HCT CO.,LTD.
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA
TEL: +82-31-645-6300 FAX: +82-31-645-6401

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:
January 07, 2022

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

Report No.: HCT-RF-2201-FC050

FCC ID: **A3LSMA336B**

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

According to the Evaluation report, all of the data contained herein is reused from the reference FCC ID : A3LSMA336M report.

Model(s): SM-A336B/DSN
Additional Model(s): SM-A336B
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	0.242	23.83
		1M10W7D	16QAM	0.204	23.10
		1M10W7D	64QAM	0.160	22.03
		1M10W7D	256QAM	0.080	19.01
LTE – Band26 (3)	815.5 – 824.0	2M72G7D	QPSK	0.233	23.68
		2M72W7D	16QAM	0.202	23.06
		2M71W7D	64QAM	0.155	21.91
		2M71W7D	256QAM	0.083	19.20
LTE – Band26 (5)	816.5 – 824.0	4M53G7D	QPSK	0.232	23.66
		4M51W7D	16QAM	0.208	23.18
		4M53W7D	64QAM	0.162	22.09
		4M51W7D	256QAM	0.082	19.14
LTE – Band26 (10)	819.0 – 824.0	9M03G7D	QPSK	0.238	23.77
		9M06W7D	16QAM	0.214	23.31
		9M02W7D	64QAM	0.166	22.19
		9M03W7D	256QAM	0.085	19.27
LTE – Band26 (15)	821.5	13M5G7D	QPSK	0.237	23.75
		13M5W7D	16QAM	0.217	23.36
		13M4W7D	64QAM	0.169	22.27
		13M5W7D	256QAM	0.084	19.26

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)

REVIEWED BY

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

* The report shall not be reproduced except in full(only partly) without approval of the laboratory.

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2201-FC050	January 07, 2022	- First Approval Report

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

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:	A3LSMA336B
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-A336B/DSN
Additional Model(s):	SM-A336B
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:	November 30, 2021 ~ December 21, 2021
Serial number:	R3CRB0DMNJP

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), Bluetooth, BT LE, NFC.

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

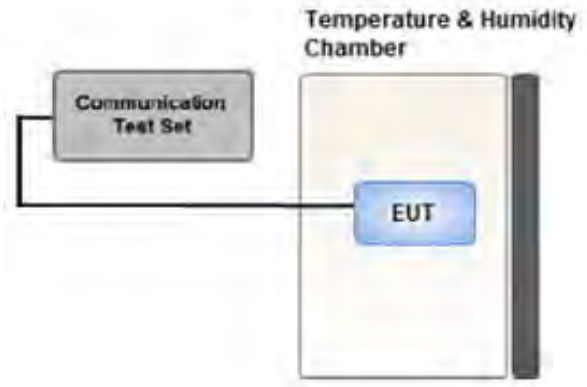
According to ANSI C63.26-2015 Section 5.2.1 when measuring the maximum RF output power from such devices, control over the EUT must be provided either through special test software (provided by manufacturer specifically for compliance testing, but not accessible by an end user) or through use of a base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

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

   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 = 100 kHz for emissions below 1 GHz and 1 MHz for emissions above 1 GHz
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 10th 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;

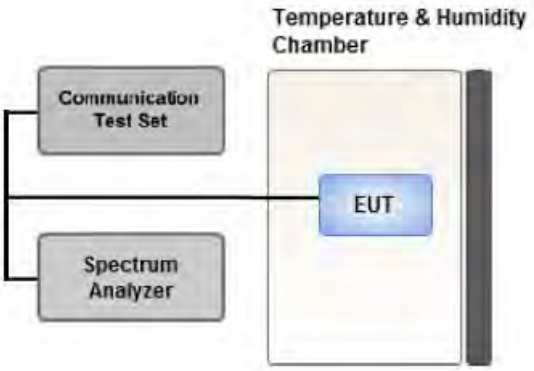
$$\text{Result}_{(dBm)} = \text{Pg}_{(dBm)} - \text{cable loss}_{(dB)} + \text{antenna gain}_{(dBi)}$$

   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.

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

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.

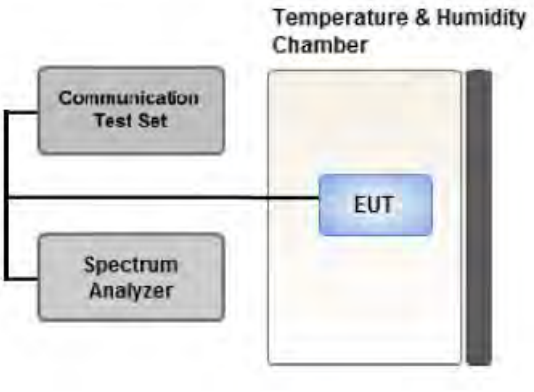
The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

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 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 ≥ 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.

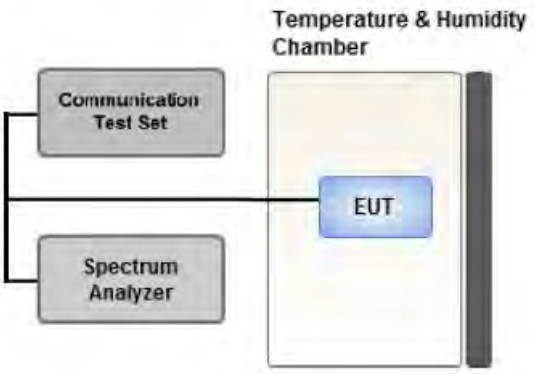
All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

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.

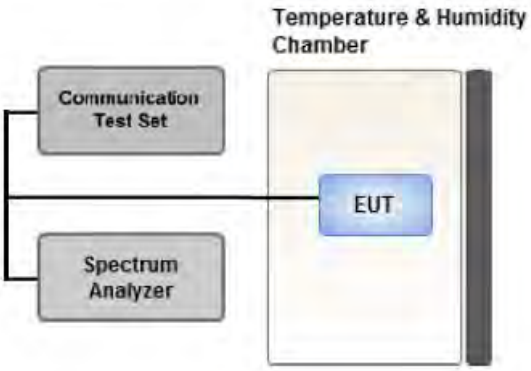
Test Settings

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 : 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 ≥ 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)

- 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
- In the case of radiated spurious emissions, all bandwidth of operation were investigated and the worst case bandwidth results are reported. (Worst case : 1.4 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-A336B/DSN & additional models were tested and the worst case results are reported.

(Worst case : SM-A336B/DSN)

[Worst case]

Test Description	Modulation	RB size	RB offset	Axis
Effective Radiated Power	QPSK, 16QAM, 64QAM, 256QAM	1	0	Y
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-A336B/DSN & additional models were tested and the worst case results are reported.

(Worst case : SM-A336B/DSN)

[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	-	03/02/2022	Annual
H.P.F	FBSR-02B(WHK3.3/18 G-10EF)	T&M SYSTEM	-	03/02/2022	Annual
Power Splitter(DC ~ 26.5 GHz)	11667B	Hewlett Packard	11275	04/07/2022	Annual
DC Power Supply	E3632A	Agilent	MY40010147	06/28/2022	Annual
Dipole Antenna	UHAP	Schwarzbeck	557	04/05/2023	Biennial
Dipole Antenna	UHAP	Schwarzbeck	558	04/05/2023	Biennial
Chamber	SU-642	ESPEC	93008124	03/15/2022	Annual
Horn Antenna(1 ~ 18 GHz)	BBHA 9120D	Schwarzbeck	147	08/30/2022	Biennial
Horn Antenna(1 ~ 18 GHz)	BBHA 9120D	Schwarzbeck	9120D-1298	09/15/2023	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170342	10/13/2022	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170124	02/11/2022	Biennial
Signal Analyzer(10 Hz ~ 26.5 GHz)	N9020A	Agilent	MY52090906	05/18/2022	Annual
ATTENUATOR(20 dB)	8493C	Hewlett Packard	17280	06/01/2022	Annual
Spectrum Analyzer(10 Hz ~ 40 GHz)	FSV40	REOHDE & SCHWARZ	100931	09/29/2022	Annual
Base Station	8960 (E5515C)	Agilent	MY48360800	08/18/2022	Annual
Loop Antenna(9 kHz ~ 30 MHz)	FMZB1513	Schwarzbeck	1513-333	03/19/2022	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	07/12/2022	Annual
Wideband Radio Communication Tester	MT8820C	Anritsu Corp.	6201026545	01/07/2022	Annual
SIGNAL GENERATOR (100 kHz ~ 40 GHz)	SMB100A	REOHDE & SCHWARZ	177633	07/05/2022	Annual
Signal Analyzer(5 Hz ~ 40.0 GHz)	N9030B	KEYSIGHT	MY55480167	06/02/2022	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_{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 (Confidence level about 95 %, *k*=2)
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40 (Confidence level about 95 %, *k*=2)
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80 (Confidence level about 95 %, *k*=2)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.70 (Confidence level about 95 %, *k*=2)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.05 (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 = 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

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	23.59	0.229	23.65	0.232	100
		1	3	23.58	0.228	23.62	0.230	100
		1	5	23.65	0.232	23.72	0.236	100
		3	0	23.68	0.233	23.70	0.234	100
		3	1	23.69	0.234	23.83	0.242	100
		3	3	23.59	0.229	23.71	0.235	100
		6	0	22.74	0.188	22.84	0.192	100
	16QAM	1	0	22.86	0.193	23.10	0.204	100
		1	3	22.84	0.192	22.94	0.197	100
		1	5	22.80	0.191	22.91	0.195	100
		3	0	22.75	0.188	22.85	0.193	100
		3	1	22.82	0.191	23.00	0.200	100
		3	3	22.88	0.194	22.90	0.195	100
		6	0	21.78	0.151	21.82	0.152	100
	64QAM	1	0	21.83	0.152	21.93	0.156	100
		1	3	21.72	0.149	21.92	0.156	100
		1	5	21.85	0.153	22.03	0.160	100
		3	0	21.76	0.150	21.90	0.155	100
		3	1	21.72	0.149	21.82	0.152	100
		3	3	21.79	0.151	21.88	0.154	100
		6	0	20.68	0.117	20.81	0.121	100
	256QAM	1	0	18.77	0.075	19.01	0.080	100
		1	3	18.71	0.074	18.81	0.076	100
		1	5	18.71	0.074	18.88	0.077	100
		3	0	18.82	0.076	18.84	0.077	100
		3	1	18.71	0.074	18.91	0.078	100
		3	3	18.80	0.076	18.94	0.078	100
		6	0	18.69	0.074	18.85	0.077	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	23.61	0.230	23.68	0.233	100
		1	7	23.43	0.220	23.55	0.226	100
		1	14	23.44	0.221	23.56	0.227	100
		8	0	22.74	0.188	22.86	0.193	100
		8	3	22.76	0.189	22.94	0.197	100
		8	7	22.74	0.188	22.90	0.195	100
		15	0	22.75	0.188	22.86	0.193	100
	16QAM	1	0	22.75	0.188	22.93	0.196	100
		1	7	22.58	0.181	22.92	0.196	100
		1	14	22.83	0.192	23.06	0.202	100
		8	0	21.78	0.151	21.83	0.152	100
		8	3	21.77	0.150	21.93	0.156	100
		8	7	21.74	0.149	21.90	0.155	100
		15	0	21.74	0.149	21.90	0.155	100
	64QAM	1	0	21.91	0.155	21.78	0.151	100
		1	7	21.75	0.150	21.78	0.151	100
		1	14	21.87	0.154	21.82	0.152	100
		8	0	20.74	0.119	20.86	0.122	100
		8	3	20.68	0.117	20.90	0.123	100
		8	7	20.73	0.118	20.85	0.122	100
		15	0	20.78	0.120	20.85	0.122	100
	256QAM	1	0	18.90	0.078	19.20	0.083	100
		1	7	18.73	0.075	19.00	0.079	100
		1	14	18.91	0.078	19.03	0.080	100
		8	0	18.65	0.073	18.73	0.075	100
		8	3	18.62	0.073	18.72	0.074	100
		8	7	18.64	0.073	18.74	0.075	100
		15	0	18.71	0.074	18.85	0.077	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	23.55	0.226	23.64	0.231	100
		1	12	23.45	0.221	23.57	0.228	100
		1	24	23.51	0.224	23.66	0.232	100
		12	0	22.80	0.191	22.90	0.195	100
		12	6	22.77	0.189	22.88	0.194	100
		12	11	22.72	0.187	22.86	0.193	100
		25	0	22.73	0.187	22.93	0.196	100
	16QAM	1	0	23.07	0.203	23.18	0.208	100
		1	12	22.73	0.187	22.81	0.191	100
		1	24	22.84	0.192	22.91	0.195	100
		12	0	21.74	0.149	21.88	0.154	100
		12	6	21.77	0.150	21.87	0.154	100
		12	11	21.72	0.149	21.88	0.154	100
		25	0	21.78	0.151	21.89	0.155	100
	64QAM	1	0	21.91	0.155	22.08	0.161	100
		1	12	21.66	0.147	22.00	0.158	100
		1	24	21.80	0.151	22.09	0.162	100
		12	0	20.75	0.119	20.85	0.122	100
		12	6	20.79	0.120	20.87	0.122	100
		12	11	20.81	0.121	20.84	0.121	100
		25	0	20.77	0.119	20.78	0.120	100
	256QAM	1	0	18.93	0.078	19.14	0.082	100
		1	12	18.68	0.074	19.02	0.080	100
		1	24	18.90	0.078	19.10	0.081	100
		12	0	18.82	0.076	18.86	0.077	100
		12	6	18.76	0.075	18.82	0.076	100
		12	11	18.73	0.075	18.85	0.077	100
		25	0	18.75	0.075	18.91	0.078	100

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm) 819 MHz		Limit (W)
				dBm	W	
10	QPSK	1	0	23.77	0.238	100
		1	24	23.58	0.228	100
		1	49	23.57	0.228	100
		25	0	22.92	0.196	100
		25	12	22.92	0.196	100
		25	24	22.93	0.196	100
		50	0	23.02	0.200	100
	16QAM	1	0	23.31	0.214	100
		1	24	22.93	0.196	100
		1	49	23.05	0.202	100
		25	0	21.95	0.157	100
		25	12	21.95	0.157	100
		25	24	21.89	0.155	100
		50	0	21.95	0.157	100
	64QAM	1	0	22.19	0.166	100
		1	24	22.02	0.159	100
		1	49	21.95	0.157	100
		25	0	20.95	0.124	100
		25	12	20.89	0.123	100
		25	24	20.89	0.123	100
		50	0	20.96	0.125	100
	256QAM	1	0	19.27	0.085	100
		1	24	19.03	0.080	100
		1	49	19.04	0.080	100
		25	0	18.95	0.079	100
		25	12	18.94	0.078	100
		25	24	18.91	0.078	100
		50	0	18.95	0.079	100

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm) 821.5 MHz		Limit (W)
				dBm	W	
15	QPSK	1	0	23.75	0.237	100
		1	36	23.53	0.225	100
		1	74	23.58	0.228	100
		36	0	22.99	0.199	100
		36	18	22.90	0.195	100
		36	39	22.89	0.195	100
		75	0	22.93	0.196	100
	16QAM	1	0	23.36	0.217	100
		1	36	22.97	0.198	100
		1	74	23.01	0.200	100
		36	0	21.97	0.157	100
		36	18	21.93	0.156	100
		36	39	21.86	0.153	100
		75	0	21.95	0.157	100
	64QAM	1	0	22.27	0.169	100
		1	36	21.91	0.155	100
		1	74	21.99	0.158	100
		36	0	20.98	0.125	100
		36	18	20.96	0.125	100
		36	39	20.93	0.124	100
		75	0	20.91	0.123	100
	256QAM	1	0	19.26	0.084	100
		1	36	19.05	0.080	100
		1	74	19.07	0.081	100
		36	0	18.97	0.079	100
		36	18	18.91	0.078	100
		36	39	18.90	0.078	100
		75	0	18.98	0.079	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	-32.50	30.04	-10.29	1.38	V	< 100	0.069	18.37
		16QAM	-33.29	29.25	-10.29	1.38	V		0.057	17.58
		64QAM	-34.37	28.17	-10.29	1.38	V		0.045	16.50
		256QAM	-37.38	25.16	-10.29	1.38	V		0.022	13.49
823.3		QPSK	-31.98	31.07	-10.25	1.39	V		0.088	19.43
		16QAM	-32.57	30.48	-10.25	1.39	V		0.077	18.84
		64QAM	-33.69	29.36	-10.25	1.39	V		0.059	17.72
		256QAM	-36.64	26.41	-10.25	1.39	V		0.030	14.77

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	-32.96	29.62	-10.29	1.39	V	< 100	0.062	17.95
		16QAM	-33.65	28.93	-10.29	1.39	V		0.053	17.26
		64QAM	-34.70	27.88	-10.29	1.39	V		0.042	16.21
		256QAM	-37.54	25.04	-10.29	1.39	V		0.022	13.37
822.5		QPSK	-32.58	30.53	-10.26	1.39	V		0.077	18.89
		16QAM	-32.86	30.25	-10.26	1.39	V		0.073	18.61
		64QAM	-33.96	29.15	-10.26	1.39	V		0.056	17.51
		256QAM	-36.90	26.21	-10.26	1.39	V		0.029	14.57

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	-32.80	29.89	-10.28	1.39	V	< 100	0.066	18.22
		16QAM	-33.43	29.26	-10.28	1.39	V		0.057	17.59
		64QAM	-34.21	28.48	-10.28	1.39	V		0.048	16.81
		256QAM	-37.22	25.47	-10.28	1.39	V		0.024	13.80
821.5		QPSK	-32.37	30.67	-10.26	1.39	V		0.080	19.02
		16QAM	-32.80	30.24	-10.26	1.39	V		0.072	18.59
		64QAM	-33.88	29.16	-10.26	1.39	V		0.056	17.51
		256QAM	-36.97	26.07	-10.26	1.39	V		0.028	14.42

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	-32.52	30.36	-10.27	1.39	V	< 100	0.074	18.70
		16QAM	-33.33	29.55	-10.27	1.39	V		0.062	17.89
		64QAM	-34.26	28.62	-10.27	1.39	V		0.050	16.96
		256QAM	-37.25	25.63	-10.27	1.39	V		0.025	13.97

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	-32.77	30.27	-10.26	1.39	V	< 7.00	0.073	18.62
		16QAM	-33.35	29.69	-10.26	1.39	V		0.064	18.04
		64QAM	-34.37	28.67	-10.26	1.39	V		0.050	17.02
		256QAM	-37.36	25.68	-10.26	1.39	V		0.025	14.03

Note

1. Limit: None (for reporting purposes only)

8.3 RADIATED SPURIOUS EMISSIONS

▣ MODE: LTE B26

▣ MODULATION SIGNAL: 1.4 MHz QPSK

▣ DISTANCE: 3 meters

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Limit
26697 (814.7)	1 629.40	-53.25	9.50	-63.21	1.98	H	-55.69	-13.00
	2 444.10	-55.27	10.28	-59.75	2.47	V	-51.93	-13.00
	3 258.80	-57.44	11.86	-58.65	2.88	V	-49.67	-13.00
26783 (823.3)	1 646.60	-52.49	9.65	-62.84	1.99	V	-55.17	-13.00
	2 469.90	-52.87	10.46	-57.52	2.47	H	-49.53	-13.00
	3 293.20	-57.40	12.04	-58.80	2.88	H	-49.64	-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	1.0947
			16QAM			1.0983
			64QAM			1.0990
			256QAM			1.0946
	3 MHz	822.5	QPSK	15		2.7176
			16QAM			2.7209
			64QAM			2.7080
			256QAM			2.7142
	5 MHz	821.5	QPSK	25		4.5253
			16QAM			4.5095
			64QAM			4.5259
			256QAM			4.5114
	10 MHz	819.0	QPSK	50		9.0294
			16QAM			9.0592
			64QAM			9.0232
			256QAM			9.0322
	15 MHz	821.5	QPSK	75		13.492
			16QAM			13.491
			64QAM			13.444
			256QAM			13.460

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	3.7054	27.976	-67.141	-39.165	-13.00
		823.3	3.6955	27.976	-66.844	-38.868	
	3	815.5	3.7069	27.976	-67.381	-39.405	
		822.5	3.6780	27.976	-67.509	-39.533	
	5	816.5	3.7069	27.976	-67.315	-39.339	
		821.5	3.6970	27.976	-66.925	-38.949	
	10	819.0	3.6845	27.976	-67.205	-39.229	
	15	821.5	3.6755	27.976	-67.288	-39.312	

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

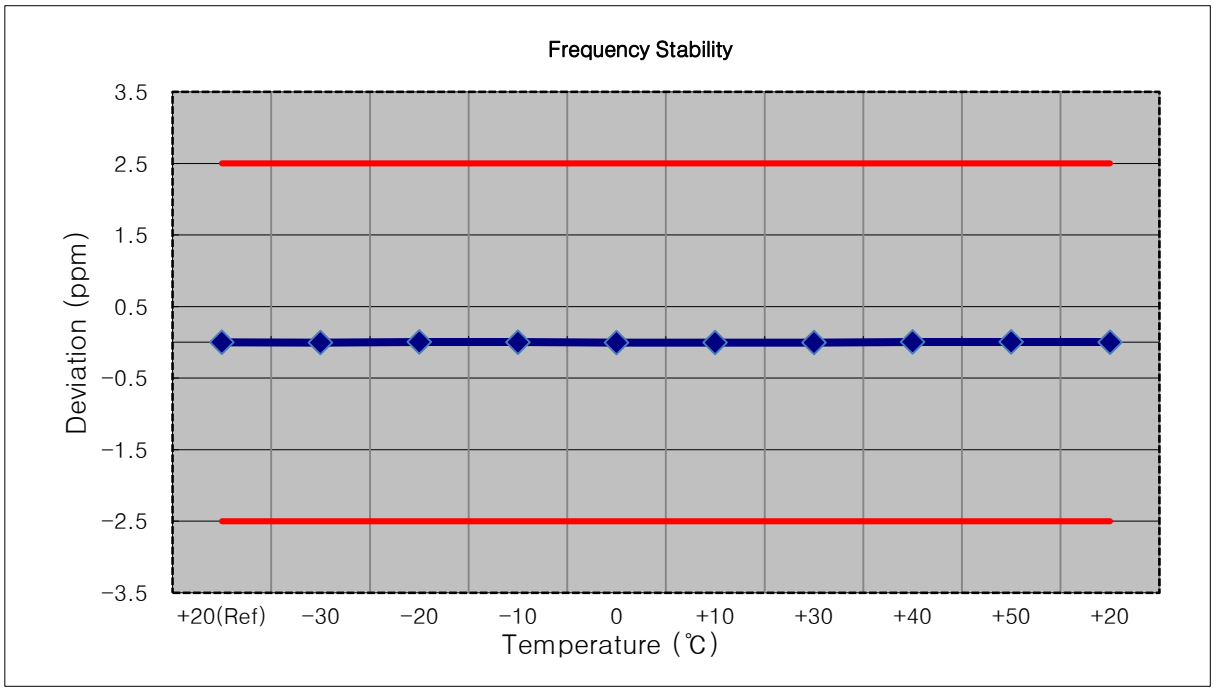
▣ OPERATING FREQUENCY: 814,700,000 Hz

▣ CHANNEL: 26697(1.4 MHz)

▣ REFERENCE VOLTAGE: 3.860 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.860	+20(Ref)	814 699 997	0.0	0.000 000	0.000
100%		-30	814 699 994	-2.8	0.000 000	-0.003
100%		-20	814 700 002	4.9	0.000 001	0.006
100%		-10	814 700 000	3.4	0.000 000	0.004
100%		0	814 699 994	-2.9	0.000 000	-0.004
100%		+10	814 699 994	-2.4	0.000 000	-0.003
100%		+30	814 699 993	-3.5	0.000 000	-0.004
100%		+40	814 700 001	4.7	0.000 001	0.006
100%		+50	814 700 001	4.6	0.000 001	0.006
Batt. Endpoint	3.400	+20	814 700 000	3.3	0.000 000	0.004



▣ MODE: LTE 26

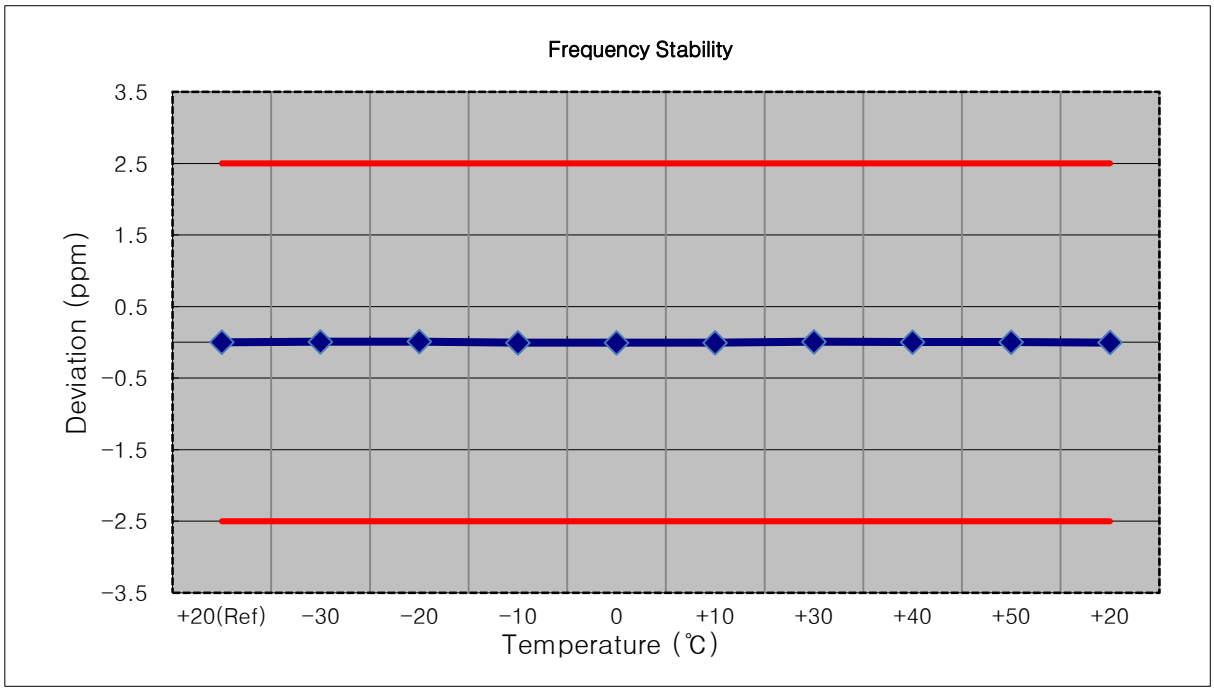
▣ OPERATING FREQUENCY: 815,500,000 Hz

▣ CHANNEL: 26705(3 MHz)

▣ REFERENCE VOLTAGE: 3.860 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.860	+20(Ref)	815 500 006	0.0	0.000 000	0.000
100%		-30	815 500 013	6.6	0.000 001	0.008
100%		-20	815 500 014	7.7	0.000 001	0.009
100%		-10	815 500 001	-5.3	-0.000 001	-0.006
100%		0	815 500 002	-4.5	-0.000 001	-0.006
100%		+10	815 500 003	-3.8	0.000 000	-0.005
100%		+30	815 500 012	6.0	0.000 001	0.007
100%		+40	815 500 010	3.5	0.000 000	0.004
100%		+50	815 500 009	2.7	0.000 000	0.003
Batt. Endpoint	3.400	+20	815 500 003	-3.2	0.000 000	-0.004



▣ MODE: LTE 26

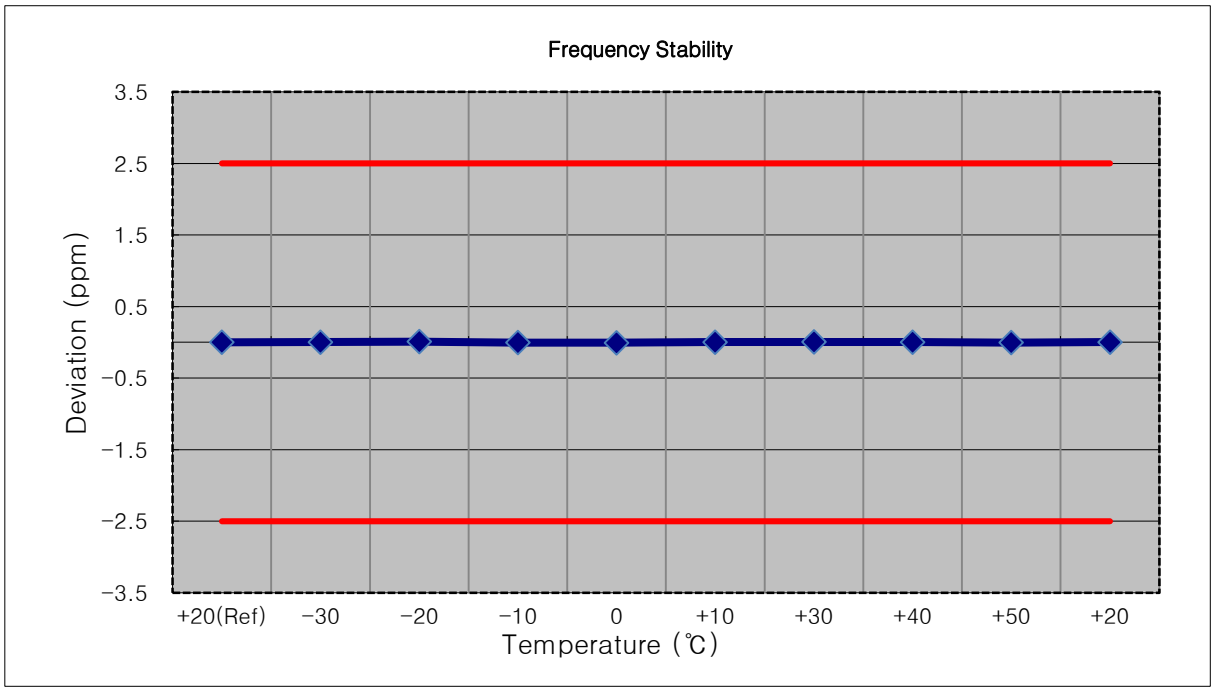
▣ OPERATING FREQUENCY: 816,500,000 Hz

▣ CHANNEL: 26715(5 MHz)

▣ REFERENCE VOLTAGE: 3.860 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.860	+20(Ref)	816 499 997	0.0	0.000 000	0.000
100%		-30	816 500 000	3.0	0.000 000	0.004
100%		-20	816 500 005	7.7	0.000 001	0.009
100%		-10	816 499 995	-2.2	0.000 000	-0.003
100%		0	816 499 992	-4.9	-0.000 001	-0.006
100%		+10	816 500 000	2.7	0.000 000	0.003
100%		+30	816 500 001	4.3	0.000 001	0.005
100%		+40	816 500 000	2.7	0.000 000	0.003
100%		+50	816 499 994	-3.4	0.000 000	-0.004
Batt. Endpoint	3.400	+20	816 500 000	2.4	0.000 000	0.003



▣ MODE: LTE 26

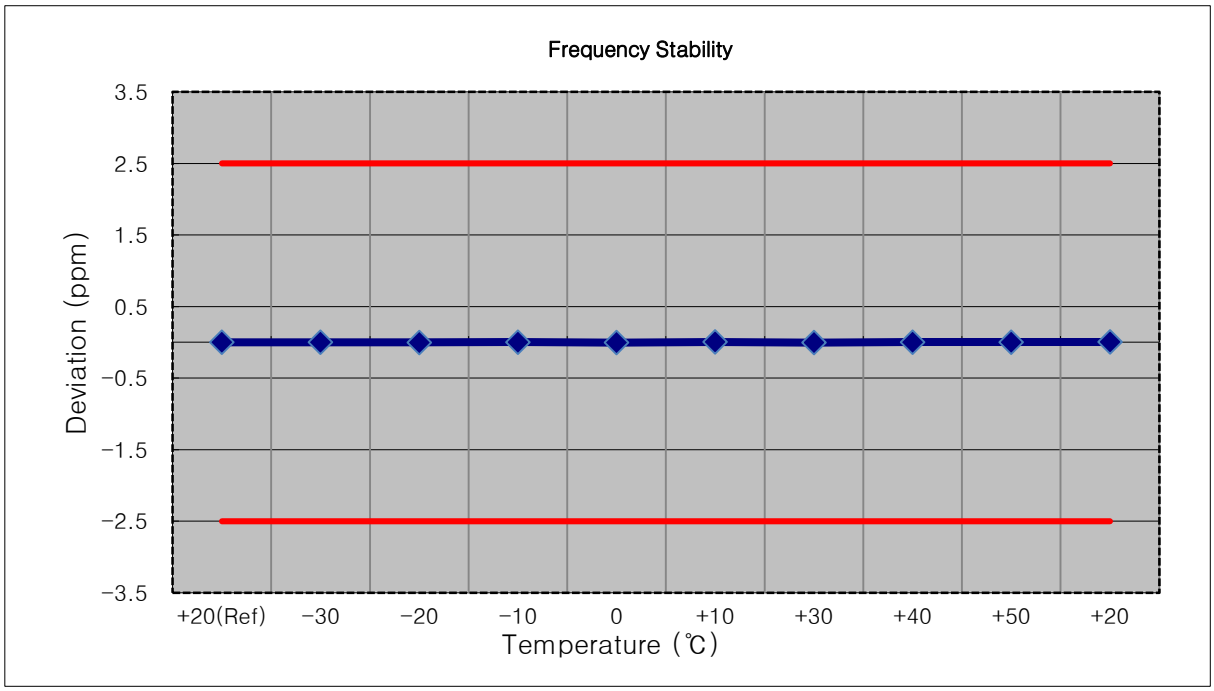
▣ OPERATING FREQUENCY: 819,000,000 Hz

▣ CHANNEL: 26740(10 MHz)

▣ REFERENCE VOLTAGE: 3.860 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.860	+20(Ref)	818 999 996	0.0	0.000 000	0.000
100%		-30	818 999 998	1.7	0.000 000	0.002
100%		-20	818 999 995	-1.4	0.000 000	-0.002
100%		-10	818 999 999	2.7	0.000 000	0.003
100%		0	818 999 993	-2.9	0.000 000	-0.004
100%		+10	819 000 001	4.4	0.000 001	0.005
100%		+30	818 999 994	-2.0	0.000 000	-0.002
100%		+40	818 999 998	1.9	0.000 000	0.002
100%		+50	819 000 000	3.4	0.000 000	0.004
Batt. Endpoint	3.400	+20	819 000 000	4.0	0.000 000	0.005



▣ MODE: LTE 26

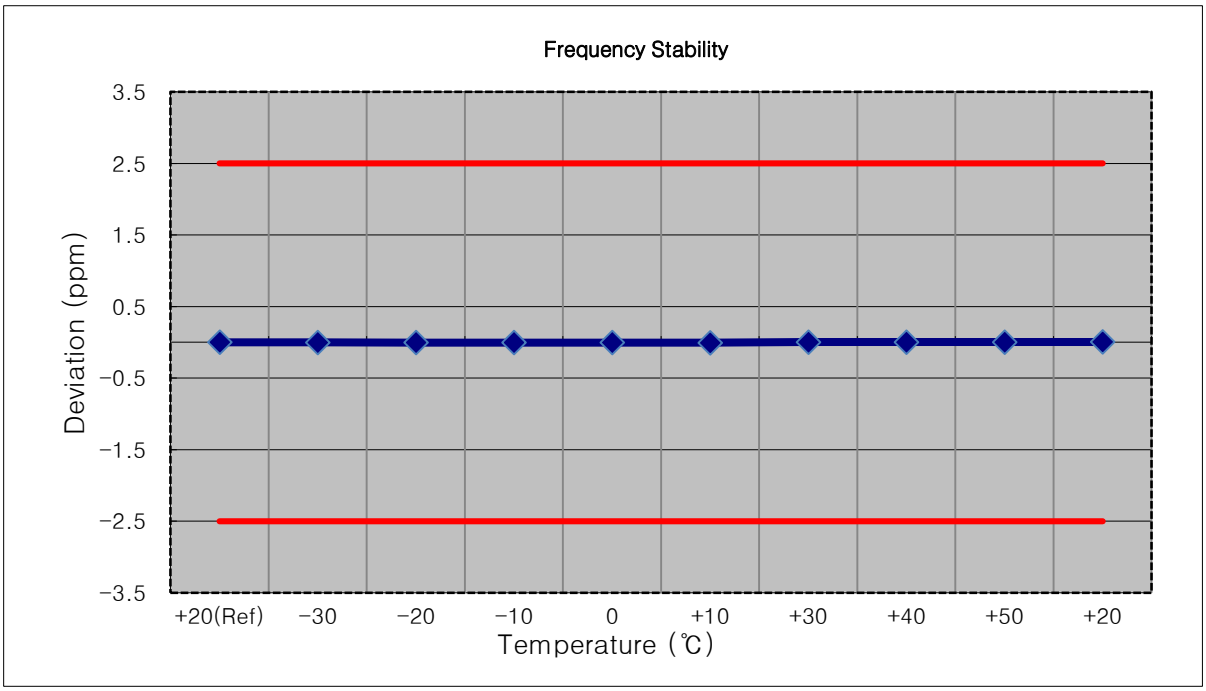
▣ OPERATING FREQUENCY: 821,500,000 Hz

▣ CHANNEL: 26765(15 MHz)

▣ REFERENCE VOLTAGE: 3.860 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.860	+20(Ref)	821 499 997	0.0	0.000 000	0.000
100%		-30	821 499 996	-1.3	0.000 000	-0.002
100%		-20	821 499 994	-2.8	0.000 000	-0.003
100%		-10	821 499 995	-2.0	0.000 000	-0.002
100%		0	821 499 995	-1.9	0.000 000	-0.002
100%		+10	821 499 993	-3.9	0.000 000	-0.005
100%		+30	821 499 999	2.2	0.000 000	0.003
100%		+40	821 499 999	2.0	0.000 000	0.002
100%		+50	821 500 001	3.6	0.000 000	0.004
Batt. Endpoint	3.400	+20	821 500 001	3.7	0.000 000	0.005



8.8 STADDLE CHANNEL

8.8.1 CONDUCTED OUTPUT POWER

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm) 824 MHz		Limit (W)
				dBm	W	
1.4	QPSK	1	0	23.61	0.230	100
		1	3	23.60	0.229	100
		1	5	23.66	0.232	100
		3	0	23.67	0.233	100
		3	1	23.70	0.234	100
		3	3	23.61	0.230	100
		6	0	22.76	0.189	100
	16QAM	1	0	22.88	0.194	100
		1	3	22.84	0.192	100
		1	5	22.80	0.191	100
		3	0	22.77	0.189	100
		3	1	22.83	0.192	100
		3	3	22.89	0.195	100
		6	0	21.81	0.152	100
	64QAM	1	0	21.85	0.153	100
		1	3	21.74	0.149	100
		1	5	21.87	0.154	100
		3	0	21.77	0.150	100
		3	1	21.73	0.149	100
		3	3	21.80	0.151	100
		6	0	20.69	0.117	100
	256QAM	1	0	18.78	0.076	100
		1	3	18.72	0.074	100
		1	5	18.73	0.075	100
		3	0	18.83	0.076	100
		3	1	18.72	0.074	100
		3	3	18.80	0.076	100
		6	0	18.70	0.074	100

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm) 824 MHz		Limit (W)
				dBm	W	
3	QPSK	1	0	23.60	0.229	100
		1	7	23.52	0.225	100
		1	14	23.45	0.221	100
		8	0	22.73	0.187	100
		8	3	22.78	0.190	100
		8	7	22.72	0.187	100
		15	0	22.74	0.188	100
	16QAM	1	0	22.75	0.188	100
		1	7	22.57	0.181	100
		1	14	22.82	0.191	100
		8	0	21.77	0.150	100
		8	3	21.75	0.150	100
		8	7	21.73	0.149	100
		15	0	21.72	0.149	100
	64QAM	1	0	21.90	0.155	100
		1	7	21.76	0.150	100
		1	14	21.88	0.154	100
		8	0	20.75	0.119	100
		8	3	20.69	0.117	100
		8	7	20.75	0.119	100
		15	0	20.79	0.120	100
	256QAM	1	0	18.91	0.078	100
		1	7	18.74	0.075	100
		1	14	18.90	0.078	100
		8	0	18.64	0.073	100
		8	3	18.60	0.072	100
		8	7	18.65	0.073	100
		15	0	18.72	0.074	100

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm) 824 MHz		Limit (W)
				dBm	W	
5	QPSK	1	0	23.54	0.226	100
		1	12	23.44	0.221	100
		1	24	23.50	0.224	100
		12	0	22.81	0.191	100
		12	6	22.76	0.189	100
		12	11	22.71	0.187	100
		25	0	22.73	0.187	100
	16QAM	1	0	23.06	0.202	100
		1	12	22.74	0.188	100
		1	24	22.85	0.193	100
		12	0	21.74	0.149	100
		12	6	21.78	0.151	100
		12	11	21.73	0.149	100
		25	0	21.79	0.151	100
	64QAM	1	0	21.92	0.156	100
		1	12	21.68	0.147	100
		1	24	21.82	0.152	100
		12	0	20.77	0.119	100
		12	6	20.80	0.120	100
		12	11	20.82	0.121	100
		25	0	20.78	0.120	100
	256QAM	1	0	18.95	0.079	100
		1	12	18.69	0.074	100
		1	24	18.92	0.078	100
		12	0	18.84	0.077	100
		12	6	18.78	0.076	100
		12	11	18.75	0.075	100
		25	0	18.77	0.075	100

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm) 824 MHz		Limit (W)
				dBm	W	
10	QPSK	1	0	23.74	0.237	100
		1	24	23.51	0.224	100
		1	49	23.49	0.223	100
		25	0	22.84	0.192	100
		25	12	22.81	0.191	100
		25	24	22.80	0.191	100
		50	0	22.88	0.194	100
	16QAM	1	0	22.97	0.198	100
		1	24	22.99	0.199	100
		1	49	23.01	0.200	100
		25	0	21.85	0.153	100
		25	12	21.84	0.153	100
		25	24	21.86	0.153	100
		50	0	21.87	0.154	100
	64QAM	1	0	22.10	0.162	100
		1	24	21.95	0.157	100
		1	49	21.91	0.155	100
		25	0	20.83	0.121	100
		25	12	20.80	0.120	100
		25	24	20.75	0.119	100
		50	0	20.86	0.122	100
	256QAM	1	0	19.07	0.081	100
		1	24	18.95	0.079	100
		1	49	18.95	0.079	100
		25	0	18.88	0.077	100
		25	12	18.86	0.077	100
		25	24	18.87	0.077	100
		50	0	18.84	0.077	100

8.8.2 EFFECTIVE RADIATED POWER

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBd)	C.L	Pol	Limit W	ERP W	ERP dBm
824.0	LTE B26/ 1.4 MHz	QPSK	-31.89	31.04	-10.25	1.39	V	< 7.00	0.087	19.40
		16QAM	-32.51	30.42	-10.25	1.39	V		0.075	18.78
		64QAM	-33.57	29.36	-10.25	1.39	V		0.059	17.72
		256QAM	-36.64	26.29	-10.25	1.39	V		0.029	14.65

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBd)	C.L	Pol	Limit W	ERP W	ERP dBm
824.0	LTE B26/ 3 MHz	QPSK	-32.47	30.46	-10.25	1.39	V	< 7.00	0.076	18.82
		16QAM	-32.83	30.10	-10.25	1.39	V		0.070	18.46
		64QAM	-33.74	29.19	-10.25	1.39	V		0.057	17.55
		256QAM	-36.71	26.22	-10.25	1.39	V		0.029	14.58

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBd)	C.L	Pol	Limit W	ERP W	ERP dBm
824.0	LTE B26/ 5 MHz	QPSK	-32.12	30.81	-10.25	1.39	V	< 7.00	0.083	19.17
		16QAM	-32.75	30.18	-10.25	1.39	V		0.071	18.54
		64QAM	-33.58	29.35	-10.25	1.39	V		0.059	17.71
		256QAM	-36.67	26.26	-10.25	1.39	V		0.029	14.62

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBd)	C.L	Pol	Limit W	ERP W	ERP dBm
824.0	LTE B26/ 10 MHz	QPSK	-32.27	30.66	-10.25	1.39	V	< 7.00	0.080	19.02
		16QAM	-32.79	30.14	-10.25	1.39	V		0.071	18.50
		64QAM	-33.82	29.11	-10.25	1.39	V		0.056	17.47
		256QAM	-36.70	26.23	-10.25	1.39	V		0.029	14.59

8.8.3 RADIATED SPURIOUS EMISSIONS

▣ MODE: LTE B26

▣ MODULATION SIGNAL: 1.4 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	-53.10	9.70	-63.42	1.99	V	-55.71	-13.00
	2 472.00	-54.06	10.46	-58.71	2.47	V	-50.72	-13.00
	3 296.00	-56.44	12.07	-57.93	2.89	V	-48.74	-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	3.7000	27.976	-67.426	-39.450	-13.00
	3		3.6905	27.976	-67.349	-39.373	
	5		3.6945	27.976	-67.232	-39.256	
	10		3.6930	27.976	-67.177	-39.201	

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)

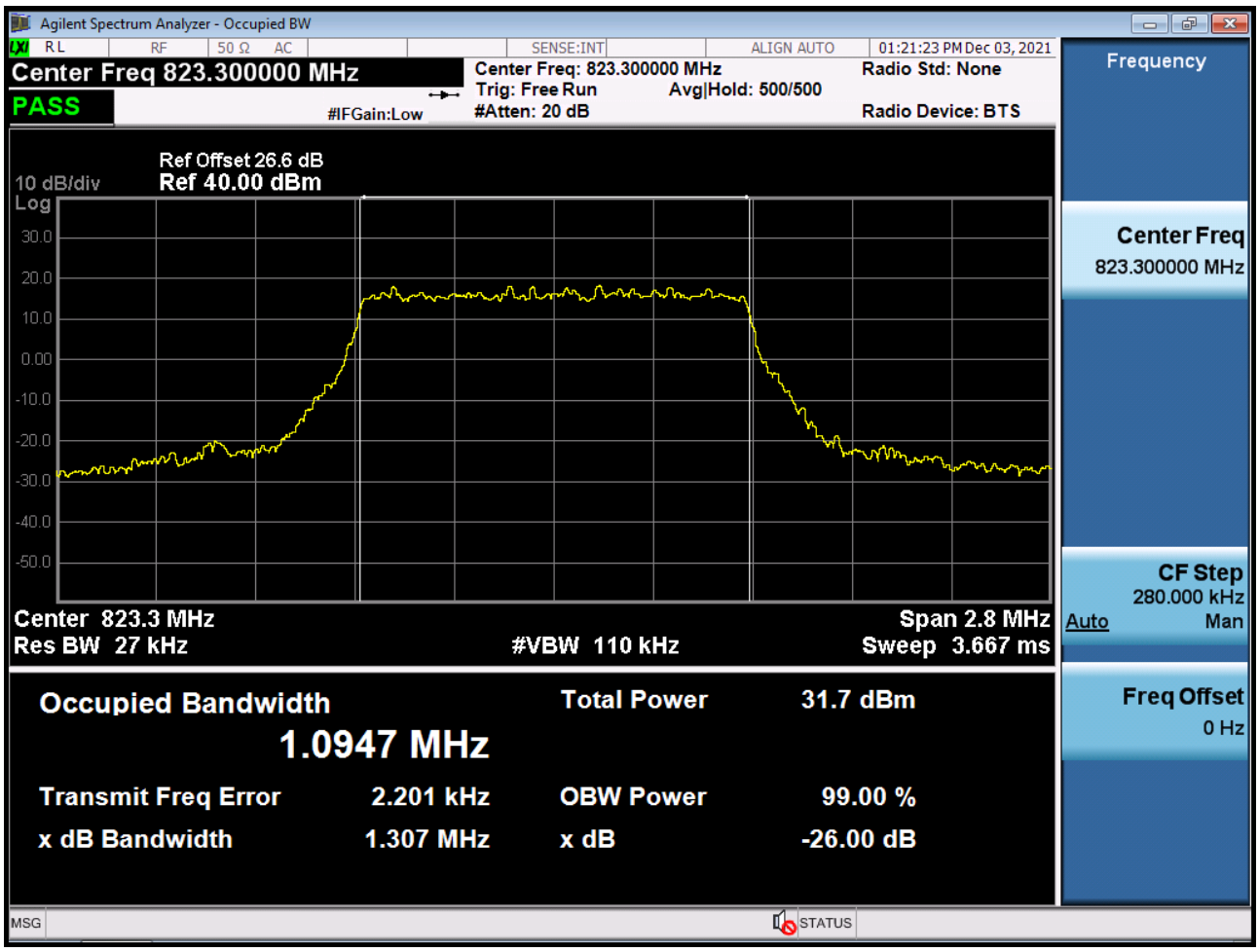
Plots of the EUT's Band Edge are shown Page 98 ~ 109.

8.8.6 BAND EDGE(Part22)

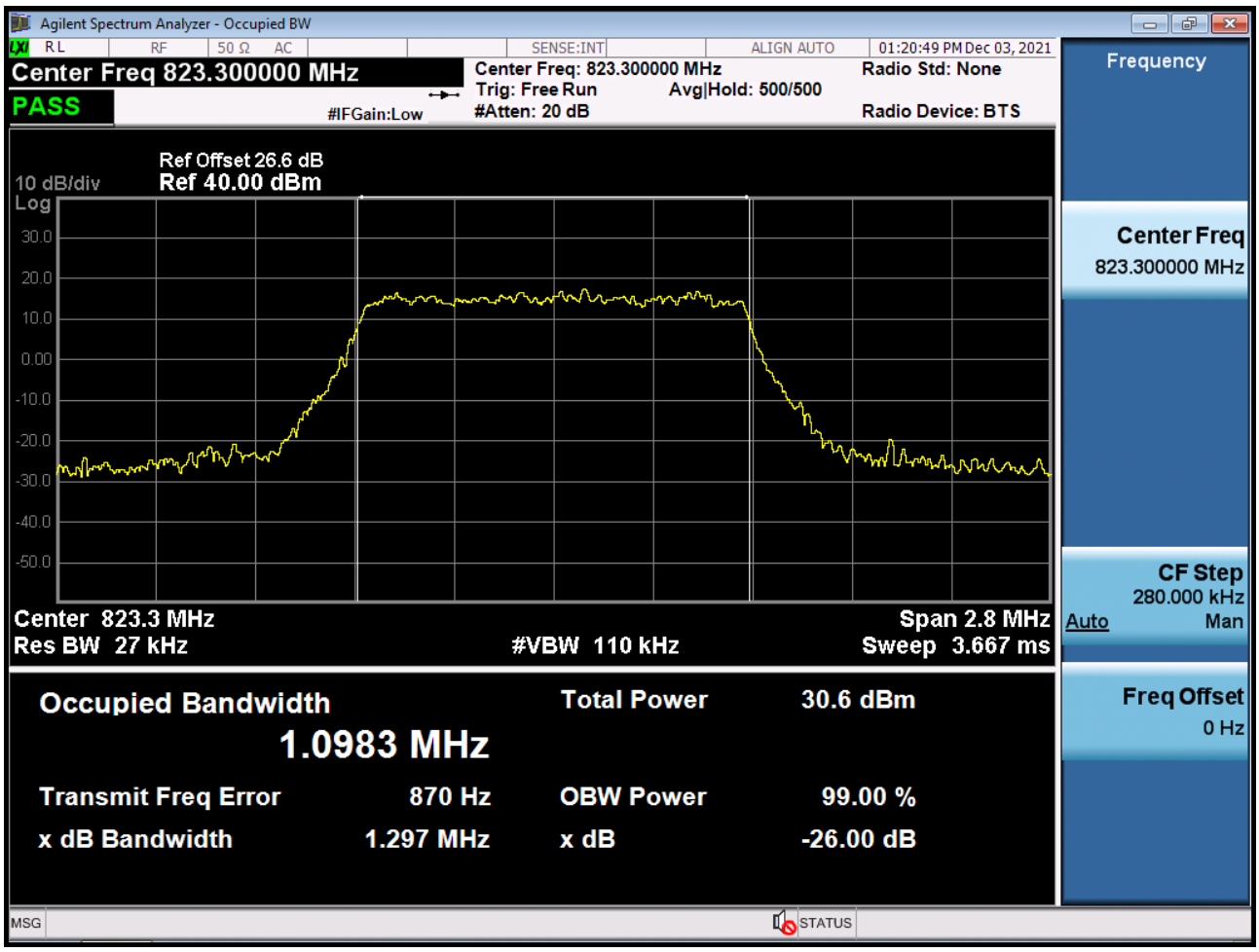
- Test Channel : 26790(824.0 MHz)
- Plots of the EUT's Band Edge are shown Page 110 ~ 117.

9. TEST PLOTS

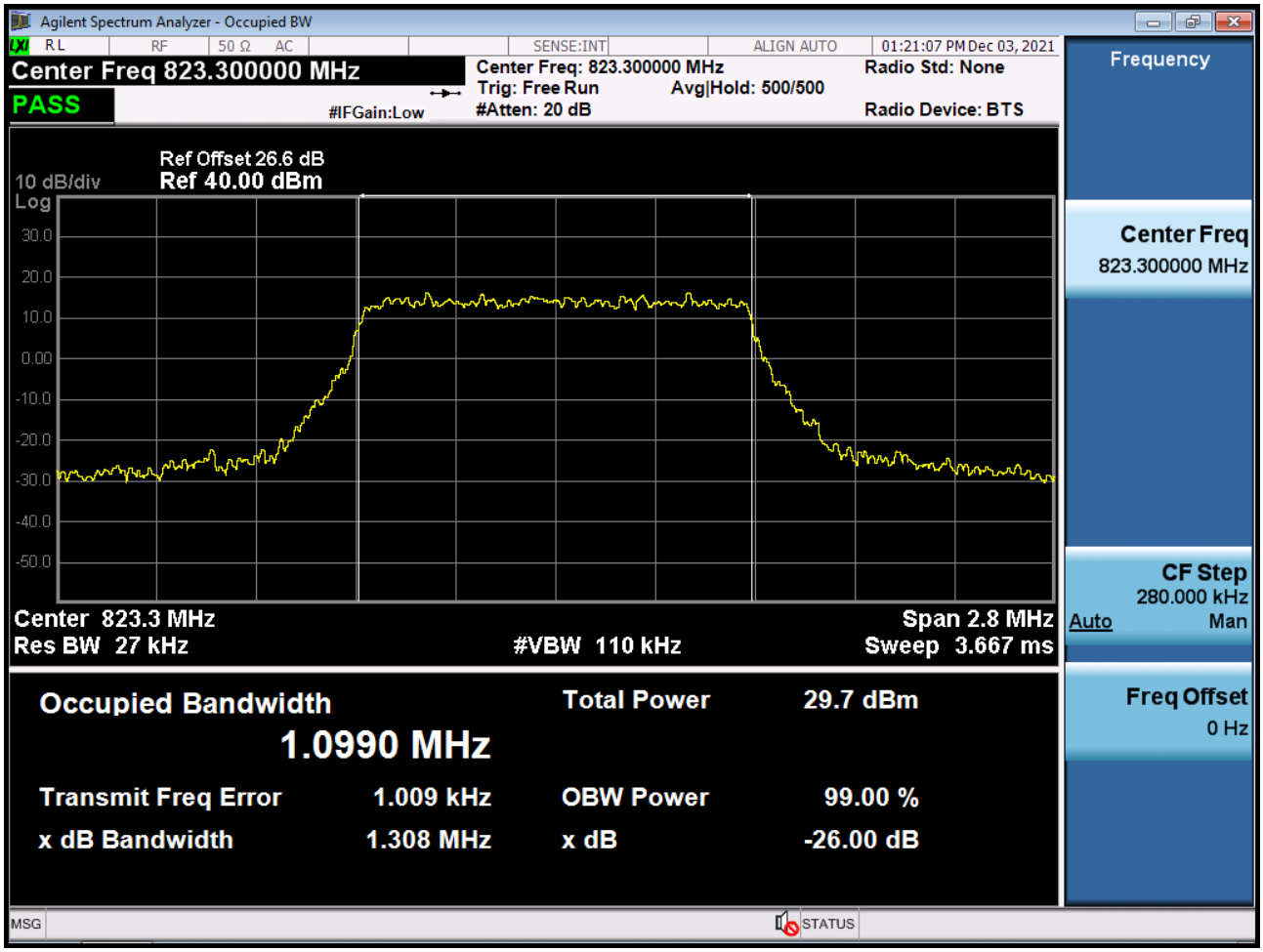
BAND 26. Occupied Bandwidth Plot (1.4 M BW Ch.26783 QPSK RB 6_0)



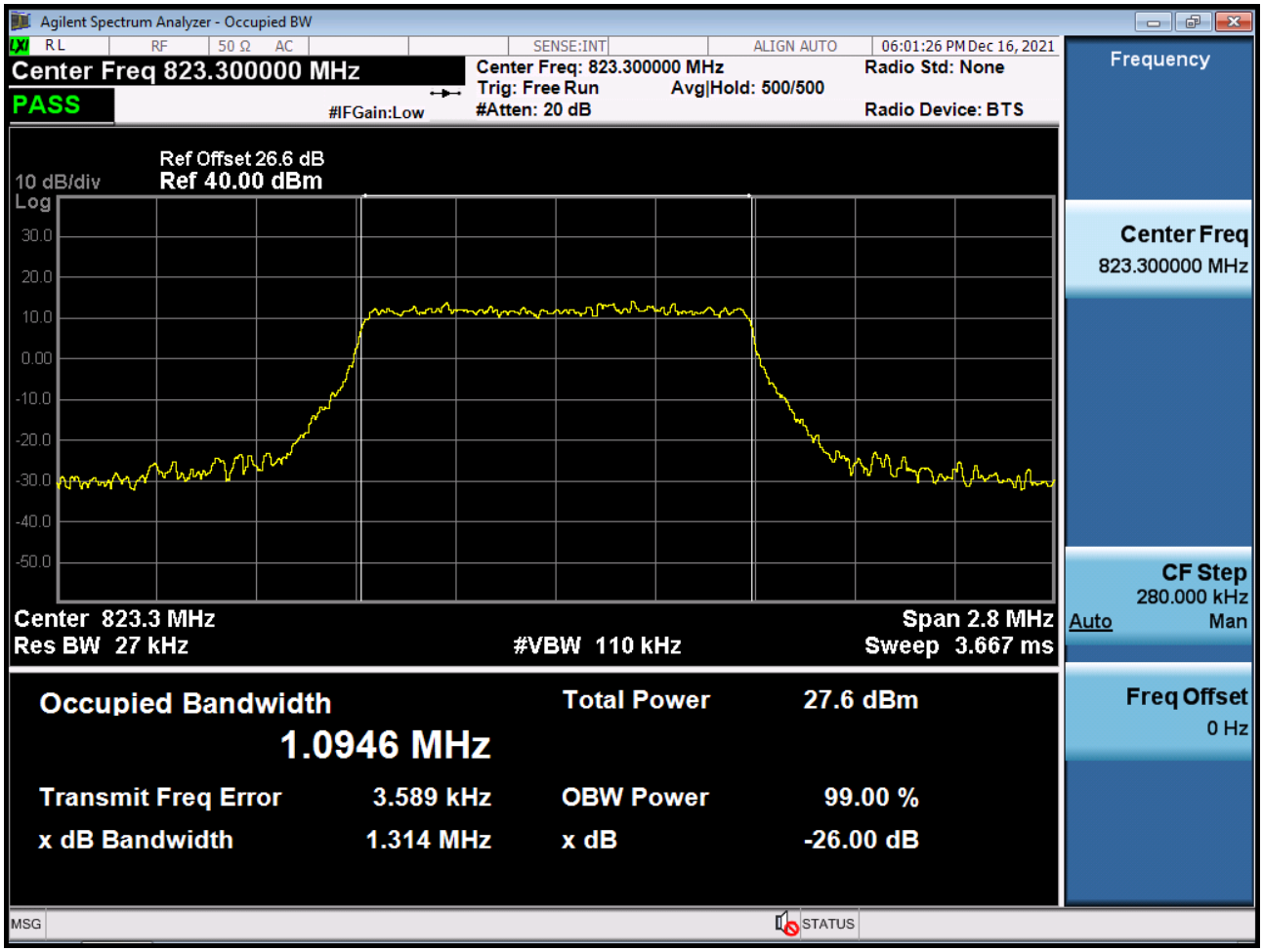
BAND 26. Occupied Bandwidth Plot (1.4 M BW Ch.26783 16QAM RB 6_0)



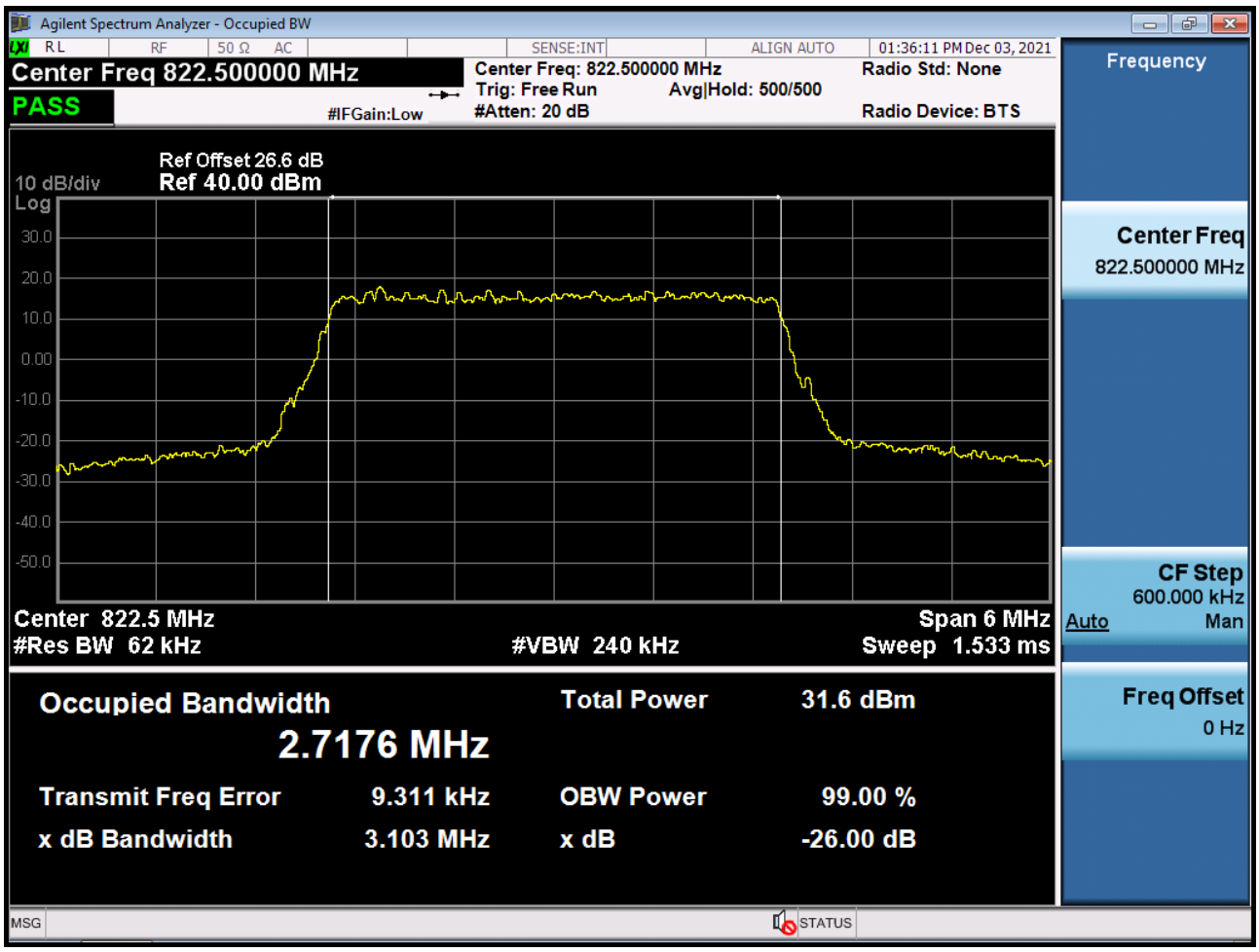
BAND 26. Occupied Bandwidth Plot (1.4 M BW Ch.26783 64QAM RB 6_0)



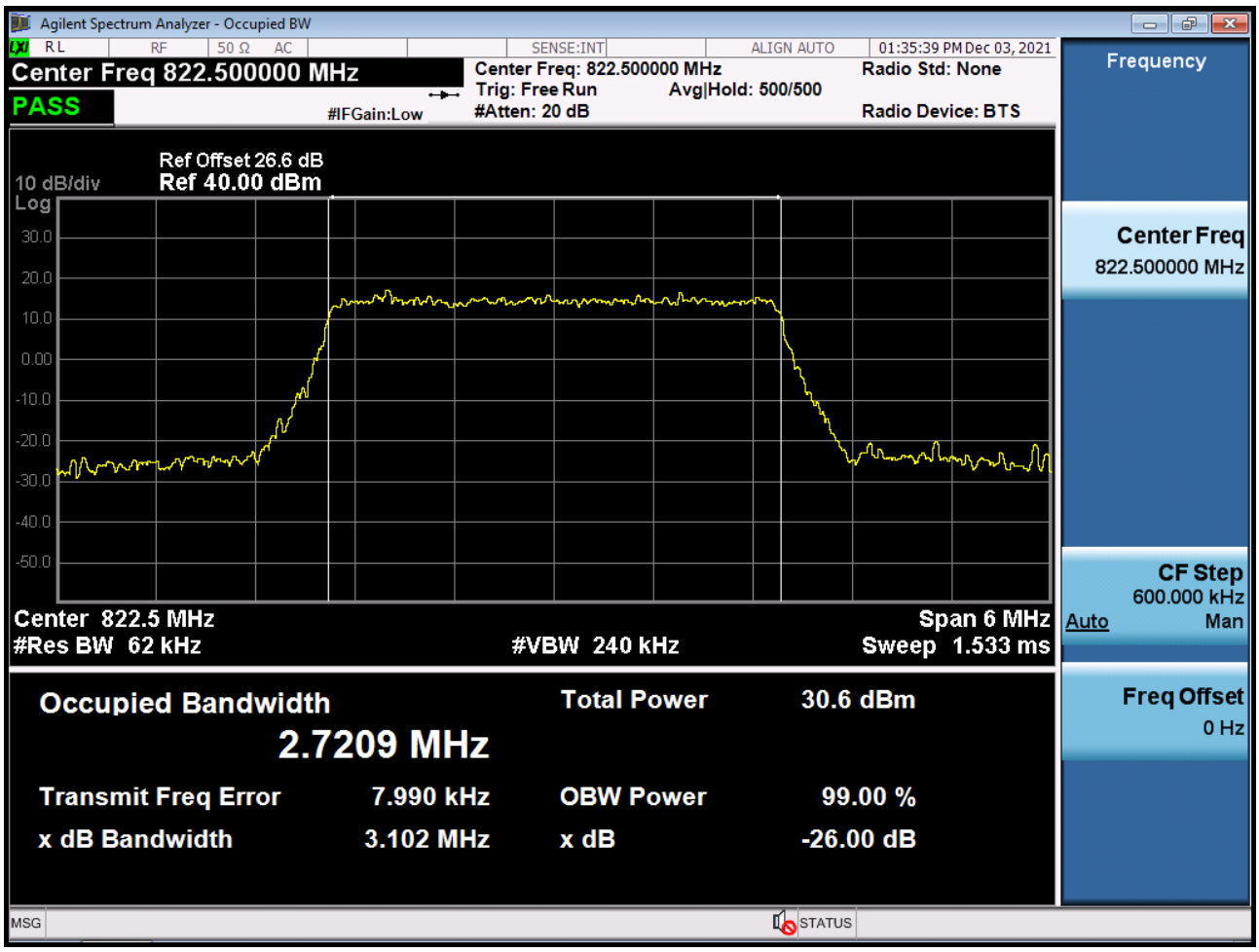
BAND 26. Occupied Bandwidth Plot (1.4 M BW Ch.26783 256QAM RB 6_0)



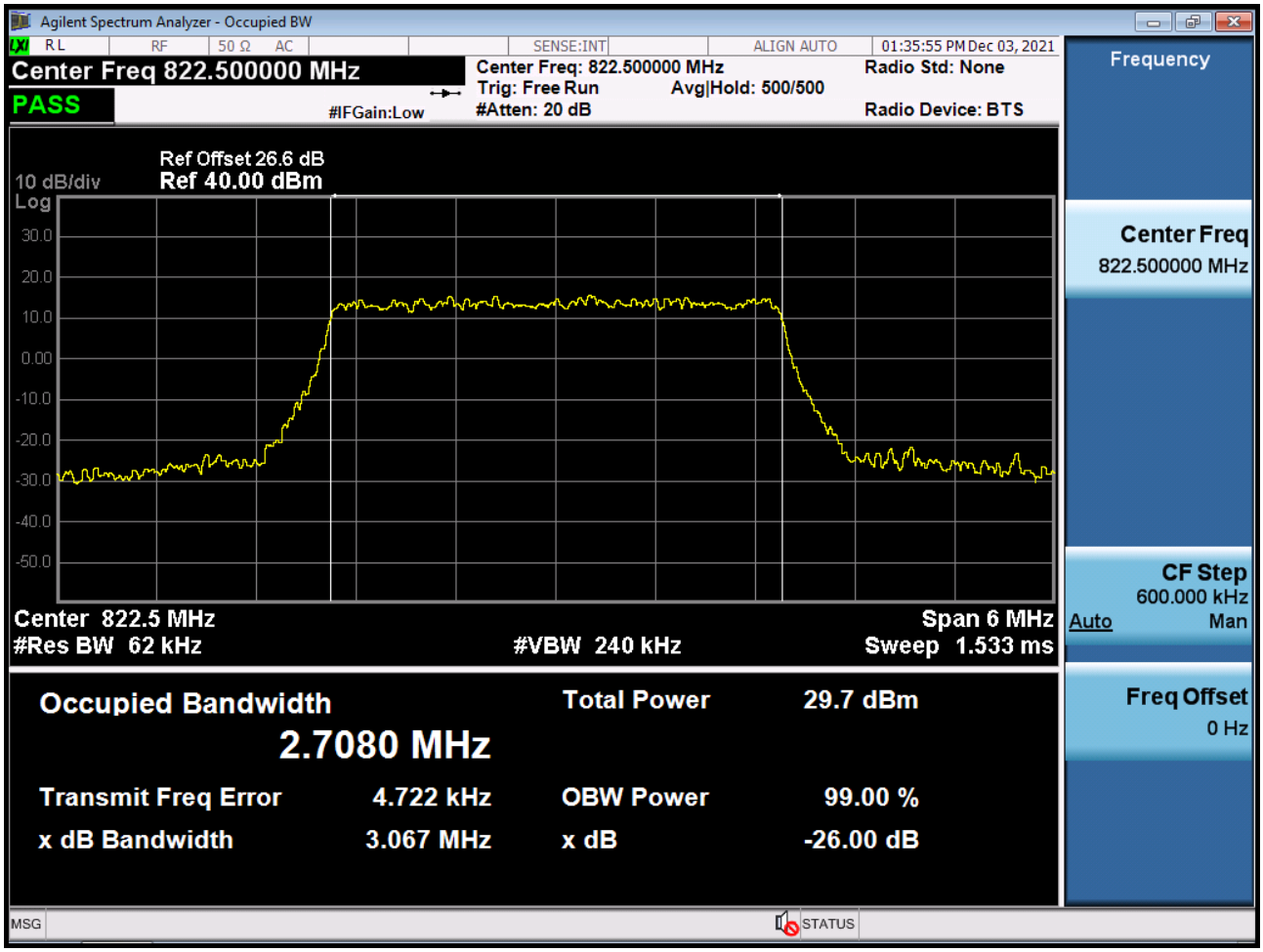
BAND 26. Occupied Bandwidth Plot (3 M BW Ch.26775 QPSK RB 15_0)



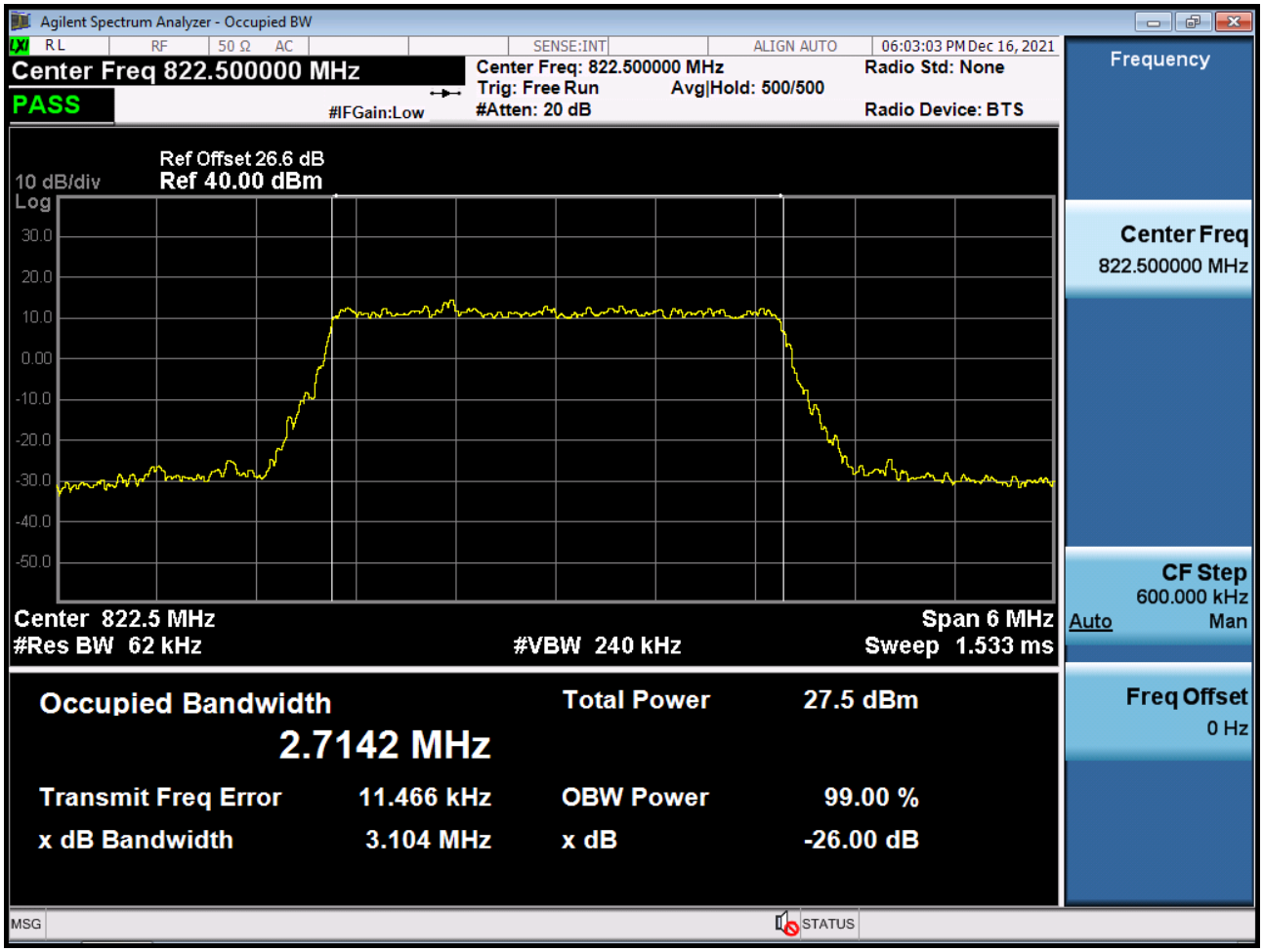
BAND 26. Occupied Bandwidth Plot (3 M BW Ch.26775 16QAM RB 15_0)



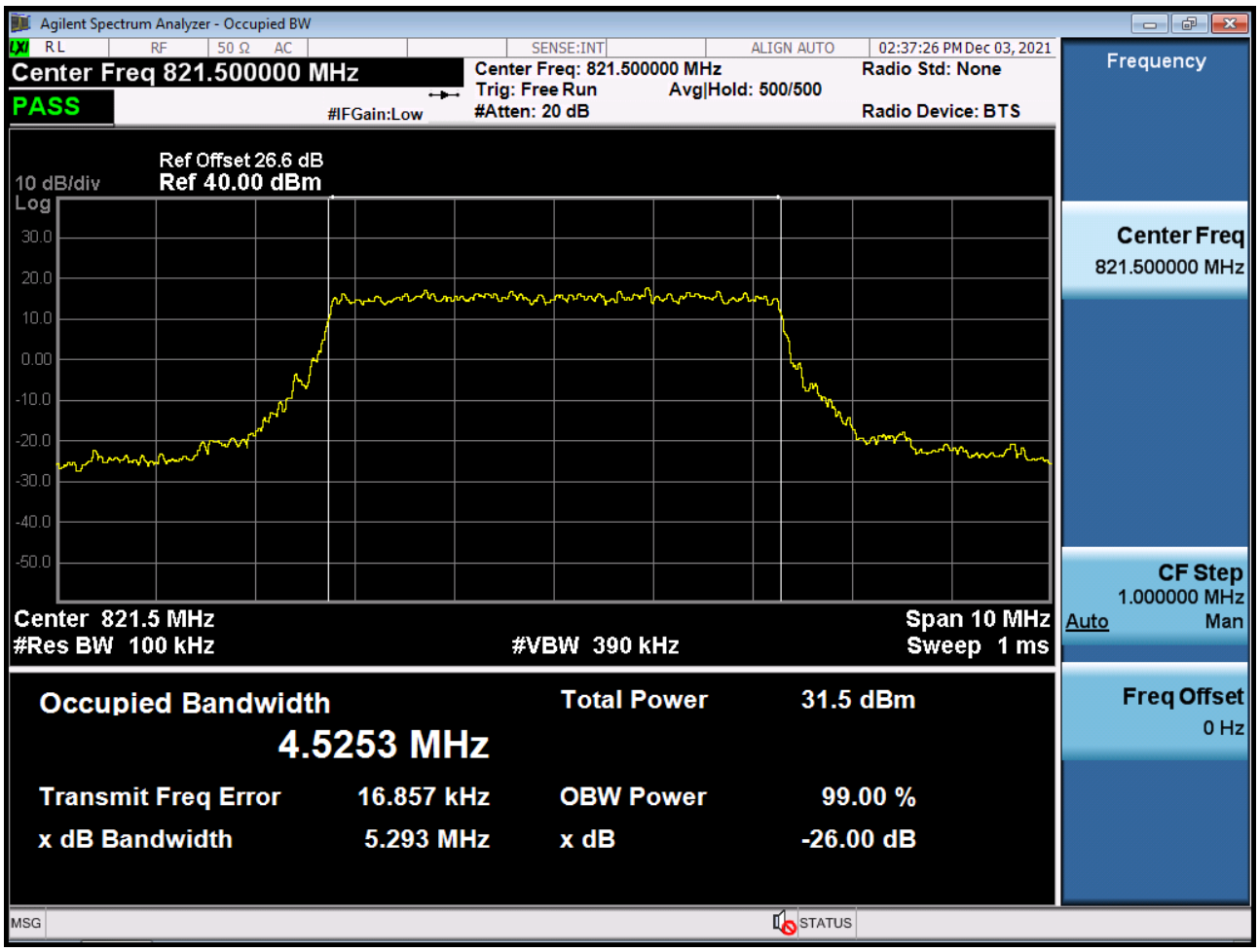
BAND 26. Occupied Bandwidth Plot (3 M BW Ch.26775 64QAM RB 15_0)



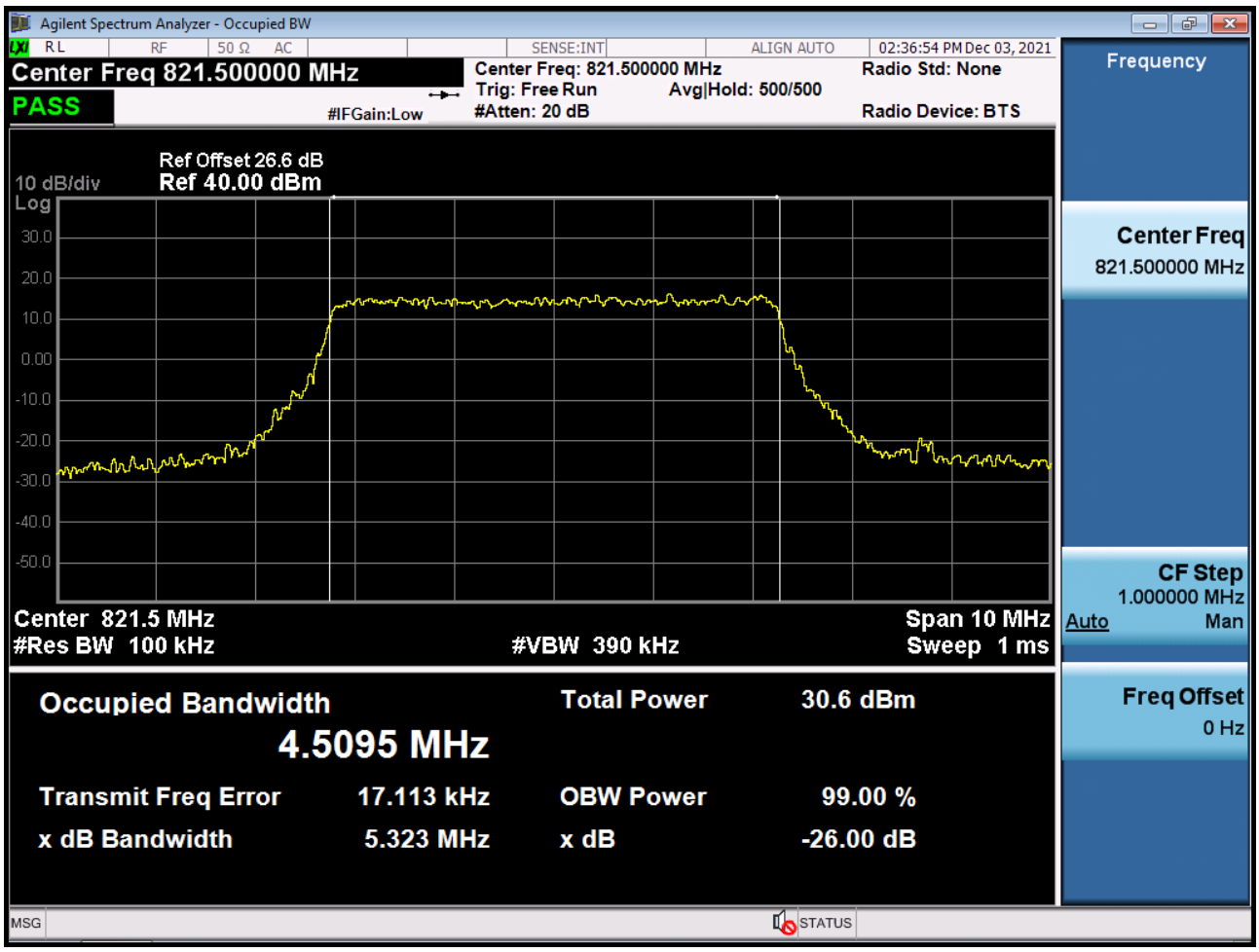
BAND 26. Occupied Bandwidth Plot (3 M BW Ch.26775 256QAM RB 15_0)



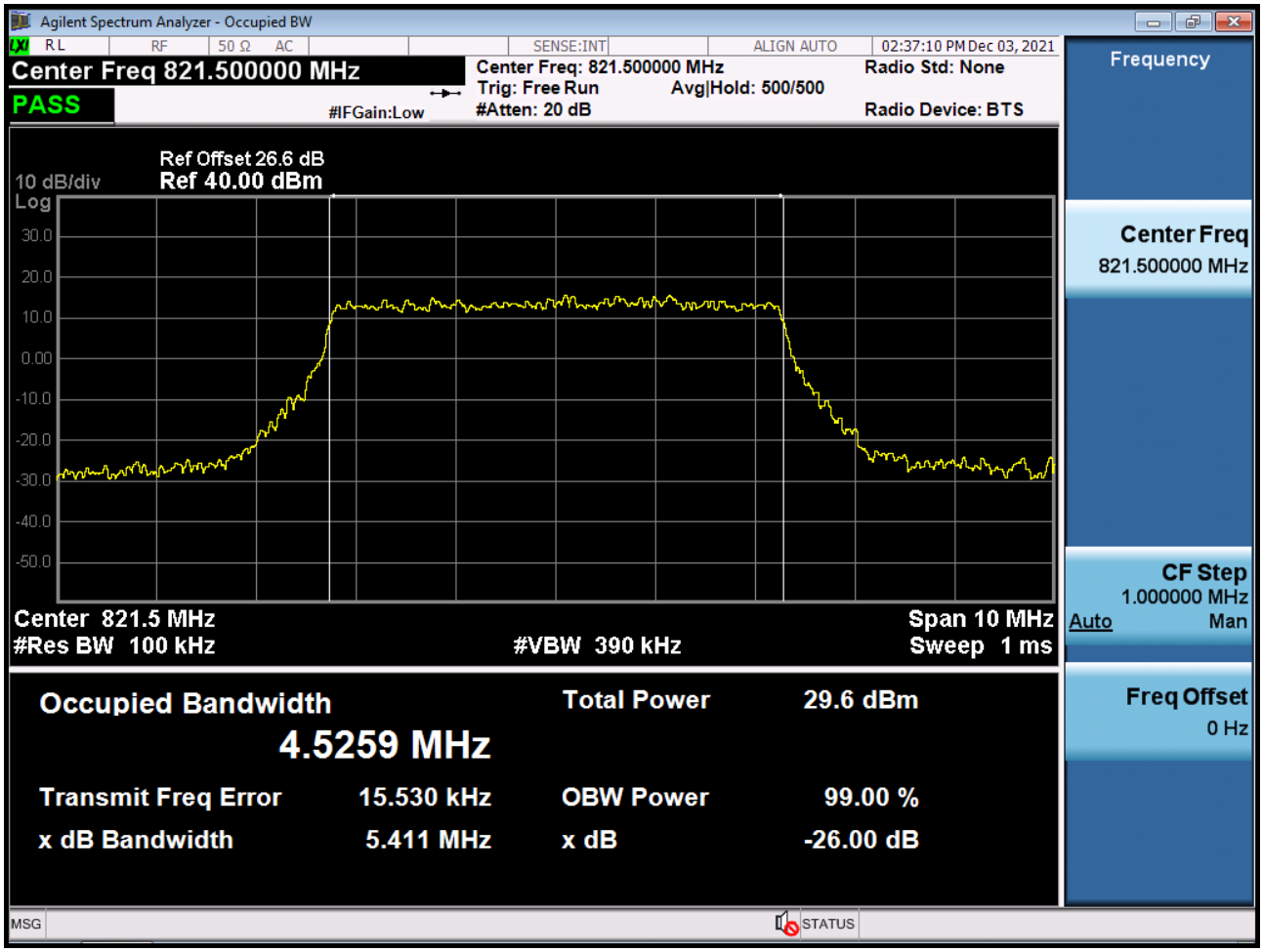
BAND 26. Occupied Bandwidth Plot (5 M BW Ch.26765 QPSK RB 25_0)



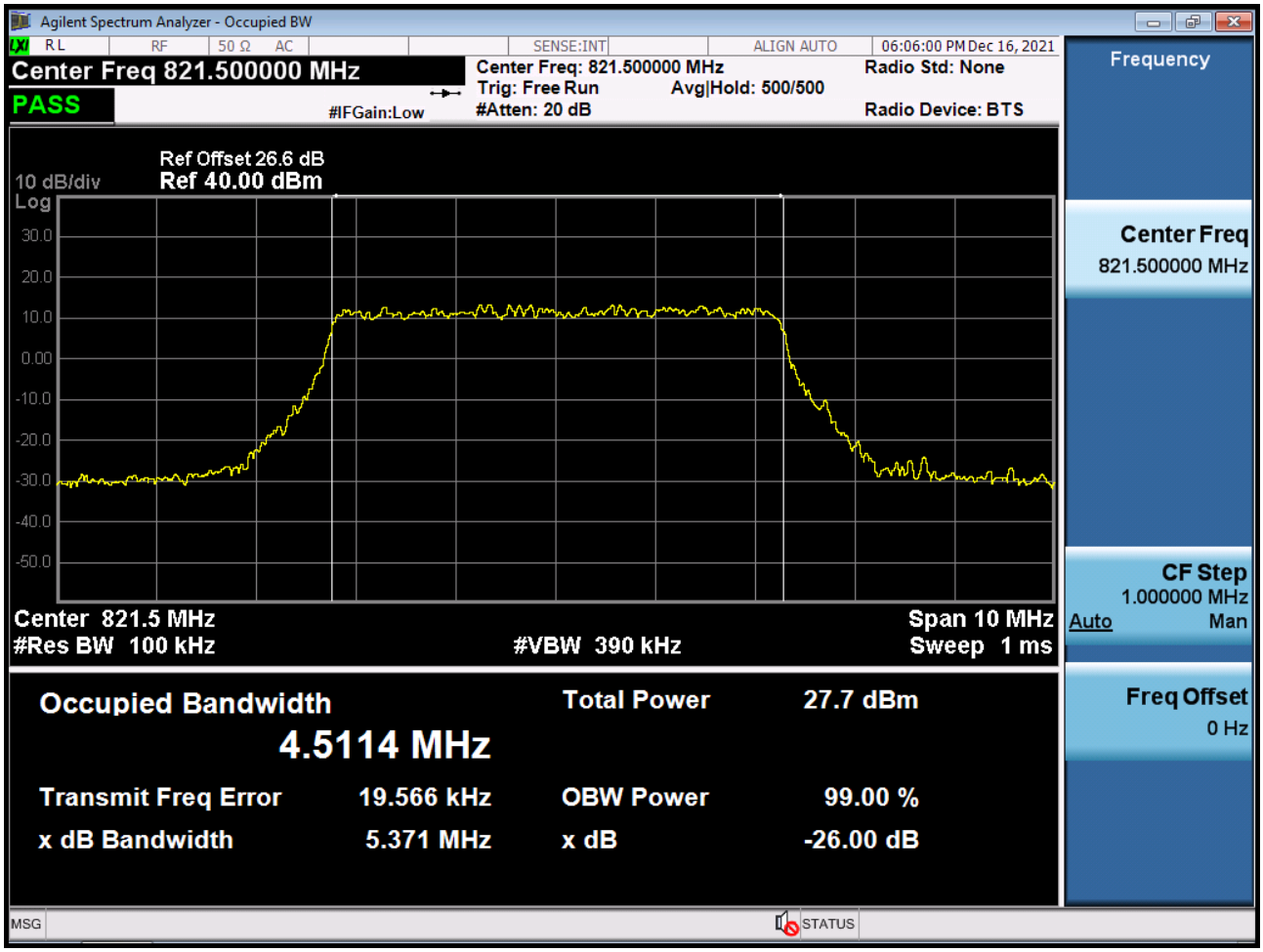
BAND 26. Occupied Bandwidth Plot (5 M BW Ch.26765 16QAM RB 25_0)



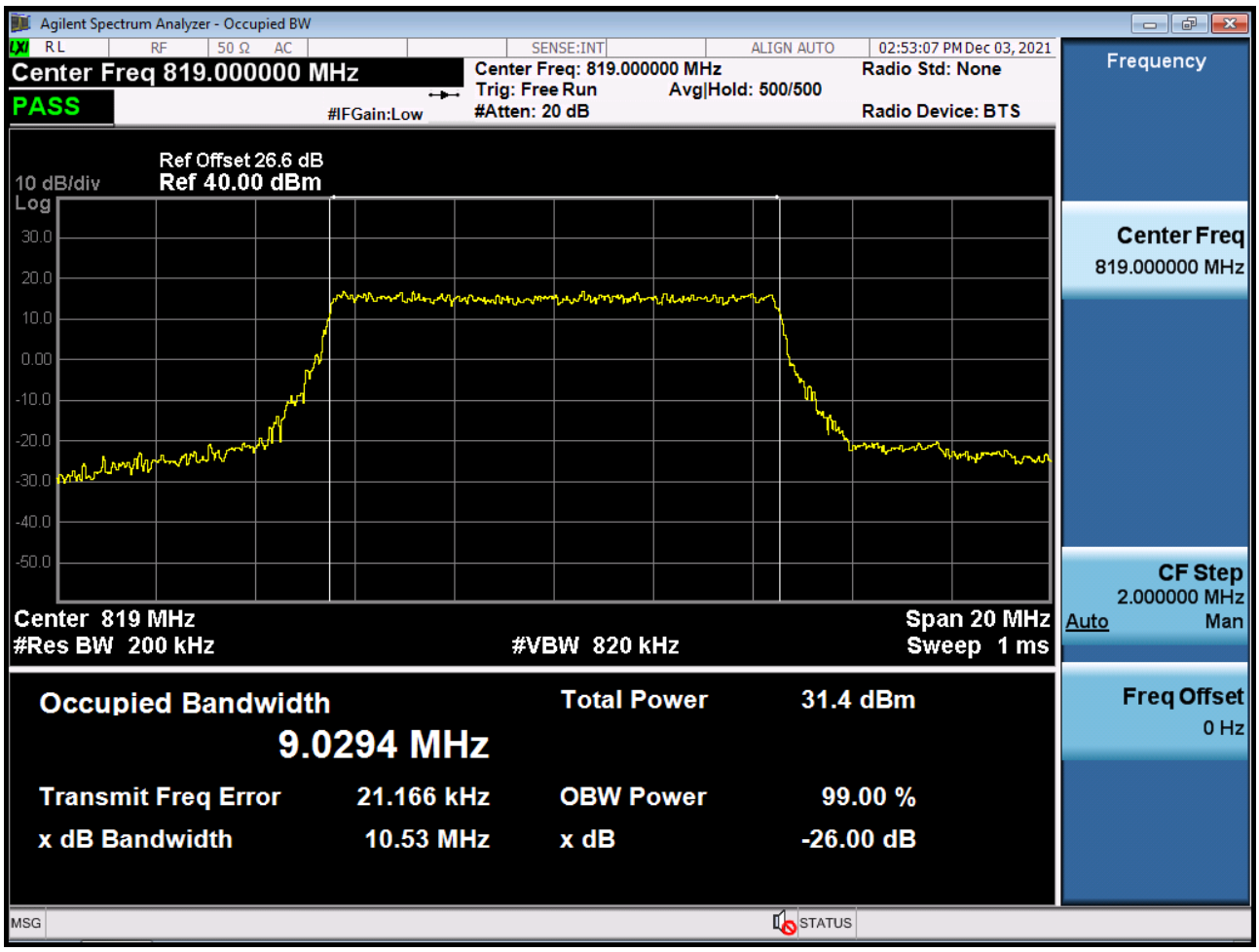
BAND 26. Occupied Bandwidth Plot (5 M BW Ch.26765 64QAM RB 25_0)



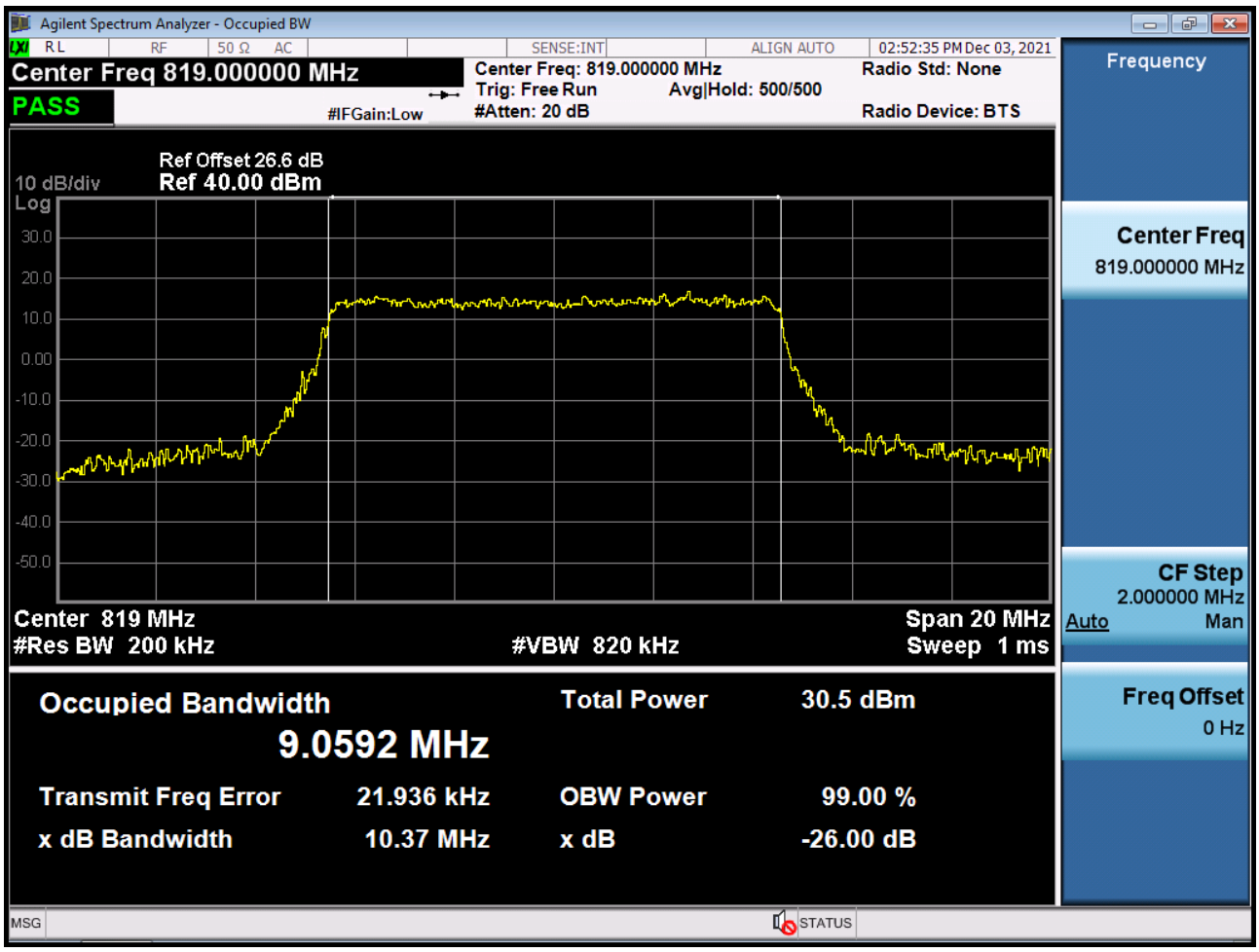
BAND 26. Occupied Bandwidth Plot (5 M BW Ch.26765 256QAM RB 25_0)



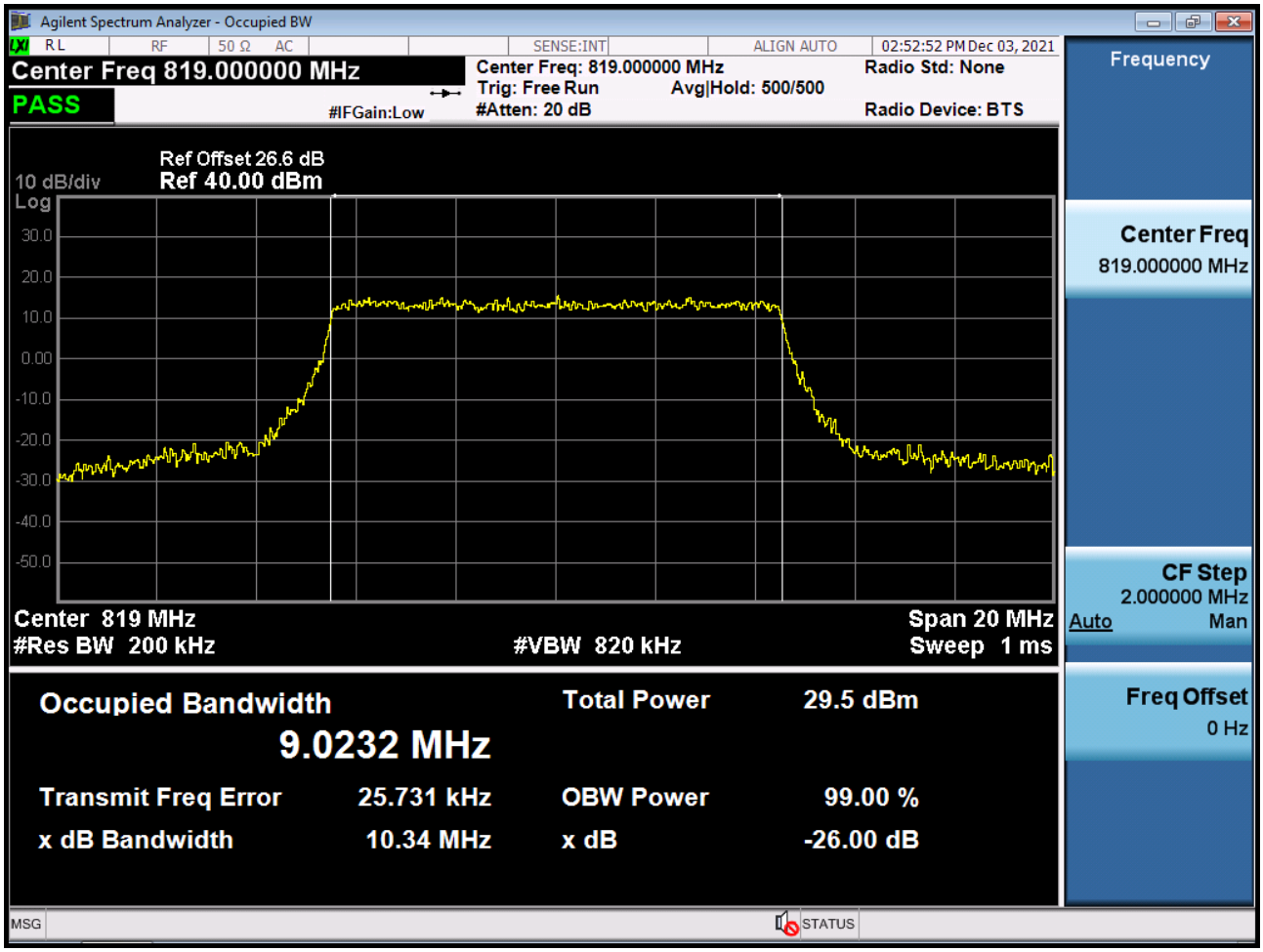
BAND 26. Occupied Bandwidth Plot (10 M BW Ch.26740 QPSK RB 50_0)



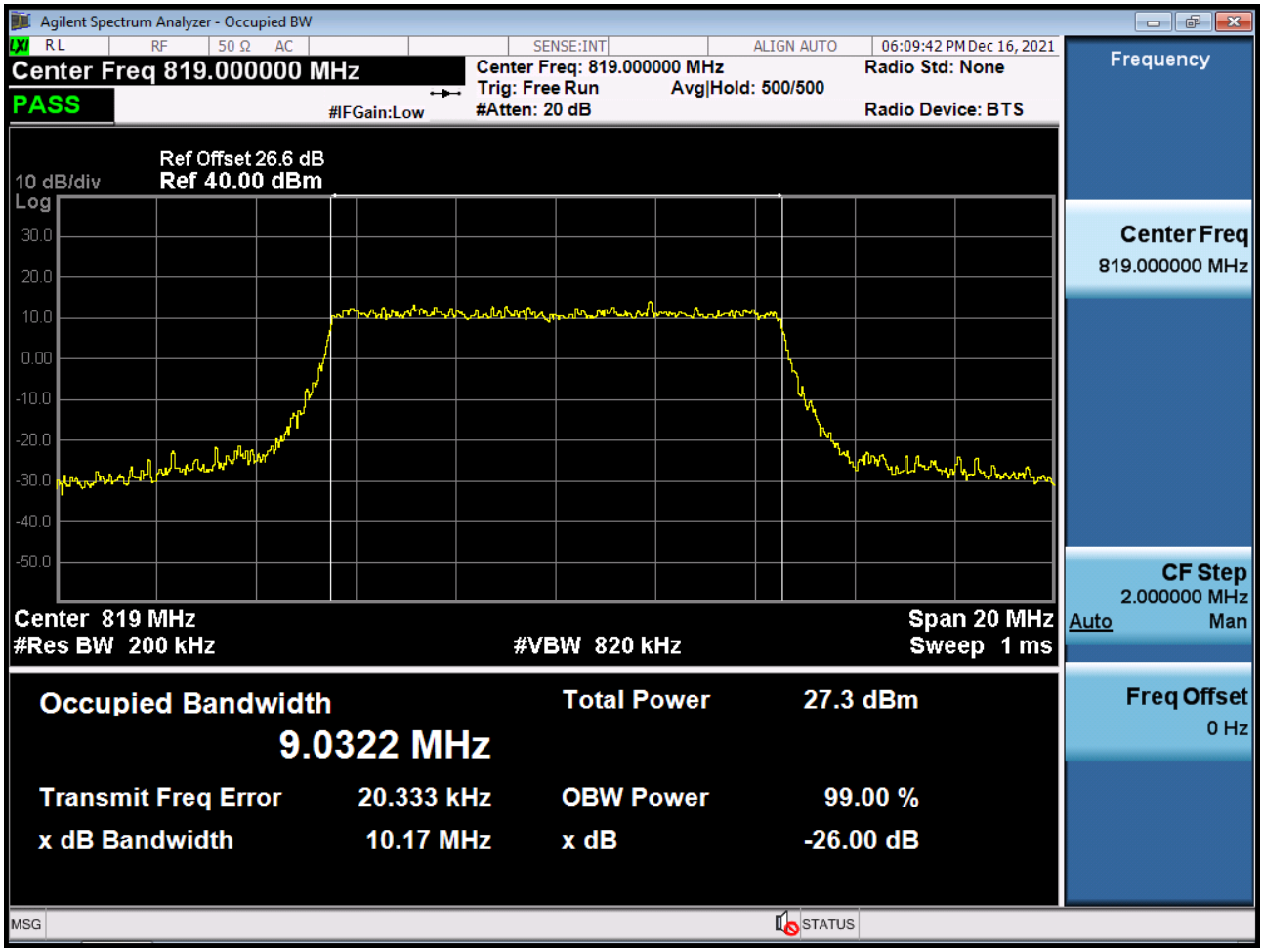
BAND 26. Occupied Bandwidth Plot (10 M BW Ch.26740 16QAM RB 50_0)



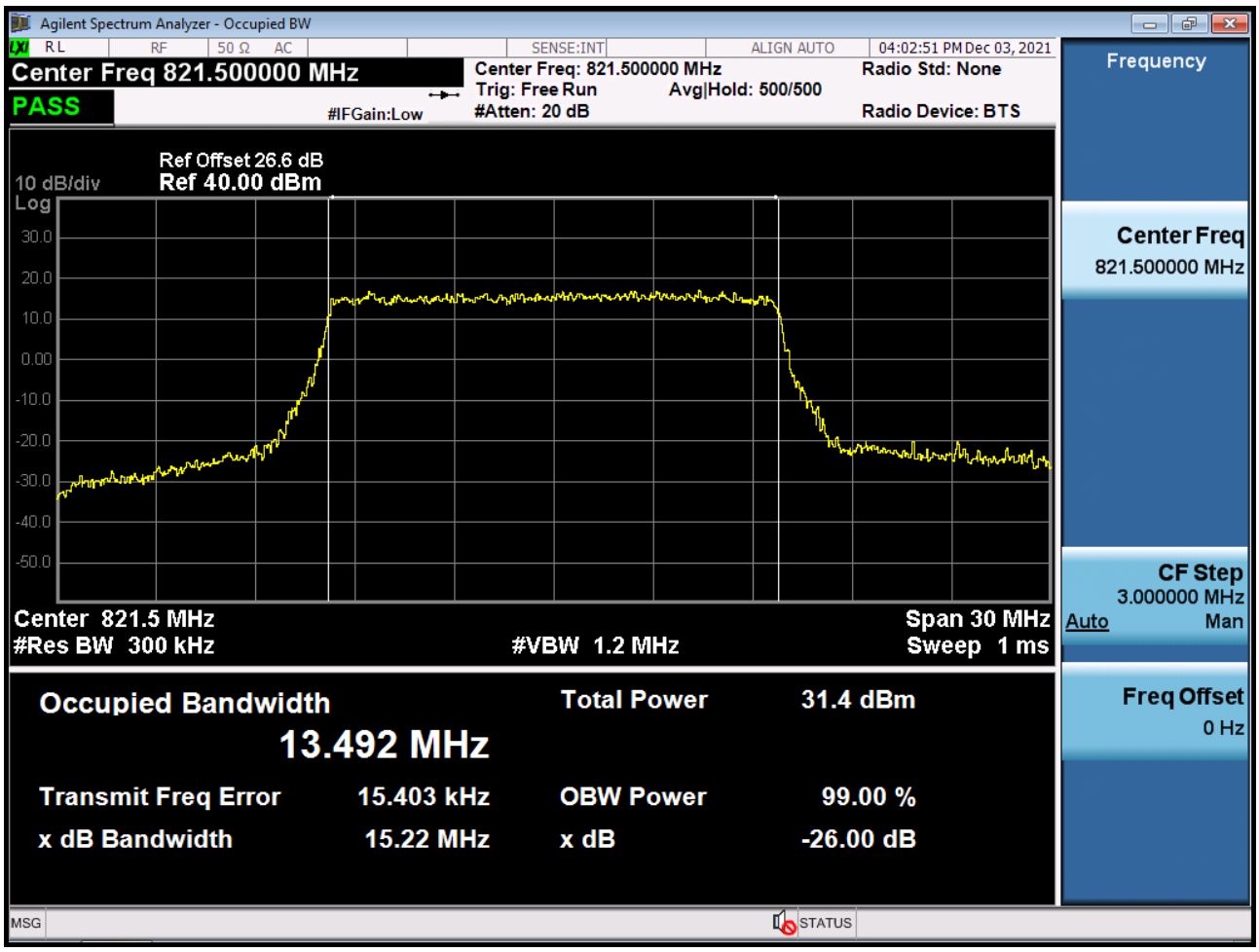
BAND 26. Occupied Bandwidth Plot (10 M BW Ch.26740 64QAM RB 50_0)



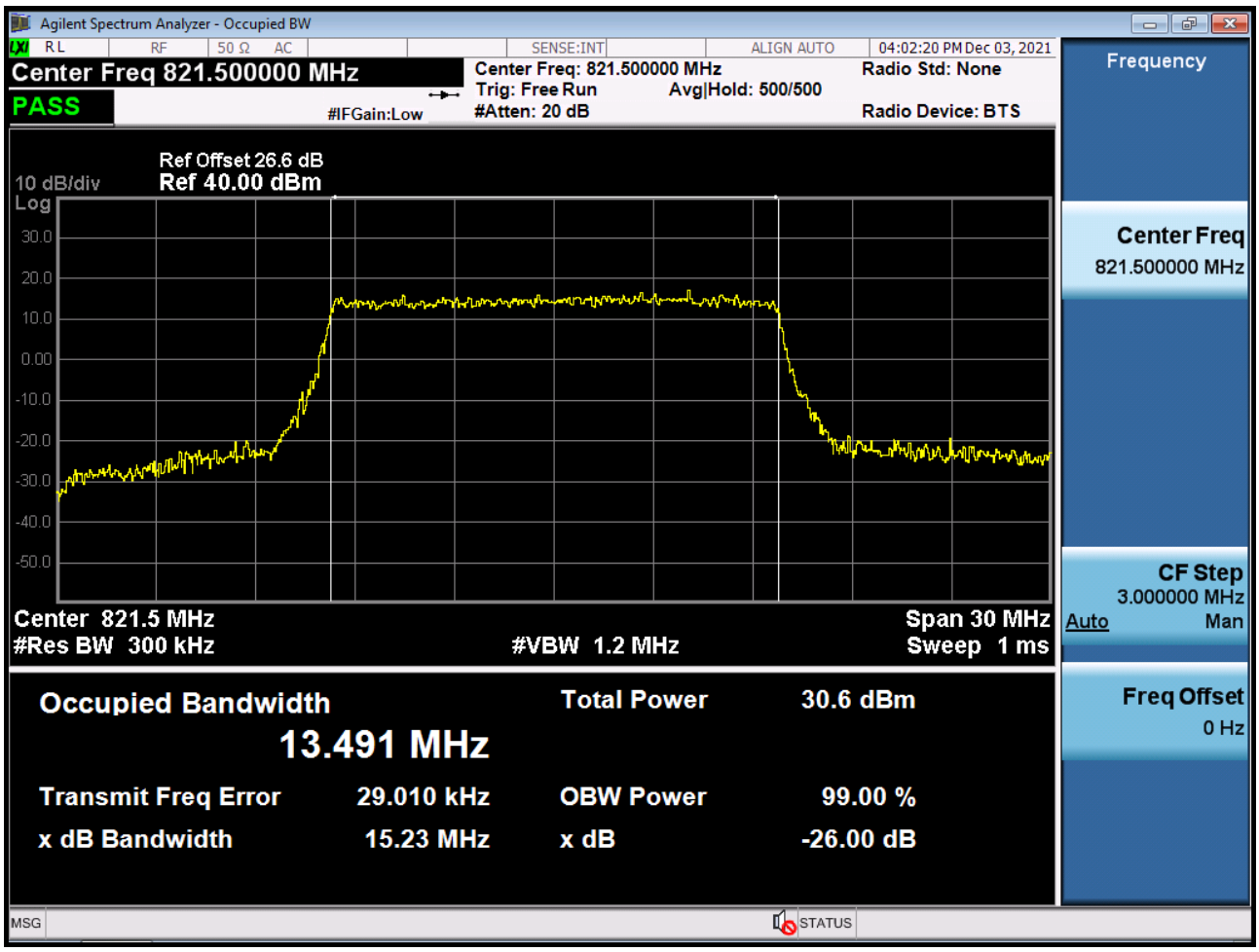
BAND 26. Occupied Bandwidth Plot (10 M BW Ch.26740 256QAM RB 50_0)



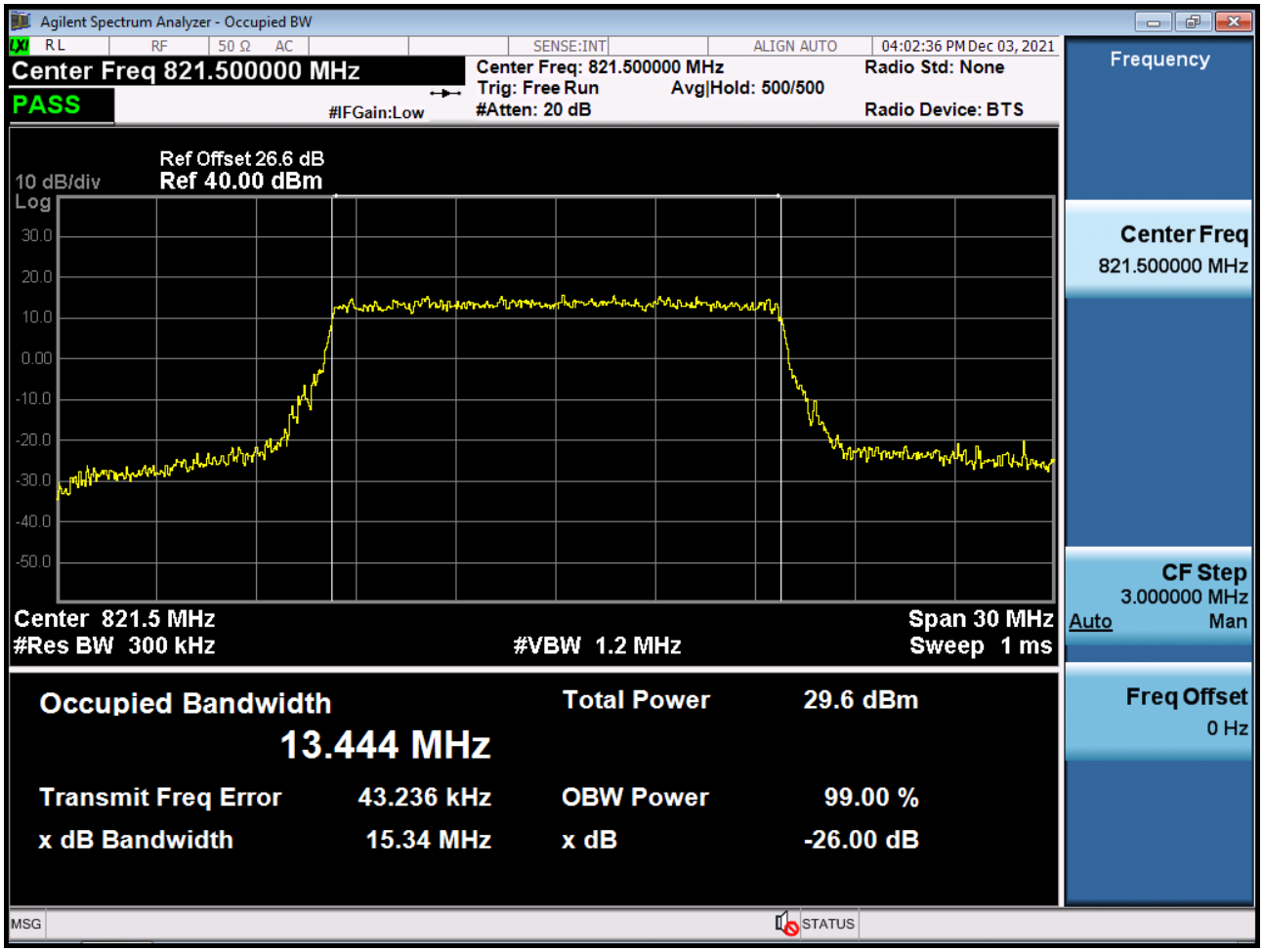
BAND 26. Occupied Bandwidth Plot (15 M BW Ch.26765 QPSK RB 75_0)



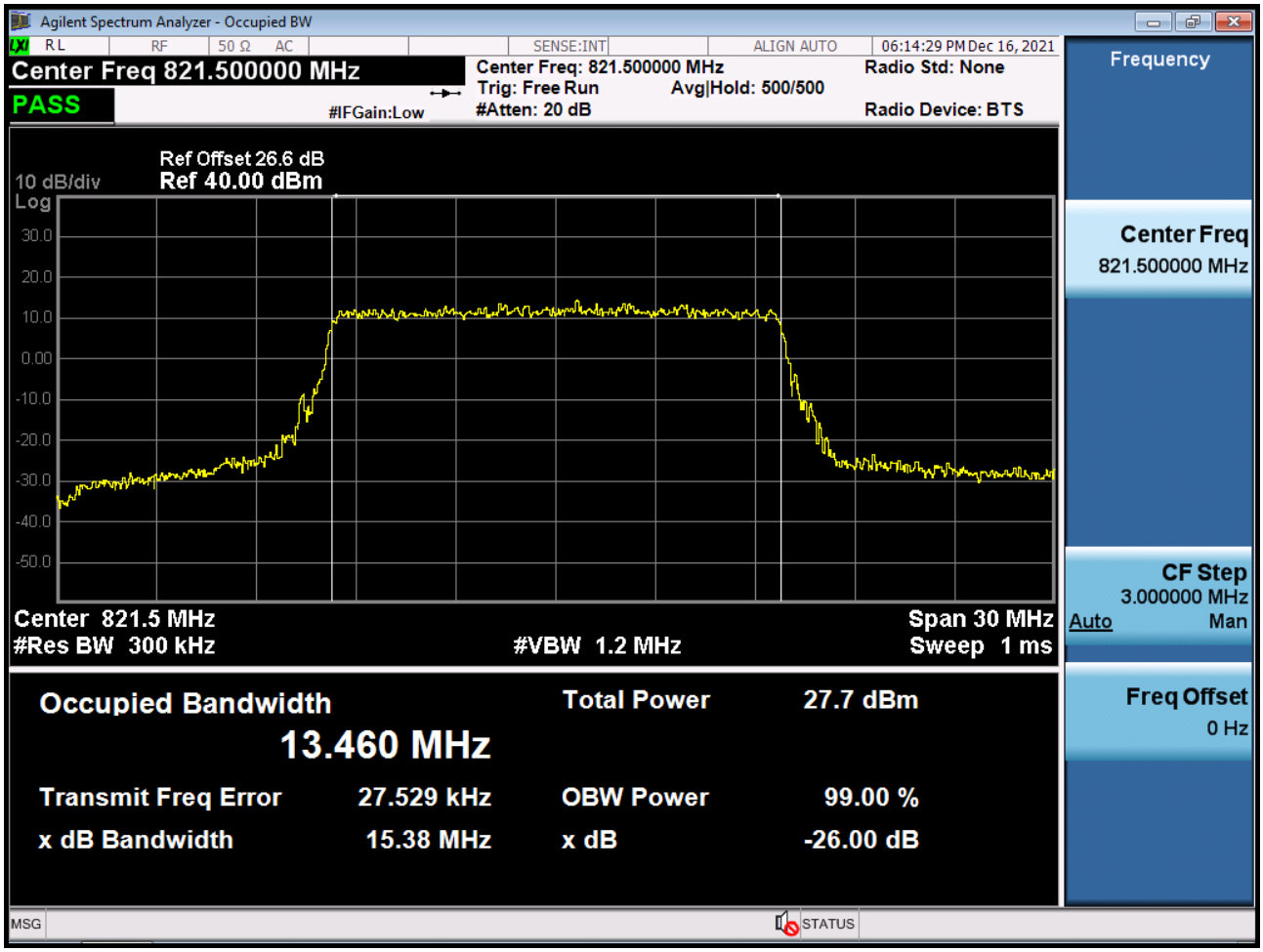
BAND 26. Occupied Bandwidth Plot (15 M BW Ch.26765 16QAM RB 75_0)



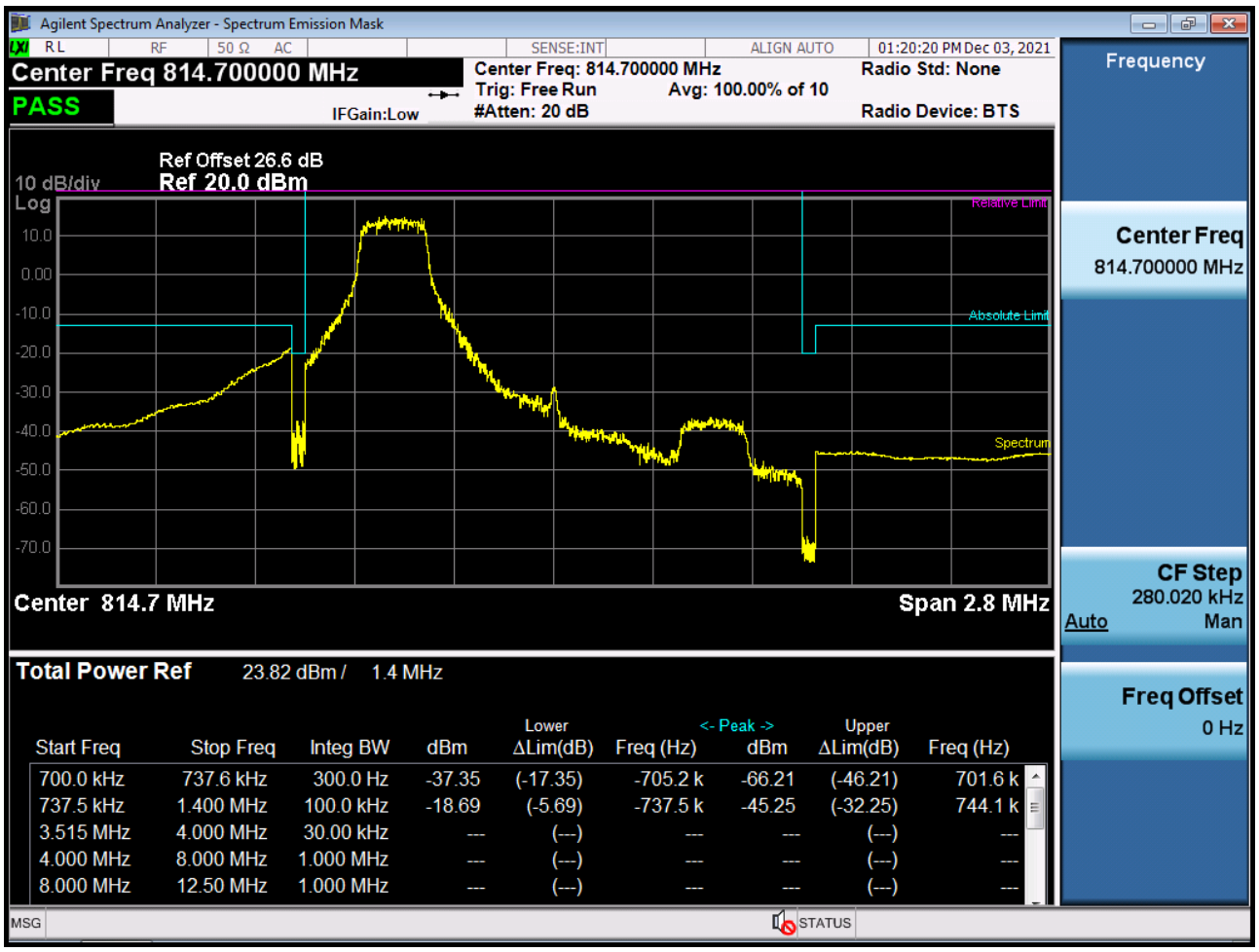
BAND 26. Occupied Bandwidth Plot (15 M BW Ch.26765 64QAM RB 75_0)



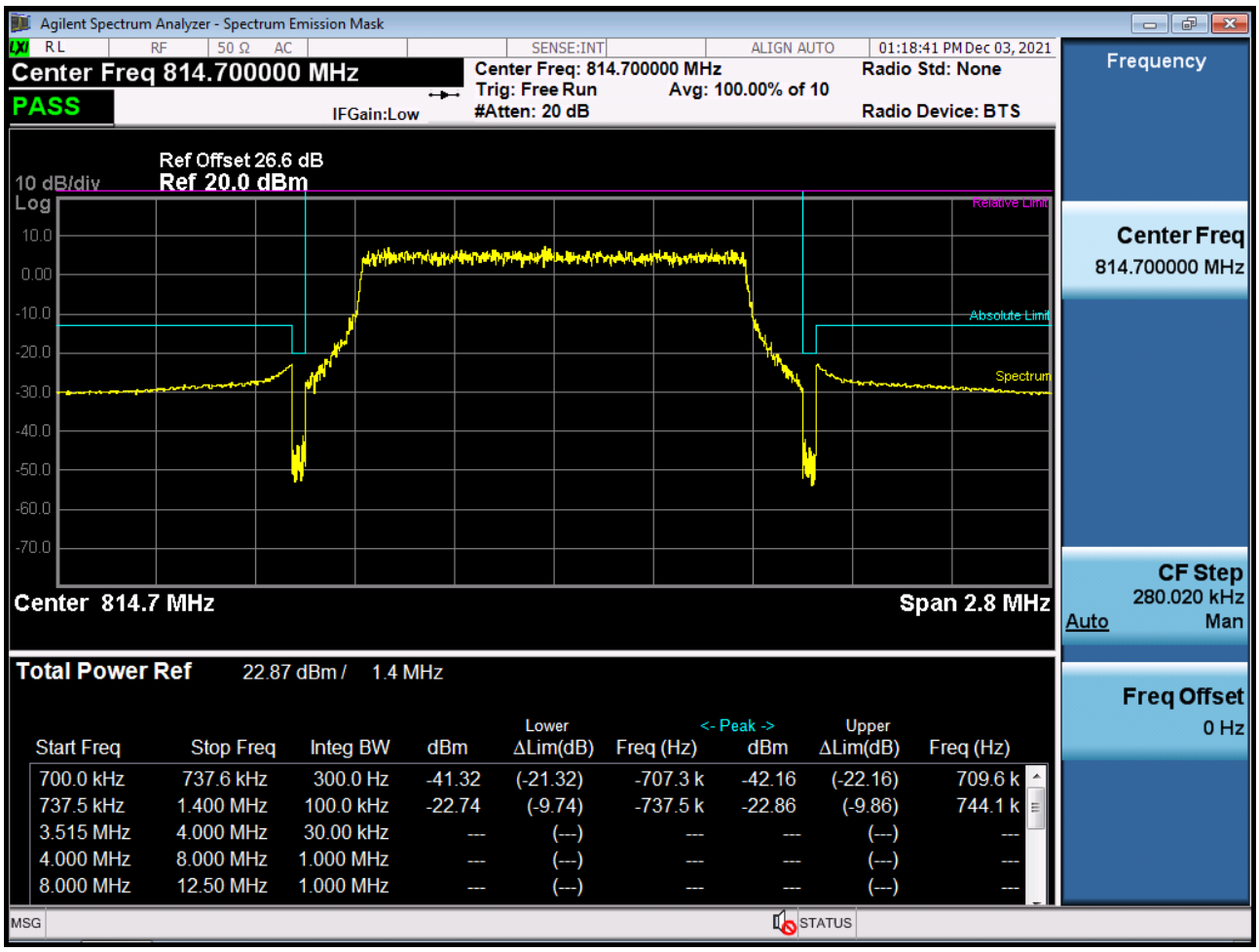
BAND 26. Occupied Bandwidth Plot (15 M BW Ch.26765 256QAM RB 75_0)



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

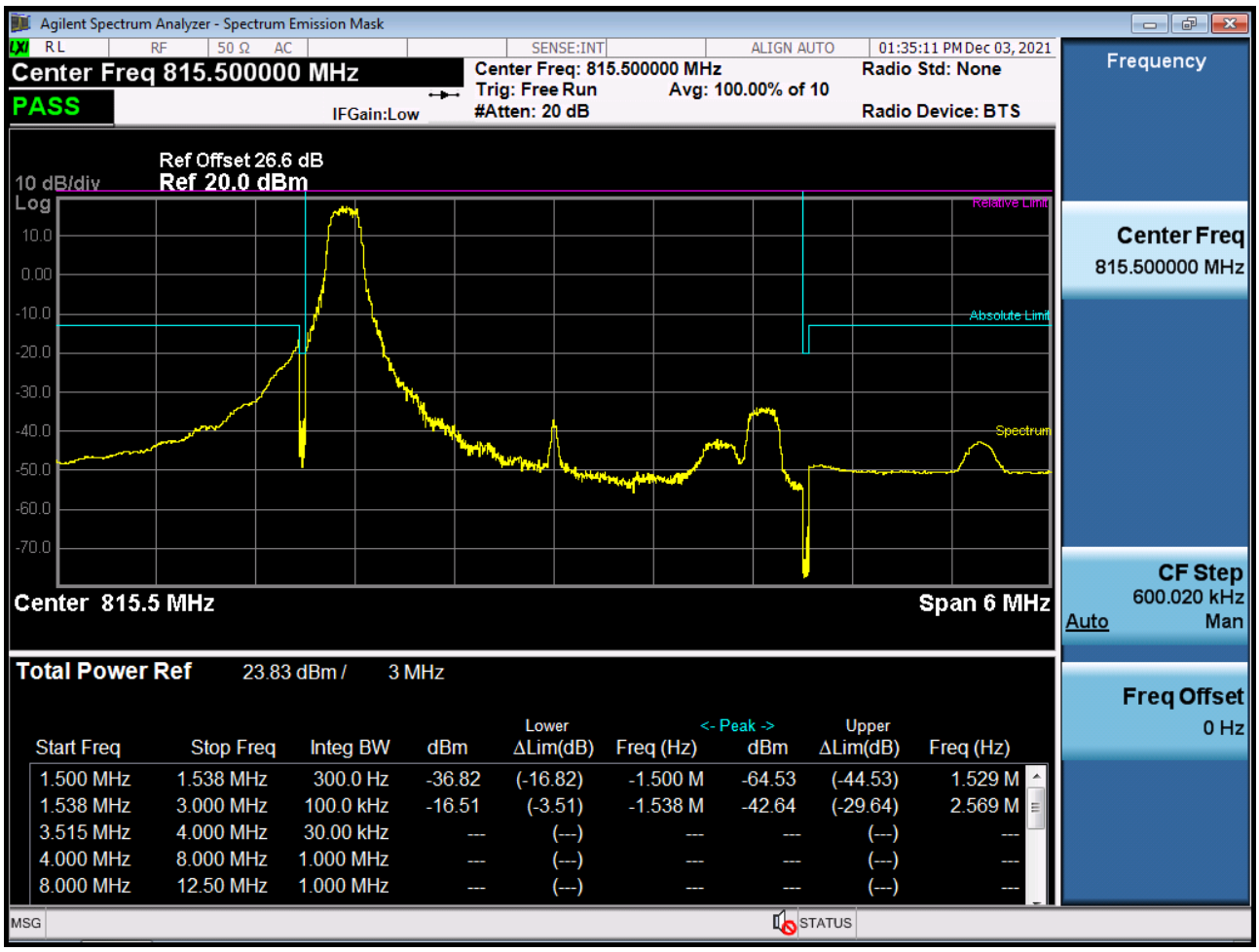


BAND 26. Lower Channel Edge Plot (1.4 M BW Ch.26697 QPSK_RB6_Offset 0)



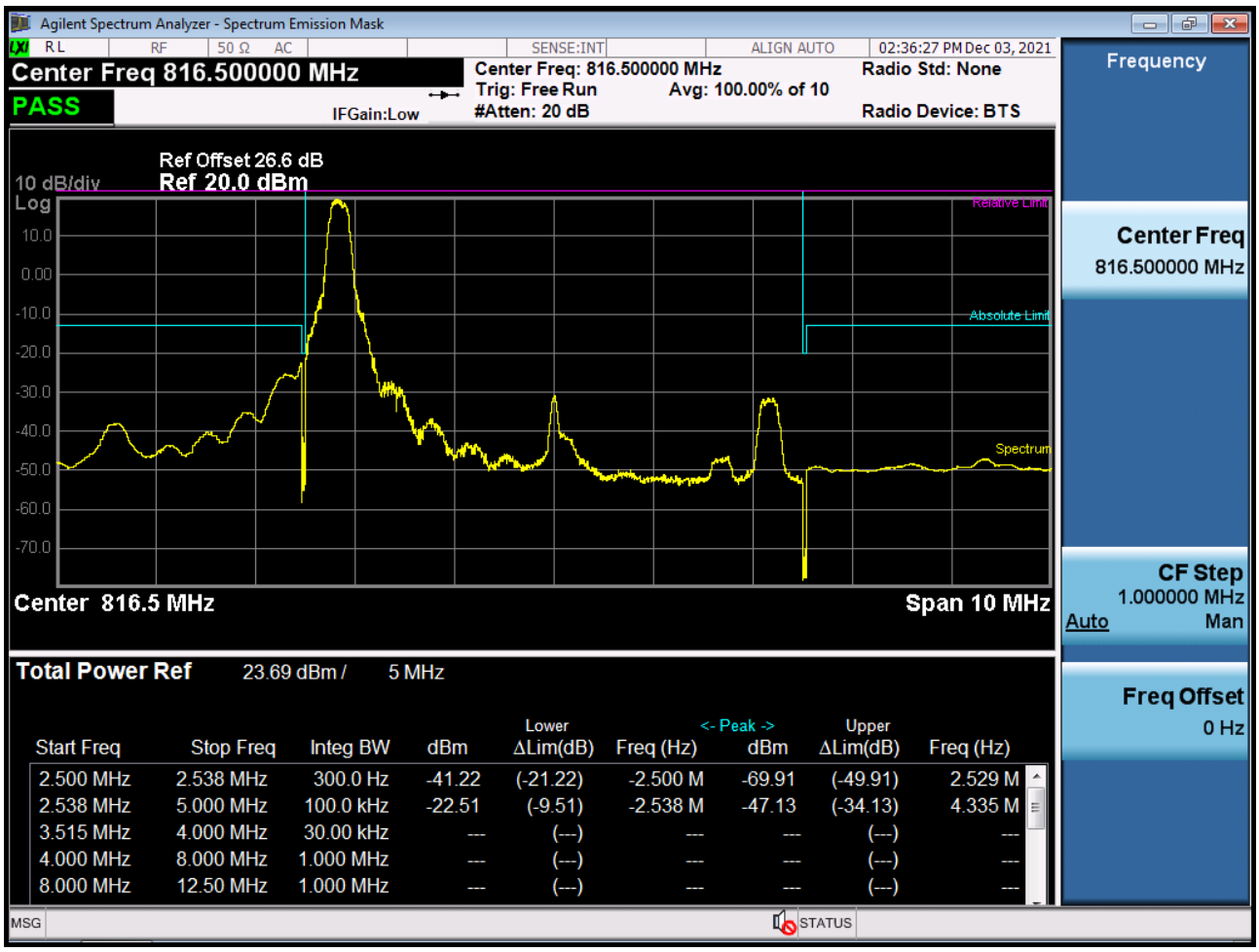
Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	<- Peak -> dBm	Upper ΔLim(dB)	Freq (Hz)
700.0 kHz	737.6 kHz	300.0 Hz	-41.32	(-21.32)	-707.3 k	-42.16	(-22.16)	709.6 k
737.5 kHz	1.400 MHz	100.0 kHz	-22.74	(-9.74)	-737.5 k	-22.86	(-9.86)	744.1 k
3.515 MHz	4.000 MHz	30.00 kHz	---	(---)	---	---	(---)	---
4.000 MHz	8.000 MHz	1.000 MHz	---	(---)	---	---	(---)	---
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---

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

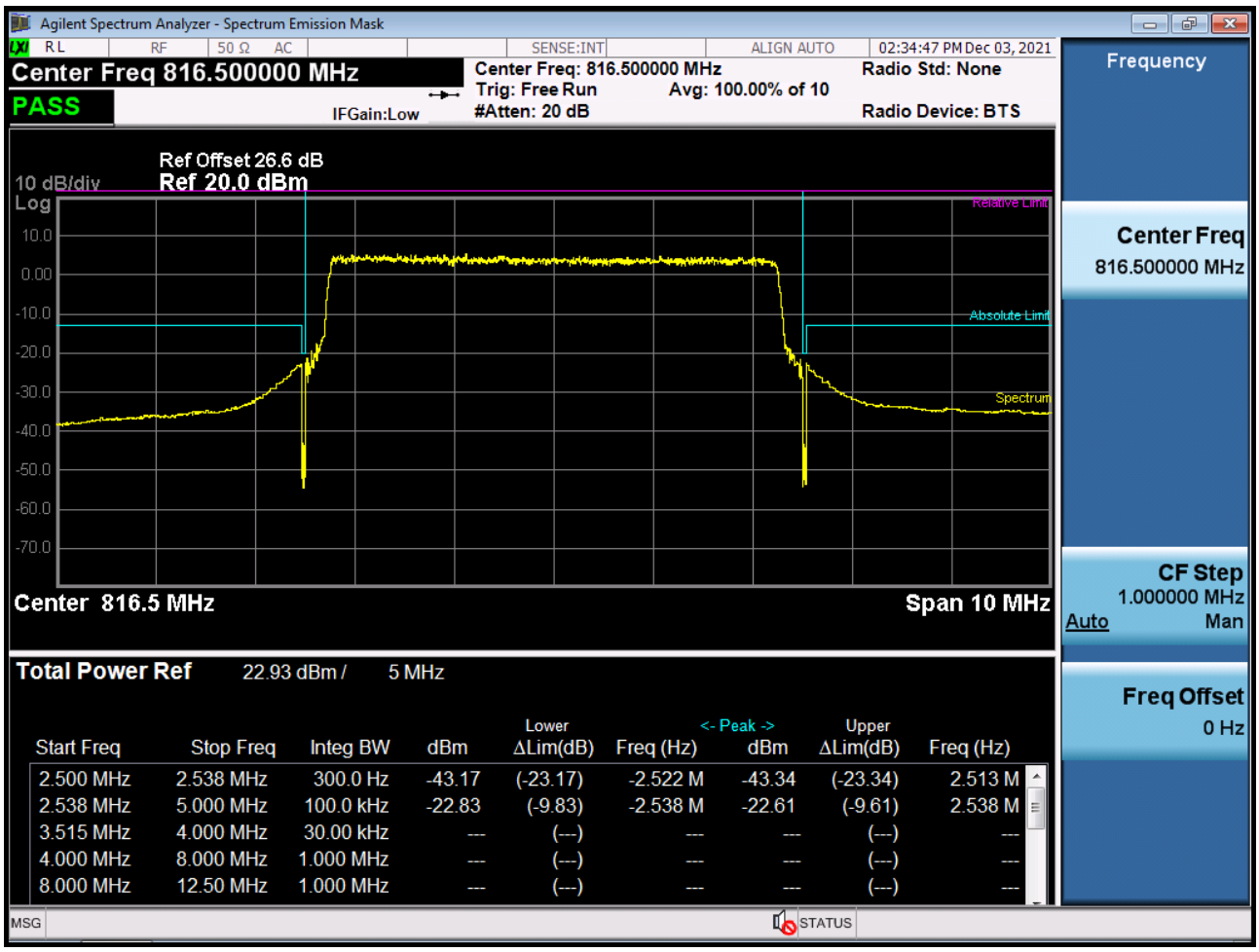


BAND 26. Lower Channel Edge Plot (3 M BW Ch.26705 QPSK_RB15_Offset 0)

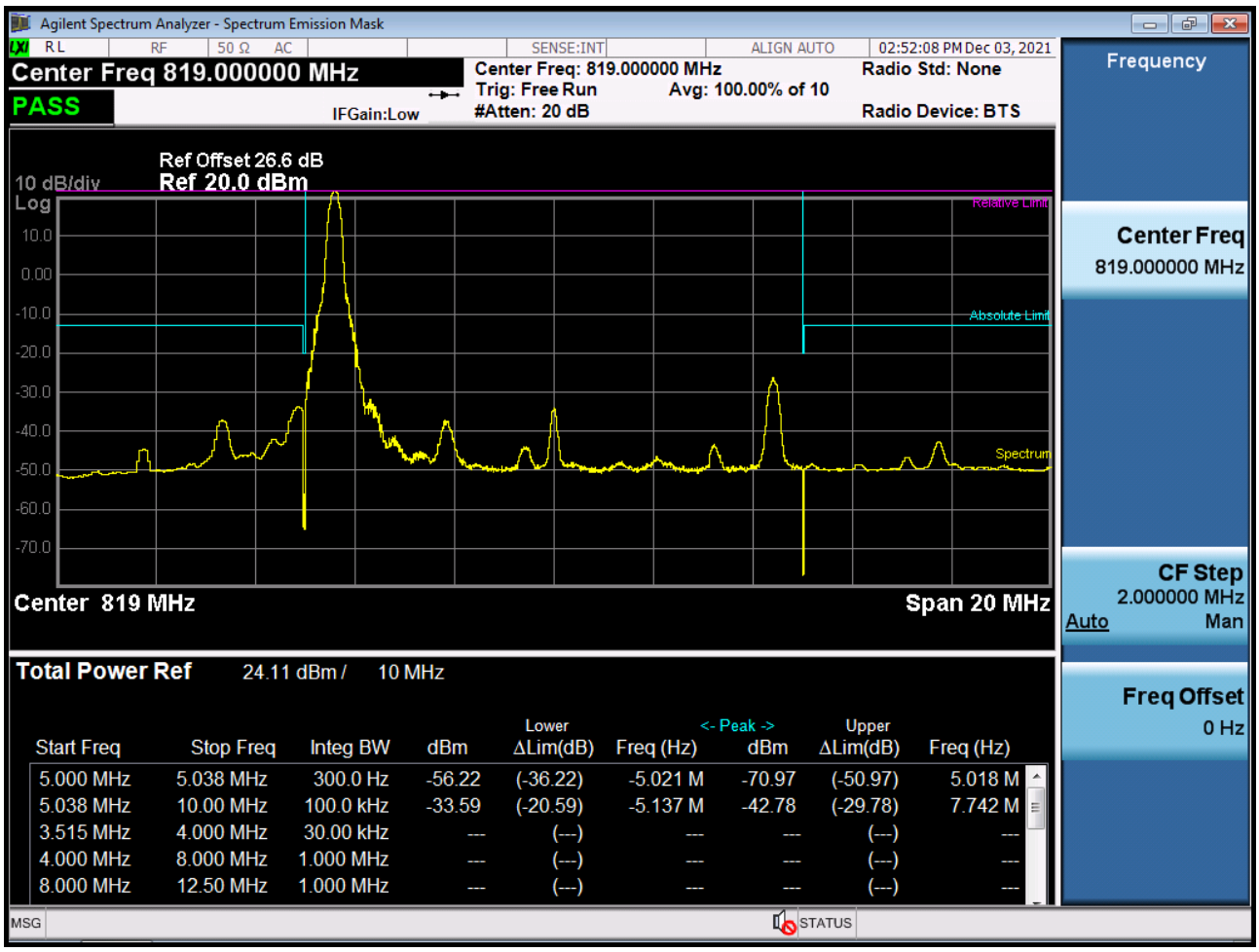
BAND 26. Lower Channel Edge Plot (5 M BW Ch.26715 QPSK RB 1, Offset 0)



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

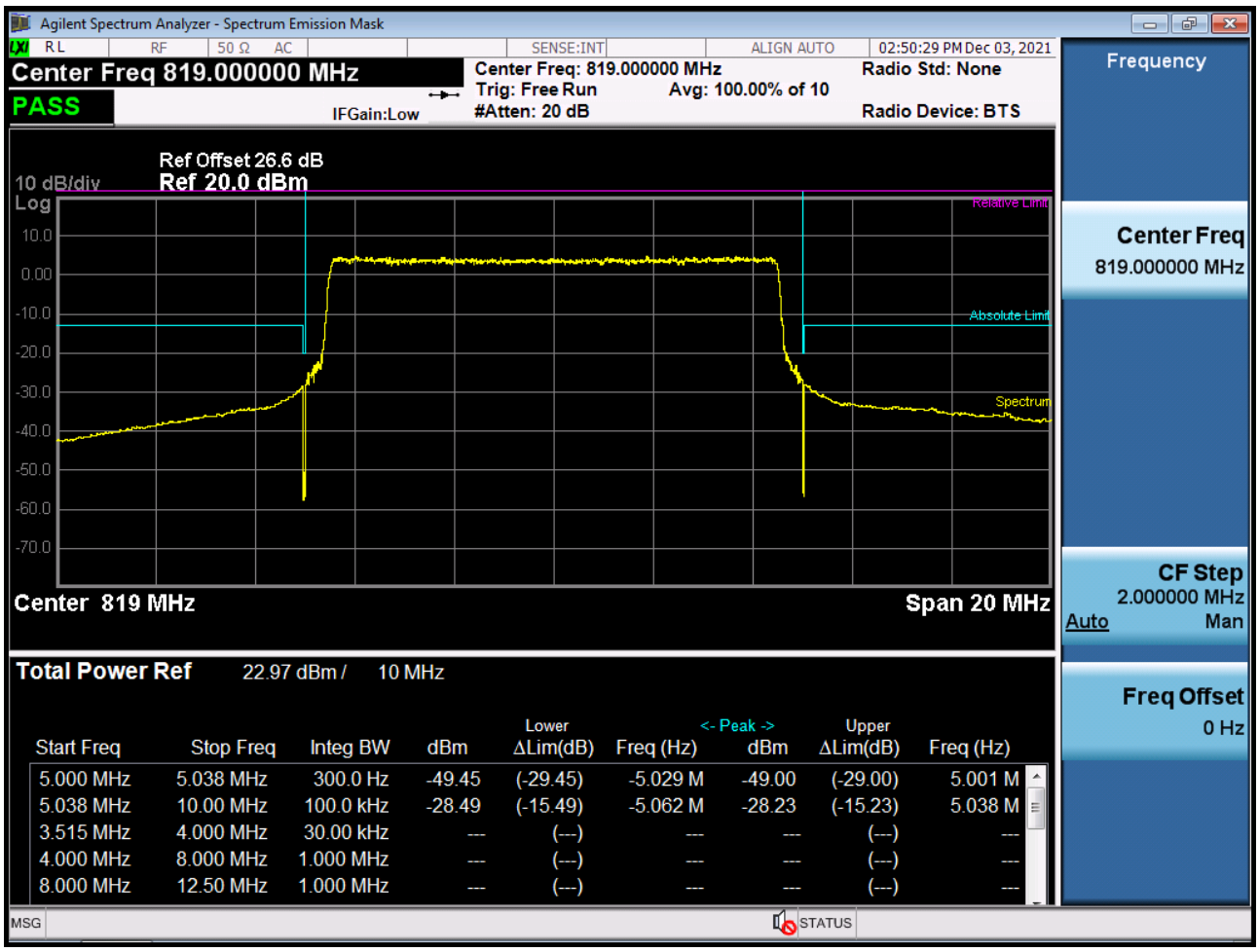


BAND 26. Low Channel Edge Plot (10 M BW Ch.26740 QPSK RB 1, Offset 0)

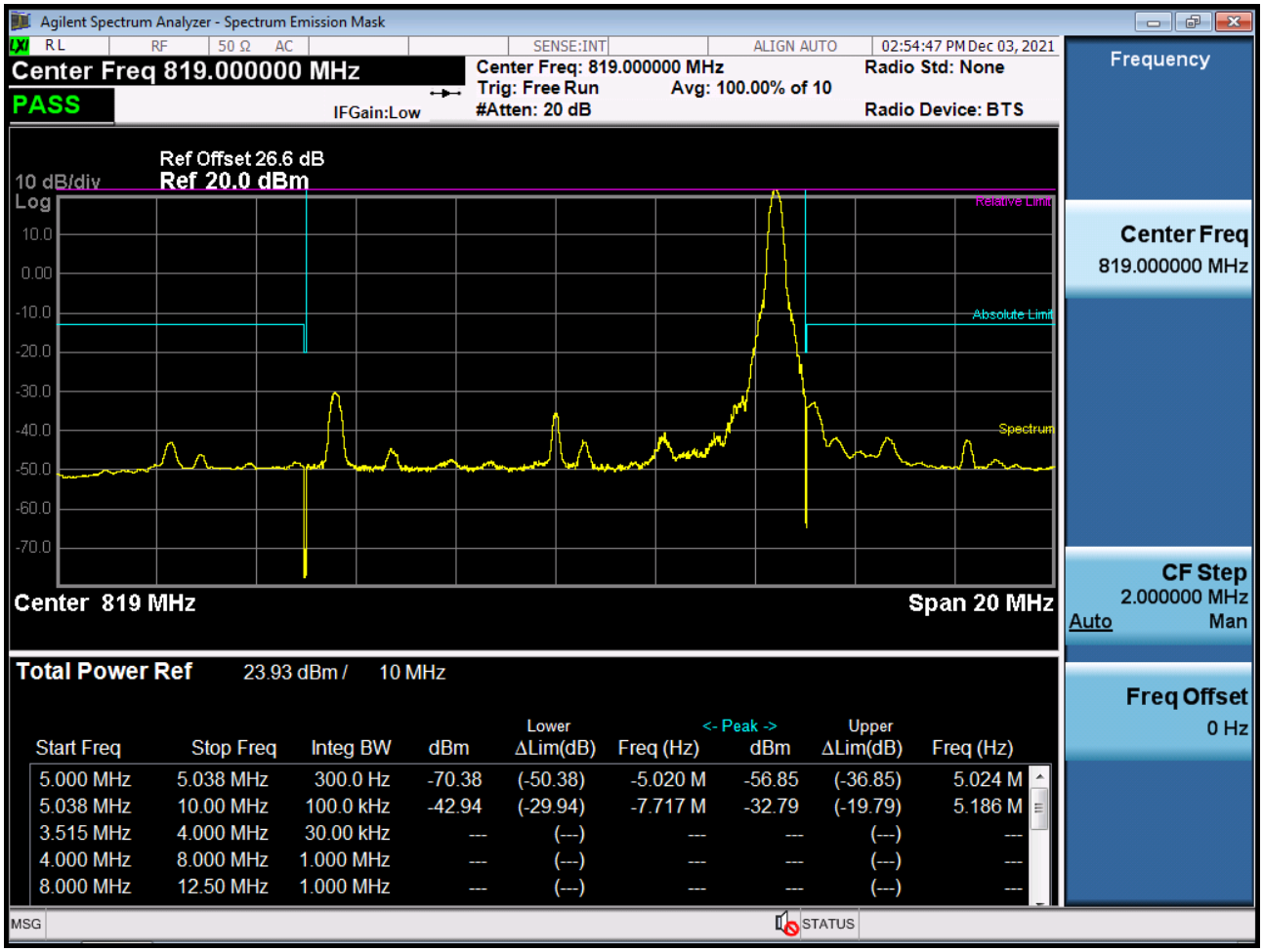


Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	<- Peak -> dBm	Upper ΔLim(dB)	Freq (Hz)
5.000 MHz	5.038 MHz	300.0 Hz	-56.22	(-36.22)	-5.021 M	-70.97	(-50.97)	5.018 M
5.038 MHz	10.00 MHz	100.0 kHz	-33.59	(-20.59)	-5.137 M	-42.78	(-29.78)	7.742 M
3.515 MHz	4.000 MHz	30.00 kHz	---	(---)	---	---	(---)	---
4.000 MHz	8.000 MHz	1.000 MHz	---	(---)	---	---	(---)	---
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---

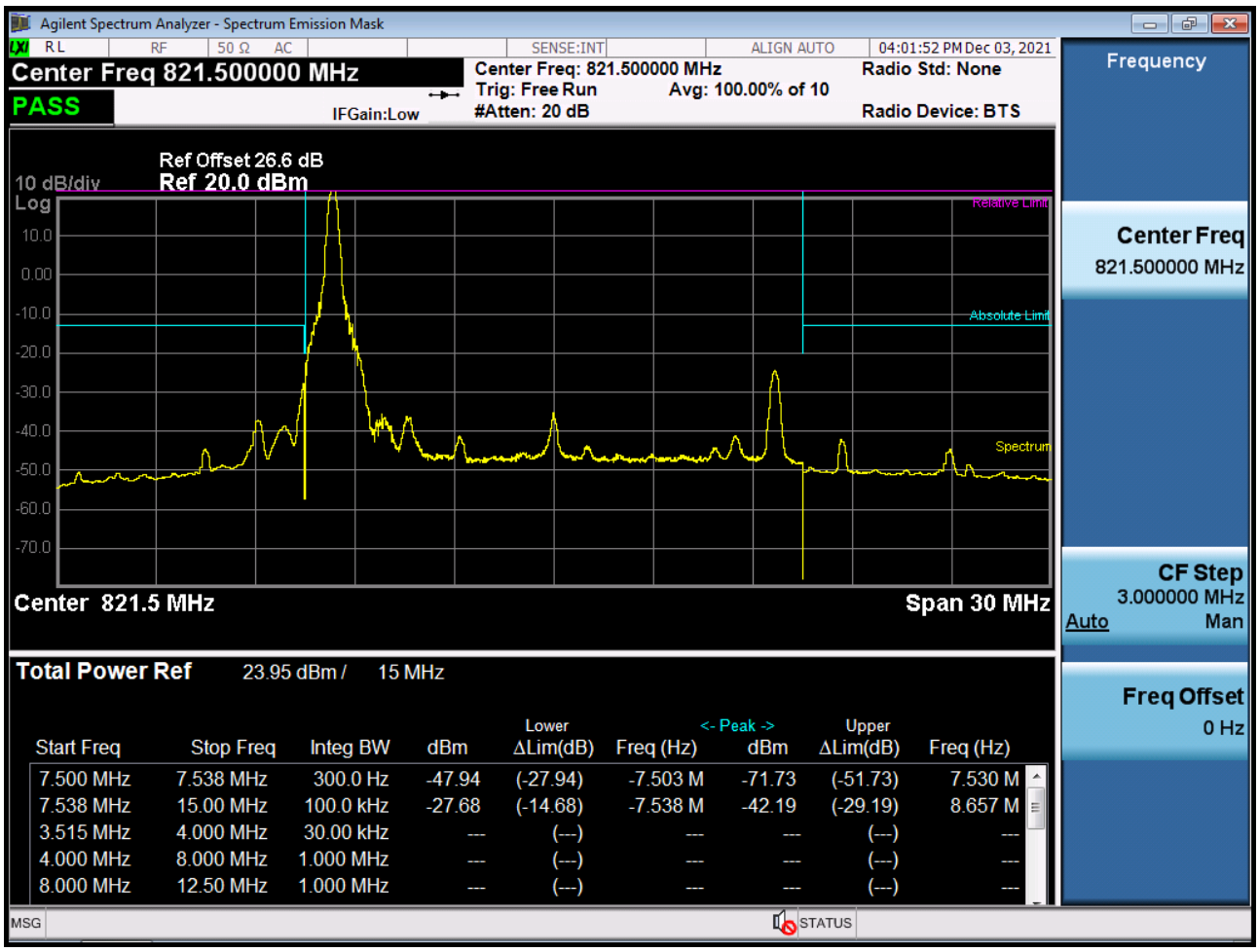
BAND 26. Low Channel Edge Plot (10 M BW Ch.26740 QPSK_RB50_Offset 0)



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

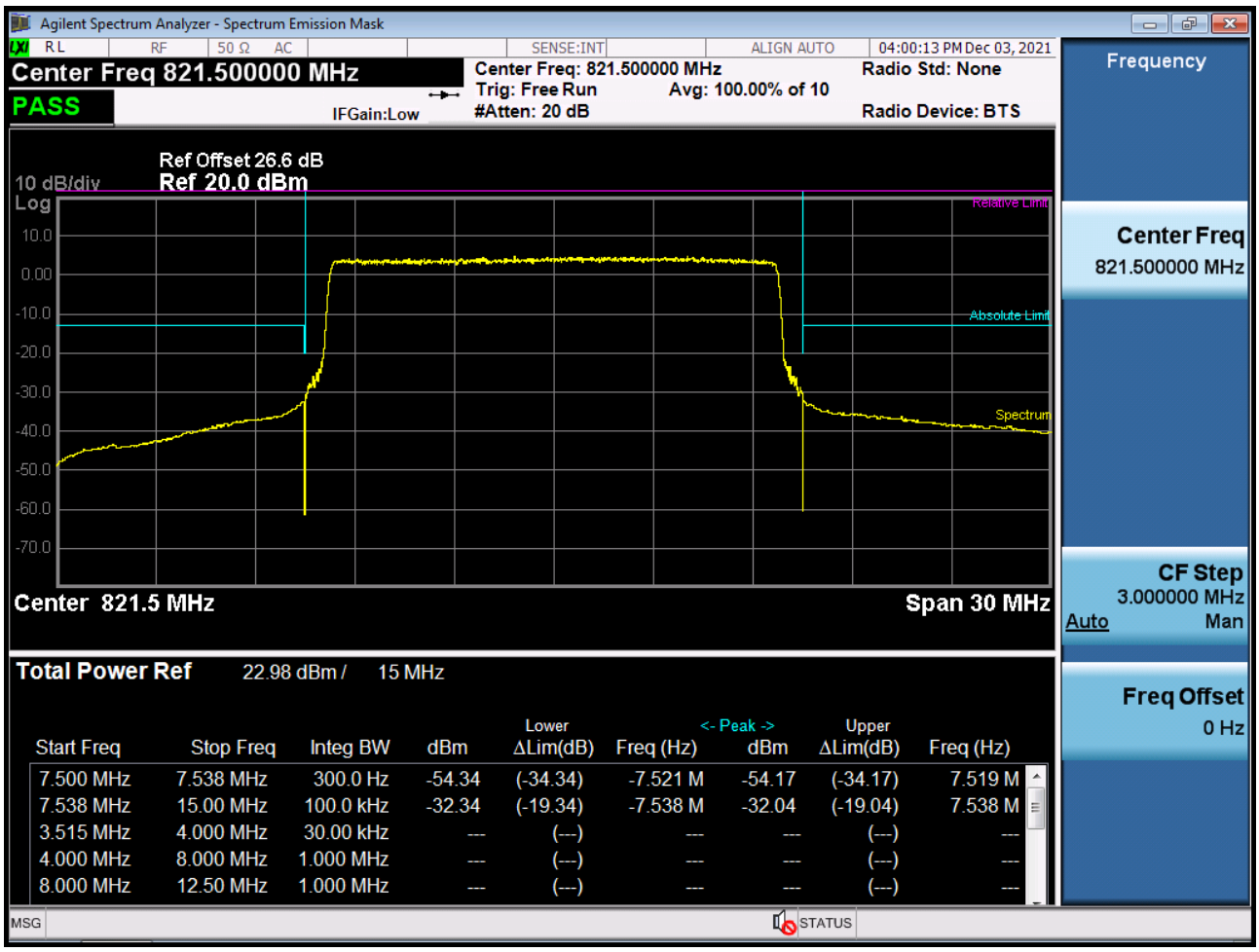


BAND 26. Low Channel Edge Plot (15 M BW Ch.26765 QPSK RB 1, Offset 0)

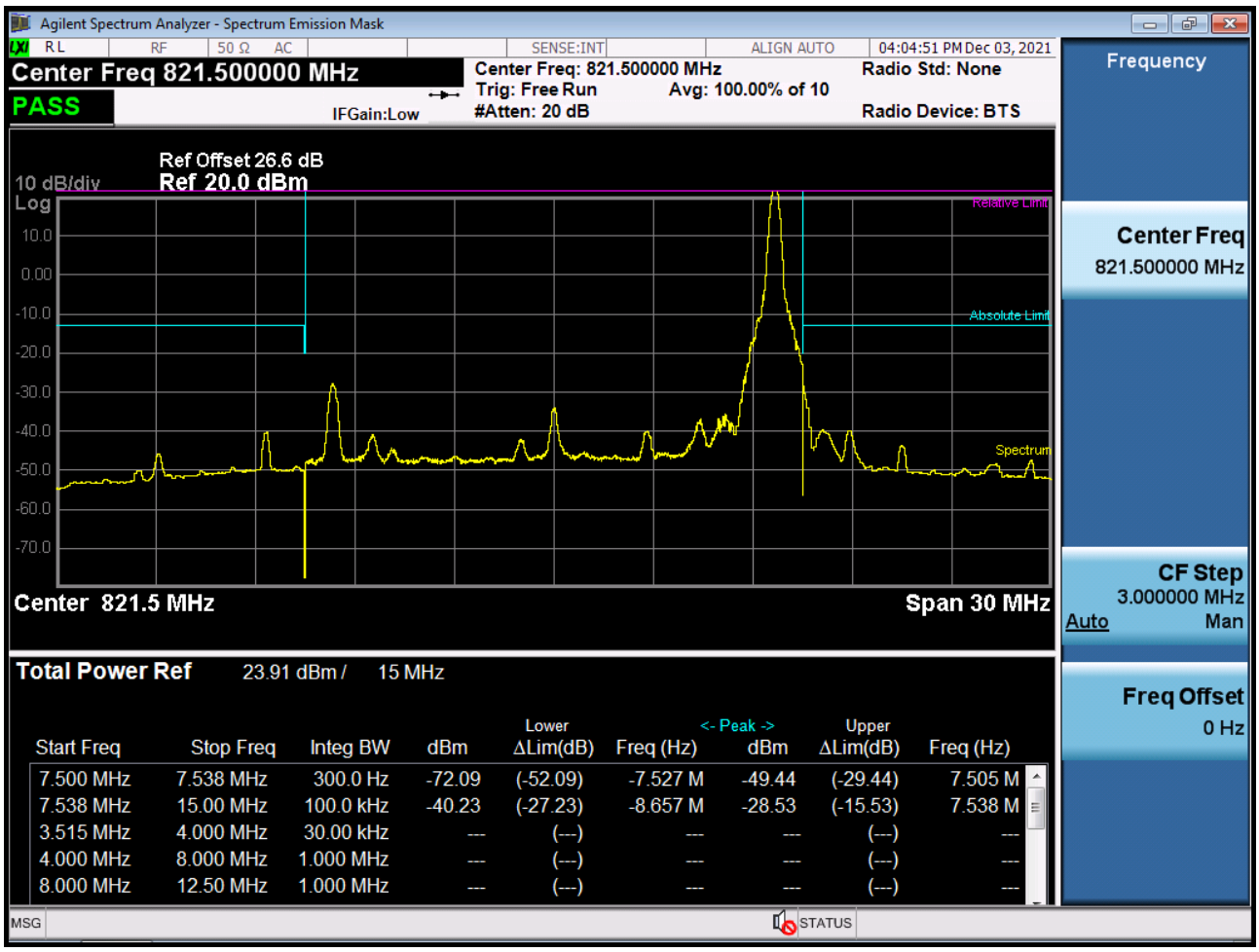


Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	<- Peak -> dBm	Upper ΔLim(dB)	Freq (Hz)
7.500 MHz	7.538 MHz	300.0 Hz	-47.94	(-27.94)	-7.503 M	-71.73	(-51.73)	7.530 M
7.538 MHz	15.00 MHz	100.0 kHz	-27.68	(-14.68)	-7.538 M	-42.19	(-29.19)	8.657 M
3.515 MHz	4.000 MHz	30.00 kHz	---	(---)	---	---	(---)	---
4.000 MHz	8.000 MHz	1.000 MHz	---	(---)	---	---	(---)	---
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---

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



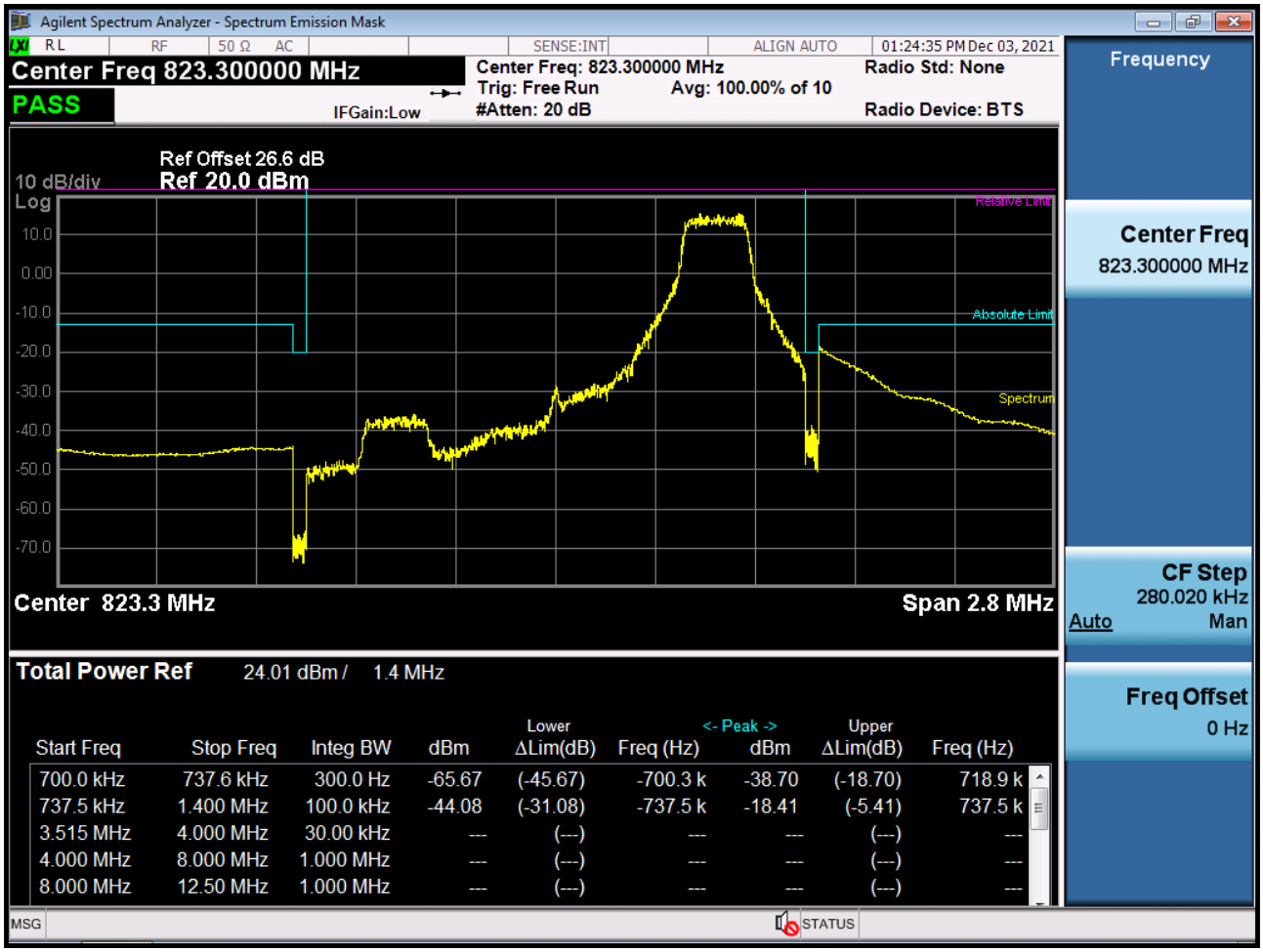
BAND 26. Mid Channel Edge Plot (15 M BW Ch.26765 QPSK_RB1_Offset 74)



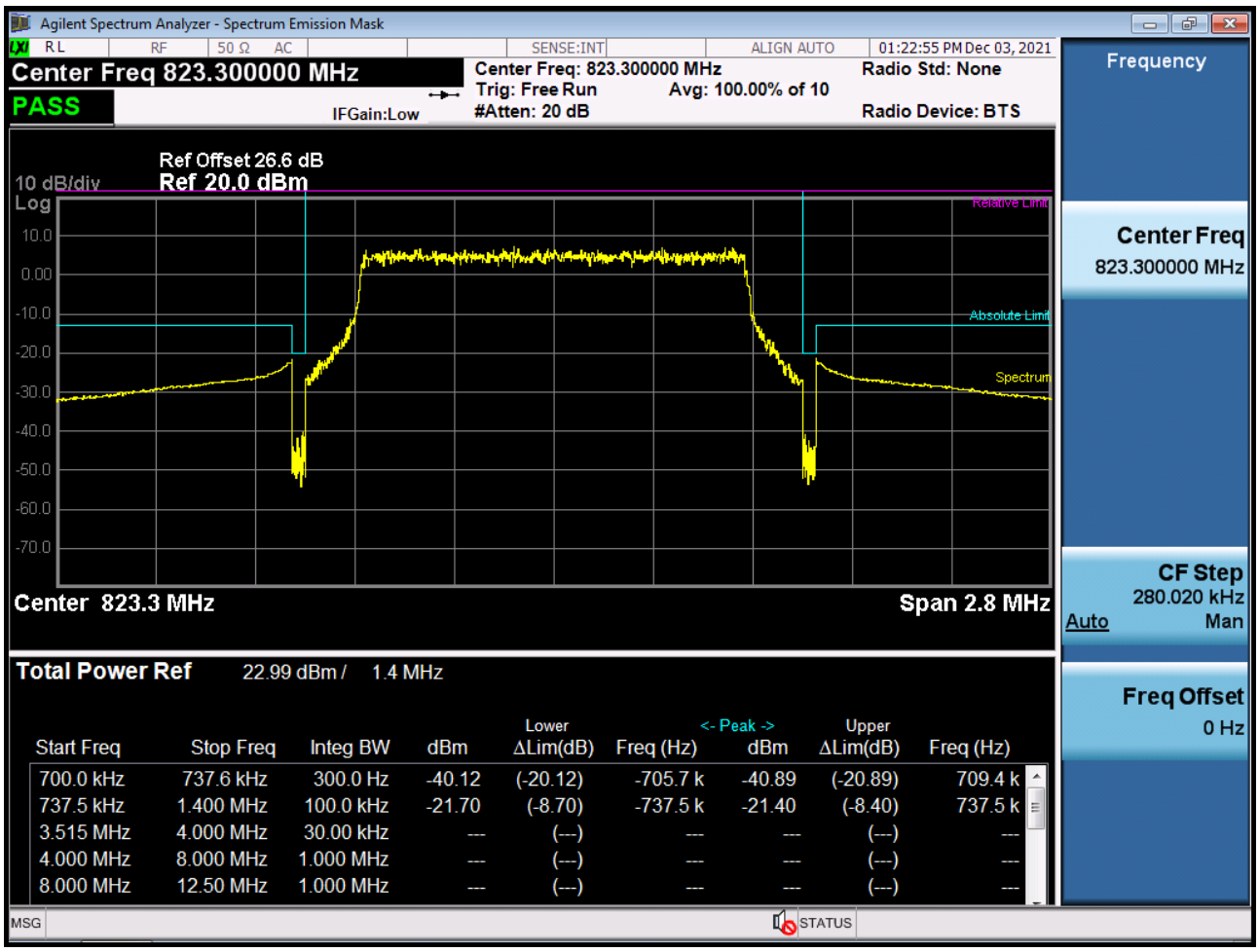
BAND 26. Mid Band Edge Plot (15 M BW Ch.26765 QPSK RB 1, Offset74)

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)

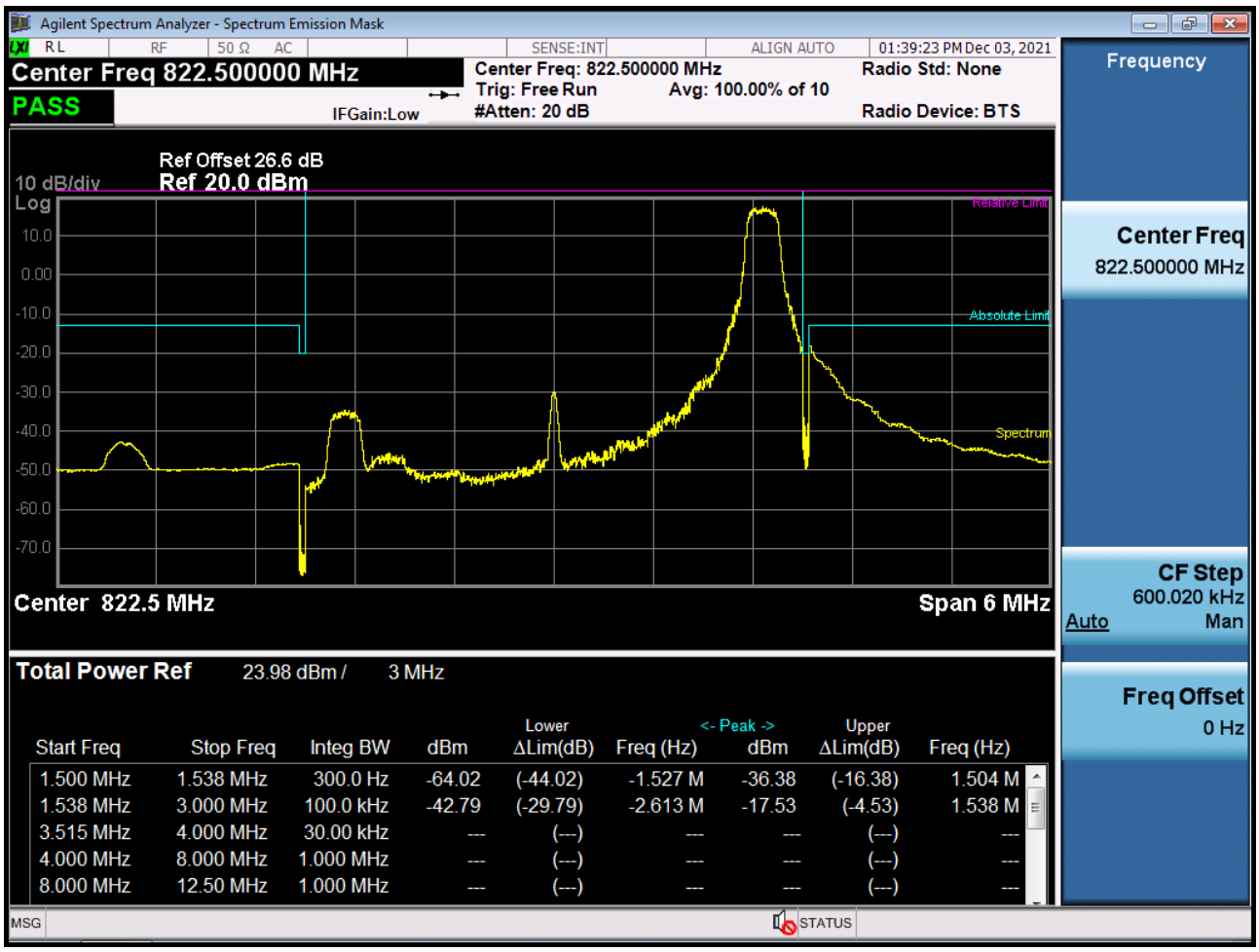


BAND 26. Upper Channel Edge Plot (1.4 M BW Ch.26783 QPSK_RB6_Offset 0)



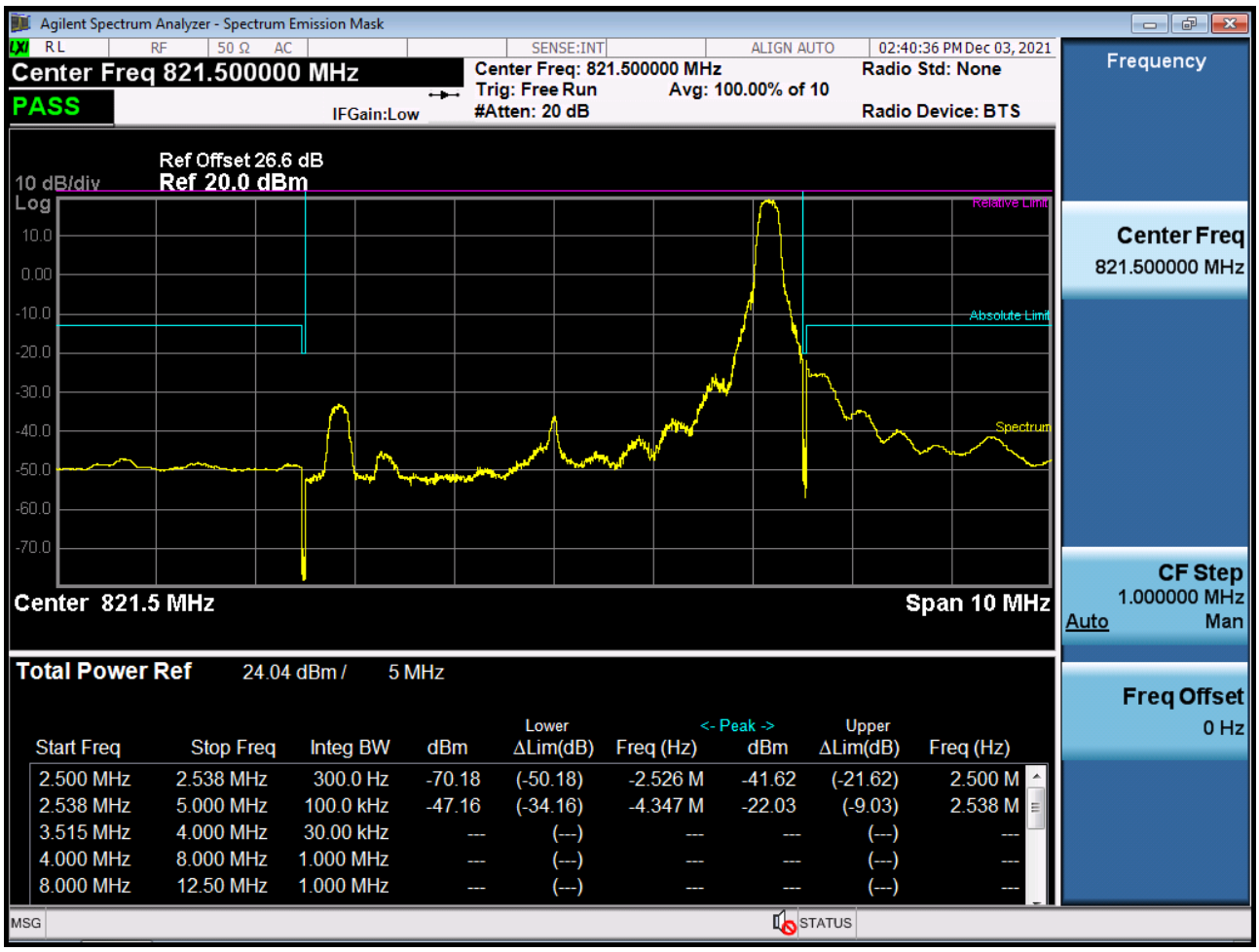
Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	<- Peak -> dBm	Upper ΔLim(dB)	Freq (Hz)
700.0 kHz	737.6 kHz	300.0 Hz	-40.12	(-20.12)	-705.7 k	-40.89	(-20.89)	709.4 k
737.5 kHz	1.400 MHz	100.0 kHz	-21.70	(-8.70)	-737.5 k	-21.40	(-8.40)	737.5 k
3.515 MHz	4.000 MHz	30.00 kHz	---	(---)	---	---	(---)	---
4.000 MHz	8.000 MHz	1.000 MHz	---	(---)	---	---	(---)	---
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---

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



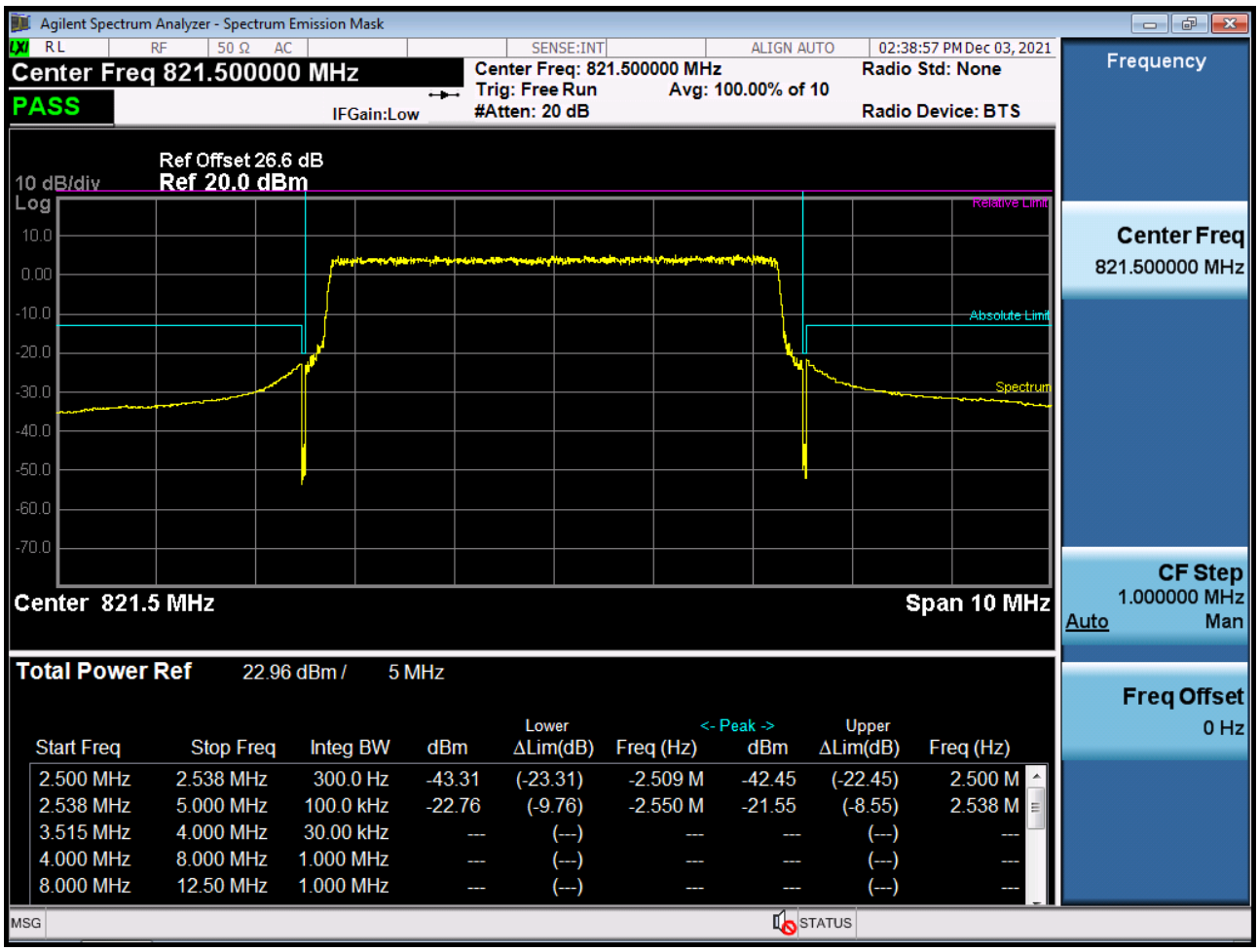
BAND 26. Upper Channel Edge Plot (3 M BW Ch.26775 QPSK_RB15_Offset 0)

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

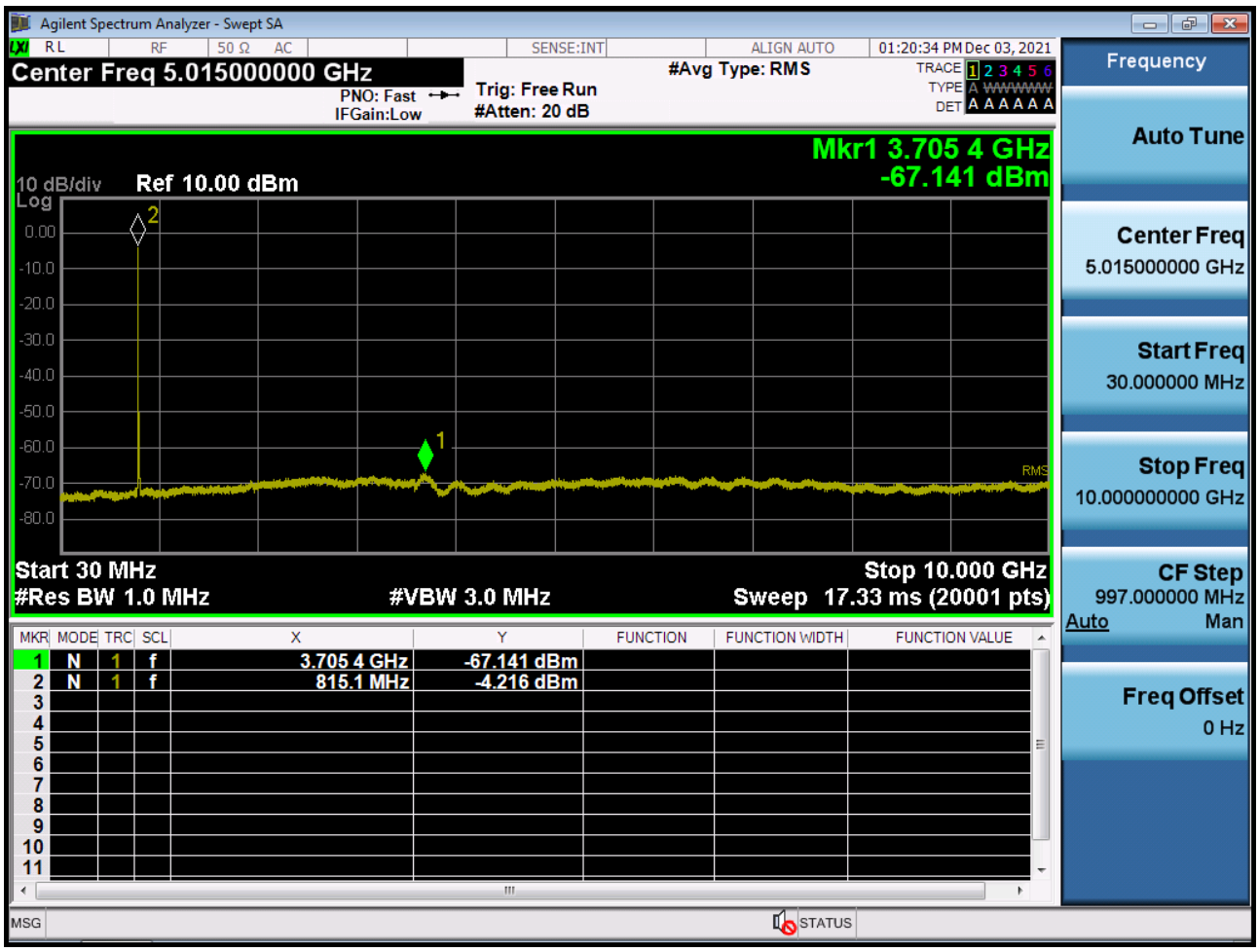


Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	<- Peak -> dBm	Upper ΔLim(dB)	Freq (Hz)
2.500 MHz	2.538 MHz	300.0 Hz	-70.18	(-50.18)	-2.526 M	-41.62	(-21.62)	2.500 M
2.538 MHz	5.000 MHz	100.0 kHz	-47.16	(-34.16)	-4.347 M	-22.03	(-9.03)	2.538 M
3.515 MHz	4.000 MHz	30.00 kHz	---	(---)	---	---	(---)	---
4.000 MHz	8.000 MHz	1.000 MHz	---	(---)	---	---	(---)	---
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---

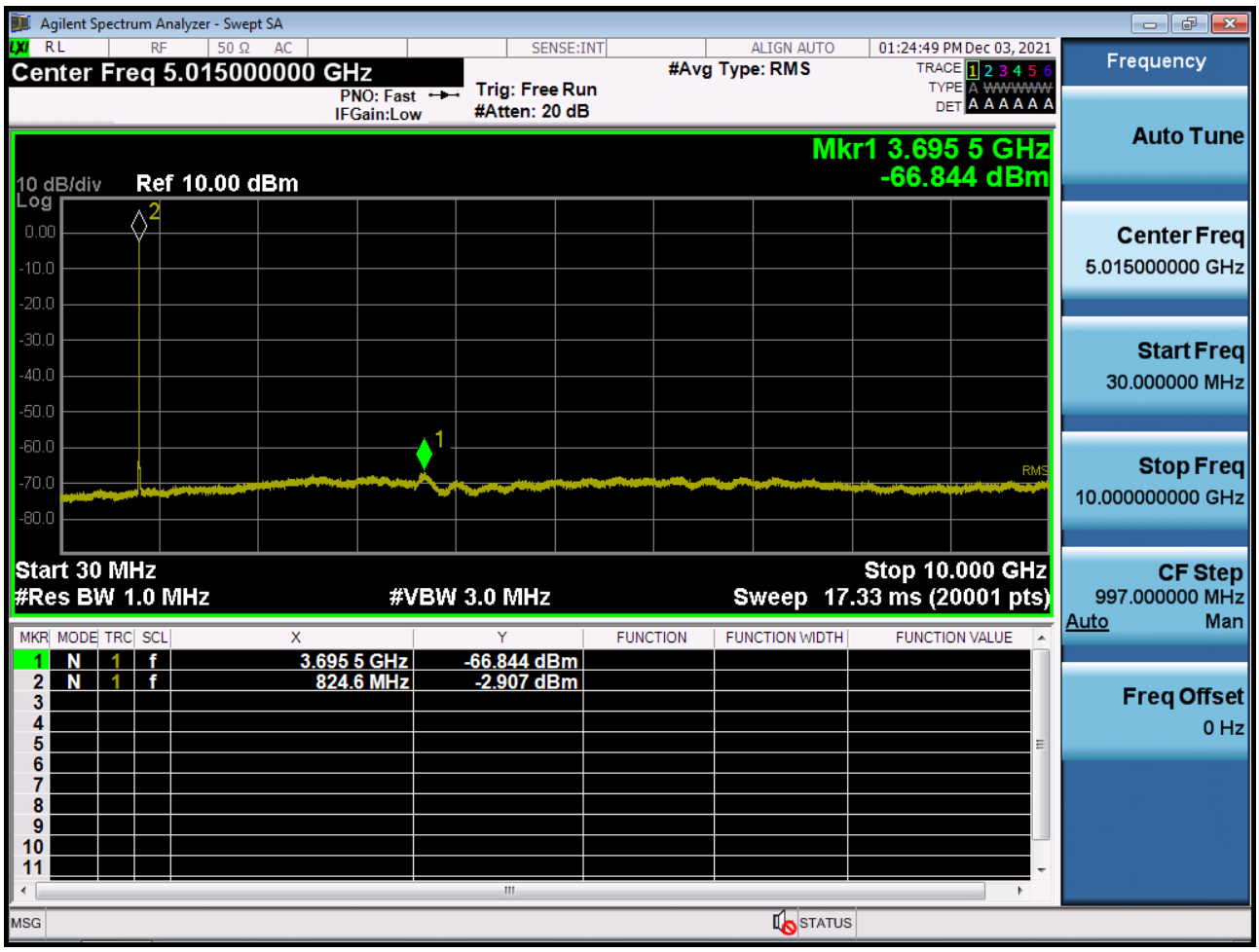
BAND 26. Upper Channel Edge Plot (5 M BW Ch.26765 QPSK_RB25_Offset 0)



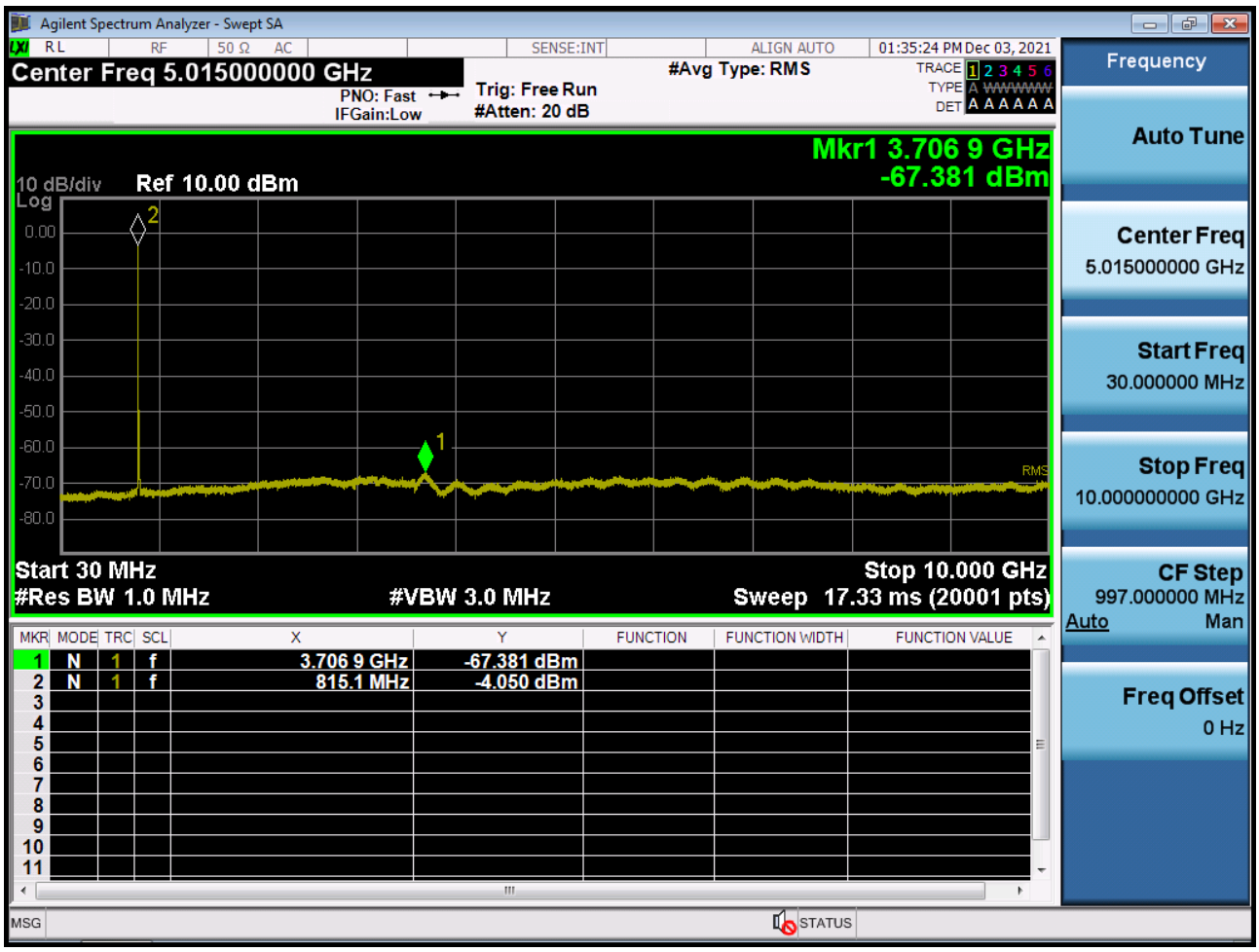
BAND 26. Conducted Spurious (26697 ch_1.4 MHz_QPSK_RB 1_0)



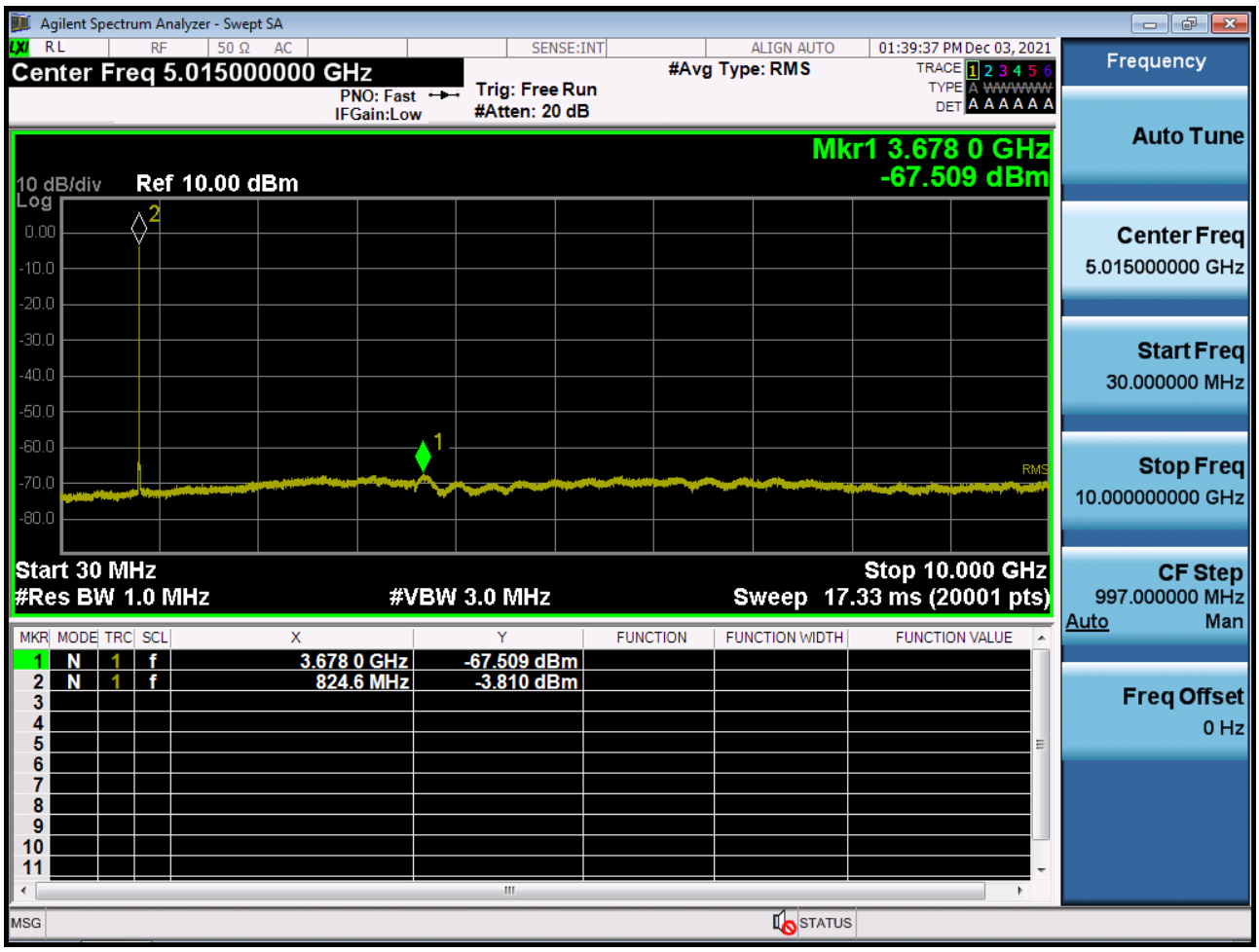
BAND 26. Conducted Spurious (26783 ch_1.4 MHz_QPSK_RB 1_0)



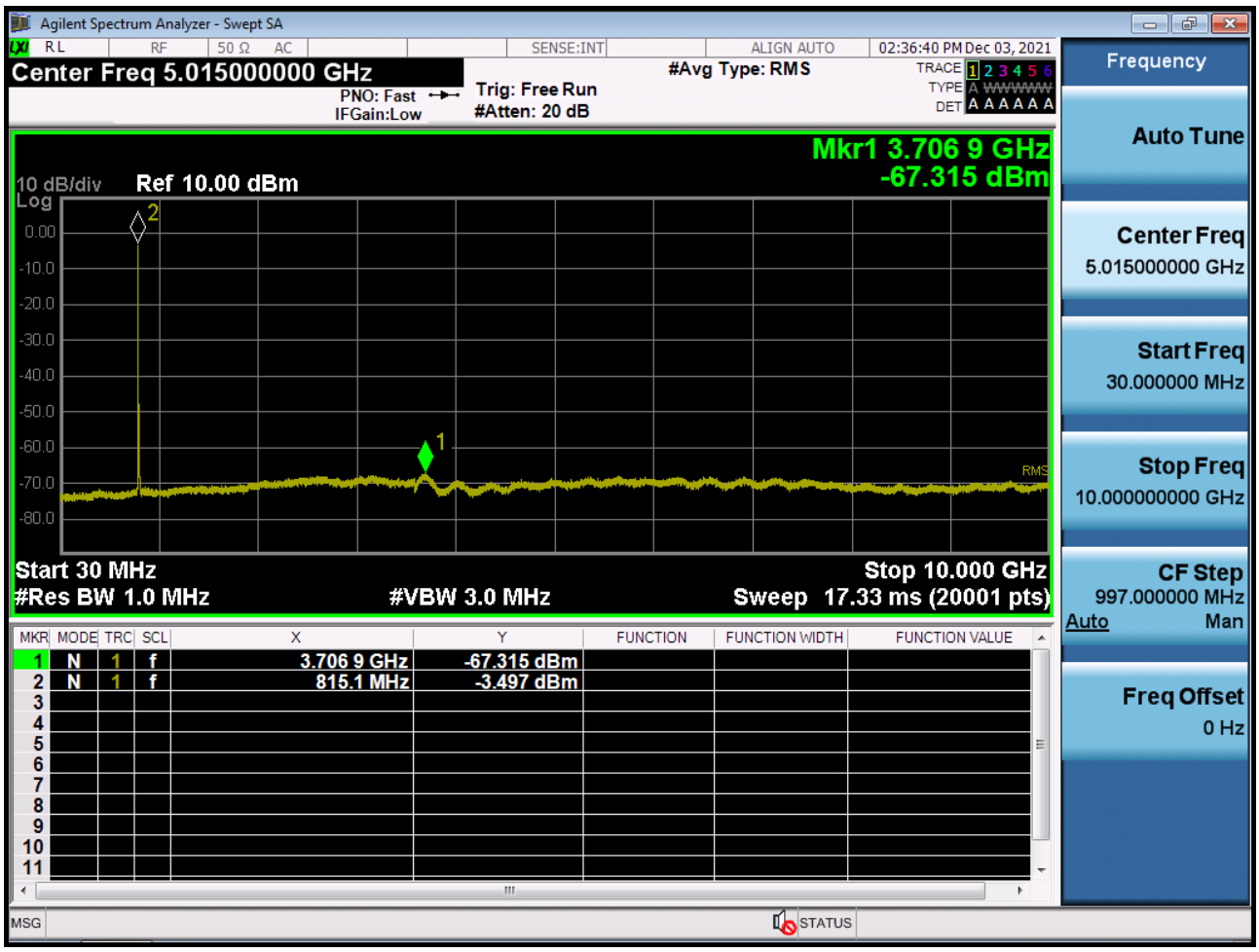
BAND 26. Conducted Spurious (26705 ch_3 MHz_QPSK_RB 1_0)



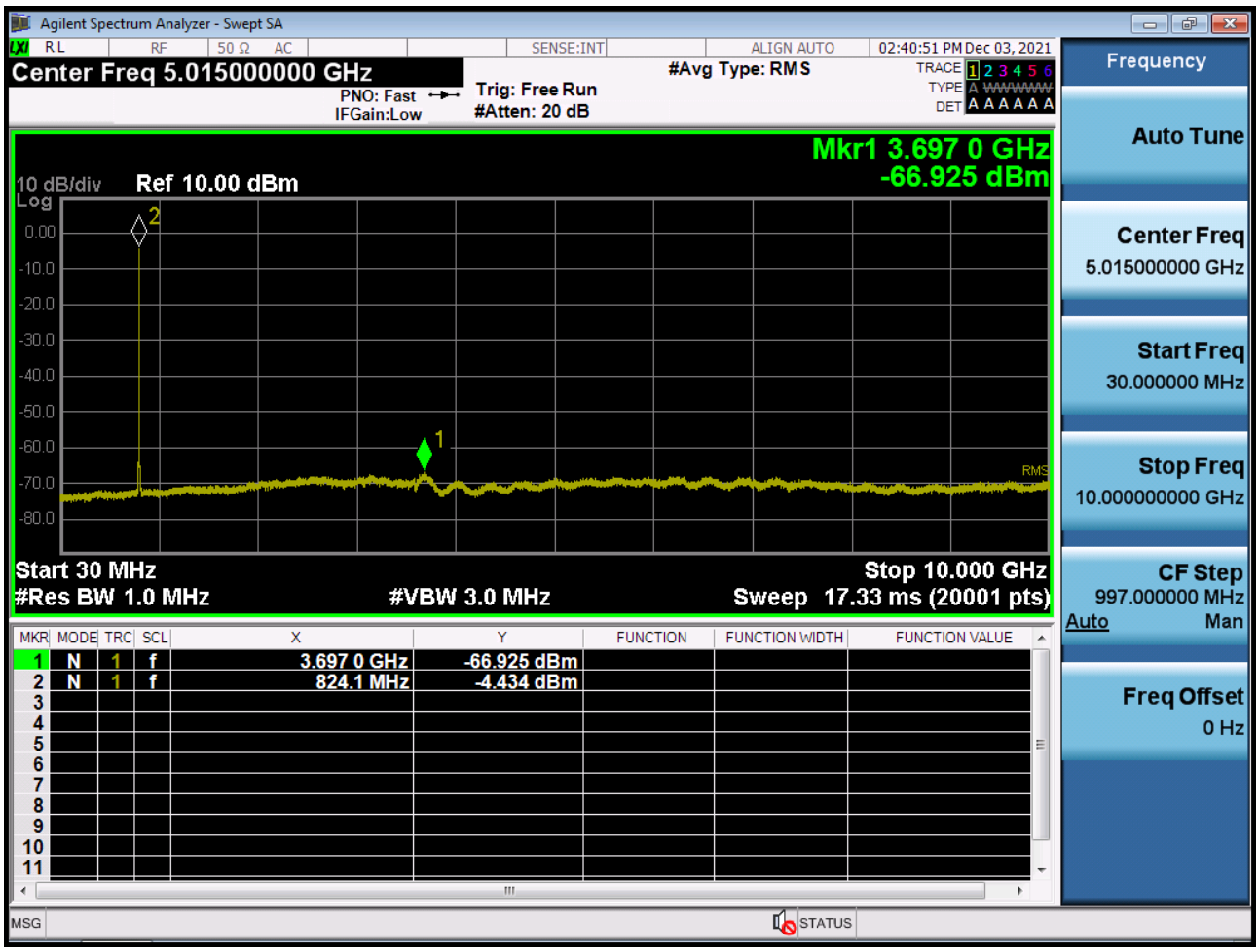
BAND 26. Conducted Spurious (26775 ch_3 MHz_QPSK_RB 1_0)



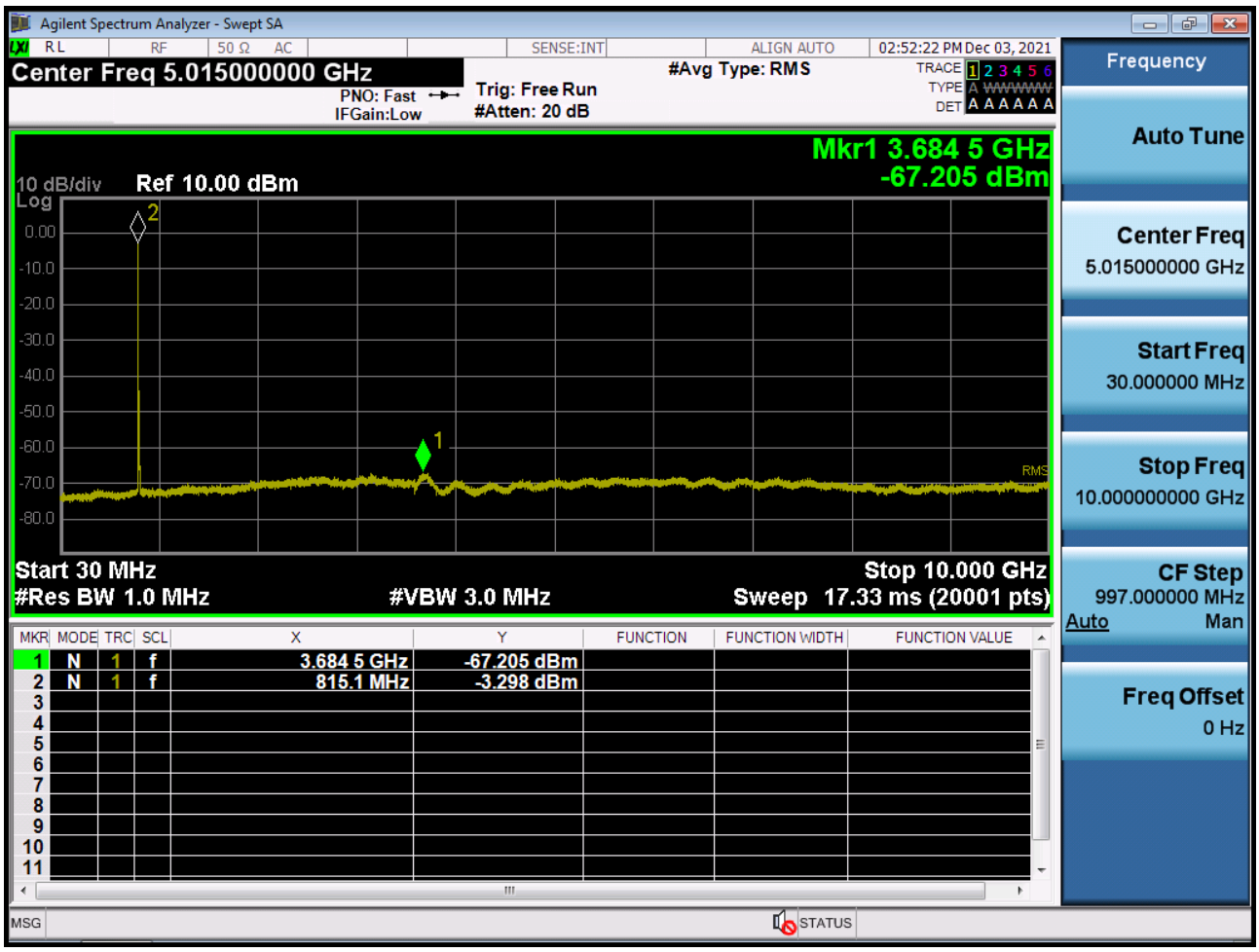
BAND 26. Conducted Spurious (26715 ch_5 MHz_QPSK_RB 1_0)



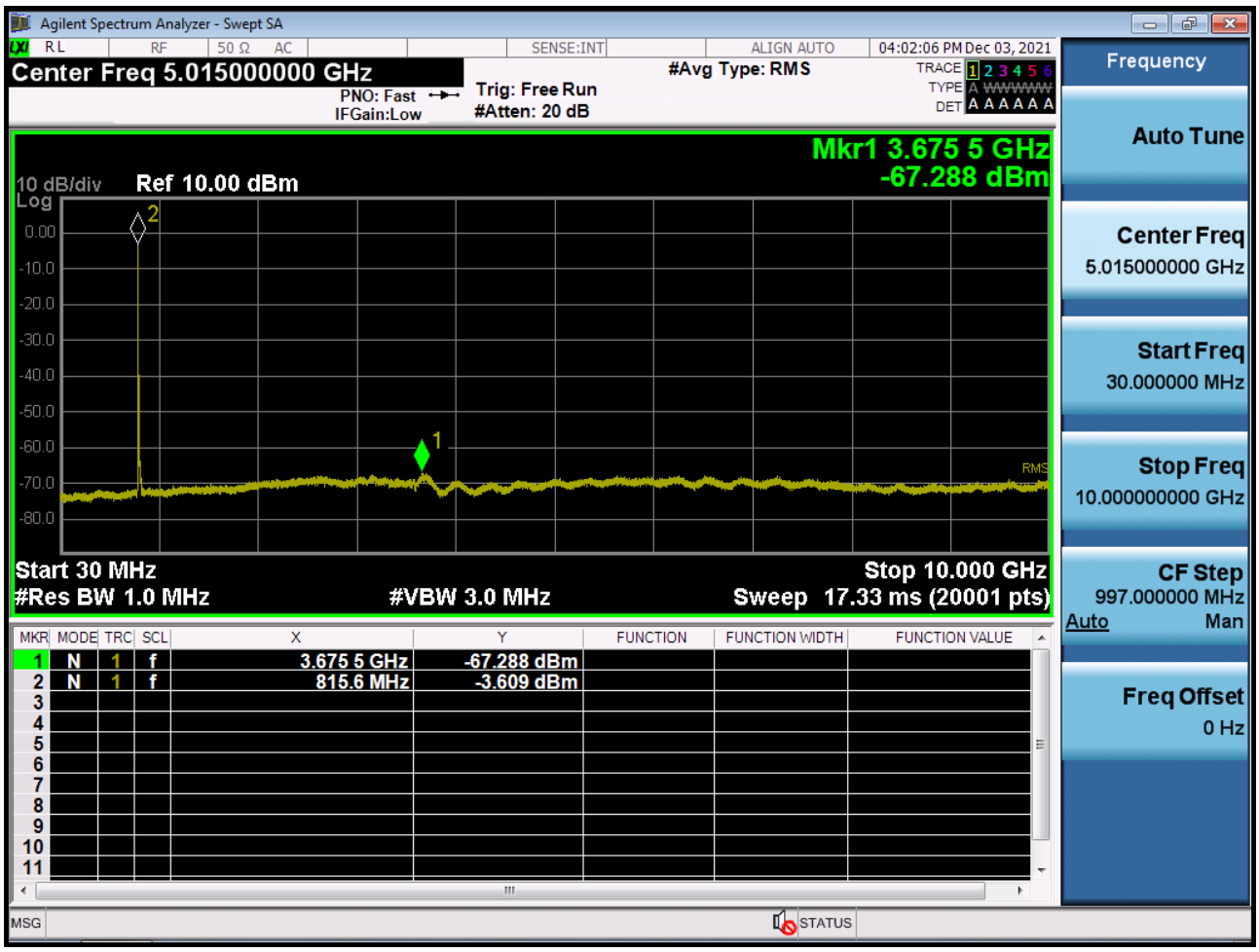
BAND 26. Conducted Spurious (26765 ch_5 MHz_QPSK_RB 1_0)



BAND 26. Conducted Spurious (26740 ch_10 MHz_QPSK_RB 1_0)

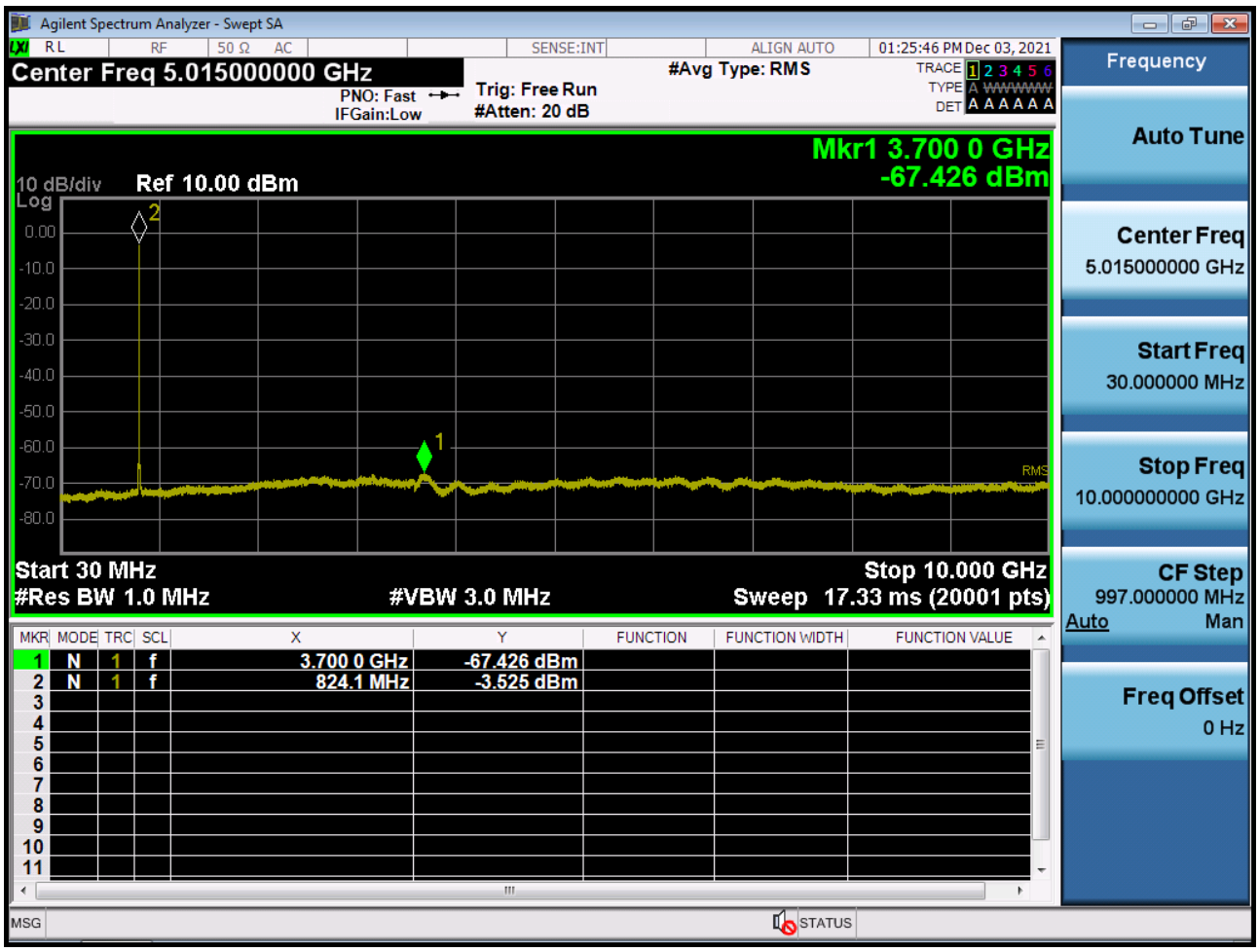


BAND 26. Conducted Spurious (26765 ch_15 MHz_QPSK_RB 1_0)

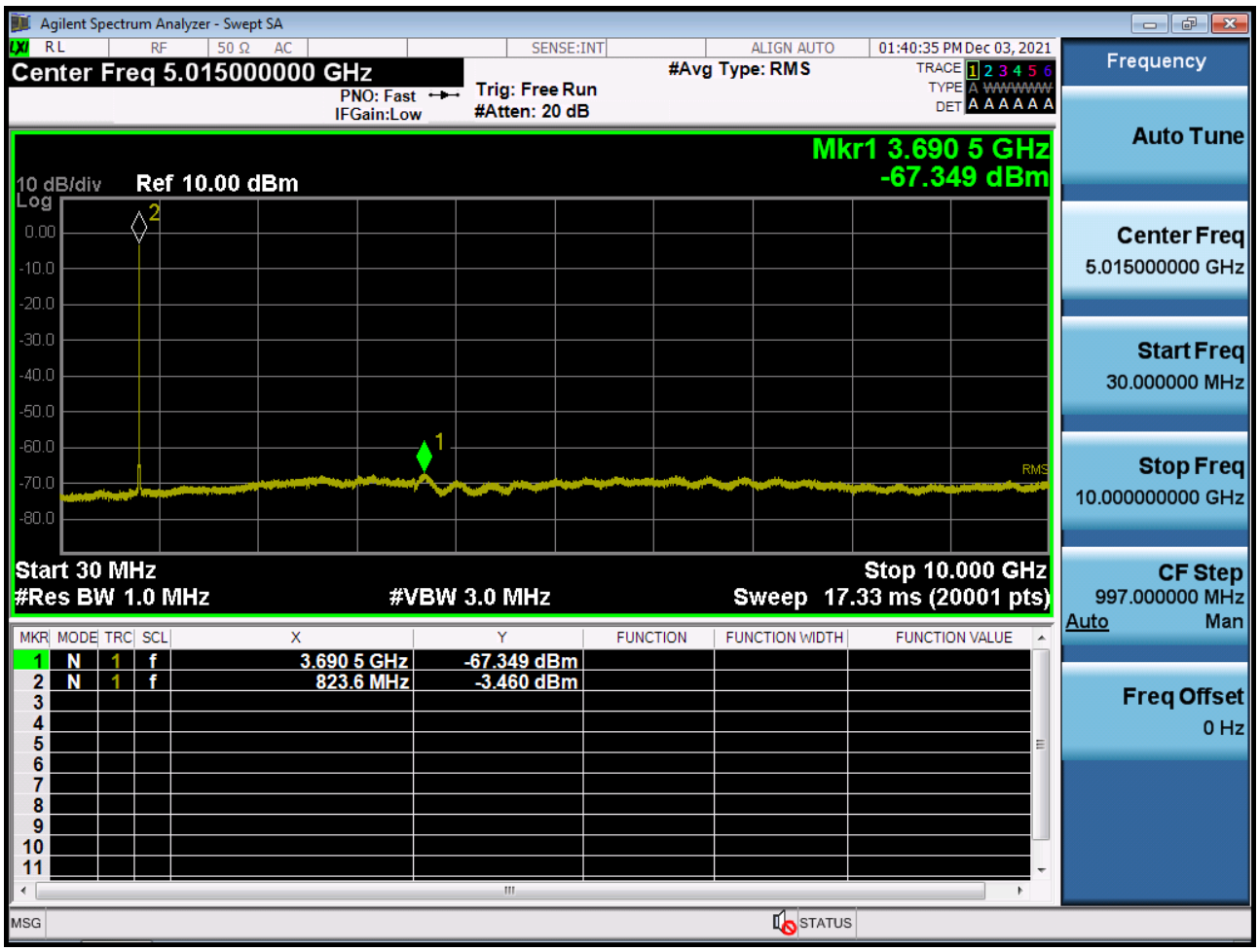


10. TEST PLOTS (STRADDLE CHANNEL)

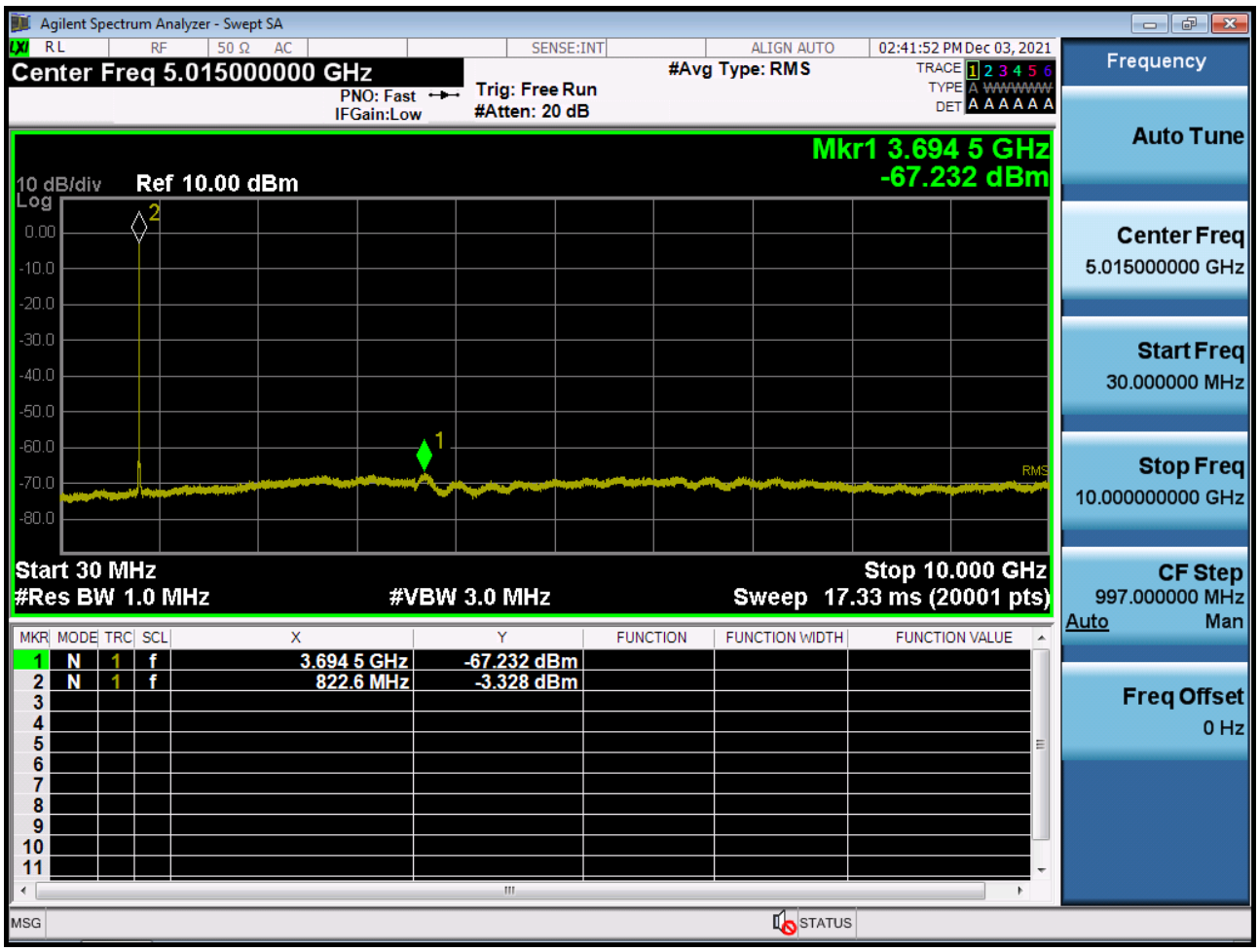
BAND 26. Conducted Spurious (1.4 MHz_QPSK_RB 1_0)



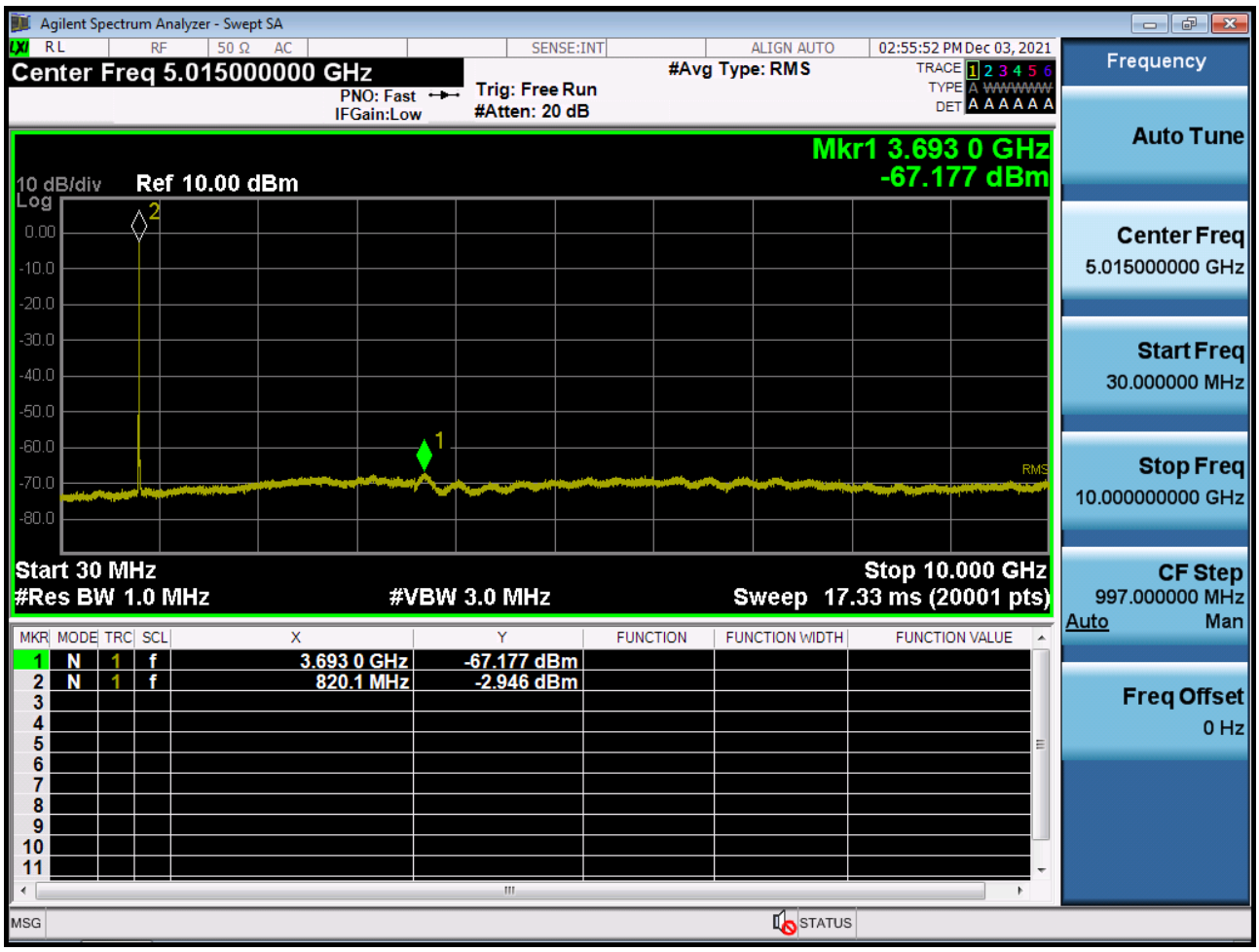
BAND 26. Conducted Spurious (3 MHz_QPSK_RB 1_0)



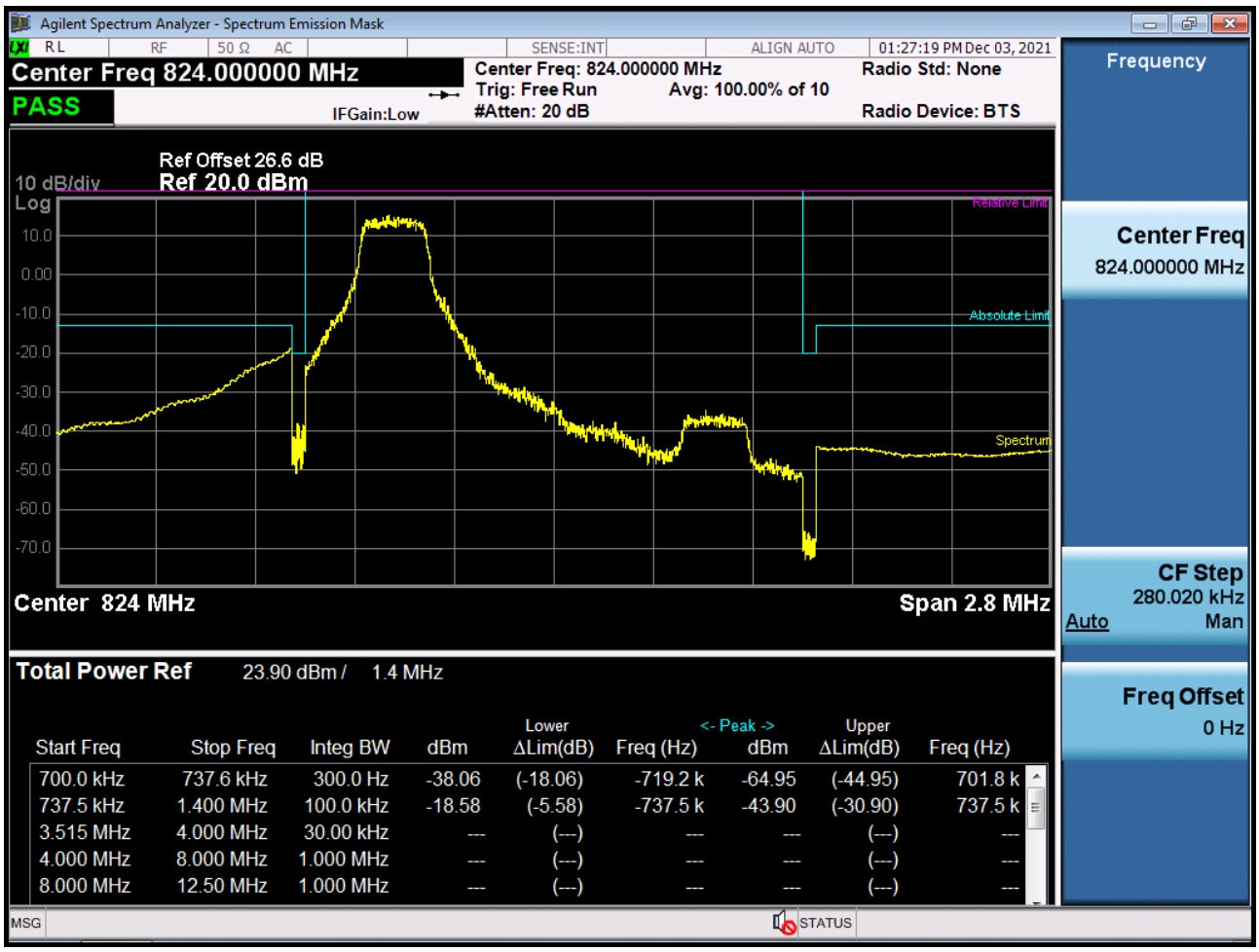
BAND 26. Conducted Spurious (5 MHz_QPSK_RB 1_0)



BAND 26. Conducted Spurious (10 MHz_QPSK_RB 1_0)

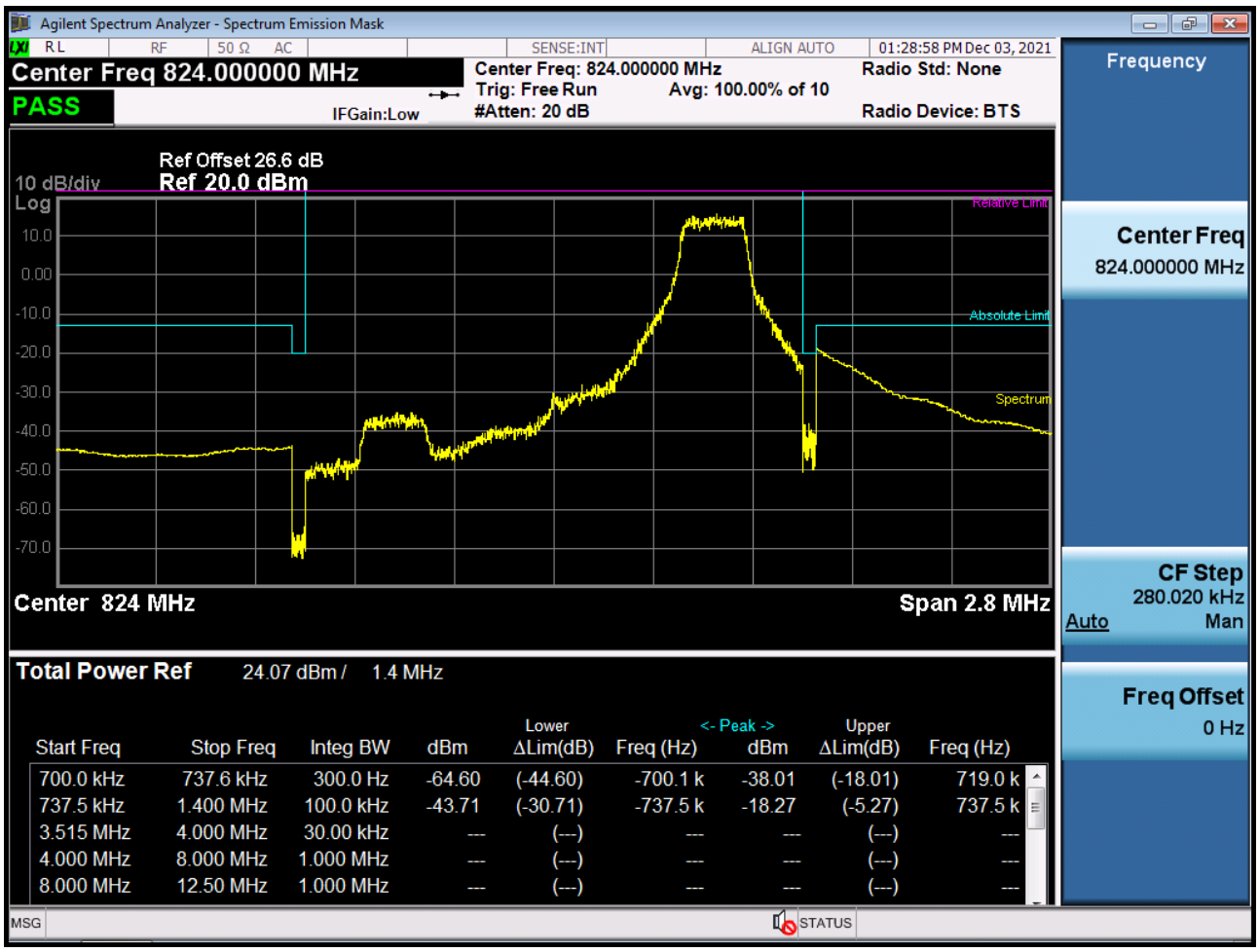


BAND 26. Channel Edge (1.4 MHz_QPSK_RB 1_0)



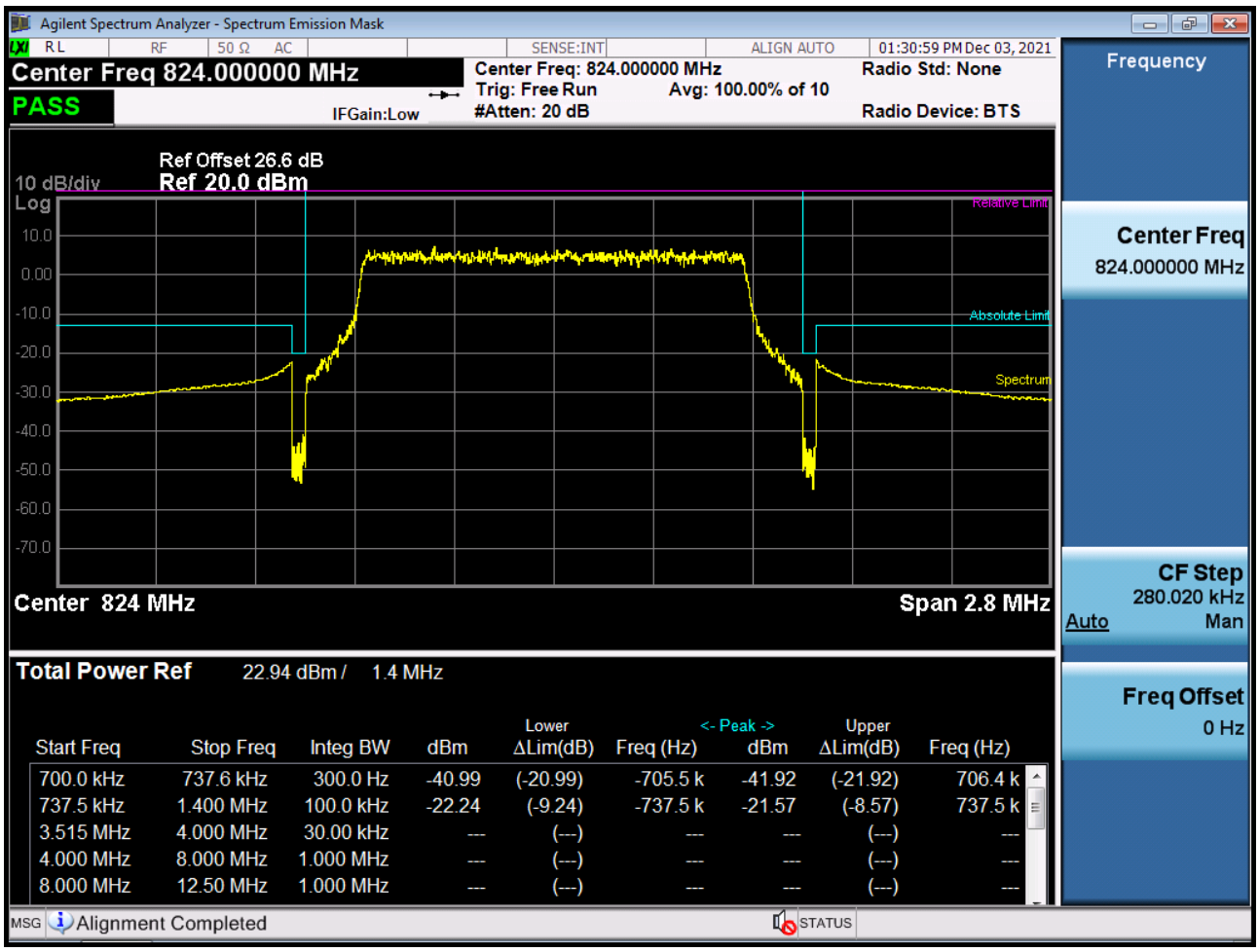
Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	<- Peak -> dBm	Upper ΔLim(dB)	Freq (Hz)
700.0 kHz	737.6 kHz	300.0 Hz	-38.06	(-18.06)	-719.2 k	-64.95	(-44.95)	701.8 k
737.5 kHz	1.400 MHz	100.0 kHz	-18.58	(-5.58)	-737.5 k	-43.90	(-30.90)	737.5 k
3.515 MHz	4.000 MHz	30.00 kHz	---	(---)	---	---	(---)	---
4.000 MHz	8.000 MHz	1.000 MHz	---	(---)	---	---	(---)	---
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---

BAND 26. Channel Edge (1.4 MHz_QPSK_RB 1_5)

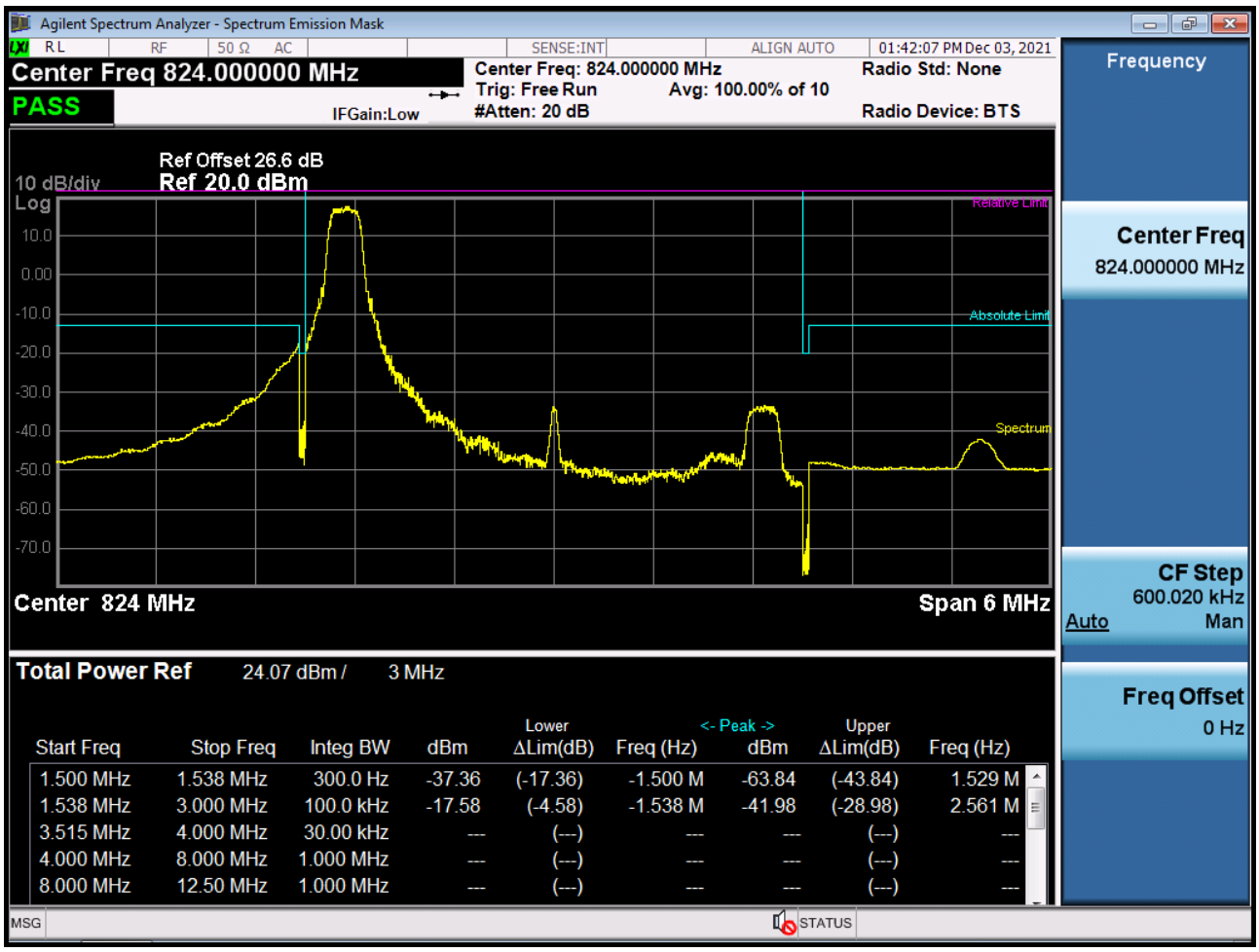


Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	<- Peak -> dBm	Upper ΔLim(dB)	Freq (Hz)
700.0 kHz	737.6 kHz	300.0 Hz	-64.60	(-44.60)	-700.1 k	-38.01	(-18.01)	719.0 k
737.5 kHz	1.400 MHz	100.0 kHz	-43.71	(-30.71)	-737.5 k	-18.27	(-5.27)	737.5 k
3.515 MHz	4.000 MHz	30.00 kHz	---	(---)	---	---	(---)	---
4.000 MHz	8.000 MHz	1.000 MHz	---	(---)	---	---	(---)	---
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---

BAND 26. Channel Edge (1.4 MHz_QPSK_Full RB)

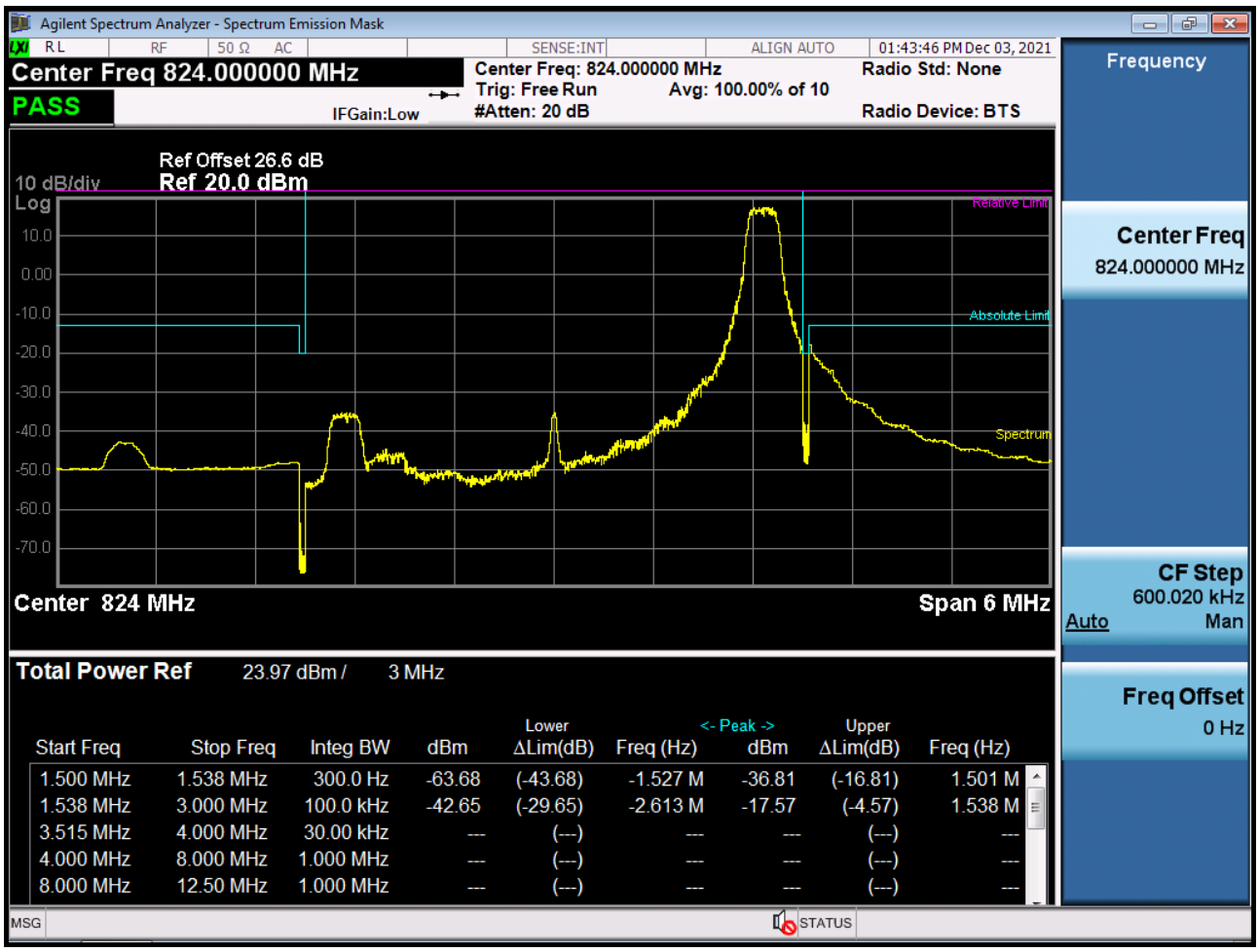


BAND 26. Channel Edge (3 MHz_QPSK_RB 1_0)



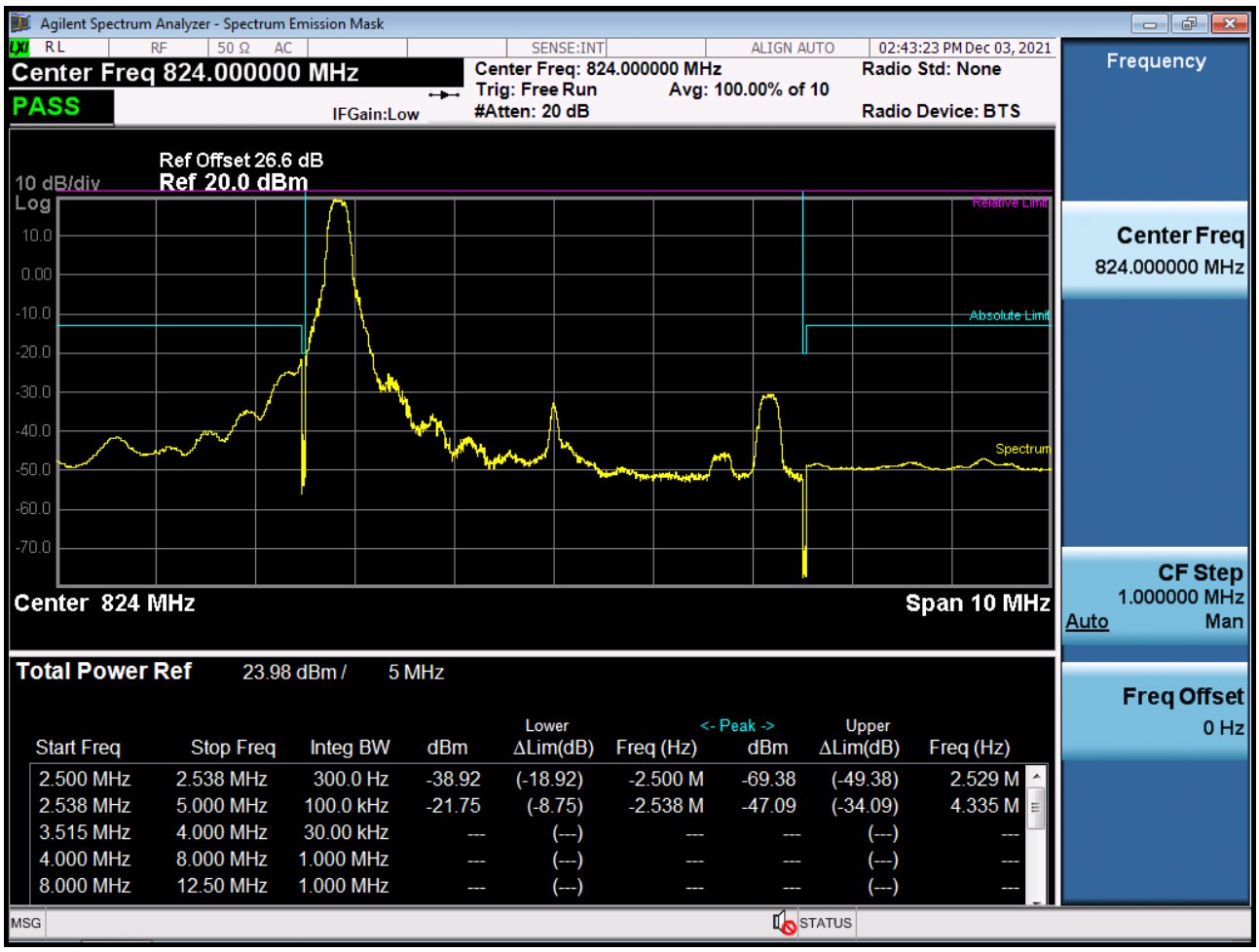
Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	<- Peak -> dBm	Upper ΔLim(dB)	Freq (Hz)
1.500 MHz	1.538 MHz	300.0 Hz	-37.36	(-17.36)	-1.500 M	-63.84	(-43.84)	1.529 M
1.538 MHz	3.000 MHz	100.0 kHz	-17.58	(-4.58)	-1.538 M	-41.98	(-28.98)	2.561 M
3.515 MHz	4.000 MHz	30.00 kHz	---	(---)	---	---	(---)	---
4.000 MHz	8.000 MHz	1.000 MHz	---	(---)	---	---	(---)	---
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---

BAND 26. Channel Edge (3 MHz_QPSK_RB 1_14)

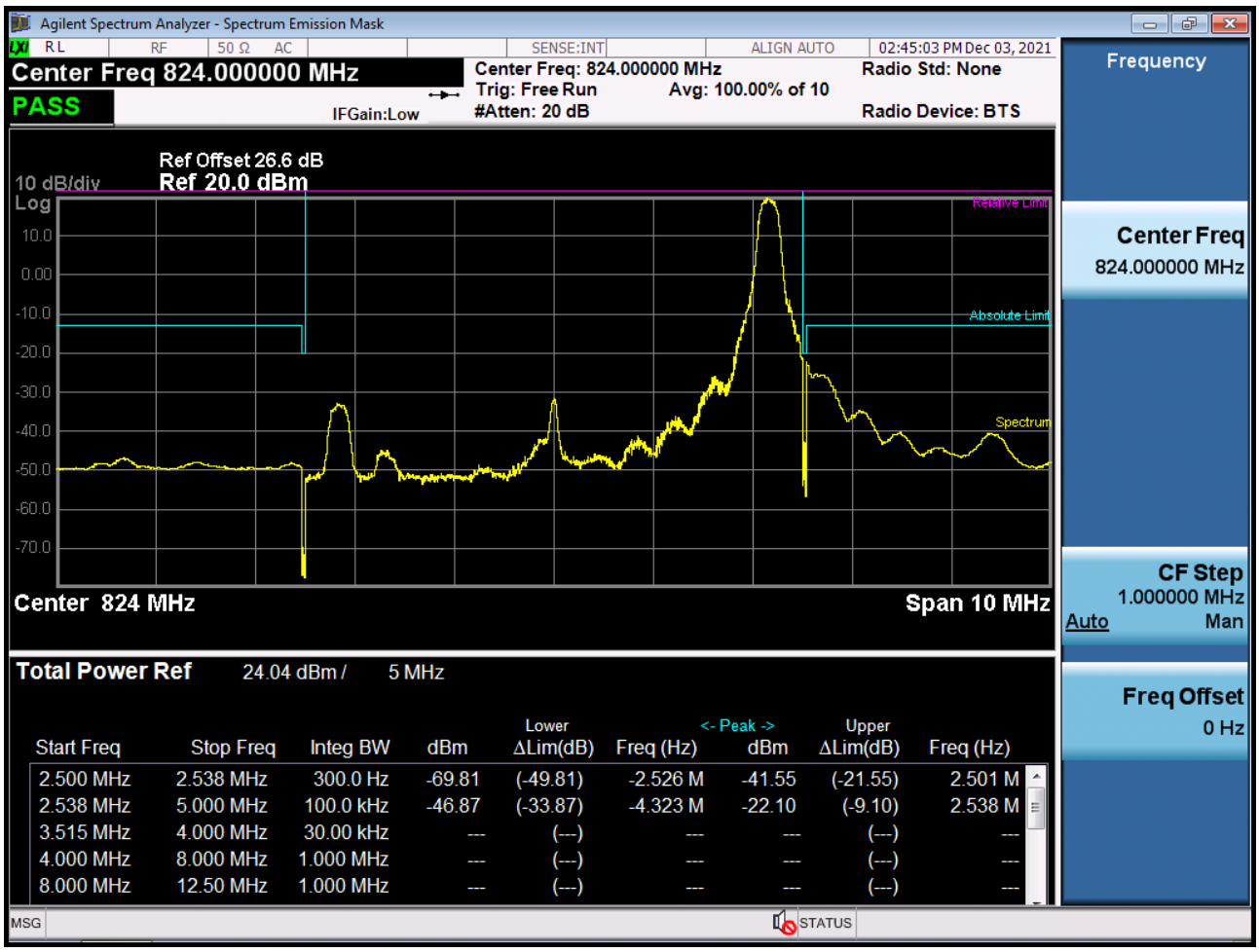


BAND 26. Channel Edge (3 MHz_QPSK_Full RB)

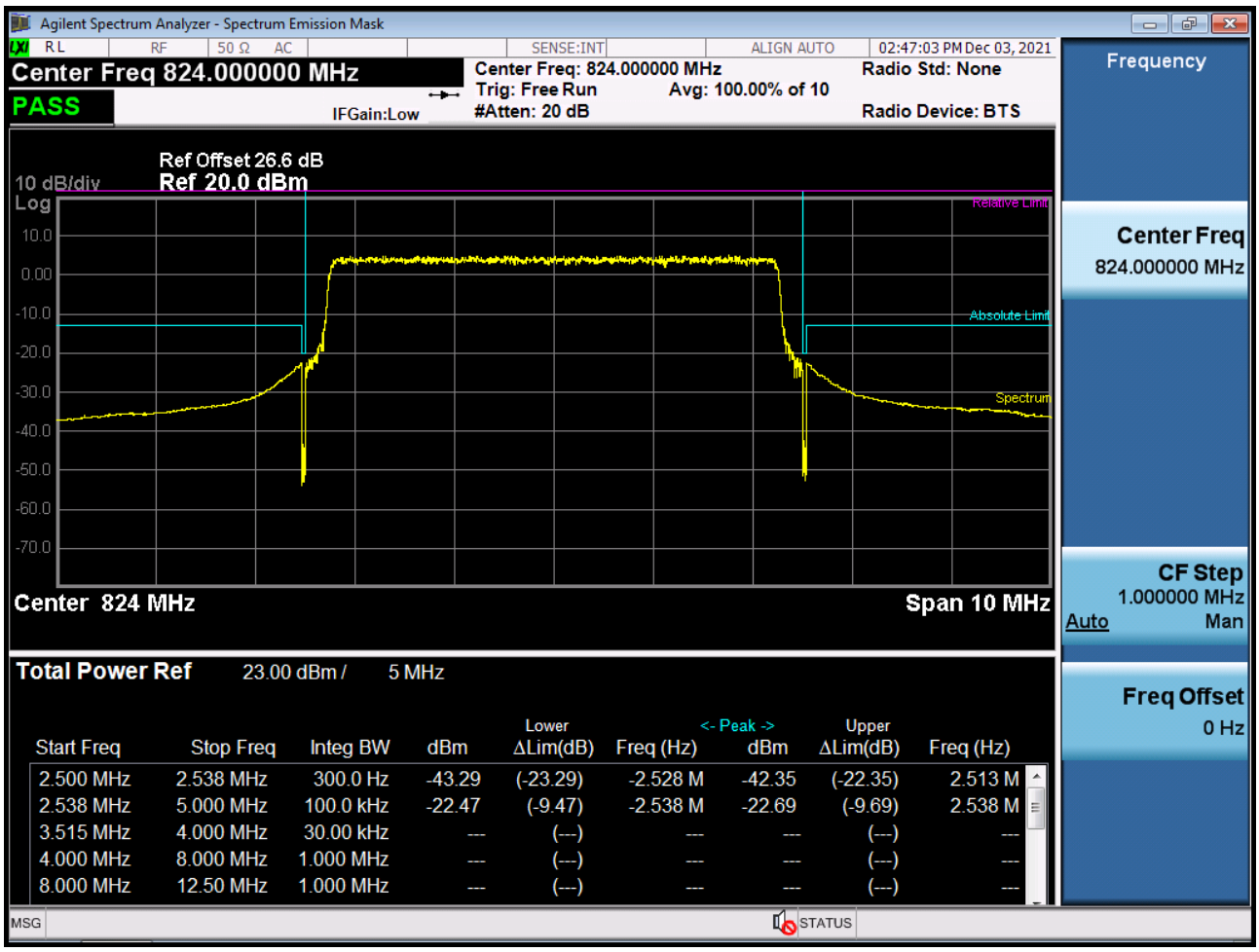
BAND 26. Channel Edge (5 MHz_QPSK_RB 1_0)



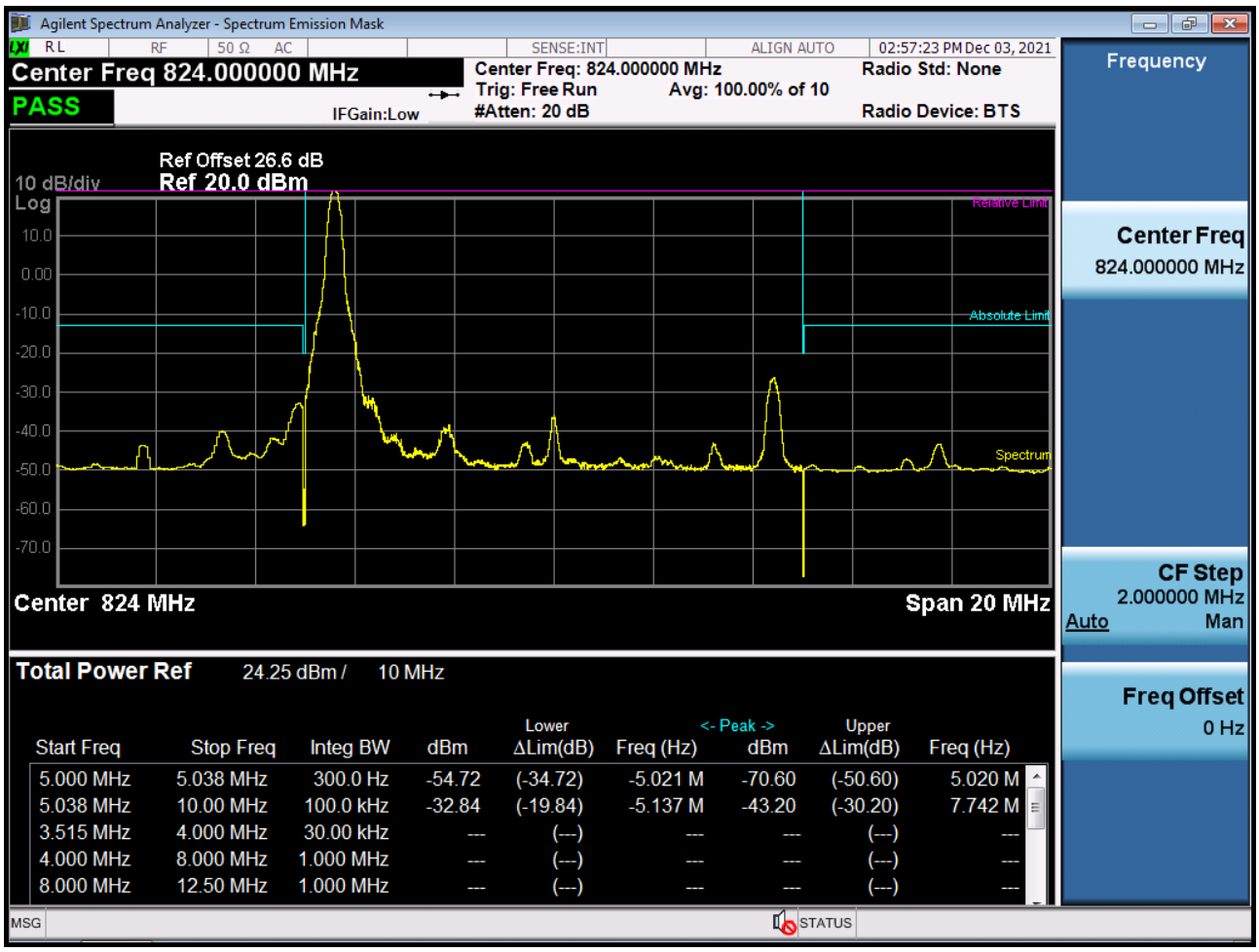
BAND 26. Channel Edge (5 MHz_QPSK_RB 1_24)



BAND 26. Channel Edge (5 MHz_QPSK_Full RB)

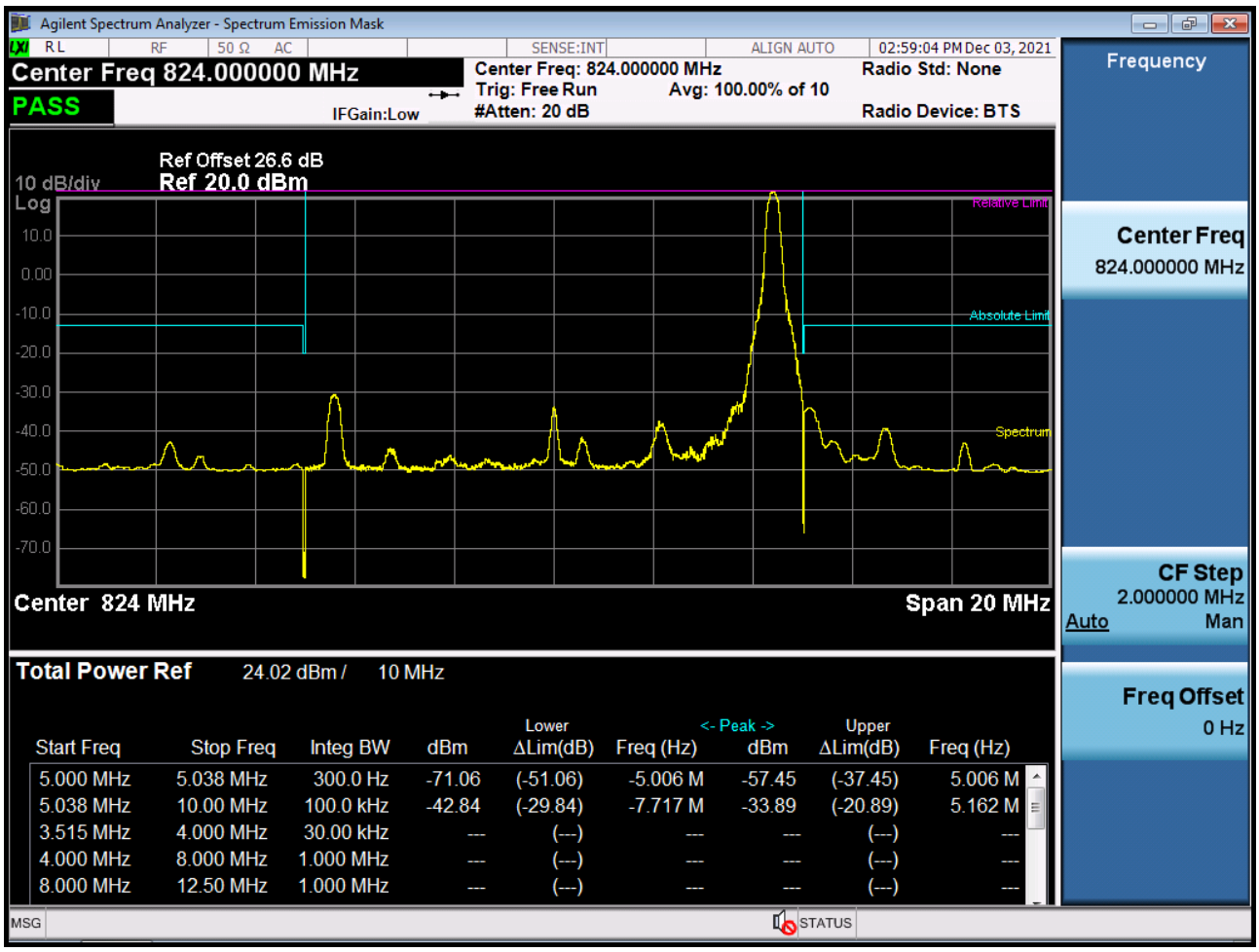


BAND 26. Channel Edge (10 MHz_QPSK_RB 1_0)



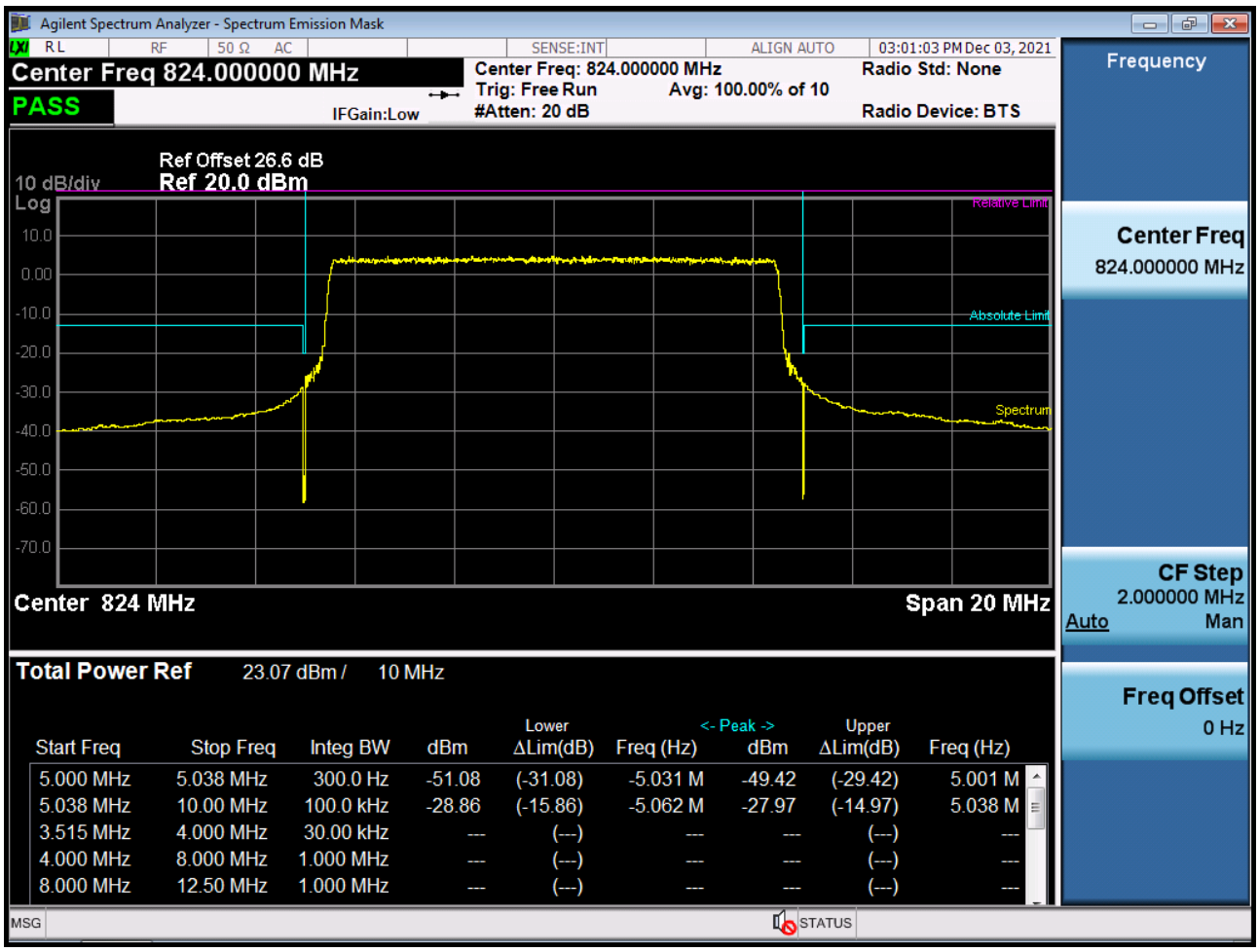
Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	<- Peak -> dBm	Upper ΔLim(dB)	Freq (Hz)
5.000 MHz	5.038 MHz	300.0 Hz	-54.72	(-34.72)	-5.021 M	-70.60	(-50.60)	5.020 M
5.038 MHz	10.00 MHz	100.0 kHz	-32.84	(-19.84)	-5.137 M	-43.20	(-30.20)	7.742 M
3.515 MHz	4.000 MHz	30.00 kHz	---	(---)	---	---	(---)	---
4.000 MHz	8.000 MHz	1.000 MHz	---	(---)	---	---	(---)	---
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---

BAND 26. Channel Edge (10 MHz_QPSK_RB 1_49)



Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	<- Peak -> dBm	Upper ΔLim(dB)	Freq (Hz)
5.000 MHz	5.038 MHz	300.0 Hz	-71.06	(-51.06)	-5.006 M	-57.45	(-37.45)	5.006 M
5.038 MHz	10.00 MHz	100.0 kHz	-42.84	(-29.84)	-7.717 M	-33.89	(-20.89)	5.162 M
3.515 MHz	4.000 MHz	30.00 kHz	---	(---)	---	---	(---)	---
4.000 MHz	8.000 MHz	1.000 MHz	---	(---)	---	---	(---)	---
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---

BAND 26. Channel Edge (10 MHz_QPSK_Full RB)



Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	<- Peak -> dBm	Upper ΔLim(dB)	Freq (Hz)
5.000 MHz	5.038 MHz	300.0 Hz	-51.08	(-31.08)	-5.031 M	-49.42	(-29.42)	5.001 M
5.038 MHz	10.00 MHz	100.0 kHz	-28.86	(-15.86)	-5.062 M	-27.97	(-14.97)	5.038 M
3.515 MHz	4.000 MHz	30.00 kHz	---	(---)	---	---	(---)	---
4.000 MHz	8.000 MHz	1.000 MHz	---	(---)	---	---	(---)	---
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---

BAND 26. Band Edge (1.4 MHz_QPSK_RB 1_5)

BAND 26. Band Edge (1.4 MHz_QPSK_FullRB)

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_RB 1_49)

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-2201-FC050-P