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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:
July 13, 2023

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

Report No.: HCT-RF-2307-FC007

FCC ID:	**A3LSMX616B**
APPLICANT:	**SAMSUNG Electronics Co., Ltd.**

Model(s): SM-X616B
EUT Type: Tablet
FCC Classification: PCS Licensed Transmitter (PCB)
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	1M09G7D	QPSK	0.263	24.20
		1M09W7D	16QAM	0.216	23.35
		1M10W7D	64QAM	0.171	22.34
		1M09W7D	256QAM	0.085	19.27
LTE – Band26 (3)	815.5 – 824.0	2M71G7D	QPSK	0.262	24.18
		2M72W7D	16QAM	0.222	23.46
		2M72W7D	64QAM	0.169	22.29
		2M71W7D	256QAM	0.083	19.17
LTE – Band26 (5)	816.5 – 824.0	4M54G7D	QPSK	0.258	24.12
		4M53W7D	16QAM	0.216	23.35
		4M54W7D	64QAM	0.171	22.32
		4M54W7D	256QAM	0.086	19.32
LTE – Band26 (10)	819.0 – 824.0	9M00G7D	QPSK	0.260	24.15
		9M02W7D	16QAM	0.215	23.32
		9M03W7D	64QAM	0.169	22.29
		9M04W7D	256QAM	0.085	19.30
LTE – Band26 (15)	821.5	13M5G7D	QPSK	0.260	24.15
		13M5W7D	16QAM	0.216	23.34
		13M5W7D	64QAM	0.169	22.29
		13M4W7D	256QAM	0.084	19.24

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-2307-FC007	July 13, 2023	- First Approval Report

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

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MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name:	SAMSUNG Electronics Co., Ltd.
Address:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
FCC ID:	A3LSMX616B
Application Type:	Certification
FCC Classification:	PCS Licensed Transmitter (PCB)
FCC Rule Part(s):	§90, §22, §2
EUT Type:	Tablet
Model(s):	SM-X616B
Tx Frequency:	814.7 MHz – 824.0 MHz (LTE – Band 26 (1.4 MHz)) 815.5 MHz – 824.0 MHz (LTE – Band 26 (3 MHz)) 816.5 MHz – 824.0 MHz (LTE – Band 26 (5 MHz)) 819.0 MHz – 824.0 MHz (LTE – Band 26 (10 MHz)) 821.5 MHz (LTE – Band 26 (15 MHz))
Date(s) of Tests:	May 08, 2023 ~ June 14, 2023
Serial number:	Radiated: R32W3008GSN Conducted: R32W3007ZEN

2. INTRODUCTION

2.1. DESCRIPTION OF EUT

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

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

2.2. MEASURING INSTRUMENT CALIBRATION

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

2.3. TEST FACILITY

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

3. DESCRIPTION OF TESTS

3.1 TEST PROCEDURE

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

3.2 CONDUCTED OUTPUT POWER

Test Overview

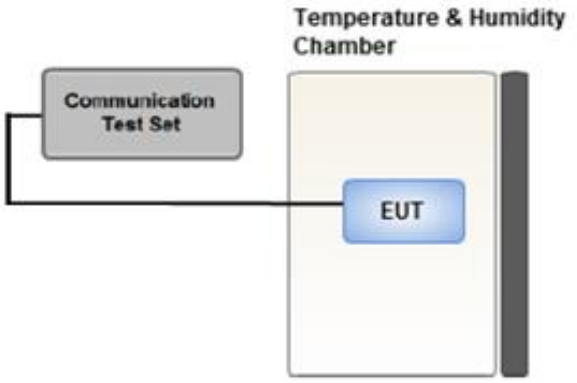
According to ANSI C63.26-2015 Section 5.2.1 when measuring the maximum RF output power from such devices, control over the EUT must be provided either through special test software (provided by manufacturer specifically for compliance testing, but not accessible by an end user) or through use of a base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

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

Test Procedure

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

Test setup



3.3 RADIATED POWER

Test Overview

Radiated tests are performed in the Fully-anechoic chamber.

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

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
2. RBW = 1 – 5 % of the expected OBW, not to exceed 1 MHz
3. VBW ≥ 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;

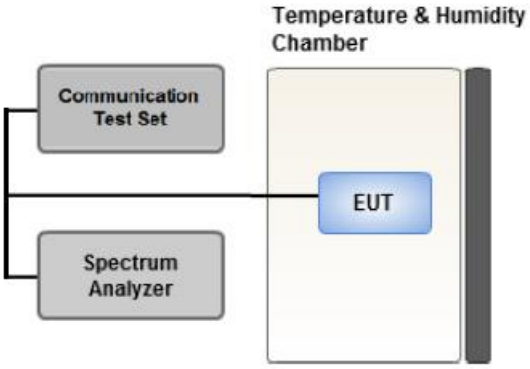
$$\text{Result}_{(dBm)} = \text{Pg}_{(dBm)} - \text{cable loss}_{(dB)} + \text{antenna gain}_{(dBi)}$$

   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.

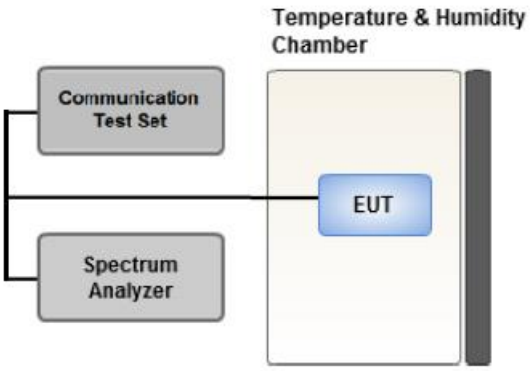
The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

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.

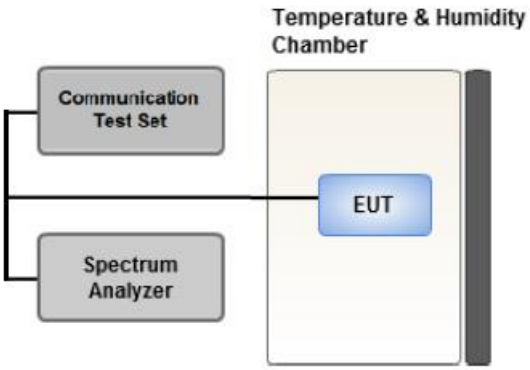
All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

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

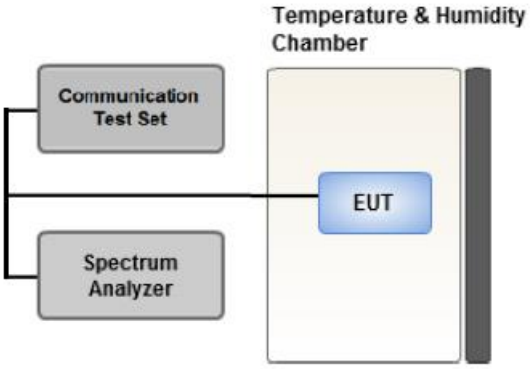
1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW :
   .- EA licensee's frequency block by up to and including 37.5 kHz : 300 Hz
   .- EA licensee's frequency 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.

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

3.8 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE



Test setup

Test Overview

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

The frequency stability of the transmitter is measured by:

1. Temperature:

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

2. Primary Supply Voltage:

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

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

Test Settings

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

3.9 WORST CASE(RADIATED TEST)

- The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
- All modes of operation were investigated and the worst case configuration results are reported.
  Mode : Stand alone, Stand alone + External accessories (Earphone, AC adapter, etc)
  Worst case : Stand alone
- We were performed the RSE test in condition of co-location.
  Mode : Stand alone, Simultaneous transmission scenarios
  Worst case : Stand alone
- In the case of radiated spurious emissions, all bandwidth of operation were investigated and the worst case bandwidth results are reported. (Worst case : 15 MHz)
- The worst case is reported with the EUT positioning, modulations, and paging service configurations shown in the test data.
- All modes of operation were tested and the worst case results are reported.
- Please refer to the table below.

[Worst case]

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

3.10 WORST CASE(CONDUCTED TEST)

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

[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 (Straddle 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
RF Switching System	FBSR-02B(1.2G HPF+LNA)	T&M SYSTEM	F1L1	01/19/2024	Annual
RF Switching System	FBSR-02B(3.3G HPF+LNA)	T&M SYSTEM	F1L2	01/19/2024	Annual
Power Splitter(DC ~ 26.5 GHz)	11667B	Hewlett Packard	5001	04/19/2024	Annual
DC Power Supply	E3632A	Agilent	MY40010147	06/23/2024	Annual
Dipole Antenna	UHAP	Schwarzbeck	557	03/09/2025	Biennial
Dipole Antenna	UHAP	Schwarzbeck	558	03/09/2025	Biennial
Chamber	SU-642	ESPEC	93008124	02/22/2024	Annual
Horn Antenna(1 ~ 18 GHz)	BBHA 9120D	Schwarzbeck	147	08/30/2023	Biennial
Horn Antenna(1 ~ 18 GHz)	BBHA 9120D	Schwarzbeck	9120D-1298	09/15/2023	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170342	09/29/2024	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170124	03/28/2025	Biennial
Signal Analyzer(10 Hz ~ 26.5 GHz)	N9020A	Agilent	MY52090906	04/20/2024	Annual
ATTENUATOR(20 dB)	8493C	Hewlett Packard	17280	04/19/2024	Annual
Spectrum Analyzer(10 Hz ~ 40 GHz)	FSV40	REOHDE & SCHWARZ	100931	08/29/2023	Annual
Base Station	8960 (E5515C)	Agilent	MY48360800	08/18/2023	Annual
Loop Antenna(9 kHz ~ 30 MHz)	FMZB1513	Schwarzbeck	1513-333	03/17/2024	Biennial
Trilog Broadband Antenna	VULB9168	Schwarzbeck	895	08/16/2024	Biennial
Trilog Broadband Antenna	VULB9168	Schwarzbeck	1135	03/21/2024	Biennial
Wideband Radio Communication Tester	MT8821C	Anritsu Corp.	6262094331	12/01/2023	Annual
Wideband Radio Communication Tester	MT8820C	Anritsu Corp.	6201026545	01/05/2024	Annual
SIGNAL GENERATOR (100 kHz ~ 40 GHz)	SMB100A	REOHDE & SCHWARZ	177633	06/22/2024	Annual
Signal Analyzer(5 Hz ~ 40.0 GHz)	N9030B	KEYSIGHT	MY55480167	05/24/2024	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)	1.90 (Confidence level about 95 %, k=2)
Radiated Disturbance (9 kHz ~ 30 MHz)	4.14 (Confidence level about 95 %, k=2)
Radiated Disturbance (30 MHz ~ 1 GHz)	5.16 (Confidence level about 95 %, k=2)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.57 (Confidence level about 95 %, k=2)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.76 (Confidence level about 95 %, k=2)
Radiated Disturbance (Above 40 GHz)	5.52 (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	24.12	0.258	24.03	0.253	100
		1	3	24.01	0.252	23.94	0.248	100
		1	5	24.11	0.258	24.03	0.253	100
		3	0	24.20	0.263	24.06	0.255	100
		3	1	23.99	0.251	23.91	0.246	100
		3	3	24.09	0.256	23.99	0.251	100
		6	0	23.19	0.208	23.09	0.204	100
	16QAM	1	0	23.35	0.216	23.30	0.214	100
		1	3	23.24	0.211	23.20	0.209	100
		1	5	23.25	0.211	23.20	0.209	100
		3	0	23.35	0.216	23.17	0.207	100
		3	1	23.20	0.209	23.15	0.206	100
		3	3	23.22	0.210	23.13	0.206	100
		6	0	22.17	0.165	22.10	0.162	100
	64QAM	1	0	22.34	0.171	22.24	0.167	100
		1	3	22.19	0.166	22.10	0.162	100
		1	5	22.20	0.166	22.15	0.164	100
		3	0	22.23	0.167	22.11	0.163	100
		3	1	22.19	0.166	22.12	0.163	100
		3	3	22.27	0.169	22.14	0.164	100
		6	0	21.20	0.132	21.10	0.129	100
	256QAM	1	0	19.27	0.085	19.16	0.082	100
		1	3	19.16	0.082	19.06	0.081	100
		1	5	19.24	0.084	19.14	0.082	100
		3	0	19.19	0.083	19.07	0.081	100
		3	1	19.12	0.082	19.02	0.080	100
		3	3	19.20	0.083	19.10	0.081	100
		6	0	19.18	0.083	19.03	0.080	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	24.15	0.260	24.08	0.256	100
		1	7	24.18	0.262	24.12	0.258	100
		1	14	24.08	0.256	24.00	0.251	100
		8	0	23.19	0.208	23.11	0.205	100
		8	3	23.19	0.208	23.14	0.206	100
		8	7	23.17	0.207	23.11	0.205	100
		15	0	23.22	0.210	23.15	0.207	100
	16QAM	1	0	23.46	0.222	23.40	0.219	100
		1	7	23.24	0.211	23.18	0.208	100
		1	14	23.34	0.216	23.32	0.215	100
		8	0	22.24	0.167	22.18	0.165	100
		8	3	22.22	0.167	22.18	0.165	100
		8	7	22.17	0.165	22.13	0.163	100
		15	0	22.20	0.166	22.13	0.163	100
	64QAM	1	0	22.23	0.167	22.19	0.166	100
		1	7	22.23	0.167	22.15	0.164	100
		1	14	22.29	0.169	22.27	0.169	100
		8	0	21.15	0.130	21.11	0.129	100
		8	3	21.14	0.130	21.10	0.129	100
		8	7	21.16	0.131	21.09	0.129	100
		15	0	21.18	0.131	21.14	0.130	100
	256QAM	1	0	19.12	0.082	19.09	0.081	100
		1	7	19.17	0.083	19.17	0.083	100
		1	14	19.12	0.082	19.11	0.081	100
		8	0	19.14	0.082	19.08	0.081	100
		8	3	19.15	0.082	19.08	0.081	100
		8	7	19.14	0.082	19.07	0.081	100
		15	0	19.09	0.081	19.04	0.080	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	24.12	0.258	24.06	0.254	100
		1	12	24.12	0.258	24.09	0.256	100
		1	24	24.12	0.258	24.04	0.254	100
		12	0	23.18	0.208	23.13	0.205	100
		12	6	23.15	0.207	23.11	0.205	100
		12	11	23.19	0.208	23.13	0.206	100
		25	0	23.25	0.211	23.14	0.206	100
	16QAM	1	0	23.35	0.216	23.31	0.214	100
		1	12	23.15	0.207	23.17	0.207	100
		1	24	23.27	0.212	23.25	0.212	100
		12	0	22.21	0.166	22.15	0.164	100
		12	6	22.18	0.165	22.15	0.164	100
		12	11	22.18	0.165	22.12	0.163	100
		25	0	22.19	0.166	22.13	0.163	100
	64QAM	1	0	22.32	0.171	22.25	0.168	100
		1	12	22.27	0.169	22.20	0.166	100
		1	24	22.22	0.167	22.20	0.166	100
		12	0	21.20	0.132	21.14	0.130	100
		12	6	21.17	0.131	21.11	0.129	100
		12	11	21.17	0.131	21.13	0.130	100
		25	0	21.14	0.130	21.07	0.128	100
	256QAM	1	0	19.32	0.086	19.21	0.083	100
		1	12	19.19	0.083	19.12	0.082	100
		1	24	19.24	0.084	19.12	0.082	100
		12	0	19.09	0.081	19.05	0.080	100
		12	6	19.13	0.082	19.05	0.080	100
		12	11	19.13	0.082	19.09	0.081	100
		25	0	19.13	0.082	19.06	0.080	100

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm) 819 MHz		Limit (W)
				dBm	W	
10	QPSK	1	0	24.15	0.260	100
		1	24	24.04	0.254	100
		1	49	24.02	0.252	100
		25	0	23.27	0.212	100
		25	12	23.19	0.208	100
		25	24	23.18	0.208	100
		50	0	23.23	0.210	100
	16QAM	1	0	23.32	0.215	100
		1	24	23.29	0.213	100
		1	49	23.30	0.214	100
		25	0	22.17	0.165	100
		25	12	22.20	0.166	100
		25	24	22.14	0.164	100
		50	0	22.19	0.166	100
	64QAM	1	0	22.27	0.169	100
		1	24	22.29	0.169	100
		1	49	22.28	0.169	100
		25	0	21.20	0.132	100
		25	12	21.16	0.131	100
		25	24	21.12	0.129	100
		50	0	21.19	0.132	100
	256QAM	1	0	19.30	0.085	100
		1	24	19.16	0.082	100
		1	49	19.19	0.083	100
		25	0	19.15	0.082	100
		25	12	19.13	0.082	100
		25	24	19.10	0.081	100
		50	0	19.11	0.081	100

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm)		Limit (W)
				821.5 MHz		
				dBm	W	
15	QPSK	1	0	24.15	0.260	100
		1	36	24.01	0.252	100
		1	74	23.97	0.249	100
		36	0	23.18	0.208	100
		36	18	23.11	0.205	100
		36	39	23.11	0.205	100
		75	0	23.18	0.208	100
	16QAM	1	0	23.34	0.216	100
		1	36	23.28	0.213	100
		1	74	23.25	0.211	100
		36	0	22.15	0.164	100
		36	18	22.12	0.163	100
		36	39	22.10	0.162	100
		75	0	22.17	0.165	100
	64QAM	1	0	22.29	0.169	100
		1	36	22.23	0.167	100
		1	74	22.20	0.166	100
		36	0	21.15	0.130	100
		36	18	21.11	0.129	100
		36	39	21.07	0.128	100
		75	0	21.13	0.130	100
	256QAM	1	0	19.24	0.084	100
		1	36	19.07	0.081	100
		1	74	19.15	0.082	100
		36	0	19.11	0.081	100
		36	18	19.07	0.081	100
		36	39	19.05	0.080	100
		75	0	19.08	0.081	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	-30.03	30.81	-9.95	1.40	H	< 100	0.088	19.46
		16QAM	-30.82	30.02	-9.95	1.40	H		0.074	18.67
		64QAM	-31.84	29.00	-9.95	1.40	H		0.058	17.65
		256QAM	-34.95	25.89	-9.95	1.40	H		0.029	14.54
823.3		QPSK	-29.65	31.40	-9.94	1.41	H		0.101	20.05
		16QAM	-30.48	30.57	-9.94	1.41	H		0.084	19.22
		64QAM	-31.50	29.55	-9.94	1.41	H		0.066	18.20
		256QAM	-34.54	26.51	-9.94	1.41	H		0.033	15.16

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	-30.02	30.82	-9.95	1.41	H	< 100	0.088	19.46
		16QAM	-30.74	30.10	-9.95	1.41	H		0.075	18.74
		64QAM	-31.84	29.00	-9.95	1.41	H		0.058	17.64
		256QAM	-34.83	26.01	-9.95	1.41	H		0.029	14.65
822.5		QPSK	-29.66	31.35	-9.94	1.41	H		0.100	20.00
		16QAM	-30.41	30.60	-9.94	1.41	H		0.084	19.25
		64QAM	-31.48	29.53	-9.94	1.41	H		0.066	18.18
		256QAM	-34.51	26.50	-9.94	1.41	H		0.033	15.15

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	-29.82	30.97	-9.95	1.41	H	< 100	0.091	19.61
		16QAM	-30.65	30.14	-9.95	1.41	H		0.076	18.78
		64QAM	-31.65	29.14	-9.95	1.41	H		0.060	17.78
		256QAM	-34.69	26.10	-9.95	1.41	H		0.030	14.74
821.5		QPSK	-29.53	31.42	-9.94	1.41	H		0.102	20.07
		16QAM	-30.34	30.61	-9.94	1.41	H		0.084	19.26
		64QAM	-31.41	29.54	-9.94	1.41	H		0.066	18.19
		256QAM	-34.41	26.54	-9.94	1.41	H		0.033	15.19

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	-29.54	31.27	-9.95	1.41	H	< 100	0.098	19.91
		16QAM	-30.35	30.46	-9.95	1.41	H		0.081	19.10
		64QAM	-31.41	29.40	-9.95	1.41	H		0.064	18.04
		256QAM	-34.45	26.36	-9.95	1.41	H		0.032	15.00

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	-29.22	31.73	-9.94	1.41	H	< 7.00	0.109	20.38
		16QAM	-29.97	30.98	-9.94	1.41	H		0.092	19.63
		64QAM	-31.06	29.89	-9.94	1.41	H		0.072	18.54
		256QAM	-34.11	26.84	-9.94	1.41	H		0.035	15.49

Note

1. Limit: None (for reporting purposes only)

8.3 RADIATED SPURIOUS EMISSIONS

▣ MODE: LTE B26

▣ MODULATION SIGNAL: 15 MHz QPSK

▣ DISTANCE: 3 meters

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Limit
26765 (821.5)	1 643.00	-53.34	9.60	-63.98	1.99	H	-56.37	78.90
	2 464.50	-55.31	10.42	-60.27	2.55	V	-52.40	74.93
	3 286.00	-57.86	12.01	-59.16	2.92	V	-50.08	72.61

8.4 OCCUPIED BANDWIDTH

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (MHz)
Band 26	1.4 MHz	823.3	QPSK	6	0	1.0943
			16QAM			1.0942
			64QAM			1.0990
			256QAM			1.0924
	3 MHz	822.5	QPSK	15		2.7134
			16QAM			2.7177
			64QAM			2.7231
			256QAM			2.7124
	5 MHz	821.5	QPSK	25		4.5418
			16QAM			4.5276
			64QAM			4.5370
			256QAM			4.5366
	10 MHz	819.0	QPSK	50		9.0031
			16QAM			9.0212
			64QAM			9.0327
			256QAM			9.0437
	15 MHz	821.5	QPSK	75		13.540
			16QAM			13.470
			64QAM			13.466
			256QAM			13.444

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	3.7049	27.976	-67.158	-39.182	-13.00
		823.3	3.6955	27.976	-67.136	-39.160	
	3	815.5	3.6990	27.976	-67.021	-39.045	
		822.5	3.1725	27.976	-67.372	-39.396	
	5	816.5	3.6720	27.976	-67.095	-39.119	
		821.5	3.6750	27.976	-67.260	-39.284	
	10	819.0	3.1661	27.976	-67.358	-39.382	
	15	821.5	3.6920	27.976	-66.941	-38.965	

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

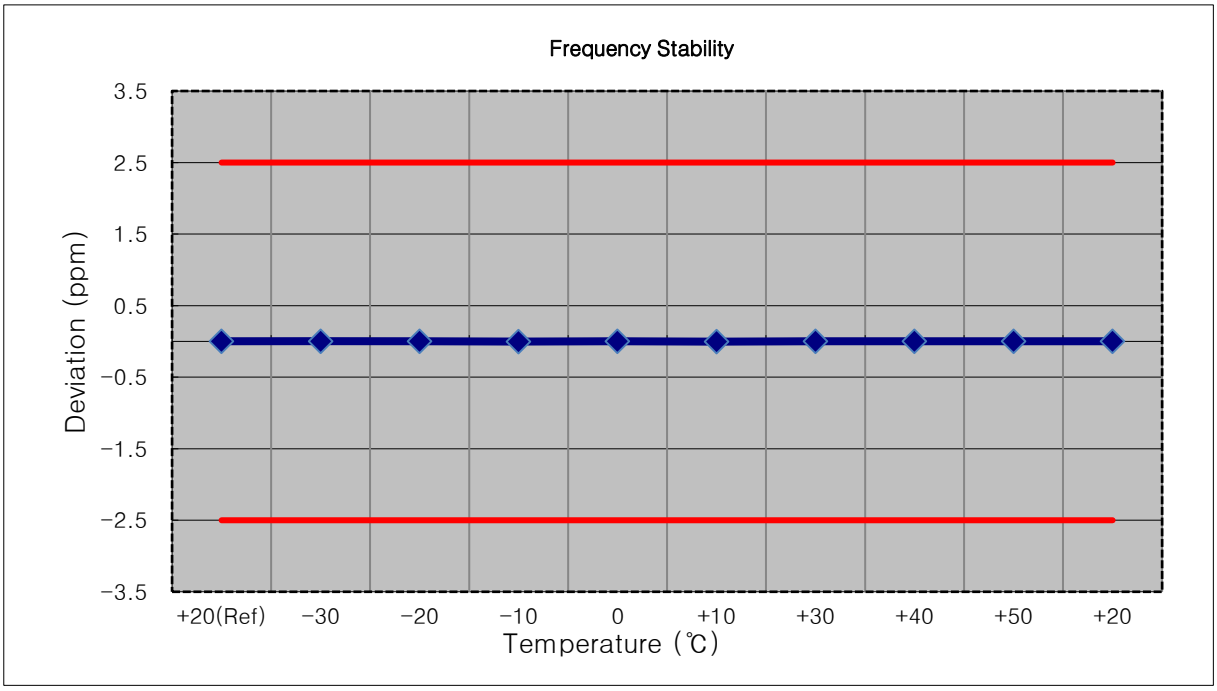
▣ OPERATING FREQUENCY: 814,700,000 Hz

▣ CHANNEL: 26697(1.4 MHz)

▣ REFERENCE VOLTAGE: 3.850 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.850	+20(Ref)	814 700 003	0.0	0.000 000	0.000
100 %		-30	814 700 005	2.7	0.000 000	0.003
100 %		-20	814 700 004	1.4	0.000 000	0.002
100 %		-10	814 700 000	-2.4	0.000 000	-0.003
100 %		0	814 700 005	2.2	0.000 000	0.003
100 %		+10	814 700 000	-2.9	0.000 000	-0.004
100 %		+30	814 700 005	2.5	0.000 000	0.003
100 %		+40	814 700 005	2.5	0.000 000	0.003
100 %		+50	814 700 004	1.8	0.000 000	0.002
Batt. Endpoint	3.400	+20	814 700 005	2.5	0.000 000	0.003



▣ MODE: LTE 26

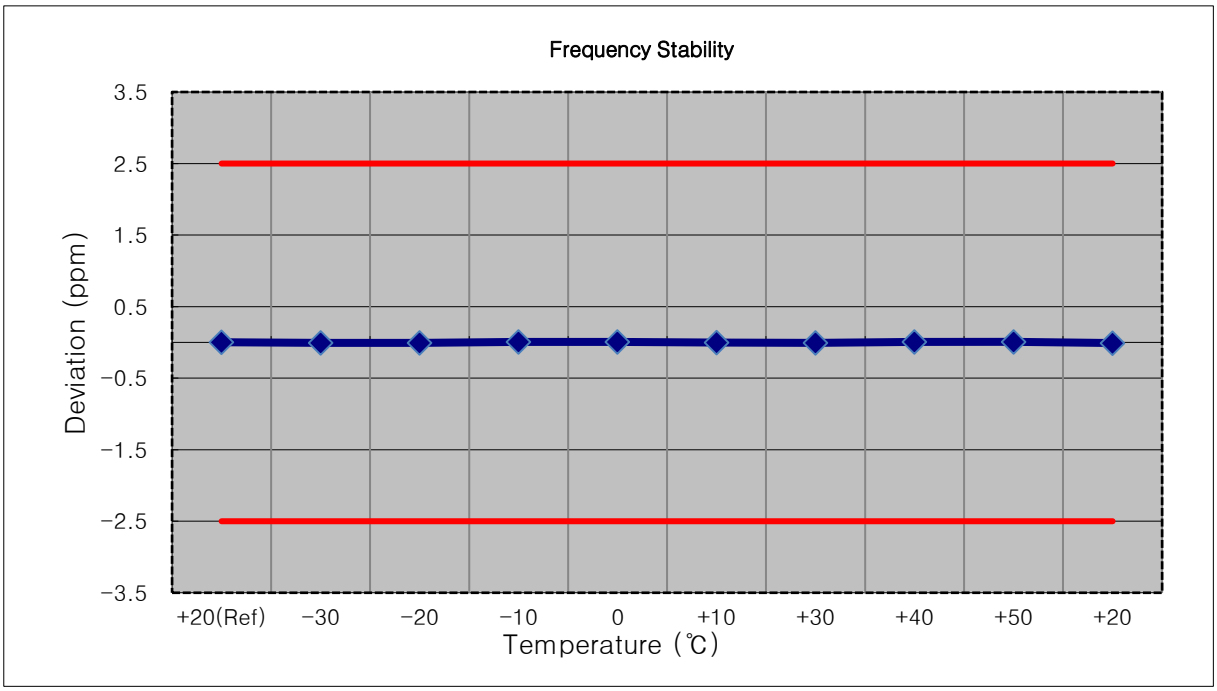
▣ OPERATING FREQUENCY: 815,500,000 Hz

▣ CHANNEL: 26705(3 MHz)

▣ REFERENCE VOLTAGE: 3.850 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.850	+20(Ref)	815 500 005	0.0	0.000 000	0.000
100 %		-30	815 500 001	-3.7	0.000 000	-0.005
100 %		-20	815 500 000	-5.1	-0.000 001	-0.006
100 %		-10	815 500 011	6.3	0.000 001	0.008
100 %		0	815 500 010	5.4	0.000 001	0.007
100 %		+10	815 500 002	-3.0	0.000 000	-0.004
100 %		+30	815 500 001	-4.1	-0.000 001	-0.005
100 %		+40	815 500 011	6.3	0.000 001	0.008
100 %		+50	815 500 011	6.4	0.000 001	0.008
Batt. Endpoint	3.400	+20	815 499 998	-7.4	-0.000 001	-0.009



▣ MODE: LTE 26

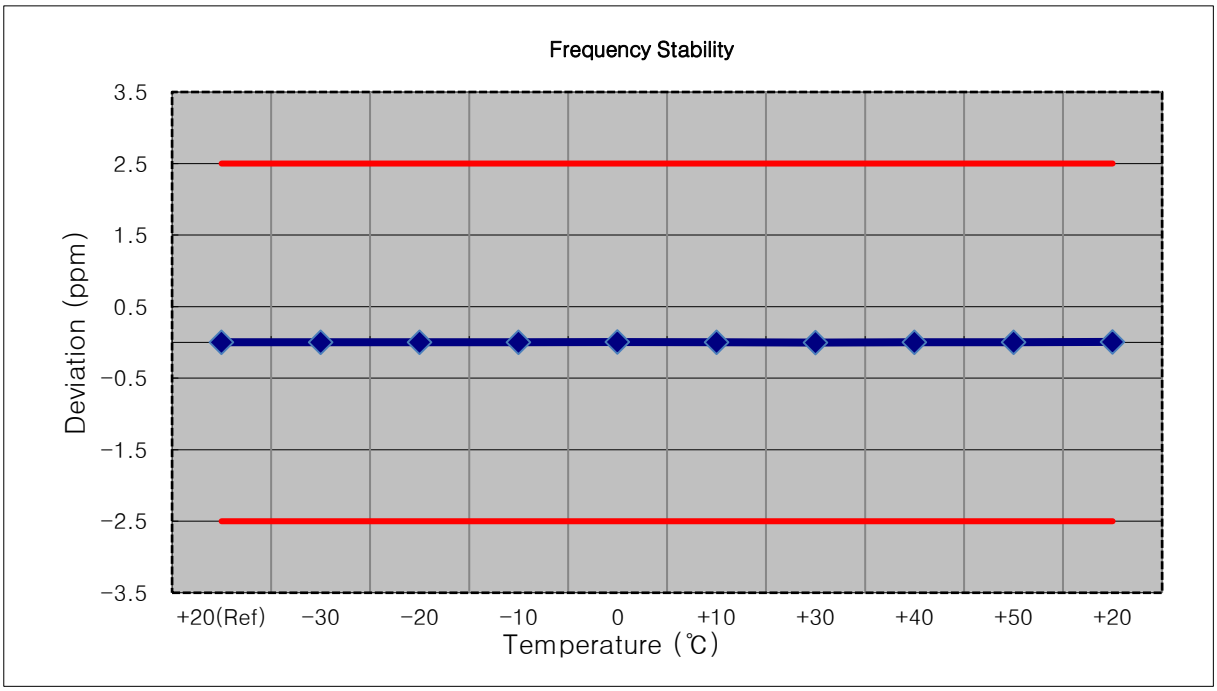
▣ OPERATING FREQUENCY: 816,500,000 Hz

▣ CHANNEL: 26715(5 MHz)

▣ REFERENCE VOLTAGE: 3.850 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.850	+20(Ref)	816 500 002	0.0	0.000 000	0.000
100 %		-30	816 500 003	1.5	0.000 000	0.002
100 %		-20	816 500 005	3.4	0.000 000	0.004
100 %		-10	816 500 004	2.1	0.000 000	0.003
100 %		0	816 500 006	3.8	0.000 000	0.005
100 %		+10	816 500 005	3.4	0.000 000	0.004
100 %		+30	816 500 000	-2.1	0.000 000	-0.003
100 %		+40	816 500 003	1.6	0.000 000	0.002
100 %		+50	816 500 004	2.1	0.000 000	0.003
Batt. Endpoint	3.400	+20	816 500 006	3.7	0.000 000	0.005



▣ MODE: LTE 26

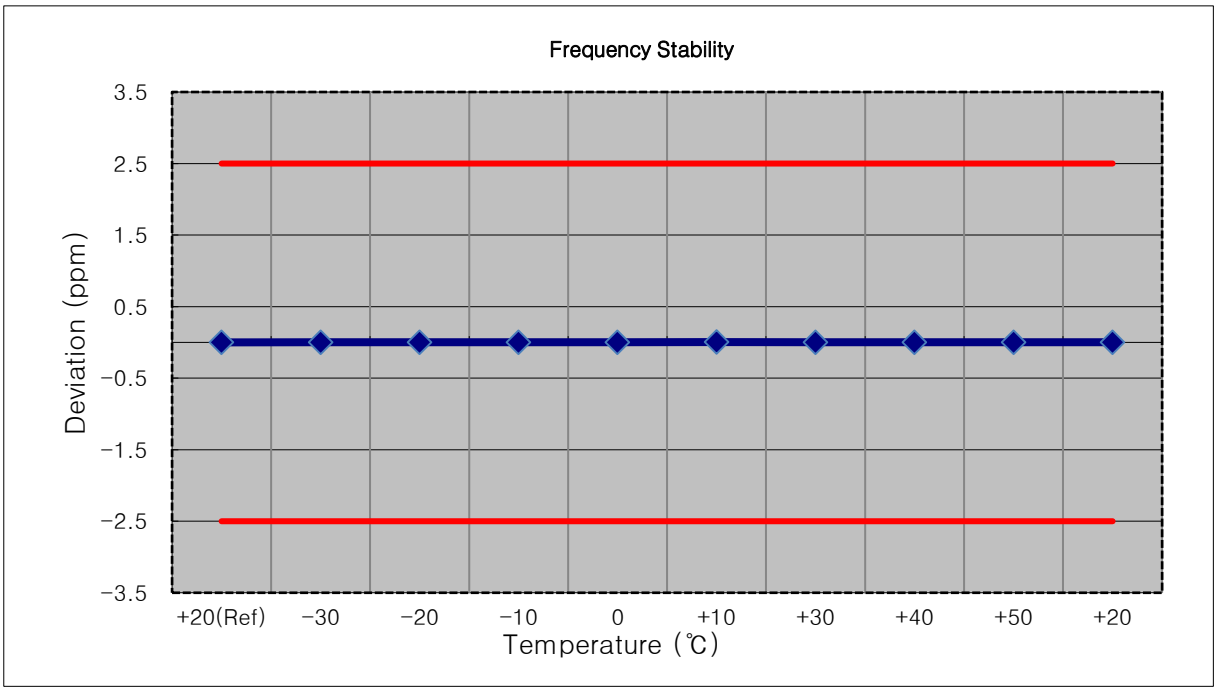
▣ OPERATING FREQUENCY: 819,000,000 Hz

▣ CHANNEL: 26740(10 MHz)

▣ REFERENCE VOLTAGE: 3.850 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.850	+20(Ref)	819 000 004	0.0	0.000 000	0.000
100 %		-30	819 000 005	1.6	0.000 000	0.002
100 %		-20	819 000 005	1.4	0.000 000	0.002
100 %		-10	819 000 006	2.3	0.000 000	0.003
100 %		0	819 000 006	2.6	0.000 000	0.003
100 %		+10	819 000 008	3.7	0.000 000	0.005
100 %		+30	819 000 007	3.4	0.000 000	0.004
100 %		+40	819 000 007	2.7	0.000 000	0.003
100 %		+50	819 000 005	1.2	0.000 000	0.001
Batt. Endpoint	3.400	+20	819 000 006	2.1	0.000 000	0.003



▣ MODE: LTE 26

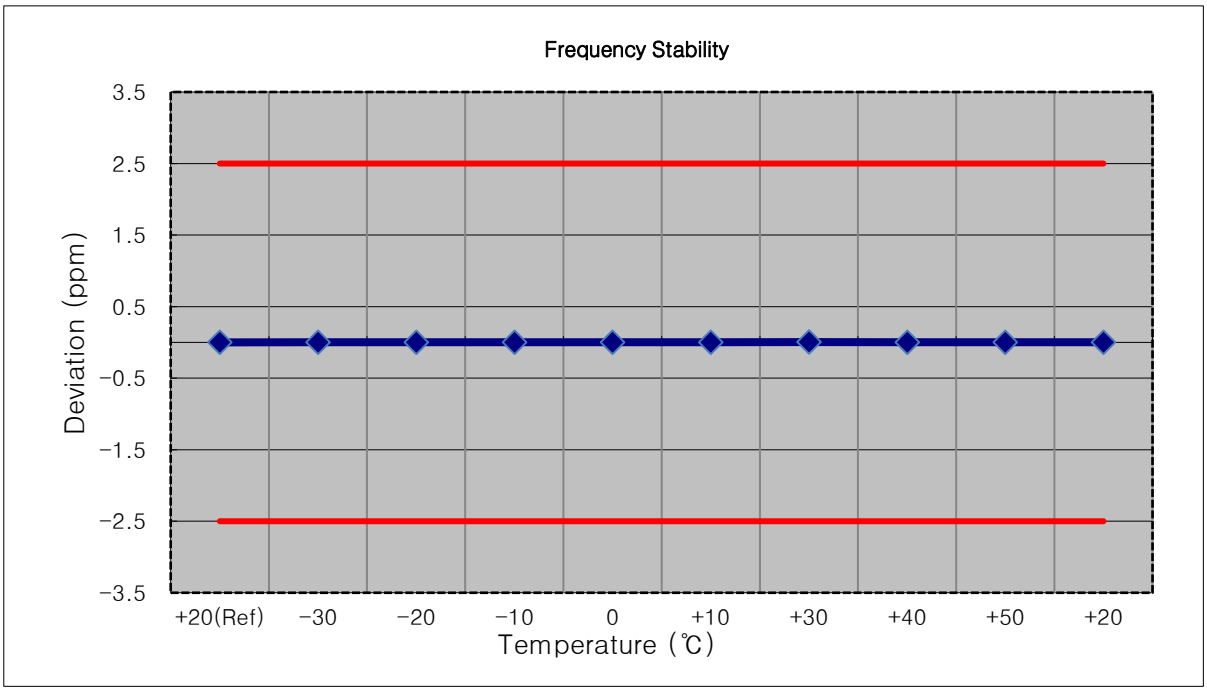
▣ OPERATING FREQUENCY: 821,500,000 Hz

▣ CHANNEL: 26765(15 MHz)

▣ REFERENCE VOLTAGE: 3.850 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.850	+20(Ref)	821 500 003	0.0	0.000 000	0.000
100 %		-30	821 500 006	2.9	0.000 000	0.004
100 %		-20	821 500 005	1.9	0.000 000	0.002
100 %		-10	821 500 006	2.7	0.000 000	0.003
100 %		0	821 500 005	2.2	0.000 000	0.003
100 %		+10	821 500 006	2.5	0.000 000	0.003
100 %		+30	821 500 007	3.8	0.000 000	0.005
100 %		+40	821 500 006	2.8	0.000 000	0.003
100 %		+50	821 500 006	2.4	0.000 000	0.003
Batt. Endpoint	3.400	+20	821 500 007	3.4	0.000 000	0.004



8.8 STRADDLE 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	24.07	0.255	100
		1	3	23.98	0.250	100
		1	5	24.07	0.255	100
		3	0	24.13	0.259	100
		3	1	23.95	0.248	100
		3	3	24.04	0.254	100
		6	0	23.14	0.206	100
	16QAM	1	0	23.33	0.215	100
		1	3	23.22	0.210	100
		1	5	23.23	0.210	100
		3	0	23.26	0.212	100
		3	1	23.17	0.208	100
		3	3	23.17	0.208	100
		6	0	22.14	0.164	100
	64QAM	1	0	22.29	0.169	100
		1	3	22.15	0.164	100
		1	5	22.18	0.165	100
		3	0	22.17	0.165	100
		3	1	22.15	0.164	100
		3	3	22.21	0.166	100
		6	0	21.15	0.130	100
	256QAM	1	0	19.21	0.083	100
		1	3	19.11	0.082	100
		1	5	19.19	0.083	100
		3	0	19.13	0.082	100
		3	1	19.07	0.081	100
		3	3	19.15	0.082	100
		6	0	19.10	0.081	100

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm)		Limit (W)
				824 MHz		
				dBm	W	
3	QPSK	1	0	24.11	0.258	100
		1	7	24.15	0.260	100
		1	14	24.04	0.254	100
		8	0	23.15	0.207	100
		8	3	23.16	0.207	100
		8	7	23.14	0.206	100
		15	0	23.19	0.208	100
	16QAM	1	0	23.43	0.220	100
		1	7	23.21	0.209	100
		1	14	23.33	0.215	100
		8	0	22.21	0.166	100
		8	3	22.20	0.166	100
		8	7	22.15	0.164	100
		15	0	22.17	0.165	100
	64QAM	1	0	22.21	0.166	100
		1	7	22.19	0.166	100
		1	14	22.28	0.169	100
		8	0	21.13	0.130	100
		8	3	21.12	0.129	100
		8	7	21.13	0.130	100
		15	0	21.16	0.131	100
	256QAM	1	0	19.11	0.081	100
		1	7	19.17	0.083	100
		1	14	19.11	0.082	100
		8	0	19.11	0.082	100
		8	3	19.11	0.082	100
		8	7	19.11	0.081	100
		15	0	19.06	0.081	100

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm)		Limit (W)
				824 MHz		
				dBm	W	
5	QPSK	1	0	24.09	0.256	100
		1	12	24.10	0.257	100
		1	24	24.08	0.256	100
		12	0	23.15	0.207	100
		12	6	23.13	0.206	100
		12	11	23.16	0.207	100
		25	0	23.20	0.209	100
	16QAM	1	0	23.33	0.215	100
		1	12	23.16	0.207	100
		1	24	23.26	0.212	100
		12	0	22.18	0.165	100
		12	6	22.17	0.165	100
		12	11	22.15	0.164	100
		25	0	22.16	0.164	100
	64QAM	1	0	22.28	0.169	100
		1	12	22.24	0.167	100
		1	24	22.21	0.166	100
		12	0	21.17	0.131	100
		12	6	21.14	0.130	100
		12	11	21.15	0.130	100
		25	0	21.11	0.129	100
	256QAM	1	0	19.26	0.084	100
		1	12	19.16	0.082	100
		1	24	19.18	0.083	100
		12	0	19.07	0.081	100
		12	6	19.09	0.081	100
		12	11	19.11	0.082	100
		25	0	19.09	0.081	100

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm)		Limit (W)
				824 MHz		
				dBm	W	
10	QPSK	1	0	24.15	0.260	100
		1	24	24.03	0.253	100
		1	49	24.00	0.251	100
		25	0	23.22	0.210	100
		25	12	23.15	0.207	100
		25	24	23.15	0.206	100
		50	0	23.21	0.209	100
	16QAM	1	0	23.31	0.214	100
		1	24	23.28	0.213	100
		1	49	23.27	0.213	100
		25	0	22.16	0.164	100
		25	12	22.16	0.165	100
		25	24	22.12	0.163	100
		50	0	22.18	0.165	100
	64QAM	1	0	22.26	0.168	100
		1	24	22.26	0.168	100
		1	49	22.24	0.167	100
		25	0	21.17	0.131	100
		25	12	21.13	0.130	100
		25	24	21.10	0.129	100
		50	0	21.16	0.131	100
	256QAM	1	0	19.27	0.085	100
		1	24	19.12	0.082	100
		1	49	19.17	0.083	100
		25	0	19.13	0.082	100
		25	12	19.10	0.081	100
		25	24	19.08	0.081	100
		50	0	19.09	0.081	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	-29.39	31.74	-9.94	1.41	H	< 7.00	0.110	20.39
		16QAM	-30.20	30.93	-9.94	1.41	H		0.091	19.58
		64QAM	-31.27	29.86	-9.94	1.41	H		0.071	18.51
		256QAM	-34.20	26.93	-9.94	1.41	H		0.036	15.58

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	-29.29	31.84	-9.94	1.41	H	< 7.00	0.112	20.49
		16QAM	-30.03	31.10	-9.94	1.41	H		0.095	19.75
		64QAM	-31.08	30.05	-9.94	1.41	H		0.074	18.70
		256QAM	-34.12	27.01	-9.94	1.41	H		0.037	15.66

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	-29.18	31.95	-9.94	1.41	H	< 7.00	0.115	20.60
		16QAM	-29.95	31.18	-9.94	1.41	H		0.096	19.83
		64QAM	-31.01	30.12	-9.94	1.41	H		0.075	18.77
		256QAM	-34.02	27.11	-9.94	1.41	H		0.038	15.76

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	-29.07	32.06	-9.94	1.41	H	< 7.00	0.118	20.71
		16QAM	-29.78	31.35	-9.94	1.41	H		0.100	20.00
		64QAM	-30.89	30.24	-9.94	1.41	H		0.077	18.89
		256QAM	-33.94	27.19	-9.94	1.41	H		0.038	15.84

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	-52.49	9.70	-63.08	2.04	H	-55.42	-13.00
	2 472.00	-54.60	10.46	-59.62	2.54	H	-51.70	-13.00
	3 296.00	-57.07	12.07	-58.12	2.95	V	-49.00	-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	3.6980	27.976	-67.273	-39.297	-13.00
	3		3.7224	27.976	-67.459	-39.483	
	5		3.6860	27.976	-67.327	-39.351	
	10		3.6760	27.976	-66.937	-38.961	

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)

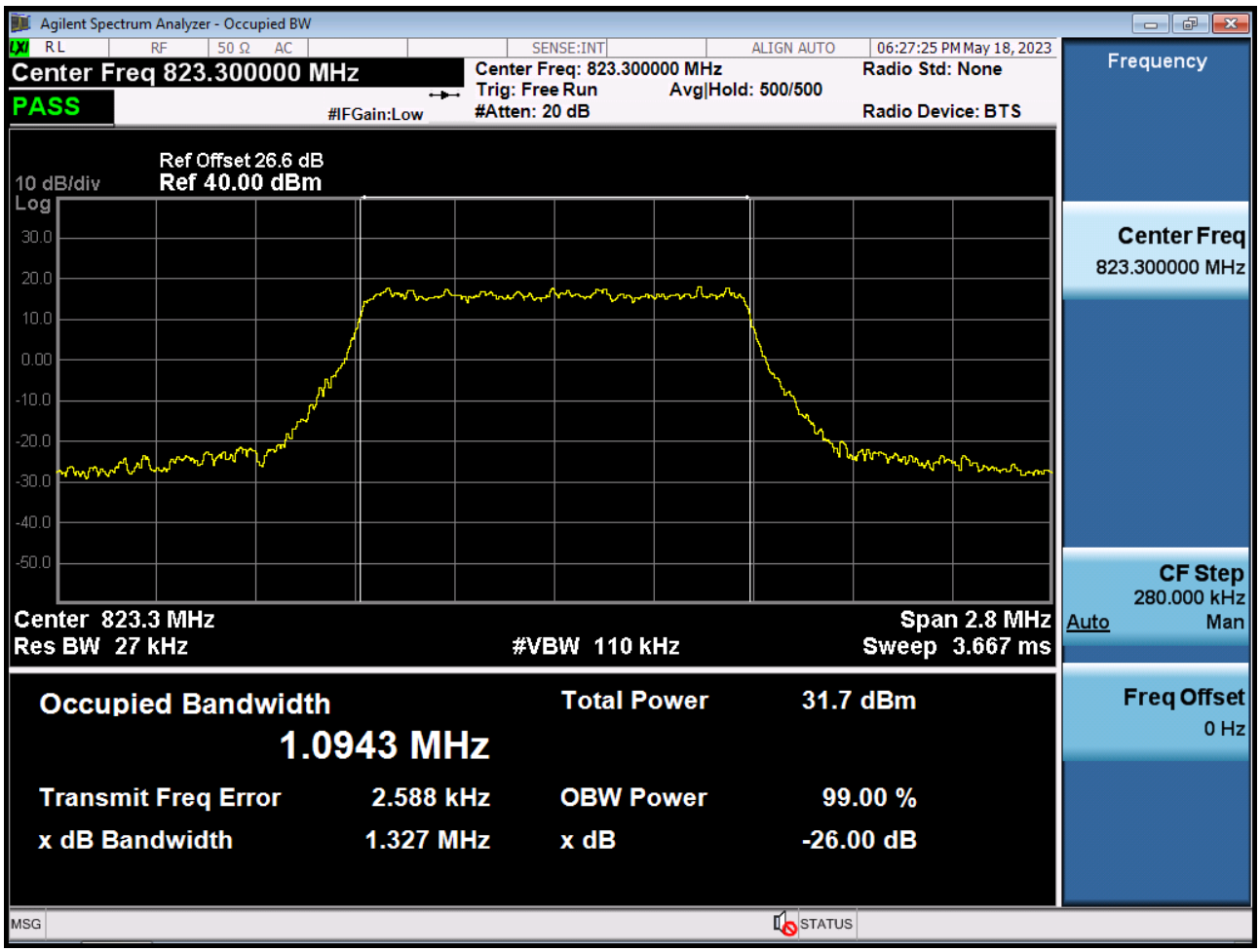
- Test Channel : 26790(824.0MHz)
- Plots of the EUT's Band Edge are shown Page 98 ~ 109.

8.8.6 BAND EDGE(Part22)

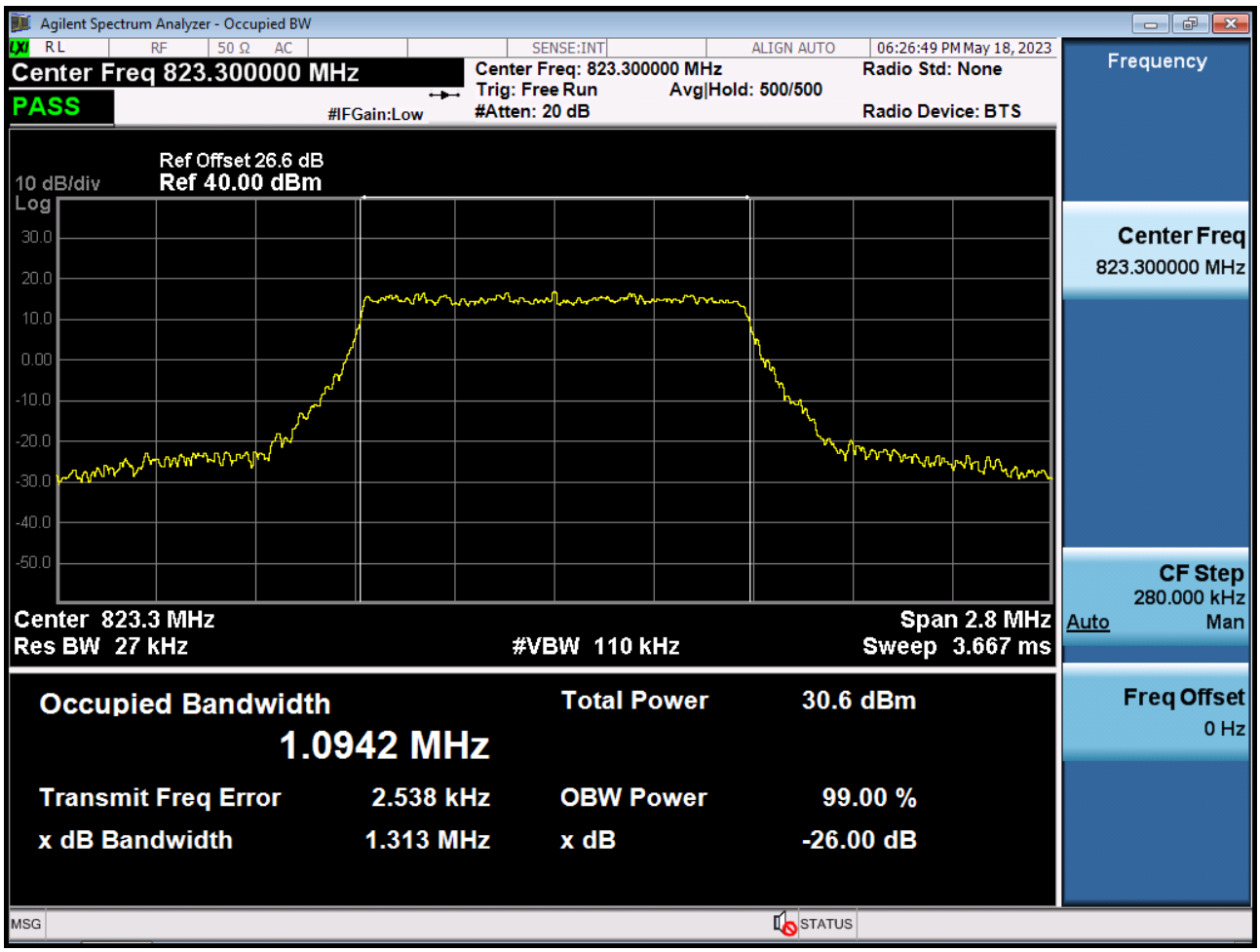
- Test Channel : 26790(824.0 MHz)
- Plots of the EUT's Band Edge are shown Page 110 ~ 117.

9. TEST PLOTS

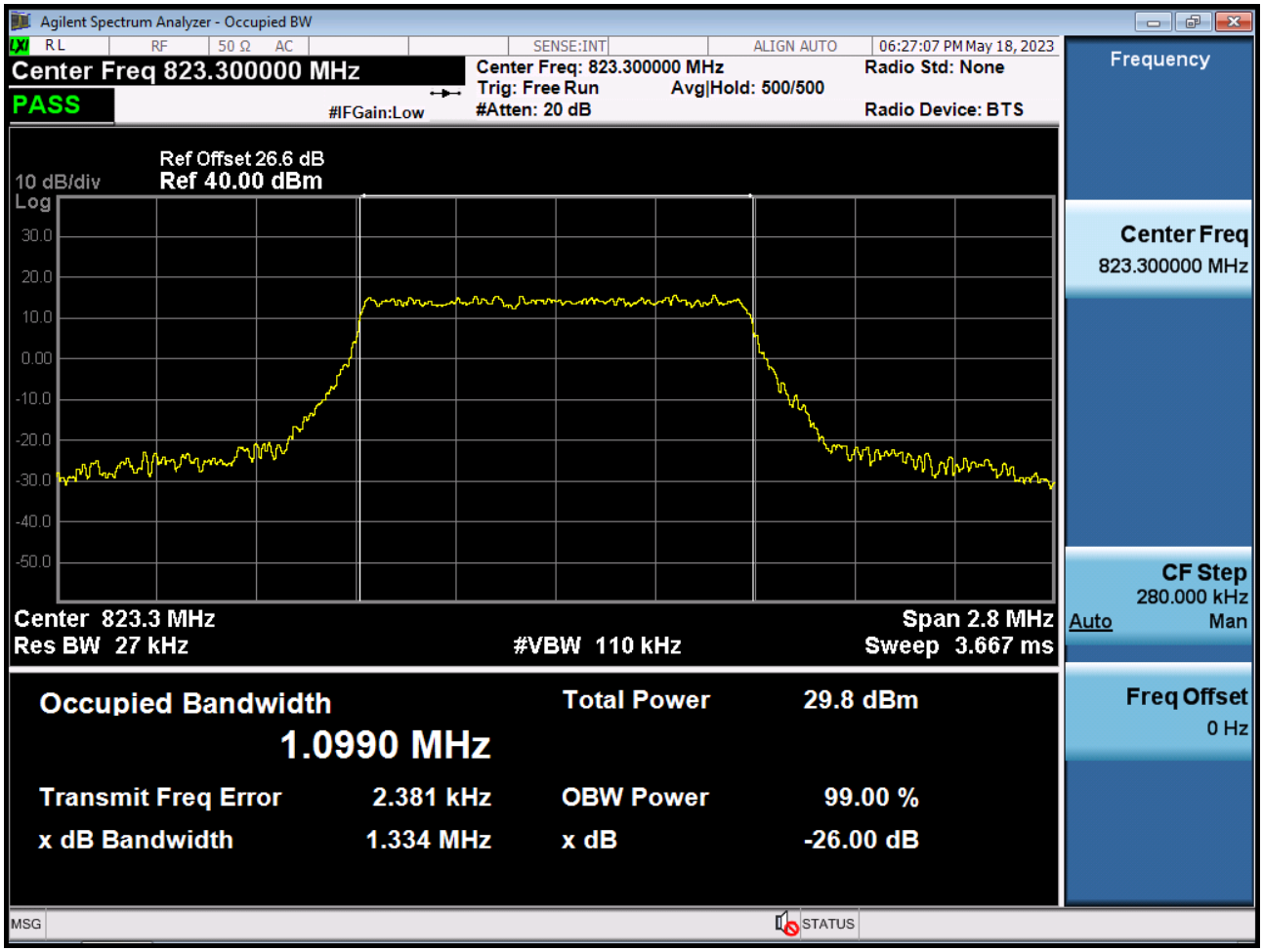
BAND 26. Occupied Bandwidth Plot (1.4 M BW Ch.26783 QPSK RB 6_0)



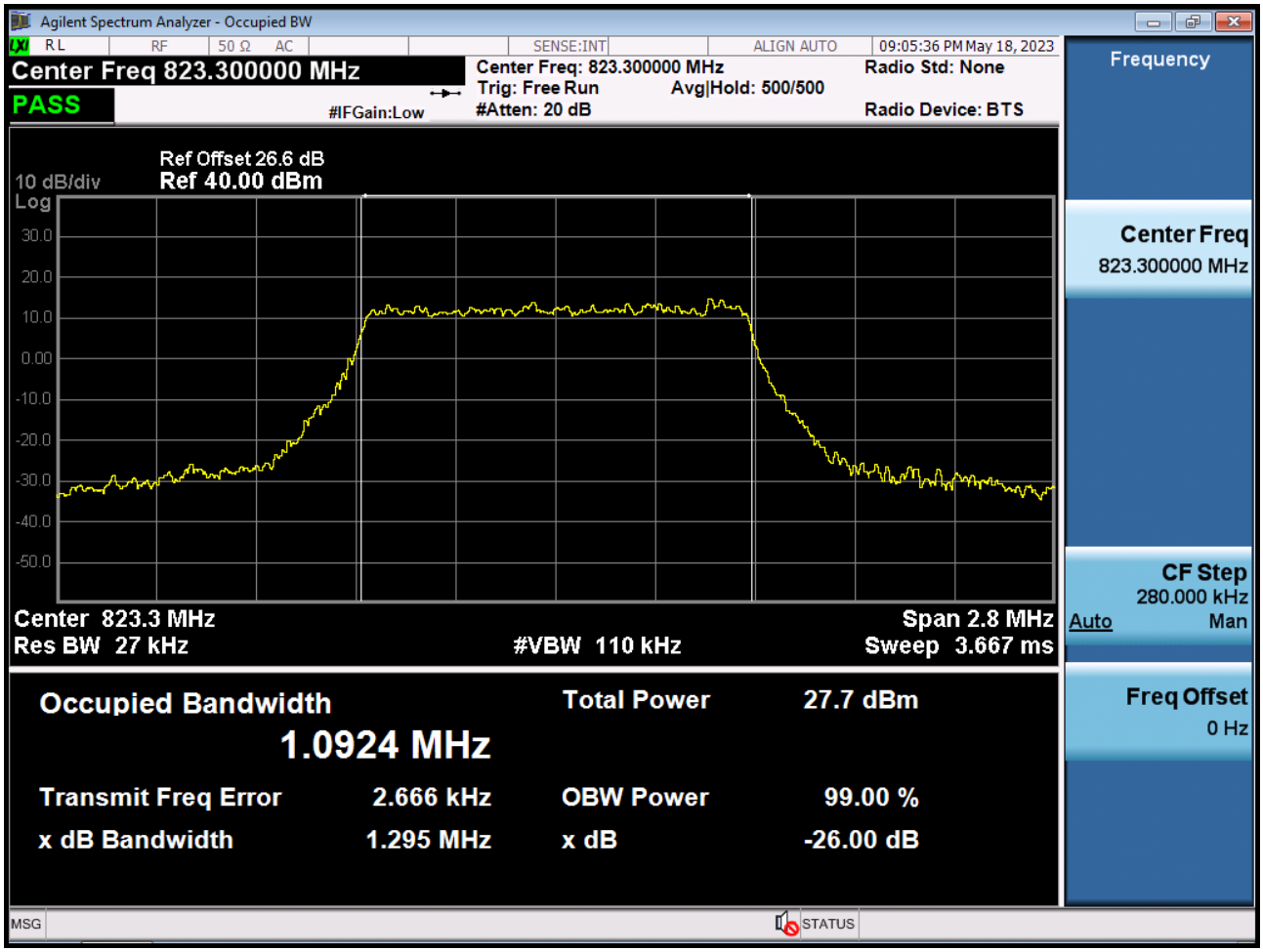
BAND 26. Occupied Bandwidth Plot (1.4 M BW Ch.26783 16QAM RB 6_0)



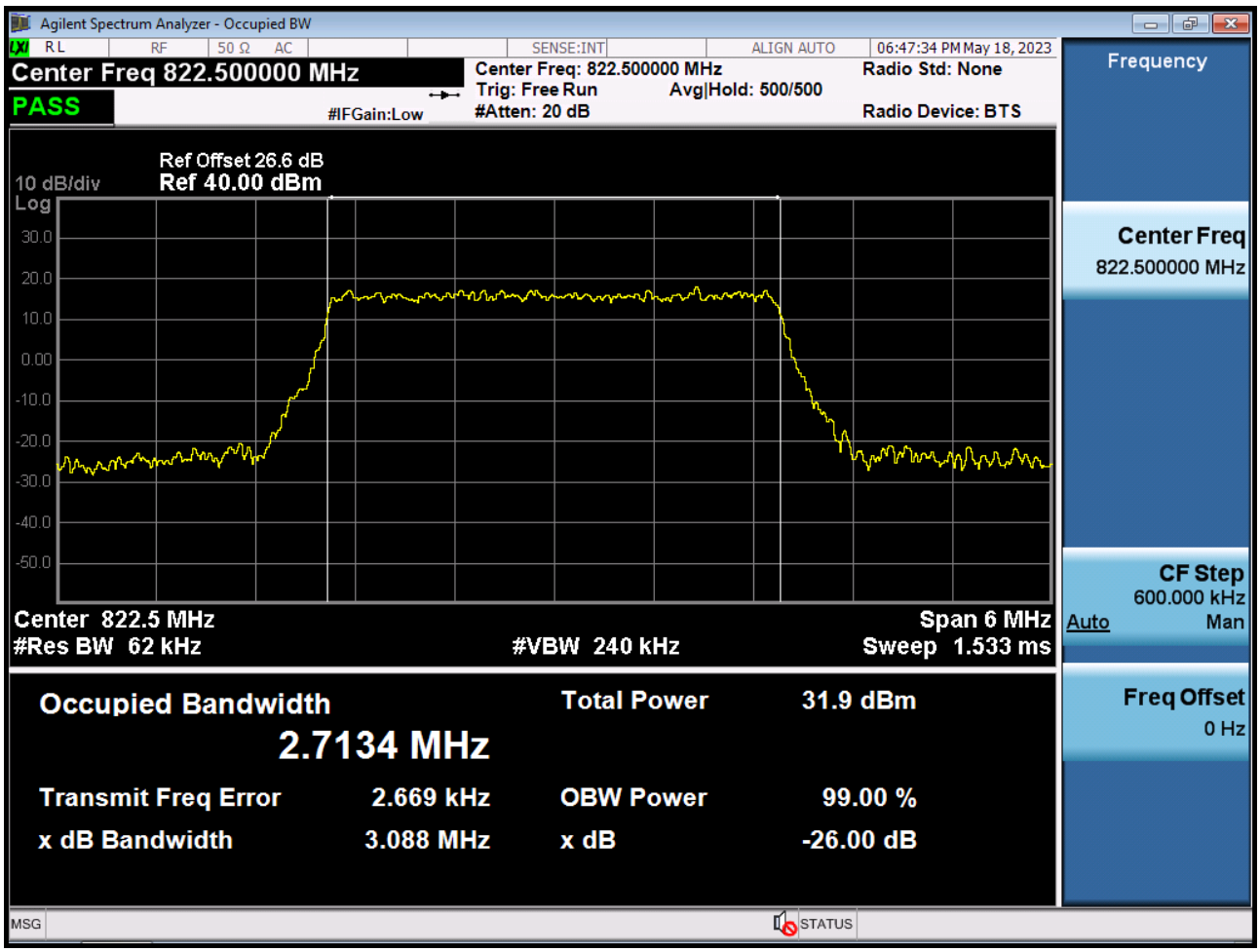
BAND 26. Occupied Bandwidth Plot (1.4 M BW Ch.26783 64QAM RB 6_0)



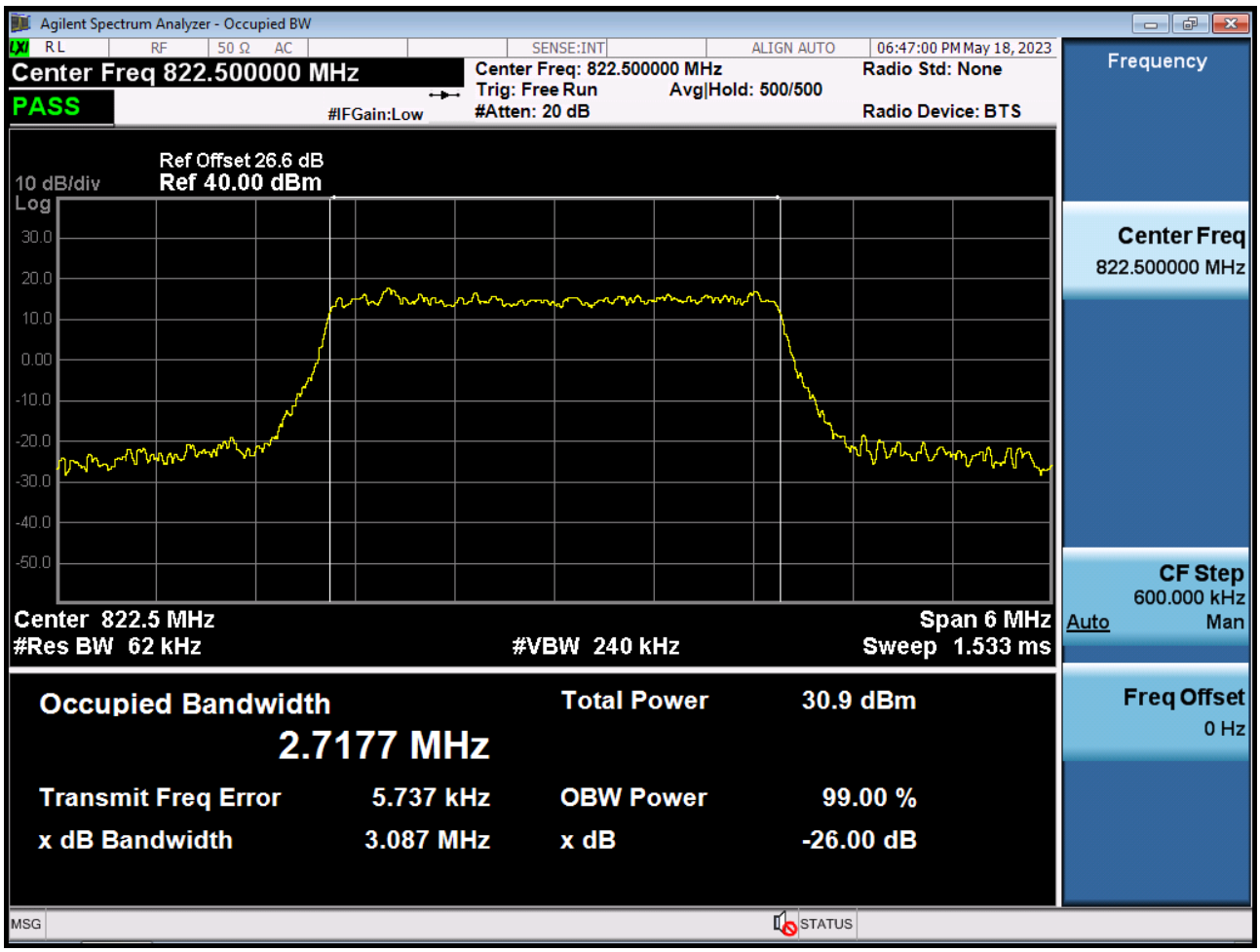
BAND 26. Occupied Bandwidth Plot (1.4 M BW Ch.26783 256QAM RB 6_0)



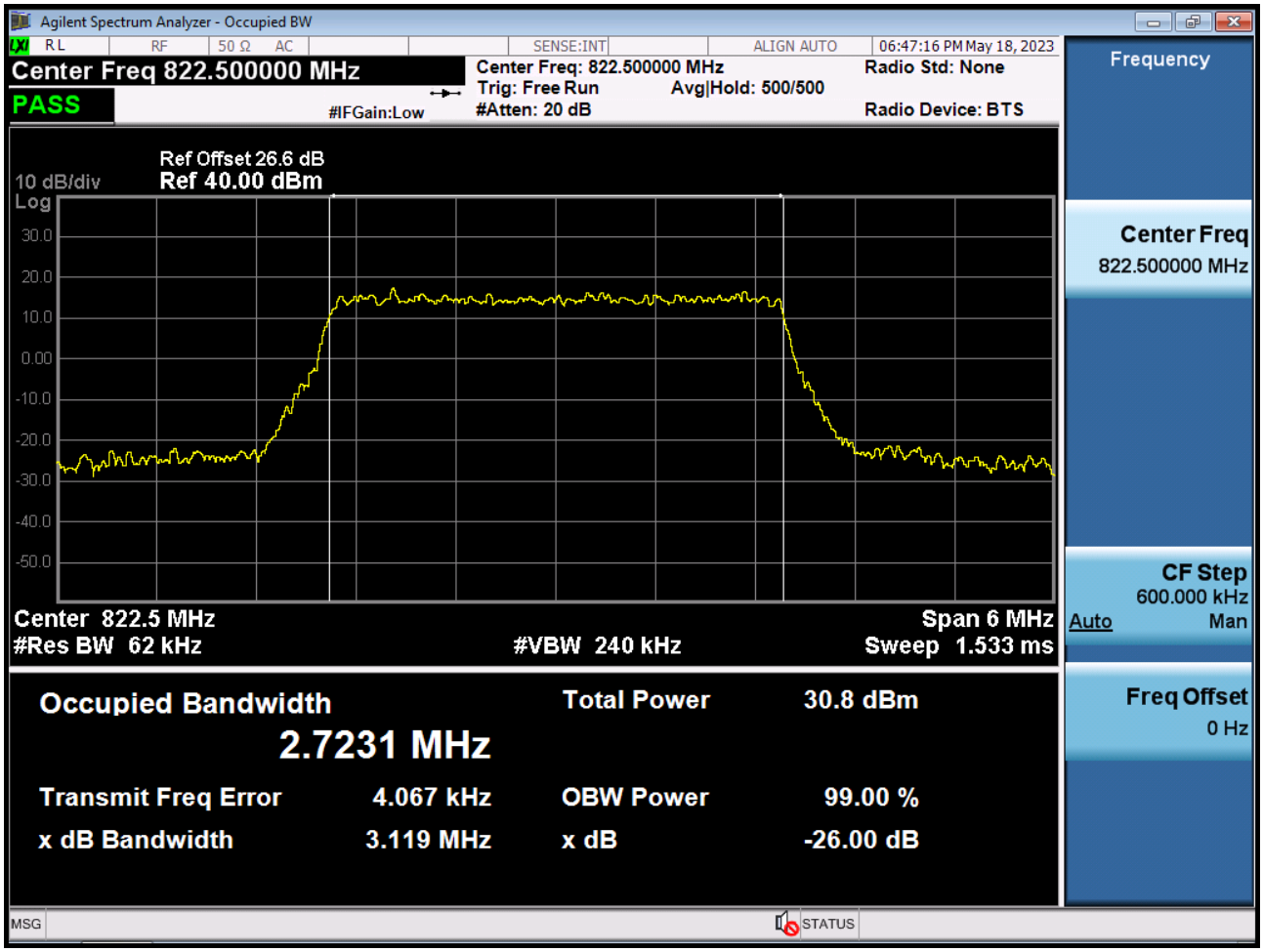
BAND 26. Occupied Bandwidth Plot (3 M BW Ch.26775 QPSK RB 15_0)



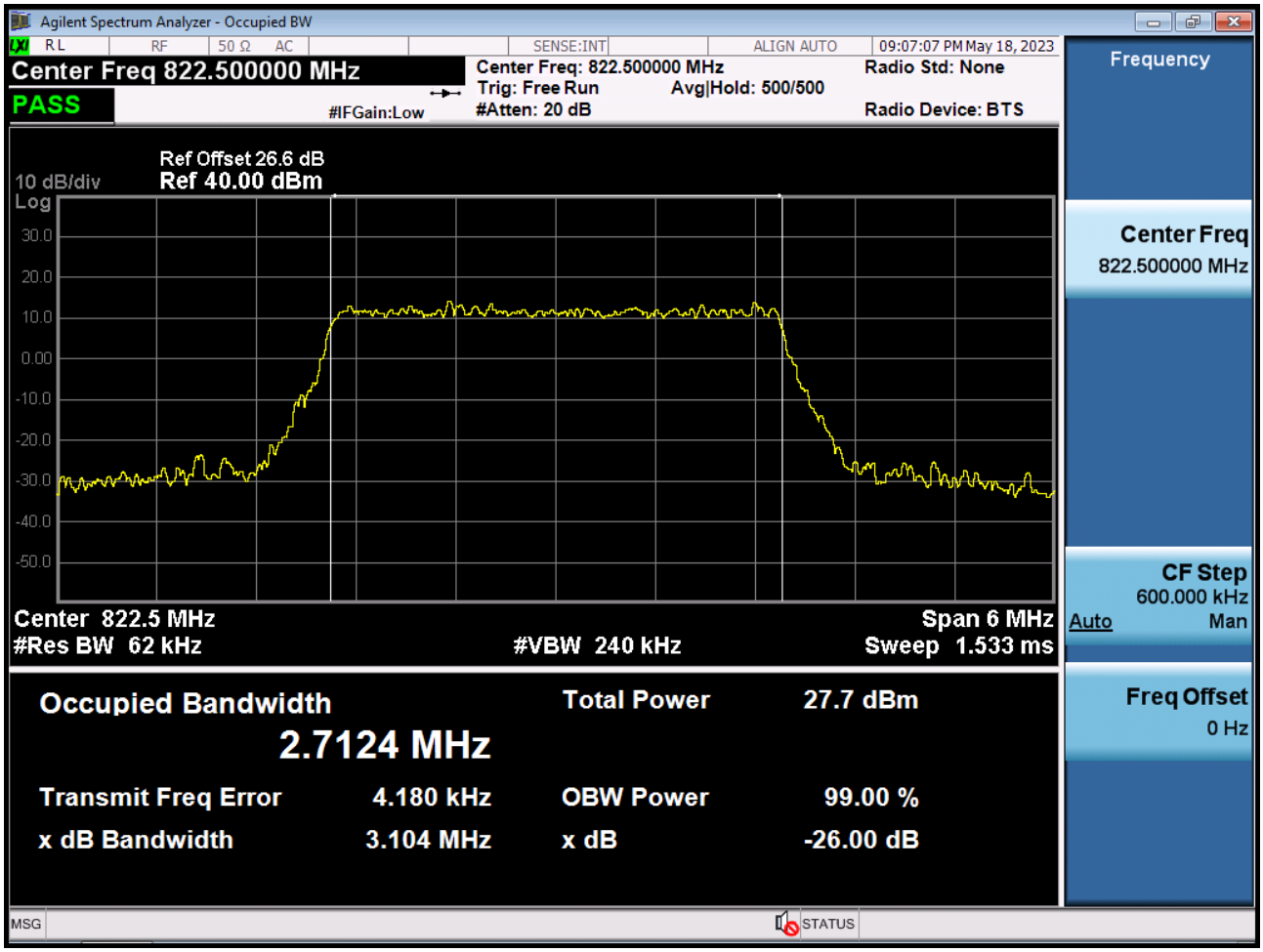
BAND 26. Occupied Bandwidth Plot (3 M BW Ch.26775 16QAM RB 15_0)



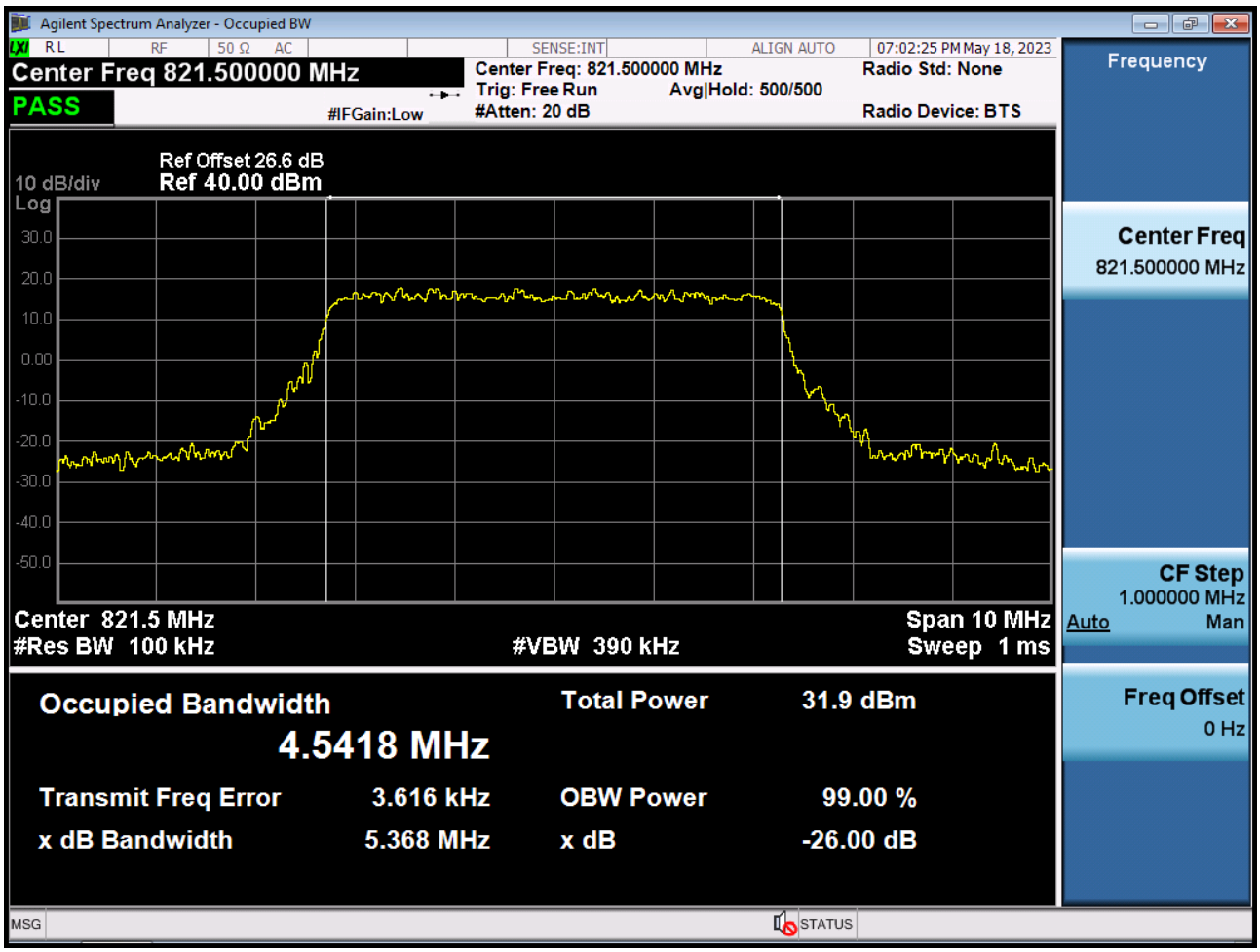
BAND 26. Occupied Bandwidth Plot (3 M BW Ch.26775 64QAM RB 15_0)



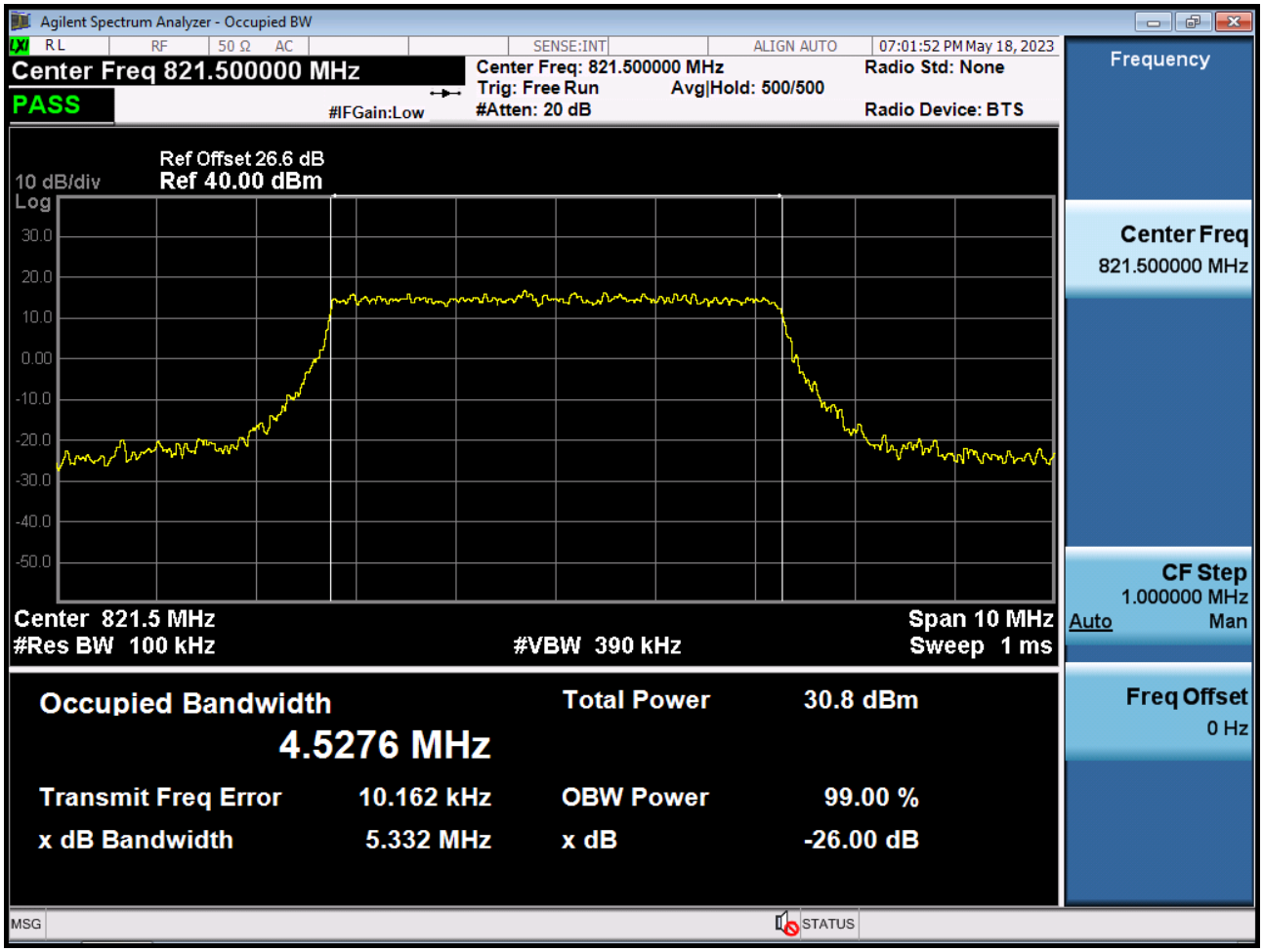
BAND 26. Occupied Bandwidth Plot (3 M BW Ch.26775 256QAM RB 15_0)



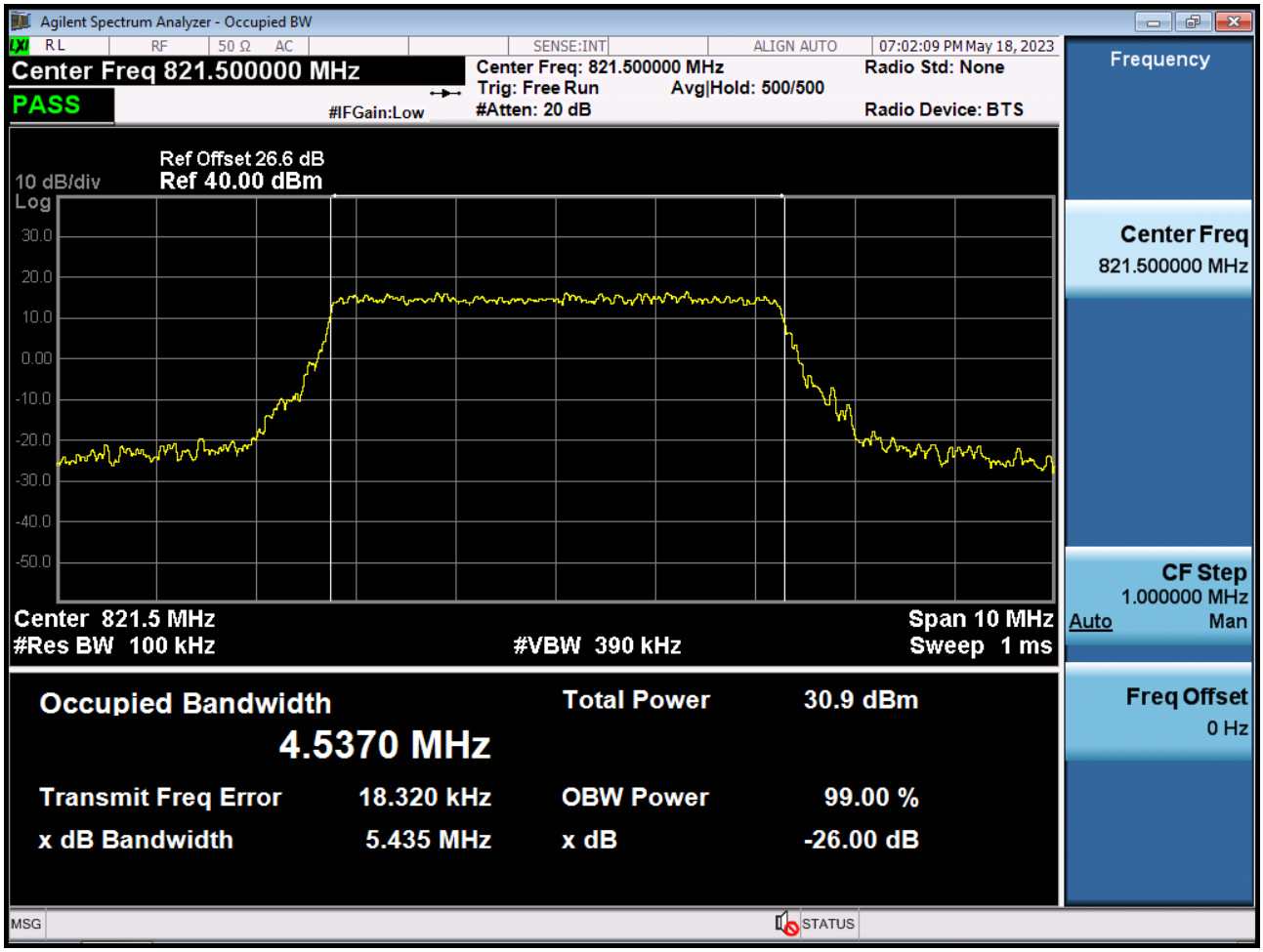
BAND 26. Occupied Bandwidth Plot (5 M BW Ch.26765 QPSK RB 25_0)



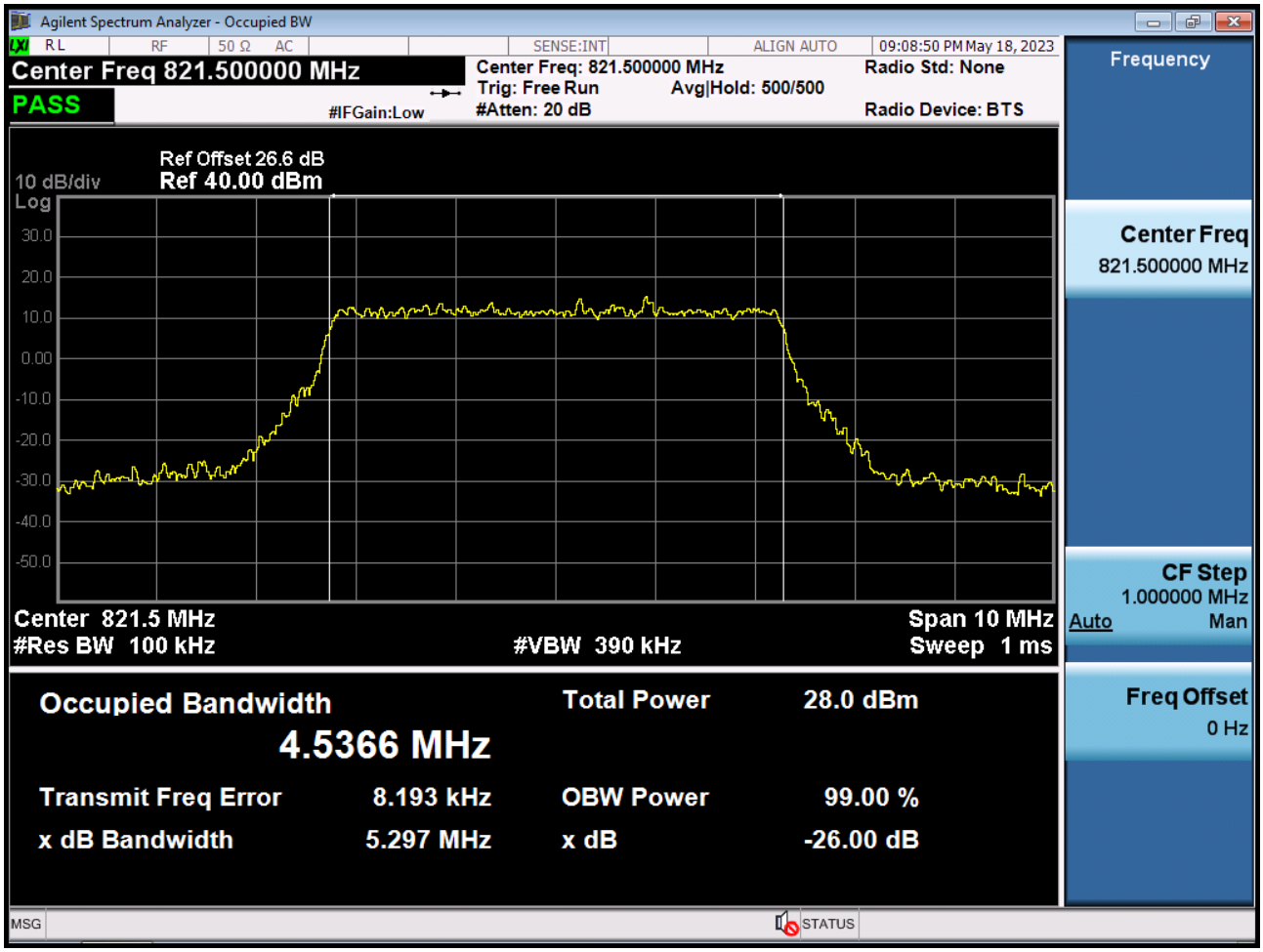
BAND 26. Occupied Bandwidth Plot (5 M BW Ch.26765 16QAM RB 25_0)



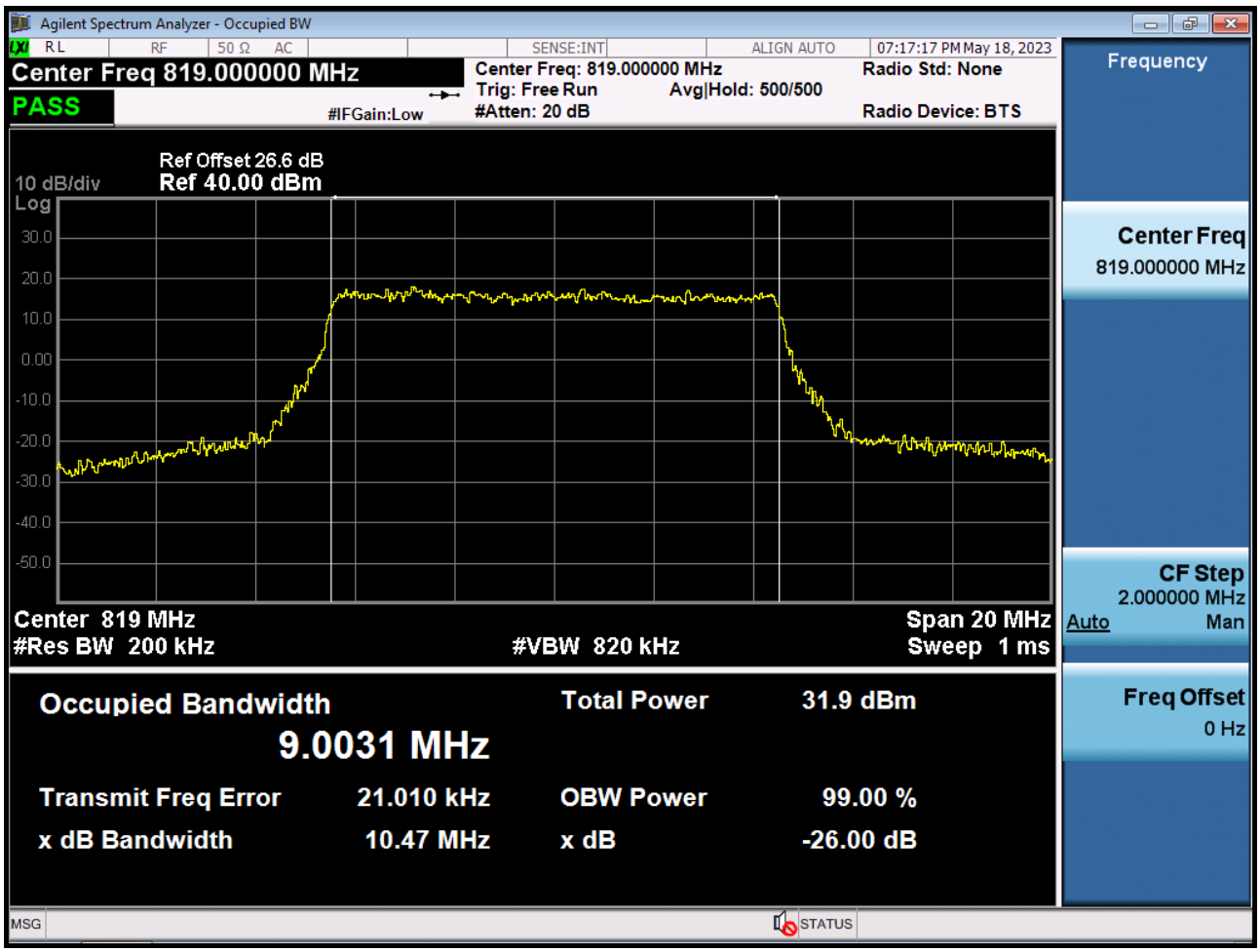
BAND 26. Occupied Bandwidth Plot (5 M BW Ch.26765 64QAM RB 25_0)



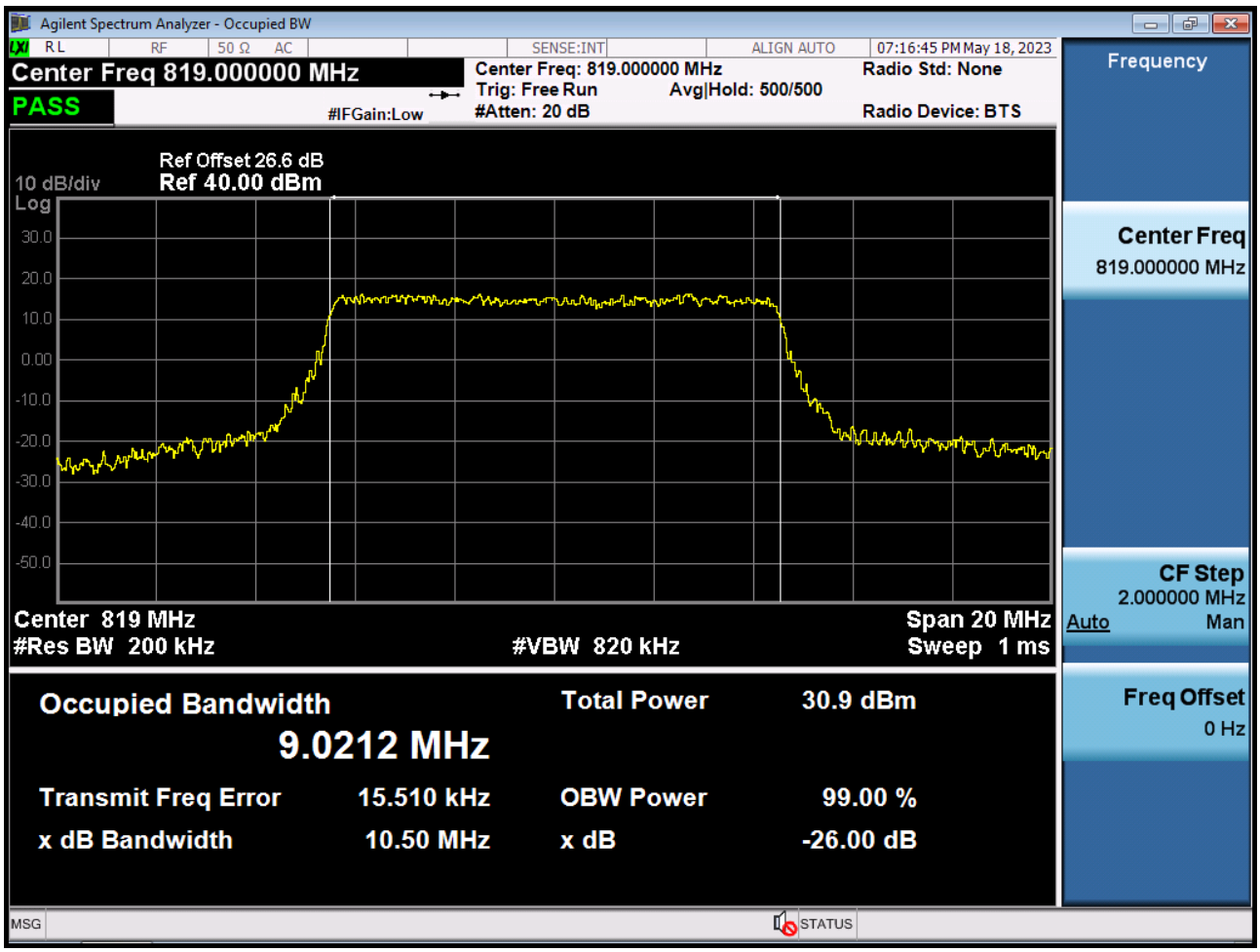
BAND 26. Occupied Bandwidth Plot (5 M BW Ch.26765 256QAM RB 25_0)



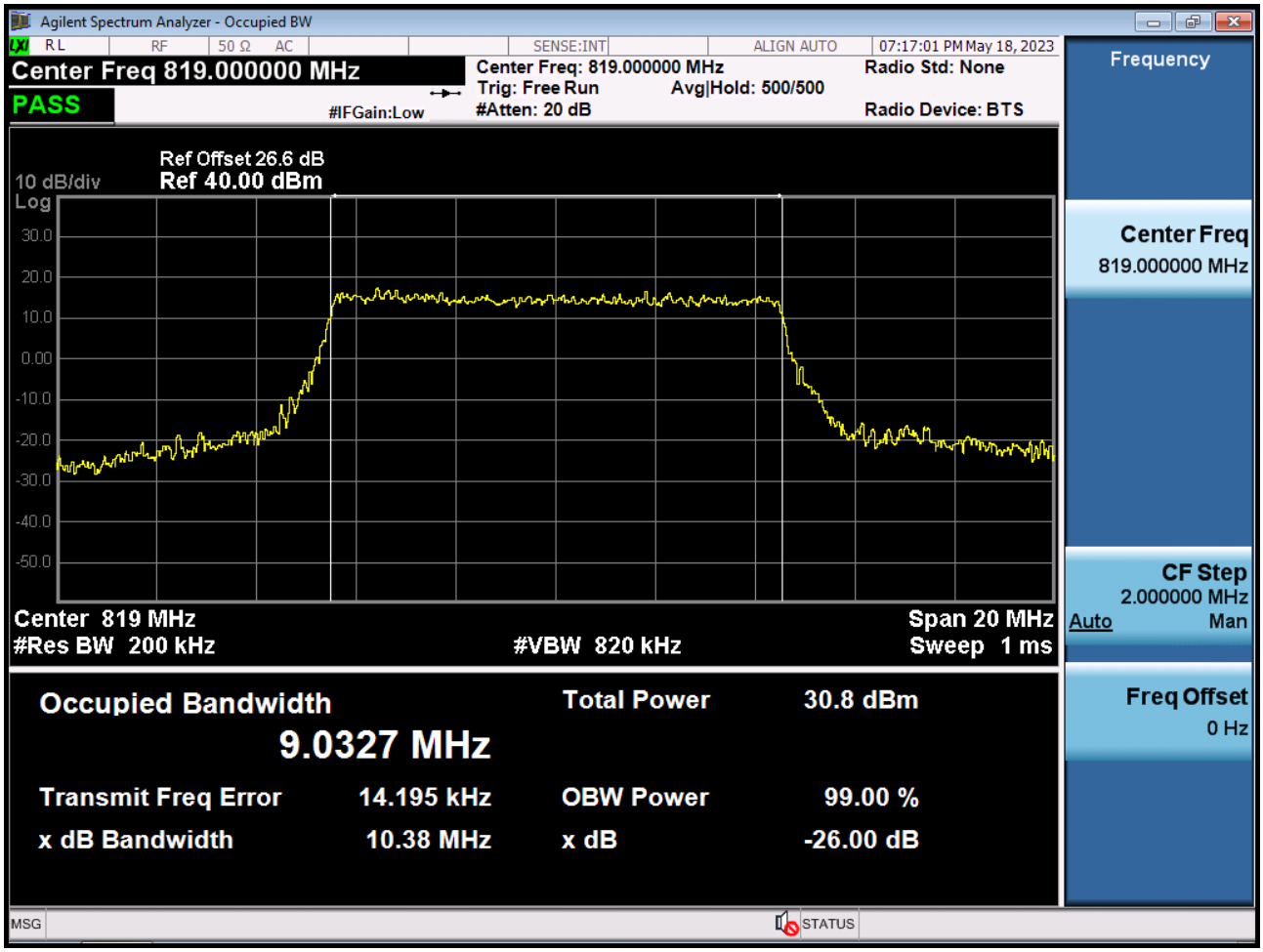
BAND 26. Occupied Bandwidth Plot (10 M BW Ch.26740 QPSK RB 50_0)



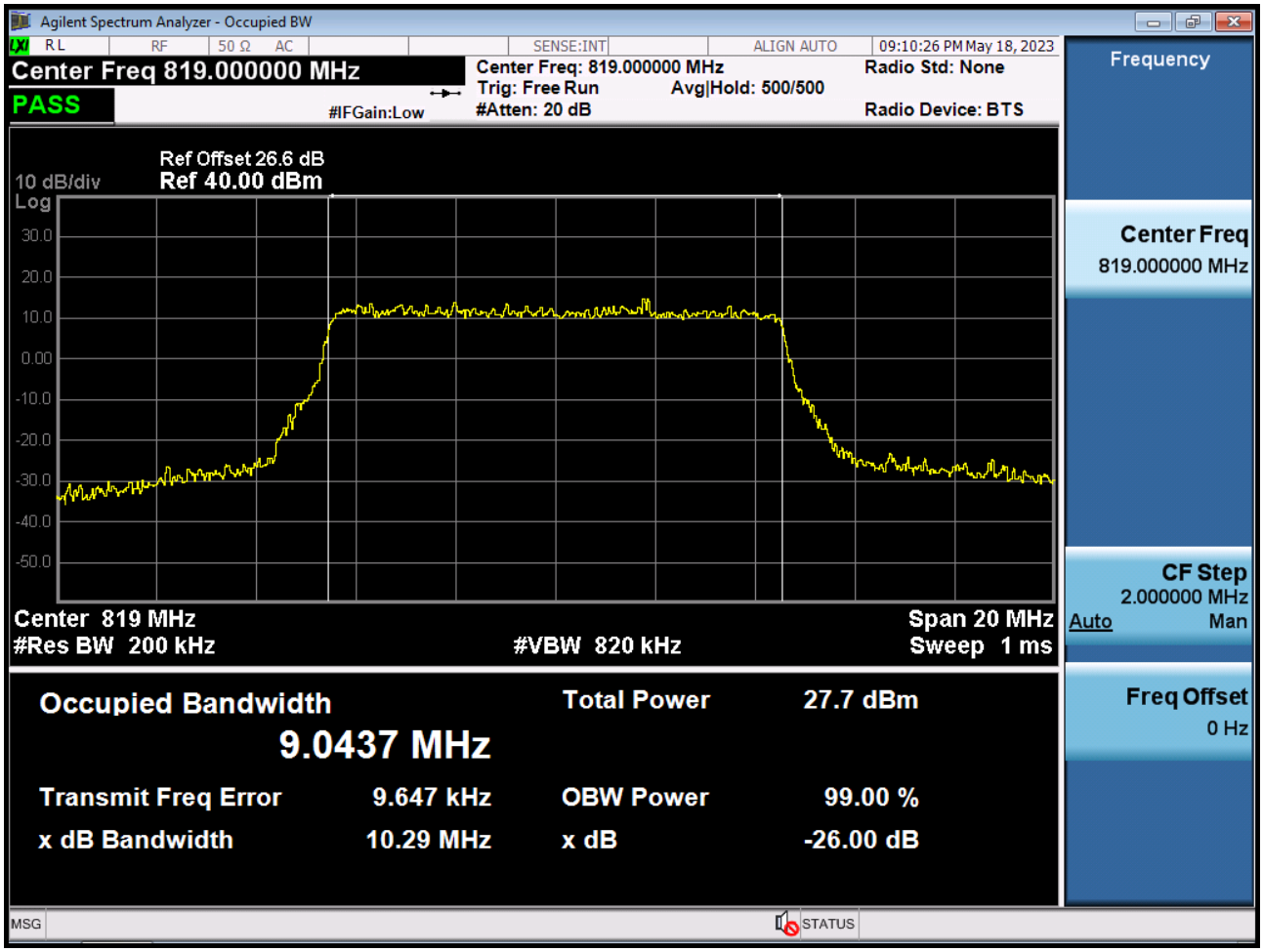
BAND 26. Occupied Bandwidth Plot (10 M BW Ch.26740 16QAM RB 50_0)



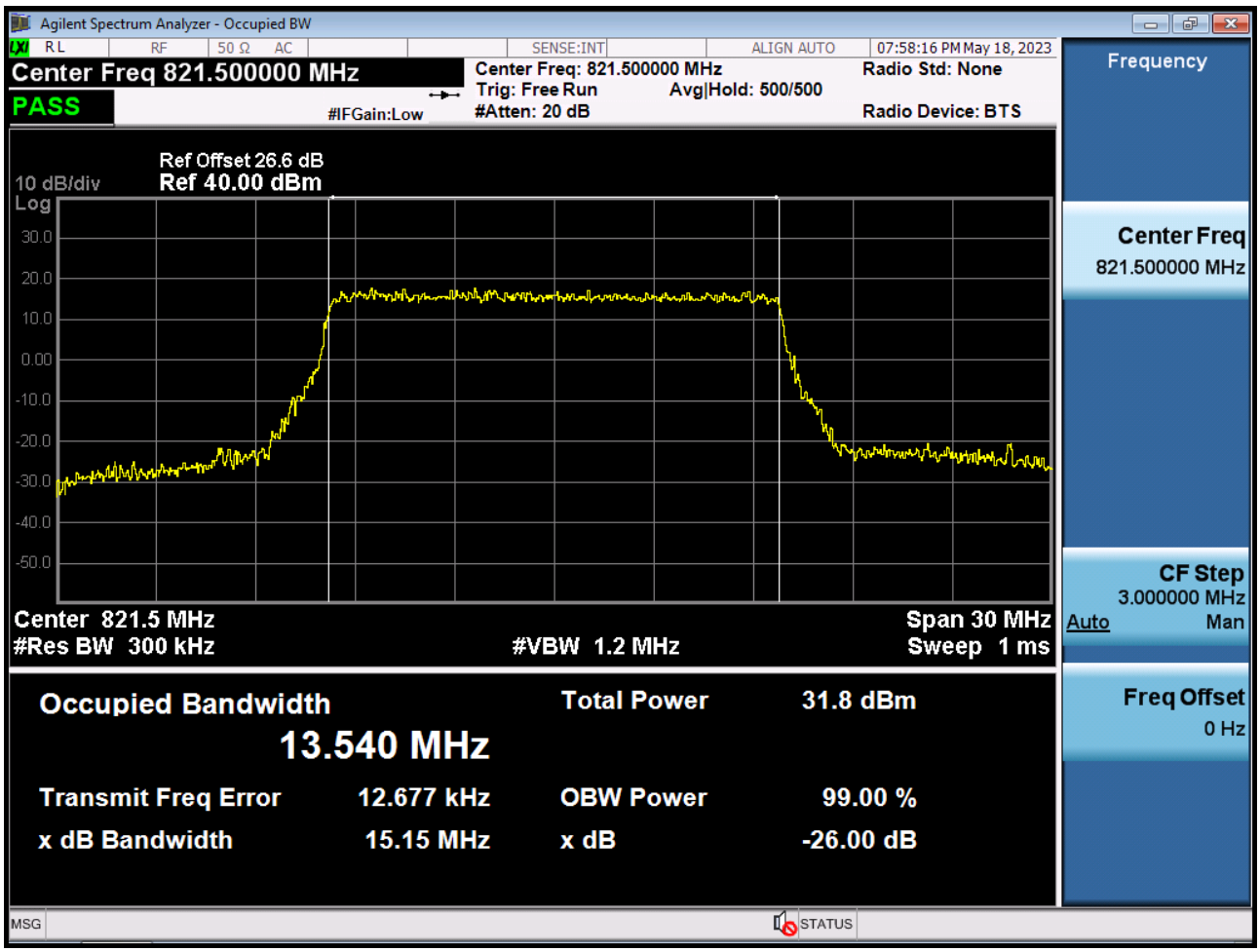
BAND 26. Occupied Bandwidth Plot (10 M BW Ch.26740 64QAM RB 50_0)



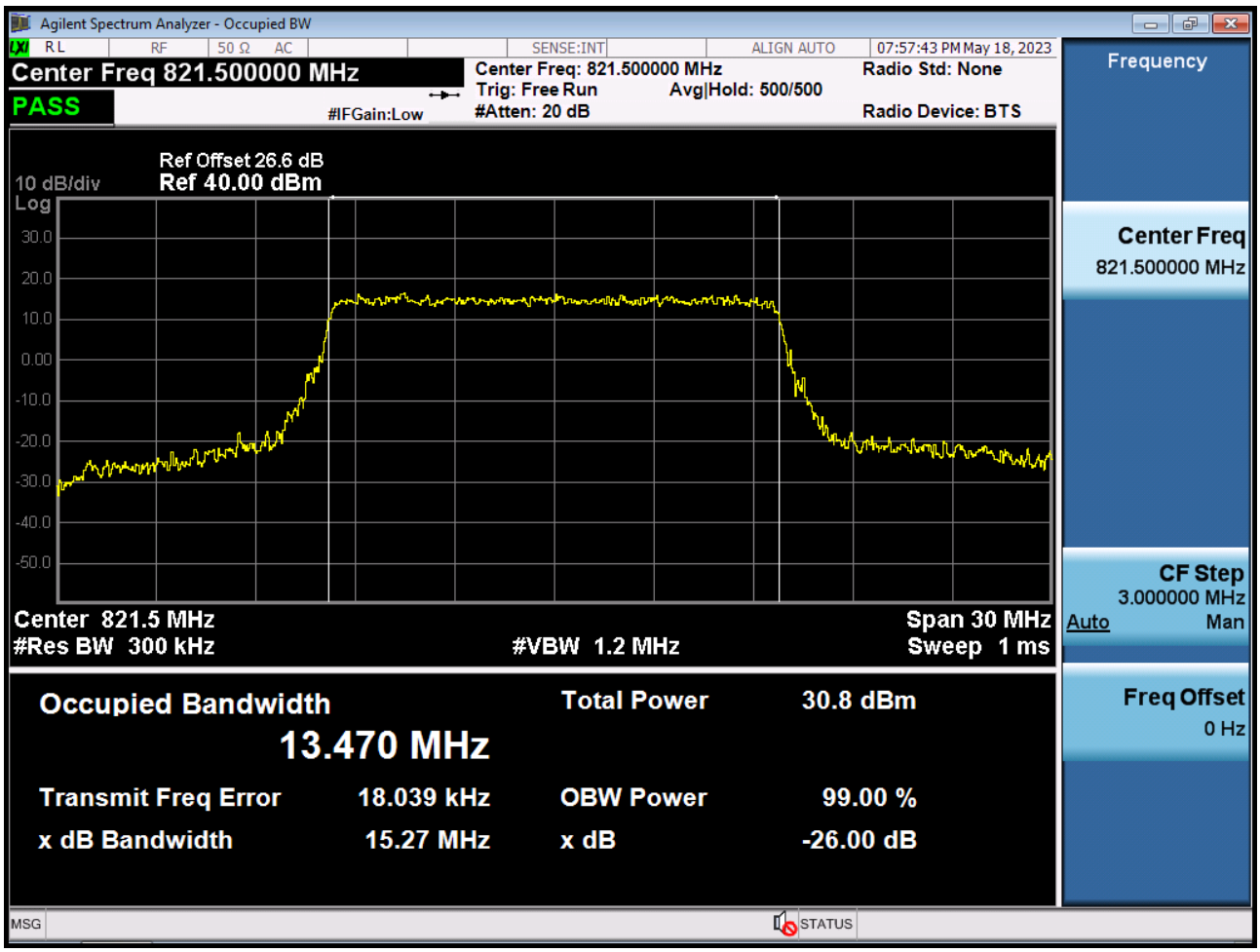
BAND 26. Occupied Bandwidth Plot (10 M BW Ch.26740 256QAM RB 50_0)



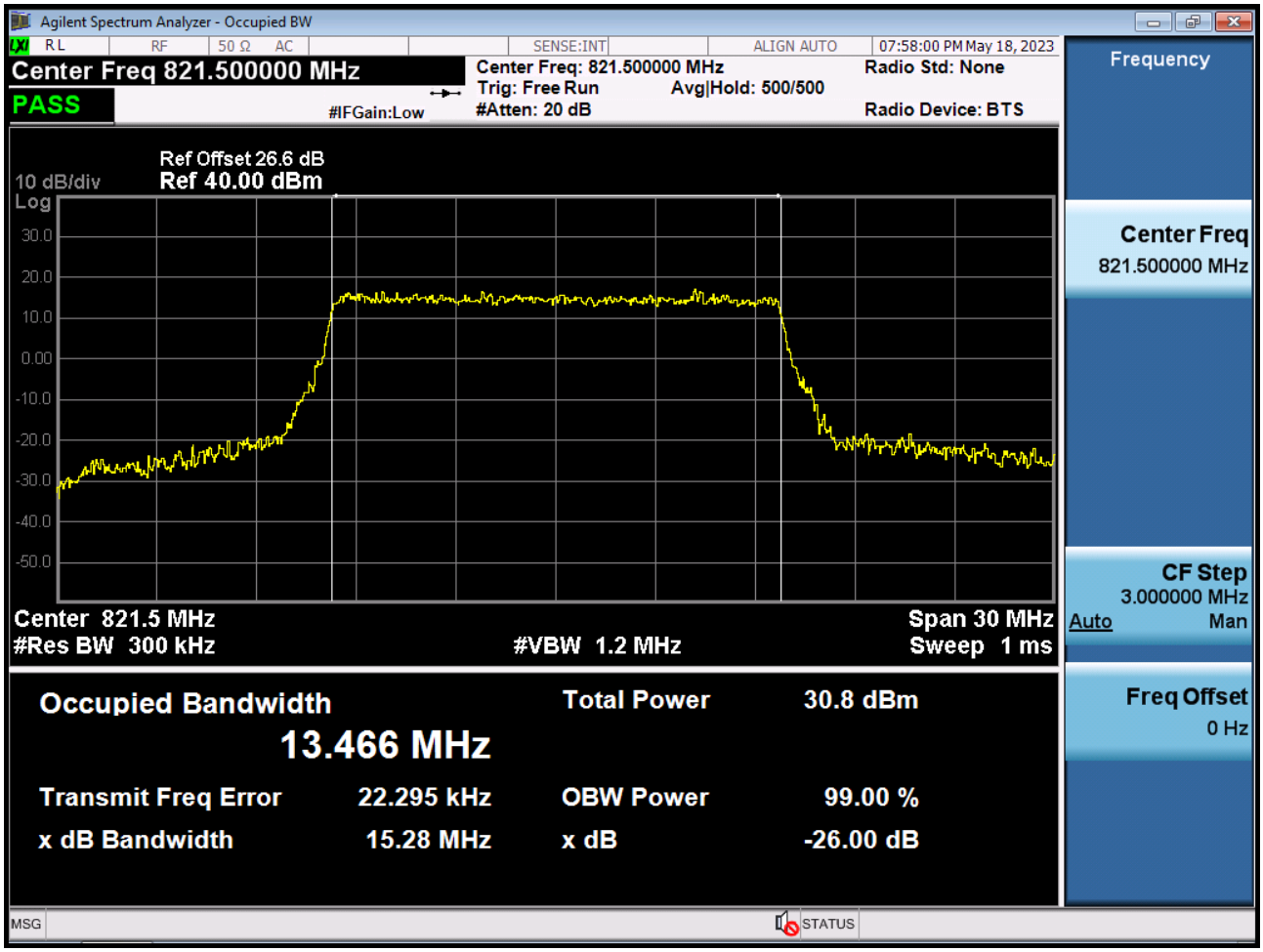
BAND 26. Occupied Bandwidth Plot (15 M BW Ch.26765 QPSK RB 75_0)



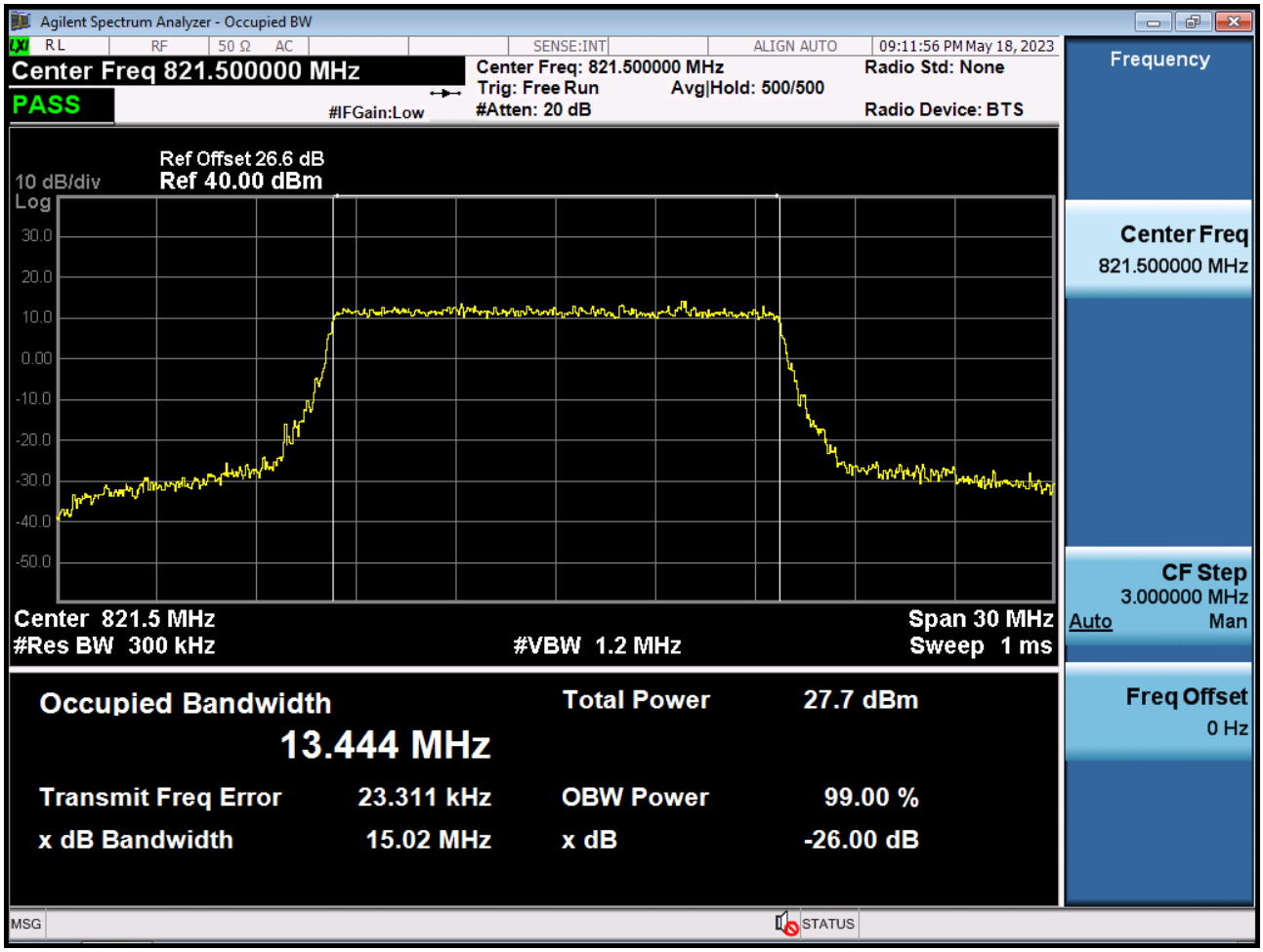
BAND 26. Occupied Bandwidth Plot (15 M BW Ch.26765 16QAM RB 75_0)



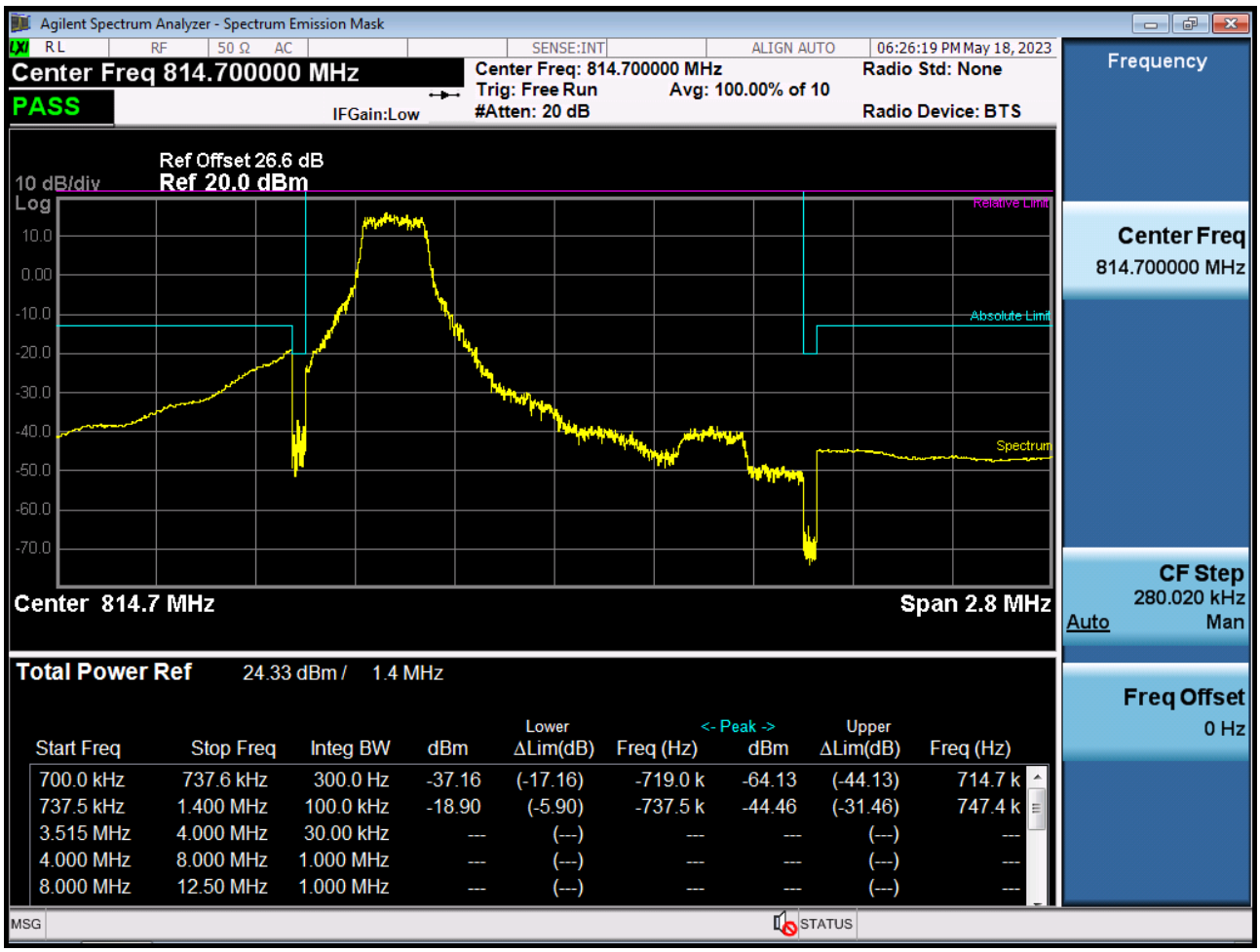
BAND 26. Occupied Bandwidth Plot (15 M BW Ch.26765 64QAM RB 75_0)



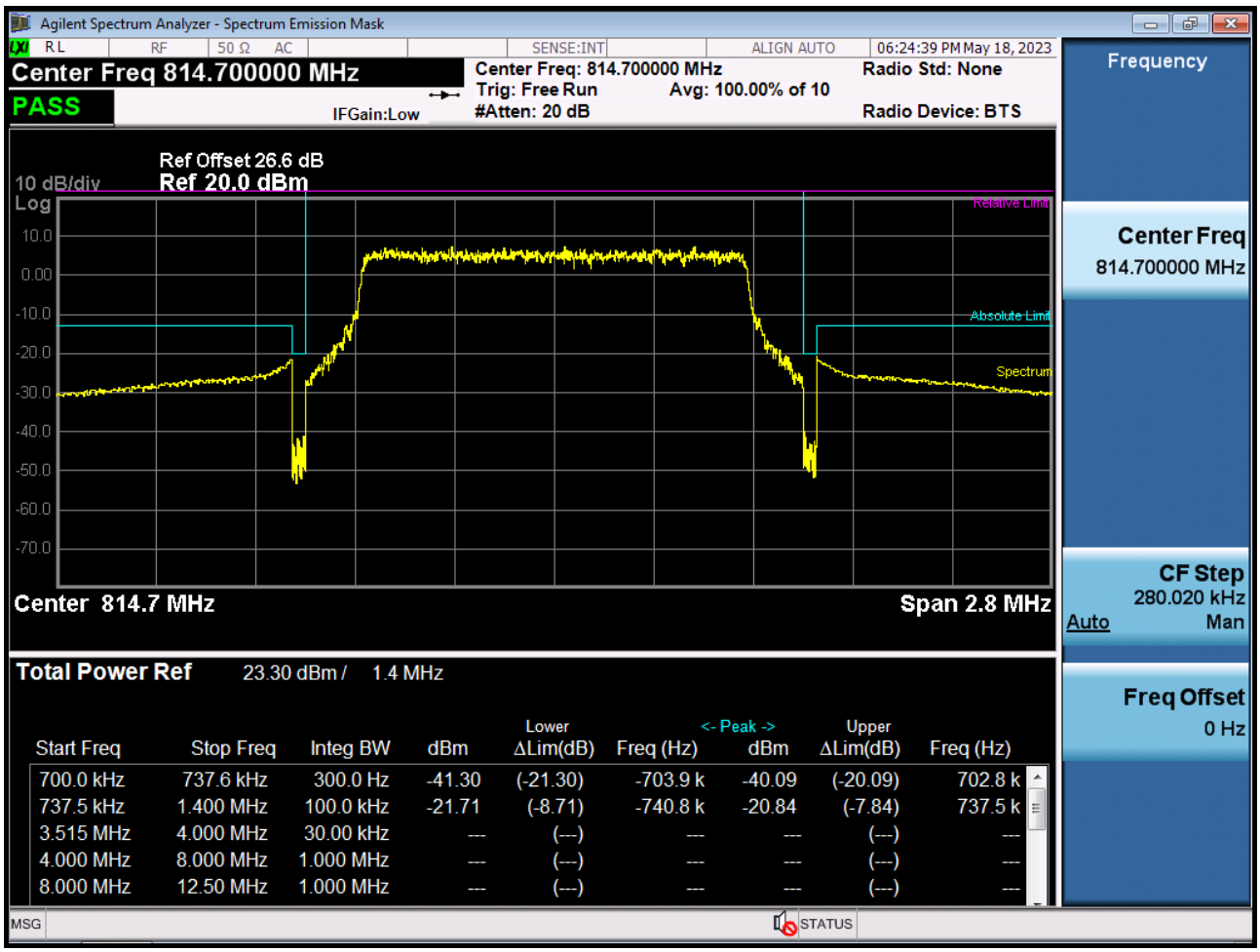
BAND 26. Occupied Bandwidth Plot (15 M BW Ch.26765 256QAM RB 75_0)



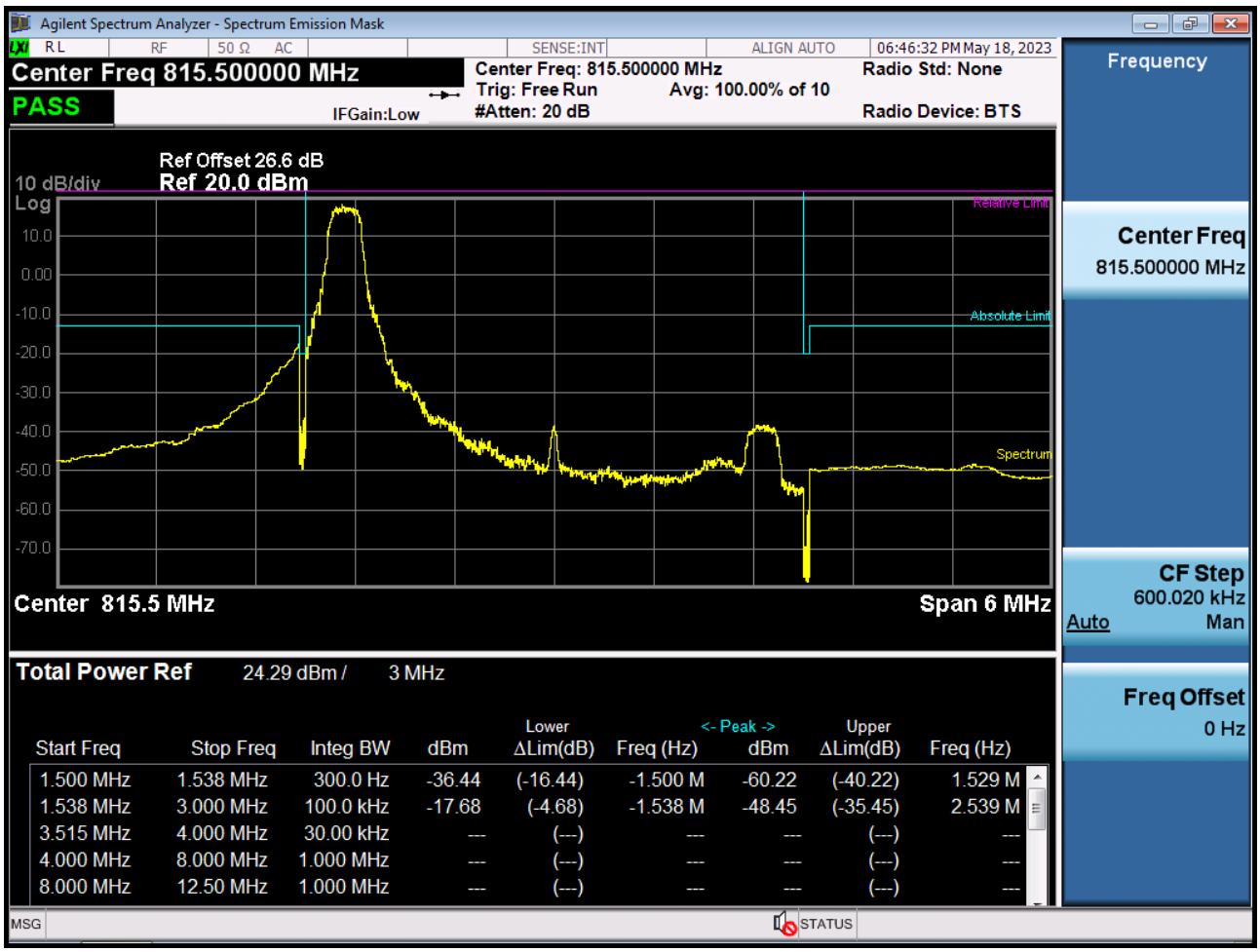
BAND 26. Lower Channel Edge Plot (1.4 M BW Ch.26697 QPSK RB 1, Offset 0)



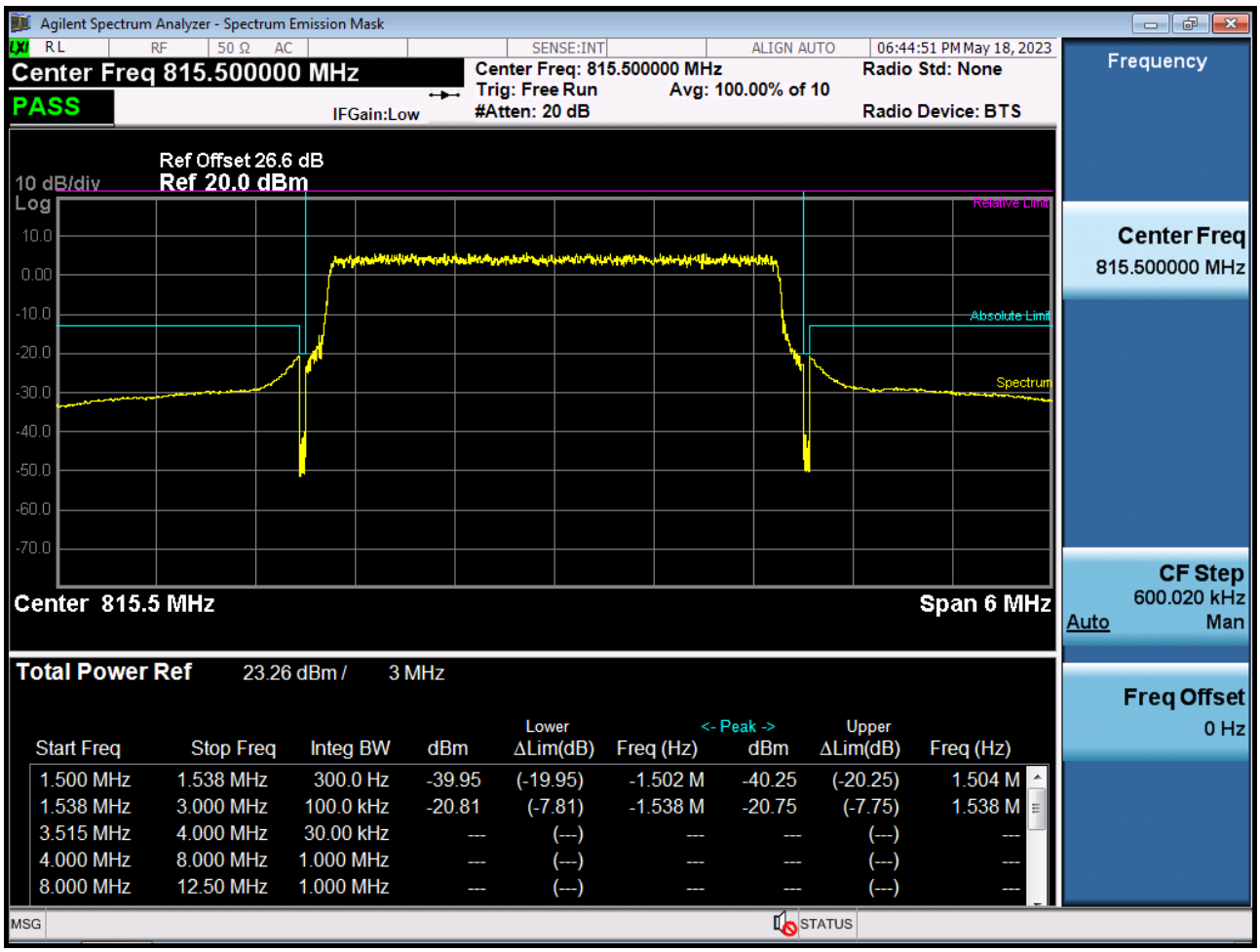
BAND 26. Lower Channel Edge Plot (1.4 M BW Ch.26697 QPSK_RB6_Offset 0)



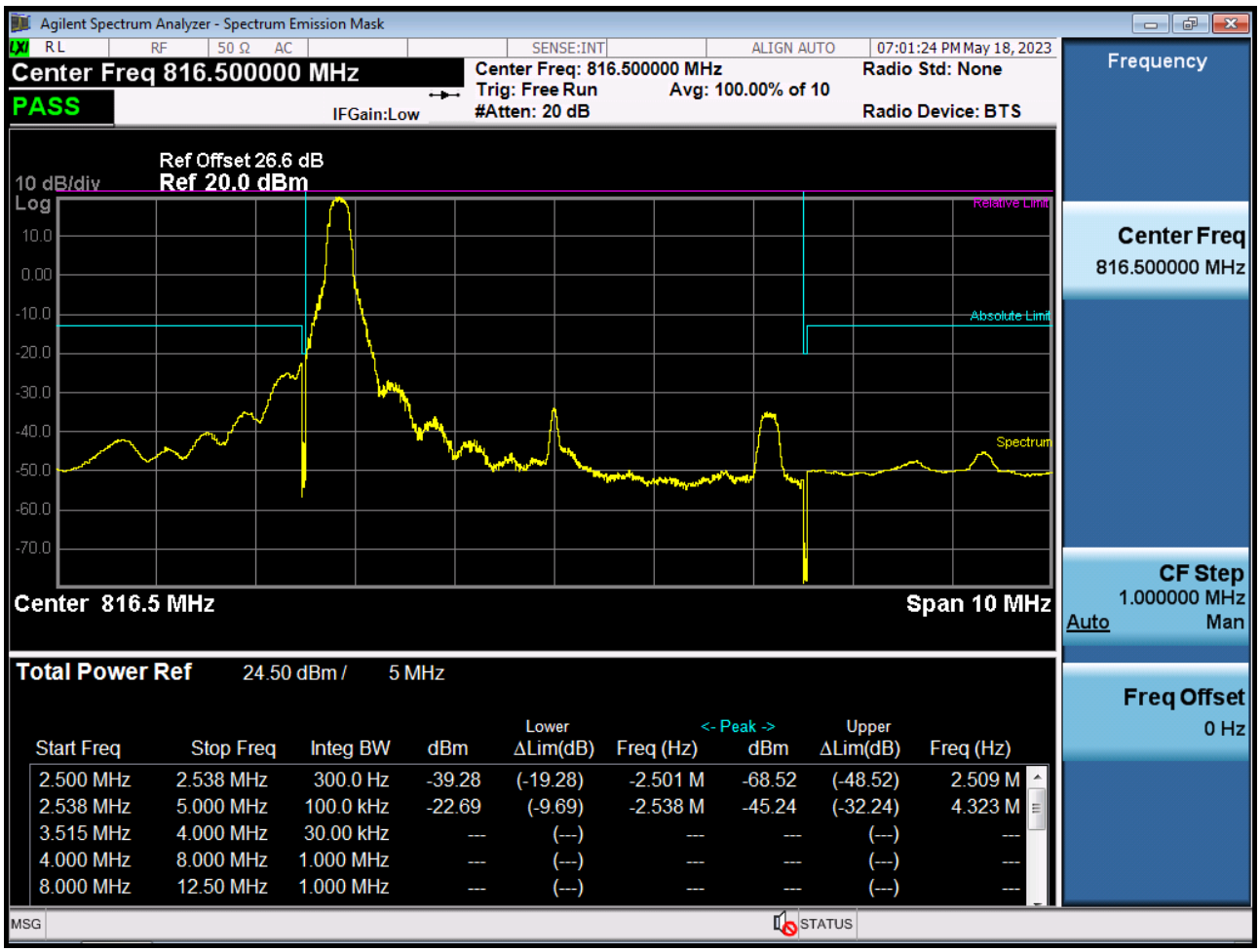
BAND 26. Lower Channel Edge Plot (3 M BW Ch.26705 QPSK RB 1, Offset 0)



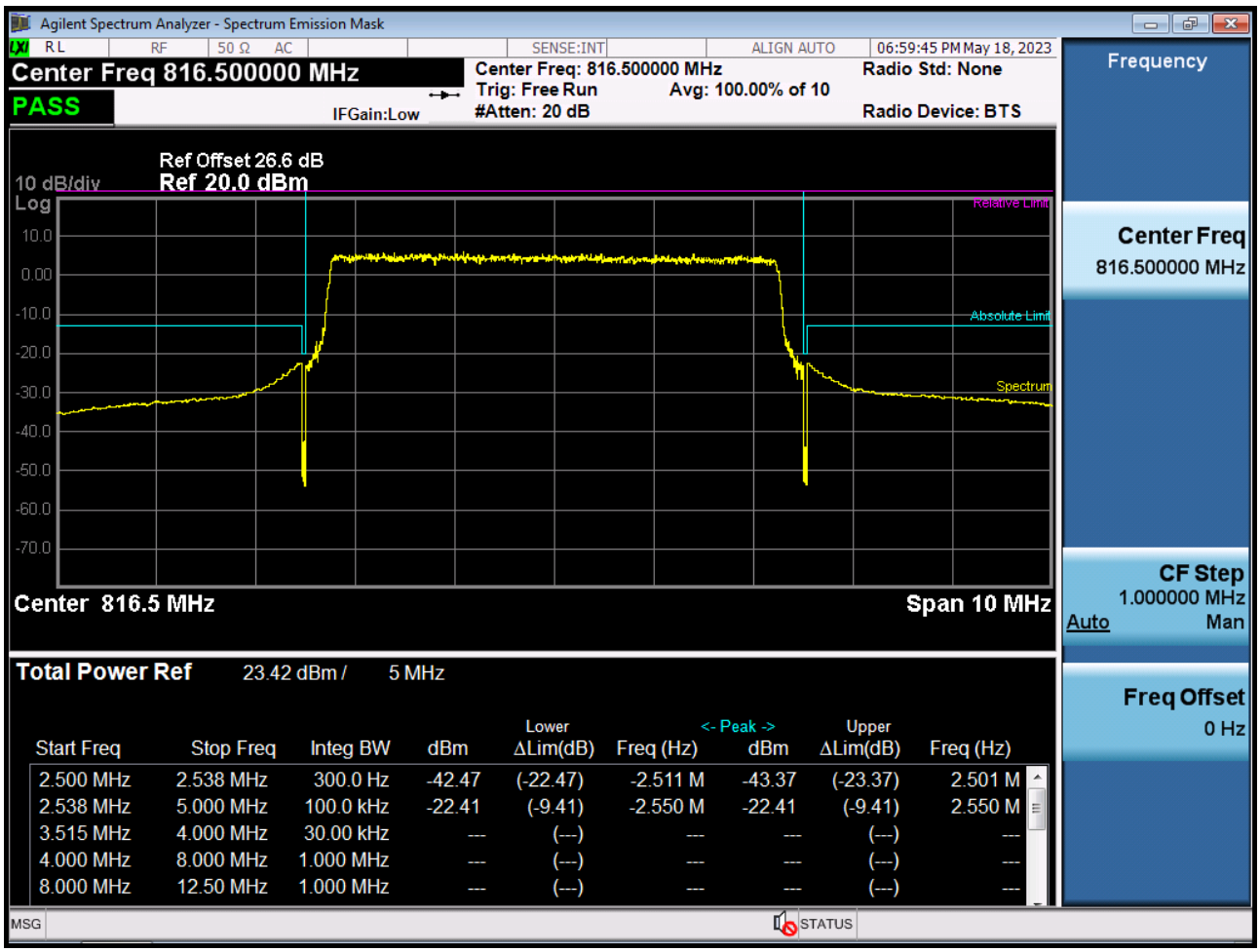
BAND 26. Lower Channel Edge Plot (3 M BW Ch.26705 QPSK_RB15_Offset 0)



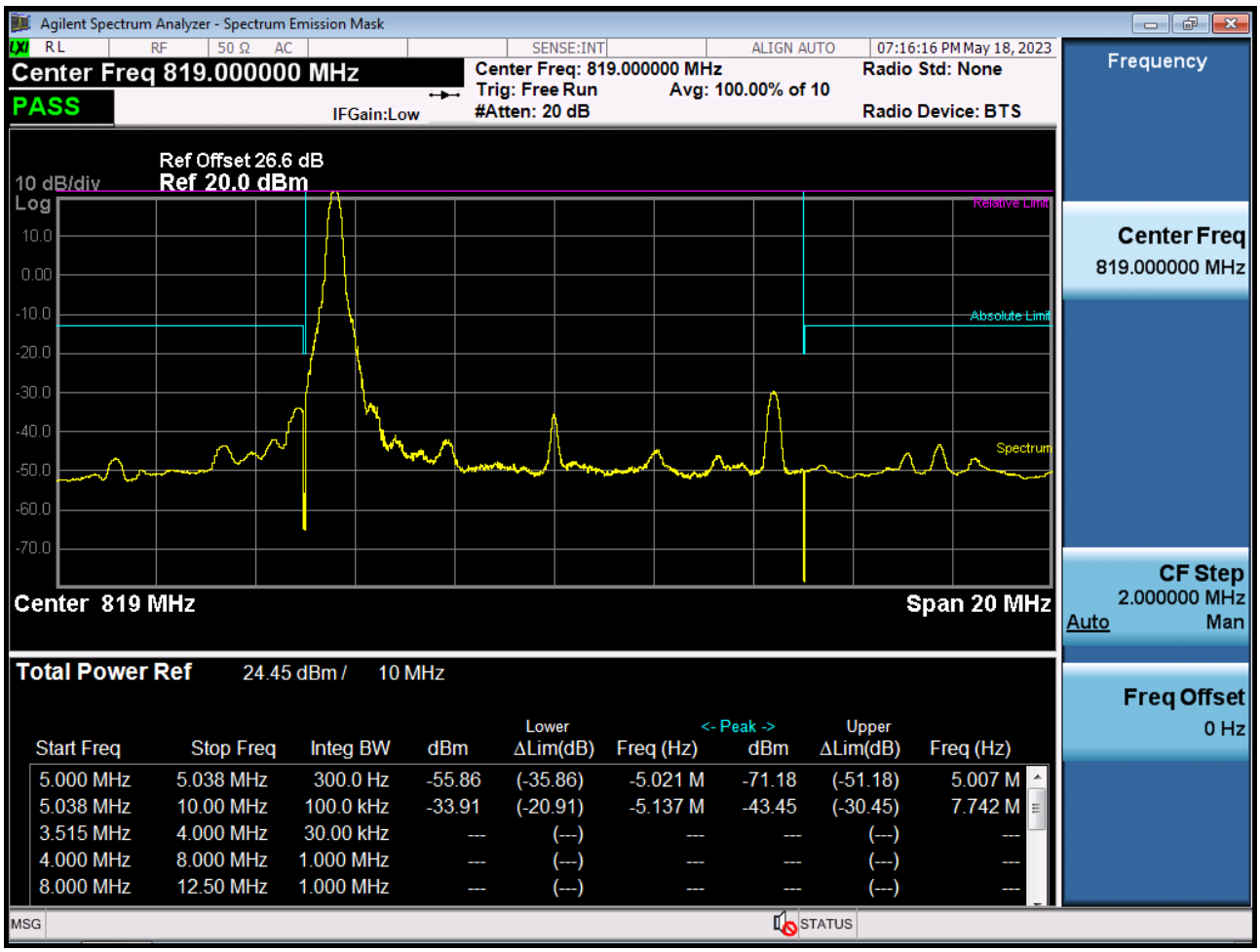
BAND 26. Lower Channel Edge Plot (5 M BW Ch.26715 QPSK RB 1, Offset 0)



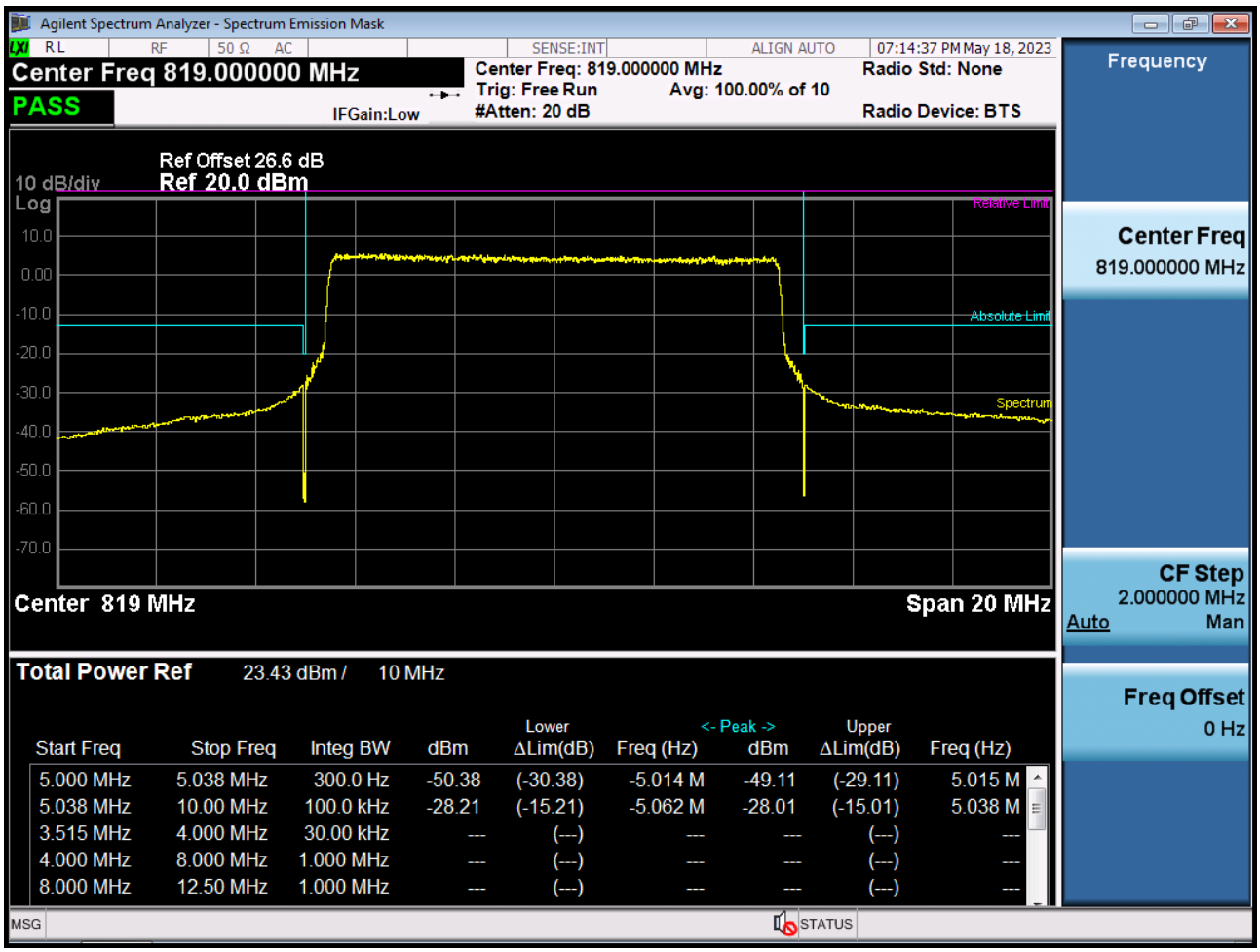
BAND 26. Lower Channel Edge Plot (5 M BW Ch.26715 QPSK_RB25_Offset 0)



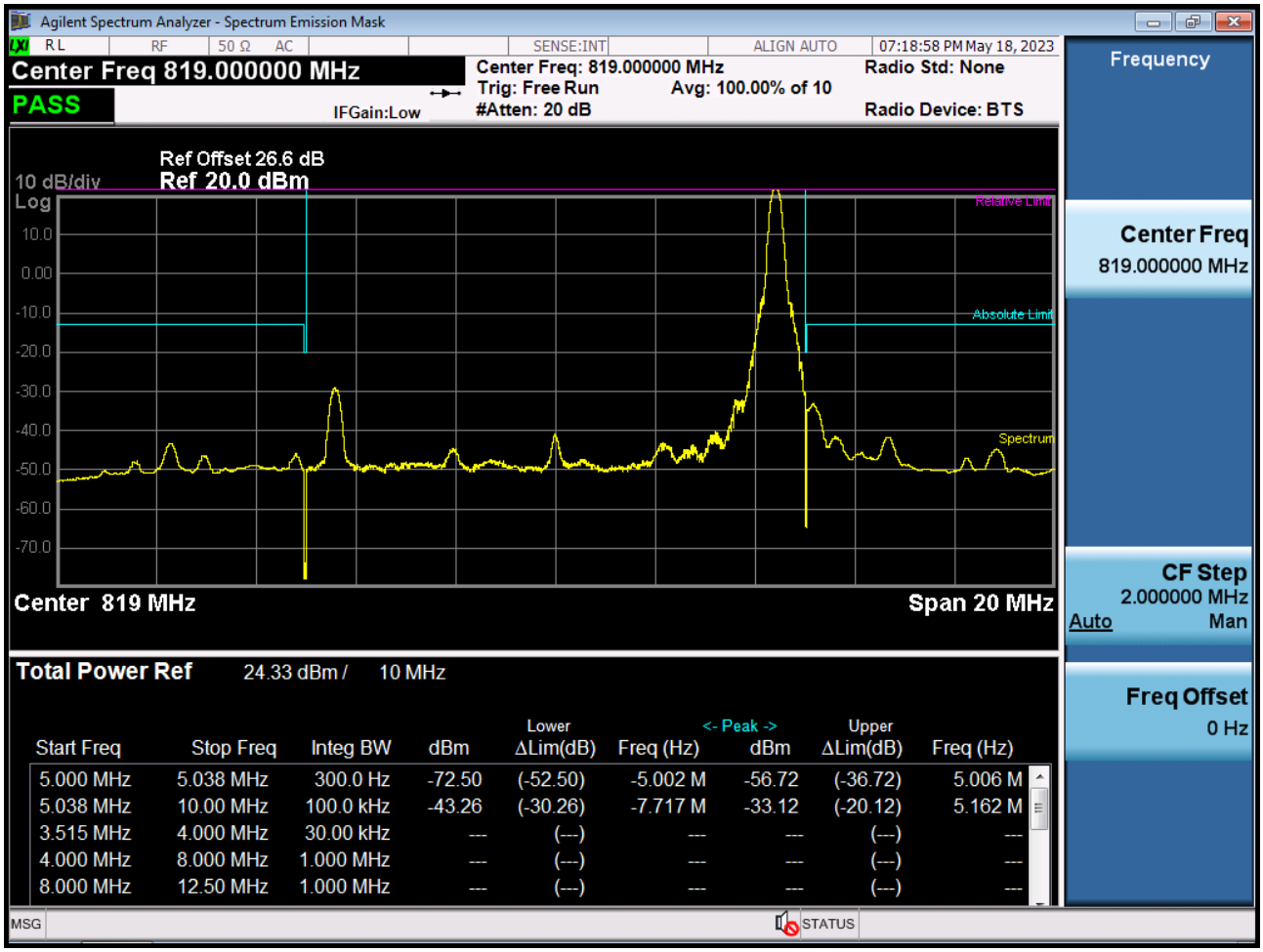
BAND 26. Low Channel Edge Plot (10 M BW Ch.26740 QPSK RB 1, Offset 0)



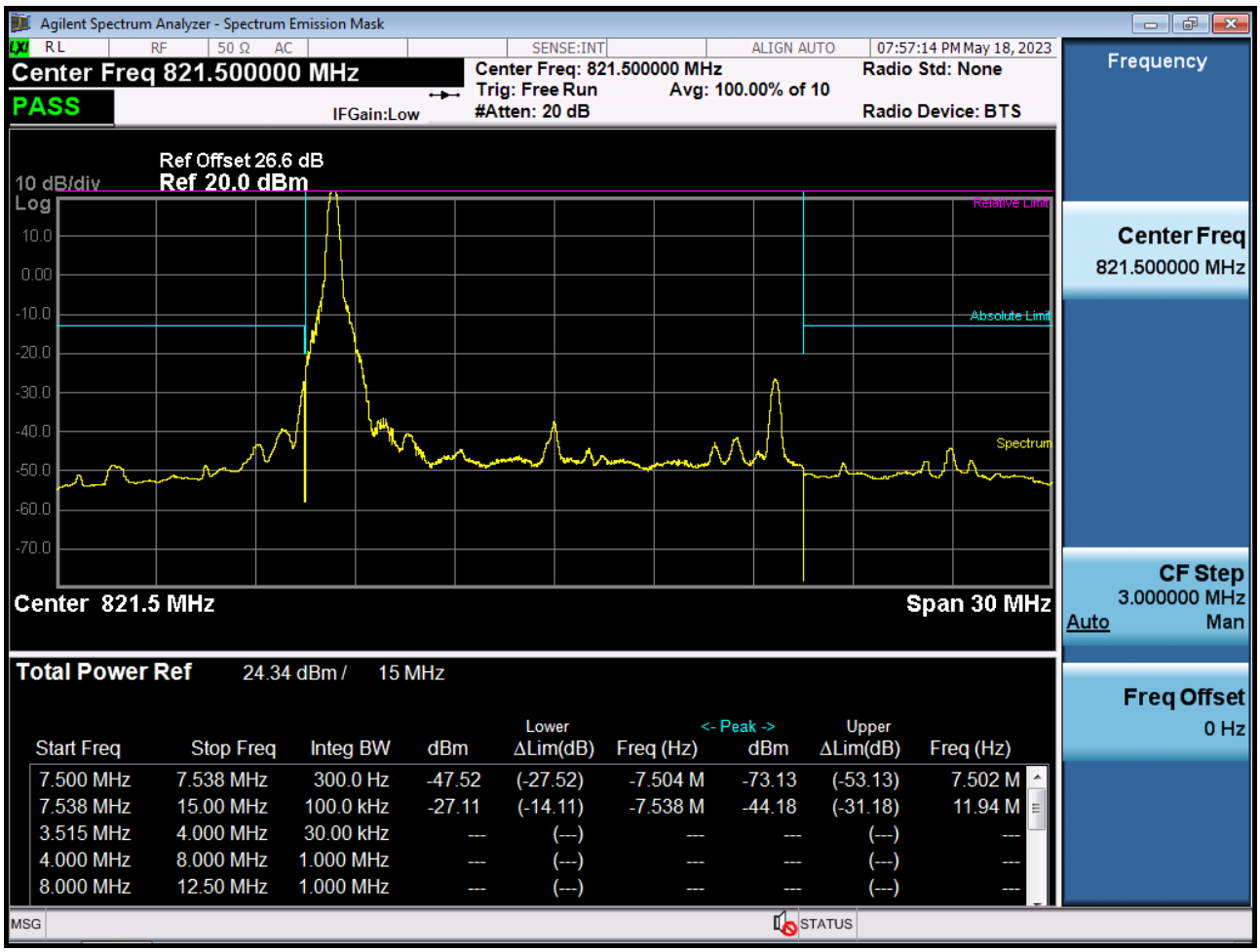
BAND 26. Low Channel Edge Plot (10 M BW Ch.26740 QPSK_RB50_Offset 0)



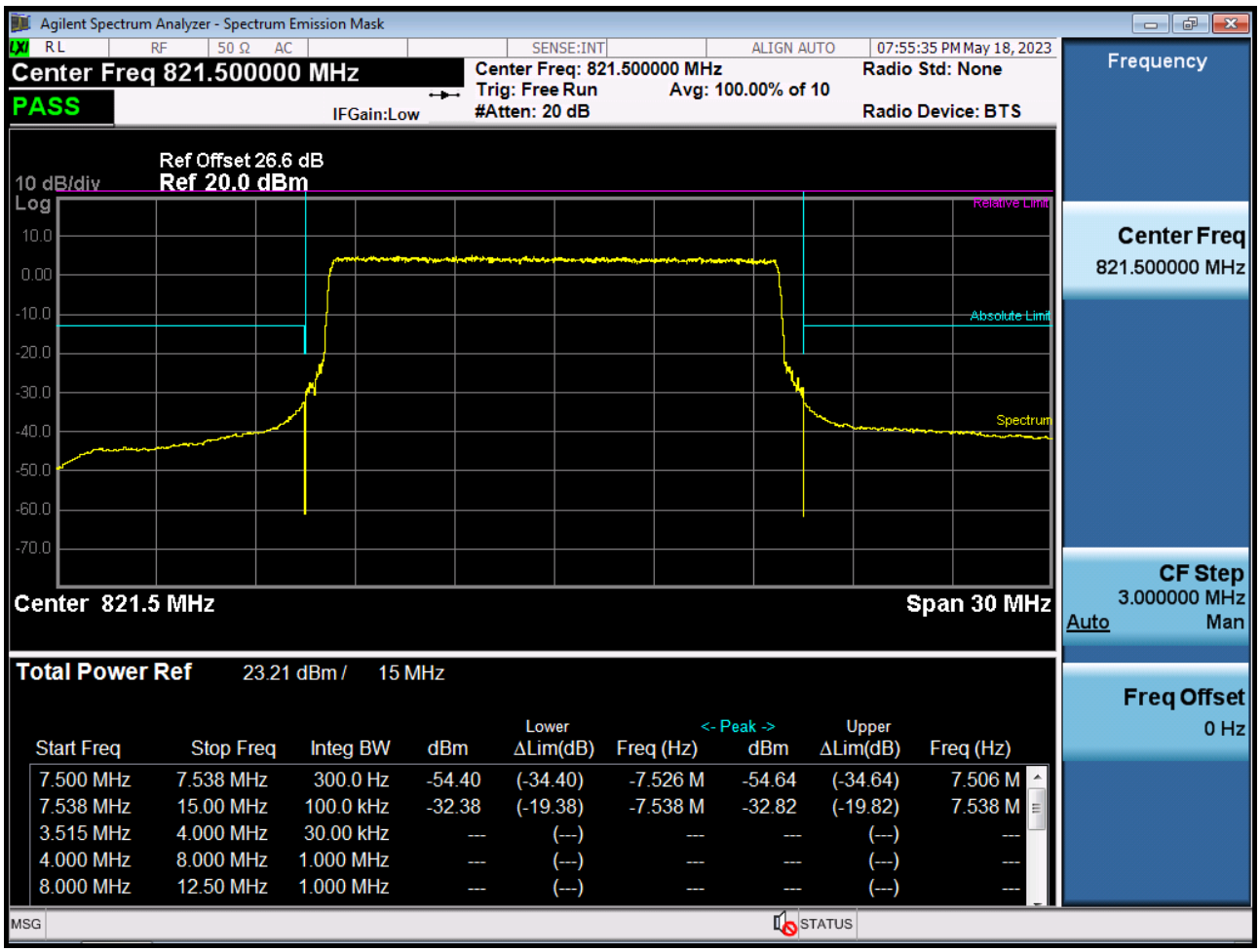
BAND 26. Mid Channel Edge Plot (10 M BW Ch. 26740 QPSK_RB1_Offset 49)



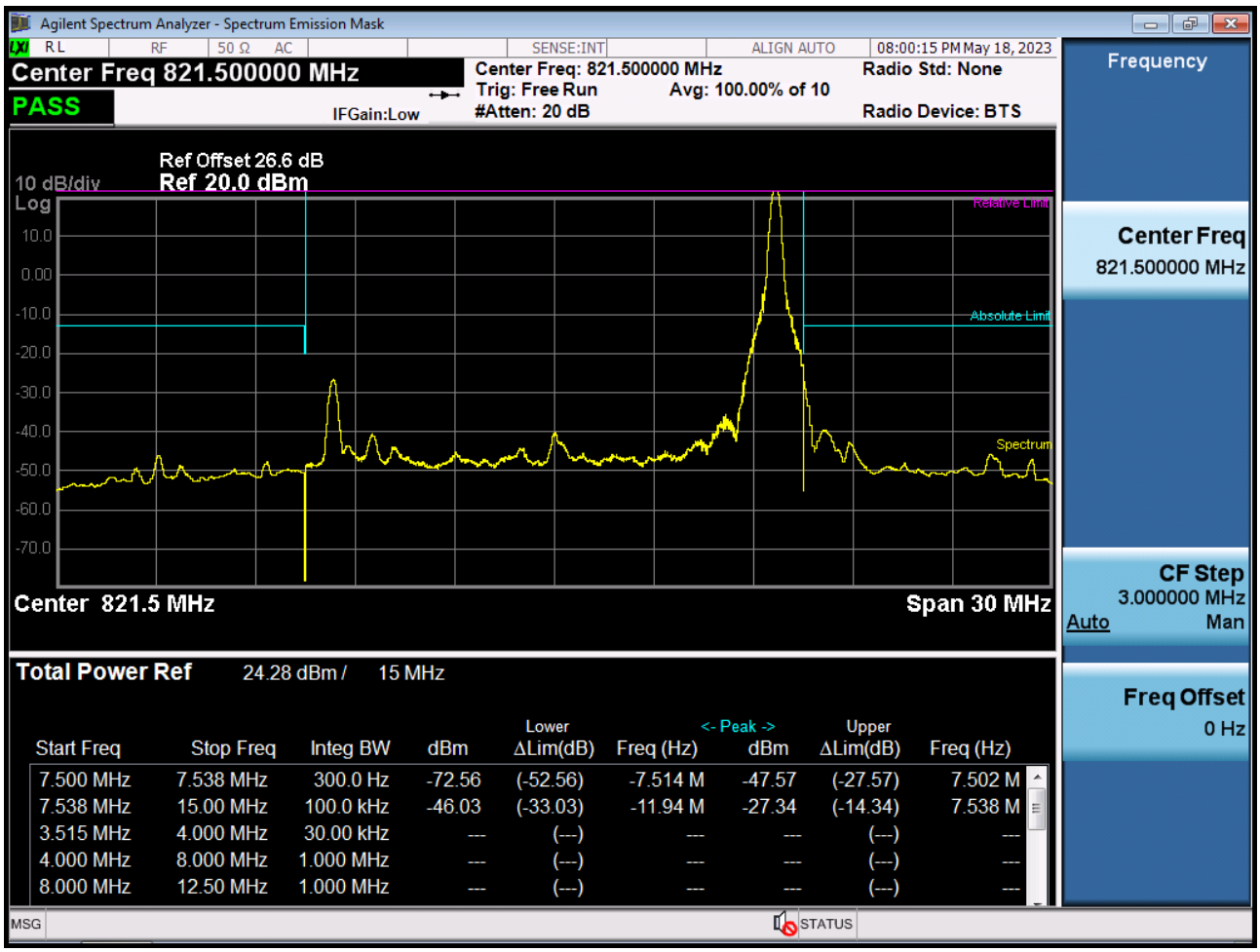
BAND 26. Low Channel Edge Plot (15 M BW Ch.26765 QPSK RB 1, Offset 0)



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



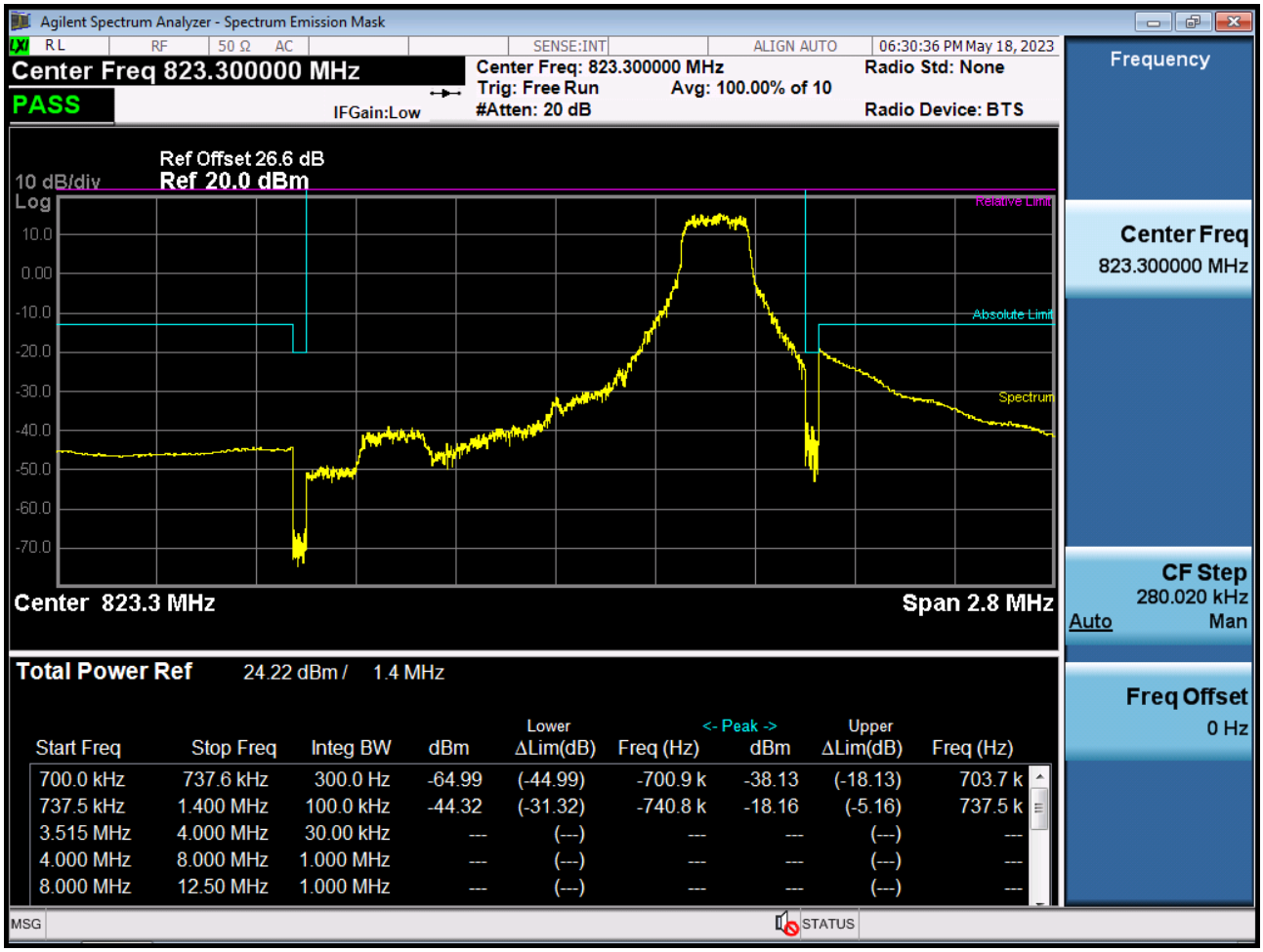
BAND 26. Mid Channel Edge Plot (15 M BW Ch.26765 QPSK_RB1_Offset 74)



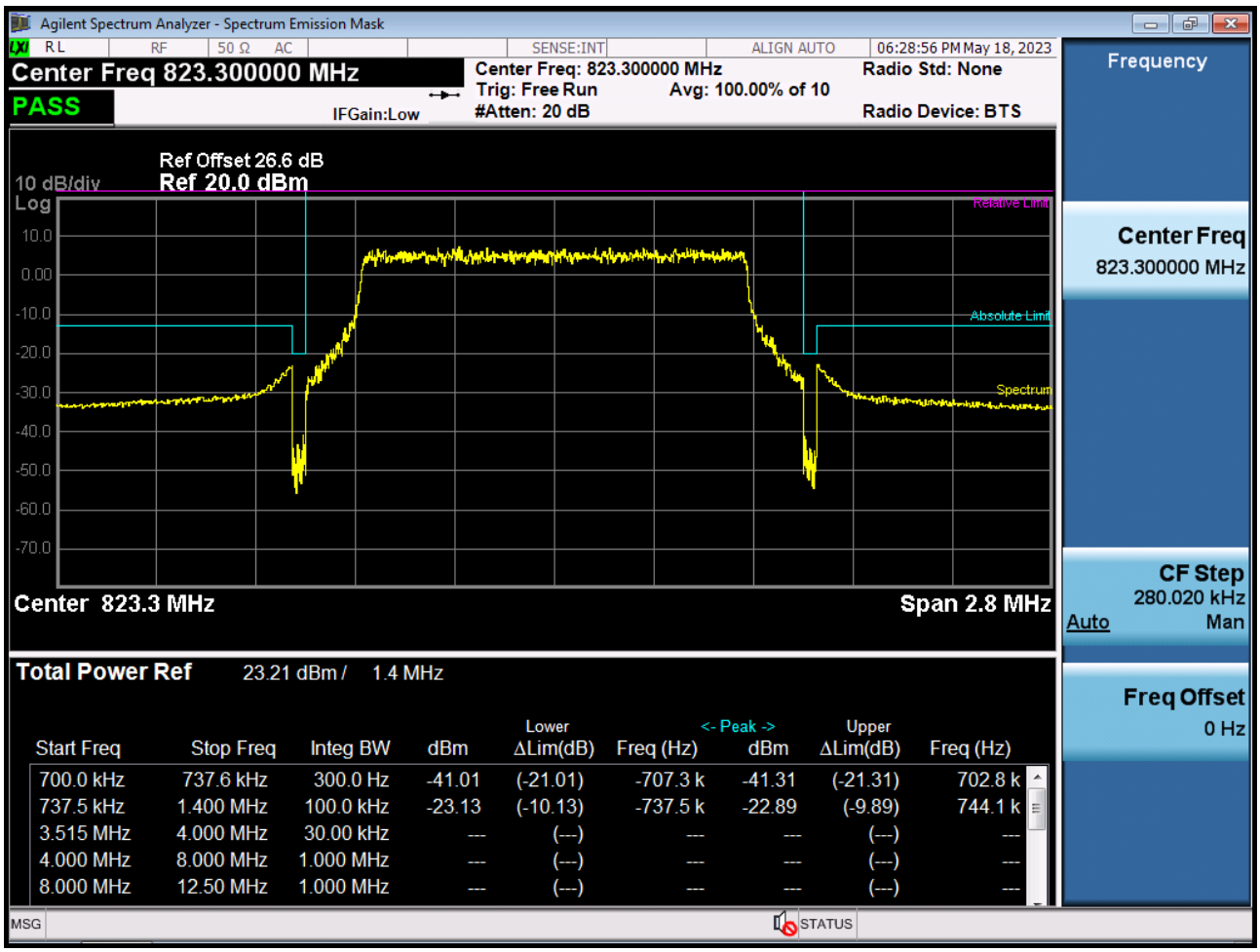
BAND 26. Mid Band Edge Plot (15 M BW Ch.26765 QPSK RB 1, Offset74)

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

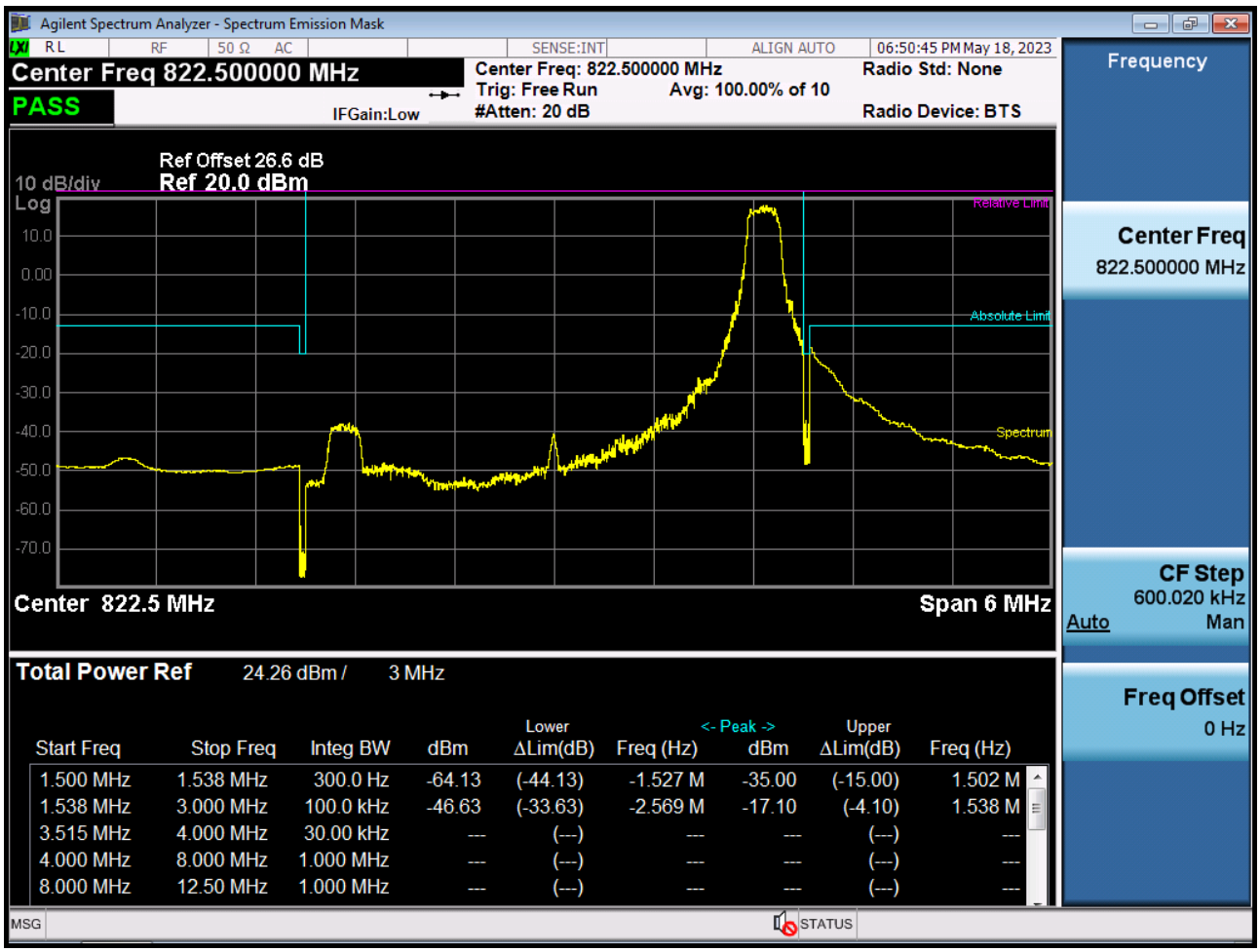
BAND 26. Upper Channel Edge Plot (1.4 M BW Ch.26783 QPSK_RB1_Offset 5)



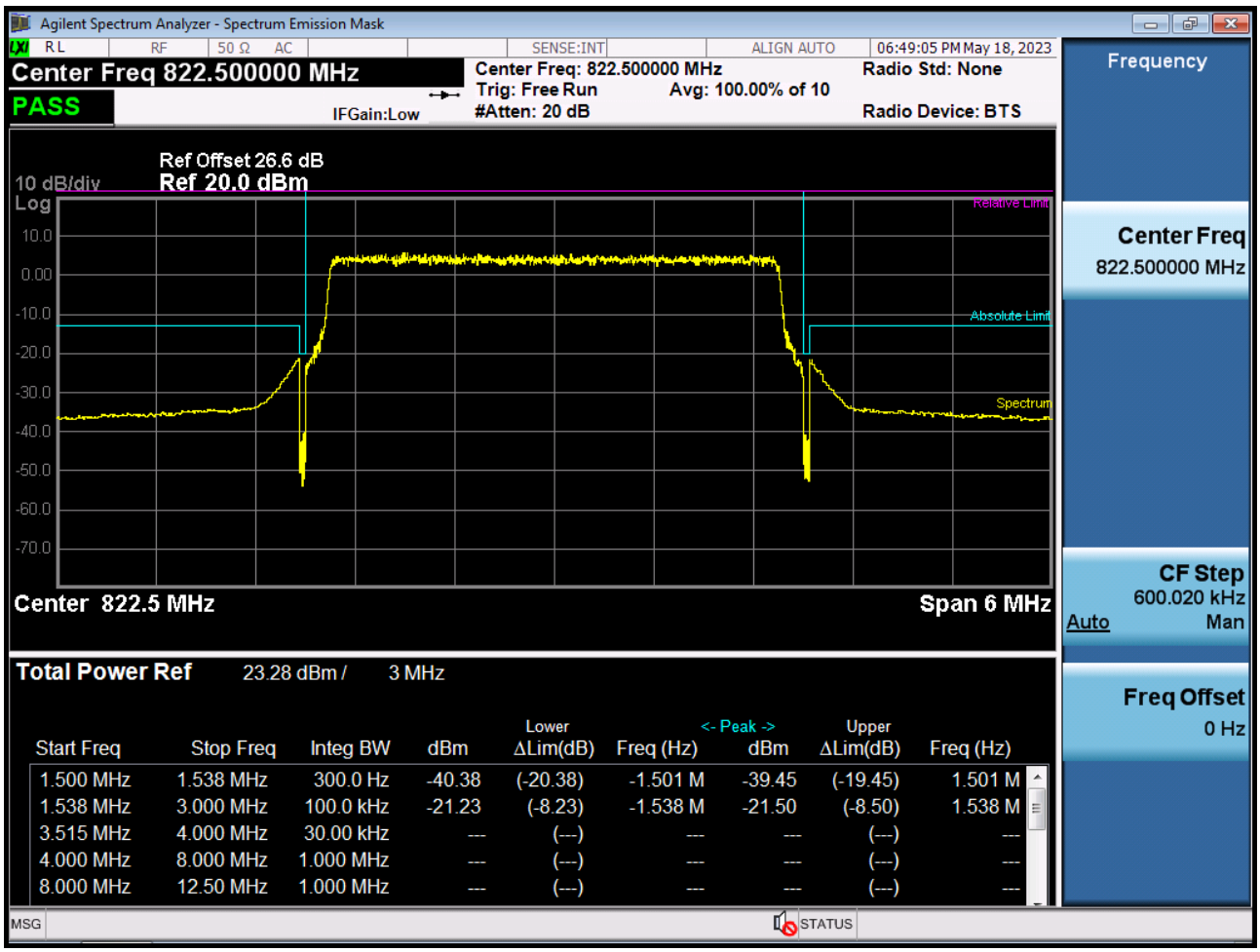
BAND 26. Upper Channel Edge Plot (1.4 M BW Ch.26783 QPSK_RB6_Offset 0)



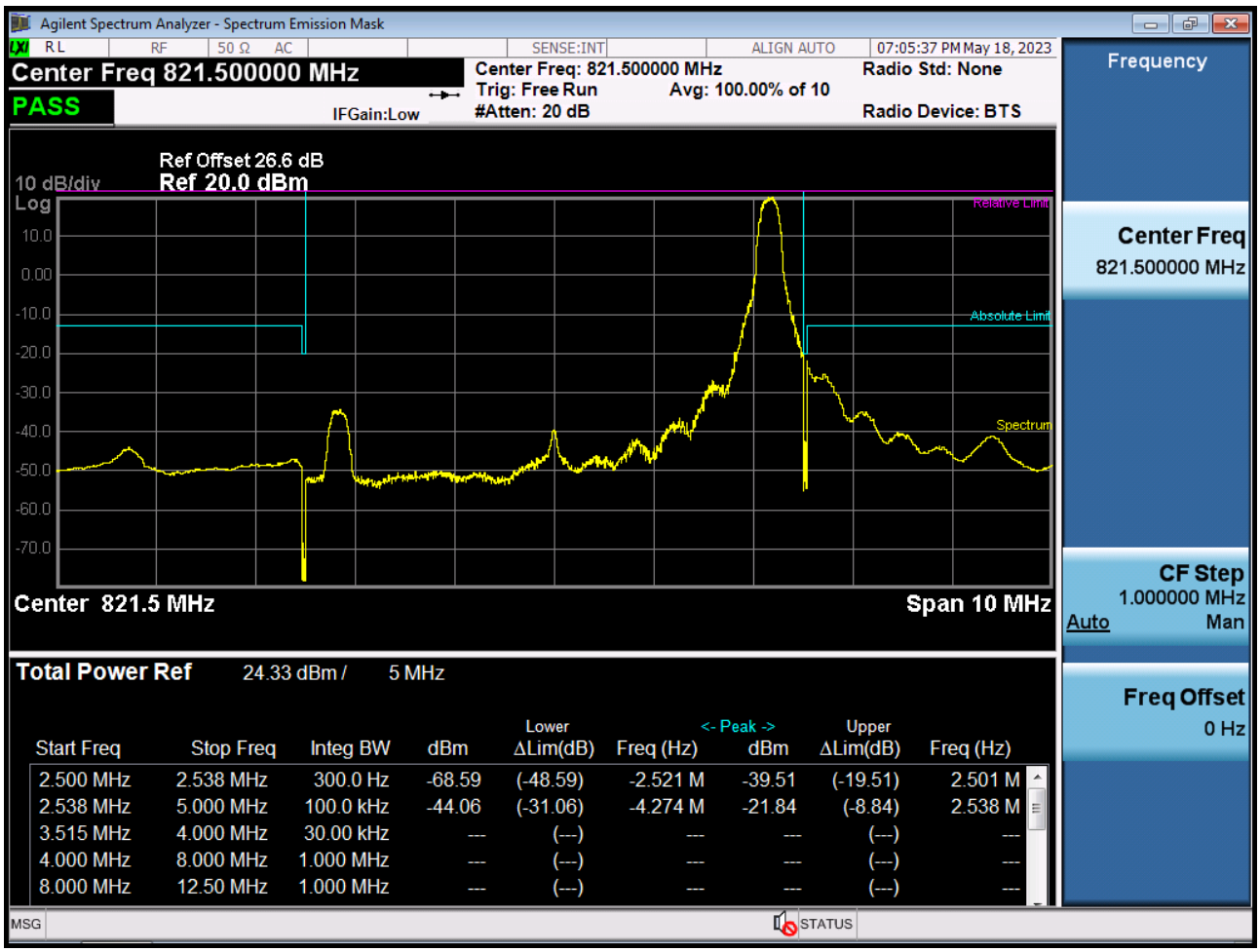
BAND 26. Upper Channel Edge Plot (3 M BW Ch.26775 QPSK_RB1_Offset 14)



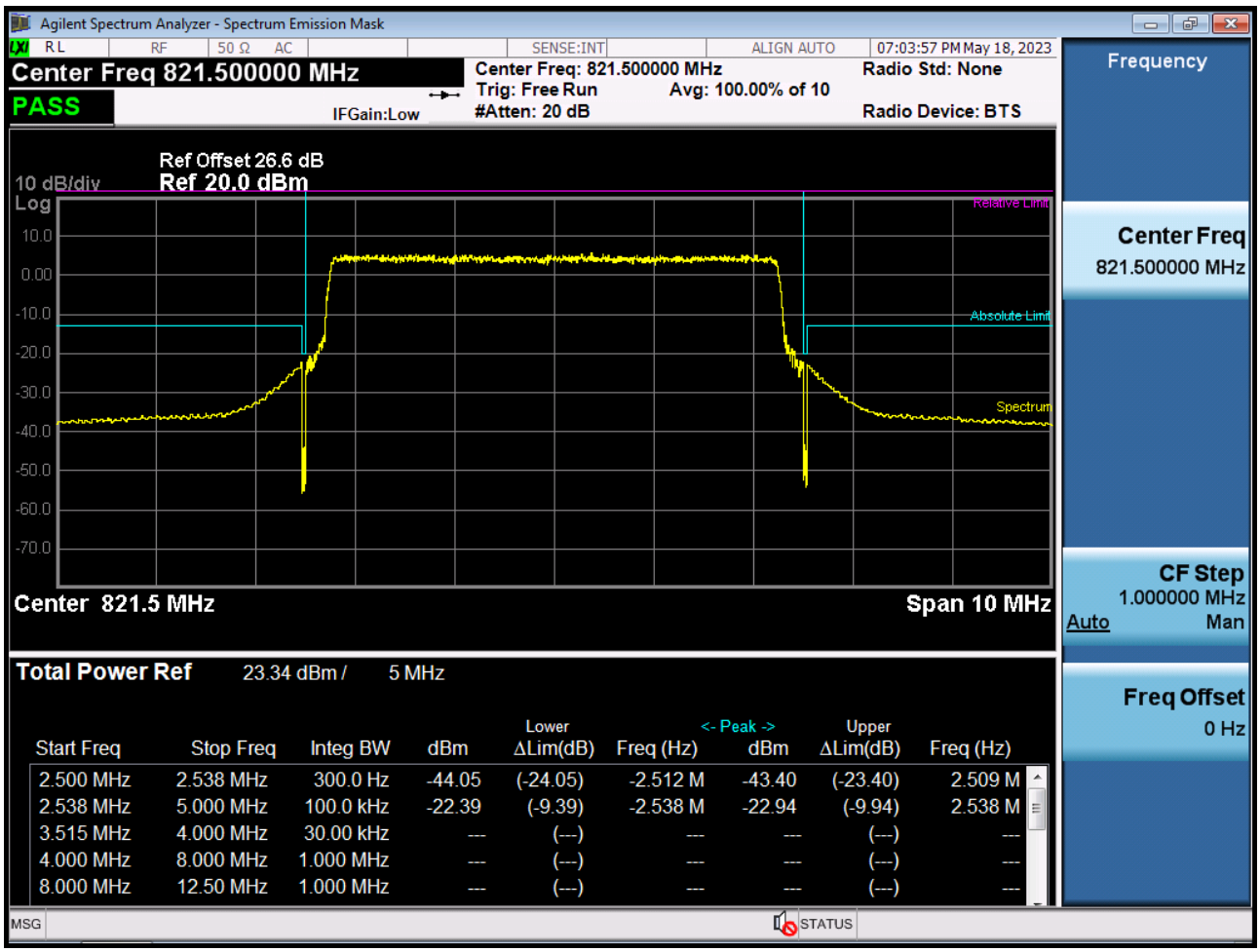
BAND 26. Upper Channel Edge Plot (3 M BW Ch.26775 QPSK_RB15_Offset 0)



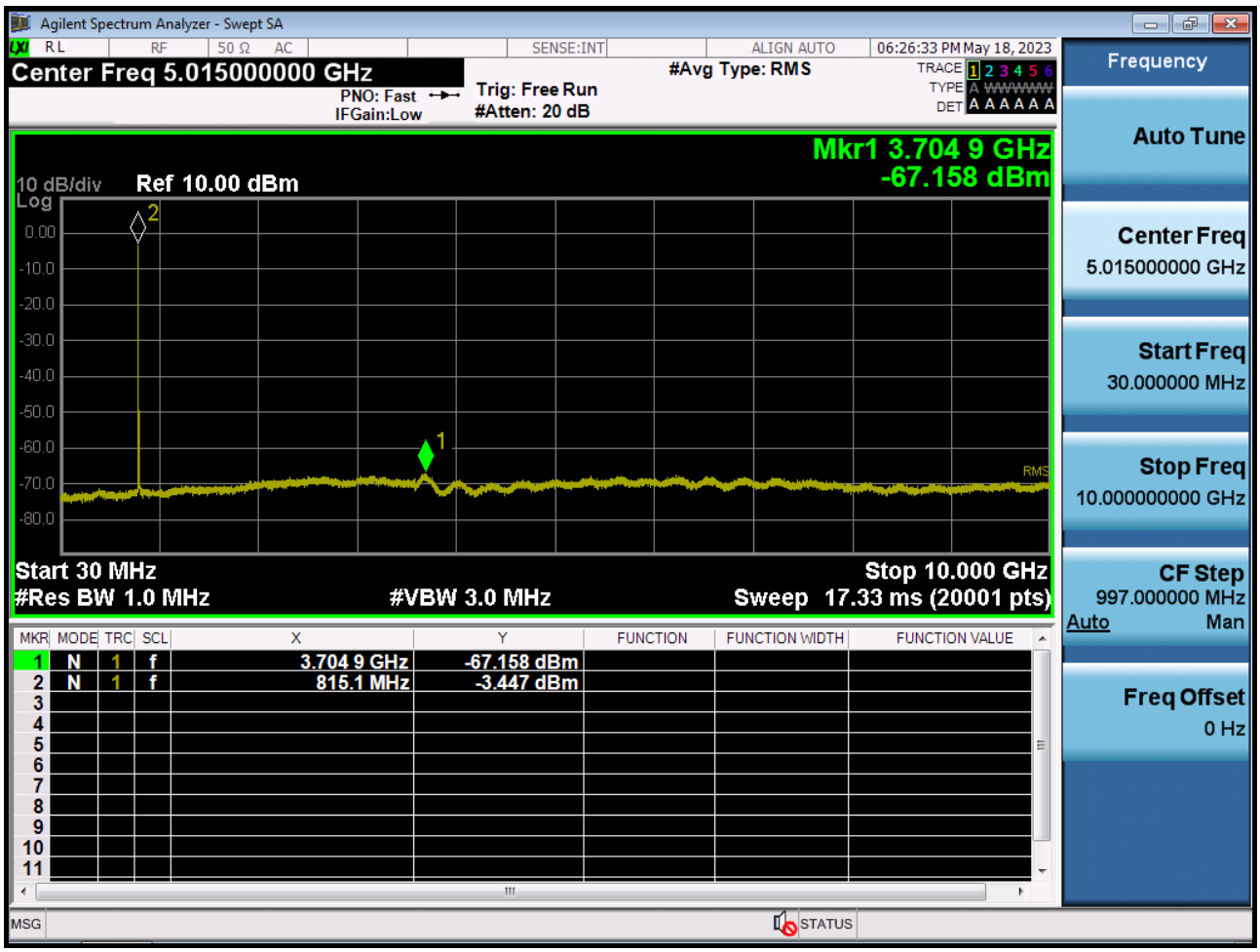
BAND 26. Upper Channel Edge Plot (5 M BW Ch.26765 QPSK_RB1_Offset 24)



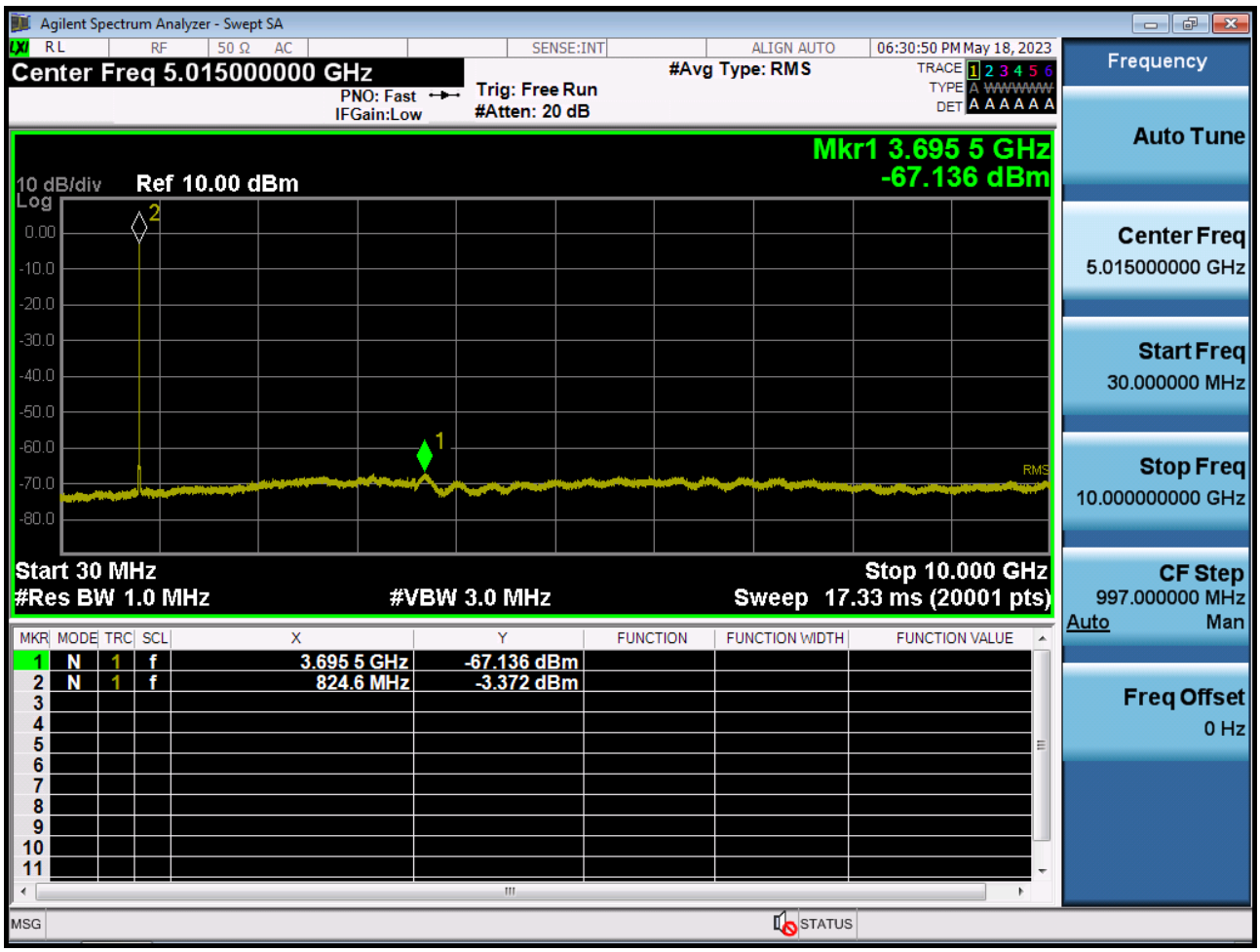
BAND 26. Upper Channel Edge Plot (5 M BW Ch.26765 QPSK_RB25_Offset 0)



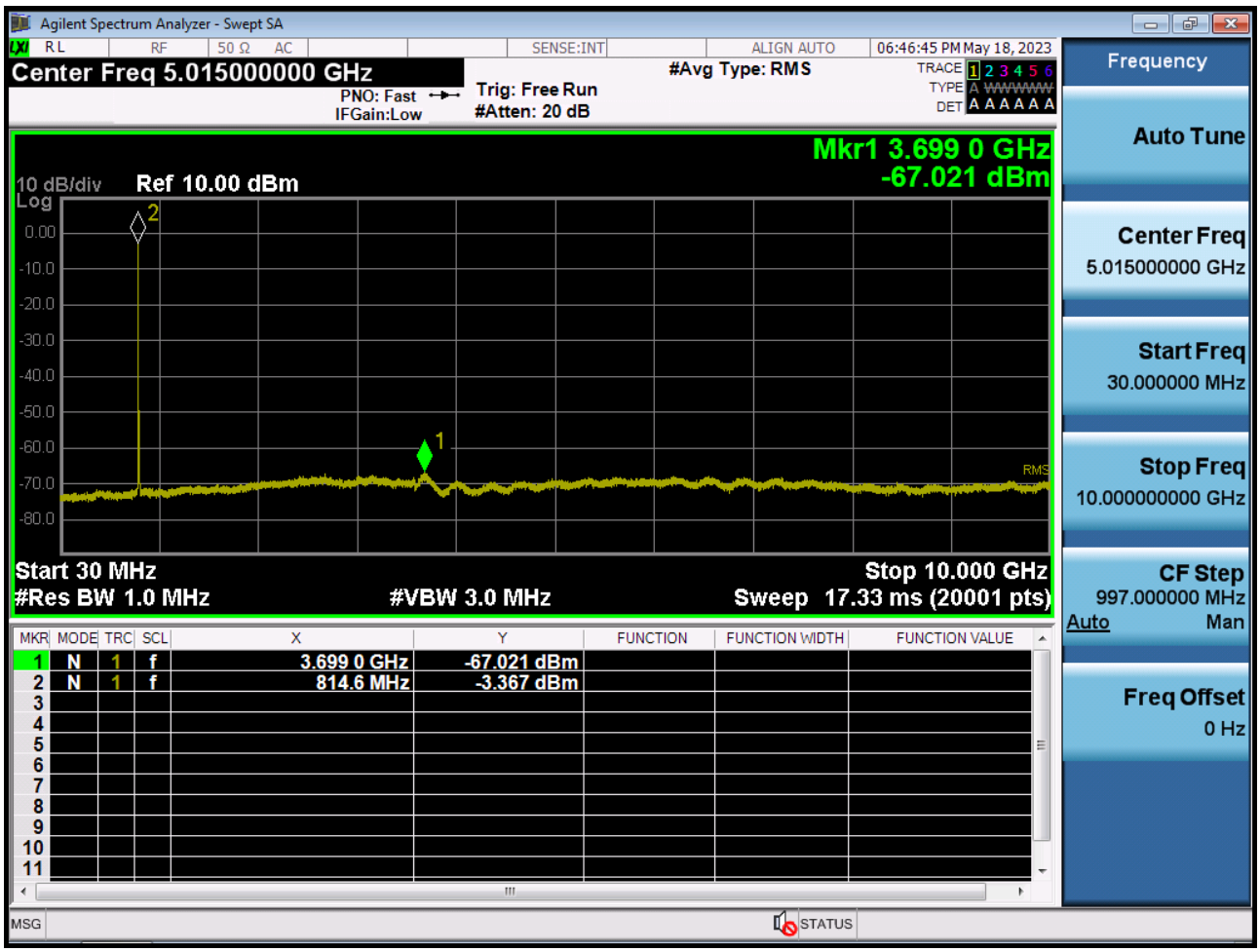
BAND 26. Conducted Spurious (26697 ch_1.4 MHz_QPSK_RB 1_0)



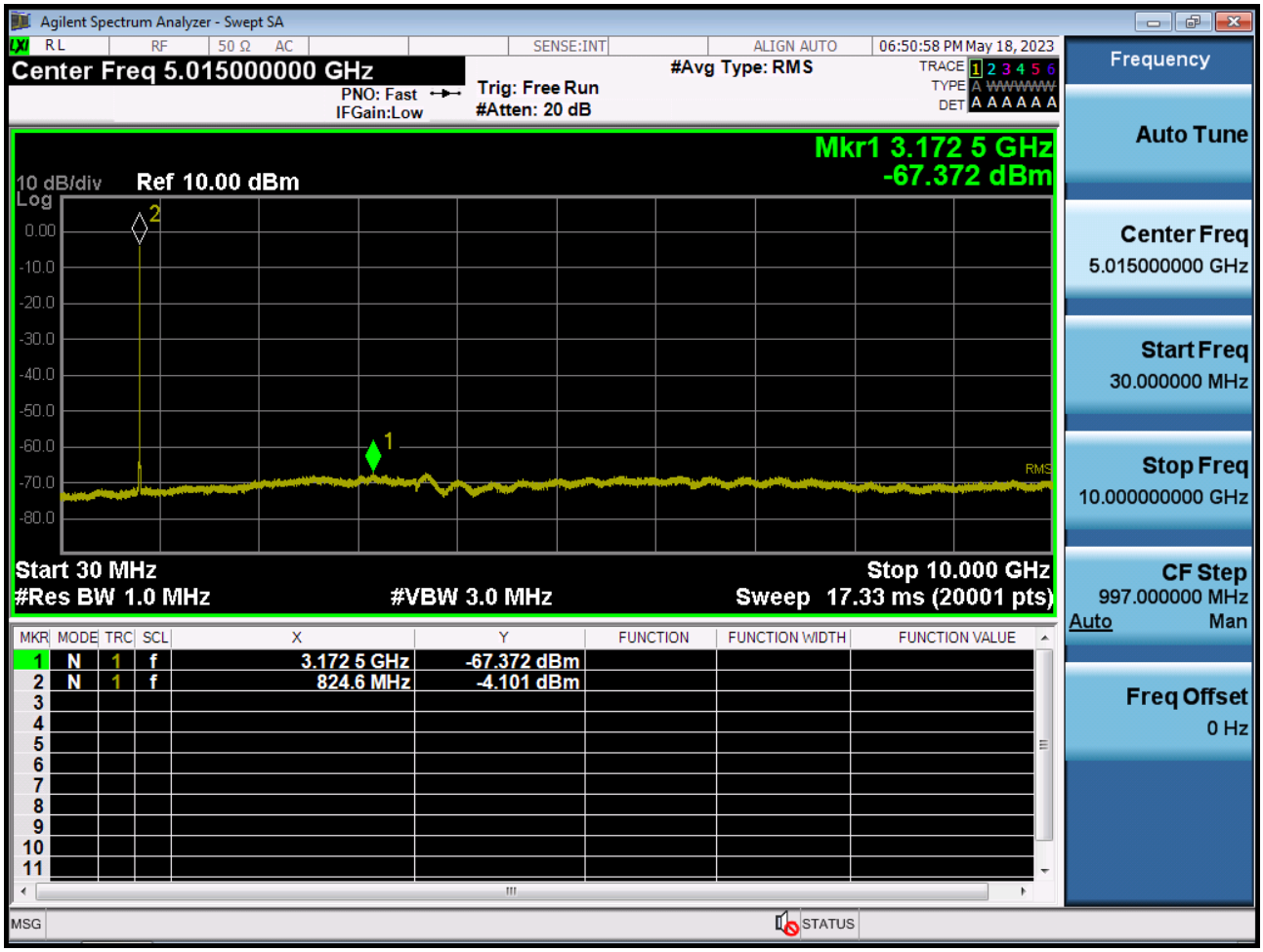
BAND 26. Conducted Spurious (26783 ch_1.4 MHz_QPSK_RB 1_0)



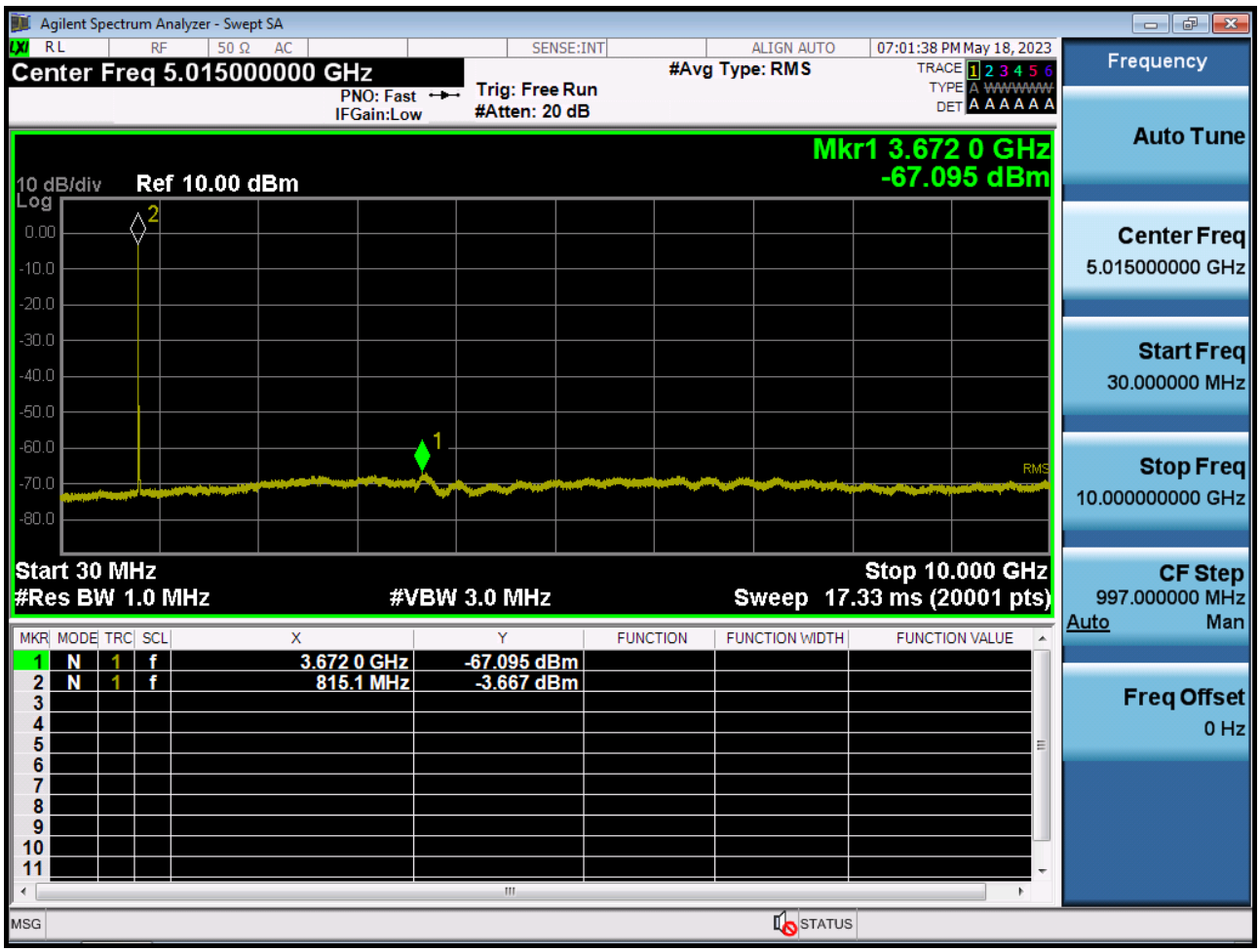
BAND 26. Conducted Spurious (26705 ch_3 MHz_QPSK_RB 1_0)



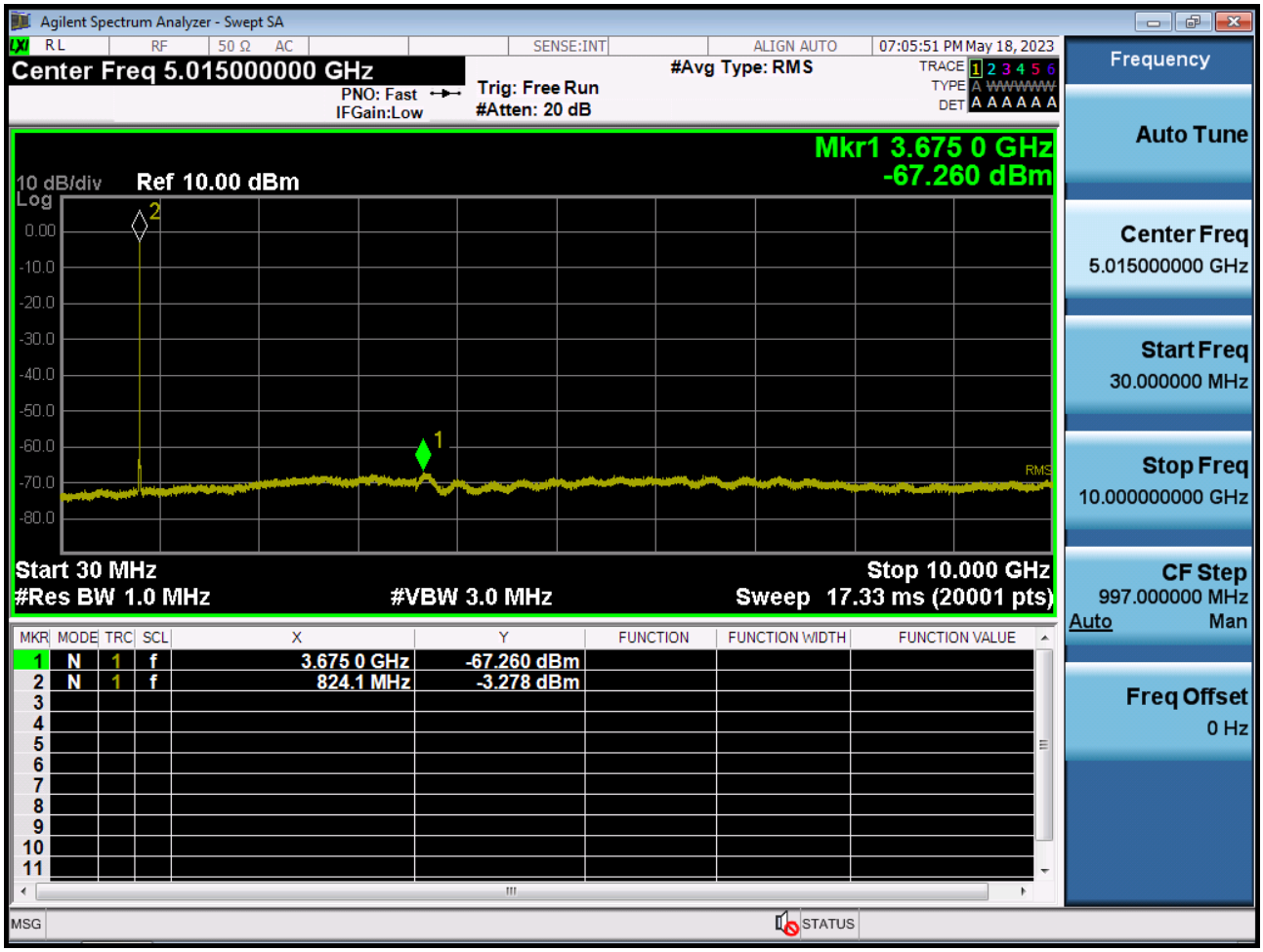
BAND 26. Conducted Spurious (26775 ch_3 MHz_QPSK_RB 1_0)



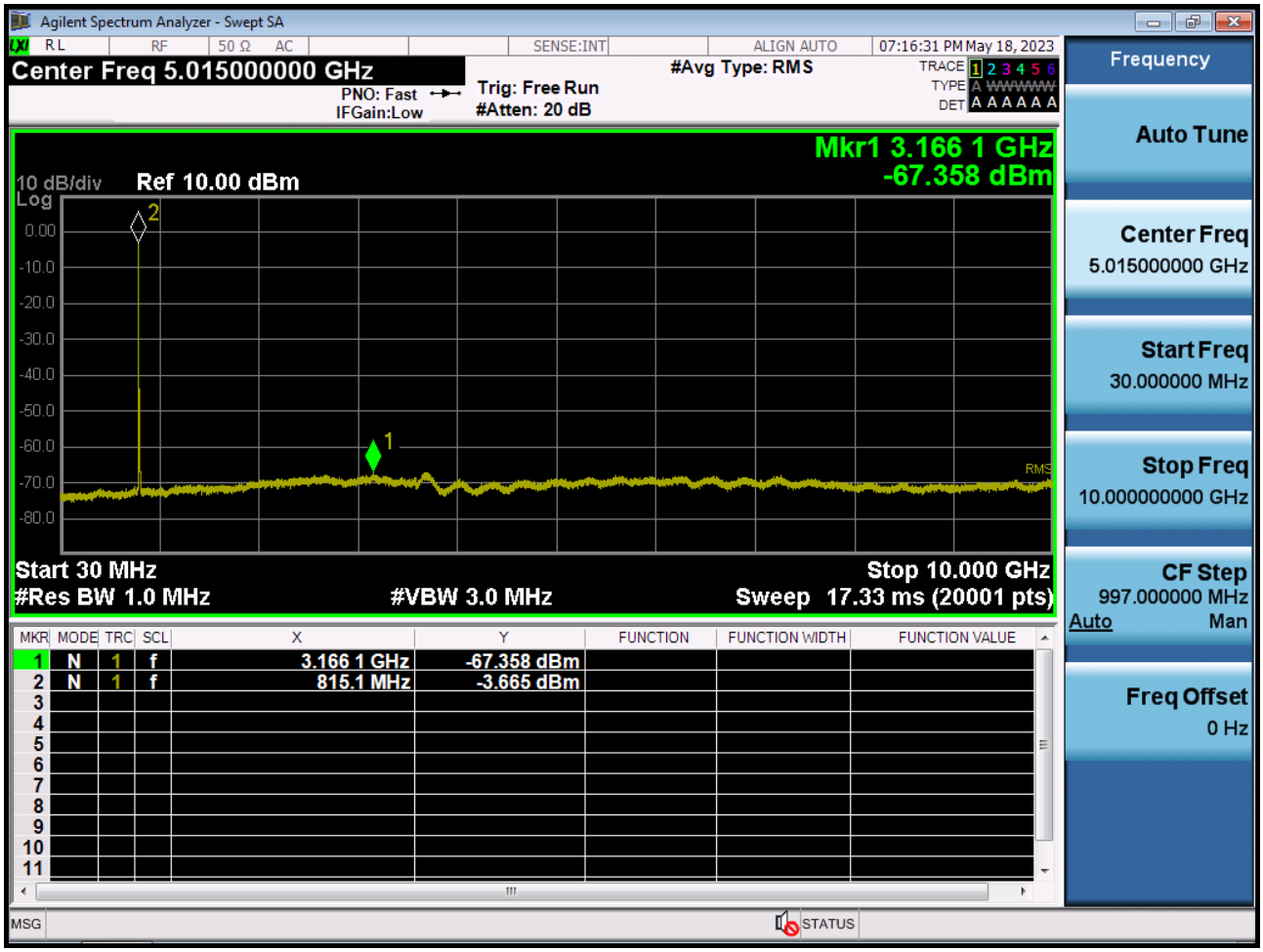
BAND 26. Conducted Spurious (26715 ch_5 MHz_QPSK_RB 1_0)



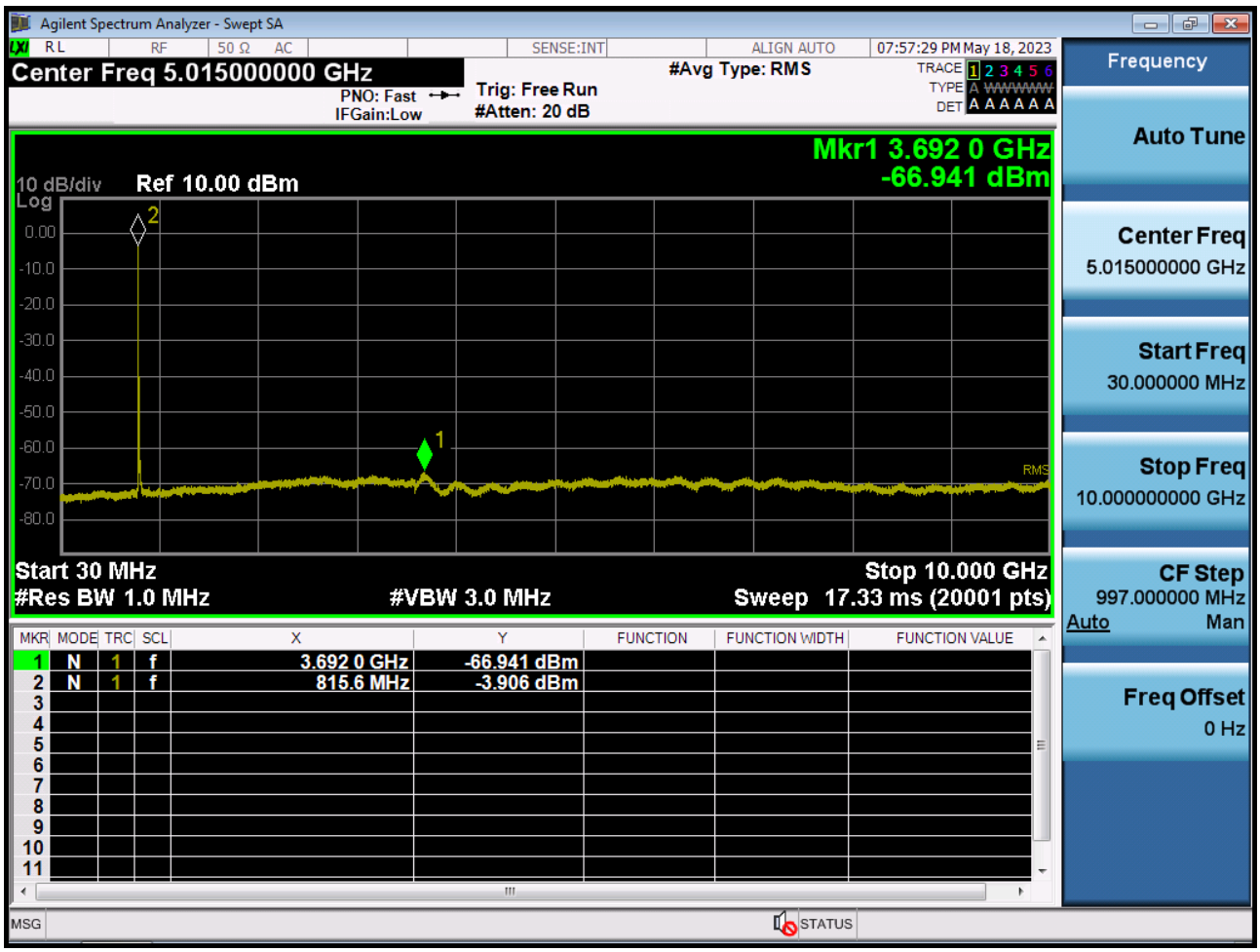
BAND 26. Conducted Spurious (26765 ch_5 MHz_QPSK_RB 1_0)



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

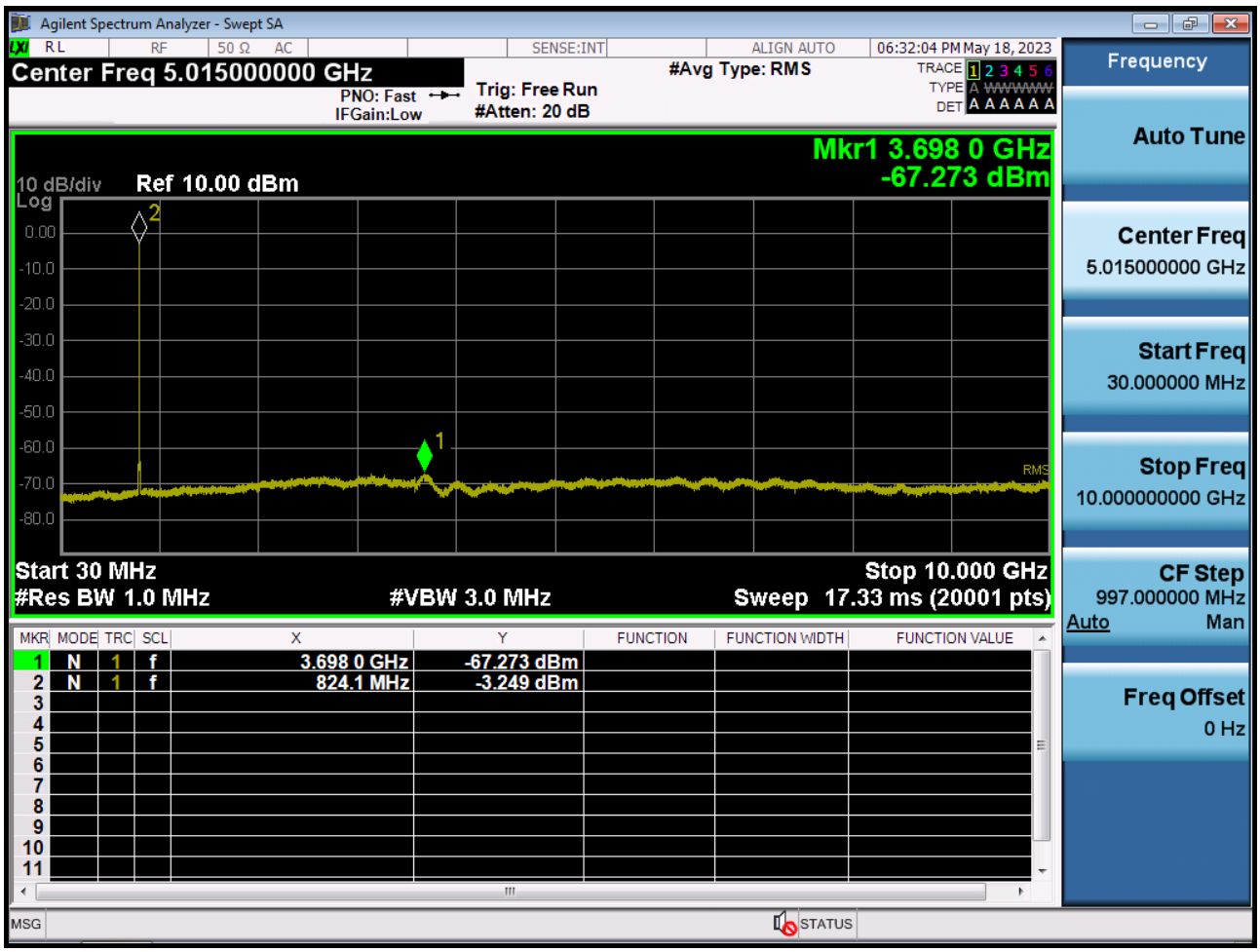


BAND 26. Conducted Spurious (26765 ch_15 MHz_QPSK_RB 1_0)

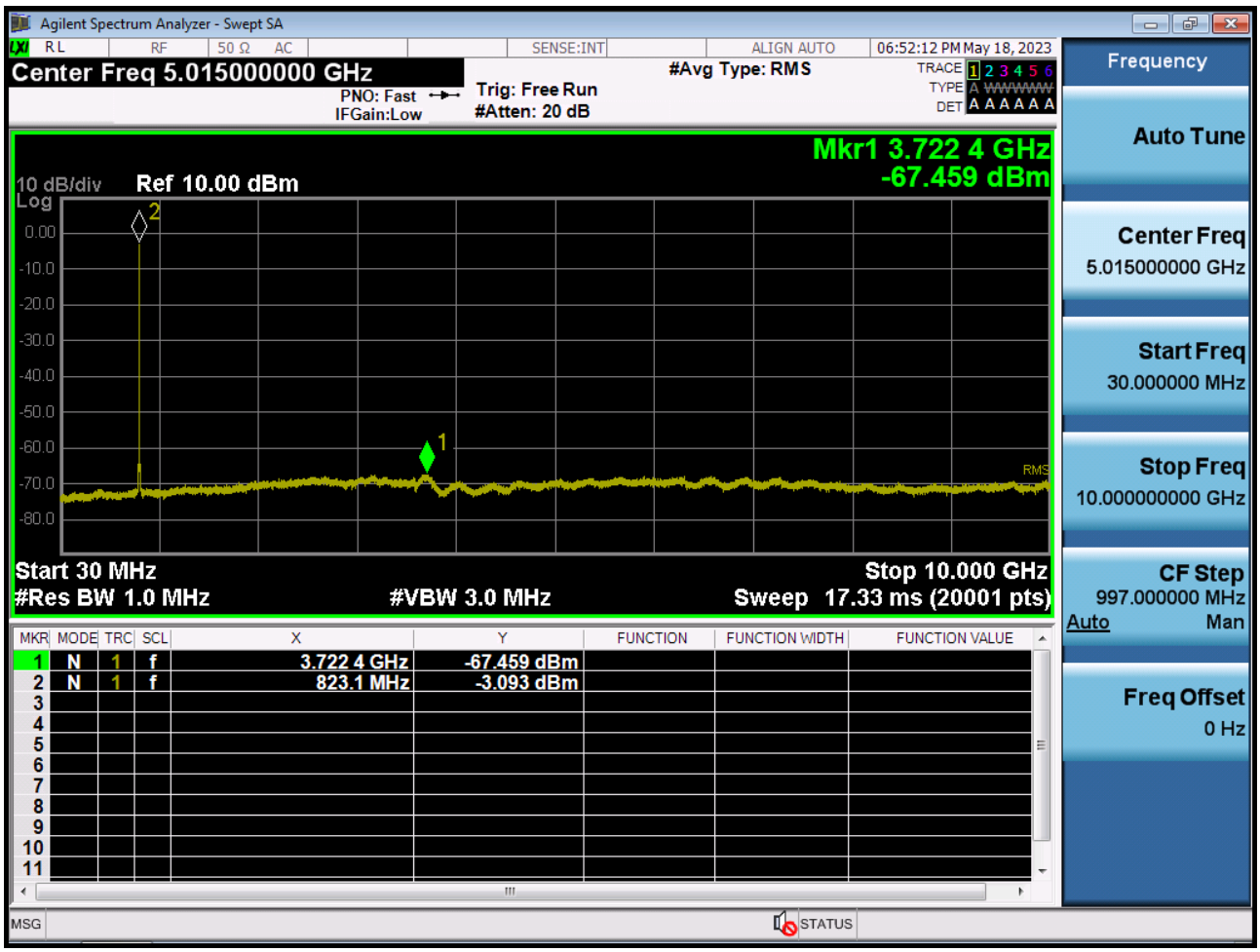


10. TEST PLOTS (STRADDLE CHANNEL)

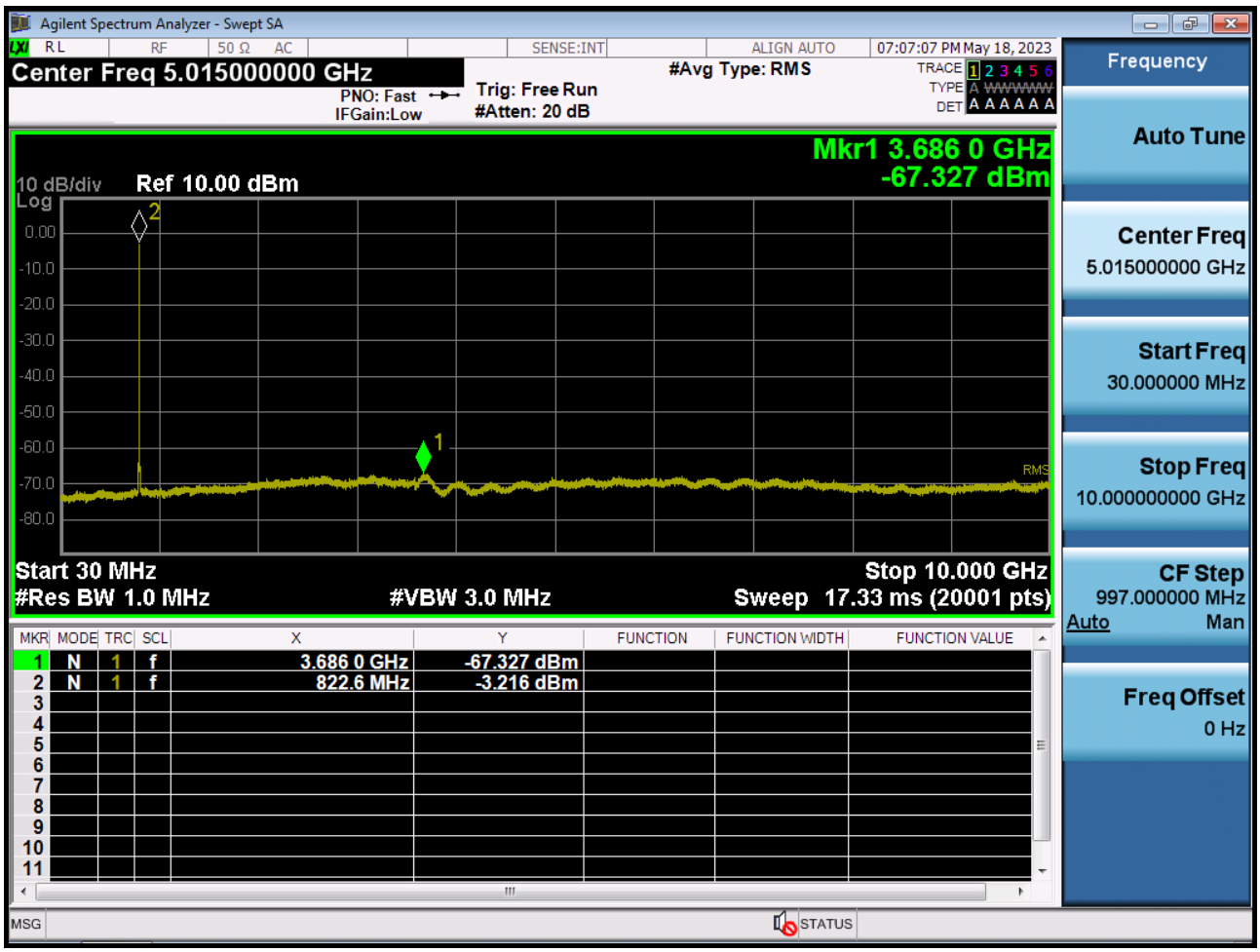
BAND 26. Conducted Spurious (1.4 MHz_QPSK_RB 1_0)



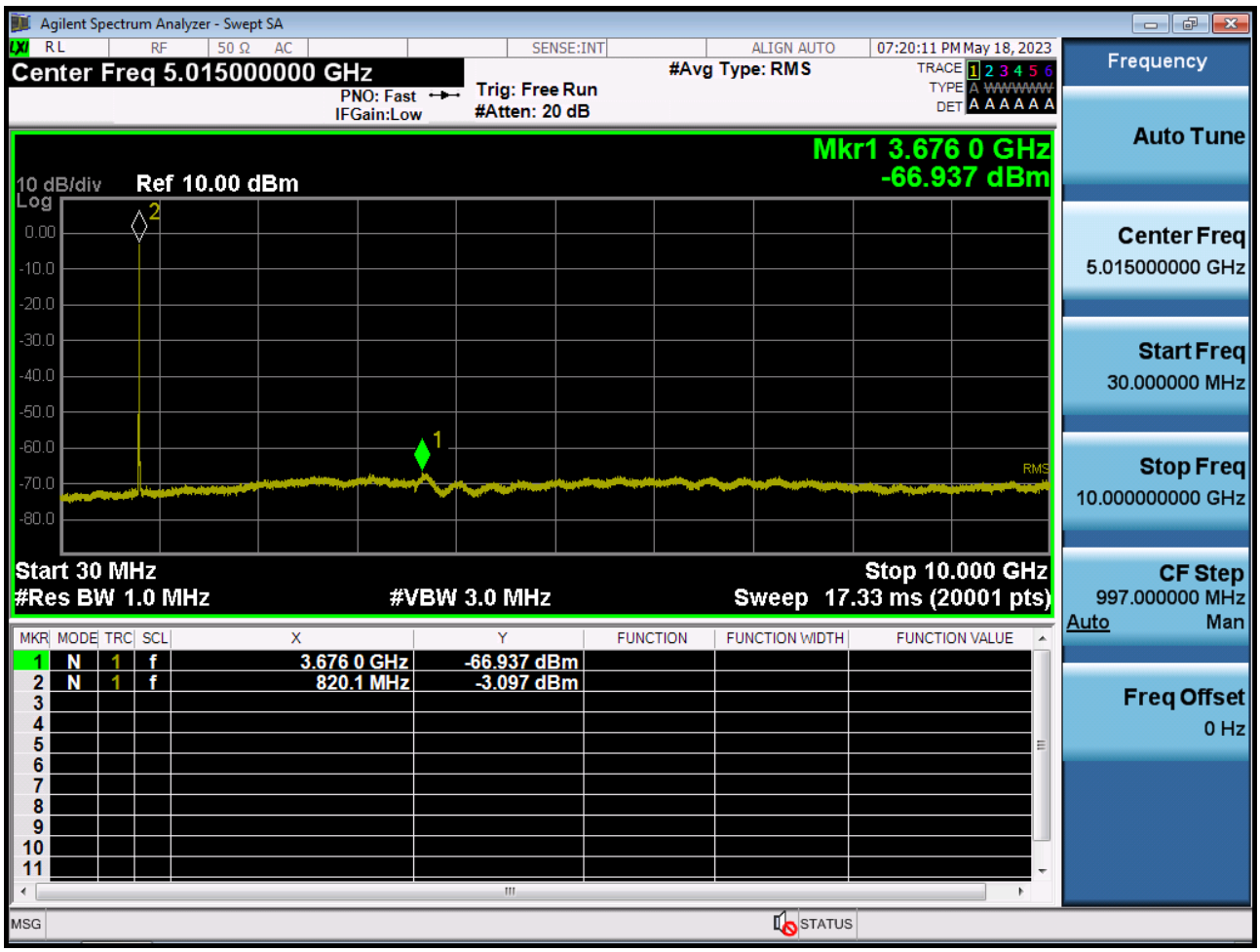
BAND 26. Conducted Spurious (3 MHz_QPSK_RB 1_0)



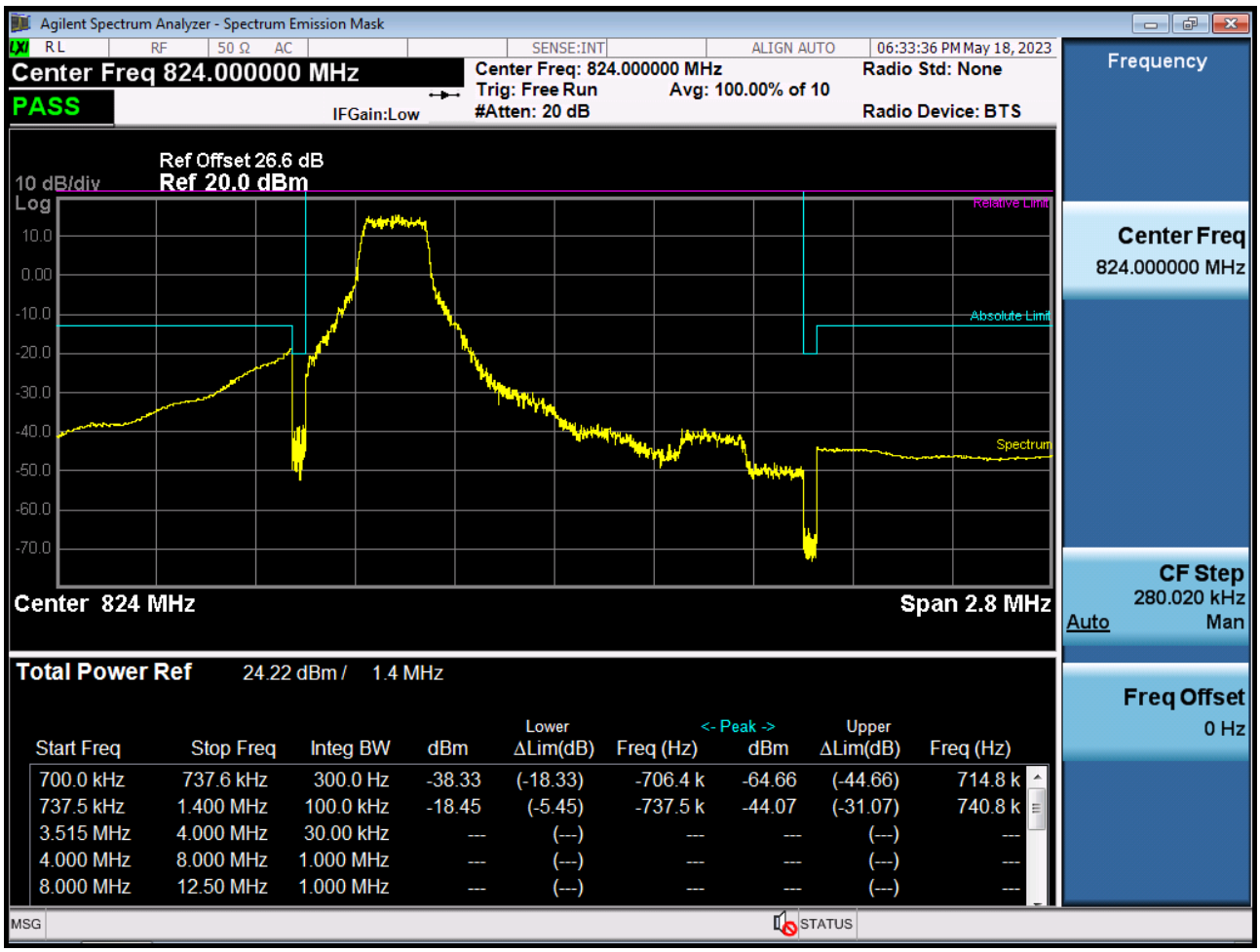
BAND 26. Conducted Spurious (5 MHz_QPSK_RB 1_0)



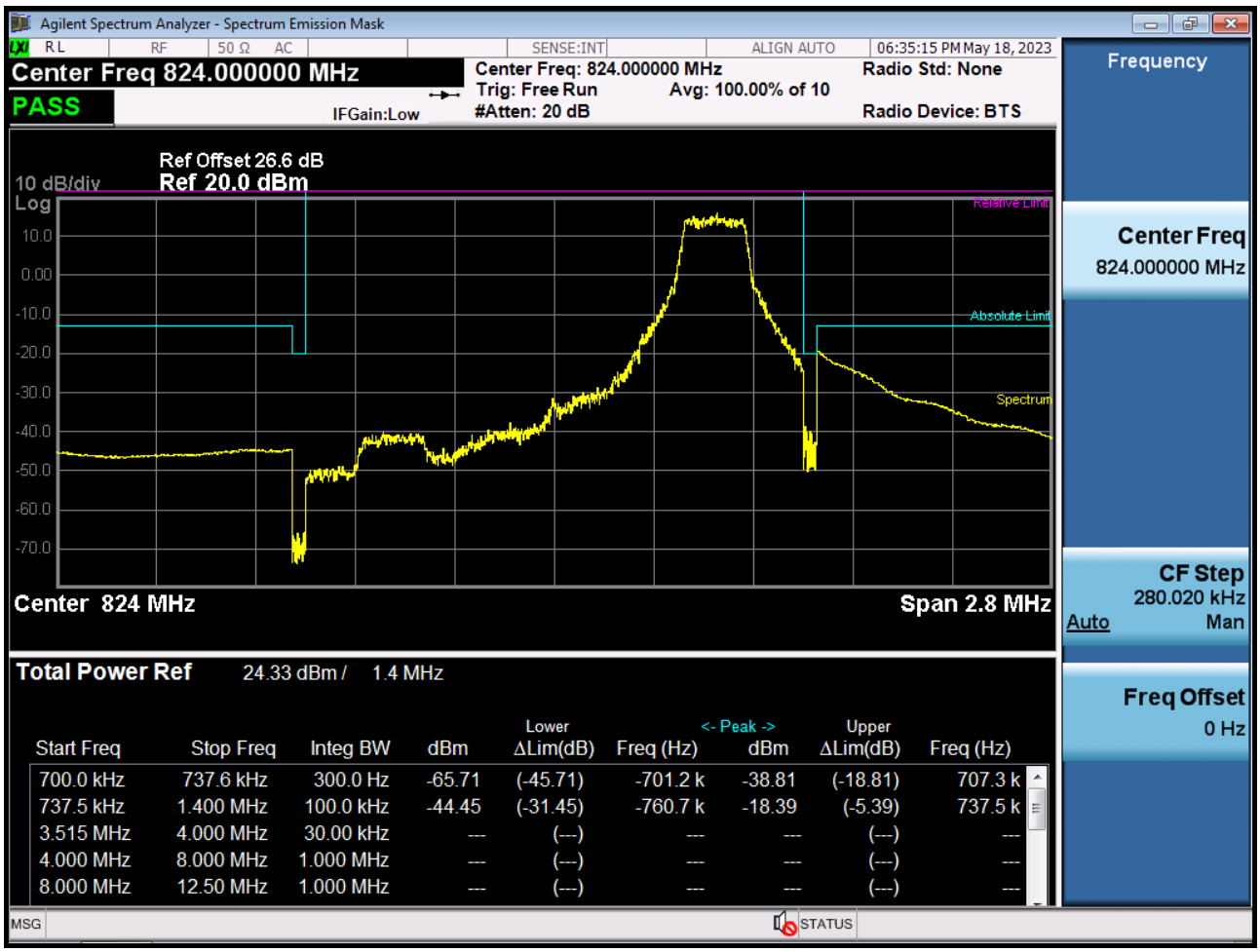
BAND 26. Conducted Spurious (10 MHz_QPSK_RB 1_0)



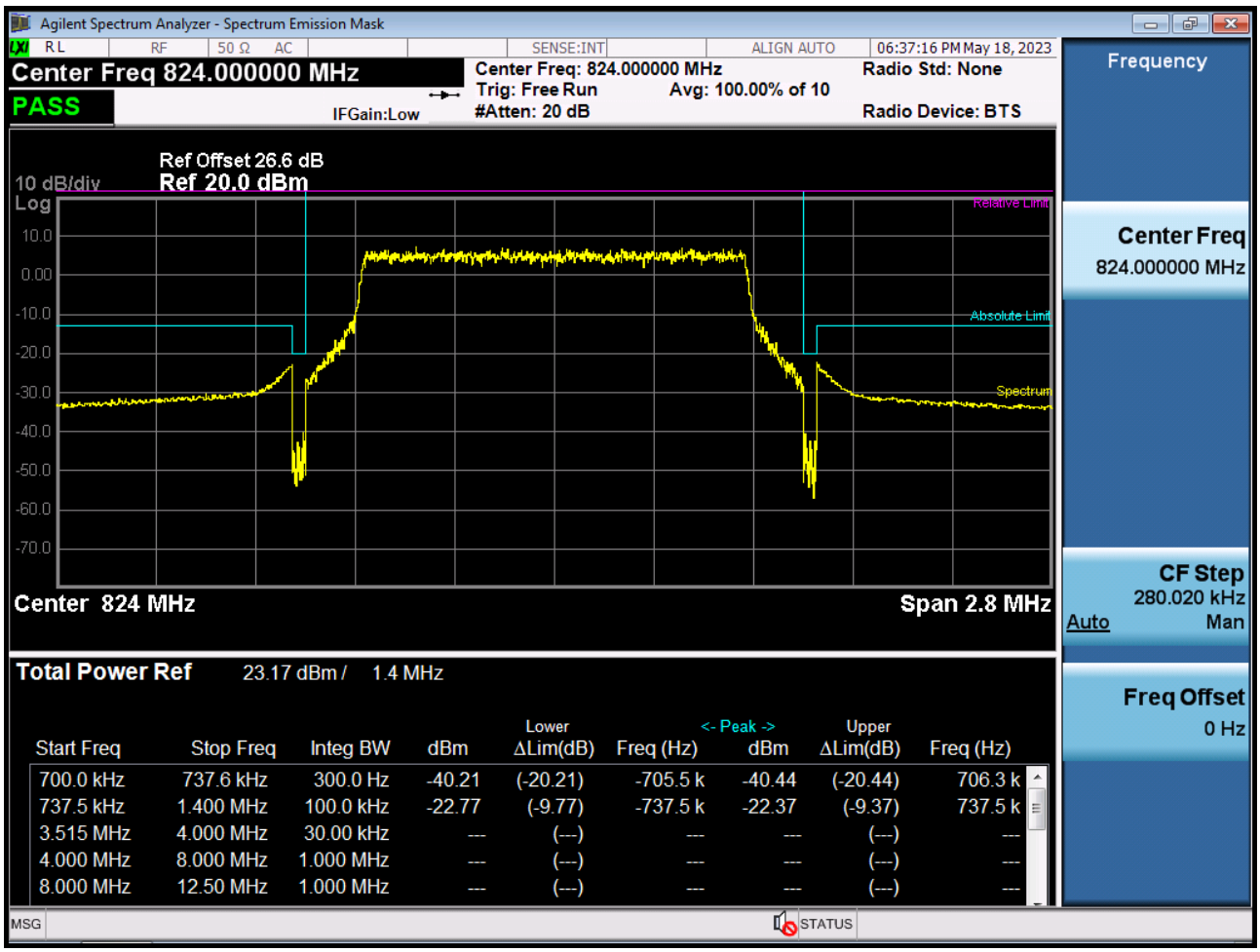
BAND 26. Channel Edge (1.4 MHz_QPSK_RB 1_0)



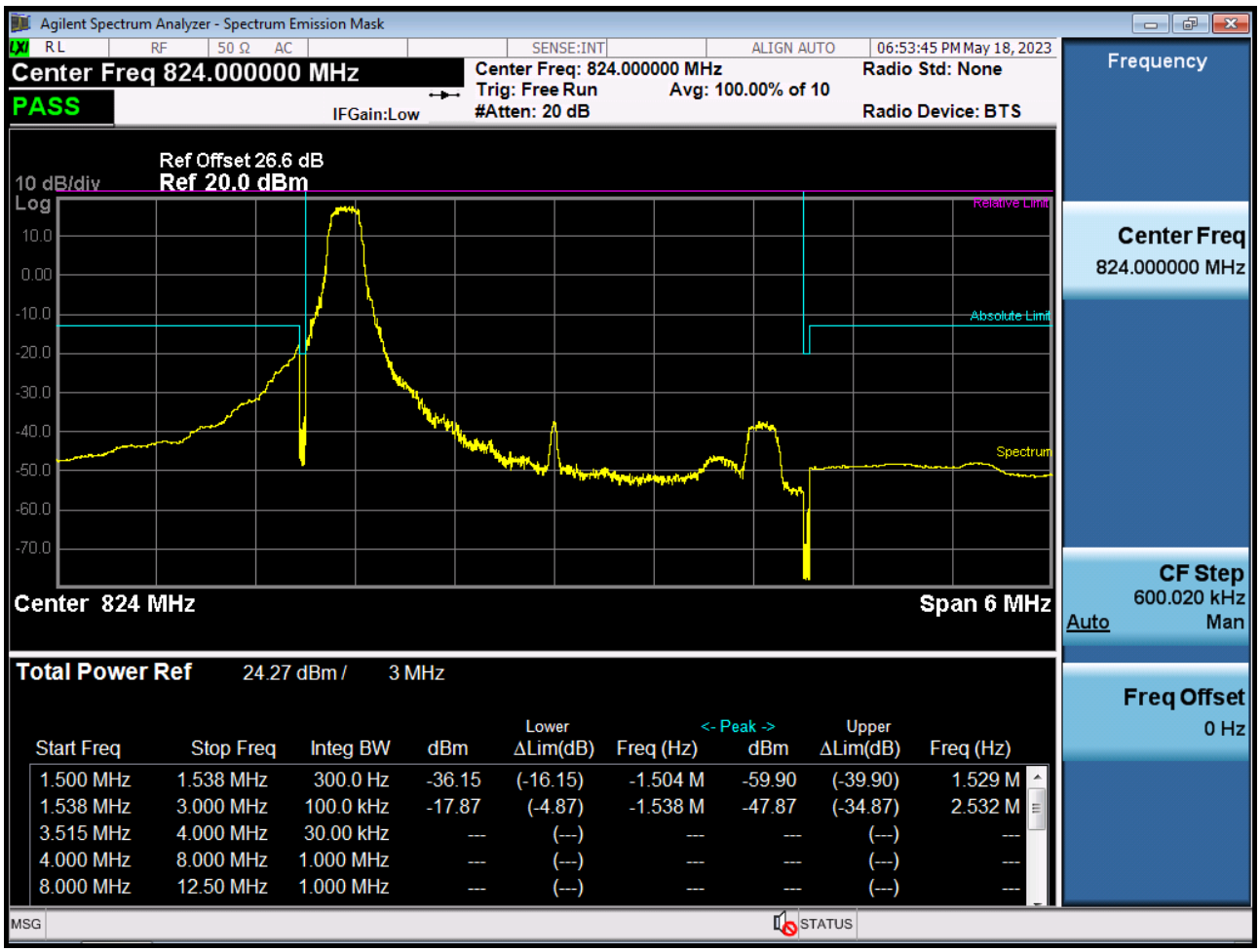
BAND 26. Channel Edge (1.4 MHz_QPSK_RB 1_5)



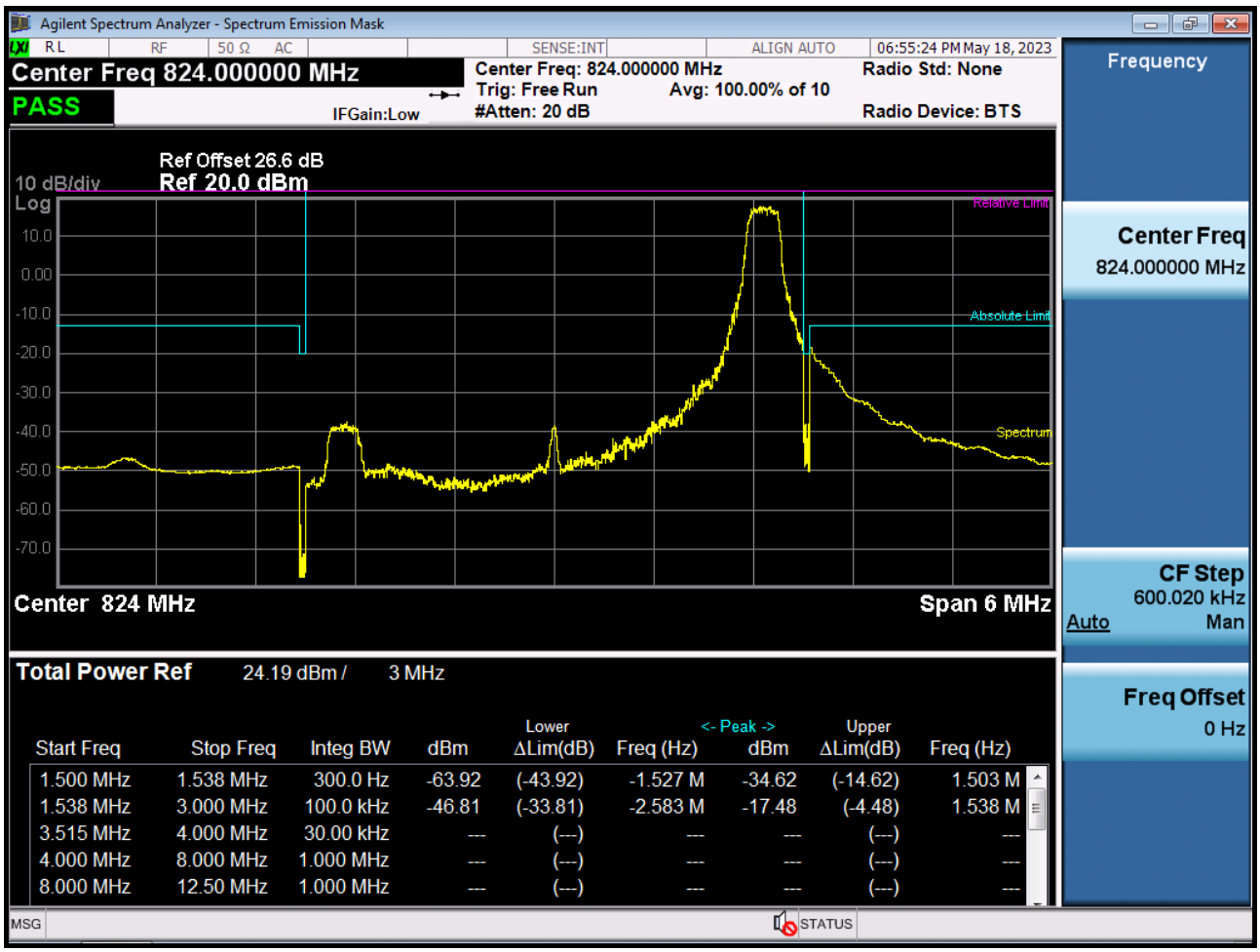
BAND 26. Channel Edge (1.4 MHz_QPSK_Full RB)



BAND 26. Channel Edge (3 MHz_QPSK_RB 1_0)

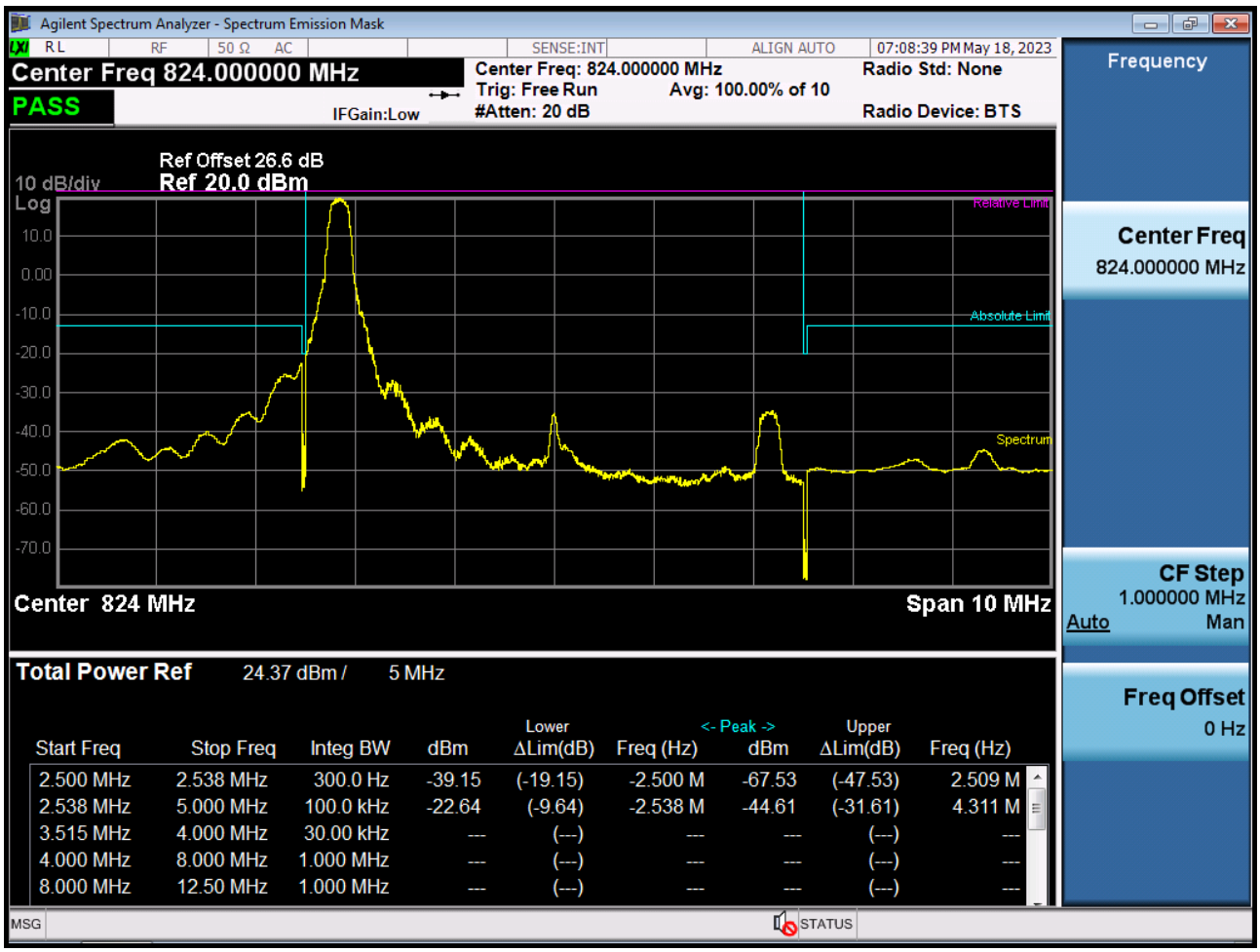


BAND 26. Channel Edge (3 MHz_QPSK_RB 1_14)

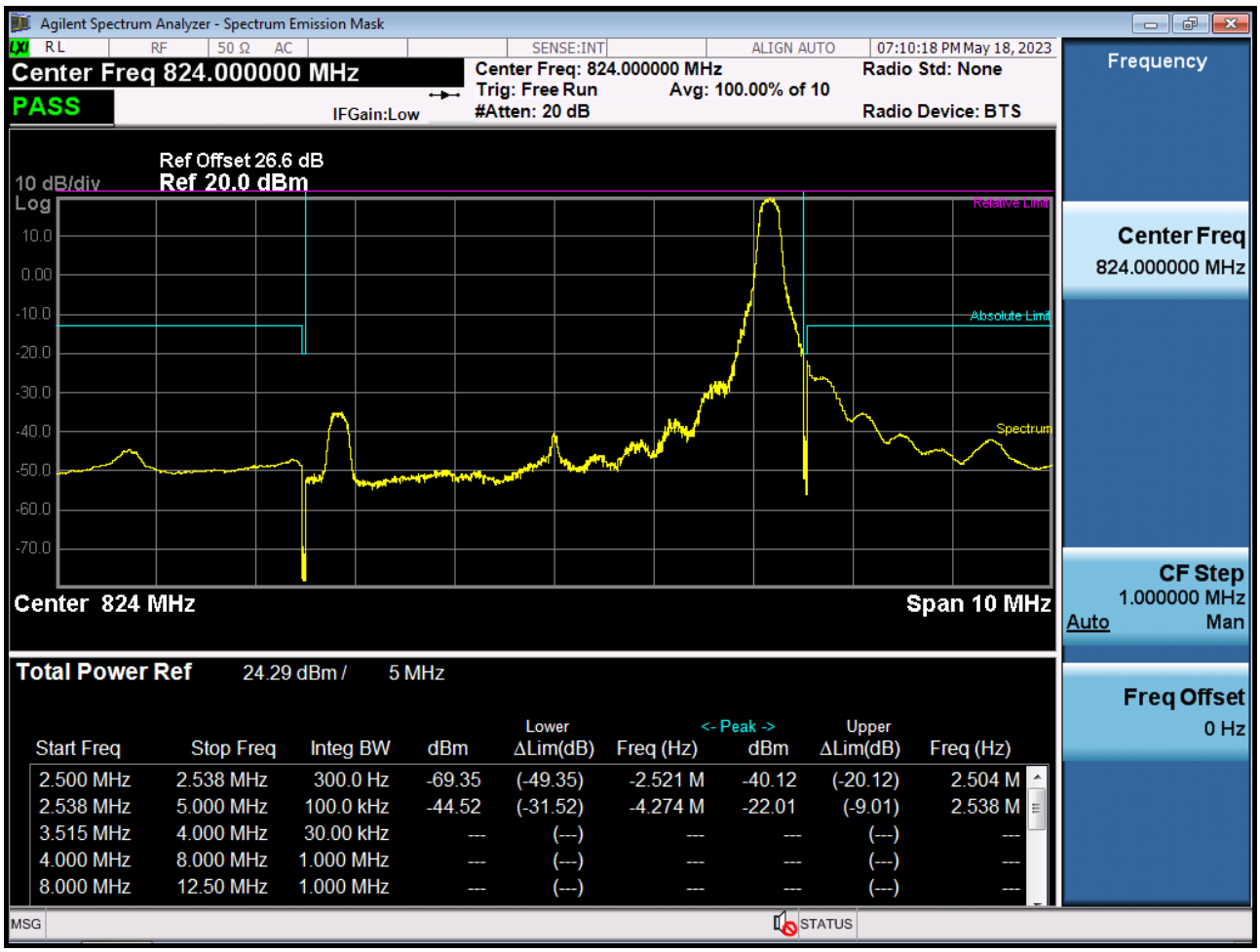


BAND 26. Channel Edge (3 MHz_QPSK_Full RB)

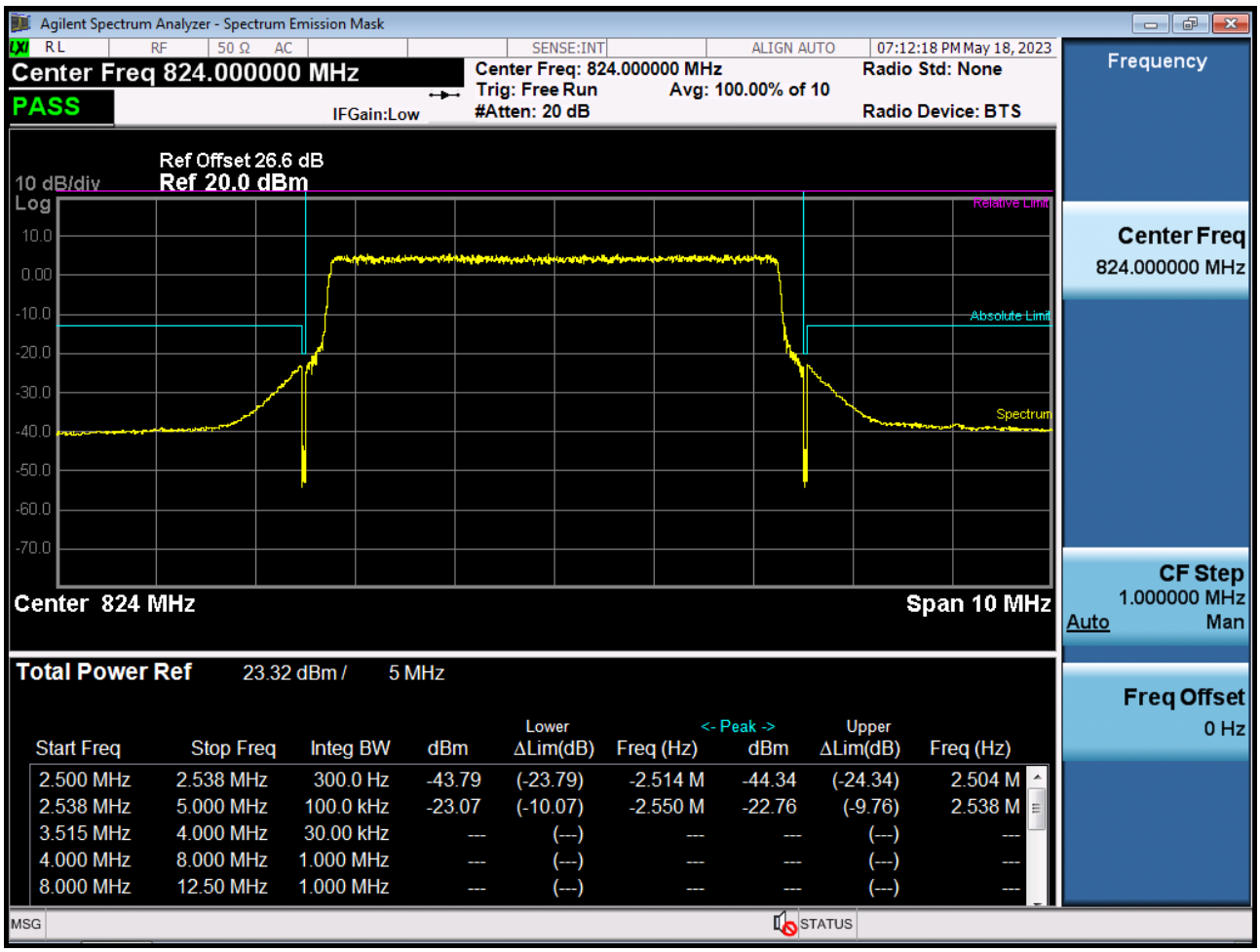
BAND 26. Channel Edge (5 MHz_QPSK_RB 1_0)



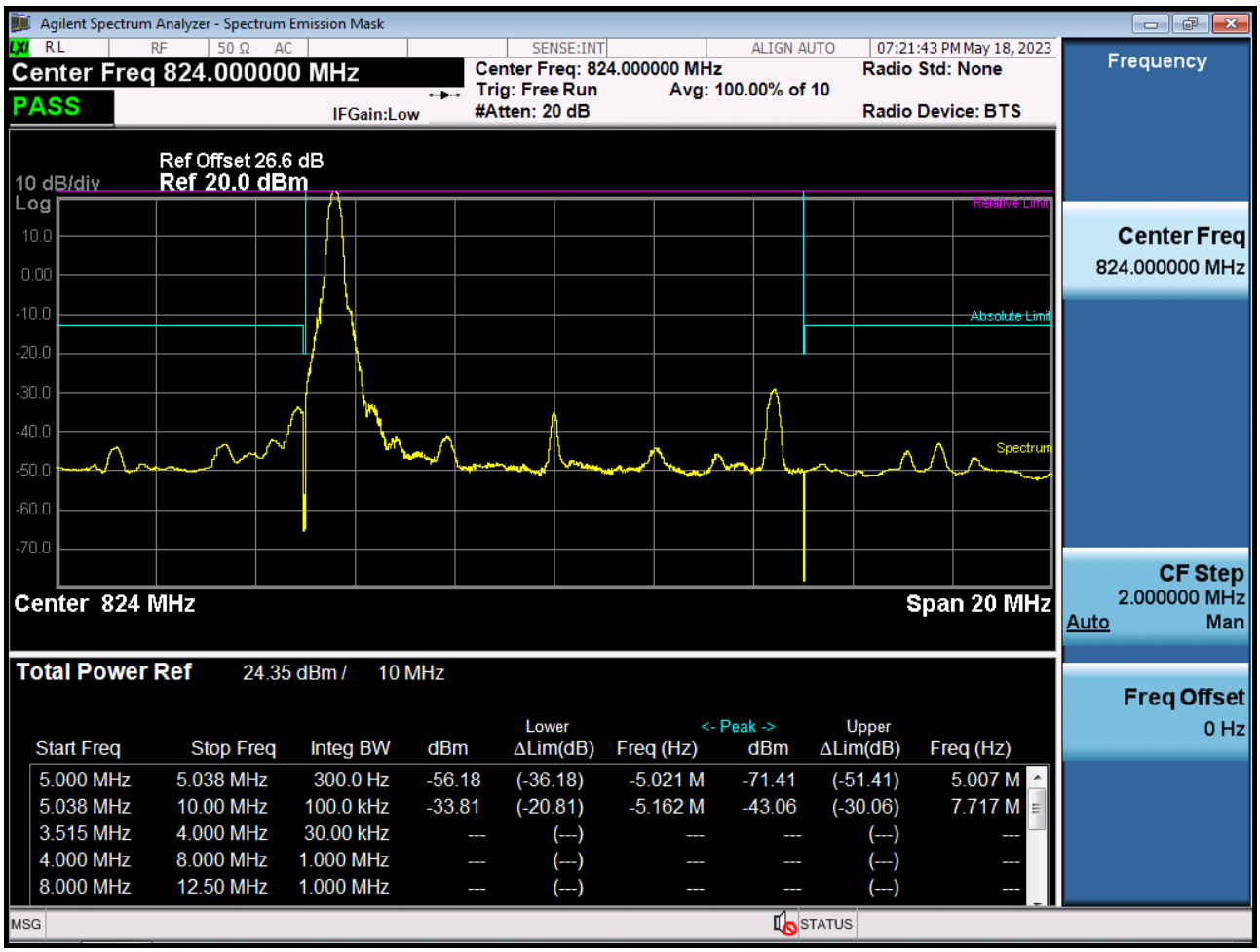
BAND 26. Channel Edge (5 MHz_QPSK_RB 1_24)



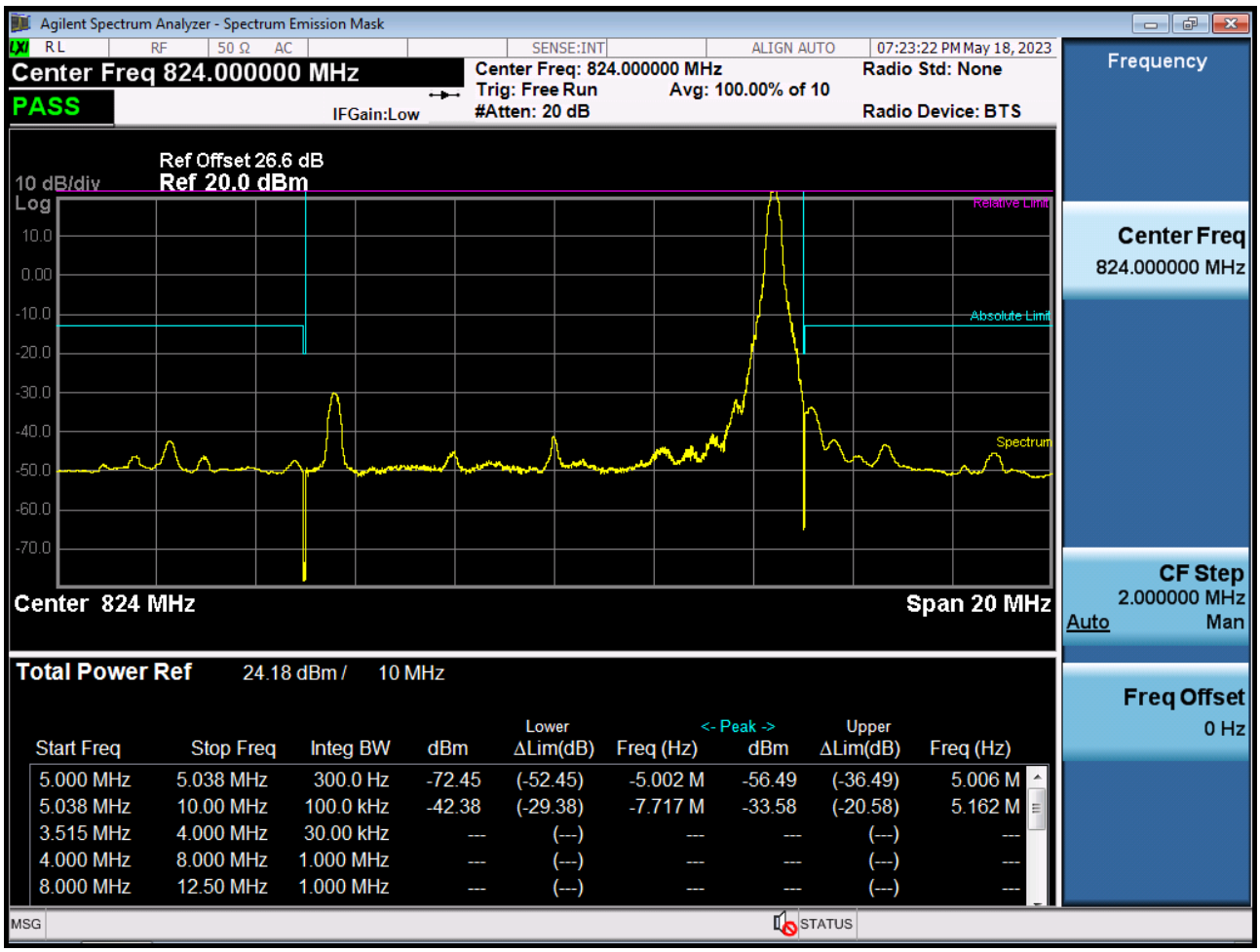
BAND 26. Channel Edge (5 MHz_QPSK_Full RB)



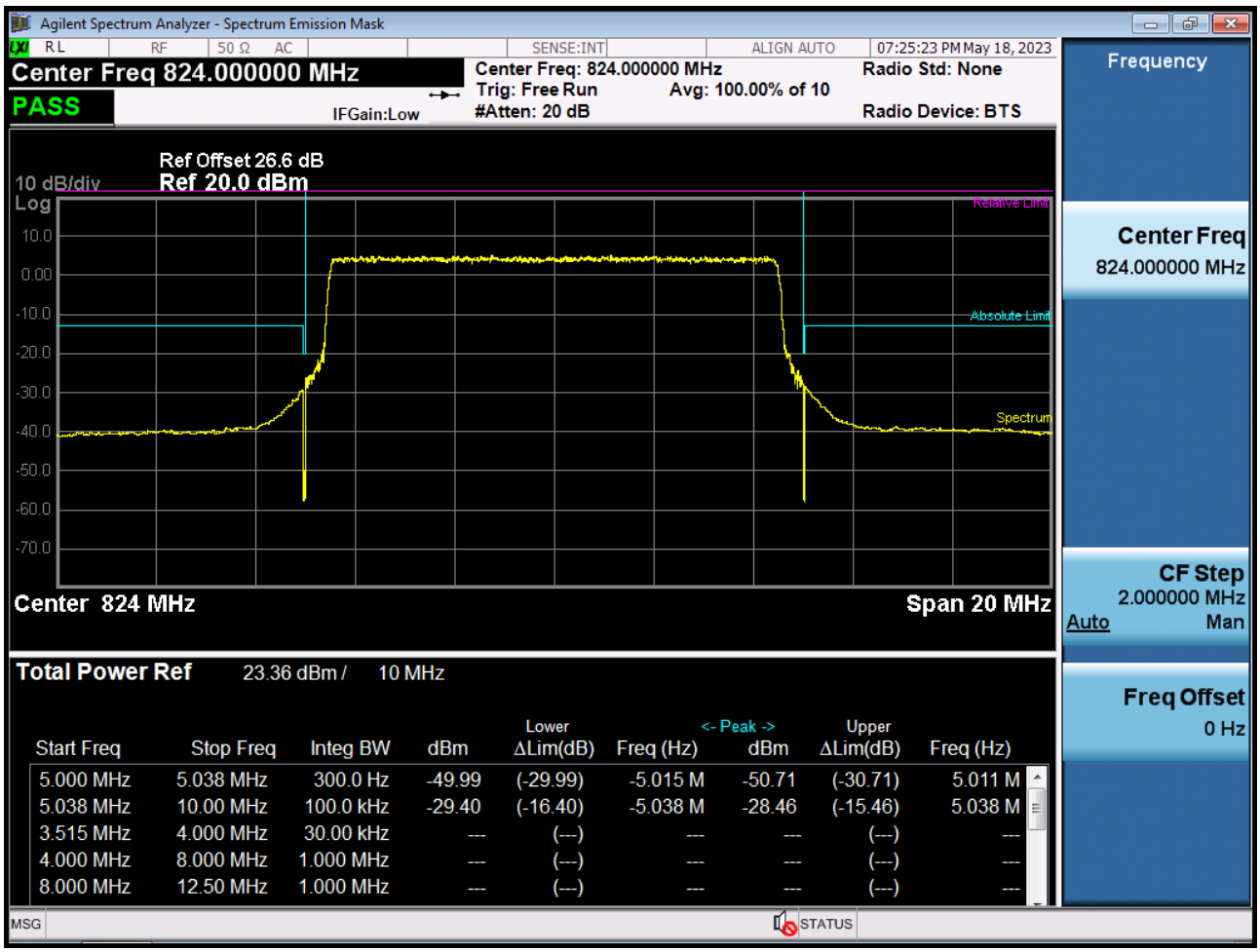
BAND 26. Channel Edge (10 MHz_QPSK_RB 1_0)



BAND 26. Channel Edge (10 MHz_QPSK_RB 1_49)



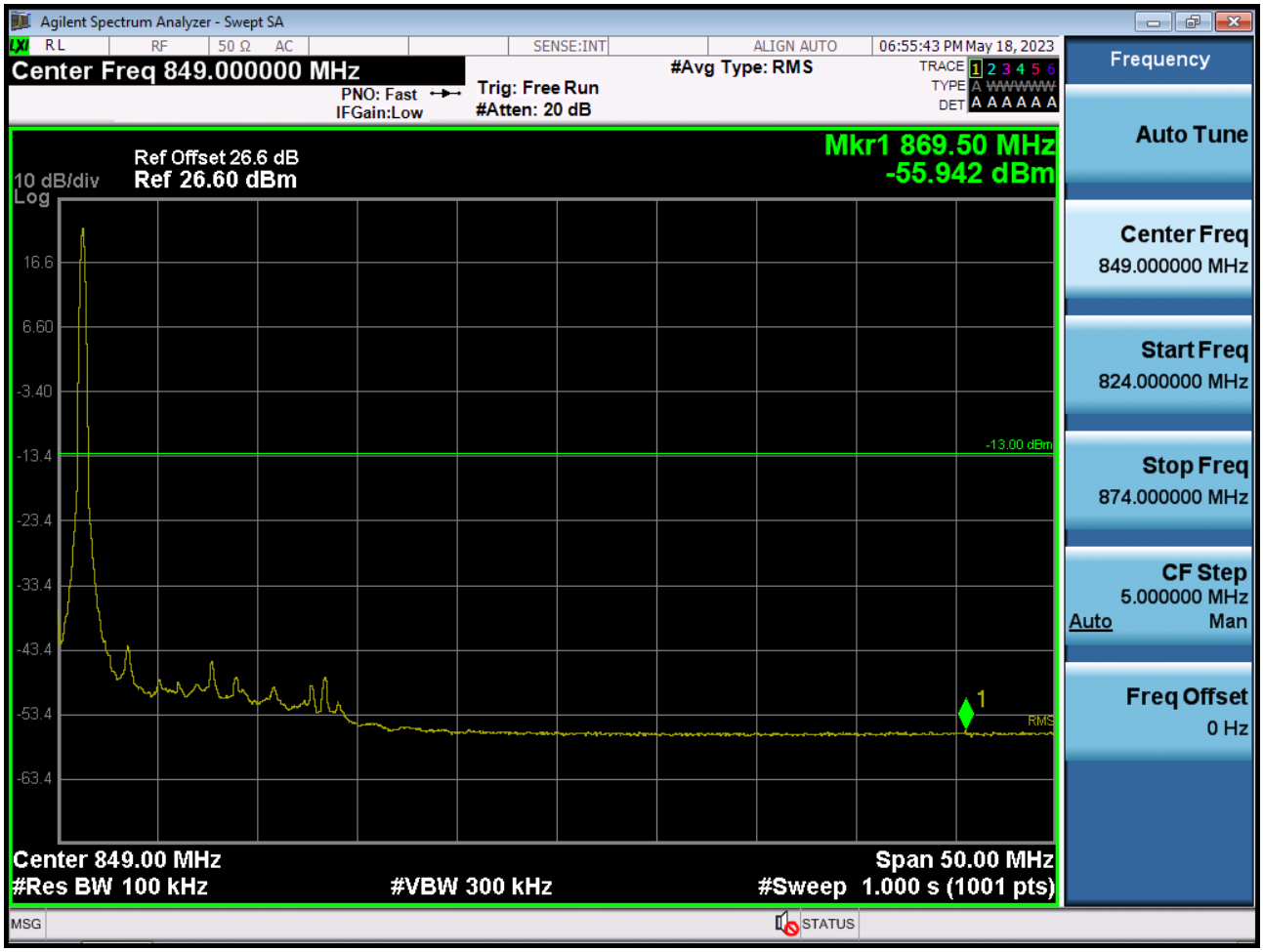
BAND 26. Channel Edge (10 MHz_QPSK_Full RB)



BAND 26. Band Edge (1.4 MHz_QPSK_RB 1_5)

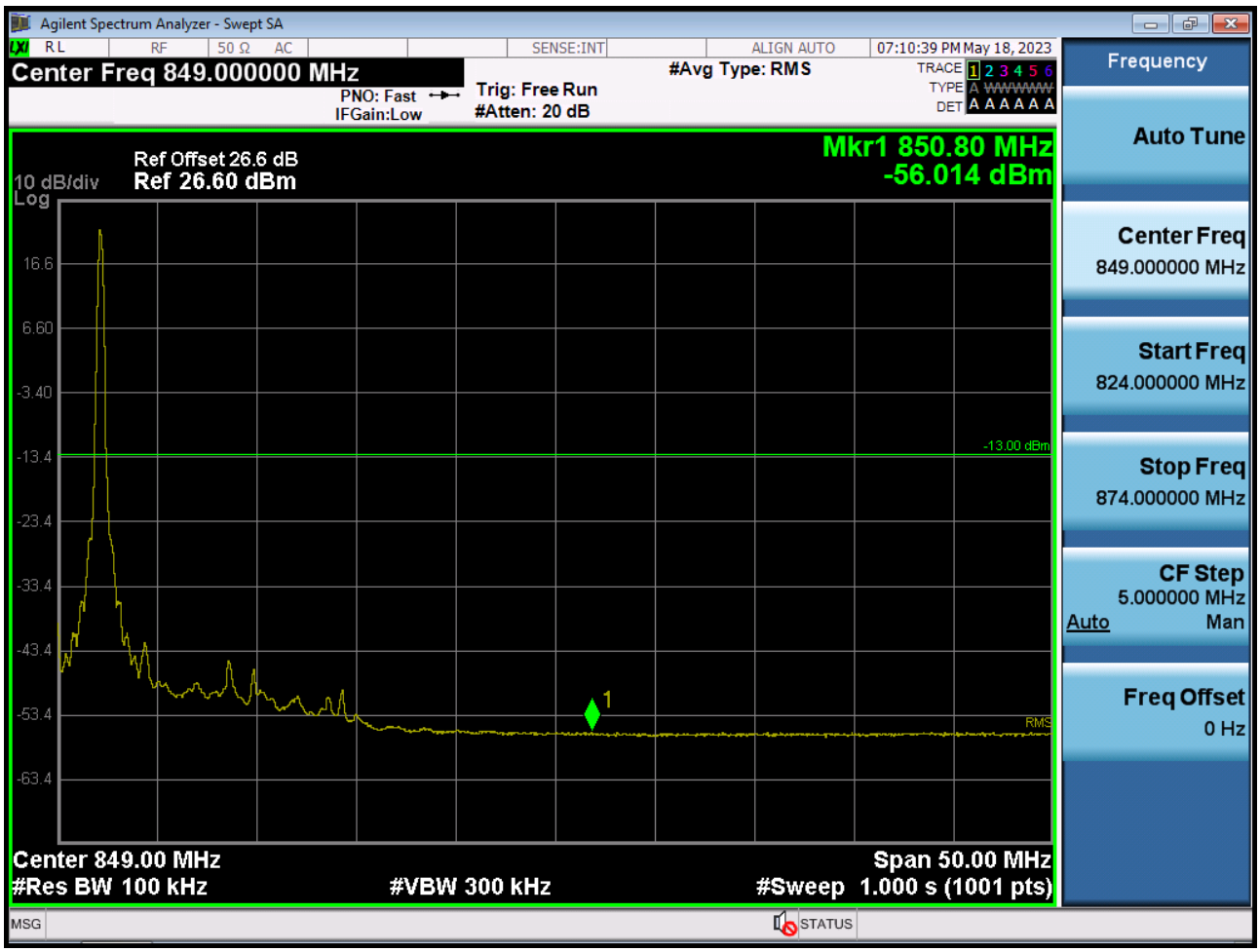
BAND 26. Band Edge (1.4 MHz_QPSK_FullRB)

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-2307-FC007-P