64
				1	12	1	21.75
				1	24	1	21.65
				12	0	2	20.83
				12	6	2	20.84
				12	11	2	20.83
				25	0	2	20.87
	39225	2357.5	QPSK	1	0	0	22.73
				1	12	0	22.88
				1	24	0	22.75
				12	0	1	21.81
				12	6	1	21.79
				12	11	1	21.80
				25	0	1	21.77
			16QAM	1	0	1	21.69
				1	12	1	21.82
				1	24	1	21.69
				12	0	2	20.76
				12	6	2	20.78
				12	11	2	20.83
				25	0	2	20.82

LTE Band 41

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
20MHz	40390	2570.0	QPSK	1	0	0	23.20
				1	49	0	23.73
				1	99	0	22.96
				50	0	1	22.48
				50	25	1	22.53
				50	49	1	22.36
				100	0	1	22.40
			16QAM	1	0	1	22.25
				1	49	1	22.78
				1	99	1	22.06
				50	0	2	21.50
				50	25	2	21.55
				50	49	2	21.42
				100	0	2	21.44
	40740	2605.0	QPSK	1	0	0	22.72
				1	49	0	23.33
				1	99	0	22.83
				50	0	1	21.96
				50	25	1	22.02
				50	49	1	22.15
				100	0	1	22.09
			16QAM	1	0	1	21.80
				1	49	1	22.41
				1	99	1	21.94
				50	0	2	21.02
				50	25	2	21.04
				50	49	2	21.16
				100	0	2	21.12
	41091	2640.1	QPSK	1	0	0	22.63
				1	49	0	22.96
				1	99	0	22.40
				50	0	1	21.70
				50	25	1	21.72
				50	49	1	21.61
				100	0	1	21.64
			16QAM	1	0	1	21.83
				1	49	1	22.19
				1	99	1	21.64
				50	0	2	20.75
				50	25	2	20.76
				50	49	2	20.65
				100	0	2	20.66

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
15MHz	40365	2567.5	QPSK	1	0	0	23.38
				1	37	0	23.53
				1	74	0	23.24
				36	0	1	22.59
				36	16	1	22.57
				36	35	1	22.57
				75	0	1	22.59
			16QAM	1	0	1	22.53
				1	37	1	22.72
				1	74	1	22.44
				36	0	2	21.59
				36	16	2	21.58
				36	35	2	21.57
				75	0	2	21.46
	40740	2605.0	QPSK	1	0	0	22.90
				1	37	0	23.13
				1	74	0	22.99
				36	0	1	22.18
				36	16	1	22.17
				36	35	1	22.15
				75	0	1	22.16
			16QAM	1	0	1	22.14
				1	37	1	22.32
				1	74	1	22.20
				36	0	2	21.17
				36	16	2	21.15
				36	35	2	21.14
				75	0	2	21.07
	41116	2642.6	QPSK	1	0	0	22.67
				1	37	0	22.64
				1	74	0	22.53
				36	0	1	21.70
				36	16	1	21.69
				36	35	1	21.69
				75	0	1	21.70
			16QAM	1	0	1	21.83
				1	37	1	21.89
				1	74	1	21.71
				36	0	2	21.72
				36	16	2	21.73
				36	35	2	21.71
				75	0	2	20.68

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
10MHz	40340	2565.0	QPSK	1	0	0	23.43
				1	24	0	23.78
				1	49	0	23.46
				25	0	1	22.55
				25	12	1	22.55
				25	25	1	22.59
				50	0	1	22.62
			16QAM	1	0	1	22.65
				1	24	1	22.56
				1	49	1	22.65
				25	0	2	21.56
				25	12	2	21.58
				25	25	2	21.59
				50	0	2	21.62
	40740	2605.0	QPSK	1	0	0	22.99
				1	24	0	23.37
				1	49	0	23.11
				25	0	1	22.09
				25	12	1	22.12
				25	25	1	22.24
				50	0	1	22.19
			16QAM	1	0	1	22.23
				1	24	1	22.56
				1	49	1	22.33
				25	0	2	21.11
				25	12	2	21.10
				25	25	2	21.23
				50	0	2	21.15
	41141	2645.1	QPSK	1	0	0	22.65
				1	24	0	22.94
				1	49	0	22.64
				25	0	1	21.68
				25	12	1	21.65
				25	25	1	21.69
				50	0	1	21.66
			16QAM	1	0	1	21.74
				1	24	1	21.98
				1	49	1	21.71
				25	0	2	21.65
				25	12	2	21.66
				25	25	2	21.68
				50	0	2	20.69

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
5MHz	40315	2562.5	QPSK	1	0	0	23.43
				1	12	0	23.60
				1	24	0	23.47
				12	0	1	22.46
				12	6	1	22.48
				12	11	1	22.46
				25	0	1	22.55
			16QAM	1	0	1	22.50
				1	12	1	22.66
				1	24	1	22.53
				12	0	2	21.52
				12	6	2	21.53
				12	11	2	21.50
				25	0	2	21.56
	40740	2605.0	QPSK	1	0	0	23.02
				1	12	0	23.15
				1	24	0	22.99
				12	0	1	22.13
				12	6	1	22.07
				12	11	1	22.12
				25	0	1	22.12
			16QAM	1	0	1	21.80
				1	12	1	21.94
				1	24	1	21.84
				12	0	2	21.13
				12	6	2	21.15
				12	11	2	21.12
				25	0	2	21.19
	41166	2647.6	QPSK	1	0	0	22.50
				1	12	0	22.67
				1	24	0	22.52
				12	0	1	21.58
				12	6	1	21.61
				12	11	1	21.62
				25	0	1	21.60
			16QAM	1	0	1	21.57
				1	12	1	21.72
				1	24	1	21.57
				12	0	2	21.61
				12	6	2	21.62
				12	11	2	21.61
				25	0	2	20.67

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 QPSKmodulation 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-2016wereapplied.

1 In 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 (Pin) is applied to the input of the dipole, and the power received (Pr) at the chamber's probe antenna is recorded.

2 The 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 ARpl=Pin + 2.15 - Pr. The ARpl 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=PMea+ARpl

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

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

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

6 Power 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.

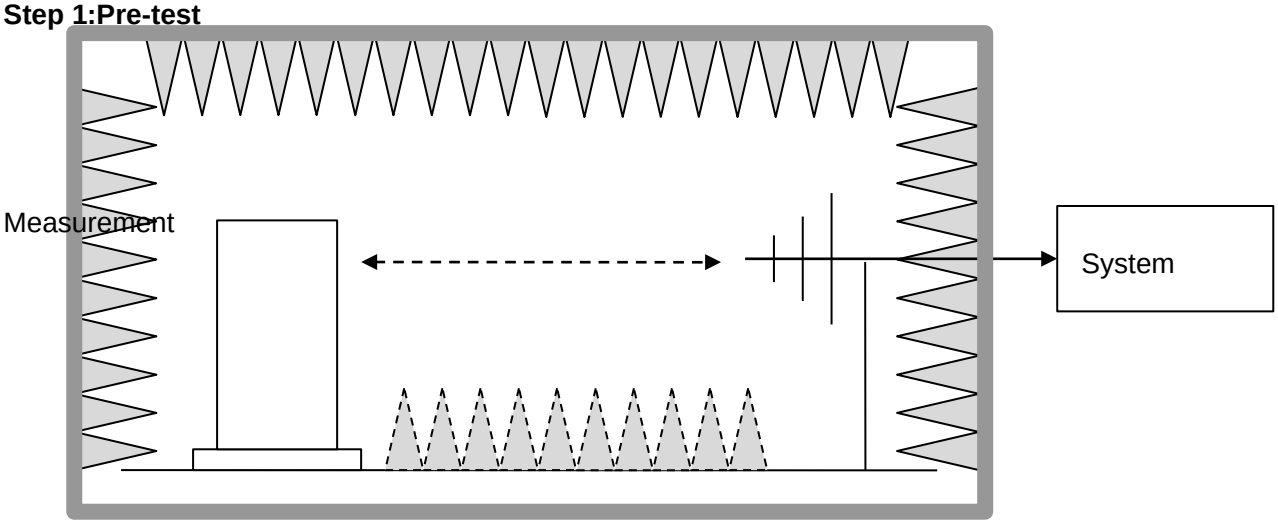
7 This value is EIRP since the measurement is calibrated using a half-wave dipole antenna of known gain (2.15 dBi) and known input power (Pin).

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

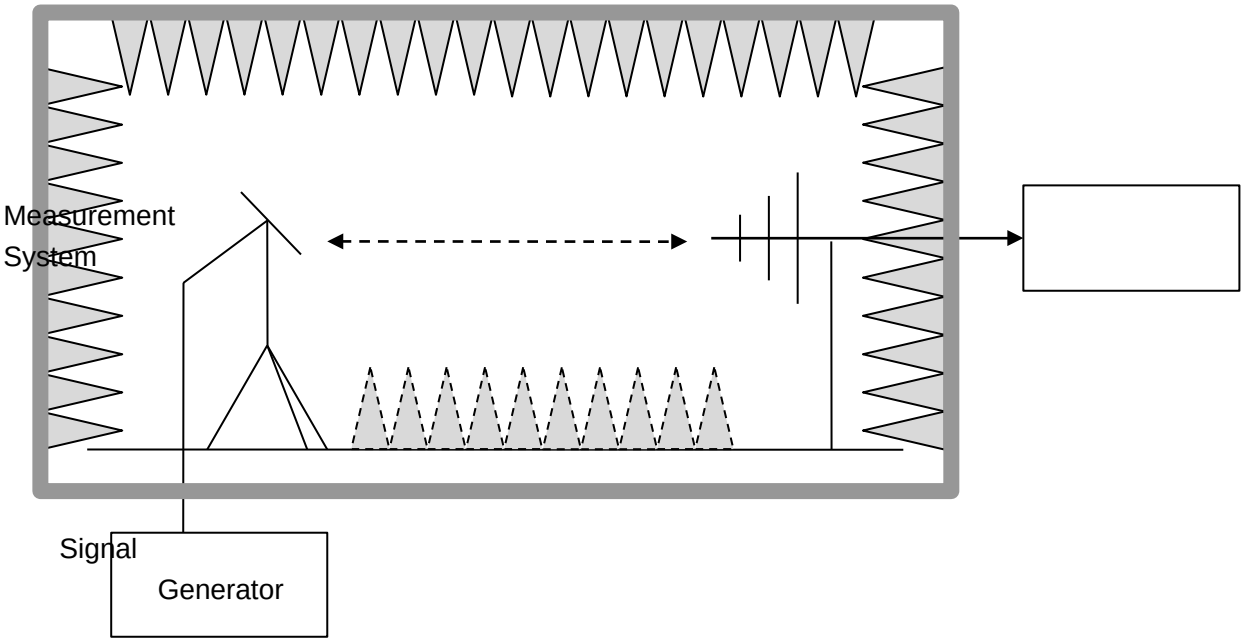
NOTE: Effective radiated power (ERP) refers to the radiation power output of the EUT, assuming all emissions are radiated from half-wave dipole antennas.

Test Setup

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 7	27.50(i)(2)	<=33dBm (2W)
LTE Band 38	27.50(i)(2)	<=33dBm (2W)
LTE Band 40	27.50(a)	<=33dBm (2W)
LTE Band 41	27.50(i)(2)	<=33dBm (2W)

6.2.3 MEASUREMENT RESULT

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	11.63	V	8.23	1.12	18.74	33
2535	5	QPSK	1/0	11.83	V	8.23	1.12	18.94	33
2567.5	5	QPSK	1/24	11.86	V	8.23	1.12	18.97	33
2502.5	5	QPSK	1/0	14.82	H	8.23	1.12	21.93	33
2535	5	QPSK	1/0	15.23	H	8.23	1.12	22.34	33
2567.5	5	QPSK	1/24	14.92	H	8.23	1.12	22.03	33
2502.5	5	16-QAM	1/0	12.12	V	8.23	1.12	19.23	33
2535	5	16-QAM	1/0	11.53	V	8.23	1.12	18.64	33
2567.5	5	16-QAM	1/24	12.19	V	8.23	1.12	19.30	33
2502.5	5	16-QAM	1/0	13.99	H	8.23	1.12	21.10	33
2535	5	16-QAM	1/0	14.05	H	8.23	1.12	21.16	33
2567.5	5	16-QAM	1/24	14.06	H	8.23	1.12	21.17	33
2505	10	QPSK	1/0	11.71	V	8.23	1.12	18.82	33
2535	10	QPSK	1/49	10.82	V	8.23	1.12	17.93	33
2565	10	QPSK	1/0	12.16	V	8.23	1.12	19.27	33
2505	10	QPSK	1/0	15.41	H	8.23	1.12	22.52	33
2535	10	QPSK	1/49	15.18	H	8.23	1.12	22.29	33
2565	10	QPSK	1/0	14.23	H	8.23	1.12	21.34	33
2505	10	16-QAM	1/0	11.71	V	8.23	1.12	18.82	33
2535	10	16-QAM	1/49	12.16	V	8.23	1.12	19.27	33
2565	10	16-QAM	1/0	11.91	V	8.23	1.12	19.02	33
2505	10	16-QAM	1/0	14.05	H	8.23	1.12	21.16	33
2535	10	16-QAM	1/49	14.43	H	8.23	1.12	21.54	33
2565	10	16-QAM	1/0	14.24	H	8.23	1.12	21.35	33
2507.5	15	QPSK	1/0	11.44	V	8.23	1.12	18.55	33
2535	15	QPSK	1/74	11.87	V	8.23	1.12	18.98	33
2562.5	15	QPSK	1/0	11.85	V	8.23	1.12	18.96	33
2507.5	15	QPSK	1/0	13.32	H	8.23	1.12	20.43	33
2535	15	QPSK	1/74	15.15	H	8.23	1.12	22.26	33
2562.5	15	QPSK	1/0	15.58	H	8.23	1.12	22.69	33
2507.5	15	16-QAM	1/0	13.03	V	8.23	1.12	20.14	33
2535	15	16-QAM	1/74	12.35	V	8.23	1.12	19.46	33
2562.5	15	16-QAM	1/0	12.21	V	8.23	1.12	19.32	33
2507.5	15	16-QAM	1/0	14.50	H	8.23	1.12	21.61	33
2535	15	16-QAM	1/74	14.49	H	8.23	1.12	21.60	33

2562.5	15	16-QAM	1/0	14.38	H	8.23	1.12	21.49	33
2510	20	QPSK	1/99	11.99	V	8.23	1.12	19.10	33
2535	20	QPSK	1/99	11.58	V	8.23	1.12	18.69	33
2560	20	QPSK	1/0	11.95	V	8.23	1.12	19.06	33
2510	20	QPSK	1/99	14.50	H	8.23	1.12	21.61	33
2535	20	QPSK	1/99	14.50	H	8.23	1.12	21.61	33
2560	20	QPSK	1/0	13.58	H	8.23	1.12	20.69	33
2510	20	16-QAM	1/99	12.22	V	8.23	1.12	19.33	33
2535	20	16-QAM	1/99	12.44	V	8.23	1.12	19.55	33
2560	20	16-QAM	1/0	12.19	V	8.23	1.12	19.30	33
2510	20	16-QAM	1/99	14.19	H	8.23	1.12	21.30	33
2535	20	16-QAM	1/99	14.19	H	8.23	1.12	21.30	33
2560	20	16-QAM	1/0	14.19	H	8.23	1.12	21.30	33

EIRP for LTE Band 38

Frequency	Channel Bandwidth	Mode.	RB	Substituted level	Antenna Polarization	Antenna Gain correction	Cable Loss	Absolute Level	Limit (dBm)
2572.5	5	QPSK	1/0	12.50	V	8.23	1.12	19.61	33
2595.0	5	QPSK	1/0	12.78	V	8.23	1.12	19.89	33
2617.5	5	QPSK	1/24	12.93	V	8.23	1.12	20.04	33
2572.5	5	QPSK	1/0	15.19	H	8.23	1.12	22.30	33
2595.0	5	QPSK	1/0	15.66	H	8.23	1.12	22.77	33
2617.5	5	QPSK	1/24	15.36	H	8.23	1.12	22.47	33
2572.5	5	16-QAM	1/0	12.00	V	8.23	1.12	19.11	33
2595.0	5	16-QAM	1/0	11.77	V	8.23	1.12	18.88	33
2617.5	5	16-QAM	1/24	12.00	V	8.23	1.12	19.11	33
2572.5	5	16-QAM	1/0	14.46	H	8.23	1.12	21.57	33
2595.0	5	16-QAM	1/0	14.54	H	8.23	1.12	21.65	33
2617.5	5	16-QAM	1/24	14.54	H	8.23	1.12	21.65	33
2575	10	QPSK	1/0	12.26	V	8.23	1.12	19.37	33
2595	10	QPSK	1/49	11.18	V	8.23	1.12	18.29	33
2615	10	QPSK	1/0	12.17	V	8.23	1.12	19.28	33
2575	10	QPSK	1/0	15.22	H	8.23	1.12	22.33	33
2595	10	QPSK	1/49	15.61	H	8.23	1.12	22.72	33
2615	10	QPSK	1/0	15.36	H	8.23	1.12	22.47	33
2575	10	16-QAM	1/0	11.87	V	8.23	1.12	18.98	33
2595	10	16-QAM	1/49	12.16	V	8.23	1.12	19.27	33
2615	10	16-QAM	1/0	11.78	V	8.23	1.12	18.89	33
2575	10	16-QAM	1/0	14.30	H	8.23	1.12	21.41	33

2595	10	16-QAM	1/49	14.75	H	8.23	1.12	21.86	33
2615	10	16-QAM	1/0	14.41	H	8.23	1.12	21.52	33
2577.5	15	QPSK	1/0	11.88	V	8.23	1.12	18.99	33
2595	15	QPSK	1/74	12.11	V	8.23	1.12	19.22	33
2612.5	15	QPSK	1/0	12.10	V	8.23	1.12	19.21	33
2577.5	15	QPSK	1/0	15.22	H	8.23	1.12	22.33	33
2595	15	QPSK	1/74	15.63	H	8.23	1.12	22.74	33
2612.5	15	QPSK	1/0	15.36	H	8.23	1.12	22.47	33
2577.5	15	16-QAM	1/0	12.21	V	8.23	1.12	19.32	33
2595	15	16-QAM	1/74	12.39	V	8.23	1.12	19.50	33
2612.5	15	16-QAM	1/0	11.96	V	8.23	1.12	19.07	33
2577.5	15	16-QAM	1/0	14.51	H	8.23	1.12	21.62	33
2595	15	16-QAM	1/74	14.29	H	8.23	1.12	21.40	33
2612.5	15	16-QAM	1/0	14.72	H	8.23	1.12	21.83	33
2580	20	QPSK	1/99	12.09	V	8.23	1.12	19.20	33
2595	20	QPSK	1/99	11.03	V	8.23	1.12	18.14	33
2610	20	QPSK	1/0	11.95	V	8.23	1.12	19.06	33
2580	20	QPSK	1/99	14.50	H	8.23	1.12	21.61	33
2595	20	QPSK	1/99	14.54	H	8.23	1.12	21.65	33
2610	20	QPSK	1/0	14.50	H	8.23	1.12	21.61	33
2580	20	16-QAM	1/99	12.35	V	8.23	1.12	19.46	33
2595	20	16-QAM	1/99	12.36	V	8.23	1.12	19.47	33
2610	20	16-QAM	1/0	11.86	V	8.23	1.12	18.97	33
2580	20	16-QAM	1/99	15.22	H	8.23	1.12	22.33	33
2595	20	16-QAM	1/99	15.63	H	8.23	1.12	22.74	33
2610	20	16-QAM	1/0	15.35	H	8.23	1.12	22.46	33

EIRP for LTE Band 40(1)

Frequency	Channel Bandwidth	Mode.	RB	Substituted level	Antenna Polarization	Antenna Gain correction	Cable Loss	Absolute Level	Limit (dBm)
2307.5	5	QPSK	1/0	12.18	V	8.17	1.09	19.26	33
2310	5	QPSK	1/0	12.88	V	8.17	1.09	19.96	33
2312.5	5	QPSK	1/24	11.86	V	8.17	1.09	18.94	33
2307.5	5	QPSK	1/0	14.64	H	8.17	1.09	21.72	33
2310	5	QPSK	1/0	14.55	H	8.17	1.09	21.63	33
2312.5	5	QPSK	1/24	14.86	H	8.17	1.09	21.94	33
2307.5	5	16-QAM	1/0	12.00	V	8.17	1.09	19.08	33
2310	5	16-QAM	1/0	12.19	V	8.17	1.09	19.27	33
2312.5	5	16-QAM	1/24	12.69	V	8.17	1.09	19.77	33
2307.5	5	16-QAM	1/0	13.60	H	8.17	1.09	20.68	33
2310	5	16-QAM	1/0	13.41	H	8.17	1.09	20.49	33
2312.5	5	16-QAM	1/24	13.30	H	8.17	1.09	20.38	33
2310	10	QPSK	1/49	12.60	V	8.17	1.09	19.68	33
2310	10	QPSK	1/49	14.47	H	8.17	1.09	21.55	33
2310	10	16-QAM	1/49	12.71	V	8.17	1.09	19.79	33
2310	10	16-QAM	1/49	14.63	H	8.17	1.09	21.71	33

EIRP for LTE Band 40(2)

Frequency	Channel Bandwidth	Mode.	RB	Substituted level	Antenna Polarization	Antenna Gain correction	Cable Loss	Absolute Level	Limit (dBm)
2352.5	5	QPSK	1/0	12.15	V	8.17	1.09	19.23	33
2355	5	QPSK	1/0	11.97	V	8.17	1.09	19.05	33
2357.5	5	QPSK	1/24	11.63	V	8.17	1.09	18.71	33
2352.5	5	QPSK	1/0	16.08	H	8.17	1.09	23.16	33
2355	5	QPSK	1/0	15.81	H	8.17	1.09	22.89	33
2357.5	5	QPSK	1/24	15.79	H	8.17	1.09	22.87	33
2352.5	5	16-QAM	1/0	12.28	V	8.17	1.09	19.36	33
2355	5	16-QAM	1/0	12.26	V	8.17	1.09	19.34	33
2357.5	5	16-QAM	1/24	12.30	V	8.17	1.09	19.38	33
2352.5	5	16-QAM	1/0	14.83	H	8.17	1.09	21.91	33
2355	5	16-QAM	1/0	14.82	H	8.17	1.09	21.9	33
2357.5	5	16-QAM	1/24	14.83	H	8.17	1.09	21.91	33
2355	10	QPSK	1/49	12.97	V	8.17	1.09	20.05	33
2355	10	QPSK	1/49	15.70	H	8.17	1.09	22.78	33
2355	10	16-QAM	1/49	12.05	V	8.17	1.09	19.13	33
2355	10	16-QAM	1/49	15.78	H	8.17	1.09	22.86	33

EIRP for LTE Band 41

Frequency	Channel Bandwidth	Mode.	RB	Substituted level	Antenna Polarization	Antenna Gain correction	Cable Loss	Absolute Level	Limit (dBm)
2562.5	5	QPSK	1/0	12.45	V	8.23	1.12	19.56	33
2605	5	QPSK	1/0	12.38	V	8.23	1.12	19.49	33
2647.6	5	QPSK	1/24	12.18	V	8.23	1.12	19.29	33
2562.5	5	QPSK	1/0	15.10	H	8.23	1.12	22.21	33
2605	5	QPSK	1/0	15.64	H	8.23	1.12	22.75	33
2647.6	5	QPSK	1/24	14.86	H	8.23	1.12	21.97	33
2562.5	5	16-QAM	1/0	12.13	V	8.23	1.12	19.24	33
2605	5	16-QAM	1/0	11.39	V	8.23	1.12	18.50	33
2647.6	5	16-QAM	1/24	11.46	V	8.23	1.12	18.57	33
2562.5	5	16-QAM	1/0	14.15	H	8.23	1.12	21.26	33
2605	5	16-QAM	1/0	14.70	H	8.23	1.12	21.81	33
2647.6	5	16-QAM	1/24	13.94	H	8.23	1.12	21.05	33
2565	10	QPSK	1/0	11.01	V	8.23	1.12	18.12	33
2605	10	QPSK	1/49	11.39	V	8.23	1.12	18.50	33
2645.1	10	QPSK	1/0	12.22	V	8.23	1.12	19.33	33
2565	10	QPSK	1/0	14.64	H	8.23	1.12	21.75	33
2605	10	QPSK	1/49	15.27	H	8.23	1.12	22.38	33
2645.1	10	QPSK	1/0	14.76	H	8.23	1.12	21.87	33
2565	10	16-QAM	1/0	11.69	V	8.23	1.12	18.80	33
2605	10	16-QAM	1/49	11.95	V	8.23	1.12	19.06	33
2645.1	10	16-QAM	1/0	11.98	V	8.23	1.12	19.09	33
2565	10	16-QAM	1/0	13.91	H	8.23	1.12	21.02	33
2605	10	16-QAM	1/49	14.05	H	8.23	1.12	21.16	33
2645.1	10	16-QAM	1/0	13.98	H	8.23	1.12	21.09	33
2567.5	15	QPSK	1/0	11.72	V	8.23	1.12	18.83	33
2605	15	QPSK	1/74	11.79	V	8.23	1.12	18.90	33
2642.6	15	QPSK	1/0	11.28	V	8.23	1.12	18.39	33
2567.5	15	QPSK	1/0	14.52	H	8.23	1.12	21.63	33
2605	15	QPSK	1/74	14.87	H	8.23	1.12	21.98	33
2642.6	15	QPSK	1/0	13.09	H	8.23	1.12	20.20	33
2567.5	15	16-QAM	1/0	11.65	V	8.23	1.12	18.76	33
2605	15	16-QAM	1/74	10.90	V	8.23	1.12	18.01	33
2642.6	15	16-QAM	1/0	11.15	V	8.23	1.12	18.26	33
2567.5	15	16-QAM	1/0	13.51	H	8.23	1.12	20.62	33
2605	15	16-QAM	1/74	13.53	H	8.23	1.12	20.64	33
2642.6	15	16-QAM	1/0	13.75	H	8.23	1.12	20.86	33

2570	20	QPSK	1/99	11.52	V	8.23	1.12	18.63	33
2605	20	QPSK	1/99	10.90	V	8.23	1.12	18.01	33
2640.1	20	QPSK	1/0	10.11	V	8.23	1.12	17.22	33
2570	20	QPSK	1/99	14.10	H	8.23	1.12	21.21	33
2605	20	QPSK	1/99	13.55	H	8.23	1.12	20.66	33
2640.1	20	QPSK	1/0	12.65	H	8.23	1.12	19.76	33
2570	20	16-QAM	1/99	11.99	V	8.23	1.12	19.10	33
2605	20	16-QAM	1/99	11.54	V	8.23	1.12	18.65	33
2640.1	20	16-QAM	1/0	11.74	V	8.23	1.12	18.85	33
2570	20	16-QAM	1/99	15.29	H	8.23	1.12	22.40	33
2605	20	16-QAM	1/99	15.43	H	8.23	1.12	22.54	33
2640.1	20	16-QAM	1/0	15.15	H	8.23	1.12	22.26	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 powerstatistics/CCDF function;

b) Set resolution/measurement bandwidth ≥ 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 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	4.51	<13	PASS
		1	12	4.48	<13	PASS
		1	24	4.66	<13	PASS
		12	0	6.26	<13	PASS
		12	6	6.3	<13	PASS
		12	13	6.45	<13	PASS
		25	0	6.45	<13	PASS
	MCH	1	0	3.59	<13	PASS
		1	12	3.44	<13	PASS
		1	24	3.97	<13	PASS
		12	0	5.38	<13	PASS
		12	6	5.59	<13	PASS
		12	13	5.48	<13	PASS
		25	0	5.4	<13	PASS
	HCH	1	0	4.65	<13	PASS
		1	12	4.37	<13	PASS
		1	24	4.26	<13	PASS
		12	0	6.14	<13	PASS
		12	6	6.16	<13	PASS
		12	13	6.18	<13	PASS
		25	0	6.03	<13	PASS
16QAM	LCH	1	0	5.27	<13	PASS
		1	12	5.29	<13	PASS
		1	24	5.42	<13	PASS
		12	0	6.5	<13	PASS
		12	6	6.32	<13	PASS
		12	13	6.3	<13	PASS
		25	0	7.42	<13	PASS
	MCH	1	0	4.68	<13	PASS
		1	12	4.55	<13	PASS
		1	24	4.59	<13	PASS
		12	0	5.8	<13	PASS
		12	6	5.46	<13	PASS

		12	13	5.45	<13	PASS
		25	0	6.3	<13	PASS
	HCH	1	0	5.5	<13	PASS
		1	12	5.13	<13	PASS
		1	24	5.22	<13	PASS
		12	0	6.17	<13	PASS
		12	6	6.22	<13	PASS
		12	13	6.16	<13	PASS
		25	0	6.92	<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	4.88	<13	PASS
		1	24	4.8	<13	PASS
		1	49	4.93	<13	PASS
		25	0	6.43	<13	PASS
		25	12	6.16	<13	PASS
		25	25	6.45	<13	PASS
		50	0	7	<13	PASS
	MCH	1	0	3.96	<13	PASS
		1	24	3.7	<13	PASS
		1	49	3.95	<13	PASS
		25	0	5.48	<13	PASS
		25	12	5.44	<13	PASS
		25	25	6.15	<13	PASS
		50	0	6.14	<13	PASS
	HCH	1	0	4.49	<13	PASS
		1	24	4.17	<13	PASS
		1	49	4.31	<13	PASS
		25	0	6.09	<13	PASS
		25	12	5.83	<13	PASS
		25	25	6.34	<13	PASS
		50	0	6.28	<13	PASS
16QAM	LCH	1	0	5.53	<13	PASS
		1	24	5.41	<13	PASS
		1	49	5.73	<13	PASS
		25	0	6.45	<13	PASS

		25	12	6.4	<13	PASS
		25	25	6.62	<13	PASS
		50	0	8.31	<13	PASS
	MCH	1	0	4.88	<13	PASS
		1	24	5.08	<13	PASS
		1	49	4.85	<13	PASS
		25	0	5.57	<13	PASS
		25	12	5.54	<13	PASS
		25	25	6.21	<13	PASS
		50	0	7.54	<13	PASS
	HCH	1	0	5.19	<13	PASS
		1	24	5.17	<13	PASS
		1	49	5.08	<13	PASS
		25	0	6.01	<13	PASS
		25	12	6.05	<13	PASS
		25	25	6.23	<13	PASS
		50	0	7.54	<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	4.53	<13	PASS
		1	37	4.81	<13	PASS
		1	74	4.68	<13	PASS
		37	0	6.72	<13	PASS
		37	18	6.5	<13	PASS
		37	38	6.91	<13	PASS
		75	0	6.77	<13	PASS
	MCH	1	0	3.77	<13	PASS
		1	37	3.83	<13	PASS
		1	74	3.8	<13	PASS
		37	0	6.67	<13	PASS
		37	18	6.65	<13	PASS
		37	38	6.89	<13	PASS
		75	0	6.53	<13	PASS
	HCH	1	0	4.58	<13	PASS
		1	37	4.28	<13	PASS
		1	74	4.24	<13	PASS

		37	0	6.81	<13	PASS
		37	18	7.03	<13	PASS
		37	38	6.57	<13	PASS
		75	0	6.84	<13	PASS
16QAM	LCH	1	0	5.49	<13	PASS
		1	37	6.24	<13	PASS
		1	74	5.6	<13	PASS
		37	0	6.93	<13	PASS
		37	18	6.66	<13	PASS
		37	38	6.7	<13	PASS
		75	0	8.07	<13	PASS
	MCH	1	0	4.6	<13	PASS
		1	37	4.82	<13	PASS
		1	74	4.65	<13	PASS
		37	0	6.57	<13	PASS
		37	18	6.59	<13	PASS
		37	38	6.69	<13	PASS
		75	0	8.15	<13	PASS
	HCH	1	0	5.26	<13	PASS
		1	37	5.25	<13	PASS
		1	74	4.97	<13	PASS
		37	0	6.86	<13	PASS
		37	18	6.86	<13	PASS
		37	38	6.71	<13	PASS
		75	0	8.23	<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	11.28	<13	PASS
		1	49	4.58	<13	PASS
		1	99	12.15	<13	PASS
		50	0	6.78	<13	PASS
		50	25	7.18	<13	PASS
		50	50	7.76	<13	PASS
		100	0	7.54	<13	PASS
	MCH	1	0	3.96	<13	PASS
		1	49	3.74	<13	PASS

		1	99	12.66	<13	PASS
		50	0	6.73	<13	PASS
		50	25	6.68	<13	PASS
		50	50	7.55	<13	PASS
		100	0	7.68	<13	PASS
	HCH	1	0	12.25	<13	PASS
		1	49	4.29	<13	PASS
		1	99	12.44	<13	PASS
		50	0	7.01	<13	PASS
		50	25	6.88	<13	PASS
		50	50	7.66	<13	PASS
		100	0	7.62	<13	PASS
16QAM	LCH	1	0	5.34	<13	PASS
		1	49	5.45	<13	PASS
		1	99	11.63	<13	PASS
		50	0	6.88	<13	PASS
		50	25	6.95	<13	PASS
		50	50	7.78	<13	PASS
		100	0	9.09	<13	PASS
	MCH	1	0	12.86	<13	PASS
		1	49	4.46	<13	PASS
		1	99	11.59	<13	PASS
		50	0	6.63	<13	PASS
		50	25	6.83	<13	PASS
		50	50	7.72	<13	PASS
		100	0	8.65	<13	PASS
	HCH	1	0	5.5	<13	PASS
		1	49	5.09	<13	PASS
		1	99	5.34	<13	PASS
		50	0	6.95	<13	PASS
		50	25	6.85	<13	PASS
		50	50	7.67	<13	PASS
		100	0	8.76	<13	PASS

LTE Band 38

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	8.6	<13	PASS
		1	12	10.31	<13	PASS
		1	24	4.52	<13	PASS
		12	0	9.35	<13	PASS
		12	6	9.39	<13	PASS
		12	13	9.18	<13	PASS
		25	0	10.27	<13	PASS
	MCH	1	0	10.71	<13	PASS
		1	12	11.13	<13	PASS
		1	24	11.51	<13	PASS
		12	0	10.57	<13	PASS
		12	6	11.4	<13	PASS
		12	13	11.15	<13	PASS
		25	0	10.8	<13	PASS
	HCH	1	0	10.66	<13	PASS
		1	12	11.05	<13	PASS
		1	24	10.38	<13	PASS
		12	0	11.1	<13	PASS
		12	6	11.2	<13	PASS
		12	13	10.54	<13	PASS
		25	0	11.92	<13	PASS
16QAM	LCH	1	0	8.45	<13	PASS
		1	12	10.71	<13	PASS
		1	24	5.08	<13	PASS
		12	0	9.15	<13	PASS
		12	6	9.42	<13	PASS
		12	13	9.11	<13	PASS
		25	0	9.96	<13	PASS
	MCH	1	0	10.38	<13	PASS
		1	12	11.48	<13	PASS
		1	24	10.67	<13	PASS
		12	0	10.89	<13	PASS
		12	6	10.45	<13	PASS
		12	13	10.7	<13	PASS

		25	0	10.59	<13	PASS
	HCH	1	0	11.2	<13	PASS
		1	12	10.76	<13	PASS
		1	24	10.62	<13	PASS
		12	0	10.35	<13	PASS
		12	6	10.37	<13	PASS
		12	13	11.59	<13	PASS
		25	0	10.71	<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	11.34	<13	PASS
		1	24	11.42	<13	PASS
		1	49	10.27	<13	PASS
		25	0	10.58	<13	PASS
		25	12	10.56	<13	PASS
		25	25	11.24	<13	PASS
		50	0	11.36	<13	PASS
	MCH	1	0	11.25	<13	PASS
		1	24	11.03	<13	PASS
		1	49	10.61	<13	PASS
		25	0	10.45	<13	PASS
		25	12	10.72	<13	PASS
		25	25	10.82	<13	PASS
		50	0	10.65	<13	PASS
	HCH	1	0	10.31	<13	PASS
		1	24	11.11	<13	PASS
		1	49	10.65	<13	PASS
		25	0	10.63	<13	PASS
		25	12	10.42	<13	PASS
		25	25	10.44	<13	PASS
		50	0	11.11	<13	PASS
16QAM	LCH	1	0	11.25	<13	PASS
		1	24	10.34	<13	PASS
		1	49	10.39	<13	PASS
		25	0	11.4	<13	PASS
		25	12	10.97	<13	PASS

		25	25	10.83	<13	PASS
		50	0	10.14	<13	PASS
	MCH	1	0	10.79	<13	PASS
		1	24	10.74	<13	PASS
		1	49	10.44	<13	PASS
		25	0	11.03	<13	PASS
		25	12	10.65	<13	PASS
		25	25	10.17	<13	PASS
		50	0	10.86	<13	PASS
	HCH	1	0	10.47	<13	PASS
		1	24	10.29	<13	PASS
		1	49	10.69	<13	PASS
		25	0	10.34	<13	PASS
		25	12	10.82	<13	PASS
		25	25	11.08	<13	PASS
		50	0	10.7	<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	11.36	<13	PASS
		1	37	11	<13	PASS
		1	74	11.55	<13	PASS
		37	0	12.36	<13	PASS
		37	18	10.03	<13	PASS
		37	38	10.47	<13	PASS
		75	0	10.29	<13	PASS
	MCH	1	0	10.35	<13	PASS
		1	37	10.93	<13	PASS
		1	74	10.67	<13	PASS
		37	0	10.69	<13	PASS
		37	18	10.59	<13	PASS
		37	38	10.36	<13	PASS
		75	0	10.22	<13	PASS
	HCH	1	0	10.41	<13	PASS
		1	37	10.91	<13	PASS
		1	74	11.02	<13	PASS
		37	0	10.76	<13	PASS

		37	18	10.12	<13	PASS
		37	38	10.6	<13	PASS
		75	0	10.79	<13	PASS
16QAM	LCH	1	0	10.59	<13	PASS
		1	37	10.98	<13	PASS
		1	74	10.4	<13	PASS
		37	0	10.53	<13	PASS
		37	18	10.86	<13	PASS
		37	38	10.34	<13	PASS
		75	0	10.36	<13	PASS
	MCH	1	0	10.13	<13	PASS
		1	37	10.72	<13	PASS
		1	74	10.44	<13	PASS
		37	0	10.25	<13	PASS
		37	18	11.67	<13	PASS
		37	38	10.56	<13	PASS
		75	0	11.15	<13	PASS
	HCH	1	0	10.98	<13	PASS
		1	37	10.97	<13	PASS
		1	74	11.41	<13	PASS
		37	0	10.46	<13	PASS
		37	18	10.52	<13	PASS
		37	38	10.44	<13	PASS
		75	0	10.45	<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	10.66	<13	PASS
		1	49	10.6	<13	PASS
		1	99	10.41	<13	PASS
		50	0	11.16	<13	PASS
		50	25	12.04	<13	PASS
		50	50	9.68	<13	PASS
		100	0	9.72	<13	PASS
	MCH	1	0	10.32	<13	PASS
		1	49	11.07	<13	PASS
		1	99	10.55	<13	PASS

		50	0	10.28	<13	PASS
		50	25	10.84	<13	PASS
		50	50	10.42	<13	PASS
		100	0	10.93	<13	PASS
	HCH	1	0	10.34	<13	PASS
		1	49	10.6	<13	PASS
		1	99	10.71	<13	PASS
		50	0	10.81	<13	PASS
		50	25	10.95	<13	PASS
		50	50	10.8	<13	PASS
		100	0	10.81	<13	PASS
16QAM	LCH	1	0	10.46	<13	PASS
		1	49	11.23	<13	PASS
		1	99	10.79	<13	PASS
		50	0	12	<13	PASS
		50	25	12.99	<13	PASS
		50	50	10.52	<13	PASS
		100	0	10.58	<13	PASS
	MCH	1	0	11.13	<13	PASS
		1	49	11.53	<13	PASS
		1	99	10.62	<13	PASS
		50	0	10.54	<13	PASS
		50	25	10.52	<13	PASS
		50	50	10.32	<13	PASS
		100	0	10.74	<13	PASS
	HCH	1	0	11.18	<13	PASS
		1	49	10.99	<13	PASS
		1	99	10.51	<13	PASS
		50	0	10.61	<13	PASS
		50	25	11.57	<13	PASS
		50	50	10.58	<13	PASS
		100	0	10.57	<13	PASS

LTE BAND 40(1)

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	7.97	<13	PASS
		1	12	5.72	<13	PASS
		1	24	6.25	<13	PASS
		12	0	8.53	<13	PASS
		12	6	10.06	<13	PASS
		12	13	10.53	<13	PASS
		25	0	10.03	<13	PASS
	MCH	1	0	11.3	<13	PASS
		1	12	9.15	<13	PASS
		1	24	6.79	<13	PASS
		12	0	10.31	<13	PASS
		12	6	10.23	<13	PASS
		12	13	10	<13	PASS
		25	0	9.76	<13	PASS
	HCH	1	0	6.08	<13	PASS
		1	12	6.26	<13	PASS
		1	24	5.94	<13	PASS
		12	0	8.05	<13	PASS
		12	6	7.96	<13	PASS
		12	13	8.52	<13	PASS
		25	0	7.92	<13	PASS
16QAM	LCH	1	0	6.72	<13	PASS
		1	12	7.21	<13	PASS
		1	24	6.8	<13	PASS
		12	0	10.21	<13	PASS
		12	6	12.77	<13	PASS
		12	13	8.33	<13	PASS
		25	0	11.36	<13	PASS
	MCH	1	0	8.49	<13	PASS
		1	12	11.07	<13	PASS
		1	24	8.97	<13	PASS
		12	0	8.64	<13	PASS
		12	6	8.31	<13	PASS
		12	13	8.22	<13	PASS

		25	0	9.42	<13	PASS
	HCH	1	0	9.67	<13	PASS
		1	12	8.94	<13	PASS
		1	24	6.89	<13	PASS
		12	0	9.37	<13	PASS
		12	6	8.79	<13	PASS
		12	13	11.58	<13	PASS
		25	0	12.45	<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	MCH	1	0	8.58	<13	PASS
		1	24	11.02	<13	PASS
		1	49	7.39	<13	PASS
		25	0	8.01	<13	PASS
		25	12	9.83	<13	PASS
		25	25	8.34	<13	PASS
		50	0	11.46	<13	PASS
16QAM	MCH	1	0	8.58	<13	PASS
		1	24	11.02	<13	PASS
		1	49	7.39	<13	PASS
		25	0	8.01	<13	PASS
		25	12	9.83	<13	PASS
		25	25	8.34	<13	PASS
		50	0	11.46	<13	PASS

LTE BAND 40(2)

Channel Bandwidth: 5 MHz

Channel Bandwidth: 15 MHz						
Modulation	Channel	RB Configuration		Peak-to-Average Ratio [dB]	Limit [dB]	Verdict
		Size	Offset			
QPSK	LCH	1	0	6.62	<13	PASS
		1	12	6.68	<13	PASS
		1	24	8.6	<13	PASS
		12	0	8.8	<13	PASS
		12	6	10.22	<13	PASS

		12	13	9.39	<13	PASS
		25	0	8.79	<13	PASS
	MCH	1	0	8.42	<13	PASS
		1	12	6.82	<13	PASS
		1	24	7.78	<13	PASS
		12	0	9.97	<13	PASS
		12	6	8.57	<13	PASS
		12	13	10.00	<13	PASS
		25	0	8.71	<13	PASS
	HCH	1	0	9.14	<13	PASS
		1	12	6.57	<13	PASS
		1	24	8.51	<13	PASS
		12	0	8.32	<13	PASS
		12	6	8.84	<13	PASS
		12	13	10.76	<13	PASS
		25	0	9.41	<13	PASS
16QAM	LCH	1	0	7.61	<13	PASS
		1	12	10.68	<13	PASS
		1	24	9.29	<13	PASS
		12	0	11.47	<13	PASS
		12	6	9.07	<13	PASS
		12	13	9.94	<13	PASS
		25	0	10.29	<13	PASS
	MCH	1	0	8.27	<13	PASS
		1	12	8.66	<13	PASS
		1	24	9.41	<13	PASS
		12	0	10.24	<13	PASS
		12	6	9.51	<13	PASS
		12	13	11.85	<13	PASS
		25	0	10.28	<13	PASS
	HCH	1	0	9.36	<13	PASS
		1	12	10.15	<13	PASS
		1	24	8.49	<13	PASS
		12	0	11.17	<13	PASS
		12	6	9.48	<13	PASS
		12	13	9	<13	PASS
		25	0	8.36	<13	PASS

Channel Bandwidth: 10 MHz

Channel Bandwidth: 20 MHz						
Modulation	Channel	RB Configuration		Peak-to-Average Ratio [dB]	Limit [dB]	Verdict
		Size	Offset			
QPSK	LCH	1	0	11.71	<13	PASS
		1	24	9.95	<13	PASS
		1	49	11.75	<13	PASS
		25	0	8.23	<13	PASS
		25	12	12.27	<13	PASS
		25	25	11.13	<13	PASS
		50	0	10.58	<13	PASS
16QAM	LCH	1	0	8.07	<13	PASS
		1	24	6.06	<13	PASS
		1	49	8.57	<13	PASS
		25	0	8.36	<13	PASS
		25	12	8.73	<13	PASS
		25	25	9.62	<13	PASS
		50	0	9.27	<13	PASS

LTE BAND 41

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	6.33	<13	PASS
		1	12	7.42	<13	PASS
		1	24	8.16	<13	PASS
		12	0	9.43	<13	PASS
		12	6	7.13	<13	PASS
		12	13	8.58	<13	PASS
		25	0	9.47	<13	PASS
	MCH	1	0	6.36	<13	PASS
		1	12	7.52	<13	PASS
		1	24	8.55	<13	PASS
		12	0	9.28	<13	PASS
		12	6	8.43	<13	PASS
		12	13	10.33	<13	PASS
		25	0	9.42	<13	PASS
	HCH	1	0	6.15	<13	PASS
		1	12	6.18	<13	PASS
		1	24	6.23	<13	PASS
		12	0	7.13	<13	PASS
		12	6	7.96	<13	PASS
		12	13	5.85	<13	PASS
		25	0	6.78	<13	PASS
16QAM	LCH	1	0	7.32	<13	PASS
		1	12	7.56	<13	PASS
		1	24	6.53	<13	PASS
		12	0	10.11	<13	PASS
		12	6	10.97	<13	PASS
		12	13	9.32	<13	PASS
		25	0	7.43	<13	PASS
	MCH	1	0	6.49	<13	PASS
		1	12	5.07	<13	PASS
		1	24	7.97	<13	PASS
		12	0	9.64	<13	PASS
		12	6	9.31	<13	PASS
		12	13	7.22	<13	PASS

		25	0	8.42	<13	PASS
	HCH	1	0	7.67	<13	PASS
		1	12	6.94	<13	PASS
		1	24	7.89	<13	PASS
		12	0	7.37	<13	PASS
		12	6	6.79	<13	PASS
		12	13	8.58	<13	PASS
		25	0	10.45	<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	6.36	<13	PASS
		1	24	8.42	<13	PASS
		1	49	6.13	<13	PASS
		25	0	7.10	<13	PASS
		25	12	6.06	<13	PASS
		25	25	8.55	<13	PASS
		50	0	7.23	<13	PASS
	MCH	1	0	6.42	<13	PASS
		1	24	7.16	<13	PASS
		1	49	8.37	<13	PASS
		25	0	6.55	<13	PASS
		25	12	7.31	<13	PASS
		25	25	6.18	<13	PASS
		50	0	8.28	<13	PASS
	HCH	1	0	7.44	<13	PASS
		1	24	7.23	<13	PASS
		1	49	7.79	<13	PASS
		25	0	6.42	<13	PASS
		25	12	8.00	<13	PASS
		25	25	7.36	<13	PASS
		50	0	6.45	<13	PASS
16QAM	LCH	1	0	8.42	<13	PASS
		1	24	6.94	<13	PASS
		1	49	7.72	<13	PASS
		25	0	7.42	<13	PASS
		25	12	6.34	<13	PASS

		25	25	8.71	<13	PASS
		50	0	6.23	<13	PASS
	MCH	1	0	8.11	<13	PASS
		1	24	8.05	<13	PASS
		1	49	6.43	<13	PASS
		25	0	7.34	<13	PASS
		25	12	8.46	<13	PASS
		25	25	7.85	<13	PASS
		50	0	7.43	<13	PASS
	HCH	1	0	8.77	<13	PASS
		1	24	6.06	<13	PASS
		1	49	8.13	<13	PASS
		25	0	7.37	<13	PASS
		25	12	6.25	<13	PASS
		25	25	7.23	<13	PASS
		50	0	8.11	<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	5.36	<13	PASS
		1	37	5.77	<13	PASS
		1	74	6.13	<13	PASS
		37	0	6.25	<13	PASS
		37	18	7.94	<13	PASS
		37	38	8.43	<13	PASS
		75	0	7.80	<13	PASS
	MCH	1	0	7.19	<13	PASS
		1	37	5.34	<13	PASS
		1	74	8.12	<13	PASS
		37	0	8.37	<13	PASS
		37	18	6.02	<13	PASS
		37	38	7.33	<13	PASS
		75	0	6.16	<13	PASS
	HCH	1	0	8.58	<13	PASS
		1	37	8.79	<13	PASS
		1	74	9.91	<13	PASS
		37	0	9.13	<13	PASS

		37	18	10.25	<13	PASS
		37	38	9.31	<13	PASS
		75	0	8.01	<13	PASS
16QAM	LCH	1	0	6.52	<13	PASS
		1	37	7.89	<13	PASS
		1	74	6.74	<13	PASS
		37	0	5.34	<13	PASS
		37	18	7.25	<13	PASS
		37	38	8.43	<13	PASS
		75	0	8.19	<13	PASS
	MCH	1	0	7.10	<13	PASS
		1	37	9.52	<13	PASS
		1	74	7.37	<13	PASS
		37	0	6.94	<13	PASS
		37	18	6.13	<13	PASS
		37	38	8.13	<13	PASS
		75	0	9.12	<13	PASS
	HCH	1	0	9.22	<13	PASS
		1	37	7.59	<13	PASS
		1	74	9.43	<13	PASS
		37	0	6.27	<13	PASS
		37	18	8.42	<13	PASS
		37	38	7.35	<13	PASS
		75	0	6.42	<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	7.23	<13	PASS
		1	49	8.31	<13	PASS
		1	99	7.00	<13	PASS
		50	0	6.07	<13	PASS
		50	25	8.31	<13	PASS
		50	50	7.92	<13	PASS
		100	0	7.56	<13	PASS
	MCH	1	0	9.70	<13	PASS
		1	49	10.99	<13	PASS
		1	99	9.73	<13	PASS

		50	0	7.32	<13	PASS
		50	25	6.72	<13	PASS
		50	50	6.31	<13	PASS
		100	0	6.07	<13	PASS
	HCH	1	0	7.61	<13	PASS
		1	49	7.86	<13	PASS
		1	99	7.55	<13	PASS
		50	0	7.63	<13	PASS
		50	25	6.37	<13	PASS
		50	50	6.26	<13	PASS
		100	0	5.72	<13	PASS
16QAM	LCH	1	0	7.13	<13	PASS
		1	49	8.17	<13	PASS
		1	99	5.76	<13	PASS
		50	0	6.59	<13	PASS
		50	25	8.42	<13	PASS
		50	50	8.32	<13	PASS
		100	0	8.56	<13	PASS
	MCH	1	0	7.22	<13	PASS
		1	49	6.72	<13	PASS
		1	99	8.25	<13	PASS
		50	0	9.50	<13	PASS
		50	25	9.17	<13	PASS
		50	50	9.00	<13	PASS
		100	0	9.61	<13	PASS
	HCH	1	0	10.33	<13	PASS
		1	49	10.03	<13	PASS
		1	99	953	<13	PASS
		50	0	8.19	<13	PASS
		50	25	7.12	<13	PASS
		50	50	8.25	<13	PASS
		100	0	8.37	<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 + log10(P[Watts]), where P is the transmitter power in Watts.

For FCC rules§27.53(m)
(i) 40 + 10 log10 p from the channel edges to 5 MHz away
(ii) 43 + 10 log10 p between 5 MHz and X MHz from the channel edges, and
(iii) 55 + 10 log10 p at X MHz and beyond from the channel edges

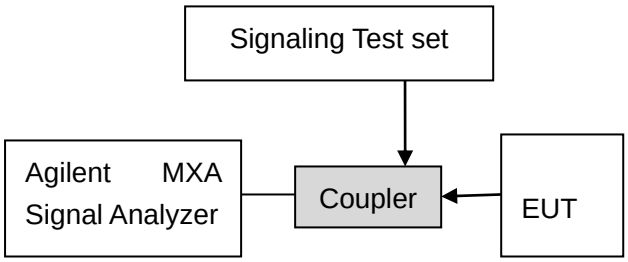
Test Procedure Used
KDB 971168 D01v03 – Section 6.0

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to at least 10 * 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+10Log(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.

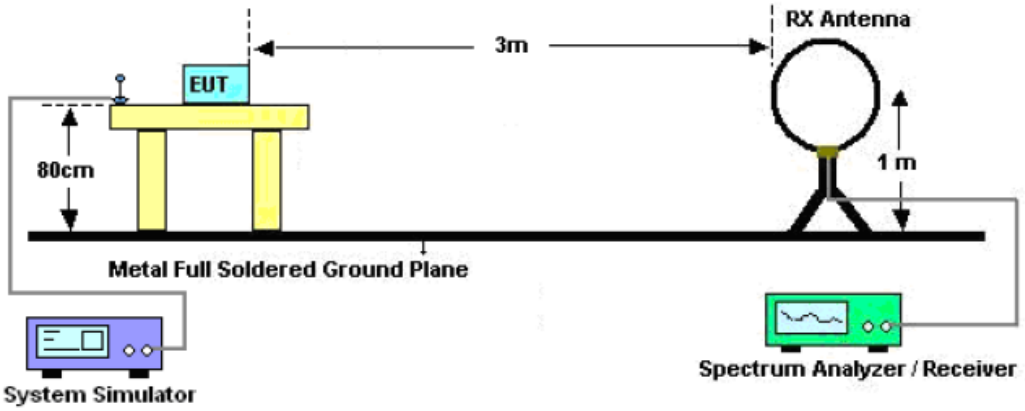
7.2 RADIATED SPURIOUS EMISSION

7.2.1. MEASUREMENT PROCEDURE

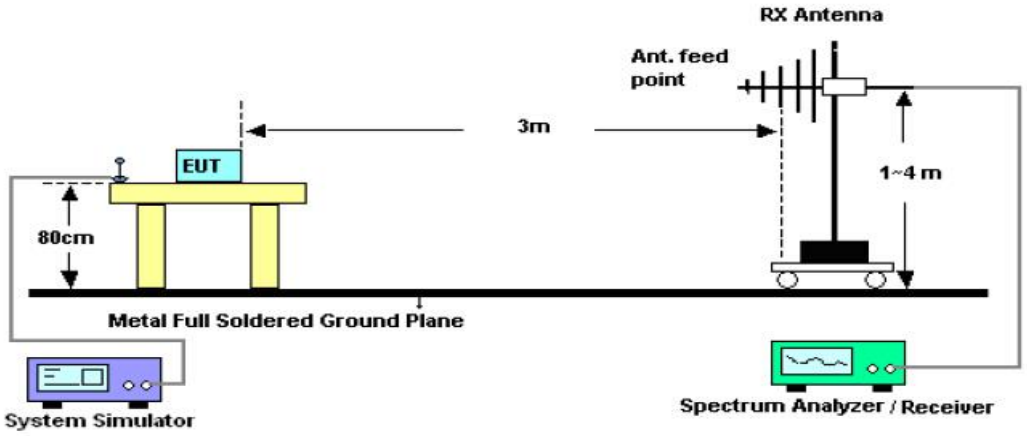
1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated 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

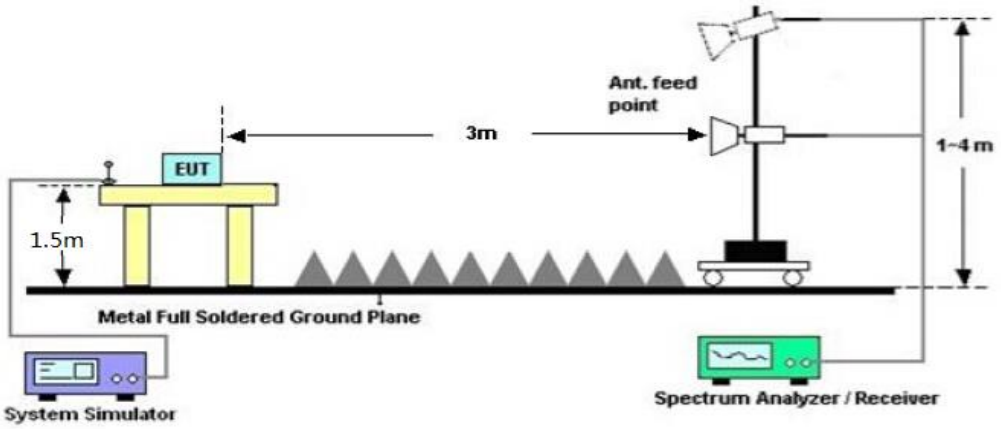
Radiated Emission Test-Setup Frequency Below 30MHz



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+10Log(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 7

Low channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5020	V	-47.45	-25	-22.45
632.5	V	-46.52	-25	-21.52
512.8	V	-46.70	-25	-21.70
5020	H	-42.55	-25	-17.55
713.2	H	-43.69	-25	-18.69
583.1	H	-46.49	-25	-21.49

Middle channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5070	V	-46.35	-25	-21.35
712.3	V	-46.50	-25	-21.50
669.4	V	-47.84	-25	-22.84
5070	H	-44.28	-25	-19.28
702.9	H	-46.90	-25	-21.90
582.5	H	-48.56	-25	-23.56

High channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5120	V	-46.09	-25	-21.09
569.5	V	-45.90	-25	-20.90
432.1	V	-46.59	-25	-21.59
5120	H	-45.92	-25	-20.92
694.3	H	-44.49	-25	-19.49
518.2	H	-47.67	-25	-22.67

LTE Band 38

Low channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5160	V	-47.23	-25	-22.23
689.3	V	-46.21	-25	-21.21
520.1	V	-48.04	-25	-23.04
5160	H	-42.85	-25	-17.85
694.3	H	-43.75	-25	-18.75
582.1	H	-47.21	-25	-22.21

Middle channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5190	V	-45.74	-25	-20.74
896.4	V	-47.33	-25	-22.33
784.3	V	-46.97	-25	-21.97
5190	H	-45.76	-25	-20.76
821.7	H	-46.98	-25	-21.98
774.3	H	-47.71	-25	-22.71

High channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5220	V	-45.43	-25	-20.43
891.4	V	-45.76	-25	-20.76
694.3	V	-46.80	-25	-21.80
5220	H	-47.27	-25	-22.27
795.4	H	-45.09	-25	-20.09
684.3	H	-47.90	-25	-22.90

LTE Band 40(1)

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
4620	V	-37.71	-13	-24.71
586.2	V	-45.19	-13	-32.19
496.5	V	-45.58	-13	-32.58
4620	H	-38.51	-13	-25.51
769.1	H	-44.34	-13	-31.34
693.5	H	-44.92	-13	-31.92

LTE Band 40(2)

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
4710	V	-39.82	-13	-26.82
686.3	V	-45.75	-13	-32.75
584.2	V	-44.37	-13	-31.37
4710	H	-39.91	-13	-26.91
792.1	H	-43.78	-13	-30.78
693.2	H	-44.74	-13	-31.74