FCC RF Test Report

APPLICANT	:	Spireon Inc
EQUIPMENT	:	GPS tracker
BRAND NAME	:	Flex2-M
MODEL NAME	:	Flex2-M
FCC ID	:	O9YFLF2M
STANDARD	:	47 CFR Part 2, 24(E), 27(L), 27(H), 27(F)
CLASSIFICATION	:	PCS Licensed Transmitter (PCB)

The product was received on May 08, 2020 and completely tested on Jun. 30, 2020. We, Sporton International (Kunshan) Inc., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.26-2015 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (Kunshan) Inc., the test report shall not be reproduced except in full.

Jason Jia

Reviewed by: Jason Jia / Supervisor

James Huang

Approved by: James Huang / Manager

ACCREDITED
Cert #5145.02

Sporton International (Kunshan) Inc.
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China

TABLE OF CONTENTS

REVISION HISTORY **3**

SUMMARY OF TEST RESULT **4**

1 GENERAL DESCRIPTION **5**

1.1 Applicant 5
1.2 Manufacturer 5
1.3 Product Feature of Equipment Under Test 5
1.4 Product Specification of Equipment Under Test 6
1.5 Modification of EUT 6
1.6 Maximum ERP/EIRP Power, Frequency Tolerance, and Emission Designator 7
1.7 Testing Location 9
1.8 Test Software 9
1.9 Applicable Standards 9

2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST **10**

2.1 Test Mode 10
2.2 Connection Diagram of Test System 11
2.3 Support Unit used in test configuration and system 12
2.4 Measurement Results Explanation Example 12
2.5 Frequency List of Low/Middle/High Channels 13

3 CONDUCTED TEST ITEMS **15**

3.1 Measuring Instruments 15
3.2 Test Setup 15
3.3 Test Result of Conducted Test 15
3.4 Conducted Output Power and ERP/EIRP 16
3.5 Peak-to-Average Ratio 17
3.6 Occupied Bandwidth 18
3.7 Conducted Band Edge 19
3.8 Conducted Spurious Emission 21
3.9 Frequency Stability 22

4 RADIATED TEST ITEMS **23**

4.1 Measuring Instruments 23
4.2 Test Setup 23
4.3 Test Result of Radiated Test 23
4.4 Radiated Spurious Emission 24

5 LIST OF MEASURING EQUIPMENT **25**

6 UNCERTAINTY OF EVALUATION **26**

APPENDIX A. TEST RESULTS OF CONDUCTED TEST

APPENDIX B. TEST RESULTS OF RADIATED TEST

APPENDIX C. TEST SETUP PHOTOGRAPHS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG050828	Rev. 01	Initial issue of report	Jul. 21, 2020

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.4	§2.1046	Conducted Output Power	Reporting Only	PASS	-
	§27.50(b)(10) §27.50(c)(10)	Effective Radiated Power (Band 12) (Band 13)	ERP < 3 Watt	PASS	-
	§24.232(c)	Equivalent Isotropic Radiated Power (Band 2) (Band 25)	EIRP < 2Watt	PASS	-
	§27.50(d)(4)	Equivalent Isotropic Radiated Power (Band 4)	EIRP < 1Watt	PASS	-
3.5	§24.232(d)	Peak-to-Average Ratio	<13 dB	PASS	-
3.6	§2.1049	Occupied Bandwidth	Reporting Only	PASS	-
3.7	§2.1051 §24.238(a) §27.53(c)(2)(4) §27.53(g) §27.53(h)	Conducted Band Edge Measurement (Band 2) (Band 4) (Band 12) (Band 13) (Band 25)	< 43+10log10(P[Watts])	PASS	-
3.8	§2.1051 §24.238(a) §27.53(c)(2) §27.53(g) §27.53(h)	Conducted Spurious Emission (Band 2) (Band 4) (Band 12) (Band 13) (Band 25)	< 43+10log10(P[Watts])	PASS	-
3.9	§2.1055 §24.235 §27.54	Frequency Stability Temperature & Voltage	Within Authorized Band	PASS	-
4.4	§2.1053 §24.238(a) §27.53(c)(2) §27.53(f) §27.53(g) §27.53(h)	Radiated Spurious Emission (Band 2) (Band 4) (Band 12) (Band 13) (Band 25)	< 43+10$\log_{10}$(P[Watts])	PASS	Under limit 12.79 dB at 1560.00 MHz

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

1 General Description

1.1 Applicant

Spireon Inc
9724 Kingston Pike, Suite 800 Knoxville, TN37922, United States

1.2 Manufacturer

Asiatelco Technologies Co.
#289 Bisheng Road, Building-8, 3F, Zhangjiang Hi-Tech Park, Pudong, Shanghai 201204, China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	GPS tracker
Brand Name	Flex2-M
Model Name	Flex2-M
FCC ID	O9YFLF2M
EUT supports Radios application	LTE Category M1
IMEI Code	Conducted/Radiation: 865284042582605
HW Version	2.0.0
SW Version	B1
EUT Stage	Identical Prototype

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx Frequency	LTE Band 2 : 1850.7 MHz ~ 1909.3 MHz LTE Band 4 : 1710.7 MHz ~ 1754.3 MHz LTE Band 12 : 699.7 MHz ~ 715.3 MHz LTE Band 13 : 779.5 MHz ~ 784.5 MHz LTE Band 25 : 1850.7MHz ~ 1914.3 MHz
Rx Frequency	LTE Band 2 : 1930.7 MHz ~ 1989.3 MHz LTE Band 4 : 2110.7 MHz ~ 2154.3 MHz LTE Band 12 : 729.7 MHz ~ 745.3 MHz LTE Band 13 : 748.5 MHz ~ 753.5 MHz LTE Band 25 : 1930.7MHz ~ 1994.3 MHz
Bandwidth	LTE Band 2 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz LTE Band 4 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz LTE Band 12 : 1.4MHz / 3MHz / 5MHz / 10MHz LTE Band 13 : 5MHz / 10MHz LTE Band 25 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz
Maximum Output Power to Antenna	LTE Band 2 : 24.20 dBm LTE Band 4 : 24.01 dBm LTE Band 12 : 23.36 dBm LTE Band 13 : 23.18 dBm LTE Band 25 : 24.28 dBm
Antenna Gain	LTE Band 2 : 1.77 dBi LTE Band 4 : 1.41 dBi LTE Band 12 : 1.06 dBi LTE Band 13 : 0.68 dBi LTE Band 25 : 1.77 dBi
Type of Modulation	QPSK / 16QAM

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Maximum ERP/EIRP Power, Frequency Tolerance, and Emission Designator

LTE Band 2		QPSK			16QAM		
BW (MHz)	Frequency Range (MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)
1.4	1850.7 ~ 1909.3	-	-	0.3715	-	-	0.3855
3	1851.5 ~ 1908.5	-	-	0.3540	-	-	0.3581
5	1852.5 ~ 1907.5	1M12G7D	0.0053	0.3589	1M14W7D	-	0.3436
10	1855.0 ~ 1905.0	-	-	0.3614	-	-	0.3491
15	1857.5 ~ 1902.5	-	-	0.3622	-	-	0.3508
20	1860.0 ~ 1900.0	-	-	0.4027	-	-	0.3540
LTE Band 25		**QPSK**			**16QAM**		
BW (MHz)	**Frequency Range (MHz)**	**Emission Designator (99%OBW)**	**Frequency Tolerance (ppm)**	**Maximum EIRP(W)**	**Emission Designator (99%OBW)**	**Frequency Tolerance (ppm)**	**Maximum EIRP(W)**
1.4	1850.7 ~ 1914.3	-	-	0.3715	-	-	0.3855
3	1851.5 ~ 1913.5	-	-	0.3540	-	-	0.3581
5	1852.5 ~ 1912.5	1M12G7D	0.0053	0.3589	1M14W7D	-	0.3436
10	1855.0 ~ 1910.0	-	-	0.3614	-	-	0.3491
15	1857.5 ~ 1907.5	-	-	0.3622	-	-	0.3508
20	1860.0 ~ 1905.0	-	-	0.4027	-	-	0.3540
LTE Band 4		**QPSK**			**16QAM**		
BW (MHz)	**Frequency Range (MHz)**	**Emission Designator (99%OBW)**	**Frequency Tolerance (ppm)**	**Maximum EIRP(W)**	**Emission Designator (99%OBW)**	**Frequency Tolerance (ppm)**	**Maximum EIRP(W)**
1.4	1710.7 ~ 1754.3	-	-	0.3311	-	-	0.3459
3	1711.5 ~ 1753.5	-	-	0.3162	-	-	0.3236
5	1712.5 ~ 1752.5	1M11G7D	0.0048	0.3436	1M11W7D	-	0.3412
10	1715.0 ~ 1750.0	-	-	0.3467	-	-	0.3436
15	1717.5 ~ 1747.5	-	-	0.3467	-	-	0.3357
20	1720.0 ~ 1745.0	-	-	0.3483	-	-	0.3381

LTE Band 12		QPSK			16QAM		
BW (MHz)	**Frequency Range (MHz)**	**Emission Designator (99%OBW)**	**Frequency Tolerance (ppm)**	**Maximum ERP(W)**	**Emission Designator (99%OBW)**	**Frequency Tolerance (ppm)**	**Maximum ERP(W)**
1.4	699.7 ~ 715.3	-	-	0.1538	-	-	0.1545
3	700.5 ~ 714.5	-	-	0.1432	-	-	0.1442
5	701.5 ~ 713.5	1M10G7D	0.0033	0.1259	1M14W7D	-	0.1265
10	704.0 ~ 711.0	-		0.1574	-	-	0.1687
LTE Band 13		**QPSK**			**16QAM**		
BW (MHz)	**Frequency Range (MHz)**	**Emission Designator (99%OBW)**	**Frequency Tolerance (ppm)**	**Maximum ERP(W)**	**Emission Designator (99%OBW)**	**Frequency Tolerance (ppm)**	**Maximum ERP(W)**
5	779.5 ~ 784.5	1M12G7D	0.0039	0.1462	1M12W7D	-	0.1442
10	782.0	-	-	0.1236	-	-	0.1483

Note:

1. LTE Band 25 overlaps the entire frequency range of LTE Band 2. Therefore, the test results provided in this report covers Band 25 as well as Band 2.
2. For LTE Category M1 that the Maximum UE channel bandwidth is restricted to 1.08MHz (Max 6 RB Size), only 5MHz bandwidth is tested for 99%OBW, and the test results could represent all the other bandwidth.

1.7 Testing Location

Sporton International (Kunshan) Inc. is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International (Kunshan) Inc.		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	03CH04-KS TH01-KS	CN1257	314309

1.8 Test Software

Item	Site	Manufacture	Name	Version
1.	03CH04-KS	AUDIX	E3	6.2009-8-24a

1.9 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 2, 24(E), 27(L), 27(H), 27(F)
- ANSI C63.26-2015
- FCC KDB 971168 D01 Power Meas License Digital Systems v03r01
- FCC KDB 412172 D01 Determining ERP and EIRP v01r01

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

2.1 Test Mode

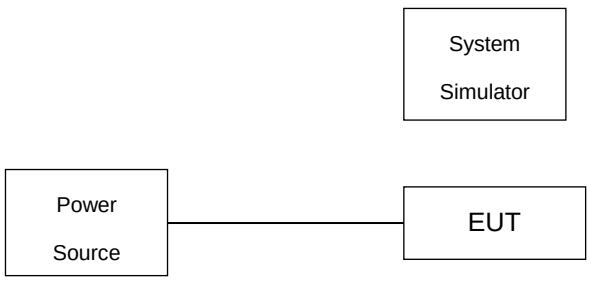
Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas License Digital Systems v03r01 with maximum output power.

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes to find the maximum emission.

Test Items	Band	Bandwidth (MHz)						Modulation		RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	1	Half	Full	L	M	H
Max. Output Power	2	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	4	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	12	v	v	v	v	-	-	v	v	v	v	v	v	v	v
	13	-	-	v	v	-	-	v	v	v	v	v	v	v	v
	25	v	v	v	v	v	v	v	v	v	v	v	v	v	v
Peak-to-Average Ratio	4			v				v	v	v		v	v	v	v
	12			v		-	-	v	v	v		v	v	v	v
	13	-	-	v		-	-	v	v	v		v	v	v	v
	25			v				v	v	v		v	v	v	v
26dB and 99% Bandwidth	4			v				v	v			v	v	v	v
	12			v		-	-	v	v			v	v	v	v
	13	-	-	v		-	-	v	v			v	v	v	v
	25			v				v	v			v	v	v	v
Conducted Band Edge	4			v				v	v	v		v	v		v
	12			v		-	-	v	v	v		v	v		v
	13	-	-	v		-	-	v	v	v		v	v		v
	25			v				v	v	v		v	v		v
Conducted Spurious Emission	4			v				v	v	v			v	v	v
	12			v		-	-	v	v	v			v	v	v
	13	-	-	v		-	-	v	v	v			v	v	v
	25			v				v	v	v			v	v	v
Frequency Stability	4			v				v				v		v	
	12			v		-	-	v				v		v	
	13	-	-	v		-	-	v				v		v	
	25			v				v				v		v	

Test Items	Band	Bandwidth (MHz)						Modulation		RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	1	Half	Full	L	M	H
E.R.P / E.I.R.P	4	v	v	v	v	v	v	v	v	v			v	v	v
	12	v	v	v	v	-	-	v	v	v			v	v	v
	13	-	-	v	v	-	-	v	v	v			v	v	v
	25	v	v	v	v	v	v	v	v	v			v	v	v
Radiated Spurious Emission	4	Worst Case											v	v	v
	12	Worst Case											v	v	v
	13	Worst Case											v	v	v
	25	Worst Case											v	v	v
Note	1. The mark "**v** " means that this configuration is chosen for testing 2. The mark "-" means that this bandwidth is not supported. 3. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported. 4. The LTE Cat M1 ony support maximum bandwidth of 1.08MHz, except output power test all the BW config, all the other test items only test 5M BW config for the representative. 5. LTE Band 25 overlaps the entire frequency range of LTE Band 2. Therefore, the test results provided in this report covers Band 25 as well as Band 2.													

2.2 Connection Diagram of Test System



This example is connection diagram of EUT test configurations.

. For detail, please refer to test mode configuration and setup photographs for each test item.

2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	LTE Base Station	Anritsu	MT8821C	N/A	N/A	Unshielded, 1.8 m
2.	DC Power Supply	GW INSTEK	GPS-3030D	N/A	N/A	Unshielded,1.2m

2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss.

Offset = RF cable loss.

Following shows an offset computation example with cable loss 5.9dB.

Example :

Offset(dB) = RF cable loss(dB).

= 5.9 (dB)

2.5 Frequency List of Low/Middle/High Channels

LTE Band 2 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
20	Channel	18700	18900	19100
	Frequency	1860	1880	1900
15	Channel	18675	18900	19125
	Frequency	1857.5	1880	1902.5
10	Channel	18650	18900	19150
	Frequency	1855	1880	1905
5	Channel	18625	18900	19175
	Frequency	1852.5	1880	1907.5
3	Channel	18615	18900	19185
	Frequency	1851.5	1880	1908.5
1.4	Channel	18607	18900	19193
	Frequency	1850.7	1880	1909.3

LTE Band 4 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
20	Channel	20050	20175	20300
	Frequency	1720	1732.5	1745
15	Channel	20025	20175	20325
	Frequency	1717.5	1732.5	1747.5
10	Channel	20000	20175	20350
	Frequency	1715	1732.5	1750
5	Channel	19975	20175	20375
	Frequency	1712.5	1732.5	1752.5
3	Channel	19965	20175	20385
	Frequency	1711.5	1732.5	1753.5
1.4	Channel	19957	20175	20393
	Frequency	1710.7	1732.5	1754.3

LTE Band 12 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
10	Channel	23060	23095	23130
	Frequency	704	707.5	711
5	Channel	23035	23095	23155
	Frequency	701.5	707.5	713.5
3	Channel	23025	23095	23165
	Frequency	700.5	707.5	714.5
1.4	Channel	23017	23095	23173
	Frequency	699.7	707.5	715.3

LTE Band 13 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
10	Channel	-	23230	-
	Frequency	-	782	-
5	Channel	23205	23230	23255
	Frequency	779.5	782	784.5

LTE Band 25 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
20	Channel	26140	26340	26590
	Frequency	1860	1880	1905
15	Channel	26115	26340	26615
	Frequency	1857.5	1880	1907.5
10	Channel	26090	26340	26640
	Frequency	1855	1880	1910
5	Channel	26065	26340	26665
	Frequency	1852.5	1880	1912.5
3	Channel	26055	26340	26675
	Frequency	1851.5	1880	1913.5
1.4	Channel	26047	26340	26683
	Frequency	1850.7	1880	1914.3

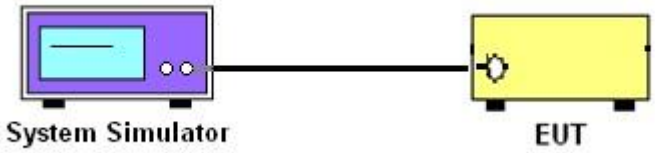
3 Conducted Test Items

3.1 Measuring Instruments

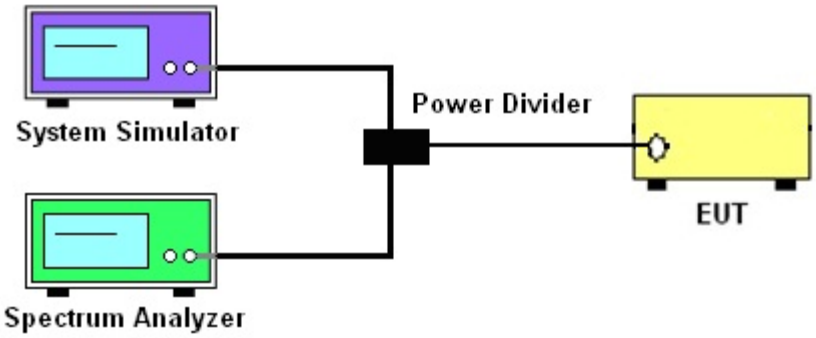
See list of measuring instruments of this test report.

3.2 Test Setup

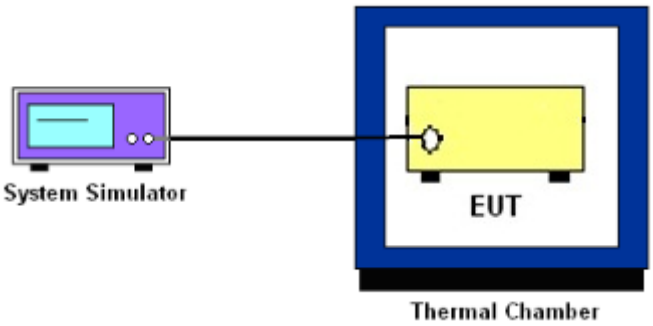
3.2.1 Conducted Output Power



3.2.2 Peak-to-Average Ratio, Occupied Bandwidth, Conducted Band-Edge and Conducted Spurious Emission



3.2.3 Frequency Stability



3.3 Test Result of Conducted Test

Please refer to Appendix A.

3.4 Conducted Output Power and ERP/EIRP

3.4.1 Description of the Conducted Output Power Measurement and ERP/EIRP Measurement

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 ERP of mobile transmitters must not exceed 3 Watts for LTE Band 12 and Band 13.

The EIRP of mobile transmitters must not exceed 2 Watts for LTE Band 2 and Band 25.

The EIRP of mobile transmitters must not exceed 1 Watts for LTE Band 4.

According to KDB 412172 D01 Power Approach,

EIRP = $P_T + G_T – L_C$, ERP = EIRP -2.15, where

P_T = transmitter output power in dBm

G_T = gain of the transmitting antenna in dBi

L_C = signal attenuation in the connecting cable between the transmitter and antenna in dB

3.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.2
2. The transmitter output port was connected to the system simulator.
3. Set EUT at maximum power through the system simulator.
4. Select lowest, middle, and highest channels for each band and different modulation.
5. Measure and record the power level from the system simulator.

3.5 Peak-to-Average Ratio

3.5.1 Description of the PAR Measurement

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.

3.5.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.2.3.4 (CCDF).
2. The EUT was connected to spectrum and system simulator via a power divider.
3. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
4. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
5. Record the deviation as Peak to Average Ratio.

3.6 Occupied Bandwidth

3.6.1 Description of Occupied Bandwidth Measurement

The occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

The 26 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 26 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.

3.6.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.4
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be between two and five times the anticipated OBW.
4. The nominal resolution bandwidth (RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
5. Set the detection mode to peak, and the trace mode to max hold.
6. Determine the reference value: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace.
   (this is the reference value)
7. Determine the “-26 dB down amplitude” as equal to (Reference Value – X).
8. Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the “–X dB down amplitude” determined in step 6. If a marker is below this “-X dB down amplitude” value it shall be placed as close as possible to this value. The OBW is the positive frequency difference between the two markers.
9. Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.

3.7 Conducted Band Edge

3.7.1 Description of Conducted Band Edge Measurement

24.238 (a)

For operations in the 1850-1910 and 1930-1990 MHz band, the FCC limit is 43 + $10\log_{10}$(P[Watts]) dB below the transmitter power P(Watts) in a 1MHz bandwidth. 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.

27.53 (c)

For operations in the 776-788 MHz band, the FCC limit is 43 + $10\log_{10}$(P[Watts]) dB below the transmitter power P(Watts) in a 100 kHz bandwidth. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed. In addition, the power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least 65 + 10 log10 p(watts), dB, for mobile and portable equipment.

27.53 (g)

For operations in the 600MHz band and 698 -746 MHz band, the FCC limit is 43 + 10log10(P[Watts]) dB below the transmitter power P(Watts) in a 100 kHz bandwidth. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

27.53 (h)

For operations in the 1710 – 1755 MHz band, the FCC limit is 43 + $10\log_{10}$(P[Watts]) dB below the transmitter power P(Watts) in a 1 MHz bandwidth. However, in the 1MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

3.7.2 Test Procedures

1. The testing follows ANSI C63.26 section 5.7
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The band edges of low and high channels for the highest RF powers were measured.
4. Set RBW >= 1% EBW in the 1MHz band immediately outside and adjacent to the band edge.
5. Beyond the 1 MHz band from the band edge, RBW=1MHz was used.
6. Set spectrum analyzer with RMS detector.
7. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
8. Checked that all the results comply with the emission limit line.

   Example:

   The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)

   = P(W)- [43 + 10log(P)] (dB)

   = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB) = -13dBm.

3.8 Conducted Spurious Emission

3.8.1 Description of Conducted Spurious Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.

It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10th harmonic.

3.8.2 Test Procedures

1. The testing follows ANSI C63.26 section 5.7
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
4. The middle channel for the highest RF power within the transmitting frequency was measured.
5. The conducted spurious emission for the whole frequency range was taken.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz.
7. Set spectrum analyzer with RMS detector.
8. Taking the record of maximum spurious emission.
9. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
10. The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)
    = P(W)- [43 + 10log(P)] (dB)
    = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
    = -13dBm.

3.9 Frequency Stability

3.9.1 Description of Frequency Stability Measurement

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency.

3.9.2 Test Procedures for Temperature Variation

1. The testing follows ANSI C63.26 section 5.6.4
2. The EUT was set up in the thermal chamber and connected with the system simulator.
3. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
4. With power OFF, the temperature was raised in 10°C step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

3.9.3 Test Procedures for Voltage Variation

1. The testing follows ANSI C63.26 section 5.6.5
2. The EUT was placed in a temperature chamber at 20±5°C and connected with the system simulator.
3. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value for other than hand carried battery equipment.
4. For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.
5. The variation in frequency was measured for the worst case.

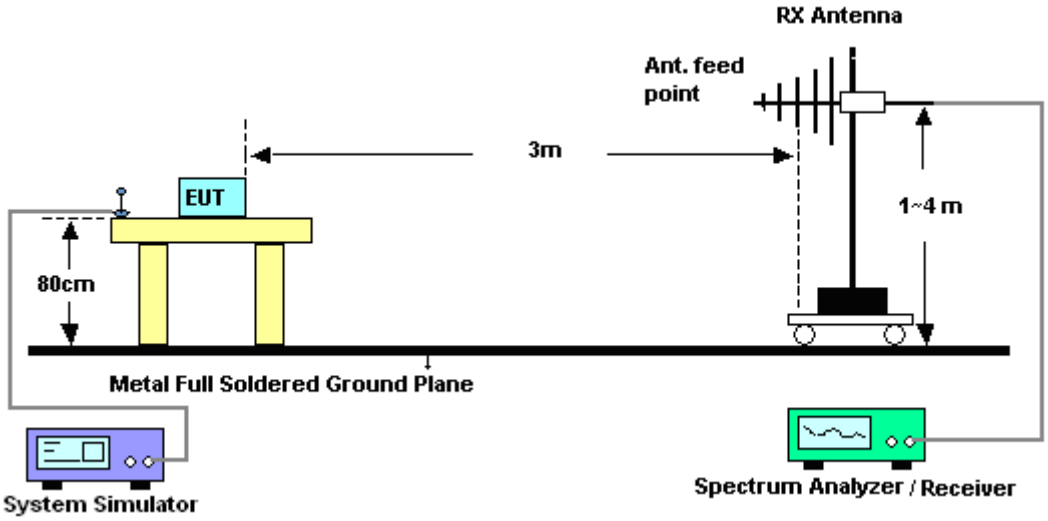
4 Radiated Test Items

4.1 Measuring Instruments

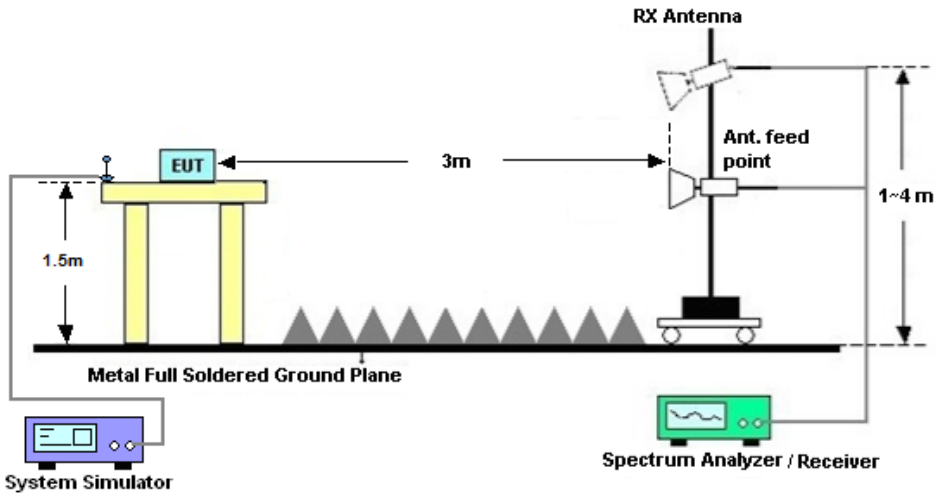
See list of measuring instruments of this test report.

4.2 Test Setup

4.2.1 For radiated test from 30MHz to 1GHz



4.2.2 For radiated test above 1GHz



4.3 Test Result of Radiated Test

Please refer to Appendix B.

4.4 Radiated Spurious Emission

4.4.1 Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI C63.26. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.

For LTE Band 13

For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

4.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.5
2. The EUT was placed on a turntable with 0.8 meter height for frequency below 1GHz and 1.5 meter height for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between 1m to 4m to search the maximum spurious emission for both horizontal and vertical polarizations.
6. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power.
7. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
8. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
9. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
10. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
11. ERP (dBm) = EIRP - 2.15
12. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
    The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)
    = P(W)- [43 + 10log(P)] (dB)
    = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
    = -13dBm.

5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Nov. 02, 2019	Jun. 28, 2020~ Jun. 29, 2020	Nov. 01, 2020	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	-40~+150°C	Oct. 28, 2019	Jun. 28, 2020~ Jun. 29, 2020	Oct. 27, 2020	Conducted (TH01-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz-44G,MAX 30dB	Apr. 15, 2020	Jun. 03, 2020	Apr. 14, 2021	Radiation (03CH04-KS)
Bilog Antenna	TeseQ	CBL6111D	49921	30MHz-1GHz	May 30, 2020	Jun. 03, 2020	May 29, 2021	Radiation (03CH04-KS)
Horn Antenna	Schwarzbeck	BBHA9120D	1356	1GHz~18GHz	Apr. 20, 2020	Jun. 03, 2020	Apr. 19, 2021	Radiation (03CH04-KS)
SHF-EHF Horn	Com-power	AH-840	101115	18GHz~40GHz	Nov. 10, 2019	Jun. 03, 2020	Nov. 09, 2020	Radiation (03CH04-KS)
Amplifier	SONOMA	310N	187289	9KHz-1GHz	Aug. 06, 2019	Jun. 03, 2020	Aug. 05, 2020	Radiation (03CH04-KS)
Amplifier	MITEQ	EM18G40G GA	060728	18~40GHz	Jan. 08, 2020	Jun. 03, 2020	Jan. 07, 2021	Radiation (03CH04-KS)
high gain Amplifier	MITEQ	AMF-7D-00 101800-30-1 0P	2025788	1Ghz-18Ghz	Aug. 16, 2019	Jun. 03, 2020	Aug. 15, 2020	Radiation (03CH04-KS)
Amplifier	Keysight	83017A	MY57280106	500MHz~26.5GHz	Oct. 15, 2019	Jun. 03, 2020	Oct. 14, 2020	Radiation (03CH04-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Jun. 03, 2020	NCR	Radiation (03CH04-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Jun. 03, 2020	NCR	Radiation (03CH04-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Jun. 03, 2020	NCR	Radiation (03CH04-KS)

NCR: No Calibration Required

6 Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.26-2015. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.3dB**

Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.8dB**

Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power)

LTE Band 2 Maximum Average Power [dBm]									
BW [MHz]	Mod	RB Size	RB Offset	Index			Lowest	Middle	Highest
				L	M	H			
20	QPSK	1	0	0	8	15	23.65	24.20	23.68
20		1	5	0	8	15	22.83	23.06	22.97
20		3	0	0	8	15	22.55	23.12	22.94
20		3	3	0	8	15	22.56	23.06	22.95
20		6	0	0	8	15	22.57	23.05	22.95
20	16-QAM	1	0	0	8	15	22.63	22.86	22.94
20		1	5	0	8	15	22.62	22.76	22.94
20		3	0	0	8	15	22.63	23.06	22.93
20		3	3	0	8	15	22.63	23.79	22.95
20		6	0	0	8	15	22.65	22.85	22.92
15	QPSK	1	0	0	6	11	22.51	23.09	23.15
15		1	5	0	6	11	22.49	23.06	23.25
15		3	0	0	6	11	22.52	23.06	23.21
15		3	3	0	6	11	22.51	23.13	23.18
15		6	0	0	6	11	22.51	23.01	23.11
15	16-QAM	1	0	0	6	11	22.41	22.93	22.82
15		1	5	0	6	11	22.52	22.86	22.76
15		3	0	0	6	11	22.43	23.03	22.93
15		3	3	0	6	11	22.41	23.02	22.96
15		6	0	0	6	11	22.49	22.93	22.97
10	QPSK	1	0	0	4	7	22.44	23.09	23.12
10		1	5	0	4	7	22.46	23.08	23.13
10		3	0	0	4	7	22.45	23.09	23.11
10		3	3	0	4	7	22.44	23.03	23.12
10		6	0	0	4	7	22.41	23.01	23.05
10	16-QAM	1	0	0	4	7	22.43	22.87	22.83
10		1	5	0	4	7	22.44	22.86	22.76
10		3	0	0	4	7	22.45	22.94	22.92

10		3	3	0	4	7	22.45	22.92	22.83
10		6	0	0	4	7	22.44	22.91	22.76
5		1	0	0	2	3	22.26	22.59	23.12
5		1	5	0	2	3	22.23	22.58	23.13
5	QPSK	3	0	0	2	3	22.25	22.59	23.15
5		3	3	0	2	3	22.22	22.58	23.12
5		6	0	0	2	3	22.22	22.44	22.98
5		1	0	0	2	3	22.23	22.36	22.78
5		1	5	0	2	3	22.22	22.38	22.71
5	16-QAM	3	0	0	2	3	22.21	22.37	22.98
5		3	3	0	2	3	22.23	22.41	22.92
5		6	0	0	2	3	22.21	22.41	22.93
3		1	0	0	0	1	23.63	23.06	23.12
3		1	5	0	0	1	23.66	23.03	22.09
3	QPSK	3	0	0	0	1	23.82	22.21	22.41
3		3	3	0	0	1	23.91	23.13	22.41
3		6	0	0	0	1	23.53	23.33	22.58
3		1	0	0	0	1	23.99	23.61	22.76
3		1	5	0	0	1	23.93	23.65	22.89
3	16-QAM	3	0	0	0	1	23.75	23.52	22.83
3		3	3	0	0	1	23.51	23.61	22.78
3		6	0	0	0	1	23.36	23.47	22.82
1.4		1	0	0	0	0	23.63	23.33	22.15
1.4		1	5	0	0	0	23.58	23.36	22.06
1.4	QPSK	3	0	0	0	0	24.03	23.66	22.38
1.4		3	3	0	0	0	23.92	23.61	22.29
1.4		6	0	0	0	0	24.03	23.63	22.35
1.4		1	0	0	0	0	24.16	23.52	22.33
1.4		1	5	0	0	0	24.19	23.59	22.51
1.4	16-QAM	3	0	0	0	0	24.17	23.52	22.47
1.4		3	3	0	0	0	24.18	23.52	22.52
1.4		6	0	0	0	0	24.09	23.67	22.46

LTE Band 25 Maximum Average Power [dBm]									
BW [MHz]	Mod	RB Size	RB Offset	Index			Lowest	Middle	Highest
				L	M	H			
20	QPSK	1	0	0	8	15	24.12	24.28	24.18
20		1	5	0	8	15	23.65	23.84	23.66
20		3	0	0	8	15	23.59	23.86	23.62
20		3	3	0	8	15	23.68	23.77	23.61
20		6	0	0	8	15	23.63	23.78	23.55
20	16-QAM	1	0	0	8	15	23.59	23.43	23.33
20		1	5	0	8	15	23.68	23.57	23.31
20		3	0	0	8	15	23.65	23.72	23.32
20		3	3	0	8	15	23.58	23.71	23.31
20		6	0	0	8	15	23.65	23.57	23.38
15	QPSK	1	0	0	6	11	23.55	23.82	23.65
15		1	5	0	6	11	23.56	23.82	23.64
15		3	0	0	6	11	23.57	23.81	23.66
15		3	3	0	6	11	23.56	23.82	23.58
15		6	0	0	6	11	23.51	23.71	23.51
15	16-QAM	1	0	0	6	11	23.51	23.36	23.36
15		1	5	0	6	11	23.52	23.41	23.37
15		3	0	0	6	11	23.51	23.68	23.51
15		3	3	0	6	11	23.56	23.58	23.44
15		6	0	0	6	11	23.58	23.53	23.38
10	QPSK	1	0	0	4	7	23.51	23.73	23.61
10		1	5	0	4	7	23.50	23.81	23.59
10		3	0	0	4	7	23.52	23.70	23.58
10		3	3	0	4	7	23.51	23.71	23.56
10		6	0	0	4	7	23.53	23.68	23.55
10	16-QAM	1	0	0	4	7	23.41	23.39	23.33
10		1	5	0	4	7	23.44	23.53	23.33
10		3	0	0	4	7	23.51	23.66	23.32
10		3	3	0	4	7	23.52	23.58	23.33
10		6	0	0	4	7	23.44	23.55	23.32
5	QPSK	1	0	0	2	3	23.52	23.71	23.25
5		1	5	0	2	3	23.51	23.78	23.36

5		3	0	0	2	3	23.52	23.72	23.41
5		3	3	0	2	3	23.51	23.72	23.36
5		6	0	0	2	3	23.55	23.77	23.33
5		1	0	0	2	3	23.52	23.51	22.96
5		1	5	0	2	3	23.44	23.52	22.95
5	**16-QAM**	3	0	0	2	3	23.52	23.52	22.19
5		3	3	0	2	3	23.46	23.59	22.13
5		6	0	0	2	3	23.53	23.58	22.11
3		1	0	0	0	1	23.35	22.52	21.68
3		1	5	0	0	1	23.44	22.58	21.54
3	**QPSK**	3	0	0	0	1	23.53	22.89	22.02
3		3	3	0	0	1	23.33	22.84	21.93
3		6	0	0	0	1	23.72	23.03	21.94
3		1	0	0	0	1	23.75	23.16	22.23
3		1	5	0	0	1	23.77	23.16	22.22
3	**16-QAM**	3	0	0	0	1	23.73	23.08	22.31
3		3	3	0	0	1	23.67	23.15	22.25
3		6	0	0	0	1	23.73	22.98	22.28
1.4		1	0	0	0	0	23.93	22.85	21.93
1.4		1	5	0	0	0	23.60	22.76	21.88
1.4	**QPSK**	3	0	0	0	0	23.88	23.17	22.19
1.4		3	3	0	0	0	23.87	23.12	22.21
1.4		6	0	0	0	0	23.91	23.23	22.38
1.4		1	0	0	0	0	23.96	23.42	22.52
1.4		1	5	0	0	0	24.03	23.26	22.46
1.4	**16-QAM**	3	0	0	0	0	24.09	23.29	22.53
1.4		3	3	0	0	0	24.06	23.33	22.63
1.4		6	0	0	0	0	24.02	23.26	22.58

LTE Band 4 Maximum Average Power [dBm]									
BW [MHz]	Mod	RB Size	RB Offset	Index			Lowest	Middle	Highest
				L	M	H			
20	QPSK	1	0	0	8	15	23.78	23.81	23.89
20		1	5	0	8	15	23.76	23.85	23.82
20		3	0	0	8	15	23.68	23.71	24.00
20		3	3	0	8	15	23.70	23.66	24.01
20		6	0	0	8	15	23.67	23.69	23.92
20	16-QAM	1	0	0	8	15	23.63	23.38	23.52
20		1	5	0	8	15	23.58	23.26	23.44
20		3	0	0	8	15	23.62	23.51	23.77
20		3	3	0	8	15	23.65	23.55	23.80
20		6	0	0	8	15	23.62	23.48	23.88
15	QPSK	1	0	0	6	11	23.62	23.98	23.87
15		1	5	0	6	11	23.58	23.97	23.85
15		3	0	0	6	11	23.62	23.89	23.99
15		3	3	0	6	11	23.62	23.88	23.96
15		6	0	0	6	11	23.59	23.92	23.92
15	16-QAM	1	0	0	6	11	23.52	23.48	23.40
15		1	5	0	6	11	23.49	23.53	23.51
15		3	0	0	6	11	23.51	23.69	23.79
15		3	3	0	6	11	23.48	23.66	23.81
15		6	0	0	6	11	23.54	23.62	23.85
10	QPSK	1	0	0	4	7	23.56	23.79	23.89
10		1	5	0	4	7	23.57	23.81	23.85
10		3	0	0	4	7	23.55	23.71	23.95
10		3	3	0	4	7	23.57	23.65	23.99
10		6	0	0	4	7	23.58	23.72	23.96
10	16-QAM	1	0	0	4	7	23.47	23.39	23.53
10		1	5	0	4	7	23.49	23.42	23.46
10		3	0	0	4	7	23.51	23.58	23.88
10		3	3	0	4	7	23.55	23.60	23.91
10		6	0	0	4	7	23.52	23.49	23.95
5	QPSK	1	0	0	2	3	23.57	23.82	23.84
5		1	5	0	2	3	23.54	23.70	23.87

5		3	0	0	2	3	23.58	23.83	23.95
5		3	3	0	2	3	23.55	23.69	23.93
5		6	0	0	2	3	23.48	23.72	23.92
5		1	0	0	2	3	23.53	23.38	23.40
5		1	5	0	2	3	23.46	23.43	23.38
5	**16-QAM**	3	0	0	2	3	23.44	23.53	23.86
5		3	3	0	2	3	23.49	23.62	23.92
5		6	0	0	2	3	23.52	23.61	23.85
3		1	0	0	0	1	23.56	23.22	23.36
3		1	5	0	0	1	23.59	23.26	23.21
3	**QPSK**	3	0	0	0	1	23.19	23.52	23.11
3		3	3	0	0	1	23.33	23.49	23.14
3		6	0	0	0	1	23.31	23.09	23.21
3		1	0	0	0	1	23.26	23.30	23.59
3		1	5	0	0	1	23.38	23.69	23.35
3	**16-QAM**	3	0	0	0	1	23.55	23.37	23.69
3		3	3	0	0	1	23.53	23.42	23.66
3		6	0	0	0	1	23.51	23.14	23.44
1.4		1	0	0	0	0	23.58	23.27	23.32
1.4		1	5	0	0	0	23.67	23.47	23.37
1.4	**QPSK**	3	0	0	0	0	23.79	23.42	23.56
1.4		3	3	0	0	0	23.75	23.31	23.61
1.4		6	0	0	0	0	23.66	23.59	23.39
1.4		1	0	0	0	0	23.77	23.32	23.65
1.4		1	5	0	0	0	23.85	23.78	23.57
1.4	**16-QAM**	3	0	0	0	0	23.95	23.62	23.69
1.4		3	3	0	0	0	23.98	23.65	23.55
1.4		6	0	0	0	0	23.62	23.47	23.56

LTE Band 12 Maximum Average Power [dBm]									
BW [MHz]	Mod	RB Size	RB Offset	Index			Lowest	Middle	Highest
				L	M	H			
10	QPSK	1	0	0	4	7	22.77	22.36	21.99
10		1	5	0	4	7	22.63	22.23	21.92
10		3	0	0	4	7	22.98	22.53	22.26
10		3	3	0	4	7	23.03	22.51	22.23
10		6	0	0	4	7	23.06	22.58	22.29
10	16-QAM	1	0	0	4	7	23.36	22.67	22.44
10		1	5	0	4	7	23.23	22.72	22.45
10		3	0	0	4	7	23.27	22.73	22.51
10		3	3	0	4	7	23.25	22.76	22.44
10		6	0	0	4	7	23.15	22.62	22.38
5	QPSK	1	0	0	2	3	21.85	22.06	22.09
5		1	5	0	2	3	21.85	22.04	22.06
5		3	0	0	2	3	21.89	21.95	22.08
5		3	3	0	2	3	21.88	21.96	22.01
5		6	0	0	2	3	21.85	21.86	21.91
5	16-QAM	1	0	0	2	3	21.83	21.78	21.56
5		1	5	0	2	3	21.76	21.63	21.68
5		3	0	0	2	3	21.83	21.95	22.11
5		3	3	0	2	3	21.85	21.95	22.10
5		6	0	0	2	3	21.82	21.88	21.93
3	QPSK	1	0	0	0	1	22.25	22.22	22.13
3		1	5	0	0	1	22.29	22.28	22.09
3		3	0	0	0	1	22.36	22.51	22.28
3		3	3	0	0	1	22.56	22.45	22.36
3		6	0	0	0	1	22.65	22.54	22.37
3	16-QAM	1	0	0	0	1	22.24	22.67	22.68
3		1	5	0	0	1	22.29	22.66	22.62
3		3	0	0	0	1	22.52	22.63	22.58
3		3	3	0	0	1	22.54	22.58	22.54
3		6	0	0	0	1	22.65	22.57	22.52
1.4	QPSK	1	0	0	0	0	22.55	22.19	21.88
1.4		1	5	0	0	0	22.34	22.18	21.86

1.4		3	0	0	0	0	22.78	22.47	22.17
1.4		3	3	0	0	0	22.95	22.45	22.16
1.4		6	0	0	0	0	22.96	22.51	22.17
1.4		1	0	0	0	0	22.98	22.64	22.41
1.4		1	5	0	0	0	22.97	22.71	22.37
1.4	**16-QAM**	3	0	0	0	0	22.94	22.63	22.35
1.4		3	3	0	0	0	22.97	22.59	22.34
1.4		6	0	0	0	0	22.91	22.48	22.17

LTE Band 13 Maximum Average Power [dBm]									
BW [MHz]	Mod	RB Size	RB Offset	Index			Lowest	Middle	Highest
				L	M	H			
10	QPSK	1	0	0	4	7	-	22.36	-
10		1	5	0	4	7		22.38	
10		3	0	0	4	7		22.39	
10		3	3	0	4	7		22.37	
10		6	0	0	4	7		22.31	
10	16-QAM	1	0	0	4	7		23.18	
10		1	5	0	4	7		22.21	
10		3	0	0	4	7		22.56	
10		3	3	0	4	7		23.15	
10		6	0	0	4	7		23.17	
5	QPSK	1	0	0	2	3	22.66	22.36	23.04
5		1	5	0	2	3	22.67	22.39	23.12
5		3	0	0	2	3	22.65	22.38	23.03
5		3	3	0	2	3	22.63	22.34	23.04
5		6	0	0	2	3	22.71	22.29	22.93
5	16-QAM	1	0	0	2	3	22.68	22.21	22.68
5		1	5	0	2	3	22.59	22.03	22.76
5		3	0	0	2	3	22.58	23.06	22.95
5		3	3	0	2	3	22.67	23.05	23.03
5		6	0	0	2	3	22.66	23.02	22.89

ERP/EIRP

LTE Band 4 (GT - LC = 1.41 dB) QPSK									
Bandwidth	1.4M			3M			5M		
Channel	19957	20175	20393	19965	20175	20385	19975	20175	20375
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency (MHz)	1710.7	1732.5	1754.3	1711.5	1732.5	1753.5	1712.5	1732.5	1752.5
Conducted Power (dBm)	23.79	23.42	23.56	23.59	23.26	23.21	23.58	23.83	23.95
Conducted Power (Watts)	0.2393	0.2198	0.2270	0.2286	0.2118	0.2094	0.2280	0.2415	0.2483
EIRP(dBm)	25.20	24.83	24.97	25.00	24.67	24.62	24.99	25.24	25.36
EIRP(Watts)	0.3311	0.3041	0.3141	0.3162	0.2931	0.2897	0.3155	0.3342	0.3436

LTE Band 4 (GT - LC = 1.41 dB) QPSK									
Bandwidth	10M			15M			20M		
Channel	20000	20175	20350	20025	20175	20325	20050	20175	20300
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency (MHz)	1715	1732.5	1750	1717.5	1732.5	1747.5	1720	1732.5	1745
Conducted Power (dBm)	23.57	23.65	23.99	23.62	23.89	23.99	23.70	23.66	24.01
Conducted Power (Watts)	0.2275	0.2317	0.2506	0.2301	0.2449	0.2506	0.2344	0.2323	0.2518
EIRP(dBm)	24.98	25.06	25.40	25.03	25.30	25.40	25.11	25.07	25.42
EIRP(Watts)	0.3148	0.3206	0.3467	0.3184	0.3388	0.3467	0.3243	0.3214	0.3483

LTE Band 4 (GT - LC = 1.41 dB) 16QAM									
Bandwidth	1.4M			3M			5M		
Channel	19957	20175	20393	19965	20175	20385	19975	20175	20375
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency (MHz)	1710.7	1732.5	1754.3	1711.5	1732.5	1753.5	1712.5	1732.5	1752.5
Conducted Power (dBm)	23.98	23.65	23.55	23.38	23.69	23.35	23.49	23.62	23.92
Conducted Power (Watts)	0.2500	0.2317	0.2265	0.2178	0.2339	0.2163	0.2234	0.2301	0.2466
EIRP(dBm)	25.39	25.06	24.96	24.79	25.10	24.76	24.90	25.03	25.33
EIRP(Watts)	0.3459	0.3206	0.3133	0.3013	0.3236	0.2992	0.3090	0.3184	0.3412

LTE Band 4 (GT - LC = 1.41 dB) 16QAM									
Bandwidth	10M			15M			20M		
Channel	20000	20175	20350	20025	20175	20325	20050	20175	20300
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency (MHz)	1715	1732.5	1750	1717.5	1732.5	1747.5	1720	1732.5	1745
Conducted Power (dBm)	23.52	23.49	23.95	23.54	23.62	23.85	23.62	23.48	23.88
Conducted Power (Watts)	0.2249	0.2234	0.2483	0.2259	0.2301	0.2427	0.2301	0.2228	0.2443
EIRP(dBm)	24.93	24.90	25.36	24.95	25.03	25.26	25.03	24.89	25.29
EIRP(Watts)	0.3112	0.3090	0.3436	0.3126	0.3184	0.3357	0.3184	0.3083	0.3381

LTE Band 12 (GT - LC = 1.06 dB) QPSK									
Bandwidth	1.4M			3M			5M		
Channel	23017	23095	23173	23025	23095	23165	23035	23095	23155
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency (MHz)	699.7	707.5	715.3	700.5	707.5	714.5	701.5	707.5	713.5
Conducted Power (dBm)	22.96	22.51	22.17	22.65	22.54	22.37	21.85	22.06	22.09
Conducted Power (Watts)	0.1977	0.1782	0.1648	0.1841	0.1795	0.1726	0.1531	0.1607	0.1618
ERP(dBm)	21.87	21.42	21.08	21.56	21.45	21.28	20.76	20.97	21.00
ERP(Watts)	0.1538	0.1387	0.1282	0.1432	0.1396	0.1343	0.1191	0.1250	0.1259

LTE Band 12 (GT - LC = 1.06 dB) QPSK			
Bandwidth	10M		
Channel	23060	23095	23130
	(Low)	(Mid)	(High)
Frequency (MHz)	704	707.5	711
Conducted Power (dBm)	23.06	22.58	22.29
Conducted Power (Watts)	0.2023	0.1811	0.1694
ERP(dBm)	21.97	21.49	21.20
ERP(Watts)	0.1574	0.1409	0.1318

LTE Band 12 (GT - LC = 1.06 dB) 16QAM									
Bandwidth	1.4M			3M			5M		
Channel	23017	23095	23173	23025	23095	23165	23035	23095	23155
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency (MHz)	699.7	707.5	715.3	700.5	707.5	714.5	701.5	707.5	713.5
Conducted Power (dBm)	22.98	22.64	22.41	22.24	22.67	22.68	21.83	21.95	22.11
Conducted Power (Watts)	0.1986	0.1837	0.1742	0.1675	0.1849	0.1854	0.1524	0.1567	0.1626
ERP(dBm)	21.89	21.55	21.32	21.15	21.58	21.59	20.74	20.86	21.02
ERP(Watts)	0.1545	0.1429	0.1355	0.1303	0.1439	0.1442	0.1186	0.1219	0.1265

LTE Band 12 (GT - LC = 1.06 dB) 16QAM			
Bandwidth	10M		
Channel	23060	23095	23130
	(Low)	(Mid)	(High)
Frequency (MHz)	704	707.5	711
Conducted Power (dBm)	23.36	22.67	22.44
Conducted Power (Watts)	0.2168	0.1849	0.1754
ERP(dBm)	22.27	21.58	21.35
ERP(Watts)	0.1687	0.1439	0.1365

LTE Band 13 (GT - LC = 0.68 dB) QPSK						
Bandwidth	5M			10M		
Channel	23205	23230	23255	23230		
	(Low)	(Mid)	(High)	-	(Mid)	-
Frequency (MHz)	779.5	782	784.5	-	782	-
Conducted Power (dBm)	22.67	22.39	23.12		22.39	-
Conducted Power (Watts)	0.1849	0.1734	0.2051		0.1734	-
ERP(dBm)	21.20	20.92	21.65		20.92	-
ERP(Watts)	0.1318	0.1236	0.1462		0.1236	-

LTE Band 13 (GT - LC = 0.68 dB) 16QAM						
Bandwidth	5M			10M		
Channel	23205	23230	23255	23230		
	(Low)	(Mid)	(High)	-	(Mid)	-
Frequency (MHz)	779.5	782	784.5	-	782	-
Conducted Power (dBm)	22.58	23.06	22.95		23.18	-
Conducted Power (Watts)	0.1811	0.2023	0.1972		0.2080	-
ERP(dBm)	21.11	21.59	21.48		21.71	-
ERP(Watts)	0.1291	0.1442	0.1406		0.1483	-

LTE Band 25 (GT - LC = 1.77 dB) QPSK									
Bandwidth	1.4M			3M			5M		
Channel	26407	26340	26683	26055	26340	26675	26065	26340	26665
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency (MHz)	1850.7	1880	1914.3	1851.5	1880	1913.5	1852.5	1880	1912.5
Conducted Power (dBm)	23.93	22.85	21.93	23.72	23.03	21.94	23.51	23.78	23.36
Conducted Power (Watts)	0.2472	0.1928	0.1560	0.2355	0.2009	0.1563	0.2244	0.2388	0.2168
EIRP(dBm)	25.70	24.62	23.70	25.49	24.80	23.71	25.28	25.55	25.13
EIRP(Watts)	0.3715	0.2897	0.2344	0.3540	0.3020	0.2350	0.3373	0.3589	0.3258

LTE Band 25 (GT - LC = 1.77 dB) QPSK									
Bandwidth	10M			15M			20M		
Channel	26090	26340	26640	26115	26340	26615	26140	26340	26590
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency (MHz)	1855	1880	1910	1857.5	1880	1907.5	1860	1880	1905
Conducted Power (dBm)	23.50	23.81	23.59	23.55	23.82	23.65	24.12	24.28	24.18
Conducted Power (Watts)	0.2239	0.2404	0.2286	0.2265	0.2410	0.2317	0.2582	0.2679	0.2618
EIRP(dBm)	25.27	25.58	25.36	25.32	25.59	25.42	25.89	26.05	25.95
EIRP(Watts)	0.3365	0.3614	0.3436	0.3404	0.3622	0.3483	0.3882	0.4027	0.3936

LTE Band 25 (GT - LC = 1.77 dB) 16QAM									
Bandwidth	1.4M			3M			5M		
Channel	26407	26340	26683	26055	26340	26675	26065	26340	26665
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency (MHz)	1850.7	1880	1914.3	1851.5	1880	1913.5	1852.5	1880	1912.5
Conducted Power (dBm)	24.09	23.29	22.53	23.77	23.16	22.22	23.46	23.59	22.13
Conducted Power (Watts)	0.2564	0.2133	0.1791	0.2382	0.2070	0.1667	0.2218	0.2286	0.1633
EIRP(dBm)	25.86	25.06	24.30	25.54	24.93	23.99	25.23	25.36	23.90
EIRP(Watts)	0.3855	0.3206	0.2692	0.3581	0.3112	0.2506	0.3334	0.3436	0.2455

LTE Band 25 (GT - LC = 1.77 dB) 16QAM									
Bandwidth	10M			15M			20M		
Channel	26090	26340	26640	26115	26340	26615	26140	26340	26590
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency (MHz)	1855	1880	1910	1857.5	1880	1907.5	1860	1880	1905
Conducted Power (dBm)	23.51	23.66	23.32	23.51	23.68	23.51	23.65	23.72	23.32
Conducted Power (Watts)	0.2244	0.2323	0.2148	0.2244	0.2333	0.2244	0.2317	0.2355	0.2148
EIRP(dBm)	25.28	25.43	25.09	25.28	25.45	25.28	25.42	25.49	25.09
EIRP(Watts)	0.3373	0.3491	0.3228	0.3373	0.3508	0.3373	0.3483	0.3540	0.3228

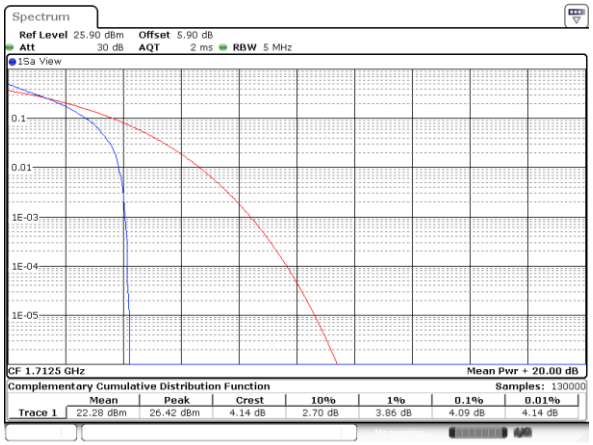
LTE Band 4

Peak-to-Average Ratio

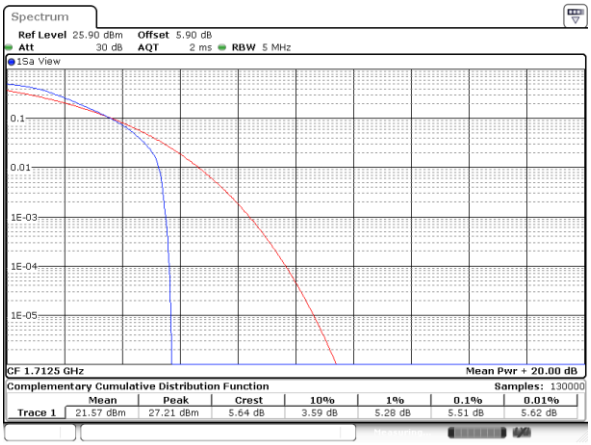
Mode	LTE Band 4 / 5MHz				
Mod.	QPSK		16QAM		Limit: 13dB
RB Size	1RB	Full RB	1RB	Full RB	Result
Lowest CH	4.09	5.51	5.13	4.35	PASS
Middle CH	4.17	4.41	4.67	4.81	
Highest CH	5.39	4.43	4.78	4.09	

LTE Band 4 / 5MHz / QPSK

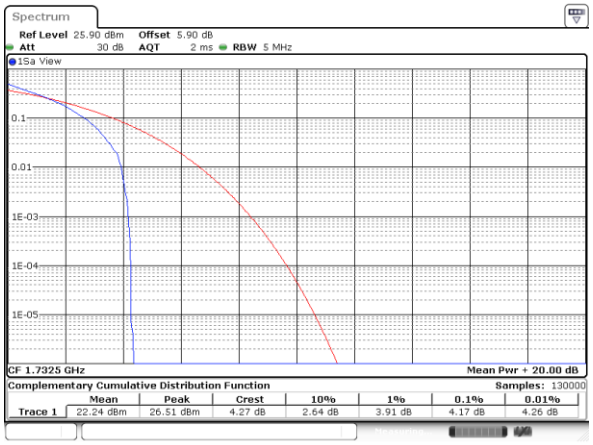
Lowest Channel / 1RB



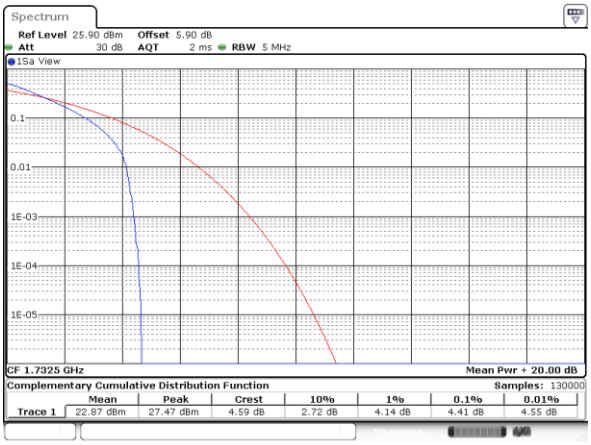
Lowest Channel / Full RB



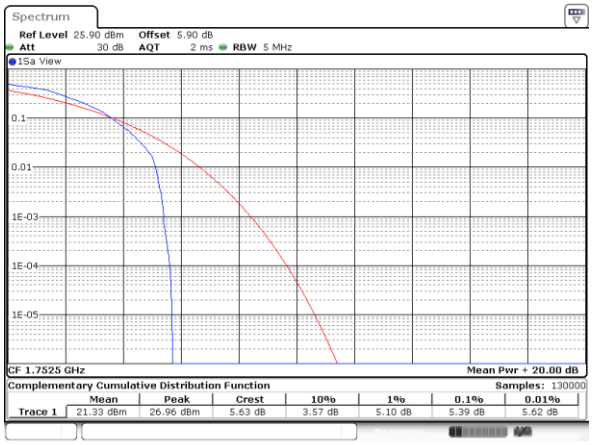
Middle Channel / 1RB



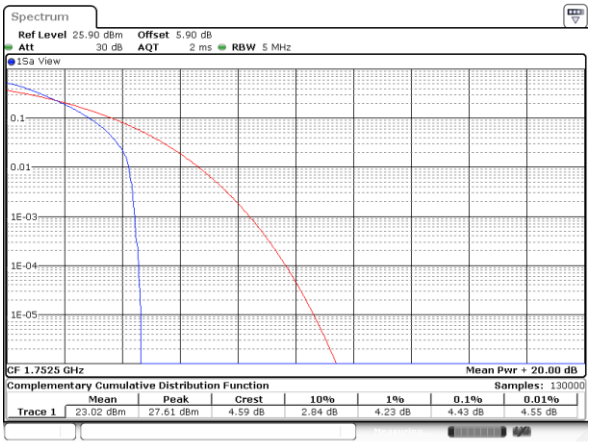
Middle Channel / Full RB



Highest Channel / 1RB

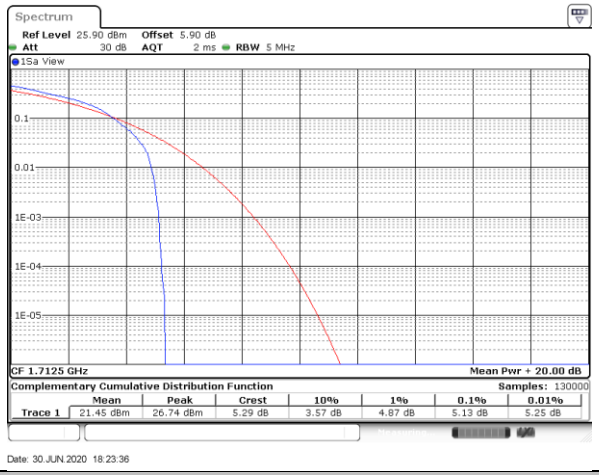


Highest Channel / Full RB

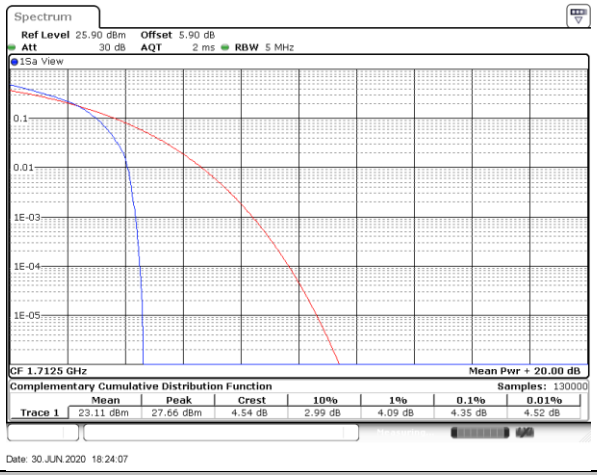


LTE Band 4 / 5MHz / 16QAM

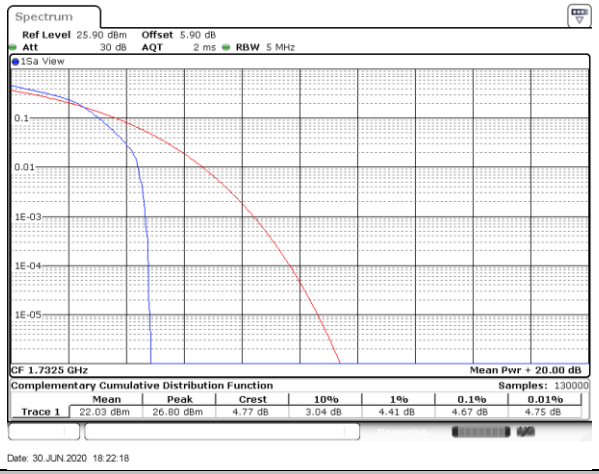
Lowest Channel / 1RB



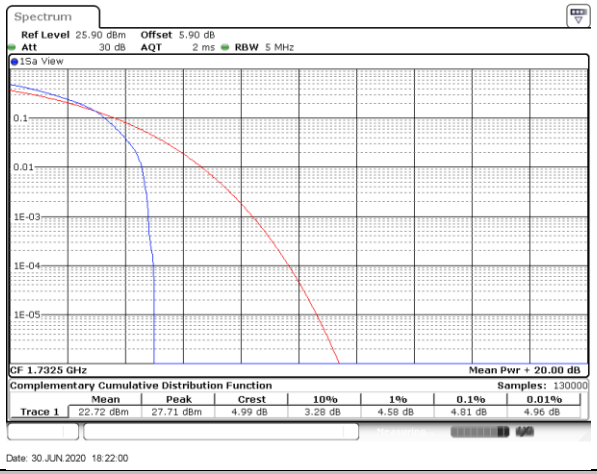
Lowest Channel / Full RB



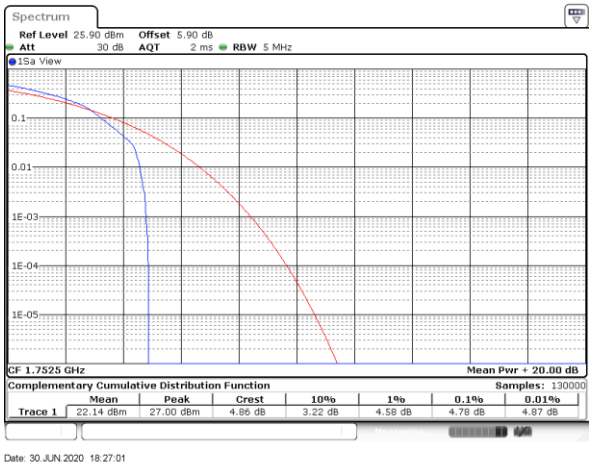
Middle Channel / 1RB



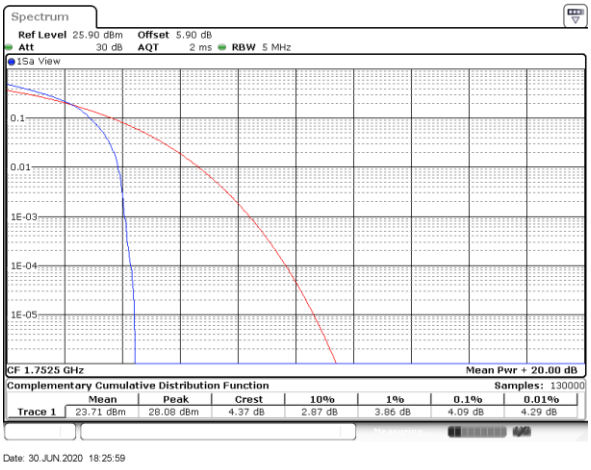
Middle Channel / Full RB



Highest Channel / 1RB



Highest Channel / Full RB

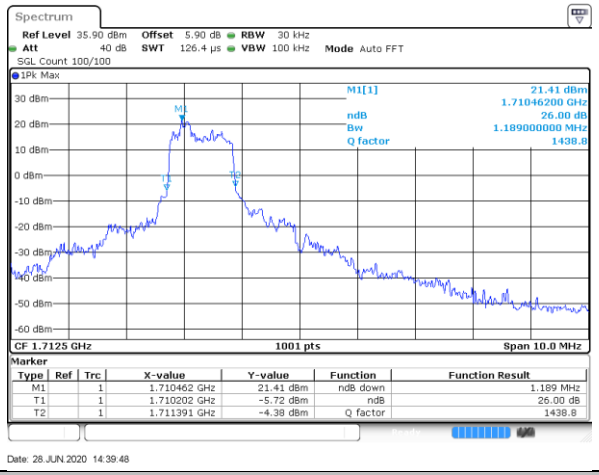


26dB Bandwidth

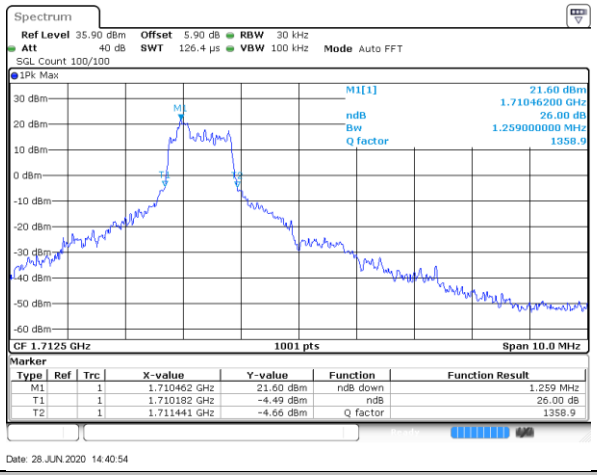
Mode	LTE Band 4 : 26dB BW(MHz)											
BW	1.4MHz		3MHz		5MHz		10MHz		15MHz		20MHz	
Mod.	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Lowest CH	-	-	-	-	1.19	1.26	-	-	-	-	-	-
Middle CH	-	-	-	-	1.25	1.26	-	-	-	-	-	-
Highest CH	-	-	-	-	1.40	1.29	-	-	-	-	-	-

LTE Band 4

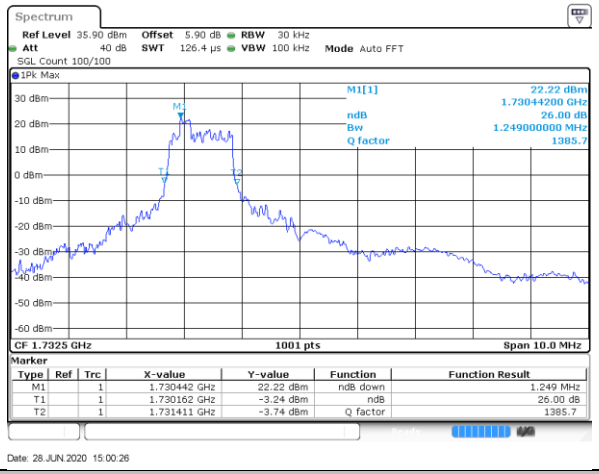
Lowest Channel / 5MHz / QPSK



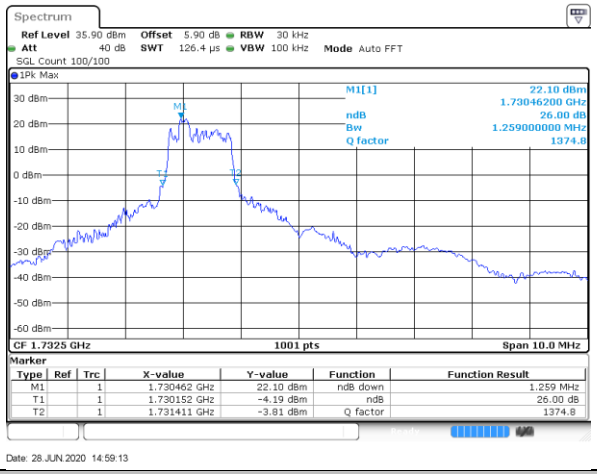
Lowest Channel / 5MHz / 16QAM



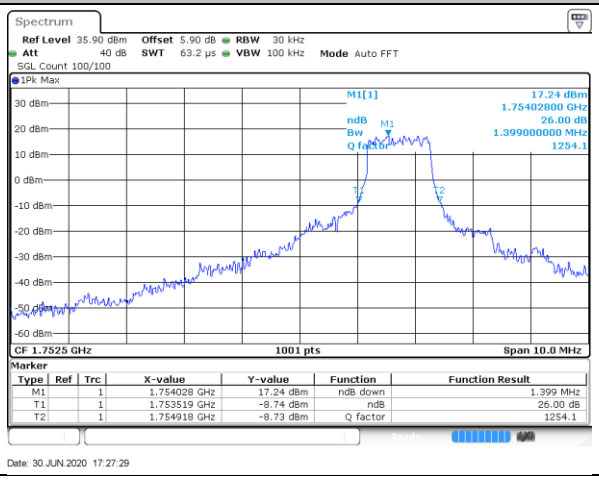
Middle Channel / 5MHz / QPSK



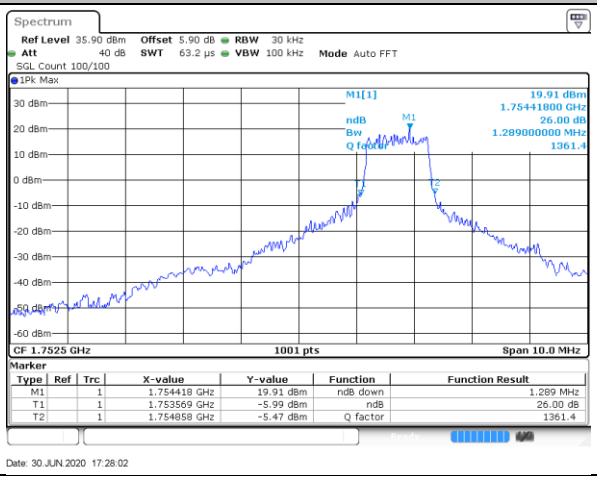
Middle Channel / 5MHz / 16QAM



Highest Channel / 5MHz / QPSK



Highest Channel / 5MHz / 16QAM

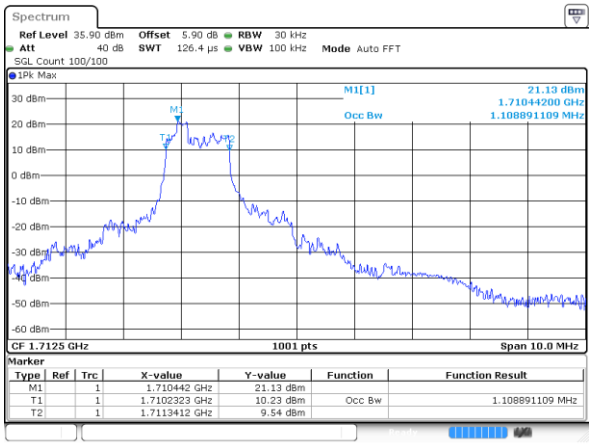


Occupied Bandwidth

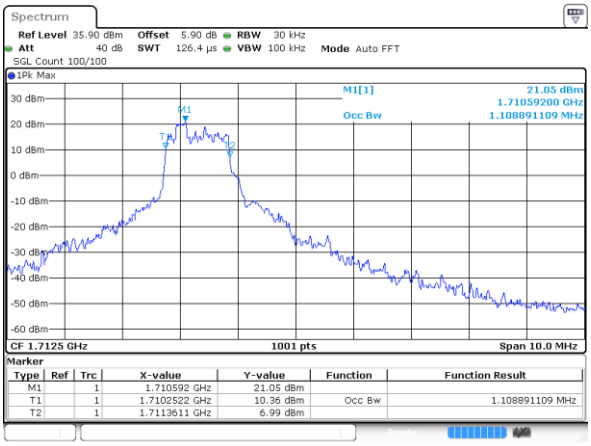
Mode	LTE Band 4 : 99%OBW(MHz)											
BW	1.4MHz		3MHz		5MHz		10MHz		15MHz		20MHz	
Mod.	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Lowest CH	-	-	-	-	1.11	1.11	-	-	-	-	-	-
Middle CH	-	-	-	-	1.11	1.11	-	-	-	-	-	-
Highest CH	-	-	-	-	1.10	1.10	-	-	-	-	-	-

LTE Band 4

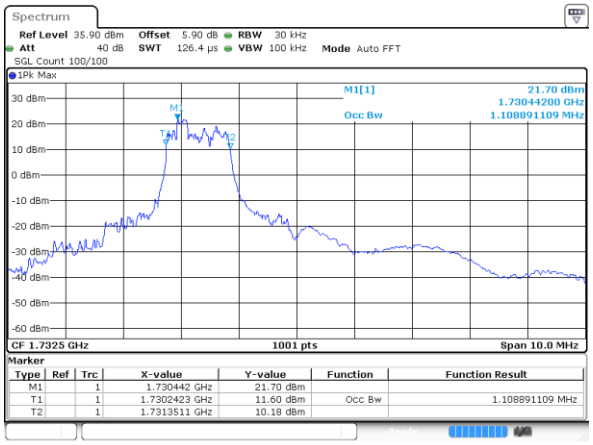
Lowest Channel / 5MHz / QPSK



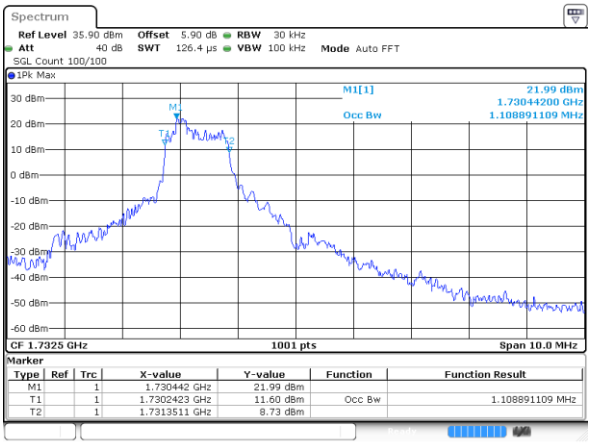
Lowest Channel / 5MHz / 16QAM



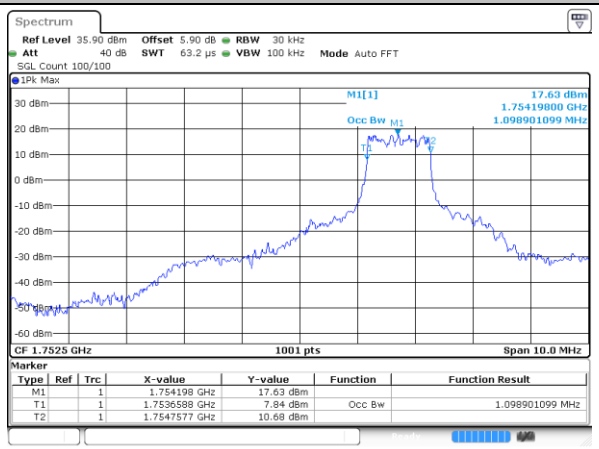
Middle Channel / 5MHz / QPSK



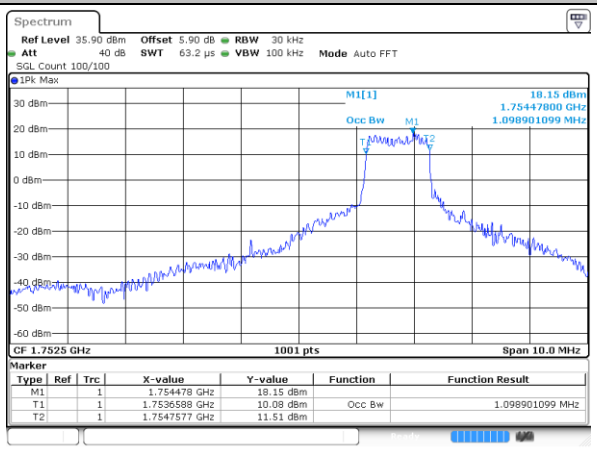
Middle Channel / 5MHz / 16QAM



Highest Channel / 5MHz / QPSK



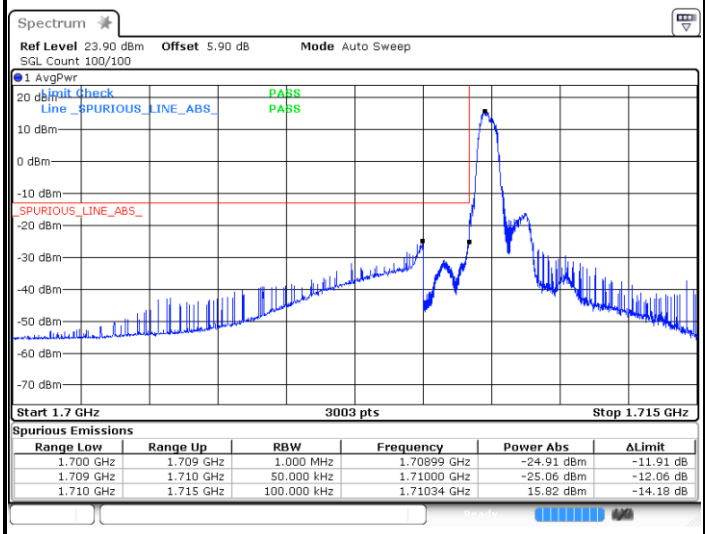
Highest Channel / 5MHz / 16QAM



Conducted Band Edge

LTE Band 4 / 5MHz / QPSK

Lowest Band Edge / 1 RB

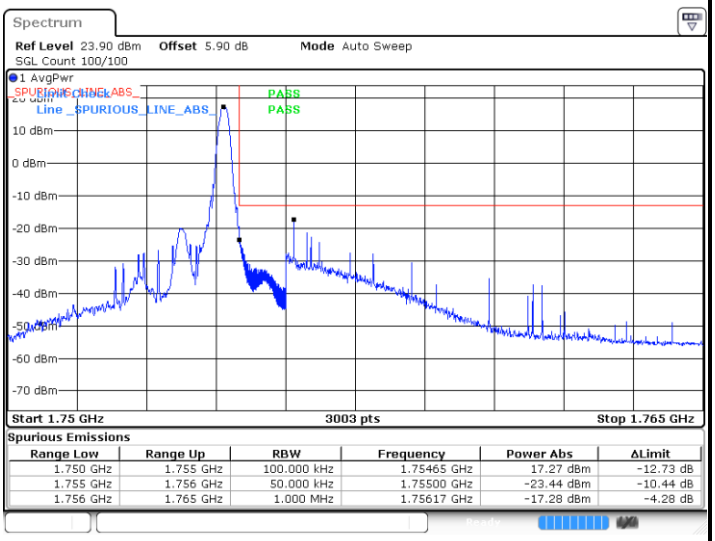


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.700 GHz	1.709 GHz	1.000 MHz	1.70899 GHz	-24.91 dBm	-11.91 dB
1.709 GHz	1.710 GHz	50.000 kHz	1.71000 GHz	-25.06 dBm	-12.06 dB
1.710 GHz	1.715 GHz	100.000 kHz	1.71034 GHz	15.82 dBm	-14.18 dB

Date: 28.JUN.2020 17:39:47

Highest Band Edge / 1 RB

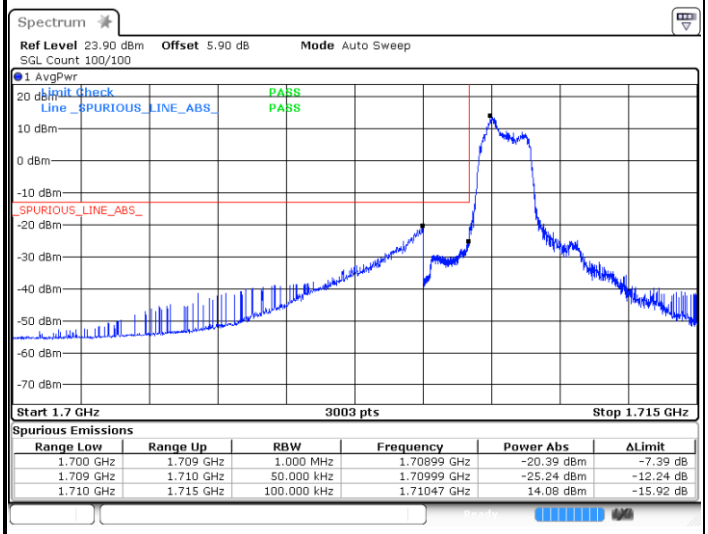


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.750 GHz	1.755 GHz	100.000 kHz	1.75465 GHz	17.27 dBm	-12.73 dB
1.755 GHz	1.756 GHz	50.000 kHz	1.75500 GHz	-23.44 dBm	-10.44 dB
1.756 GHz	1.765 GHz	1.000 MHz	1.75617 GHz	-17.28 dBm	-4.28 dB

Date: 30.JUN.2020 17:25:43

Lowest Band Edge / Full RB

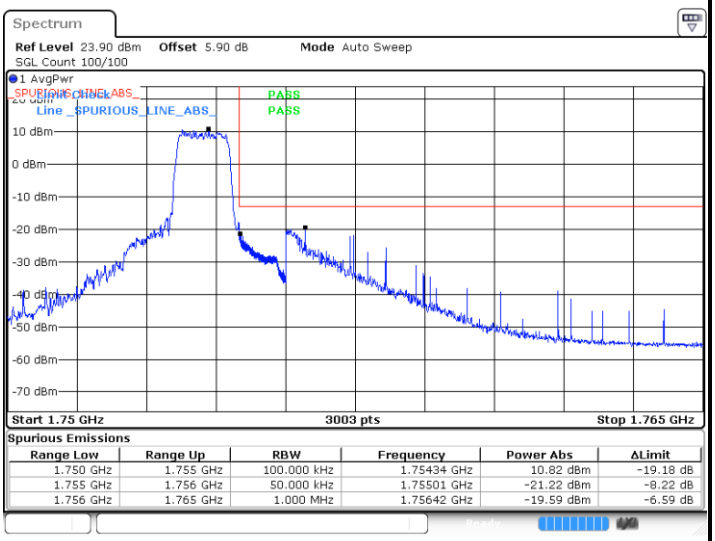


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.700 GHz	1.709 GHz	1.000 MHz	1.70899 GHz	-20.39 dBm	-7.39 dB
1.709 GHz	1.710 GHz	50.000 kHz	1.70999 GHz	-25.24 dBm	-12.24 dB
1.710 GHz	1.715 GHz	100.000 kHz	1.71047 GHz	14.08 dBm	-15.92 dB

Date: 28.JUN.2020 17:39:02

Highest Band Edge / Full RB



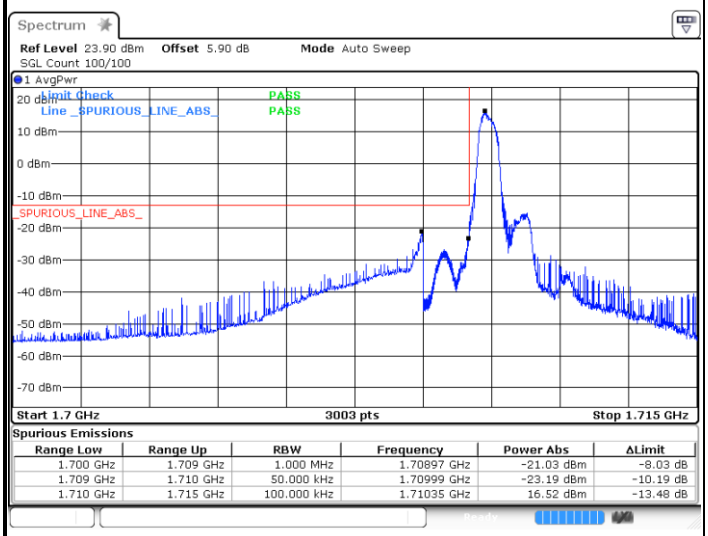
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.750 GHz	1.755 GHz	100.000 kHz	1.75434 GHz	10.82 dBm	-19.18 dB
1.755 GHz	1.756 GHz	50.000 kHz	1.75501 GHz	-21.22 dBm	-8.22 dB
1.756 GHz	1.765 GHz	1.000 MHz	1.75642 GHz	-19.59 dBm	-6.59 dB

Date: 30.JUN.2020 17:26:51

LTE Band 4 / 5MHz / 16QAM

Lowest Band Edge / 1RB

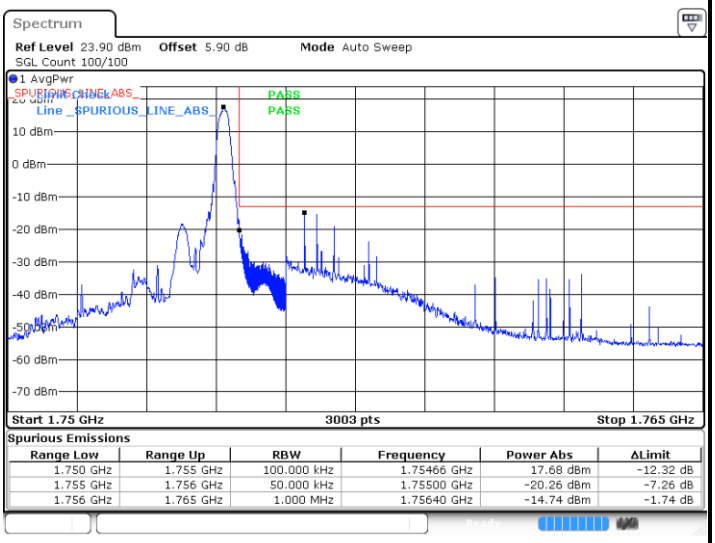


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.700 GHz	1.709 GHz	1.000 MHz	1.70897 GHz	-21.03 dBm	-8.03 dB
1.709 GHz	1.710 GHz	50.000 kHz	1.70999 GHz	-23.19 dBm	-10.19 dB
1.710 GHz	1.715 GHz	100.000 kHz	1.71035 GHz	16.52 dBm	-13.48 dB

Date: 28.JUN.2020 17:40:40

Highest Band Edge / 1 RB

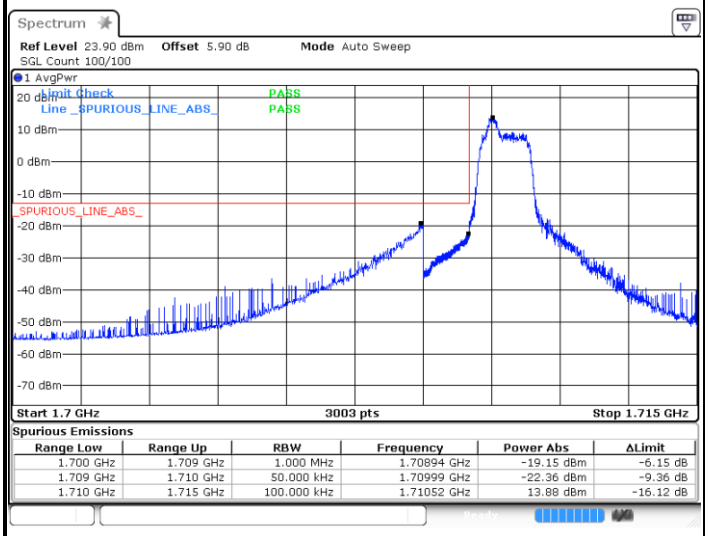


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.750 GHz	1.755 GHz	100.000 kHz	1.75466 GHz	17.68 dBm	-12.32 dB
1.755 GHz	1.756 GHz	50.000 kHz	1.75500 GHz	-20.26 dBm	-7.26 dB
1.756 GHz	1.765 GHz	1.000 MHz	1.75640 GHz	-14.74 dBm	-1.74 dB

Date: 30.JUN.2020 17:26:07

Lowest Band Edge / Full RB

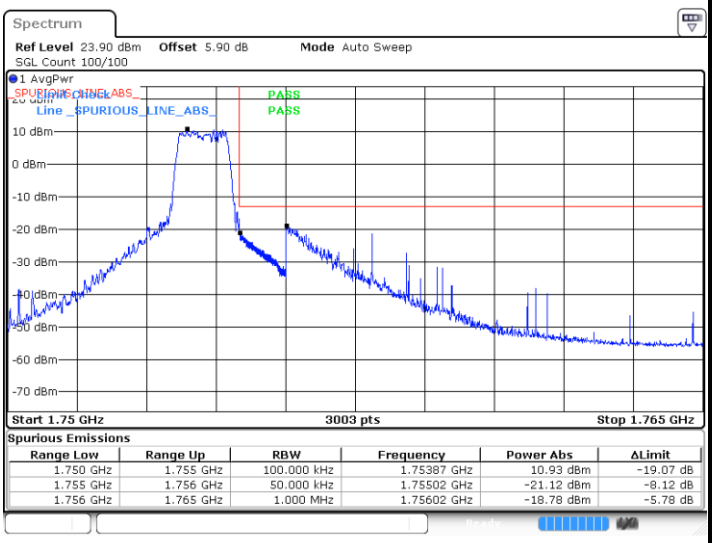


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.700 GHz	1.709 GHz	1.000 MHz	1.70894 GHz	-19.15 dBm	-6.15 dB
1.709 GHz	1.710 GHz	50.000 kHz	1.70999 GHz	-22.36 dBm	-9.36 dB
1.710 GHz	1.715 GHz	100.000 kHz	1.71052 GHz	13.88 dBm	-16.12 dB

Date: 28.JUN.2020 17:38:02

Highest Band Edge / Full RB



Spurious Emissions

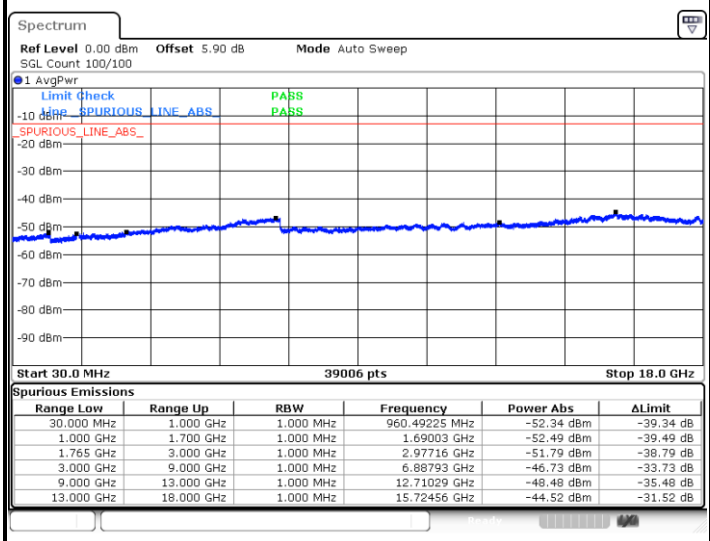
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.750 GHz	1.755 GHz	100.000 kHz	1.75387 GHz	10.93 dBm	-19.07 dB
1.755 GHz	1.756 GHz	50.000 kHz	1.75502 GHz	-21.12 dBm	-8.12 dB
1.756 GHz	1.765 GHz	1.000 MHz	1.75602 GHz	-18.78 dBm	-5.78 dB

Date: 30.JUN.2020 17:26:32

Conducted Spurious Emission

LTE Band 4 / 5MHz

Lowest Channel / QPSK

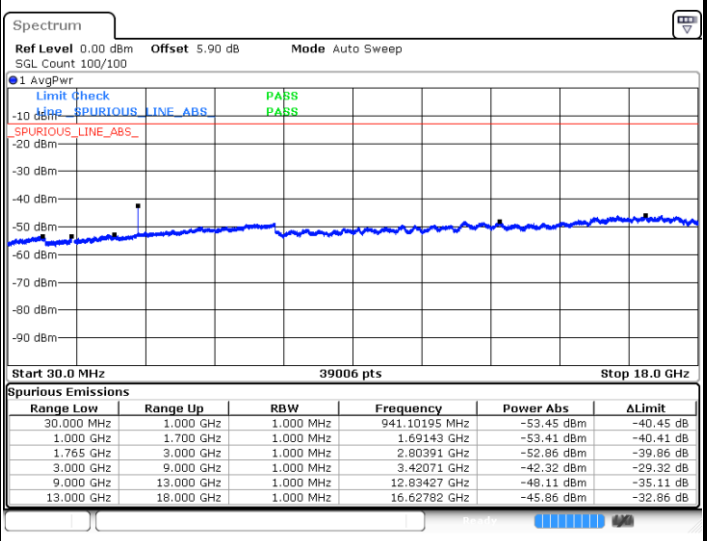


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	960.49225 MHz	-52.34 dBm	-39.34 dB
1.000 GHz	1.700 GHz	1.000 MHz	1.69003 GHz	-52.49 dBm	-39.49 dB
1.765 GHz	3.000 GHz	1.000 MHz	2.97716 GHz	-51.79 dBm	-38.79 dB
3.000 GHz	9.000 GHz	1.000 MHz	6.88793 GHz	-46.73 dBm	-33.73 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.71029 GHz	-48.48 dBm	-35.48 dB
13.000 GHz	18.000 GHz	1.000 MHz	15.72456 GHz	-44.52 dBm	-31.52 dB

Date: 28.JUN.2020 15:24:59

Lowest Channel / 16QAM

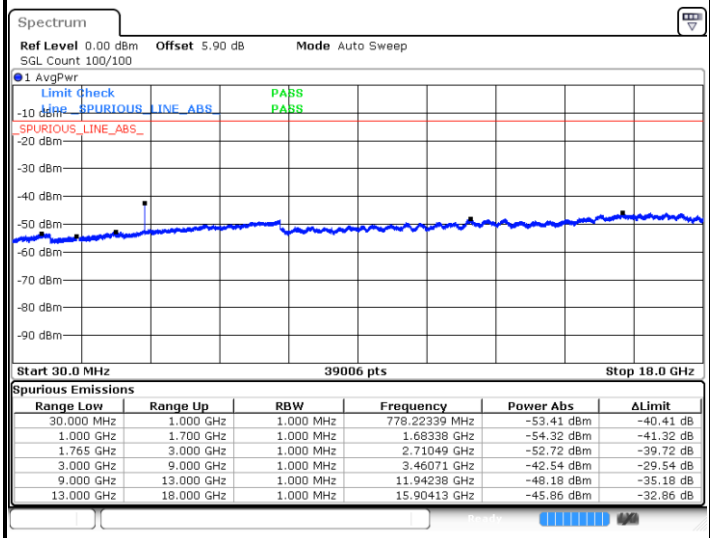


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	941.10195 MHz	-53.45 dBm	-40.45 dB
1.000 GHz	1.700 GHz	1.000 MHz	1.69143 GHz	-53.41 dBm	-40.41 dB
1.765 GHz	3.000 GHz	1.000 MHz	2.80391 GHz	-52.86 dBm	-39.86 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.42071 GHz	-42.32 dBm	-29.32 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.83427 GHz	-48.11 dBm	-35.11 dB
13.000 GHz	18.000 GHz	1.000 MHz	16.62782 GHz	-45.86 dBm	-32.86 dB

Date: 28.JUN.2020 16:51:18

Middle Channel / QPSK

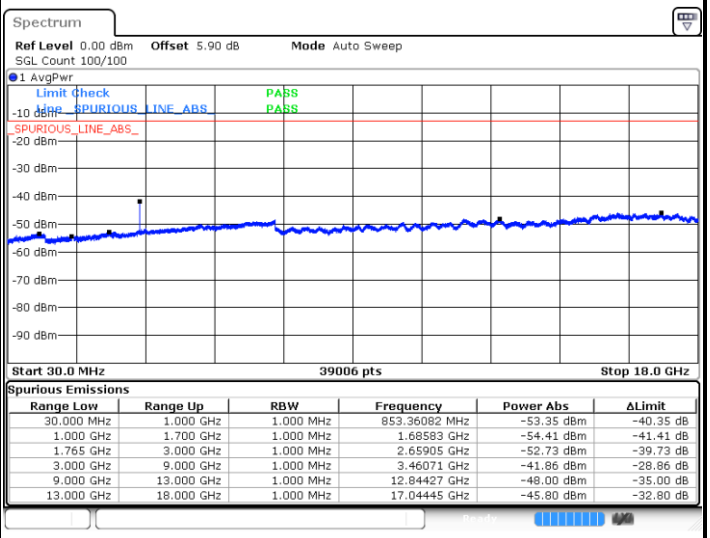


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	778.22339 MHz	-53.41 dBm	-40.41 dB
1.000 GHz	1.700 GHz	1.000 MHz	1.68338 GHz	-54.32 dBm	-41.32 dB
1.765 GHz	3.000 GHz	1.000 MHz	2.71049 GHz	-52.72 dBm	-39.72 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.46071 GHz	-42.54 dBm	-29.54 dB
9.000 GHz	13.000 GHz	1.000 MHz	11.94238 GHz	-48.18 dBm	-35.18 dB
13.000 GHz	18.000 GHz	1.000 MHz	15.90413 GHz	-45.86 dBm	-32.86 dB

Date: 28.JUN.2020 16:54:26

Middle Channel / 16QAM



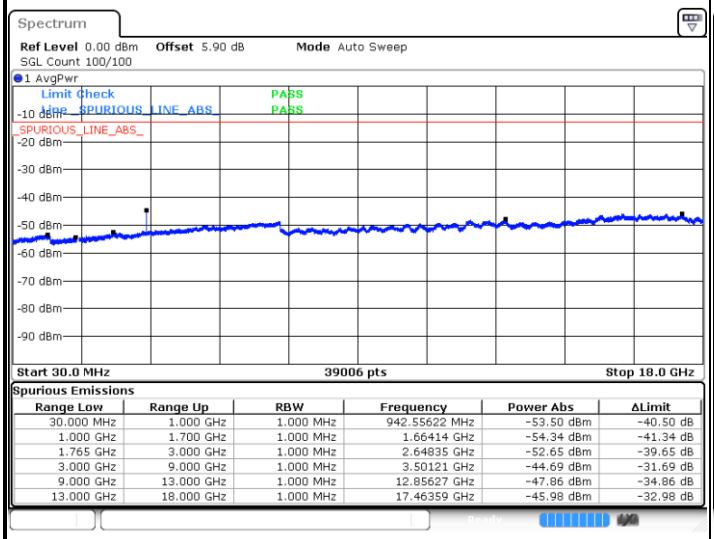
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	853.36082 MHz	-53.35 dBm	-40.35 dB
1.000 GHz	1.700 GHz	1.000 MHz	1.68583 GHz	-54.41 dBm	-41.41 dB
1.765 GHz	3.000 GHz	1.000 MHz	2.65905 GHz	-52.73 dBm	-39.73 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.46071 GHz	-41.86 dBm	-28.86 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.84427 GHz	-48.00 dBm	-35.00 dB
13.000 GHz	18.000 GHz	1.000 MHz	17.04445 GHz	-45.80 dBm	-32.80 dB

Date: 28.JUN.2020 16:53:39

LTE Band 4 / 5MHz

Highest Channel / QPSK

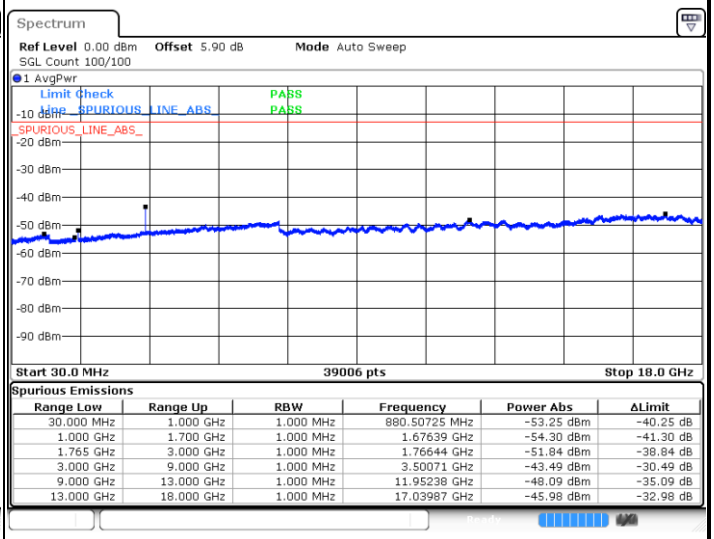


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	942.55622 MHz	-53.50 dBm	-40.50 dB
1.000 GHz	1.700 GHz	1.000 MHz	1.66414 GHz	-54.34 dBm	-41.34 dB
1.765 GHz	3.000 GHz	1.000 MHz	2.64835 GHz	-52.65 dBm	-39.65 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.50121 GHz	-44.69 dBm	-31.69 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.85627 GHz	-47.86 dBm	-34.86 dB
13.000 GHz	18.000 GHz	1.000 MHz	17.46359 GHz	-45.98 dBm	-32.98 dB

Date: 28.JUN.2020 16:55:22

Highest Channel / 16QAM



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	880.50725 MHz	-53.25 dBm	-40.25 dB
1.000 GHz	1.700 GHz	1.000 MHz	1.67639 GHz	-54.30 dBm	-41.30 dB
1.765 GHz	3.000 GHz	1.000 MHz	1.76644 GHz	-51.84 dBm	-38.84 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.50071 GHz	-43.49 dBm	-30.49 dB
9.000 GHz	13.000 GHz	1.000 MHz	11.95238 GHz	-48.09 dBm	-35.09 dB
13.000 GHz	18.000 GHz	1.000 MHz	17.03987 GHz	-45.98 dBm	-32.98 dB

Date: 28.JUN.2020 16:56:08

Frequency Stability

Test Conditions		LTE Band 4 (QPSK) / Middle Channel	Limit
Temperature (°C)	Voltage (Volt)	BW 5MHz	Note 2.
		Deviation (ppm)	Result
50	Normal Voltage	0.0028	PASS
40	Normal Voltage	0.0011	
30	Normal Voltage	0.0033	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0014	
0	Normal Voltage	0.0028	
-10	Normal Voltage	0.0033	
-20	Normal Voltage	0.0021	
-30	Normal Voltage	0.0009	
20	Maximum Voltage	0.0027	
20	Normal Voltage	0.0034	
20	Battery End Point	0.0048	

Note:

1. Normal Voltage =12 V；Battery End Point (BEP) =10 V；Maximum Voltage =30 V.
2. Note: The frequency fundamental emissions stay within the authorized frequency block.

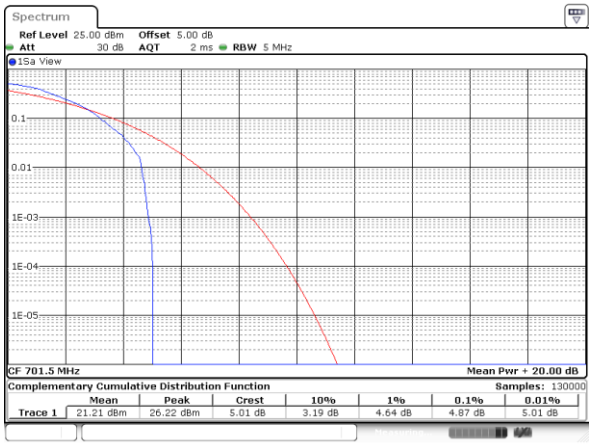
LTE Band 12

Peak-to-Average Ratio

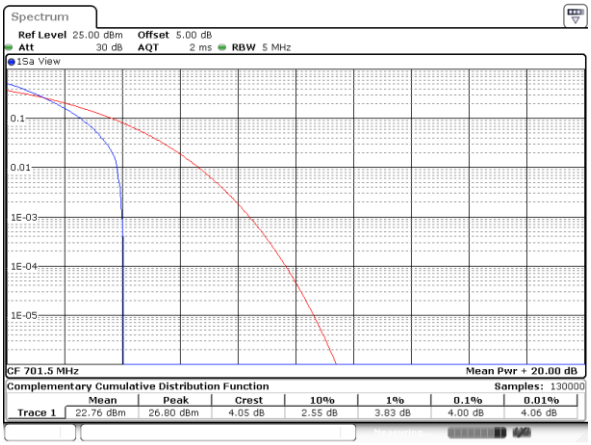
Mode	LTE Band 12 / 5MHz				
Mod.	QPSK		16QAM		Limit: 13dB
RB Size	1RB	Full RB	1RB	Full RB	Result
Lowest CH	4.87	4.00	4.78	5.86	PASS
Middle CH	4.90	3.91	4.49	5.25	
Highest CH	4.14	4.52	4.43	4.32	

LTE Band 12 / 5MHz / QPSK

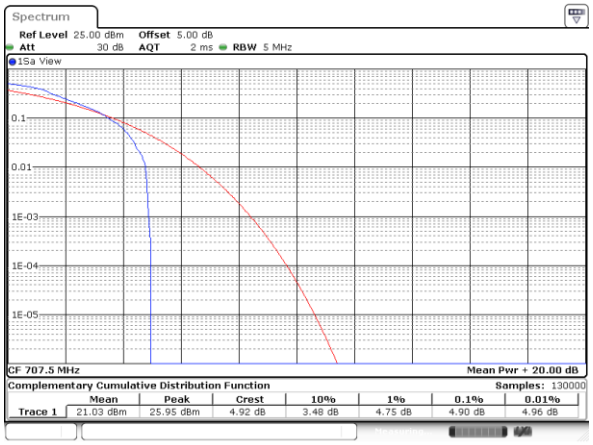
Lowest Channel / 1RB



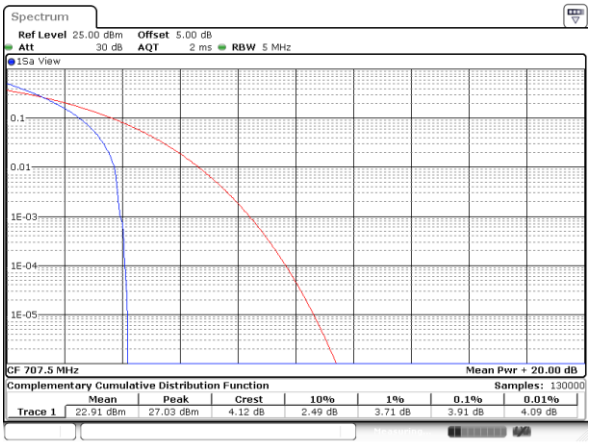
Lowest Channel / Full RB



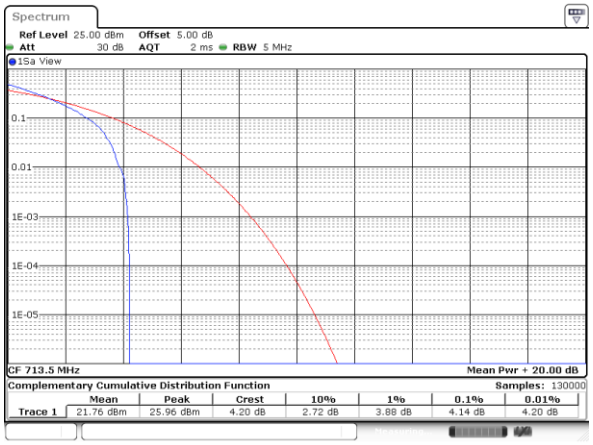
Middle Channel / 1RB



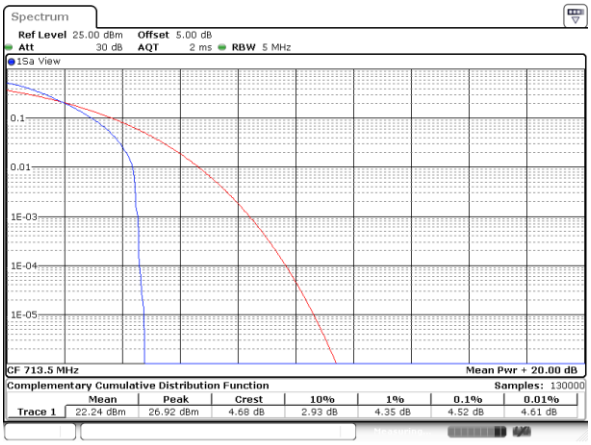
Middle Channel / Full RB



Highest Channel / 1RB

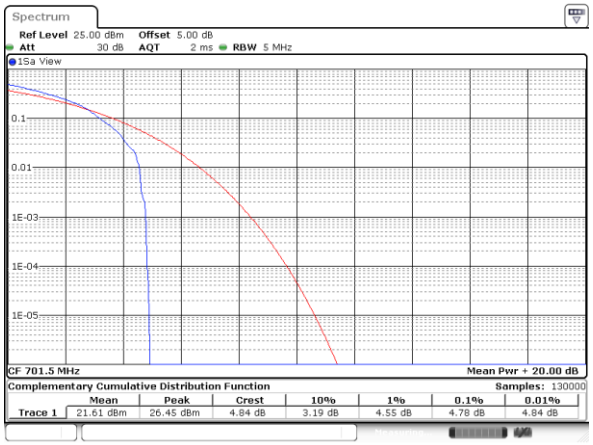


Highest Channel / Full RB

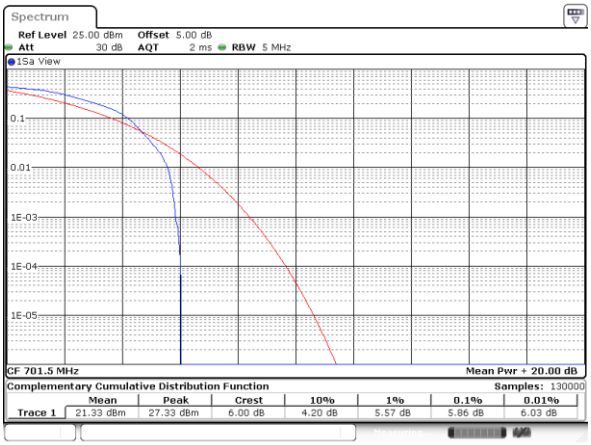


LTE Band 12 / 5MHz / 16QAM

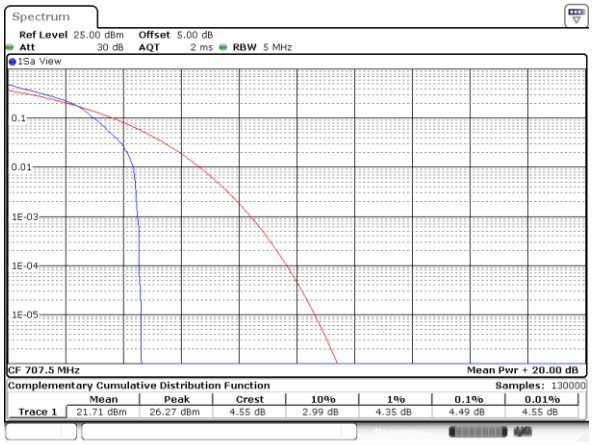
Lowest Channel / 1RB



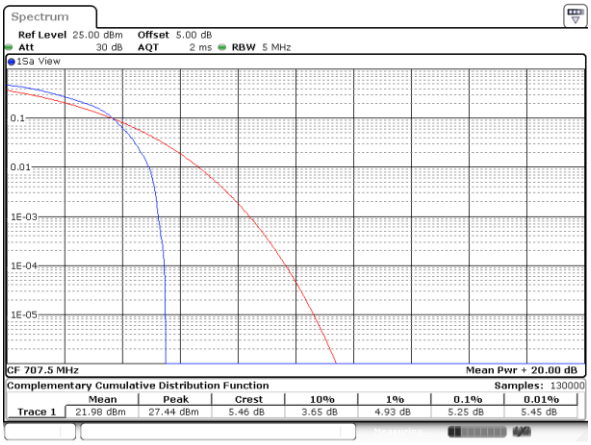
Lowest Channel / Full RB



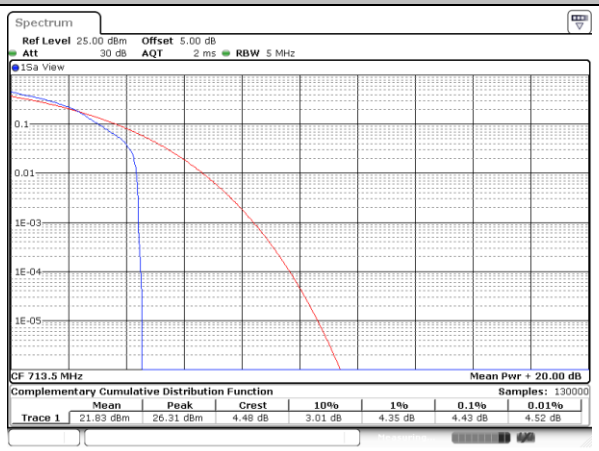
Middle Channel / 1RB



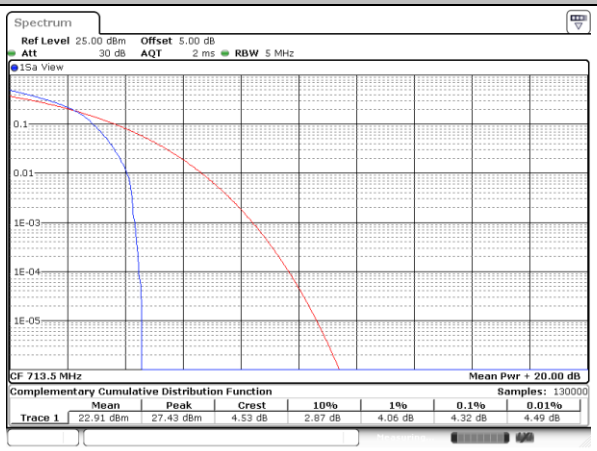
Middle Channel / Full RB



Highest Channel / 1RB



Highest Channel / Full RB

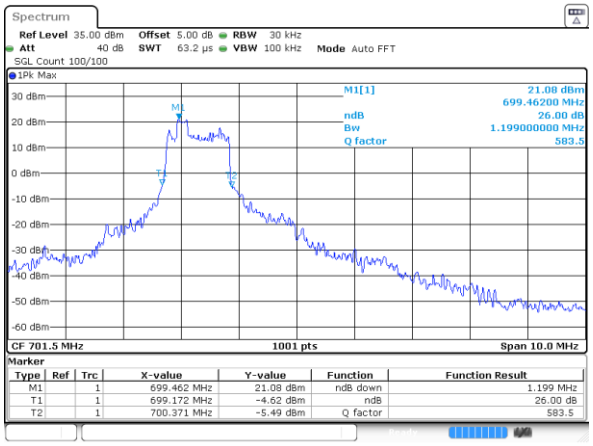


26dB Bandwidth

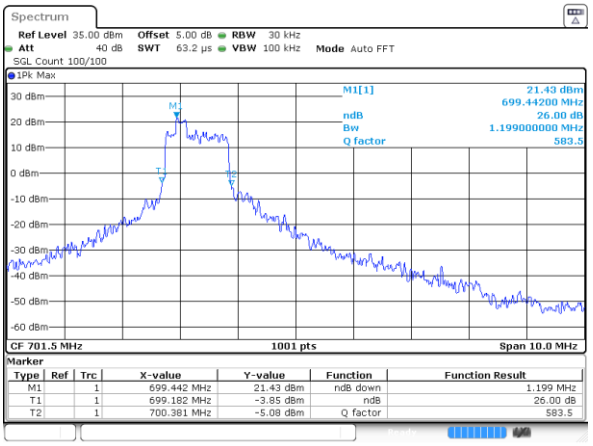
Mode	LTE Band 12 : 26dB BW(MHz)											
BW	1.4MHz		3MHz		5MHz		10MHz		15MHz		20MHz	
Mod.	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Lowest CH	-	-	-	-	1.20	1.20	-	-	-	-	-	-
Middle CH	-	-	-	-	1.27	1.29	-	-	-	-	-	-
Highest CH	-	-	-	-	1.36	1.49	-	-	-	-	-	-

LTE Band 12

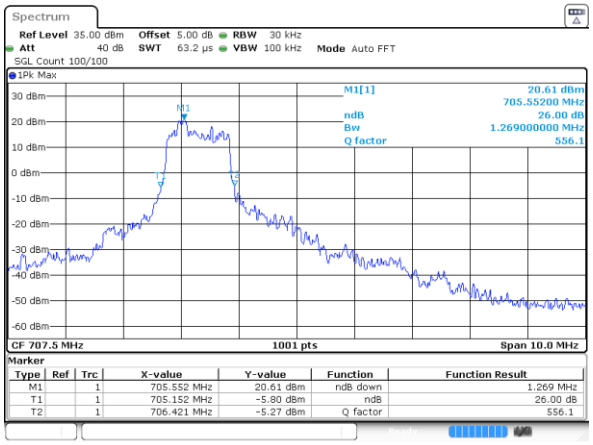
Lowest Channel / 5MHz / QPSK



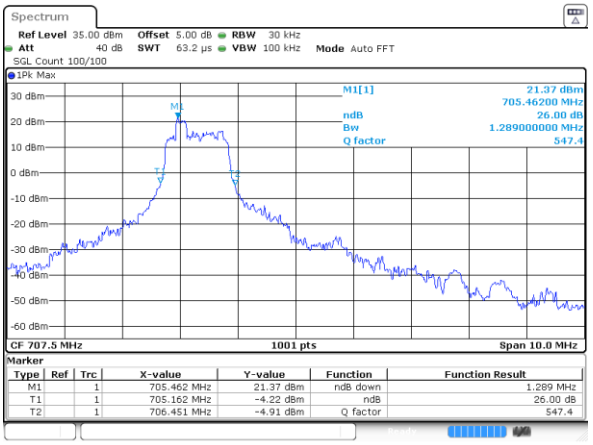
Lowest Channel / 5MHz / 16QAM



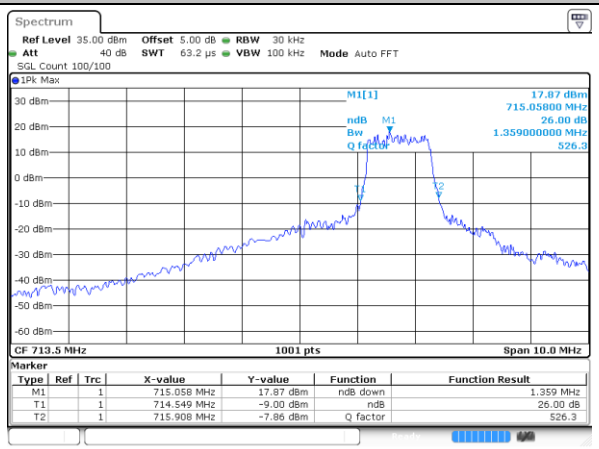
Middle Channel / 5MHz / QPSK



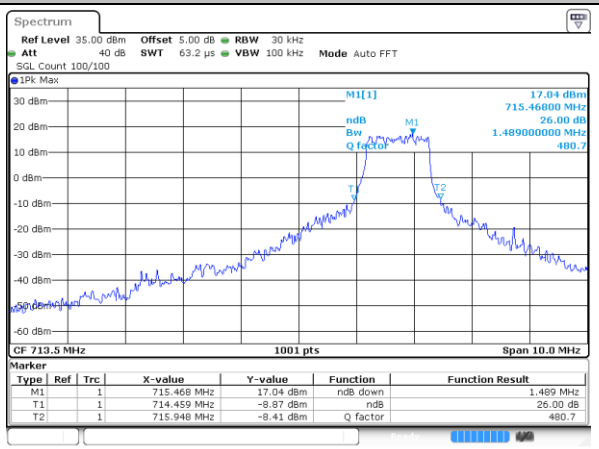
Middle Channel / 5MHz / 16QAM



Highest Channel / 5MHz / QPSK



Highest Channel / 5MHz / 16QAM

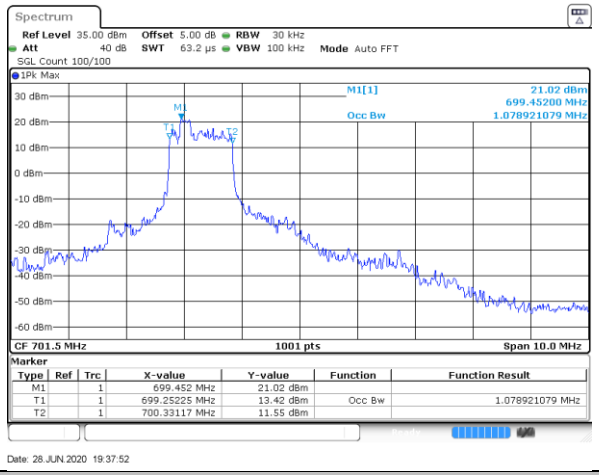


Occupied Bandwidth

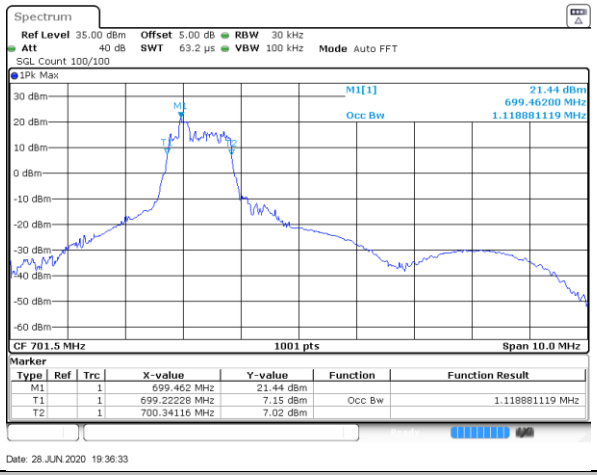
Mode	LTE Band 12 : 99%OBW(MHz)											
BW	1.4MHz		3MHz		5MHz		10MHz		15MHz		20MHz	
Mod.	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Lowest CH	-	-	-	-	1.08	1.12	-	-	-	-	-	-
Middle CH	-	-	-	-	1.10	1.10	-	-	-	-	-	-
Highest CH	-	-	-	-	1.10	1.14	-	-	-	-	-	-

LTE Band 12

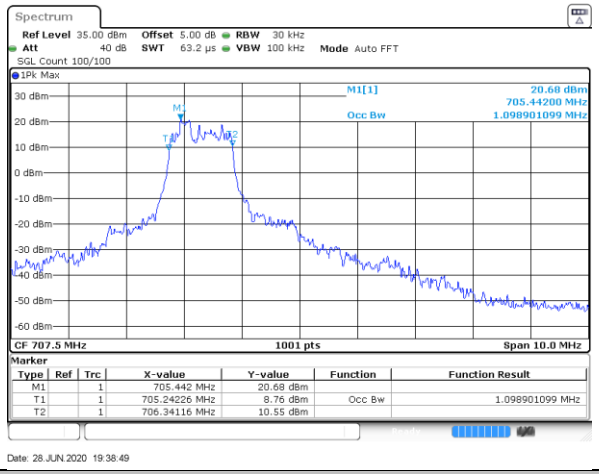
Lowest Channel / 5MHz / QPSK



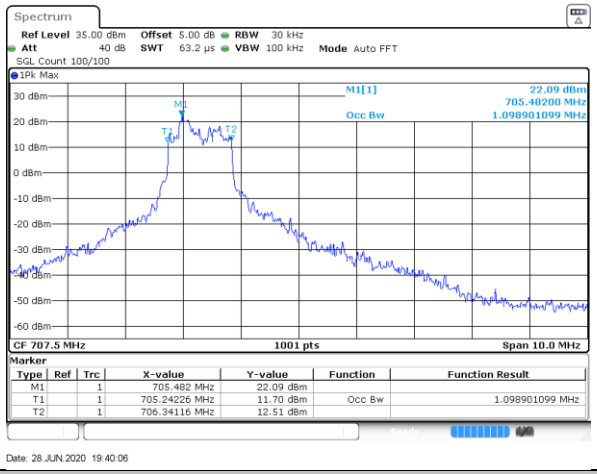
Lowest Channel / 5MHz / 16QAM



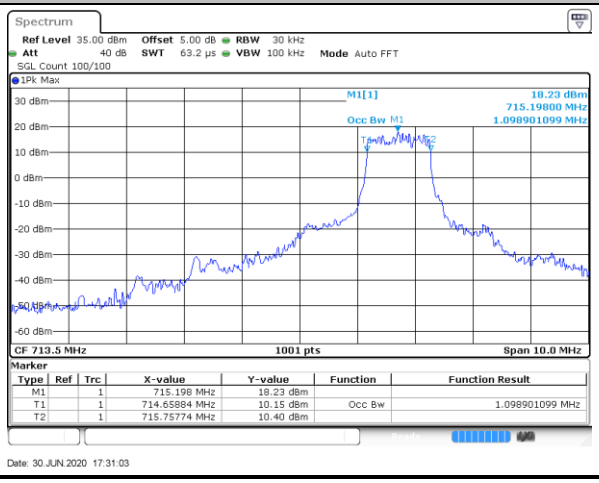
Middle Channel / 5MHz / QPSK



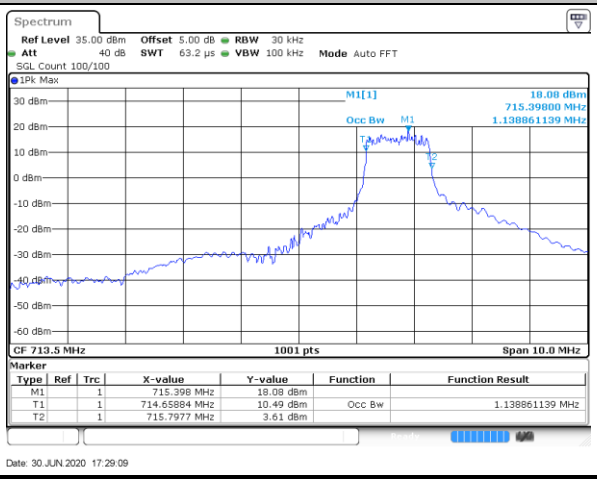
Middle Channel / 5MHz / 16QAM



Highest Channel / 5MHz / QPSK



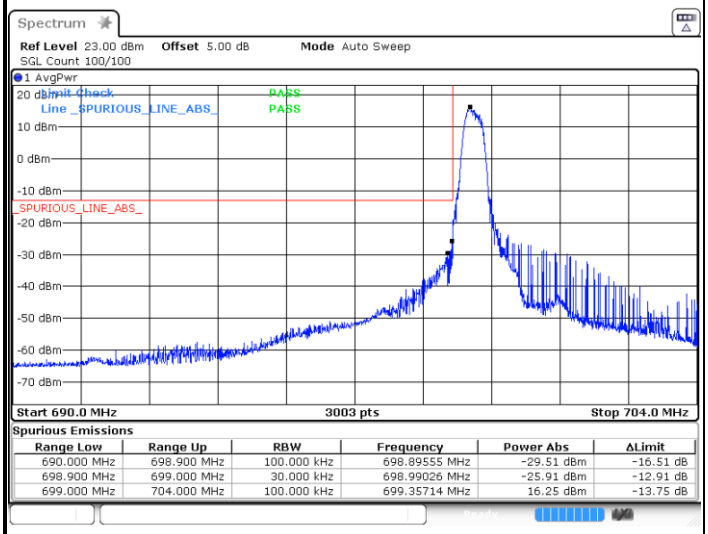
Highest Channel / 5MHz / 16QAM



Conducted Band Edge

LTE Band 12 / 5MHz / QPSK

Lowest Band Edge / 1 RB

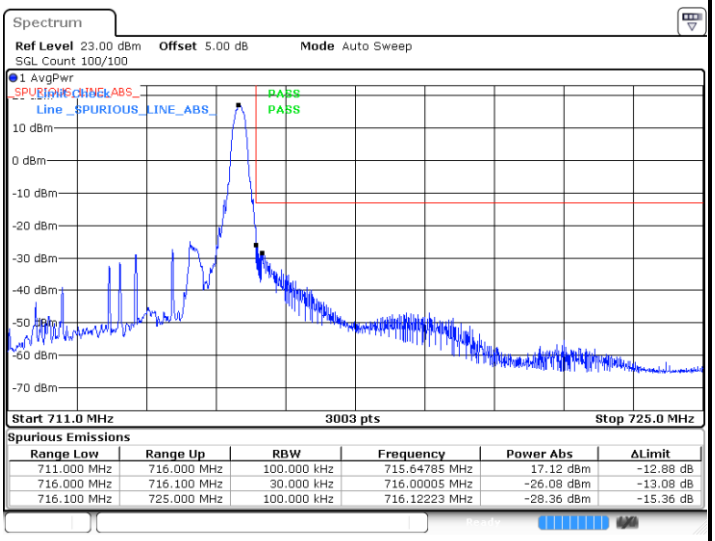


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
690.000 MHz	698.900 MHz	100.000 kHz	698.89555 MHz	-29.51 dBm	-16.51 dB
698.900 MHz	699.000 MHz	30.000 kHz	698.99026 MHz	-25.91 dBm	-12.91 dB
699.000 MHz	704.000 MHz	100.000 kHz	699.35714 MHz	16.25 dBm	-13.75 dB

Date: 28.JUN.2020 20:54:27

Highest Band Edge / 1 RB

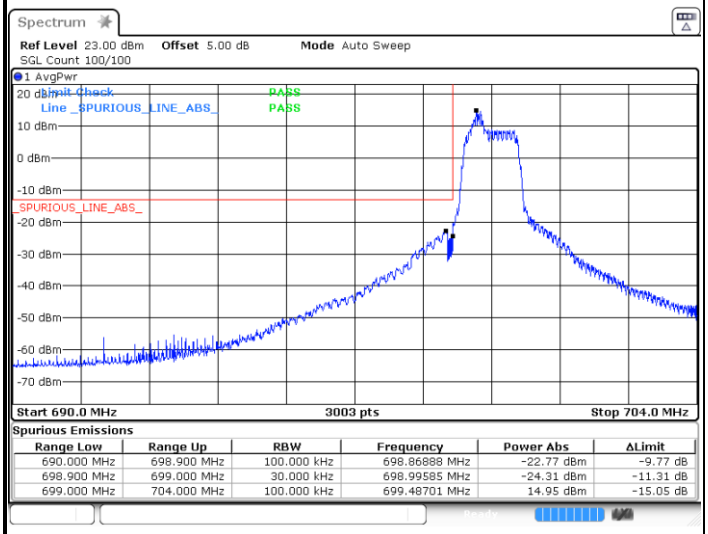


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
711.000 MHz	716.000 MHz	100.000 kHz	715.64785 MHz	17.12 dBm	-12.88 dB
716.000 MHz	716.100 MHz	30.000 kHz	716.00005 MHz	-26.08 dBm	-13.08 dB
716.100 MHz	725.000 MHz	100.000 kHz	716.12223 MHz	-28.36 dBm	-15.36 dB

Date: 30.JUN.2020 17:31:48

Lowest Band Edge / Full RB

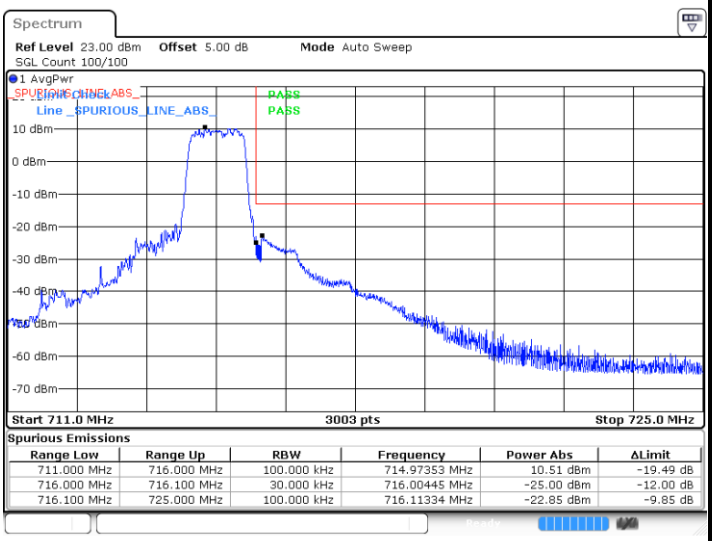


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
690.000 MHz	698.900 MHz	100.000 kHz	698.86888 MHz	-22.77 dBm	-9.77 dB
698.900 MHz	699.000 MHz	30.000 kHz	698.99585 MHz	-24.31 dBm	-11.31 dB
699.000 MHz	704.000 MHz	100.000 kHz	699.48701 MHz	14.95 dBm	-15.05 dB

Date: 28.JUN.2020 20:55:37

Highest Band Edge / Full RB



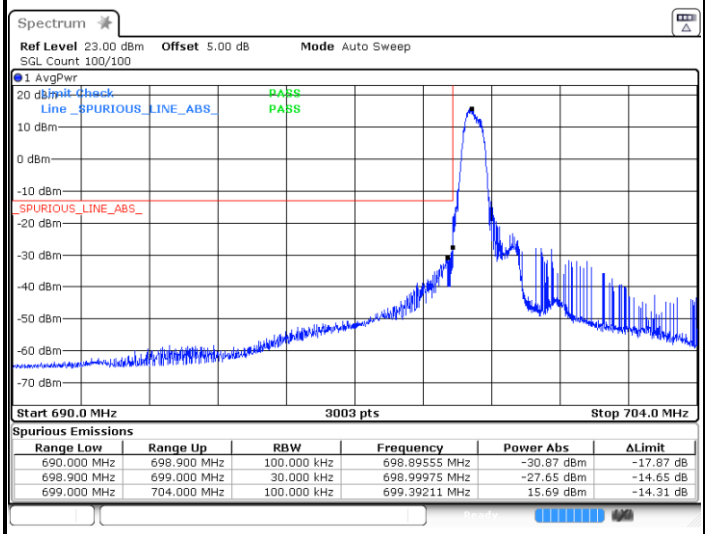
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
711.000 MHz	716.000 MHz	100.000 kHz	714.97353 MHz	10.51 dBm	-19.49 dB
716.000 MHz	716.100 MHz	30.000 kHz	716.00445 MHz	-25.00 dBm	-12.00 dB
716.100 MHz	725.000 MHz	100.000 kHz	716.11334 MHz	-22.85 dBm	-9.85 dB

Date: 30.JUN.2020 17:30:36

LTE Band 12 / 5MHz / 16QAM

Lowest Band Edge / 1RB

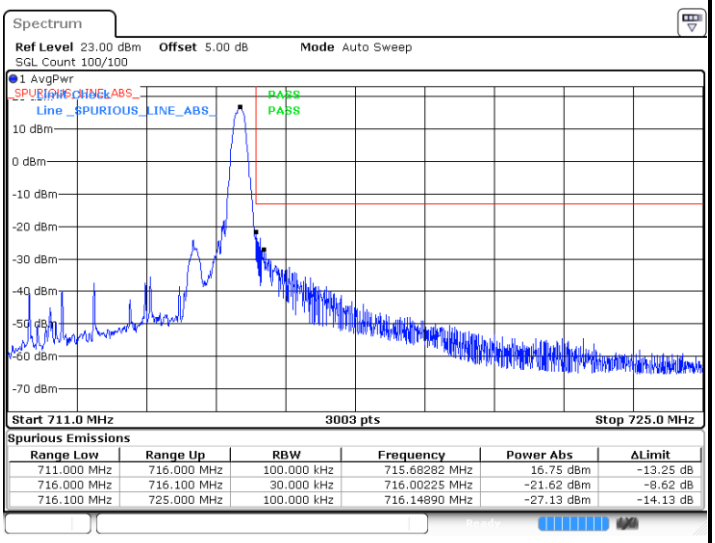


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
690.000 MHz	698.900 MHz	100.000 kHz	698.89555 MHz	-30.87 dBm	-17.87 dB
698.900 MHz	699.000 MHz	30.000 kHz	698.99975 MHz	-27.65 dBm	-14.65 dB
699.000 MHz	704.000 MHz	100.000 kHz	699.39211 MHz	15.69 dBm	-14.31 dB

Date: 28.JUN.2020 20:53:19

Highest Band Edge / 1 RB

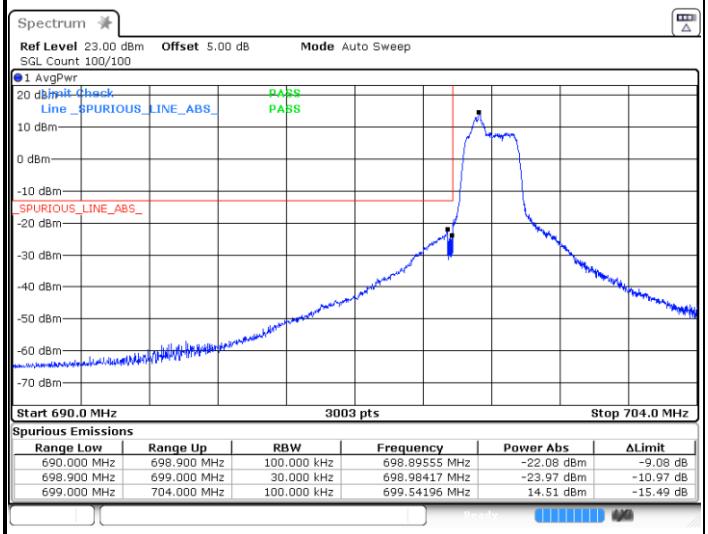


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
711.000 MHz	716.000 MHz	100.000 kHz	715.68282 MHz	16.75 dBm	-13.25 dB
716.000 MHz	716.100 MHz	30.000 kHz	716.00225 MHz	-21.62 dBm	-8.62 dB
716.100 MHz	725.000 MHz	100.000 kHz	716.14890 MHz	-27.13 dBm	-14.13 dB

Date: 30.JUN.2020 17:32:29

Lowest Band Edge / Full RB

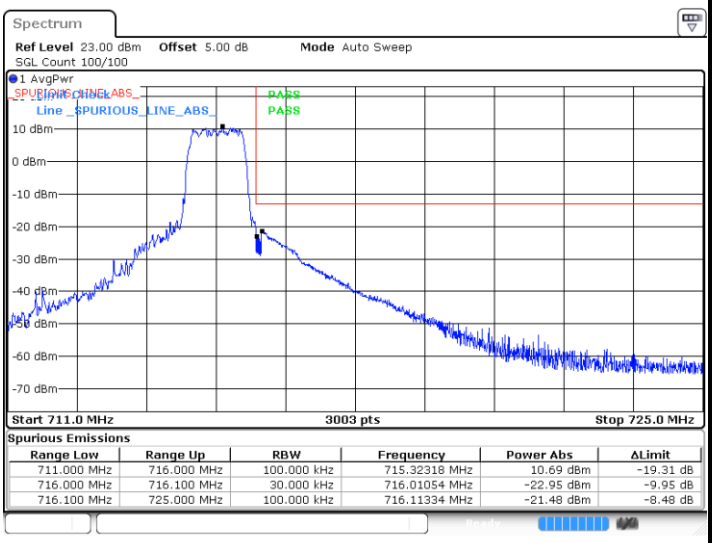


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
690.000 MHz	698.900 MHz	100.000 kHz	698.89555 MHz	-22.08 dBm	-9.08 dB
698.900 MHz	699.000 MHz	30.000 kHz	698.98417 MHz	-23.97 dBm	-10.97 dB
699.000 MHz	704.000 MHz	100.000 kHz	699.54196 MHz	14.51 dBm	-15.49 dB

Date: 28.JUN.2020 20:56:41

Highest Band Edge / Full RB



Spurious Emissions

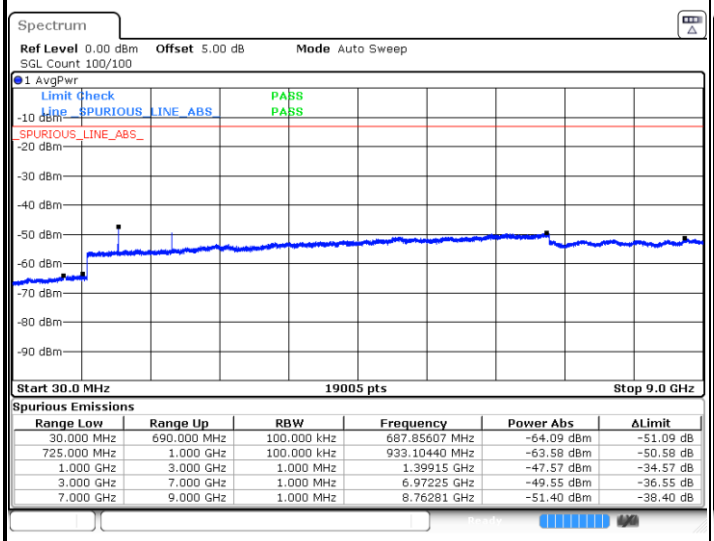
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
711.000 MHz	716.000 MHz	100.000 kHz	715.32318 MHz	10.69 dBm	-19.31 dB
716.000 MHz	716.100 MHz	30.000 kHz	716.01054 MHz	-22.95 dBm	-9.95 dB
716.100 MHz	725.000 MHz	100.000 kHz	716.11334 MHz	-21.48 dBm	-8.48 dB

Date: 30.JUN.2020 17:29:57

Conducted Spurious Emission

LTE Band 12 / 5MHz

Lowest Channel / QPSK

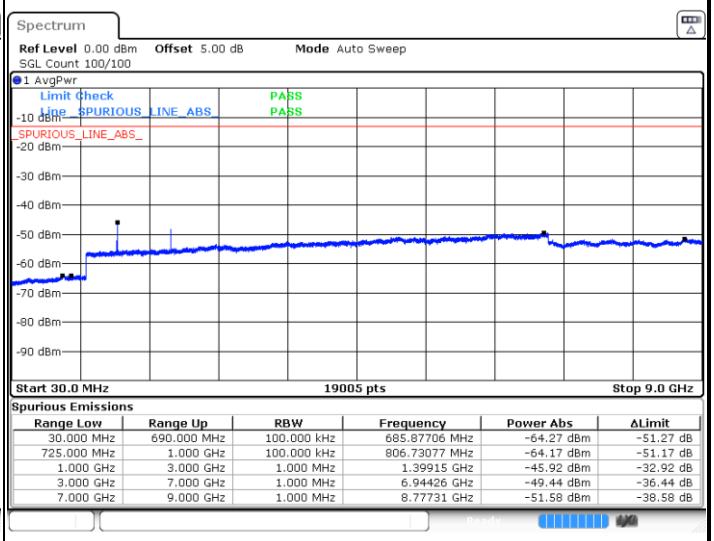


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	690.000 MHz	100.000 kHz	687.85607 MHz	-64.09 dBm	-51.09 dB
725.000 MHz	1.000 GHz	100.000 kHz	933.10440 MHz	-63.58 dBm	-50.58 dB
1.000 GHz	3.000 GHz	1.000 MHz	1.39915 GHz	-47.57 dBm	-34.57 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.97225 GHz	-49.55 dBm	-36.55 dB
7.000 GHz	9.000 GHz	1.000 MHz	8.76281 GHz	-51.40 dBm	-38.40 dB

Date: 28.JUN.2020 20:09:42

Lowest Channel / 16QAM

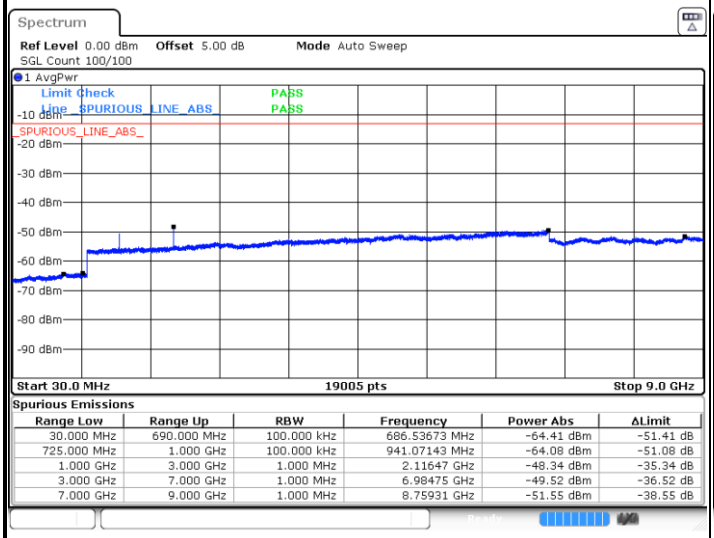


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	690.000 MHz	100.000 kHz	685.87706 MHz	-64.27 dBm	-51.27 dB
725.000 MHz	1.000 GHz	100.000 kHz	806.73077 MHz	-64.17 dBm	-51.17 dB
1.000 GHz	3.000 GHz	1.000 MHz	1.39915 GHz	-45.92 dBm	-32.92 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.94426 GHz	-49.44 dBm	-36.44 dB
7.000 GHz	9.000 GHz	1.000 MHz	8.77731 GHz	-51.58 dBm	-38.58 dB

Date: 28.JUN.2020 20:10:13

Middle Channel / QPSK

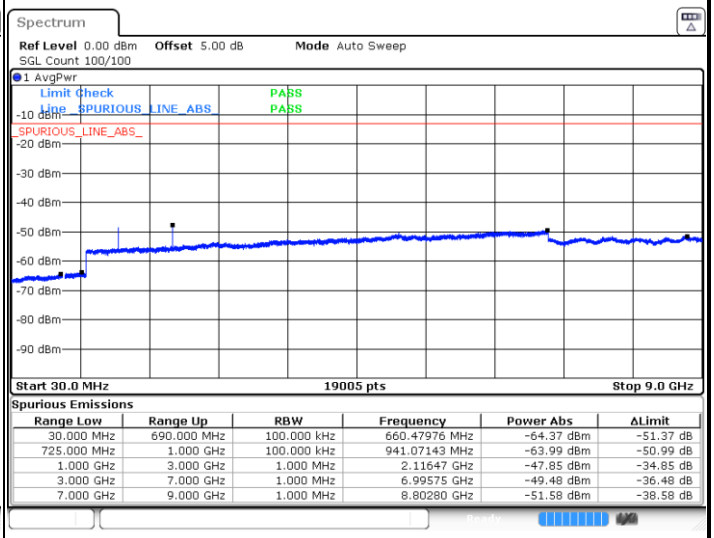


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	690.000 MHz	100.000 kHz	686.53673 MHz	-64.41 dBm	-51.41 dB
725.000 MHz	1.000 GHz	100.000 kHz	941.07143 MHz	-64.08 dBm	-51.08 dB
1.000 GHz	3.000 GHz	1.000 MHz	2.11647 GHz	-48.34 dBm	-35.34 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.98475 GHz	-49.52 dBm	-36.52 dB
7.000 GHz	9.000 GHz	1.000 MHz	8.75931 GHz	-51.55 dBm	-38.55 dB

Date: 28.JUN.2020 20:11:58

Middle Channel / 16QAM



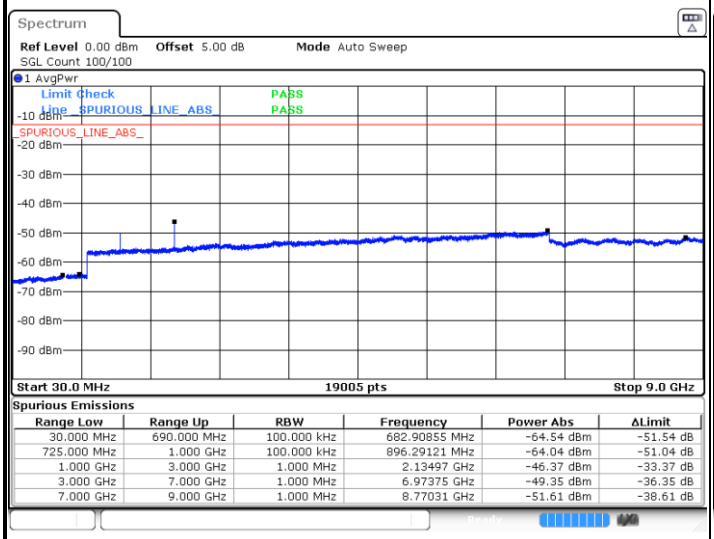
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	690.000 MHz	100.000 kHz	660.47976 MHz	-64.37 dBm	-51.37 dB
725.000 MHz	1.000 GHz	100.000 kHz	941.07143 MHz	-63.99 dBm	-50.99 dB
1.000 GHz	3.000 GHz	1.000 MHz	2.11647 GHz	-47.85 dBm	-34.85 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.99575 GHz	-49.48 dBm	-36.48 dB
7.000 GHz	9.000 GHz	1.000 MHz	8.80280 GHz	-51.58 dBm	-38.58 dB

Date: 28.JUN.2020 20:11:22

LTE Band 12 / 5MHz

Highest Channel / QPSK

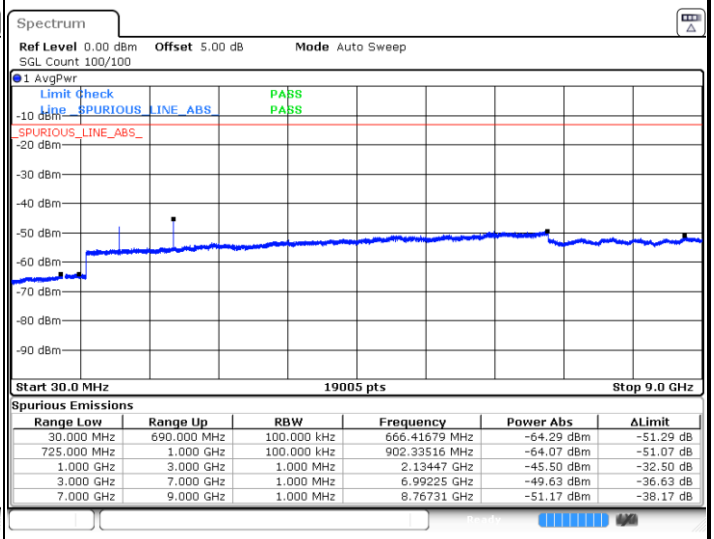


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	690.000 MHz	100.000 kHz	682.90855 MHz	-64.54 dBm	-51.54 dB
725.000 MHz	1.000 GHz	100.000 kHz	896.29121 MHz	-64.04 dBm	-51.04 dB
1.000 GHz	3.000 GHz	1.000 MHz	2.13497 GHz	-46.37 dBm	-33.37 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.97375 GHz	-49.35 dBm	-36.35 dB
7.000 GHz	9.000 GHz	1.000 MHz	8.77031 GHz	-51.61 dBm	-38.61 dB

Date: 28.JUN.2020 20:12:42

Highest Channel / 16QAM



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	690.000 MHz	100.000 kHz	666.41679 MHz	-64.29 dBm	-51.29 dB
725.000 MHz	1.000 GHz	100.000 kHz	902.33516 MHz	-64.07 dBm	-51.07 dB
1.000 GHz	3.000 GHz	1.000 MHz	2.13447 GHz	-45.50 dBm	-32.50 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.99225 GHz	-49.63 dBm	-36.63 dB
7.000 GHz	9.000 GHz	1.000 MHz	8.76731 GHz	-51.17 dBm	-38.17 dB

Date: 28.JUN.2020 20:13:12

Frequency Stability

Test Conditions		LTE Band 12 (QPSK) / Middle Channel	Limit
Temperature (°C)	Voltage (Volt)	BW 5MHz	Note 2.
		Deviation (ppm)	Result
50	Normal Voltage	0.0014	PASS
40	Normal Voltage	0.0026	
30	Normal Voltage	0.0013	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0019	
0	Normal Voltage	0.0021	
-10	Normal Voltage	0.0015	
-20	Normal Voltage	0.0027	
-30	Normal Voltage	0.0022	
20	Maximum Voltage	0.0016	
20	Normal Voltage	0.0033	
20	Battery End Point	0.0028	

Note:

1. Normal Voltage =12 V；Battery End Point (BEP) =10 V；Maximum Voltage =30 V.
2. Note: The frequency fundamental emissions stay within the authorized frequency block.

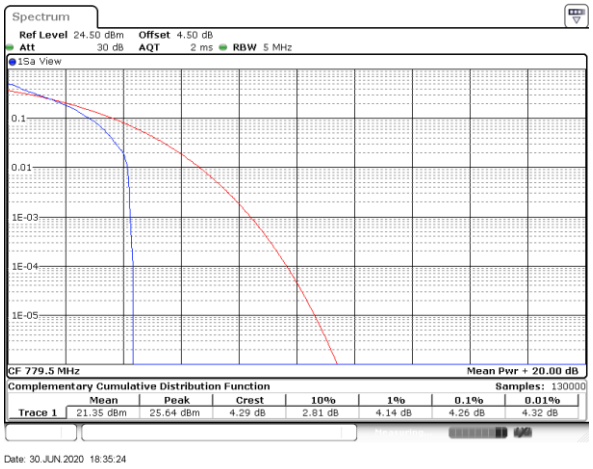
LTE Band 13

Peak-to-Average Ratio

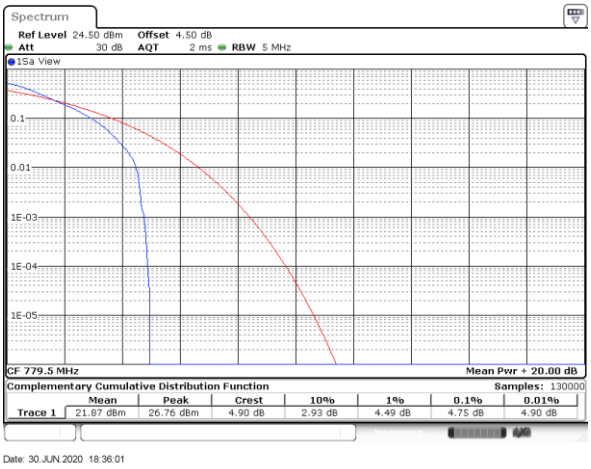
Mode	LTE Band 13 / 5MHz				
Mod.	QPSK		16QAM		Limit: 13dB
RB Size	1RB	Full RB	1RB	Full RB	Result
Lowest CH	4.26	4.75	5.65	6.29	PASS
Middle CH	4.09	4.14	4.35	5.88	
Highest CH	4.29	5.48	6.49	5.59	

LTE Band 13/ 5MHz / QPSK

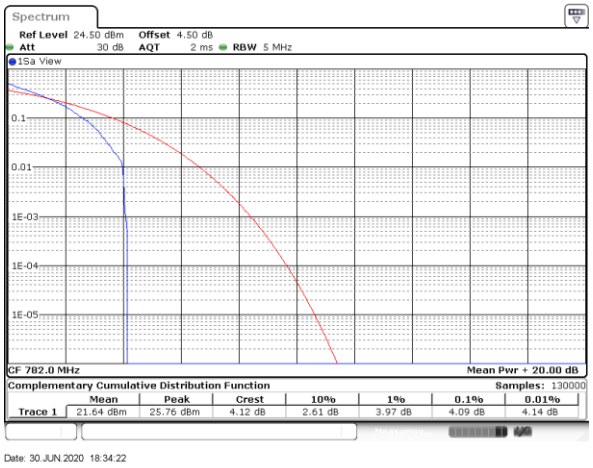
Lowest Channel / 1RB



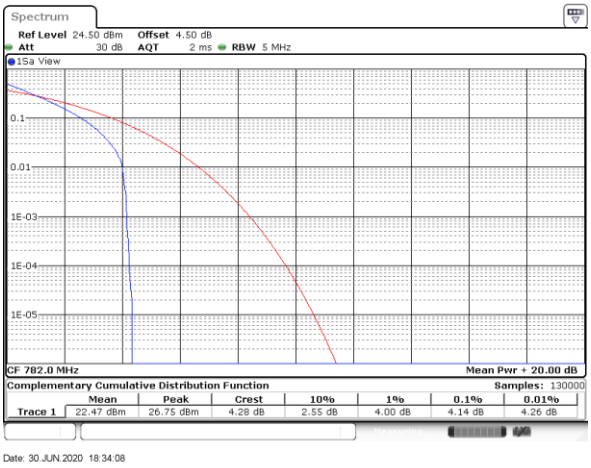
Lowest Channel / Full RB



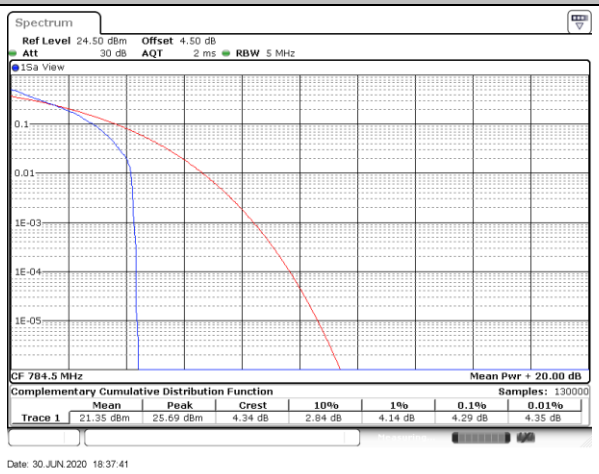
Middle Channel / 1RB



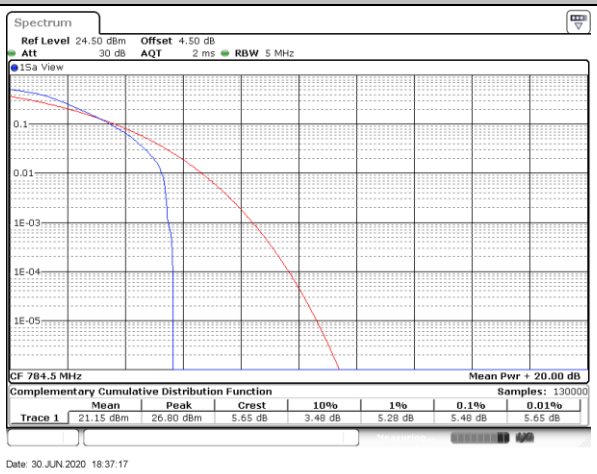
Middle Channel / Full RB



Highest Channel / 1RB

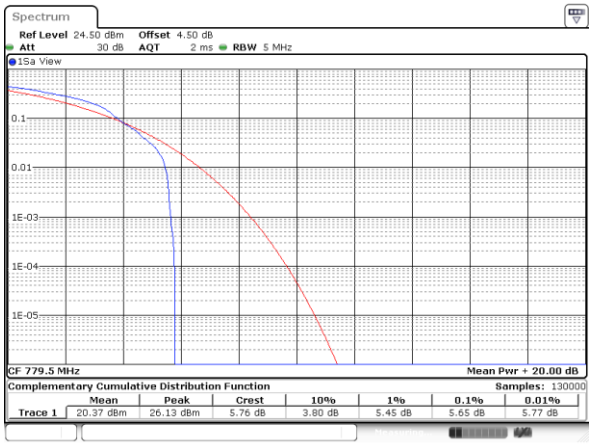


Highest Channel / Full RB



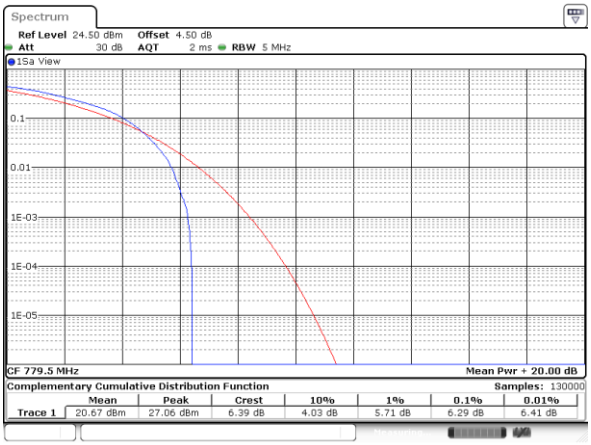
LTE Band 13 / 5MHz / 16QAM

Lowest Channel / 1RB



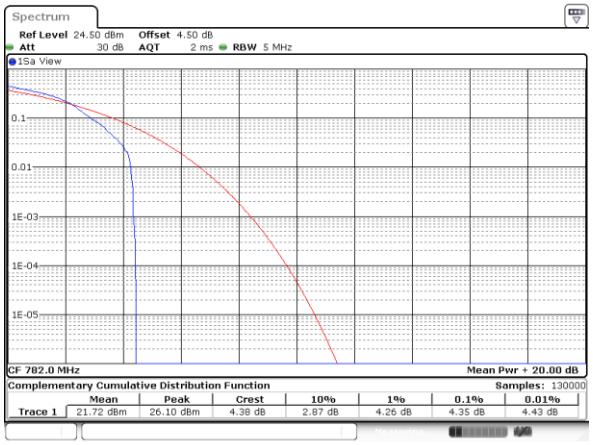
Date: 30.JUN.2020 18:35:08

Lowest Channel / Full RB



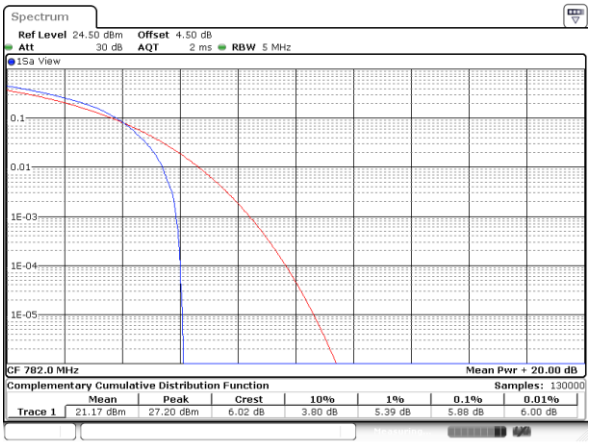
Date: 30.JUN.2020 18:36:31

Middle Channel / 1RB



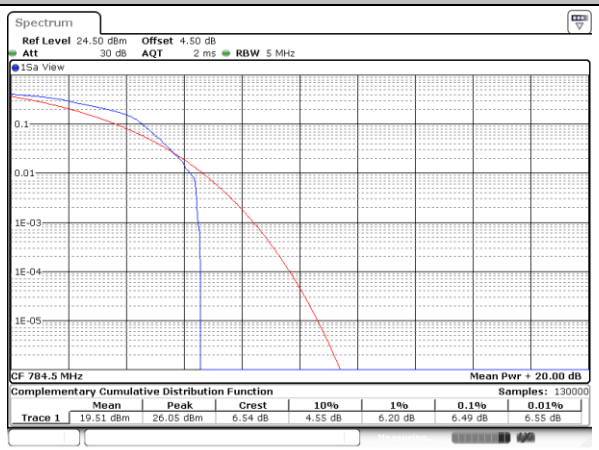
Date: 30.JUN.2020 18:34:47

Middle Channel / Full RB



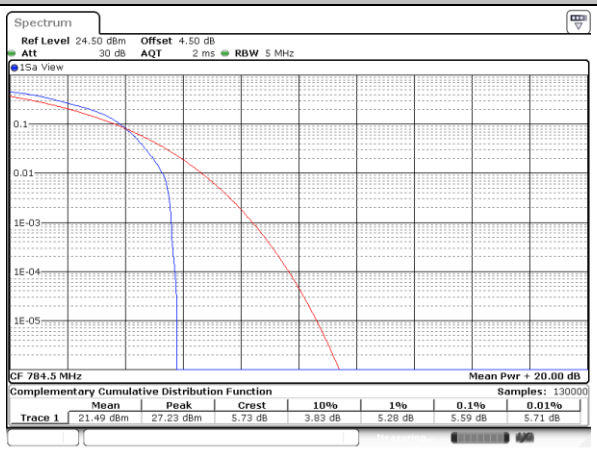
Date: 30.JUN.2020 18:33:44

Highest Channel / 1RB



Date: 30.JUN.2020 18:38:27

Highest Channel / Full RB



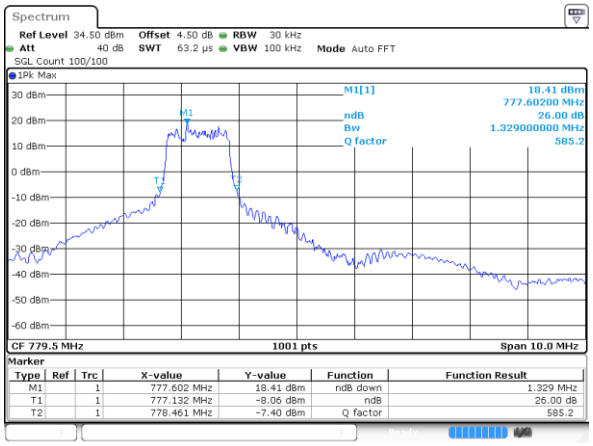
Date: 30.JUN.2020 18:36:55

26dB Bandwidth

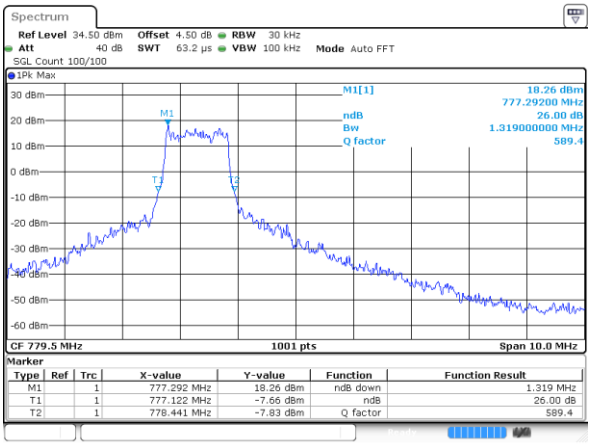
Mode	LTE Band 13 : 26dB BW(MHz)											
BW	1.4MHz		3MHz		5MHz		10MHz		15MHz		20MHz	
Mod.	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Lowest CH	-	-	-	-	1.33	1.32	-	-	-	-	-	-
Middle CH	-	-	-	-	1.29	1.54	-	-	-	-	-	-
Highest CH	-	-	-	-	1.34	1.35	-	-	-	-	-	-

LTE Band 13

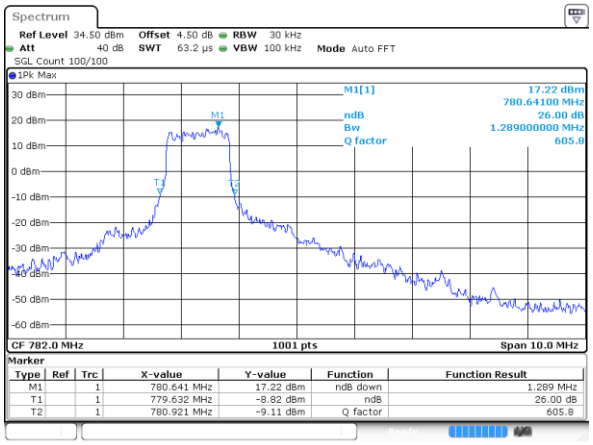
Lowest Channel / 5MHz / QPSK



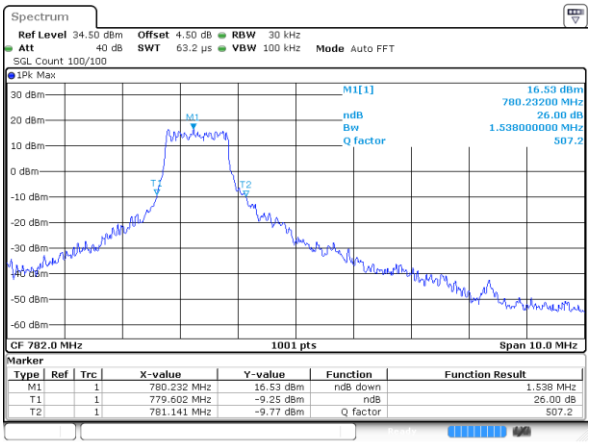
Lowest Channel / 5MHz / 16QAM



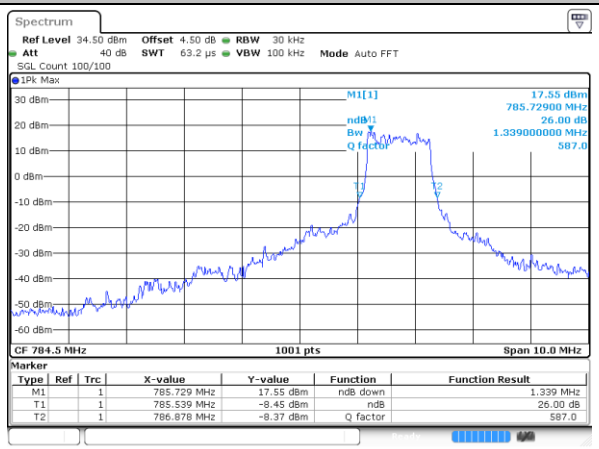
Middle Channel / 5MHz / QPSK



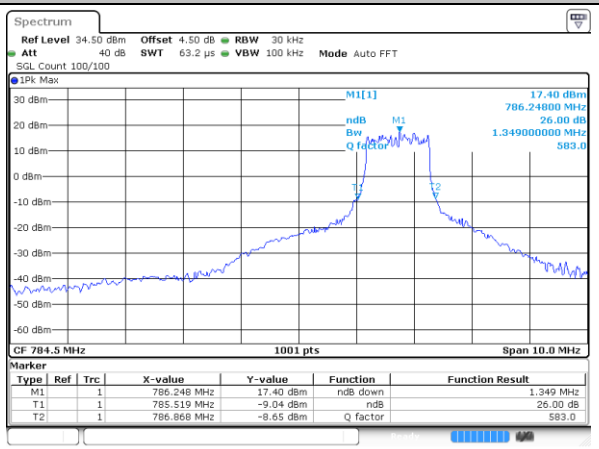
Middle Channel / 5MHz / 16QAM



Highest Channel / 5MHz / QPSK



Highest Channel / 5MHz / 16QAM



Occupied Bandwidth

Mode	LTE Band 13 : 99%OBW(MHz)											
BW	1.4MHz		3MHz		5MHz		10MHz		15MHz		20MHz	
Mod.	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Lowest CH	-	-	-	-	1.11	1.11	-	-	-	-	-	-
Middle CH	-	-	-	-	1.12	1.10	-	-	-	-	-	-
Highest CH	-	-	-	-	1.12	1.12	-	-	-	-	-	-