FCC 47 CFR PART 22 SUBPART H AND PART 24 SUBPART E
+
INDUSTRY CANADA RSS-132 & RSS-133

TEST REPORT

For

GUARDIAN SYSTEM LTE

FCC Model No.: G2-SY-CON2
IC Model No.: G2-SY-CON2-1002244

Trade Name: GUARDIAN

Issued to

FCC:	**Seeing Machines Pty Ltd** **80 Mildura Street, Fyshwick, ACT , Canberra 2609 Australia**
IC:	**Seeing Machines Ltd.** **80 Mildura Street Fyshwick ACT 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 20, 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	April 21, 2020	See the following Note Rev. (01)	P.6, P.12, P.14, P.16, P.27-P.31, P.33, P.47-48, P.50, P.57-62, P.67-70, P.84-95, P.104-111, P.112-152, P.153-154	Doris Chu
02	April 28, 2020	See the following Note Rev. (02)	P.6, P.23-26	Doris Chu
03	June 20, 2020	See the following Note Rev. (03)	P.1, P.4, P.6	Allison Chen

Rev (01):
1. Revised Antenna type.
2. Revised section 5.2 DC Power Supplies Cal Due date indication.
3. Revised section 6.3.
4. Revised section 8.1 limit.
5. Revised section 8.2 Test Procedure and Test Results.
6. Revised section 8.3 LTE Band 2 26dB Bandwidth test data.
7. Revised 100%RB to Full RB.
8. The worst case in section 8.6 is 1RB
9. Revised section 8.7 Test Configuration and test procedure.
Rev (02):
1. Revised section 2 power supply.
2. Revised section 8.1 Band V power.
Rev (03):
1. Modify IC Model No.: G2-SY-CON2-1002244.

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APPENDIX 1 - PHOTOGRAPHS OF EUT

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1. TEST RESULT CERTIFICATION

FCC Applicant:	Seeing Machines Pty Ltd 80 Mildura Street, Fyshwick, ACT , Canberra 2609 Australia
IC Applicant:	Seeing Machines Ltd. 80 Mildura Street Fyshwick ACT 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
FCC Model No.:	G2-SY-CON2
IC Model No.:	G2-SY-CON2-1002244
Date of Test:	December 17, 2019 ~ January 8, 2020

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APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
FCC 47 CFR PART 22 SUBPART H AND PART 24 SUBPART E + RSS-132 Issue 3 and RSS-133 Issue 6	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 was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in TIA -603-E and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rule FCC PART 22 Subpart H, PART 24 Subpart E and IC RSS-132 Issue 3 and IC RSS-133 Issue 6.

Approved by:

Kevin Tsai
Deputy Manager
Compliance Certification Services Inc.

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2. EUT DESCRIPTION

Product	GUARDIAN SYSTEM LTE	
FCC Model No.	G2-SY-CON2	
IC Model No.	G2-SY-CON2-1002244	
Model Discrepancy	N/A	
Trade	GUARDIAN	
Received Date	November 20, 2019	
Power Supply	Powered from DC supply: DC 12V.	
Frequency Range	LTE Band 2 Channel Bandwidth: 1.4MHz	1850.7MHz ~1909.2MHz
	LTE Band 2 Channel Bandwidth: 3MHz	1851.5 MHz ~ 1908.4 MHz
	LTE Band 2 Channel Bandwidth: 5MHz	1852.5MHz ~1907.5MHz
	LTE Band 2 Channel Bandwidth: 10MHz	1855MHz ~1905MHz
	LTE Band 2 Channel Bandwidth: 15MHz	1857.5 MHz ~ 1902.5 MHz
	LTE Band 2 Channel Bandwidth: 20MHz	1860MHz ~1900MHz
	LTE Band 5 Channel Bandwidth: 1.4MHz	824.7MHz ~848.2MHz
	LTE Band 5 Channel Bandwidth: 3MHz	825.5 MHz ~ 847.4 MHz
	LTE Band 5 Channel Bandwidth: 5MHz	826.5MHz ~846.5MHz
	LTE Band 5 Channel Bandwidth: 10MHz	829MHz ~844MHz
Modulation Technique	LTE Band 2	QPSK, 16QAM
	LTE Band 5	QPSK, 16QAM
Antenna Specification	Dipole Antenna LTE Band 2 Antenna gain: 1.2 dBi LTE Band 5 Antenna gain: -0.1 dBi	

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Transmit Power (ERP & EIRP Power)	LTE Band 2 Channel Bandwidth: 1.4MHz	QPSK: 16QAM:	22.66 22.50	dBm dBm
	LTE Band 2 Channel Bandwidth: 3MHz	QPSK: 16QAM:	22.67 22.51	dBm dBm
	LTE Band 2 Channel Bandwidth: 5MHz	QPSK: 16QAM:	22.71 22.55	dBm dBm
	LTE Band 2 Channel Bandwidth: 10MHz	QPSK: 16QAM:	22.73 22.57	dBm dBm
	LTE Band 2 Channel Bandwidth: 15MHz	QPSK: 16QAM:	22.74 22.58	dBm dBm
	LTE Band 2 Channel Bandwidth: 20MHz	QPSK: 16QAM:	22.80 22.64	dBm dBm
	LTE Band 5 Channel Bandwidth: 1.4MHz	QPSK: 16QAM:	20.31 19.83	dBm dBm
	LTE Band 5 Channel Bandwidth: 3MHz	QPSK: 16QAM:	20.33 19.84	dBm dBm
	LTE Band 5 Channel Bandwidth: 5MHz	QPSK: 16QAM:	20.35 19.85	dBm dBm
	LTE Band 5 Channel Bandwidth: 10MHz	QPSK: 16QAM:	20.42 19.89	dBm 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.*

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3. TEST METHODOLOGY

Both conducted and radiated testing were performed according to TIA -603-E, FCC CFR 47, Part 2 and Part 22 Subpart H & Part 24 Subpart E.

The tests documented in this report were performed in accordance with IC RSS-132, SPSR503, RSS-133, SPSR510 and ANSI C63.26: 2015.

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 had been tested under operating condition.
The EUT be set in maximum power transmission via call box during testing.

LTE Band 2: 1850MHz ~ 1910MHz
Three channels had been tested for each channel bandwidth.

Channel	1.4MHz		3MHz		5MHz	
	Channel	Frequency(MHz)	Channel	Frequency(MHz)	Channel	Frequency(MHz)
Lowest	18607	1850.7	18615	1851.5	18625	1852.5
Middle	18900	1880.0	18900	1880.0	18900	1880.0
Highest	19193	1909.2	19184	1908.4	19175	1907.5
Channel	10MHz		15MHz		20MHz	
	Channel	Frequency(MHz)	Channel	Frequency(MHz)	Channel	Frequency(MHz)
Lowest	18650	1855.0	18675	1857.5	18700	1860.0
Middle	18900	1880.0	18900	1880.0	18900	1880.0
Highest	19150	1905.0	19125	1902.5	19100	1900.0

LTE Band 5: 824MHz ~ 849MHz
Three channels had been tested for each channel bandwidth.

Channel	1.4MHz		3MHz	
	Channel	Frequency(MHz)	Channel	Frequency(MHz)
Lowest	20407	824.7	20415	825.5
Middle	20525	836.5	20525	836.5
Highest	20642	848.2	20634	847.4
Channel	5MHz		10MHz	
	Channel	Frequency(MHz)	Channel	Frequency(MHz)
Lowest	20425	826.5	20450	829.0
Middle	20525	836.5	20525	836.5
Highest	20625	846.5	20600	844.0

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3.2.1 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.	IC Standard Sec.	Report Section	Test Item	Result
-	-	2	Antenna Requirement	Pass
2.1046	RSS-GEN 6.12	8.1	Output Power measurement	Pass
22.913(a), 24.232(c)	RSS-132, section 5.4 RSS-133, section 6.4	8.2	ERP and EIRP Measurement	Pass
2.1055, 22.355, 24.235	RSS-132 section 5.3 RSS-133 section 6.3	8.3	Frequency Stability v.s. temperature measurement	Pass
2.1049	RSS-GEN 6.7	8.4	Occupied Bandwidth Measurement	Pass
22.917(a), 24.238(a)	RSS-132 section 5.5 RSS-133 section 6.5	8.5	Conducted Band Edge	Pass
22.913(d), 24.232(d)	RSS-132, section 5.4 RSS-133, section 6.4	8.6	Peak to Average Ratio	Pass
22.917(a), 24.238(a)	RSS-132 section 5.5 RSS-133 section 6.5	8.7	Conducted Spurious Emission	Pass
22.917(a), 24.238(a)	RSS-132 section 5.5 RSS-133 section 6.5	8.8	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.*

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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	01/13/2020
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				

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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

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, ISED#: 2324G.

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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 & 24 REQUIREMENTS & INDUSTRY CANADA RSS-132 & RSS-133

8.1 ERP & EIRP MEASUREMENT

LIMIT

According to FCC §2.1046

FCC 22.913(b):

The Effective Radiated Power (ERP) of mobile transmitters must not exceed 7 Watts.

FCC 24.232(b):

The equivalent Isotropic Radiated Power (EIRP) must not exceed 2 Watts.

RSS-132 § 5.4 The maximum (EIRP) shall not exceed 11.5 Watts for mobile stations.

RSS133 § 6.4: Mobile stations and hand-held portables are limited to 2 watts maximum (EIRP).

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.

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TEST RESULTS
LTE Band 2

Band	BW (MHz)	Channel	Frequency (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Average power(dBm)	EIRP Power (dBm)
Band 2	1.4M	18607	1850.7	QPSK	1	0	0	20.79	22.59
					1	2	0	20.60	22.40
					1	5	0	19.54	21.34
					3	0	1	20.08	21.88
					3	1	1	20.06	21.86
					3	2	1	19.88	21.68
					6	0	1	19.99	21.79
				16QAM	1	0	1	20.06	21.86
					1	2	1	20.01	21.81
					1	5	1	18.72	20.52
					3	0	2	18.94	20.74
					3	1	2	18.92	20.72
					3	2	2	18.89	20.69
					6	0	2	18.93	20.73
		18900	1880.0	QPSK	1	0	0	20.50	22.30
					1	2	0	20.86	22.66
					1	5	0	20.74	22.54
					3	0	1	19.99	21.79
					3	1	1	20.28	22.08
					3	2	1	20.06	21.86
					6	0	1	19.98	21.78
				16QAM	1	0	1	20.02	21.82
					1	2	1	20.70	22.50
					1	5	1	20.21	22.01
					3	0	2	19.16	20.96
					3	1	2	19.34	21.14
					3	2	2	19.19	20.99
					6	0	2	19.07	20.87
		19192	1909.2	QPSK	1	0	0	20.47	22.27
					1	2	0	20.49	22.29
					1	5	0	19.59	21.39
					3	0	1	19.68	21.48
					3	1	1	19.54	21.34
					3	2	1	19.82	21.62
					6	0	1	19.62	21.42
				16QAM	1	0	1	20.09	21.89
					1	2	1	20.27	22.07
					1	5	1	19.35	21.15
					3	0	2	18.49	20.29
					3	1	2	18.54	20.34
					3	2	2	18.70	20.50
					6	0	2	18.63	20.43

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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 2	3M	18615	1851.5	QPSK	1	0	0	20.80	22.60
					1	7	0	20.61	22.41
					1	14	0	19.55	21.35
					8	0	1	20.09	21.89
					8	4	1	20.07	21.87
					8	7	1	19.89	21.69
					15	0	1	20.00	21.80
				16QAM	1	0	1	20.07	21.87
					1	7	1	20.02	21.82
					1	14	1	18.73	20.53
					8	0	2	18.95	20.75
					8	4	2	18.93	20.73
					8	7	2	18.90	20.70
					15	0	2	18.94	20.74
		18900	1880.0	QPSK	1	0	0	20.51	22.31
					1	7	0	20.87	22.67
					1	14	0	20.75	22.55
					8	0	1	20.00	21.80
					8	4	1	20.29	22.09
					8	7	1	20.07	21.87
					15	0	1	19.99	21.79
				16QAM	1	0	1	20.03	21.83
					1	7	1	20.71	22.51
					1	14	1	20.22	22.02
					8	0	2	19.17	20.97
					8	4	2	19.35	21.15
					8	7	2	19.20	21.00
					15	0	2	19.08	20.88
		19184	1908.4	QPSK	1	0	0	20.49	22.29
					1	7	0	20.51	22.31
					1	14	0	19.61	21.41
					8	0	1	19.70	21.50
					8	4	1	19.56	21.36
					8	7	1	19.84	21.64
					15	0	1	19.64	21.44
				16QAM	1	0	1	20.11	21.91
					1	7	1	20.29	22.09
					1	14	1	19.37	21.17
					8	0	2	18.51	20.31
					8	4	2	18.56	20.36
					8	7	2	18.72	20.52
					15	0	2	18.65	20.45

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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 2	5M	18625	1852.5	QPSK	1	0	0	20.85	22.65
					1	12	0	20.66	22.46
					1	24	0	19.60	21.40
					12	0	1	20.14	21.94
					12	6	1	20.12	21.92
					12	11	1	19.94	21.74
					25	0	1	20.05	21.85
				16QAM	1	0	1	20.12	21.92
					1	12	1	20.07	21.87
					1	24	1	18.78	20.58
					12	0	2	19.00	20.80
					12	6	2	18.98	20.78
					12	11	2	18.95	20.75
					25	0	2	18.99	20.79
		18900	1880.0	QPSK	1	0	0	20.55	22.35
					1	12	0	20.91	22.71
					1	24	0	20.79	22.59
					12	0	1	20.04	21.84
					12	6	1	20.33	22.13
					12	11	1	20.11	21.91
					25	0	1	20.03	21.83
				16QAM	1	0	1	20.07	21.87
					1	12	1	20.75	22.55
					1	24	1	20.26	22.06
					12	0	2	19.21	21.01
					12	6	2	19.39	21.19
					12	11	2	19.24	21.04
					25	0	2	19.12	20.92
		19175	1907.5	QPSK	1	0	0	20.54	22.34
					1	12	0	20.56	22.36
					1	24	0	19.66	21.46
					12	0	1	19.75	21.55
					12	6	1	19.61	21.41
					12	11	1	19.89	21.69
					25	0	1	19.69	21.49
				16QAM	1	0	1	20.16	21.96
					1	12	1	20.34	22.14
					1	24	1	19.42	21.22
					12	0	2	18.56	20.36
					12	6	2	18.61	20.41
					12	11	2	18.77	20.57
					25	0	2	18.70	20.50

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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 2	10M	18650	1855.0	QPSK	1	0	0	20.87	22.67
					1	24	0	20.68	22.48
					1	49	0	19.62	21.42
					25	0	1	20.16	21.96
					25	12	1	20.14	21.94
					25	24	1	19.96	21.76
					50	0	1	20.07	21.87
				16QAM	1	0	1	20.14	21.94
					1	24	1	20.09	21.89
					1	49	1	18.80	20.60
					25	0	2	19.02	20.82
					25	12	2	19.00	20.80
					25	24	2	18.97	20.77
					50	0	2	19.01	20.81
		18900	1880.0	QPSK	1	0	0	20.57	22.37
					1	24	0	20.93	22.73
					1	49	0	20.81	22.61
					25	0	1	20.06	21.86
					25	12	1	20.35	22.15
					25	24	1	20.13	21.93
					50	0	1	20.05	21.85
				16QAM	1	0	1	20.09	21.89
					1	24	1	20.77	22.57
					1	49	1	20.28	22.08
					25	0	2	19.23	21.03
					25	12	2	19.41	21.21
					25	24	2	19.26	21.06
					50	0	2	19.14	20.94
		19150	1905.0	QPSK	1	0	0	20.57	22.37
					1	24	0	20.59	22.39
					1	49	0	19.69	21.49
					25	0	1	19.78	21.58
					25	12	1	19.64	21.44
					25	24	1	19.92	21.72
					50	0	1	19.72	21.52
				16QAM	1	0	1	20.19	21.99
					1	24	1	20.37	22.17
					1	49	1	19.45	21.25
					25	0	2	18.59	20.39
					25	12	2	18.64	20.44
					25	24	2	18.80	20.60
					50	0	2	18.73	20.53

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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 2	15M	18675	1857.5	QPSK	1	0	0	20.88	22.68
					1	37	0	20.69	22.49
					1	74	0	19.63	21.43
					36	0	1	20.17	21.97
					36	18	1	20.15	21.95
					36	35	1	19.97	21.77
					75	0	1	20.08	21.88
				16QAM	1	0	1	20.15	21.95
					1	37	1	20.10	21.90
					1	74	1	18.81	20.61
					36	0	2	19.03	20.83
					36	18	2	19.01	20.81
					36	35	2	18.98	20.78
					75	0	2	19.02	20.82
		18900	1880.0	QPSK	1	0	0	20.58	22.38
					1	37	0	20.94	22.74
					1	74	0	20.82	22.62
					36	0	1	20.07	21.87
					36	18	1	20.36	22.16
					36	35	1	20.14	21.94
					75	0	1	20.06	21.86
				16QAM	1	0	1	20.10	21.90
					1	37	1	20.78	22.58
					1	74	1	20.29	22.09
					36	0	2	19.24	21.04
					36	18	2	19.42	21.22
					36	35	2	19.27	21.07
					75	0	2	19.15	20.95
		19125	1902.5	QPSK	1	0	0	20.58	22.38
					1	37	0	20.60	22.40
					1	74	0	19.70	21.50
					36	0	1	19.79	21.59
					36	18	1	19.65	21.45
					36	35	1	19.93	21.73
					75	0	1	19.73	21.53
				16QAM	1	0	1	20.20	22.00
					1	37	1	20.38	22.18
					1	74	1	19.46	21.26
					36	0	2	18.60	20.40
					36	18	2	18.65	20.45
					36	35	2	18.81	20.61
					75	0	2	18.74	20.54

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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 2	20M	18700	1860.0	QPSK	1	0	0	20.91	22.71
					1	49	0	20.72	22.52
					1	99	0	19.66	21.46
					50	0	1	20.20	22.00
					50	24	1	20.18	21.98
					50	49	1	20.00	21.80
					100	0	1	20.11	21.91
				16QAM	1	0	1	20.18	21.98
					1	49	1	20.13	21.93
					1	99	1	18.84	20.64
					50	0	2	19.06	20.86
					50	24	2	19.04	20.84
					50	49	2	19.01	20.81
					100	0	2	19.05	20.85
		18900	1880.0	QPSK	1	0	0	20.64	22.44
					1	49	0	21.00	22.80
					1	99	0	20.88	22.68
					50	0	1	20.13	21.93
					50	24	1	20.42	22.22
					50	49	1	20.20	22.00
					100	0	1	20.12	21.92
				16QAM	1	0	1	20.16	21.96
					1	49	1	20.84	22.64
					1	99	1	20.35	22.15
					50	0	2	19.30	21.10
					50	24	2	19.48	21.28
					50	49	2	19.33	21.13
					100	0	2	19.21	21.01
		19100	1900.0	QPSK	1	0	0	20.65	22.45
					1	49	0	20.67	22.47
					1	99	0	19.77	21.57
					50	0	1	19.86	21.66
					50	24	1	19.72	21.52
					50	49	1	20.00	21.80
					100	0	1	19.80	21.60
				16QAM	1	0	1	20.27	22.07
					1	49	1	20.45	22.25
					1	99	1	19.53	21.33
					50	0	2	18.67	20.47
					50	24	2	18.72	20.52
					50	49	2	18.88	20.68
					100	0	2	18.81	20.61

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LTE Band V

Band	BW (MHz)	Channel	Frequency (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Average power(dBm)	ERP Power (dBm)	EIRP Power (dBm)
Band 5	1.4M	20407	824.7	QPSK	1	0	0	22.22	19.97	22.12
					1	2	0	22.41	20.16	22.31
					1	5	0	22.26	20.01	22.16
					3	0	1	21.56	19.31	21.46
					3	1	1	21.68	19.43	21.58
					3	2	1	21.51	19.26	21.41
					6	0	1	21.46	19.21	21.36
				16QAM	1	0	1	21.73	19.48	21.63
					1	2	1	21.71	19.46	21.61
					1	5	1	21.62	19.37	21.52
					3	0	2	20.61	18.36	20.51
					3	1	2	20.56	18.31	20.46
					3	2	2	20.57	18.32	20.47
					6	0	2	20.51	18.26	20.41
		20525	836.5	QPSK	1	0	0	22.07	19.82	21.97
					1	2	0	22.36	20.11	22.26
					1	5	0	22.25	20.00	22.15
					3	0	1	21.49	19.24	21.39
					3	1	1	21.54	19.29	21.44
					3	2	1	21.46	19.21	21.36
					6	0	1	21.55	19.30	21.45
				16QAM	1	0	1	21.90	19.65	21.80
					1	2	1	22.08	19.83	21.98
					1	5	1	21.41	19.16	21.31
					3	0	2	20.49	18.24	20.39
					3	1	2	20.50	18.25	20.40
					3	2	2	20.47	18.22	20.37
					6	0	2	20.48	18.23	20.38
		20642	848.2	QPSK	1	0	0	22.43	20.18	22.33
					1	2	0	22.56	20.31	22.46
					1	5	0	22.37	20.12	22.27
					3	0	1	21.49	19.24	21.39
					3	1	1	21.60	19.35	21.50
					3	2	1	21.42	19.17	21.32
					6	0	1	21.45	19.20	21.35
				16QAM	1	0	1	21.55	19.30	21.45
					1	2	1	21.61	19.36	21.51
					1	5	1	21.42	19.17	21.32
					3	0	2	20.55	18.30	20.45
					3	1	2	20.66	18.41	20.56
					3	2	2	20.43	18.18	20.33
					6	0	2	20.47	18.22	20.37

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Band	BW (MHz)	Channel	Frequency (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Average power(dBm)	ERP Power (dBm)	EIRP Power (dBm)
Band 5	3M	20415	825.5	QPSK	1	0	0	22.25	20.00	22.15
					1	7	0	22.44	20.19	22.34
					1	14	0	22.29	20.04	22.19
					8	0	1	21.59	19.34	21.49
					8	4	1	21.71	19.46	21.61
					8	7	1	21.54	19.29	21.44
					15	0	1	21.49	19.24	21.39
				16QAM	1	0	1	21.76	19.51	21.66
					1	7	1	21.74	19.49	21.64
					1	14	1	21.65	19.40	21.55
					8	0	2	20.64	18.39	20.54
					8	4	2	20.59	18.34	20.49
					8	7	2	20.60	18.35	20.50
					15	0	2	20.54	18.29	20.44
		20525	836.5	QPSK	1	0	0	22.08	19.83	21.98
					1	7	0	22.37	20.12	22.27
					1	14	0	22.26	20.01	22.16
					8	0	1	21.50	19.25	21.40
					8	4	1	21.55	19.30	21.45
					8	7	1	21.47	19.22	21.37
					15	0	1	21.56	19.31	21.46
				16QAM	1	0	1	21.91	19.66	21.81
					1	7	1	22.09	19.84	21.99
					1	14	1	21.42	19.17	21.32
					8	0	2	20.50	18.25	20.40
					8	4	2	20.51	18.26	20.41
					8	7	2	20.48	18.23	20.38
					15	0	2	20.49	18.24	20.39
		20634	847.4	QPSK	1	0	0	22.45	20.20	22.35
					1	7	0	22.58	20.33	22.48
					1	14	0	22.39	20.14	22.29
					8	0	1	21.51	19.26	21.41
					8	4	1	21.62	19.37	21.52
					8	7	1	21.44	19.19	21.34
					15	0	1	21.47	19.22	21.37
				16QAM	1	0	1	21.57	19.32	21.47
					1	7	1	21.63	19.38	21.53
					1	14	1	21.44	19.19	21.34
					8	0	2	20.57	18.32	20.47
					8	4	2	20.68	18.43	20.58
					8	7	2	20.45	18.20	20.35
					15	0	2	20.49	18.24	20.39

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Band	BW (MHz)	Channel	Frequency (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Average power(dBm)	ERP Power (dBm)	EIRP Power (dBm)
Band 5	5M	20425	826.5	QPSK	1	0	0	22.27	20.02	22.17
					1	12	0	22.46	20.21	22.36
					1	24	0	22.31	20.06	22.21
					12	0	1	21.61	19.36	21.51
					12	6	1	21.73	19.48	21.63
					12	11	1	21.56	19.31	21.46
					25	0	1	21.51	19.26	21.41
				16QAM	1	0	1	21.78	19.53	21.68
					1	12	1	21.76	19.51	21.66
					1	24	1	21.67	19.42	21.57
					12	0	2	20.66	18.41	20.56
					12	6	2	20.61	18.36	20.51
					12	11	2	20.62	18.37	20.52
					25	0	2	20.56	18.31	20.46
		20525	836.5	QPSK	1	0	0	22.09	19.84	21.99
					1	12	0	22.38	20.13	22.28
					1	24	0	22.27	20.02	22.17
					12	0	1	21.51	19.26	21.41
					12	6	1	21.56	19.31	21.46
					12	11	1	21.48	19.23	21.38
					25	0	1	21.57	19.32	21.47
				16QAM	1	0	1	21.92	19.67	21.82
					1	12	1	22.10	19.85	22.00
					1	24	1	21.43	19.18	21.33
					12	0	2	20.51	18.26	20.41
					12	6	2	20.52	18.27	20.42
					12	11	2	20.49	18.24	20.39
					25	0	2	20.50	18.25	20.40
		20625	846.5	QPSK	1	0	0	22.47	20.22	22.37
					1	12	0	22.60	20.35	22.50
					1	24	0	22.41	20.16	22.31
					12	0	1	21.53	19.28	21.43
					12	6	1	21.64	19.39	21.54
					12	11	1	21.46	19.21	21.36
					25	0	1	21.49	19.24	21.39
				16QAM	1	0	1	21.59	19.34	21.49
					1	12	1	21.65	19.40	21.55
					1	24	1	21.46	19.21	21.36
					12	0	2	20.59	18.34	20.49
					12	6	2	20.70	18.45	20.60
					12	11	2	20.47	18.22	20.37
					25	0	2	20.51	18.26	20.41

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Band	BW (MHz)	Channel	Frequency (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Average power(dBm)	ERP Power (dBm)	EIRP Power (dBm)
Band 5	10M	20450	829.0	QPSK	1	0	0	22.32	20.07	22.22
					1	24	0	22.51	20.26	22.41
					1	49	0	22.36	20.11	22.26
					25	0	1	21.66	19.41	21.56
					25	12	1	21.78	19.53	21.68
					25	24	1	21.61	19.36	21.51
					50	0	1	21.56	19.31	21.46
				16QAM	1	0	1	21.83	19.58	21.73
					1	24	1	21.81	19.56	21.71
					1	49	1	21.72	19.47	21.62
					25	0	2	20.71	18.46	20.61
					25	12	2	20.66	18.41	20.56
					25	24	2	20.67	18.42	20.57
					50	0	2	20.61	18.36	20.51
		20525	836.5	QPSK	1	0	0	22.13	19.88	22.03
					1	24	0	22.42	20.17	22.32
					1	49	0	22.31	20.06	22.21
					25	0	1	21.55	19.30	21.45
					25	12	1	21.60	19.35	21.50
					25	24	1	21.52	19.27	21.42
					50	0	1	21.61	19.36	21.51
				16QAM	1	0	1	21.96	19.71	21.86
					1	24	1	22.14	19.89	22.04
					1	49	1	21.47	19.22	21.37
					25	0	2	20.55	18.30	20.45
					25	12	2	20.56	18.31	20.46
					25	24	2	20.53	18.28	20.43
					50	0	2	20.54	18.29	20.44
		20600	844.0	QPSK	1	0	0	22.54	20.29	22.44
					1	24	0	22.67	20.42	22.57
					1	49	0	22.48	20.23	22.38
					25	0	1	21.60	19.35	21.50
					25	12	1	21.71	19.46	21.61
					25	24	1	21.53	19.28	21.43
					50	0	1	21.56	19.31	21.46
				16QAM	1	0	1	21.66	19.41	21.56
					1	24	1	21.72	19.47	21.62
					1	49	1	21.53	19.28	21.43
					25	0	2	20.66	18.41	20.56
					25	12	2	20.77	18.52	20.67
					25	24	2	20.54	18.29	20.44
					50	0	2	20.58	18.33	20.48

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8.2 FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT

LIMIT

According to FCC §2.1055, FCC §22.355, .FCC §24.235.

Frequency Tolerance: +/- 2.5ppm

According to RSS-132 section 5.3,

The carrier frequency shall not depart from the reference frequency, in excess of ±2.5 ppm for mobile stations and ±1.0 ppm for base stations.
In lieu of meeting the above stability values, the test report may show that the frequency stability is sufficient to ensure that the emission bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS-Gen.

According to RSS -133 section 6.3,

The carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations and ±1.5 ppm for base stations.
In lieu of meeting the above stability values, the test report may show that the frequency stability is sufficient to ensure that the occupied bandwidth stays within each of the sub-bands (see Section 5.1) when tested to the temperature and supply voltage variations specified in RSS-Gen.

Test Procedure

Use Anritsu 8820 with frequency Error measurement capability.

Temp = -40℃ to +65℃

Voltage= 85% to 115% of the nominal value.

The Worst case: DC 12V

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 2 / QPSK

Reference Frequency: LTE Band 2, 1880 MHz at 20(°C)				
Limit: 2.5 ppm = 4700 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	-0.000005	
12	40	0.01	0.000005	
12	30	0.01	0.000005	
12	20	0.00	0.000000	
12	10	0.02	0.000011	
12	0	0.01	0.000005	
12	-10	0.01	0.000005	
12	-20	0.02	0.000011	
12	-30	0.02	0.000011	
12	-40	0.01	0.000005	

LTE Band 2 / 16QAM

Reference Frequency: LTE Band 2, 1880 MHz at 20(°C)				
Limit: 2.5 ppm = 4700 Hz				
Power Supply (Vac)	Environment Temperature (°C)	BW: 10M Frequency Error(Hz)	Frequency Error (ppm)	Limit (ppm)
12	65	0.01	0.000005	+/- 2.5
12	50	-0.01	-0.000005	
12	40	0.00	0.000000	
12	30	0.01	0.000005	
12	20	0.00	0.000000	
12	10	0.02	0.000011	
12	0	0.01	0.000005	
12	-10	0.01	0.000005	
12	-20	0.02	0.000011	
12	-30	0.02	0.000011	
12	-40	0.00	0.000000	

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LTE Band 5 / QPSK

Reference Frequency: LTE Band 5, 836.5 MHz at 20(°C)				
Limit: 2.5 ppm = 2091.25 Hz				
Power Supply (Vac)	Environment Temperature (°C)	BW: 10M Frequency Error(Hz)	Frequency Error (ppm)	Limit (ppm)
12	65	0.01	0.000012	+/- 2.5
12	50	0.01	0.000012	
12	40	0.00	0.000000	
12	30	-0.01	-0.000012	
12	20	0.00	0.000000	
12	10	0.01	0.000012	
12	0	0.00	0.000000	
12	-10	-0.01	-0.000012	
12	-20	0.00	0.000000	
12	-30	0.01	0.000012	
12	-40	-0.01	-0.000012	

LTE Band 5 / 16QAM

Reference Frequency: LTE Band 5, 836.5 MHz at 20(°C)				
Limit: 2.5 ppm = 2091.25 Hz				
Power Supply (Vac)	Environment Temperature (°C)	BW: 10M Frequency Error(Hz)	Frequency Error (ppm)	Limit (ppm)
12	65	0.01	0.000012	+/- 2.5
12	50	0.00	0.000000	
12	40	0.01	0.000012	
12	30	0.00	0.000000	
12	20	0.00	0.000000	
12	10	0.01	0.000010	
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	0.00	0.000000	

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FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT:

LTE Band 2 / QPSK

Reference Frequency: LTE Band 2, 1880 MHz at 20(°C)				
Limit: 2.5 ppm = 4700 Hz				
Power Supply (Vac)	Environment Temperature (°C)	BW: 20M Frequency Error(Hz)	Frequency Error (ppm)	Limit (ppm)
10.2	20	0.00	0.000000	+/- 2.5
12		0.00	0.000000	
13.8		-0.01	-0.000005	

LTE Band 2 / 16QAM

Reference Frequency: LTE Band 2, 1880 MHz at 20(°C)				
Limit: 2.5 ppm = 4700 Hz				
Power Supply (Vac)	Environment Temperature (°C)	BW: 20M Frequency Error(Hz)	Frequency Error (ppm)	Limit (ppm)
10.2	20	0.00	0.000000	+/- 2.5
12		0.00	0.000000	
13.8		0.01	0.000003	

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LTE Band 5 / QPSK

Reference Frequency: LTE Band 5, 836.5 MHz at 20(°C)				
Limit: 2.5 ppm = 2091.25 Hz				
Power Supply (Vac)	Environment Temperature (°C)	BW: 10M Frequency Error(Hz)	Frequency Error (ppm)	Limit (ppm)
10.2	20	0.00	0.000004	+/- 2.5
12		0.00	0.000000	
13.8		0.02	0.000024	

LTE Band 5 / 16QAM

Reference Frequency: LTE Band 5, 836.5 MHz at 20(°C)				
Limit: 2.5 ppm = 2091.25 Hz				
Power Supply (Vac)	Environment Temperature (°C)	BW: 10M Frequency Error(Hz)	Frequency Error (ppm)	Limit (ppm)
10.2	20	-0.01	-0.000008	+/- 2.5
12		0.00	0.000000	
13.8		0.01	0.000008	

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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 ≥ 3 x RBW
4. Detector = Peak
5. Trace mode = max. hold

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LTE Band 2

Band	BW (MHz)	Channel	Mode	UL RB Allocation	UL RB offset	OBW(99%)(MHz)	26 dB Bandwidth(MHz)
2	1.4	Middle	QPSK	6	0	1.0984	1.3198
		Middle	16QAM	6	0	1.0941	1.2894
	3	Middle	QPSK	15	0	2.6918	2.9305
		Middle	16QAM	15	0	2.6831	2.9392
	5	Middle	QPSK	25	0	4.4863	4.9130
		Middle	16QAM	25	0	4.4573	4.9280
	10	Middle	QPSK	50	0	8.9435	9.7320
		Middle	16QAM	50	0	8.9146	9.5880
	15	Middle	QPSK	75	0	13.3719	14.5950
		Middle	16QAM	75	0	13.3285	14.5510
	20	Middle	QPSK	100	0	17.8292	19.5150
		Middle	16QAM	100	0	17.8871	19.5730

LTE Band 5

Band	BW (MHz)	Channel	Mode	UL RB Allocation	UL RB offset	OBW(99%)(MHz)	26 dB Bandwidth(MHz)
5	1.4	Middle	QPSK	6	0	1.0984	1.3054
		Middle	16QAM	6	0	1.1027	1.3140
	3	Middle	QPSK	15	0	2.6830	2.9204
		Middle	16QAM	15	0	2.6830	2.9378
	5	Middle	QPSK	25	0	4.4863	4.9350
		Middle	16QAM	25	0	4.4863	4.9350
	10	Middle	QPSK	50	0	8.9146	9.7250
		Middle	16QAM	50	0	8.9146	9.6380

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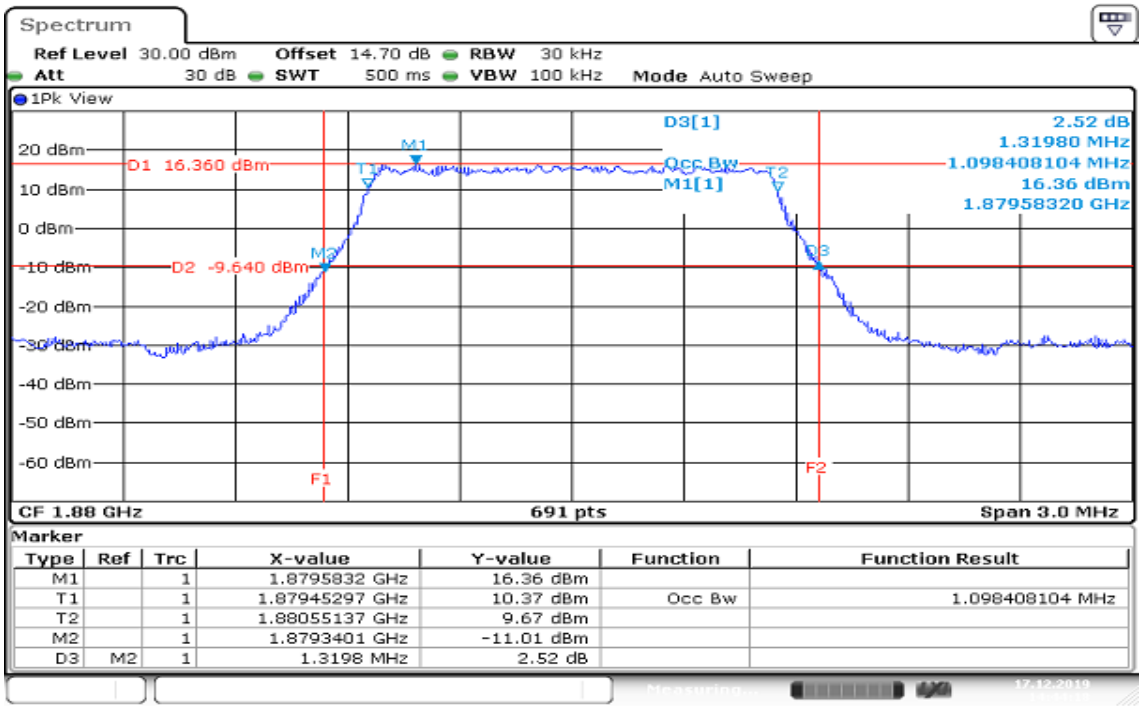
LTE Band 2

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

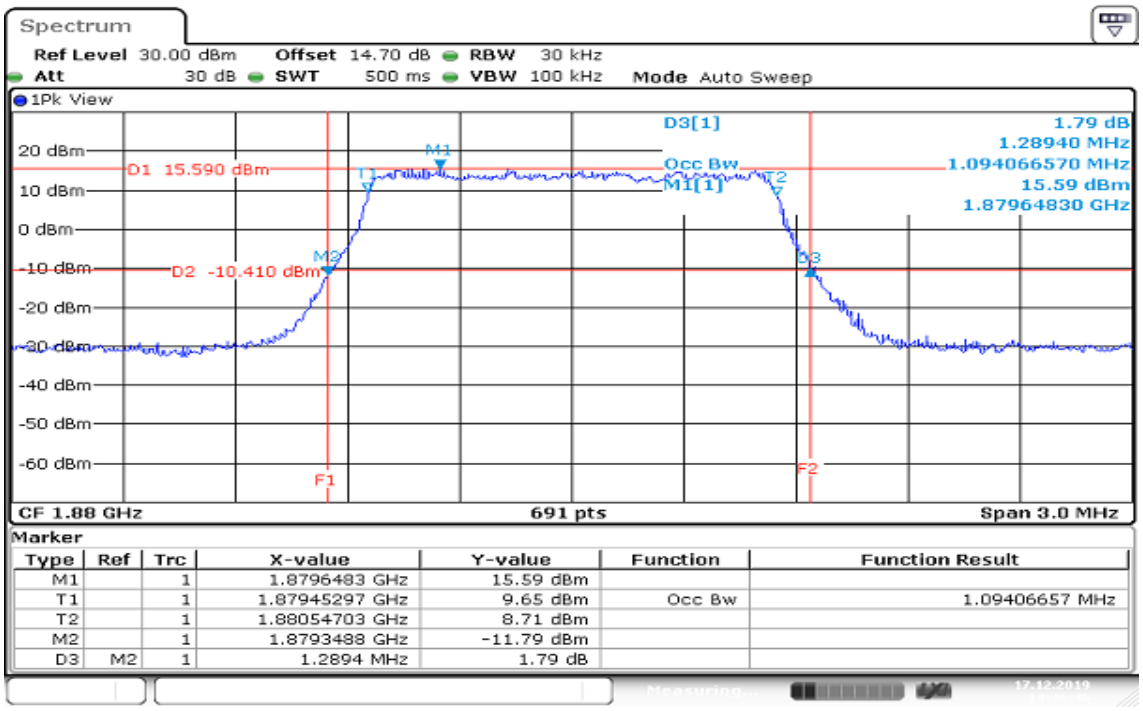


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.8795832 GHz	16.36 dBm		
T1		1	1.87945297 GHz	10.37 dBm	Occ Bw	1.098408104 MHz
T2		1	1.88055137 GHz	9.67 dBm		
M2		1	1.8793401 GHz	-11.01 dBm		
D3	M2	1	1.3198 MHz	2.52 dB		

Date: 17.DEC.2019 14:44:18

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



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.8796483 GHz	15.59 dBm		
T1		1	1.87945297 GHz	9.65 dBm	Occ Bw	1.09406657 MHz
T2		1	1.88054703 GHz	8.71 dBm		
M2		1	1.8793488 GHz	-11.79 dBm		
D3	M2	1	1.2894 MHz	1.79 dB		

Date: 17.DEC.2019 14:46:47

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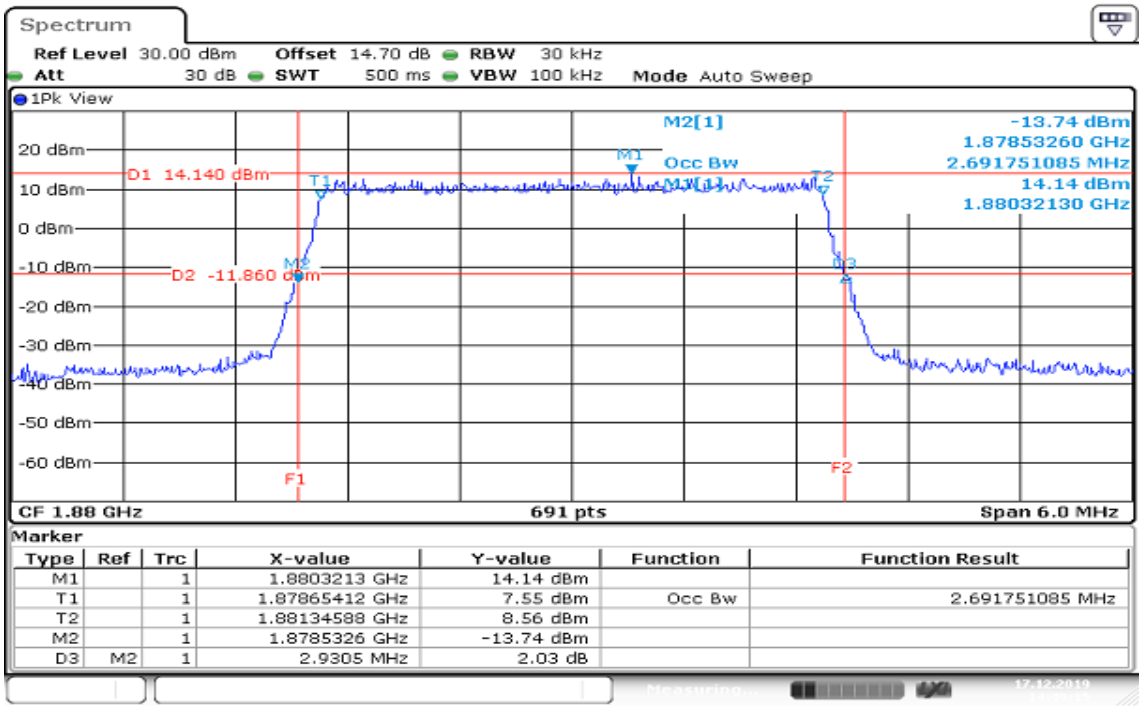
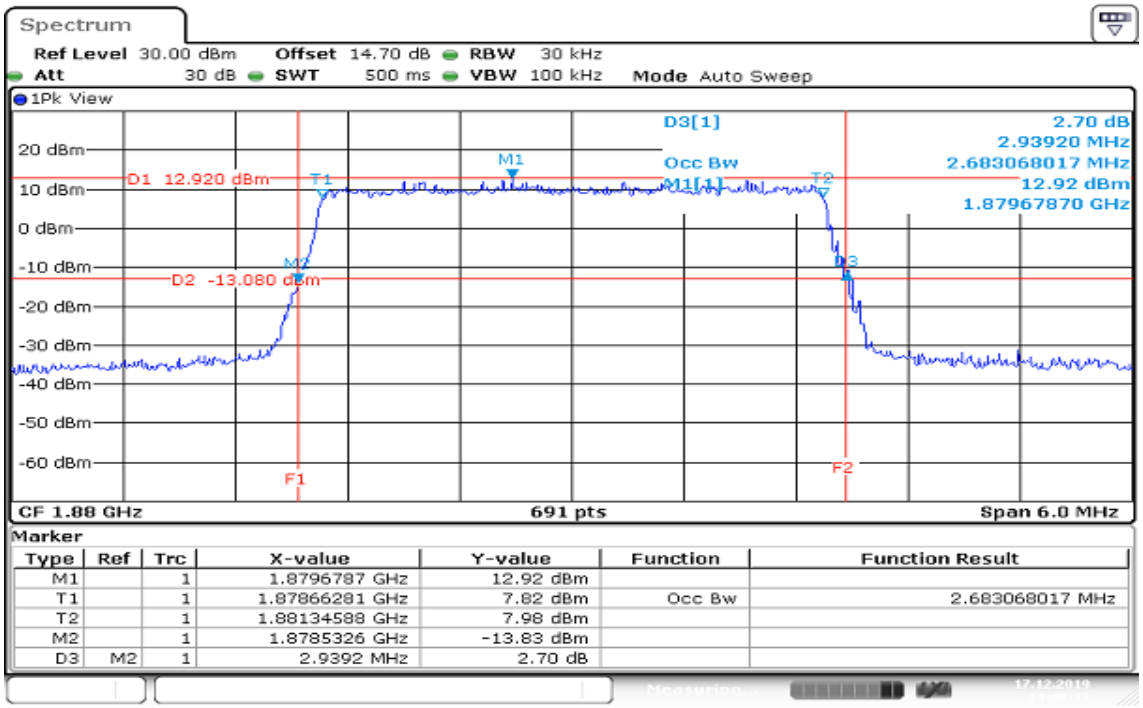
BW: 3MHz / QPSK / RB =15, RB Offset = 0
CH Mid



Date: 17.DEC.2019 14:49:16

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



Date: 17.DEC.2019 14:48:14

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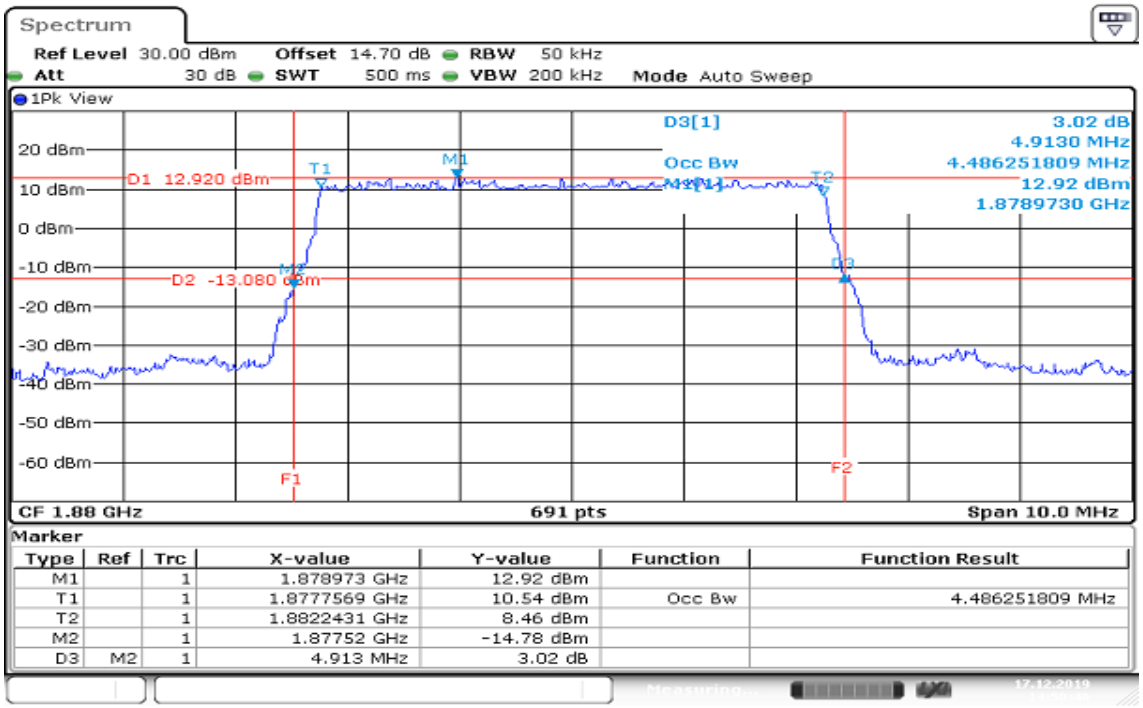
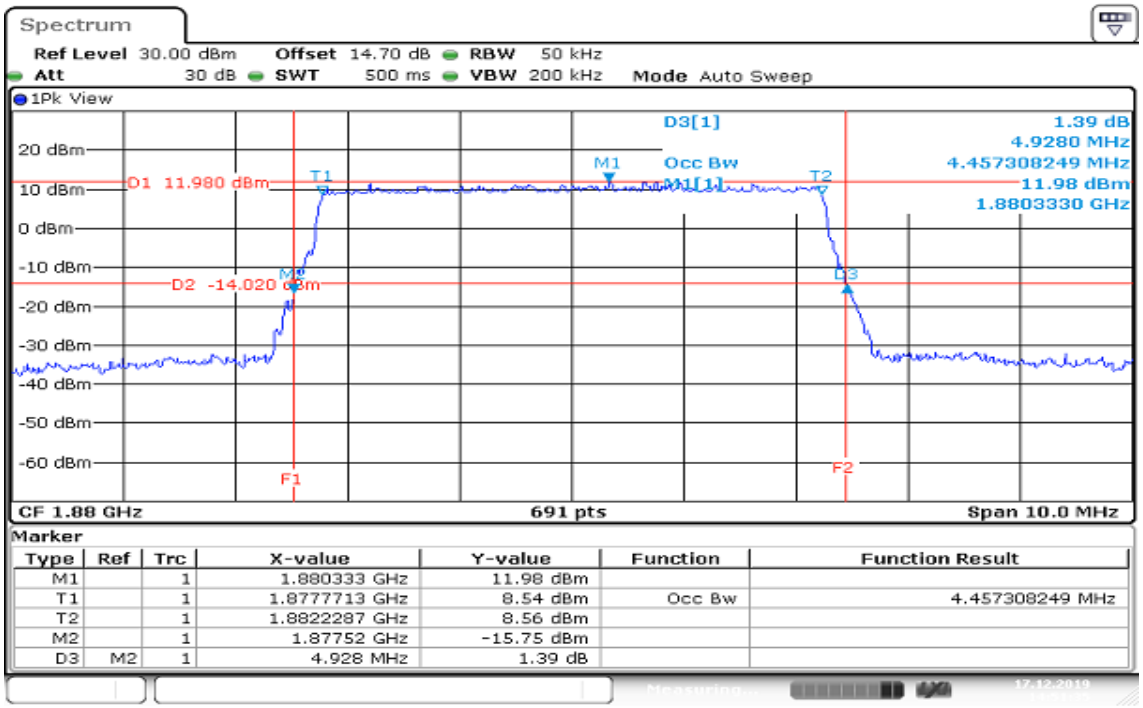
BW: 5MHz / QPSK / RB =25, RB Offset = 0
CH Mid



Date: 17.DEC.2019 14:50:46

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



Date: 17.DEC.2019 14:51:36

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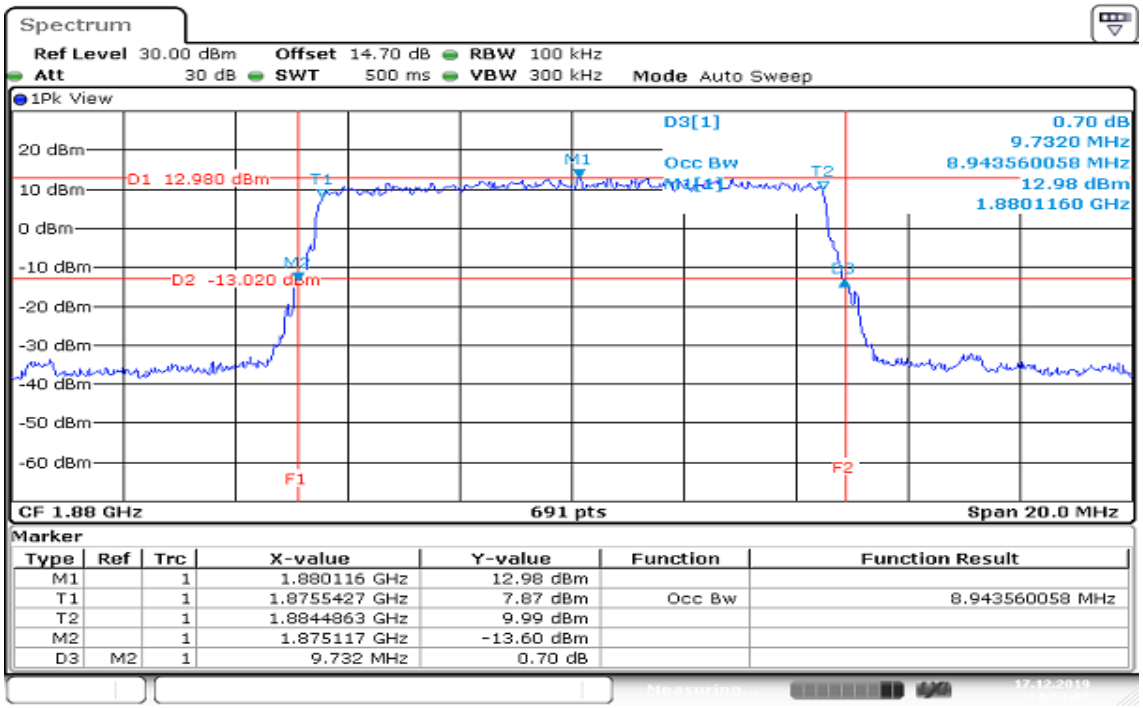
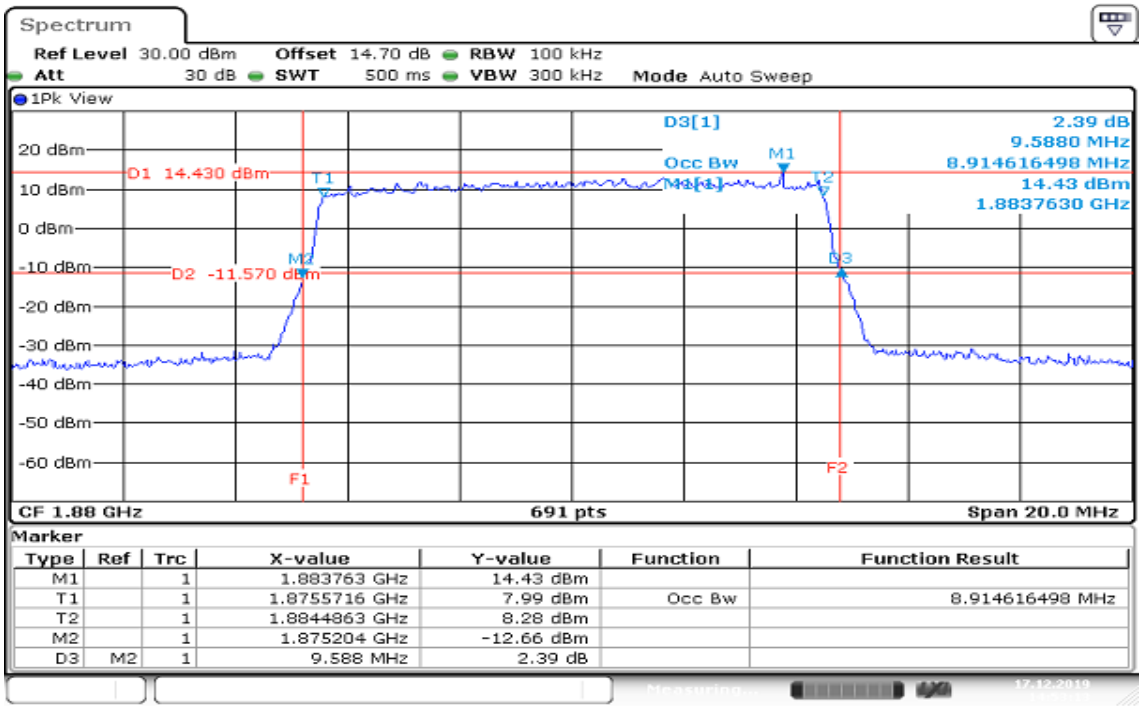
BW: 10MHz / QPSK / RB =50, RB Offset = 0
CH Mid



Date: 17.DEC.2019 14:54:08

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



Date: 17.DEC.2019 14:53:13

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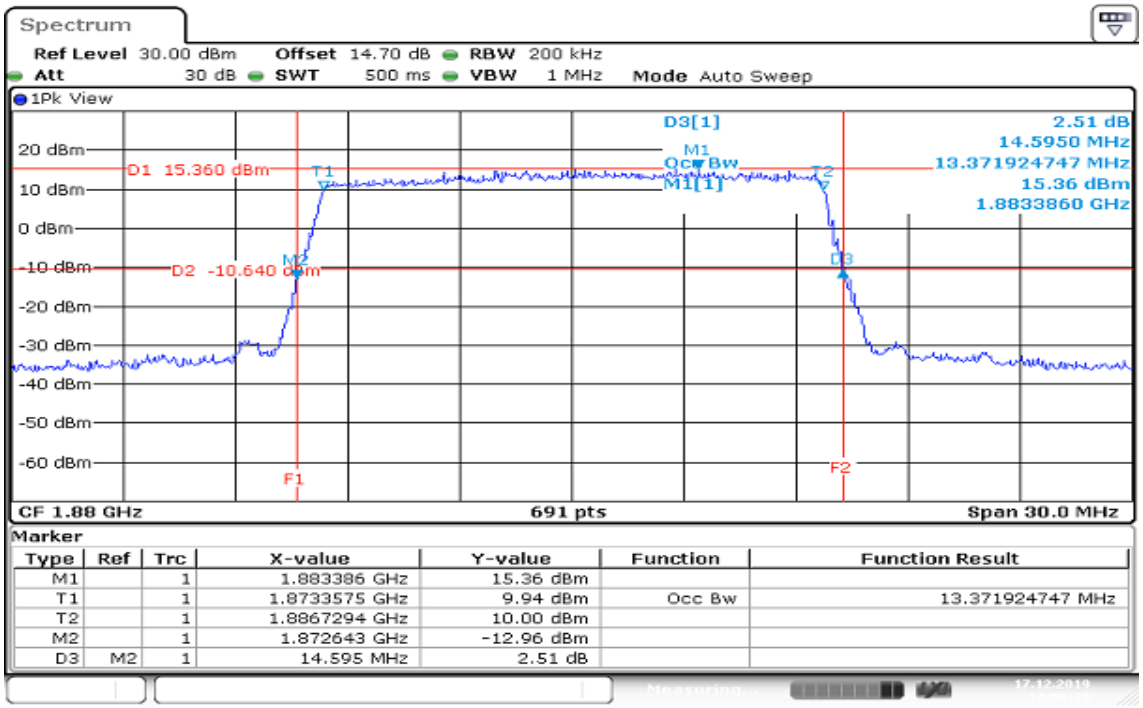
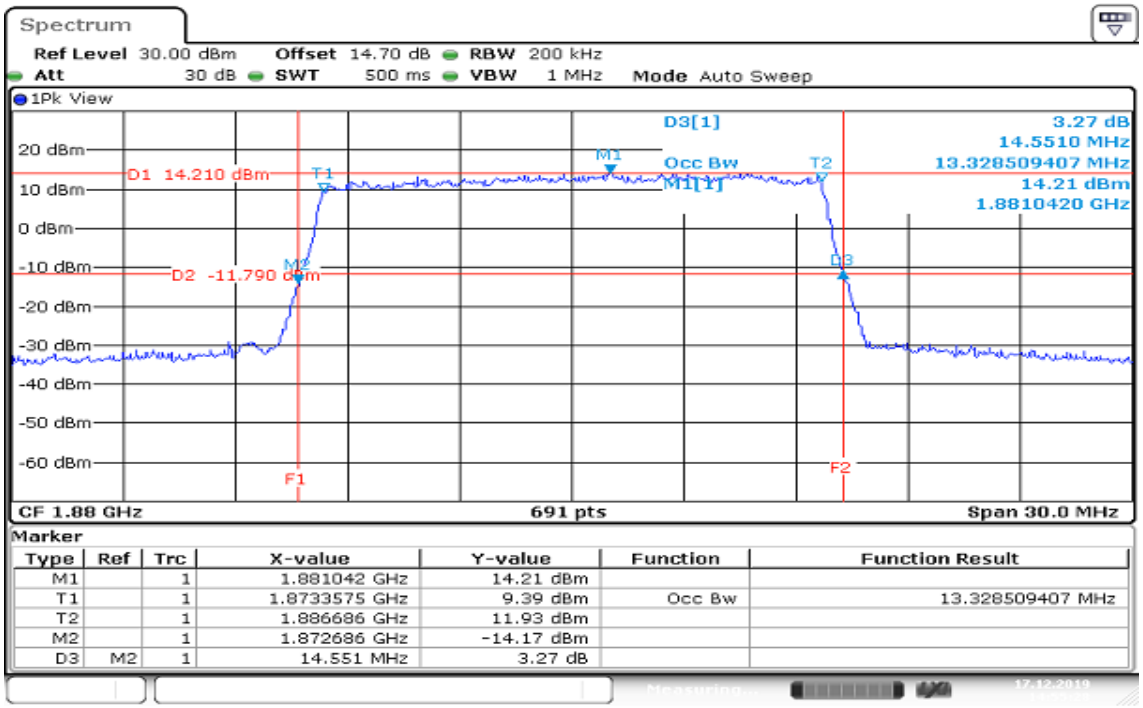
BW: 15MHz / QPSK / RB =75, RB Offset = 0
CH Mid



Date: 17.DEC.2019 14:56:40

BW: 15MHz / 16QAM / RB =75, RB Offset = 0
CH Mid



Date: 17.DEC.2019 14:55:29

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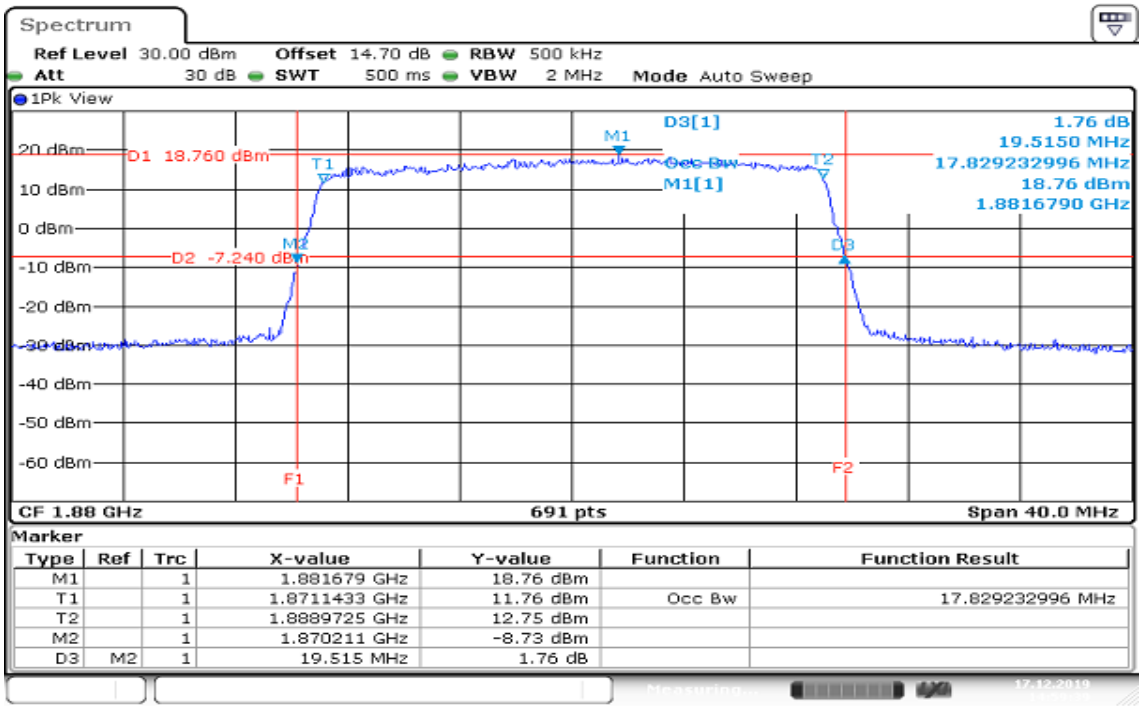
BW: 20MHz / QPSK / RB =100, RB Offset = 0
CH Mid

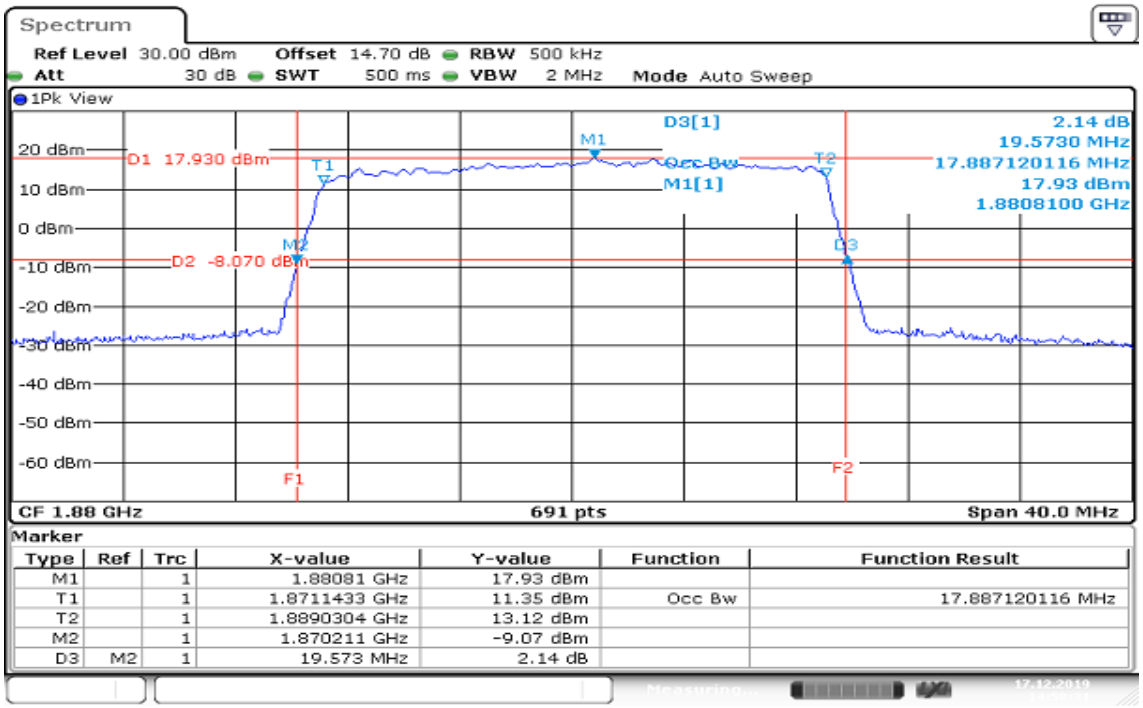


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.881679 GHz	18.76 dBm		
T1		1	1.8711433 GHz	11.76 dBm	Occ Bw	17.829232996 MHz
T2		1	1.8889725 GHz	12.75 dBm		
M2		1	1.870211 GHz	-8.73 dBm		
D3	M2	1	19.515 MHz	1.76 dB		

Date: 17.DEC.2019 14:59:39

BW: 20MHz / 16QAM / RB =100, RB Offset = 0
CH Mid



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.88081 GHz	17.93 dBm		
T1		1	1.8711433 GHz	11.35 dBm	Occ Bw	17.887120116 MHz
T2		1	1.8890304 GHz	13.12 dBm		
M2		1	1.870211 GHz	-9.07 dBm		
D3	M2	1	19.573 MHz	2.14 dB		

Date: 17.DEC.2019 14:58:31

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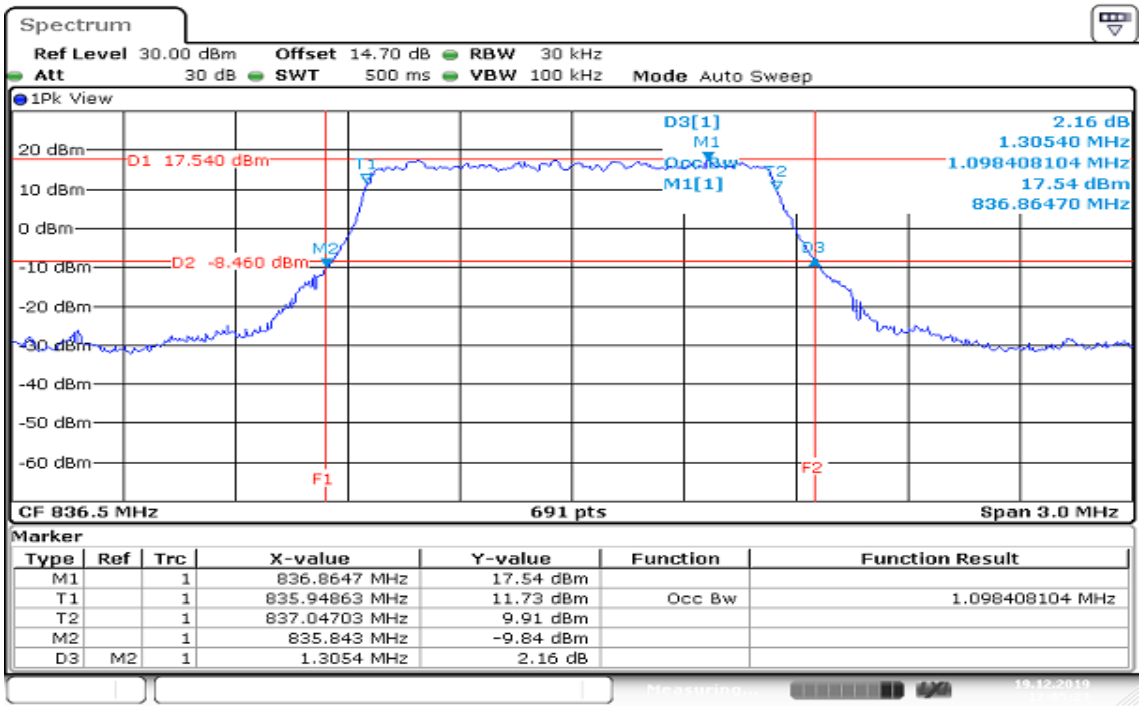
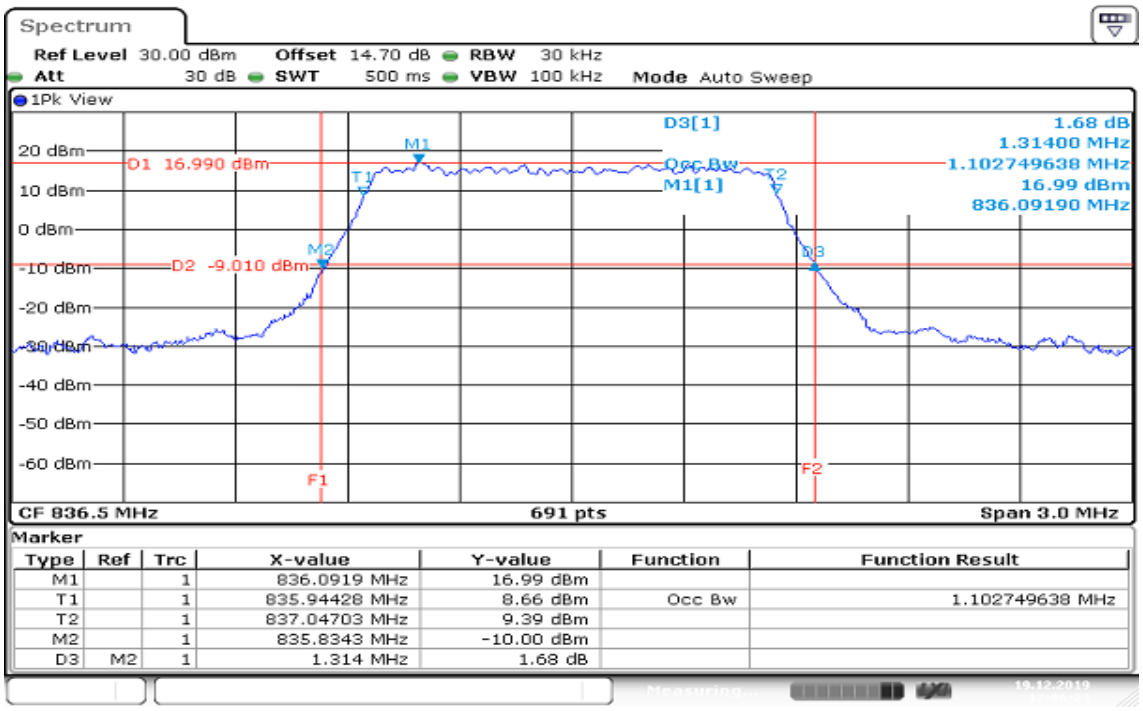
LTE Band 5

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



Date: 19.DEC.2019 12:05:24

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



Date: 19.DEC.2019 12:06:24

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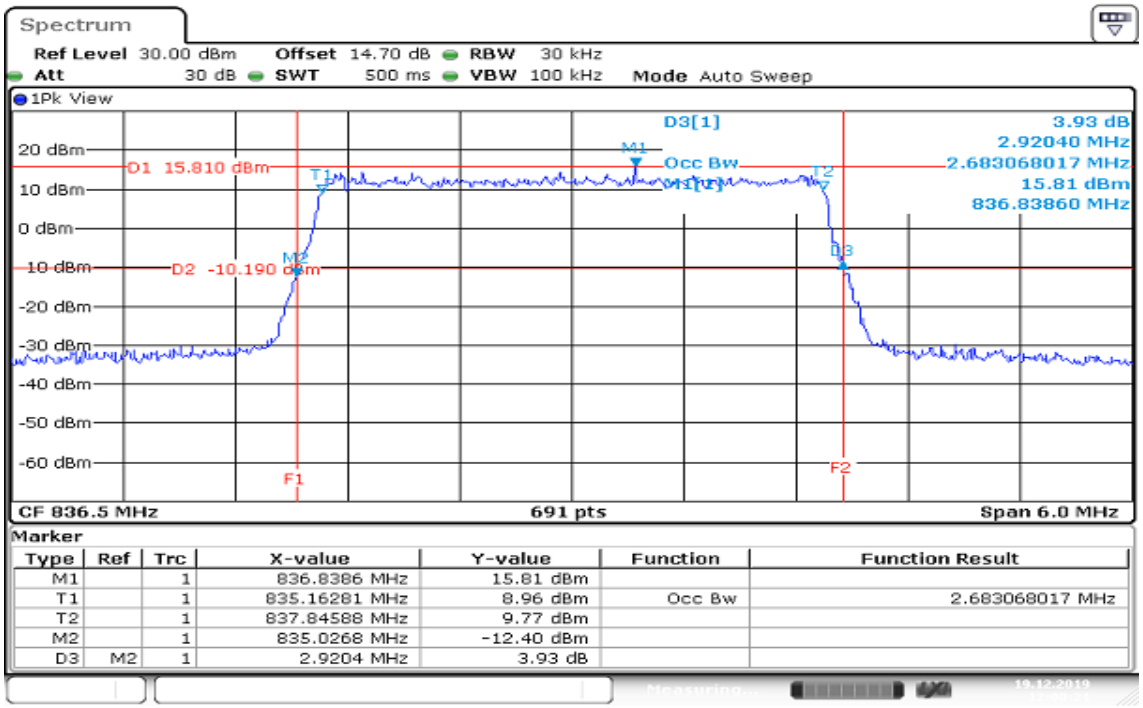
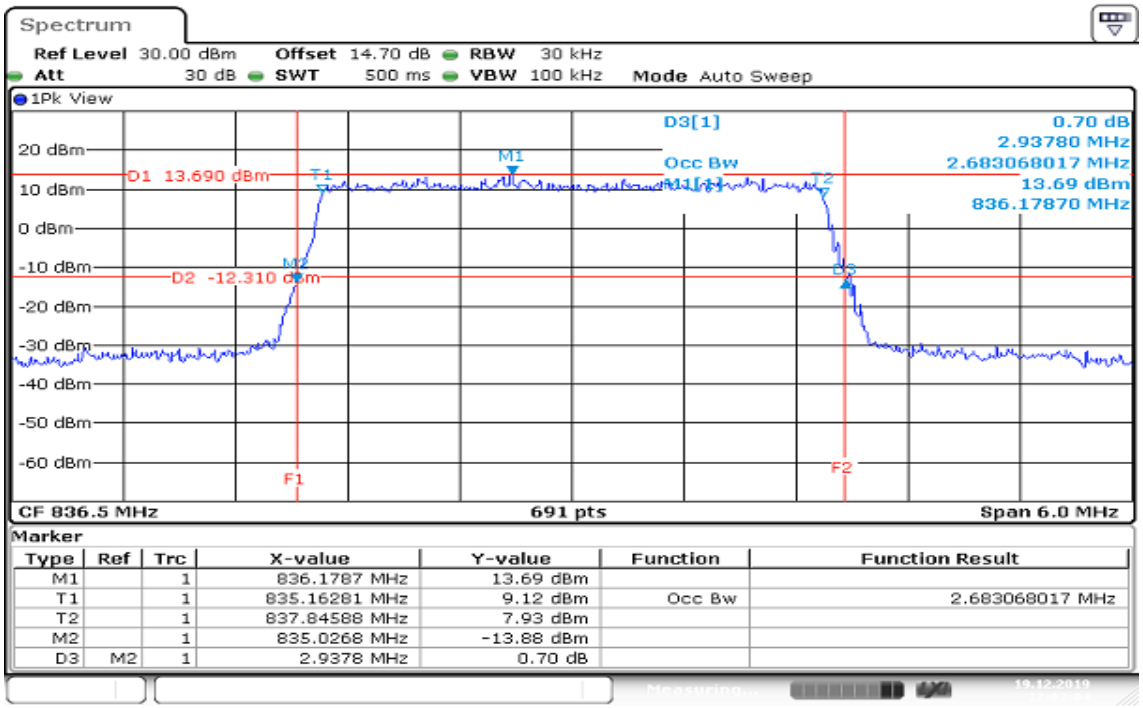
BW: 3MHz / QPSK / RB =15, RB Offset = 0
CH Mid



Date: 19.DEC.2019 12:00:21

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



Date: 19.DEC.2019 12:02:04

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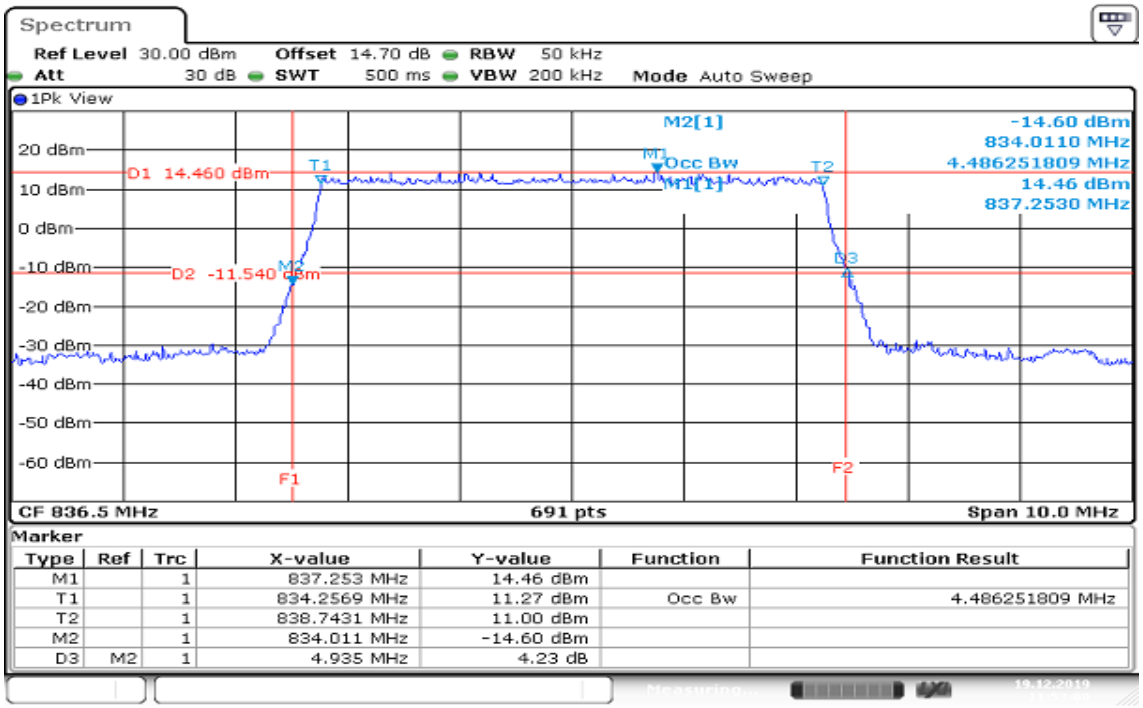
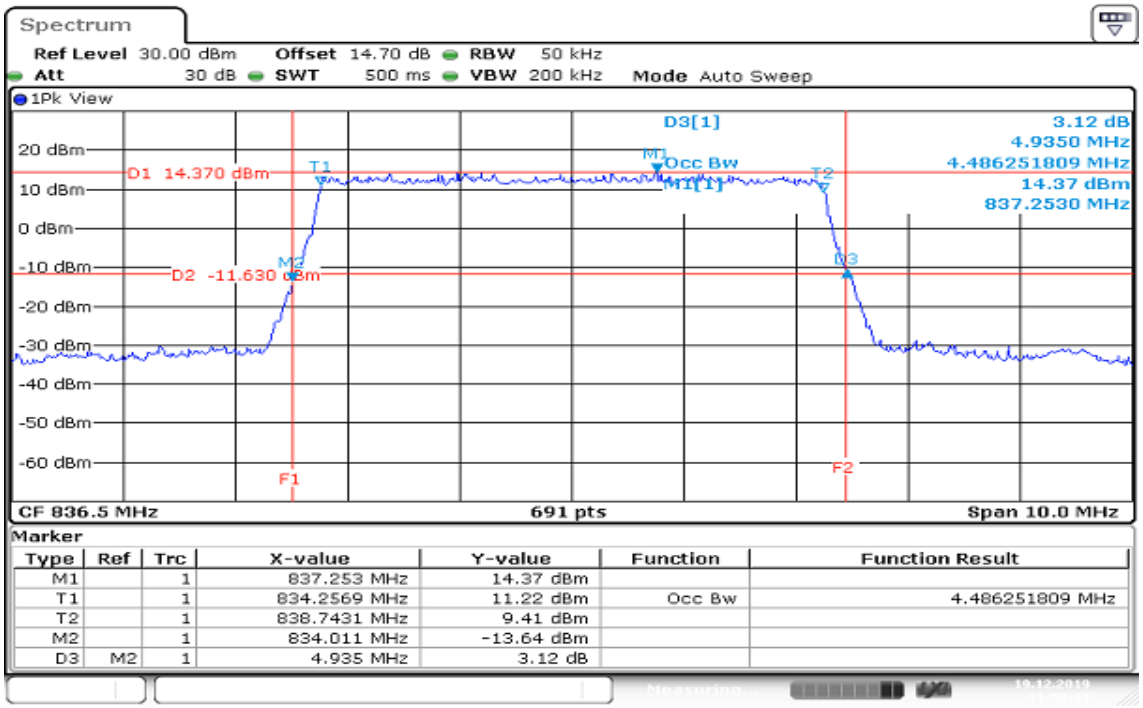
BW: 5MHz / QPSK / RB =25, RB Offset = 0
CH Mid



Marker						
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	837.253 MHz	14.46 dBm		
T1		1	834.2569 MHz	11.27 dBm	Occ Bw	4.486251809 MHz
T2		1	838.7431 MHz	11.00 dBm		
M2		1	834.011 MHz	-14.60 dBm		
D3	M2	1	4.935 MHz	4.23 dB		

Date: 19.DEC.2019 11:53:01

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



Marker						
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	837.253 MHz	14.37 dBm		
T1		1	834.2569 MHz	11.22 dBm	Occ Bw	4.486251809 MHz
T2		1	838.7431 MHz	9.41 dBm		
M2		1	834.011 MHz	-13.64 dBm		
D3	M2	1	4.935 MHz	3.12 dB		

Date: 19.DEC.2019 11:50:41

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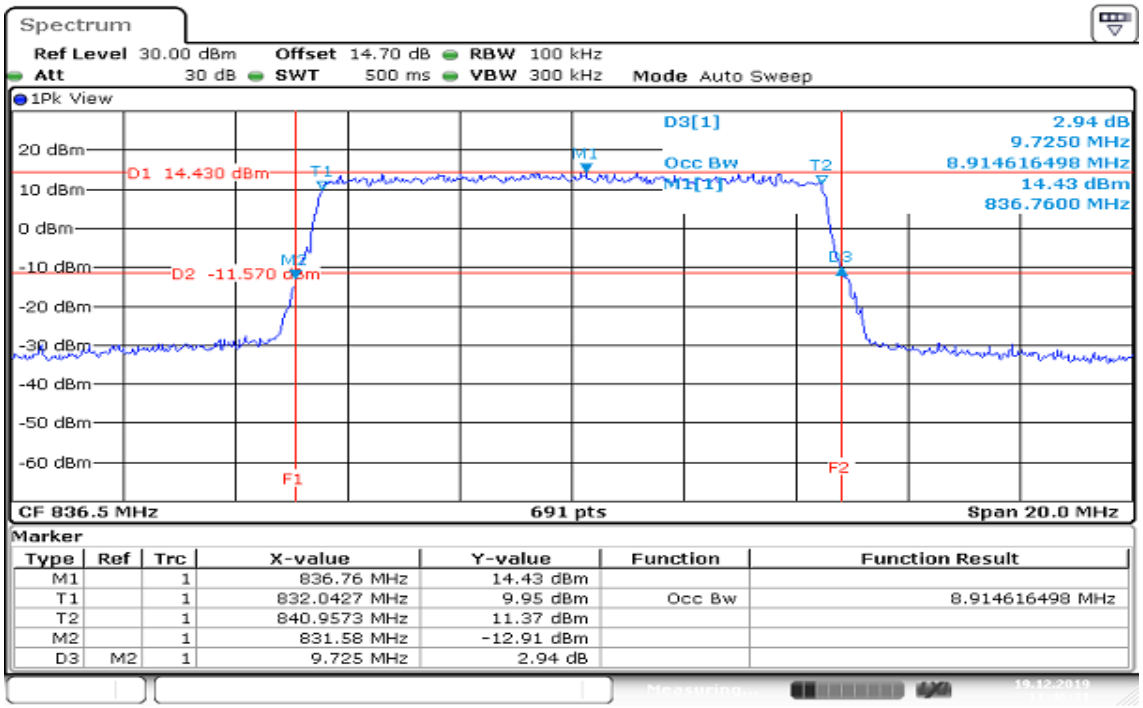
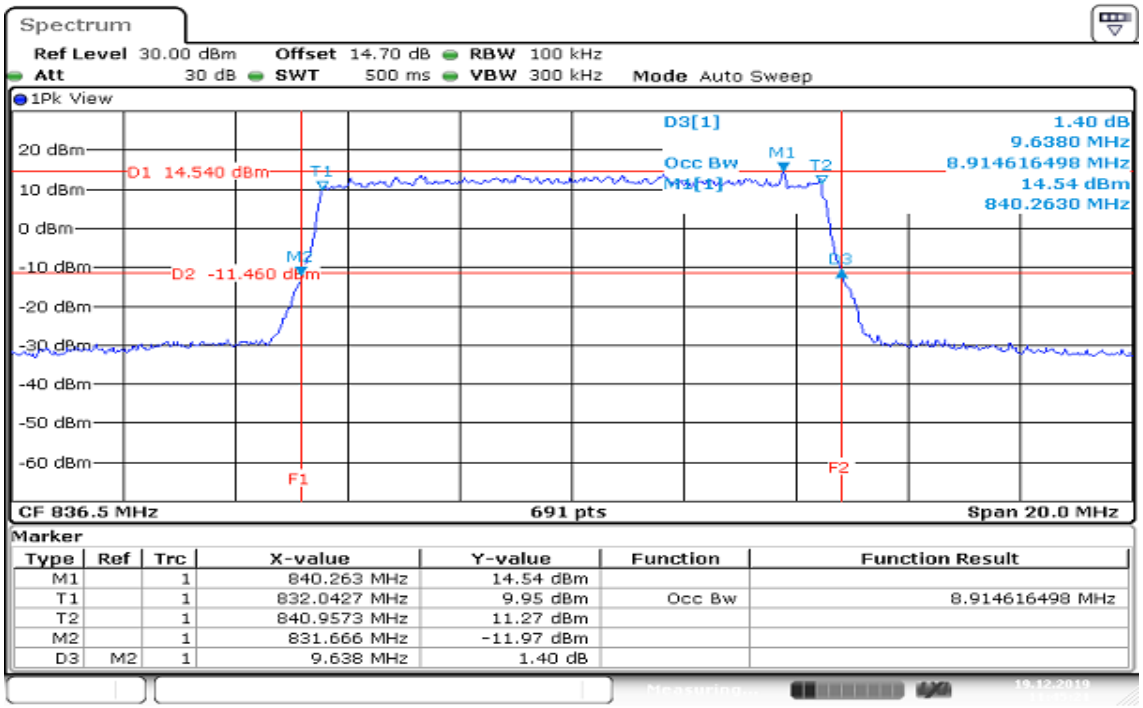
BW: 10MHz / QPSK / RB =50, RB Offset = 0
CH Mid



Date: 19.DEC.2019 11:46:31

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



Date: 19.DEC.2019 11:45:22

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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.

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Test Results

LTE Band 2

CHANNEL BANDWIDTH: 1.4MHz / QPSK / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
18900	1880.00	4.64

CHANNEL BANDWIDTH: 1.4MHz / 16QAM / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
18900	1880.00	5.65

CHANNEL BANDWIDTH: 3MHz / QPSK / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
18900	1880.00	4.72

CHANNEL BANDWIDTH: 3MHz / 16QAM / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
18900	1880.00	5.65

CHANNEL BANDWIDTH: 5MHz / QPSK / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
18900	1880.00	4.81

CHANNEL BANDWIDTH: 5MHz / 16QAM / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
18900	1880.00	5.80

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

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CHANNEL BANDWIDTH: 10MHz / QPSK / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
18900	1880.00	4.49

CHANNEL BANDWIDTH: 10MHz / 16QAM / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
18900	1880.00	5.30

CHANNEL BANDWIDTH: 15MHz / QPSK / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
18900	1880.00	4.55

CHANNEL BANDWIDTH: 15MHz / 16QAM / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
18900	1880.00	5.48

CHANNEL BANDWIDTH: 20MHz / QPSK / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
18900	1880.00	4.72

CHANNEL BANDWIDTH: 20MHz / 16QAM / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
18900	1880.00	5.33

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

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CHANNEL BANDWIDTH: 1.4MHz / QPSK / Full RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
18900	1880.00	5.22

CHANNEL BANDWIDTH: 1.4MHz / 16QAM / Full RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
18900	1880.00	6.03

CHANNEL BANDWIDTH: 3MHz / QPSK / Full RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
18900	1880.00	5.07

CHANNEL BANDWIDTH: 3MHz / 16QAM / Full RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
18900	1880.00	6.00

CHANNEL BANDWIDTH: 5MHz / QPSK / Full RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
18900	1880.00	4.99

CHANNEL BANDWIDTH: 5MHz / 16QAM / Full RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
18900	1880.00	5.94

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

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CHANNEL BANDWIDTH: 10MHz / QPSK / Full RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
18900	1880.00	4.90

CHANNEL BANDWIDTH: 10MHz / 16QAM / Full RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
18900	1880.00	5.86

CHANNEL BANDWIDTH: 15MHz / QPSK / Full RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
18900	1880.00	5.01

CHANNEL BANDWIDTH: 15MHz / 16QAM / Full RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
18900	1880.00	5.94

CHANNEL BANDWIDTH: 20MHz / QPSK / Full RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
18900	1880.00	4.72

CHANNEL BANDWIDTH: 20MHz / 16QAM / Full RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
18900	1880.00	5.88

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

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LTE Band 5

CHANNEL BANDWIDTH: 1.4MHz / QPSK / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
20525	836.5	4.26

CHANNEL BANDWIDTH: 1.4MHz / 16QAM / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
20525	836.5	5.04

CHANNEL BANDWIDTH: 3MHz / QPSK / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
20525	836.5	4.17

CHANNEL BANDWIDTH: 3MHz / 16QAM / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
20525	836.5	5.10

CHANNEL BANDWIDTH: 5MHz / QPSK / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
20525	836.5	4.41

CHANNEL BANDWIDTH: 5MHz / 16QAM / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
20525	836.5	5.39

CHANNEL BANDWIDTH: 10MHz / QPSK / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
20525	836.5	5.48

CHANNEL BANDWIDTH: 10MHz / 16QAM / 1RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
20525	836.5	5.45

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

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CHANNEL BANDWIDTH: 1.4MHz / QPSK / Full RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
20525	836.5	4.93

CHANNEL BANDWIDTH: 1.4MHz / 16QAM / Full RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
20525	836.5	5.71

CHANNEL BANDWIDTH: 3MHz / QPSK / Full RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
20525	836.5	4.75

CHANNEL BANDWIDTH: 3MHz / 16QAM / Full RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
20525	836.5	5.77

CHANNEL BANDWIDTH: 5MHz / QPSK / Full RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
20525	836.5	4.78

CHANNEL BANDWIDTH: 5MHz / 16QAM / Full RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
20525	836.5	5.86

CHANNEL BANDWIDTH: 10MHz / QPSK / Full RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
20525	836.5	4.84

CHANNEL BANDWIDTH: 10MHz / 16QAM / Full RB

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
20525	836.5	5.83

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

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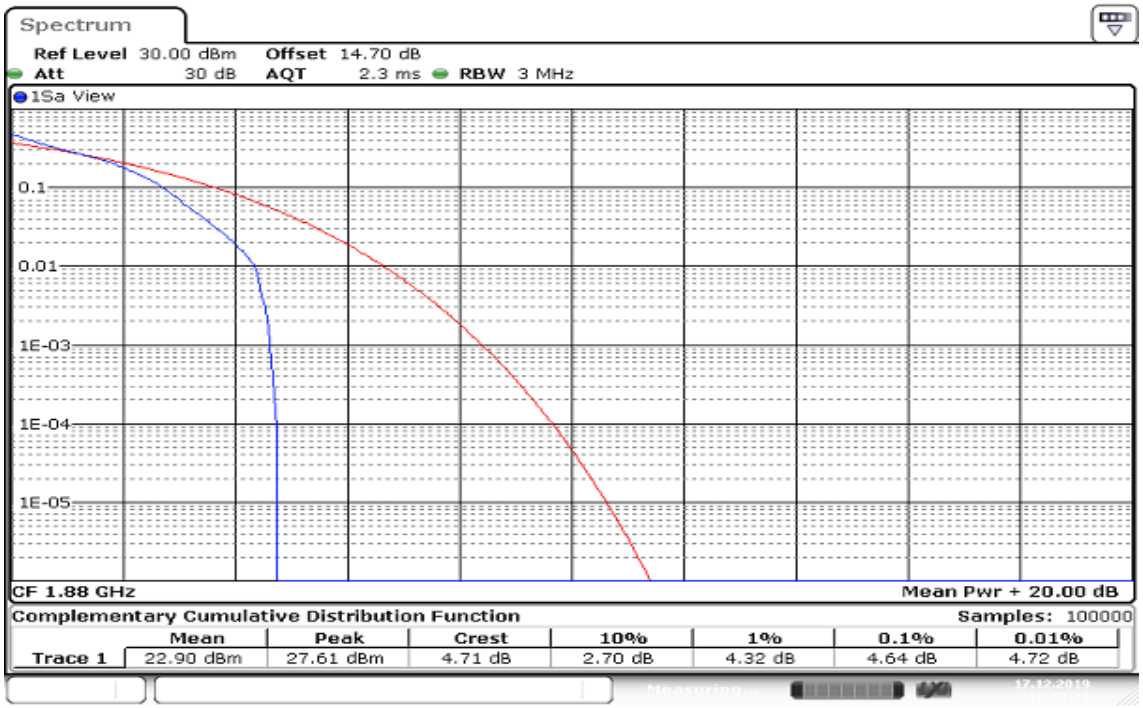
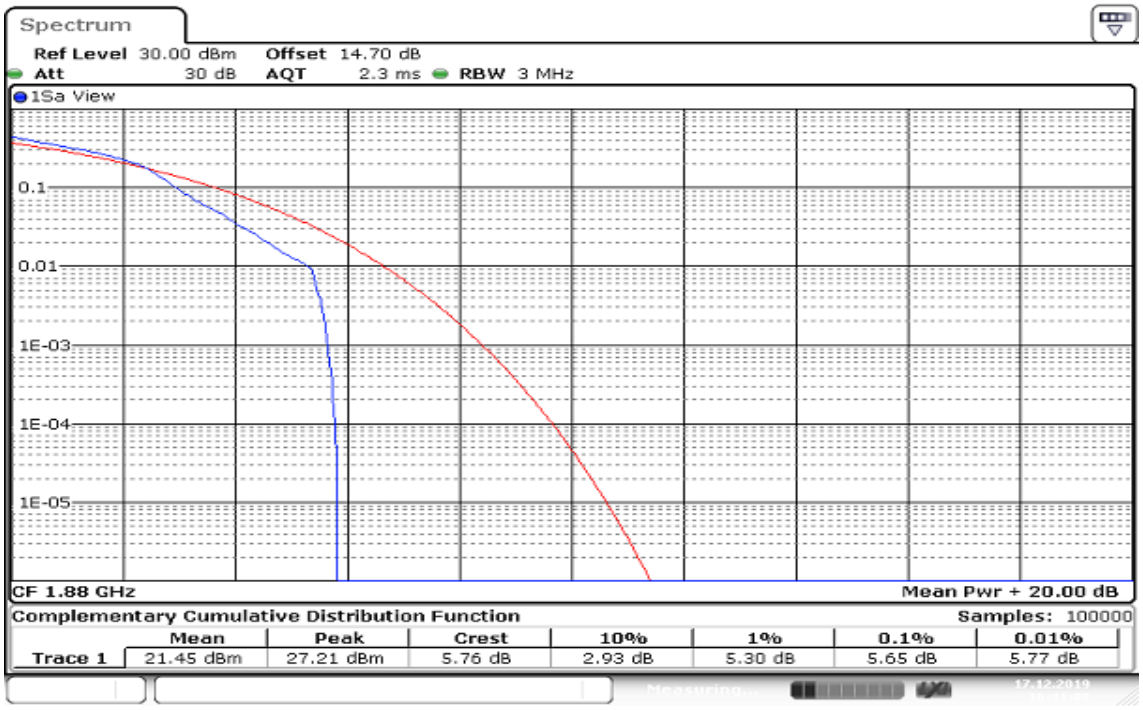
LTE Band 2

BW: 1.4MHz / QPSK / RB =1, RB Offset = 0
CH Mid



Date: 17.DEC.2019 16:43:22

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



Date: 17.DEC.2019 16:41:09

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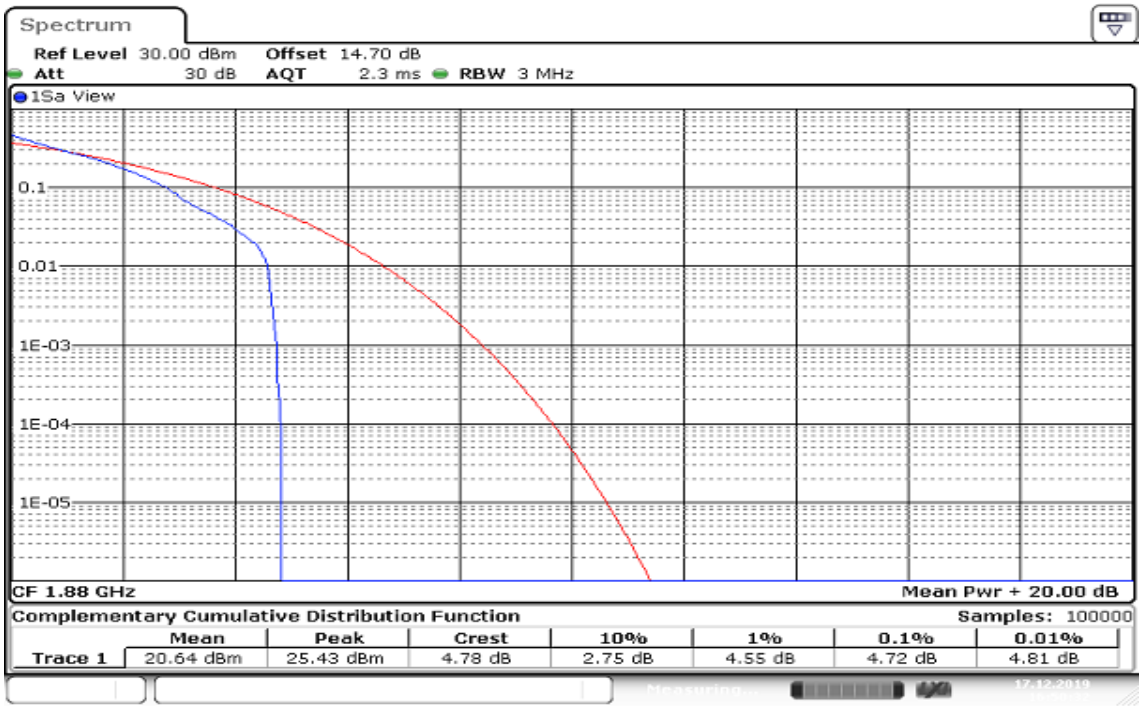
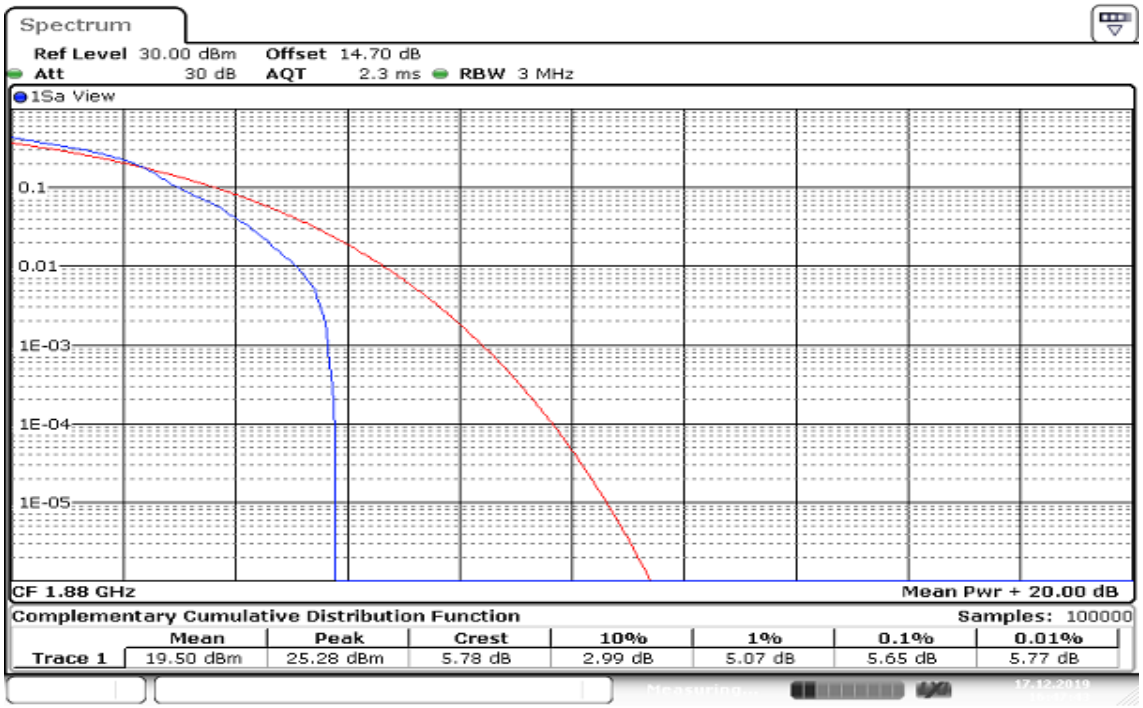
BW: 3MHz / QPSK / RB =1, RB Offset = 0
CH Mid



Date: 17.DEC.2019 16:50:32

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



Date: 17.DEC.2019 16:47:44

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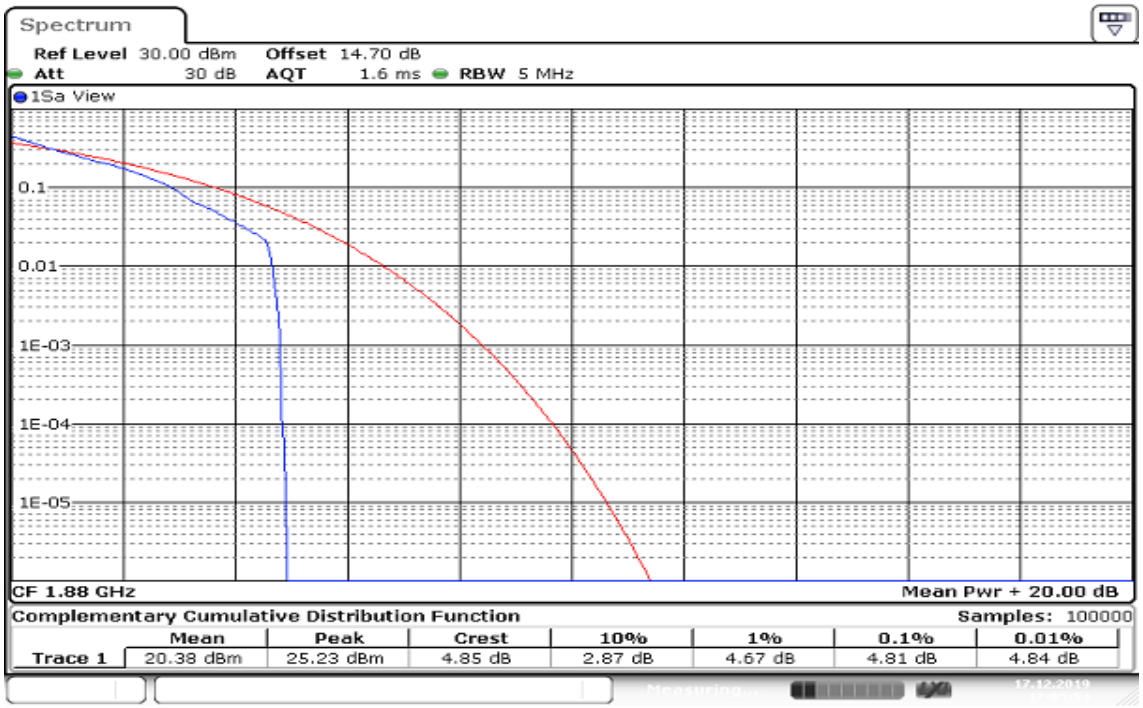
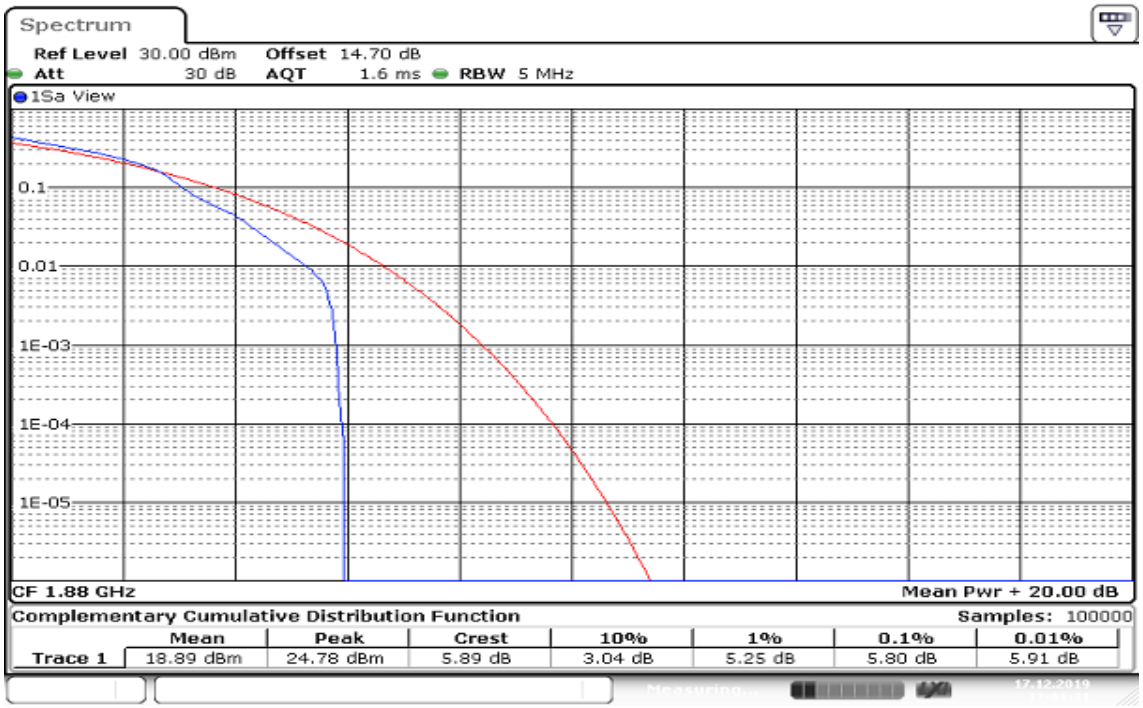
BW: 5MHz / QPSK / RB =1, RB Offset = 0
CH Mid



Date: 17.DEC.2019 17:05:55

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



Date: 17.DEC.2019 17:01:32

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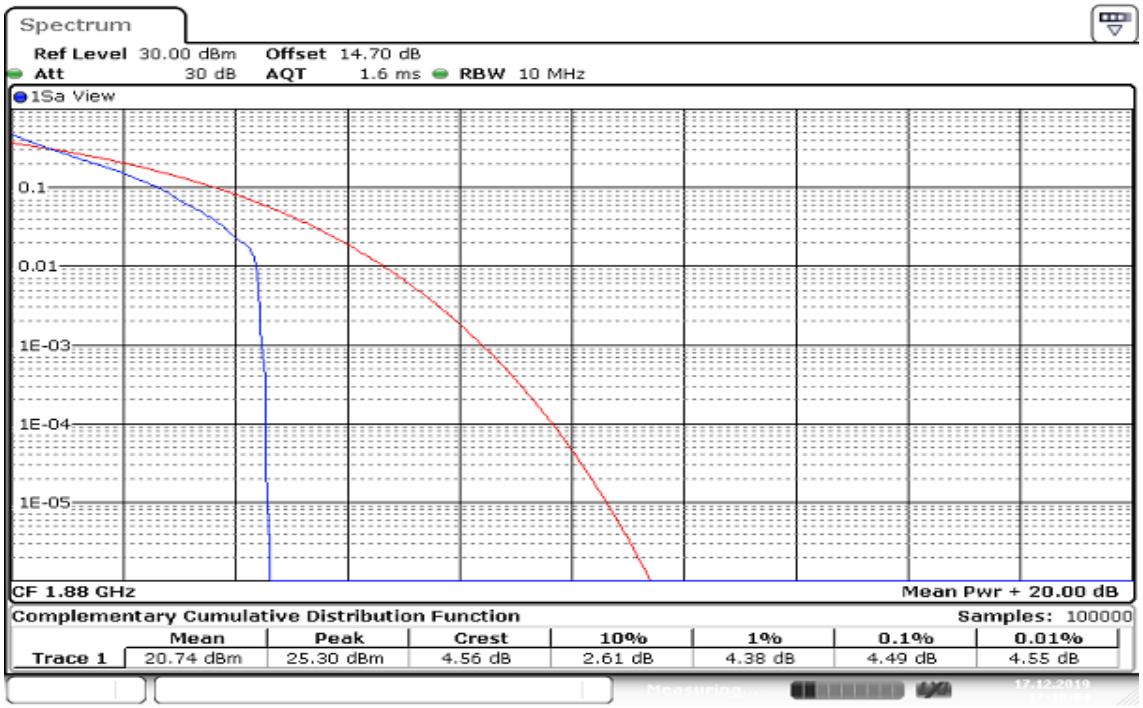
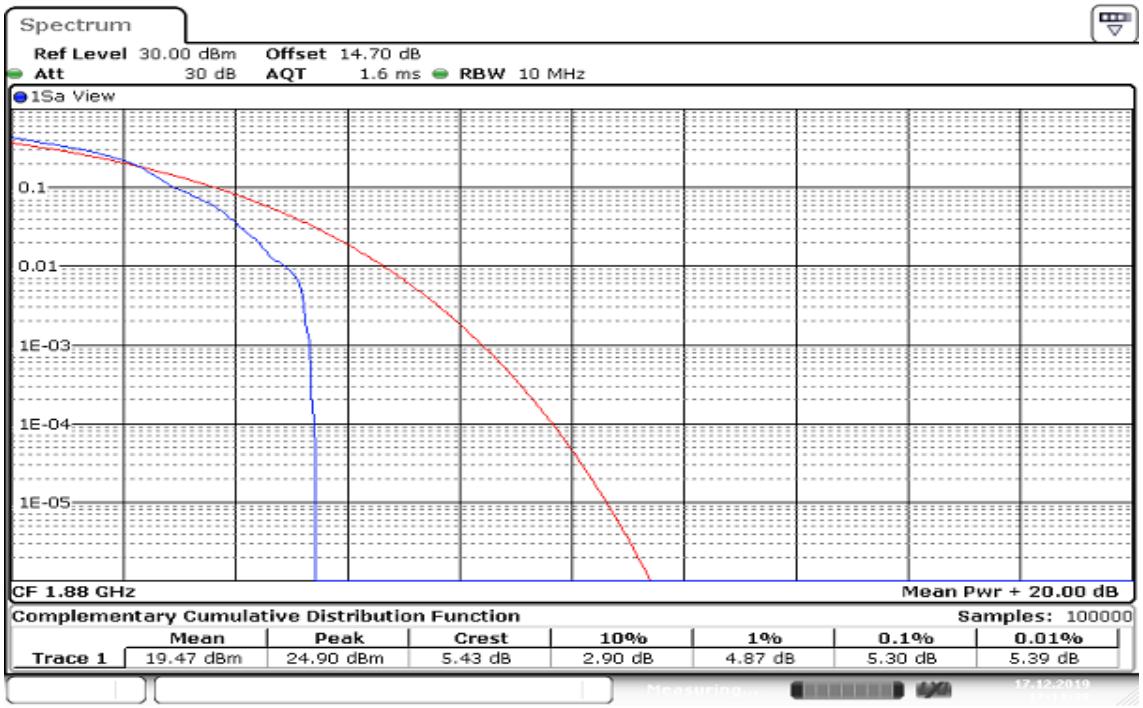
BW: 10MHz / QPSK /RB =1, RB Offset = 0
CH Mid



Date: 17.DEC.2019 17:10:05

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



Date: 17.DEC.2019 17:11:39

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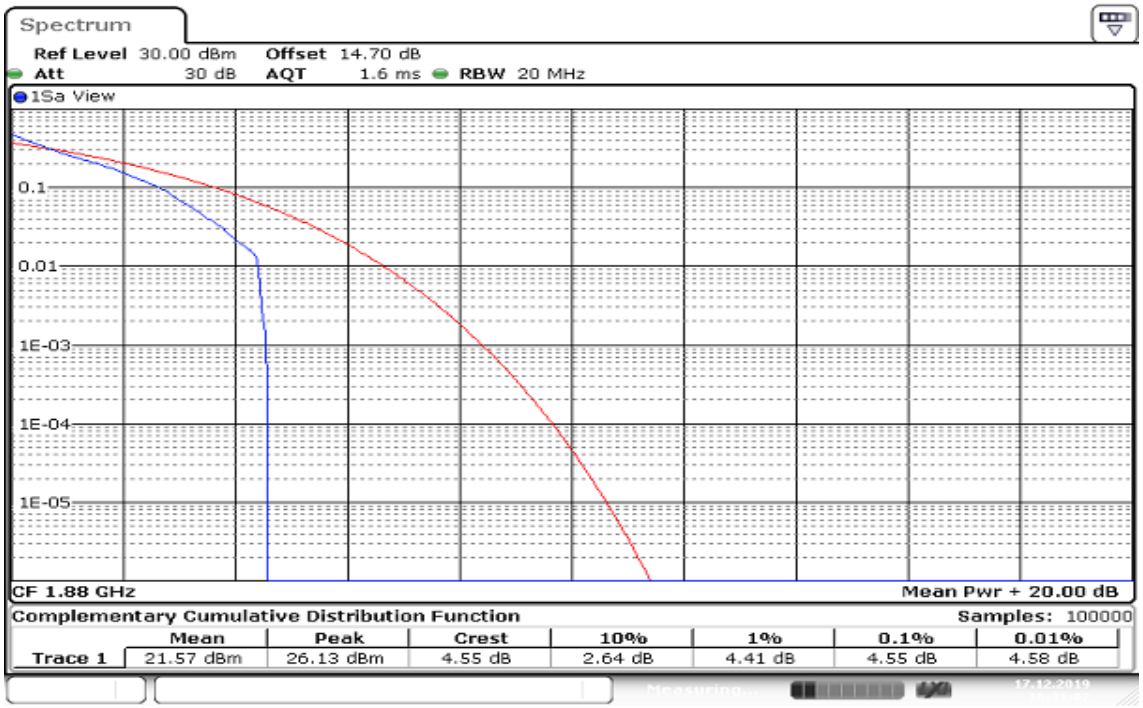
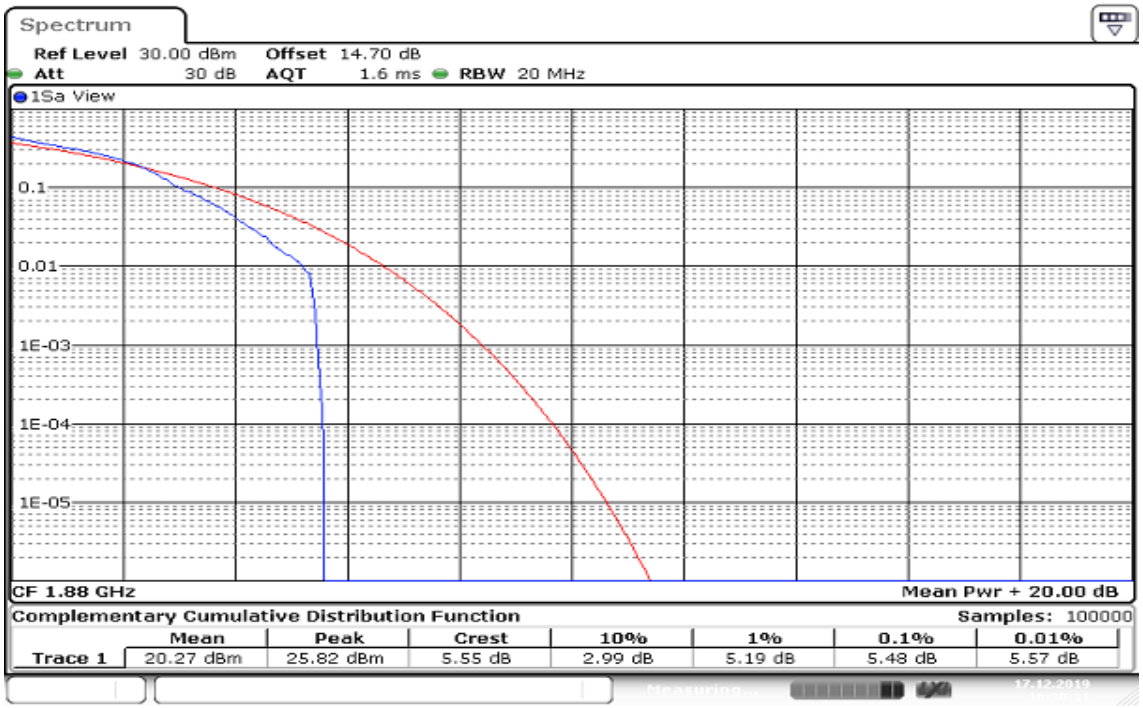
BW: 15MHz / QPSK /RB =1, RB Offset = 0
CH Mid



Date: 17.DEC.2019 16:31:03

BW: 15MHz / 16QAM /RB =1, RB Offset = 0
CH Mid



Date: 17.DEC.2019 16:30:12

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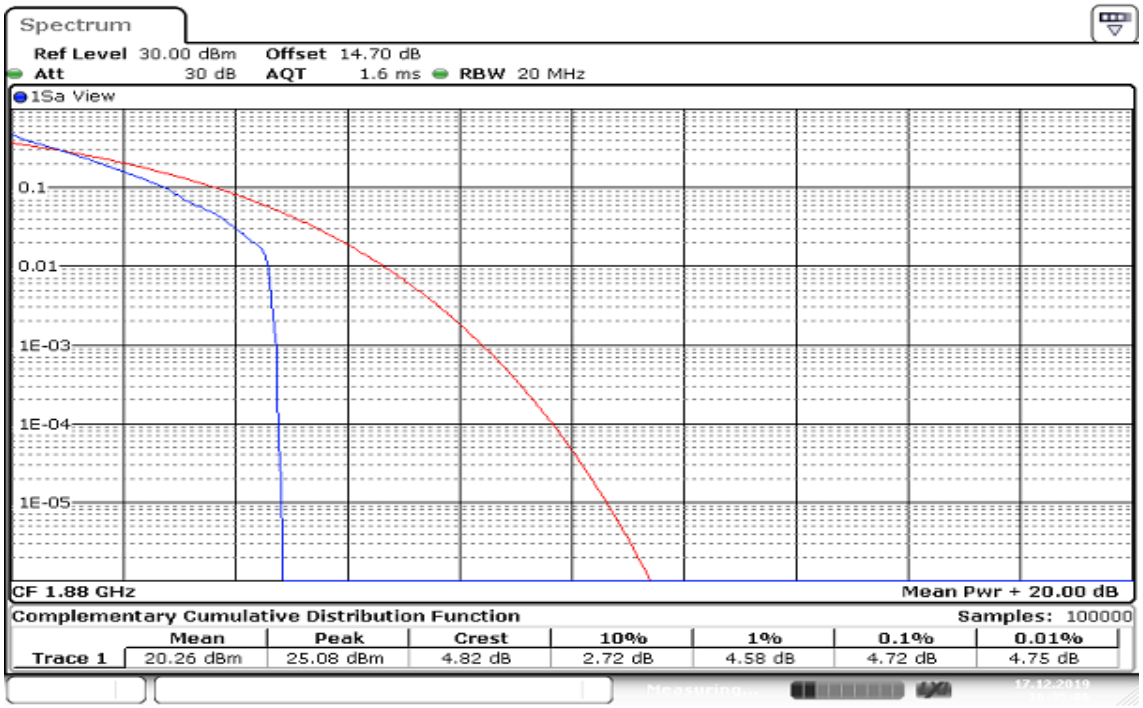
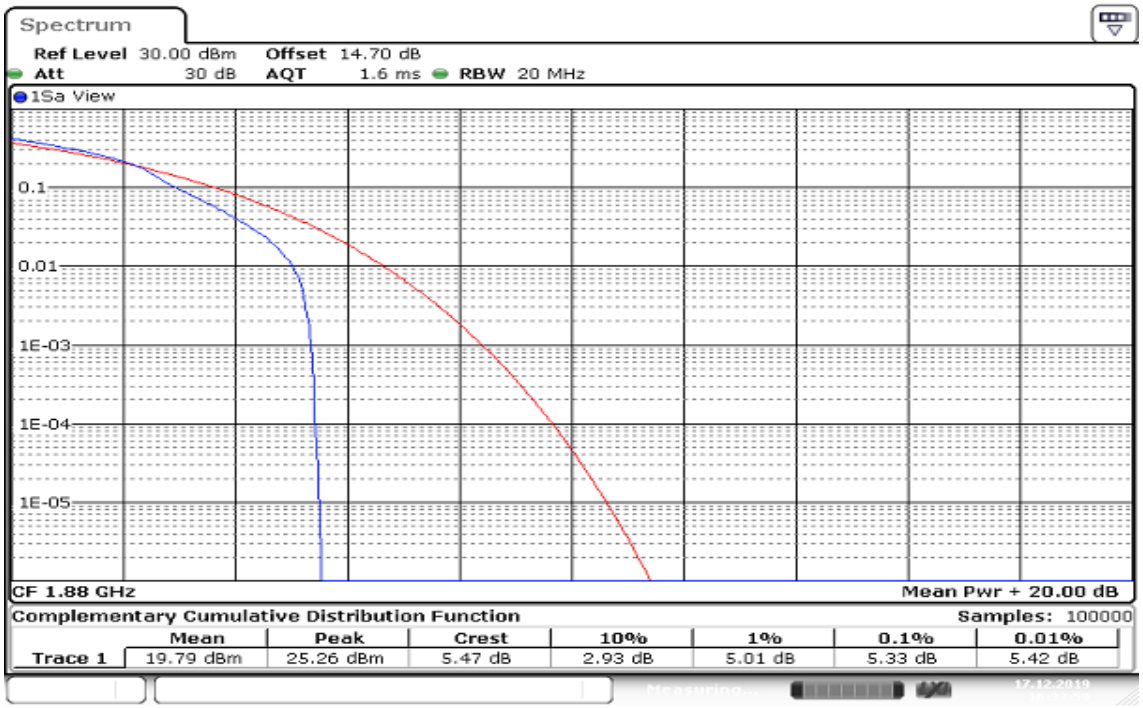
BW: 20MHz / QPSK / RB =1, RB Offset = 0
CH Mid



Date: 17.DEC.2019 16:35:07

BW: 20MHz / 16QAM / RB =1, RB Offset = 0
CH Mid



Date: 17.DEC.2019 16:34:00

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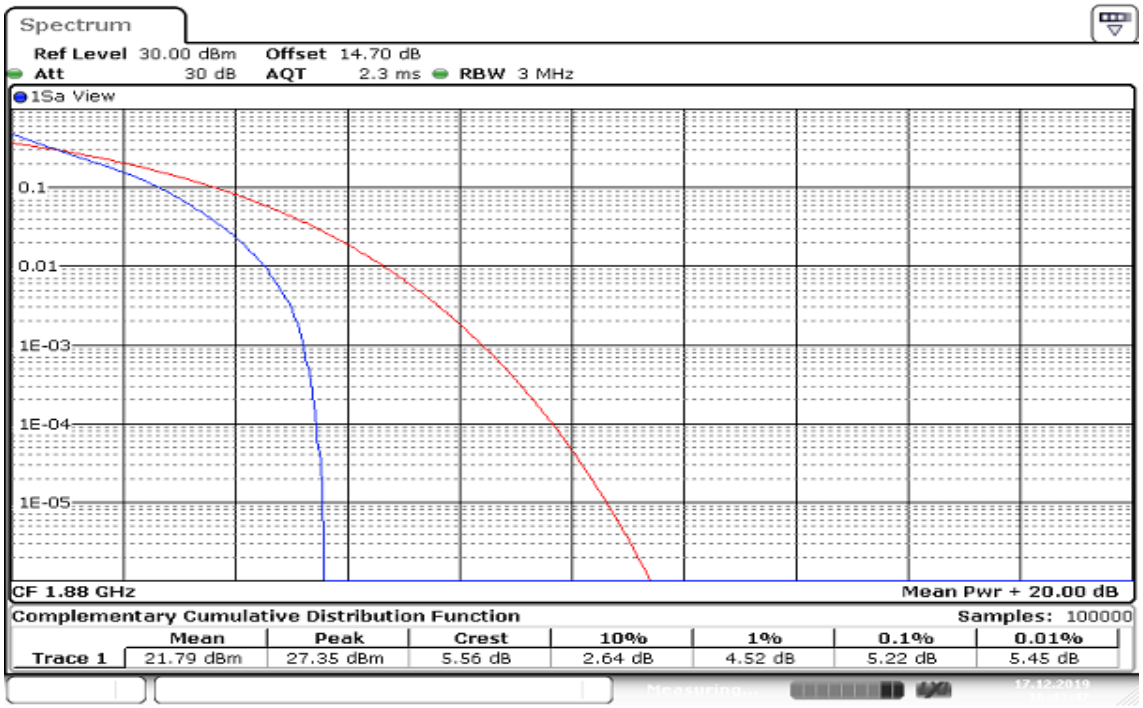
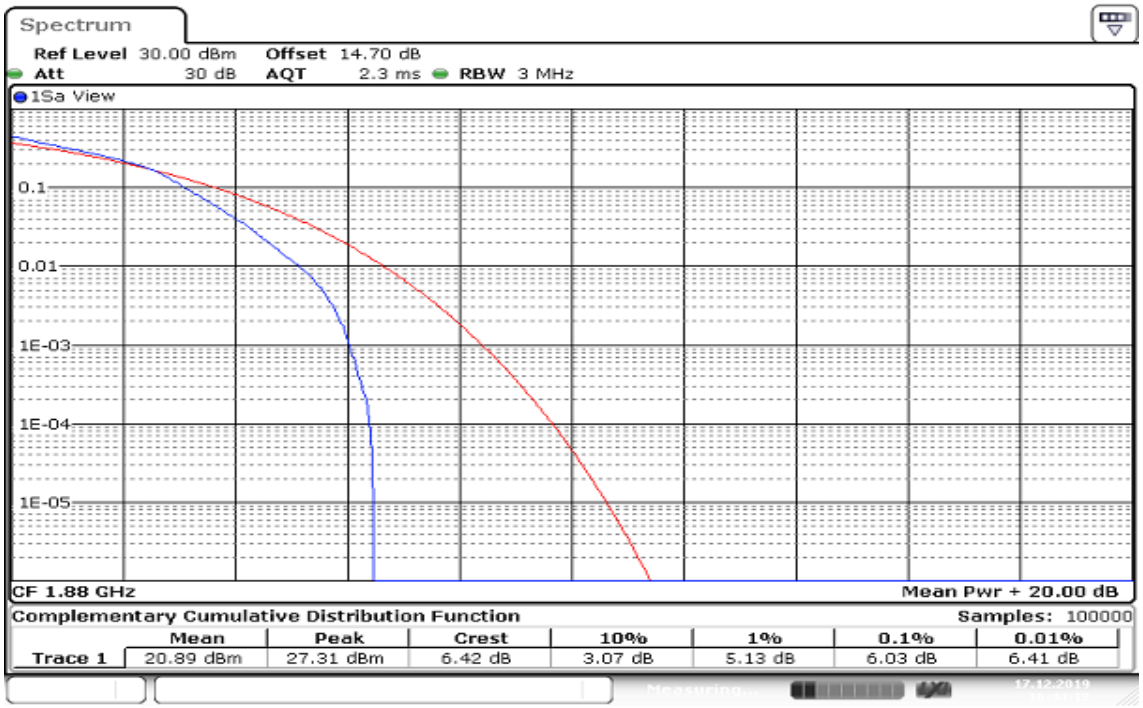
BW: 1.4MHz / QPSK / Full RB, RB Offset = 0
CH Mid



Date: 17.DEC.2019 16:43:48

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



Date: 17.DEC.2019 16:44:13

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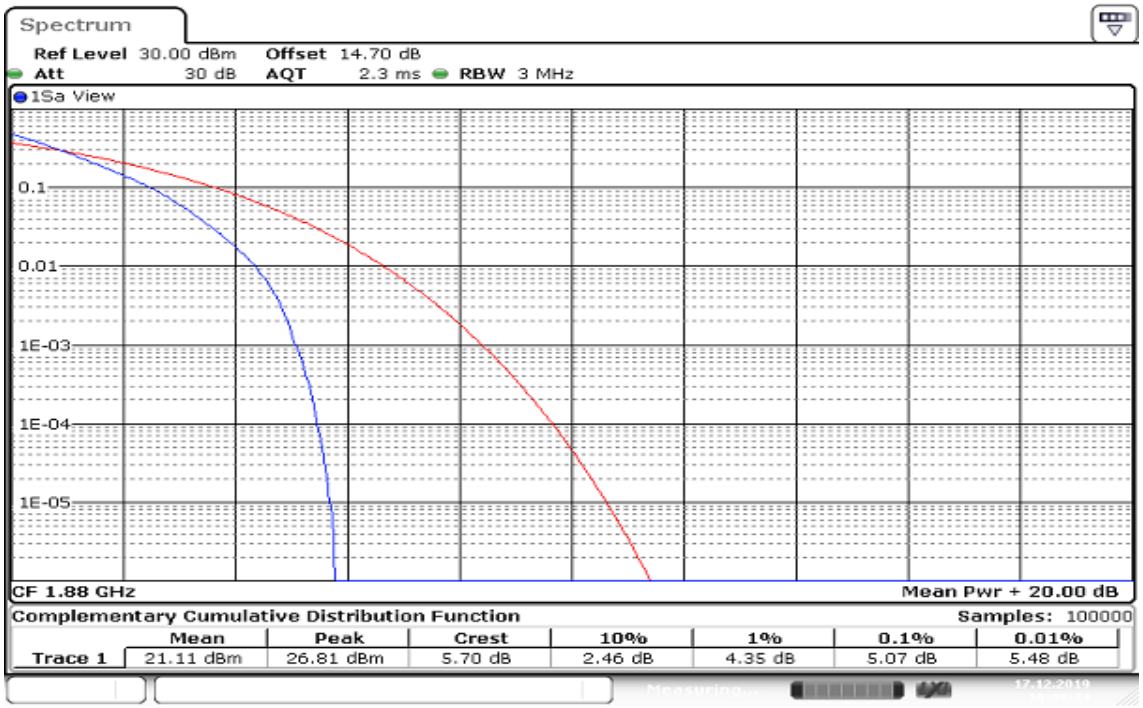
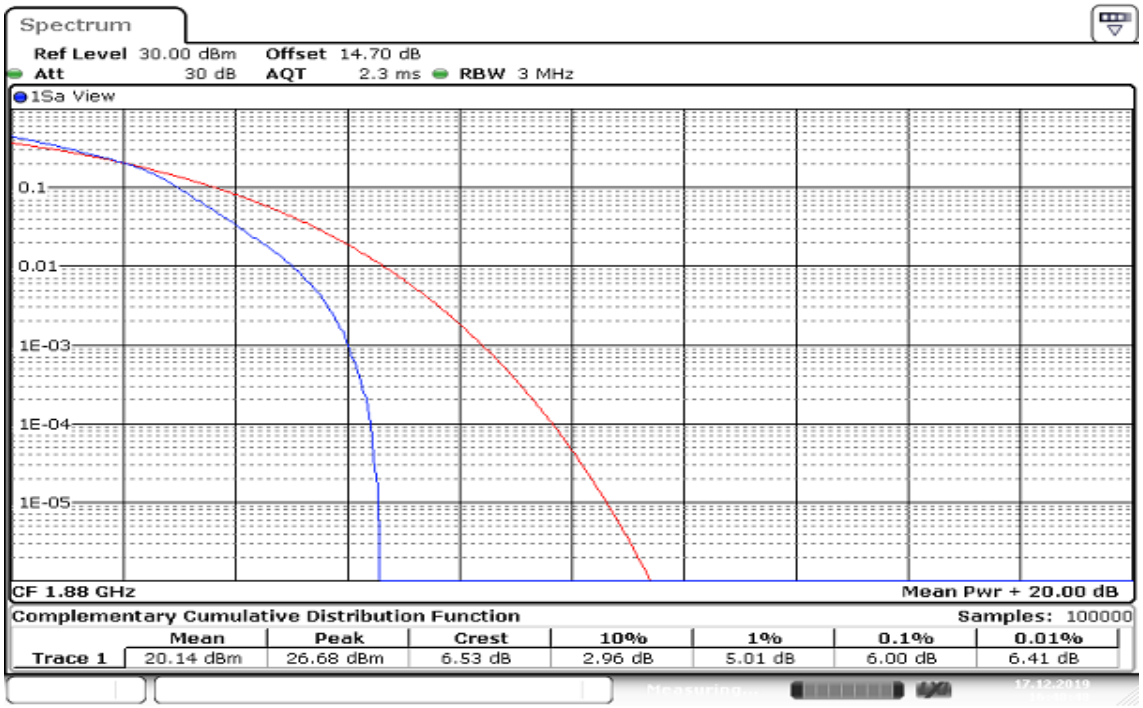
BW: 3MHz / QPSK / Full RB, RB Offset = 0
CH Mid



Date: 17.DEC.2019 16:49:34

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



Date: 17.DEC.2019 16:48:48

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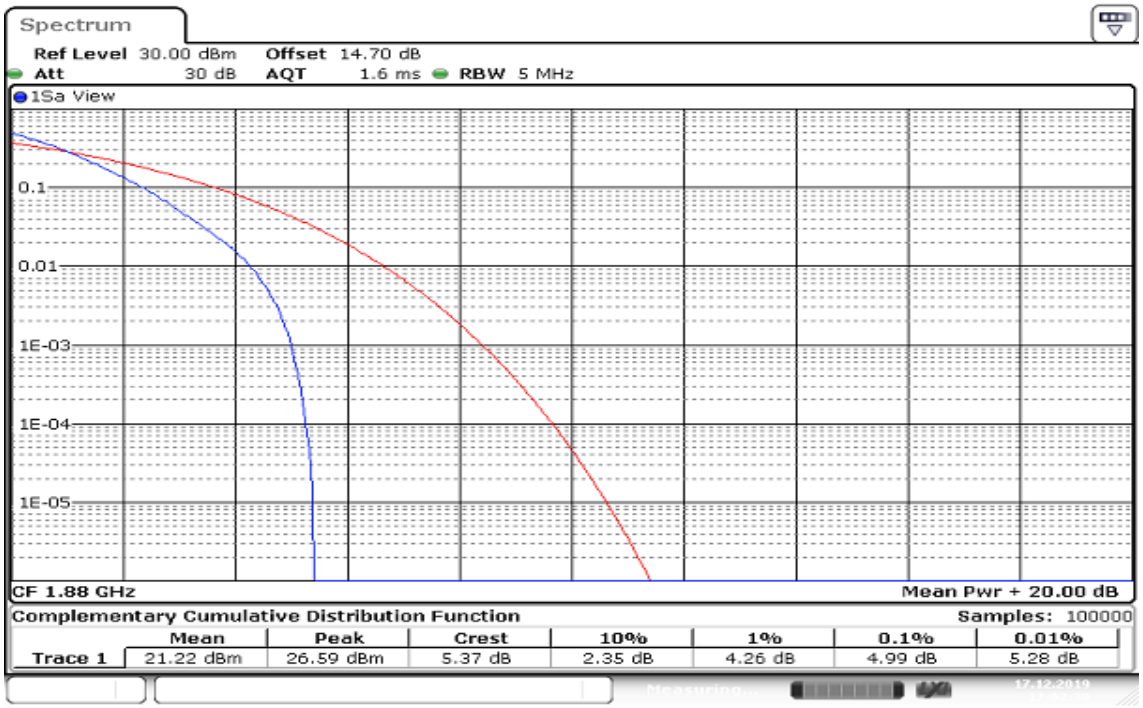
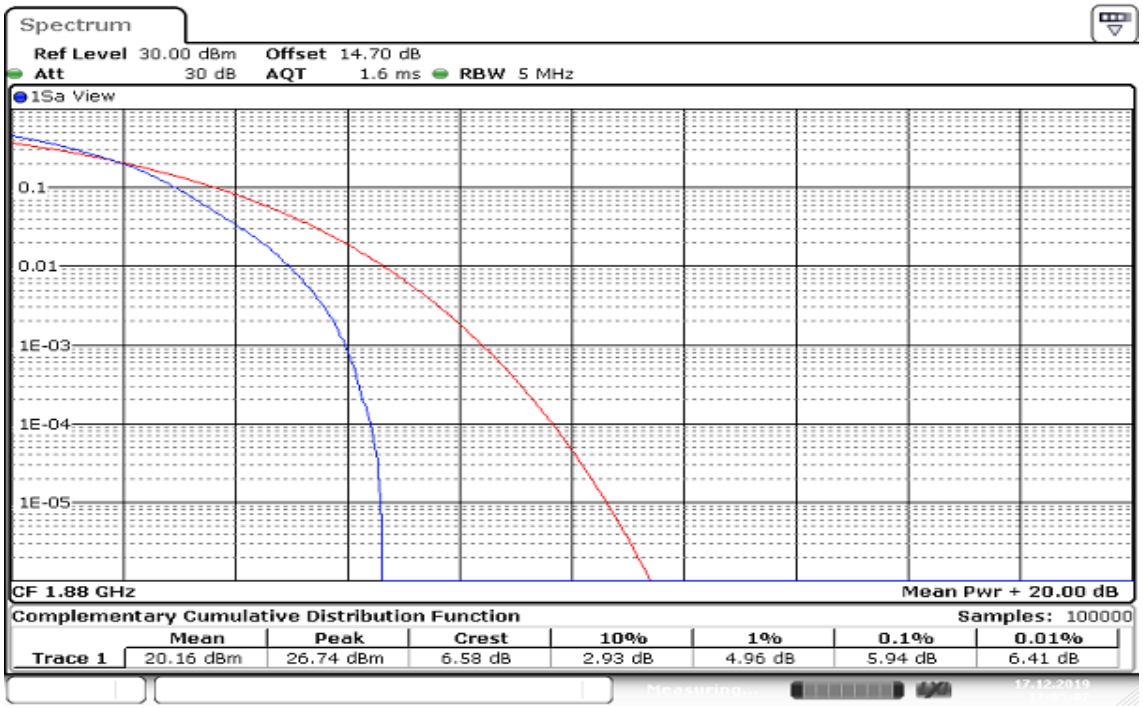
BW: 5MHz / QPSK / Full RB, RB Offset = 0
CH Mid



Date: 17.DEC.2019 17:02:31

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



Date: 17.DEC.2019 17:05:08

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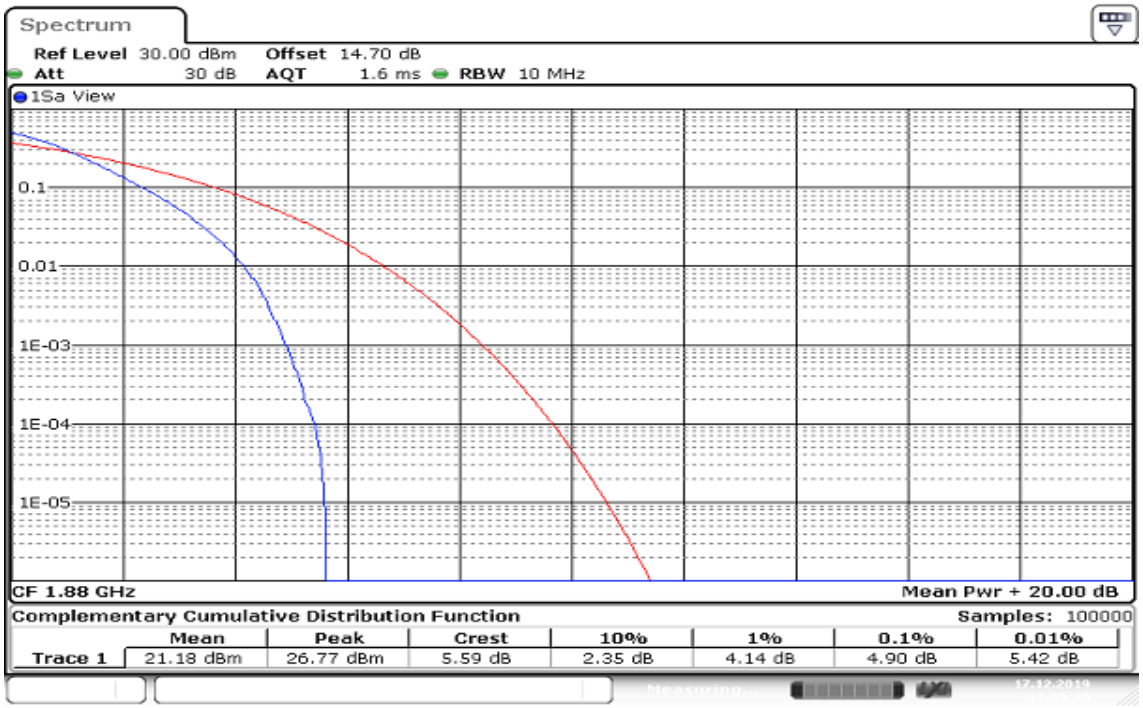
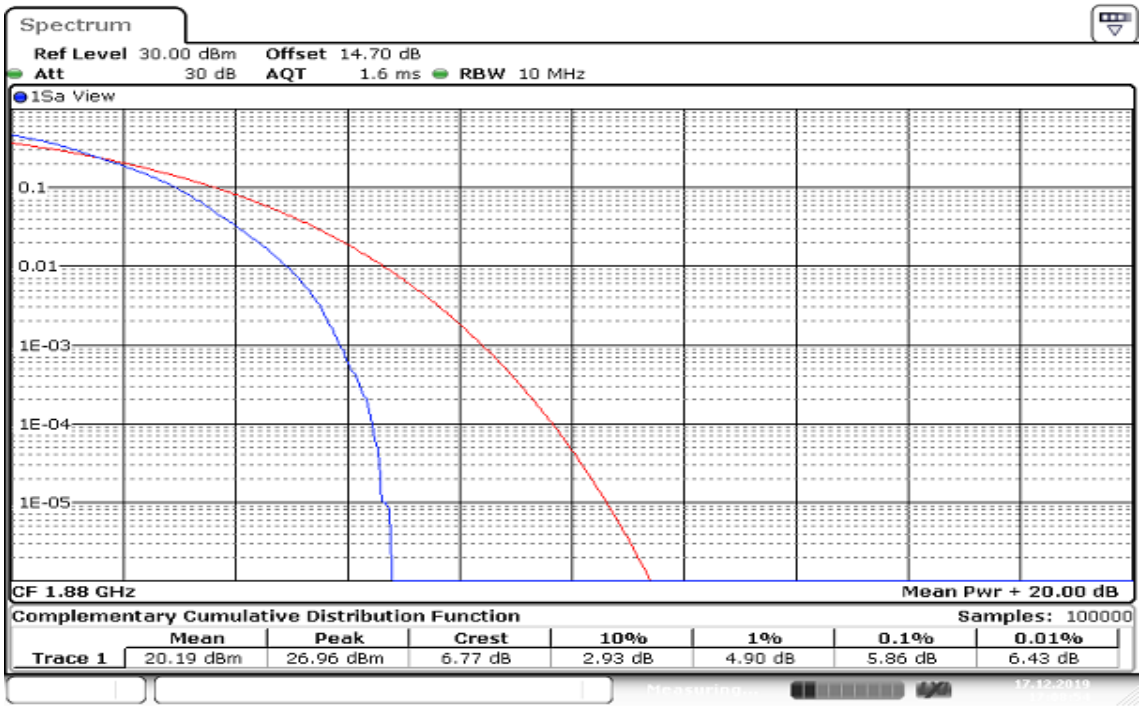
BW: 10MHz / QPSK / Full RB, RB Offset = 0
CH Mid



Date: 17.DEC.2019 17:09:35

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



Date: 17.DEC.2019 17:08:55

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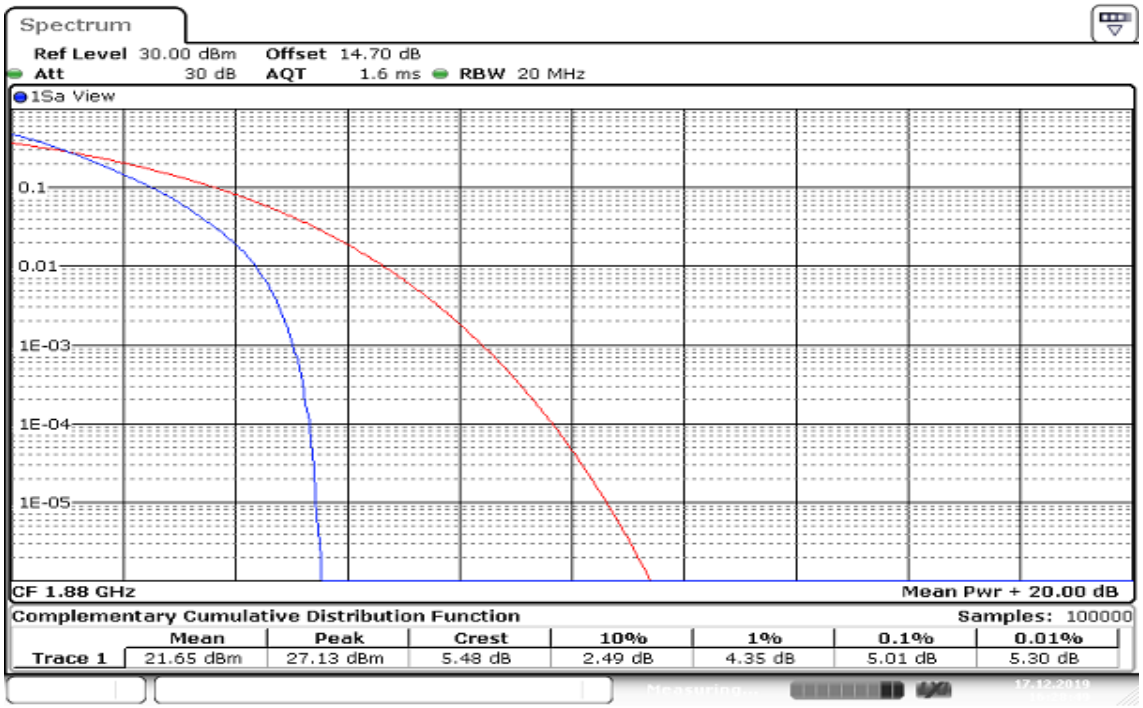
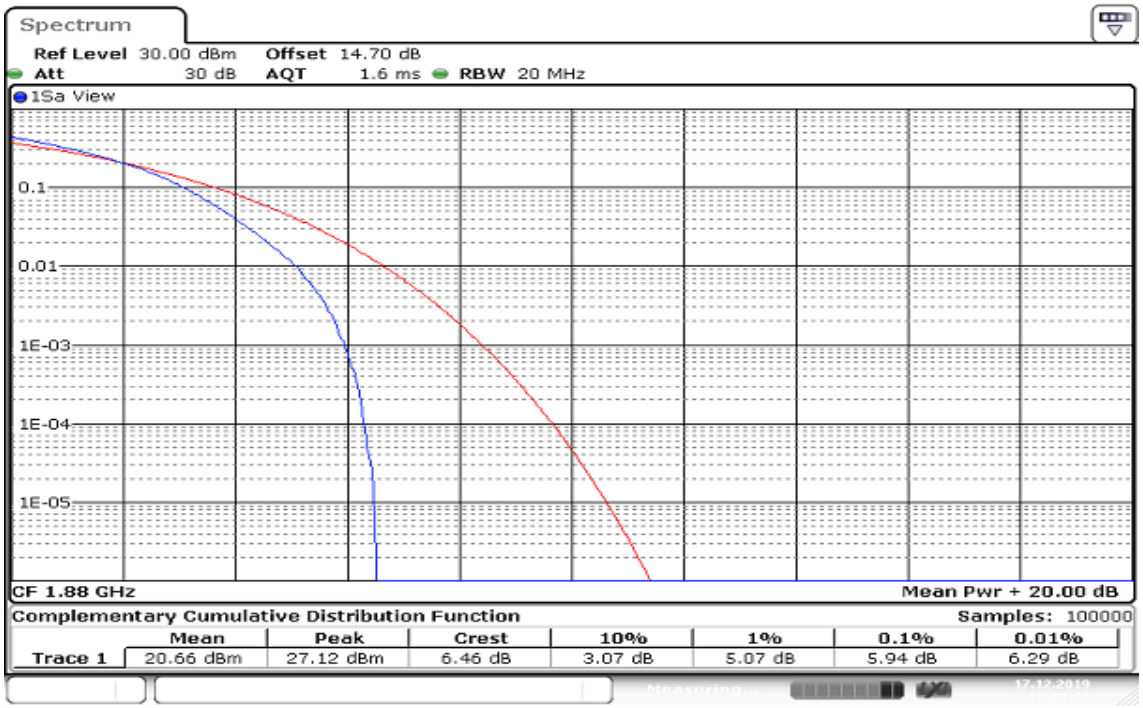
BW: 15MHz / QPSK / Full RB, RB Offset = 0
CH Mid



Date: 17.DEC.2019 16:28:49

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



Date: 17.DEC.2019 16:29:32

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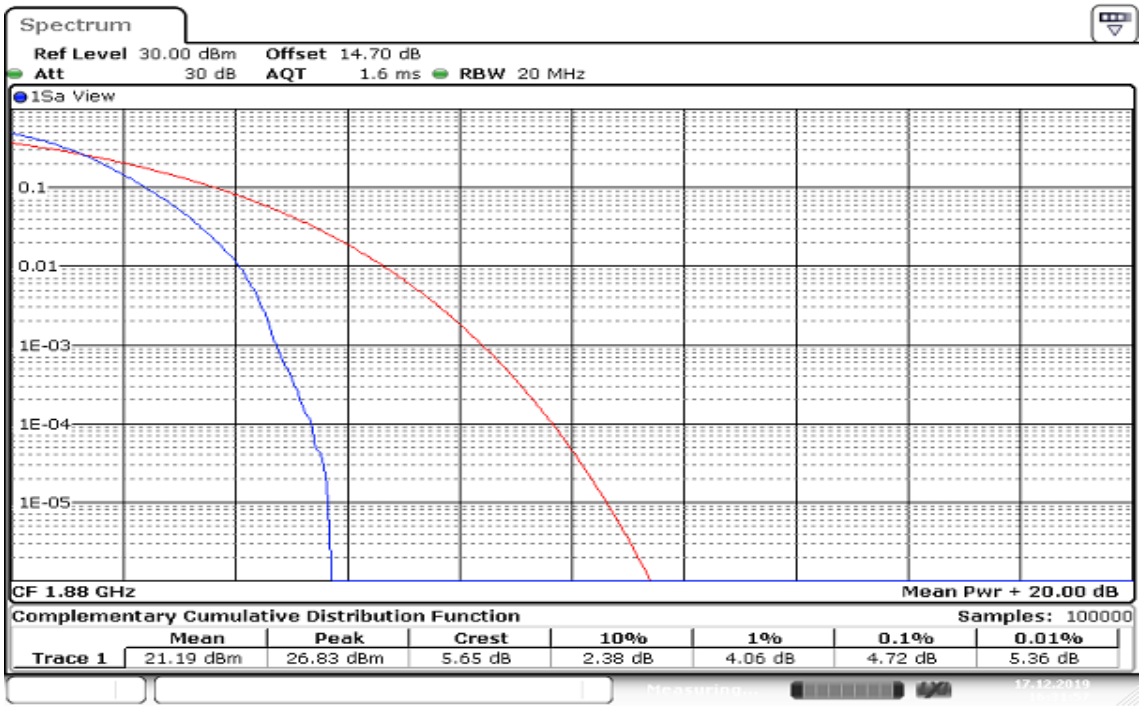
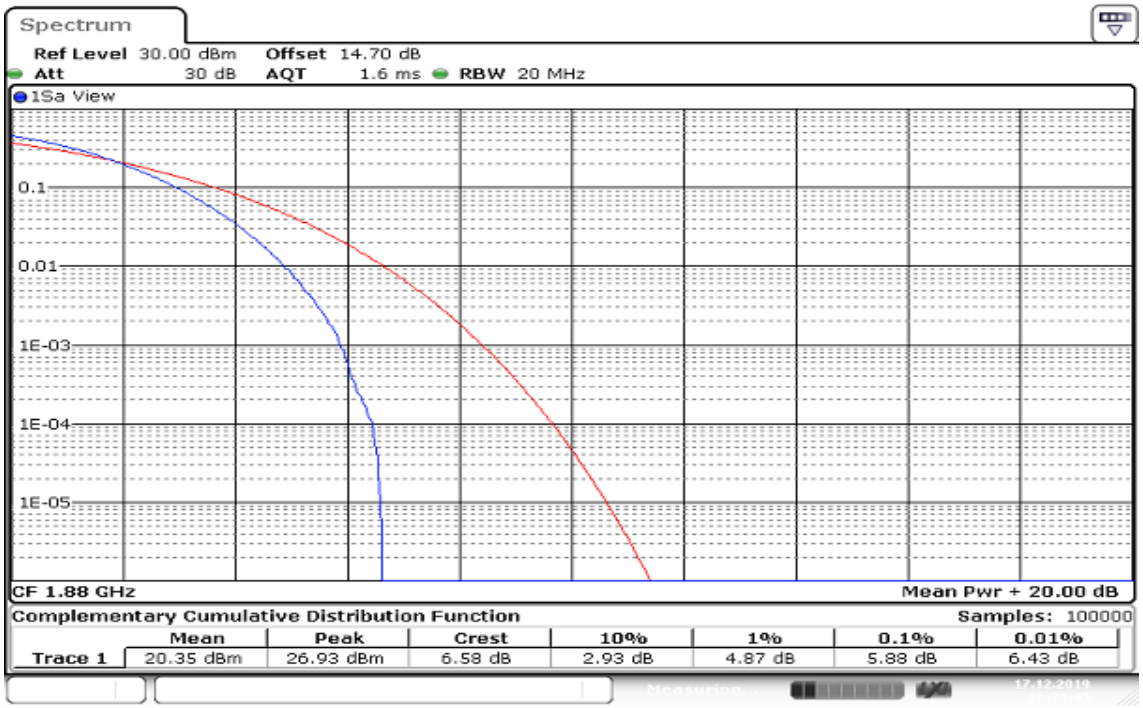
BW: 20MHz / QPSK / Full RB, RB Offset = 0
CH Mid



Date: 17.DEC.2019 16:31:58

BW: 20MHz / 16QAM / Full RB, RB Offset = 0
CH Mid



Date: 17.DEC.2019 16:32:45

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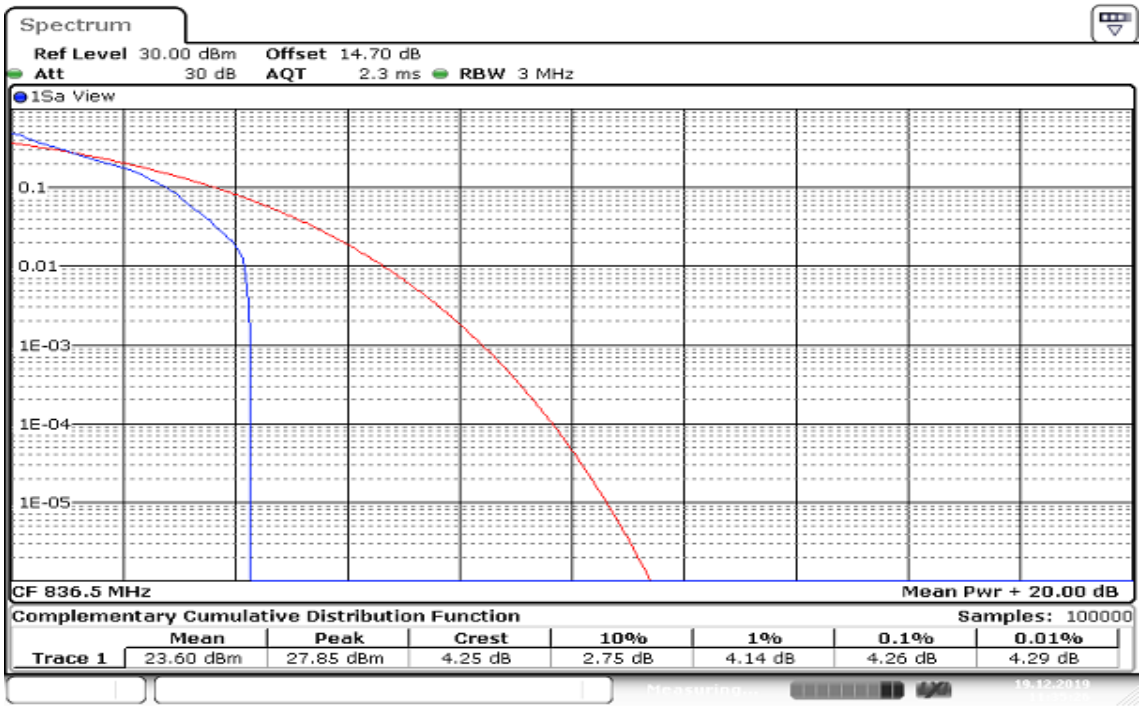
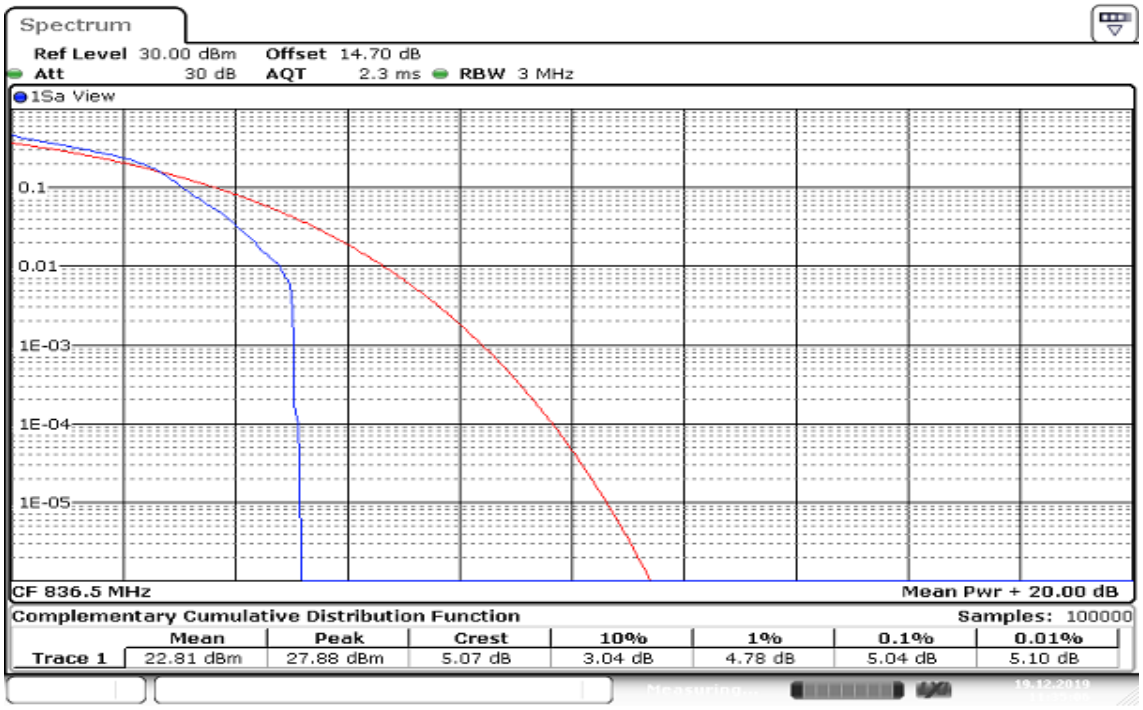
LTE Band 5

BW: 1.4MHz / QPSK / RB =1, RB Offset = 0
CH Mid



Date: 19.DEC.2019 11:35:26

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



Date: 19.DEC.2019 11:35:06

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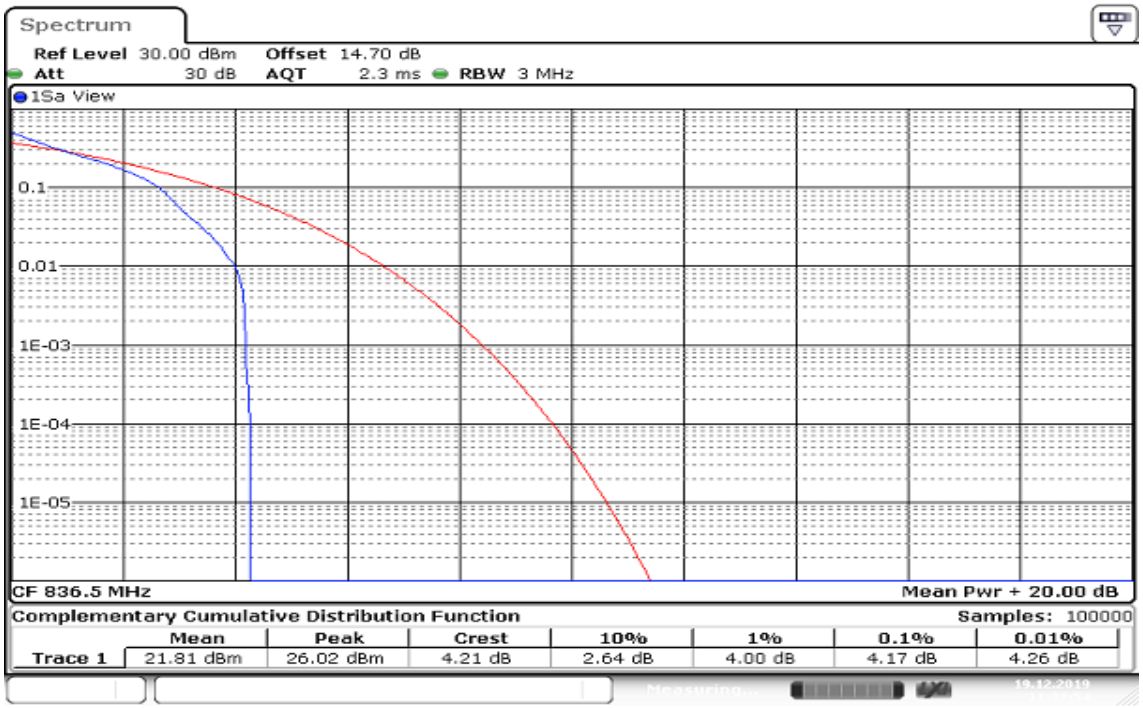
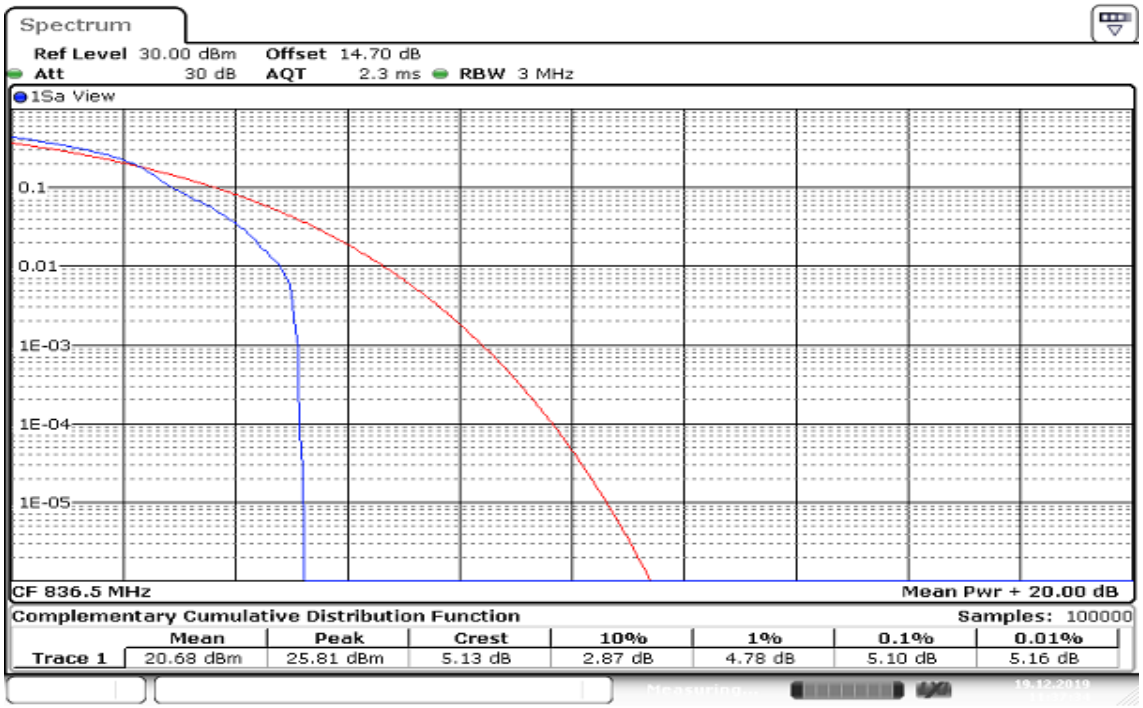
BW: 3MHz / QPSK / RB =1, RB Offset = 0
CH Mid



Date: 19.DEC.2019 11:37:54

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



Date: 19.DEC.2019 11:37:34

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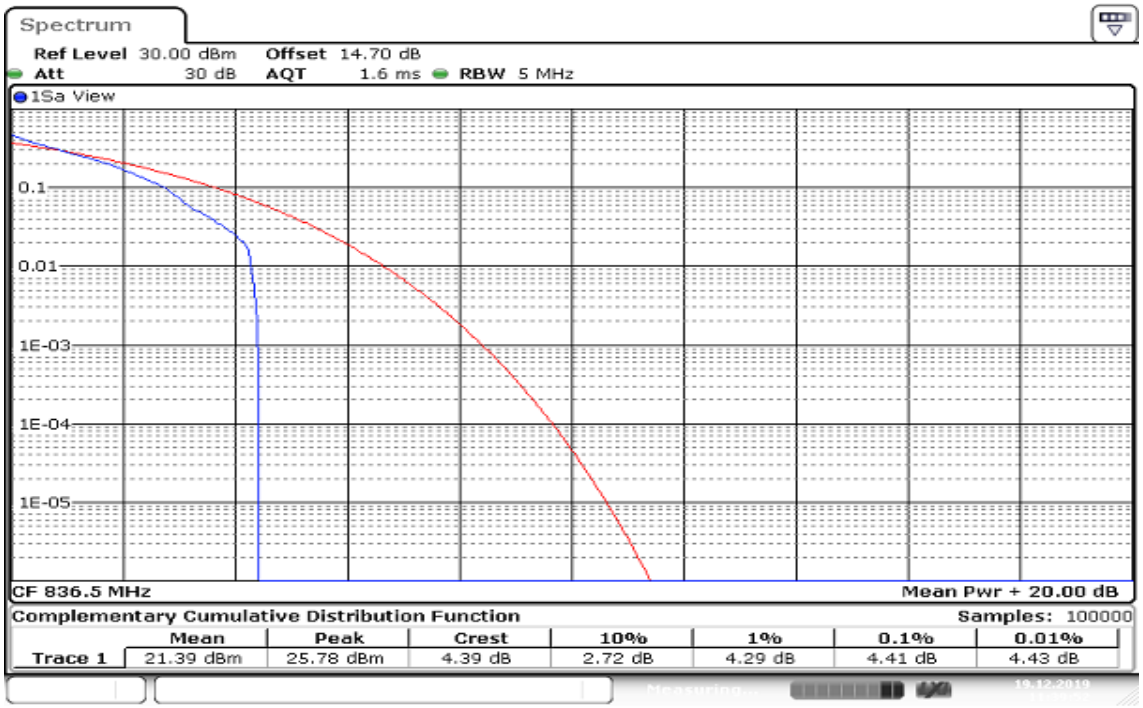
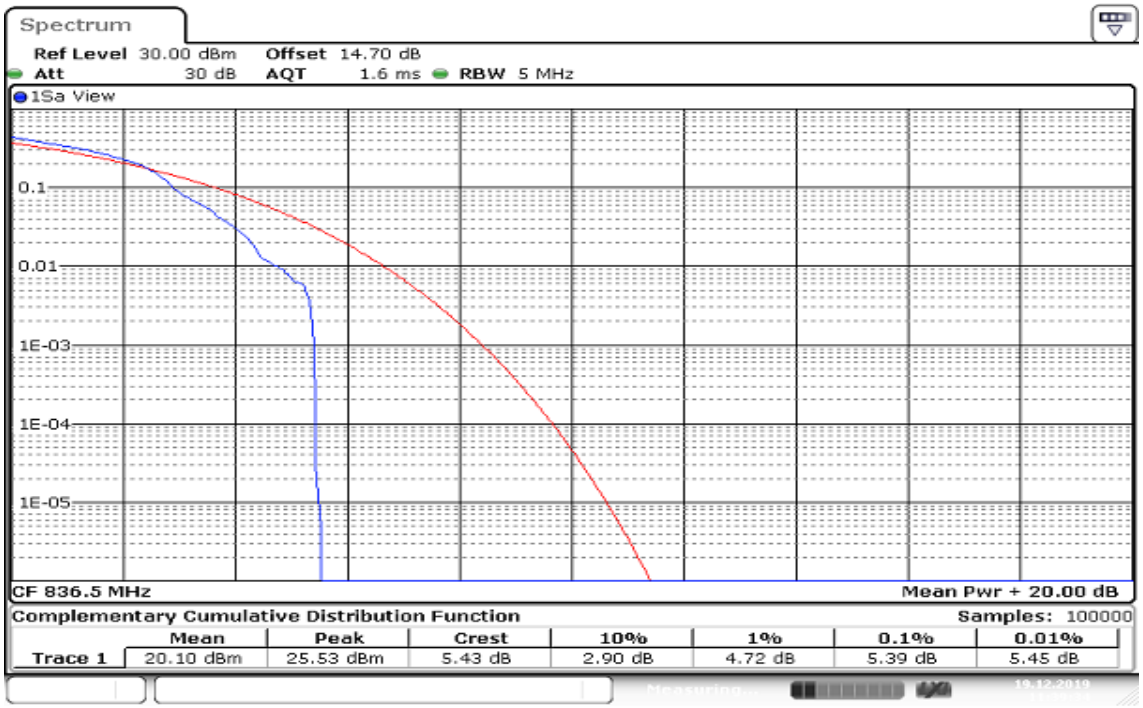
BW: 5MHz / QPSK / RB =1, RB Offset = 0
CH Mid



Date: 19.DEC.2019 11:39:53

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



Date: 19.DEC.2019 11:39:34

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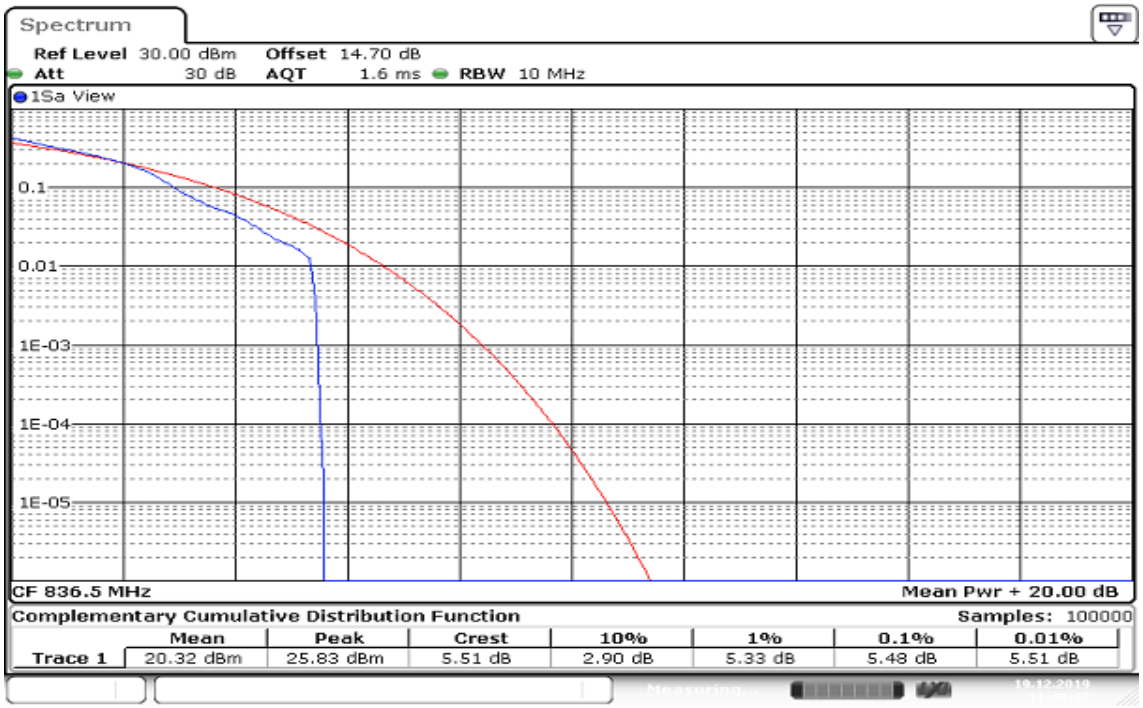
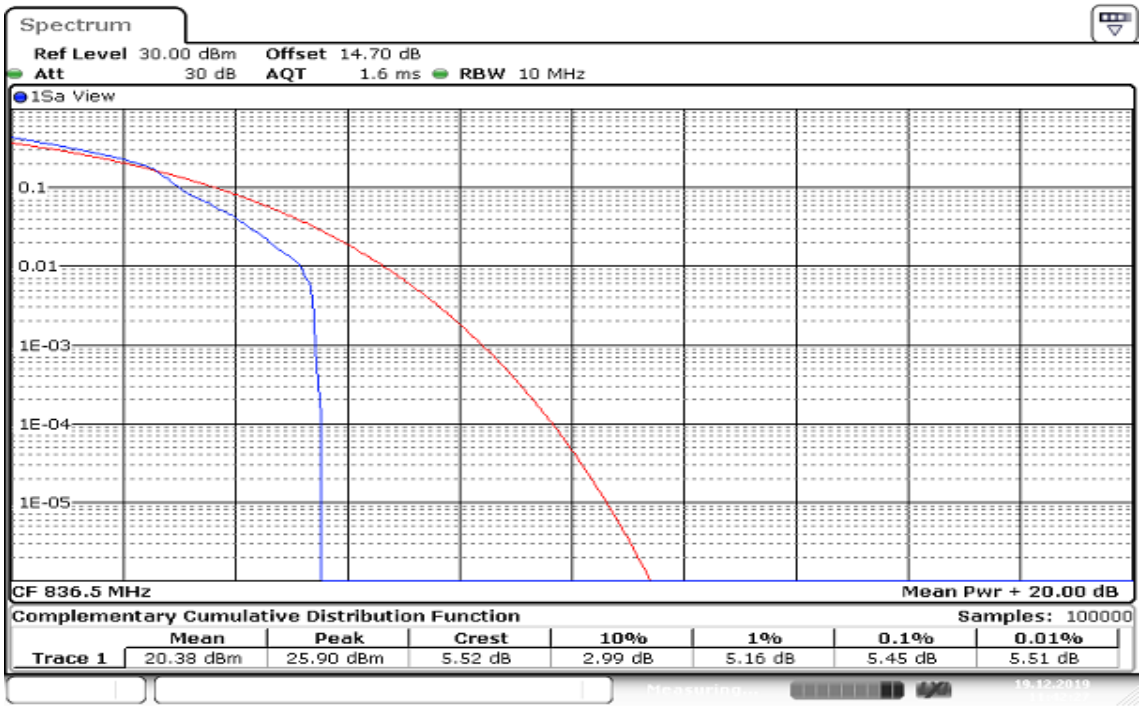
BW: 10MHz / QPSK / RB =1, RB Offset = 0
CH Mid



Date: 19.DEC.2019 11:40:48

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



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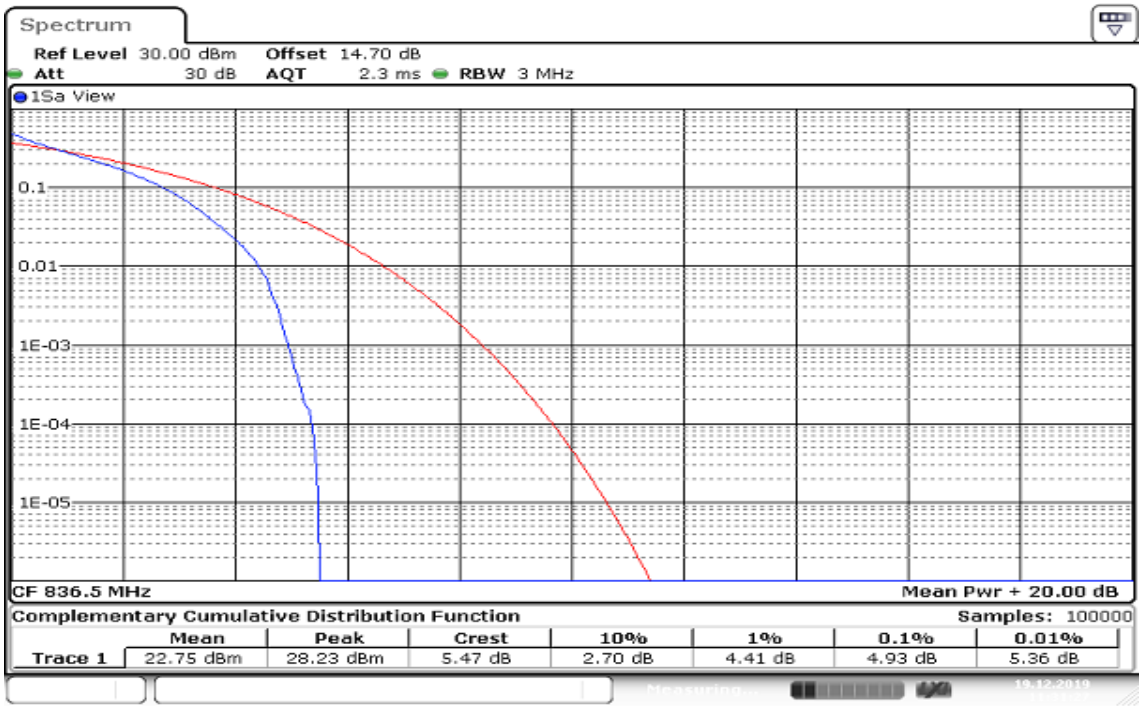
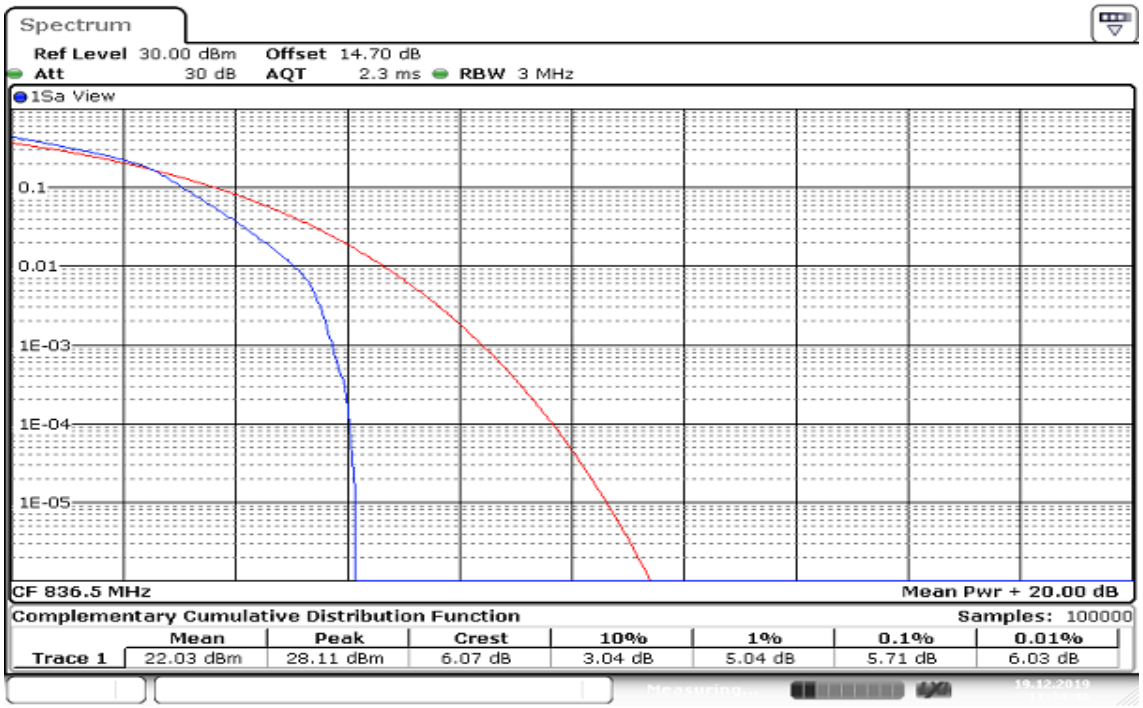
BW: 1.4MHz / QPSK / Full RB, RB Offset = 0
CH Mid



Date: 19.DEC.2019 11:31:27

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



Date: 19.DEC.2019 11:34:47

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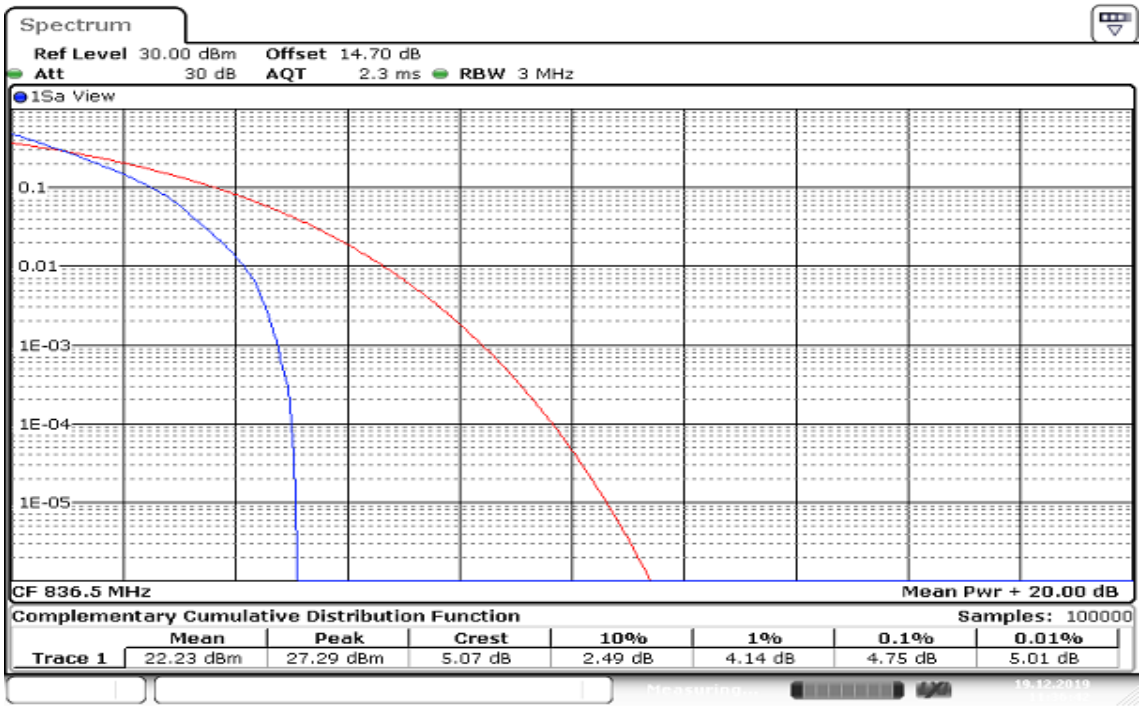
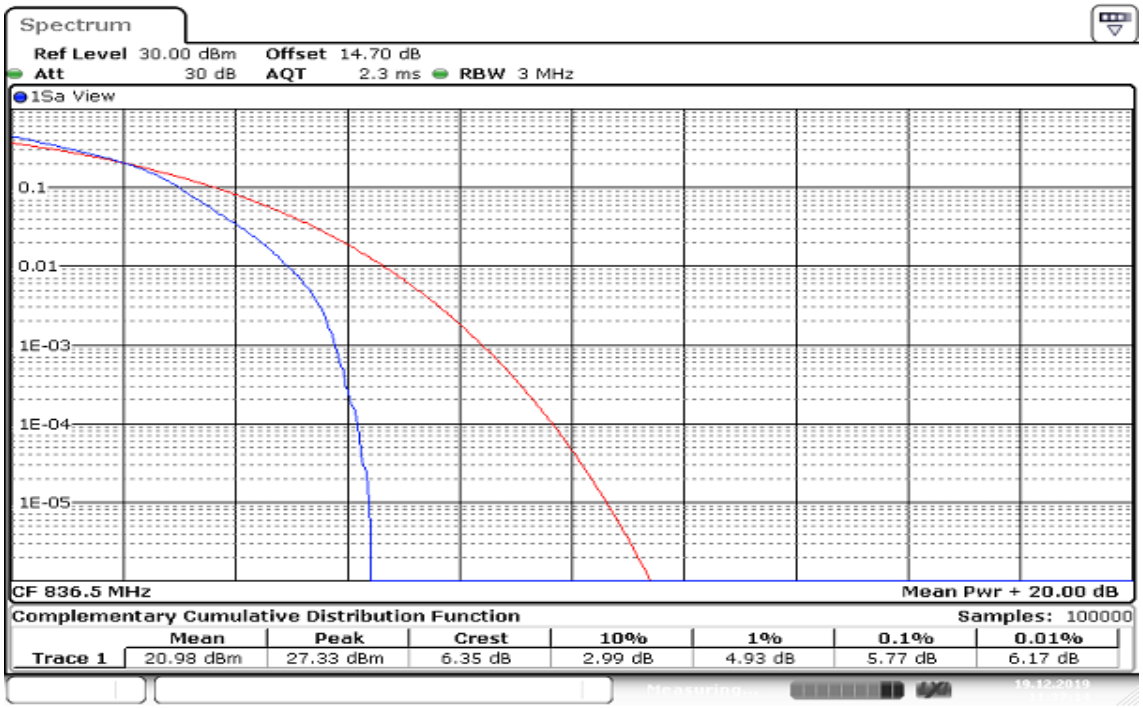
BW: 3MHz / QPSK / Full RB, RB Offset = 0
CH Mid



Date: 19.DEC.2019 11:36:42

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



Date: 19.DEC.2019 11:37:15

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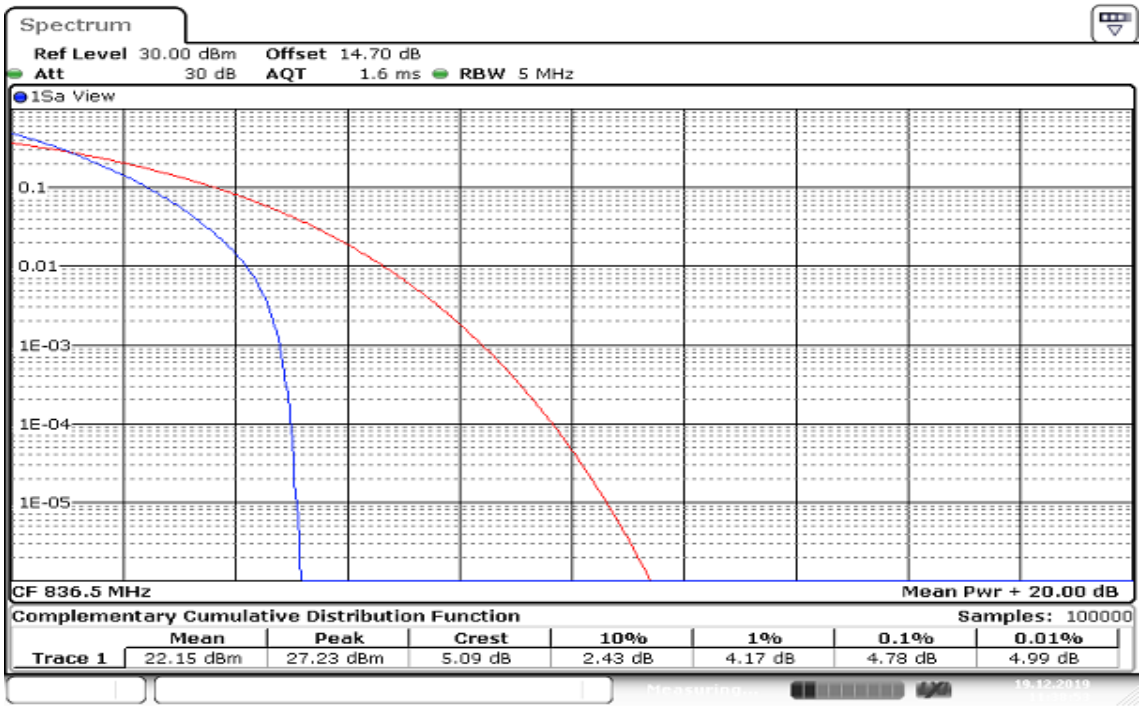
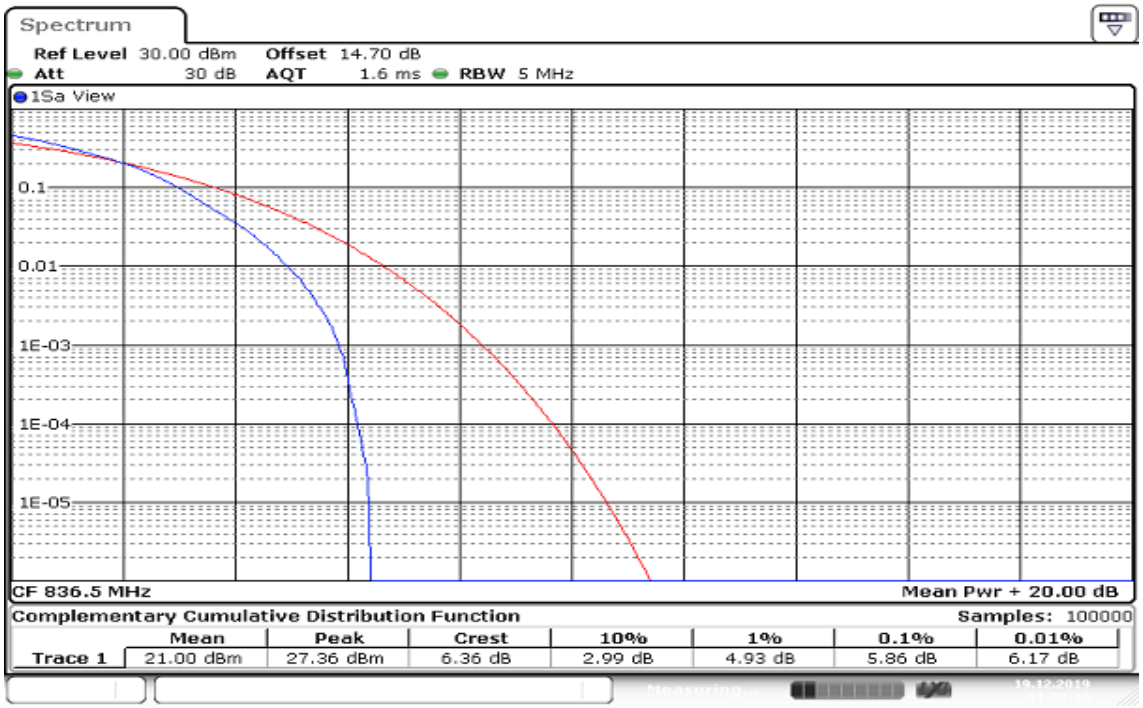
BW: 5MHz / QPSK / Full RB, RB Offset = 0
CH Mid



Date: 19.DEC.2019 11:38:54

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



Date: 19.DEC.2019 11:39:14

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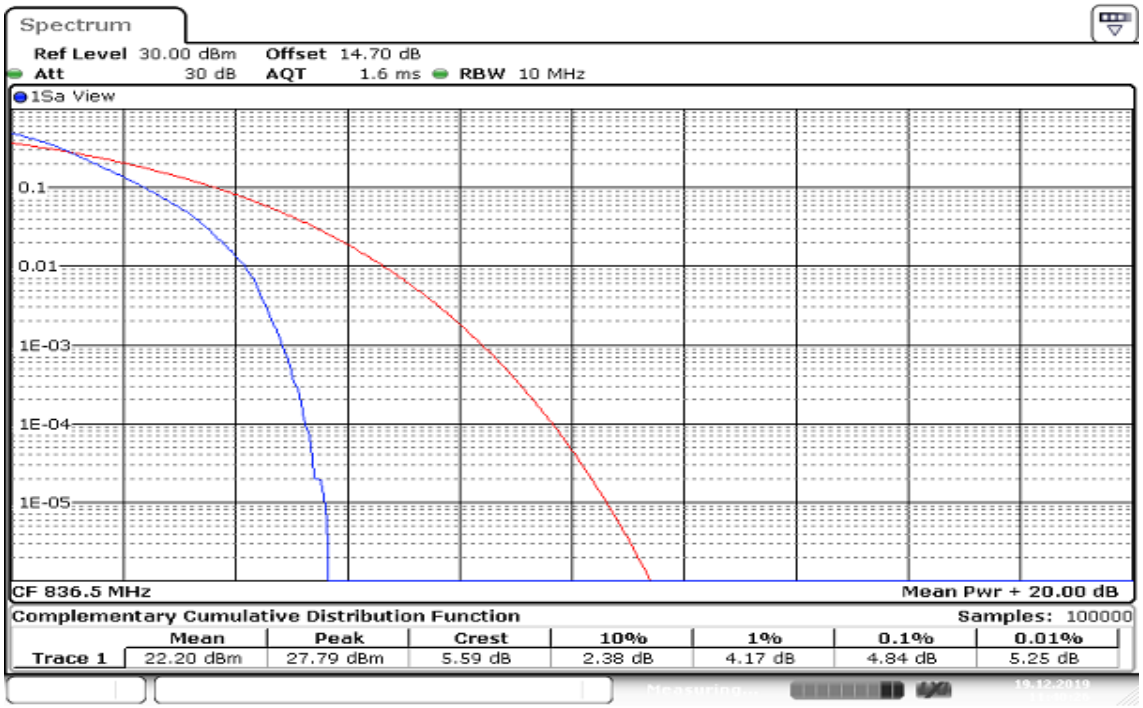
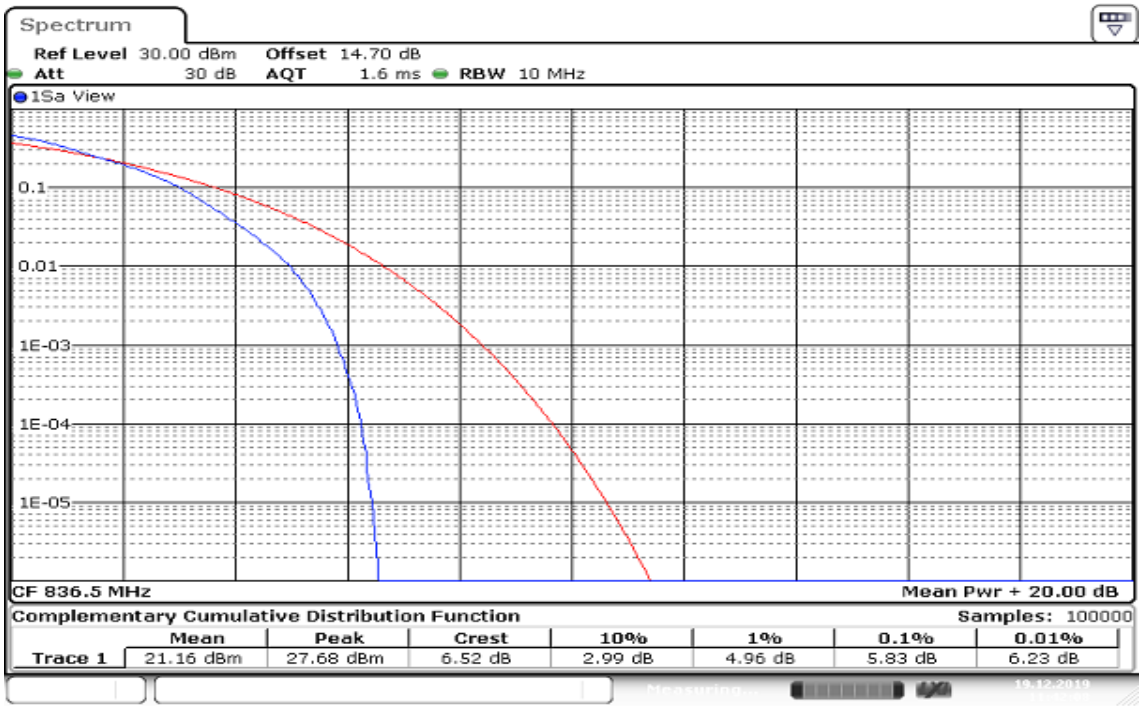
BW: 10MHz / QPSK / Full RB, RB Offset = 0
CH Mid



Date: 19.DEC.2019 11:40:27

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



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8.5 CONDUCTED BAND EDGE MEASUREMENT

Limit

FCC §22.917(a), Band 5

For operations in the 824-849 MHz band ,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.

FCC §24.238(a), Band 2

For operations in the 1850-1910 and 1930-1950 MHz band , 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.

RSS-132 section 5.5 and RSS-133 section 6.5
In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10 p (watts).

Test Procedures

KDB 971168 D01,

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

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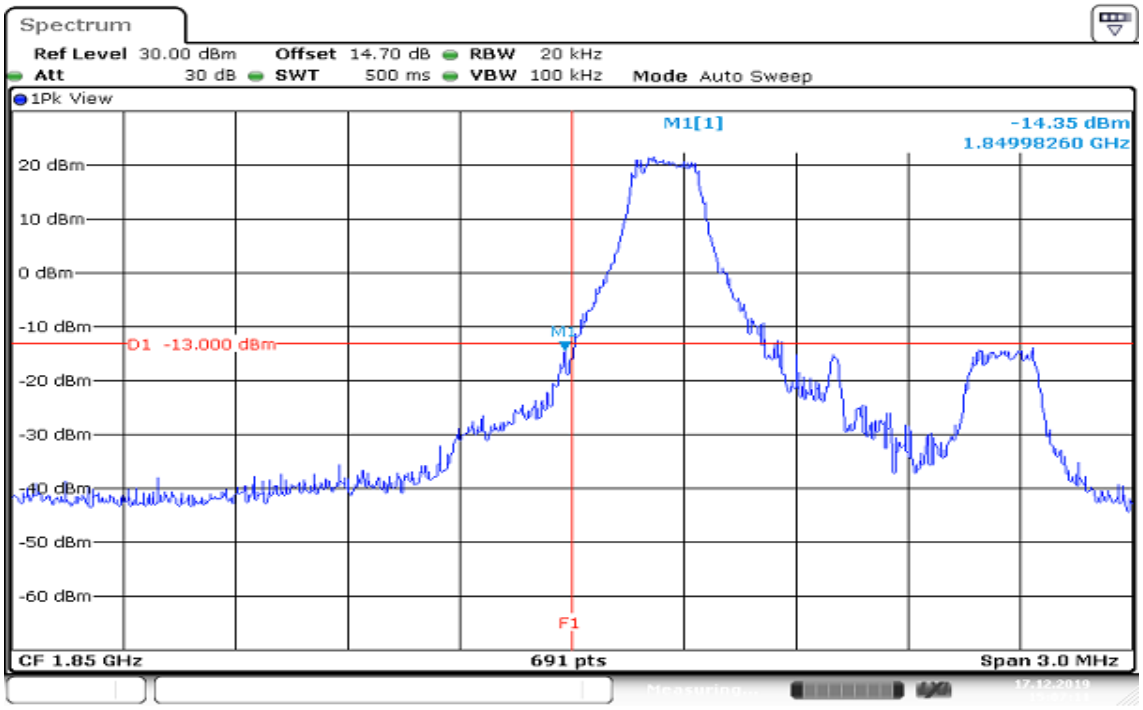
Test Results:

LTE Band 2

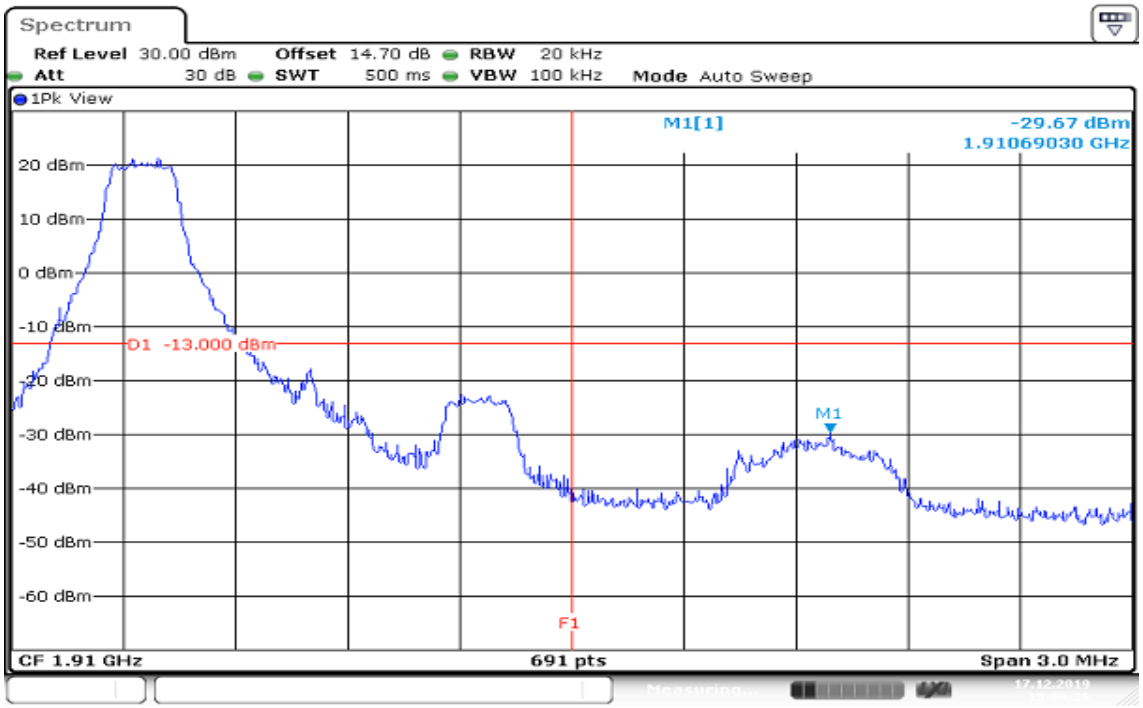
CHANNEL BANDWIDTH: 1.4MHz / QPSK / 1RB ALLOCATED

LOWER BAND EDGE



Date: 17.DEC.2019 15:07:11

HIGHER BAND EDGE



Date: 17.DEC.2019 15:09:26

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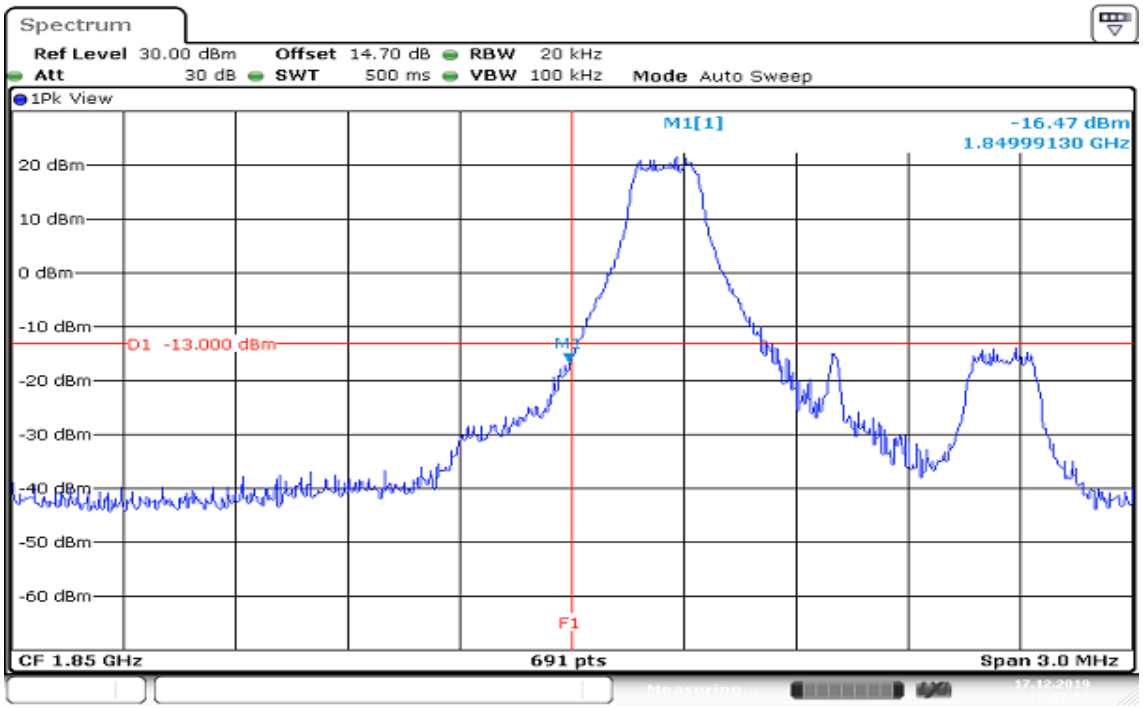
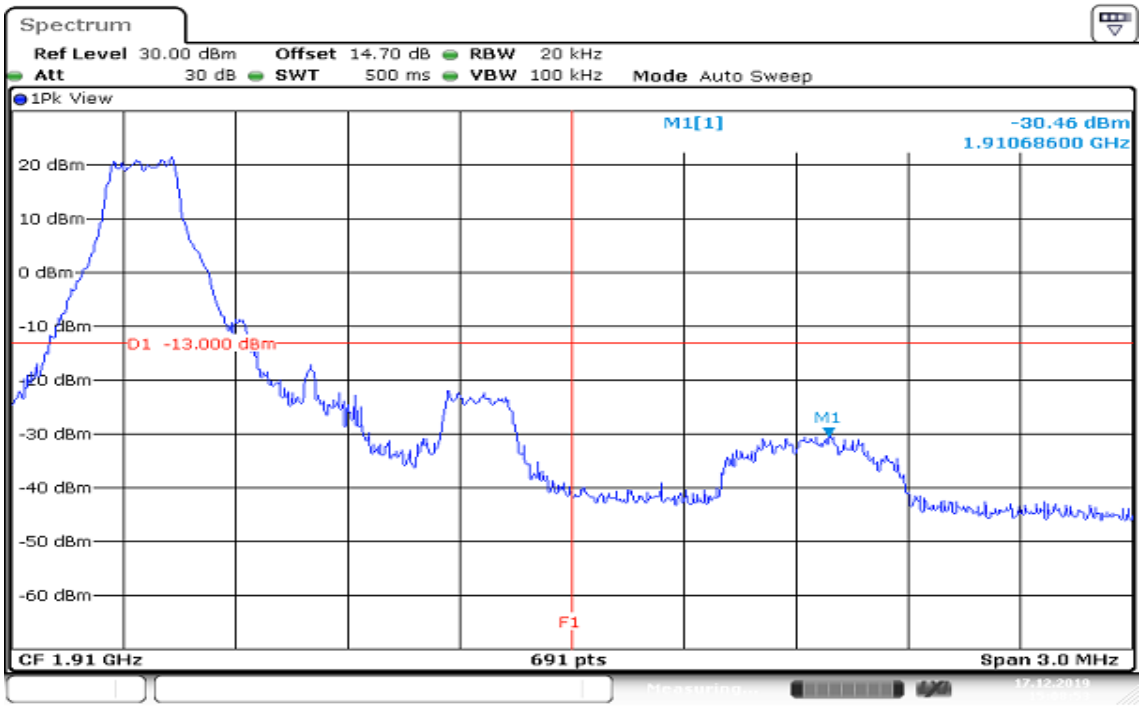
CHANNEL BANDWIDTH: 1.4MHz / 16QAM / 1RB ALLOCATED
LOWER BAND EDGE



Date: 17.DEC.2019 15:07:55

HIGHER BAND EDGE



Date: 17.DEC.2019 15:08:54

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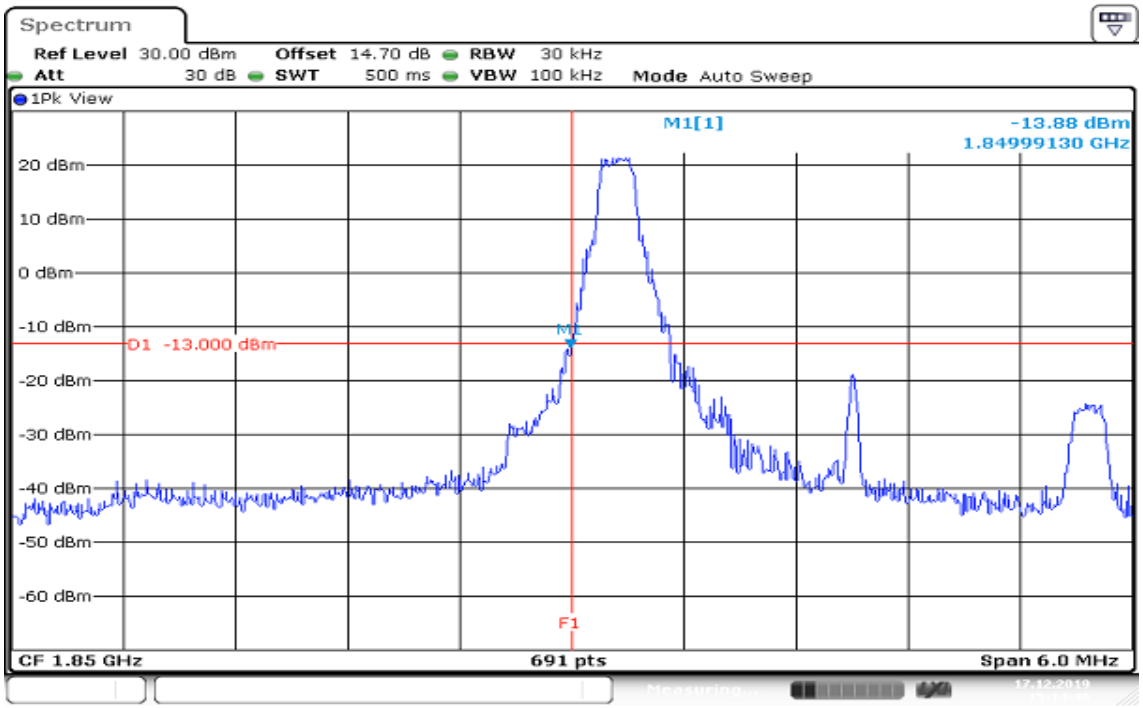
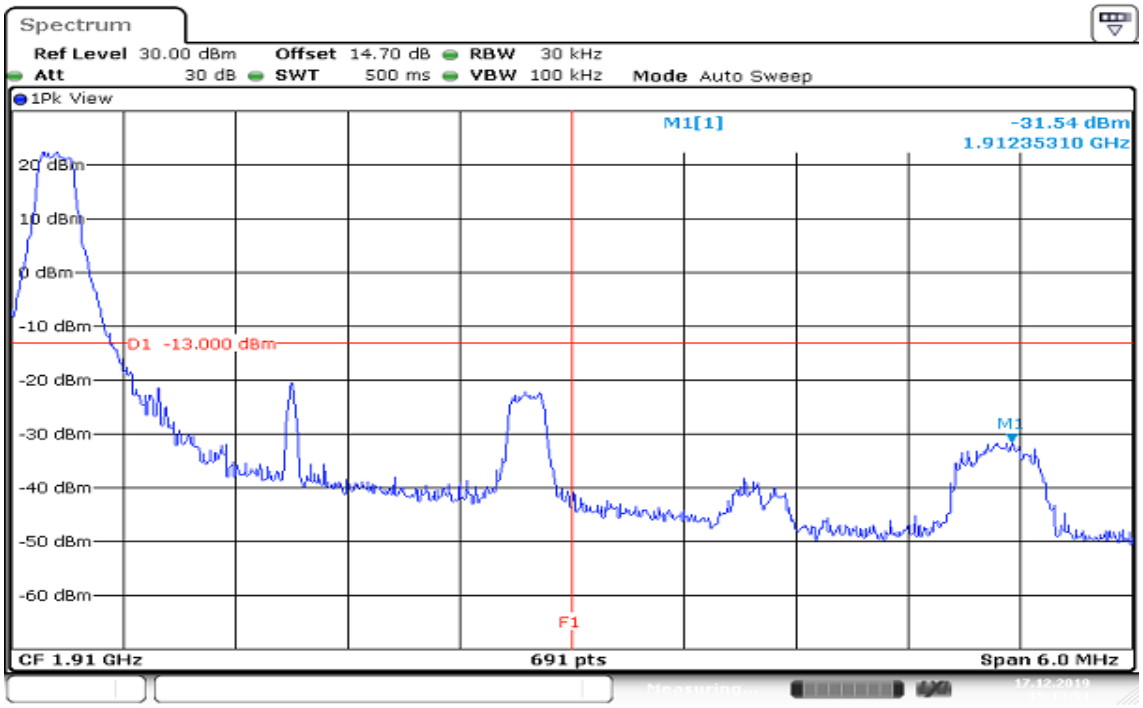
CHANNEL BANDWIDTH: 3MHz / QPSK / 1RB ALLOCATED
LOWER BAND EDGE



Date: 17.DEC.2019 15:14:47

HIGHER BAND EDGE



Date: 17.DEC.2019 15:13:52

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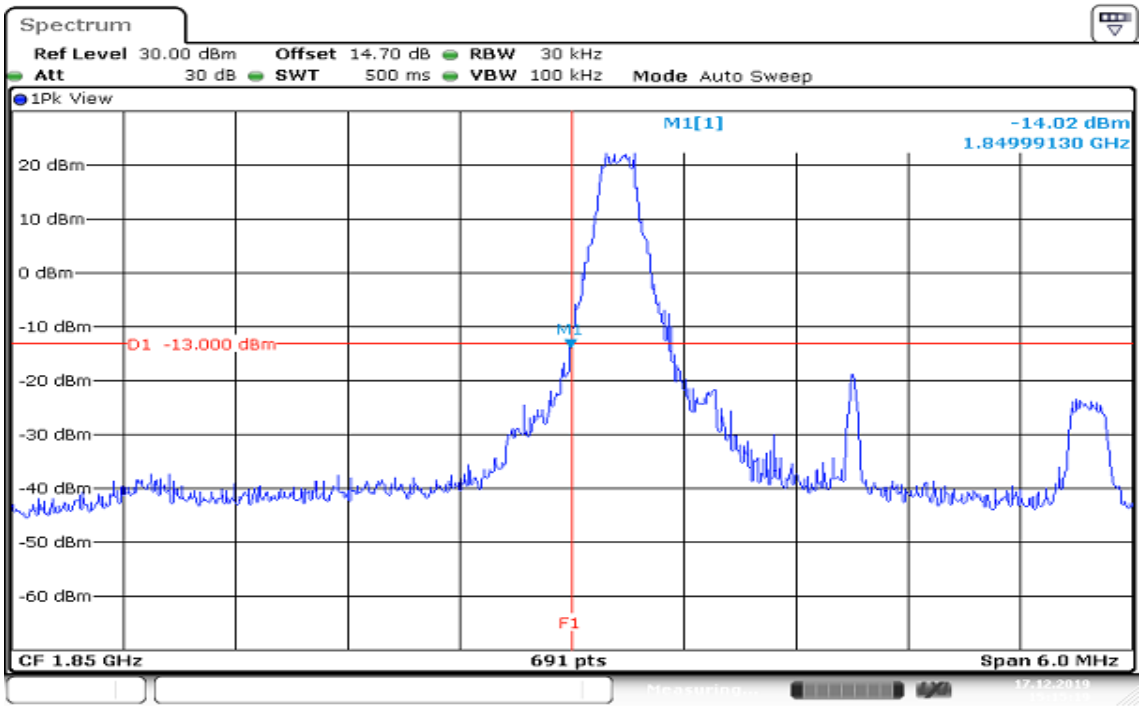
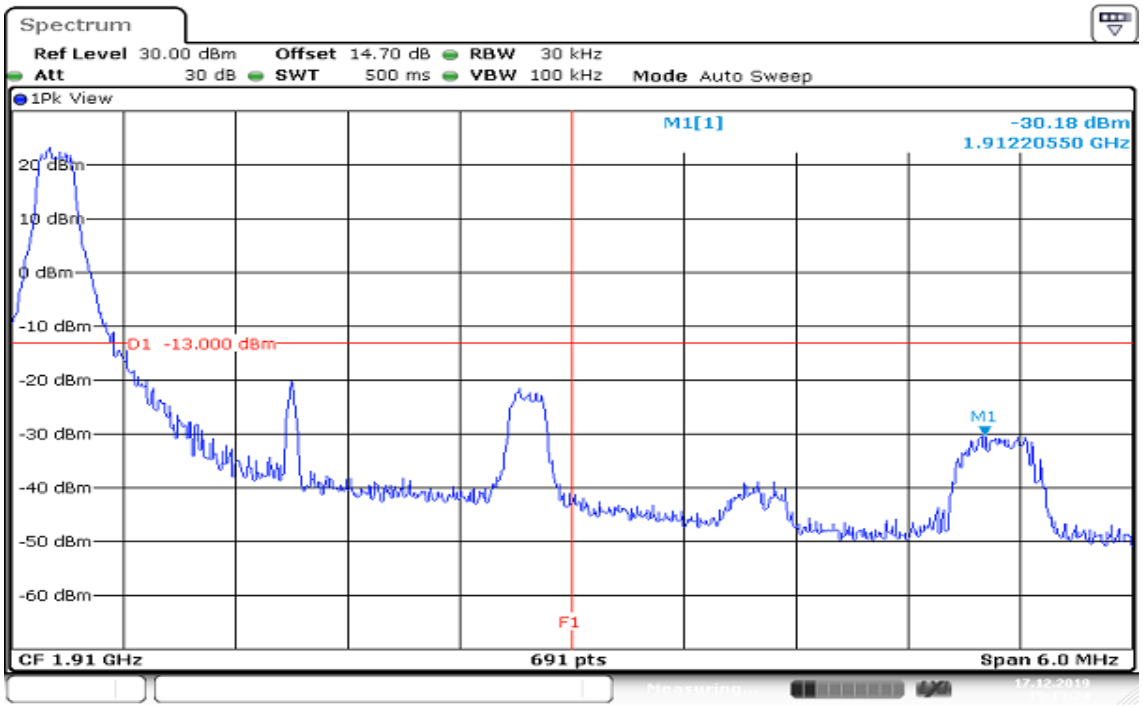
CHANNEL BANDWIDTH: 3MHz / 16QAM / 1RB ALLOCATED
LOWER BAND EDGE



Date: 17.DEC.2019 15:15:20

HIGHER BAND EDGE



Date: 17.DEC.2019 15:13:25

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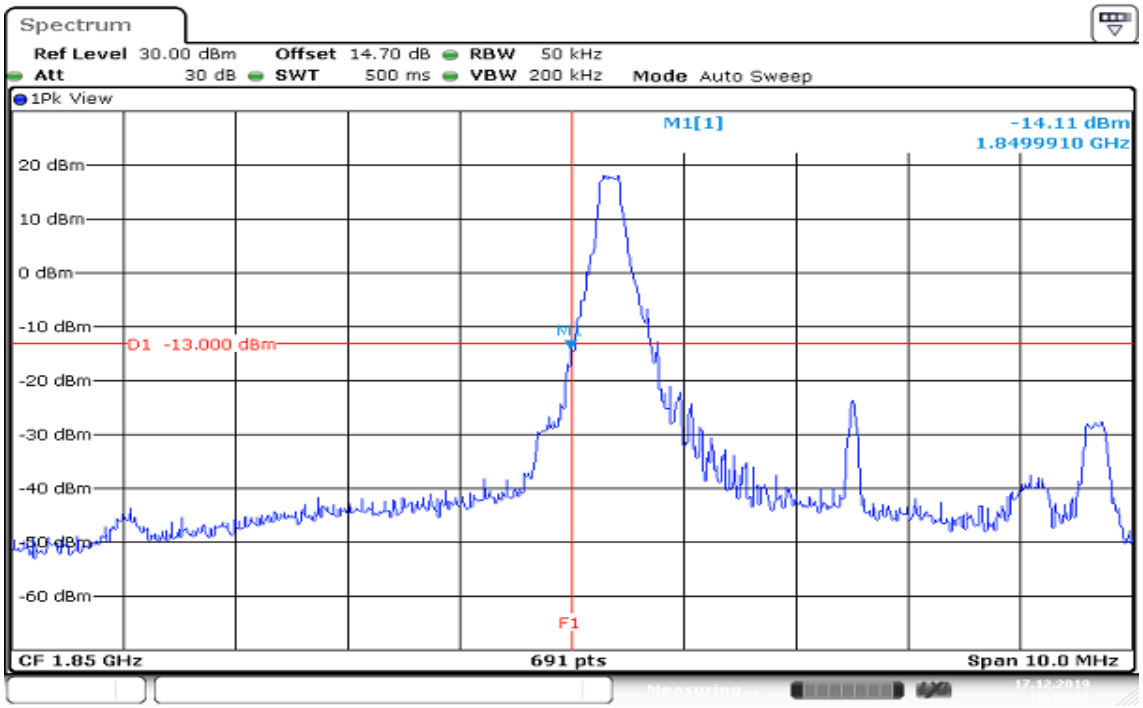
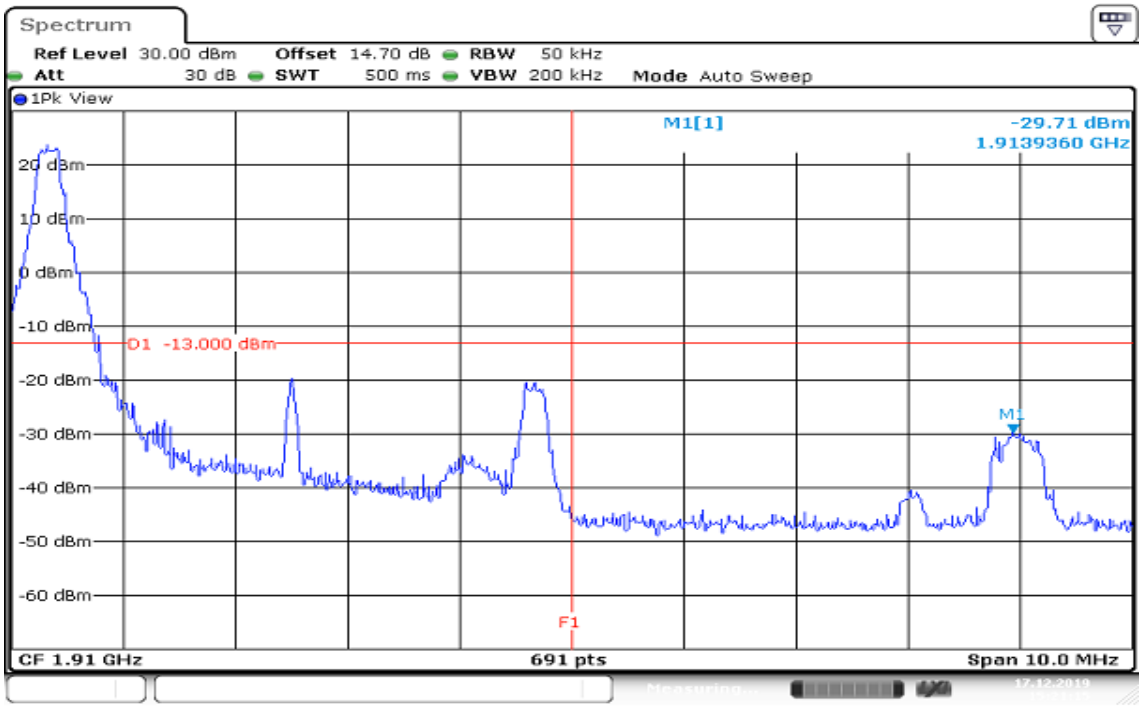
CHANNEL BANDWIDTH: 5MHz / QPSK / 1RB ALLOCATED
LOWER BAND EDGE



Date: 17.DEC.2019 15:19:01

HIGHER BAND EDGE



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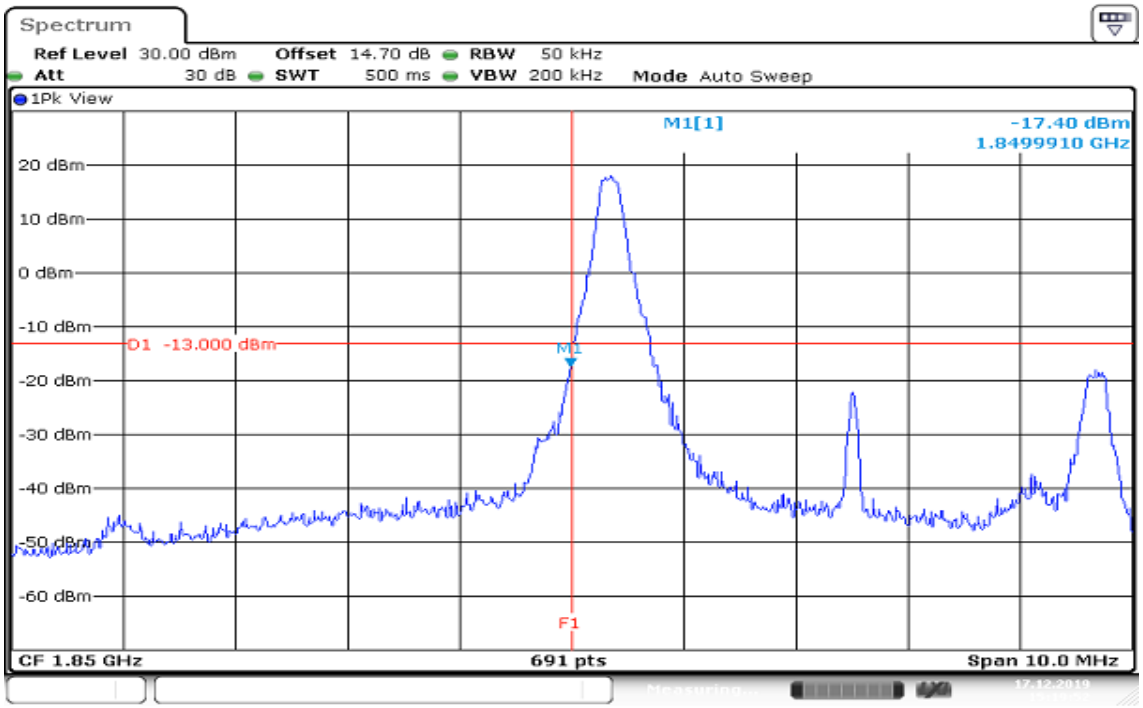
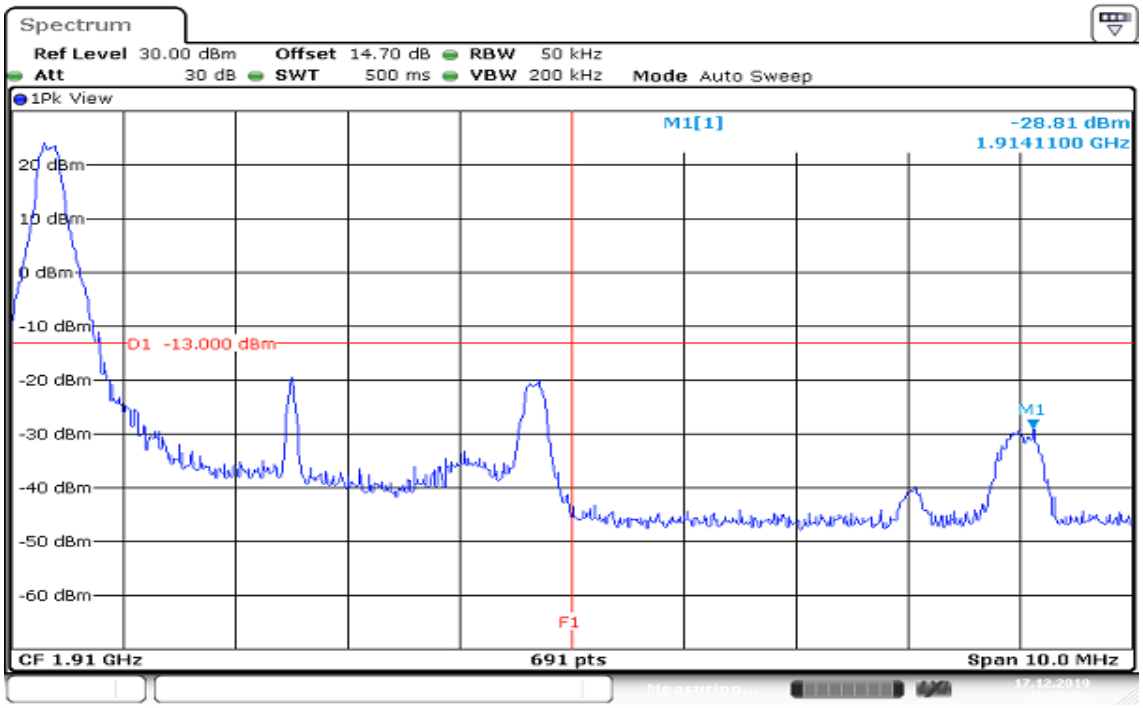
CHANNEL BANDWIDTH: 5MHz / 16QAM / 1RB ALLOCATED
LOWER BAND EDGE



Date: 17.DEC.2019 15:19:52

HIGHER BAND EDGE



Date: 17.DEC.2019 15:20:55

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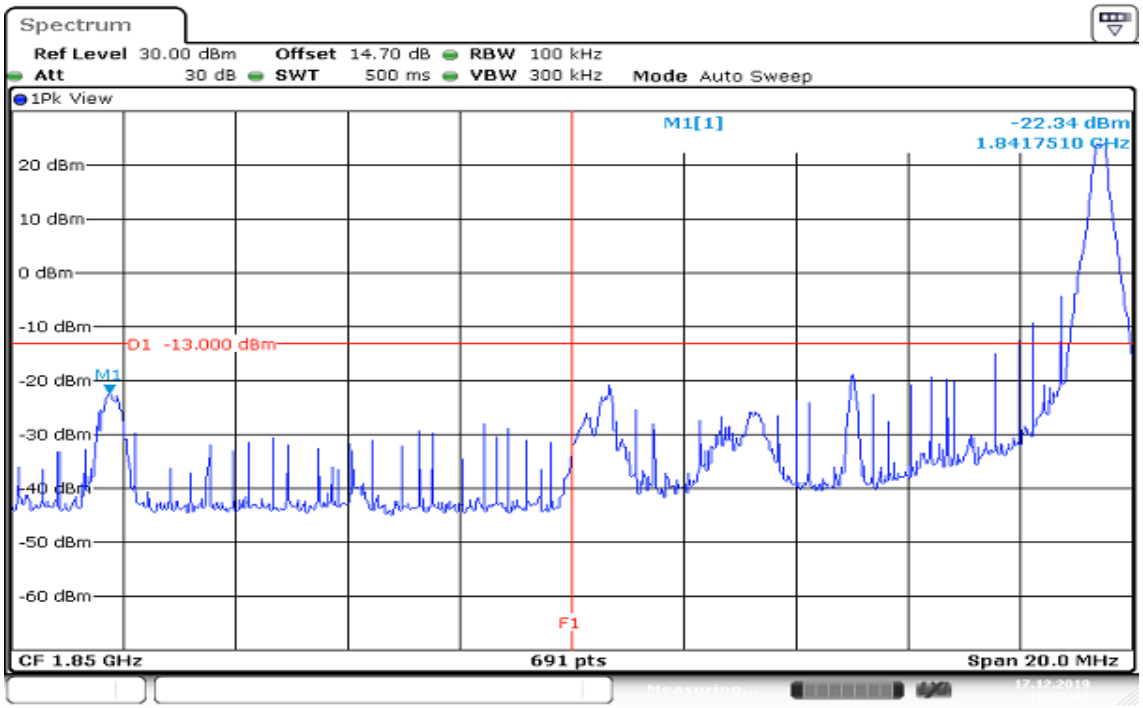
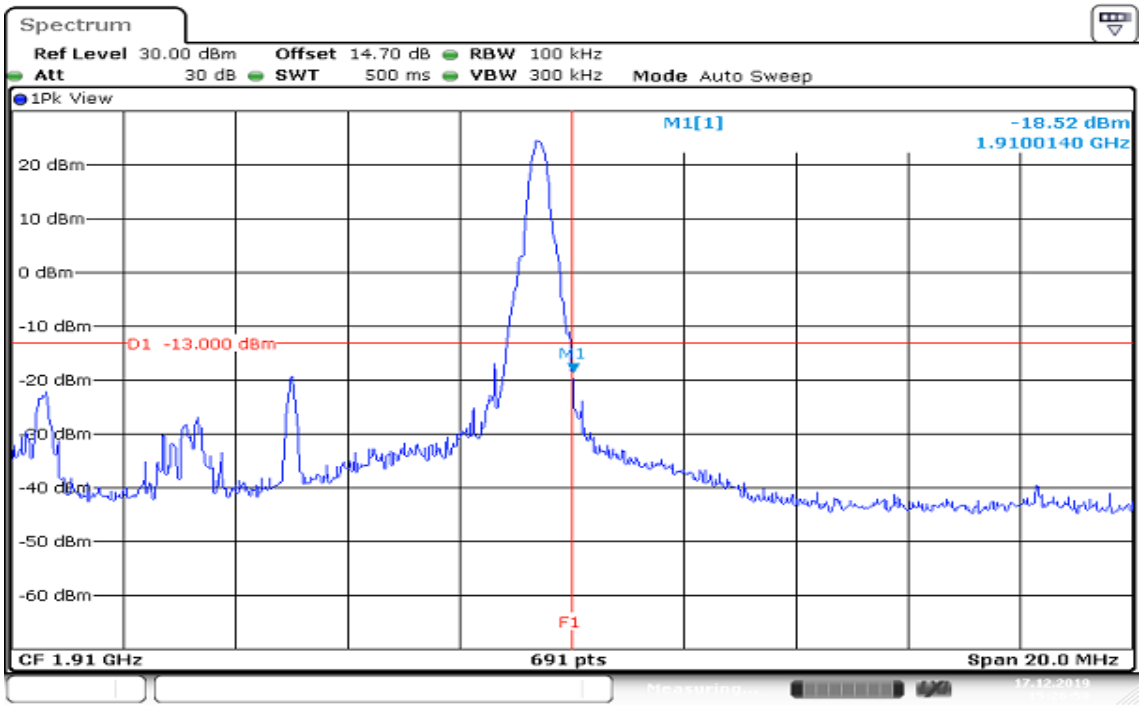
CHANNEL BANDWIDTH: 10MHz / QPSK / 1RB ALLOCATED
LOWER BAND EDGE



Date: 17.DEC.2019 15:29:09

HIGHER BAND EDGE



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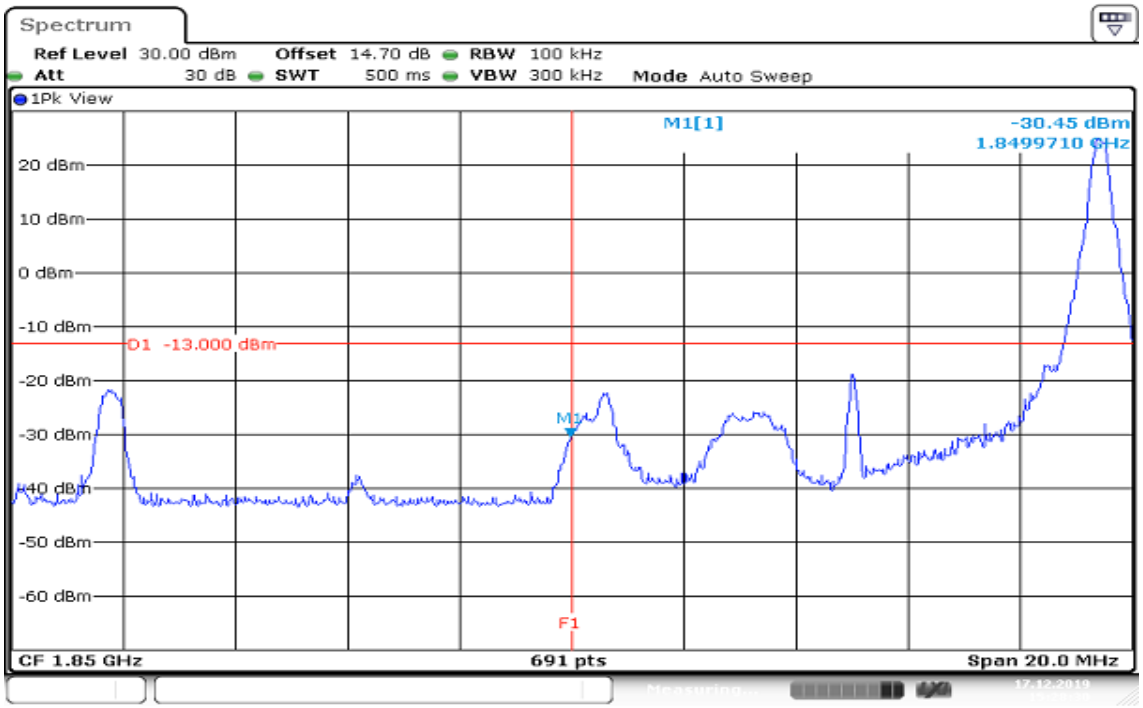
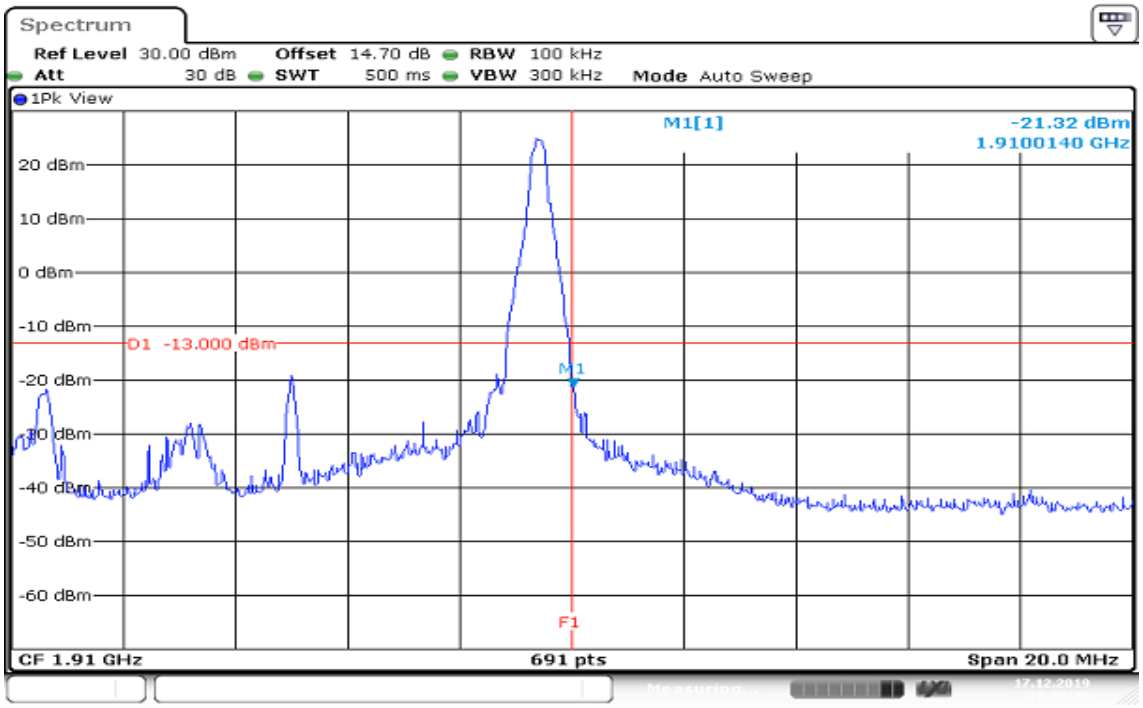
CHANNEL BANDWIDTH: 10MHz / 16QAM / 1RB ALLOCATED
LOWER BAND EDGE



Date: 17.DEC.2019 15:28:31

HIGHER BAND EDGE



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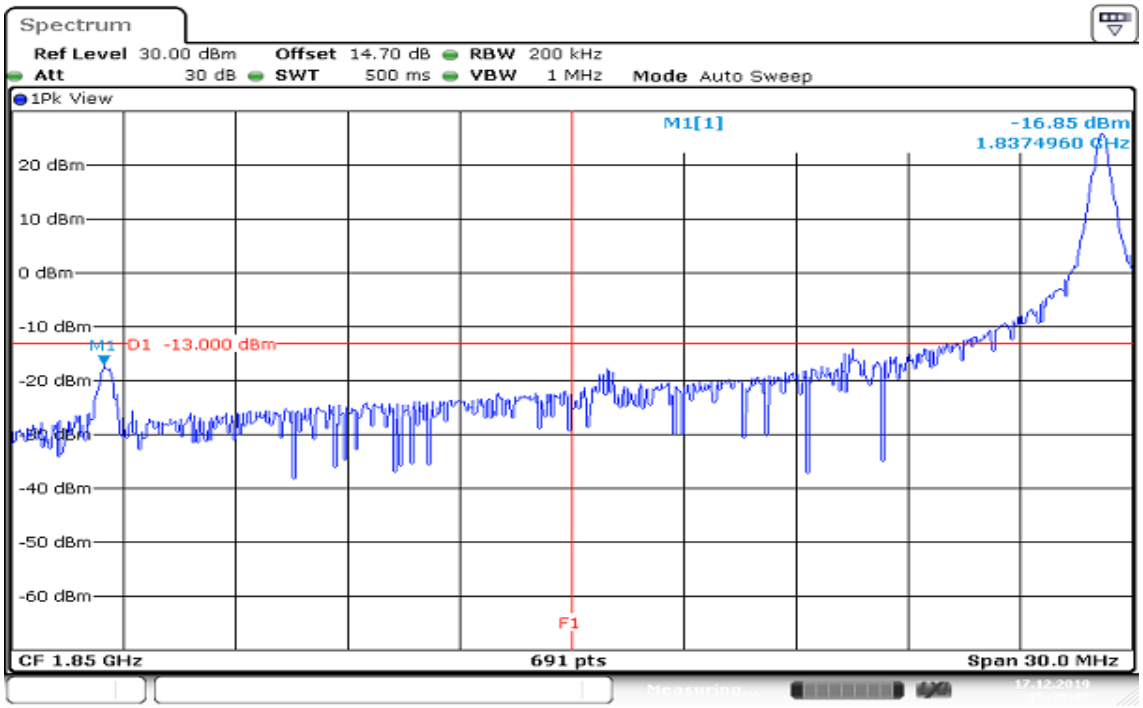
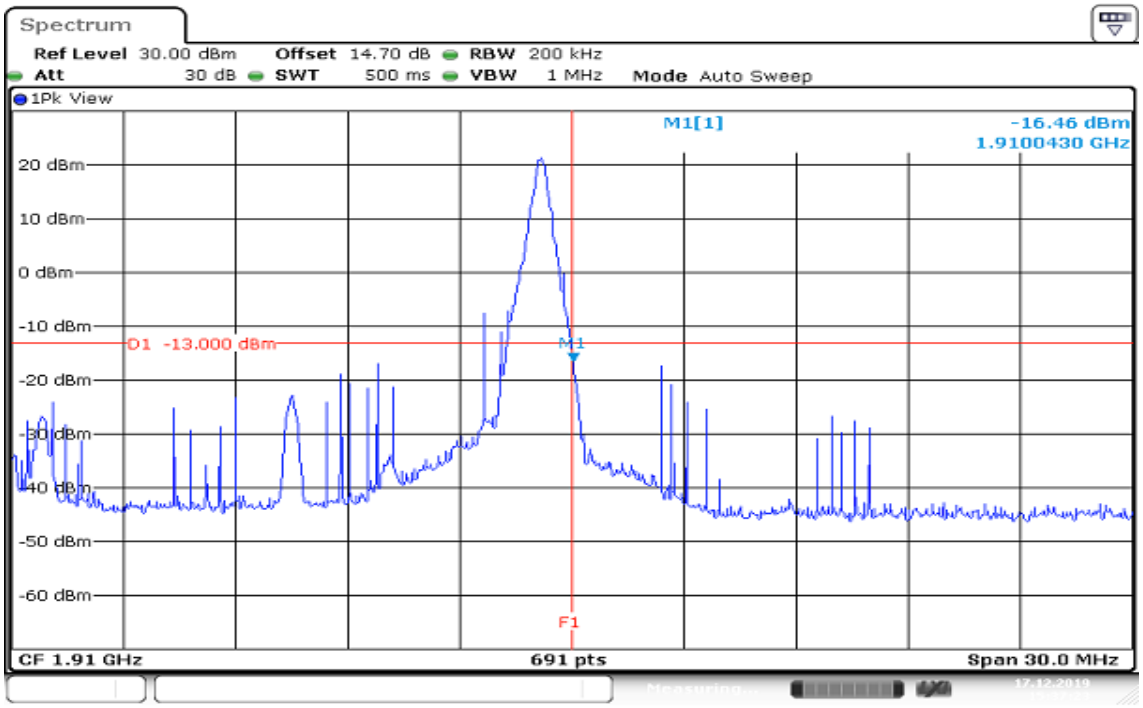
CHANNEL BANDWIDTH: 15MHz / QPSK / 1RB ALLOCATED
LOWER BAND EDGE



Date: 17.DEC.2019 15:35:48

HIGHER BAND EDGE



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