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FCC LTE REPORT

Certification

Applicant Name:
Franklin Technology Inc.

Address:
906 JEI Platz, 186, Gasan digital 1-ro,
Geumcheon-gu, Seoul, Korea, (08502)

Date of Issue:
February 07, 2018

Location:
HCT CO., LTD.,
74, Seoicheon-ro 578beon-gil, Majang-myeon,
Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA

Report No.: HCT-RF-1802-FC002

FCC ID:	**XHG-C801**
APPLICANT:	**Franklin Technology Inc.**

Model(s): C801
EUT Type: CPE
FCC Classification: PCS Licensed Transmitter (PCB)
FCC Rule Part(s): §90.691, §2

Mode (MHz)	Tx Frequency (MHz)	Emission Designator	Modulation	ERP	
				Max. Power (W)	Max. Power (dBm)
LTE - Band26 (1.4)	814.7	1M09G7D	QPSK	0.190	22.78
		1M08W7D	16QAM	0.169	22.27
	823.3	1M08G7D	QPSK	0.155	21.91
		1M08W7D	16QAM	0.136	21.32
LTE - Band26 (3)	815.5	2M69G7D	QPSK	0.196	22.92
		2M69W7D	16QAM	0.170	22.31
	822.5	2M69G7D	QPSK	0.182	22.59
		2M68W7D	16QAM	0.156	21.92
LTE - Band26 (5)	816.5	4M48G7D	QPSK	0.197	22.94
		4M47W7D	16QAM	0.169	22.29
	821.5	4M49G7D	QPSK	0.194	22.88
		4M48W7D	16QAM	0.156	21.94
LTE - Band26 (10)	819.0	8M93G7D	QPSK	0.203	23.08
		8M92W7D	16QAM	0.174	22.41

The measurements shown in this report were made in accordance` with the procedures specified in CFR47 section §2.947. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a)

Report prepared by : Jae Ryang Do
Engineer of Telecommunication Testing Center

Report approved by : Jong Seok Lee
Manager of Telecommunication Testing Center

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-1802-FC002	February 07, 2018	- First Approval Report

Table of Contents

MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name:	Franklin Technology Inc.
Address:	906 JEI Platz, 186, Gasan digital 1-ro, Geumcheon-gu, Seoul, Korea, (08502)
FCC ID:	XHG-C801
Application Type:	Certification
FCC Classification:	PCS Licensed Transmitter (PCB)
FCC Rule Part(s):	§90.691, §2
EUT Type:	CPE
Model(s):	C801
Tx Frequency:	814.7 MHz – 823.3 MHz (LTE – Band 26 (1.4 MHz)) 815.5 MHz – 822.5 MHz (LTE – Band 26 (3 MHz)) 816.5 MHz – 821.5 MHz (LTE – Band 26 (5 MHz)) 819.0 MHz (LTE – Band 26 (10 MHz))
Date(s) of Tests:	December 25, 2017 ~ February 07, 2018

2. INTRODUCTION

2.1. Description of EUT

The EUT was a CPE with only LTE.

2.2. MEASURING INSTRUMENT CALIBRATION

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

2.3. TEST FACILITY

The Fully-anechoic chamber and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA.

3. DESCRIPTION OF TESTS

3.1 TEST PROCEDURE

Test Description	Test Procedure Used
Occupied Bandwidth	- KDB 971168 D01 v03 – Section 4.2 - ANSI C63.26-2015 – Section 5.4.4
Band Edge	- KDB 971168 D01 v03 – Section 6.0 - ANSI C63.26-2015 – Section 5.7
Spurious and Harmonic Emissions at Antenna Terminal	- KDB 971168 D01 v03 – Section 6.0 - ANSI C63.26-2015 – Section 5.7
Conducted Output Power	- KDB 971168 D01 v03 – Section 5.2 - ANSI C63.26-2015 – Section 5.2.4.2
Frequency stability	- ANSI C63.26-2015 – Section 5.6
Effective Radiated Power/ Effective Isotropic Radiated Power	- KDB 971168 D01 v03 – Section 5.2 - ANSI C63.26-2015 – Section 5.2 - ANSI/TIA-603-E-2016 – Section 2.2.17
Radiated Spurious and Harmonic Emissions	- KDB 971168 D01 v03 – Section 5.8 - ANSI/TIA-603-E-2016 – Section 2.2.12

3.2 CONDUCTED OUTPUT POWER

Test Overview

When an average power meter is used to perform RF output power measurements, the fundamental condition that measurements be performed only over durations of active transmissions at maximum output power level applies.

Thus, an average power meter can always be used to perform the measurement when the EUT can be configured to transmit continuously.

3.3 RADIATED POWER

Test Overview

Radiated tests are performed in the Fully-anechoic chamber.

The equipment under test is placed on a non-conductive table 3-meters away from the receive antenna in accordance with ANSI/TIA-603-E-2016 Clause 2.2.17.

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
3. VBW ≥ 3 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points > 2 x span / RBW
6. Detector = RMS
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto".
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

Test Note

1. The turntable is rotated through 360 degrees, and the receiving antenna scans in order to determine the level of the maximized emission.
2. A half wave dipole is then substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated.

   The power is calculated by the following formula;

   $$P_{d(dBm)} = Pg_{(dBm)} - \text{cable loss}_{(dB)} + \text{antenna gain}_{(dB)}$$

   Where: P_d is the dipole equivalent power and P_g is the generator output power into the substitution antenna.
3. The maximum value is calculated by adding the forward power to the calibrated source plus its appropriate gain value.

   These steps are repeated with the receiving antenna in both vertical and horizontal polarization. the difference between the gain of the horn and an isotropic antenna are taken into consideration
4. The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
5. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

3.4 RADIATED SPURIOUS EMISSIONS

Test Overview

Radiated tests are performed in the Fully-anechoic chamber.

Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA-603-E-2016.

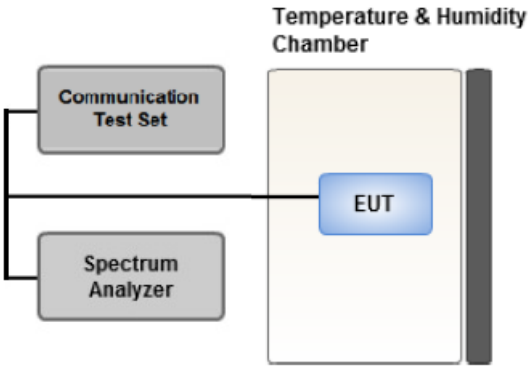
Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW ≥ 3 x RBW
3. Span = 1.5 times the OBW
4. No. of sweep points > 2 x span / RBW
5. Detector = Peak
6. Trace mode = Max Hold
7. The trace was allowed to stabilize
8. Test channel : Low/ Middle/ High
9. Frequency range : We are performed all frequency to 10^{th} harmonics from 9 kHz.

Test Note

1. Measurements value show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
2. The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
   The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the test data

3.5 OCCUPIED BANDWIDTH.



Test setup

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

The EUT makes a call to the communication simulator.

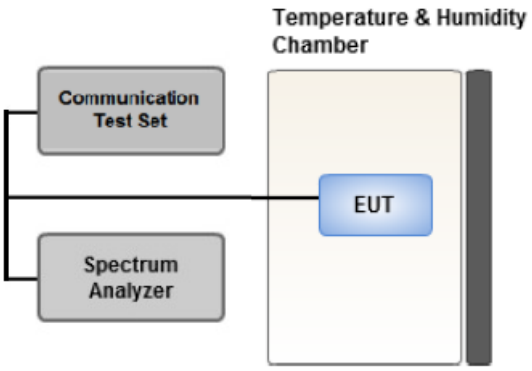
The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth

Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW ≥ 3 x RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the 99% occupied bandwidth observed in Step 7

3.6 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL



Test setup

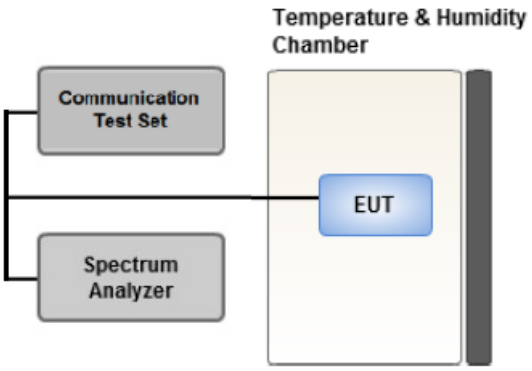
Test Overview

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Settings

1. RBW = 1 MHz
2. VBW ≥ 3 MHz
3. Detector = Peak
4. Trace Mode = max hold
5. Sweep time = auto
6. Number of points in sweep ≥ 2 * Span / RBW

3.7 BAND EDGE



Test setup

Test Overview

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

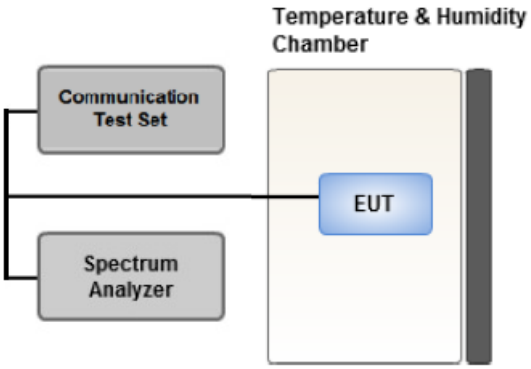
Test Settings

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW :
   .- EA licensee's frequency block by up to and including 37.5 kHz : 300Hz
   .- EA licensee's frequency block greater than 37.5 kHz : 100kHz
4. VBW > 3 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW
7. Trace mode = trace average
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Test Notes

For 90.691(a), RBW=300 Hz for offset less than 37.5 kHz from channel edge and RBW=100 kHz for offsets greater than 37.5 kHz is allowed.

3.8 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE



Test setup

Test Overview

Frequency stability testing is performed in accordance with the guidelines of ANSI C63.26-2015.

The frequency stability of the transmitter is measured by:

1. Temperature:

   The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.

2. Primary Supply Voltage:

   .- Unless otherwise specified, vary primary supply voltage from 85% to 115% of the nominal value for other than hand carried battery equipment.

   .- For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.

Test Settings

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a “standby” condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

4. LIST OF TEST EQUIPMENT

Manufacture	Model/ Equipment	Serial Number	Calibration Date	Calibration Interval	Calibration Due
REOHDE & SCHWARZ	SCU 18 / AMPLIFIER	10094	04/24/2017	Annual	04/24/2018
Wainwright	WHK1.2/15G-10EF/H.P.F	4	04/10/2017	Annual	04/10/2018
Wainwright	WHK3.3/18G-10EF/H.P.F	2	04/10/2017	Annual	04/10/2018
Hewlett Packard	11667B / Power Splitter(DC~26.5 GHz)	11275	05/04/2017	Annual	05/04/2018
Agilent	E3632A/DC Power Supply	KR75303243	07/18/2017	Annual	07/18/2018
Schwarzbeck	UHAP/ Dipole Antenna	557	03/31/2017	Biennial	03/31/2019
Schwarzbeck	UHAP/ Dipole Antenna	558	03/31/2017	Biennial	03/31/2019
ESPEC	SU-642 / Chamber	0093008124	03/31/2017	Annual	03/31/2018
Schwarzbeck	BBHA 9120D/ Horn Antenna(1~18GHz)	147	09/09/2016	Biennial	09/09/2018
Schwarzbeck	BBHA 9120D/ Horn Antenna(1~18GHz)	9120D-1298	10/14/2016	Biennial	10/14/2018
Schwarzbeck	BBHA 9170/ Horn Antenna(15~40GHz)	BBHA9170342	04/25/2017	Biennial	04/25/2019
Schwarzbeck	BBHA 9170/ Horn Antenna(15~40GHz)	BBHA9170124	04/25/2017	Biennial	04/25/2019
Agilent	N9020A/Signal Analyzer(10Hz~26.5GHz)	MY52090906	06/01/2017	Annual	06/01/2018
Hewlett Packard	8493C/ATTENUATOR(20dB)	17280	06/22/2017	Annual	06/22/2018
REOHDE & SCHWARZ	FSV40/Spectrum Analyzer(10Hz~40GHz)	100931	10/30/2017	Annual	10/30/2018
Agilent	8960 (E5515C)/ Base Station	MY48360800	09/26/2017	Annual	09/26/2018
Schwarzbeck	FMZB1513/ Loop Antenna(9kHz~30MHz)	1513-175	04/06/2017	Biennial	04/06/2019
Schwarzbeck	VULB9160/ Bilog Antenna	3150	09/30/2016	Biennial	09/30/2018
Schwarzbeck	VULB9160/ Bilog Antenna	9160-3368	10/14/2016	Biennial	10/14/2018
Anritsu Corp.	MT8820C/Wideband Radio Communication Tester	6200863156	02/15/2017	Annual	02/15/2018
Anritsu Corp.	MT8820C/Wideband Radio Communication Tester	6201026545	02/13/2017	Annual	02/13/2018
REOHDE & SCHWARZ	SMB100A/ SIGNAL GENERATOR (100kHz~40GHz)	177633	07/18/2017	Annual	07/18/2018
REOHDE & SCHWARZ	FSV40/Spectrum Analyzer	100931	10/30/2017	Annual	10/30/2018
REOHDE & SCHWARZ	ESU40 / EMI TEST RECEIVER	100524	08/16/2017	Annual	08/16/2018

5. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4:2014.

All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence. The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (±dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.82
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80
Radiated Disturbance (1 GHz ~ 18 GHz)	6.07

6. SUMMARY OF TEST RESULTS

6.1 Test Condition : Conducted Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Occupied Bandwidth	§2.1049	N/A	PASS
Band Edge / Spurious and Harmonic Emissions at Antenna Terminal.	§2.1051, §90.691	< 50 + 10log10 (P[Watts]) at Band Edge and for all out-of-band emissions within 37.5 kHz of Block Edge	PASS
Conducted Output Power	§2.1046	N/A	PASS
Frequency stability / variation of ambient temperature	§2.1055, §90.213	< 2.5 ppm	PASS

6.2 Test Condition : Radiated Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Effective Radiated Power	§90.635	< 100 Watts	PASS
Radiated Spurious and Harmonic Emissions	§2.1053, §90.691	< 43 + 10log10 (P[Watts]) for all out-of band emissions	PASS

7. SAMPLE CALCULATION

7.1 ERP Sample Calculation

Ch./ Freq.		Measured Level(dBm)	Substitute Level(dBm)	Ant. Gain (dBd)	C.L	Pol.	ERP	
channel	Freq.(MHz)						W	dBm
26697	814.7	-30.11	32.45	-10.54	1.32	V	0.115	20.59

ERP = Substitute LEVEL(dBm) + Ant. Gain – CL(Cable Loss)

1) The EUT mounted on a non-conductive turntable is 2.5 meter above test site ground level.
2) During the test , the turn table is rotated until the maximum signal is found.
3) Record the field strength meter's level.
4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
5) Increase the signal generator output till the field strength meter's level is equal to the item (3).
6) The signal generator output level with Ant. Gain and cable loss are the rating of effective radiated power.

7.2 EIRP Sample Calculation

Ch./ Freq.		Measured Level(dBm)	Substitute Level(dBm)	Ant. Gain (dBi)	C.L	Pol.	EIRP	
channel	Freq.(MHz)						W	dBm
20175	1,732.50	-15.75	18.45	9.90	1.76	H	0.456	26.59

EIRP = Substitute LEVEL(dBm) + Ant. Gain – CL(Cable Loss)

1) The EUT mounted on a non-conductive turntable is 2.5 meter above test site ground level.
2) During the test , the turn table is rotated until the maximum signal is found.
3) Record the field strength meter's level.
4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
5) Increase the signal generator output till the field strength meter's level is equal to the item (3).
6) The signal generator output level with Ant. Gain and cable loss are the rating of equivalent isotropic radiated power.

7.3. Emission Designator

GSM Emission Designator

Emission Designator = 249KGXW

GSM BW = 249 kHz

G = Phase Modulation

X = Cases not otherwise covered

W = Combination (Audio/Data)

EDGE Emission Designator

Emission Designator = 249KG7W

GSM BW = 249 kHz

G = Phase Modulation

7 = Quantized/Digital Info

W = Combination (Audio/Data)

WCDMA Emission Designator

Emission Designator = 4M17F9W

WCDMA BW = 4.17 MHz

F = Frequency Modulation

9 = Composite Digital Info

W = Combination (Audio/Data)

QPSK Modulation

Emission Designator = 4M48G7D

LTE BW = 4.48 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission; telemetry; telecommand

16QAM Modulation

Emission Designator = 4M48W7D

LTE BW = 4.48 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Data transmission; telemetry; telecommand

8. TEST DATA

8.1 CONDUCTED OUTPUT POWER

Band	Band Width (MHz)	Frequency (MHz)	Channel	Resource Block Size	Resource Block Offset	Average Power [dBm]	
						QPSK	16-QAM
Band 26	1.4	814.7	26697	1	0	22.56	22.02
				1	3	22.41	21.77
				1	5	22.47	21.82
				3	0	22.50	21.71
				3	1	22.45	21.65
				3	3	22.43	21.70
				6	0	21.50	20.55

LTE Conducted Average Output Powers (1.4 MHz Band 26 LTE)

Band	Band Width (MHz)	Frequency (MHz)	Channel	Resource Block Size	Resource Block Offset	Average Power [dBm]	
						QPSK	16-QAM
Band 26	3	815.5	26705	1	0	22.70	21.81
				1	7	22.33	21.57
				1	14	22.47	21.73
				8	0	21.35	20.26
				8	3	21.54	20.43
				8	7	21.59	20.38
				15	0	21.44	20.28

LTE Conducted Average Output Powers (3 MHz Band 26 LTE)

Band	Band Width (MHz)	Frequency (MHz)	Channel	Resource Block Size	Resource Block Offset	Average Power [dBm]	
						QPSK	16-QAM
Band 26	5	816.5	26715	1	0	22.50	21.88
				1	12	22.37	21.45
				1	24	22.74	21.80
				12	0	21.35	20.19
				12	6	21.62	20.38
				12	11	21.64	20.46
				25	0	21.66	20.41

LTE Conducted Average Output Powers (5 MHz Band 26 LTE)

Band	Band Width (MHz)	Frequency (MHz)	Channel	Resource Block Size	Resource Block Offset	Average Power [dBm]	
						QPSK	16-QAM
Band 26	10	819.0	26740	1	0	22.40	21.55
				1	24	22.62	21.47
				1	49	22.90	22.02
				25	0	21.74	20.63
				25	12	21.75	20.59
				25	24	21.99	21.02
				50	0	21.77	20.62

LTE Conducted Average Output Powers (10 MHz Band 26 LTE)

Note : Detecting mode is average.

8.2 EFFECTIVE RADIATED POWER

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBd)	C.L	Pol	Limit	ERP	
								W	W	dBm
814.7	LTE B26/ 1.4 MHz	QPSK	-27.94	34.81	-10.25	1.78	V	< 7.00	0.190	22.78
		16-QAM	-28.45	34.30	-10.25	1.78	V		0.169	22.27
823.3		QPSK	-28.74	33.93	-10.23	1.79	V		0.155	21.91
		16-QAM	-29.33	33.34	-10.23	1.79	V		0.136	21.32

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBd)	C.L	Pol	Limit	ERP	
								W	W	dBm
815.5	LTE B26/ 3 MHz	QPSK	-27.81	34.95	-10.25	1.78	V	< 7.00	0.196	22.92
		16-QAM	-28.42	34.34	-10.25	1.78	V		0.170	22.31
822.5		QPSK	-28.07	34.61	-10.23	1.79	V		0.182	22.59
		16-QAM	-28.74	33.94	-10.23	1.79	V		0.156	21.92

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBd)	C.L	Pol	Limit	ERP	
								W	W	dBm
816.5	LTE B26/ 5 MHz	QPSK	-27.80	34.97	-10.25	1.78	V	< 7.00	0.197	22.94
		16-QAM	-28.45	34.32	-10.25	1.78	V		0.169	22.29
821.5		QPSK	-27.80	34.90	-10.23	1.79	V		0.194	22.88
		16-QAM	-28.74	33.96	-10.23	1.79	V		0.156	21.94

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBd)	C.L	Pol	Limit	ERP	
								W	W	dBm
819.0	LTE B26/ 10 MHz	QPSK	-27.62	35.10	-10.24	1.78	V	< 7.00	0.203	23.08
		16-QAM	-28.29	34.43	-10.24	1.78	V		0.174	22.41

8.3 RADIATED SPURIOUS EMISSIONS

▣ OPERATING FREQUENTY: 814.70 MHz

▣ MEASURED OUTPUT POWER: 22.78 dBm = 0.190 W

▣ MODE: LTE B26

▣ MODULATION SIGNAL: 1.4 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 lo_{g10} (W) = 35.78 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBd)	Substitude Level (dBm)	C.L	Pol	ERP (dBm)	dBc
26697 (814.7)	1,629.40	-48.96	9.07	-63.24	1.73	H	-55.90	78.68
	2,444.10	-54.45	10.89	-65.25	2.18	H	-56.54	79.32
	3,258.80	-55.11	11.84	-63.45	2.55	H	-54.16	76.94
26783 (823.3)	1,646.60	-44.17	9.12	-58.63	1.74	H	-51.25	74.03
	2,469.90	-55.51	10.91	-66.24	2.18	V	-57.51	80.29
	3,293.20	-56.07	11.92	-64.86	2.55	V	-55.49	78.27

▣ OPERATING FREQUENTY: 815.50 MHz

▣ MEASURED OUTPUT POWER: 22.92 dBm = 0.196 W

▣ MODE: LTE B26

▣ MODULATION SIGNAL: 3 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 lo_{g10} (W) = 35.92 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBd)	Substitude Level (dBm)	C.L	Pol	ERP (dBm)	dBc
26705 (815.5)	1,631.00	-48.66	9.09	-62.82	1.73	H	-55.46	78.38
	2,446.50	-53.57	10.89	-64.37	2.18	H	-55.66	78.58
	3,262.00	-56.28	11.86	-64.70	2.53	H	-55.37	78.29
26775 (822.5)	1,645.00	-44.63	9.14	-59.26	1.74	H	-51.86	74.78
	2,467.50	-56.53	10.91	-67.26	2.18	H	-58.53	81.45
	3,290.00	-56.63	11.92	-65.42	2.55	H	-56.05	78.97

▣ OPERATING FREQUENTY: 816.50 MHz

▣ MEASURED OUTPUT POWER: 22.94 dBm = 0.197 W

▣ MODE: LTE B26

▣ MODULATION SIGNAL: 5 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 lo_{g10} (W) = 35.94 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBd)	Substitude Level (dBm)	C.L	Pol	ERP (dBm)	dBc
26715 (816.5)	1,633.00	-49.16	9.27	-63.70	1.74	H	-56.17	79.11
	2,449.50	-52.71	10.92	-63.06	2.19	H	-54.33	77.27
	3,266.00	-58.06	11.95	-67.07	2.55	H	-57.67	80.61
26765 (821.5)	1,643.00	-48.48	9.31	-63.16	1.76	V	-55.61	78.55
	2,464.50	-54.44	10.98	-64.70	2.20	V	-55.92	78.86
	3,286.00	-56.68	12.11	-65.87	2.62	V	-56.38	79.32

▣ OPERATING FREQUENTY: 819.00 MHz

▣ MEASURED OUTPUT POWER: 23.08 dBm = 0.203 W

▣ MODE: LTE B26

▣ MODULATION SIGNAL: 10 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 lo_{g10} (W) = 36.08 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBd)	Substitute Level (dBm)	C.L	Pol	ERP (dBm)	dBc
26740 (819.0)	1 638.00	-50.66	9.09	-65.17	1.73	H	-57.81	80.89
	2 457.00	-53.58	10.90	-64.26	2.18	H	-55.54	78.62
	3 276.00	-56.31	11.88	-65.05	2.53	V	-55.70	78.78

8.4 OCCUPIED BANDWIDTH

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (MHz)
Band 26	1.4 MHz	814.7	QPSK	6	0	1.0861
			16-QAM			1.0833
		823.3	QPSK			1.0830
			16-QAM			1.0815
	3 MHz	815.5	QPSK	15		2.6878
			16-QAM			2.6931
		822.5	QPSK			2.6920
			16-QAM			2.6834
	5 MHz	816.5	QPSK	25		4.4803
			16-QAM			4.4720
		821.5	QPSK			4.4862
			16-QAM			4.4773
	10 MHz	819.0	QPSK	50		8.9329
			16-QAM			8.9249

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 33 ~ 39.

8.5 CONDUCTED SPURIOUS EMISSIONS

Band	Band Width (MHz)	Frequency (MHz)	Frequency of Maximum Harmonic (GHz)	Factor (dB)	Measurement Maximum Data (dBm)	Result (dBm)	Limit (dBm)
26	1.4	814.7	3.6092	27.976	-68.020	-40.044	-13.00
		823.3	3.1641	27.976	-67.682	-39.706	
	3	815.5	3.6466	27.976	-68.198	-40.222	
		822.5	3.0220	27.976	-68.469	-40.493	
	5	816.5	3.6466	27.976	-67.824	-39.848	
		821.5	3.0459	27.976	-68.136	-40.160	
	10	819.0	3.1790	27.976	-67.833	-39.857	

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 47 ~ 50.
2. Conducted Spurious Emissions was Tested QPSK Modulation, Resource Block Size 1 and Resource Block Offset 0
3. Result (dBm) = Measurement Maximum Data (dBm) + Factor (dB)
4. Factor(dB) = Cable Loss + Attenuator + Power Splitter

Frequency Range (GHz)	Factor [dB]
0.03 – 1	25.270
1 – 5	27.976
5 – 10	28.591
10 – 15	29.116
15 – 20	29.489
Above 20	30.131

8.6 BAND EDGE

- Plots of the EUT's Band Edge are shown Page 40 ~ 47.

8.7 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

▣ MODE: LTE 26

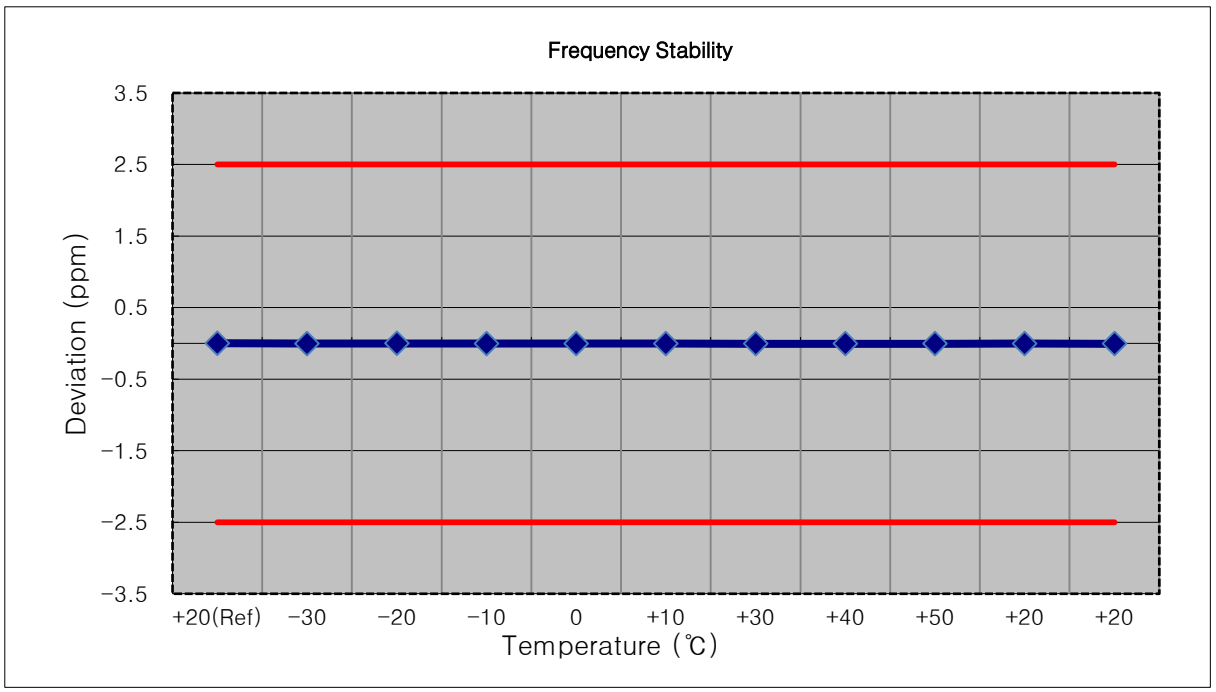
▣ OPERATING FREQUENCY: 814,700,000 Hz

▣ CHANNEL: 26697(1.4 MHz)

▣ REFERENCE VOLTAGE: 5.00 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	5.00	+20(Ref)	814 699 998	0.0	0.000 000	0.000
100%		-30	814 699 994	-3.3	0.000 000	-0.004
100%		-20	814 699 996	-1.8	0.000 000	-0.002
100%		-10	814 699 995	-2.7	0.000 000	-0.003
100%		0	814 699 994	-3.5	0.000 000	-0.004
100%		+10	814 699 994	-3.3	0.000 000	-0.004
100%		+30	814 699 994	-3.9	0.000 000	-0.005
100%		+40	814 699 993	-4.2	-0.000 001	-0.005
100%		+50	814 699 993	-4.8	-0.000 001	-0.006
115%	5.75	+20	814 699 994	-3.6	0.000 000	-0.004
85%	4.25	+20	814 699 992	-5.4	-0.000 001	-0.007



▣ MODE: LTE 26

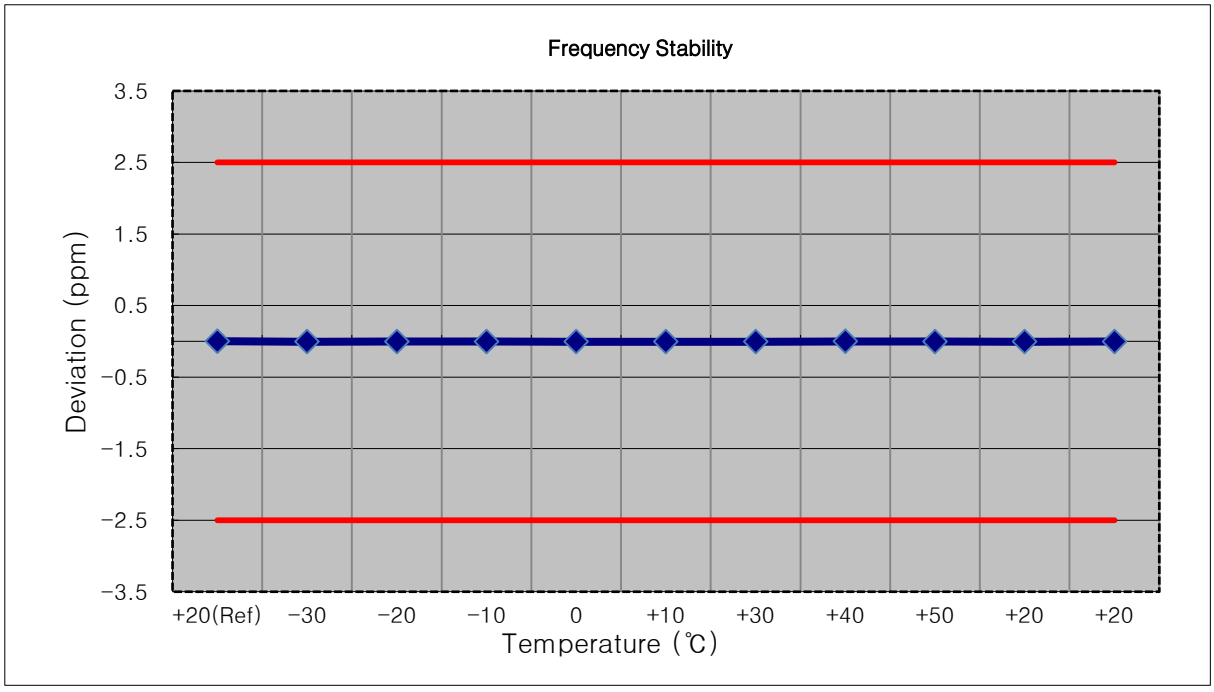
▣ OPERATING FREQUENCY: 815,500,000 Hz

▣ CHANNEL: 26705(3 MHz)

▣ REFERENCE VOLTAGE: 5.00 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	5.00	+20(Ref)	815 500 005	0.0	0.000 000	0.000
100%		-30	815 499 999	-5.4	-0.000 001	-0.007
100%		-20	815 500 002	-2.1	0.000 000	-0.003
100%		-10	815 500 001	-3.4	0.000 000	-0.004
100%		0	815 500 001	-3.7	0.000 000	-0.005
100%		+10	815 500 000	-4.2	-0.000 001	-0.005
100%		+30	815 499 999	-5.3	-0.000 001	-0.006
100%		+40	815 500 003	-1.7	0.000 000	-0.002
100%		+50	815 500 002	-2.5	0.000 000	-0.003
115%	5.75	+20	814 699 994	-3.7	0.000 000	-0.005
85%	4.25	+20	814 699 994	-3.3	0.000 000	-0.004



▣ MODE: LTE 26

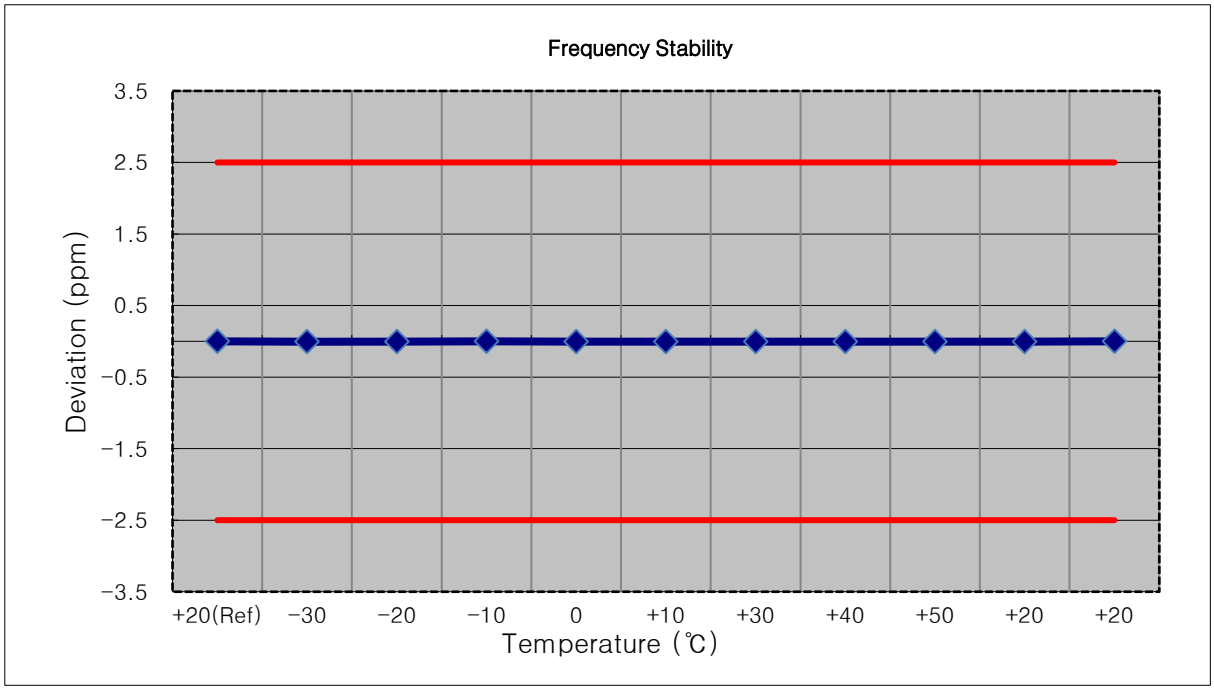
▣ OPERATING FREQUENCY: 816.500,000 Hz

▣ CHANNEL: 26715(5MHz)

▣ REFERENCE VOLTAGE: 5.00 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	5.00	+20(Ref)	816 499 999	0.0	0.000 000	0.000
100%		-30	816 499 994	-4.6	-0.000 001	-0.006
100%		-20	816 499 996	-2.8	0.000 000	-0.003
100%		-10	816 499 997	-1.8	0.000 000	-0.002
100%		0	816 499 996	-3.1	0.000 000	-0.004
100%		+10	816 499 997	-2.2	0.000 000	-0.003
100%		+30	816 499 997	-1.9	0.000 000	-0.002
100%		+40	816 499 994	-4.5	-0.000 001	-0.006
100%		+50	816 499 995	-3.3	0.000 000	-0.004
115%	5.75	+20	814 699 995	-2.6	0.000 000	-0.003
85%	4.25	+20	814 699 996	-1.5	0.000 000	-0.002



▣ MODE: LTE 26

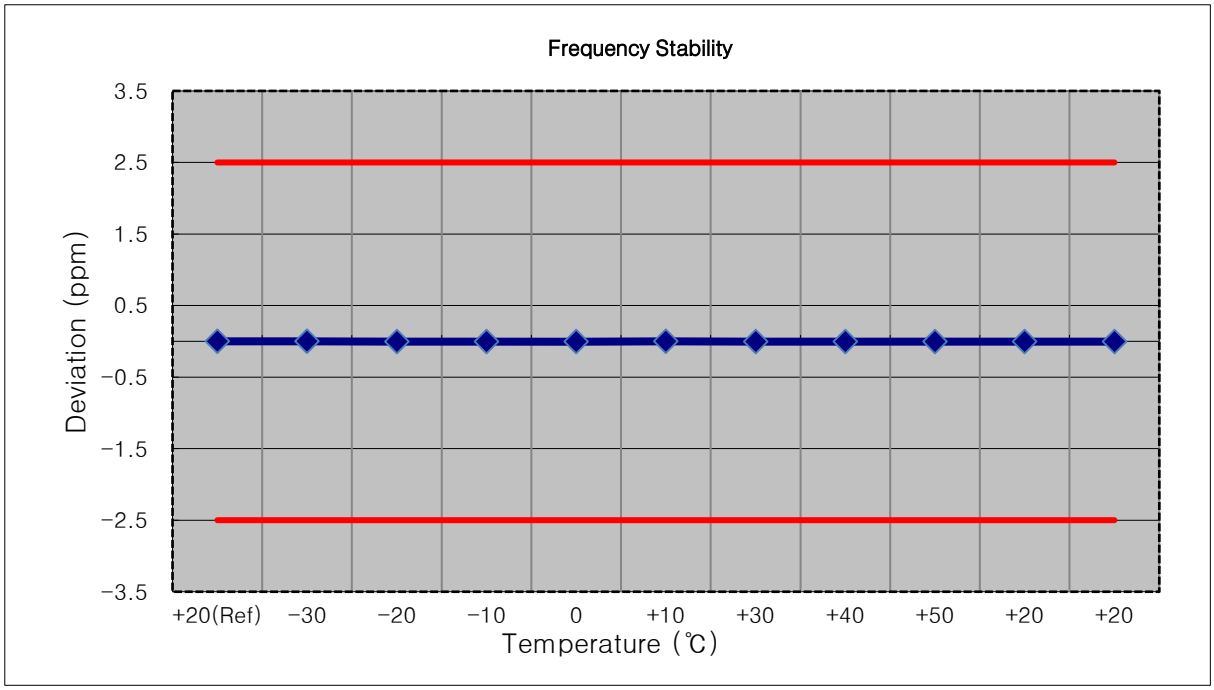
▣ OPERATING FREQUENCY: 819,000,000 Hz

▣ CHANNEL: 26740(10 MHz)

▣ REFERENCE VOLTAGE: 5.00 VDC

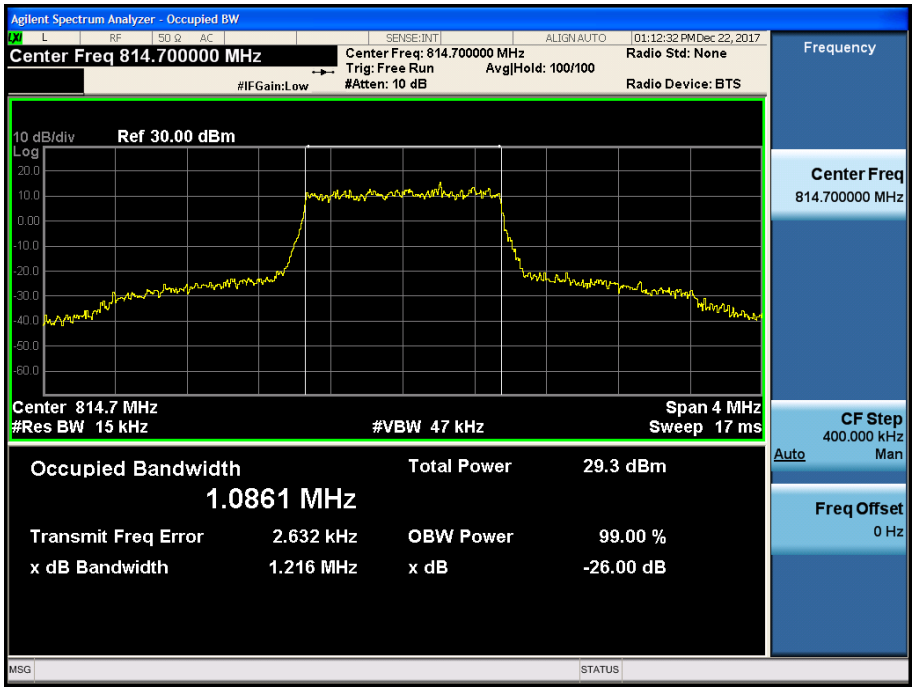
▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	5.00	+20(Ref)	819 000 000	0.0	0.000 000	0.000
100%		-30	818 999 999	-1.4	0.000 000	-0.002
100%		-20	818 999 997	-3.4	0.000 000	-0.004
100%		-10	818 999 998	-2.6	0.000 000	-0.003
100%		0	818 999 996	-4.7	-0.000 001	-0.006
100%		+10	818 999 999	-1.6	0.000 000	-0.002
100%		+30	818 999 998	-2.2	0.000 000	-0.003
100%		+40	818 999 997	-2.9	0.000 000	-0.004
100%		+50	818 999 998	-2.5	0.000 000	-0.003
115%	5.75	+20	814 699 995	-2.9	0.000 000	-0.004
85%	4.25	+20	814 699 994	-3.6	0.000 000	-0.004

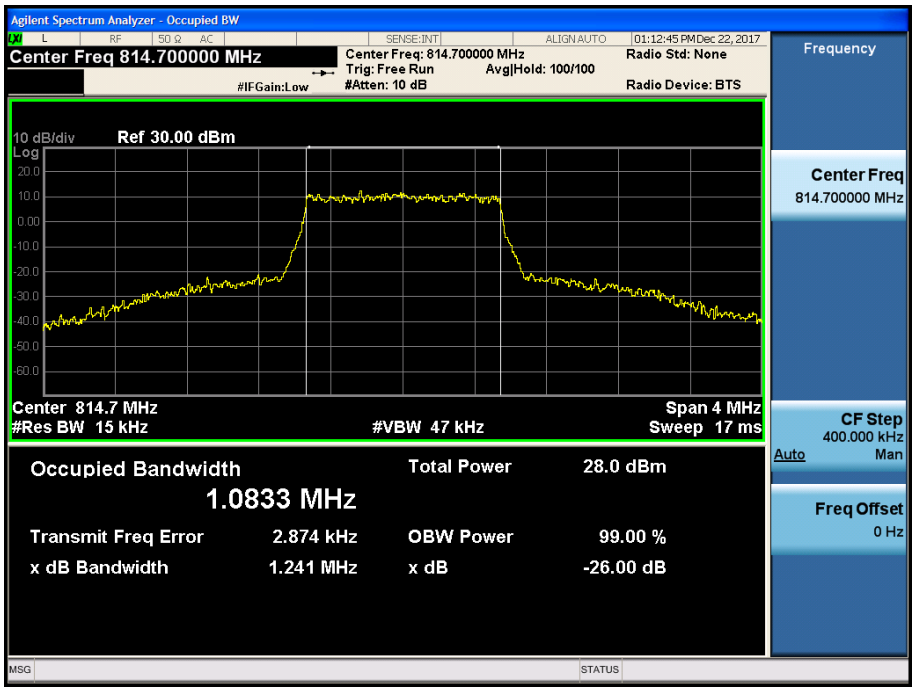


9. TEST PLOTS

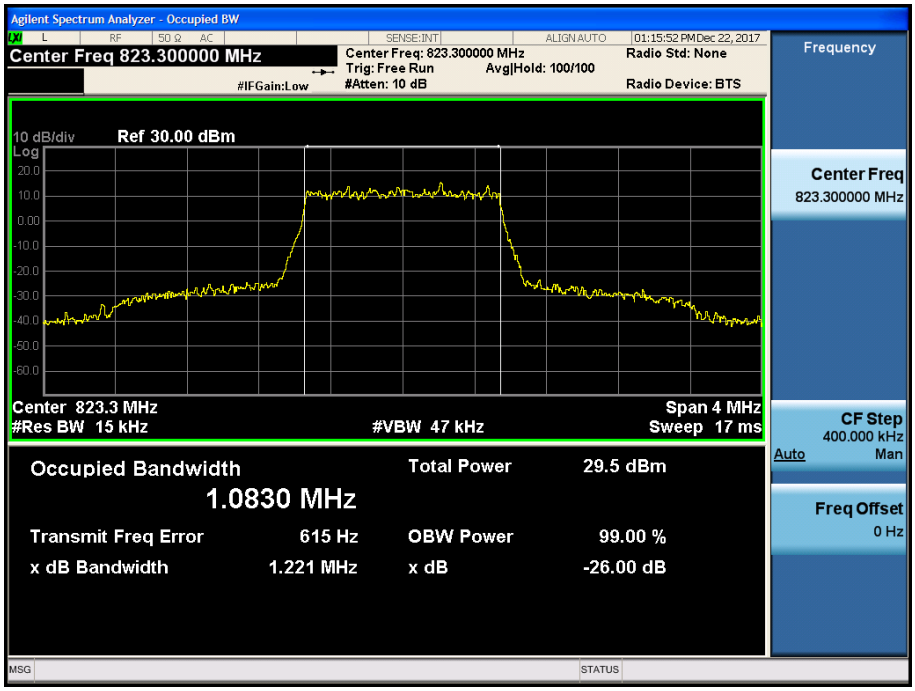
BAND 26. Occupied Bandwidth Plot (1.4M BW Ch.26697 QPSK RB 6_0)



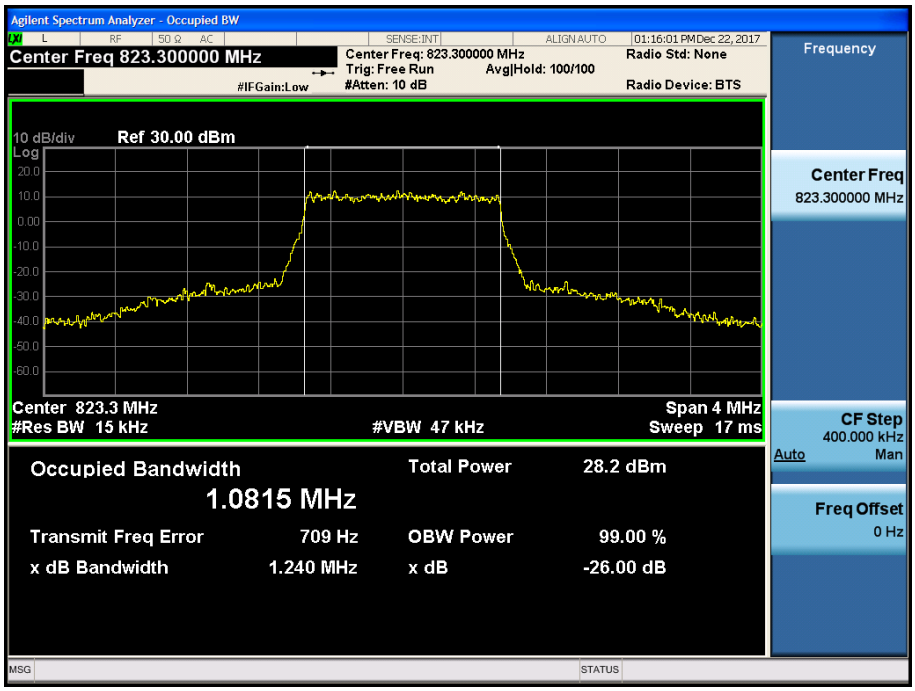
BAND 26. Occupied Bandwidth Plot (1.4M BW Ch.26697 16QAM RB 6_0)



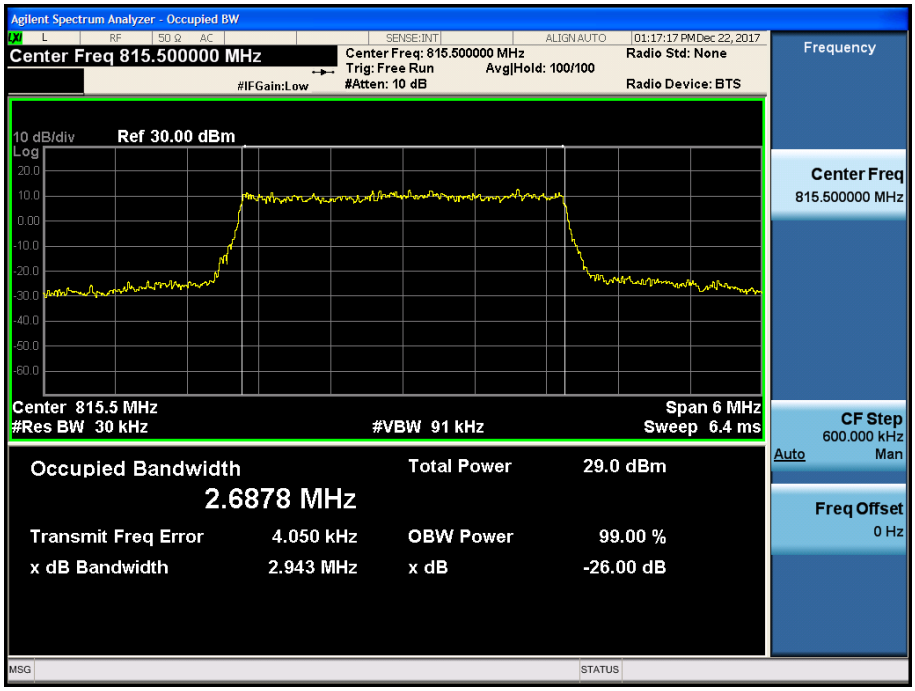
BAND 26. Occupied Bandwidth Plot (1.4M BW Ch.26783 QPSK RB 6_0)



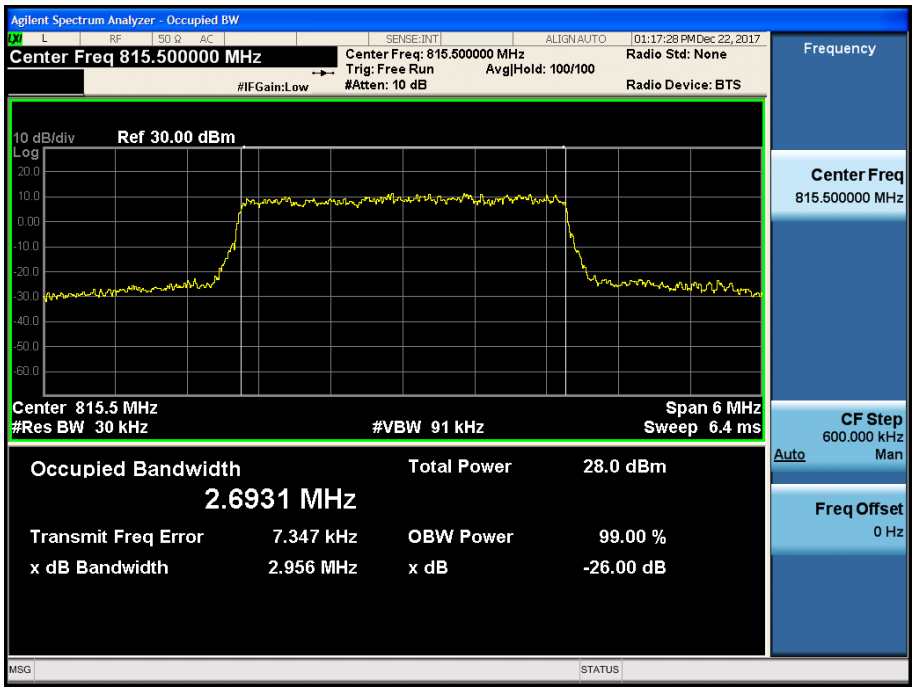
BAND 26. Occupied Bandwidth Plot (1.4M BW Ch.26783 16QAM RB 6_0)



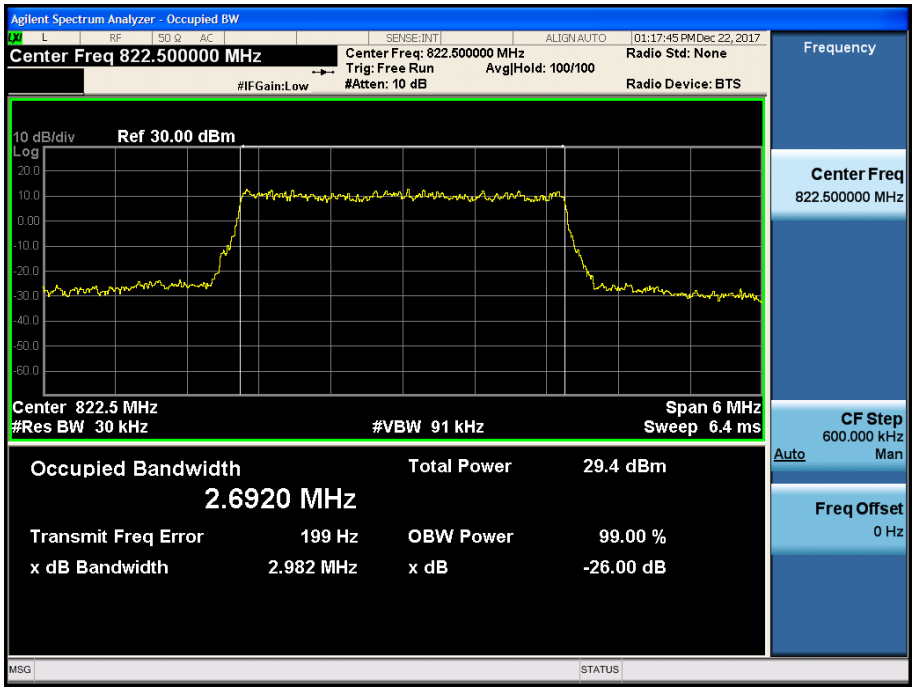
BAND 26. Occupied Bandwidth Plot (3M BW Ch.26705 QPSK RB 15_0)



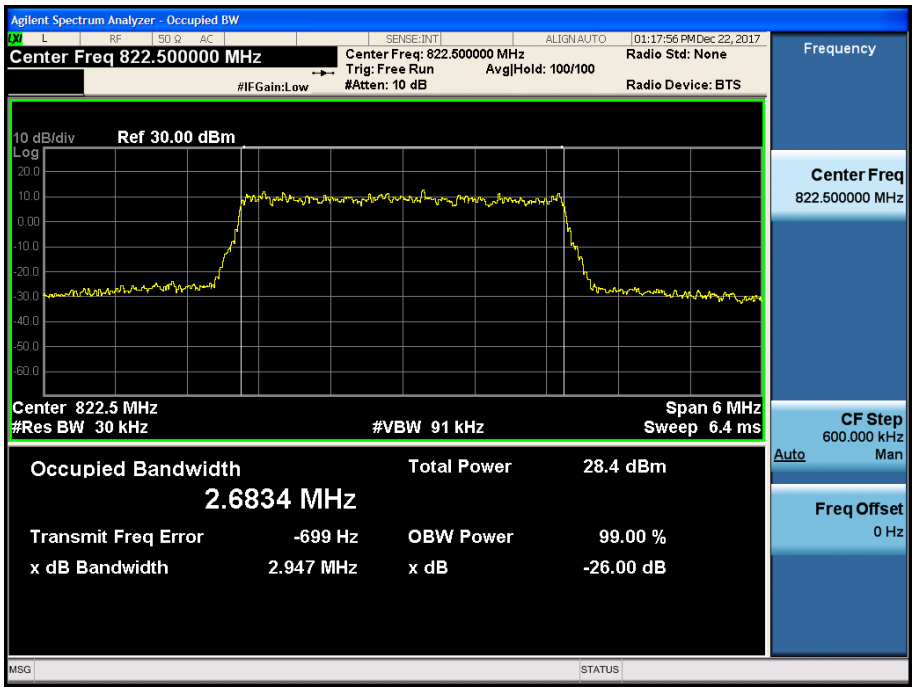
BAND 26. Occupied Bandwidth Plot (3M BW Ch.26705 16QAM RB 15_0)



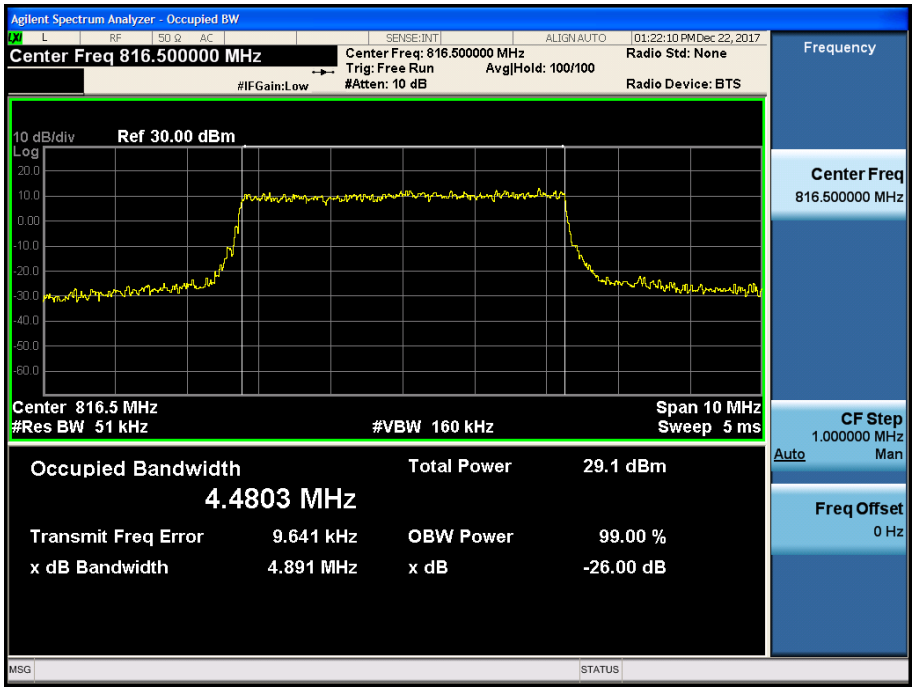
BAND 26. Occupied Bandwidth Plot (3M BW Ch.26775 QPSK RB 15_0)



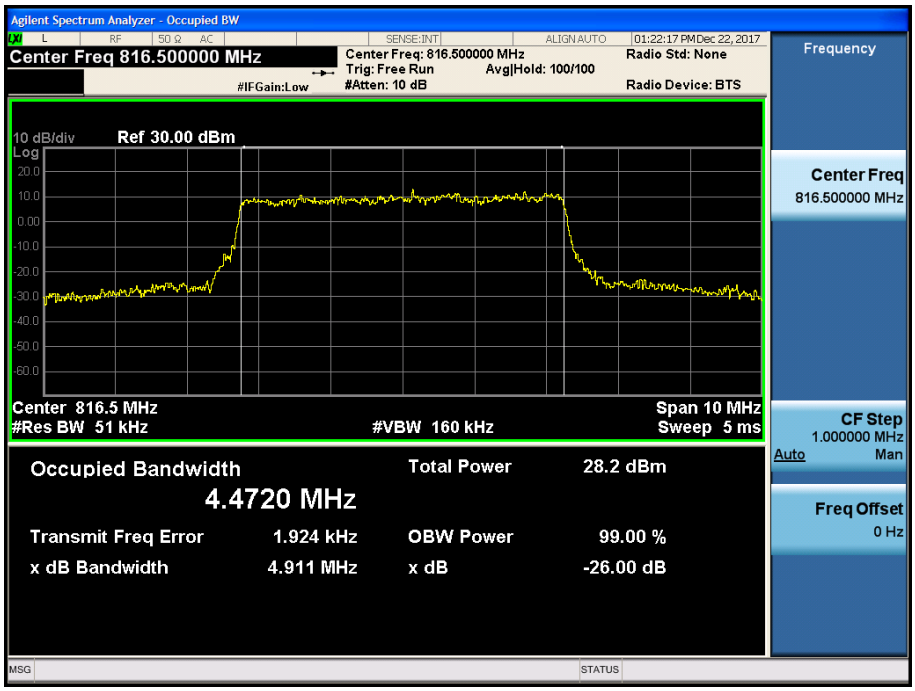
BAND 26. Occupied Bandwidth Plot (3M BW Ch.26775 16QAM RB 15_0)



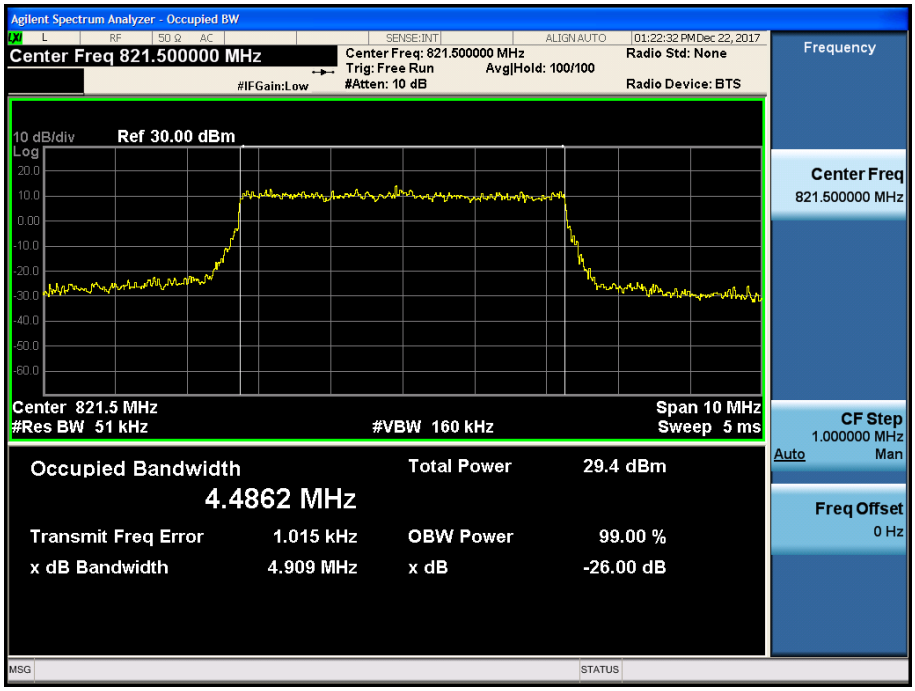
BAND 26. Occupied Bandwidth Plot (5M BW Ch.26715 QPSK RB 25_0)



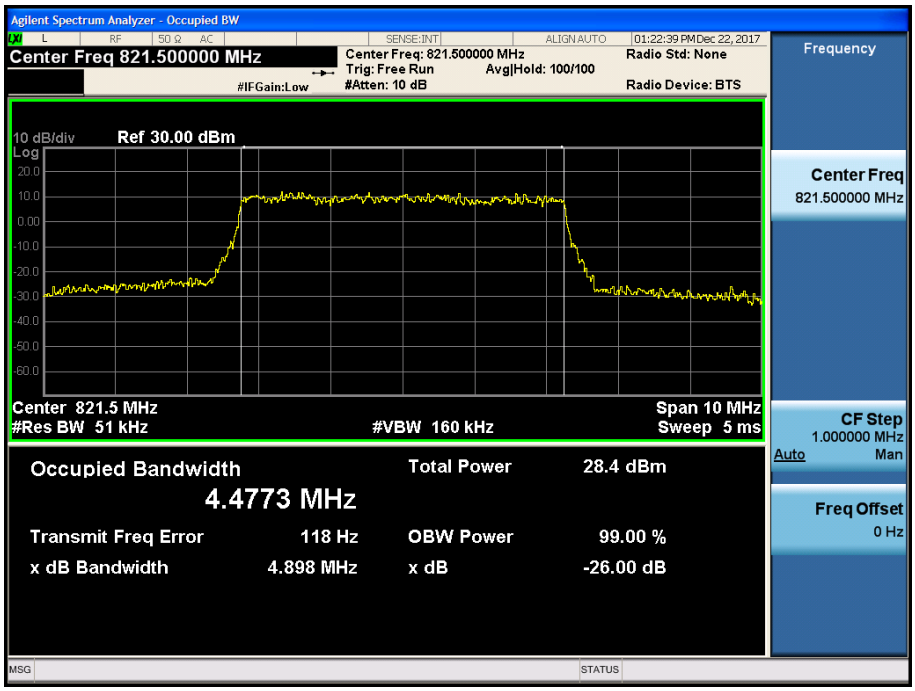
BAND 26. Occupied Bandwidth Plot (5M BW Ch.26715 16QAM RB 25_0)



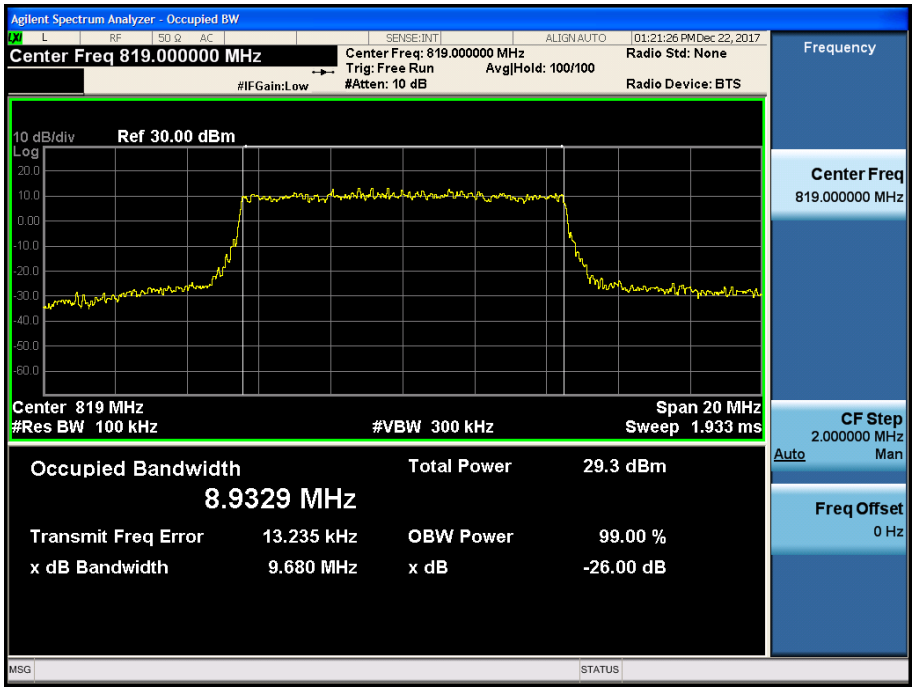
BAND 26. Occupied Bandwidth Plot (5M BW Ch.26765 QPSK RB 25_0)



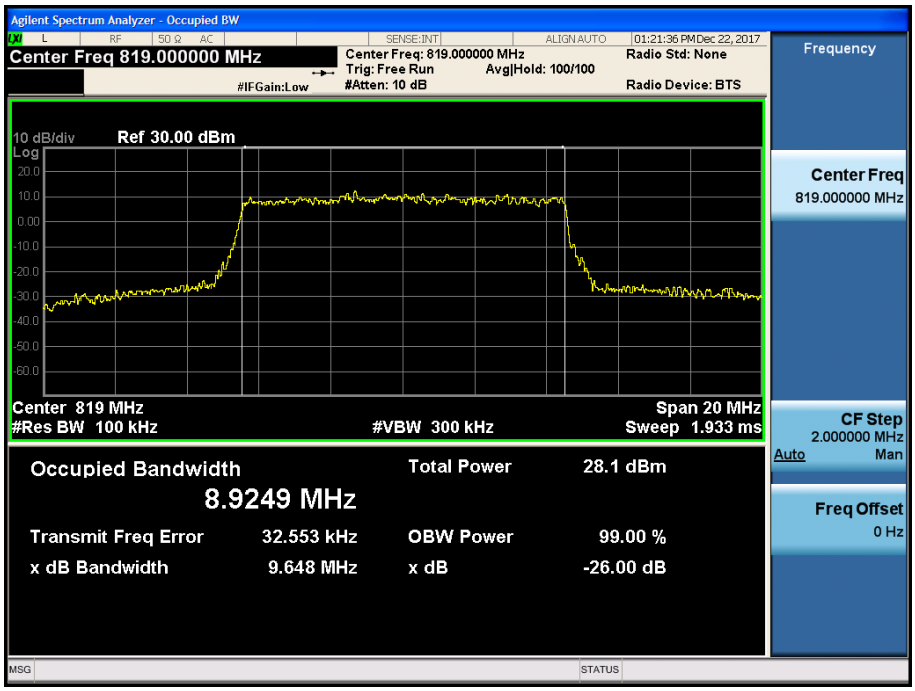
BAND 26. Occupied Bandwidth Plot (5M BW Ch.26765 16QAM RB 25_0)



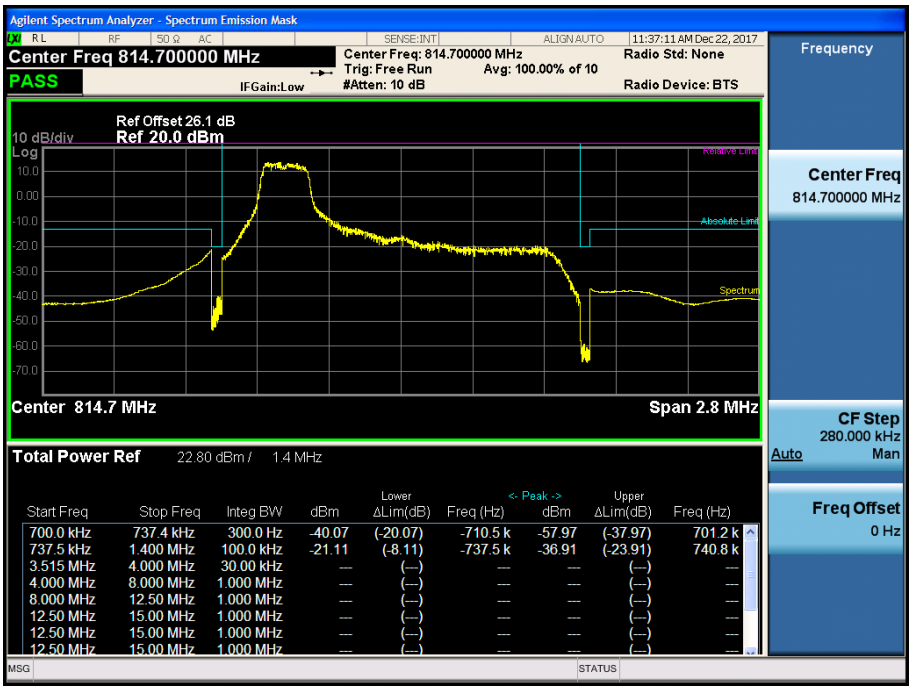
BAND 26. Occupied Bandwidth Plot (10M BW Ch.26740 QPSK RB 50_0)



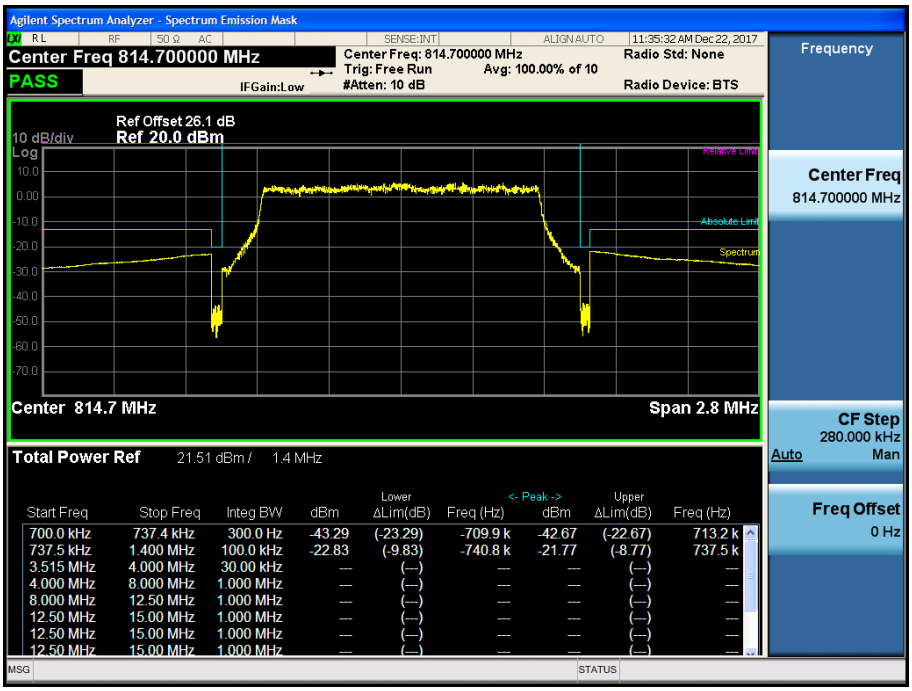
BAND 26. Occupied Bandwidth Plot (10M BW Ch.26740 16QAM RB 50_0)



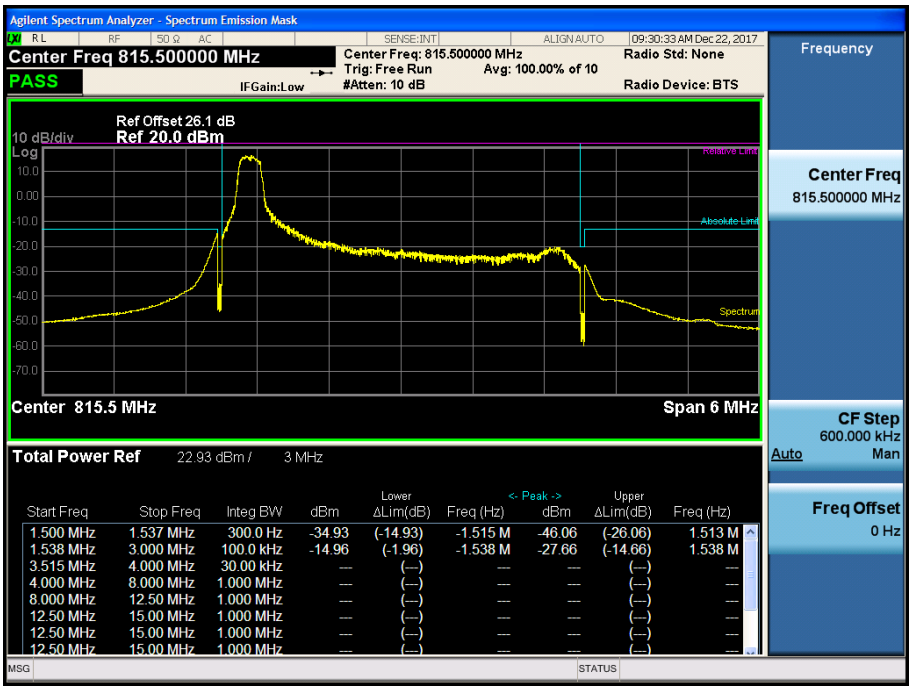
BAND 26. Lower Channel Edge Plot (1.4M BW Ch.26697 QPSK_RB1_Offset 0) -1



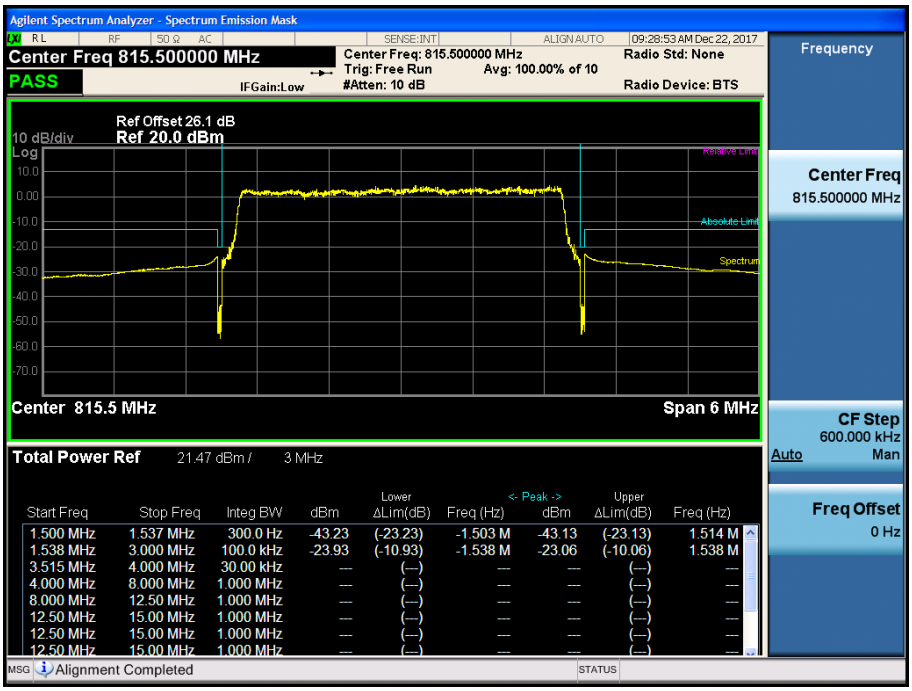
BAND 26. Lower Channel Edge Plot (1.4M BW Ch.26697 QPSK_RB6_Offset 0) -2



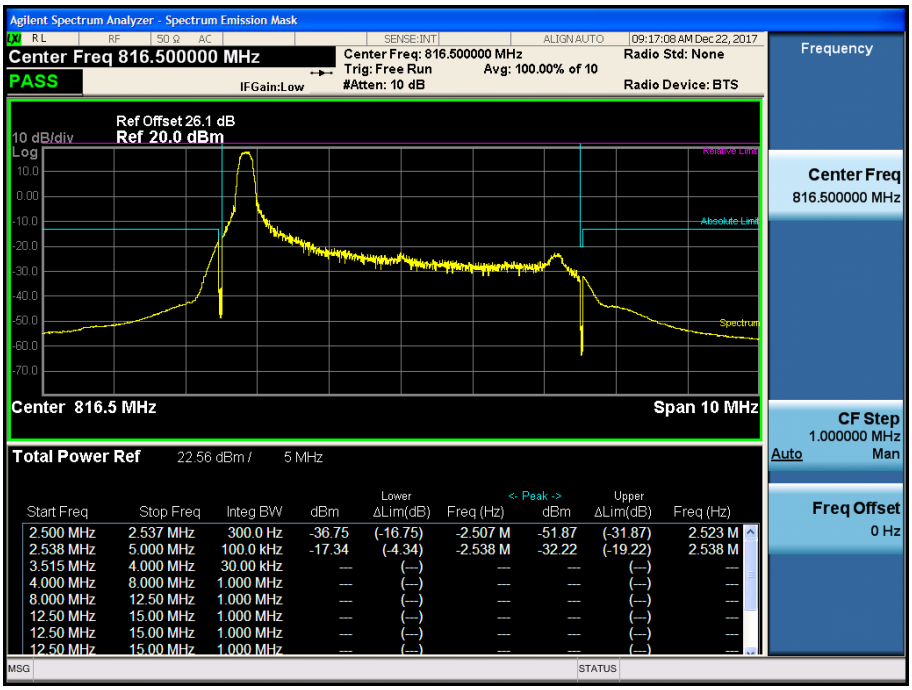
BAND 26. Lower Channel Edge Plot (3M BW Ch.26705 QPSK_RB1_Offset 0) -1



BAND 26. Lower Channel Edge Plot (3M BW Ch. 26705 QPSK_RB15_Offset 0) -2

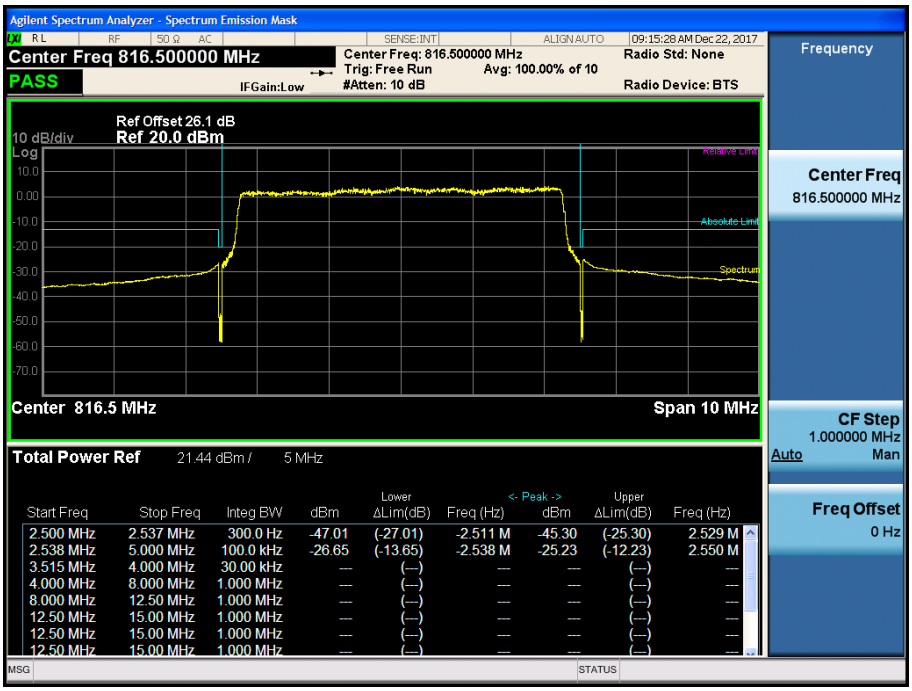


BAND 26. Lower Channel Edge Plot (5M BW Ch.26715 QPSK_RB1_Offset 0) -1



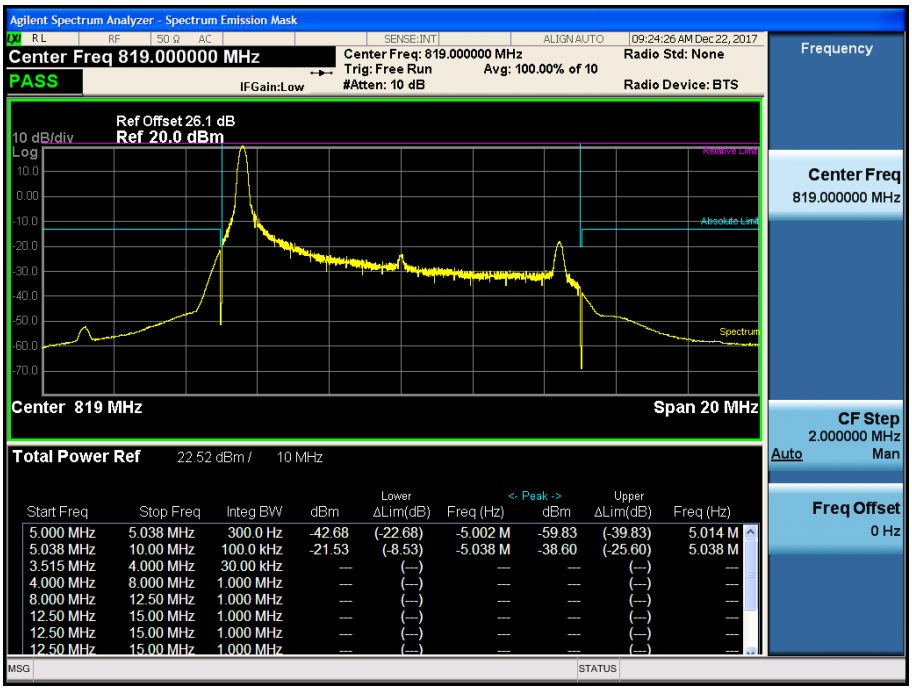
Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Lower Freq (Hz)	<- Peak -> dBm	Upper ΔLim(dB)	Upper Freq (Hz)
2.500 MHz	2.537 MHz	300.0 Hz	-36.75	(-16.75)	-2.507 M	-51.87	(-31.87)	2.523 M
2.538 MHz	5.000 MHz	100.0 kHz	-17.34	(-4.34)	-2.538 M	-32.22	(-19.22)	2.538 M
3.515 MHz	4.000 MHz	30.00 kHz	---	(---)	---	---	(---)	---
4.000 MHz	8.000 MHz	1.000 MHz	---	(---)	---	---	(---)	---
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---

BAND 26. Lower Channel Edge Plot (5M BW Ch. 26715 QPSK_RB25_Offset 0) -2



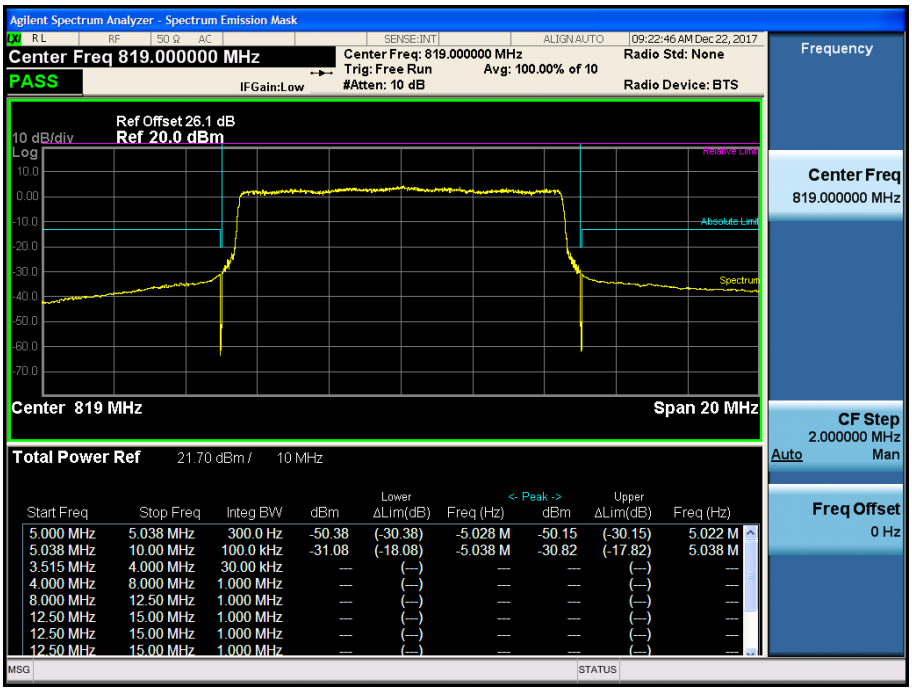
Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Lower Freq (Hz)	<- Peak -> dBm	Upper ΔLim(dB)	Upper Freq (Hz)
2.500 MHz	2.537 MHz	300.0 Hz	-47.01	(-27.01)	-2.511 M	-45.30	(-25.30)	2.529 M
2.538 MHz	5.000 MHz	100.0 kHz	-26.65	(-13.65)	-2.538 M	-25.23	(-12.23)	2.550 M
3.515 MHz	4.000 MHz	30.00 kHz	---	(---)	---	---	(---)	---
4.000 MHz	8.000 MHz	1.000 MHz	---	(---)	---	---	(---)	---
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---

BAND 26. Lower Channel Edge Plot (10M BW Ch.26740 QPSK_RB1_Offset 0) -1



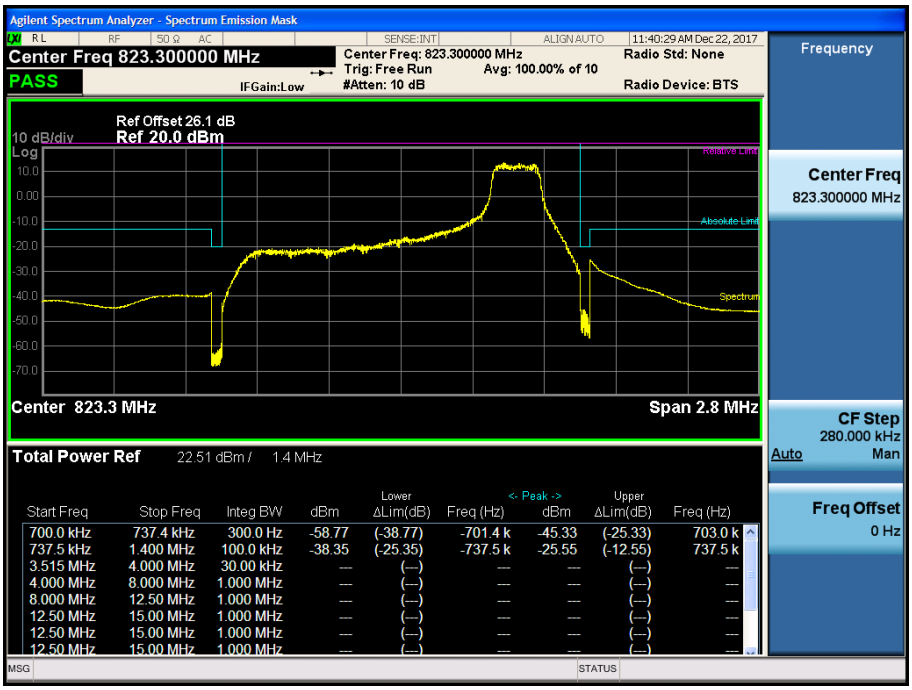
Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Lower Freq (Hz)	<- Peak -> dBm	Upper ΔLim(dB)	Upper Freq (Hz)
5.000 MHz	5.038 MHz	300.0 Hz	-42.68	(-22.68)	-5.002 M	-59.83	(-39.83)	5.014 M
5.038 MHz	10.00 MHz	100.0 kHz	-21.53	(-8.53)	-5.038 M	-38.60	(-25.60)	5.038 M
3.515 MHz	4.000 MHz	30.00 kHz	---	(---)	---	---	(---)	---
4.000 MHz	8.000 MHz	1.000 MHz	---	(---)	---	---	(---)	---
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---

BAND 26. Lower Channel Edge Plot (10M BW Ch. 26740 QPSK_RB50_Offset 0) -2



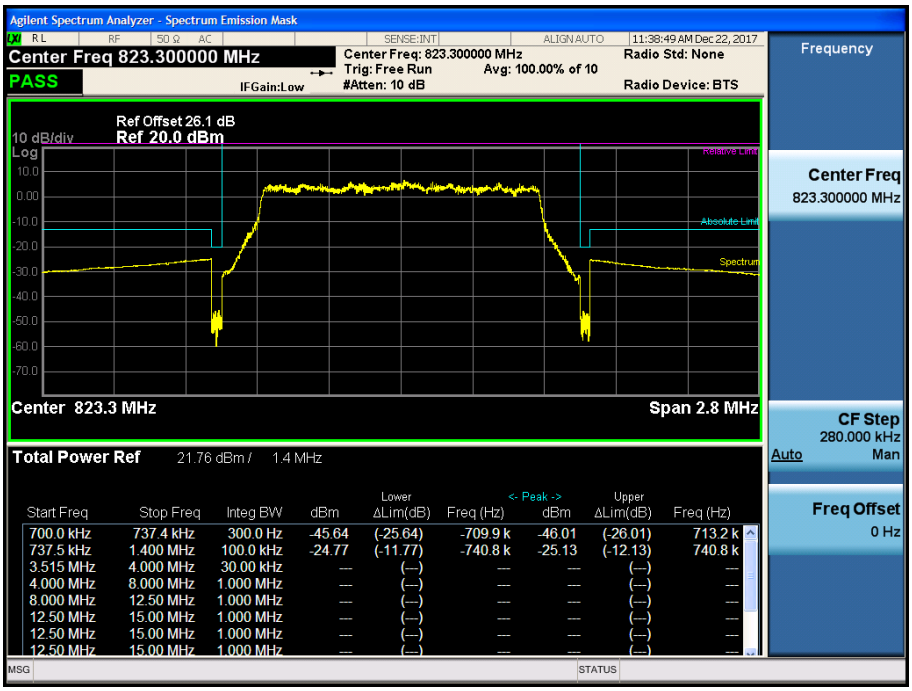
Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Lower Freq (Hz)	<- Peak -> dBm	Upper ΔLim(dB)	Upper Freq (Hz)
5.000 MHz	5.038 MHz	300.0 Hz	-50.38	(-30.38)	-5.028 M	-50.15	(-30.15)	5.022 M
5.038 MHz	10.00 MHz	100.0 kHz	-31.08	(-18.08)	-5.038 M	-30.82	(-17.82)	5.038 M
3.515 MHz	4.000 MHz	30.00 kHz	---	(---)	---	---	(---)	---
4.000 MHz	8.000 MHz	1.000 MHz	---	(---)	---	---	(---)	---
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---

BAND 26. Upper Channel Edge Plot (1.4M BW Ch.26783 QPSK_RB1_Offset 0) -1



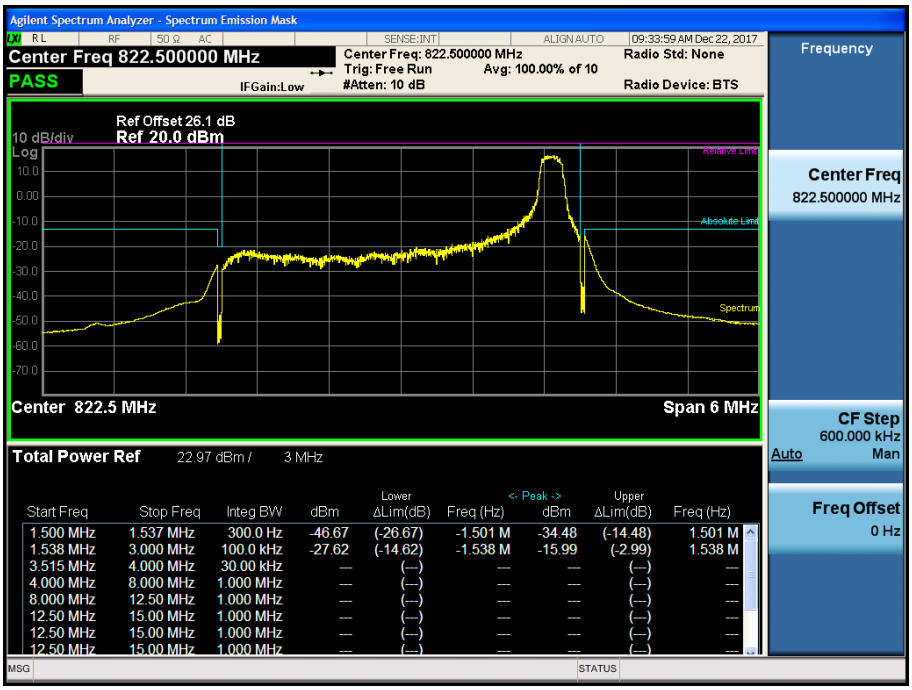
Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Lower Freq (Hz)	<- Peak -> dBm	Upper ΔLim(dB)	Upper Freq (Hz)
700.0 kHz	737.4 kHz	300.0 Hz	-58.77	(-38.77)	-701.4 k	-45.33	(-25.33)	703.0 k
737.5 kHz	1.400 MHz	100.0 kHz	-38.35	(-25.35)	-737.5 k	-25.55	(-12.55)	737.5 k
3.515 MHz	4.000 MHz	30.00 kHz	---	(---)	---	---	(---)	---
4.000 MHz	8.000 MHz	1.000 MHz	---	(---)	---	---	(---)	---
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---

BAND 26. Upper Channel Edge Plot (1.4M BW Ch.26783 QPSK_RB6_Offset 0) -2

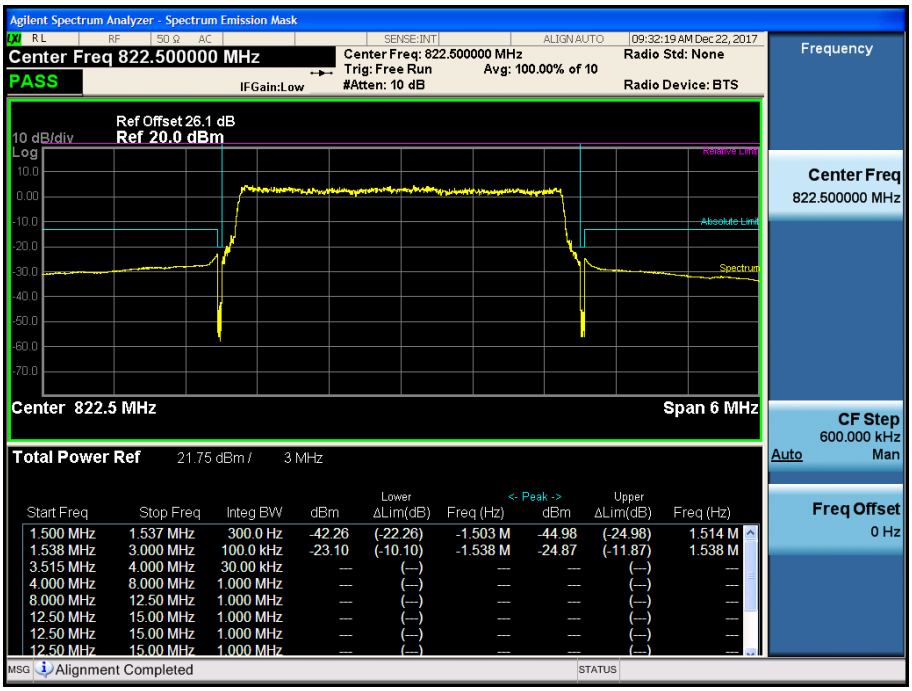


Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Lower Freq (Hz)	<- Peak -> dBm	Upper ΔLim(dB)	Upper Freq (Hz)
700.0 kHz	737.4 kHz	300.0 Hz	-45.64	(-25.64)	-709.9 k	-46.01	(-26.01)	713.2 k
737.5 kHz	1.400 MHz	100.0 kHz	-24.77	(-11.77)	-740.8 k	-25.13	(-12.13)	740.8 k
3.515 MHz	4.000 MHz	30.00 kHz	---	(---)	---	---	(---)	---
4.000 MHz	8.000 MHz	1.000 MHz	---	(---)	---	---	(---)	---
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---

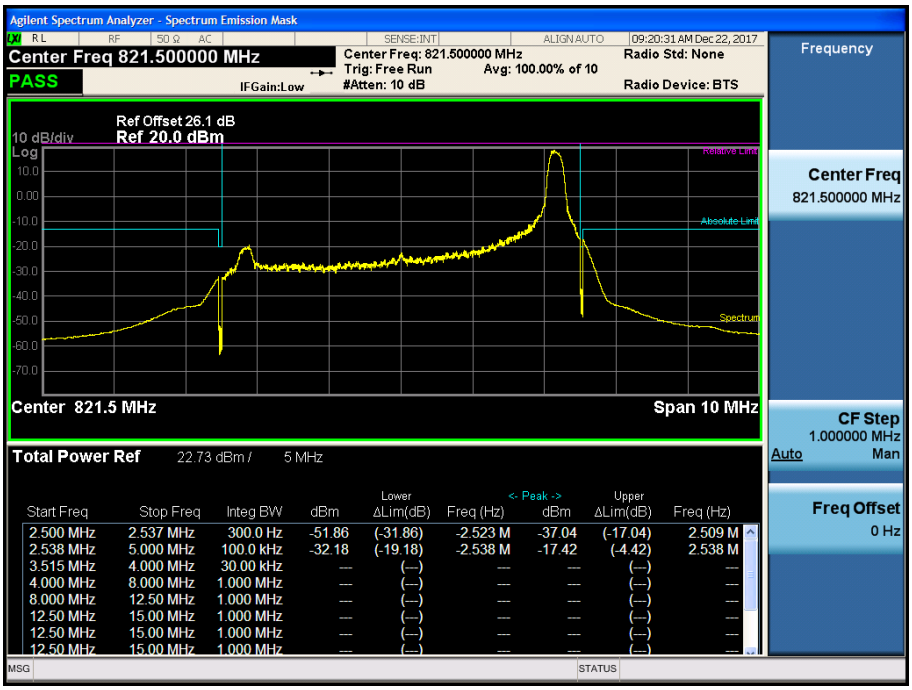
BAND 26. Upper Channel Edge Plot (3M BW Ch.26775 QPSK_RB1_Offset 0) -1



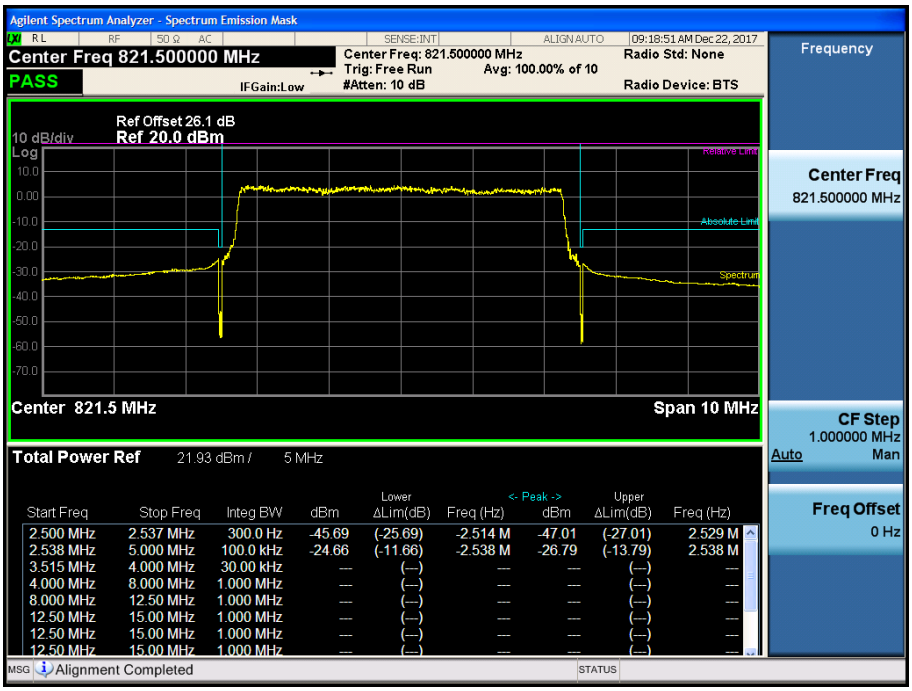
BAND 26. Upper Channel Edge Plot (3M BW Ch. 26775 QPSK_RB15_Offset 0) -2



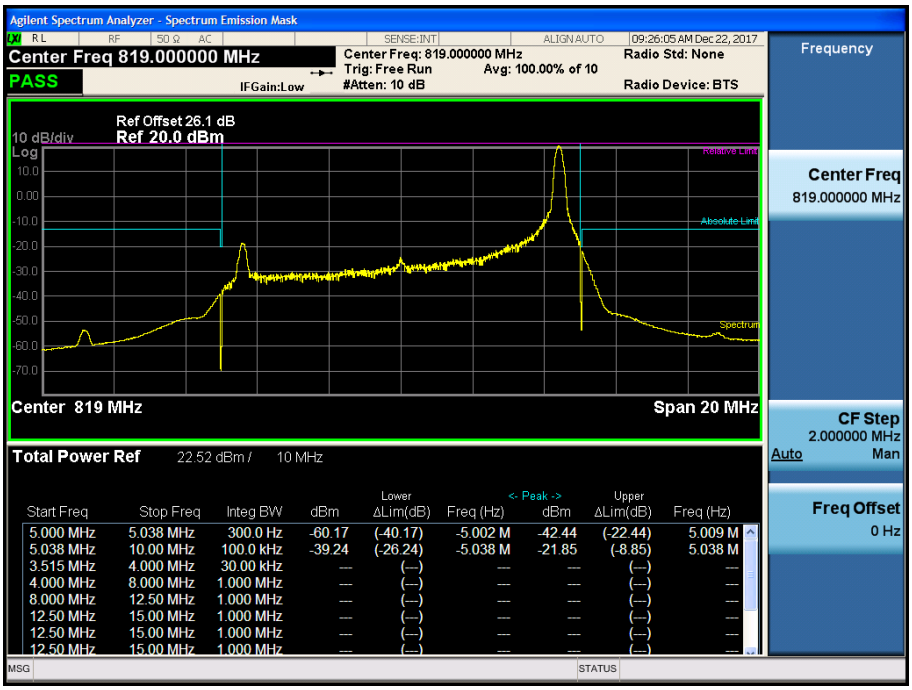
BAND 26. Upper Channel Edge Plot (5M BW Ch.26765 QPSK_RB1_Offset 0) -1



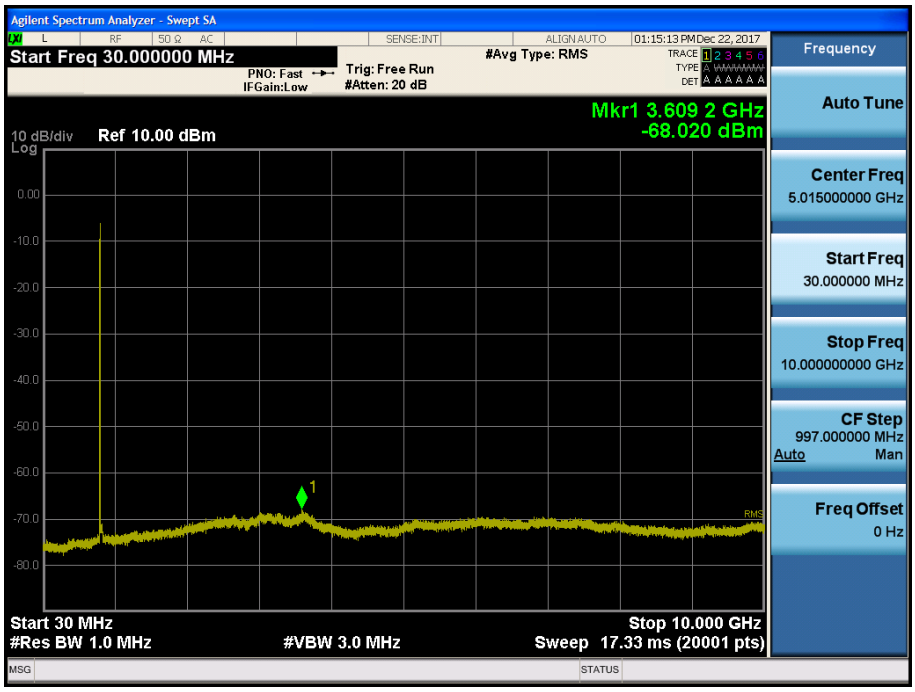
BAND 26. Upper Channel Edge Plot (5M BW Ch. 26765 QPSK_RB25_Offset 0) -2



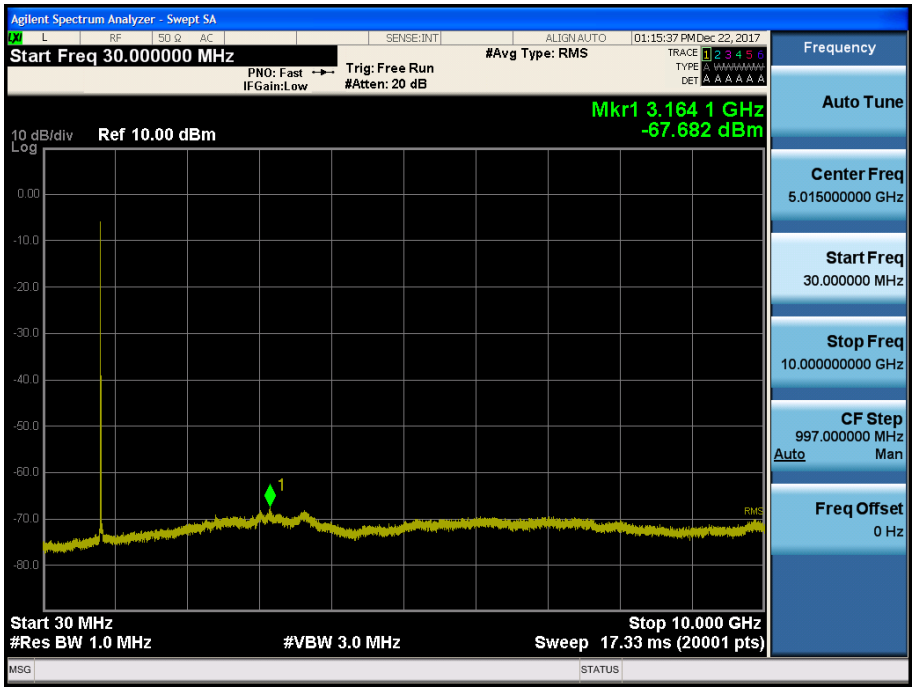
BAND 26. Upper Channel Edge Plot (10M BW Ch.26740 QPSK_RB1_Offset 0)



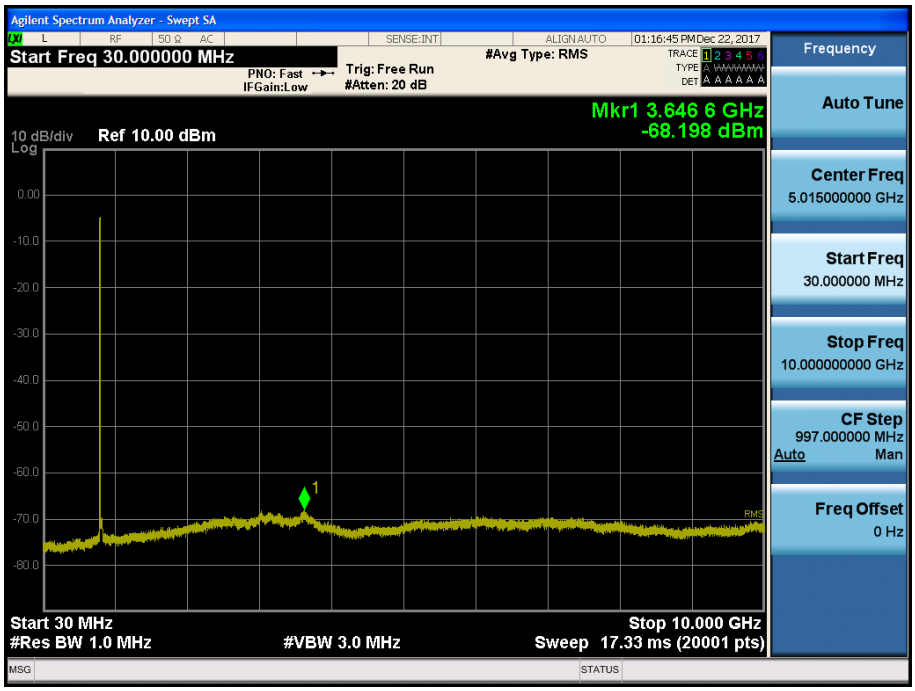
BAND 26. Conducted Spurious (26697 ch_1.4MHz_QPSK_RB 1_0)



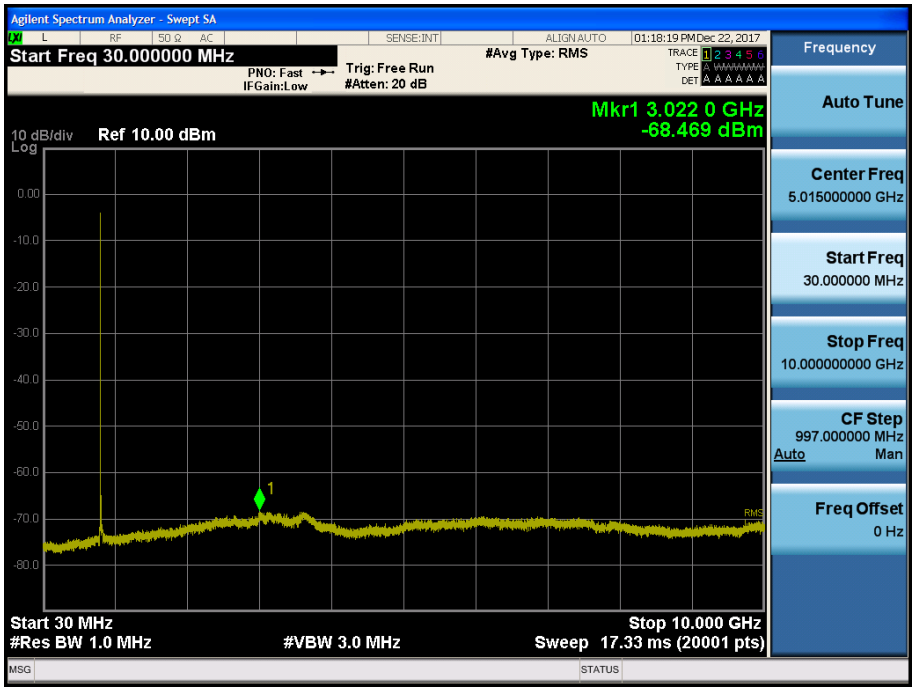
BAND 26. Conducted Spurious (26783 ch_1.4MHz_QPSK_RB 1_0)



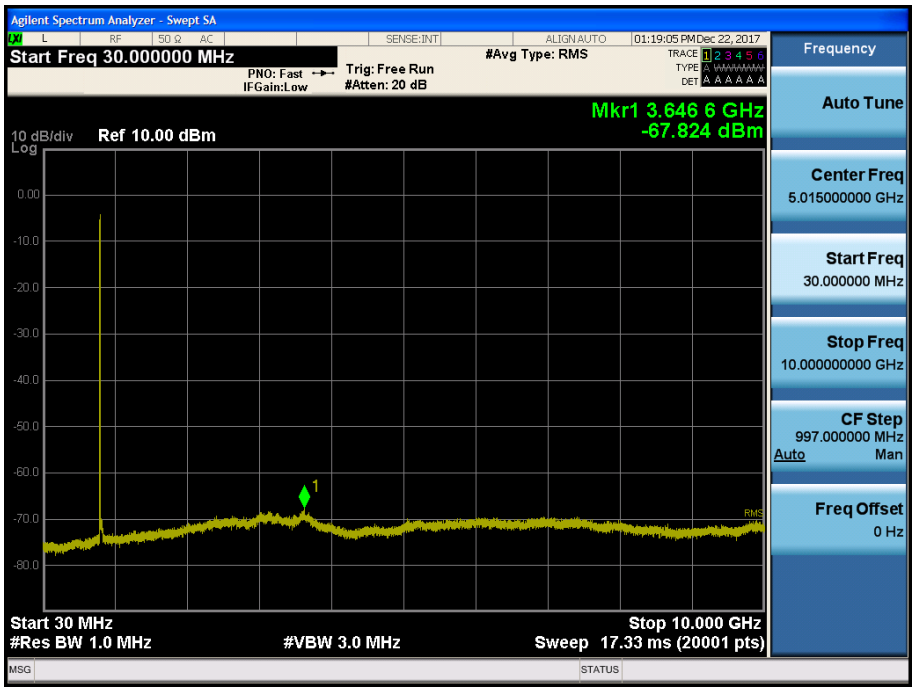
BAND 26. Conducted Spurious (26705 ch_3MHz_QPSK_RB 1_0)



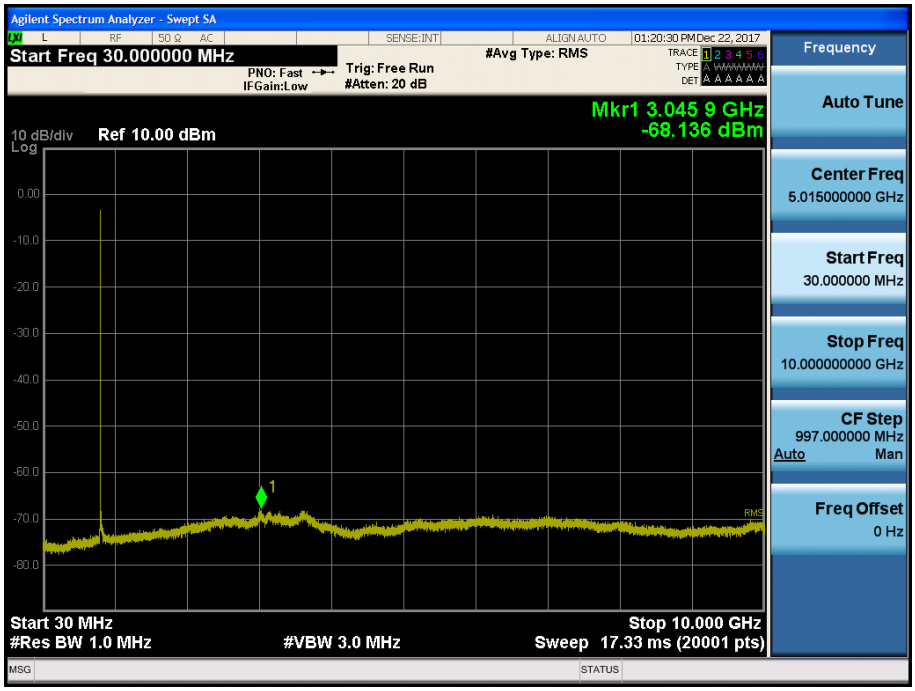
BAND 26. Conducted Spurious (26775 ch_3MHz_QPSK_RB 1_0)



BAND 26. Conducted Spurious (26715 ch_5MHz_QPSK_RB 1_0)



BAND 26. Conducted Spurious (26765 ch_5MHz_QPSK_RB 1_0)



BAND 26. Conducted Spurious (26740 ch_10MHz_QPSK_RB 1_0)