

# FCC LTE REPORT

## Certification

<b>Applicant Name:</b> SAMSUNG Electronics Co., Ltd.	<b>Date of Issue:</b> May 19, 2022
<b>Address:</b> 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea	<b>Location:</b> HCT CO., LTD., 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA
	<b>Report No.:</b> HCT-RF-2205-FC031-R1

<b>FCC ID:</b>	<b>A3LSMG990U2</b>
<b>APPLICANT:</b>	<b>SAMSUNG Electronics Co., Ltd.</b>

Model(s): SM-G990U2  
 Additional Model(s): SM-G990U3/DS  
 EUT Type: Mobile Phone  
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)  
 FCC Rule Part(s): §27, §2

Mode (MHz)	Tx Frequency (MHz)	Emission Designator	Modulation	ERP	
				Max. Power (W)	Max. Power (dBm)
LTE – Band71 (5)	665.5 - 695.5	4M50G7D	QPSK	0.052	17.17
		4M49W7D	16QAM	0.045	16.54
		4M51W7D	64QAM	0.035	15.42
		4M51W7D	256QAM	0.018	12.57
LTE – Band71 (10)	668.0 - 693.0	8M98G7D	QPSK	0.056	17.51
		9M00W7D	16QAM	0.052	17.18
		8M99W7D	64QAM	0.038	15.83
		8M99W7D	256QAM	0.019	12.81
LTE – Band71 (15)	670.5 - 690.5	13M5G7D	QPSK	0.057	17.58
		13M5W7D	16QAM	0.051	17.06
		13M5W7D	64QAM	0.039	15.87
		13M5W7D	256QAM	0.019	12.81
LTE – Band71 (20)	673.0 - 688.0	18M0G7D	QPSK	0.058	17.64
		17M9W7D	16QAM	0.050	17.00
		18M0W7D	64QAM	0.039	15.87
		17M9W7D	256QAM	0.019	12.84

The measurements shown in this report were made in accordance with the procedures specified in CFR47 section §2.947. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998, 21 U.S. C.853(a)

Report No.: HCT-RF-2205-FC031-R1

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REVIEWED BY



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

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

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

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

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

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## Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2205-FC031	May 13, 2022	- First Approval Report
HCT-RF-2205-FC031-R1	May 19, 2022	- Revised the Section 3.8. (Page 14.)

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

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# MEASUREMENT REPORT

## 1. GENERAL INFORMATION

<b>Applicant Name:</b>	SAMSUNG Electronics Co., Ltd.
<b>Address:</b>	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
<b>FCC ID:</b>	A3LSMG990U2
<b>Application Type:</b>	Certification
<b>FCC Classification:</b>	PCS Licensed Transmitter Held to Ear (PCE)
<b>FCC Rule Part(s):</b>	§27, §2
<b>EUT Type:</b>	Mobile Phone
<b>Model(s):</b>	SM-G990U2
<b>Additional Model(s):</b>	SM-G990U3/DS
<b>Tx Frequency:</b>	665.5 MHz – 695.5 MHz (LTE – Band 71 (5 MHz)) 668.0 MHz – 693.0 MHz (LTE – Band 71 (10 MHz)) 670.5 MHz – 690.5 MHz (LTE – Band 71 (15 MHz)) 673.0 MHz – 688.0 MHz (LTE – Band 71 (20 MHz))
<b>Date(s) of Tests:</b>	April 05, 2022 ~ May 02, 2022
<b>Serial number:</b>	Radiated: R3CT30Q0QPV Conducted: R3CT30Q0SAV

## **2. INTRODUCTION**

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

The EUT was a Mobile Phone with GSM/GPRS/EGPRS/UMTS, CDMA(BC0, 1, 10) and LTE, Sub6.

It also supports IEEE 802.11 a/b/g/n/ac/ax (20/40/80), Bluetooth, BT LE, NFC, AIT, WPT, mmWave(n260/261).

### **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
Band 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	- N/A (See SAR Report)
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 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 1MHz
3. VBW  $\geq 3 \times$  RBW
4. Span = 1.5 times the OBW
5. No. of sweep points  $> 2 \times$  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 1GHz, 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;

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

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.



### 3.3 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 = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW  $\geq 3 \times$  RBW
3. Span = 1.5 times the OBW
4. No. of sweep points  $> 2 \times$  span / RBW
5. Detector = Peak
6. Trace mode = Max Hold
7. The trace was allowed to stabilize
8. Test channel : Low/ Middle/ High
9. Frequency range : We are performed all frequency to 10<sup>th</sup> harmonics from 9 kHz.

#### Test Note

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

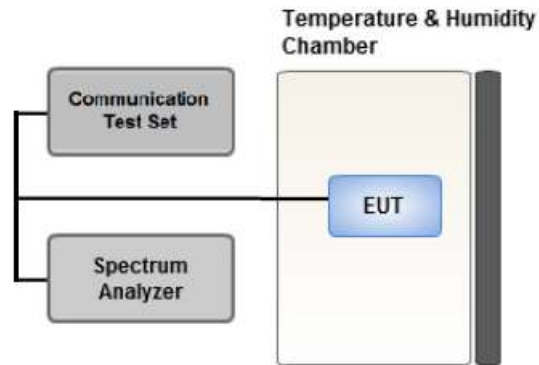
$$\text{Result}_{(\text{dBm})} = P_{g(\text{dBm})} - \text{cable loss}_{(\text{dB})} + \text{antenna gain}_{(\text{dBi})}$$

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

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

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

### 3.4 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.

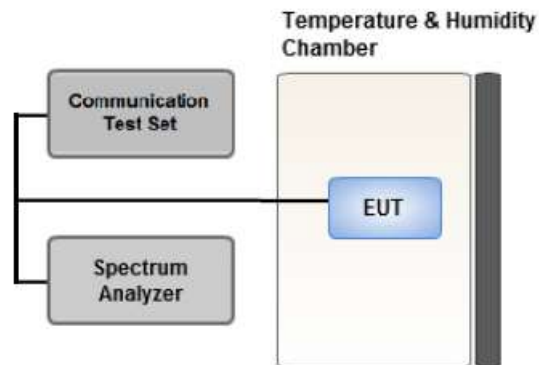
The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

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 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW  $\geq 3 \times$  RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the 99% occupied bandwidth observed in Step 7

### 3.5 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL



**Test setup**

#### **Test Overview**

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic.

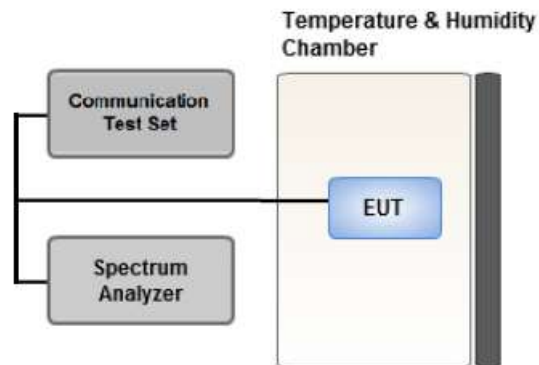
All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

#### **Test Settings**

1. RBW = 1 MHz
2. VBW  $\geq$  3 MHz
3. Detector = RMS
4. Trace Mode = trace average
5. Sweep time = auto
6. Number of points in sweep  $\geq$  2 x Span / RBW

### 3.6 BAND 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 > 1% of the emission bandwidth
4. VBW > 3 x RBW
5. Detector = RMS
6. Number of sweep points  $\geq 2 \times \text{Span/RBW}$
7. Trace mode = trace average
8. Sweep time = auto couple
9. The trace was allowed to stabilize

#### **Test Notes**

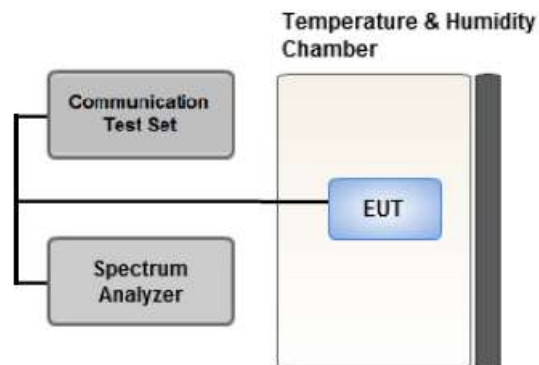
According to FCC 22.917, 24.238, 27.53 specified that power of any emission outside of The authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

All measurements were done at 2 channels(low and high operational frequency range.)

The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

### 3.7 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.

**3.8 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 : 20 MHz)
- The worst case is reported with the EUT positioning, modulations, and paging service configurations shown in the test data.
- SM-G990U2 & additional models were tested and the worst case results are reported.  
 (Worst case : SM-G990U2)

[ Worst case ]

Test Description	Modulation	Bandwidth (MHz)	Frequency	RB size	RB offset	Axis
Effective Isotropic Radiated Power	QPSK, 16QAM, 64QAM, 256QAM	5	Low	1	13	Y
			Mid , High	1	0	
		10	Low	1	25	
			Mid , High	1	0	
		15	Low	1	38	
			Mid , High	1	0	
		20	Low	1	50	
			Mid , High	1	0	
Radiated Spurious and Harmonic Emissions	QPSK	20	Low	1	50	Z
			Mid , High	1	0	

**3.9 WORST CASE(CONDUCTED TEST)**

- All modes of operation were investigated and the worst case configuration results are reported.
- SM-G990U2 & additional models were tested and the worst case results are reported.

(Worst case : SM-G990U2)

[ Worst case ]

Test Description	Modulation	Bandwidth (MHz)	Frequency	RB size	RB offset
<b>Occupied Bandwidth</b>	QPSK, 16QAM, 64QAM, 256QAM	5,10,15,20	Mid	Full RB	0
<b>Band Edge</b>	QPSK	5	Low	1	0
			High	1	24
		10	Low	1	0
			High	1	49
		15	Low	1	0
			High	1	74
		20	Low	1	0
			High	1	99
		5,10,15,20	Low, High	Full RB	0
<b>Spurious and Harmonic Emissions at Antenna Terminal</b>	QPSK	5,10,15,20	Low, Mid, High	1	0

#### 4. LIST OF TEST EQUIPMENT

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
H.P.F	FBSR-02B(WHK1.2/15 G-10EF)	T&M SYSTEM	-	02/18/2023	Annual
H.P.F	FBSR-02B(WHK3.3/18 G-10EF)	T&M SYSTEM	-	02/18/2023	Annual
Power Splitter(DC ~ 26.5 GHz)	11667B	Hewlett Packard	11275	03/11/2023	Annual
DC Power Supply	E3632A	Agilent	MY40010147	06/28/2022	Annual
Dipole Antenna	UHAP	Schwarzbeck	557	04/05/2023	Biennial
Dipole Antenna	UHAP	Schwarzbeck	558	04/05/2023	Biennial
Chamber	SU-642	ESPEC	93008124	03/04/2023	Annual
Horn Antenna(1 ~ 18 GHz)	BBHA 9120D	Schwarzbeck	147	08/30/2022	Biennial
Horn Antenna(1 ~ 18 GHz)	BBHA 9120D	Schwarzbeck	9120D-1298	09/15/2023	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170342	10/13/2022	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170124	04/12/2023	Biennial
Signal Analyzer(10 Hz ~ 26.5 GHz)	N9020A	Agilent	MY52090906	05/18/2022	Annual
ATTENUATOR(20 dB)	8493C	Hewlett Packard	17280	06/01/2022	Annual
Spectrum Analyzer(10 Hz ~ 40 GHz)	FSV40	REOHDE & SCHWARZ	100931	09/29/2022	Annual
Base Station	8960 (E5515C)	Agilent	MY48360800	08/18/2022	Annual
Loop Antenna(9 kHz ~ 30 MHz)	FMZB1513	Schwarzbeck	1513-333	03/17/2024	Biennial
Bilog Antenna	VULB9160	Schwarzbeck	3150	03/03/2023	Biennial
Hybrid Antenna	VULB9168	Schwarzbeck	760	02/22/2023	Biennial
Wideband Radio Communication Tester	MT8821C	Anritsu Corp.	6262116770	07/12/2022	Annual
Wideband Radio Communication Tester	MT8820C	Anritsu Corp.	6200863156	12/29/2022	Annual
SIGNAL GENERATOR (100 kHz ~ 40 GHz)	SMB100A	REOHDE & SCHWARZ	177633	07/05/2022	Annual
Signal Analyzer(5 Hz ~ 40.0 GHz)	N9030B	KEYSIGHT	MY55480167	06/02/2022	Annual
FCC LTE Mobile Conducted RF Automation Test Software	-	HCT CO., LTD.,	-	-	-

**Note:**

- Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.
- Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).



## 5. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4:2014. All measurement uncertainty values are shown with a coverage factor of  $k = 2$  to indicate a 95 % level of confidence. The measurement data shown herein meets or exceeds the  $U_{\text{CISPR}}$  measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

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

## 6. SUMMARY OF TEST RESULTS

### 6.1 Test Condition : Conducted Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Occupied Bandwidth	§2.1049	N/A	PASS
Band Edge / Spurious and Harmonic Emissions at Antenna Terminal.	§2.1051, §27.53(g)	< 43 + 10log10 (P[Watts]) at Band Edge and for all out-of-band emissions	PASS
Conducted Output Power	§2.1046	N/A	<u>See Note1</u>
Frequency stability / variation of ambient temperature	§2.1055, §27.54	Emission must remain in band	PASS

Note:

1. See SAR Report

### 6.2 Test Condition : Radiated Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Effective Radiated Power	§27.50(c)(10)	< 3 Watts max. ERP	PASS
Radiated Spurious and Harmonic Emissions	§2.1053, §27.53(g)	< 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 EFFECTIVE RADIATED POWER

Freq (MHz)	Mod (Bandwidth)	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBd)	C.L	Pol	Limit	ERP	
								W	W	dBm
665.5	LTE B71 (5 MHz)	QPSK	-31.02	28.18	-9.76	1.25	V	< 3.00	0.052	17.17
		16-QAM	-31.72	27.48	-9.76	1.25	V		0.044	16.47
		64-QAM	-33.77	25.43	-9.76	1.25	V		0.028	14.42
		256-QAM	-35.62	23.58	-9.76	1.25	V		0.018	12.57
680.5		QPSK	-30.76	28.07	-9.78	1.26	V		0.051	17.03
		16-QAM	-31.42	27.41	-9.78	1.26	V		0.043	16.37
		64-QAM	-32.61	26.22	-9.78	1.26	V		0.033	15.18
		256-QAM	-35.64	23.19	-9.78	1.26	V		0.016	12.15
695.5		QPSK	-30.76	28.24	-9.79	1.28	V		0.052	17.17
		16-QAM	-31.39	27.61	-9.79	1.28	V		0.045	16.54
		64-QAM	-32.51	26.49	-9.79	1.28	V		0.035	15.42
		256-QAM	-35.56	23.44	-9.79	1.28	V		0.017	12.37

Freq (MHz)	Mod (Bandwidth)	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBd)	C.L	Pol	Limit	ERP	
								W	W	dBm
668.0	LTE B71 (10 MHz)	QPSK	-30.78	28.52	-9.76	1.25	V	< 3.00	0.056	17.51
		16-QAM	-31.11	28.19	-9.76	1.25	V		0.052	17.18
		64-QAM	-32.46	26.84	-9.76	1.25	V		0.038	15.83
		256-QAM	-35.48	23.82	-9.76	1.25	V		0.019	12.81
680.5		QPSK	-30.62	28.21	-9.78	1.26	V		0.052	17.17
		16-QAM	-31.22	27.61	-9.78	1.26	V		0.045	16.57
		64-QAM	-32.48	26.35	-9.78	1.26	V		0.034	15.31
		256-QAM	-35.74	23.09	-9.78	1.26	V		0.016	12.05
693.0		QPSK	-30.64	28.31	-9.79	1.27	V		0.053	17.25
		16-QAM	-31.18	27.77	-9.79	1.27	V		0.047	16.71
		64-QAM	-32.36	26.59	-9.79	1.27	V		0.036	15.53
		256-QAM	-35.68	23.27	-9.79	1.27	V		0.017	12.21

Freq (MHz)	Mod (Bandwidth)	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBd)	C.L	Pol	Limit	ERP	
								W	W	dBm
670.5	LTE B71 (15 MHz)	QPSK	-30.72	28.60	-9.77	1.25	V	< 3.00	0.057	17.58
		16-QAM	-31.24	28.08	-9.77	1.25	V		0.051	17.06
		64-QAM	-32.43	26.89	-9.77	1.25	V		0.039	15.87
		256-QAM	-35.49	23.83	-9.77	1.25	V		0.019	12.81
680.5		QPSK	-30.59	28.24	-9.78	1.26	V		0.053	17.20
		16-QAM	-31.26	27.57	-9.78	1.26	V		0.045	16.53
		64-QAM	-32.41	26.42	-9.78	1.26	V		0.035	15.38
		256-QAM	-35.66	23.17	-9.78	1.26	V		0.016	12.13
690.5		QPSK	-30.67	28.25	-9.79	1.27	V		0.052	17.19
		16-QAM	-31.22	27.70	-9.79	1.27	V		0.046	16.64
		64-QAM	-32.46	26.46	-9.79	1.27	V		0.035	15.40
		256-QAM	-35.68	23.24	-9.79	1.27	V		0.017	12.18

Freq (MHz)	Mod (Bandwidth)	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBd)	C.L	Pol	Limit	ERP	
								W	W	dBm
673.0	LTE B71 (20 MHz)	QPSK	-30.49	28.66	-9.77	1.25	V	< 3.00	0.058	17.64
		16-QAM	-31.13	28.02	-9.77	1.25	V		0.050	17.00
		64-QAM	-32.26	26.89	-9.77	1.25	V		0.039	15.87
		256-QAM	-35.29	23.86	-9.77	1.25	V		0.019	12.84
680.5		QPSK	-30.81	28.02	-9.78	1.26	V		0.050	16.98
		16-QAM	-31.32	27.51	-9.78	1.26	V		0.044	16.47
		64-QAM	-32.52	26.31	-9.78	1.26	V		0.034	15.27
		256-QAM	-35.86	22.97	-9.78	1.26	V		0.016	11.93
688.0		QPSK	-30.65	28.29	-9.78	1.27	V		0.053	17.24
		16-QAM	-31.33	27.61	-9.78	1.27	V		0.045	16.56
		64-QAM	-32.46	26.48	-9.78	1.27	V		0.035	15.43
		256-QAM	-35.80	23.14	-9.78	1.27	V		0.016	12.09

**8.2 RADIATED SPURIOUS EMISSIONS**

- ▣ MODE: LTE B71
- ▣ MODULATION SIGNAL: 20 MHz QPSK
- ▣ DISTANCE: 3 meters

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Limit
133222 (673.0)	1 346.00	-51.43	7.29	-59.84	1.80	H	-54.35	-13.00
	2 019.00	-53.84	10.18	-60.12	2.23	V	-52.17	-13.00
	2 692.00	-56.63	10.78	-59.91	2.59	H	-51.72	-13.00
133297 (680.5)	1 361.00	-50.66	7.36	-58.91	1.81	V	-53.36	-13.00
	2 041.50	-53.76	10.06	-59.54	2.23	V	-51.71	-13.00
	2 722.00	-56.13	10.80	-59.37	2.61	V	-51.18	-13.00
133372 (688.0)	1 376.00	-50.86	7.45	-59.57	1.82	H	-53.93	-13.00
	2 064.00	-55.02	9.88	-60.44	2.25	V	-52.81	-13.00
	2 752.00	-56.11	10.80	-59.30	2.65	V	-51.15	-13.00

**8.3 OCCUPIED BANDWIDTH**

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data ( MHz )
71	5 MHz	680.5	QPSK	25	0	4.5034
			16-QAM			4.4872
			64-QAM			4.5083
			256-QAM			4.5076
	10 MHz		QPSK	50		8.9783
			16-QAM			8.9946
			64-QAM			8.9846
			256-QAM			8.9906
	15 MHz		QPSK	75		13.476
			16-QAM			13.481
			64-QAM			13.494
			256-QAM			13.465
	20 MHz		QPSK	100		17.987
			16-QAM			17.925
			64-QAM			17.963
			256-QAM			17.923

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 39 ~ 54.



**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)
71	5	665.5	3.7209	27.976	-67.348	-39.372	-13.00
		680.5	3.6691	27.976	-67.151	-39.175	
		695.5	3.7039	27.976	-66.908	-38.932	
	10	668.0	3.6980	27.976	-66.874	-38.898	
		680.5	3.7049	27.976	-67.175	-39.199	
		693.0	3.6845	27.976	-67.198	-39.222	
	15	670.5	3.7064	27.976	-67.110	-39.134	
		680.5	3.6935	27.976	-67.137	-39.161	
		690.5	3.6681	27.976	-67.154	-39.178	
	20	673.0	3.6970	27.976	-67.373	-39.397	
		680.5	3.6915	27.976	-67.273	-39.297	
		688.0	3.6765	27.976	-67.220	-39.244	

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 79 ~ 90.
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

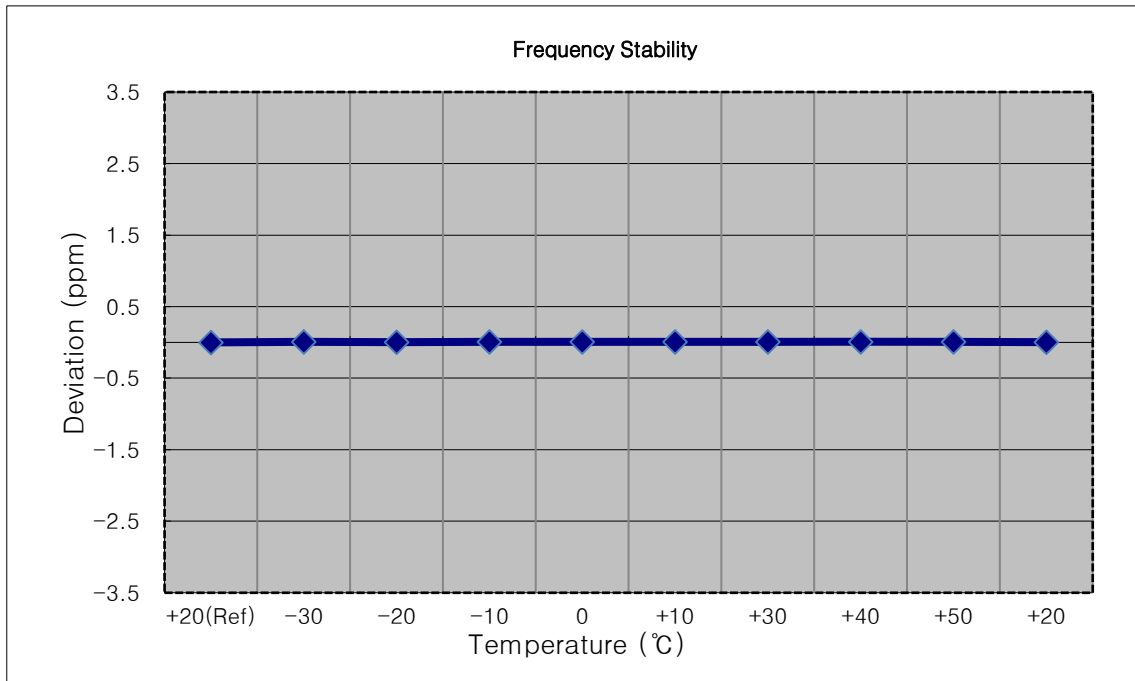
**8.5 BAND EDGE**

- Plots of the EUT's Band Edge are shown Page 55 ~ 78.

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

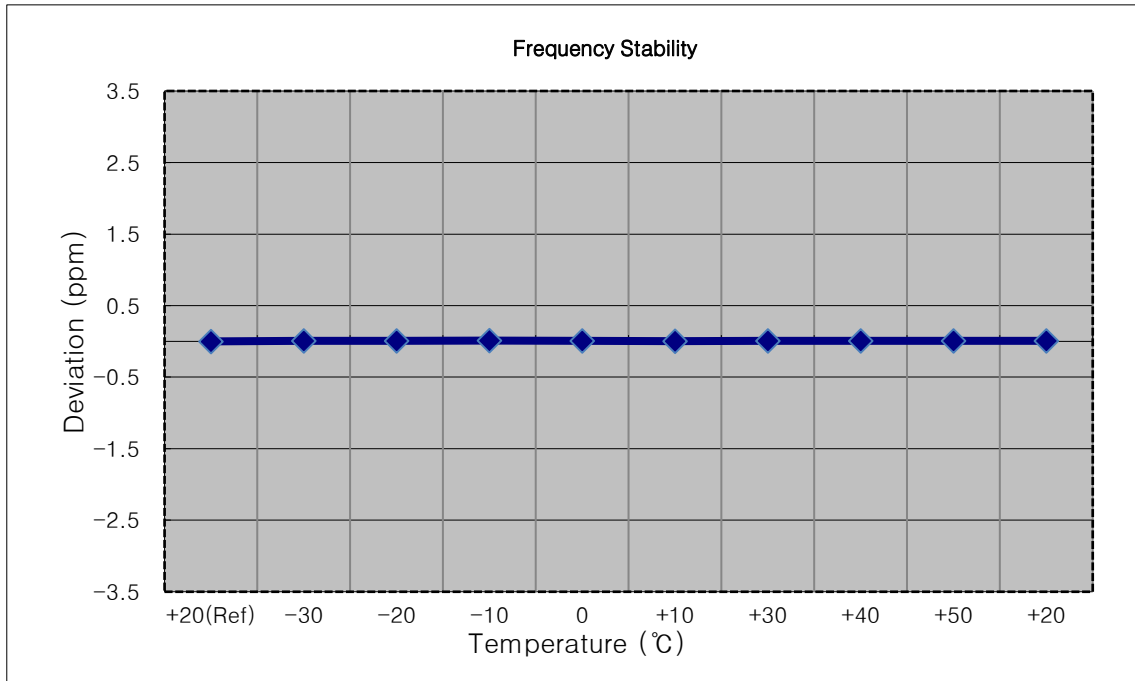
- ▣ MODE: LTE B71
- ▣ OPERATING FREQUENCY: 665,500,000 Hz
- ▣ CHANNEL: 133147 (5 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.880	+20(Ref)	665 500 006	0.0	0.000 000	0.000
100 %		-30	665 500 011	4.6	0.000 001	0.007
100 %		-20	665 500 009	3.1	0.000 000	0.005
100 %		-10	665 500 011	5.3	0.000 001	0.008
100 %		0	665 500 010	4.4	0.000 001	0.007
100 %		+10	665 500 011	5.4	0.000 001	0.008
100 %		+30	665 500 011	4.8	0.000 001	0.007
100 %		+40	665 500 012	6.2	0.000 001	0.009
100 %		+50	665 500 012	5.7	0.000 001	0.009
Batt. Endpoint		3.650	+20	665 500 009	3.3	0.000 000



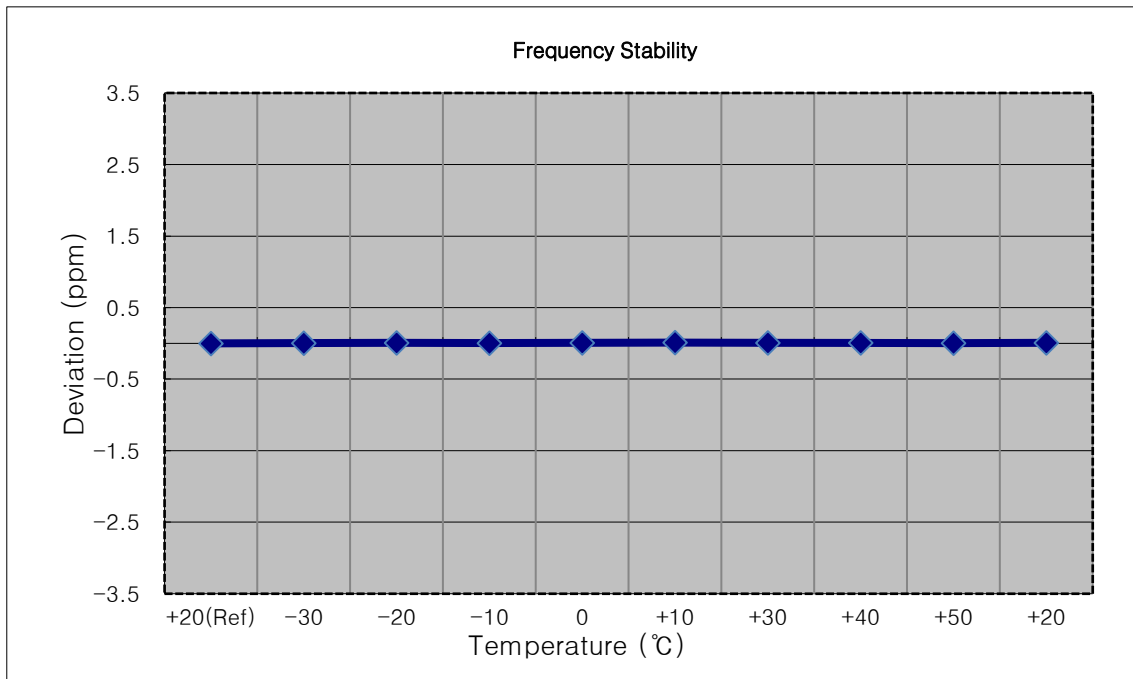
- ▣ MODE: LTE B71
- ▣ OPERATING FREQUENCY: 668,000,000 Hz
- ▣ CHANNEL: 133172 (10 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.880	+20(Ref)	668 000 003	0.0	0.000 000	0.000
100 %		-30	668 000 009	5.8	0.000 001	0.009
100 %		-20	668 000 008	5.0	0.000 001	0.007
100 %		-10	668 000 011	7.5	0.000 001	0.011
100 %		0	668 000 008	5.1	0.000 001	0.008
100 %		+10	668 000 007	3.3	0.000 000	0.005
100 %		+30	668 000 010	6.7	0.000 001	0.010
100 %		+40	668 000 008	5.1	0.000 001	0.008
100 %		+50	668 000 010	6.7	0.000 001	0.010
Batt. Endpoint		3.650	+20	668 000 009	5.7	0.000 001



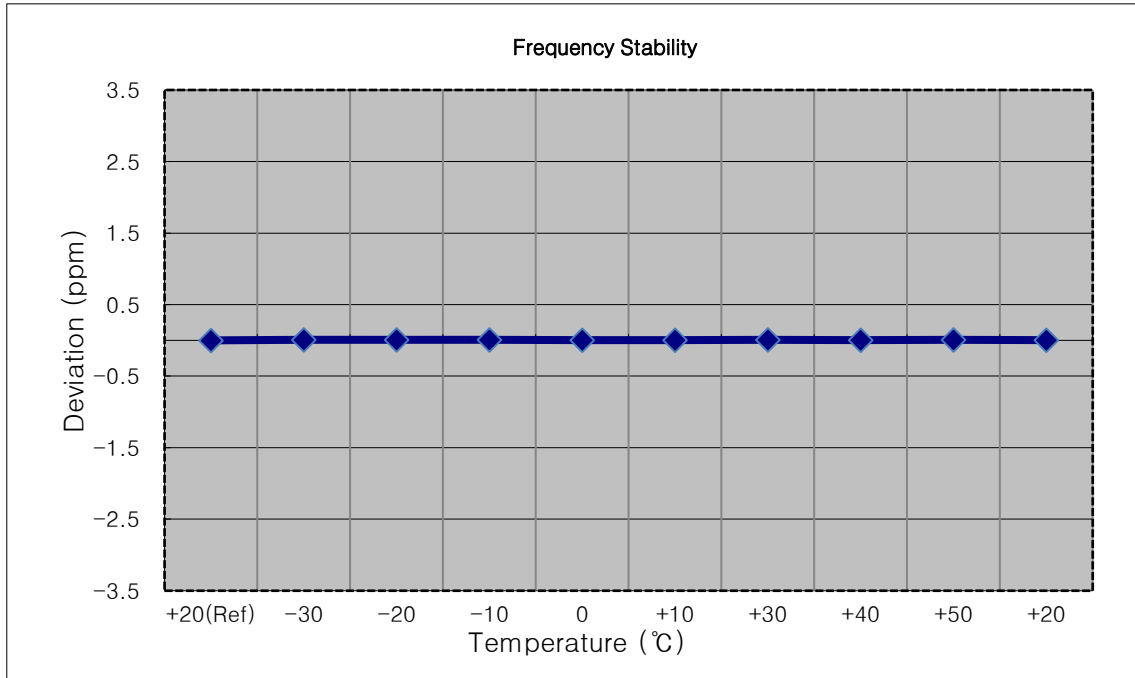
- ▣ MODE: LTE B71
- ▣ OPERATING FREQUENCY: 670,500,000 Hz
- ▣ CHANNEL: 133197 (15 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.880	+20(Ref)	670 500 006	0.0	0.000 000	0.000
100 %		-30	670 500 009	3.0	0.000 000	0.004
100 %		-20	670 500 010	4.4	0.000 001	0.007
100 %		-10	670 500 009	3.0	0.000 000	0.004
100 %		0	670 500 011	5.1	0.000 001	0.008
100 %		+10	670 500 013	7.3	0.000 001	0.011
100 %		+30	670 500 010	4.4	0.000 001	0.007
100 %		+40	670 500 010	4.3	0.000 001	0.006
100 %		+50	670 500 008	2.8	0.000 000	0.004
Batt. Endpoint	3.650	+20	670 500 011	5.1	0.000 001	0.008



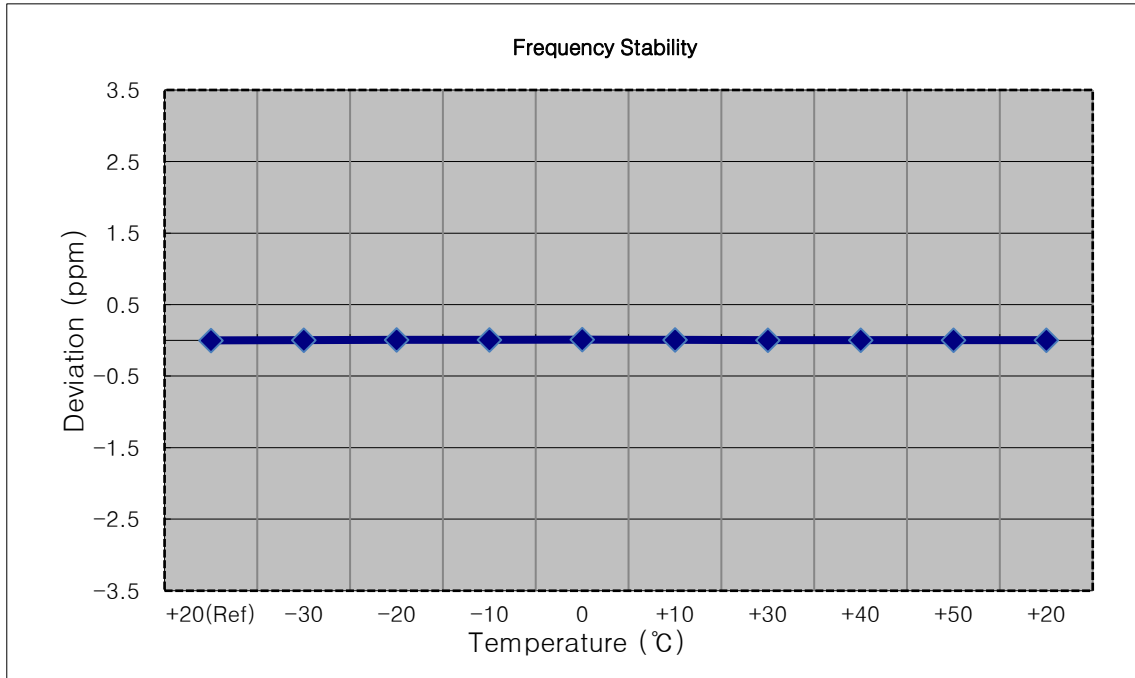
- ▣ MODE: LTE B71
- ▣ OPERATING FREQUENCY: 673,000,000 Hz
- ▣ CHANNEL: 133222 (20 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.880	+20(Ref)	673 000 004	0.0	0.000 000	0.000
100 %		-30	673 000 010	5.6	0.000 001	0.008
100 %		-20	673 000 009	4.8	0.000 001	0.007
100 %		-10	673 000 010	5.6	0.000 001	0.008
100 %		0	673 000 007	2.6	0.000 000	0.004
100 %		+10	673 000 008	3.7	0.000 001	0.005
100 %		+30	673 000 008	4.4	0.000 001	0.007
100 %		+40	673 000 007	2.8	0.000 000	0.004
100 %		+50	673 000 008	4.1	0.000 001	0.006
Batt. Endpoint	3.650	+20	673 000 007	3.0	0.000 000	0.004



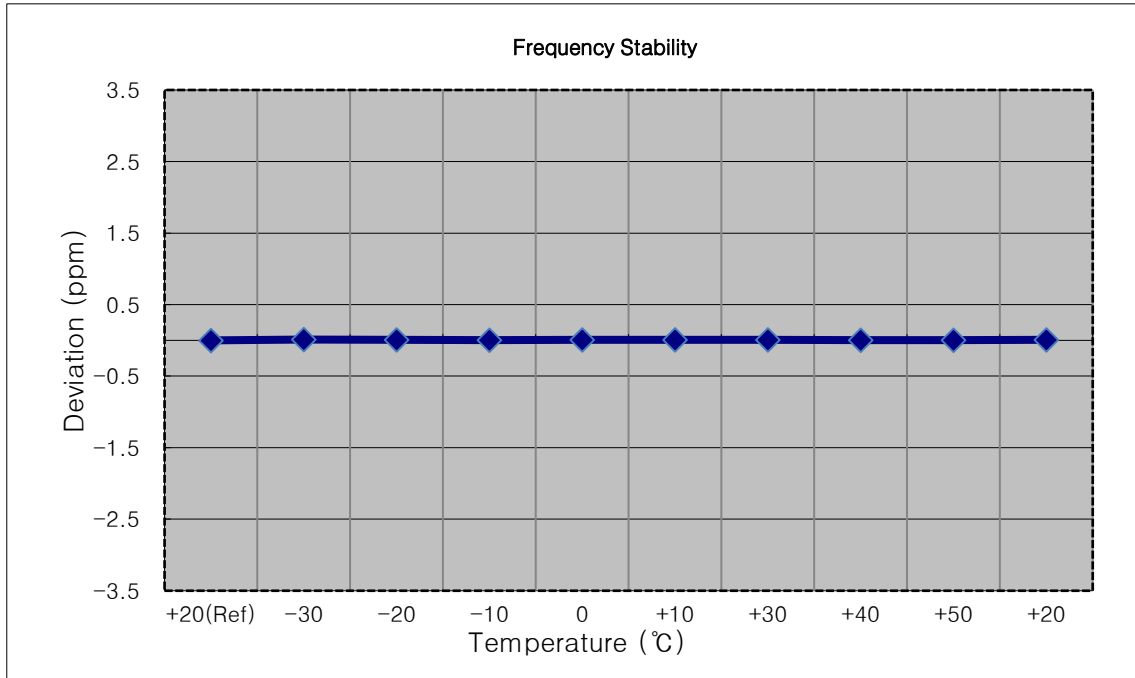
- ▣ MODE: LTE B71
- ▣ OPERATING FREQUENCY: 680,500,000 Hz
- ▣ CHANNEL: 133297 (5 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.880	+20(Ref)	680 500 002	0.0	0.000 000	0.000
100 %		-30	680 500 006	3.6	0.000 001	0.005
100 %		-20	680 500 007	4.6	0.000 001	0.007
100 %		-10	680 500 008	6.0	0.000 001	0.009
100 %		0	680 500 009	6.9	0.000 001	0.010
100 %		+10	680 500 006	4.0	0.000 001	0.006
100 %		+30	680 500 006	3.6	0.000 001	0.005
100 %		+40	680 500 004	2.1	0.000 000	0.003
100 %		+50	680 500 005	3.2	0.000 000	0.005
Batt. Endpoint	3.650	+20	680 500 005	2.4	0.000 000	0.004



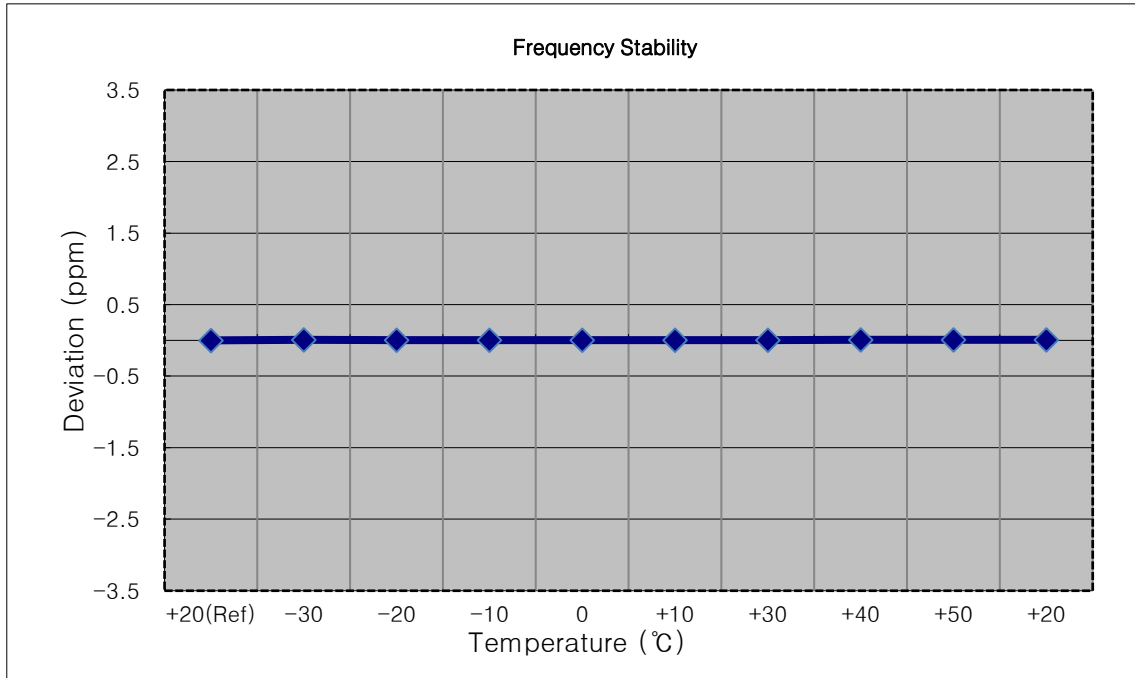
- ▣ MODE: LTE B71
- ▣ OPERATING FREQUENCY: 680,500,000 Hz
- ▣ CHANNEL: 133297 (10 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.880	+20(Ref)	680 500 003	0.0	0.000 000	0.000
100 %		-30	680 500 010	7.8	0.000 001	0.011
100 %		-20	680 500 008	5.4	0.000 001	0.008
100 %		-10	680 500 005	2.7	0.000 000	0.004
100 %		0	680 500 007	4.2	0.000 001	0.006
100 %		+10	680 500 008	5.3	0.000 001	0.008
100 %		+30	680 500 009	6.3	0.000 001	0.009
100 %		+40	680 500 006	3.5	0.000 001	0.005
100 %		+50	680 500 005	2.7	0.000 000	0.004
Batt. Endpoint	3.650	+20	680 500 007	4.4	0.000 001	0.006



- ▣ MODE: LTE B71
- ▣ OPERATING FREQUENCY: 680,500,000 Hz
- ▣ CHANNEL: 133297 (15 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

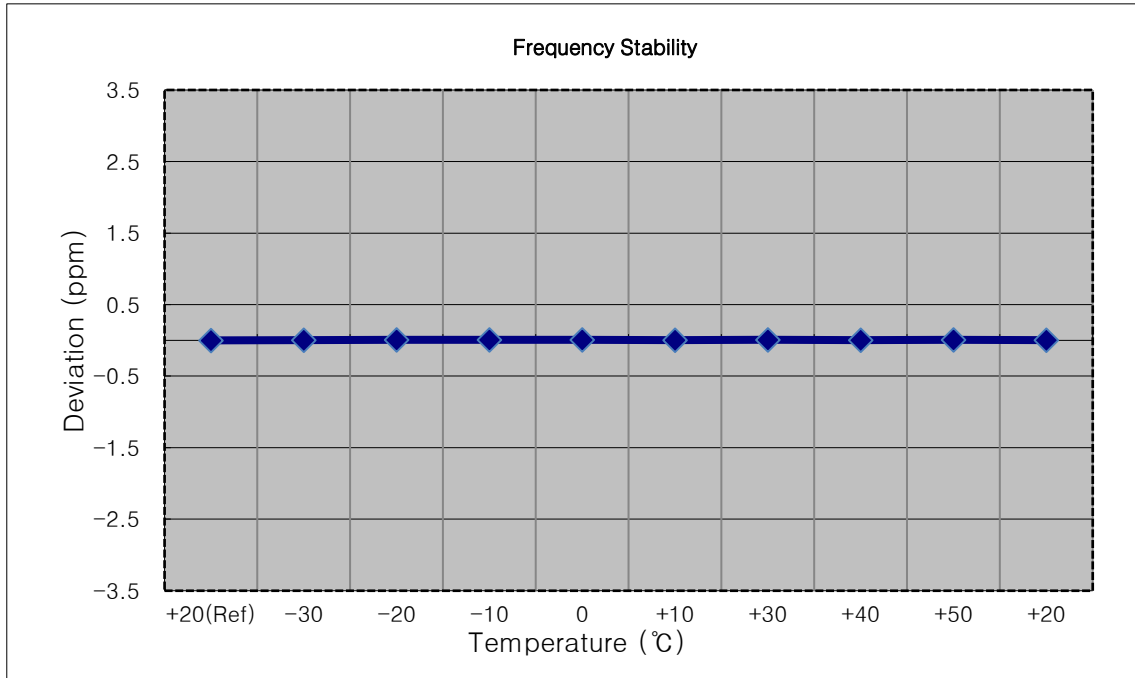
Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.880	+20(Ref)	680 500 005	0.0	0.000 000	0.000
100 %		-30	680 500 010	4.9	0.000 001	0.007
100 %		-20	680 500 008	3.2	0.000 000	0.005
100 %		-10	680 500 008	3.0	0.000 000	0.004
100 %		0	680 500 006	1.4	0.000 000	0.002
100 %		+10	680 500 008	3.5	0.000 001	0.005
100 %		+30	680 500 008	3.1	0.000 000	0.005
100 %		+40	680 500 010	5.5	0.000 001	0.008
100 %		+50	680 500 010	4.8	0.000 001	0.007
Batt. Endpoint	3.650	+20	680 500 009	4.4	0.000 001	0.006





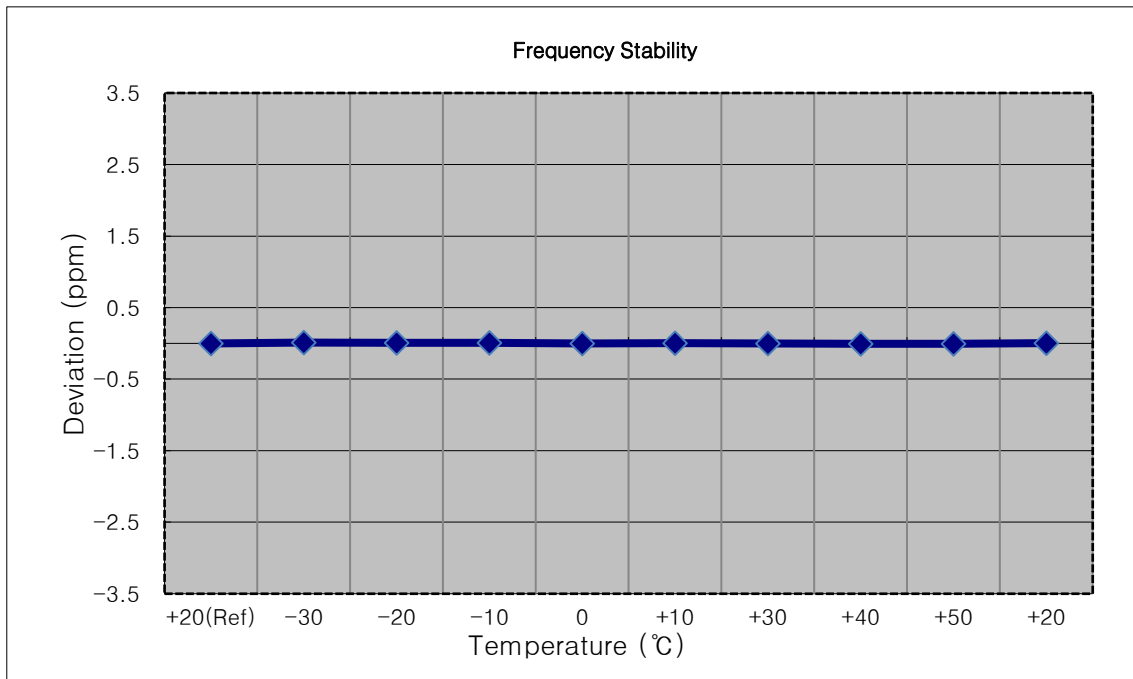
- ▣ MODE: LTE B71
- ▣ OPERATING FREQUENCY: 680,500,000 Hz
- ▣ CHANNEL: 133297 (20 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.880	+20(Ref)	680 500 006	0.0	0.000 000	0.000
100 %		-30	680 500 008	1.9	0.000 000	0.003
100 %		-20	680 500 011	4.9	0.000 001	0.007
100 %		-10	680 500 010	4.3	0.000 001	0.006
100 %		0	680 500 011	4.9	0.000 001	0.007
100 %		+10	680 500 009	3.3	0.000 000	0.005
100 %		+30	680 500 012	5.9	0.000 001	0.009
100 %		+40	680 500 010	3.6	0.000 001	0.005
100 %		+50	680 500 011	4.7	0.000 001	0.007
Batt. Endpoint	3.650	+20	680 500 010	3.7	0.000 001	0.005



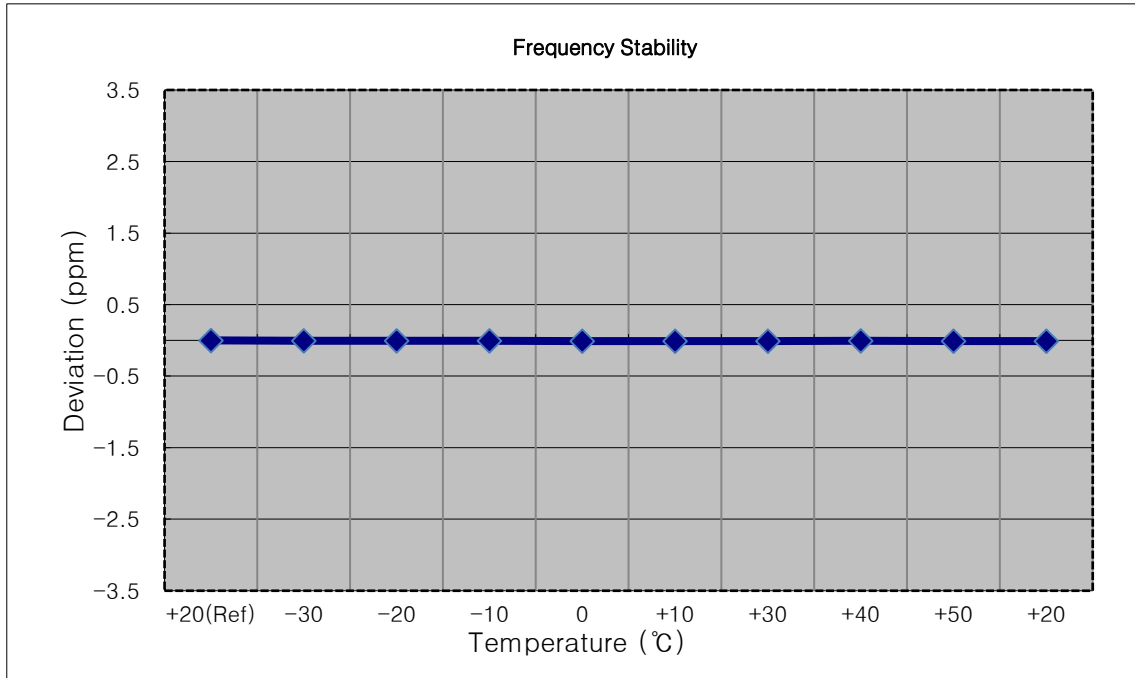
- ▣ MODE: LTE B71
- ▣ OPERATING FREQUENCY: 695,500,000 Hz
- ▣ CHANNEL: 133447 (5 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.880	+20(Ref)	695 500 003	0.0	0.000 000	0.000
100 %		-30	695 500 011	7.7	0.000 001	0.011
100 %		-20	695 500 007	3.9	0.000 001	0.006
100 %		-10	695 500 008	4.5	0.000 001	0.006
100 %		0	695 500 001	-2.3	0.000 000	-0.003
100 %		+10	695 500 007	3.6	0.000 001	0.005
100 %		+30	695 500 001	-2.1	0.000 000	-0.003
100 %		+40	695 499 999	-4.1	-0.000 001	-0.006
100 %		+50	695 500 000	-2.8	0.000 000	-0.004
Batt. Endpoint	3.650	+20	695 500 007	3.8	0.000 001	0.005



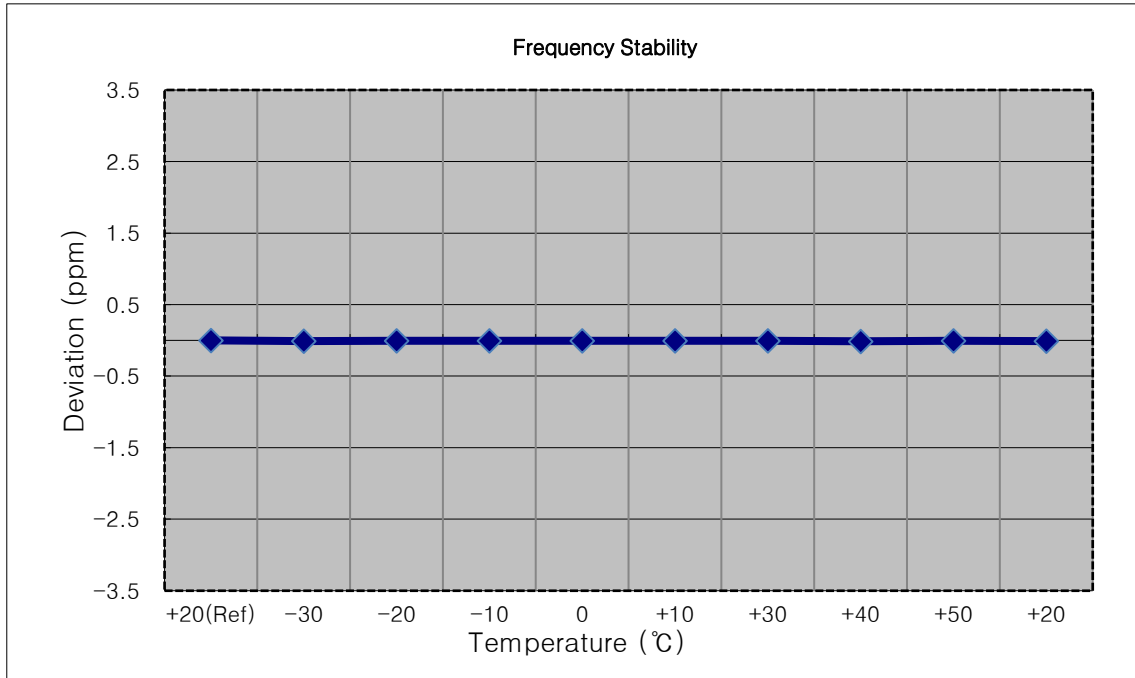
- ▣ MODE: LTE B71
- ▣ OPERATING FREQUENCY: 693,000,000 Hz
- ▣ CHANNEL: 133422 (10 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.880	+20(Ref)	692 999 996	0.0	0.000 000	0.000
100 %		-30	692 999 990	-5.4	-0.000 001	-0.008
100 %		-20	692 999 991	-4.9	-0.000 001	-0.007
100 %		-10	692 999 991	-4.5	-0.000 001	-0.006
100 %		0	692 999 990	-6.2	-0.000 001	-0.009
100 %		+10	692 999 990	-5.9	-0.000 001	-0.009
100 %		+30	692 999 990	-6.3	-0.000 001	-0.009
100 %		+40	692 999 991	-5.2	-0.000 001	-0.008
100 %		+50	692 999 989	-6.7	-0.000 001	-0.010
Batt. Endpoint	3.650	+20	692 999 990	-5.6	-0.000 001	-0.008



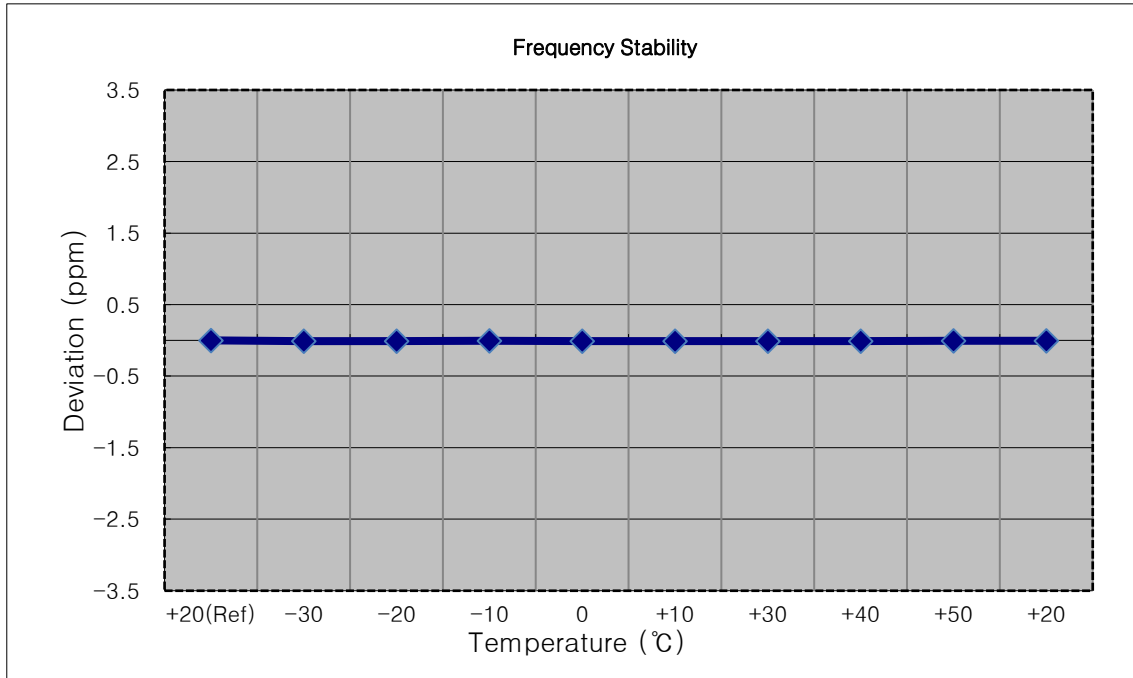
- ▣ MODE: LTE B71
- ▣ OPERATING FREQUENCY: 690,500,000 Hz
- ▣ CHANNEL: 133397 (15 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.880	+20(Ref)	690 499 995	0.0	0.000 000	0.000
100 %		-30	690 499 986	-8.5	-0.000 001	-0.012
100 %		-20	690 499 990	-4.3	-0.000 001	-0.006
100 %		-10	690 499 991	-4.0	-0.000 001	-0.006
100 %		0	690 499 990	-5.0	-0.000 001	-0.007
100 %		+10	690 499 990	-4.5	-0.000 001	-0.007
100 %		+30	690 499 991	-4.1	-0.000 001	-0.006
100 %		+40	690 499 986	-8.6	-0.000 001	-0.012
100 %		+50	690 499 991	-3.5	-0.000 001	-0.005
Batt. Endpoint	3.650	+20	690 499 989	-5.6	-0.000 001	-0.008



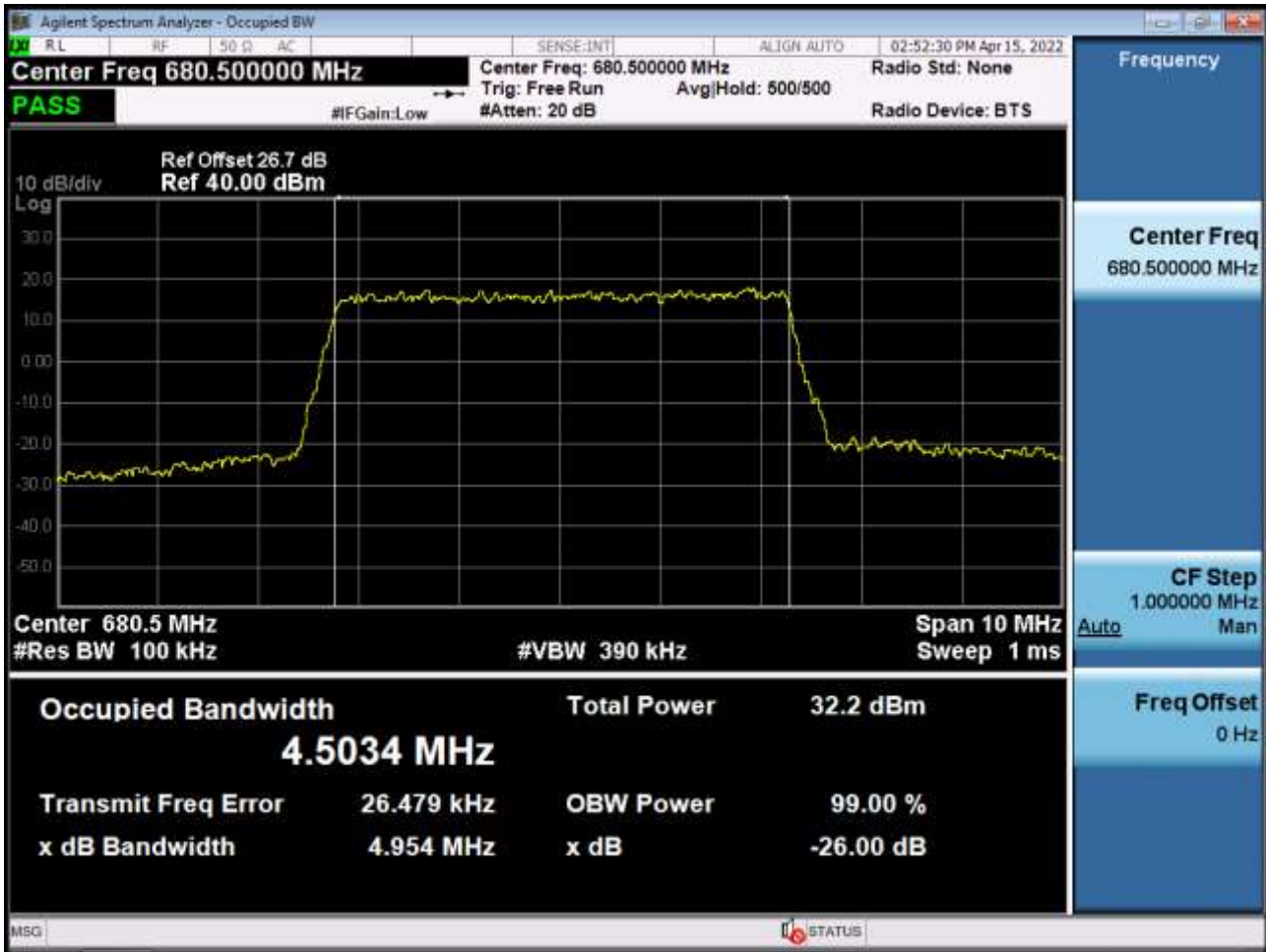
- ▣ MODE: LTE B71
- ▣ OPERATING FREQUENCY: 688,000,000 Hz
- ▣ CHANNEL: 133372 (20 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.880	+20(Ref)	687 999 995	0.0	0.000 000	0.000
100 %		-30	687 999 987	-7.5	-0.000 001	-0.011
100 %		-20	687 999 989	-6.1	-0.000 001	-0.009
100 %		-10	687 999 993	-2.4	0.000 000	-0.003
100 %		0	687 999 989	-6.0	-0.000 001	-0.009
100 %		+10	687 999 989	-5.5	-0.000 001	-0.008
100 %		+30	687 999 989	-5.8	-0.000 001	-0.008
100 %		+40	687 999 989	-6.2	-0.000 001	-0.009
100 %		+50	687 999 991	-3.8	-0.000 001	-0.006
Batt. Endpoint	3.650	+20	687 999 990	-5.0	-0.000 001	-0.007

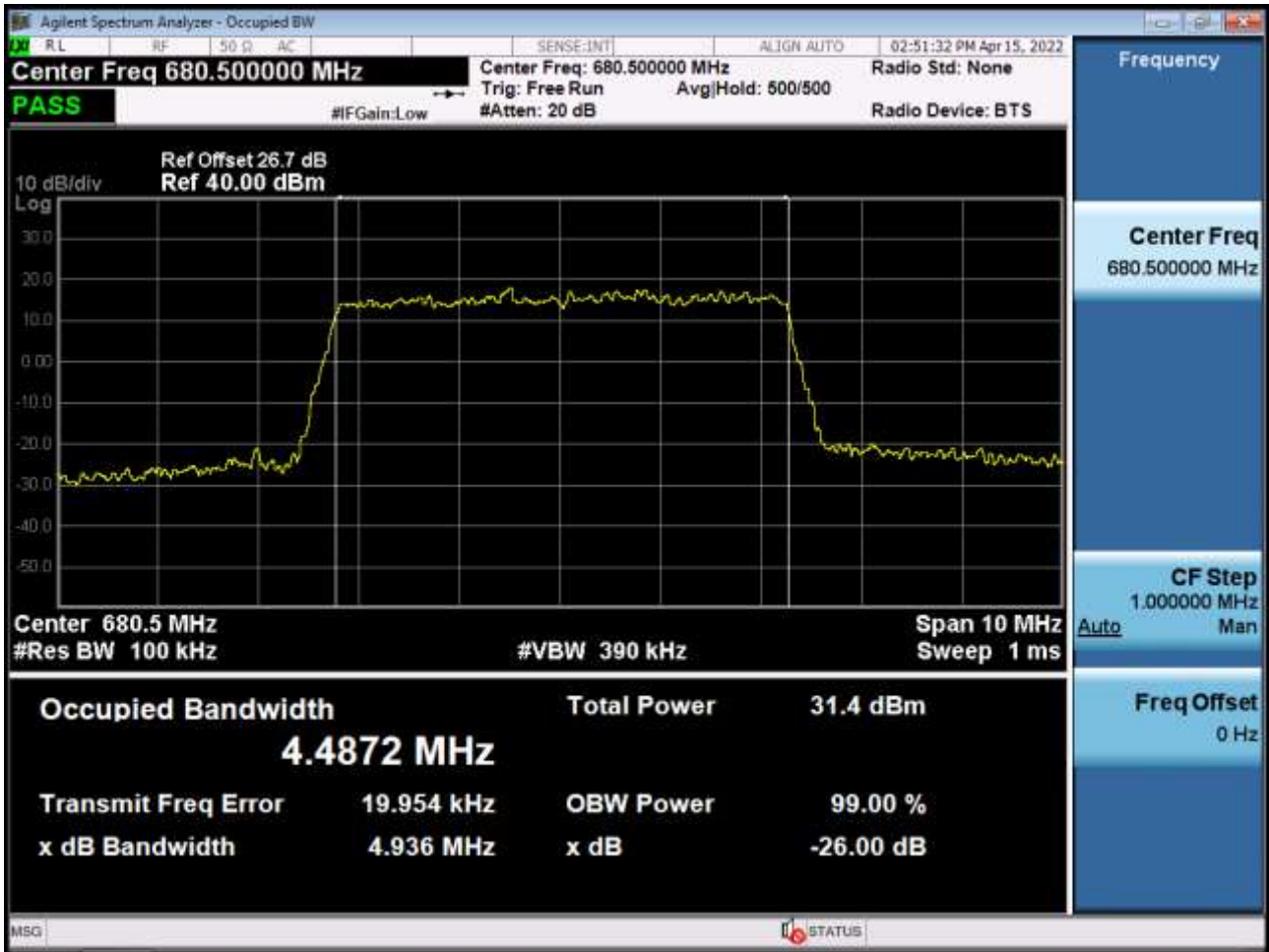


## 9. TEST PLOTS

BAND 71. Occupied Bandwidth Plot (5M BW Ch.133297 QPSK\_RB6\_0)

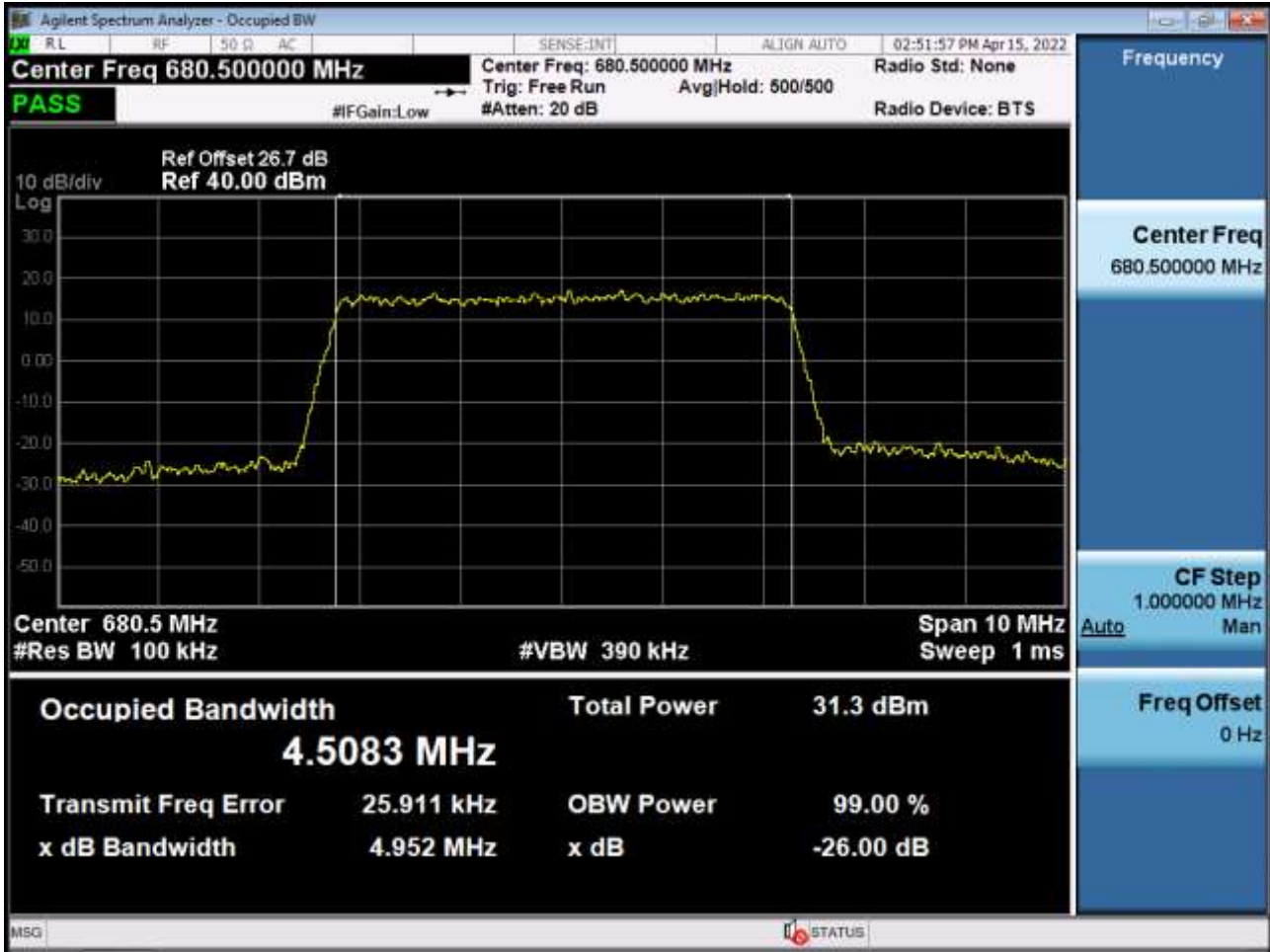


BAND 71. Occupied Bandwidth Plot (5M BW Ch.133297 16QAM\_RB6\_0)

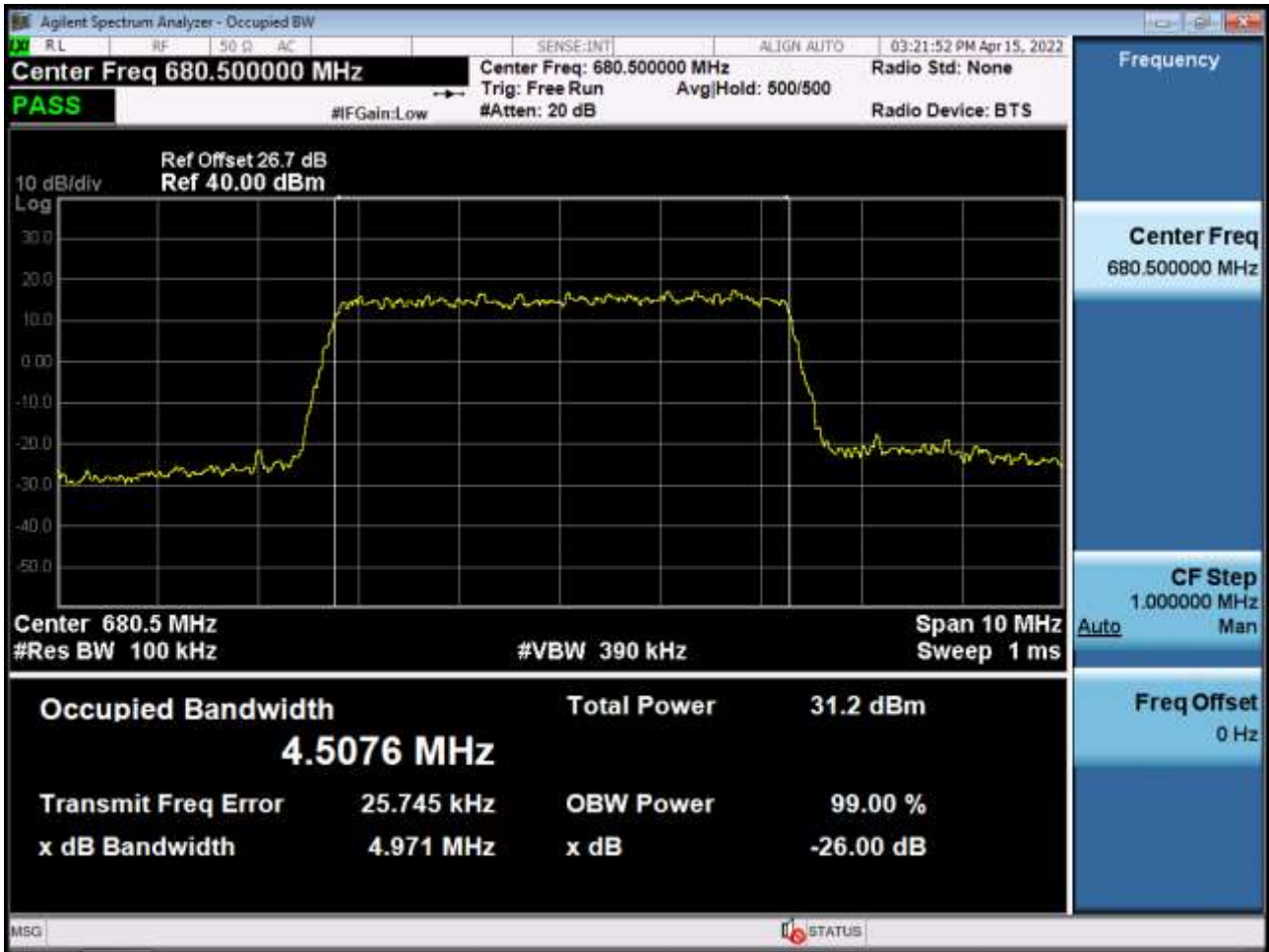




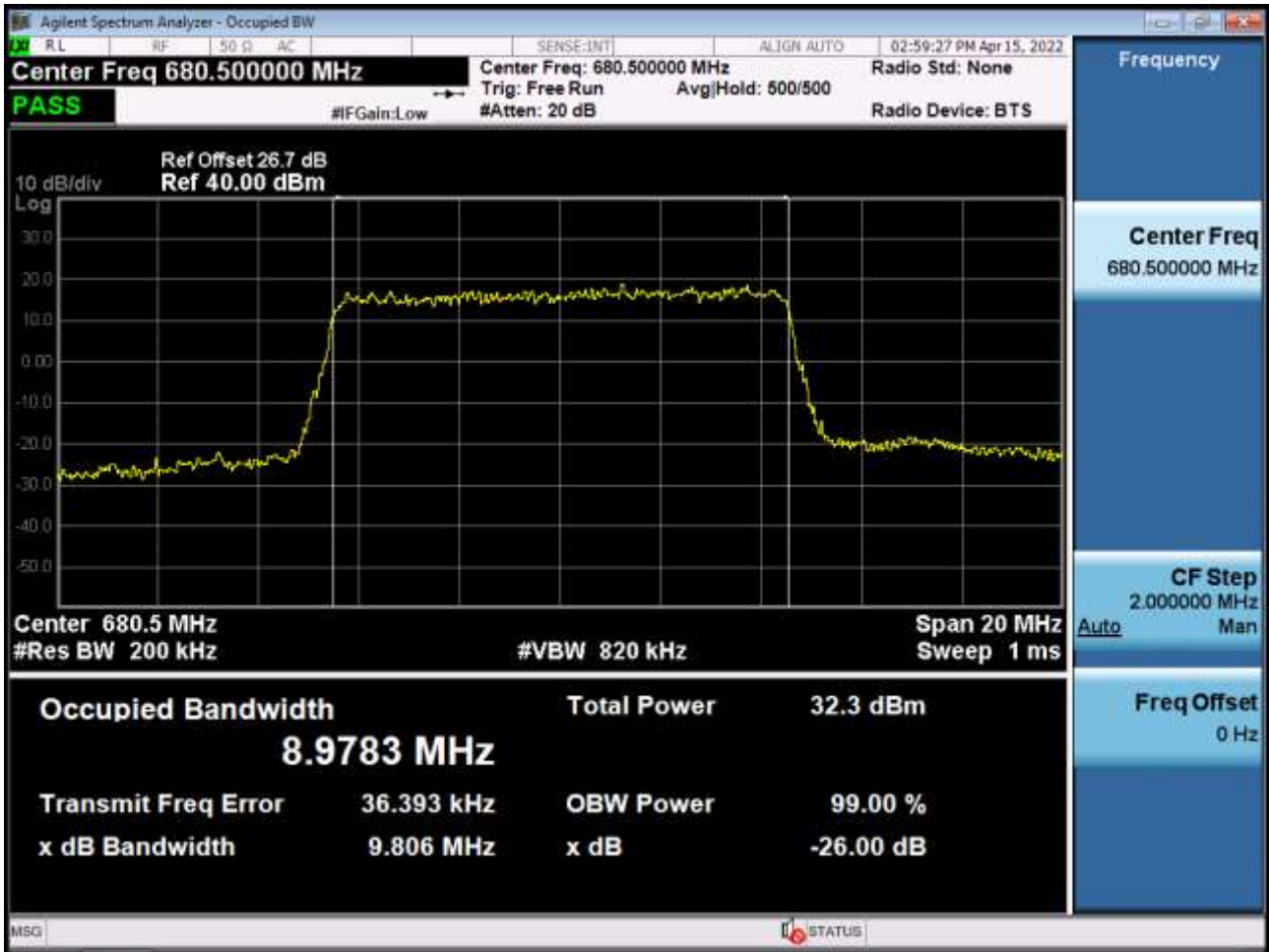
BAND 71. Occupied Bandwidth Plot (5M BW Ch.133297 64QAM\_RB6\_0)



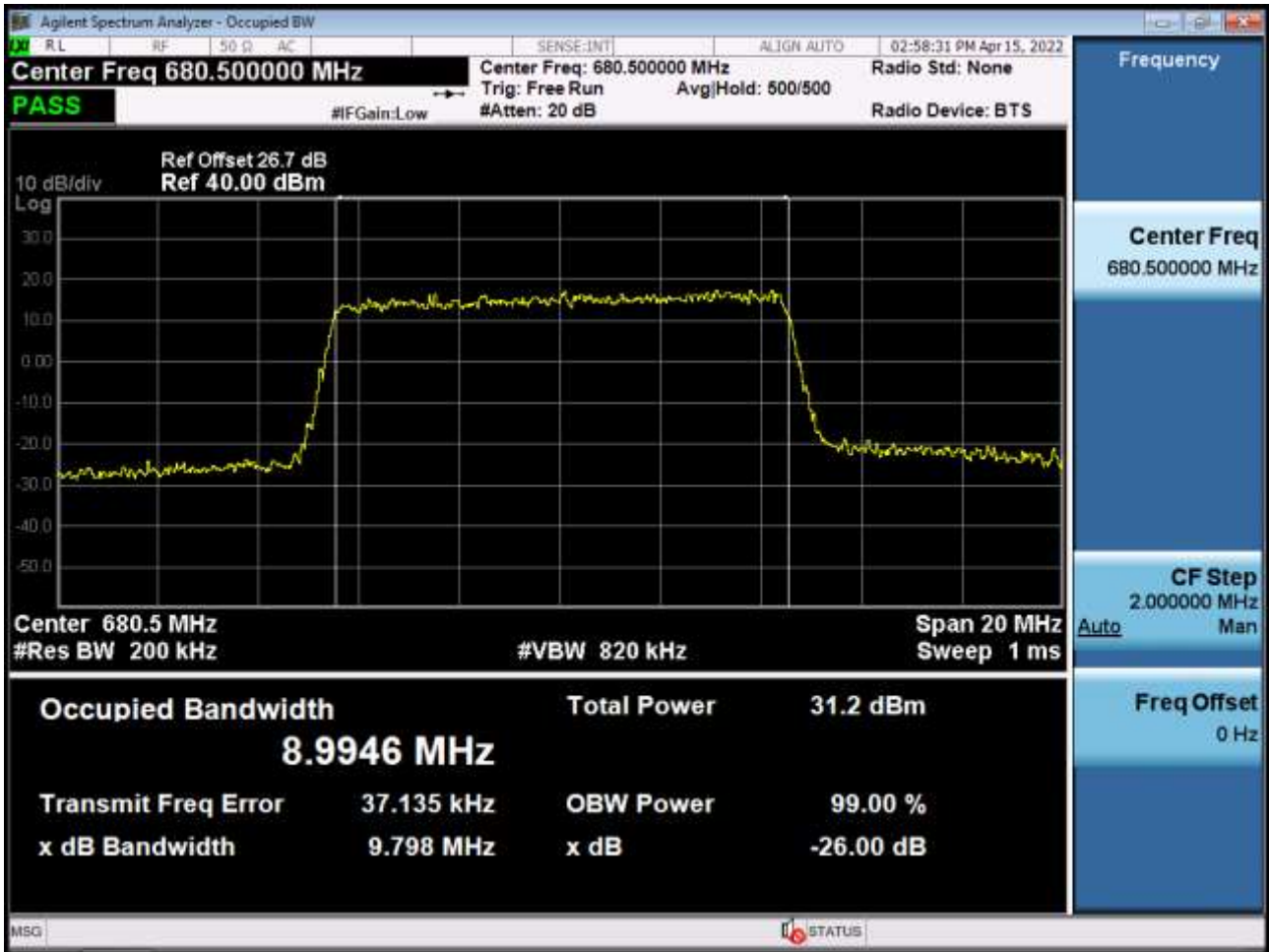
BAND 71. Occupied Bandwidth Plot (5M BW Ch.133297 256QAM\_RB6\_0)



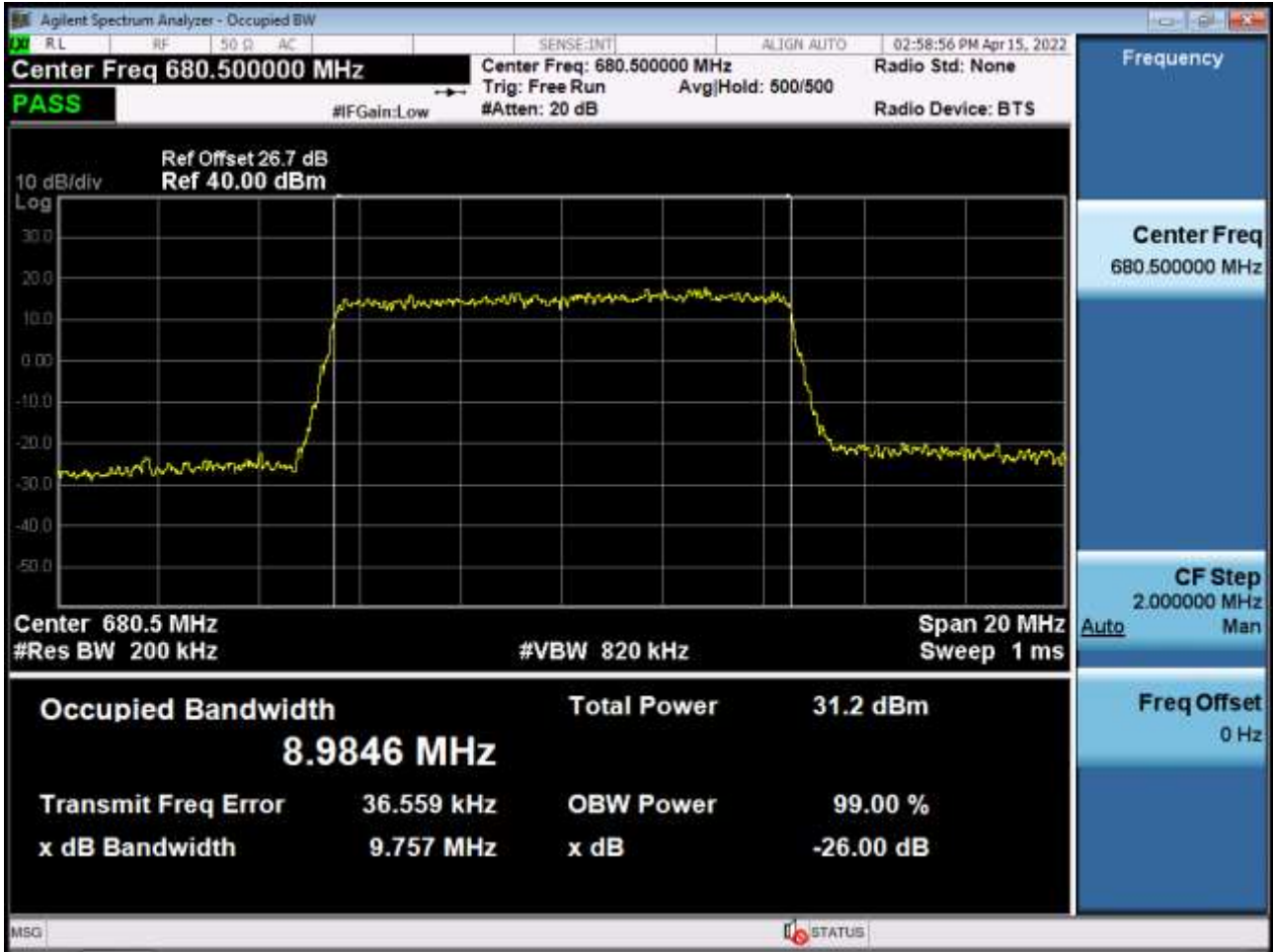
BAND 71. Occupied Bandwidth Plot (10M BW Ch.133297 QPSK\_RB15\_0)



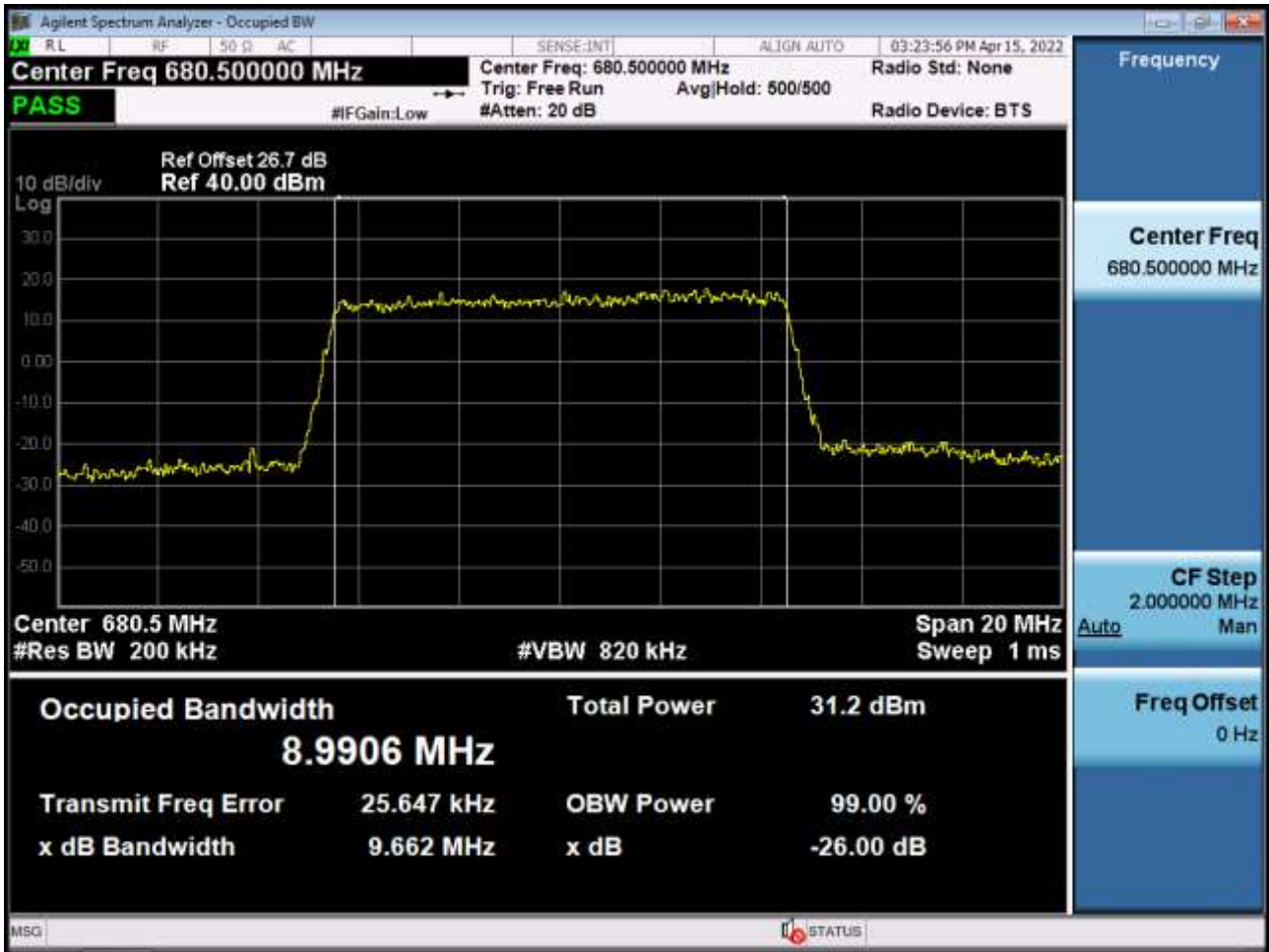
BAND 71. Occupied Bandwidth Plot (10M BW Ch.133297 16QAM\_RB15\_0)



BAND 71. Occupied Bandwidth Plot (10M BW Ch.133297 64QAM\_RB15\_0)

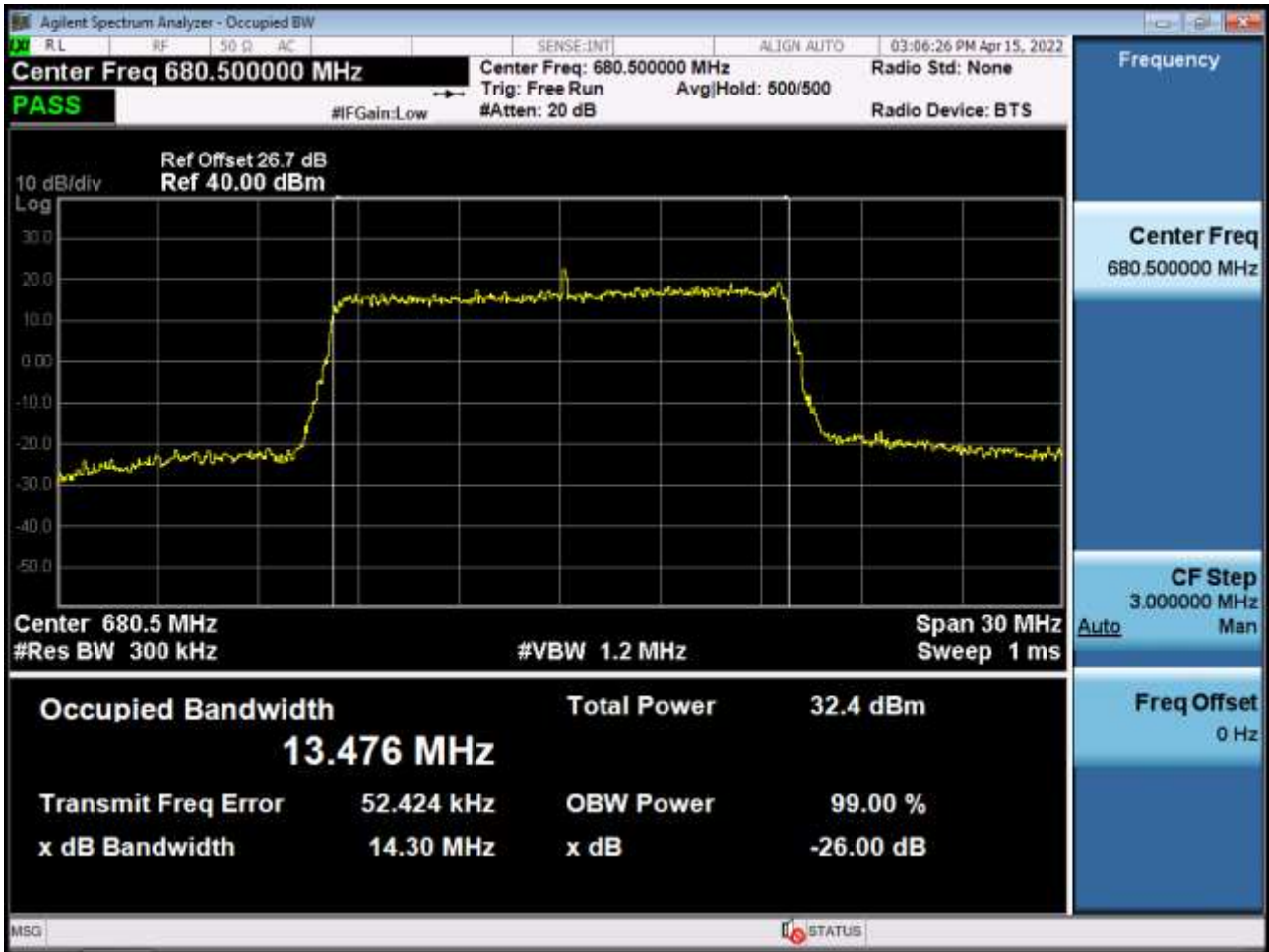


BAND 71. Occupied Bandwidth Plot (10M BW Ch.133297 256QAM\_RB15\_0)

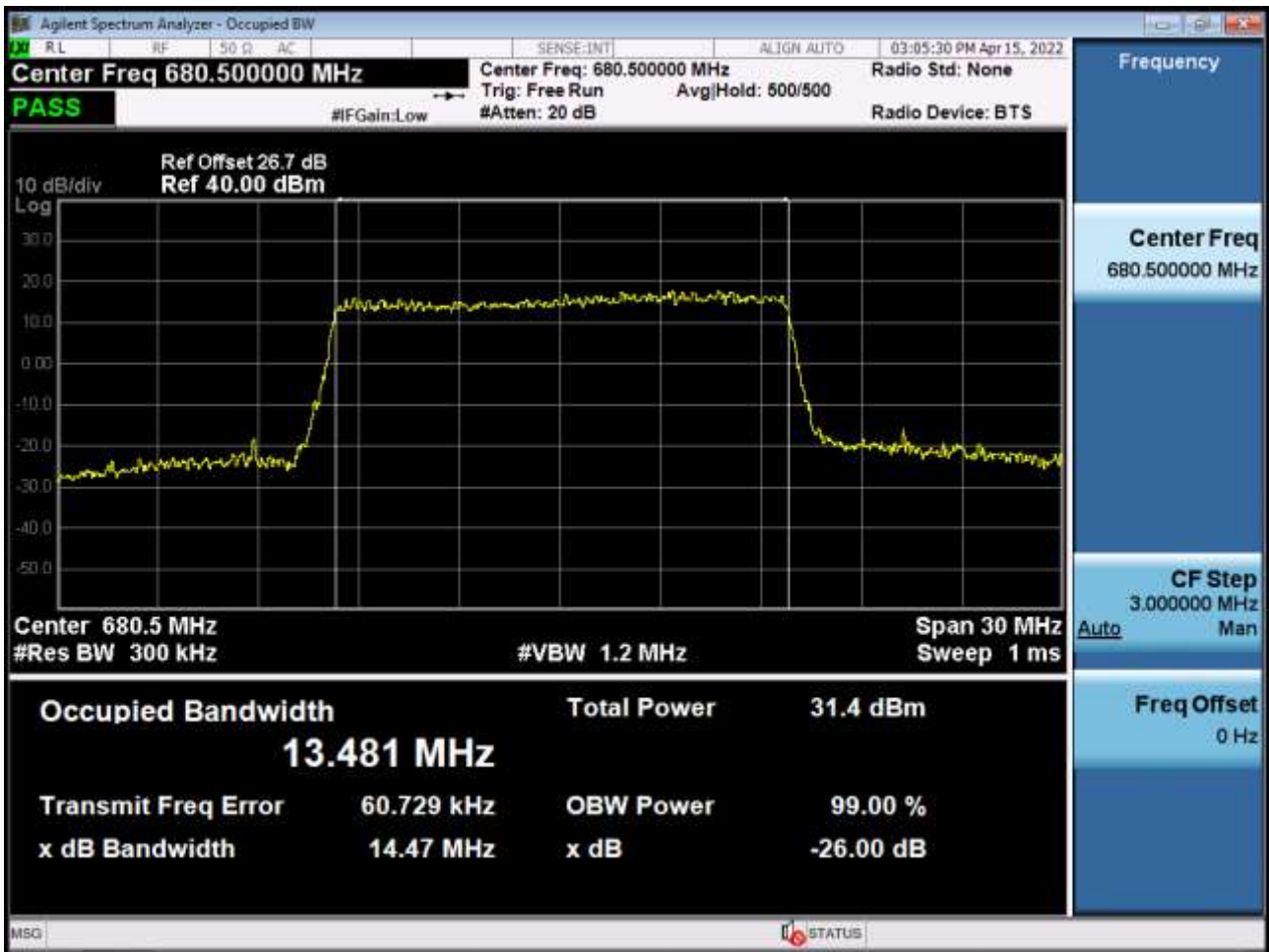




BAND 71. Occupied Bandwidth Plot (15M BW Ch.133297 QPSK\_RB25\_0)

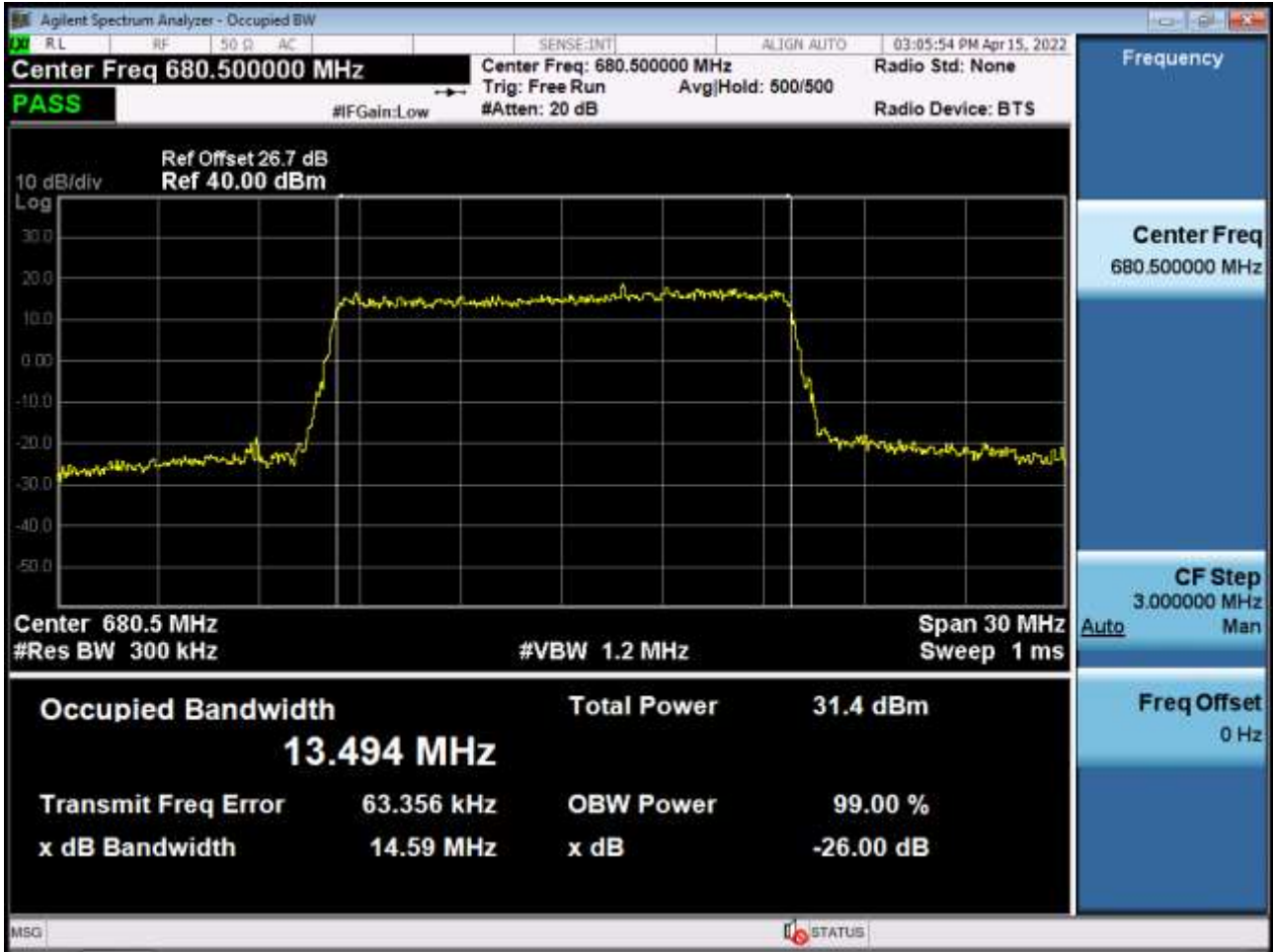


BAND 71. Occupied Bandwidth Plot (15M BW Ch.133297 16QAM\_RB25\_0)

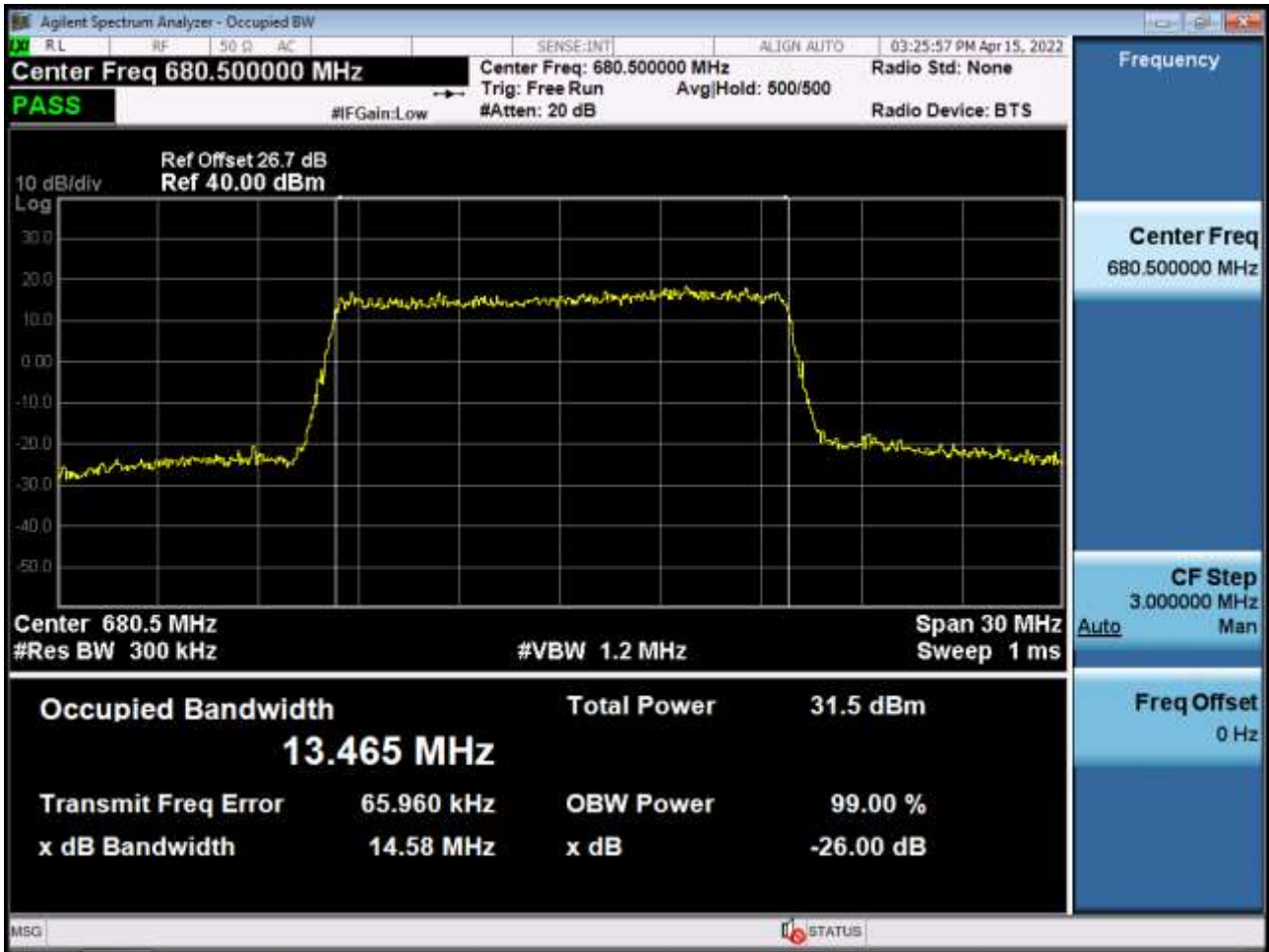




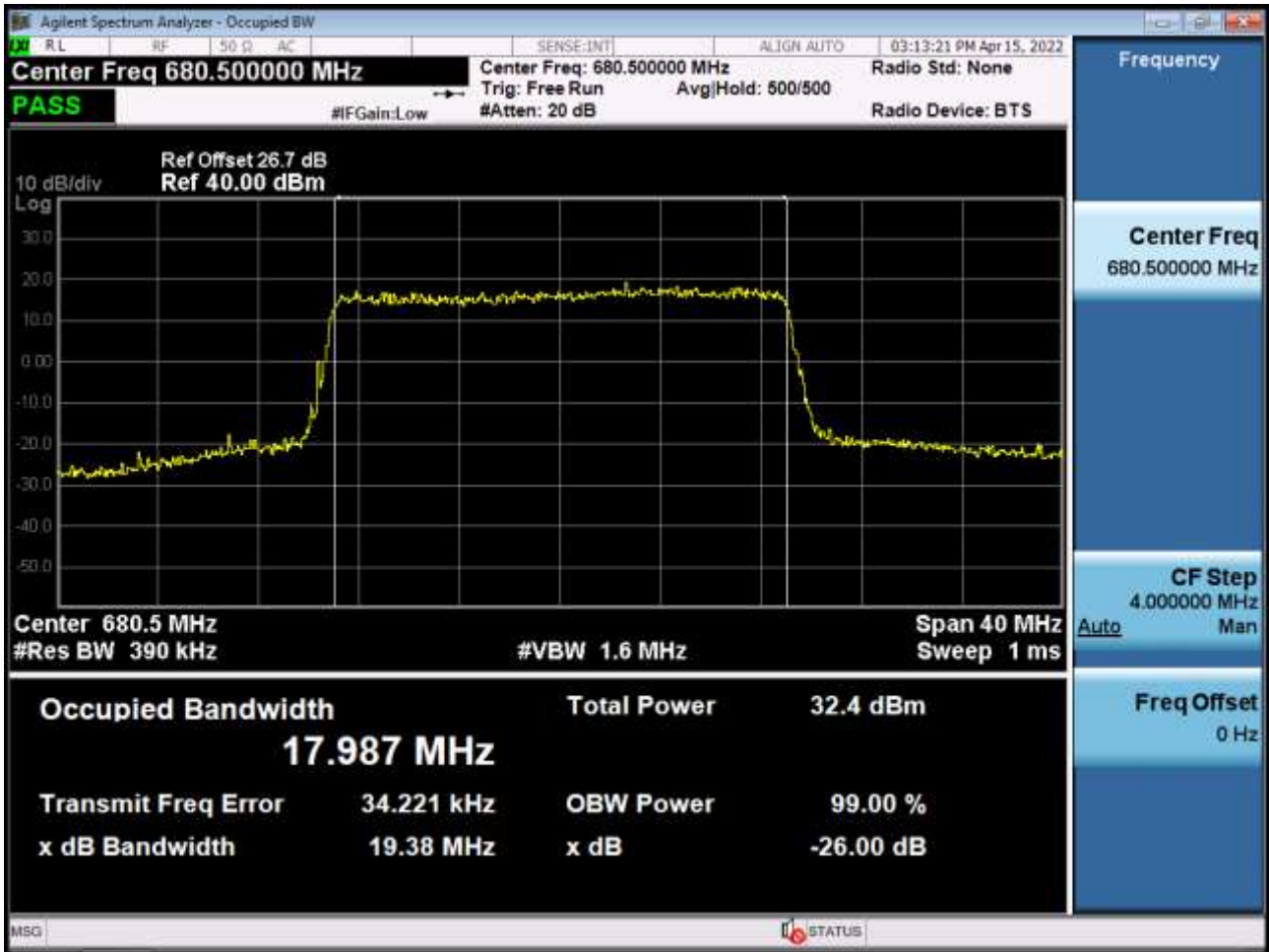
BAND 71. Occupied Bandwidth Plot (15M BW Ch.133297 64QAM\_RB25\_0)



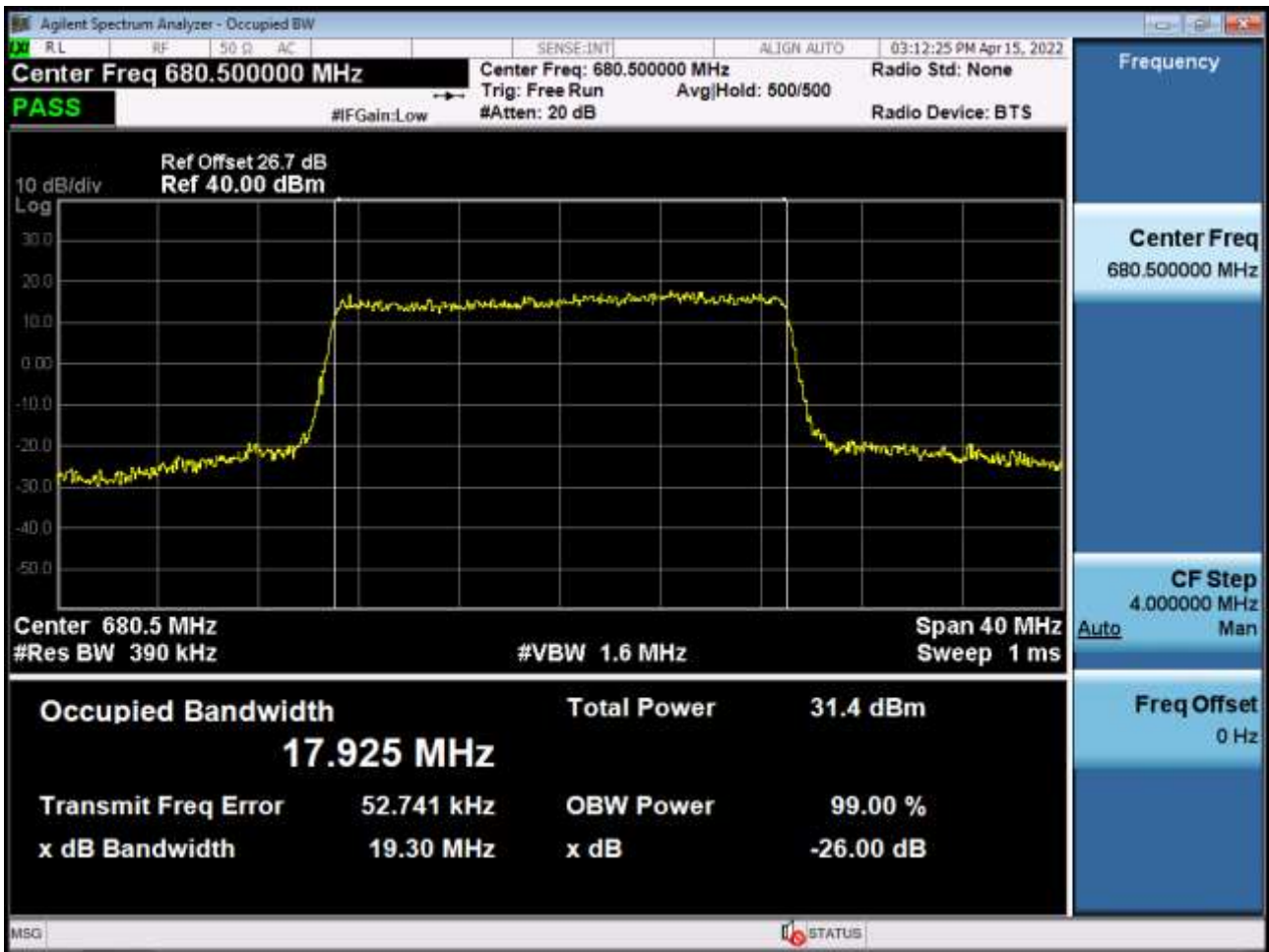
BAND 71. Occupied Bandwidth Plot (15M BW Ch.133297 256QAM\_RB25\_0)



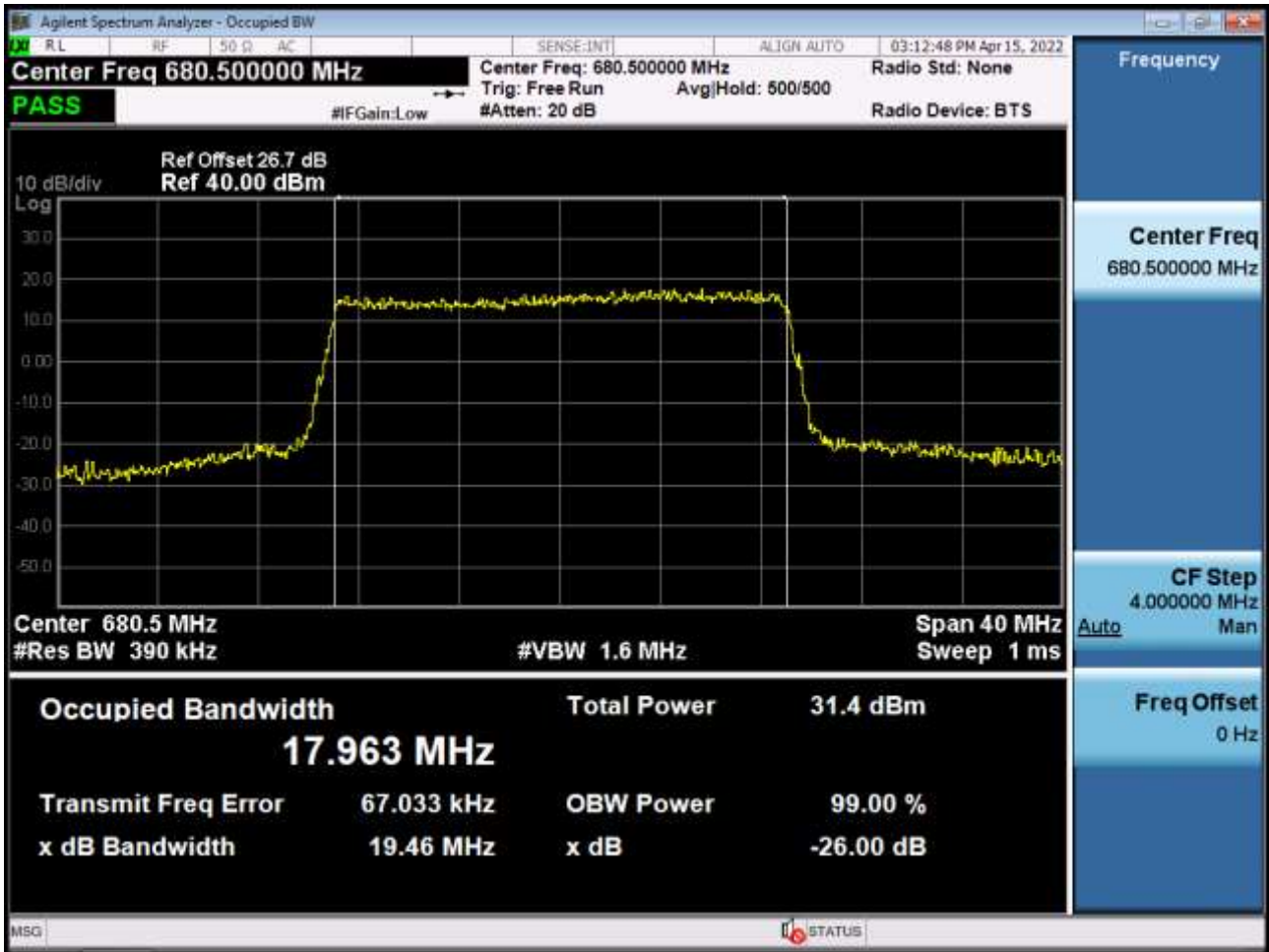
BAND 71. Occupied Bandwidth Plot (20M BW Ch.133297 QPSK\_RB50\_0)



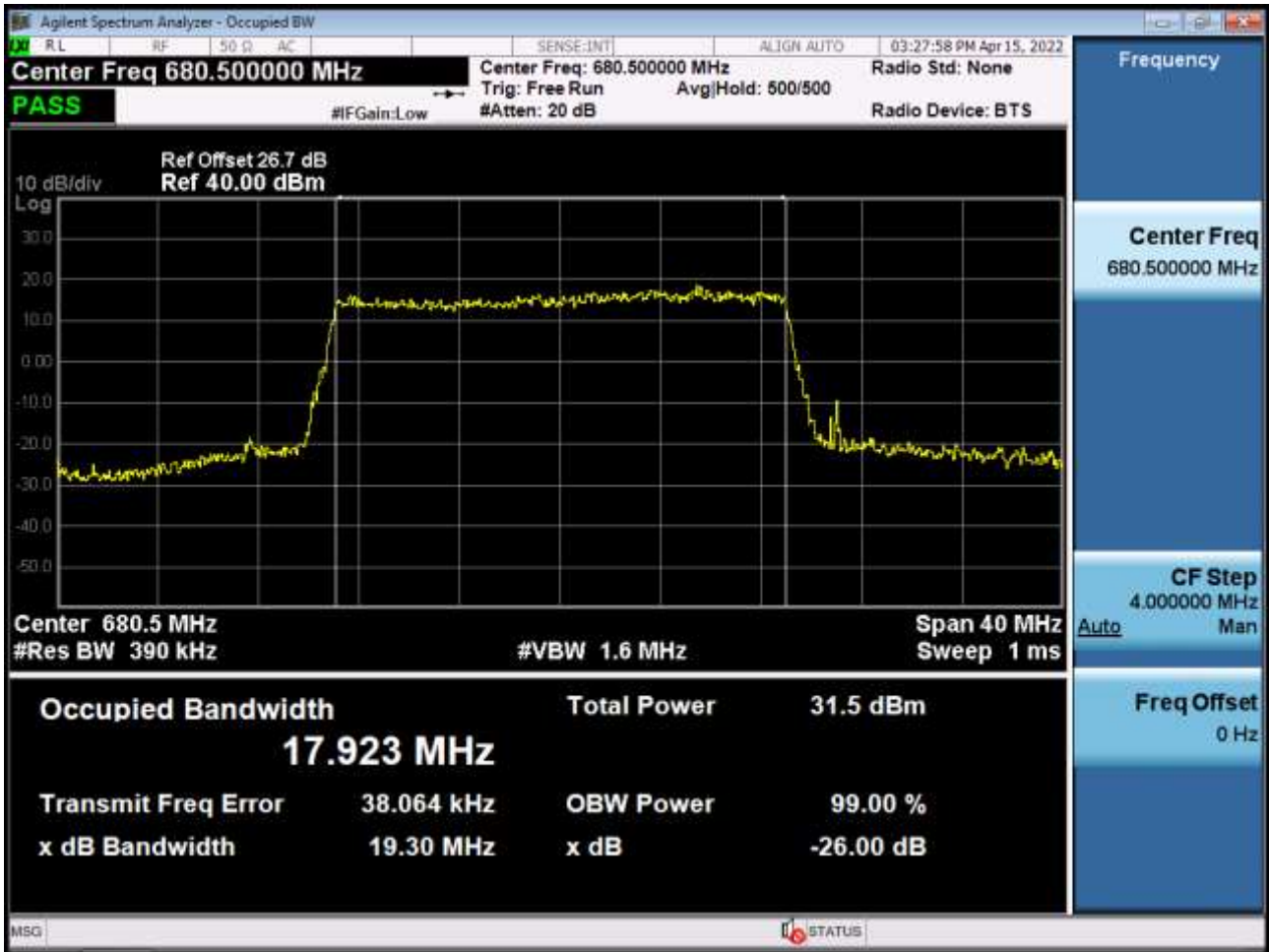
BAND 71. Occupied Bandwidth Plot (20M BW Ch.133297 16QAM\_RB50\_0)



BAND 71. Occupied Bandwidth Plot (20M BW Ch.133297 64QAM\_RB50\_0)

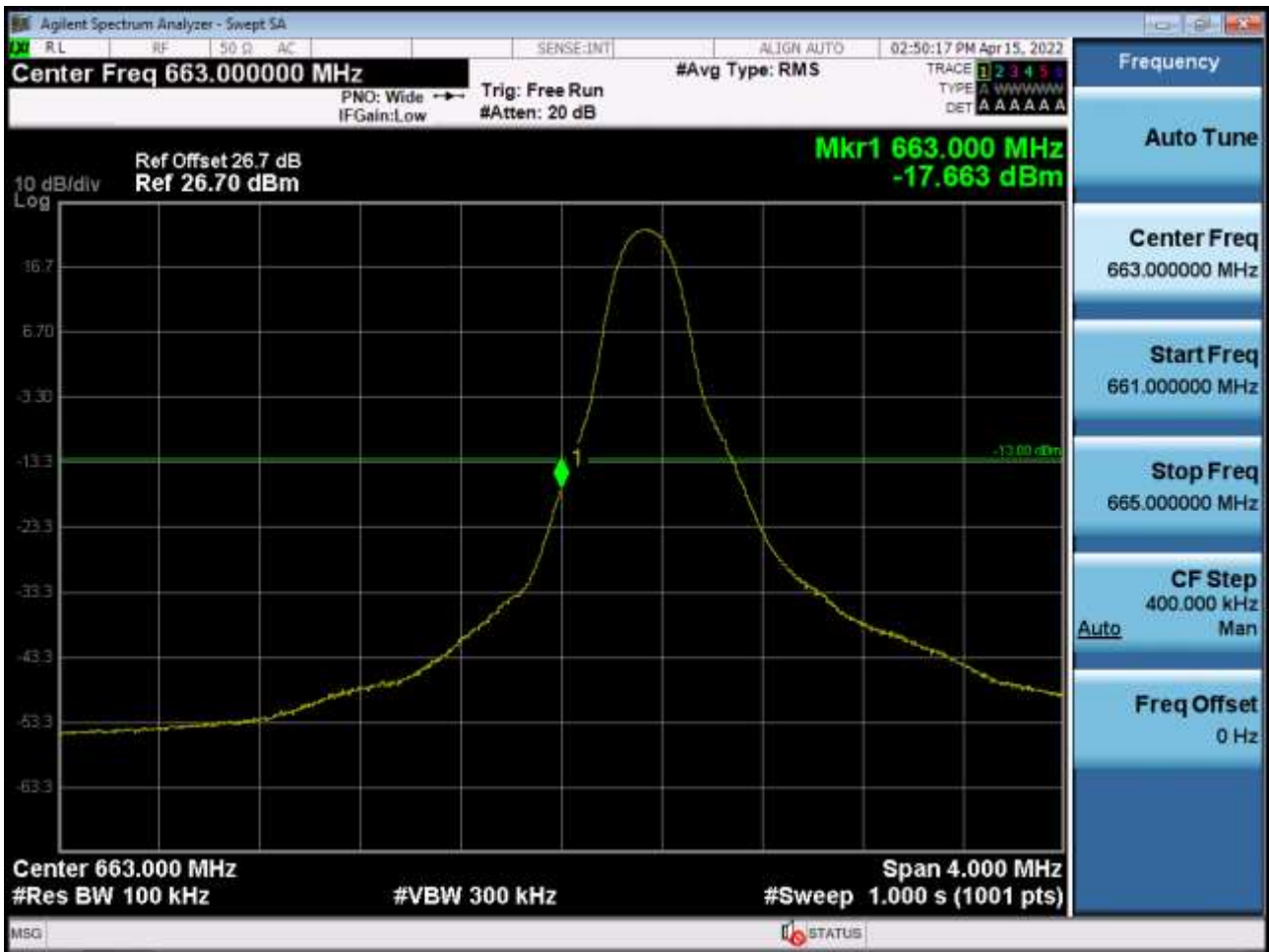


BAND 71. Occupied Bandwidth Plot (20M BW Ch.133297 256QAM\_RB50\_0)





BAND 71. Lower Band Edge Plot (5M BW Ch.133147 QPSK\_RB1\_Offset 0)



BAND 71. Lower Band Edge Plot (5M BW Ch.133147 QPSK\_RB6\_Offset 0)

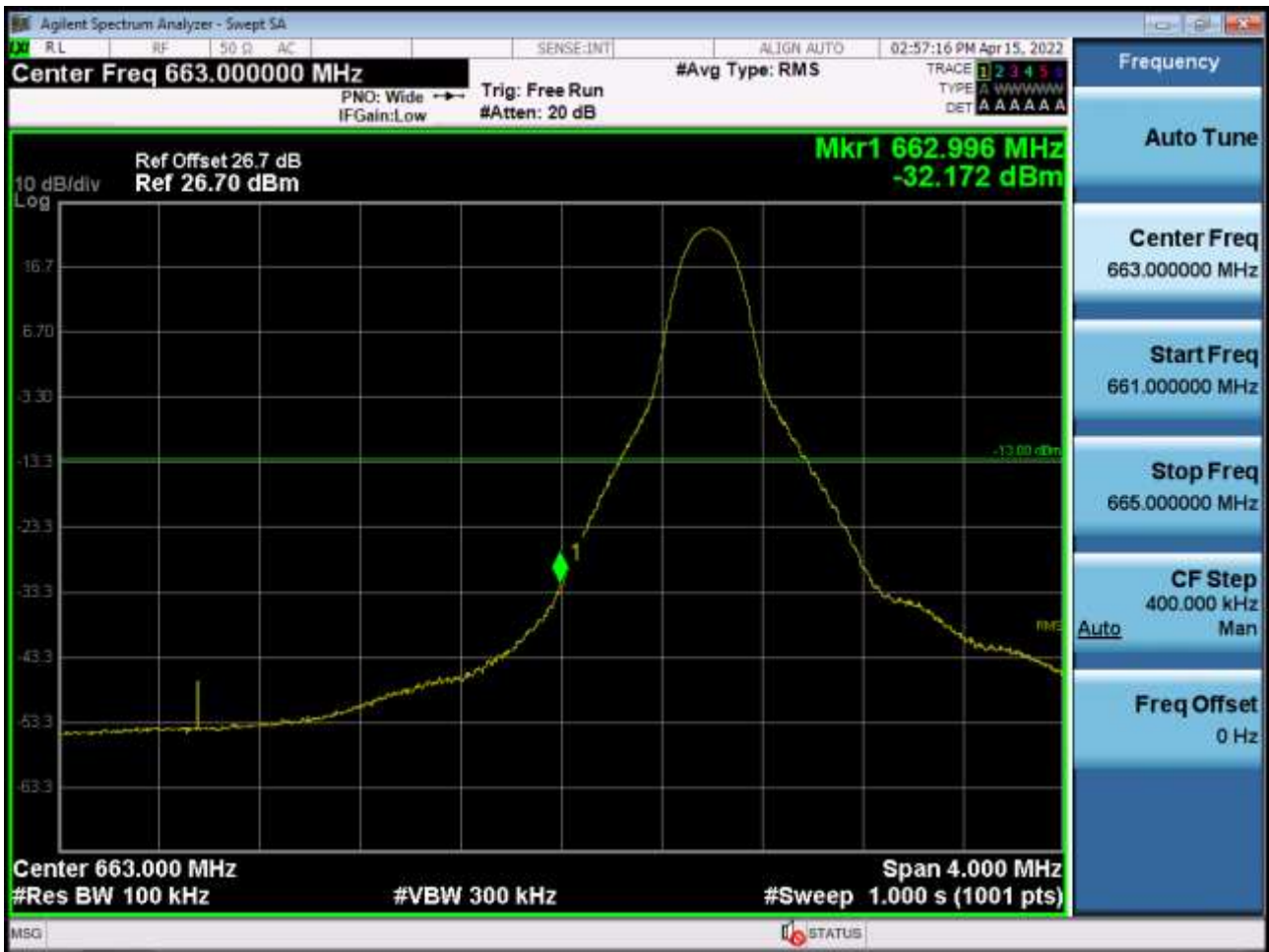




BAND 71. Lower Extended Band Edge Plot (5M BW Ch.133147 QPSK\_RB6\_0)



BAND 71. Lower Band Edge Plot (10M BW Ch.133172 QPSK\_RB1\_Offset 0)



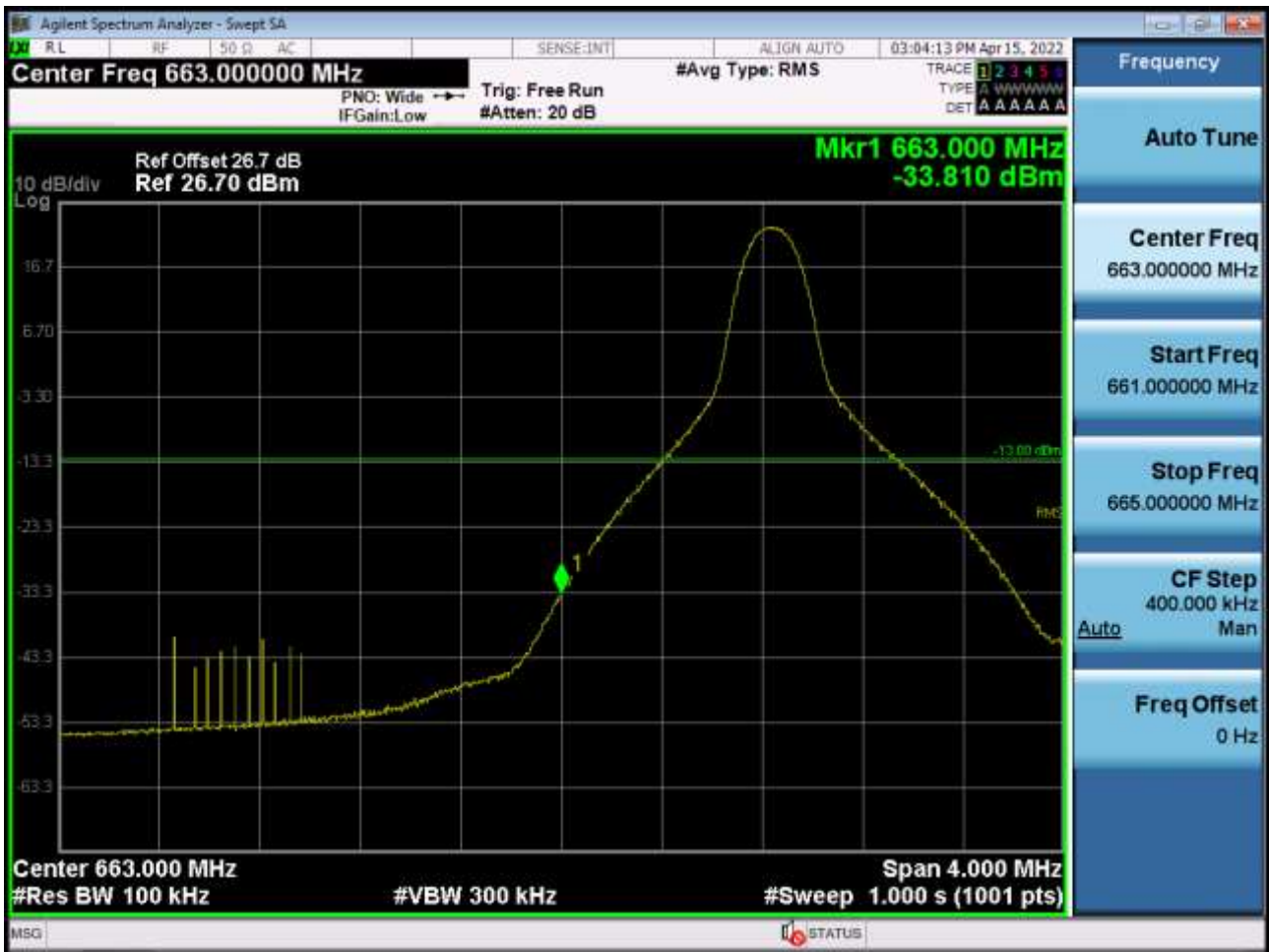
BAND 71. Lower Band Edge Plot (10M BW Ch.133172 QPSK\_RB15\_Offset 0)



BAND 71. Lower Extended Band Edge Plot (10M BW Ch.133172 QPSK\_RB15\_0)



BAND 71. Lower Band Edge Plot (15M BW Ch.133197 QPSK\_RB1\_Offset 0)



BAND 71. Lower Band Edge Plot (15M BW Ch.133197 QPSK\_RB25\_Offset 0)





BAND 71. Lower Extended Band Edge Plot (15M BW Ch.133197 QPSK\_RB25\_0)



BAND 71. Lower Band Edge Plot (20M BW Ch.133222 QPSK\_RB1\_Offset 0)





BAND 71. Lower Band Edge Plot (20M BW Ch.133222 QPSK\_RB50\_Offset 0)



BAND 71. Lower Extended Band Edge Plot (20M BW Ch.133222 QPSK\_RB50\_0)



BAND 71. Upper Band Edge Plot (5M BW Ch.133447 QPSK\_RB1\_Offset 5)



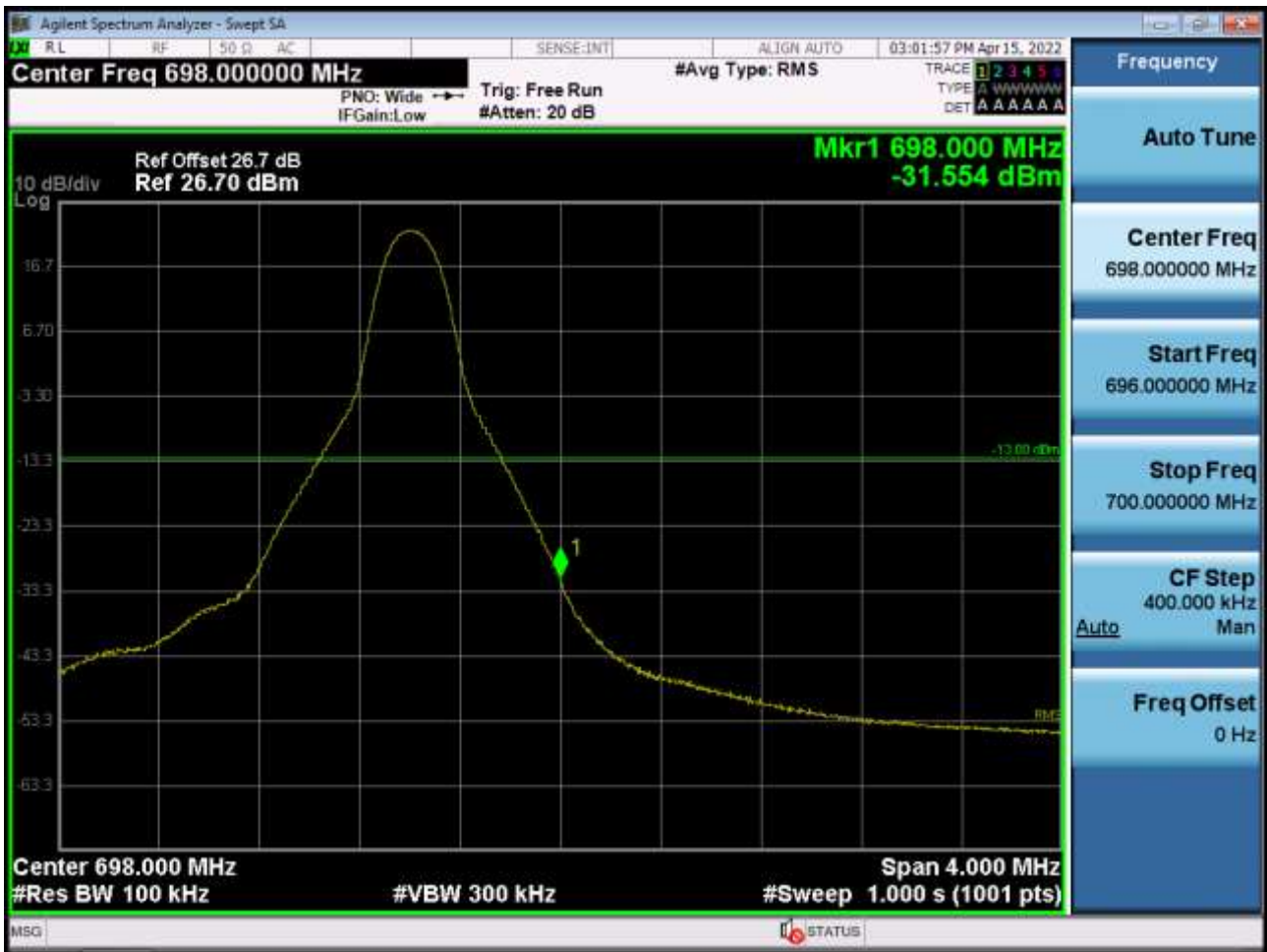
BAND 71. Upper Band Edge Plot (5M BW Ch.133447 QPSK\_RB1\_Offset 5)



BAND 71. Upper Extended Band Edge Plot (5M BW Ch.133447 QPSK\_RB6\_0)



BAND 71. Upper Band Edge Plot (10M BW Ch.133422 QPSK\_RB1\_Offset 14)





BAND 71. Upper Band Edge Plot (10M BW Ch.133422 QPSK\_RB1\_Offset 14)

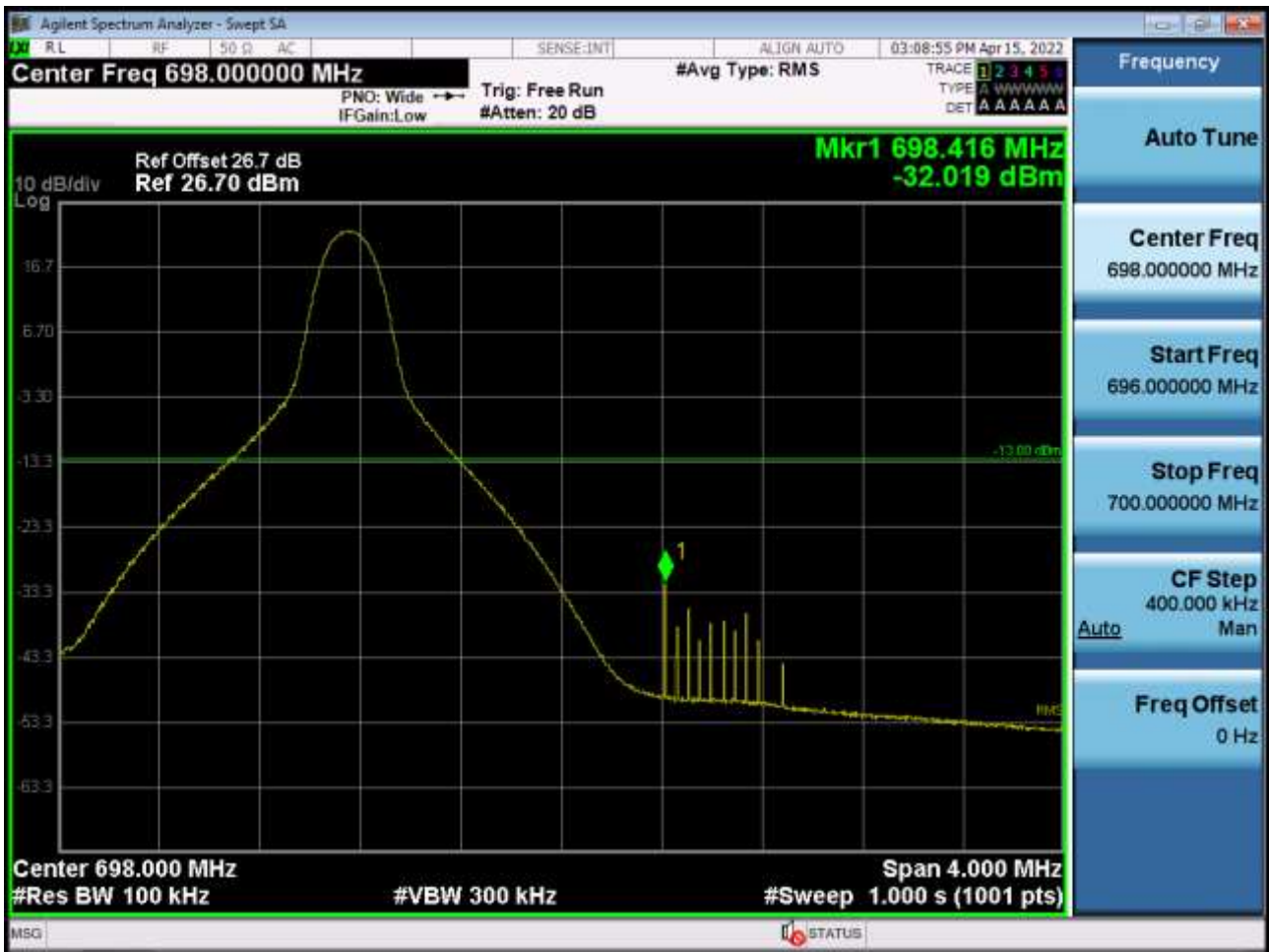


BAND 71. Upper Extended Band Edge Plot (10M BW Ch.133422 QPSK\_RB15\_0)





BAND 71. Upper Band Edge Plot (15M BW Ch.133397 QPSK\_RB1\_Offset 24)



BAND 71. Upper Band Edge Plot (15M BW Ch.133397 QPSK\_RB25\_Offset 0)



BAND 71. Upper Extended Band Edge Plot (15M BW Ch.133397 QPSK\_RB25\_0)



BAND 71. Upper Band Edge Plot (20M BW Ch.133372 QPSK\_RB1\_Offset 49)



BAND 71. Upper Band Edge Plot (20M BW Ch.133372 QPSK\_RB50\_Offset 0)

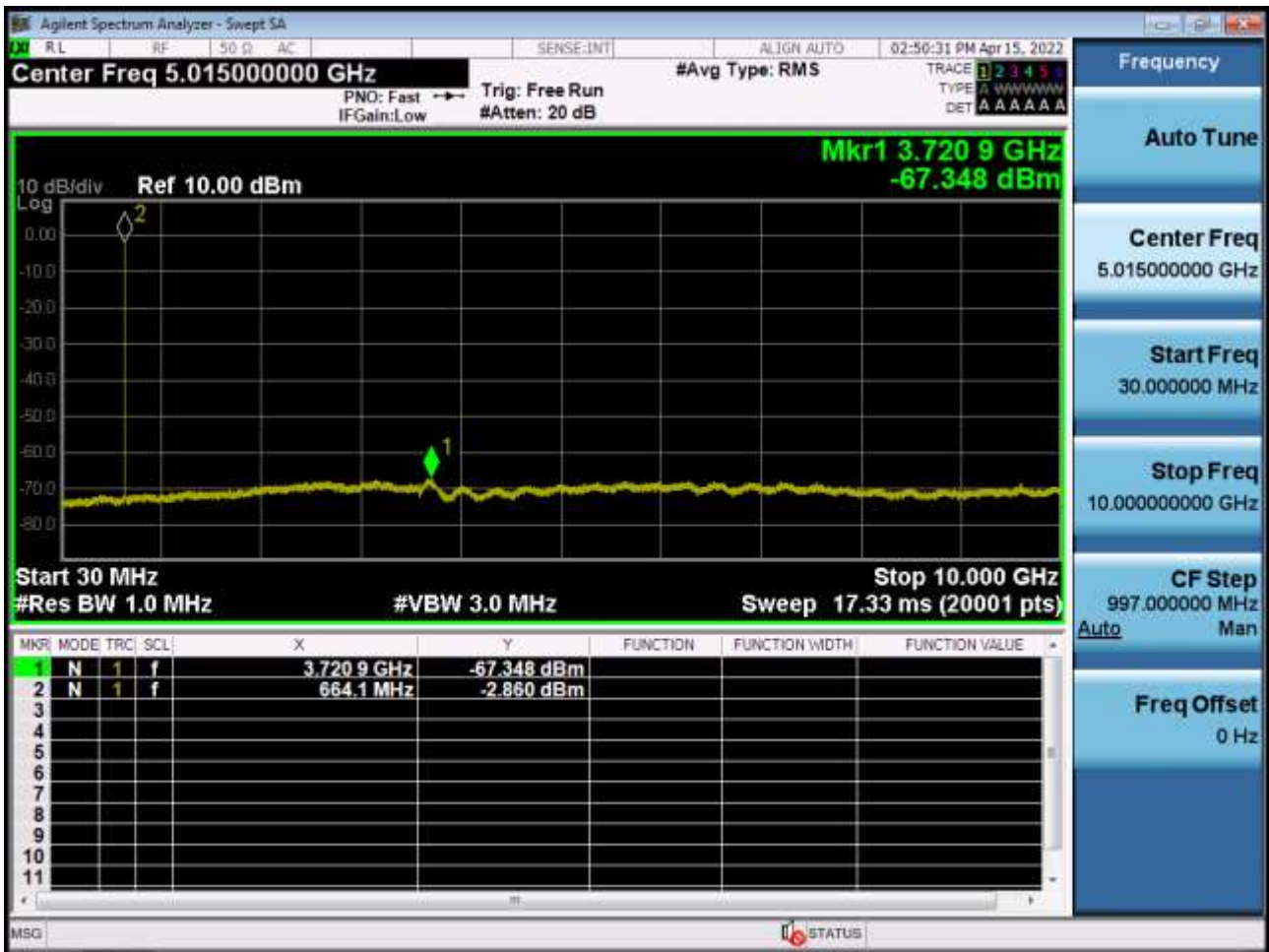


BAND 71. Upper Extended Band Edge Plot (20M BW Ch.133372 QPSK\_RB50\_0)

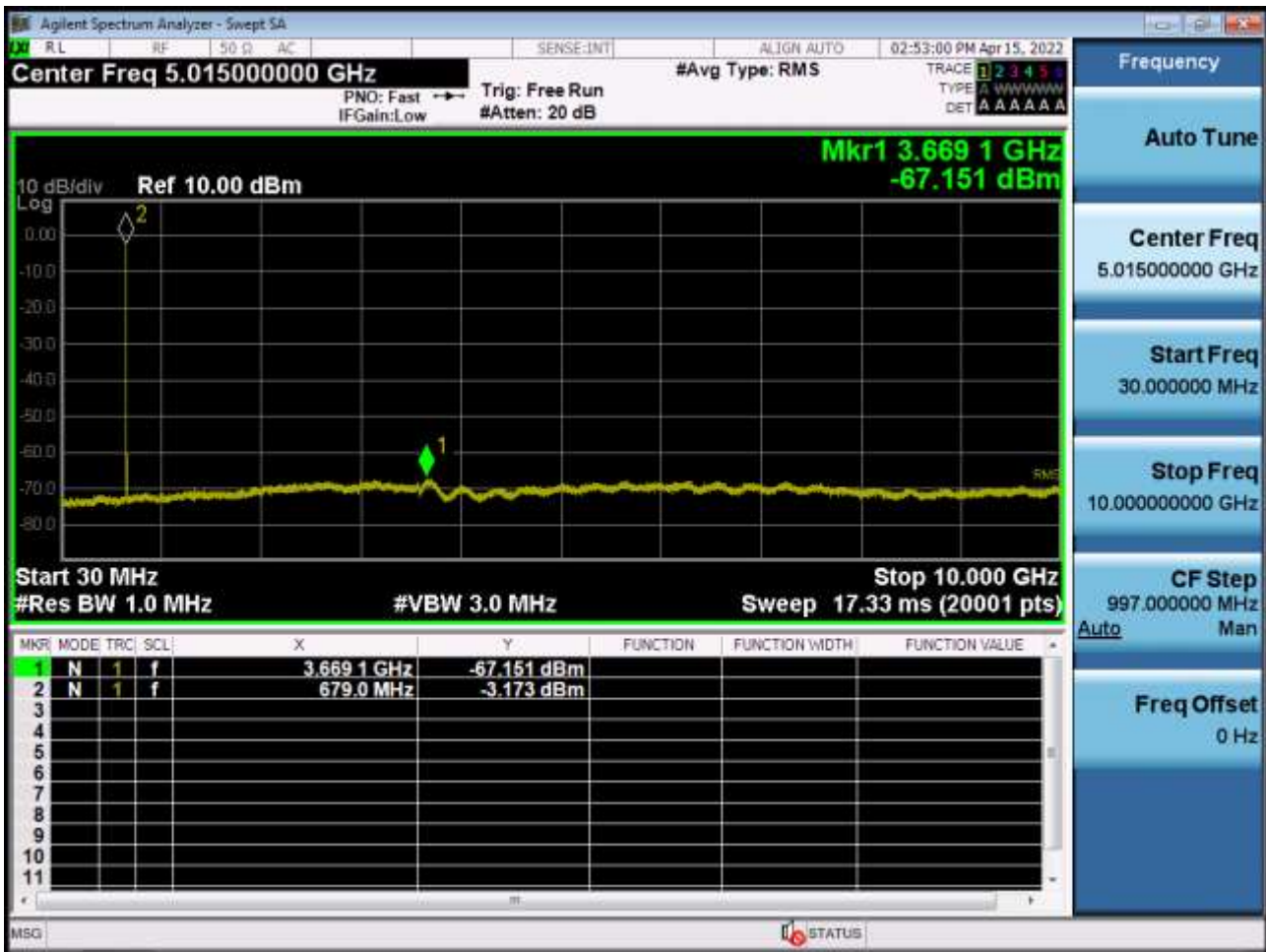




BAND 71. Conducted Spurious Plot \_ (133147ch\_5MHz\_QPSK\_RB 1\_0)

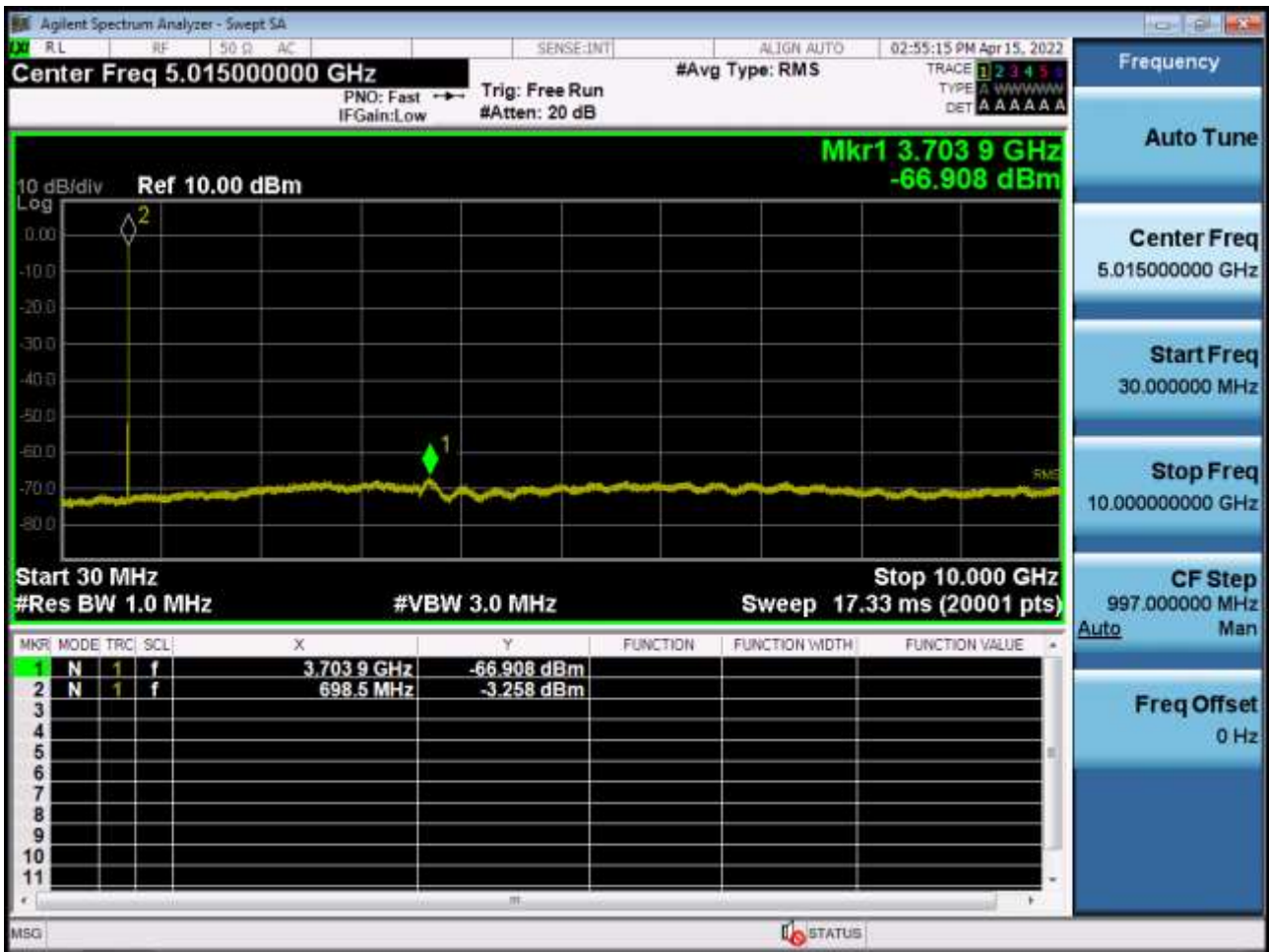


BAND 71. Conducted Spurious Plot \_ (133297ch\_5MHz\_QPSK\_RB 1\_0)

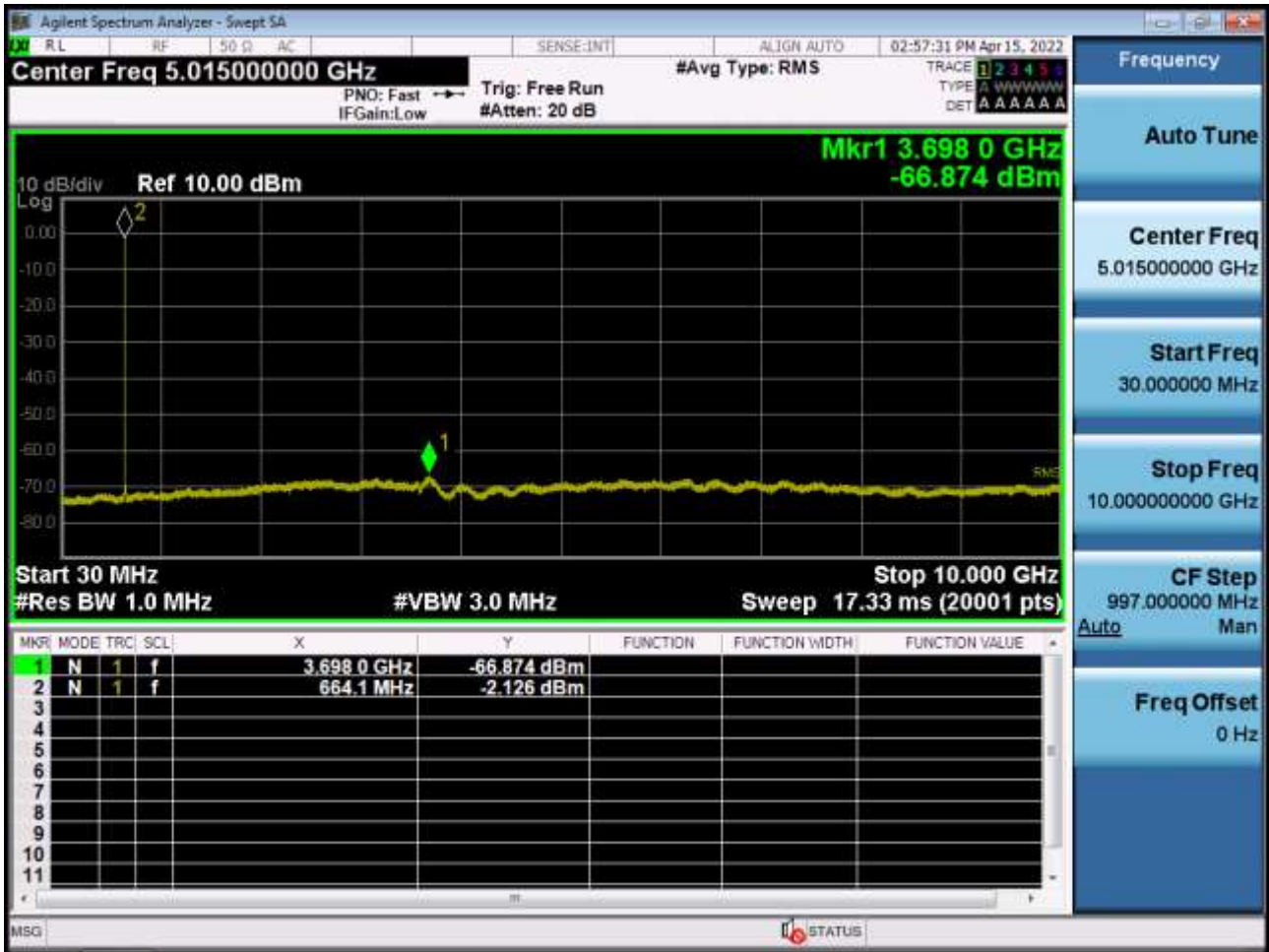




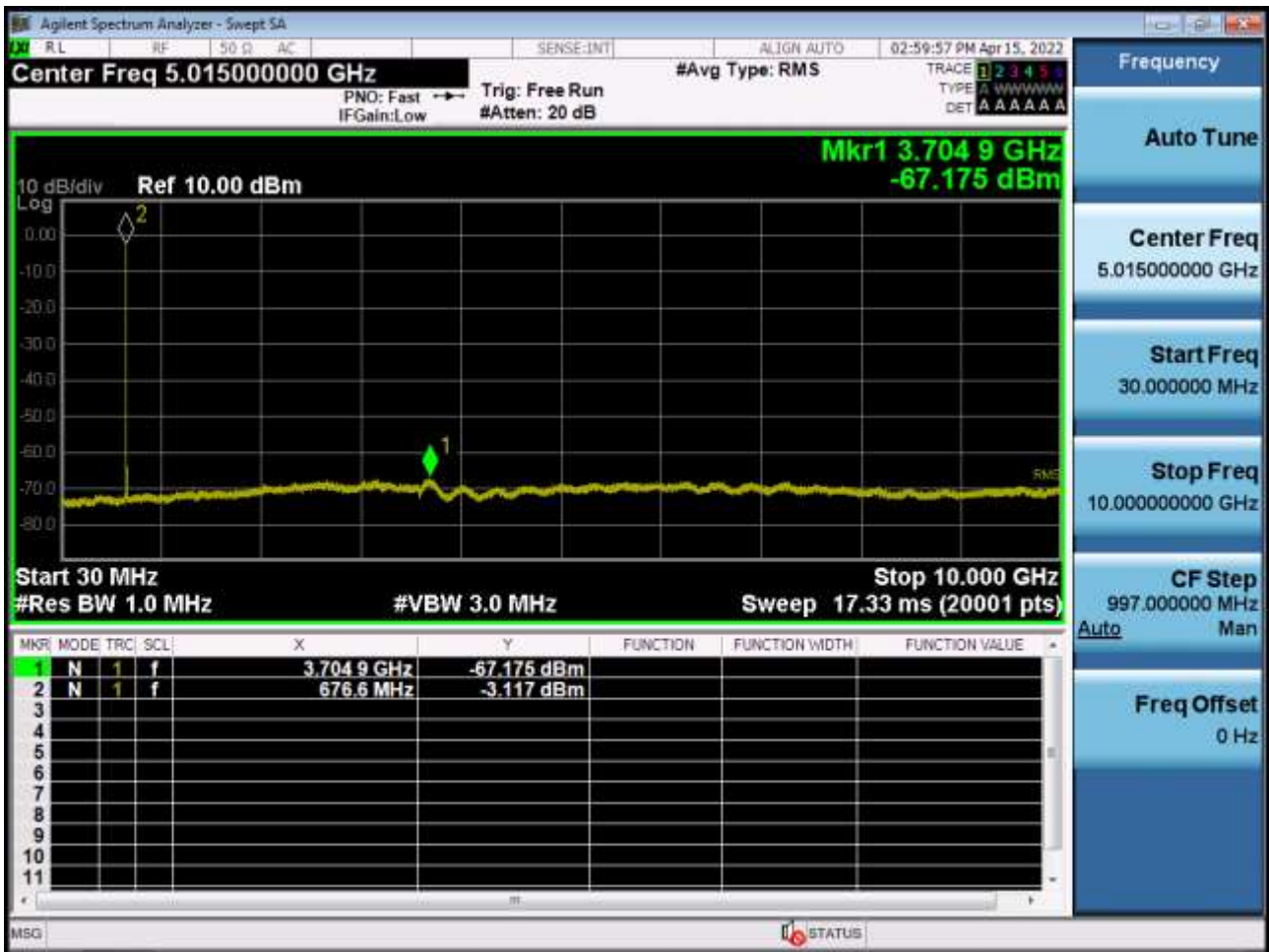
BAND 71. Conducted Spurious Plot \_ (133447ch\_5MHz\_QPSK\_RB 1\_0)



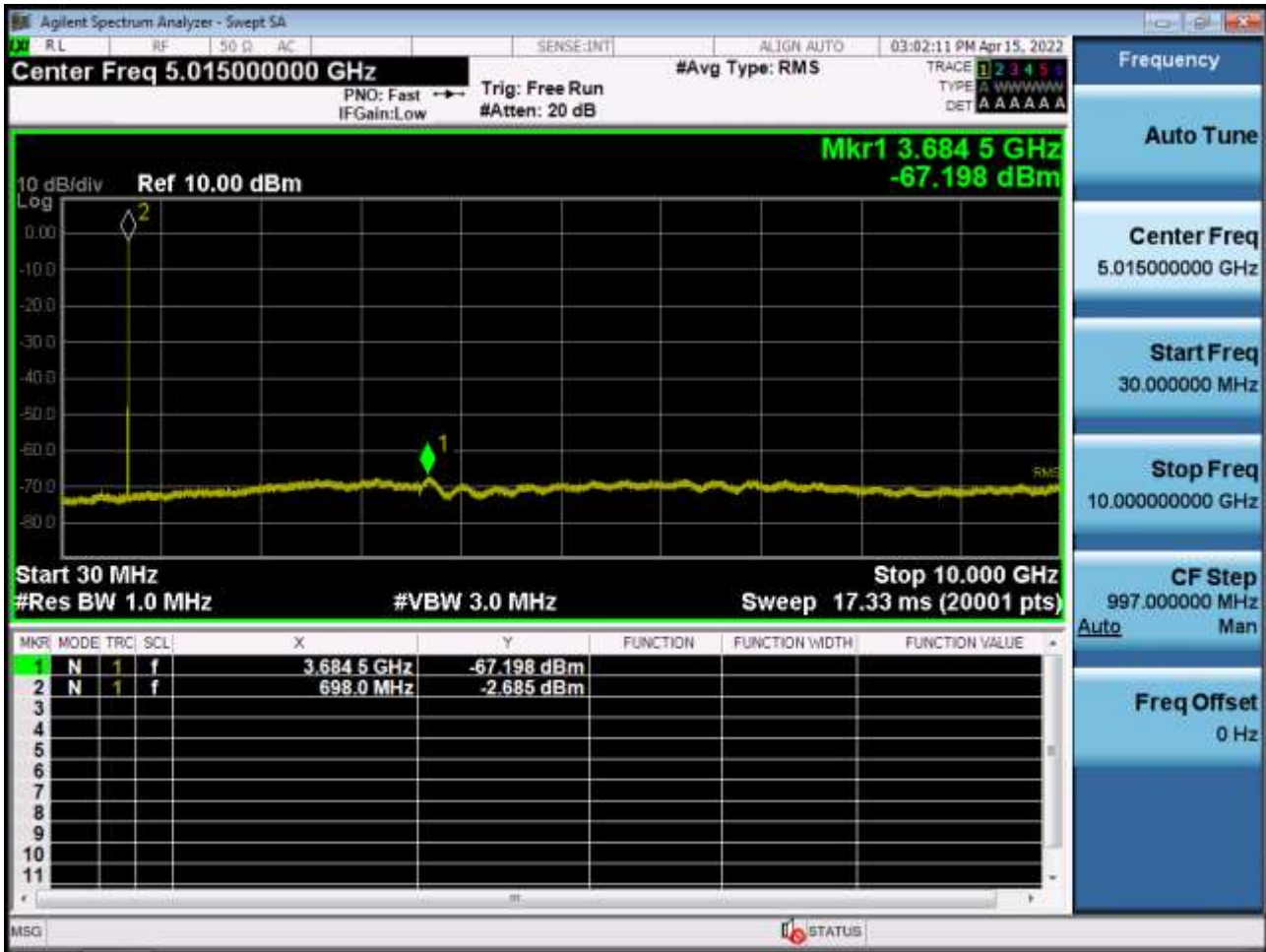
BAND 71. Conducted Spurious Plot \_ (133172ch\_10MHz\_QPSK\_RB 1\_0)



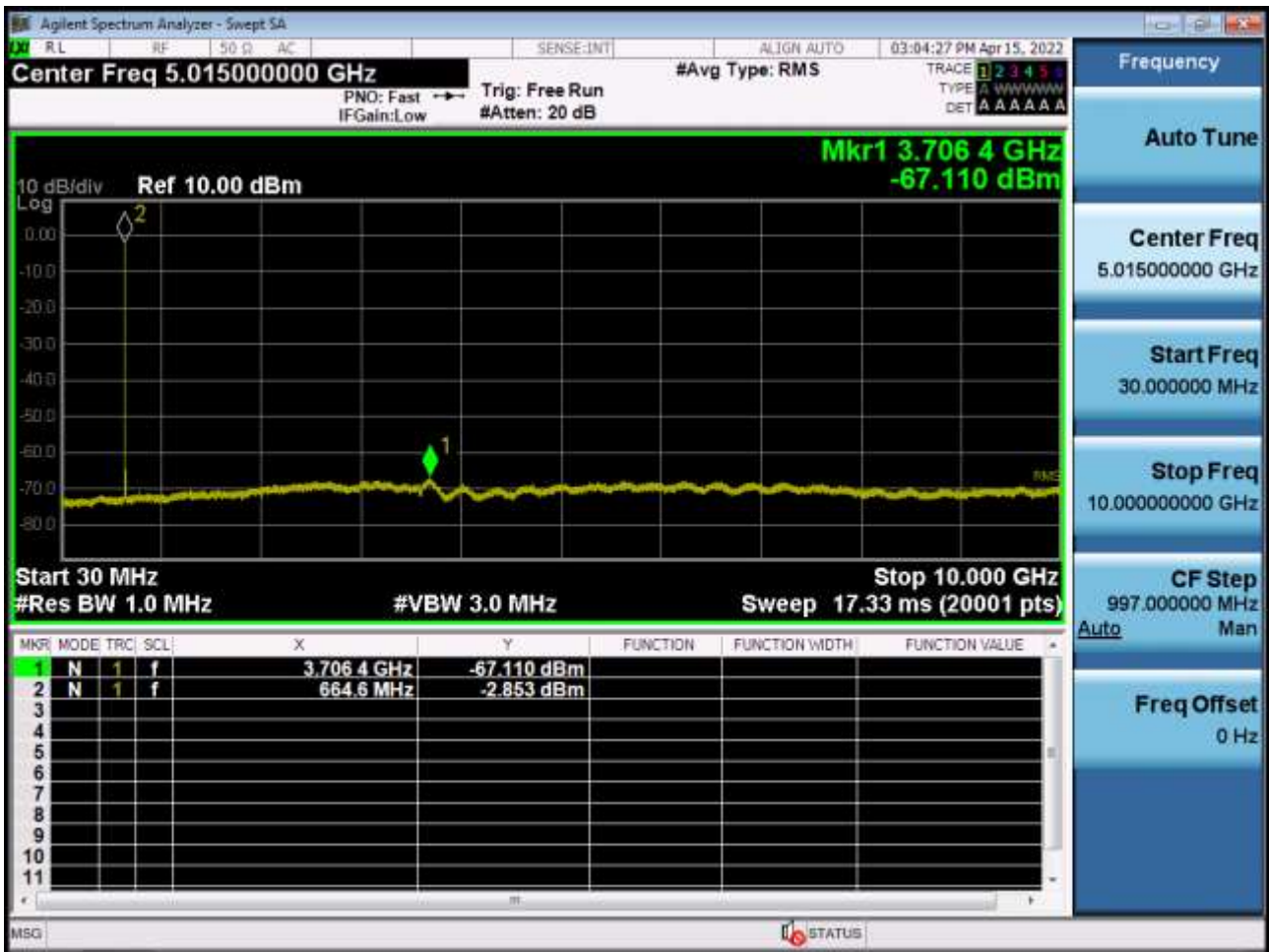
BAND 71. Conducted Spurious Plot \_ (133297ch\_10MHz\_QPSK\_RB 1\_0)



BAND 71. Conducted Spurious Plot \_ (133422ch\_10MHz\_QPSK\_RB 1\_0)

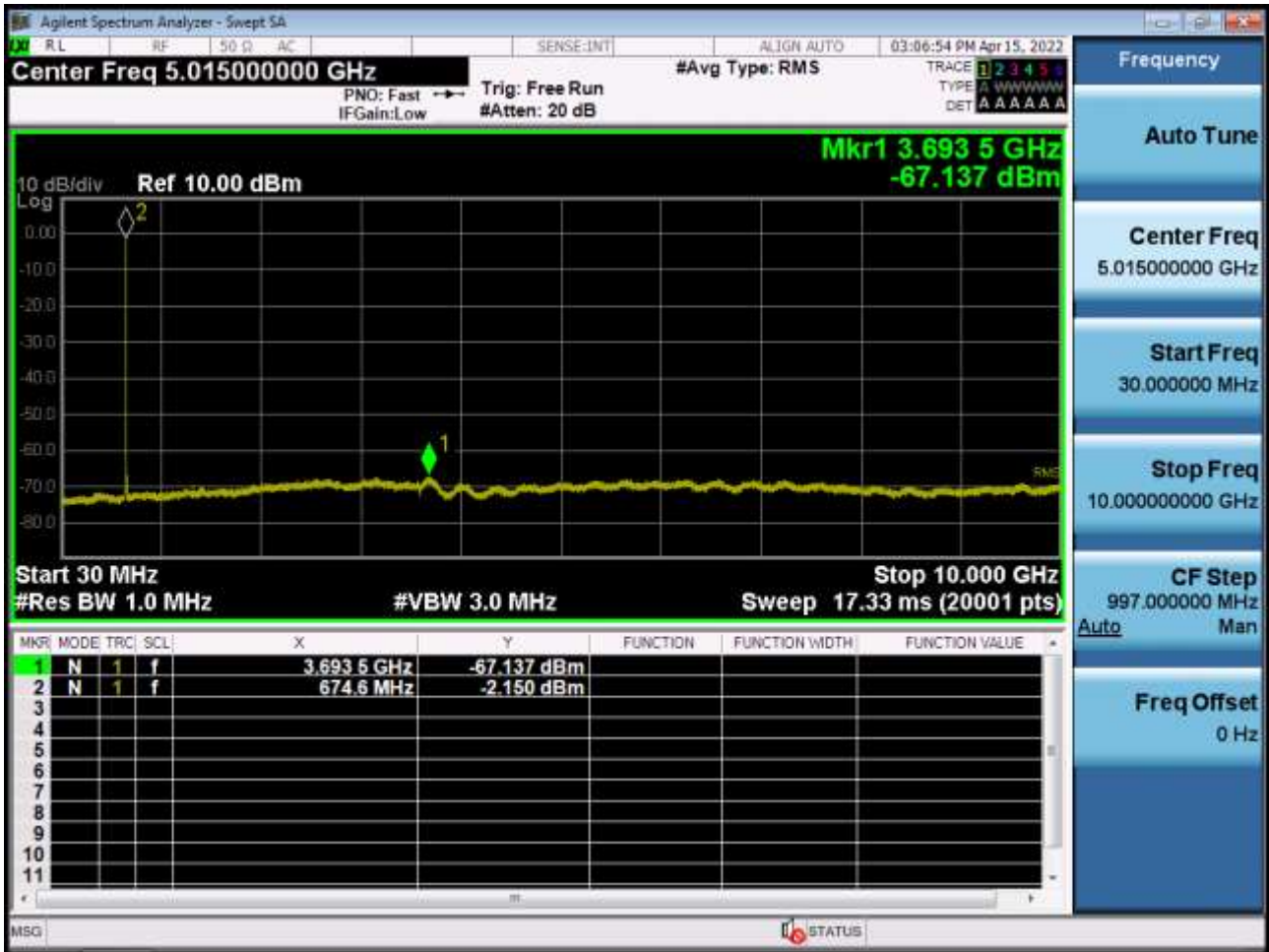


BAND 71. Conducted Spurious Plot \_ (133197ch\_15MHz\_QPSK\_RB 1\_0)

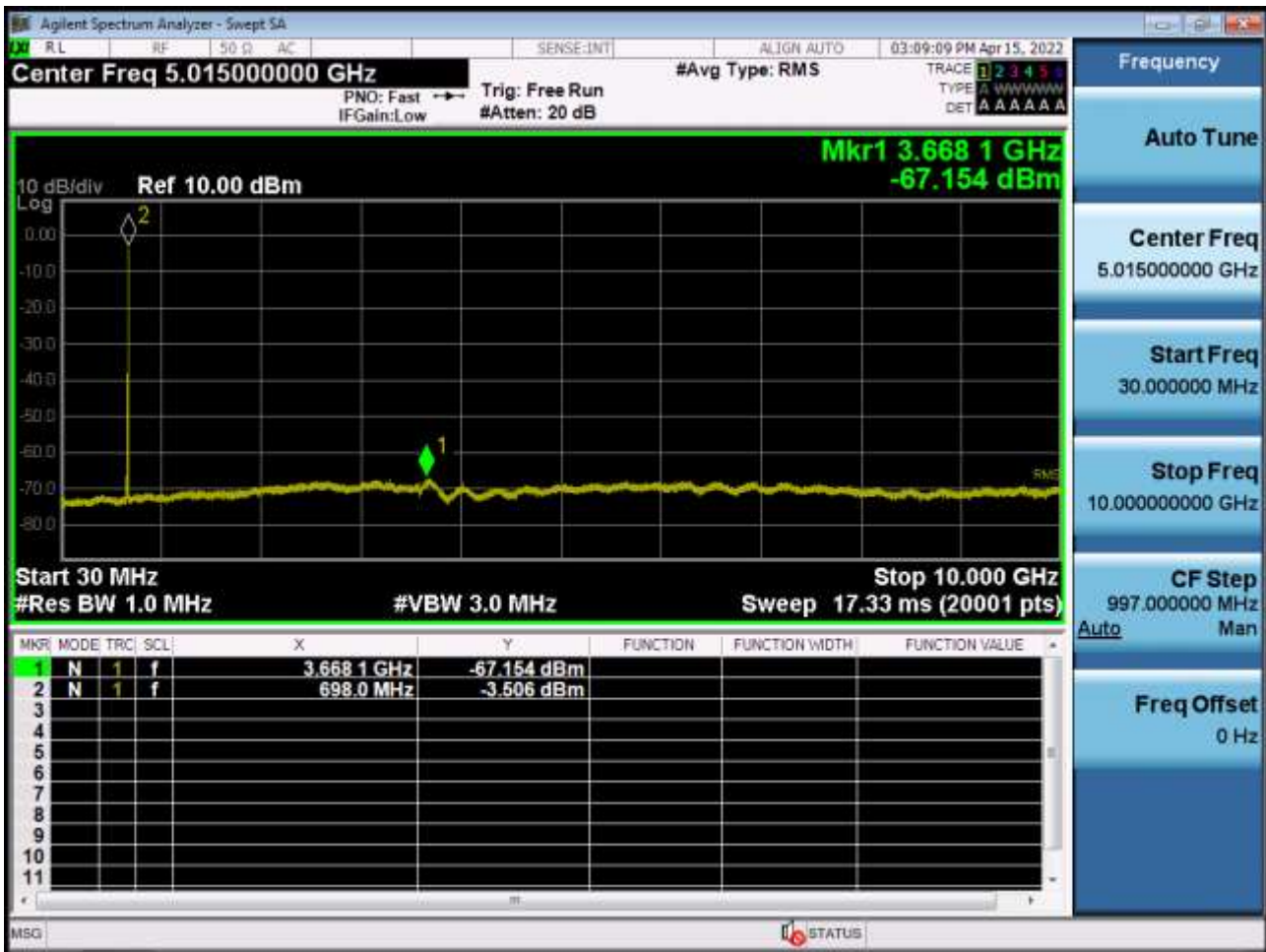




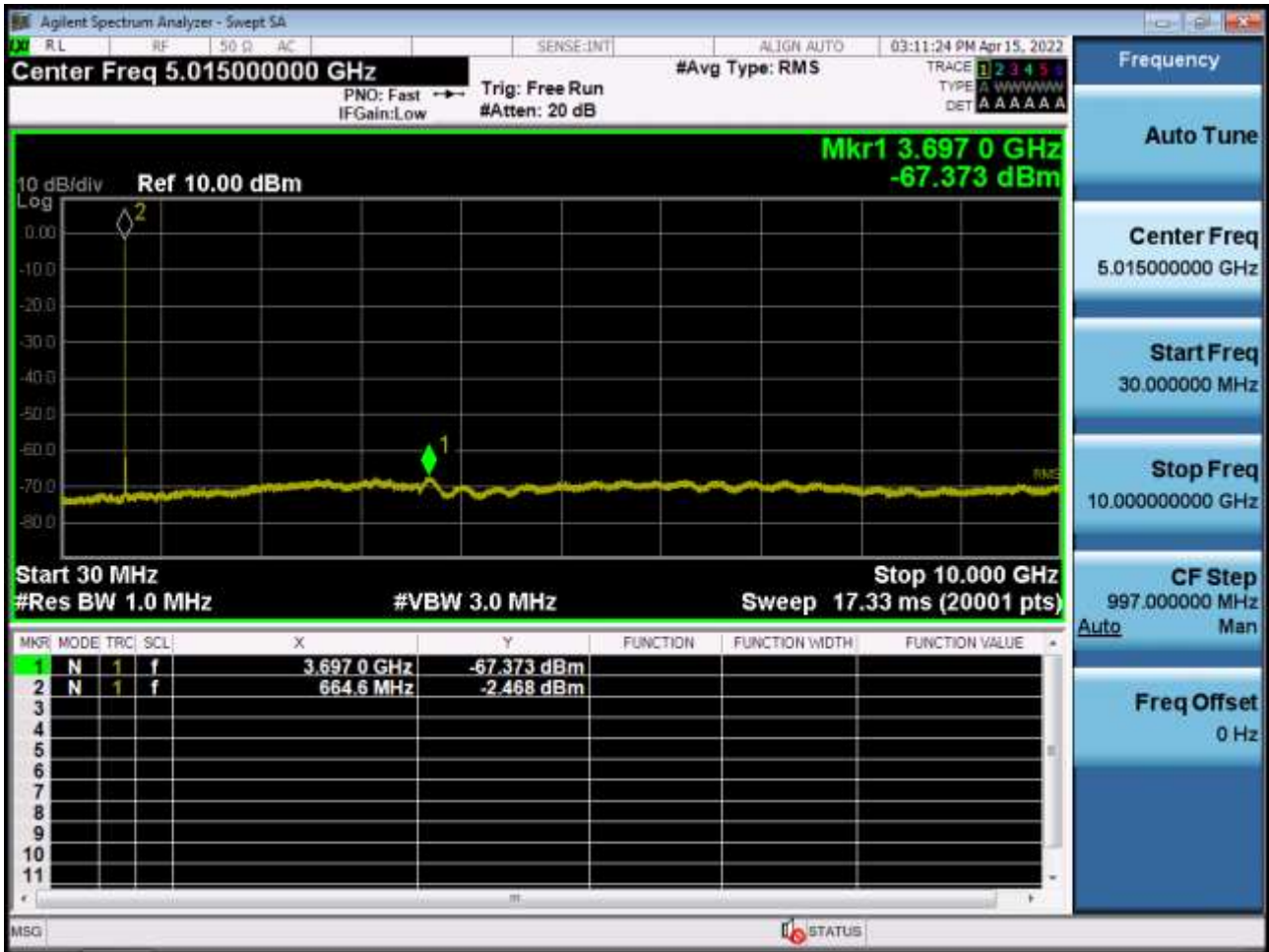
BAND 71. Conducted Spurious Plot \_ (133297ch\_15MHz\_QPSK\_RB 1\_0)



BAND 71. Conducted Spurious Plot \_ (133397ch\_15MHz\_QPSK\_RB 1\_0)

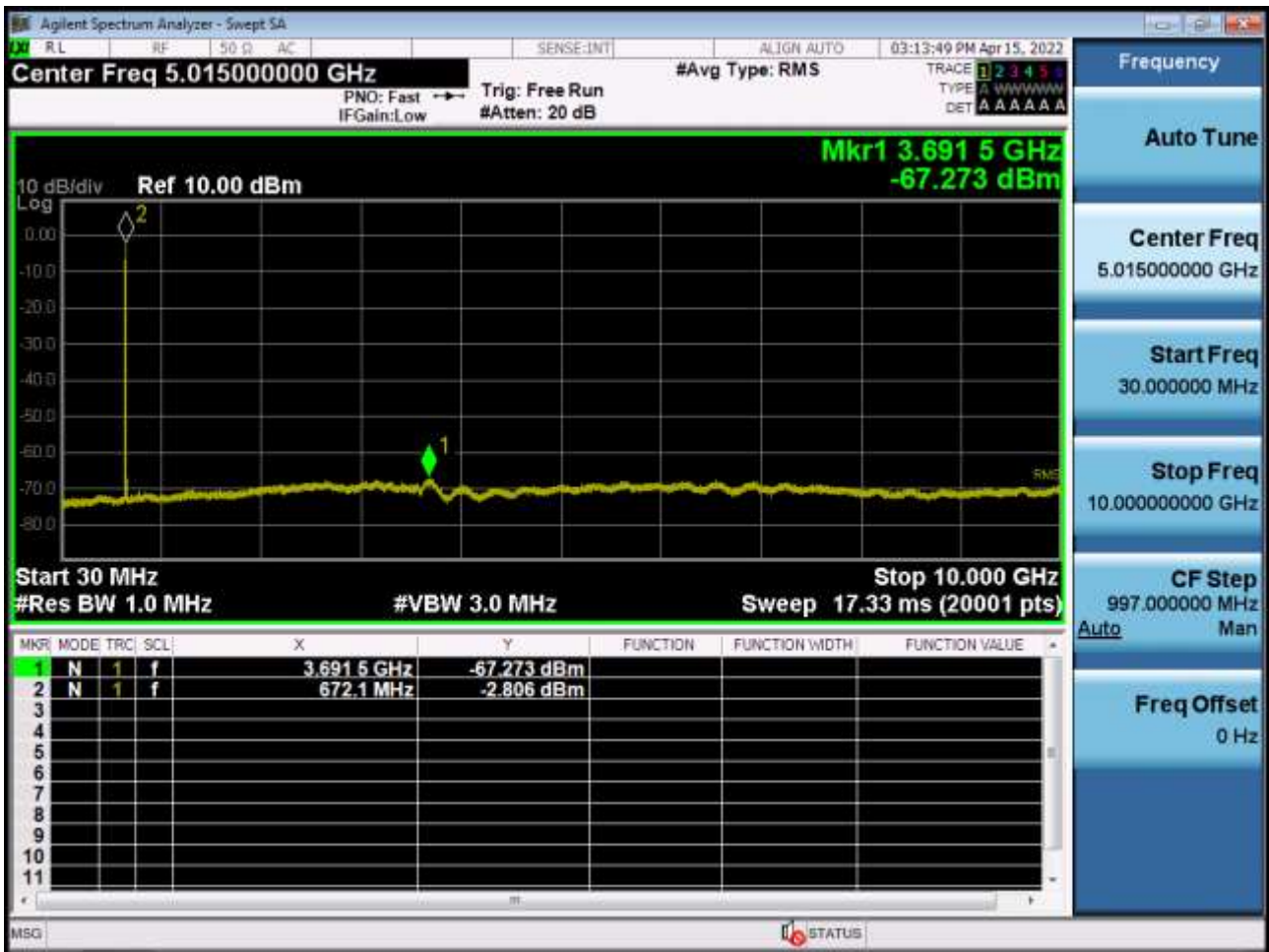


BAND 71. Conducted Spurious Plot \_ (133222ch\_20MHz\_QPSK\_RB 1\_0)

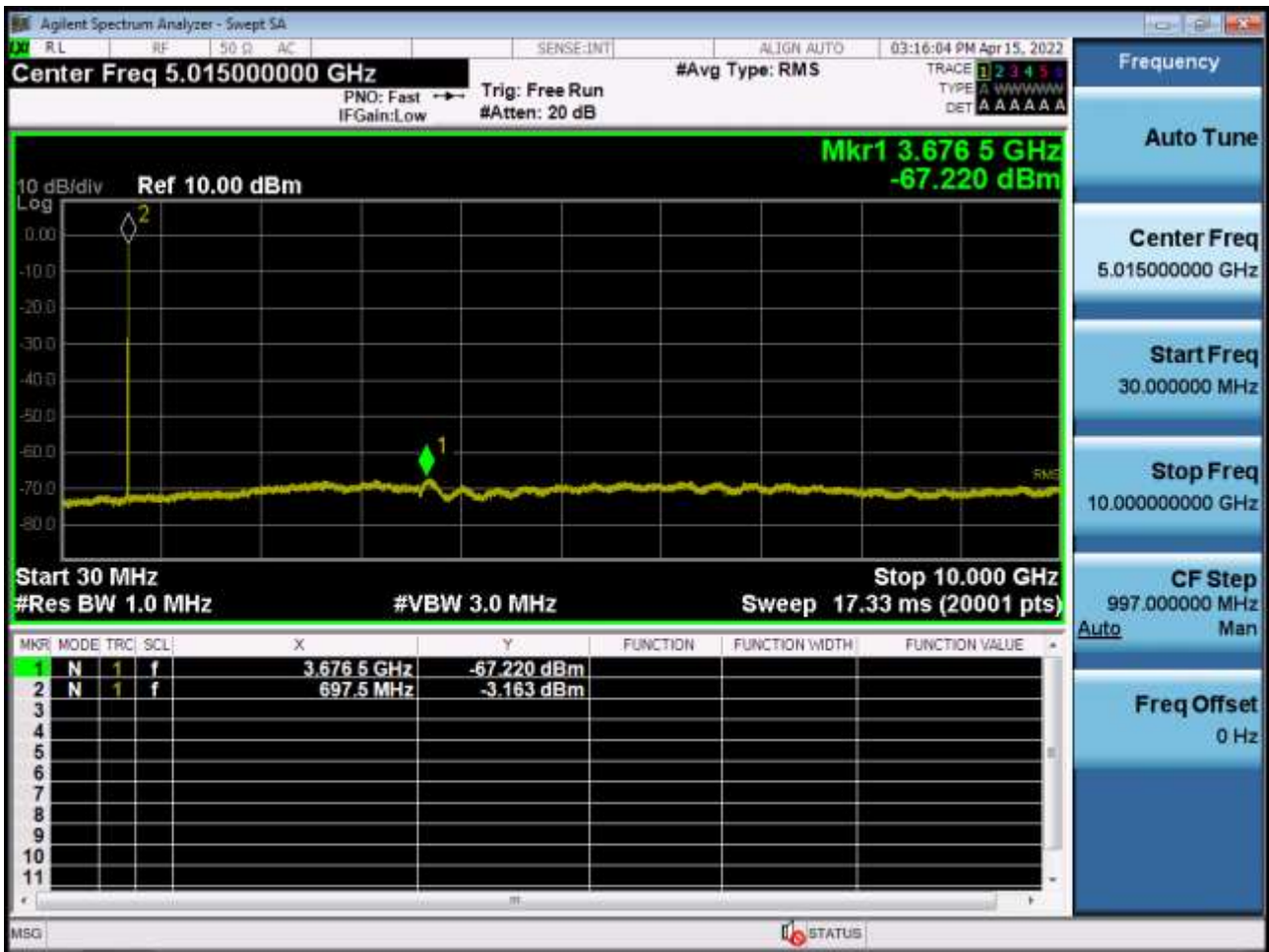




BAND 71. Conducted Spurious Plot \_ (133297ch\_20MHz\_QPSK\_RB 1\_0)



BAND 71. Conducted Spurious Plot \_ (133372ch\_20MHz\_QPSK\_RB 1\_0)



**10. ANNEX A\_ TEST SETUP PHOTO**

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

No.	Description
1	HCT-RF-2205-FC031-P