FCC Test Report

Product Name	:	Edge Lite
Trade Name	:	Edge Lite
Model No.	:	SHIO-EL-NB
FCC ID	:	2AVDX-GC474264

Applicant	:	Softhard.IO Ltd.
Address	:	Entrepreneurship Center, Cyberport 3, Core F, 100 Cyberport Road, Hong Kong

Date of Receipt	:	Dec. 11, 2019
Issued Date	:	May 04, 2020
Report No.	:	19C0179R-HPUSP40V00
Report Version	:	V1.0

Testing Laboratory
3024

Test Report Certification

Issued Date : May 04, 2020
Report No. : 19C0179R-HPUSP40V00

Product Name	:	Edge Lite
Applicant	:	Softhard.IO Ltd.
Address	:	Entrepreneurship Center, Cyberport 3, Core F, 100 Cyberport Road, Hong Kong
Manufacturer	:	Softhard.IO Ltd.
Address	:	Entrepreneurship Center, Cyberport 3, Core F, 100 Cyberport Road, Hong Kong
Trade name	:	Edge Lite
Model No.	:	SHIO-EL-NB
FCC ID	:	2AVDX-GC474264
EUT Voltage	:	DC 3.7V
Testing Voltage	:	DC 3.7V
Applicable Standard	:	FCC CFR Title 47 Part 27 Subpart F
Test Lab	:	Hsin Chu Laboratory
Address	:	No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 310, Taiwan, R.O.C. TEL: +886-3-582-8001 / FAX: +886-3-582-8958
Test Result	:	Complied

Documented By : Lyla Yang

(Lyla Yang / Engineering Adm. Specialist)

Tested By : Max Chang

(Max Chang / Senior Engineer)

Approved By : Louis Hsu

(Louis Hsu / Deputy Manager)

Revision History

Report No.	Version	Description	Issued Date
19C0179R-HPUSP40V00	V1.0	Initial issue of report	May 04, 2020

TABLE OF CONTENTS

1. General Information

1.1. EUT Description

Product Name	Edge Lite
Trade Name	Edge Lite
Model No.	SHIO-EL-NB
Uplink Frequency Range	LTE Band 12: 698~716 MHz
Downlink Frequency Range	LTE Band 12: 729~746 MHz
Modulation	BPSK / QPSK
HW Version	V1.4
FW Version	V1.12.0

Antenna Information	
MFR. / Model	OCEAN COMPONENTS LTD. / CH200B+1.13+MHF (EG-5002)
Antenna Type	PCB Antenna
Antenna Gain	-4.92dBi

Note:

1. This SHIO-EL-NB supports LTE NB-IoT Band 12 function.
2. Regarding frequency band operation, the lowest, middle and highest frequency of channel were selected to perform the test, and the details were shown on this report.
3. The EUT description is from the customer declaration.

1.2. Mode of Operation

DEKRA has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1: LTE NB-IoT_Band 12

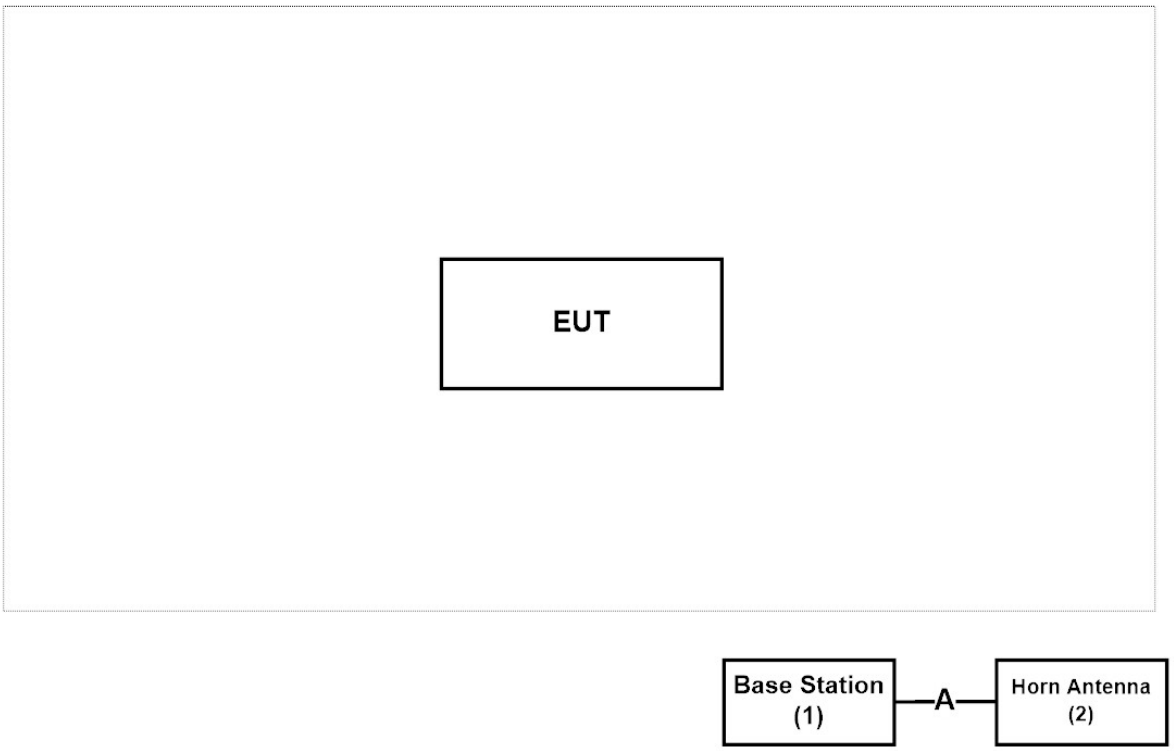
1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	FCC ID	Power Cord
1	Base Station	R&S	CMW500	106071	DoC	Non-Shielded, 2m.
2	Horn Antenna	scnwahzbeck	BBHA 9120D	1640	DoC	--

1.4. Configuration of Tested System

Connection Diagram



Signal Cable Type		Signal cable Description
A	RF Cable	Shielded, 6m

1.5. EUT Exercise Software

1	Setup the EUT and simulators as shown on on 1.4.
2	Turn on the power of all equipment.
3	The EUT will continue receive the signal from NB-IoT function.
4	Repeat the above procedure.

2. Technical Test

2.1. Summary of Test Result

☒ No deviations from the test standards

☐ Deviations from the test standards as below description:

B12

Uplink: 698-716MHz

Downlink: 729-746MHz

LTE B12			
FCC Part 27 Subpart F			
Test item	Reference section	Limit	Result
RF Output Power	§2.1033 §2.1046 §27.50	<3 Watts ERP	Pass
Occupied Bandwidth	§2.1049	N/A	Pass
Peak-to-average power ratio	§27.50	<13 dB	Pass
Spurious Emissions	§2.1053 §27.53	<-13dBm	Pass
Spurious Emissions at Antenna erminals	§27.53	<-13dBm	Pass
Frequency Stability	§2.1055 §27.54	<±2.5 ppm	Pass

Note: Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.2. Test Environment

Items	Required	Actual	Test Site
Temperature (°C)	15-35	23	2 & 3
Humidity (%RH)	25-75	52	

Note: Test site information refers to Laboratory Information.

Laboratory Information

USA : FCC Registration Number: TW3024

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: http://www.dekra.com.tw

If you have any comments, please don't hesitate to contact us. Our test sites as below:

Test Laboratory	DEKRA Testing and Certification Co., Ltd.
Address	1. No. 75-2, 3rd Lin, WangYe Keng, Yonghxing Tsuen, Qionglin Shiang, Hsinchu County 307, Taiwan, R.O.C. 2. No.372, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C. 3. No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C.
Phone number	1. +886-3-592-8858 2. +886-3-582-8001 3. +886-3-582-8001
Fax number	1. +886-3-592-8859 2. +886-3-582-8958 3. +886-3-582-8958
E mail address	info.tw@dekra.com
Website	http://www.dekra.com.tw

2.3. List of Test Equipment

RF Output Power / SR12-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal & Spectrum Analyzer	R&S	FSV40	101049	2020/03/30	2021/03/29
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2020/02/21	2021/02/20
Spectrum Analyzer	Keysight	N9030B	MY57140404	2019/06/18	2020/06/17
Spectrum Analyzer	Keysight	N9010B	MY57110159	2019/05/03	2020/05/02
Wireless Conn. Tseter	R&S	CMW500	157118	2019/08/08	2020/08/07
Wideband Radio Communication Tester	R&S	CMW500	106071	2020/02/03	2021/02/02

Occupied Bandwidth / SR12-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal & Spectrum Analyzer	R&S	FSV40	101049	2020/03/30	2021/03/29
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2020/02/21	2021/02/20
Spectrum Analyzer	Keysight	N9030B	MY57140404	2019/06/18	2020/06/17
Spectrum Analyzer	Keysight	N9010B	MY57110159	2019/05/03	2020/05/02
Wireless Conn. Tseter	R&S	CMW500	157118	2019/08/08	2020/08/07
Wideband Radio Communication Tester	R&S	CMW500	106071	2020/02/03	2021/02/02

Peak To Average Ratio / SR12-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal & Spectrum Analyzer	R&S	FSV40	101049	2020/03/30	2021/03/29
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2020/02/21	2021/02/20
Spectrum Analyzer	Keysight	N9030B	MY57140404	2019/06/18	2020/06/17
Spectrum Analyzer	Keysight	N9010B	MY57110159	2019/05/03	2020/05/02
Wireless Conn. Tseter	R&S	CMW500	157118	2019/08/08	2020/08/07
Wideband Radio Communication Tester	R&S	CMW500	106071	2020/02/03	2021/02/02

Conducted Spurious Emissions / SR12-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal & Spectrum Analyzer	R&S	FSV40	101049	2020/03/30	2021/03/29
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2020/02/21	2021/02/20
Spectrum Analyzer	Keysight	N9030B	MY57140404	2019/06/18	2020/06/17
Spectrum Analyzer	Keysight	N9010B	MY57110159	2019/05/03	2020/05/02
Wireless Conn. Tseter	R&S	CMW500	157118	2019/08/08	2020/08/07
Wideband Radio Communication Tester	R&S	CMW500	106071	2020/02/03	2021/02/02

Radiated Spurious Emissions / CB4-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Horn Antenna	Schwarzbeck	BBHA 9120D	639	2019/05/28	2020/05/27
Bilog Antenna	Teseq	CBL6112D	23191	2019/06/17	2020/06/16
Signal & Spectrum Analyzer	R&S	FSV40	101049	2020/03/30	2021/03/29
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2020/02/21	2021/02/20
Signal Analyzer	R&S	FSVA40	101455	2019/10/21	2020/10/20
Horn Antenna	Schwarzbeck	BBHA 9170	202	2019/12/27	2020/12/26
Pre-Amplifier	DEKRA	AP-400C	201801231	2019/12/03	2020/12/02
Pre-Amplifier	EMCI	EMC11830I	980366	2019/12/03	2020/12/02
Horn Antenna	Schwarzbeck	BBHA 9120D	01656	2019/10/25	2020/10/24
Pre-Amplifier	DEKRA	AP-025C	12183122	2019/09/24	2020/09/23
Signal Analyzer	R&S	FSV40	101435	2019/07/08	2020/07/07
Wideband Radio Communication Tester	R&S	CMW500	106071	2020/02/03	2021/02/02
Wireless Conn. Tseter	R&S	CMW500	157118	2019/08/08	2020/08/07
Coaxial Cable(19m)	Suhner	SF102_SF104 _SF106	CB4_2	2019/07/25	2020/07/24
EMI system	DEKRA	Version 1.0	CB4-H	NA	NA

Spurious Emissions at Antenna Terminals / SR12-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal & Spectrum Analyzer	R&S	FSV40	101049	2020/03/30	2021/03/29
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2020/02/21	2021/02/20
Spectrum Analyzer	Keysight	N9030B	MY57140404	2019/06/18	2020/06/17
Spectrum Analyzer	Keysight	N9010B	MY57110159	2019/05/03	2020/05/02
Wireless Conn. Tseter	R&S	CMW500	157118	2019/08/08	2020/08/07
Wideband Radio Communication Tester	R&S	CMW500	106071	2020/02/03	2021/02/02

Frequency Stability / SR12-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal & Spectrum Analyzer	R&S	FSV40	101049	2020/03/30	2021/03/29
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2020/02/21	2021/02/20
Spectrum Analyzer	Keysight	N9030B	MY57140404	2019/06/18	2020/06/17
Spectrum Analyzer	Keysight	N9010B	MY57110159	2019/05/03	2020/05/02
Wireless Conn. Tseter	R&S	CMW500	157118	2019/08/08	2020/08/07
Wideband Radio Communication Tester	R&S	CMW500	106071	2020/02/03	2021/02/02

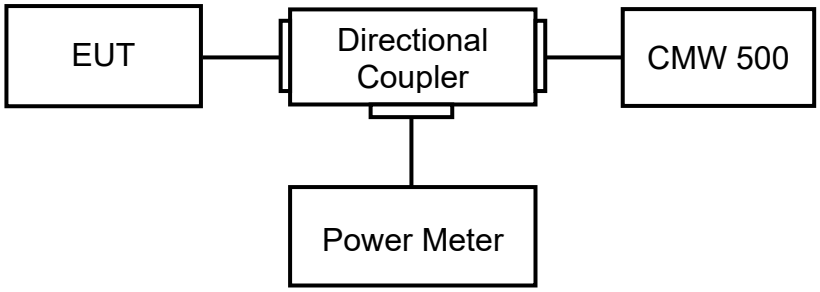
Note: All equipment upon which need to calibrated are with calibration period of 1 year.

2.4. Uncertainty

Test Item	Uncertainty
RF Output Power	±1.27 dB
Occupied Bandwidth	± 10 Hz
Peak To Average Ratio	Not exceed 13 dB
Spurious Emissions	± 1.27 dB for Conducted Measurement ± 3.2 dB for Radiated Measurement
Spurious Emissions at Antenna Terminals	± 3.2 dB
Frequency Stability	± 10 Hz

3. RF Output Power

3.1. Test Setup



3.2. Test Procedure

a) The RF output of the transmitter was connected to base station simulator.
b) The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
c) Set EUT at maximum average power by base station simulator.
d) Measure lowest, middle, and highest channels for each bandwidth and different modulation.

Effective Isotropic Radiated Power = Conducted Power(dBm) + Antenna Gain(dBi)
Effective Radiated Power = Conducted Power(dBm) + Antenna Gain(dBi) - 2.15dB
The conversion of dBm to watts is given by the formula:

$$P_{(W)} = 1W \times \frac{10^{\left(\frac{P_{(dBm)}}{10}\right)}}{1000} = 10^{((P_{(dBm)}-30)/10)}$$

3.3. Test Method

KDB 971168 D01 Power Meas License Digital Systems v03 sub-clause 5.2.4
ANSI C63.26: 2015 Sub-clause 5.2.4.2

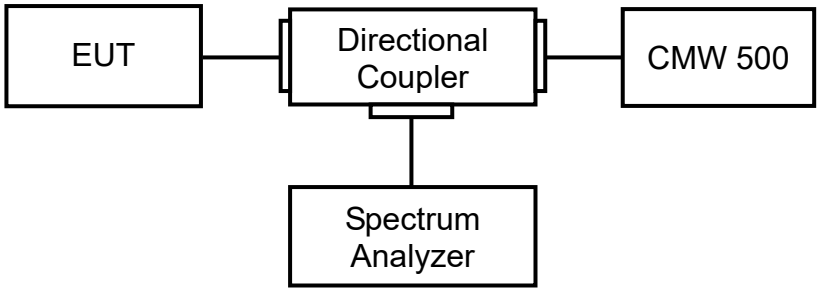
3.4. Test Result

Product	Edge Lite		
Test Item	RF Output Power		
Test Mode	Mode 1: LTE NB-IoT_Band 12		
Date of Test	2020/04/13	Test Site	SR12-H
Temperature (°C)	19.0	Humidity (%RH)	50.0

Channel	Freq. (MHz)	Modulation	BW (kHz)	RB No.	RB offset	Conducted Output Power (dBm)	RF Output Power (W) ERP	Limit (W) ERP
23011	699.1	BPSK	3.75	1	0	15.24	0.007	3
			15	1	0	15.45	0.007	3
		QPSK	3.75	1	0	15.25	0.007	3
			15	1	0	15.52	0.007	3
				12	0	13.95	0.005	3
23095	707.5	BPSK	3.75	1	0	15.53	0.007	3
			15	1	0	15.70	0.007	3
		QPSK	3.75	1	0	15.49	0.007	3
			15	1	0	15.78	0.007	3
				12	0	14.21	0.005	3
23178	715.8	BPSK	3.75	1	47	16.13	0.008	3
			15	1	11	16.31	0.008	3
		QPSK	3.75	1	47	16.16	0.008	3
			15	1	11	16.34	0.008	3
				12	0	14.82	0.006	3

4. Occupied Bandwidth

4.1. Test Setup



4.2. Test Procedure

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The 26 dB bandwidth and 99% occupied bandwidth of the low & middle & high channel for the highest RF powers were measured.

4.3. Test Method

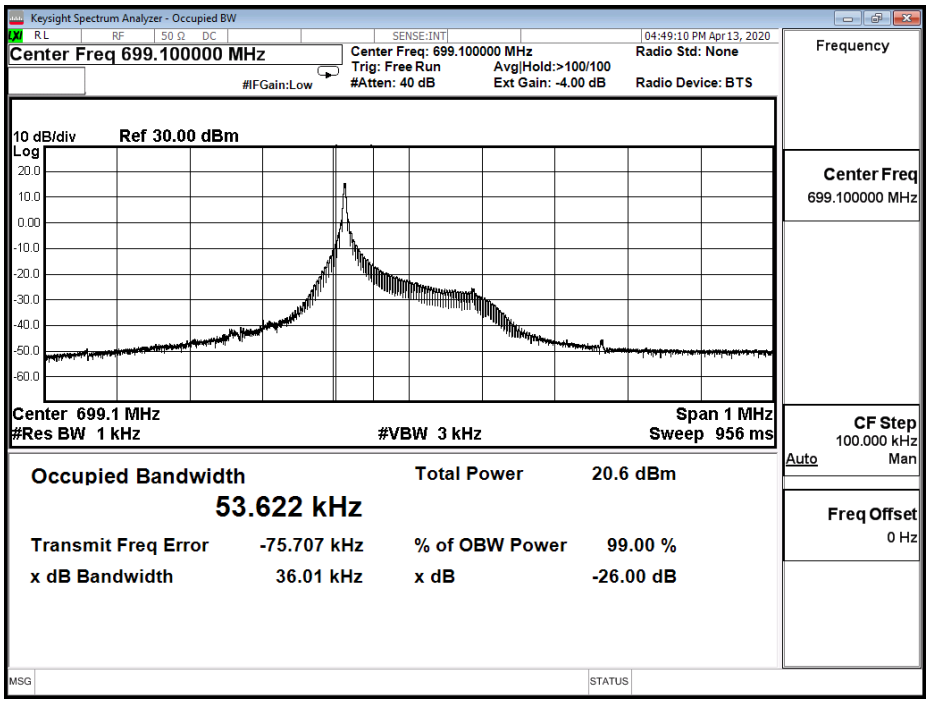
KDB 971168 D01 Power Meas License Digital Systems v03 sub-clause 4.2 & 4.3
ANSI C63.26: 2015 Sub-clause 5.4.3 & 5.4.4

4.4. Test Result

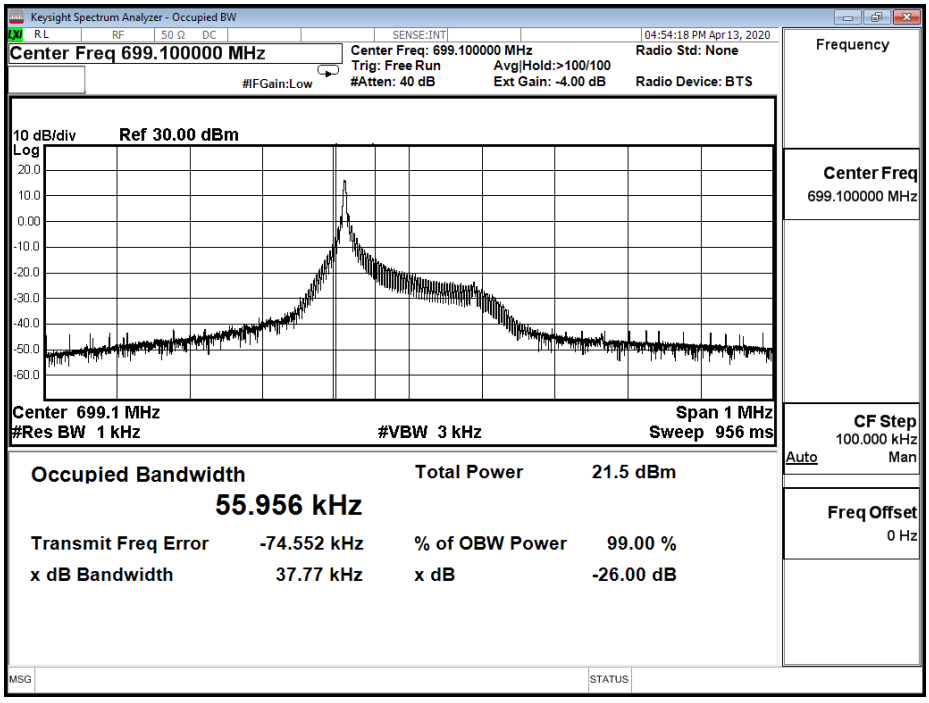
Product	Edge Lite		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: LTE NB-IoT_Band 12		
Date of Test	2020/04/13	Test Site	SR12-H
Temperature (°C)	19.0	Humidity (%RH)	50.0

Channel	Freq. (MHz)	Modulation	BW (kHz)	RB No.	RB offset	Measure Level (kHz)		Limit (MHz)
						26dB BW	99% BW	
23011	699.1	BPSK	3.75	1	0	36.010	53.622	NA
			15	1	0	103.800	127.970	NA
		QPSK	3.75	1	0	37.770	55.956	NA
			15	1	0	116.300	120.660	NA
				12	0	247.300	184.410	NA
23095	707.5	BPSK	3.75	1	0	33.430	52.681	NA
			15	1	0	105.700	127.710	NA
		QPSK	3.75	1	0	40.410	54.734	NA
			15	1	0	116.700	119.910	NA
				12	0	247.300	185.120	NA
23178	715.8	BPSK	3.75	1	47	33.520	53.324	NA
			15	1	11	100.500	124.450	NA
		QPSK	3.75	1	47	37.530	52.925	NA
			15	1	11	115.800	122.430	NA
				12	0	236.800	187.650	NA

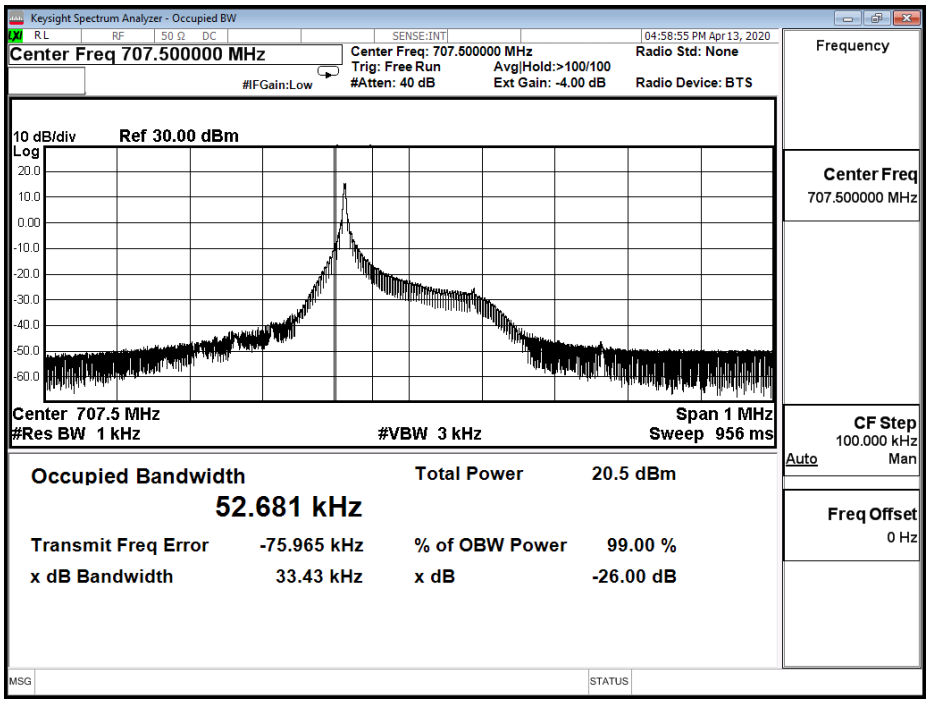
B12_3.75K_CH23011_BPSK_1RB0



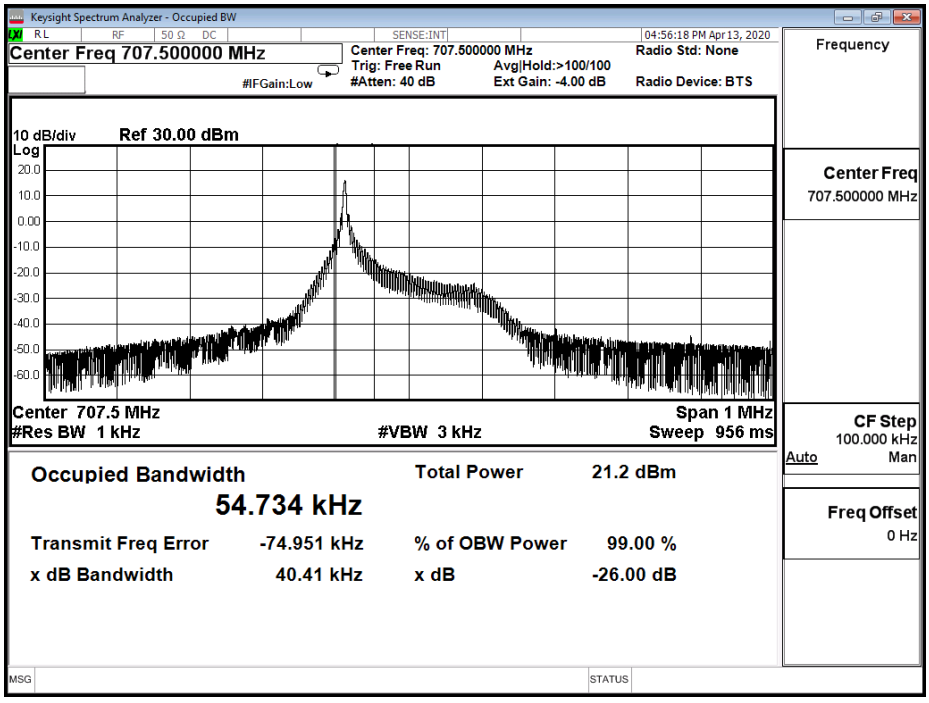
B12_3.75K_CH23011_QPSK_1RB0



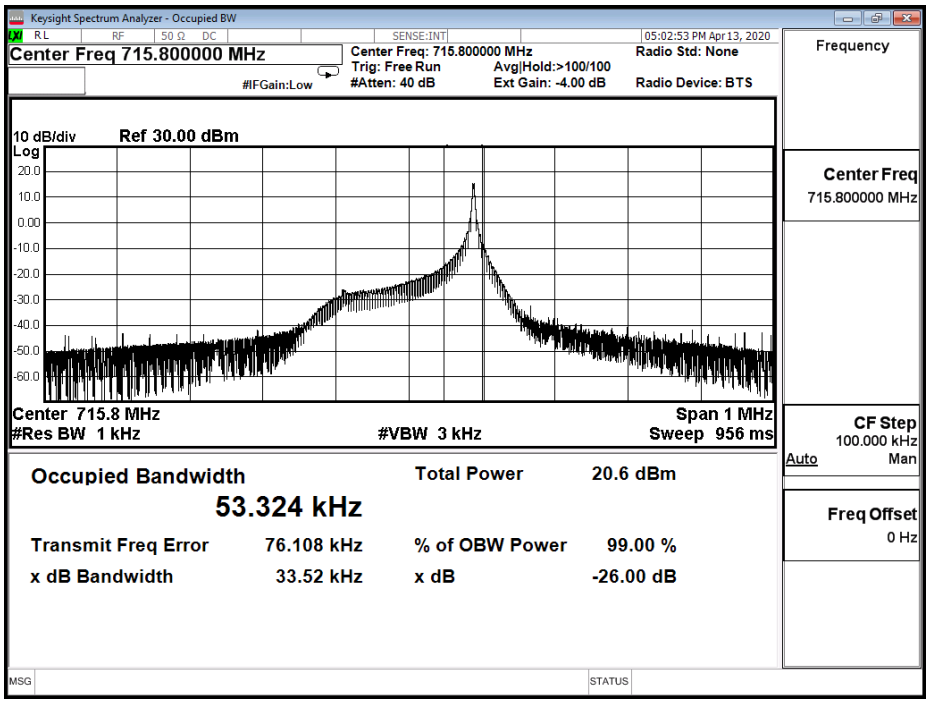
B12_3.75K_CH23095_BPSK_1RB0



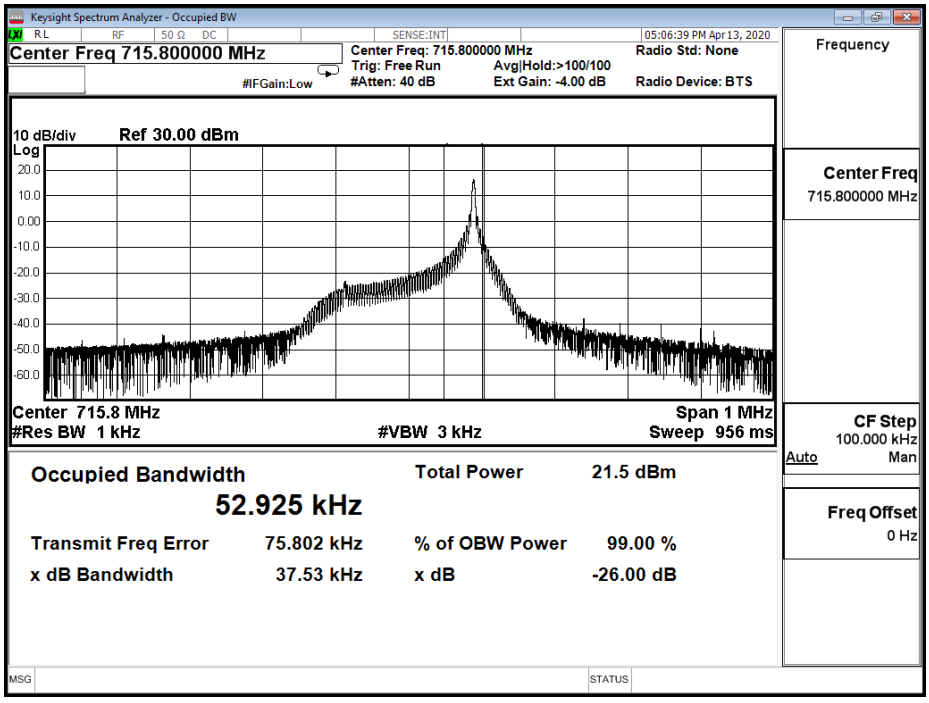
B12_3.75K_CH23095_QPSK_1RB0



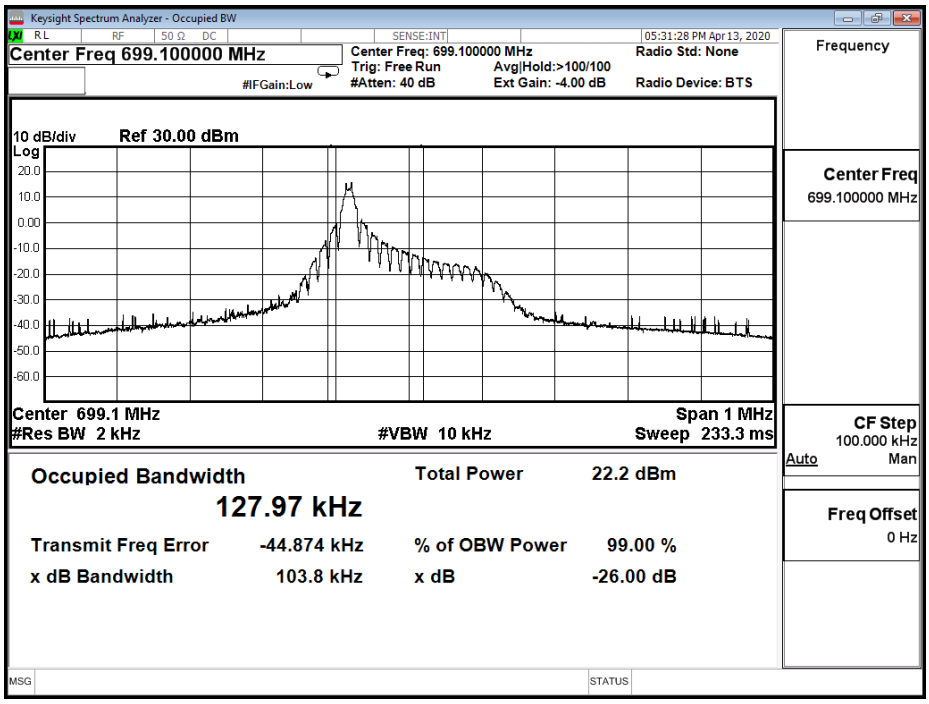
B12_3.75K_CH23178_BPSK_1RB47



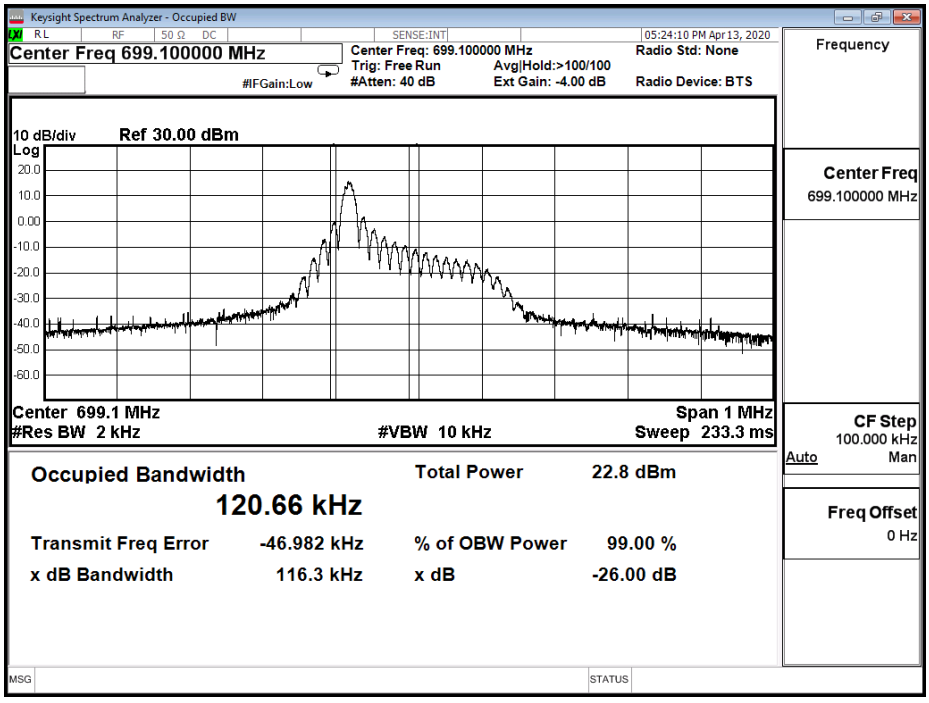
B12_3.75K_CH23178_QPSK_1RB47



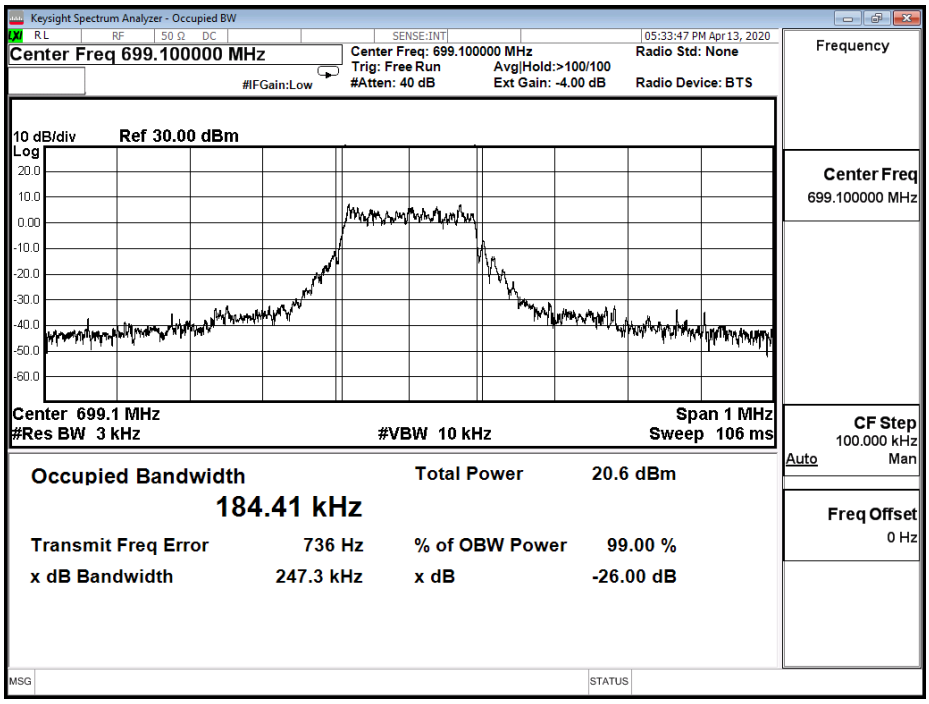
B12_15K_CH23011_BPSK_1RB0



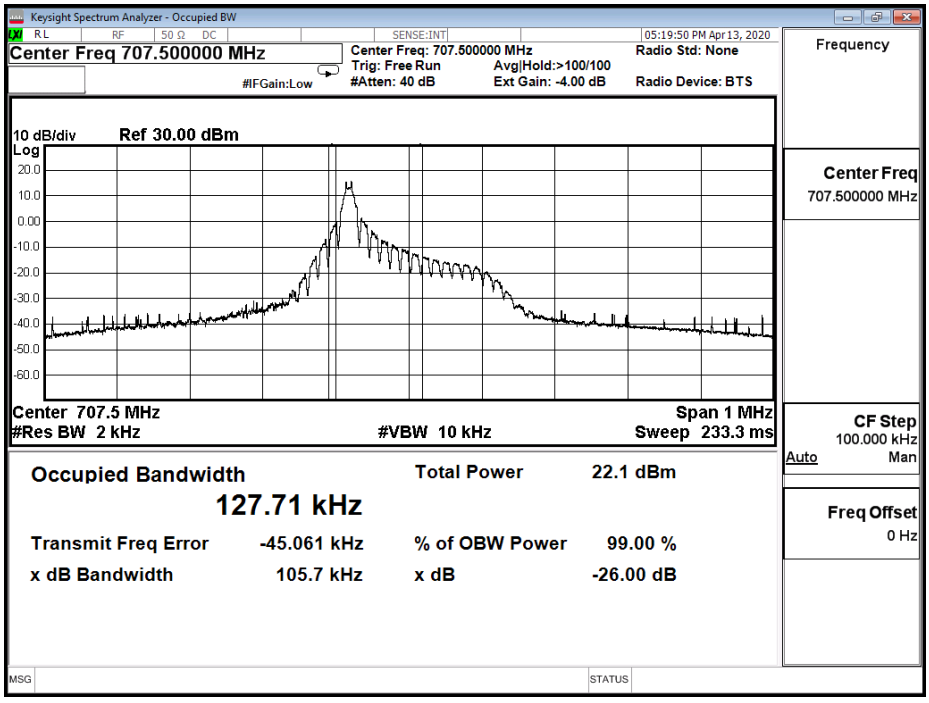
B12_15K_CH23011_QPSK_1RB0



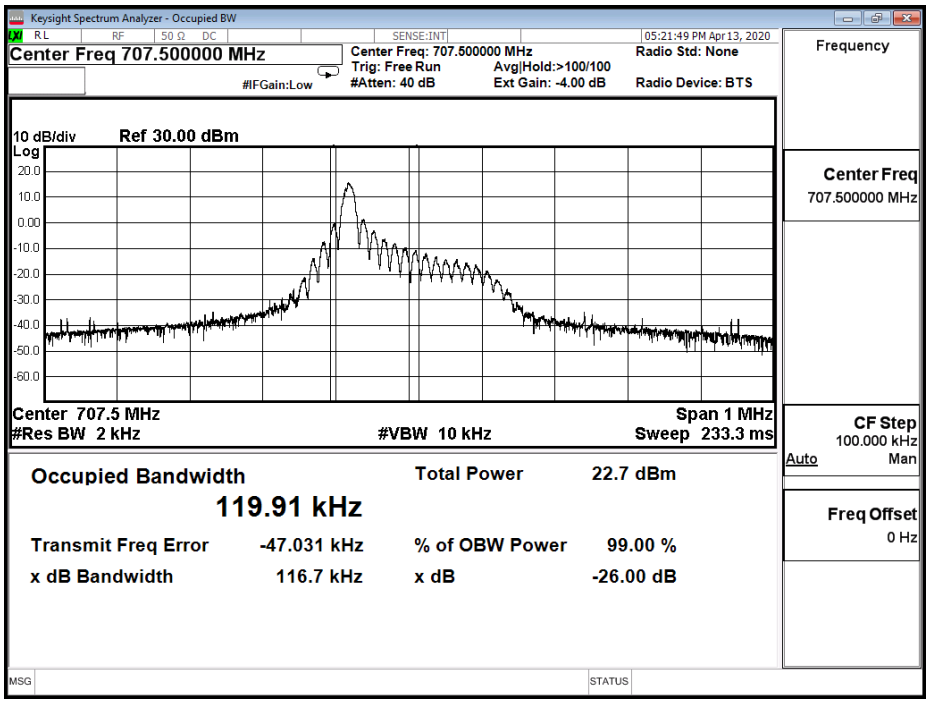
B12_15K_CH23011_QPSK_12RB0



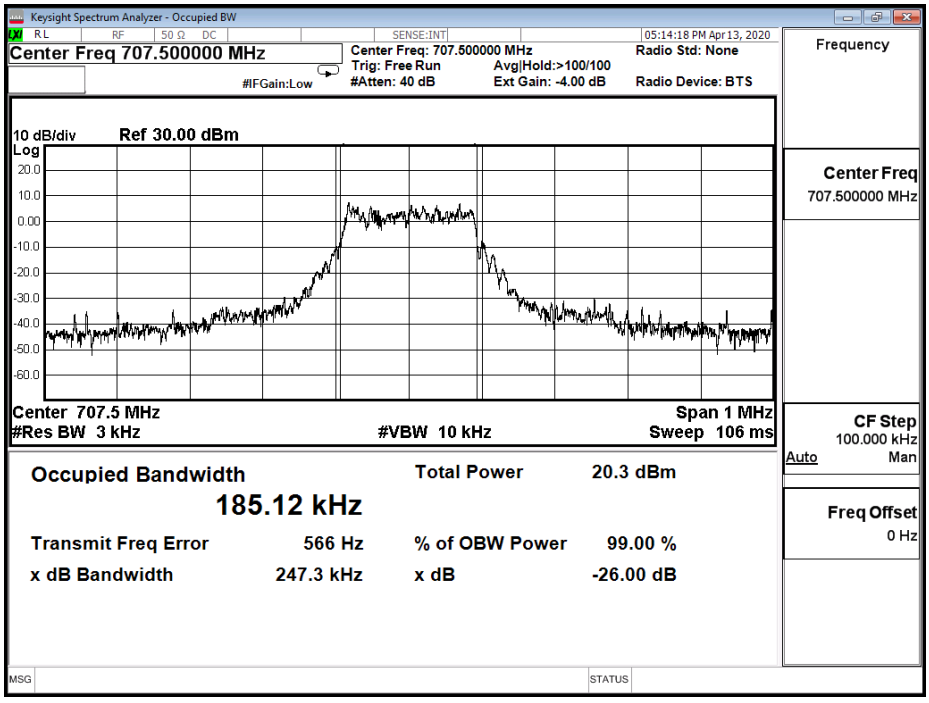
B12_15K_CH23095_BPSK_1RB0



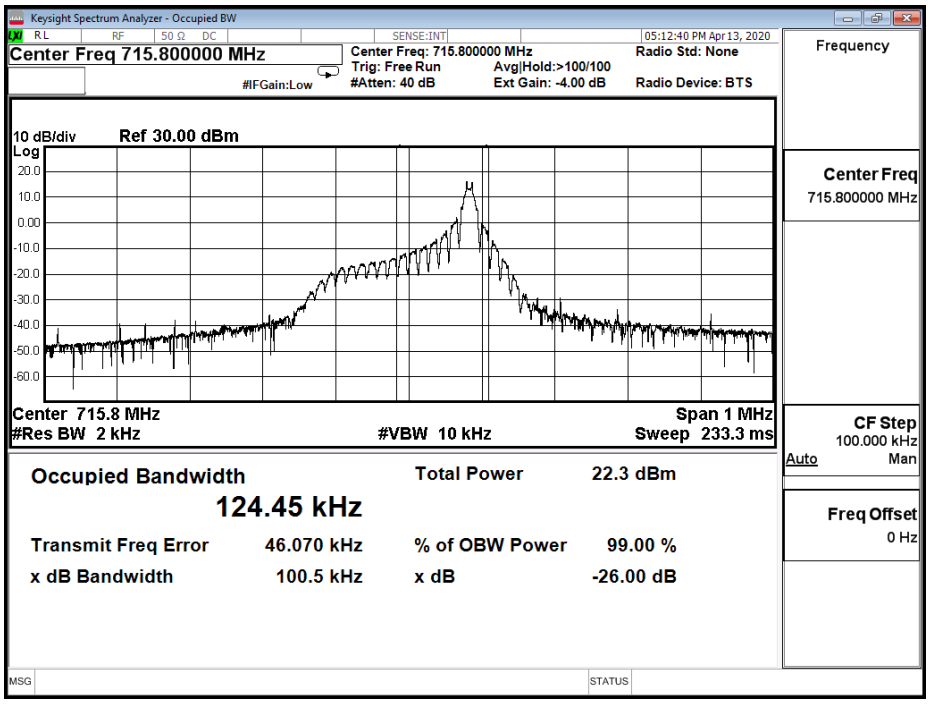
B12_15K_CH23095_QPSK_1RB0



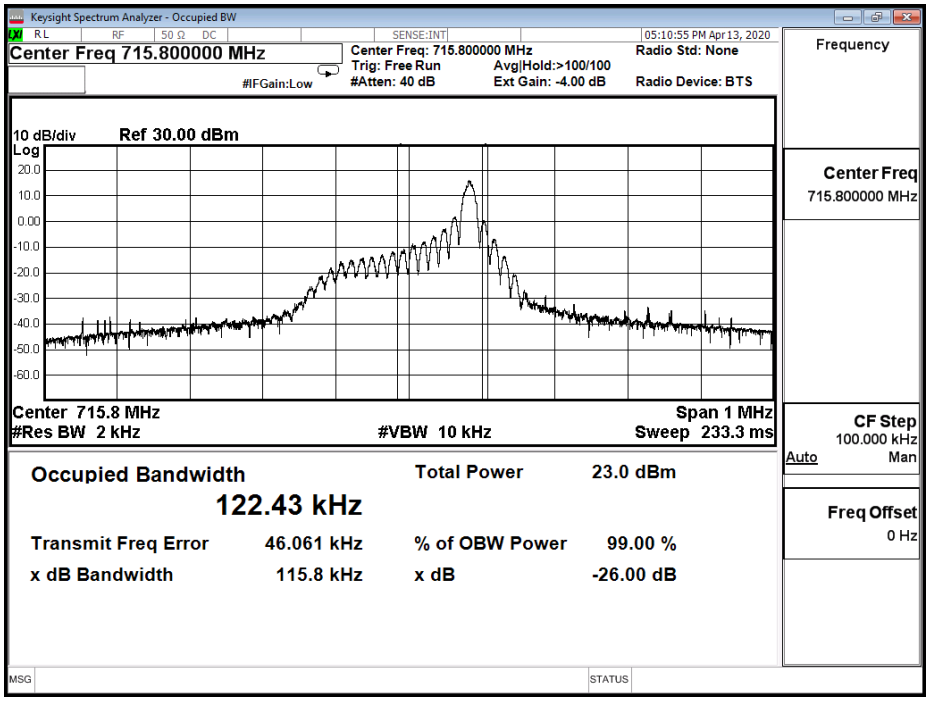
B12_15K_CH23095_QPSK_12RB0



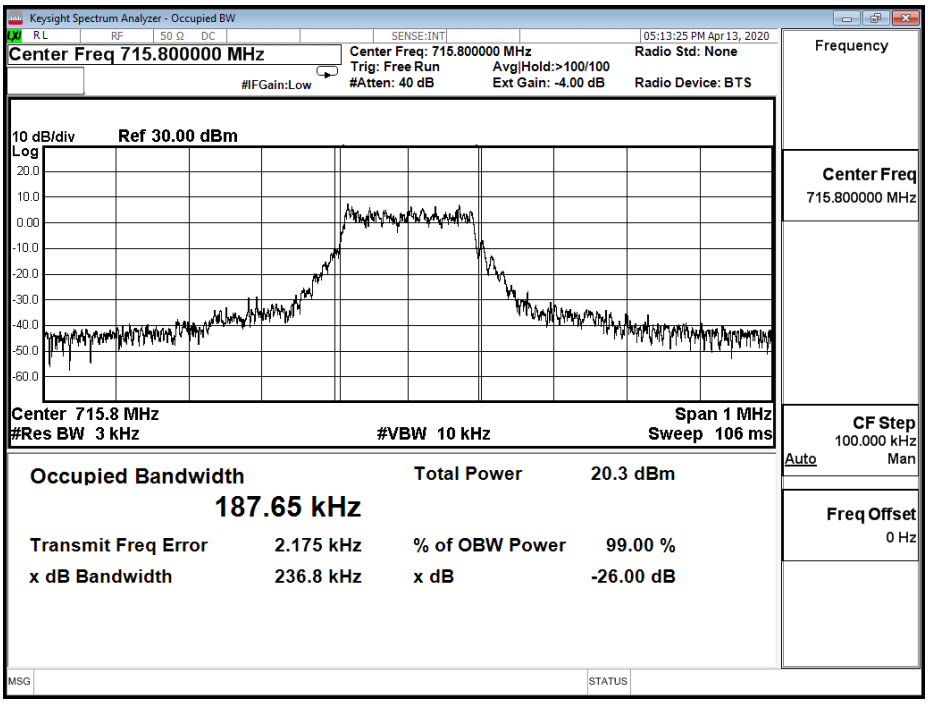
B12_15K_CH23178_BPSK_1RB11



B12_15K_CH23178_QPSK_1RB11

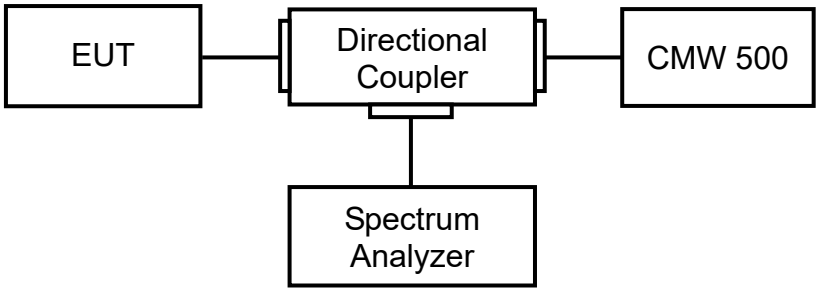


B12_15K_CH23178_QPSK_12RB0



5. Peak To Average Ratio

5.1. Test Setup



5.2. Test Procedure

1. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth.
2. Set the number of counts to a value that stabilizes the measured CCDF curve.
3. Record the maximum PAPR level associated with a probability of 0.1 %.

5.3. Test Method

KDB 971168 D01 Power Meas License Digital Systems v03 sub-clause 5.7.2
ANSI C63.26: 2015 Sub-clause 5.2.3.4

5.4. Limit

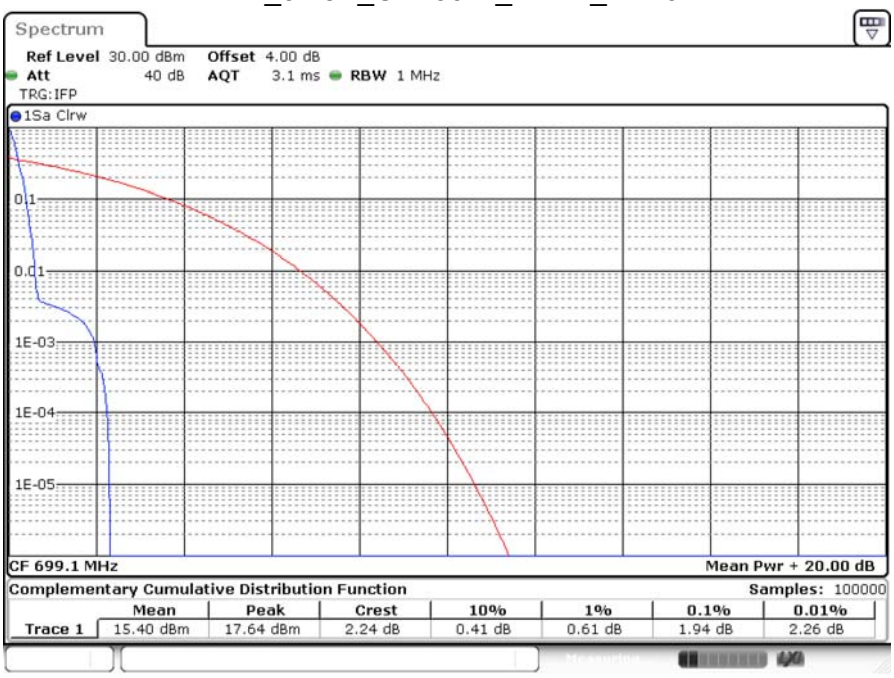
In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13dB.

5.5. Test Result

Product	Edge Lite		
Test Item	Peak To Average Ratio		
Test Mode	Mode 1: LTE NB-IoT_Band 12		
Date of Test	2020/04/14	Test Site	SR12-H
Temperature (°C)	20.0	Humidity (%RH)	44.0

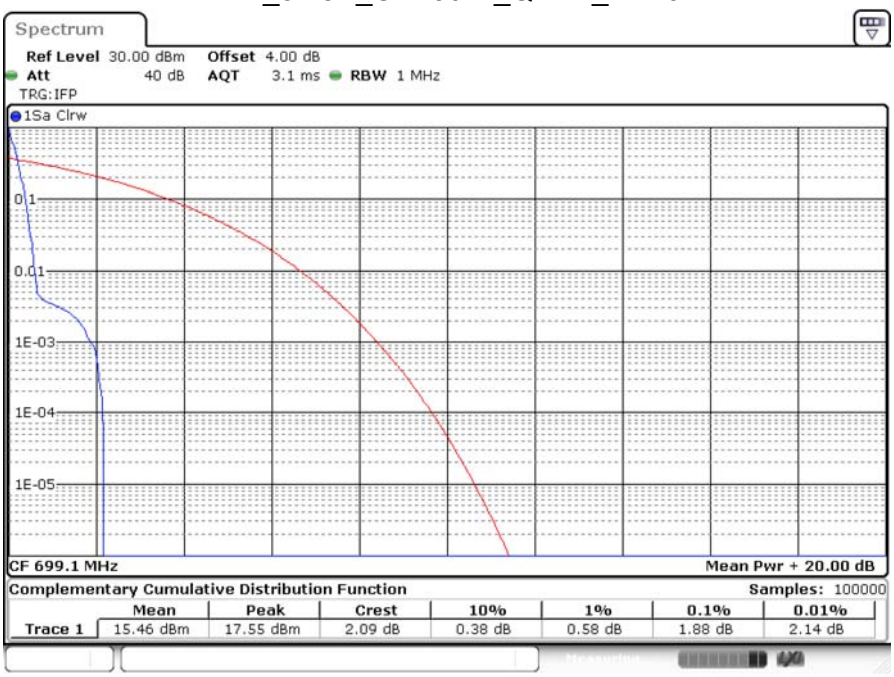
Channel	Freq. (MHz)	BW (kHz)	Modulation	RB No.	RB offset	Average (dBm)	Peak (dBm)	PAPR 0.01% (dB)
23011	699.1	3.75	BPSK	1	0	15.40	17.64	1.94
			QPSK	1	0	15.97	17.57	1.59
		15	BPSK	1	0	15.46	17.55	1.88
			QPSK	1	0	16.27	18.21	1.74
				12	0	9.96	21.72	11.01
23095	707.5	3.75	BPSK	1	0	15.15	17.18	1.80
			QPSK	1	0	15.72	17.22	1.51
		15	BPSK	1	0	15.54	17.59	1.77
			QPSK	1	0	15.97	17.82	1.68
				12	0	9.64	21.88	11.68
23178	715.8	3.75	BPSK	1	47	15.37	17.37	1.97
			QPSK	1	47	15.99	17.51	1.54
		15	BPSK	1	11	15.60	17.62	1.62
			QPSK	1	11	16.21	17.97	1.59
				12	0	9.82	21.34	10.81

B12_3.75K_CH23011_BPSK_1RB0



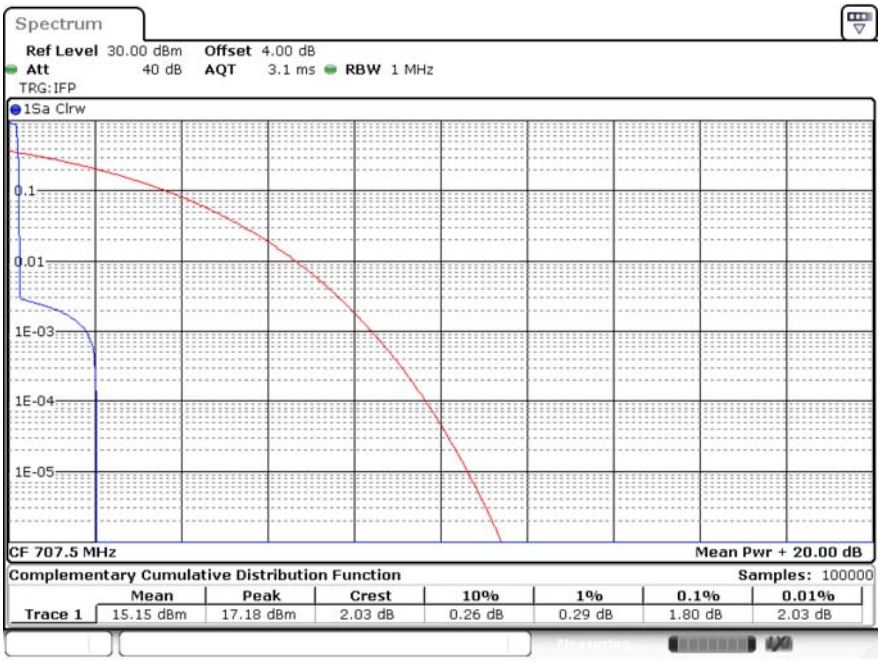
Date: 16.APR.2020 09:44:13

B12_3.75K_CH23011_QPSK_1RB0



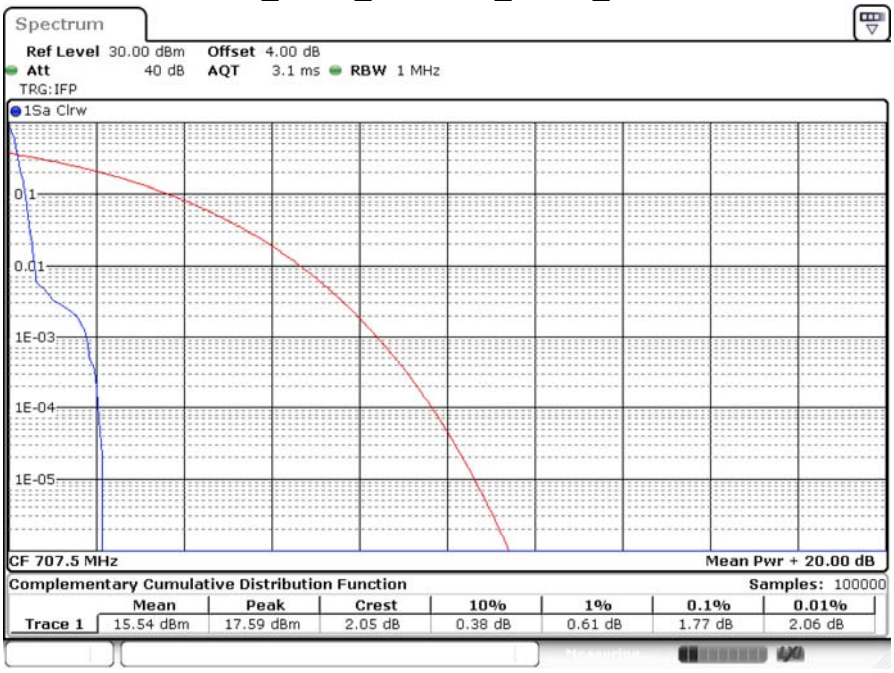
Date: 16.APR.2020 09:45:14

B12_3.75K_CH23095_BPSK_1RB0



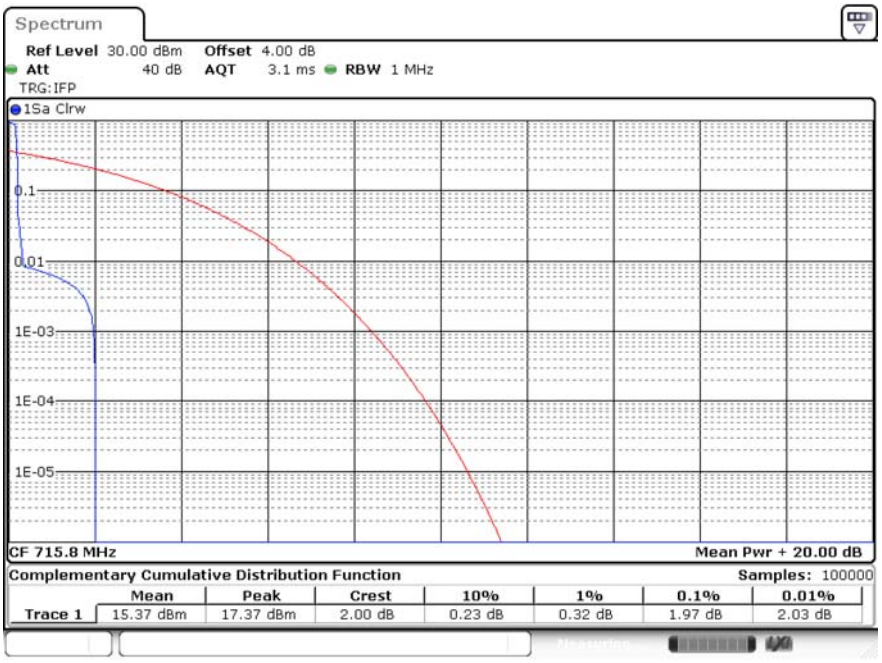
Date: 16.APR.2020 09:45:44

B12_3.75K_CH23095_QPSK_1RB0



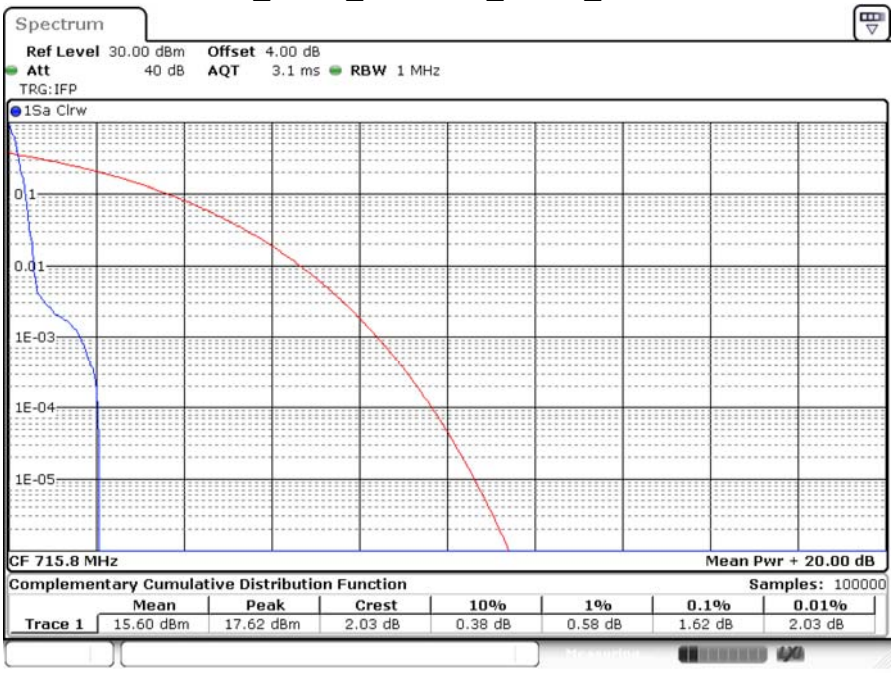
Date: 16.APR.2020 09:45:33

B12_3.75K_CH23178_BPSK_1RB47



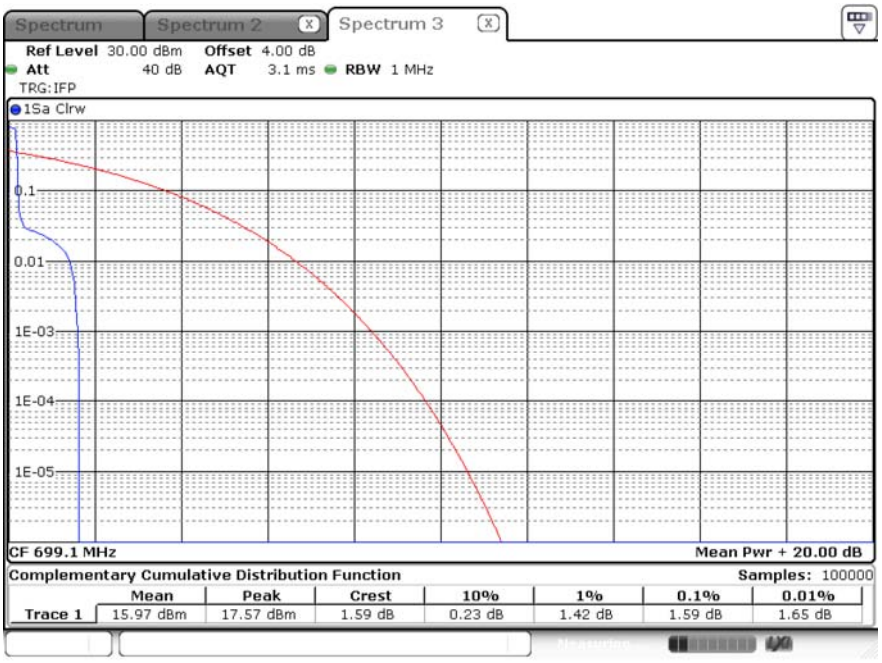
Date: 16.APR.2020 09:47:13

B12_3.75K_CH23178_QPSK_1RB47



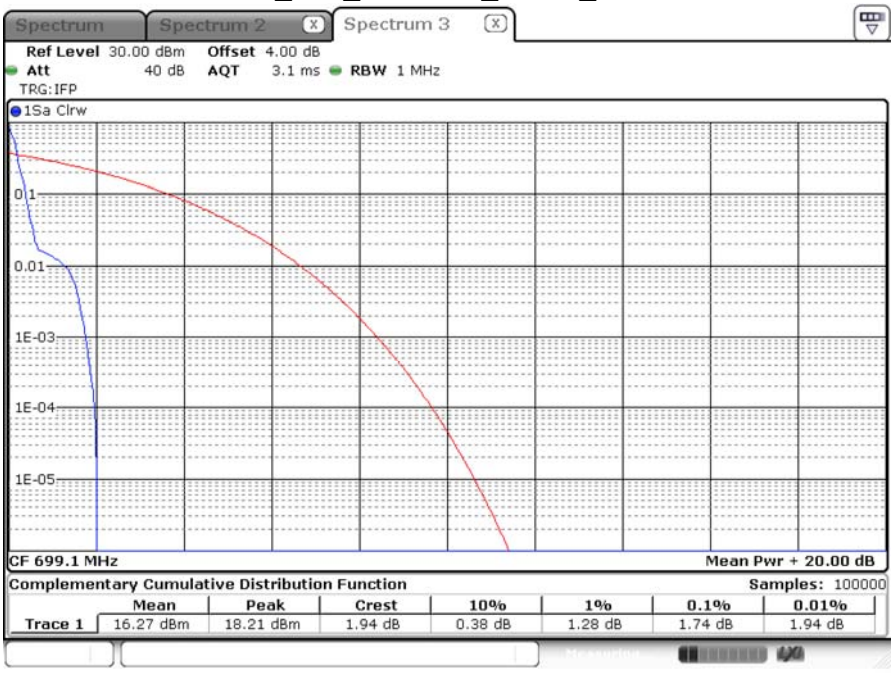
Date: 16.APR.2020 09:47:23

B12_15K_CH23011_BPSK_1RB0



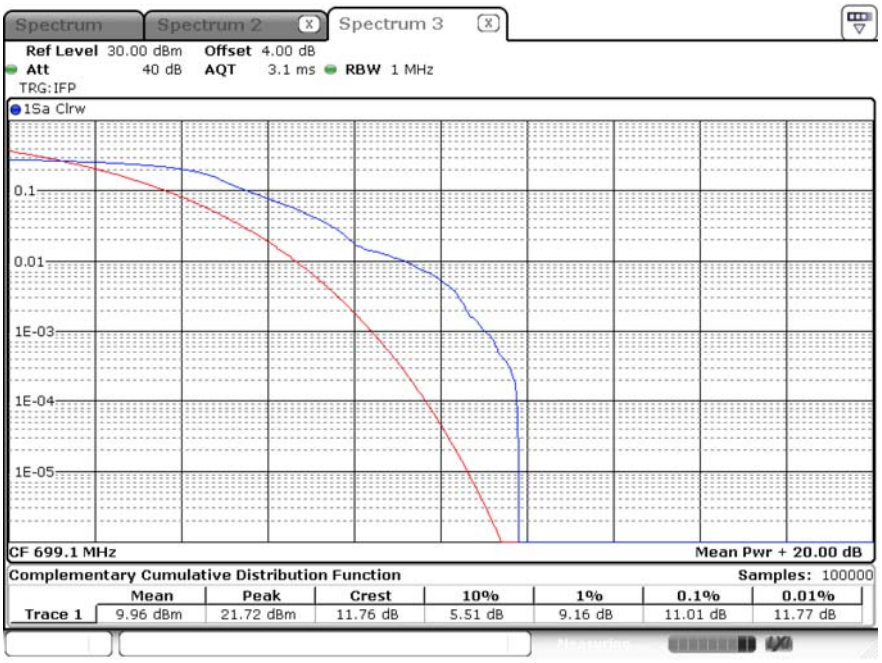
Date: 14.APR.2020 11:09:25

B12_15K_CH23011_QPSK_1RB0



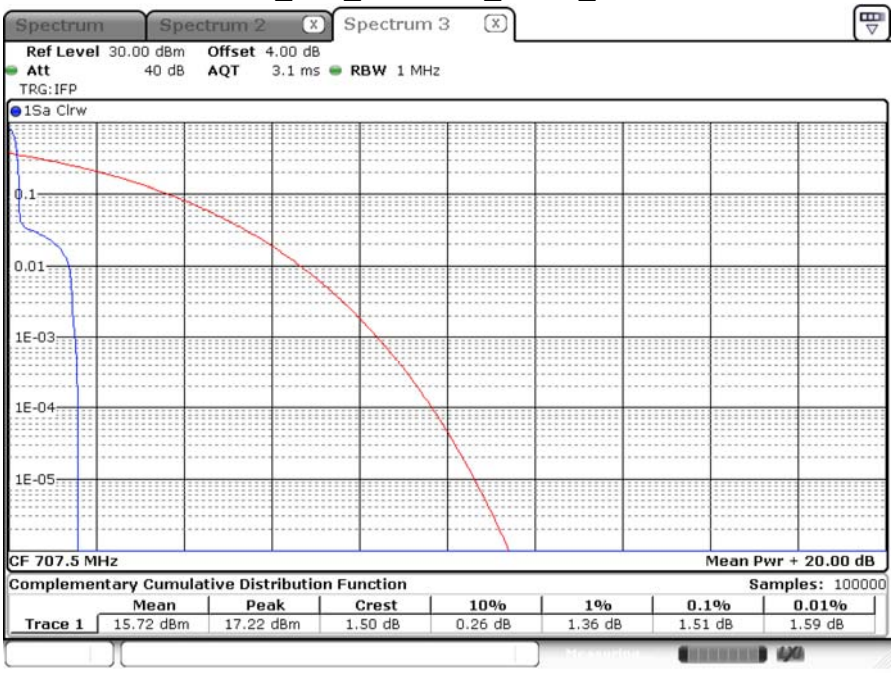
Date: 14.APR.2020 11:08:04

B12_15K_CH23011_QPSK_12RB0



Date: 14.APR.2020 11:09:02

B12_15K_CH23095_BPSK_1RB0

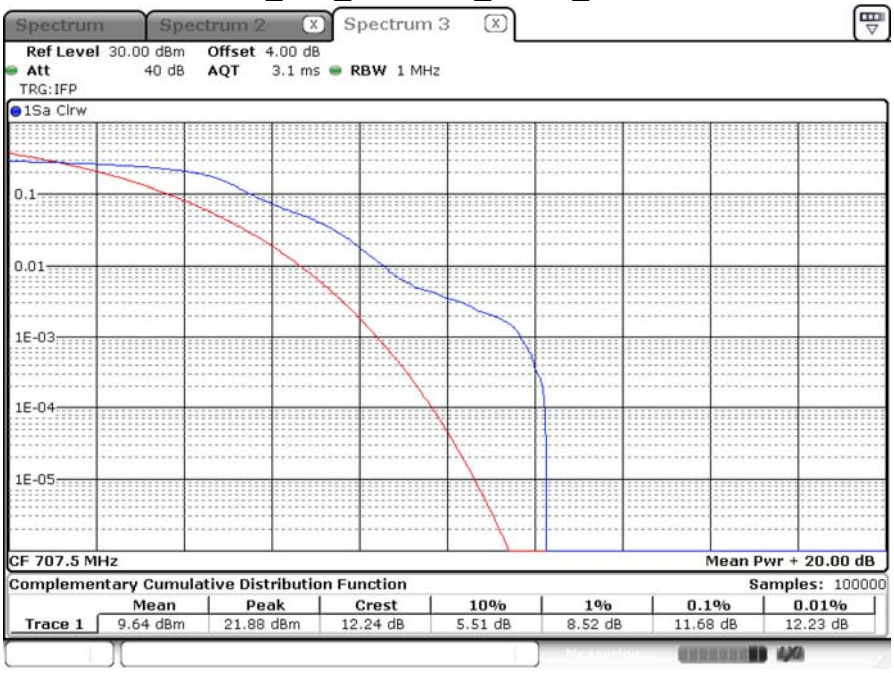


Date: 14.APR.2020 11:36:15

B12_15K_CH23095_QPSK_1RB0

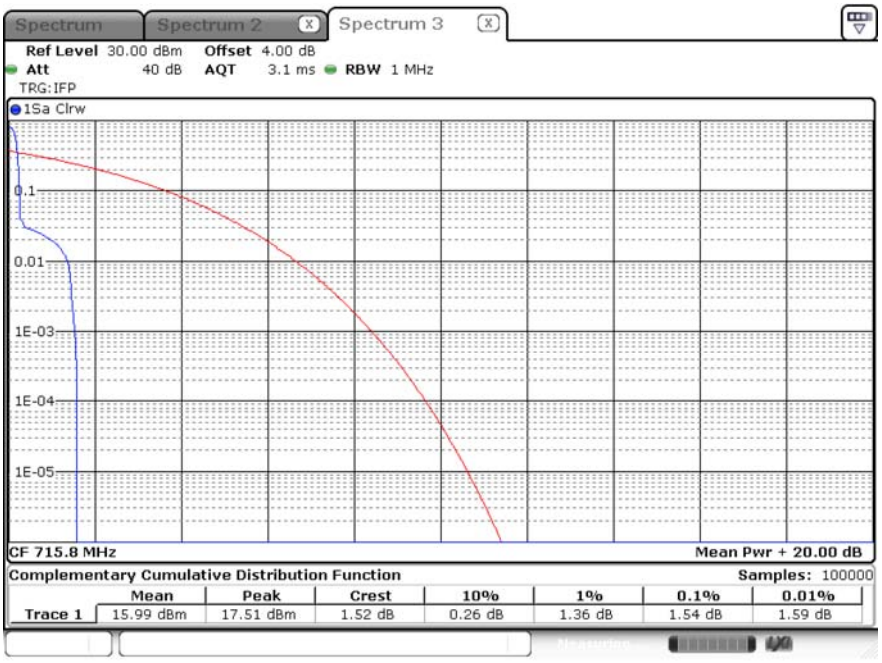
Date: 14.APR.2020 11:37:09

B12_15K_CH23095_QPSK_12RB0



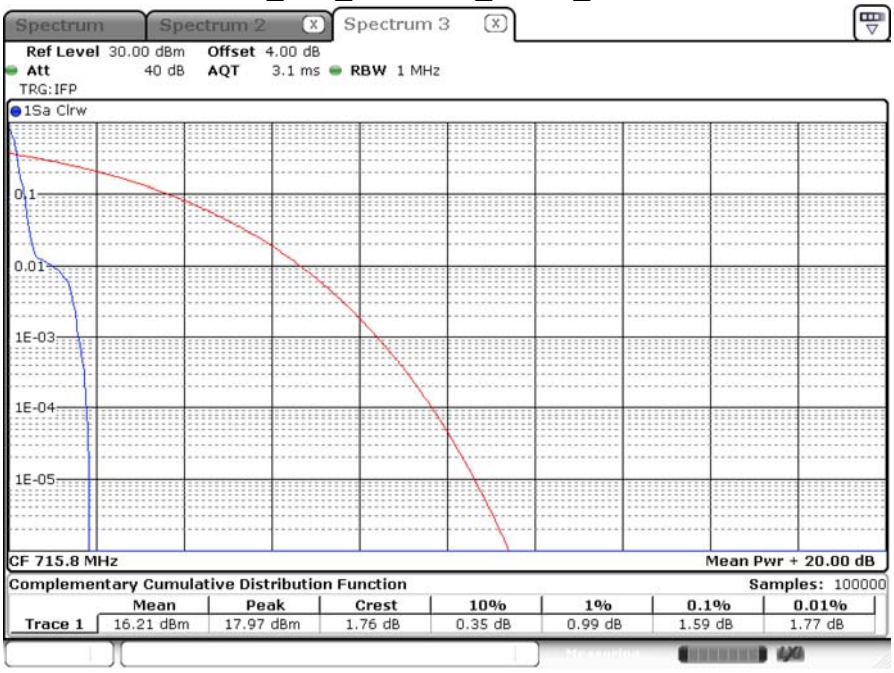
Date: 14.APR.2020 11:37:56

B12_15K_CH23178_BPSK_1RB11



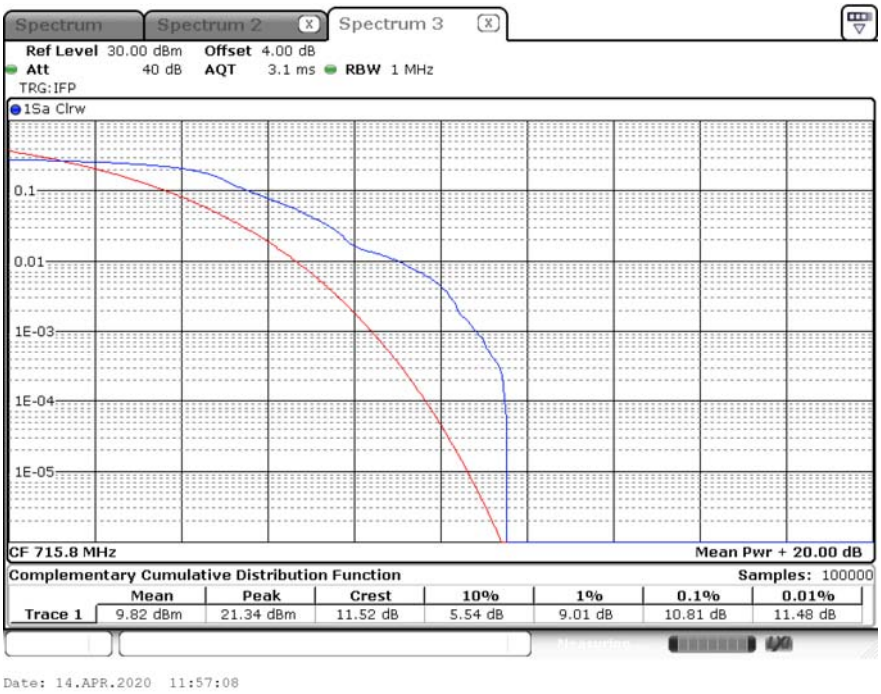
Date: 14.APR.2020 11:57:33

B12_15K_CH23178_QPSK_1RB11



Date: 14.APR.2020 11:57:46

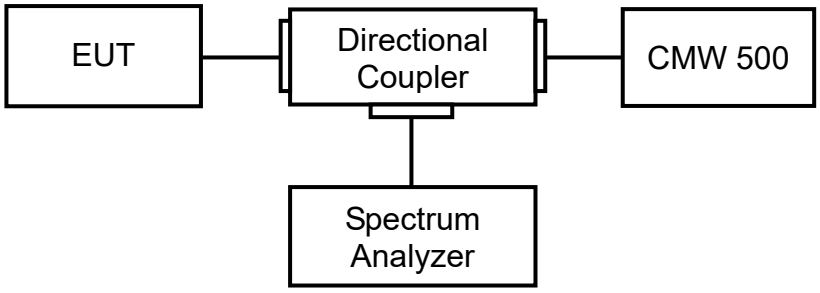
B12_15K_CH23178_QPSK_12RB0



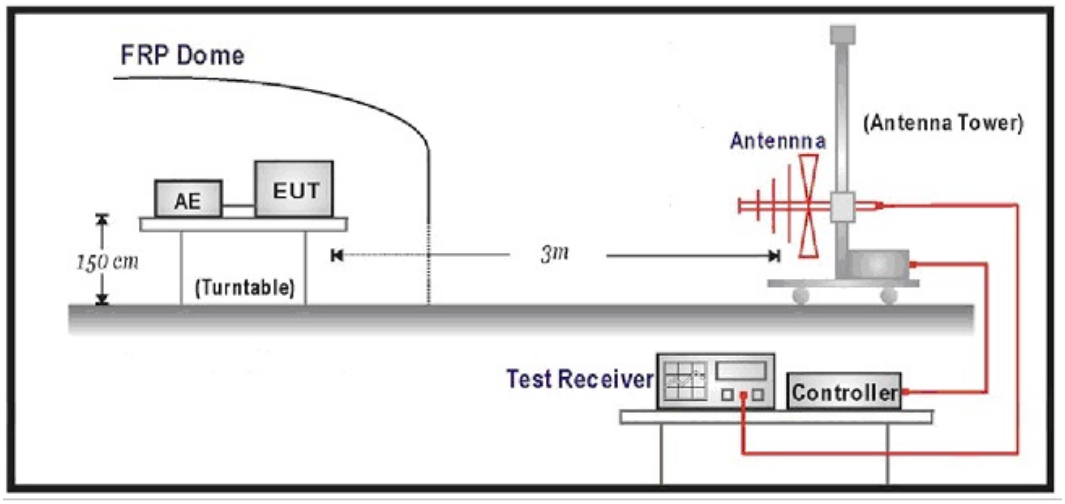
6. Spurious Emissions

6.1. Test Setup

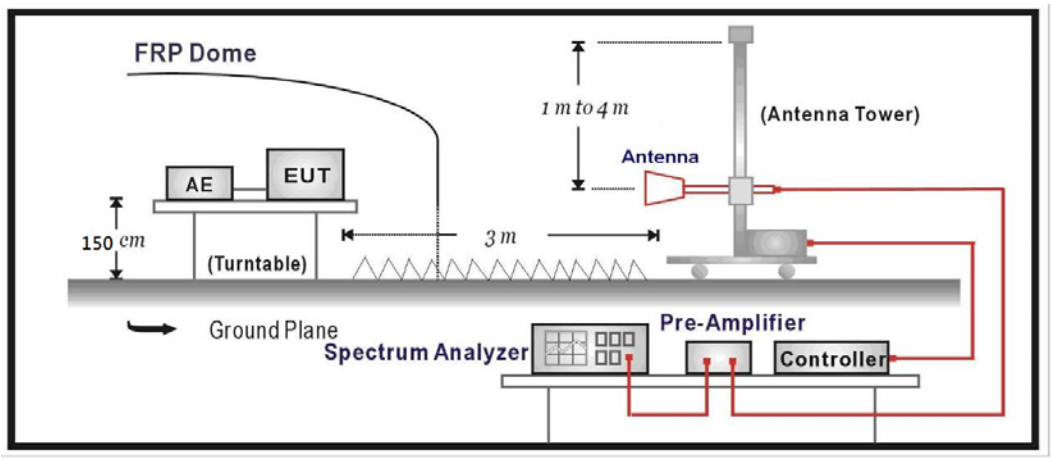
Conducted Spurious Measurement:



Radiated Spurious Measurement (below 1GHz)



Radiated Spurious Measurement (above 1GHz)



6.2. Test Procedure

Conducted Spurious Measurement:

a) Place the EUT on a bench and set it in transmitting mode.
b) Connect a low loss RF cable from the antenna port to a spectrum analyzer and CMW500 by a Directional Couple.
c) EUT Communicate with CMW500, then select a channel for testing.
d) Add a correction factor to the display of spectrum, and then test.
e) The resolution bandwidth of the spectrum analyzer was set at 1 MHz, sufficient scans were taken to show the out of band Emission if any up to 10^{th} harmonic.

Radiated Spurious Measurement:

a) The EUT was placed on a rotatable wooden table with 1.5 meter above ground.
b) The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
c) The table was rotated 360 degrees to determine the position of the highest spurious emission.
d) The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
e) Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 1MHz, Sweep 500ms, Taking the record of maximum spurious emission.
f) A horn antenna was substituted in place of the EUT and was driven by a signal generator.
g) Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
h) Taking the record of output power at antenna port
i) Repeat step 7 to step 8 for another polarization.
j) EIRP = SG - Cable loss + Antenna Gain

6.3. Test Method

Conducted Spurious Measurement:

KDB 971168 D01 Power Meas License Digital Systems v03 sub-clause 6.1
ANSI C63.26: 2015 Sub-clause 5.7

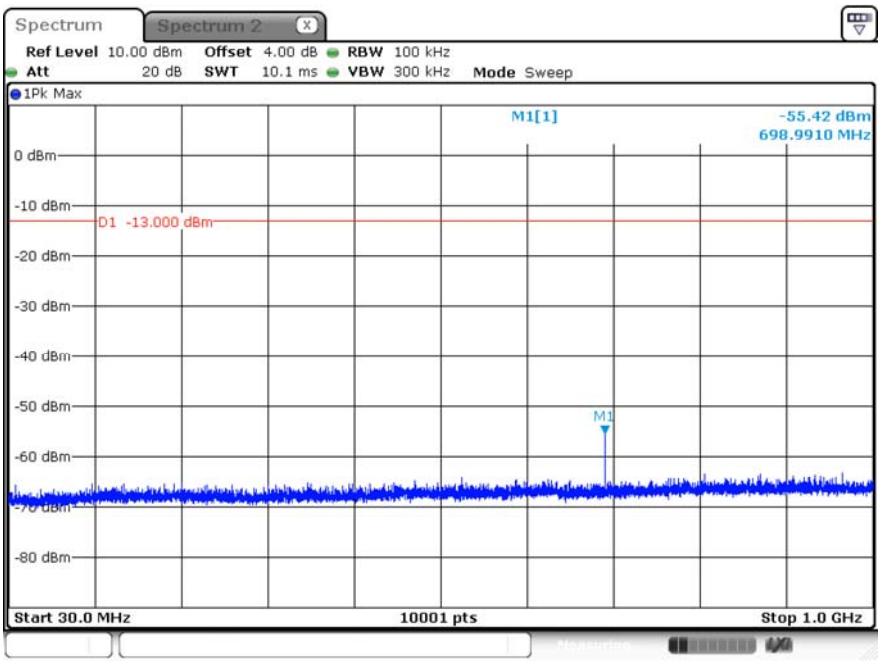
Radiated Spurious Measurement:

KDB 971168 D01 Power Meas License Digital Systems v03 sub-clause 5.8
ANSI C63.26: 2015 Sub-clause 5.5.3.2

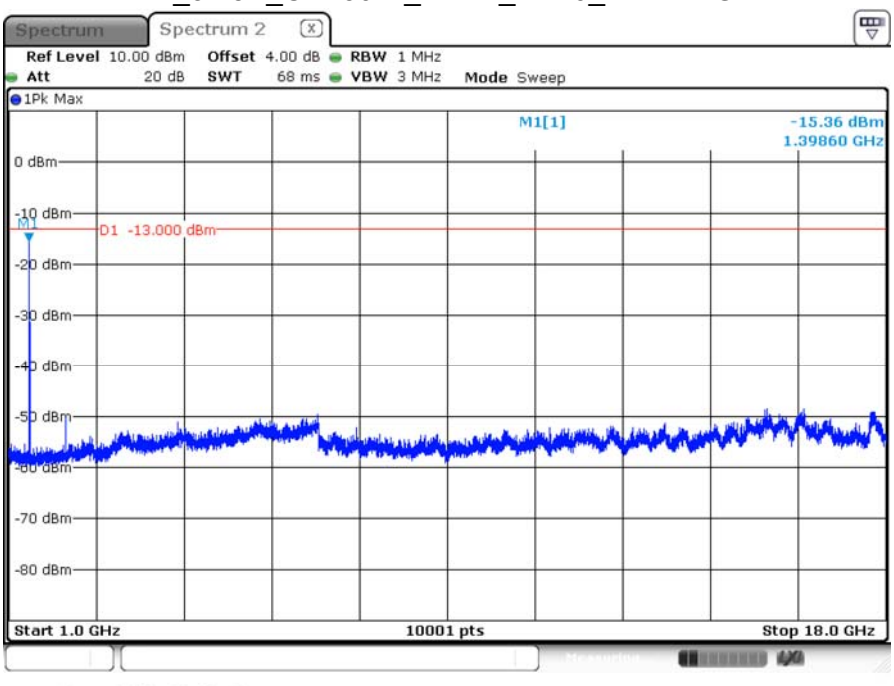
6.4. Test Result

Product	Edge Lite		
Test Item	Conducted Spurious Emissions		
Test Mode	Mode 1: LTE NB-IoT_Band 12		
Date of Test	2020/04/14	Test Site	SR12-H
Temperature (°C)	20.0	Humidity (%RH)	44.0

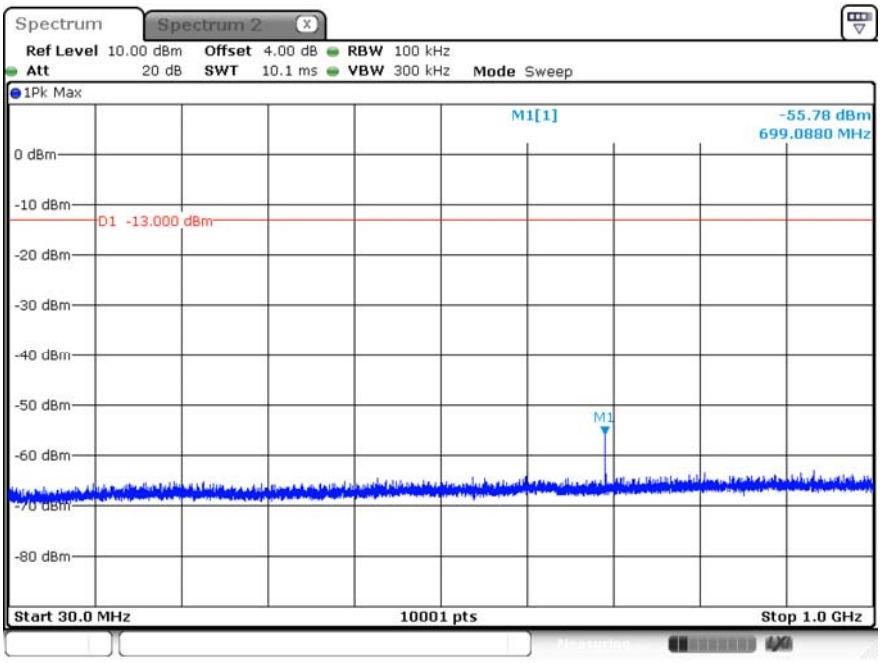
B12_3.75K_CH23011_BPSK_1RB0_Below 1GHz



B12_3.75K_CH23011_BPSK_1RB0_Above 1GHz

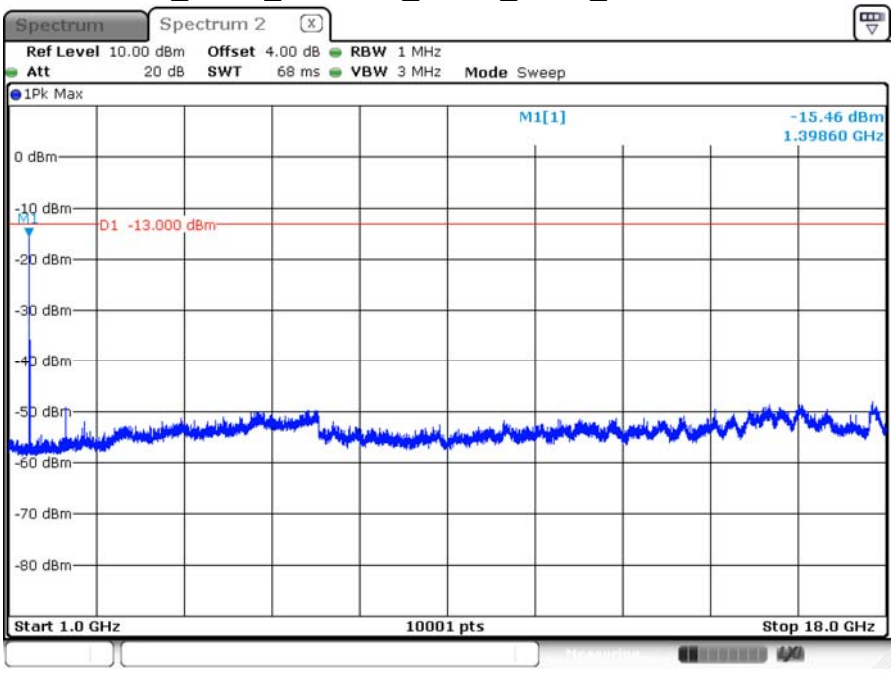


B12_3.75K_CH23011_QPSK_1RB0_Below 1GHz



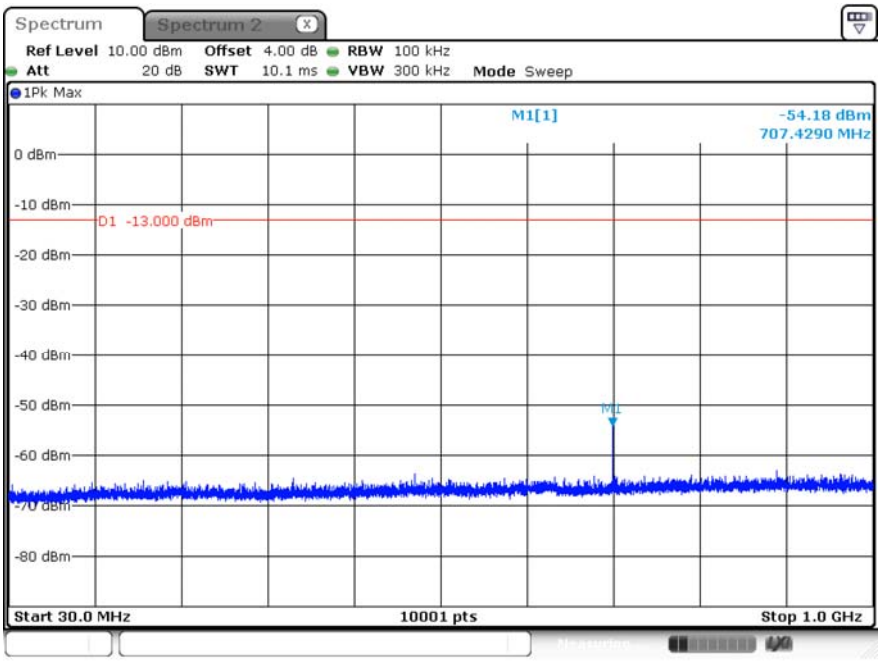
Date: 14.APR.2020 09:56:36

B12_3.75K_CH23011_QPSK_1RB0_Above 1GHz



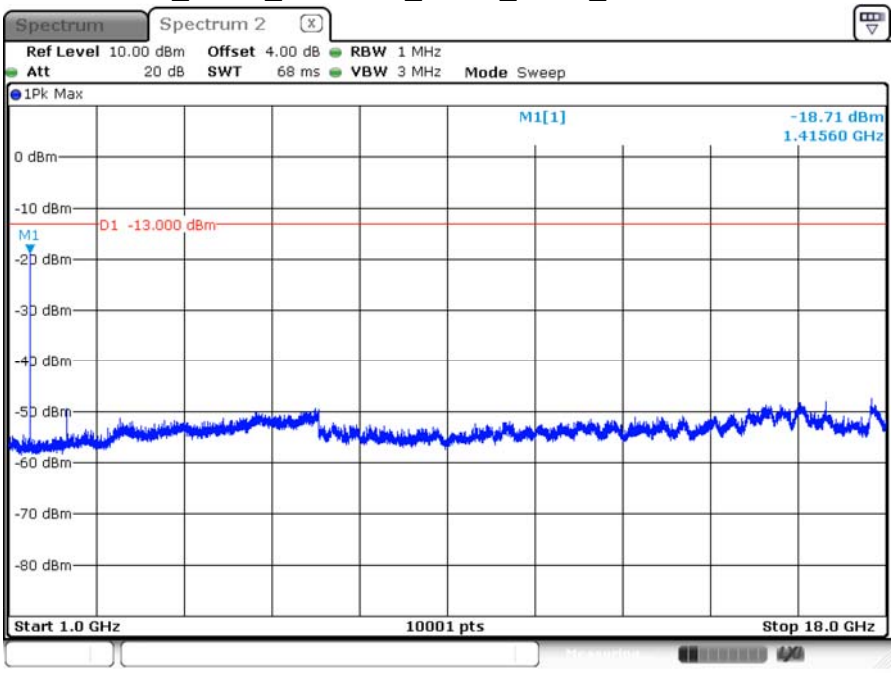
Date: 14.APR.2020 09:57:16

B12_3.75K_CH23095_BPSK_1RB0_Below 1GHz



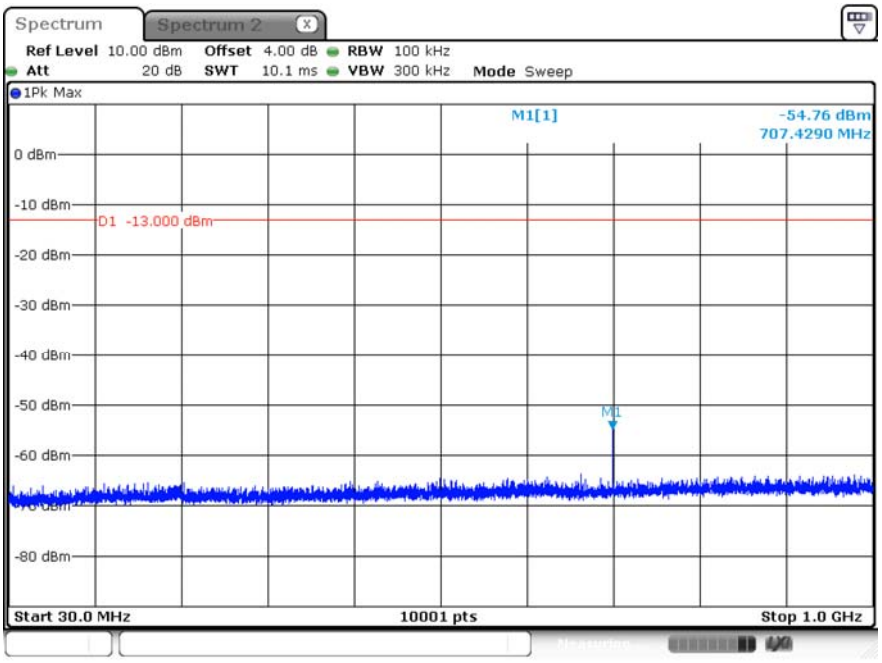
Date: 14.APR.2020 10:00:48

B12_3.75K_CH23095_BPSK_1RB0_Above 1GHz

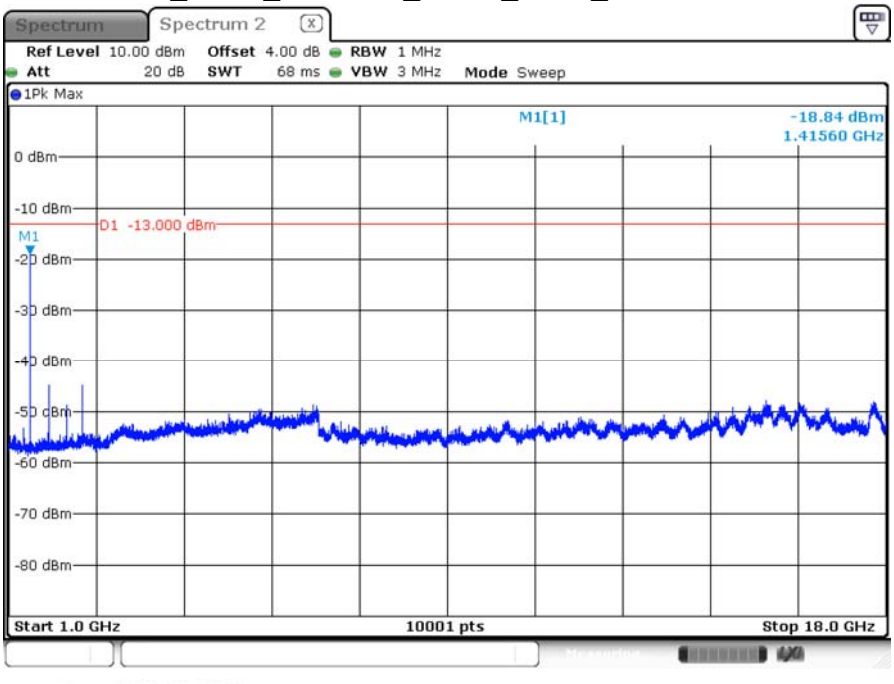


Date: 14.APR.2020 10:01:54

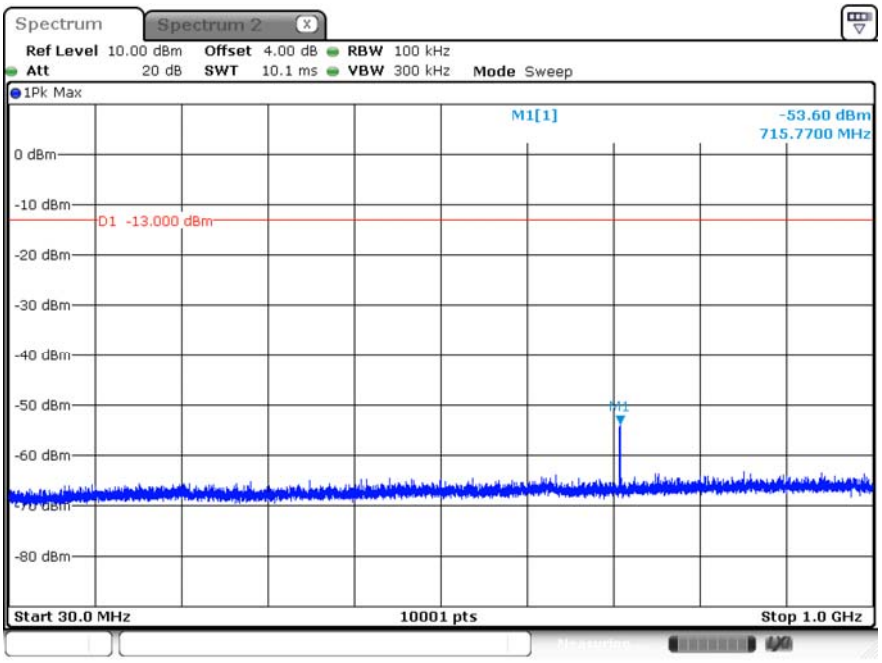
B12_3.75K_CH23095_QPSK_1RB0_Below 1GHz



B12_3.75K_CH23095_QPSK_1RB0_Above 1GHz

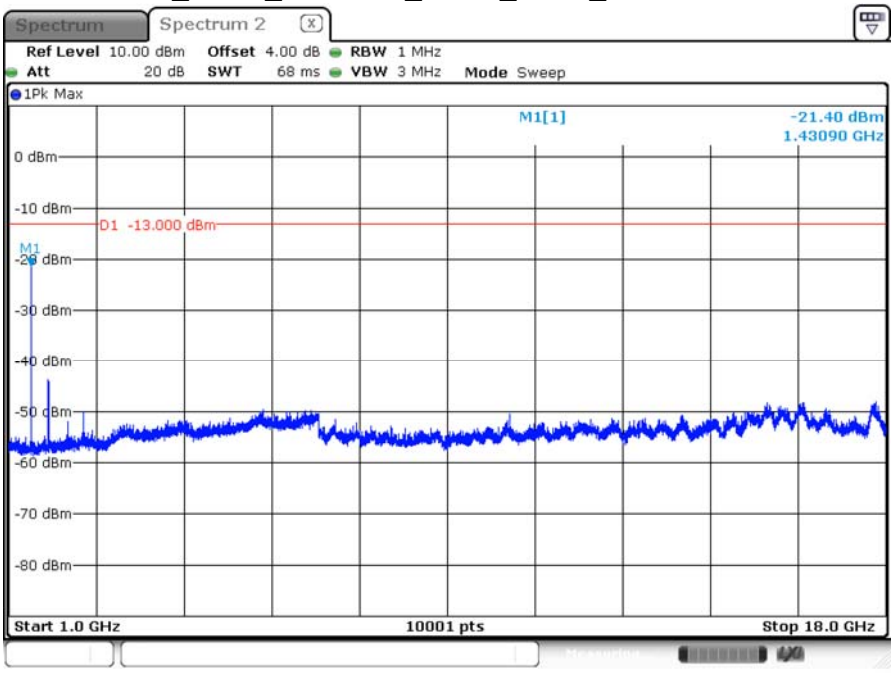


B12_3.75K_CH23178_BPSK_1RB0_Below 1GHz



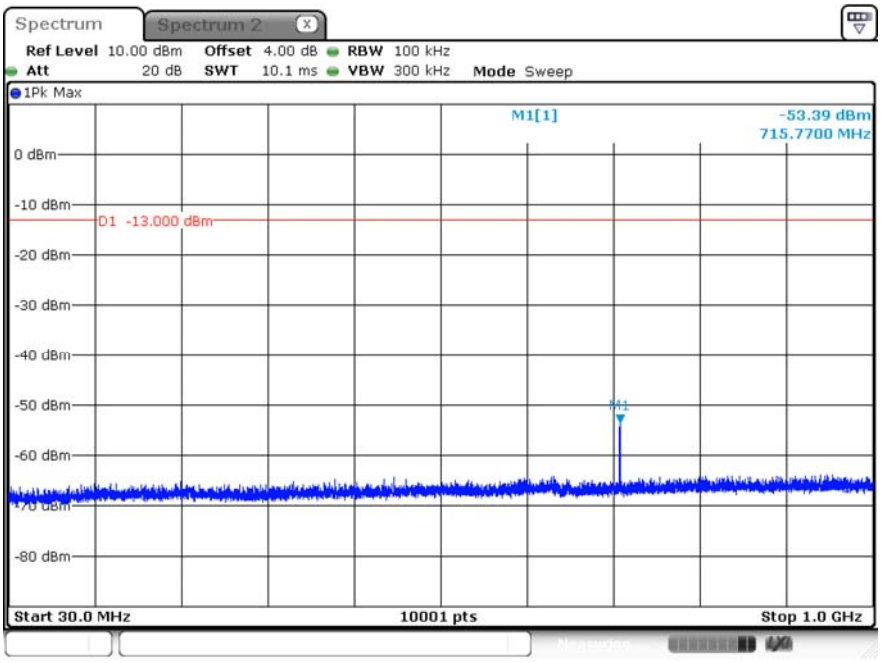
Date: 14.APR.2020 10:03:52

B12_3.75K_CH23178_BPSK_1RB0_Above 1GHz



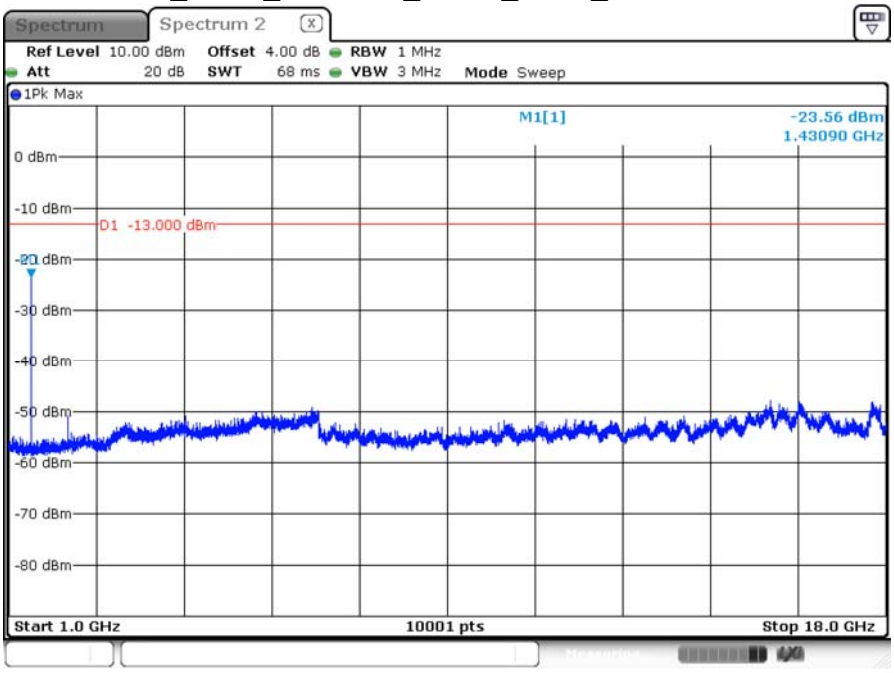
Date: 14.APR.2020 10:02:52

B12_3.75K_CH23178_QPSK_1RB0_Below 1GHz



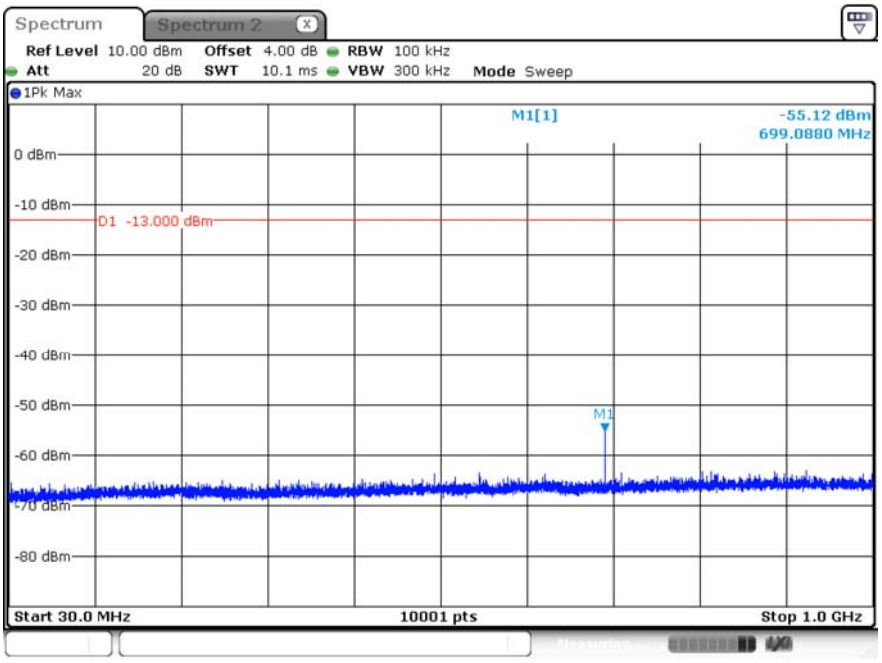
Date: 14.APR.2020 10:05:03

B12_3.75K_CH23178_QPSK_1RB0_Above 1GHz



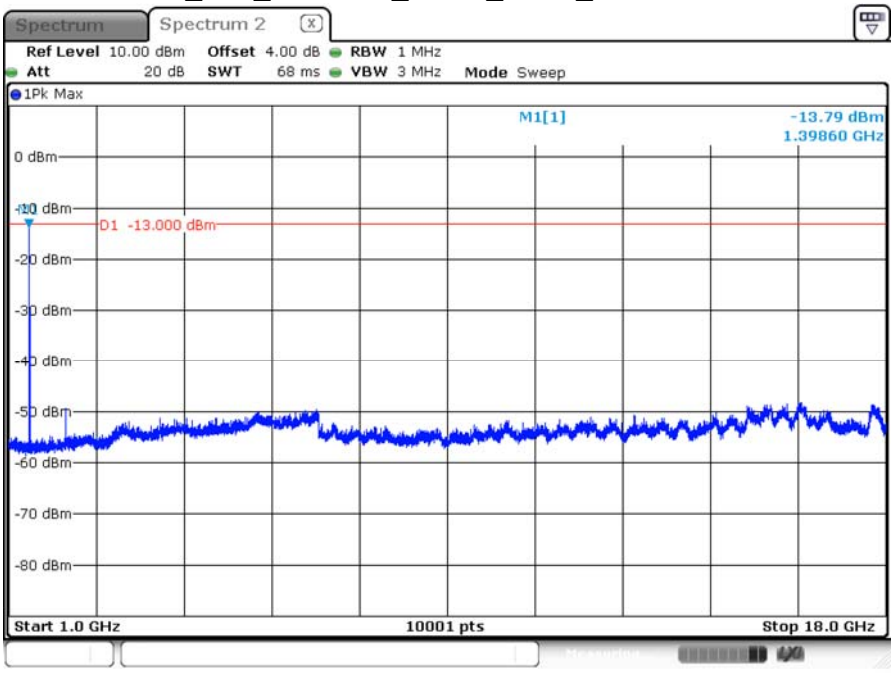
Date: 14.APR.2020 10:05:44

B12_15K_CH23011_BPSK_1RB0_Below 1GHz



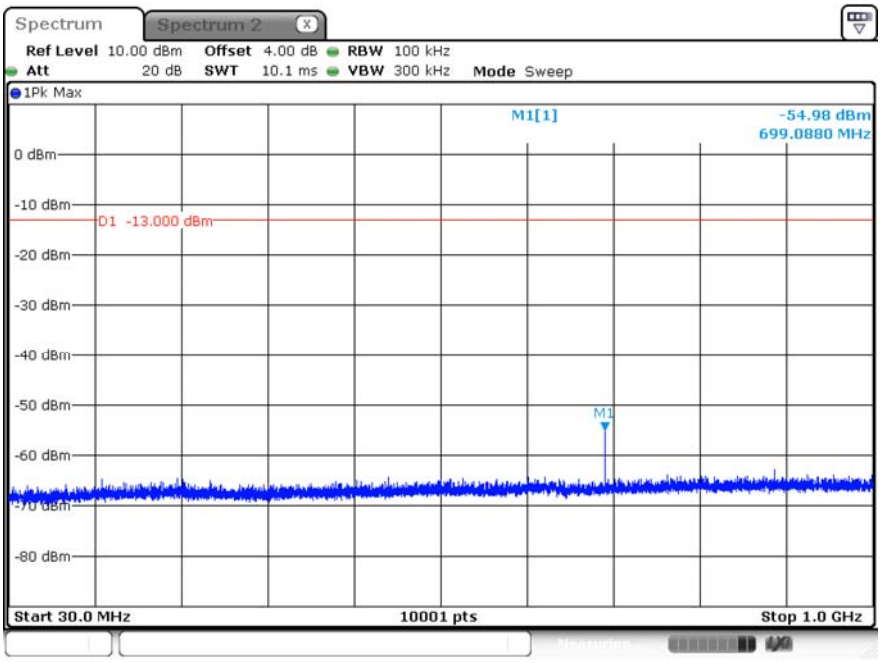
Date: 14.APR.2020 10:42:46

B12_15K_CH23011_BPSK_1RB0_Above 1GHz



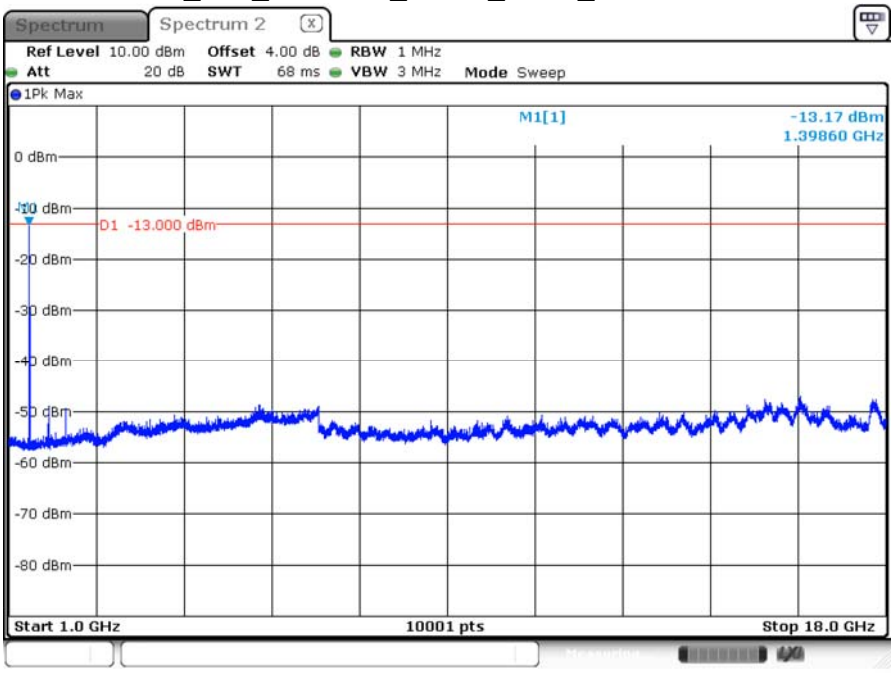
Date: 14.APR.2020 10:40:51

B12_15K_CH23011_QPSK_1RB0_Below 1GHz



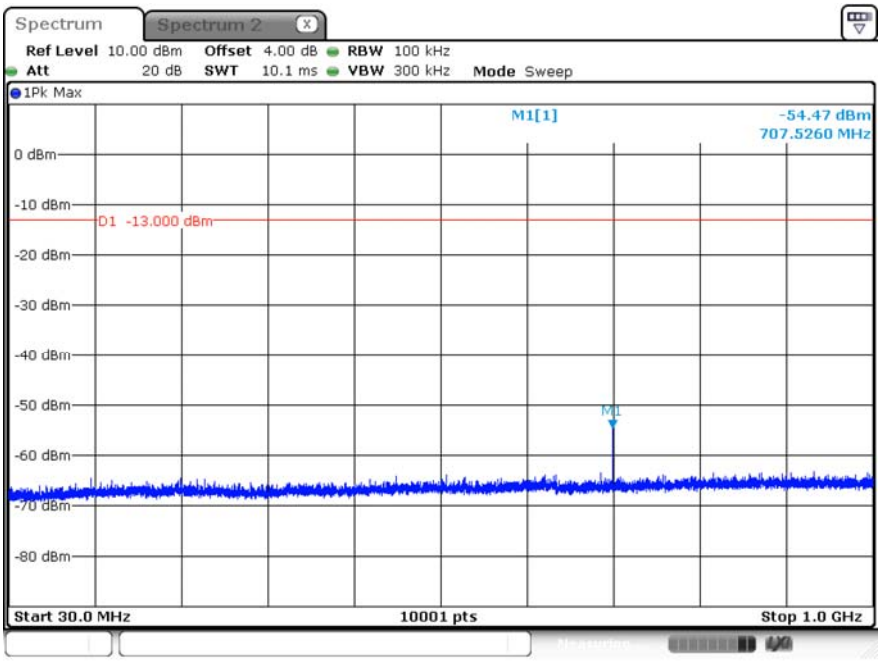
Date: 14.APR.2020 10:44:06

B12_15K_CH23011_QPSK_1RB0_Above 1GHz



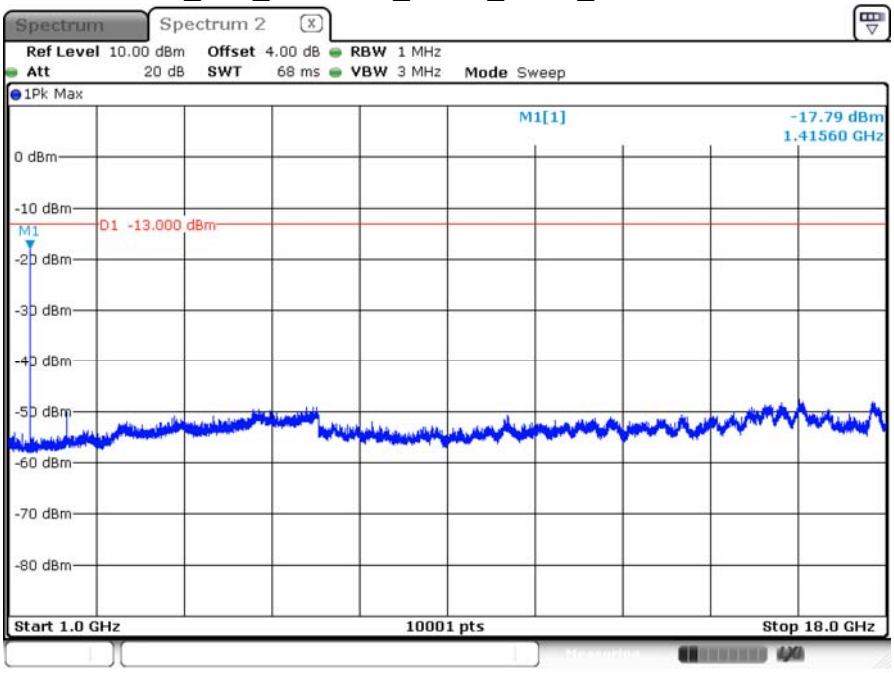
Date: 14.APR.2020 10:48:27

B12_15K_CH23095_BPSK_1RB0_Below 1GHz



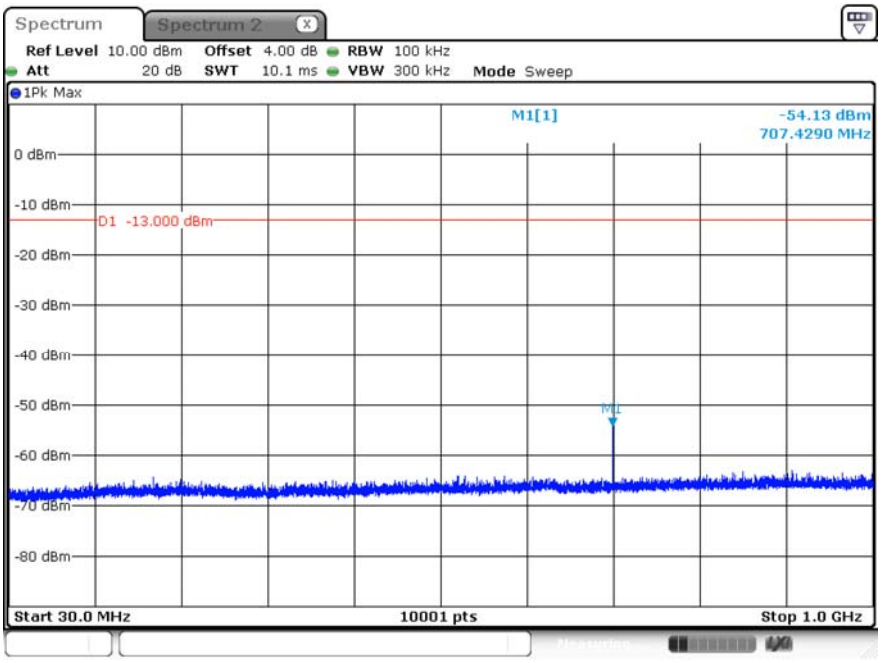
Date: 14.APR.2020 10:37:56

B12_15K_CH23095_BPSK_1RB0_Above 1GHz



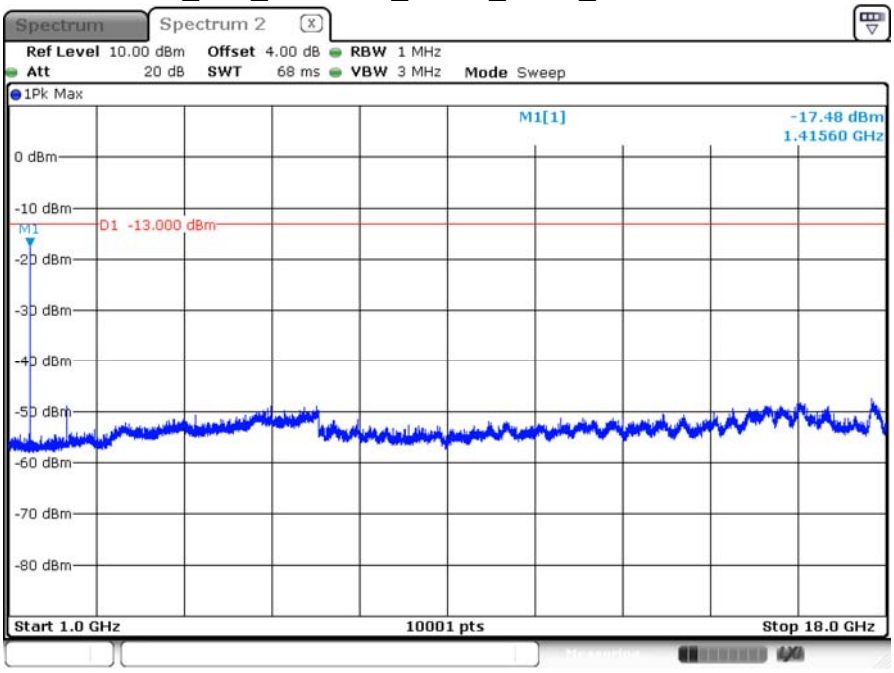
Date: 14.APR.2020 10:39:36

B12_15K_CH23095_QPSK_1RB0_Below 1GHz



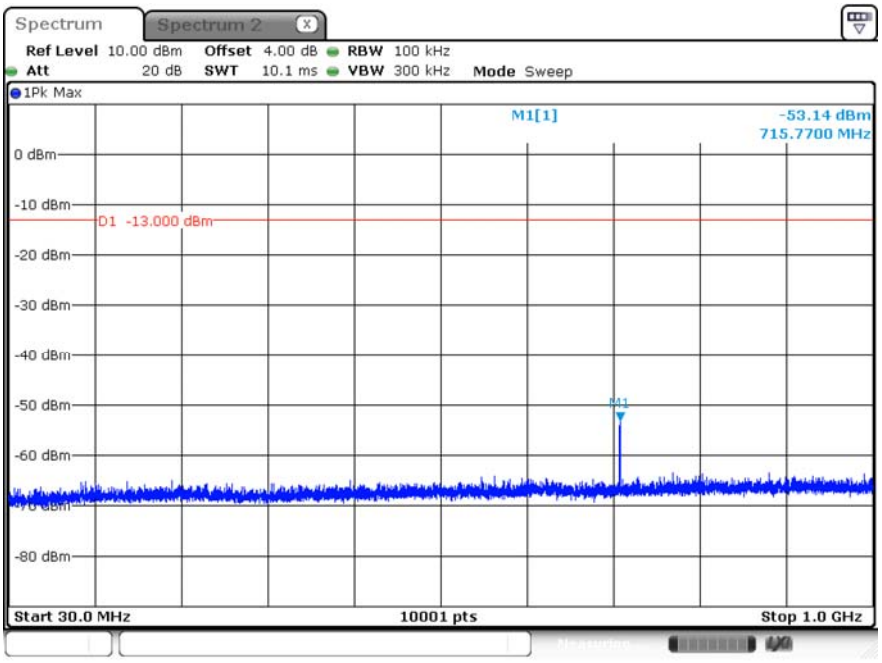
Date: 14.APR.2020 10:35:06

B12_15K_CH23095_QPSK_1RB0_Above 1GHz



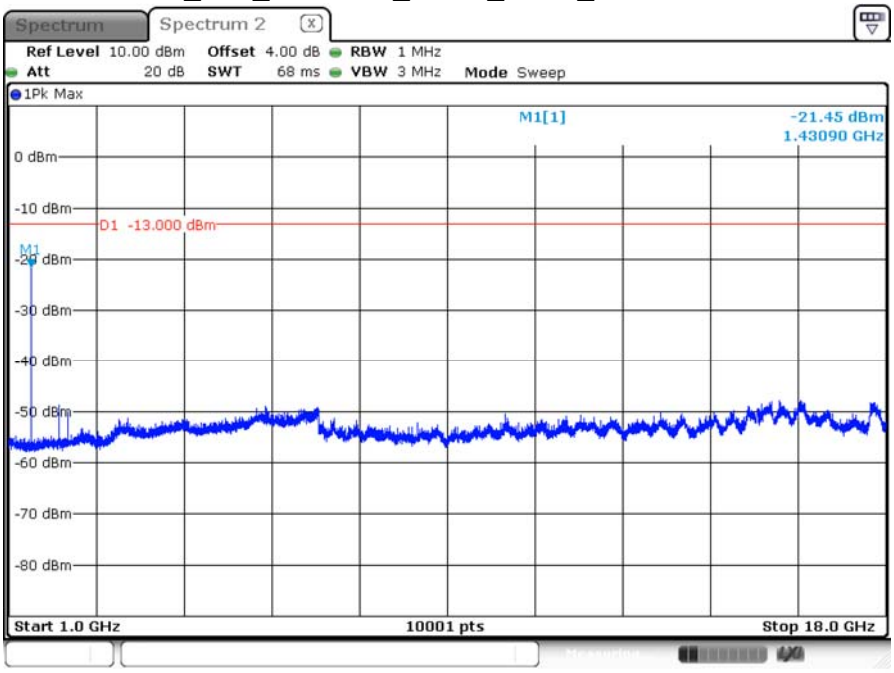
Date: 14.APR.2020 10:32:29

B12_15K_CH23178_BPSK_1RB0_Below 1GHz



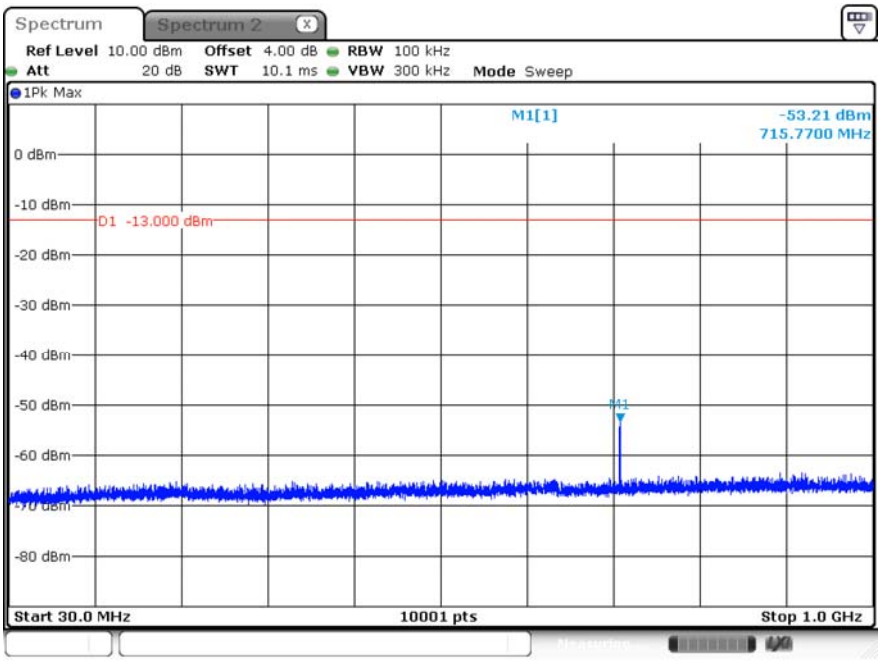
Date: 14.APR.2020 10:28:45

B12_15K_CH23178_BPSK_1RB0_Above 1GHz



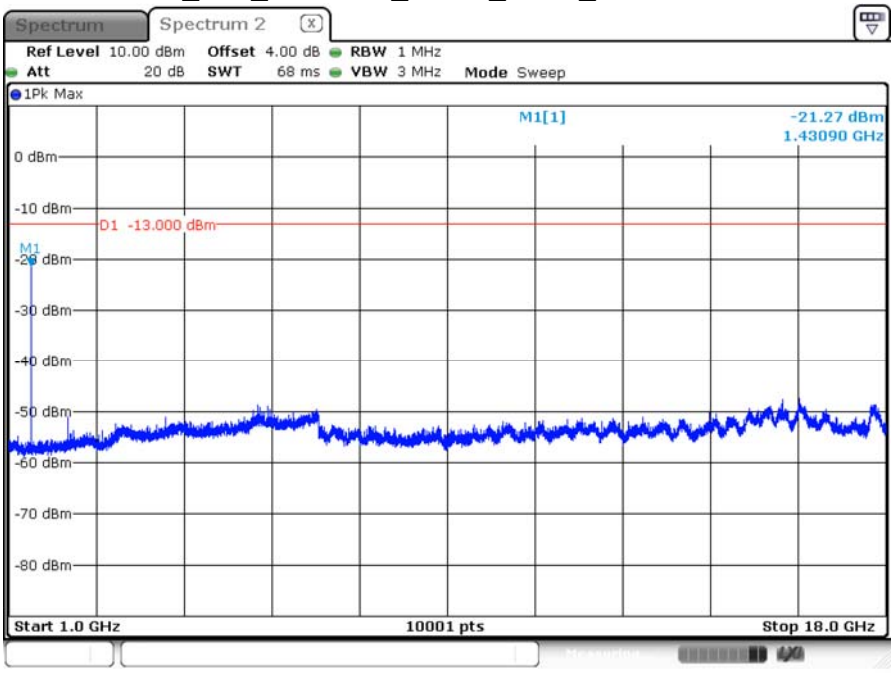
Date: 14.APR.2020 10:27:54

B12_15K_CH23178_QPSK_1RB0_Below 1GHz



Date: 14.APR.2020 10:29:52

B12_15K_CH23178_QPSK_1RB0_Above 1GHz



Date: 14.APR.2020 10:30:43

Product	Edge Lite		
Test Item	Radiated Spurious Emissions		
Test Mode	Mode 1: LTE NB-IoT_Band 12		
Date of Test	2020/4/20	Test Site	CB4-H
Temperature (°C)	25.0	Humidity (%RH)	54.0

3.75k_23011_BPSK_1RB0

Antenna Polarity	Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	SG Level (dBm)	Antenna Gain (dBi)	Cable Loss (dB)
H	1398.200	-44.19	-13	-31.19	-49.71	8.26	2.74
	2097.300	-59.49	-13	-46.49	-66.49	10.40	3.40
	2796.400	-65.22	-13	-52.22	-72.46	11.15	3.90
	3495.500	-64.22	-13	-51.22	-72.41	12.60	4.41
	4194.600	-63.31	-13	-50.31	-71.14	12.62	4.79
	4893.700	-61.34	-13	-48.34	-68.76	12.65	5.23
V	1398.200	-51.92	-13	-38.92	-57.44	8.26	2.74
	2097.300	-60.48	-13	-47.48	-67.48	10.40	3.40
	2796.400	-65.77	-13	-52.77	-73.01	11.15	3.90
	3495.500	-64.32	-13	-51.32	-72.51	12.60	4.41
	4194.600	-63.63	-13	-50.63	-71.46	12.62	4.79
	4893.700	-61.18	-13	-48.18	-68.60	12.65	5.23

Emission Level=SG(Signal Generator) Level+Antenna Gain-Cable Loss.

3.75k_23011_QPSK_1RB0

Antenna Polarity	Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	SG Level (dBm)	Antenna Gain (dBi)	Cable Loss (dB)
H	1398.200	-44.73	-13	-31.73	-50.25	8.26	2.74
	2097.300	-59.48	-13	-46.48	-66.48	10.40	3.40
	2796.400	-65.21	-13	-52.21	-72.45	11.15	3.90
	3495.500	-64.22	-13	-51.22	-72.41	12.60	4.41
	4194.600	-63.53	-13	-50.53	-71.36	12.62	4.79
	4893.700	-60.60	-13	-47.60	-68.02	12.65	5.23
V	1398.200	-51.12	-13	-38.12	-56.64	8.26	2.74
	2097.300	-61.62	-13	-48.62	-68.62	10.40	3.40
	2796.400	-66.40	-13	-53.40	-73.64	11.15	3.90
	3495.500	-63.38	-13	-50.38	-71.57	12.60	4.41
	4194.600	-63.68	-13	-50.68	-71.51	12.62	4.79
	4893.700	-61.47	-13	-48.47	-68.89	12.65	5.23

Emission Level=SG(Signal Generator) Level+Antenna Gain-Cable Loss.

3.75k_23095_BPSK_1RB0

Antenna Polarity	Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	SG Level (dBm)	Antenna Gain (dBi)	Cable Loss (dB)
H	1415.000	-44.30	-13	-31.30	-49.90	8.35	2.75
	2122.500	-59.38	-13	-46.38	-66.37	10.41	3.42
	2830.000	-65.27	-13	-52.27	-72.55	11.21	3.93
	3537.500	-64.10	-13	-51.10	-72.28	12.61	4.43
	4245.000	-63.19	-13	-50.19	-70.99	12.63	4.83
	4952.500	-61.40	-13	-48.40	-68.79	12.65	5.26
V	1415.000	-51.88	-13	-38.88	-57.48	8.35	2.75
	2122.500	-60.28	-13	-47.28	-67.27	10.41	3.42
	2830.000	-65.66	-13	-52.66	-72.94	11.21	3.93
	3537.500	-64.12	-13	-51.12	-72.30	12.61	4.43
	4245.000	-61.24	-13	-48.24	-69.04	12.63	4.83
	4952.500	-61.11	-13	-48.11	-68.50	12.65	5.26

Emission Level=SG(Signal Generator) Level+Antenna Gain-Cable Loss.

3.75k_23095_QPSK_1RB0

Antenna Polarity	Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	SG Level (dBm)	Antenna Gain (dBi)	Cable Loss (dB)
H	1415.000	-44.58	-13	-31.58	-50.18	8.35	2.75
	2122.500	-59.71	-13	-46.71	-66.70	10.41	3.42
	2830.000	-65.46	-13	-52.46	-72.74	11.21	3.93
	3537.500	-64.18	-13	-51.18	-72.36	12.61	4.43
	4245.000	-63.22	-13	-50.22	-71.02	12.63	4.83
	4952.500	-60.98	-13	-47.98	-68.37	12.65	5.26
V	1415.000	-51.88	-13	-38.88	-57.48	8.35	2.75
	2122.500	-60.08	-13	-47.08	-67.07	10.41	3.42
	2830.000	-65.56	-13	-52.56	-72.84	11.21	3.93
	3537.500	-64.15	-13	-51.15	-72.33	12.61	4.43
	4245.000	-61.21	-13	-48.21	-69.01	12.63	4.83
	4952.500	-61.19	-13	-48.19	-68.58	12.65	5.26

Emission Level=SG(Signal Generator) Level+Antenna Gain-Cable Loss.

3.75k_23178_BPSK_1RB47

Antenna Polarity	Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	SG Level (dBm)	Antenna Gain (dBi)	Cable Loss (dB)
H	1431.600	-48.87	-13	-35.87	-54.55	8.45	2.77
	2147.400	-59.94	-13	-46.94	-66.93	10.42	3.44
	2863.200	-65.49	-13	-52.49	-72.81	11.27	3.95
	3579.000	-64.51	-13	-51.51	-72.67	12.61	4.45
	4294.800	-63.73	-13	-50.73	-71.51	12.64	4.86
	5010.600	-62.28	-13	-49.28	-69.64	12.66	5.30
V	1431.600	-52.56	-13	-39.56	-58.24	8.45	2.77
	2147.400	-59.46	-13	-46.46	-66.45	10.42	3.44
	2863.200	-64.84	-13	-51.84	-72.16	11.27	3.95
	3579.000	-63.91	-13	-50.91	-72.07	12.61	4.45
	4294.800	-62.41	-13	-49.41	-70.19	12.64	4.86
	5010.600	-62.13	-13	-49.13	-69.49	12.66	5.30

Emission Level=SG(Signal Generator) Level+Antenna Gain-Cable Loss.

3.75k_23178_QPSK_1RB47

Antenna Polarity	Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	SG Level (dBm)	Antenna Gain (dBi)	Cable Loss (dB)
H	1431.600	-49.05	-13	-36.05	-54.73	8.45	2.77
	2147.400	-60.82	-13	-47.82	-67.81	10.42	3.44
	2863.200	-65.54	-13	-52.54	-72.86	11.27	3.95
	3579.000	-64.12	-13	-51.12	-72.28	12.61	4.45
	4294.800	-63.37	-13	-50.37	-71.15	12.64	4.86
	5010.600	-61.80	-13	-48.80	-69.16	12.66	5.30
V	1431.600	-52.31	-13	-39.31	-57.99	8.45	2.77
	2147.400	-59.58	-13	-46.58	-66.57	10.42	3.44
	2863.200	-65.17	-13	-52.17	-72.49	11.27	3.95
	3579.000	-64.48	-13	-51.48	-72.64	12.61	4.45
	4294.800	-63.50	-13	-50.50	-71.28	12.64	4.86
	5010.600	-61.83	-13	-48.83	-69.19	12.66	5.30

Emission Level=SG(Signal Generator) Level+Antenna Gain-Cable Loss.

15k_23011_BPSK_1RB0

Antenna Polarity	Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	SG Level (dBm)	Antenna Gain (dBi)	Cable Loss (dB)
H	1398.200	-44.35	-13	-31.35	-49.87	8.26	2.74
	2097.300	-59.58	-13	-46.58	-66.58	10.40	3.40
	2796.400	-65.34	-13	-52.34	-72.58	11.15	3.90
	3495.500	-64.41	-13	-51.41	-72.60	12.60	4.41
	4194.600	-63.31	-13	-50.31	-71.14	12.62	4.79
	4893.700	-61.39	-13	-48.39	-68.81	12.65	5.23
V	1398.200	-52.22	-13	-39.22	-57.74	8.26	2.74
	2097.300	-60.69	-13	-47.69	-67.69	10.40	3.40
	2796.400	-65.99	-13	-52.99	-73.23	11.15	3.90
	3495.500	-64.38	-13	-51.38	-72.57	12.60	4.41
	4194.600	-63.56	-13	-50.56	-71.39	12.62	4.79
	4893.700	-61.15	-13	-48.15	-68.57	12.65	5.23

Emission Level=SG(Signal Generator) Level+Antenna Gain-Cable Loss.

15k_23011_QPSK_1RB0

Antenna Polarity	Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	SG Level (dBm)	Antenna Gain (dBi)	Cable Loss (dB)
H	1398.200	-44.89	-13	-31.89	-50.41	8.26	2.74
	2097.300	-59.57	-13	-46.57	-66.57	10.40	3.40
	2796.400	-65.35	-13	-52.35	-72.59	11.15	3.90
	3495.500	-64.26	-13	-51.26	-72.45	12.60	4.41
	4194.600	-63.55	-13	-50.55	-71.38	12.62	4.79
	4893.700	-60.68	-13	-47.68	-68.10	12.65	5.23
V	1398.200	-51.43	-13	-38.43	-56.95	8.26	2.74
	2097.300	-61.87	-13	-48.87	-68.87	10.40	3.40
	2796.400	-66.57	-13	-53.57	-73.81	11.15	3.90
	3495.500	-63.31	-13	-50.31	-71.50	12.60	4.41
	4194.600	-63.61	-13	-50.61	-71.44	12.62	4.79
	4893.700	-61.34	-13	-48.34	-68.76	12.65	5.23

Emission Level=SG(Signal Generator) Level+Antenna Gain-Cable Loss.

15k_23095_BPSK_1RB0

Antenna Polarity	Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	SG Level (dBm)	Antenna Gain (dBi)	Cable Loss (dB)
H	1415.000	-44.66	-13	-31.66	-50.26	8.35	2.75
	2122.500	-59.54	-13	-46.54	-66.53	10.41	3.42
	2830.000	-65.46	-13	-52.46	-72.74	11.21	3.93
	3537.500	-64.18	-13	-51.18	-72.36	12.61	4.43
	4245.000	-63.11	-13	-50.11	-70.91	12.63	4.83
	4952.500	-61.33	-13	-48.33	-68.72	12.65	5.26
V	1415.000	-52.11	-13	-39.11	-57.71	8.35	2.75
	2122.500	-60.74	-13	-47.74	-67.73	10.41	3.42
	2830.000	-65.89	-13	-52.89	-73.17	11.21	3.93
	3537.500	-64.19	-13	-51.19	-72.37	12.61	4.43
	4245.000	-61.28	-13	-48.28	-69.08	12.63	4.83
	4952.500	-61.14	-13	-48.14	-68.53	12.65	5.26

Emission Level=SG(Signal Generator) Level+Antenna Gain-Cable Loss.

15k_23095_QPSK_1RB0

Antenna Polarity	Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	SG Level (dBm)	Antenna Gain (dBi)	Cable Loss (dB)
H	1415.000	-44.84	-13	-31.84	-50.44	8.35	2.75
	2122.500	-59.91	-13	-46.91	-66.90	10.41	3.42
	2830.000	-65.57	-13	-52.57	-72.85	11.21	3.93
	3537.500	-64.17	-13	-51.17	-72.35	12.61	4.43
	4245.000	-63.17	-13	-50.17	-70.97	12.63	4.83
	4952.500	-61.22	-13	-48.22	-68.61	12.65	5.26
V	1415.000	-52.23	-13	-39.23	-57.83	8.35	2.75
	2122.500	-60.44	-13	-47.44	-67.43	10.41	3.42
	2830.000	-65.67	-13	-52.67	-72.95	11.21	3.93
	3537.500	-64.11	-13	-51.11	-72.29	12.61	4.43
	4245.000	-61.27	-13	-48.27	-69.07	12.63	4.83
	4952.500	-61.10	-13	-48.10	-68.49	12.65	5.26

Emission Level=SG(Signal Generator) Level+Antenna Gain-Cable Loss.

15k_23178_BPSK_1RB47

Antenna Polarity	Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	SG Level (dBm)	Antenna Gain (dBi)	Cable Loss (dB)
H	1431.600	-48.99	-13	-35.99	-54.67	8.45	2.77
	2147.400	-60.18	-13	-47.18	-67.17	10.42	3.44
	2863.200	-65.57	-13	-52.57	-72.89	11.27	3.95
	3579.000	-64.55	-13	-51.55	-72.71	12.61	4.45
	4294.800	-63.69	-13	-50.69	-71.47	12.64	4.86
	5010.600	-62.30	-13	-49.30	-69.66	12.66	5.30
V	1431.600	-52.77	-13	-39.77	-58.45	8.45	2.77
	2147.400	-59.64	-13	-46.64	-66.63	10.42	3.44
	2863.200	-64.93	-13	-51.93	-72.25	11.27	3.95
	3579.000	-63.88	-13	-50.88	-72.04	12.61	4.45
	4294.800	-62.37	-13	-49.37	-70.15	12.64	4.86
	5010.600	-62.11	-13	-49.11	-69.47	12.66	5.30

Emission Level=SG(Signal Generator) Level+Antenna Gain-Cable Loss.

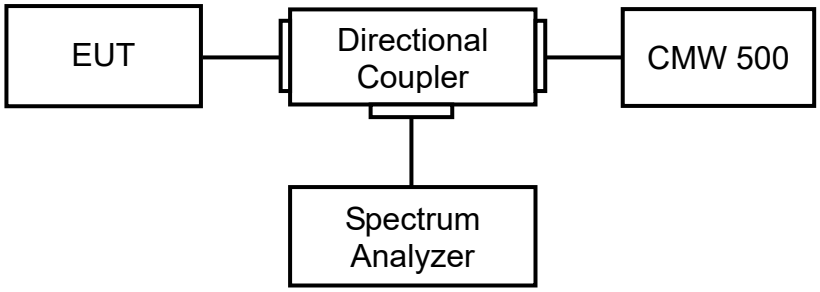
15k_23178_QPSK_1RB47

Antenna Polarity	Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	SG Level (dBm)	Antenna Gain (dBi)	Cable Loss (dB)
H	1431.600	-49.33	-13	-36.33	-55.01	8.45	2.77
	2147.400	-60.97	-13	-47.97	-67.96	10.42	3.44
	2863.200	-65.63	-13	-52.63	-72.95	11.27	3.95
	3579.000	-64.18	-13	-51.18	-72.34	12.61	4.45
	4294.800	-63.33	-13	-50.33	-71.11	12.64	4.86
	5010.600	-61.77	-13	-48.77	-69.13	12.66	5.30
V	1431.600	-52.49	-13	-39.49	-58.17	8.45	2.77
	2147.400	-59.63	-13	-46.63	-66.62	10.42	3.44
	2863.200	-65.37	-13	-52.37	-72.69	11.27	3.95
	3579.000	-64.41	-13	-51.41	-72.57	12.61	4.45
	4294.800	-63.58	-13	-50.58	-71.36	12.64	4.86
	5010.600	-61.67	-13	-48.67	-69.03	12.66	5.30

Emission Level=SG(Signal Generator) Level+Antenna Gain-Cable Loss.

7. Spurious Emissions at Antenna Terminals

7.1. Test Setup



7.2. Test Procedure

a) Place the EUT on a bench and set it in transmitting mode.
b) Connect a low loss RF cable from the antenna port to a spectrum analyzer and CMW500 by a Directional Couple.
c) EUT Communicate with CMW500, then select a channel for testing.
d) Add a correction factor to the display of spectrum, and then test.
e) The resolution bandwidth of the spectrum analyzer was set at 1 MHz, sufficient scans were taken to show the out of band Emission if any up to 10th harmonic.

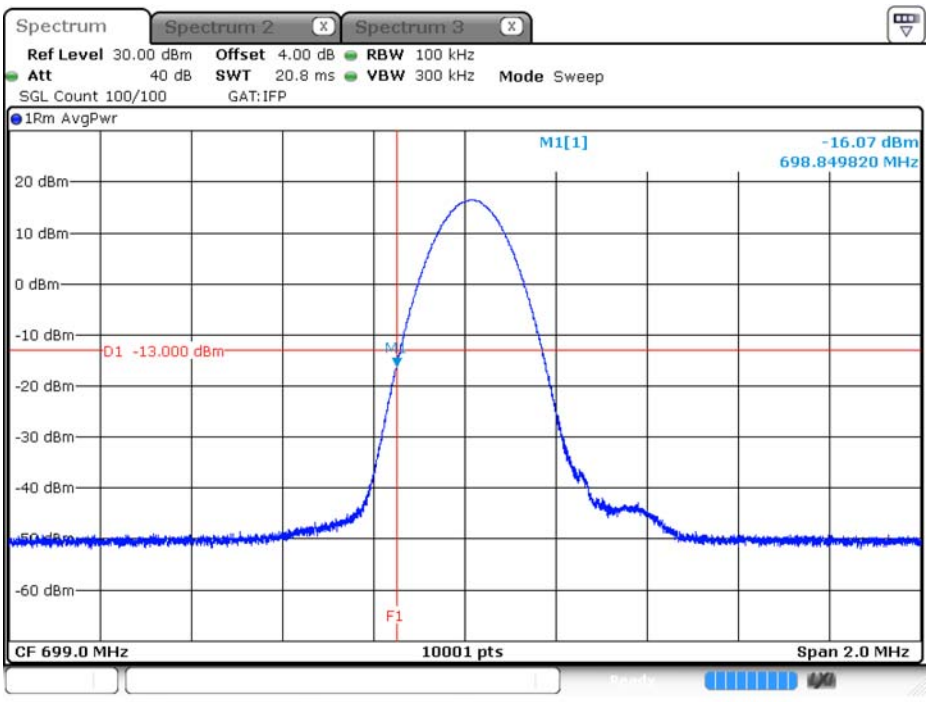
7.3. Test Method

KDB 971168 D01 Power Meas License Digital Systems v03 sub-clause 6.1
ANSI C63.26: 2015 Sub-clause 5.7

7.4. Test Result

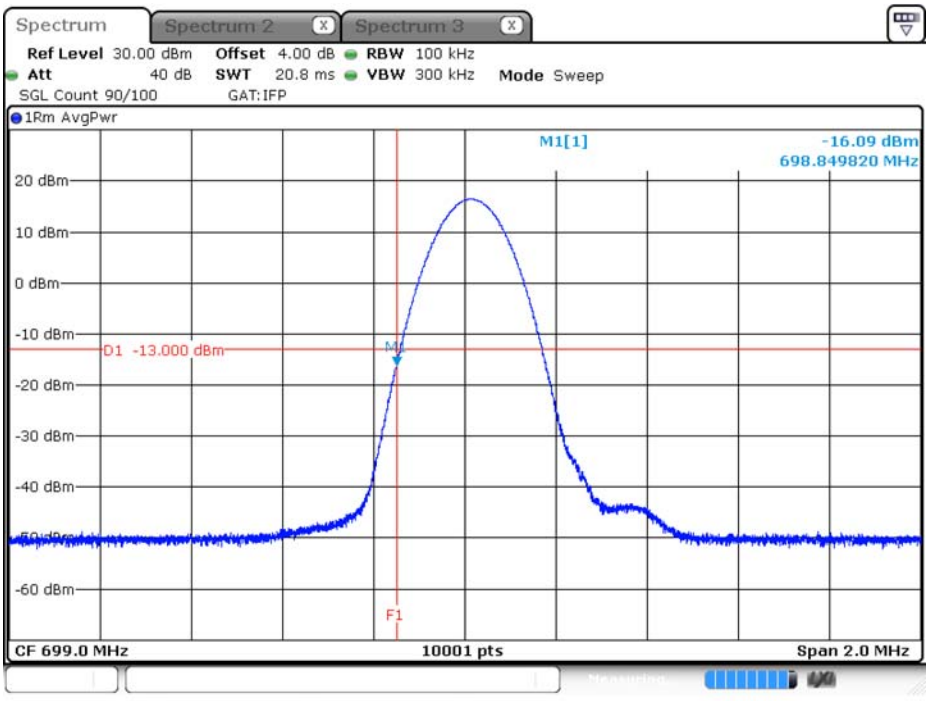
Product	Edge Lite		
Test Item	Spurious Emissions at Antenna Terminals		
Test Mode	Mode 1: LTE NB-IoT_Band 12		
Date of Test	2020/4/20	Test Site	SR12-H
Temperature (°C)	25.0	Humidity (%RH)	54.0

B12_3.75K_CH23011_BPSK_1RB0-150k



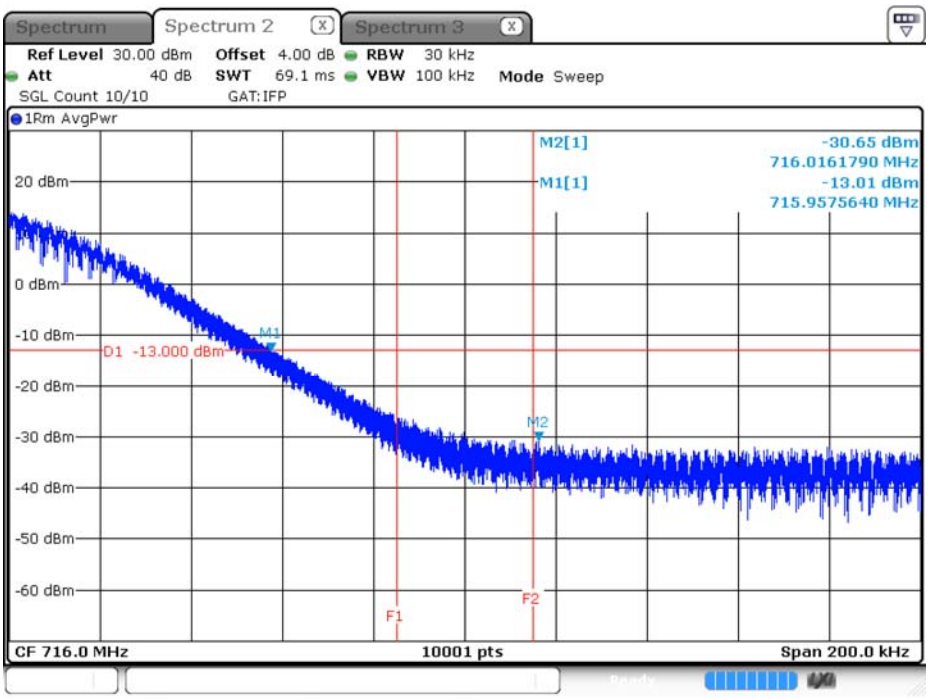
Date: 20.APR.2020 09:34:51

B12_3.75K_CH23011_QPSK_1RB0-150k



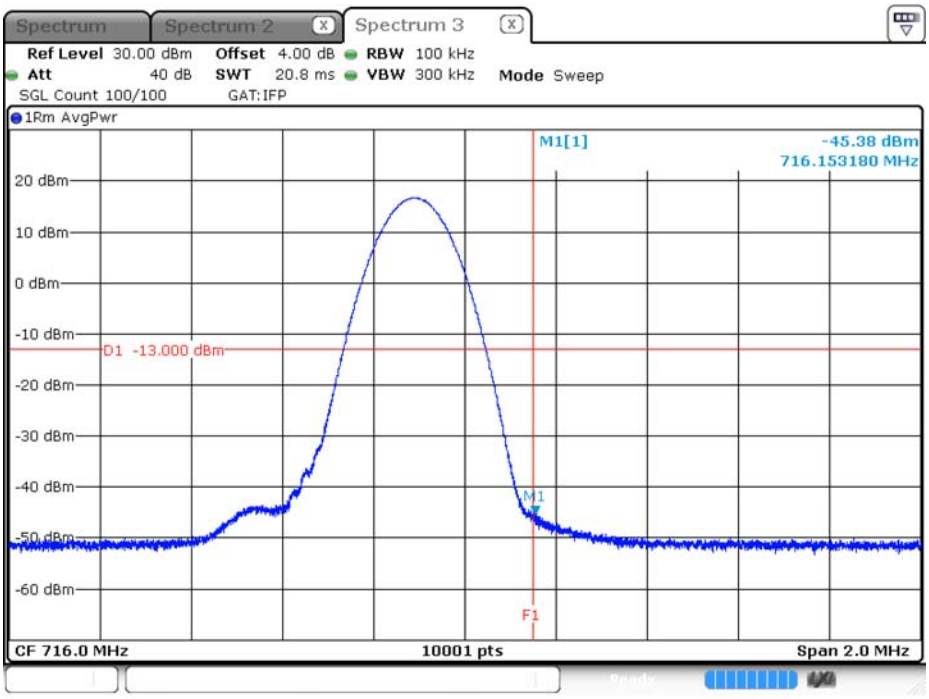
Date: 20.APR.2020 09:36:43

B12_3.75K_CH23178_BPSK_1RB47-15k



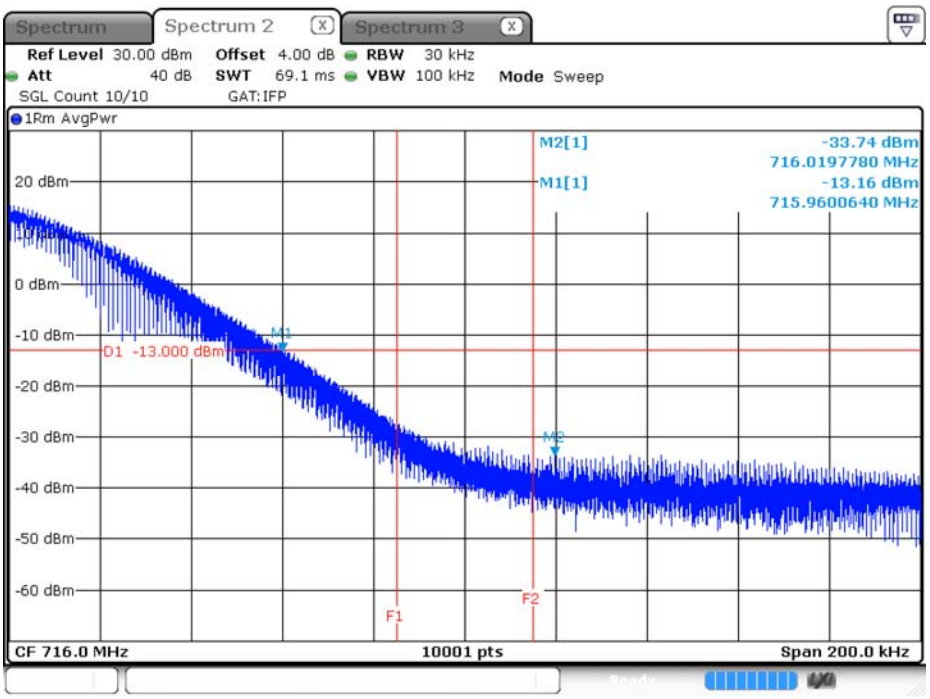
Date: 20.APR.2020 09:43:51

B12_3.75K_CH23178_BPSK_1RB47-150k



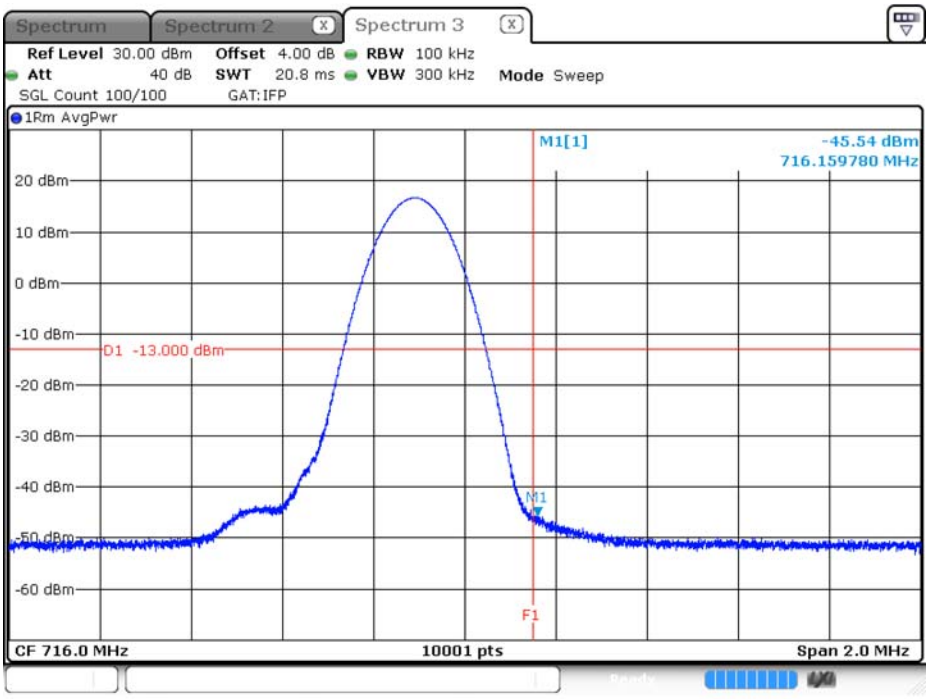
Date: 20.APR.2020 09:46:49

B12_3.75K_CH23178_QPSK_1RB47-15k



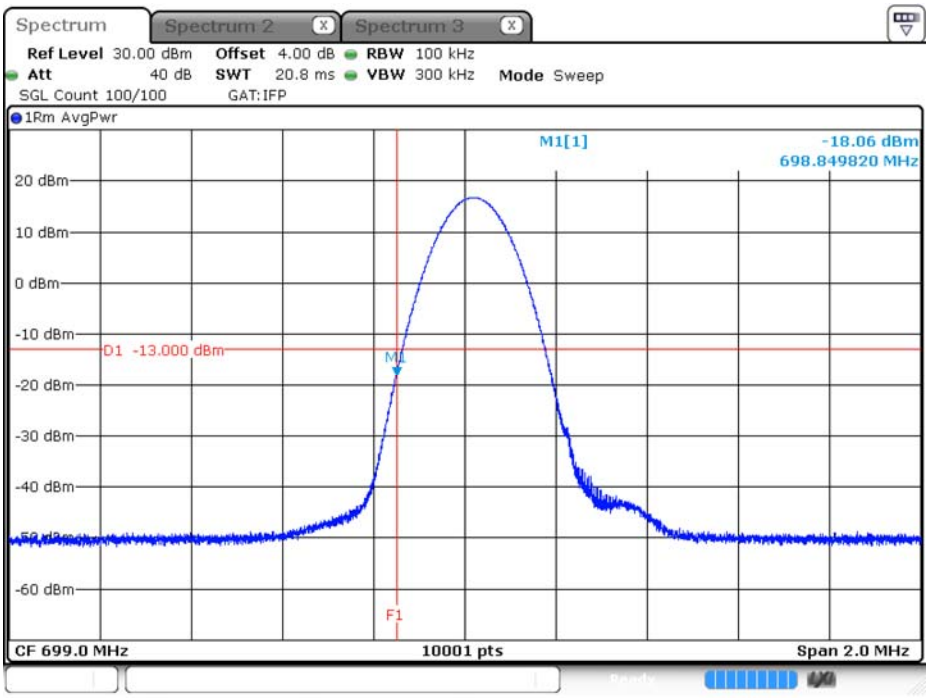
Date: 20.APR.2020 10:08:52

B12_3.75K_CH23178_QPSK_1RB47-150k



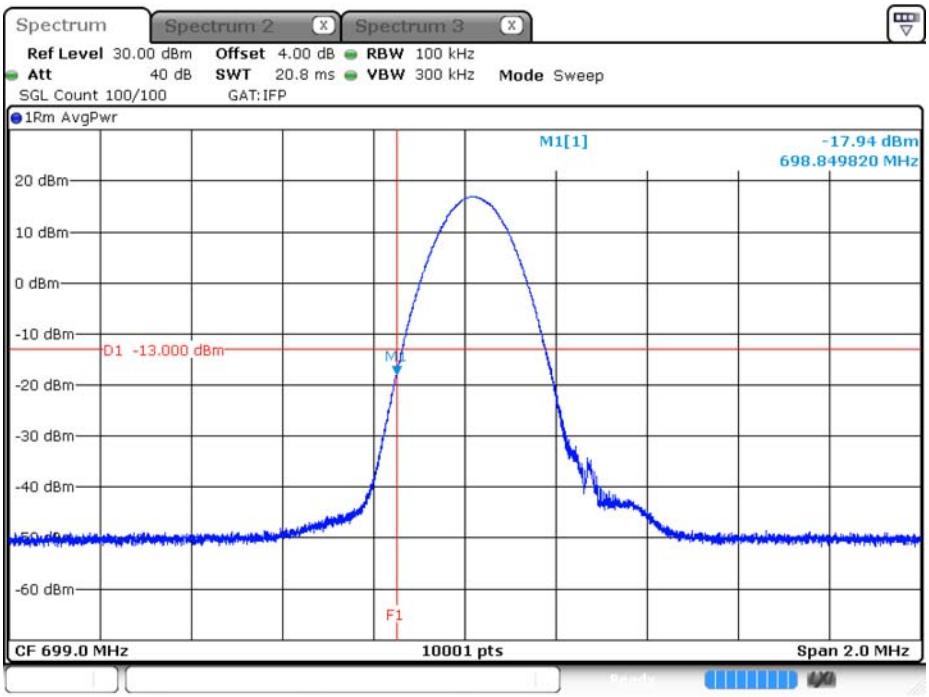
Date: 20.APR.2020 10:05:41

B12_15K_CH23011_BPSK_1RB0-150k



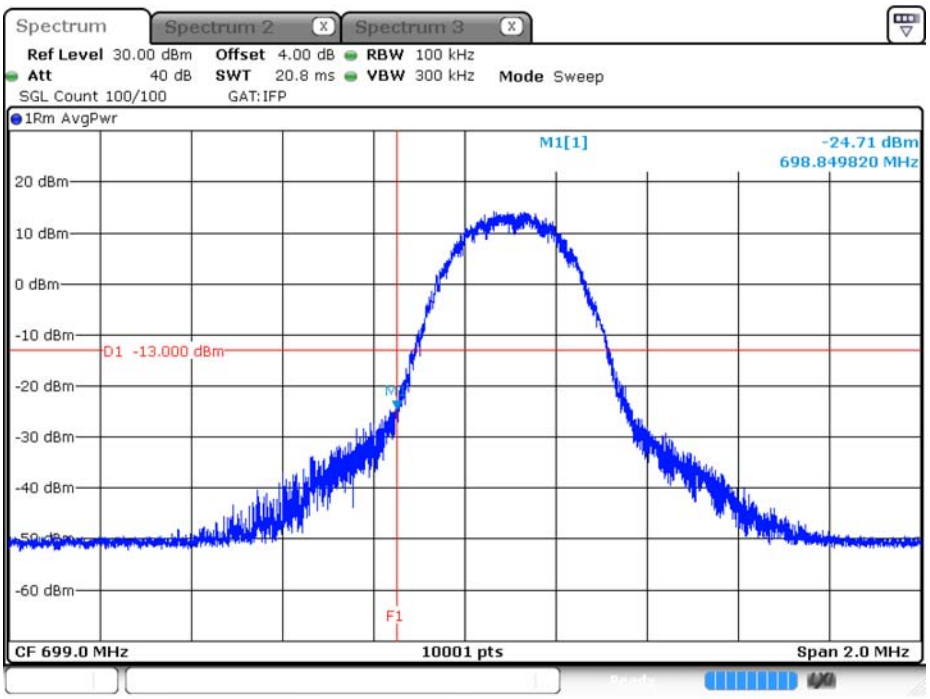
Date: 20.APR.2020 10:42:27

B12_15K_CH23011_QPSK_1RB0-150k



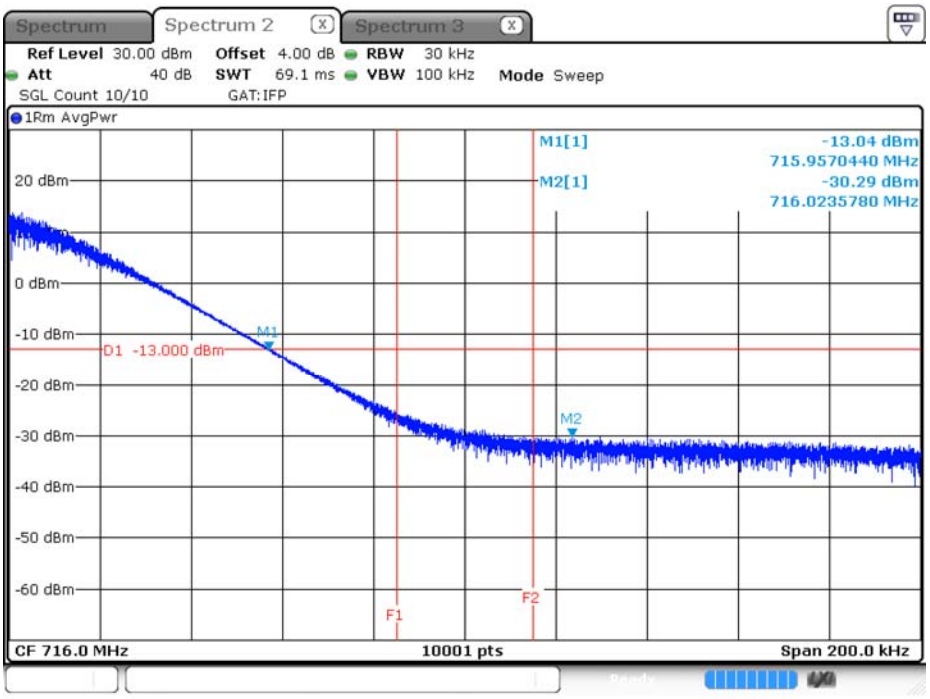
Date: 20.APR.2020 10:43:47

B12_15K_CH23011_QPSK_12RB0-150k



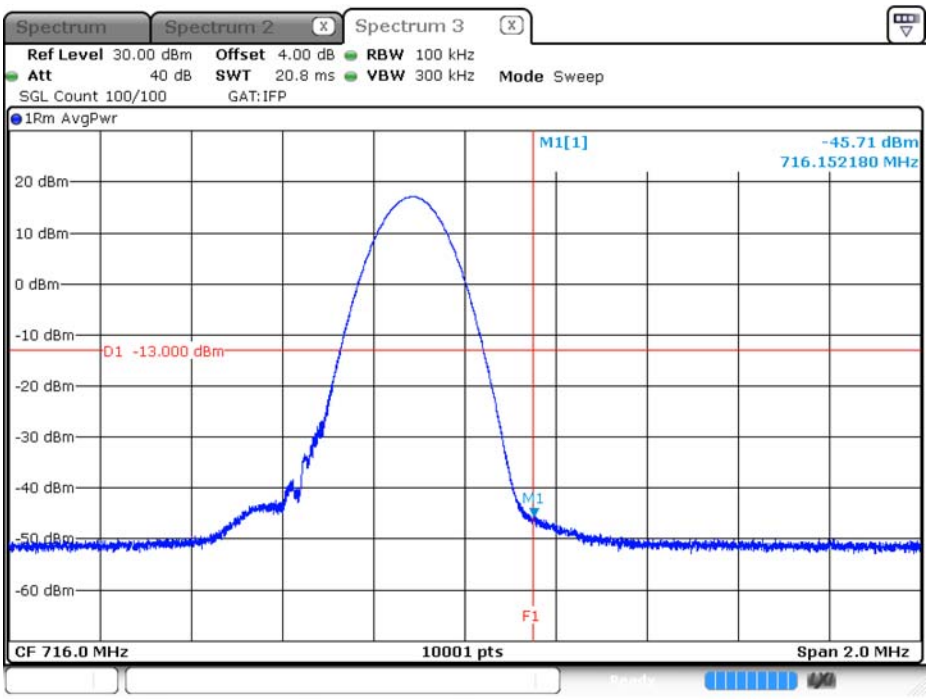
Date: 20.APR.2020 10:45:31

B12_15K_CH23178_BPSK_1RB11-15k



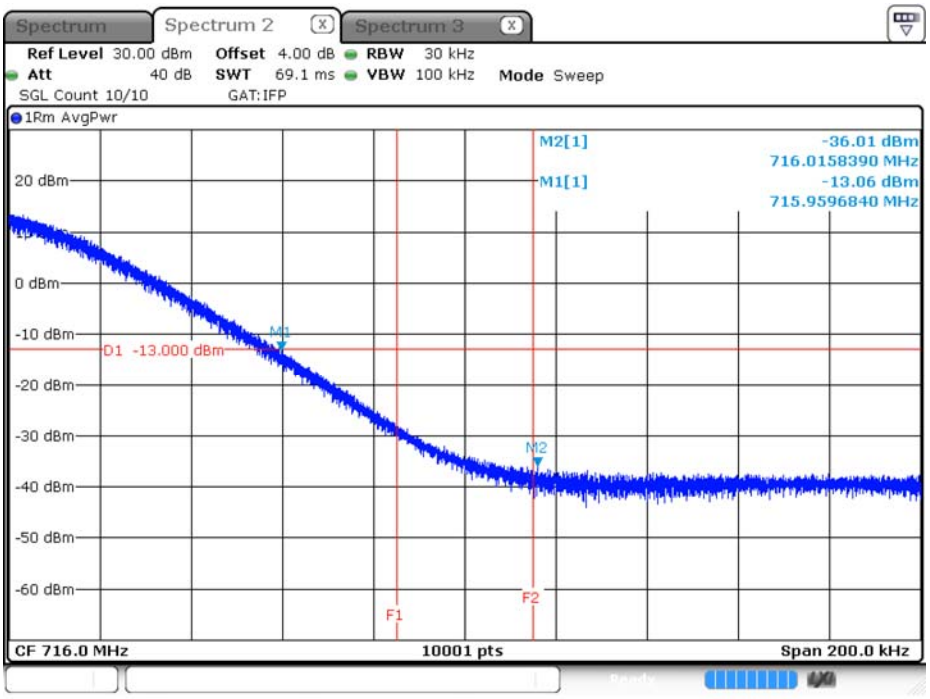
Date: 20.APR.2020 10:27:38

B12_15K_CH23178_BPSK_1RB11-150k



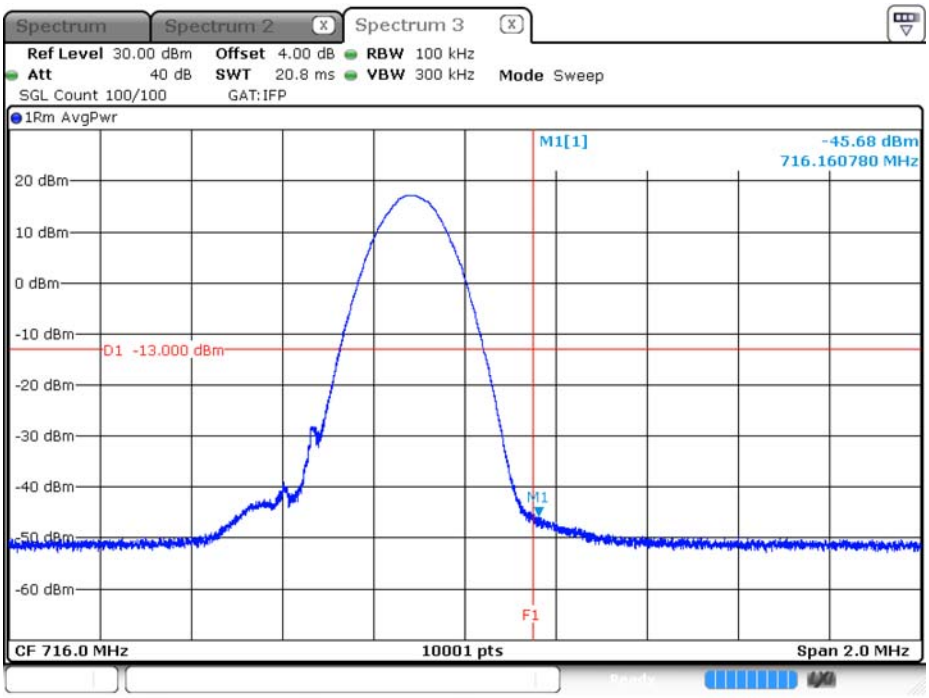
Date: 20.APR.2020 10:25:49

B12_15K_CH23178_QPSK_1RB11-15k



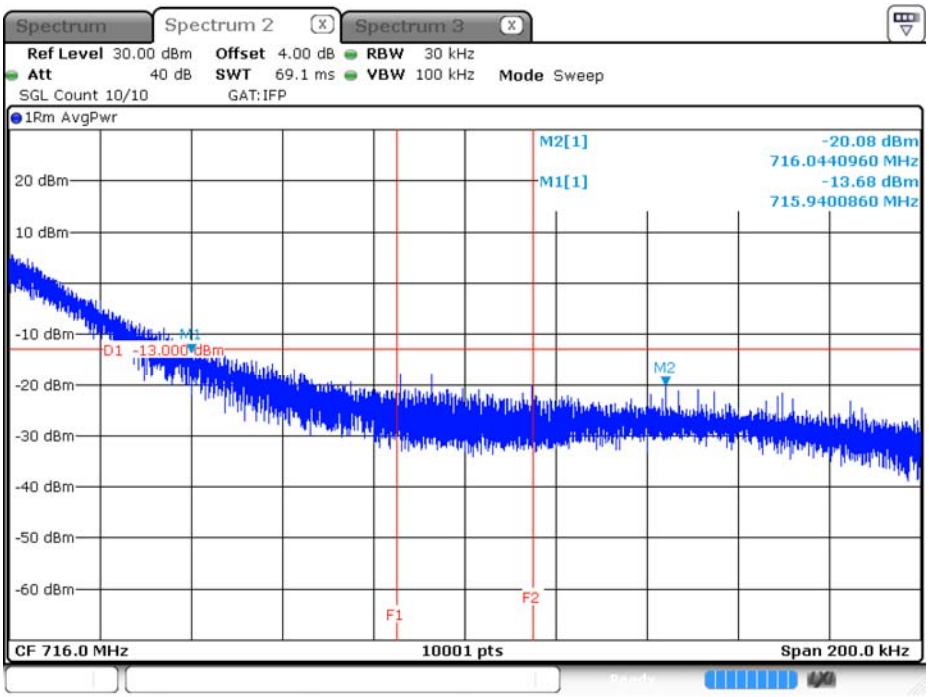
Date: 20.APR.2020 10:16:12

B12_15K_CH23178_QPSK_1RB11-150k



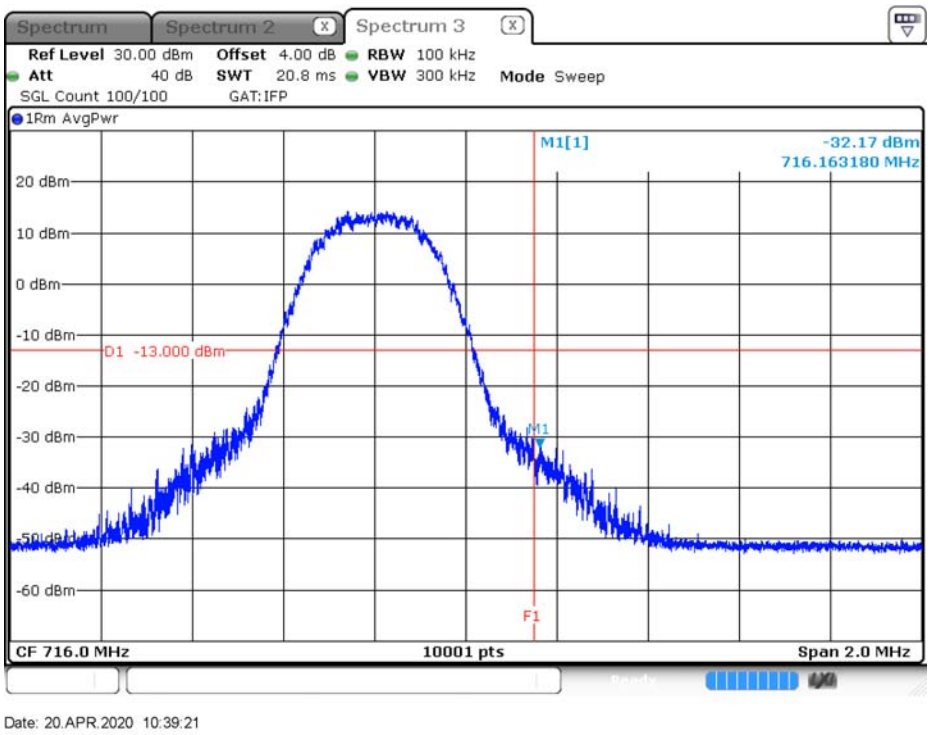
Date: 20.APR.2020 10:18:57

B12_15K_CH23178_QPSK_12RB0-15k



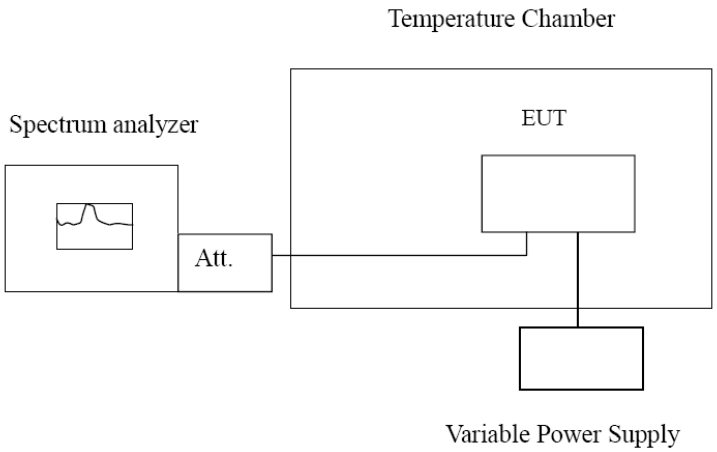
Date: 20.APR.2020 10:32:02

B12_15K_CH23178_QPSK_12RB0-150k



8. Frequency Stability

8.1. Test Setup



8.2. Test Procedure

Frequency Stability Under Temperature Variations:

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20℃ operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30℃. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃ reached.

Frequency Stability Under Voltage Variations:

Set chamber temperature to 20℃. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.
Reduce the input voltage to specify extreme voltage variation (±15%) and endpoint, record the maximum frequency change.

8.3. Test Method

KDB 971168 D01 Power Meas License Digital Systems v03 sub-clause 9
ANSI C63.26: 2015 Sub-clause 5.6

8.4. Test Result

Product	Edge Lite		
Test Item	Frequency Stability Under Temperature & Voltage Variations		
Test Mode	Mode 1: LTE NB-IoT_Band 12		
Date of Test	2020/04/13	Test Site	SR12-H
Temperature (°C)	19.0	Humidity (%RH)	50.0

LTE-Band 12 699.1MHz

Voltage

Voltage (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
4.1	2.69	-0.0038
3.7	3.15	-0.0045
3.3	3.47	-0.0050

Temperature

Temperature (°C)	Frequency Error (Hz)	Frequency Error (ppm)
-30	3.44	-0.0049
-20	2.77	-0.0040
-10	2.72	-0.0039
0	2.86	-0.0041
10	2.54	-0.0036
20	2.06	-0.0029
30	2.44	-0.0035
40	3.12	-0.0045
50	2.30	-0.0033

LTE-Band 12 707.5MHz

Voltage

Voltage (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
4.1	1.68	-0.0024
3.7	2.78	-0.0039
3.3	3.22	-0.0046

Temperature

Temperature (°C)	Frequency Error (Hz)	Frequency Error (ppm)
-30	1.94	-0.0027
-20	2.28	-0.0032
-10	1.55	-0.0022
0	1.92	-0.0027
10	2.47	-0.0035
20	1.92	-0.0027
30	2.24	-0.0032
40	1.69	-0.0024
50	2.91	-0.0041

LTE-Band 12 715.7MHz

Voltage

Voltage (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
4.1	2.09	-0.0029
3.7	3.11	-0.0043
3.3	3.21	-0.0045

Temperature

Temperature (°C)	Frequency Error (Hz)	Frequency Error (ppm)
-30	1.82	-0.0025
-20	2.44	-0.0034
-10	2.18	-0.0030
0	3.14	-0.0044
10	2.18	-0.0030
20	3.02	-0.0042
30	2.17	-0.0030
40	2.62	-0.0037
50	2.87	-0.0040