FCC/ISED Test Report

Product Name	:	Module
Trade Name	:	AirPrime
Model No.	:	HL7802
FCC ID	:	N7NHL7802
IC ID	:	2417C-HL7802

Applicant : Sierra Wireless, Inc.

Address : 13811 Wireless Way, Richmond, BC, Canada V6V 3A4 Canada

Date of Receipt	:	Dec. 20, 2019
Issued Date	:	Jun 16, 2020
Report No.	:	19C0344R-HPUSP56V00
Report Version	:	V1.0

Testing Laboratory
3024

Test Report Certification

Issued Date : Jun 16, 2020
Report No. : 19C0344R-HPUSP56V00

Product Name	:	Module
Applicant	:	Sierra Wireless, Inc.
Address	:	13811 Wireless Way, Richmond, BC, Canada V6V 3A4 Canada
Manufacturer	:	Sierra Wireless, Inc.
Address	:	13811 Wireless Way, Richmond, BC, Canada V6V 3A4 Canada
Trade name	:	AirPrime
Model No.	:	HL7802
FCC ID	:	N7NHL7802
IC ID	:	2417C-HL7802
EUT Voltage	:	DC 3.7V
Testing Voltage	:	DC 3.7V
Applicable Standard	:	FCC CFR Title 47 Part 22 Subpart H FCC CFR Title 47 Part 24 Subpart E FCC CFR Title 47 Part 27 Subpart L, Subpart F FCC CFR Title 47 Part 90 Subpart S, Subpart R Industry Canada RSS-GEN Issue 5 Industry Canada RSS-130 Issue 1 Industry Canada RSS-132 Issue 3 Industry Canada RSS-133 Issue 6 Industry Canada RSS-139 Issue 3 Industry Canada RSS-140 issue 1 ANSI/TIA-603-D-2010
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 : Fonbo Fang

(Fonbo Fang / Engineering Adm. Specialist)

Tested By : Clemens Fang

(Clemens Fang / Senior Engineer)

Approved By : Louis Hsu

(Louis Hsu / Deputy Manager)

Revision History

Report No.	Version	Description	Issued Date
19C0344R-HPUSP56V00	V1.0	Initial issue of report	Jun 16, 2020

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1. General Information

1.1. EUT Description

Product Name	Module	
Trade Name	AirPrime	
Model No.	HL7802	
Uplink Frequency Range (MHz)	LTE Band 2: 1850~1910 LTE Band 4: 1710~1755 LTE Band 5: 824~849 LTE Band 12: 698~716	LTE Band 13: 777~787 LTE Band 25: 1850~1915 LTE Band 26: 814~849 LTE Band 66: 1710~1780
Downlink Frequency Range (MHz)	LTE Band 2: 1930~1990 LTE Band 4: 2110~2115 LTE Band 5: 869~894 LTE Band 12: 729~746	LTE Band 13: 746~756 LTE Band 25: 1930~1995 LTE Band 26: 859~894 LTE Band 66: 2110~2200
Modulation	BPSK / QPSK	
HW Version	1.0	
FW Version	4.4.7.0	
IMEI No.	359459090002929	

Accessories Information	
Antenna Type	3 Pcs (2pcs for GSM, LTE / 1 pc for GPS)

Antenna Information	
MFR. / Model	Pulse / SPDA24700/2700
Antenna Type	Dipole Antenna
Antenna Gain	2dBi

Note:

1. This HL7802 support Cat-M1/ NB-IoT-LTE Band 2/4/5/12/13//25/26/66 & GPS & 2G functions.
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 2
Mode 2：LTE NB-IoT_Band 4
Mode 3：LTE NB-IoT_Band 5
Mode 4：LTE NB-IoT_Band 12
Mode 5：LTE NB-IoT_Band 13
Mode 6：LTE NB-IoT_Band 25
Mode 7：LTE NB-IoT_Band 26
Mode 8：LTE NB-IoT_Band 66

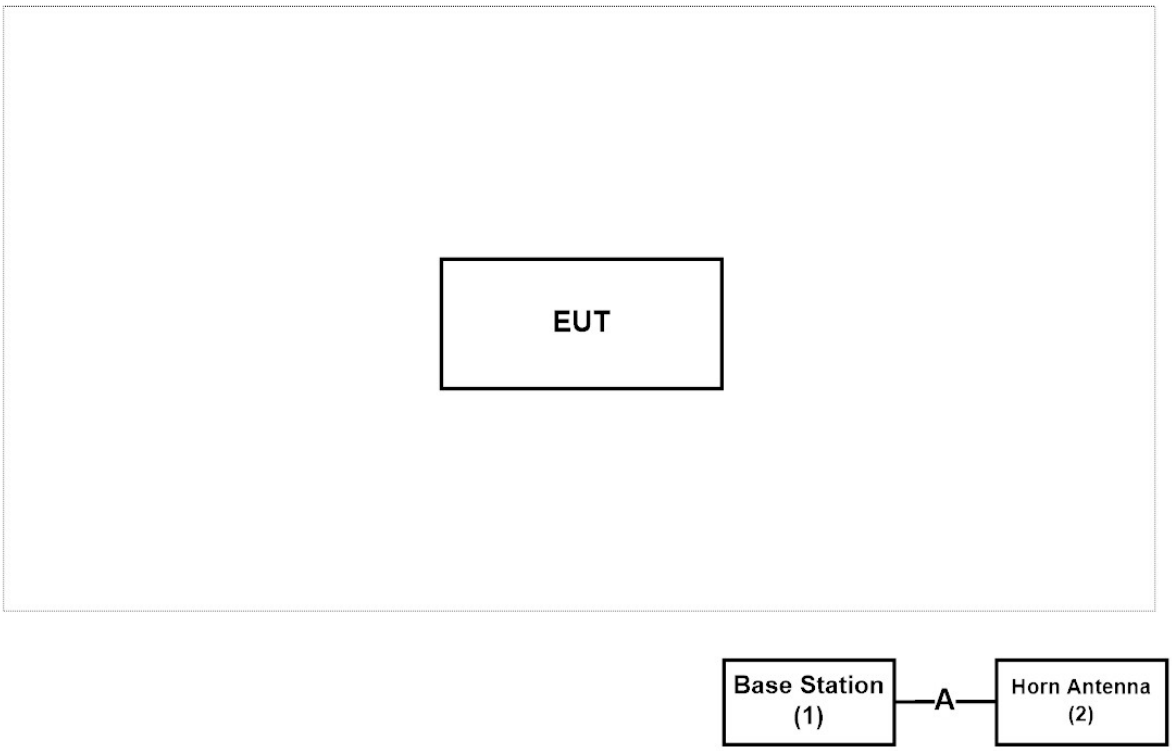
1.3. Tested System Details

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:

B2

Uplink: 1850-1910MHz

Downlink: 1930-1990MHz

LTE B2					
FCC Part 24 Subpart E					
Industry Canada RSS-133, issue 6, Industry Canada RSS-GEN					
Test item	FCC Reference section	FCC Limit	IC Reference section	IC Limit	Result
RF Output Power	§2.1033 §2.1046 §24.232	<2 Watts	§6.4	<2 Watts	Pass
Occupied Bandwidth	§2.1049	N/A	RSS-GEN §4.2	N/A	Pass
Peak-to-average power ratio	§24.232	<13 dB	§6.4	<13 dB	Pass
Spurious Emissions	§2.1053 §24.238	<-13dBm	§6.5	<-13dBm	Pass
Spurious Emissions at Antenna Terminals	§27.238	<-13dBm	§6.5	<-13dBm	Pass
Frequency Stability	§2.1055 §24.235	<±2.5 ppm	§6.3	<±2.5 ppm	Pass

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

B4

Uplink: 1710-1755MHz

Downlink: 2110-2155MHz

LTE B4					
FCC Part 27 Subpart L					
Industry Canada RSS-139, issue 3, Industry Canada RSS-GEN					
Test item	FCC Reference section	FCC Limit	IC Reference section	IC Limit	Result
RF Output Power	§2.1033 §2.1046 §27.50	<1 Watt	§6.5	<1 Watt	Pass
Occupied Bandwidth	§2.1049	N/A	RSS-GEN §4.2	N/A	Pass
Peak-to-average power ratio	§27.50	<13 dB	§6.5	<13 dB	Pass
Spurious Emissions	§2.1053 §27.53	<-13dBm	§6.6	<-13dBm	Pass
Spurious Emissions at Antenna Terminals	§27.53	<-13dBm	§6.6	<-13dBm	Pass
Frequency Stability	§2.1055 §27.54	<2.5 ppm	§6.4	Within the frequency range	Pass

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

B5

Uplink: 824-849MHz

Downlink: 869-894MHz

LTE B5					
FCC Part 22 Subpart H					
Industry Canada RSS-132, issue 3, Industry Canada RSS-GEN					
Test item	FCC Reference section	FCC Limit	IC Reference section	IC Limit	Result
RF Output Power	§2.1033 §2.1046 §22.913	<7 Watts	§5.4	<11.5 Watts	Pass
Occupied Bandwidth	§2.1049	N/A	RSS-GEN §4.2	N/A	Pass
Peak-to-average power ratio	§22.913	<13 dB	§5.4	<13 dB	Pass
Spurious Emissions	§2.1053 §22.917	<-13dBm	§5.5	<-13dBm	Pass
Spurious Emissions at Antenna Terminals	§22.917	<-13dBm	§5.5	<-13dBm	Pass
Frequency Stability	§2.1055 §22.335	<±2.5 ppm	§5.3	<±2.5 ppm for mobile stations <±1.5 ppm for base stations	Pass

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

B12

Uplink: 698-716MHz

Downlink: 729-746MHz

LTE B12					
FCC Part 27 Subpart F					
Industry Canada RSS-130, issue 2, Industry Canada RSS-GEN					
Test item	FCC Reference section	FCC Limit	IC Reference section	IC Limit	Result
RF Output Power	§2.1033 §2.1046 §27.50	<3 Watts ERP	§4.6	<3 Watts E.R.P for portable equipment or for indoor fixed subscriber equipment	Pass
Occupied Bandwidth	§2.1049	N/A	RSS-GEN §4.2	N/A	Pass
Peak-to-average power ratio	§27.50	<13 dB	§4.4	<13 dB	Pass
Spurious Emissions	§2.1053 §27.53	<-13dBm	§4.6	<-13dBm The e.i.r.p. in the band 1559-1610 MHz shall not exceed -70 dBW/MHz for wideband signal and -80 dBW for discrete emission with bandwidth less than 700 Hz.	Pass
Spurious Emissions at Antenna Terminals	§27.53	<-13dBm	§4.6	<-13dBm	Pass
Frequency Stability	§2.1055 §27.54	<±2.5 ppm	§4.3	Within the frequency range	Pass

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

B13

Uplink: 777-787MHz

Downlink: 746-756MHz

LTE B13					
FCC Part 27 Subpart F					
Industry Canada RSS-130, issue 2, Industry Canada RSS-GEN					
RF Output Power	FCC Reference section	FCC Limit	IC Reference section	IC Limit	Result
RF Output Power	§2.1033 §2.1046 §27.50	<3 Watts ERP	§4.6	<3 Watts E.R.P for portable equipment or for indoor fixed subscriber equipment	Pass
Occupied Bandwidth	§2.1049	N/A	RSS-GEN §4.2	N/A	Pass
Peak-to-average power ratio	§27.50	<-13 dB	§4.4	<13 dB	Pass
Spurious Emissions	§2.1053 §27.53	<-13dBm	§4.6	<-13dBm	Pass
Spurious Emissions at Antenna Terminals	§27.53	<-13dBm	§4.6	<-13dBm	Pass
Frequency Stability	§2.1055 §27.54	<±2.5 ppm	§4.5	Within the frequency range	Pass

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

B25

Uplink: 1850~1915MHz

Downlink: 1930~1995MHz

LTE B25					
FCC Part 24 Subpart E					
Industry Canada RSS-133, issue 6, Industry Canada RSS-GEN					
Test item	FCC Reference section	FCC Limit	IC Reference section	IC Limit	Result
RF Output Power	§2.1033 §2.1046 §24.232	<2 Watts	§6.4	<2 Watts	Pass
Occupied Bandwidth	§2.1049	N/A	RSS-GEN §4.2	N/A	Pass
Peak-to-average power ratio	§24.232	<13 dB	§6.4	<13 dB	Pass
Spurious Emissions	§2.1053 §24.238	<-13dBm	§6.5	<-13dBm	Pass
Spurious Emissions at Antenna Terminals	§27.238	<-13dBm	§6.5	<-13dBm	Pass
Frequency Stability	§2.1055 §24.235	<±2.5 ppm	§6.3	<±2.5 ppm	Pass

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

B26

Uplink: 814~849MHz (ISED not support 814~824 MHz)

Downlink: 859~894MHz

LTE B26					
FCC Part 22 Subpart H FCC Part 90 Subpart S					
Industry Canada RSS-132, issue 3, Industry Canada RSS-GEN					
Test item	FCC Reference section	FCC Limit	IC Reference section	IC Limit	Result
RF Output Power	§2.1033 §2.1046 §90.635(b) §22.913	<100 Watts	§5.4	<11.5 Watts	Pass
Occupied Bandwidth	§2.1049	N/A	RSS-GEN §4.2	N/A	Pass
Peak-to-average power ratio	§22.913	<13 dB	§5.4	<13 dB	Pass
Spurious Emissions	§2.1053 §90.691 §22.917	<-13dBm	§5.5	<-13dBm	Pass
Spurious Emissions at Antenna Terminals	§90.691 §22.917	<-13dBm	§5.5	<-13dBm	Pass
Frequency Stability	§2.1055 §90.213	<±2.5 ppm	§5.2	<±2.5ppm	Pass

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

B66

Uplink: 1710~1780MHz

Downlink: 2110~2200MHz

LTE B66					
FCC Part 27 Subpart L					
Industry Canada RSS-139, issue 3, Industry Canada RSS-GEN					
Test item	FCC Reference section	FCC Limit	IC Reference section	IC Limit	Result
RF Output Power	§2.1033 §2.1046 §27.50	<1 Watts	§6.5	<1 Watts	Pass
Occupied Bandwidth	§2.1049	N/A	RSS-GEN §4.2	N/A	Pass
Peak-to-average power ratio	§27.50	<13 dB	§6.5	<13 dB	Pass
Spurious Emissions	§2.1053 §27.53	<-13dBm	§6.6	<-13dBm	Pass
Spurious Emissions at Antenna Terminals	§27.53	<-13dBm	§6.6	<-13dBm	Pass
Frequency Stability	§2.1055 §27.54	<2.5 ppm	§6.4	Within the frequency range	Pass

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**
Canada	**:**	**IC Registration Number: 22397-1 / 22397-2 / 22397-3**

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
High Speed Peak Power Meter Dual Input	Anritsu	ML2496A	1602004	2019/12/02	2020/12/01
Pulse Power Sensor	Anritsu	MA2411B	1531043	2019/12/02	2020/12/01
Pulse Power Sensor	Anritsu	MA2411B	1531044	2019/12/02	2020/12/01
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	2019/09/11	2020/09/10
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2019/03/15	2020/03/14
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
Spectrum Analyzer	Keysight	N9010B	MY57110159	2020/04/15	2021/04/14
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	2019/09/11	2020/09/10
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2019/03/15	2020/03/14
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
Spectrum Analyzer	Keysight	N9010B	MY57110159	2020/04/15	2021/04/14
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	2019/09/11	2020/09/10
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2019/03/15	2020/03/14
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
Spectrum Analyzer	Keysight	N9010B	MY57110159	2020/04/15	2021/04/14
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 / CB2-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Horn Antenna	Schwarzbeck	BBHA 9120D	639	2019/05/28	2020/05/27
Horn Antenna	Schwarzbeck	BBHA 9120D	639	2020/06/04	2021/06/03
Bilog Antenna	Teseq	CBL6112D	23191	2019/06/17	2020/06/16
Signal & Spectrum Analyzer	R&S	FSV40	101049	2019/09/11	2020/09/10
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2019/03/15	2020/03/14
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	2020/070/7
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(16m)	Huber+Suhner	SF104	CB2-H	2019/07/25	2020/07/24
EMI system	DEKRA	Version 1.0	CB2-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	2019/09/11	2020/09/10
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2019/03/15	2020/03/14
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
Spectrum Analyzer	Keysight	N9010B	MY57110159	2020/04/15	2021/04/14
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	2019/09/11	2020/09/10
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2019/03/15	2020/03/14
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
Spectrum Analyzer	Keysight	N9010B	MY57110159	2020/04/15	2021/04/14
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

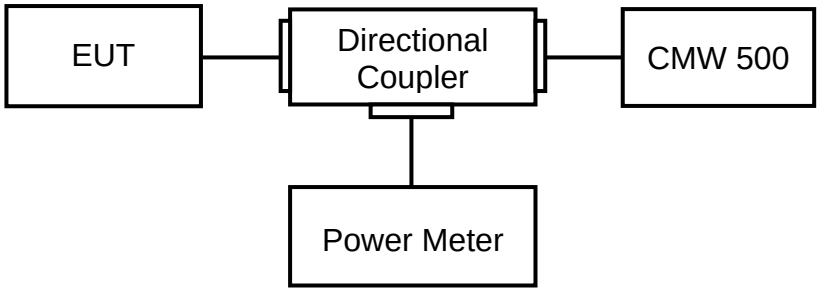
Note: All equipment upon which need to calibrated are with calibration period of 1 year.

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	Module		
Test Item	RF Output Power		
Test Mode	Mode 1：LTE NB-IoT_Band 2		
Date of Test	2020/01/17	Test Site	SR12-H
Temperature (°C)	21.0	Temperature (°C)	60.0

Channel	Freq. (MHz)	Modulation	SC spacing (kHz)	SC allocation	SC offset	Conducted Output Power (dBm)	RF Output Power (W) EIRP	Limit (W) EIRP
18602	1850.2	BPSK	3.75	1	0	23.13	0.326	2
			15	1	0	22.84	0.305	2
		QPSK	3.75	1	0	23.13	0.326	2
			15	1	0	22.82	0.303	2
				12	0	21.15	0.207	2
18900	1880	BPSK	3.75	1	0	24.04	0.402	2
			15	1	0	23.81	0.381	2
		QPSK	3.75	1	0	24.01	0.399	2
			15	1	0	23.79	0.379	2
				12	0	22.12	0.258	2
19198	1909.8	BPSK	3.75	1	47	22.77	0.300	2
			15	1	11	22.74	0.298	2
		QPSK	3.75	1	47	22.79	0.301	2
			15	1	11	22.72	0.296	2
				12	0	21.05	0.202	2

Product	Module		
Test Item	RF Output Power		
Test Mode	Mode 2：LTE NB-IoT_Band 4		
Date of Test	2020/01/17	Test Site	SR12-H
Temperature (°C)	21.0	Temperature (°C)	60.0

Channel	Freq. (MHz)	Modulation	SC spacing (kHz)	SC allocation	SC offset	Conducted Output Power (dBm)	RF Output Power (W) EIRP	Limit (W) EIRP
19952	1710.2	BPSK	3.75	1	0	23.05	0.320	1
			15	1	0	22.89	0.308	1
		QPSK	3.75	1	0	23.07	0.321	1
			15	1	0	22.90	0.309	1
				12	0	21.24	0.211	1
20175	1732.5	BPSK	3.75	1	0	24.10	0.407	1
			15	1	0	23.88	0.387	1
		QPSK	3.75	1	0	24.11	0.408	1
			15	1	0	23.89	0.388	1
				12	0	22.13	0.259	1
20398	1754.8	BPSK	3.75	1	47	23.05	0.320	1
			15	1	11	22.99	0.316	1
		QPSK	3.75	1	47	23.08	0.322	1
			15	1	11	23.00	0.316	1
				12	0	21.21	0.209	1

Product	Module		
Test Item	RF Output Power		
Test Mode	Mode 3：LTE NB-IoT_Band 5		
Date of Test	2020/01/17	Test Site	SR12-H
Temperature (°C)	21.0	Temperature (°C)	60.0

Channel	Freq. (MHz)	Modulation	SC spacing (kHz)	SC allocation	SC offset	Conducted Output Power (dBm)	RF Output Power (W) ERP	Limit (W) ERP
20402	824.2	BPSK	3.75	1	0	22.81	0.185	7
			15	1	0	22.78	0.183	7
		QPSK	3.75	1	0	22.84	0.186	7
			15	1	0	22.75	0.182	7
				12	0	21.25	0.129	7
20525	836.5	BPSK	3.75	1	0	24.02	0.244	7
			15	1	0	23.98	0.242	7
		QPSK	3.75	1	0	24.01	0.243	7
			15	1	0	23.97	0.241	7
				12	0	22.23	0.161	7
20648	848.8	BPSK	3.75	1	47	23.08	0.196	7
			15	1	11	22.94	0.190	7
		QPSK	3.75	1	47	23.09	0.197	7
			15	1	11	22.93	0.190	7
				12	0	21.21	0.128	7

Product	Module		
Test Item	RF Output Power		
Test Mode	Mode 4：LTE NB-IoT_Band 12		
Date of Test	2020/01/17~2020/06/06	Test Site	SR12-H
Temperature (°C)	21.0	Temperature (°C)	60.0

Channel	Freq. (MHz)	Modulation	SC spacing (kHz)	SC allocation	SC offset	Conducted Output Power (dBm)	RF Output Power (W) ERP	Limit (W) ERP
23012	699.2	BPSK	3.75	1	0	22.86	0.187	2
			15	1	0	22.73	0.181	2
		QPSK	3.75	1	0	22.89	0.188	2
			15	1	0	22.67	0.179	2
				12	0	21.18	0.127	2
23095	707.5	BPSK	3.75	1	0	23.94	0.239	3
			15	1	0	23.92	0.238	3
		QPSK	3.75	1	0	23.93	0.239	3
			15	1	0	23.89	0.237	3
				12	0	22.31	0.164	3
23178	715.8	BPSK	3.75	1	47	22.97	0.191	2
			15	1	11	22.86	0.187	2
		QPSK	3.75	1	47	23.02	0.194	2
			15	1	11	22.78	0.183	2
				12	0	21.24	0.129	2

Product	Module		
Test Item	RF Output Power		
Test Mode	Mode 5：LTE NB-IoT_Band 13		
Date of Test	2020/01/17	Test Site	SR12-H
Temperature (°C)	21.0	Temperature (°C)	60.0

Channel	Freq. (MHz)	Modulation	SC spacing (kHz)	SC allocation	SC offset	Conducted Output Power (dBm)	RF Output Power (W) ERP	Limit (W) ERP
23182	777.2	BPSK	3.75	1	0	22.83	0.185	3
			15	1	0	22.79	0.184	3
		QPSK	3.75	1	0	22.87	0.187	3
			15	1	0	22.78	0.183	3
				12	0	21.18	0.127	3
23230	782	BPSK	3.75	1	0	23.81	0.232	3
			15	1	0	23.79	0.231	3
		QPSK	3.75	1	0	23.84	0.234	3
			15	1	0	23.77	0.230	3
				12	0	22.18	0.160	3
23278	786.8	BPSK	3.75	1	47	22.88	0.187	3
			15	1	11	22.81	0.185	3
		QPSK	3.75	1	47	22.90	0.188	3
			15	1	11	22.81	0.185	3
				12	0	21.12	0.125	3

Product	Module		
Test Item	RF Output Power		
Test Mode	Mode 6：LTE NB-IoT_Band 25		
Date of Test	2020/01/17	Test Site	SR12-H
Temperature (°C)	21.0	Temperature (°C)	60.0

Channel	Freq. (MHz)	Modulation	SC spacing (kHz)	SC allocation	SC offset	Conducted Output Power (dBm)	RF Output Power (W) EIRP	Limit (W) EIRP
26042	1850.2	BPSK	3.75	1	0	23.17	0.329	2
			15	1	0	23.04	0.319	2
		QPSK	3.75	1	0	23.17	0.329	2
			15	1	0	23.02	0.318	2
				12	0	21.20	0.209	2
26365	1882.5	BPSK	3.75	1	0	24.02	0.400	2
			15	1	0	23.97	0.395	2
		QPSK	3.75	1	0	24.04	0.402	2
			15	1	0	23.98	0.396	2
				12	0	22.21	0.264	2
26688	1914.8	BPSK	3.75	1	47	22.77	0.300	2
			15	1	11	22.73	0.297	2
		QPSK	3.75	1	47	22.79	0.301	2
			15	1	11	22.76	0.299	2
				12	0	21.12	0.205	2

Product	Module		
Test Item	RF Output Power (Part 22)		
Test Mode	Mode 7：LTE NB-IoT_Band 26		
Date of Test	2020/01/17	Test Site	SR12-H
Temperature (°C)	21.0	Temperature (°C)	60.0

Channel	Freq. (MHz)	Modulation	SC spacing (kHz)	SC allocation	SC offset	Conducted Output Power (dBm)	RF Output Power (W) ERP	Limit (W) ERP
26792	824.2	BPSK	3.75	1	0	23.79	0.231	100
			15	1	0	23.72	0.228	100
		QPSK	3.75	1	0	23.78	0.231	100
			15	1	0	23.71	0.227	100
				12	0	22.20	0.160	100
26915	836.5	BPSK	3.75	1	0	23.91	0.238	100
			15	1	0	23.89	0.237	100
		QPSK	3.75	1	0	23.95	0.240	100
			15	1	0	23.88	0.236	100
				12	0	22.17	0.159	100
27038	848.8	BPSK	3.75	1	47	23.08	0.196	100
			15	1	11	22.93	0.190	100
		QPSK	3.75	1	47	23.07	0.196	100
			15	1	11	22.91	0.189	100
				12	0	21.22	0.128	100

Product	Module		
Test Item	RF Output Power (Part 90)		
Test Mode	Mode 7：LTE NB-IoT_Band 26		
Date of Test	2020/01/17~2020/06/06	Test Site	SR12-H
Temperature (°C)	21.0	Temperature (°C)	60.0

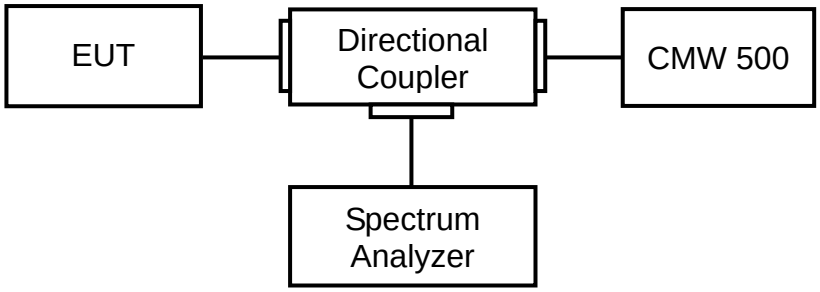
Channel	Freq. (MHz)	Modulation	SC spacing (kHz)	SC allocation	SC offset	Conducted Output Power (dBm)	RF Output Power (W) ERP	Limit (W) ERP
26692	814.2	BPSK	3.75	1	0	23.68	0.225	100
			15	1	0	22.65	0.178	100
		QPSK	3.75	1	0	23.73	0.228	100
			15	1	0	22.64	0.177	100
				12	0	21.21	0.128	100
26740	819	BPSK	3.75	1	0	23.96	0.240	100
			15	1	0	23.92	0.238	100
		QPSK	3.75	1	0	23.98	0.242	100
			15	1	0	23.91	0.238	100
				12	0	22.19	0.160	100
26788	823.8	BPSK	3.75	1	47	23.81	0.232	100
			15	1	11	23.76	0.230	100
		QPSK	3.75	1	47	23.88	0.236	100
			15	1	11	23.74	0.229	100
				12	0	22.13	0.158	100

Product	Module		
Test Item	RF Output Power		
Test Mode	Mode 8：LTE NB-IoT_Band 66		
Date of Test	2020/01/17	Test Site	SR12-H
Temperature (°C)	21.0	Temperature (°C)	60.0

Channel	Freq. (MHz)	Modulation	SC spacing (kHz)	SC allocation	SC offset	Conducted Output Power (dBm)	RF Output Power (W) EIRP	Limit (W) EIRP
131974	1710.2	BPSK	3.75	1	0	23.04	0.319	1
			15	1	0	22.93	0.311	1
		QPSK	3.75	1	0	23.07	0.321	1
			15	1	0	22.92	0.310	1
				12	0	21.21	0.209	1
132322	1745	BPSK	3.75	1	0	24.08	0.406	1
			15	1	0	23.94	0.393	1
		QPSK	3.75	1	0	24.08	0.406	1
			15	1	0	23.93	0.392	1
				12	0	22.17	0.261	1
132670	1779.8	BPSK	3.75	1	47	23.10	0.324	1
			15	1	11	22.97	0.314	1
		QPSK	3.75	1	47	23.11	0.324	1
			15	1	11	22.97	0.314	1
				12	0	21.22	0.210	1

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

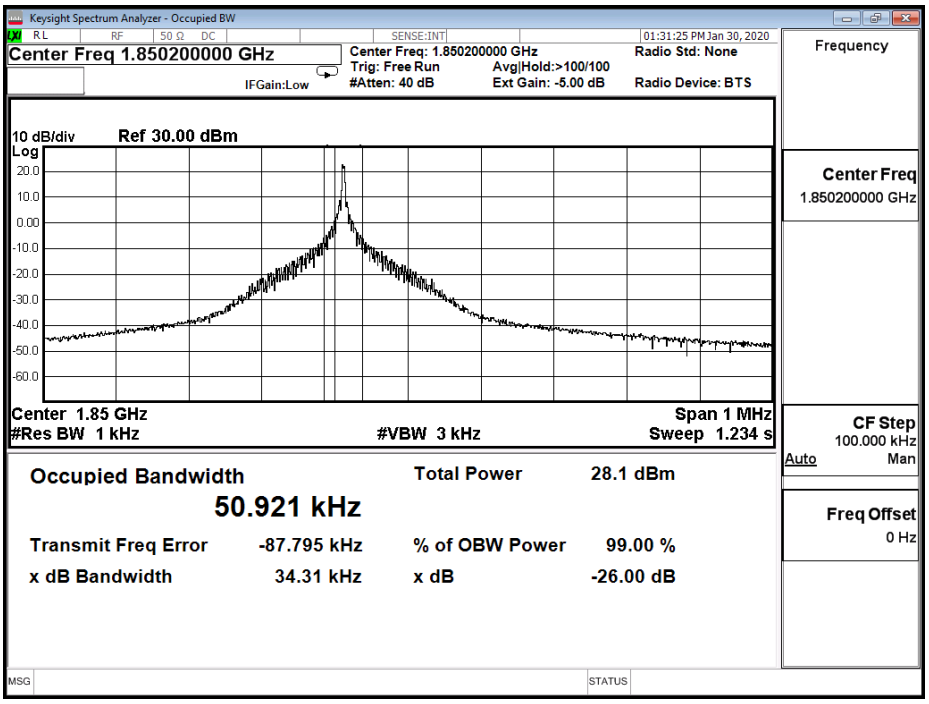
KDB 971168 D01 Power Meas License Digital Systems v03 sub-clause 4.2 & 4.3
ANSI C63.26: 2015 Sub-clause 5.4.3 & 5.4.4

4.4. Test Result

Product	Module		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1：LTE NB-IoT_Band 2		
Date of Test	2020/01/30	Test Site	SR12-H
Temperature (°C)	19.0	Humidity (%RH)	59.0

Channel	Freq. (MHz)	Modulation	BW (kHz)	RB No.	RB offset	Measure Level (kHz)		Limit (MHz)
						26dB BW	99% BW	
18602	1850.2	BPSK	3.75	1	0	34.310	50.921	NA
			15	1	0	121.300	101.490	NA
		QPSK	3.75	1	0	41.020	52.337	NA
			15	1	0	125.300	100.840	NA
				12	0	265.500	192.830	NA
18900	1880	BPSK	3.75	1	0	40.270	52.715	NA
			15	1	0	137.800	101.340	NA
		QPSK	3.75	1	0	40.500	51.675	NA
			15	1	0	126.400	99.244	NA
				12	0	265.000	190.190	NA
19198	1909.8	BPSK	3.75	1	47	36.600	50.620	NA
			15	1	11	122.900	99.398	NA
		QPSK	3.75	1	47	37.300	49.420	NA
			15	1	11	126.200	98.946	NA
				12	0	264.900	191.170	NA

B2_3.75K_CH18602_BPSK_1RB0



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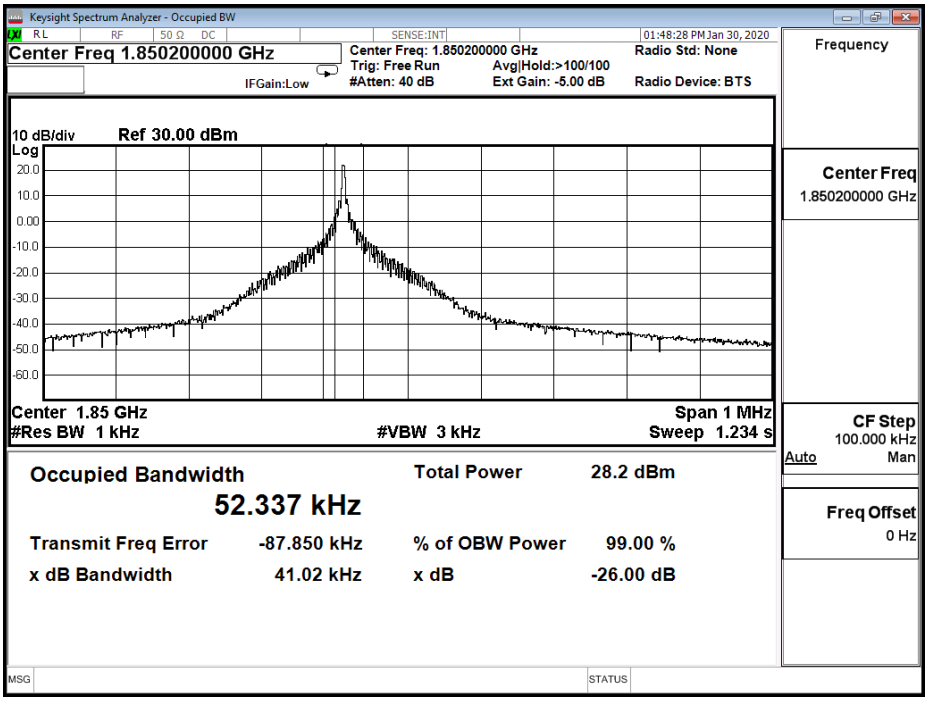

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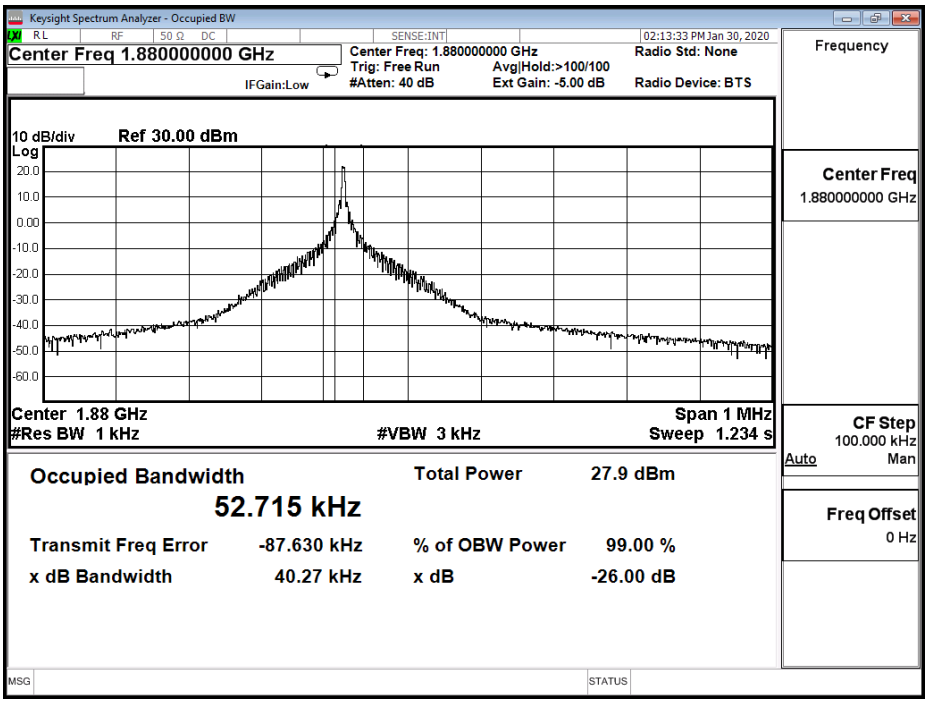

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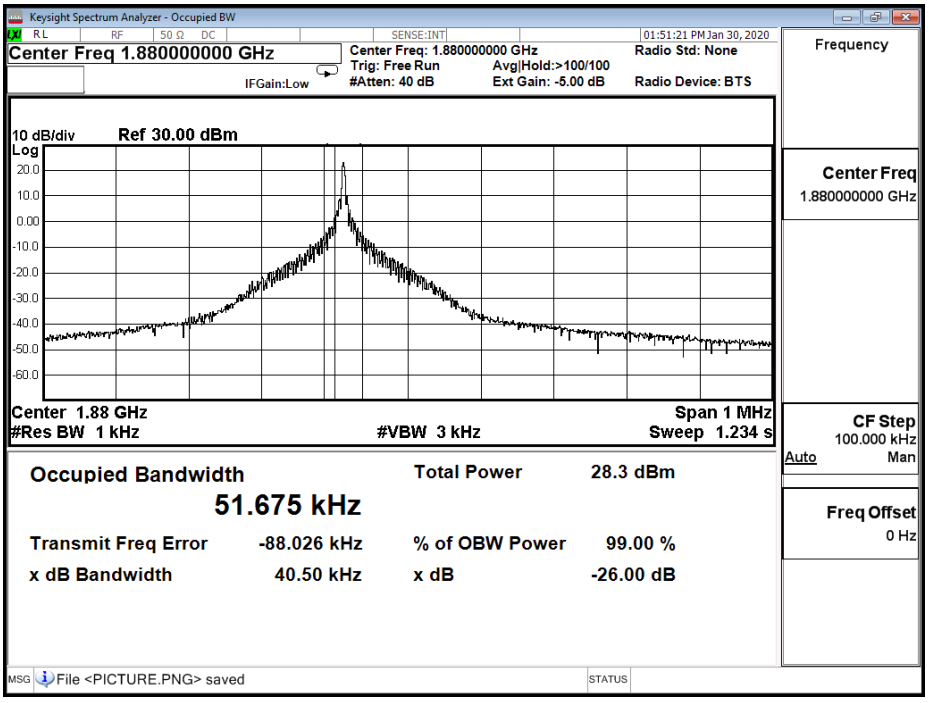

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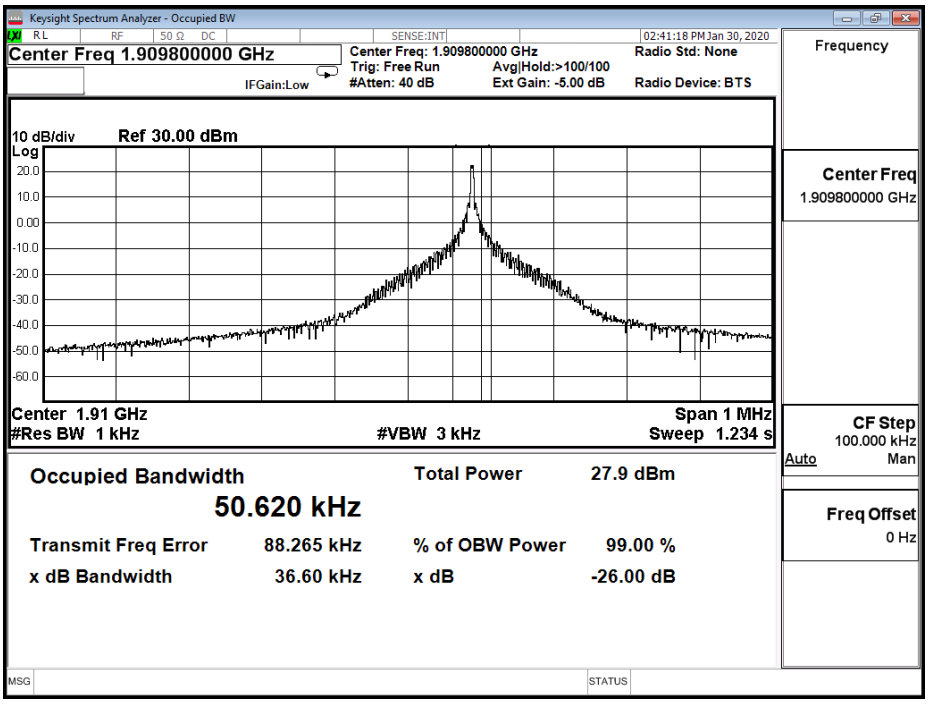

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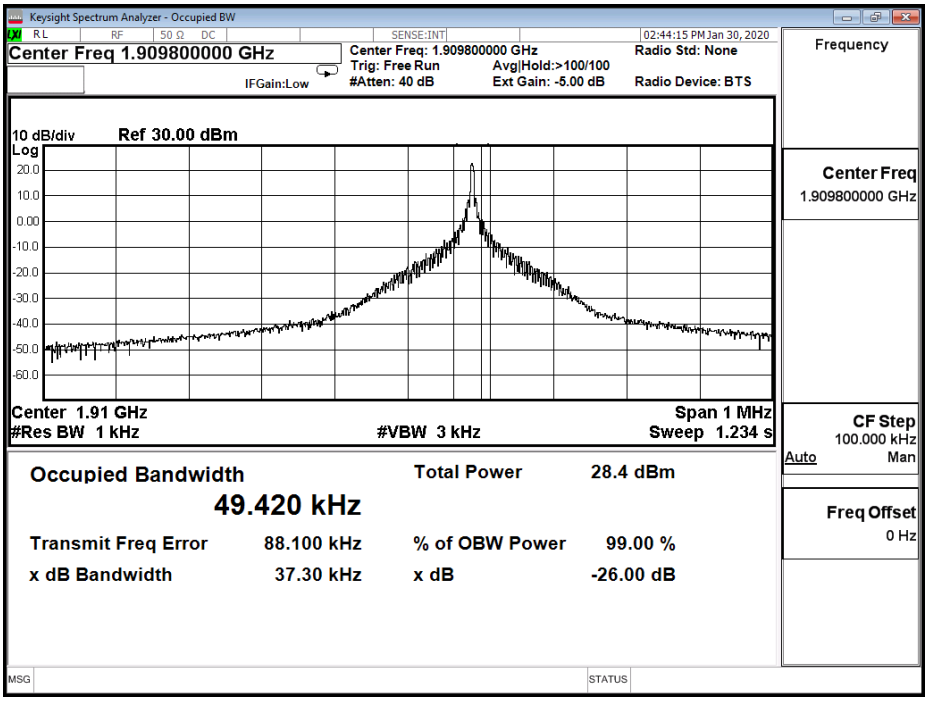

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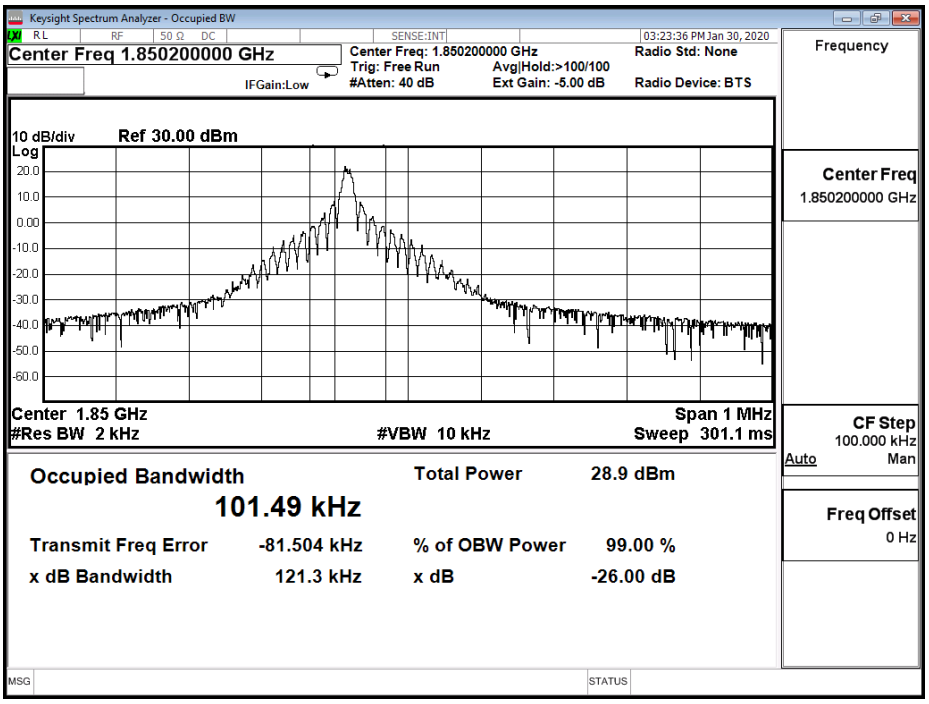

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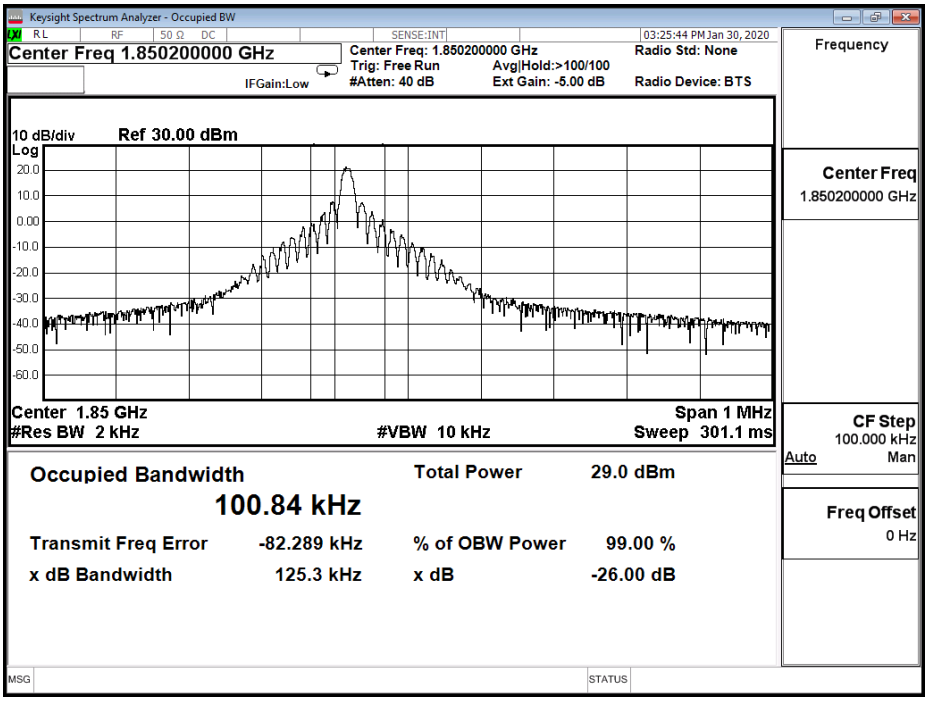

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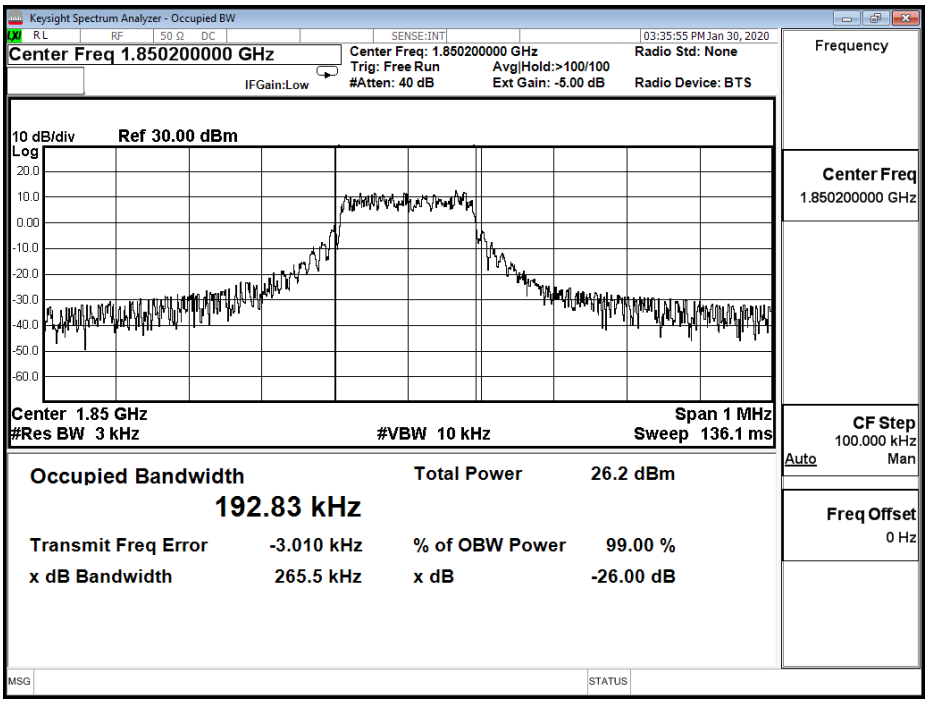

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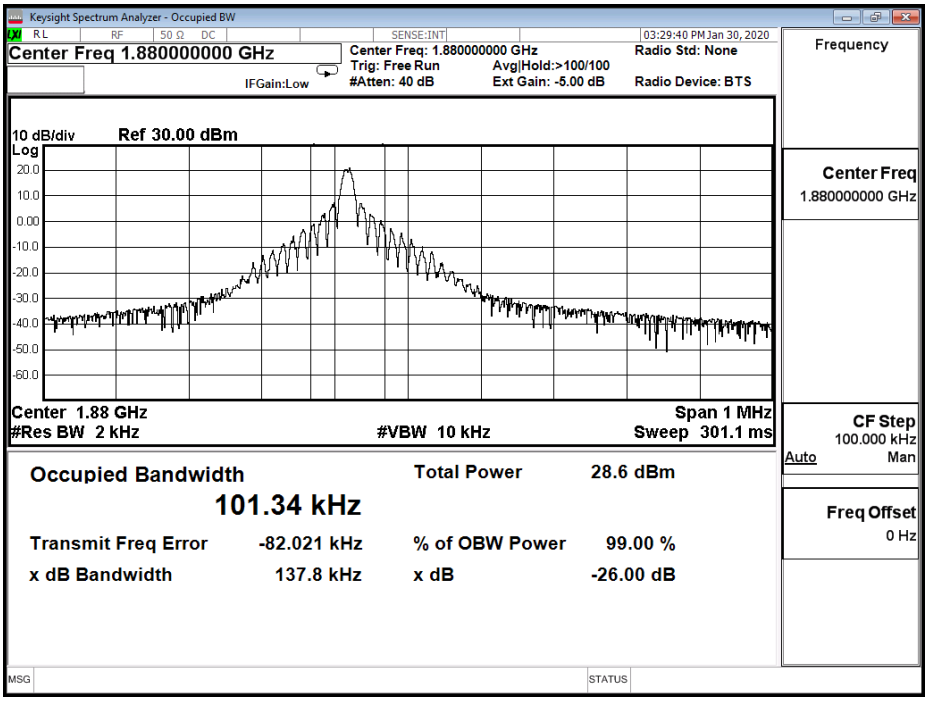

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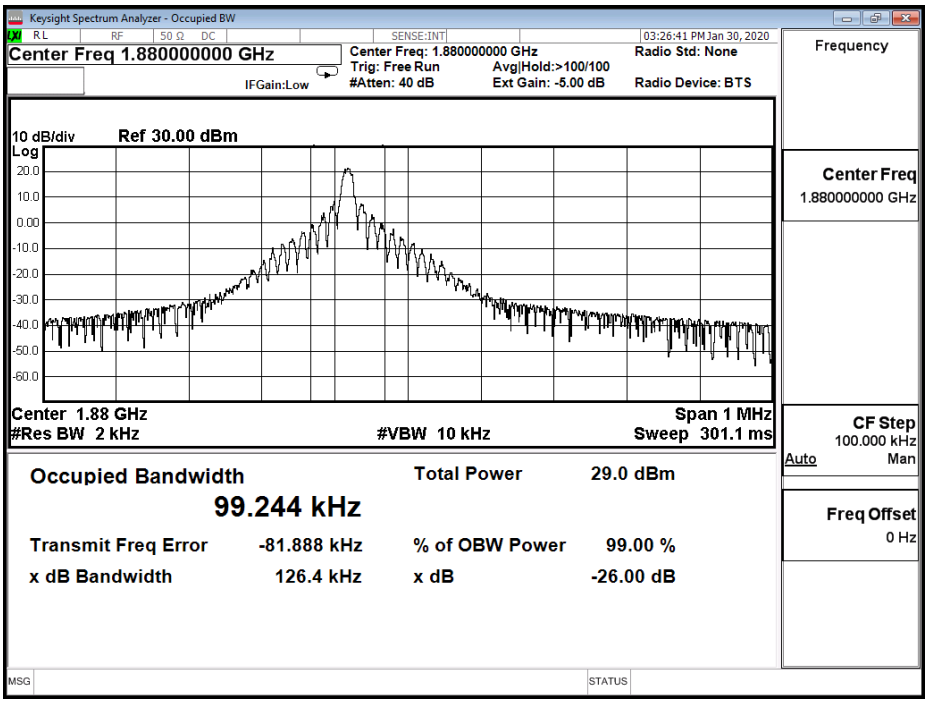

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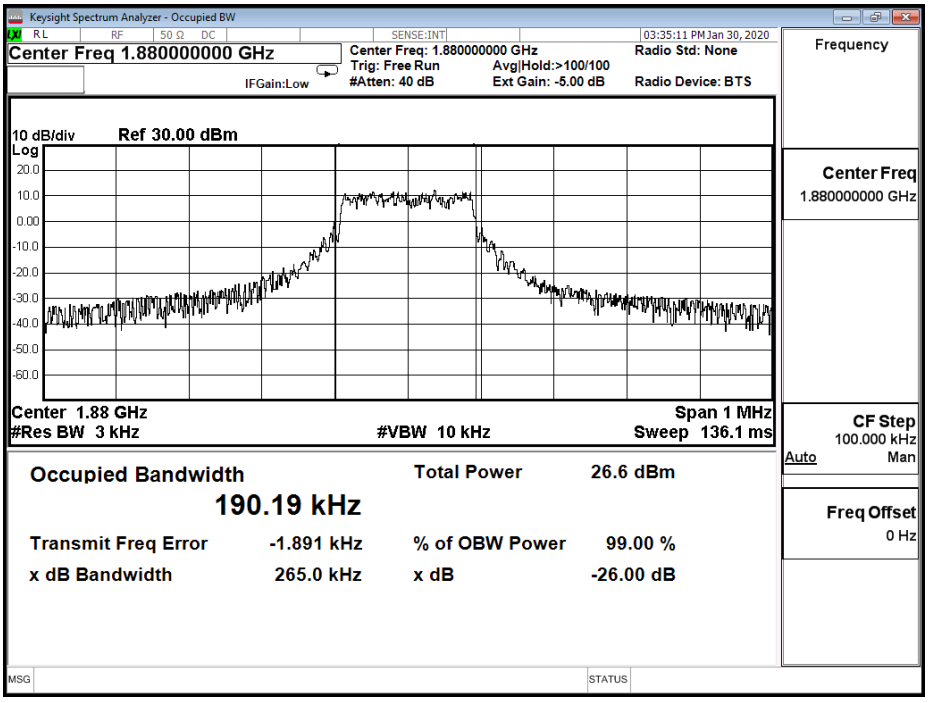

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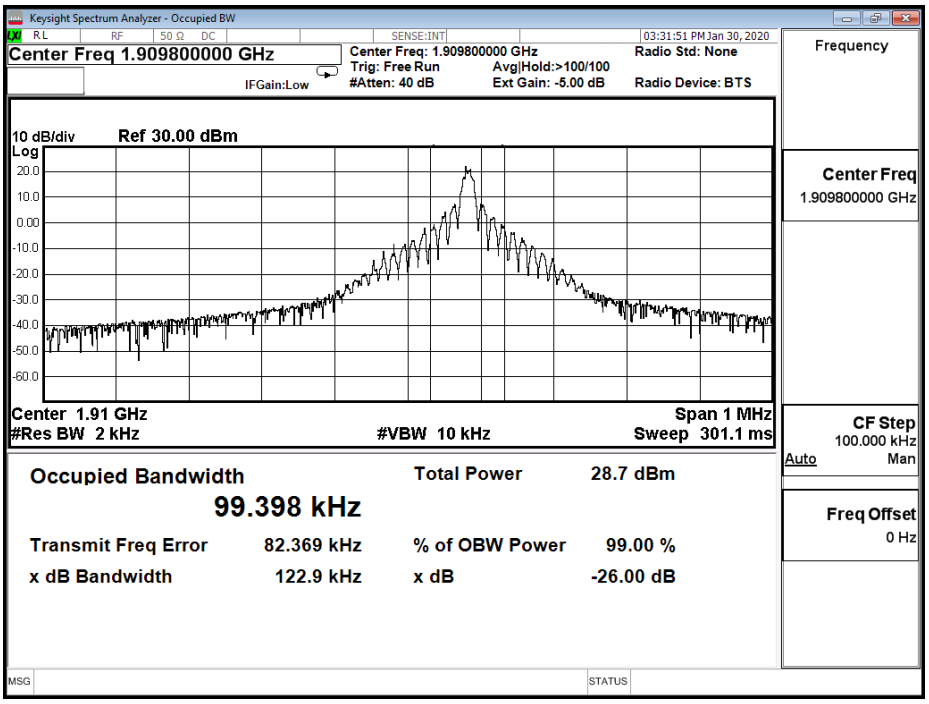

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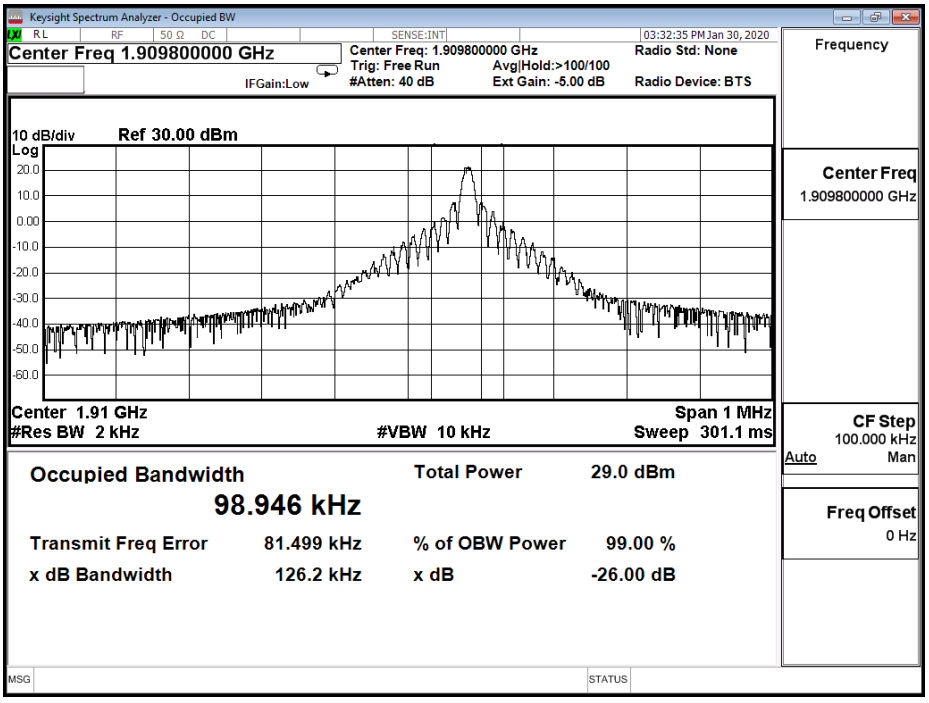

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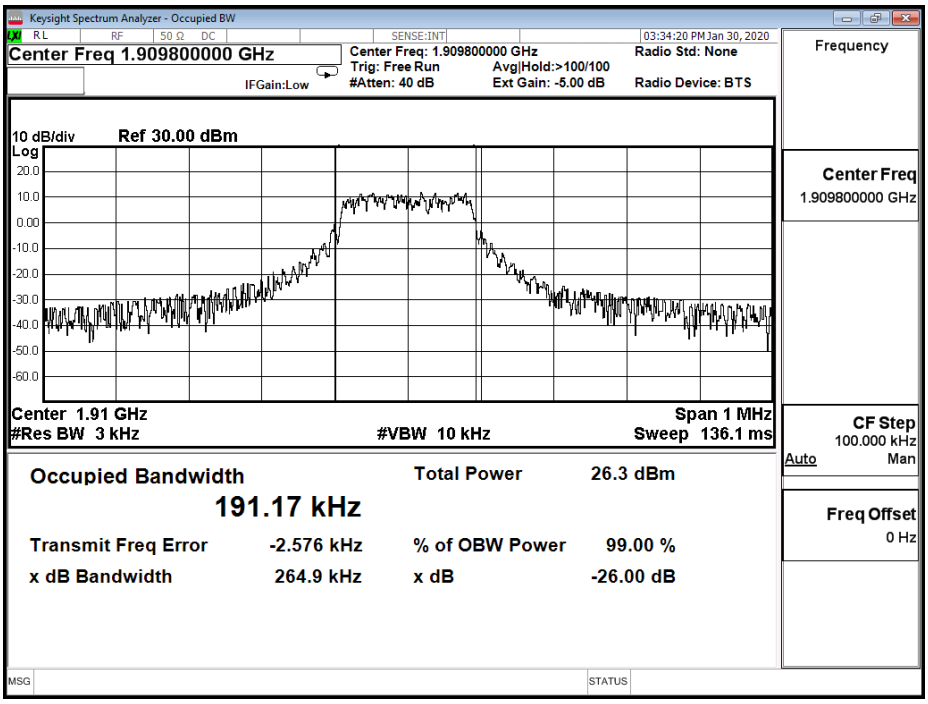
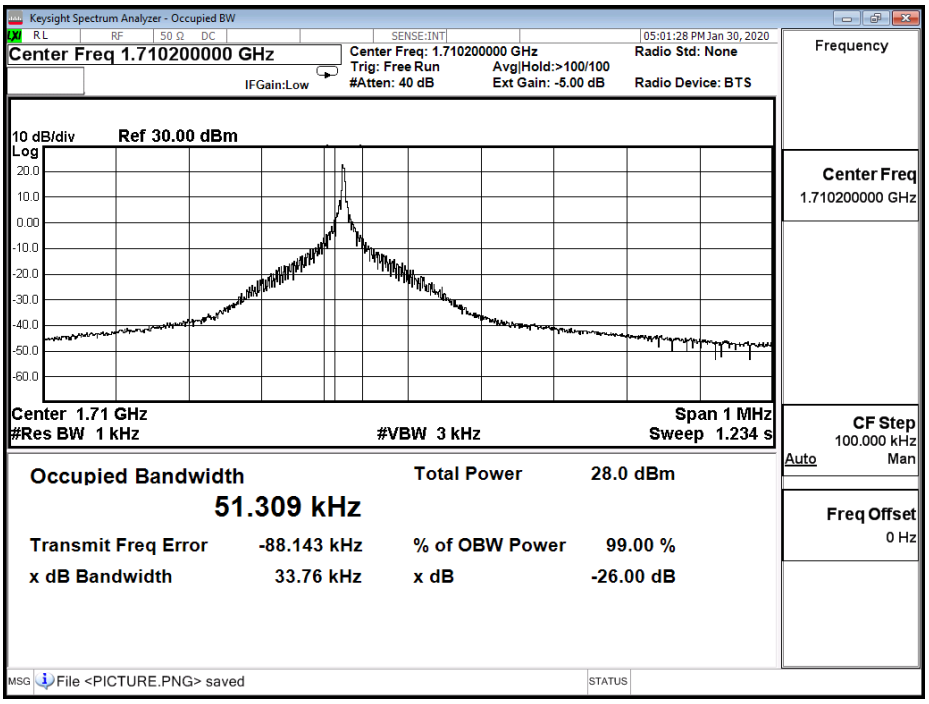


Product	Module		
Test Item	Occupied Bandwidth		
Test Mode	Mode 2：LTE NB-IoT_Band 4		
Date of Test	2020/01/30	Test Site	SR12-H
Temperature (°C)	19.0	Humidity (%RH)	59.0

Channel	Freq. (MHz)	Modulation	BW (kHz)	RB No.	RB offset	Measure Level (kHz)		Limit (MHz)
						26dB BW	99% BW	
19952	1710.2	BPSK	3.75	1	0	33.760	51.309	NA
			15	1	0	113.500	100.320	NA
		QPSK	3.75	1	0	40.820	49.529	NA
			15	1	0	126.100	101.010	NA
				12	0	265.800	189.360	NA
20175	1732.5	BPSK	3.75	1	0	34.200	49.930	NA
			15	1	0	125.900	100.810	NA
		QPSK	3.75	1	0	40.910	53.649	NA
			15	1	0	138.400	100.430	NA
				12	0	264.400	191.650	NA
20398	1754.8	BPSK	3.75	1	47	35.950	49.506	NA
			15	1	11	121.400	99.557	NA
		QPSK	3.75	1	47	40.470	48.769	NA
			15	1	11	127.200	100.970	NA
				12	0	265.200	190.980	NA

B4_3.75K_CH19952_BPSK_1RB0



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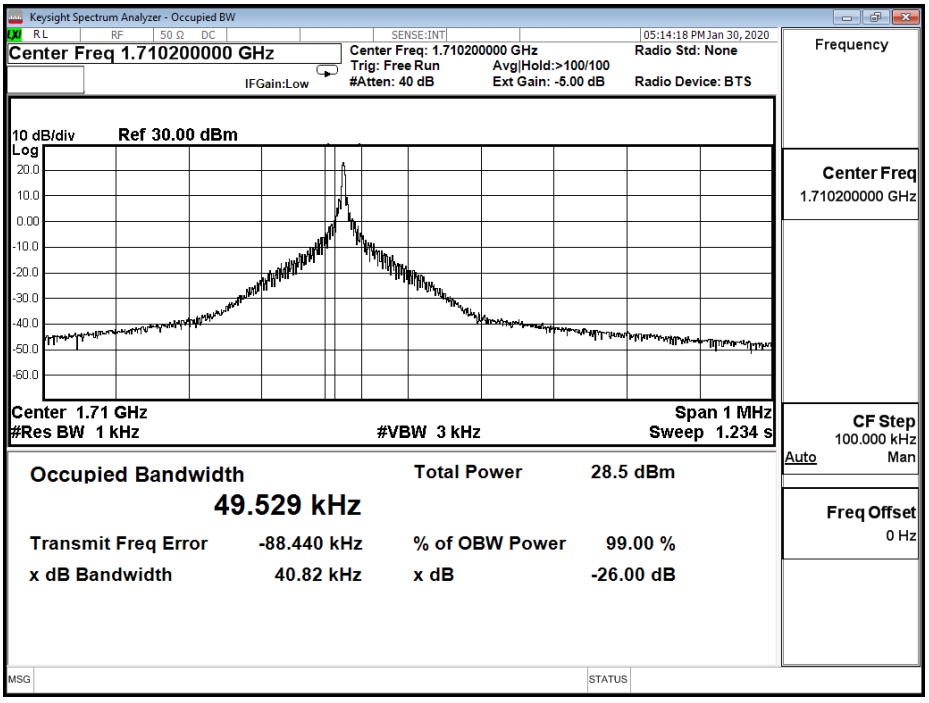

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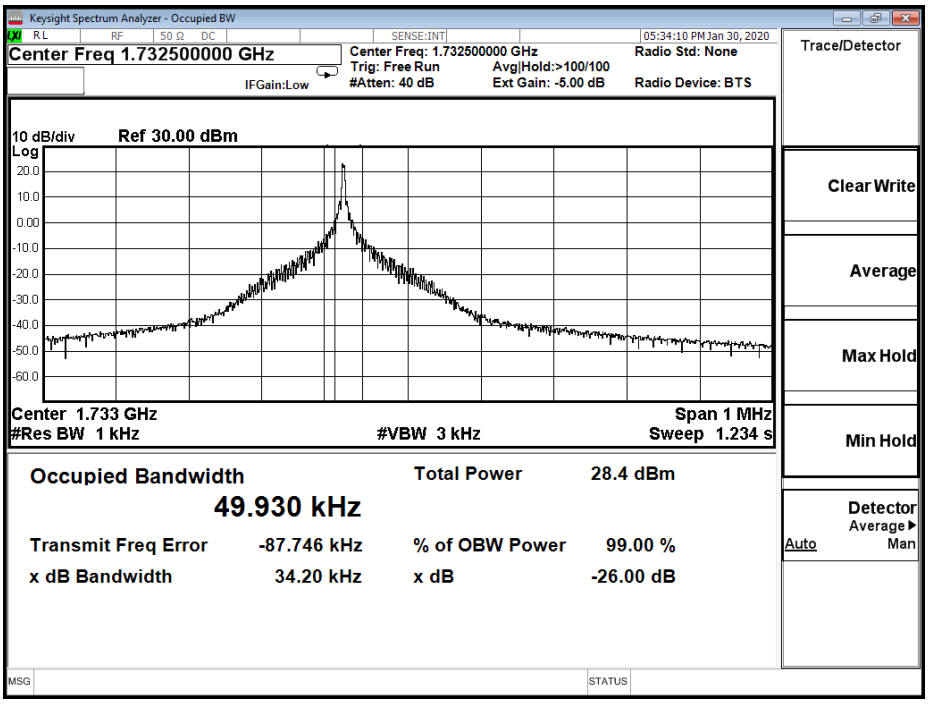

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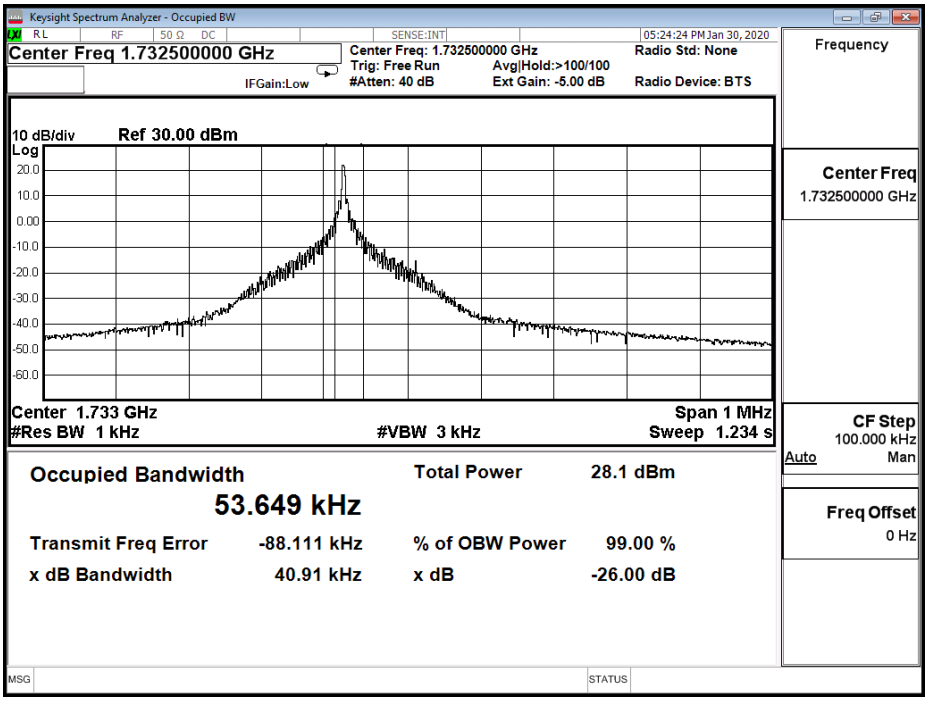

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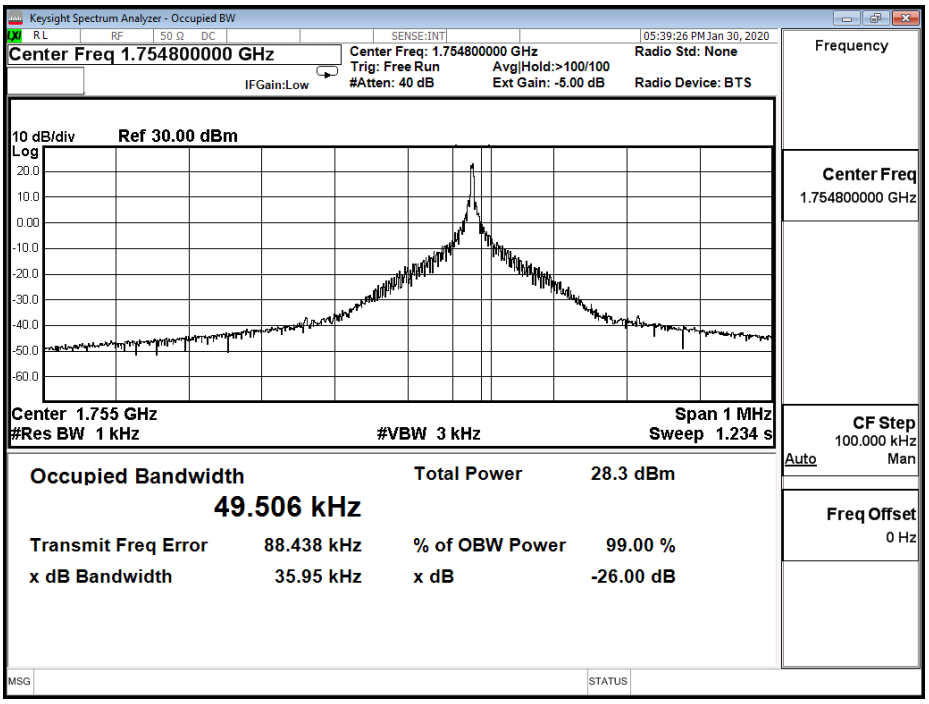

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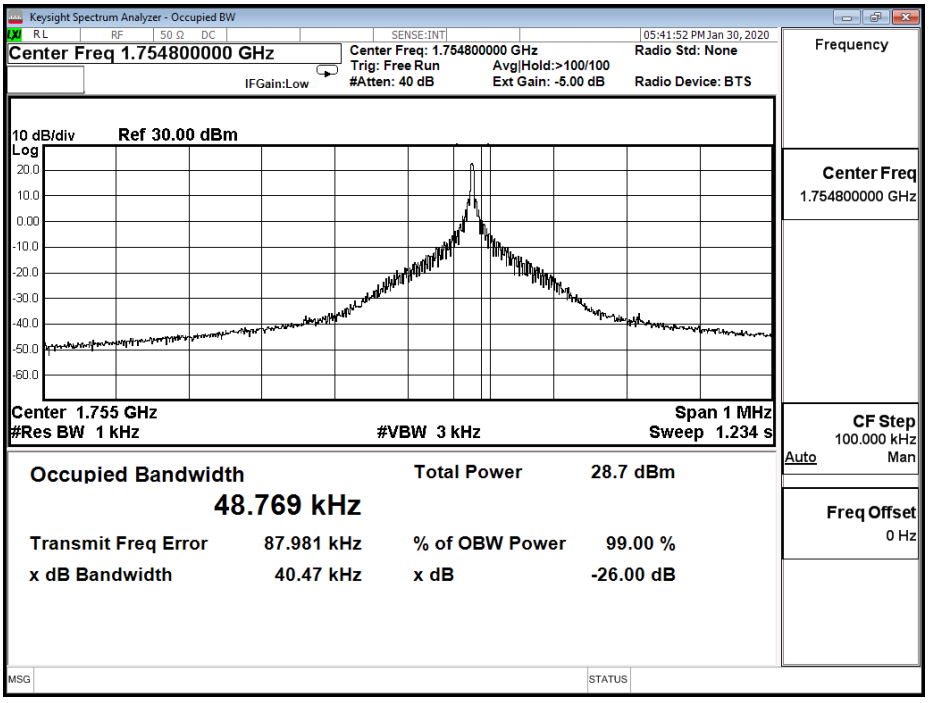

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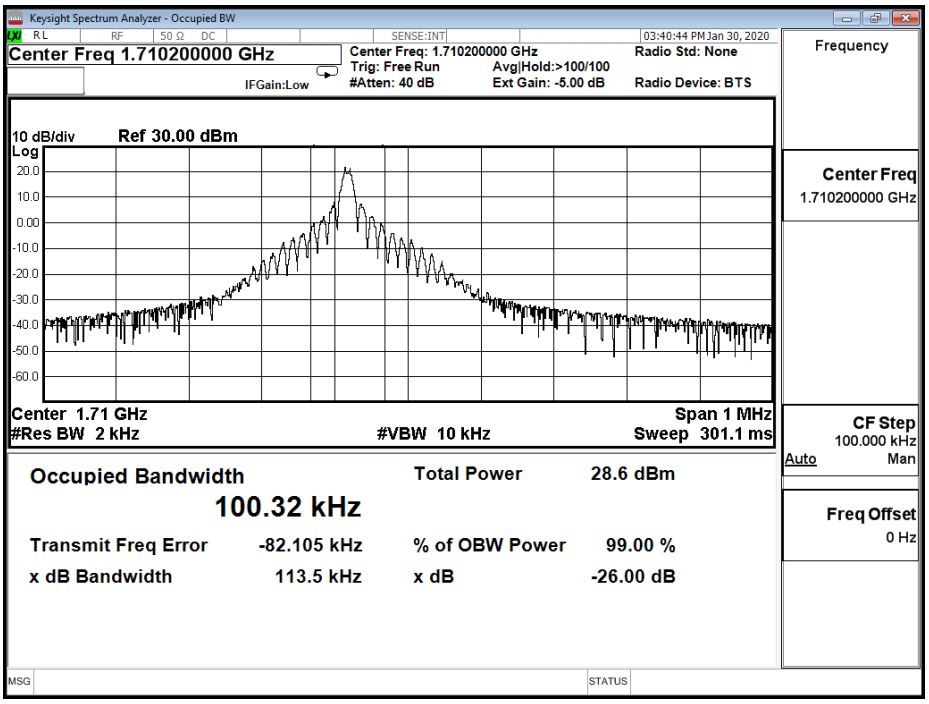
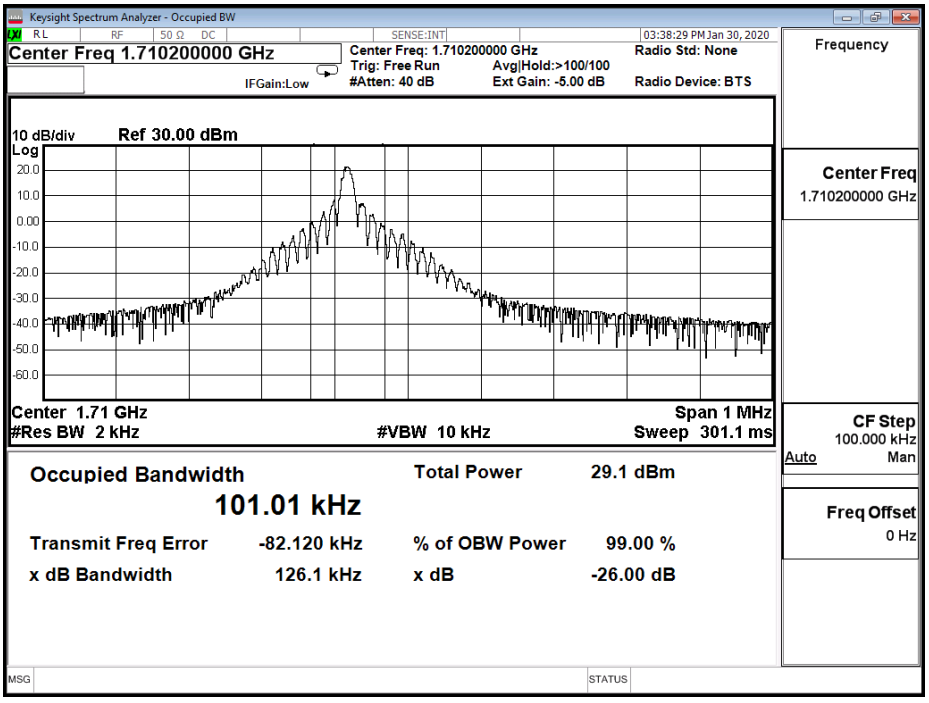
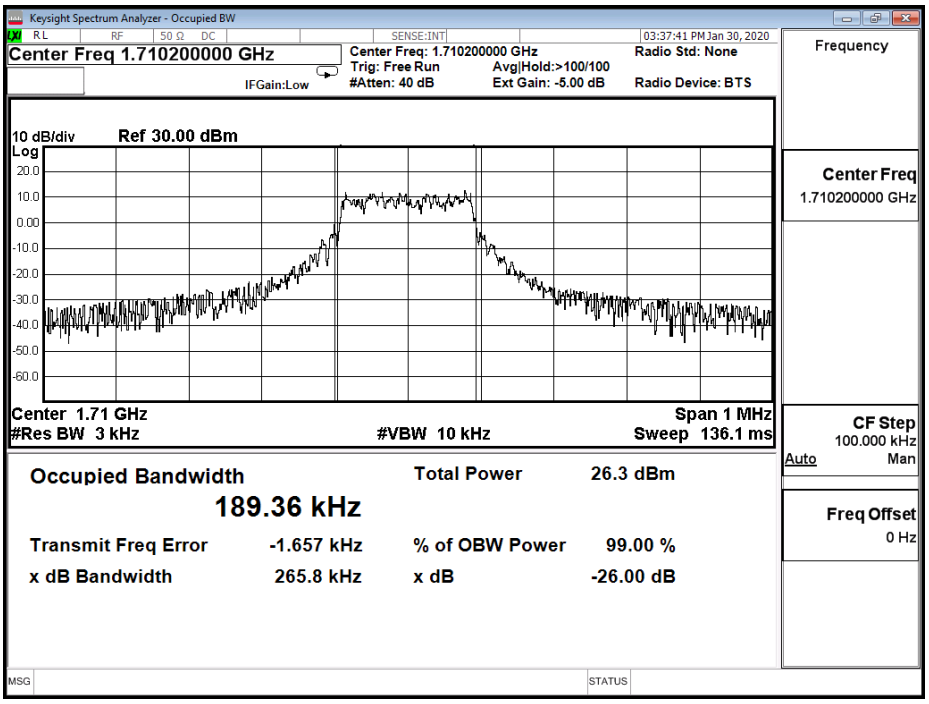


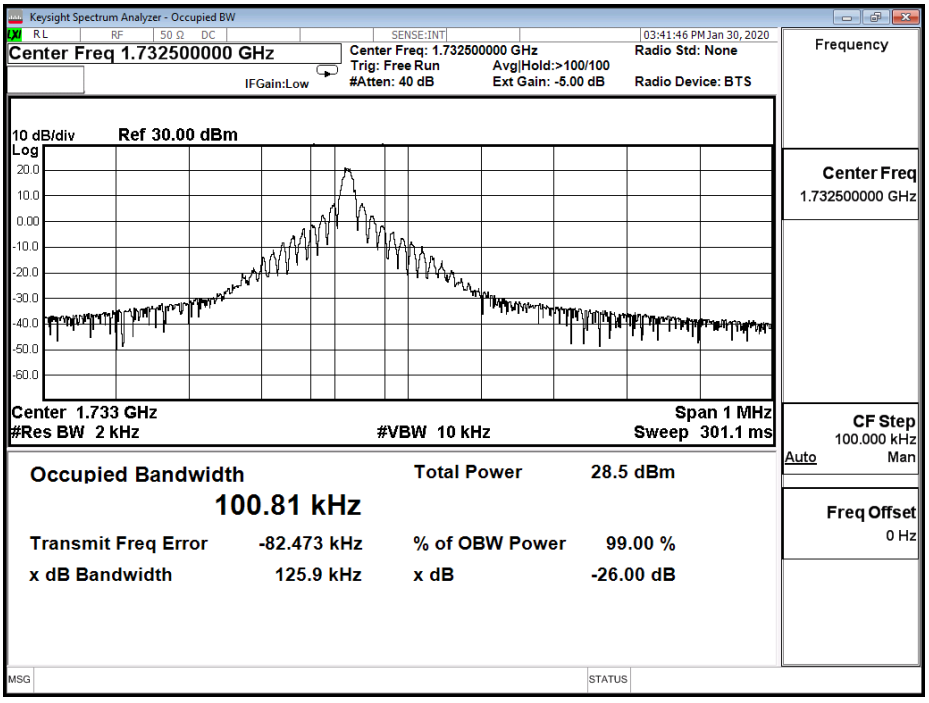
B4_15K_CH19952_QPSK_1RB0



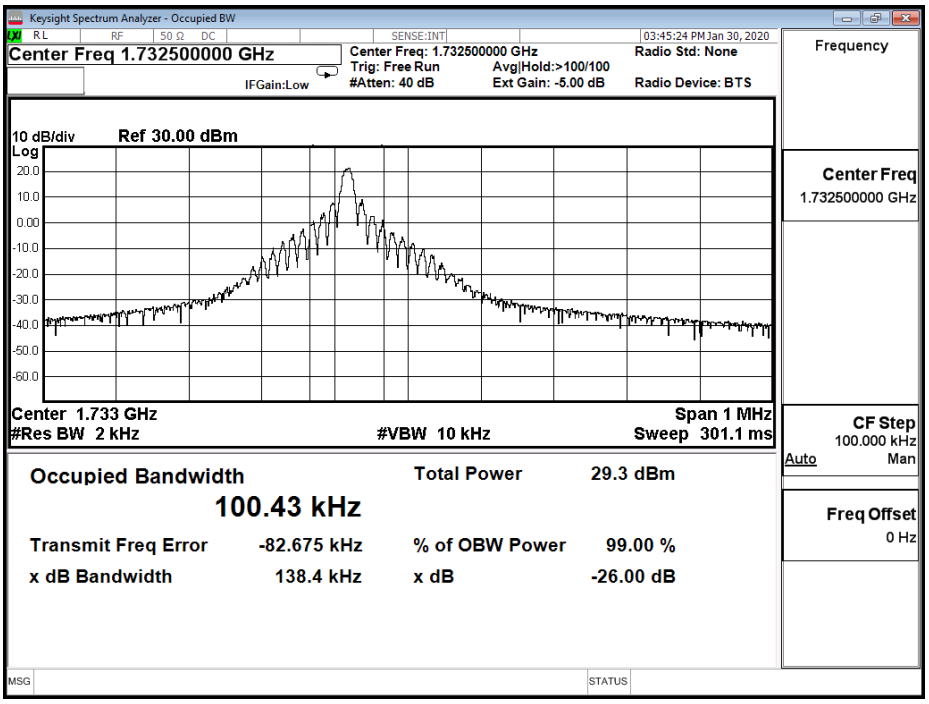
B4_15K_CH19952_QPSK_12RB0



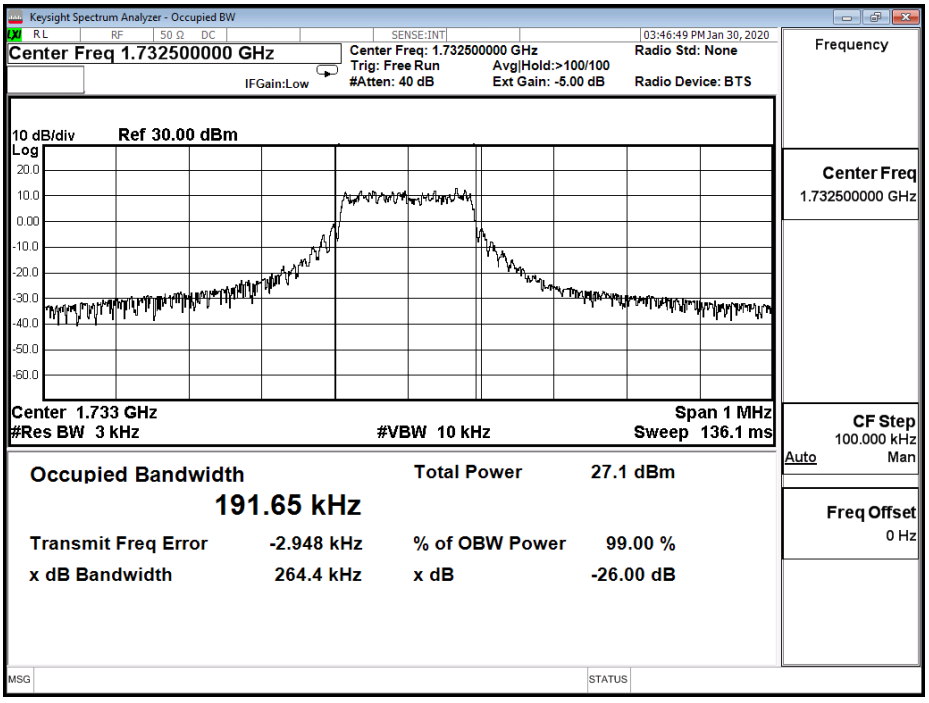
B4_15K_CH20175_BPSK_1RB0



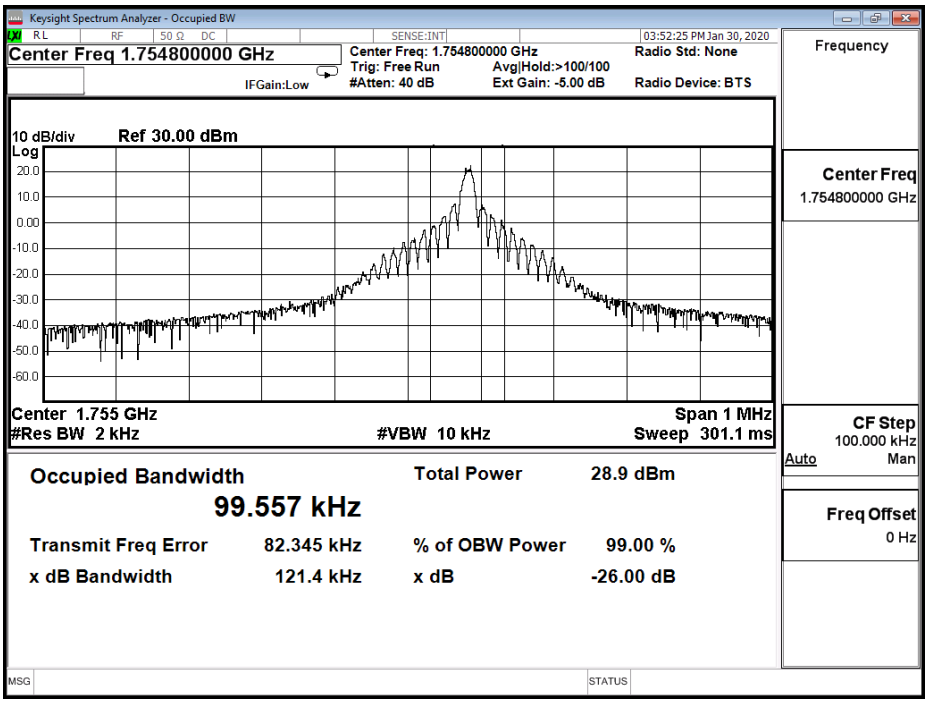
B4_15K_CH20175_QPSK_1RB0



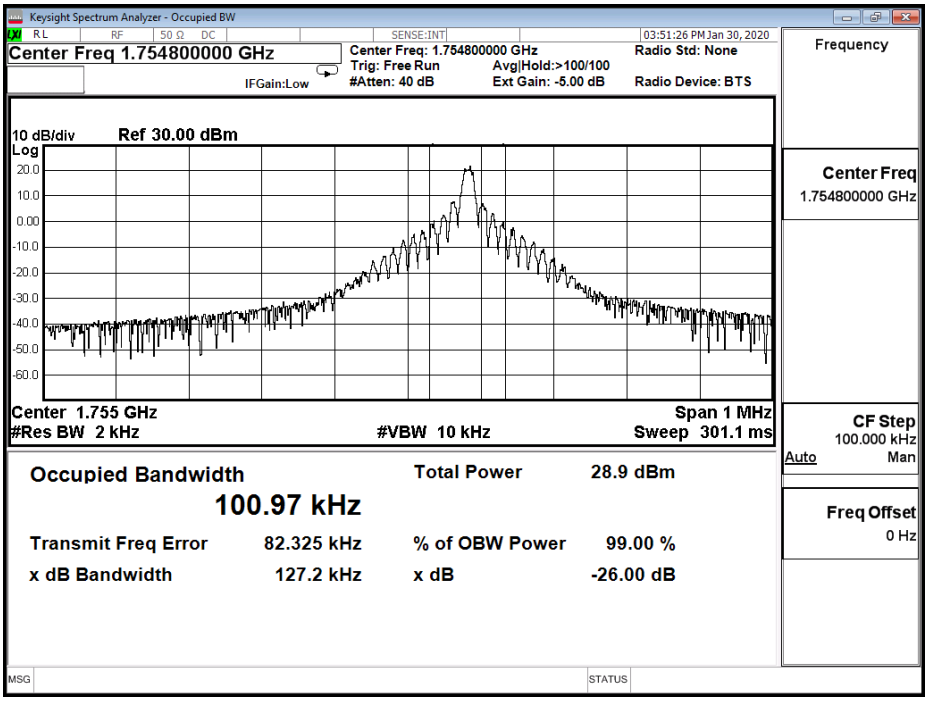
B4_15K_CH20175_QPSK_12RB0



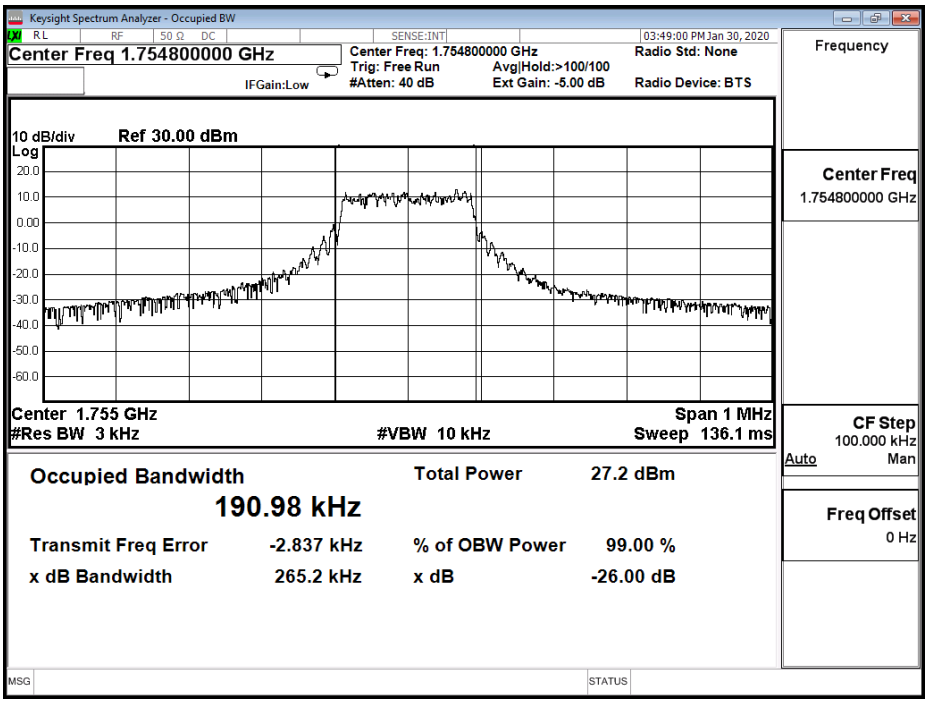
B4_15K_CH20398_BPSK_1RB11



B4_15K_CH20398_QPSK_1RB11



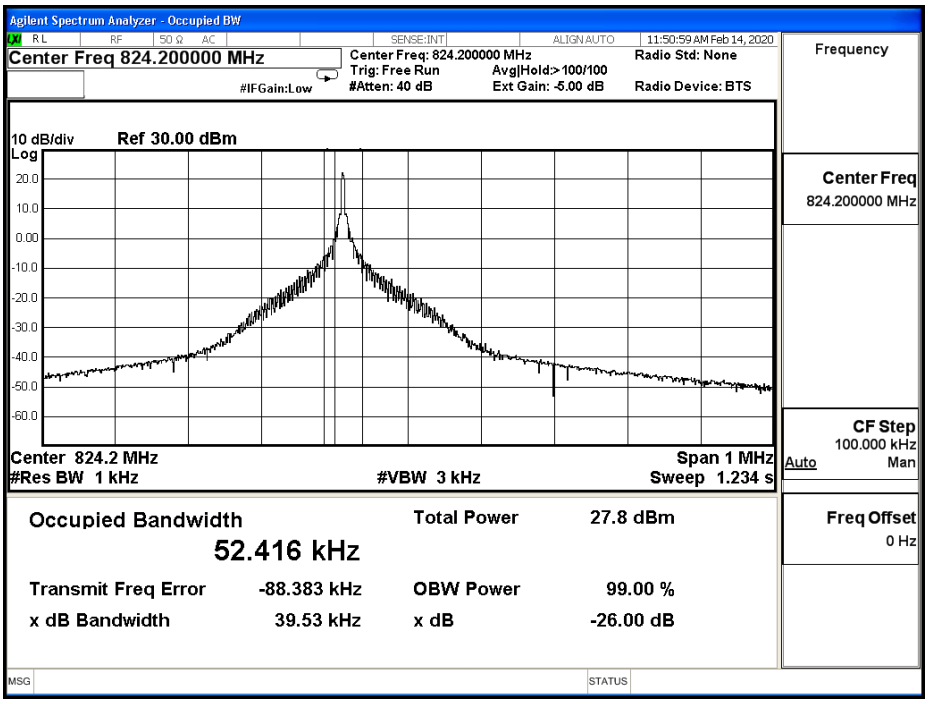
B4_15K_CH20398_QPSK_12RB0



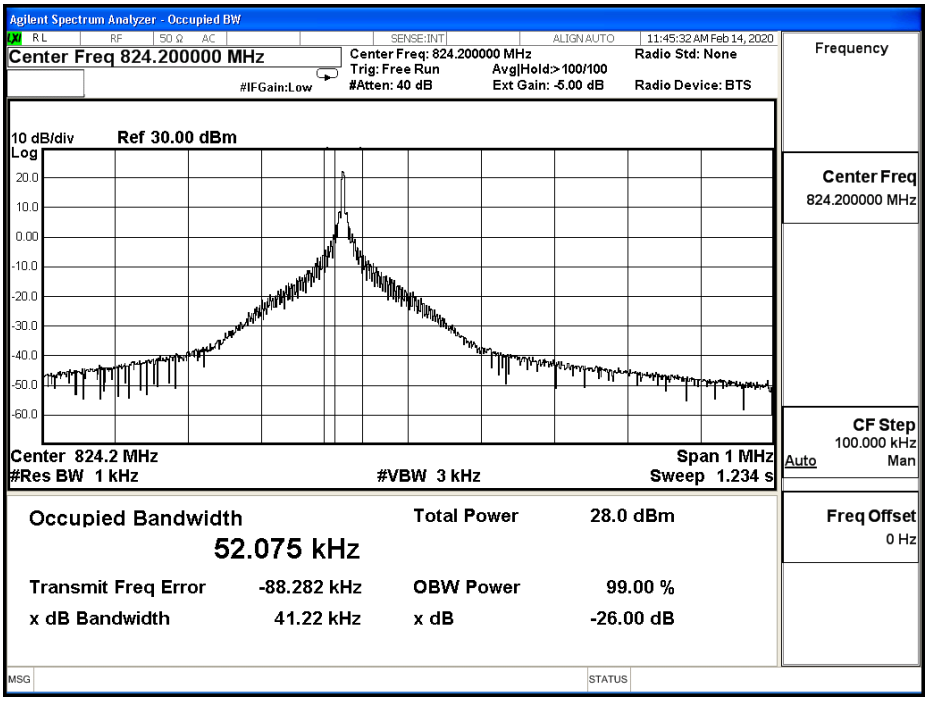
Product	Module		
Test Item	Occupied Bandwidth		
Test Mode	Mode 3：LTE NB-IoT_Band 5		
Date of Test	2020/01/31~2020/02/14	Test Site	SR12-H
Temperature (°C)	19.0	Humidity (%RH)	59.0

Channel	Freq. (MHz)	Modulation	BW (kHz)	RB No.	RB offset	Measure Level (kHz)		Limit (MHz)
						26dB BW	99% BW	
20402	824.2	BPSK	3.75	1	0	39.530	52.416	NA
			15	1	0	124.800	101.270	NA
		QPSK	3.75	1	0	41.220	52.075	NA
			15	1	0	124.400	99.693	NA
				12	0	263.600	192.380	NA
20525	836.5	BPSK	3.75	1	0	36.660	51.582	NA
			15	1	0	134.200	100.370	NA
		QPSK	3.75	1	0	39.630	49.661	NA
			15	1	0	138.000	99.535	NA
				12	0	266.100	192.780	NA
20648	848.8	BPSK	3.75	1	47	37.270	52.687	NA
			15	1	11	125.200	100.120	NA
		QPSK	3.75	1	47	40.590	48.756	NA
			15	1	11	138.200	100.700	NA
				12	0	262.600	191.520	NA

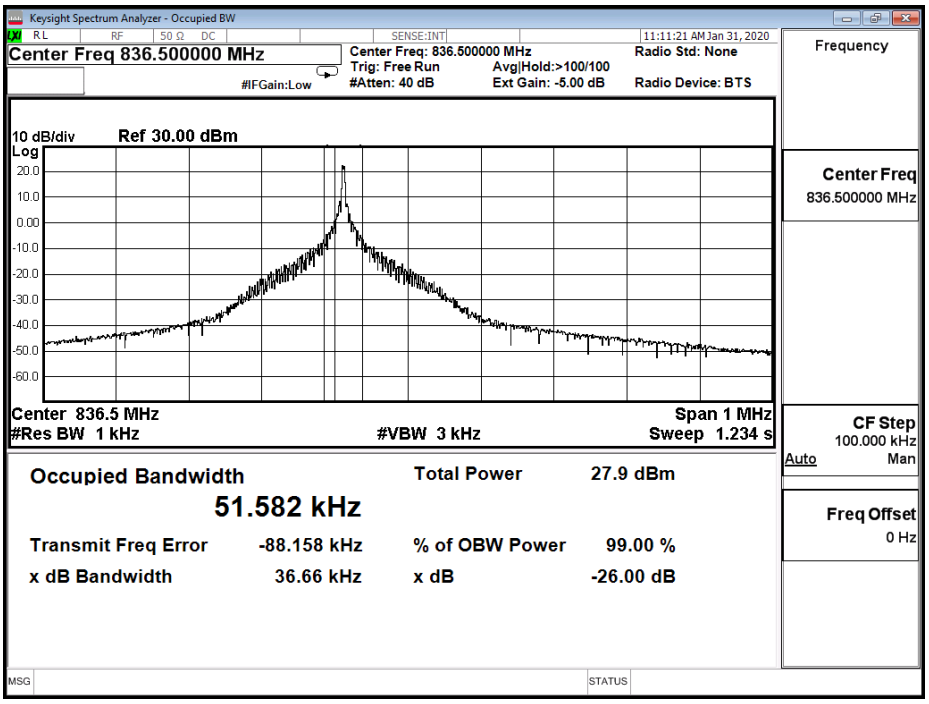
B5_3.75K_CH20402_BPSK_1RB0



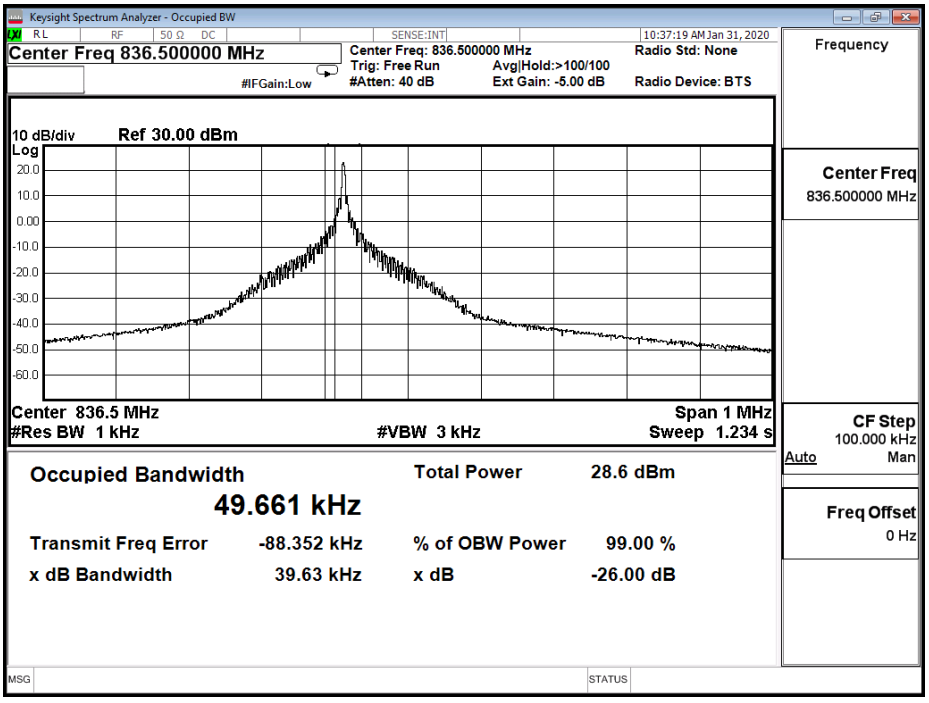
B5_3.75K_CH20402_QPSK_1RB0



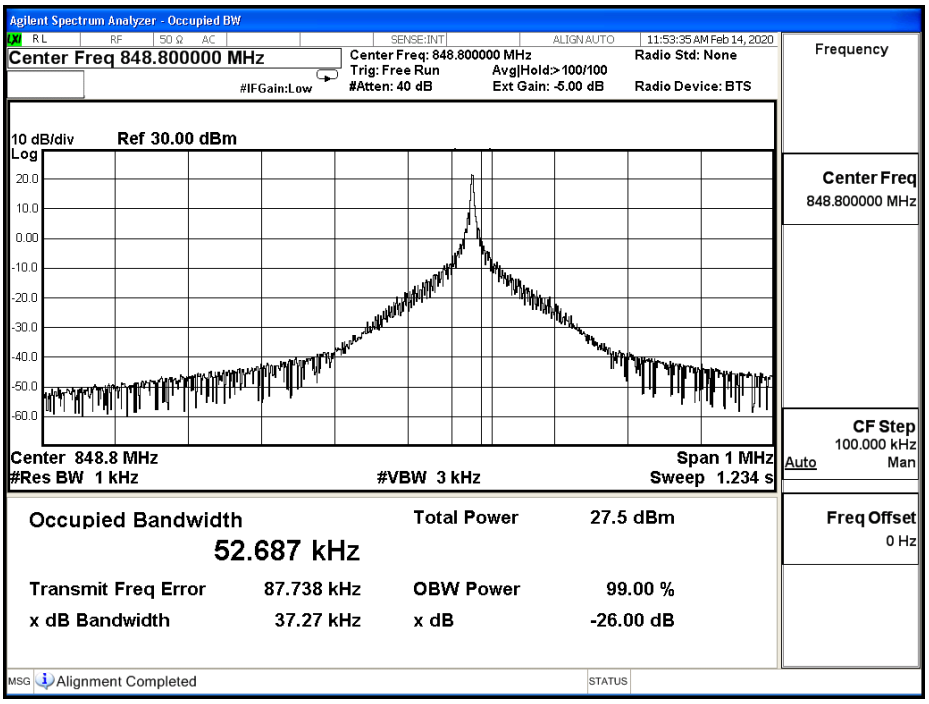
B5_3.75K_CH20525_BPSK_1RB0



B5_3.75K_CH20525_QPSK_1RB0



B5_3.75K_CH20648_BPSK_1RB47



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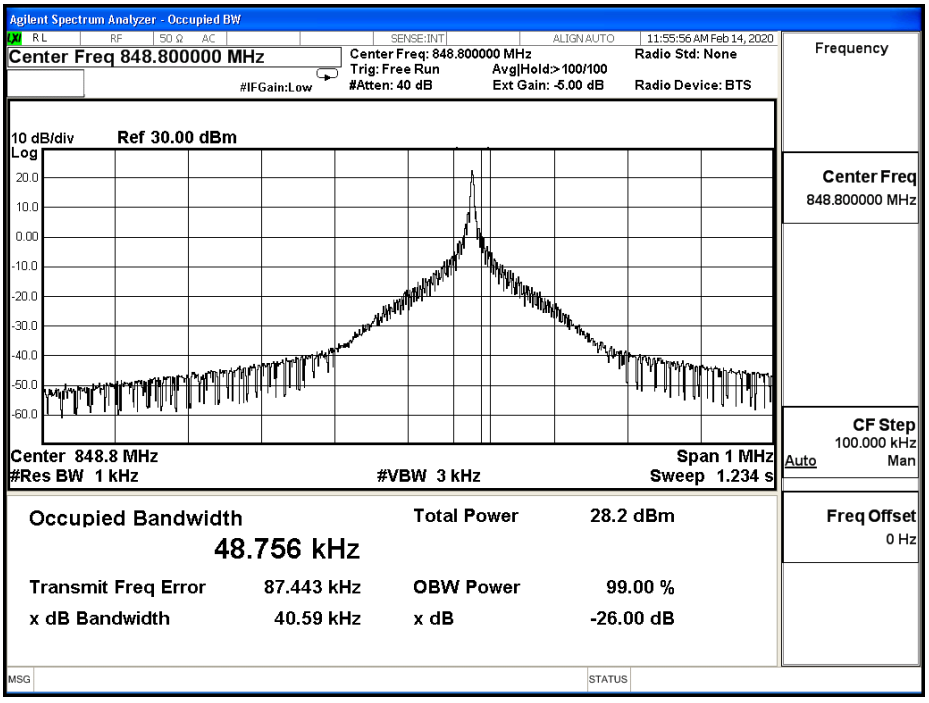
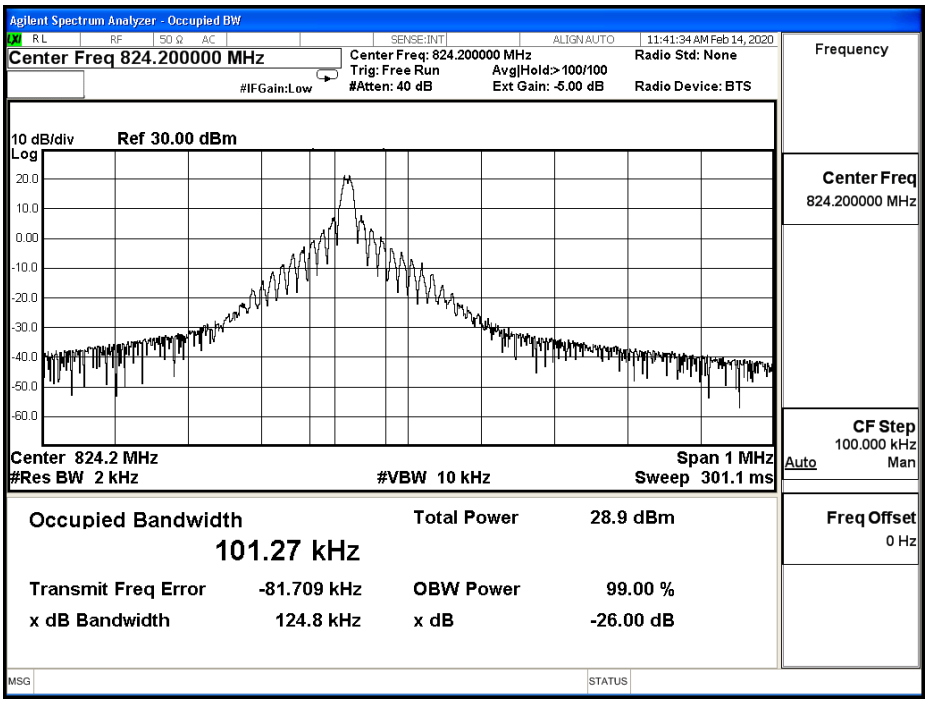
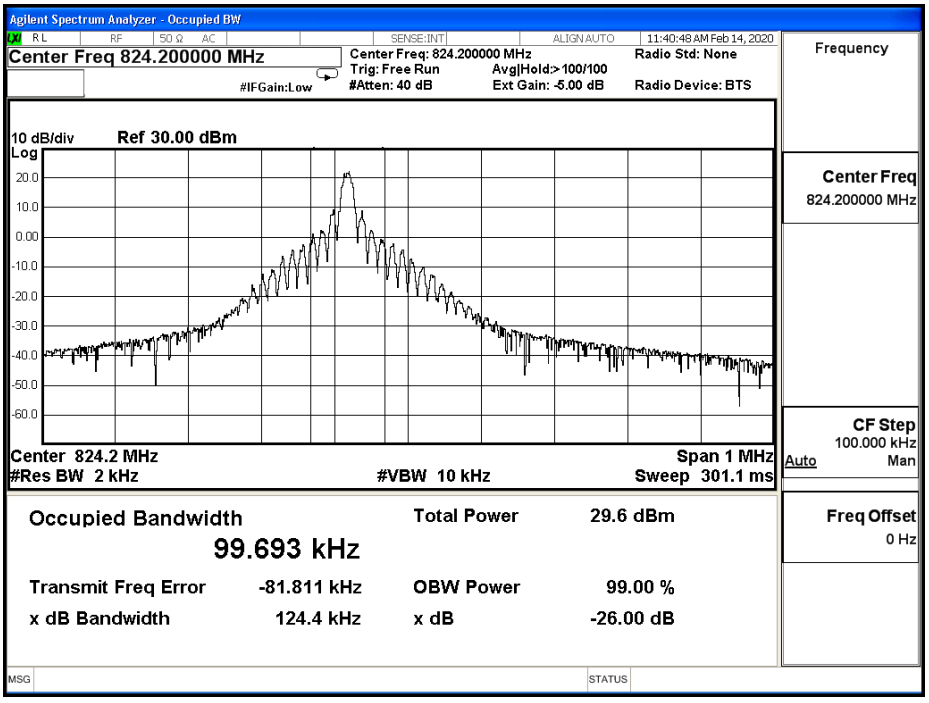


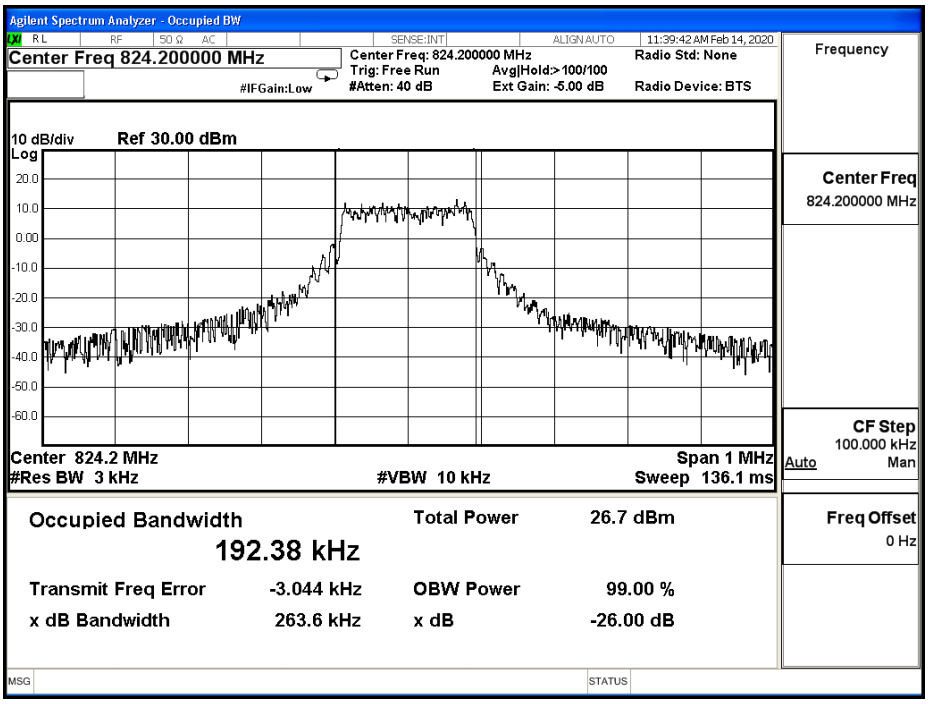
B5_15K_CH20402_BPSK_1RB0



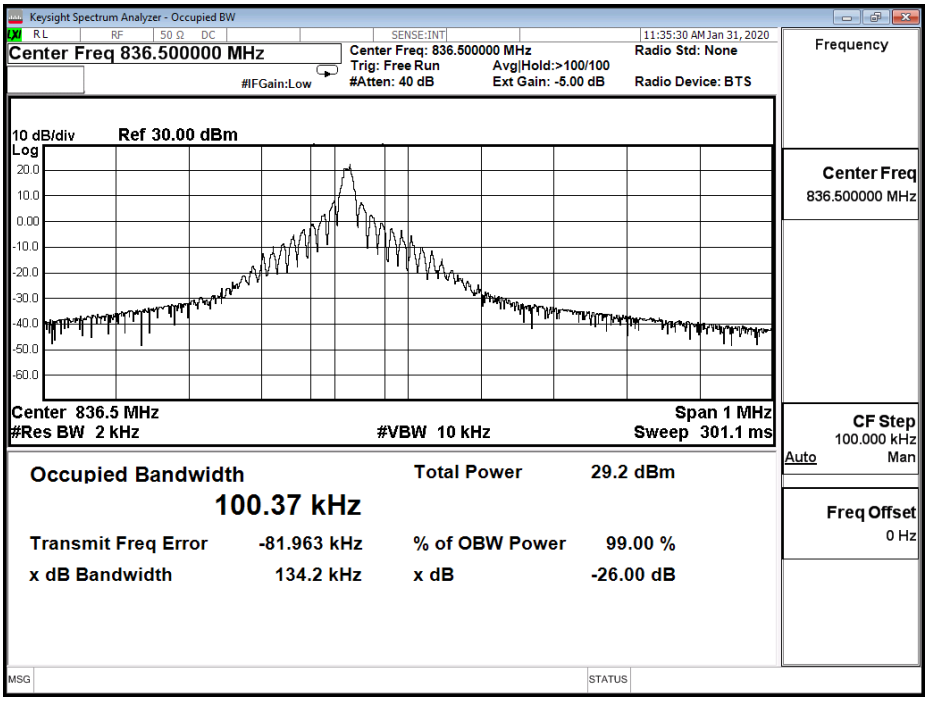
B5_15K_CH20402_QPSK_1RB0



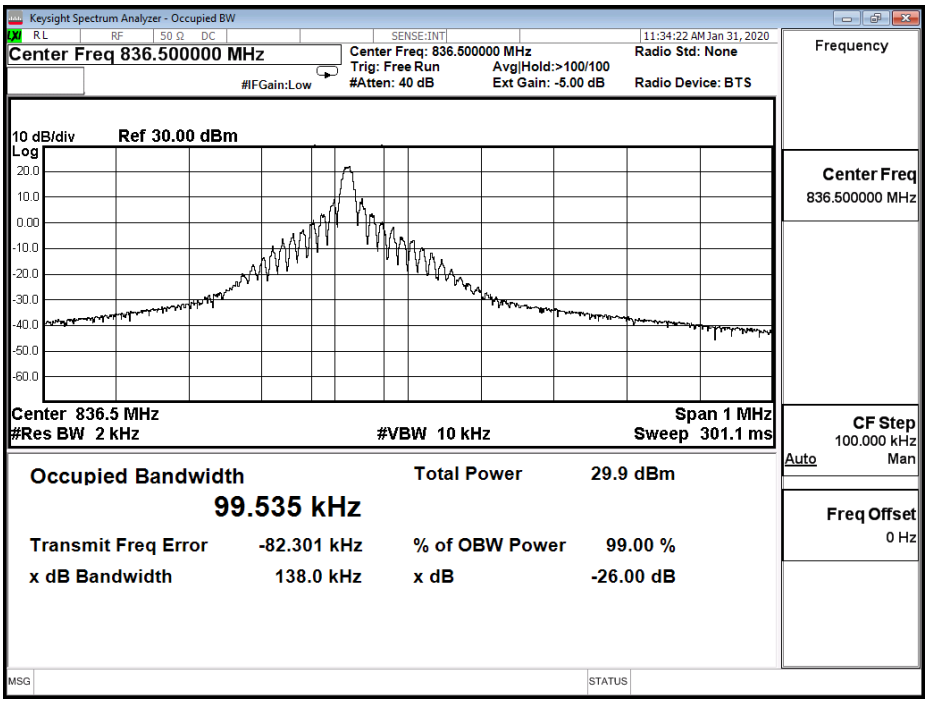
B5_15K_CH20402_QPSK_12RB0



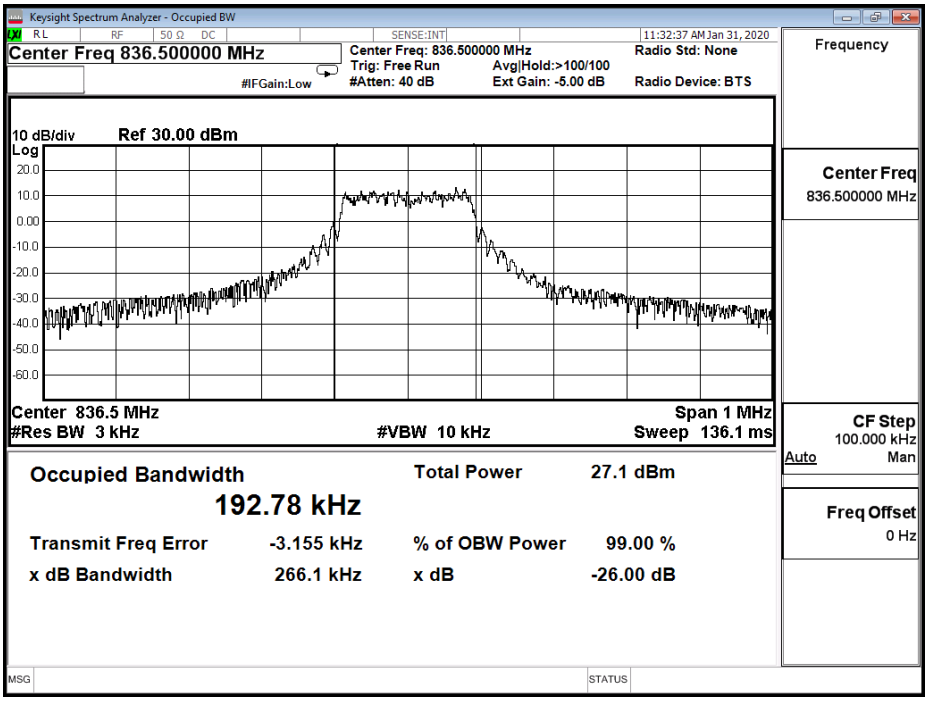
B5_15K_CH20525_BPSK_1RB0



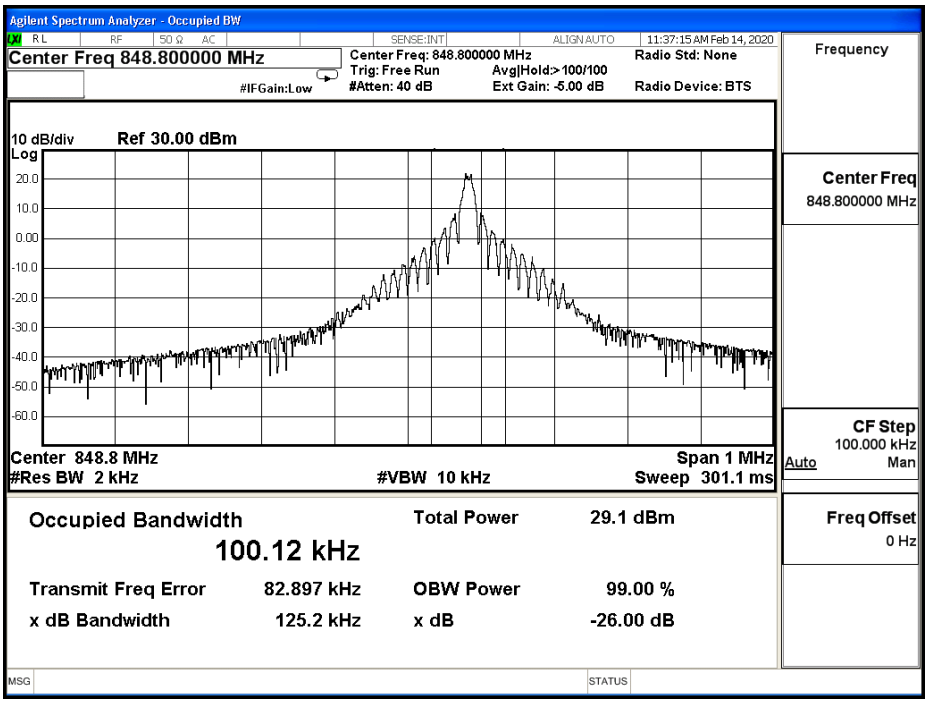
B5_15K_CH20525_QPSK_1RB0



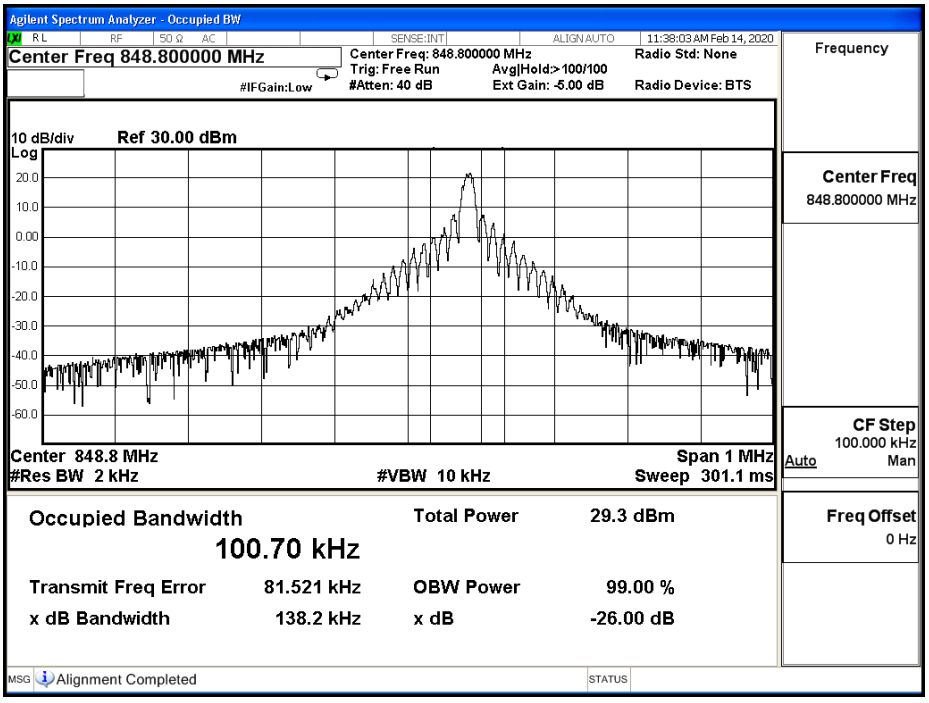
B5_15K_CH20525_QPSK_12RB0



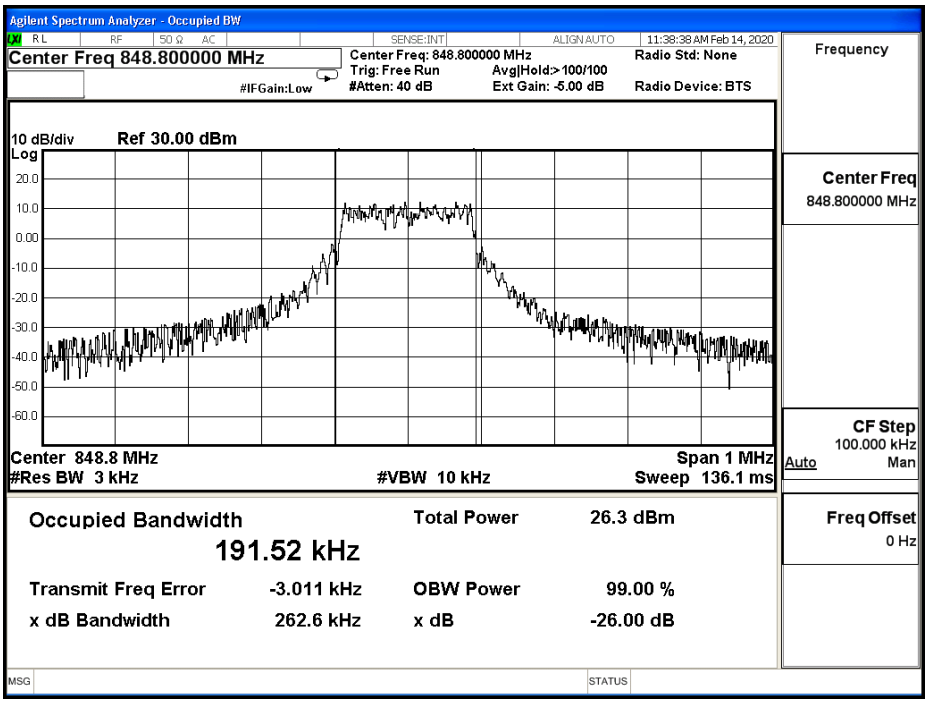
B5_15K_CH20648_BPSK_1RB11



B5_15K_CH20648_QPSK_1RB11



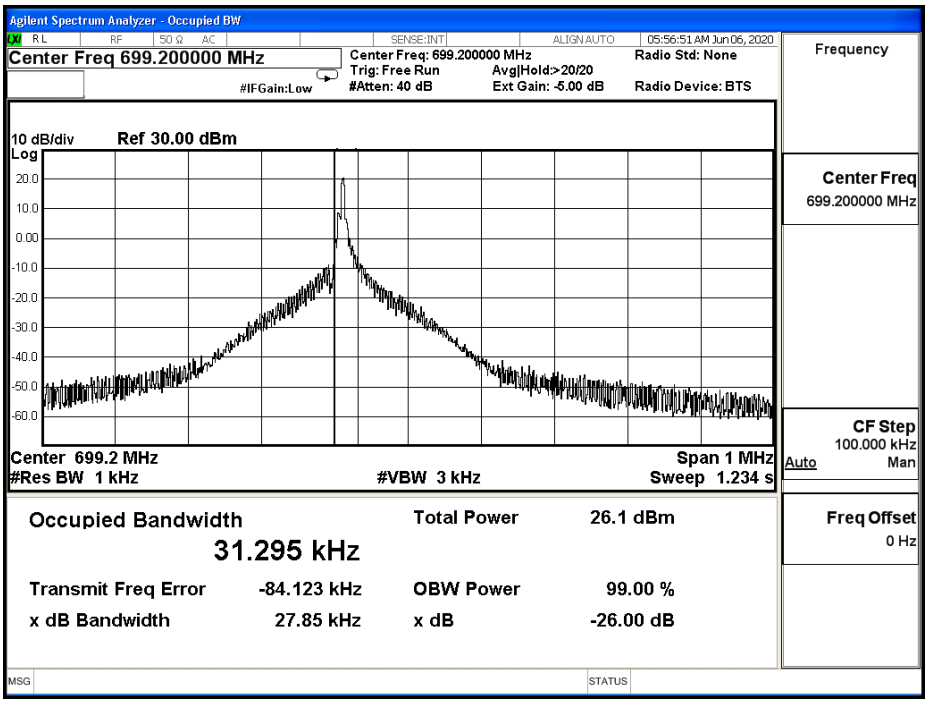
B5_15K_CH20648_QPSK_12RB0



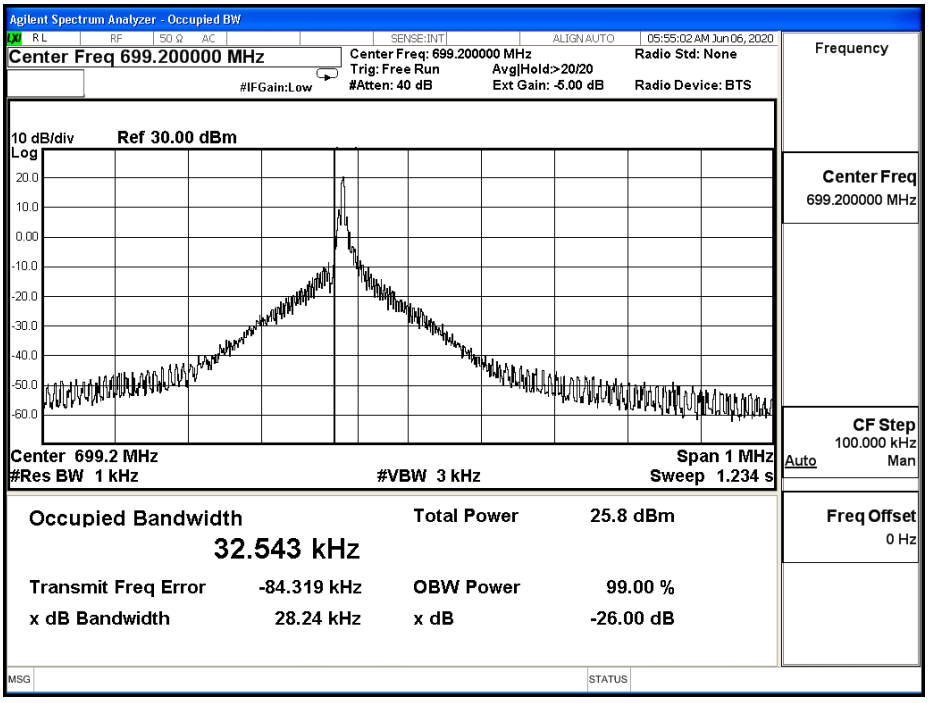
Product	Module		
Test Item	Occupied Bandwidth		
Test Mode	Mode 4：LTE NB-IoT_Band 12		
Date of Test	2020/01/31~2020/06/06	Test Site	SR12-H
Temperature (°C)	19.0~21.0	Humidity (%RH)	56.0~59.0

Channel	Freq. (MHz)	Modulation	BW (kHz)	RB No.	RB offset	Measure Level (kHz)		Limit (MHz)
						26dB BW	99% BW	
23012	699.2	BPSK	3.75	1	0	27.850	31.295	NA
			15	1	0	110.500	97.557	NA
		QPSK	3.75	1	0	28.240	32.543	NA
			15	1	0	113.300	95.519	NA
				12	0	261.400	191.810	NA
23095	707.5	BPSK	3.75	1	0	34.360	49.970	NA
			15	1	0	112.700	100.600	NA
		QPSK	3.75	1	0	40.800	48.421	NA
			15	1	0	124.300	103.770	NA
				12	0	261.300	185.940	NA
23178	715.8	BPSK	3.75	1	47	27.190	30.266	NA
			15	1	11	108.700	95.370	NA
		QPSK	3.75	1	47	28.290	31.865	NA
			15	1	11	123.900	97.270	NA
				12	0	261.900	186.210	NA

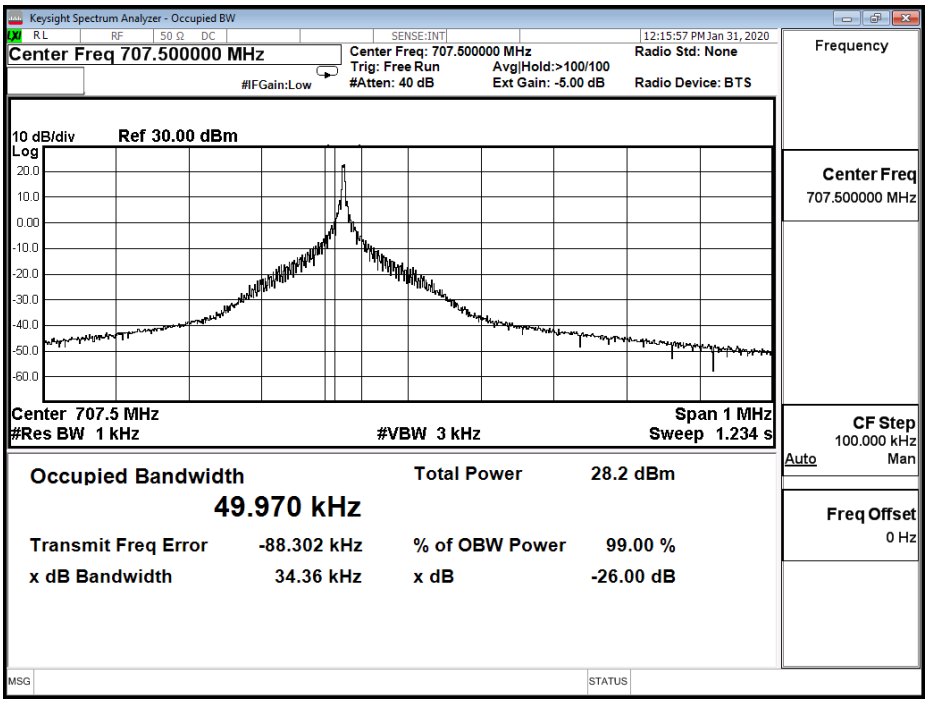
B12_3.75K_CH23012_BPSK_1RB0



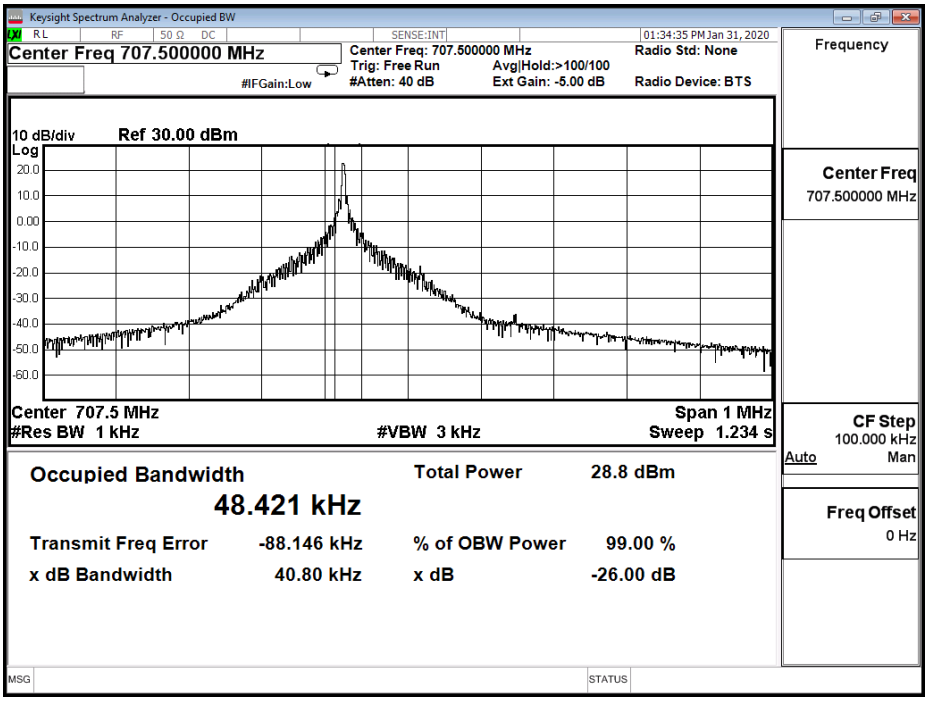
B12_3.75K_CH23012_QPSK_1RB0



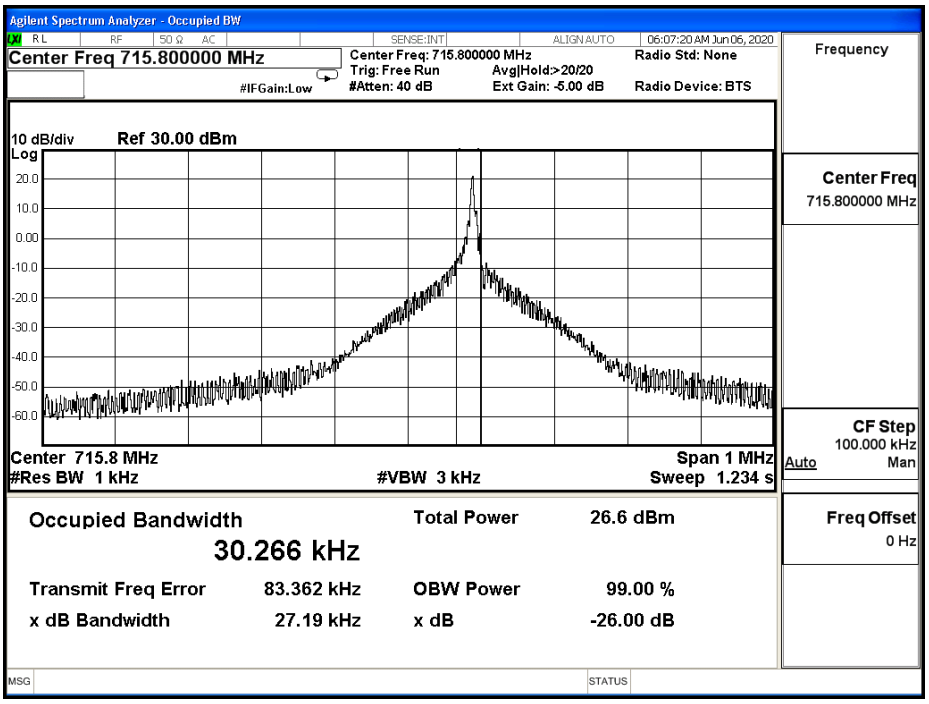
B12_3.75K_CH23095_BPSK_1RB0



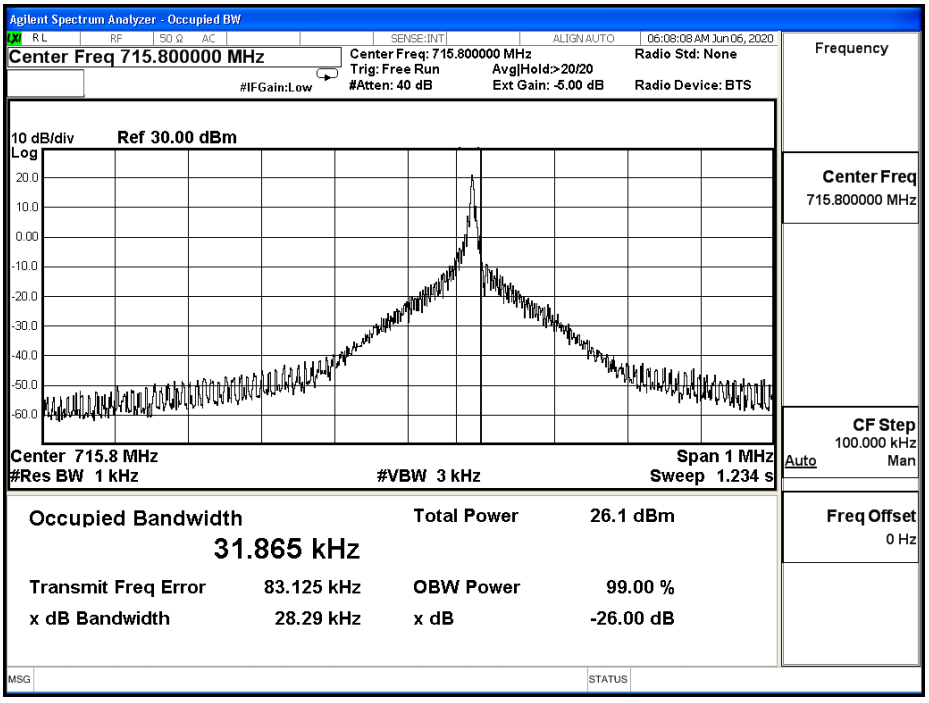
B12_3.75K_CH23095_QPSK_1RB0



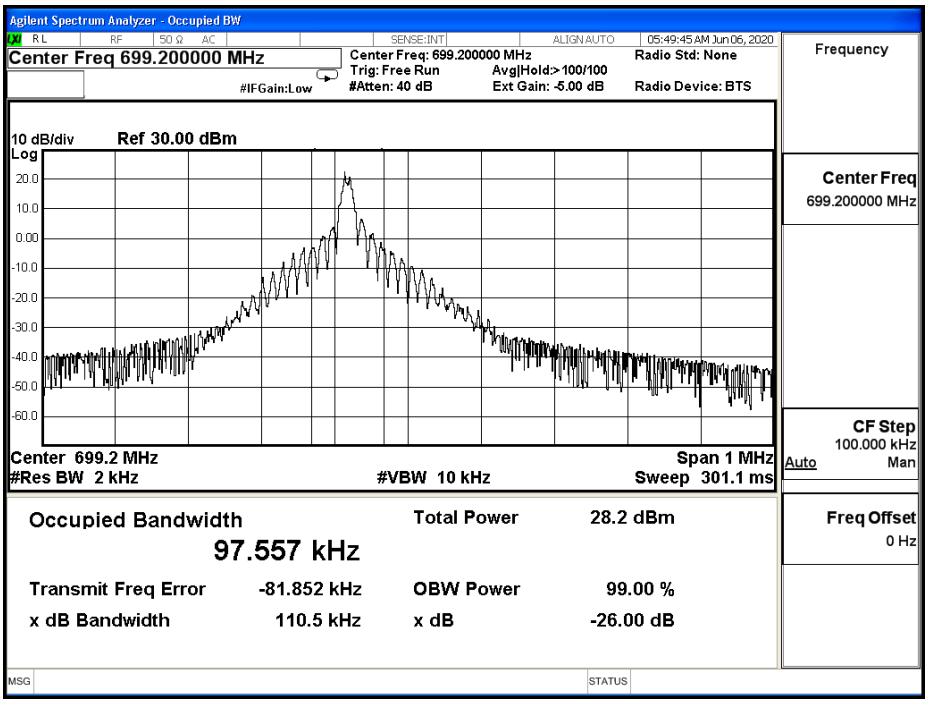
B12_3.75K_CH23178_BPSK_1RB47



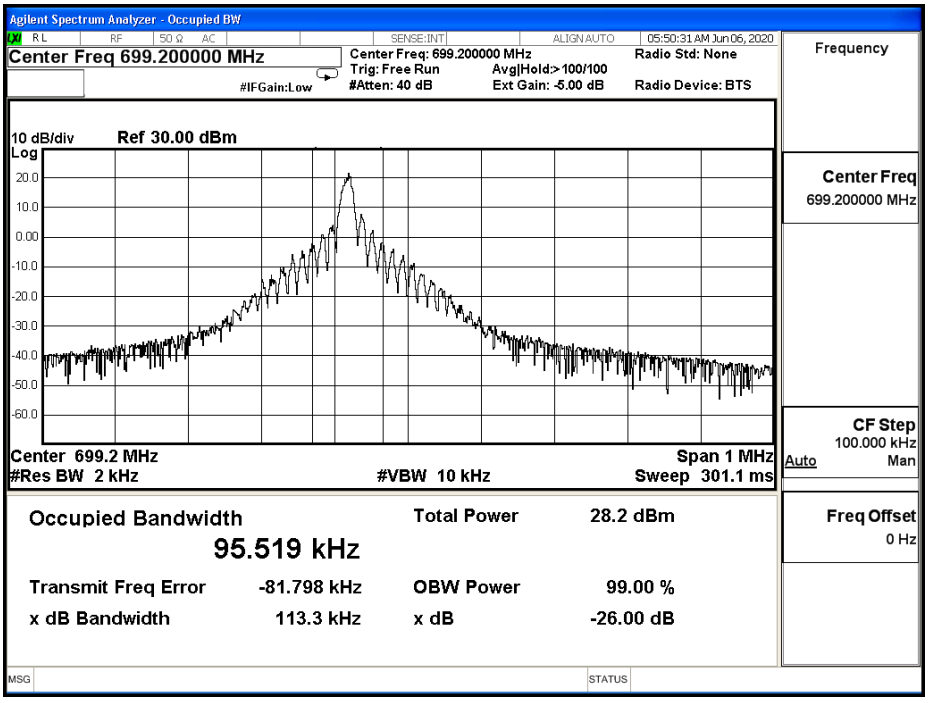
B12_3.75K_CH23178_QPSK_1RB47



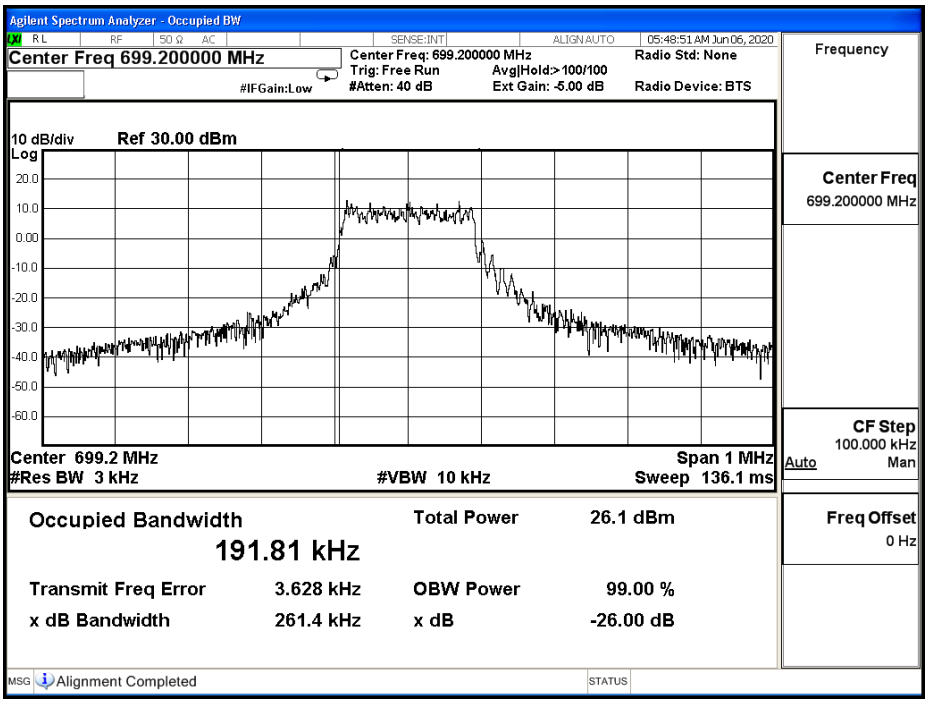
B12_15K_CH23012_BPSK_1RB0



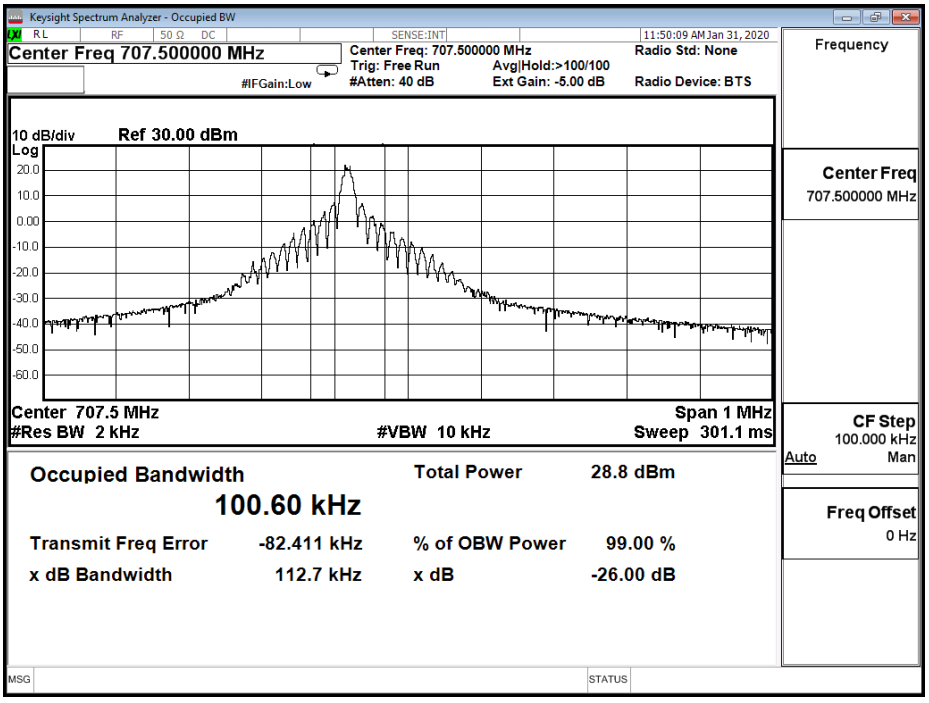
B12_15K_CH23012_QPSK_1RB0



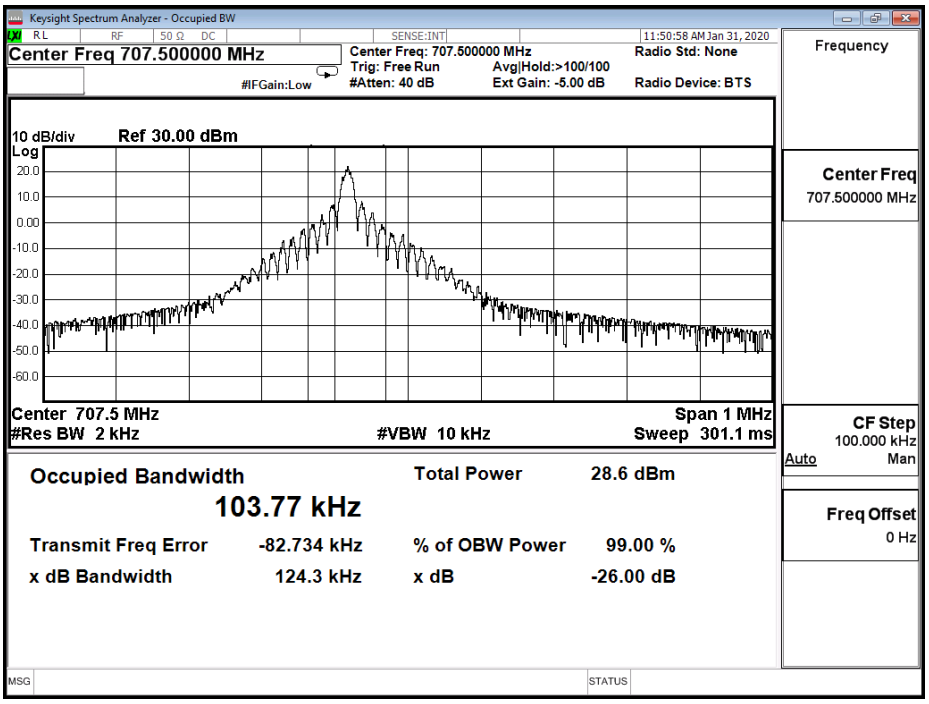
B12_15K_CH23012_QPSK_12RB0



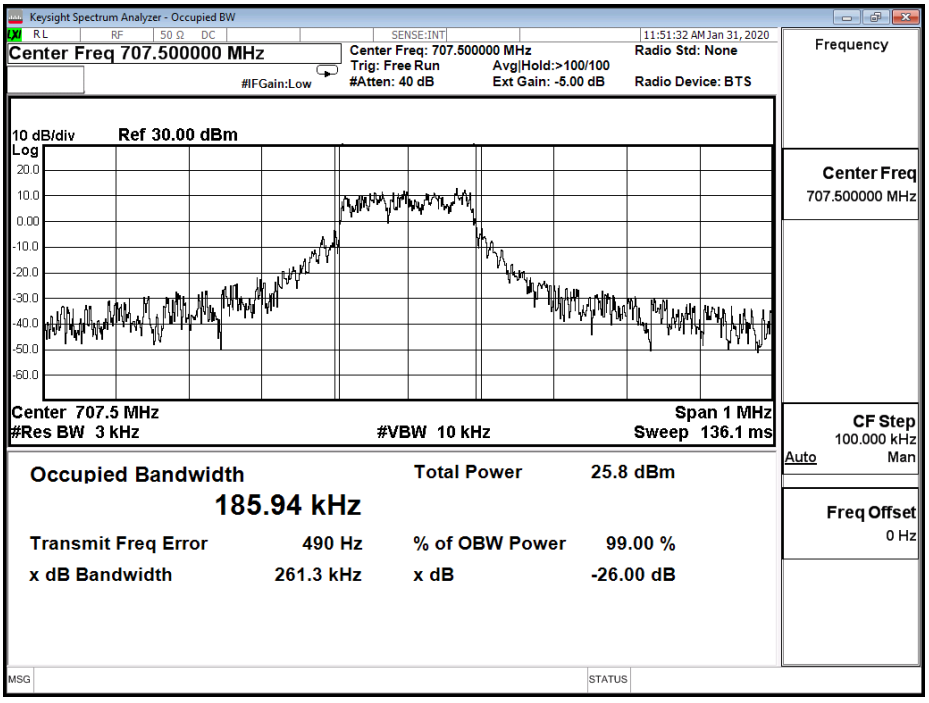
B12_15K_CH23095_BPSK_1RB0



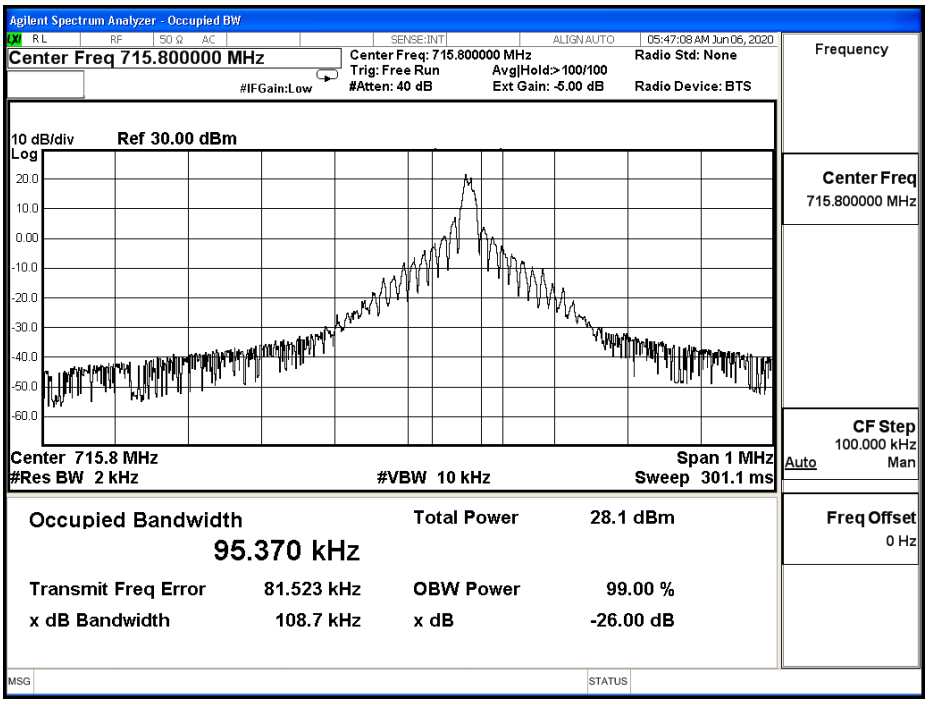
B12_15K_CH23095_QPSK_1RB0



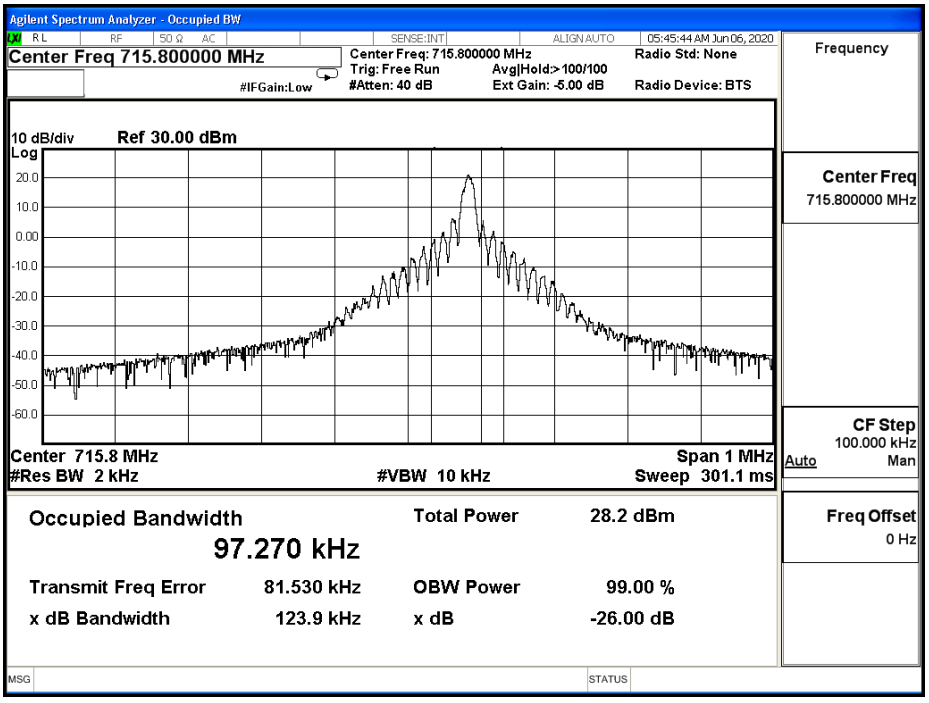
B12_15K_CH23095_QPSK_12RB0



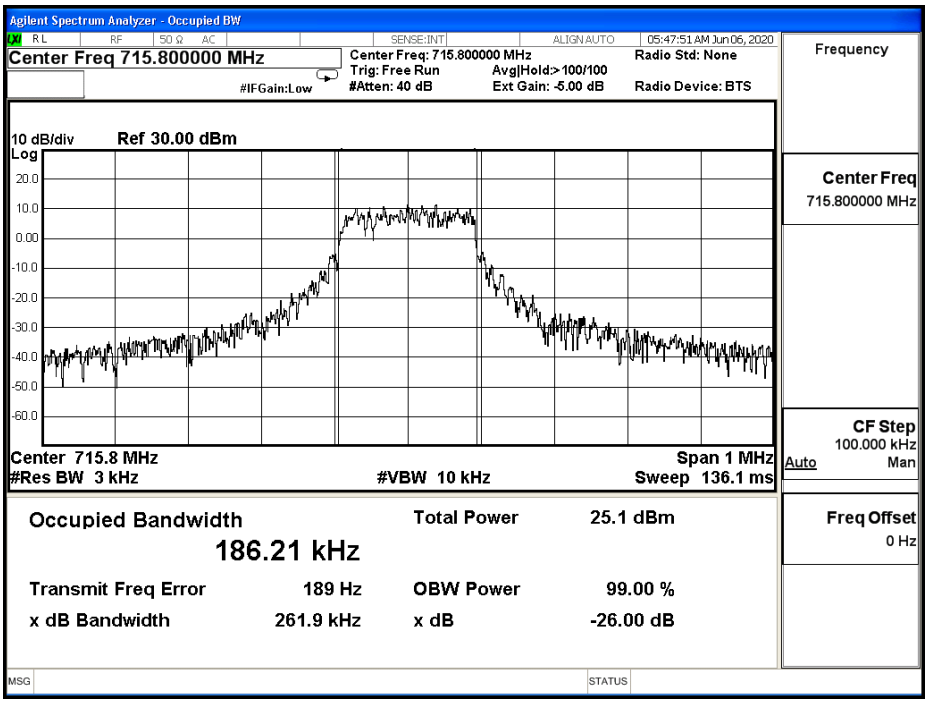
B12_15K_CH23178_BPSK_1RB11



B12_15K_CH23178_QPSK_1RB11



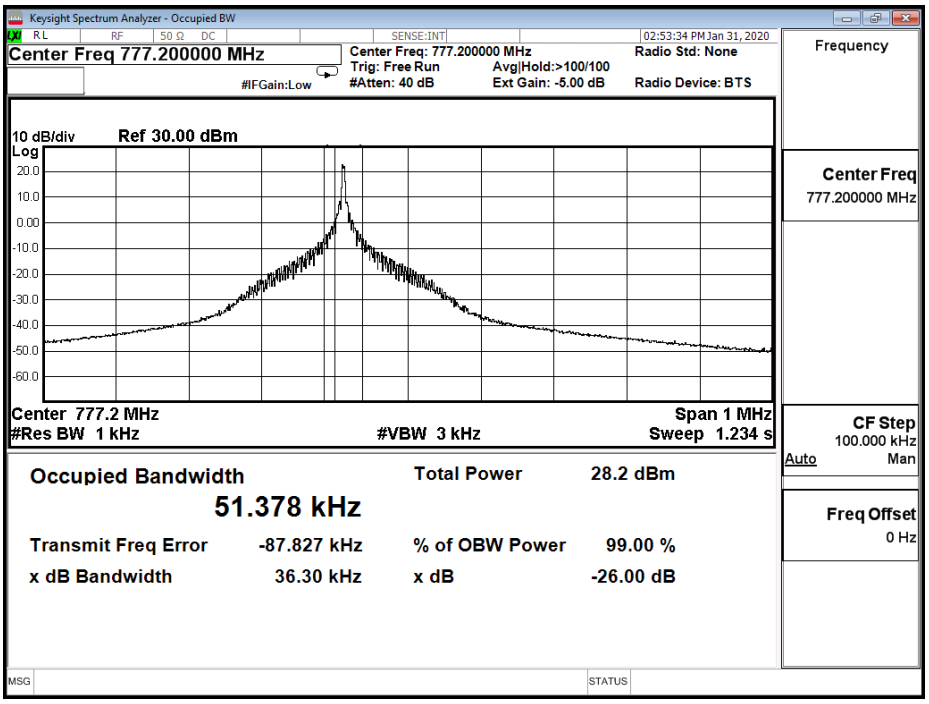
B12_15K_CH23178_QPSK_12RB0



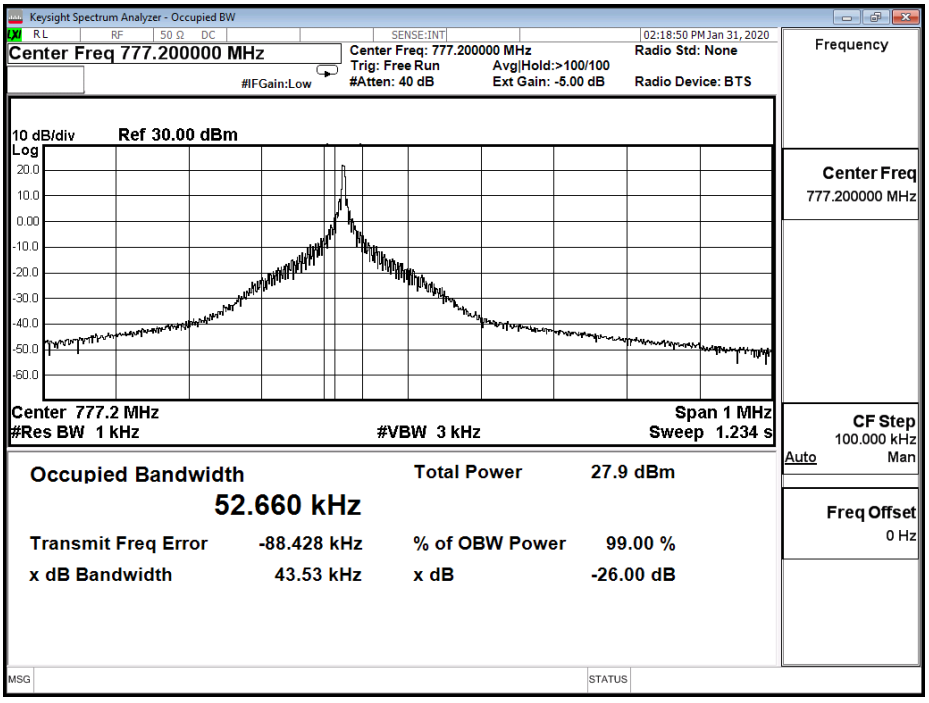
Product	Module		
Test Item	Occupied Bandwidth		
Test Mode	Mode 5：LTE NB-IoT_Band 13		
Date of Test	2020/01/31	Test Site	SR12-H
Temperature (°C)	19.0	Humidity (%RH)	59.0

Channel	Freq. (MHz)	Modulation	BW (kHz)	RB No.	RB offset	Measure Level (kHz)		Limit (MHz)
						26dB BW	99% BW	
23182	777.2	BPSK	3.75	1	0	36.300	51.378	NA
			15	1	0	147.600	102.830	NA
		QPSK	3.75	1	0	43.530	52.660	NA
			15	1	0	124.400	100.960	NA
				12	0	276.500	191.720	NA
23230	782	BPSK	3.75	1	0	39.900	52.745	NA
			15	1	0	125.000	101.920	NA
		QPSK	3.75	1	0	40.840	51.957	NA
			15	1	0	128.500	108.660	NA
				12	0	264.800	191.320	NA
23278	786.8	BPSK	3.75	1	47	34.120	50.227	NA
			15	1	11	137.800	101.280	NA
		QPSK	3.75	1	47	40.430	51.239	NA
			15	1	11	125.700	101.070	NA
				12	0	264.900	192.280	NA

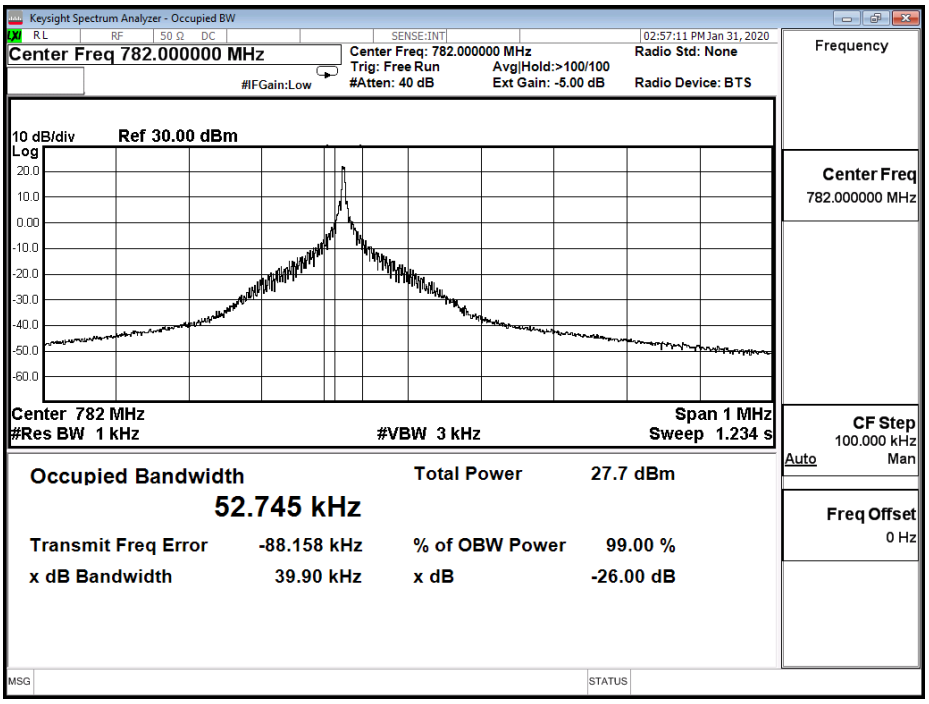
B13_3.75K_CH23182_BPSK_1RB0



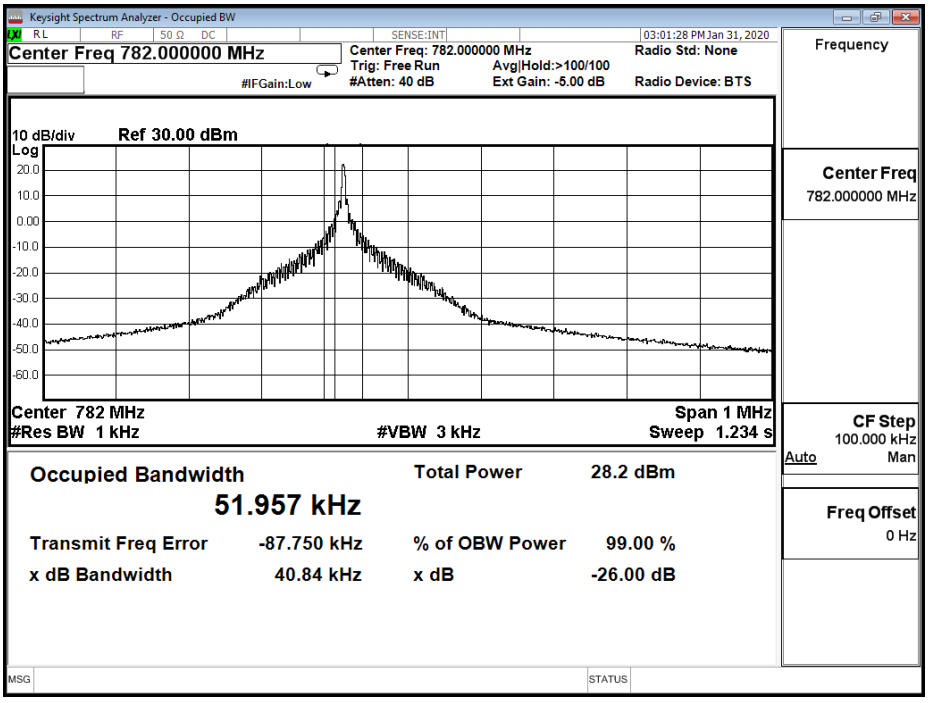
B13_3.75K_CH23182_QPSK_1RB0



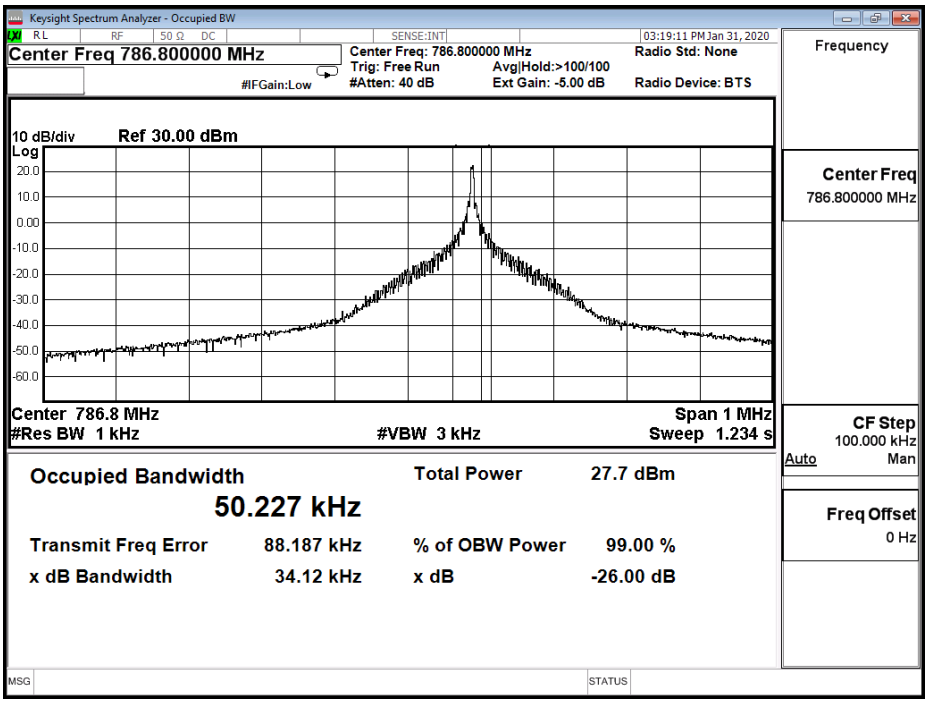
B13_3.75K_CH23230_BPSK_1RB0



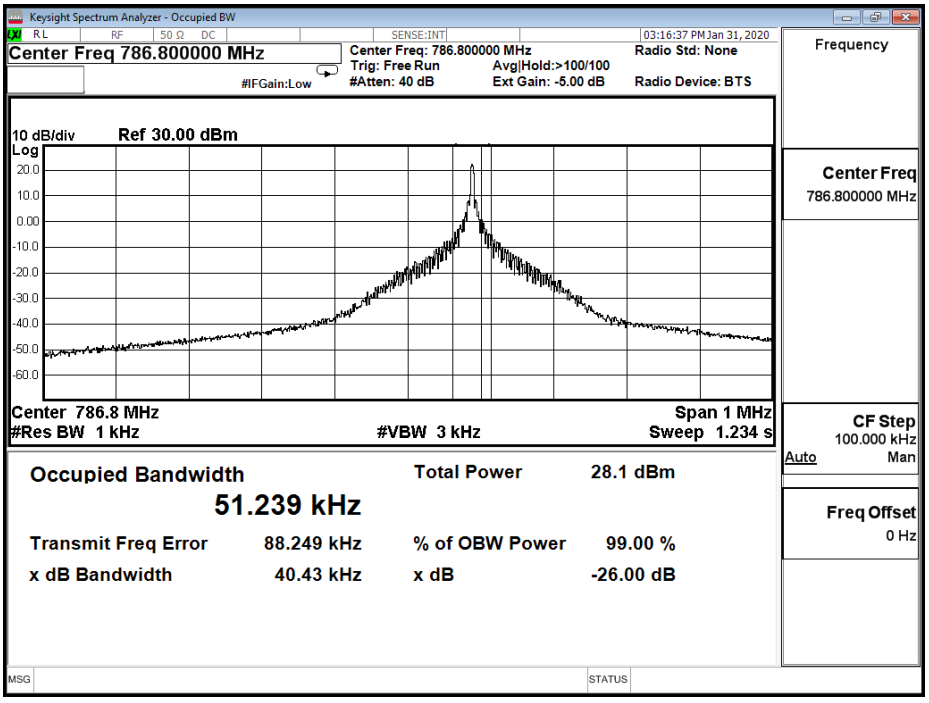
B13_3.75K_CH23230_QPSK_1RB0



B13_3.75K_CH23278_BPSK_1RB47



B13_3.75K_CH23278_QPSK_1RB47



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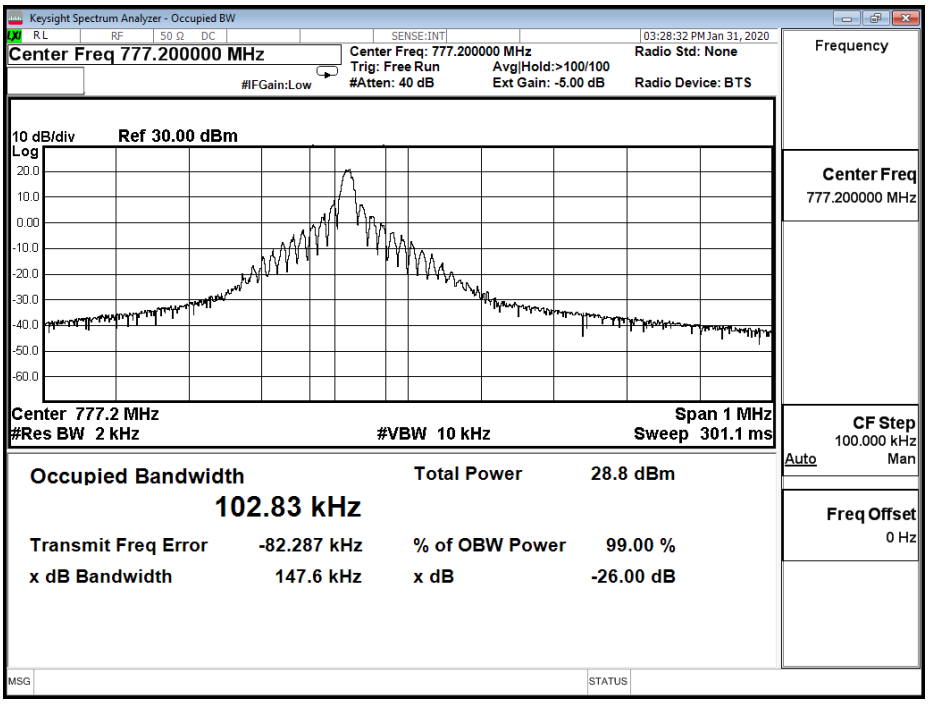

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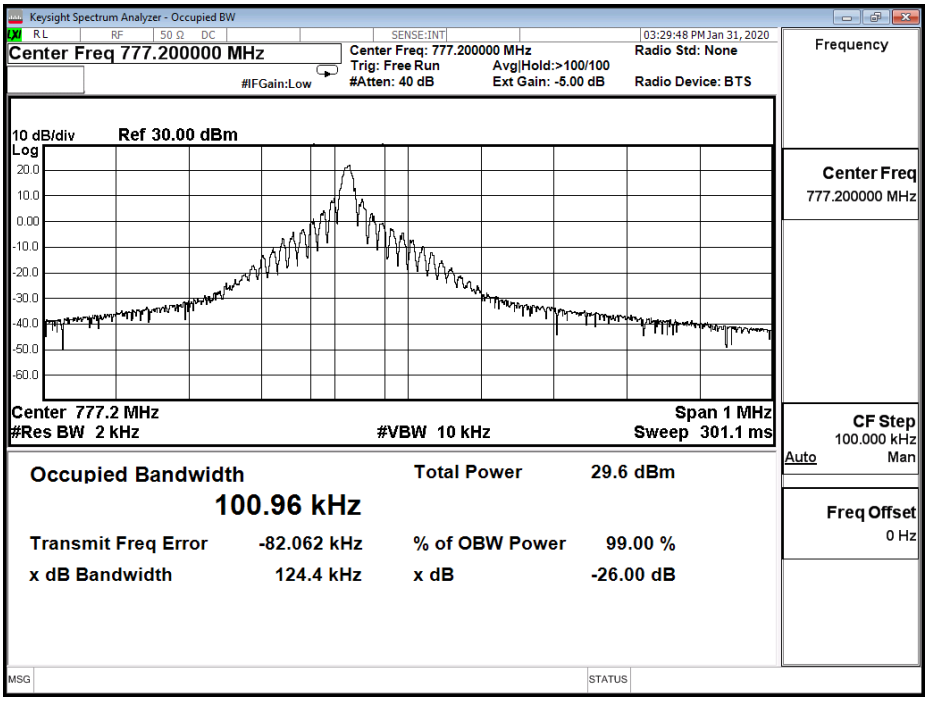

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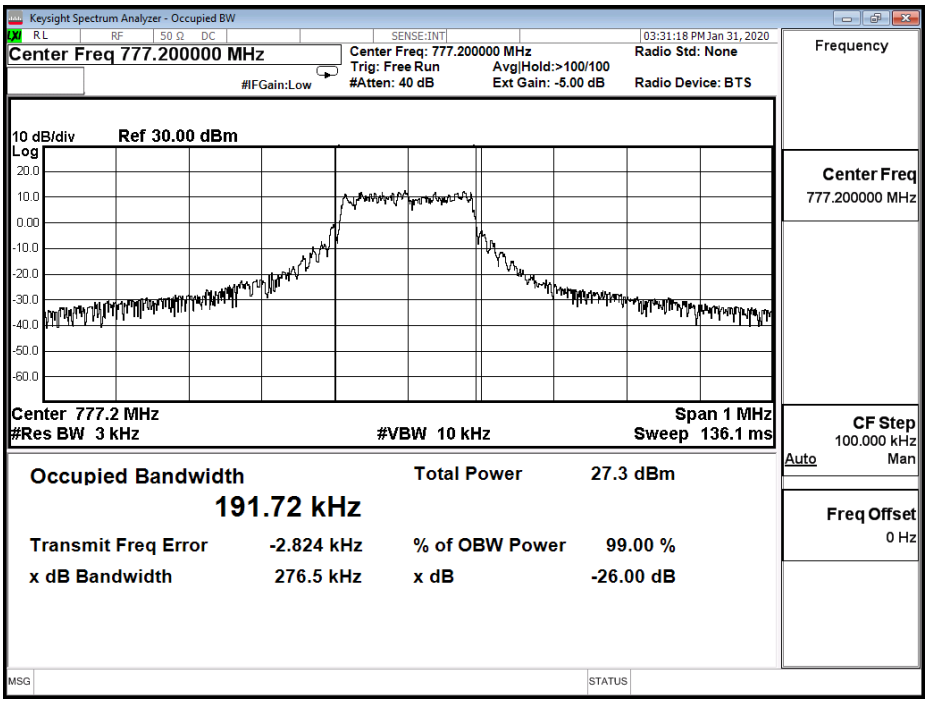

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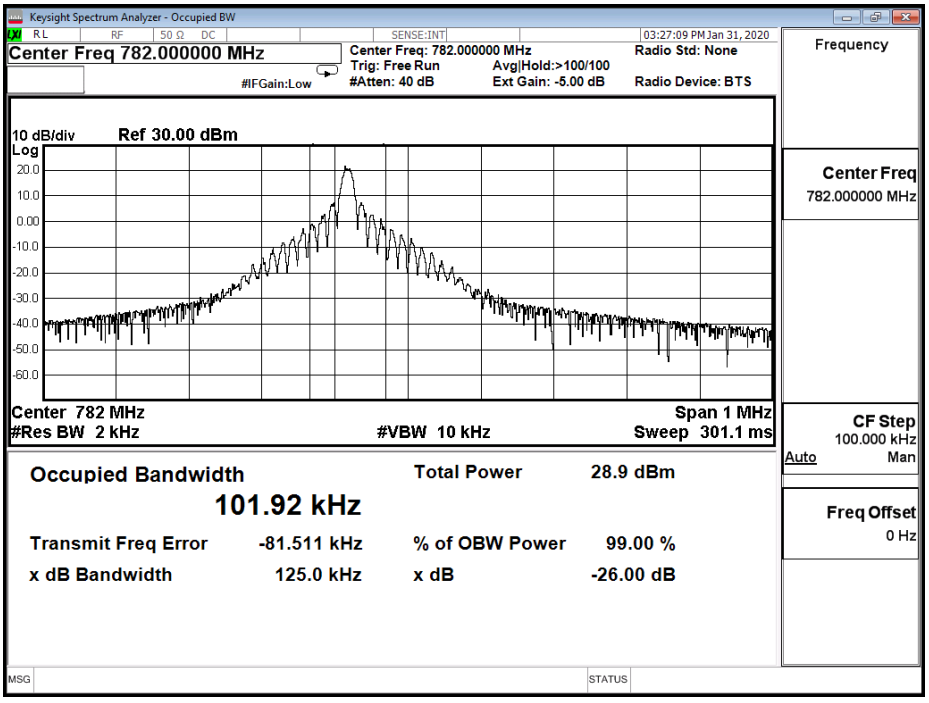

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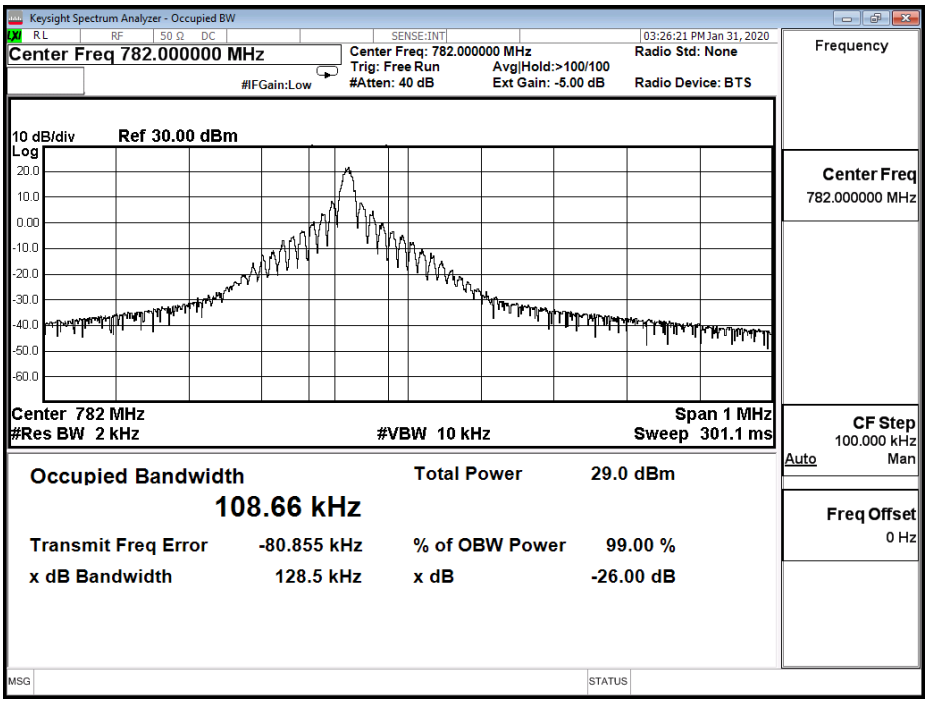

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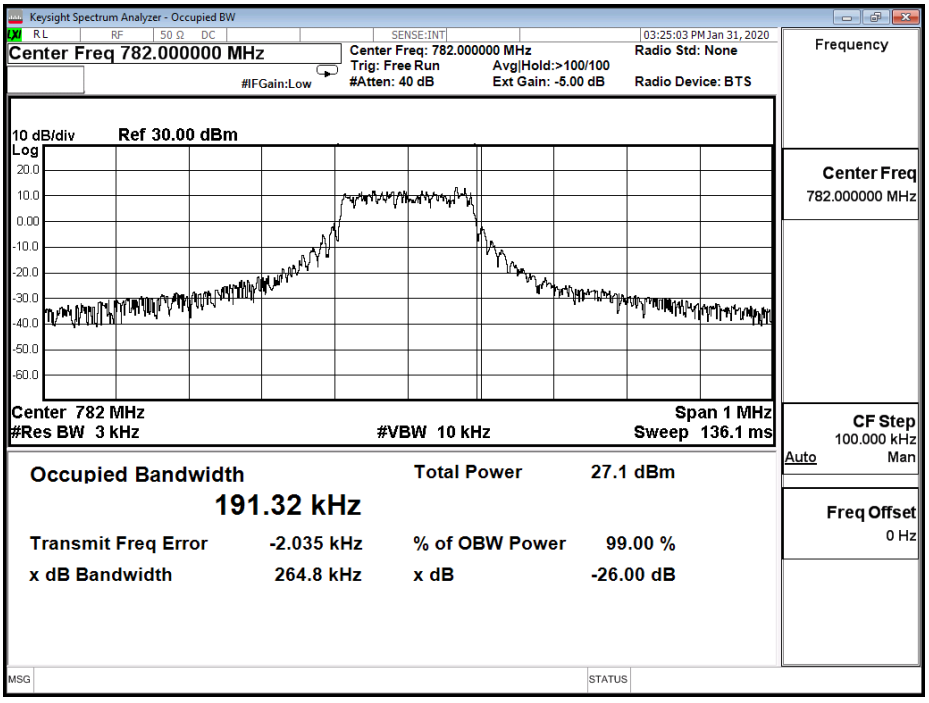

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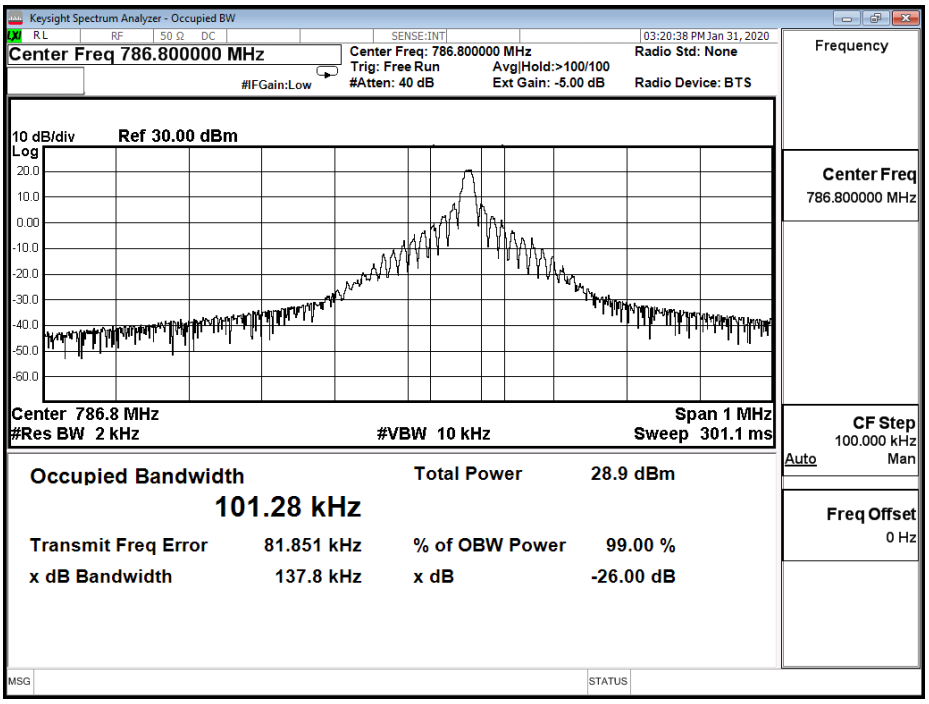

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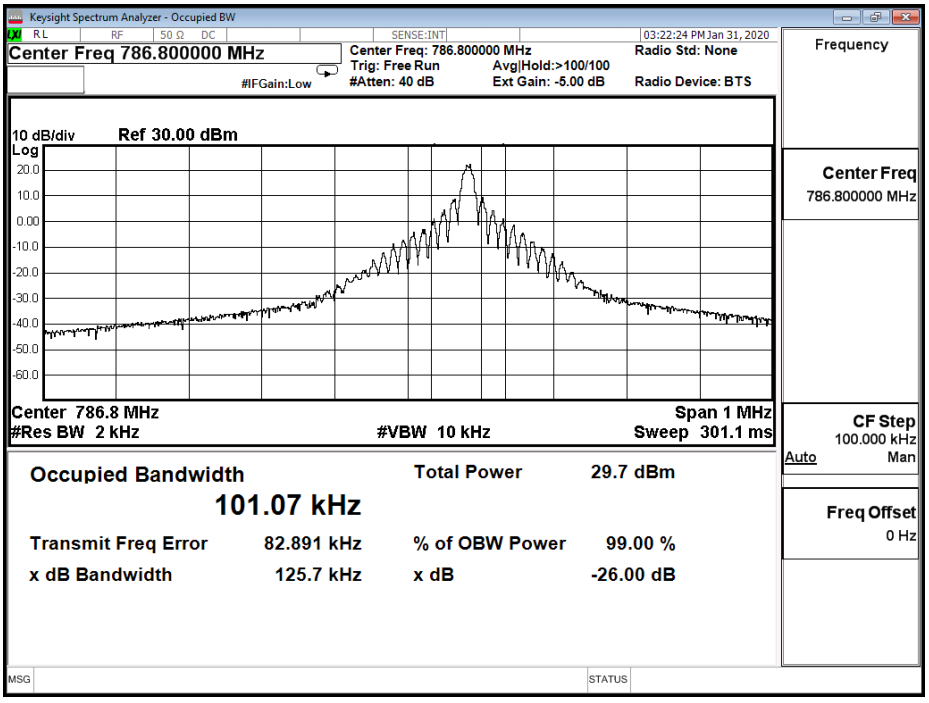

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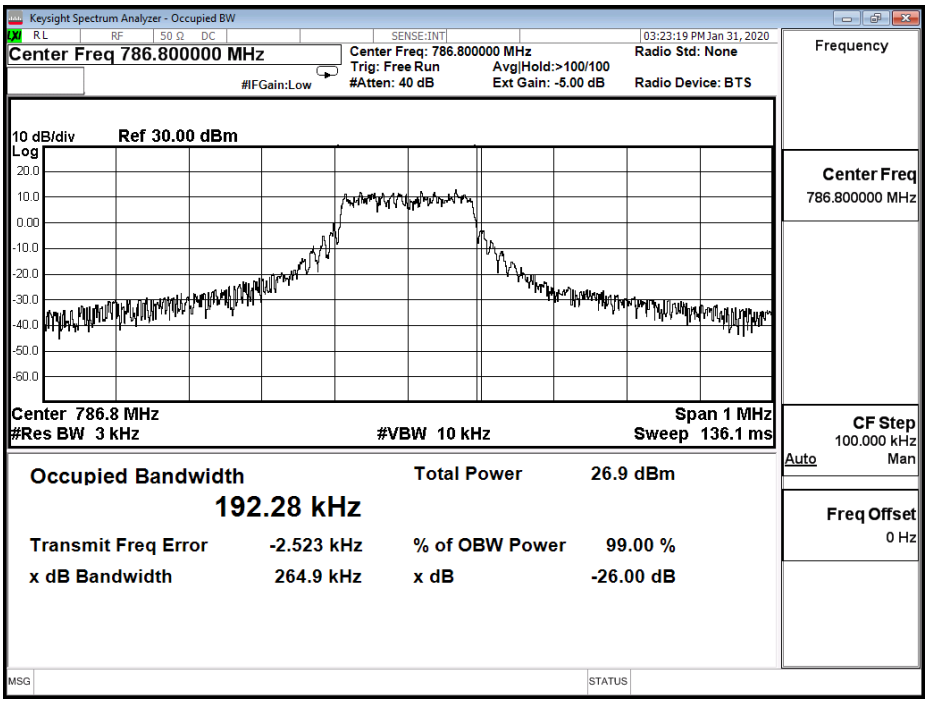
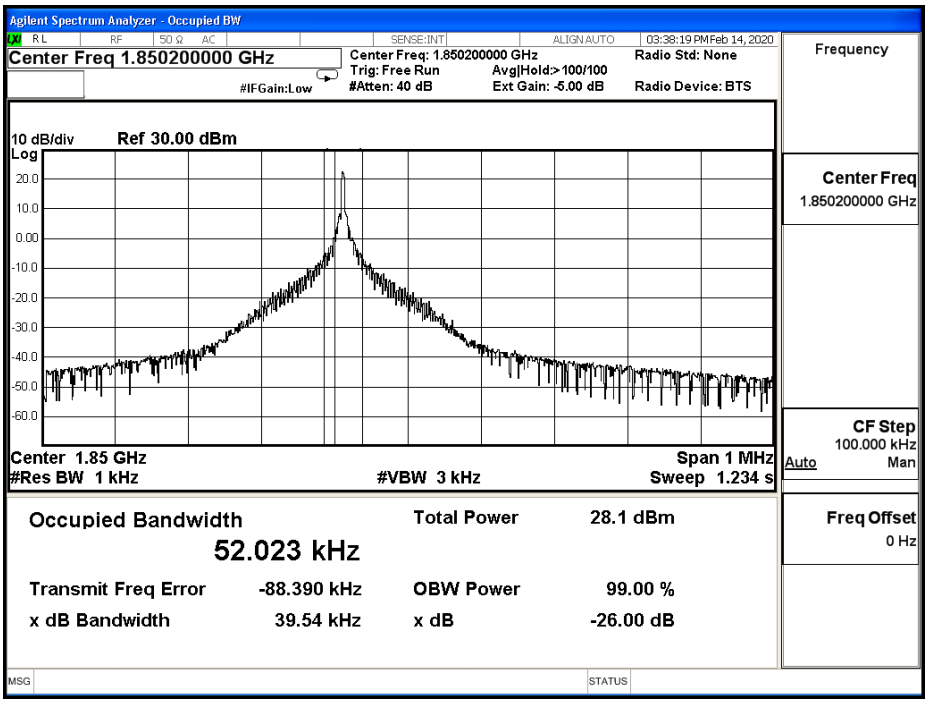


Product	Module		
Test Item	Occupied Bandwidth		
Test Mode	Mode 6：LTE NB-IoT_Band 25		
Date of Test	2020/02/03~2020/02/14	Test Site	SR12-H
Temperature (°C)	19.0	Humidity (%RH)	59.0

Channel	Freq. (MHz)	Modulation	BW (kHz)	RB No.	RB offset	Measure Level (kHz)		Limit (MHz)
						26dB BW	99% BW	
26042	1850.2	BPSK	3.75	1	0	39.540	52.023	NA
			15	1	0	121.900	98.276	NA
		QPSK	3.75	1	0	43.870	52.457	NA
			15	1	0	124.600	99.771	NA
				12	0	263.000	186.530	NA
26365	1882.5	BPSK	3.75	1	0	37.240	53.679	NA
			15	1	0	126.900	100.430	NA
		QPSK	3.75	1	0	40.320	50.100	NA
			15	1	0	124.300	99.033	NA
				12	0	275.800	192.310	NA
26688	1914.8	BPSK	3.75	1	47	40.290	53.169	NA
			15	1	11	121.400	99.680	NA
		QPSK	3.75	1	47	40.370	51.445	NA
			15	1	11	127.700	101.430	NA
				12	0	272.700	186.700	NA

B25_3.75K_CH26042_BPSK_1RB0



B25_3.75K_CH26042_QPSK_1RB0