FCC Test Report

Report No.:AGC00677200303FE07

FCC ID	:	2ATS6Q9
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	Smart Phone
BRAND NAME	:	Win
MODEL NAME	:	Q9
APPLICANT	:	Smartech,C.A.
DATE OF ISSUE	:	May 06, 2020
STANDARD(S)	:	FCC Part 27 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	/	May 06, 2020	Valid	Initial Release

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1.VERIFICATION OF COMPLIANCE

Applicant	Smartech,C.A.
Address	Manongo Avenue with Palma Real Street,C.C. Via Veneto,Milan Level,M32 Local,Manongo Valencia Venezuela
Manufacturer	United Creation Technology Corp.,Ltd
Address	Room 201, Block A, Science and technology buliding phase-2, Nanhai Road 1057, Shekou, Nanshan district, Shenzhen
Factory	United Creation Technology Corp.,Ltd
Address	Room 201, Block A, Science and technology buliding phase-2, Nanhai Road 1057, Shekou, Nanshan district, Shenzhen
Product Designation	Smartphone
Brand Name	Win
Test Model	Q9
Date of test	Apr. 09, 2020~May 06, 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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May 06, 2020

Reviewed By

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May 06, 2020

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May 06, 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 2 ☒FDD Band 4 ☐FDD Band 5 ☒FDD Band 7 ☐FDD Band 12 ☐FDD Band 17 (U.S. Bands) ☐FDD Band 1 ☒FDD Band 3 ☐FDD Band 7 ☐FDD Band 19 ☐FDD Band 20 ☐FDD Band 28 ☐TDD Band 38 ☐TDD Band 39 (Non-U.S. Bands)	
Frequency Range	LTE Band 4	Transmission (TX): 1710 to 1754.9 MHz
		Receiving (RX): 2110 to 2154.9 MHz
	LTE Band 7	Transmission (TX): 2500 to 2569.9MHz
		Receiving (RX): 2620 to 2689.9MHz
Supported Channel Bandwidth	LTE Band 4	☒ 1.4 MHz ☒ 3 MHz ☒ 5 MHz ☒ 10 MHz ☒ 15 MHz ☒ 20 MHz
	LTE Band 7	☒ 5 MHz ☒ 10 MHz ☒ 15 MHz ☒ 20 MHz
Hardware Version	J517G-63	
Software Version	Win_Q9_v1.2	
Antenna:	PIFA Antenna	
Type of Modulation	QPSK/16QAM	
Antenna gain:	Band 4: 1.92dBi; Band 7: 2.22dBi;	
Diversity Antenna gain:	Band 4: 1.85dBi; Band 7: 2.19dBi;	
Power Supply:	DC 3.8V by battery	
Dual Card:	GSM/WCDMA/LTE Card Slot	
Power Class	3	
Extreme Vol. Limits:	DC3.23V to 4.35V (Normal: 3.8V)	
Temperature range	-10℃ to +40℃	
Note1: The High Voltage DC4.35V and Low Voltage DC3.23V were declared by manufacturer, The EUT couldn't be operating normally with higher or lower voltage..		

2.3 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID:2ATS6Q9**, 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 FCC KDB 971168 D01 Power Means License Digital Systems V03R01.

2.5 TEST FACILITY

Test Site	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 communication test	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 was supplied 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

3.1 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	2.1046/22.913(a)(2)/24.232(c)/ 27.50(d)(4)/ 27.50(h)(2)
		Radiated output power	
2	Peak-to-Average Ratio	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

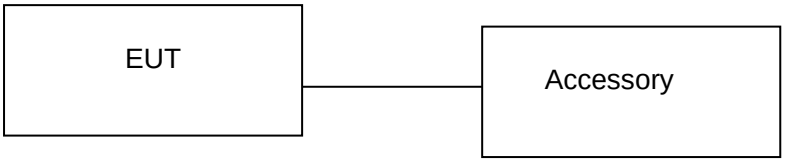


Table 2-1 Equipment Used in EUT System

Item	Equipment	Model No.	ID or Specification	Remark
1	Smartphone	Q9	FCC ID: 2ATS6Q9	EUT
2	Adapter	Q9	DC 5.0V 1A	AE
3	Battery	Q9	DC 3.8V 2600mAh	AE
4	USB Cable	N/A	N/A	AE
5	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 4	TX (1.4M)	Channel 19957	Channel 20175	Channel 20393
		1710.7 MHz	1732.5 MHz	1754.3 MHz
	TX (3M)	Channel 19965	Channel 20175	Channel 20385
		1711.5 MHz	1732.5 MHz	1753.5 MHz
	TX (5M)	Channel 19975	Channel 20175	Channel 20375
		1712.5 MHz	1732.5 MHz	1752.5 MHz
	TX (10M)	Channel 20000	Channel 20175	Channel 20350
		1715 MHz	1732.5 MHz	1750 MHz
	TX (15M)	Channel 20025	Channel 20175	Channel 20325
		1717.5 MHz	1732.5 MHz	1747.5 MHz
	TX (20M)	Channel 20050	Channel 20175	Channel 20300
		1720 MHz	1732.5 MHz	1745 MHz
	RX (1.4M)	Channel 1957	Channel 2175	Channel 2393
		2110.7 MHz	2132.5 MHz	2154.3 MHz
	RX (3M)	Channel 1965	Channel 2175	Channel 2385
		2111.5 MHz	2132.5 MHz	2153.5 MHz
	RX (5M)	Channel 1975	Channel 2175	Channel 2375
		2112.5 MHz	2132.5 MHz	2152.5 MHz
	RX (10M)	Channel 2000	Channel 2175	Channel 2350
		2115 MHz	2132.5 MHz	2150 MHz
	RX (15M)	Channel 2025	Channel 2175	Channel 2325
		2117.5 MHz	2132.5 MHz	2147.5 MHz
	RX (20M)	Channel 2050	Channel 2175	Channel 2300
		2120 MHz	2132.5 MHz	2145 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 4

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
20MHz	20050	1720.0	QPSK	1	0	0	23.44
				1	49	0	23.52
				1	99	0	23.75
				50	0	1	22.30
				50	25	1	22.29
				50	49	1	22.33
				100	0	1	22.42
			16QAM	1	0	1	22.37
				1	49	1	22.43
				1	99	1	22.62
				50	0	2	22.29
				50	25	2	22.37
				50	49	2	22.37
				100	0	2	21.57
	20175	1732.5	QPSK	1	0	0	23.00
				1	49	0	23.23
				1	99	0	23.22
				50	0	1	21.82
				50	25	1	21.82
				50	49	1	21.97
				100	0	1	22.02
			16QAM	1	0	1	21.91
				1	49	1	22.09
				1	99	1	22.12
				50	0	2	21.94
				50	25	2	21.94
				50	49	2	21.98
				100	0	2	21.14
	20300	1745.0	QPSK	1	0	0	23.08
				1	49	0	23.05
				1	99	0	22.89
				50	0	1	22.09
				50	25	1	22.10
				50	49	1	21.89
				100	0	1	21.97
			16QAM	1	0	1	22.46
				1	49	1	22.34
				1	99	1	22.17
				50	0	2	22.00
				50	25	2	22.00
				50	49	2	21.88
				100	0	2	21.13

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
15MHz	20025	1717.5	QPSK	1	0	0	23.26
				1	37	0	23.24
				1	74	0	23.34
				36	0	1	22.38
				36	16	1	22.34
				36	35	1	22.39
				75	0	1	22.35
			16QAM	1	0	1	22.32
				1	37	1	22.38
				1	74	1	22.45
				36	0	2	22.37
				36	16	2	22.37
				36	35	2	22.36
				75	0	2	21.37
	20175	1732.5	QPSK	1	0	0	22.74
				1	37	0	22.96
				1	74	0	22.87
				36	0	1	21.84
				36	16	1	21.83
				36	35	1	21.84
				75	0	1	21.92
			16QAM	1	0	1	21.93
				1	37	1	22.03
				1	74	1	22.04
				36	0	2	21.83
				36	16	2	21.83
				36	35	2	21.93
				75	0	2	21.01
	20325	1747.5	QPSK	1	0	0	23.01
				1	37	0	22.83
				1	74	0	22.78
				36	0	1	21.91
				36	16	1	21.90
				36	35	1	21.90
				75	0	1	21.89
			16QAM	1	0	1	22.25
				1	37	1	22.13
				1	74	1	21.83
				36	0	2	21.90
				36	16	2	21.89
				36	35	2	21.89
				75	0	2	20.95

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
10MHz	20000	1715.0	QPSK	1	0	0	23.23
				1	24	0	23.21
				1	49	0	23.22
				25	0	1	22.20
				25	12	1	22.20
				25	25	1	22.33
				50	0	1	22.38
			16QAM	1	0	1	22.30
				1	24	1	22.34
				1	49	1	22.37
				25	0	2	22.26
				25	12	2	22.31
				25	25	2	22.28
				50	0	2	21.40
	20175	1732.5	QPSK	1	0	0	22.77
				1	24	0	22.84
				1	49	0	22.87
				25	0	1	21.97
				25	12	1	21.97
				25	25	1	22.07
				50	0	1	21.94
			16QAM	1	0	1	21.96
				1	24	1	21.96
				1	49	1	22.04
				25	0	2	21.98
				25	12	2	21.95
				25	25	2	22.07
				50	0	2	21.05
	20350	1750.0	QPSK	1	0	0	23.00
				1	24	0	22.82
				1	49	0	22.77
				25	0	1	21.91
				25	12	1	21.93
				25	25	1	21.71
				50	0	1	21.83
			16QAM	1	0	1	21.87
				1	24	1	21.72
				1	49	1	21.63
				25	0	2	21.93
				25	12	2	21.93
				25	25	2	21.62
				50	0	2	21.00

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
5MHz	19975	1712.5	QPSK	1	0	0	23.30
				1	12	0	23.23
				1	24	0	23.27
				12	0	1	22.34
				12	6	1	22.33
				12	11	1	22.33
				25	0	1	22.31
			16QAM	1	0	1	21.93
				1	12	1	22.05
				1	24	1	21.97
				12	0	2	22.33
				12	6	2	22.33
				12	11	2	22.32
				25	0	2	21.53
	20175	1732.5	QPSK	1	0	0	22.92
				1	12	0	22.87
				1	24	0	22.94
				12	0	1	21.94
				12	6	1	21.92
				12	11	1	21.93
				25	0	1	21.93
			16QAM	1	0	1	21.59
				1	12	1	21.61
				1	24	1	21.64
				12	0	2	21.93
				12	6	2	21.93
				12	11	2	21.93
				25	0	2	21.18
	20375	1752.5	QPSK	1	0	0	22.87
				1	12	0	22.82
				1	24	0	22.82
				12	0	1	21.74
				12	6	1	21.75
				12	11	1	21.75
				25	0	1	21.75
			16QAM	1	0	1	21.99
				1	12	1	21.89
				1	24	1	21.98
				12	0	2	21.75
				12	6	2	21.74
				12	11	2	21.75
				25	0	2	20.97

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
3MHz	19965	1711.5	QPSK	1	0	0	23.13
				1	7	0	23.15
				1	14	0	23.14
				8	0	1	22.27
				8	4	1	22.30
				8	7	1	22.29
				15	0	1	22.28
			16QAM	1	0	1	22.09
				1	7	1	22.08
				1	14	1	22.16
				8	0	2	22.28
				8	4	2	22.28
				8	7	2	22.28
				15	0	2	21.48
	20175	1732.5	QPSK	1	0	0	22.72
				1	7	0	22.80
				1	14	0	22.84
				8	0	1	21.83
				8	4	1	21.85
				8	7	1	21.85
				15	0	1	21.85
			16QAM	1	0	1	21.78
				1	7	1	21.76
				1	14	1	21.79
				8	0	2	21.86
				8	4	2	21.86
				8	7	2	21.86
				15	0	2	21.14
	20385	1753.5	QPSK	1	0	0	22.72
				1	7	0	22.67
				1	14	0	22.72
				8	0	1	21.63
				8	4	1	21.63
				8	7	1	21.60
				15	0	1	21.61
			16QAM	1	0	1	21.59
				1	7	1	21.50
				1	14	1	21.51
				8	0	2	21.60
				8	4	2	21.60
				8	7	2	21.69
				15	0	2	20.71

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
1.4MHz	19957	1710.7	QPSK	1	0	0	23.22
				1	2	0	23.18
				1	5	0	23.19
				3	0	0	23.17
				3	1	0	23.17
				3	2	0	23.24
				6	0	1	22.20
			16QAM	1	0	1	22.26
				1	2	1	22.28
				1	5	1	22.30
				3	0	1	23.18
				3	1	1	23.32
				3	2	1	23.31
				6	0	2	21.52
	20175	1732.5	QPSK	1	0	0	22.82
				1	2	0	22.84
				1	5	0	22.82
				3	0	0	22.87
				3	1	0	22.86
				3	2	0	22.88
				6	0	1	21.91
			16QAM	1	0	1	21.50
				1	2	1	21.48
				1	5	1	21.43
				3	0	1	22.94
				3	1	1	22.84
				3	2	1	22.85
				6	0	2	20.99
	20393	1754.3	QPSK	1	0	0	22.55
				1	2	0	22.58
				1	5	0	22.69
				3	0	0	22.57
				3	1	0	22.56
				3	2	0	22.54
				6	0	1	21.54
			16QAM	1	0	1	21.85
				1	2	1	21.79
				1	5	1	21.77
				3	0	1	22.55
				3	1	1	22.55
				3	2	1	22.58
				6	0	2	20.80

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	24.62
				1	49	0	24.21
				1	99	0	23.73
				50	0	1	23.27
				50	25	1	23.33
				50	49	1	22.86
				100	0	1	23.11
			16QAM	1	0	1	23.28
				1	49	1	22.74
				1	99	1	22.26
				50	0	2	23.36
				50	25	2	23.33
				50	49	2	22.85
				100	0	2	22.24
	21100	2535	QPSK	1	0	0	23.32
				1	49	0	23.17
				1	99	0	23.45
				50	0	1	21.96
				50	25	1	21.97
				50	49	1	22.02
				100	0	1	22.12
			16QAM	1	0	1	21.64
				1	49	1	21.46
				1	99	1	21.77
				50	0	2	21.97
				50	25	2	21.97
				50	49	2	22.02
				100	0	2	21.22
	21350	2560	QPSK	1	0	0	22.69
				1	49	0	22.90
				1	99	0	23.39
				50	0	1	21.48
				50	25	1	21.48
				50	49	1	21.87
				100	0	1	21.65
			16QAM	1	0	1	21.65
				1	49	1	22.02
				1	99	1	22.49
				50	0	2	21.48
				50	25	2	21.48
				50	49	2	21.87
				100	0	2	20.92

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
15MHz	20825	2507.5	QPSK	1	0	0	24.43
				1	37	0	24.07
				1	74	0	23.80
				36	0	1	23.25
				36	16	1	23.17
				36	35	1	23.24
				75	0	1	23.23
			16QAM	1	0	1	23.63
				1	37	1	23.26
				1	74	1	22.99
				36	0	2	23.16
				36	16	2	23.15
				36	35	2	23.21
				75	0	2	22.29
	21100	2535	QPSK	1	0	0	22.97
				1	37	0	22.93
				1	74	0	23.01
				36	0	1	22.09
				36	16	1	22.02
				36	35	1	22.09
				75	0	1	21.92
			16QAM	1	0	1	22.16
				1	37	1	22.05
				1	74	1	22.15
				36	0	2	22.04
				36	16	2	21.99
				36	35	2	22.01
				75	0	2	21.11
	21375	2562.5	QPSK	1	0	0	22.49
				1	37	0	22.70
				1	74	0	23.03
				36	0	1	21.85
				36	16	1	21.84
				36	35	1	21.84
				75	0	1	21.83
			16QAM	1	0	1	21.69
				1	37	1	22.00
				1	74	1	22.29
				36	0	2	21.84
				36	16	2	21.84
				36	35	2	21.84
				75	0	2	20.96

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
10MHz	20800	2505	QPSK	1	0	0	24.42
				1	24	0	24.17
				1	49	0	23.97
				25	0	1	23.46
				25	12	1	23.39
				25	25	1	23.19
				50	0	1	23.26
			16QAM	1	0	1	23.63
				1	24	1	23.42
				1	49	1	23.16
				25	0	2	23.42
				25	12	2	23.42
				25	25	2	23.19
				50	0	2	22.44
	21100	2535	QPSK	1	0	0	22.88
				1	24	0	22.84
				1	49	0	22.92
				25	0	1	21.90
				25	12	1	21.90
				25	25	1	22.05
				50	0	1	21.97
			16QAM	1	0	1	22.03
				1	24	1	22.05
				1	49	1	22.13
				25	0	2	21.90
				25	12	2	21.91
				25	25	2	22.06
				50	0	2	21.12
	21400	2565	QPSK	1	0	0	22.68
				1	24	0	22.88
				1	49	0	23.18
				25	0	1	21.74
				25	12	1	21.74
				25	25	1	21.99
				50	0	1	21.84
			16QAM	1	0	1	21.69
				1	24	1	21.81
				1	49	1	22.06
				25	0	2	21.73
				25	12	2	21.72
				25	25	2	21.99
				50	0	2	21.05

BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	MPR	Average power (dBm)
5MHz	20775	2502.5	QPSK	1	0	0	24.63
				1	12	0	24.48
				1	24	0	24.37
				12	0	1	23.42
				12	6	1	23.41
				12	13	1	23.40
				25	0	1	23.50
			16QAM	1	0	1	23.28
				1	12	1	23.26
				1	24	1	23.08
				12	0	2	23.38
				12	6	2	23.37
				12	13	2	23.52
				25	0	2	22.66
	21100	2535	QPSK	1	0	0	23.09
				1	12	0	23.09
				1	24	0	23.05
				12	0	1	21.95
				12	6	1	21.93
				12	13	1	22.04
				25	0	1	22.04
			16QAM	1	0	1	22.22
				1	12	1	22.31
				1	24	1	22.29
				12	0	2	22.04
				12	6	2	21.98
				12	13	2	22.04
				25	0	2	21.16
	21425	2567.5	QPSK	1	0	0	22.79
				1	12	0	22.88
				1	24	0	23.05
				12	0	1	21.98
				12	6	1	21.98
				12	13	1	21.98
				25	0	1	21.97
			16QAM	1	0	1	22.51
				1	12	1	22.66
				1	24	1	22.69
				12	0	2	21.98
				12	6	2	21.98
				12	13	2	21.98
				25	0	2	21.13

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.

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.

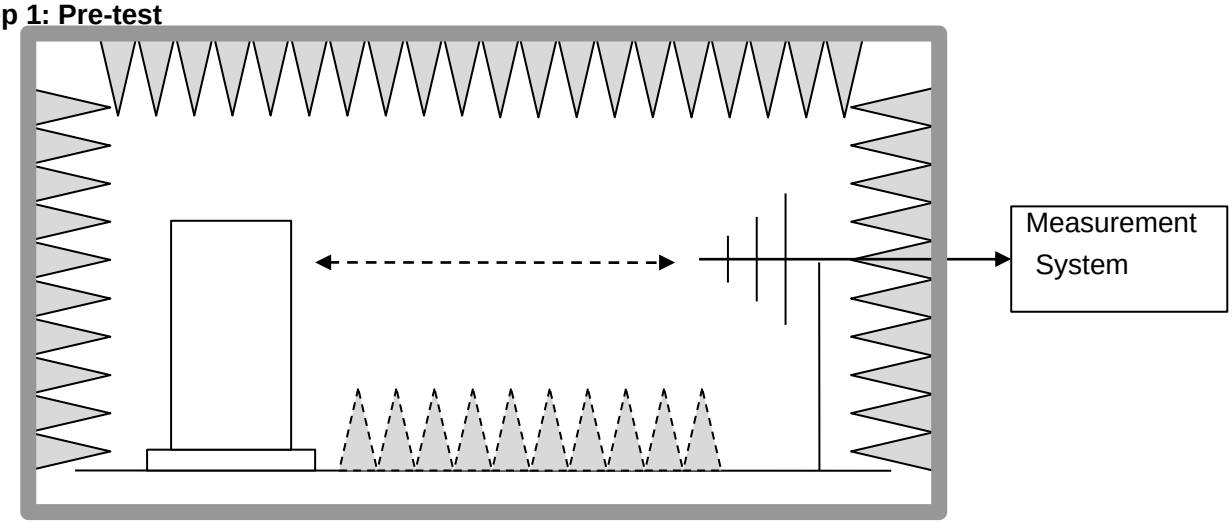
7 This value is EIRP since the measurement is calibrated using a half-wave dipole antenna of known gain (2.15 dBi) and known input power (Pin).

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

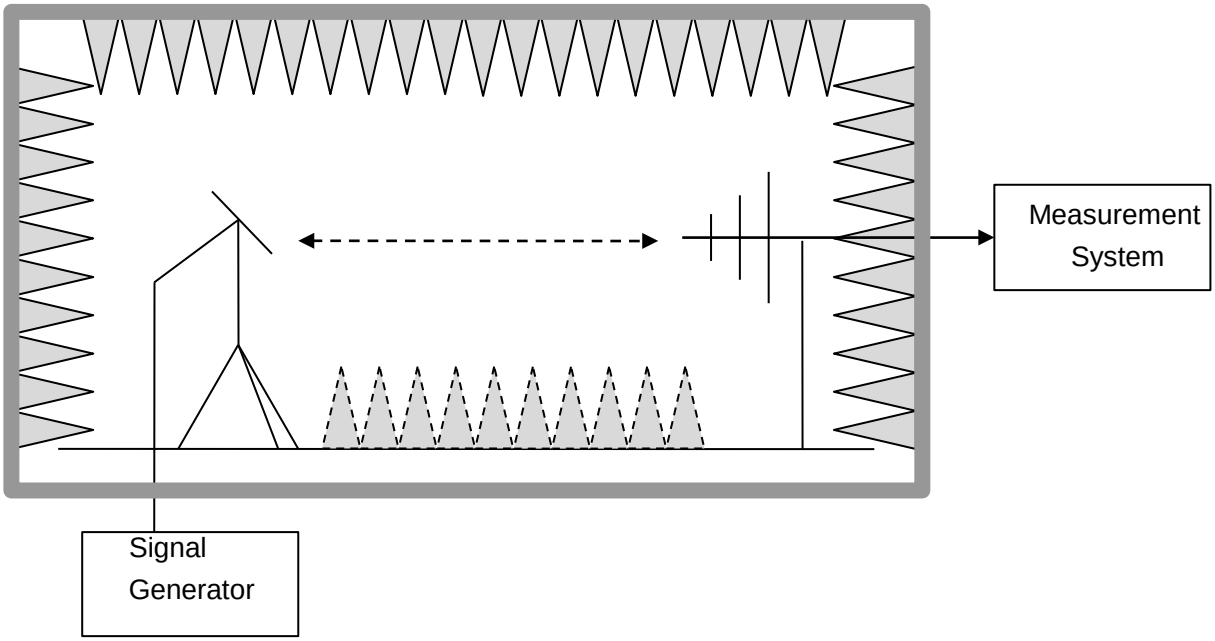
Test Setup

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 4	24.5(h)	<=30dBm (1W)
LTE Band 7	27.50(i)(2)	<=33dBm (2W)

6.2.3 MEASUREMENT RESULT

EIRP for LTE Band 4

Frequency	Channel Bandwidth	Mode.	RB	Substituted level	Antenna Polarization	Antenna Gain correction	Cable Loss	Absolute Level	Limit (dBm)
1710.7	1.4	QPSK	1/0	10.94	V	7.95	0.79	18.10	30
1732.5	1.4	QPSK	1/0	12.09	V	7.95	0.79	19.25	30
1754.3	1.4	QPSK	1/0	13.56	V	7.95	0.79	20.72	30
1710.7	1.4	QPSK	1/0	10.87	H	7.95	0.79	18.03	30
1732.5	1.4	QPSK	1/0	10.50	H	7.95	0.79	17.66	30
1754.3	1.4	QPSK	1/0	11.70	H	7.95	0.79	18.86	30
1710.7	1.4	16-QAM	1/5	11.63	V	7.95	0.79	18.79	30
1732.5	1.4	16-QAM	1/0	12.26	V	7.95	0.79	19.42	30
1754.3	1.4	16-QAM	1/0	9.94	V	7.95	0.79	17.10	30
1710.7	1.4	16-QAM	1/5	13.31	H	7.95	0.79	20.47	30
1732.5	1.4	16-QAM	1/0	11.92	H	7.95	0.79	19.08	30
1754.3	1.4	16-QAM	1/0	10.66	H	7.95	0.79	17.82	30
1711.5	3	QPSK	1/0	11.89	V	7.95	0.79	19.05	30
1732.5	3	QPSK	1/0	13.85	V	7.95	0.79	21.01	30
1753.5	3	QPSK	1/0	11.52	V	7.95	0.79	18.68	30
1711.5	3	QPSK	1/0	12.26	H	7.95	0.79	19.42	30
1732.5	3	QPSK	1/0	10.80	H	7.95	0.79	17.96	30
1753.5	3	QPSK	1/0	13.05	H	7.95	0.79	20.21	30
1711.5	3	16-QAM	1/0	12.37	V	7.95	0.79	19.53	30
1732.5	3	16-QAM	1/0	10.68	V	7.95	0.79	17.84	30
1753.5	3	16-QAM	1/0	10.27	V	7.95	0.79	17.43	30
1711.5	3	16-QAM	1/0	11.84	H	7.95	0.79	19.00	30
1732.5	3	16-QAM	1/0	12.39	H	7.95	0.79	19.55	30
1753.5	3	16-QAM	1/0	13.98	H	7.95	0.79	21.14	30
1712.5	5	QPSK	1/0	12.35	V	7.95	0.79	19.51	30
1732.5	5	QPSK	1/0	13.87	V	7.95	0.79	21.03	30
1752.5	5	QPSK	1/24	13.95	V	7.95	0.79	21.11	30
1712.5	5	QPSK	1/0	14.01	H	7.95	0.79	21.17	30
1732.5	5	QPSK	1/0	11.68	H	7.95	0.79	18.84	30
1752.5	5	QPSK	1/24	10.80	H	7.95	0.79	17.96	30
1712.5	5	16-QAM	1/0	10.05	V	7.95	0.79	17.21	30
1732.5	5	16-QAM	1/0	12.15	V	7.95	0.79	19.31	30
1752.5	5	16-QAM	1/24	8.30	V	7.95	0.79	15.46	30
1712.5	5	16-QAM	1/0	10.44	H	7.95	0.79	17.60	30
1732.5	5	16-QAM	1/0	10.44	H	7.95	0.79	17.60	30

1752.5	5	16-QAM	1/24	12.17	H	7.95	0.79	19.33	30
1715	10	QPSK	1/0	10.47	V	7.95	0.79	17.63	30
1732.5	10	QPSK	1/49	11.51	V	7.95	0.79	18.67	30
1750	10	QPSK	1/0	9.33	V	7.95	0.79	16.49	30
1715	10	QPSK	1/0	11.35	H	7.95	0.79	18.51	30
1732.5	10	QPSK	1/49	11.25	H	7.95	0.79	18.41	30
1750	10	QPSK	1/0	11.79	H	7.95	0.79	18.95	30
1715	10	16-QAM	1/0	10.20	V	7.95	0.79	17.36	30
1732.5	10	16-QAM	1/49	11.97	V	7.95	0.79	19.13	30
1750	10	16-QAM	1/0	10.59	V	7.95	0.79	17.75	30
1715	10	16-QAM	1/0	12.67	H	7.95	0.79	19.83	30
1732.5	10	16-QAM	1/49	13.51	H	7.95	0.79	20.67	30
1750	10	16-QAM	1/0	12.18	H	7.95	0.79	19.34	30
1717.5	15	QPSK	1/0	11.98	V	7.95	0.79	19.14	30
1732.5	15	QPSK	1/74	12.50	V	7.95	0.79	19.66	30
1747.5	15	QPSK	1/0	11.06	V	7.95	0.79	18.22	30
1717.5	15	QPSK	1/0	10.55	H	7.95	0.79	17.71	30
1732.5	15	QPSK	1/74	10.80	H	7.95	0.79	17.96	30
1747.5	15	QPSK	1/0	10.51	H	7.95	0.79	17.67	30
1717.5	15	16-QAM	1/0	9.98	V	7.95	0.79	17.14	30
1732.5	15	16-QAM	1/74	12.37	V	7.95	0.79	19.53	30
1747.5	15	16-QAM	1/0	13.11	V	7.95	0.79	20.27	30
1717.5	15	16-QAM	1/0	10.25	H	7.95	0.79	17.41	30
1732.5	15	16-QAM	1/74	13.39	H	7.95	0.79	20.55	30
1747.5	15	16-QAM	1/0	13.21	H	7.95	0.79	20.37	30
1720	20	QPSK	1/99	11.38	V	7.95	0.79	18.54	30
1732.5	20	QPSK	1/99	10.79	V	7.95	0.79	17.95	30
1745	20	QPSK	1/0	10.55	V	7.95	0.79	17.71	30
1720	20	QPSK	1/99	10.93	H	7.95	0.79	18.09	30
1732.5	20	QPSK	1/99	10.82	H	7.95	0.79	17.98	30
1745	20	QPSK	1/0	13.81	H	7.95	0.79	20.97	30
1720	20	16-QAM	1/99	12.49	V	7.95	0.79	19.65	30
1732.5	20	16-QAM	1/99	10.09	V	7.95	0.79	17.25	30
1745	20	16-QAM	1/0	10.56	V	7.95	0.79	17.72	30
1720	20	16-QAM	1/99	11.37	H	7.95	0.79	18.53	30
1732.5	20	16-QAM	1/99	11.27	H	7.95	0.79	18.43	30
1745	20	16-QAM	1/0	11.35	H	7.95	0.79	18.51	30

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	11.18	V	8.23	1.12	18.29	33
2535	5	QPSK	1/0	10.03	V	8.23	1.12	17.14	33
2567.5	5	QPSK	1/24	13.90	V	8.23	1.12	21.01	33
2502.5	5	QPSK	1/0	11.69	H	8.23	1.12	18.80	33
2535	5	QPSK	1/0	10.31	H	8.23	1.12	17.42	33
2567.5	5	QPSK	1/24	11.32	H	8.23	1.12	18.43	33
2502.5	5	16-QAM	1/0	12.48	V	8.23	1.12	19.59	33
2535	5	16-QAM	1/0	12.43	V	8.23	1.12	19.54	33
2567.5	5	16-QAM	1/24	11.27	V	8.23	1.12	18.38	33
2502.5	5	16-QAM	1/0	10.45	H	8.23	1.12	17.56	33
2535	5	16-QAM	1/0	10.46	H	8.23	1.12	17.57	33
2567.5	5	16-QAM	1/24	11.25	H	8.23	1.12	18.36	33
2505	10	QPSK	1/0	11.84	V	8.23	1.12	18.95	33
2535	10	QPSK	1/49	13.32	V	8.23	1.12	20.43	33
2565	10	QPSK	1/0	11.81	V	8.23	1.12	18.92	33
2505	10	QPSK	1/0	12.76	H	8.23	1.12	19.87	33
2535	10	QPSK	1/49	12.29	H	8.23	1.12	19.40	33
2565	10	QPSK	1/0	11.12	H	8.23	1.12	18.23	33
2505	10	16-QAM	1/0	9.72	V	8.23	1.12	16.83	33
2535	10	16-QAM	1/49	10.27	V	8.23	1.12	17.38	33
2565	10	16-QAM	1/0	11.15	V	8.23	1.12	18.26	33
2505	10	16-QAM	1/0	10.57	H	8.23	1.12	17.68	33
2535	10	16-QAM	1/49	11.80	H	8.23	1.12	18.91	33
2565	10	16-QAM	1/0	13.14	H	8.23	1.12	20.25	33
2507.5	15	QPSK	1/0	13.05	V	8.23	1.12	20.16	33
2535	15	QPSK	1/74	12.59	V	8.23	1.12	19.70	33
2562.5	15	QPSK	1/0	14.49	V	8.23	1.12	21.60	33
2507.5	15	QPSK	1/0	13.99	H	8.23	1.12	21.10	33
2535	15	QPSK	1/74	9.99	H	8.23	1.12	17.10	33
2562.5	15	QPSK	1/0	10.06	H	8.23	1.12	17.17	33
2507.5	15	16-QAM	1/0	13.18	V	8.23	1.12	20.29	33
2535	15	16-QAM	1/74	12.32	V	8.23	1.12	19.43	33
2562.5	15	16-QAM	1/0	12.71	V	8.23	1.12	19.82	33
2507.5	15	16-QAM	1/0	13.55	H	8.23	1.12	20.66	33
2535	15	16-QAM	1/74	12.50	H	8.23	1.12	19.61	33
2562.5	15	16-QAM	1/0	11.10	H	8.23	1.12	18.21	33

2510	20	QPSK	1/99	11.12	V	8.23	1.12	18.23	33
2535	20	QPSK	1/99	10.32	V	8.23	1.12	17.43	33
2560	20	QPSK	1/0	12.97	V	8.23	1.12	20.08	33
2510	20	QPSK	1/99	11.96	H	8.23	1.12	19.07	33
2535	20	QPSK	1/99	11.05	H	8.23	1.12	18.16	33
2560	20	QPSK	1/0	10.21	H	8.23	1.12	17.32	33
2510	20	16-QAM	1/99	10.27	V	8.23	1.12	17.38	33
2535	20	16-QAM	1/99	12.50	V	8.23	1.12	19.61	33
2560	20	16-QAM	1/0	13.79	V	8.23	1.12	20.90	33
2510	20	16-QAM	1/99	13.33	H	8.23	1.12	20.44	33
2535	20	16-QAM	1/99	11.10	H	8.23	1.12	18.21	33
2560	20	16-QAM	1/0	10.39	H	8.23	1.12	17.50	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 ≥ 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 4

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	4.66	<13	PASS
		1	3	4.77	<13	PASS
		1	5	4.72	<13	PASS
		3	0	4.82	<13	PASS
		3	2	4.70	<13	PASS
		3	3	4.81	<13	PASS
		6	0	5.23	<13	PASS
	MCH	1	0	4.14	<13	PASS
		1	3	4.05	<13	PASS
		1	5	4.06	<13	PASS
		3	0	4.35	<13	PASS
		3	2	4.32	<13	PASS
		3	3	4.35	<13	PASS
		6	0	4.87	<13	PASS
	HCH	1	0	4.37	<13	PASS
		1	3	4.32	<13	PASS
		1	5	4.31	<13	PASS
		3	0	4.45	<13	PASS
		3	2	4.45	<13	PASS
		3	3	4.52	<13	PASS
		6	0	4.86	<13	PASS
16QAM	LCH	1	0	5.48	<13	PASS
		1	3	5.39	<13	PASS
		1	5	5.52	<13	PASS
		3	0	4.83	<13	PASS
		3	2	4.81	<13	PASS
		3	3	4.88	<13	PASS
		6	0	6.01	<13	PASS
	MCH	1	0	5.27	<13	PASS
		1	3	5.19	<13	PASS
		1	5	5.18	<13	PASS
		3	0	4.39	<13	PASS
		3	2	4.38	<13	PASS

		3	3	4.31	<13	PASS
		6	0	5.58	<13	PASS
	HCH	1	0	5.08	<13	PASS
		1	3	5.09	<13	PASS
		1	5	5.06	<13	PASS
		3	0	4.47	<13	PASS
		3	2	4.46	<13	PASS
		3	3	4.43	<13	PASS
		6	0	5.86	<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	4.66	<13	PASS
		1	7	4.76	<13	PASS
		1	14	4.79	<13	PASS
		8	0	5.25	<13	PASS
		8	4	5.29	<13	PASS
		8	7	5.27	<13	PASS
		15	0	5.27	<13	PASS
	MCH	1	0	4.40	<13	PASS
		1	7	4.29	<13	PASS
		1	14	4.29	<13	PASS
		8	0	4.92	<13	PASS
		8	4	4.9	<13	PASS
		8	7	4.93	<13	PASS
		15	0	4.93	<13	PASS
	HCH	1	0	4.23	<13	PASS
		1	7	4.18	<13	PASS
		1	14	4.23	<13	PASS
		8	0	4.89	<13	PASS
		8	4	4.91	<13	PASS
		8	7	4.92	<13	PASS
		15	0	4.92	<13	PASS
16QAM	LCH	1	0	5.74	<13	PASS
		1	7	5.91	<13	PASS
		1	14	5.68	<13	PASS
		8	0	5.33	<13	PASS

		8	4	5.24	<13	PASS
		8	7	5.3	<13	PASS
		15	0	6.01	<13	PASS
	MCH	1	0	5.3	<13	PASS
		1	7	5.17	<13	PASS
		1	14	5.24	<13	PASS
		8	0	4.94	<13	PASS
		8	4	4.94	<13	PASS
		8	7	4.94	<13	PASS
		15	0	5.79	<13	PASS
	HCH	1	0	5.10	<13	PASS
		1	7	5.16	<13	PASS
		1	14	5.11	<13	PASS
		8	0	4.89	<13	PASS
		8	4	4.92	<13	PASS
		8	7	4.94	<13	PASS
		15	0	5.73	<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	4.60	<13	PASS
		1	12	4.66	<13	PASS
		1	24	4.73	<13	PASS
		12	0	5.22	<13	PASS
		12	6	5.25	<13	PASS
		12	13	5.26	<13	PASS
		25	0	5.24	<13	PASS
	MCH	1	0	4.25	<13	PASS
		1	12	4.08	<13	PASS
		1	24	4.09	<13	PASS
		12	0	4.86	<13	PASS
		12	6	4.87	<13	PASS
		12	13	4.83	<13	PASS
		25	0	4.89	<13	PASS
	HCH	1	0	4.21	<13	PASS
		1	12	4.27	<13	PASS
		1	24	4.38	<13	PASS

		12	0	4.89	<13	PASS
		12	6	4.91	<13	PASS
		12	13	4.88	<13	PASS
		25	0	4.87	<13	PASS
16QAM	LCH	1	0	5.53	<13	PASS
		1	12	5.64	<13	PASS
		1	24	5.64	<13	PASS
		12	0	5.24	<13	PASS
		12	6	5.22	<13	PASS
		12	13	5.21	<13	PASS
		25	0	6.04	<13	PASS
	MCH	1	0	5.3	<13	PASS
		1	12	5.19	<13	PASS
		1	24	5.07	<13	PASS
		12	0	4.87	<13	PASS
		12	6	4.86	<13	PASS
		12	13	4.86	<13	PASS
		25	0	5.66	<13	PASS
	HCH	1	0	4.90	<13	PASS
		1	12	4.90	<13	PASS
		1	24	5.01	<13	PASS
		12	0	4.88	<13	PASS
		12	6	4.88	<13	PASS
		12	13	4.86	<13	PASS
		25	0	5.65	<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	4.77	<13	PASS
		1	49	4.96	<13	PASS
		1	99	4.89	<13	PASS
		50	0	5.32	<13	PASS
		50	25	5.28	<13	PASS
		50	50	5.27	<13	PASS
		100	0	5.35	<13	PASS
	MCH	1	0	4.57	<13	PASS
		1	49	4.33	<13	PASS

		1	99	4.23	<13	PASS
		50	0	5.01	<13	PASS
		50	25	4.94	<13	PASS
		50	50	4.87	<13	PASS
		100	0	4.92	<13	PASS
	HCH	1	0	4.05	<13	PASS
		1	49	4.12	<13	PASS
		1	99	4.19	<13	PASS
		50	0	4.91	<13	PASS
		50	25	4.91	<13	PASS
		50	50	4.90	<13	PASS
		100	0	4.93	<13	PASS
16QAM	LCH	1	0	5.66	<13	PASS
		1	49	5.86	<13	PASS
		1	99	5.84	<13	PASS
		50	0	5.35	<13	PASS
		50	25	5.32	<13	PASS
		50	50	5.32	<13	PASS
		100	0	6.06	<13	PASS
	MCH	1	0	5.47	<13	PASS
		1	49	5.15	<13	PASS
		1	99	5.13	<13	PASS
		50	0	5.05	<13	PASS
		50	25	5.05	<13	PASS
		50	50	4.88	<13	PASS
		100	0	5.77	<13	PASS
	HCH	1	0	4.97	<13	PASS
		1	49	5.03	<13	PASS
		1	99	5.19	<13	PASS
		50	0	4.91	<13	PASS
		50	25	4.93	<13	PASS
		50	50	4.92	<13	PASS
		100	0	5.72	<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	4.83	<13	PASS
		1	37	4.79	<13	PASS
		1	74	4.80	<13	PASS
		37	0	5.68	<13	PASS
		37	18	5.64	<13	PASS
		37	38	5.65	<13	PASS
		75	0	5.63	<13	PASS
	MCH	1	0	4.68	<13	PASS
		1	37	4.41	<13	PASS
		1	74	4.23	<13	PASS
		37	0	5.32	<13	PASS
		37	18	5.30	<13	PASS
		37	38	5.31	<13	PASS
		75	0	5.32	<13	PASS
	HCH	1	0	4.04	<13	PASS
		1	37	4.12	<13	PASS
		1	74	4.37	<13	PASS
		37	0	5.31	<13	PASS
		37	18	5.31	<13	PASS
		37	38	5.32	<13	PASS
		75	0	5.33	<13	PASS
16QAM	LCH	1	0	5.69	<13	PASS
		1	37	5.97	<13	PASS
		1	74	5.65	<13	PASS
		37	0	5.64	<13	PASS
		37	18	5.63	<13	PASS
		37	38	5.63	<13	PASS
		75	0	6.16	<13	PASS
	MCH	1	0	5.48	<13	PASS
		1	37	5.10	<13	PASS
		1	74	5.08	<13	PASS
		37	0	5.30	<13	PASS
		37	18	5.31	<13	PASS
		37	38	5.32	<13	PASS
		75	0	5.91	<13	PASS

	HCH	1	0	4.94	<13	PASS
		1	37	5.05	<13	PASS
		1	74	5.19	<13	PASS
		37	0	5.32	<13	PASS
		37	18	5.32	<13	PASS
		37	38	5.32	<13	PASS
		75	0	5.89	<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	4.56	<13	PASS
		1	49	4.67	<13	PASS
		1	99	4.30	<13	PASS
		50	0	5.33	<13	PASS
		50	25	5.33	<13	PASS
		50	50	5.22	<13	PASS
		100	0	5.42	<13	PASS
	MCH	1	0	4.58	<13	PASS
		1	49	4.13	<13	PASS
		1	99	4.02	<13	PASS
		50	0	5.13	<13	PASS
		50	25	5.08	<13	PASS
		50	50	4.96	<13	PASS
		100	0	5.18	<13	PASS
	HCH	1	0	4.15	<13	PASS
		1	49	4.17	<13	PASS
		1	99	4.35	<13	PASS
		50	0	4.87	<13	PASS
		50	25	4.91	<13	PASS
		50	50	4.96	<13	PASS
		100	0	5.31	<13	PASS
16QAM	LCH	1	0	5.40	<13	PASS
		1	49	5.5	<13	PASS
		1	99	5.19	<13	PASS
		50	0	5.29	<13	PASS
		50	25	5.34	<13	PASS
		50	50	5.18	<13	PASS

		100	0	6.19	<13	PASS
	MCH	1	0	5.39	<13	PASS
		1	49	5.00	<13	PASS
		1	99	5.01	<13	PASS
		50	0	5.13	<13	PASS
		50	25	5.13	<13	PASS
		50	50	4.96	<13	PASS
		100	0	5.95	<13	PASS
	HCH	1	0	5.11	<13	PASS
		1	49	5.12	<13	PASS
		1	99	5.39	<13	PASS
		50	0	4.84	<13	PASS
		50	25	4.89	<13	PASS
		50	50	4.97	<13	PASS
		100	0	5.97	<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	3.87	<13	PASS
		1	12	4.01	<13	PASS
		1	24	4.10	<13	PASS
		12	0	4.74	<13	PASS
		12	6	4.74	<13	PASS
		12	13	4.75	<13	PASS
		25	0	4.75	<13	PASS
	MCH	1	0	4.54	<13	PASS
		1	12	4.30	<13	PASS
		1	24	4.55	<13	PASS
		12	0	5.03	<13	PASS
		12	6	5.01	<13	PASS
		12	13	5.01	<13	PASS
		25	0	4.99	<13	PASS
	HCH	1	0	4.10	<13	PASS
		1	12	3.86	<13	PASS
		1	24	3.74	<13	PASS
		12	0	4.62	<13	PASS
		12	6	4.63	<13	PASS
		12	13	4.63	<13	PASS
		25	0	4.65	<13	PASS
16QAM	LCH	1	0	4.93	<13	PASS
		1	12	4.91	<13	PASS
		1	24	5.16	<13	PASS
		12	0	4.76	<13	PASS
		12	6	4.76	<13	PASS
		12	13	4.77	<13	PASS
		25	0	5.58	<13	PASS
	MCH	1	0	5.15	<13	PASS
		1	12	5.18	<13	PASS
		1	24	5.28	<13	PASS
		12	0	4.98	<13	PASS
		12	6	5.04	<13	PASS
		12	13	4.98	<13	PASS

		25	0	5.77	<13	PASS
	HCH	1	0	4.48	<13	PASS
		1	12	4.26	<13	PASS
		1	24	4.03	<13	PASS
		12	0	4.61	<13	PASS
		12	6	4.62	<13	PASS
		12	13	4.65	<13	PASS
		25	0	5.36	<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	4.24	<13	PASS
		1	24	4.31	<13	PASS
		1	49	4.59	<13	PASS
		25	0	4.79	<13	PASS
		25	12	4.76	<13	PASS
		25	25	4.92	<13	PASS
		50	0	4.90	<13	PASS
	MCH	1	0	4.58	<13	PASS
		1	24	4.62	<13	PASS
		1	49	4.57	<13	PASS
		25	0	5.03	<13	PASS
		25	12	5.06	<13	PASS
		25	25	5.06	<13	PASS
		50	0	5.08	<13	PASS
	HCH	1	0	4.02	<13	PASS
		1	24	3.91	<13	PASS
		1	49	3.61	<13	PASS
		25	0	4.84	<13	PASS
		25	12	4.84	<13	PASS
		25	25	4.70	<13	PASS
		50	0	4.76	<13	PASS
16QAM	LCH	1	0	4.92	<13	PASS
		1	24	5.25	<13	PASS
		1	49	5.35	<13	PASS
		25	0	4.75	<13	PASS
		25	12	4.78	<13	PASS

		25	25	4.95	<13	PASS
		50	0	5.63	<13	PASS
	MCH	1	0	5.53	<13	PASS
		1	24	5.41	<13	PASS
		1	49	5.38	<13	PASS
		25	0	5.11	<13	PASS
		25	12	5.13	<13	PASS
		25	25	5.07	<13	PASS
		50	0	5.83	<13	PASS
	HCH	1	0	5.00	<13	PASS
		1	24	4.80	<13	PASS
		1	49	4.64	<13	PASS
		25	0	4.84	<13	PASS
		25	12	4.86	<13	PASS
		25	25	4.67	<13	PASS
		50	0	5.48	<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	4.24	<13	PASS
		1	37	4.53	<13	PASS
		1	74	4.55	<13	PASS
		37	0	5.33	<13	PASS
		37	18	5.33	<13	PASS
		37	38	5.35	<13	PASS
		75	0	5.34	<13	PASS
	MCH	1	0	4.68	<13	PASS
		1	37	4.63	<13	PASS
		1	74	4.54	<13	PASS
		37	0	5.37	<13	PASS
		37	18	5.34	<13	PASS
		37	38	5.35	<13	PASS
		75	0	5.36	<13	PASS
	HCH	1	0	4.45	<13	PASS
		1	37	4.19	<13	PASS
		1	74	3.87	<13	PASS
		37	0	5.17	<13	PASS

		37	18	5.17	<13	PASS
		37	38	5.16	<13	PASS
		75	0	5.18	<13	PASS
16QAM	LCH	1	0	5.03	<13	PASS
		1	37	5.18	<13	PASS
		1	74	5.33	<13	PASS
		37	0	5.36	<13	PASS
		37	18	5.33	<13	PASS
		37	38	5.34	<13	PASS
		75	0	5.89	<13	PASS
	MCH	1	0	5.42	<13	PASS
		1	37	5.42	<13	PASS
		1	74	5.57	<13	PASS
		37	0	5.35	<13	PASS
		37	18	5.36	<13	PASS
		37	38	5.34	<13	PASS
		75	0	5.92	<13	PASS
	HCH	1	0	5.23	<13	PASS
		1	37	4.98	<13	PASS
		1	74	4.74	<13	PASS
		37	0	5.17	<13	PASS
		37	18	5.16	<13	PASS
		37	38	5.15	<13	PASS
		75	0	5.73	<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	4.03	<13	PASS
		1	49	4.37	<13	PASS
		1	99	4.49	<13	PASS
		50	0	4.92	<13	PASS
		50	25	4.92	<13	PASS
		50	50	5.09	<13	PASS
		100	0	5.25	<13	PASS
	MCH	1	0	4.38	<13	PASS
		1	49	4.34	<13	PASS
		1	99	4.19	<13	PASS

		50	0	5.04	<13	PASS
		50	25	5.04	<13	PASS
		50	50	5.06	<13	PASS
		100	0	5.22	<13	PASS
	HCH	1	0	4.44	<13	PASS
		1	49	4.22	<13	PASS
		1	99	3.76	<13	PASS
		50	0	4.94	<13	PASS
		50	25	4.95	<13	PASS
		50	50	4.82	<13	PASS
		100	0	5.25	<13	PASS
16QAM	LCH	1	0	4.85	<13	PASS
		1	49	5.13	<13	PASS
		1	99	5.16	<13	PASS
		50	0	4.92	<13	PASS
		50	25	4.92	<13	PASS
		50	50	5.08	<13	PASS
		100	0	6.00	<13	PASS
	MCH	1	0	5.30	<13	PASS
		1	49	5.21	<13	PASS
		1	99	5.07	<13	PASS
		50	0	5.04	<13	PASS
		50	25	5.04	<13	PASS
		50	50	5.09	<13	PASS
		100	0	5.97	<13	PASS
	HCH	1	0	5.35	<13	PASS
		1	49	5.05	<13	PASS
		1	99	4.78	<13	PASS
		50	0	4.94	<13	PASS
		50	25	4.93	<13	PASS
		50	50	4.82	<13	PASS
		100	0	5.85	<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 Band 7:
(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

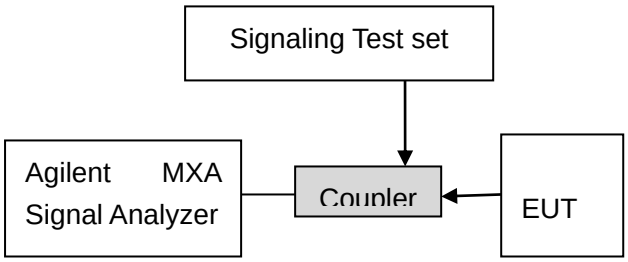
Test Procedure Used
KDB 971168 D01v03 – Section 6.0

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.

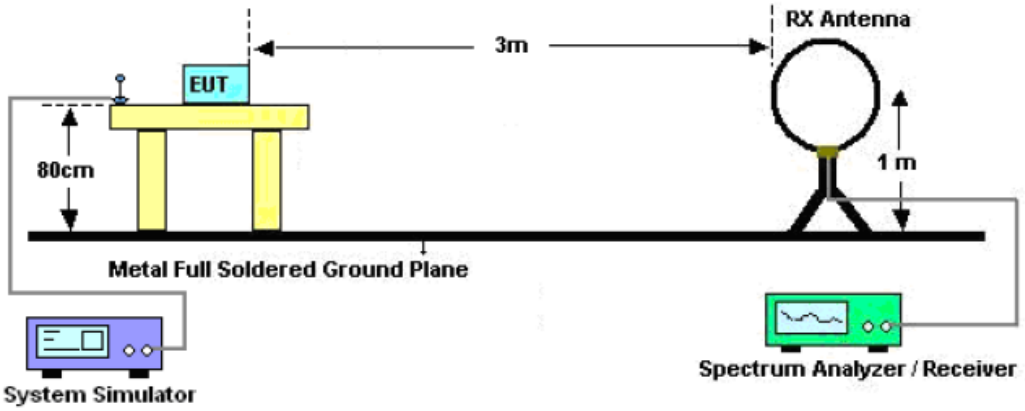
7.2 RADIATED SPURIOUS EMISSION

7.2.1. MEASUREMENT PROCEDURE

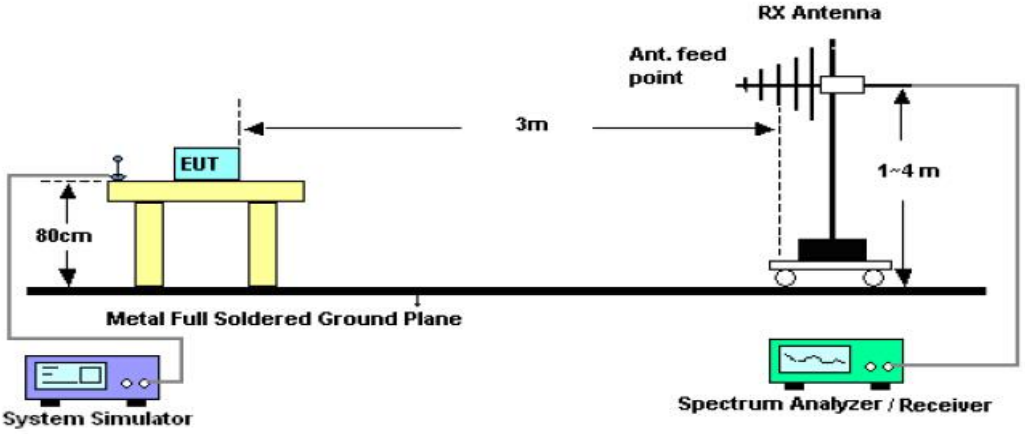
1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated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

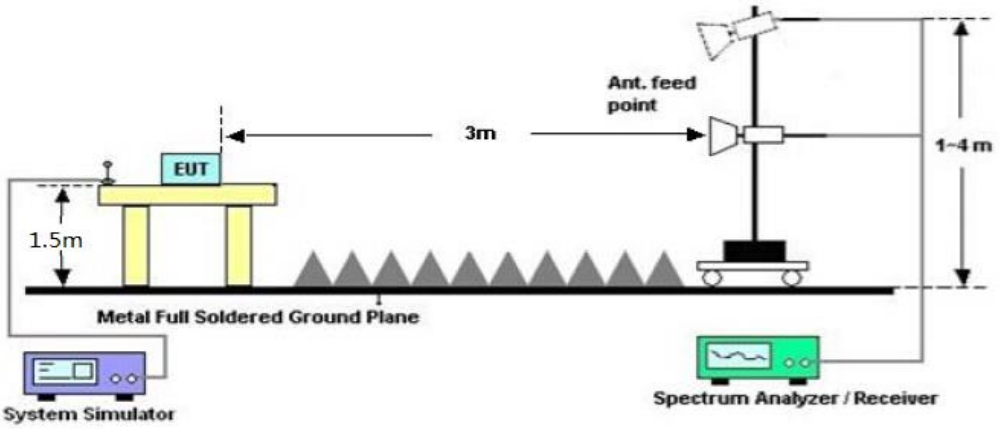
Radiated Emission Test-Setup Frequency Below 30MHz



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.

7.2.4 MEASUREMENT RESULT

LTE Band 4

Low channel (QPSK)

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
3440	V	-38.55	-13	-25.55
814.5	V	-44.09	-13	-31.09
695.3	V	-46.13	-13	-33.13
3440	H	-37.69	-13	-24.69
779.1	H	-44.56	-13	-31.56
558.4	H	-46.76	-13	-33.76

Middle channel (QPSK)

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
3465	V	-39.60	-13	-26.60
758.9	V	-44.09	-13	-31.09
661.3	V	-45.71	-13	-32.71
3465	H	-38.93	-13	-25.93
625.2	H	-44.12	-13	-31.12
446.8	H	-48.25	-13	-35.25

High channel (QPSK)

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
3490	V	-38.70	-13	-25.70
538.7	V	-44.60	-13	-31.60
472.4	V	-45.28	-13	-32.28
3490	H	-38.02	-13	-25.02
512.8	H	-44.76	-13	-31.76
453.5	H	-46.17	-13	-33.17

Low channel (16QAM)

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
3440	V	-38.48	-13	-25.48
815.2	V	-43.94	-13	-30.94
693.8	V	-45.96	-13	-32.96
3440	H	-37.18	-13	-24.18
776.4	H	-44.23	-13	-31.23
553.4	H	-46.61	-13	-33.61

Middle channel (16QAM)

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
3465	V	-39.42	-13	-26.42
756.4	V	-43.75	-13	-30.75
663.7	V	-45.13	-13	-32.13
3465	H	-38.86	-13	-25.86
623.1	H	-44.09	-13	-31.09
441.9	H	-47.99	-13	-34.99

High channel (16QAM)

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
3490	V	-38.20	-13	-25.20
535.3	V	-44.01	-13	-31.01
471.7	V	-45.06	-13	-32.06
3490	H	-37.67	-13	-24.67
516.4	H	-44.15	-13	-31.15
454.5	H	-45.81	-13	-32.81

Note: 1. Margin = Emission Level -Limit

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

3. Only record the worst data of worst Bandwidth (20M)

LTE Band 7

Low channel (QPSK)

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5020	V	-46.44	-25	-21.44
569.3	V	-45.17	-25	-20.17
441.8	V	-46.35	-25	-21.35
5020	H	-45.30	-25	-20.30
728.2	H	-46.10	-25	-21.10
612.5	H	-45.66	-25	-20.66

Middle channel (QPSK)

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5070	V	-45.18	-25	-20.18
669.7	V	-46.06	-25	-21.06
521.1	V	-46.45	-25	-21.45
5070	H	-44.19	-25	-19.19
661.8	H	-45.58	-25	-20.58
436.9	H	-46.90	-25	-21.90

High channel (QPSK)

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5120	V	-44.45	-25	-19.45
695.3	V	-45.02	-25	-20.02
588.9	V	-46.40	-25	-21.40
5120	H	-45.74	-25	-20.74
614.3	H	-44.01	-25	-19.01
521.1	H	-46.76	-25	-21.76

Low channel (16QAM)

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5020	V	-45.87	-25	-20.87
563.4	V	-44.71	-25	-19.71
443.7	V	-45.70	-25	-20.70
5020	H	-44.68	-25	-19.68
720.5	H	-45.30	-25	-20.30
605.1	H	-44.72	-25	-19.72

Middle channel (16QAM)

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5070	V	-45.26	-25	-20.26
663.4	V	-46.39	-25	-21.39
526.7	V	-46.47	-25	-21.47
5070	H	-44.67	-25	-19.67
668.2	H	-45.73	-25	-20.73
431.5	H	-47.27	-25	-22.27

High channel (16QAM)

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5120	V	-45.00	-25	-20.00
692.4	V	-45.48	-25	-20.48
583.7	V	-47.05	-25	-22.05
5120	H	-46.44	-25	-21.44
611.9	H	-44.68	-25	-19.68
518.6	H	-46.87	-25	-21.87

Note: 1. Margin = Emission Level -Limit

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

3. Only record the worst data of worst Bandwidth (20M)

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.

1 Measure the carrier frequency at room temperature.

2 Subject the EUT to overnight soak at -10℃. 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.

3 Repeat the above measurements at 10℃ increments from -10℃ to +40℃. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.

4 Re-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.

5 Subject the EUT to overnight soak at +40℃.

6 With 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.

7 Repeat the above measurements at 10℃ increments from +40℃ to -10℃. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.

8 At all temperature levels hold the temperature to +/- 0.5℃ 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 -10°C to +40°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 ±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 -10°C to +40°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 4

Middle Channel, fo = 1732.5 MHz					
Modulation	Temperature (℃)	Power Supplied (VDC)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
QPSK	-10	3.8	6.19	0.003621	±2.5
	0		26.18	0.015303	±2.5
	10		35.76	0.020905	±2.5
	20		11.29	0.006598	±2.5
	30		24.88	0.014542	±2.5
	40		14.41	0.008421	±2.5
	25	4.35	-2.88	-0.001681	±2.5
		3.23	8.87	0.005119	±2.5
16QAM	-10	3.8	22.26	0.013011	±2.5
	0		33.33	0.019484	±2.5
	10		40.96	0.023941	±2.5
	20		0.94	0.000552	±2.5
	30		-26.84	-0.015687	±2.5
	40		-14.61	-0.008538	±2.5
	25	4.35	-36.82	-0.021524	±2.5
		3.23	-28.70	-0.016563	±2.5

LTE Band 7

Middle Channel, f_O = 2535 MHz				
Modulation	Temperature (℃)	Power Supplied (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
QPSK	-10	3.8	32.69	0.013062
	0		34.42	0.013753
	10		41.48	0.016577
	20		48.89	0.019538
	30		22.86	0.009135
	40		34.96	0.013971
	25	4.35	37.57	0.015011
		3.23	2.05	0.000807

16QAM	-10	3.8	-17.24	-0.006888
	0		-20.38	-0.008146
	10		-32.42	-0.012953
	20		-10.57	-0.004224
	30		-33.06	-0.013210
	40		-42.54	-0.017000
	25	4.35	34.92	0.013954
		3.23	-0.99	-0.000389

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

The EUT doesn’t work below -10℃

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 4

Channel Bandwidth: 1.4 MHz

Channel Bandwidth: 1.4 MHz					
Modulation	Channel	RB Configuration		Occupied Bandwidth(MHz)	Verdict
		Size	Offset		
QPSK	LCH	6	0	1.0758	PASS
	MCH	6	0	1.0787	PASS
	HCH	6	0	1.0774	PASS
16QAM	LCH	6	0	1.0771	PASS
	MCH	6	0	1.0775	PASS
	HCH	6	0	1.0786	PASS

Channel Bandwidth: 3 MHz

Channel Bandwidth: 3 MHz					
Modulation	Channel	RB Configuration		Occupied Bandwidth(MHz)	Verdict
		Size	Offset		
QPSK	LCH	15	0	2.6819	PASS
	MCH	15	0	2.6839	PASS
	HCH	15	0	2.6880	PASS
16QAM	LCH	15	0	2.6849	PASS
	MCH	15	0	2.6838	PASS
	HCH	15	0	2.6845	PASS

Channel Bandwidth: 5 MHz

Channel Bandwidth: 5 MHz					
Modulation	Channel	RB Configuration		Occupied Bandwidth(MHz)	Verdict
		Size	Offset		
QPSK	LCH	25	0	4.4714	PASS
	MCH	25	0	4.4717	PASS
	HCH	25	0	4.4790	PASS
16QAM	LCH	25	0	4.4670	PASS
	MCH	25	0	4.4670	PASS
	HCH	25	0	4.4680	PASS

Channel Bandwidth: 10 MHz

Channel Bandwidth: 10 MHz					
Modulation	Channel	RB Configuration		Occupied Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	50	0	8.9510	PASS
	MCH	50	0	8.9478	PASS
	HCH	50	0	8.9459	PASS
16QAM	LCH	50	0	8.9392	PASS
	MCH	50	0	8.9284	PASS
	HCH	50	0	8.9581	PASS

Channel Bandwidth: 15 MHz

Channel Bandwidth: 15 MHz					
Modulation	Channel	RB Configuration		Occupied Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	75	0	13.416	PASS
	MCH	75	0	13.396	PASS
	HCH	75	0	13.414	PASS
16QAM	LCH	75	0	13.392	PASS
	MCH	75	0	13.392	PASS
	HCH	75	0	13.400	PASS

Channel Bandwidth: 20 MHz

Channel Bandwidth: 20 MHz					
Modulation	Channel	RB Configuration		Occupied Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	100	0	17.880	PASS
	MCH	100	0	17.873	PASS
	HCH	100	0	17.896	PASS
16QAM	LCH	100	0	17.886	PASS
	MCH	100	0	17.870	PASS
	HCH	100	0	17.913	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	4.4798	PASS
	MCH	25	0	4.4709	PASS
	HCH	25	0	4.4779	PASS
16QAM	LCH	25	0	4.4673	PASS
	MCH	25	0	4.4607	PASS
	HCH	25	0	4.4642	PASS

Channel Bandwidth: 10 MHz

Channel Bandwidth: 10 MHz					
Modulation	Channel	RB Configuration		Occupied Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	50	0	8.9480	PASS
	MCH	50	0	8.9525	PASS
	HCH	50	0	8.9564	PASS
16QAM	LCH	50	0	8.9418	PASS
	MCH	50	0	8.9369	PASS
	HCH	50	0	8.9492	PASS

Channel Bandwidth: 15 MHz

Channel Bandwidth: 15 MHz					
Modulation	Channel	RB Configuration		Occupied Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	75	0	13.408	PASS
	MCH	75	0	13.422	PASS
	HCH	75	0	13.409	PASS
16QAM	LCH	75	0	13.414	PASS
	MCH	75	0	13.400	PASS
	HCH	75	0	13.408	PASS

Channel Bandwidth: 20 MHz

Channel Bandwidth: 20 MHz					
Modulation	Channel	RB Configuration		Occupied Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	100	0	17.896	PASS
	MCH	100	0	17.889	PASS
	HCH	100	0	17.893	PASS
16QAM	LCH	100	0	17.903	PASS
	MCH	100	0	17.880	PASS
	HCH	100	0	17.908	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 4

Channel Bandwidth: 1.4 MHz

Channel Bandwidth: 1.4 MHz					
Modulation	Channel	RB Configuration		26dB Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	6	0	1.220	PASS
	MCH	6	0	1.229	PASS
	HCH	6	0	1.215	PASS
16QAM	LCH	6	0	1.223	PASS
	MCH	6	0	1.231	PASS
	HCH	6	0	1.230	PASS

Channel Bandwidth: 3 MHz

Channel Bandwidth: 3 MHz					
Modulation	Channel	RB Configuration		26dB Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	15	0	2.939	PASS
	MCH	15	0	2.933	PASS
	HCH	15	0	2.939	PASS
16QAM	LCH	15	0	2.965	PASS
	MCH	15	0	2.934	PASS
	HCH	15	0	2.970	PASS

Channel Bandwidth: 5 MHz

Channel Bandwidth: 5 MHz					
Modulation	Channel	RB Configuration		26dB Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	25	0	4.816	PASS
	MCH	25	0	4.803	PASS
	HCH	25	0	4.804	PASS
16QAM	LCH	25	0	4.821	PASS
	MCH	25	0	4.836	PASS
	HCH	25	0	4.836	PASS

Channel Bandwidth: 10 MHz

Channel Bandwidth: 10 MHz					
Modulation	Channel	RB Configuration		26dB Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	50	0	9.498	PASS
	MCH	50	0	9.480	PASS
	HCH	50	0	9.537	PASS
16QAM	LCH	50	0	9.531	PASS
	MCH	50	0	9.555	PASS
	HCH	50	0	9.601	PASS

Channel Bandwidth: 15 MHz

Channel Bandwidth: 15 MHz					
Modulation	Channel	RB Configuration		26dB Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	75	0	14.13	PASS
	MCH	75	0	14.25	PASS
	HCH	75	0	14.20	PASS
16QAM	LCH	75	0	14.18	PASS
	MCH	75	0	14.17	PASS
	HCH	75	0	14.08	PASS

Channel Bandwidth: 20 MHz

Channel Bandwidth: 20 MHz					
Modulation	Channel	RB Configuration		26dB Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	100	0	18.67	PASS
	MCH	100	0	18.74	PASS
	HCH	100	0	18.84	PASS
16QAM	LCH	100	0	18.71	PASS
	MCH	100	0	18.86	PASS
	HCH	100	0	18.83	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	4.809	PASS
	MCH	25	0	4.906	PASS
	HCH	25	0	4.821	PASS
16QAM	LCH	25	0	4.851	PASS
	MCH	25	0	4.795	PASS
	HCH	25	0	4.812	PASS

Channel Bandwidth: 10 MHz

Channel Bandwidth: 10MHz					
Modulation	Channel	RB Configuration		26dB Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	50	0	9.513	PASS
	MCH	50	0	9.510	PASS
	HCH	50	0	9.524	PASS
16QAM	LCH	50	0	9.487	PASS
	MCH	50	0	9.483	PASS
	HCH	50	0	9.632	PASS

Channel Bandwidth: 15 MHz

Channel Bandwidth: 15MHz					
Modulation	Channel	RB Configuration		26dB Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	75	0	14.25	PASS
	MCH	75	0	14.11	PASS
	HCH	75	0	14.30	PASS
16QAM	LCH	75	0	14.14	PASS
	MCH	75	0	14.18	PASS
	HCH	75	0	14.21	PASS

Channel Bandwidth: 20 MHz

Channel Bandwidth: 20MHz					
Modulation	Channel	RB Configuration		26dB Bandwidth (MHz)	Verdict
		Size	Offset		
QPSK	LCH	100	0	18.66	PASS
	MCH	100	0	18.70	PASS
	HCH	100	0	18.96	PASS
16QAM	LCH	100	0	18.81	PASS
	MCH	100	0	18.81	PASS
	HCH	100	0	18.76	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 + log10(P[Watts]), where P is the transmitter power in Watts.

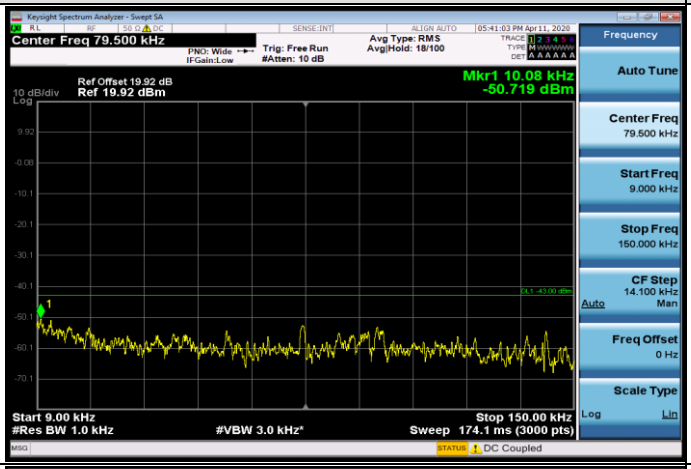
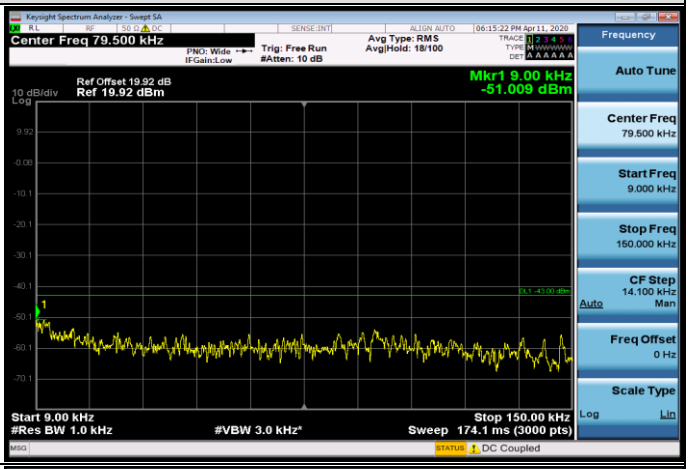
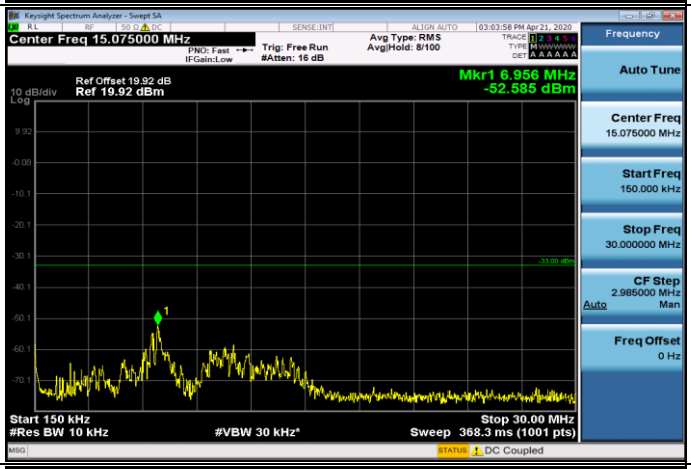
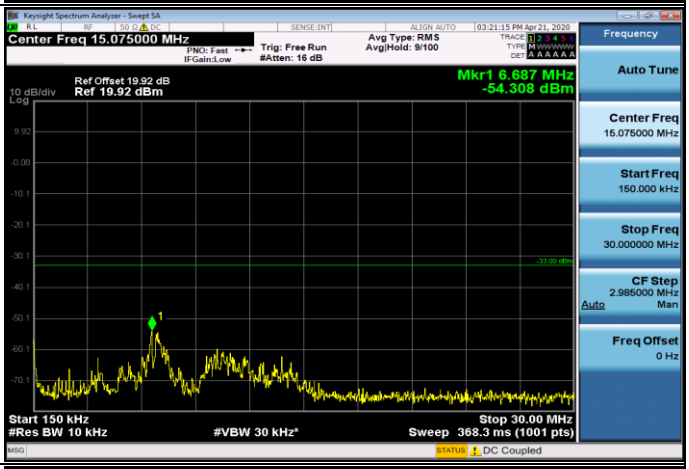
For Band 7:
(i) 40 + 10 log10 p from the channel edges to 5 MHz away
(ii) 43 + 10 log10 p between 5 MHz and X MHz from the channel edges, and
(iii) 55 + 10 log10 p at X MHz and beyond from the channel edges

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

APPENDIX A TEST PLOTS FOR CONDUCTED SPURIOUS EMISSION

TEST PLOTS FOR CONDUCTED SPURIOUS EMISSION

LTE BAND 4

1.4MHz_LCH_QPSK_1RB#0	20MHz_LCH_QPSK_1RB#0
	
	
	

1.4MHz_MCH_QPSK_1RB#0	20MHz_MCH_QPSK_1RB#0