



FCC ID: W5Y-1002244
Report No.: T191120D05-RP10

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FCC 47 CFR PART 90

TEST REPORT

For

GUARDIAN SYSTEM LTE

Model No.: G2-SY-CON2

Trade Name: GUARDIAN

Issued to

**Seeing Machines Pty Ltd
80 Mildura Street, Fyshwick, ACT , Canberra 2609 Australia**

Issued by

Compliance Certification Services Inc.

Wugu Laboratory

**No.11, Wugong 6th Rd., Wugu Dist.,
New Taipei City, Taiwan. (R.O.C.)**

Issued Date: June 6, 2020

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.
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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	January 22, 2020	Initial Issue	ALL	Doris Chu
01	May 29, 2020	See the following Note Rev. (01)	P.1, P.4, P.6, P.20-22, P.48-54	May Lin
02	June 6, 2020	See the following Note Rev. (02)	P.31, P.36-39	Allison Chen

Rev (01):

- 1. Revised the section 2 、8.2 、8.5.*
- 2. Remove IC information.*

Rev (02):

- 1. Revised the section 8.4.*



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1. TEST RESULT CERTIFICATION

Applicant: Seeing Machines Pty Ltd
80 Mildura Street, Fyshwick, ACT , Canberra 2609 Australia

Manufacturer: ADLINK TECHNOLOGY INC.
9F, No. 166, Jian Yi Rd., Zhonghe Dist., New Taipei City, 235
Taiwan

Equipment Under Test: GUARDIAN SYSTEM LTE

Trade Name: GUARDIAN

Model No.: G2-SY-CON2

Date of Test: December 20, 2019 ~ January 15, 2020



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APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR PART 90	No non-compliance noted
Statements of Conformity	
Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.	

We hereby certify that:

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:

Kevin Tsai
Deputy Manager
Compliance Certification Services Inc.

2. EUT DESCRIPTION

Product	GUARDIAN SYSTEM LTE				
Model No.	G2-SY-CON2				
Model Discrepancy	N/A				
Trade	GUARDIAN				
Received Date	November 20, 2019				
Power Supply	Powered from DC supply: DC 12V.				
Frequency Range	LTE Band 26 Channel Bandwidth: 1.4MHz	814.7MHz ~ 823.3MHz			
	LTE Band 26 Channel Bandwidth: 3MHz	815.5MHz ~ 822.5MHz			
	LTE Band 26 Channel Bandwidth: 5MHz	816.5MHz ~ 821.5MHz			
	LTE Band 26 Channel Bandwidth: 10MHz	819MHz			
Modulation Technique	LTE Band 26	QPSK, 16QAM			
Antenna Specification	Dipole Antenna Band 26 Antenna gain: -0.1 dBi				
Transmit Power (ERP Power)	LTE Band 26 Channel Bandwidth: 1.4MHz	QPSK:	20.12	dBm	
		16QAM:	19.76	dBm	
	LTE Band 26 Channel Bandwidth: 3MHz	QPSK:	20.13	dBm	
		16QAM:	19.77	dBm	
	LTE Band 26 Channel Bandwidth: 5MHz	QPSK:	20.17	dBm	
		16QAM:	19.81	dBm	
	LTE Band 26 Channel Bandwidth: 10MHz	QPSK:	20.19	dBm	
		16QAM:	19.83	dBm	
HW Version	V1				
SW Version	V9				

Remark: The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.

3. TEST METHODOLOGY

Both conducted and radiated testing were performed according to the procedures document on chapter 13 of TIA-603-E and FCC CFR 47, Part 2 and Part 90, KDB 971168 D01 Power Meas License Digital Systems.

3.1 EUT CONFIGURATION

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

3.2 DESCRIPTION OF TEST MODES

The EUT (Model: G2-SY-CON2) had been tested under operating condition. The EUT be set in maximum power transmission via call box during testing.

LTE Band 26: 814 MHz ~ 824 MHz

Three channels had been tested for each channel bandwidth.

Channel Bandwidth	1.4MHz		3MHz		5MHz	
	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
Low channel (L)	26697	814.7	26705	815.5	26715	816.5
Middle channel (M)	26740	819	26740	819	26740	819
High channel (H)	26783	823.3	26775	822.5	26765	821.5
Channel Bandwidth	10MHz					
	Channel	Frequency (MHz)				
Low channel (L)	-	-				
Middle channel (M)	26740	819				
High channel (H)	-	-				

3.3 THE WORST MODE OF MEASUREMENT

Radiated Emission Measurement Above 1G	
Test Condition	Radiated Emission Above 1G
Power supply Mode	Mode 1: EUT power by Power supply
Worst Mode	☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4
Worst Position	☐ Placed in fixed position. ☒ Placed in fixed position at X-Plane (E2-Plane) ☐ Placed in fixed position at Y-Plane (E1-Plane) ☐ Placed in fixed position at Z-Plane (H-Plane)

Radiated Emission Measurement Below 1G	
Test Condition	Radiated Emission Below 1G
Power supply Mode	Mode 1: EUT power by Power supply
Worst Mode	☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4

Remark:

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



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4. TEST SUMMERY

FCC Standard Sec.	Report Section	Test Item	Result
-	2	Antenna Requirement	Pass
2.1046, 90.635(b), 90.542 (a)(7)	8.1	ERP Measurement	Pass
2.1055, 90.213	8.2	Frequency Stability v.s. temperature measurement	Pass
2.1049, 90.209	8.3	Occupied Bandwidth Measurement	Pass
90.691, 90.543	8.4	Conducted Band Edge	Pass
90.691, 90.543	8.5	Peak to Average Ratio	Pass
90.691, 90.543	8.6	Conducted Spurious Emission	Pass
2.1053, 90.691	8.7	Spurious Radiation Measurement	Pass



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5. INSTRUMENT CALIBRATION

5.1 FACILITIES AND TEST LOCATION

All measurement facilities used to collect the measurement data are located at
No.11, Wugong 6th Rd., Wugu Dist., New Taipei City, Taiwan. (R.O.C.)

Test site	Test Engineer	Remark
Radiation	Jerry Chang	-
RF Conducted	Dally Hong	-

Remark: *The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.*

5.2 MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

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

RF Conducted Test Site					
Equipment	Manufacturer	Model	S/N	Cal Date	Cal Due
Coaxial Cable	Woken	WC12	CC001	06/28/2019	06/27/2020
Coaxial Cable	Woken	WC12	CC003	06/28/2019	06/27/2020
Power Divider	Solvang Technology	STI08-0015	008	08/06/2019	08/05/2020
Signal Analyzer	R&S	FSV 40	101073	09/25/2019	09/24/2020
Wideband Radio Communication Tester	R&S	CMW 500	116875	07/29/2019	07/28/2020
DC Power Supplies	GW Instek	SPS-3610	GPE880163	01/14/2019	2020/1/13
Software	N/A				

3M 966 Chamber Test Site					
Equipment	Manufacturer	Model	S/N	Cal Date	Cal Due
Band Reject Filters	MICRO TRONICS	BRM 50702	120	02/26/2019	02/25/2020
Bilog Antenna	Sunol Sciences	JB3	A030105	07/26/2019	07/25/2020
Coaxial Cable	HUBER SUHNER	SUCOFLEX 104PEA	20995	02/26/2019	02/25/2020
Coaxial Cable	EMCI	EMC105	190914+25111	09/20/2019	09/19/2020
Digital Thermo-Hygro Meter	WISEWIND	1206	D07	01/30/2019	01/29/2020
double Ridged Guide Horn Antenna	ETC	MCTD 1209	DRH13M02003	10/04/2019	10/03/2020
Loop Ant	COM-POWER	AL-130	121051	03/22/2019	03/21/2020
Pre-Amplifier	EMEC	EM330	060609	02/26/2019	02/25/2020
Pre-Amplifier	HP	8449B	3008A00965	02/26/2019	02/25/2020
Wideband Radio Communication Tester	R&S	CMW 500	116875	07/29/2019	07/28/2020
PSA Series Spectrum Analyzer	Agilent	E4446A	MY46180323	05/29/2019	05/28/2020
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R
Software	e3 6.11-20180413				

5.3 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	+/- 1.2575
Emission bandwidth, 20dB bandwidth	+/- 0.0014
RF output power, conducted	+/- 1.14
Power density, conducted	+/- 1.40
3M Semi Anechoic Chamber / 30M~200M	+/- 4.12
3M Semi Anechoic Chamber / 200M~1000M	+/- 4.68
3M Semi Anechoic Chamber / 1G~8G	+/- 5.18
3M Semi Anechoic Chamber / 8G~18G	+/- 5.47
3M Semi Anechoic Chamber / 18G~26G	+/- 3.81
3M Semi Anechoic Chamber / 26G~40G	+/- 3.87

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



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6. FACILITIES AND ACCREDITATIONS

6.1 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.

Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029

☒ No.11, Wugong 6th Rd., Wugu Dist., New Taipei City, Taiwan. (R.O.C.)

Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045

Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10: 2013 and CISPR Publication 22.

6.2 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."

6.3 LABORATORY ACCREDITATIONS AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by American Association for Laboratory Accreditation Program for the specific scope accreditation under Lab Code: 0824-01 to perform Electromagnetic Interference tests according to FCC Part 15 and CISPR 22 requirements. In addition, the test facilities are listed with Industry Canada, Certification and Engineering Bureau, IC 2324G-1 for 3M Semi Anechoic Chamber A, 2324G-2 for 3M Semi Anechoic Chamber B.



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7. SETUP OF EQUIPMENT UNDER TEST

7.1 SETUP CONFIGURATION OF EUT

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

7.2 SUPPORT EQUIPMENT

No.	Equipment	Brand	Model	Series No.	FCC ID	IC ID
1	NB(J)	TOSHIBA	PT345T-00L002	N/A	PD97260H	1000M-7260H

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.



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8. FCC PART 22 REQUIREMENTS

8.1 ERP MEASUREMENT

LIMIT

According to FCC §2.1046

FCC 90.635(b): The maximum output power of the transmitter for mobile stations is 100 watts (20 dBw).

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

No non-compliance noted.

LTE Band 26

Band	BW (MHz)	Channel	Frequency (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Average power(dBm)	EIRP Power (dBm)
Band 26	1.4M	26697	814.7	QPSK	1	0	0	22.20	19.95
					1	2	0	22.17	19.92
					1	5	0	22.13	19.88
					3	0	1	21.32	19.07
					3	1	1	21.49	19.24
					3	2	1	21.44	19.19
					6	0	1	21.35	19.10
				16QAM	1	0	1	21.24	18.99
					1	2	1	21.54	19.29
					1	5	1	21.25	19.00
					3	0	2	20.29	18.04
					3	1	2	20.32	18.07
					3	2	2	20.40	18.15
					6	0	2	20.36	18.11
		26740	819.0	QPSK	1	0	0	22.13	19.88
					1	2	0	22.32	20.07
					1	5	0	22.37	20.12
					3	0	1	21.62	19.37
					3	1	1	21.66	19.41
					3	2	1	21.60	19.35
					6	0	1	21.67	19.42
				16QAM	1	0	1	21.87	19.62
					1	2	1	22.01	19.76
					1	5	1	21.74	19.49
					3	0	2	20.54	18.29
					3	1	2	20.57	18.32
					3	2	2	20.56	18.31
					6	0	2	20.67	18.42
		26783	823.3	QPSK	1	0	0	22.11	19.86
					1	2	0	22.12	19.87
					1	5	0	21.14	18.89
					3	0	1	21.35	19.10
					3	1	1	21.13	18.88
					3	2	1	21.11	18.86
					6	0	1	21.28	19.03
				16QAM	1	0	1	21.18	18.93
					1	2	1	21.38	19.13
					1	5	1	21.09	18.84
					3	0	2	20.33	18.08
					3	1	2	20.15	17.90
					3	2	2	20.18	17.93
					6	0	2	20.38	18.13

Band	BW (MHz)	Channel	Frequency (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Average power(dBm)	EIRP Power (dBm)
Band 26	3M	26705	815.5	QPSK	1	0	0	22.21	19.96
					1	7	0	22.18	19.93
					1	14	0	22.14	19.89
					8	0	1	21.33	19.08
					8	4	1	21.50	19.25
					8	7	1	21.45	19.20
					15	0	1	21.36	19.11
				16QAM	1	0	1	21.25	19.00
					1	7	1	21.55	19.30
					1	14	1	21.26	19.01
					8	0	2	20.30	18.05
					8	4	2	20.33	18.08
					8	7	2	20.41	18.16
					15	0	2	20.37	18.12
		26740	819.0	QPSK	1	0	0	22.14	19.89
					1	7	0	22.33	20.08
					1	14	0	22.38	20.13
					8	0	1	21.63	19.38
					8	4	1	21.67	19.42
					8	7	1	21.61	19.36
					15	0	1	21.68	19.43
				16QAM	1	0	1	21.88	19.63
					1	7	1	22.02	19.77
					1	14	1	21.75	19.50
					8	0	2	20.55	18.30
					8	4	2	20.58	18.33
					8	7	2	20.57	18.32
					15	0	2	20.68	18.43
		26775	822.5	QPSK	1	0	0	22.13	19.88
					1	7	0	22.14	19.89
					1	14	0	21.16	18.91
					8	0	1	21.37	19.12
					8	4	1	21.15	18.90
					8	7	1	21.13	18.88
					15	0	1	21.30	19.05
				16QAM	1	0	1	21.20	18.95
					1	7	1	21.40	19.15
					1	14	1	21.11	18.86
					8	0	2	20.35	18.10
					8	4	2	20.17	17.92
					8	7	2	20.20	17.95
					15	0	2	20.40	18.15

Band	BW (MHz)	Channel	Frequency (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Average power(dBm)	EIRP Power (dBm)
Band 26	5M	26715	816.5	QPSK	1	0	0	22.26	20.01
					1	12	0	22.23	19.98
					1	24	0	22.19	19.94
					12	0	1	21.38	19.13
					12	6	1	21.55	19.30
					12	11	1	21.50	19.25
					25	0	1	21.41	19.16
				16QAM	1	0	1	21.30	19.05
					1	12	1	21.60	19.35
					1	24	1	21.31	19.06
					12	0	2	20.35	18.10
					12	6	2	20.38	18.13
					12	11	2	20.46	18.21
					25	0	2	20.42	18.17
		26740	819.0	QPSK	1	0	0	22.18	19.93
					1	12	0	22.37	20.12
					1	24	0	22.42	20.17
					12	0	1	21.67	19.42
					12	6	1	21.71	19.46
					12	11	1	21.65	19.40
					25	0	1	21.72	19.47
				16QAM	1	0	1	21.92	19.67
					1	12	1	22.06	19.81
					1	24	1	21.79	19.54
					12	0	2	20.59	18.34
					12	6	2	20.62	18.37
					12	11	2	20.61	18.36
					25	0	2	20.72	18.47
		26765	821.5	QPSK	1	0	0	22.18	19.93
					1	12	0	22.19	19.94
					1	24	0	21.21	18.96
					12	0	1	21.42	19.17
					12	6	1	21.20	18.95
					12	11	1	21.18	18.93
					25	0	1	21.35	19.10
				16QAM	1	0	1	21.25	19.00
					1	12	1	21.45	19.20
					1	24	1	21.16	18.91
					12	0	2	20.40	18.15
					12	6	2	20.22	17.97
					12	11	2	20.25	18.00
					25	0	2	20.45	18.20



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Band	BW (MHz)	Channel	Frequency (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Average power(dBm)	EIRP Power (dBm)
Band 26	10M	26740	819.0	QPSK	1	0	0	22.20	19.95
					1	24	0	22.39	20.14
					1	49	0	22.44	20.19
					25	0	1	21.69	19.44
					25	12	1	21.73	19.48
					25	24	1	21.67	19.42
					50	0	1	21.74	19.49
				16QAM	1	0	1	21.94	19.69
					1	24	1	22.08	19.83
					1	49	1	21.81	19.56
					25	0	2	20.61	18.36
					25	12	2	20.64	18.39
					25	24	2	20.63	18.38
					50	0	2	20.74	18.49



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8.2 FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT

LIMIT

According to FCC §2.1055, FCC §90.213.

Frequency Tolerance: +/- 2.5ppm

TEST PROCEDURE

Use Anritsu 8820 with frequency Error measurement capability.

Temp = -40°C to +65°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

No non-compliance noted.



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Test Results

FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT: LTE Band 26 / QPSK

Reference Frequency: LTE Band 26, 819 MHz at 20(°C)				
Limit: 2.5 ppm = 2078.75 Hz				
Power Supply (Vac)	Environment Temperature (°C)	BW: 10M Frequency Error(Hz)	Frequency Error (ppm)	Limit (ppm)
12	65	0.02	0.000024	+/- 2.5
12	50	0.01	0.000012	
12	40	-0.01	-0.000012	
12	30	0.00	0.000000	
12	20	0.00	0.000000	
12	10	0.02	0.000024	
12	0	0.00	0.000000	
12	-10	-0.01	-0.000012	
12	-20	0.01	0.000012	
12	-30	-0.01	-0.000012	
12	-40	0.00	0.000000	

LTE Band 26 / 16QAM

Reference Frequency: LTE Band 26, 819 MHz at 20(°C)				
Limit: 2.5 ppm = 2078.75 Hz				
Power Supply (Vac)	Environment Temperature (°C)	BW: 10M Frequency Error(Hz)	Frequency Error (ppm)	Limit (ppm)
12	65	0.00	0.000000	+/- 2.5
12	50	0.01	0.000012	
12	40	-0.01	-0.000012	
12	30	0.01	0.000012	
12	20	0.00	0.000000	
12	10	0.00	0.000000	
12	0	-0.01	-0.000012	
12	-10	0.01	0.000012	
12	-20	0.01	0.000012	
12	-30	-0.01	-0.000012	
12	-40	-0.01	-0.000012	



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FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT:

LTE Band 26 / QPSK

Reference Frequency: LTE Band 26, 819 MHz at 20(°C)				
Limit: 2.5 ppm = 2078.75 Hz				
Power Supply (Vac)	Environment Temperature (°C)	BW: 20M Frequency Error(Hz)	Frequency Error (ppm)	Limit (ppm)
10.2	20	0.01	0.000012	+/- 2.5
12		0.00	0.000000	
13.8		0.01	0.000012	

LTE Band 26 / 16QAM

Reference Frequency: LTE Band 26, 819 MHz at 20(°C)				
Limit: 2.5 ppm = 2078.75 Hz				
Power Supply (Vac)	Environment Temperature (°C)	BW: 20M Frequency Error(Hz)	Frequency Error (ppm)	Limit (ppm)
10.2	20	0.01	0.000012	+/- 2.5
12		0.00	0.000000	
13.8		-0.01	-0.000012	



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8.3 OCCUPIED BANDWIDTH MEASUREMENT

Limits

For Reporting purposes only.

TEST PROCEDURES

KDB 971168 D01

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 $\geq 3 \times$ RBW
4. Detector = Peak
5. Trace mode = max. hold



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LTE Band 26

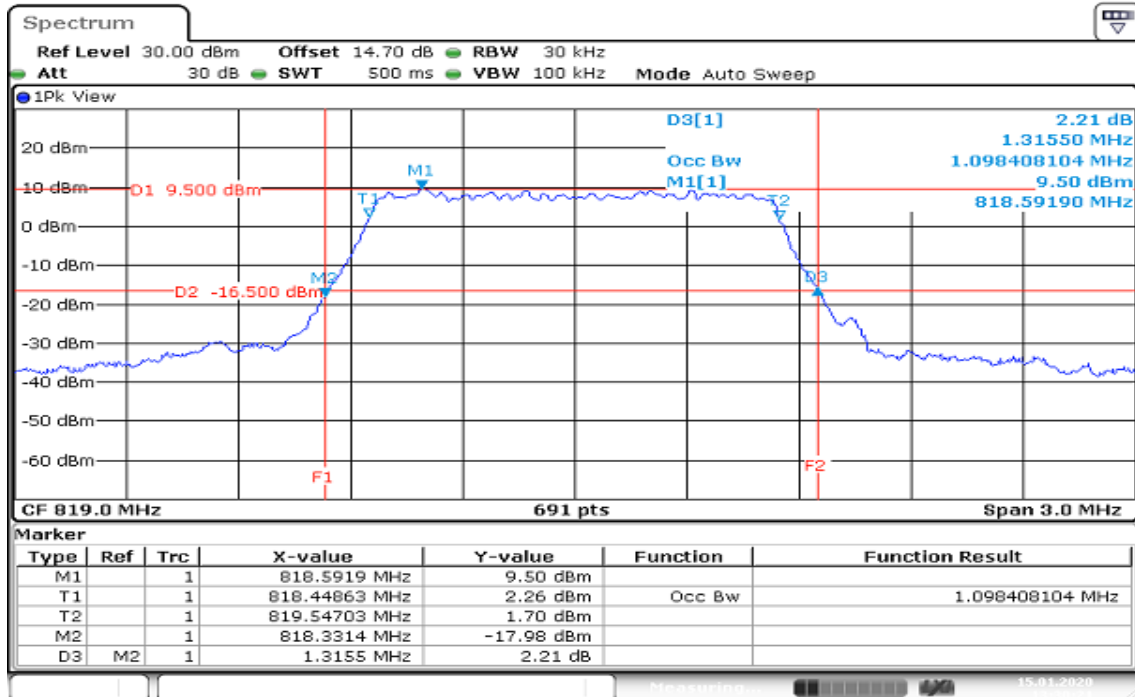
Band	BW (MHz)	Channel	Mode	UL RB Allocation	UL RB offset	OBW(99%)(MHz)	26 dB Bandwidth(MHz)
26	1.4	Middle	QPSK	6	0	1.0984	1.3155
		Middle	16QAM	6	0	1.0984	1.3068
	3	Middle	QPSK	15	0	2.6831	2.9305
		Middle	16QAM	15	0	2.6831	2.9479
	5	Middle	QPSK	25	0	4.4718	4.9160
		Middle	16QAM	25	0	4.4718	4.9160
	10	Middle	QPSK	50	0	8.9725	9.8080
		Middle	16QAM	50	0	8.9725	9.8080

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LTE Band 26

BW: 1.4MHz / QPSK / RB =6, RB Offset = 0

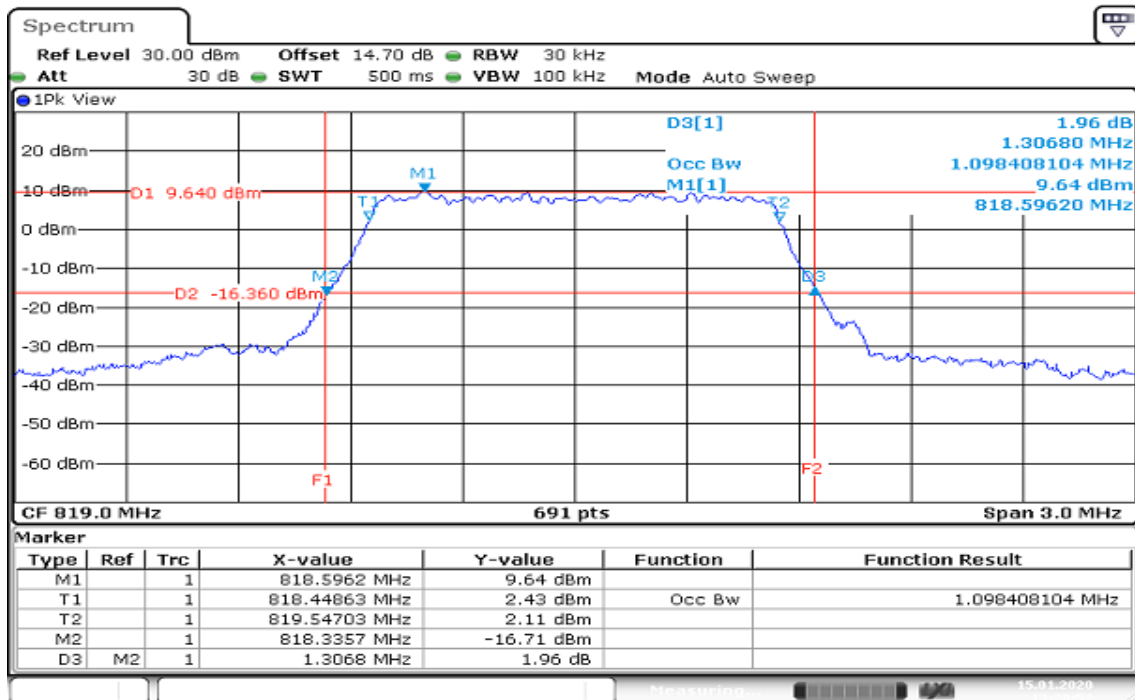
CH Mid



Date: 15.JAN.2020 13:30:22

BW: 1.4MHz / 16QAM / RB =6, RB Offset = 0

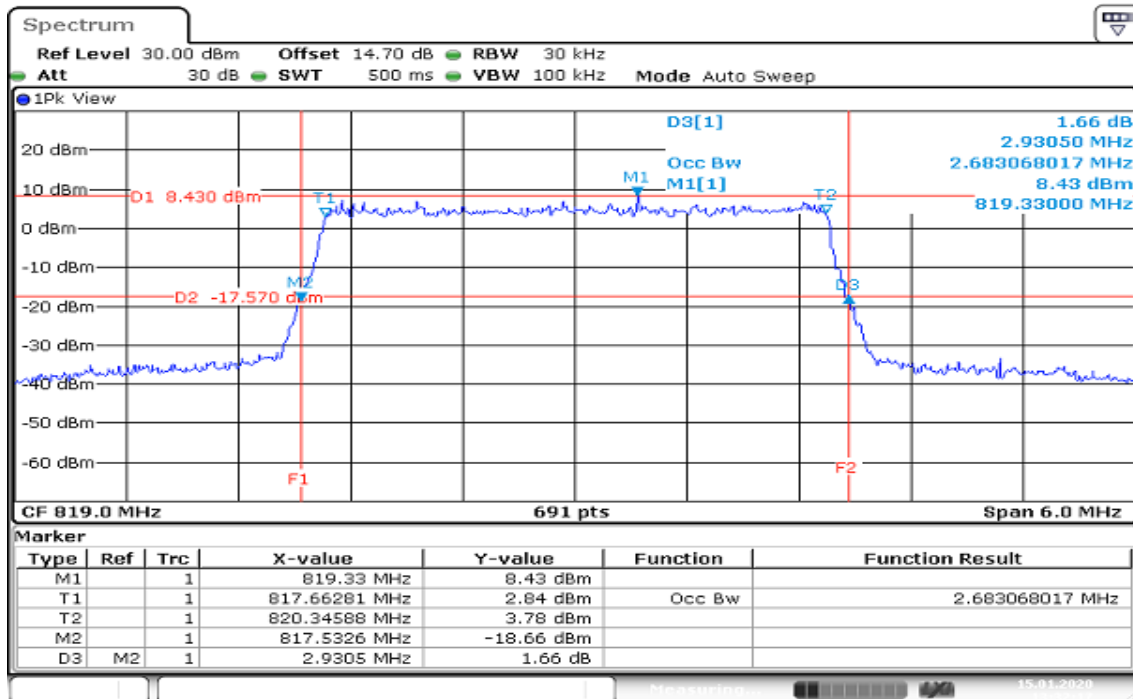
CH Mid



Date: 15.JAN.2020 13:28:52

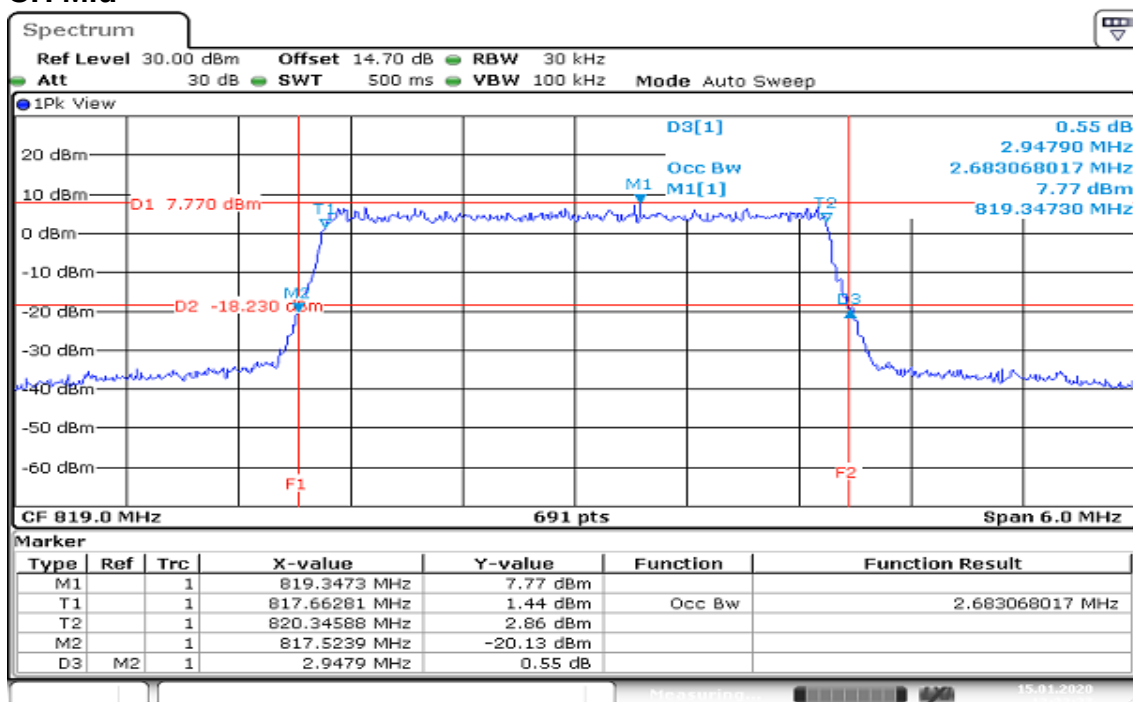
Report No.: T191120D05-RP10

BW: 3MHz / QPSK / RB =15, RB Offset = 0
CH Mid



Date: 15.JAN.2020 13:32:17

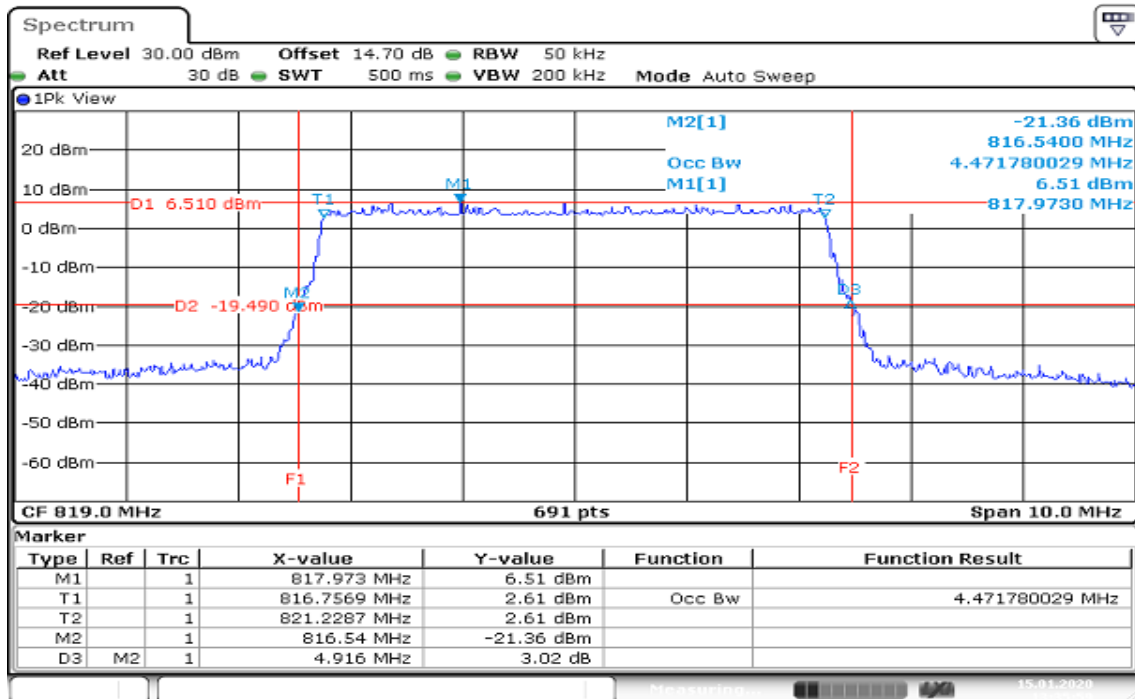
BW: 3MHz / 16QAM / RB =15, RB Offset = 0
CH Mid



Date: 15.JAN.2020 13:33:37

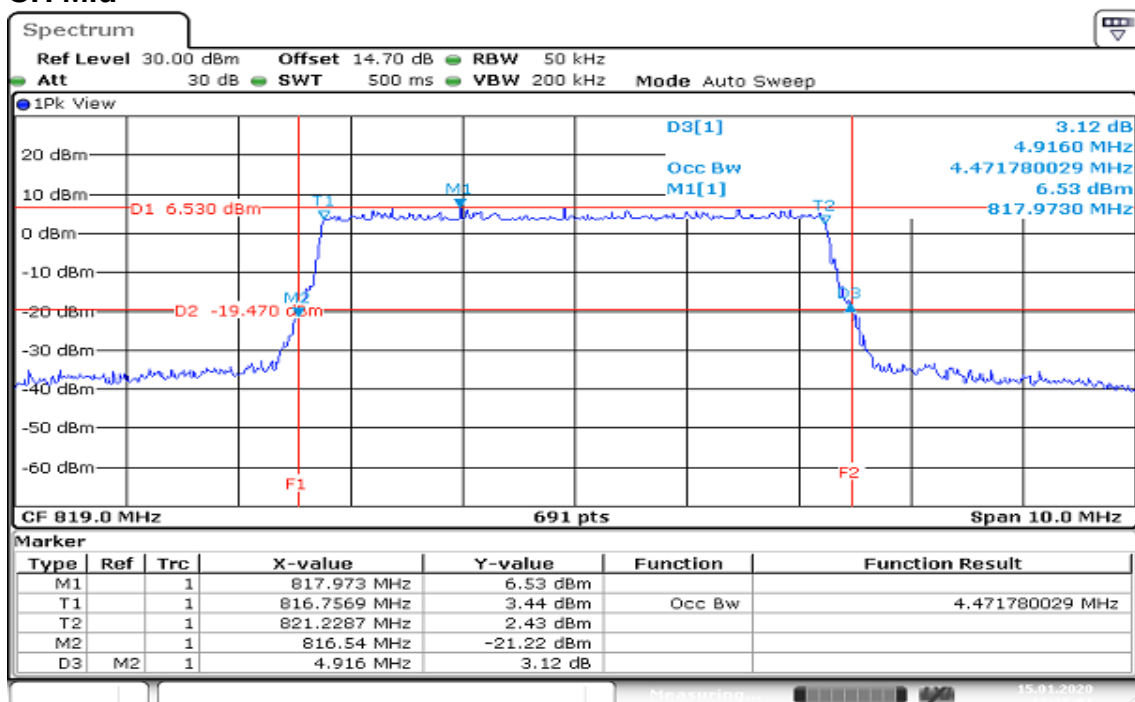
Report No.: T191120D05-RP10

BW: 5MHz / QPSK / RB =25, RB Offset = 0
CH Mid



Date: 15.JAN.2020 13:35:59

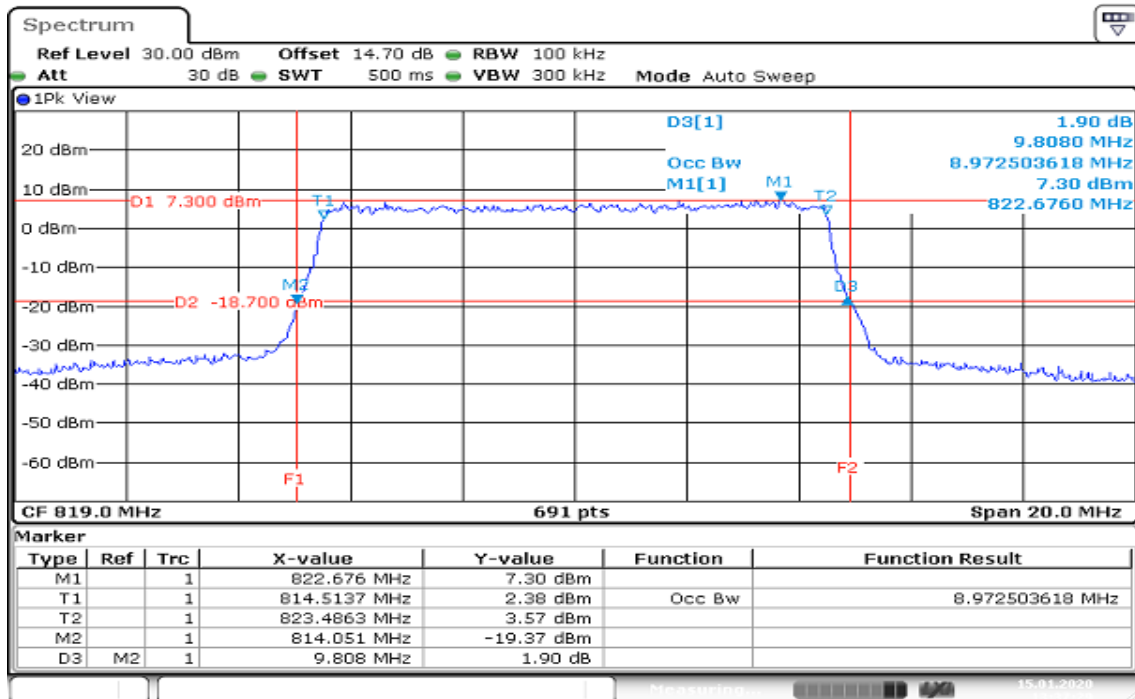
BW: 5MHz / 16QAM / RB =25, RB Offset = 0
CH Mid



Date: 15.JAN.2020 13:35:01

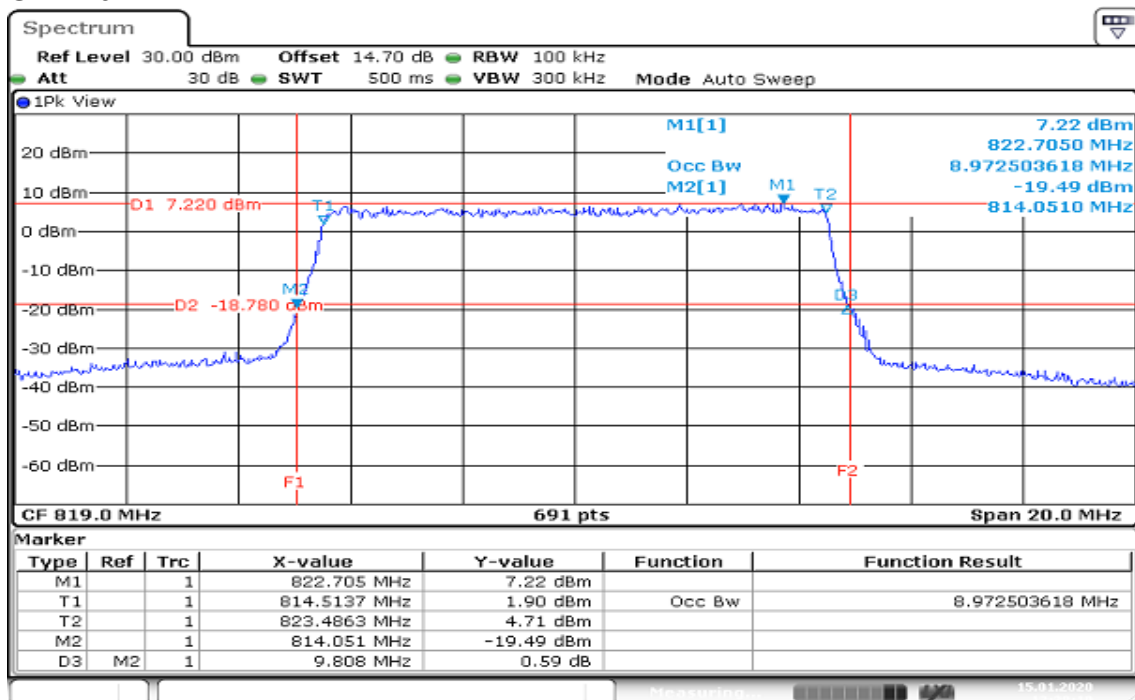
Report No.: T191120D05-RP10

BW: 10MHz / QPSK / RB =50, RB Offset = 0
CH Mid



Date: 15.JAN.2020 13:37:29

BW: 10MHz / 16QAM / RB =50, RB Offset = 0
CH Mid



Date: 15.JAN.2020 13:38:19

8.4 PEAK TO AVERAGE POWER RATIO

Limit

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

Test Procedures

1. According to KDB 971168 D01,
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.

Note: We selected worst case to performed test in middle channel, the results can be meet other channel.

Test Results

LTE Band 26

CHANNEL BANDWIDTH: 1.4MHz / QPSK / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
26740	819	4.58

CHANNEL BANDWIDTH: 1.4MHz / 16QAM / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
26740	819	5.54

CHANNEL BANDWIDTH: 3MHz / QPSK / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
26740	819	4.52

CHANNEL BANDWIDTH: 3MHz / 16QAM / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
26740	819	5.39

CHANNEL BANDWIDTH: 5MHz / QPSK / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
26740	819	4.46

CHANNEL BANDWIDTH: 5MHz / 16QAM / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
26740	819	5.39

CHANNEL BANDWIDTH: 10MHz / QPSK / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
26740	819	4.23

CHANNEL BANDWIDTH: 10MHz / 16QAM / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
26740	819	5.25

Note: We selected worst case to performed test in middle channel, the results can be meet other channel.

CHANNEL BANDWIDTH: 1.4MHz / QPSK / Full RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
26740	819	4.93

CHANNEL BANDWIDTH: 1.4MHz / 16QAM / Full RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
26740	819	5.80

CHANNEL BANDWIDTH: 3MHz / QPSK / Full RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
26740	819	4.81

CHANNEL BANDWIDTH: 3MHz / 16QAM / Full RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
26740	819	5.86

CHANNEL BANDWIDTH: 5MHz / QPSK / Full RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
26740	819	4.78

CHANNEL BANDWIDTH: 5MHz / 16QAM / Full RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
26740	819	5.65

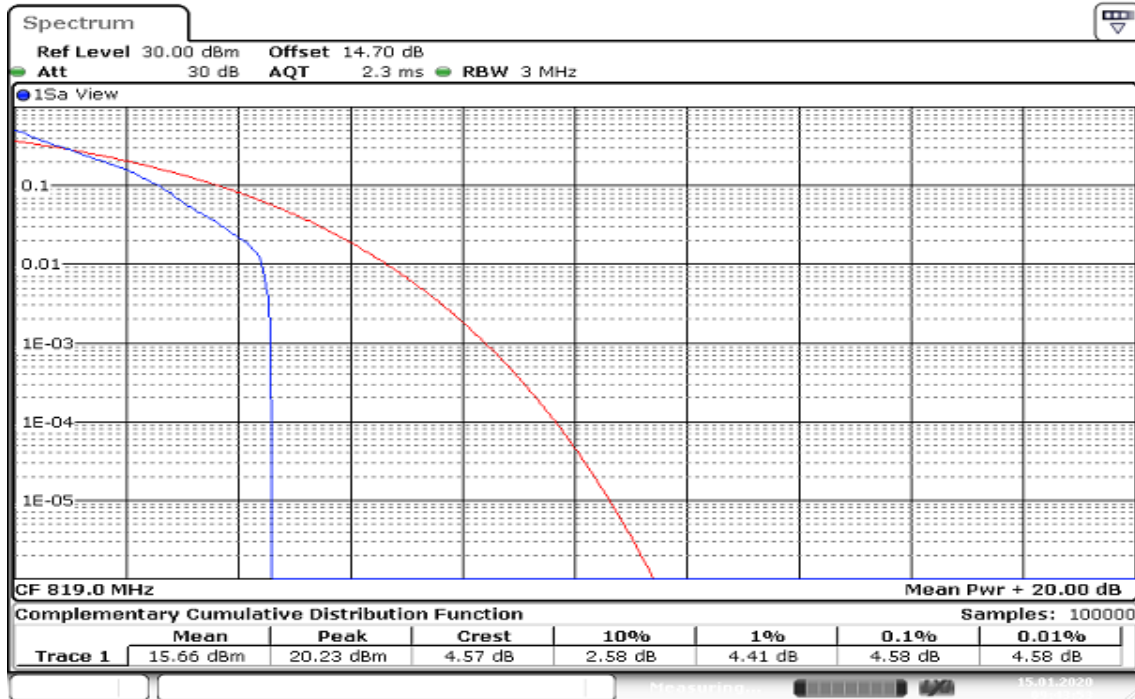
CHANNEL BANDWIDTH: 10MHz / QPSK / Full RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
26740	819	4.81

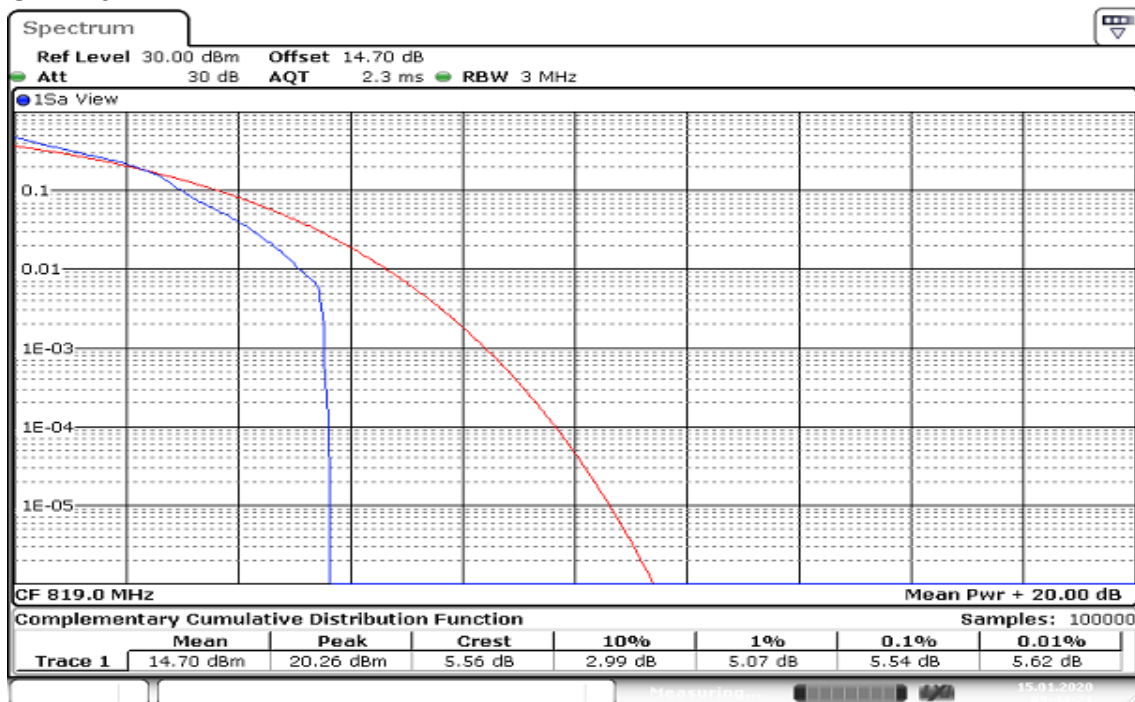
CHANNEL BANDWIDTH: 10MHz / 16QAM / Full RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
26740	819	5.74

Note: We selected worst case to performed test in middle channel, the results can be meet other channel.

LTE Band 26**BW: 1.4MHz / QPSK / RB =1, RB Offset = 0****CH Mid**

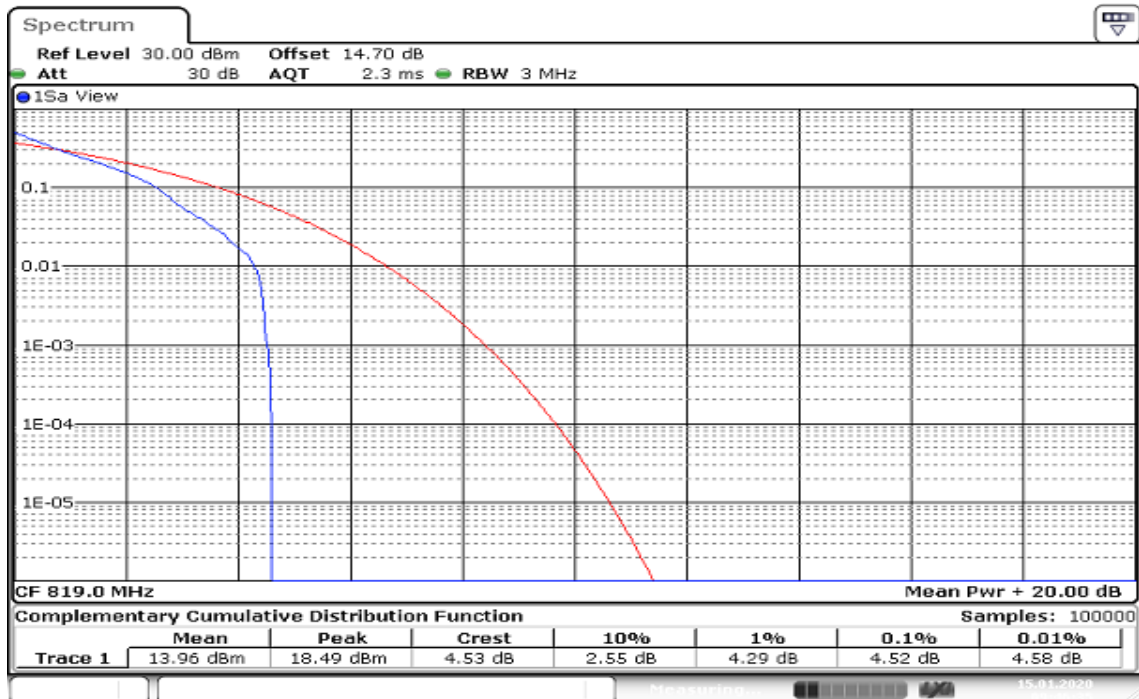
Date: 15.JAN.2020 09:43:53

BW: 1.4MHz / 16QAM / RB =1, RB Offset = 0**CH Mid**

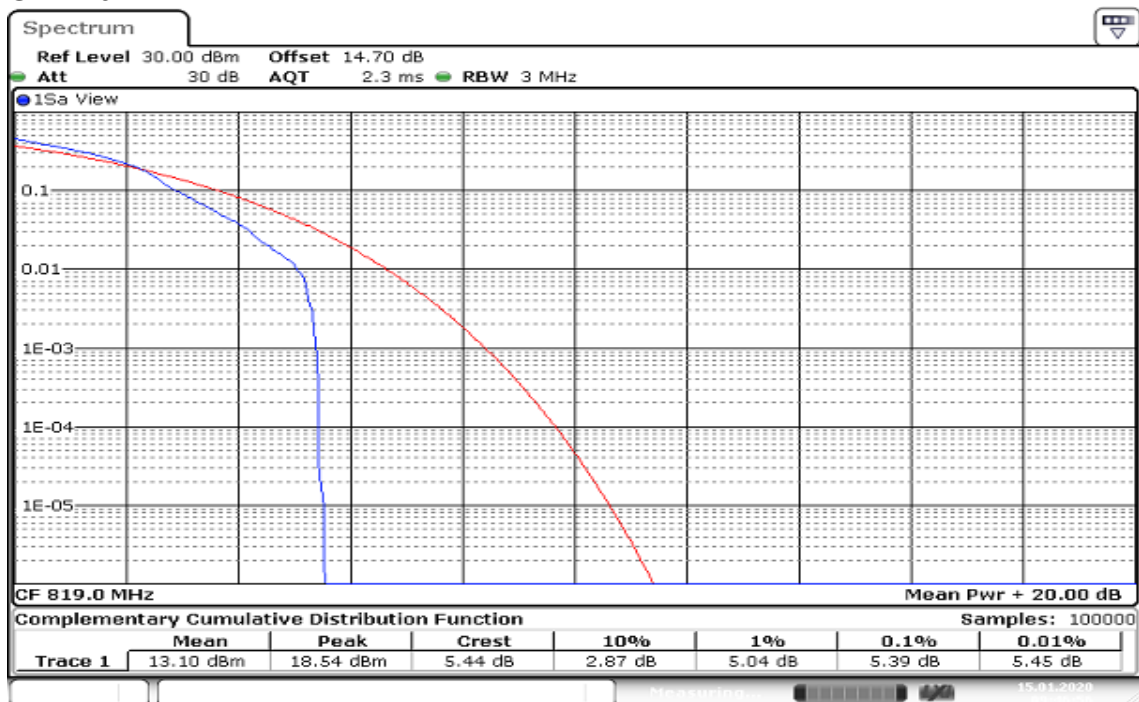
Date: 15.JAN.2020 09:44:21

Report No.: T191120D05-RP10

BW: 3MHz / QPSK / RB =1, RB Offset = 0
CH Mid

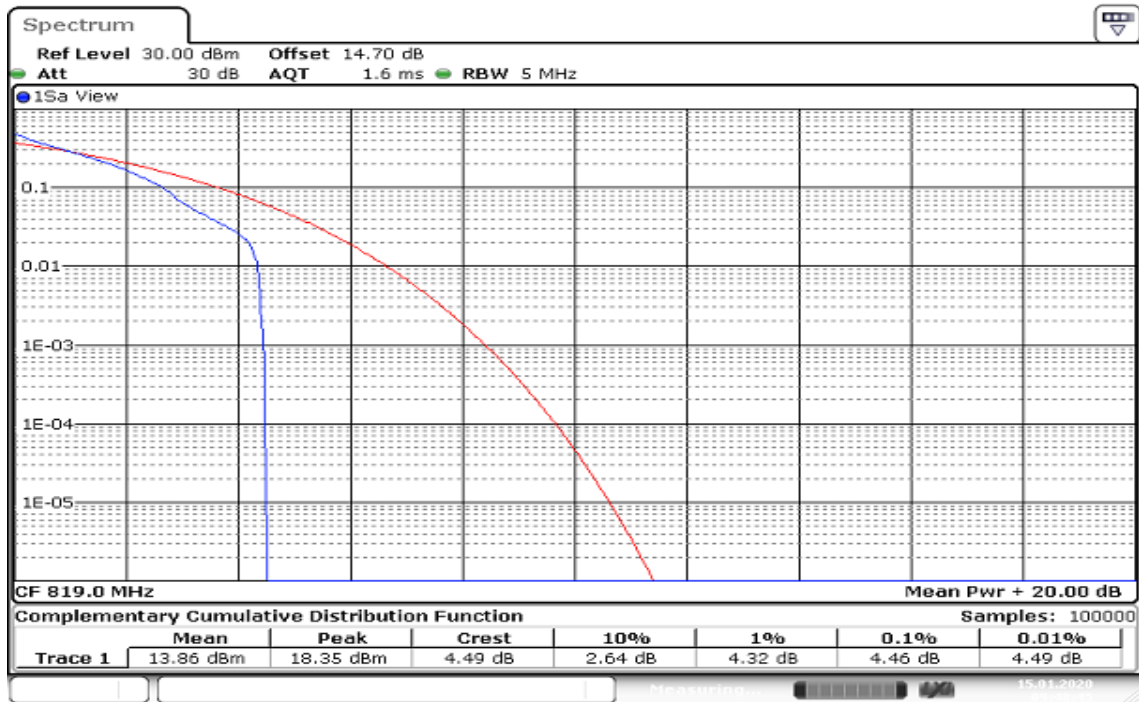


BW: 3MHz / 16QAM / RB =1, RB Offset = 0
CH Mid

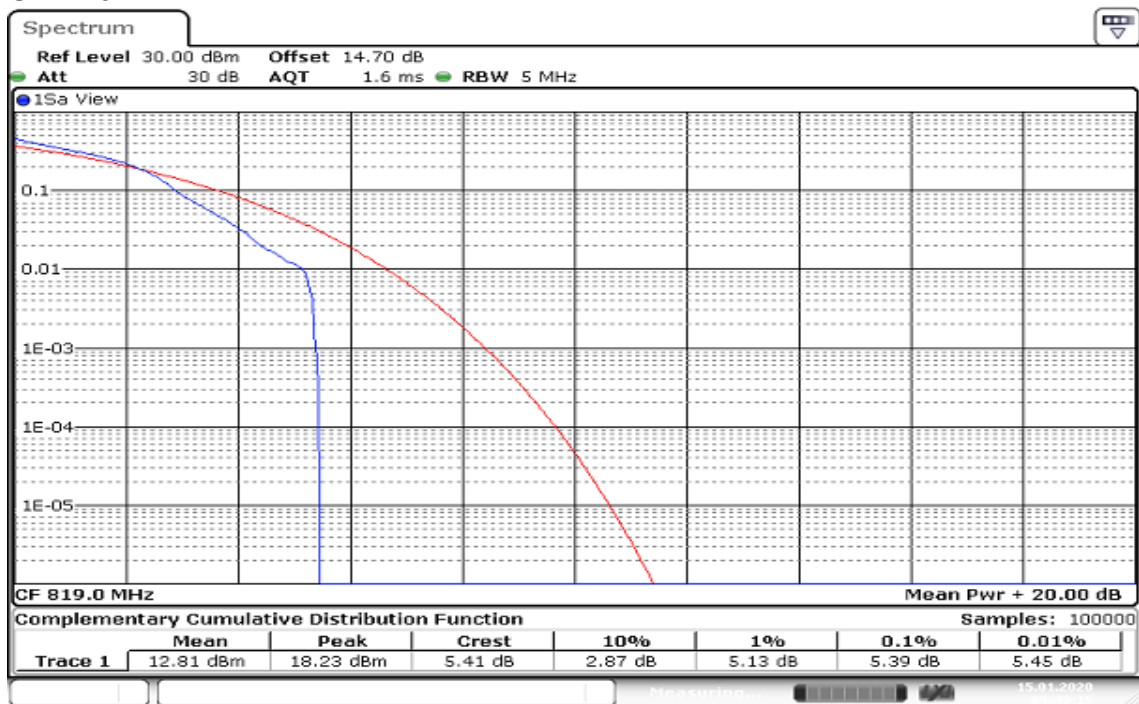


Report No.: T191120D05-RP10

BW: 5MHz / QPSK / RB =1, RB Offset = 0
CH Mid

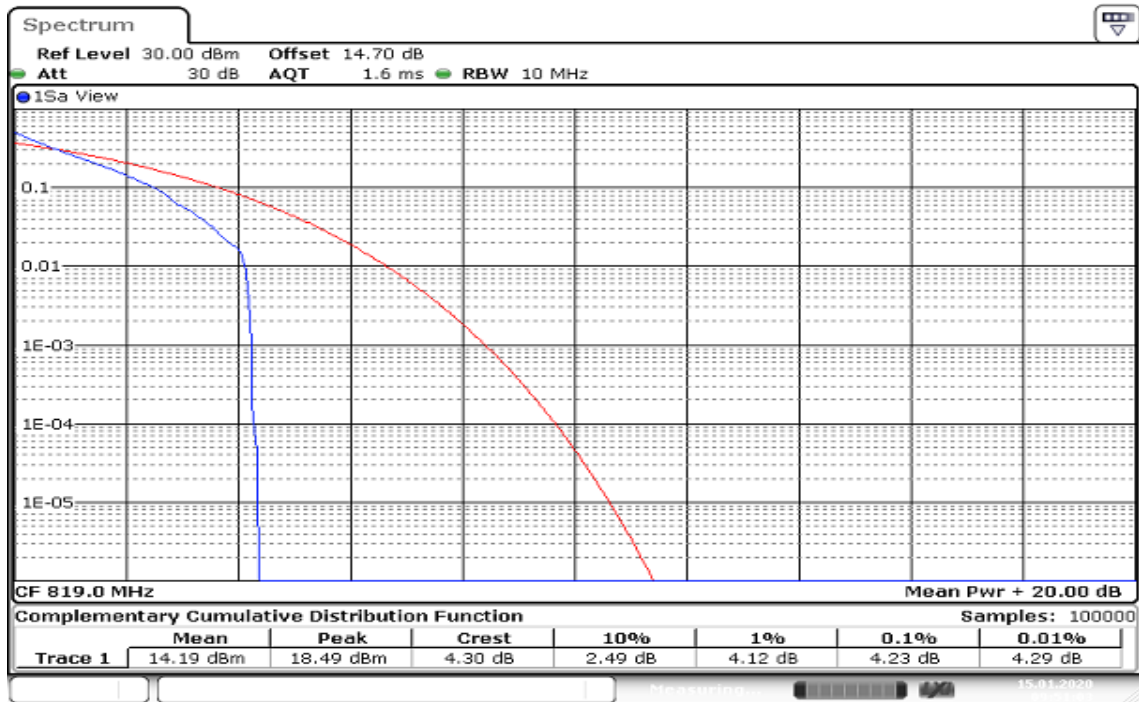


BW: 5MHz / 16QAM / RB =1, RB Offset = 0
CH Mid

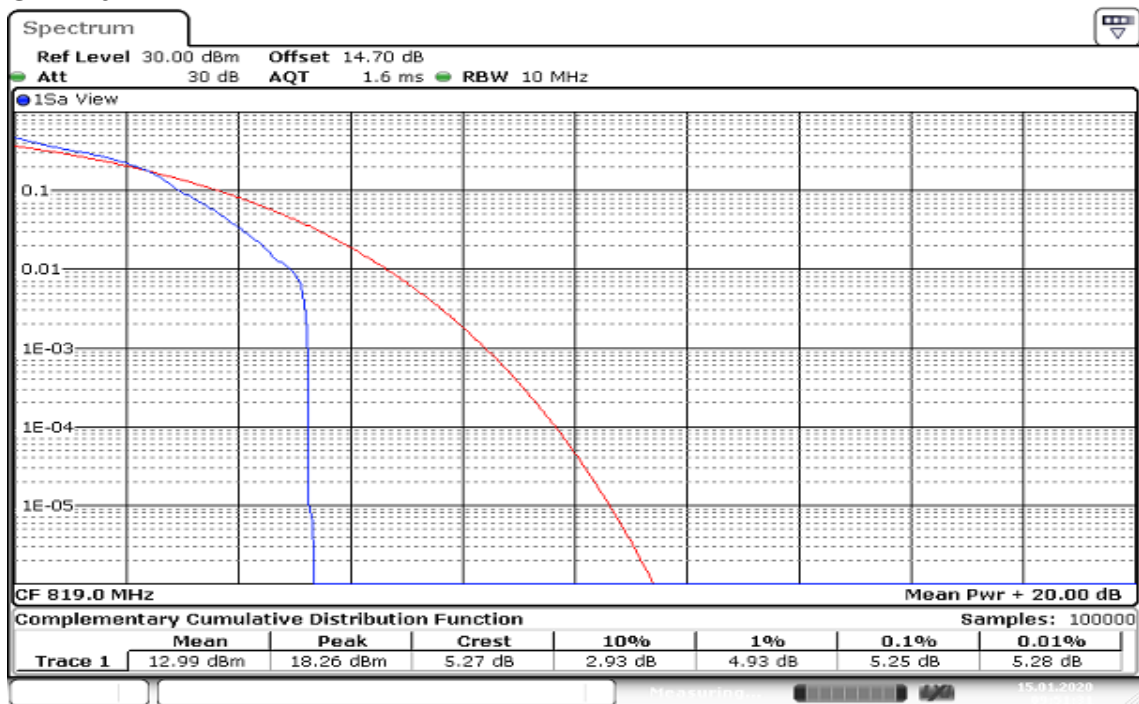


Report No.: T191120D05-RP10

BW: 10MHz / QPSK /RB =1, RB Offset = 0
CH Mid

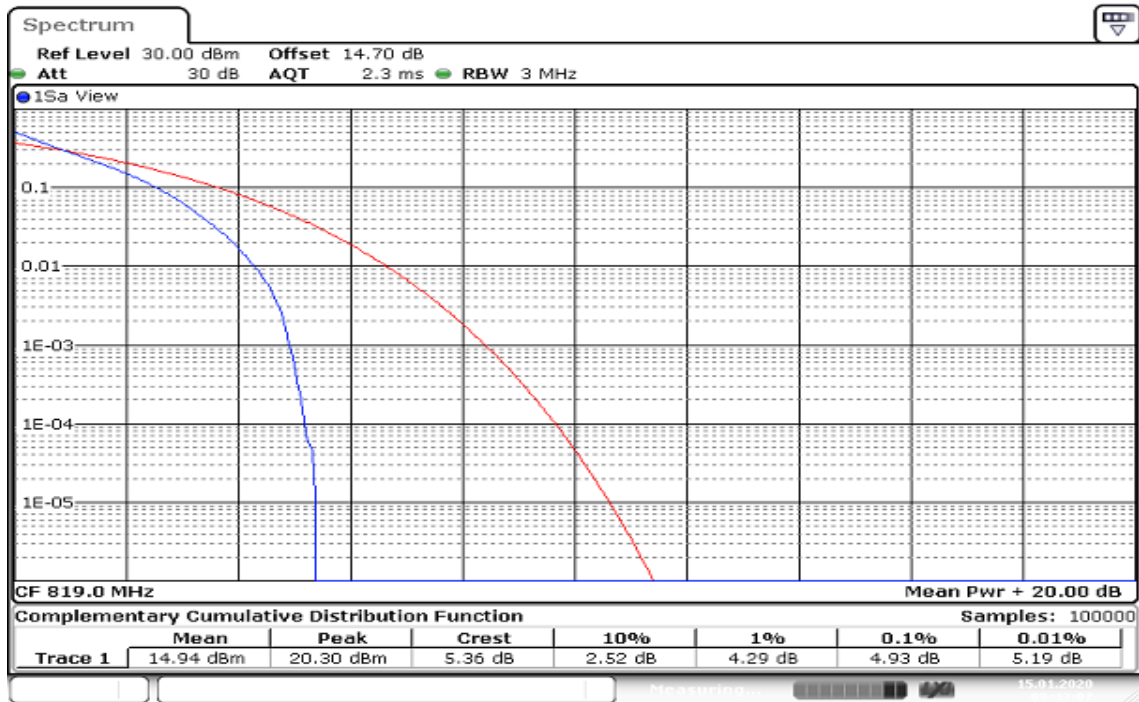


BW: 10MHz / 16QAM /RB =1, RB Offset = 0
CH Mid



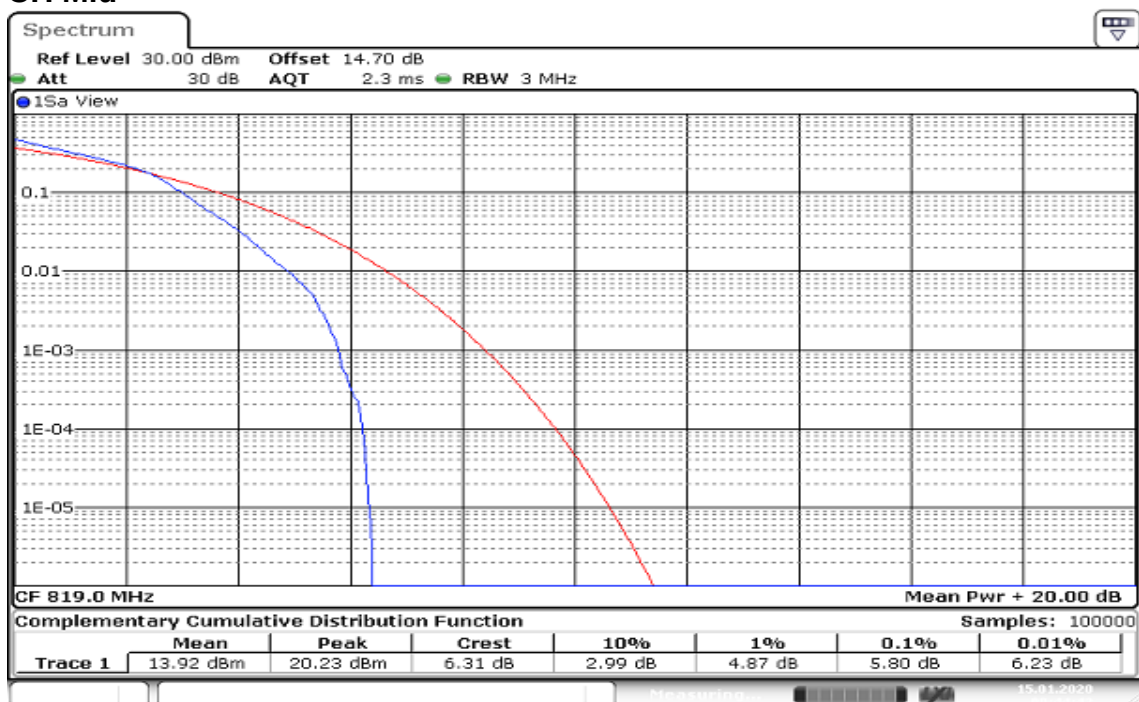
Report No.: T191120D05-RP10

BW: 1.4MHz / QPSK / RB =Full, RB Offset = 0
CH Mid



Date: 15. JAN. 2020 09:43:07

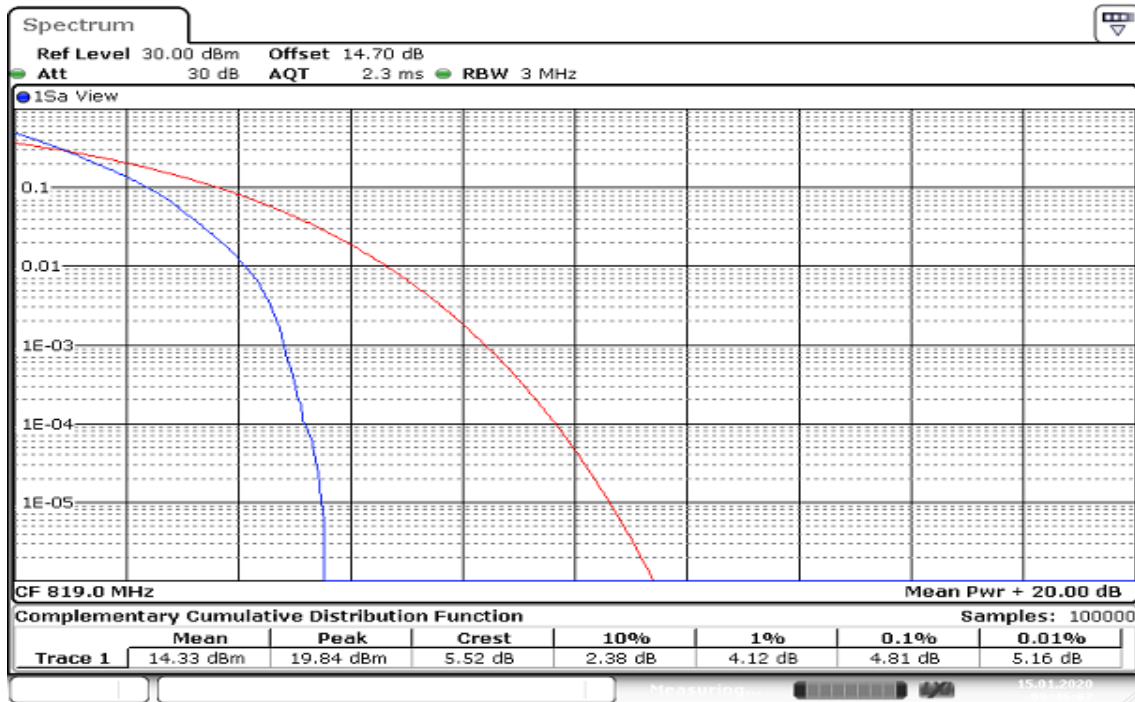
BW: 1.4MHz / 16QAM / RB =Full, RB Offset = 0
CH Mid



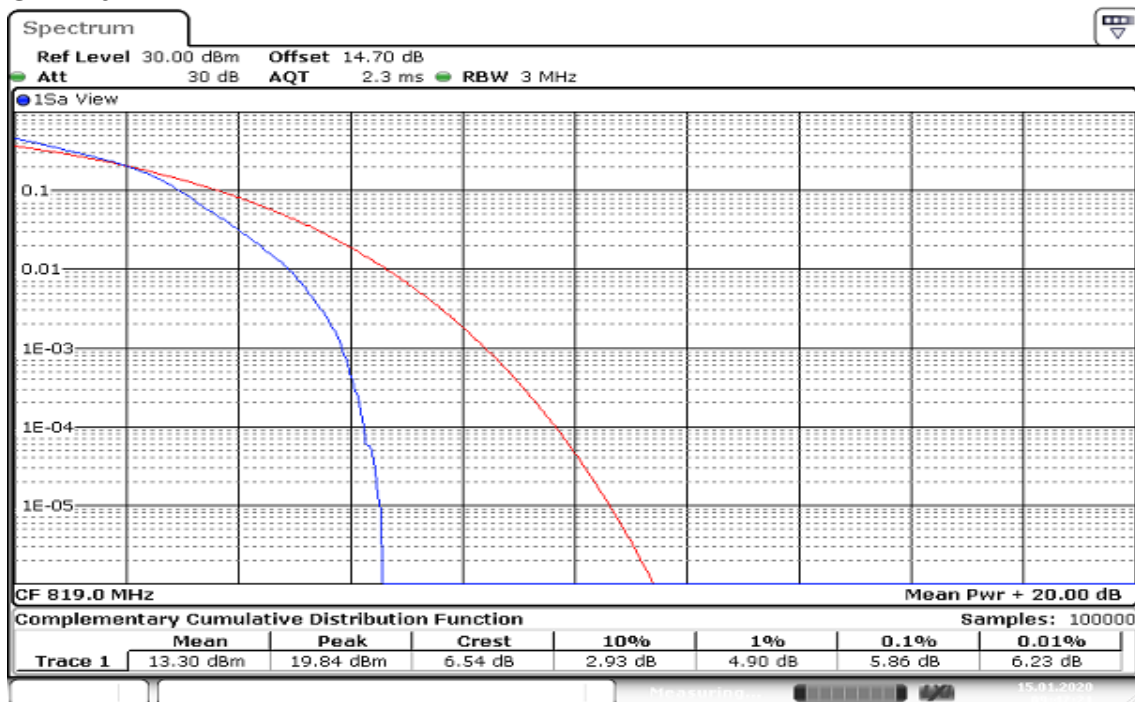
Date: 15. JAN. 2020 09:44:43

Report No.: T191120D05-RP10

BW: 3MHz / QPSK / RB =Full, RB Offset = 0
CH Mid

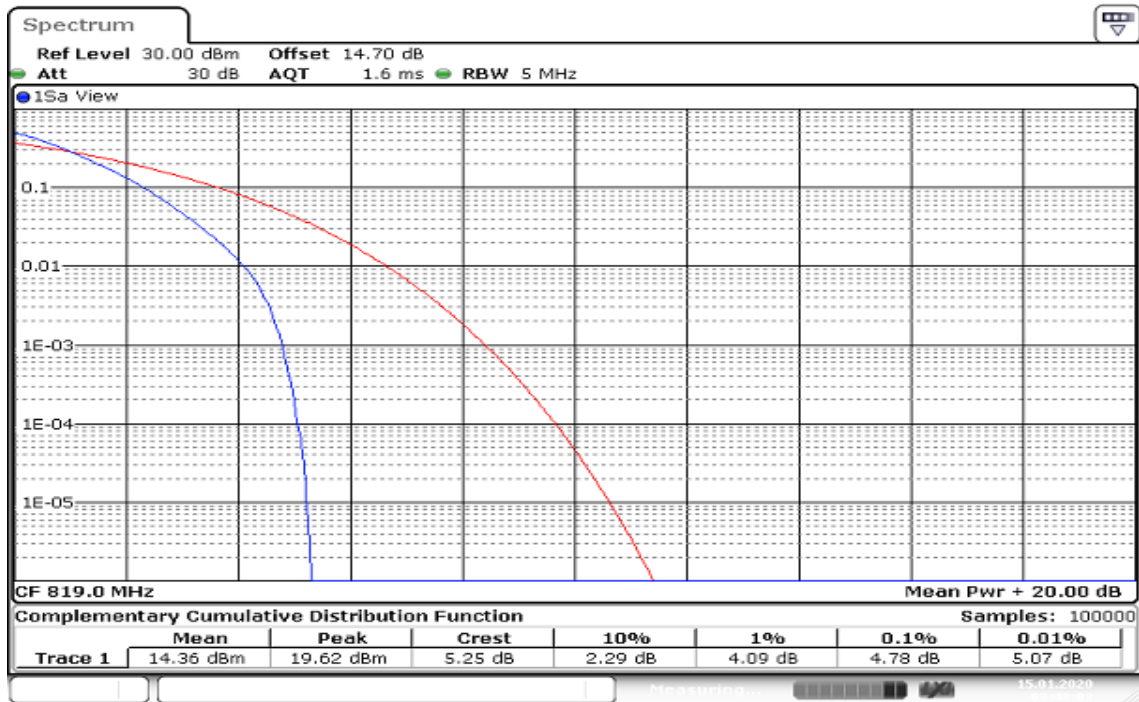


BW: 3MHz / 16QAM / RB =Full, RB Offset = 0
CH Mid

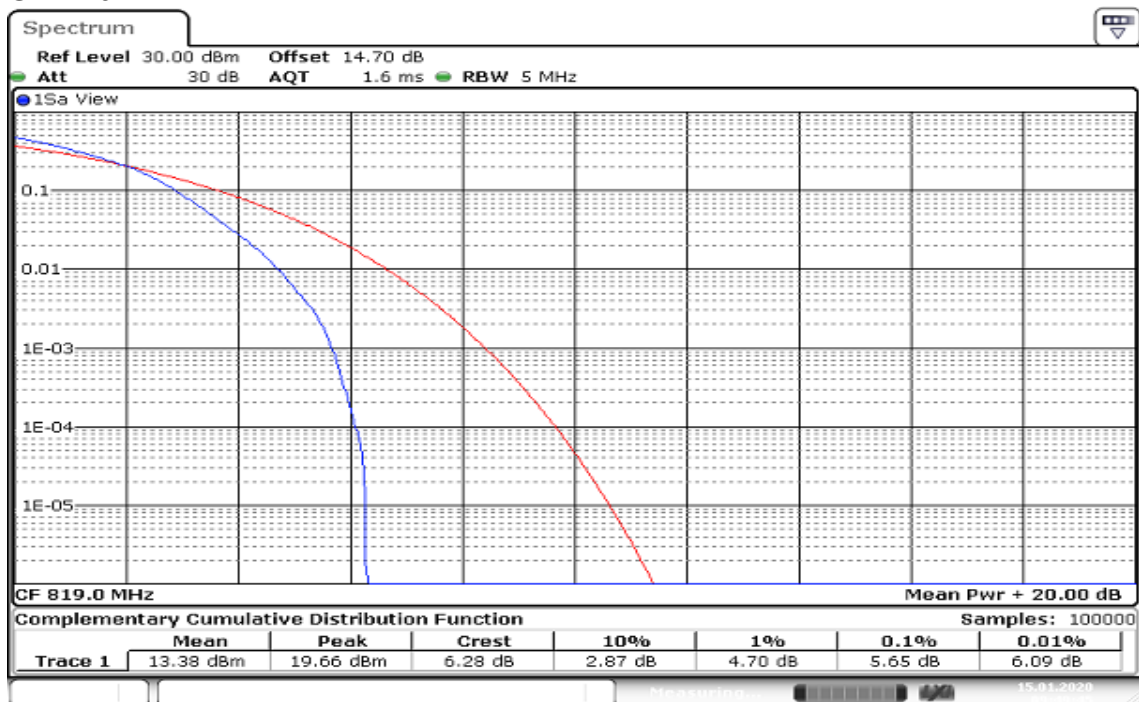


Report No.: T191120D05-RP10

BW: 5MHz / QPSK / RB =Full, RB Offset = 0
CH Mid

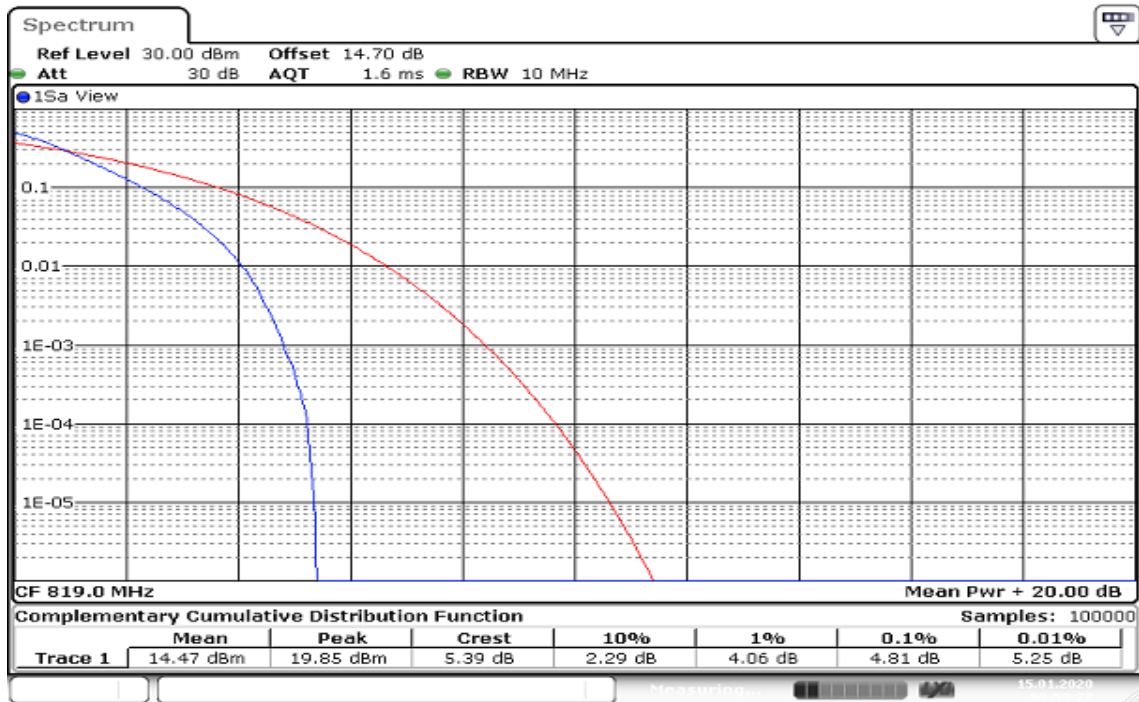


BW: 5MHz / 16QAM / RB =Full, RB Offset = 0
CH Mid

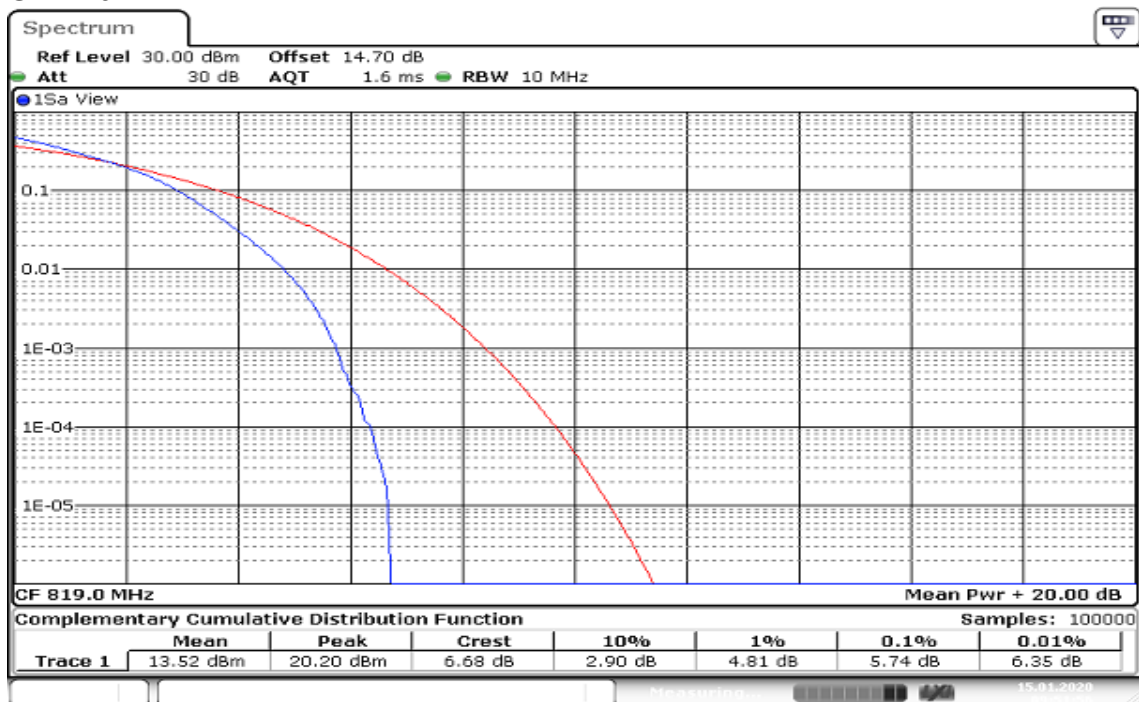


Report No.: T191120D05-RP10

BW: 10MHz / QPSK /RB =Full, RB Offset = 0
CH Mid



BW: 10MHz / 16QAM /RB =Full, RB Offset = 0
CH Mid





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8.5 CONDUCTED BAND EDGE MEASUREMENT

Limit

FCC Part 90.691, FCC Part 90.543

Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

Test Procedures

KDB 971168 D01,

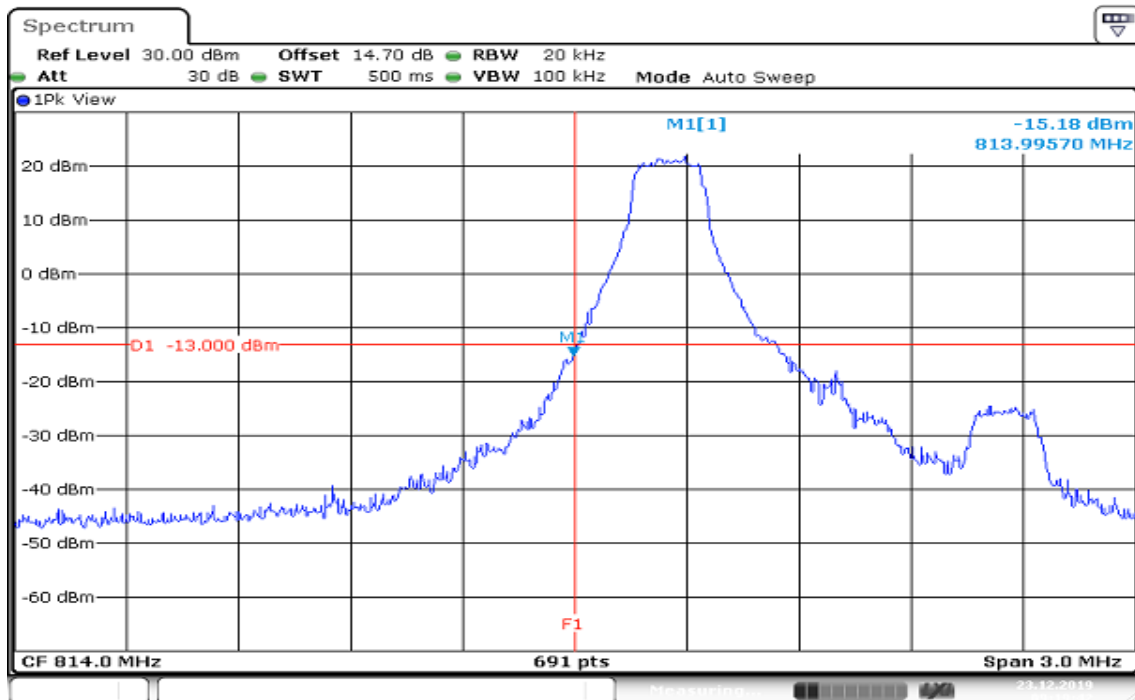
1. RBW $\geq$ 1% of the emission bandwidth
2. VBW $\geq$ 3 x RBW
3. Span was set large enough so as to capture all out of emissions near the band edge.

Test Results:

LTE Band 26

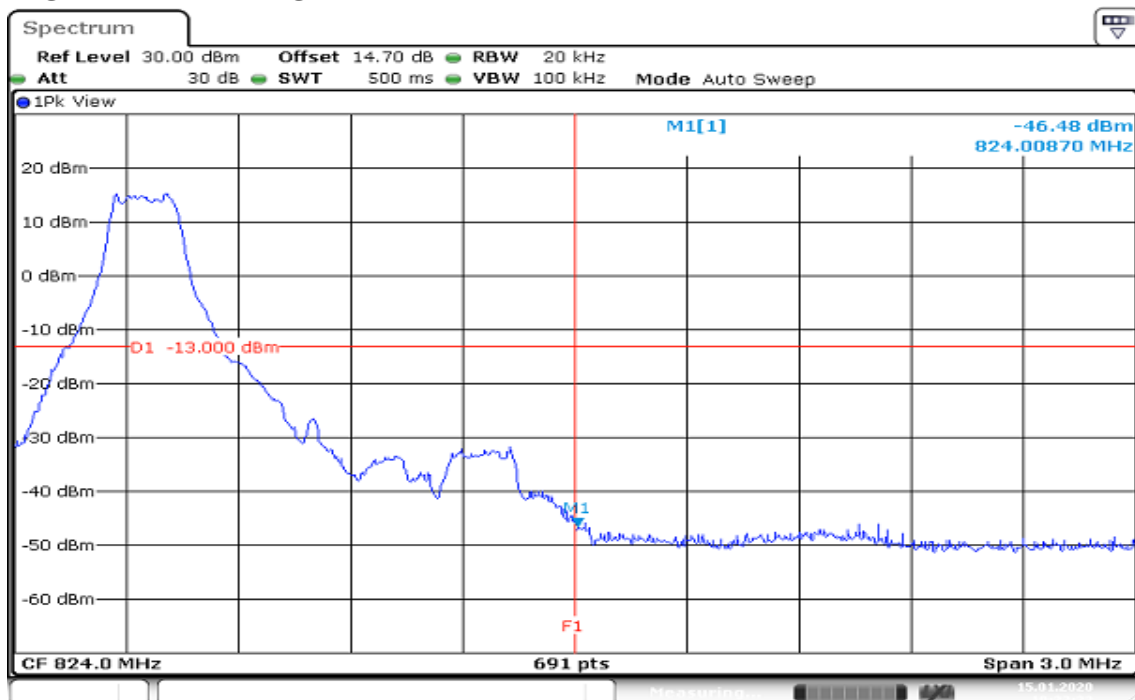
CHANNEL BANDWIDTH: 1.4MHz / QPSK / 1RB ALLOCATED

LOWER BAND EDGE



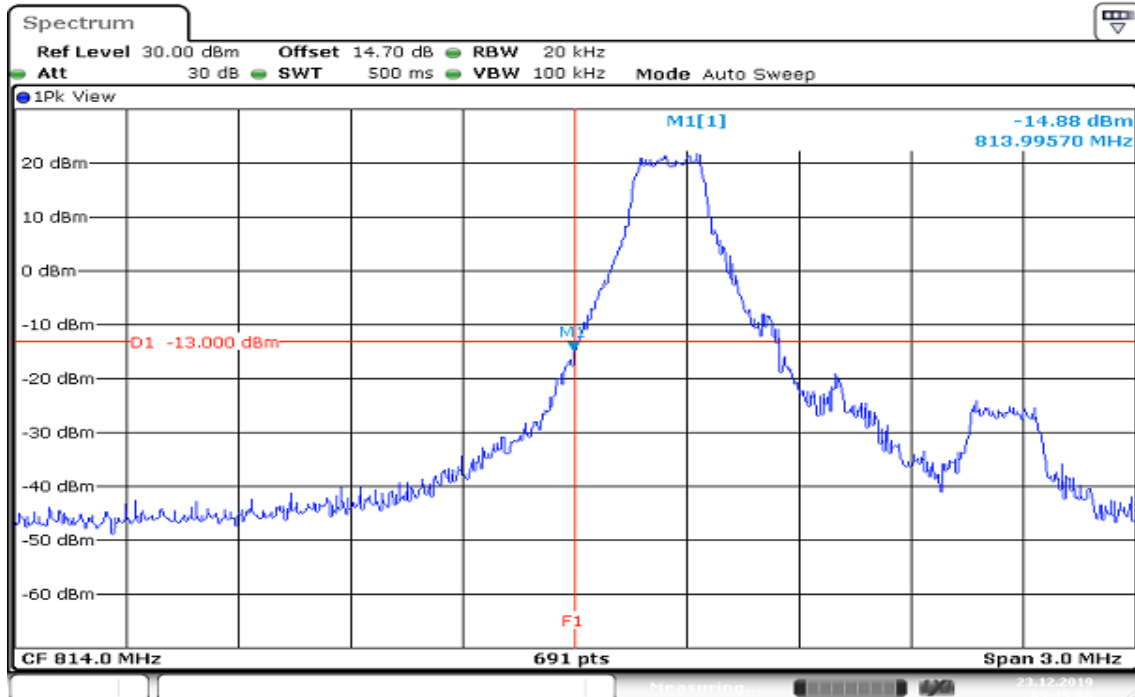
Date: 23.DEC.2019 09:19:43

HIGHER BAND EDGE



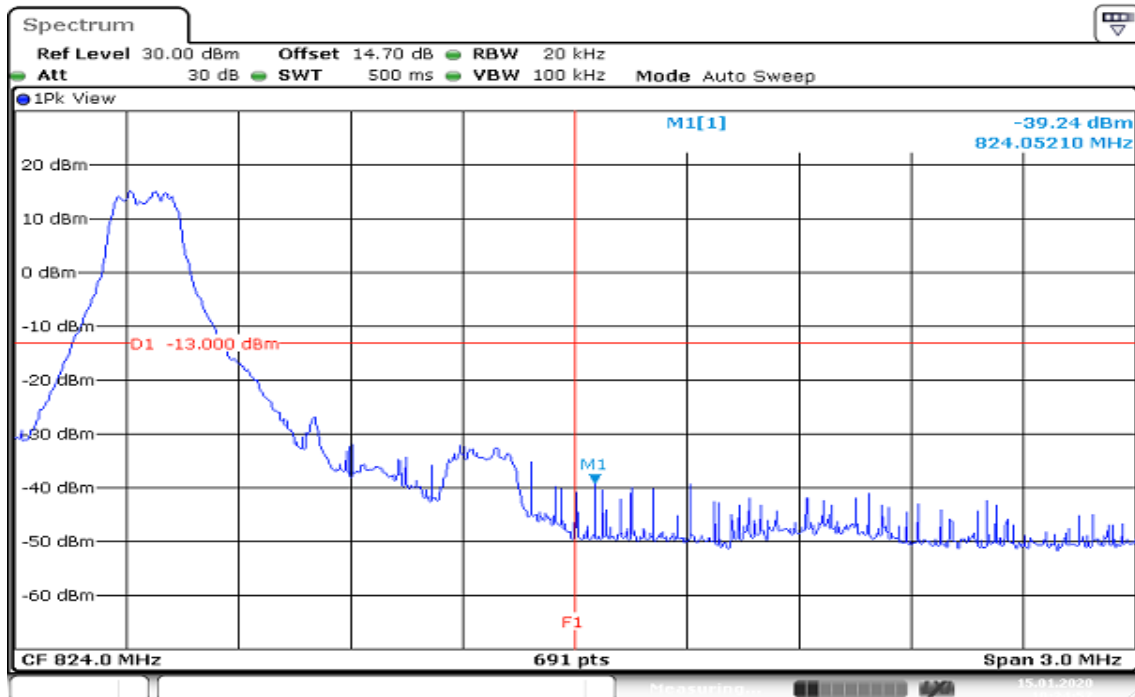
Date: 15.JAN.2020 10:32:23

CHANNEL BANDWIDTH: 1.4MHz / 16QAM / 1RB ALLOCATED LOWER BAND EDGE



Date: 23.DEC.2019 09:19:07

HIGHER BAND EDGE



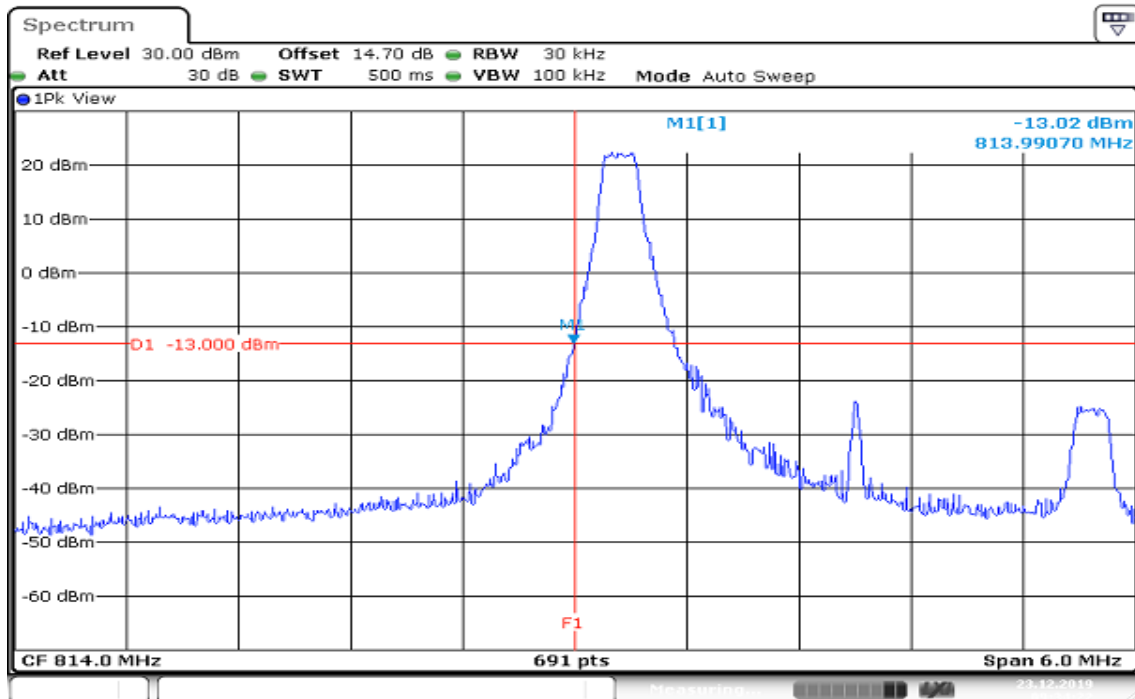
Date: 15.JAN.2020 10:34:57

Report No.: T191120D05-RP10

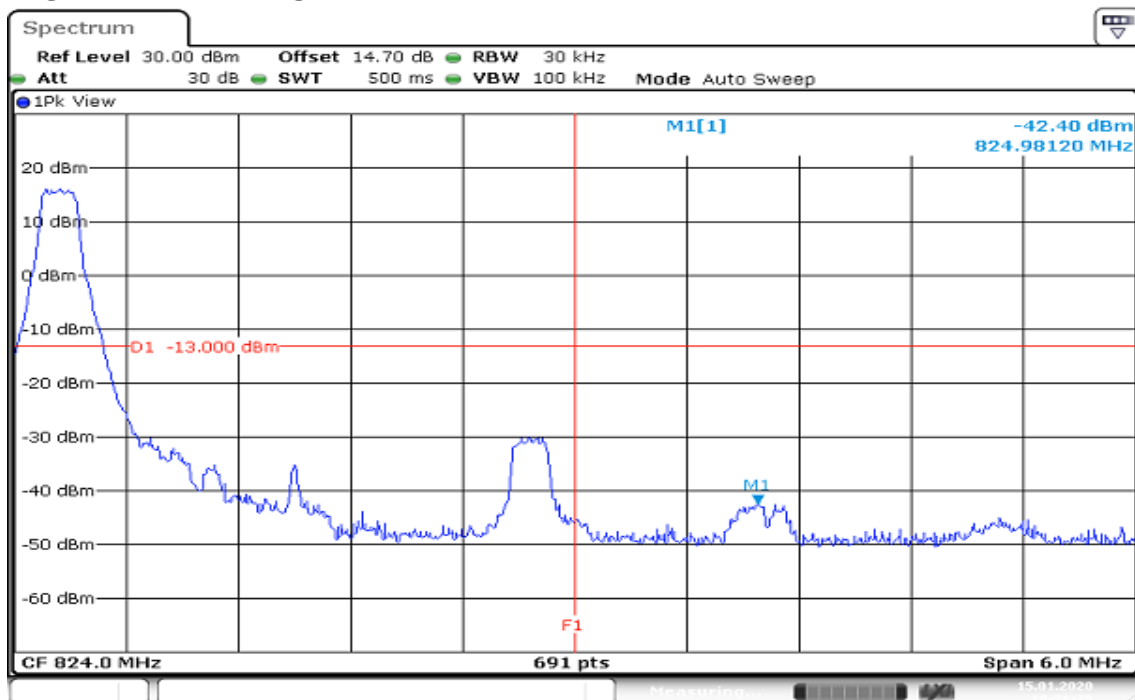
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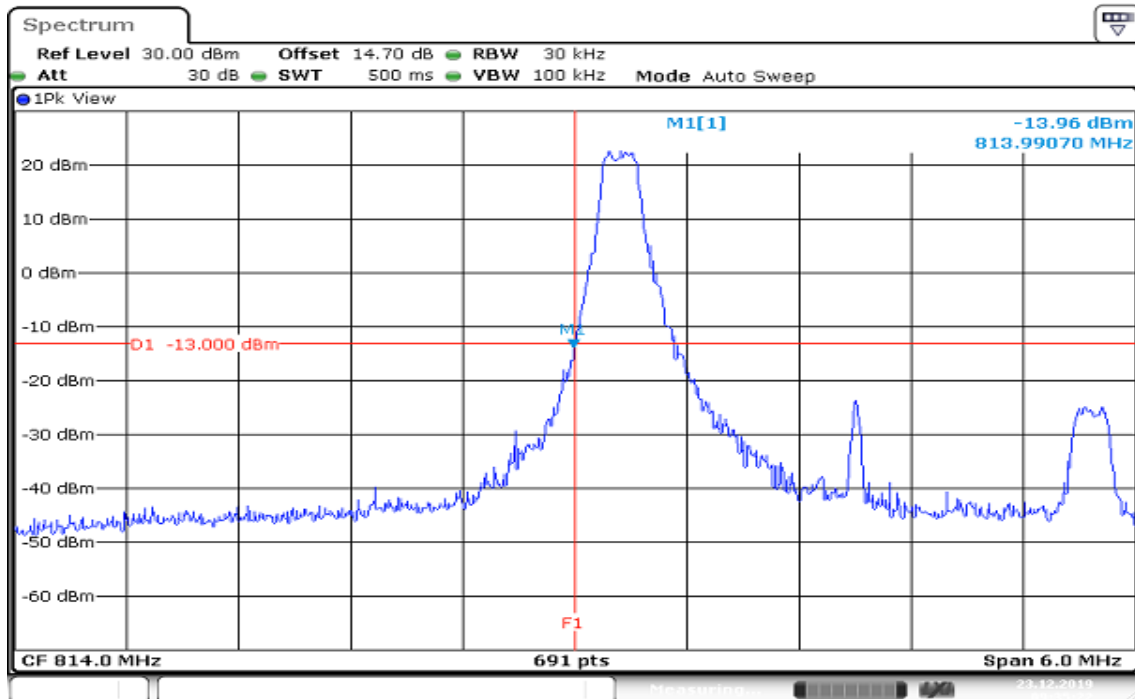
CHANNEL BANDWIDTH: 3MHz / QPSK / 1RB ALLOCATED LOWER BAND EDGE



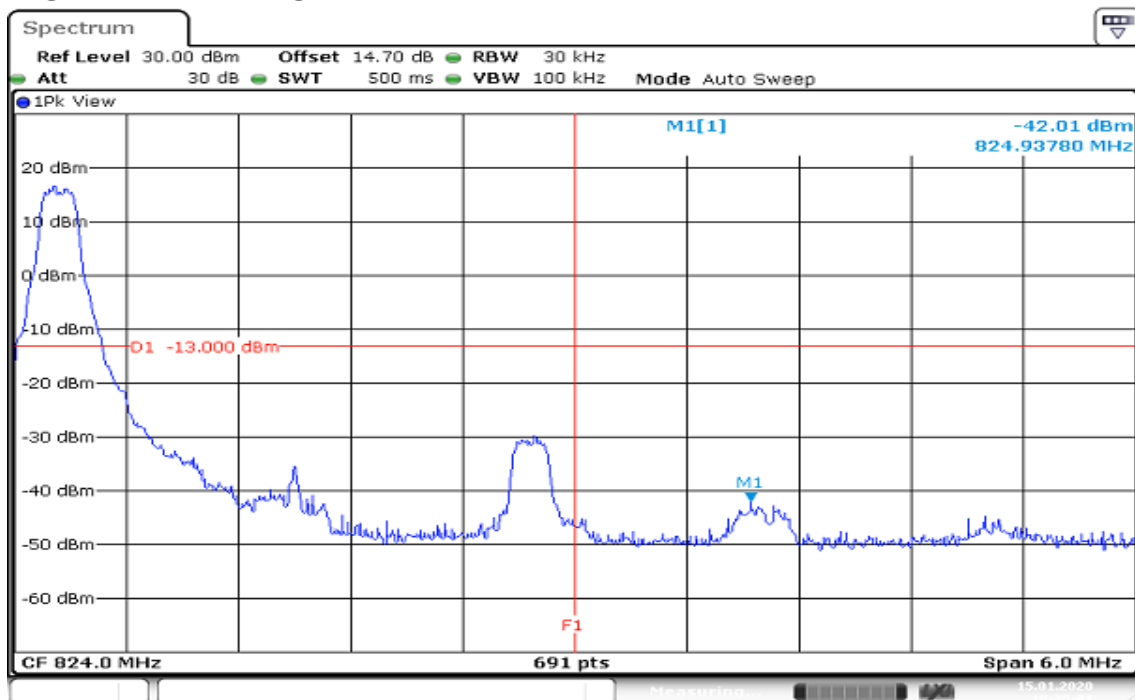
HIGHER BAND EDGE



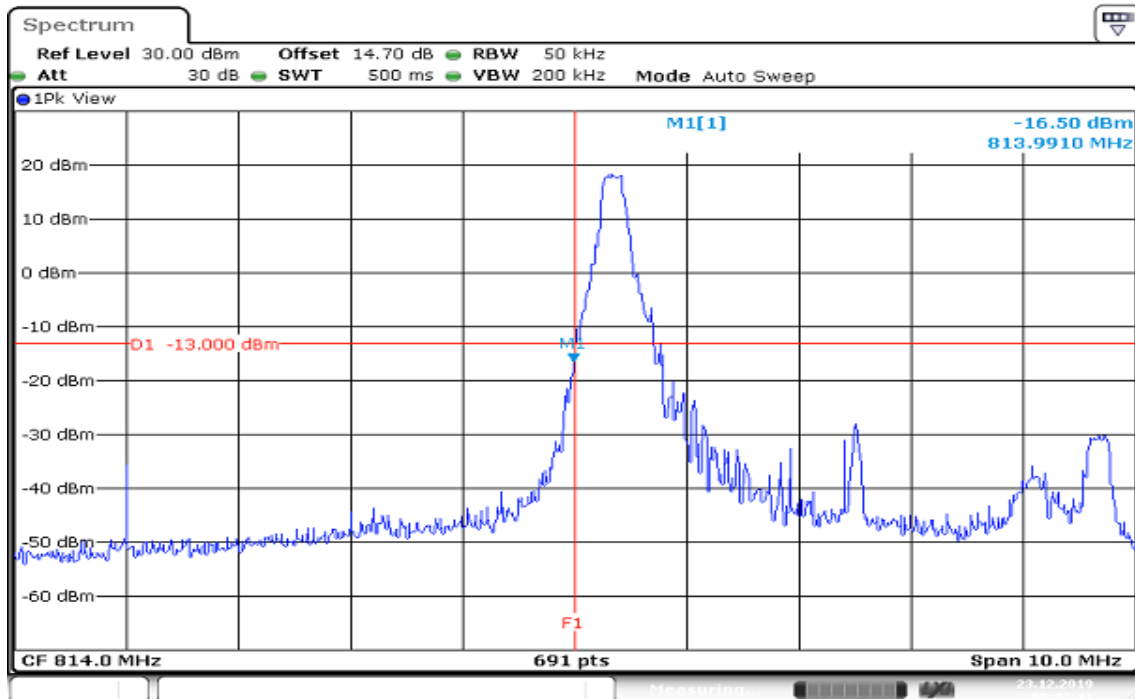
CHANNEL BANDWIDTH: 3MHz / 16QAM / 1RB ALLOCATED LOWER BAND EDGE



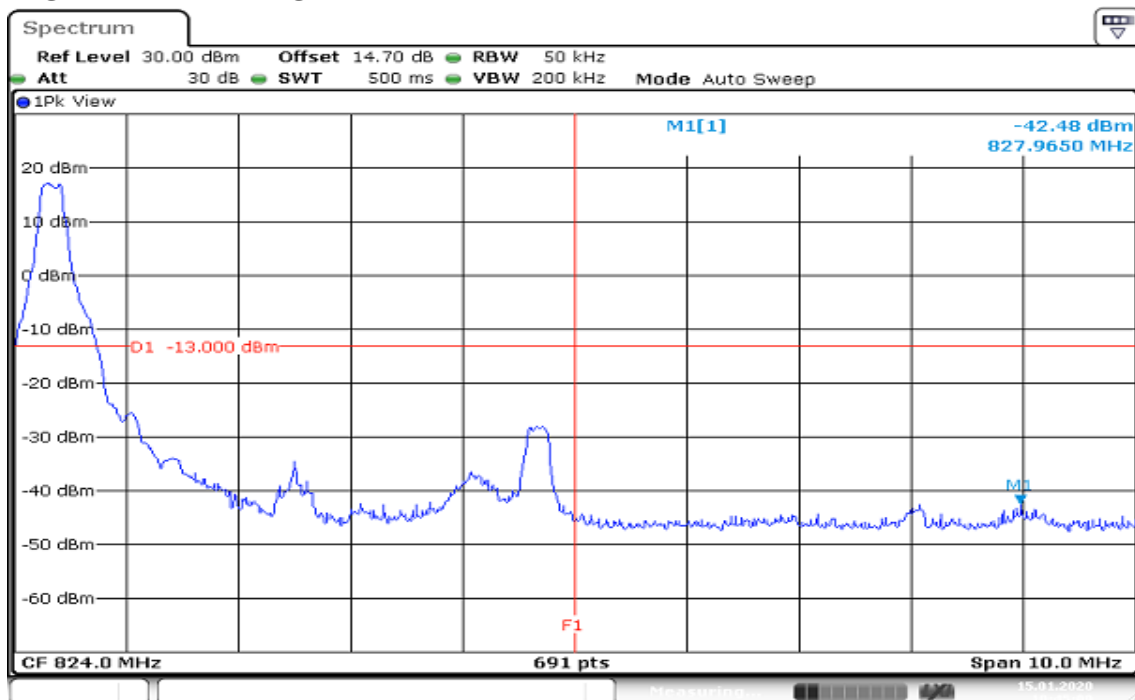
HIGHER BAND EDGE

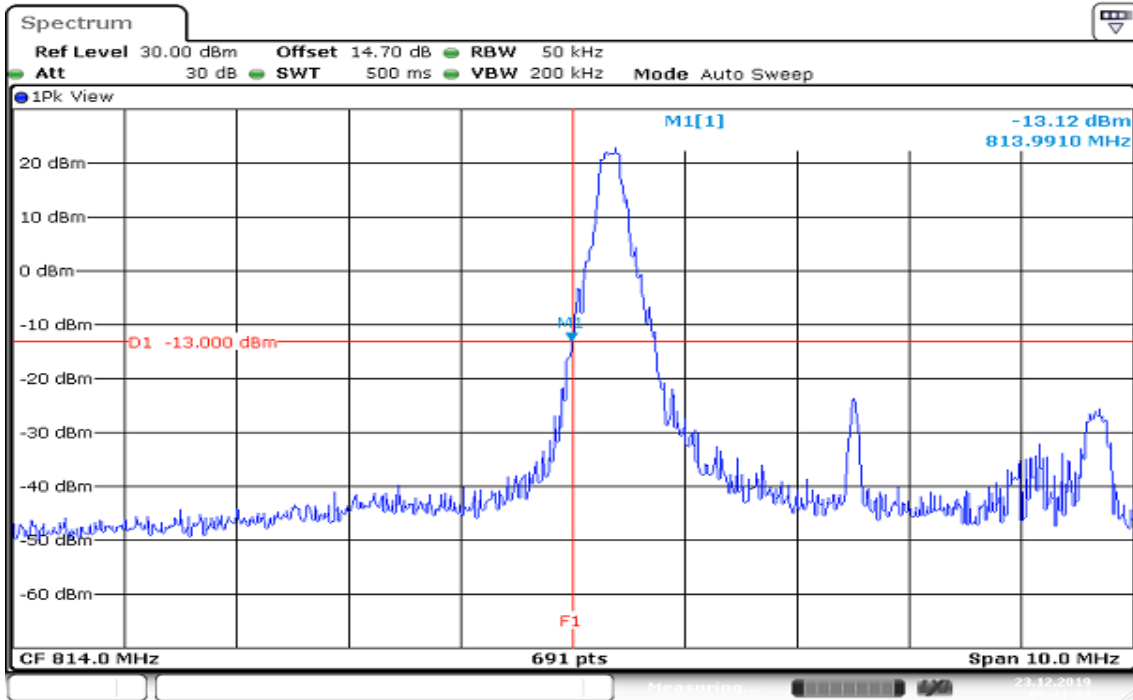


CHANNEL BANDWIDTH: 5MHz / QPSK / 1RB ALLOCATED LOWER BAND EDGE

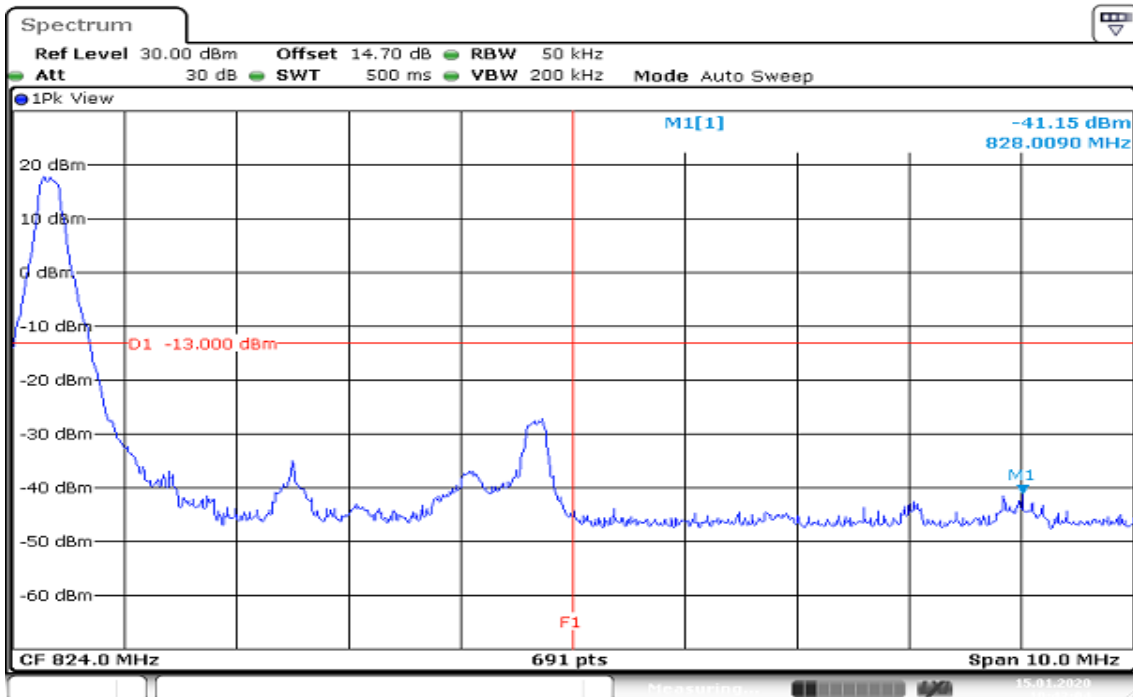


HIGHER BAND EDGE



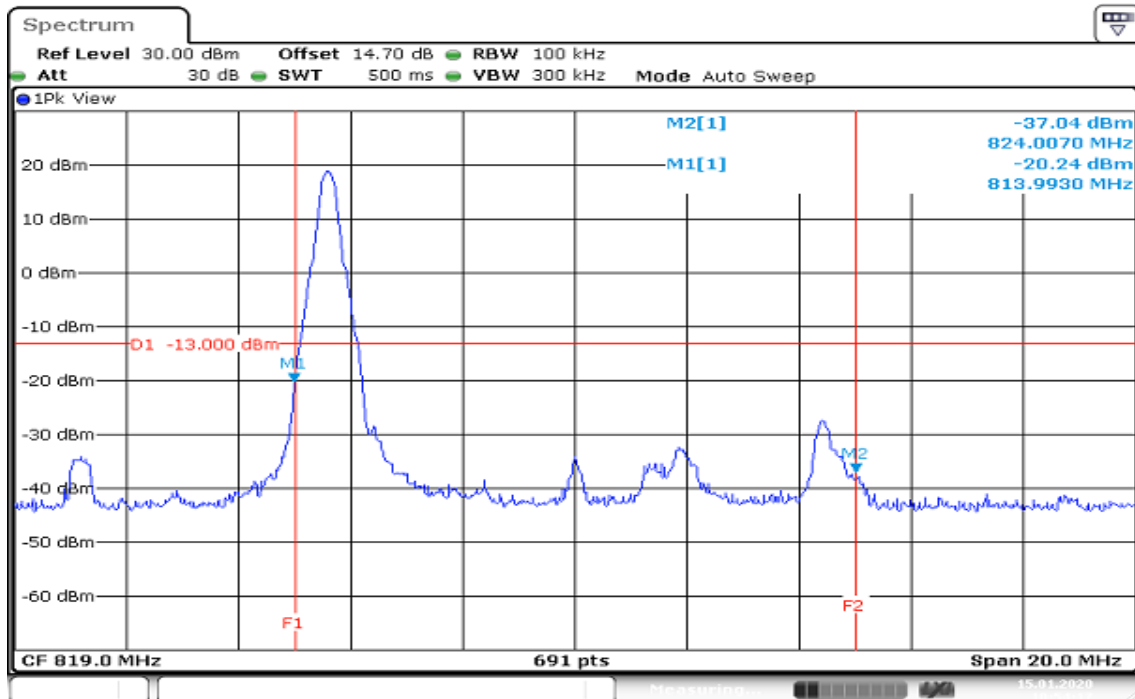
**CHANNEL BANDWIDTH: 5MHz / 16QAM / 1RB ALLOCATED
LOWER BAND EDGE**

Date: 23.DEC.2019 09:41:24

HIGHER BAND EDGE

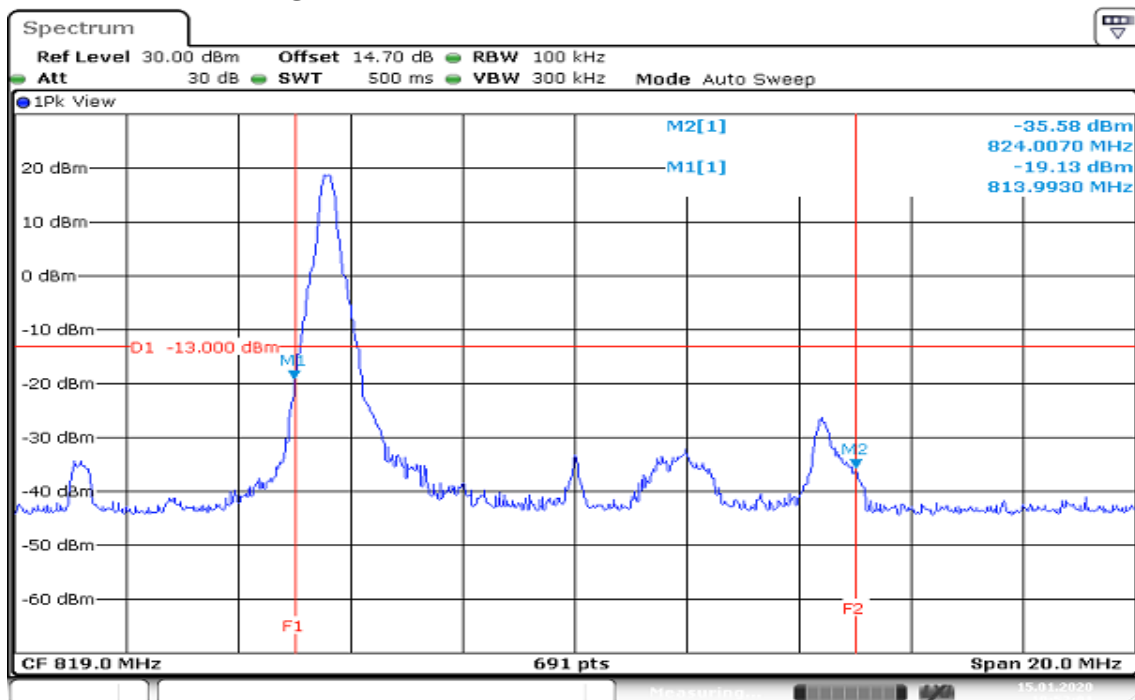
Date: 15.JAN.2020 10:43:04

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



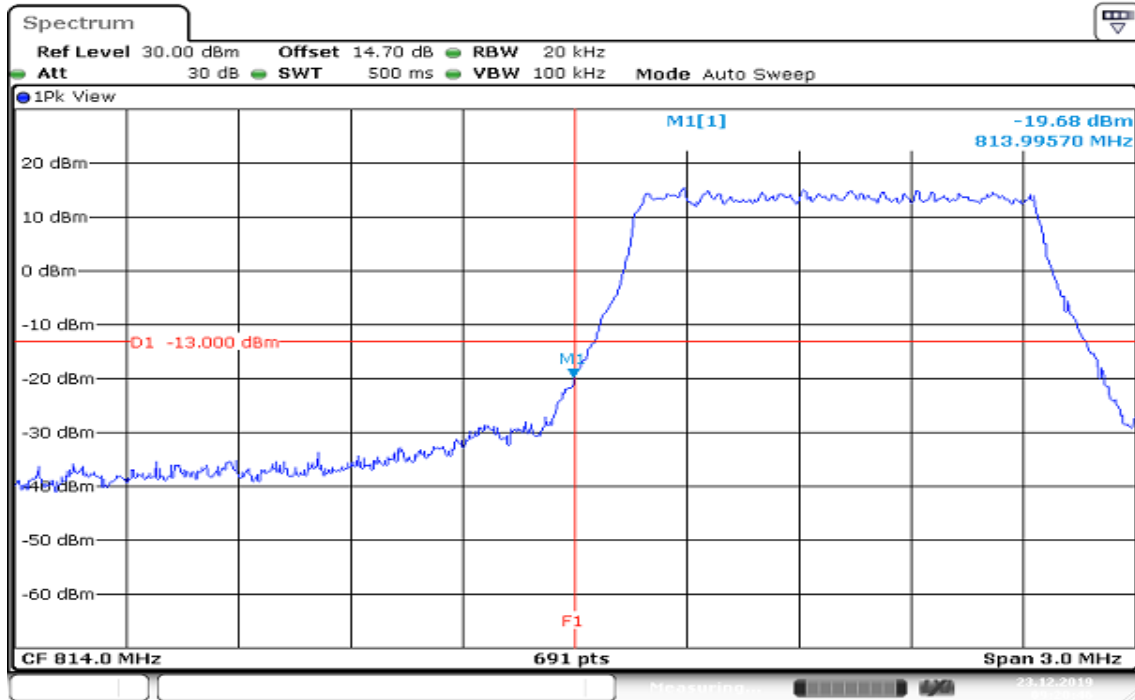
Date: 15.JAN.2020 10:54:16

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

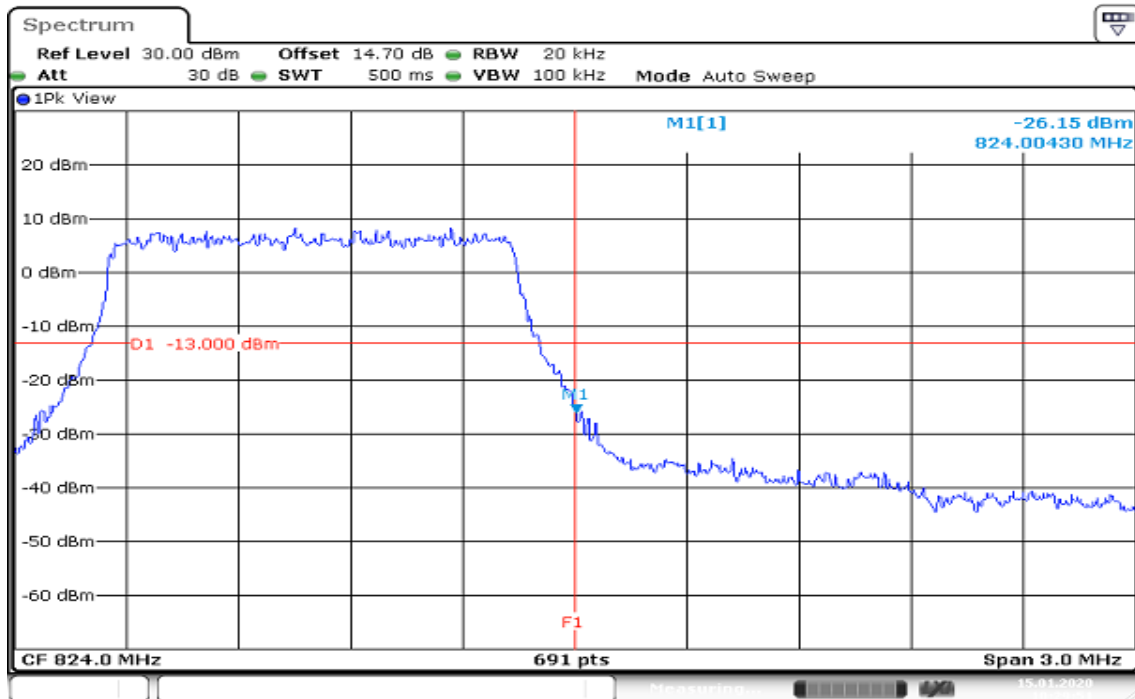


Date: 15.JAN.2020 10:52:00

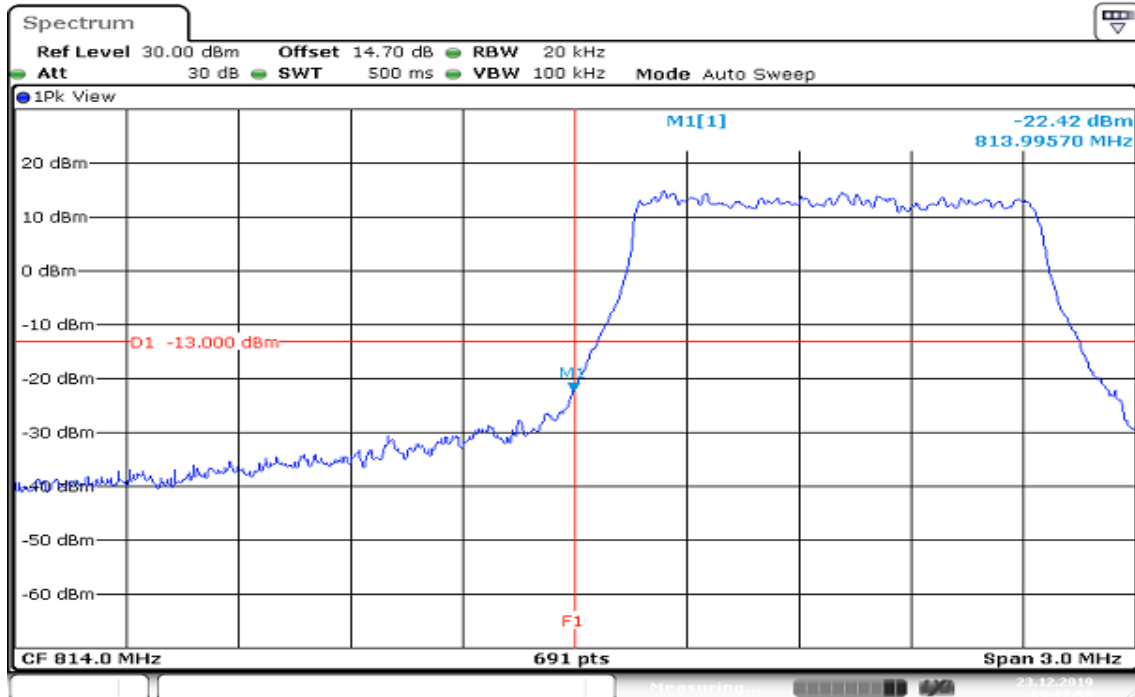
CHANNEL BANDWIDTH: 1.4MHz / QPSK / Full RB ALLOCATED LOWER BAND EDGE



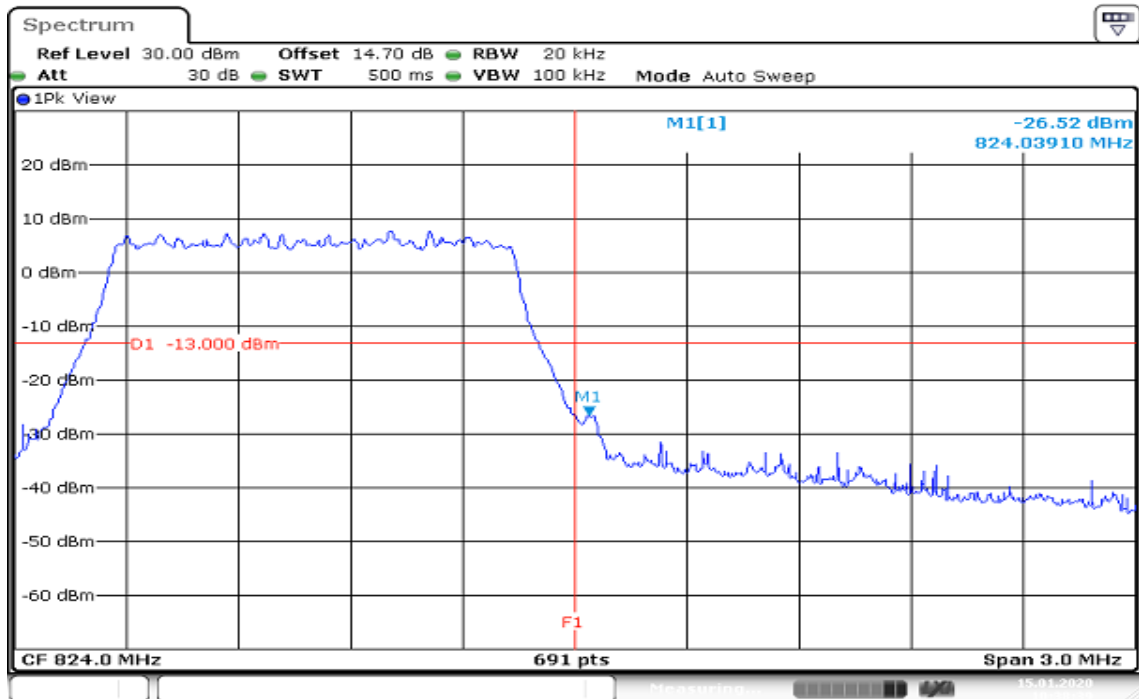
HIGHER BAND EDGE



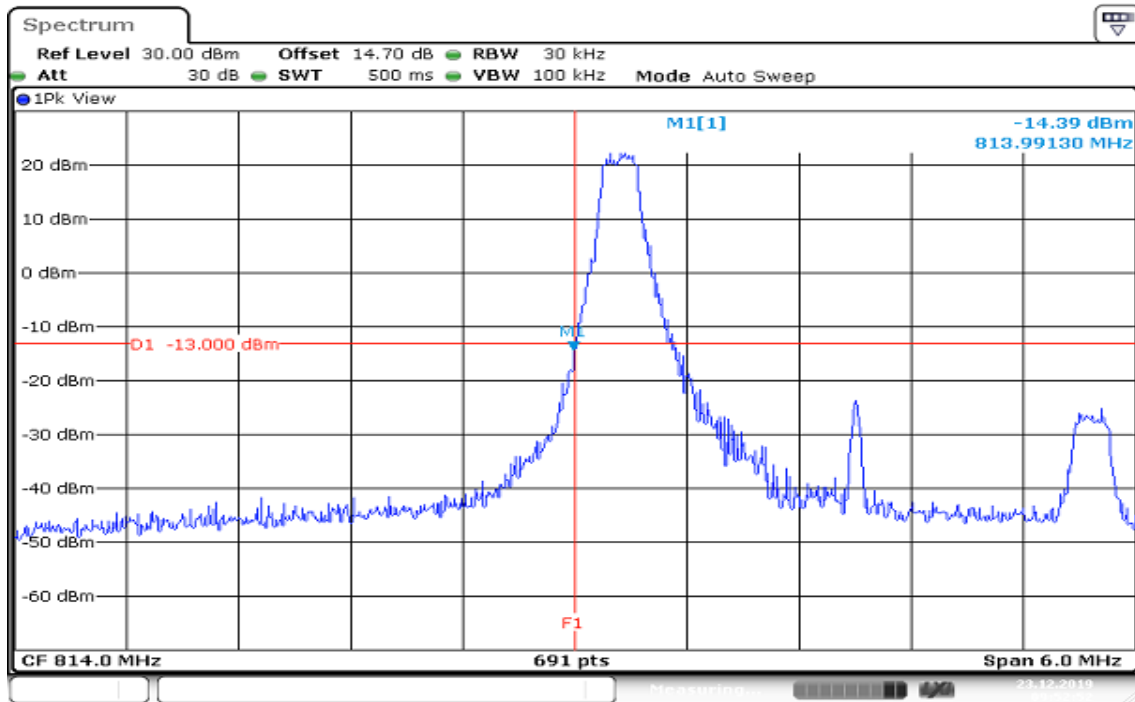
CHANNEL BANDWIDTH: 1.4MHz / 16QAM / Full RB ALLOCATED LOWER BAND EDGE



HIGHER BAND EDGE

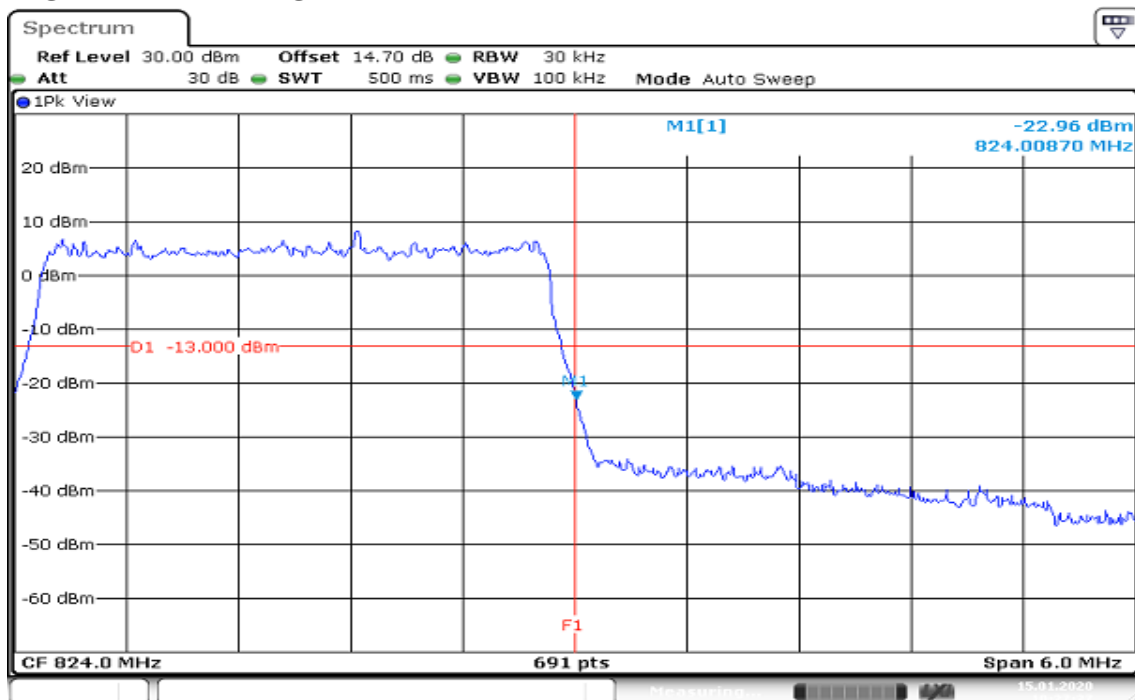


CHANNEL BANDWIDTH: 3MHz / QPSK / Full RB ALLOCATED LOWER BAND EDGE



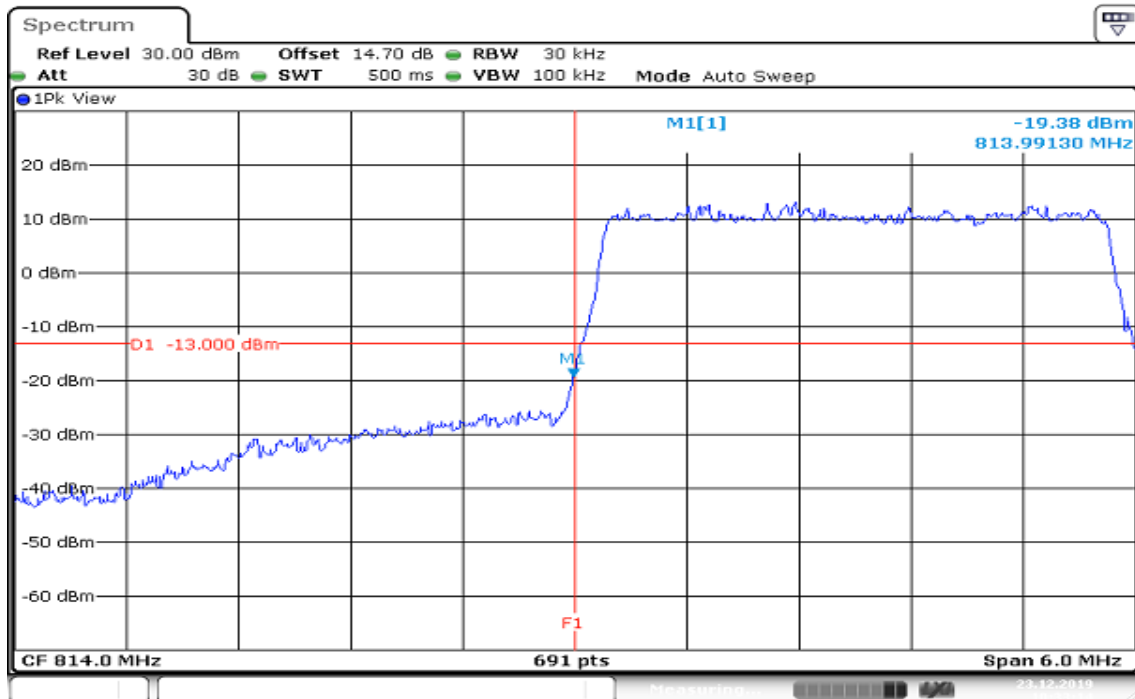
Date: 23.DEC.2019 09:52:52

HIGHER BAND EDGE

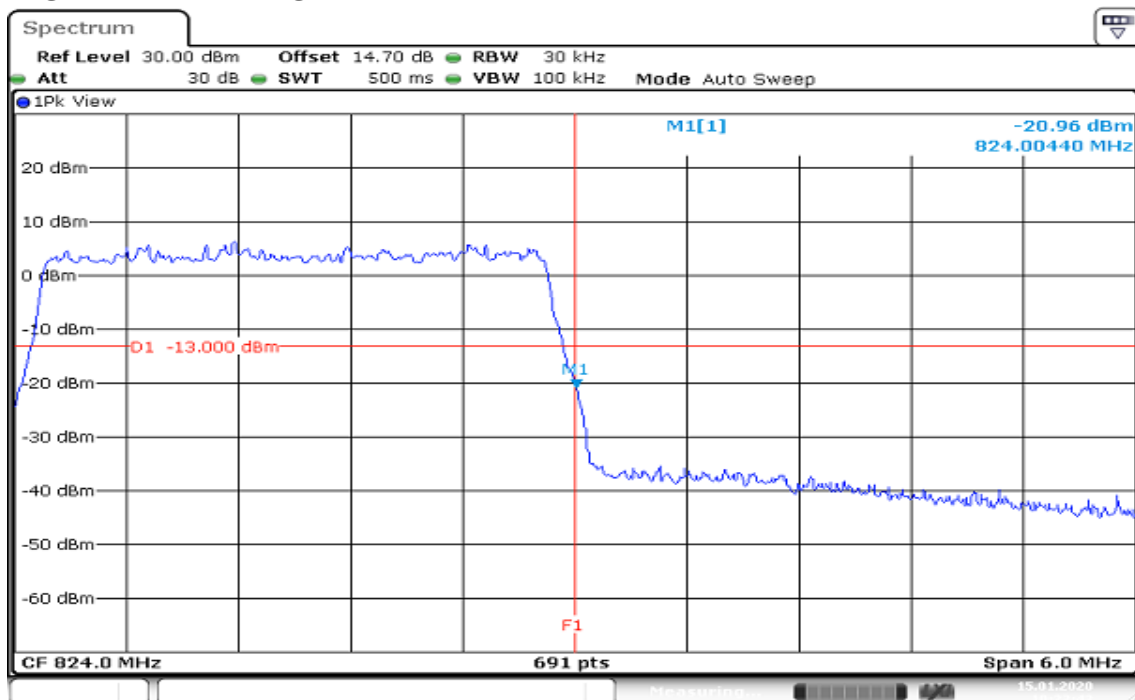


Date: 15.JAN.2020 10:27:37

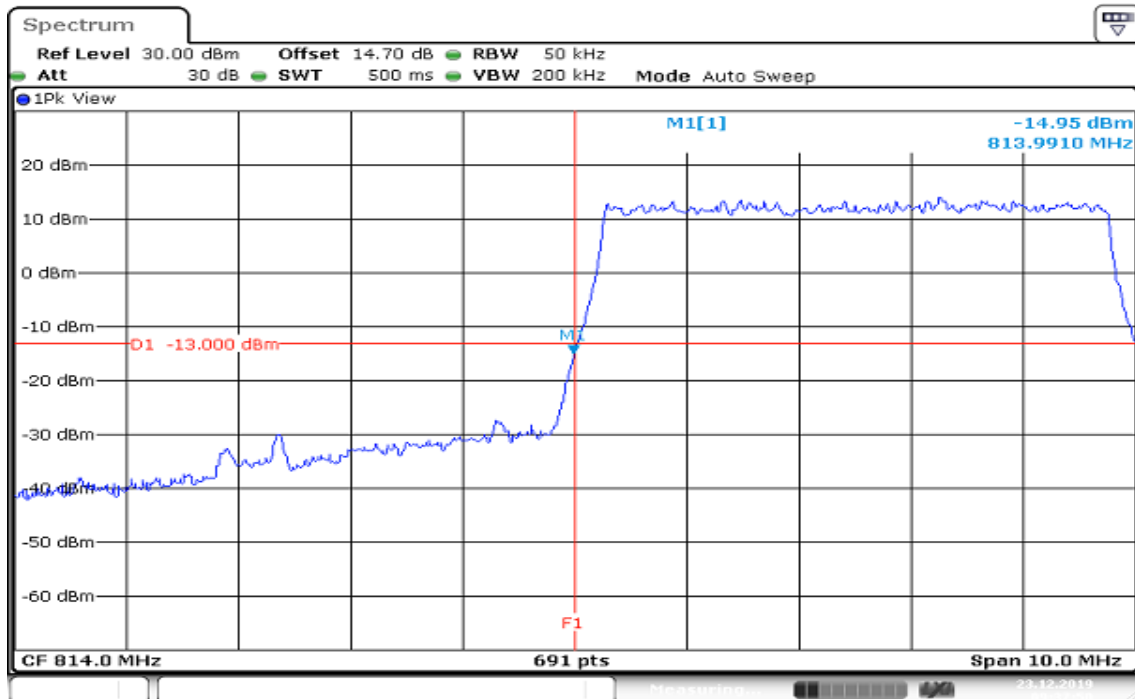
CHANNEL BANDWIDTH: 3MHz / 16QAM / Full RB ALLOCATED LOWER BAND EDGE



HIGHER BAND EDGE

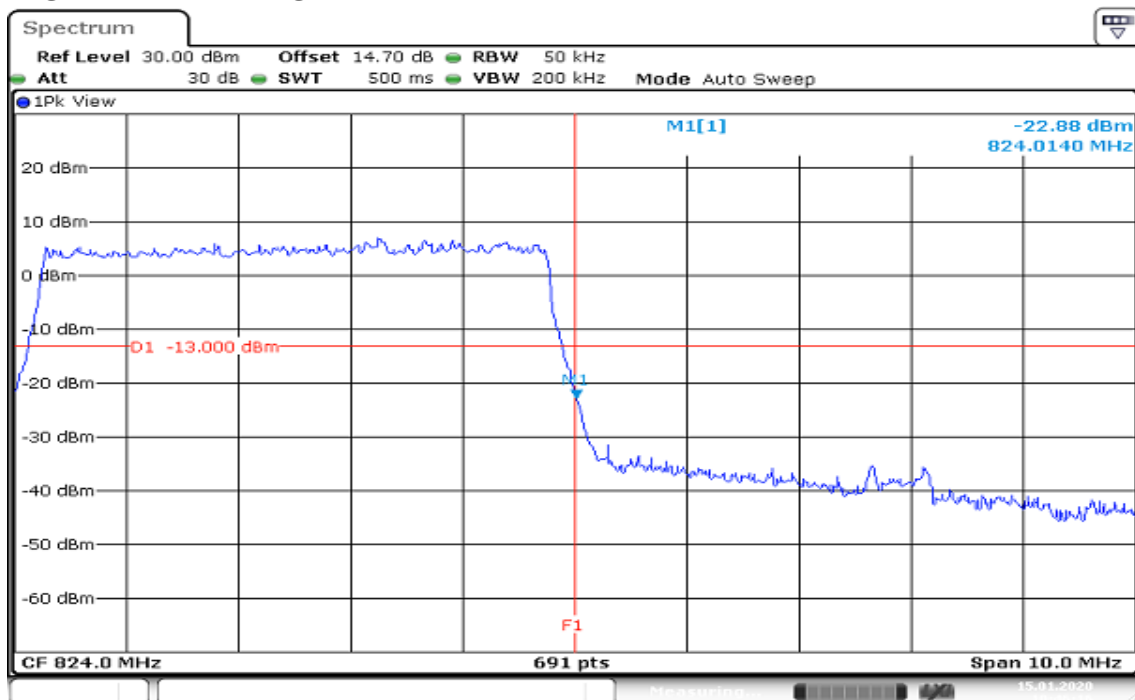


CHANNEL BANDWIDTH: 5MHz / QPSK / Full RB ALLOCATED LOWER BAND EDGE



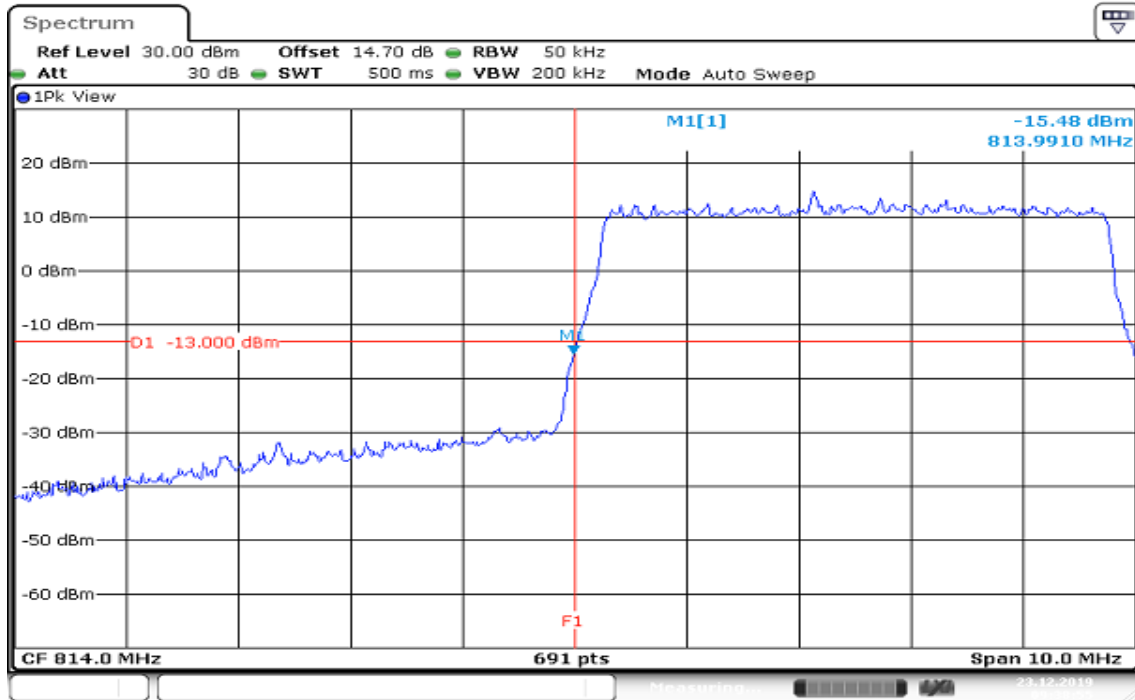
Date: 23.DEC.2019 09:37:50

HIGHER BAND EDGE



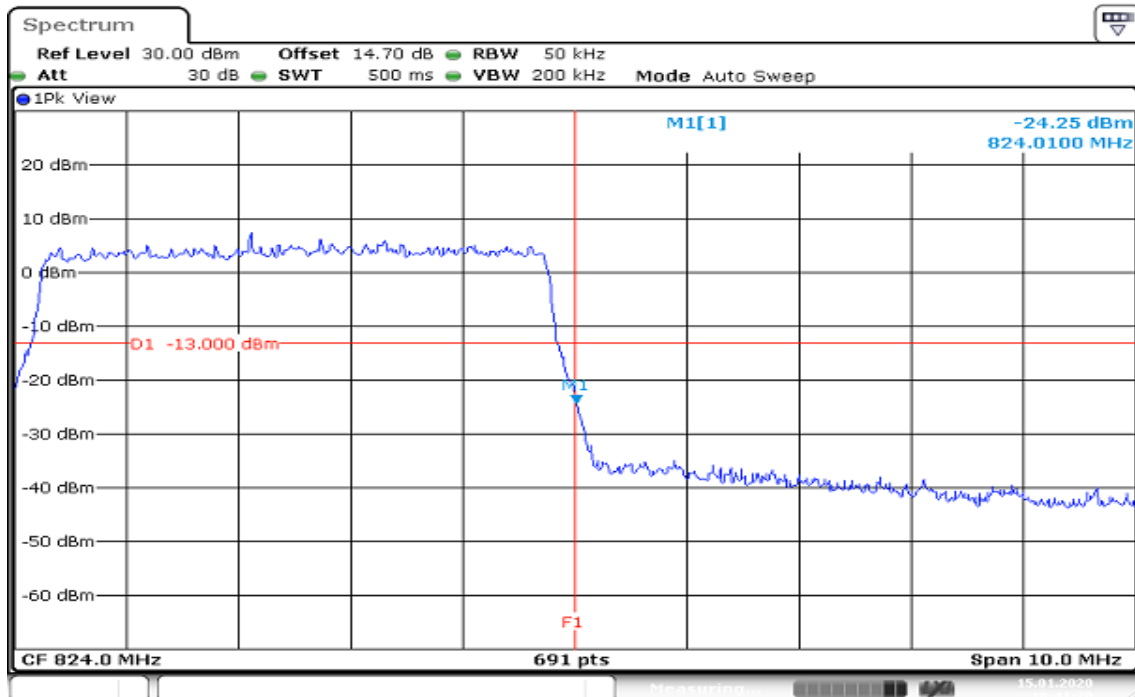
Date: 15.JAN.2020 10:46:16

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



Date: 23.DEC.2019 09:38:55

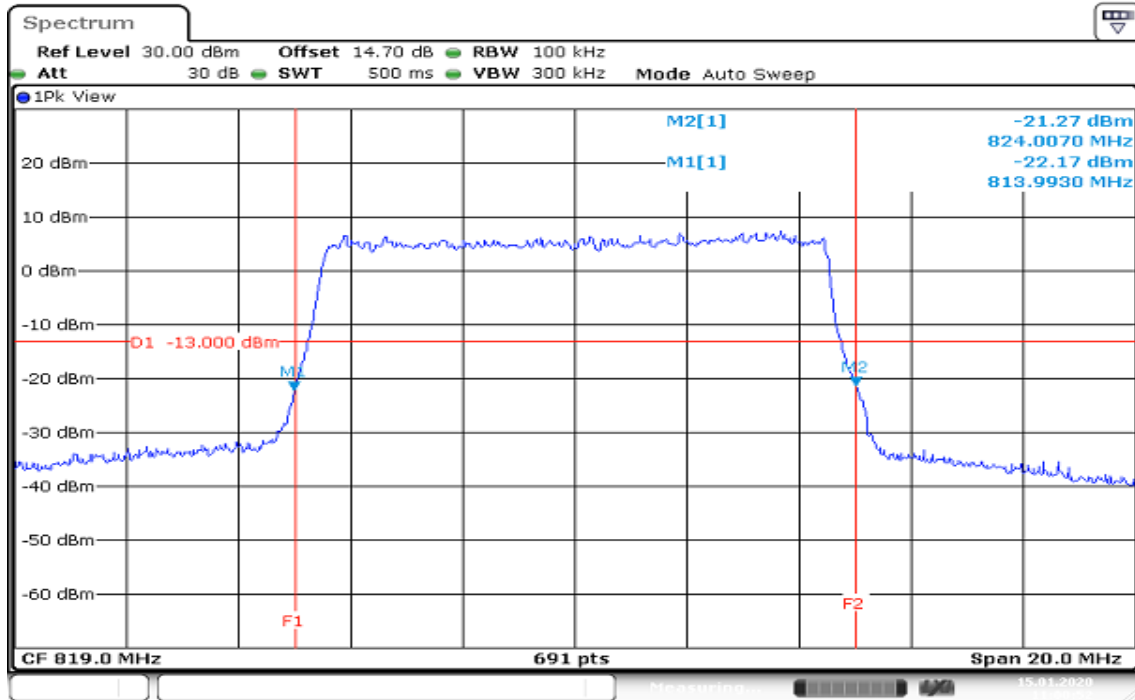
HIGHER BAND EDGE



Date: 15.JAN.2020 10:41:20

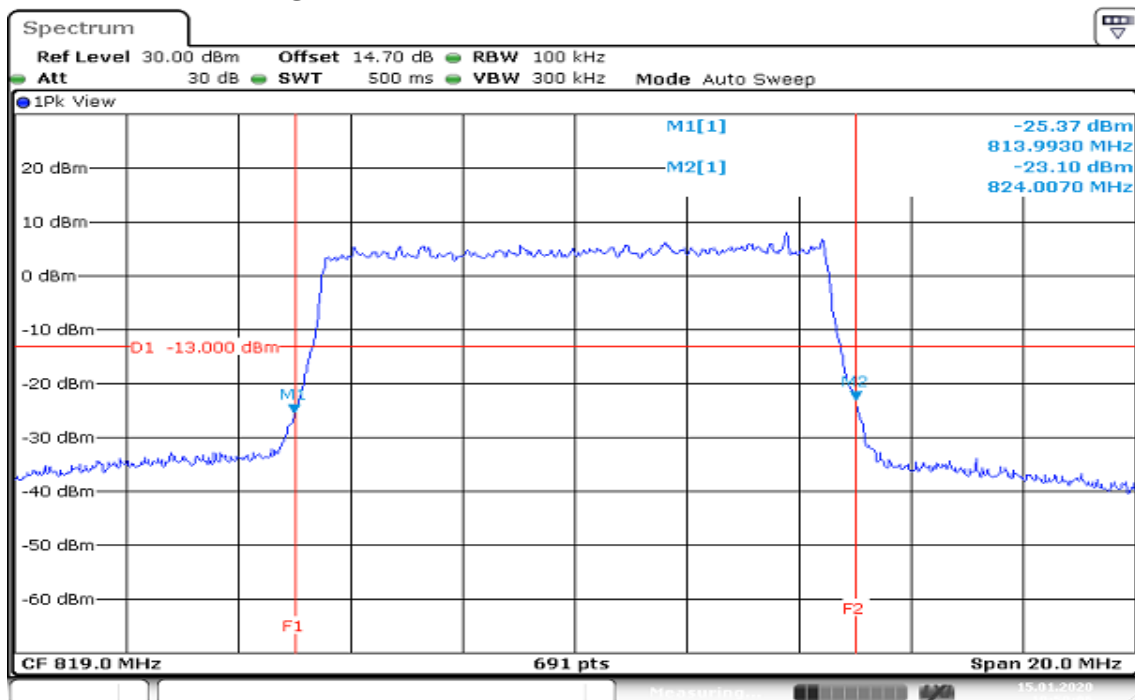
Report No.: T191120D05-RP10

CHANNEL BANDWIDTH: 10MHz / QPSK / Full RB ALLOCATED MIDDLE BAND EDGE



Date: 15.JAN.2020 11:00:52

CHANNEL BANDWIDTH: 10MHz / 16QAM / Full RB ALLOCATED MIDDLE BAND EDGE



Date: 15.JAN.2020 10:50:06



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8.6 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

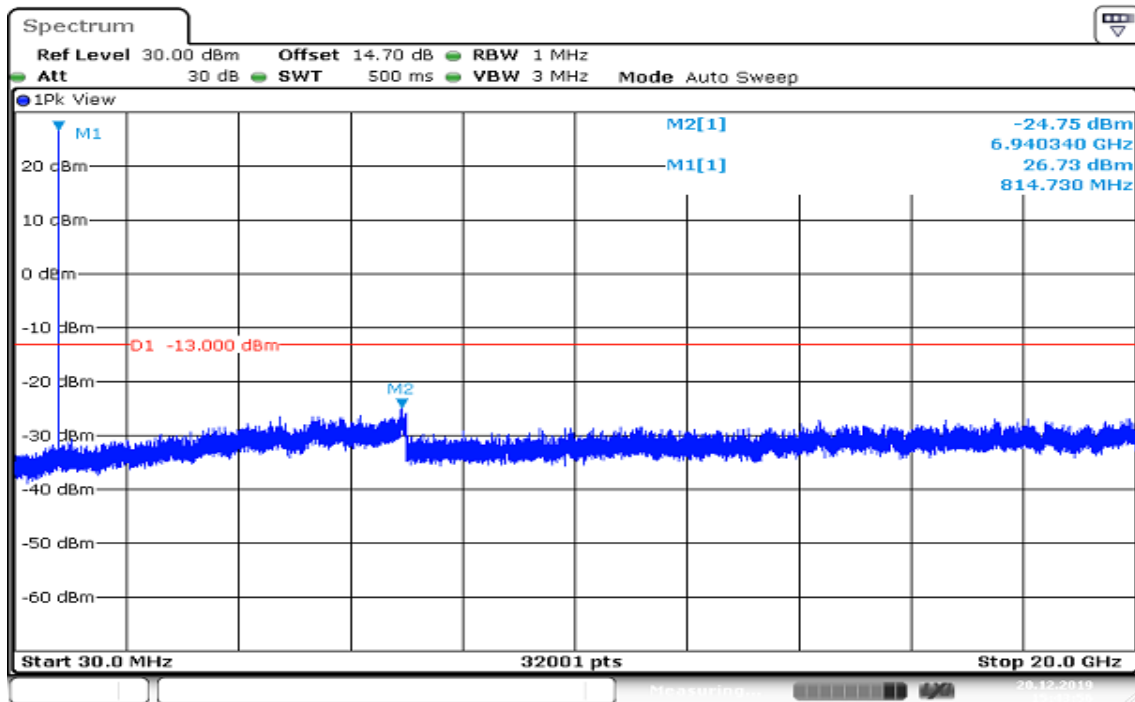
1. According to KDB 971168 D01,
2. The EUT was connect to spectrum analyzer and call box.
3. The RF output of EUT was connected to the spectrum analyzer.
4. Set the spectrum analyzer , RBW=1MHz, VBW=3MHz.
5. Record the maximum spurious emission.
6. The fundamental frequency should be excluded against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

Test Results

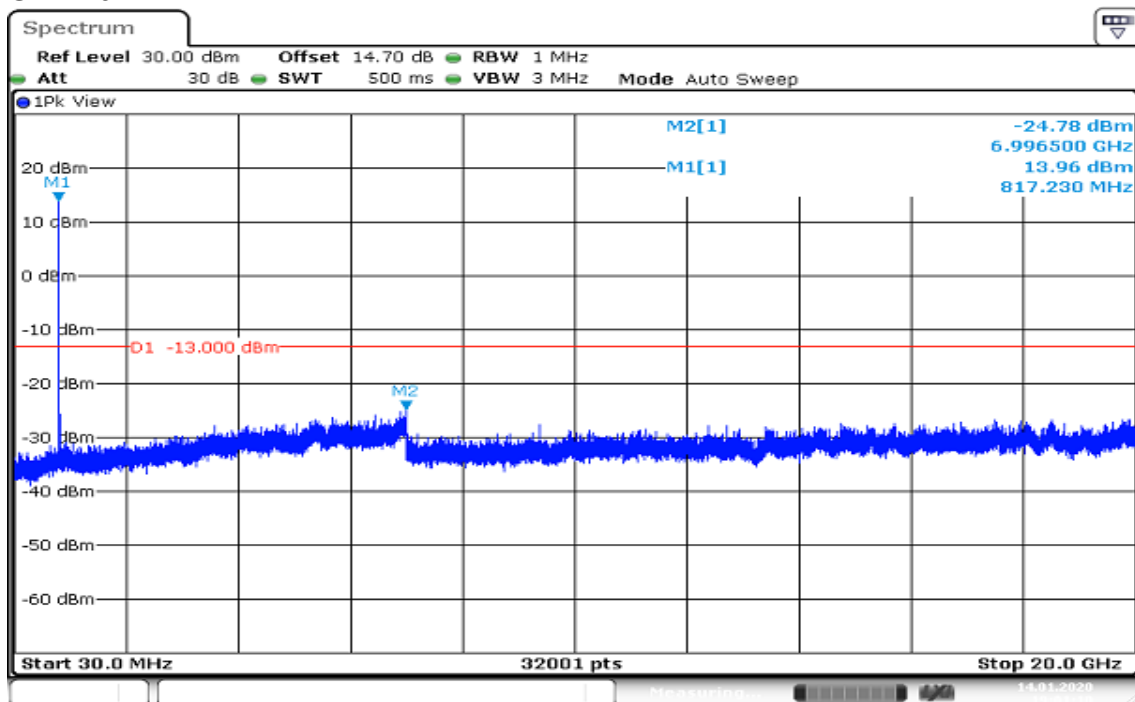
LTE Band 26

CHANNEL BANDWIDTH: 1.4MHz / QPSK

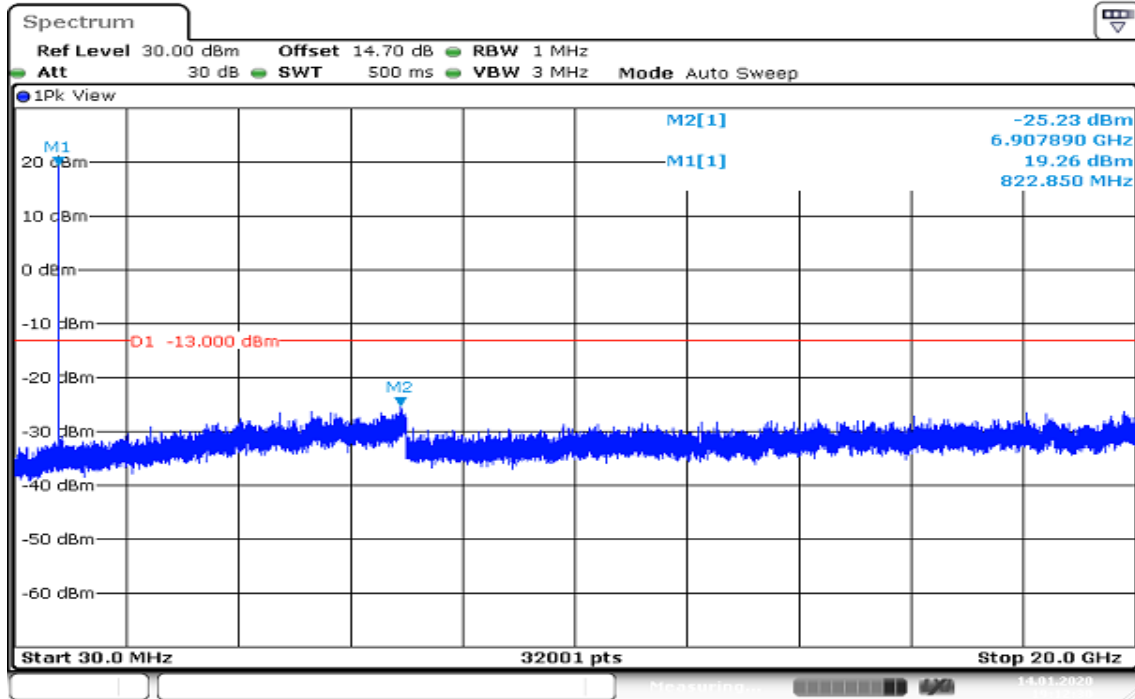
CH Low



CH Mid



CH High



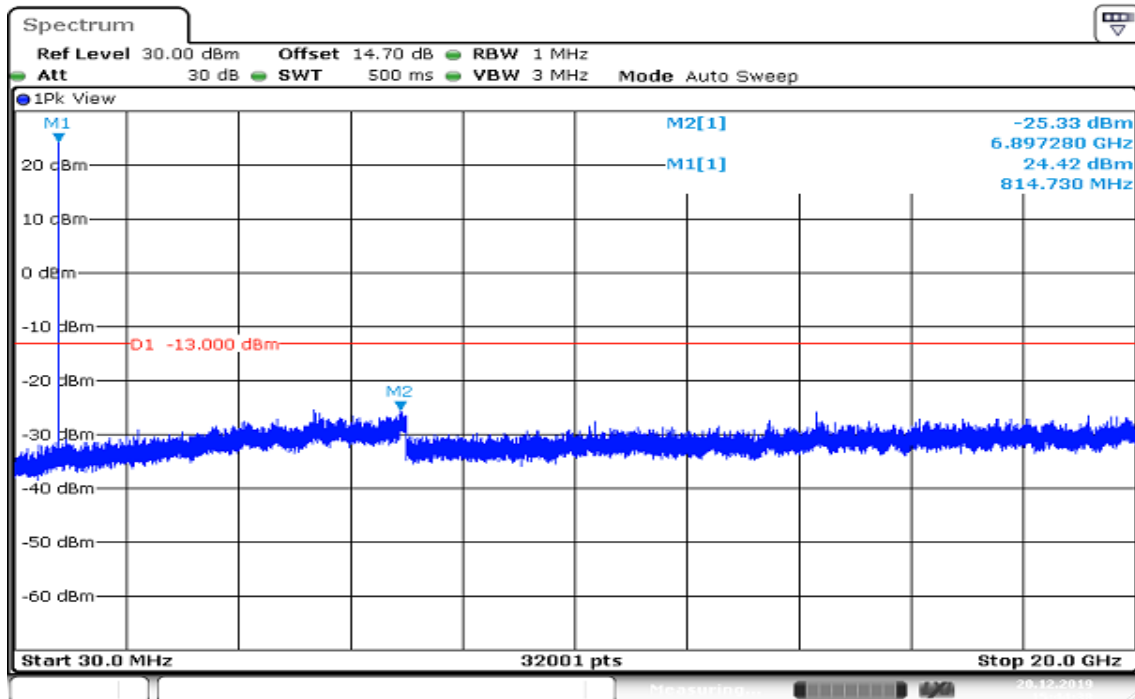
Date: 14.JAN.2020 19:12:30

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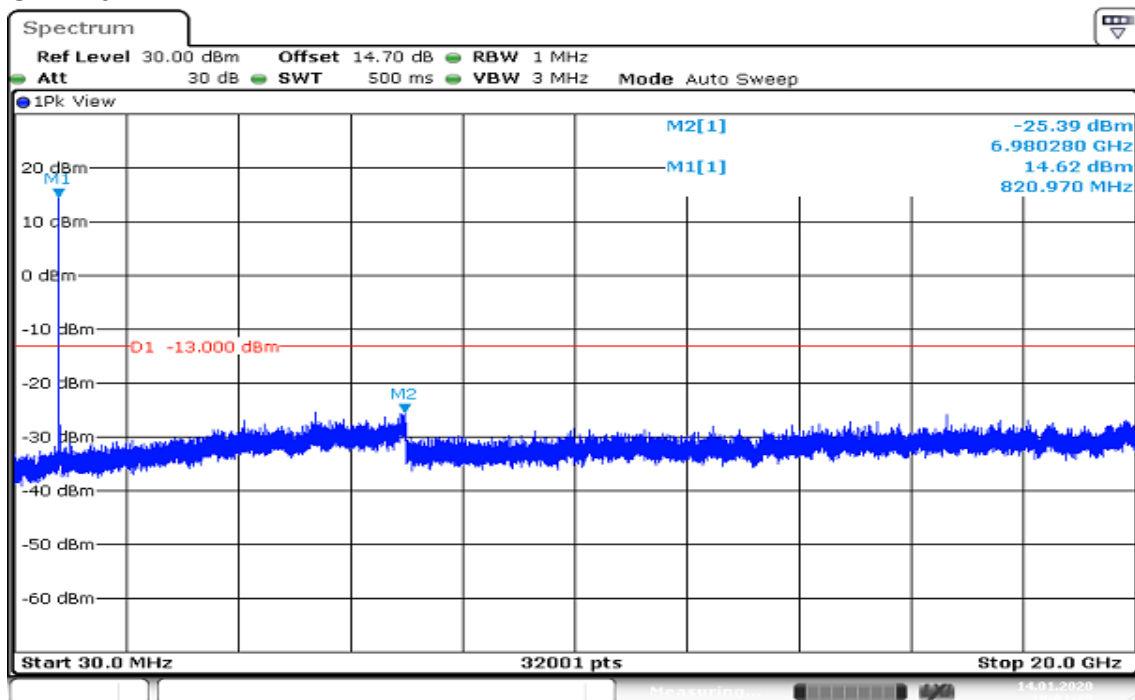
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CHANNEL BANDWIDTH: 3MHz / QPSK CH Low



CH Mid



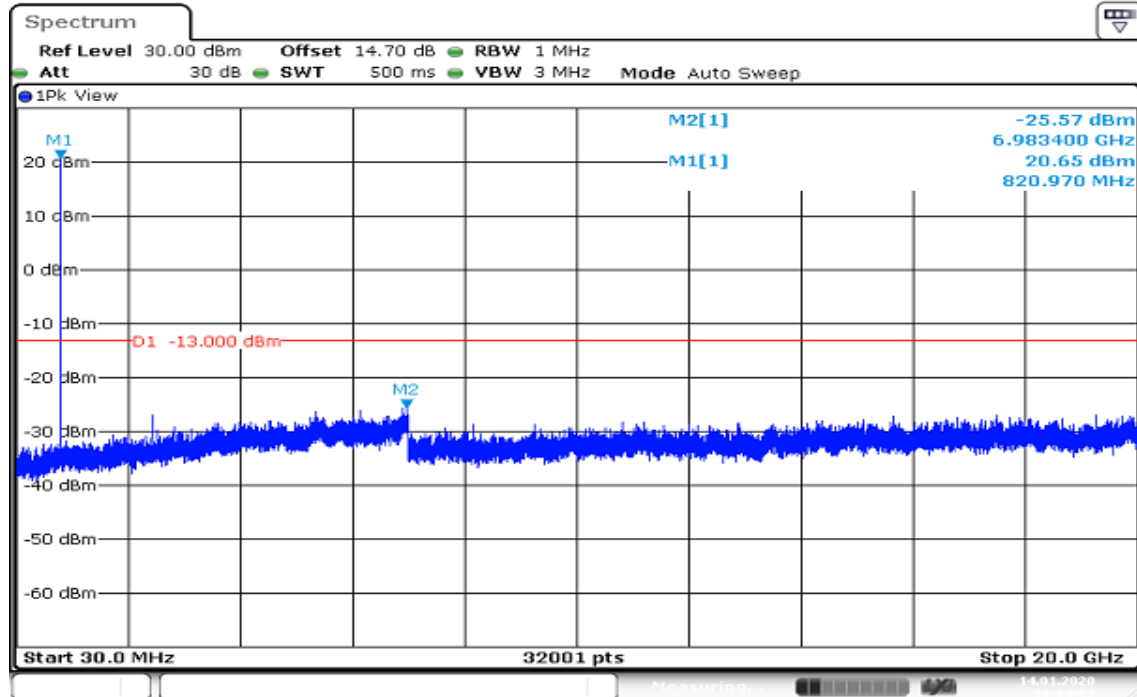


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CH High



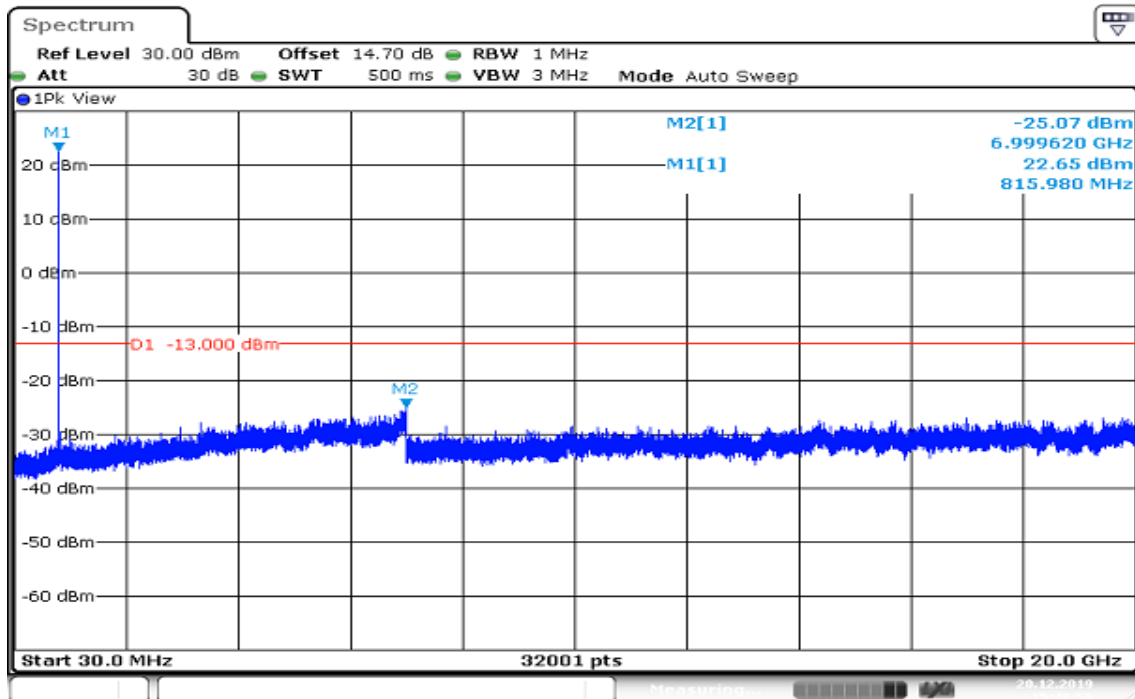
Date: 14.JAN.2020 19:14:52

Report No.: T191120D05-RP10

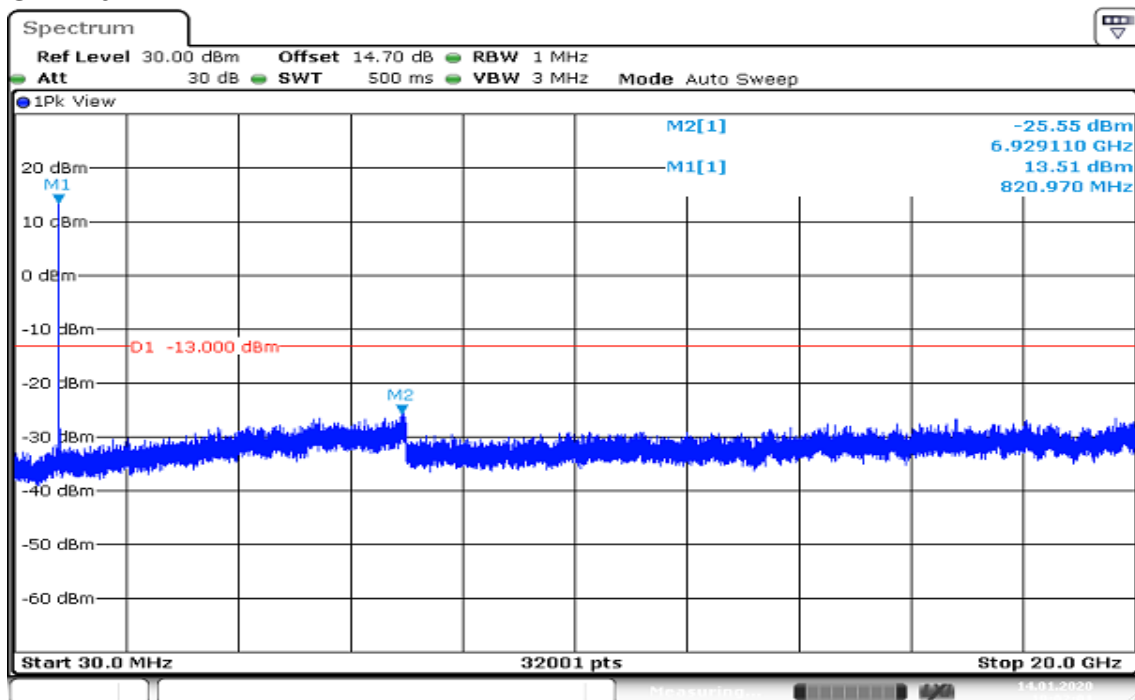
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CHANNEL BANDWIDTH: 5MHz / QPSK CH Low



CH Mid



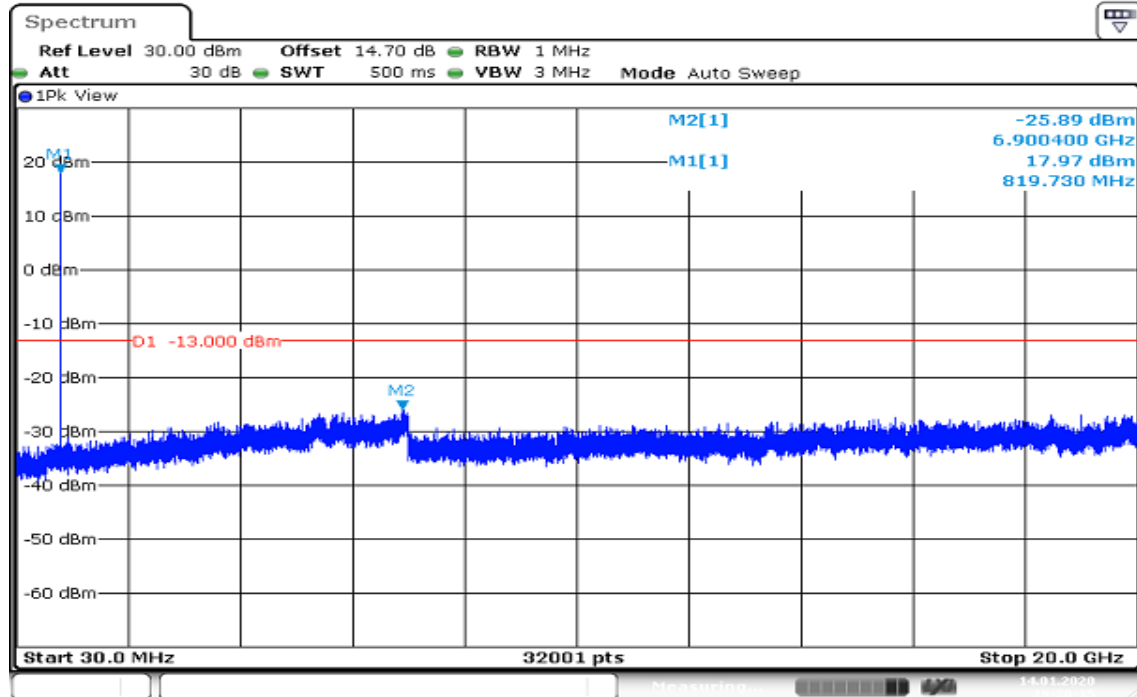


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CH High



Date: 14.JAN.2020 19:20:15

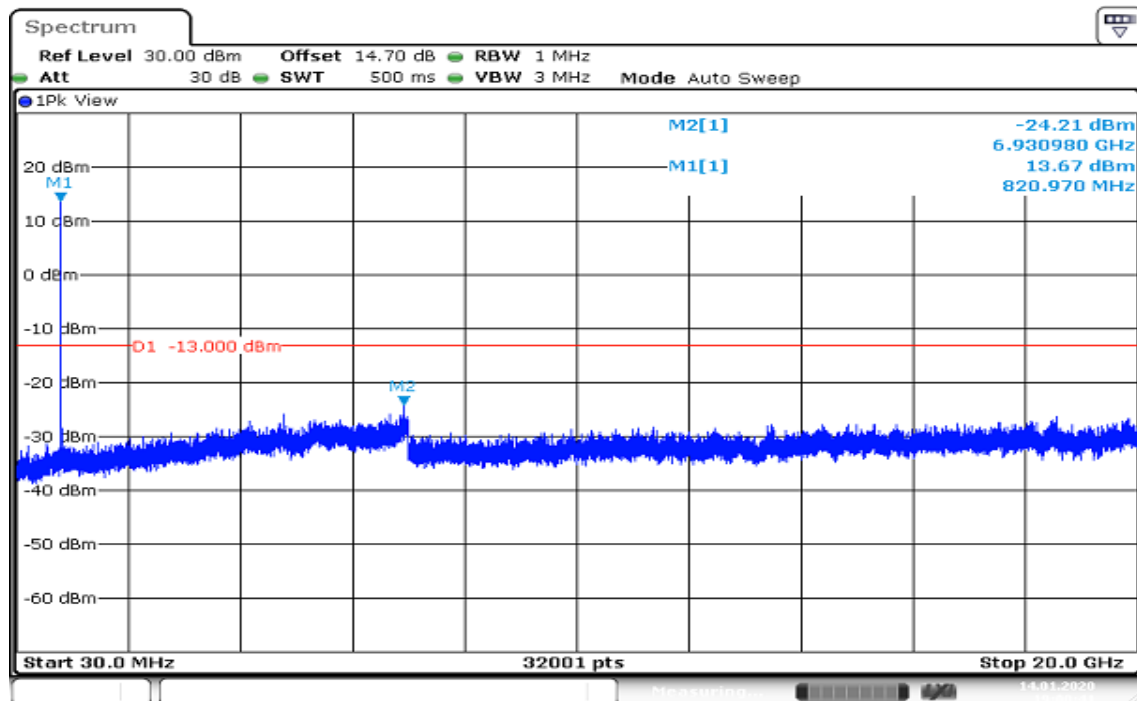


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CHANNEL BANDWIDTH: 10MHz / QPSK
CH Mid



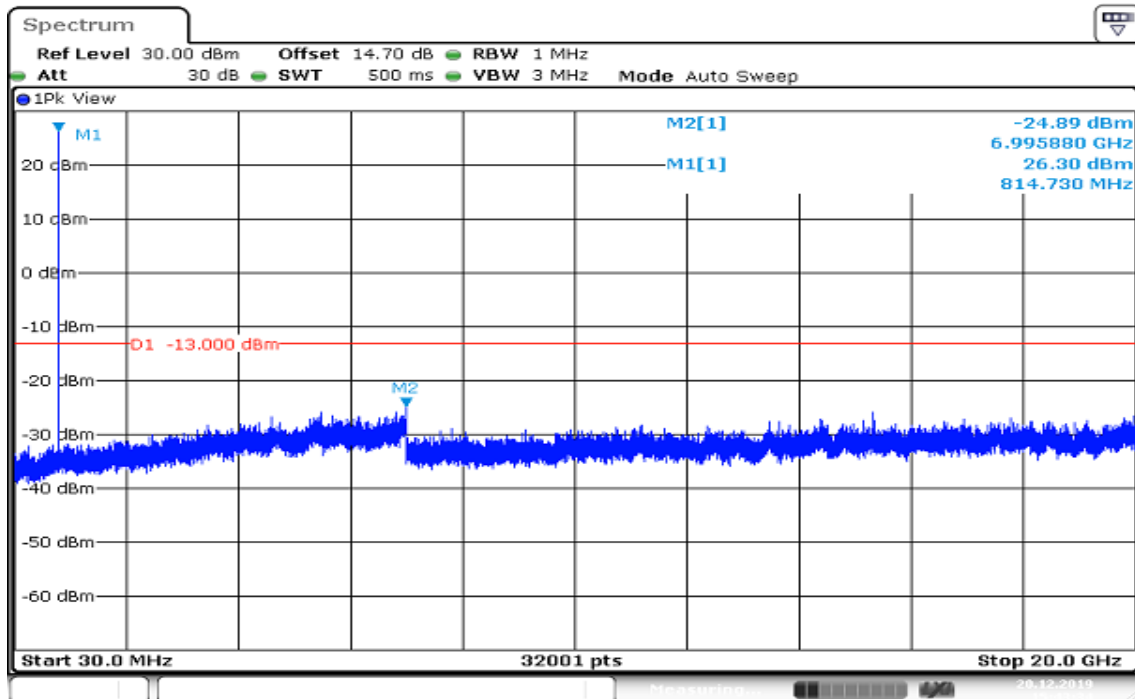
Date: 14.JAN.2020 19:00:42

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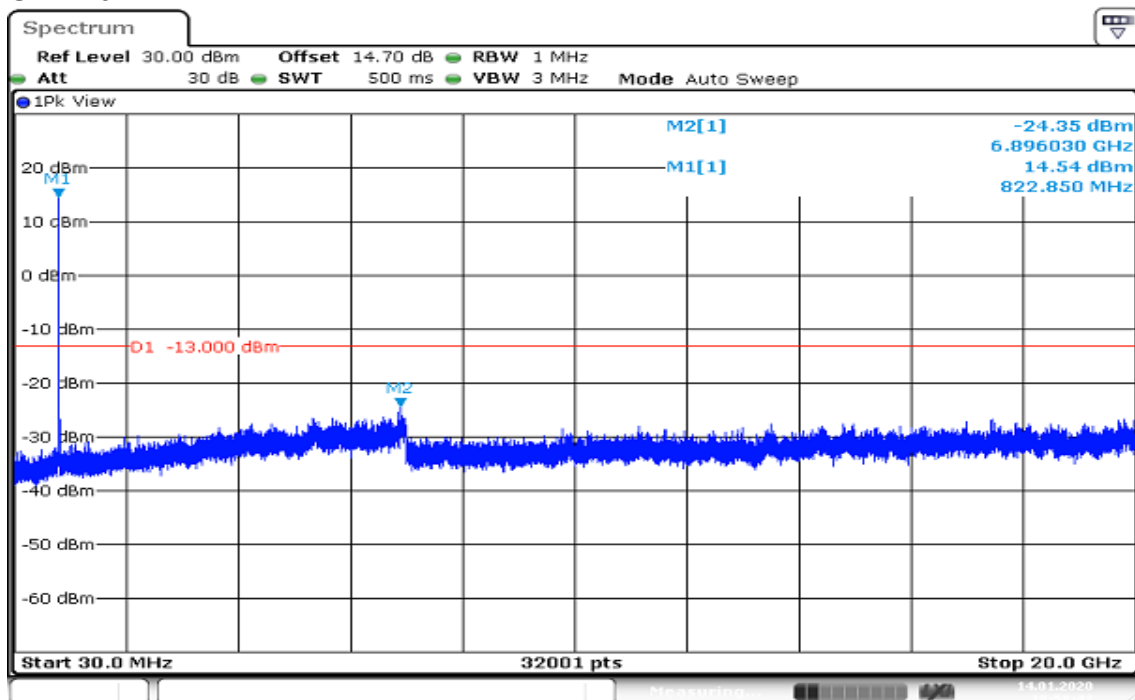
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CHANNEL BANDWIDTH: 1.4MHz / 16QAM CH Low



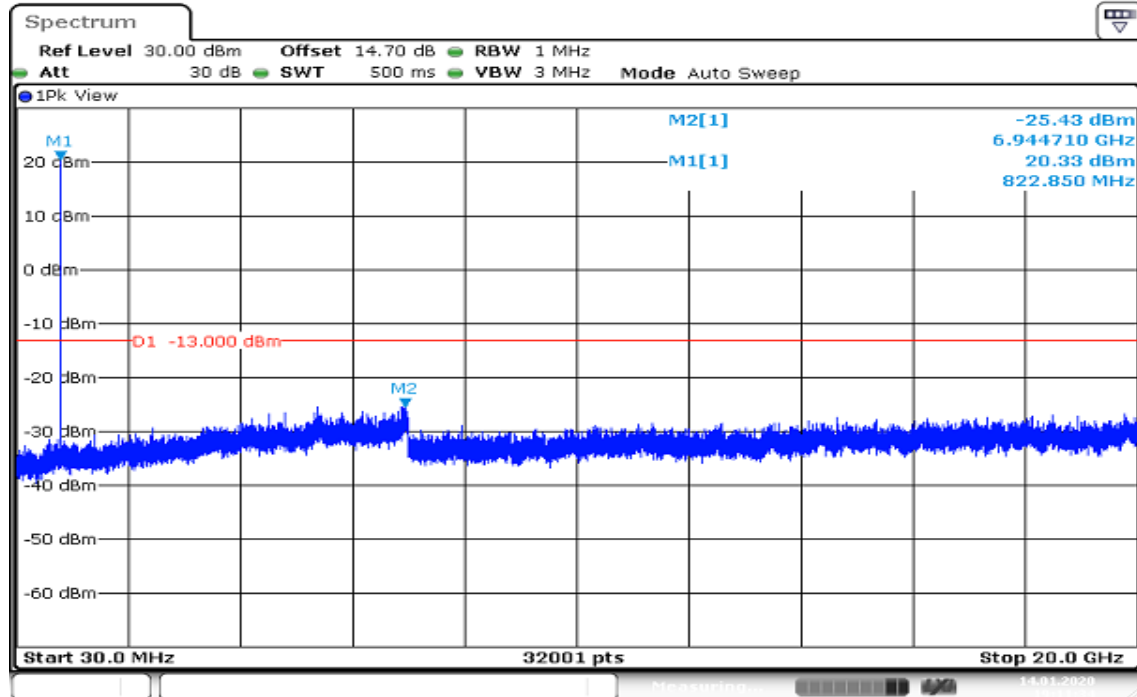
Date: 20.DEC.2019 15:43:35

CH Mid



Date: 14.JAN.2020 18:58:42

CH High



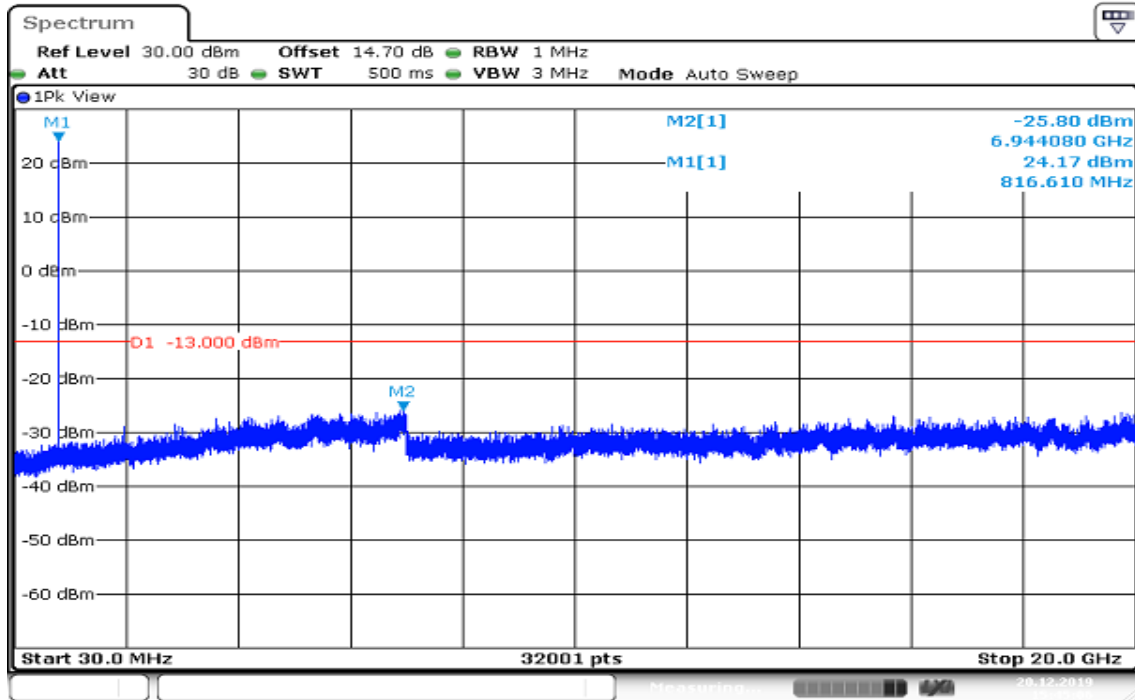
Date: 14.JAN.2020 19:11:34

Report No.: T191120D05-RP10

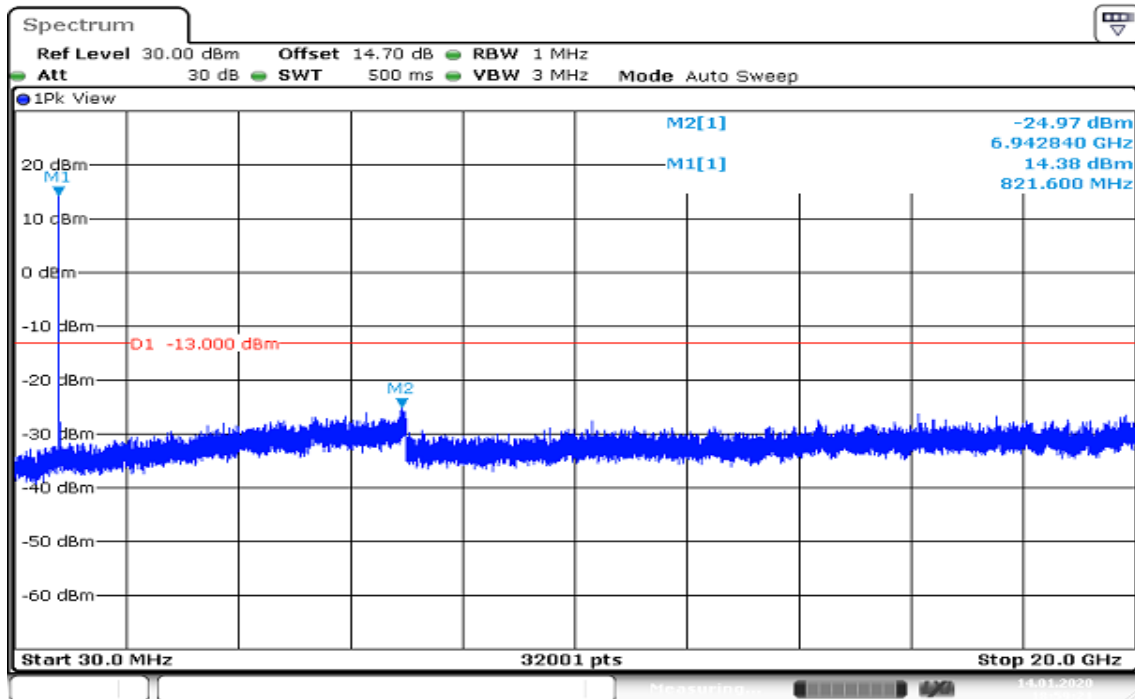
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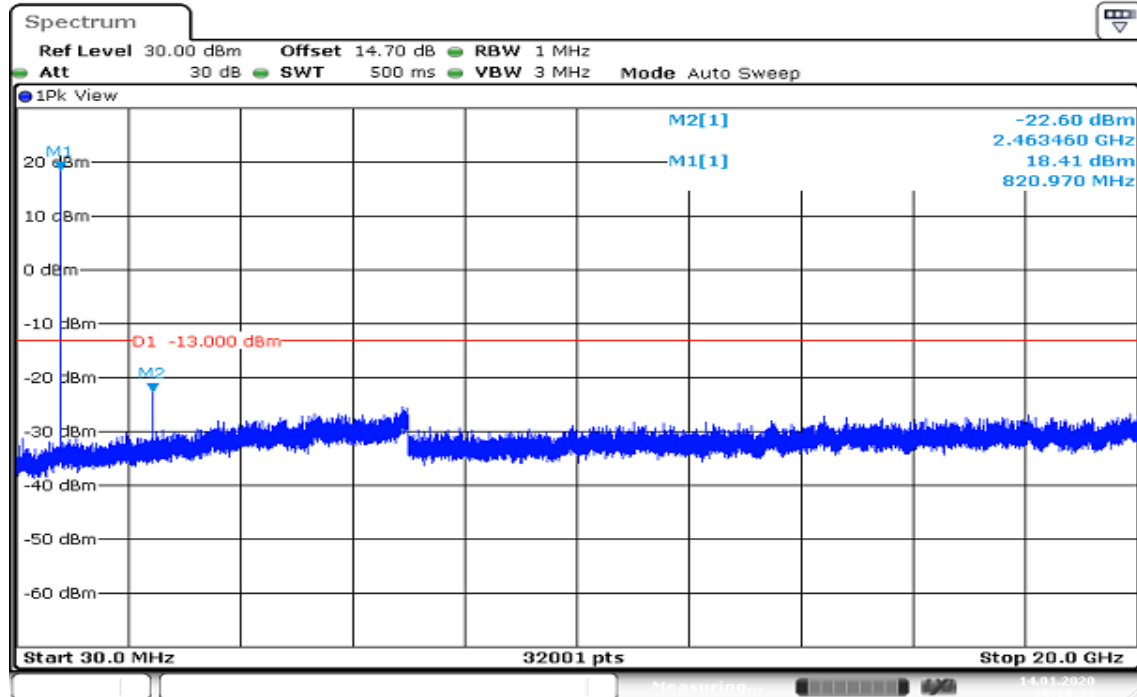
CHANNEL BANDWIDTH: 3MHz / 16QAM CH Low



CH Mid



CH High



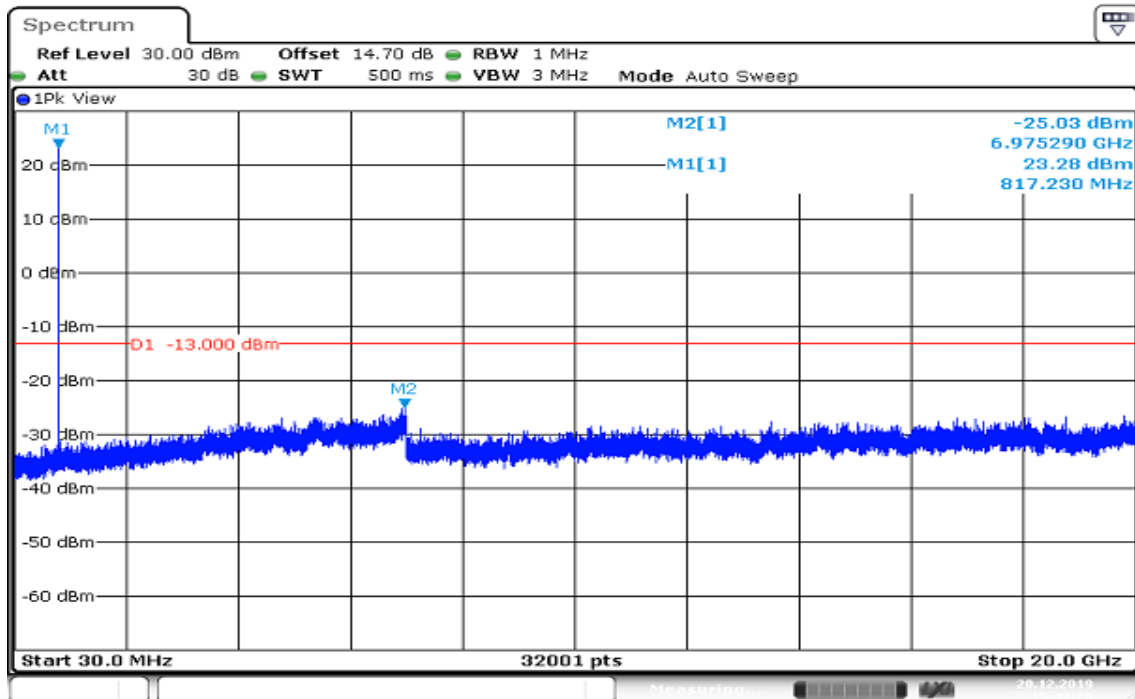
Date: 14.JAN.2020 19:15:24

Report No.: T191120D05-RP10

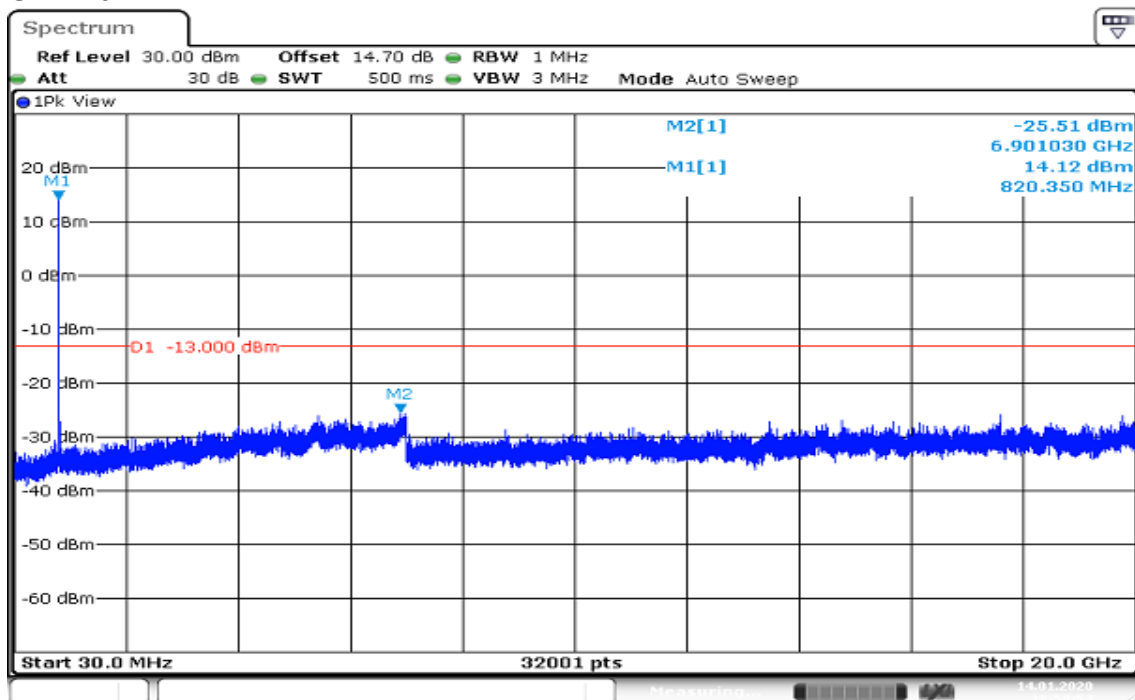
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CHANNEL BANDWIDTH: 5MHz / 16QAM CH Low



CH Mid



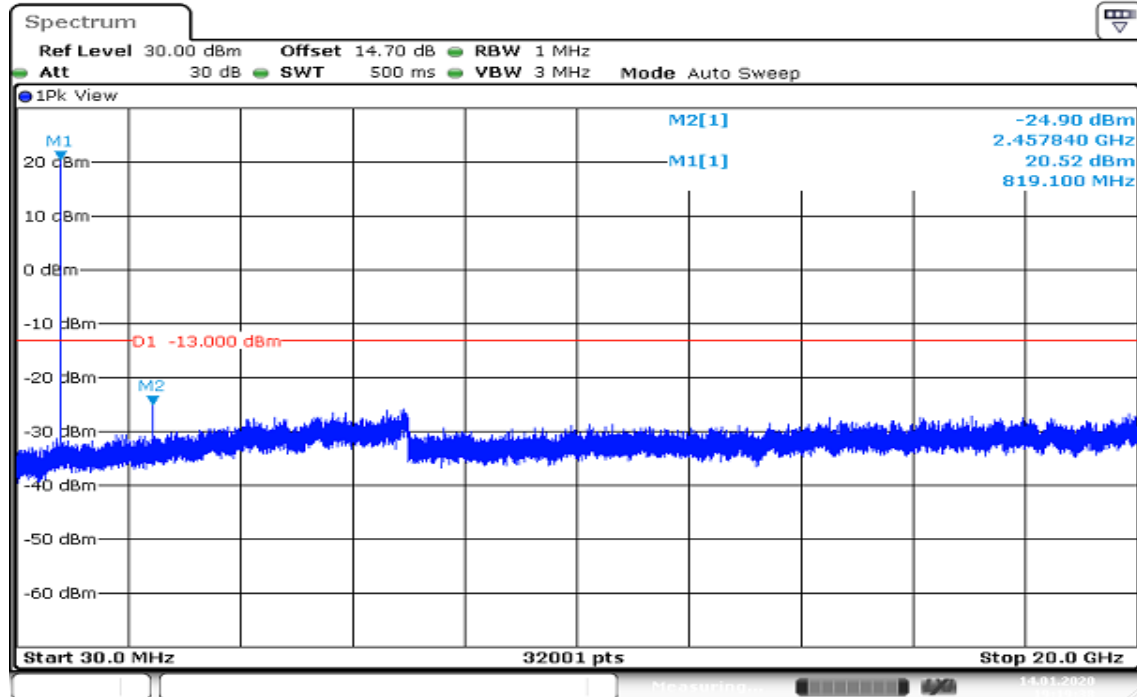


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CH High



Date: 14.JAN.2020 19:19:38

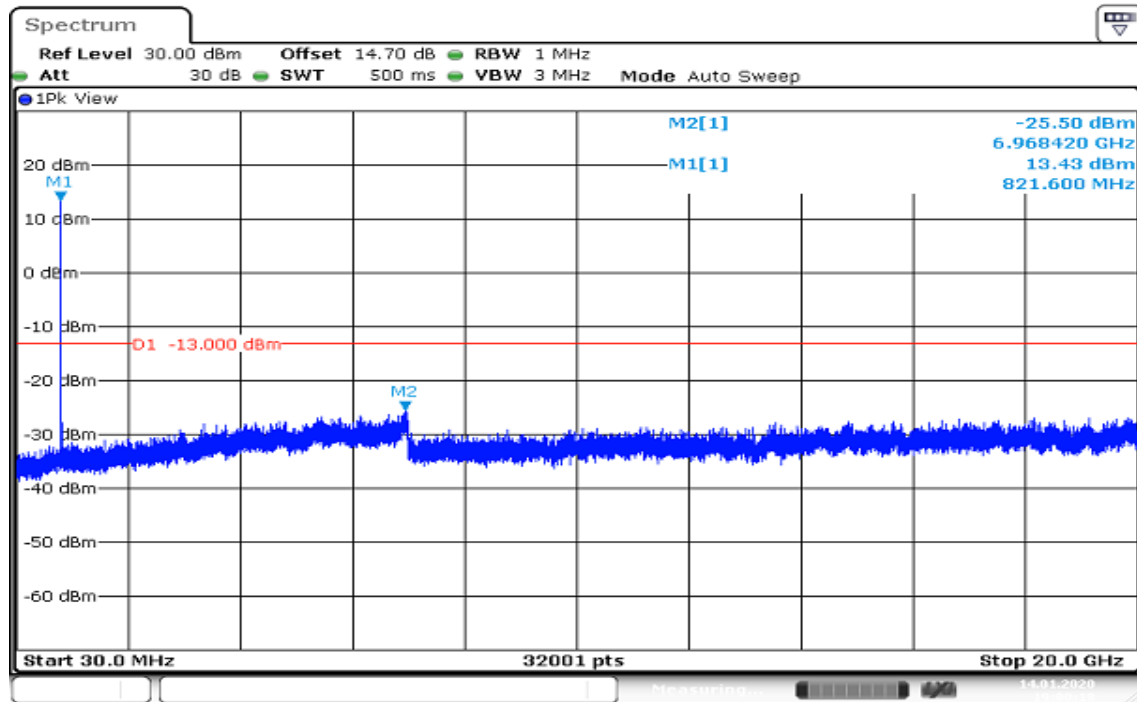


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CHANNEL BANDWIDTH: 10MHz / 16QAM
CH Mid



Date: 14.JAN.2020 19:00:18

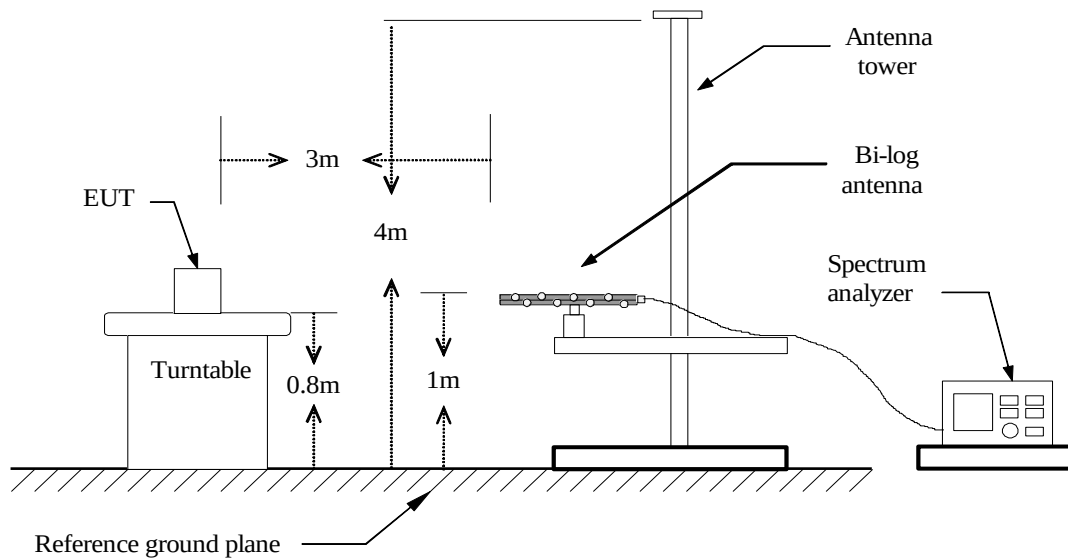
8.7 SPURIOUS RADIATION MEASUREMENT

LIMIT

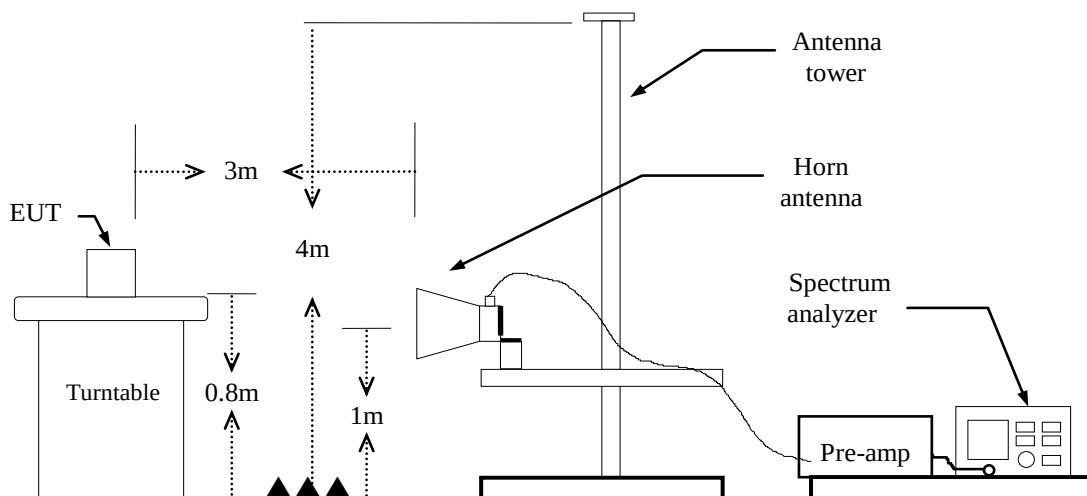
The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $43 + 10 \log_{10}(P)$ dB. The limit of emission equal to -13dBm

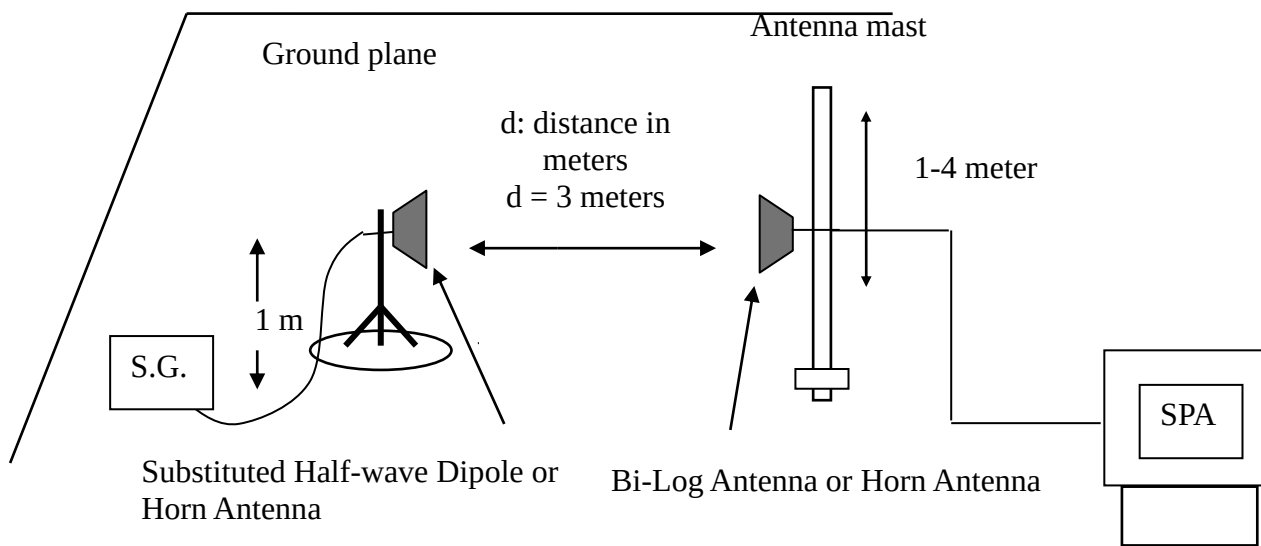
Test Configuration

Below 1 GHz



Above 1 GHz



Substituted Method Test Set-up**TEST PROCEDURE**

1. According to KDB 971168 D01 Power Meas License Digital Systems and TIA-603-E Section 2.2.12.
2. The EUT was placed on a turntable
 - (1) Below 1G : 0.8m
 - (2) Above 1G : 0.8m
 - (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

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

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

TEST RESULTS

Refer to the attached tabular data sheets.

Remark: Above 1GHz

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

Test Results**LTE Band 26 / BW: 15MHz / QPSK / RB =1, RB Offset = 0****Operation Mode:** Tx / Low CH**Test Date:**

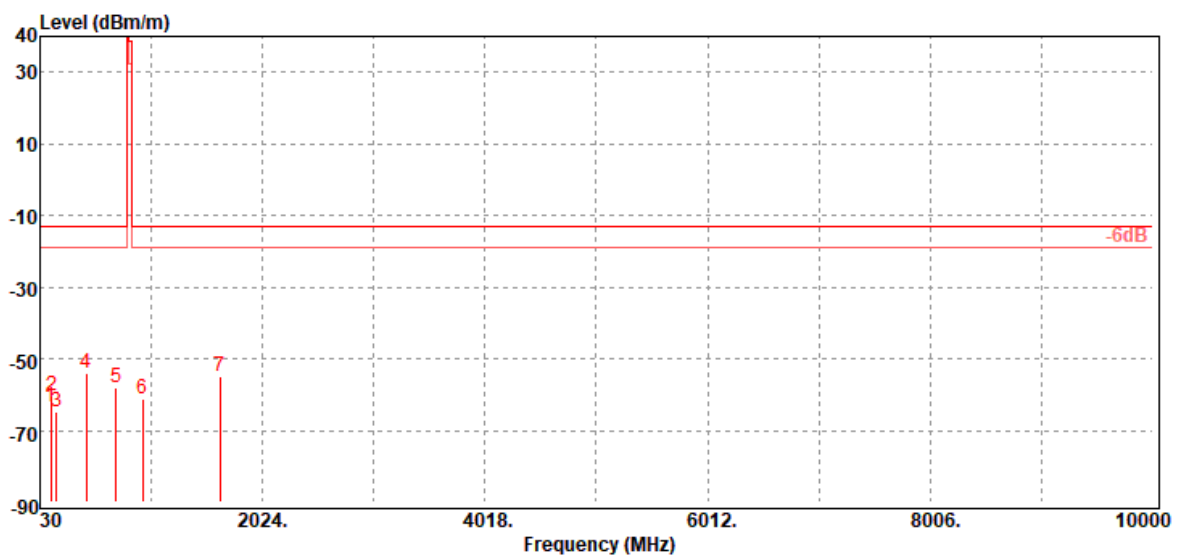
January 8, 2020

Temperature: 18.6°C**Tested by:**

Jerry Chang

Humidity: 59% RH**Polarity:**

Ver.



Freq. (MHz)	ERP/EIRP (dBm)	SG Output Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
125.06	-63.48	-52.07	-10.49	-0.92	-13.00	-50.48	V
133.79	-60.42	-49.95	-9.52	-0.95	-13.00	-47.42	V
178.41	-64.93	-59.27	-4.56	-1.10	-13.00	-51.93	V
447.10	-54.11	-50.26	-2.10	-1.75	-13.00	-41.11	V
713.85	-57.84	-54.19	-1.40	-2.25	-13.00	-44.84	V
946.65	-61.13	-57.32	-1.20	-2.61	-13.00	-48.13	V
1645.00	-54.76	-60.91	9.69	-3.54	-13.00	-41.76	V



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Operation Mode: Tx / Low CH

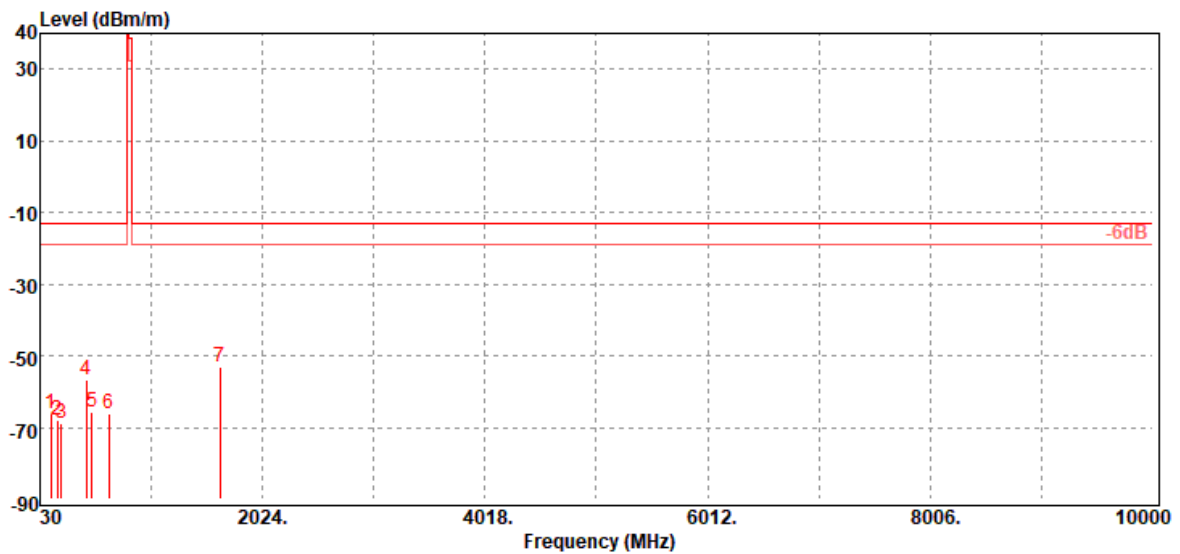
Test Date: January 8, 2020

Temperature: 18.6°C

Tested by: Jerry Chang

Humidity: 59% RH

Polarity: Hor.



Freq. (MHz)	ERP/EIRP (dBm)	SG Output Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
124.09	-66.10	-54.69	-10.50	-0.91	-13.00	-53.10	H
188.11	-67.75	-62.72	-3.90	-1.13	-13.00	-54.75	H
224.00	-68.84	-65.69	-1.92	-1.23	-13.00	-55.84	H
445.16	-56.64	-52.79	-2.10	-1.75	-13.00	-43.64	H
498.51	-65.75	-61.88	-2.00	-1.87	-13.00	-52.75	H
648.86	-66.20	-62.37	-1.68	-2.15	-13.00	-53.20	H
1645.00	-53.00	-59.15	9.69	-3.54	-13.00	-40.00	H



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Operation Mode: Tx / Mid CH

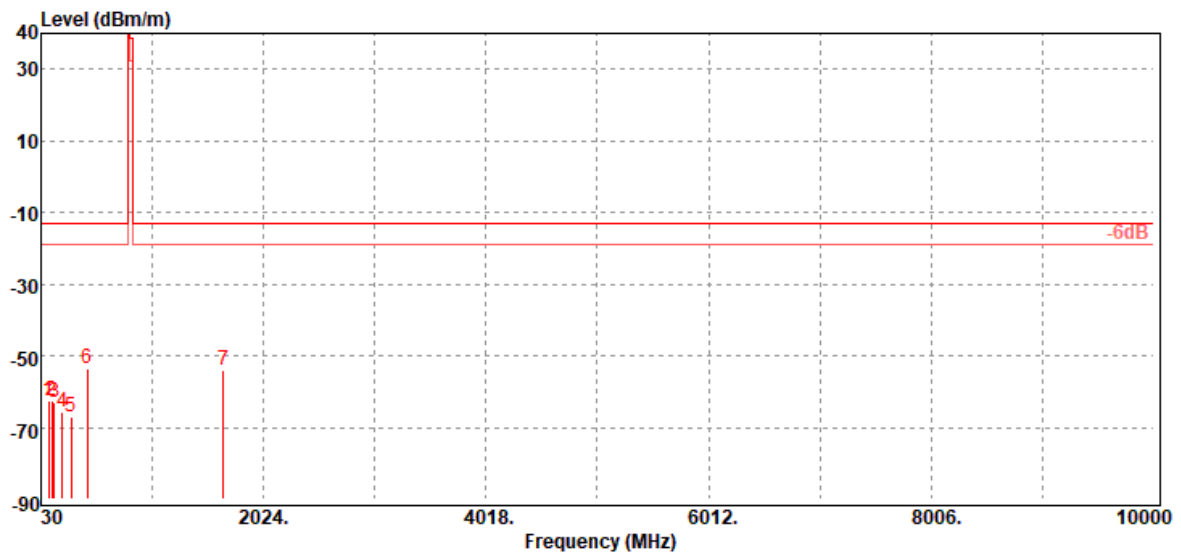
Test Date: January 8, 2020

Temperature: 18.6°C

Tested by: Jerry Chang

Humidity: 59% RH

Polarity: Ver.



Freq. (MHz)	ERP/EIRP (dBm)	SG Output Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
98.87	-62.46	-53.66	-7.99	-0.81	-13.00	-49.46	V
129.91	-62.55	-51.43	-10.19	-0.93	-13.00	-49.55	V
149.31	-63.11	-54.94	-7.17	-1.00	-13.00	-50.11	V
221.09	-65.79	-62.59	-1.98	-1.22	-13.00	-52.79	V
299.66	-67.17	-63.73	-2.01	-1.43	-13.00	-54.17	V
447.10	-53.72	-49.87	-2.10	-1.75	-13.00	-40.72	V
1663.00	-54.00	-60.21	9.78	-3.57	-13.00	-41.00	V



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Operation Mode: Tx / Mid CH

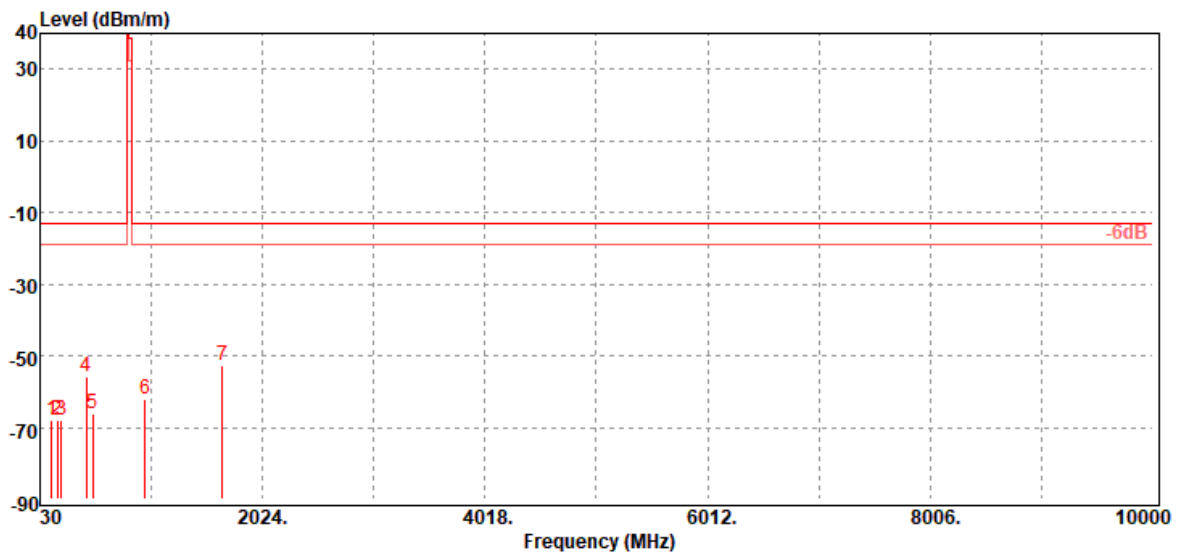
Test Date: January 8, 2020

Temperature: 18.6°C

Tested by: Jerry Chang

Humidity: 59% RH

Polarity: Hor.



Freq. (MHz)	ERP/EIRP (dBm)	SG Output Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
131.85	-67.87	-57.12	-9.81	-0.94	-13.00	-54.87	H
185.20	-67.82	-62.62	-4.08	-1.12	-13.00	-54.82	H
221.09	-68.02	-64.82	-1.98	-1.22	-13.00	-55.02	H
445.16	-55.80	-51.95	-2.10	-1.75	-13.00	-42.80	H
500.45	-66.31	-62.45	-1.99	-1.87	-13.00	-53.31	H
972.84	-62.20	-58.2	-1.36	-2.64	-13.00	-49.20	H
1663.00	-52.84	-59.05	9.78	-3.57	-13.00	-39.84	H



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Operation Mode: Tx / High CH

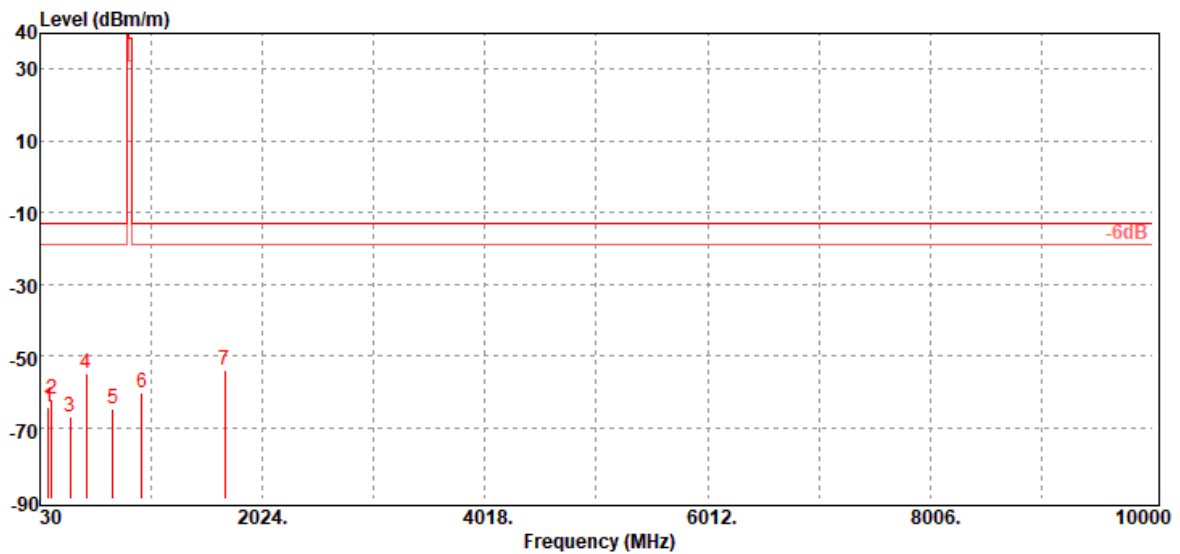
Test Date: January 8, 2020

Temperature: 18.6°C

Tested by: Jerry Chang

Humidity: 59% RH

Polarity: Ver.



Freq. (MHz)	ERP/EIRP (dBm)	SG Output Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
105.66	-64.17	-53.96	-9.37	-0.84	-13.00	-51.17	V
131.85	-62.26	-51.51	-9.81	-0.94	-13.00	-49.26	V
299.66	-67.10	-63.66	-2.01	-1.43	-13.00	-54.10	V
444.19	-55.12	-51.27	-2.10	-1.75	-13.00	-42.12	V
684.75	-64.64	-61.13	-1.30	-2.21	-13.00	-51.64	V
941.80	-60.36	-56.5	-1.26	-2.60	-13.00	-47.36	V
1683.00	-54.02	-60.33	9.90	-3.59	-13.00	-41.02	V



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Operation Mode: Tx / High CH

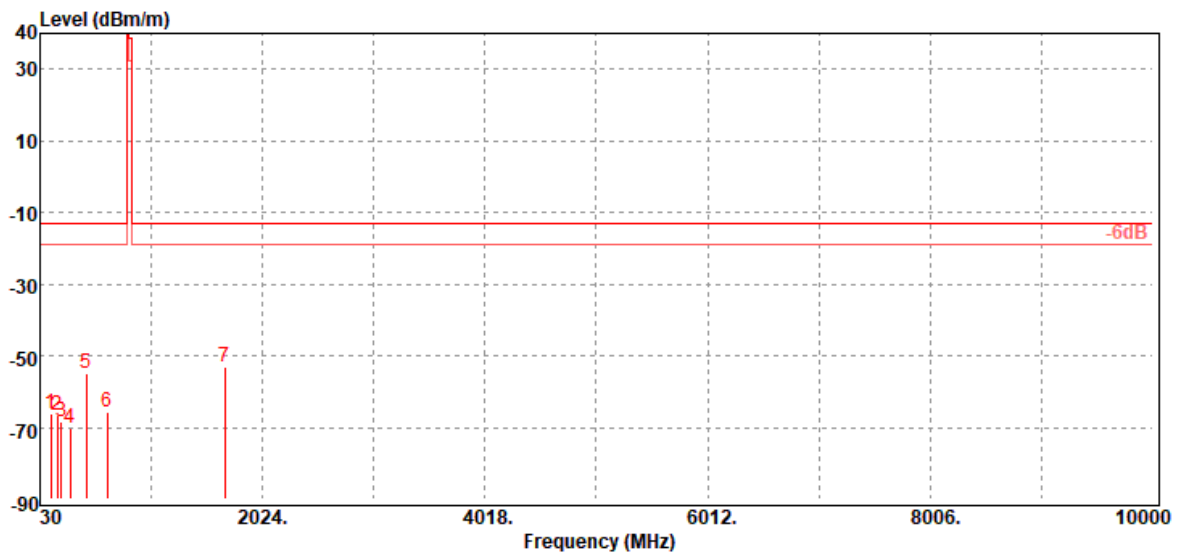
Test Date: January 8, 2020

Temperature: 18.6°C

Tested by: Jerry Chang

Humidity: 59% RH

Polarity: Hor.



Freq. (MHz)	ERP/EIRP (dBm)	SG Output Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
124.09	-66.29	-54.88	-10.50	-0.91	-13.00	-53.29	124.09
185.20	-66.77	-61.57	-4.08	-1.12	-13.00	-53.77	185.20
224.00	-68.32	-65.17	-1.92	-1.23	-13.00	-55.32	224.00
299.66	-70.23	-66.79	-2.01	-1.43	-13.00	-57.23	299.66
445.16	-55.08	-51.23	-2.10	-1.75	-13.00	-42.08	445.16
634.31	-65.74	-61.95	-1.67	-2.12	-13.00	-52.74	634.31
1683.00	-52.91	-59.22	9.90	-3.59	-13.00	-39.91	1683.00

- End of Test Report -