TEST REPORT

FCC LTE B26(Part90) Test for SM-S721U
Certification

APPLICANT
SAMSUNG Electronics Co., Ltd.

REPORT NO.
HCT-RF-2407-FC019

DATE OF ISSUE
July 19, 2024

Tested by
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Additional Model
SM-S721U1

Applicant	**SAMSUNG Electronics Co., Ltd.** 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
Product Name Model Name	Mobile Phone SM-S721U
Date of Test	May 16, 2024 ~ July 19, 2024
FCC ID	A3LSMS721U
Location of Test	■ Permanent Testing Lab ☐ On Site Testing (Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 Republic of Korea)
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
Test Standard Used	FCC Rule Part: § 90, § 22
Test Results	PASS

REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	July 19, 2024	Initial Release

Notice

Content
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)
The results shown in this test report only apply to the sample(s), as received, provided by the applicant, unless otherwise stated. The test results have only been applied with the test methods required by the standard(s).
The laboratory is not accredited for the test results marked *. Information provided by the applicant is marked **. Test results provided by external providers are marked ***.
When confirmation of authenticity of this test report is required, please contact www.hct.co.kr
The test results in this test report are not associated with the ((KS Q) ISO/IEC 17025) accreditation by KOLAS (Korea Laboratory Accreditation Scheme) / A2LA (American Association for Laboratory Accreditation) that are under the ILAC (International Laboratory Accreditation Cooperation) Mutual Recognition Agreement (MRA).

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:	A3LSMS721U
Application Type:	Certification
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part(s):	§ 90, § 22
EUT Type:	Mobile phone
Model(s):	SM-S721U
Additional Model(s)	SM-S721U1
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 16, 2024 ~ July 19, 2024
Serial number:	Radiated : 67d50ecc63197ece Conducted : R3CX40SV75R

1.1. MAXIMUM OUTPUT POWER

Mode (MHz)	Tx Frequency (MHz)	Emission Designator	Modulation	Conducted Output Power	
				Max. Power (W)	Max. Power (dBm)
LTE – Band26 (1.4)	814.7 – 824.0	1M10G7D	QPSK	0.303	24.81
		1M10W7D	16QAM	0.253	24.03
		1M10W7D	64QAM	0.199	22.98
		1M10W7D	256QAM	0.097	19.89
LTE – Band26 (3)	815.5 – 824.0	2M73G7D	QPSK	0.294	24.69
		2M73W7D	16QAM	0.248	23.95
		2M70W7D	64QAM	0.200	23.01
		2M72W7D	256QAM	0.098	19.92
LTE – Band26 (5)	816.5 – 824.0	4M54G7D	QPSK	0.308	24.88
		4M54W7D	16QAM	0.249	23.96
		4M53W7D	64QAM	0.201	23.03
		4M52W7D	256QAM	0.099	19.95
LTE – Band26 (10)	819.0 – 824.0	9M01G7D	QPSK	0.313	24.96
		9M02W7D	16QAM	0.251	24.00
		9M03W7D	64QAM	0.202	23.05
		9M01W7D	256QAM	0.098	19.93
LTE – Band26 (15)	821.5	13M5G7D	QPSK	0.318	25.03
		13M4W7D	16QAM	0.257	24.10
		13M4W7D	64QAM	0.207	23.16
		13M4W7D	256QAM	0.106	20.27

2. INTRODUCTION

2.1. DESCRIPTION OF EUT

The EUT was a Mobile Phone with GSM/GPRS/EGPRS/UMTS and LTE, Sub 6, mmWave.
It also supports IEEE 802.11 a/b/g/n/ac/ax (20/40/80/160 MHz), Bluetooth(iPA, ePA), BT LE(iPA, ePA), NFC, WPT, WIFI 6E.

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

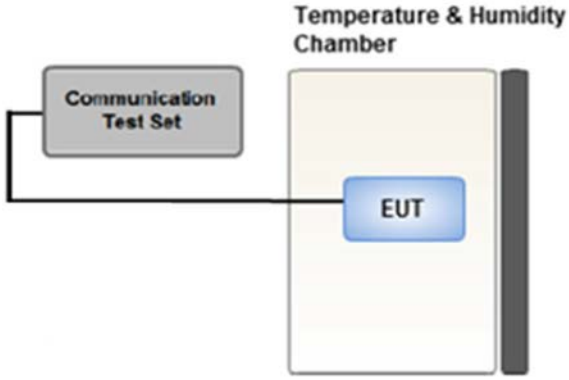
According to ANSI C63.26-2015 Section 5.2.1 when measuring the maximum RF output power from such devices, control over the EUT must be provided either through special test software (provided by manufacturer specifically for compliance testing, but not accessible by an end user) or through use of a base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

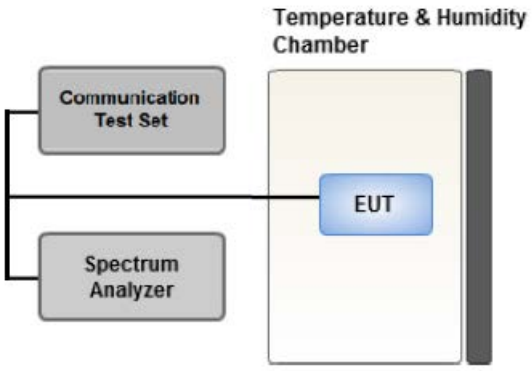
$$\text{Result}_{(dBm)} = \text{Pg}_{(dBm)} - \text{cable loss}_{(dB)} + \text{antenna gain}_{(dBi)}$$

   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.



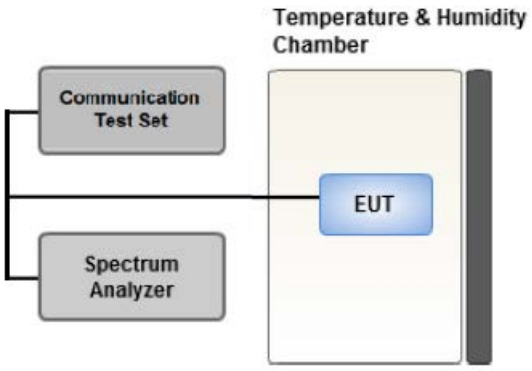
Test setup

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

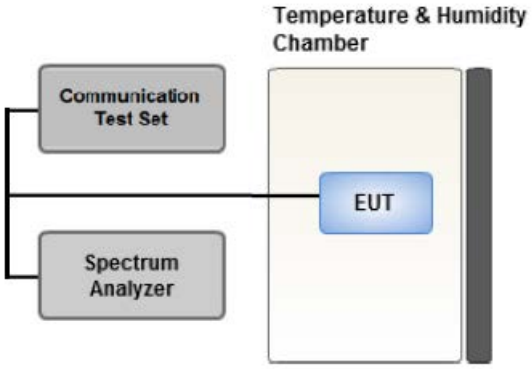
Test Overview

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

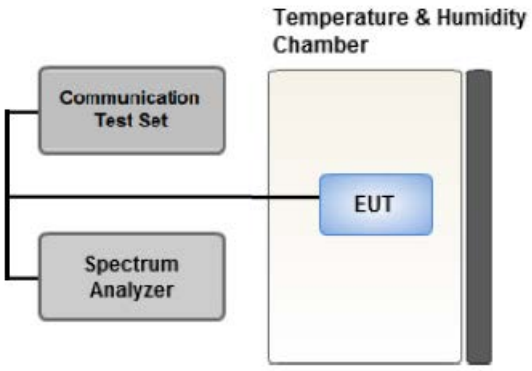
1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW :
   .- EA licensee's frequency block by up to and including 37.5 kHz : 300 Hz
   .- EA licensee's frequency 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
- All simultaneous transmission scenarios of operation were investigated, and the test results showed no additional significant emissions relative to the least restrictive limit were observed.
  Therefore, only the worst case(stand-alone) results were reported.
- In the case of radiated spurious emissions, all bandwidth of operation were investigated and the worst case bandwidth results are reported. (Worst case : 5 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.
- The EUT was tested in three modes(Open, Half-open, Closed), the worst case configuration results are reported.
  Worst case: Open mode.
- Please refer to the table below.
- SM-S721U & additional models were tested and the worst case results are reported.
  (Worst case : SM-S721U)

[Worst case]

Test Description	Modulation	RB size	RB offset	Axis
Effective Radiated Power	QPSK, 16QAM, 64QAM, 256QAM	See Section 8.1		X
Radiated Spurious and Harmonic Emissions	QPSK	See Section 8.2		X

3.10 WORST CASE(CONDUCTED TEST)

- Worst case : Of all modulation, We have tested modulation of the high Conducted Output Power.
- SM-S721U & additional models were tested and the worst case results are reported.
(Worst case : SM-S721U)

[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	Manufacture	Serial No.	Due to Calibration	Calibration Interval
Precision Dipole Antenna	UHAP	Schwarzbeck	01273	03/10/2026	Biennial
Precision Dipole Antenna	UHAP	Schwarzbeck	01274	03/10/2026	Biennial
Horn Antenna(1~18 GHz)	BBHA 9120D	Schwarzbeck	02289	02/14/2026	Biennial
Horn Antenna(1~18 GHz)	BBHA 9120D	Schwarzbeck	9120D-1299	04/27/2025	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
Loop Antenna(9 kHz~30 MHz)	FMZB1513	Rohde & Schwarz	1513-175	01/16/2025	Biennial
Bilog Antenna	VULB9160	Schwarzbeck	3150	03/09/2025	Biennial
Hybrid Antenna	VULB9160	Schwarzbeck	760	02/24/2025	Biennial
RF Switching System	FBSR-06B (1G HPF + LNA)	T&M SYSTEM	F3L1	05/14/2025	Annual
RF Switching System	FBSR-06B (3G HPF + LNA)	T&M SYSTEM	F3L2	05/14/2025	Annual
RF Switching System	FBSR-06B (6G HPF + LNA)	T&M SYSTEM	F3L3	05/14/2025	Annual
RF Switching System	FBSR-06B (LNA)	T&M SYSTEM	F3L4	05/14/2025	Annual
Power Amplifier	CBL18265035	CERNEX	22966	11/17/2024	Annual
Power Amplifier	CBL26405040	CERNEX	25956	02/26/2025	Annual
DC Power Supply	E3632A	Hewlett Packard	MY40004427	08/25/2024	Annual
Power Splitter(DC~26.5 GHz)	11667B	Hewlett Packard	11275	02/29/2025	Annual
Chamber	SU-642	ESPEC	93008124	02/19/2025	Annual
Signal Analyzer(10 Hz~26.5 GHz)	N9020A	Agilent	MY51110063	04/04/2025	Annual
ATTENUATOR(20 dB)	8493C	Hewlett Packard	17280	04/17/2025	Annual
Spectrum Analyzer(10 Hz~40 GHz)	FSV40	REOHDE & SCHWARZ	101436	02/13/2025	Annual
Base Station	8960 (E5515C)	Agilent	MY48360800	08/10/2024	Annual
Wideband Radio Communication Tester	MT8821C	Anritsu Corp.	6262287701	05/16/2025	Annual
Wideband Radio Communication Tester	MT8000A	Anritsu Corp.	6262302511	05/14/2025	Annual
Signal Analyzer(5 Hz~40.0 GHz)	N9030B	KEYSIGHT	MY55480167	05/17/2025	Annual
4-Way Divider	ZC4PD-K1844+	Mini-Circuits	942907	09/19/2024	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)	1.98 (Confidence level about 95 %, k=2)
Radiated Disturbance (9 kHz ~ 30 MHz)	4.36 (Confidence level about 95 %, k=2)
Radiated Disturbance (30 MHz ~ 1 GHz)	5.70 (Confidence level about 95 %, k=2)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.52 (Confidence level about 95 %, k=2)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.66 (Confidence level about 95 %, k=2)
Radiated Disturbance (Above 40 GHz)	5.58 (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	24.81	0.303	24.81	0.302	100
		1	3	24.59	0.288	24.58	0.287	100
		1	5	24.73	0.297	24.70	0.295	100
		3	0	24.76	0.299	24.73	0.297	100
		3	1	24.63	0.290	24.60	0.288	100
		3	3	24.76	0.299	24.73	0.297	100
		6	0	23.92	0.247	23.90	0.245	100
	16QAM	1	0	24.03	0.253	24.02	0.252	100
		1	3	23.83	0.242	23.81	0.241	100
		1	5	23.98	0.250	23.96	0.249	100
		3	0	23.76	0.238	23.74	0.236	100
		3	1	23.84	0.242	23.83	0.242	100
		3	3	23.74	0.237	23.71	0.235	100
		6	0	22.86	0.193	22.85	0.193	100
	64QAM	1	0	22.98	0.199	22.97	0.198	100
		1	3	22.88	0.194	22.86	0.193	100
		1	5	22.91	0.195	22.88	0.194	100
		3	0	22.77	0.189	22.74	0.188	100
		3	1	22.75	0.188	22.73	0.187	100
		3	3	22.77	0.189	22.75	0.189	100
		6	0	21.91	0.155	21.88	0.154	100
	256QAM	1	0	19.83	0.096	19.80	0.096	100
		1	3	19.89	0.097	19.88	0.097	100
		1	5	19.81	0.096	19.78	0.095	100
		3	0	19.84	0.096	19.81	0.096	100
		3	1	19.81	0.096	19.80	0.095	100
		3	3	19.83	0.096	19.81	0.096	100
		6	0	19.89	0.097	19.88	0.097	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	24.69	0.294	24.65	0.292	100
		1	7	24.62	0.290	24.60	0.288	100
		1	14	24.69	0.294	24.67	0.293	100
		8	0	23.80	0.240	23.79	0.239	100
		8	3	23.71	0.235	23.67	0.233	100
		8	7	23.77	0.238	23.73	0.236	100
		15	0	24.04	0.254	24.01	0.252	100
	16QAM	1	0	23.91	0.246	23.90	0.245	100
		1	7	23.94	0.248	23.93	0.247	100
		1	14	23.95	0.248	23.92	0.246	100
		8	0	22.72	0.187	22.69	0.186	100
		8	3	22.78	0.190	22.75	0.188	100
		8	7	22.77	0.189	22.76	0.189	100
		15	0	22.93	0.196	22.90	0.195	100
	64QAM	1	0	23.00	0.200	22.99	0.199	100
		1	7	23.01	0.200	23.01	0.200	100
		1	14	22.91	0.195	22.90	0.195	100
		8	0	21.78	0.151	21.75	0.149	100
		8	3	21.79	0.151	21.77	0.150	100
		8	7	21.79	0.151	21.79	0.151	100
		15	0	21.91	0.155	21.88	0.154	100
	256QAM	1	0	19.79	0.095	19.78	0.095	100
		1	7	19.79	0.095	19.78	0.095	100
		1	14	19.71	0.094	19.68	0.093	100
		8	0	19.79	0.095	19.76	0.095	100
		8	3	19.84	0.096	19.83	0.096	100
		8	7	19.92	0.098	19.90	0.098	100
		15	0	19.86	0.097	19.85	0.097	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	24.88	0.308	24.85	0.306	100
		1	12	24.42	0.277	24.42	0.276	100
		1	24	24.75	0.299	24.75	0.298	100
		12	0	23.81	0.240	23.78	0.239	100
		12	6	23.78	0.239	23.76	0.238	100
		12	11	23.80	0.240	23.78	0.239	100
		25	0	23.84	0.242	23.82	0.241	100
	16QAM	1	0	23.95	0.248	23.93	0.247	100
		1	12	23.96	0.249	23.95	0.248	100
		1	24	23.91	0.246	23.90	0.245	100
		12	0	22.86	0.193	22.85	0.193	100
		12	6	22.79	0.190	22.76	0.189	100
		12	11	22.77	0.189	22.75	0.188	100
		25	0	22.84	0.192	22.81	0.191	100
	64QAM	1	0	23.03	0.201	23.02	0.201	100
		1	12	22.91	0.195	22.88	0.194	100
		1	24	22.90	0.195	22.87	0.194	100
		12	0	21.78	0.151	21.76	0.150	100
		12	6	21.79	0.151	21.77	0.150	100
		12	11	21.76	0.150	21.75	0.149	100
		25	0	21.77	0.150	21.73	0.149	100
	256QAM	1	0	19.83	0.096	19.83	0.096	100
		1	12	19.55	0.090	19.53	0.090	100
		1	24	19.81	0.096	19.79	0.095	100
		12	0	19.85	0.097	19.83	0.096	100
		12	6	19.95	0.099	19.94	0.099	100
		12	11	19.83	0.096	19.79	0.095	100
		25	0	19.89	0.097	19.87	0.097	100

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm)		Limit (W)
				819 MHz		
				dBm	W	
10	QPSK	1	0	24.85	0.305	100
		1	24	24.96	0.314	100
		1	49	24.82	0.303	100
		25	0	23.98	0.250	100
		25	12	23.94	0.247	100
		25	24	23.92	0.246	100
		50	0	23.94	0.248	100
	16QAM	1	0	24.00	0.251	100
		1	24	23.97	0.250	100
		1	49	23.92	0.246	100
		25	0	22.90	0.195	100
		25	12	22.87	0.194	100
		25	24	22.86	0.193	100
		50	0	22.89	0.194	100
	64QAM	1	0	22.90	0.195	100
		1	24	23.05	0.202	100
		1	49	22.95	0.197	100
		25	0	21.91	0.155	100
		25	12	21.88	0.154	100
		25	24	21.89	0.155	100
		50	0	21.87	0.154	100
	256QAM	1	0	19.78	0.095	100
		1	24	19.83	0.096	100
		1	49	19.70	0.093	100
		25	0	19.83	0.096	100
		25	12	19.93	0.098	100
		25	24	19.75	0.094	100
		50	0	19.75	0.094	100

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm) 821.5 MHz		Limit (W)
				dBm	W	
15	QPSK	1	0	25.03	0.318	100
		1	36	24.60	0.288	100
		1	74	24.79	0.301	100
		36	0	23.99	0.250	100
		36	18	23.90	0.245	100
		36	39	23.89	0.245	100
		75	0	23.91	0.246	100
	16QAM	1	0	24.10	0.257	100
		1	36	23.91	0.246	100
		1	74	23.92	0.247	100
		36	0	22.96	0.198	100
		36	18	22.90	0.195	100
		36	39	22.84	0.192	100
		75	0	22.87	0.194	100
	64QAM	1	0	23.16	0.207	100
		1	36	22.90	0.195	100
		1	74	22.91	0.195	100
		36	0	21.94	0.156	100
		36	18	21.93	0.156	100
		36	39	21.88	0.154	100
		75	0	21.91	0.155	100
	256QAM	1	0	20.27	0.106	100
		1	36	20.05	0.101	100
		1	74	20.03	0.101	100
		36	0	20.20	0.105	100
		36	18	20.24	0.106	100
		36	39	20.06	0.101	100
		75	0	20.06	0.101	100

8.2 EFFECTIVE RADIATED POWER

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBd)	C.L	Pol	Limit	ERP		RB	
								W	W	dBm	Size	Offset
814.7	LTE B26/ 1.4 MHz	QPSK	-31.10	29.74	-10.05	1.38	H	< 100	0.068	18.31	1	5
		16QAM	-31.90	28.94	-10.05	1.38	H		0.056	17.51		
		64QAM	-32.90	27.94	-10.05	1.38	H		0.045	16.51		
		256QAM	-35.88	24.96	-10.05	1.38	H		0.023	13.53		
823.3		QPSK	-30.66	30.24	-10.05	1.38	H		0.076	18.81	1	0
		16QAM	-31.39	29.51	-10.05	1.38	H		0.064	18.08		
		64QAM	-32.47	28.43	-10.05	1.38	H		0.050	17.00		
		256QAM	-35.45	25.45	-10.05	1.38	H		0.025	14.02		

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBd)	C.L	Pol	Limit	ERP		RB	
								W	W	dBm	Size	Offset
815.5	LTE B26/ 3 MHz	QPSK	-30.94	29.87	-10.05	1.38	H	< 100	0.070	18.44	1	14
		16QAM	-31.68	29.13	-10.05	1.38	H		0.059	17.70		
		64QAM	-32.66	28.15	-10.05	1.38	H		0.047	16.72		
		256QAM	-35.67	25.14	-10.05	1.38	H		0.024	13.71		
822.5		QPSK	-30.48	30.42	-10.05	1.38	H		0.079	18.99	1	14
		16QAM	-31.35	29.55	-10.05	1.38	H		0.065	18.12		
		64QAM	-32.33	28.57	-10.05	1.38	H		0.052	17.14		
		256QAM	-35.33	25.57	-10.05	1.38	H		0.026	14.14		

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBd)	C.L	Pol	Limit	ERP		RB	
								W	W	dBm	Size	Offset
816.5	LTE B26/ 5 MHz	QPSK	-30.75	29.99	-10.05	1.38	H	< 100	0.072	18.56	1	24
		16QAM	-31.54	29.20	-10.05	1.38	H		0.060	17.77		
		64QAM	-32.53	28.21	-10.05	1.38	H		0.048	16.78		
		256QAM	-35.50	25.24	-10.05	1.38	H		0.024	13.81		
821.5		QPSK	-30.48	30.44	-10.05	1.38	H		0.080	19.01	1	24
		16QAM	-31.35	29.57	-10.05	1.38	H		0.065	18.14		
		64QAM	-32.36	28.56	-10.05	1.38	H		0.052	17.13		
		256QAM	-35.37	25.55	-10.05	1.38	H		0.026	14.12		

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBd)	C.L	Pol	Limit	ERP		RB	
								W	W	dBm	Size	Offset
819.0	LTE B26/ 10 MHz	QPSK	-30.49	30.25	-10.05	1.38	H	< 100	0.076	18.82	1	49
		16QAM	-31.30	29.44	-10.05	1.38	H		0.063	18.01		
		64QAM	-32.38	28.36	-10.05	1.38	H		0.049	16.93		
		256QAM	-35.24	25.50	-10.05	1.38	H		0.026	14.07		

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBd)	C.L	Pol	Limit	ERP		RB	
								W	W	dBm	Size	Offset
821.5	LTE B26/ 15 MHz	QPSK	-30.40	30.52	-10.05	1.38	H	< 100	0.081	19.09	1	74
		16QAM	-31.28	29.64	-10.05	1.38	H		0.066	18.21		
		64QAM	-32.30	28.62	-10.05	1.38	H		0.052	17.19		
		256QAM	-35.22	25.70	-10.05	1.38	H		0.027	14.27		

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	Size	
									Size	Offset
26715 (816.5)	1 633.00	-58.42	8.70	-66.34	1.93	V	-59.57	-13.00	1	24
	2 449.50	-59.83	10.20	-64.45	2.52	V	-56.77	-13.00		
	3 266.00	-58.75	10.60	-60.44	2.86	V	-52.70	-13.00		
26765 (821.5)	1 643.00	-56.38	8.70	-65.00	1.97	V	-58.27	-13.00	1	24
	2 464.50	-57.75	10.20	-62.12	2.51	V	-54.43	-13.00		
	3 286.00	-59.59	10.60	-62.03	2.89	V	-54.32	-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	1.1007
			16QAM			1.0985
			64QAM			1.0975
			256QAM			1.0957
	3 MHz	822.5	QPSK	15		2.7265
			16QAM			2.7300
			64QAM			2.7044
			256QAM			2.7232
	5 MHz	821.5	QPSK	25		4.5374
			16QAM			4.5433
			64QAM			4.5291
			256QAM			4.5203
	10 MHz	819.0	QPSK	50		9.0096
			16QAM			9.0180
			64QAM			9.0275
			256QAM			9.0070
	15 MHz	821.5	QPSK	75		13.459
			16QAM			13.441
			64QAM			13.436
			256QAM			13.435

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 46 ~ 65.

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	3.7099	27.976	-67.123	-39.147	-13.00
		823.3	3.6915	27.976	-67.193	-39.217	
	3	815.5	3.6970	27.976	-67.395	-39.419	
		822.5	3.1835	27.976	-67.262	-39.286	
	5	816.5	3.6995	27.976	-66.869	-38.893	
		821.5	3.6735	27.976	-67.204	-39.228	
	10	819.0	3.6975	27.976	-67.473	-39.497	
	15	821.5	3.6750	27.976	-67.030	-39.054	

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 86 ~ 93.
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 66 ~ 85.

8.7 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

▣ MODE: LTE 26

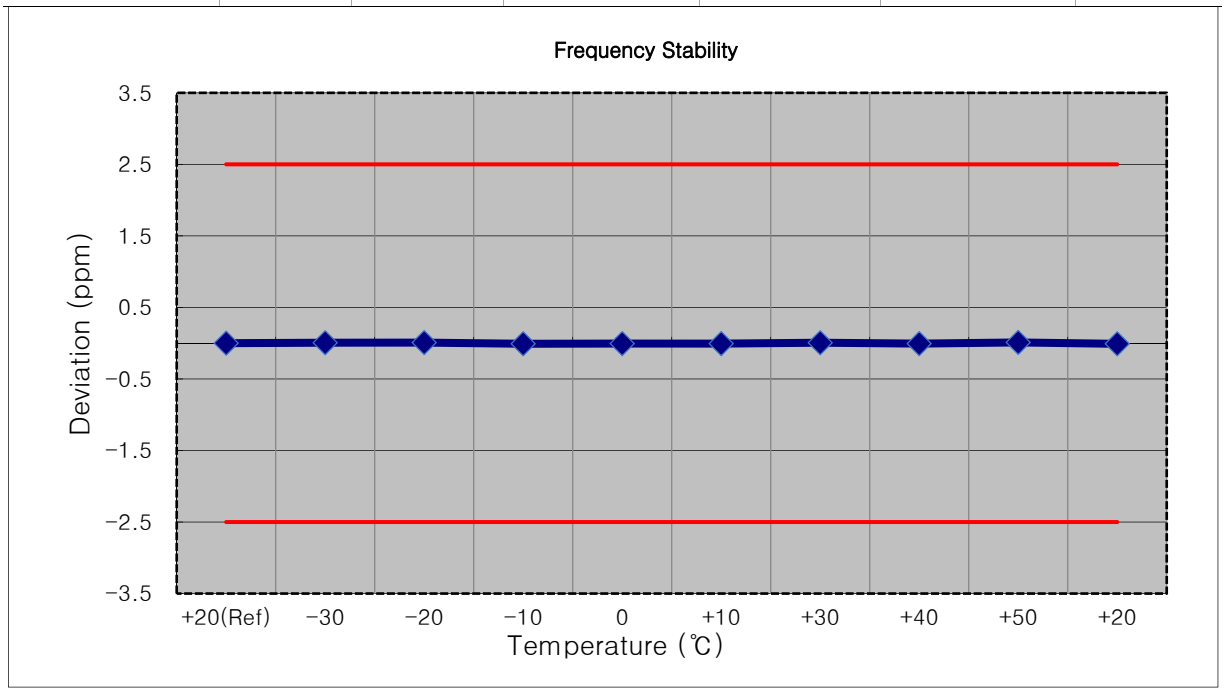
▣ OPERATING FREQUENCY: 814,700,000 Hz

▣ CHANNEL: 26697(1.4 MHz)

▣ REFERENCE VOLTAGE: 3.880 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage	Power	Temp.	Frequency	Frequency	Deviation	ppm
(%)	(VDC)	(℃)	(Hz)	Error (Hz)	(%)	
100 %	3.880	+20(Ref)	814 699 996	0.0	0.000 000	0.000
100 %		-30	814 700 002	5.2	0.000 001	0.006
100 %		-20	814 700 003	6.7	0.000 001	0.008
100 %		-10	814 699 990	-6.6	-0.000 001	-0.008
100 %		0	814 699 992	-4.6	-0.000 001	-0.006
100 %		+10	814 699 992	-4.9	-0.000 001	-0.006
100 %		+30	814 700 002	5.2	0.000 001	0.006
100 %		+40	814 699 991	-5.1	-0.000 001	-0.006
100 %		+50	814 700 005	8.6	0.000 001	0.011
Batt. Endpoint	3.300	+20	814 699 989	-7.4	-0.000 001	-0.009



▣ MODE: LTE 26

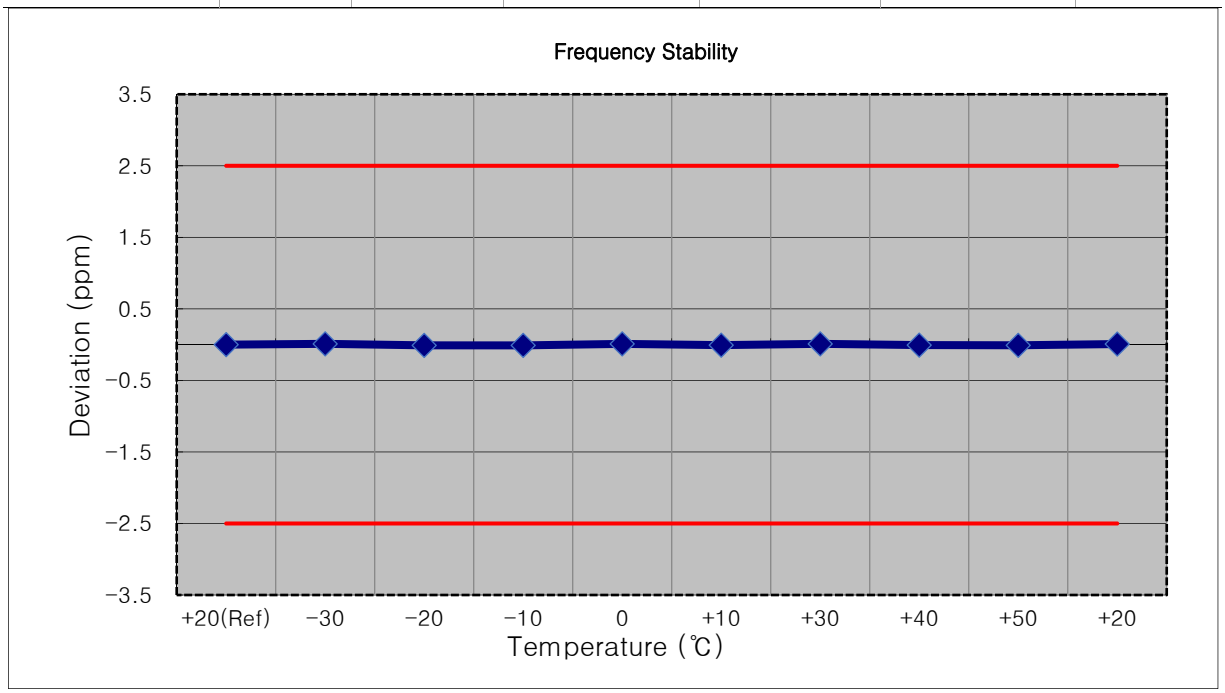
▣ OPERATING FREQUENCY: 815,500,000 Hz

▣ CHANNEL: 26705(3 MHz)

▣ REFERENCE VOLTAGE: 3.880 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage	Power	Temp.	Frequency	Frequency	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	
100 %	3.880	+20(Ref)	815 500 009	0.0	0.000 000	0.000
100 %		-30	815 500 018	9.0	0.000 001	0.011
100 %		-20	815 500 001	-8.1	-0.000 001	-0.010
100 %		-10	815 500 001	-8.5	-0.000 001	-0.010
100 %		0	815 500 018	8.7	0.000 001	0.011
100 %		+10	815 500 003	-5.7	-0.000 001	-0.007
100 %		+30	815 500 018	9.0	0.000 001	0.011
100 %		+40	815 500 004	-5.0	-0.000 001	-0.006
100 %		+50	815 500 002	-7.5	-0.000 001	-0.009
Batt. Endpoint	3.300	+20	815 500 016	6.7	0.000 001	0.008



▣ MODE: LTE 26

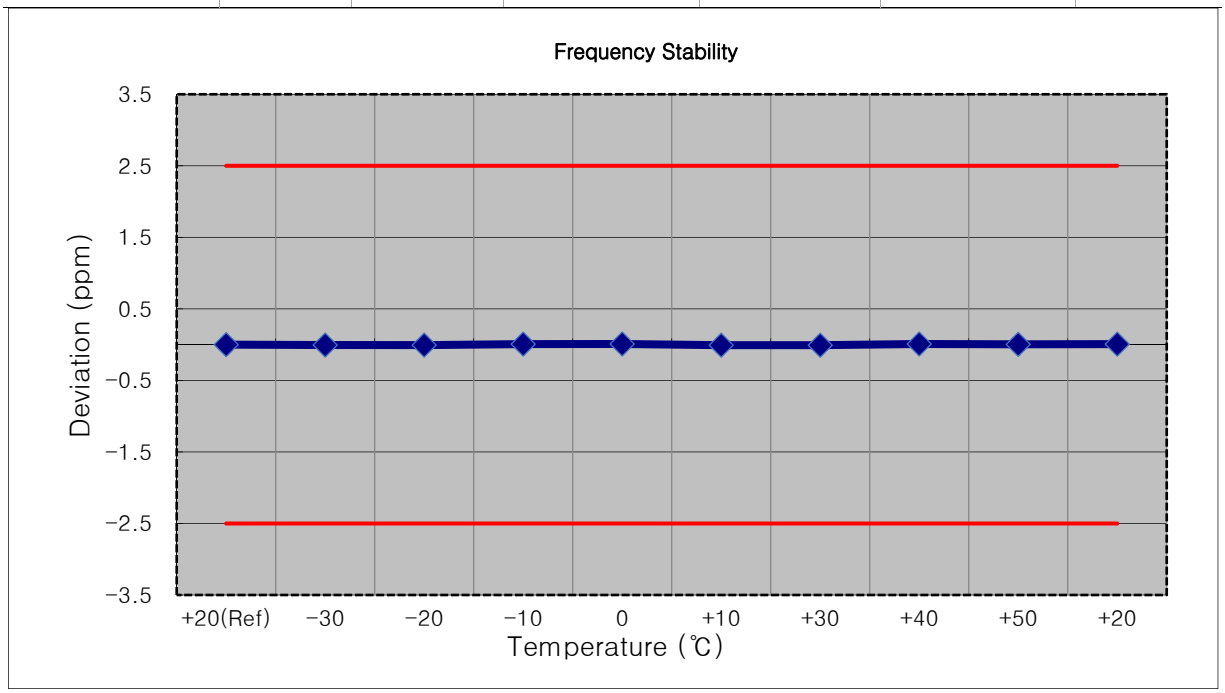
▣ OPERATING FREQUENCY: 816,500,000 Hz

▣ CHANNEL: 26715(5 MHz)

▣ REFERENCE VOLTAGE: 3.880 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage	Power	Temp.	Frequency	Frequency	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	
100 %	3.880	+20(Ref)	816 500 004	0.0	0.000 000	0.000
100 %		-30	816 499 999	-4.5	-0.000 001	-0.006
100 %		-20	816 499 998	-5.4	-0.000 001	-0.007
100 %		-10	816 500 010	6.3	0.000 001	0.008
100 %		0	816 500 011	7.3	0.000 001	0.009
100 %		+10	816 499 998	-6.2	-0.000 001	-0.008
100 %		+30	816 499 998	-6.3	-0.000 001	-0.008
100 %		+40	816 500 011	7.3	0.000 001	0.009
100 %		+50	816 500 007	3.4	0.000 000	0.004
Batt. Endpoint	3.300	+20	816 500 010	5.9	0.000 001	0.007



▣ MODE: LTE 26

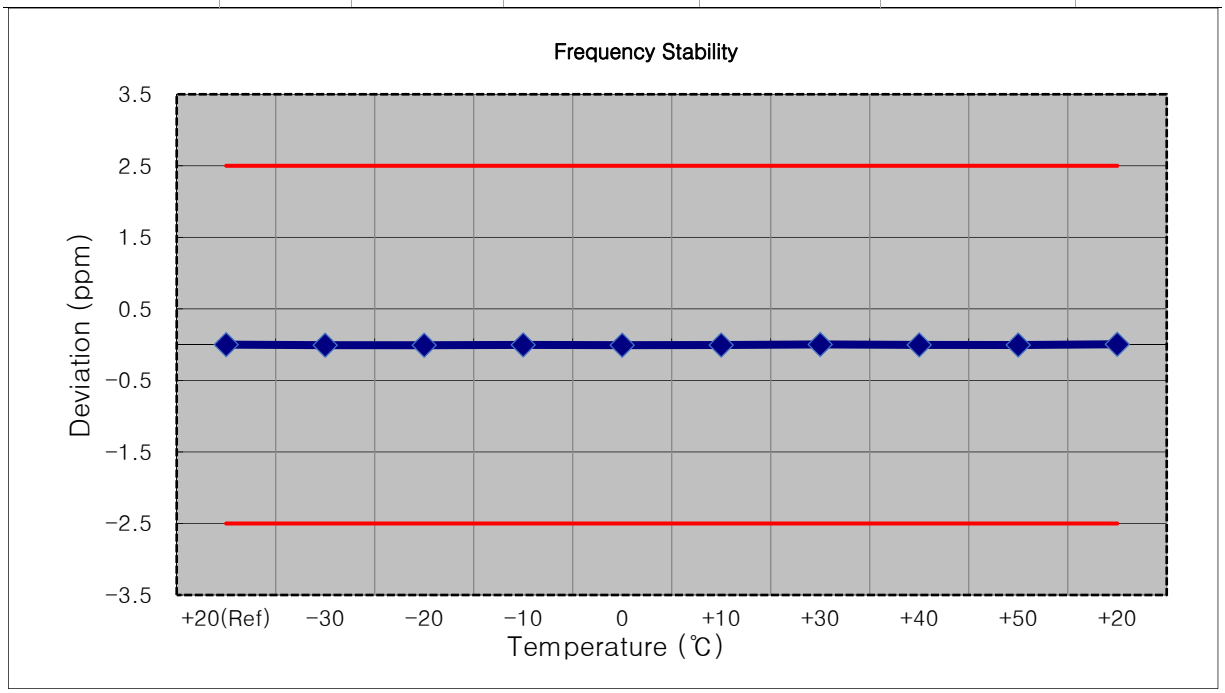
▣ OPERATING FREQUENCY: 819,000,000 Hz

▣ CHANNEL: 26740(10 MHz)

▣ REFERENCE VOLTAGE: 3.880 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage	Power	Temp.	Frequency	Frequency	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	
100 %	3.880	+20(Ref)	818 999 993	0.0	0.000 000	0.000
100 %		-30	818 999 987	-6.2	-0.000 001	-0.008
100 %		-20	818 999 986	-6.7	-0.000 001	-0.008
100 %		-10	818 999 990	-2.8	0.000 000	-0.003
100 %		0	818 999 987	-6.3	-0.000 001	-0.008
100 %		+10	818 999 989	-4.3	-0.000 001	-0.005
100 %		+30	818 999 995	2.4	0.000 000	0.003
100 %		+40	818 999 990	-2.9	0.000 000	-0.004
100 %		+50	818 999 989	-4.0	0.000 000	-0.005
Batt. Endpoint	3.300	+20	818 999 997	4.1	0.000 001	0.005



▣ MODE: LTE 26

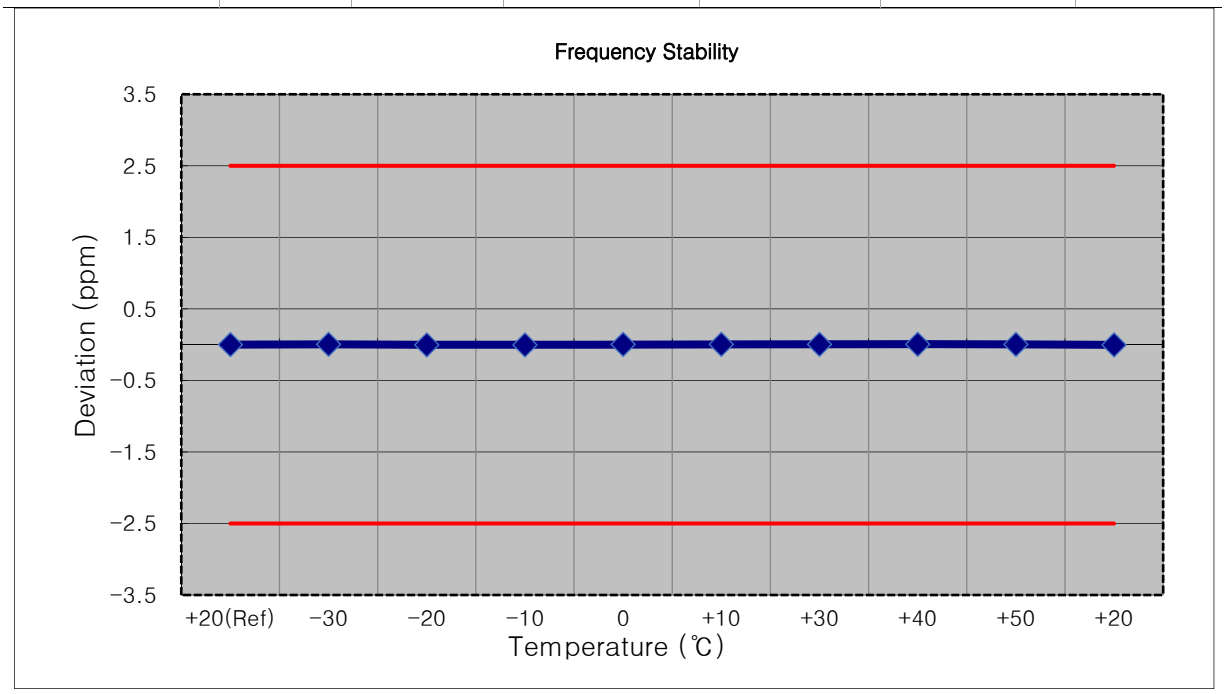
▣ OPERATING FREQUENCY: 821,500,000 Hz

▣ CHANNEL: 26765(15 MHz)

▣ REFERENCE VOLTAGE: 3.880 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage	Power	Temp.	Frequency	Frequency	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	
100 %	3.880	+20(Ref)	821 500 002	0.0	0.000 000	0.000
100 %		-30	821 500 006	3.8	0.000 000	0.005
100 %		-20	821 500 000	-2.6	0.000 000	-0.003
100 %		-10	821 499 999	-3.6	0.000 000	-0.004
100 %		0	821 500 005	2.8	0.000 000	0.003
100 %		+10	821 500 006	3.6	0.000 000	0.004
100 %		+30	821 500 005	3.2	0.000 000	0.004
100 %		+40	821 500 006	4.1	0.000 000	0.005
100 %		+50	821 500 005	2.8	0.000 000	0.003
Batt. Endpoint	3.300	+20	821 500 000	-2.5	0.000 000	-0.003



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	24.77	0.300	100
		1	3	24.54	0.284	100
		1	5	24.69	0.294	100
		3	0	24.73	0.297	100
		3	1	24.58	0.287	100
		3	3	24.69	0.294	100
		6	0	23.86	0.243	100
	16QAM	1	0	24.01	0.252	100
		1	3	23.78	0.239	100
		1	5	23.92	0.247	100
		3	0	23.72	0.236	100
		3	1	23.80	0.240	100
		3	3	23.68	0.233	100
		6	0	22.81	0.191	100
	64QAM	1	0	22.94	0.197	100
		1	3	22.84	0.192	100
		1	5	22.84	0.192	100
		3	0	22.71	0.187	100
		3	1	22.69	0.186	100
		3	3	22.72	0.187	100
		6	0	21.87	0.154	100
	256QAM	1	0	19.76	0.095	100
		1	3	19.86	0.097	100
		1	5	19.74	0.094	100
		3	0	19.77	0.095	100
		3	1	19.79	0.095	100
		3	3	19.80	0.095	100
		6	0	19.87	0.097	100

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm)		Limit (W)
				824 MHz		
				dBm	W	
3	QPSK	1	0	24.67	0.293	100
		1	7	24.58	0.287	100
		1	14	24.68	0.294	100
		8	0	23.78	0.239	100
		8	3	23.68	0.233	100
		8	7	23.75	0.237	100
		15	0	24.03	0.253	100
	16QAM	1	0	23.90	0.245	100
		1	7	23.93	0.247	100
		1	14	23.94	0.248	100
		8	0	22.69	0.186	100
		8	3	22.75	0.188	100
		8	7	22.74	0.188	100
		15	0	22.90	0.195	100
	64QAM	1	0	23.00	0.199	100
		1	7	22.98	0.199	100
		1	14	22.87	0.194	100
		8	0	21.78	0.151	100
		8	3	21.75	0.150	100
		8	7	21.76	0.150	100
		15	0	21.88	0.154	100
	256QAM	1	0	19.77	0.095	100
		1	7	19.78	0.095	100
		1	14	19.68	0.093	100
		8	0	19.76	0.095	100
		8	3	19.81	0.096	100
		8	7	19.89	0.097	100
		15	0	19.85	0.097	100

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm)		Limit (W)
				824 MHz		
				dBm	W	
5	QPSK	1	0	24.85	0.306	100
		1	12	24.39	0.275	100
		1	24	24.74	0.298	100
		12	0	23.78	0.239	100
		12	6	23.78	0.239	100
		12	11	23.79	0.239	100
		25	0	23.83	0.242	100
	16QAM	1	0	23.94	0.248	100
		1	12	23.95	0.248	100
		1	24	23.88	0.244	100
		12	0	22.85	0.193	100
		12	6	22.78	0.190	100
		12	11	22.75	0.188	100
		25	0	22.83	0.192	100
	64QAM	1	0	23.02	0.200	100
		1	12	22.90	0.195	100
		1	24	22.87	0.194	100
		12	0	21.74	0.149	100
		12	6	21.77	0.150	100
		12	11	21.73	0.149	100
		25	0	21.75	0.150	100
	256QAM	1	0	19.80	0.095	100
		1	12	19.53	0.090	100
		1	24	19.78	0.095	100
		12	0	19.82	0.096	100
		12	6	19.92	0.098	100
		12	11	19.80	0.096	100
		25	0	19.86	0.097	100

Band Width	Modulation	RB Size	RB Offset	Max. output power(dBm)		Limit (W)
				824 MHz		
				dBm	W	
10	QPSK	1	0	24.84	0.305	100
		1	24	24.93	0.311	100
		1	49	24.79	0.302	100
		25	0	23.94	0.248	100
		25	12	23.90	0.245	100
		25	24	23.88	0.245	100
		50	0	23.90	0.245	100
	16QAM	1	0	23.99	0.251	100
		1	24	23.97	0.249	100
		1	49	23.89	0.245	100
		25	0	22.87	0.193	100
		25	12	22.83	0.192	100
		25	24	22.83	0.192	100
		50	0	22.86	0.193	100
	64QAM	1	0	22.88	0.194	100
		1	24	23.02	0.200	100
		1	49	22.93	0.196	100
		25	0	21.88	0.154	100
		25	12	21.86	0.153	100
		25	24	21.88	0.154	100
		50	0	21.84	0.153	100
	256QAM	1	0	19.75	0.094	100
		1	24	19.80	0.096	100
		1	49	19.68	0.093	100
		25	0	19.82	0.096	100
		25	12	19.93	0.098	100
		25	24	19.73	0.094	100
		50	0	19.73	0.094	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		RB	
								W	W	dBm	Size	Offset
824.0	LTE B26/ 1.4 MHz	QPSK	-30.58	30.32	-10.05	1.38	H	< 7.00	0.078	18.89	1	5
		16QAM	-31.34	29.56	-10.05	1.38	H		0.065	18.13		
		64QAM	-32.36	28.54	-10.05	1.38	H		0.052	17.11		
		256QAM	-35.35	25.55	-10.05	1.38	H		0.026	14.12		

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBd)	C.L	Pol	Limit	ERP		RB	
								W	W	dBm	Size	Offset
824.0	LTE B26/ 3 MHz	QPSK	-30.50	30.40	-10.05	1.38	H	< 7.00	0.079	18.97	1	14
		16QAM	-31.21	29.69	-10.05	1.38	H		0.067	18.26		
		64QAM	-32.24	28.66	-10.05	1.38	H		0.053	17.23		
		256QAM	-35.27	25.63	-10.05	1.38	H		0.026	14.20		

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBd)	C.L	Pol	Limit	ERP		RB	
								W	W	dBm	Size	Offset
824.0	LTE B26/ 5 MHz	QPSK	-30.42	30.48	-10.05	1.38	H	< 7.00	0.080	19.05	1	24
		16QAM	-31.25	29.65	-10.05	1.38	H		0.066	18.22		
		64QAM	-32.24	28.66	-10.05	1.38	H		0.053	17.23		
		256QAM	-35.22	25.68	-10.05	1.38	H		0.027	14.25		

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBd)	C.L	Pol	Limit	ERP		RB	
								W	W	dBm	Size	Offset
824.0	LTE B26/ 10 MHz	QPSK	-30.31	30.59	-10.05	1.38	H	< 7.00	0.083	19.16	1	49
		16QAM	-31.24	29.66	-10.05	1.38	H		0.067	18.23		
		64QAM	-32.25	28.65	-10.05	1.38	H		0.053	17.22		
		256QAM	-35.15	25.75	-10.05	1.38	H		0.027	14.32		

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	RB	
									Size	Offset
26790 (824.0)	1 648.00	-58.43	9.20	-67.42	2.02	V	-60.24	-13.00	1	49
	2 472.00	-60.47	10.20	-64.61	2.49	V	-56.90	-13.00		
	3 296.00	-60.39	10.75	-62.74	2.91	V	-54.90	-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	3.6875	27.976	-66.972	-38.996	-13.00
	3		3.6910	27.976	-67.306	-39.330	
	5		3.6870	27.976	-67.273	-39.297	
	10		3.6710	27.976	-67.412	-39.436	

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 95 ~ 98.
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)

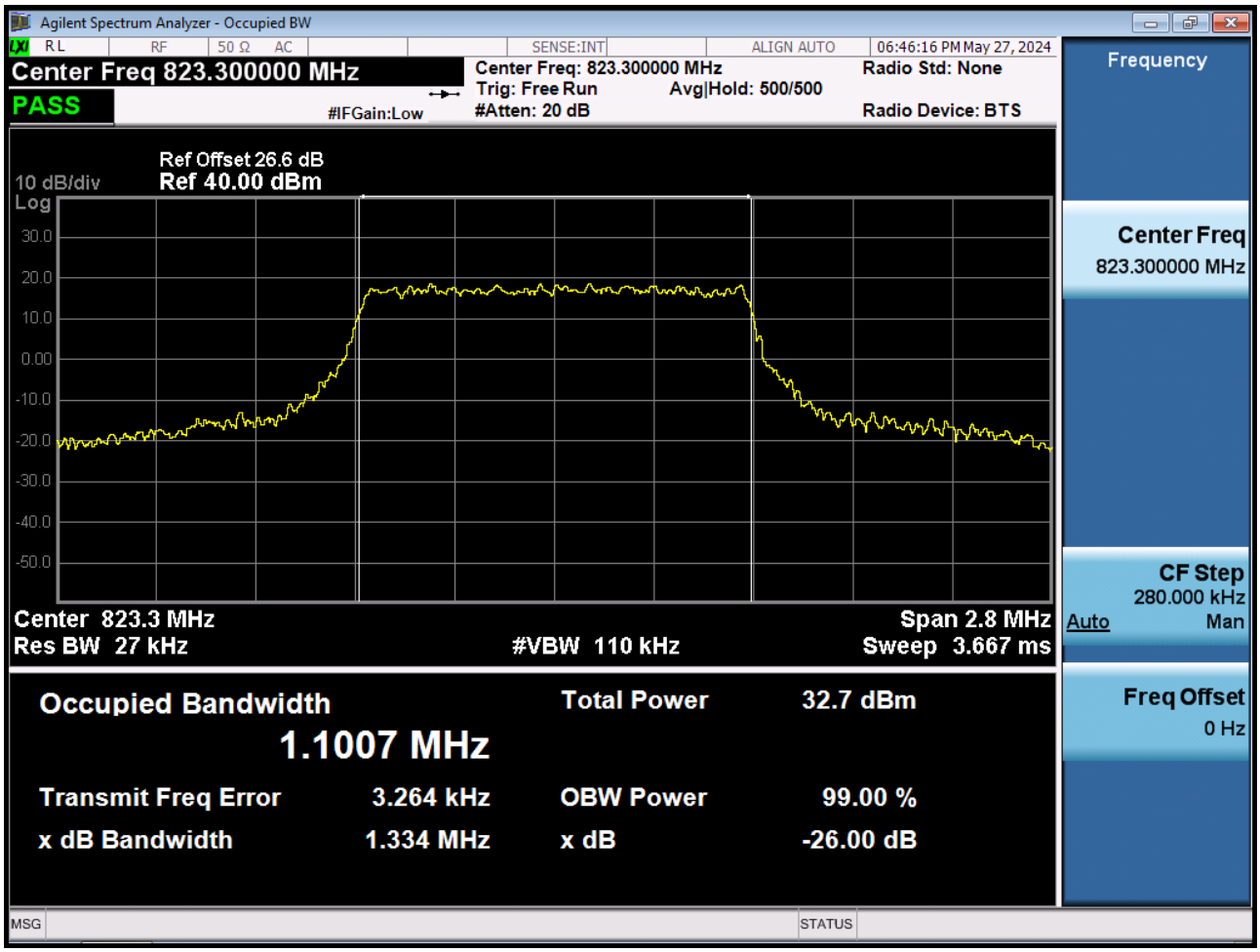
- Test Channel : 26790(824.0MHz)
- Plots of the EUT's Band Edge are shown Page 99 ~ 110.

8.8.6 BAND EDGE(Part22)

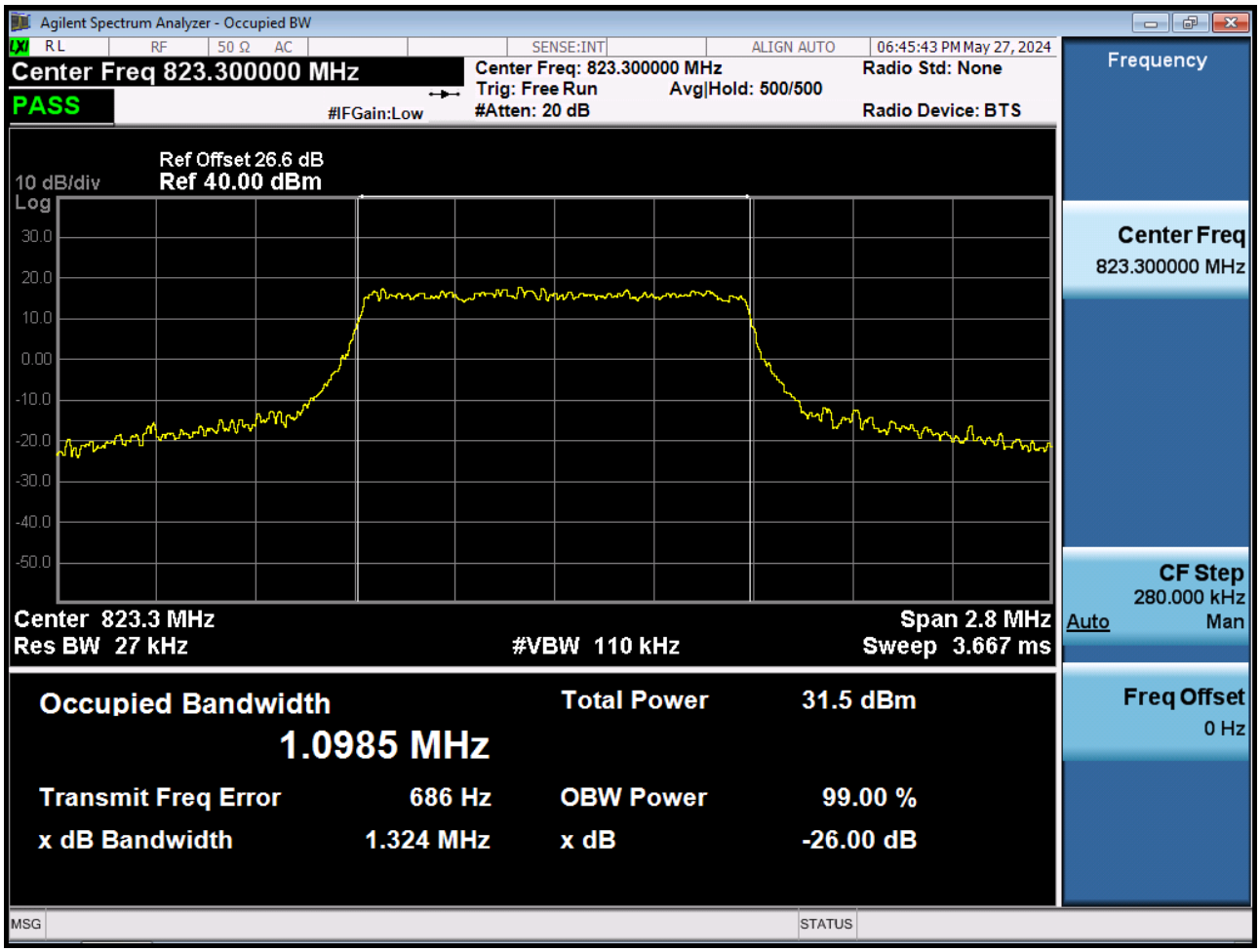
- Test Channel : 26790(824.0 MHz)
- Plots of the EUT's Band Edge are shown Page 111 ~ 118.

9. TEST PLOTS

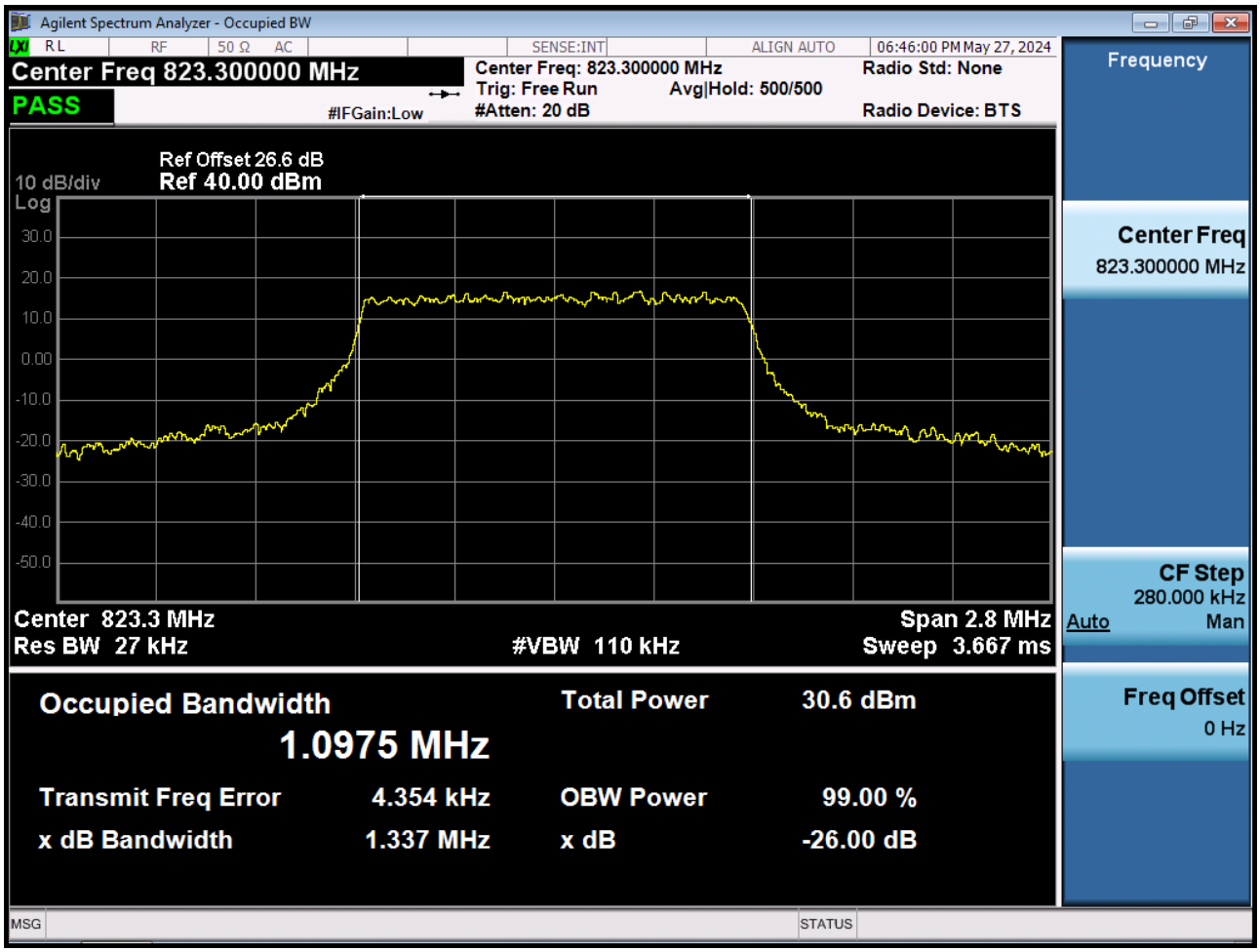
BAND 26. Occupied Bandwidth Plot (1.4 M BW Ch.26783 QPSK RB 6_0)



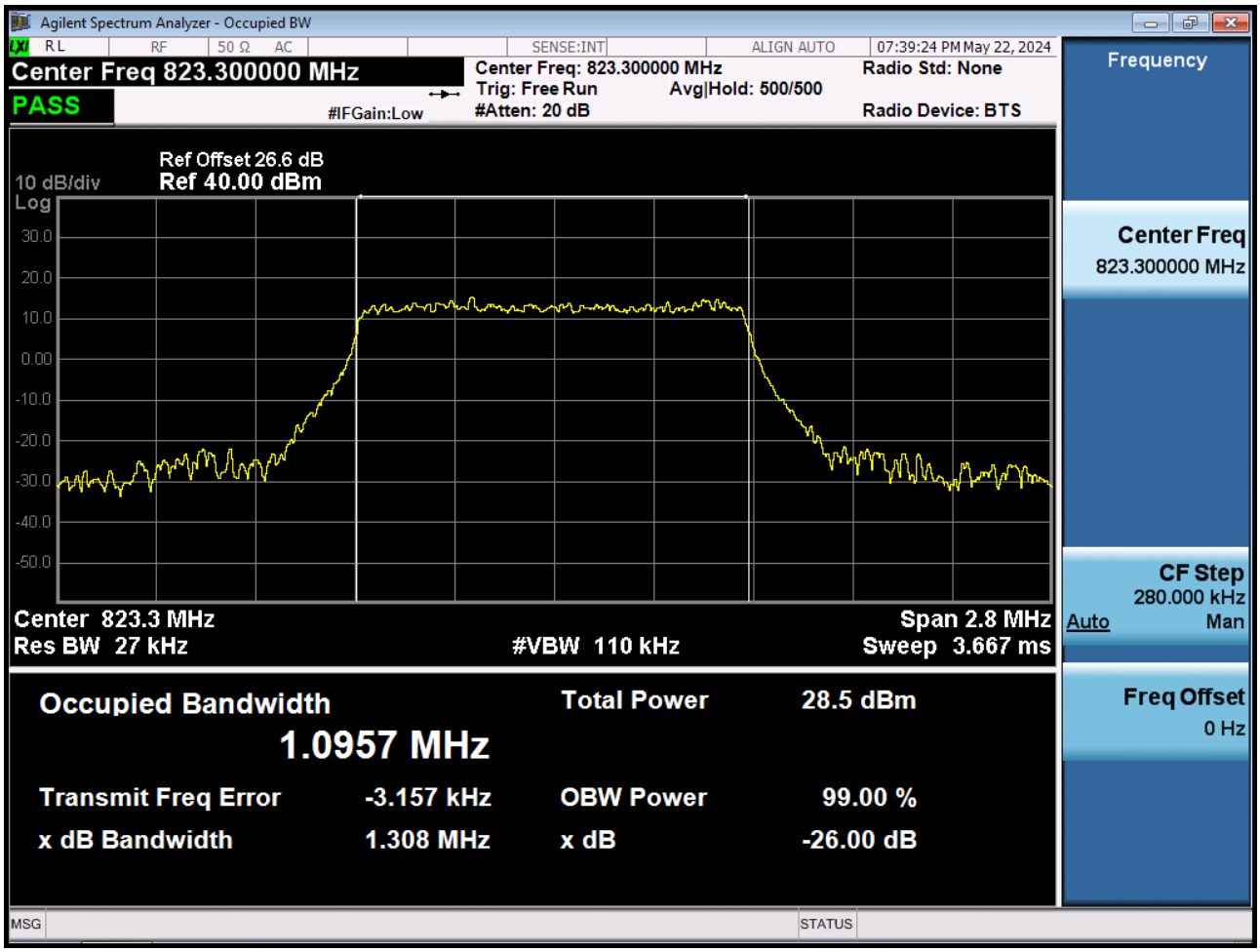
BAND 26. Occupied Bandwidth Plot (1.4 M BW Ch.26783 16QAM RB 6_0)



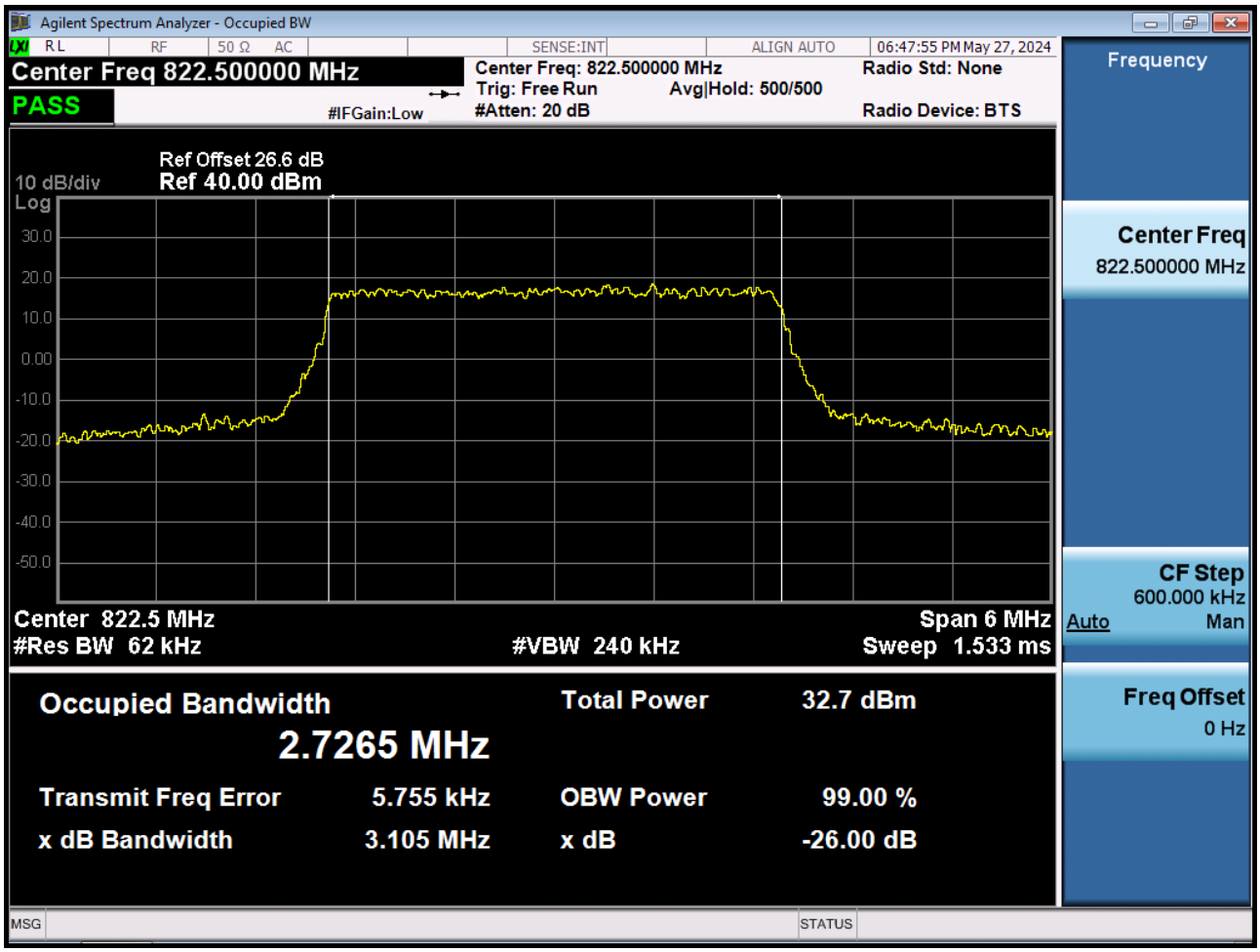
BAND 26. Occupied Bandwidth Plot (1.4 M BW Ch.26783 64QAM RB 6_0)



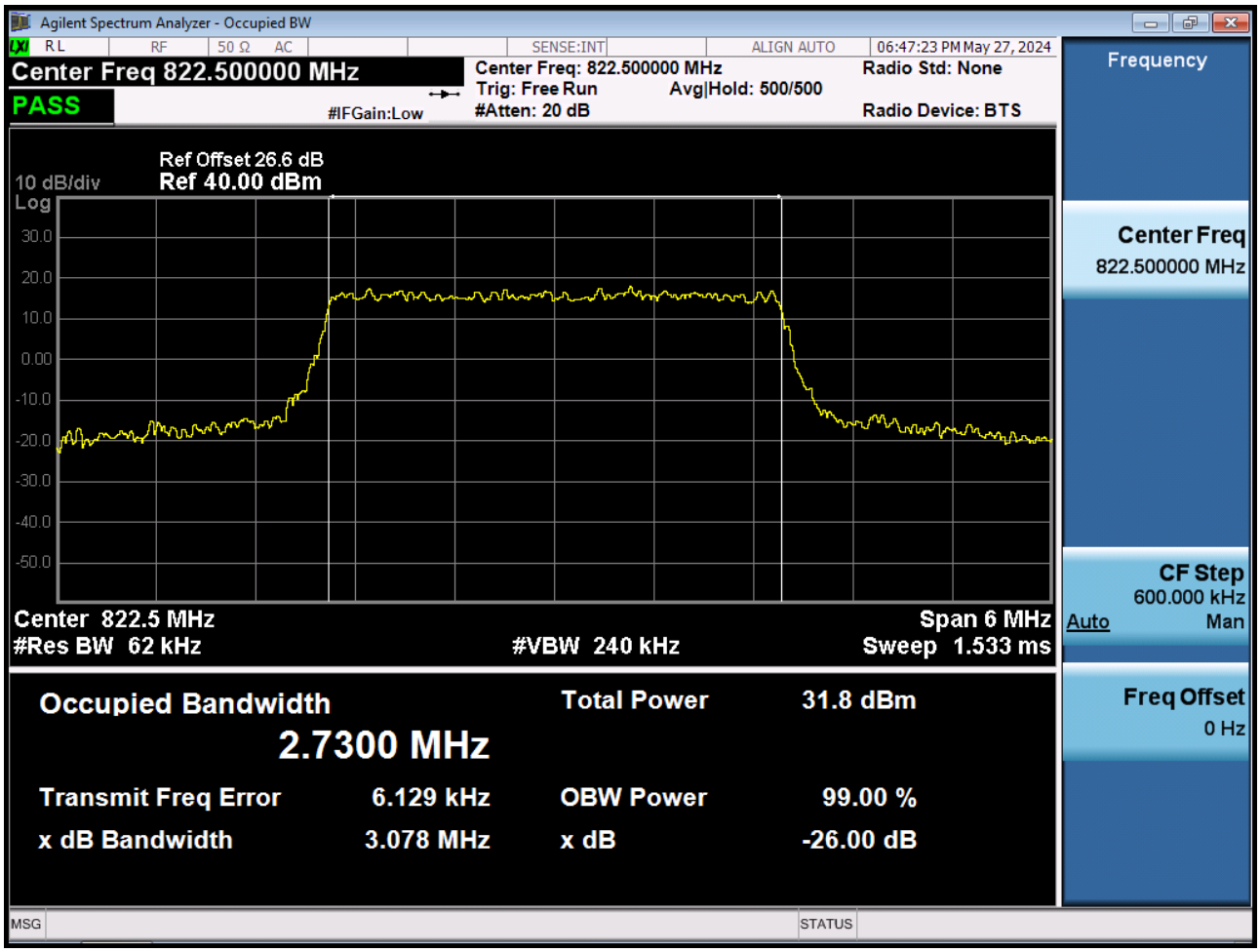
BAND 26. Occupied Bandwidth Plot (1.4 M BW Ch.26783 256QAM RB 6_0)



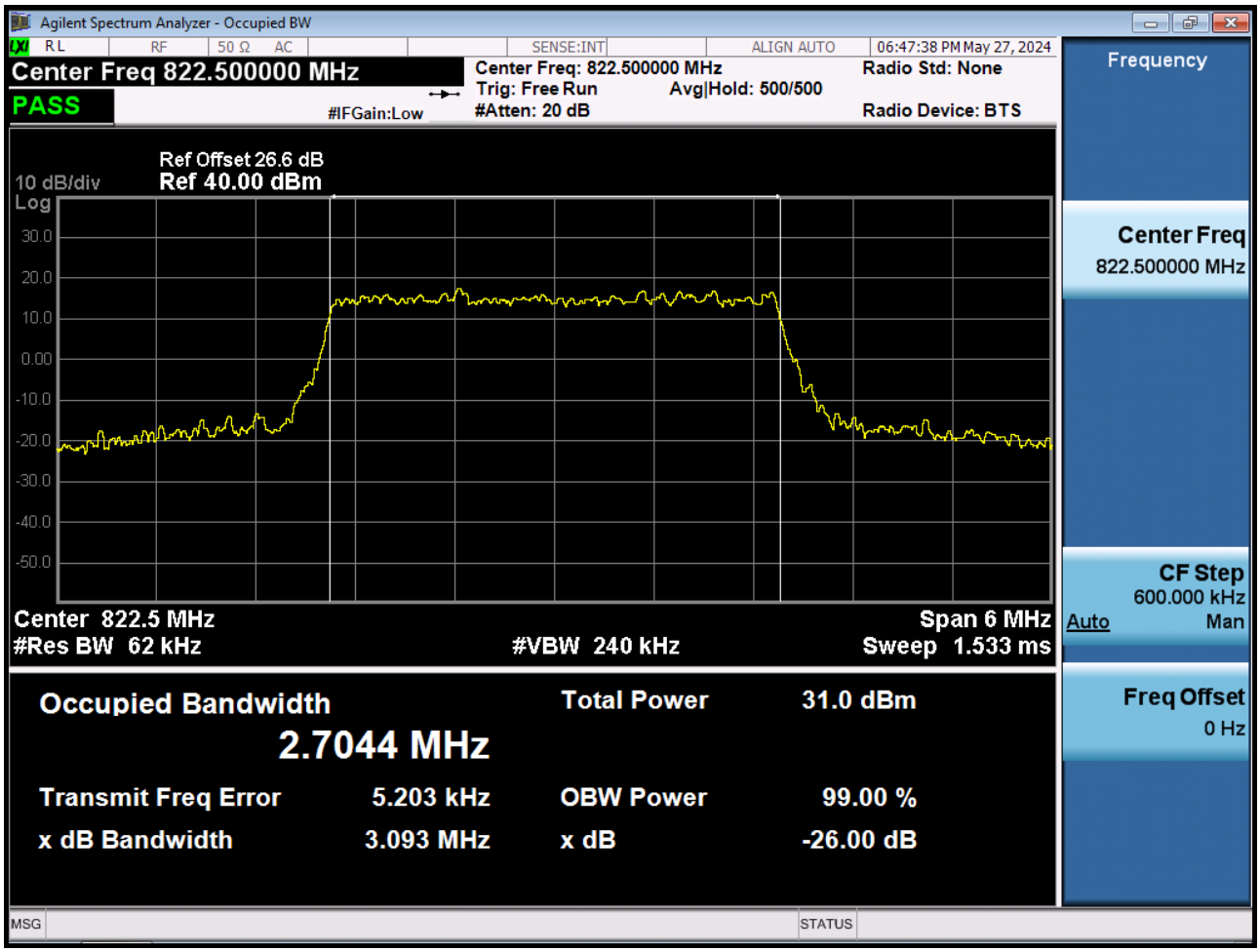
BAND 26. Occupied Bandwidth Plot (3 M BW Ch.26775 QPSK RB 15_0)



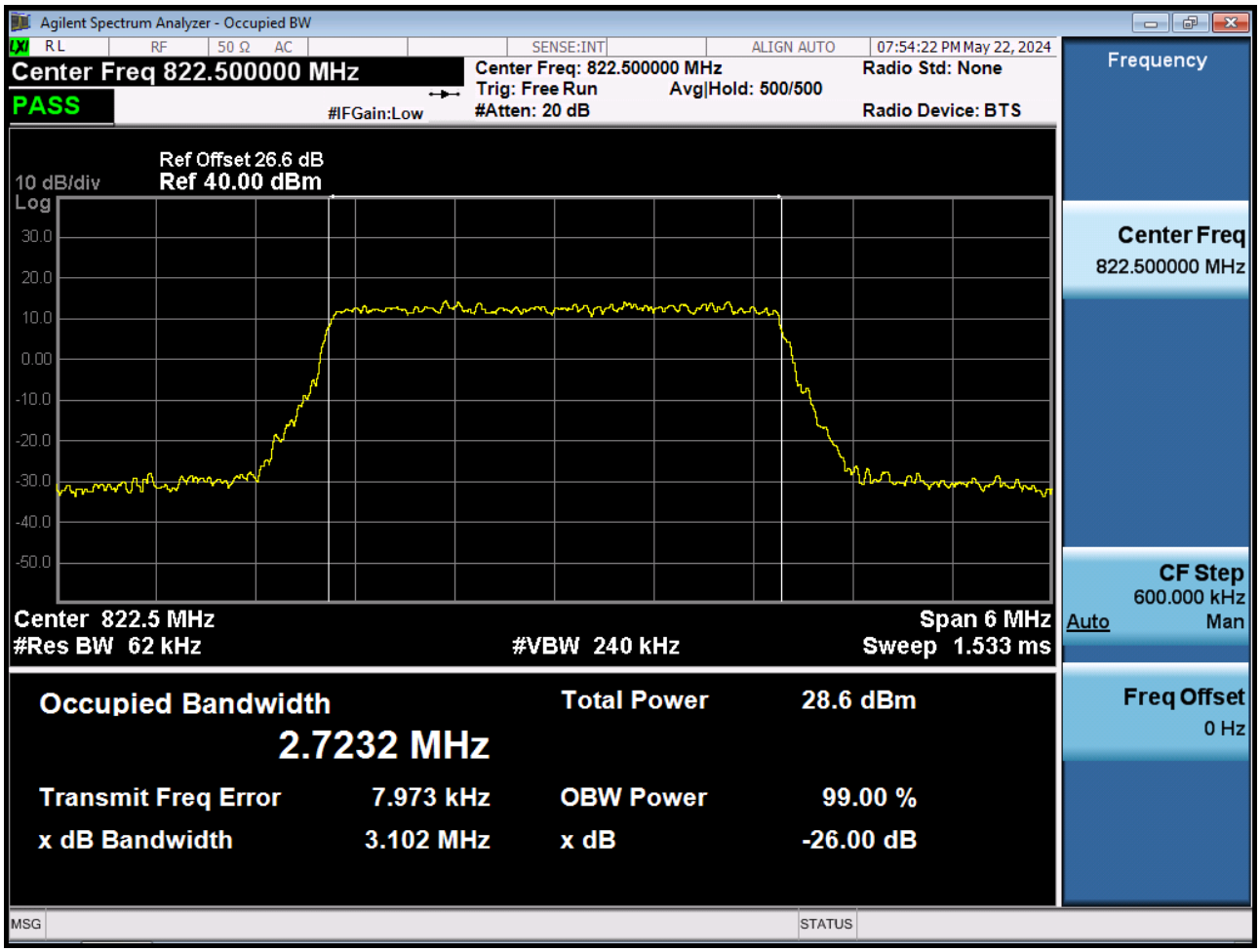
BAND 26. Occupied Bandwidth Plot (3 M BW Ch.26775 16QAM RB 15_0)



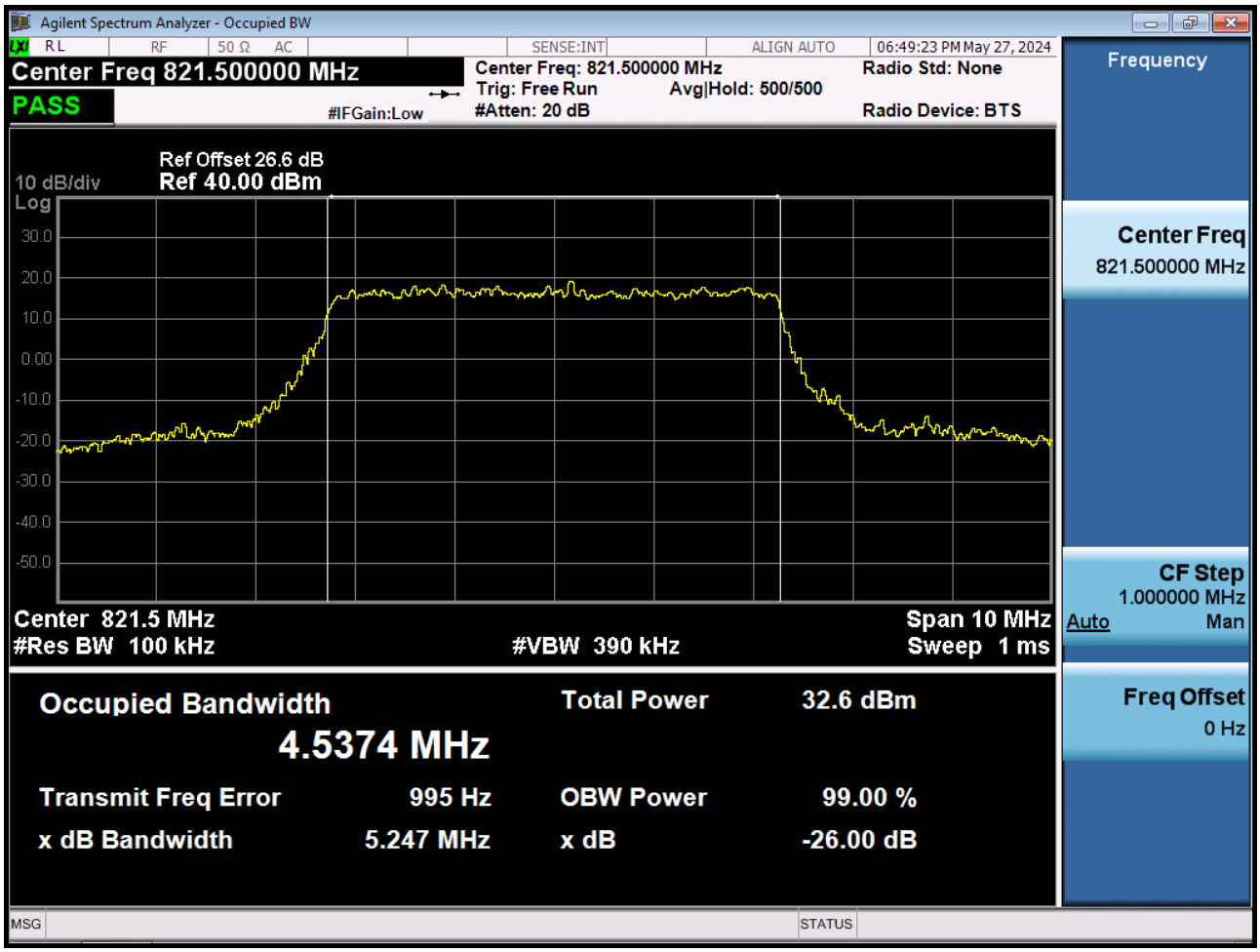
BAND 26. Occupied Bandwidth Plot (3 M BW Ch.26775 64QAM RB 15_0)



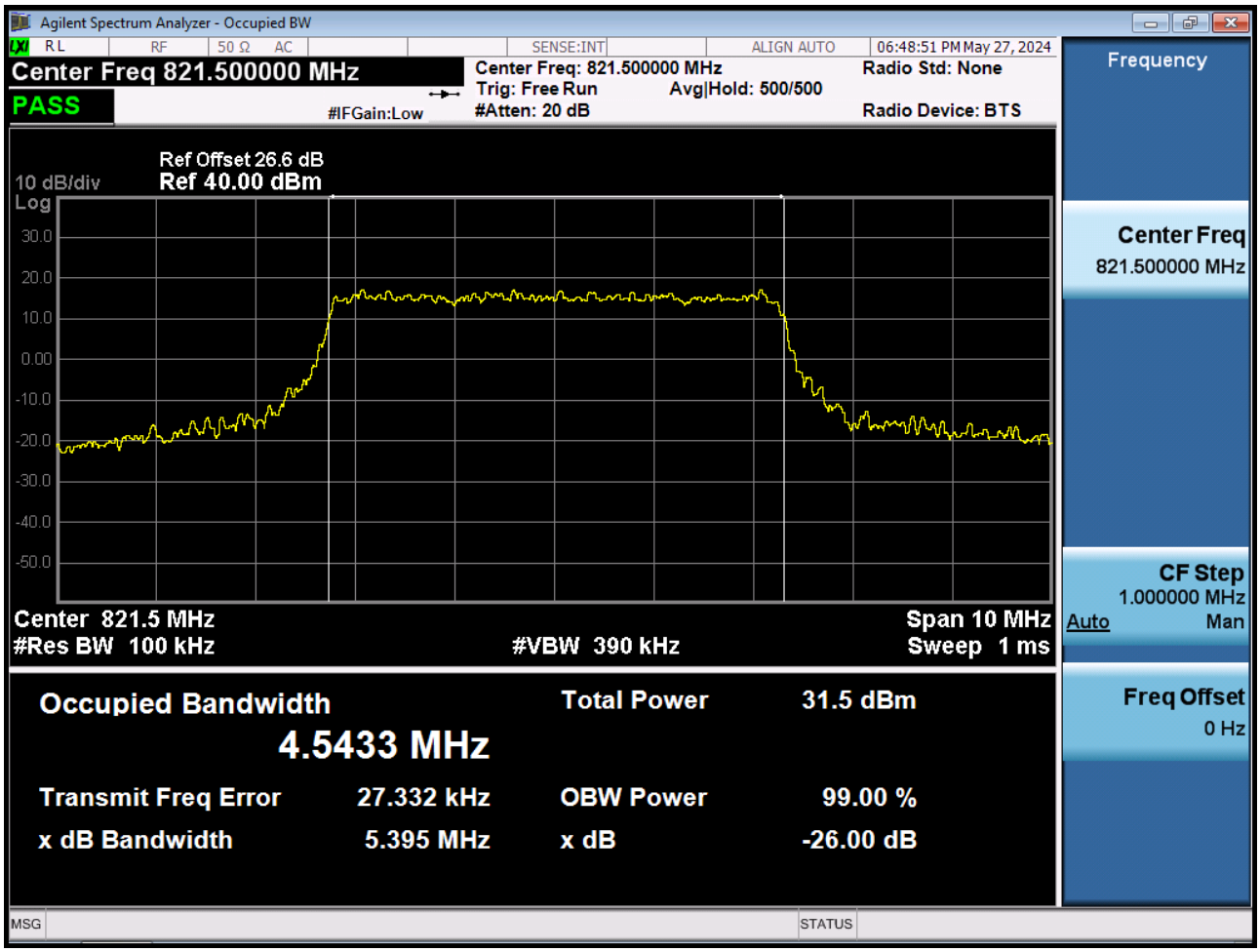
BAND 26. Occupied Bandwidth Plot (3 M BW Ch.26775 256QAM RB 15_0)



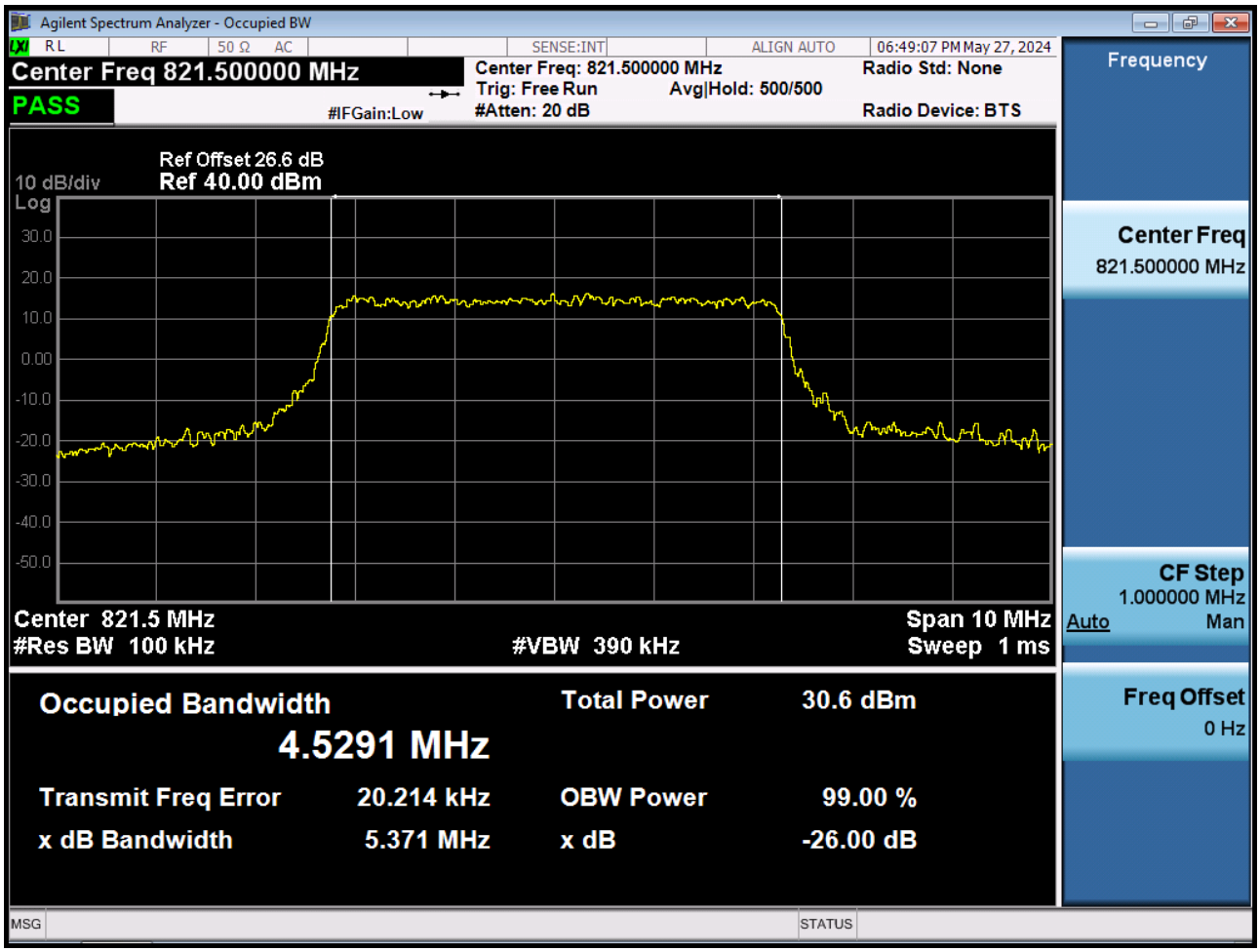
BAND 26. Occupied Bandwidth Plot (5 M BW Ch.26765 QPSK RB 25_0)



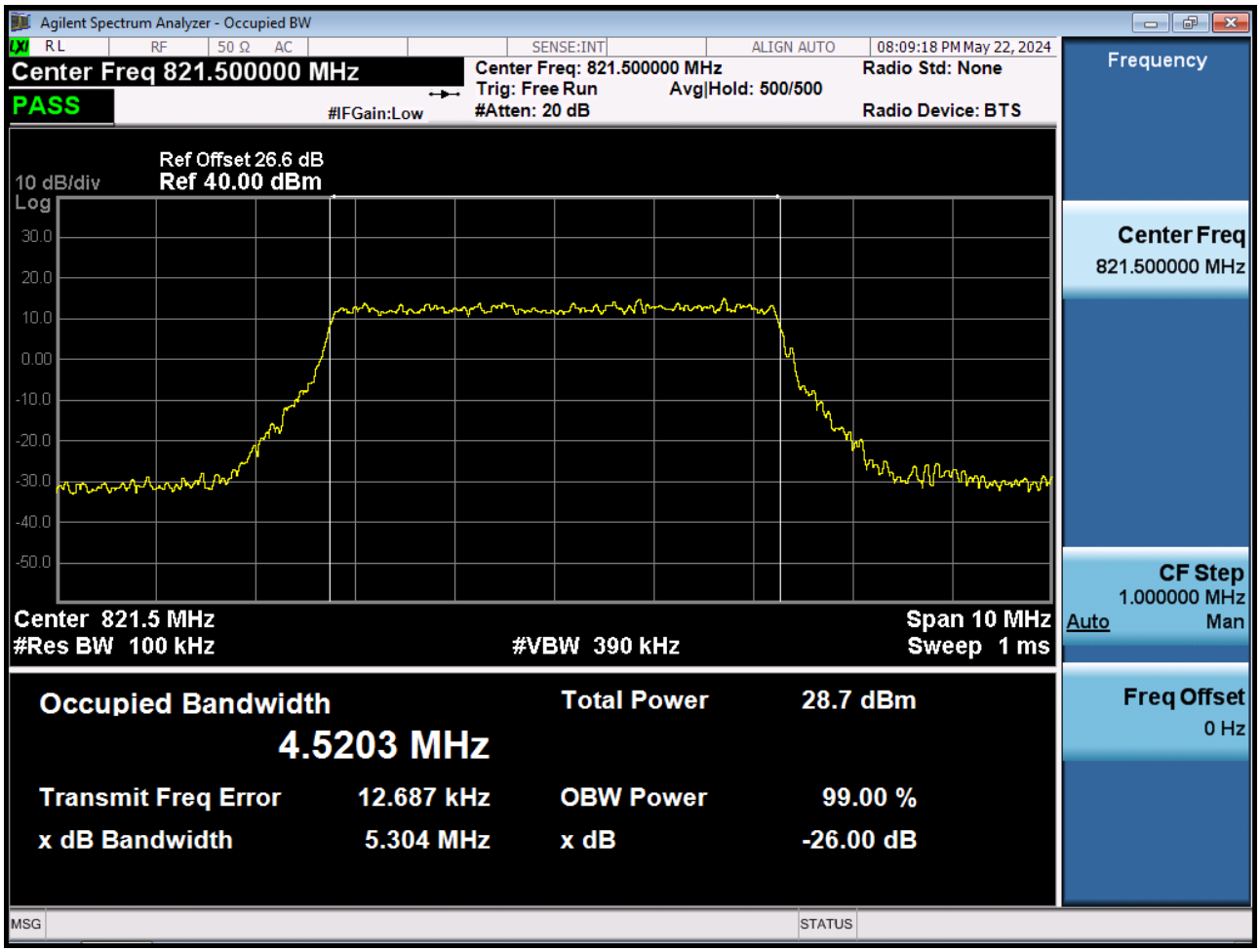
BAND 26. Occupied Bandwidth Plot (5 M BW Ch.26765 16QAM RB 25_0)



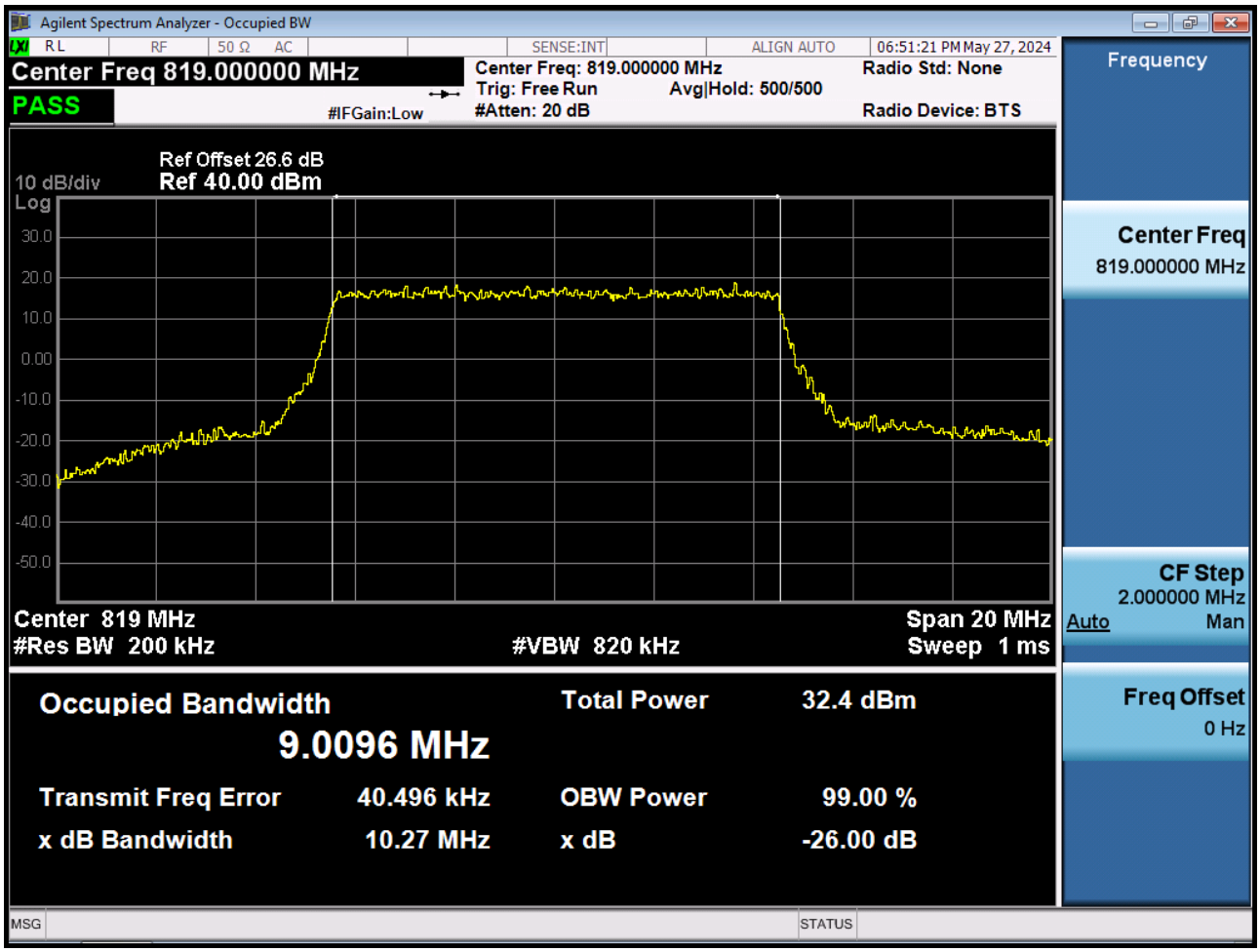
BAND 26. Occupied Bandwidth Plot (5 M BW Ch.26765 64QAM RB 25_0)



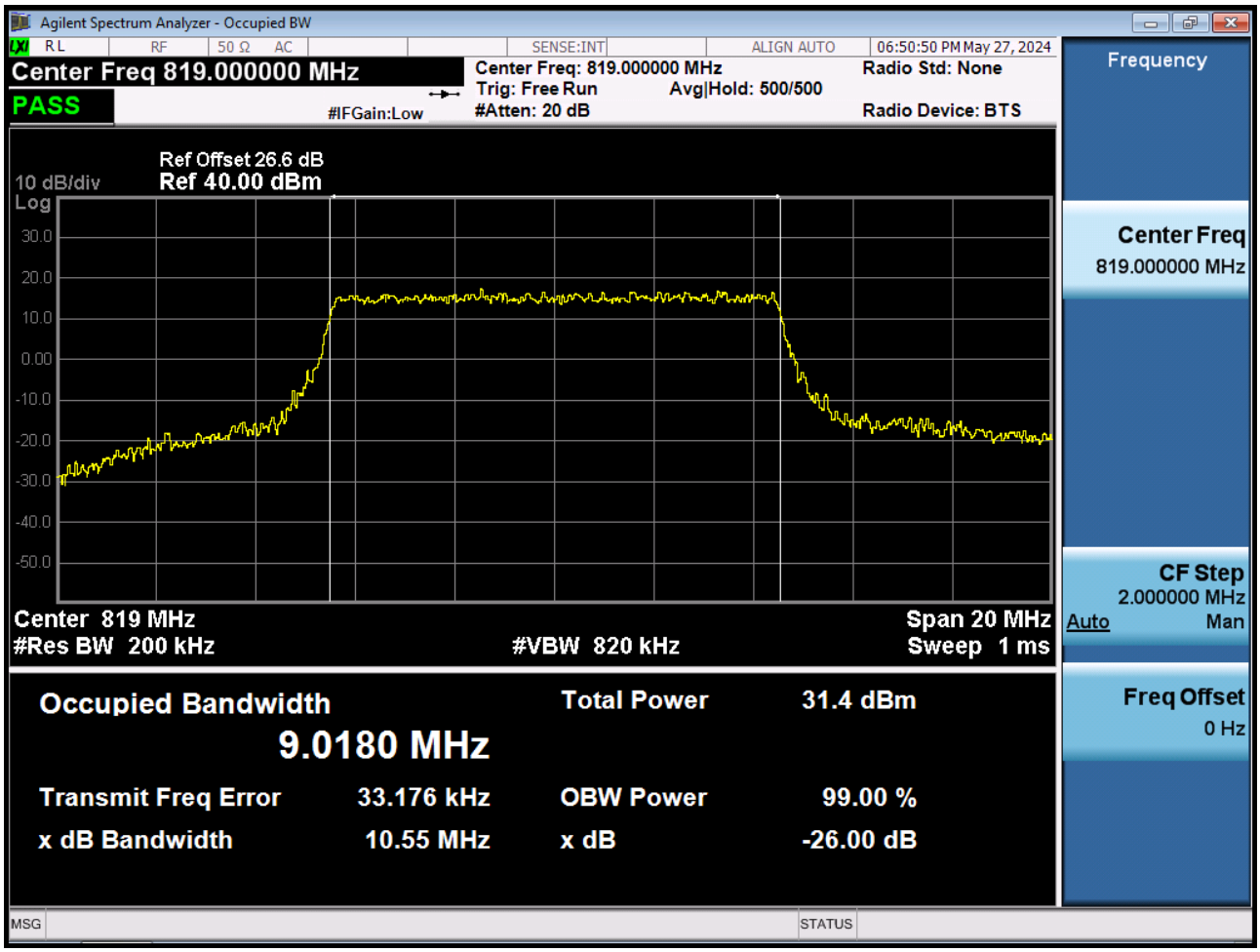
BAND 26. Occupied Bandwidth Plot (5 M BW Ch.26765 256QAM RB 25_0)



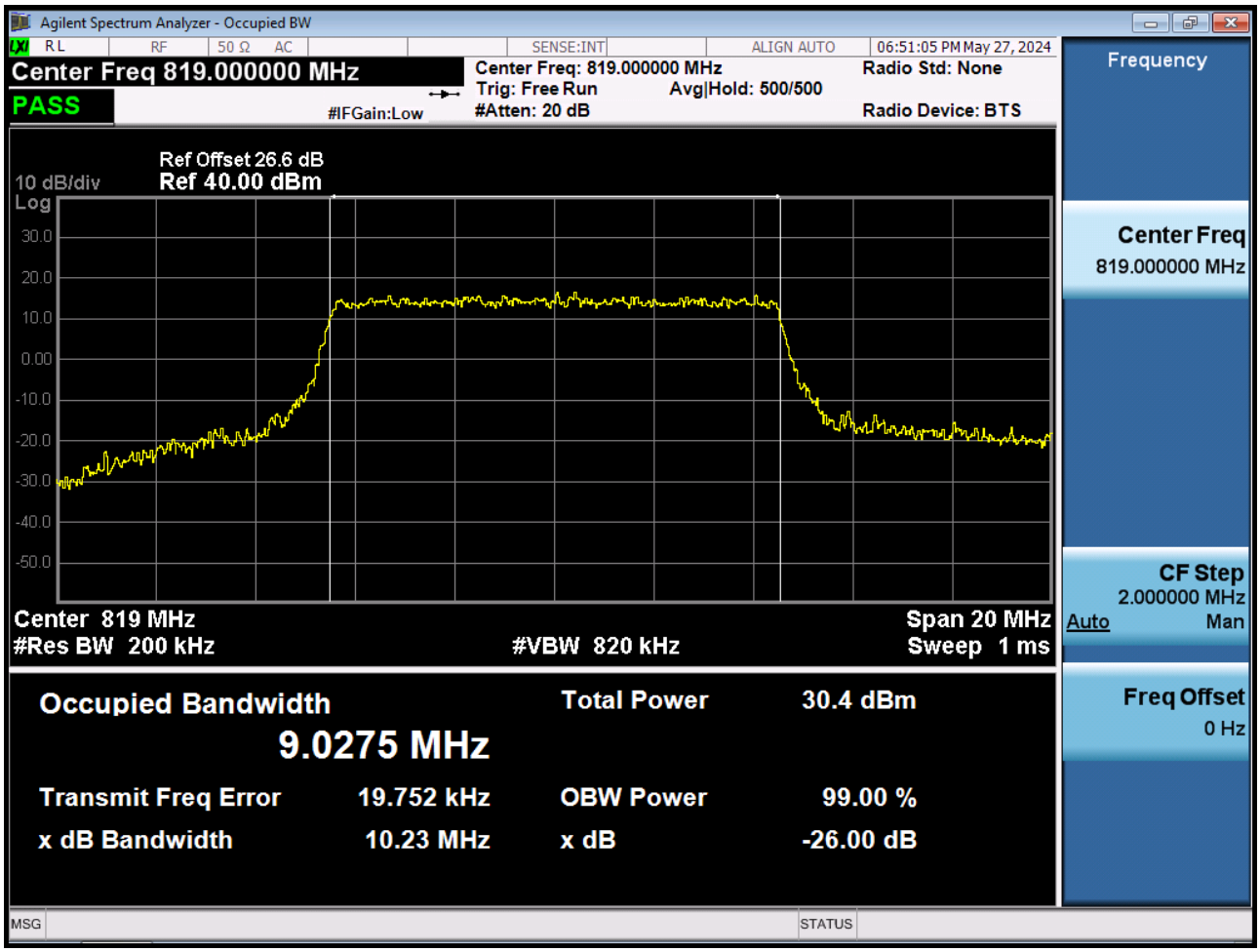
BAND 26. Occupied Bandwidth Plot (10 M BW Ch.26740 QPSK RB 50_0)



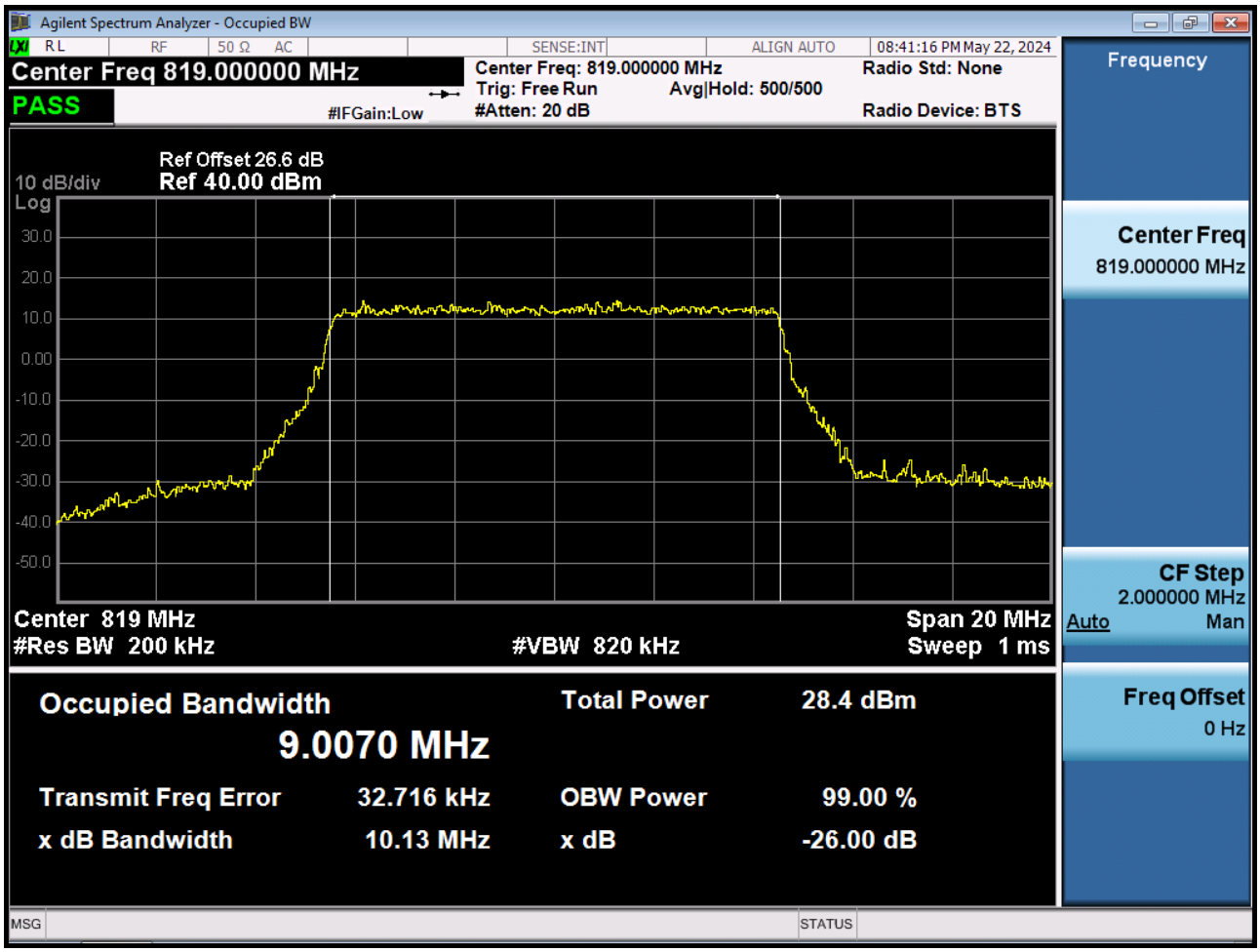
BAND 26. Occupied Bandwidth Plot (10 M BW Ch.26740 16QAM RB 50_0)



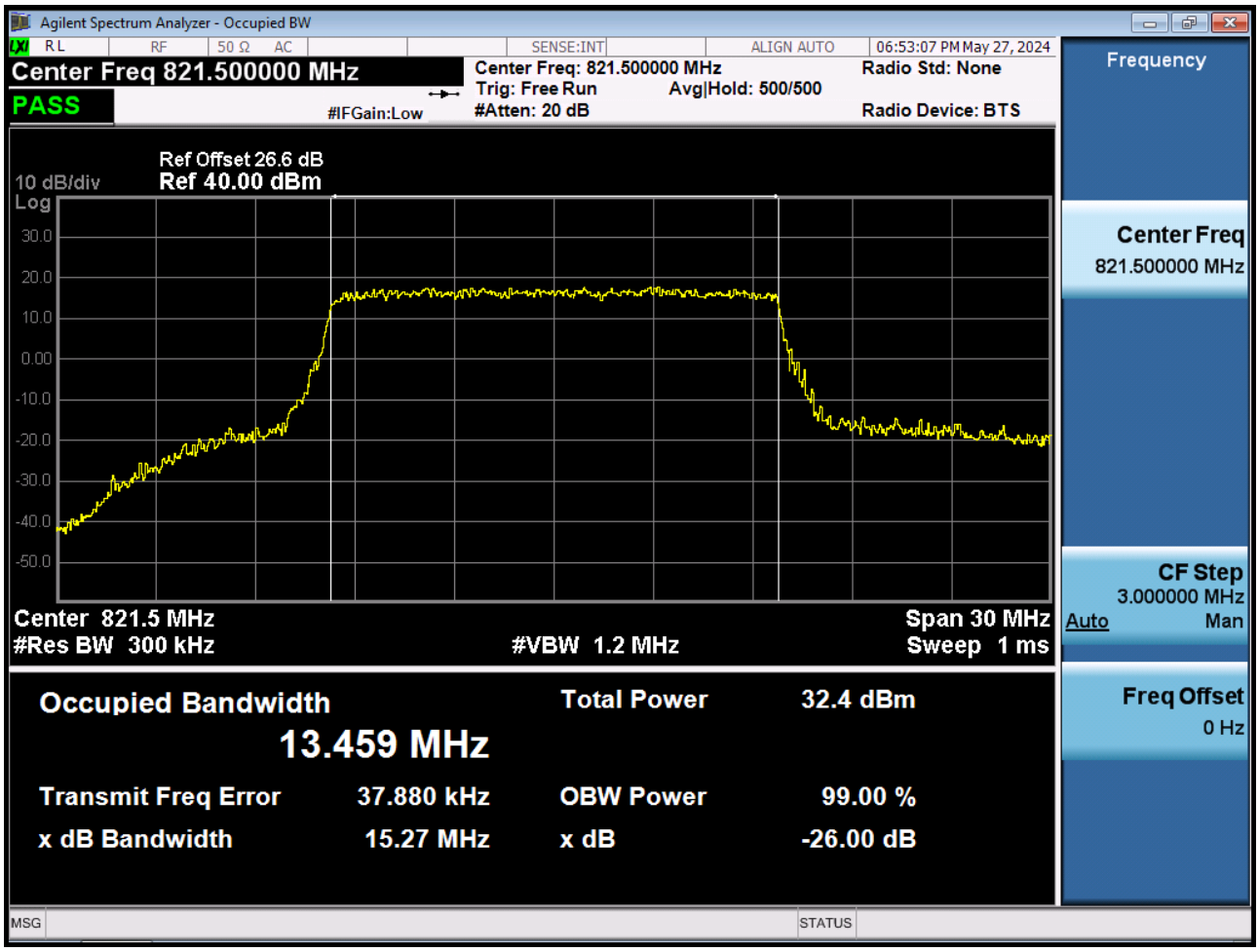
BAND 26. Occupied Bandwidth Plot (10 M BW Ch.26740 64QAM RB 50_0)



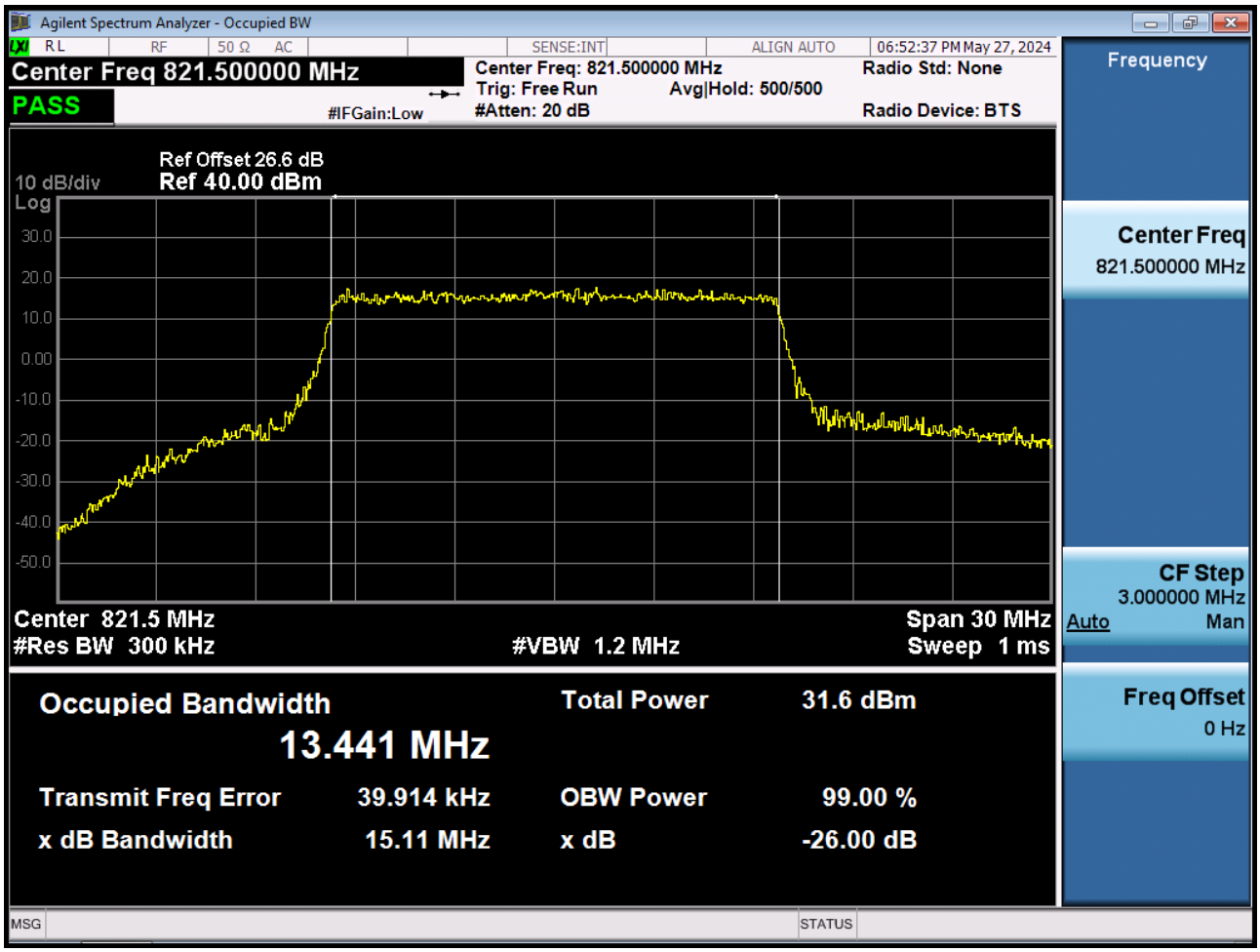
BAND 26. Occupied Bandwidth Plot (10 M BW Ch.26740 256QAM RB 50_0)



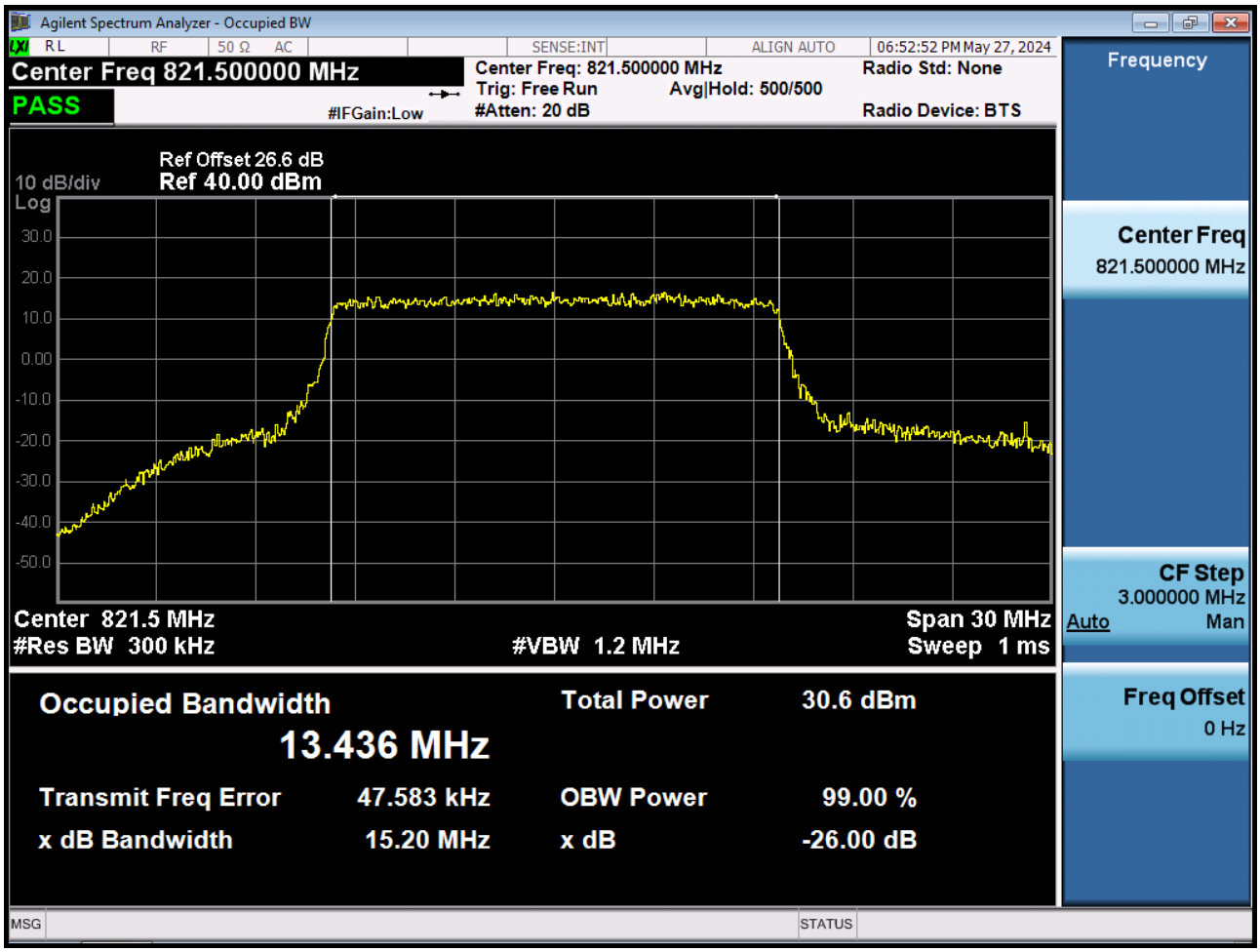
BAND 26. Occupied Bandwidth Plot (15 M BW Ch.26765 QPSK RB 75_0)



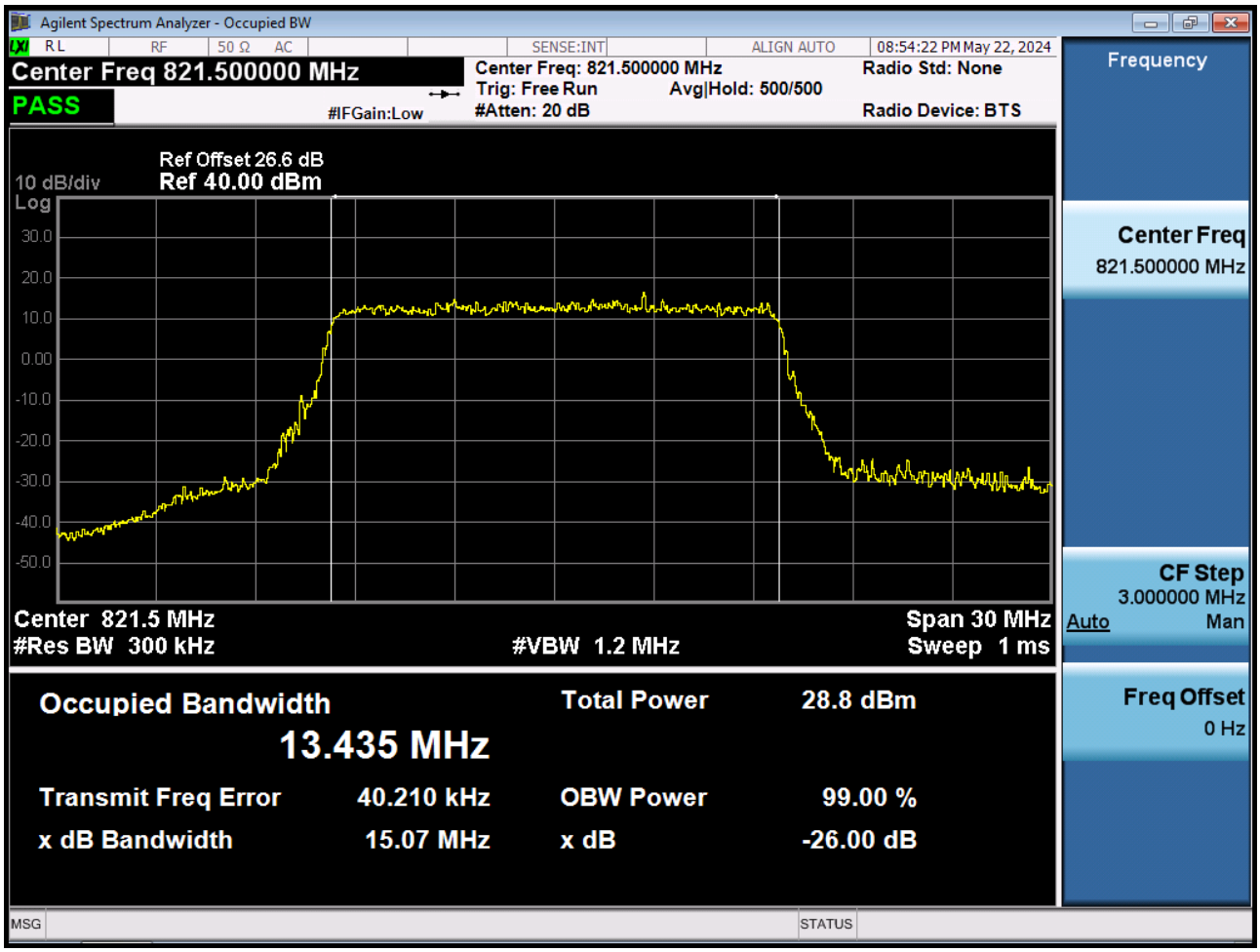
BAND 26. Occupied Bandwidth Plot (15 M BW Ch.26765 16QAM RB 75_0)



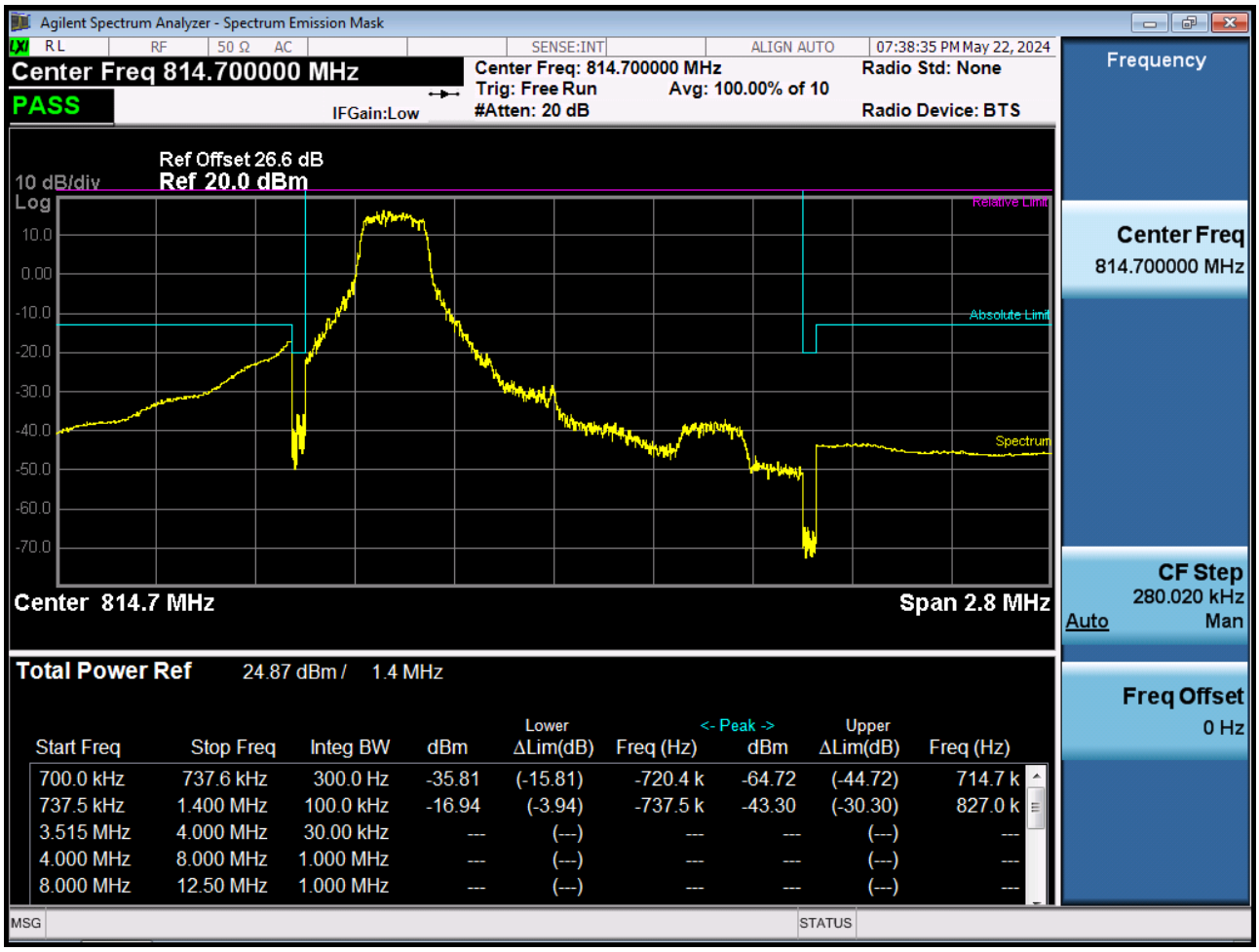
BAND 26. Occupied Bandwidth Plot (15 M BW Ch.26765 64QAM RB 75_0)



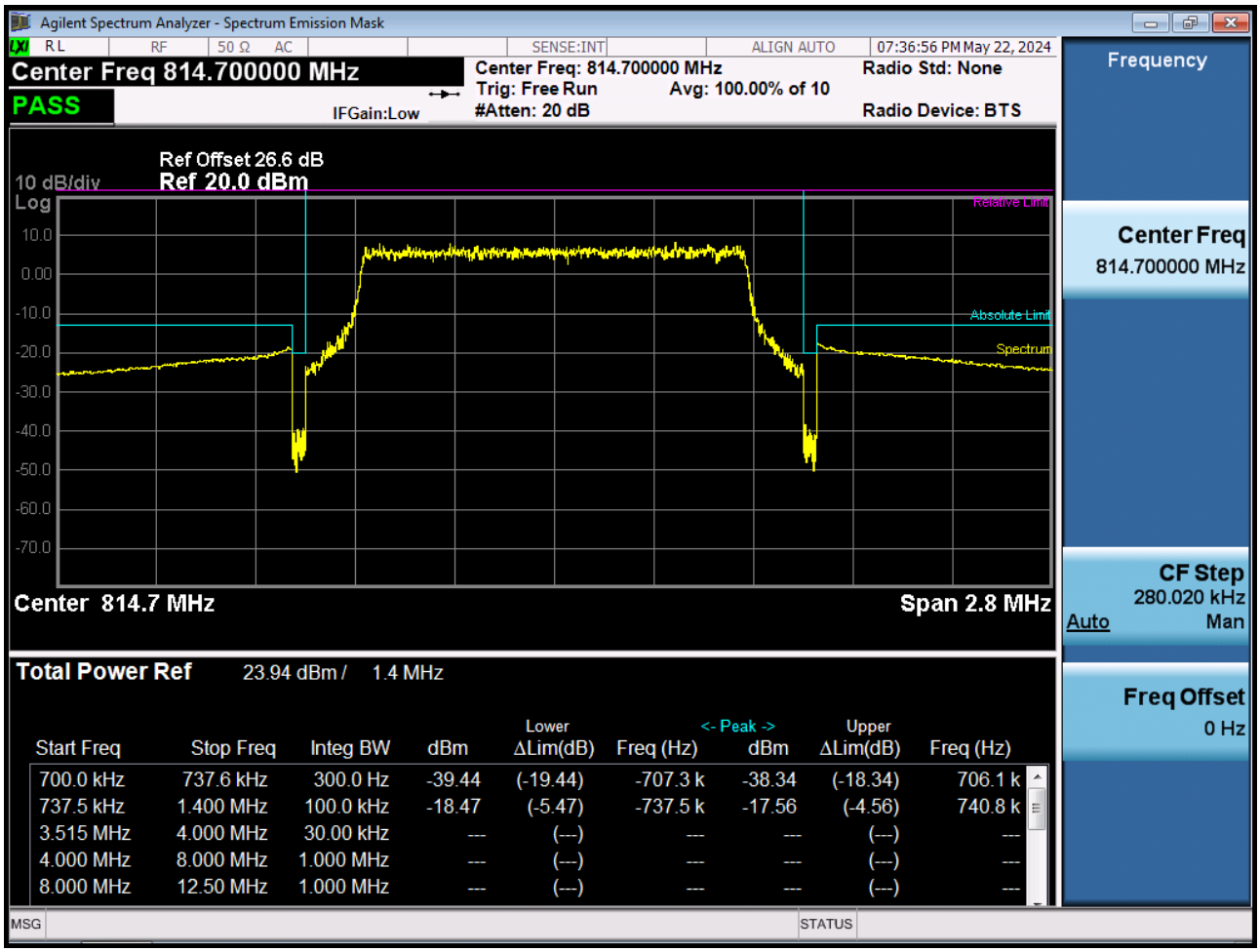
BAND 26. Occupied Bandwidth Plot (15 M BW Ch.26765 256QAM RB 75_0)



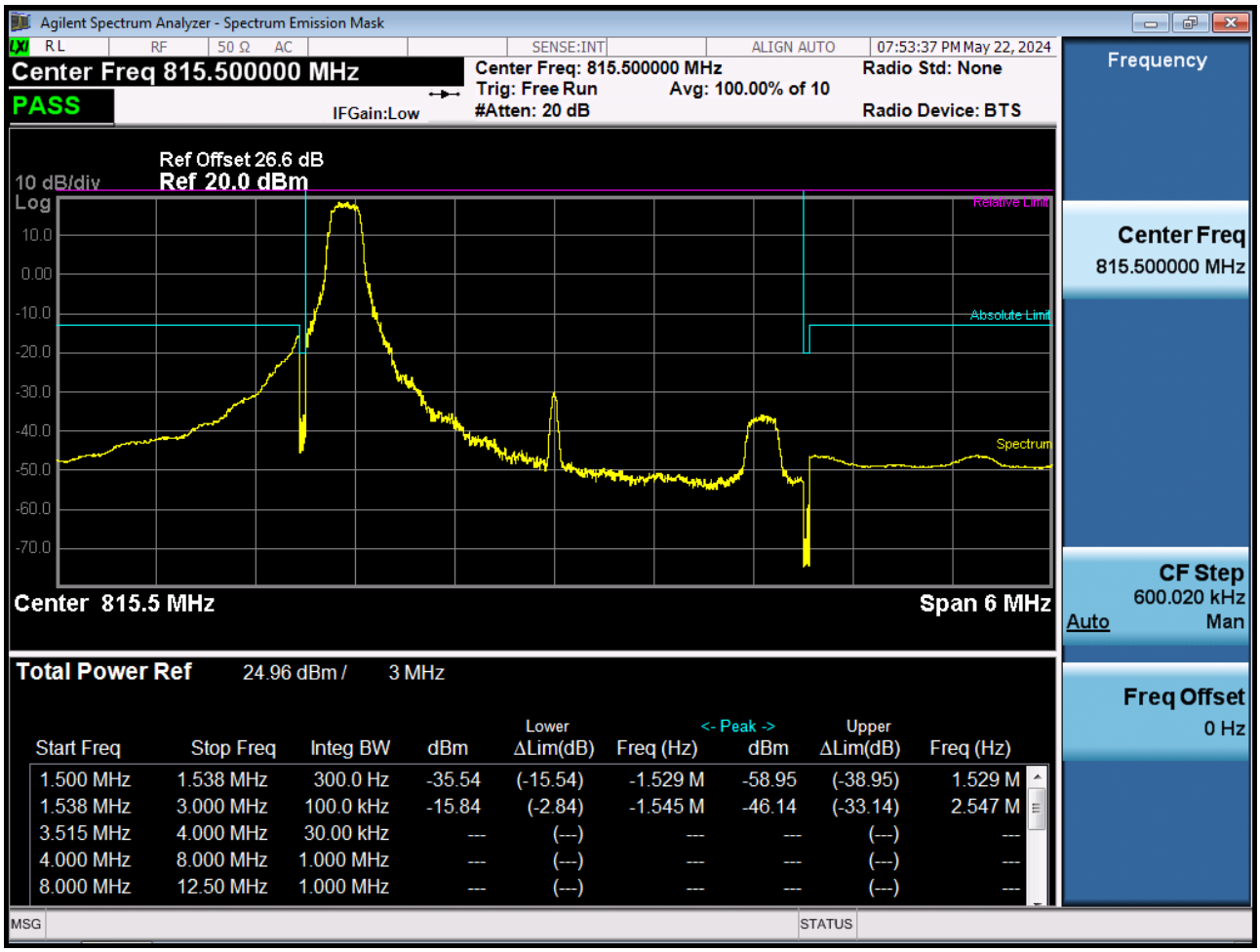
BAND 26. Lower Channel Edge Plot (1.4 M BW Ch.26697 QPSK RB 1, Offset 0)



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

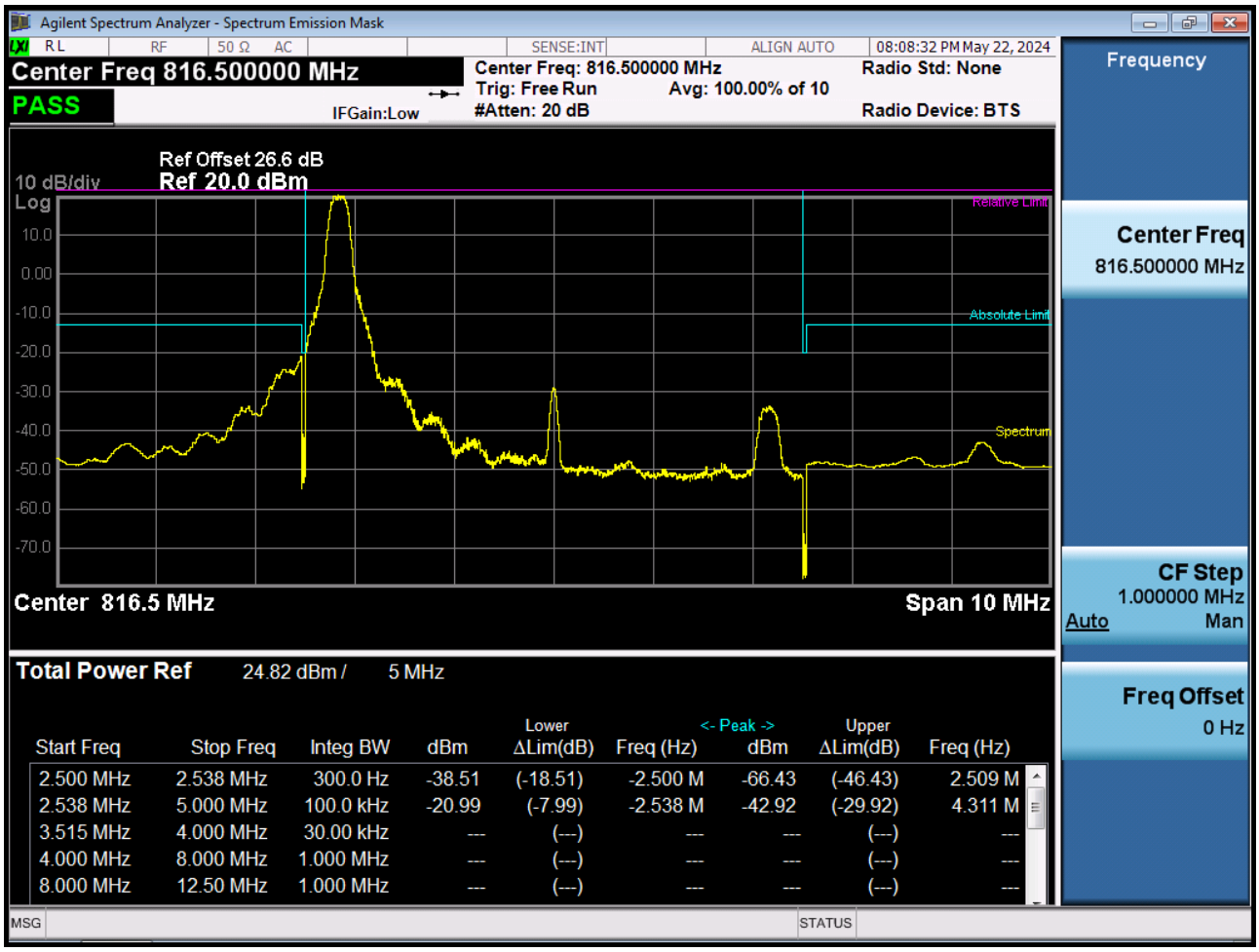


BAND 26. Lower Channel Edge Plot (3 M BW Ch.26705 QPSK RB 1, Offset 0)

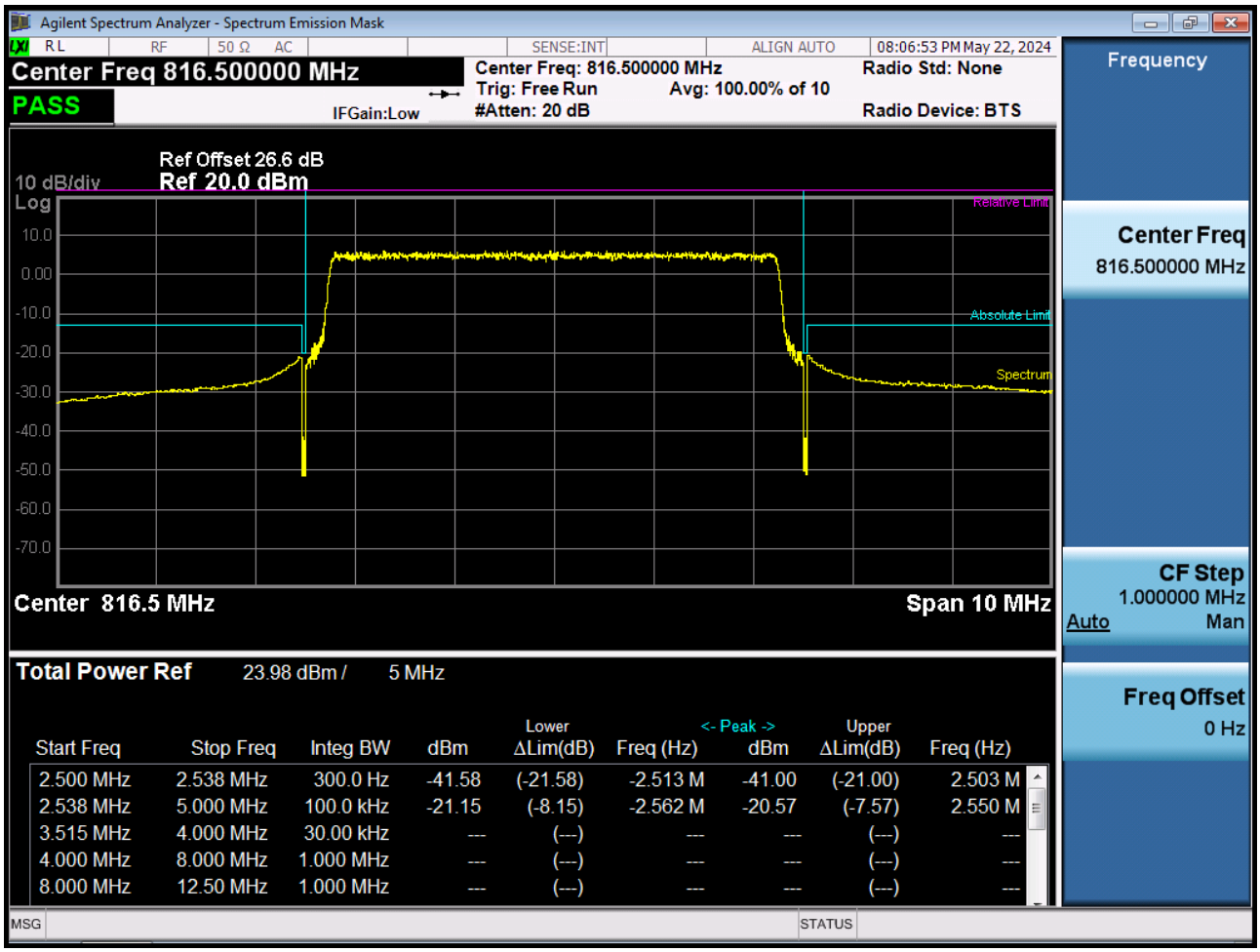


BAND 26. Lower Channel Edge Plot (3 M BW Ch.26705 QPSK_RB15_Offset 0)

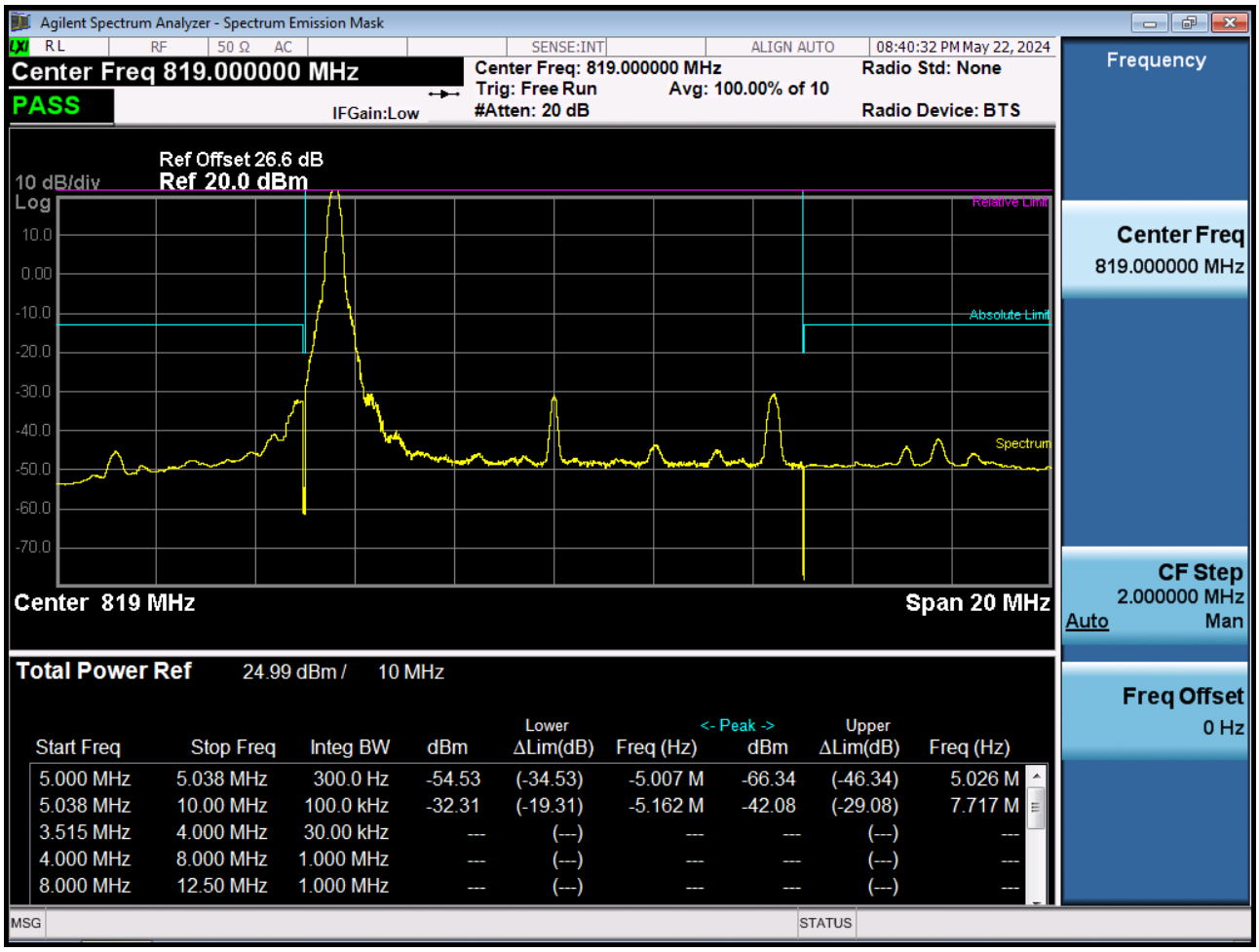
BAND 26. Lower Channel Edge Plot (5 M BW Ch.26715 QPSK RB 1, Offset 0)



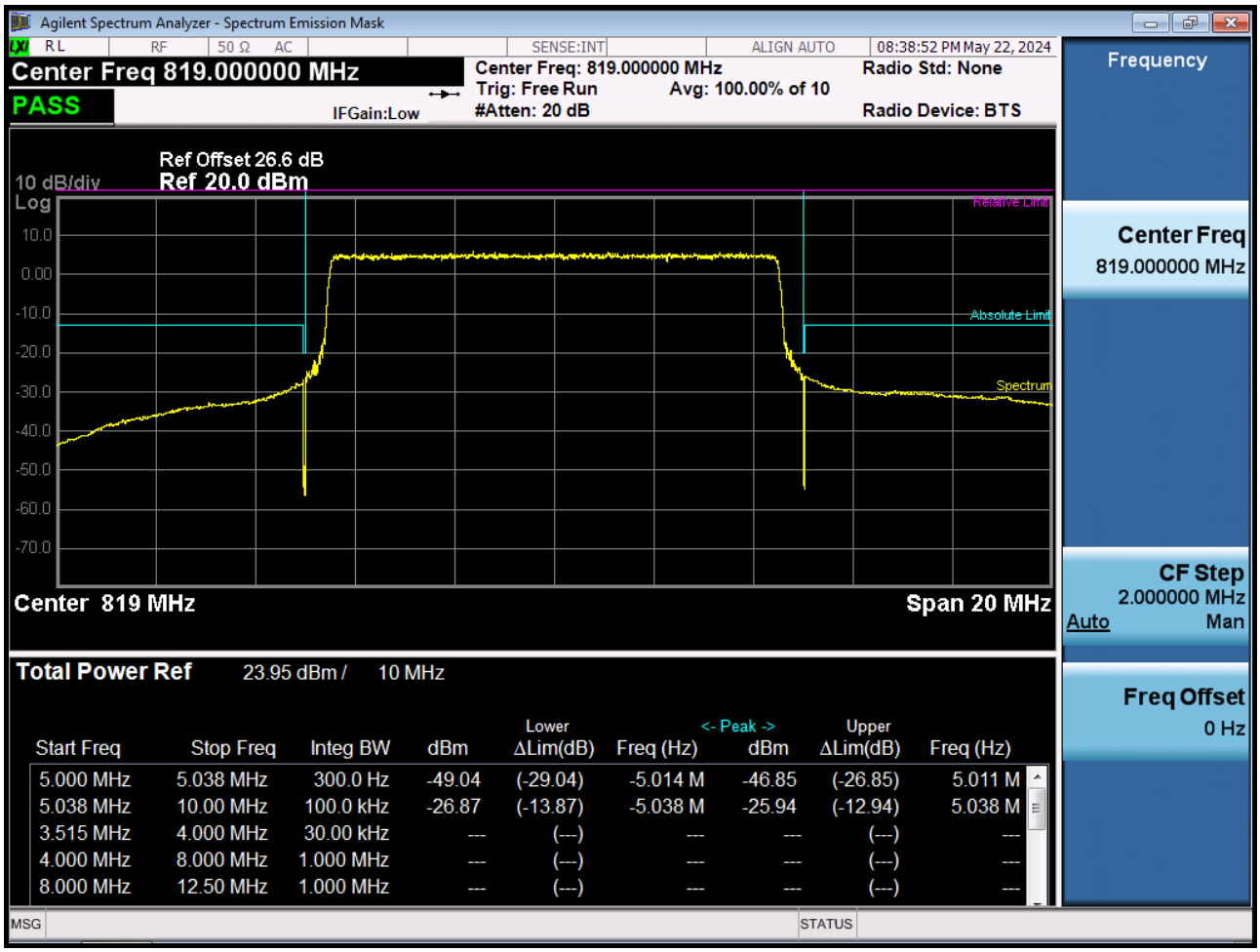
BAND 26. Lower Channel Edge Plot (5 M BW Ch.26715 QPSK_RB25_Offset 0)



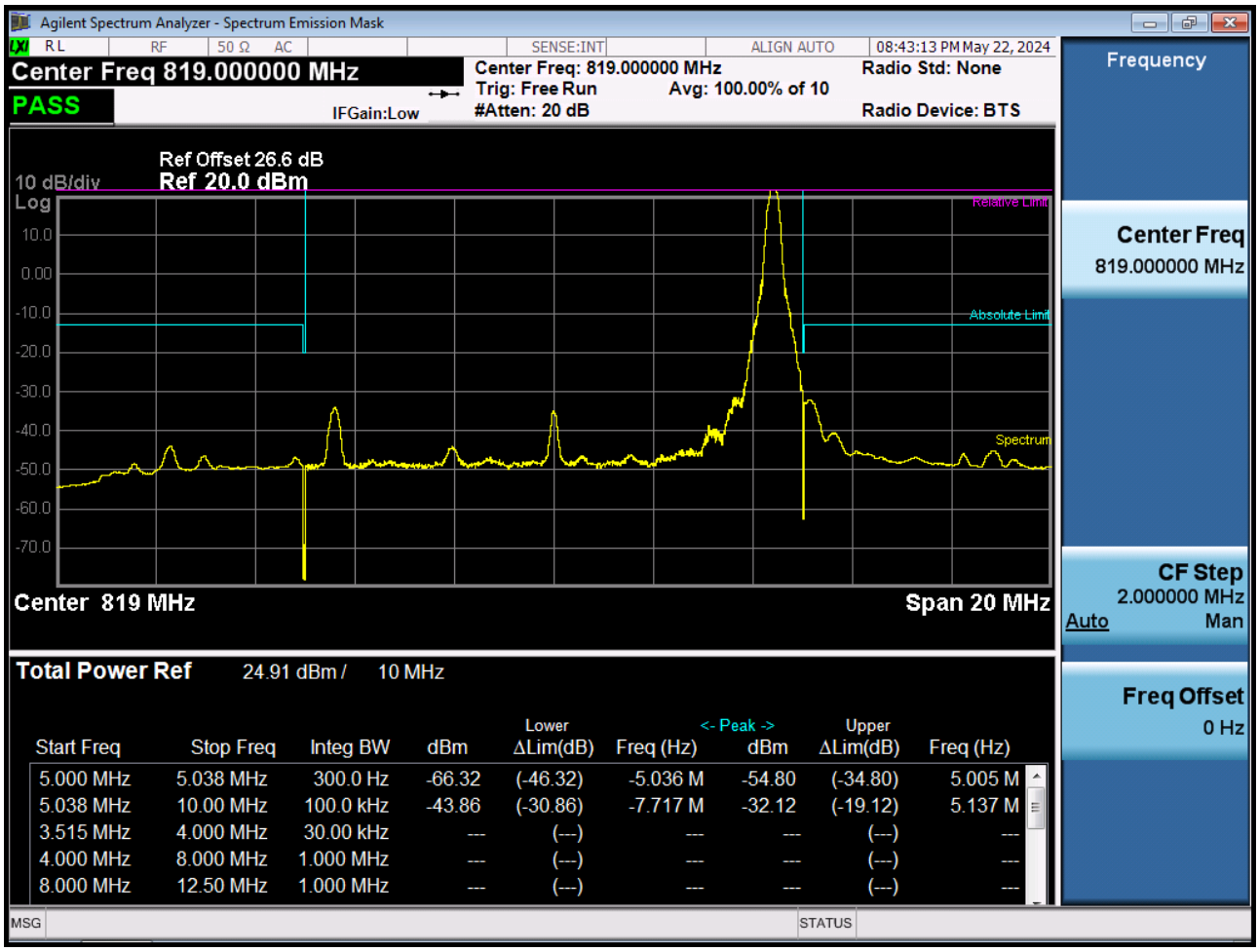
BAND 26. Low Channel Edge Plot (10 M BW Ch.26740 QPSK RB 1, Offset 0)



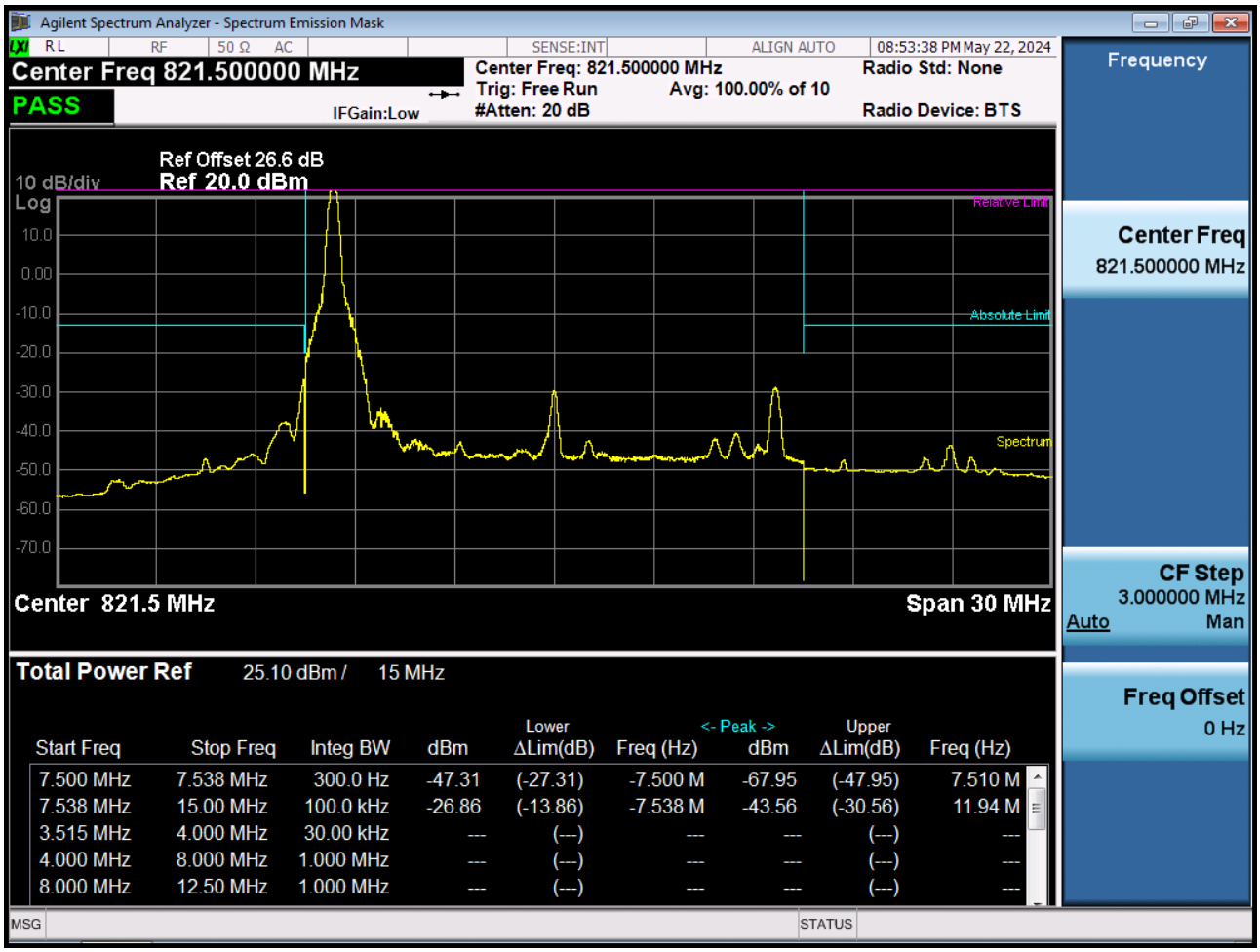
BAND 26. Low Channel Edge Plot (10 M BW Ch.26740 QPSK_RB50_Offset 0)



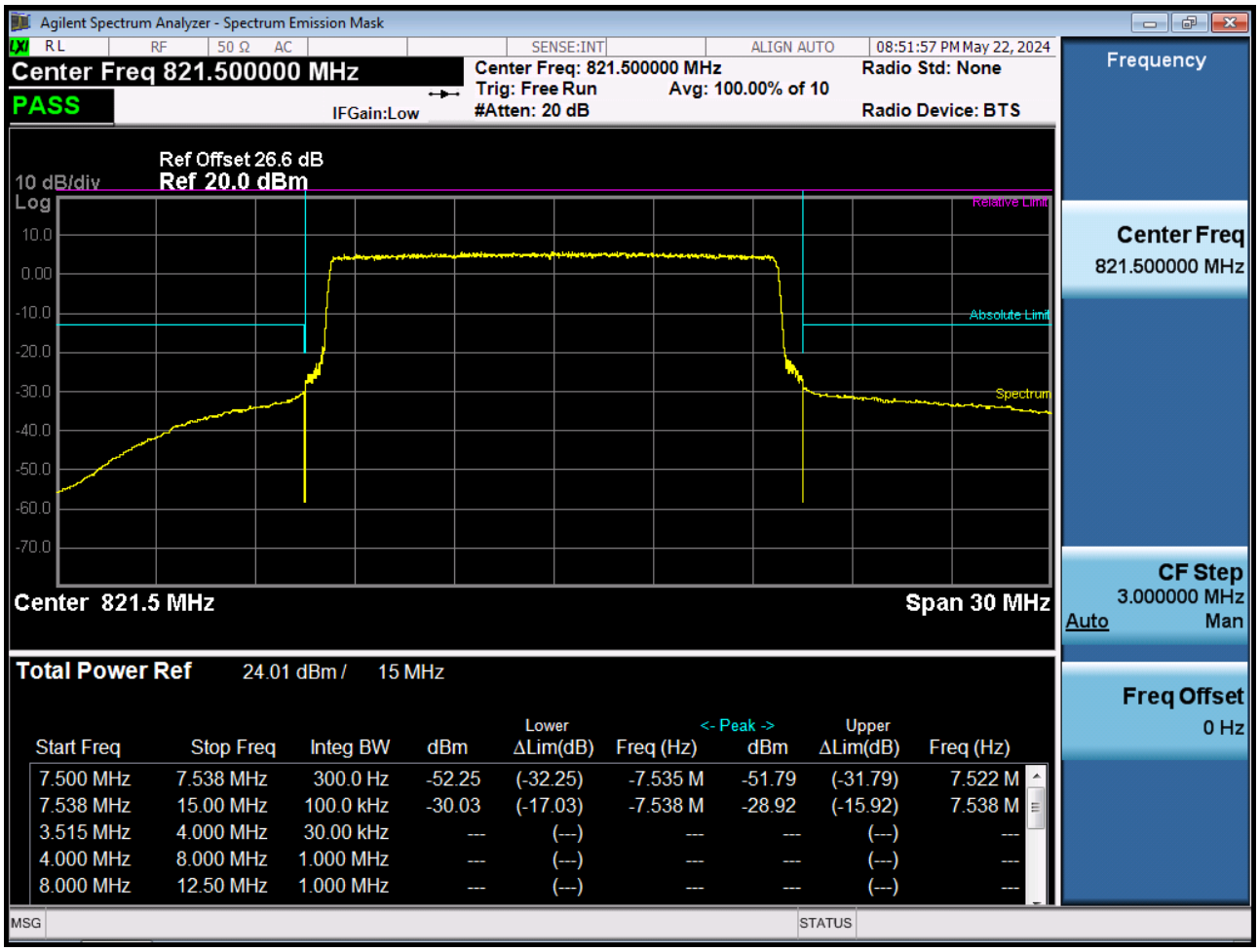
BAND 26. Mid Channel Edge Plot (10 M BW Ch. 26740 QPSK_RB1_Offset 49)



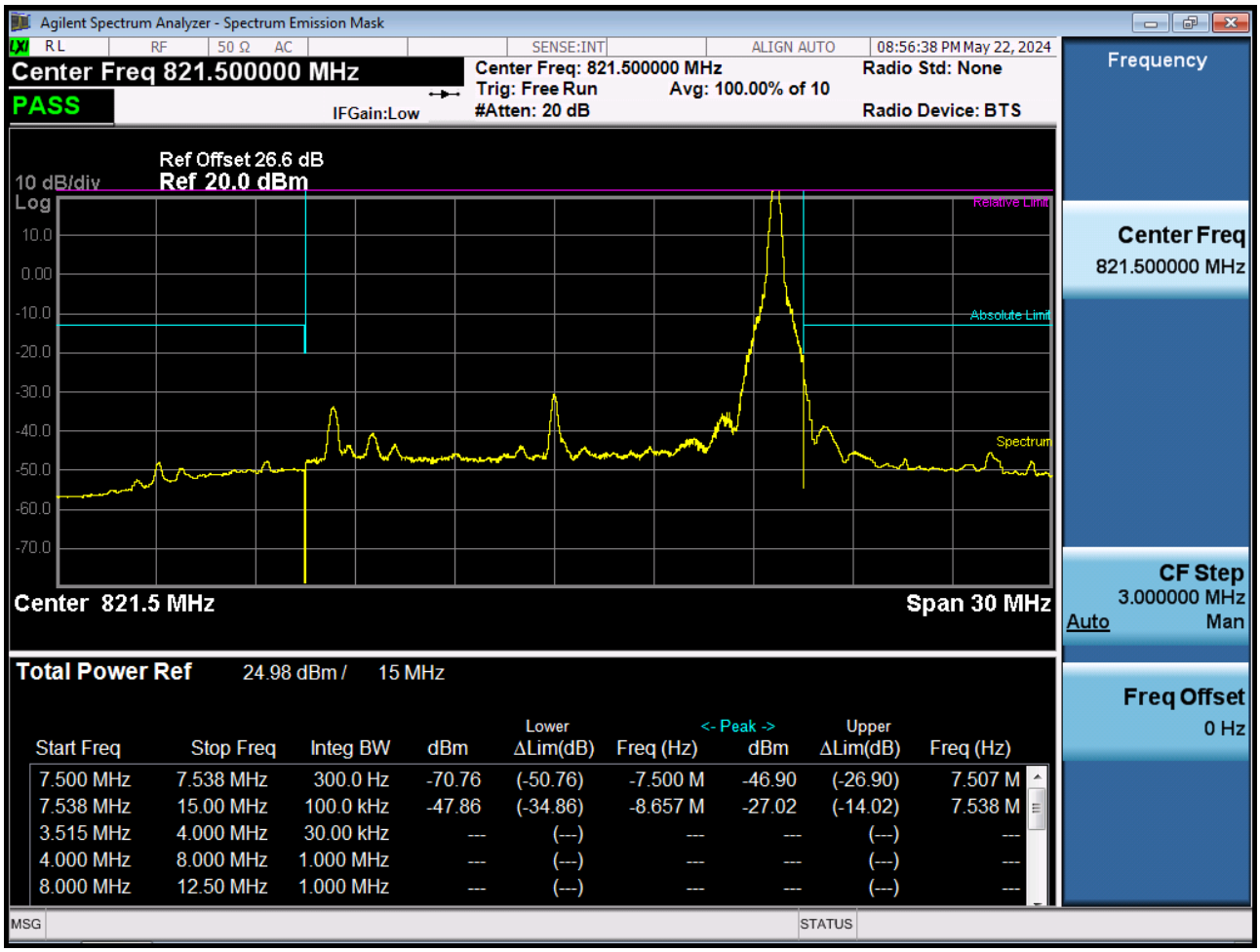
BAND 26. Low Channel Edge Plot (15 M BW Ch.26765 QPSK RB 1, Offset 0)



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



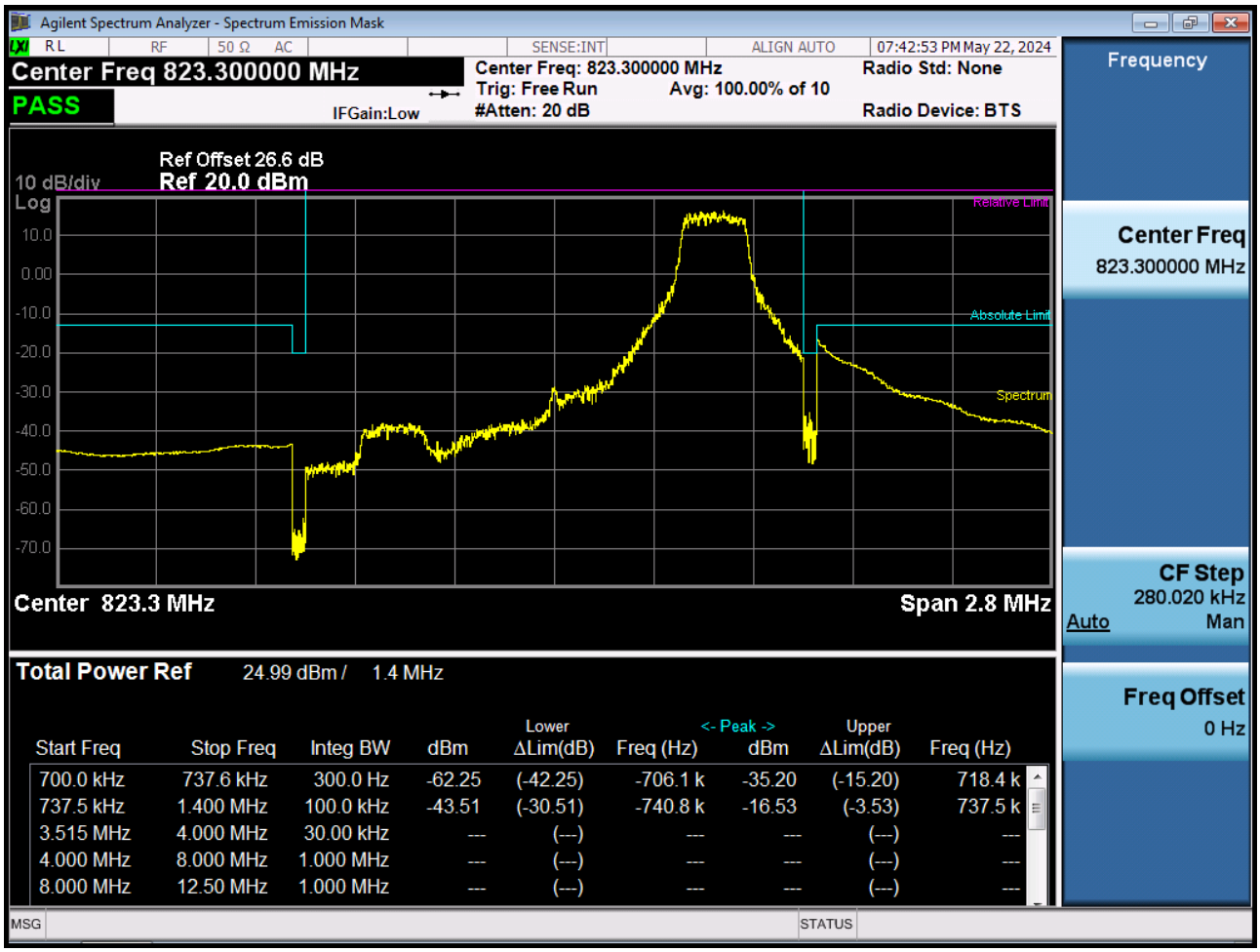
BAND 26. Mid Channel Edge Plot (15 M BW Ch.26765 QPSK_RB1_Offset 74)



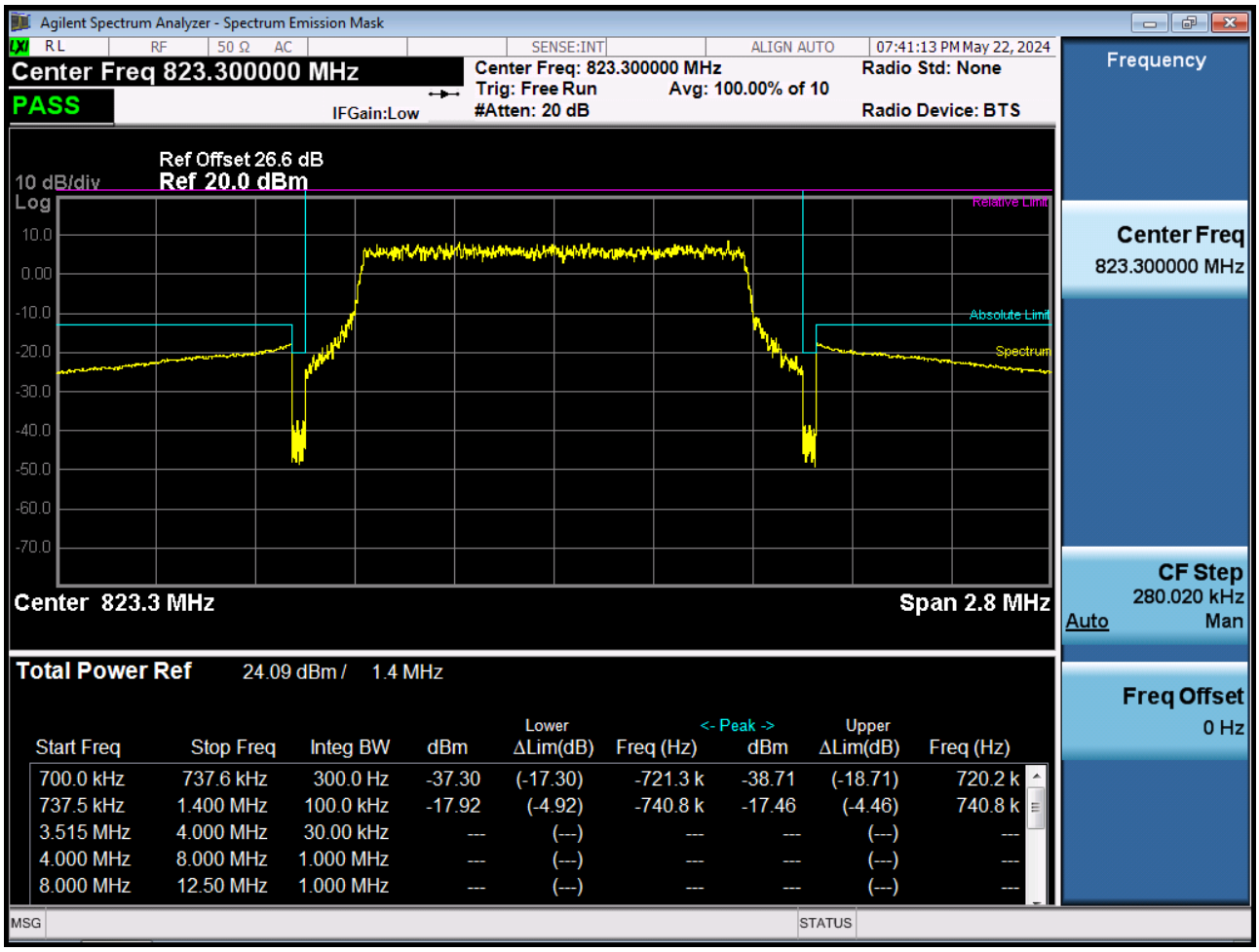
BAND 26. Mid Band Edge Plot (15 M BW Ch.26765 QPSK RB 1, Offset74)

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

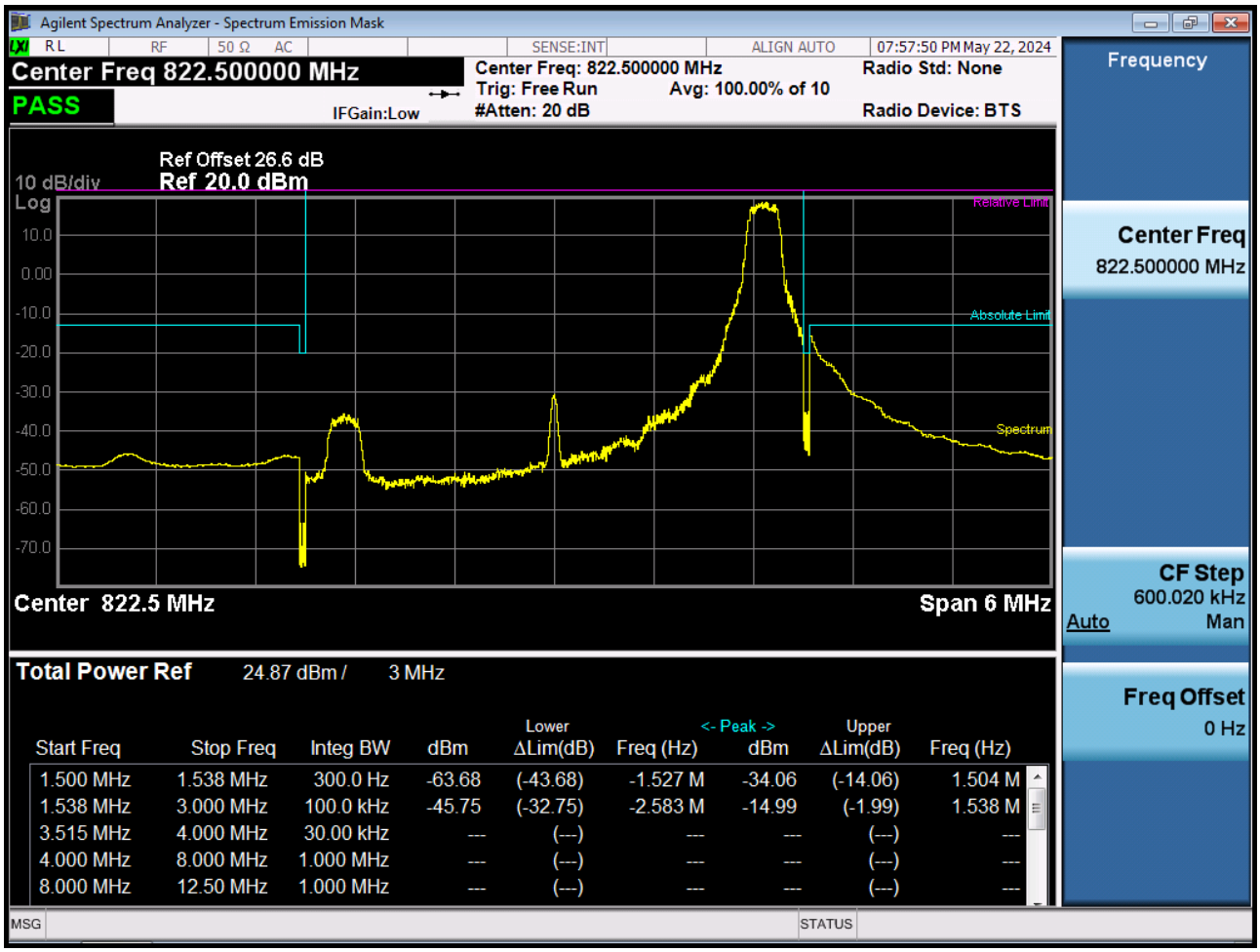
BAND 26. Upper Channel Edge Plot (1.4 M BW Ch.26783 QPSK_RB1_Offset 5)



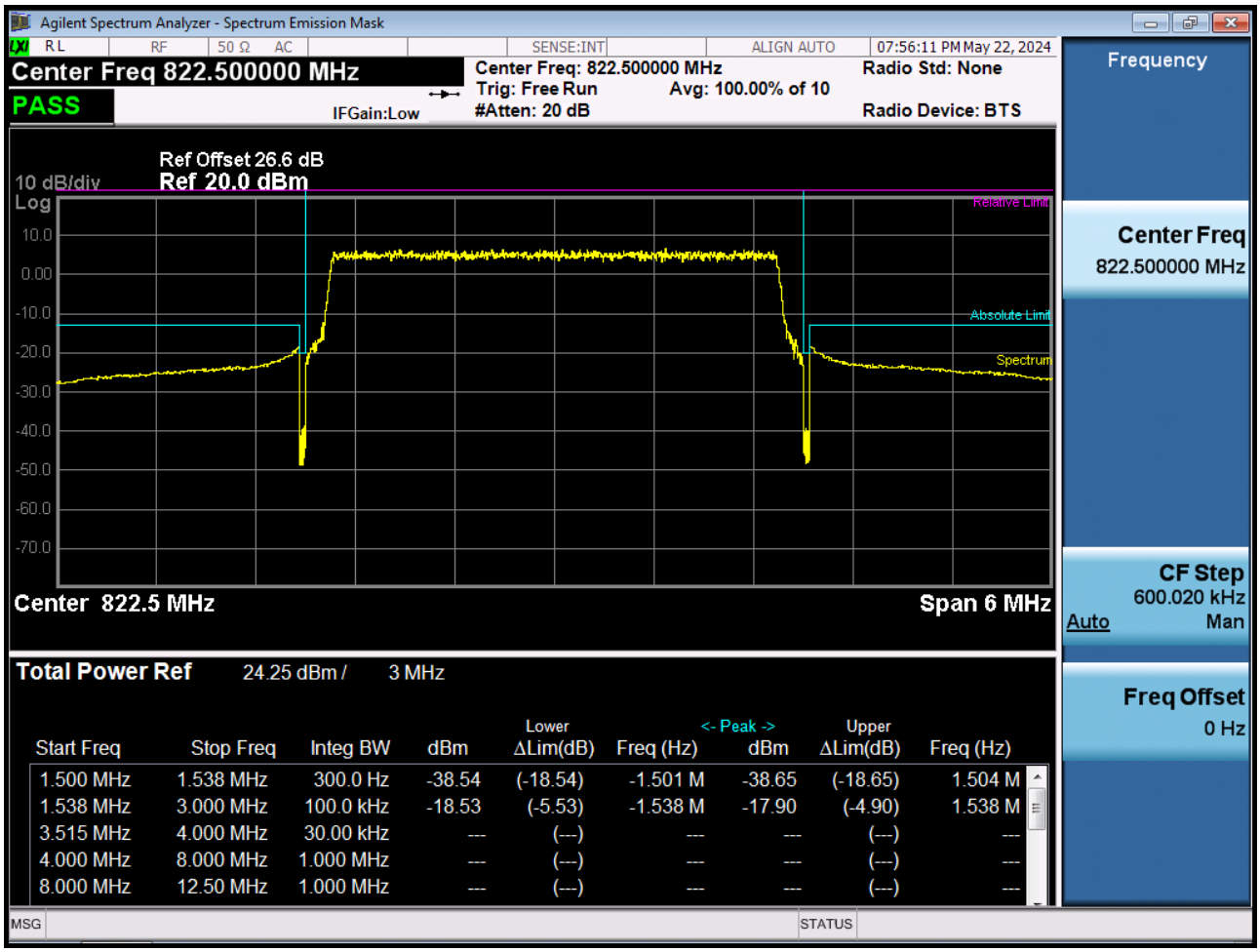
BAND 26. Upper Channel Edge Plot (1.4 M BW Ch.26783 QPSK_RB6_Offset 0)



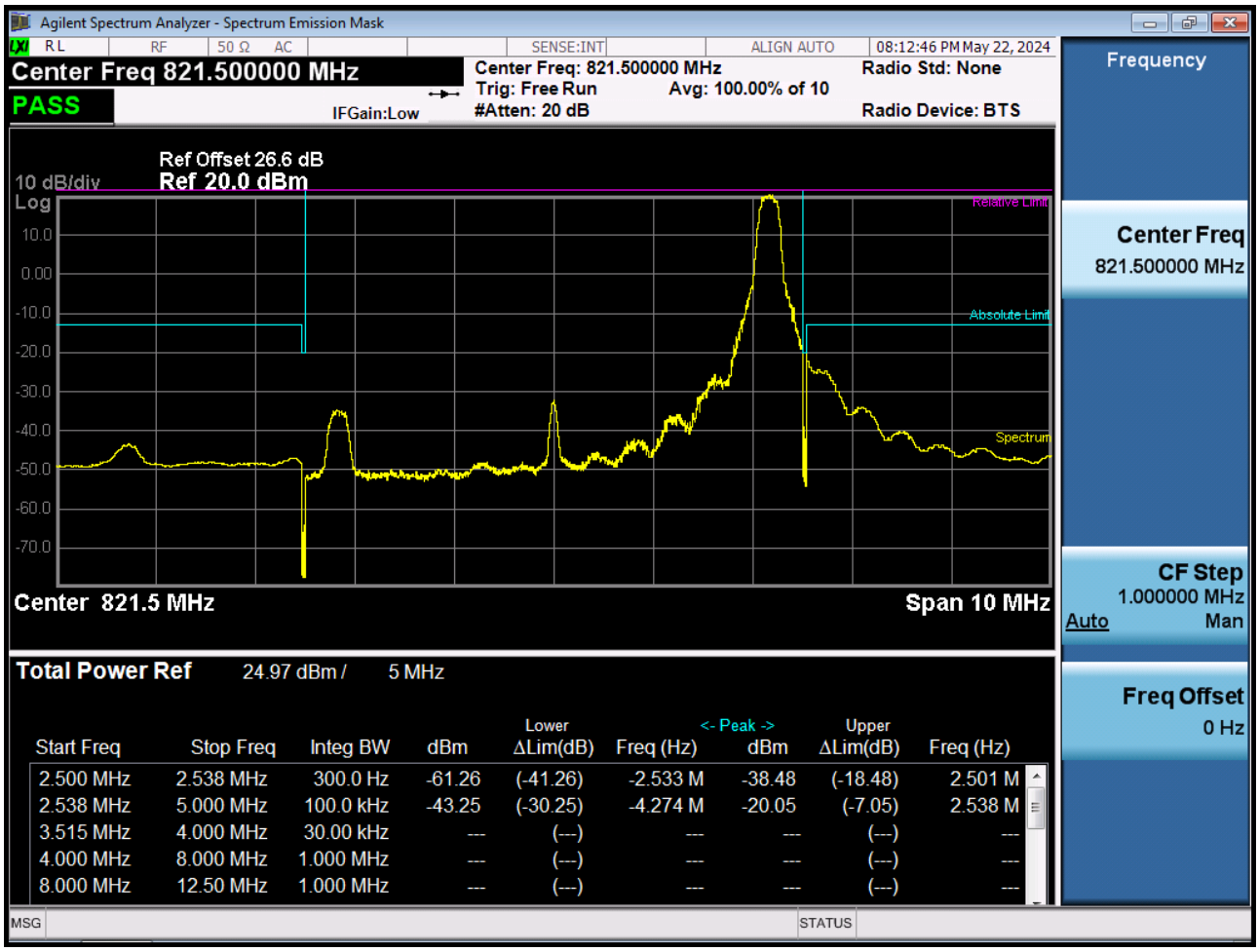
BAND 26. Upper Channel Edge Plot (3 M BW Ch.26775 QPSK_RB1_Offset 14)



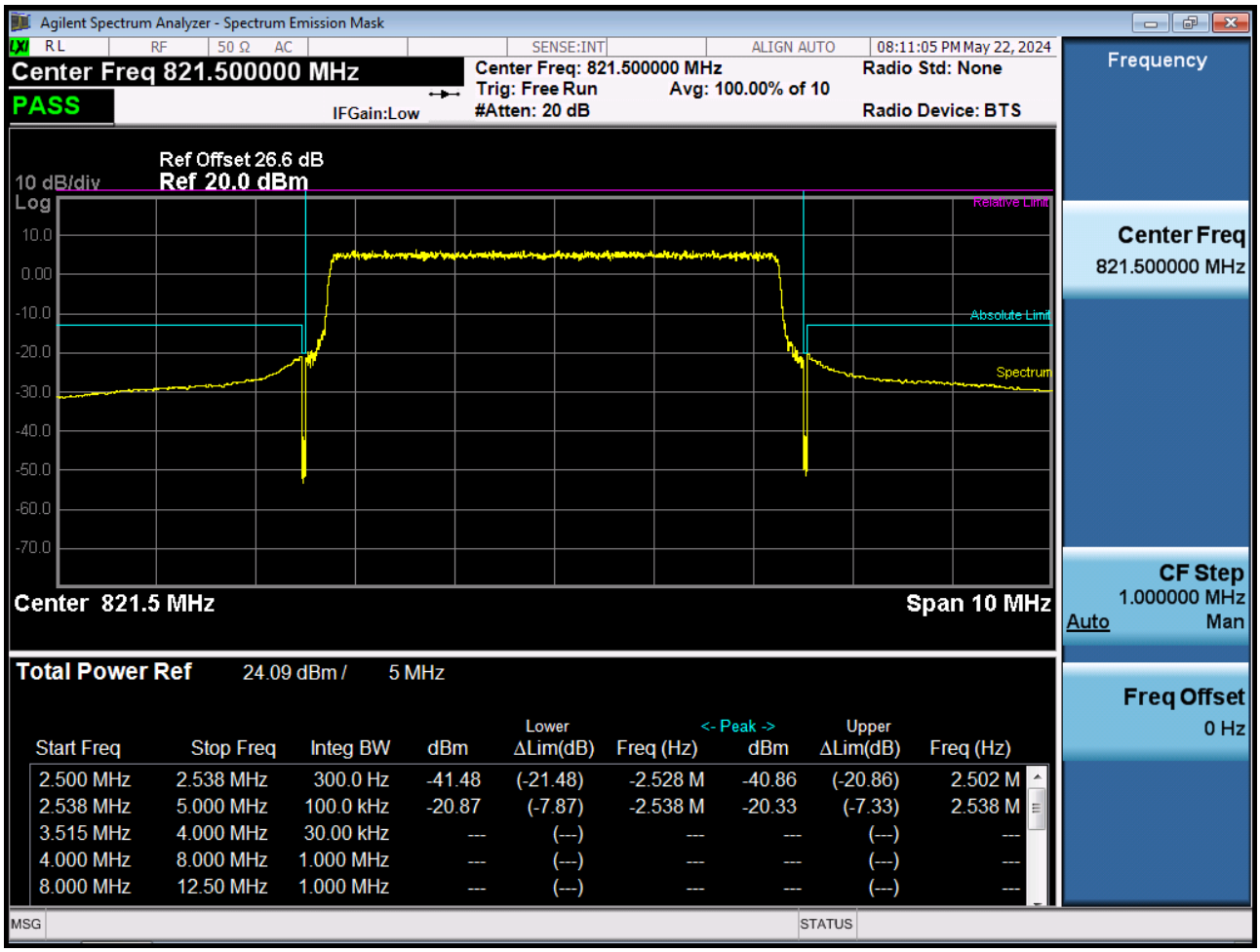
BAND 26. Upper Channel Edge Plot (3 M BW Ch.26775 QPSK_RB15_Offset 0)



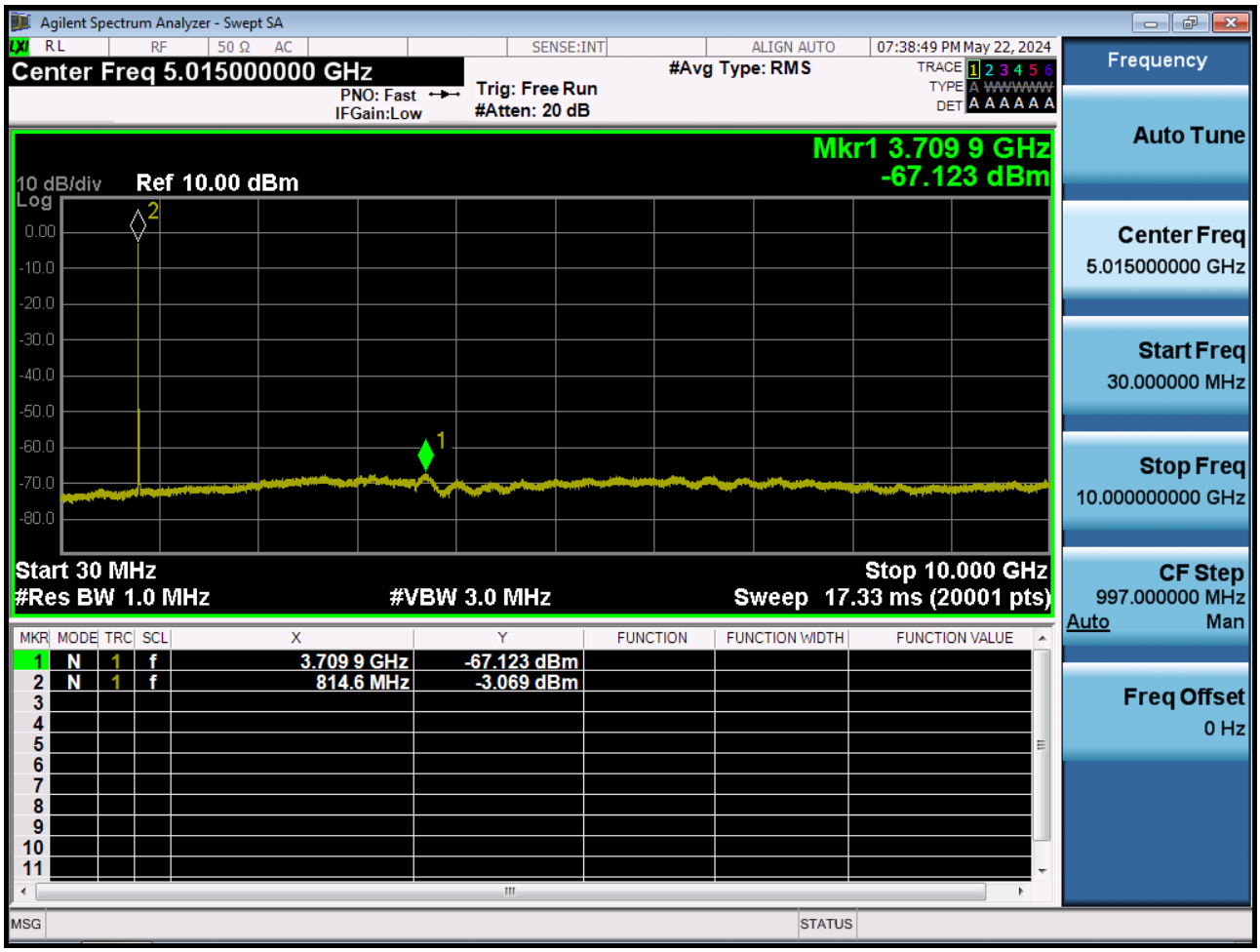
BAND 26. Upper Channel Edge Plot (5 M BW Ch.26765 QPSK_RB1_Offset 24)



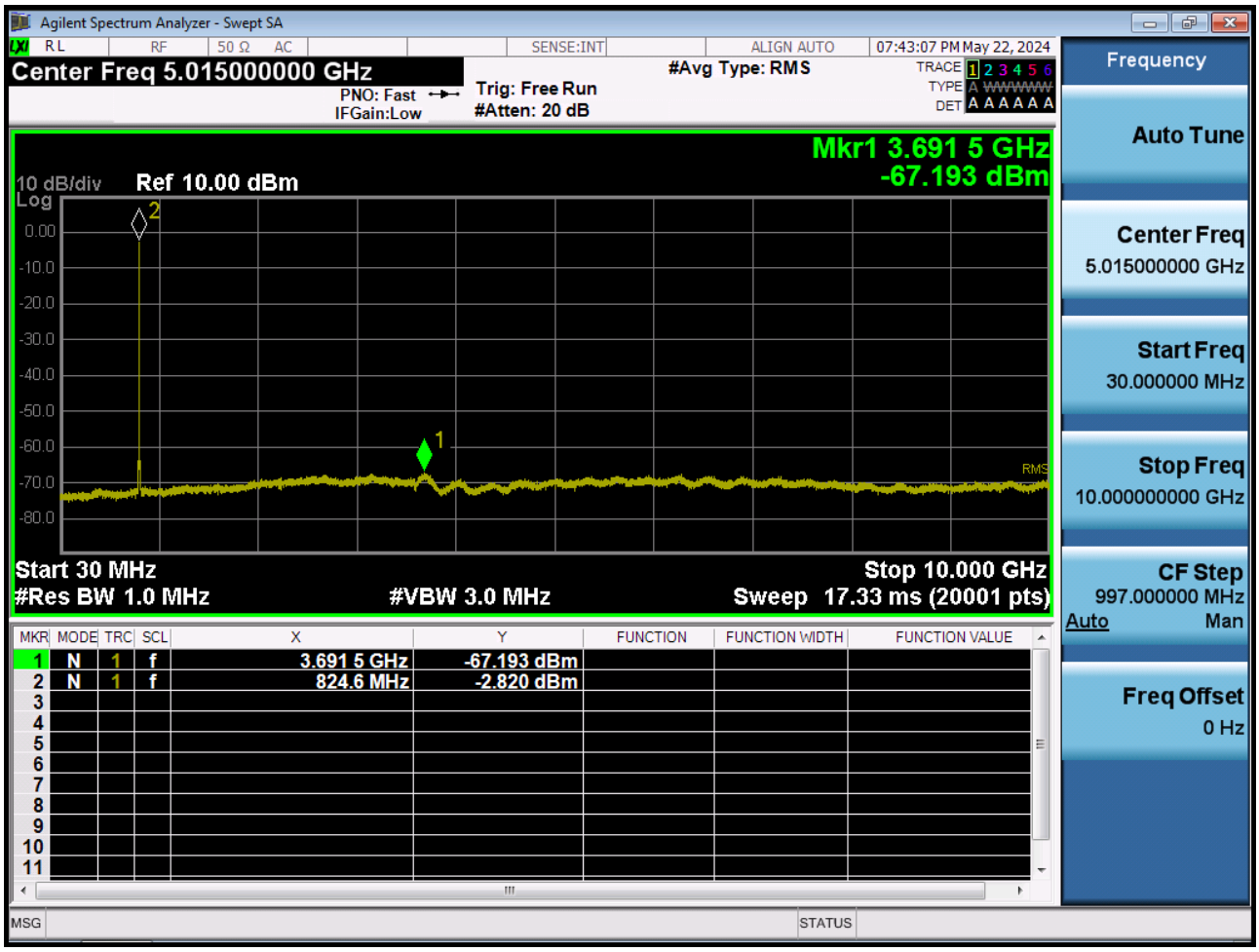
BAND 26. Upper Channel Edge Plot (5 M BW Ch.26765 QPSK_RB25_Offset 0)



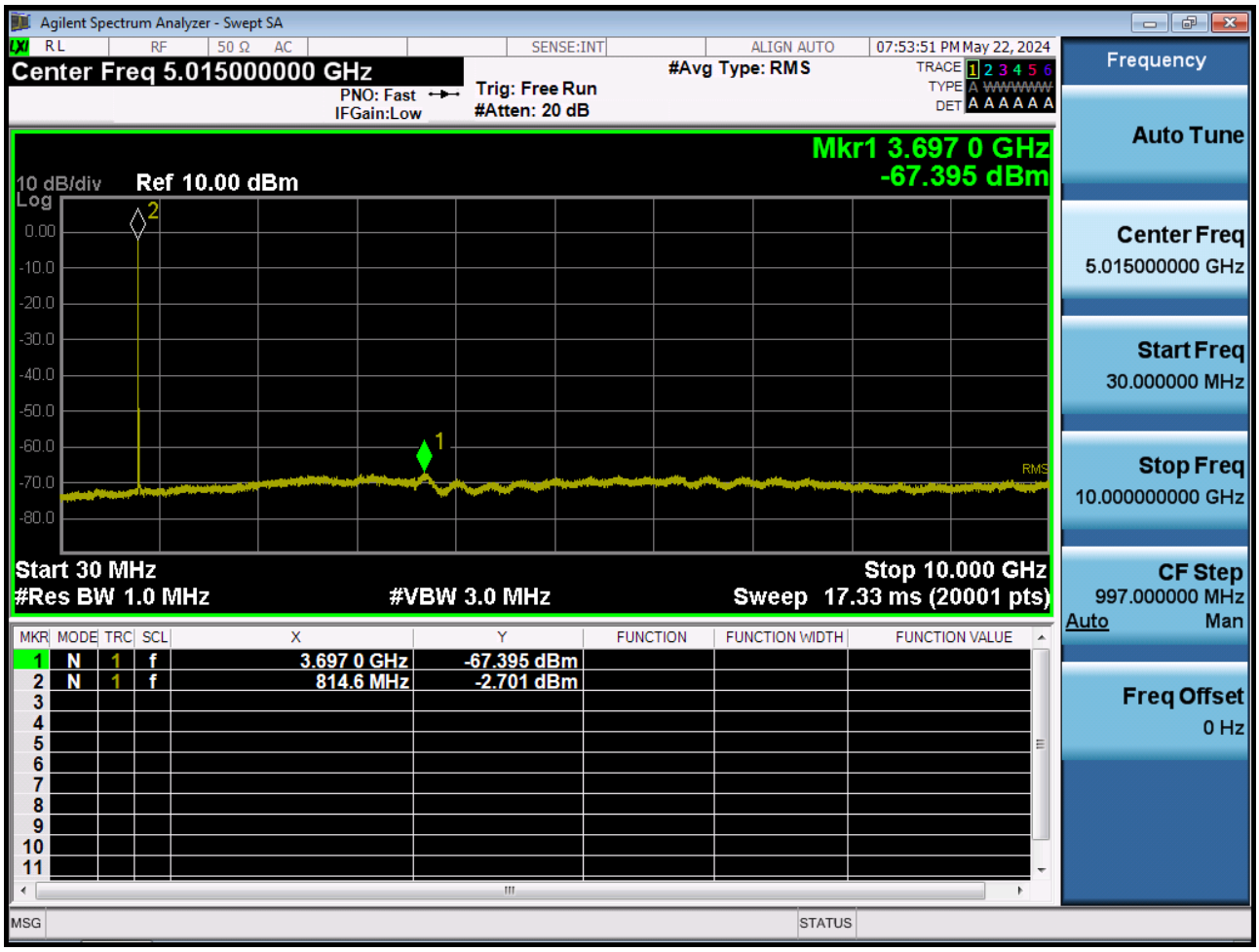
BAND 26. Conducted Spurious (26697 ch_1.4 MHz_QPSK_RB 1_0)



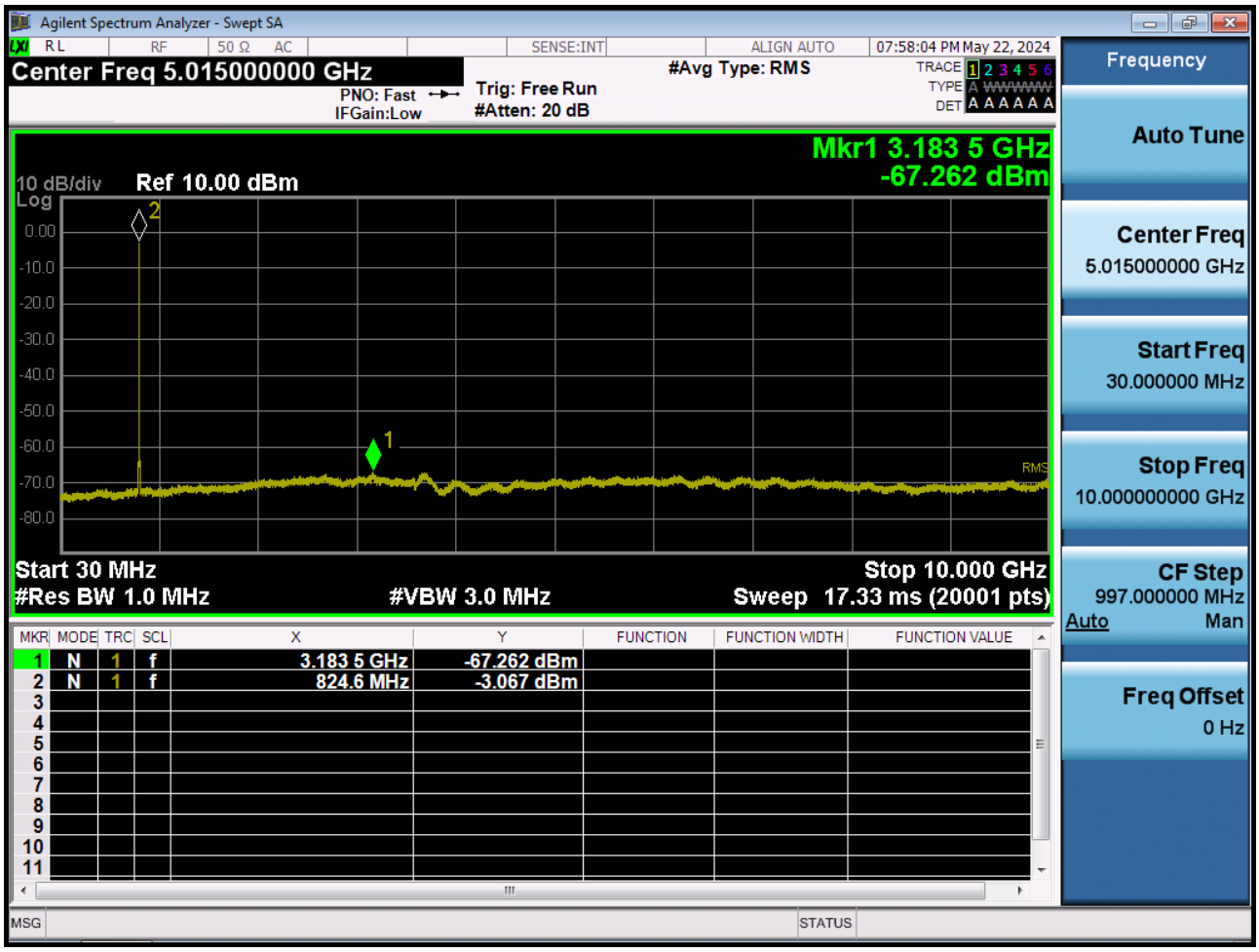
BAND 26. Conducted Spurious (26783 ch_1.4 MHz_QPSK_RB 1_0)



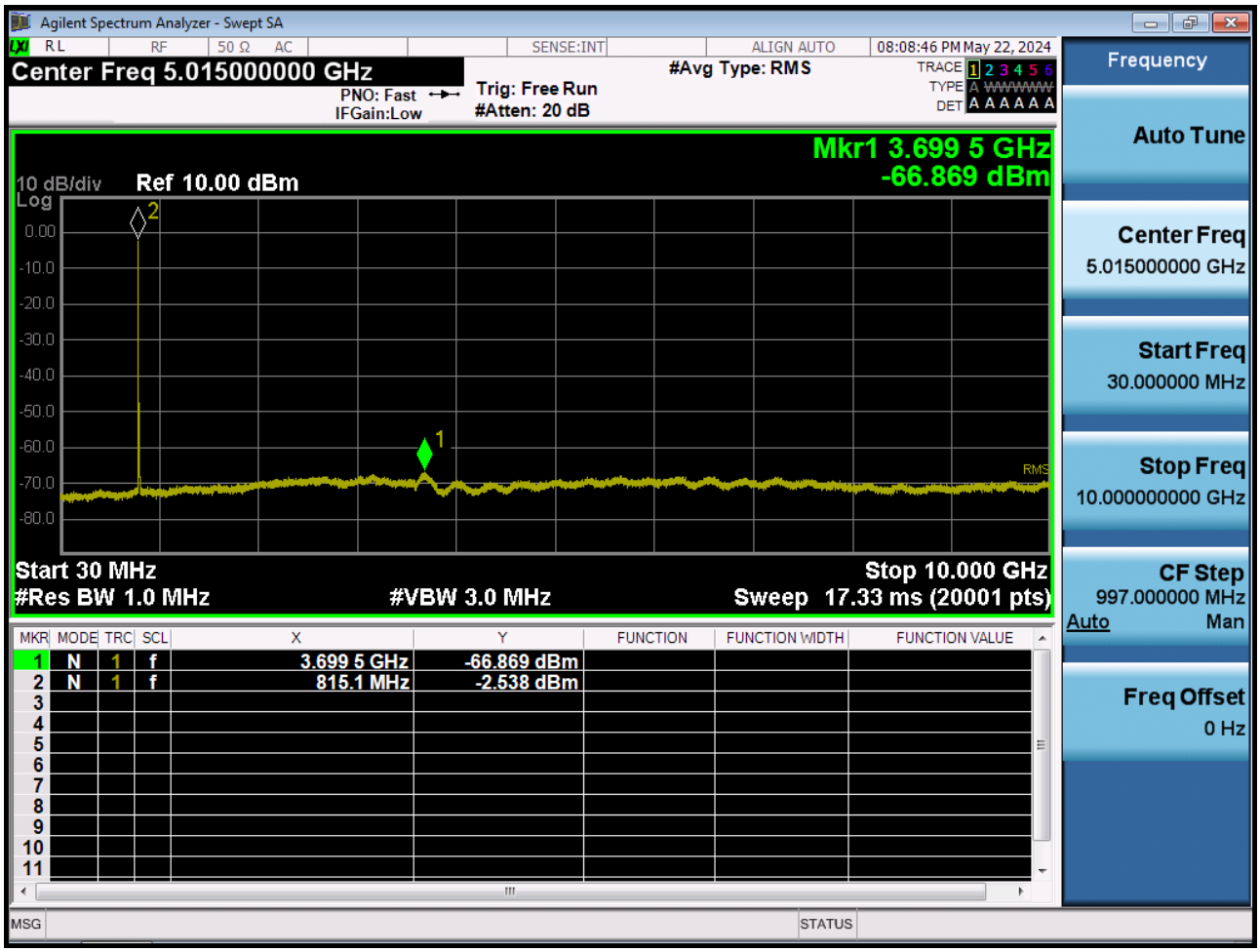
BAND 26. Conducted Spurious (26705 ch_3 MHz_QPSK_RB 1_0)



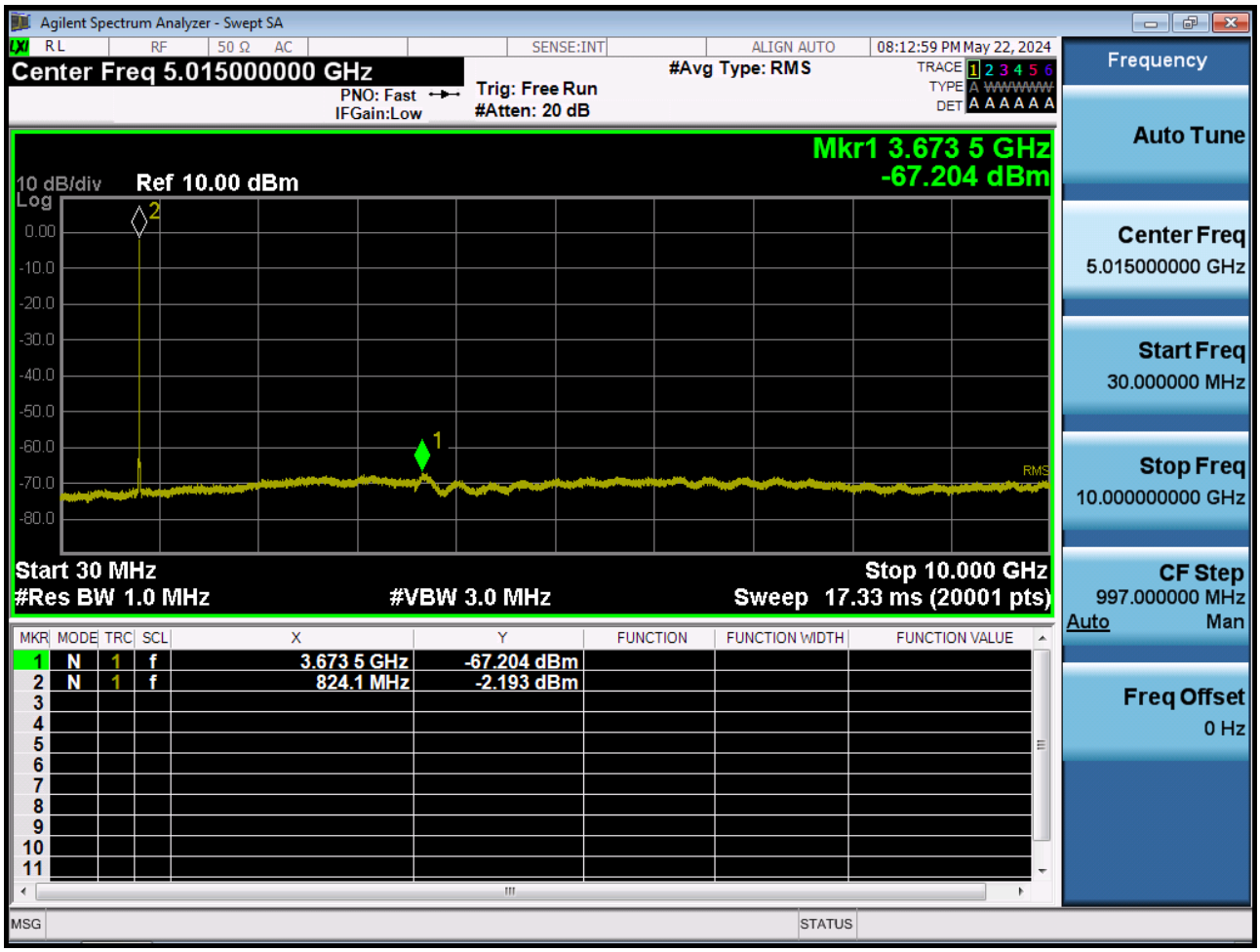
BAND 26. Conducted Spurious (26775 ch_3 MHz_QPSK_RB 1_0)



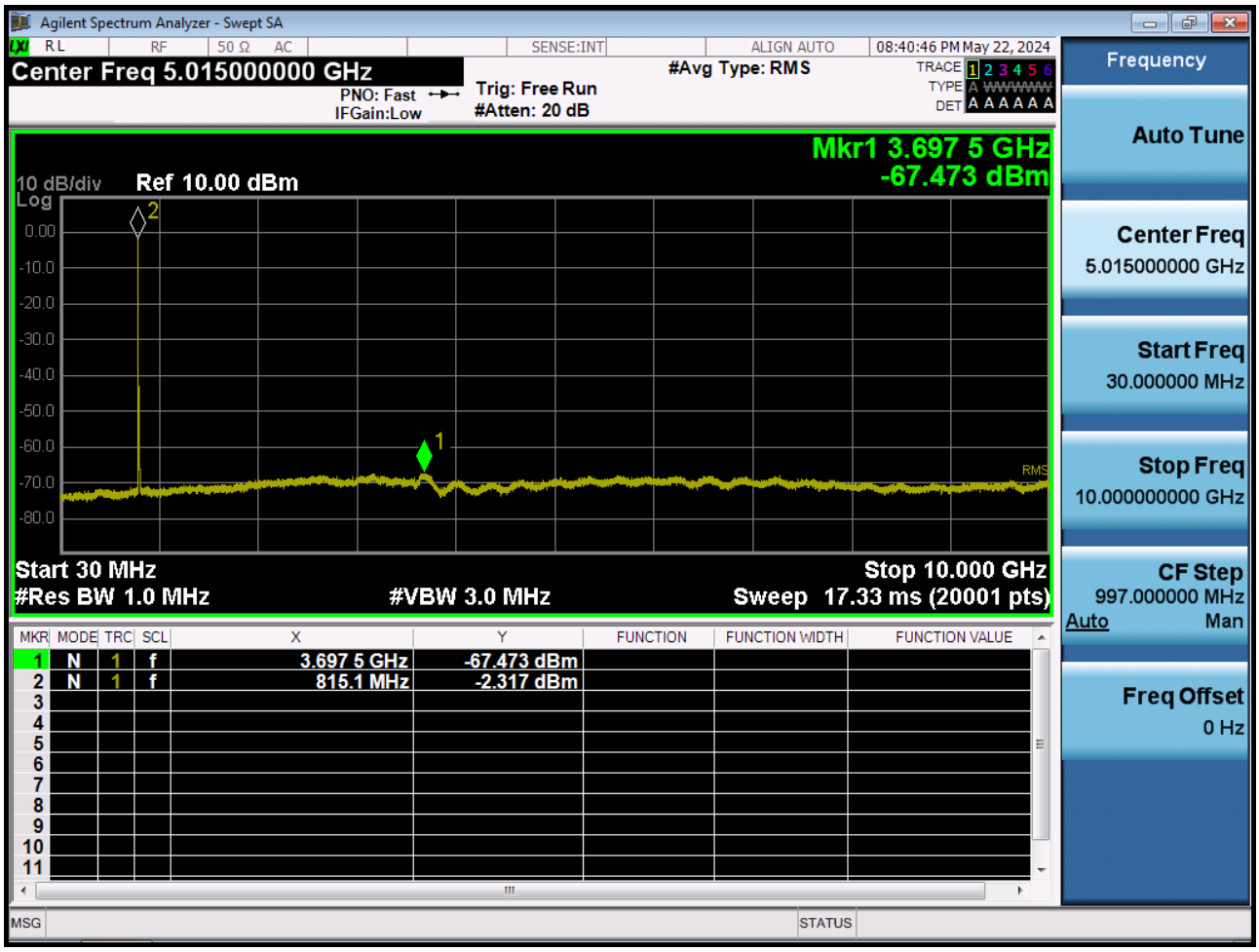
BAND 26. Conducted Spurious (26715 ch_5 MHz_QPSK_RB 1_0)



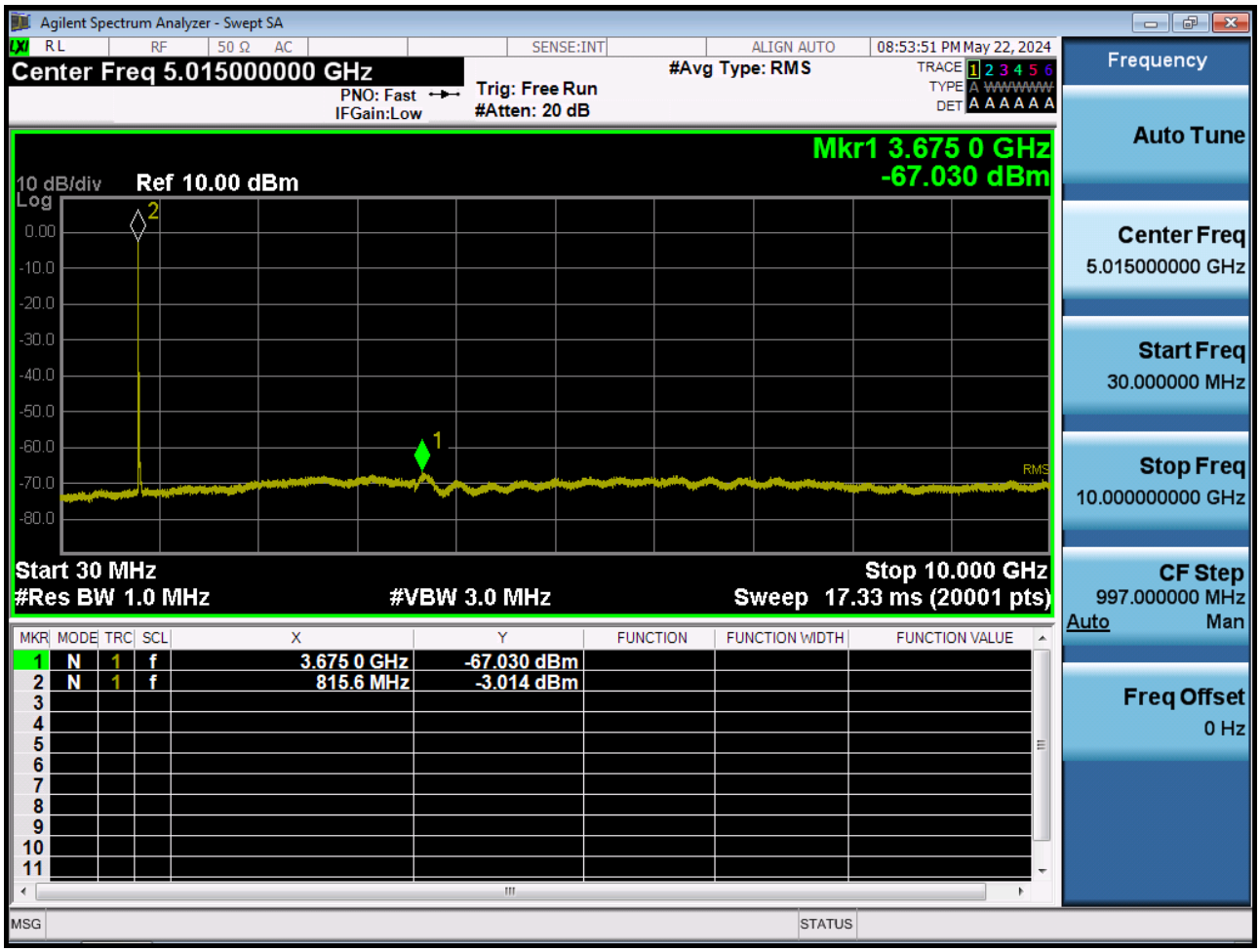
BAND 26. Conducted Spurious (26765 ch_5 MHz_QPSK_RB 1_0)



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

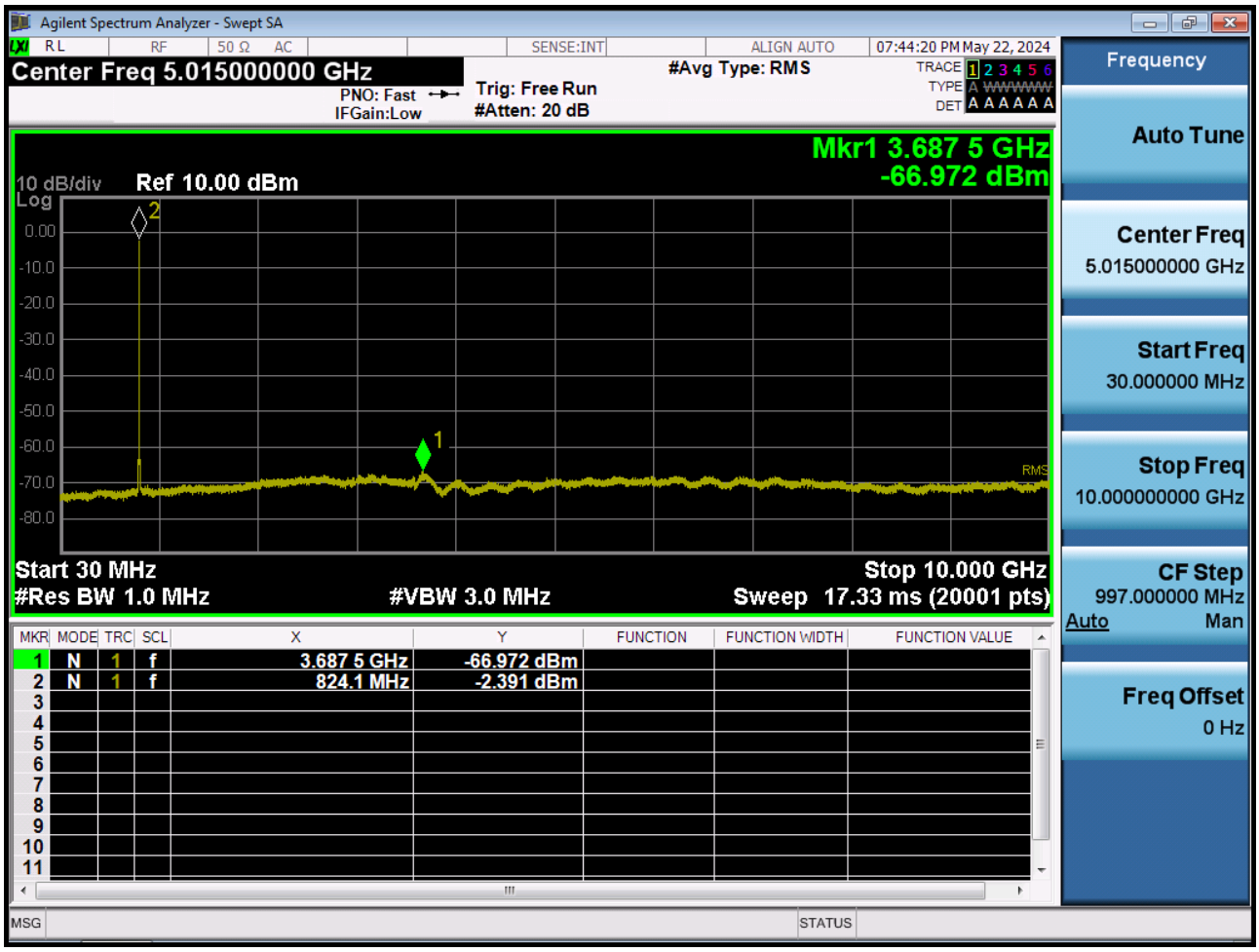


BAND 26. Conducted Spurious (26765 ch_15 MHz_QPSK_RB 1_0)

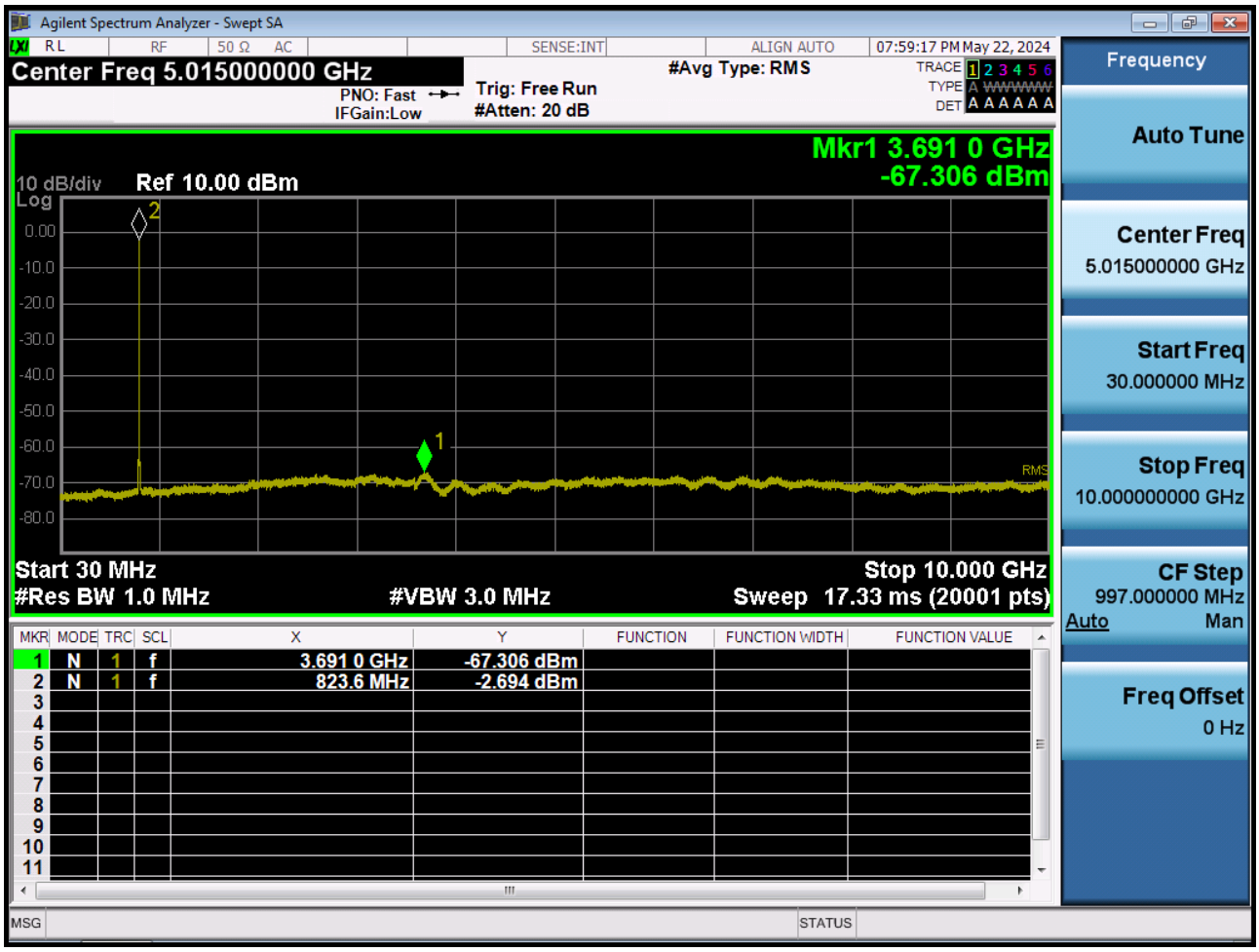


10. TEST PLOTS (STRADDLE CHANNEL)

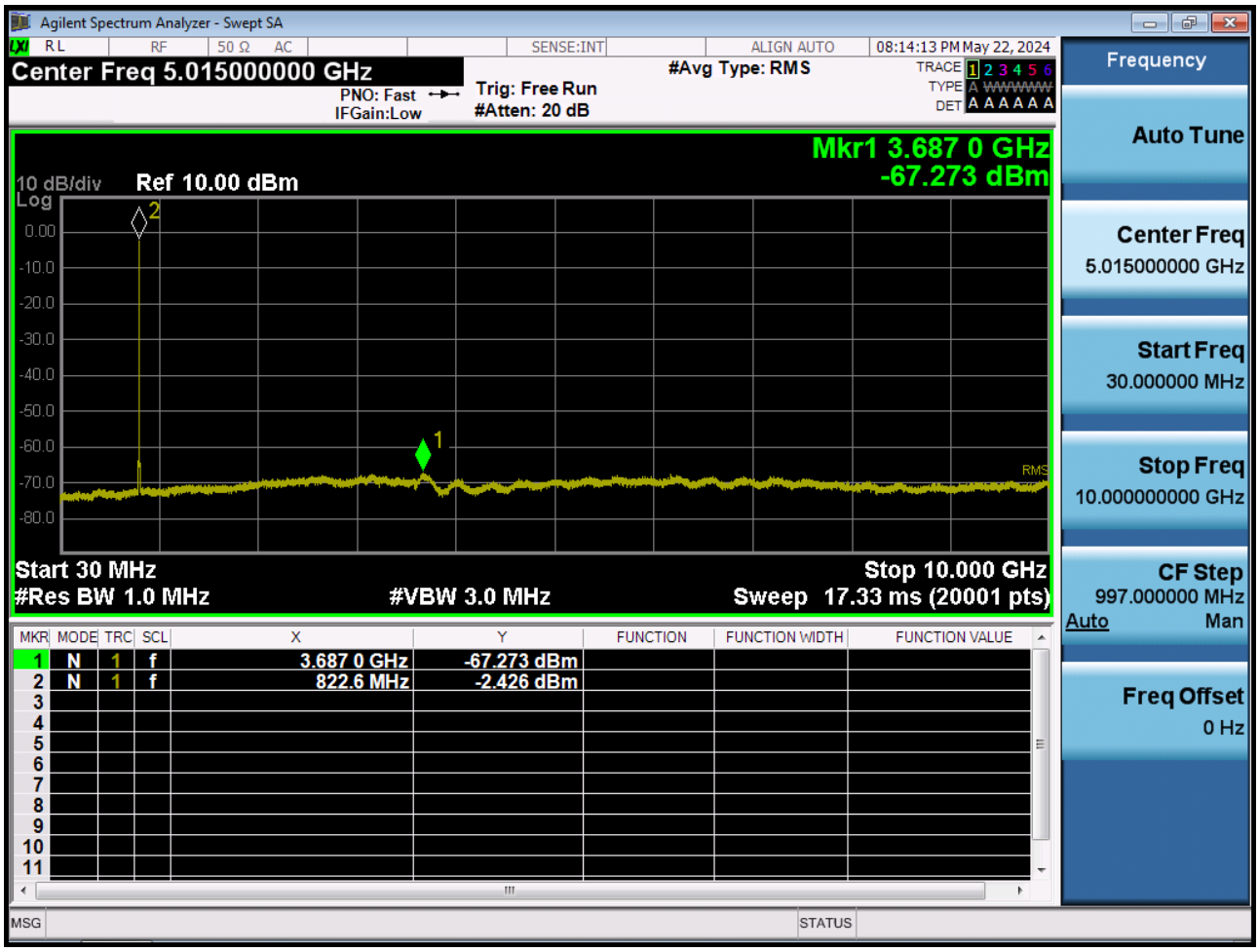
BAND 26. Conducted Spurious (1.4 MHz_QPSK_RB 1_0)



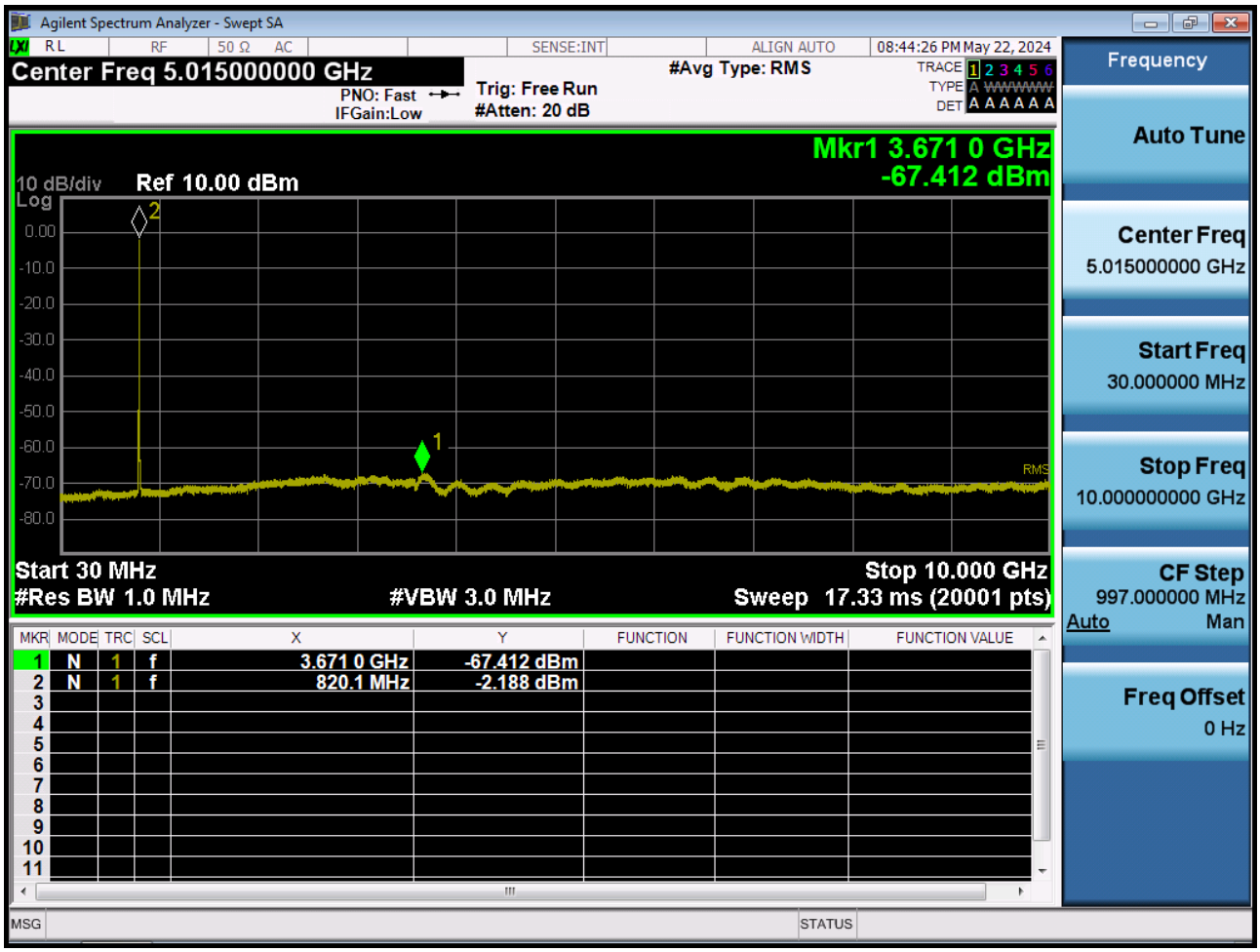
BAND 26. Conducted Spurious (3 MHz_QPSK_RB 1_0)



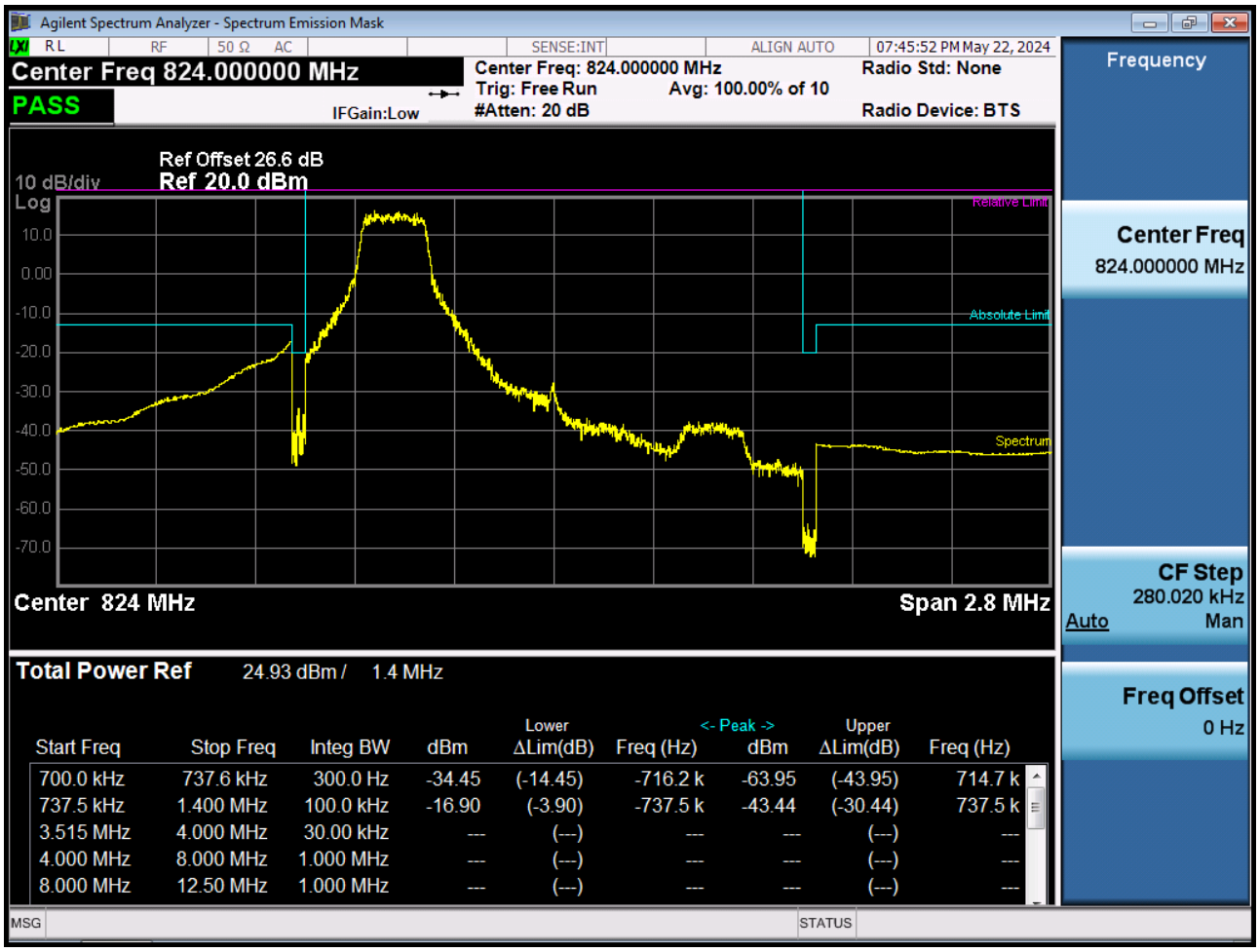
BAND 26. Conducted Spurious (5 MHz_QPSK_RB 1_0)



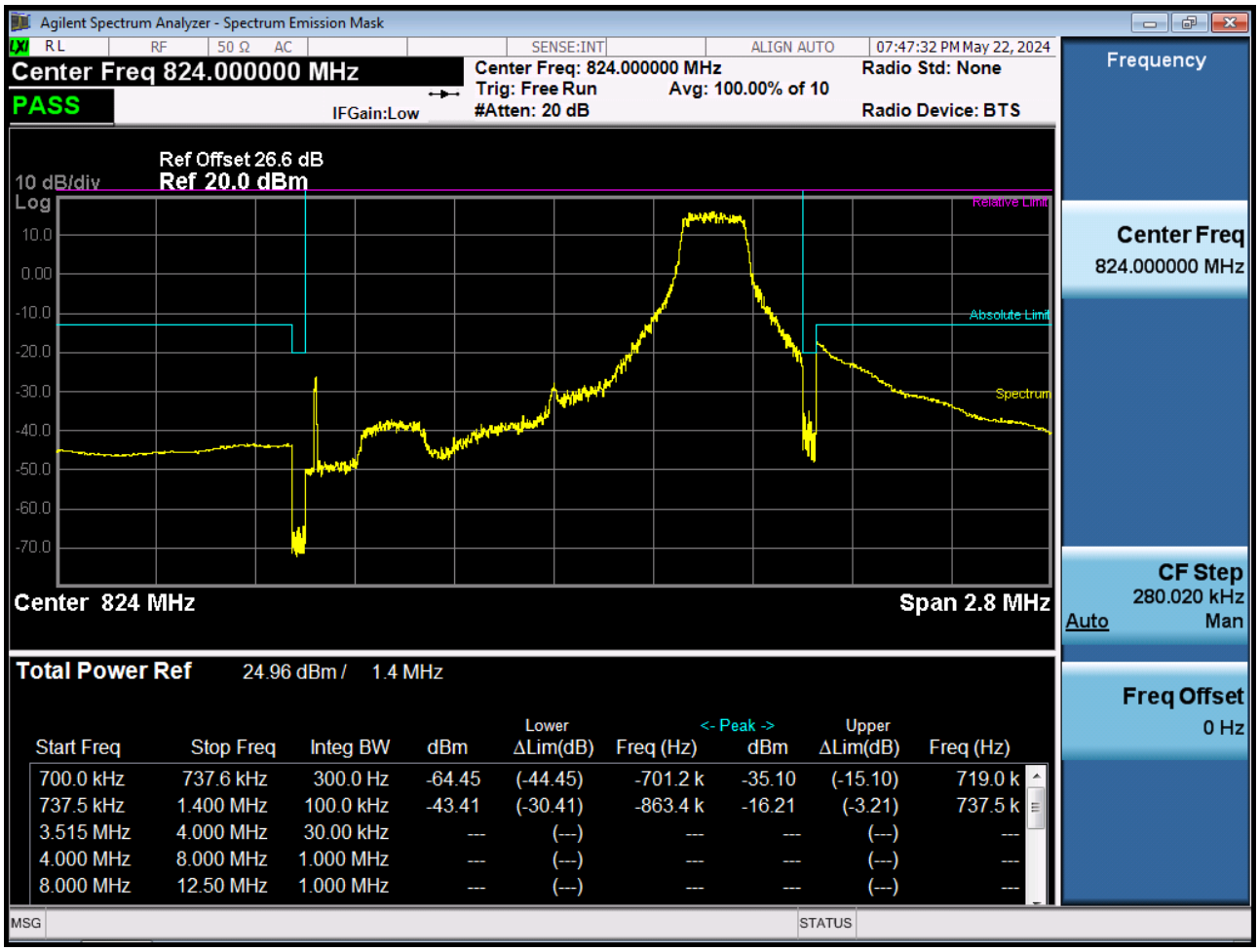
BAND 26. Conducted Spurious (10 MHz_QPSK_RB 1_0)



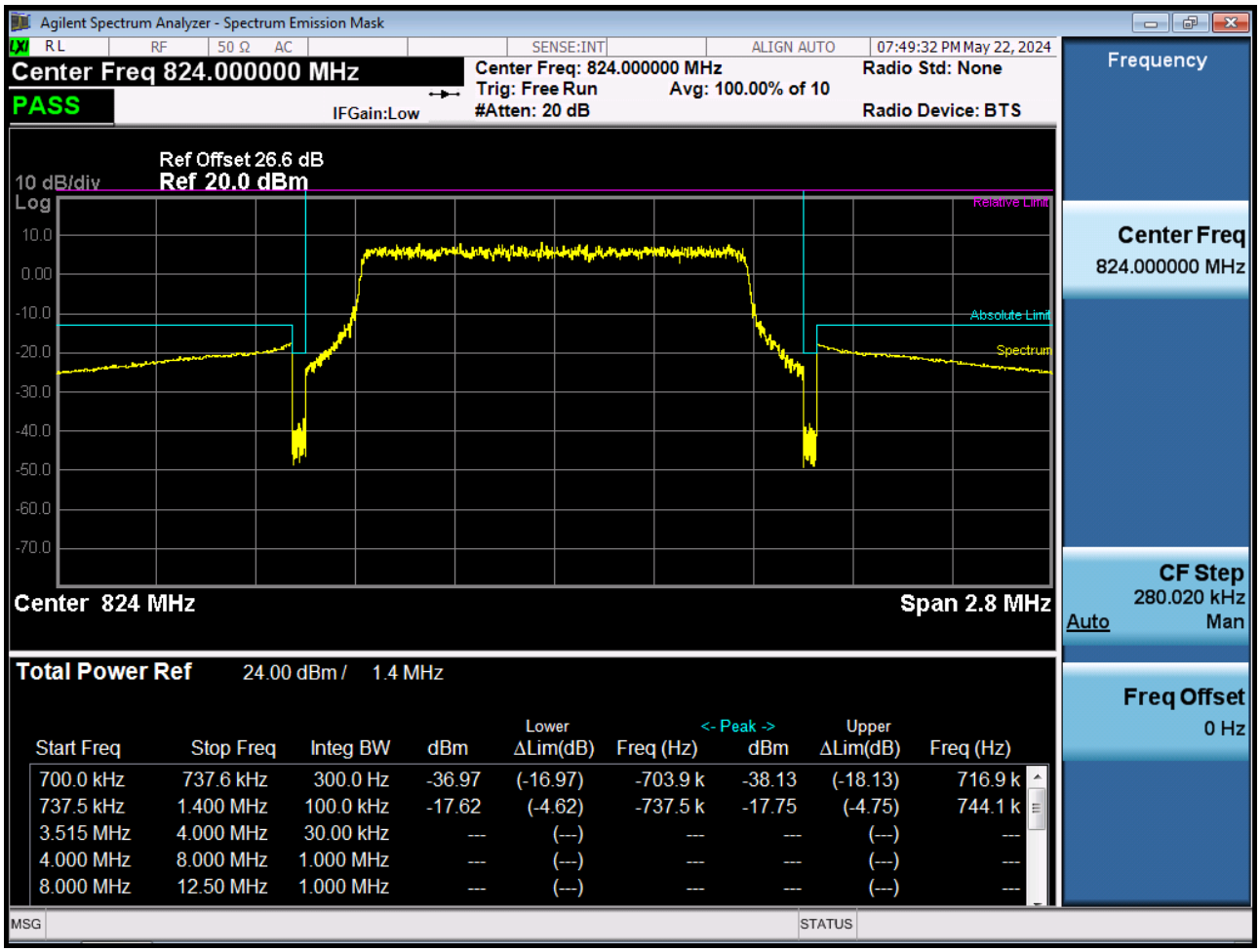
BAND 26. Channel Edge (1.4 MHz_QPSK_RB 1_0)



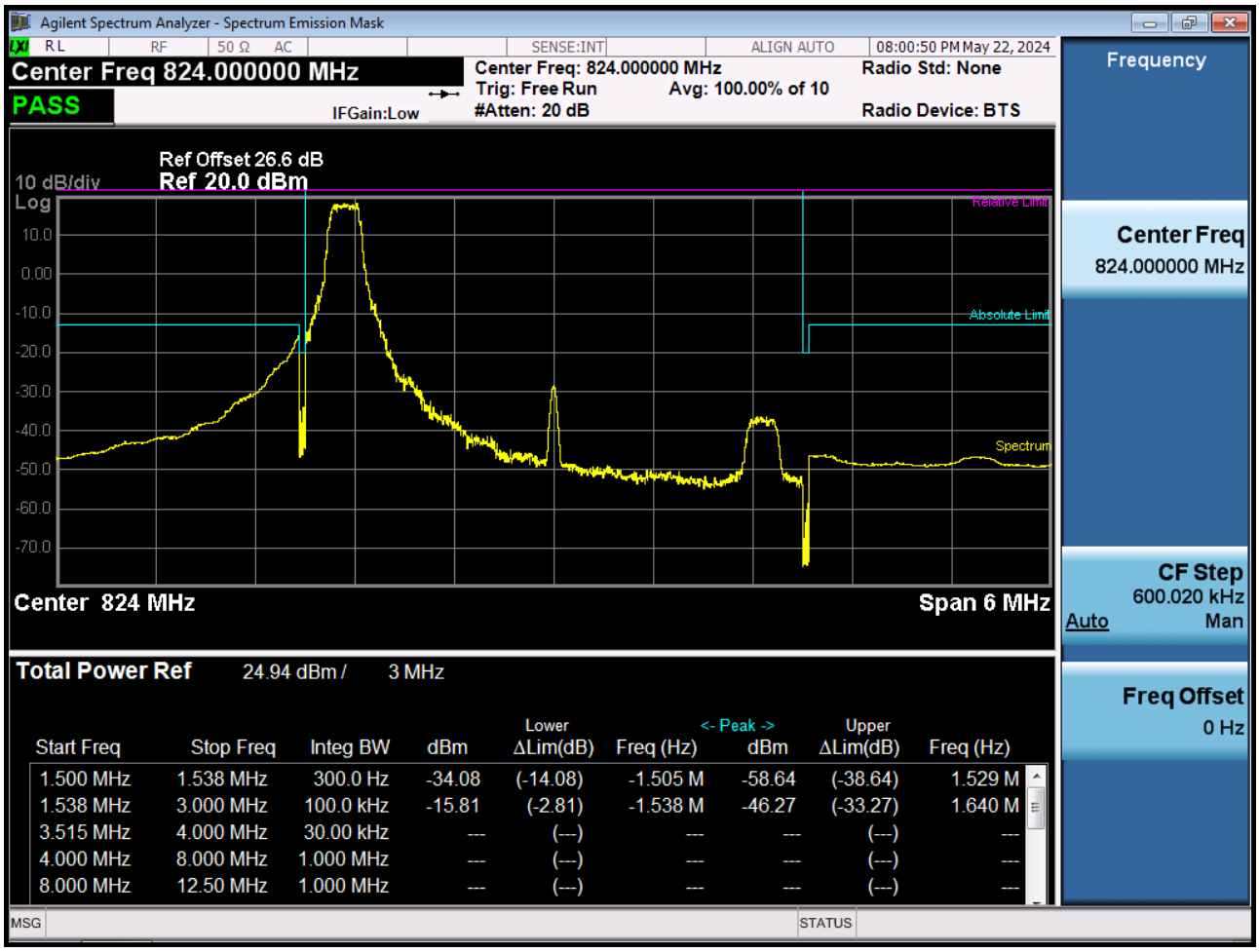
BAND 26. Channel Edge (1.4 MHz_QPSK_RB 1_5)



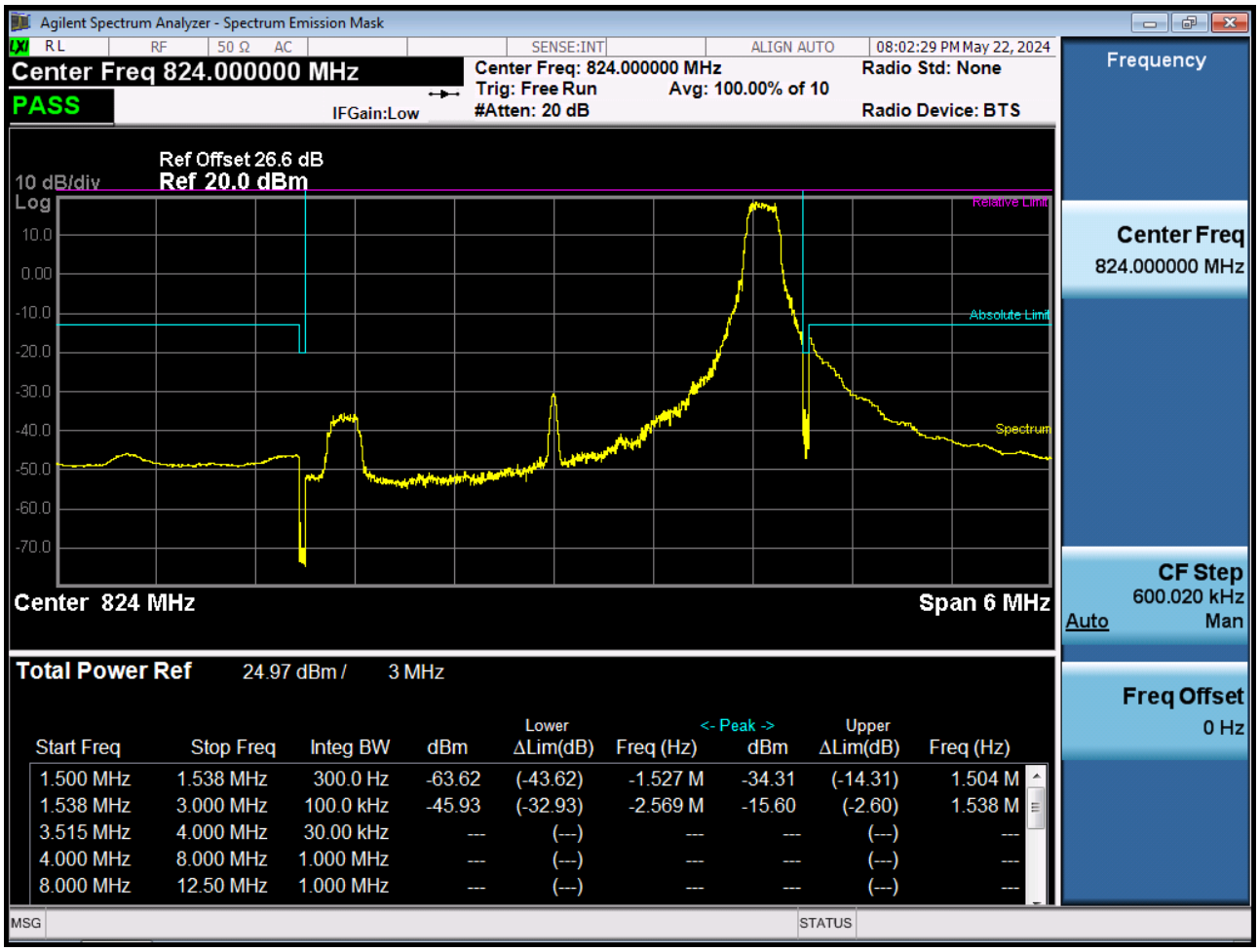
BAND 26. Channel Edge (1.4 MHz_QPSK_Full RB)



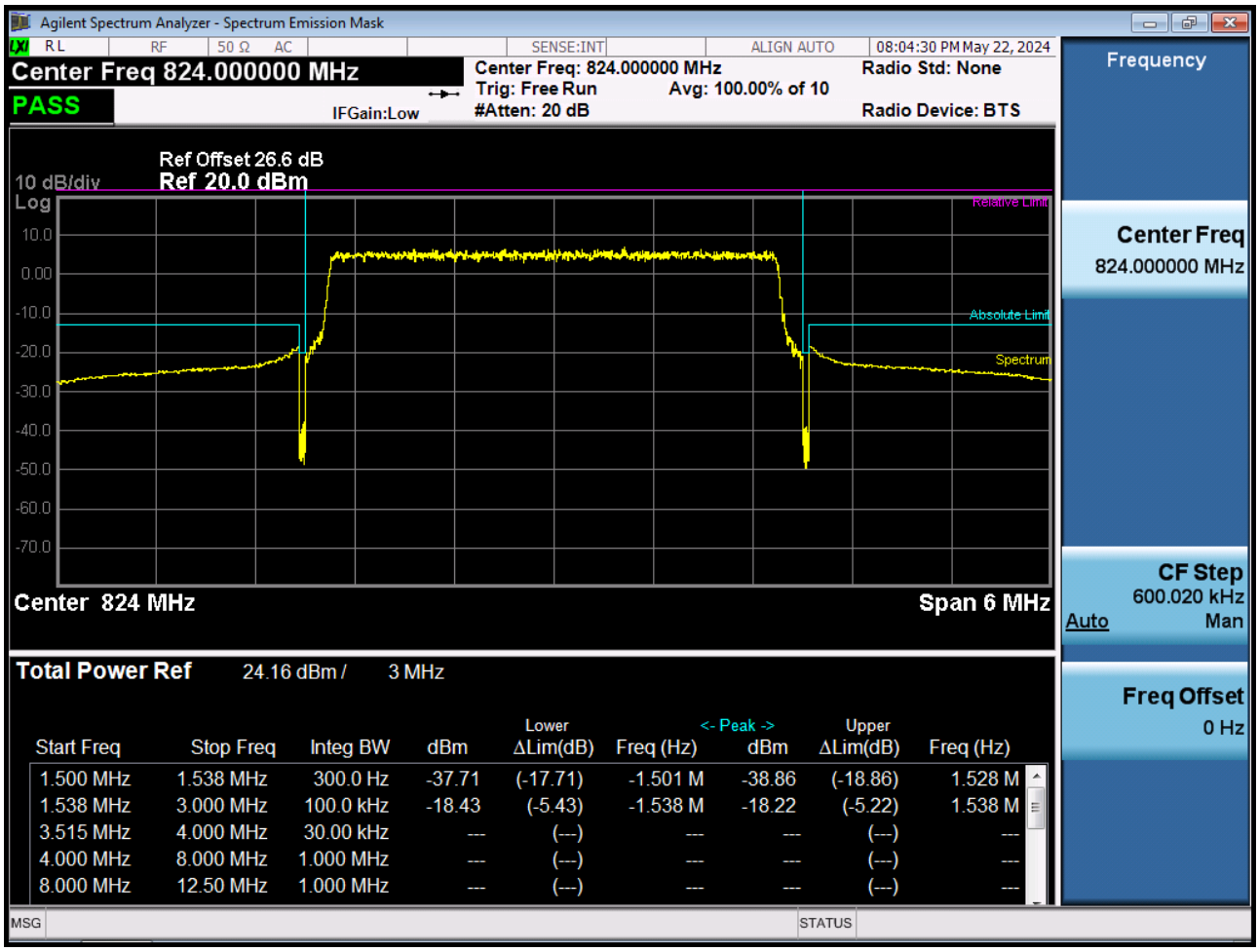
BAND 26. Channel Edge (3 MHz_QPSK_RB 1_0)



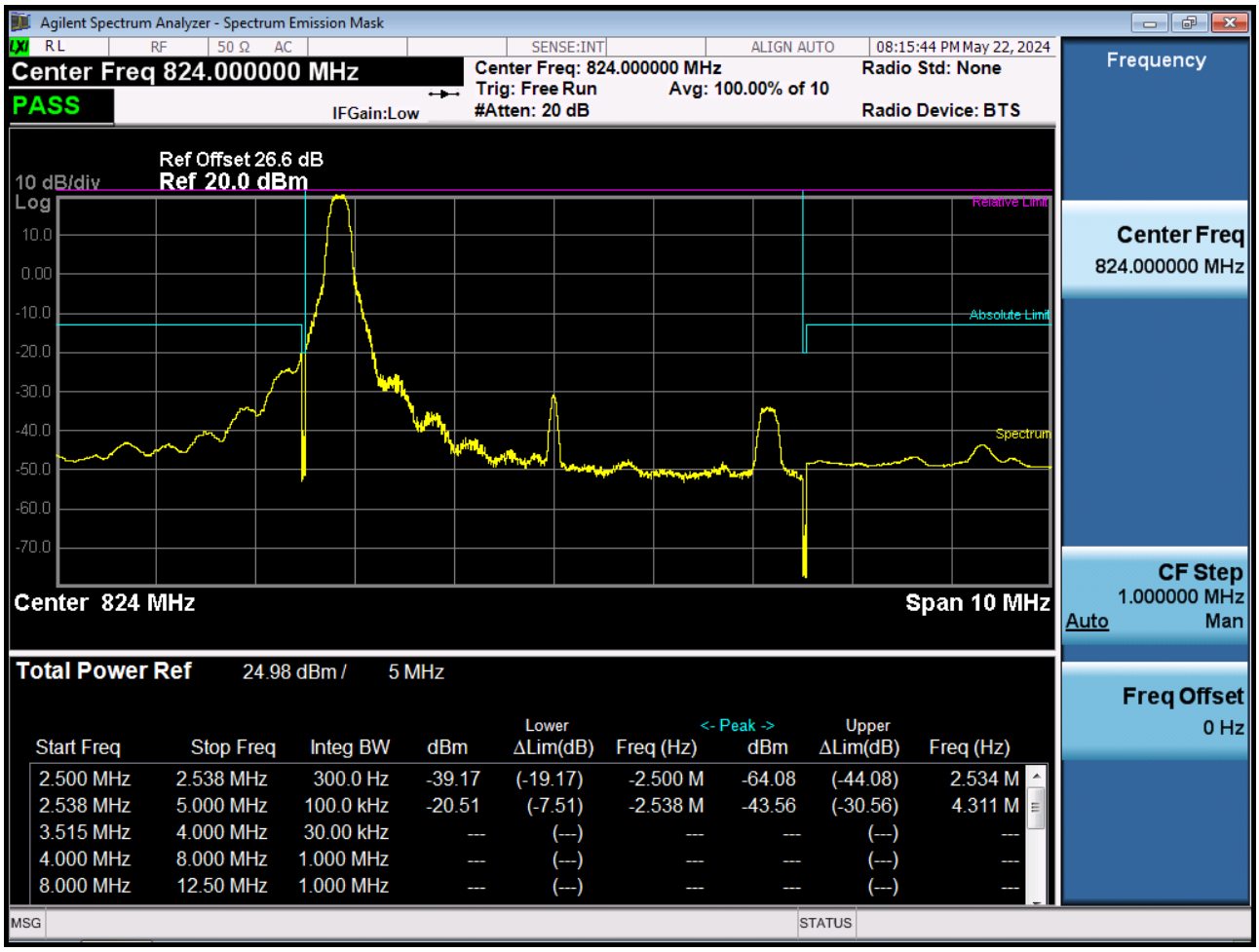
BAND 26. Channel Edge (3 MHz_QPSK_RB 1_14)



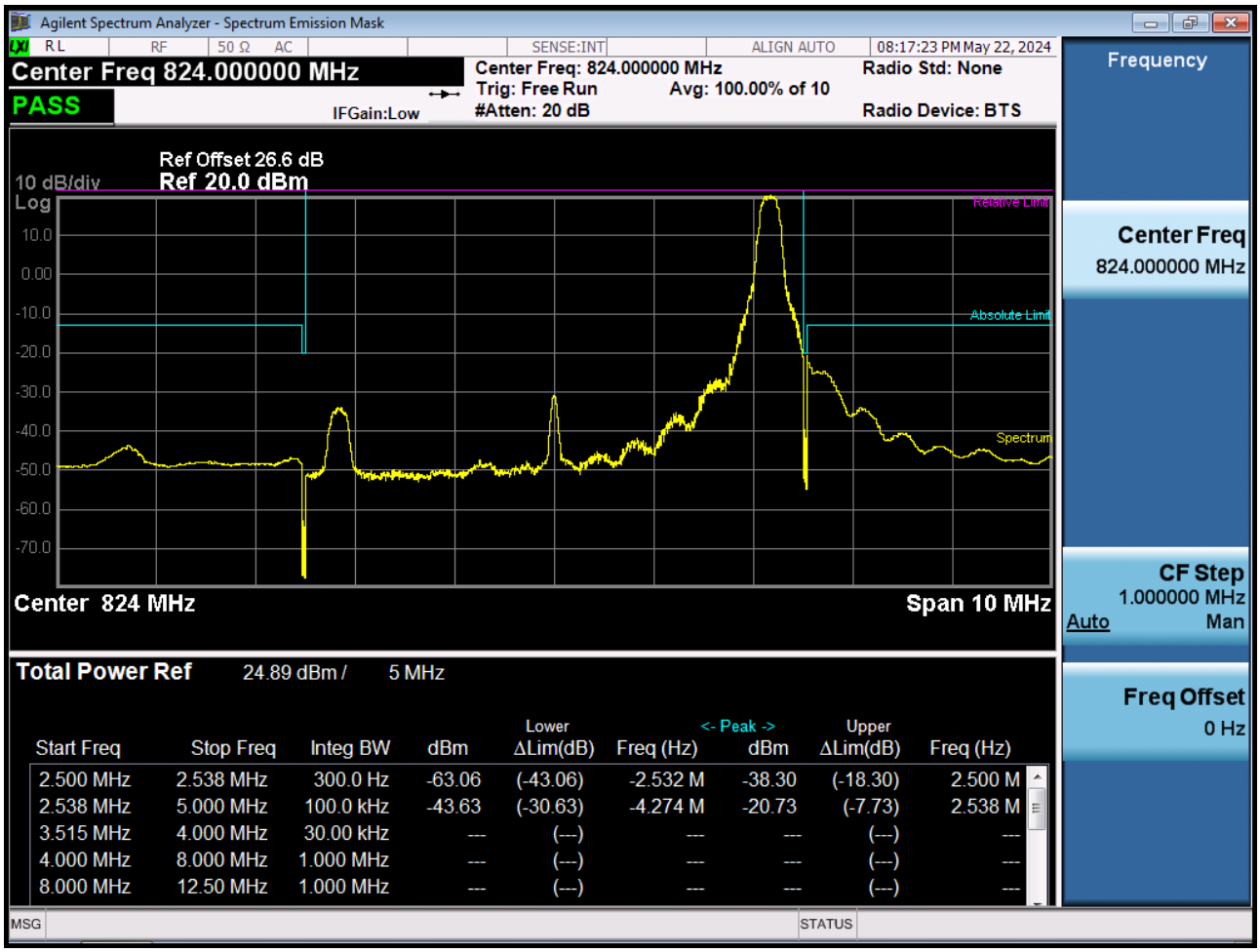
BAND 26. Channel Edge (3 MHz_QPSK_Full RB)



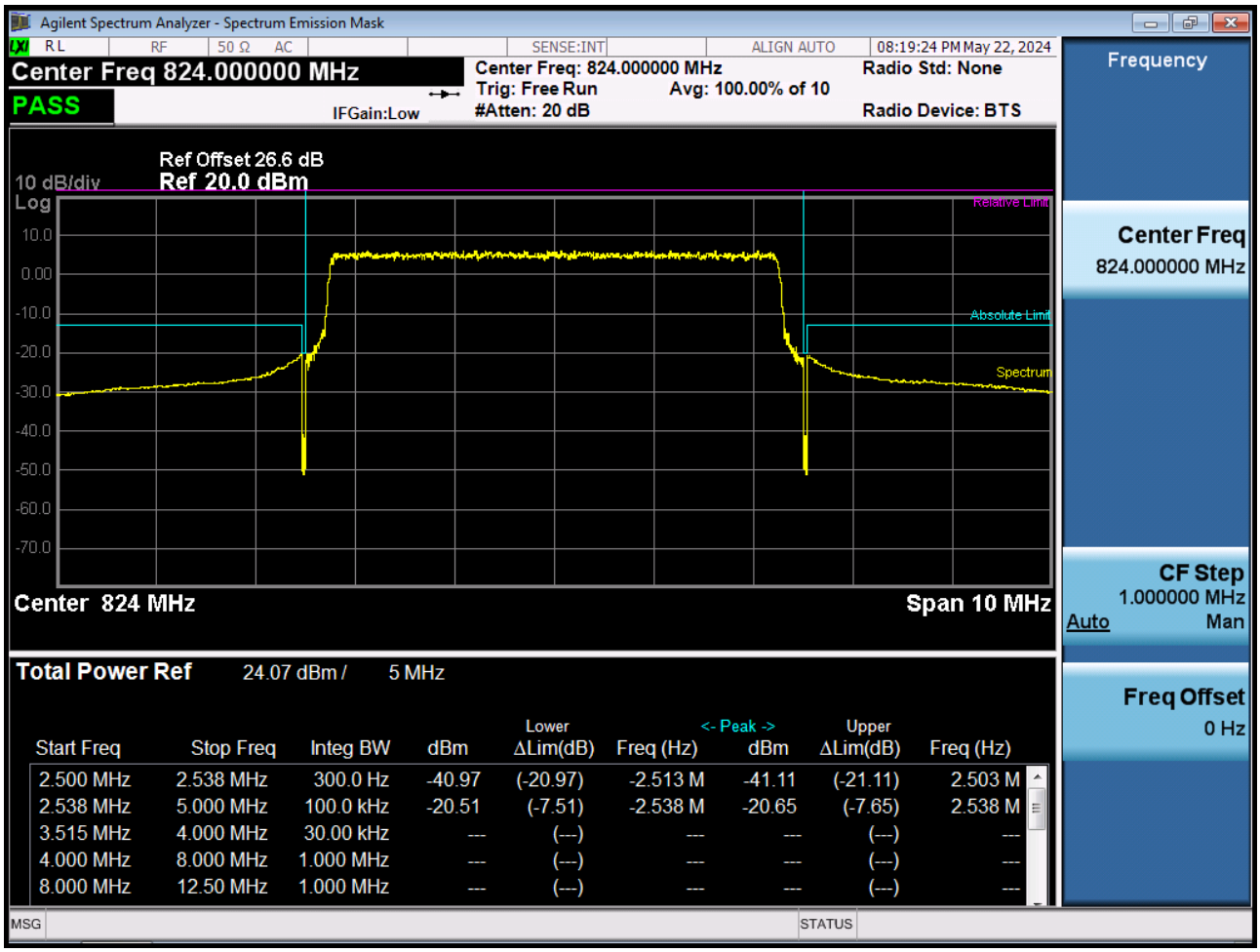
BAND 26. Channel Edge (5 MHz_QPSK_RB 1_0)



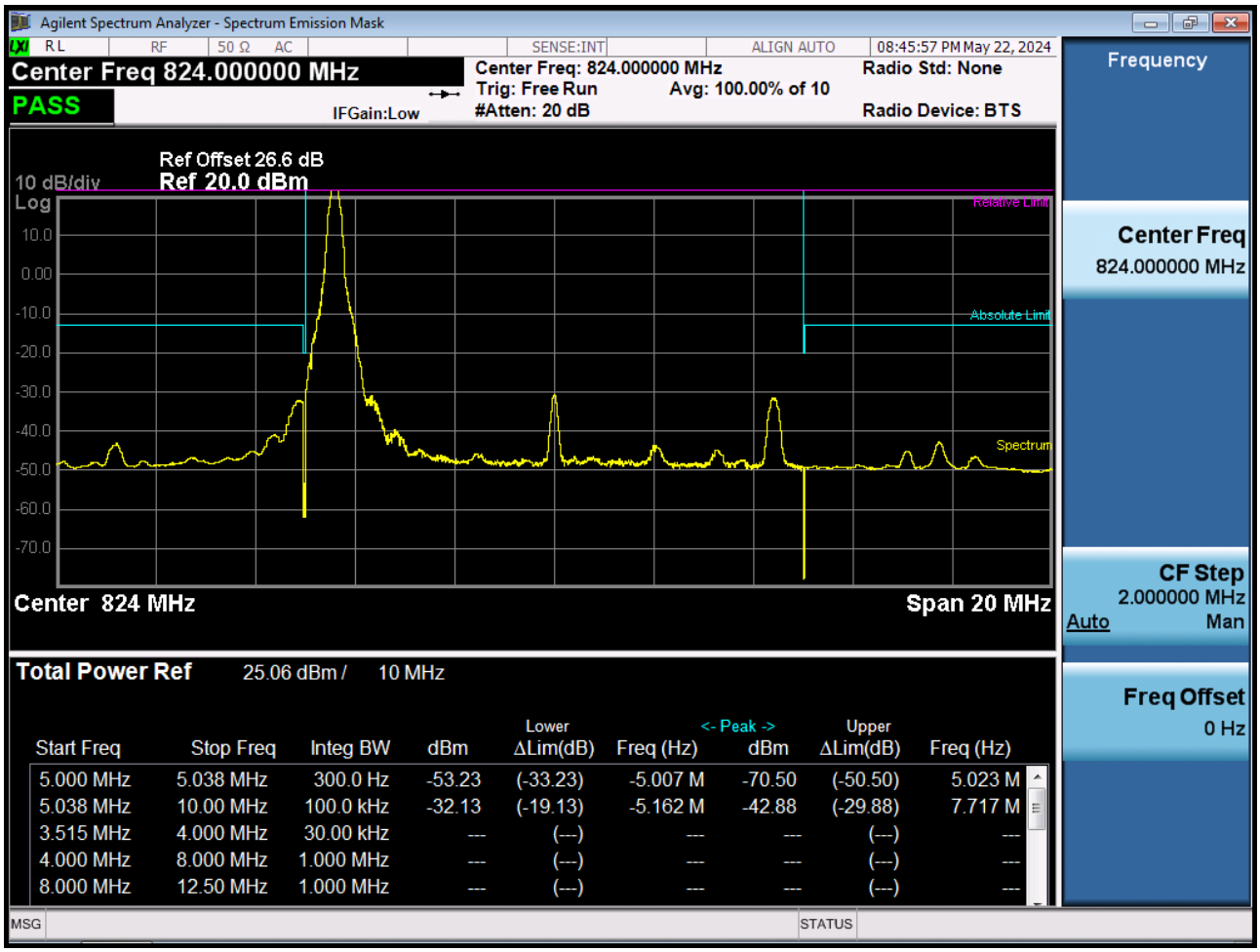
BAND 26. Channel Edge (5 MHz_QPSK_RB 1_24)



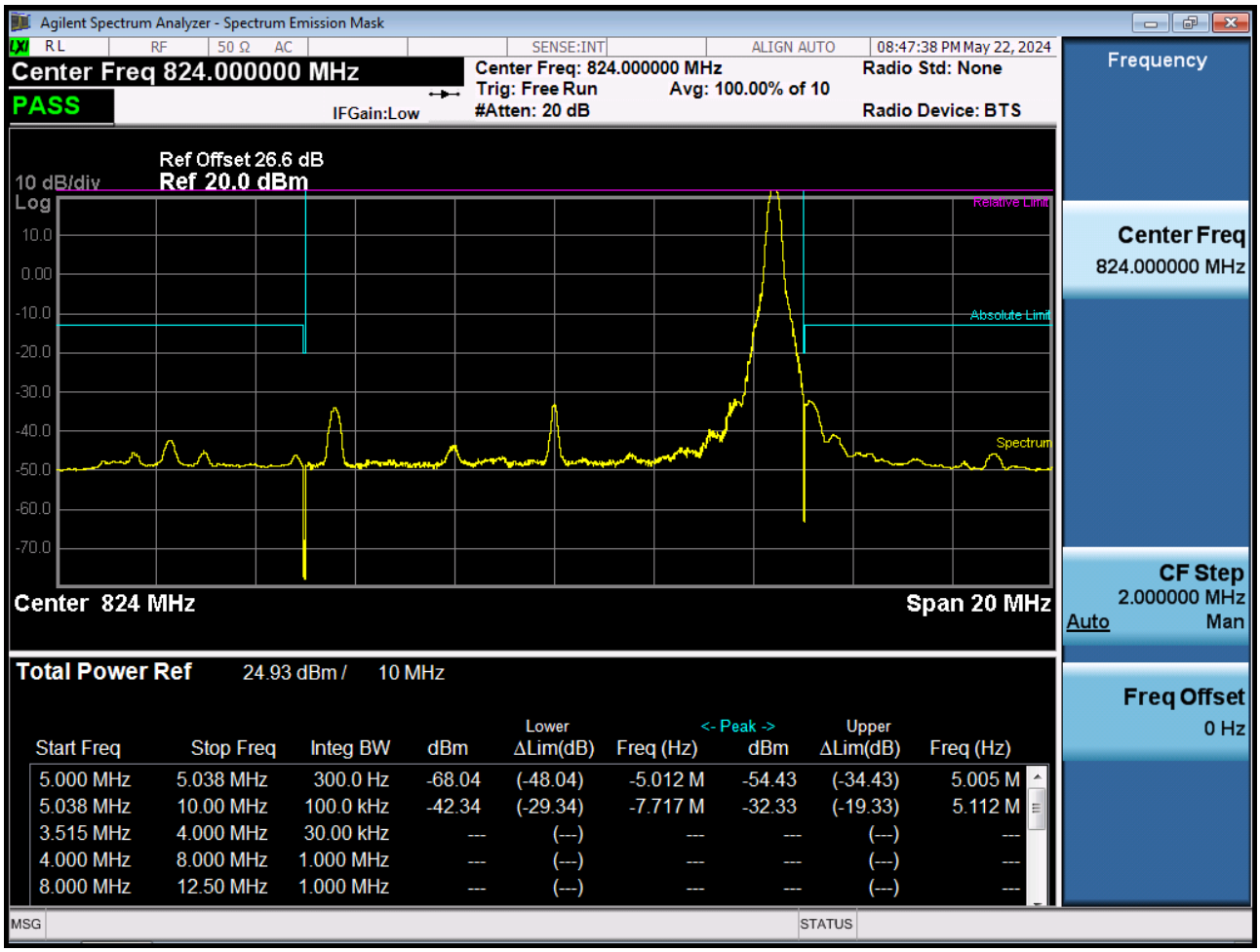
BAND 26. Channel Edge (5 MHz_QPSK_Full RB)



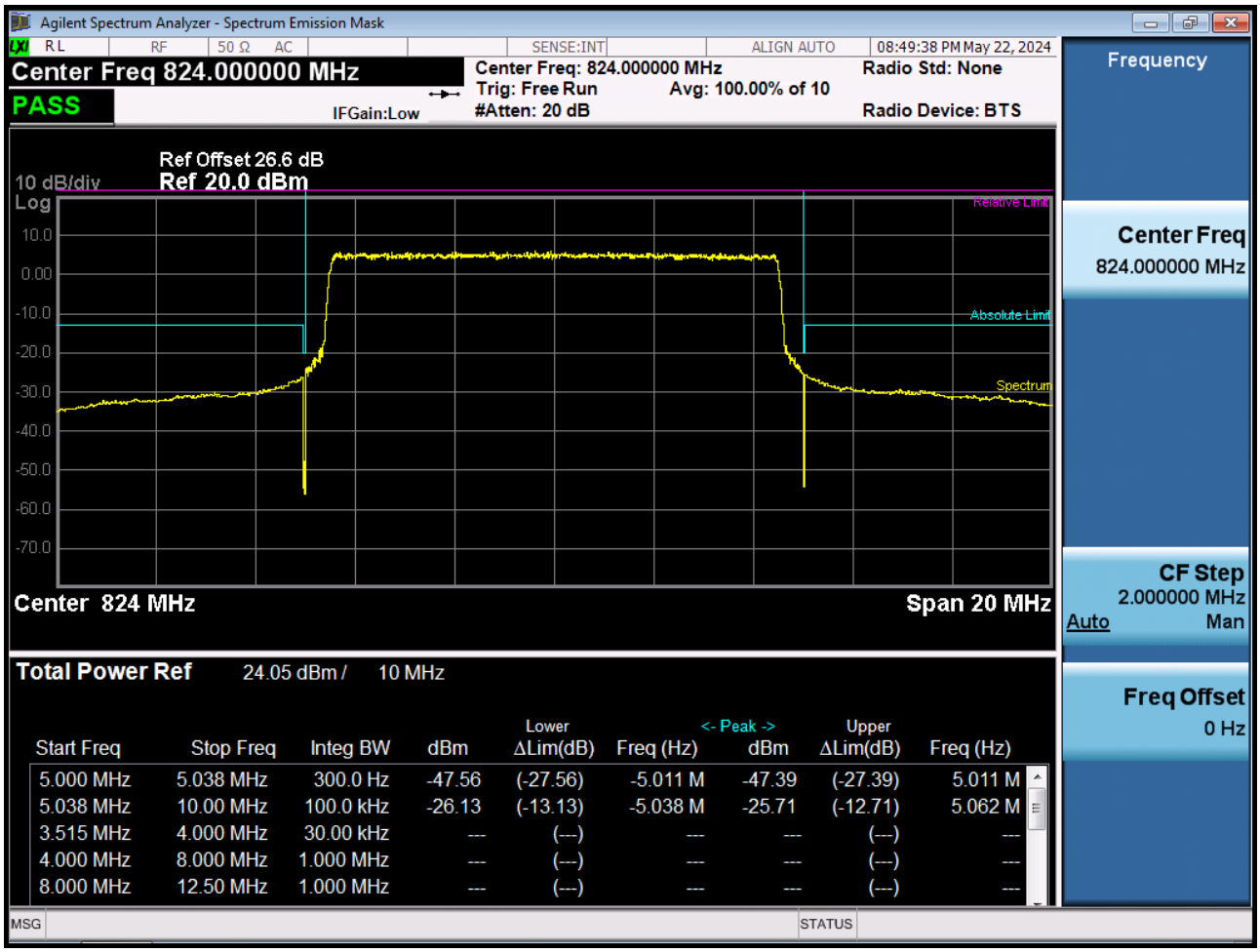
BAND 26. Channel Edge (10 MHz_QPSK_RB 1_0)



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)

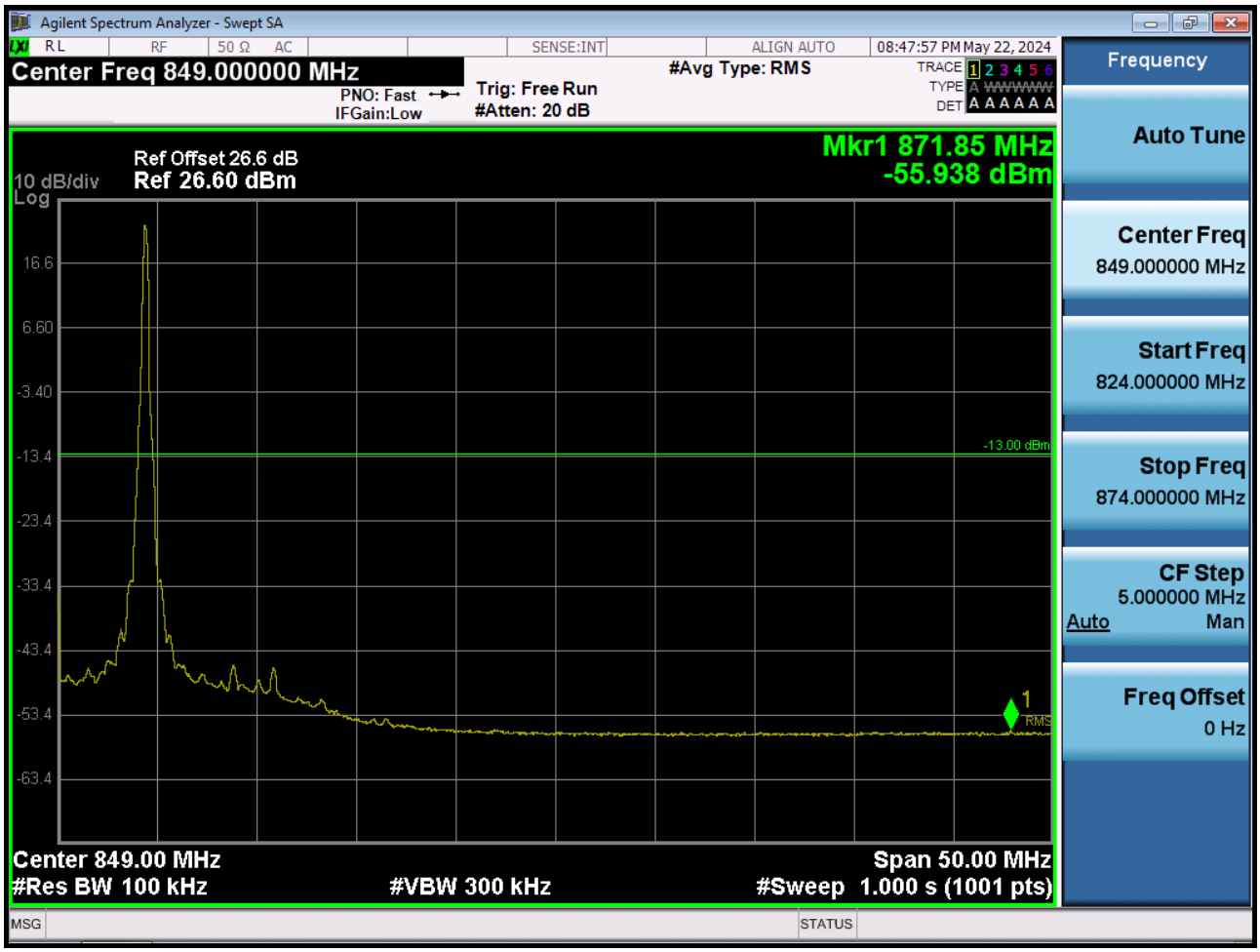
BAND 26. Band Edge (3 MHz_QPSK_RB 1_14)

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-2407-FC019-P