HCT CO.,LTD.
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FCC LTE REPORT

Certification

Applicant Name:
SAMSUNG Electronics Co., Ltd.

Address:
129, Samsung-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Rep. of Korea

Date of Issue:
October 31, 2019

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

Report No.: HCT-RF-1910-FC015

FCC ID:	**A3LSMG770F**
APPLICANT:	**SAMSUNG Electronics Co., Ltd.**

Model(s):	SM-G770F/DS
Additional Model(s):	SM-G770F/DSM, SM-G770F
EUT Type:	Mobile Phone
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part(s):	§90, §22, §2

Mode (MHz)	Tx Frequency (MHz)	Emission Designator	Modulation	Conducted Output Power	
				Max. Power (W)	Max. Power (dBm)
LTE – Band26 (1.4)	814.7 – 823.3	1M09G7D	QPSK	0.231	23.63
		1M09W7D	16QAM	0.191	22.81
		1M09W7D	64QAM	0.149	21.73
LTE – Band26 (3)	815.5 – 822.5	2M71G7D	QPSK	0.225	23.52
		2M70W7D	16QAM	0.190	22.78
		2M70W7D	64QAM	0.149	21.74
LTE – Band26 (5)	816.5 – 821.5	4M51G7D	QPSK	0.227	23.56
		4M50W7D	16QAM	0.191	22.81
		4M51W7D	64QAM	0.149	21.72
LTE – Band26 (10)	819.0	8M99G7D	QPSK	0.228	23.58
		8M98W7D	16QAM	0.191	22.82
		8M98W7D	64QAM	0.152	21.82
LTE – Band26 (15)	821.5	13M4G7D	QPSK	0.235	23.71
		13M5W7D	16QAM	0.194	22.87
		13M4W7D	64QAM	0.153	21.84

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-1910-FC015	October 31, 2019	- First Approval Report

The result shown in this test report refer only to the sample(s) tested unless otherwise stated.

This laboratory is not accredited for the test results marked *.
The above Test Report is the accredited test result by KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA.(HCT Accreditation No.: KT197)

Table of Contents

MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name:	SAMSUNG Electronics Co., Ltd.
Address:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
FCC ID:	A3LSMG770F
Application Type:	Certification
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part(s):	§90, §22, §2
EUT Type:	Mobile Phone
Model(s):	SM-G770F/DS
Additional Model(s):	SM-G770F/DSM, SM-G770F
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)) 821.5 MHz (LTE – Band 26 (15 MHz))
Date(s) of Tests:	September 09, 2019 ~ October 14, 2019

2. INTRODUCTION

2.1. DESCRIPTION OF EUT

The EUT was a Mobile Phone with GSM/GPRS/EGPRS/UMTS and LTE.

It also supports IEEE 802.11 a/b/g/n/ac (HT20/40/80), Bluetooth, NFC, ANT+.

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 v03r01 – Section 4.3 - ANSI C63.26-2015 – Section 5.4.4
Channel Edge	- KDB 971168 D01 v03r01 – Section 6.0 - ANSI C63.26-2015 – Section 5.7
Spurious and Harmonic Emissions at Antenna Terminal	- KDB 971168 D01 v03r01 – Section 6.0 - ANSI C63.26-2015 – Section 5.7
Conducted Output Power	- KDB 971168 D01 v03r01 - Section 5.2.4 - ANSI C63.26-2015 - Section 5.2.1 & 5.2.4.2
Frequency stability	- ANSI C63.26-2015 – Section 5.6
Effective Radiated Power/ Effective Isotropic Radiated Power	- KDB 971168 D01 v03r01 – Section 5.2 & 5.8 - ANSI/TIA-603-E-2016 – Section 2.2.17
Radiated Spurious and Harmonic Emissions	- KDB 971168 D01 v03r01 – Section 6.2 - ANSI/TIA-603-E-2016 – Section 2.2.12

3.2 CONDUCTED OUTPUT POWER

Test Overview

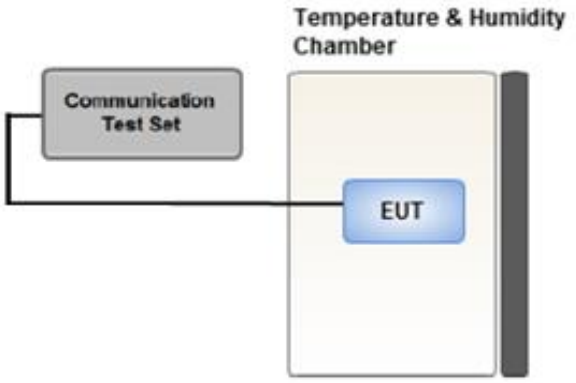
According to ANSI C63.26-2015 Section 5.2.1 when measuring the maximum RF output power from such devices, control over the EUT must be provided either through special test software (provided by manufacturer specifically for compliance testing, but not accessible by an end user) or through use of a base station emulator, communications test set, call box, or similar instrumentation that is capable of establishing a communications link with the EUT to enable control over variable parameters (e.g., output power, OBW, etc.).

In some cases, these instruments also include basic digital spectrum analyzer and/or power meter capabilities that can be utilized to measure the RF output power if the specified detectors and requirements can be realized and the measurement functions have been calibrated.

Test Procedure

1. The RF port of the EUT was connected to the Communication Tester via an RF cable.
2. Conducted average power was measured using a calibrated Radio Communication Tester.

Test setup



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. For spurious 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 spurious emissions is calculated by the following formula;

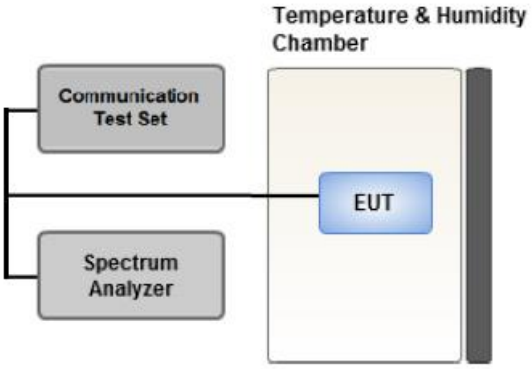
$$Result_{(dBm)} = Pg_{(dBm)} - \text{cable loss}_{(dB)} + \text{antenna gain}_{(dBi)}$$

   Where: $P_g$is the generator output power into the substitution antenna.

   If the fundalmatal frequency is below 1GHz, RF output power has been converted to EIRP.

$$EIRP_{(dBm)} = ERP_{(dBm)} + 2.15$$

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.

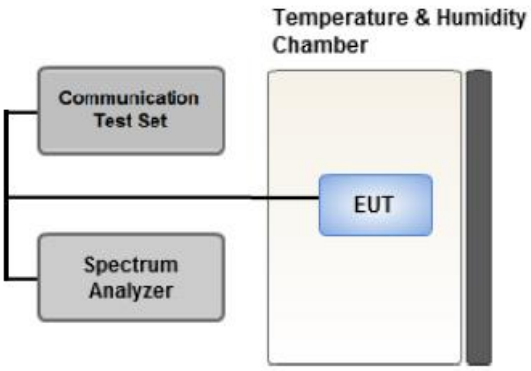
The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

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

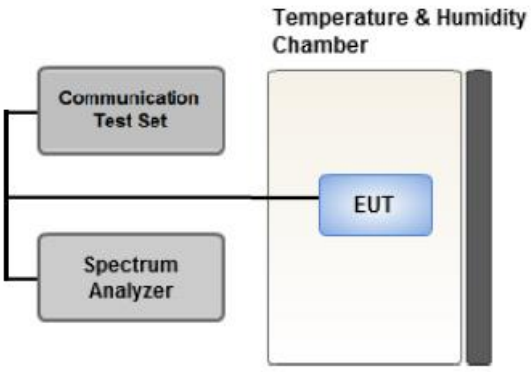
Test Overview

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 = RMS
4. Trace Mode = trace average
5. Sweep time = auto
6. Number of points in sweep ≥ 2 x Span / RBW

3.7 CHANNEL 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.

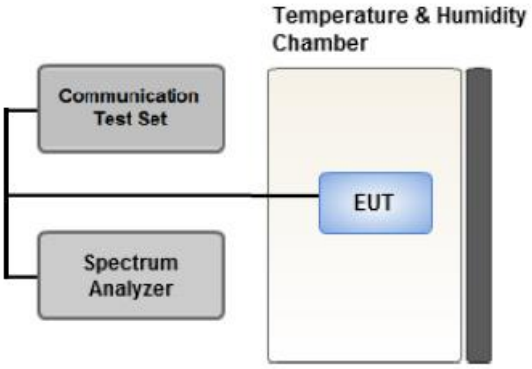
Test Settings

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.

3.9 WORST CASE(RADIATED TEST)

- This device uses a tuner circuit that dynamically updates the antenna impedance parameters to optimize antenna performance for certain bands and modes of operation.
  The tuner for this device was set to simulate a **"free space"** condition where the transmit antenna is matched to the medium into which it is transmitting and, thus, the power is at its maximum level.
- The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
- All modes of operation were investigated and the worst case configuration results are reported.
- The worst case is reported with the EUT positioning, modulations, and paging service configurations shown in the test data.
- All modes of operation were tested and the worst case results are reported.
- Please refer to the table below.
- SM-G770FDS & additional models were tested and the worst case results are reported.

(Worst case : SM-G770FDS)

[Worst case]

Test Description	Modulation	RB size	RB offset	Axis
Effective Radiated Power	QPSK, 16QAM, 64QAM	1	0	X
Radiated Spurious and Harmonic Emissions	QPSK	1	0	Y

3.10 WORST CASE(CONDUCTED TEST)

- Worst case : Of all modulation, We have tested modulation of the high Conducted Output Power.
- SM-G770FDS & additional models were tested and the worst case results are reported.

(Worst case : SM-G770FDS)

[Worst case]

Test Description	Modulation	Bandwidth (MHz)	Frequency	RB size	RB offset
Occupied Bandwidth	QPSK, 16QAM, 64QAM	1.4, 3, 5	High	Full RB	0
	QPSK, 16QAM, 64QAM	10, 15	Mid	Full RB	0
Channel Edge	QPSK	1.4	Low	1	0
			High	1	5
		3	Low	1	0
			High	1	14
		5	Low	1	0
			High	1	24
		10	Mid	1	0
				1	49
		15	Mid	1	0
				1	74
		1.4, 3, 5	Low, High	Full RB	0
		10, 15	Mid	Full RB	0
Band Edge (Staddle Channel)	QPSK	1.4	Mid	1	5
		3	Mid	1	14
		5	Mid	1	24
		10	Mid	1	49
		15	Mid	1	74
		1.4, 3, 5 10,15	Mid	Full RB	0
Spurious and Harmonic Emissions at Antenna Terminal	QPSK	1.4, 3, 5	Low, High	1	0
		10, 15	Mid	1	0

4. LIST OF TEST EQUIPMENT

Manufacture	Model/ Equipment	Serial Number	Calibration Date	Calibration Interval	Calibration Due
T&M SYSTEM	FBSR-02B(WHK1.2/15G-10EF)/H.P.F	-	06/10/2019	Annual	06/10/2020
T&M SYSTEM	FBSR-02B(WHK3.3/18G-10EF)/H.P.F	-	06/10/2019	Annual	06/10/2020
Hewlett Packard	11667B / Power Splitter(DC~26.5 GHz)	11275	05/03/2019	Annual	05/03/2020
Agilent	E3632A/DC Power Supply	MY40004326	07/01/2019	Annual	07/01/2020
Schwarzbeck	UHAP/ Dipole Antenna	557	03/29/2019	Biennial	03/29/2021
Schwarzbeck	UHAP/ Dipole Antenna	558	03/29/2019	Biennial	03/29/2021
ESPEC	SU-642 / Chamber	93000717	08/14/2019	Annual	08/14/2020
Schwarzbeck	BBHA 9120D/ Horn Antenna(1~18GHz)	147	08/29/2019	Biennial	08/29/2021
Schwarzbeck	BBHA 9120D/ Horn Antenna(1~18GHz)	9120D-1298	09/25/2019	Biennial	09/25/2021
Schwarzbeck	BBHA 9170/ Horn Antenna(15~40GHz)	BBHA9170342	04/29/2019	Biennial	04/29/2021
Schwarzbeck	BBHA 9170/ Horn Antenna(15~40GHz)	BBHA9170124	01/28/2019	Biennial	01/28/2021
Agilent	N9020A/Signal Analyzer(10Hz~26.5GHz)	MY51110063	05/08/2019	Annual	05/08/2020
Hewlett Packard	8493C/ATTENUATOR(20dB)	17280	06/04/2019	Annual	06/04/2020
REOHDE & SCHWARZ	FSV40/Spectrum Analyzer(10Hz~40GHz)	100931	10/14/2019	Annual	10/14/2020
Agilent	8960 (E5515C)/ Base Station	MY48360800	08/27/2019	Annual	08/27/2020
Schwarzbeck	FMZB1513/ Loop Antenna(9kHz~30MHz)	1513-175	08/23/2018	Biennial	08/23/2020
Schwarzbeck	VULB9160/ Bilog Antenna	9160-3368	08/09/2018	Biennial	08/09/2020
Schwarzbeck	VULB9160/ Hybrid Antenna	760	03/22/2019	Biennial	03/22/2021
Anritsu Corp.	MT8821C/Wideband Radio Communication Tester	6201502997	08/09/2019	Annual	08/09/2020
Anritsu Corp.	MT8820C/Wideband Radio Communication Tester	6201026545	01/30/2019	Annual	01/30/2020
REOHDE & SCHWARZ	SMB100A/ SIGNAL GENERATOR (100kHz~40GHz)	177633	07/15/2019	Annual	07/15/2020
REOHDE & SCHWARZ	ESU40 / EMI TEST RECEIVER	100524	05/17/2019	Annual	05/17/2020
HCT CO., LTD.,	FCC LTE Mobile Conducted RF Automation Test Software	-	-	-	-

Note:

1. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.
2. Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).

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)	5.70
Radiated Disturbance (18 GHz ~ 40 GHz)	5.05

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
Channel 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
Band Edge / Spurious and Harmonic Emissions at Antenna Terminal.	§2.1051, §22.917(a)	< 43 + 10log10 (P[Watts]) at Band Edge and for all out-of-band emissions	PASS
Conducted Output Power	§2.1046 §90.635	< 100 Watts	PASS
Frequency stability / variation of ambient temperature	§2.1055, §90.213 §22.355	< 2.5 ppm	PASS

Note:

1. The same samples were used for SAR and EMC

6.2 Test Condition : Radiated Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Effective Radiated Power	§22.913(a)(5)	< 7 Watts max. ERP	PASS
Radiated Spurious and Harmonic Emissions	§2.1053, §90.691 §22.917(a)	< 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
128	824.20	-21.37	38.40	-10.61	0.95	H	0.483	26.84

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

64QAM 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 Width	Modulation	RB Size	RB Offset	Max. output power(dBm)				Limit (W)
				814.7MHz		823.3MHz		
				dBm	W	dBm	W	
1.4	QPSK	1	0	23.42	0.220	23.34	0.216	100
		1	3	23.63	0.231	23.43	0.220	100
		1	5	23.45	0.221	23.37	0.217	100
		3	0	23.53	0.225	23.34	0.216	100
		3	1	23.58	0.228	23.46	0.222	100
		3	3	23.48	0.223	23.41	0.219	100
		6	0	22.65	0.184	22.47	0.176	100
	16QAM	1	0	22.61	0.182	22.44	0.176	100
		1	3	22.81	0.191	22.63	0.183	100
		1	5	22.71	0.187	22.67	0.185	100
		3	0	22.55	0.180	22.52	0.179	100
		3	1	22.56	0.180	22.36	0.172	100
		3	3	22.50	0.178	22.30	0.170	100
		6	0	21.68	0.147	21.67	0.147	100
	64QAM	1	0	21.64	0.146	21.51	0.142	100
		1	3	21.73	0.149	21.54	0.143	100
		1	5	21.68	0.147	21.62	0.145	100
		3	0	21.62	0.145	21.53	0.142	100
		3	1	21.71	0.148	21.67	0.147	100
		3	3	21.64	0.146	21.57	0.144	100
		6	0	20.60	0.115	20.58	0.114	100

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm)				Limit (W)
				815.5MHz		822.5MHz		
				dBm	W	dBm	W	
3	QPSK	1	0	23.48	0.223	23.34	0.216	100
		1	7	23.50	0.224	23.40	0.219	100
		1	14	23.52	0.225	23.46	0.222	100
		8	0	22.61	0.182	22.56	0.180	100
		8	3	22.68	0.185	22.54	0.180	100
		8	7	22.61	0.182	22.58	0.181	100
		15	0	22.70	0.186	22.65	0.184	100
	16QAM	1	0	22.60	0.182	22.41	0.174	100
		1	7	22.78	0.190	22.68	0.185	100
		1	14	22.72	0.187	22.67	0.185	100
		8	0	21.61	0.145	21.52	0.142	100
		8	3	21.69	0.148	21.53	0.142	100
		8	7	21.63	0.146	21.57	0.144	100
		15	0	21.62	0.145	21.45	0.140	100
	64QAM	1	0	21.68	0.147	21.57	0.144	100
		1	7	21.74	0.149	21.62	0.145	100
		1	14	21.70	0.148	21.59	0.144	100
		8	0	20.63	0.116	20.46	0.111	100
		8	3	20.68	0.117	20.55	0.113	100
		8	7	20.63	0.116	20.59	0.114	100
		15	0	20.68	0.117	20.55	0.114	100

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm)				Limit (W)
				816.5MHz		821.5MHz		
				dBm	W	dBm	W	
5	QPSK	1	0	23.42	0.220	23.24	0.211	100
		1	12	23.56	0.227	23.50	0.224	100
		1	24	23.50	0.224	23.45	0.221	100
		12	0	22.62	0.183	22.54	0.179	100
		12	6	22.67	0.185	22.67	0.185	100
		12	11	22.64	0.184	22.61	0.182	100
		25	0	22.72	0.187	22.60	0.182	100
	16QAM	1	0	22.71	0.187	22.67	0.185	100
		1	12	22.81	0.191	22.79	0.190	100
		1	24	22.76	0.189	22.60	0.182	100
		12	0	21.59	0.144	21.41	0.138	100
		12	6	21.66	0.147	21.53	0.142	100
		12	11	21.62	0.145	21.49	0.141	100
		25	0	21.68	0.147	21.53	0.142	100
	64QAM	1	0	21.63	0.146	21.47	0.140	100
		1	12	21.72	0.149	21.53	0.142	100
		1	24	21.70	0.148	21.70	0.148	100
		12	0	20.62	0.115	20.60	0.115	100
		12	6	20.70	0.117	20.58	0.114	100
		12	11	20.67	0.117	20.49	0.112	100
		25	0	20.63	0.116	20.61	0.115	100

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm)		Limit (W)
				819MHz		
				dBm	W	
10	QPSK	1	0	23.58	0.228	100
		1	24	23.49	0.223	100
		1	49	23.45	0.221	100
		25	0	22.70	0.186	100
		25	12	22.66	0.185	100
		25	24	22.64	0.184	100
		50	0	22.67	0.185	100
	16QAM	1	0	22.82	0.191	100
		1	24	22.77	0.189	100
		1	49	22.61	0.182	100
		25	0	21.65	0.146	100
		25	12	21.65	0.146	100
		25	24	21.61	0.145	100
		50	0	21.67	0.147	100
	64QAM	1	0	21.82	0.152	100
		1	24	21.63	0.146	100
		1	49	21.71	0.148	100
		25	0	20.65	0.116	100
		25	12	20.66	0.116	100
		25	24	20.64	0.116	100
		50	0	20.67	0.117	100

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm)		Limit (W)
				821.5MHz		
				dBm	W	
15	QPSK	1	0	23.71	0.235	100
		1	36	23.56	0.227	100
		1	74	23.45	0.221	100
		36	0	22.70	0.186	100
		36	18	22.79	0.190	100
		36	39	22.65	0.184	100
		75	0	22.71	0.187	100
	16QAM	1	0	22.87	0.194	100
		1	36	22.84	0.192	100
		1	74	22.73	0.187	100
		36	0	21.67	0.147	100
		36	18	21.70	0.148	100
		36	39	21.64	0.146	100
		75	0	21.66	0.147	100
	64QAM	1	0	21.84	0.153	100
		1	36	21.81	0.152	100
		1	74	21.63	0.146	100
		36	0	20.76	0.119	100
		36	18	20.74	0.119	100
		36	39	20.68	0.117	100
		75	0	20.71	0.118	100

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	-34.81	28.74	-10.29	1.27	H	< 100	0.052	17.18
		16QAM	-35.69	27.86	-10.29	1.27	H		0.043	16.30
		64QAM	-36.69	26.86	-10.29	1.27	H		0.034	15.30
823.3		QPSK	-34.60	29.01	-10.25	1.28	H		0.056	17.48
		16QAM	-35.40	28.21	-10.25	1.28	H		0.047	16.68
		64QAM	-36.70	26.91	-10.25	1.28	H		0.034	15.38

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	-34.76	28.79	-10.29	1.27	H	< 100	0.053	17.23
		16QAM	-35.66	27.89	-10.29	1.27	H		0.043	16.33
		64QAM	-36.66	26.89	-10.29	1.27	H		0.034	15.33
822.5		QPSK	-34.49	29.08	-10.26	1.28	H		0.057	17.54
		16QAM	-35.30	28.27	-10.26	1.28	H		0.047	16.73
		64QAM	-36.73	26.84	-10.26	1.28	H		0.034	15.30

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	-34.71	28.86	-10.28	1.27	H	< 100	0.054	17.31
		16QAM	-35.65	27.92	-10.28	1.27	H		0.043	16.37
		64QAM	-36.62	26.95	-10.28	1.27	H		0.035	15.40
821.5		QPSK	-34.51	29.02	-10.26	1.28	H		0.056	17.48
		16QAM	-35.32	28.21	-10.26	1.28	H		0.046	16.67
		64QAM	-36.32	27.21	-10.26	1.28	H		0.037	15.67

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	-34.63	28.90	-10.27	1.27	H	< 100	0.054	17.36
		16QAM	-35.53	28.00	-10.27	1.27	H		0.044	16.46
		64QAM	-36.55	26.98	-10.27	1.27	H		0.035	15.44

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBd)	C.L	Pol	Limit	ERP	
								W	W	dBm
821.5	LTE B26/ 15 MHz	QPSK	-34.62	28.91	-10.26	1.28	H	< 7.00	0.055	17.37
		16QAM	-35.50	28.03	-10.26	1.28	H		0.045	16.49
		64QAM	-36.47	27.06	-10.26	1.28	H		0.036	15.52

Note

1. Limit: None (for reporting purposes only.

8.3 RADIATED SPURIOUS EMISSIONS

▣ OPERATING FREQUENTY: 823.3 MHz

▣ MEASURED OUTPUT POWER: 19.63 dBm = 0.092 W

▣ MODE: LTE B26

▣ MODULATION SIGNAL: 1.4 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 log10 (W) = 32.63 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	dBc
26697 (814.7)	1,629.40	-53.26	9.40	-63.85	1.82	V	-56.27	75.90
	2,444.10	-52.90	10.47	-57.70	2.27	V	-49.51	69.13
	3,258.80	-57.69	12.00	-59.20	2.66	H	-49.86	69.49
26783 (823.3)	1,646.60	-53.40	9.48	-64.10	1.83	H	-56.45	76.08
	2,469.90	-53.57	10.60	-58.61	2.28	H	-50.29	69.92
	3,293.20	-56.37	12.20	-58.08	2.69	H	-48.57	68.20

▣ OPERATING FREQUENTY: 822.5 MHz

▣ MEASURED OUTPUT POWER: 19.69 dBm = 0.093 W

▣ MODE: LTE B26

▣ MODULATION SIGNAL: 3 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 log10 (W) = 32.69 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	dBc
26705 (815.5)	1,631.00	-52.36	9.40	-62.95	1.82	H	-55.37	75.07
	2,446.50	-52.84	10.47	-57.64	2.27	V	-49.45	69.14
	3,262.00	-57.27	12.00	-58.78	2.66	H	-49.44	69.14
26775 (822.5)	1,645.00	-53.04	9.48	-63.74	1.83	H	-56.09	75.79
	2,467.50	-52.93	10.60	-57.97	2.28	H	-49.65	69.34
	3,290.00	-57.98	12.20	-59.69	2.69	H	-50.18	69.87

▣ OPERATING FREQUENTY: 821.50 MHz

▣ MEASURED OUTPUT POWER: 19.63 dBm = 0.092 W

▣ MODE: LTE B26

▣ MODULATION SIGNAL: 5 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 log10 (W) = 32.63 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	dBc
26715 (816.5)	1,633.00	-53.36	9.40	-63.95	1.82	V	-56.37	76.00
	2,449.50	-53.88	10.53	-58.84	2.27	H	-50.58	70.21
	3,266.00	-57.47	12.05	-58.94	2.67	H	-49.55	69.19
26765 (821.5)	1,643.00	-53.34	9.45	-63.96	1.83	V	-56.34	75.97
	2,464.50	-52.90	10.58	-57.78	2.28	H	-49.48	69.11
	3,286.00	-55.48	12.15	-57.28	2.69	H	-47.82	67.45

▣ OPERATING FREQUENTY: 819.00 MHz

▣ MEASURED OUTPUT POWER: 19.51 dBm = 0.089 W

▣ MODE: LTE B26

▣ MODULATION SIGNAL: 10 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 log10 (W) = 32.51 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	dBc
26740 (819.0)	1638.00	-53.28	9.45	-63.90	1.83	H	-56.28	75.79
	2457.00	-53.42	10.55	-58.13	2.27	H	-49.85	69.37
	3276.00	-54.81	12.10	-56.47	2.68	H	-47.05	66.56

▣ OPERATING FREQUENTY: 821.50 MHz

▣ MEASURED OUTPUT POWER: 19.52 dBm = 0.090 W

▣ MODE: LTE B26

▣ MODULATION SIGNAL: 15 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 log10 (W) = 32.52 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	dBc
26765 (821.5)	1643.00	-53.36	9.45	-63.98	1.83	H	-56.36	75.88
	2464.50	-54.60	10.58	-59.48	2.28	H	-51.18	70.70
	3286.00	-57.75	12.15	-59.55	2.69	H	-50.09	69.61

8.4 OCCUPIED BANDWIDTH

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (MHz)
Band 26	1.4 MHz	823.3	QPSK	6	0	1.0901
			16QAM			1.0921
			64QAM			1.0911
	3 MHz	822.5	QPSK	15		2.7099
			16QAM			2.6946
			64QAM			2.7036
	5 MHz	821.5	QPSK	25		4.5095
			16QAM			4.4963
			64QAM			4.5089
	10 MHz	819.0	QPSK	50		8.9919
			16QAM			8.9764
			64QAM			8.9824
	15 MHz	821.5	QPSK	75		13.440
			16QAM			13.451
			64QAM			13.432

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 45 ~ 59.

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	3.6880	27.976	-67.445	-39.469	-13.00
		823.3	3.7249	27.976	-67.353	-39.377	
	3	815.5	3.6955	27.976	-67.408	-39.432	
		822.5	3.7099	27.976	-67.059	-39.083	
	5	816.5	3.7089	27.976	-67.347	-39.371	
		821.5	3.7204	27.976	-67.460	-39.484	
	10	819.0	3.7015	27.976	-67.153	-39.177	
	15	821.5	3.6995	27.976	-67.210	-39.234	

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 80 ~ 87.
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 CHANNEL EDGE

- Plots of the EUT's Band Edge are shown Page 60 ~ 79.

8.7 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

▣ MODE: LTE 26

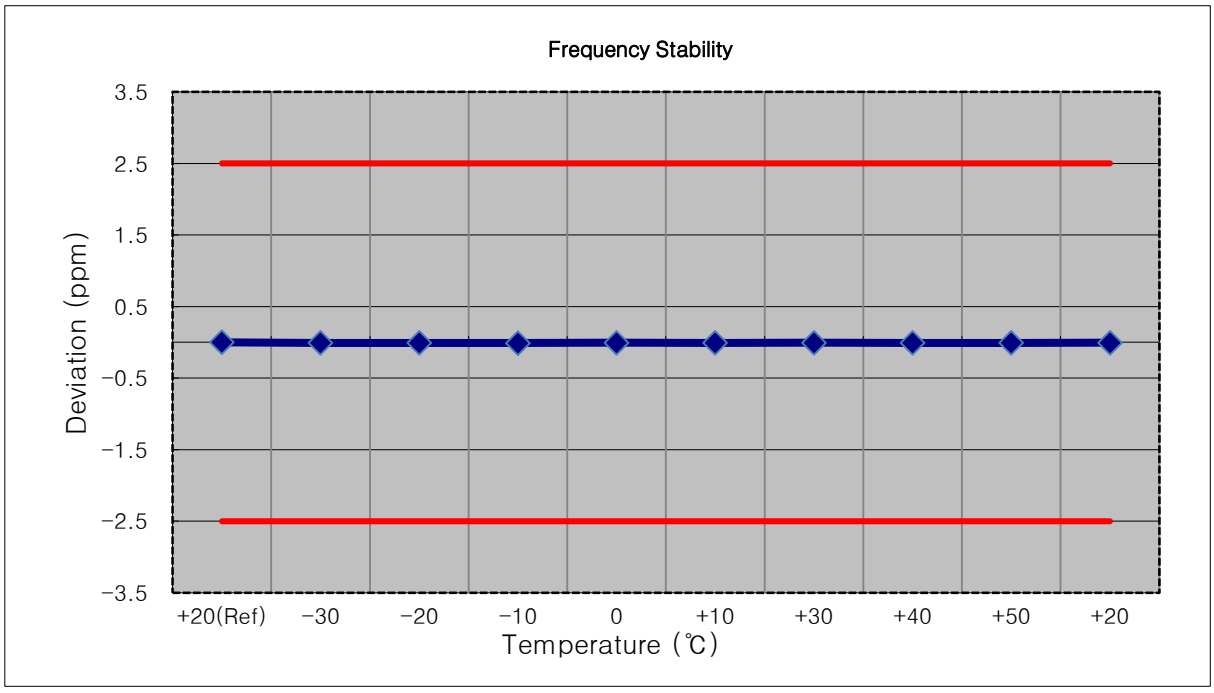
▣ OPERATING FREQUENCY: 814,700,000 Hz

▣ CHANNEL: 26697(1.4 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	814 699 992	0.0	0.000 000	0.000
100%		-30	814 699 985	-7.2	-0.000 001	-0.009
100%		-20	814 699 985	-7.0	-0.000 001	-0.009
100%		-10	814 699 984	-8.1	-0.000 001	-0.010
100%		0	814 699 987	-5.1	-0.000 001	-0.006
100%		+10	814 699 986	-5.7	-0.000 001	-0.007
100%		+30	814 699 986	-5.4	-0.000 001	-0.007
100%		+40	814 699 985	-6.9	-0.000 001	-0.008
100%		+50	814 699 985	-6.6	-0.000 001	-0.008
Batt. Endpoint	3.400	+20	814 699 988	-3.8	0.000 000	-0.005



▣ MODE: LTE 26

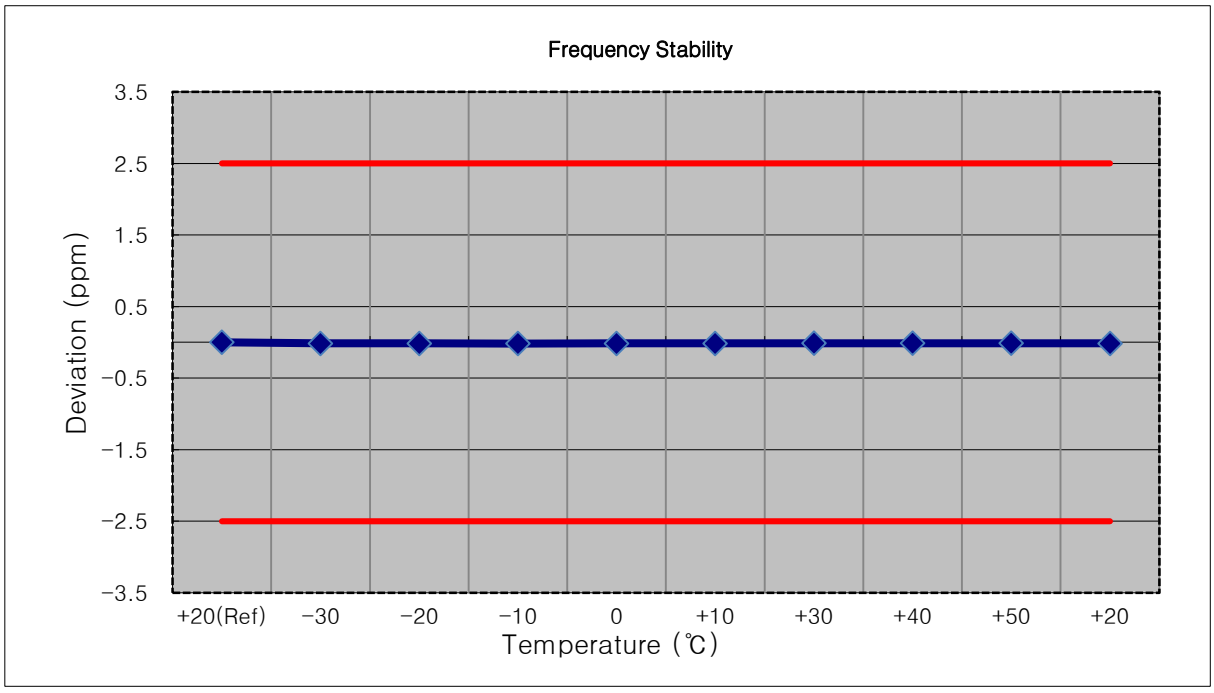
▣ OPERATING FREQUENCY: 815,500,000 Hz

▣ CHANNEL: 26705(3 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	815 499 990	0.0	0.000 000	0.000
100%		-30	815 499 979	-11.2	-0.000 001	-0.014
100%		-20	815 499 978	-12.7	-0.000 002	-0.016
100%		-10	815 499 976	-14.1	-0.000 002	-0.017
100%		0	815 499 978	-12.5	-0.000 002	-0.015
100%		+10	815 499 979	-11.1	-0.000 001	-0.014
100%		+30	815 499 979	-10.8	-0.000 001	-0.013
100%		+40	815 499 980	-10.1	-0.000 001	-0.012
100%		+50	815 499 979	-11.0	-0.000 001	-0.013
Batt. Endpoint	3.400	+20	815 499 978	-11.9	-0.000 001	-0.015



▣ MODE: LTE 26

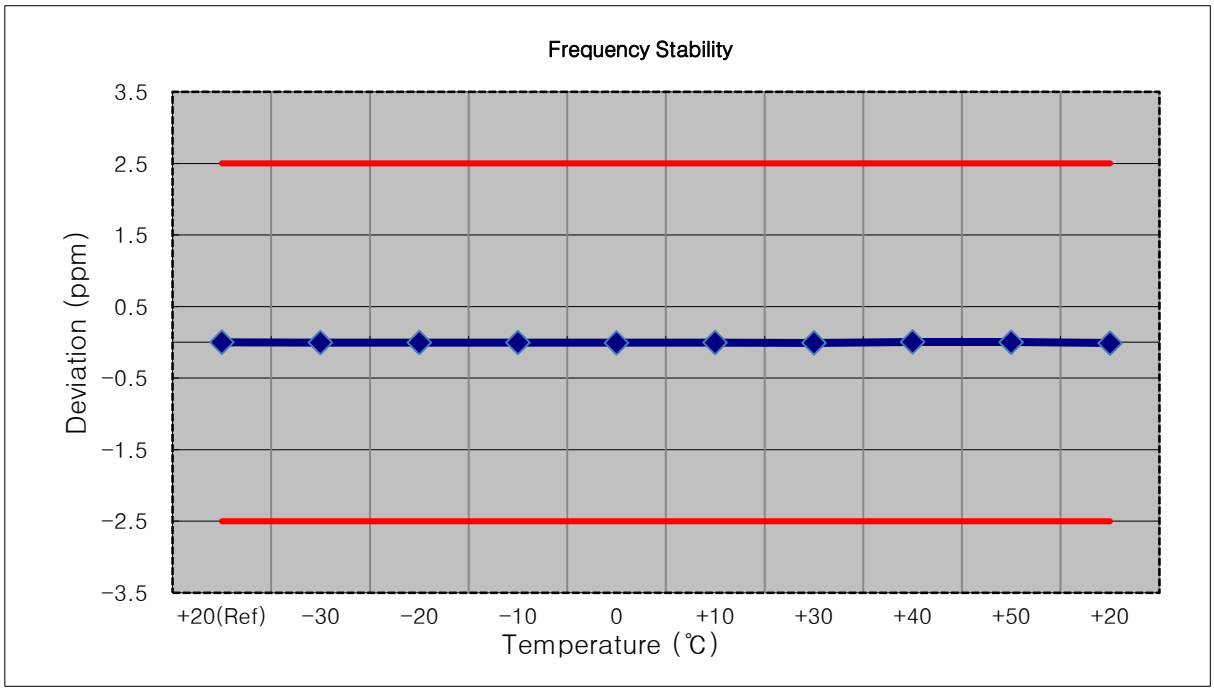
▣ OPERATING FREQUENCY: 816.500,000 Hz

▣ CHANNEL: 26715(5MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	816 499 993	0.0	0.000 000	0.000
100%		-30	816 499 991	-2.1	0.000 000	-0.003
100%		-20	816 499 991	-2.0	0.000 000	-0.002
100%		-10	816 499 990	-3.6	0.000 000	-0.004
100%		0	816 499 990	-3.7	0.000 000	-0.005
100%		+10	816 499 990	-3.4	0.000 000	-0.004
100%		+30	816 499 987	-5.9	-0.000 001	-0.007
100%		+40	816 499 997	3.9	0.000 000	0.005
100%		+50	816 499 997	3.6	0.000 000	0.004
Batt. Endpoint	3.400	+20	816 499 985	-8.0	-0.000 001	-0.010



▣ MODE: LTE 26

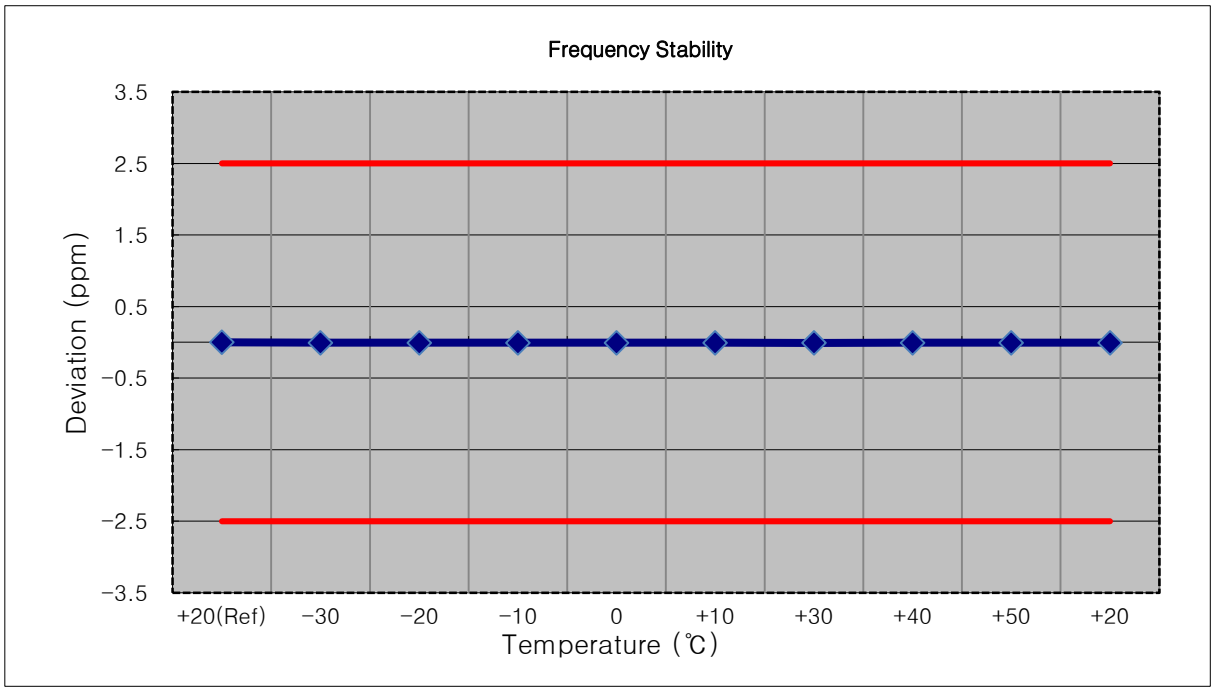
▣ OPERATING FREQUENCY: 819,000,000 Hz

▣ CHANNEL: 26740(10 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	818 999 996	0.0	0.000 000	0.000
100%		-30	818 999 992	-3.8	0.000 000	-0.005
100%		-20	818 999 991	-4.9	-0.000 001	-0.006
100%		-10	818 999 990	-5.5	-0.000 001	-0.007
100%		0	818 999 991	-4.6	-0.000 001	-0.006
100%		+10	818 999 991	-4.7	-0.000 001	-0.006
100%		+30	818 999 990	-6.0	-0.000 001	-0.007
100%		+40	818 999 991	-4.7	-0.000 001	-0.006
100%		+50	818 999 990	-5.3	-0.000 001	-0.006
Batt. Endpoint	3.400	+20	818 999 991	-4.4	-0.000 001	-0.005



▣ MODE: LTE 26

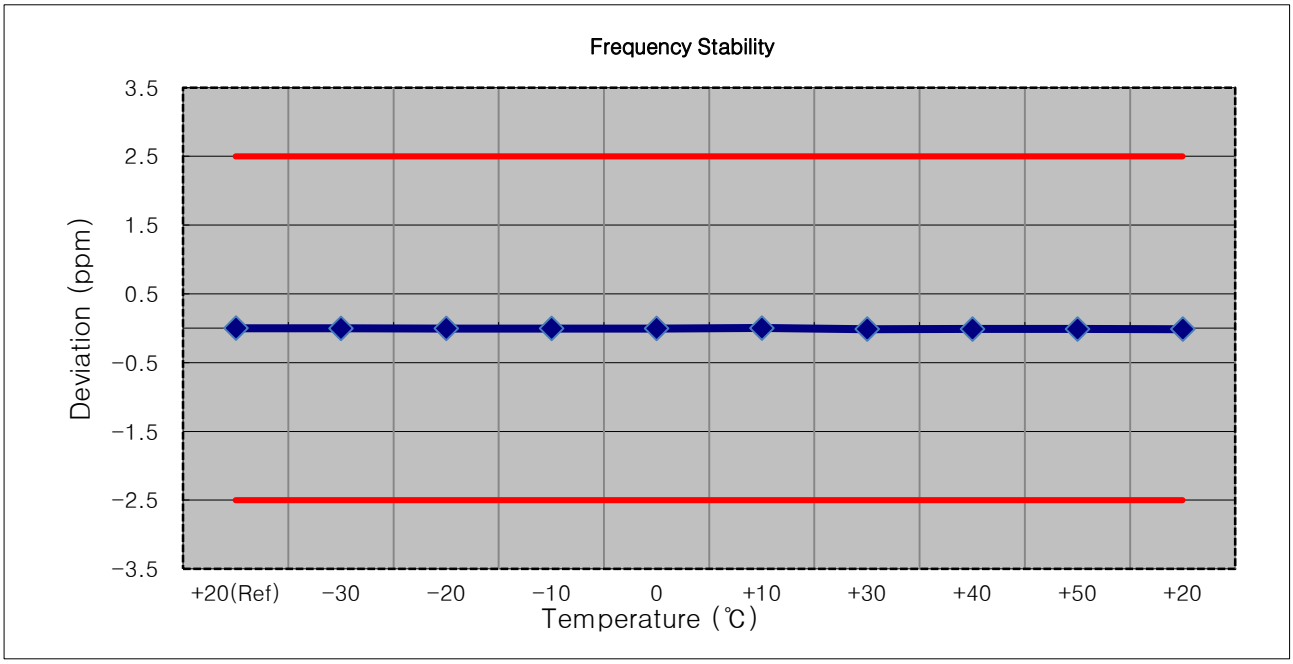
▣ OPERATING FREQUENCY: 821,500,000 Hz

▣ CHANNEL: 26765(15 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	821 499 998	0.0	0.000 000	0.000
100%		-30	821 499 997	-1.5	0.000 000	-0.002
100%		-20	821 499 996	-2.2	0.000 000	-0.003
100%		-10	821 499 996	-2.7	0.000 000	-0.003
100%		0	821 499 996	-2.5	0.000 000	-0.003
100%		+10	821 500 001	2.5	0.000 000	0.003
100%		+30	821 499 988	-9.9	-0.000 001	-0.012
100%		+40	821 499 989	-9.0	-0.000 001	-0.011
100%		+50	821 499 990	-8.0	-0.000 001	-0.010
Batt. Endpoint	3.400	+20	821 499 988	-10.2	-0.000 001	-0.012



8.8 STADDLE CHANNEL

8.8.1 EFFECTIVE RADIATED POWER

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBd)	C.L	Pol	Limit	ERP	
								W	W	dBm
824.0	LTE B26/ 1.4 MHz	QPSK	-34.55	29.06	-10.25	1.28	H	< 7.00	0.057	17.53
		16QAM	-35.37	28.24	-10.25	1.28	H		0.047	16.71
		64QAM	-36.55	27.06	-10.25	1.28	H		0.036	15.53

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBd)	C.L	Pol	Limit	ERP	
								W	W	dBm
824.0	LTE B26/ 3 MHz	QPSK	-34.51	29.10	-10.25	1.28	H	< 7.00	0.057	17.57
		16QAM	-35.33	28.28	-10.25	1.28	H		0.047	16.75
		64QAM	-36.65	26.96	-10.25	1.28	H		0.035	15.43

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBd)	C.L	Pol	Limit	ERP	
								W	W	dBm
824.0	LTE B26/ 5 MHz	QPSK	-34.50	29.11	-10.25	1.28	H	< 7.00	0.057	17.58
		16QAM	-35.29	28.32	-10.25	1.28	H		0.048	16.79
		64QAM	-36.71	26.90	-10.25	1.28	H		0.034	15.37

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBd)	C.L	Pol	Limit	ERP	
								W	W	dBm
824.0	LTE B26/ 10 MHz	QPSK	-34.42	29.19	-10.25	1.28	H	< 7.00	0.058	17.66
		16QAM	-35.21	28.40	-10.25	1.28	H		0.049	16.87
		64QAM	-36.25	27.36	-10.25	1.28	H		0.038	15.83

8.8.2 RADIATED SPURIOUS EMISSIONS

▣ OPERATING FREQUENTY: 824.00 MHz

▣ MEASURED OUTPUT POWER: 19.68 dBm = 0.093 W

▣ MODE: LTE B26

▣ MODULATION SIGNAL: 1.4 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 log10 (W) = 32.68 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	dBc
26790 (824.0)	1,648.00	-53.11	9.50	-63.87	1.84	H	-56.21	75.90
	2,472.00	-54.34	10.60	-59.38	2.28	V	-51.06	70.74
	3,296.00	-56.16	12.25	-57.98	2.69	H	-48.42	68.11

▣ OPERATING FREQUENTY: 824.00 MHz

▣ MEASURED OUTPUT POWER: 19.72 dBm = 0.094 W

▣ MODE: LTE B26

▣ MODULATION SIGNAL: 3 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 log10 (W) = 32.72 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	dBc
26790 (824.0)	1,648.00	-50.82	9.50	-61.58	1.84	V	-53.92	73.65
	2,472.00	-53.51	10.60	-58.55	2.28	V	-50.23	69.95
	3,296.00	-55.44	12.25	-57.26	2.69	H	-47.70	67.43

▣ OPERATING FREQUENTY: 824.00 MHz

▣ MEASURED OUTPUT POWER: 19.73 dBm = 0.094 W

▣ MODE: LTE B26

▣ MODULATION SIGNAL: 5 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 log10 (W) = 32.73 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	dBc
26790 (824.0)	1,648.00	-53.69	9.50	-64.45	1.84	H	-56.79	76.53
	2,472.00	-53.24	10.60	-58.28	2.28	H	-49.96	69.69
	3,296.00	-56.11	12.25	-57.93	2.69	H	-48.37	68.11

▣ OPERATING FREQUENTY: 824.00 MHz

▣ MEASURED OUTPUT POWER: 19.81 dBm = 0.096 W

▣ MODE: LTE B26

▣ MODULATION SIGNAL: 10 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 log10 (W) = 32.81 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	dBc
26790 (824.0)	1,648.00	-52.19	9.50	-62.95	1.84	V	-55.29	75.11
	2,472.00	-56.09	10.60	-61.13	2.28	H	-52.81	72.62
	3,296.00	-57.75	12.25	-59.57	2.69	V	-50.01	69.83

8.8.3 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	824.0	3.7109	27.976	-67.248	-39.272	-13.00
	3		3.6930	27.976	-67.522	-39.546	
	5		3.7010	27.976	-67.470	-39.494	
	10		3.6960	27.976	-67.430	-39.454	

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 89 ~ 92.
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

8.8.4 CHANNEL EDGE(Part90)

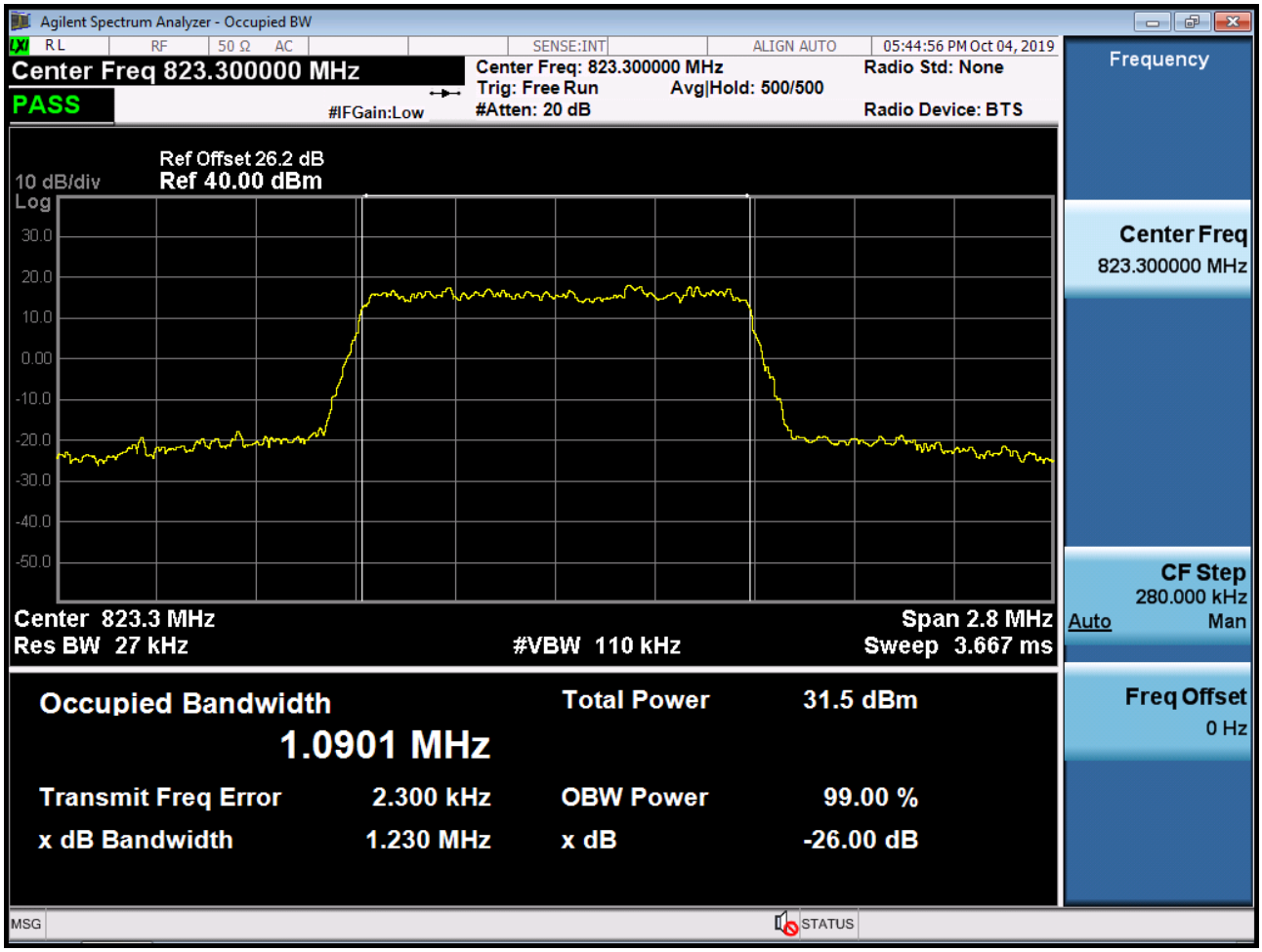
- Test Channel : 26790(824.0MHz)
- Plots of the EUT's Band Edge are shown Page 93 ~ 104.

8.8.5 BAND EDGE(Part22)

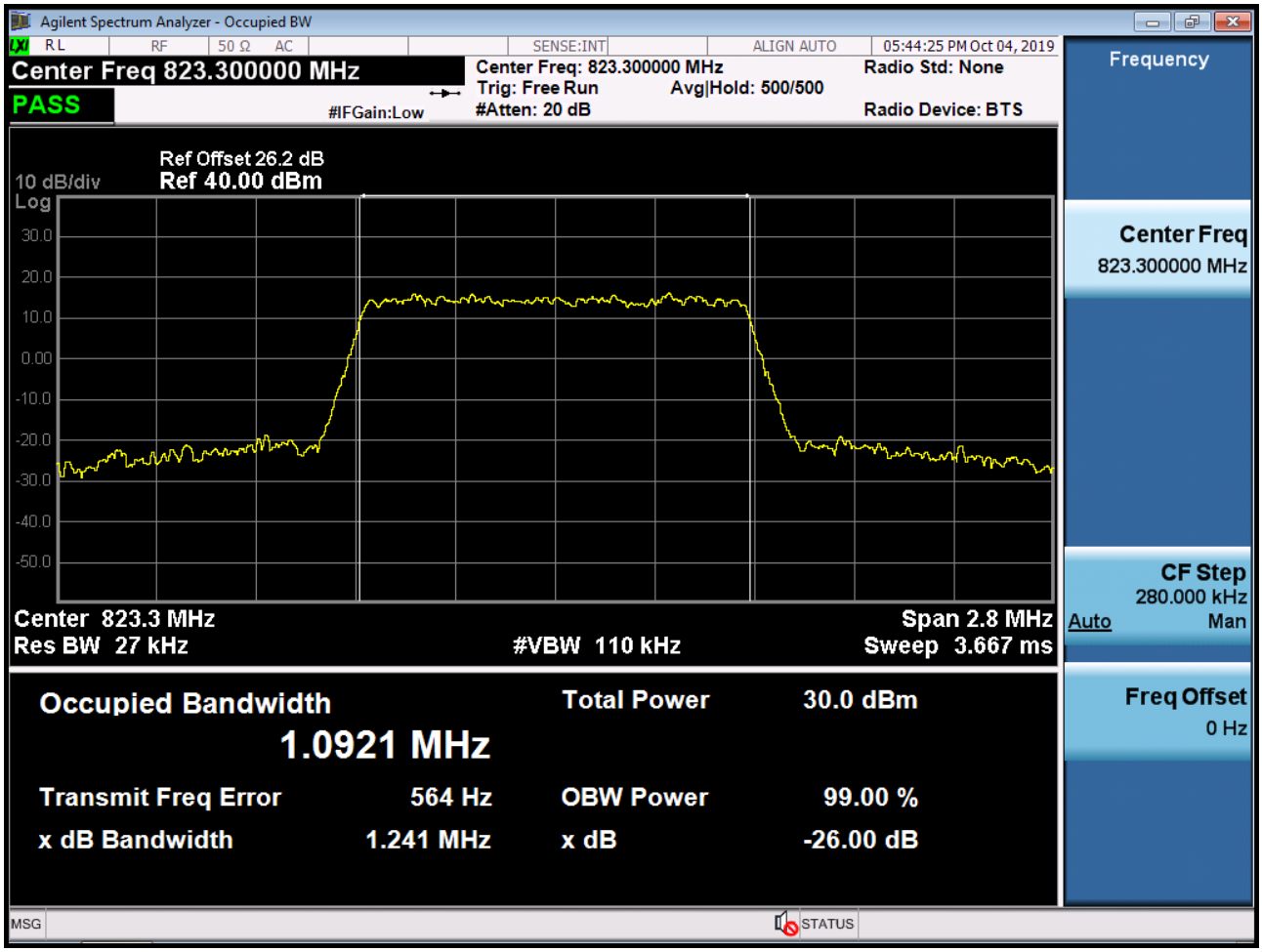
- Test Channel : 26790(824.0MHz)
- Plots of the EUT's Band Edge are shown Page 105 ~ 112.

9. TEST PLOTS

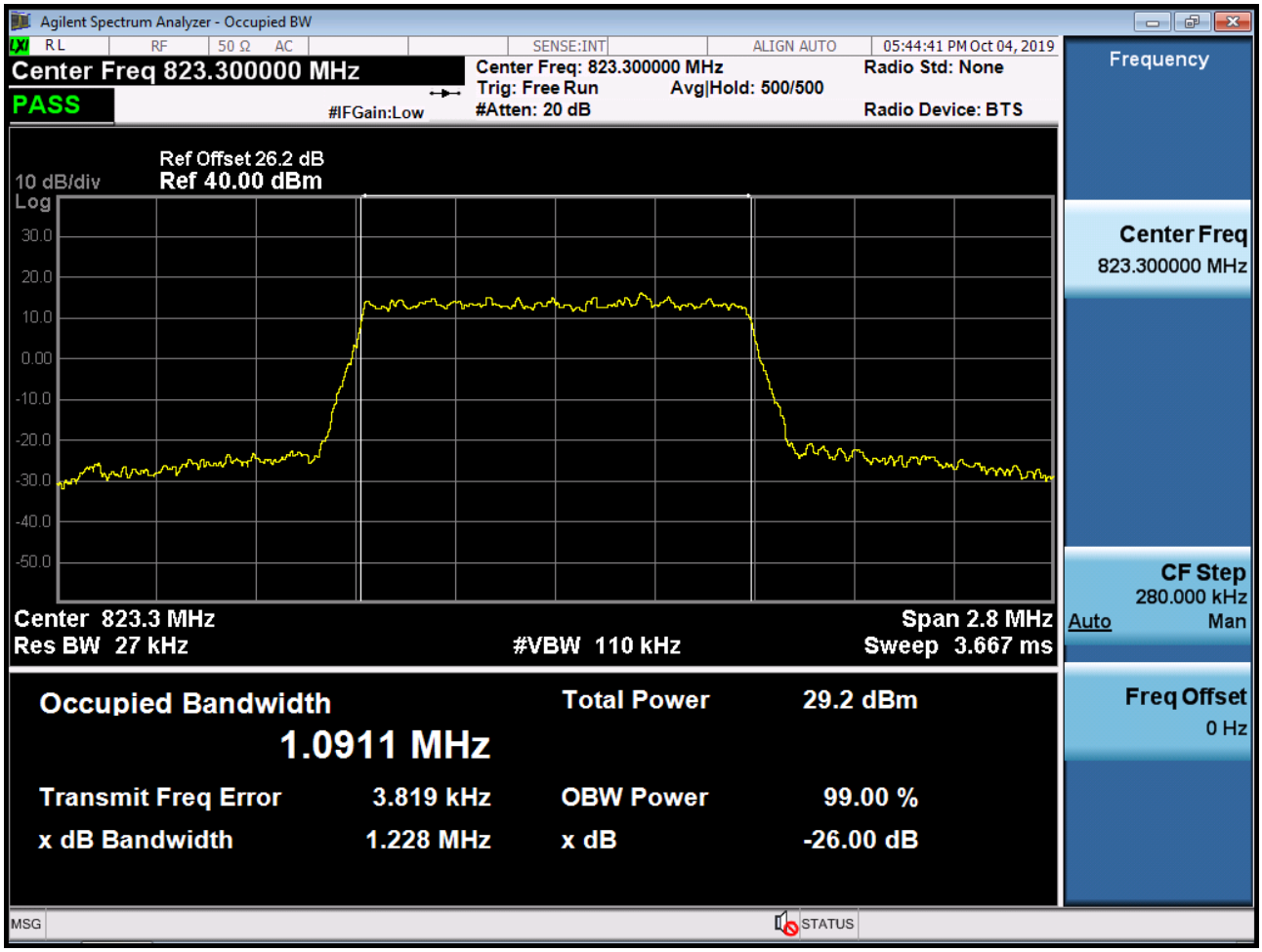
BAND 26. Occupied Bandwidth Plot (1.4M BW Ch.26783 QPSK RB 6_0)



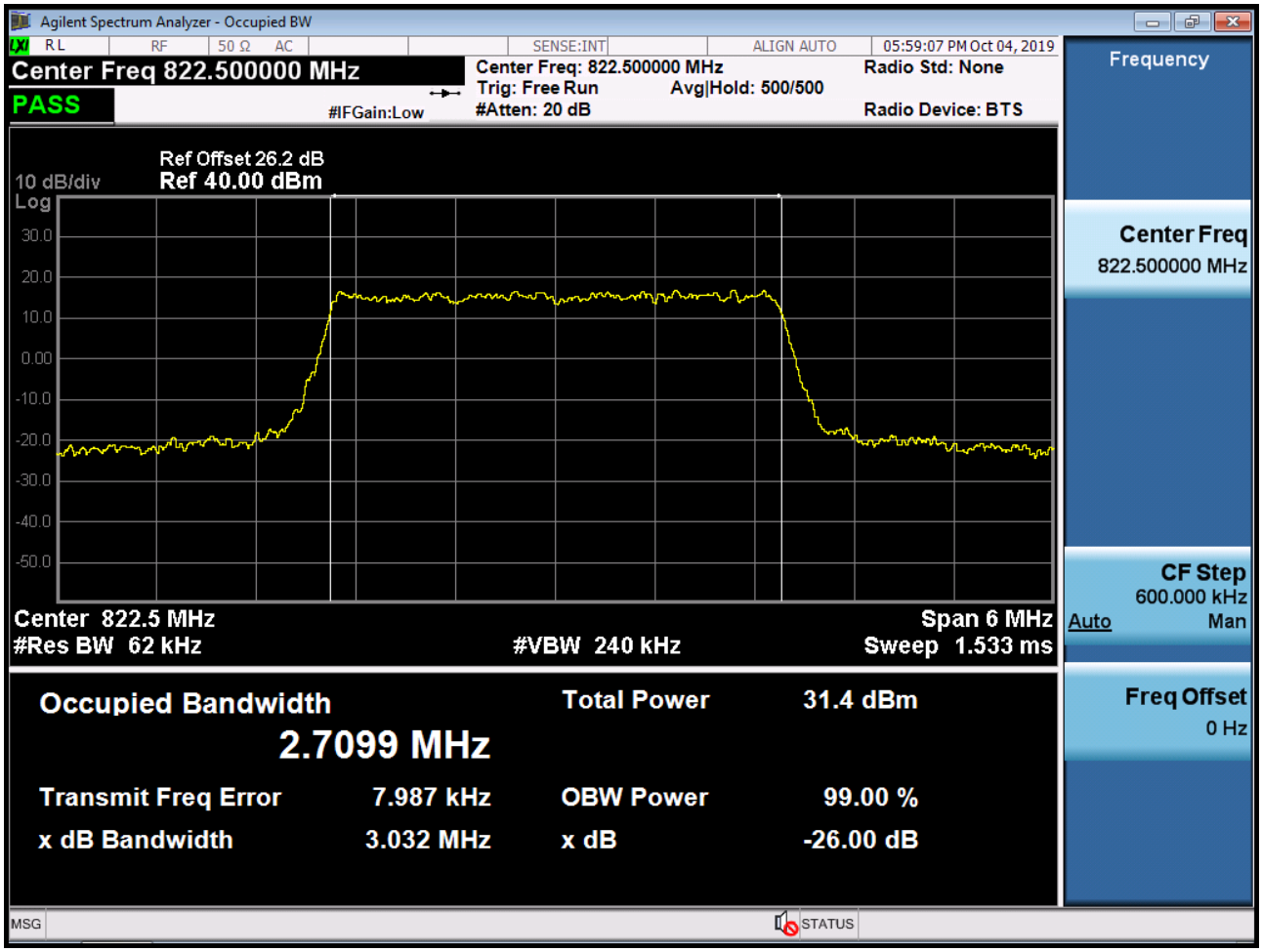
BAND 26. Occupied Bandwidth Plot (1.4M BW Ch.26783 16QAM RB 6_0)



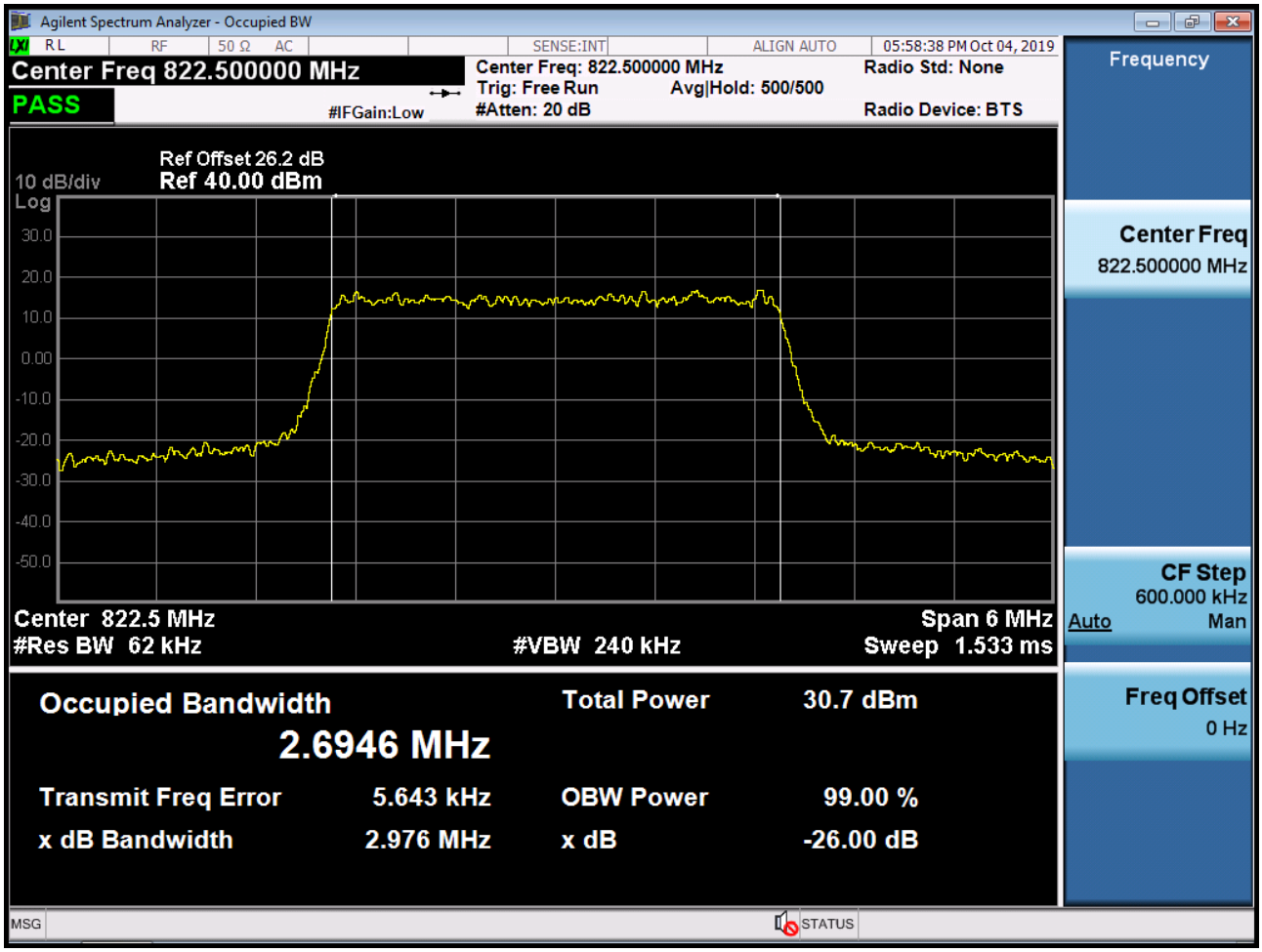
BAND 26. Occupied Bandwidth Plot (1.4M BW Ch.26783 64QAM RB 6_0)



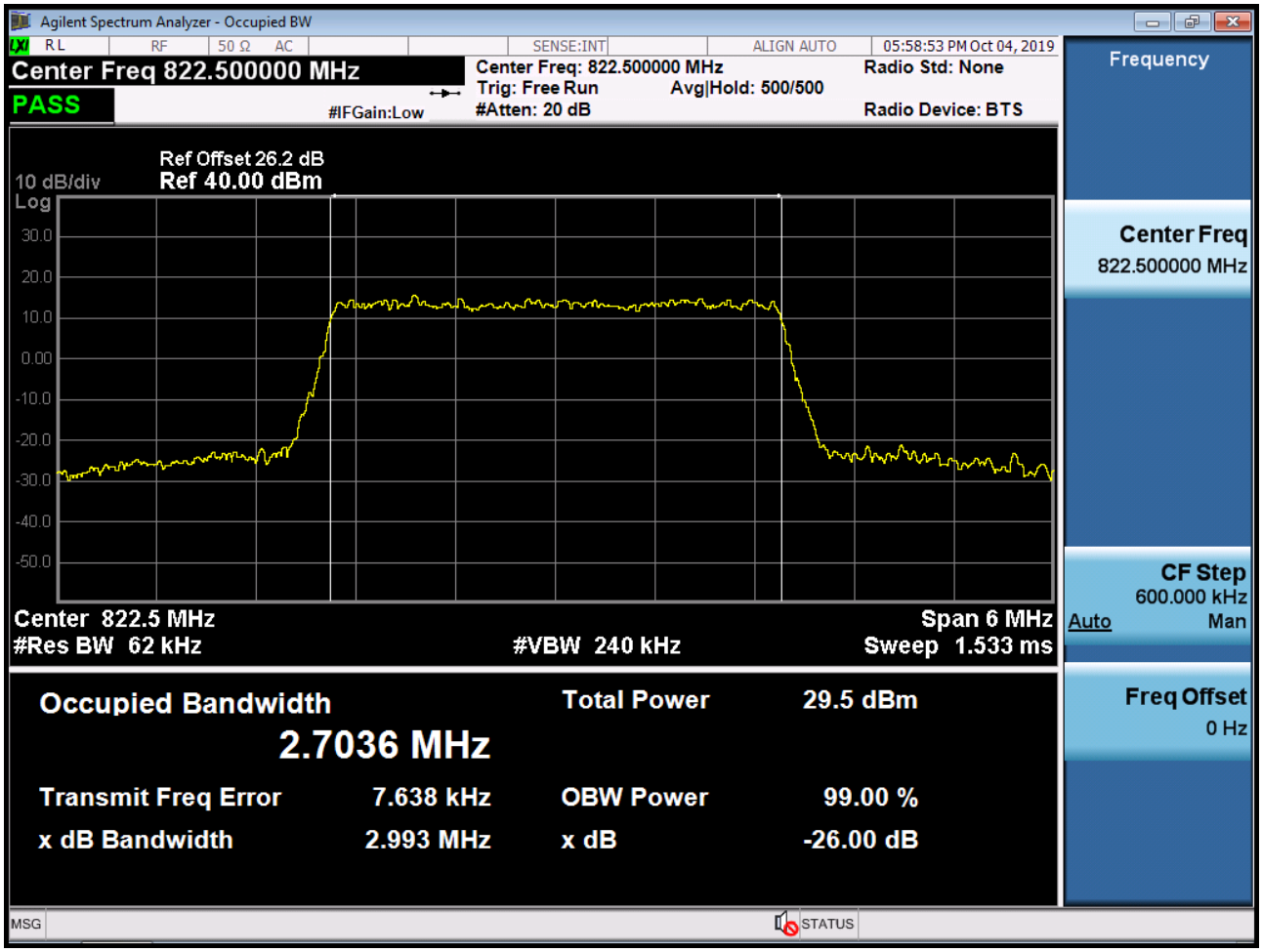
BAND 26. Occupied Bandwidth Plot (3M BW Ch.26775 QPSK RB 15_0)



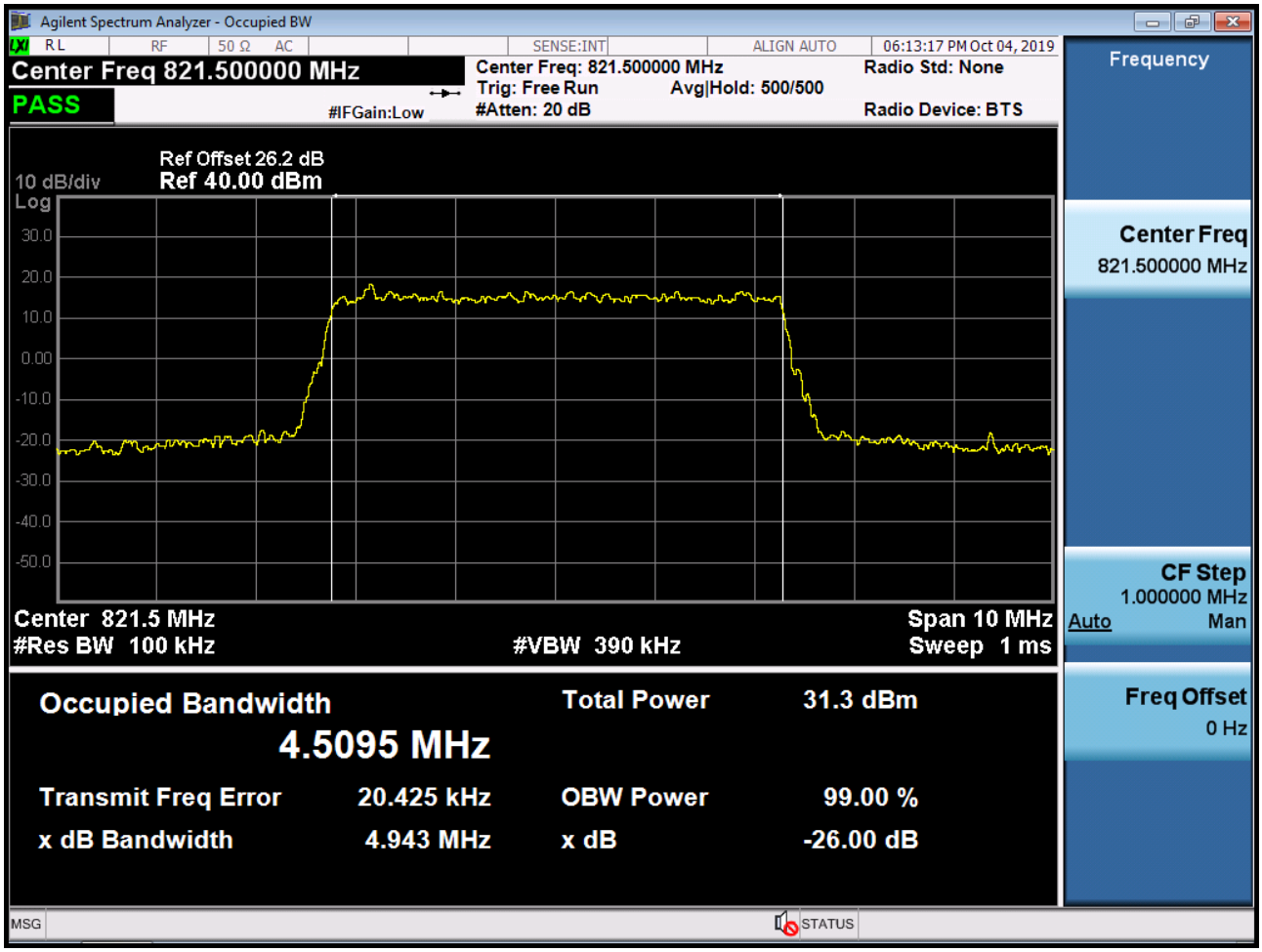
BAND 26. Occupied Bandwidth Plot (3M BW Ch.26775 16QAM RB 15_0)



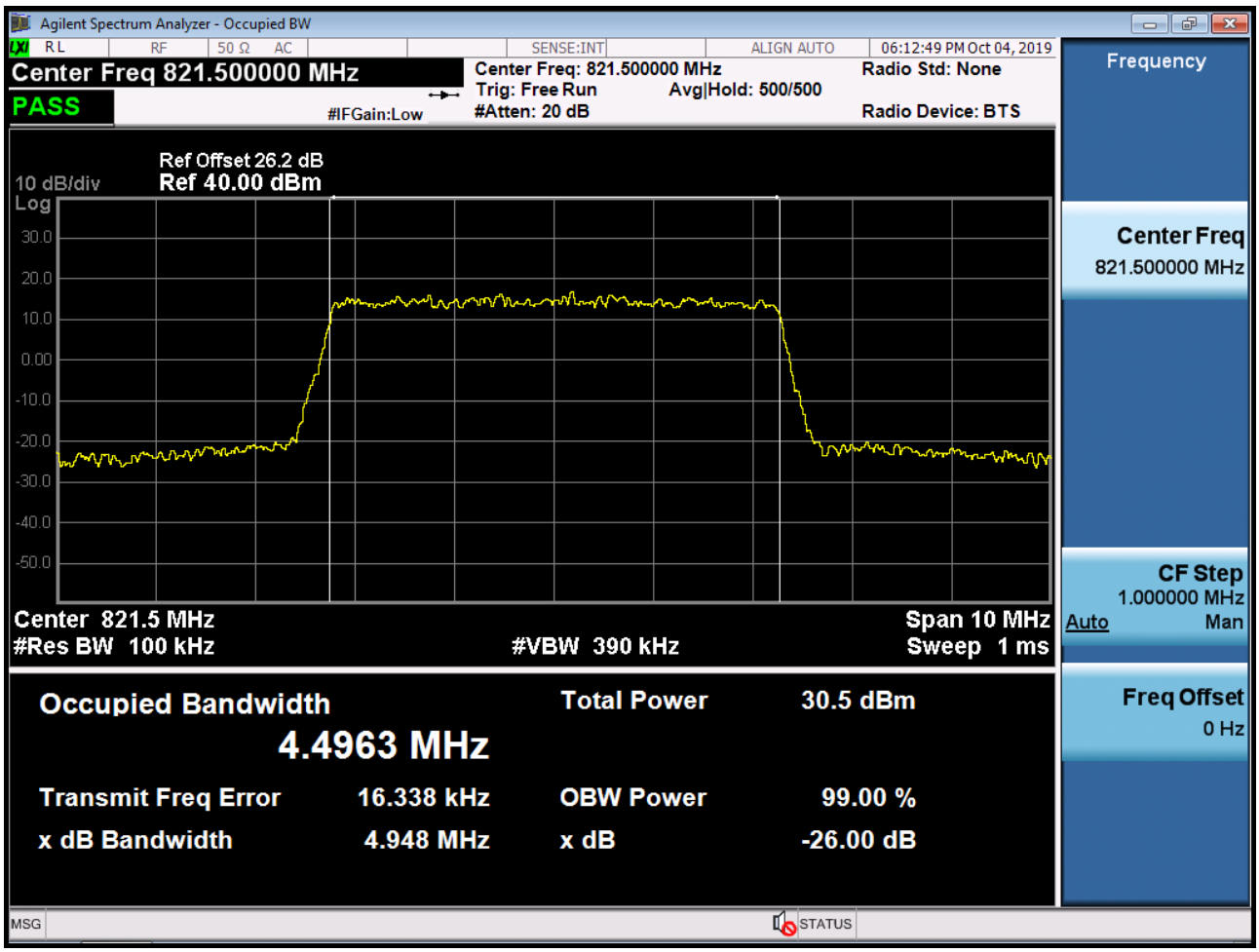
BAND 26. Occupied Bandwidth Plot (3M BW Ch.26775 64QAM RB 15_0)



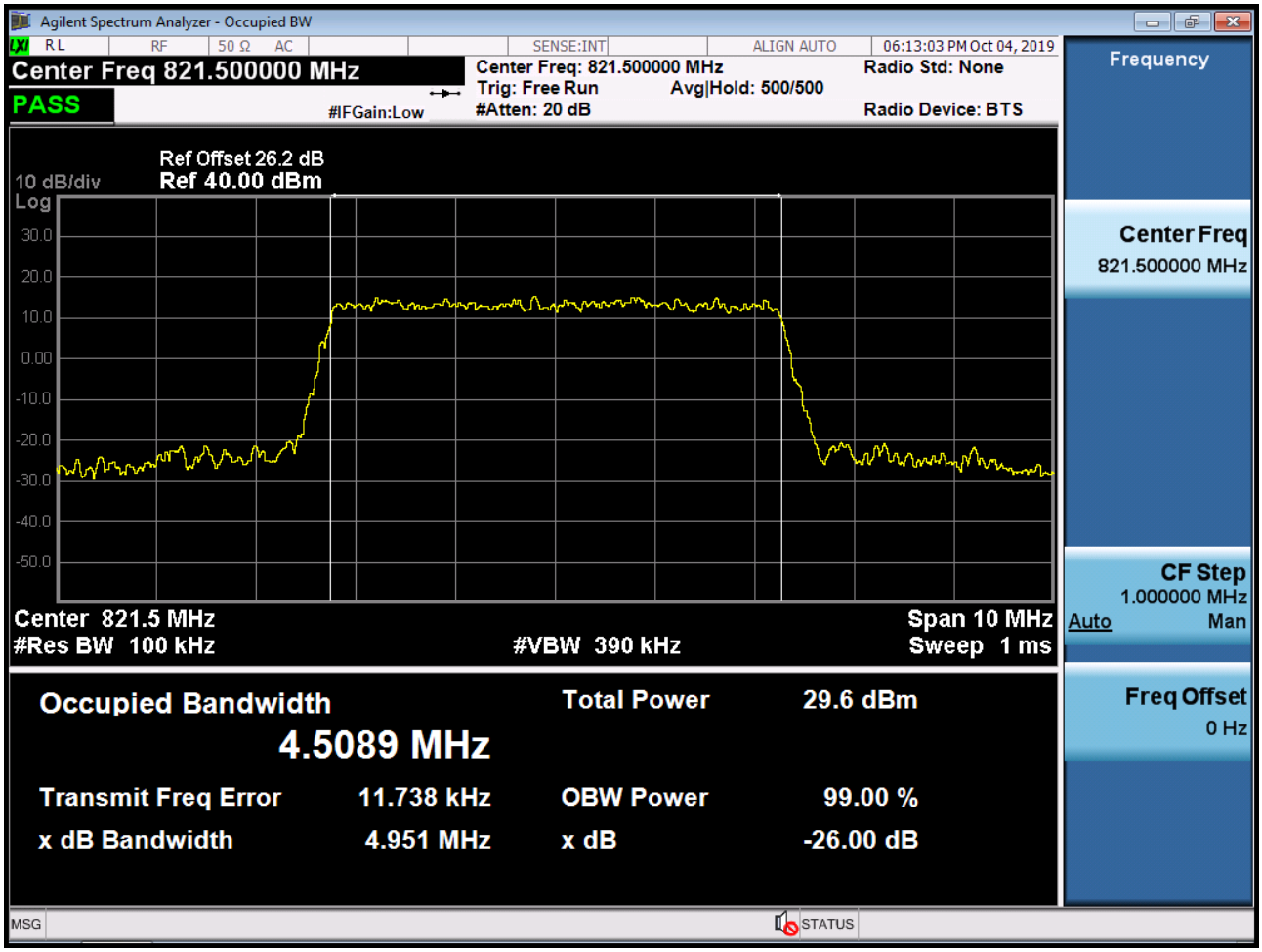
BAND 26. Occupied Bandwidth Plot (5M BW Ch.26765 QPSK RB 25_0)



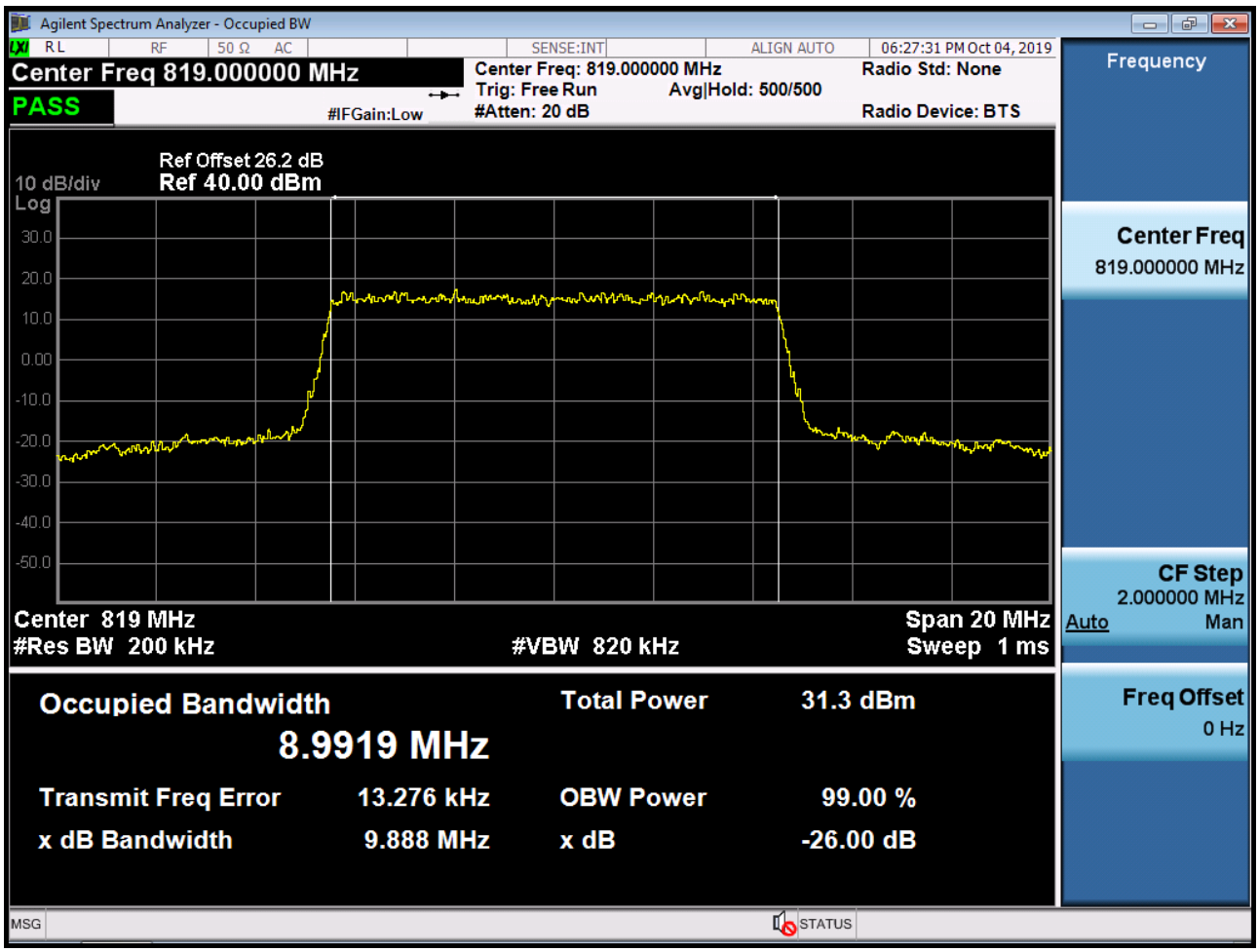
BAND 26. Occupied Bandwidth Plot (5M BW Ch.26765 16QAM RB 25_0)



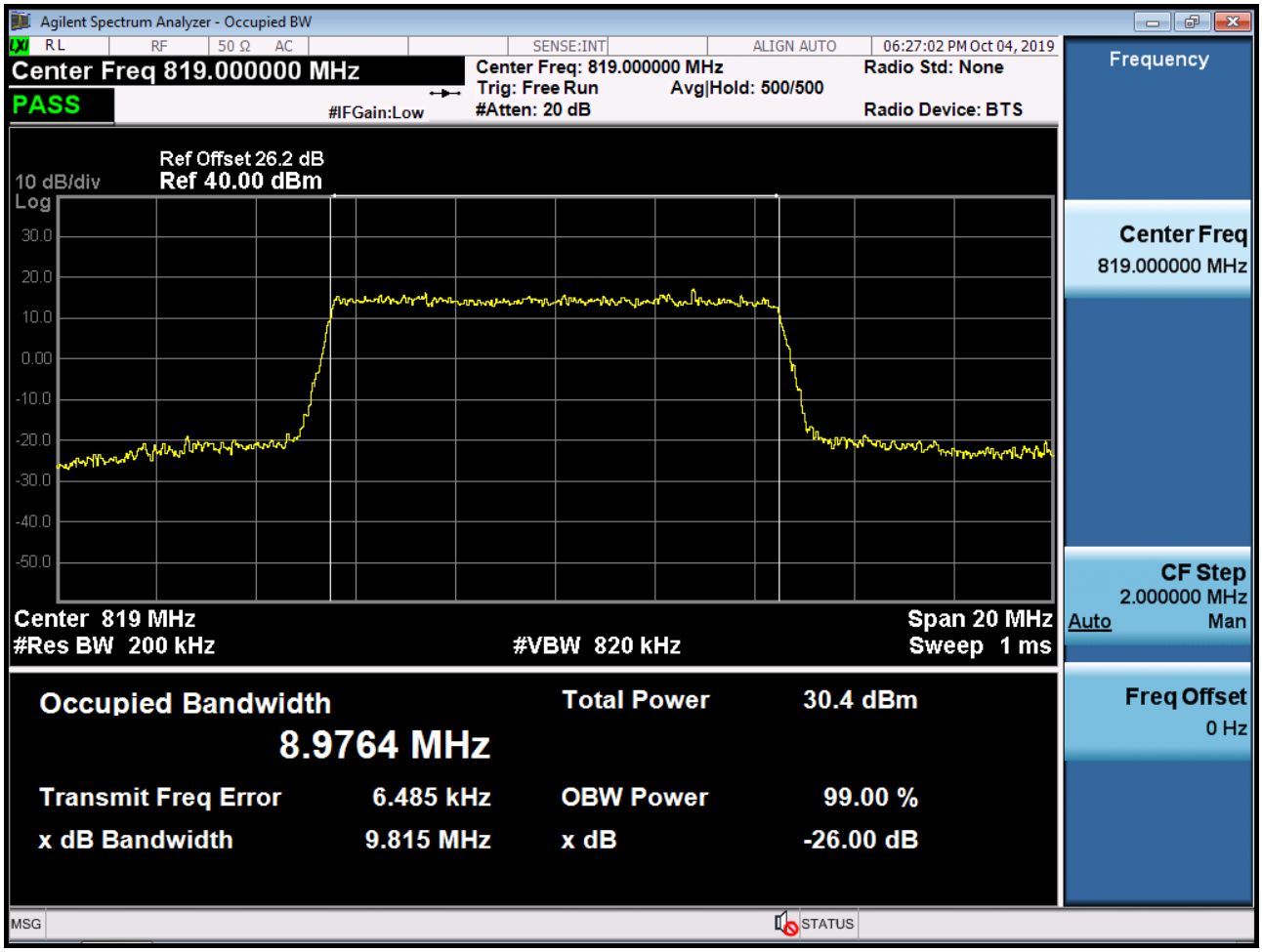
BAND 26. Occupied Bandwidth Plot (5M BW Ch.26765 64QAM RB 25_0)



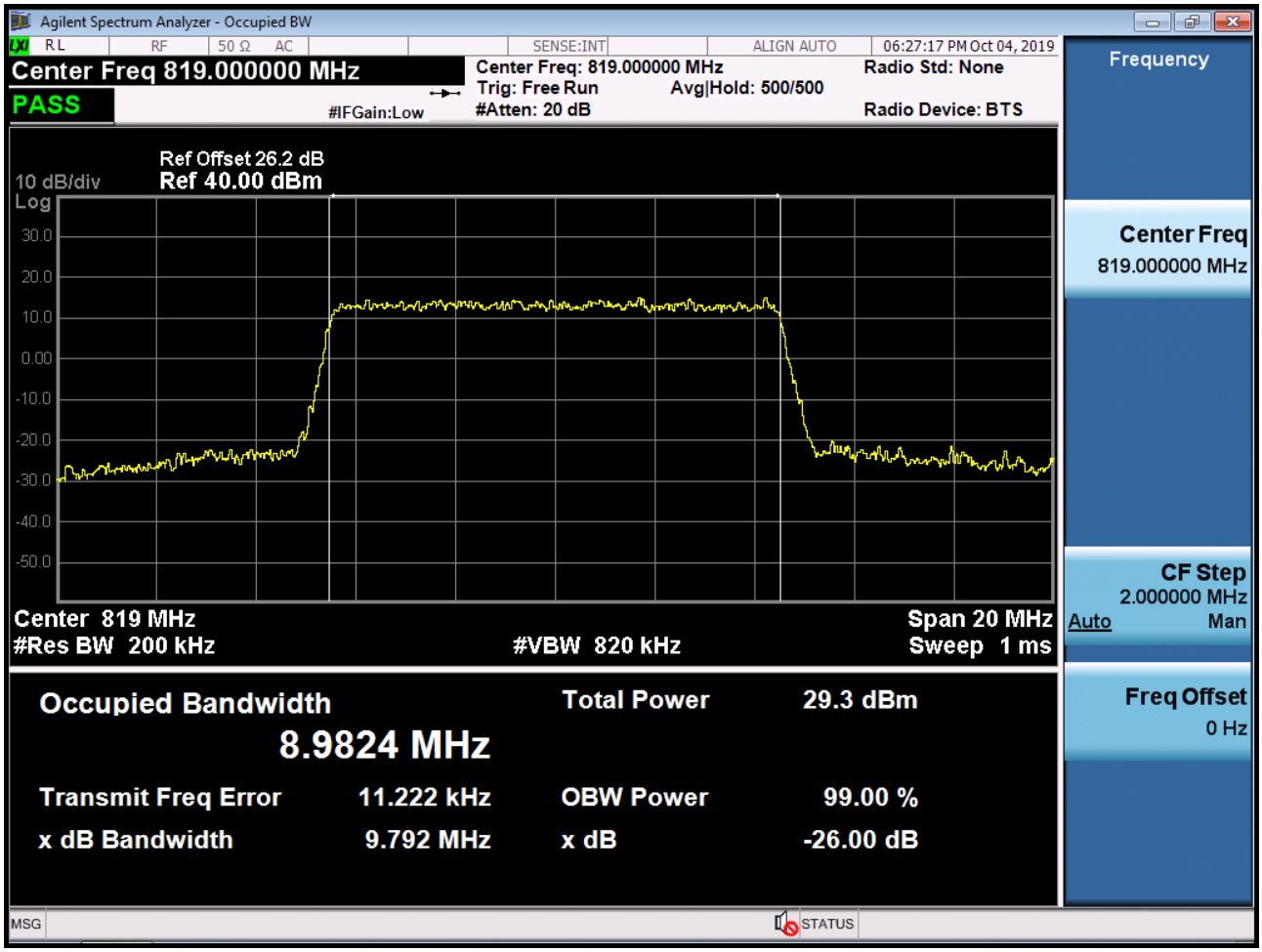
BAND 26. Occupied Bandwidth Plot (10M BW Ch.26740 QPSK RB 50_0)



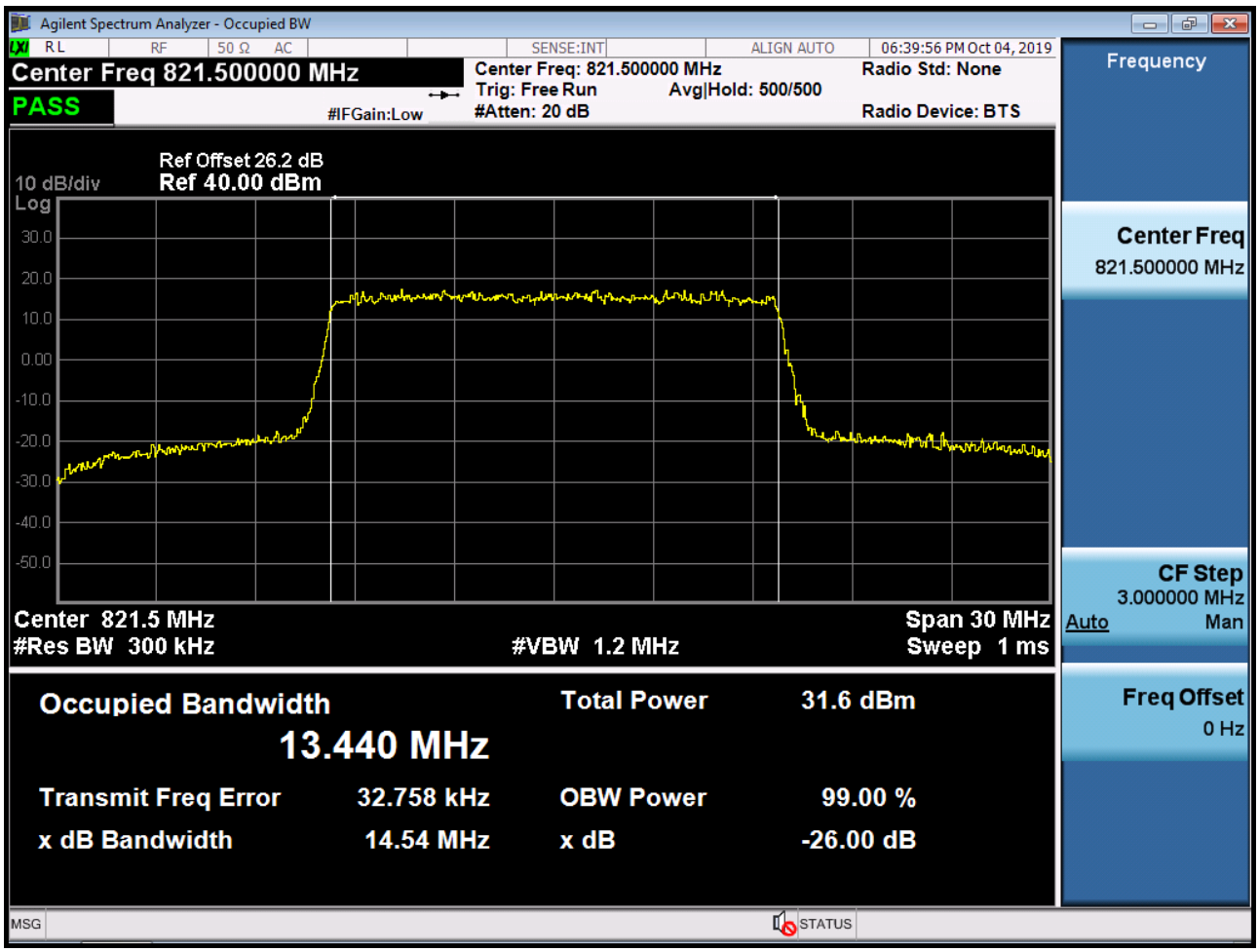
BAND 26. Occupied Bandwidth Plot (10M BW Ch.26740 16QAM RB 50_0)



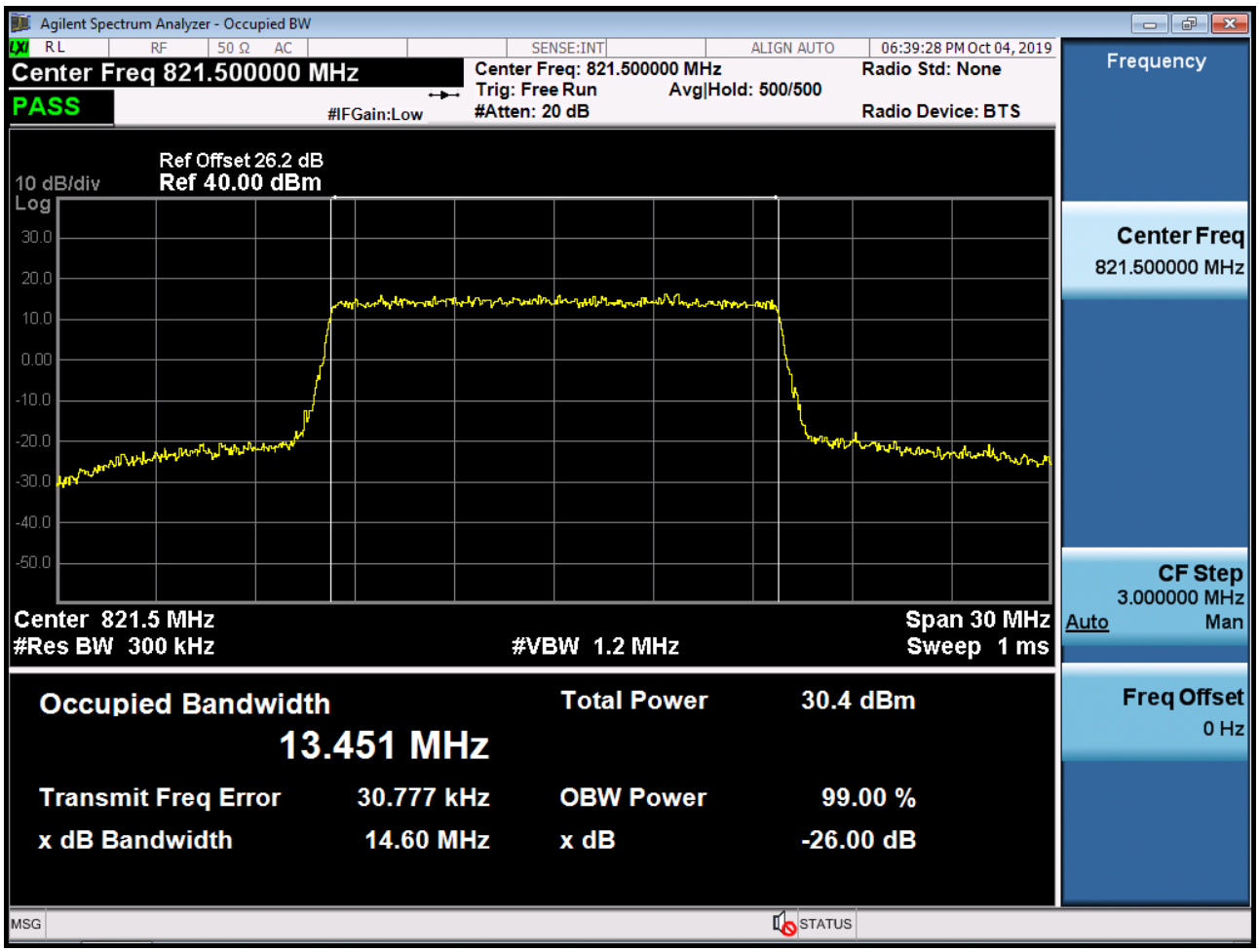
BAND 26. Occupied Bandwidth Plot (10M BW Ch.26740 64QAM RB 50_0)



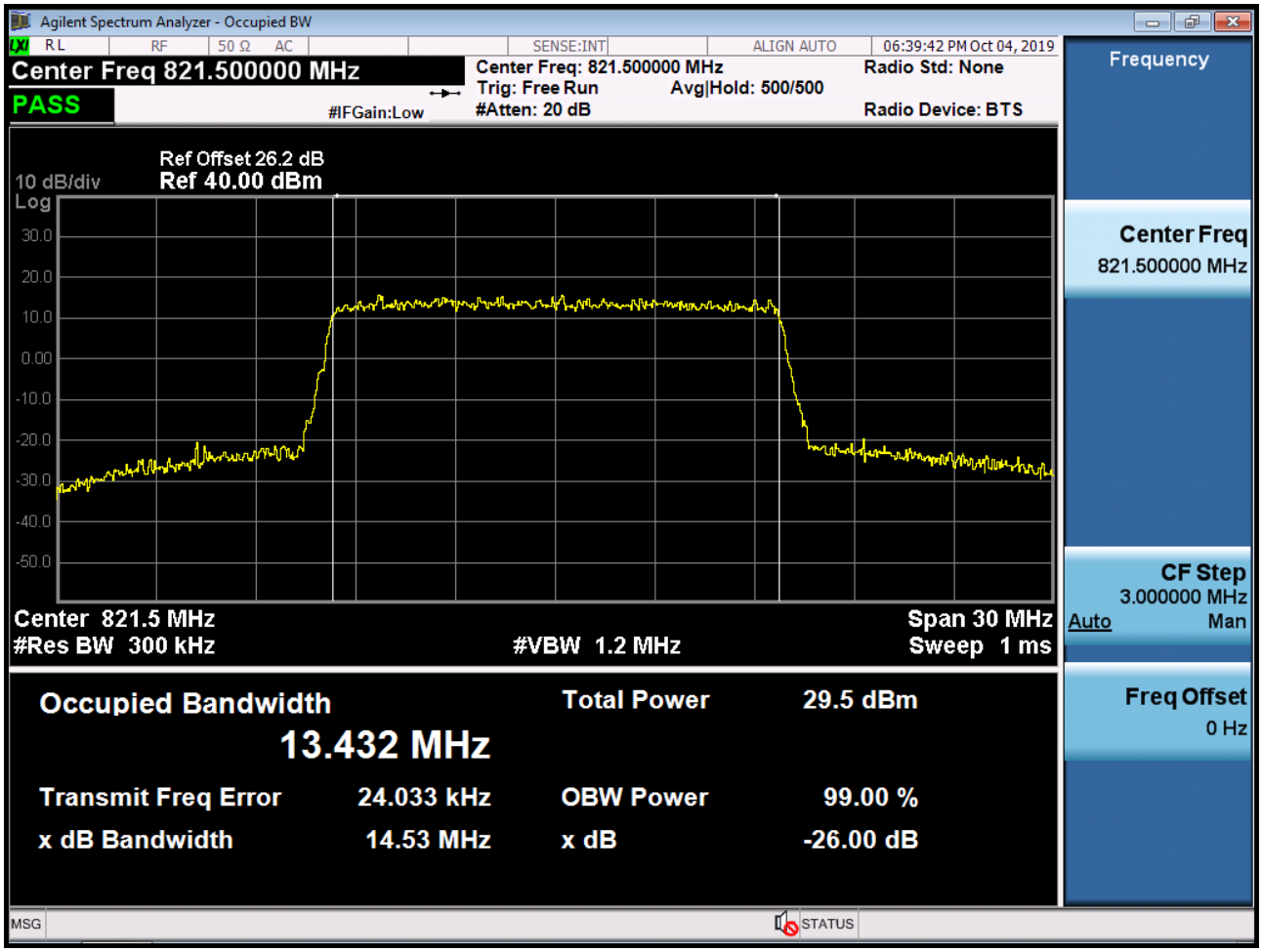
BAND 26. Occupied Bandwidth Plot (15M BW Ch.26765 QPSK RB 75_0)



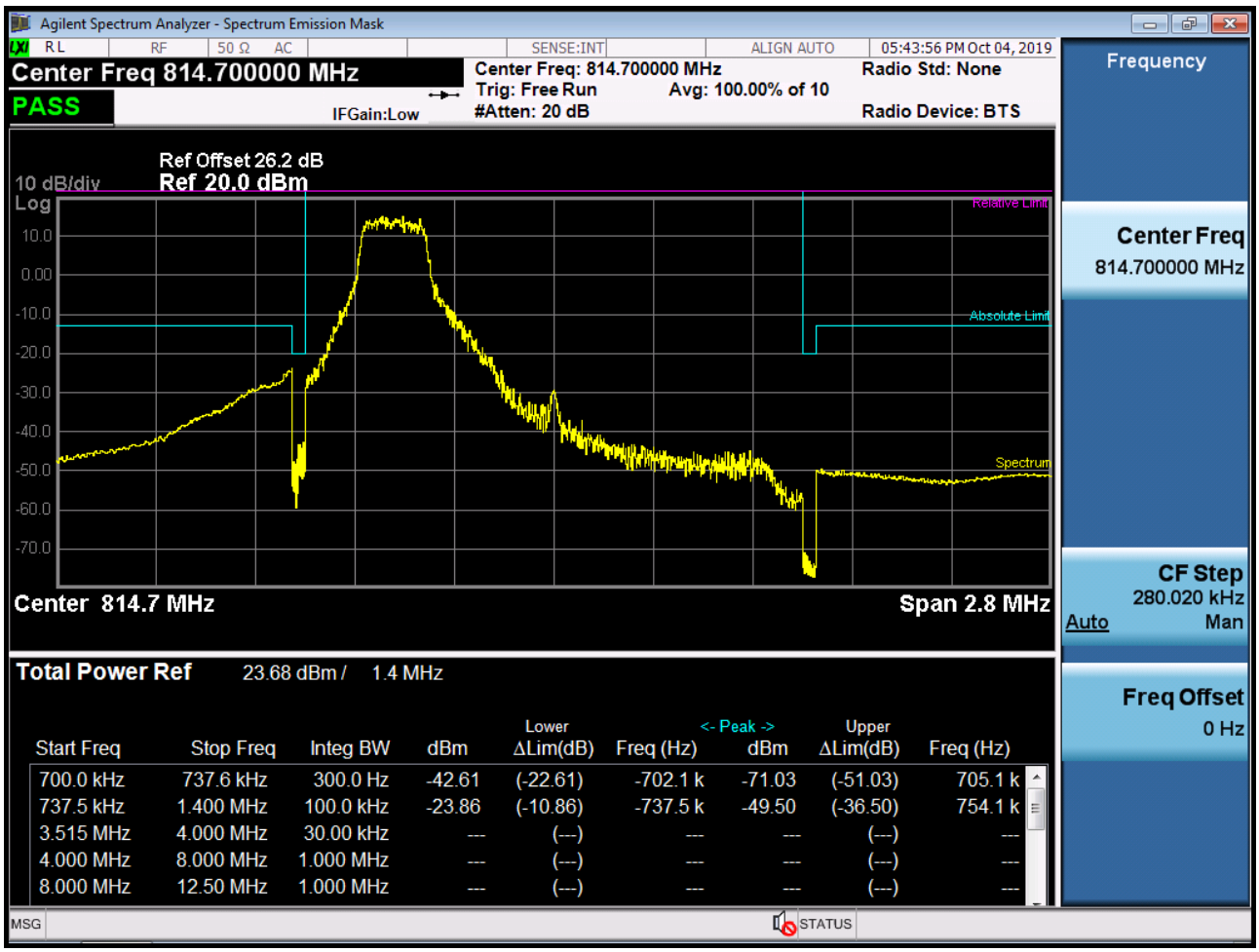
BAND 26. Occupied Bandwidth Plot (15M BW Ch.26765 16QAM RB 75_0)



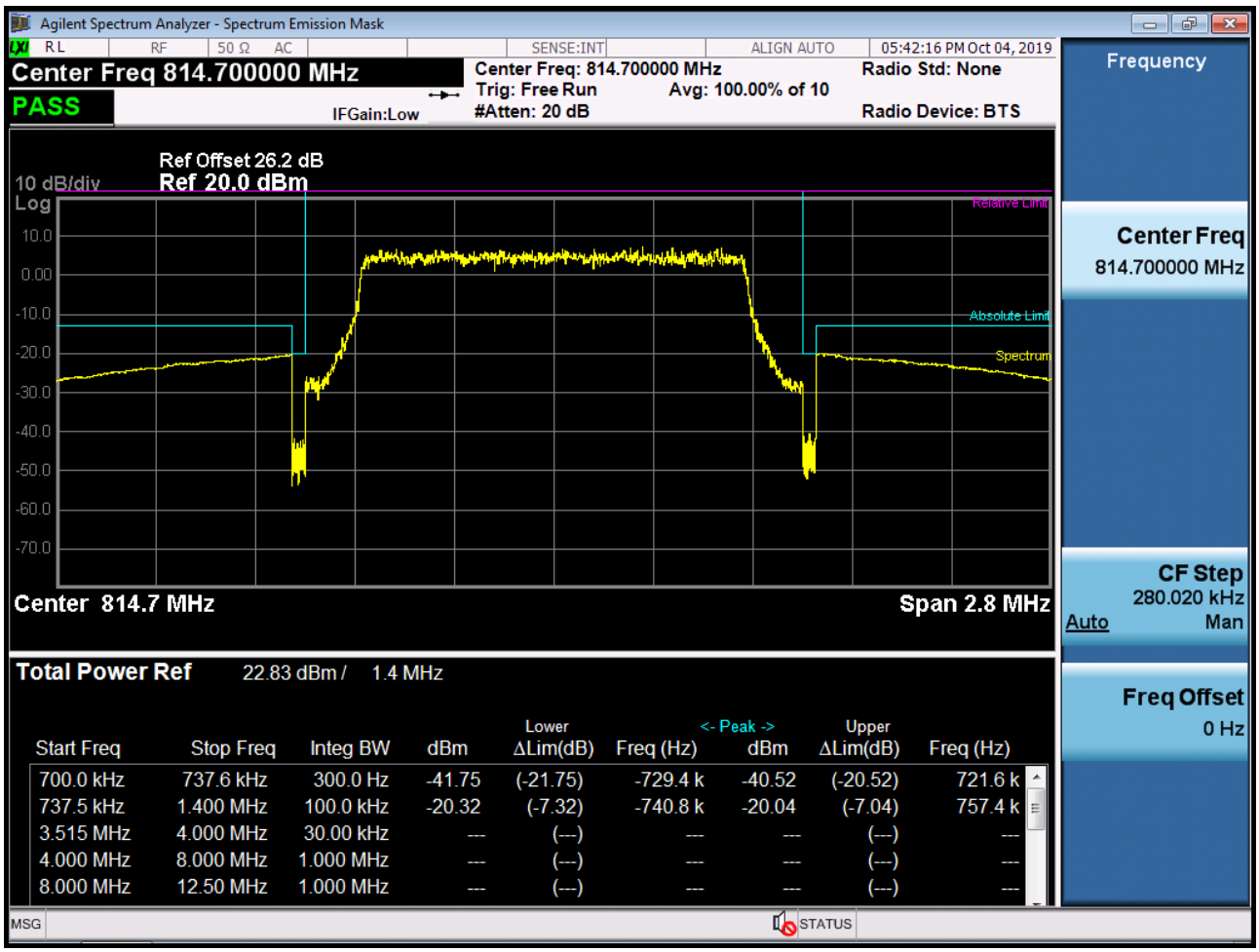
BAND 26. Occupied Bandwidth Plot (15M BW Ch.26765 64QAM RB 75_0)



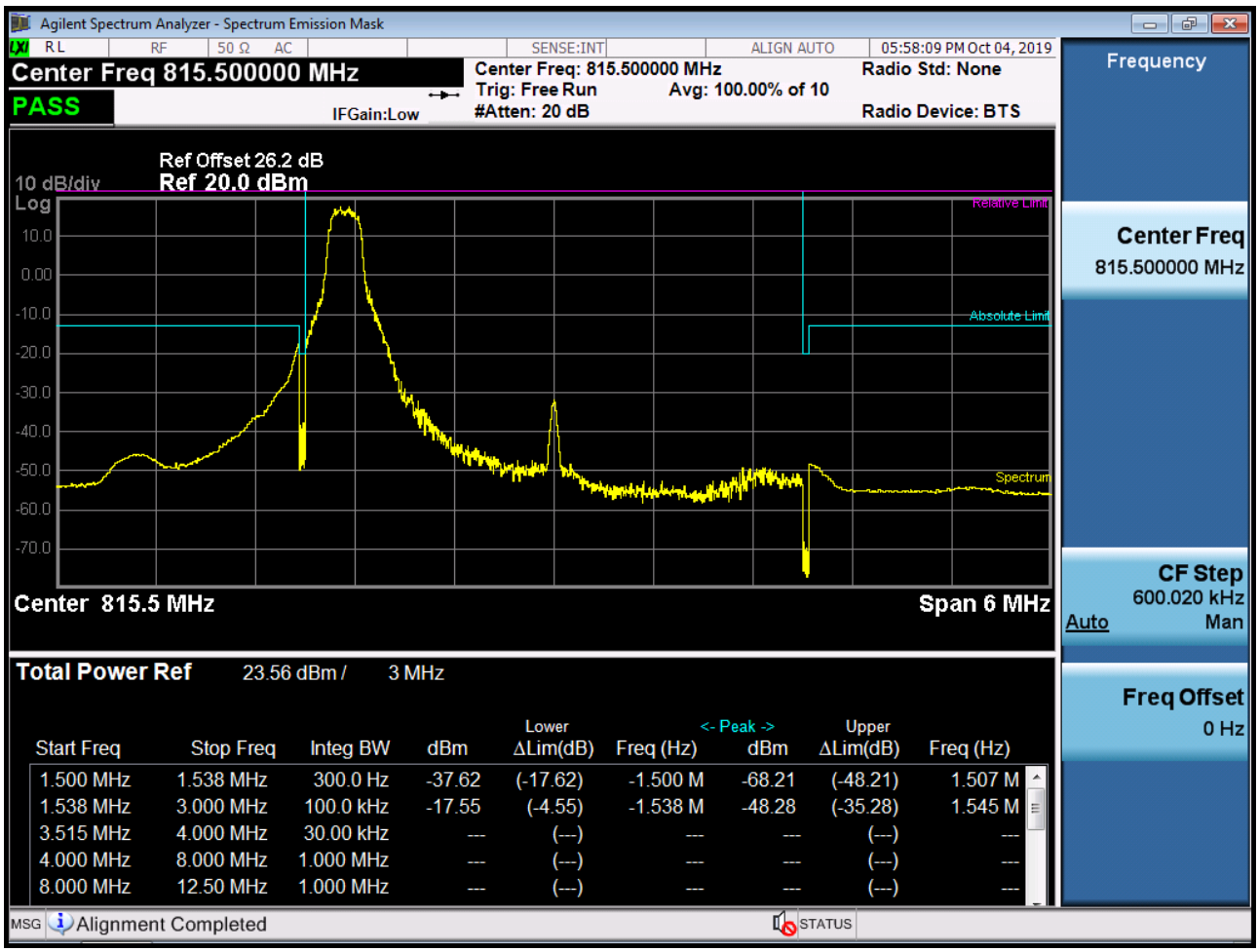
BAND 26. Lower Channel Edge Plot (1.4M BW Ch.26697 QPSK RB 1, Offset 0)



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

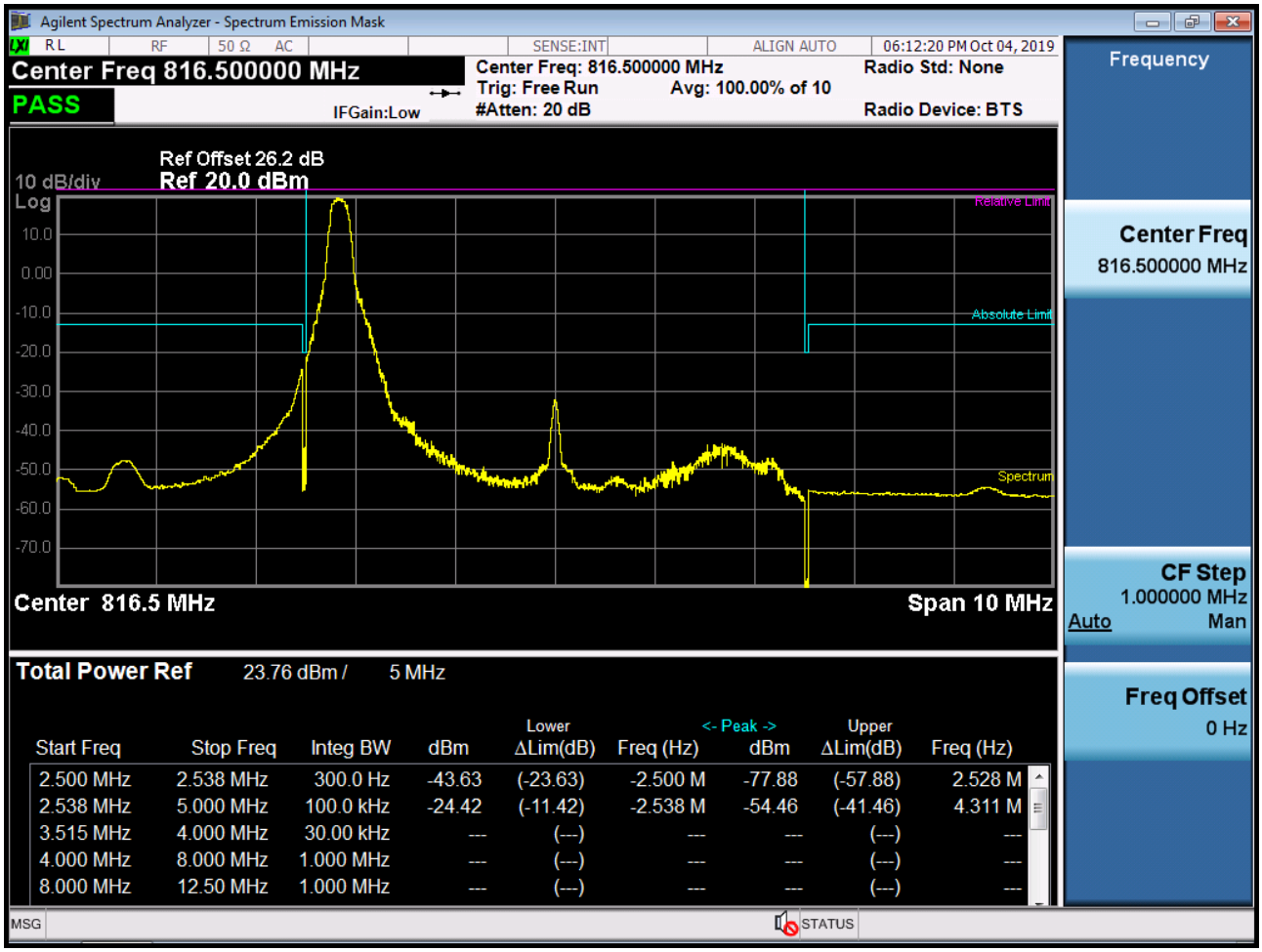


BAND 26. Lower Channel Edge Plot (3M BW Ch.26705 QPSK RB 1, Offset 0)

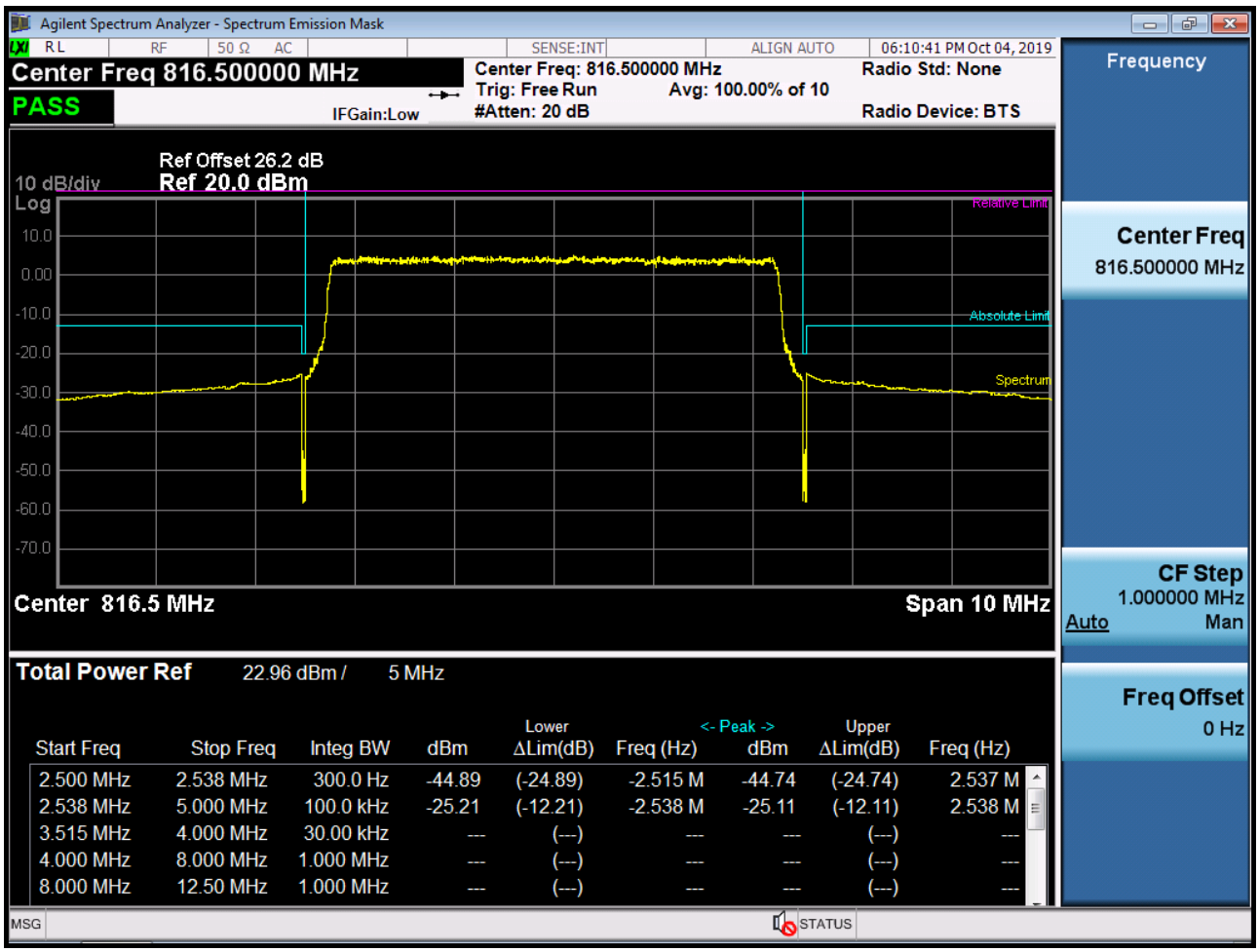


BAND 26. Lower Channel Edge Plot (3M BW Ch.26705 QPSK_RB15_Offset 0)

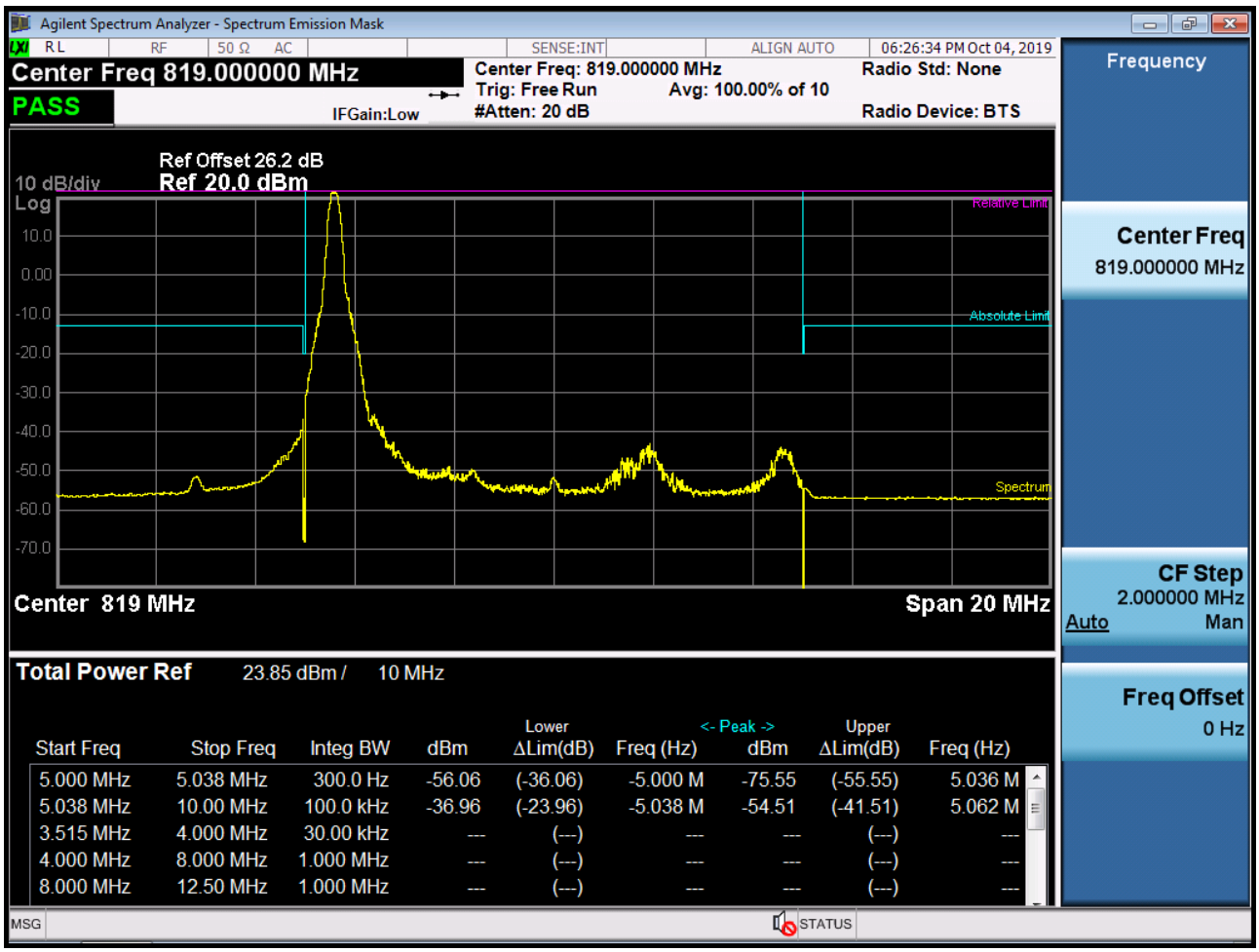
BAND 26. Lower Channel Edge Plot (5M BW Ch.26715 QPSK RB 1, Offset 0)



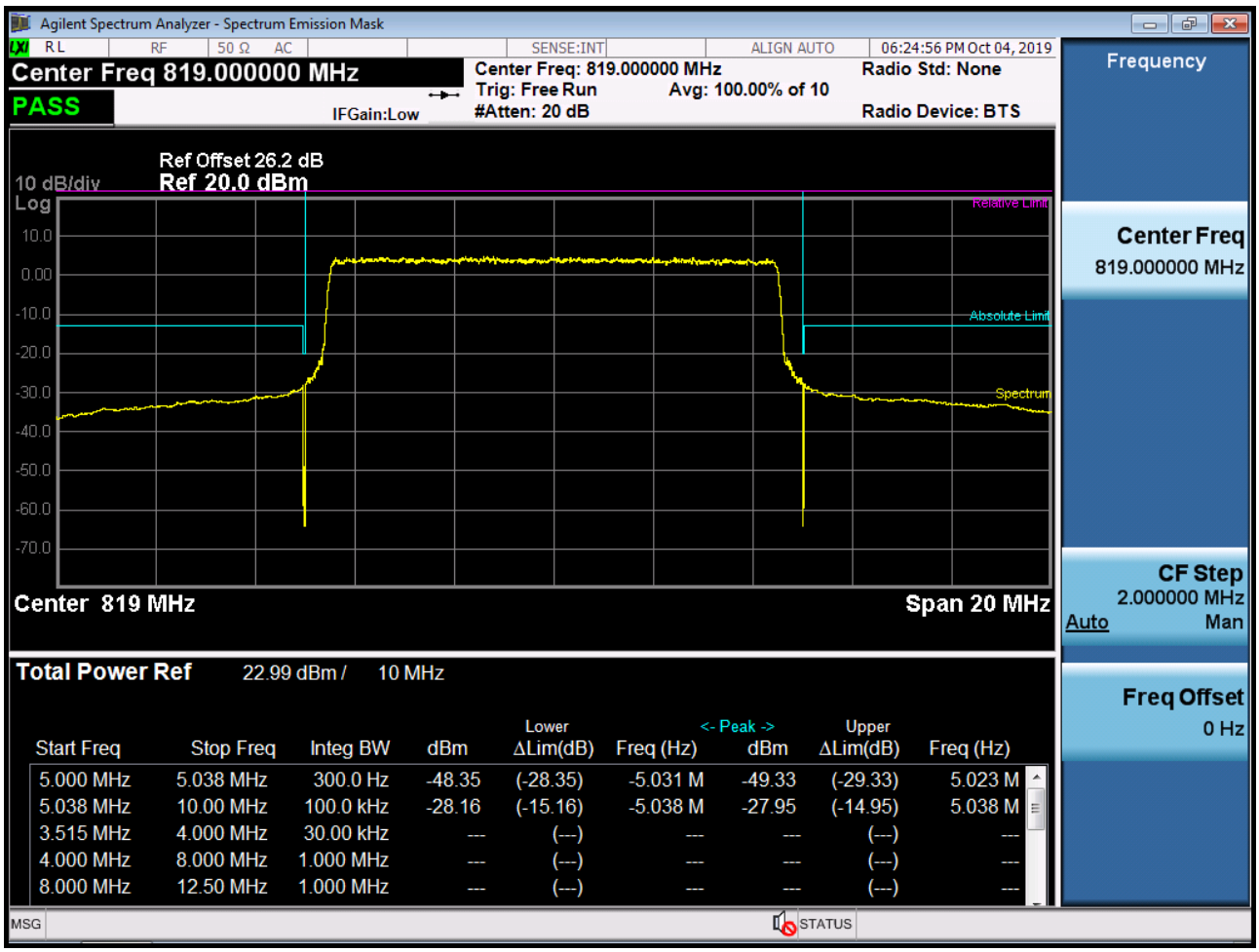
BAND 26. Lower Channel Edge Plot (5M BW Ch.26715 QPSK_RB25_Offset 0)



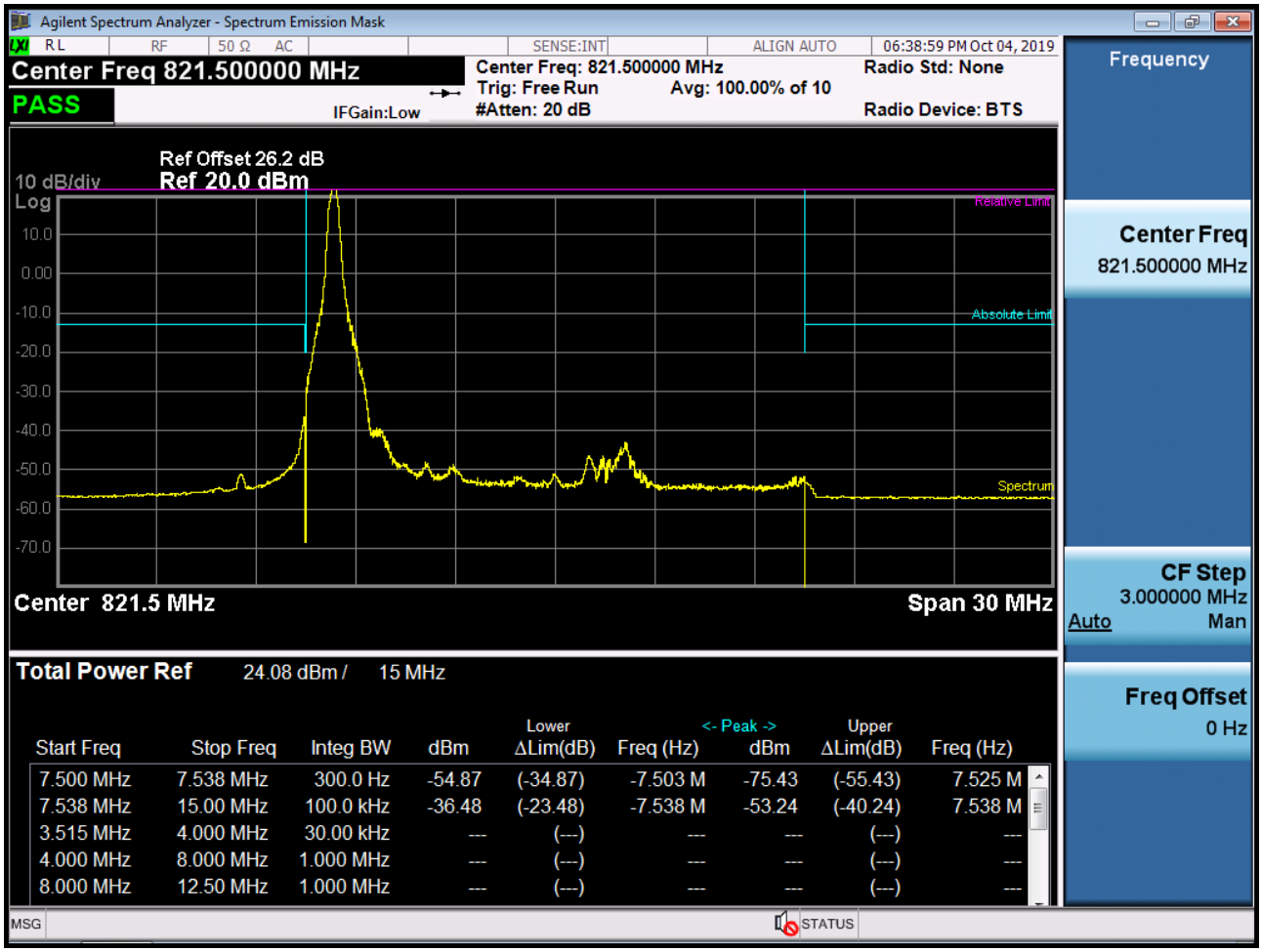
BAND 26. Low Channel Edge Plot (10M BW Ch.26740 QPSK RB 1, Offset 0)



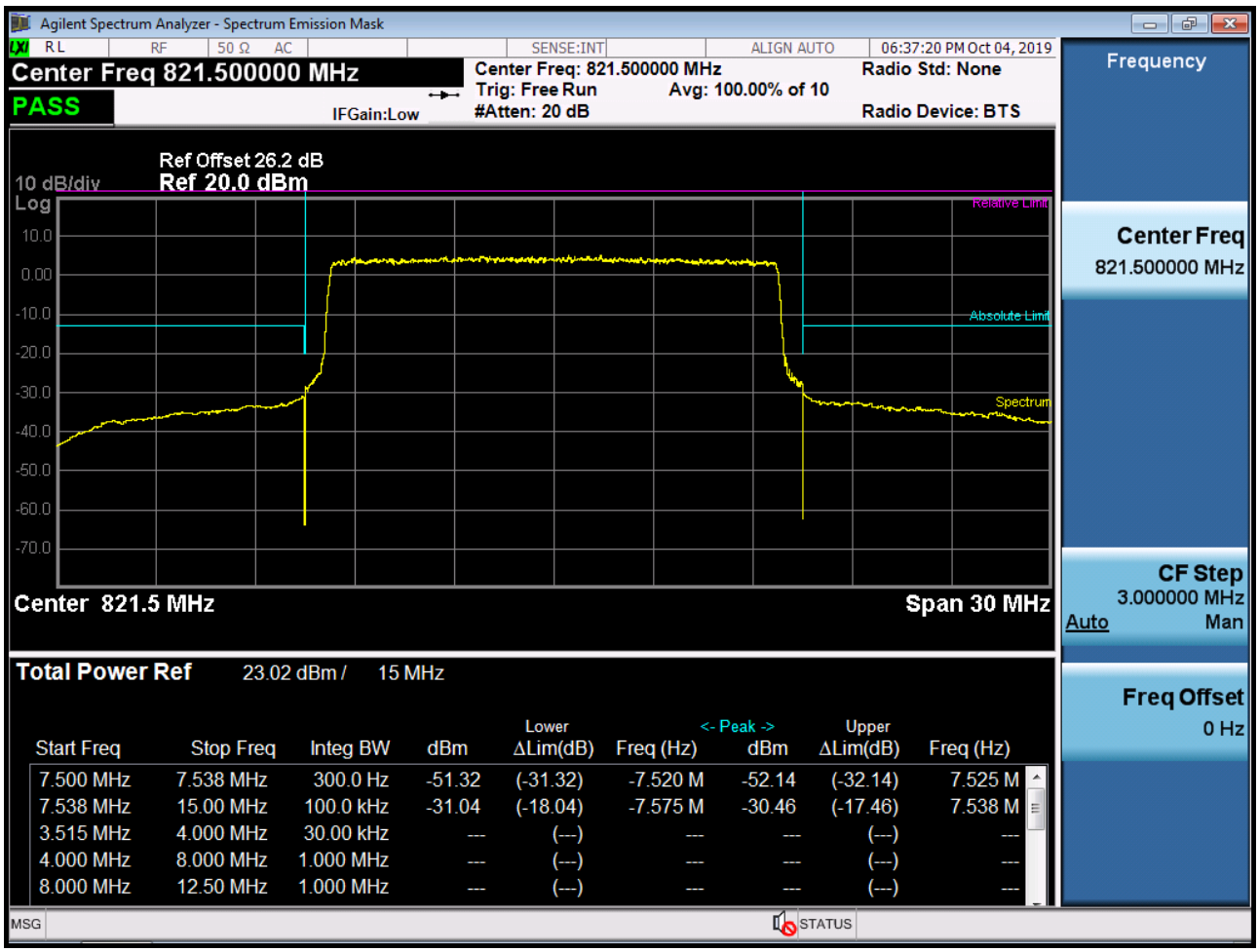
BAND 26. Low Channel Edge Plot (10M BW Ch.26740 QPSK_RB50_Offset 0)



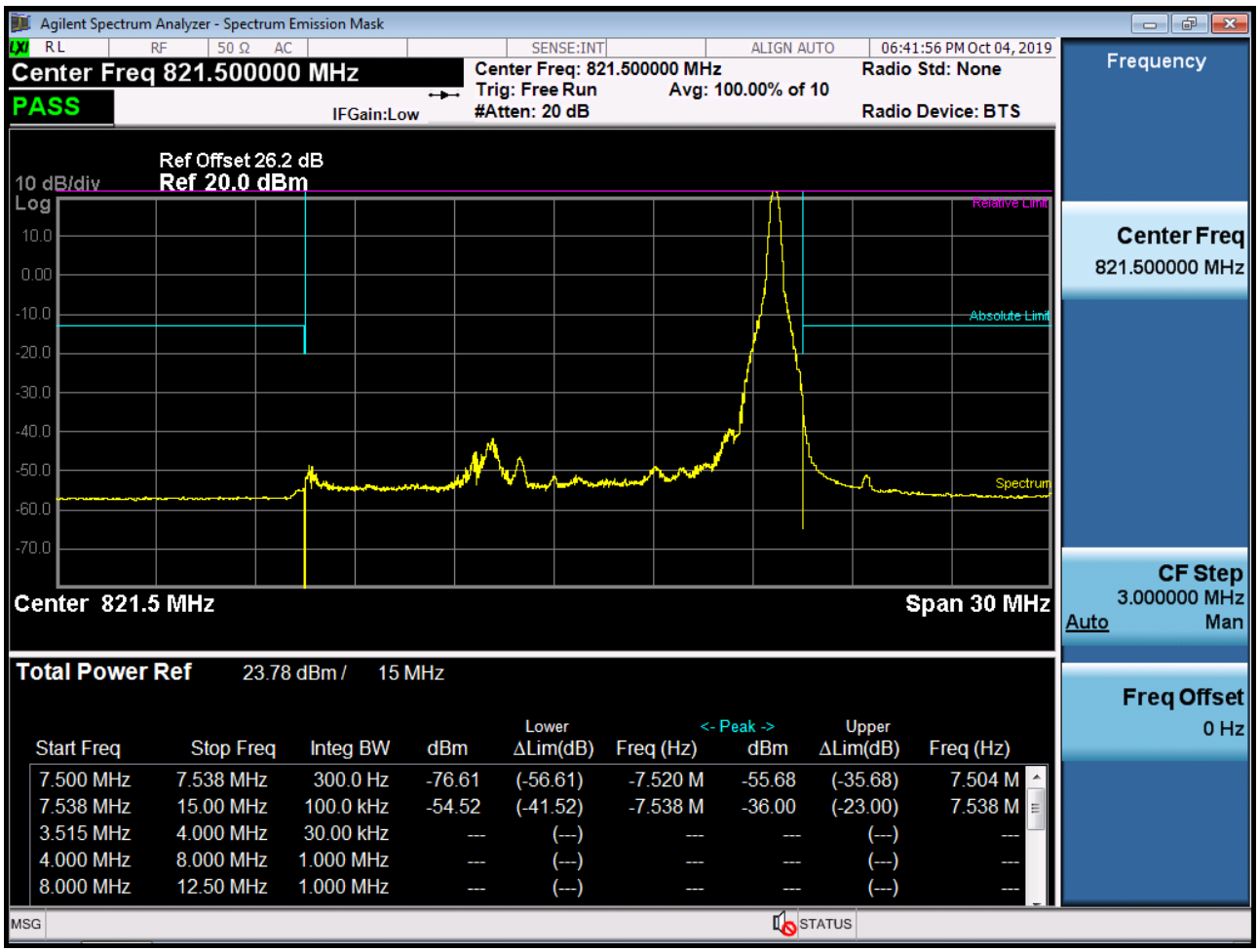
BAND 26. Low Channel Edge Plot (15M BW Ch.26765 QPSK RB 1, Offset 0)



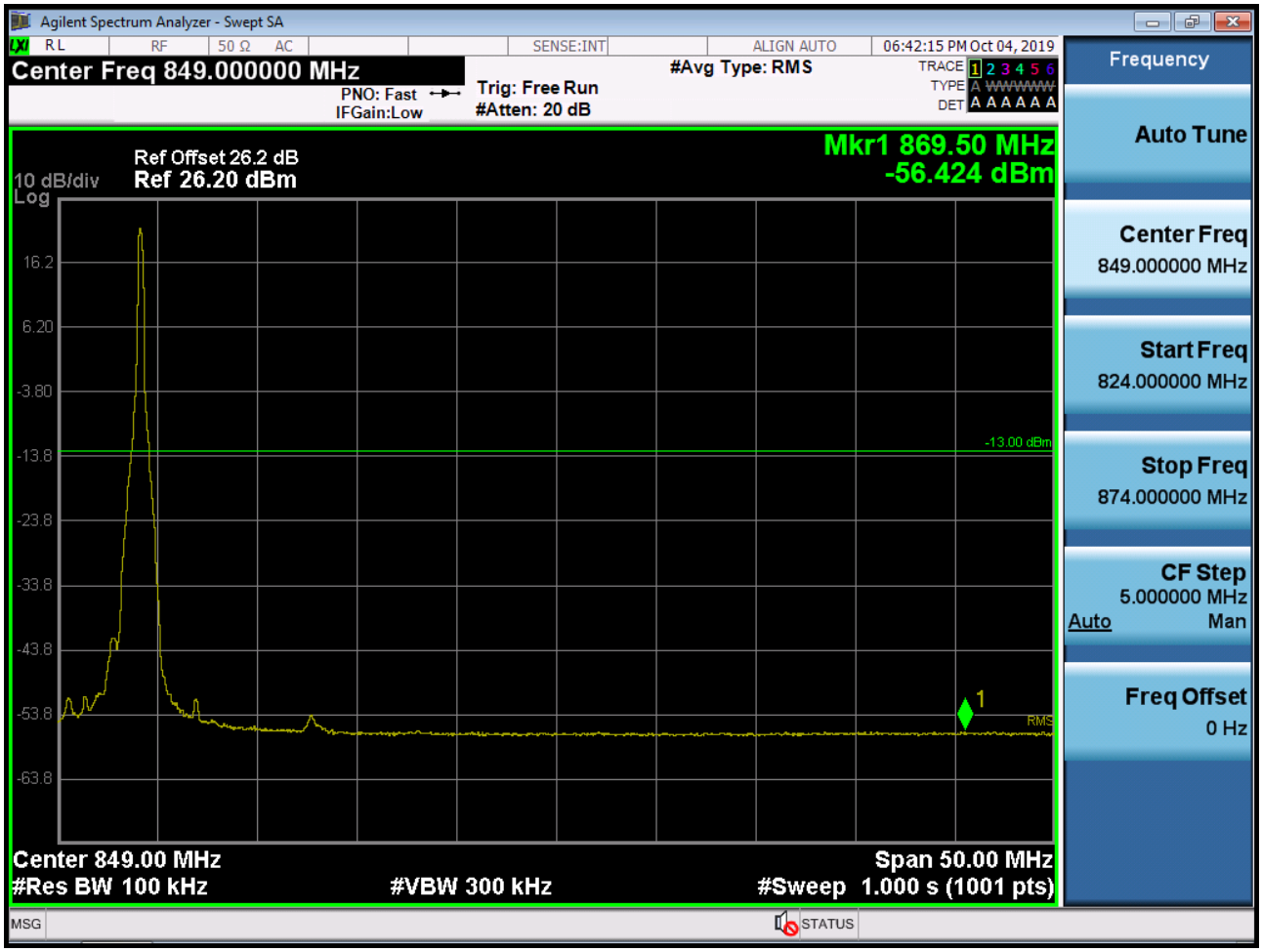
BAND 26. Low Channel Edge Plot (15M BW Ch.26765 QPSK RB 1, Offset74)



BAND 26. Mid Channel Edge Plot (15M BW Ch.26765 QPSK_RB75_Offset 0)

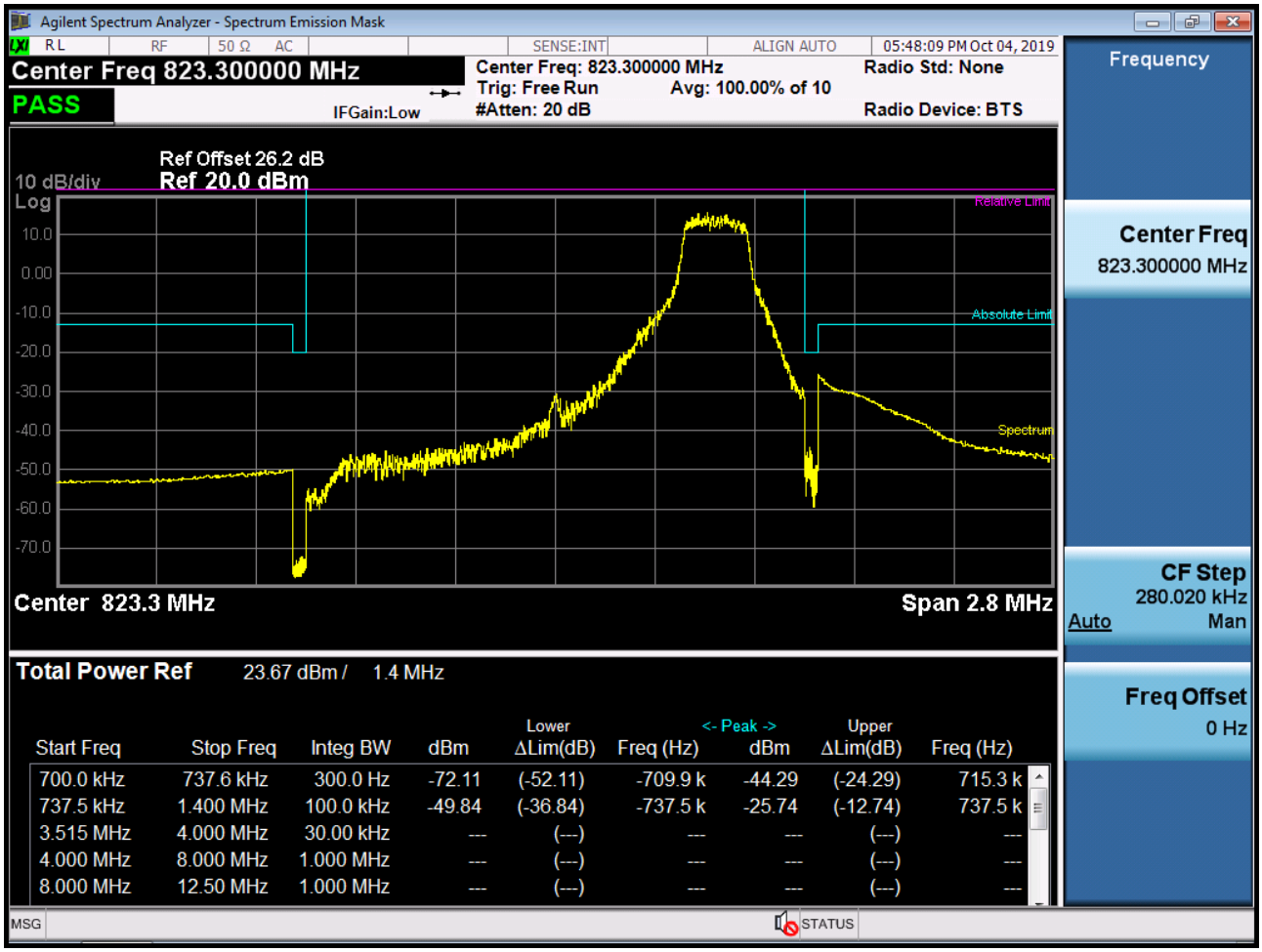


BAND 26. Mid Band Edge Plot (15M BW Ch.26765 QPSK RB 1, Offset74)-1

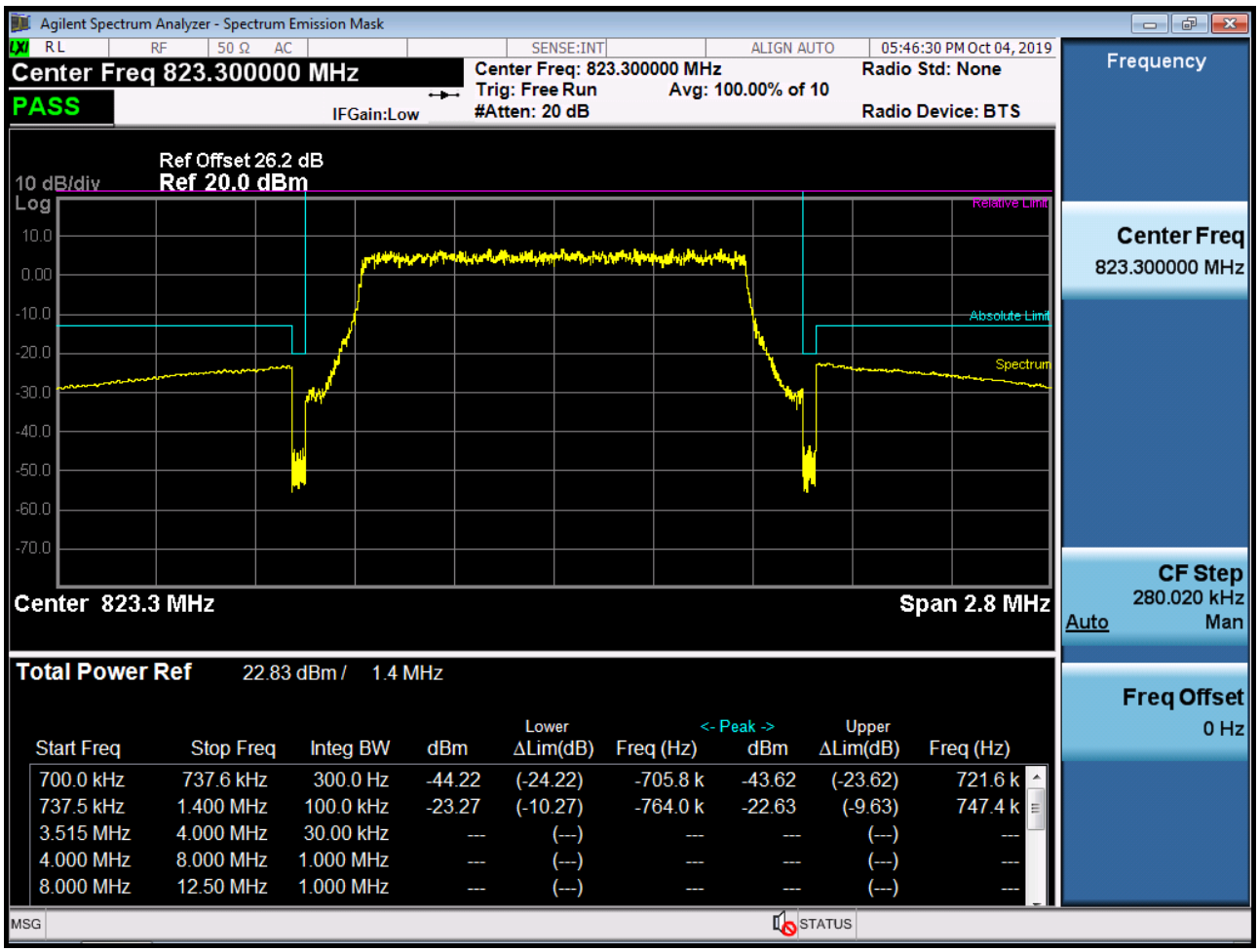


BAND 26. Mid Band Edge Plot (15M BW Ch.26765 QPSK_RB75_Offset 0)-2

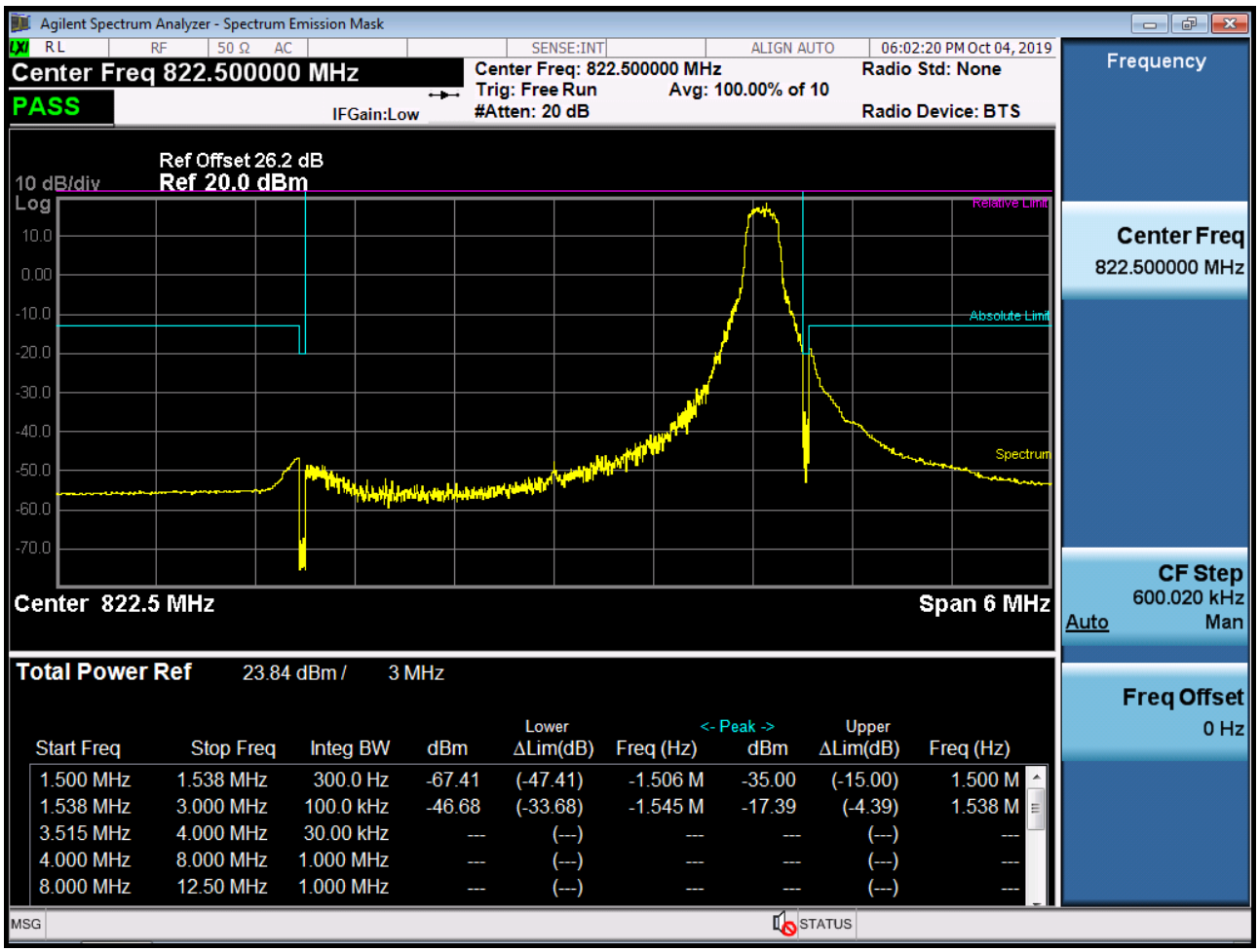
BAND 26. Upper Channel Edge Plot (1.4M BW Ch.26783 QPSK_RB1_Offset 5)



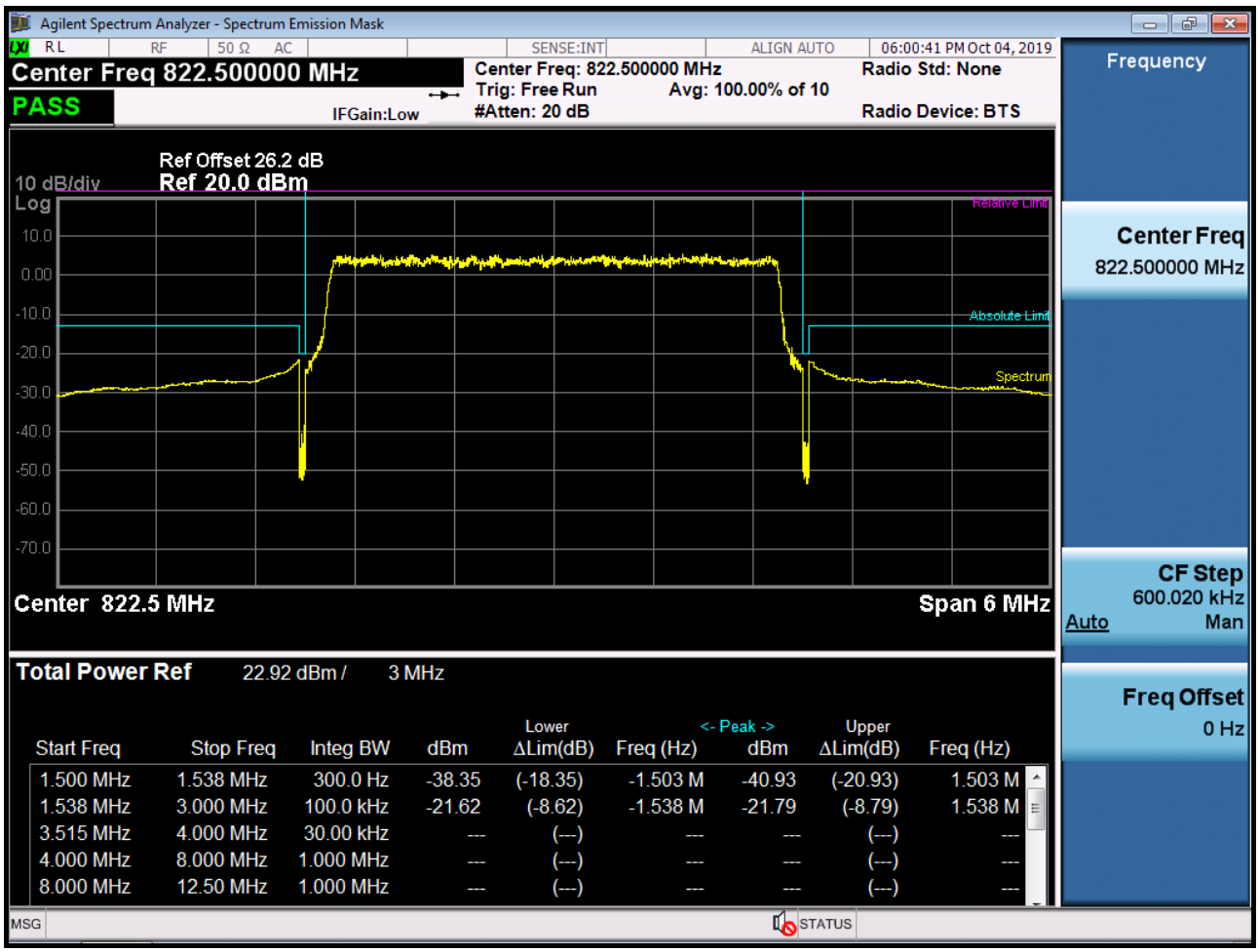
BAND 26. Upper Channel Edge Plot (1.4M BW Ch.26783 QPSK_RB6_Offset 0)



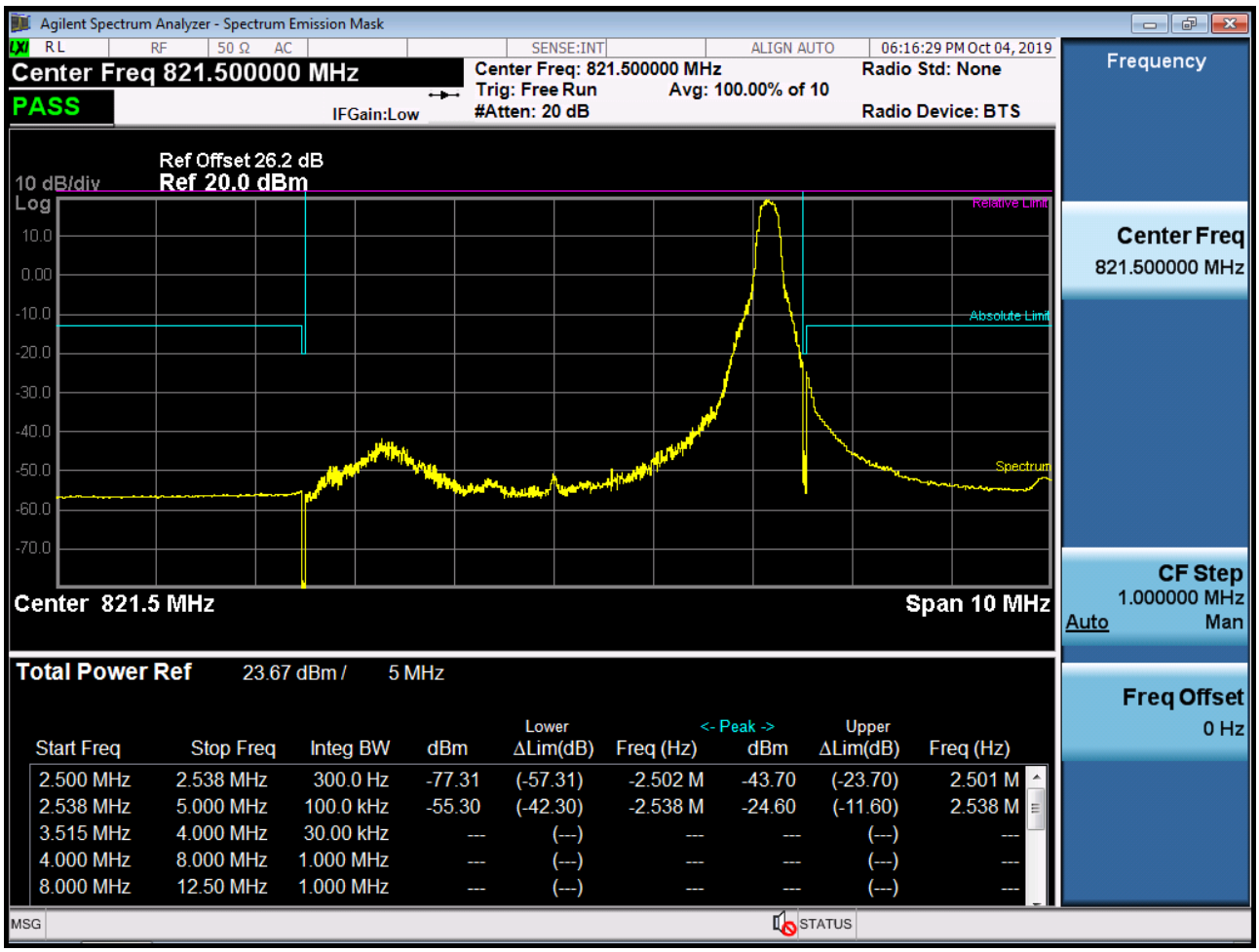
BAND 26. Upper Channel Edge Plot (3M BW Ch.26775 QPSK_RB1_Offset 14)



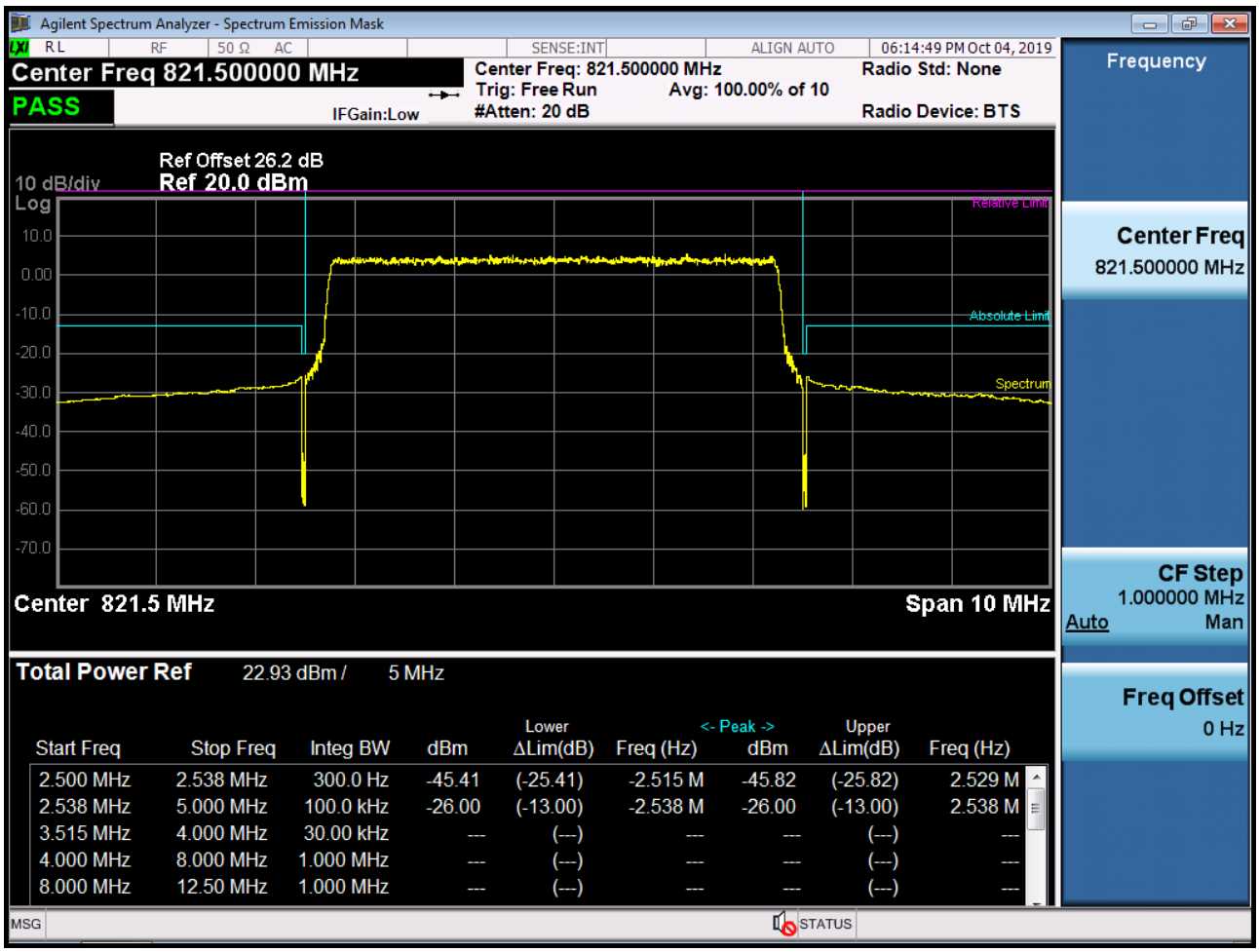
BAND 26. Upper Channel Edge Plot (3M BW Ch.26775 QPSK_RB15_Offset 0)



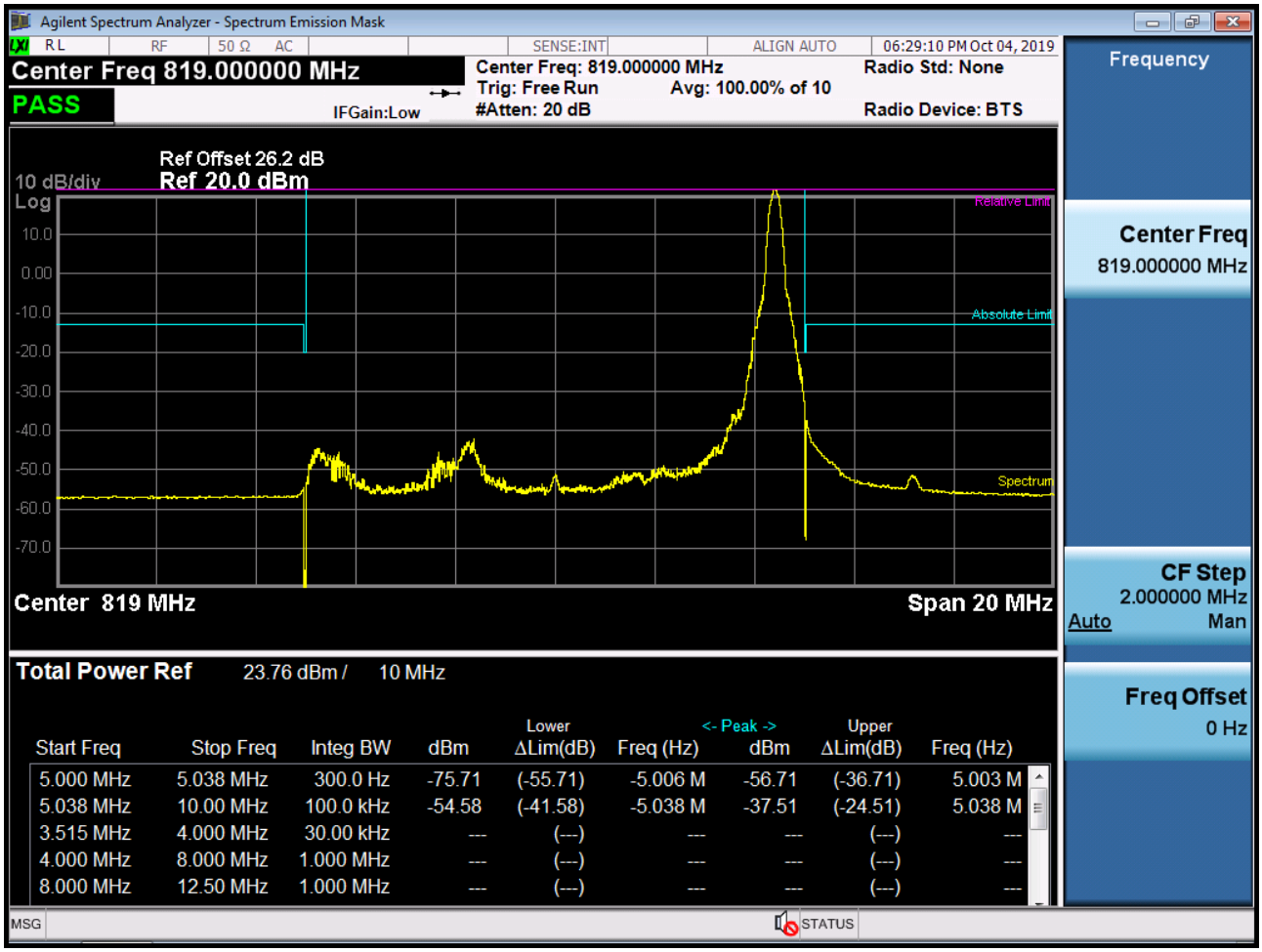
BAND 26. Upper Channel Edge Plot (5M BW Ch.26765 QPSK_RB1_Offset 24)



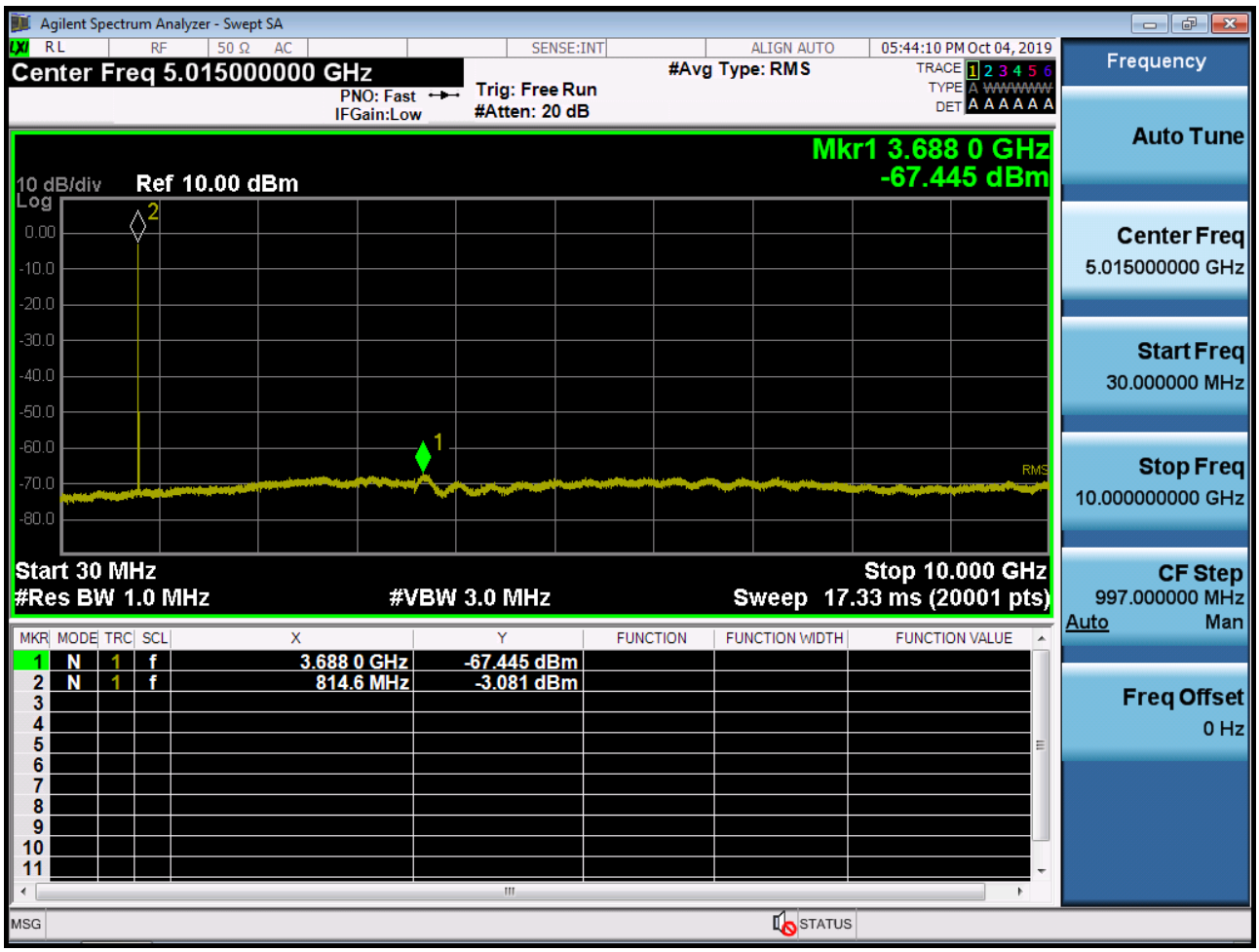
BAND 26. Upper Channel Edge Plot (5M BW Ch.26765 QPSK_RB25_Offset 0)



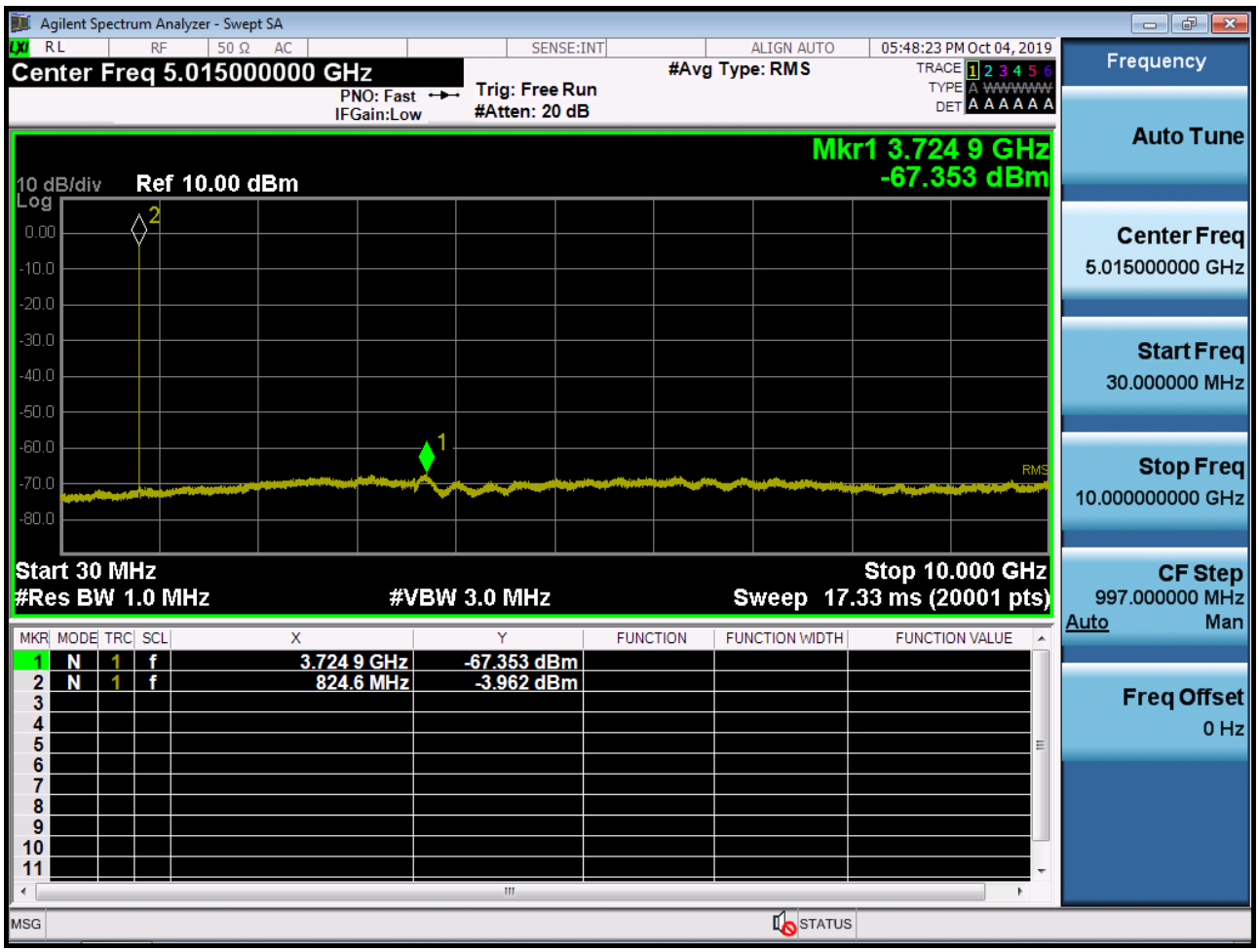
BAND 26. Mid Channel Edge Plot (10M BW Ch. 26740 QPSK_RB1_Offset 49)



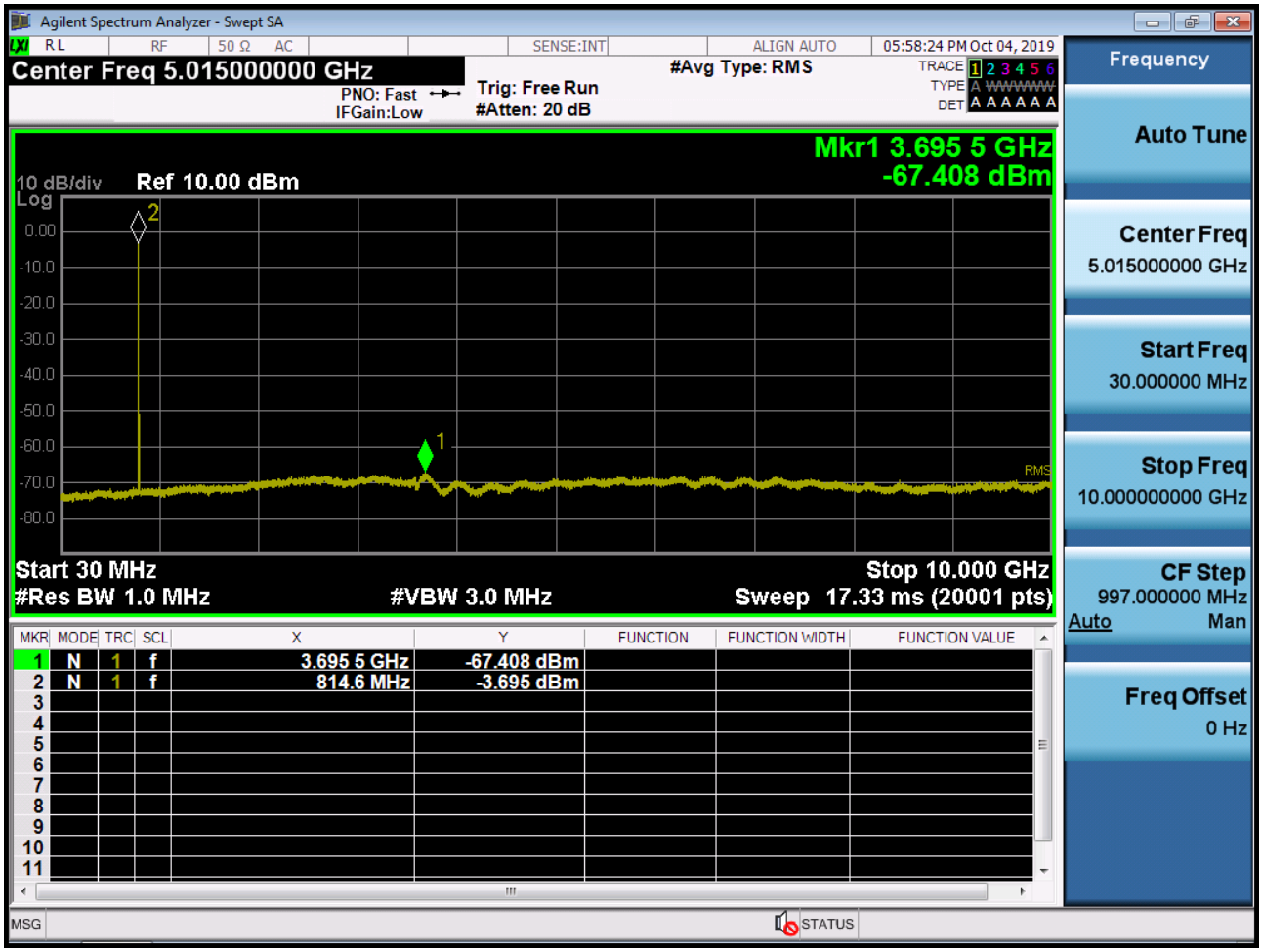
BAND 26. Conducted Spurious (26697 ch_1.4MHz_QPSK_RB 1_0)



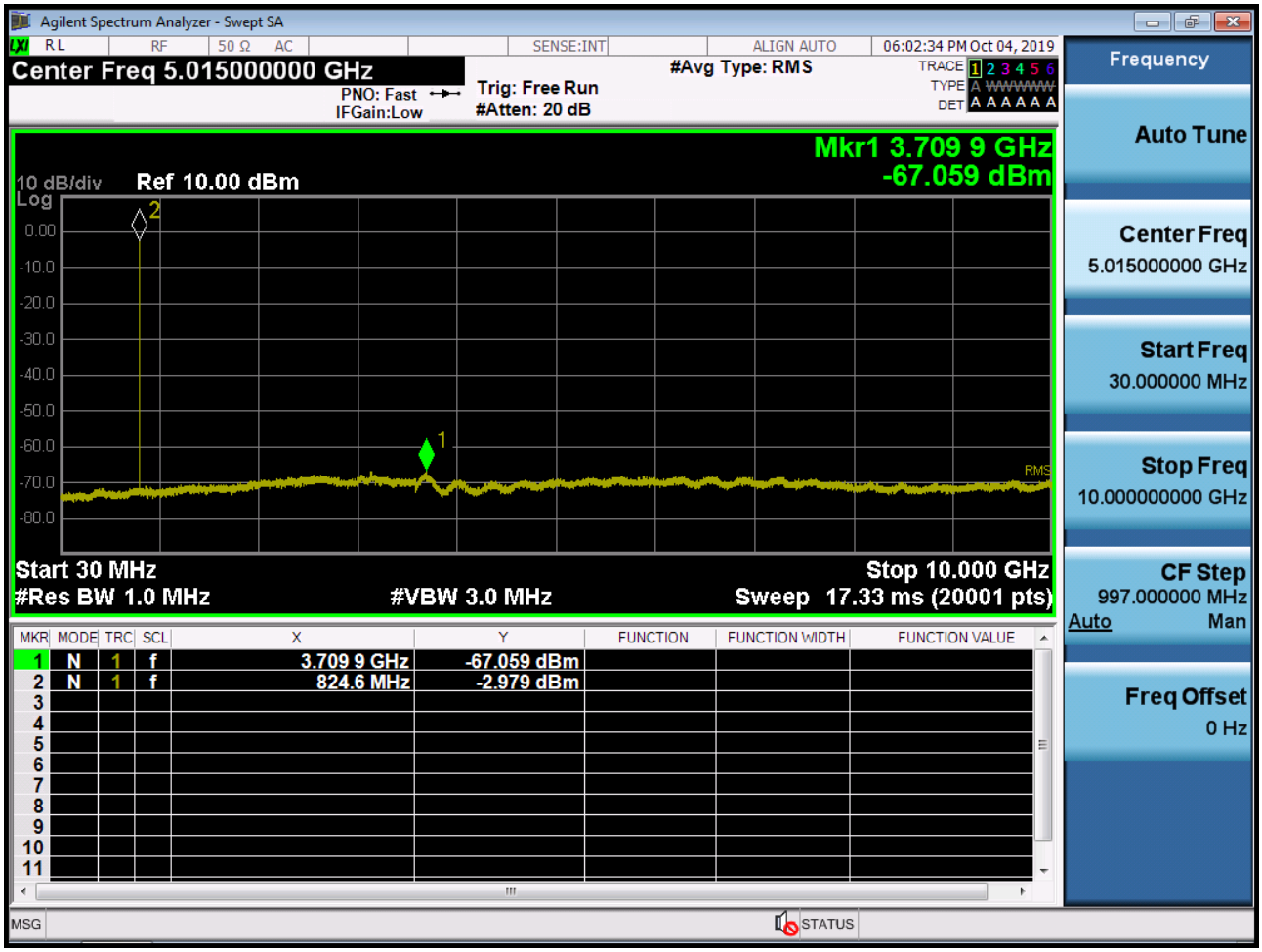
BAND 26. Conducted Spurious (26783 ch_1.4MHz_QPSK_RB 1_0)



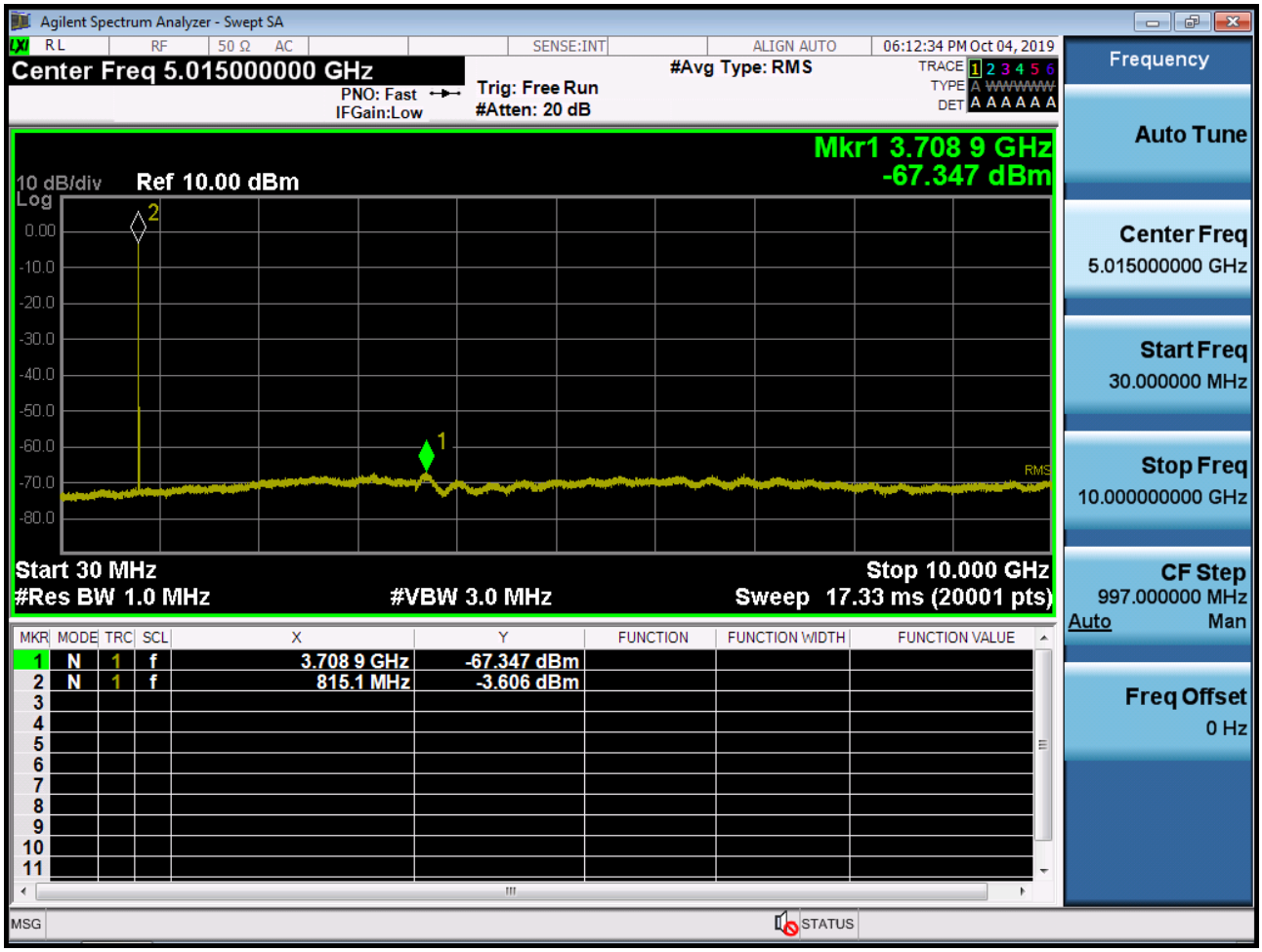
BAND 26. Conducted Spurious (26705 ch_3MHz_QPSK_RB 1_0)



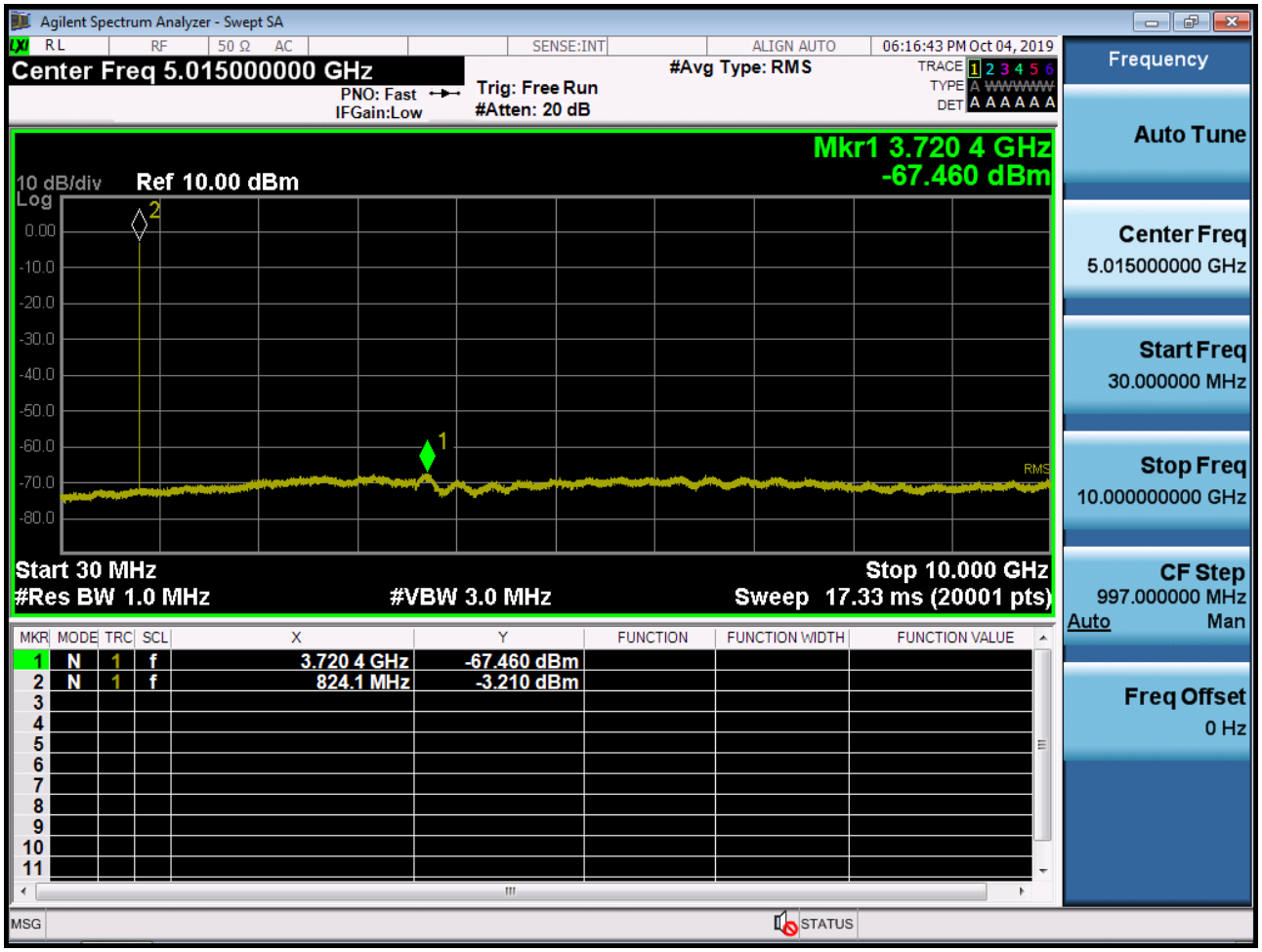
BAND 26. Conducted Spurious (26775 ch_3MHz_QPSK_RB 1_0)



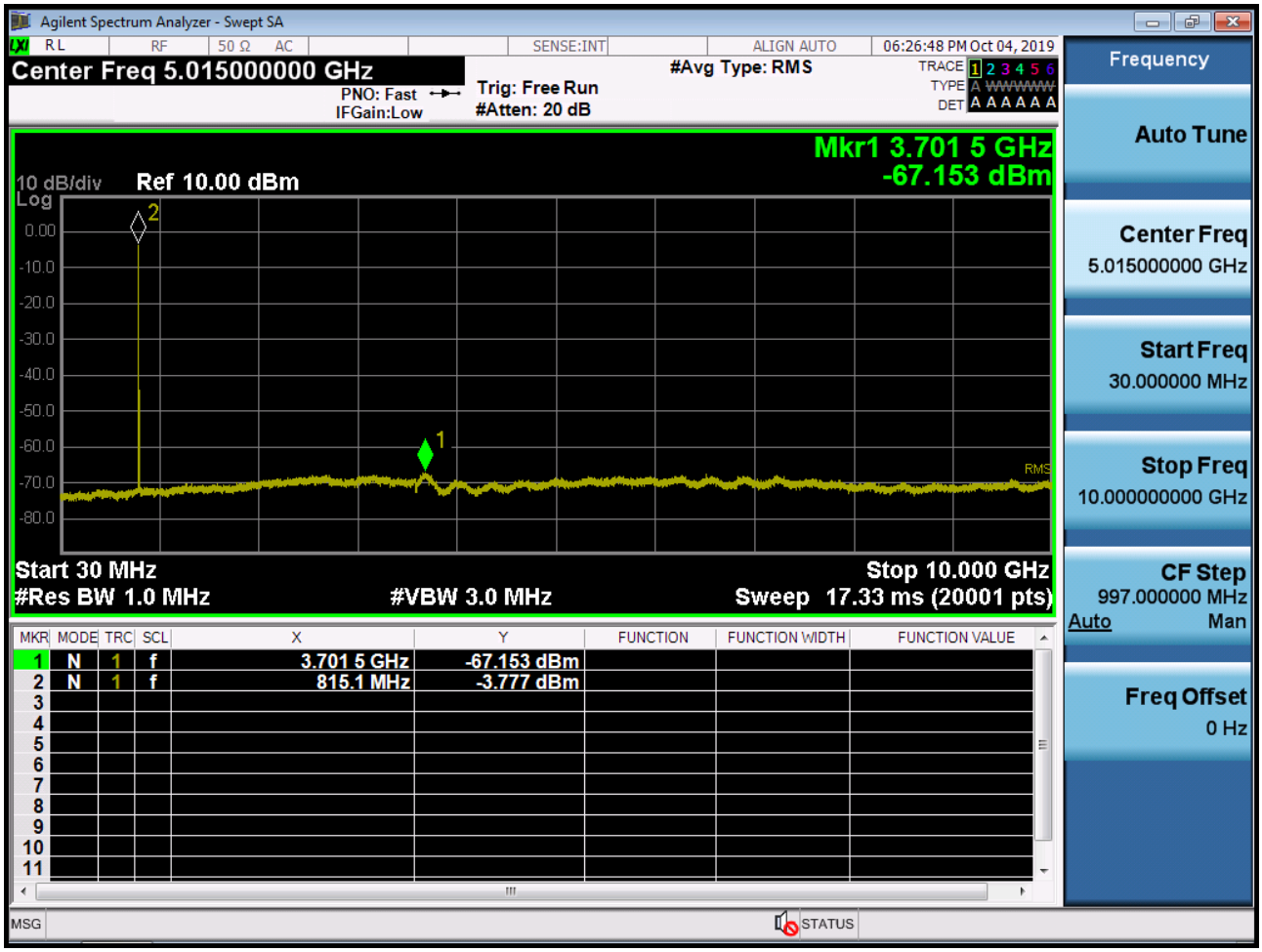
BAND 26. Conducted Spurious (26715 ch_5MHz_QPSK_RB 1_0)



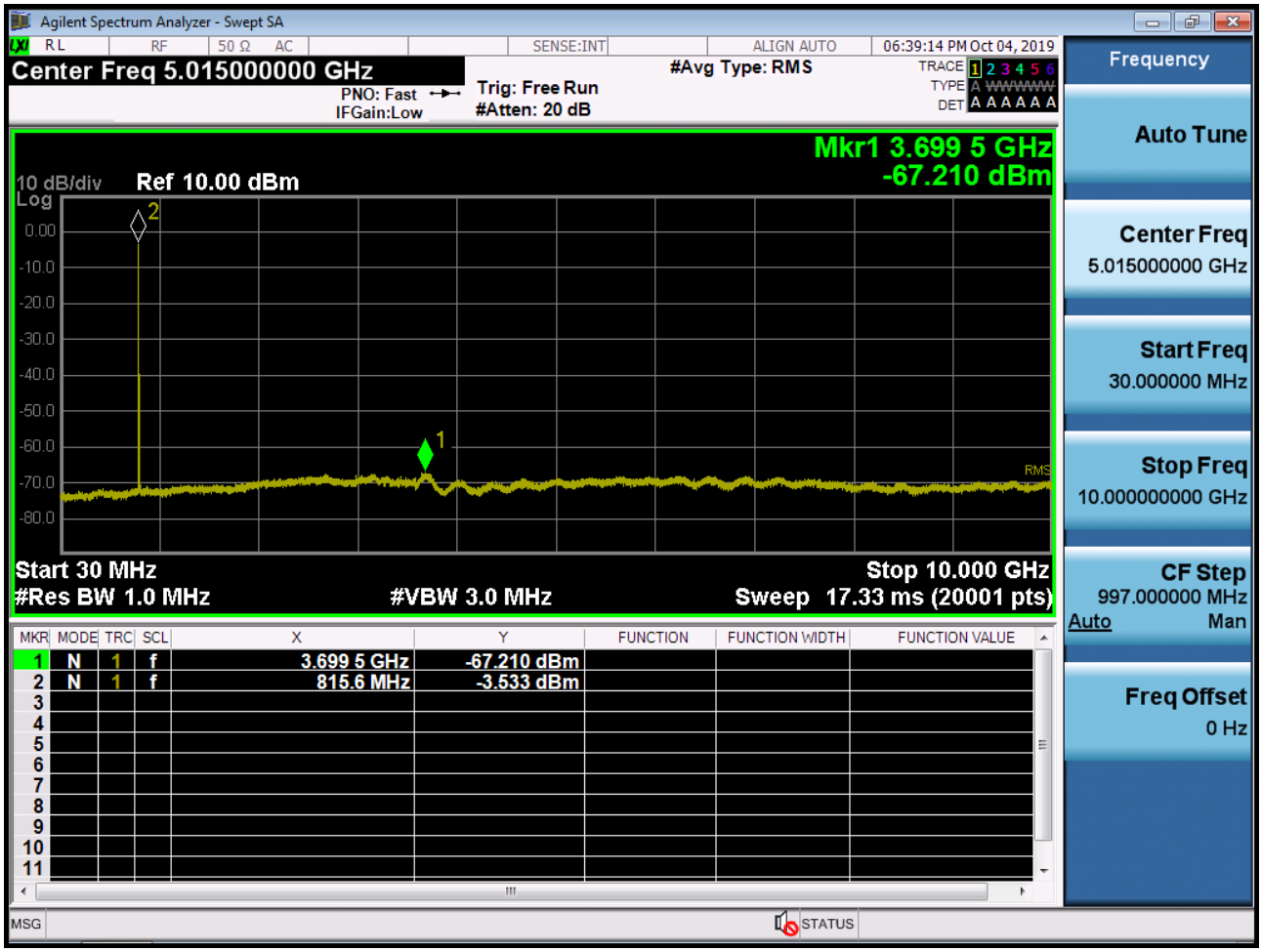
BAND 26. Conducted Spurious (26765 ch_5MHz_QPSK_RB 1_0)



BAND 26. Conducted Spurious (26740 ch_10MHz_QPSK_RB 1_0)

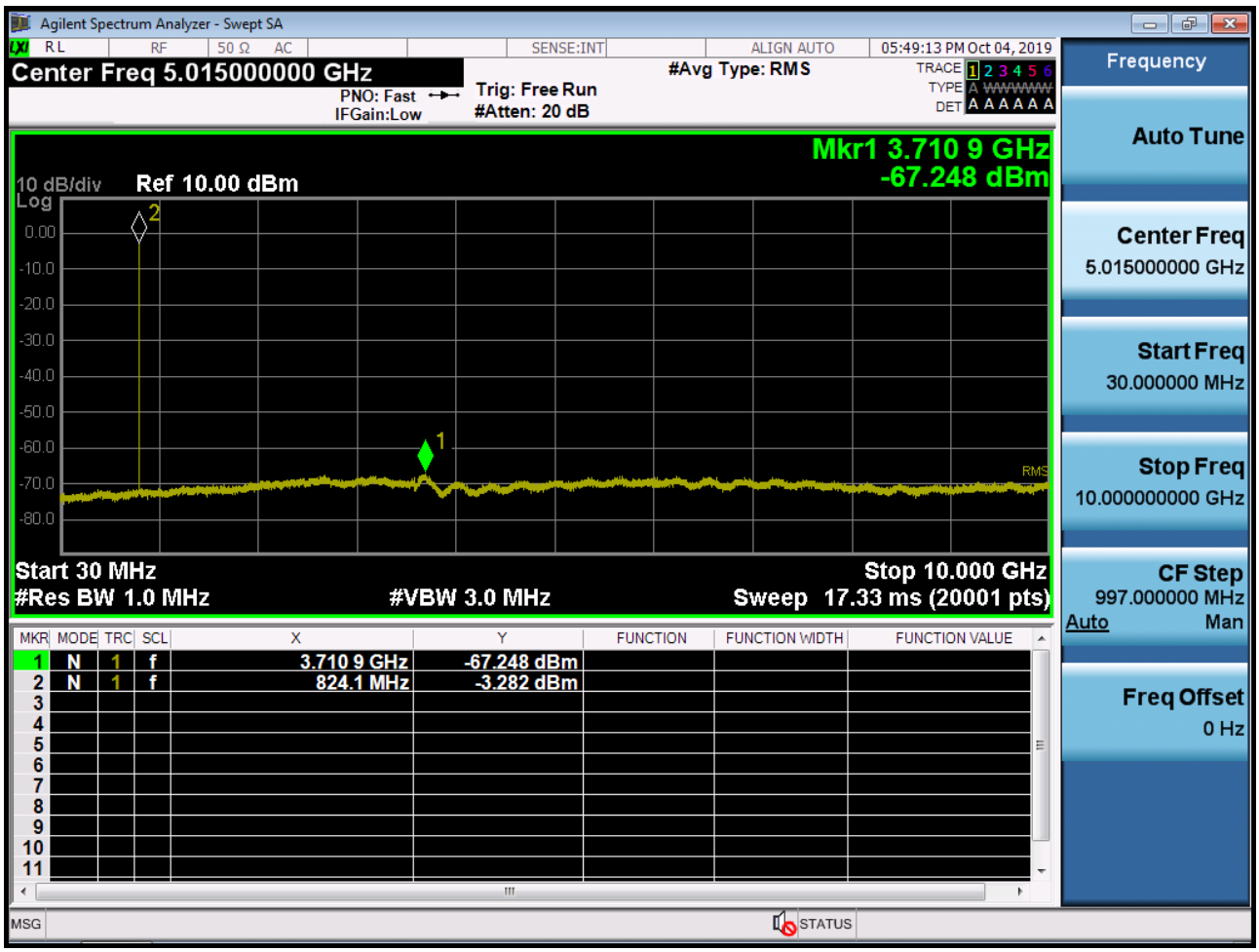


BAND 26. Conducted Spurious (26765 ch_15MHz_QPSK_RB 1_0)

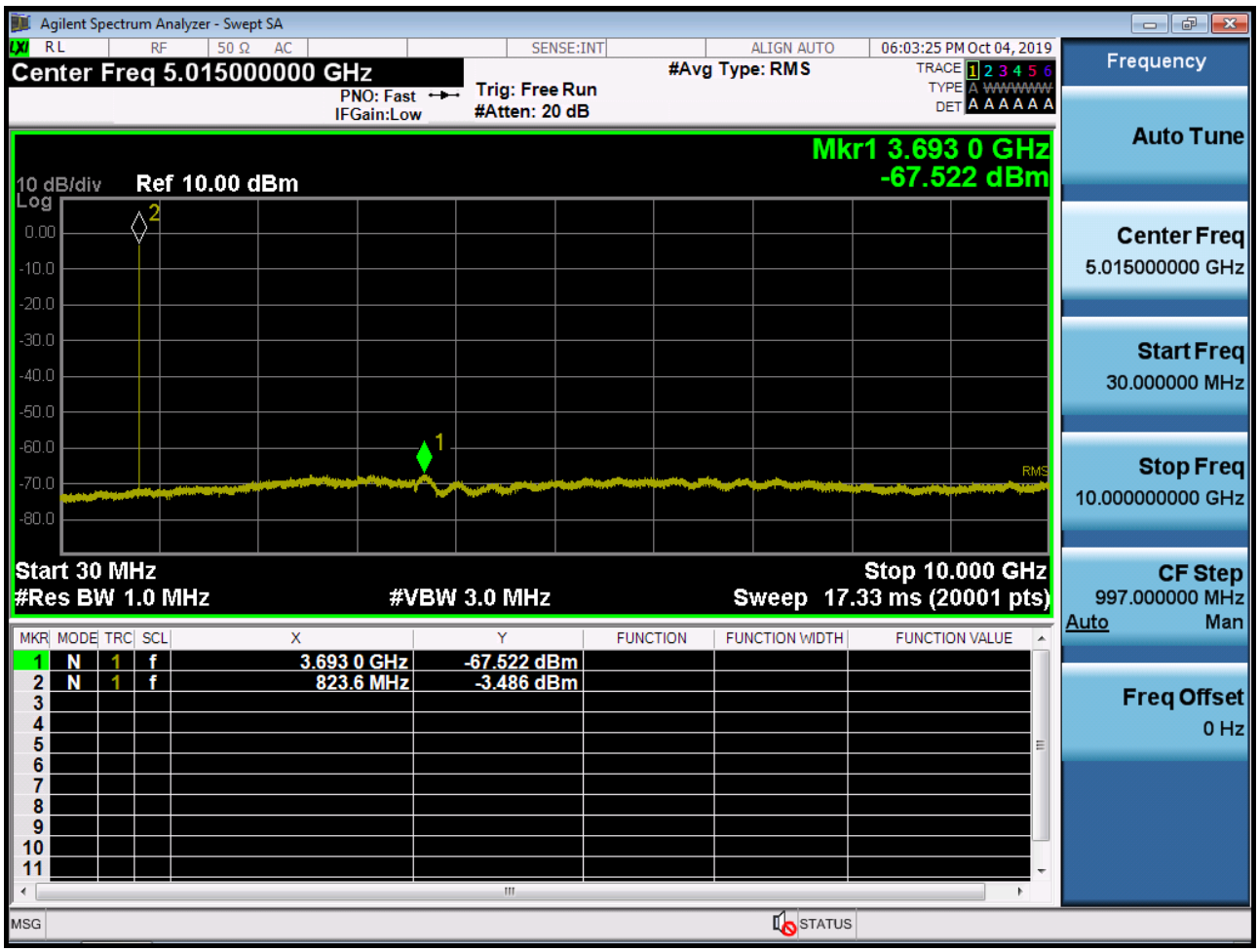


10. TEST PLOTS (STRADDLE CHANNEL)

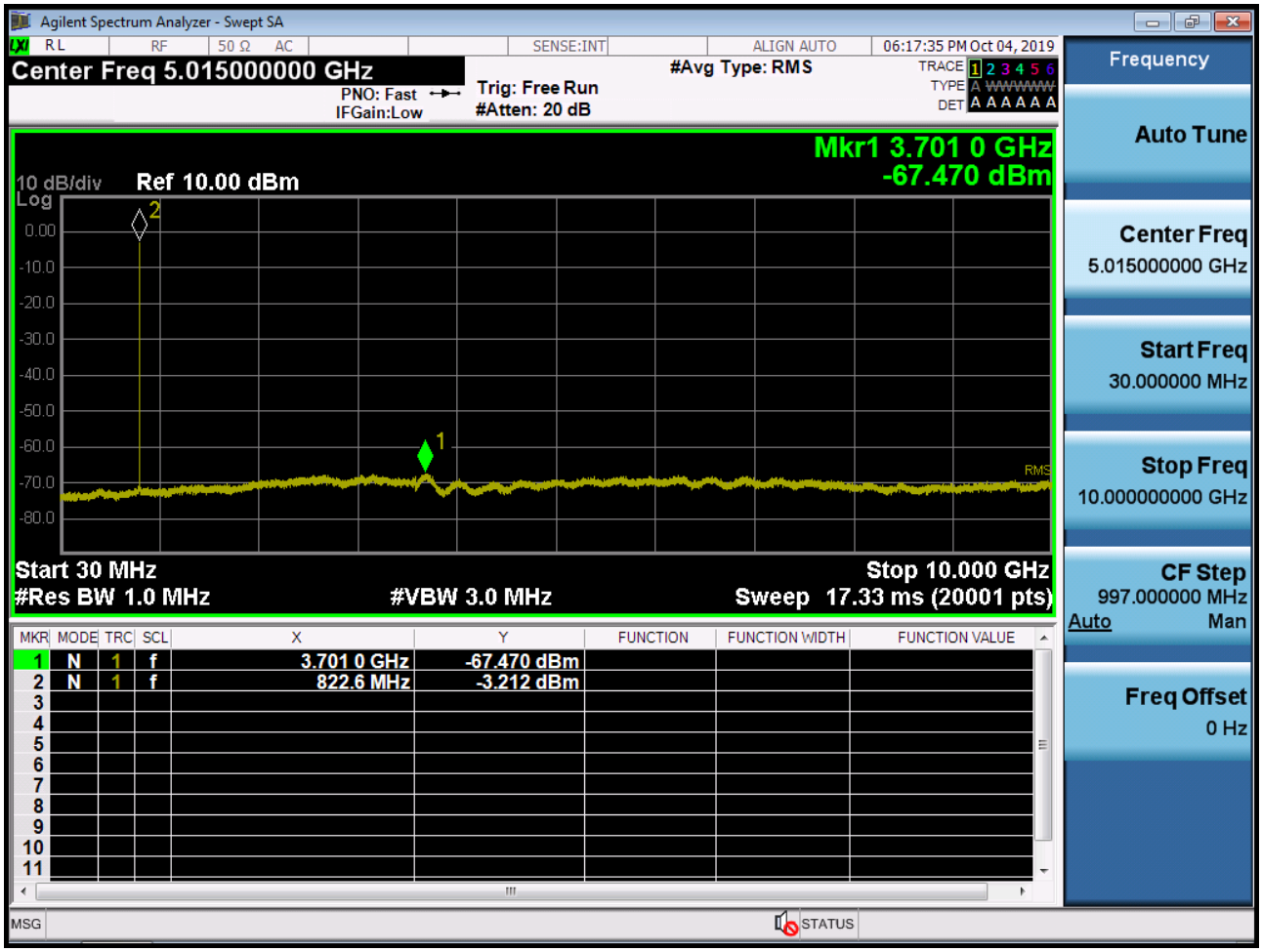
BAND 26. Conducted Spurious (1.4MHz_QPSK_RB 1_0)



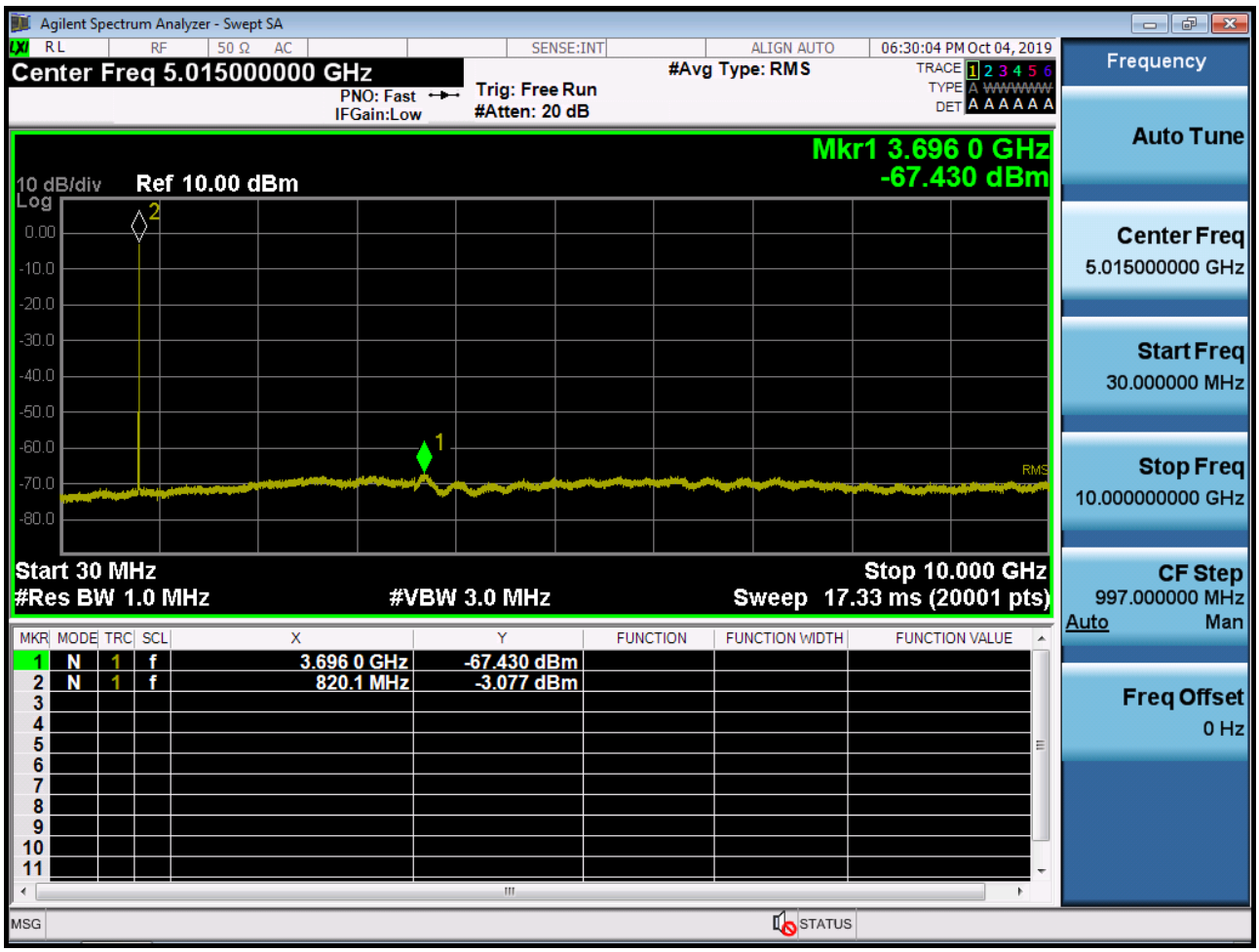
BAND 26. Conducted Spurious (3MHz_QPSK_RB 1_0)



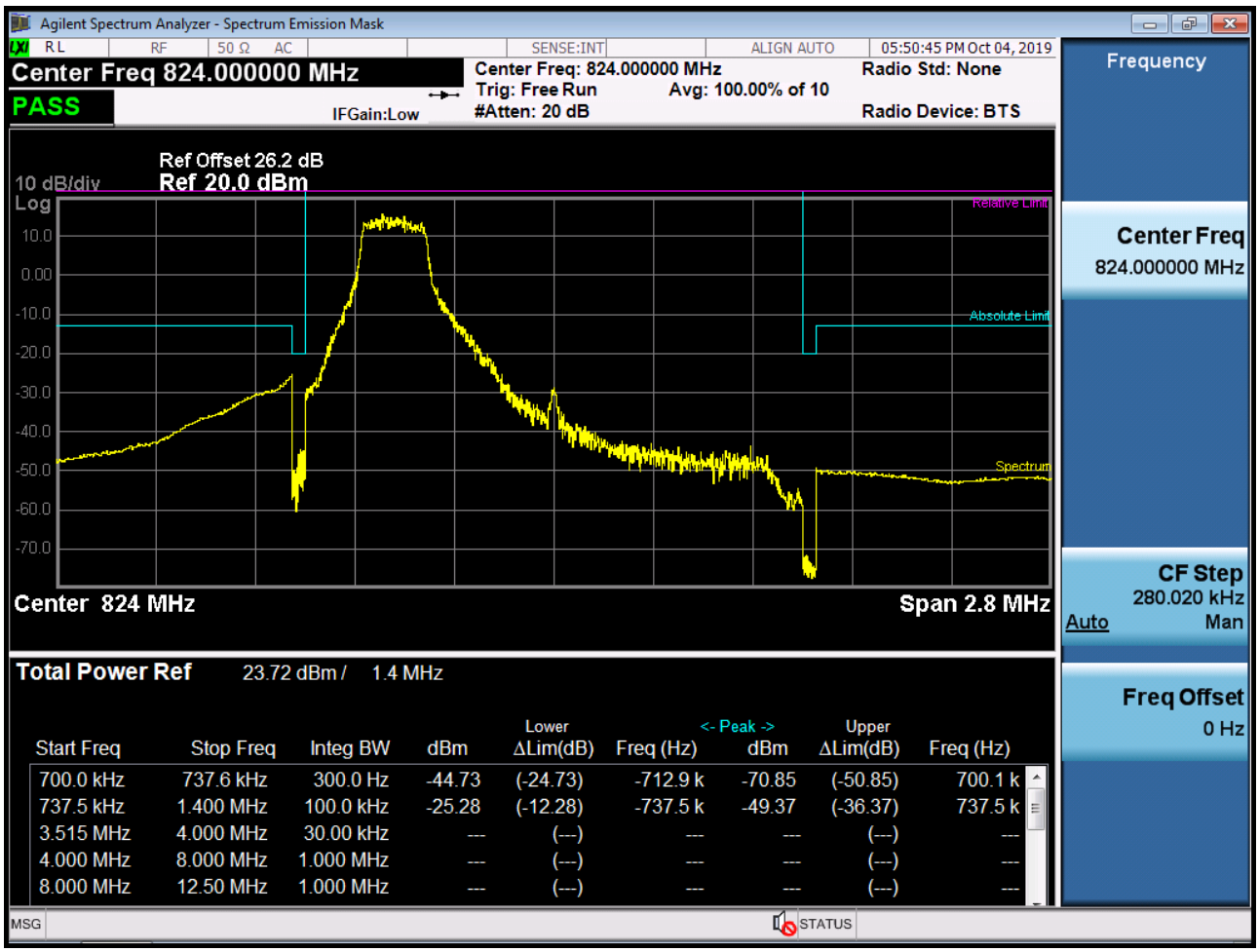
BAND 26. Conducted Spurious (5MHz_QPSK_RB 1_0)



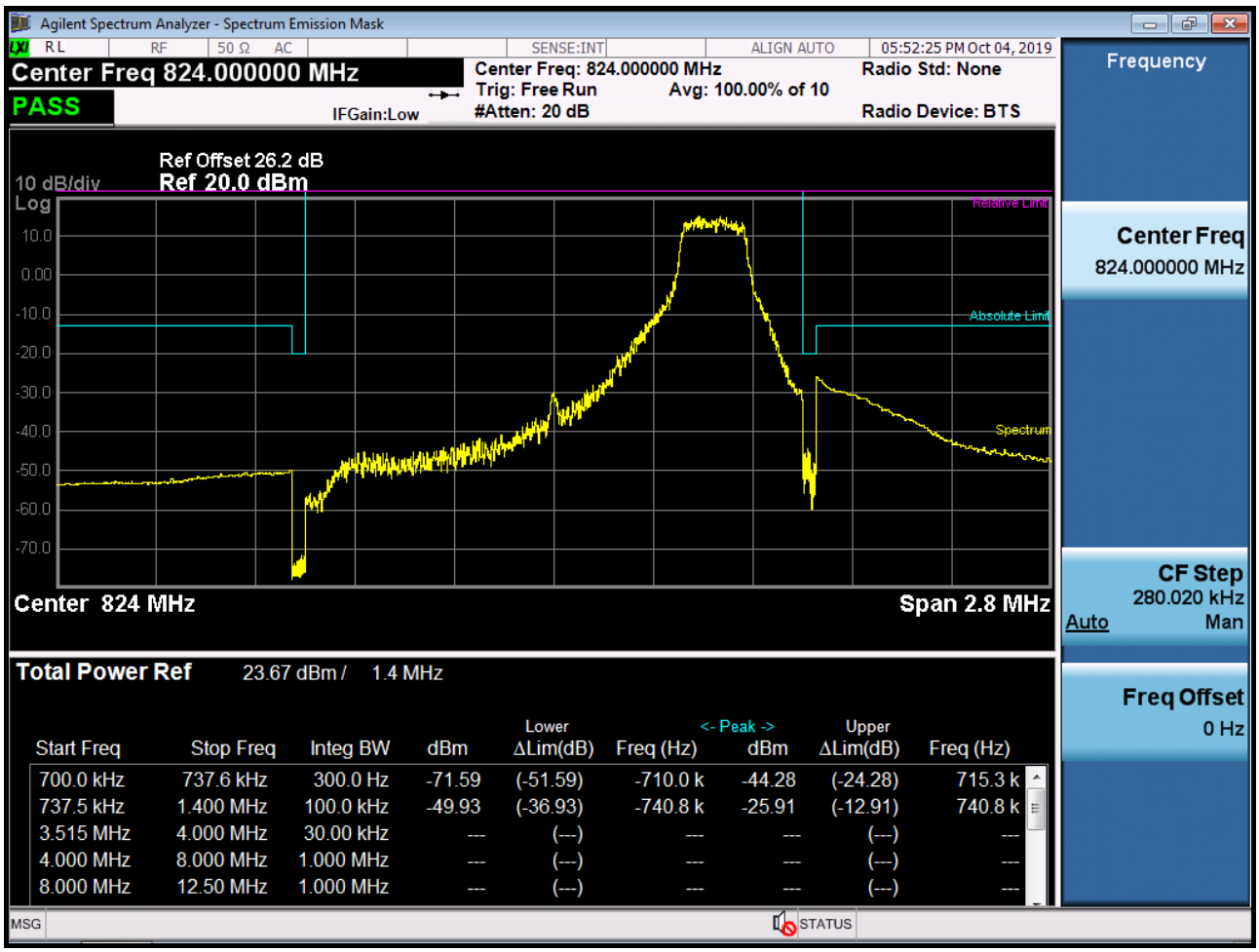
BAND 26. Conducted Spurious (10MHz_QPSK_RB 1_0)



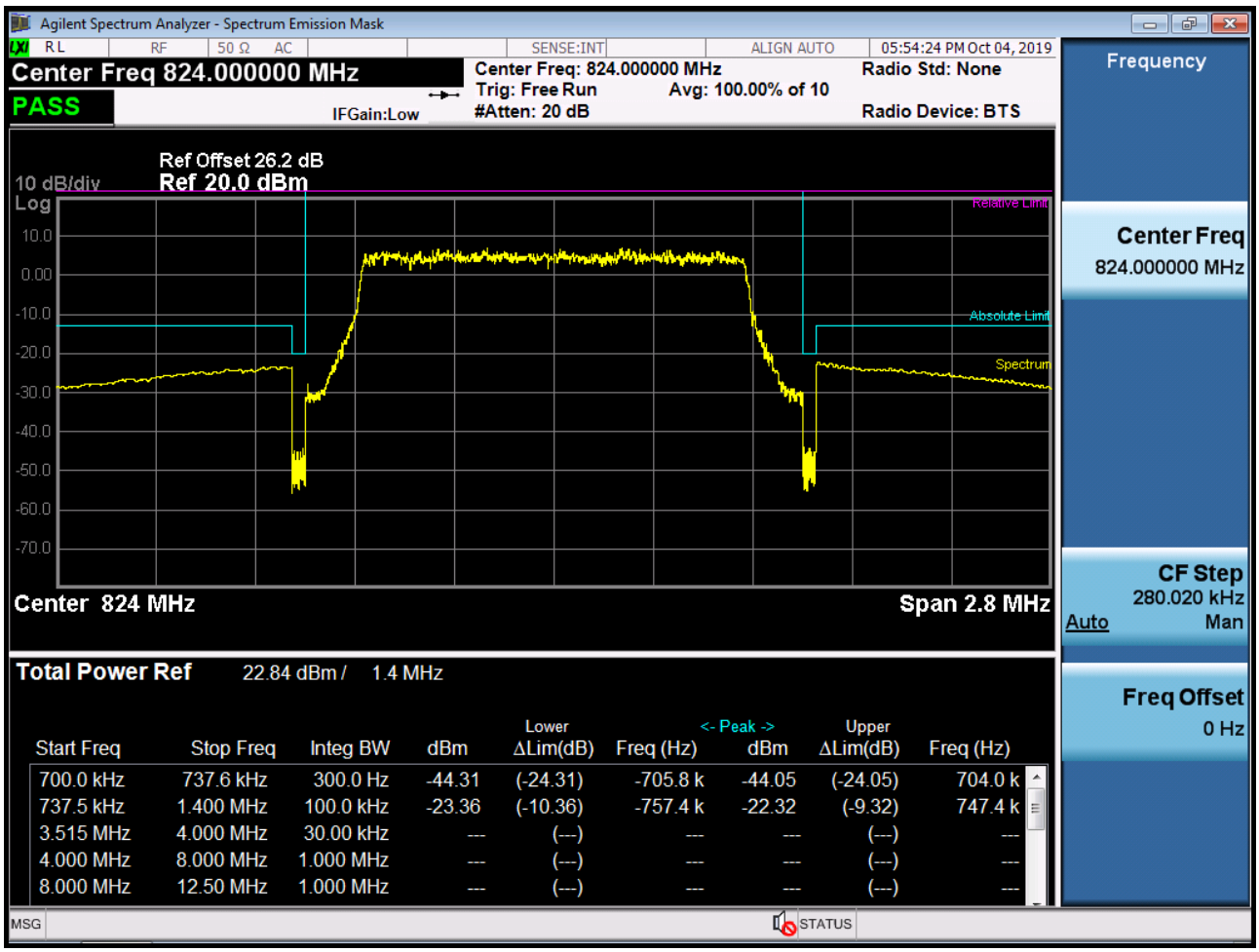
BAND 26. Channel Edge (1.4MHz_QPSK_RB 1_0)



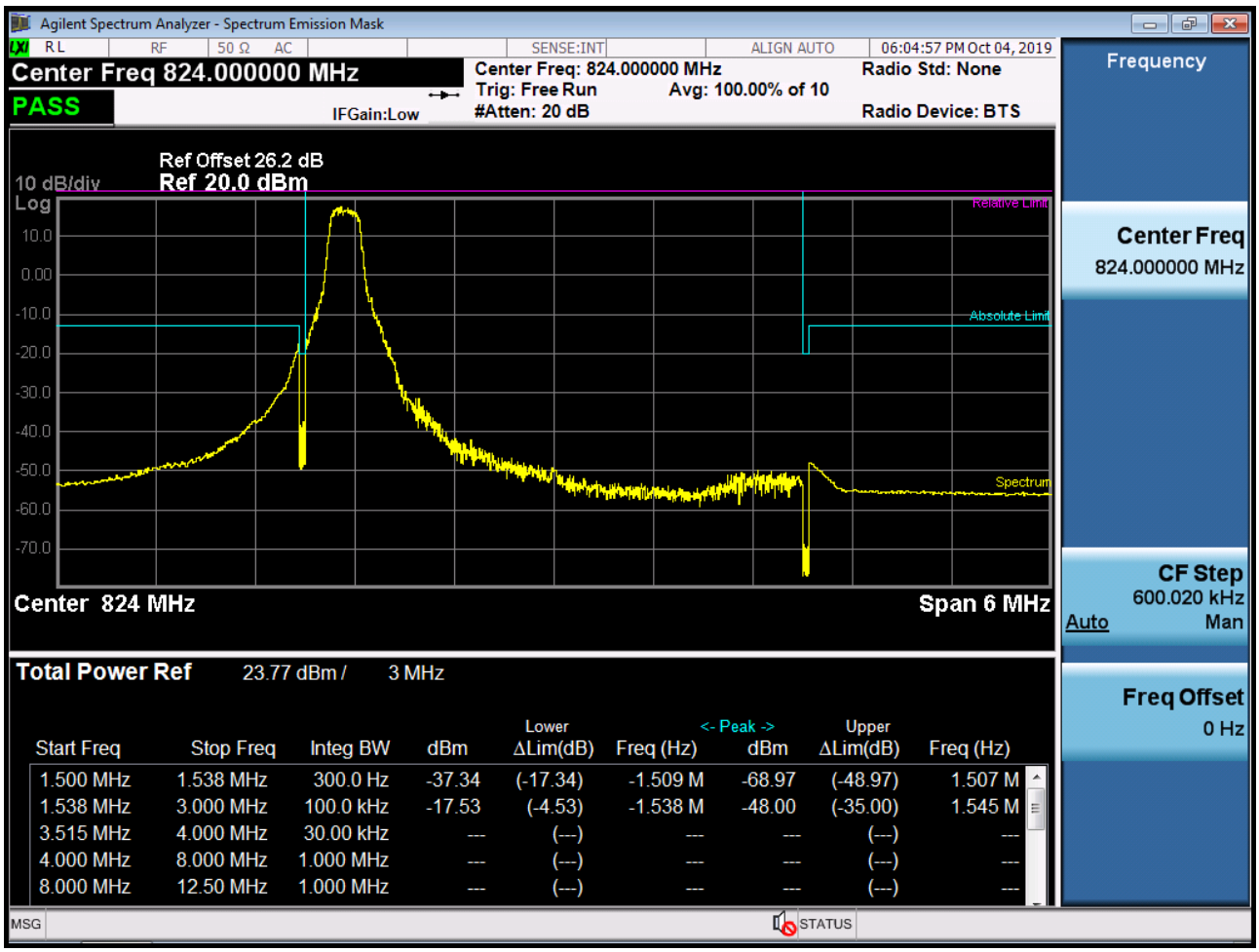
BAND 26. Channel Edge (1.4MHz_QPSK_RB 1_5)



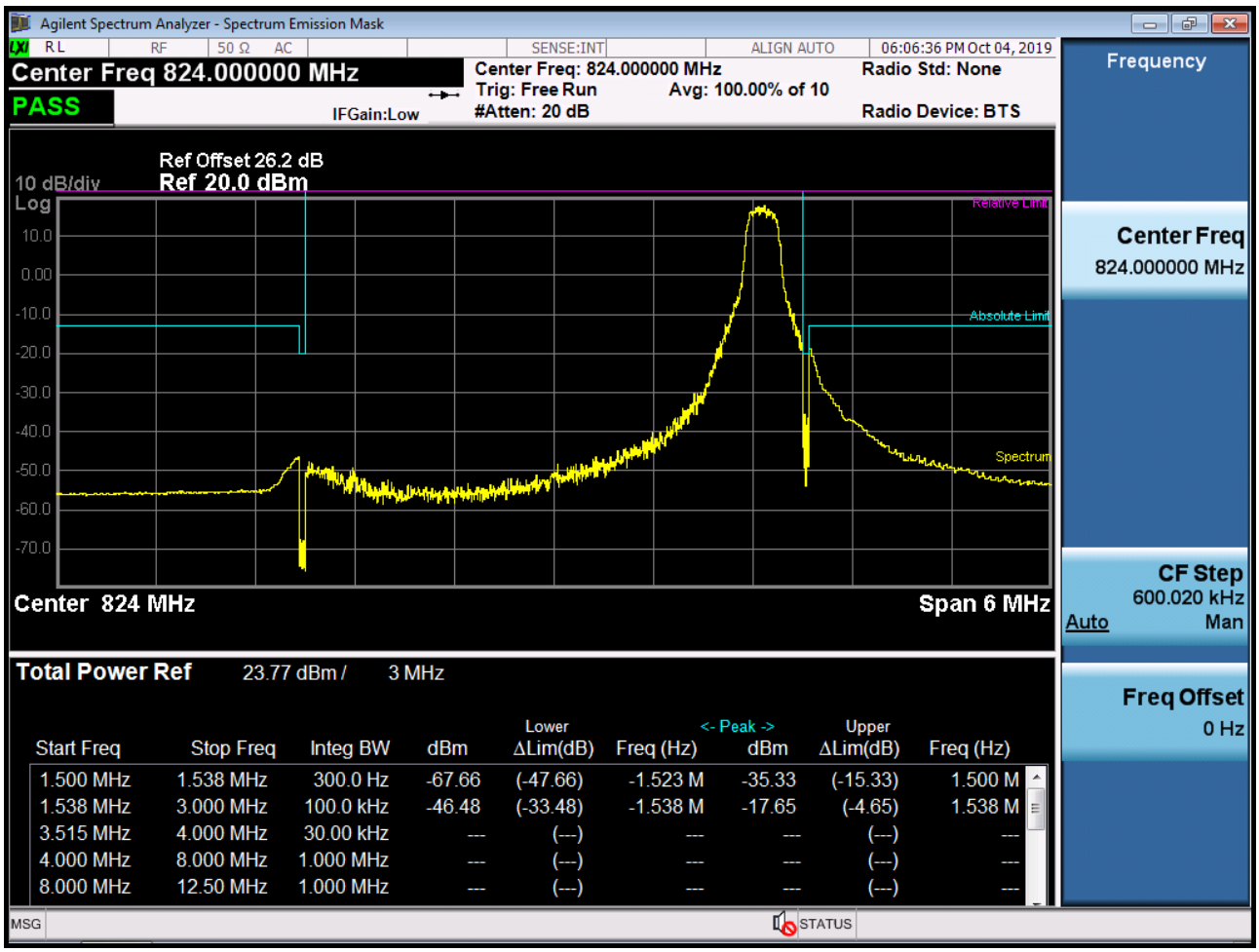
BAND 26. Channel Edge (1.4MHz_QPSK_Full RB)



BAND 26. Channel Edge (3MHz_QPSK_RB 1_0)

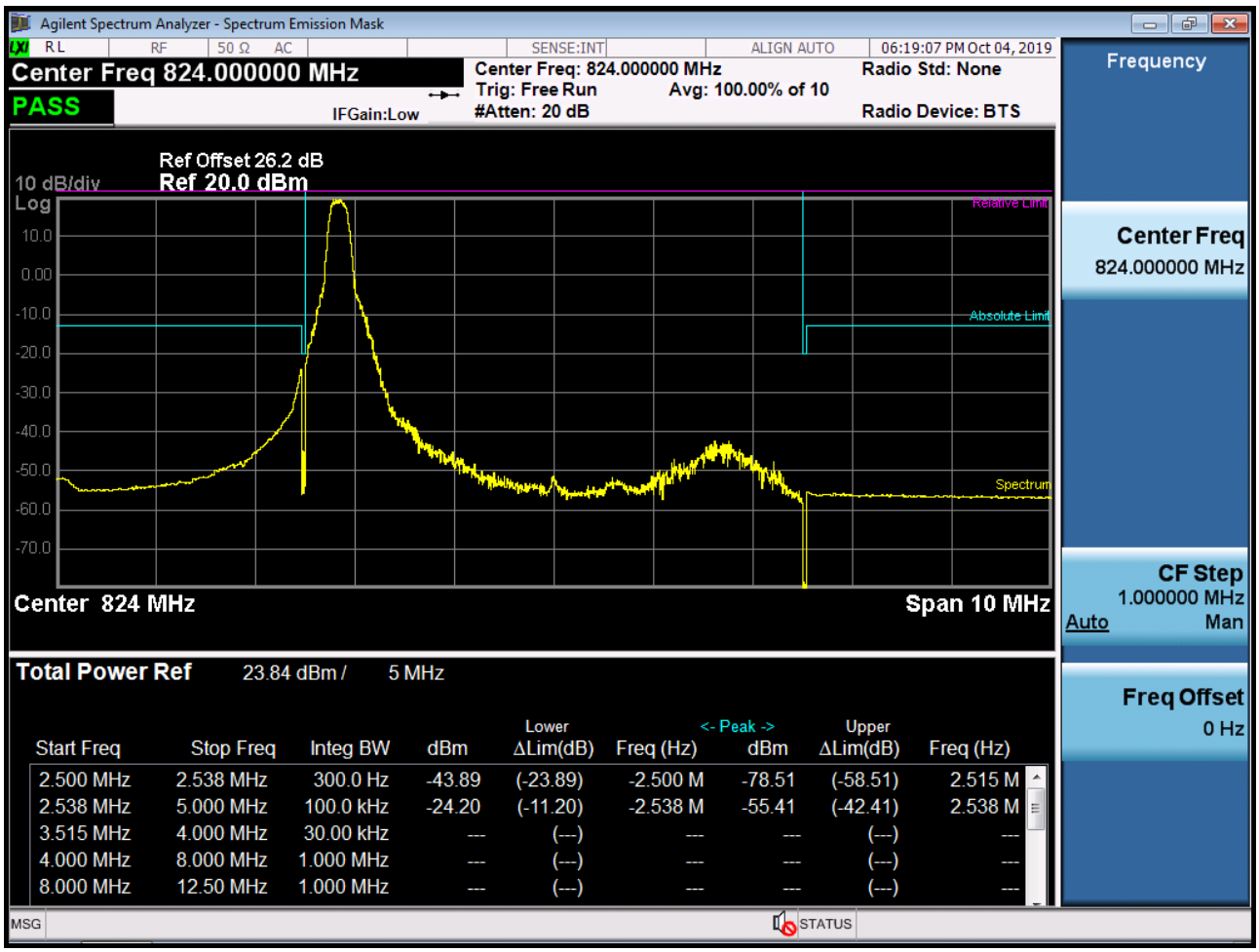


BAND 26. Channel Edge (3MHz_QPSK_RB 1_14)

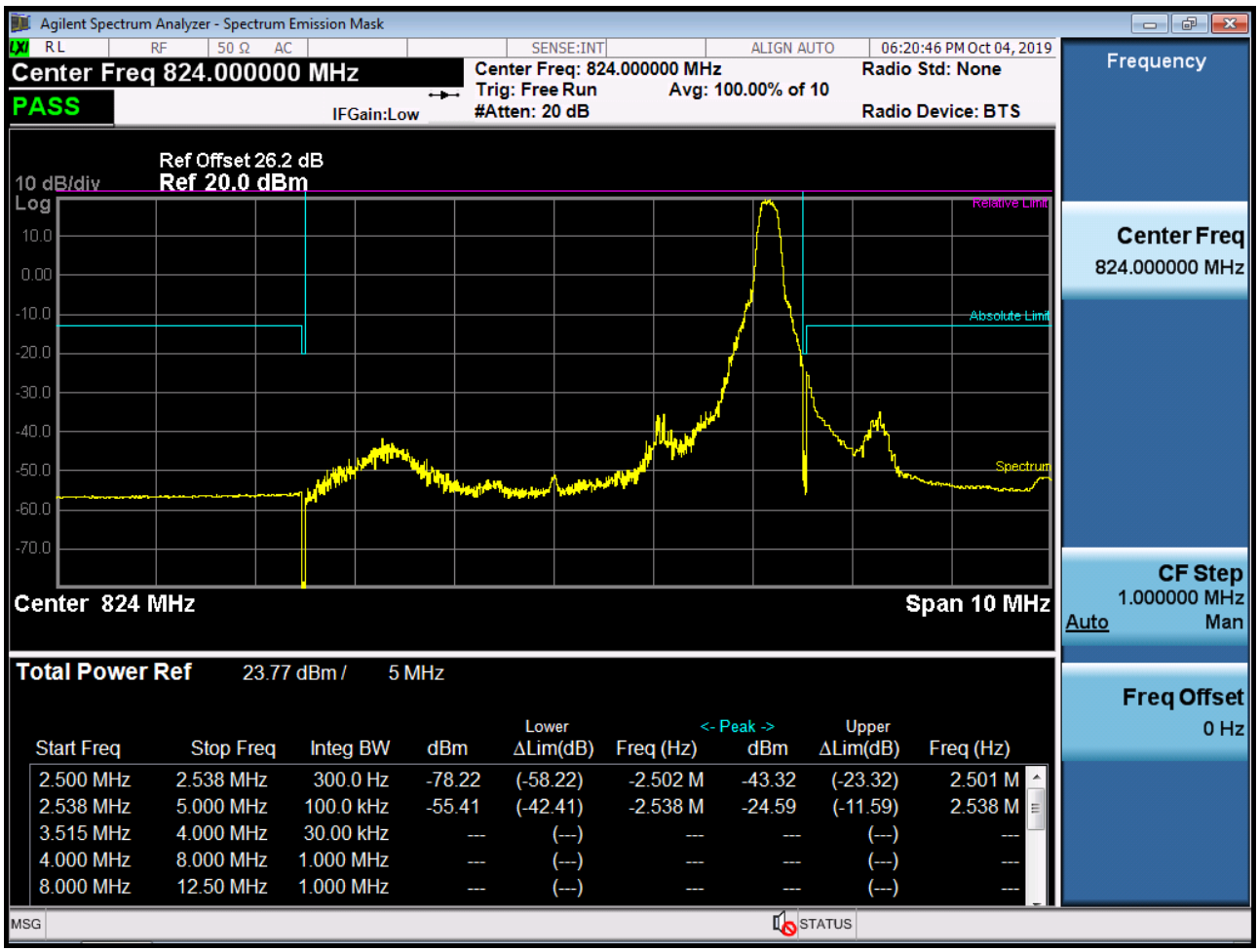


BAND 26. Channel Edge (3MHz_QPSK_Full RB)

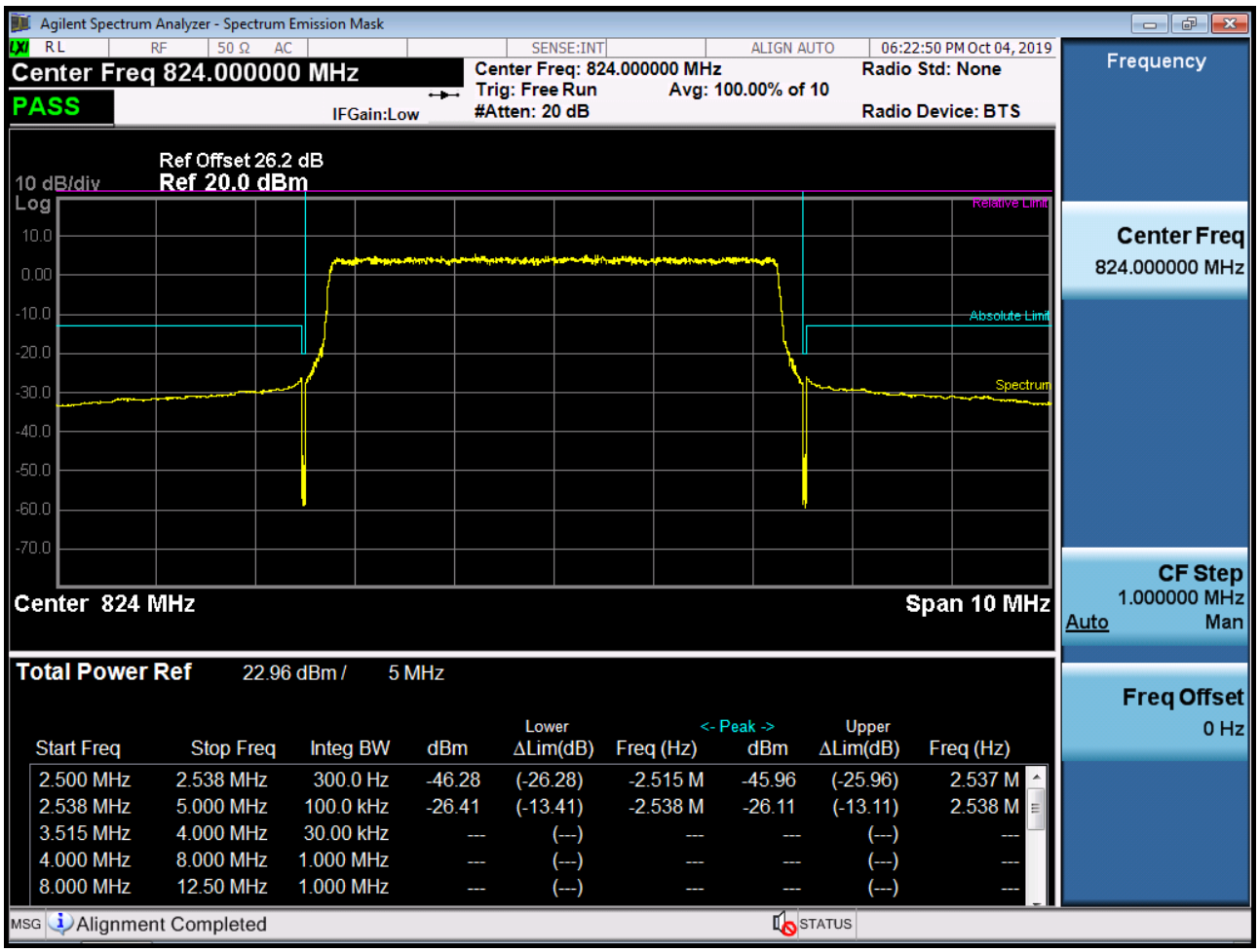
BAND 26. Channel Edge (5MHz_QPSK_RB 1_0)



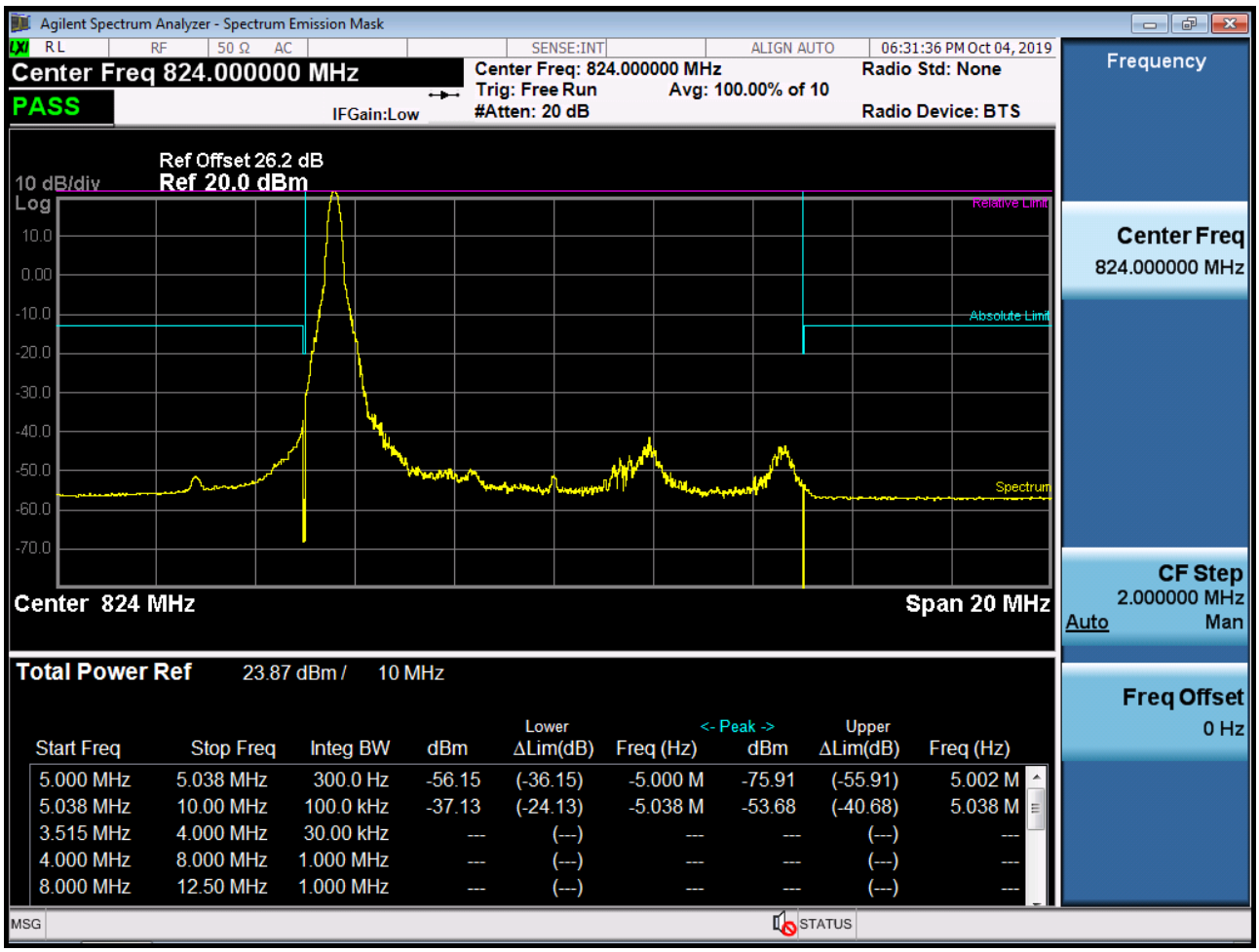
BAND 26. Channel Edge (5MHz_QPSK_RB 1_24)



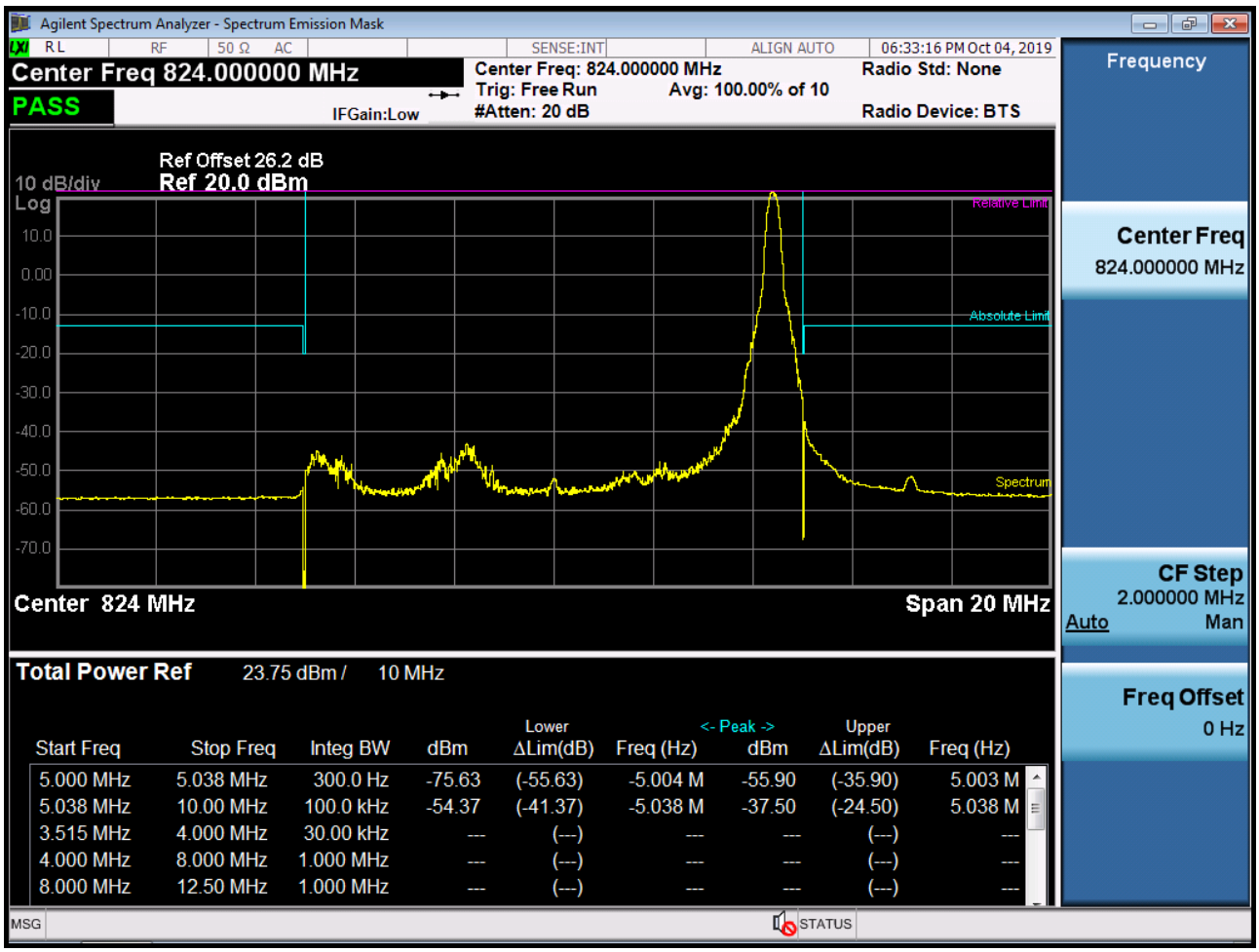
BAND 26. Channel Edge (5MHz_QPSK_Full RB)



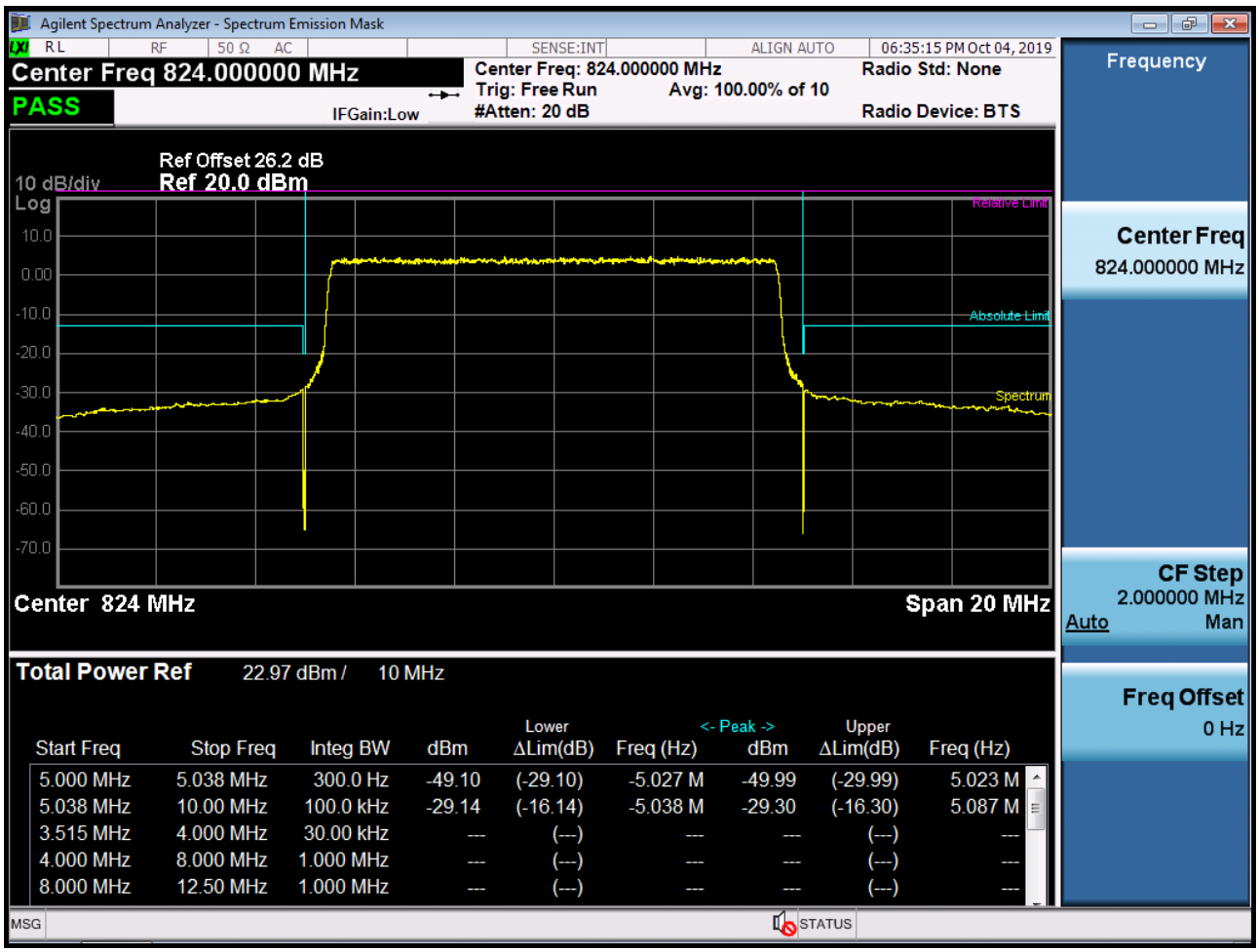
BAND 26. Channel Edge (10MHz_QPSK_RB 1_0)



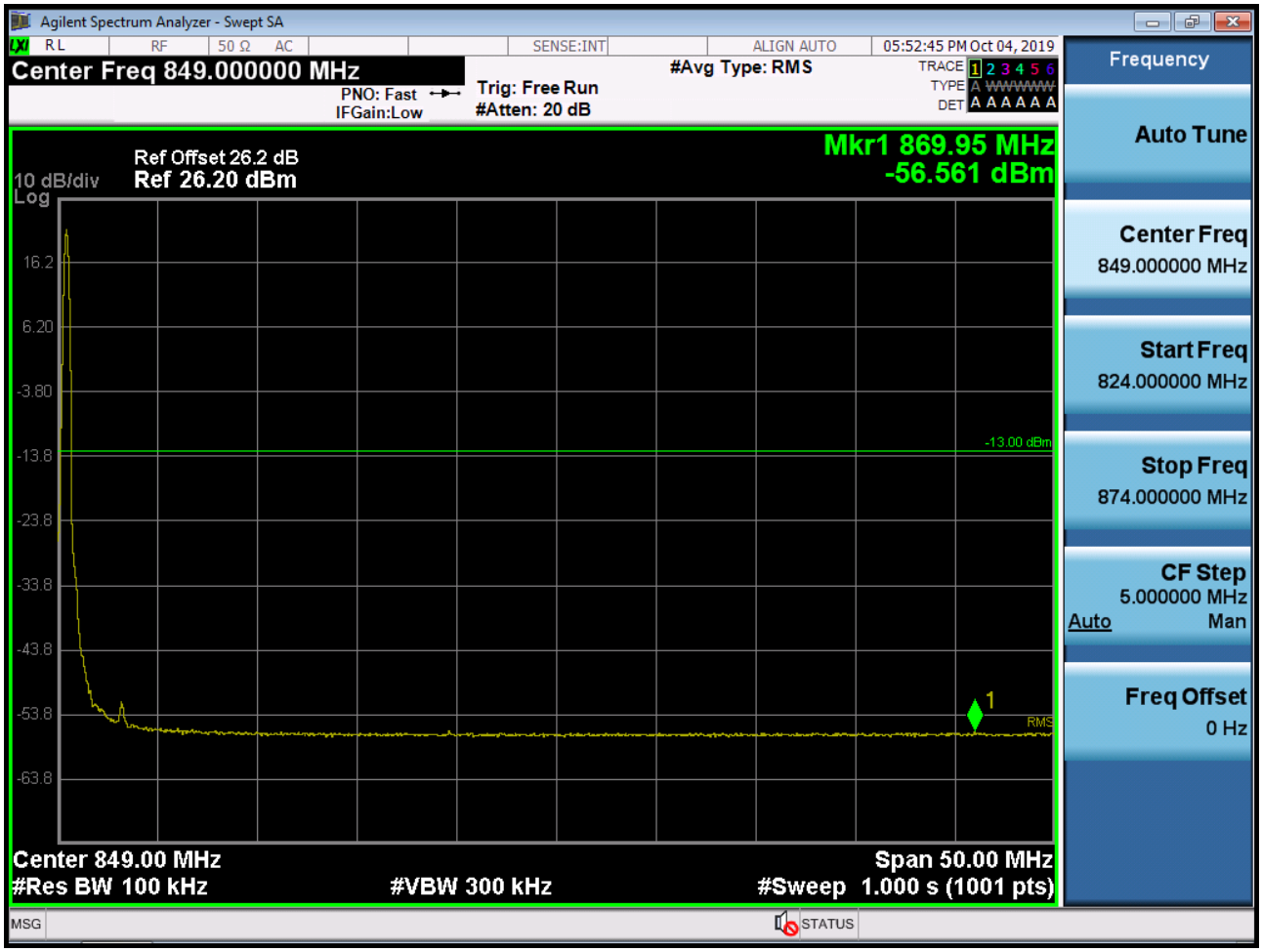
BAND 26. Channel Edge (10MHz_QPSK_RB 1_49)



BAND 26. Channel Edge (10MHz_QPSK_Full RB)



BAND 26. Band Edge (1.4MHz_QPSK_RB 1_5)



BAND 26. Band Edge (1.4MHz_QPSK_FullRB)

BAND 26. Band Edge (3MHz_QPSK_RB 1_14)

BAND 26. Band Edge (3MHz_QPSK_ Full RB)

BAND 26. Band Edge (5MHz_QPSK_RB 1_24)

BAND 26. Band Edge (5MHz_QPSK_ Full RB)

BAND 26. Band Edge (10MHz_QPSK_RB 1_49)

BAND 26. Band Edge (10MHz_QPSK_ Full RB)

11 ANNEX A_ TEST SETUP PHOTO

Please refer to test setup photo file no. as follows;

No.	Description
1	HCT-RF-1910-FC015-P