

FCC 47 CFR PART 27 SUBPART L

For

Computer

Model No.: DMS-SJ03

Trade Name: ADVANTECH

Issued to

Advantech Co.Ltd.
No.1, Alley 20, Lane 26, Rueiguang Road, Neihu District, Taipei 114,
Taiwan, R.O.C.

Issued by

Compliance Certification Services Inc.
(Hsinchu Lab)
No.989-1, Wenshan Rd., Shangshan Village, Qionglin Township,
Hsinchu County 30741, Taiwan (R.O.C.)
<http://www.ccsrf.com>
service@ccsrf.com

Issued Date: September 21, 2017



Note: This report shall not be reproduced except in full, without the written approval of Compliance Certification Services Inc. This document may be altered or revised by Compliance Certification Services Inc. personnel only, and shall be noted in the revision section of the document.

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	September 21, 2017	Initial Issue	ALL	Allison Chen
01	November 14, 2017	1. Revise section 6.2 2. Revise section 6.8	P.13, P.45	Angel Cheng

TABLE OF CONTENTS

1.	TEST RESULT CERTIFICATION.....	4
2.	EUT DESCRIPTION	5
3.	TEST METHODOLOGY	6
3.1	DESCRIPTION OF TEST TYPE	6
3.2	The worst mode of measurement	6
3.3	INSTRUMENT CALIBRATION	7
3.4	MEASURING INSTRUMENT CALIBRATION.....	7
3.5	MEASUREMENT EQUIPMENT USED.....	7
3.6	MEASUREMENT UNCERTAINTY.....	8
4.	FACILITIES AND ACCREDITATIONS.....	9
4.1	FACILITIES.....	9
4.2	EQUIPMENT	9
5.	SETUP OF EQUIPMENT UNDER TEST.....	10
5.1	SETUP CONFIGURATION OF EUT.....	10
5.2	SUPPORT EQUIPMENT	10
6.	TEST PROCEDURE AND RESULT.....	11
6.1	OUTPUT POWER MEASUREMENT	11
6.2	ERP & EIRP MEASUREMENT	13
6.3	FREQUENCY STABILITY MEASUREMENT	16
6.4	OCCUPIED BANDWIDTH MEASUREMENT	19
6.5	PEAK TO AVERAGE POWER RATIO.....	23
6.6	BAND EDGE MEASUREMENT	29
6.7	CONDUCTED SPURIOUS EMISSIONS	38
6.8	RADIATED EMISSION MEASUREMENT	45
	APPENDIX I PHOTOGRAPHS OF TEST SETUP	54

1. TEST RESULT CERTIFICATION

Applicant: Advantech Co.Ltd.
 No.1, Alley 20, Lane 26, Rueiguang Road, Neihu District,
 Taipei 114, Taiwan, R.O.C.

Manufacturer: Advantech Co.Ltd.
 No.1, Alley 20, Lane 26, Rueiguang Road, Neihu District,
 Taipei 114, Taiwan, R.O.C.

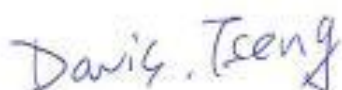
Equipment Under Test: Computer
Trade Name: ADVANTECH
Model: DMS-SJ03
Date of Test: August 11 ~ 18, 2017

APPLICABLE STANDARDS	
Standard	TEST RESULT
FCC Part 27, Subpart C, L, FCC Part 2	No non-compliance noted

The above equipment has been tested by Compliance Certification Services Inc., and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Approved by

Tested by




Davis Tseng
 Sr. Engineer
 Compliance Certification Services Inc.

Kevin Kuo
 Engineer
 Compliance Certification Services Inc.

2. EUT DESCRIPTION

Product	Computer	
Model No.	DMS-SJ03	
Model Discrepancy	N/A	
Trade Name	ADVANTECH	
Received Date	August 31, 2017	
Power Supply	Powered from host device: DC 12V	
Modulation Technology	LTE Band 13	QPSK, 16QAM
Frequency Range	LTE Band 13 Channel Bandwidth: 5MHz	779.5MHz ~ 784.5MHz
	LTE Band 13 Channel Bandwidth: 10MHz	782MHz
Maximum EIRP Power	LTE Band 13 Channel Bandwidth: 5MHz	QPSK: 23.63dBm 16QAM: 22.72dBm
	LTE Band 13 Channel Bandwidth: 10MHz	QPSK : 23.65dBm 16QAM: 22.74dBm
Antenna Specification	PIFA Antenna LTE Band 13: Gain: 5.25dBi	

Note: 1. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3. TEST METHODOLOGY

3.1 DESCRIPTION OF TEST TYPE

The EUT (model: DMS-SJ03) had been tested under operating condition. Software used to control the EUT for staying in continuous transmitting mode was programmed.

LTE Band 13: 777 MHz ~ 787 MHz

Three channels had been tested for each channel bandwidth.

Channel	5MHz		10MHz	
	Channel	Frequency(MHz)	Channel	Frequency(MHz)
Low CH	23205	779.5	-	-
Middle CH	23230	752.0	23230	782.0
High CH	23255	784.5	-	-

For test mode:

The conducted power be measured in 1, 50% and 100% RB allocation, offset to upper edge, centered and lower edge of the channel bandwidth of each required channel.

	QPSK	Worst Mode	16QAM	Worst Mode
Band13	5M	1 RB ALLOCATED AT THE UPPER EDGE	1.4M	1 RB ALLOCATED AT THE LOWER EDGE
	10M	1 RB ALLOCATED AT THE UPPER EDGE	5M	1 RB ALLOCATED AT THE UPPER EDGE

3.2 The worst mode of measurement

Radiated Emission Measurement	
Test Condition	Band edge, Emission for Unwanted and Fundamental
Voltage/Hz	DC 12V
Test Mode	Mode 1: EUT power by DC Source via cable.
Worst Mode	<input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4
Position	<input type="checkbox"/> Placed in fixed position. <input type="checkbox"/> Placed in fixed position at X-Plane (E2-Plane) <input type="checkbox"/> Placed in fixed position at Y-Plane (E1-Plane) <input checked="" type="checkbox"/> Placed in fixed position at Z-Plane (H-Plane)

Remark:

1. The worst mode was record in this test report.
2. The EUT pre-scanned in three axis ,X,Y, Z and two polarity, Horizontal and Vertical for radiated measurement. The worst case (Z-Plane) were recorded in this report.

3.3 INSTRUMENT CALIBRATION

3.4 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

3.5 MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

Remark: Each piece of equipment is scheduled for calibration once a year.

Conducted Emissions Test Site					
Name of Equipment	Manufacturer	Model	Serial Number	Cal Date	Cal Due
Base Station	Anritsu	MT-8820C	6201240043	07/11/2017	07/10/2018
Spectrum Analyzer	R&S	FSV 40	101073	10/05/2016	10/04/2017
Spectrum Analyzer	R&S	FSU 20Hz....26.5GHz	100258	07/27/2017	07/26/2018
Power Meter	Anritsu	ML2495A	1149001	12/06/2016	12/05/2017
Power Sensor	Anritsu	MA2411B	1126148	12/06/2016	12/05/2017

Wugu 966 Chamber A					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Base Station	Anritsu	MT-8820C	6201240043	07/10/2017	07/11/2018
Bi-Log Antenna	TESEQ	CBL 6112D	35404	08/07/2017	08/06/2018
Double Ridged BroadBand Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-285	04/25/2017	04/24/2018
Double Ridged Guide Horn Antenna	ETS • LINDGREN	3117	00078732	07/06/2017	07/05/2018
Horn Antenna	COM-POWER	AH-840	03077	12/02/2016	12/01/2017
Pre-Amplifier	EMCI	EMC001625	980243	04/11/2017	04/10/2018
Pre-Amplifier	COM-POWER	PAM-118A	551043	04/11/2017	04/10/2018
PSA Series Spectrum Analyzer	Agilent	E4446A	MY48250064	04/20/2017	04/19/2018

3.6 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
Powerline Conducted Emission	N/A
3M Semi Anechoic Chamber / 30M~200M	+/- 4.0138
3M Semi Anechoic Chamber / 200M~1000M	+/- 3.9483
3M Semi Anechoic Chamber / 1G~8G	+/- 2.5975
3M Semi Anechoic Chamber / 8G~18G	+/- 2.6112
3M Semi Anechoic Chamber / 18G~26G	+/- 2.7389
3M Semi Anechoic Chamber / 26G~40G	+/- 2.9683

Remark: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

4. FACILITIES AND ACCREDITATIONS

4.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

- No.199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.
- No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan, R.O.C
- No.81-1, Lane 210, Bade 2nd Rd., Lujhu Township, Taoyuan County 33841, Taiwan, R.O.C
- No.989-1, Wenshan Rd., Shangshan Village, Qionglin Township, Hsinchu County 30741, Taiwan, R.O.C

4.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

5. SETUP OF EQUIPMENT UNDER TEST

5.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix I for the actual connections between EUT and support equipment.

5.2 SUPPORT EQUIPMENT

No	Equipment	Brand	Model	Series No.	FCC ID	Data Cable
1	DC Power Source	Agilent	E3640A	N/A	N/A	DC Cable 1.5m shielding
2	NB(D)	ASUS	A8J	R31018	N/A	N/A

Remark:

1. *All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.*
2. *Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*

6. TEST PROCEDURE AND RESULT

6.1 OUTPUT POWER MEASUREMENT

TEST PROCEDURES

CONDUCTED POWER MEASUREMENT:

1. The transmitter output power was connected to the call box.
2. Set EUT at maximum output power via call box.
3. Set Call box at lowest, middle and highest channels for each band and modulation.

TEST RESULTS

LTE Band 13

Band	BW (MHz)	Channel	Frequency (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Average power(dBm)	Output Power (W)
13	10	23230	782.0	QPSK	1	0	0	23.45	0.2213
					1	24	0	23.54	0.2259
					1	49	0	23.65	0.2317
					25	0	1	22.41	0.1742
					25	12	1	22.61	0.1824
					25	24	1	22.72	0.1871
					50	0	1	22.38	0.1730
				16QAM	1	0	1	22.49	0.1774
					1	24	1	22.61	0.1824
					1	49	1	22.74	0.1879
					25	0	2	21.54	0.1426
					25	12	2	21.59	0.1442
					25	24	2	21.74	0.1493
					50	0	2	21.83	0.1524

Band	BW (MHz)	Channel	Frequency (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Average power(dBm)	Output Power (W)
13	5	23205	779.5	QPSK	1	0	0	23.39	0.2183
					1	12	0	23.48	0.2228
					1	24	0	23.59	0.2286
					12	0	1	22.35	0.1718
					12	6	1	22.55	0.1799
					12	11	1	22.66	0.1845
					25	0	1	22.32	0.1706
				16QAM	1	0	1	22.43	0.1750
					1	12	1	22.55	0.1799
					1	24	1	22.68	0.1854
					12	0	2	21.48	0.1406
					12	6	2	21.53	0.1422
					12	11	2	21.68	0.1472
					25	0	2	21.77	0.1503
		23230	782.0	QPSK	1	0	0	23.46	0.2218
					1	12	0	23.37	0.2173
					1	24	0	23.57	0.2275
					12	0	1	22.33	0.1710
					12	6	1	22.53	0.1791
					12	11	1	22.64	0.1837
					25	0	1	22.30	0.1698
				16QAM	1	0	1	22.41	0.1742
					1	12	1	22.53	0.1791
					1	24	1	22.66	0.1845
					12	0	2	21.46	0.1400
					12	6	2	21.51	0.1416
					12	11	2	21.66	0.1466
					25	0	2	21.75	0.1496
		23255	784.5	QPSK	1	0	0	23.43	0.2203
					1	12	0	23.52	0.2249
1	24				0	23.63	0.2307		
12	0				1	22.39	0.1734		
12	6				1	22.59	0.1816		
12	11				1	22.70	0.1862		
25	0				1	22.36	0.1722		
16QAM	1			0	1	22.47	0.1766		
	1			12	1	22.59	0.1816		
	1			24	1	22.72	0.1871		
	12			0	2	21.52	0.1419		
	12			6	2	21.57	0.1435		
	12			11	2	21.72	0.1486		
	25			0	2	21.81	0.1517		

6.2 ERP & EIRP MEASUREMENT

LIMIT

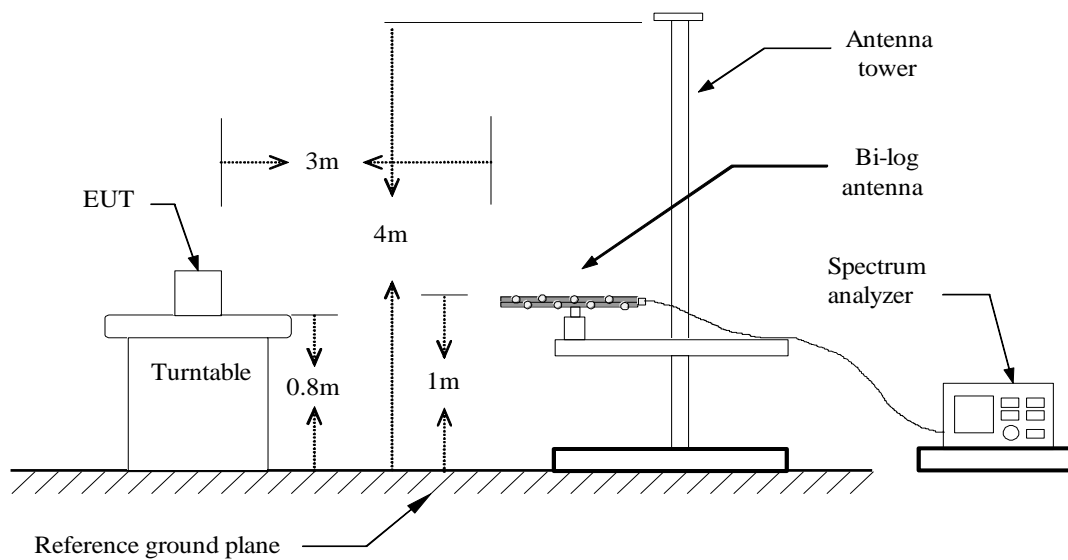
According to FCC §2.1046

FCC 27.50 (b) (10): The portable stations (hand-held devices) in the 600MHz uplink band and the 698-746MHz band, and fixed and mobile stations in the 600MHz uplink band are limited to 3 Watts ERP.

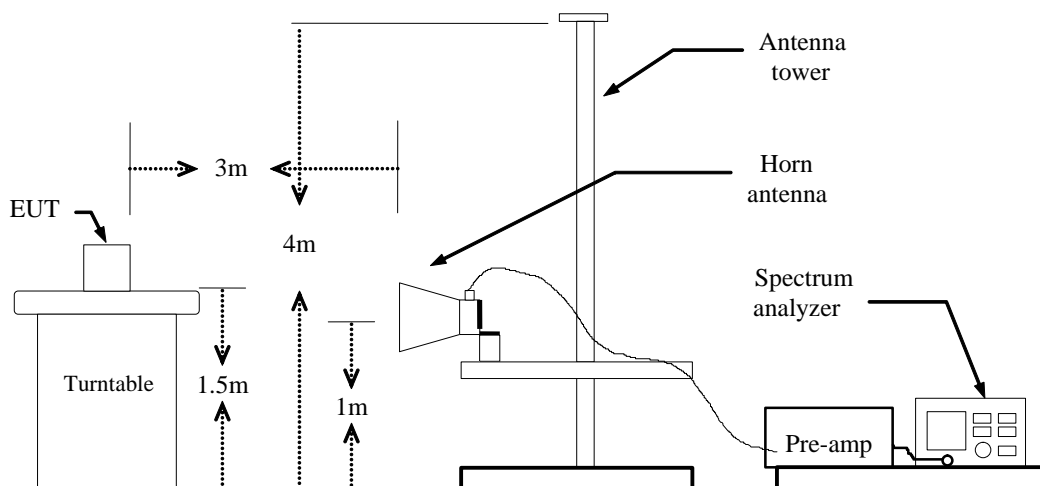
FCC 27.50 (d) (4): Fixed, mobile, and portable (handheld)stations operating in the 1710-1755MHz band and mobile and portable stations operating in the 1695-1710MHz and 1755-1780MHz bands are limited to 1 watt EIRP.

Test Configuration

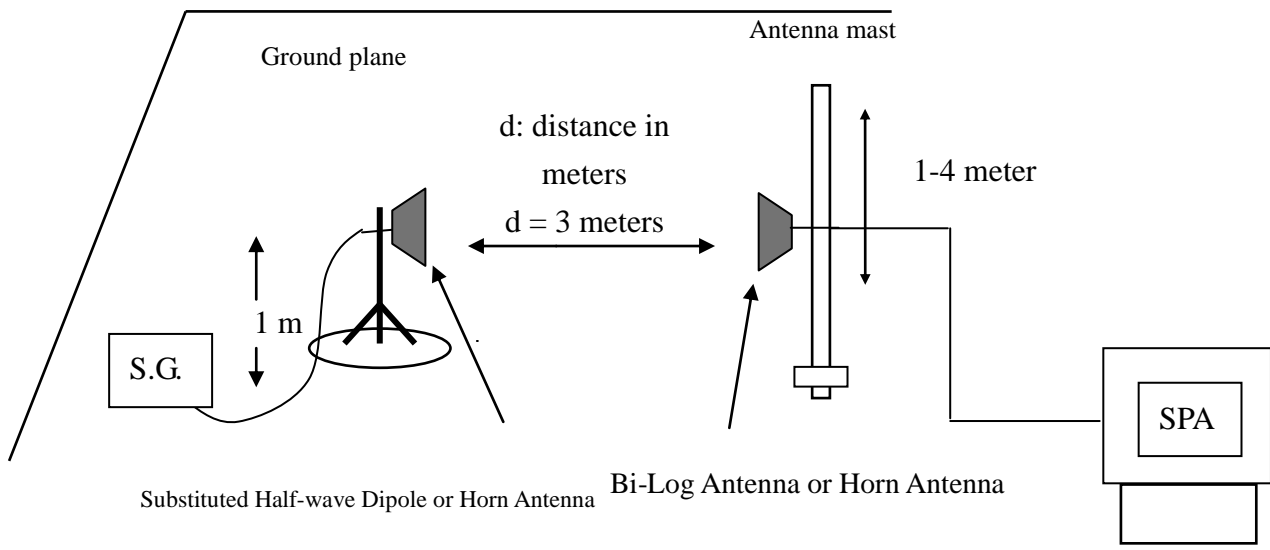
Below 1 GHz



Above 1 GHz



For Substituted Method Test Set-UP



TEST PROCEDURE

1. The EUT was placed on a non-conductive rotating platform (0.8m for below 1G and 1.5m for above 1G) in a semi-chamber. The radiated emission at the fundamental frequency was measured at 3m and SA with RMS detector per photograph 5, KDB 971168 D01.
2. During the measurement, the call box parameters were set to get the maximum output power of the EUT. The maximum emission was recorded from spectrum analyzer power level (LVL) from 360 degrees rotation of turntable and the test antenna raised and lowered over a range from 1m to 4m in both horizontally and vertically polarized orientations.
3. EIRP was measured method according to TIA/EIA-603-D:2010. The EUT was replaced by the substitution antenna at same location, and then record the maximum Analyzer reading through raised and lowered the test antenna.

$$ERP = \text{S.G. output (dBm)} + \text{Antenna Gain (dBi)} - \text{Cable (dB)} - 2.15$$

$$EIRP = \text{S.G. output (dBm)} + \text{Antenna Gain (dBi)} - \text{Cable (dB)}$$

TEST RESULTS

No non-compliance noted.

ERP POWER

LTE Band 13

BW: 5MHz / RB=1, RB Offset=0

Band	BW (MHz)	Channel	Mode	UL RB Allocation	UL RB offset	Vertical		Horizontal	
						EIRP (dBm)	EIRP (W)	EIRP (dBm)	EIRP (W)
13	5	Lowest	QPSK	1	0	31.30	1.348	21.35	0.136
		Middle		1	0	31.58	1.438	21.82	0.152
		Highest		1	0	32.05	1.603	29.51	0.893
		Lowest	16 QAM	1	0	22.69	0.185	29.55	0.901
		Middle		1	0	23.26	0.211	29.28	0.847
		Highest		1	0	23.66	0.232	29.47	0.885

BW: 10MHz / RB=1, RB Offset=0

Band	BW (MHz)	Channel	Mode	UL RB Allocation	UL RB offset	Vertical		Horizontal	
						EIRP (dBm)	EIRP (W)	EIRP (dBm)	EIRP (W)
13	10	Middle	QPSK	1	0	25.71	0.372	27.34	0.542
		Middle	16 QAM	1	0	26.91	0.490	28.09	0.644

6.3 FREQUENCY STABILITY MEASUREMENT

LIMIT

According to the FCC part 27.54 shall be tested the frequency stability. The rule is defined that” The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

TEST PROCEDURE

Use Anritsu 8820 with frequency Error measurement capability.

Temp = -30 to +50°C

Voltage= 85% to 115% of the nominal value for AC powered equipment.

NOTE: *The frequency error was recorded frequency error from the communication simulator.*

TEST RESULTS

FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT:

LTE Band 13

Reference Frequency: LTE Band 13 Max Bandwidth QPSK, 782MHz				
Limit: ± 2.5 ppm = 1955Hz				
Power Supply	Environment	Frequency Error	Frequency Error	Limit (ppm)
Vdc	Temperature (°C)	(Hz)	(ppm)	(ppm)
12	50	0.02	0.000026	+/- 2.5
12	40	0.03	0.000038	
12	30	-0.01	-0.000009	
12	20	0.02	0.000026	
12	10	0.03	0.000038	
12	0	0.01	0.000013	
12	-10	-0.01	-0.000013	
12	-20	-0.02	-0.000026	

Reference Frequency: LTE Band 13 Max Bandwidth 16QAM, 782MHz				
Limit: ± 2.5 ppm = 1955Hz				
Power Supply	Environment	Frequency Error	Frequency Error	Limit (ppm)
Vdc	Temperature (°C)	(Hz)	(ppm)	(ppm)
12	50	0.01	0.000013	+/- 2.5
12	40	0.03	0.000038	
12	30	0.03	0.000038	
12	20	0.02	0.000026	
12	10	0.01	0.000018	
12	0	0.01	0.000012	
12	-10	-0.01	-0.000013	
12	-20	-0.01	-0.000013	

FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT:

LTE Band 13

Reference Frequency: LTE Band 13 Max Bandwidth QPSK, MHz				
Limit: ± 2.5 ppm = Hz				
Power Supply	Environment	Frequency Error	Frequency Error	Limit (ppm)
Vdc	Temperature (°C)	(Hz)	(ppm)	(ppm)
10.2	20	0.01	0.000008	+/- 2.5
12	20	0.02	0.000026	
13.8	20	0.01	0.000007	

Reference Frequency: LTE Band 13 Max Bandwidth 16QAM, MHz				
Limit: ± 2.5 ppm = Hz				
Power Supply	Environment	Frequency Error	Frequency Error	Limit (ppm)
Vdc	Temperature (°C)	(Hz)	(ppm)	(ppm)
10.2	20	0.02	0.000026	+/- 2.5
12	20	0.02	0.000026	
13.8	20	0.01	0.000012	

6.4 OCCUPIED BANDWIDTH MEASUREMENT

LIMITS

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 power of a given emission.

TEST PROCEDURES

KDB 971168 v02r02 - Section 4.2

1. The occupied bandwidth was measured with the spectrum analyzer at the lowest, middle and highest channels in each band and different modulation. The 99% and -26dB bandwidth was measured and recorded.
2. RBW = 1-5% of the expected OBW
3. VBW \geq 3 x RBW
4. Detector = Peak
5. Trace mode = max. hold

TEST RESULTS

LTE Band 13

CHANNEL BANDWIDTH: 5MHz / QPSK

Channel	FREQUENCY (MHz)	Occupied bandwidth (MHz)
23230	782.00	4.4862

CHANNEL BANDWIDTH: 10MHz / QPSK

Channel	FREQUENCY (MHz)	Occupied bandwidth (MHz)
23230	782.00	8.9146

CHANNEL BANDWIDTH: 5MHz / 16QAM

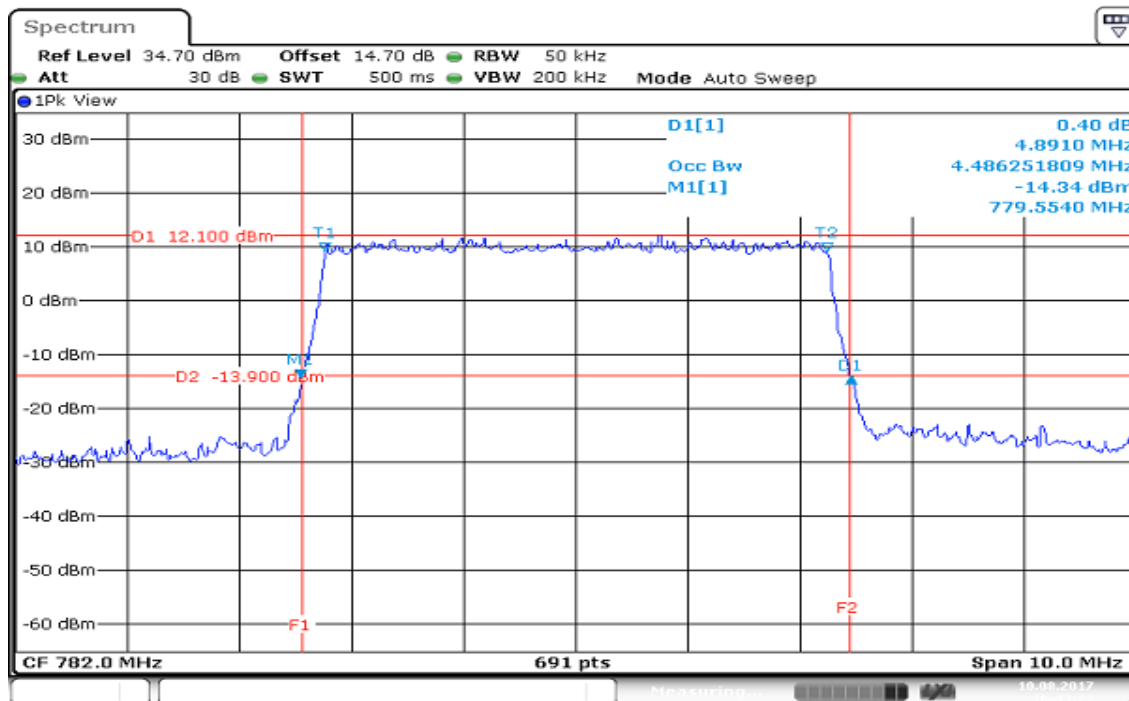
Channel	FREQUENCY (MHz)	Occupied bandwidth (MHz)
23230	782.00	4.4862

CHANNEL BANDWIDTH: 10MHz / 16QAM

Channel	FREQUENCY (MHz)	Occupied bandwidth (MHz)
23230	782.00	8.9146

LTE Band 13
CHANNEL BANDWIDTH: 5MHz / QPSK

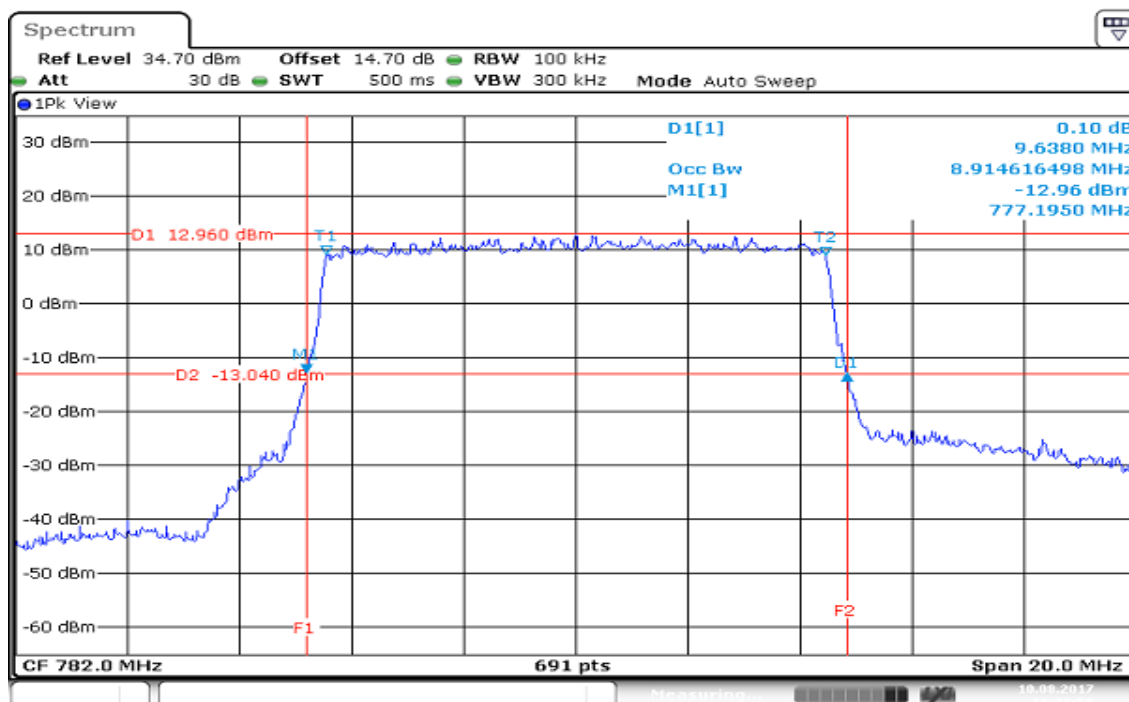
CH Mid



Date: 10 AUG 2017 16:43:23

CHANNEL BANDWIDTH: 10MHz / QPSK

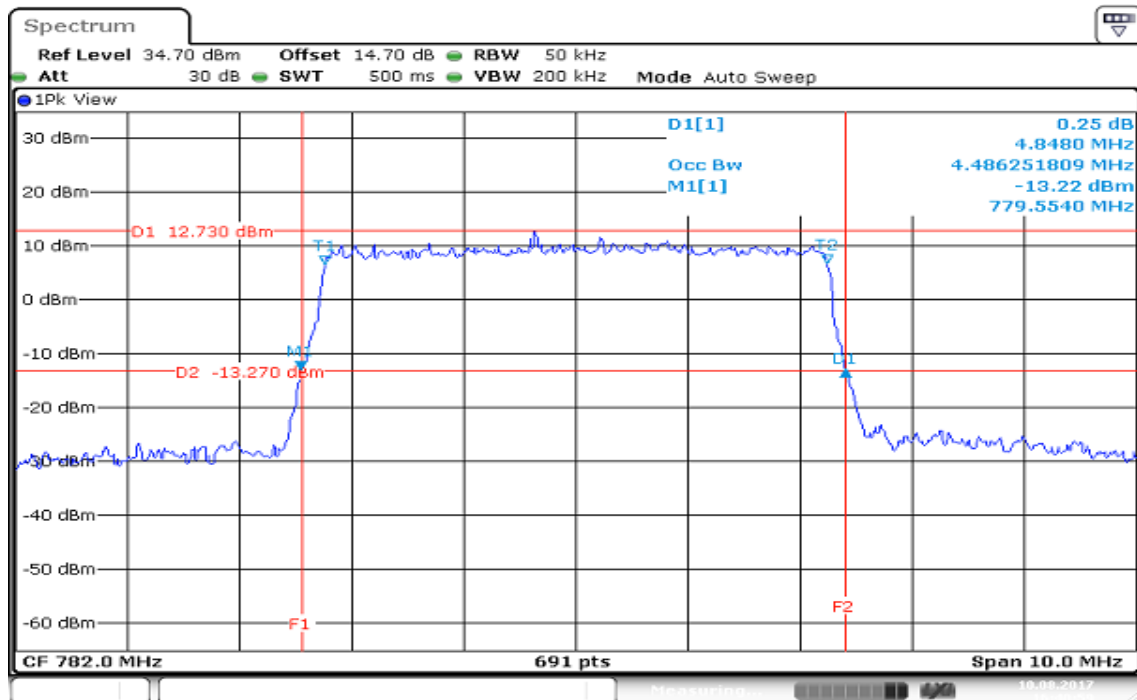
CH Mid



Date: 10 AUG 2017 16:38:56

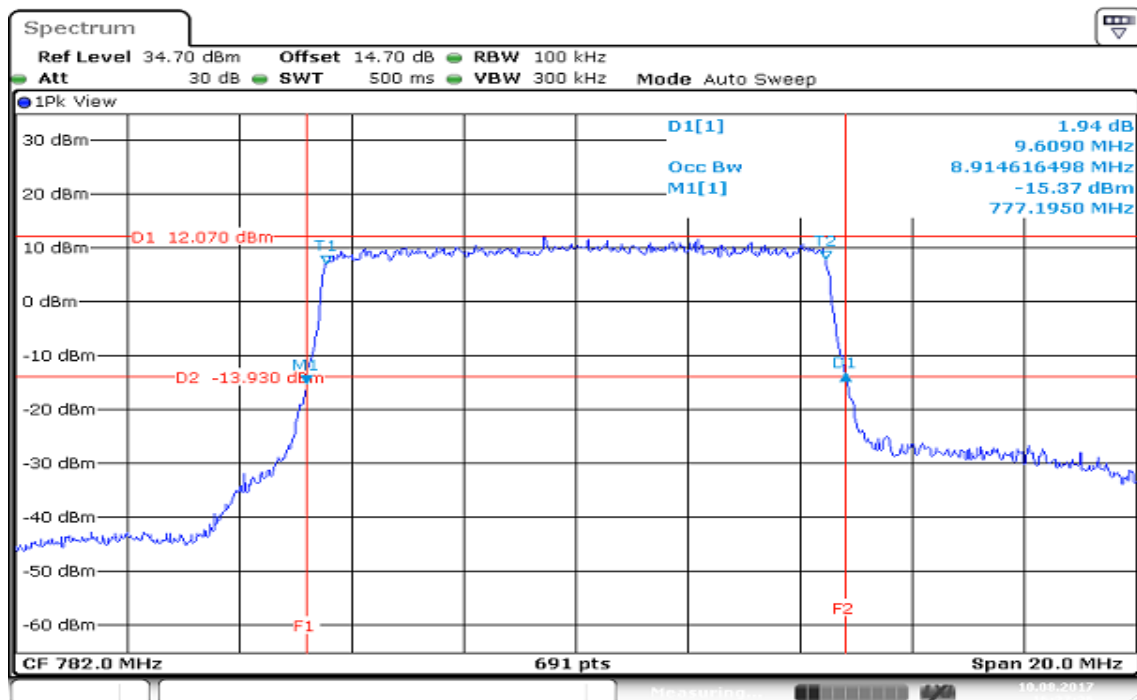
CHANNEL BANDWIDTH: 5MHz / 16QAM

CH Min



CHANNEL BANDWIDTH: 10MHz / 16QAM

CH Min



6.5 PEAK TO AVERAGE POWER RATIO

LIMIT

FCC §27.50(a)

In measuring transmissions in this band using an average power technique, peak-to-average power ratio (PAPR) of the transmission may not exceed 13 dB.]

TEST PROCEDURES

1. According to KDB 971168D01, photograph 5.7.1
2. The EUT was connect to spectrum analyzer and call box.
3. Set the CCDF function in spectrum analyzer.
4. The highest RF output power were measured and recorded the maximum PAPR level associated with a probability of 0.1%.
5. Record the Peak to Average Power Ratio.

TEST RESULTS

LTE Band 13

CHANNEL BANDWIDTH: 5MHz / QPSK / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
23230	782.00	4.78

CHANNEL BANDWIDTH: 10MHz / QPSK / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
23230	782.00	3.86

CHANNEL BANDWIDTH: 5MHz / QPSK / 100%RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
23230	782.00	4.52

CHANNEL BANDWIDTH: 10MHz / QPSK / 100%RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
23230	782.00	4.96

CHANNEL BANDWIDTH: 5MHz / 16QAM / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
23230	782.00	5.39

CHANNEL BANDWIDTH: 10MHz / 16QAM / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
23230	782.00	4.17

CHANNEL BANDWIDTH: 5MHz / 16QAM / 100%RB

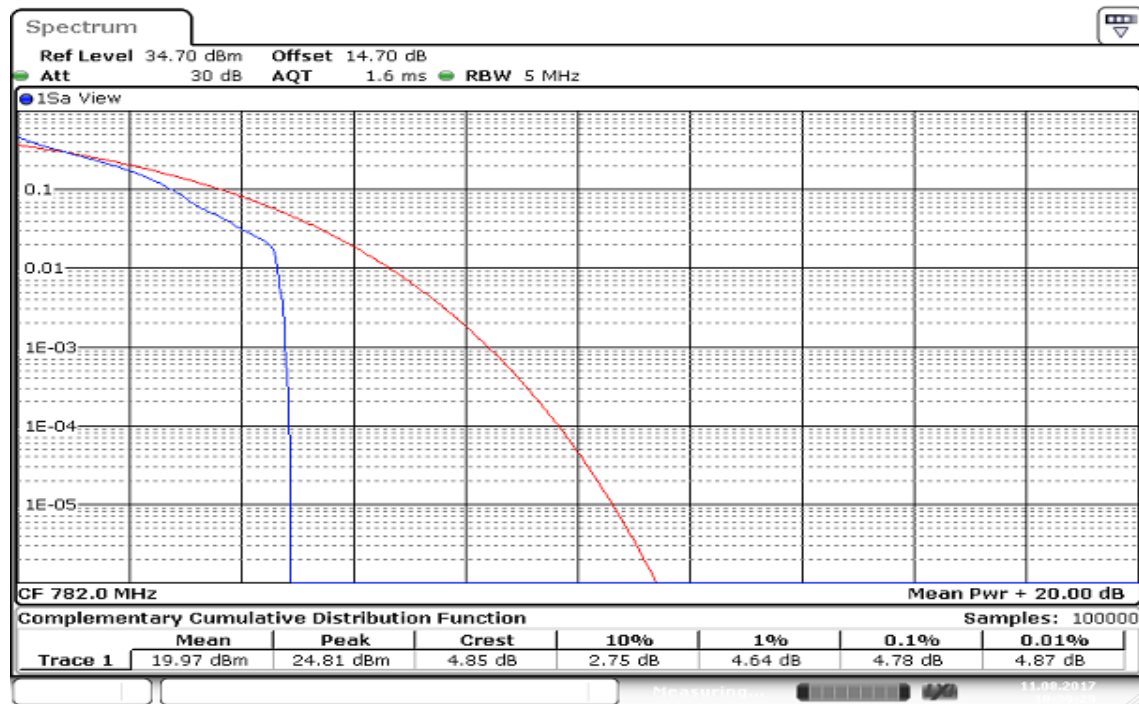
Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
23230	782.00	4.52

CHANNEL BANDWIDTH: 10MHz / 16QAM / 100%RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
23230	782.00	6.09

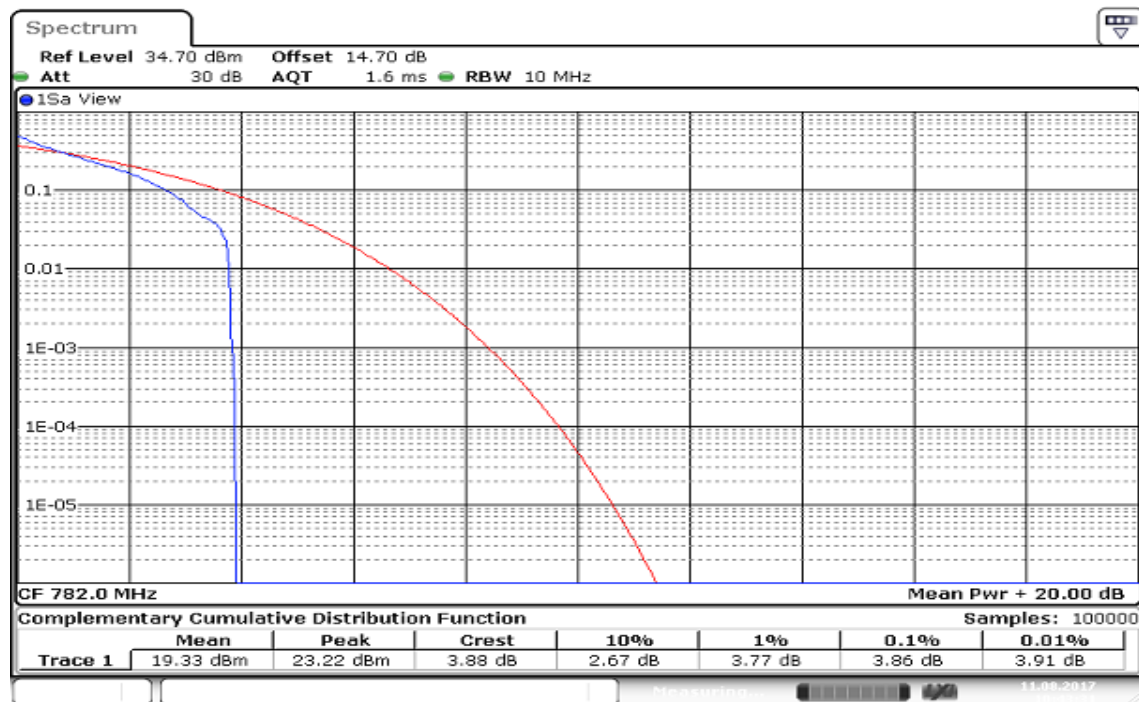
TE Band 13

CHANNEL BANDWIDTH: 5MHz / QPSK/ 1RB .



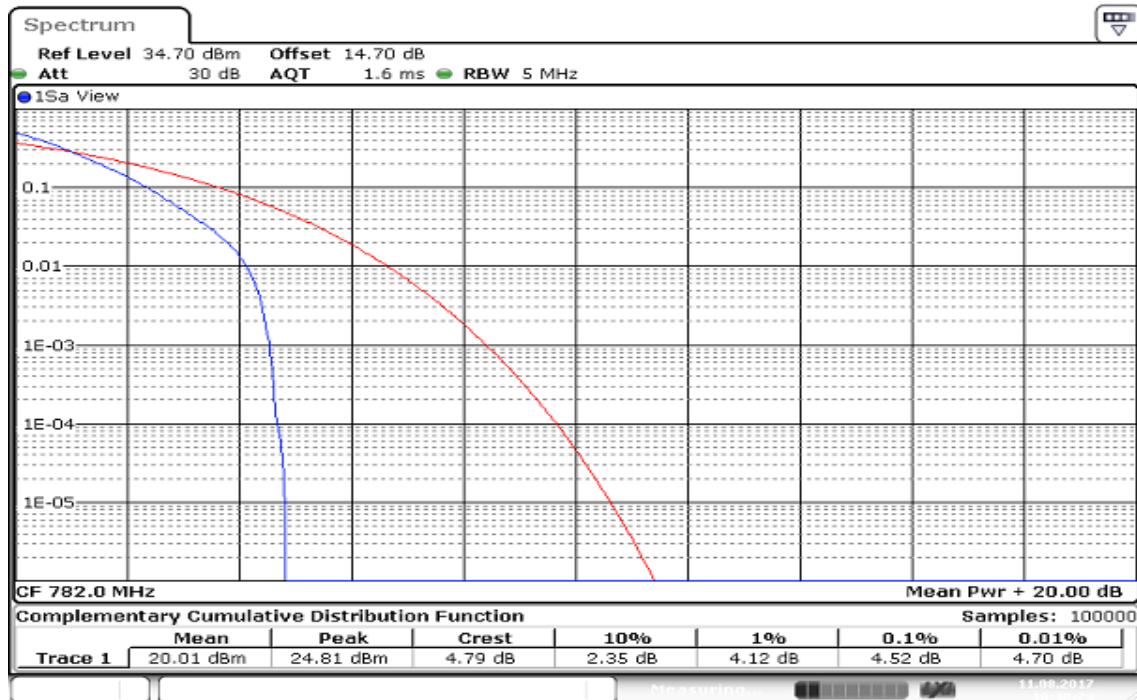
Date: 11 AUG 2017 10:29:29

CHANNEL BANDWIDTH: 10MHz / QPSK/ 1RB



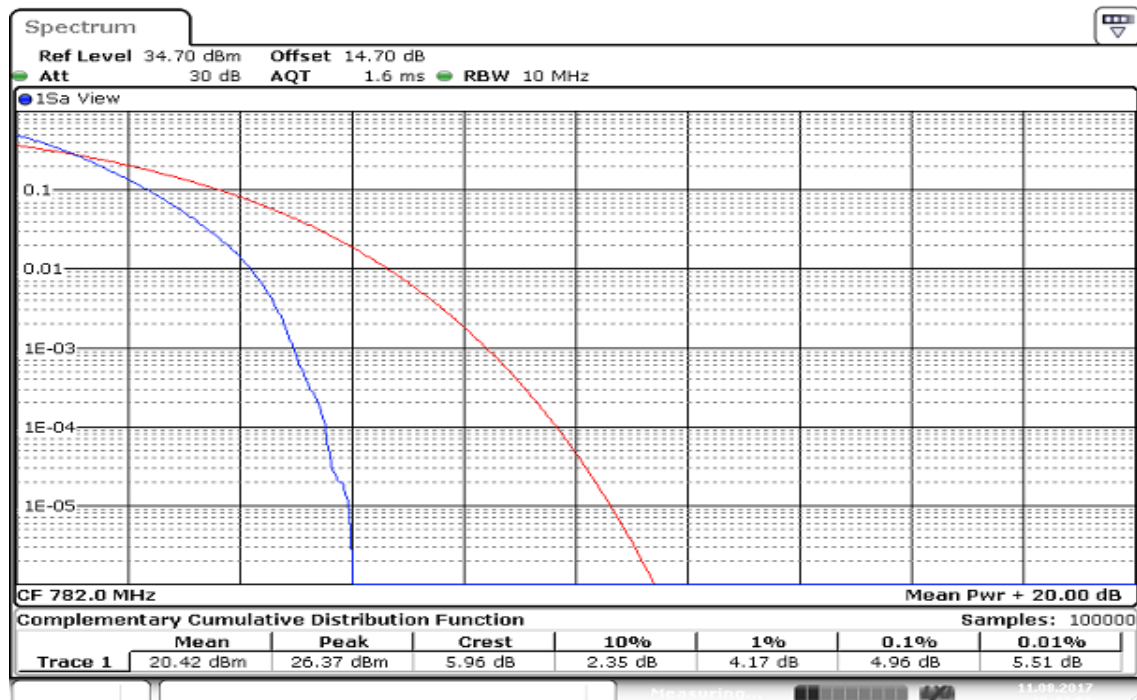
Date: 11 AUG 2017 10:43:21

CHANNEL BANDWIDTH: 5MHz / QPSK/ 100%RB



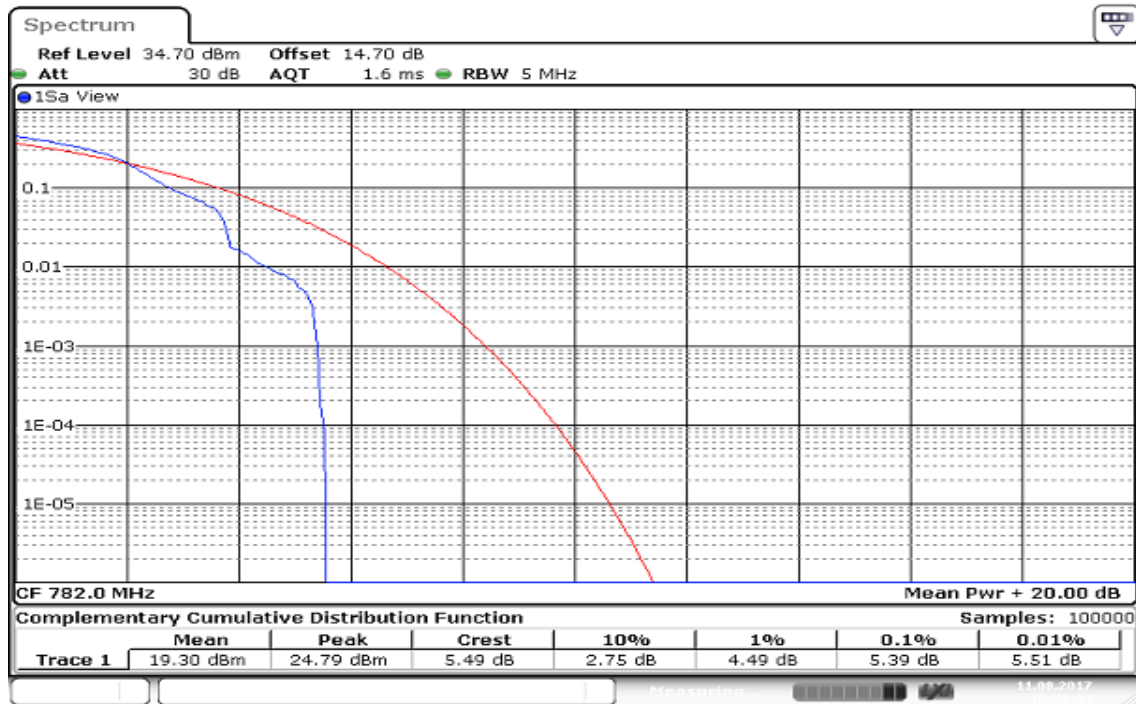
Date: 11 AUG 2017 10:40:24

CHANNEL BANDWIDTH: 10MHz / QPSK/ 100%RB



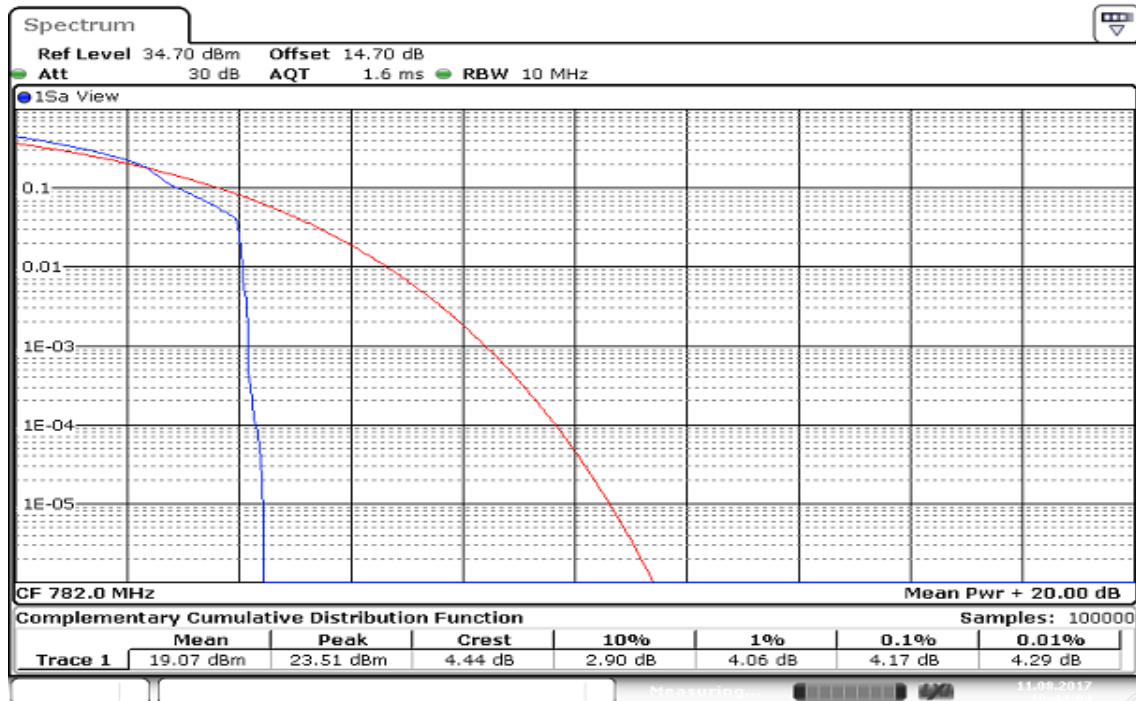
Date: 11 AUG 2017 10:42:56

CHANNEL BANDWIDTH: 5MHz / 16QAM / 1RB



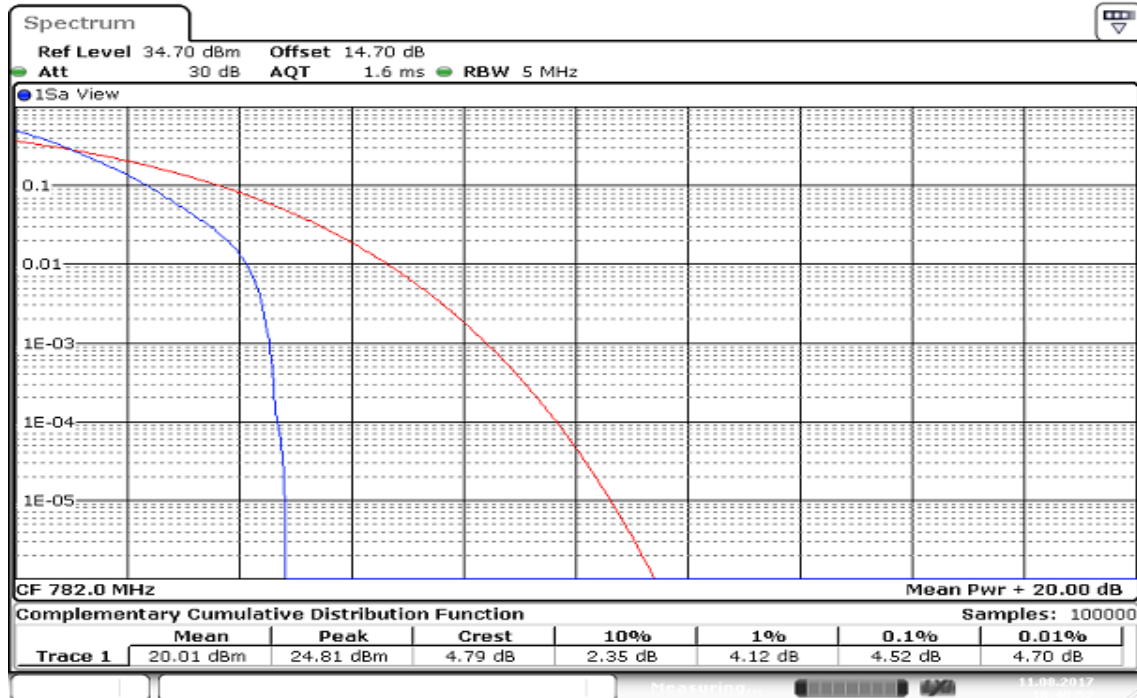
Date: 11 AUG 2017 10:42:05

CHANNEL BANDWIDTH: 10MHz / 16QAM / 1RB



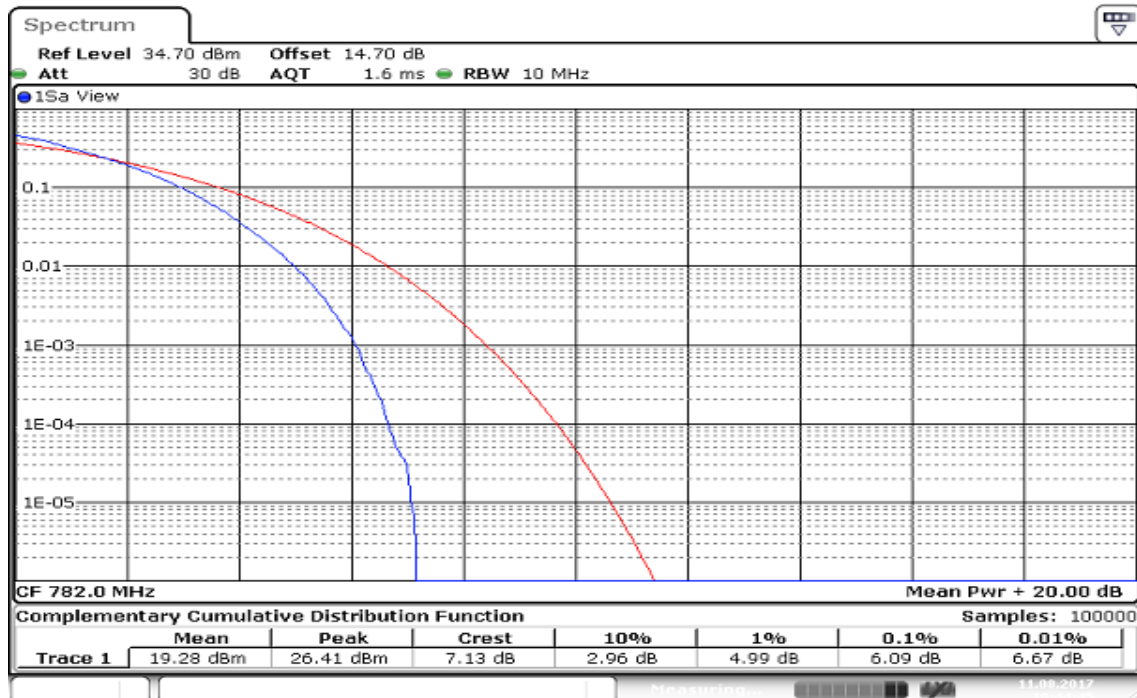
Date: 11 AUG 2017 10:44:04

CHANNEL BANDWIDTH: 5MHz / 16QAM / 100%RB



Date: 11 AUG 2017 10:40:52

CHANNEL BANDWIDTH: 10MHz / 16QAM / 100%RB



Date: 11 AUG 2017 10:44:46

6.6 BAND EDGE MEASUREMENT

LIMIT

Part 27.53 (C)(2)

On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB.

TEST PROCEDURES

KDB 971168 v02r02 - Section 6.0

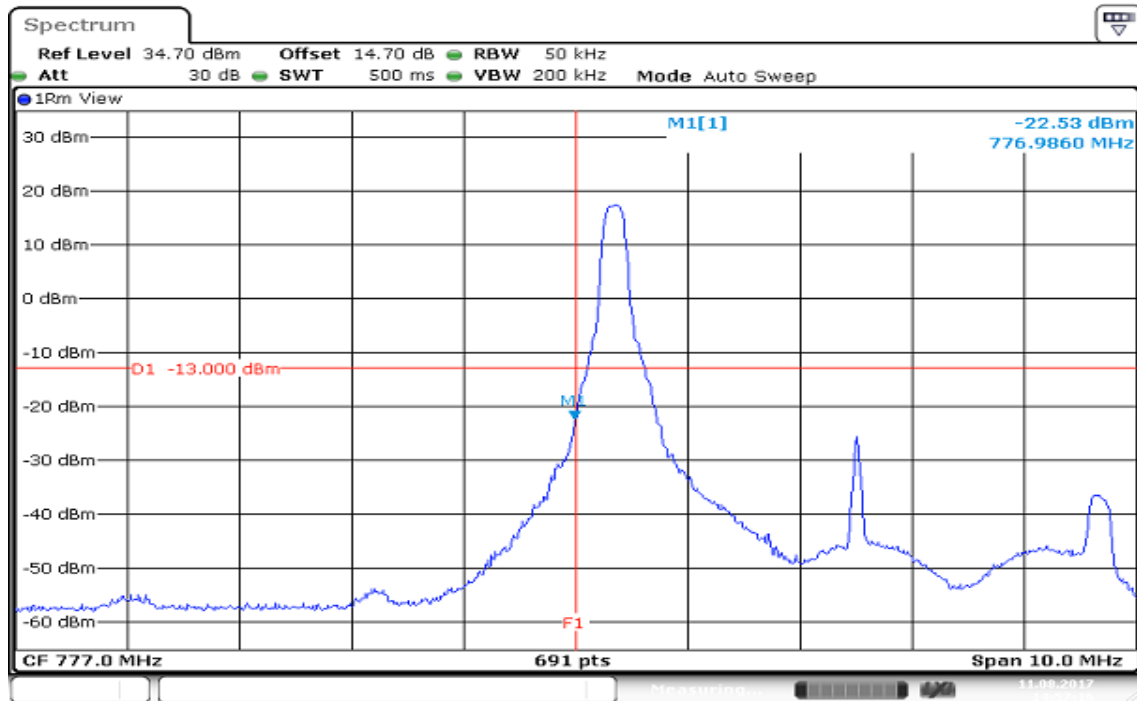
1. RBW \geq 1% of the emission bandwidth
2. VBW \geq 3 x RBW
3. Span was set large enough so as to capture all out of emissions near the band edge.

TEST RESULTS:

LTE Band 13

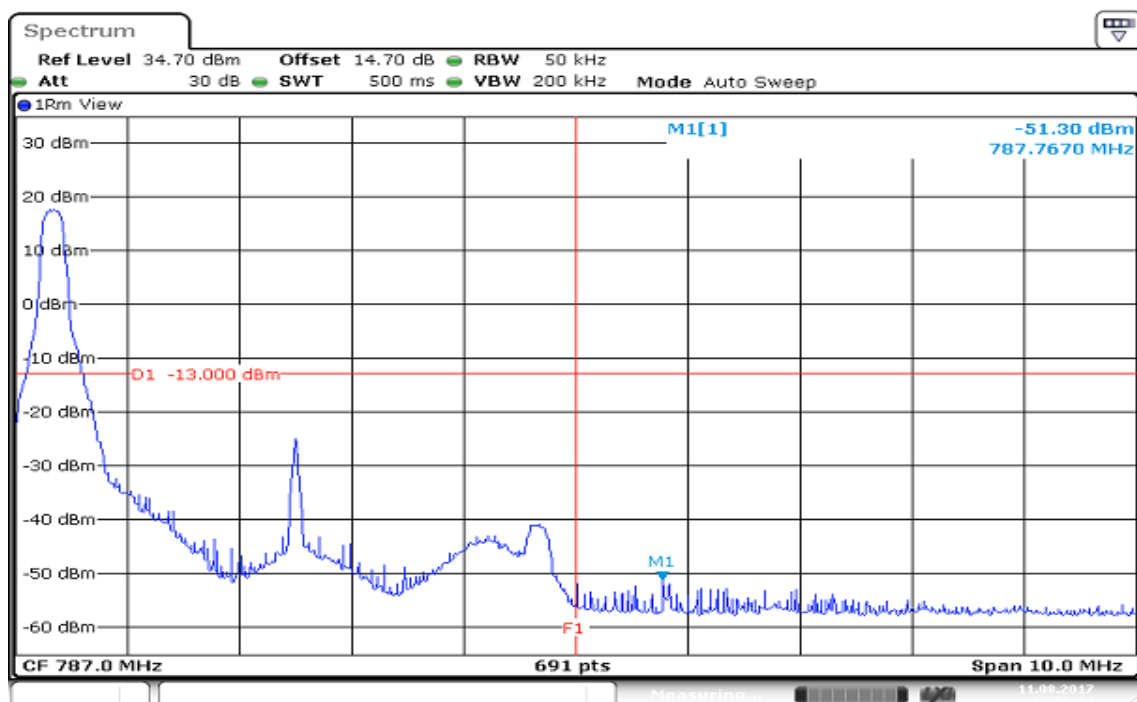
CHANNEL BANDWIDTH: 5MHz / QPSK / 1 RB ALLOCATED

LOWER BAND EDGE



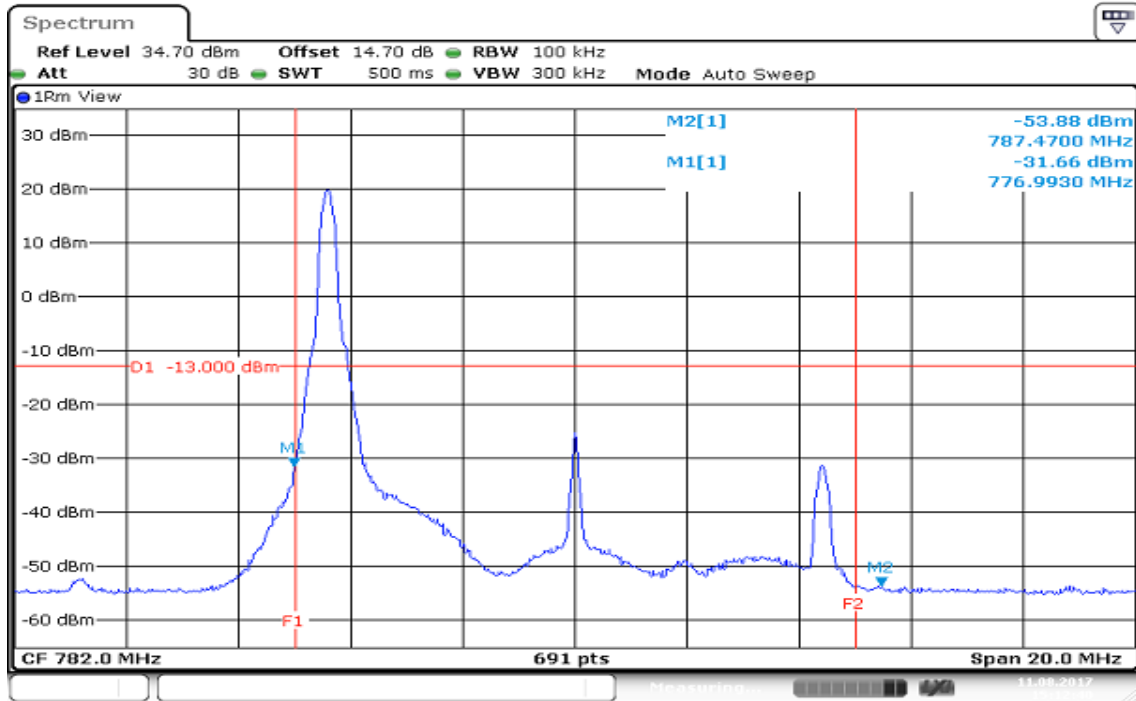
Date: 11 AUG 2017 14:57:16

HIGHER BAND EDGE



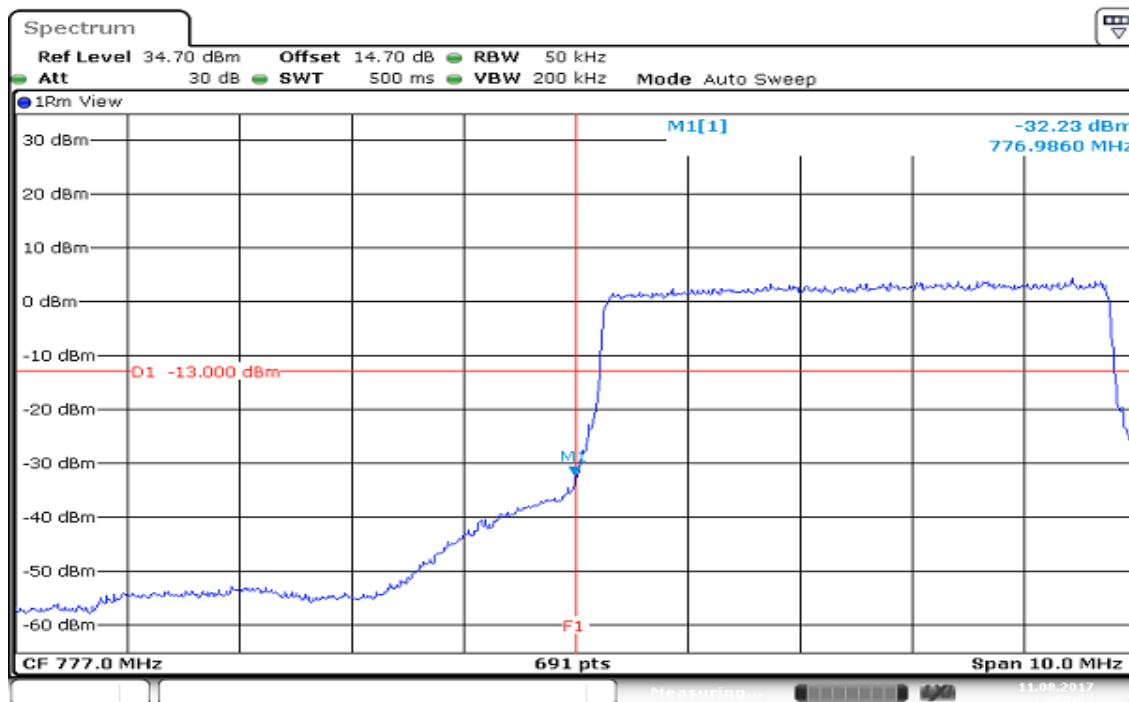
Date: 11 AUG 2017 15:06:17

CHANNEL BANDWIDTH: 10MHz / QPSK / 1 RB ALLOCATED
Mid BAND EDGE



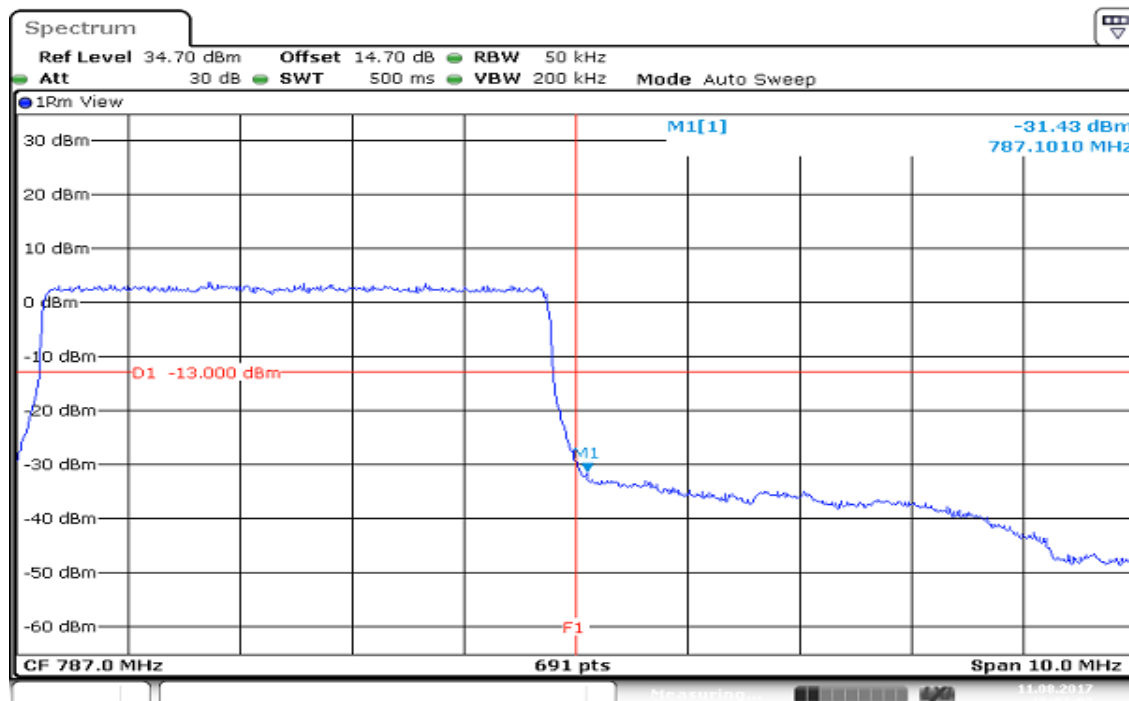
Date: 11 AUG 2017 15:12:41

**CHANNEL BANDWIDTH: 5MHz / QPSK / FULL RB ALLOCATED
 LOWER BAND EDGE**



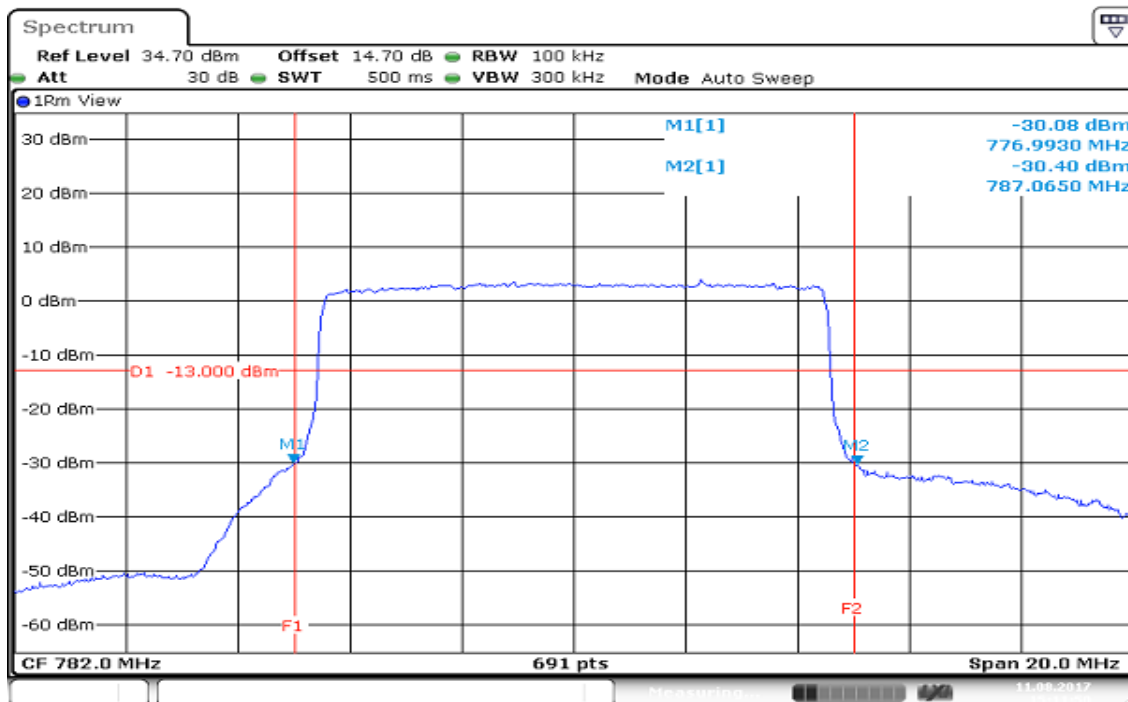
Date: 11 AUG 2017 14:58:54

HIGHER BAND EDGE



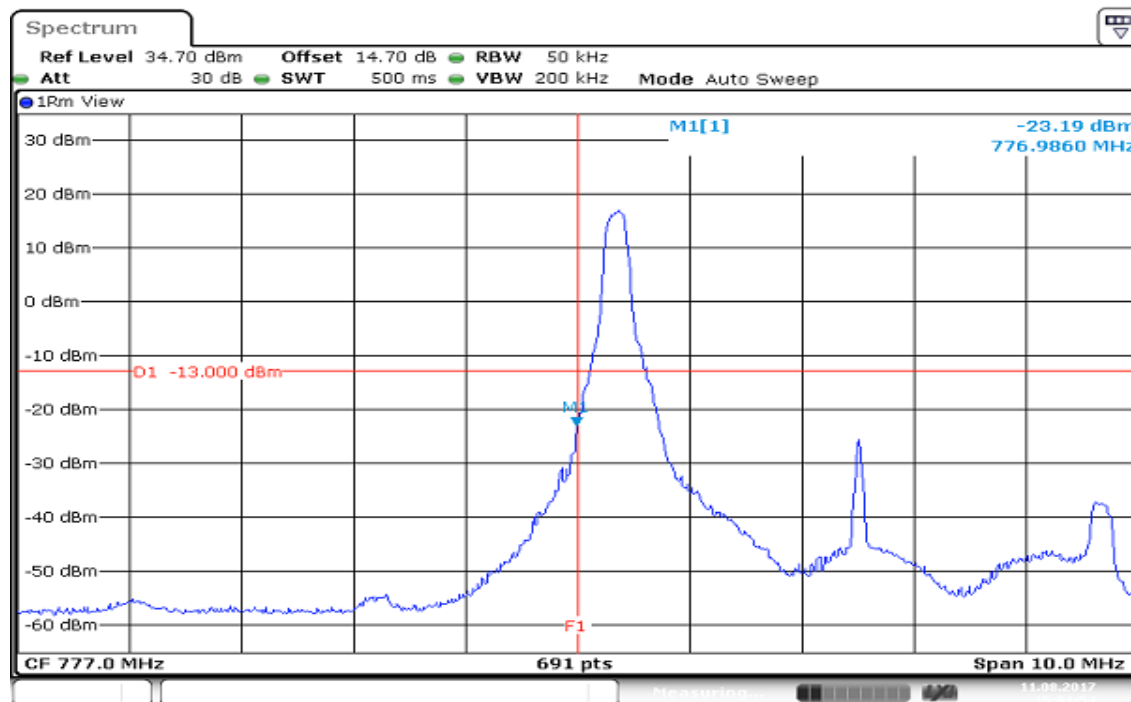
Date: 11 AUG 2017 15:07:03

CHANNEL BANDWIDTH: 10MHz / QPSK / FULL RB ALLOCATED
Mid BAND EDGE

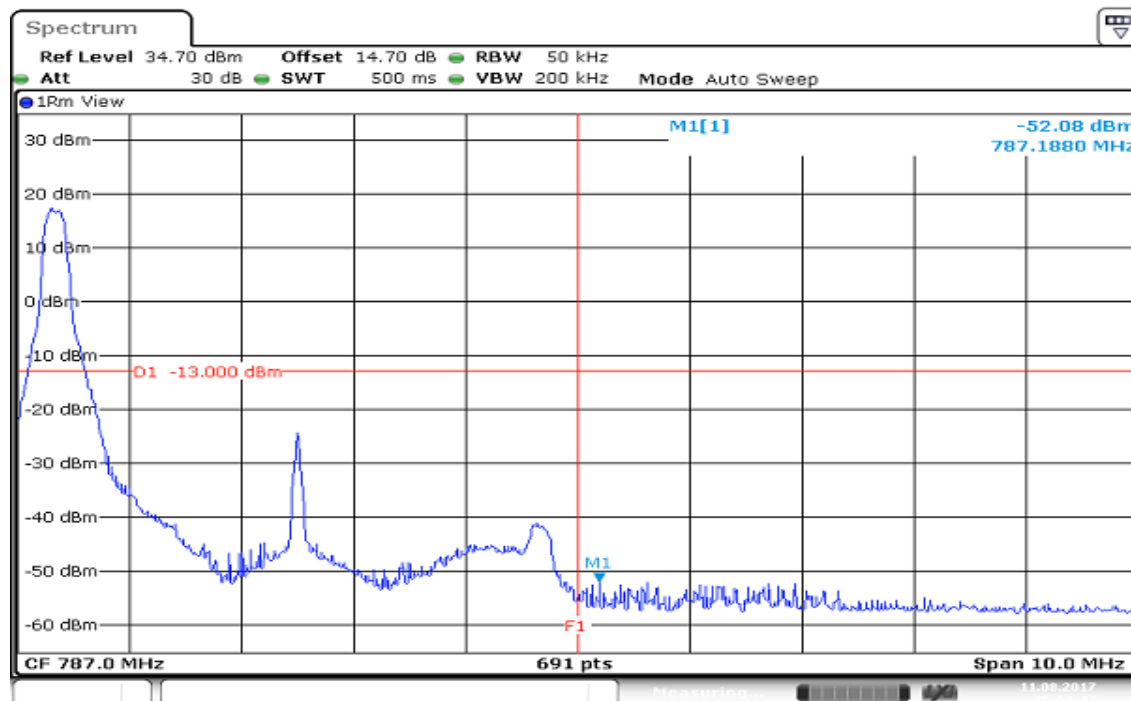


Date: 11.AUG.2017 15:11:50

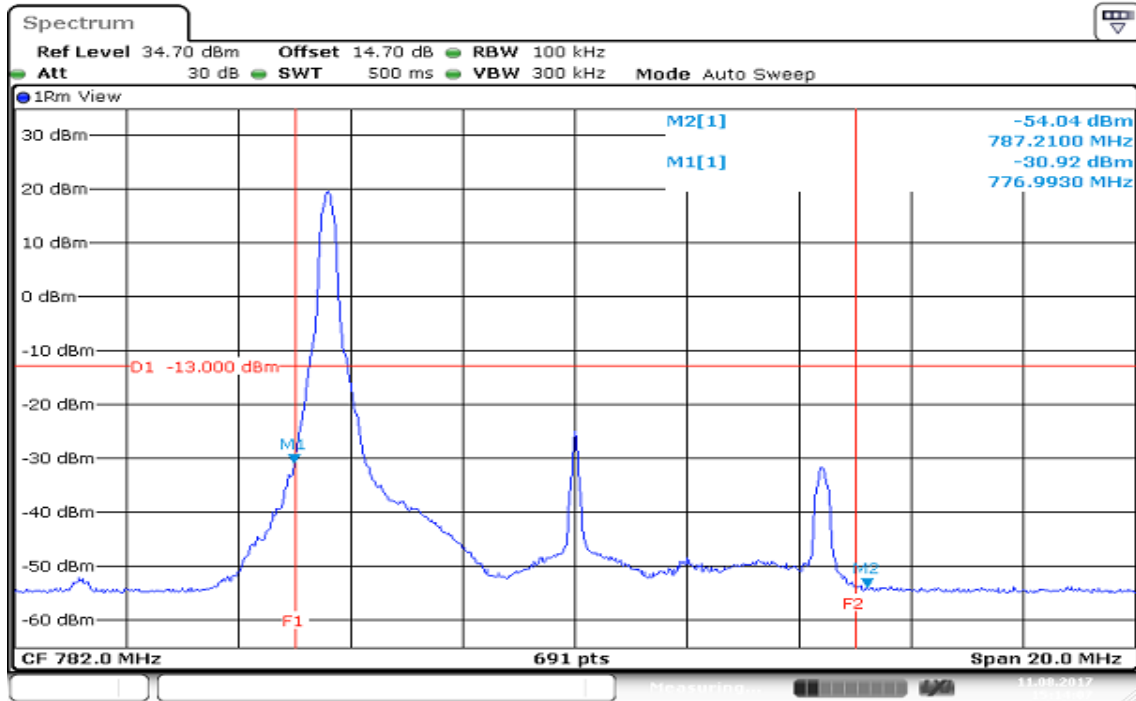
**CHANNEL BANDWIDTH: 5MHz / 16QAM / 1RB ALLOCATED
 LOWER BAND EDGE**



HIGHER BAND EDGE

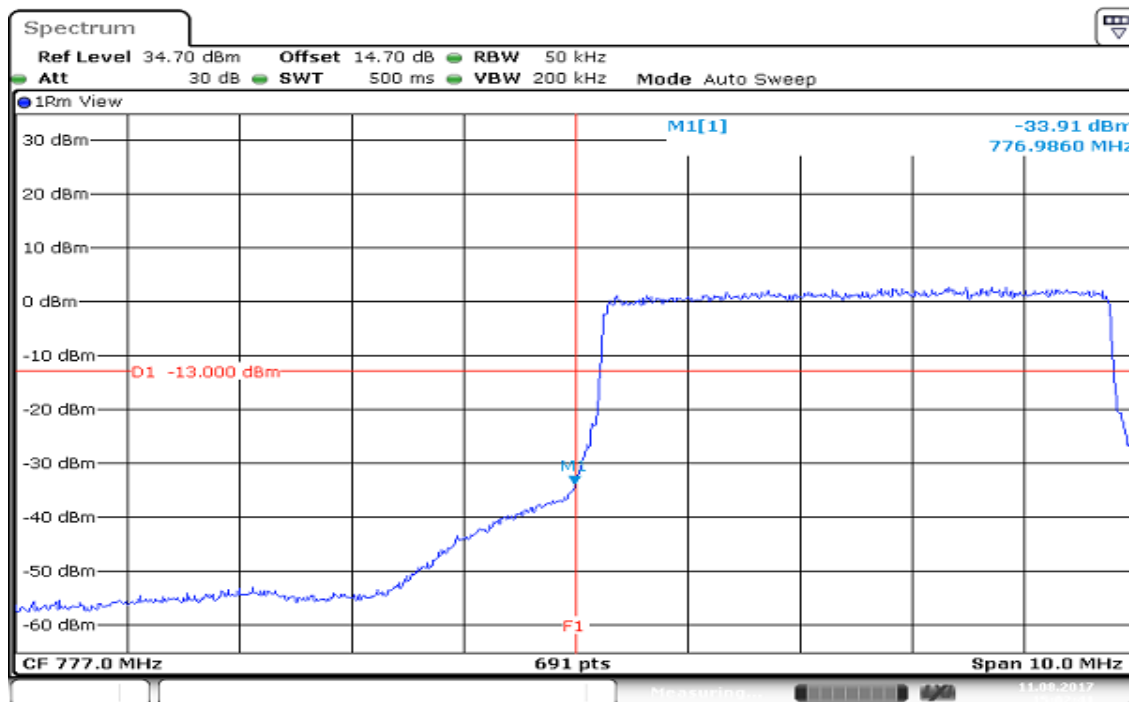


CHANNEL BANDWIDTH: 10MHz / 16QAM / 1RB ALLOCATED
Mid BAND EDGE

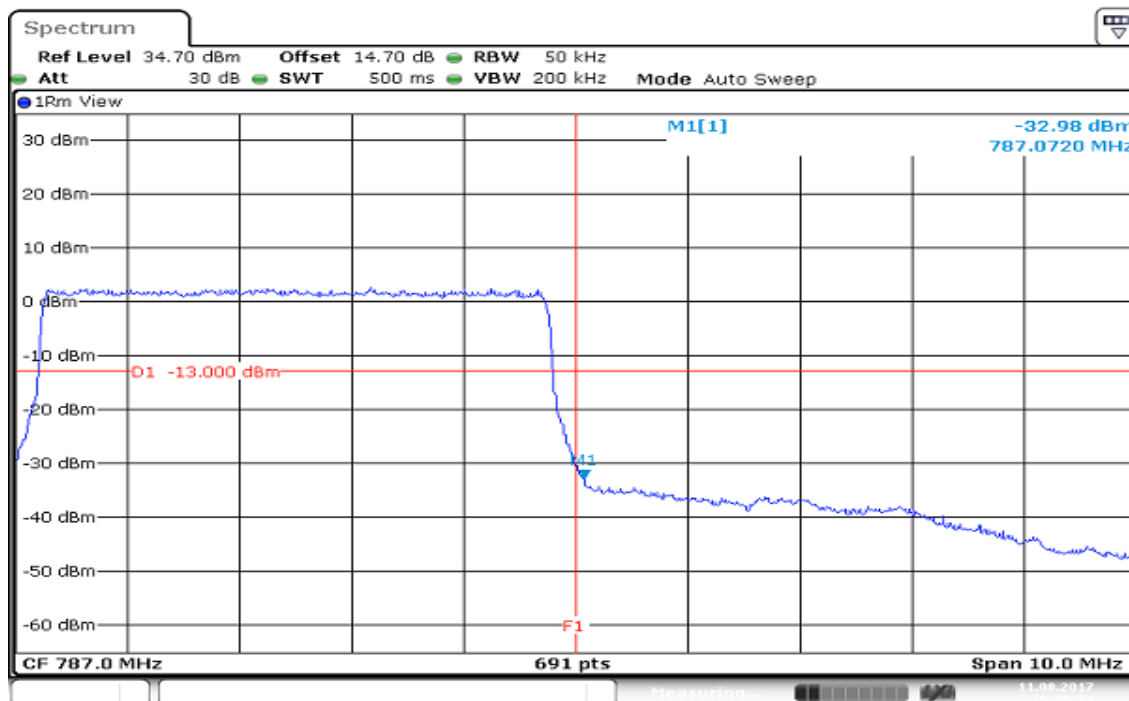


Date: 11 AUG 2017 15:14:07

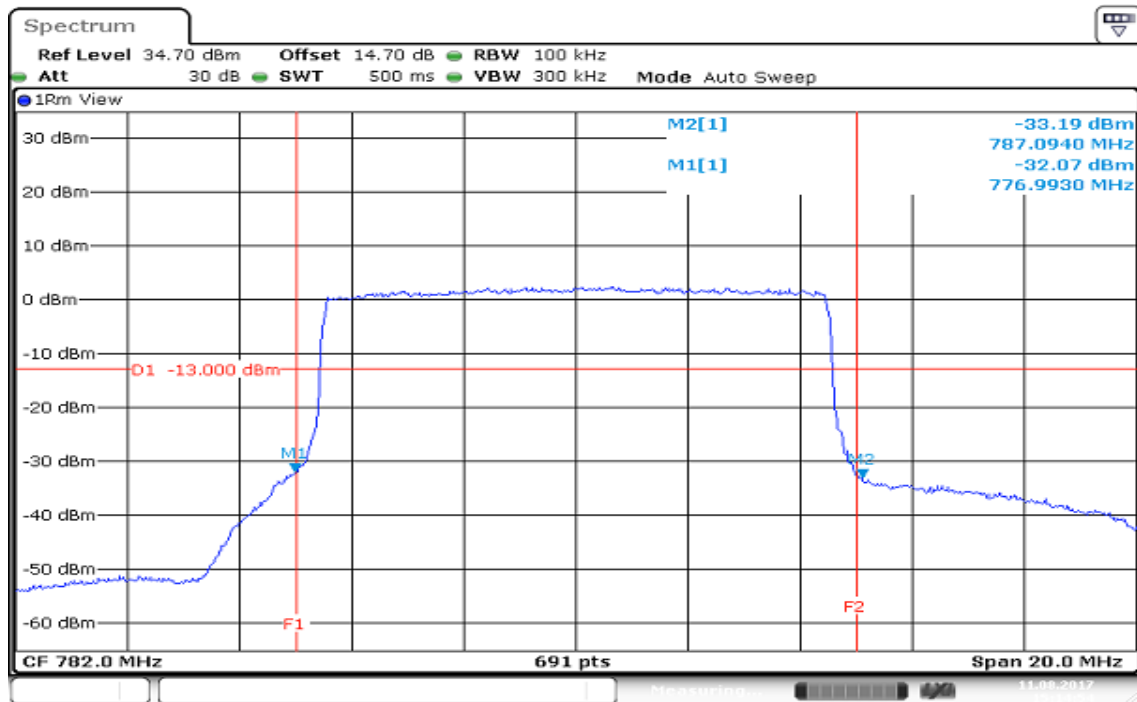
**CHANNEL BANDWIDTH: 5MHz / 16QAM / FULLRB ALLOCATED
 LOWER BAND EDGE**



HIGHER BAND EDGE



CHANNEL BANDWIDTH: 10MHz / 16QAM / FULLRB ALLOCATED Mid BAND EDGE



Date: 11 AUG 2017 15:14:54

6.7 CONDUCTED SPURIOUS EMISSIONS

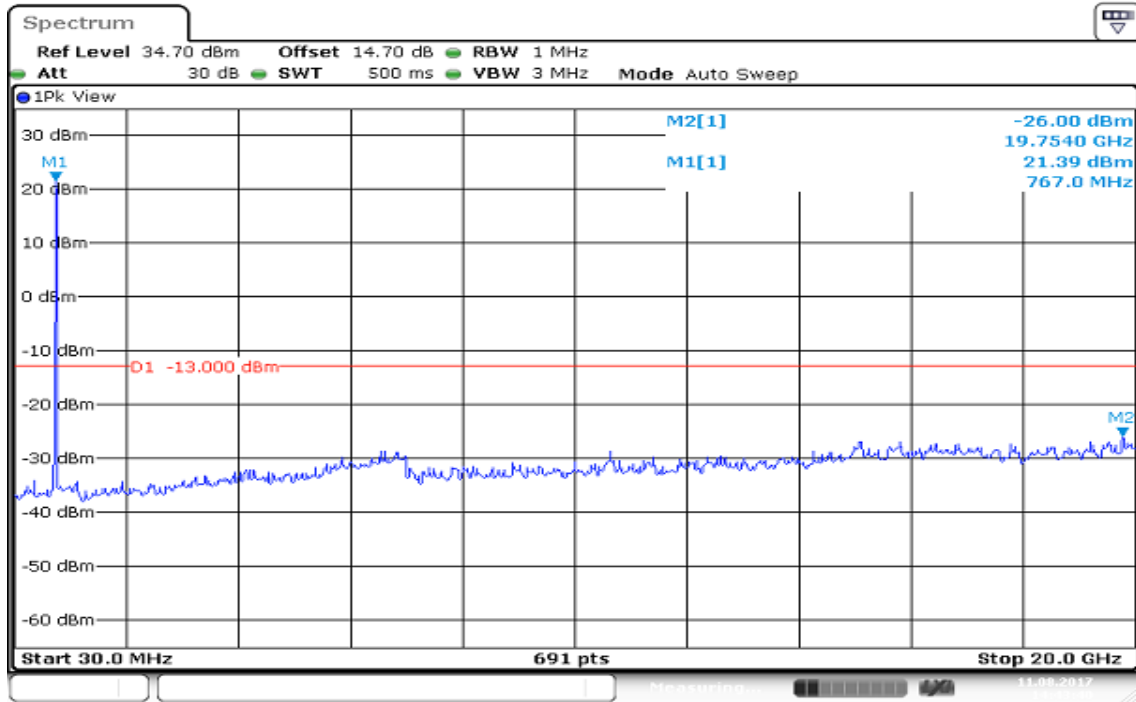
LIMITS

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $43 + 10 \log_{10}(P)$ dB. The limit of emission equal to -13dBm

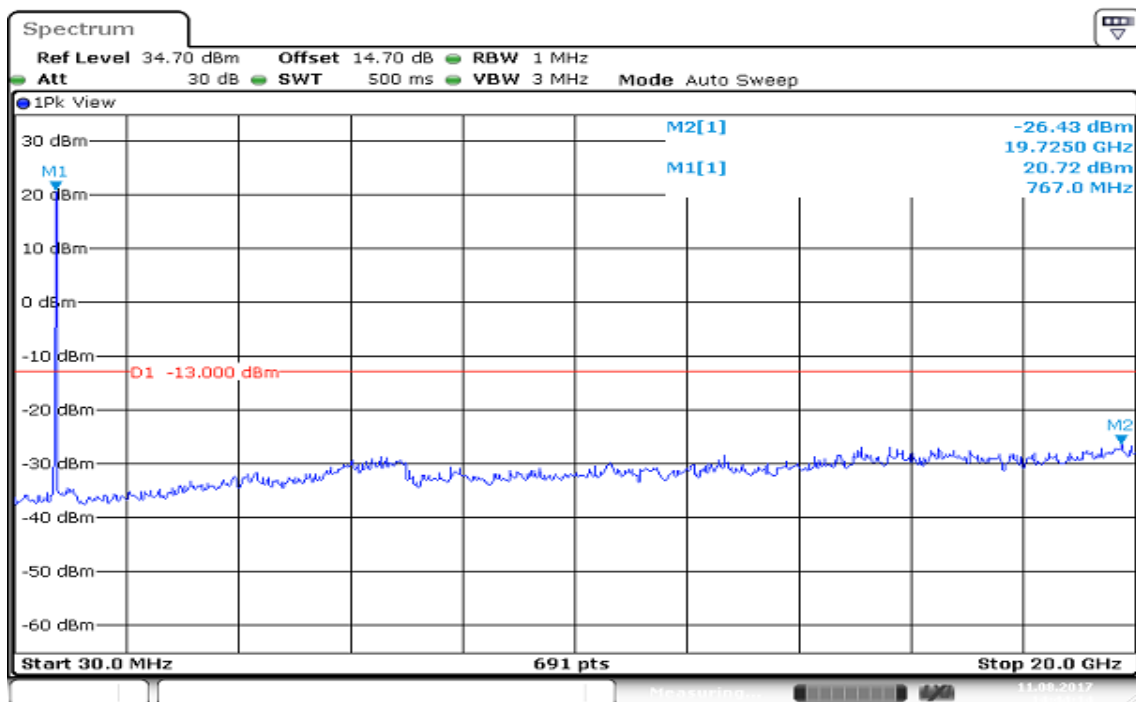
TEST PROCEDURES

1. According to KDB 971168D01, photograph 6.0
2. The EUT was connect to spectrum analyzer and call box.
3. The RF output of EUT was connected to the spectrum analyzer.
4. Set the spectrum analyzer , RBW=1MHz, VBW=3MHz.
5. Record the maximum spurious emission.
6. The fundamental frequency should be excluded against the limit in operating band.

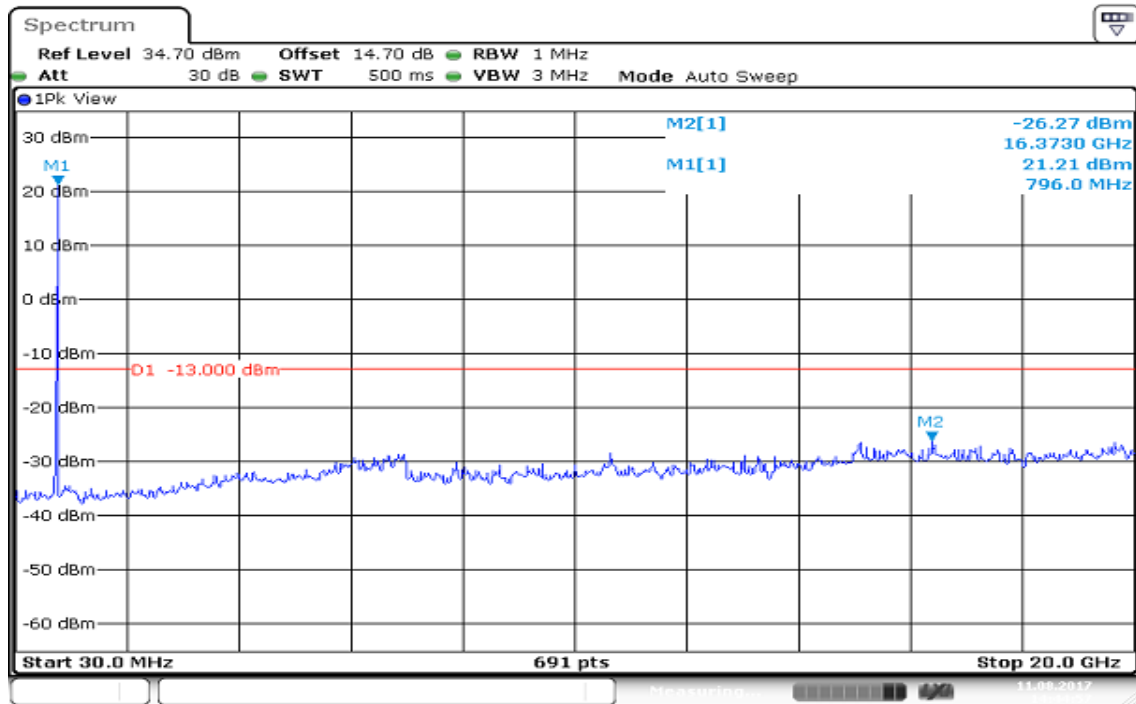
TEST RESULTS
LTE Band 13
CHANNEL BANDWIDTH: 5MHz / QPSK
CH Low



CH Mid



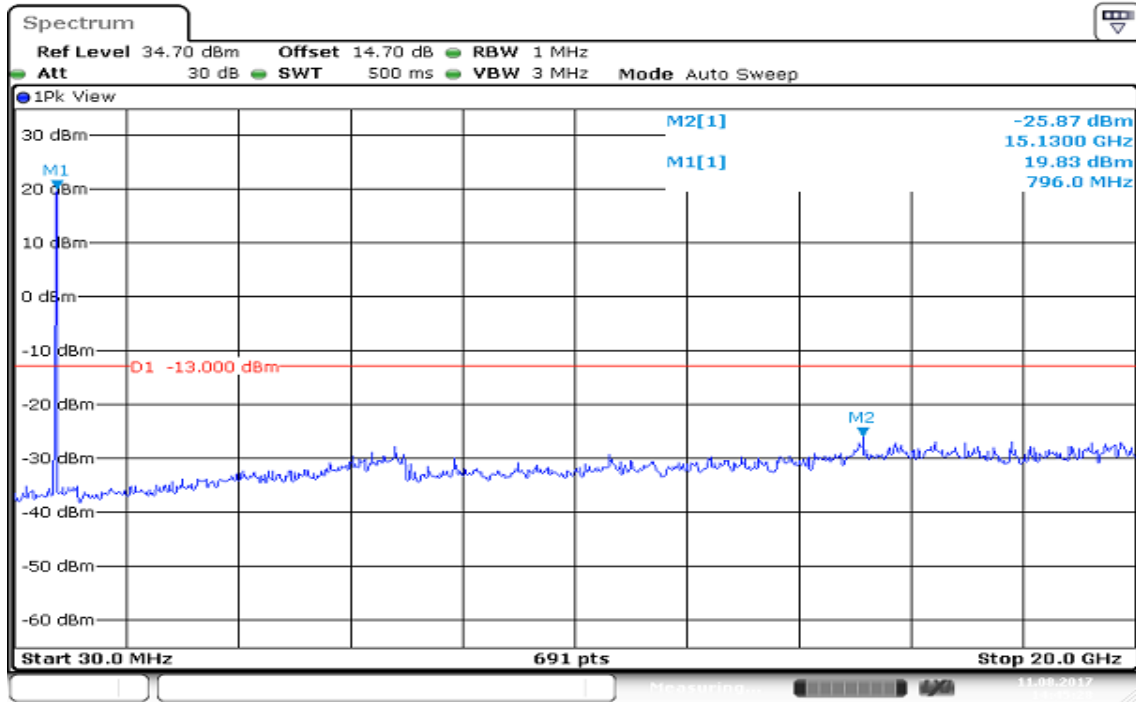
CH High



Date: 11.AUG.2017 14:44:58

CHANNEL BANDWIDTH: 10MHz / QPSK

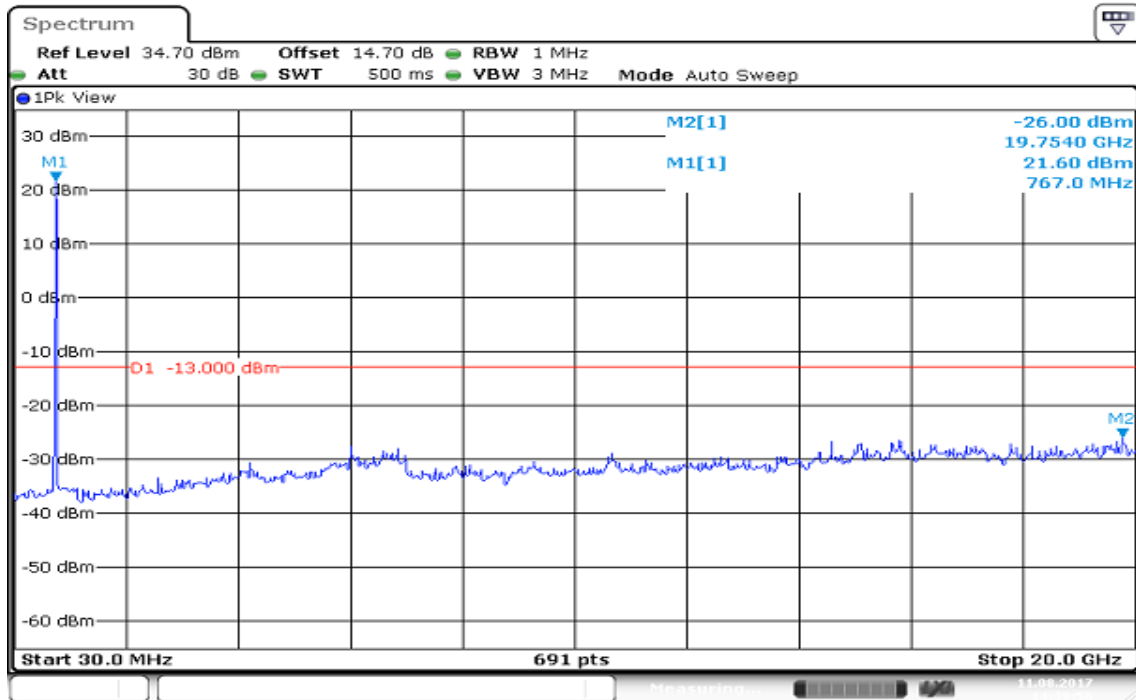
CH Mid



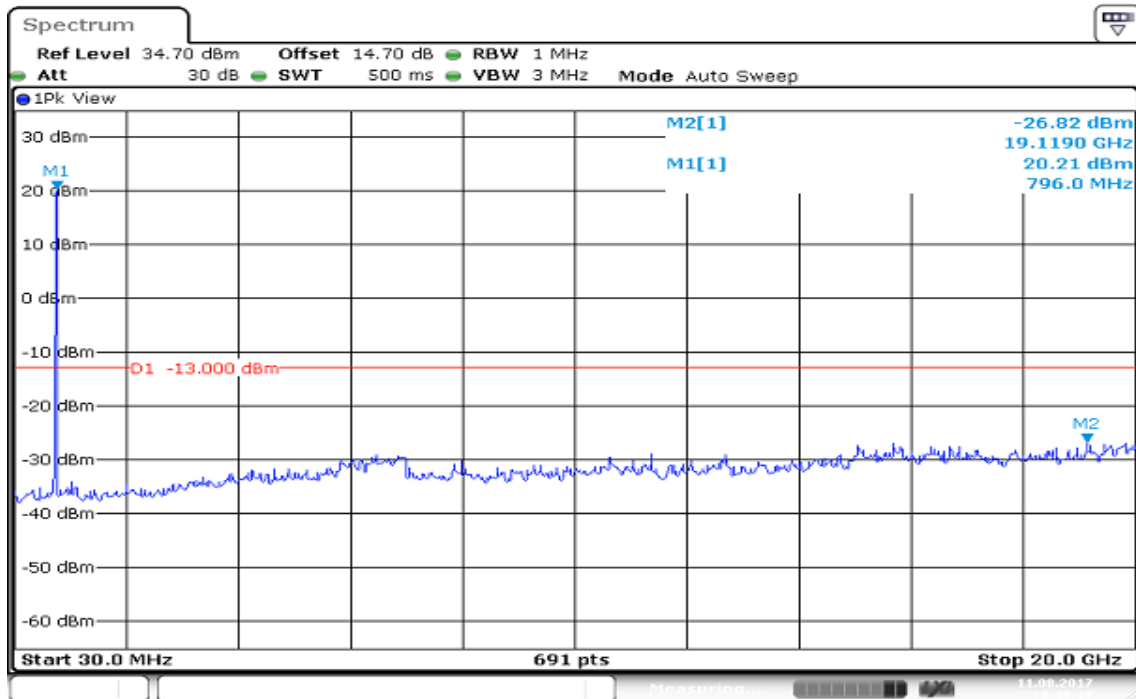
Date: 11 AUG 2017 14:45:28

CHANNEL BANDWIDTH: 5MHz / 16QAM

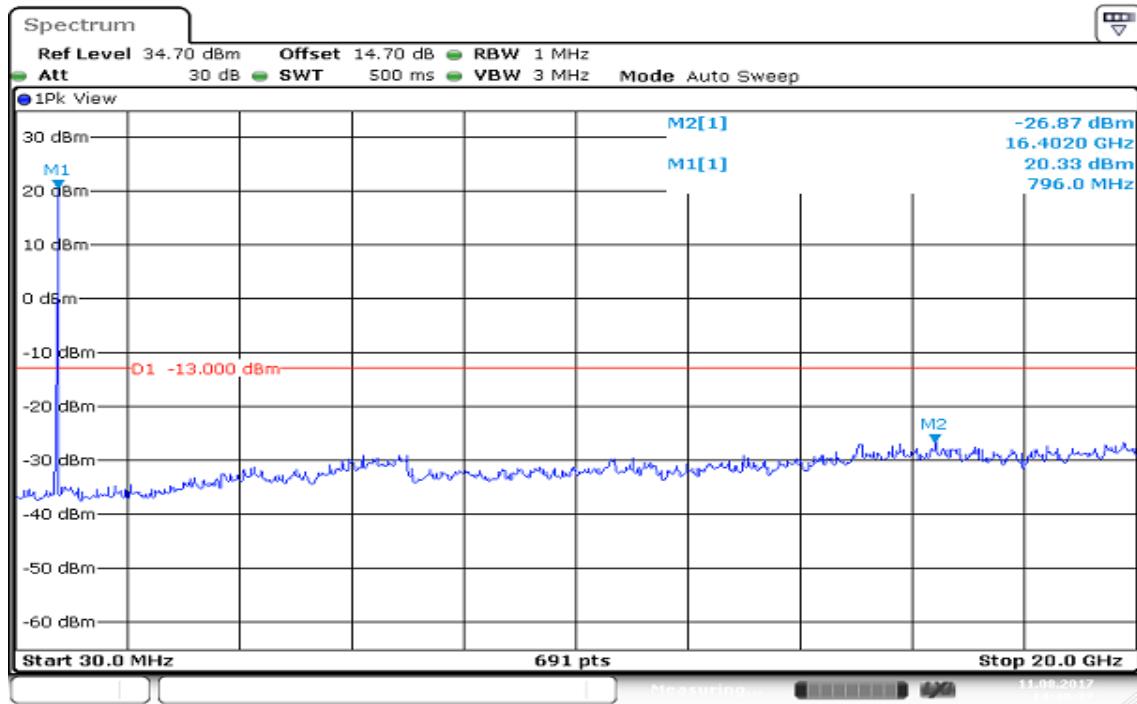
CH Low



CH Mid

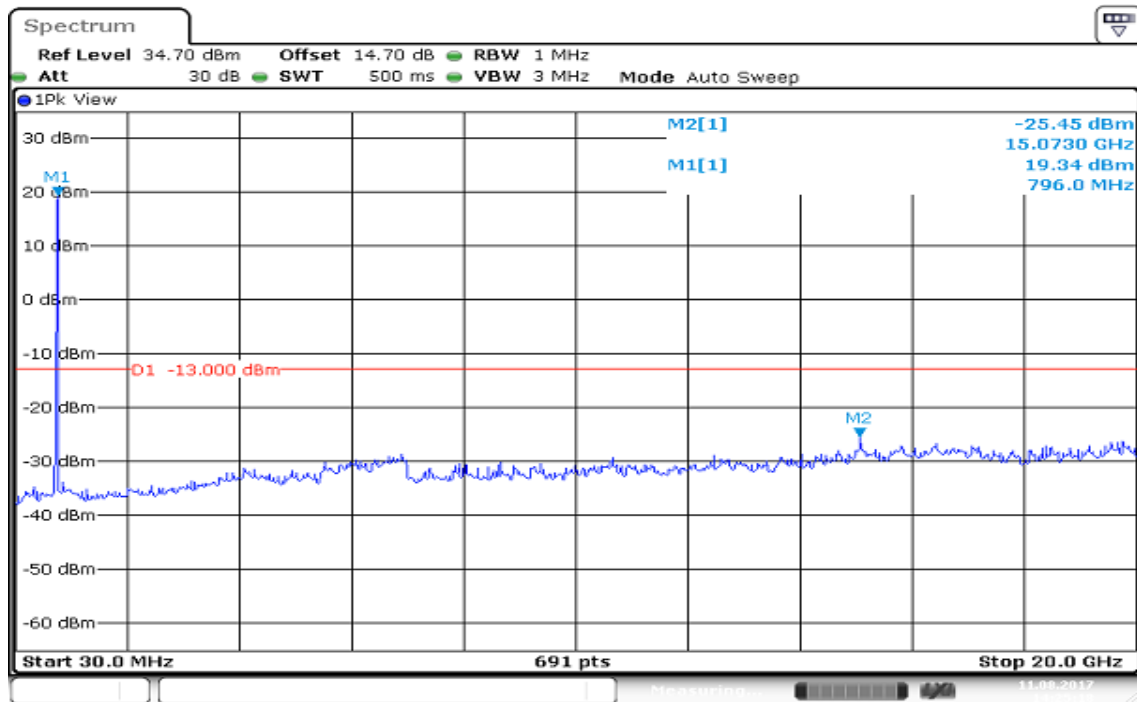


CH High



CHANNEL BANDWIDTH: 10MHz / 16QAM

CH Mid



Date: 11 AUG 2017 14:25:19

6.8 RADIATED EMISSION MEASUREMENT

LIMITS

27.53(c)(2), Band 13

For operations in the 600 MHz band and the 698-746MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. 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.

Limit Line: -13dBm

TEST PROCEDURES

1. According to KDB 971168 D01. Photograph 5.8 and TIA-603-D:2010 Photograph 2.2.12.
2. The EUT was placed on a turntable
 - (1) Below 1G : 0.8m
 - (2) Above 1G : 1.5m
 - (3) EUT set 3m from the receiving antenna
 - (4) The table was rotated 360 degrees of the highest spurious emission to determine the position.
3. Set the spectrum analyzer , RBW=1MHz, VBW=3MHz.
4. A horn antenna was driven by a signal generator.
5. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission

Test Results

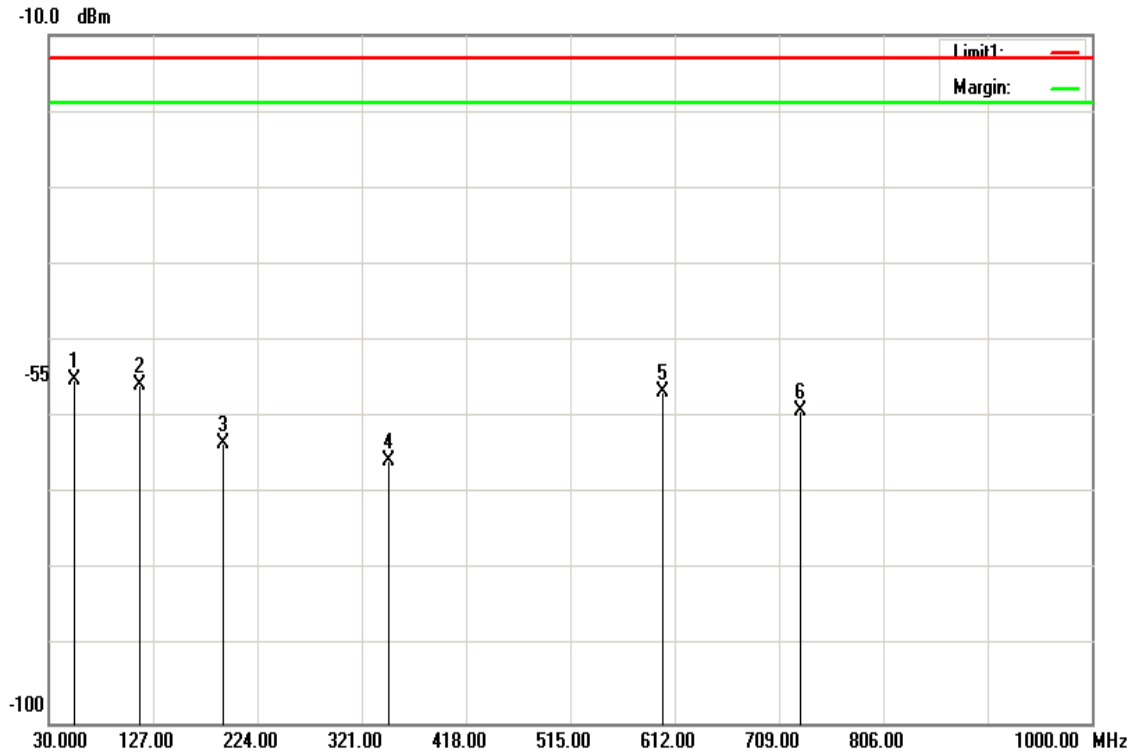
Below 1GHz

LTE Band 13 / BW: 10MHz / QPSK / RB =1, RB Offset = 0

Operation Mode: Tx / Mid CH **Test Date:** August 16, 2017

Temperature: 21°C **Tested by:** Kevin Kuo

Humidity: 52% RH **Polarity:** Ver.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
53.2800	-53.05	-1.97	-55.02	-13.00	-42.02	V
114.3900	-56.52	0.68	-55.84	-13.00	-42.84	V
191.9900	-67.56	4.1	-63.46	-13.00	-50.46	V
346.2200	-72.66	7.08	-65.58	-13.00	-52.58	V
600.3600	-55.07	-1.56	-56.63	-13.00	-43.63	V
729.3700	-60.96	1.83	-59.13	-13.00	-46.13	V

Operation Mode: Tx / Mid CH

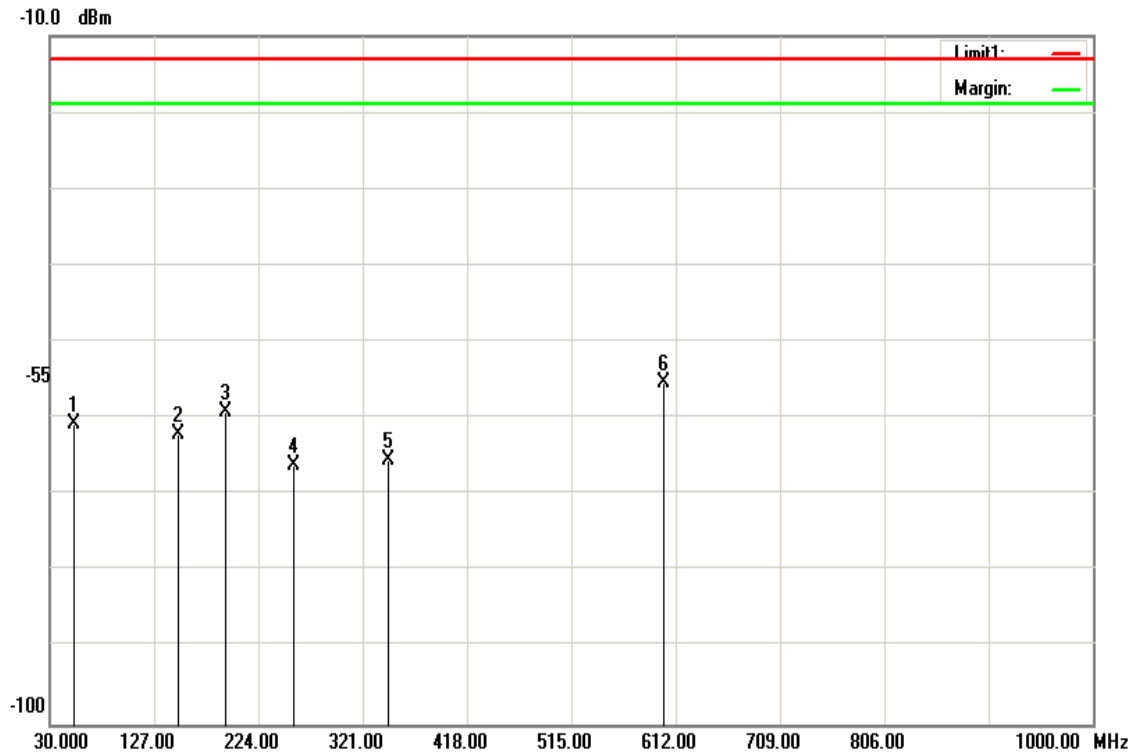
Test Date: August 16, 2017

Temperature: 21°C

Tested by: Kevin Kuo

Humidity: 52% RH

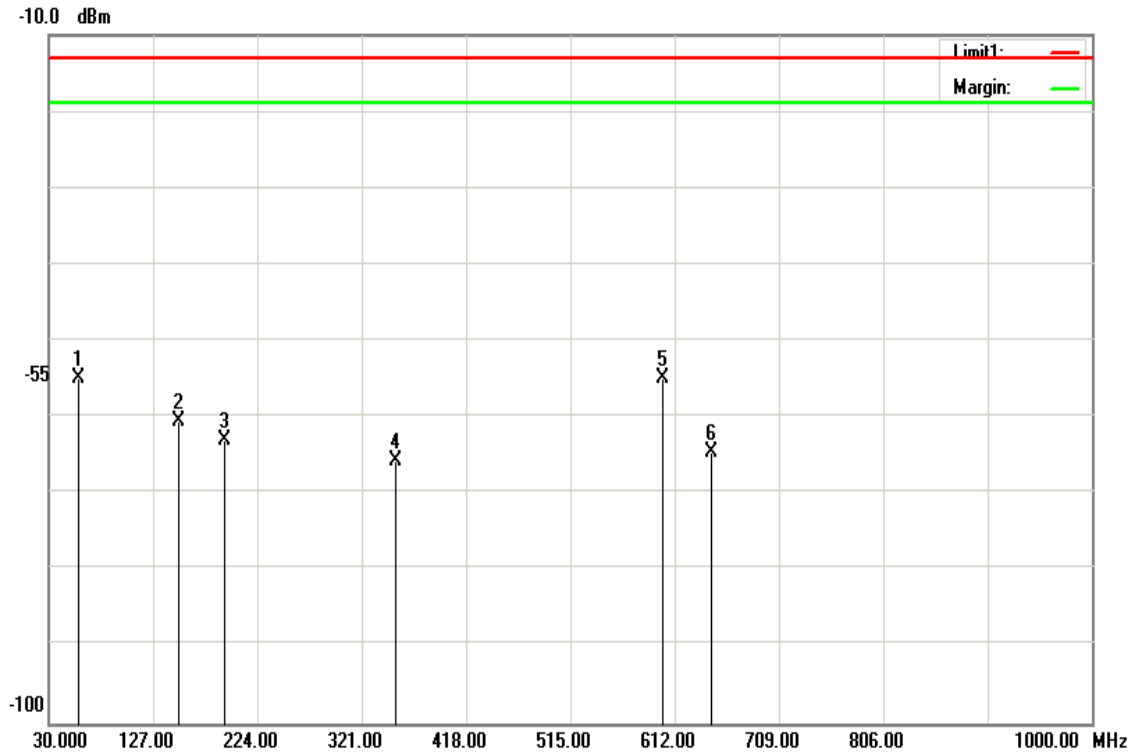
Polarity: Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
52.3100	-58.7	-2.07	-60.77	-13.00	-47.77	H
149.3100	-62.53	0.36	-62.17	-13.00	-49.17	H
192.9600	-63.29	4.1	-59.19	-13.00	-46.19	H
256.9800	-73.43	7.33	-66.10	-13.00	-53.10	H
344.2800	-72.45	7.08	-65.37	-13.00	-52.37	H
600.3600	-53.88	-1.56	-55.44	-13.00	-42.44	H

LTE Band 13 / BW: 10MHz / 16QAM / RB =1, RB Offset = 0

Operation Mode: Tx / Mid CH **Test Date:** August 16, 2017
Temperature: 21°C **Tested by:** Kevin Kuo
Humidity: 52% RH **Polarity:** Ver.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
57.1600	-53.22	-1.58	-54.80	-13.00	-41.80	V
150.2800	-60.87	0.27	-60.60	-13.00	-47.60	V
192.9600	-67.07	4.1	-62.97	-13.00	-49.97	V
353.0100	-72.82	7.11	-65.71	-13.00	-52.71	V
600.3600	-53.22	-1.56	-54.78	-13.00	-41.78	V
645.9500	-65.6	1.06	-64.54	-13.00	-51.54	V

Operation Mode: Tx / Mid CH

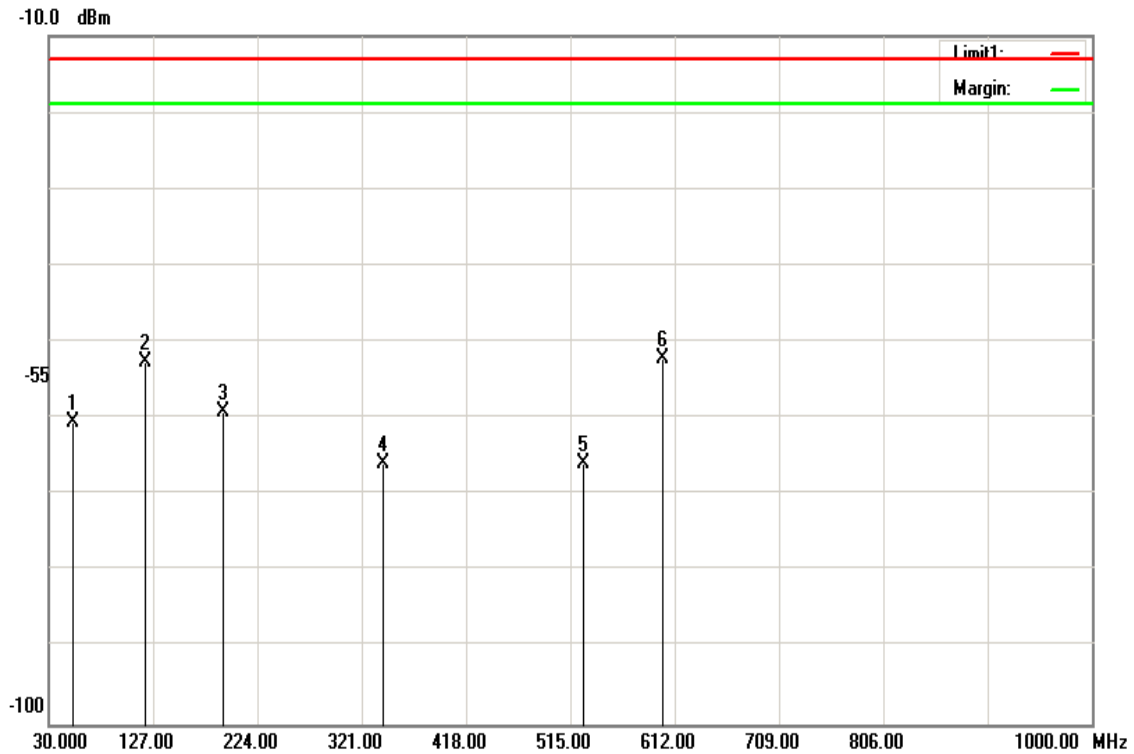
Test Date: August 16, 2017

Temperature: 21°C

Tested by: Kevin Kuo

Humidity: 52% RH

Polarity: Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
52.3100	-58.49	-2.07	-60.56	-13.00	-47.56	V
119.2400	-53.61	0.87	-52.74	-13.00	-39.74	V
191.9900	-63.17	4.1	-59.07	-13.00	-46.07	V
341.3700	-72.97	7.07	-65.90	-13.00	-52.90	V
527.6100	-72.81	6.83	-65.98	-13.00	-52.98	V
600.3600	-50.61	-1.56	-52.17	-13.00	-39.17	V

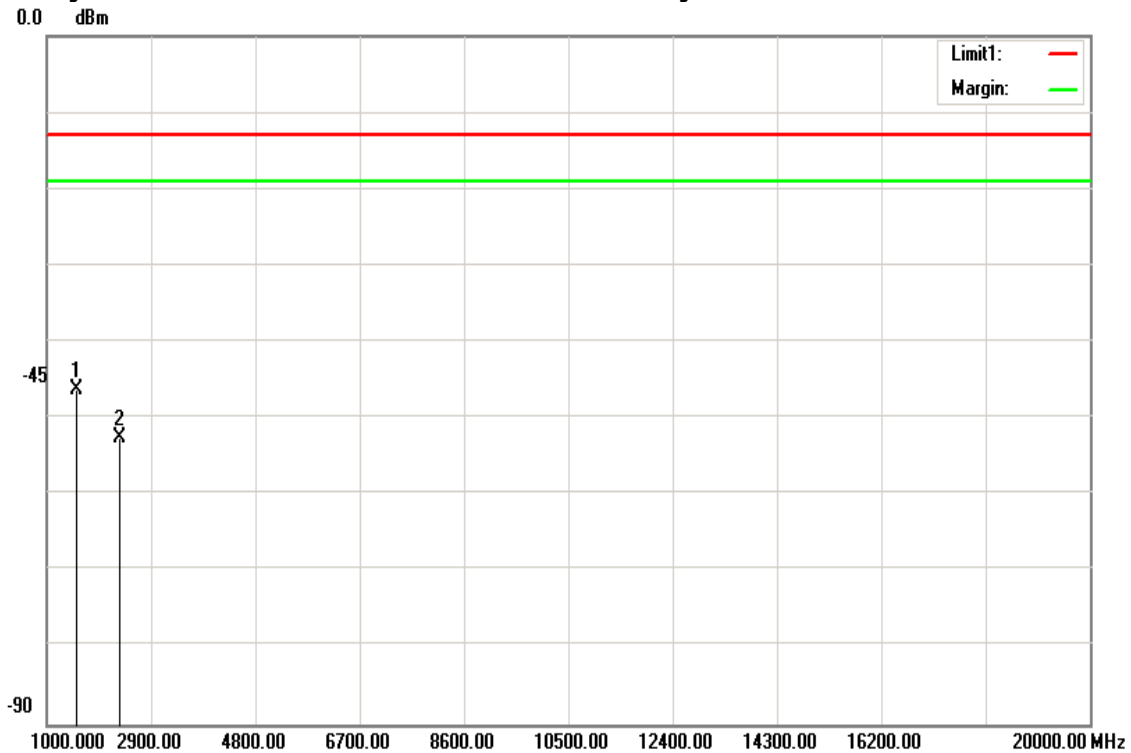
Above 1GHz

LTE Band 13 / BW: 10MHz / QPSK RB =1, RB Offset = 0

Operation Mode: Tx / Mid CH **Test Date:** August 18, 2017

Temperature: 21°C **Tested by:** Kevin Kuo

Humidity: 52% RH **Polarity:** Ver.

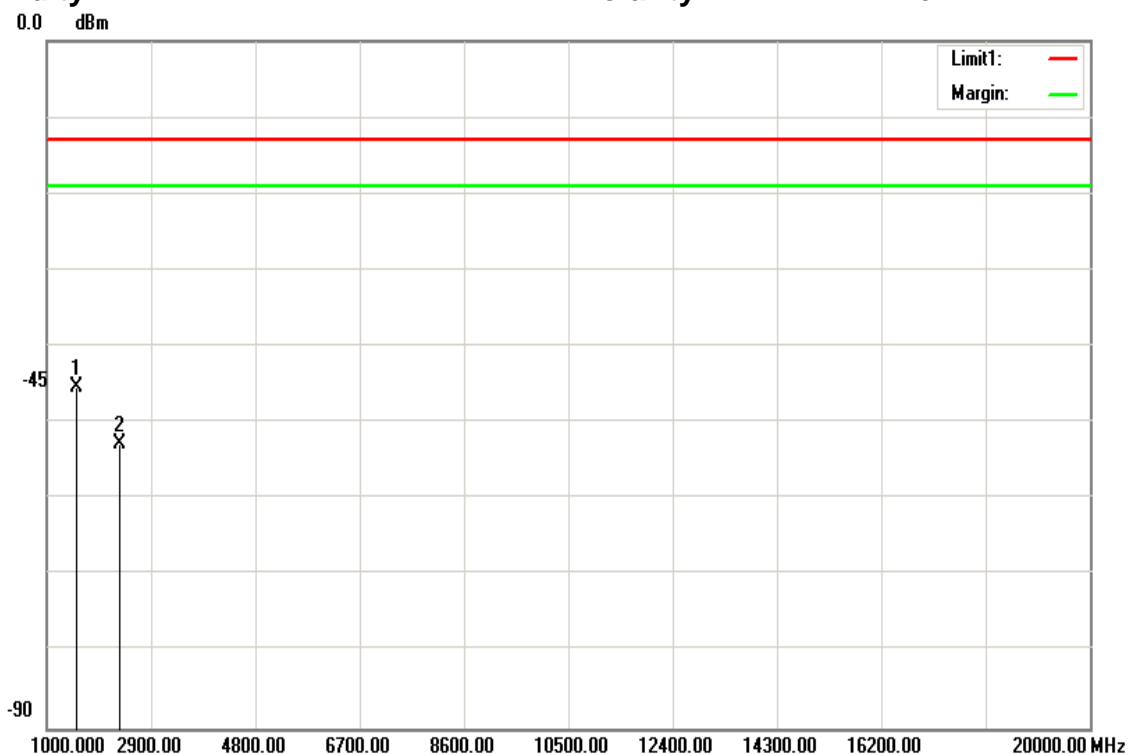


Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1553.000	-47.8	1.53	-46.27	-13.00	-33.27	V
2330.000	-54.33	1.73	-52.60	-13.00	-39.60	V
N/A						

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

Operation Mode: Tx / Mid CH **Test Date:** August 18, 2017
Temperature: 21°C **Tested by:** Kevin Kuo
Humidity: 52% RH **Polarity:** Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1553.000	-46.76	1.53	-45.23	-13.00	-32.23	H
2330.000	-54.44	1.73	-52.71	-13.00	-39.71	H
N/A						

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

LTE Band 13 / BW: 10MHz / 16QAM RB =1, RB Offset = 0

Operation Mode: Tx / Mid CH

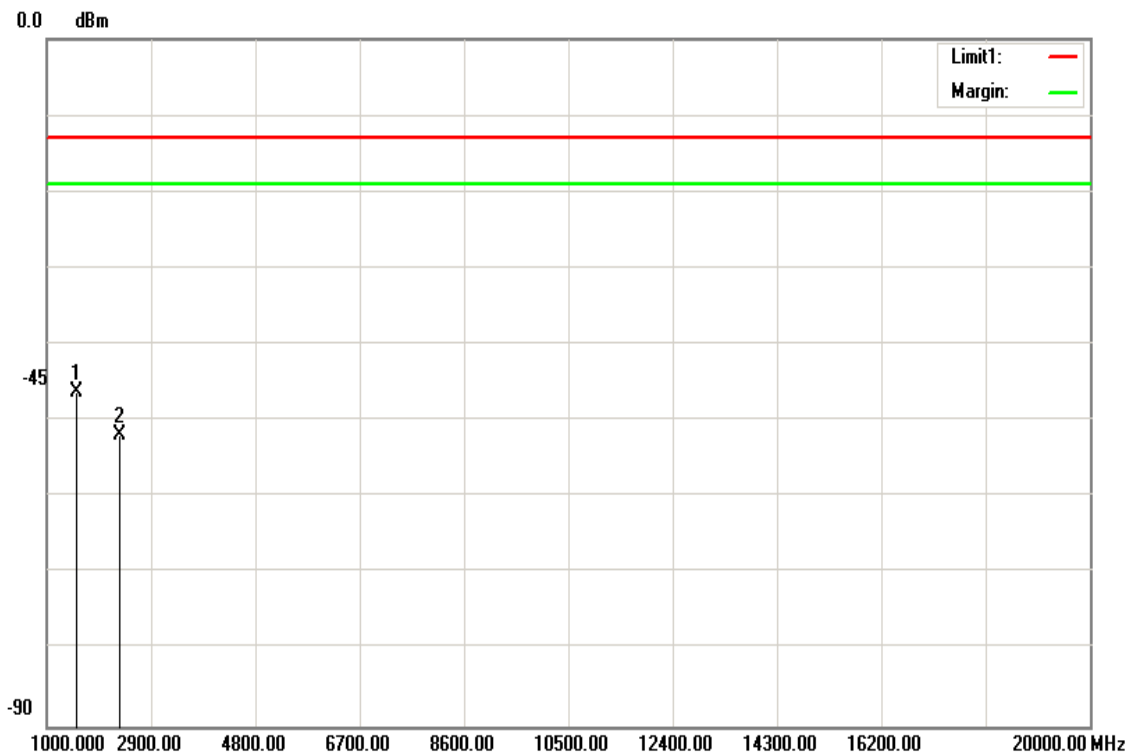
Test Date: August 18, 2017

Temperature: 21°C

Tested by: Kevin Kuo

Humidity: 52% RH

Polarity: Ver.



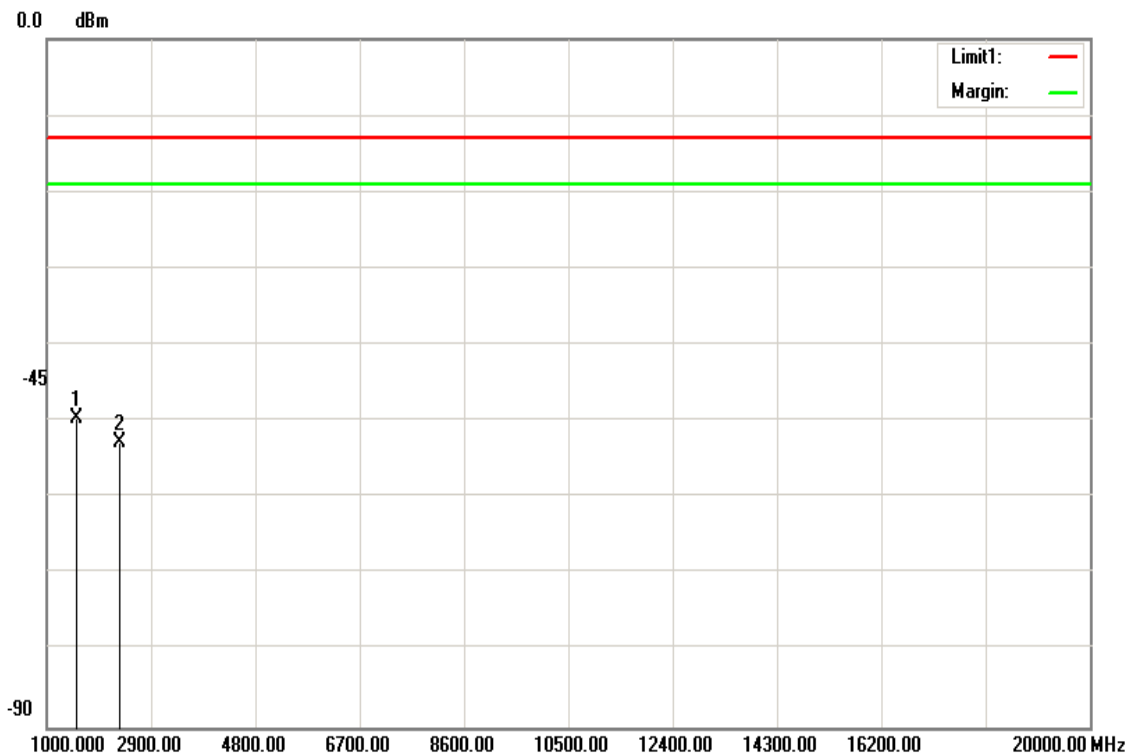
Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1553.000	-47.74	1.53	-46.21	-13.00	-33.21	V
2330.000	-53.54	1.73	-51.81	-13.00	-38.81	V
N/A						

Remark:

- Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

Operation Mode: Tx / Mid CH
Temperature: 21°C
Humidity: 52% RH

Test Date: August 18, 2017
Tested by: Kevin Kuo
Polarity: Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1553.000	-51.06	1.53	-49.53	-13.00	-36.53	H
2330.000	-54.4	1.73	-52.67	-13.00	-39.67	H
N/A						

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.