

# FCC LTE REPORT

## Certification

**Applicant Name:**  
SAMSUNG Electronics Co., Ltd.

**Date of Issue:**  
November 24, 2022

**Address:**  
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Suwon-si, Gyeonggi-do, 16677, Rep. of Korea

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

**Report No.:** HCT-RF-2211-FC036

**FCC ID:** A3LSMA146M

**APPLICANT:** SAMSUNG Electronics Co., Ltd.

Model(s): SM-A146M/DS  
 Additional Model(s): SM-A146M  
 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 – 824.0	1M10G7D	QPSK	0.195	22.89
		1M10W7D	16QAM	0.160	22.03
		1M11W7D	64QAM	0.127	21.03
		1M10W7D	256QAM	0.063	18.01
LTE – Band26 (3)	815.5 – 824.0	2M72G7D	QPSK	0.191	22.80
		2M72W7D	16QAM	0.156	21.92
		2M72W7D	64QAM	0.124	20.95
		2M71W7D	256QAM	0.061	17.88
LTE – Band26 (5)	816.5 – 824.0	4M52G7D	QPSK	0.192	22.83
		4M53W7D	16QAM	0.156	21.93
		4M53W7D	64QAM	0.127	21.03
		4M53W7D	256QAM	0.062	17.92
LTE – Band26 (10)	819.0 – 824.0	9M05G7D	QPSK	0.191	22.81
		9M08W7D	16QAM	0.161	22.06
		9M03W7D	64QAM	0.126	20.99
		9M02W7D	256QAM	0.061	17.88
LTE – Band26 (15)	821.5	13M5G7D	QPSK	0.194	22.87
		13M5W7D	16QAM	0.156	21.93
		13M5W7D	64QAM	0.126	20.99
		13M5W7D	256QAM	0.063	17.99

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 No.: HCT-RF-2211-FC036

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REVIEWED BY



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

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

This test results were applied only to the test methods required by the standard.

This laboratory is not accredited for the test results marked \*.

The above Test Report is the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA. (HCT Accreditation No.: KT197)

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## Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2211-FC036	November 24, 2022	- First Approval Report

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

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# MEASUREMENT REPORT

## 1. GENERAL INFORMATION

<b>Applicant Name:</b>	SAMSUNG Electronics Co., Ltd.
<b>Address:</b>	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
<b>FCC ID:</b>	A3LSMA146M
<b>Application Type:</b>	Certification
<b>FCC Classification:</b>	PCS Licensed Transmitter Held to Ear (PCE)
<b>FCC Rule Part(s):</b>	§90, §22, §2
<b>EUT Type:</b>	Mobile phone
<b>Model(s):</b>	SM-A146M/DS
<b>Additional Model(s):</b>	SM-A146M
<b>Tx Frequency:</b>	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))
<b>Date(s) of Tests:</b>	September 21, 2022~ October 31, 2022
<b>Serial number:</b>	Radiated: R93T8000JLY Conducted: R93T8000BCB

## **2. INTRODUCTION**

### **2.1. DESCRIPTION OF EUT**

The EUT was a Mobile Phone with GSM/GPRS/EGPRS/UMTS and LTE, Sub6.

It also supports IEEE 802.11 a/b/g/n/ac (20/40/80 MHz), Bluetooth, BT LE.

### **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

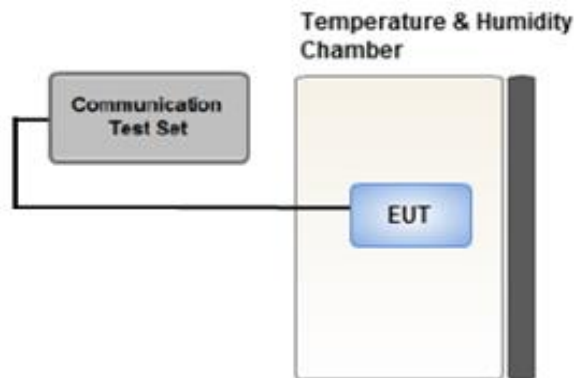
According to ANSI C63.26-2015 Section 5.2.1 when measuring the maximum RF output power from such devices, control over the EUT must be provided either through special test software (provided by manufacturer specifically for compliance testing, but not accessible by an end user) or through use of a base 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 1 MHz
3. VBW  $\geq$  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 1 GHz, 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;

$$P_d \text{ (dBm)} = P_g \text{ (dBm)} - \text{cable loss (dB)} + \text{antenna gain (dB)}$$

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 = 100 kHz for emissions below 1 GHz and 1 MHz for emissions above 1 GHz
2. VBW  $\geq 3 \times$  RBW
3. Span = 1.5 times the OBW
4. No. of sweep points  $> 2 \times$  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<sup>th</sup> 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 1 GHz, 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;

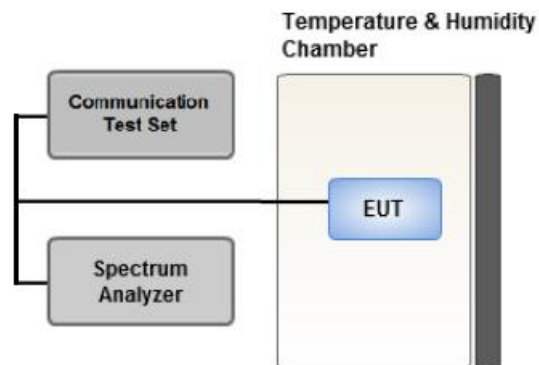
$$\text{Result (dBm)} = P_g \text{ (dBm)} - \text{cable loss (dB)} + \text{antenna gain (dBi)}$$

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

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

$$\text{EIRP}_{(\text{dBm})} = \text{ERP}_{(\text{dBm})} + 2.15$$

### 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.

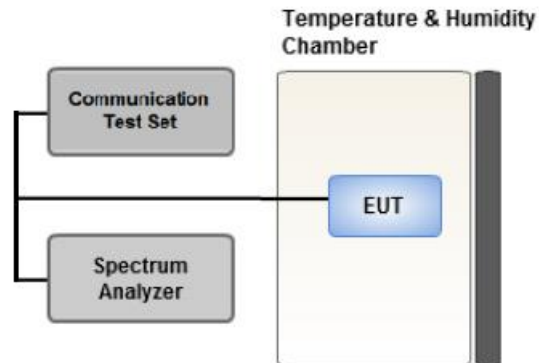
The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

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 26 dB 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  $\geq 3 \times$  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.

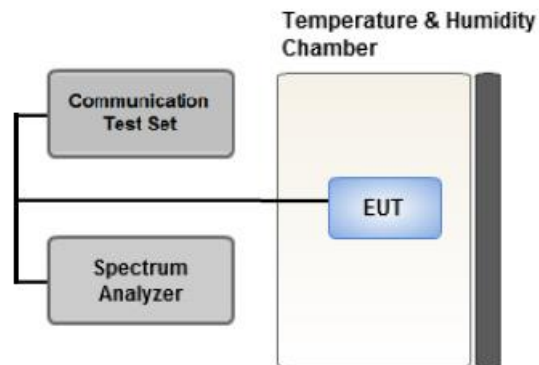
All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

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  $\geq$  3 MHz
3. Detector = RMS
4. Trace Mode = trace average
5. Sweep time = auto
6. Number of points in sweep  $\geq$  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

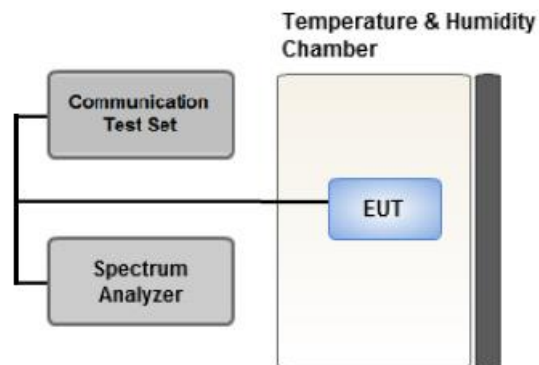
1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW :
  - .- EA licensee's frequency block by up to and including 37.5 kHz : 300 Hz
  - .- EA licensee's frequency block greater than 37.5 kHz : 100 kHz
4. VBW > 3 x RBW
5. Detector = RMS
6. Number of sweep points  $\geq 2 \times \text{Span/RBW}$
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.

Where Margin < 1 dB the emission level is either corrected by  $10 \log(1 \text{ MHz}/ \text{RB})$  or the emission is integrated over a 1 MHz bandwidth to determine the final result. When using the integration method the integration window is either centered on the emission or, for emissions at the band edge, centered by an offset of 500 kHz from the block edge so that the integration window is the 1 MHz adjacent to the block edge

### 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)**

- 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.  
 Mode : Stand alone, Stand alone + External accessories (Earphone, AC adapter, etc)  
 Worst case : Stand alone
- We were performed the RSE test in condition of co-location.  
 Mode : Stand alone, Simultaneous transmission scenarios  
 Worst case : Stand alone
- In the case of radiated spurious emissions, all bandwidth of operation were investigated and the worst case bandwidth results are reported. (Worst case : 15 MHz)
- 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-A146M/DS & additional models were tested and the worst case results are reported.  
 (Worst case : SM-A146M/DS)

[ Worst case ]

Test Description	Modulation	RB size	RB offset	Axis
Effective Isotropic Radiated Power	QPSK, 16QAM, 64QAM, 256QAM	1	0	Z
Radiated Spurious and Harmonic Emissions	QPSK	1	0	X

**3.10 WORST CASE(CONDUCTED TEST)**

-Worst case : Of all modulation, We have tested modulation of the high Conducted Output Power.

- SM-A146M/DS & additional models were tested and the worst case results are reported.

(Worst case : SM-A146M/DS)

[ Worst case ]

Test Description	Modulation	Bandwidth (MHz)	Frequency	RB size	RB offset
Occupied Bandwidth	QPSK, 16QAM, 64QAM, 256QAM	1.4, 3, 5	High	Full RB	0
	QPSK, 16QAM, 64QAM, 256QAM	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
		1.4, 3, 5 10	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

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
H.P.F	FBSR-02B(WHK1.2/15 G-10EF)	T&M SYSTEM	-	02/18/2023	Annual
H.P.F	FBSR-02B(WHK3.3/18 G-10EF)	T&M SYSTEM	-	02/18/2023	Annual
Power Splitter(DC ~ 26.5 GHz)	11667B	Hewlett Packard	11275	03/11/2023	Annual
DC Power Supply	E3632A	Agilent	MY40010147	06/21/2023	Annual
Dipole Antenna	UHAP	Schwarzbeck	557	04/05/2023	Biennial
Dipole Antenna	UHAP	Schwarzbeck	558	04/05/2023	Biennial
Chamber	SU-642	ESPEC	93008124	03/04/2023	Annual
Horn Antenna(1 ~ 18 GHz)	BBHA 9120D	Schwarzbeck	147	08/30/2023	Biennial
Horn Antenna(1 ~ 18 GHz)	BBHA 9120D	Schwarzbeck	9120D-1298	09/15/2023	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170342	09/29/2024	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170124	04/12/2023	Biennial
Signal Analyzer(10 Hz ~ 26.5 GHz)	N9020A	Agilent	MY52090906	05/02/2023	Annual
ATTENUATOR(20 dB)	8493C	Hewlett Packard	17280	05/18/2023	Annual
Spectrum Analyzer(10 Hz ~ 40 GHz)	FSV40	REOHDE & SCHWARZ	100931	08/29/2023	Annual
Base Station	8960 (E5515C)	Agilent	MY48360800	08/18/2023	Annual
Loop Antenna(9 kHz ~ 30 MHz)	FMZB1513	Schwarzbeck	1513-333	03/17/2024	Biennial
Bilog Antenna	VULB9160	Schwarzbeck	3150	03/03/2023	Biennial
Hybrid Antenna	VULB9168	Schwarzbeck	760	02/22/2023	Biennial
Wideband Radio Communication Tester	MT8821C	Anritsu Corp.	6262116770	07/05/2023	Annual
Wideband Radio Communication Tester	MT8820C	Anritsu Corp.	6200863156	12/29/2022	Annual
SIGNAL GENERATOR (100 kHz ~ 40 GHz)	SMB100A	REOHDE & SCHWARZ	177633	07/05/2023	Annual
Signal Analyzer(5 Hz ~ 40.0 GHz)	N9030B	KEYSIGHT	MY55480167	05/30/2023	Annual
FCC LTE Mobile Conducted RF Automation Test Software	-	HCT CO., LTD.,	-	-	-

**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  $U_{\text{CISPR}}$  measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty ( $\pm$ dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	2.00 (Confidence level about 95 %, $k=2$ )
Radiated Disturbance (9 kHz ~ 30 MHz)	4.40 (Confidence level about 95 %, $k=2$ )
Radiated Disturbance (30 MHz ~ 1 GHz)	5.74 (Confidence level about 95 %, $k=2$ )
Radiated Disturbance (1 GHz ~ 18 GHz)	5.51 (Confidence level about 95 %, $k=2$ )
Radiated Disturbance (18 GHz ~ 40 GHz)	5.92 (Confidence level about 95 %, $k=2$ )
Radiated Disturbance (Above 40 GHz)	5.48 (Confidence level about 95 %, $k=2$ )

## 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

### 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 (Only 15 MHz B.W)	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

$$ERP = \text{Substitute LEVEL(dBm)} + \text{Ant. Gain} - \text{CL(Cable Loss)}$$

- 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

$$EIRP = \text{Substitute LEVEL(dBm)} + \text{Ant. Gain} - \text{CL(Cable Loss)}$$

- 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

QAM 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)
				814.7 MHz		823.3 MHz		
				dBm	W	dBm	W	
1.4	QPSK	1	0	22.72	0.187	22.88	0.194	100
		1	3	22.62	0.183	22.81	0.191	100
		1	5	22.74	0.188	22.88	0.194	100
		3	0	22.74	0.188	22.89	0.195	100
		3	1	22.77	0.189	22.83	0.192	100
		3	3	22.72	0.187	22.86	0.193	100
		6	0	21.77	0.150	21.83	0.152	100
	16QAM	1	0	21.92	0.156	22.00	0.158	100
		1	3	21.91	0.155	21.98	0.158	100
		1	5	22.02	0.159	21.95	0.157	100
		3	0	21.80	0.151	21.97	0.157	100
		3	1	21.77	0.150	22.00	0.158	100
		3	3	21.83	0.152	22.03	0.160	100
		6	0	20.75	0.119	21.00	0.126	100
	64QAM	1	0	20.91	0.123	21.02	0.126	100
		1	3	20.80	0.120	20.95	0.124	100
		1	5	20.86	0.122	21.01	0.126	100
		3	0	20.72	0.118	21.03	0.127	100
		3	1	20.81	0.121	20.91	0.123	100
		3	3	20.72	0.118	20.97	0.125	100
		6	0	19.79	0.095	19.92	0.098	100
	256QAM	1	0	17.91	0.062	18.01	0.063	100
		1	3	17.75	0.060	17.86	0.061	100
		1	5	17.80	0.060	17.94	0.062	100
		3	0	17.77	0.060	17.94	0.062	100
		3	1	17.82	0.061	17.93	0.062	100
		3	3	17.75	0.060	17.88	0.061	100
		6	0	17.74	0.059	17.91	0.062	100

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm)				Limit (W)
				815.5 MHz		822.5 MHz		
				dBm	W	dBm	W	
3	QPSK	1	0	22.75	0.188	22.61	0.182	100
		1	7	22.80	0.191	22.66	0.185	100
		1	14	22.71	0.187	22.60	0.182	100
		8	0	21.75	0.150	21.64	0.146	100
		8	3	21.78	0.151	21.61	0.145	100
		8	7	21.74	0.149	21.66	0.147	100
		15	0	21.78	0.151	21.68	0.147	100
	16QAM	1	0	21.89	0.155	21.82	0.152	100
		1	7	21.79	0.151	21.77	0.150	100
		1	14	21.92	0.156	21.88	0.154	100
		8	0	20.82	0.121	20.69	0.117	100
		8	3	20.87	0.122	20.71	0.118	100
		8	7	20.83	0.121	20.68	0.117	100
		15	0	20.81	0.121	20.69	0.117	100
	64QAM	1	0	20.88	0.122	20.79	0.120	100
		1	7	20.95	0.124	20.93	0.124	100
		1	14	20.87	0.122	20.81	0.121	100
		8	0	19.77	0.095	19.68	0.093	100
		8	3	19.78	0.095	19.64	0.092	100
		8	7	19.77	0.095	19.60	0.091	100
		15	0	19.75	0.094	19.65	0.092	100
	256QAM	1	0	17.87	0.061	17.76	0.060	100
		1	7	17.88	0.061	17.75	0.060	100
		1	14	17.80	0.060	17.68	0.059	100
		8	0	17.75	0.060	17.65	0.058	100
		8	3	17.83	0.061	17.65	0.058	100
		8	7	17.78	0.060	17.63	0.058	100
		15	0	17.74	0.059	17.60	0.058	100

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm)				Limit (W)
				816.5 MHz		821.5 MHz		
				dBm	W	dBm	W	
5	QPSK	1	0	22.72	0.187	22.70	0.186	100
		1	12	22.83	0.192	22.81	0.191	100
		1	24	22.71	0.187	22.70	0.186	100
		12	0	21.80	0.151	21.78	0.151	100
		12	6	21.82	0.152	21.81	0.152	100
		12	11	21.84	0.153	21.81	0.152	100
		25	0	21.87	0.154	21.85	0.153	100
	16QAM	1	0	21.93	0.156	21.91	0.155	100
		1	12	21.92	0.156	21.90	0.155	100
		1	24	21.90	0.155	21.88	0.154	100
		12	0	20.83	0.121	20.80	0.120	100
		12	6	20.84	0.121	20.81	0.121	100
		12	11	20.82	0.121	20.79	0.120	100
		25	0	20.84	0.121	20.81	0.121	100
	64QAM	1	0	20.98	0.125	20.97	0.125	100
		1	12	21.03	0.127	21.01	0.126	100
		1	24	20.88	0.122	20.86	0.122	100
		12	0	19.82	0.096	19.80	0.095	100
		12	6	19.79	0.095	19.77	0.095	100
		12	11	19.82	0.096	19.80	0.095	100
		25	0	19.85	0.097	19.83	0.096	100
	256QAM	1	0	17.92	0.062	17.90	0.062	100
		1	12	17.80	0.060	17.77	0.060	100
		1	24	17.85	0.061	17.83	0.061	100
		12	0	17.73	0.059	17.71	0.059	100
		12	6	17.83	0.061	17.81	0.060	100
		12	11	17.78	0.060	17.75	0.060	100
		25	0	17.82	0.061	17.80	0.060	100



Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm)		Limit (W)
				819 MHz		
				dBm	W	
10	QPSK	1	0	22.81	0.191	100
		1	24	22.80	0.191	100
		1	49	22.69	0.186	100
		25	0	21.90	0.155	100
		25	12	21.86	0.153	100
		25	24	21.88	0.154	100
		50	0	21.96	0.157	100
	16QAM	1	0	22.06	0.161	100
		1	24	21.92	0.156	100
		1	49	21.93	0.156	100
		25	0	20.93	0.124	100
		25	12	20.89	0.123	100
		25	24	20.86	0.122	100
		50	0	20.94	0.124	100
	64QAM	1	0	20.99	0.126	100
		1	24	20.95	0.124	100
		1	49	20.89	0.123	100
		25	0	19.86	0.097	100
		25	12	19.85	0.097	100
		25	24	19.82	0.096	100
		50	0	19.96	0.099	100
	256QAM	1	0	17.88	0.061	100
		1	24	17.87	0.061	100
		1	49	17.73	0.059	100
		25	0	17.88	0.061	100
		25	12	17.86	0.061	100
		25	24	17.82	0.061	100
		50	0	17.85	0.061	100

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm)		Limit (W)
				821.5 MHz		
				dBm	W	
15	QPSK	1	0	22.83	0.192	100
		1	36	22.87	0.194	100
		1	74	22.71	0.187	100
		36	0	21.91	0.155	100
		36	18	21.86	0.153	100
		36	39	21.82	0.152	100
		75	0	21.87	0.154	100
	16QAM	1	0	21.92	0.156	100
		1	36	21.91	0.155	100
		1	74	21.93	0.156	100
		36	0	20.93	0.124	100
		36	18	20.85	0.122	100
		36	39	20.80	0.120	100
		75	0	20.86	0.122	100
	64QAM	1	0	20.99	0.126	100
		1	36	20.99	0.126	100
		1	74	20.94	0.124	100
		36	0	19.93	0.098	100
		36	18	19.88	0.097	100
		36	39	19.82	0.096	100
		75	0	19.84	0.096	100
	256QAM	1	0	17.99	0.063	100
		1	36	17.79	0.060	100
		1	74	17.78	0.060	100
		36	0	17.89	0.062	100
		36	18	17.86	0.061	100
		36	39	17.81	0.060	100
		75	0	17.86	0.061	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
814.7	LTE B26/ 1.4 MHz	QPSK	-33.28	27.56	-10.29	1.40	H	< 100	0.039	15.87
		16QAM	-34.11	26.73	-10.29	1.40	H		0.032	15.04
		64QAM	-35.18	25.66	-10.29	1.40	H		0.025	13.97
		256QAM	-38.24	22.60	-10.29	1.40	H		0.012	10.91
823.3		QPSK	-33.05	28.00	-10.25	1.41	H		0.043	16.34
		16QAM	-33.78	27.27	-10.25	1.41	H		0.036	15.61
		64QAM	-34.98	26.07	-10.25	1.41	H		0.028	14.41
		256QAM	-37.96	23.09	-10.25	1.41	H		0.014	11.43

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBd)	C.L	Pol	Limit	ERP	
									W	W
815.5	LTE B26/ 3 MHz	QPSK	-33.22	27.61	-10.29	1.41	H	< 100	0.039	15.92
		16QAM	-34.06	26.77	-10.29	1.41	H		0.032	15.08
		64QAM	-35.12	25.71	-10.29	1.41	H		0.025	14.02
		256QAM	-38.17	22.66	-10.29	1.41	H		0.013	10.97
822.5		QPSK	-33.07	27.95	-10.26	1.41	H		0.043	16.28
		16QAM	-33.87	27.15	-10.26	1.41	H		0.035	15.48
		64QAM	-35.00	26.02	-10.26	1.41	H		0.027	14.35
		256QAM	-37.99	23.03	-10.26	1.41	H		0.014	11.36

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBd)	C.L	Pol	Limit	ERP	
									W	W
816.5	LTE B26/ 5 MHz	QPSK	-33.10	27.69	-10.28	1.41	H	< 100	0.040	16.00
		16QAM	-33.98	26.81	-10.28	1.41	H		0.033	15.12
		64QAM	-35.05	25.74	-10.28	1.41	H		0.025	14.05
		256QAM	-38.08	22.71	-10.28	1.41	H		0.013	11.02
821.5		QPSK	-32.96	28.00	-10.26	1.41	H		0.043	16.33
		16QAM	-33.77	27.19	-10.26	1.41	H		0.036	15.52
		64QAM	-34.88	26.08	-10.26	1.41	H		0.028	14.41
		256QAM	-37.87	23.09	-10.26	1.41	H		0.014	11.42

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBd)	C.L	Pol	Limit	ERP	
									W	W
819.0	LTE B26/ 10 MHz	QPSK	-32.95	27.86	-10.27	1.41	H	< 100	0.042	16.18
		16QAM	-33.73	27.08	-10.27	1.41	H		0.035	15.40
		64QAM	-34.83	25.98	-10.27	1.41	H		0.027	14.30
		256QAM	-37.84	22.97	-10.27	1.41	H		0.014	11.29

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBd)	C.L	Pol	Limit	ERP	
									W	W
821.5	LTE B26/ 15 MHz	QPSK	-32.75	28.21	-10.26	1.41	H	< 7.00	0.045	16.54
		16QAM	-33.53	27.43	-10.26	1.41	H		0.038	15.76
		64QAM	-34.62	26.34	-10.26	1.41	H		0.029	14.67
		256QAM	-37.66	23.30	-10.26	1.41	H		0.015	11.63

**Note**

1. Limit: None (for reporting purposes only)

**8.3 RADIATED SPURIOUS EMISSIONS**

- ▣ MODE: LTE B26
- ▣ MODULATION SIGNAL: 15 MHz QPSK
- ▣ DISTANCE: 3 meters

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Limit
26765 (821.5)	1 643.00	-53.23	9.60	-63.87	1.99	H	-56.26	-13.00
	2 464.50	-53.41	10.42	-58.37	2.55	V	-50.50	-13.00
	3 286.00	-57.44	12.01	-58.74	2.92	H	-49.66	-13.00

**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	1.0961
			16QAM			1.1007
			64QAM			1.1062
			256QAM			1.0970
	3 MHz	822.5	QPSK	15		2.7172
			16QAM			2.7163
			64QAM			2.7154
			256QAM			2.7059
	5 MHz	821.5	QPSK	25		4.5188
			16QAM			4.5313
			64QAM			4.5285
			256QAM			4.5316
	10 MHz	819.0	QPSK	50		9.0463
			16QAM			9.0763
			64QAM			9.0337
			256QAM			9.0152
	15 MHz	821.5	QPSK	75		13.478
			16QAM			13.484
			64QAM			13.470
			256QAM			13.465

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 45 ~ 64.

**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	3.6910	27.976	-67.380	-39.404	-13.00
		823.3	3.7044	27.976	-67.112	-39.136	
	3	815.5	3.1860	27.976	-67.323	-39.347	
		822.5	3.6835	27.976	-67.301	-39.325	
	5	816.5	3.6755	27.976	-67.013	-39.037	
		821.5	3.6975	27.976	-67.344	-39.368	
	10	819.0	3.6695	27.976	-67.009	-39.033	
	15	821.5	3.6825	27.976	-67.261	-39.285	

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 85 ~ 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 + Ext. 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(26.5)	30.131

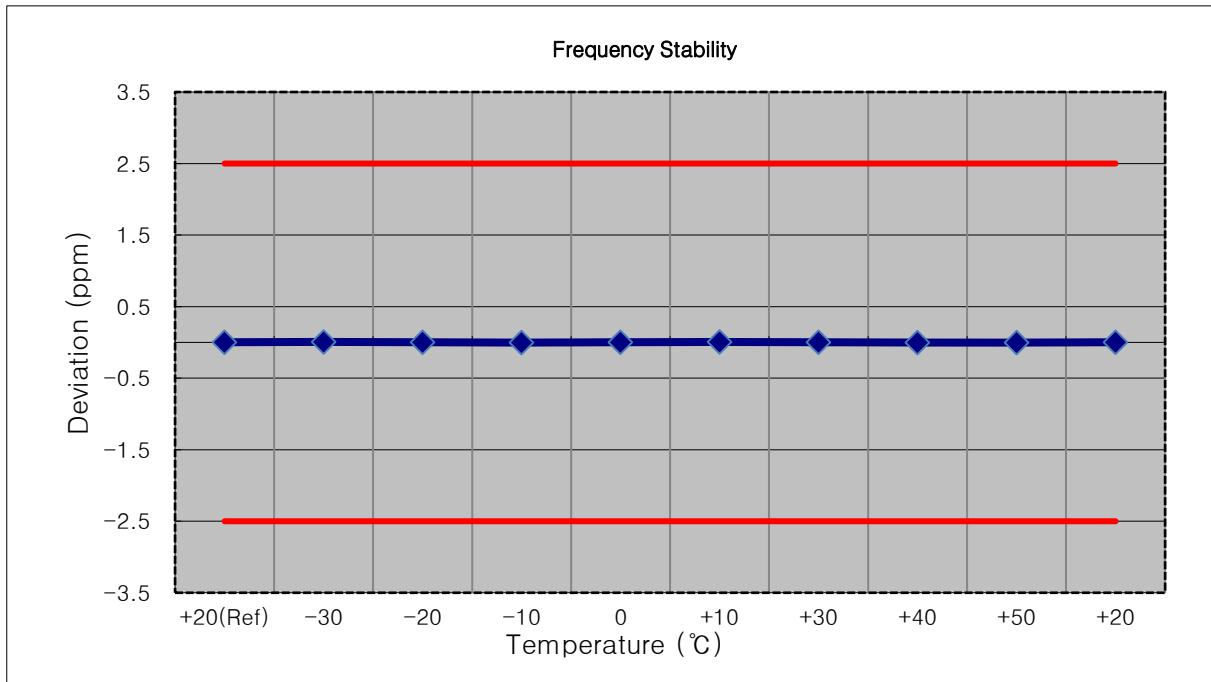
**8.6 CHANNEL EDGE**

- Plots of the EUT's Band Edge are shown Page 65 ~ 84.

**8.7 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE**

- ▣ MODE: LTE 26
- ▣ OPERATING FREQUENCY: 814,700,000 Hz
- ▣ CHANNEL: 26697(1.4 MHz)
- ▣ REFERENCE VOLTAGE: 4.200 VDC
- ▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

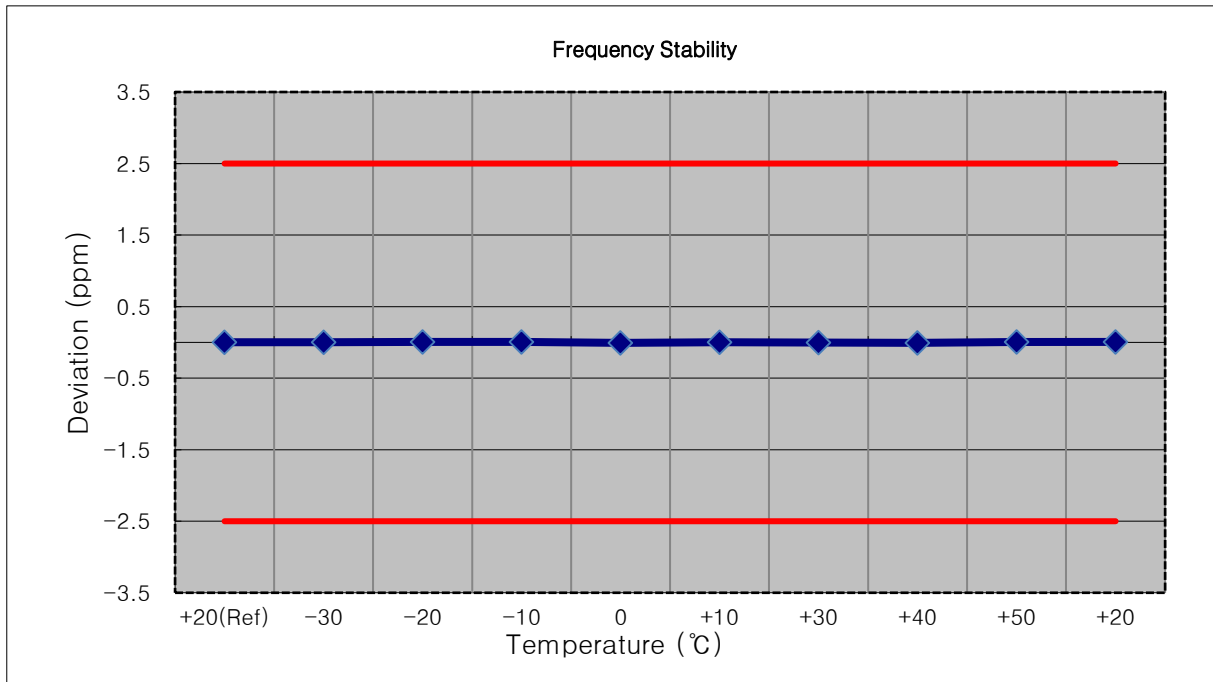
Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	4.200	+20(Ref)	814 700 003	0.0	0.000 000	0.000
100%		-30	814 700 008	4.9	0.000 001	0.006
100%		-20	814 700 006	2.6	0.000 000	0.003
100%		-10	814 700 001	-2.5	0.000 000	-0.003
100%		0	814 700 006	2.9	0.000 000	0.004
100%		+10	814 700 008	5.0	0.000 001	0.006
100%		+30	814 700 006	2.7	0.000 000	0.003
100%		+40	814 700 002	-1.4	0.000 000	-0.002
100%		+50	814 700 001	-2.5	0.000 000	-0.003
Batt. Endpoint		3.400	+20	814 700 006	3.1	0.000 000





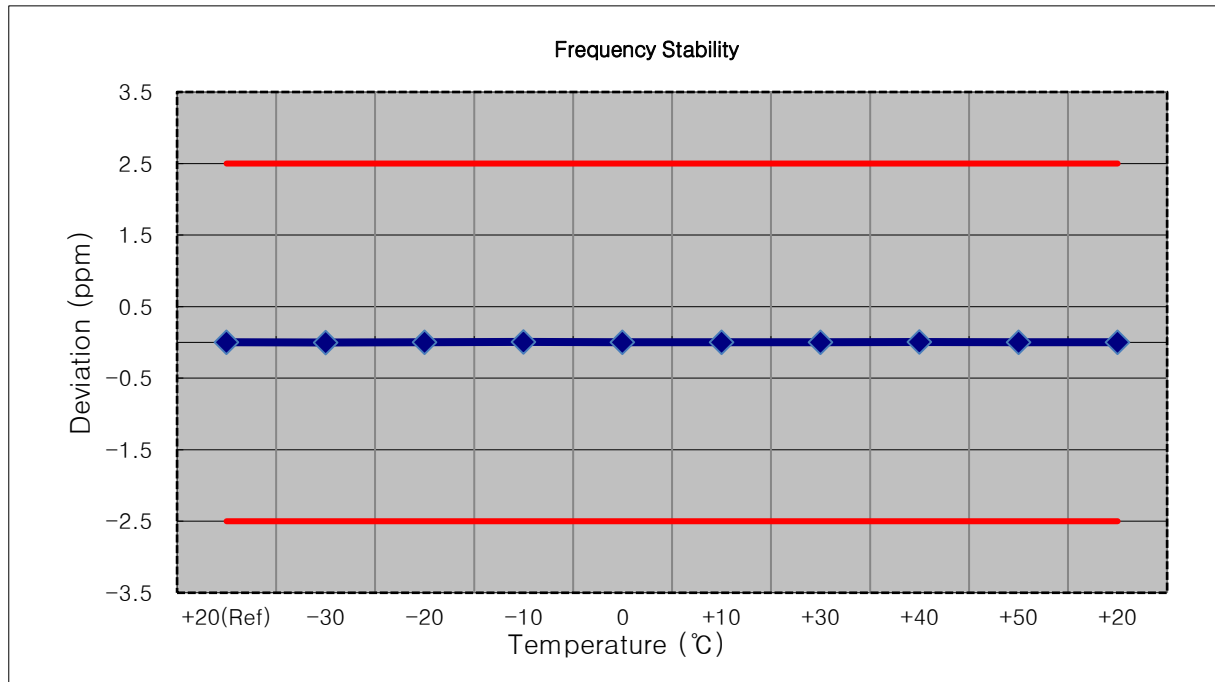
- ▣ MODE: LTE 26
- ▣ OPERATING FREQUENCY: 815,500,000 Hz
- ▣ CHANNEL: 26705(3 MHz)
- ▣ REFERENCE VOLTAGE: 4.200 VDC
- ▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	4.200	+20(Ref)	815 499 997	0.0	0.000 000	0.000
100%		-30	815 500 000	3.0	0.000 000	0.004
100%		-20	815 500 001	4.1	0.000 001	0.005
100%		-10	815 500 001	4.2	0.000 001	0.005
100%		0	815 499 992	-4.7	-0.000 001	-0.006
100%		+10	815 500 000	3.6	0.000 000	0.004
100%		+30	815 499 993	-3.3	0.000 000	-0.004
100%		+40	815 499 992	-5.1	-0.000 001	-0.006
100%		+50	815 500 001	4.7	0.000 001	0.006
Batt. Endpoint		3.400	+20	815 500 001	4.4	0.000 001



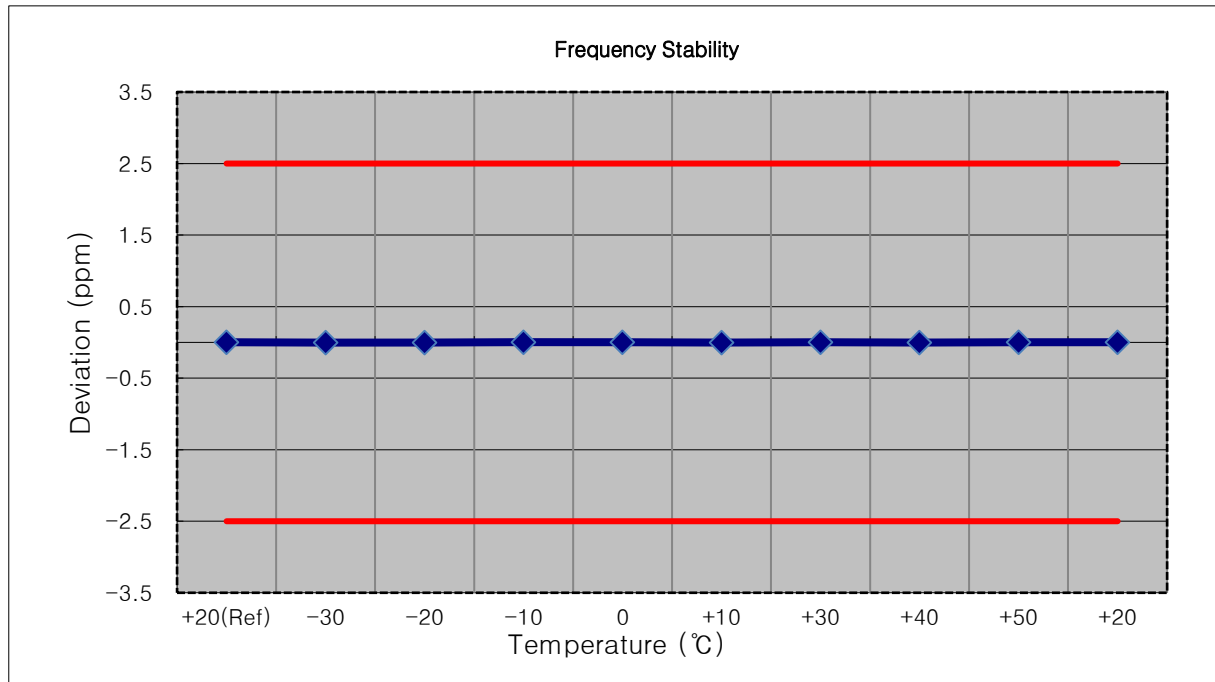
- ▣ MODE: LTE 26
- ▣ OPERATING FREQUENCY: 816,500,000 Hz
- ▣ CHANNEL: 26715(5 MHz)
- ▣ REFERENCE VOLTAGE: 4.200 VDC
- ▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	4.200	+20(Ref)	816 499 998	0.0	0.000 000	0.000
100%		-30	816 499 997	-1.3	0.000 000	-0.002
100%		-20	816 500 001	3.1	0.000 000	0.004
100%		-10	816 500 002	3.9	0.000 000	0.005
100%		0	816 500 001	3.3	0.000 000	0.004
100%		+10	816 500 000	2.6	0.000 000	0.003
100%		+30	816 500 001	3.6	0.000 000	0.004
100%		+40	816 500 002	4.3	0.000 001	0.005
100%		+50	816 500 000	2.4	0.000 000	0.003
Batt. Endpoint		3.400	+20	816 500 001	3.4	0.000 000



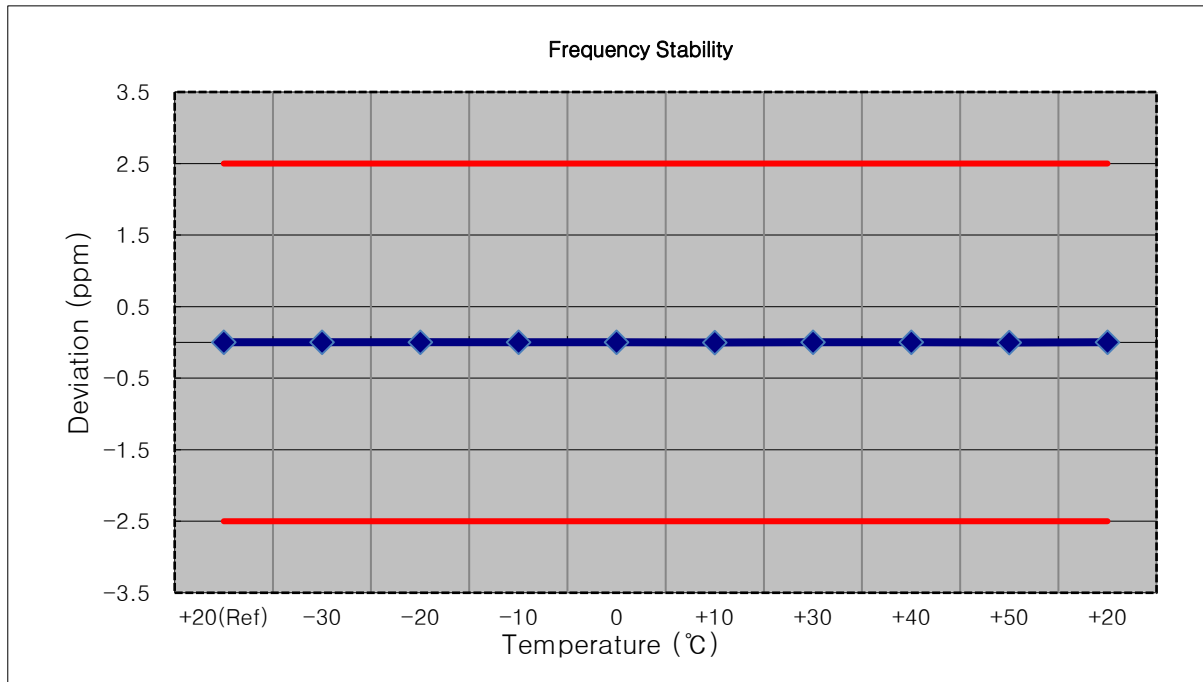
- ▣ MODE: LTE 26
- ▣ OPERATING FREQUENCY: 819,000,000 Hz
- ▣ CHANNEL: 26740(10 MHz)
- ▣ REFERENCE VOLTAGE: 4.200 VDC
- ▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	4.200	+20(Ref)	819 000 002	0.0	0.000 000	0.000
100%		-30	819 000 000	-2.5	0.000 000	-0.003
100%		-20	819 000 001	-1.4	0.000 000	-0.002
100%		-10	819 000 005	2.6	0.000 000	0.003
100%		0	819 000 004	2.4	0.000 000	0.003
100%		+10	819 000 001	-0.8	0.000 000	-0.001
100%		+30	819 000 004	2.4	0.000 000	0.003
100%		+40	819 000 000	-2.3	0.000 000	-0.003
100%		+50	819 000 004	2.2	0.000 000	0.003
Batt. Endpoint		3.400	+20	819 000 004	2.0	0.000 000



- ▣ MODE: LTE 26
- ▣ OPERATING FREQUENCY: 821,500,000 Hz
- ▣ CHANNEL: 26765(15 MHz)
- ▣ REFERENCE VOLTAGE: 4.200 VDC
- ▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	4.200	+20(Ref)	821 500 001	0.0	0.000 000	0.000
100%		-30	821 500 003	1.3	0.000 000	0.002
100%		-20	821 500 004	2.3	0.000 000	0.003
100%		-10	821 500 002	0.7	0.000 000	0.001
100%		0	821 500 003	1.4	0.000 000	0.002
100%		+10	821 500 000	-1.3	0.000 000	-0.002
100%		+30	821 500 003	1.6	0.000 000	0.002
100%		+40	821 500 003	1.5	0.000 000	0.002
100%		+50	821 500 000	-1.0	0.000 000	-0.001
Batt. Endpoint		3.400	+20	821 500 002	1.0	0.000 000



**8.8 STADDLE CHANNEL**

**8.8.1 CONDUCTED OUTPUT POWER**

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm)		Limit (W)
				824 MHz		
				dBm	W	
1.4	QPSK	1	0	22.65	0.184	100
		1	3	22.55	0.180	100
		1	5	22.62	0.183	100
		3	0	22.65	0.184	100
		3	1	22.50	0.178	100
		3	3	22.56	0.180	100
		6	0	21.65	0.146	100
	16QAM	1	0	21.83	0.152	100
		1	3	21.65	0.146	100
		1	5	21.70	0.148	100
		3	0	21.65	0.146	100
		3	1	21.77	0.150	100
		3	3	21.60	0.145	100
		6	0	20.65	0.116	100
	64QAM	1	0	20.83	0.121	100
		1	3	20.63	0.116	100
		1	5	20.73	0.118	100
		3	0	20.63	0.116	100
		3	1	20.61	0.115	100
		3	3	20.67	0.117	100
		6	0	19.60	0.091	100
	256QAM	1	0	17.61	0.058	100
		1	3	17.48	0.056	100
		1	5	17.61	0.058	100
		3	0	17.58	0.057	100
		3	1	17.68	0.059	100
		3	3	17.65	0.058	100
		6	0	17.60	0.058	100

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm)		Limit (W)
				824 MHz		
				dBm	W	
3	QPSK	1	0	22.39	0.173	100
		1	7	22.44	0.175	100
		1	14	22.35	0.172	100
		8	0	21.41	0.138	100
		8	3	21.40	0.138	100
		8	7	21.43	0.139	100
		15	0	21.43	0.139	100
	16QAM	1	0	21.61	0.145	100
		1	7	21.54	0.143	100
		1	14	21.50	0.141	100
		8	0	20.41	0.110	100
		8	3	20.44	0.111	100
		8	7	20.40	0.110	100
		15	0	20.39	0.109	100
	64QAM	1	0	20.49	0.112	100
		1	7	20.57	0.114	100
		1	14	20.49	0.112	100
		8	0	19.40	0.087	100
		8	3	19.36	0.086	100
		8	7	19.38	0.087	100
		15	0	19.38	0.087	100
	256QAM	1	0	17.50	0.056	100
		1	7	17.45	0.056	100
		1	14	17.33	0.054	100
		8	0	17.35	0.054	100
		8	3	17.35	0.054	100
		8	7	17.35	0.054	100
		15	0	17.30	0.054	100

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm)		Limit (W)
				824 MHz		
				dBm	W	
5	QPSK	1	0	22.61	0.182	100
		1	12	22.74	0.188	100
		1	24	22.61	0.182	100
		12	0	21.68	0.147	100
		12	6	21.66	0.147	100
		12	11	21.69	0.148	100
		25	0	21.69	0.148	100
	16QAM	1	0	21.83	0.152	100
		1	12	21.75	0.150	100
		1	24	21.77	0.150	100
		12	0	20.66	0.116	100
		12	6	20.71	0.118	100
		12	11	20.65	0.116	100
		25	0	20.69	0.117	100
	64QAM	1	0	20.78	0.120	100
		1	12	20.85	0.122	100
		1	24	20.75	0.119	100
		12	0	19.64	0.092	100
		12	6	19.65	0.092	100
		12	11	19.65	0.092	100
		25	0	19.64	0.092	100
	256QAM	1	0	17.77	0.060	100
		1	12	17.74	0.059	100
		1	24	17.72	0.059	100
		12	0	17.66	0.058	100
		12	6	17.65	0.058	100
		12	11	17.62	0.058	100
		25	0	17.67	0.058	100

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm)		Limit (W)
				824 MHz		
				dBm	W	
10	QPSK	1	0	22.70	0.186	100
		1	24	22.74	0.188	100
		1	49	22.60	0.182	100
		25	0	21.87	0.154	100
		25	12	21.83	0.152	100
		25	24	21.85	0.153	100
		50	0	21.91	0.155	100
	16QAM	1	0	22.01	0.159	100
		1	24	21.88	0.154	100
		1	49	21.88	0.154	100
		25	0	20.89	0.123	100
		25	12	20.85	0.122	100
		25	24	20.82	0.121	100
		50	0	20.90	0.123	100
	64QAM	1	0	20.95	0.124	100
		1	24	20.91	0.123	100
		1	49	20.85	0.122	100
		25	0	19.82	0.096	100
		25	12	19.80	0.095	100
		25	24	19.78	0.095	100
		50	0	19.91	0.098	100
	256QAM	1	0	17.84	0.061	100
		1	24	17.81	0.060	100
		1	49	17.69	0.059	100
		25	0	17.84	0.061	100
		25	12	17.81	0.060	100
		25	24	17.78	0.060	100
		50	0	17.84	0.061	100



**8.8.2 EFFECTIVE RADIATED POWER**

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBd)	C.L	Pol	Limit	ERP	
								W	W	dBm
824.0	LTE B26/ 1.4 MHz	QPSK	-32.94	28.20	-10.25	1.41	H	< 7.00	0.045	16.54
		16QAM	-33.70	27.44	-10.25	1.41	H		0.038	15.78
		64QAM	-34.85	26.29	-10.25	1.41	H		0.029	14.63
		256QAM	-37.85	23.29	-10.25	1.41	H		0.015	11.63

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	-32.90	28.24	-10.25	1.41	H	< 7.00	0.046	16.58
		16QAM	-33.62	27.52	-10.25	1.41	H		0.039	15.86
		64QAM	-34.78	26.36	-10.25	1.41	H		0.030	14.70
		256QAM	-37.78	23.36	-10.25	1.41	H		0.015	11.70

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	-32.89	28.25	-10.25	1.41	H	< 7.00	0.046	16.59
		16QAM	-33.66	27.48	-10.25	1.41	H		0.038	15.82
		64QAM	-34.81	26.33	-10.25	1.41	H		0.029	14.67
		256QAM	-37.79	23.35	-10.25	1.41	H		0.015	11.69

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	-32.94	28.20	-10.25	1.41	H	< 7.00	0.045	16.54
		16QAM	-33.68	27.46	-10.25	1.41	H		0.038	15.80
		64QAM	-34.79	26.35	-10.25	1.41	H		0.029	14.69
		256QAM	-37.85	23.29	-10.25	1.41	H		0.015	11.63

**8.8.3 RADIATED SPURIOUS EMISSIONS**

- ▣ MODE: LTE B26
- ▣ MODULATION SIGNAL: 5 MHz QPSK
- ▣ DISTANCE: 3 meters

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Limit
26790 (824.0)	1 648.00	-52.73	9.70	-63.32	2.04	H	-55.66	-13.00
	2 472.00	-51.83	10.46	-56.85	2.54	V	-48.93	-13.00
	3 296.00	-57.62	12.07	-58.67	2.95	H	-49.55	-13.00

**8.8.4 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	3.6855	27.976	-67.270	-39.294	-13.00
	3		3.6855	27.976	-67.288	-39.312	
	5		3.6885	27.976	-67.007	-39.031	
	10		3.7015	27.976	-67.221	-39.245	

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 94 ~ 97.
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(26.5)	30.131

**8.8.5 CHANNEL EDGE(Part90)**

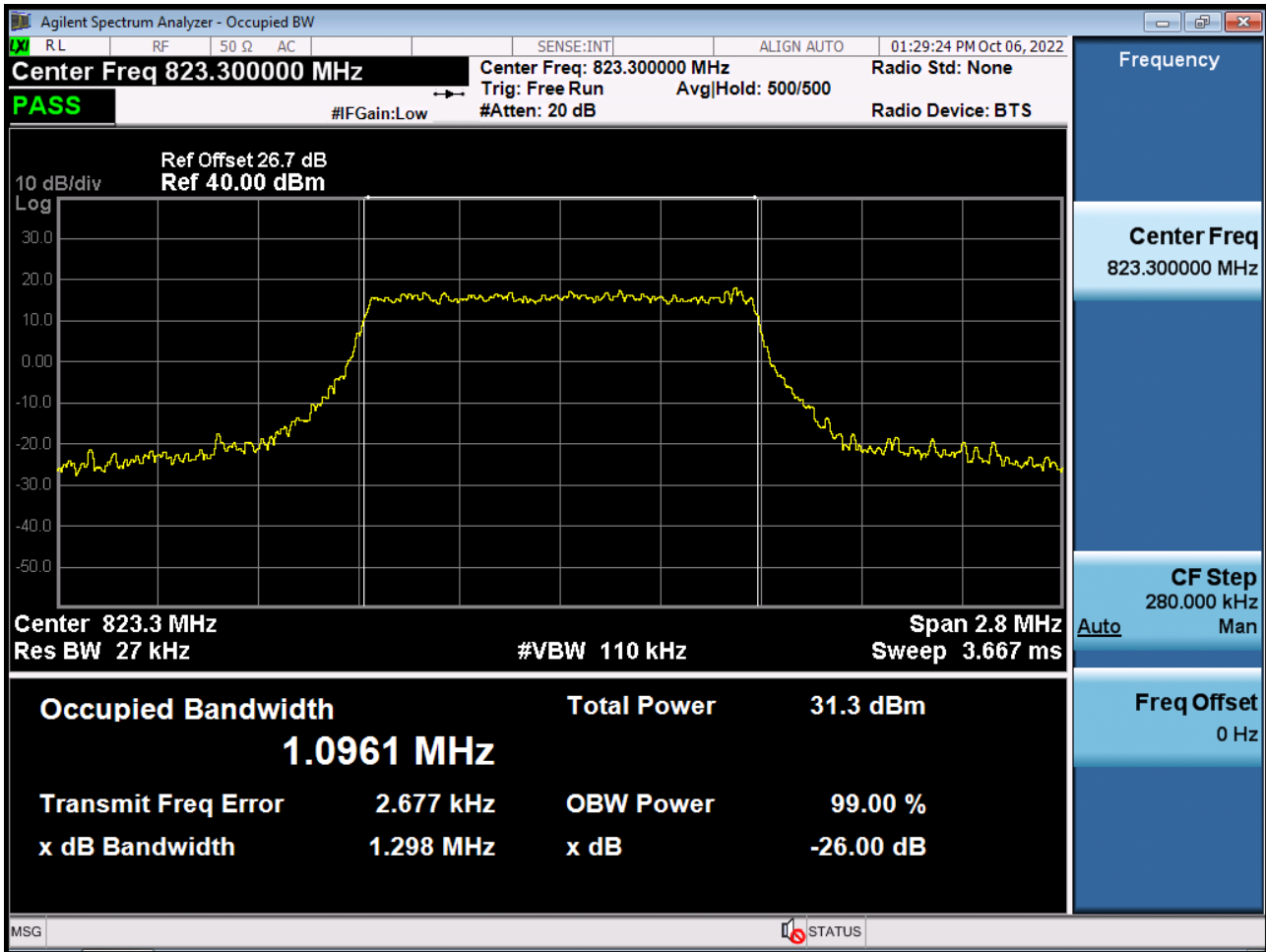
- Test Channel : 26790(824.0MHz)
- Plots of the EUT's Band Edge are shown Page 98 ~ 109.

**8.8.6 BAND EDGE(Part22)**

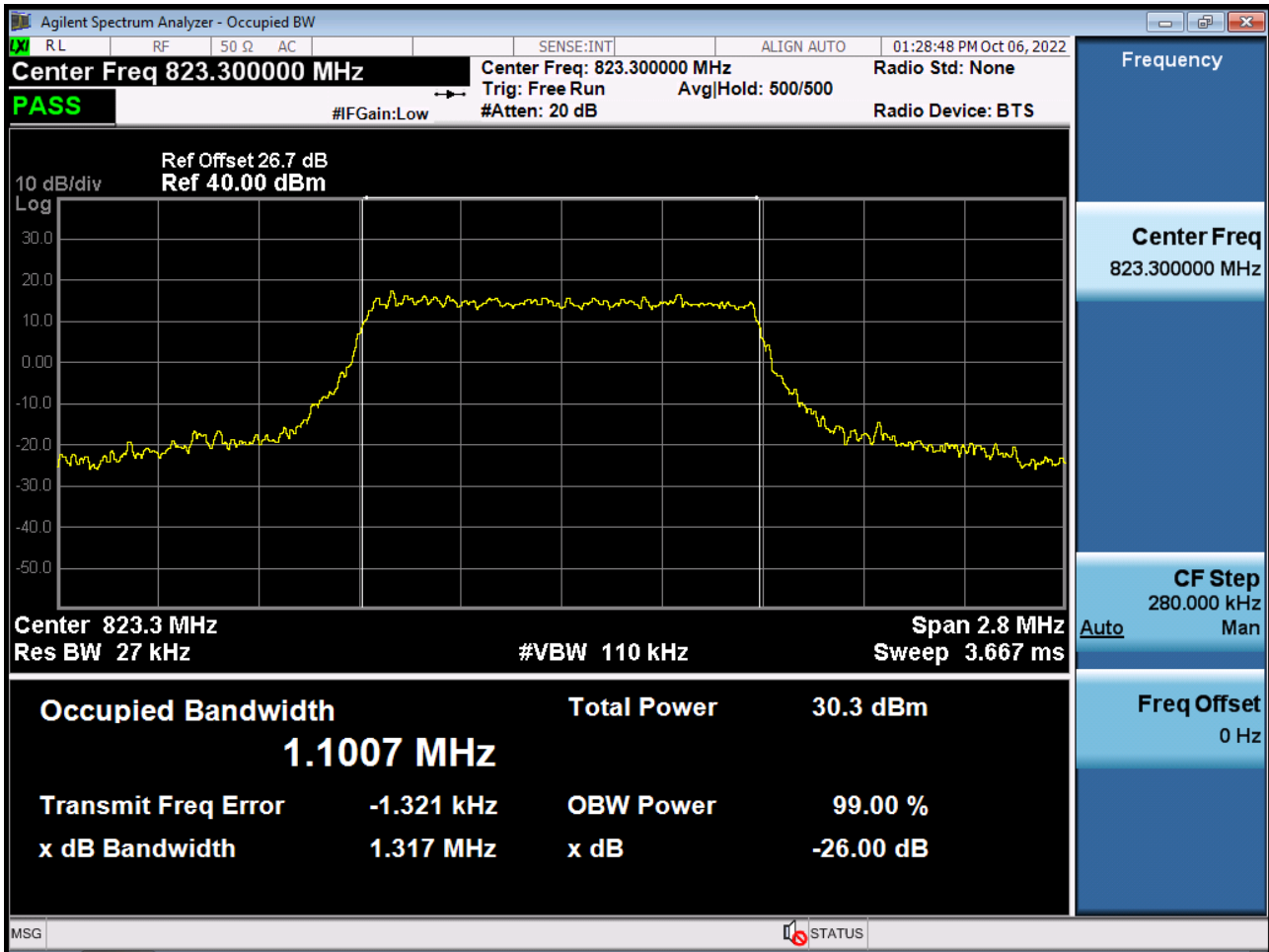
- Test Channel : 26790(824.0 MHz)
- Plots of the EUT's Band Edge are shown Page 110 ~ 117.

## 9. TEST PLOTS

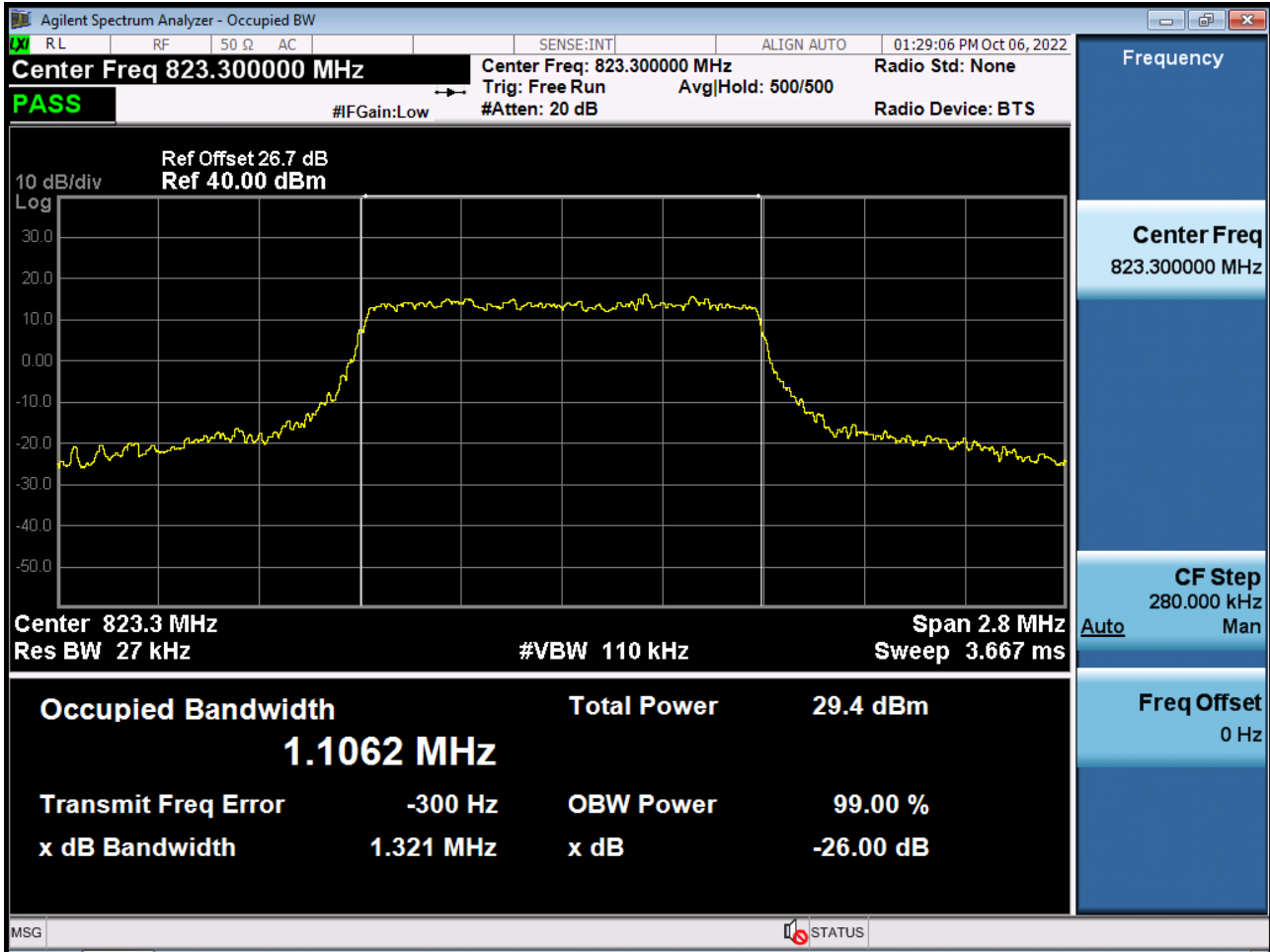
BAND 26. Occupied Bandwidth Plot (1.4 M BW Ch.26783 QPSK RB 6\_0)



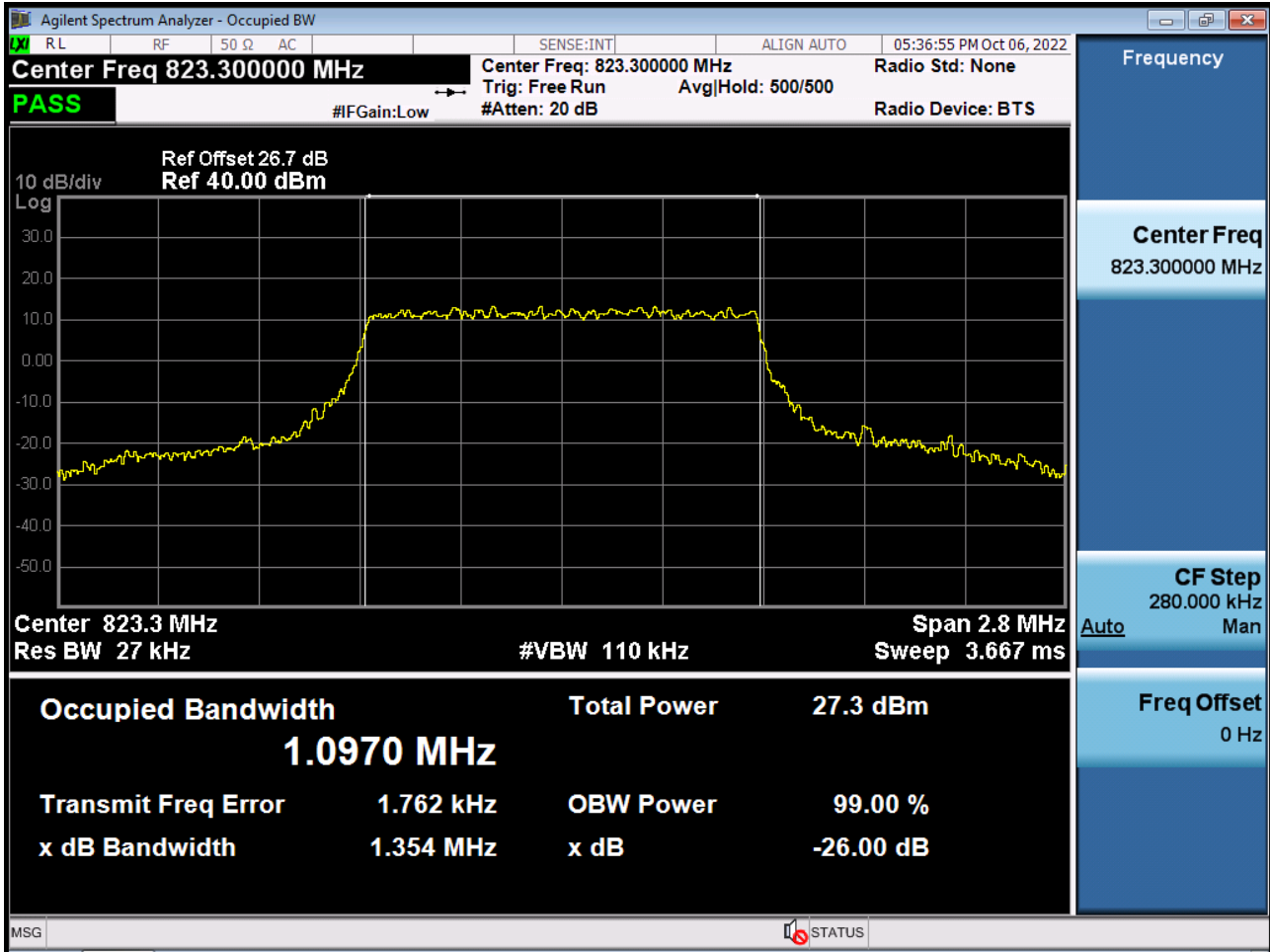
BAND 26. Occupied Bandwidth Plot (1.4 M BW Ch.26783 16QAM RB 6\_0)



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

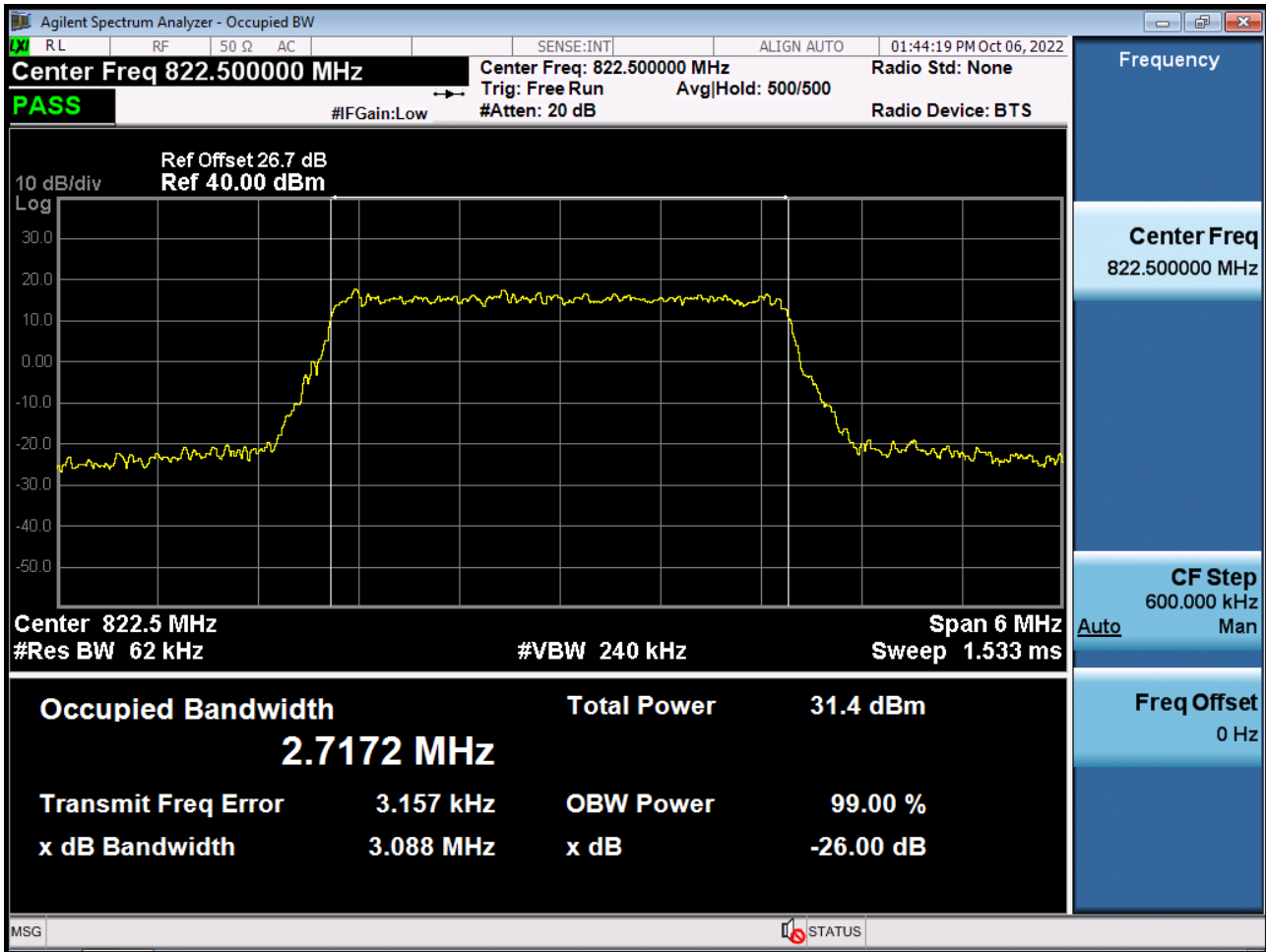


BAND 26. Occupied Bandwidth Plot (1.4 M BW Ch.26783 256QAM RB 6\_0)

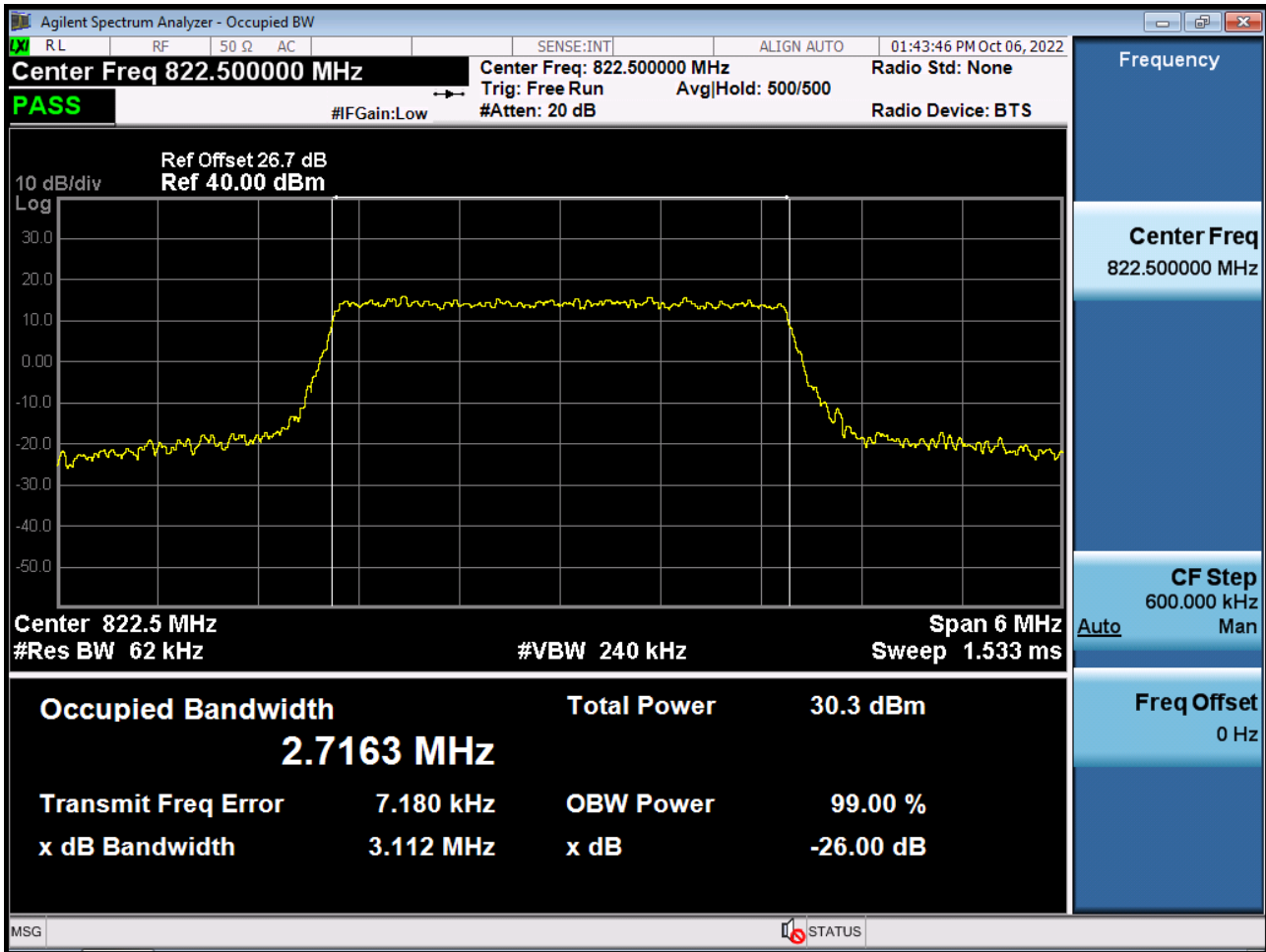




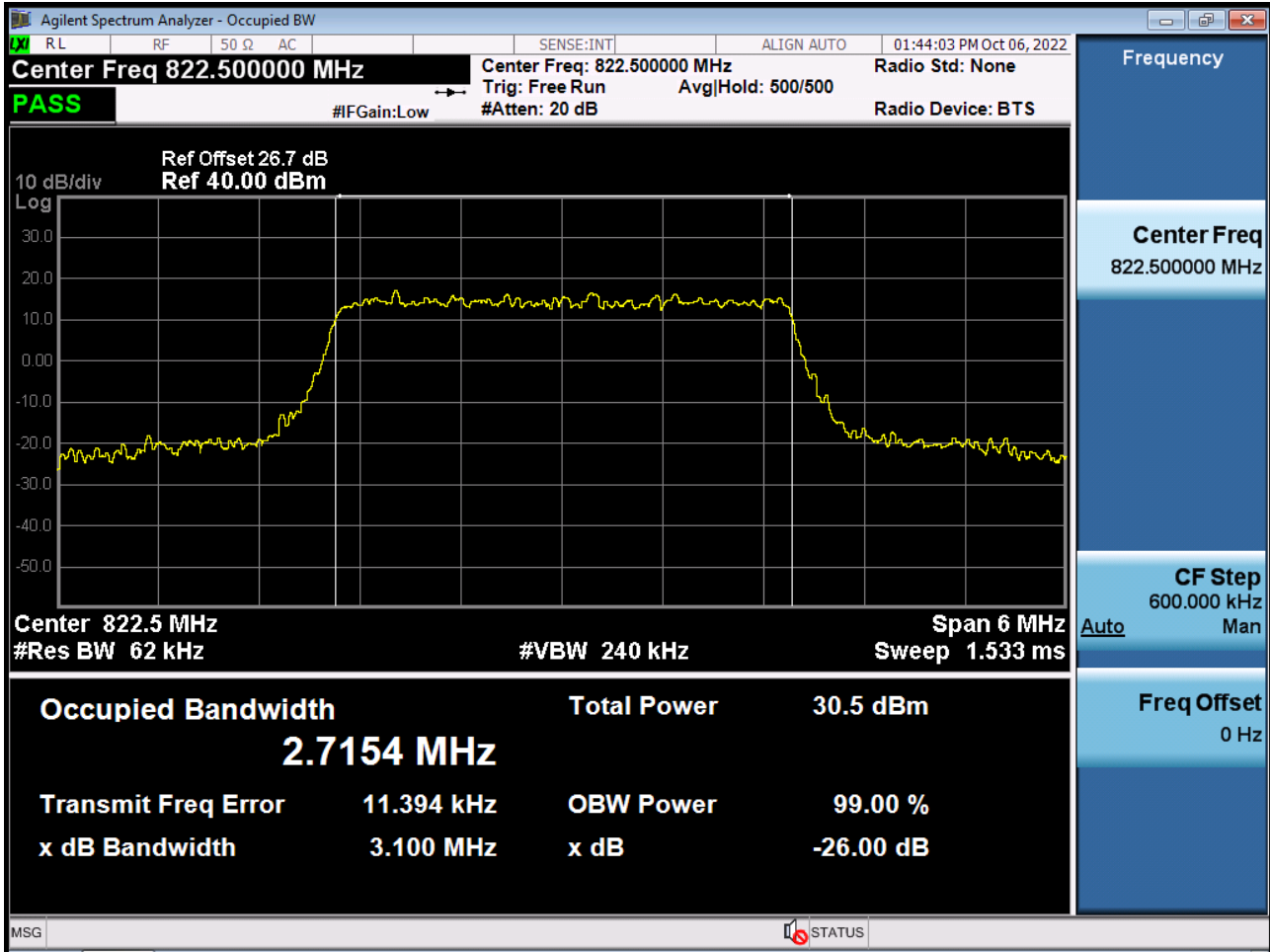
BAND 26. Occupied Bandwidth Plot (3 M BW Ch.26775 QPSK RB 15\_0)



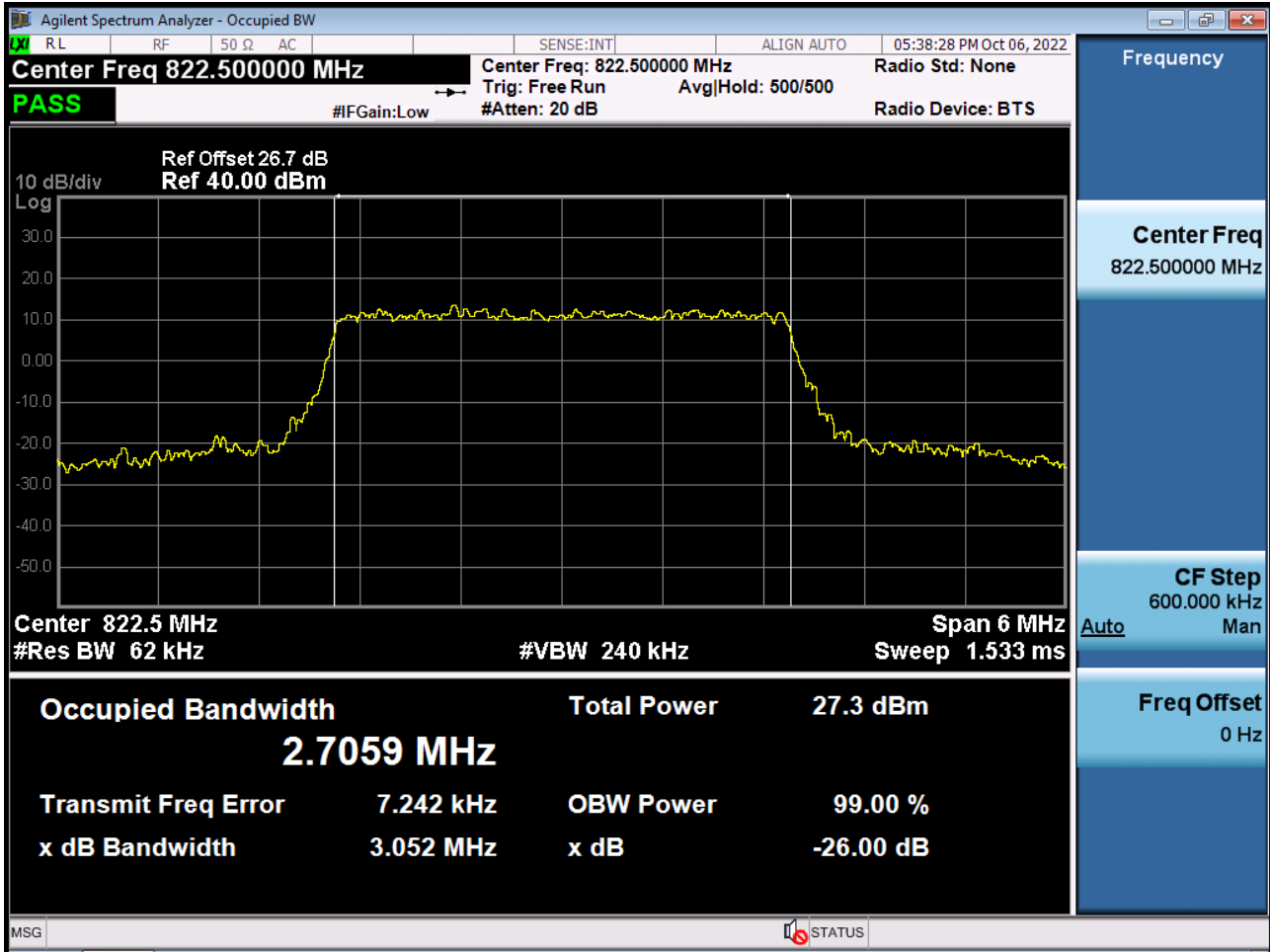
BAND 26. Occupied Bandwidth Plot (3 M BW Ch.26775 16QAM RB 15\_0)



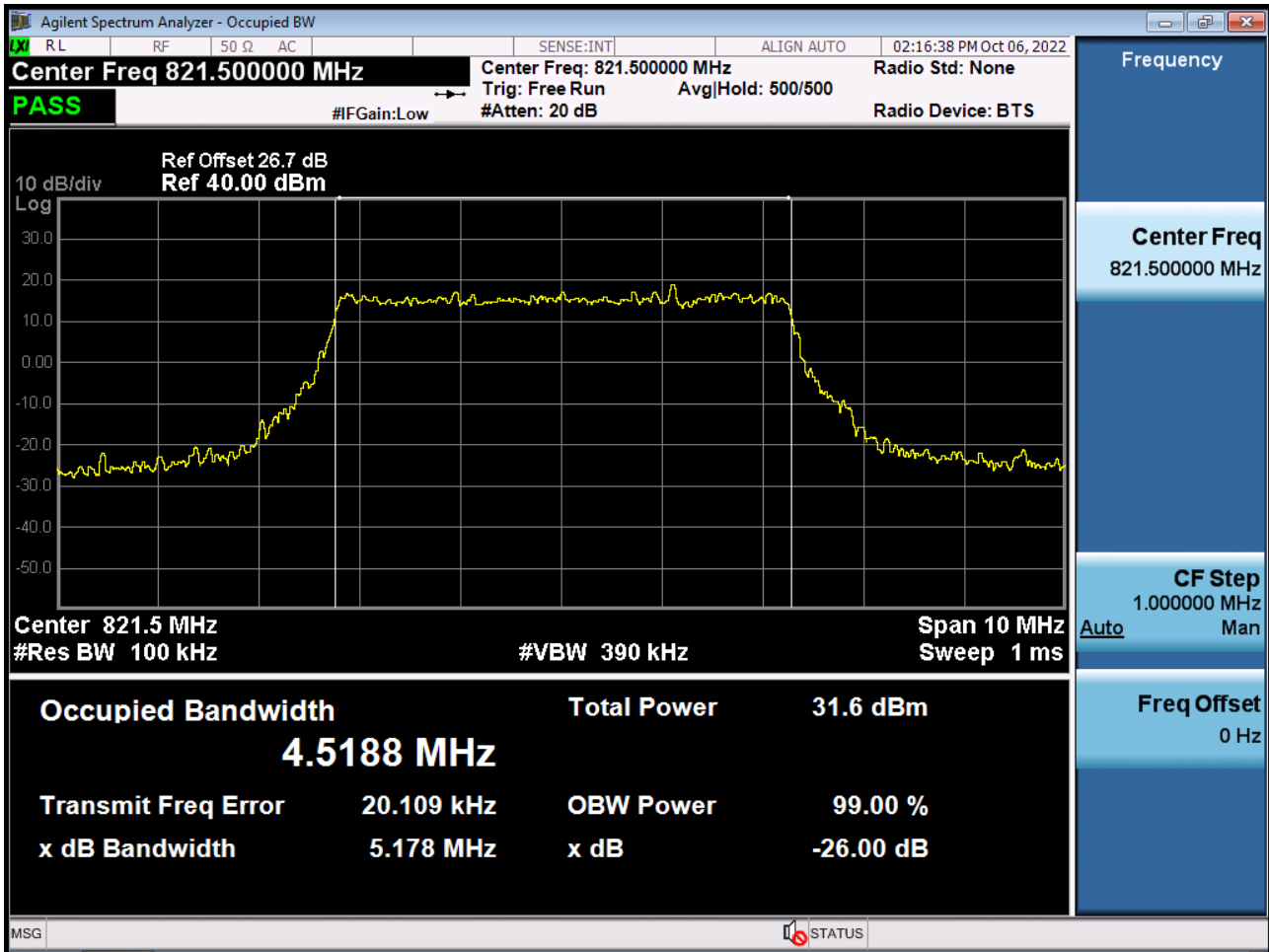
BAND 26. Occupied Bandwidth Plot (3 M BW Ch.26775 64QAM RB 15\_0)



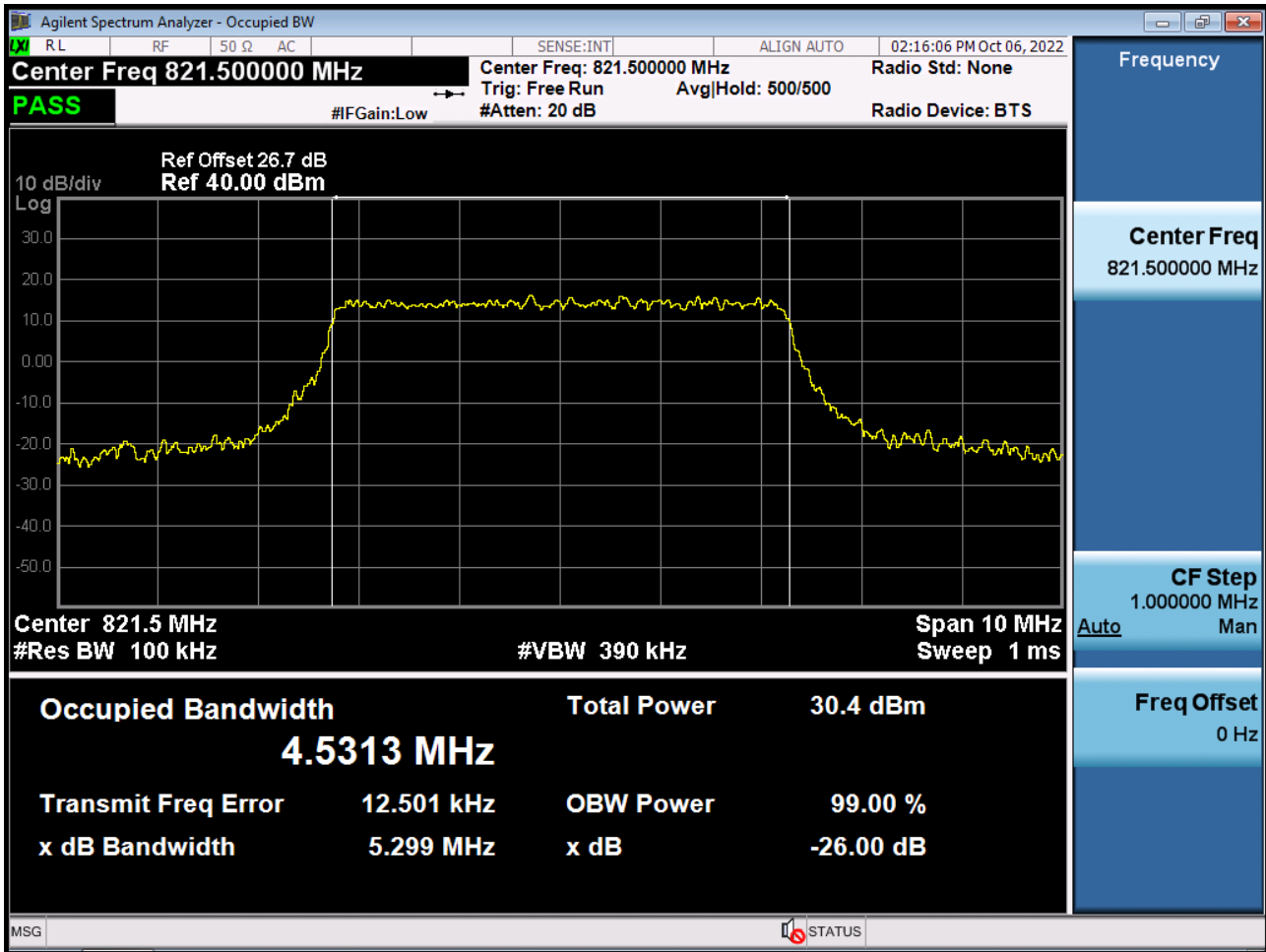
BAND 26. Occupied Bandwidth Plot (3 M BW Ch.26775 256QAM RB 15\_0)



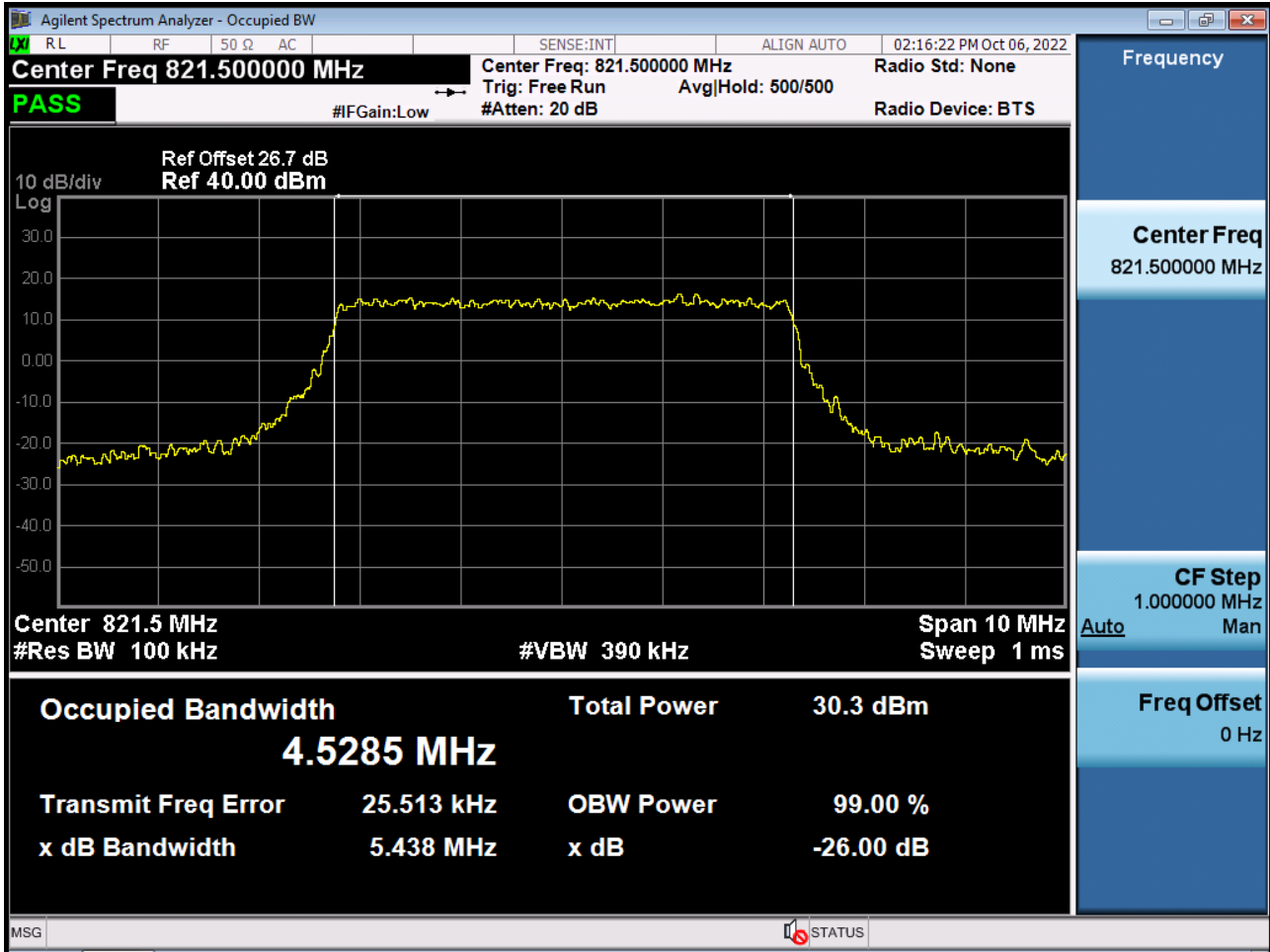
BAND 26. Occupied Bandwidth Plot (5 M BW Ch.26765 QPSK RB 25\_0)



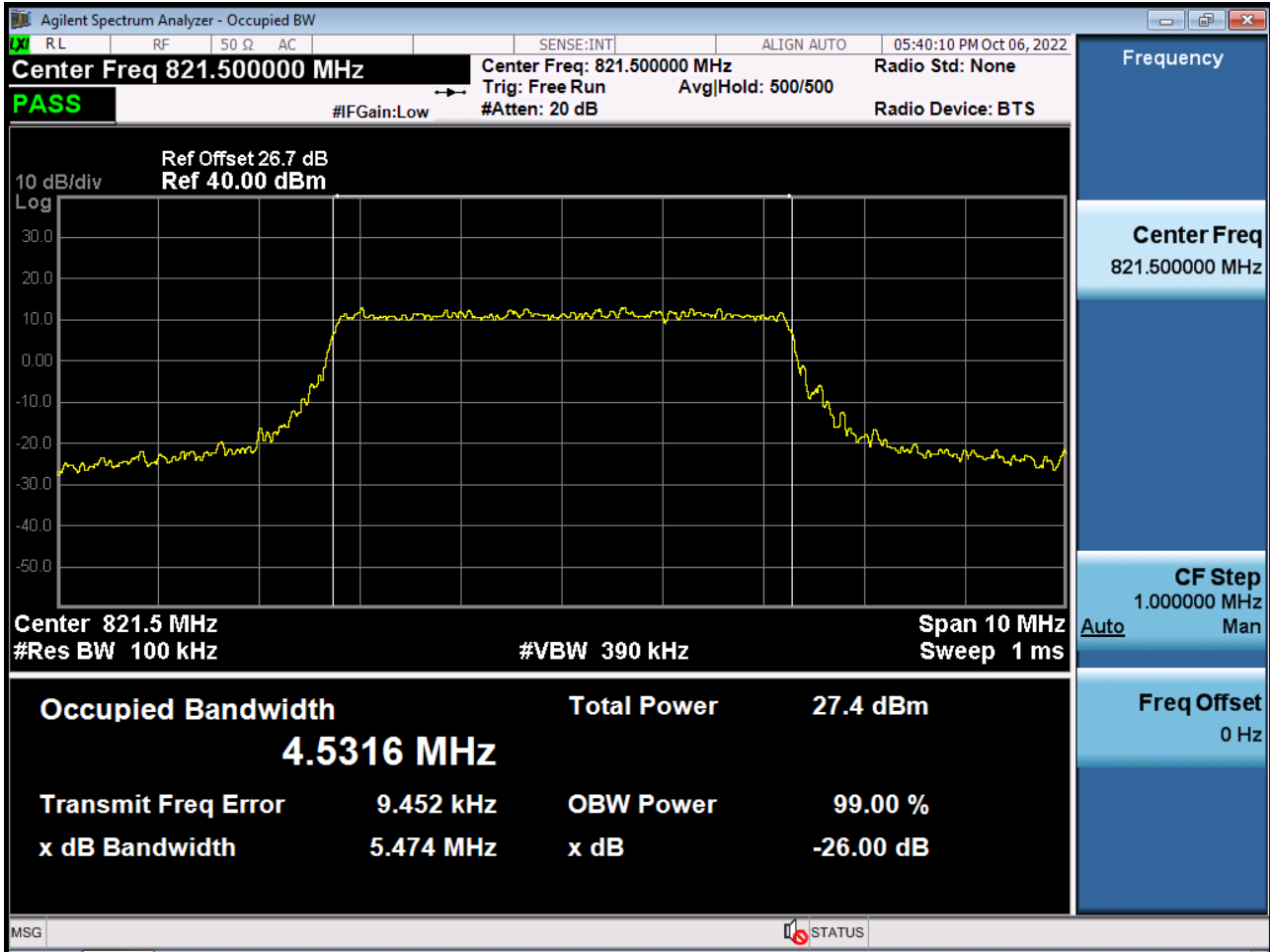
BAND 26. Occupied Bandwidth Plot (5 M BW Ch.26765 16QAM RB 25\_0)



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

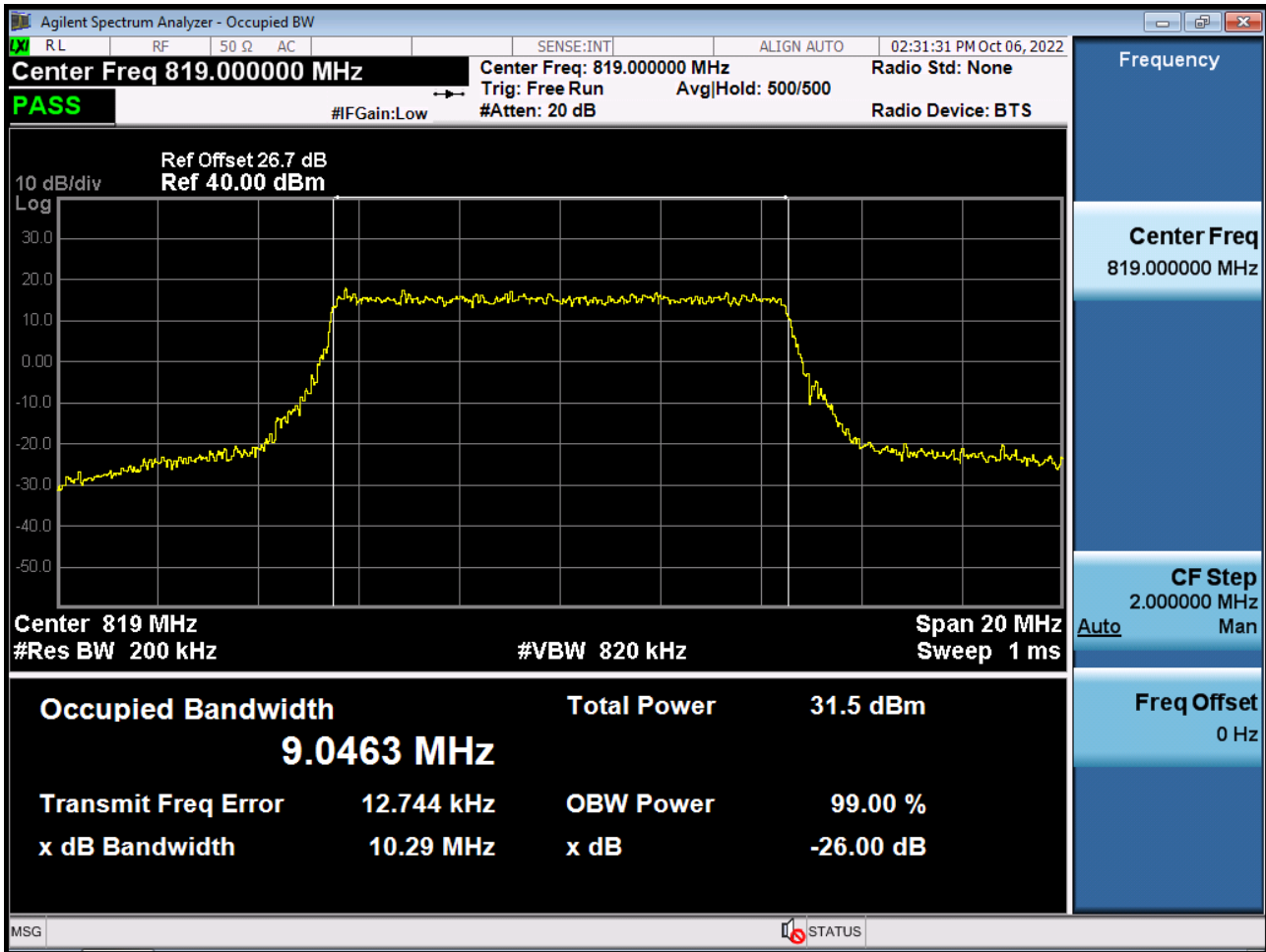


BAND 26. Occupied Bandwidth Plot (5 M BW Ch.26765 256QAM RB 25\_0)

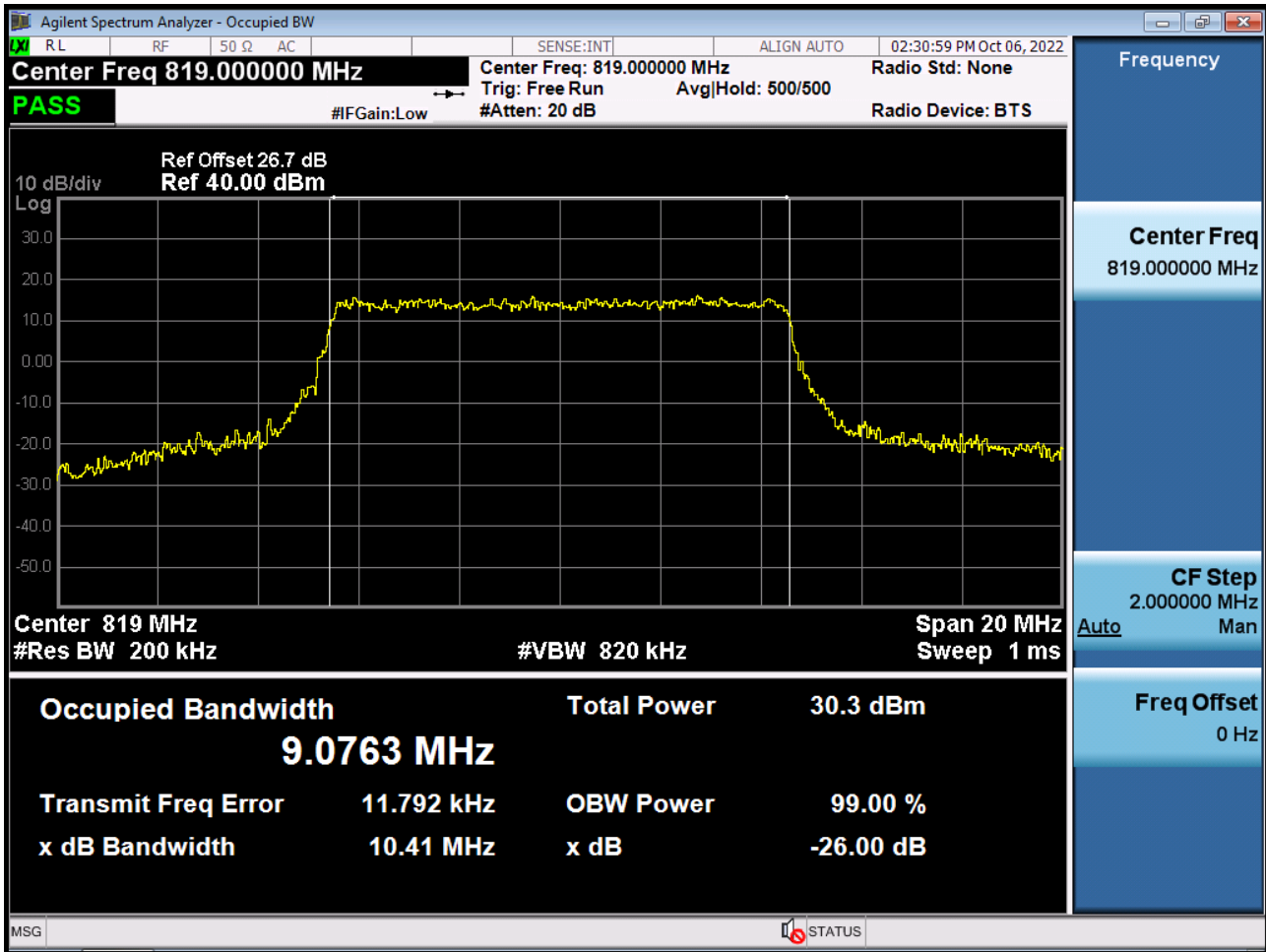




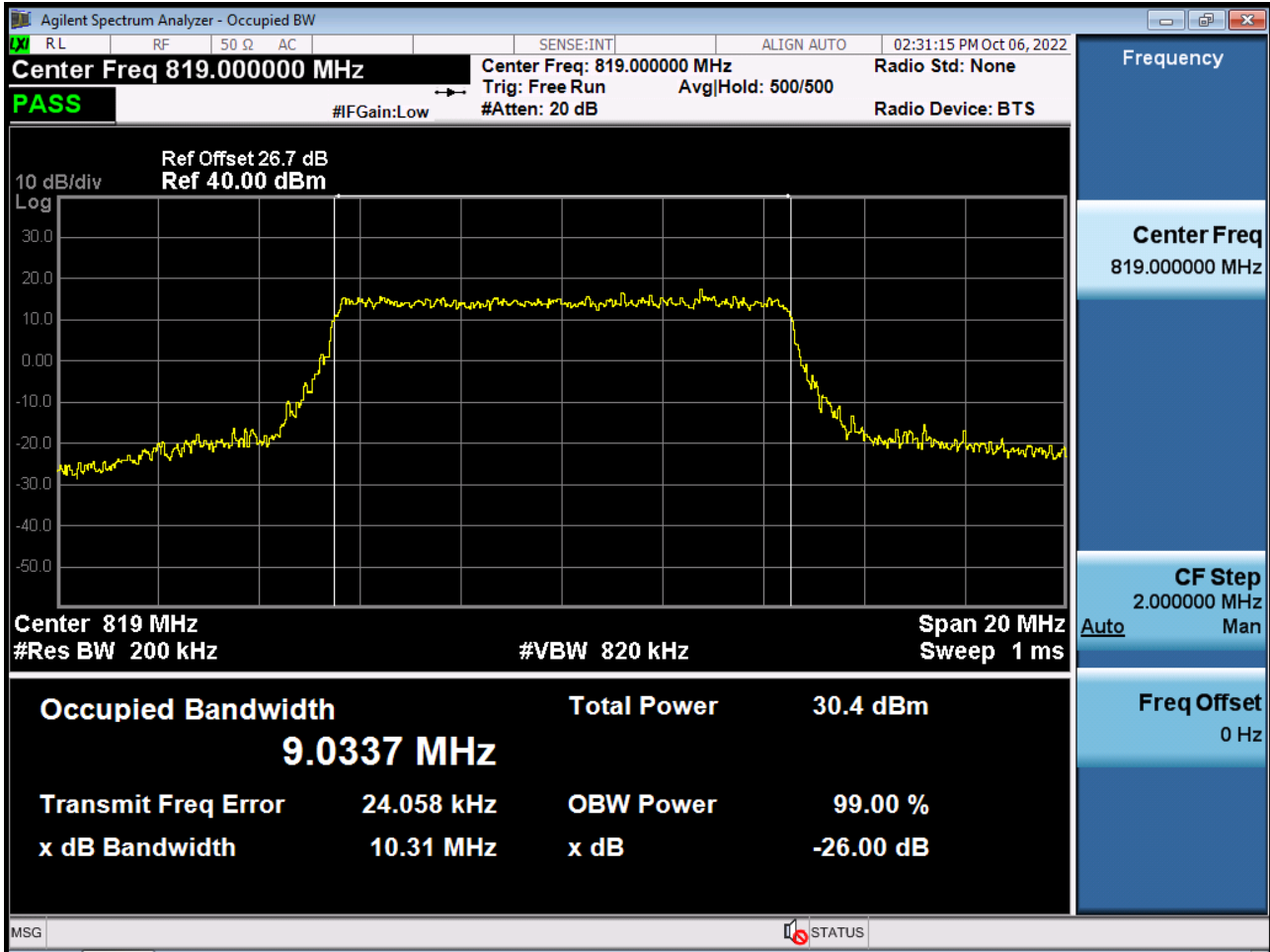
BAND 26. Occupied Bandwidth Plot (10 M BW Ch.26740 QPSK RB 50\_0)



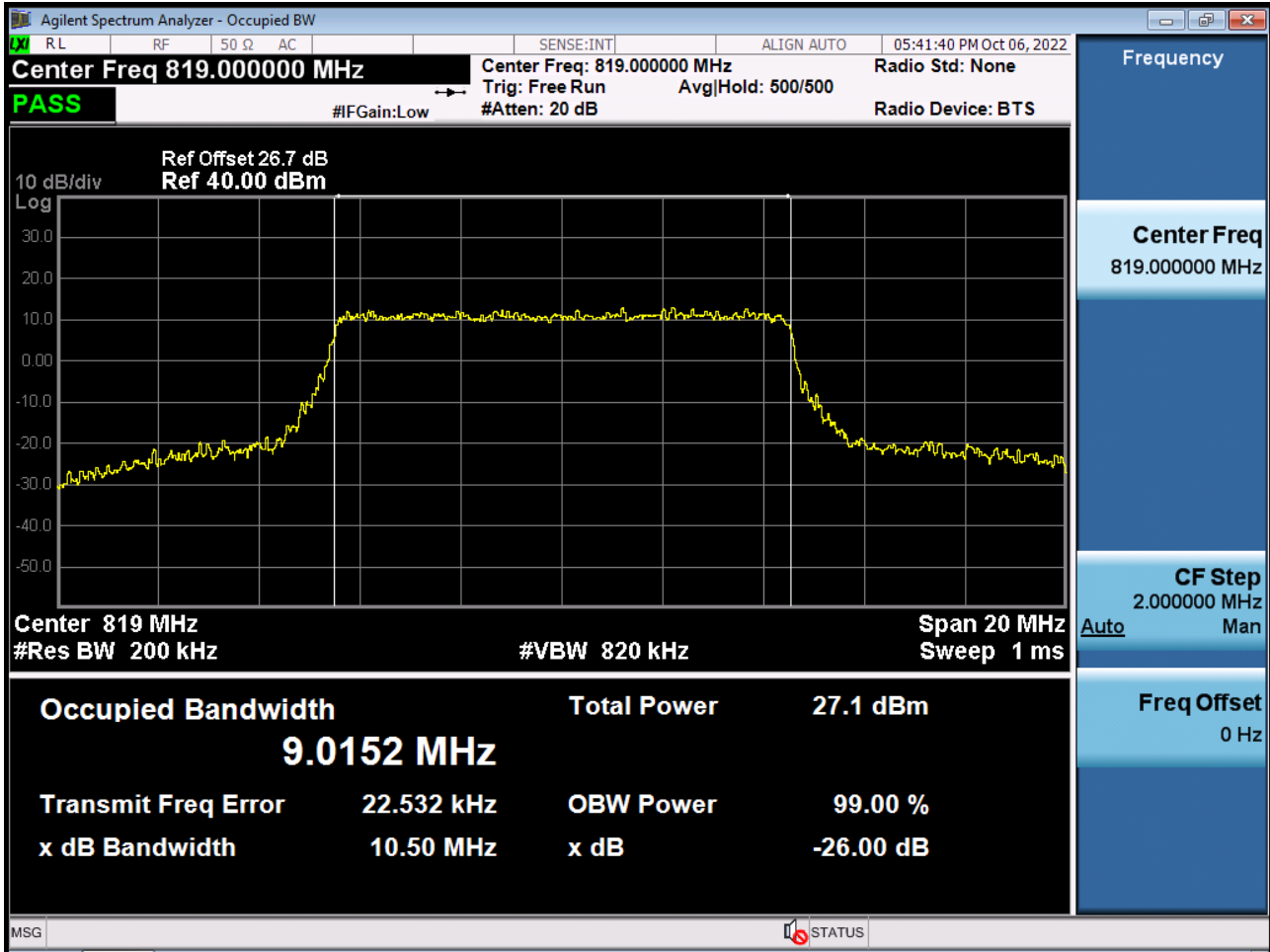
BAND 26. Occupied Bandwidth Plot (10 M BW Ch.26740 16QAM RB 50\_0)



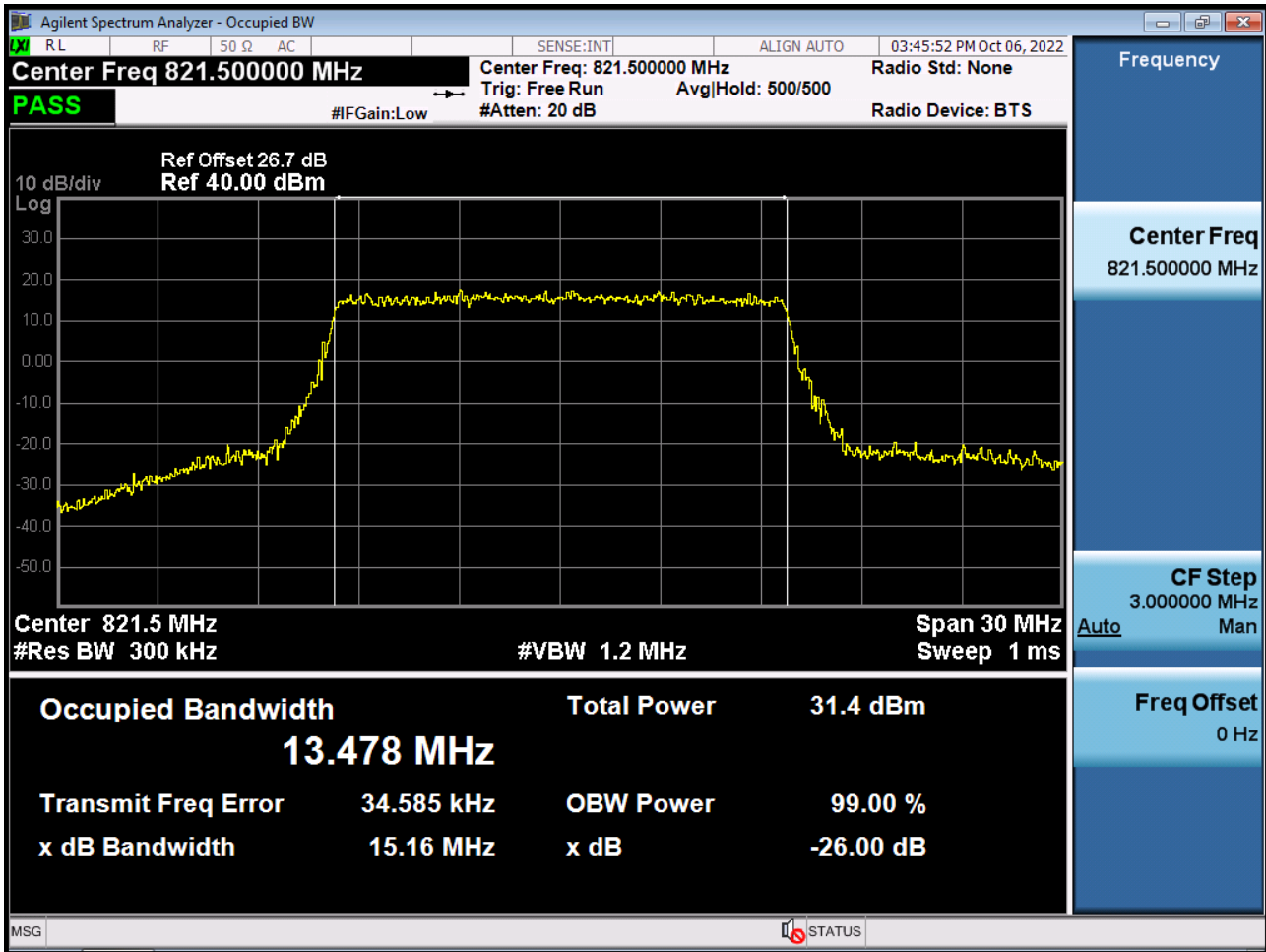
BAND 26. Occupied Bandwidth Plot (10 M BW Ch.26740 64QAM RB 50\_0)



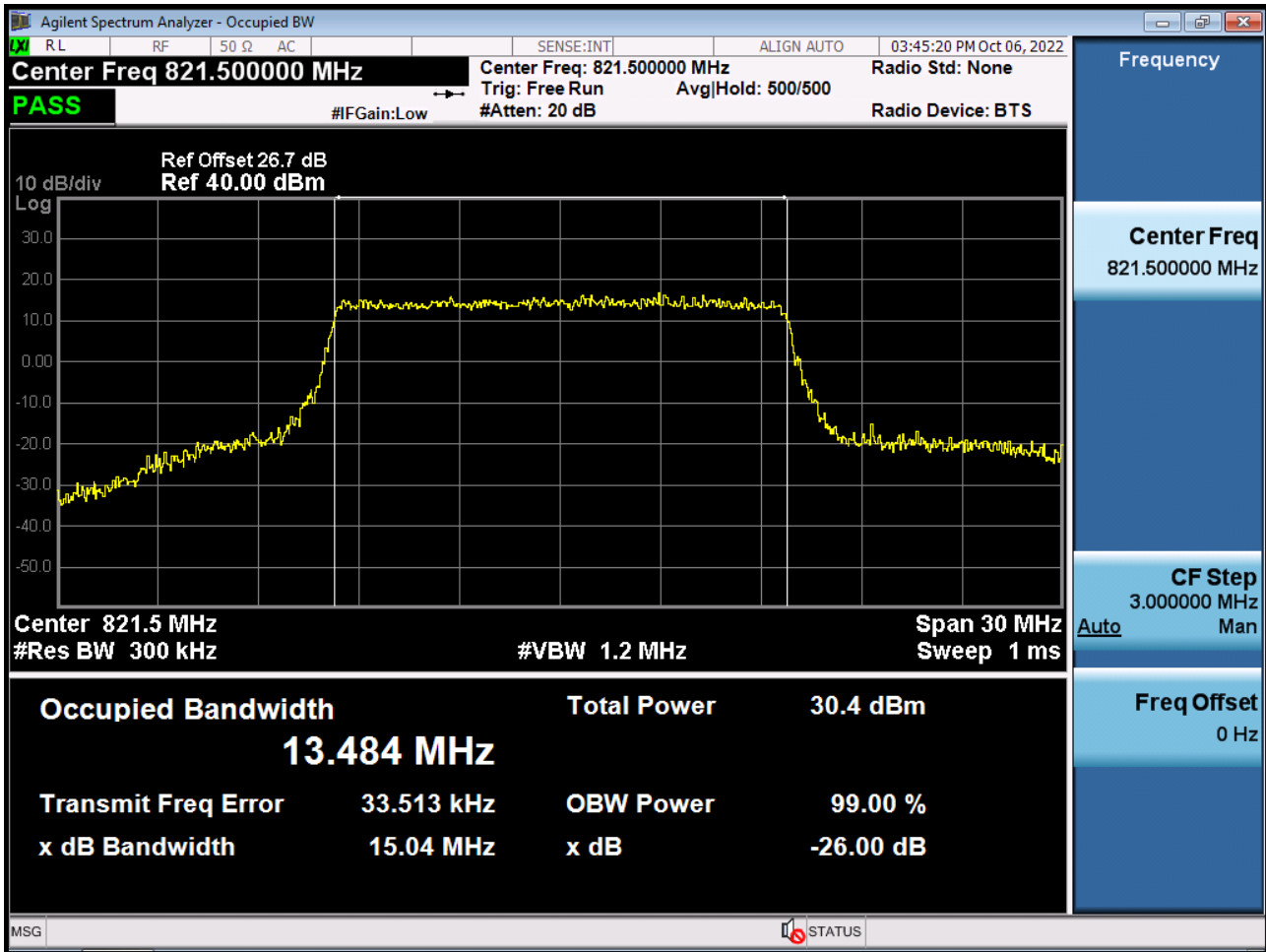
BAND 26. Occupied Bandwidth Plot (10 M BW Ch.26740 256QAM RB 50\_0)



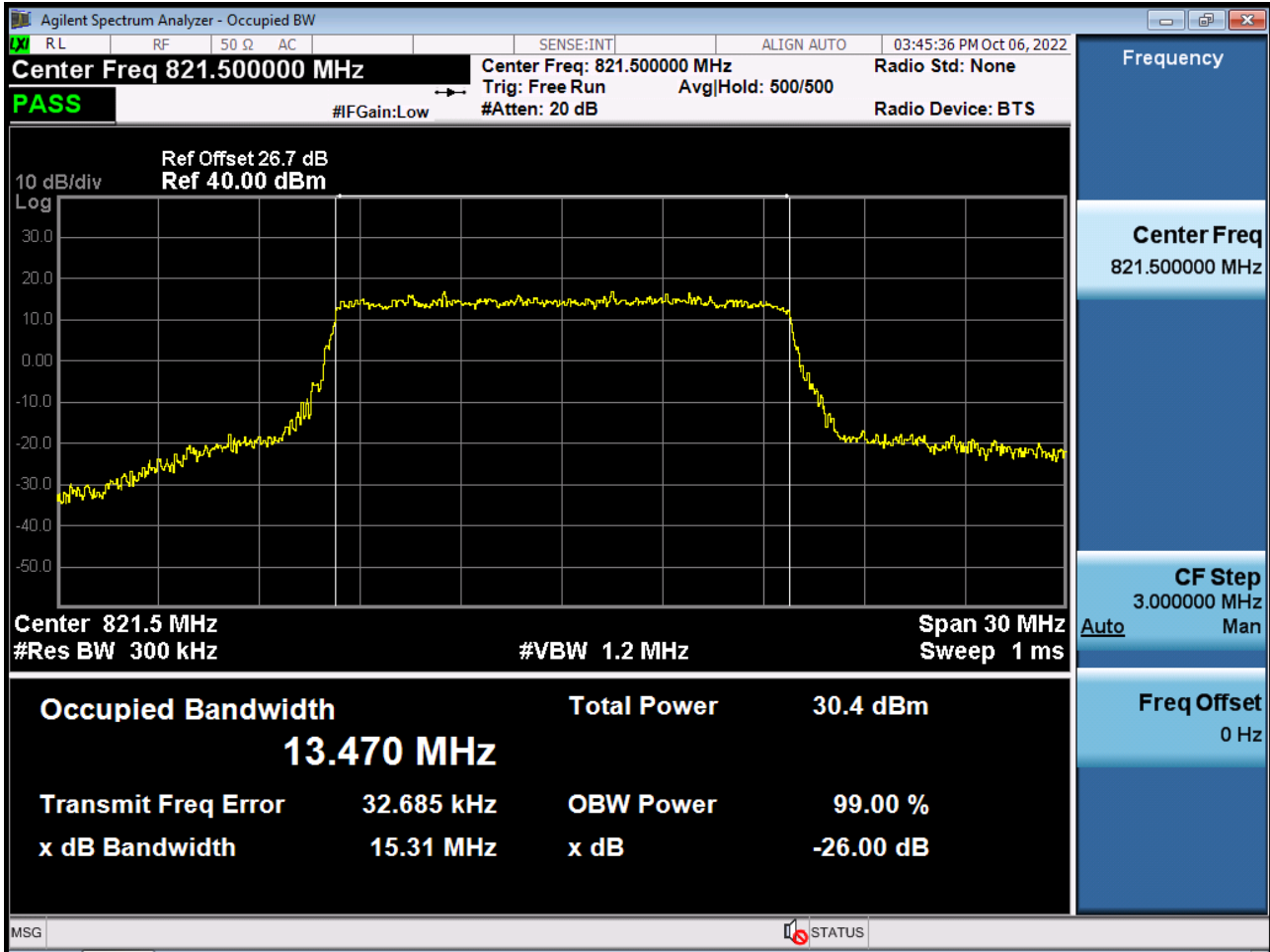
BAND 26. Occupied Bandwidth Plot (15 M BW Ch.26765 QPSK RB 75\_0)



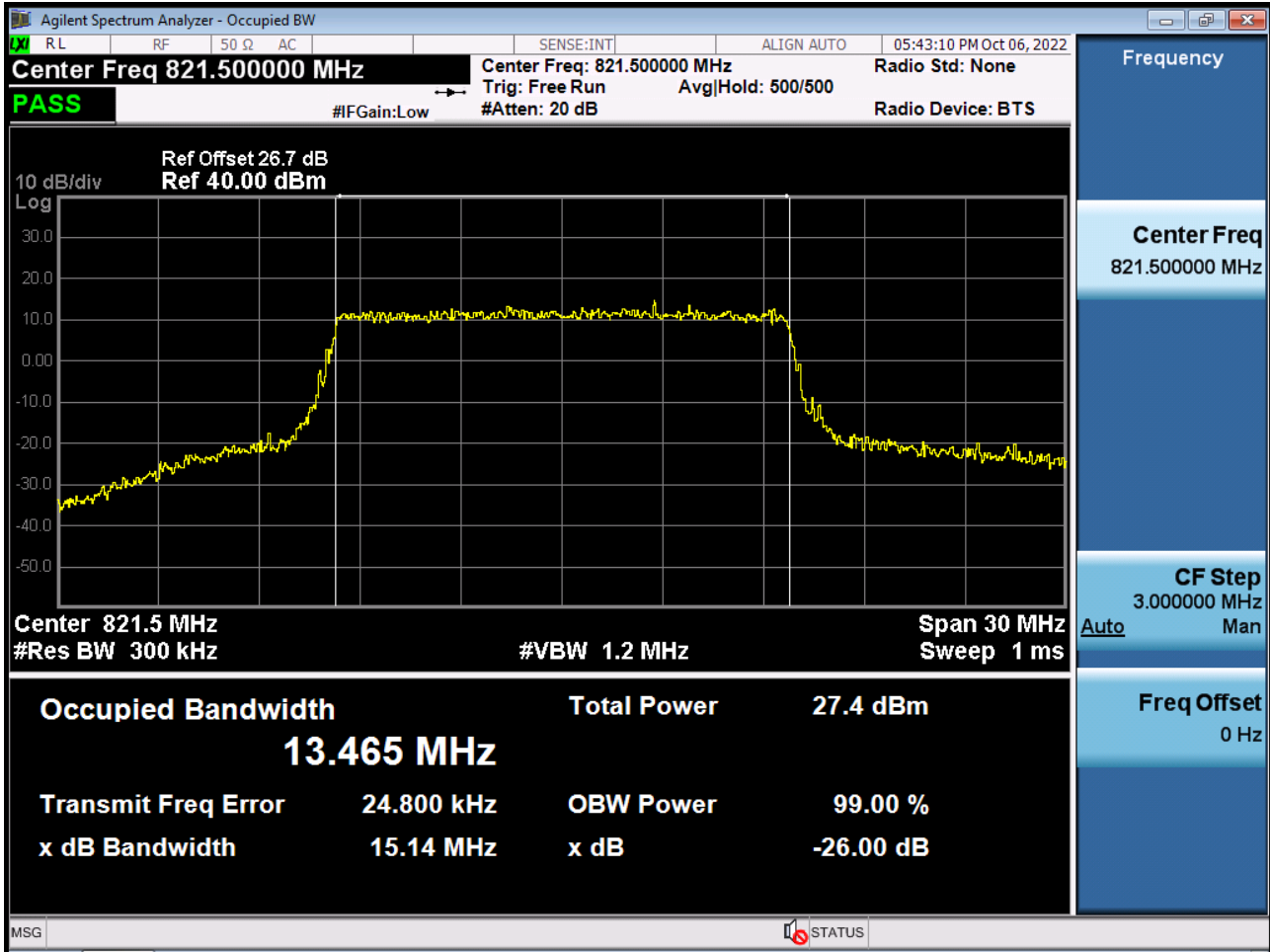
BAND 26. Occupied Bandwidth Plot (15 M BW Ch.26765 16QAM RB 75\_0)



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

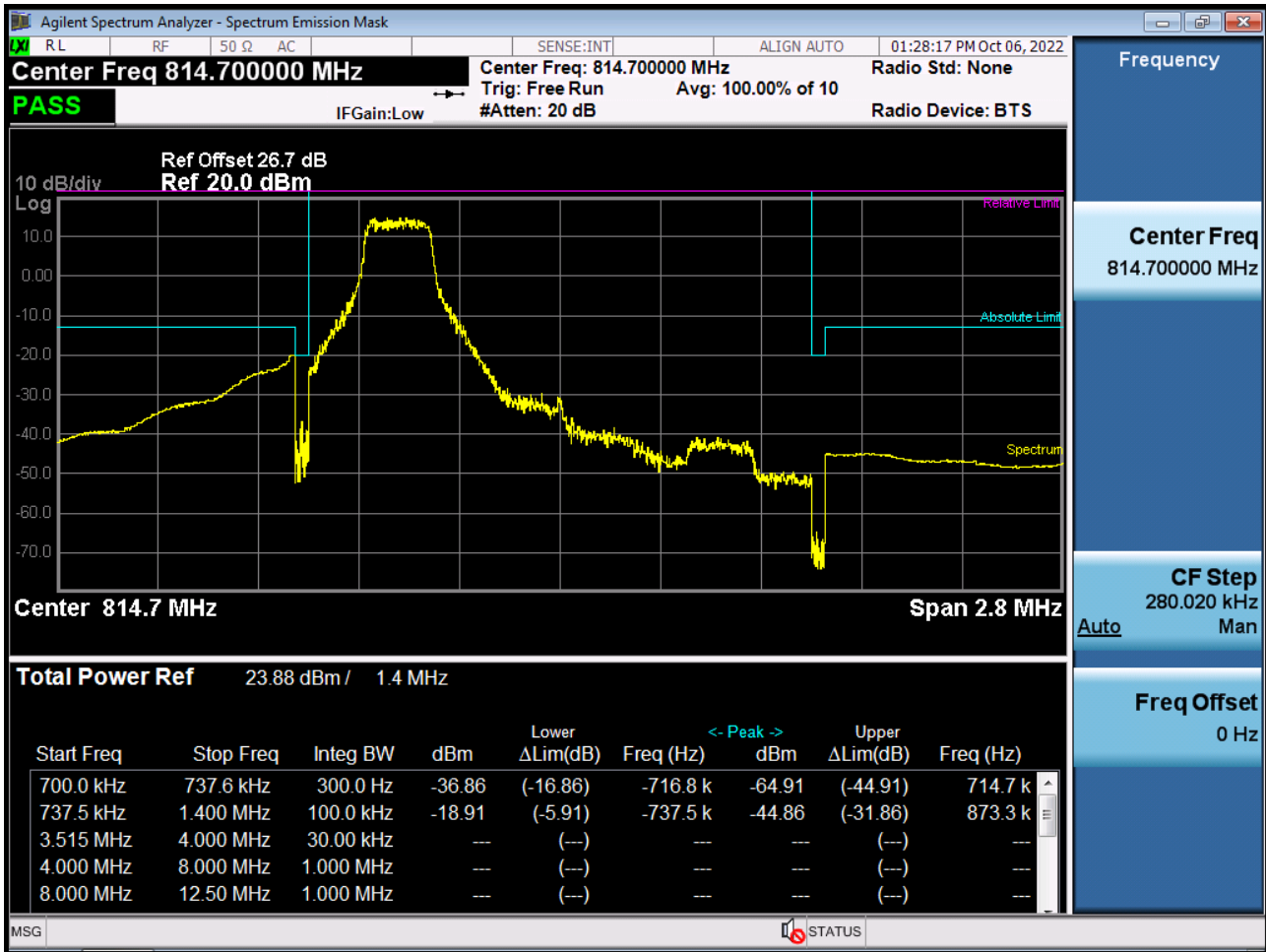


BAND 26. Occupied Bandwidth Plot (15 M BW Ch.26765 256QAM RB 75\_0)

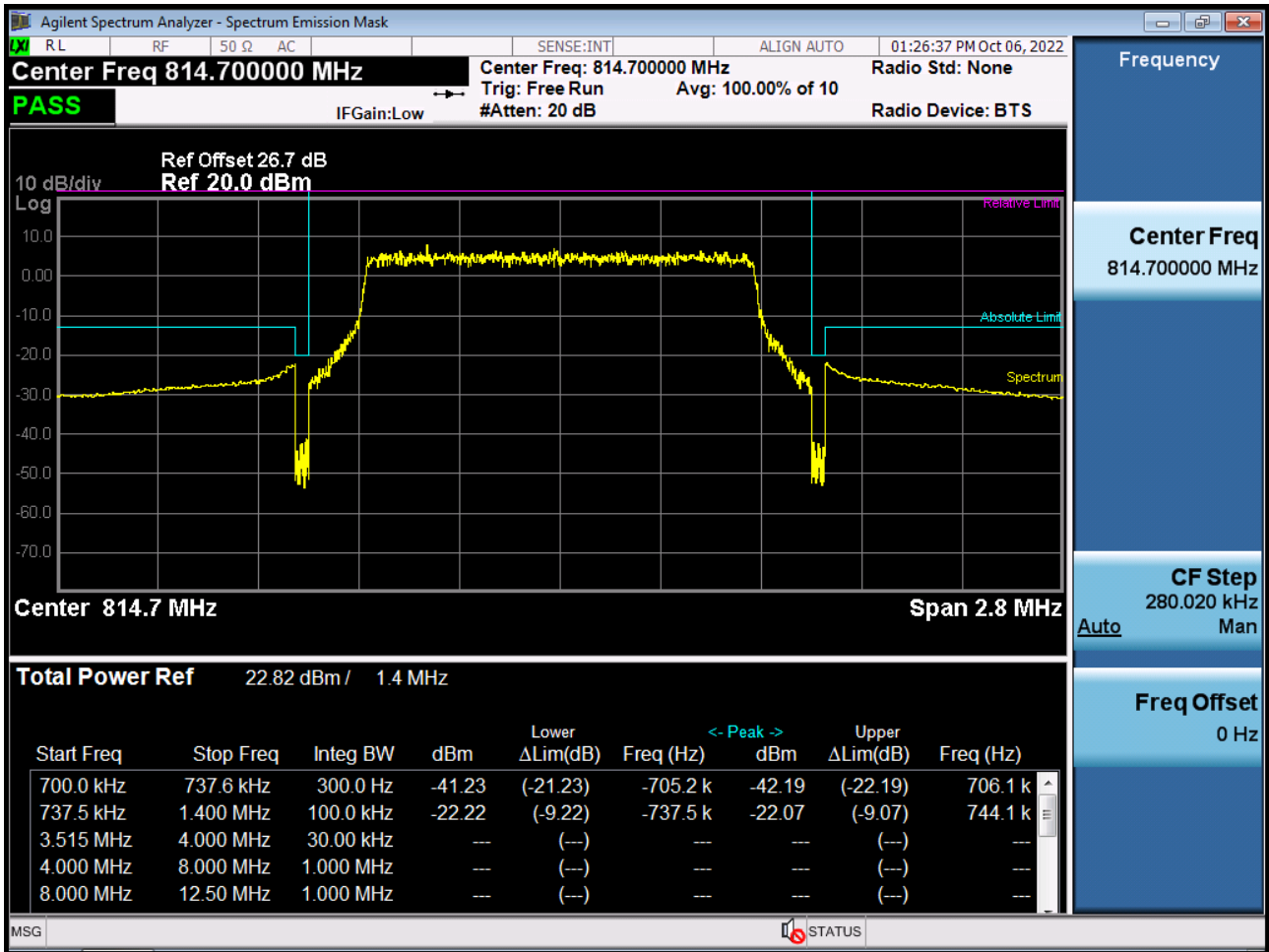




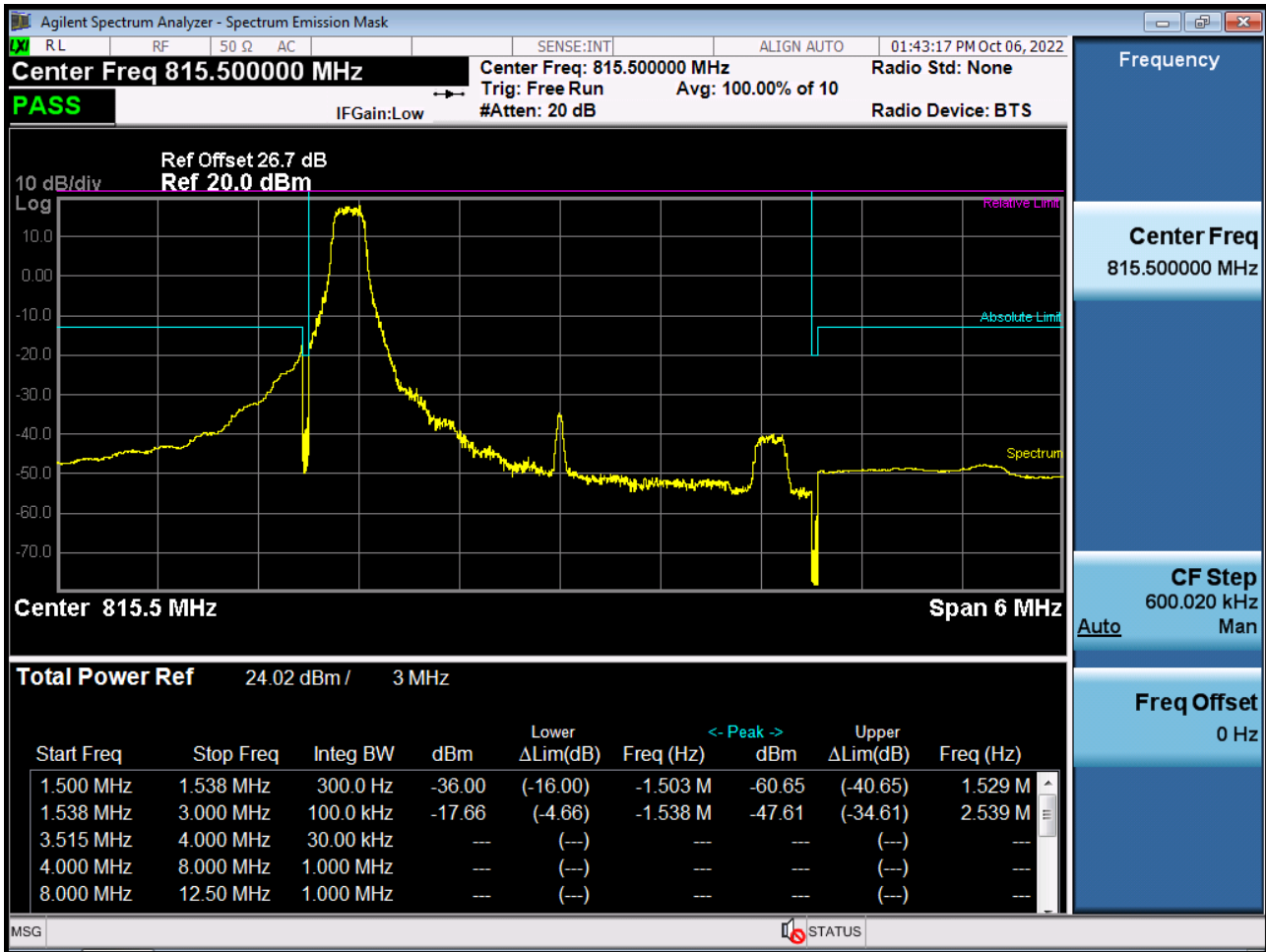
BAND 26. Lower Channel Edge Plot (1.4 M BW Ch.26697 QPSK RB 1, Offset 0)



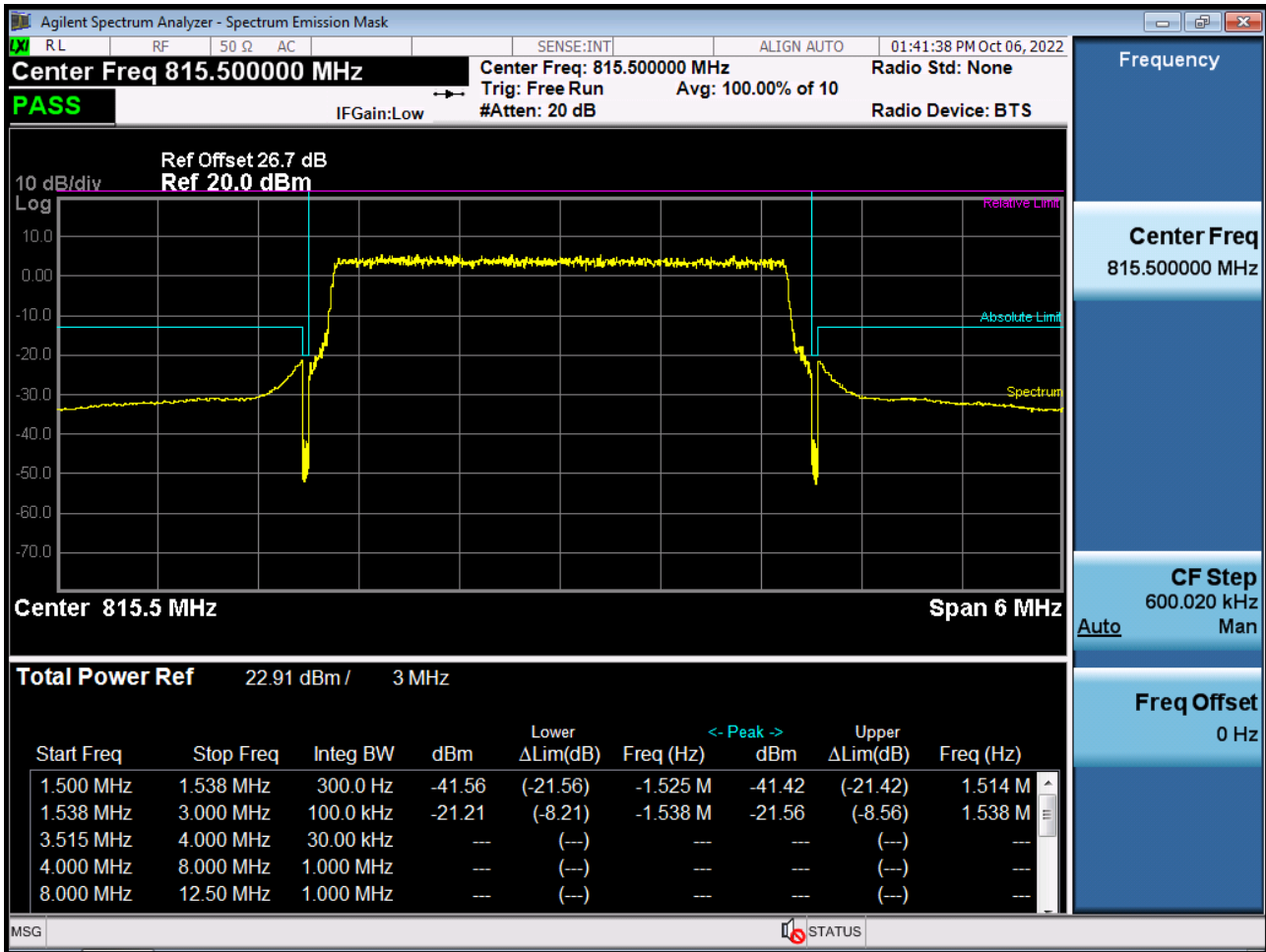
BAND 26. Lower Channel Edge Plot (1.4 M BW Ch.26697 QPSK\_RB6\_Offset 0)



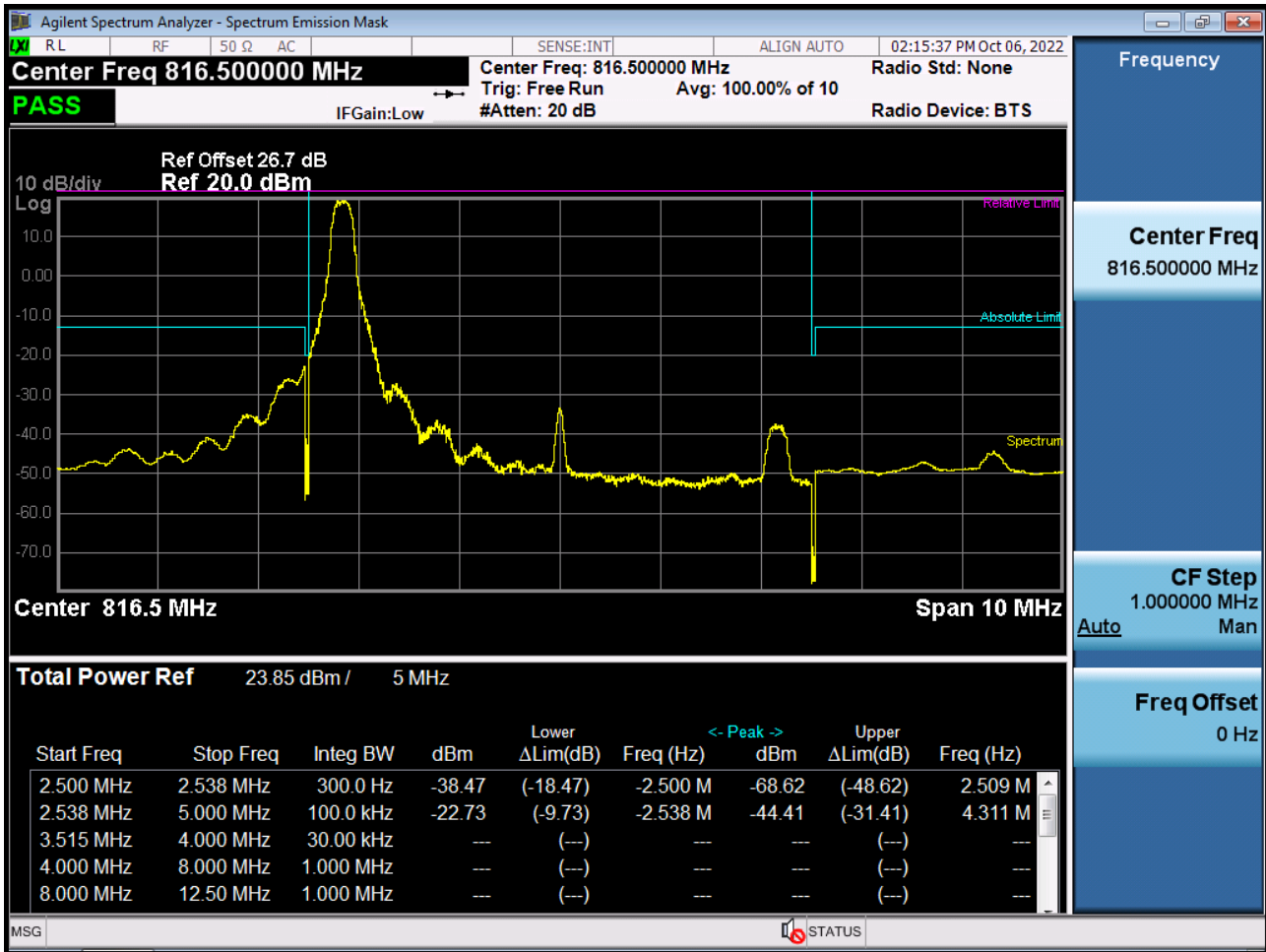
BAND 26. Lower Channel Edge Plot (3 M BW Ch.26705 QPSK RB 1, Offset 0)



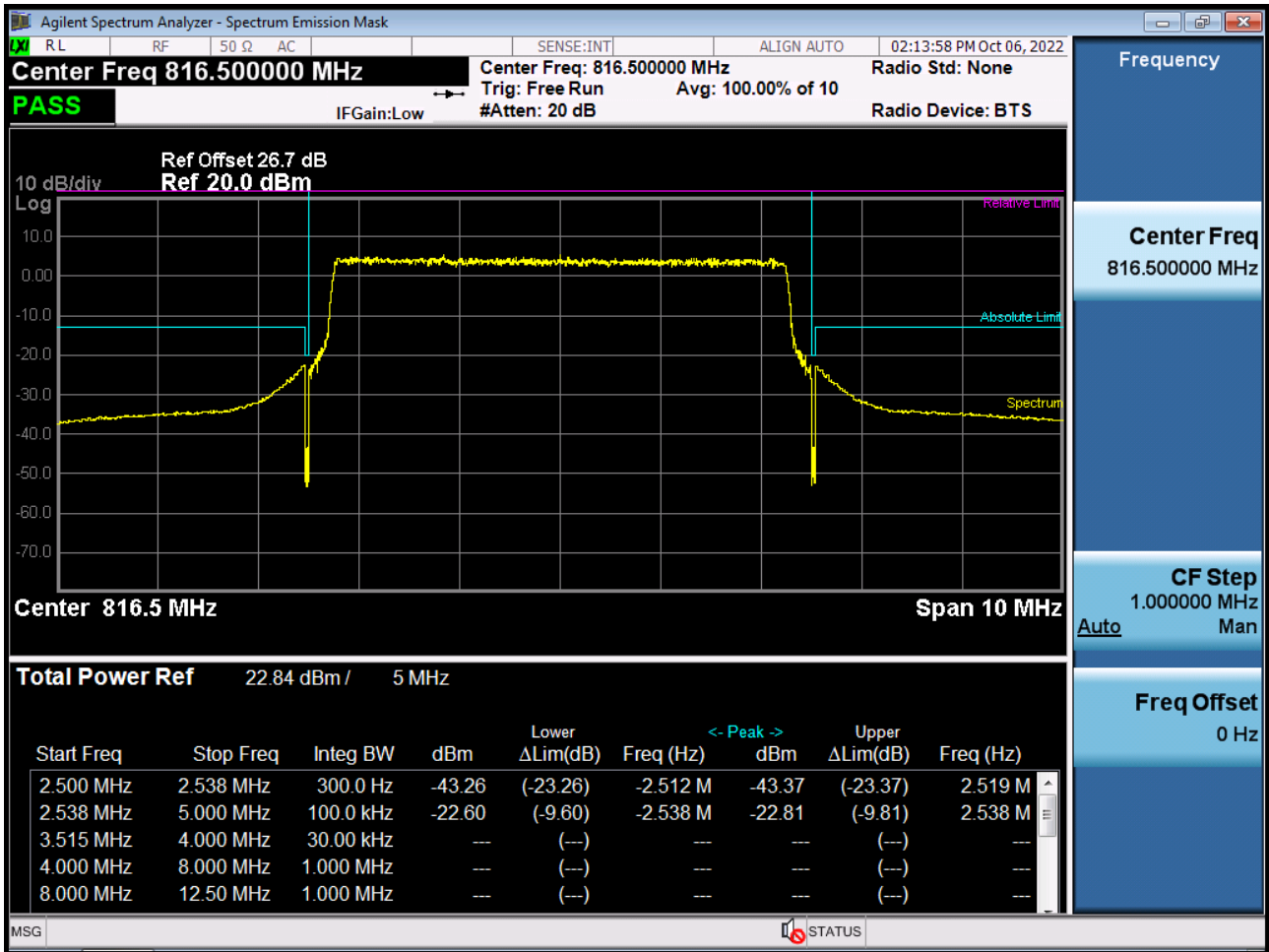
BAND 26. Lower Channel Edge Plot (3 M BW Ch.26705 QPSK\_RB15\_Offset 0)



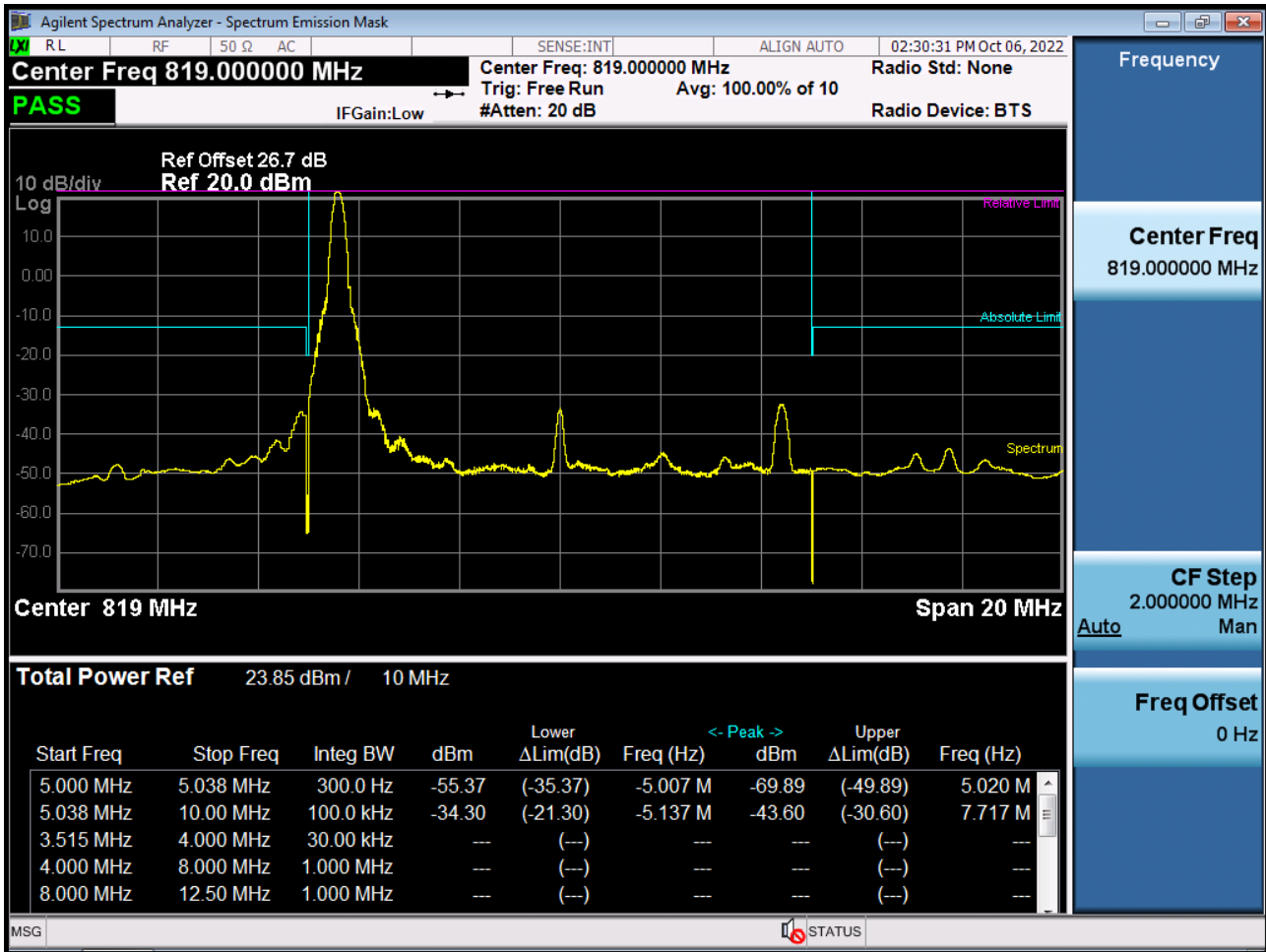
BAND 26. Lower Channel Edge Plot (5 M BW Ch.26715 QPSK RB 1, Offset 0)



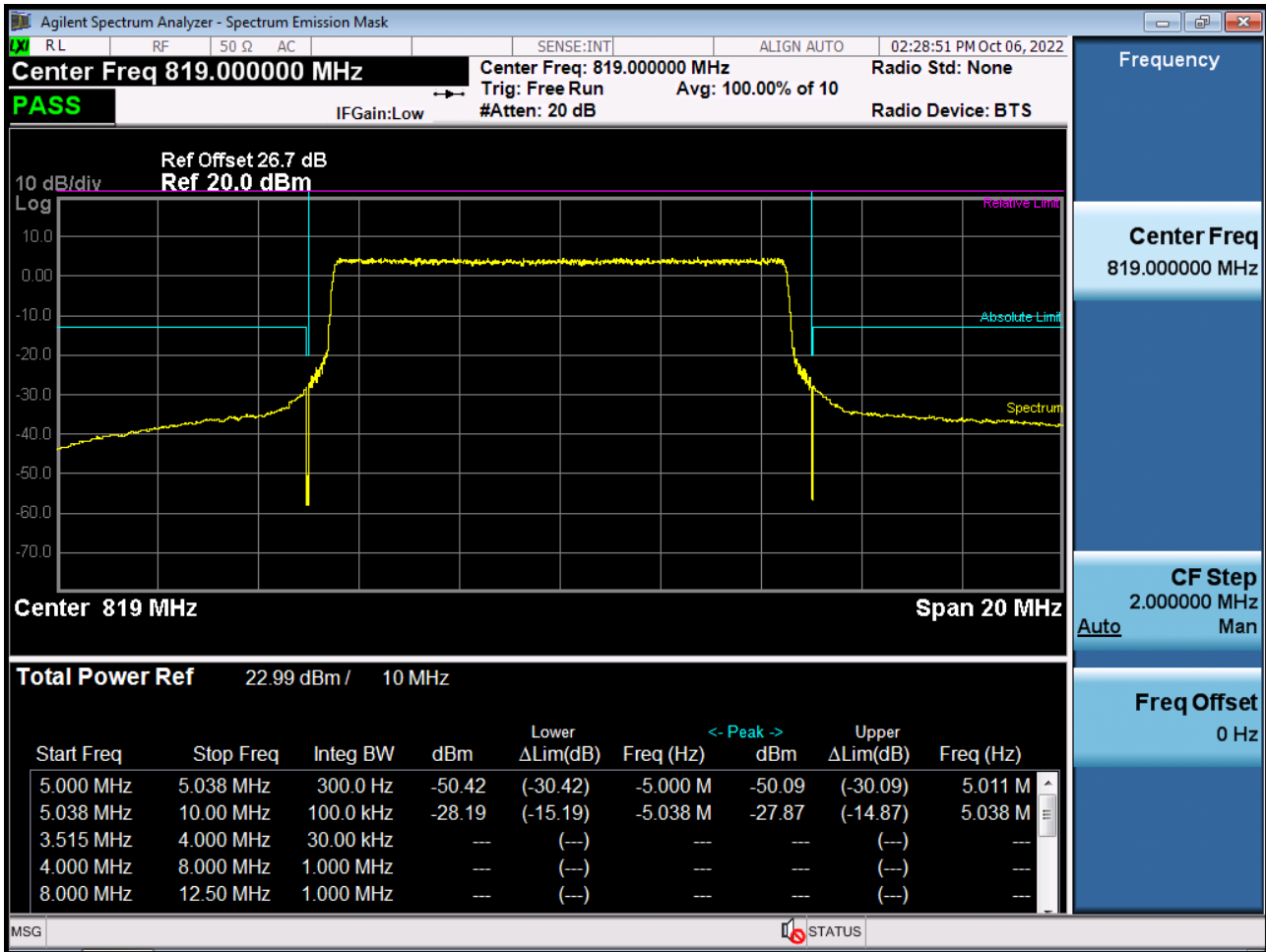
BAND 26. Lower Channel Edge Plot (5 M BW Ch.26715 QPSK\_RB25\_Offset 0)



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

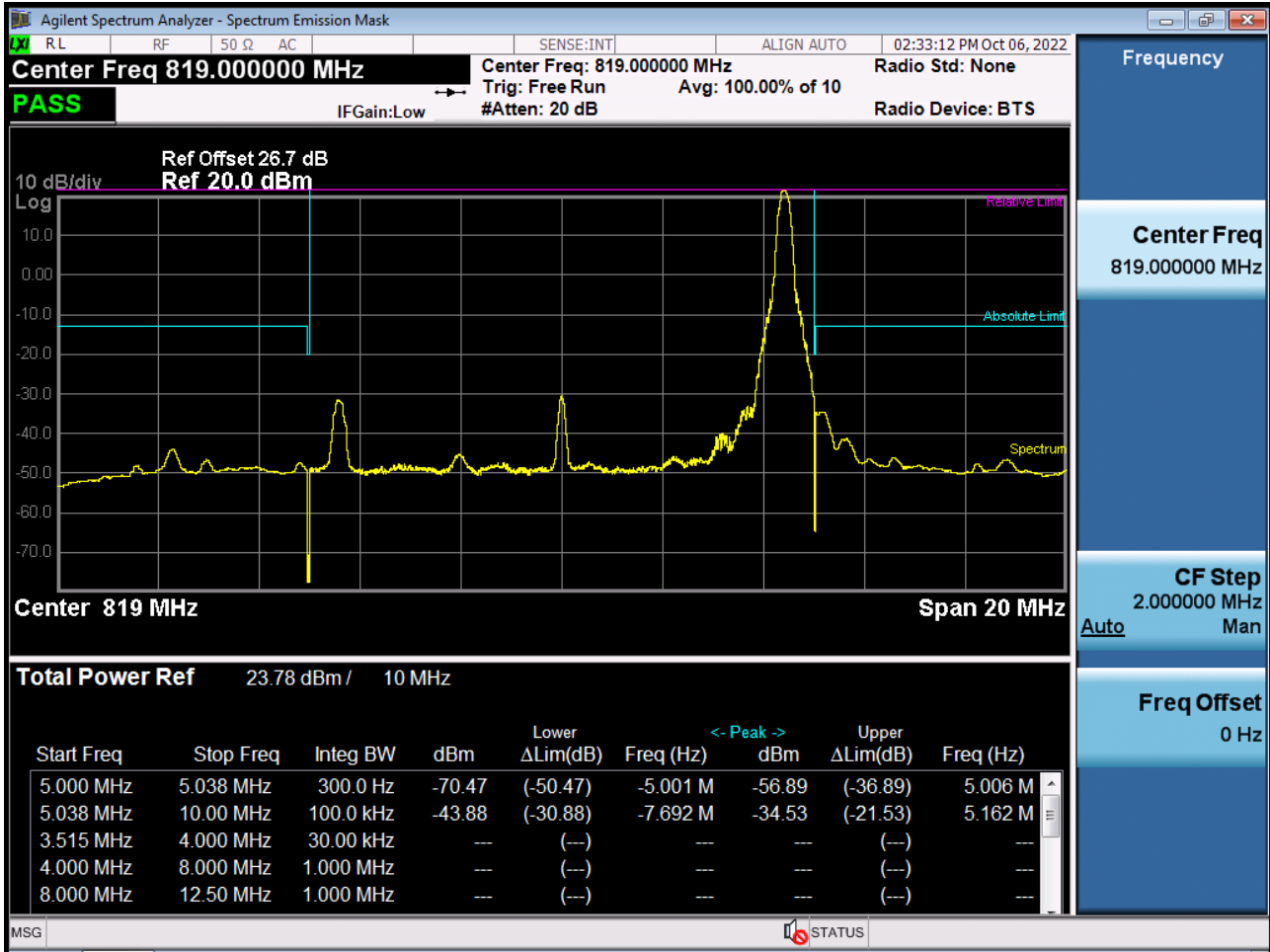


BAND 26. Low Channel Edge Plot (10 M BW Ch.26740 QPSK\_RB50\_Offset 0)

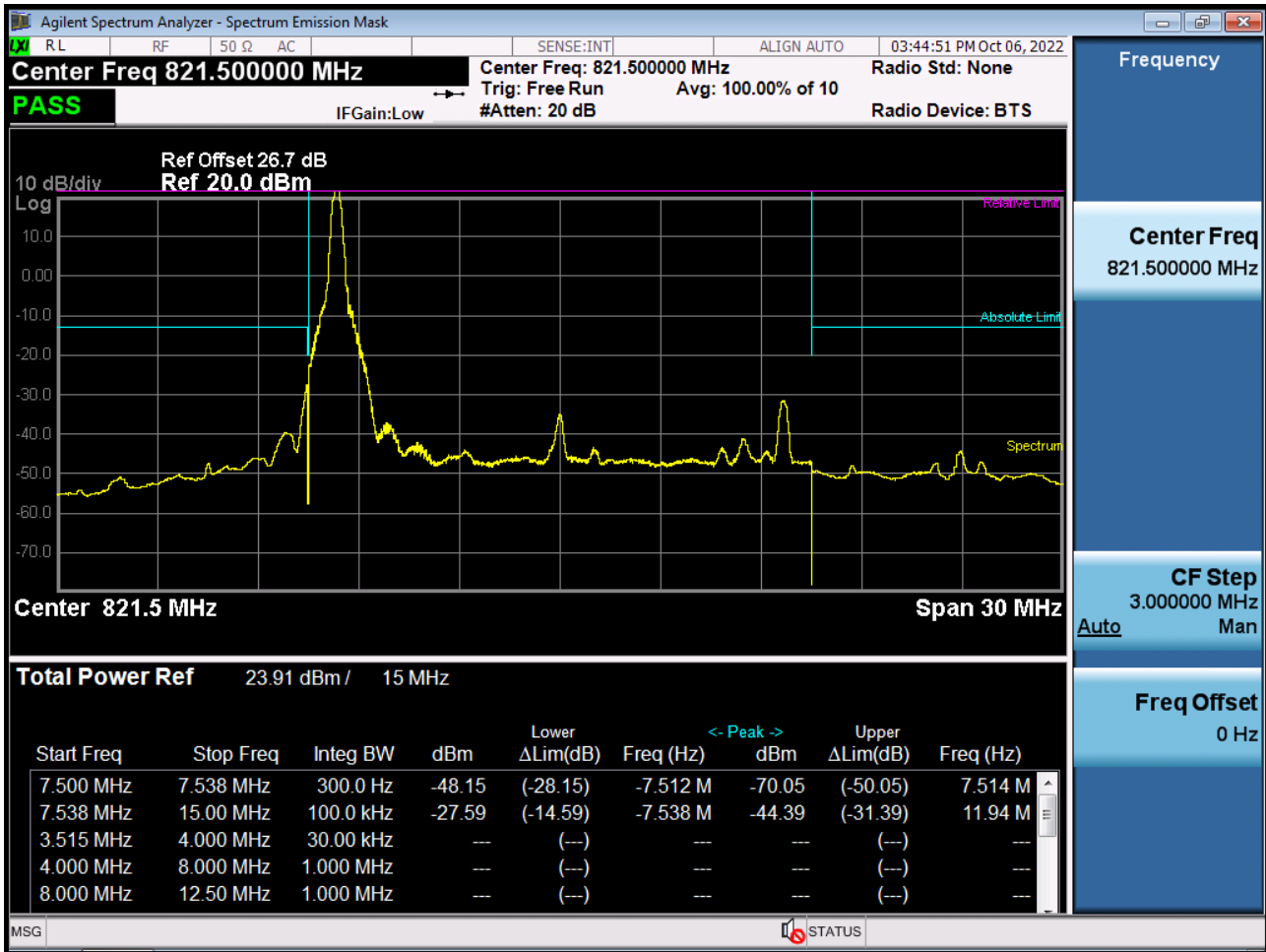




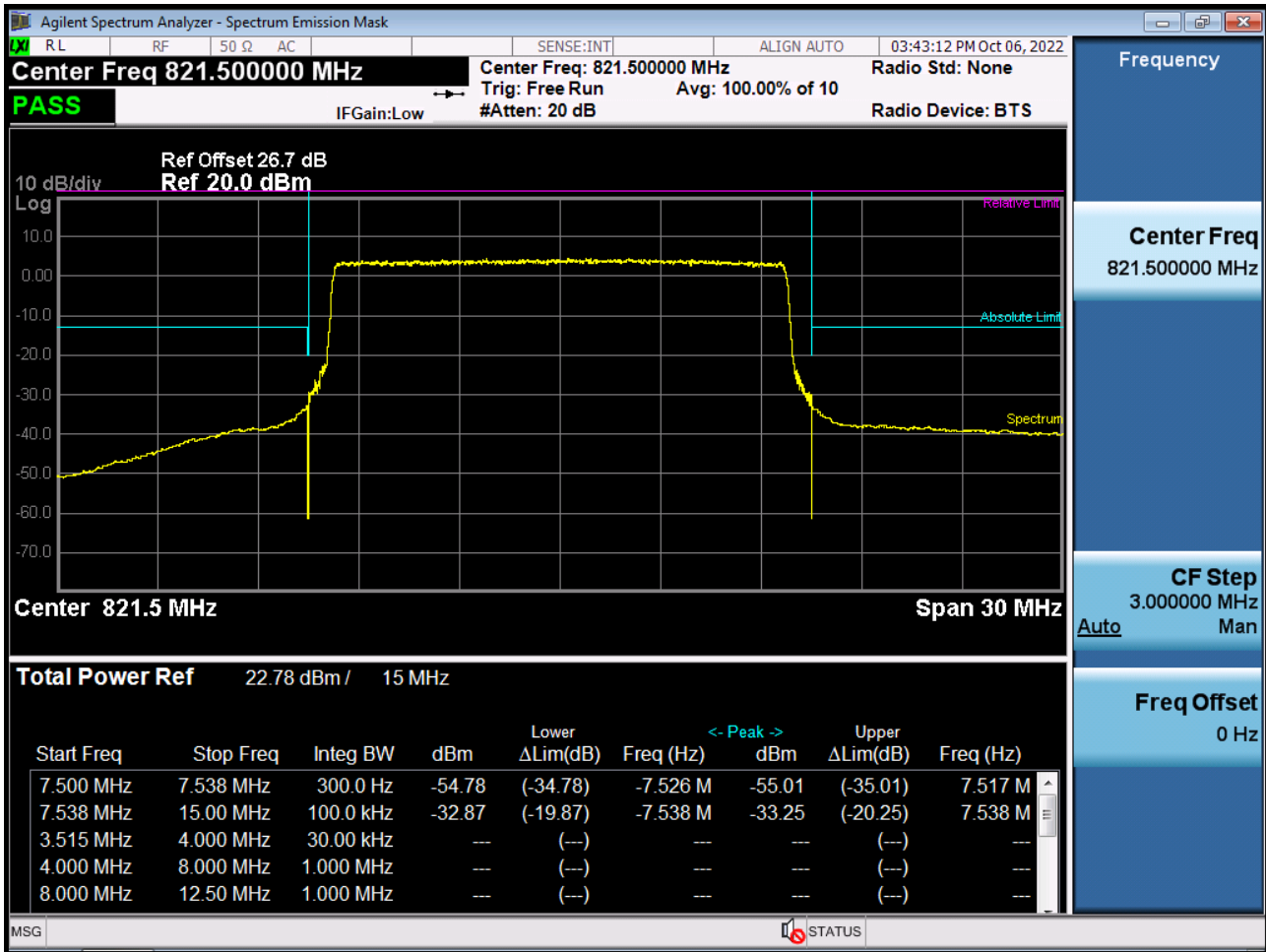
BAND 26. Mid Channel Edge Plot (10 M BW Ch. 26740 QPSK\_RB1\_Offset 49)



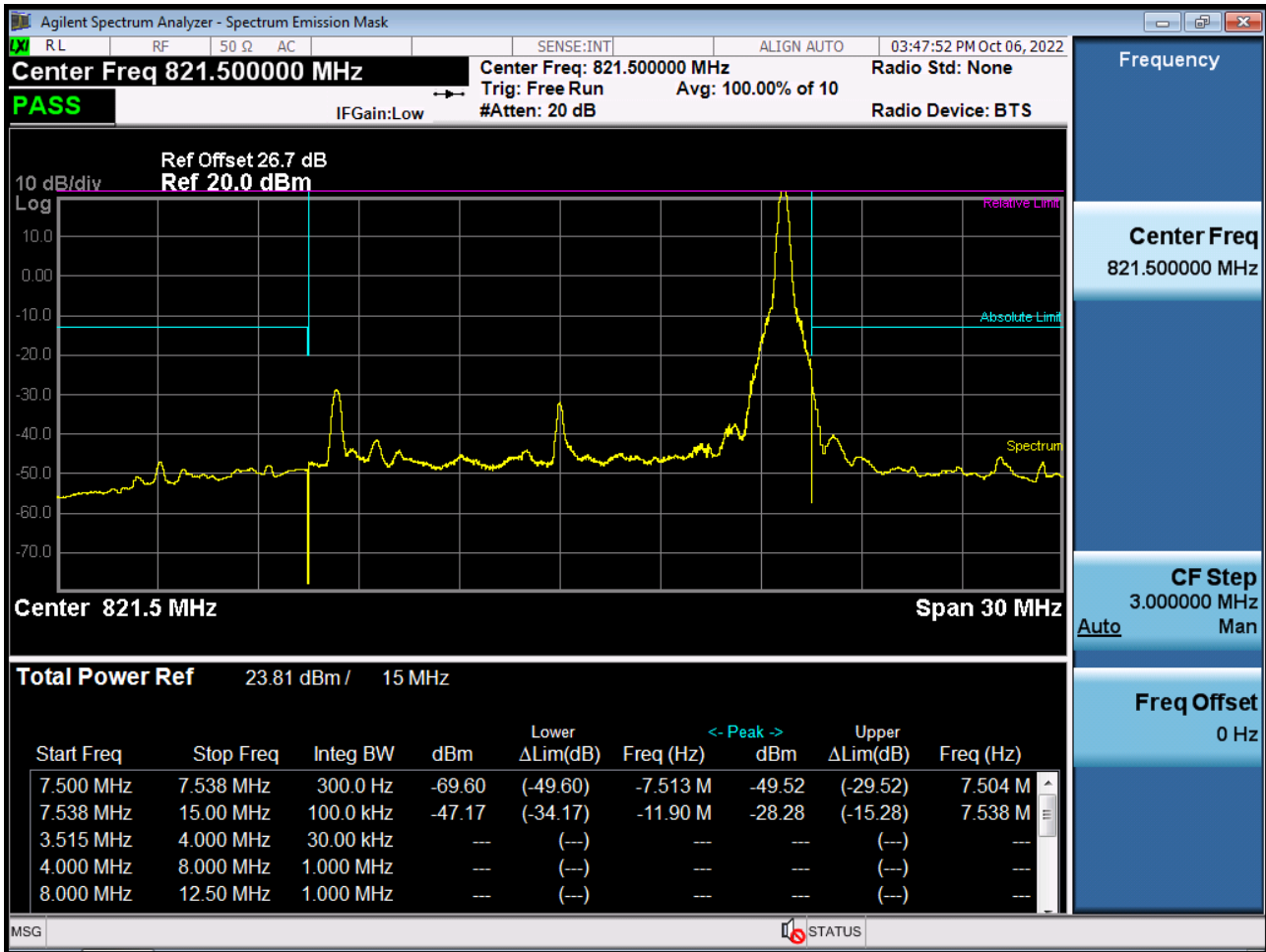
BAND 26. Low Channel Edge Plot (15 M BW Ch.26765 QPSK RB 1, Offset 0)



BAND 26. Low Channel Edge Plot (15 M BW Ch.26765 QPSK RB 75, Offset0)



BAND 26. Mid Channel Edge Plot (15 M BW Ch.26765 QPSK\_RB1\_Offset 74)



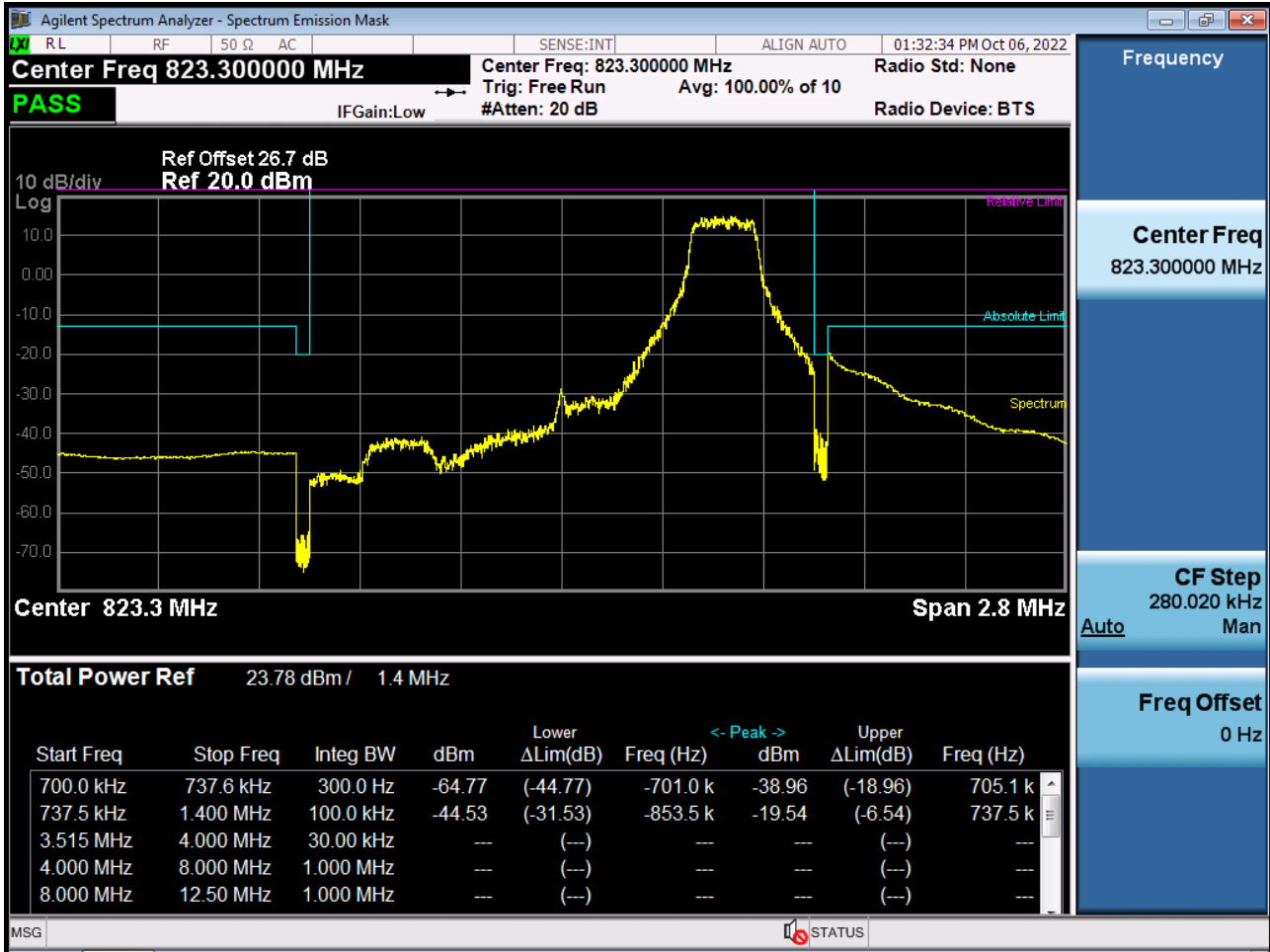
BAND 26. Mid Band Edge Plot (15 M BW Ch.26765 QPSK RB 1, Offset74)



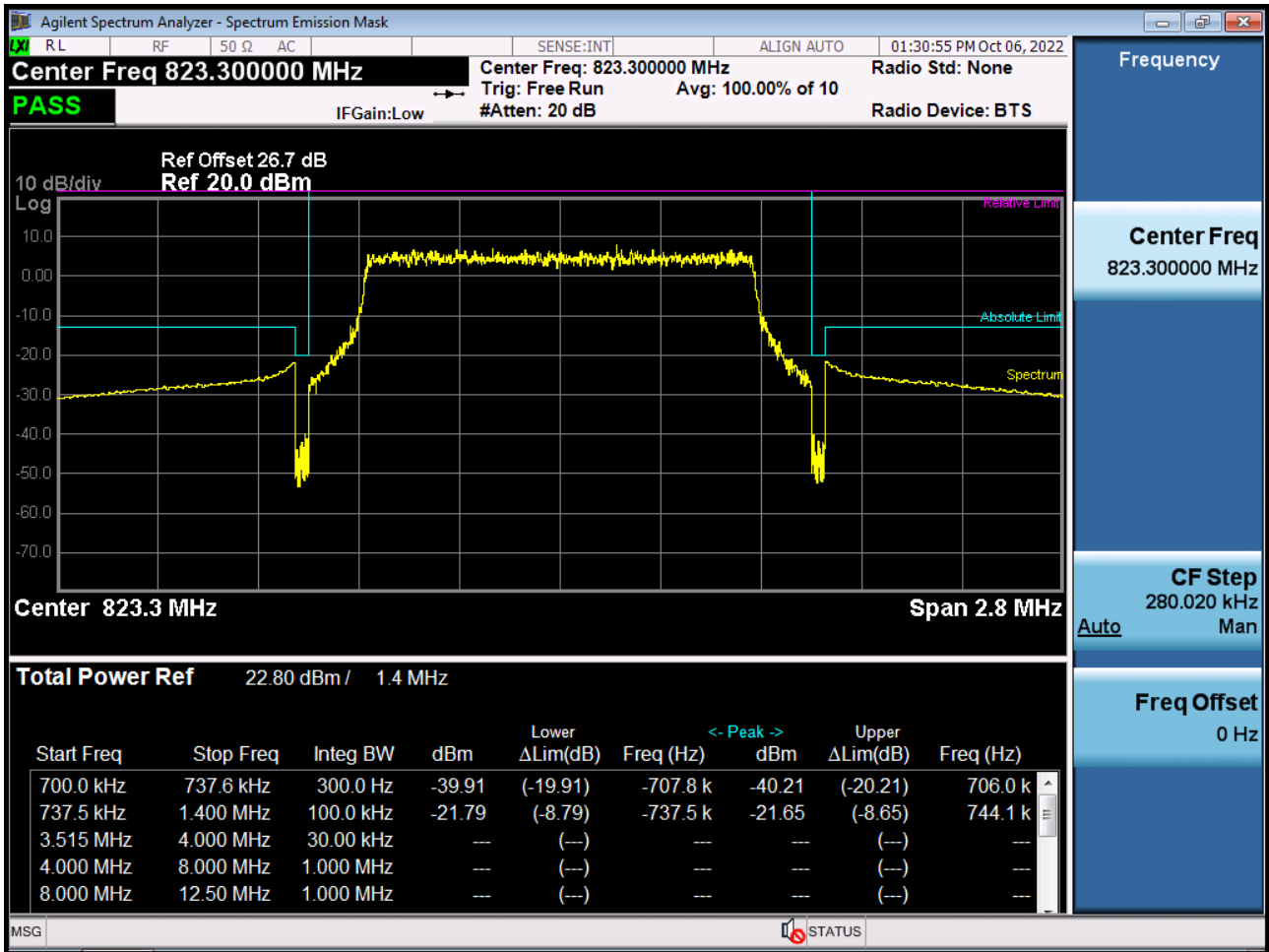
BAND 26. Mid Band Edge Plot (15 M BW Ch.26765 QPSK\_RB75\_Offset 0)



BAND 26. Upper Channel Edge Plot (1.4 M BW Ch.26783 QPSK\_RB1\_Offset 5)

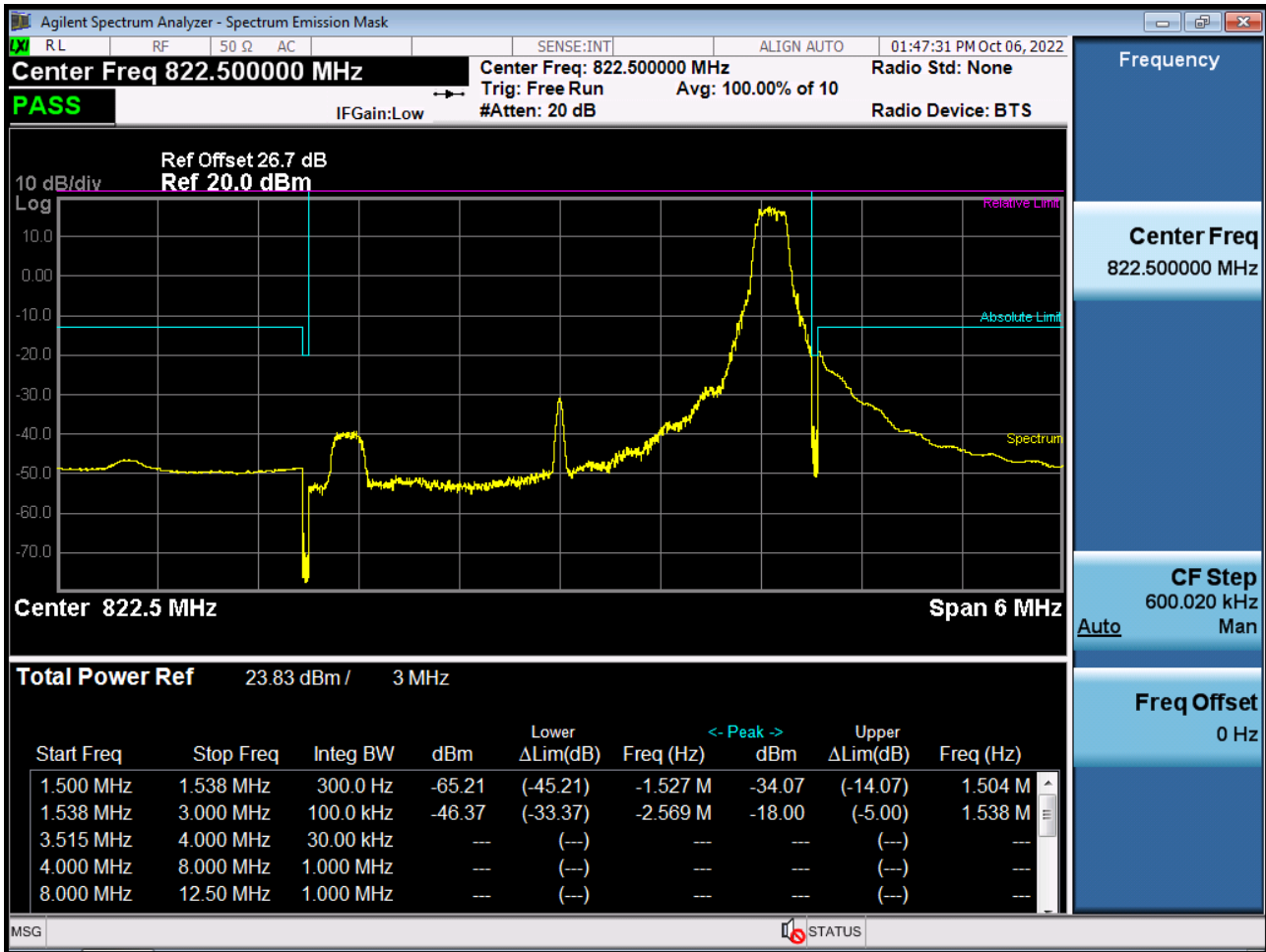


BAND 26. Upper Channel Edge Plot (1.4 M BW Ch.26783 QPSK\_RB6\_Offset 0)

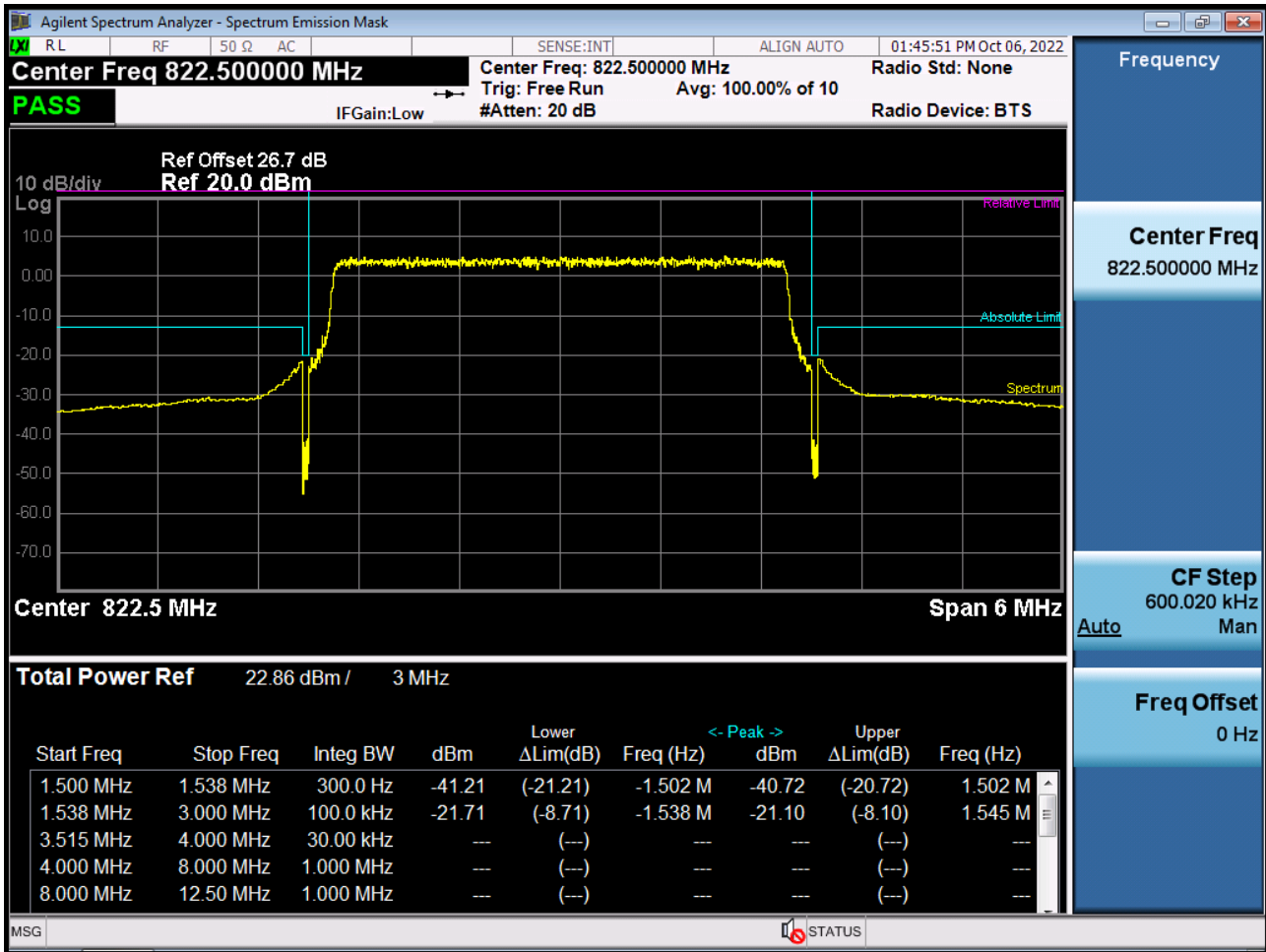




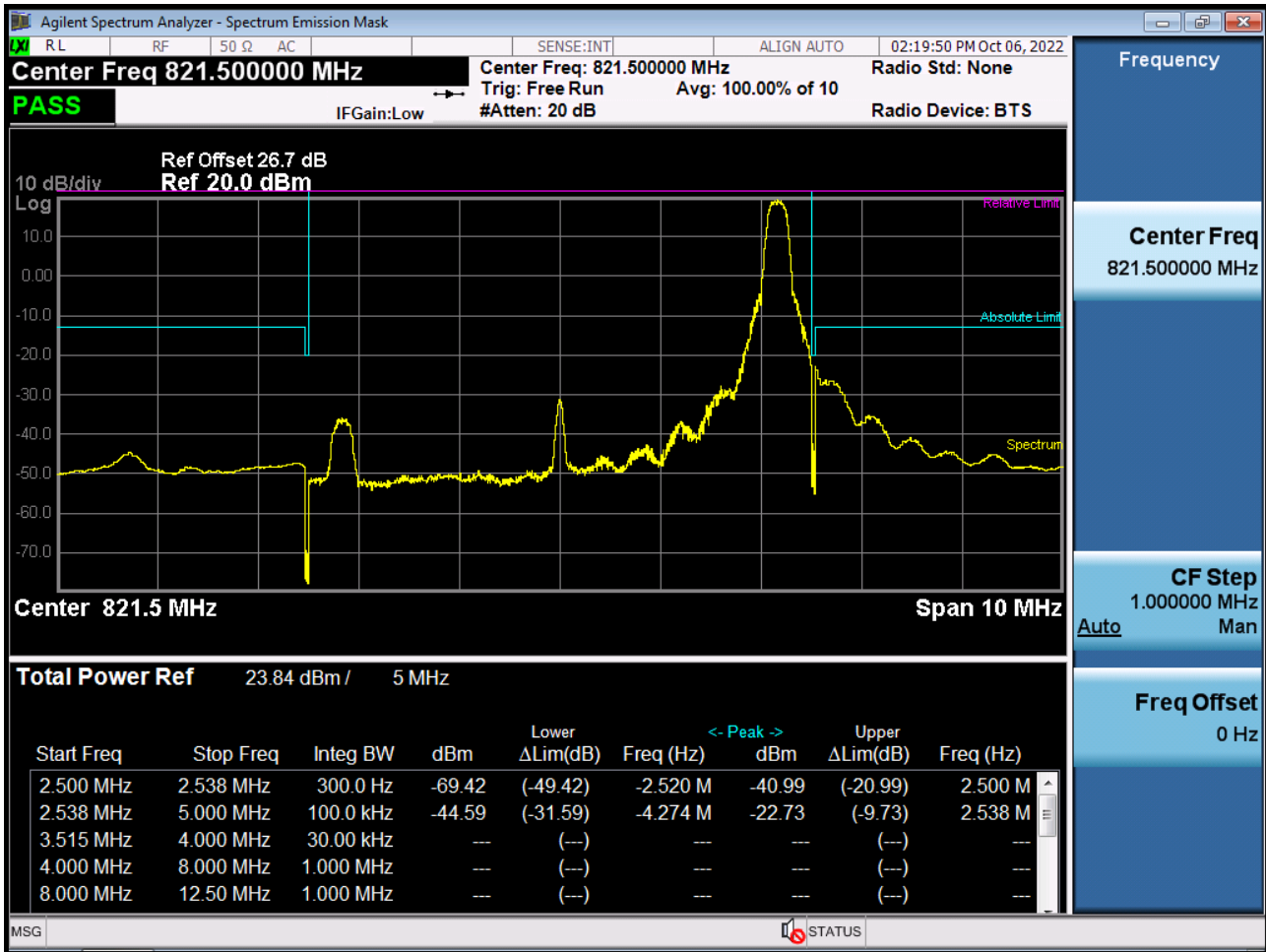
BAND 26. Upper Channel Edge Plot (3 M BW Ch.26775 QPSK\_RB1\_Offset 14)



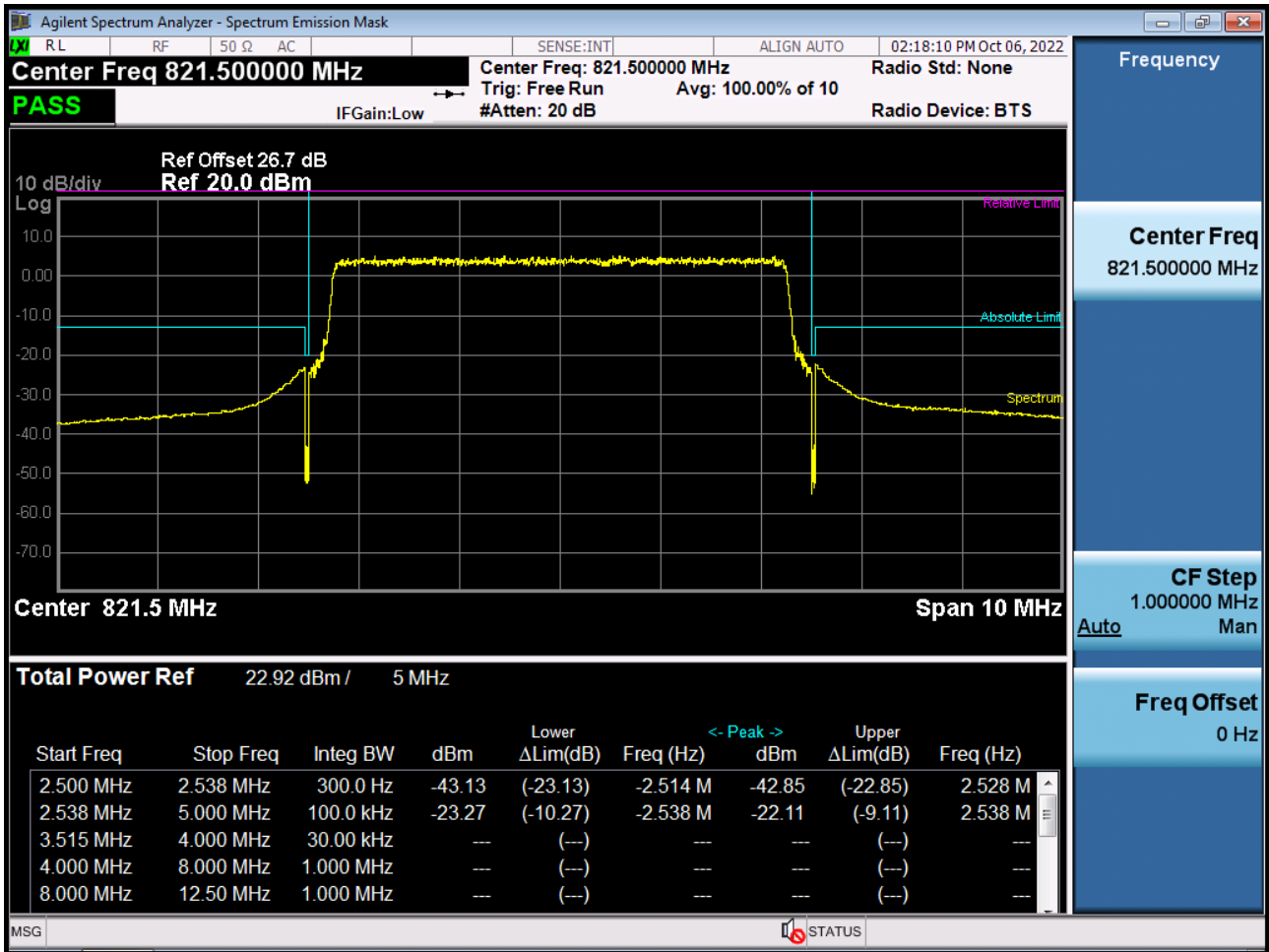
BAND 26. Upper Channel Edge Plot (3 M BW Ch.26775 QPSK\_RB15\_Offset 0)



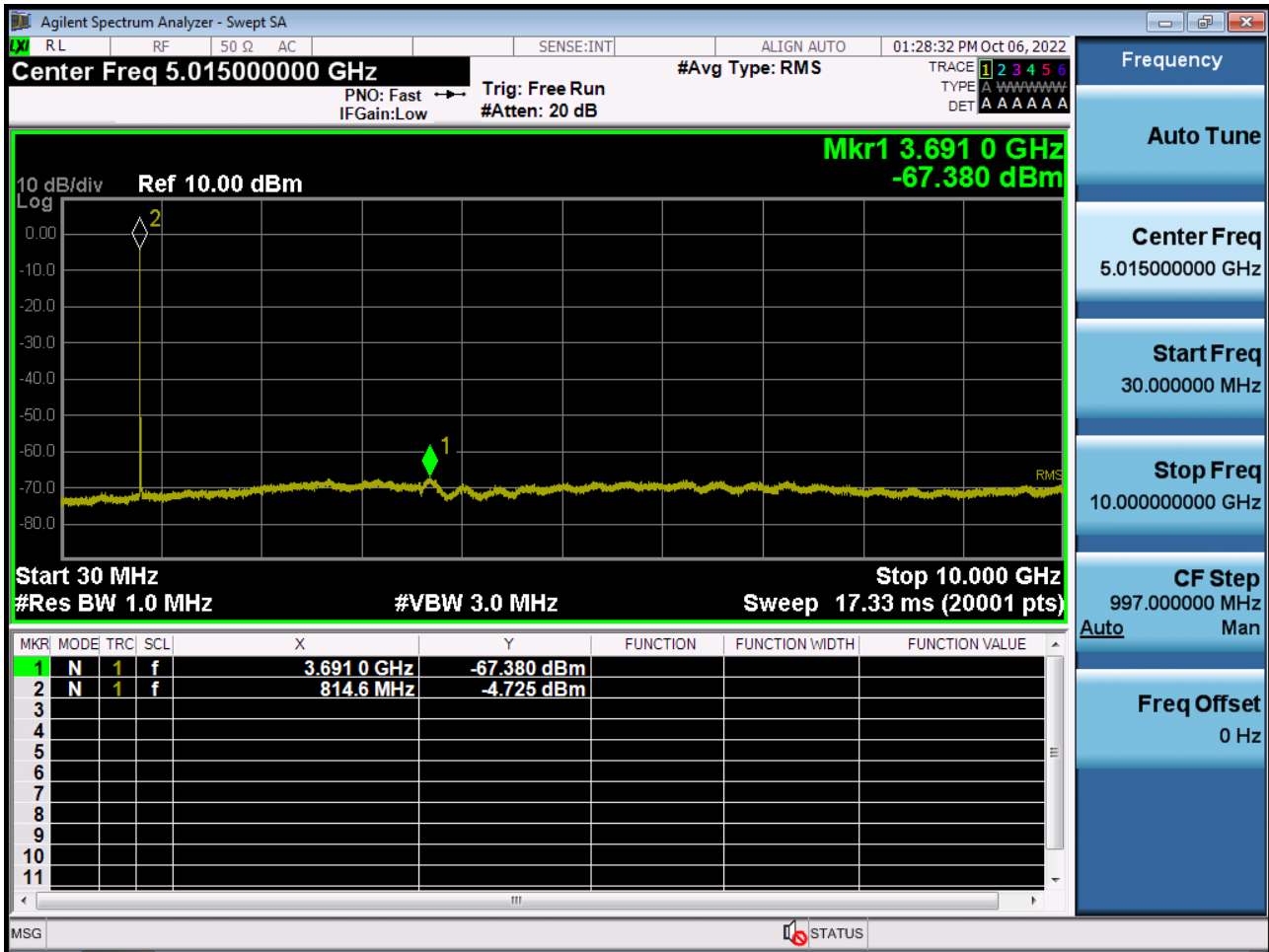
BAND 26. Upper Channel Edge Plot (5 M BW Ch.26765 QPSK\_RB1\_Offset 24)



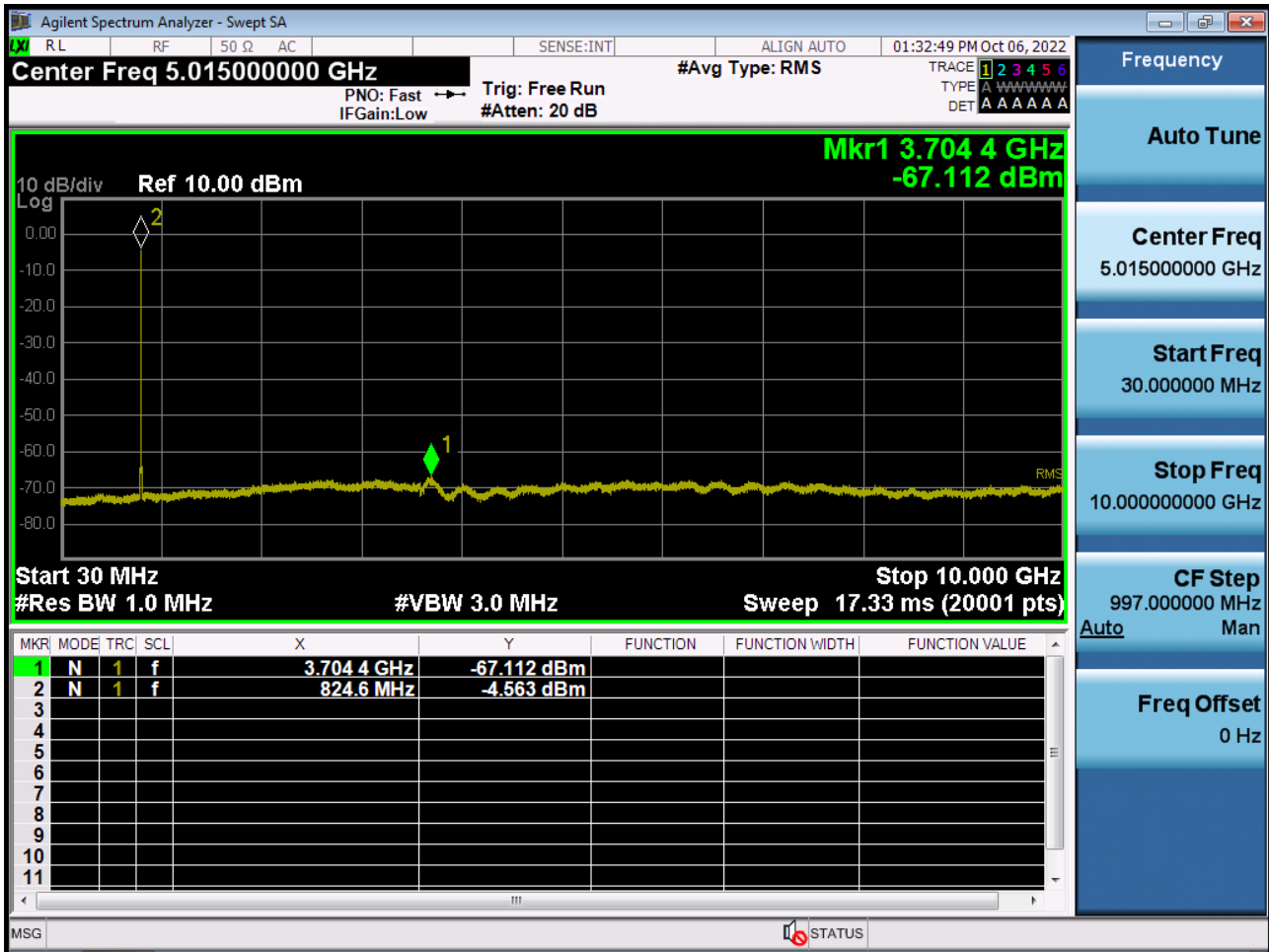
BAND 26. Upper Channel Edge Plot (5 M BW Ch.26765 QPSK\_RB25\_Offset 0)



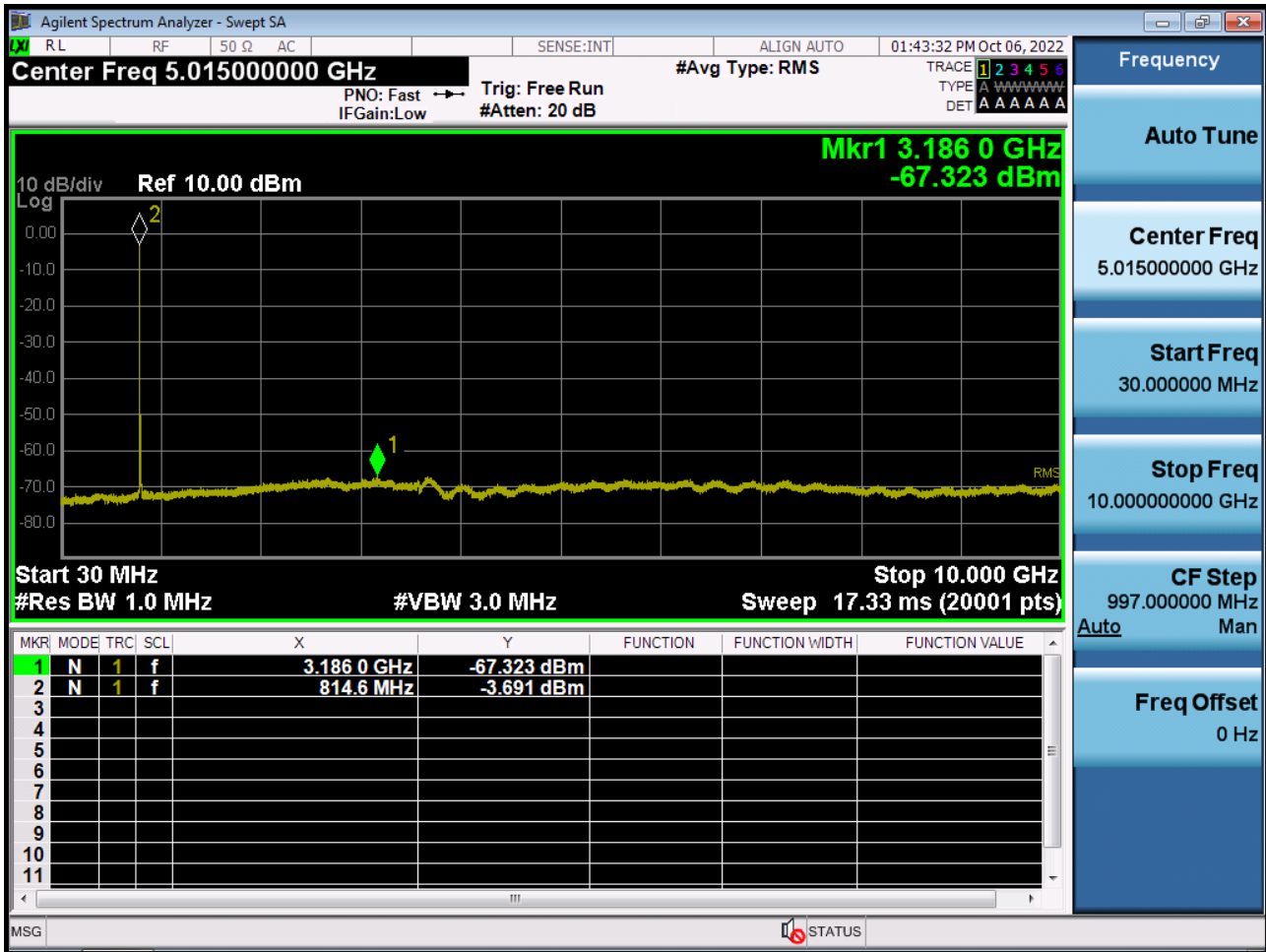
BAND 26. Conducted Spurious (26697 ch\_1.4 MHz\_QPSK\_RB 1\_0)



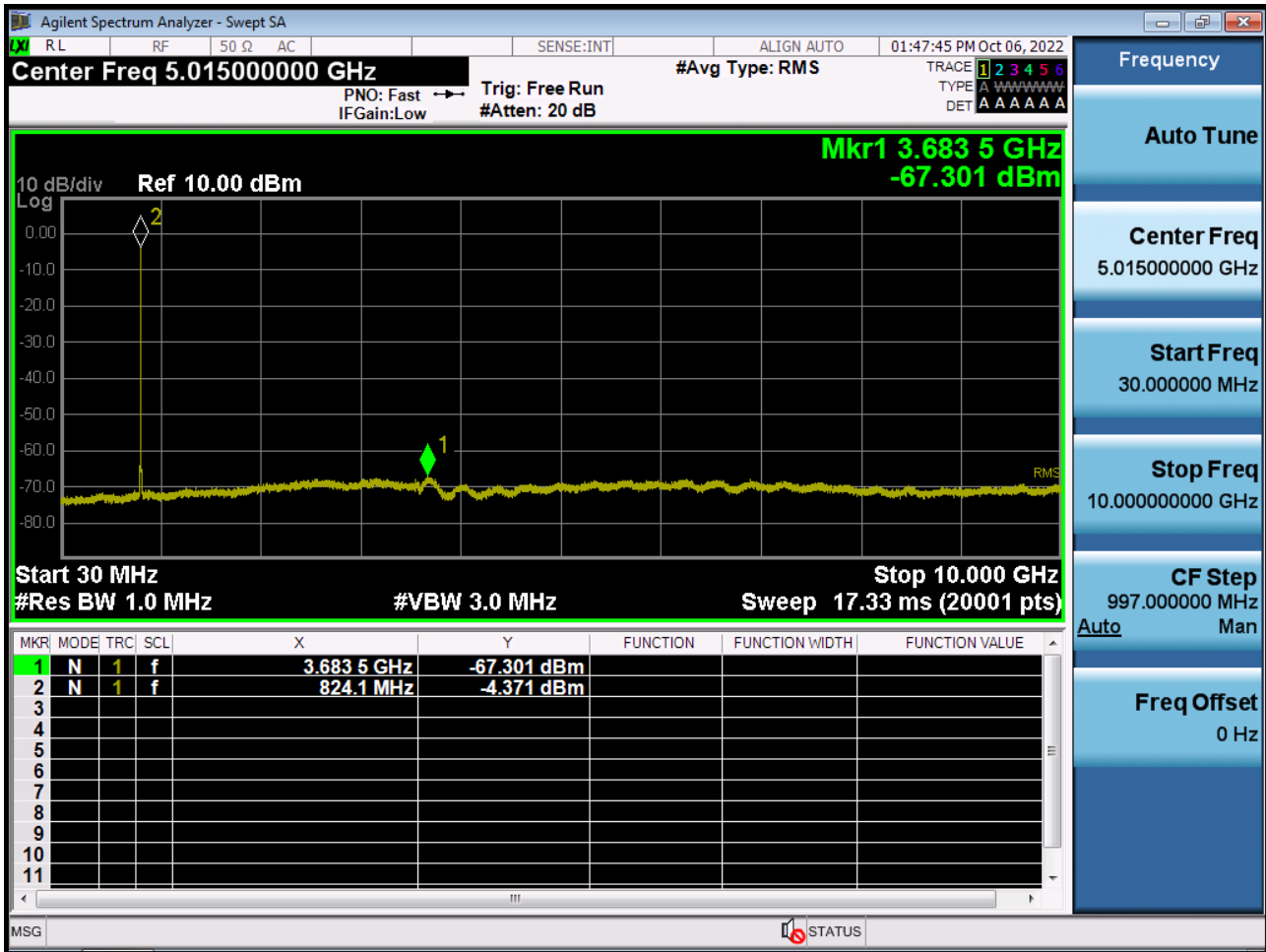
BAND 26. Conducted Spurious (26783 ch\_1.4 MHz\_QPSK\_RB 1\_0)



BAND 26. Conducted Spurious (26705 ch\_3 MHz\_QPSK\_RB 1\_0)



BAND 26. Conducted Spurious (26775 ch\_3 MHz\_QPSK\_RB 1\_0)







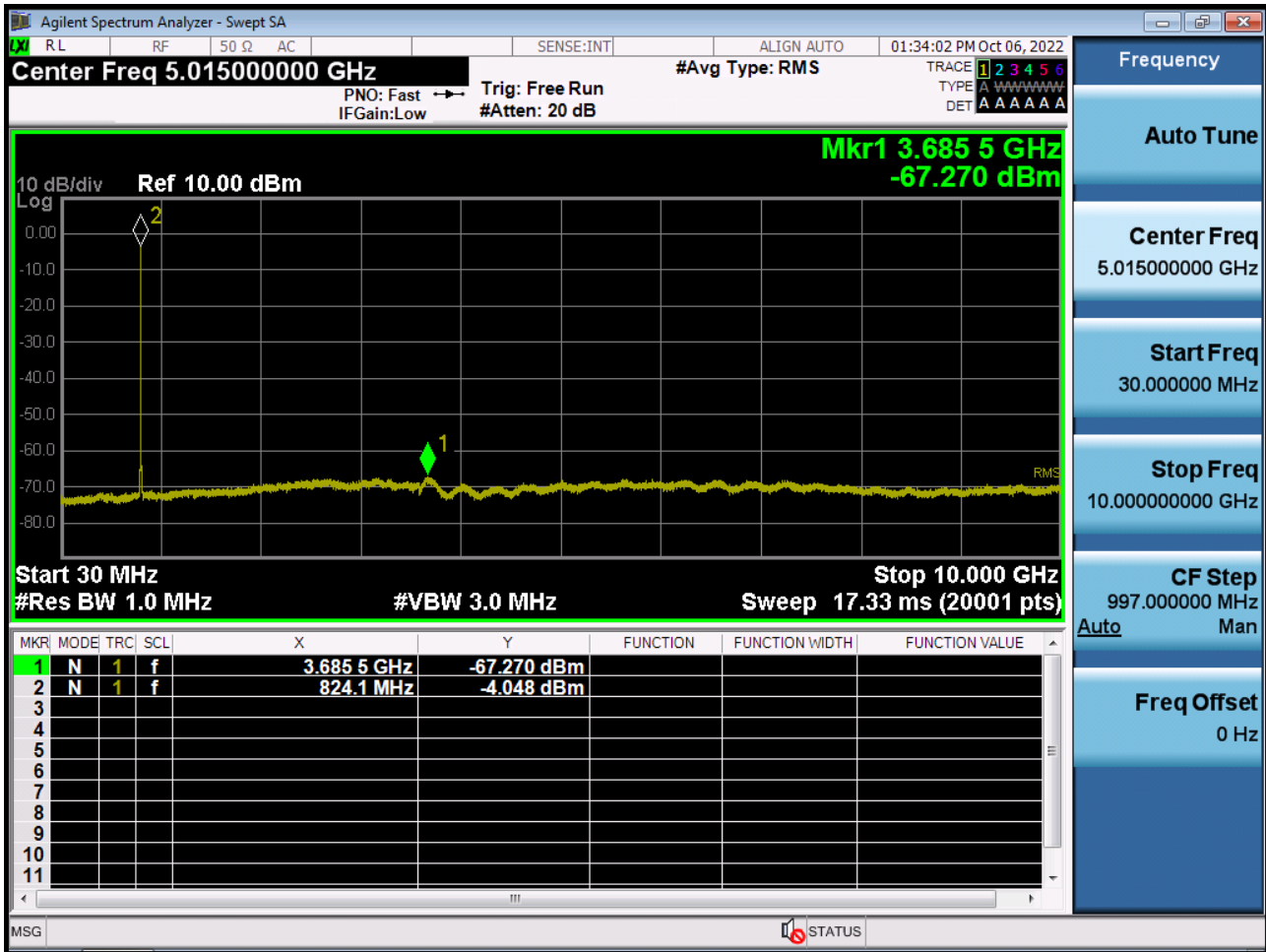




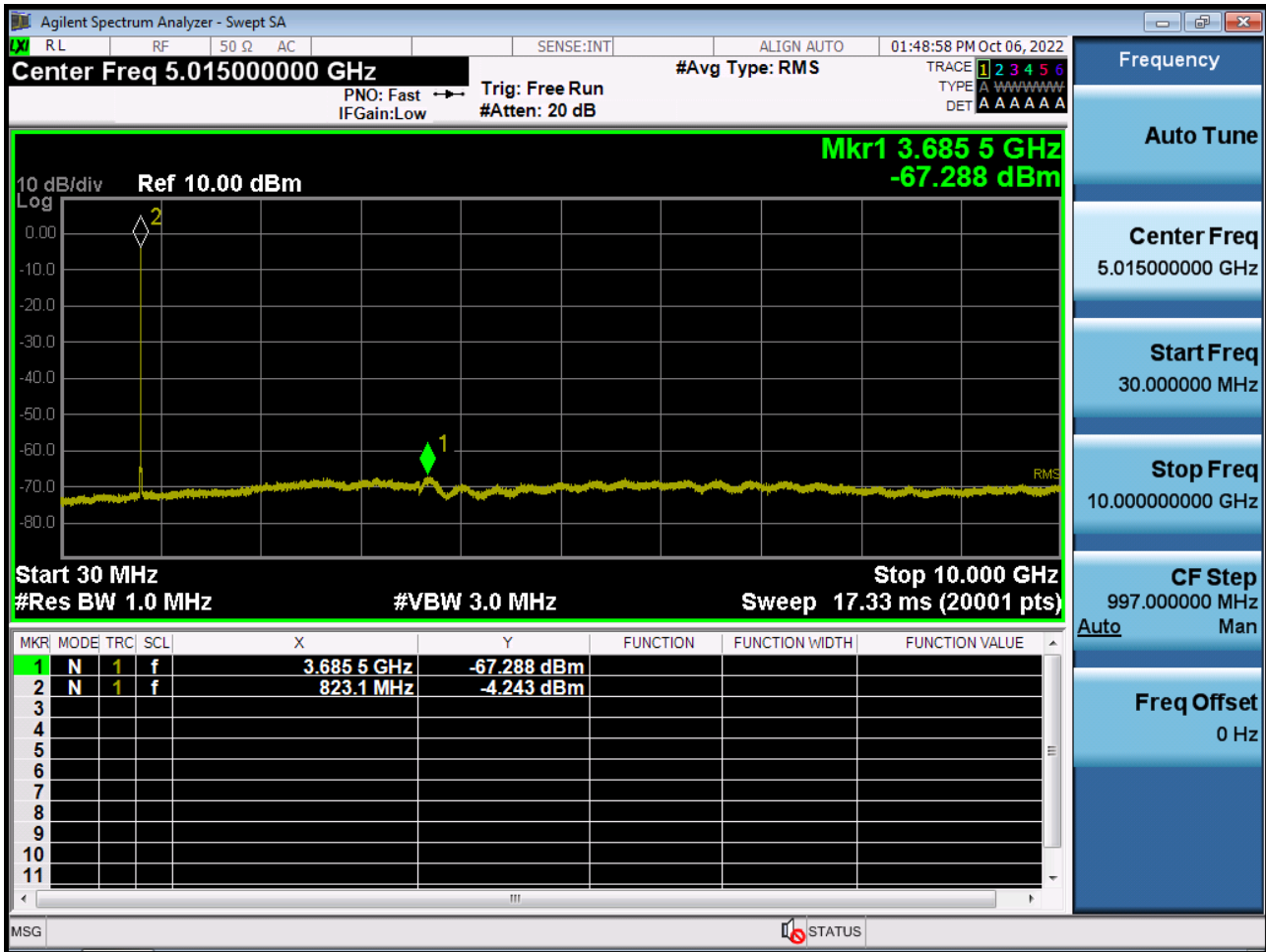


## 10. TEST PLOTS (STRADDLE CHANNEL)

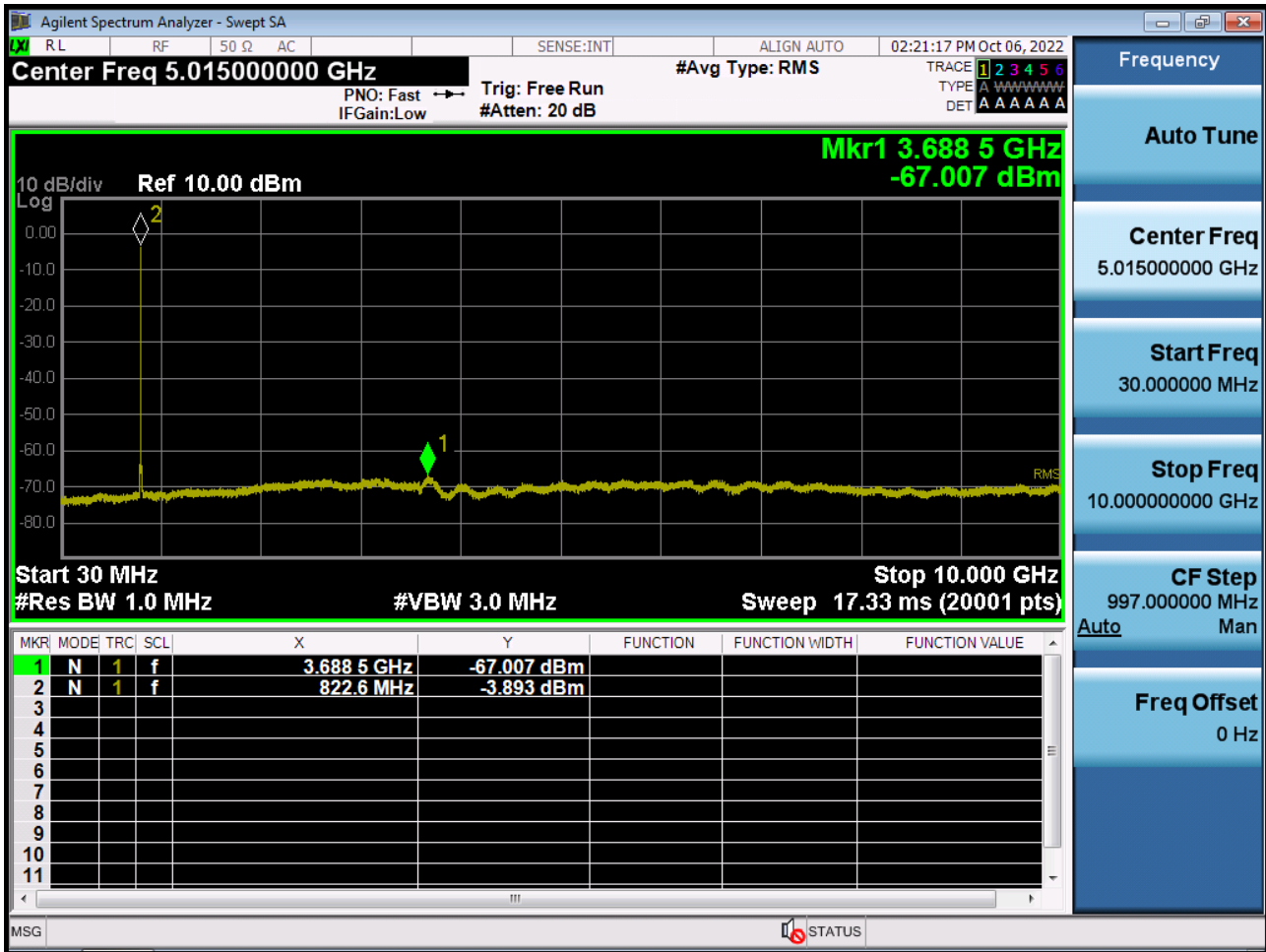
BAND 26. Conducted Spurious (1.4 MHz\_QPSK\_RB 1\_0)



BAND 26. Conducted Spurious (3 MHz\_QPSK\_RB 1\_0)

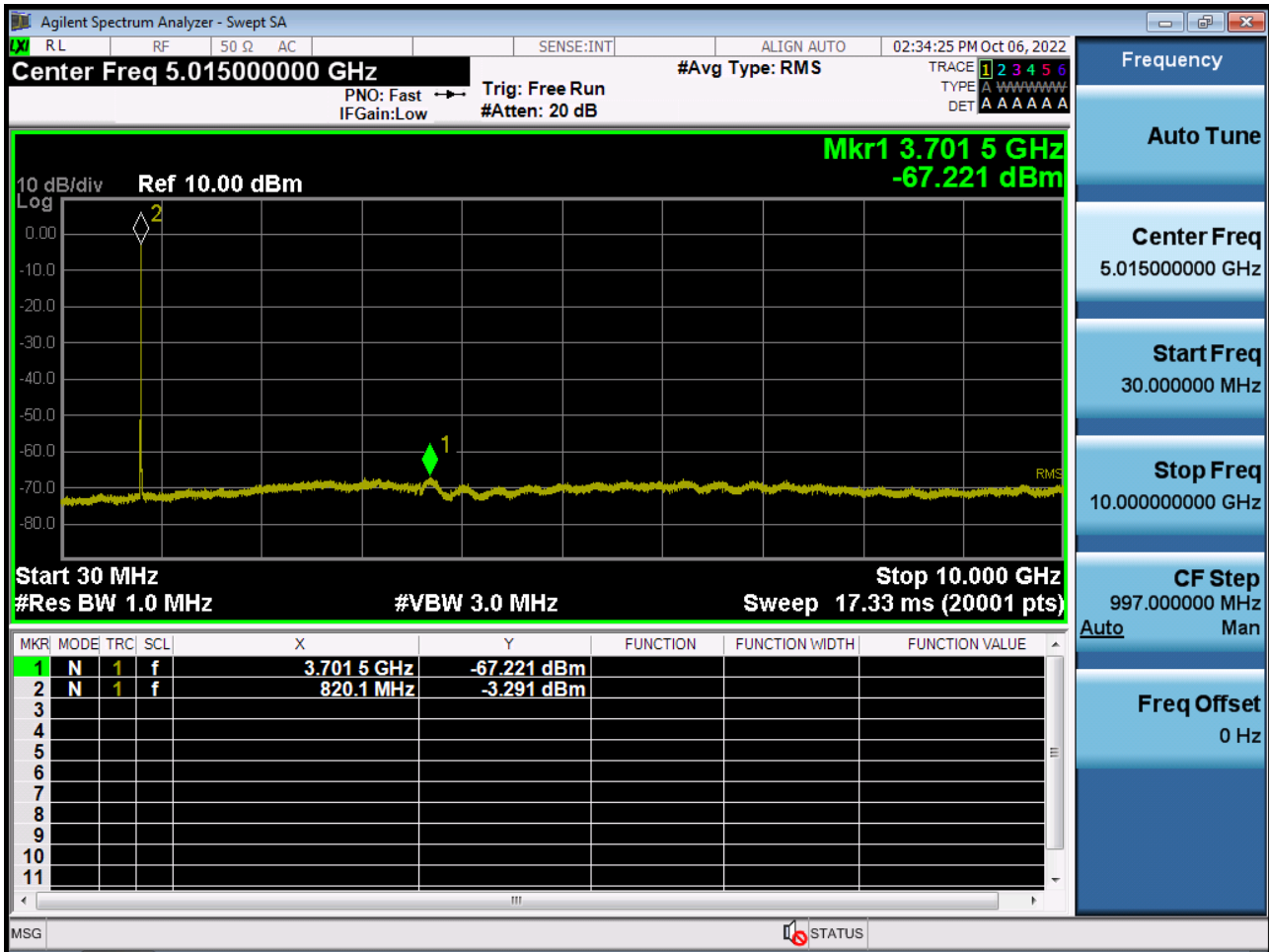


BAND 26. Conducted Spurious (5 MHz\_QPSK\_RB 1\_0)

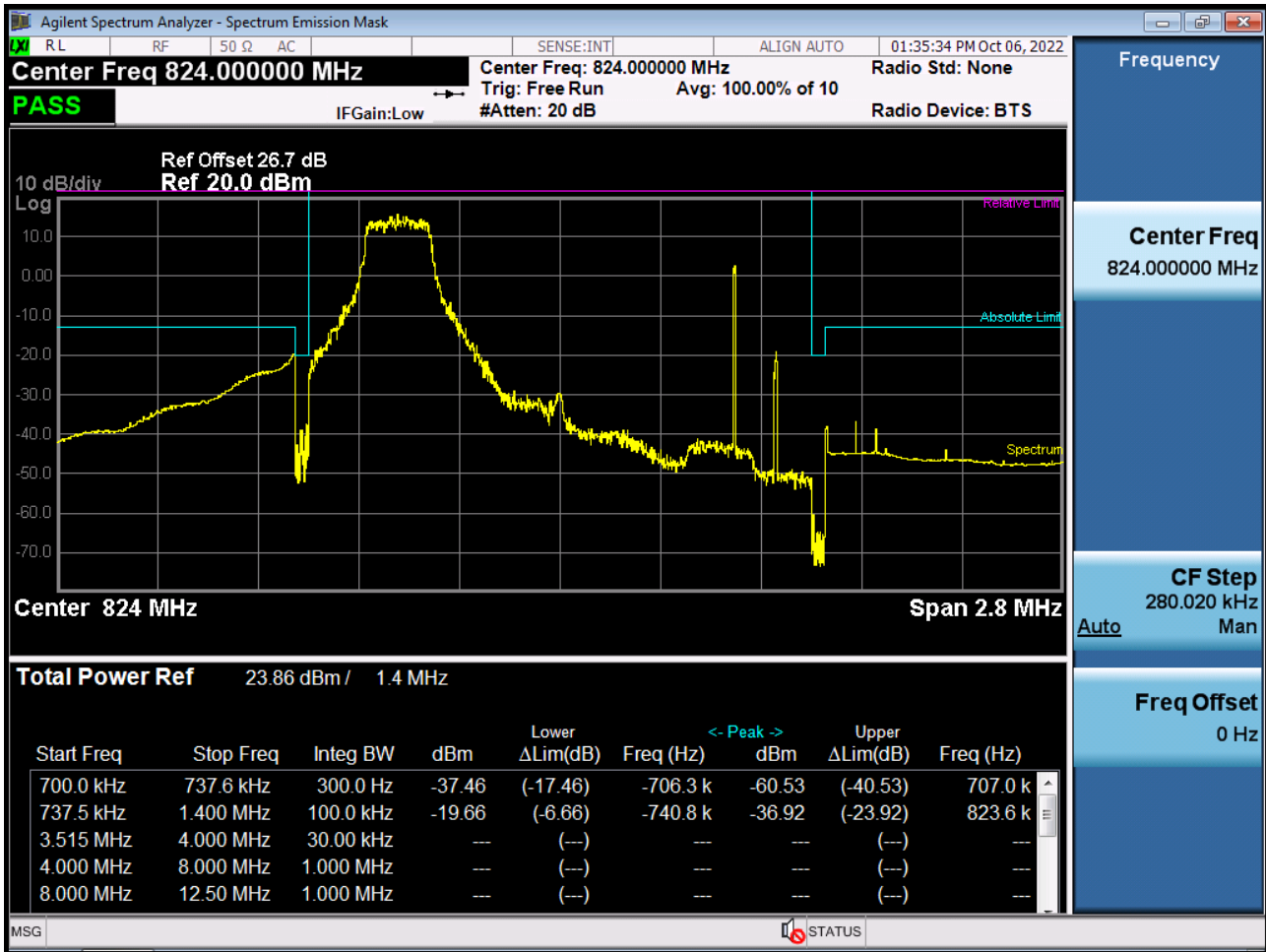




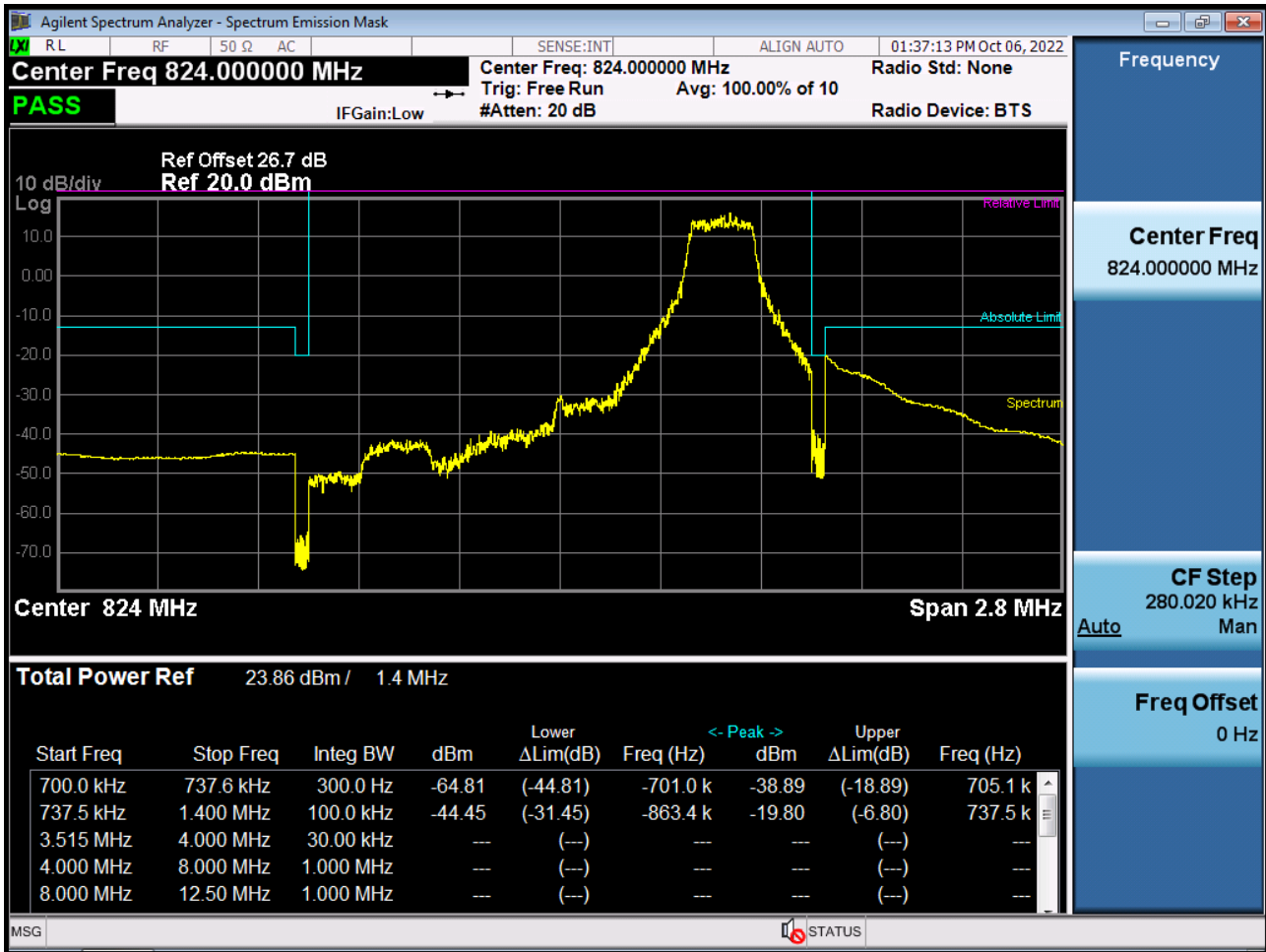
BAND 26. Conducted Spurious (10 MHz\_QPSK\_RB 1\_0)



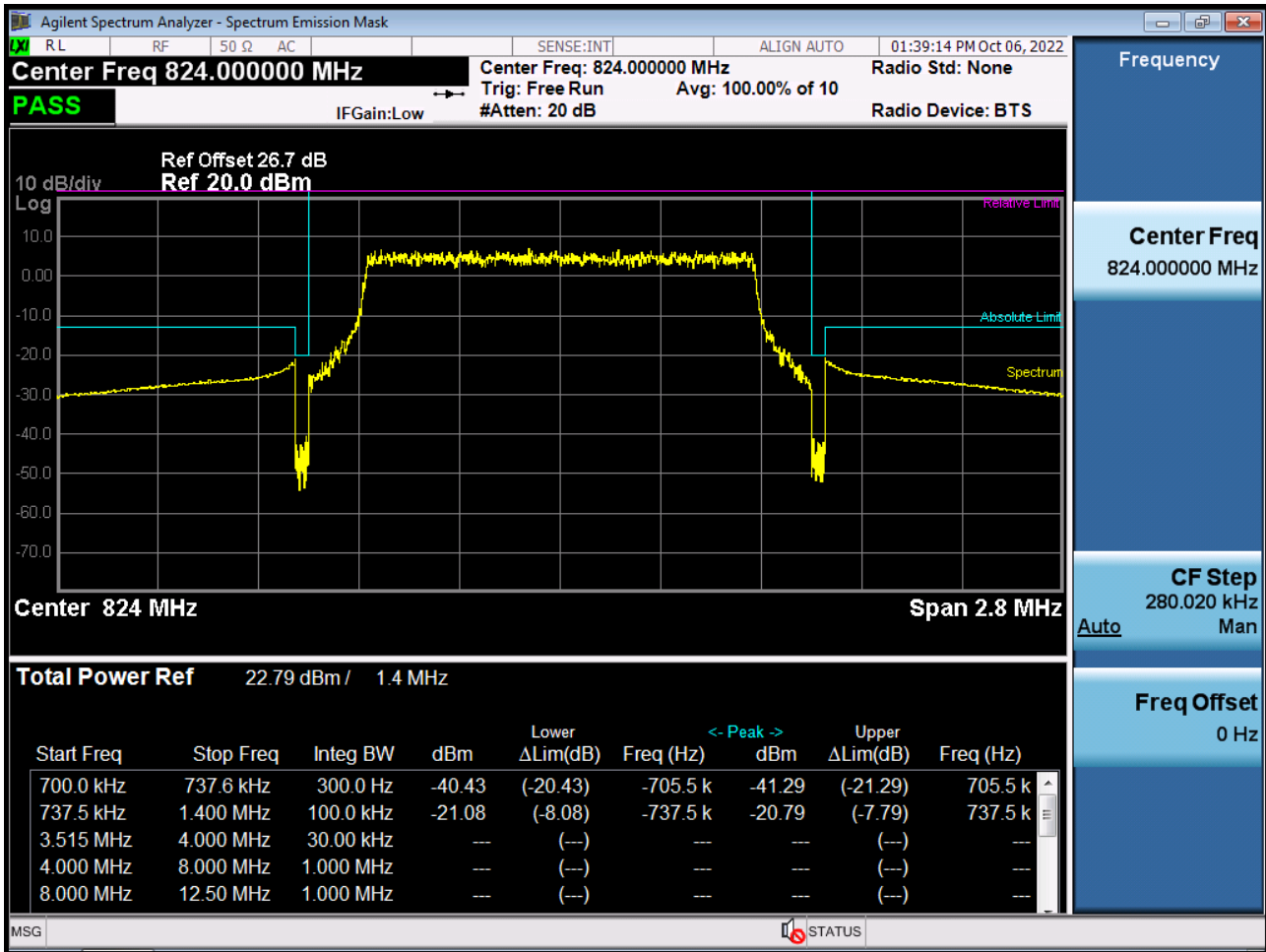
BAND 26. Channel Edge (1.4 MHz\_QPSK\_RB 1\_0)



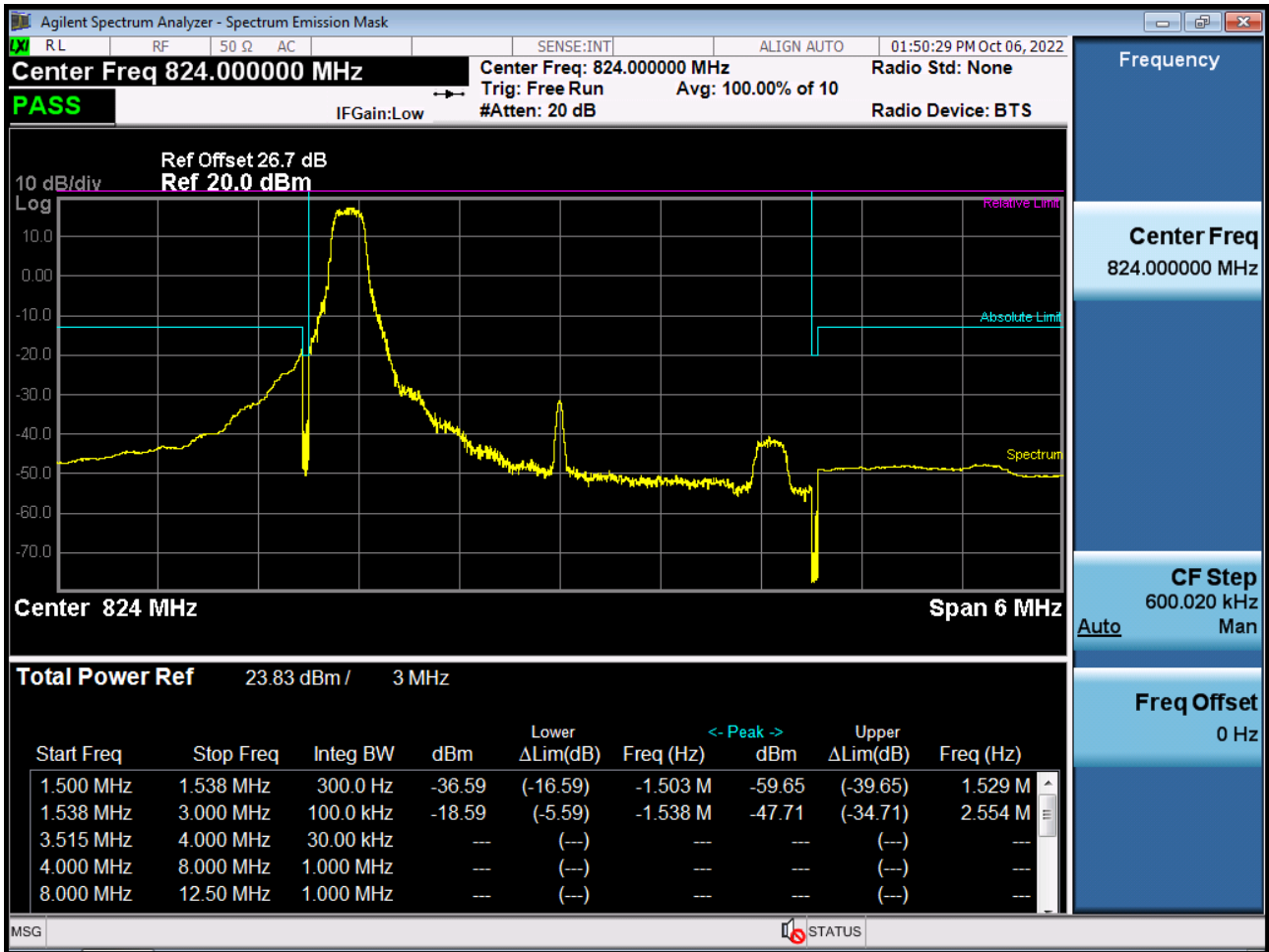
BAND 26. Channel Edge (1.4 MHz\_QPSK\_RB 1\_5)



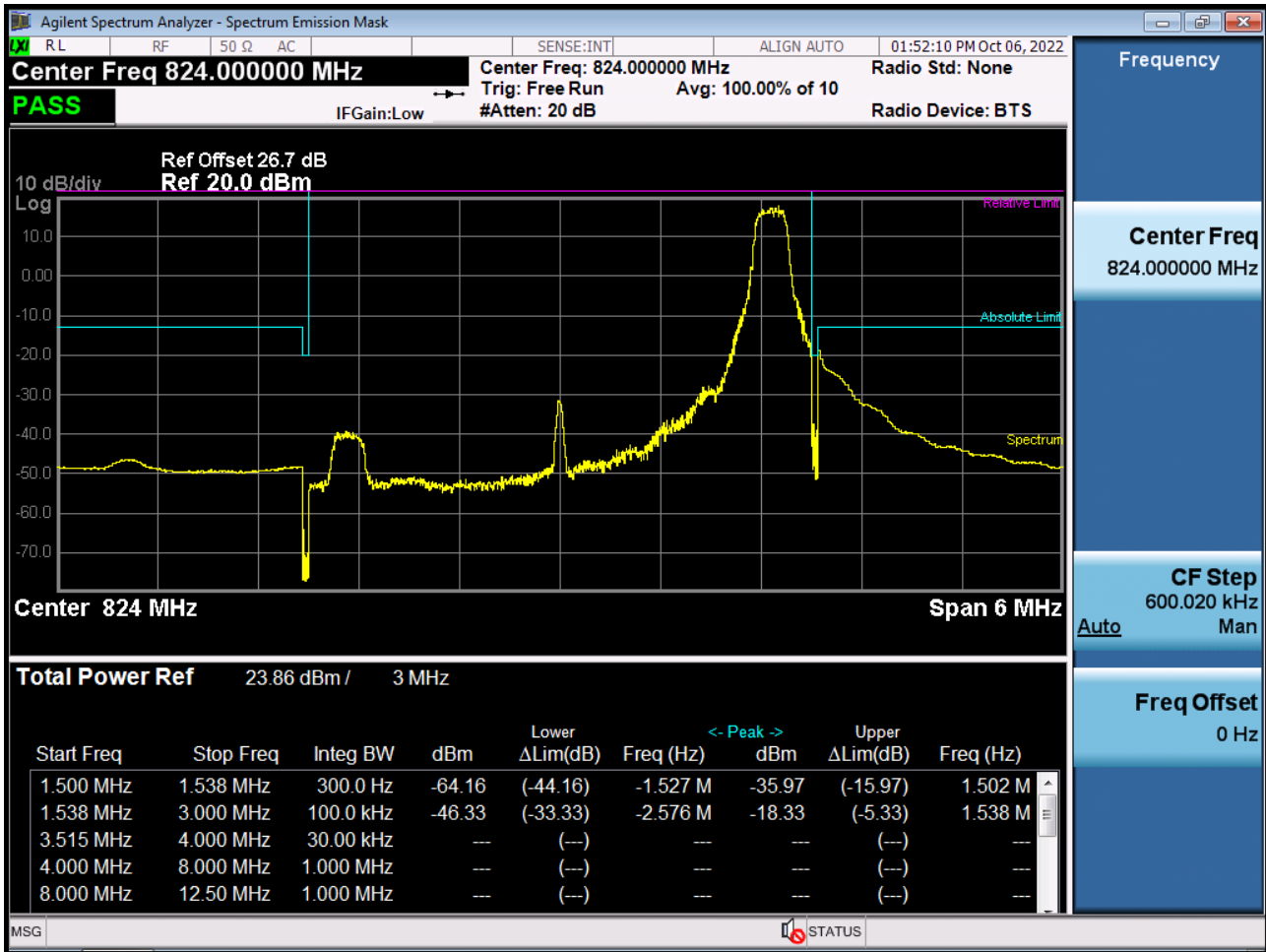
BAND 26. Channel Edge (1.4 MHz\_QPSK\_Full RB)



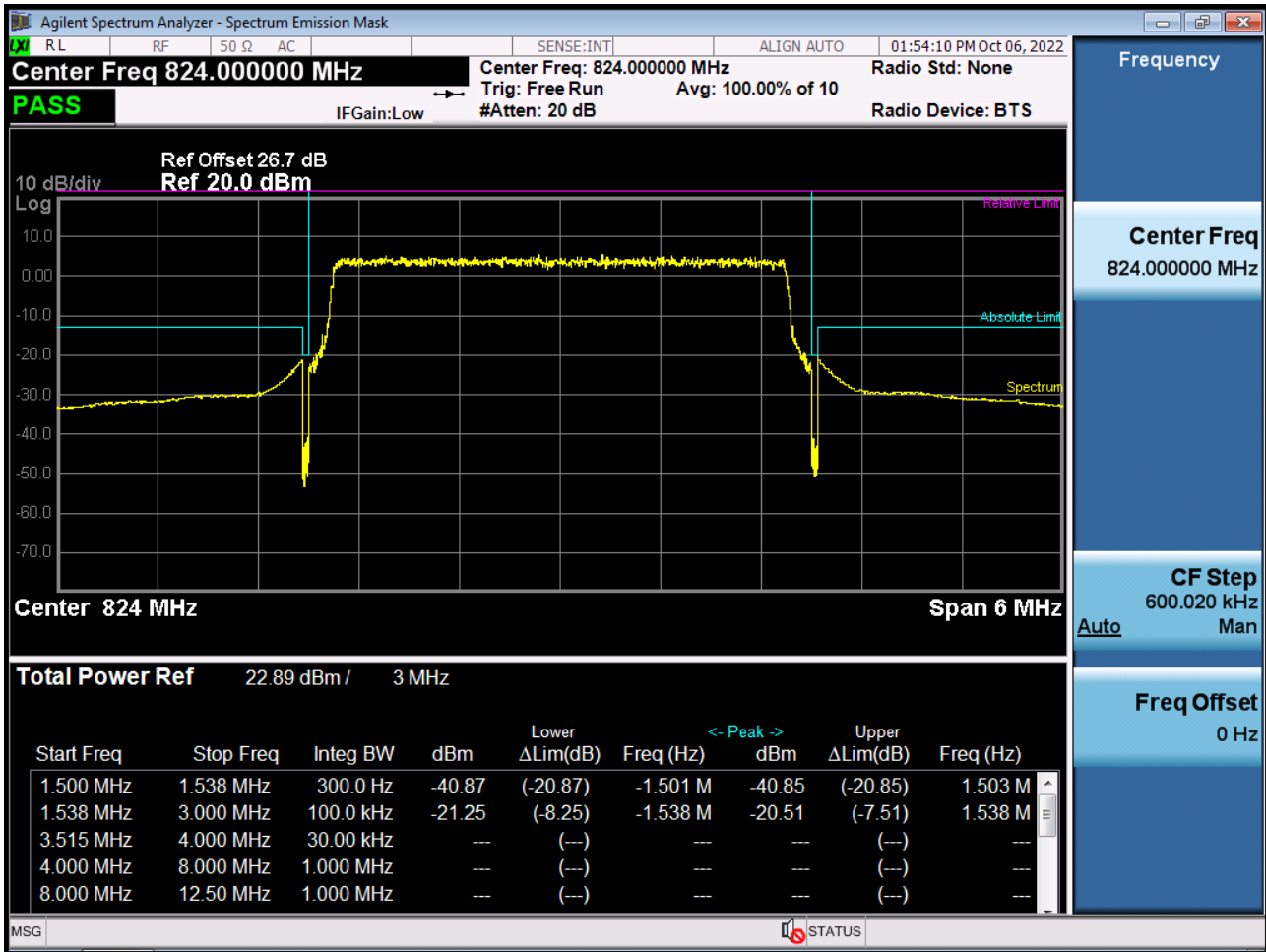
BAND 26. Channel Edge (3 MHz\_QPSK\_RB 1\_0)



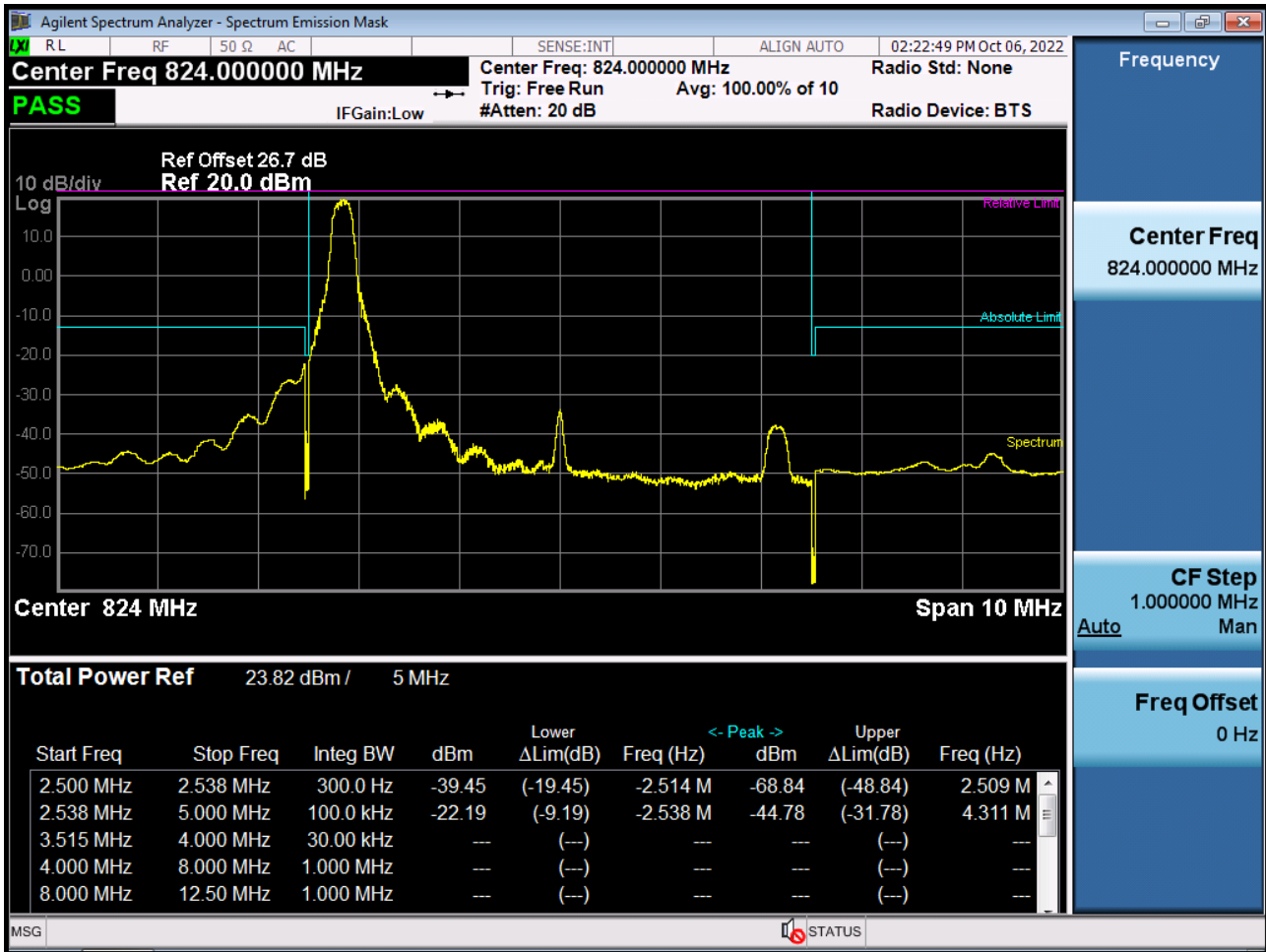
BAND 26. Channel Edge (3 MHz\_QPSK\_RB 1\_14)



BAND 26. Channel Edge (3 MHz\_QPSK\_Full RB)

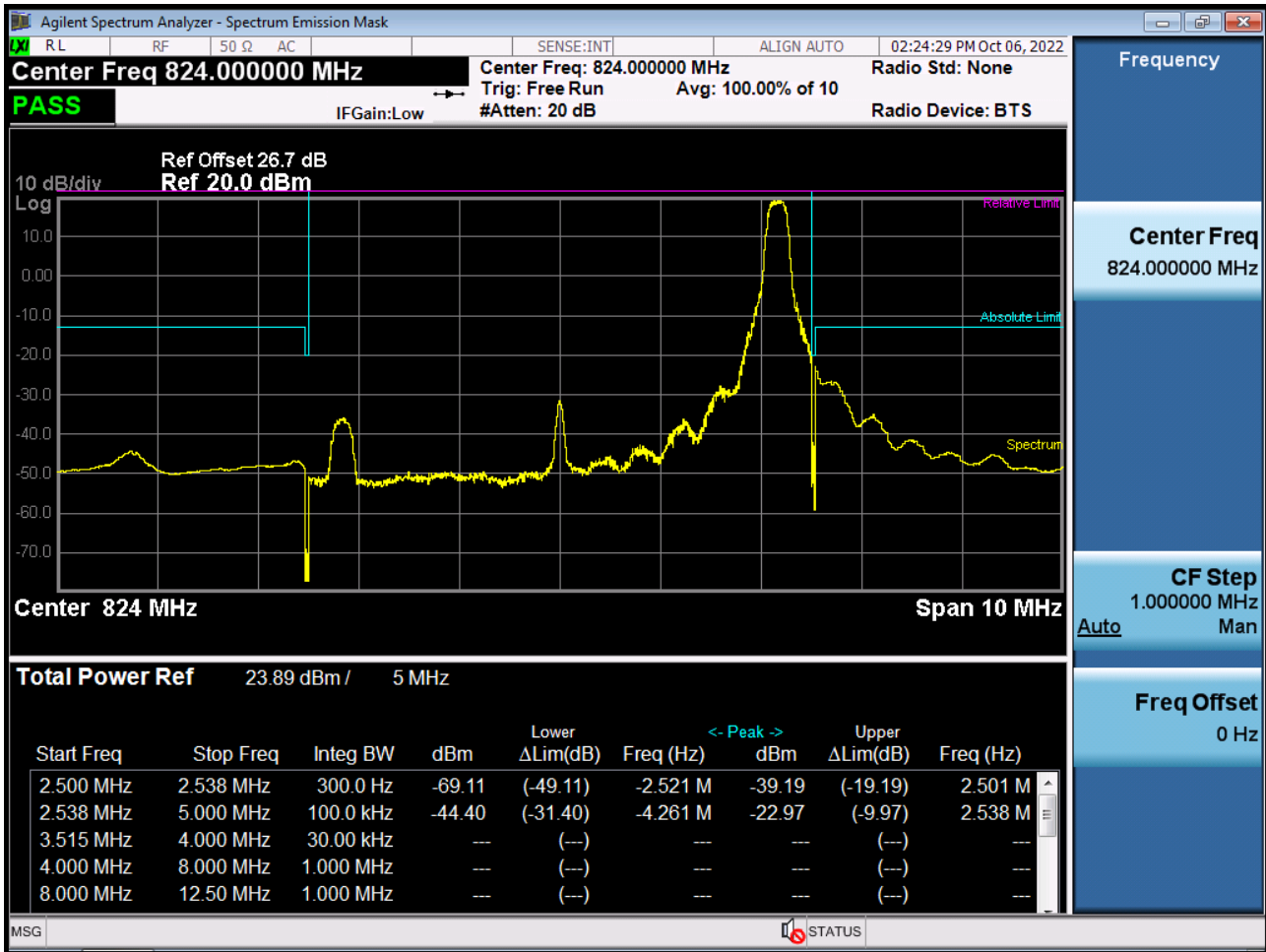


BAND 26. Channel Edge (5 MHz\_QPSK\_RB 1\_0)

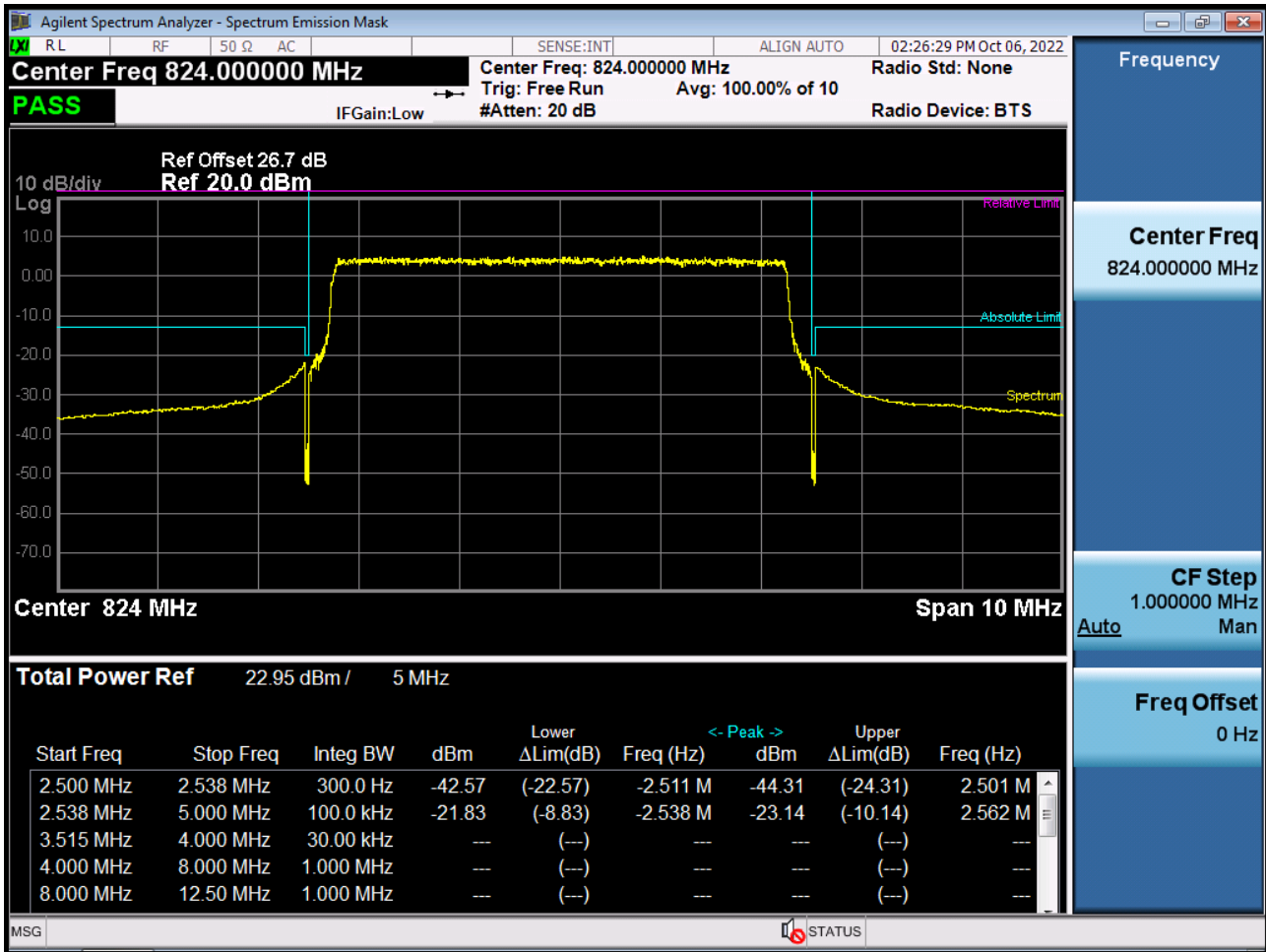




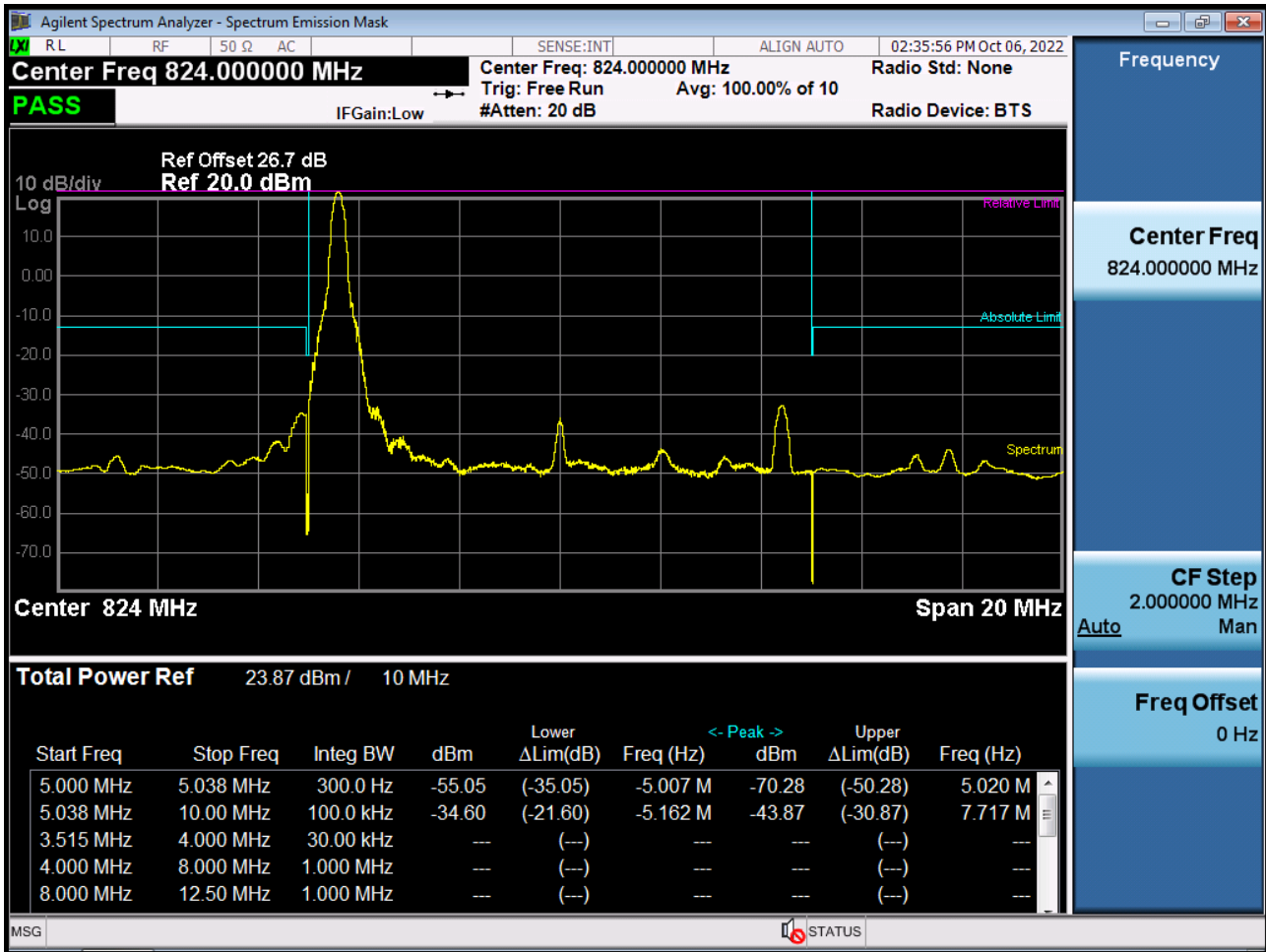
BAND 26. Channel Edge (5 MHz\_QPSK\_RB 1\_24)



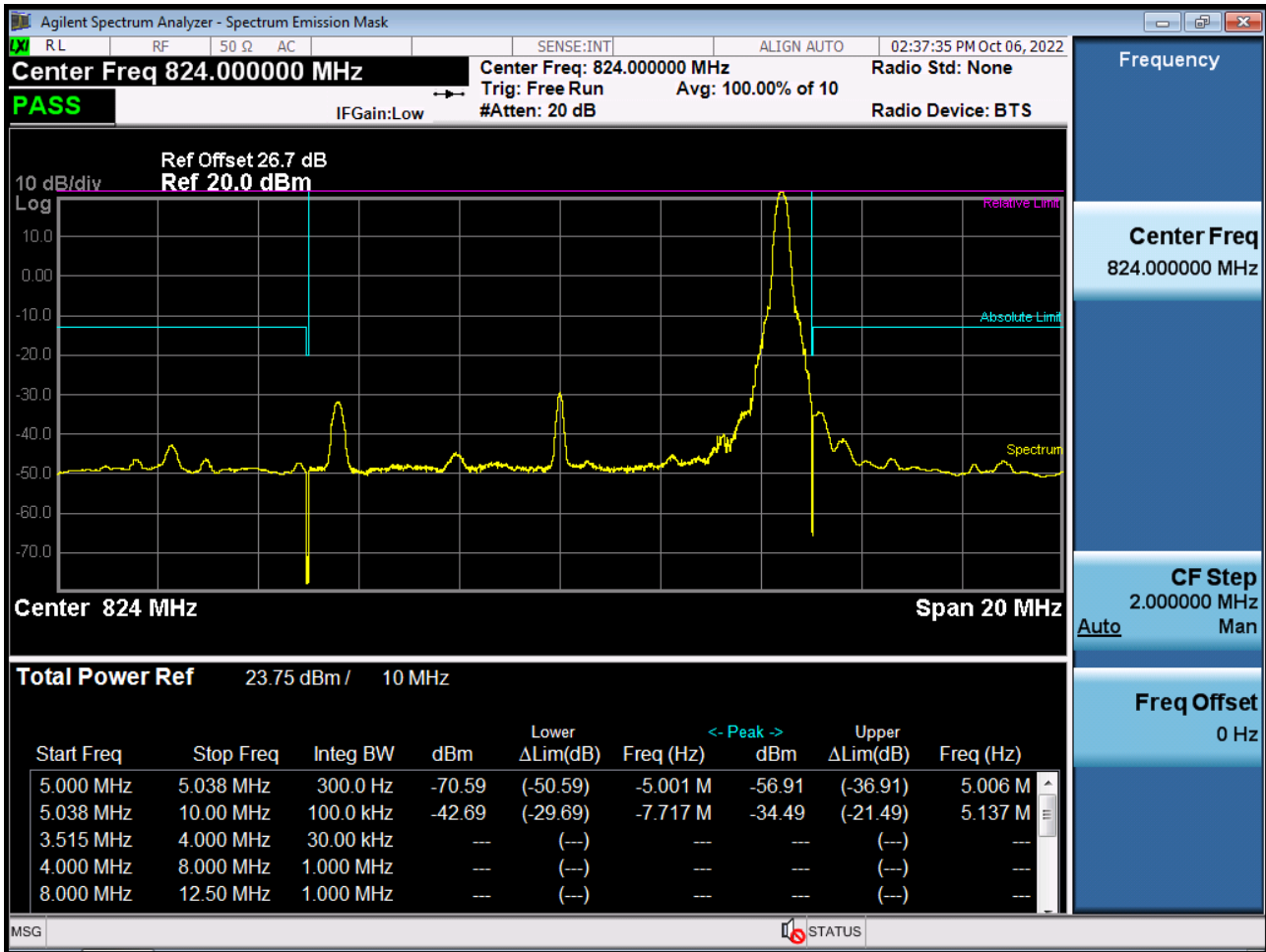
BAND 26. Channel Edge (5 MHz\_QPSK\_Full RB)



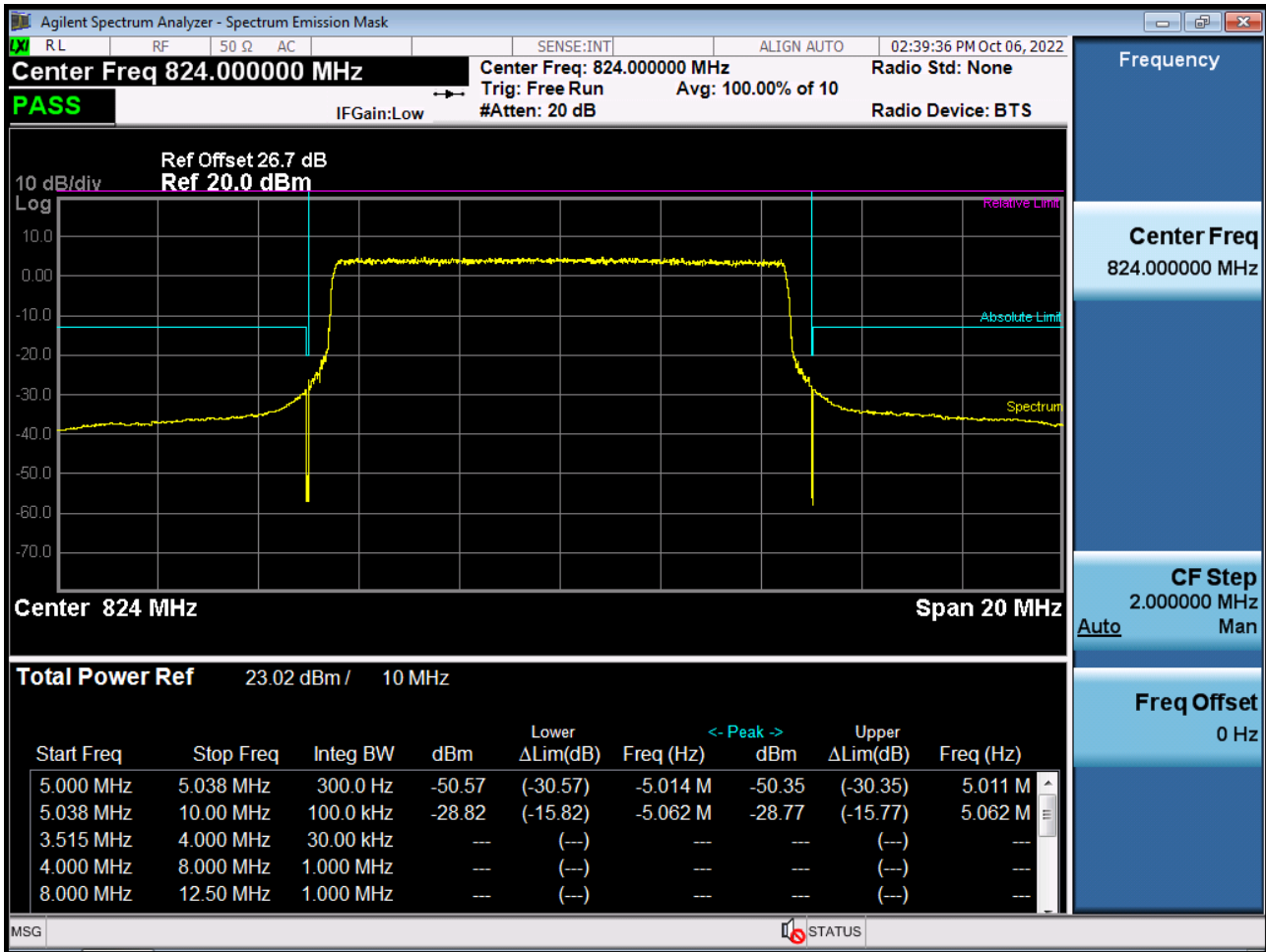
BAND 26. Channel Edge (10 MHz\_QPSK\_RB 1\_0)



BAND 26. Channel Edge (10 MHz\_QPSK\_RB 1\_49)



BAND 26. Channel Edge (10 MHz\_QPSK\_Full RB)



BAND 26. Band Edge (1.4 MHz\_QPSK\_RB 1\_5)



BAND 26. Band Edge (1.4 MHz\_QPSK\_FullIRB)



BAND 26. Band Edge (3 MHz\_QPSK\_RB 1\_14)

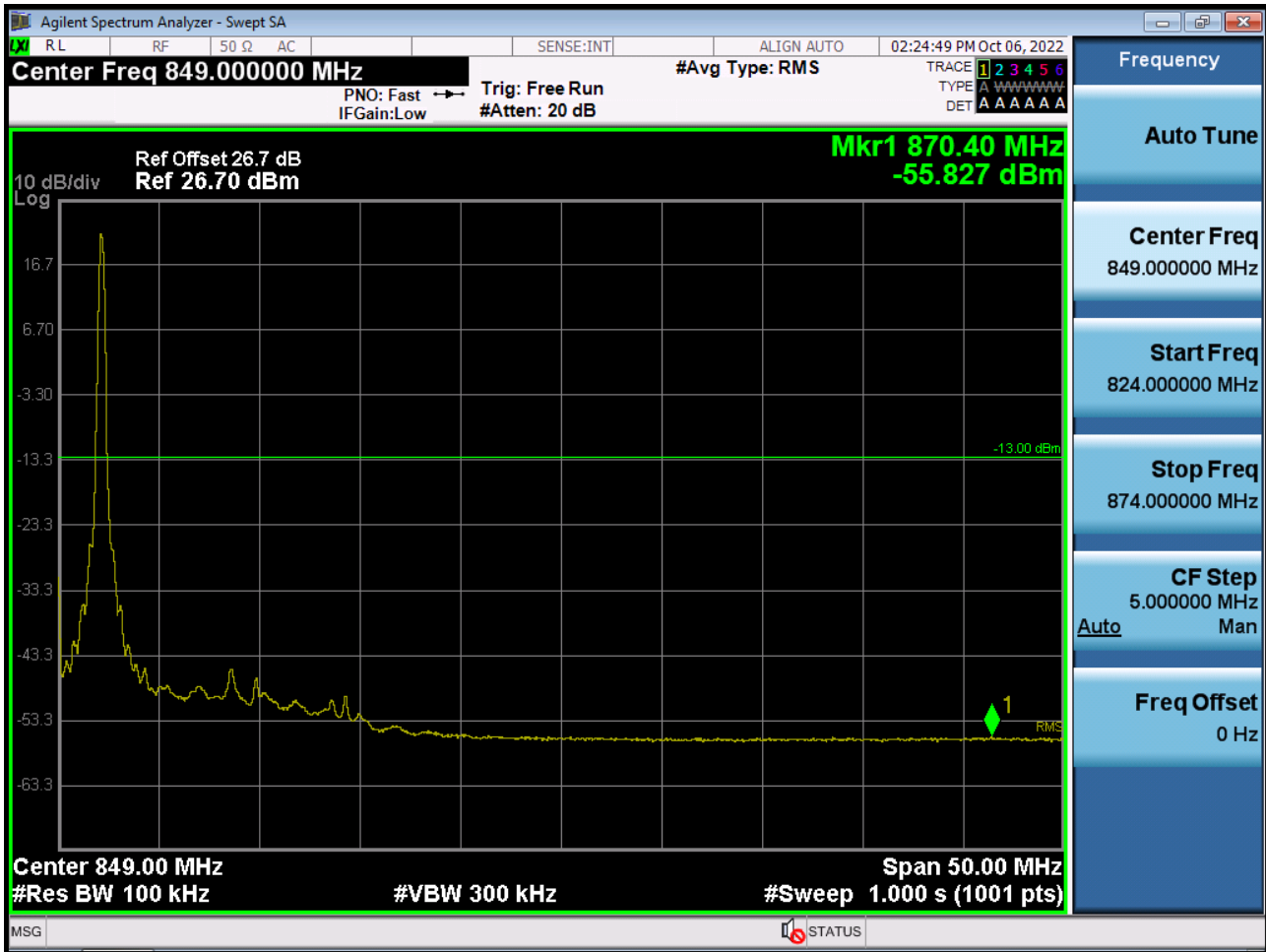




BAND 26. Band Edge (3 MHz\_QPSK\_ Full RB)



BAND 26. Band Edge (5 MHz\_QPSK\_RB 1\_24)



BAND 26. Band Edge (5 MHz\_QPSK\_ Full RB)





BAND 26. Band Edge (10 MHz\_QPSK\_ Full RB)



## 11 ANNEX A\_ TEST SETUP PHOTO

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

No.	Description
1	HCT-RF-2211-FC036-P