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FCC LTE REPORT

Certification

Applicant Name:
SAMSUNG Electronics Co., Ltd.

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

Date of Issue:
November 05, 2021

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

Report No.: HCT-RF-2110-FC053-R1

FCC ID:	**A3LSMS901B**
APPLICANT:	**SAMSUNG Electronics Co., Ltd.**

Model(s): SM-S901B/DS
EUT Type: Mobile phone
FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part(s): §90, §22, §2

Mode (MHz)	Tx Frequency (MHz)	Emission Designator	Modulation	Conducted Output Power	
				Max. Power (W)	Max. Power (dBm)
LTE – Band26 (1.4)	814.7 – 823.3	1M09G7D	QPSK	0.300	24.77
		1M10W7D	16QAM	0.251	23.99
		1M10W7D	64QAM	0.195	22.89
		1M10W7D	256QAM	0.095	19.76
LTE – Band26 (3)	815.5 – 822.5	2M73G7D	QPSK	0.300	24.77
		2M71W7D	16QAM	0.248	23.95
		2M72W7D	64QAM	0.199	22.99
		2M72W7D	256QAM	0.094	19.73
LTE – Band26 (5)	816.5 – 821.5	4M53G7D	QPSK	0.294	24.68
		4M52W7D	16QAM	0.247	23.92
		4M51W7D	64QAM	0.197	22.95
		4M51W7D	256QAM	0.096	19.81
LTE – Band26 (10)	819.0	9M02G7D	QPSK	0.298	24.74
		9M03W7D	16QAM	0.250	23.98
		9M02W7D	64QAM	0.198	22.97
		9M00W7D	256QAM	0.099	19.95
LTE – Band26 (15)	821.5	13M5G7D	QPSK	0.296	24.71
		13M5W7D	16QAM	0.251	24.00
		13M5W7D	64QAM	0.198	22.96
		13M4W7D	256QAM	0.099	19.95

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)

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2110-FC053	October 28, 2021	- First Approval Report
HCT-RF-2110-FC053-R1	November 05, 2021	- Revised the 6 page.

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:	A3LSMS901B
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-S901B/DS
Tx Frequency:	814.7 MHz – 823.3 MHz (LTE – Band 26 (1.4 MHz)) 815.5 MHz – 822.5 MHz (LTE – Band 26 (3 MHz)) 816.5 MHz – 821.5 MHz (LTE – Band 26 (5 MHz)) 819.0 MHz (LTE – Band 26 (10 MHz)) 821.5 MHz (LTE – Band 26 (15 MHz))
Date(s) of Tests:	September 18, 2021 ~ October 25, 2021
Serial number:	Radiated: R3CR809BXFP Conducted: R3CR809C6BE

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/ax (20/40/80), Bluetooth, BT LE, NFC, WPT.

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

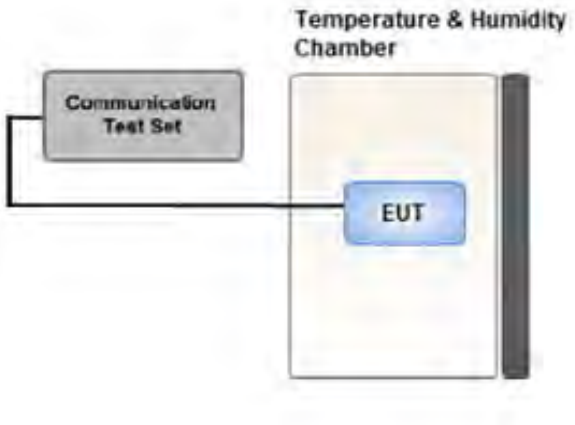
According to ANSI C63.26-2015 Section 5.2.1 when measuring the maximum RF output power from such devices, control over the EUT must be provided either through special test software (provided by manufacturer specifically for compliance testing, but not accessible by an end user) or through use of a base 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 10^{th} harmonics from 9 kHz.

Test Note

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

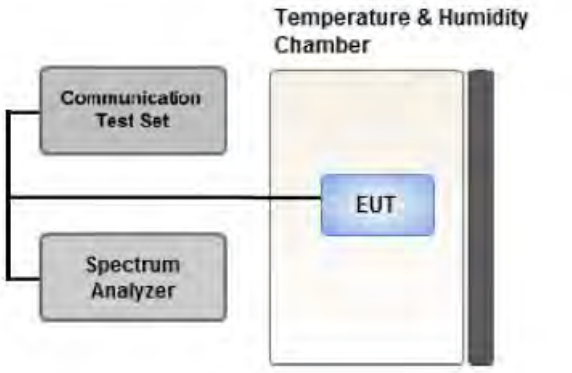
$$\text{Result}_{(dBm)} = \text{Pg}_{(dBm)} - \text{cable loss}_{(dB)} + \text{antenna gain}_{(dBi)}$$

   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.

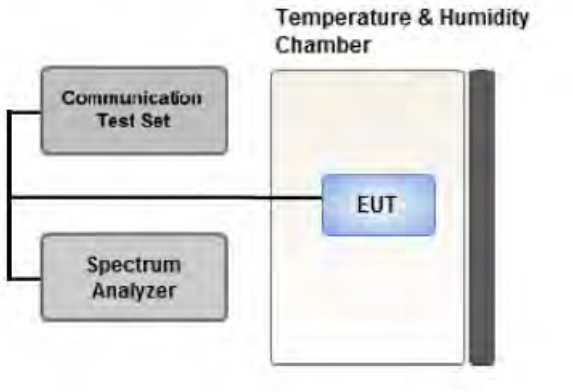
The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

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.

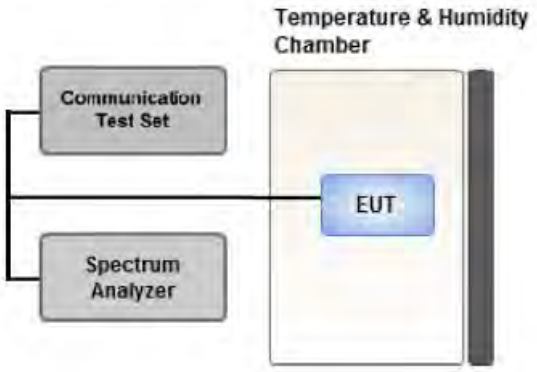
All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

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.

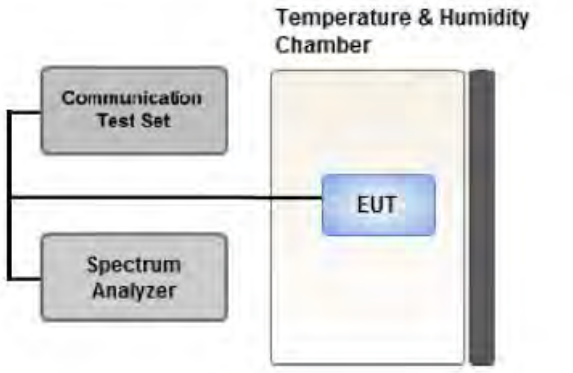
Test Settings

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.

(In the case of radiated spurious emissions, only the B.W result that confirmed the maximum radiated power was reported.)

- The worst case is reported with the EUT positioning, modulations, and paging service configurations shown in the test data.
- All modes of operation were tested and the worst case results are reported.
- Please refer to the table below.

[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.

[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	MY50200093	11/17/2021	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	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	24.54	0.284	24.56	0.286	100
		1	3	24.54	0.284	24.55	0.285	100
		1	5	24.75	0.299	24.77	0.300	100
		3	0	23.51	0.224	23.54	0.226	100
		3	1	23.48	0.223	23.49	0.223	100
		3	3	23.50	0.224	23.52	0.225	100
		6	0	22.60	0.182	22.63	0.183	100
	16QAM	1	0	23.99	0.251	23.99	0.251	100
		1	3	23.88	0.244	23.90	0.245	100
		1	5	23.95	0.248	23.94	0.248	100
		3	0	22.59	0.182	22.61	0.182	100
		3	1	22.70	0.186	22.72	0.187	100
		3	3	22.67	0.185	22.69	0.186	100
		6	0	21.65	0.146	21.67	0.147	100
	64QAM	1	0	22.87	0.194	22.89	0.195	100
		1	3	22.82	0.191	22.85	0.193	100
		1	5	22.86	0.193	22.88	0.194	100
		3	0	21.58	0.144	21.59	0.144	100
		3	1	21.52	0.142	21.54	0.143	100
		3	3	21.61	0.145	21.63	0.146	100
		6	0	20.48	0.112	20.49	0.112	100
	256QAM	1	0	19.70	0.093	19.74	0.094	100
		1	3	19.50	0.089	19.52	0.090	100
		1	5	19.76	0.095	19.76	0.095	100
		3	0	18.58	0.072	18.57	0.072	100
		3	1	18.55	0.072	18.54	0.071	100
		3	3	18.50	0.071	18.51	0.071	100
		6	0	18.54	0.071	18.53	0.071	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	24.77	0.300	24.76	0.299	100
		1	7	24.75	0.299	24.75	0.299	100
		1	14	24.71	0.296	24.70	0.295	100
		8	0	22.69	0.186	22.67	0.185	100
		8	3	22.78	0.190	22.76	0.189	100
		8	7	22.75	0.188	22.73	0.187	100
		15	0	22.70	0.186	22.72	0.187	100
	16QAM	1	0	23.94	0.248	23.93	0.247	100
		1	7	23.92	0.247	23.95	0.248	100
		1	14	23.90	0.245	23.94	0.248	100
		8	0	21.62	0.145	21.60	0.145	100
		8	3	21.66	0.147	21.65	0.146	100
		8	7	21.56	0.143	21.55	0.143	100
		15	0	21.75	0.150	21.71	0.148	100
	64QAM	1	0	22.63	0.183	22.65	0.184	100
		1	7	22.99	0.199	22.97	0.198	100
		1	14	22.82	0.191	22.92	0.196	100
		8	0	20.89	0.123	20.82	0.121	100
		8	3	20.50	0.112	20.51	0.112	100
		8	7	20.55	0.114	20.53	0.113	100
		15	0	20.84	0.121	20.81	0.121	100
	256QAM	1	0	19.68	0.093	19.70	0.093	100
		1	7	19.67	0.093	19.69	0.093	100
		1	14	19.73	0.094	19.71	0.094	100
		8	0	18.45	0.070	18.44	0.070	100
		8	3	18.50	0.071	18.51	0.071	100
		8	7	18.43	0.070	18.44	0.070	100
		15	0	18.49	0.071	18.50	0.071	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	24.67	0.293	24.67	0.293	100
		1	12	24.66	0.292	24.68	0.294	100
		1	24	24.66	0.292	24.66	0.292	100
		12	0	22.61	0.182	22.63	0.183	100
		12	6	22.59	0.182	22.61	0.182	100
		12	11	22.56	0.180	22.58	0.181	100
		25	0	22.59	0.182	22.61	0.182	100
	16QAM	1	0	23.92	0.247	23.92	0.247	100
		1	12	23.87	0.244	23.88	0.244	100
		1	24	23.86	0.243	23.89	0.245	100
		12	0	21.57	0.144	21.59	0.144	100
		12	6	21.59	0.144	21.58	0.144	100
		12	11	21.51	0.142	21.54	0.143	100
		25	0	21.60	0.145	21.61	0.145	100
	64QAM	1	0	22.94	0.197	22.95	0.197	100
		1	12	22.78	0.190	22.81	0.191	100
		1	24	22.84	0.192	22.89	0.195	100
		12	0	20.58	0.114	20.56	0.114	100
		12	6	20.55	0.114	20.54	0.113	100
		12	11	20.49	0.112	20.52	0.113	100
		25	0	20.57	0.114	20.59	0.115	100
	256QAM	1	0	19.79	0.095	19.81	0.096	100
		1	12	19.70	0.093	19.71	0.094	100
		1	24	19.77	0.095	19.77	0.095	100
		12	0	18.57	0.072	18.55	0.072	100
		12	6	18.55	0.072	18.54	0.071	100
		12	11	18.56	0.072	18.54	0.071	100
		25	0	18.60	0.072	18.58	0.072	100

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm)		Limit (W)
				819 MHz		
				dBm	W	
10	QPSK	1	0	24.74	0.298	100
		1	24	24.71	0.296	100
		1	49	24.61	0.289	100
		25	0	22.81	0.191	100
		25	12	22.84	0.192	100
		25	24	22.74	0.188	100
		50	0	22.70	0.186	100
	16QAM	1	0	23.96	0.249	100
		1	24	23.90	0.245	100
		1	49	23.98	0.250	100
		25	0	21.85	0.153	100
		25	12	21.84	0.153	100
		25	24	21.98	0.158	100
		50	0	21.85	0.153	100
	64QAM	1	0	22.97	0.198	100
		1	24	22.91	0.195	100
		1	49	22.79	0.190	100
		25	0	20.69	0.117	100
		25	12	20.68	0.117	100
		25	24	20.87	0.122	100
		50	0	20.82	0.121	100
	256QAM	1	0	19.95	0.099	100
		1	24	19.86	0.097	100
		1	49	19.77	0.095	100
		25	0	18.67	0.074	100
		25	12	18.58	0.072	100
		25	24	18.60	0.072	100
		50	0	18.66	0.073	100

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm)		Limit (W)
				821.5 MHz		
				dBm	W	
15	QPSK	1	0	24.71	0.296	100
		1	36	24.70	0.295	100
		1	74	24.61	0.289	100
		36	0	22.81	0.191	100
		36	18	22.85	0.193	100
		36	39	22.75	0.188	100
		75	0	22.70	0.186	100
	16QAM	1	0	23.99	0.251	100
		1	36	23.90	0.245	100
		1	74	24.00	0.251	100
		36	0	21.85	0.153	100
		36	18	21.80	0.151	100
		36	39	21.99	0.158	100
		75	0	21.89	0.155	100
	64QAM	1	0	22.96	0.198	100
		1	36	22.90	0.195	100
		1	74	22.84	0.192	100
		36	0	20.65	0.116	100
		36	18	20.69	0.117	100
		36	39	20.87	0.122	100
		75	0	20.84	0.121	100
	256QAM	1	0	19.95	0.099	100
		1	36	19.86	0.097	100
		1	74	19.72	0.094	100
		36	0	18.64	0.073	100
		36	18	18.55	0.072	100
		36	39	18.58	0.072	100
		75	0	18.64	0.073	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	-31.19	31.35	-10.29	1.38	V	< 100	0.093	19.68
		16QAM	-32.97	29.57	-10.29	1.38	V		0.062	17.90
		64QAM	-34.05	28.49	-10.29	1.38	V		0.048	16.82
		256QAM	-35.10	27.44	-10.29	1.38	V		0.038	15.77
823.3		QPSK	-31.09	31.96	-10.25	1.39	V		0.108	20.32
		16QAM	-32.76	30.29	-10.25	1.39	V		0.073	18.65
		64QAM	-33.87	29.18	-10.25	1.39	V		0.057	17.54
		256QAM	-34.99	28.06	-10.25	1.39	V		0.044	16.42

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	-31.18	31.40	-10.29	1.39	V	< 100	0.094	19.73
		16QAM	-32.99	29.59	-10.29	1.39	V		0.062	17.92
		64QAM	-34.06	28.52	-10.29	1.39	V		0.048	16.85
		256QAM	-35.08	27.50	-10.29	1.39	V		0.038	15.83
822.5		QPSK	-31.06	32.05	-10.26	1.39	V		0.110	20.41
		16QAM	-32.79	30.32	-10.26	1.39	V		0.074	18.68
		64QAM	-33.84	29.27	-10.26	1.39	V		0.058	17.63
		256QAM	-34.93	28.18	-10.26	1.39	V		0.045	16.54

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	-31.11	31.58	-10.28	1.39	V	< 100	0.098	19.91
		16QAM	-32.89	29.80	-10.28	1.39	V		0.065	18.13
		64QAM	-33.94	28.75	-10.28	1.39	V		0.051	17.08
		256QAM	-35.01	27.68	-10.28	1.39	V		0.040	16.01
821.5		QPSK	-30.94	32.10	-10.26	1.39	V		0.111	20.45
		16QAM	-32.64	30.40	-10.26	1.39	V		0.075	18.75
		64QAM	-33.72	29.32	-10.26	1.39	V		0.059	17.67
		256QAM	-34.82	28.22	-10.26	1.39	V		0.045	16.57

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	-31.08	31.80	-10.27	1.39	V	< 100	0.103	20.14
		16QAM	-32.91	29.97	-10.27	1.39	V		0.068	18.31
		64QAM	-34.01	28.87	-10.27	1.39	V		0.053	17.21
		256QAM	-34.98	27.90	-10.27	1.39	V		0.042	16.24

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	-31.10	31.94	-10.26	1.39	V	< 7.00	0.107	20.29
		16QAM	-32.86	30.18	-10.26	1.39	V		0.071	18.53
		64QAM	-33.95	29.09	-10.26	1.39	V		0.055	17.44
		256QAM	-34.98	28.06	-10.26	1.39	V		0.044	16.41

Note

1. Limit: None (for reporting purposes only)

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
26715 (816.5)	1 633.00	-52.72	9.50	-62.68	1.98	H	-55.16	-13.00
	2 449.50	-56.42	10.30	-60.81	2.46	V	-52.97	-13.00
	3 266.00	-58.16	10.89	-58.48	2.88	V	-50.47	-13.00
26765 (821.5)	1 643.00	-52.79	9.60	-63.17	1.98	V	-55.55	-13.00
	2 464.50	-55.57	10.42	-60.23	2.47	H	-52.27	-13.00
	3 286.00	-58.16	12.01	-59.72	2.88	H	-50.59	-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	1.0931
			16QAM			1.0982
			64QAM			1.0966
			256QAM			1.0959
	3 MHz	822.5	QPSK	15		2.7270
			16QAM			2.7122
			64QAM			2.7183
			256QAM			2.7173
	5 MHz	821.5	QPSK	25		4.5311
			16QAM			4.5157
			64QAM			4.5134
			256QAM			4.5135
	10 MHz	819.0	QPSK	50		9.0199
			16QAM			9.0258
			64QAM			9.0203
			256QAM			8.9977
	15 MHz	821.5	QPSK	75		13.513
			16QAM			13.491
			64QAM			13.464
			256QAM			13.431

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	3.6990	27.976	-67.195	-39.219	-13.00
		823.3	3.7049	27.976	-67.295	-39.319	
	3	815.5	3.6825	27.976	-67.417	-39.441	
		822.5	3.7124	27.976	-67.346	-39.370	
	5	816.5	3.6965	27.976	-67.153	-39.177	
		821.5	3.1860	27.976	-67.237	-39.261	
	10	819.0	3.6955	27.976	-67.013	-39.037	
	15	821.5	3.1855	27.976	-67.410	-39.434	

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

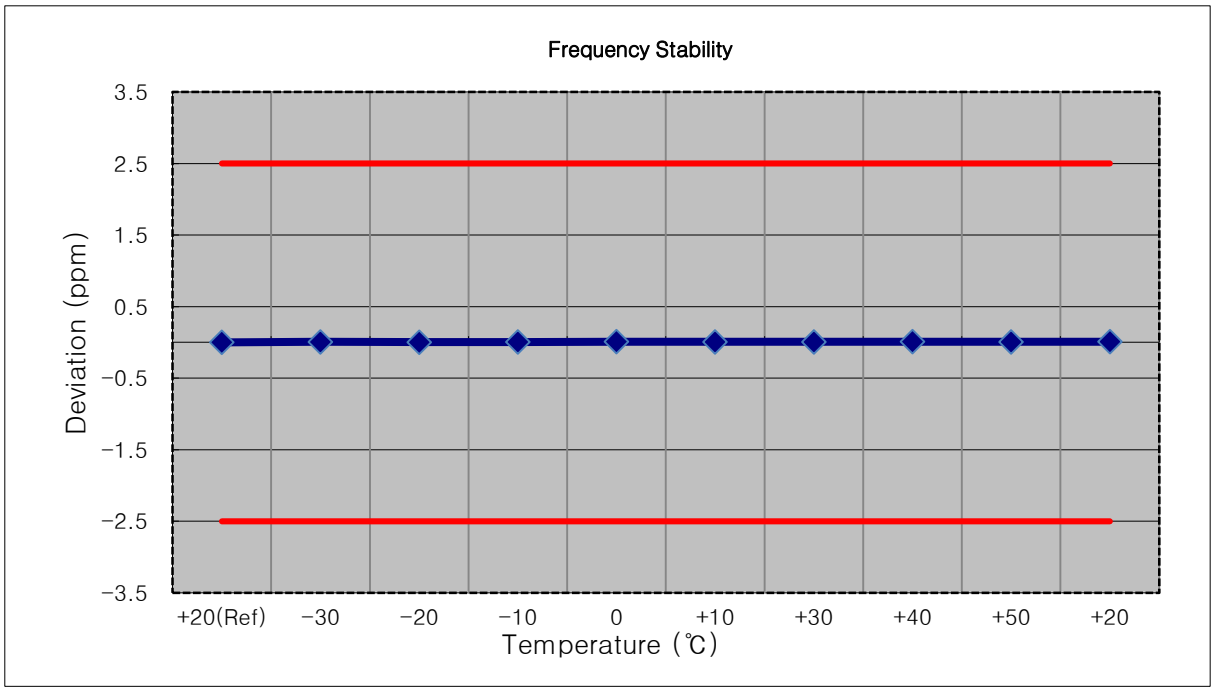
▣ OPERATING FREQUENCY: 814,700,000 Hz

▣ CHANNEL: 26697(1.4 MHz)

▣ REFERENCE VOLTAGE: 3.880 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.880	+20(Ref)	814 700 008	0.0	0.000 000	0.000
100 %		-30	814 700 014	6.9	0.000 001	0.008
100 %		-20	814 700 011	3.5	0.000 000	0.004
100 %		-10	814 700 013	5.4	0.000 001	0.007
100 %		0	814 700 015	7.8	0.000 001	0.010
100 %		+10	814 700 014	6.2	0.000 001	0.008
100 %		+30	814 700 014	6.6	0.000 001	0.008
100 %		+40	814 700 015	7.8	0.000 001	0.010
100 %		+50	814 700 015	7.0	0.000 001	0.009
Batt. Endpoint	3.350	+20	814 700 015	7.4	0.000 001	0.009



▣ MODE: LTE 26

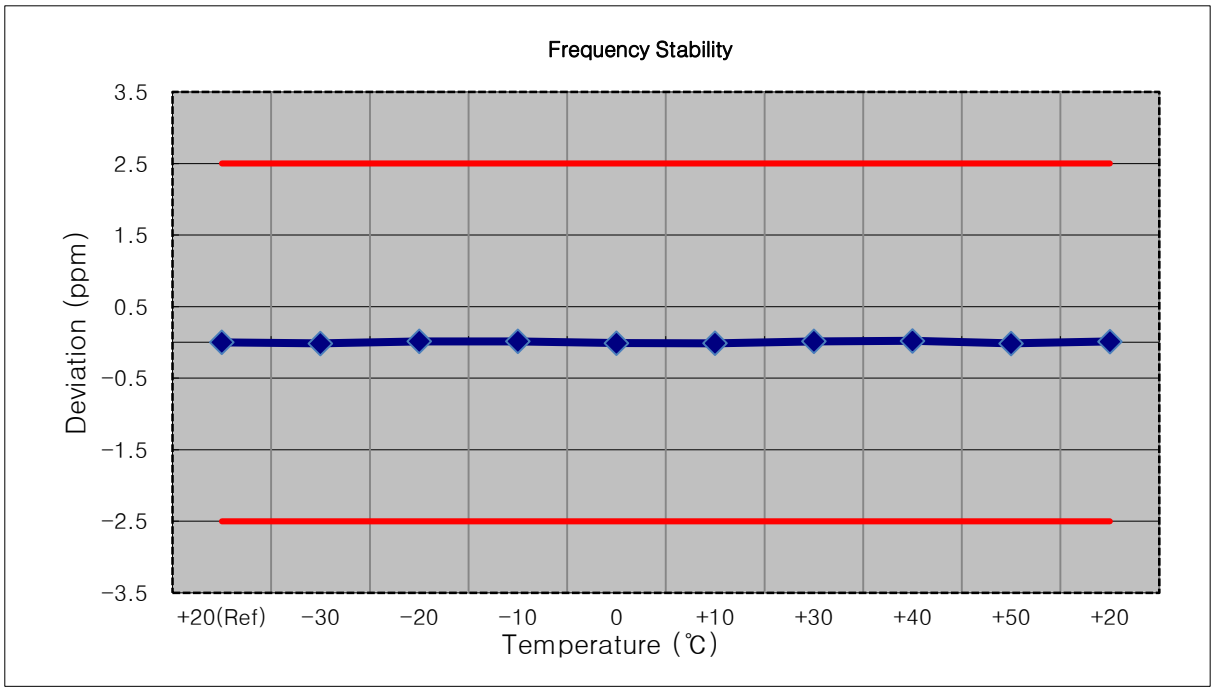
▣ OPERATING FREQUENCY: 815,500,000 Hz

▣ CHANNEL: 26705(3 MHz)

▣ REFERENCE VOLTAGE: 3.880 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.880	+20(Ref)	815 499 990	0.0	0.000 000	0.000
100 %		-30	815 499 979	-11.2	-0.000 001	-0.014
100 %		-20	815 500 002	12.1	0.000 001	0.015
100 %		-10	815 500 001	11.2	0.000 001	0.014
100 %		0	815 499 981	-8.9	-0.000 001	-0.011
100 %		+10	815 499 981	-9.3	-0.000 001	-0.011
100 %		+30	815 500 002	11.8	0.000 001	0.014
100 %		+40	815 500 008	18.1	0.000 002	0.022
100 %		+50	815 499 979	-11.3	-0.000 001	-0.014
Batt. Endpoint	3.350	+20	815 500 000	10.4	0.000 001	0.013



▣ MODE: LTE 26

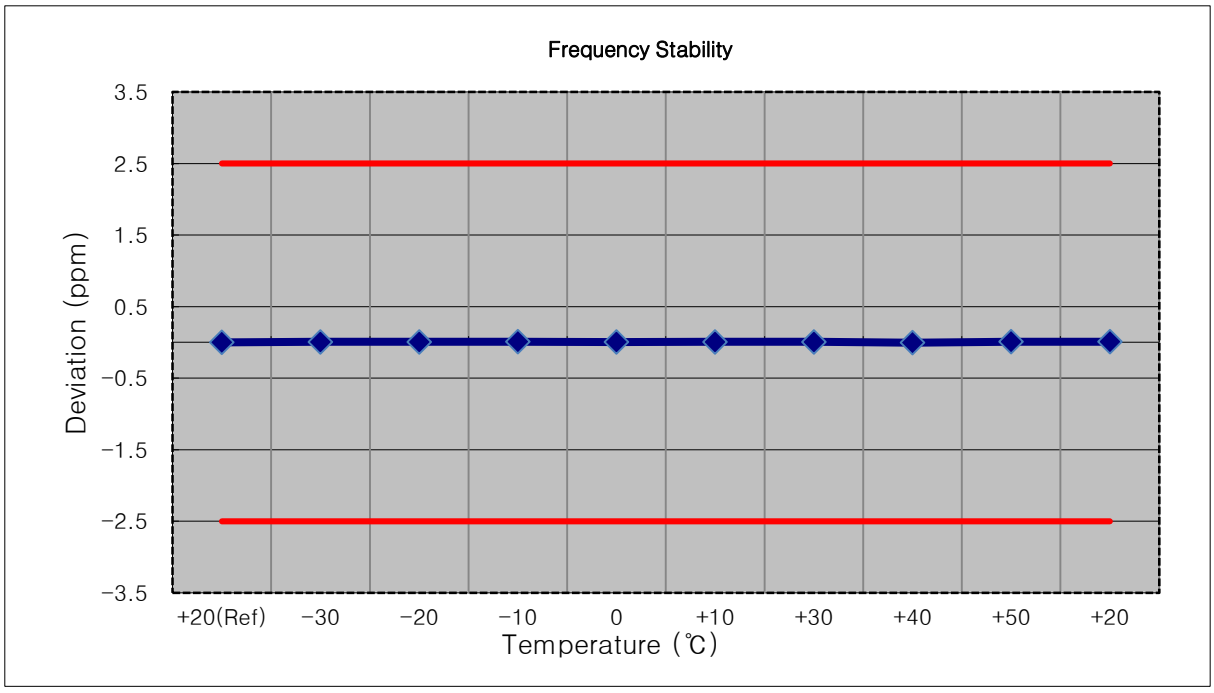
▣ OPERATING FREQUENCY: 816,500,000 Hz

▣ CHANNEL: 26715(5 MHz)

▣ REFERENCE VOLTAGE: 3.880 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.880	+20(Ref)	816 500 005	0.0	0.000 000	0.000
100 %		-30	816 500 012	6.6	0.000 001	0.008
100 %		-20	816 500 012	6.2	0.000 001	0.008
100 %		-10	816 500 013	7.6	0.000 001	0.009
100 %		0	816 500 010	4.6	0.000 001	0.006
100 %		+10	816 500 012	6.1	0.000 001	0.007
100 %		+30	816 500 011	5.6	0.000 001	0.007
100 %		+40	816 500 002	-3.6	0.000 000	-0.004
100 %		+50	816 500 013	7.4	0.000 001	0.009
Batt. Endpoint	3.350	+20	816 500 014	8.4	0.000 001	0.010



▣ MODE: LTE 26

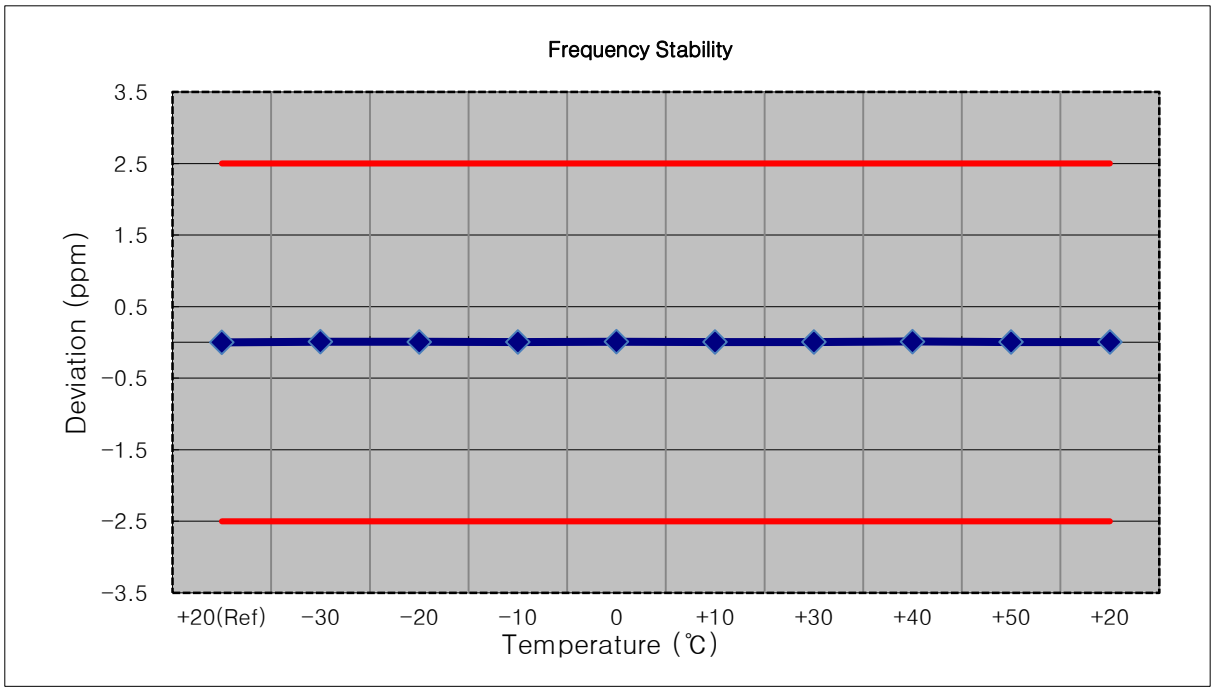
▣ OPERATING FREQUENCY: 819,000,000 Hz

▣ CHANNEL: 26740(10 MHz)

▣ REFERENCE VOLTAGE: 3.880 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.880	+20(Ref)	818 999 995	0.0	0.000 000	0.000
100 %		-30	819 000 002	7.4	0.000 001	0.009
100 %		-20	819 000 001	6.6	0.000 001	0.008
100 %		-10	818 999 999	4.7	0.000 001	0.006
100 %		0	819 000 003	8.0	0.000 001	0.010
100 %		+10	818 999 999	4.4	0.000 001	0.005
100 %		+30	819 000 000	5.0	0.000 001	0.006
100 %		+40	819 000 004	9.7	0.000 001	0.012
100 %		+50	819 000 000	5.2	0.000 001	0.006
Batt. Endpoint	3.350	+20	818 999 999	4.3	0.000 001	0.005



▣ MODE: LTE 26

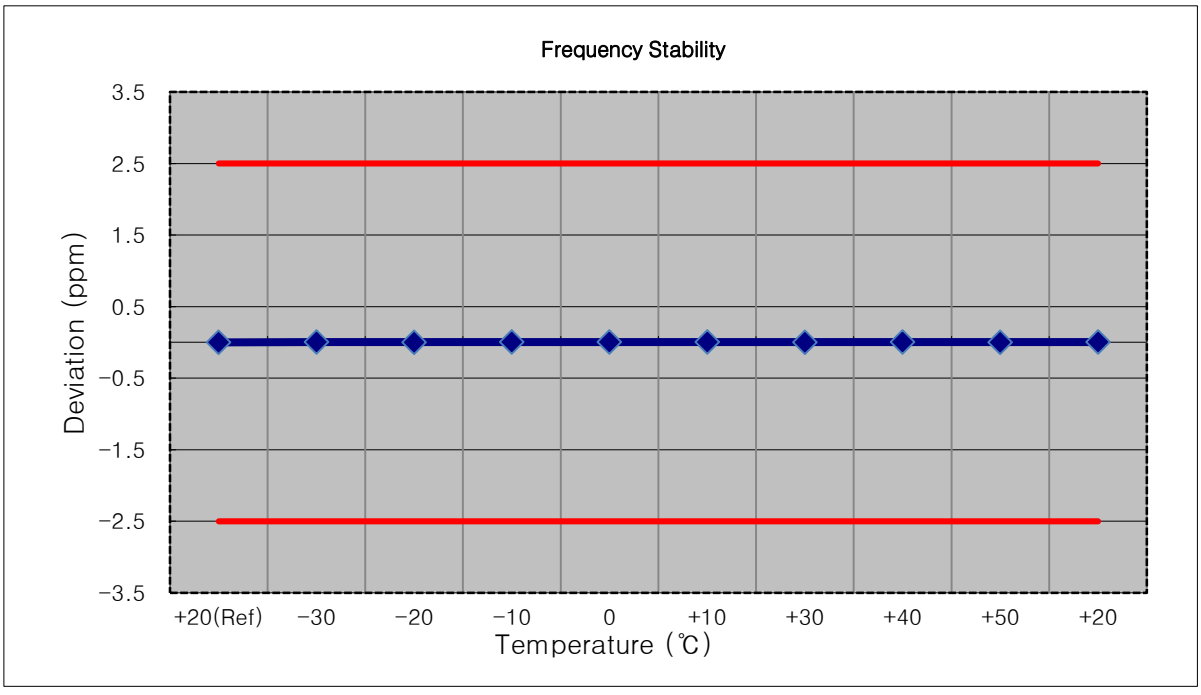
▣ OPERATING FREQUENCY: 821,500,000 Hz

▣ CHANNEL: 26765(15 MHz)

▣ REFERENCE VOLTAGE: 3.880 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.880	+20(Ref)	821 499 996	0.0	0.000 000	0.000
100 %		-30	821 500 001	4.4	0.000 001	0.005
100 %		-20	821 499 999	2.9	0.000 000	0.004
100 %		-10	821 500 000	4.1	0.000 000	0.005
100 %		0	821 500 000	4.0	0.000 000	0.005
100 %		+10	821 500 001	5.1	0.000 001	0.006
100 %		+30	821 500 000	3.6	0.000 000	0.004
100 %		+40	821 500 000	3.8	0.000 000	0.005
100 %		+50	821 500 000	3.5	0.000 000	0.004
Batt. Endpoint	3.350	+20	821 500 001	4.2	0.000 001	0.005



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	24.89	0.308	100
		1	3	24.70	0.295	100
		1	5	24.92	0.310	100
		3	0	23.74	0.237	100
		3	1	23.72	0.236	100
		3	3	23.74	0.237	100
		6	0	22.92	0.196	100
	16QAM	1	0	23.98	0.250	100
		1	3	23.93	0.247	100
		1	5	23.94	0.248	100
		3	0	22.80	0.191	100
		3	1	22.74	0.188	100
		3	3	22.80	0.191	100
		6	0	21.77	0.150	100
	64QAM	1	0	22.90	0.195	100
		1	3	22.93	0.196	100
		1	5	22.91	0.195	100
		3	0	21.71	0.148	100
		3	1	21.70	0.148	100
		3	3	21.65	0.146	100
		6	0	20.58	0.114	100
	256QAM	1	0	19.81	0.096	100
		1	3	19.60	0.091	100
		1	5	19.76	0.095	100
		3	0	18.55	0.072	100
		3	1	18.53	0.071	100
		3	3	18.52	0.071	100
		6	0	18.52	0.071	100

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm)		Limit (W)
				824 MHz		
				dBm	W	
3	QPSK	1	0	24.75	0.299	100
		1	7	24.75	0.299	100
		1	14	24.68	0.294	100
		8	0	22.63	0.183	100
		8	3	22.75	0.188	100
		8	7	22.65	0.184	100
		15	0	22.72	0.187	100
	16QAM	1	0	23.91	0.246	100
		1	7	23.95	0.248	100
		1	14	23.97	0.249	100
		8	0	21.56	0.143	100
		8	3	21.64	0.146	100
		8	7	21.55	0.143	100
		15	0	21.57	0.144	100
	64QAM	1	0	22.76	0.189	100
		1	7	22.88	0.194	100
		1	14	22.82	0.191	100
		8	0	20.71	0.118	100
		8	3	20.51	0.112	100
		8	7	20.50	0.112	100
		15	0	20.55	0.114	100
	256QAM	1	0	19.84	0.096	100
		1	7	19.71	0.094	100
		1	14	19.69	0.093	100
		8	0	18.44	0.070	100
		8	3	18.51	0.071	100
		8	7	18.44	0.070	100
		15	0	18.51	0.071	100

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm)		Limit (W)
				824 MHz		
				dBm	W	
5	QPSK	1	0	24.67	0.293	100
		1	12	24.70	0.295	100
		1	24	24.66	0.292	100
		12	0	22.63	0.183	100
		12	6	22.61	0.182	100
		12	11	22.62	0.183	100
		25	0	22.64	0.184	100
	16QAM	1	0	23.93	0.247	100
		1	12	23.91	0.246	100
		1	24	23.90	0.245	100
		12	0	21.77	0.150	100
		12	6	21.58	0.144	100
		12	11	21.60	0.145	100
		25	0	21.63	0.146	100
	64QAM	1	0	22.97	0.198	100
		1	12	22.86	0.193	100
		1	24	22.99	0.199	100
		12	0	20.54	0.113	100
		12	6	20.54	0.113	100
		12	11	20.78	0.120	100
		25	0	20.79	0.120	100
	256QAM	1	0	19.95	0.099	100
		1	12	19.70	0.093	100
		1	24	19.76	0.095	100
		12	0	18.54	0.071	100
		12	6	18.54	0.071	100
		12	11	18.52	0.071	100
		25	0	18.59	0.072	100

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm)		Limit (W)
				824 MHz		
				dBm	W	
10	QPSK	1	0	24.77	0.300	100
		1	24	24.72	0.296	100
		1	49	24.63	0.290	100
		25	0	22.78	0.190	100
		25	12	22.81	0.191	100
		25	24	22.70	0.186	100
		50	0	22.74	0.188	100
	16QAM	1	0	23.96	0.249	100
		1	24	23.94	0.248	100
		1	49	23.98	0.250	100
		25	0	21.97	0.157	100
		25	12	21.83	0.152	100
		25	24	21.98	0.158	100
		50	0	21.95	0.157	100
	64QAM	1	0	22.98	0.199	100
		1	24	22.94	0.197	100
		1	49	22.84	0.192	100
		25	0	20.72	0.118	100
		25	12	20.69	0.117	100
		25	24	20.91	0.123	100
		50	0	20.75	0.119	100
	256QAM	1	0	19.93	0.098	100
		1	24	19.80	0.095	100
		1	49	19.77	0.095	100
		25	0	18.64	0.073	100
		25	12	18.57	0.072	100
		25	24	18.55	0.072	100
		50	0	18.61	0.073	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	-31.10	31.83	-10.25	1.39	V	< 7.00	0.104	20.19
		16QAM	-32.87	30.06	-10.25	1.39	V		0.069	18.42
		64QAM	-33.91	29.02	-10.25	1.39	V		0.055	17.38
		256QAM	-35.04	27.89	-10.25	1.39	V		0.042	16.25

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	-31.08	31.85	-10.25	1.39	V	< 7.00	0.105	20.21
		16QAM	-32.79	30.14	-10.25	1.39	V		0.071	18.50
		64QAM	-33.86	29.07	-10.25	1.39	V		0.055	17.43
		256QAM	-34.93	28.00	-10.25	1.39	V		0.043	16.36

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	-31.00	31.93	-10.25	1.39	V	< 7.00	0.107	20.29
		16QAM	-32.74	30.19	-10.25	1.39	V		0.072	18.55
		64QAM	-33.84	29.09	-10.25	1.39	V		0.056	17.45
		256QAM	-34.88	28.05	-10.25	1.39	V		0.044	16.41

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	-30.87	32.06	-10.25	1.39	V	< 7.00	0.110	20.42
		16QAM	-32.68	30.25	-10.25	1.39	V		0.073	18.61
		64QAM	-33.71	29.22	-10.25	1.39	V		0.057	17.58
		256QAM	-34.77	28.16	-10.25	1.39	V		0.045	16.52

8.8.3 RADIATED SPURIOUS EMISSIONS

▣ MODE: LTE B26

▣ MODULATION SIGNAL: 10 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	-52.60	9.70	-62.92	1.99	H	-55.21	-13.00
	2 472.00	-54.86	10.46	-59.51	2.47	V	-51.52	-13.00
	3 296.00	-57.60	12.07	-59.09	2.89	H	-49.90	-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	3.7029	27.976	-66.918	-38.942	-13.00
	3		3.7199	27.976	-67.294	-39.318	
	5		3.7024	27.976	-67.412	-39.436	
	10		3.7074	27.976	-66.900	-38.924	

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)

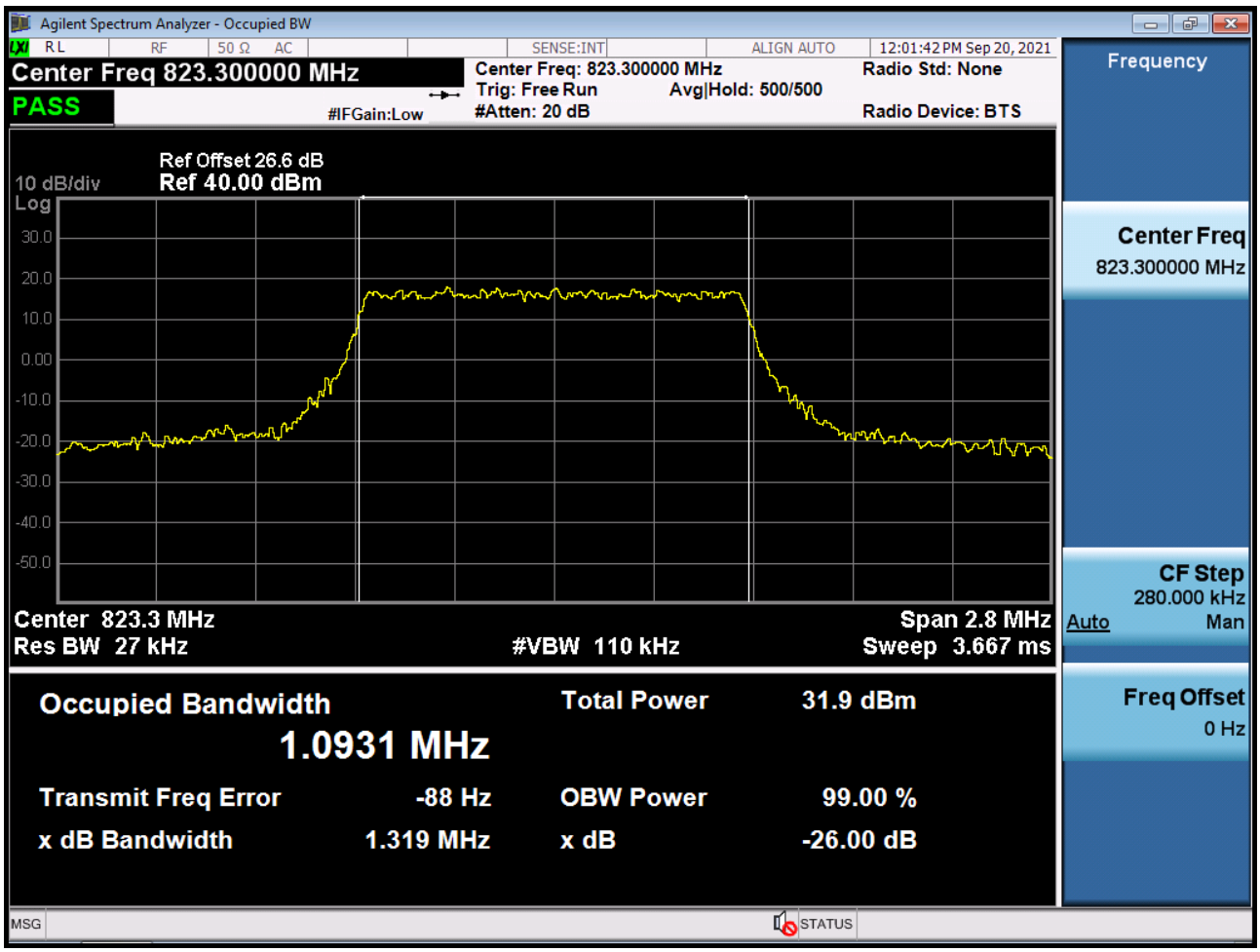
Plots of the EUT's Band Edge are shown Page 98 ~ 109.

8.8.6 BAND EDGE(Part22)

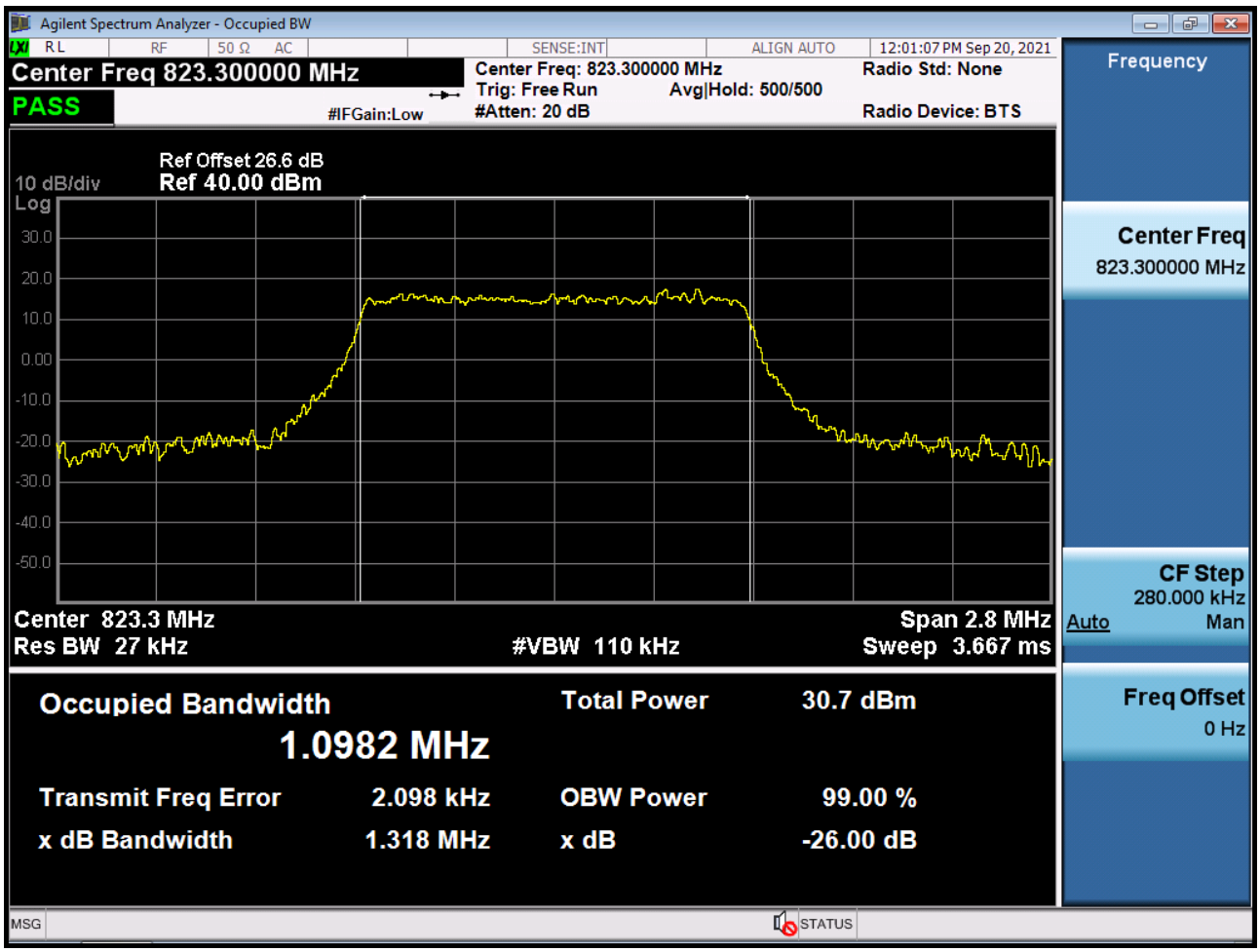
- Test Channel : 26790(824.0 MHz)
- Plots of the EUT's Band Edge are shown Page 110 ~ 117.

9. TEST PLOTS

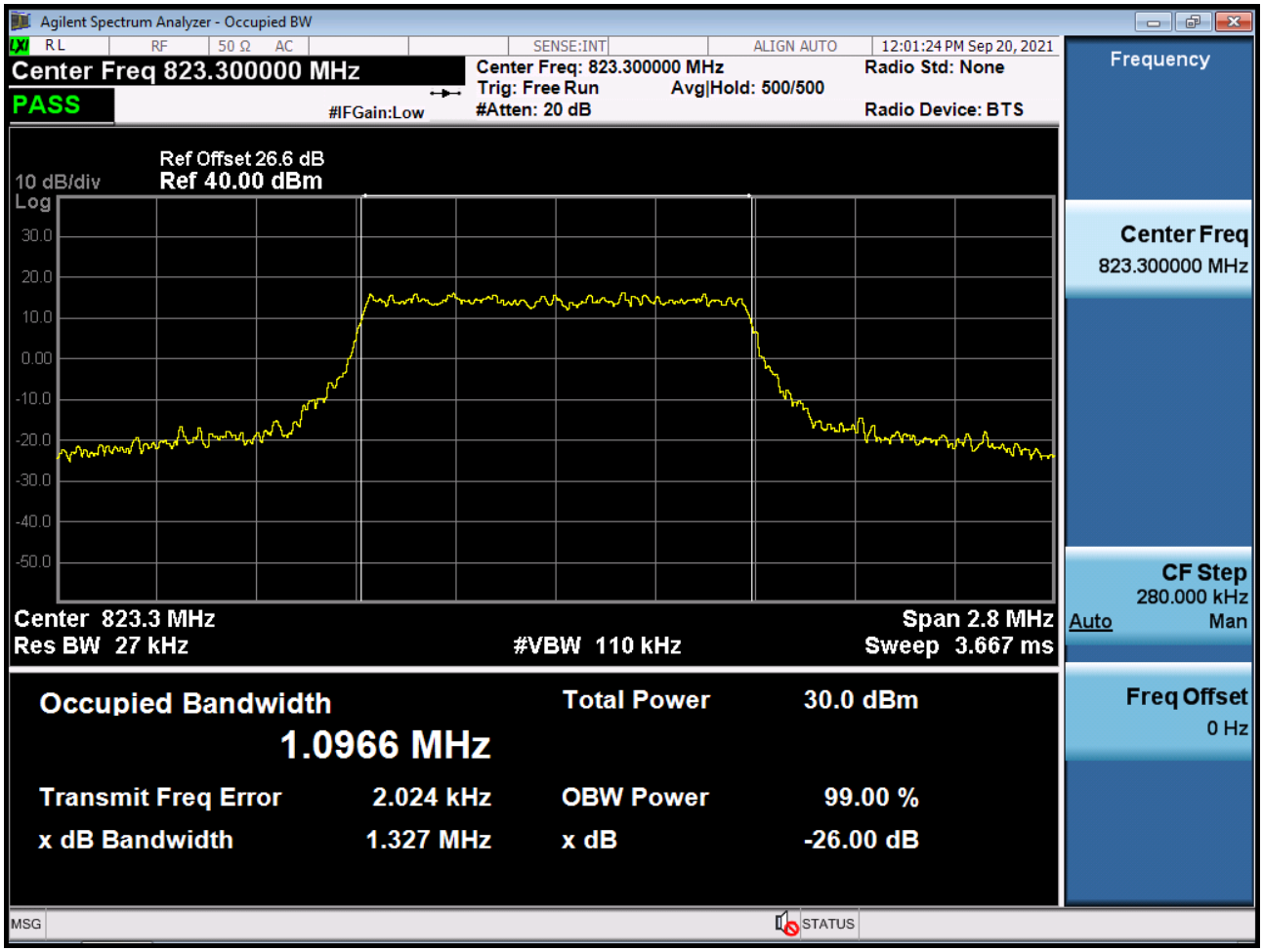
BAND 26. Occupied Bandwidth Plot (1.4 M BW Ch.26783 QPSK RB 6_0)



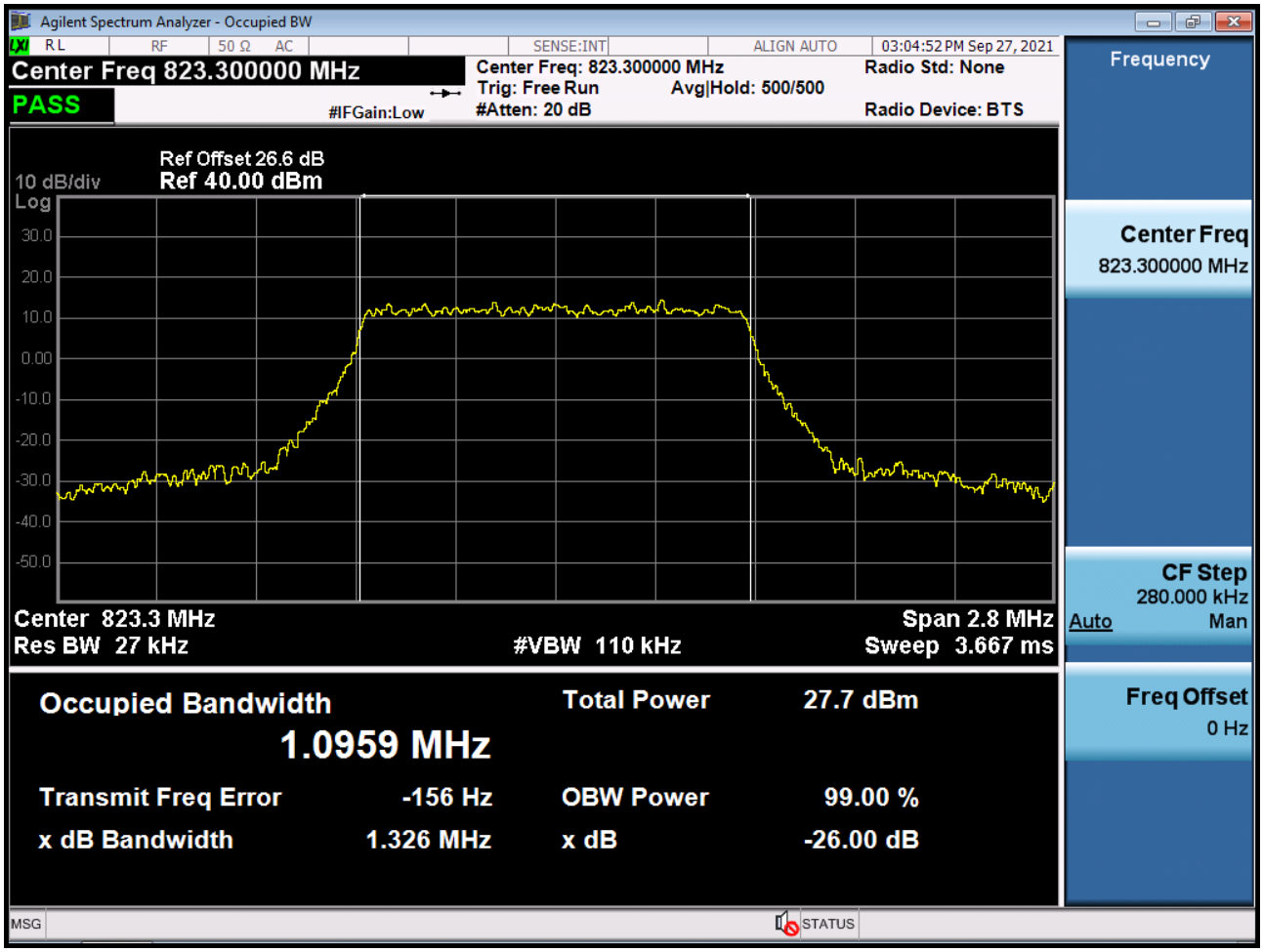
BAND 26. Occupied Bandwidth Plot (1.4 M BW Ch.26783 16QAM RB 6_0)



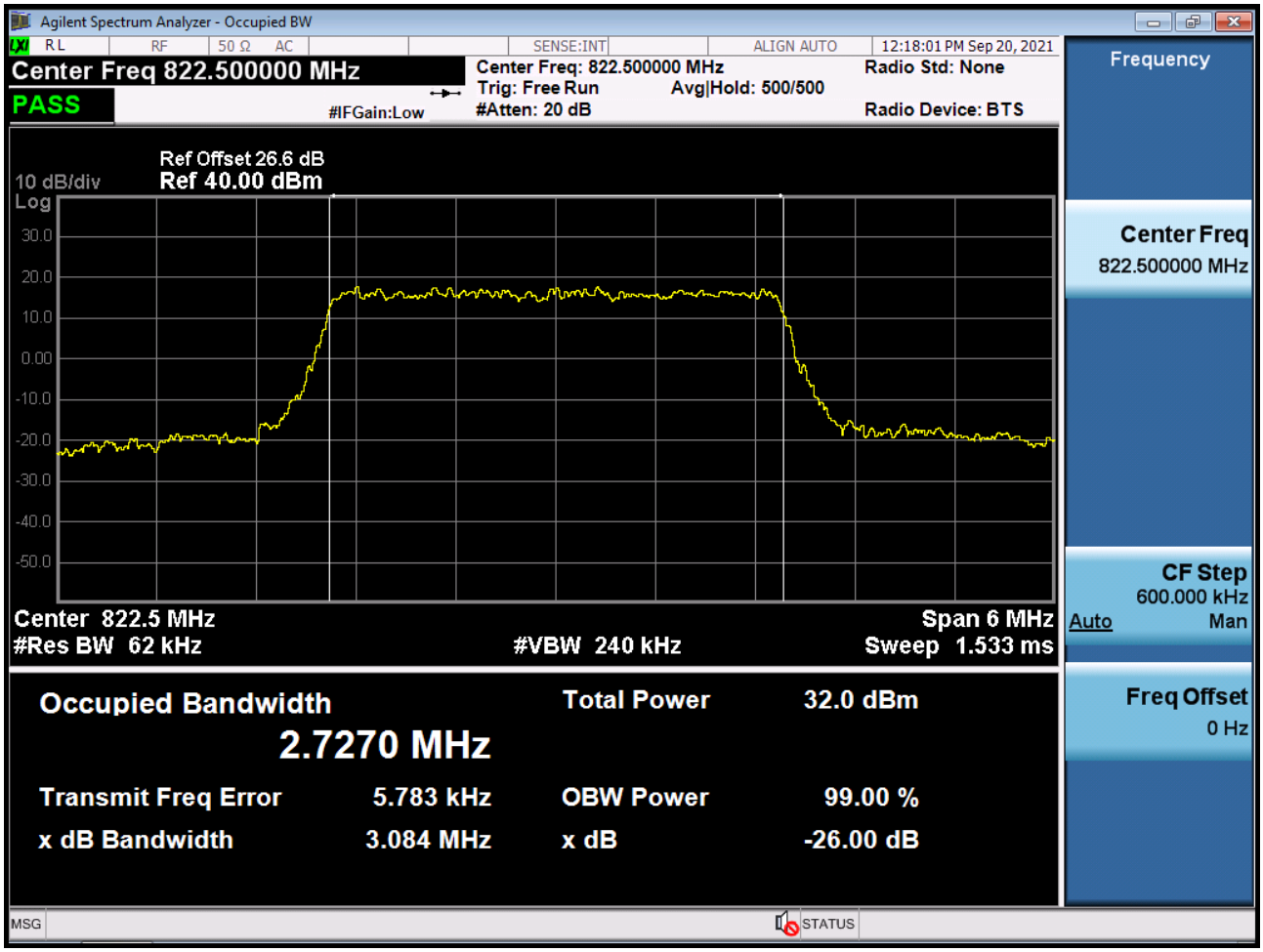
BAND 26. Occupied Bandwidth Plot (1.4 M BW Ch.26783 64QAM RB 6_0)



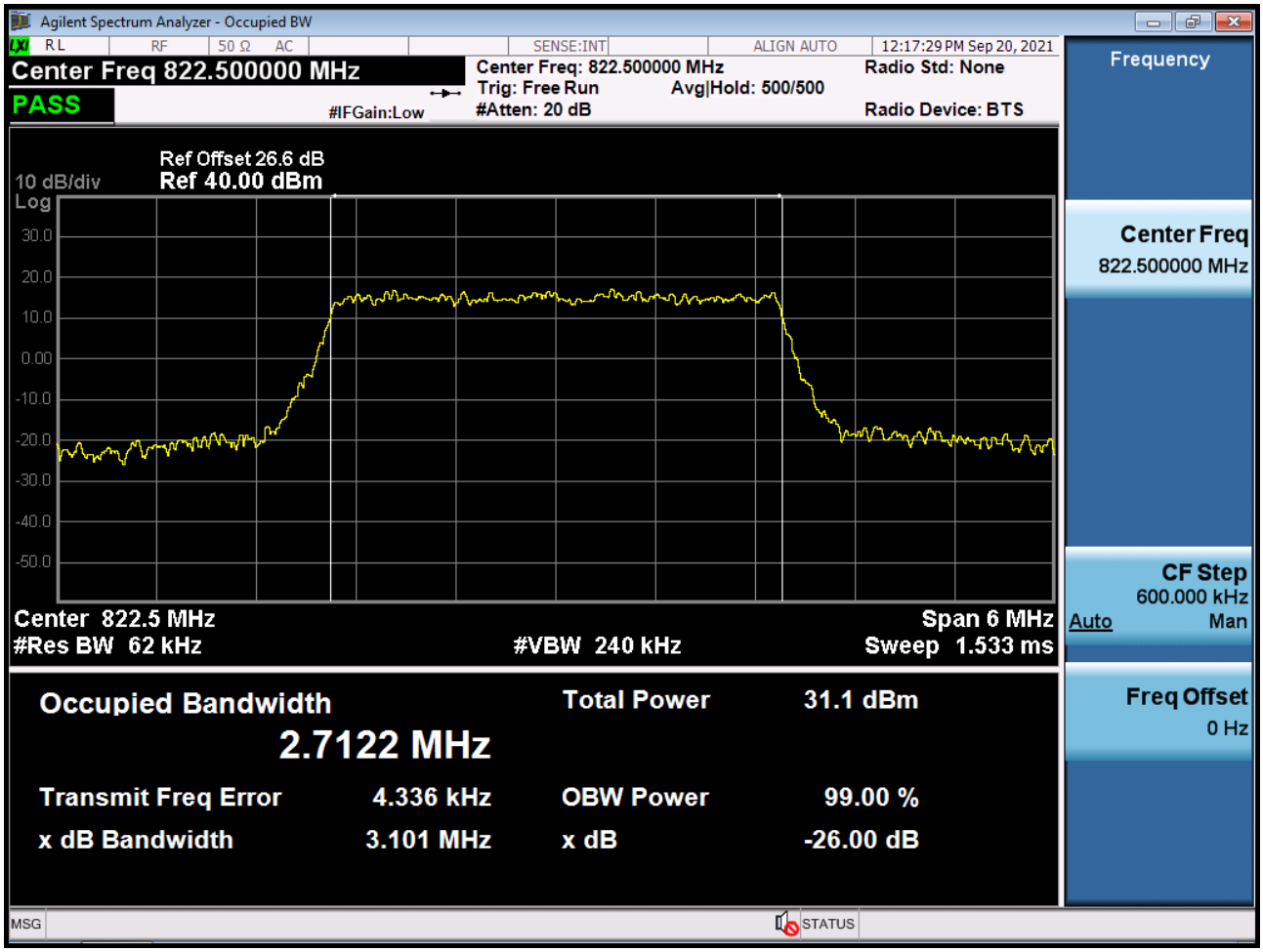
BAND 26. Occupied Bandwidth Plot (1.4 M BW Ch.26783 256QAM RB 6_0)



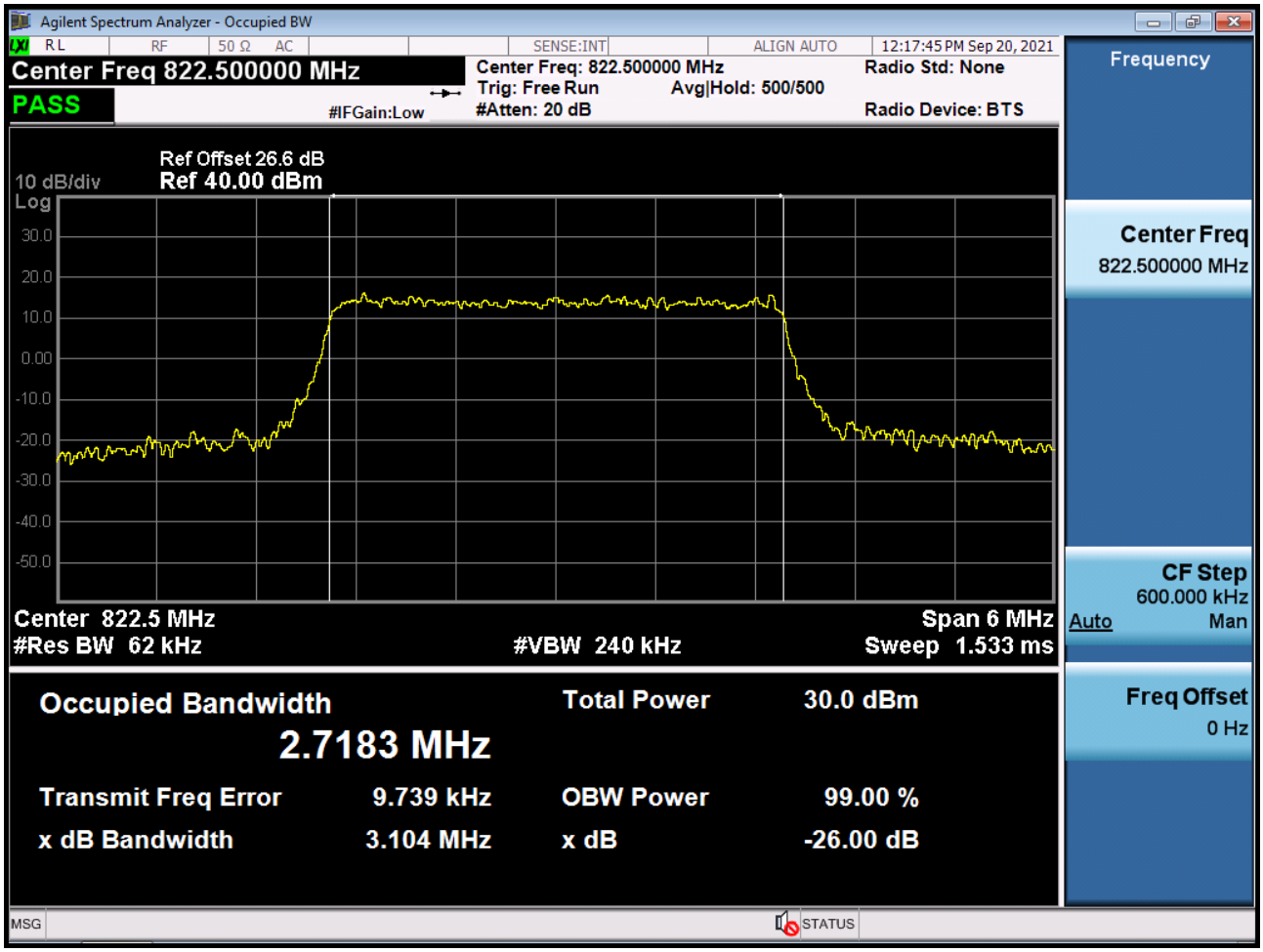
BAND 26. Occupied Bandwidth Plot (3 M BW Ch.26775 QPSK RB 15_0)



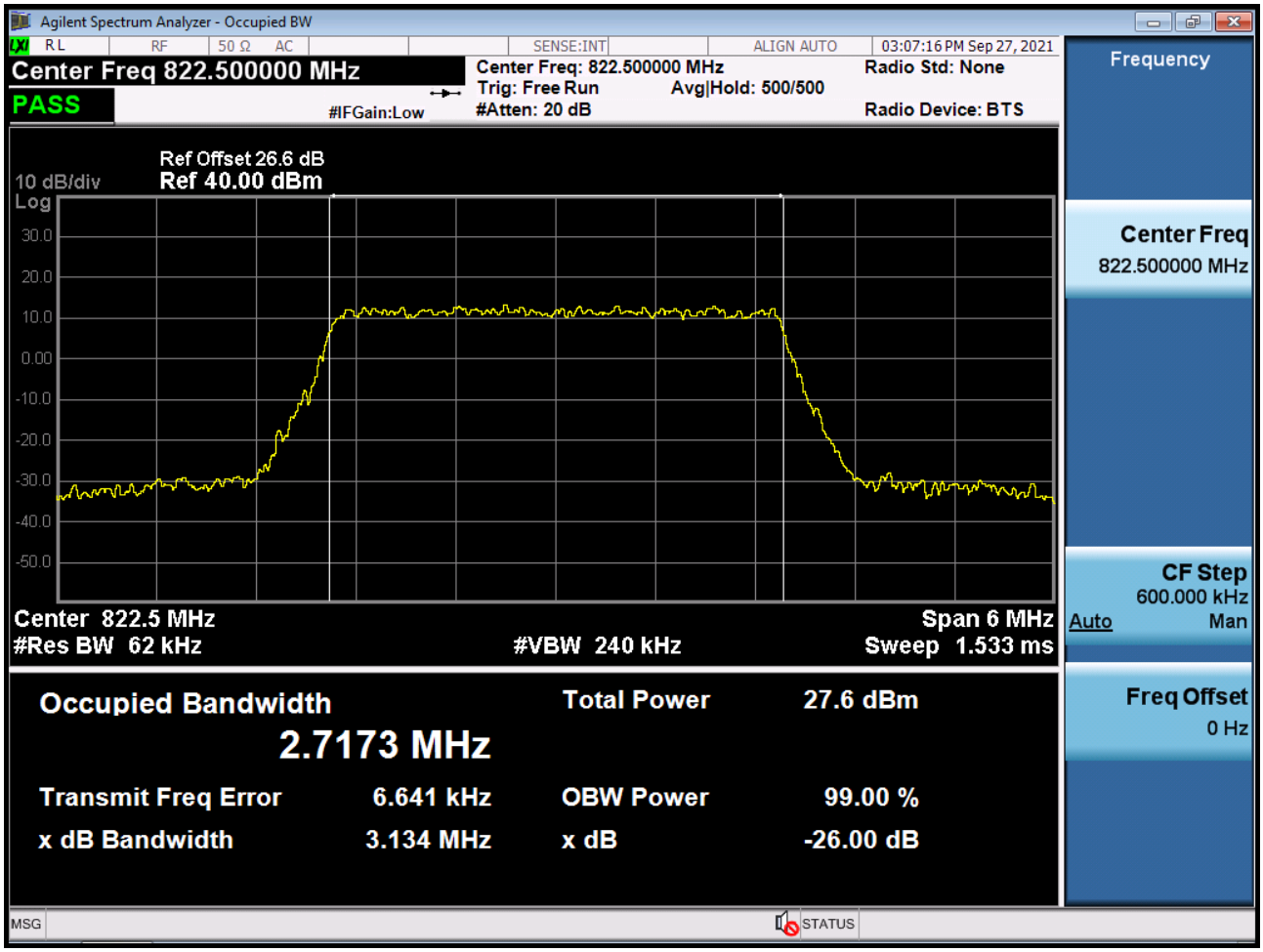
BAND 26. Occupied Bandwidth Plot (3 M BW Ch.26775 16QAM RB 15_0)



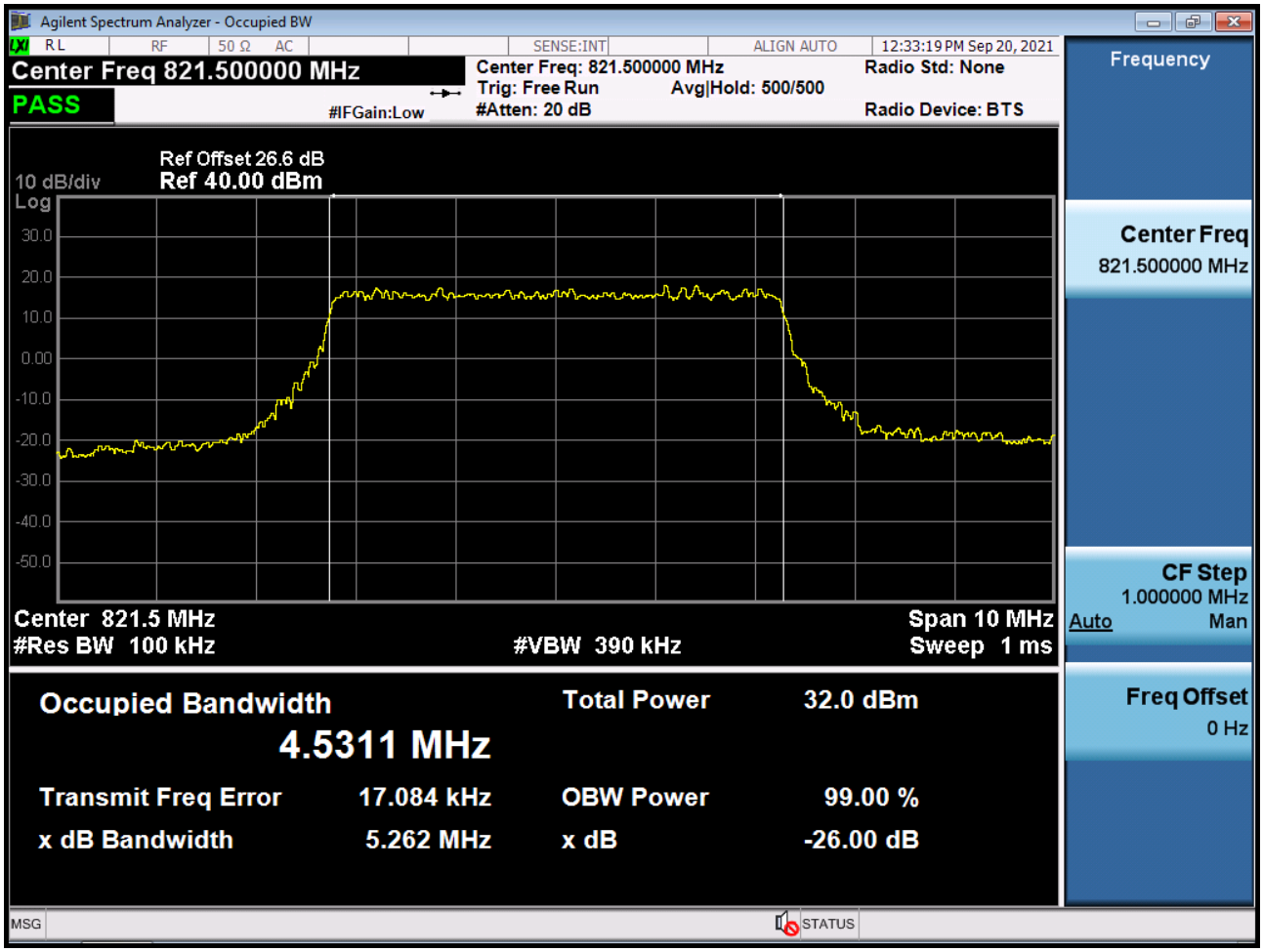
BAND 26. Occupied Bandwidth Plot (3 M BW Ch.26775 64QAM RB 15_0)



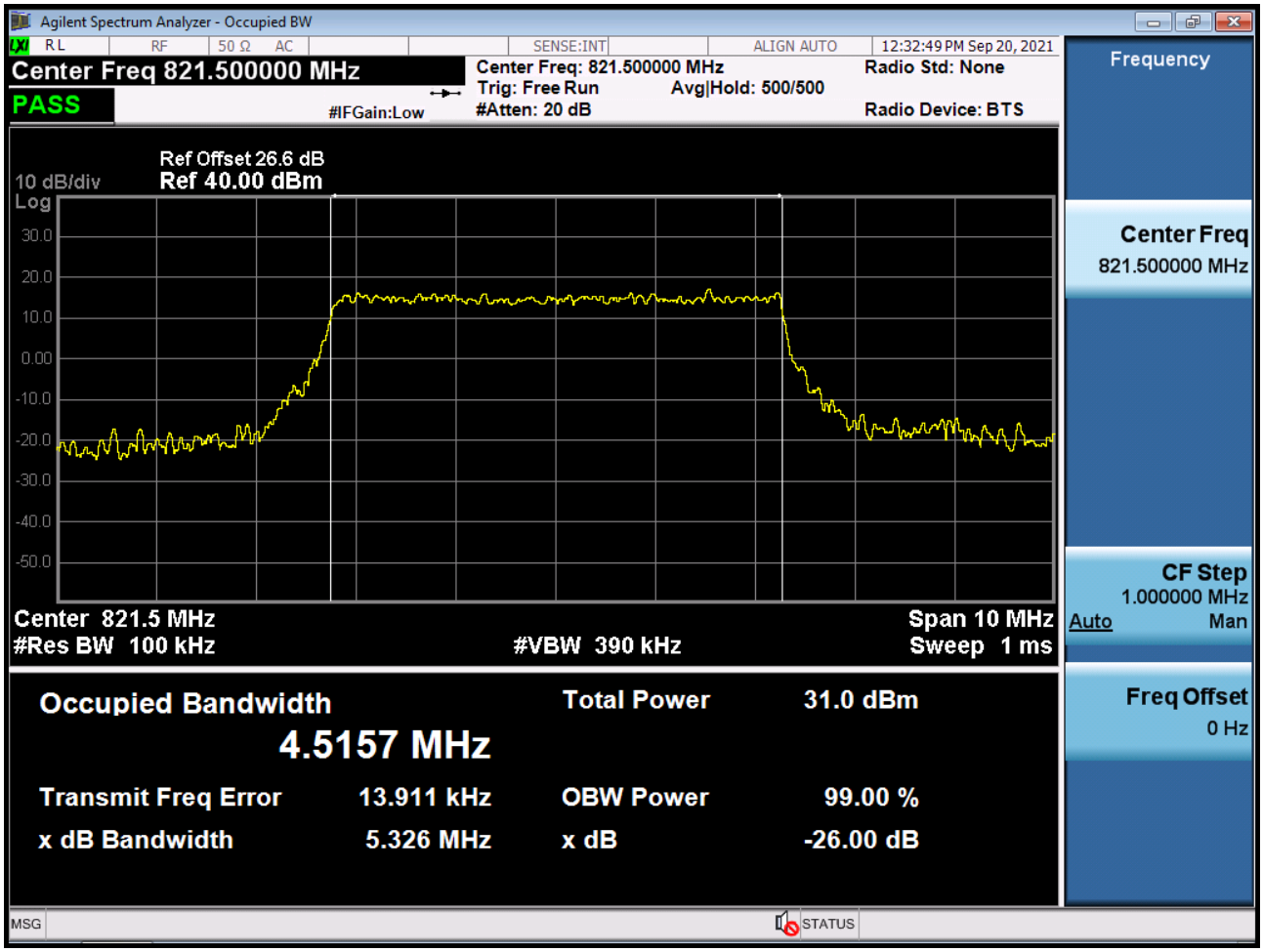
BAND 26. Occupied Bandwidth Plot (3 M BW Ch.26775 256QAM RB 15_0)



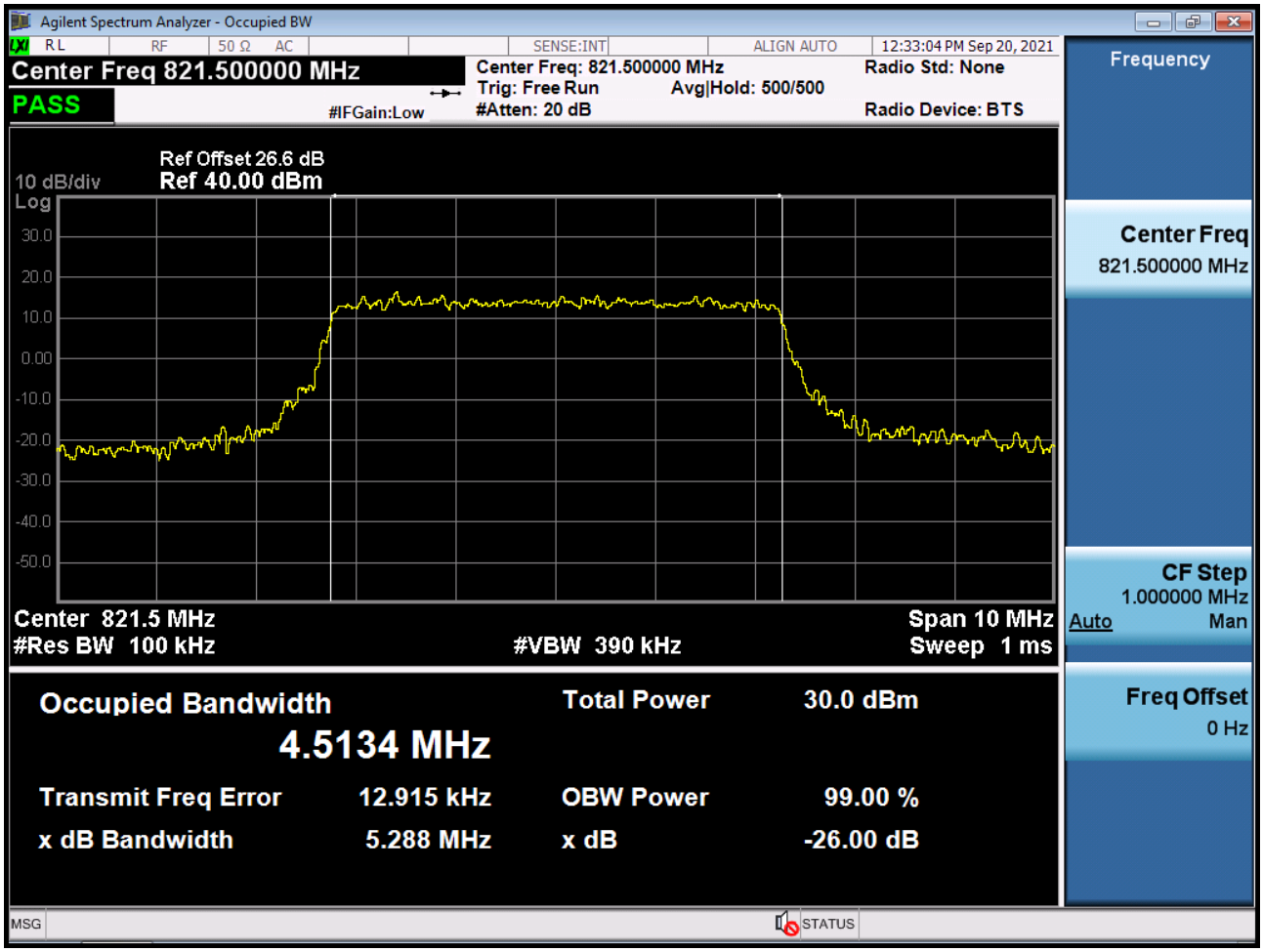
BAND 26. Occupied Bandwidth Plot (5 M BW Ch.26765 QPSK RB 25_0)



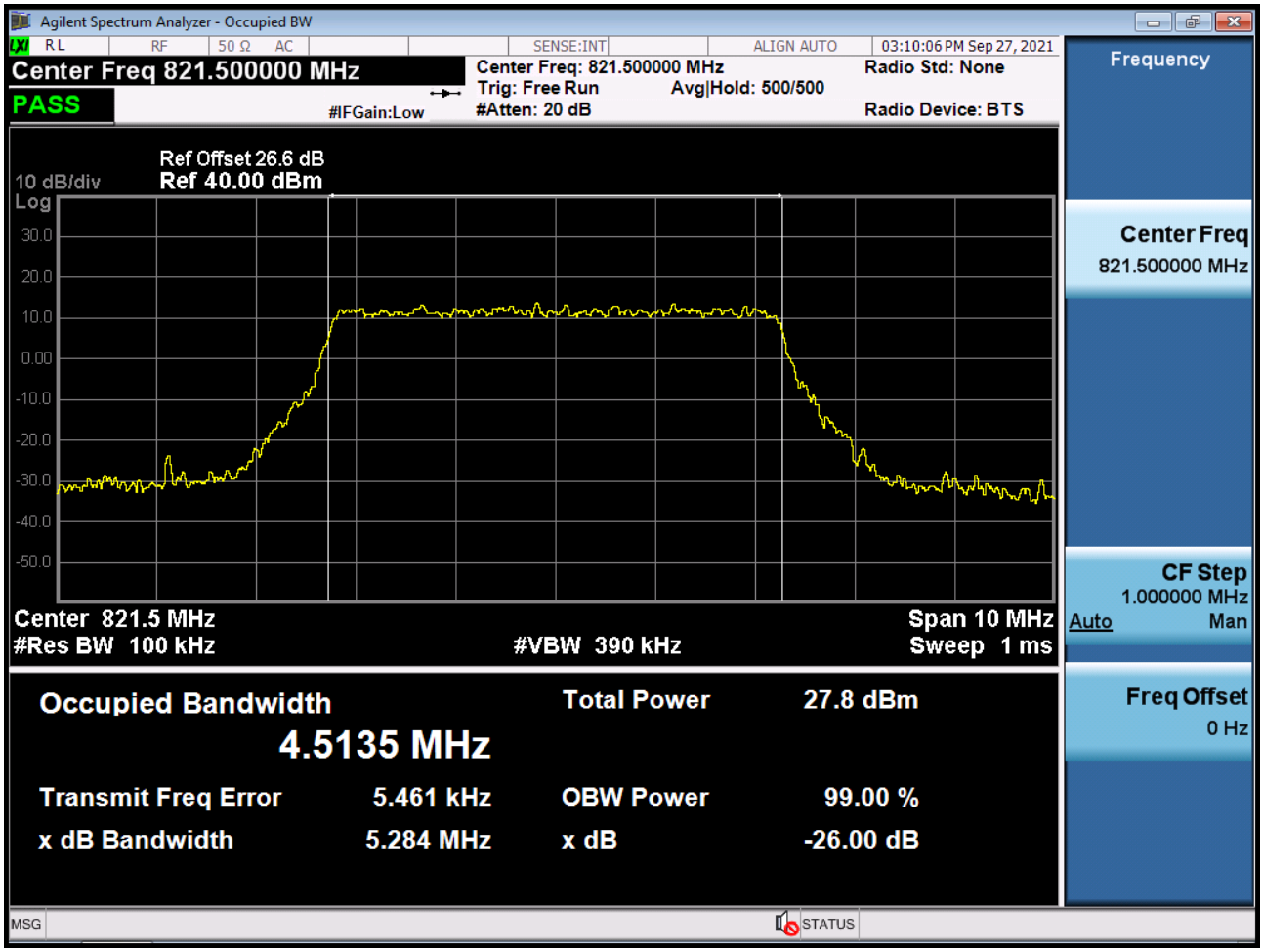
BAND 26. Occupied Bandwidth Plot (5 M BW Ch.26765 16QAM RB 25_0)



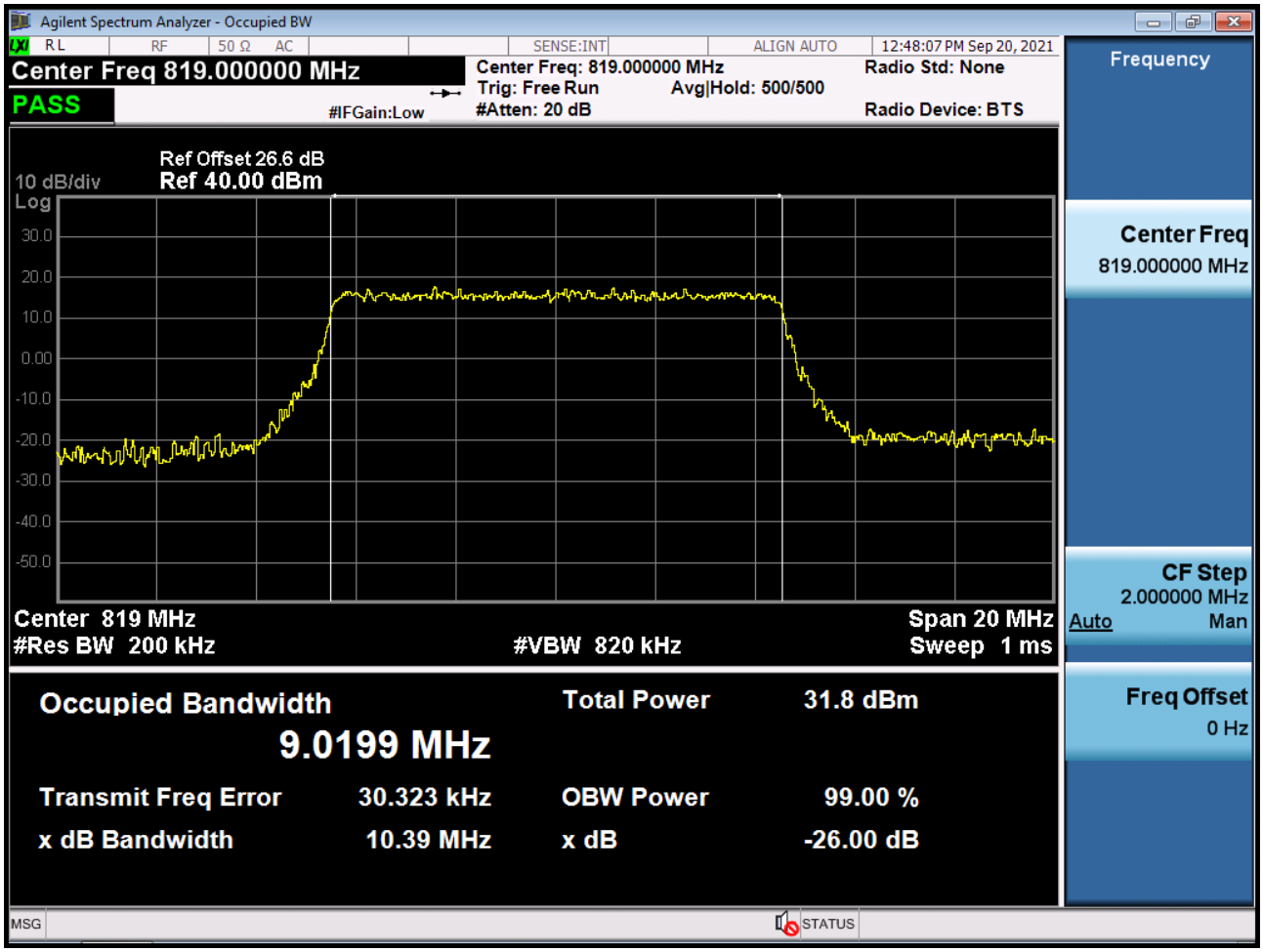
BAND 26. Occupied Bandwidth Plot (5 M BW Ch.26765 64QAM RB 25_0)



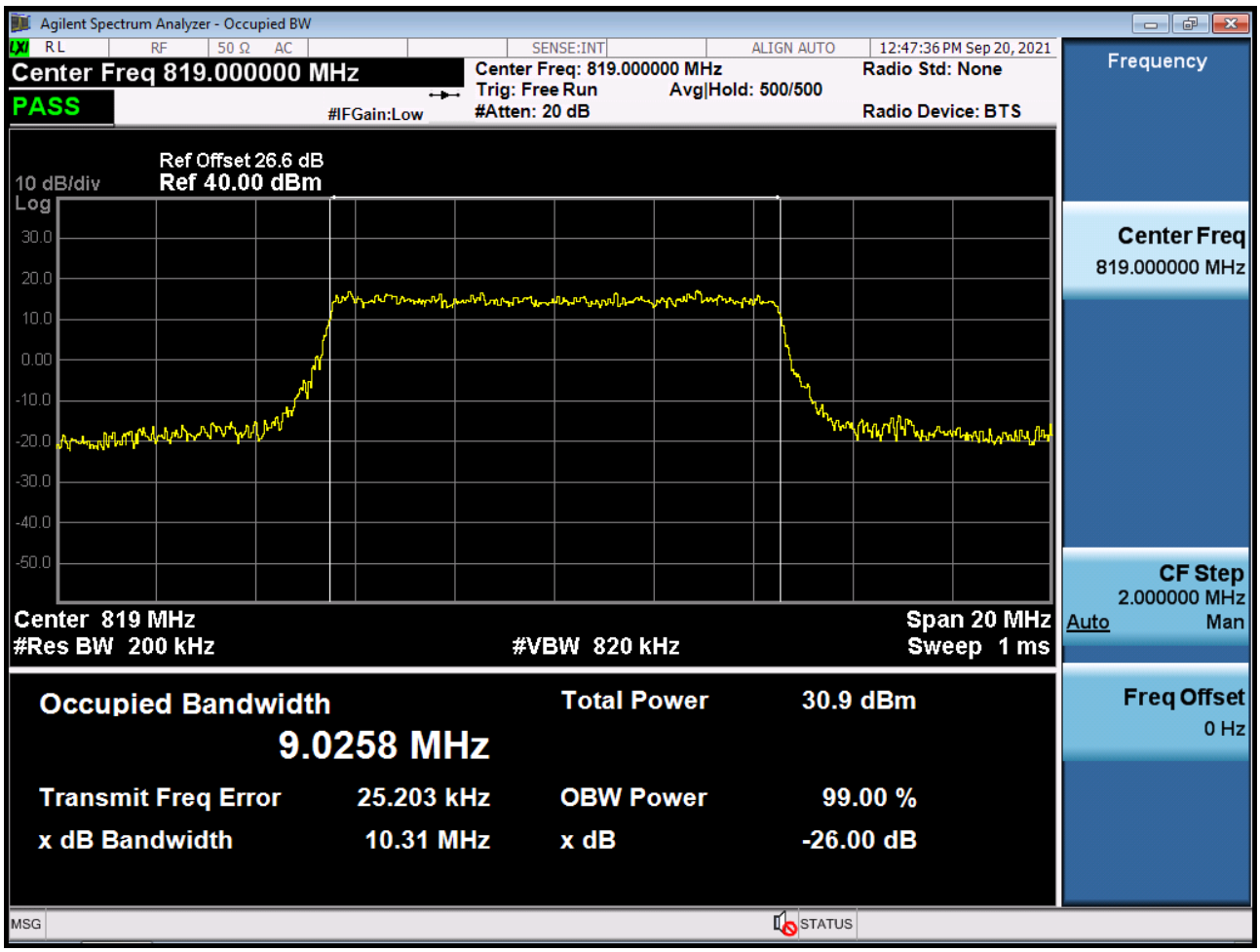
BAND 26. Occupied Bandwidth Plot (5 M BW Ch.26765 256QAM RB 25_0)



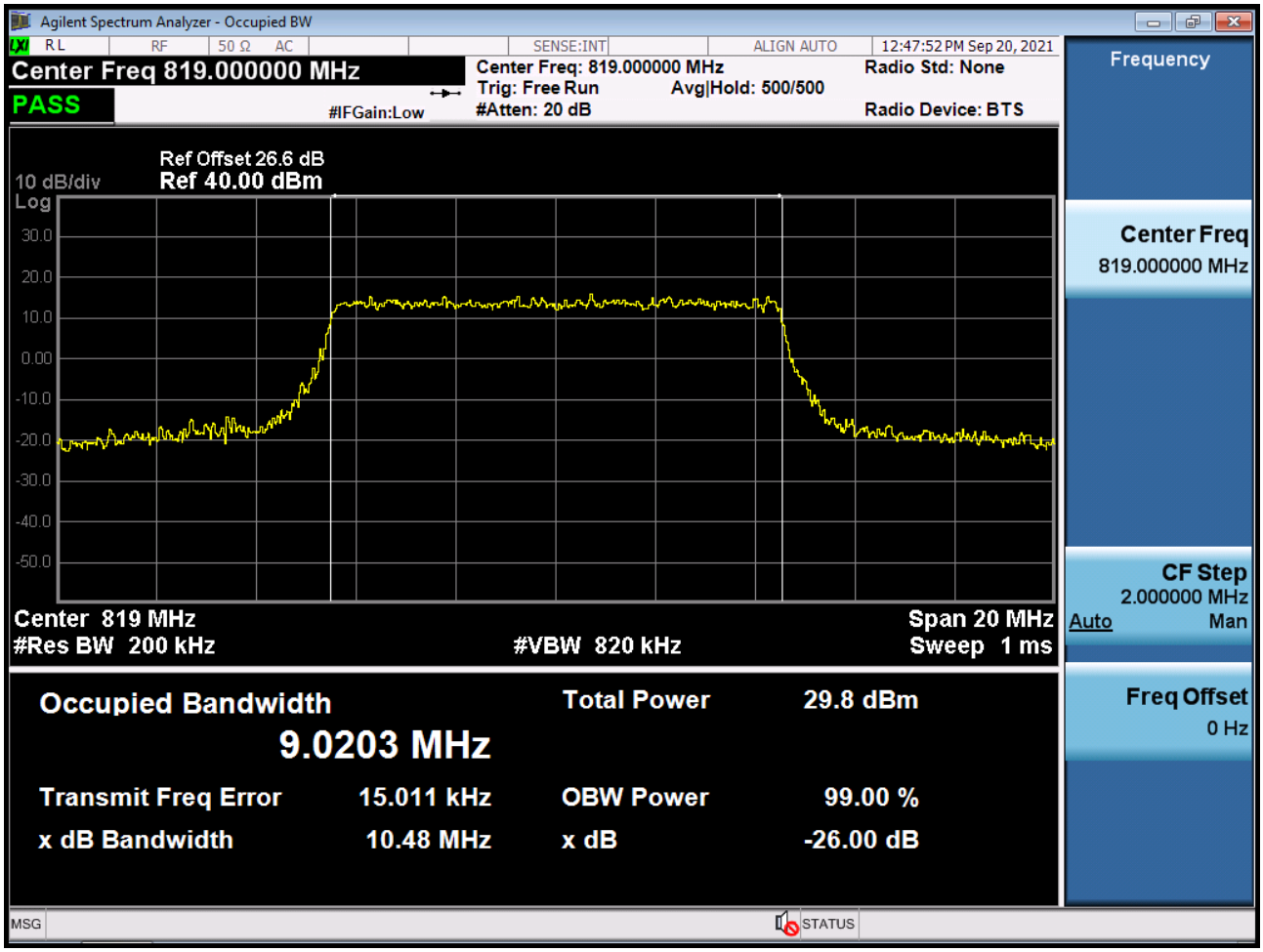
BAND 26. Occupied Bandwidth Plot (10 M BW Ch.26740 QPSK RB 50_0)



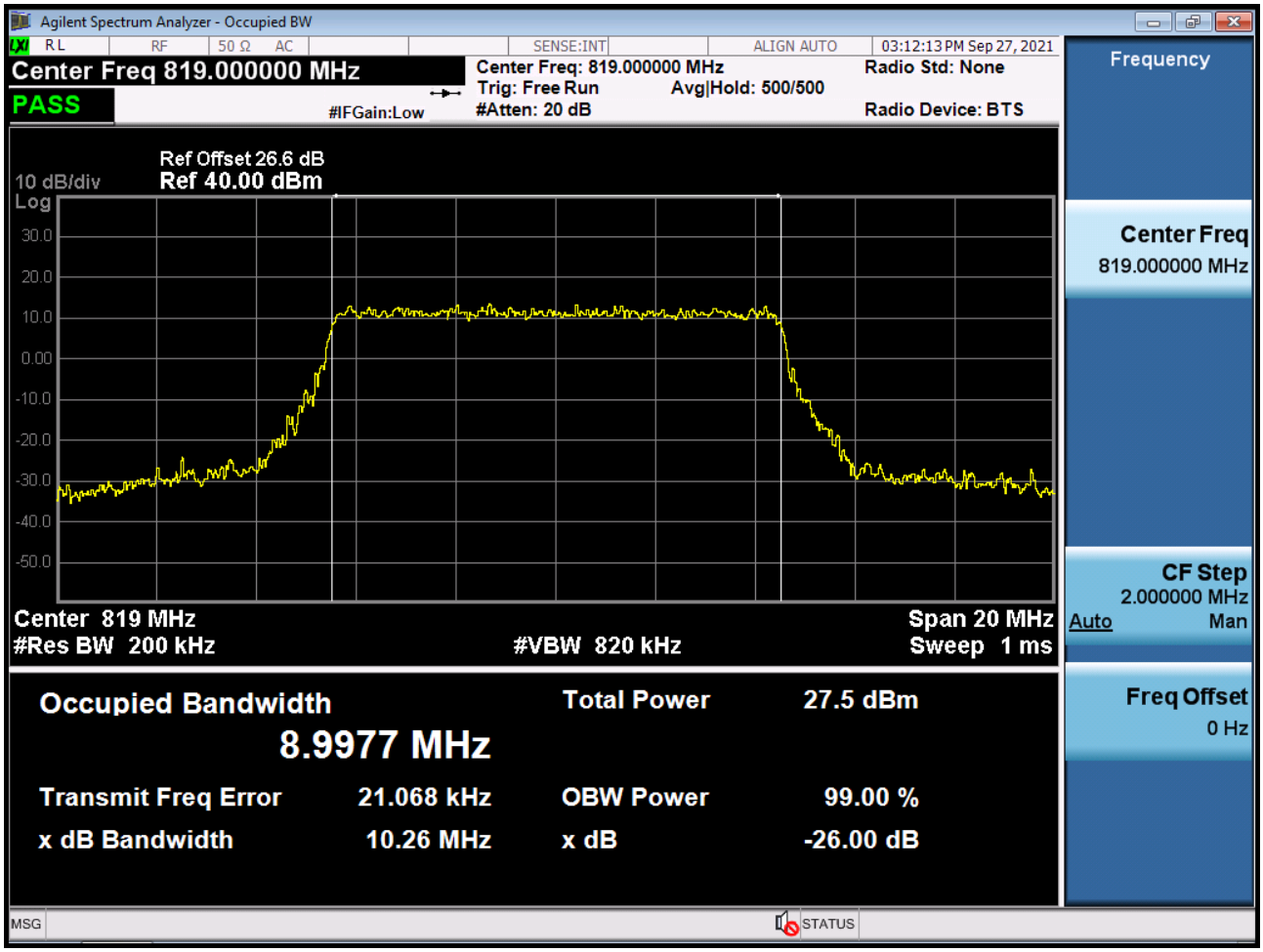
BAND 26. Occupied Bandwidth Plot (10 M BW Ch.26740 16QAM RB 50_0)



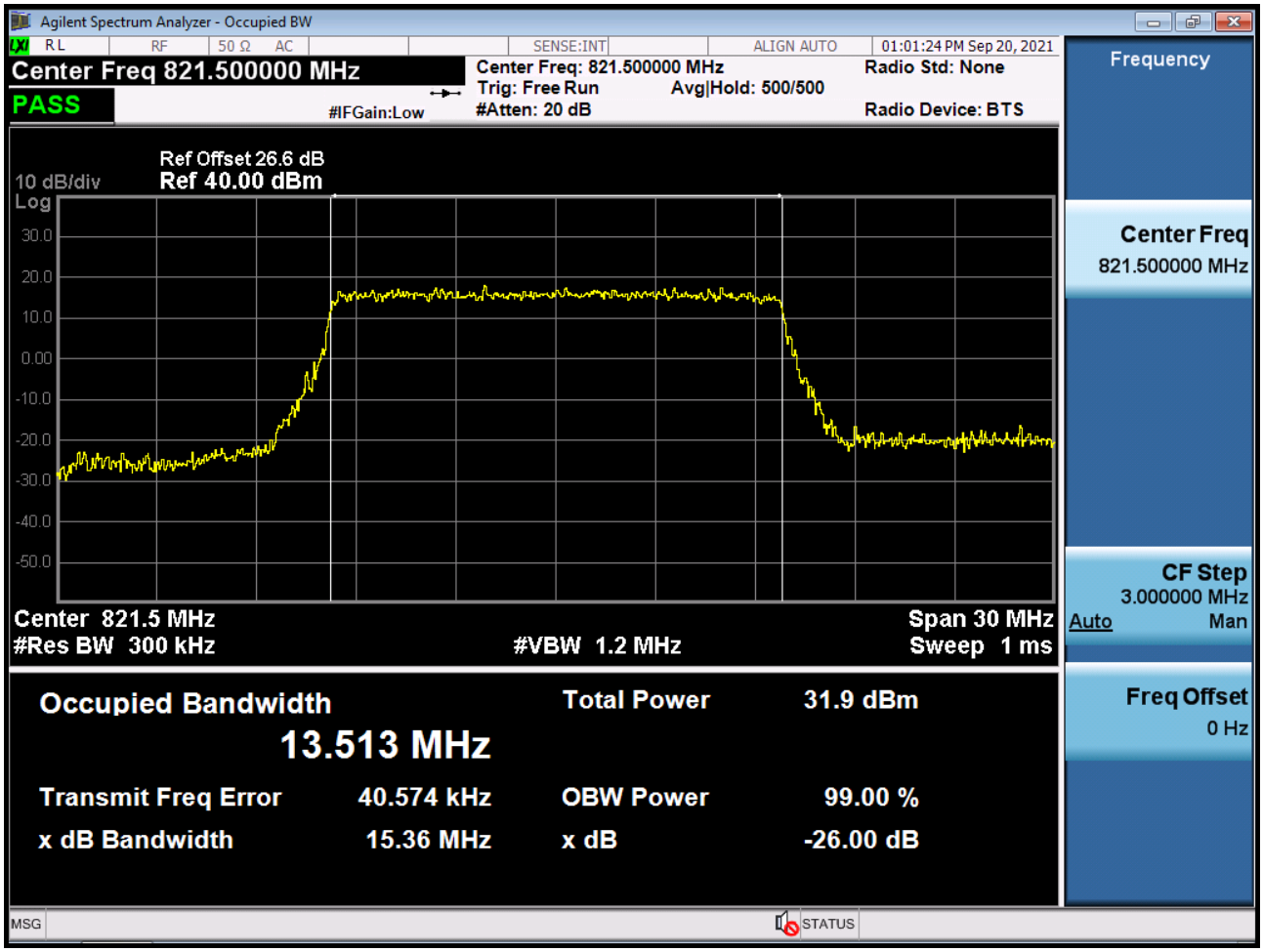
BAND 26. Occupied Bandwidth Plot (10 M BW Ch.26740 64QAM RB 50_0)



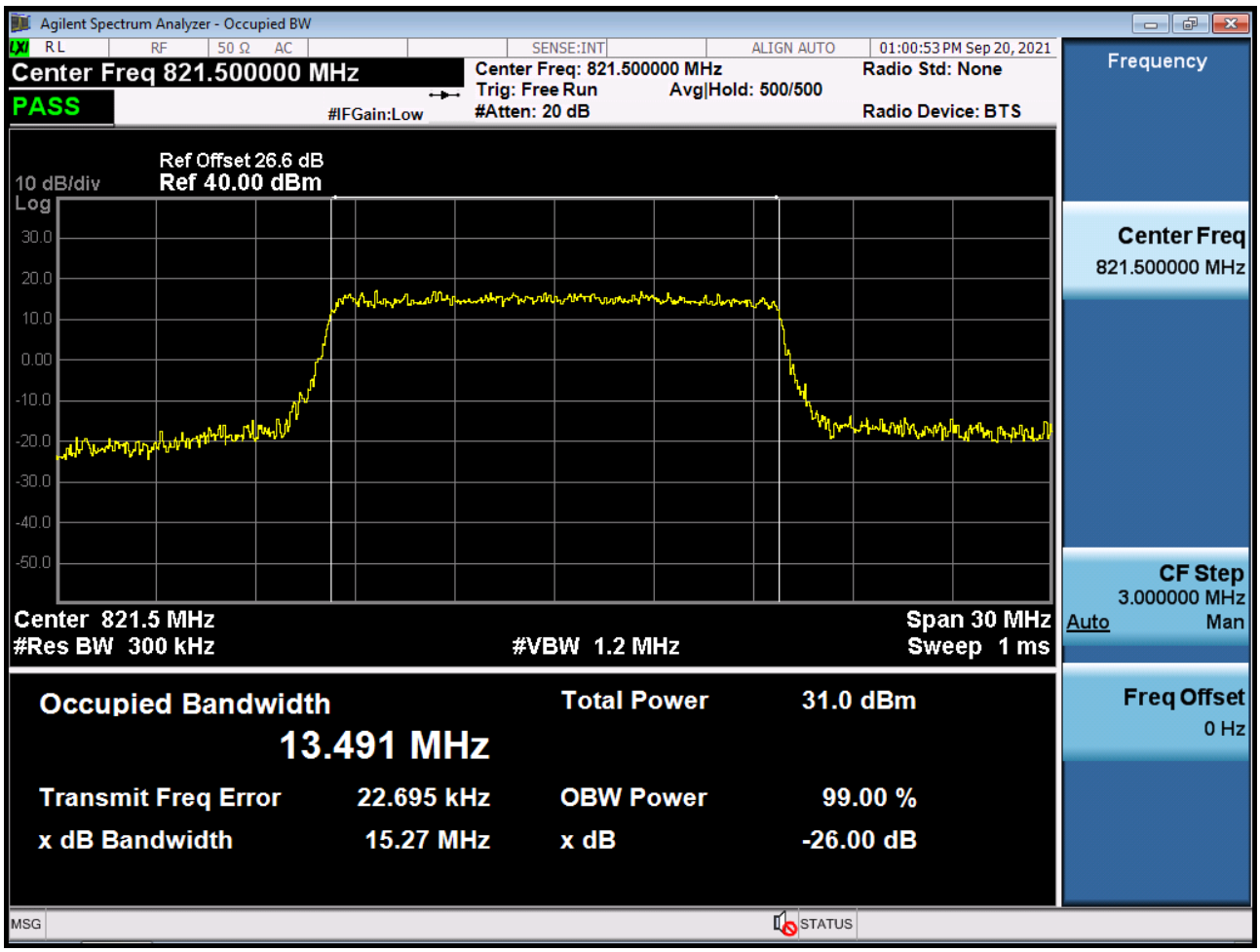
BAND 26. Occupied Bandwidth Plot (10 M BW Ch.26740 256QAM RB 50_0)



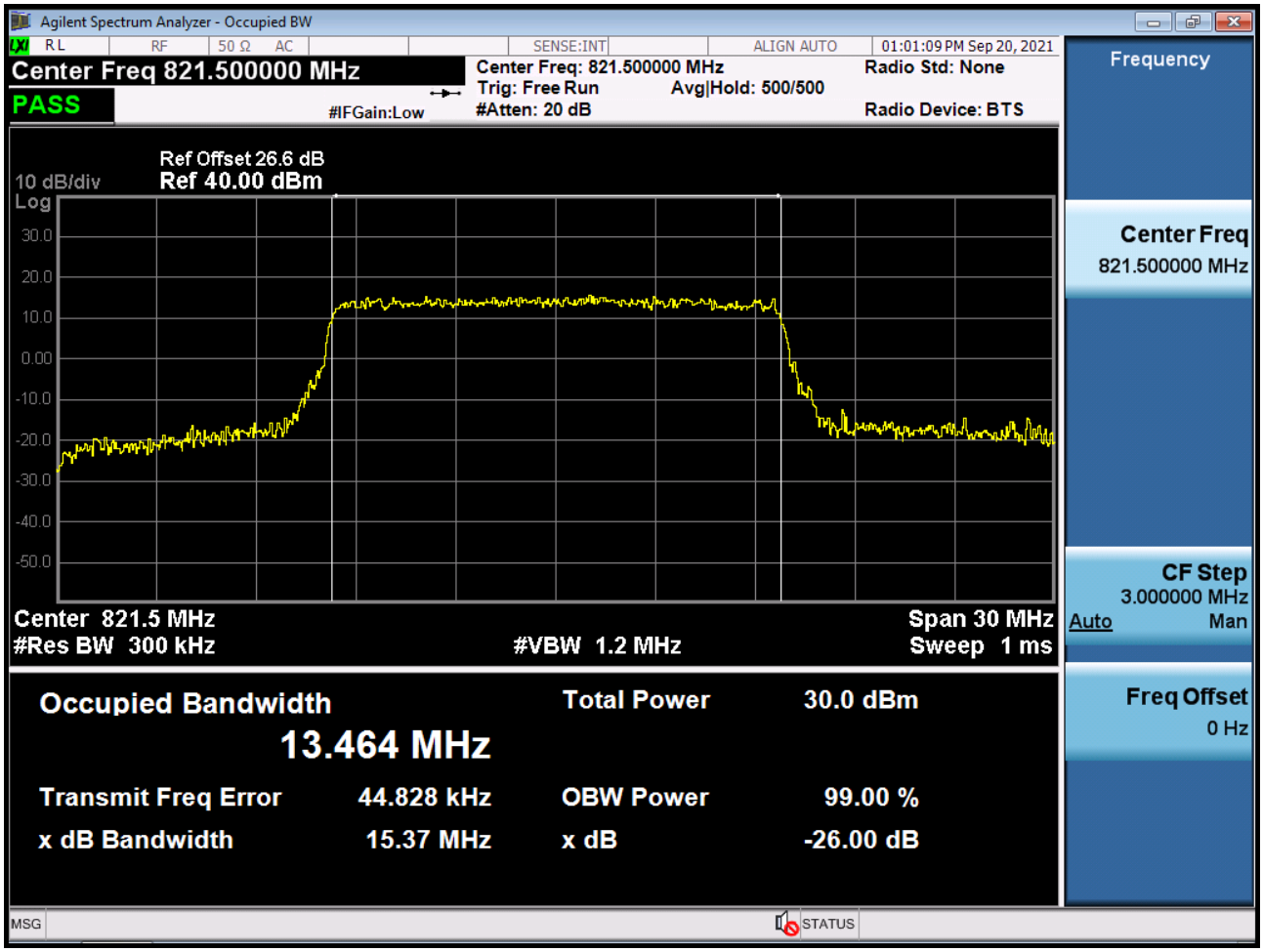
BAND 26. Occupied Bandwidth Plot (15 M BW Ch.26765 QPSK RB 75_0)



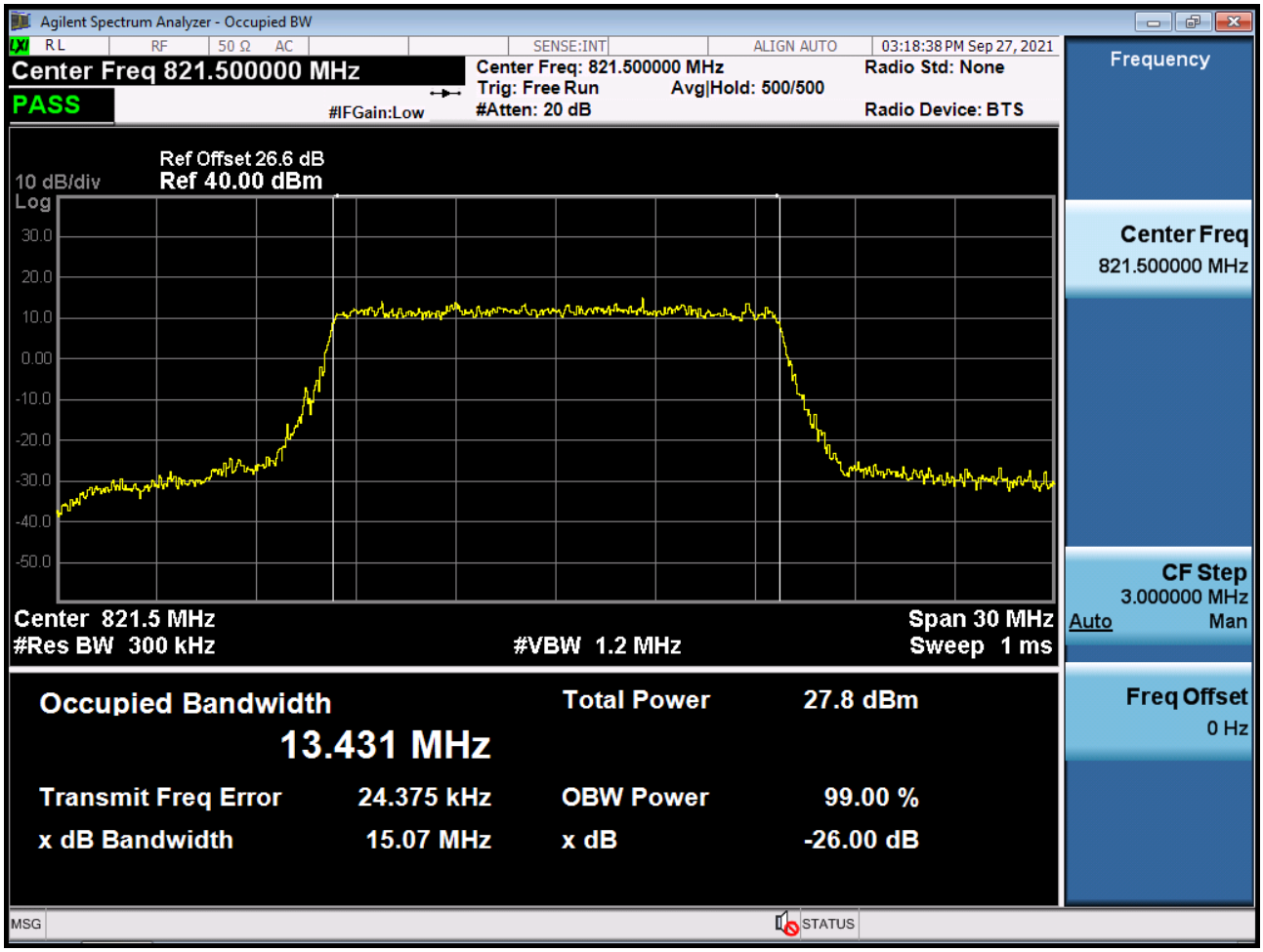
BAND 26. Occupied Bandwidth Plot (15 M BW Ch.26765 16QAM RB 75_0)



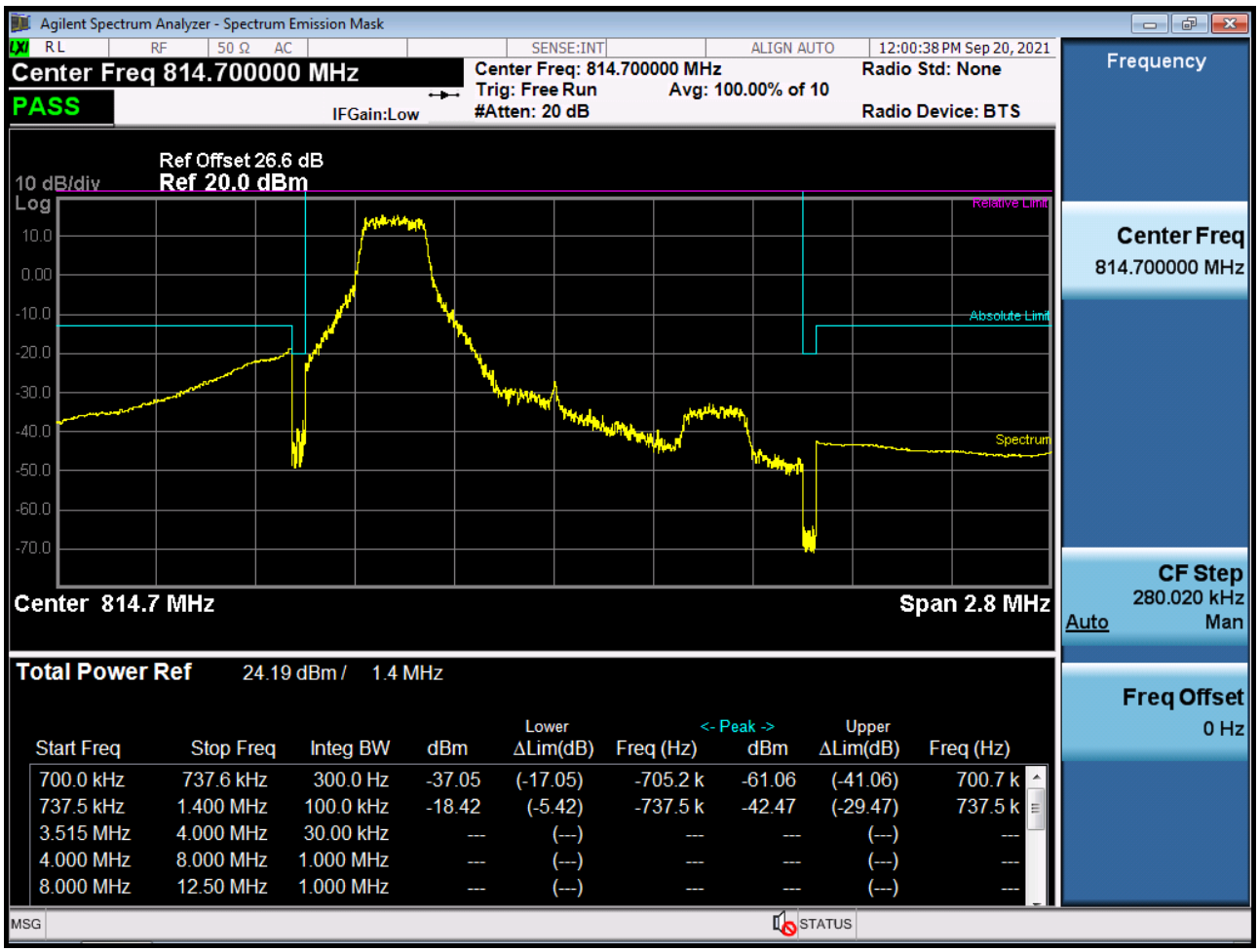
BAND 26. Occupied Bandwidth Plot (15 M BW Ch.26765 64QAM RB 75_0)



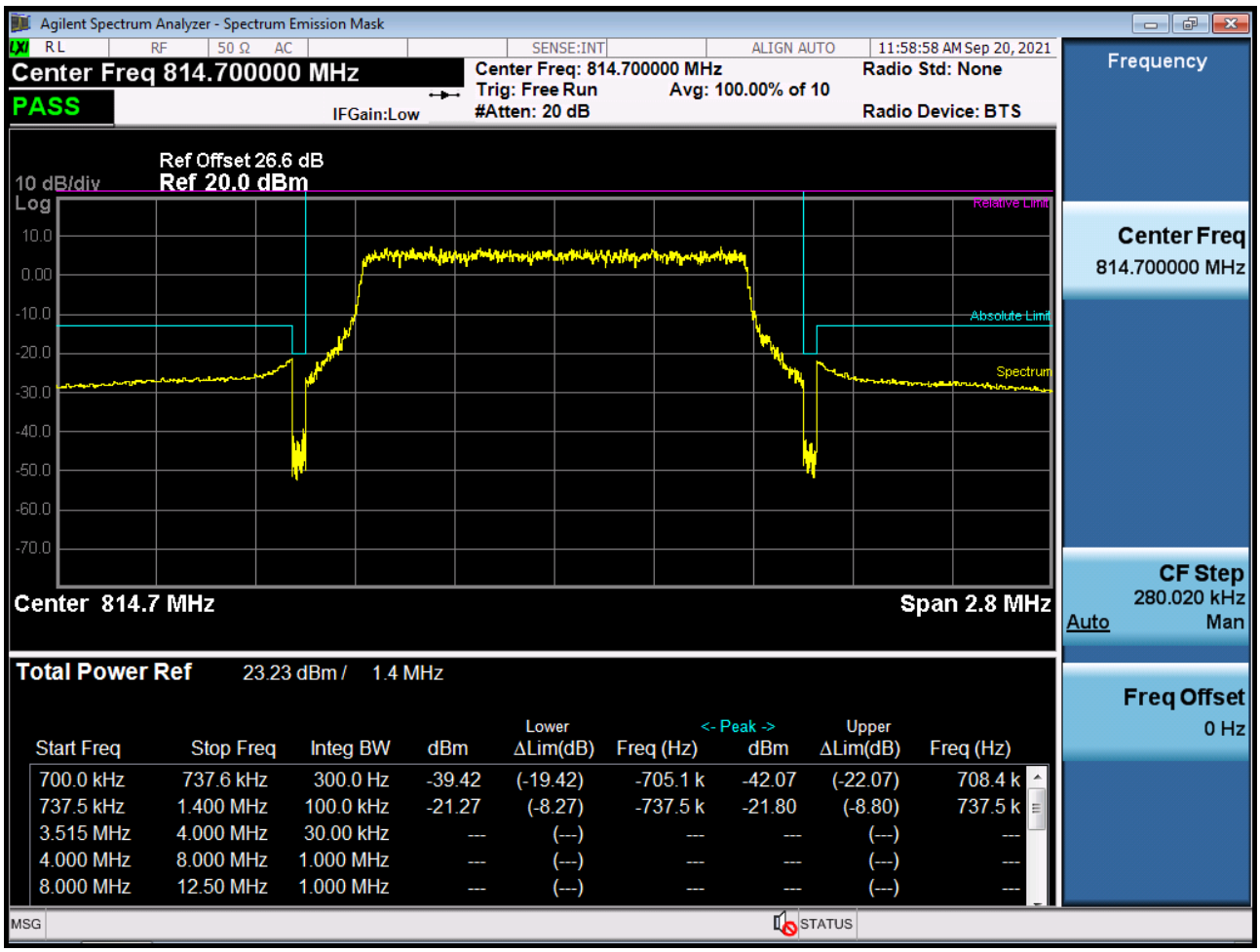
BAND 26. Occupied Bandwidth Plot (15 M BW Ch.26765 256QAM RB 75_0)



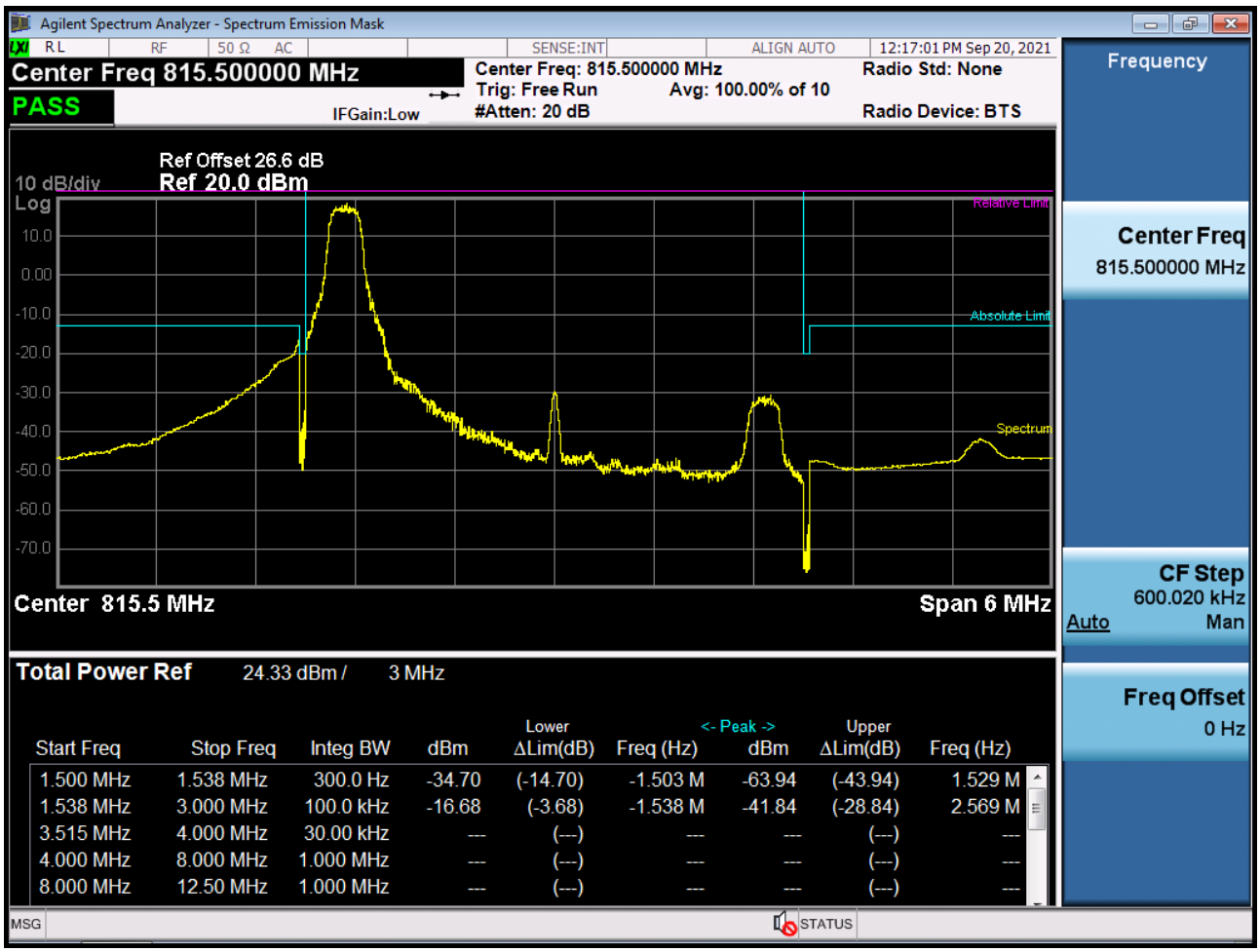
BAND 26. Lower Channel Edge Plot (1.4 M BW Ch.26697 QPSK RB 1, Offset 0)



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

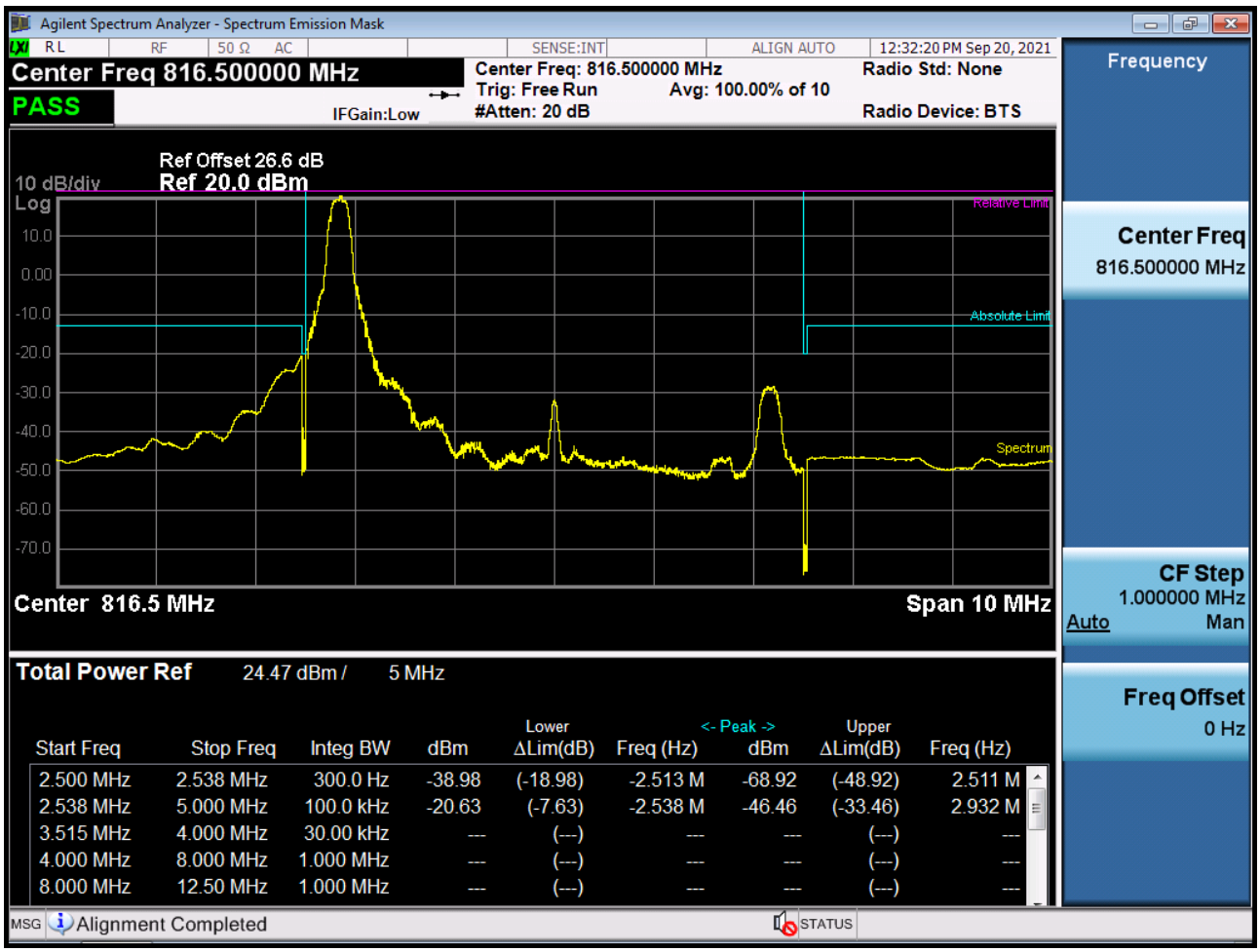


BAND 26. Lower Channel Edge Plot (3 M BW Ch.26705 QPSK RB 1, Offset 0)

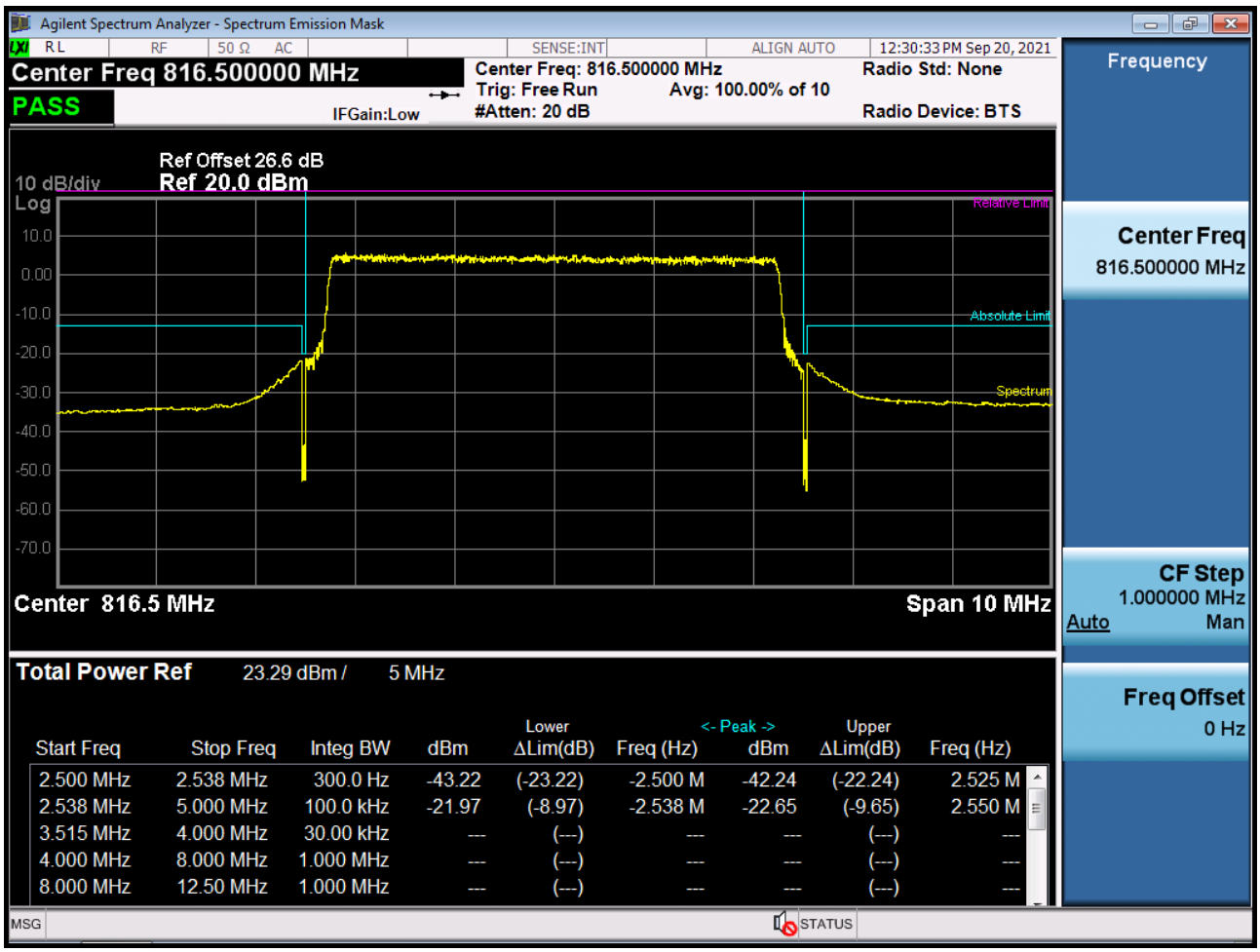


BAND 26. Lower Channel Edge Plot (3 M BW Ch.26705 QPSK_RB15_Offset 0)

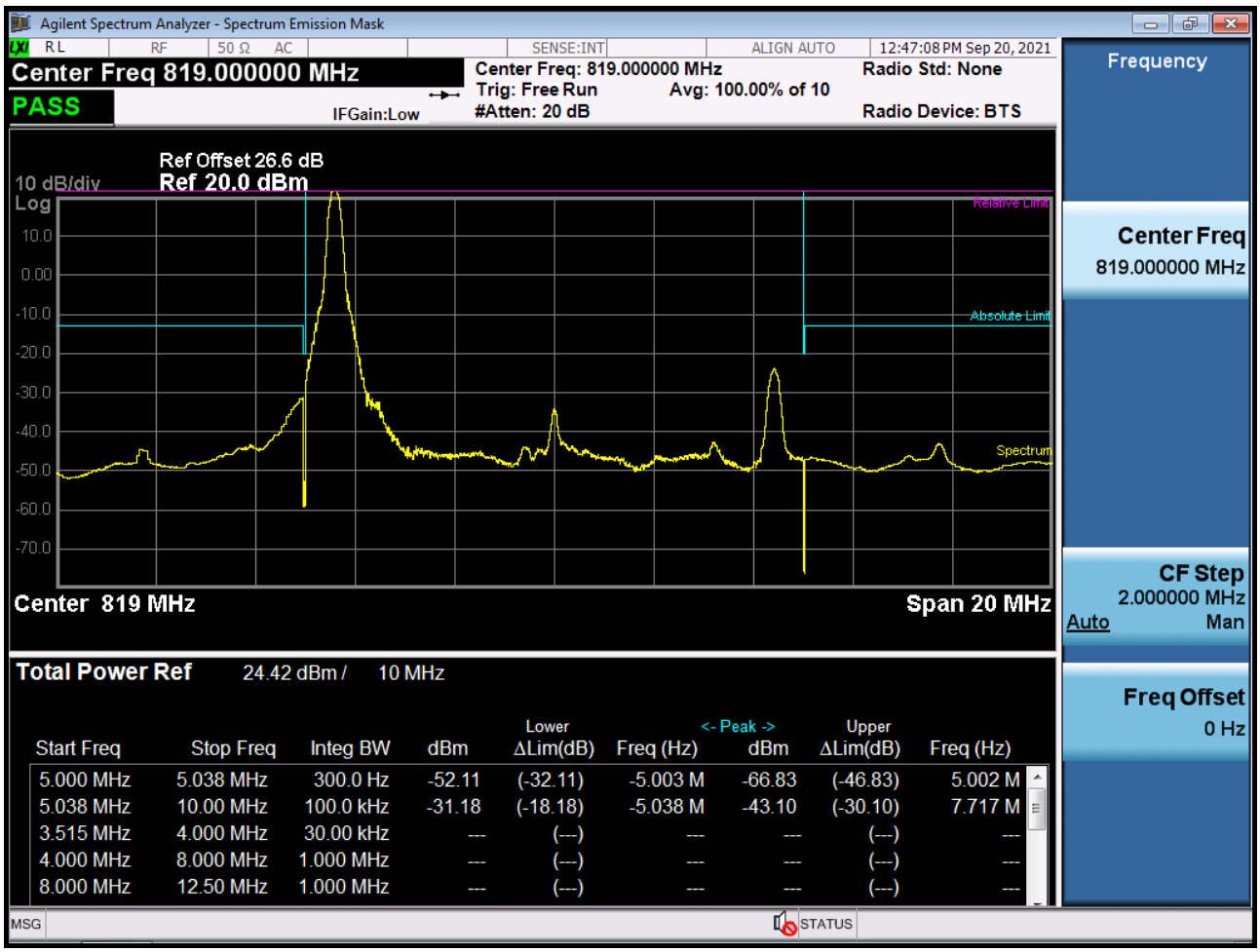
BAND 26. Lower Channel Edge Plot (5 M BW Ch.26715 QPSK RB 1, Offset 0)



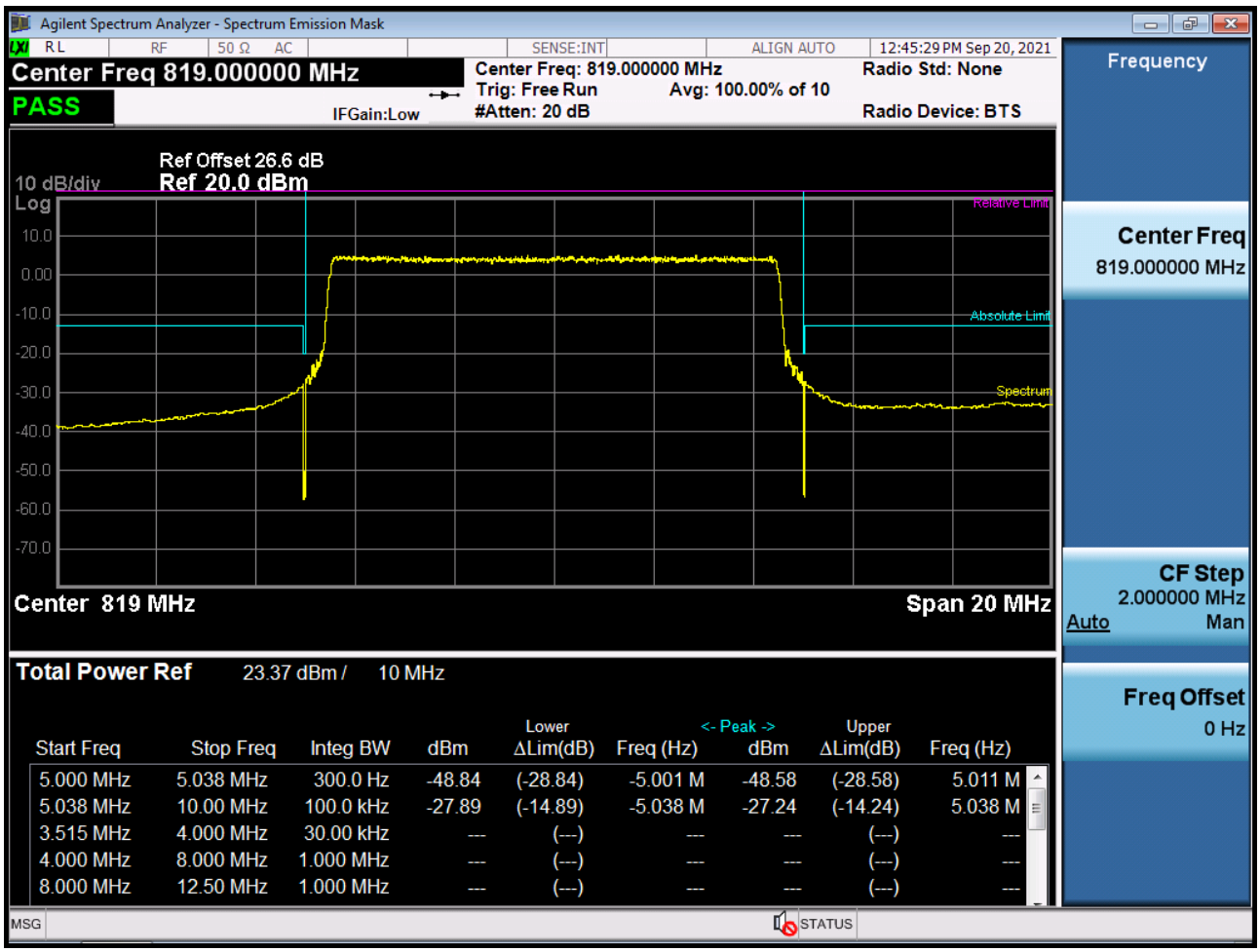
BAND 26. Lower Channel Edge Plot (5 M BW Ch.26715 QPSK_RB25_Offset 0)



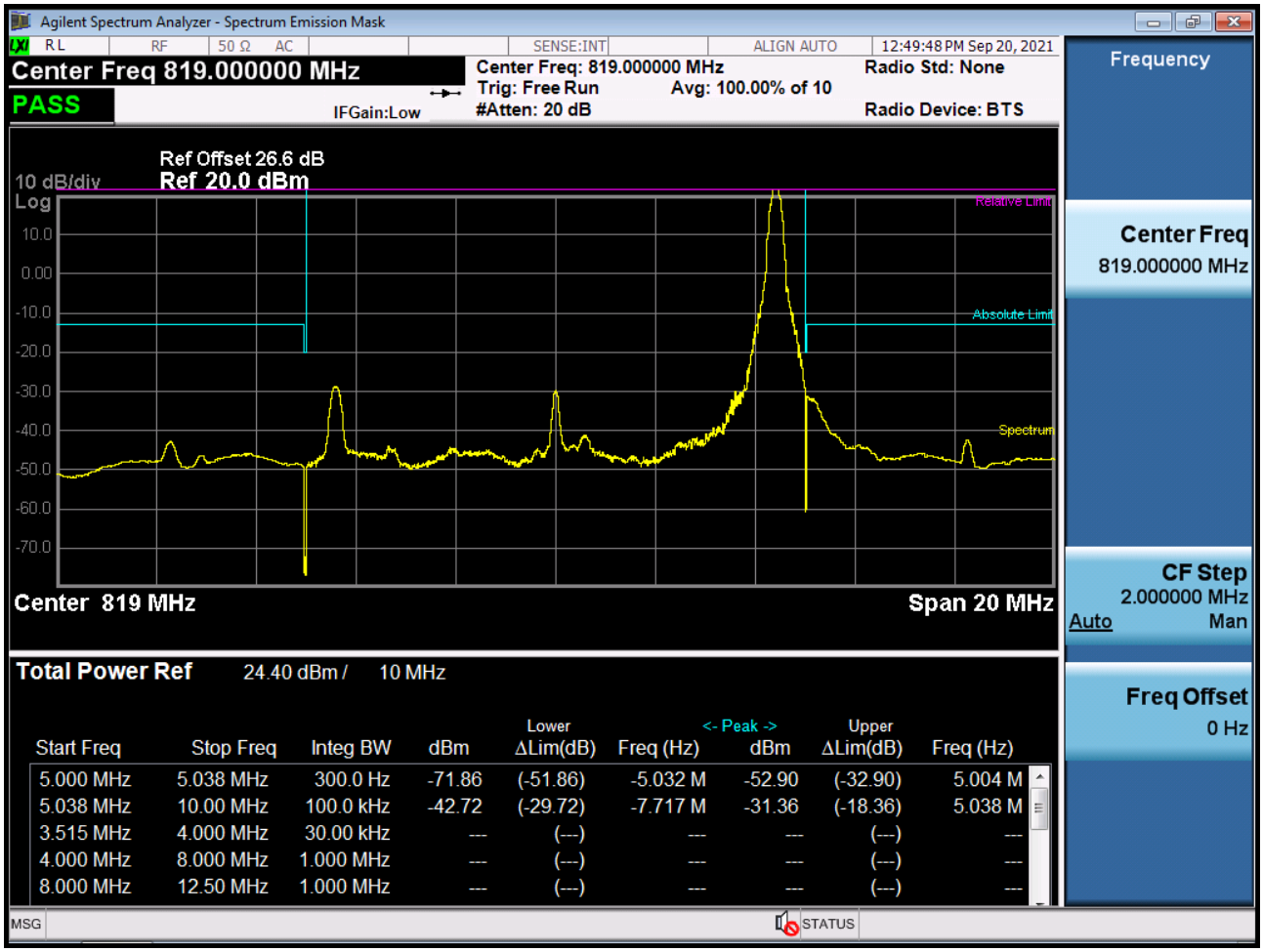
BAND 26. Low Channel Edge Plot (10 M BW Ch.26740 QPSK RB 1, Offset 0)



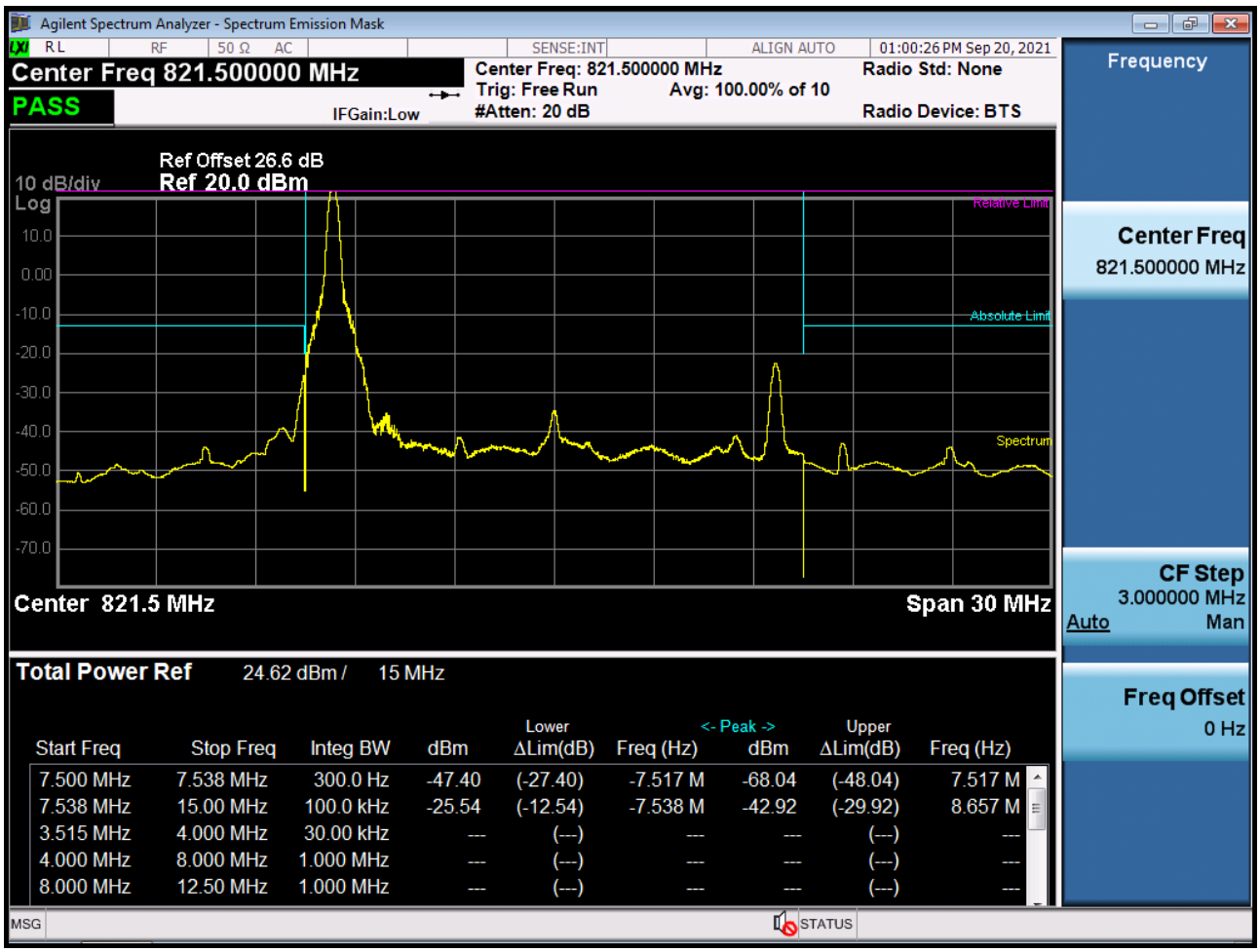
BAND 26. Low Channel Edge Plot (10 M BW Ch.26740 QPSK_RB50_Offset 0)



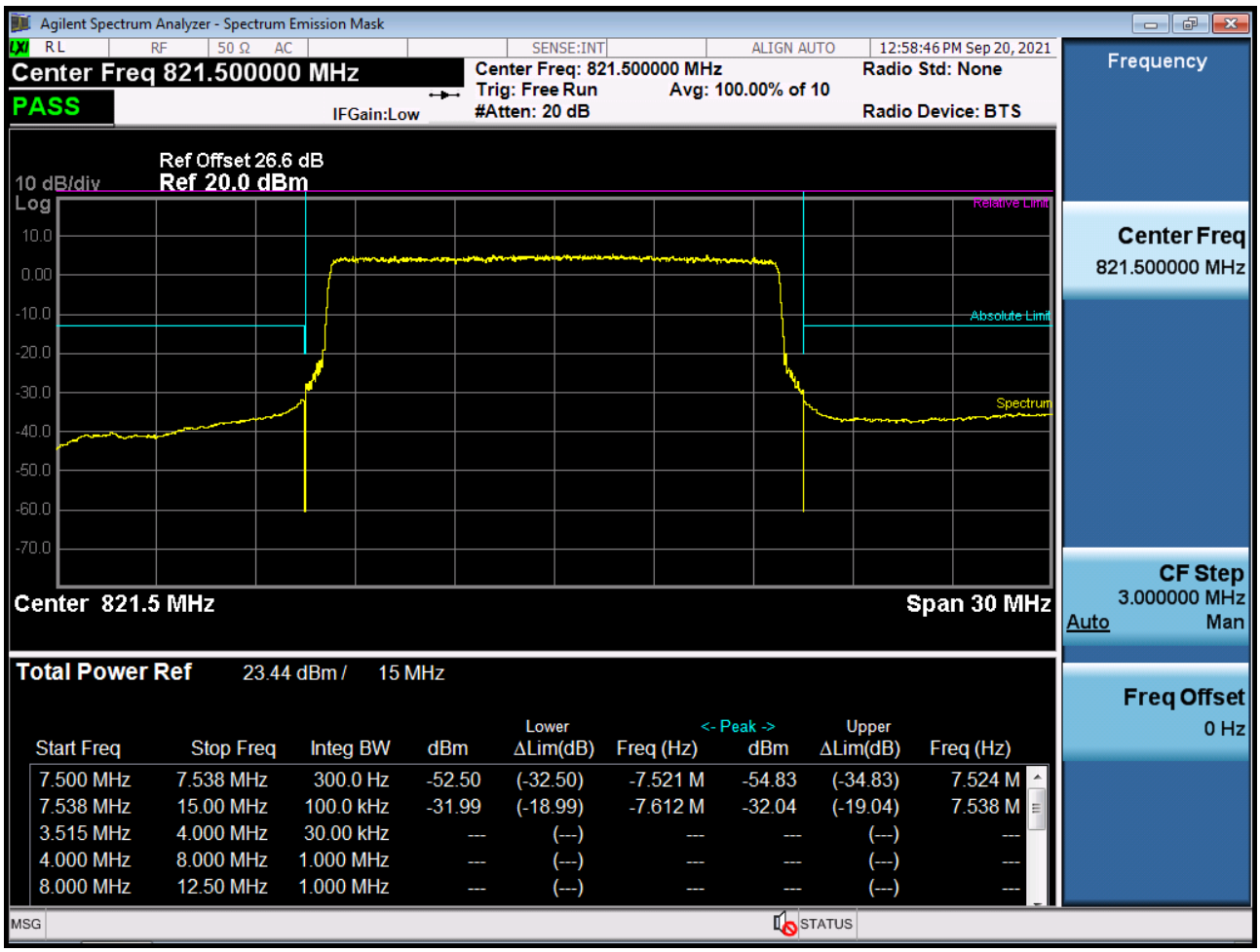
BAND 26. Mid Channel Edge Plot (10 M BW Ch. 26740 QPSK_RB1_Offset 49)



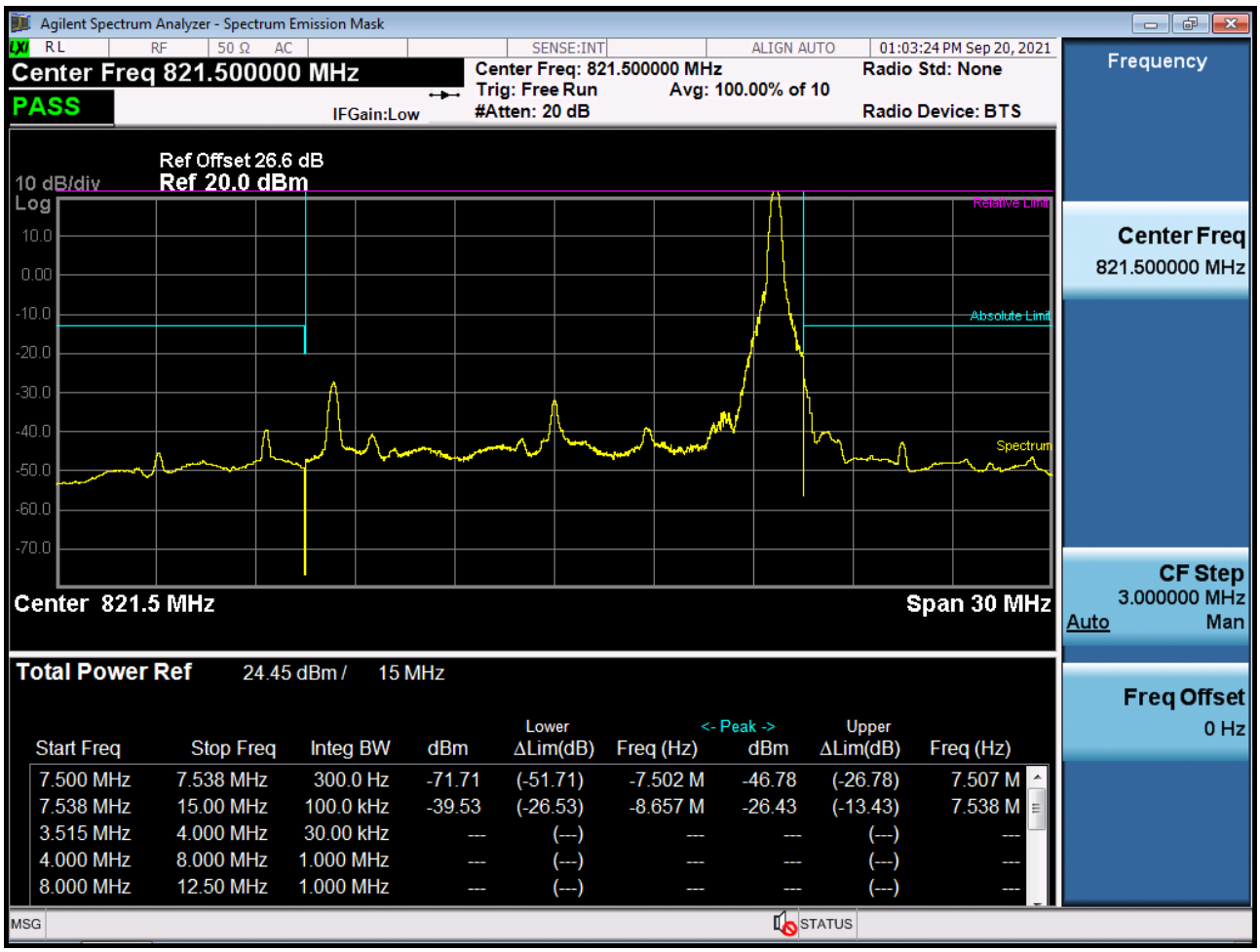
BAND 26. Low Channel Edge Plot (15 M BW Ch.26765 QPSK RB 1, Offset 0)



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



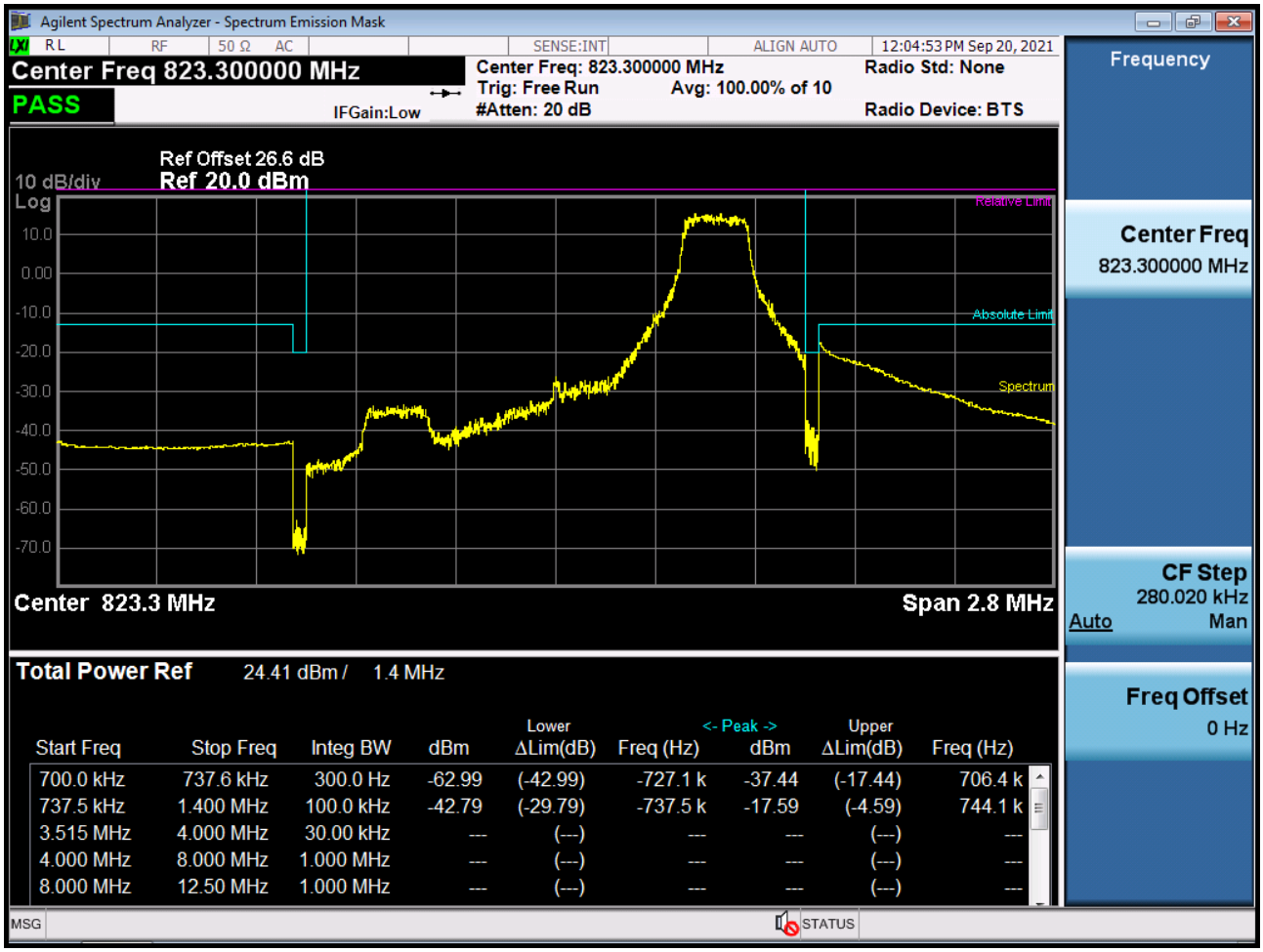
BAND 26. Mid Channel Edge Plot (15 M BW Ch.26765 QPSK_RB1_Offset 74)



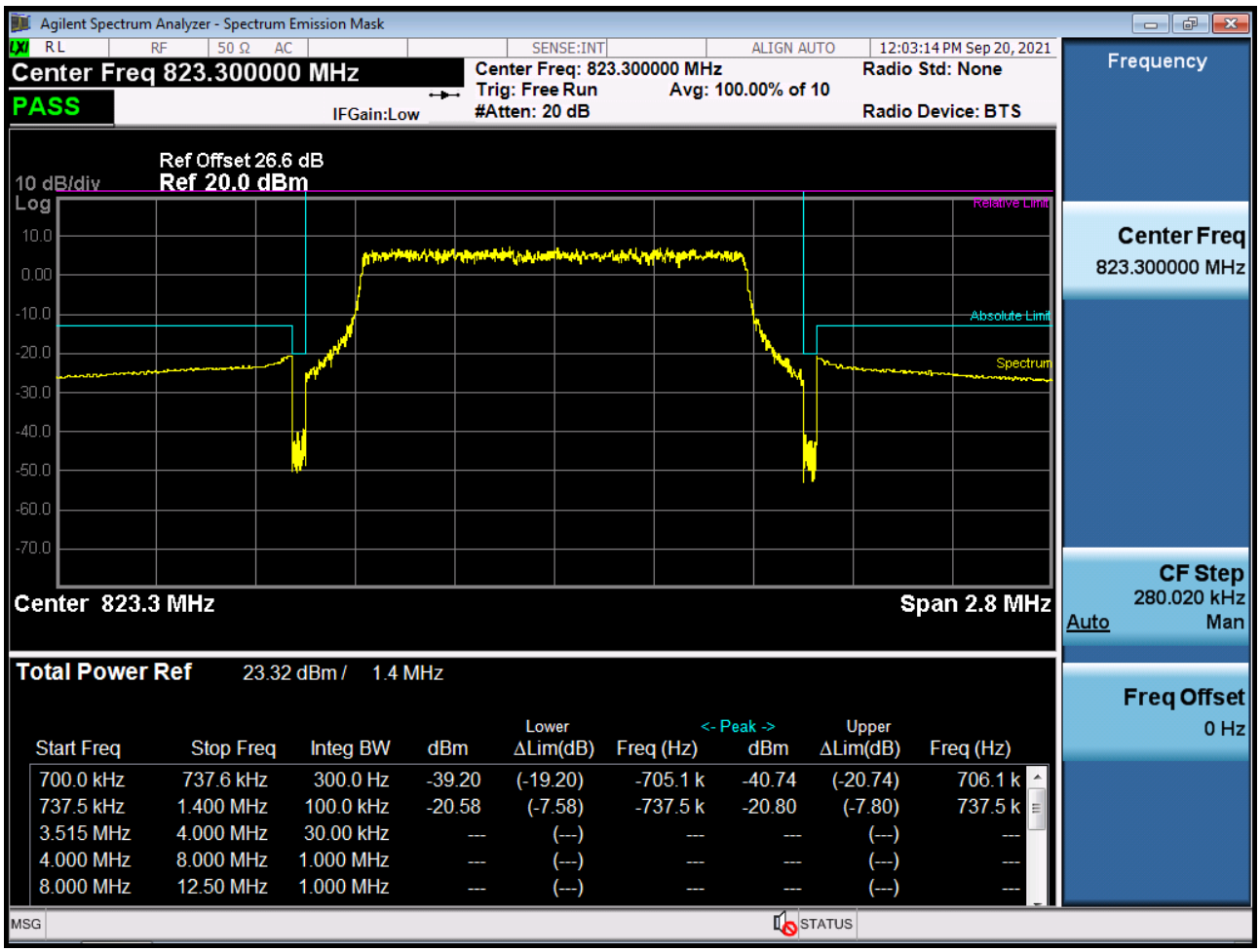
BAND 26. Mid Band Edge Plot (15 M BW Ch.26765 QPSK RB 1, Offset74)

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

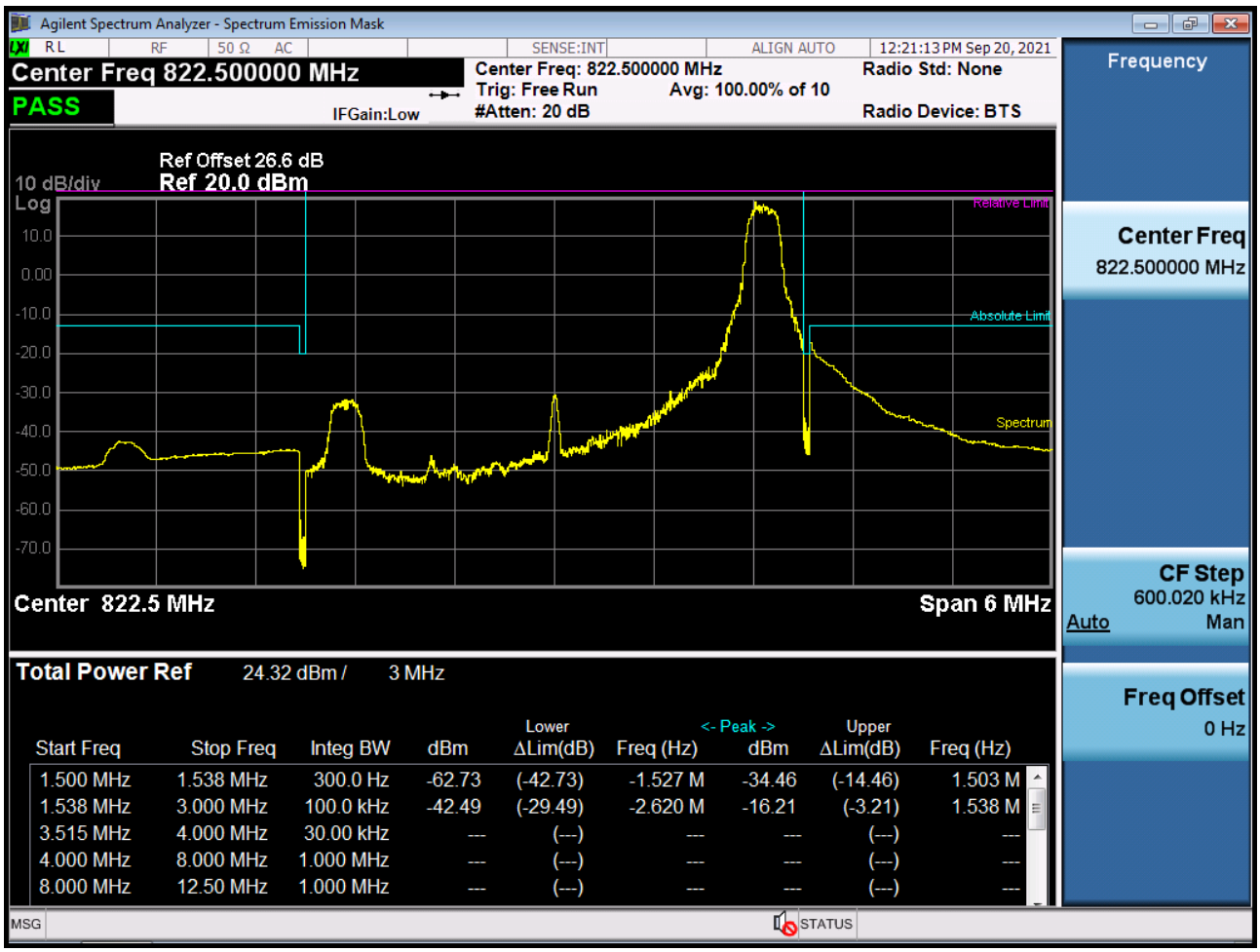
BAND 26. Upper Channel Edge Plot (1.4 M BW Ch.26783 QPSK_RB1_Offset 5)



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

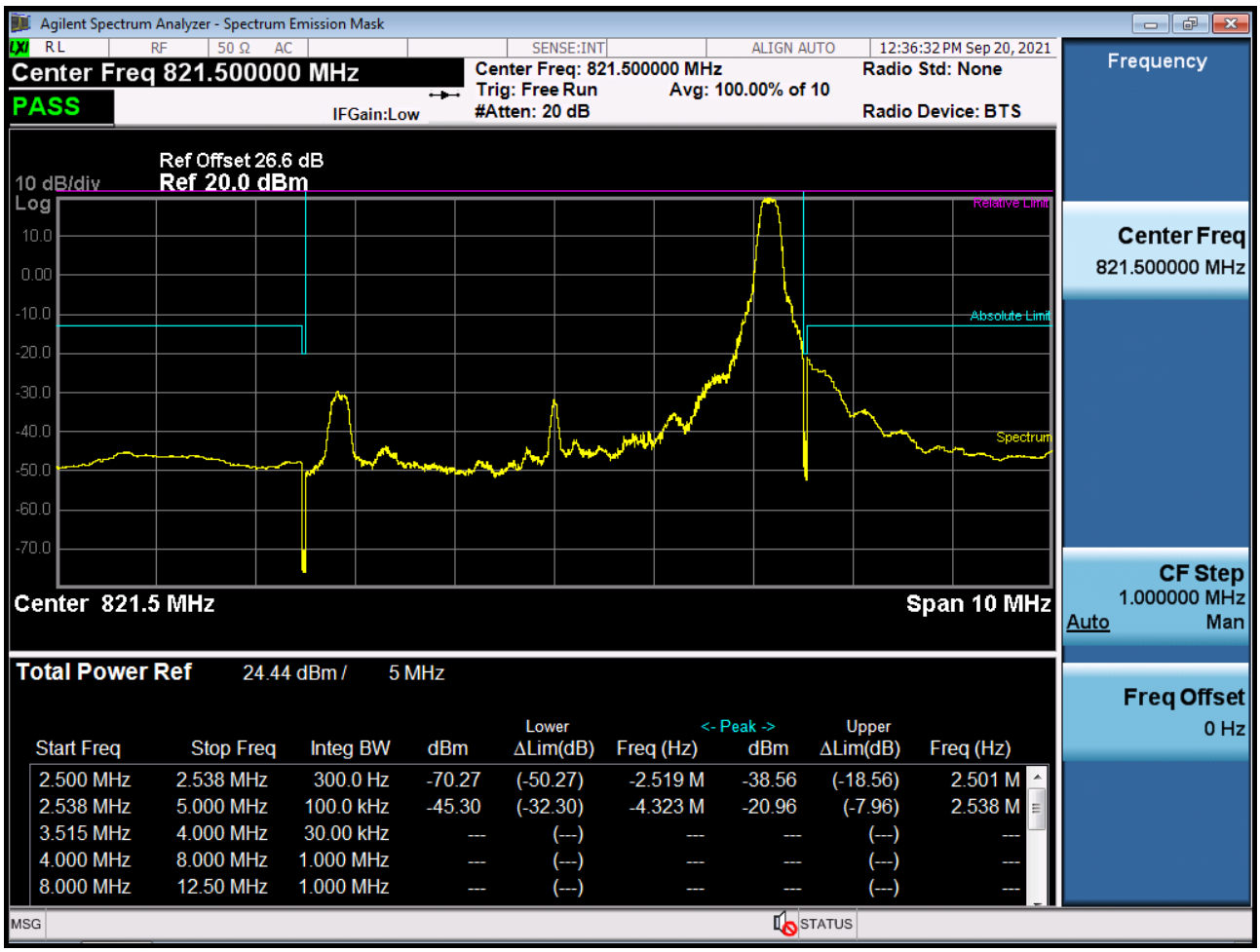


BAND 26. Upper Channel Edge Plot (3 M BW Ch.26775 QPSK_RB1_Offset 14)

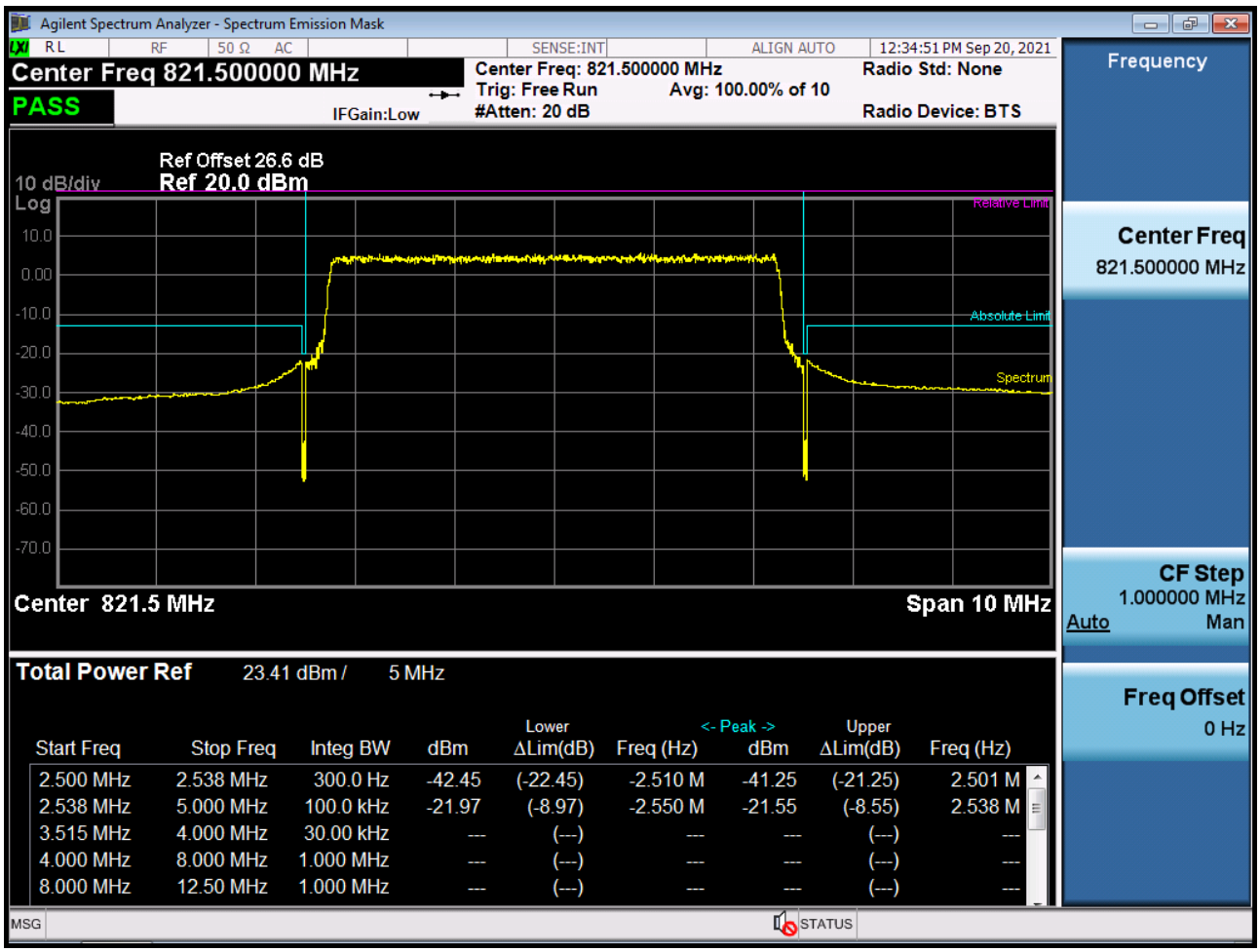


BAND 26. Upper Channel Edge Plot (3 M BW Ch.26775 QPSK_RB15_Offset 0)

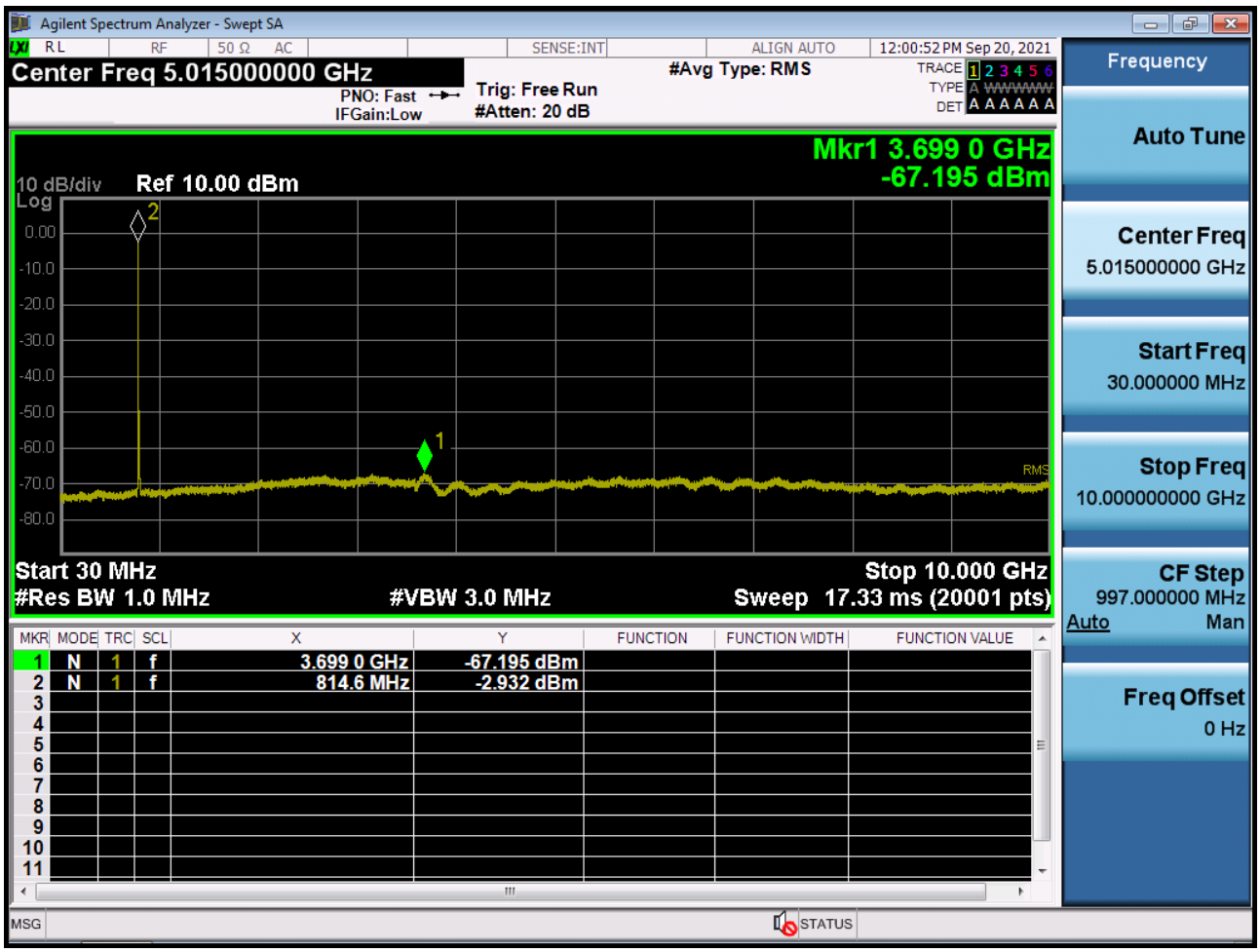
BAND 26. Upper Channel Edge Plot (5 M BW Ch.26765 QPSK_RB1_Offset 24)



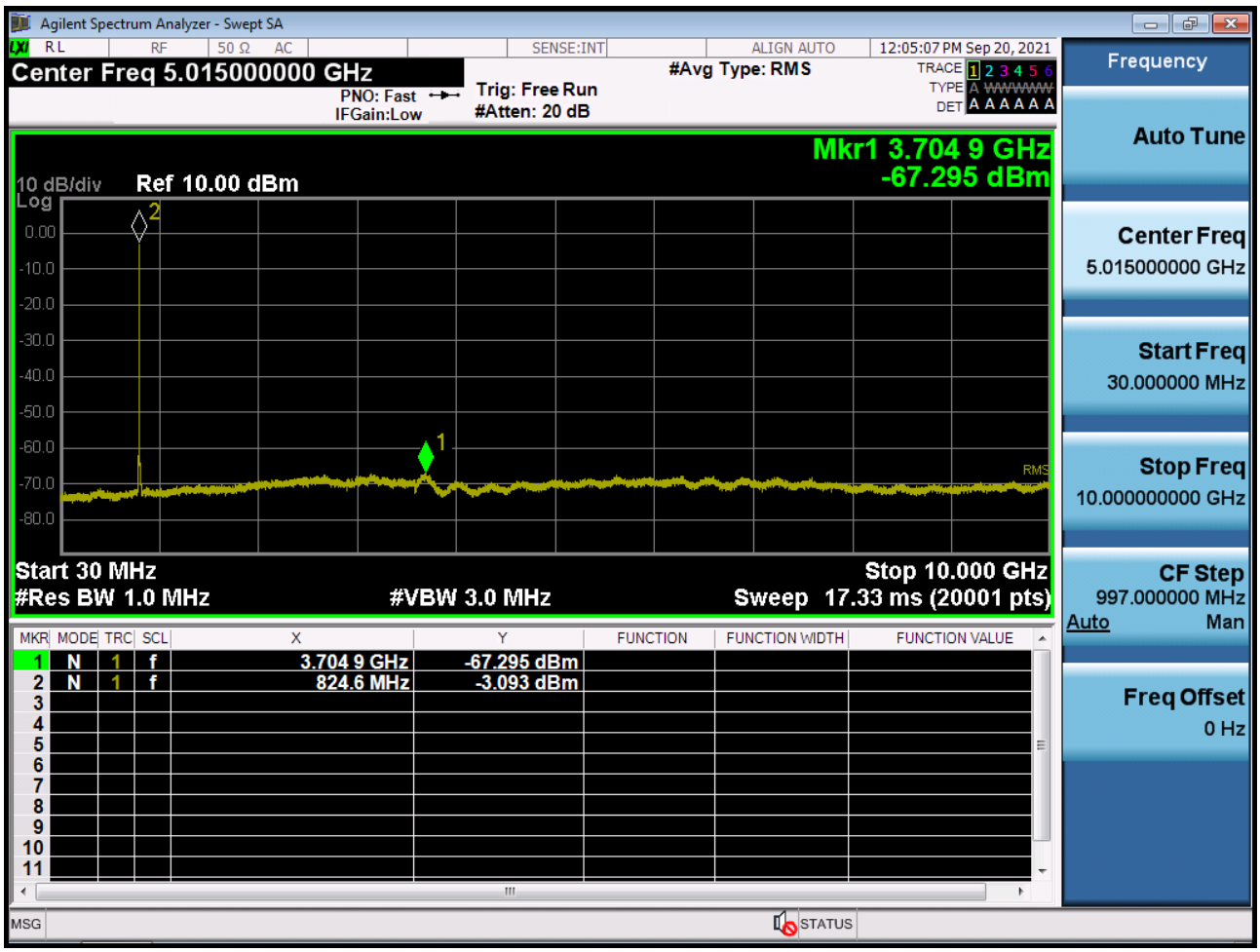
BAND 26. Upper Channel Edge Plot (5 M BW Ch.26765 QPSK_RB25_Offset 0)



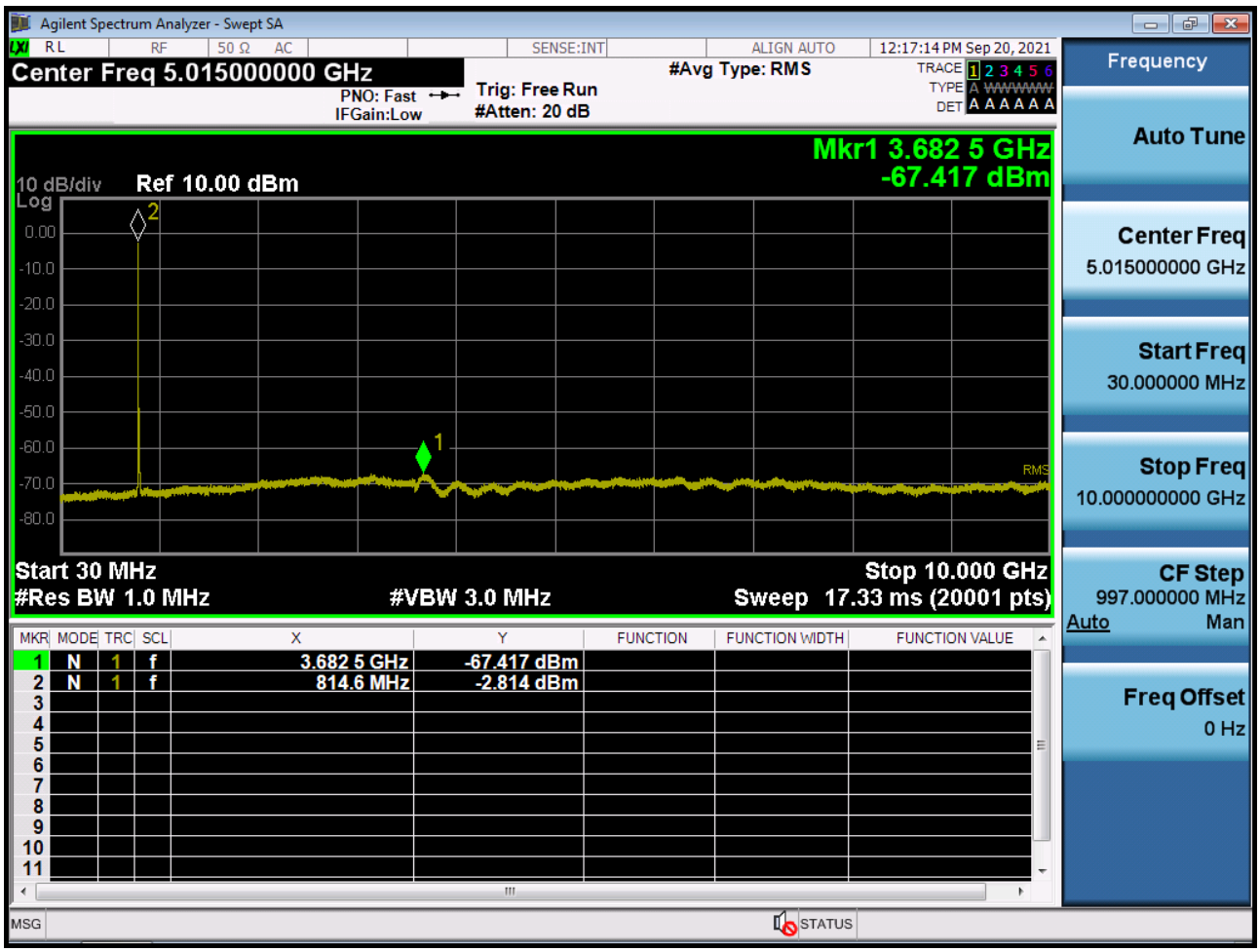
BAND 26. Conducted Spurious (26697 ch_1.4 MHz_QPSK_RB 1_0)



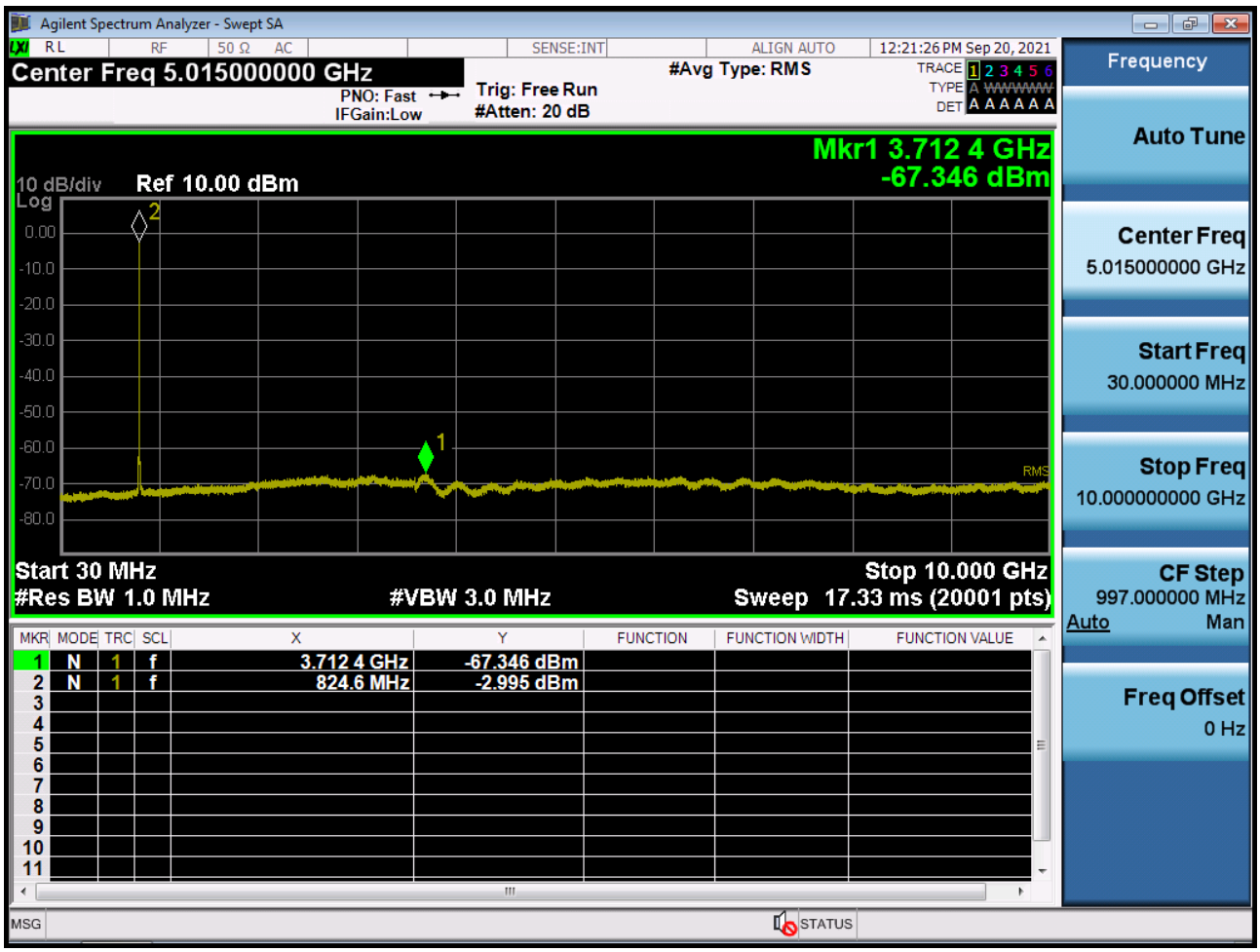
BAND 26. Conducted Spurious (26783 ch_1.4 MHz_QPSK_RB 1_0)



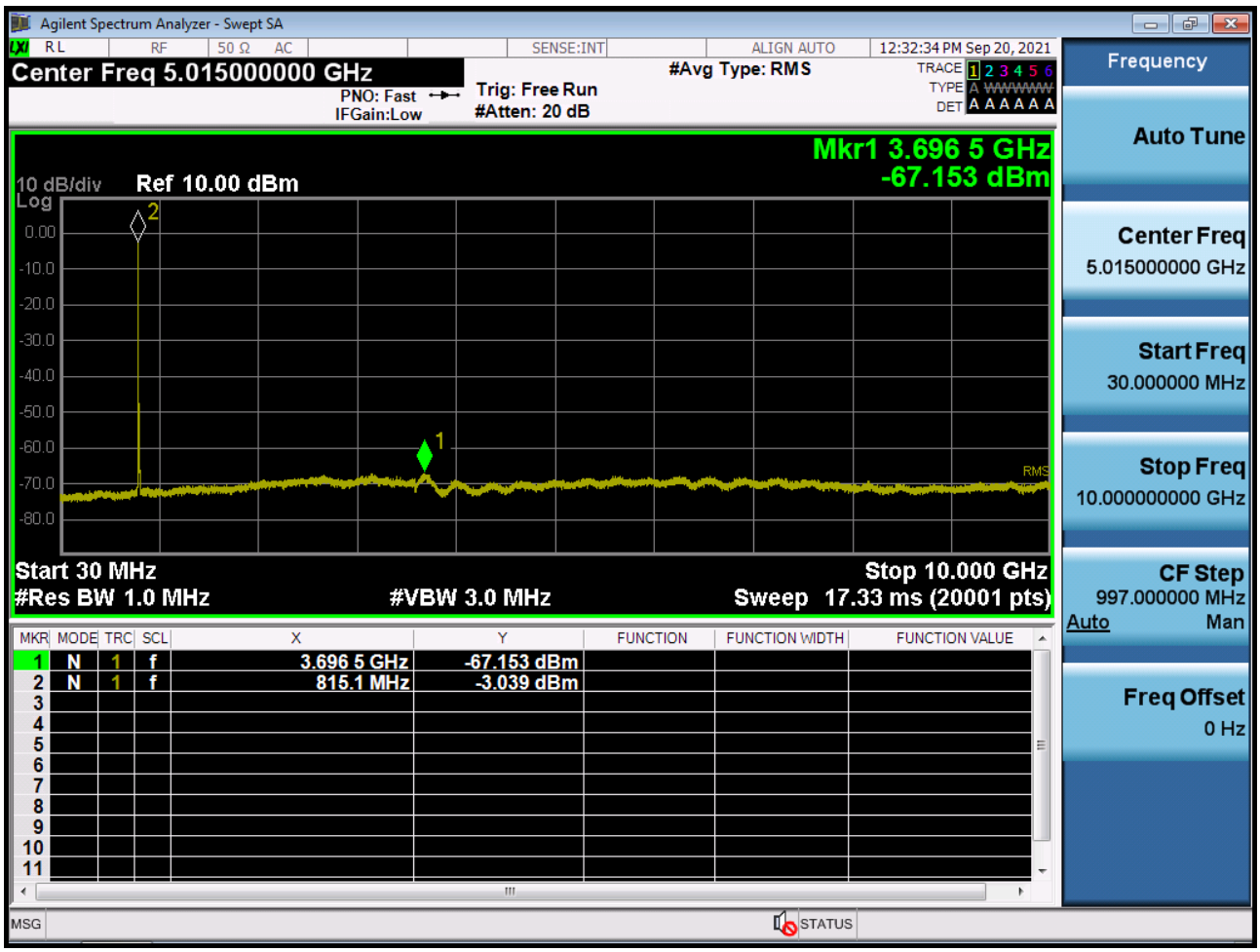
BAND 26. Conducted Spurious (26705 ch_3 MHz_QPSK_RB 1_0)



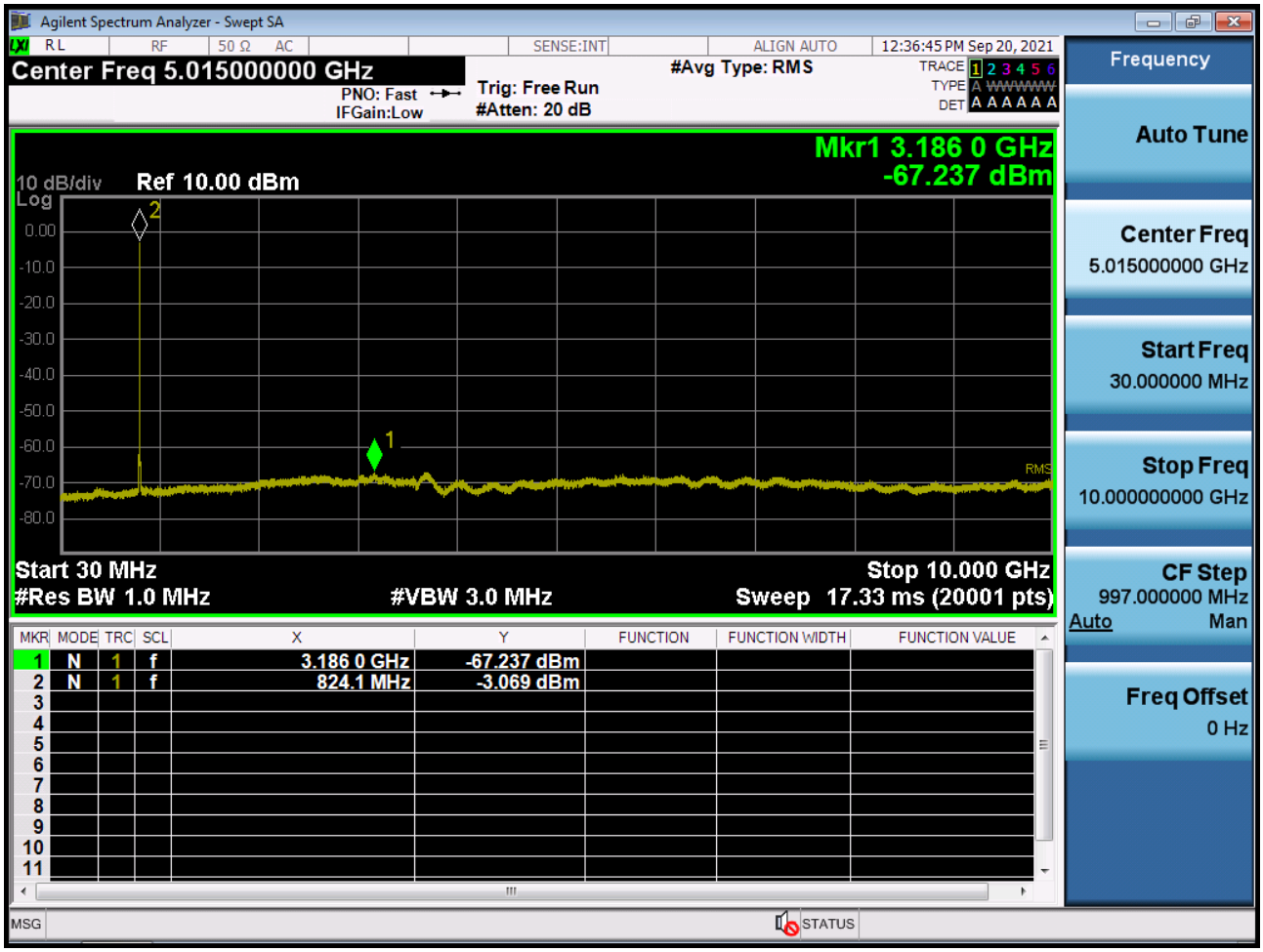
BAND 26. Conducted Spurious (26775 ch_3 MHz_QPSK_RB 1_0)



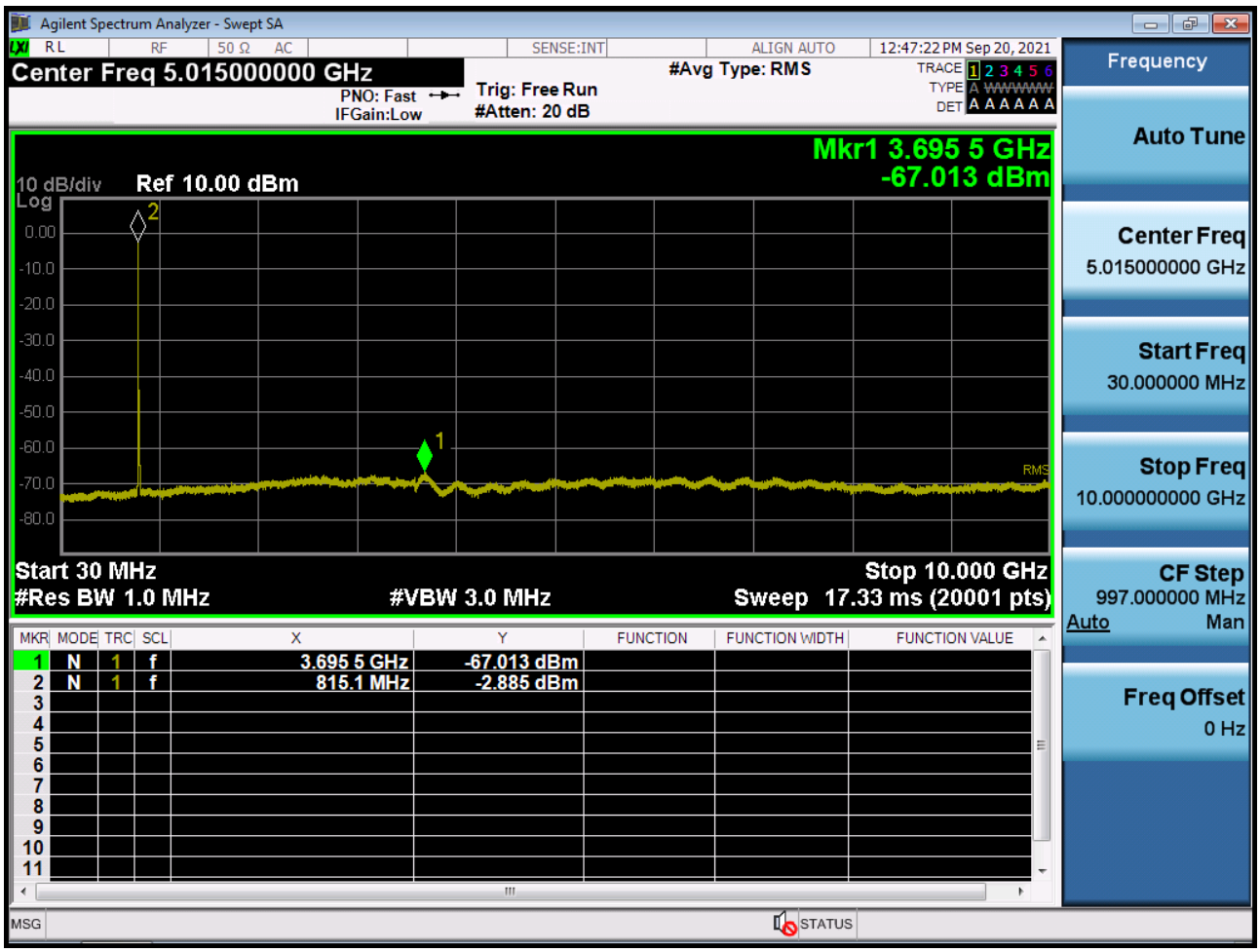
BAND 26. Conducted Spurious (26715 ch_5 MHz_QPSK_RB 1_0)



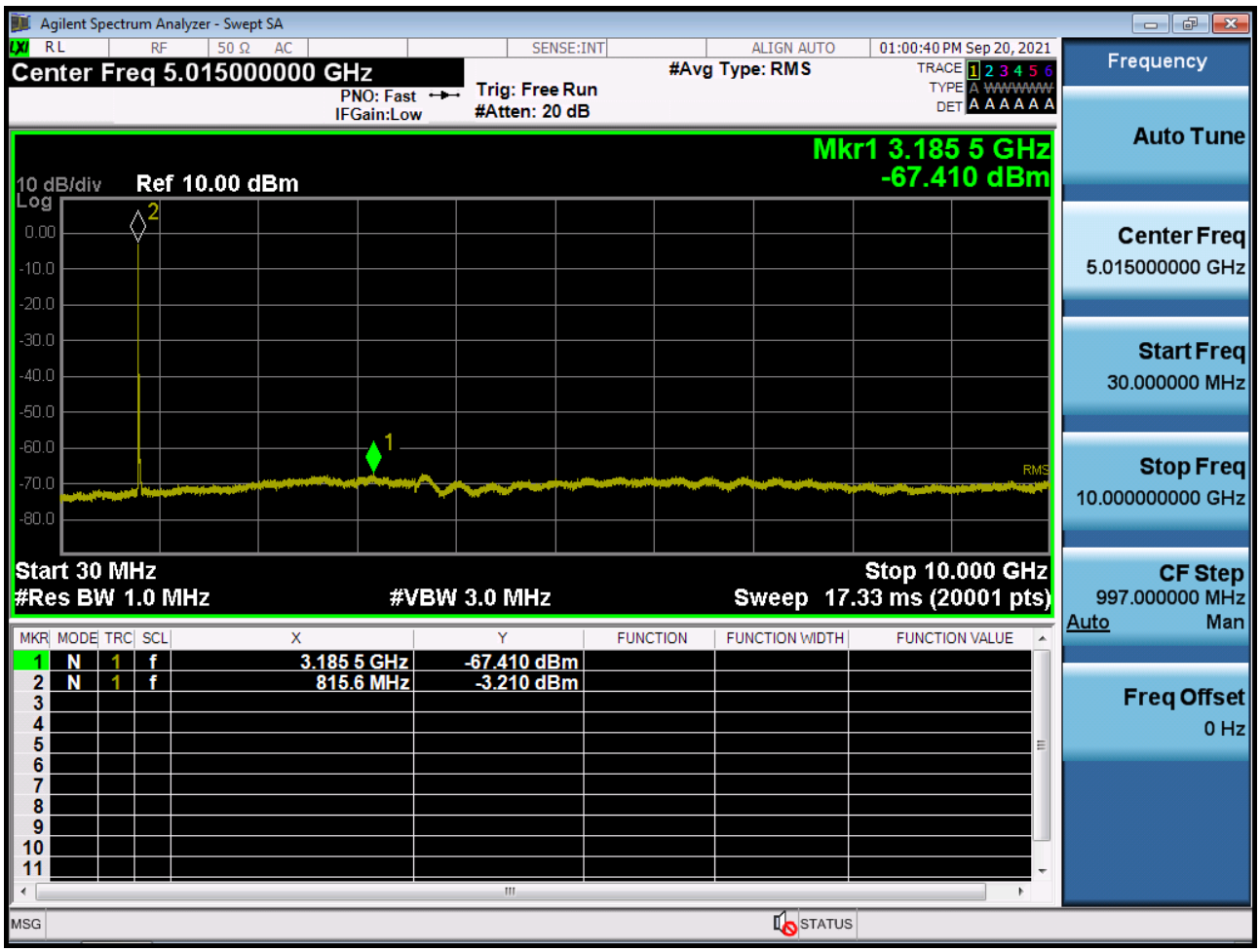
BAND 26. Conducted Spurious (26765 ch_5 MHz_QPSK_RB 1_0)



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

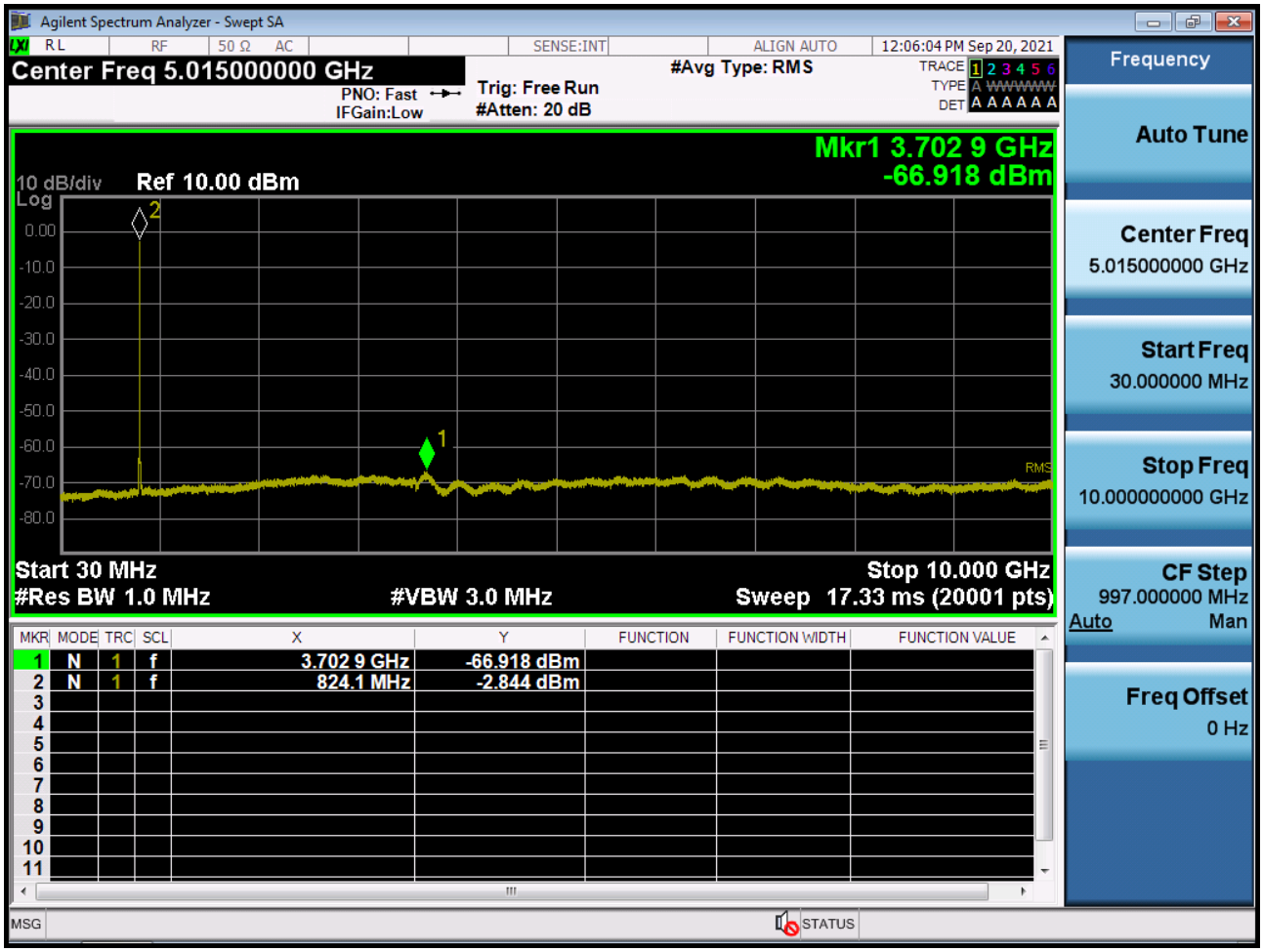


BAND 26. Conducted Spurious (26765 ch_15 MHz_QPSK_RB 1_0)

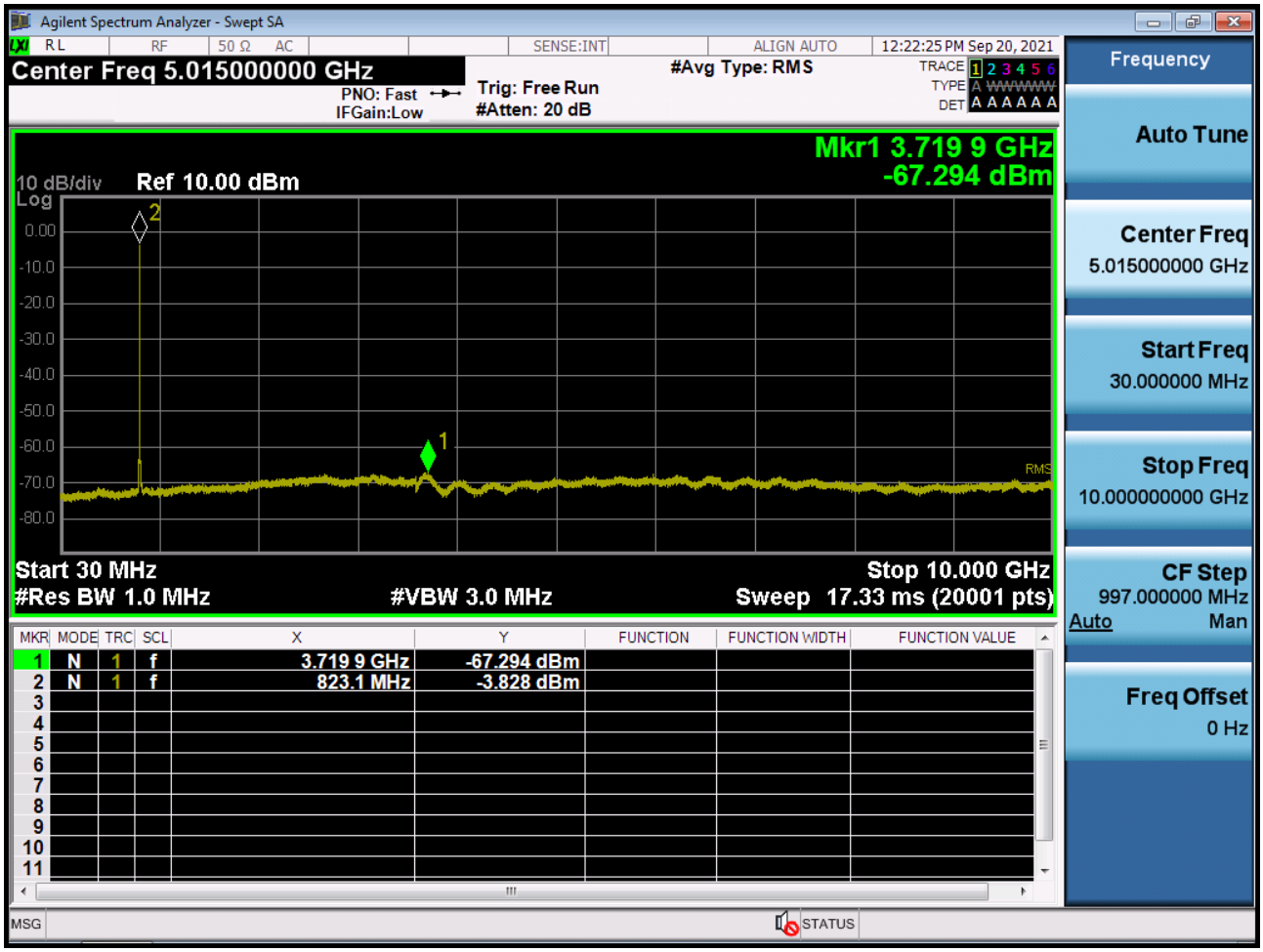


10. TEST PLOTS (STRADDLE CHANNEL)

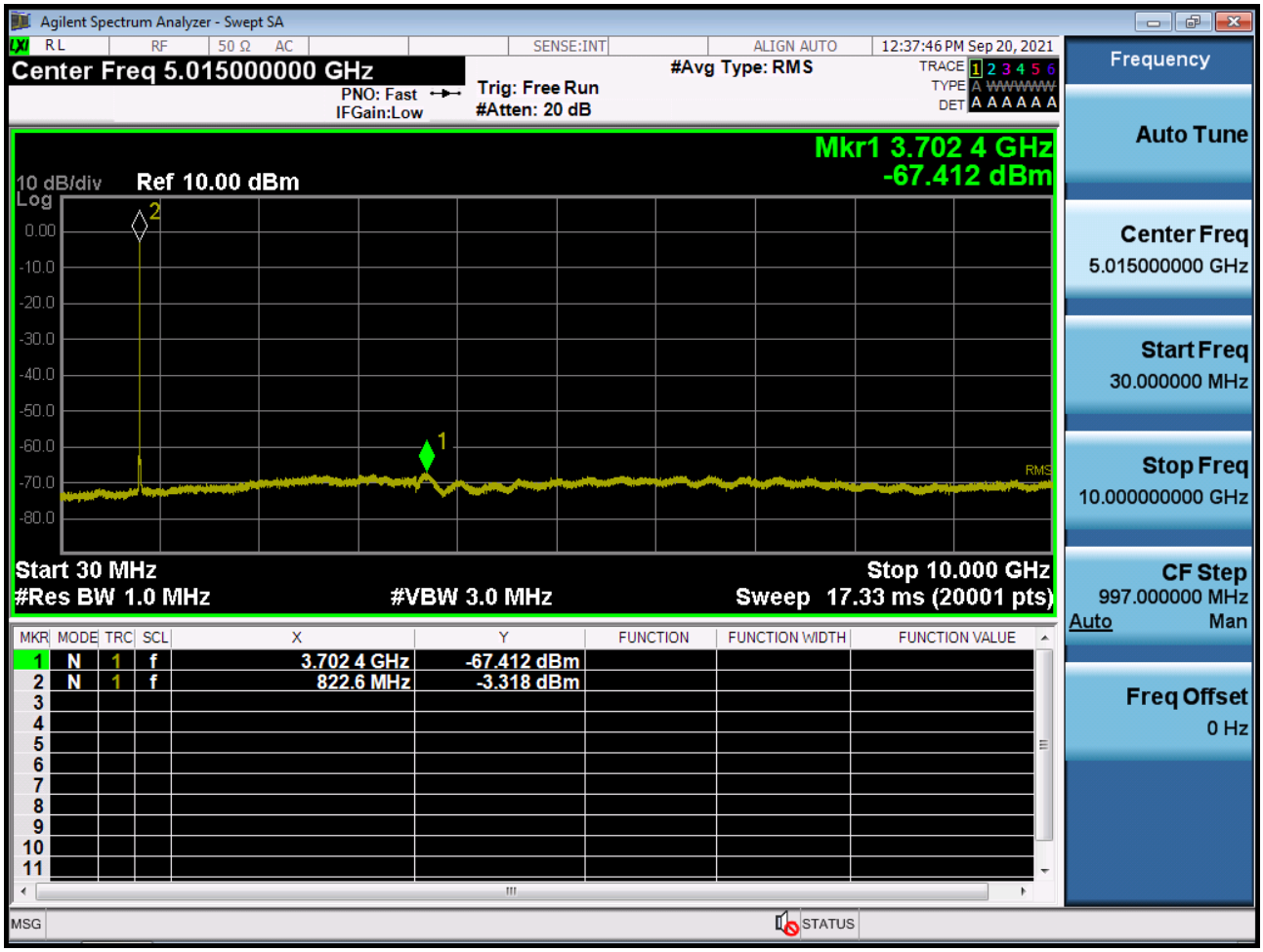
BAND 26. Conducted Spurious (1.4 MHz_QPSK_RB 1_0)



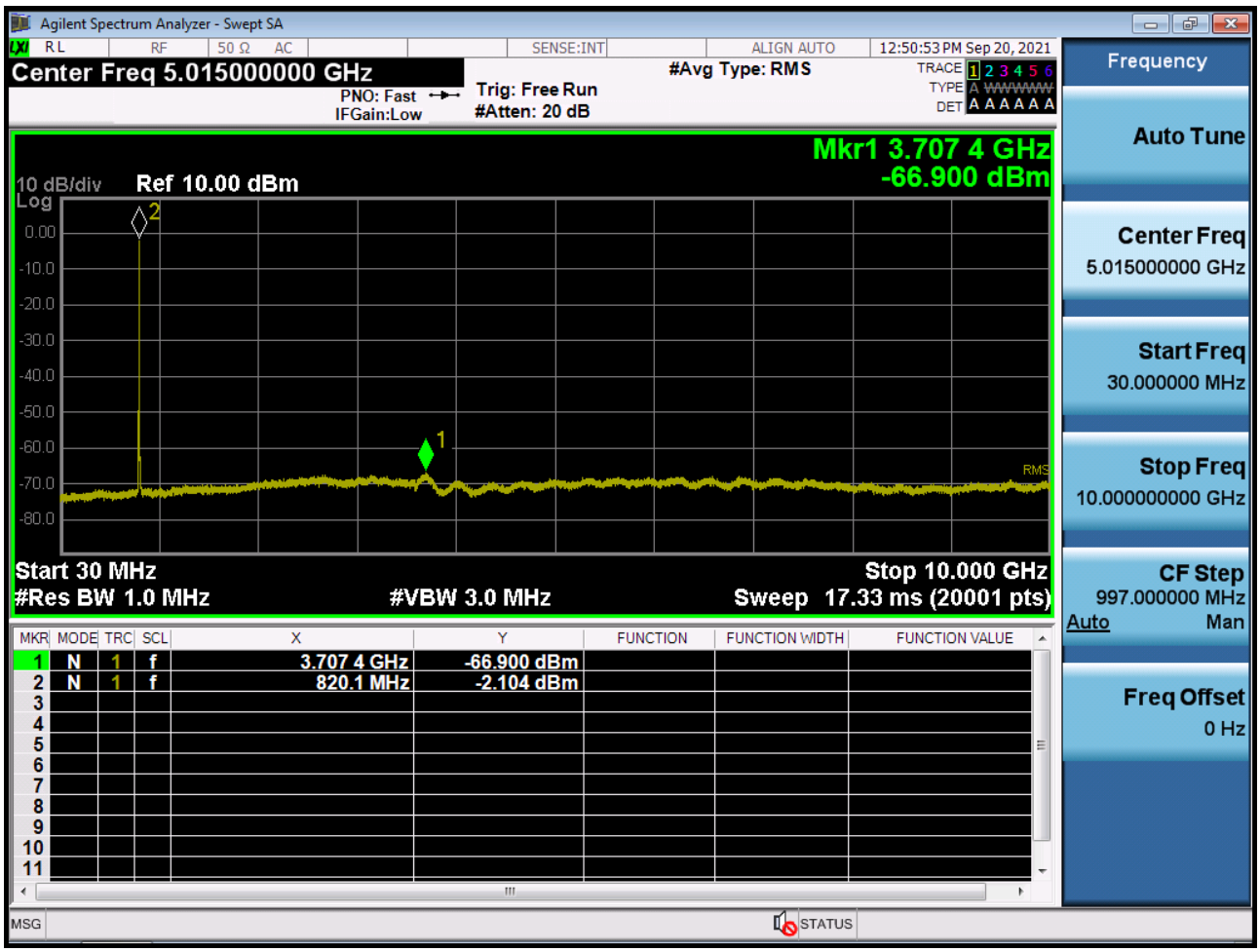
BAND 26. Conducted Spurious (3 MHz_QPSK_RB 1_0)



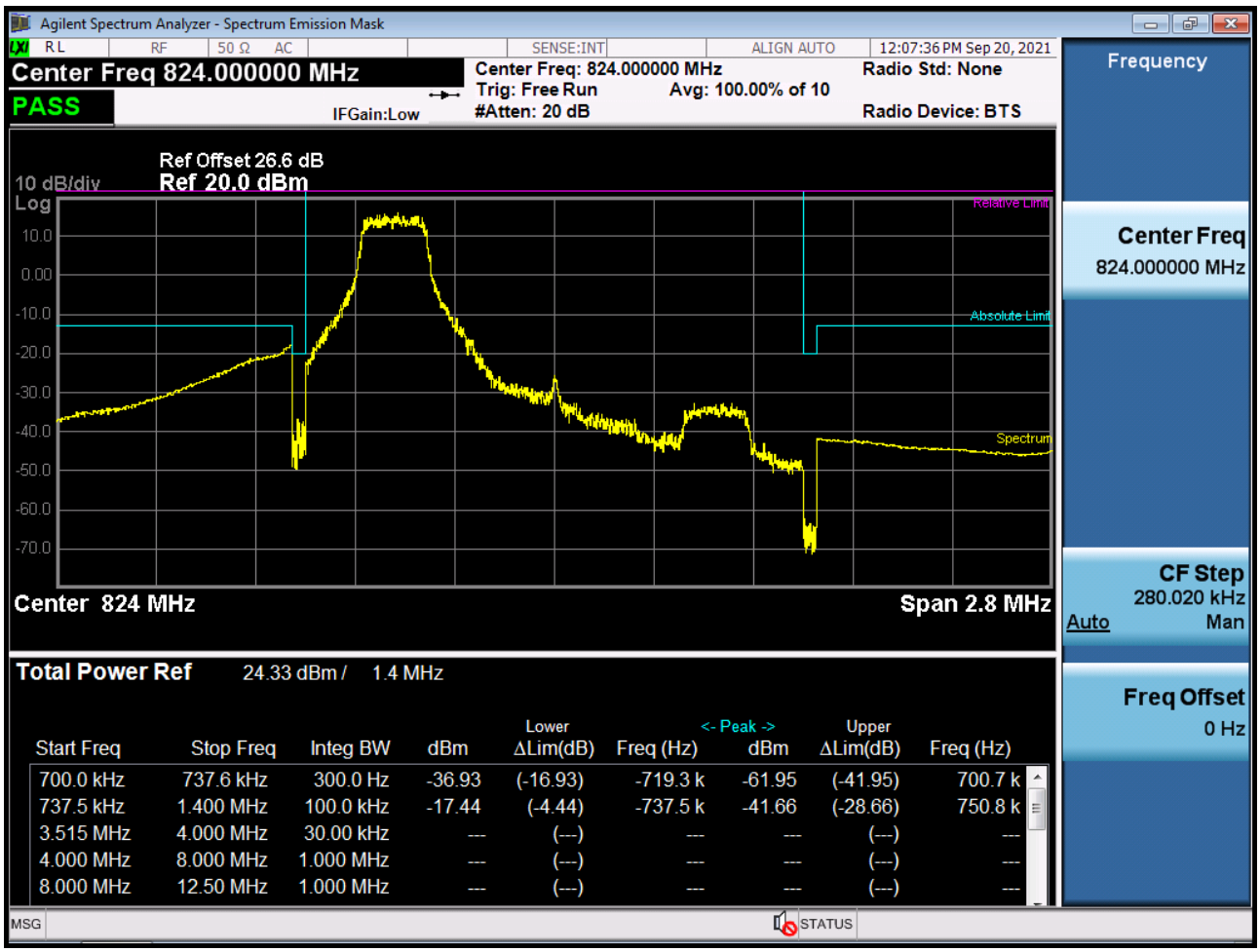
BAND 26. Conducted Spurious (5 MHz_QPSK_RB 1_0)



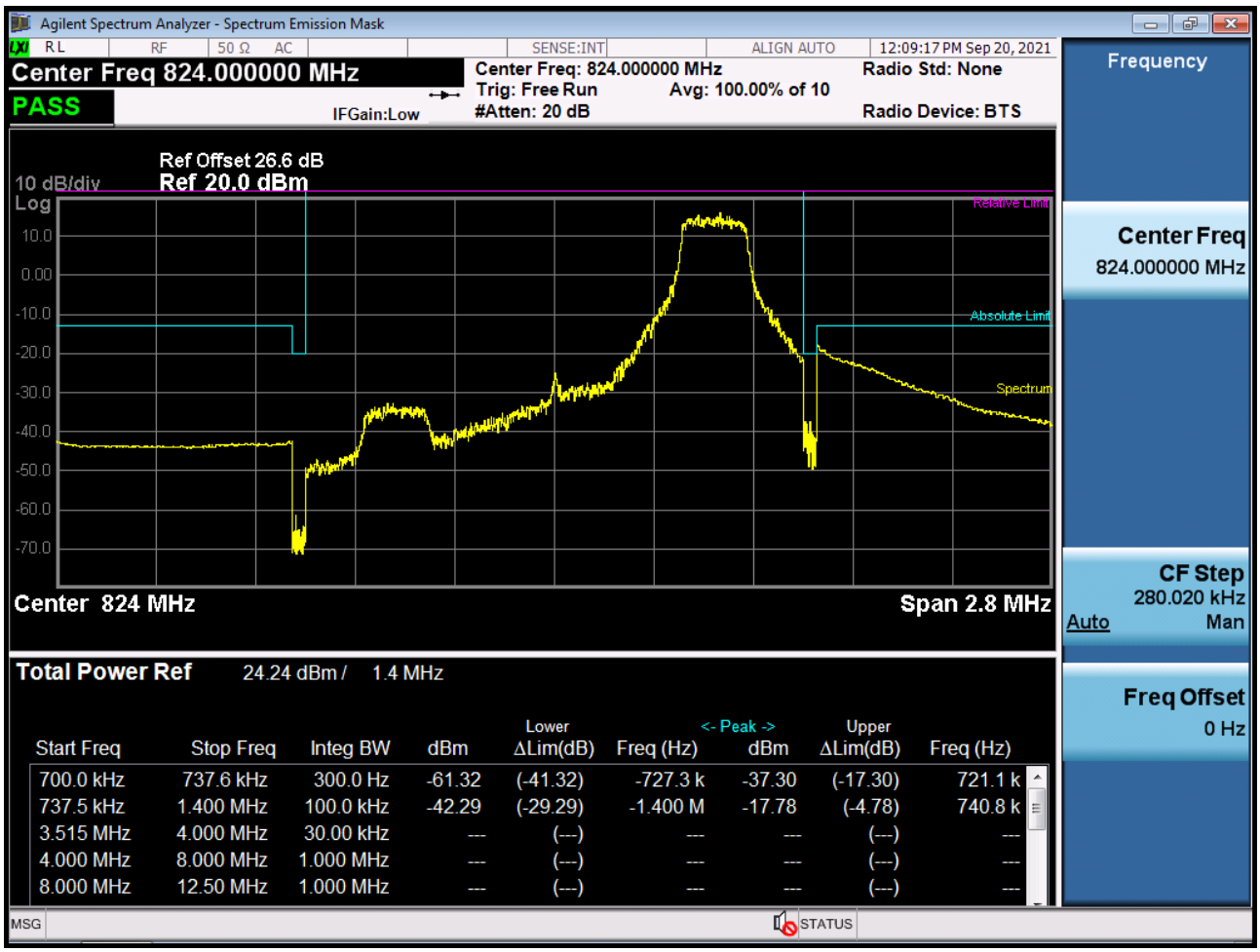
BAND 26. Conducted Spurious (10 MHz_QPSK_RB 1_0)



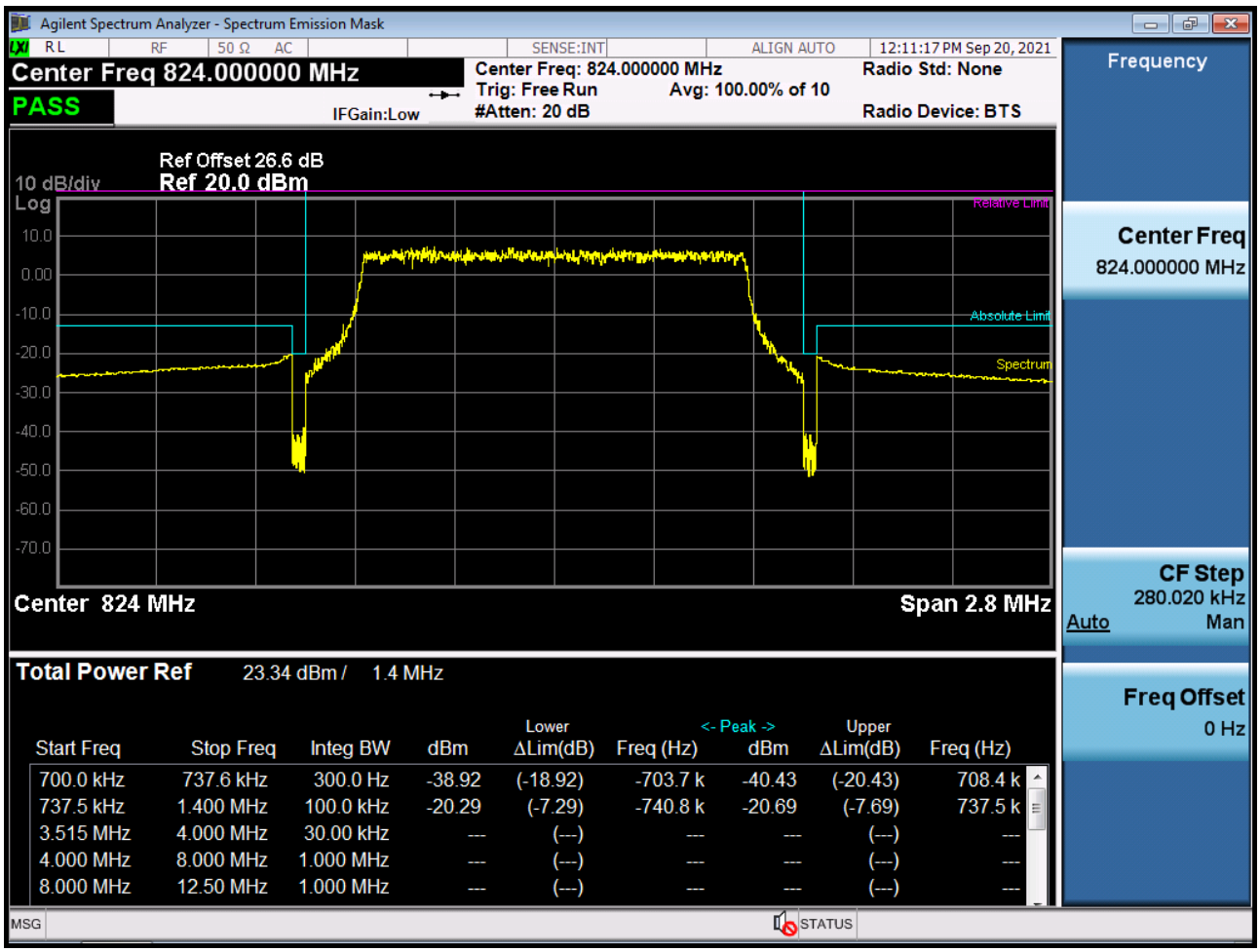
BAND 26. Channel Edge (1.4 MHz_QPSK_RB 1_0)



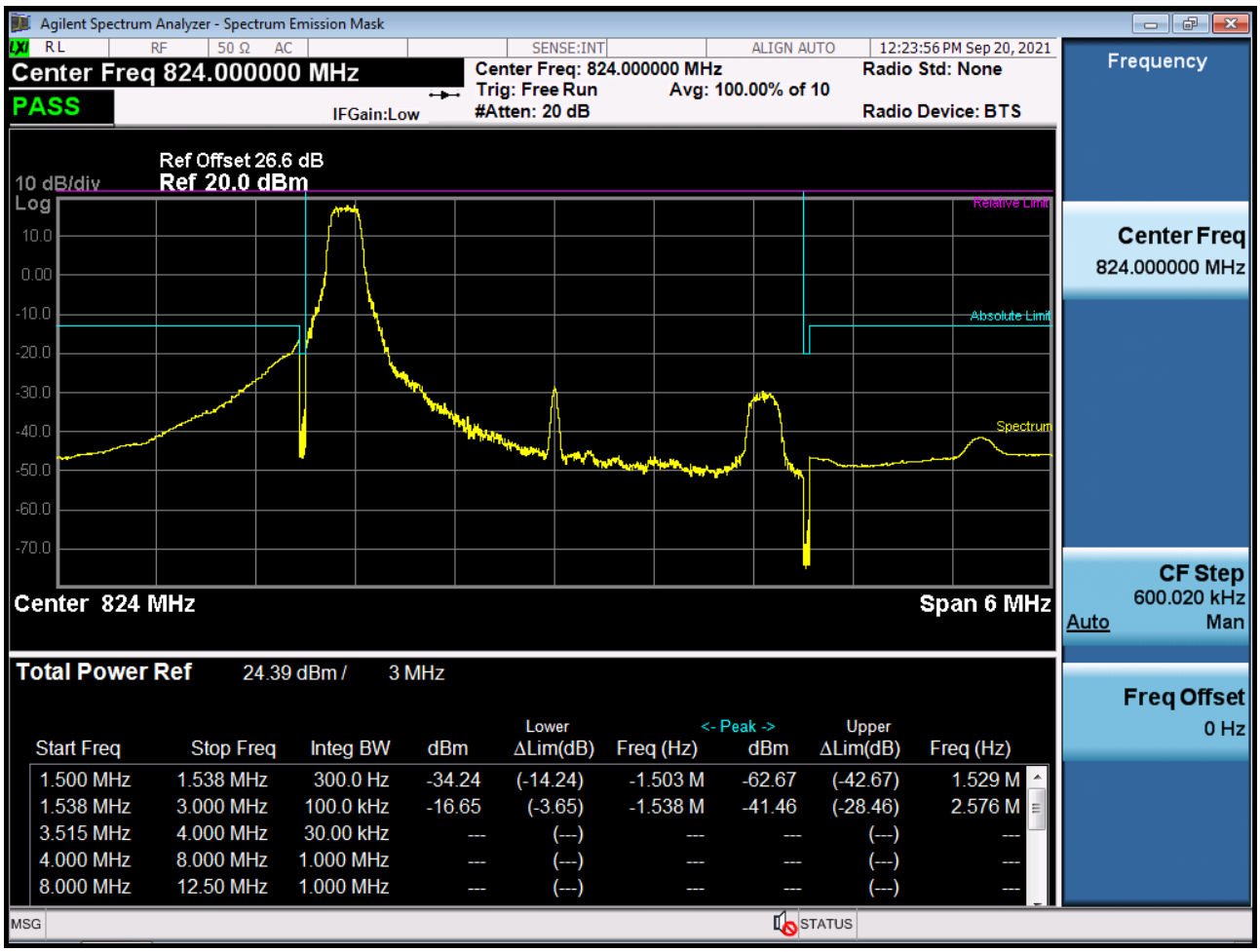
BAND 26. Channel Edge (1.4 MHz_QPSK_RB 1_5)



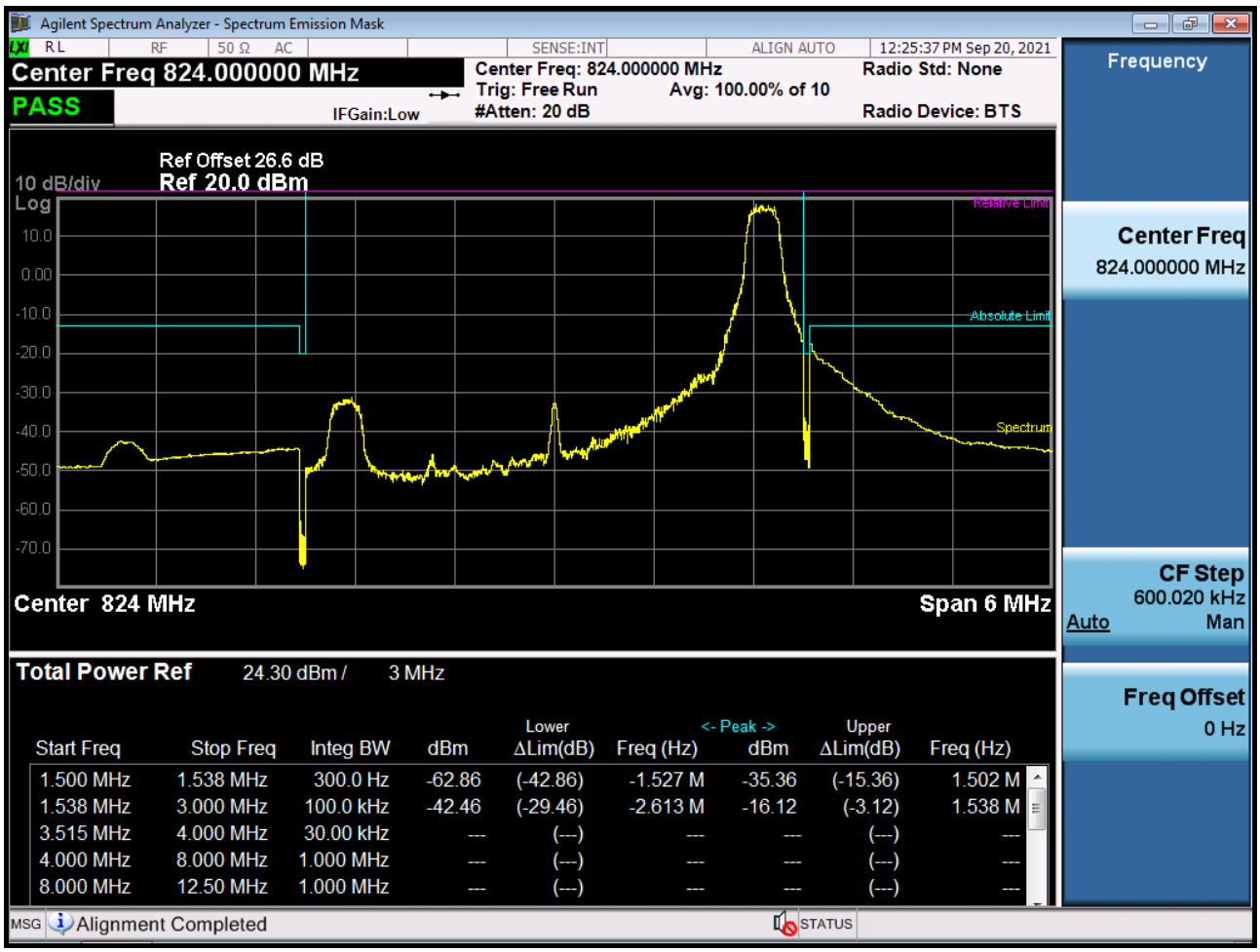
BAND 26. Channel Edge (1.4 MHz_QPSK_Full RB)



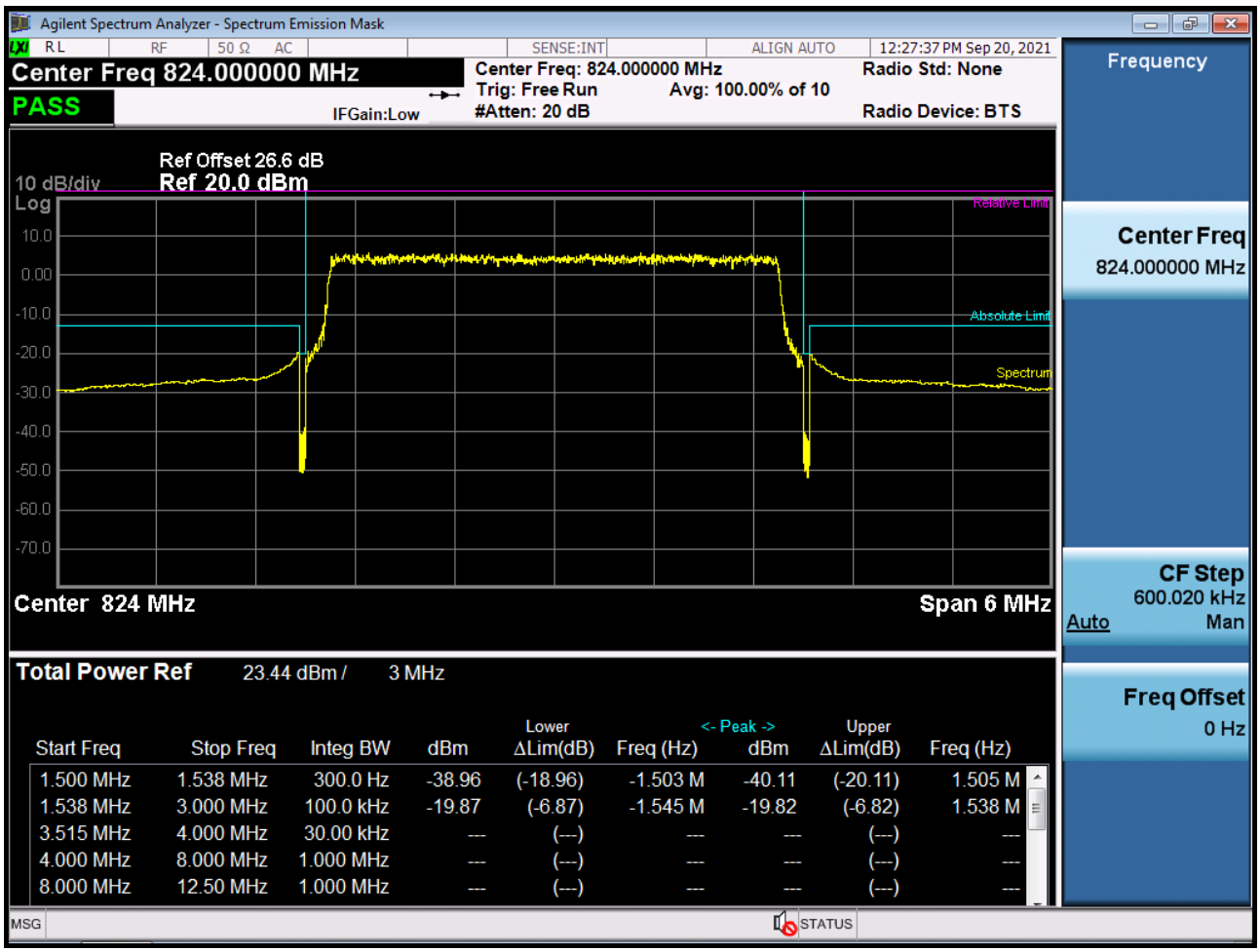
BAND 26. Channel Edge (3 MHz_QPSK_RB 1_0)



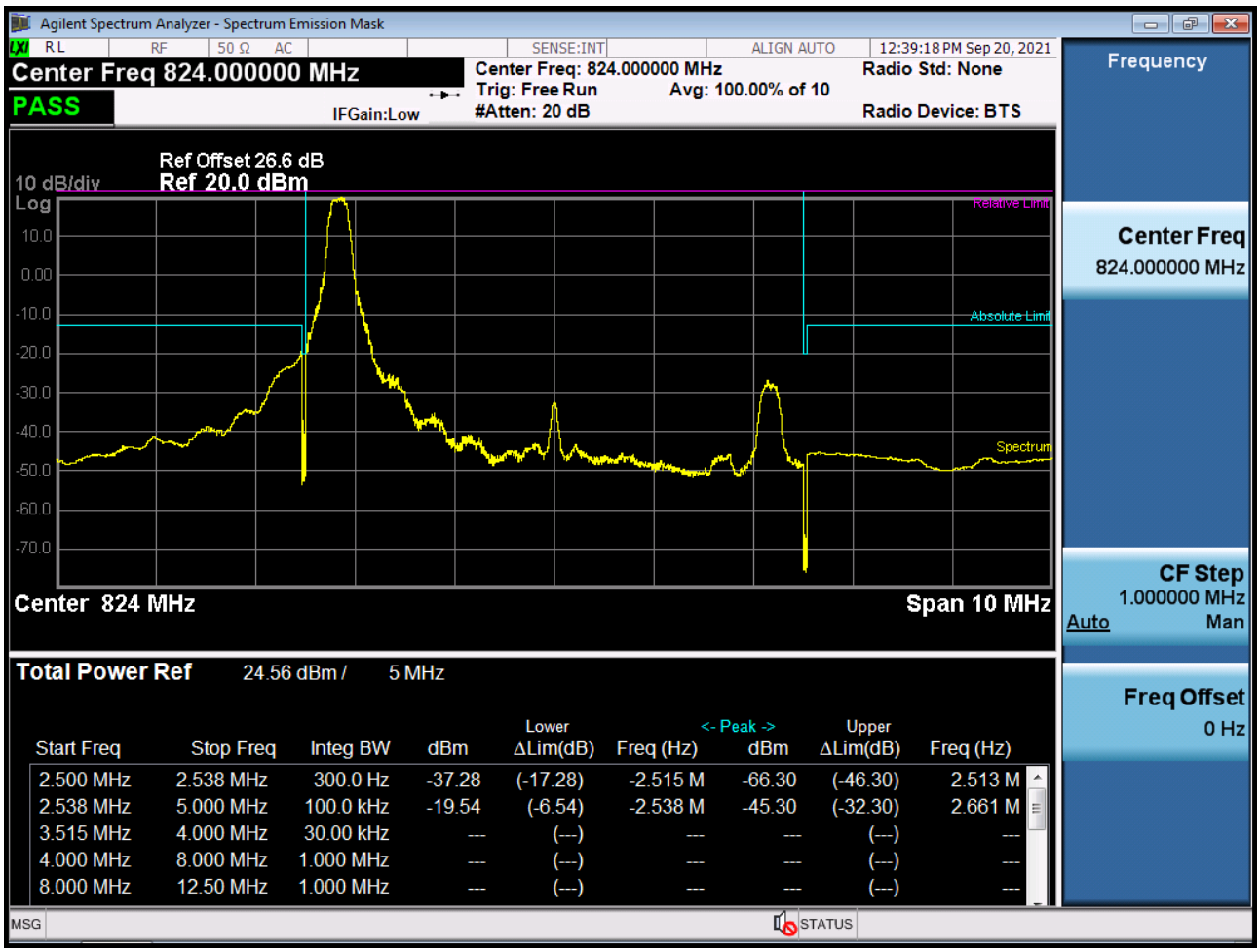
BAND 26. Channel Edge (3 MHz_QPSK_RB 1_14)



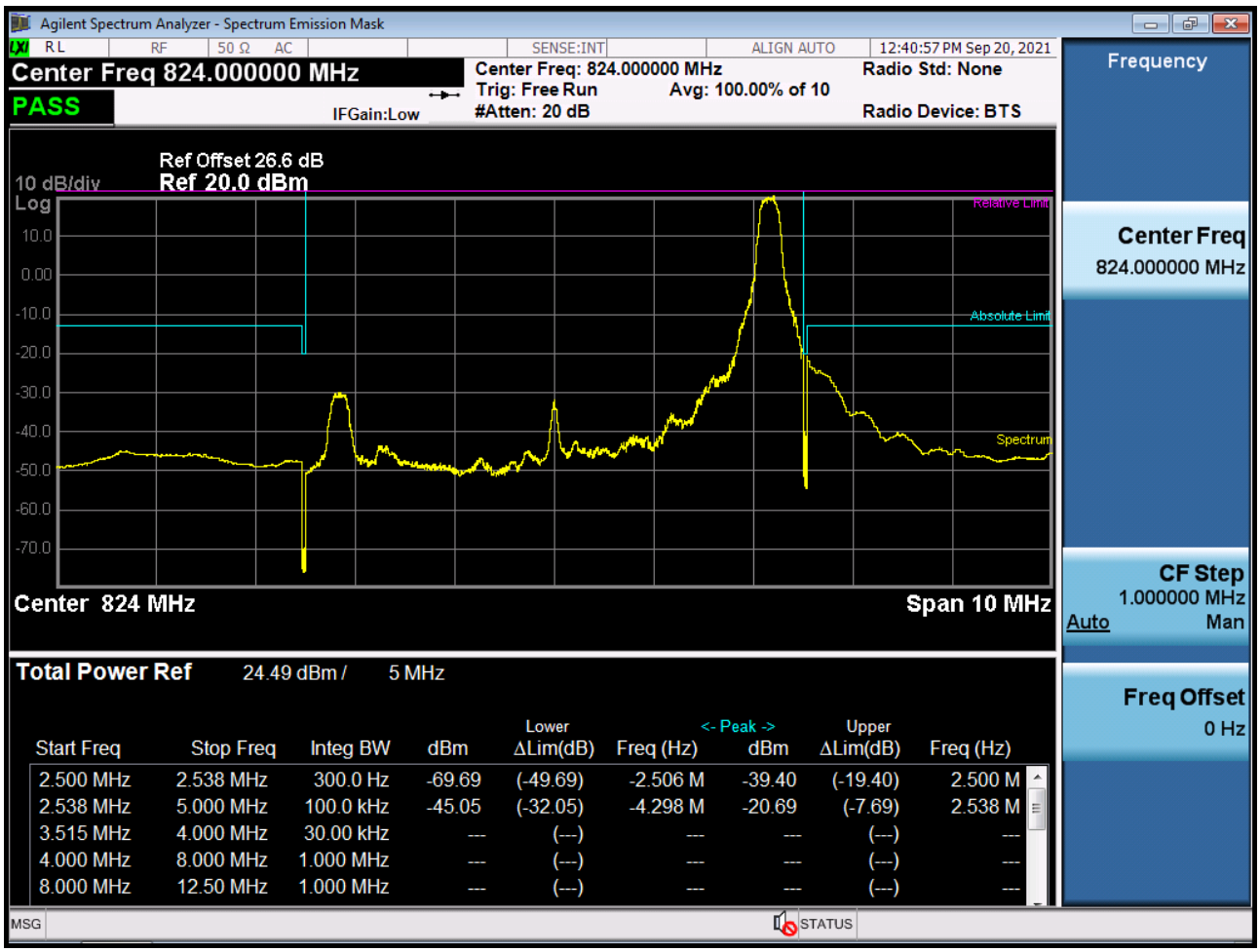
BAND 26. Channel Edge (3 MHz_QPSK_Full RB)



BAND 26. Channel Edge (5 MHz_QPSK_RB 1_0)

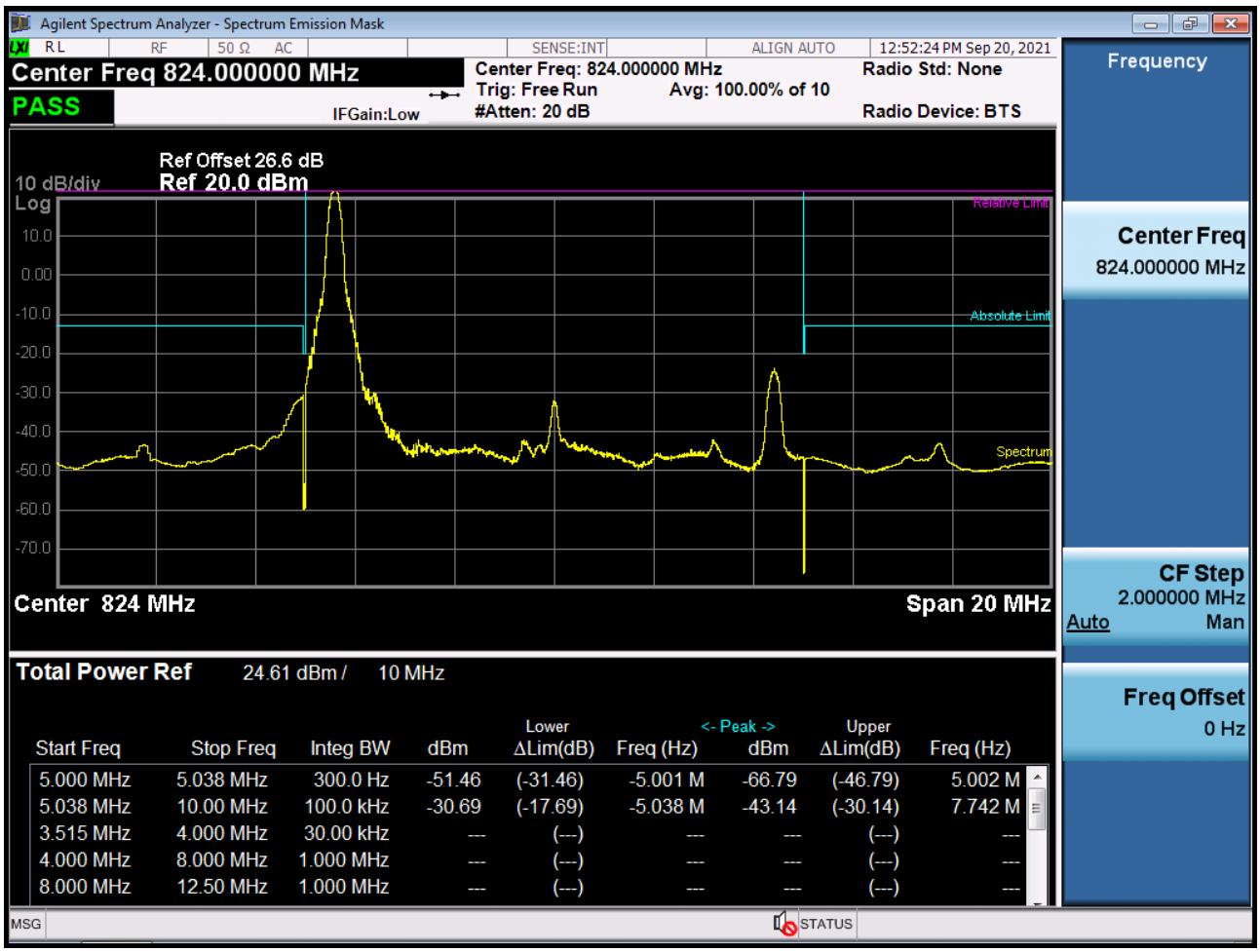


BAND 26. Channel Edge (5 MHz_QPSK_RB 1_24)

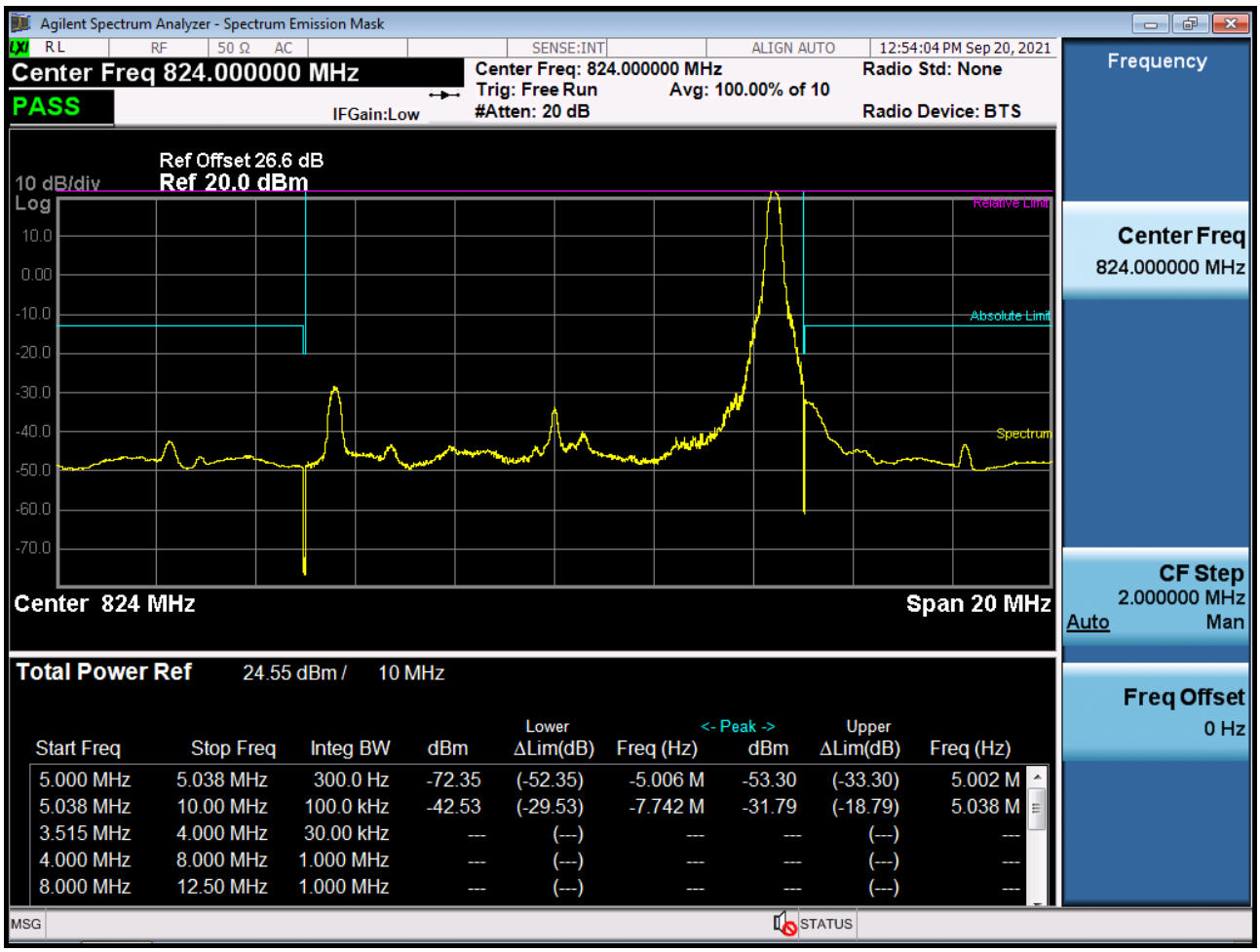


BAND 26. Channel Edge (5 MHz_QPSK_Full RB)

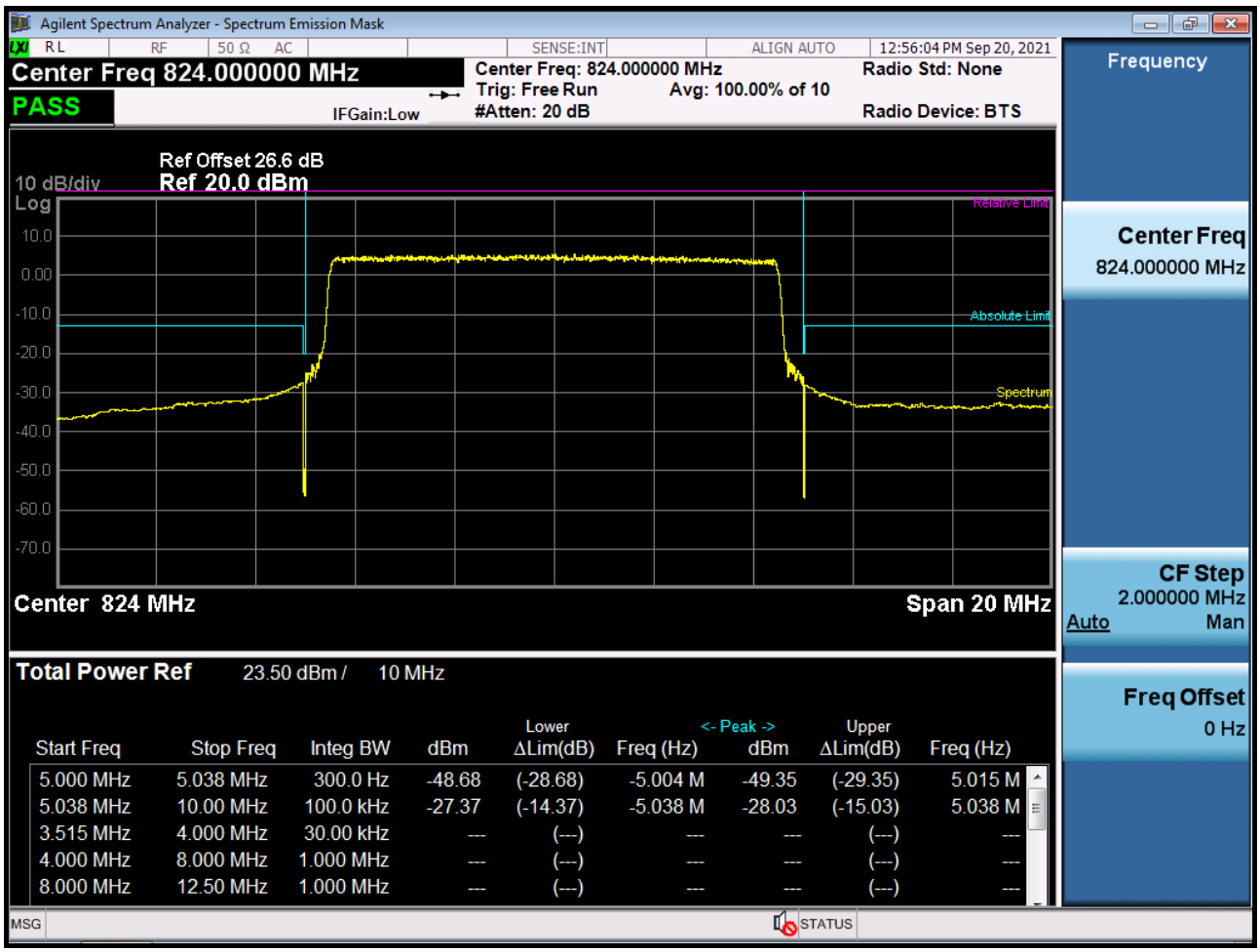
BAND 26. Channel Edge (10 MHz_QPSK_RB 1_0)



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_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-2110-FC053-P