

FCC/IC LTE REPORT

Certification

Applicant Name:

SAMSUNG Electronics Co., Ltd.

Date of Issue:

December 23, 2019

Location:

HCT CO., LTD.,

Address:

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

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Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA

Report No.: HCT-RF-1912-FI011-R1

FCC ID:

A3LSMT307U

IC:

649E-SMT307U

APPLICANT:

SAMSUNG Electronics Co., Ltd.

Model(s): SM-T307U
EUT Type: Tablet
FCC Classification: PCS Licensed Transmitter (PCB)
FCC Rule Part(s): §27, §2
IC Rule(s): RSS-Gen Issue5, RSS-130 Issue 2

Mode (MHz)	Tx Frequency (MHz)	Emission Designator	Modulation	ERP	
				Max. Power (W)	Max. Power (dBm)
LTE – Band71 (5)	665.5 - 695.5	4M53G7D	QPSK	0.056	17.47
		4M53W7D	16QAM	0.043	16.30
		4M53W7D	64QAM	0.035	15.40
LTE – Band71 (10)	668.0 - 693.0	8M96G7D	QPSK	0.057	17.59
		8M97W7D	16QAM	0.044	16.46
		8M97W7D	64QAM	0.035	15.45
LTE – Band71 (15)	670.5 - 690.5	13M5G7D	QPSK	0.061	17.82
		13M5W7D	16QAM	0.047	16.71
		13M4W7D	64QAM	0.038	15.76
LTE – Band71 (20)	673.0 - 688.0	17M9G7D	QPSK	0.067	18.28
		17M9W7D	16QAM	0.051	17.04
		17M9W7D	64QAM	0.041	16.10

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 prepared by : Jae Ryang Do
Engineer of Telecommunication Testing Center



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

This report only responds to the tested sample and may not be reproduced, except in full, without written approval of the HCT Co., Ltd.

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-1912-FI011	December 11, 2019	- First Approval Report
HCT-RF-1912-FI011-R1	December 23, 2019	- Added EIRP result to Section 8.2.

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

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

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

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MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name:	SAMSUNG Electronics Co., Ltd.
Address:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
FCC ID:	A3LSMT307U
IC	649E-SMT307U
Application Type:	Certification
FCC Classification:	PCS Licensed Transmitter (PCB)
FCC Rule Part(s):	§27, §2
IC Rule(s):	RSS-Gen Issue5, RSS-130 Issue 2
EUT Type:	Tablet
Model(s):	SM-T307U
Tx Frequency:	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))
Date(s) of Tests:	October 22, 2019 ~ November 25, 2019

2. INTRODUCTION

2.1. DESCRIPTION OF EUT

The EUT was a Tablet with UMTS and LTE.

It also supports IEEE 802.11 a/b/g/n/ac (HT20/40/80), Bluetooth, BT LE, ANT+.

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 10th harmonics from 9 kHz.

Test Note

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

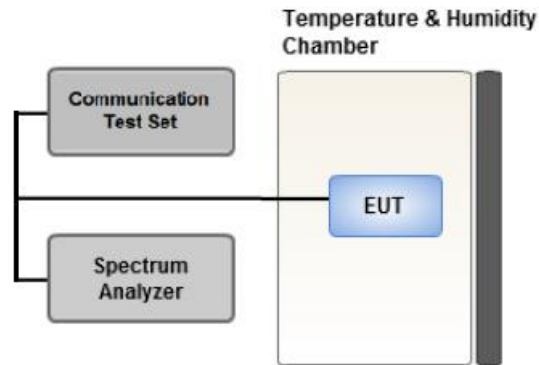
$$\text{Result}_{(\text{dBm})} = P_{g(\text{dBm})} - \text{cable loss}_{(\text{dB})} + \text{antenna gain}_{(\text{dBi})}$$

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

If the fundamatal 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.

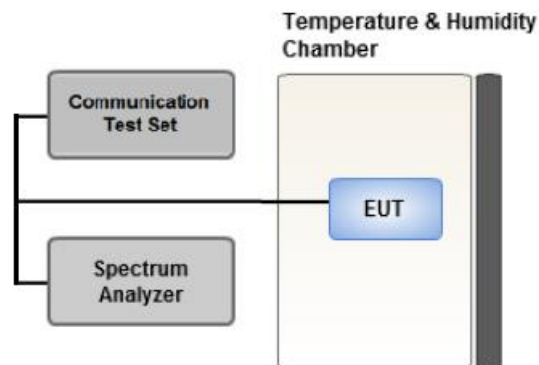
The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

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

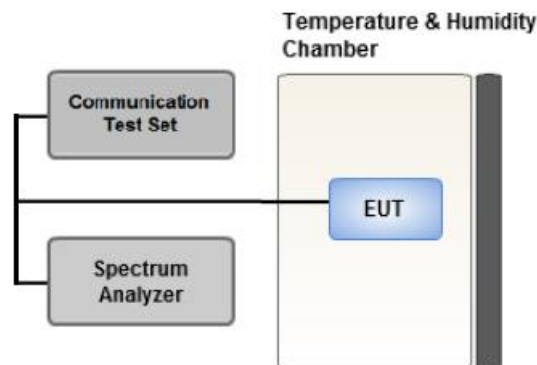
Test Overview

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 $\geq 2 * \text{Span} / \text{RBW}$

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 = 100kHz
4. VBW = 300kHz
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

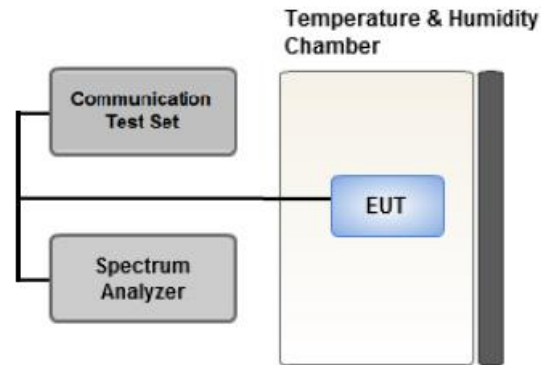
According to FCC 22.917, 24.238, 27.53 specified that power of any emission outside of The authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

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.
- The worst case is reported with the EUT positioning, modulations, and paging service configurations shown in the test data.

[Worst case]

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

3.9 WORST CASE(CONDUCTED TEST)

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

Conducted Output Power value can be confirmed on the SAR report.

[Worst case]

Test Description	Modulation	Bandwidth (MHz)	Frequency	RB size	RB offset
Occupied Bandwidth	QPSK, 16QAM, 64QAM	5,10,15,20	Mid	Full RB	0
Band Edge	* 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
Spurious and Harmonic Emissions at Antenna Terminal	* QPSK	5,10,15,20	Low, High	Full RB	0
			Low, Mid, High	1	0

4. LIST OF TEST EQUIPMENT

Manufacture	Model/ Equipment	Serial Number	Calibration Date	Calibration Interval	Calibration Due
T&M SYSTEM	FBSR-02B(WHK1.2/15G-10EF)/H.P.F	-	06/10/2019	Annual	06/10/2020
T&M SYSTEM	FBSR-02B(WHK3.3/18G-10EF)/H.P.F	-	06/10/2019	Annual	06/10/2020
Hewlett Packard	11667B / Power Splitter(DC~26.5 GHz)	11275	05/03/2019	Annual	05/03/2020
Agilent	E3632A/DC Power Supply	MY40004326	07/01/2019	Annual	07/01/2020
Schwarzbeck	UHAP/ Dipole Antenna	557	03/29/2019	Biennial	03/29/2021
Schwarzbeck	UHAP/ Dipole Antenna	558	03/29/2019	Biennial	03/29/2021
ESPEC	SU-642 / Chamber	93000717	08/14/2019	Annual	08/14/2020
Schwarzbeck	BBHA 9120D/ Horn Antenna(1~18GHz)	147	08/29/2019	Biennial	08/29/2021
Schwarzbeck	BBHA 9120D/ Horn Antenna(1~18GHz)	9120D-1298	09/25/2019	Biennial	09/25/2021
Schwarzbeck	BBHA 9170/ Horn Antenna(15~40GHz)	BBHA9170342	04/29/2019	Biennial	04/29/2021
Schwarzbeck	BBHA 9170/ Horn Antenna(15~40GHz)	BBHA9170124	01/28/2019	Biennial	01/28/2021
Agilent	N9020A/Signal Analyzer(10Hz~26.5GHz)	MY51110063	05/08/2019	Annual	05/08/2020
Hewlett Packard	8493C/ATTENUATOR(20dB)	17280	06/04/2019	Annual	06/04/2020
REOHDE & SCHWARZ	FSV40/Spectrum Analyzer(10Hz~40GHz)	100931	10/14/2019	Annual	10/14/2020
Agilent	8960 (E5515C)/ Base Station	MY48360800	08/27/2019	Annual	08/27/2020
Schwarzbeck	FMZB1513/ Loop Antenna(9kHz~30MHz)	1513-175	08/23/2018	Biennial	08/23/2020
Schwarzbeck	VULB9160/ Bilog Antenna	9160-3368	08/09/2018	Biennial	08/09/2020
Schwarzbeck	VULB9160/ Hybrid Antenna	760	03/22/2019	Biennial	03/22/2021
Anritsu Corp.	MT8821C/Wideband Radio Communication Tester	6201502997	08/09/2019	Annual	08/09/2020
Anritsu Corp.	MT8820C/Wideband Radio Communication Tester	6201026545	01/30/2019	Annual	01/30/2020
REOHDE & SCHWARZ	SMB100A/ SIGNAL GENERATOR (100kHz~40GHz)	177633	07/15/2019	Annual	07/15/2020
REOHDE & SCHWARZ	ESU40 / EMI TEST RECEIVER	100524	05/17/2019	Annual	05/17/2020
HCT CO., LTD.,	FCC LTE Mobile Conducted RF Automation Test Software	-	-	-	-

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_{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)	1.82
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80
Radiated Disturbance (1 GHz ~ 18 GHz)	5.70
Radiated Disturbance (18 GHz ~ 40 GHz)	5.05

6. SUMMARY OF TEST RESULTS

6.1 Test Condition : Conducted Test

Test Description	FCC Part Section(s)	IC Section(s)	Test Limit	Test Result
Occupied Bandwidth	§2.1049	RSS Gen(6.7)	N/A	PASS
Band Edge / Spurious and Harmonic Emissions at Antenna Terminal.	§2.1051, §27.53(g)	RSS 130(4.7)	$< 43 + 10\log_{10} (P[\text{Watts}])$ 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	RSS 130(4.5)	Emission must remain in band	PASS

Note:

1. See SAR Report
2. The same samples were used for SAR and EMC

6.2 Test Condition : Radiated Test

Test Description	FCC Part Section(s)	IC Section(s)	Test Limit	Test Result
Effective Radiated Power	§27.50(c)(10)	RSS 130(4.6)	< 3 Watts max. ERP	PASS
Radiated Spurious and Harmonic Emissions	§2.1053, §27.53(g)	RSS 130(4.7)	$< 43 + 10\log_{10} (P[\text{Watts}])$ for all out-of band emissions	PASS
Receiver Spurious Emissions	N/A	RSS Gen(7)	Section 8.7	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

$$\text{ERP} = \text{Substitute LEVEL(dBm)} + \text{Ant. Gain} - \text{CL(Cable Loss)}$$

- 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

$$\text{EIRP} = \text{Substitute LEVEL(dBm)} + \text{Ant. Gain} - \text{CL(Cable Loss)}$$

- 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

16QAM Modulation

Emission Designator = 4M48W7D
LTE BW = 4.48 MHz
W = Amplitude/Angle Modulated
7 = Quantized/Digital Info
D = Data transmission; telemetry; telecommand

64QAM 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	-30.68	28.09	-9.76	1.15	V	< 3.00	0.052	17.18
		16-QAM	-31.84	26.93	-9.76	1.15	V		0.040	16.02
		64-QAM	-32.83	25.94	-9.76	1.15	V		0.032	15.03
680.5		QPSK	-30.25	28.41	-9.78	1.16	V		0.056	17.47
		16-QAM	-31.42	27.24	-9.78	1.16	V		0.043	16.30
		64-QAM	-32.32	26.34	-9.78	1.16	V		0.035	15.40
695.5		QPSK	-31.05	27.72	-9.79	1.18	V		0.047	16.75
		16-QAM	-32.10	26.67	-9.79	1.18	V		0.037	15.70
		64-QAM	-33.04	25.73	-9.79	1.18	V		0.030	14.76

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	-30.61	27.98	-9.76	1.15	V	< 3.00	0.051	17.07
		16-QAM	-31.76	26.83	-9.76	1.15	V		0.039	15.92
		64-QAM	-32.72	25.87	-9.76	1.15	V		0.031	14.96
680.5		QPSK	-30.13	28.53	-9.78	1.16	V		0.057	17.59
		16-QAM	-31.26	27.40	-9.78	1.16	V		0.044	16.46
		64-QAM	-32.27	26.39	-9.78	1.16	V		0.035	15.45
693.0		QPSK	-30.52	28.29	-9.79	1.17	V		0.054	17.33
		16-QAM	-31.65	27.16	-9.79	1.17	V		0.042	16.20
		64-QAM	-32.52	26.29	-9.79	1.17	V		0.034	15.33

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	-30.48	28.05	-9.77	1.15	V	< 3.00	0.052	17.13
		16-QAM	-31.65	26.88	-9.77	1.15	V		0.039	15.96
		64-QAM	-32.56	25.97	-9.77	1.15	V		0.032	15.05
680.5		QPSK	-30.02	28.64	-9.78	1.16	V		0.059	17.70
		16-QAM	-31.21	27.45	-9.78	1.16	V		0.045	16.51
		64-QAM	-32.15	26.51	-9.78	1.16	V		0.036	15.57
690.5		QPSK	-30.05	28.78	-9.79	1.17	V		0.061	17.82
		16-QAM	-31.16	27.67	-9.79	1.17	V		0.047	16.71
		64-QAM	-32.11	26.72	-9.79	1.17	V		0.038	15.76

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	-30.33	28.14	-9.77	1.15	V	< 3.00	0.053	17.22
		16-QAM	-31.57	26.90	-9.77	1.15	V		0.040	15.98
		64-QAM	-32.50	25.97	-9.77	1.15	V		0.032	15.05
680.5		QPSK	-29.89	28.77	-9.78	1.16	V		0.061	17.83
		16-QAM	-31.11	27.55	-9.78	1.16	V		0.046	16.61
		64-QAM	-32.06	26.60	-9.78	1.16	V		0.037	15.66
688.0		QPSK	-29.58	29.23	-9.78	1.17	V		0.067	18.28
		16-QAM	-30.82	27.99	-9.78	1.17	V		0.051	17.04
		64-QAM	-31.76	27.05	-9.78	1.17	V		0.041	16.10

8.2 EQUIVALENT ISOTROPIC RADIATED POWER

Freq (MHz)	Mod (Bandwidth)	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBd)	C.L	Pol	Limit	EIRP	
								W	W	dBm
665.5	LTE B71 (5 MHz)	QPSK	-30.68	28.09	-9.76	1.15	V	< 3.00	0.086	19.33
		16-QAM	-31.84	26.93	-9.76	1.15	V		0.066	18.17
		64-QAM	-32.83	25.94	-9.76	1.15	V		0.052	17.18
680.5		QPSK	-30.25	28.41	-9.78	1.16	V		0.092	19.62
		16-QAM	-31.42	27.24	-9.78	1.16	V		0.070	18.45
		64-QAM	-32.32	26.34	-9.78	1.16	V		0.057	17.55
695.5		QPSK	-31.05	27.72	-9.79	1.18	V		0.078	18.90
		16-QAM	-32.10	26.67	-9.79	1.18	V		0.061	17.85
		64-QAM	-33.04	25.73	-9.79	1.18	V		0.049	16.91

Freq (MHz)	Mod (Bandwidth)	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBd)	C.L	Pol	Limit	EIRP	
								W	W	dBm
668.0	LTE B71 (10 MHz)	QPSK	-30.61	27.98	-9.76	1.15	V	< 3.00	0.084	19.22
		16-QAM	-31.76	26.83	-9.76	1.15	V		0.064	18.07
		64-QAM	-32.72	25.87	-9.76	1.15	V		0.051	17.11
680.5		QPSK	-30.13	28.53	-9.78	1.16	V		0.094	19.74
		16-QAM	-31.26	27.40	-9.78	1.16	V		0.073	18.61
		64-QAM	-32.27	26.39	-9.78	1.16	V		0.058	17.60
693.0		QPSK	-30.52	28.29	-9.79	1.17	V		0.089	19.48
		16-QAM	-31.65	27.16	-9.79	1.17	V		0.068	18.35
		64-QAM	-32.52	26.29	-9.79	1.17	V		0.056	17.48

Freq (MHz)	Mod (Bandwidth)	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBd)	C.L	Pol	Limit	EIRP	
								W	W	dBm
670.5	LTE B71 (15 MHz)	QPSK	-30.48	28.05	-9.77	1.15	V	< 3.00	0.085	19.28
		16-QAM	-31.65	26.88	-9.77	1.15	V		0.065	18.11
		64-QAM	-32.56	25.97	-9.77	1.15	V		0.052	17.20
680.5		QPSK	-30.02	28.64	-9.78	1.16	V		0.097	19.85
		16-QAM	-31.21	27.45	-9.78	1.16	V		0.074	18.66
		64-QAM	-32.15	26.51	-9.78	1.16	V		0.059	17.72
690.5		QPSK	-30.05	28.78	-9.79	1.17	V		0.099	19.97
		16-QAM	-31.16	27.67	-9.79	1.17	V		0.077	18.86
		64-QAM	-32.11	26.72	-9.79	1.17	V		0.062	17.91

Freq (MHz)	Mod (Bandwidth)	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBd)	C.L	Pol	Limit	EIRP	
								W	W	dBm
673.0	LTE B71 (20 MHz)	QPSK	-30.33	28.14	-9.77	1.15	V	< 3.00	0.086	19.37
		16-QAM	-31.57	26.90	-9.77	1.15	V		0.065	18.13
		64-QAM	-32.50	25.97	-9.77	1.15	V		0.052	17.20
680.5		QPSK	-29.89	28.77	-9.78	1.16	V		0.100	19.98
		16-QAM	-31.11	27.55	-9.78	1.16	V		0.075	18.76
		64-QAM	-32.06	26.60	-9.78	1.16	V		0.060	17.81
688.0		QPSK	-29.58	29.23	-9.78	1.17	V		0.110	20.43
		16-QAM	-30.82	27.99	-9.78	1.17	V		0.083	19.19
		64-QAM	-31.76	27.05	-9.78	1.17	V		0.067	18.25

Note:

1. EIRP = ERP + 2.15.

8.3 RADIATED SPURIOUS EMISSIONS

- ▣ OPERATING FREQUENCY: 680.5 MHz
- ▣ MEASURED OUTPUT POWER: 19.62 dBm = 0.092 W
- ▣ MODE: LTE B71
- ▣ MODULATION SIGNAL: 5 MHz QPSK
- ▣ DISTANCE: 3 meters
- ▣ LIMIT: $43 + 10 \log_{10} (W) =$ 32.62 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	dBc
133147 (665.5)	1,331.00	-52.37	6.95	-60.62	1.64	H	-55.31	74.94
	1,996.50	-48.38	10.39	-56.26	2.04	H	-47.91	67.53
	2,662.00	-57.20	11.10	-60.42	2.39	H	-51.71	71.33
133297 (680.5)	1,361.00	-51.79	7.23	-60.74	1.66	H	-55.17	74.80
	2,041.50	-49.73	10.25	-56.30	2.06	H	-48.11	67.73
	2,722.00	-57.12	11.05	-60.58	2.40	H	-51.93	71.55
133447 (695.5)	1,391.00	-51.41	7.48	-60.74	1.69	H	-54.95	74.57
	2,086.50	-55.39	9.95	-60.67	2.09	V	-52.81	72.44
	2,782.00	-57.37	10.95	-60.30	2.46	V	-51.81	71.43

- ▣ OPERATING FREQUENCY: 680.5 MHz
- ▣ MEASURED OUTPUT POWER: 19.74 dBm = 0.094 W
- ▣ MODE: LTE B71
- ▣ MODULATION SIGNAL: 10 MHz QPSK
- ▣ DISTANCE: 3 meters
- ▣ LIMIT: $43 + 10 \log_{10}(W) =$ 32.74 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	dBc
133172 (668.0)	1,336.00	-50.88	6.99	-59.36	1.64	V	-54.01	73.75
	2,004.00	-49.70	10.38	-57.17	2.05	H	-48.84	68.58
	2,672.00	-57.65	11.10	-60.90	2.39	V	-52.19	71.93
133297 (680.5)	1,361.00	-52.11	7.23	-61.06	1.66	V	-55.49	75.24
	2,041.50	-50.74	10.25	-57.31	2.06	H	-49.12	68.86
	2,722.00	-56.77	11.05	-60.23	2.40	V	-51.58	71.32
133422 (693.0)	1,386.00	-51.08	7.42	-60.33	1.69	H	-54.60	74.35
	2,079.00	-51.42	10.00	-56.65	2.09	H	-48.74	68.49
	2,772.00	-57.51	10.95	-60.26	2.46	H	-51.77	71.52

- ▣ OPERATING FREQUENCY: 690.50 MHz
- ▣ MEASURED OUTPUT POWER: 19.97 dBm = 0.099 W
- ▣ MODE: LTE B71
- ▣ MODULATION SIGNAL: 15 MHz QPSK
- ▣ DISTANCE: 3 meters
- ▣ LIMIT: $43 + 10 \log_{10} (W) =$ 32.97 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	dBc
133197 (670.5)	1,341.00	-53.19	7.03	-61.52	1.64	V	-56.13	76.11
	2,011.50	-50.11	10.35	-57.44	2.05	H	-49.14	69.12
	2,682.00	-56.84	11.10	-60.35	2.38	H	-51.63	71.60
133297 (680.5)	1,361.00	-52.64	7.23	-61.59	1.66	V	-56.02	75.99
	2,041.50	-50.22	10.25	-56.79	2.06	H	-48.60	68.57
	2,722.00	-57.05	11.05	-60.51	2.40	H	-51.86	71.83
133397 (690.5)	1,381.00	-51.79	7.35	-60.97	1.68	V	-55.30	75.27
	2,071.50	-51.15	10.00	-57.24	2.08	H	-49.32	69.29
	2,762.00	-56.45	10.98	-59.72	2.45	H	-51.19	71.16

- ▣ OPERATING FREQUENCY: 688.00 MHz
- ▣ MEASURED OUTPUT POWER: 20.43 dBm = 0.110 W
- ▣ MODE: LTE B71
- ▣ MODULATION SIGNAL: 20 MHz QPSK
- ▣ DISTANCE: 3 meters
- ▣ LIMIT: $43 + 10 \log_{10} (W) =$ 33.43 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	dBc
133222 (673.0)	1,346.00	-52.52	7.07	-61.19	1.65	V	-55.77	76.20
	2,019.00	-49.61	10.30	-56.47	2.05	H	-48.22	68.65
	2,692.00	-56.67	11.10	-59.45	2.39	H	-50.74	71.17
133297 (680.5)	1,361.00	-52.19	7.23	-61.14	1.66	H	-55.57	76.00
	2,041.50	-47.13	10.25	-53.70	2.06	V	-45.51	65.94
	2,722.00	-56.66	11.05	-60.12	2.40	H	-51.47	71.90
133372 (688.0)	1,376.00	-51.37	7.35	-60.41	1.68	H	-54.73	75.16
	2,064.00	-50.27	10.05	-56.33	2.08	V	-48.35	68.78
	2,752.00	-56.50	11.00	-59.98	2.42	V	-51.40	71.83

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	4.5278
			16-QAM			4.5256
			64-QAM			4.5322
	10 MHz		QPSK	50		8.9575
			16-QAM			8.9708
			64-QAM			8.9707
	15 MHz		QPSK	75		13.481
			16-QAM			13.456
			64-QAM			13.432
	20 MHz	QPSK	100	17.908		
		16-QAM		17.859		
		64-QAM		17.878		

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 44 ~ 55.

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	3.6990	27.976	-67.058	-39.082	-13.00
		680.5	3.6760	27.976	-67.280	-39.304	
		695.5	3.7154	27.976	-67.314	-39.338	
	10	668.0	3.6835	27.976	-66.944	-38.968	
		680.5	3.7044	27.976	-67.106	-39.130	
		693.0	3.6740	27.976	-67.185	-39.209	
	15	670.5	3.7164	27.976	-66.894	-38.918	
		680.5	3.7049	27.976	-67.243	-39.267	
		690.5	3.7159	27.976	-67.208	-39.232	
	20	673.0	3.7079	27.976	-67.322	-39.346	
		680.5	3.7299	27.976	-67.420	-39.444	
		688.0	3.6830	27.976	-66.574	-38.598	

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 80 ~ 91.
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	30.131

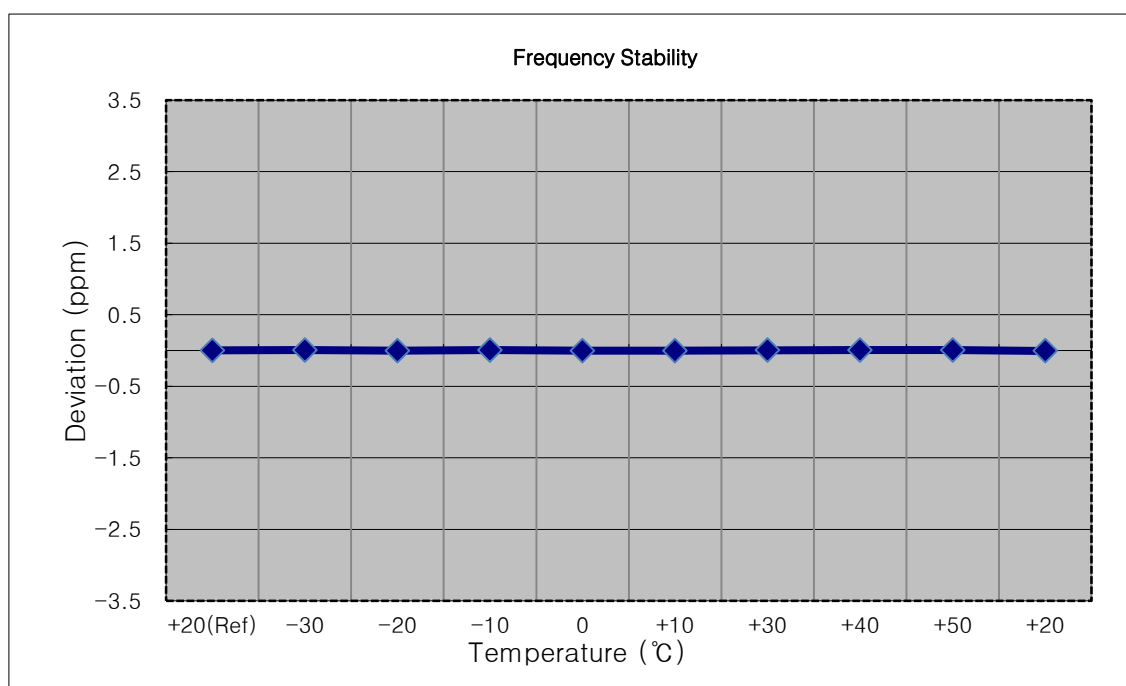
8.5 BAND EDGE

- Plots of the EUT's Band Edge are shown Page 56 ~ 79.

8.6 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

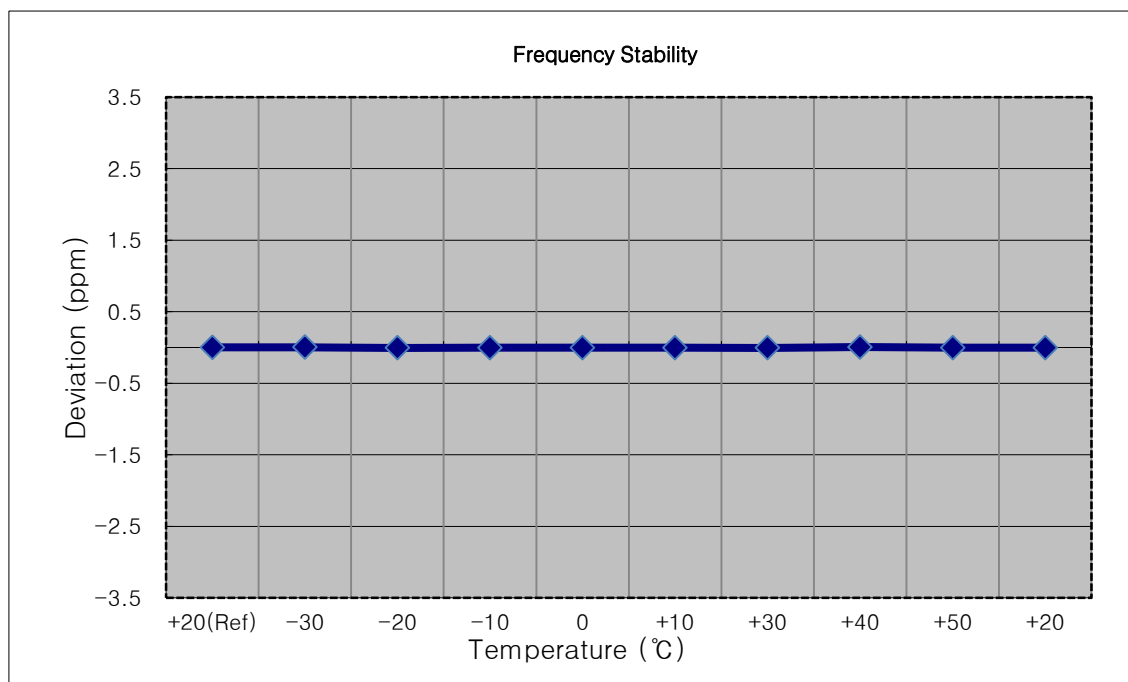
- ▣ MODE: LTE B71
- ▣ OPERATING FREQUENCY: 665,500,000 Hz
- ▣ CHANNEL: 133147 (5 MHz)
- ▣ REFERENCE VOLTAGE: 7.70 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	7.700	+20(Ref)	665 500 003	0.0	0.000 000	0.000
100%		-30	665 500 007	3.1	0.000 000	0.005
100%		-20	665 500 001	-2.2	0.000 000	-0.003
100%		-10	665 500 007	4.0	0.000 001	0.006
100%		0	665 500 000	-3.2	0.000 000	-0.005
100%		+10	665 500 001	-2.6	0.000 000	-0.004
100%		+30	665 500 006	2.6	0.000 000	0.004
100%		+40	665 500 007	3.6	0.000 001	0.005
100%		+50	665 500 007	3.8	0.000 001	0.006
Batt. Endpoint	7.300	+20	665 500 000	-3.4	-0.000 001	-0.005



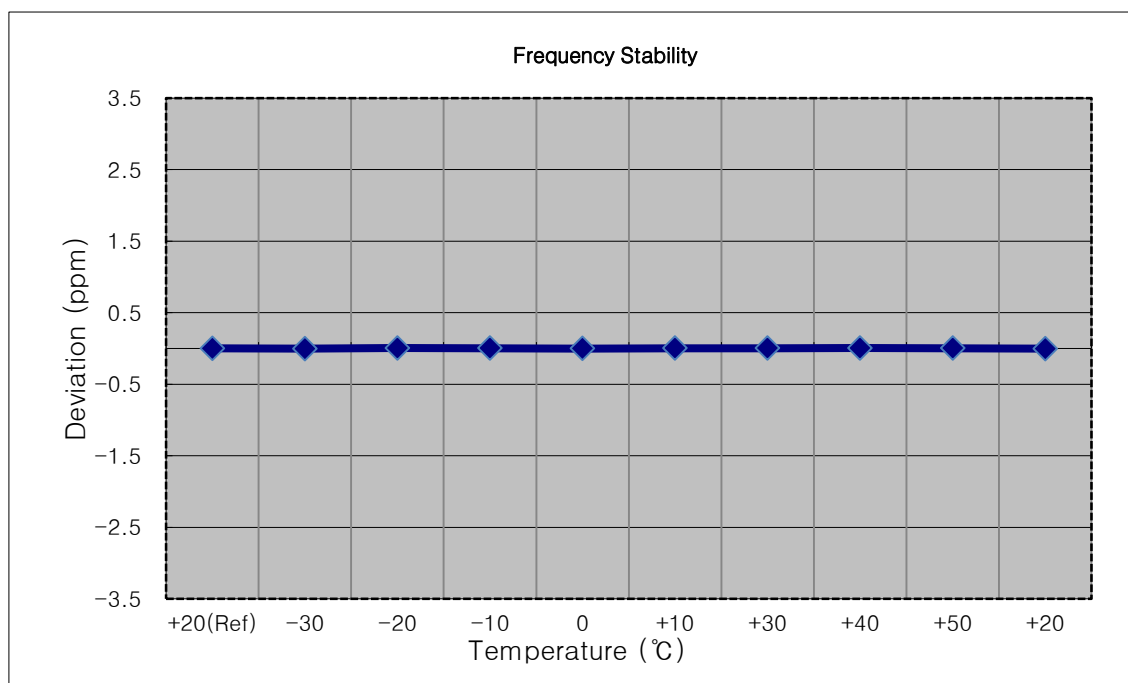
- ▣ MODE: LTE B71
- ▣ OPERATING FREQUENCY: 668,000,000 Hz
- ▣ CHANNEL: 133172 (10 MHz)
- ▣ REFERENCE VOLTAGE: 7.70 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	7.700	+20(Ref)	667 999 997	0.0	0.000 000	0.000
100%		-30	668 000 000	2.3	0.000 000	0.003
100%		-20	667 999 993	-4.6	-0.000 001	-0.007
100%		-10	667 999 995	-2.4	0.000 000	-0.004
100%		0	667 999 995	-2.3	0.000 000	-0.003
100%		+10	667 999 994	-3.0	0.000 000	-0.004
100%		+30	667 999 994	-3.4	-0.000 001	-0.005
100%		+40	668 000 000	2.9	0.000 000	0.004
100%		+50	667 999 995	-2.5	0.000 000	-0.004
Batt. Endpoint	7.300	+20	667 999 995	-2.6	0.000 000	-0.004



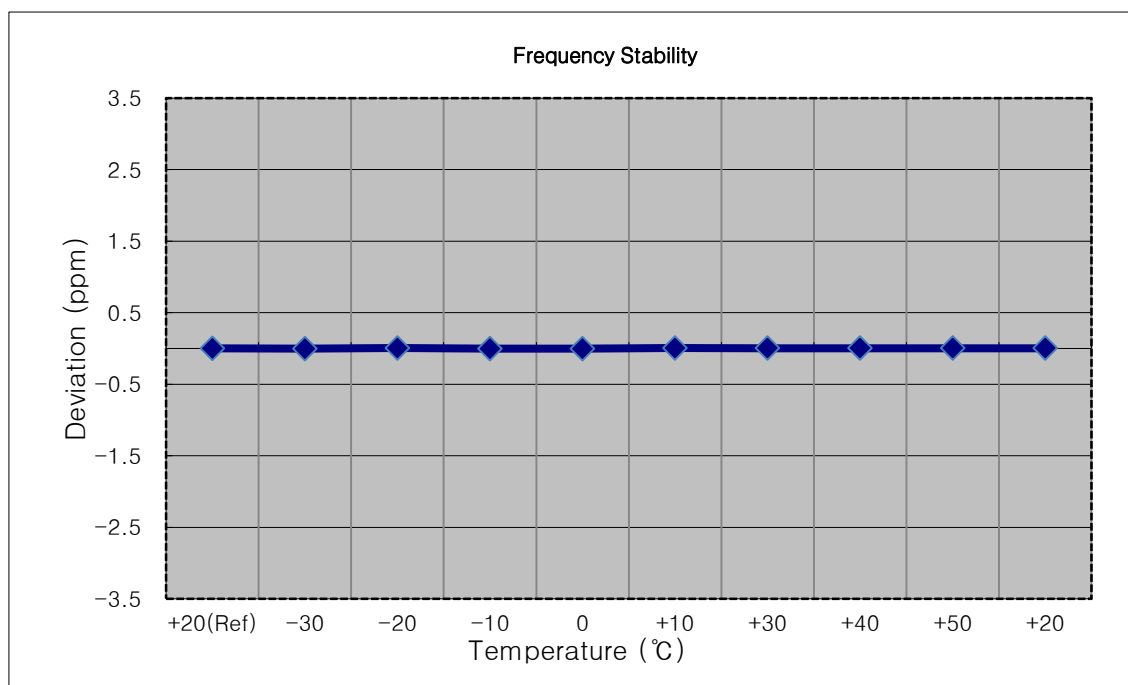
- ▣ MODE: LTE B71
- ▣ OPERATING FREQUENCY: 670,500,000 Hz
- ▣ CHANNEL: 133197 (15 MHz)
- ▣ REFERENCE VOLTAGE: 7.70 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	7.700	+20(Ref)	670 499 997	0.0	0.000 000	0.000
100%		-30	670 499 994	-2.2	0.000 000	-0.003
100%		-20	670 500 000	3.1	0.000 000	0.005
100%		-10	670 499 999	2.1	0.000 000	0.003
100%		0	670 499 995	-1.8	0.000 000	-0.003
100%		+10	670 499 998	1.8	0.000 000	0.003
100%		+30	670 499 998	1.9	0.000 000	0.003
100%		+40	670 500 000	3.8	0.000 001	0.006
100%		+50	670 499 999	2.0	0.000 000	0.003
Batt. Endpoint	7.300	+20	670 499 995	-2.0	0.000 000	-0.003



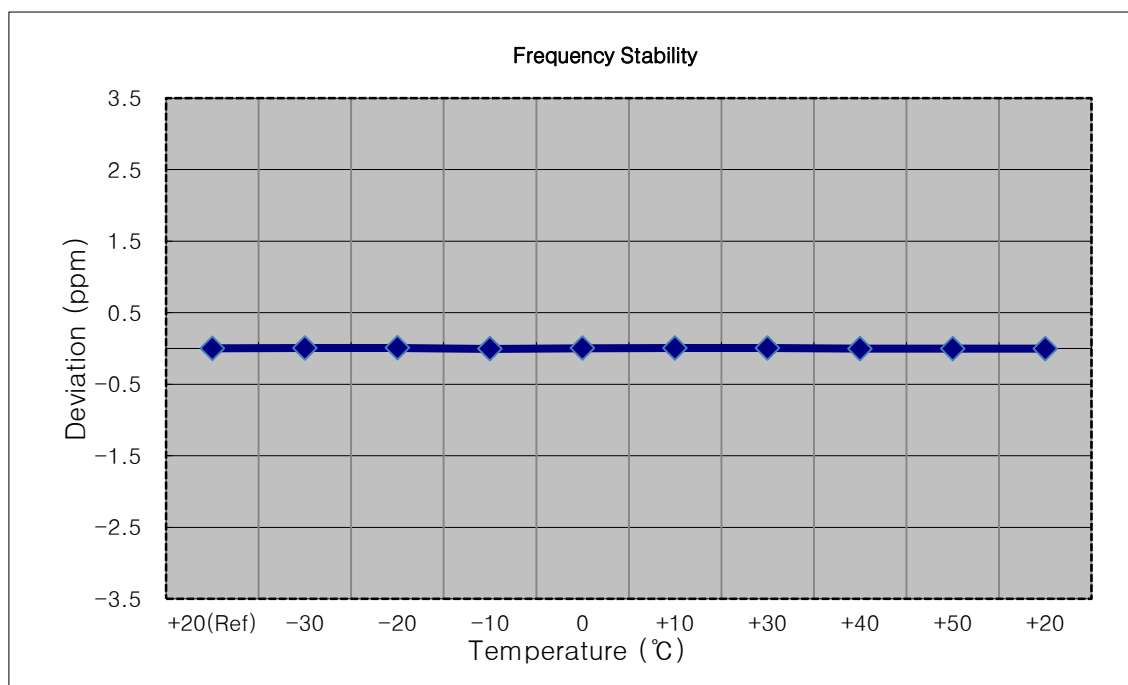
- ▣ MODE: LTE B71
- ▣ OPERATING FREQUENCY: 673,000,000 Hz
- ▣ CHANNEL: 133222 (20 MHz)
- ▣ REFERENCE VOLTAGE: 7.70 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	7.700	+20(Ref)	673 000 003	0.0	0.000 000	0.000
100%		-30	673 000 000	-2.9	0.000 000	-0.004
100%		-20	673 000 006	2.8	0.000 000	0.004
100%		-10	673 000 000	-2.6	0.000 000	-0.004
100%		0	673 000 001	-2.3	0.000 000	-0.003
100%		+10	673 000 006	3.1	0.000 000	0.005
100%		+30	673 000 005	2.3	0.000 000	0.003
100%		+40	673 000 005	1.8	0.000 000	0.003
100%		+50	673 000 005	1.5	0.000 000	0.002
Batt. Endpoint	7.300	+20	673 000 006	2.5	0.000 000	0.004



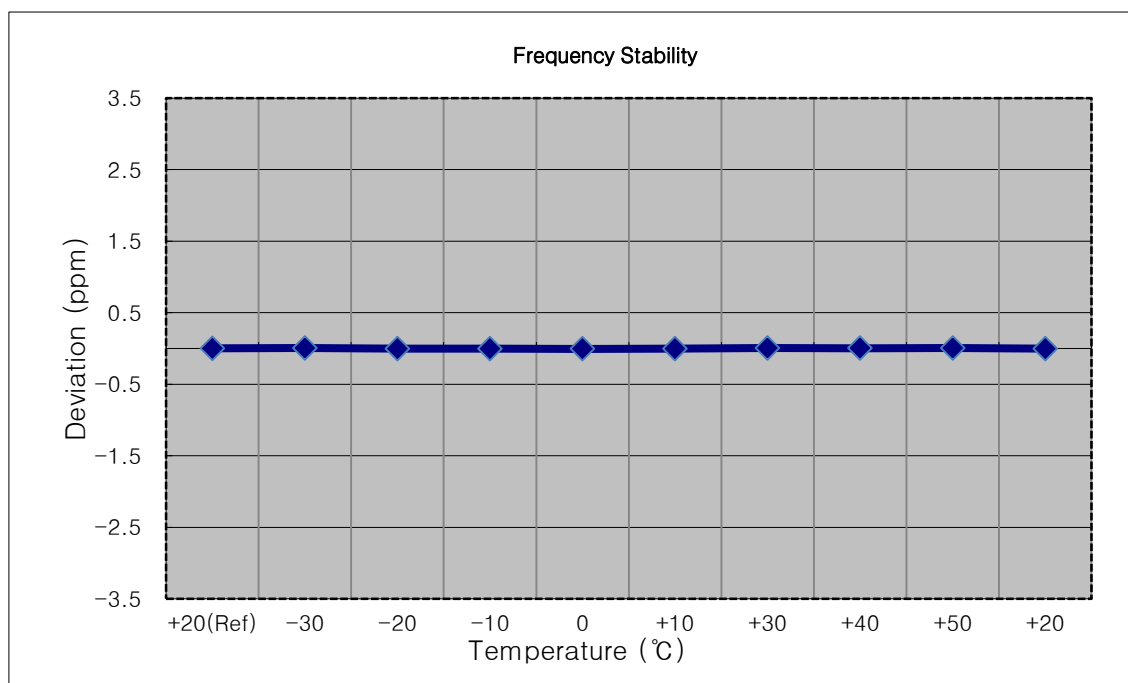
- ▣ MODE: LTE B71
- ▣ OPERATING FREQUENCY: 680,500,000 Hz
- ▣ CHANNEL: 133297 (5 MHz)
- ▣ REFERENCE VOLTAGE: 7.70 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	7.700	+20(Ref)	680 500 003	0.0	0.000 000	0.000
100%		-30	680 500 006	3.0	0.000 000	0.004
100%		-20	680 500 008	4.9	0.000 001	0.007
100%		-10	680 499 999	-4.5	-0.000 001	-0.007
100%		0	680 500 006	2.3	0.000 000	0.003
100%		+10	680 500 007	3.4	0.000 000	0.005
100%		+30	680 500 006	2.9	0.000 000	0.004
100%		+40	680 500 000	-3.0	0.000 000	-0.004
100%		+50	680 500 000	-2.9	0.000 000	-0.004
Batt. Endpoint	7.300	+20	680 500 000	-3.2	0.000 000	-0.005



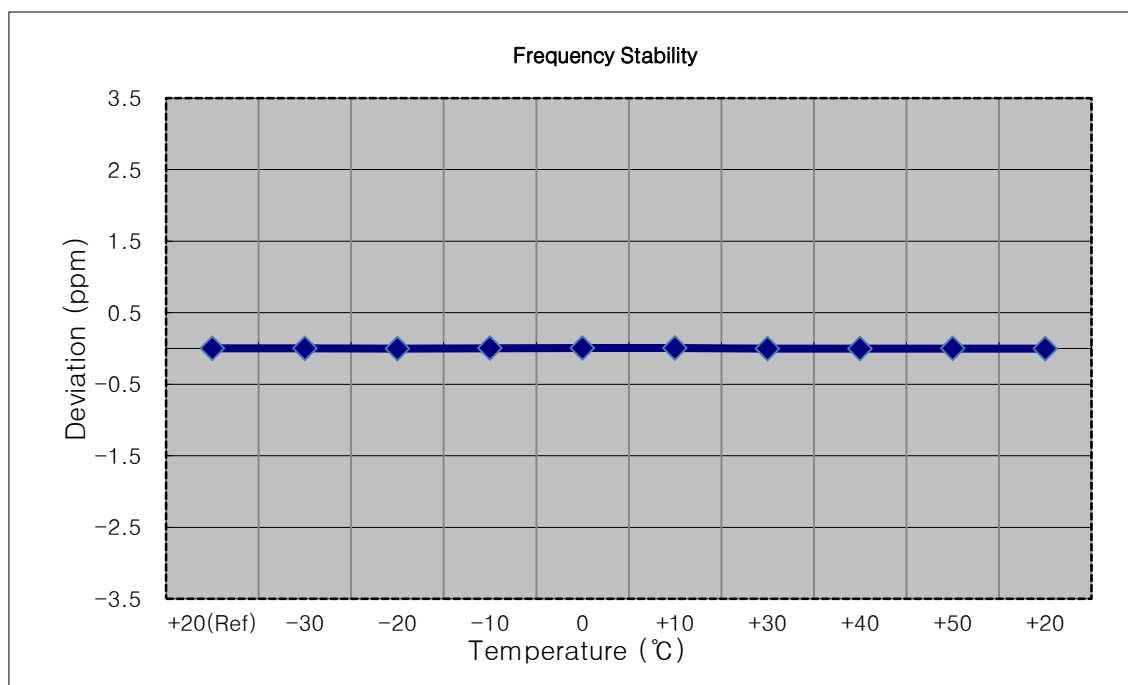
- ▣ MODE: LTE B71
- ▣ OPERATING FREQUENCY: 680,500,000 Hz
- ▣ CHANNEL: 133297 (10 MHz)
- ▣ REFERENCE VOLTAGE: 7.70 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	7.700	+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	680 500 000	-1.9	0.000 000	-0.003
100%		-10	680 500 000	-2.1	0.000 000	-0.003
100%		0	680 499 999	-3.6	-0.000 001	-0.005
100%		+10	680 499 999	-3.3	0.000 000	-0.005
100%		+30	680 500 006	3.7	0.000 001	0.005
100%		+40	680 500 005	2.6	0.000 000	0.004
100%		+50	680 500 006	3.6	0.000 001	0.005
Batt. Endpoint	7.300	+20	680 500 000	-2.5	0.000 000	-0.004



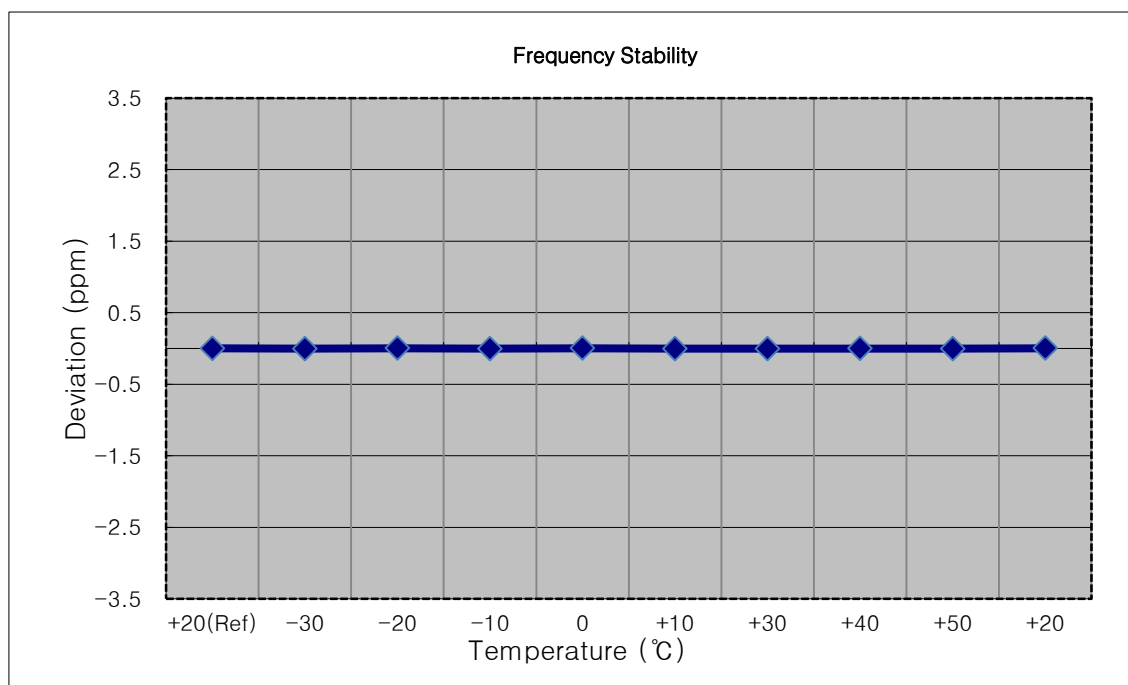
- ▣ MODE: LTE B71
- ▣ OPERATING FREQUENCY: 680,500,000 Hz
- ▣ CHANNEL: 133297 (15 MHz)
- ▣ REFERENCE VOLTAGE: 7.70 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	7.700	+20(Ref)	680 500 004	0.0	0.000 000	0.000
100%		-30	680 500 004	0.9	0.000 000	0.001
100%		-20	680 500 001	-2.3	0.000 000	-0.003
100%		-10	680 500 005	1.4	0.000 000	0.002
100%		0	680 500 007	3.0	0.000 000	0.004
100%		+10	680 500 007	3.0	0.000 000	0.004
100%		+30	680 500 001	-2.6	0.000 000	-0.004
100%		+40	680 500 001	-2.2	0.000 000	-0.003
100%		+50	680 500 002	-1.8	0.000 000	-0.003
Batt. Endpoint	7.300	+20	680 500 000	-3.1	0.000 000	-0.005



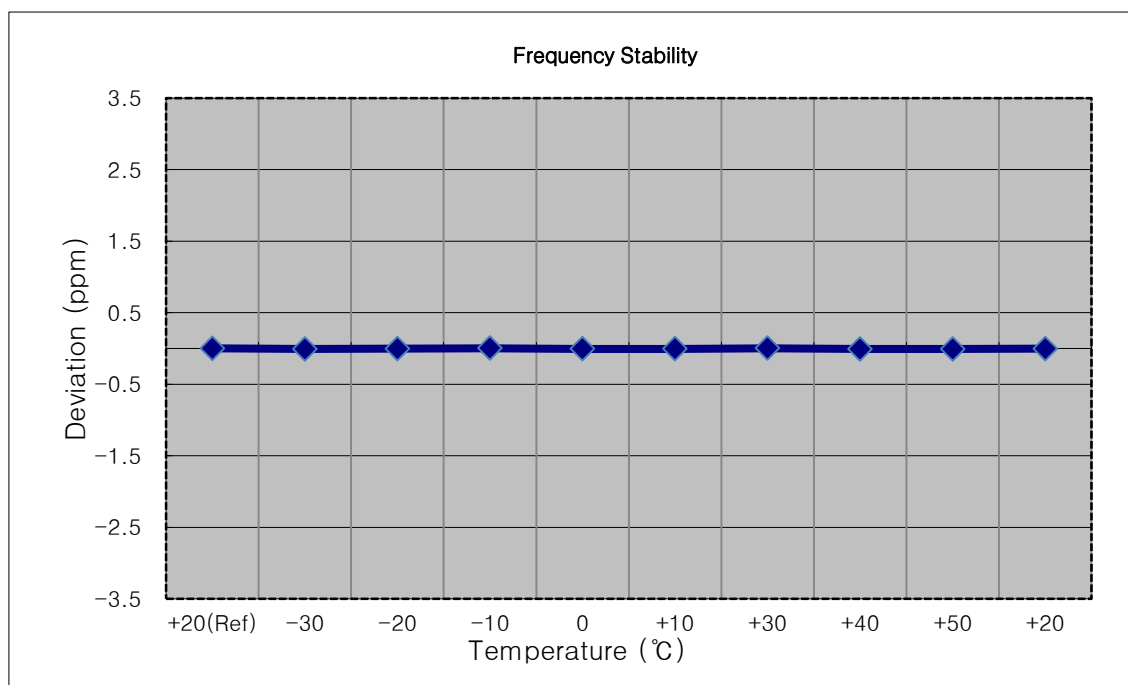
- ▣ MODE: LTE B71
- ▣ OPERATING FREQUENCY: 680,500,000 Hz
- ▣ CHANNEL: 133297 (20 MHz)
- ▣ REFERENCE VOLTAGE: 7.70 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	7.700	+20(Ref)	680 499 998	0.0	0.000 000	0.000
100%		-30	680 499 995	-2.9	0.000 000	-0.004
100%		-20	680 499 999	1.4	0.000 000	0.002
100%		-10	680 499 995	-2.1	0.000 000	-0.003
100%		0	680 500 000	2.4	0.000 000	0.004
100%		+10	680 499 995	-2.1	0.000 000	-0.003
100%		+30	680 499 996	-1.9	0.000 000	-0.003
100%		+40	680 499 996	-1.7	0.000 000	-0.002
100%		+50	680 499 996	-1.9	0.000 000	-0.003
Batt. Endpoint	7.300	+20	680 500 000	2.3	0.000 000	0.003



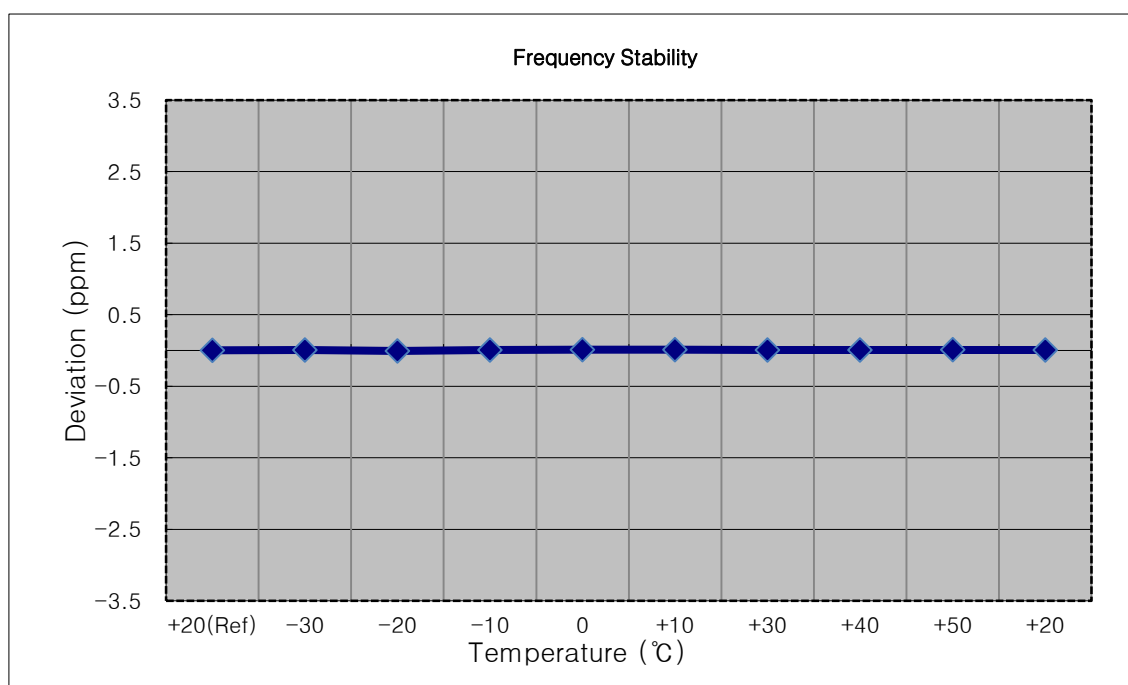
- ▣ MODE: LTE B71
- ▣ OPERATING FREQUENCY: 695,500,000 Hz
- ▣ CHANNEL: 133447 (5 MHz)
- ▣ REFERENCE VOLTAGE: 7.70 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	7.700	+20(Ref)	695 499 994	0.0	0.000 000	0.000
100%		-30	695 499 988	-6.0	-0.000 001	-0.009
100%		-20	695 499 992	-2.1	0.000 000	-0.003
100%		-10	695 499 996	2.2	0.000 000	0.003
100%		0	695 499 990	-3.5	-0.000 001	-0.005
100%		+10	695 499 990	-4.3	-0.000 001	-0.006
100%		+30	695 499 996	2.5	0.000 000	0.004
100%		+40	695 499 988	-5.5	-0.000 001	-0.008
100%		+50	695 499 988	-6.1	-0.000 001	-0.009
Batt. Endpoint	7.300	+20	695 499 991	-2.6	0.000 000	-0.004



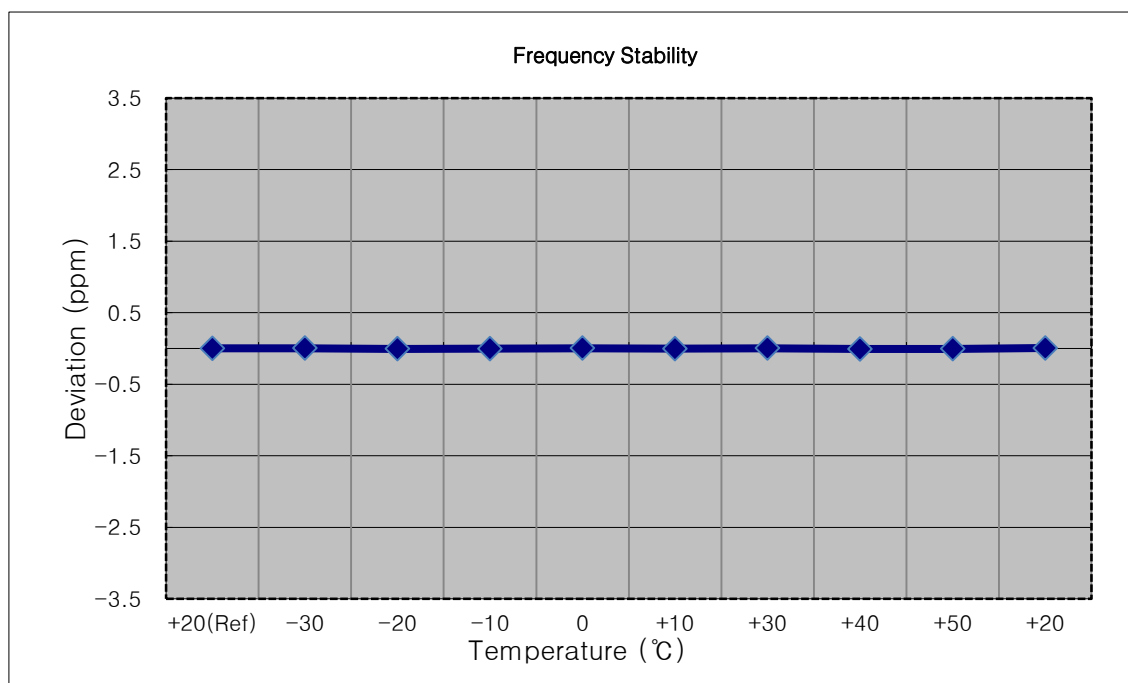
- ▣ MODE: LTE B71
- ▣ OPERATING FREQUENCY: 693,000,000 Hz
- ▣ CHANNEL: 133422 (10 MHz)
- ▣ REFERENCE VOLTAGE: 7.70 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	7.700	+20(Ref)	692 999 995	0.0	0.000 000	0.000
100%		-30	692 999 999	3.7	0.000 001	0.005
100%		-20	692 999 990	-5.1	-0.000 001	-0.007
100%		-10	693 000 000	4.3	0.000 001	0.006
100%		0	693 000 002	6.7	0.000 001	0.010
100%		+10	693 000 001	5.9	0.000 001	0.009
100%		+30	692 999 998	2.9	0.000 000	0.004
100%		+40	693 000 000	4.3	0.000 001	0.006
100%		+50	693 000 000	4.6	0.000 001	0.007
Batt. Endpoint	7.300	+20	692 999 998	3.1	0.000 000	0.004



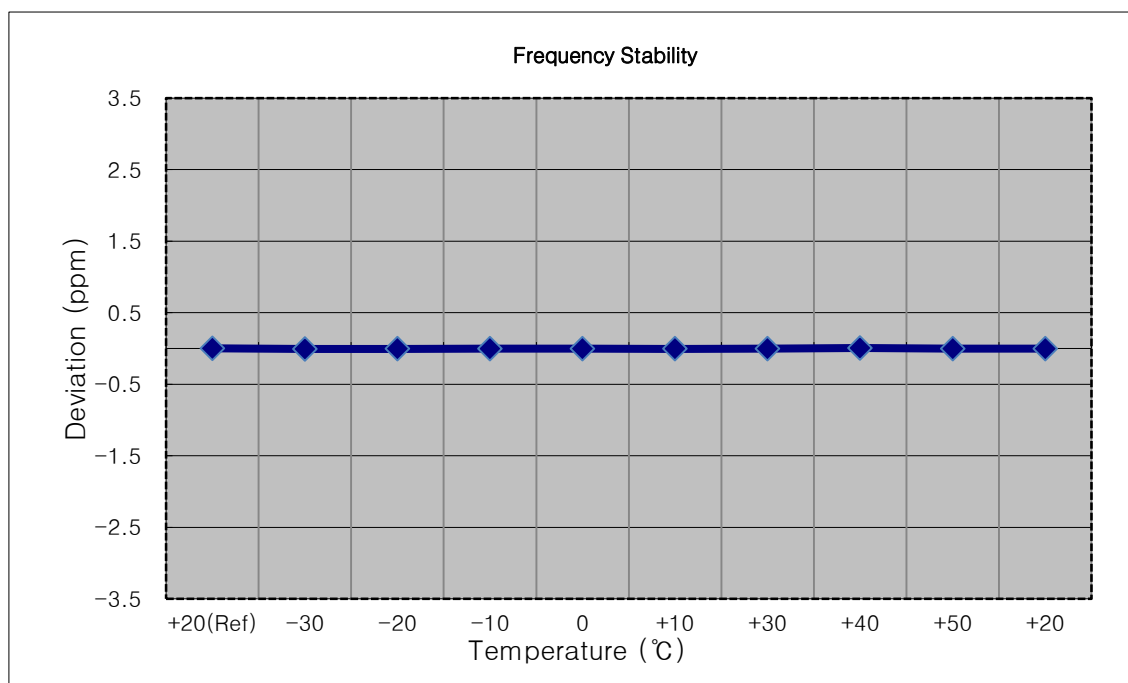
- ☐ MODE: LTE B71
☐ OPERATING FREQUENCY: 690,500,000 Hz
☐ CHANNEL: 133397 (15 MHz)
☐ REFERENCE VOLTAGE: 7.70 VDC
☐ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	7.700	+20(Ref)	690 499 995	0.0	0.000 000	0.000
100%		-30	690 499 997	2.7	0.000 000	0.004
100%		-20	690 499 991	-3.5	-0.000 001	-0.005
100%		-10	690 499 992	-3.1	0.000 000	-0.004
100%		0	690 499 997	2.5	0.000 000	0.004
100%		+10	690 499 992	-2.6	0.000 000	-0.004
100%		+30	690 499 997	2.3	0.000 000	0.003
100%		+40	690 499 988	-6.5	-0.000 001	-0.009
100%		+50	690 499 990	-4.9	-0.000 001	-0.007
Batt. Endpoint	7.300	+20	690 499 998	3.7	0.000 001	0.005



- ▣ MODE: LTE B71
- ▣ OPERATING FREQUENCY: 688,000,000 Hz
- ▣ CHANNEL: 133372 (20 MHz)
- ▣ REFERENCE VOLTAGE: 7.70 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	7.700	+20(Ref)	688 000 002	0.0	0.000 000	0.000
100%		-30	687 999 996	-5.8	-0.000 001	-0.008
100%		-20	687 999 998	-4.6	-0.000 001	-0.007
100%		-10	688 000 000	-1.9	0.000 000	-0.003
100%		0	688 000 000	-2.4	0.000 000	-0.003
100%		+10	687 999 998	-4.3	-0.000 001	-0.006
100%		+30	688 000 000	-2.2	0.000 000	-0.003
100%		+40	688 000 006	3.5	0.000 001	0.005
100%		+50	687 999 999	-3.0	0.000 000	-0.004
Batt. Endpoint	7.300	+20	688 000 000	-2.3	0.000 000	-0.003



8.7 RECEIVER SPURIOUS EMISSIONS

Frequency Range : 30 MHz ~ 1 GHz

Frequency	Reading	Ant. factor+Cable loss- Amp Gain	Ant. POL	Total	Limit	Margin
MHz	$\text{dB}\mu\text{V}$	dB /m	(H/V)	$\text{dB}\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$	dB
No Peak Found						

Frequency Range : Above 1 GHz

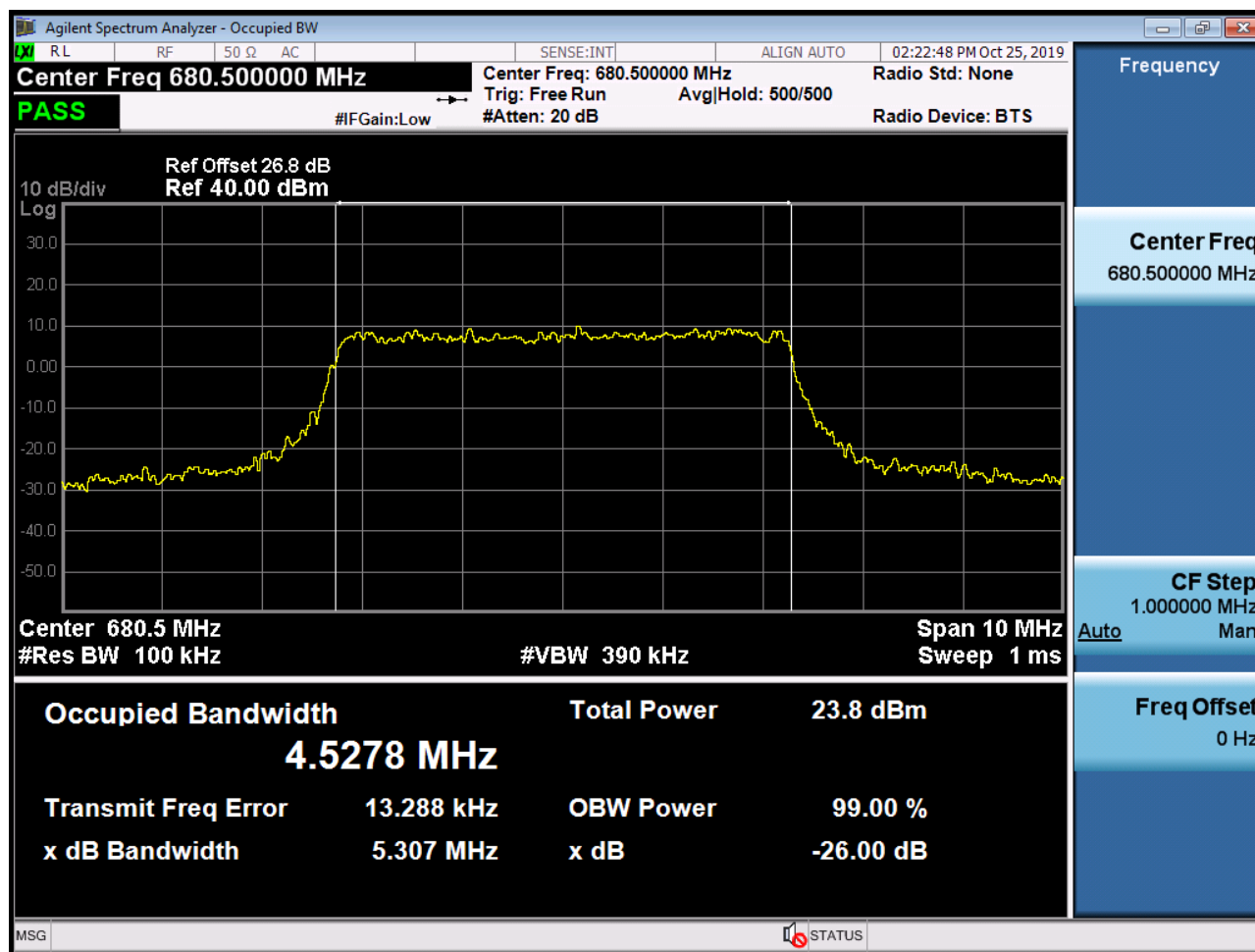
Frequency	Reading	Ant. factor+Cable loss- Amp Gain	Ant. POL	Total	Limit	Margin
MHz	$\text{dB}\mu\text{V}$	dB /m	(H/V)	$\text{dB}\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$	dB
No Peak Found						

Limit

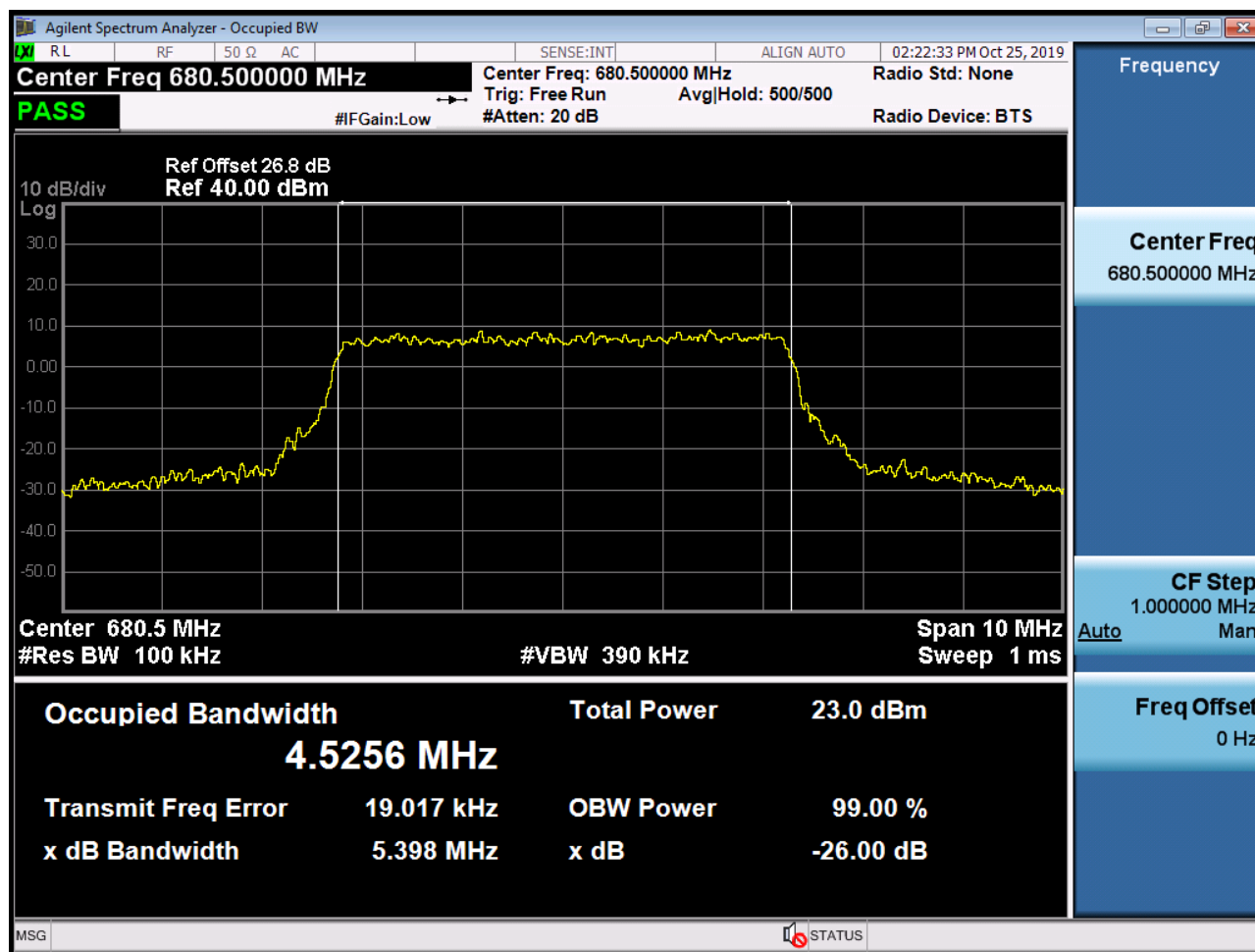
Frequency (MHz)	Field Strength ($\mu\text{V/m}$ at 3 meters)
30 – 88	100
88 - 216	150
216 – 960	200
Above 960	500

9. TEST PLOTS

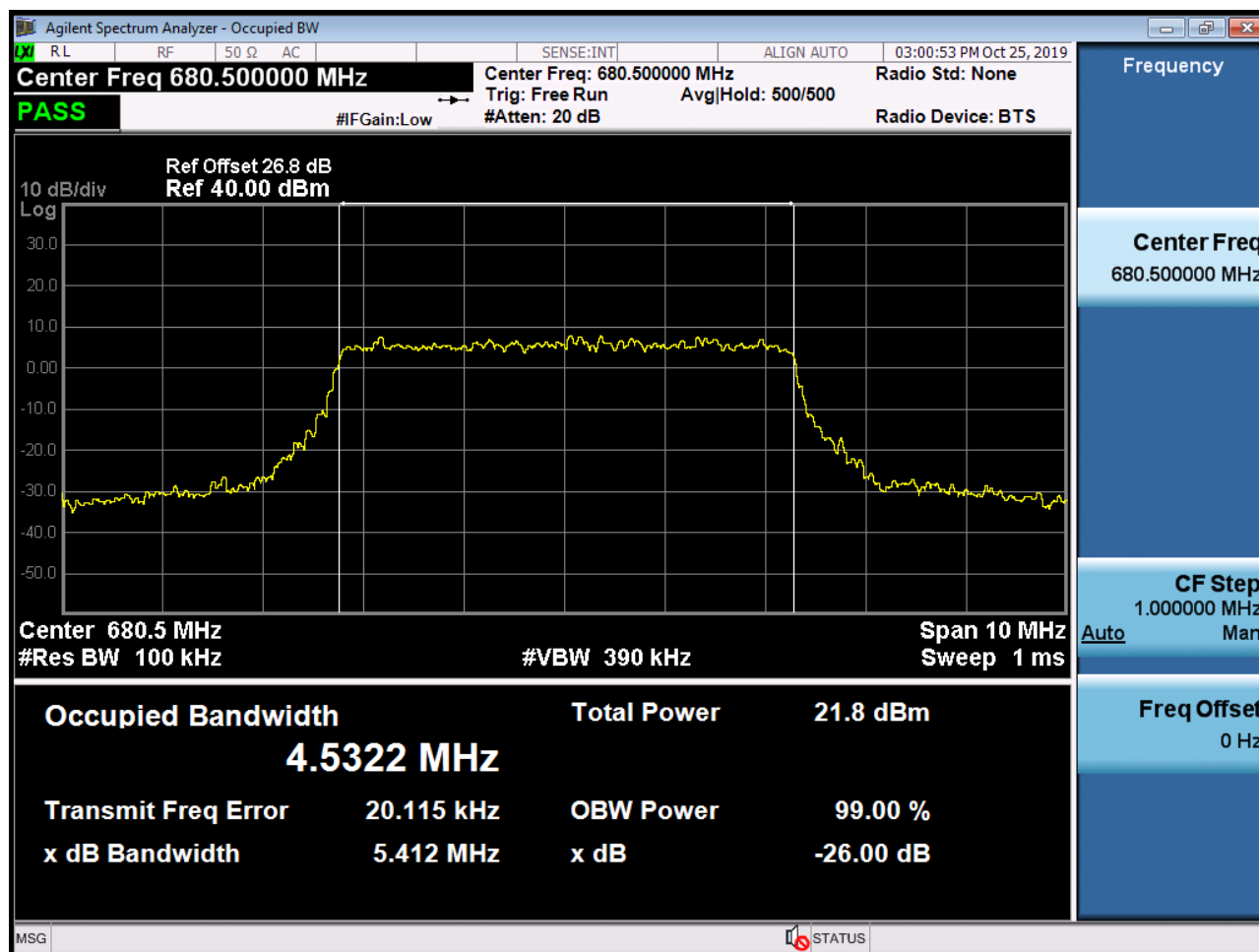
BAND 71. Occupied Bandwidth Plot (5M BW Ch.133297 QPSK_RB6_0)



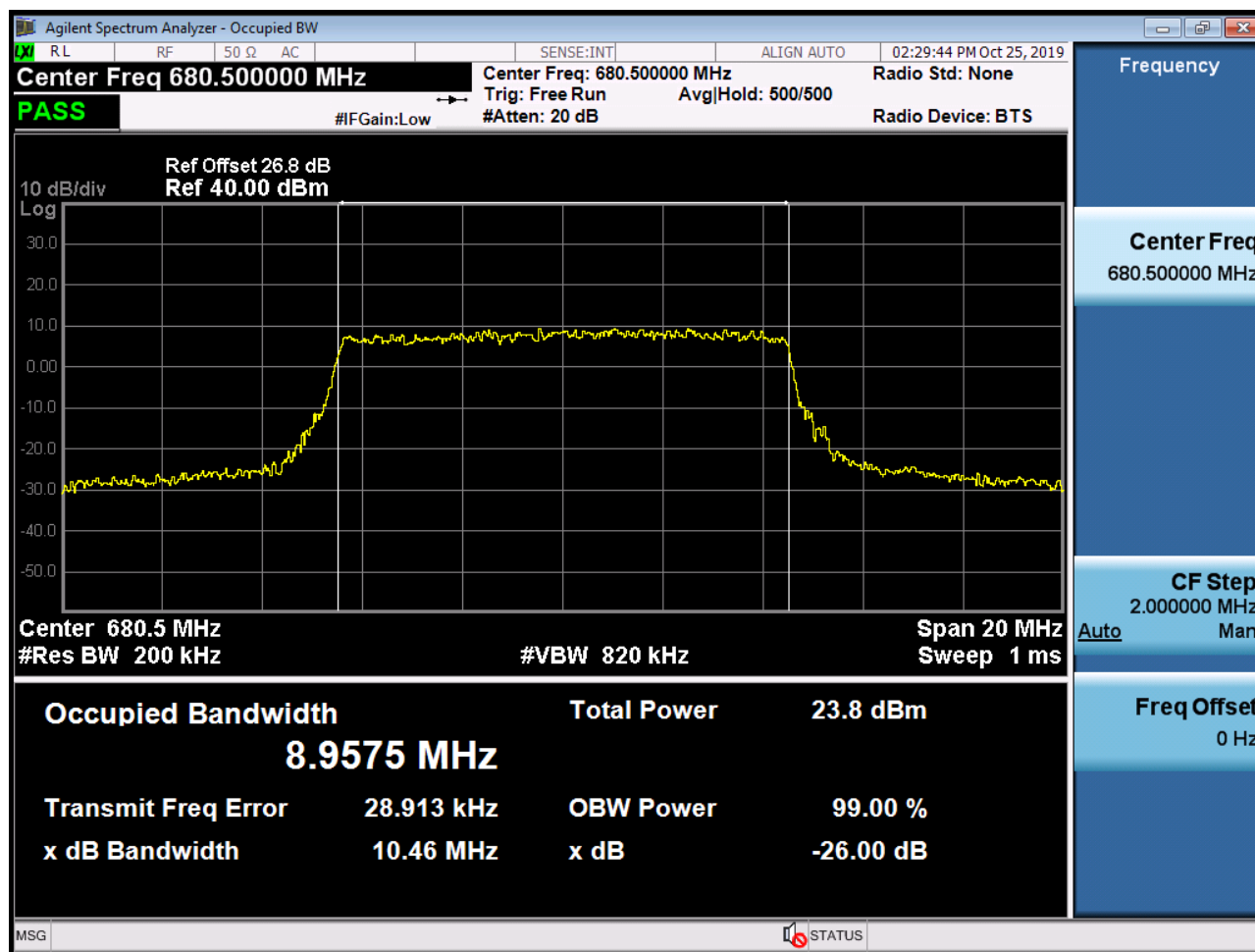
BAND 71. Occupied Bandwidth Plot (5M BW Ch.133297 16QAM_RB6_0)



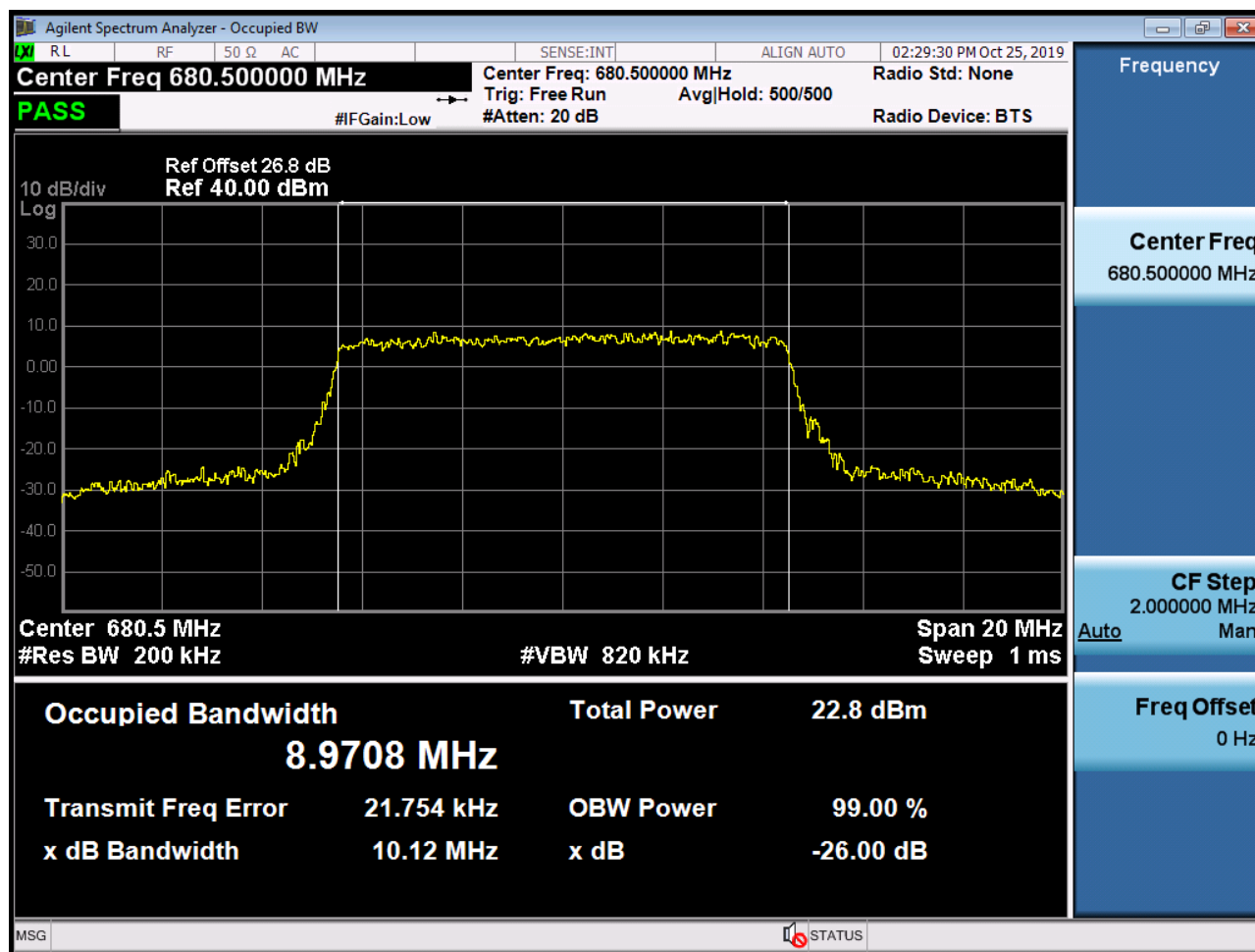
BAND 71. Occupied Bandwidth Plot (5M BW Ch.133297 64QAM_RB6_0)



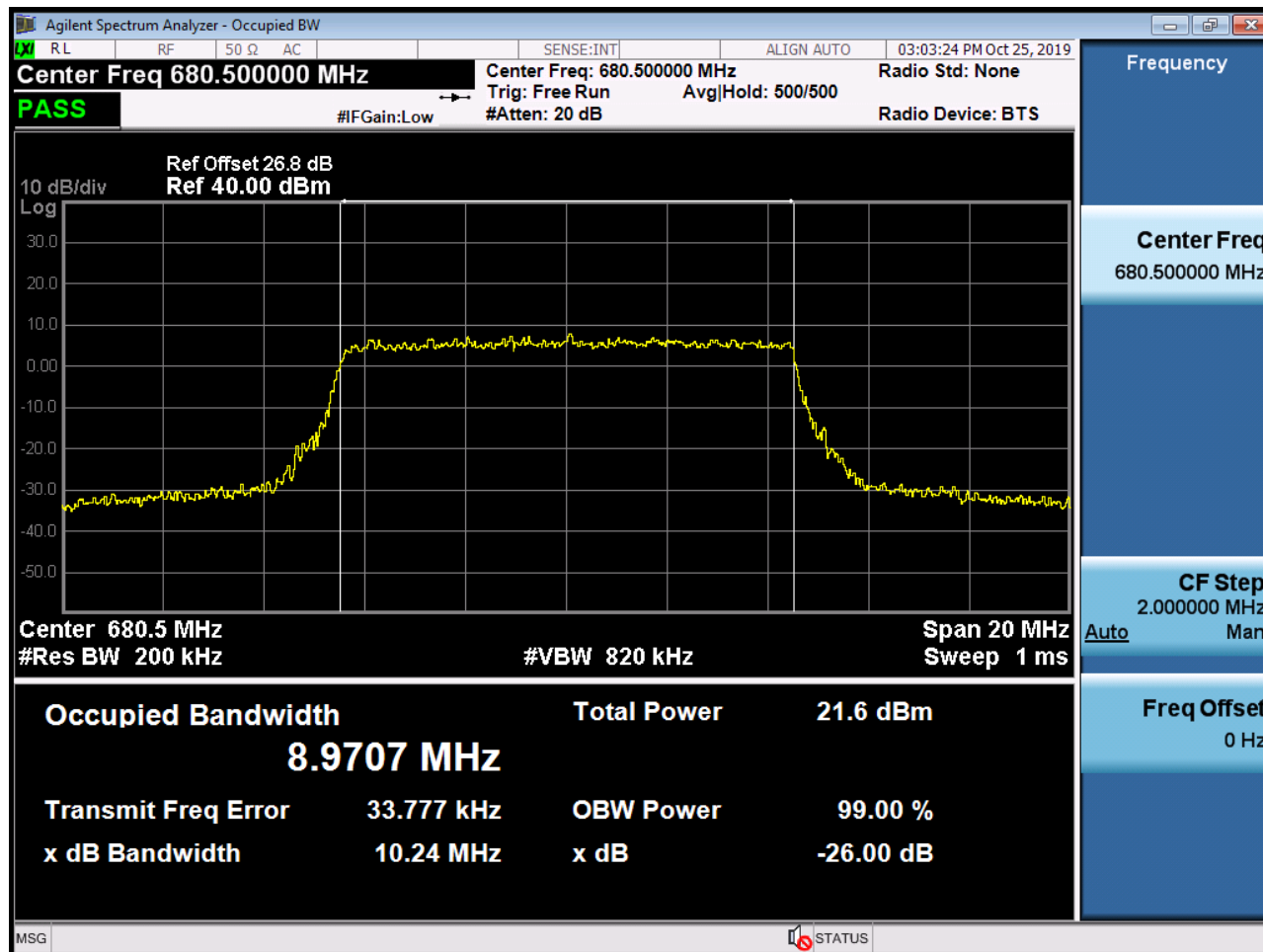
BAND 71. Occupied Bandwidth Plot (10M BW Ch.133297 QPSK_RB15_0)



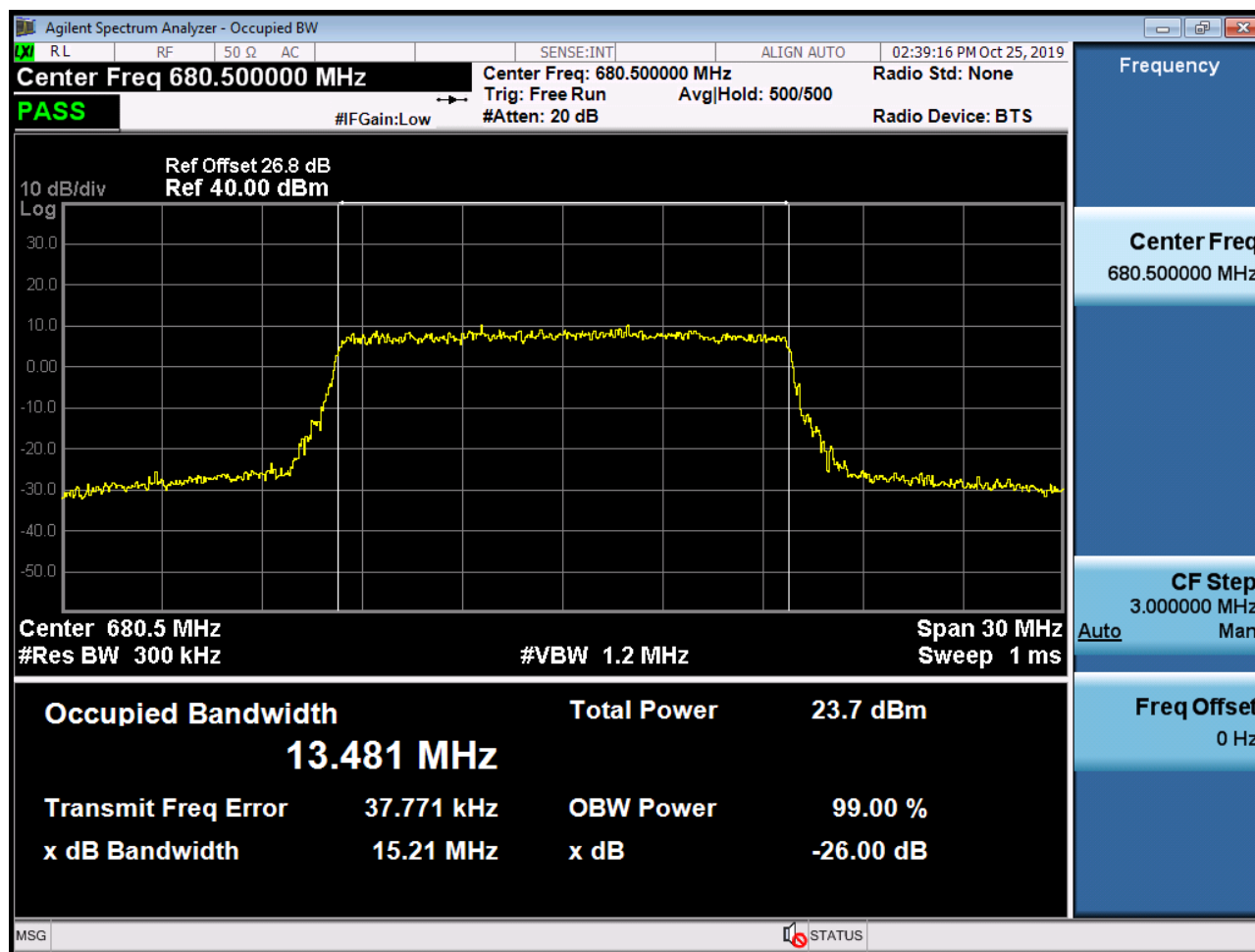
BAND 71. Occupied Bandwidth Plot (10M BW Ch.133297 16QAM_RB15_0)



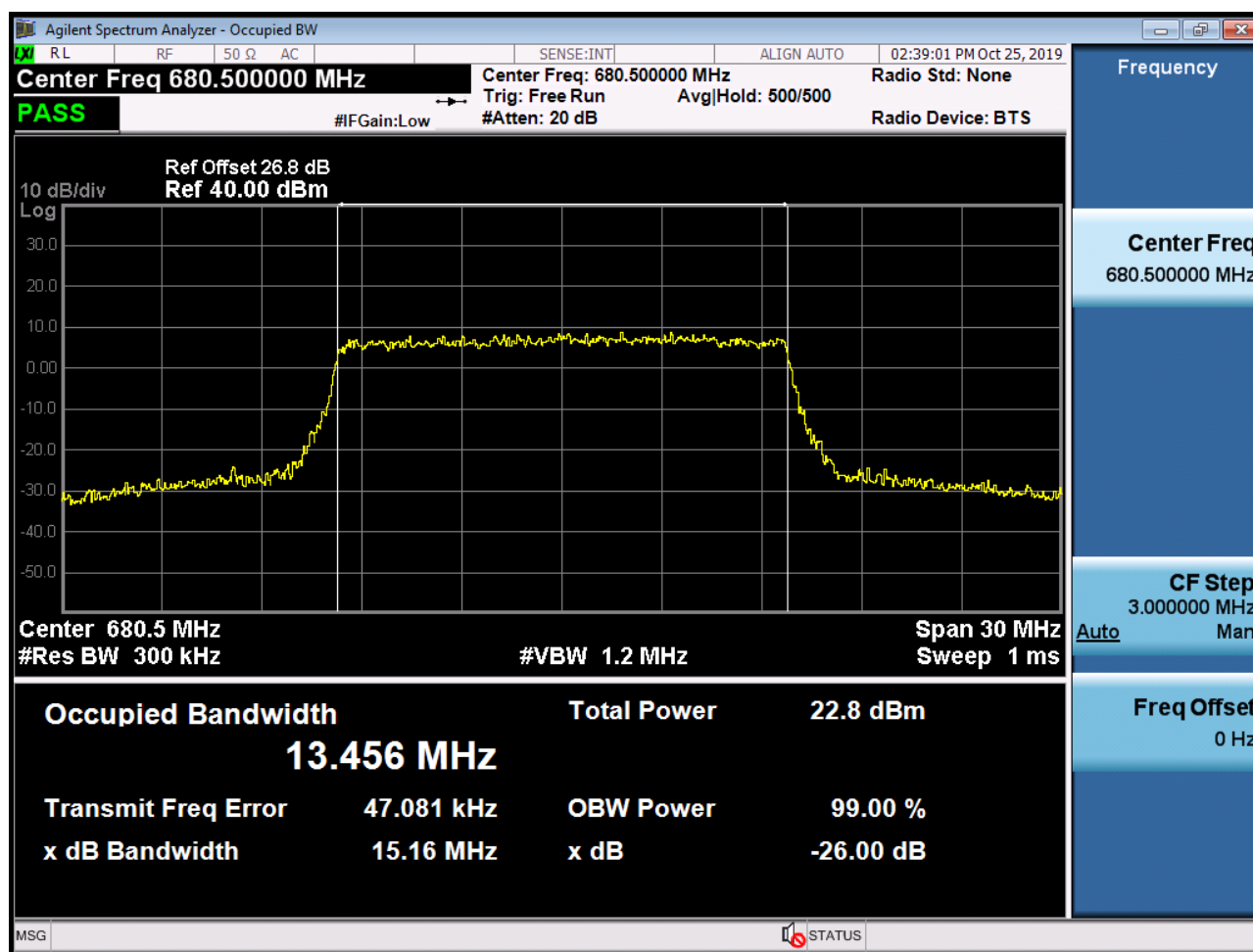
BAND 71. Occupied Bandwidth Plot (10M BW Ch.133297 64QAM_RB15_0)



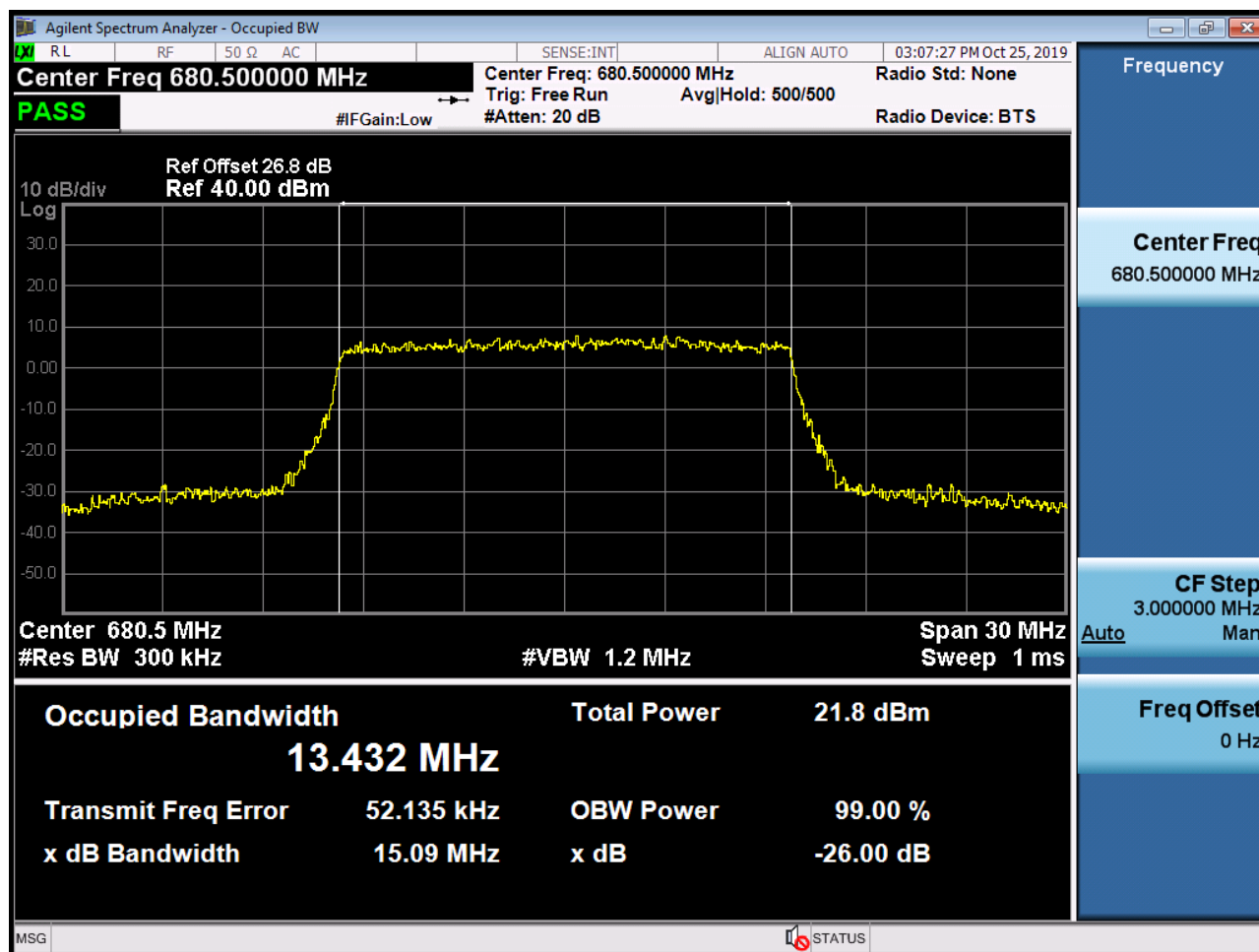
BAND 71. Occupied Bandwidth Plot (15M BW Ch.133297 QPSK_RB25_0)



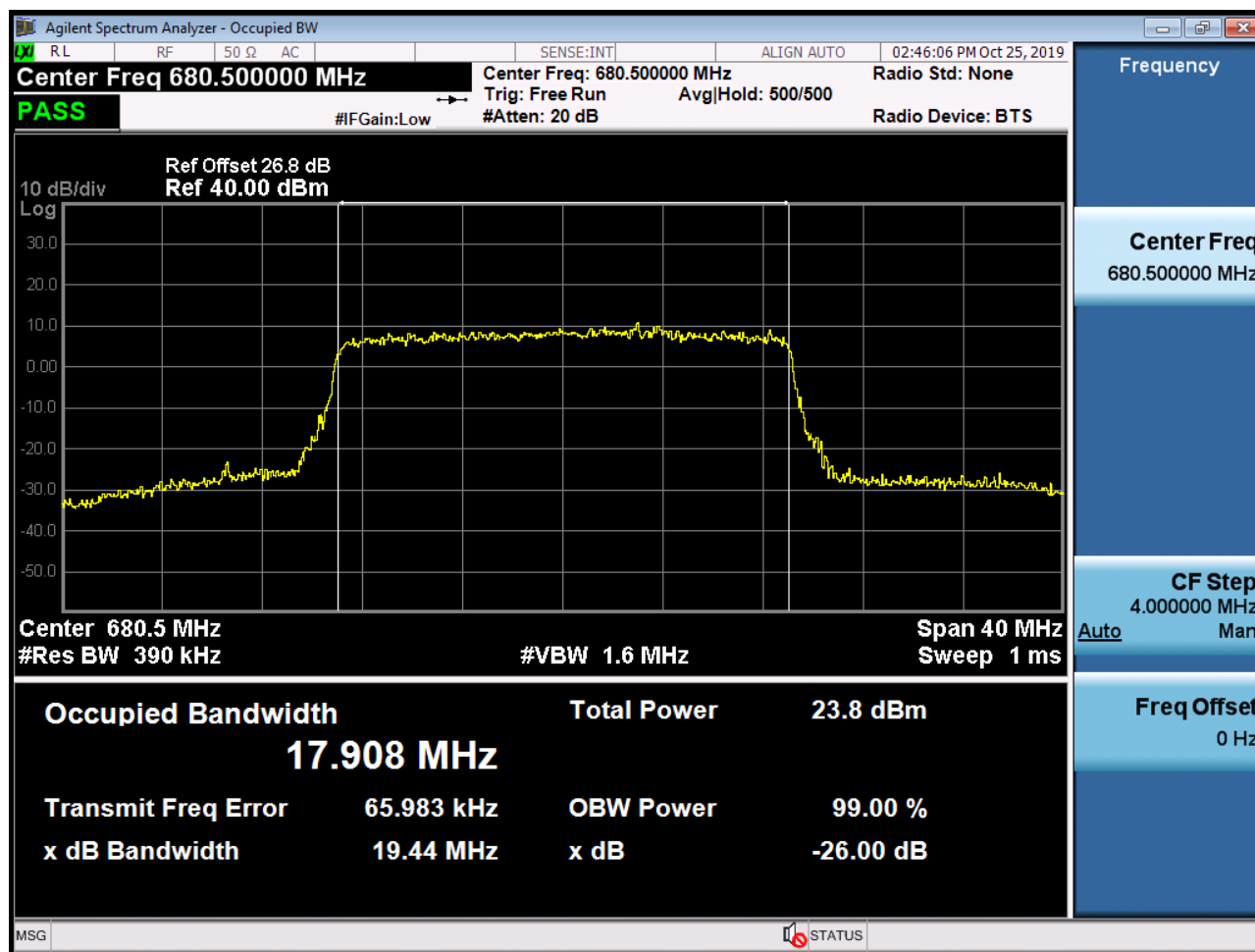
BAND 71. Occupied Bandwidth Plot (15M BW Ch.133297 16QAM_RB25_0)



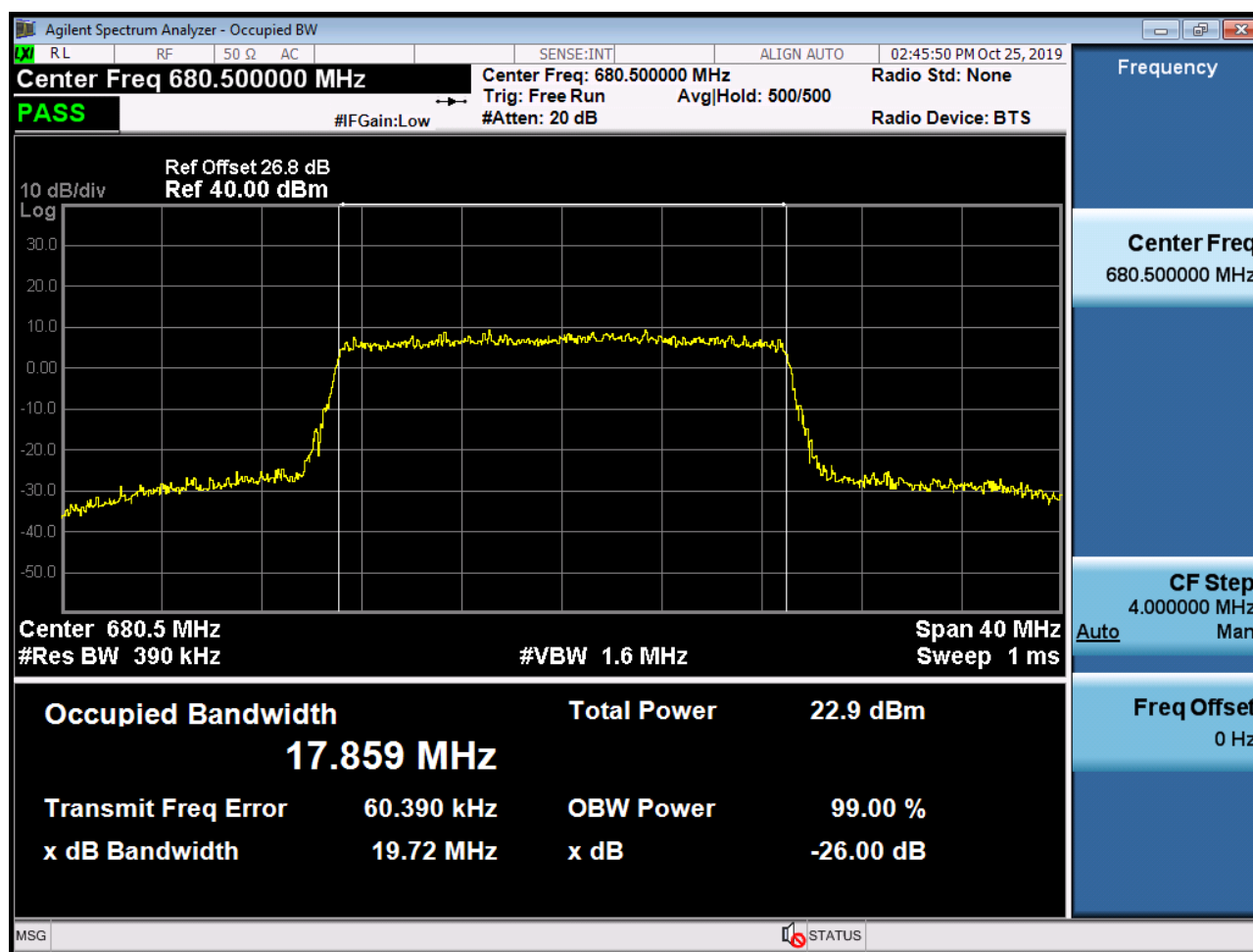
BAND 71. Occupied Bandwidth Plot (15M BW Ch.133297 64QAM_RB25_0)



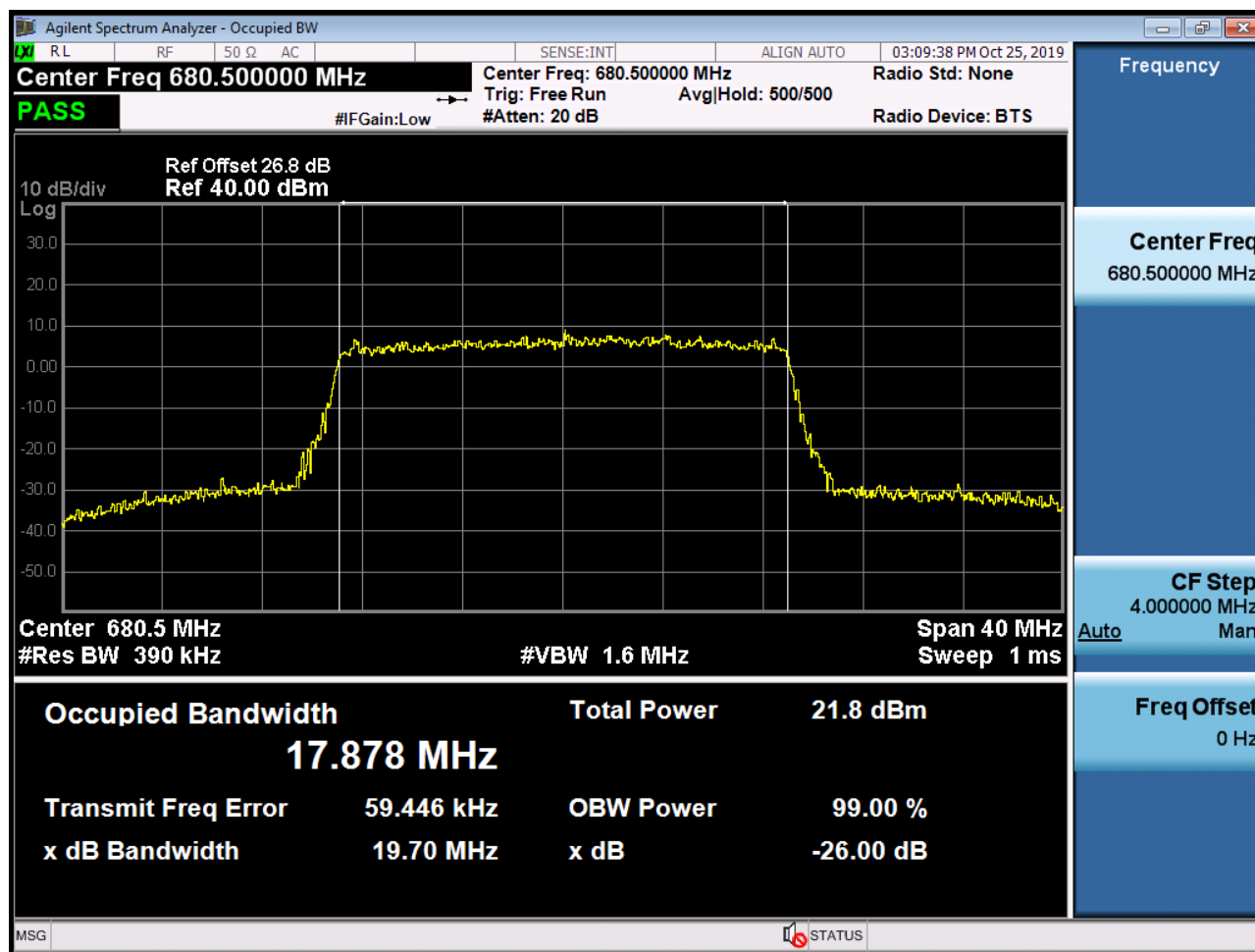
BAND 71. Occupied Bandwidth Plot (20M BW Ch.133297 QPSK_RB50_0)



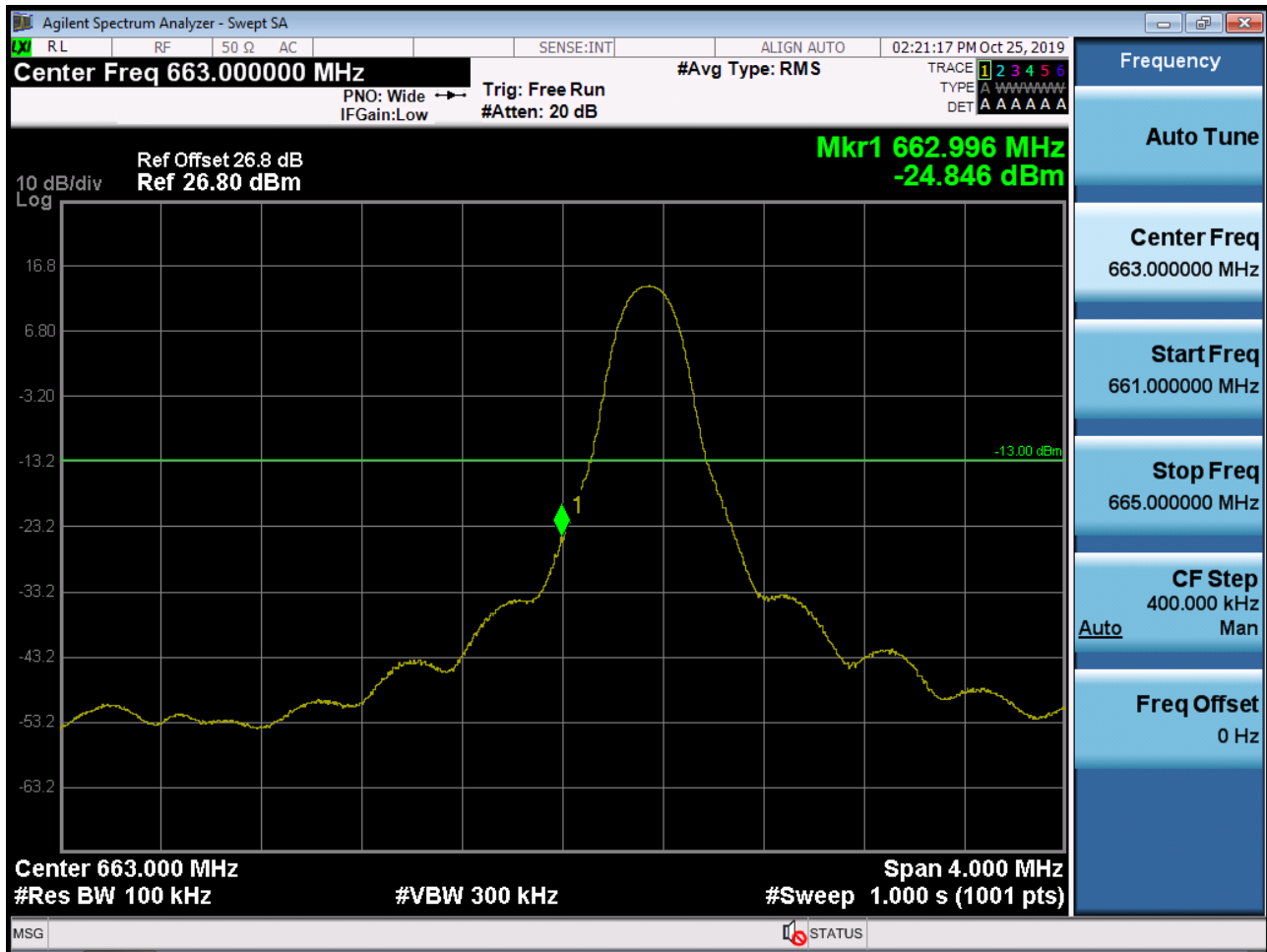
BAND 71. Occupied Bandwidth Plot (20M BW Ch.133297 16QAM_RB50_0)



BAND 71. Occupied Bandwidth Plot (20M BW Ch.133297 64QAM_RB50_0)



BAND 71. 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)



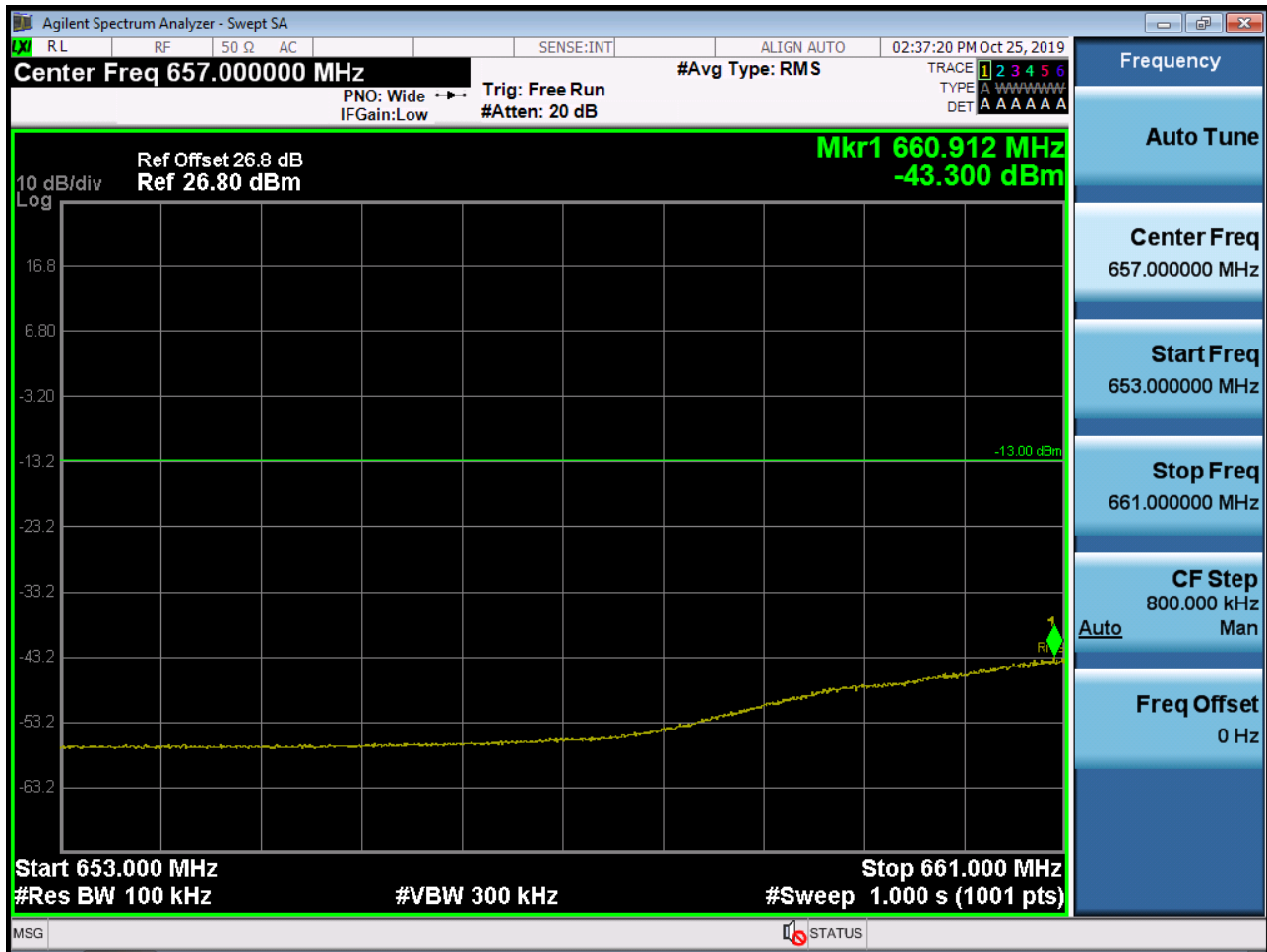
BAND 71. Lower Band Edge Plot (15M BW Ch.133197 QPSK_RB1_Offset 0)



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)



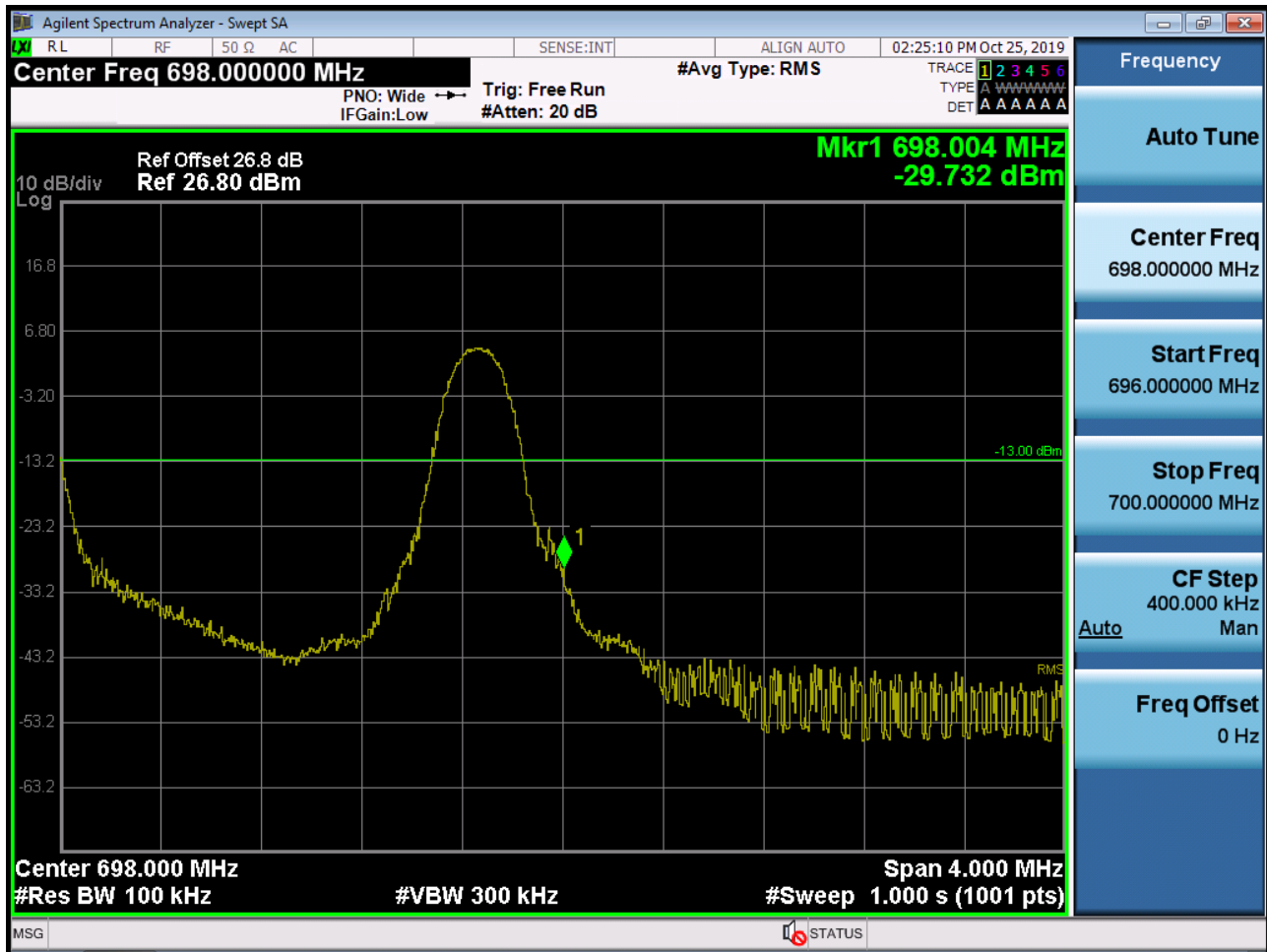
BAND 71. Lower Band Edge Plot (20M BW Ch.133222 QPSK_RB50_Offset 0)



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)_1



BAND 71. Upper Band Edge Plot (5M BW Ch.133447 QPSK_RB1_Offset 5)_2



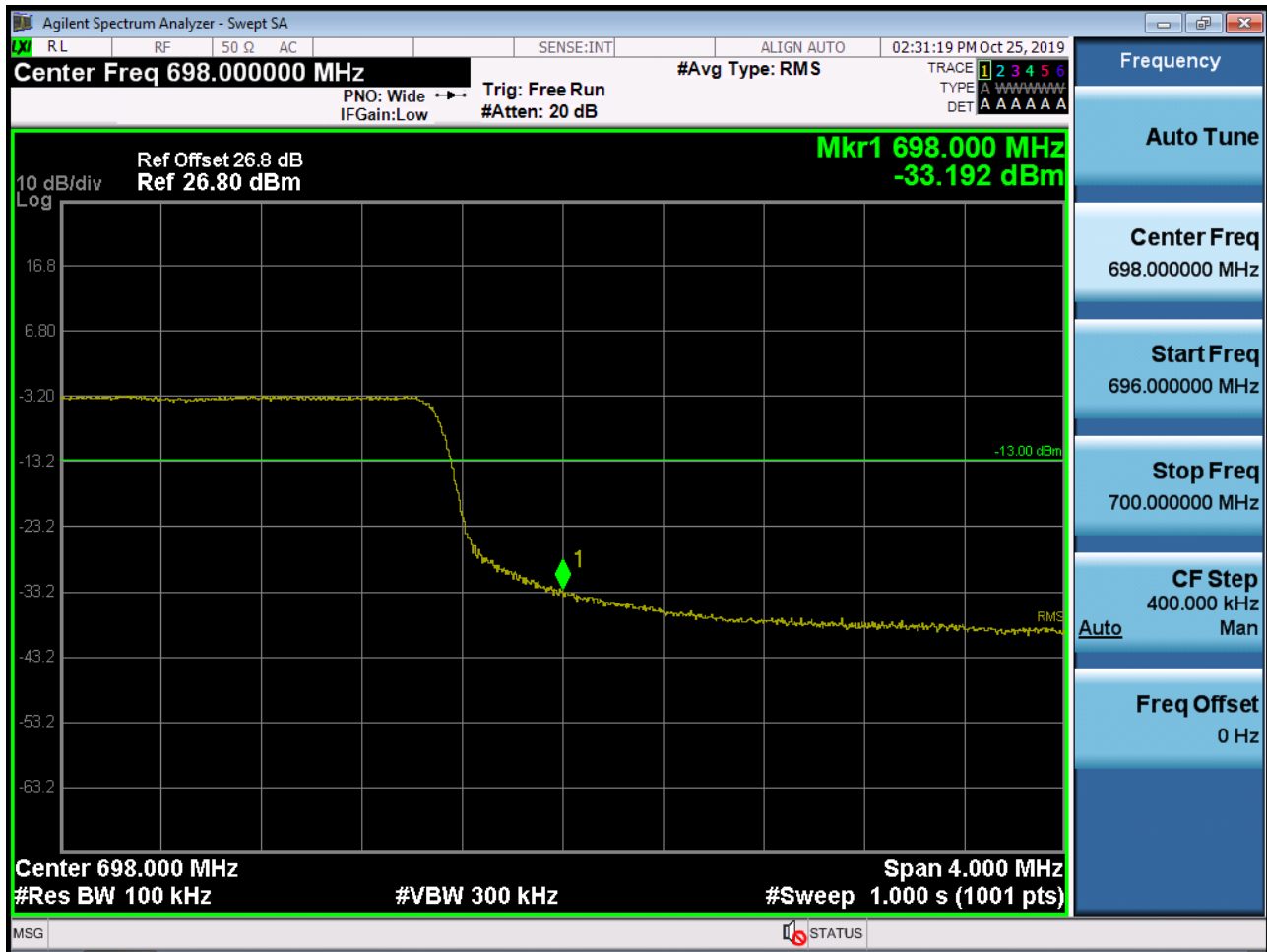
BAND 71. Upper Extended Band Edge Plot (5M BW Ch.133447 QPSK_RB6_0)



BAND 71. Upper Band Edge Plot (10M BW Ch.133422 QPSK_RB1_Offset 14)-1



BAND 71. Upper Band Edge Plot (10M BW Ch.133422 QPSK_RB1_Offset 14)-2



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)



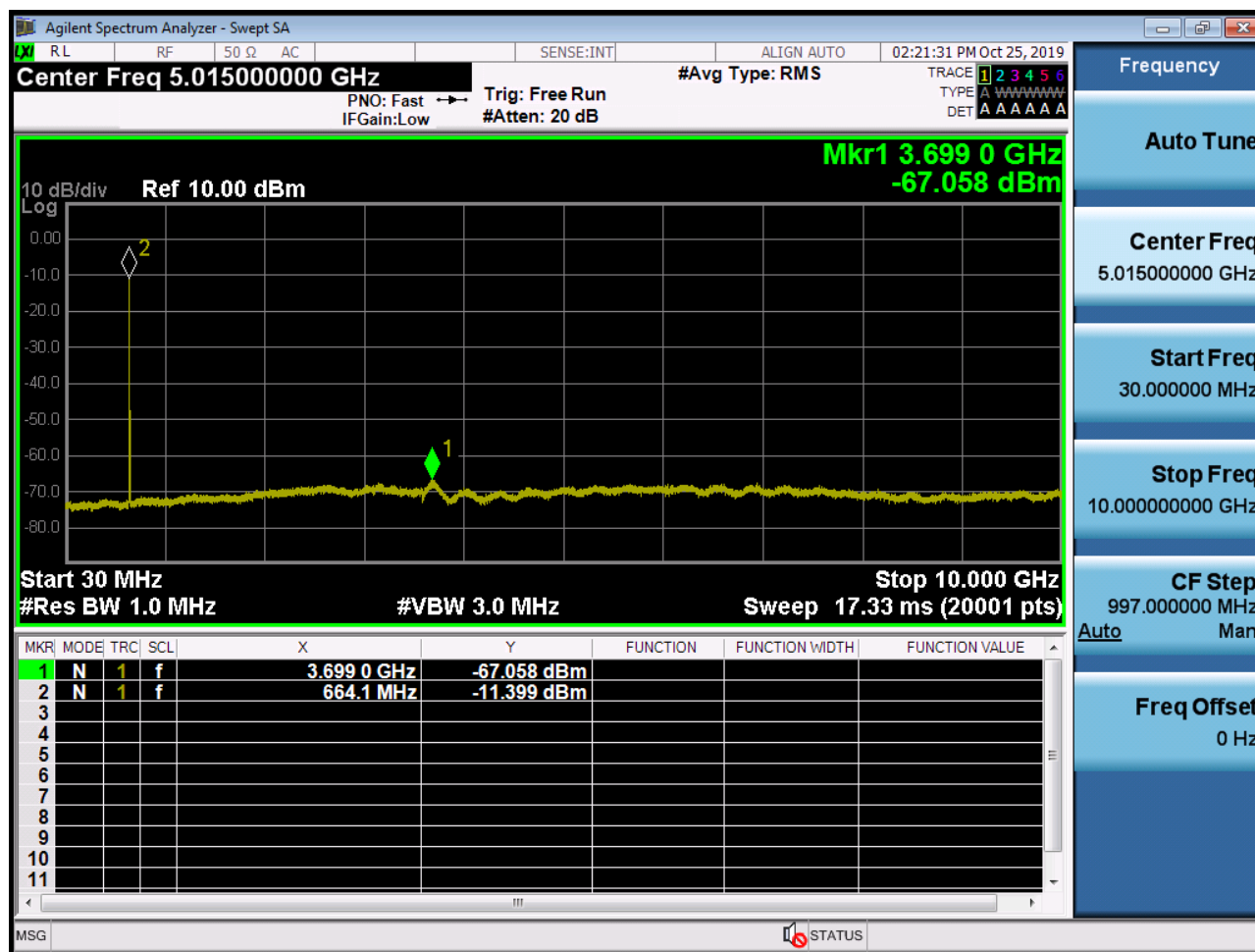
BAND 71. Upper Band Edge Plot (20M BW Ch.133372 QPSK_RB50_Offset 0)



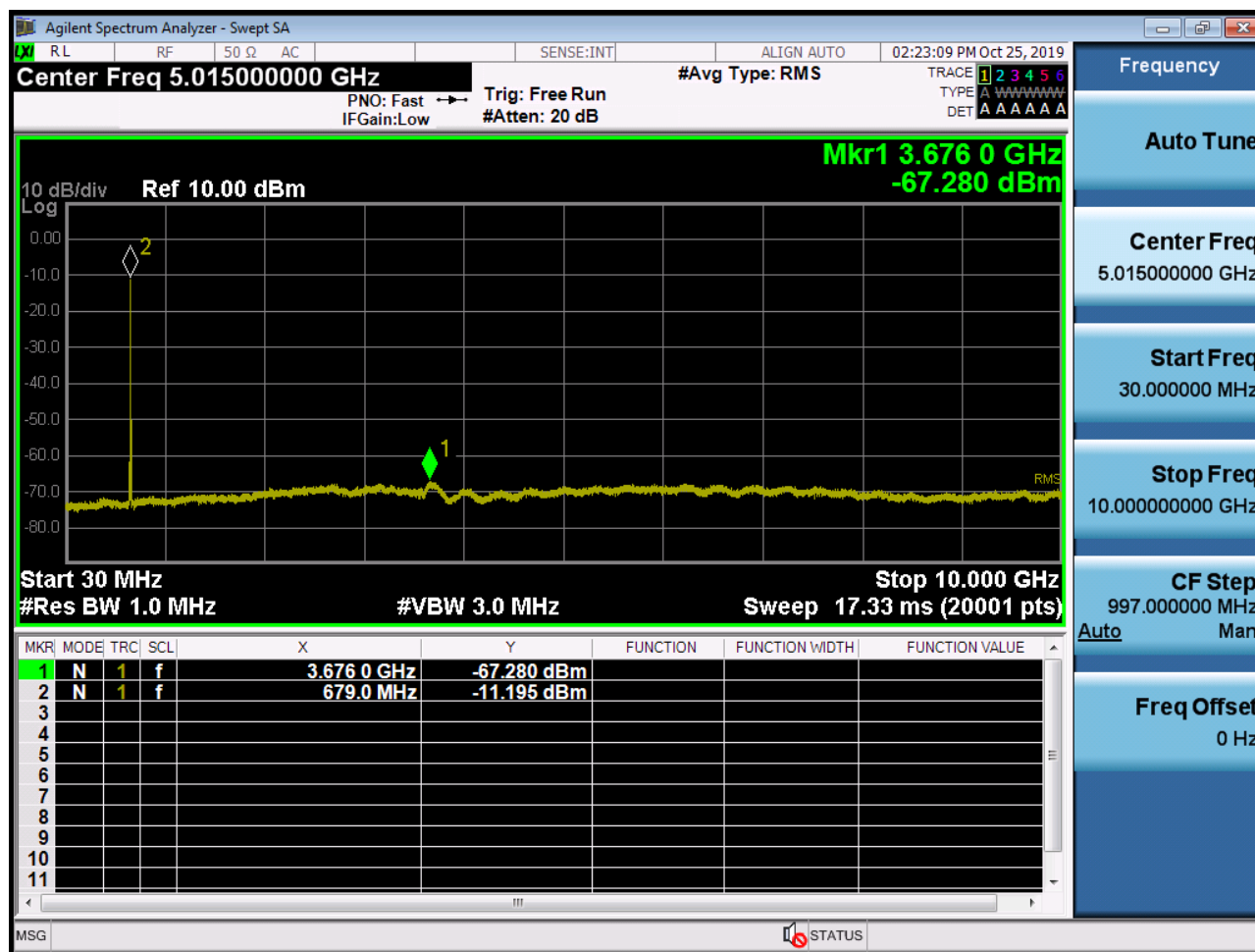
BAND 71. Upper Extended Band Edge Plot (20M BW Ch.133372 QPSK_RB50_0)



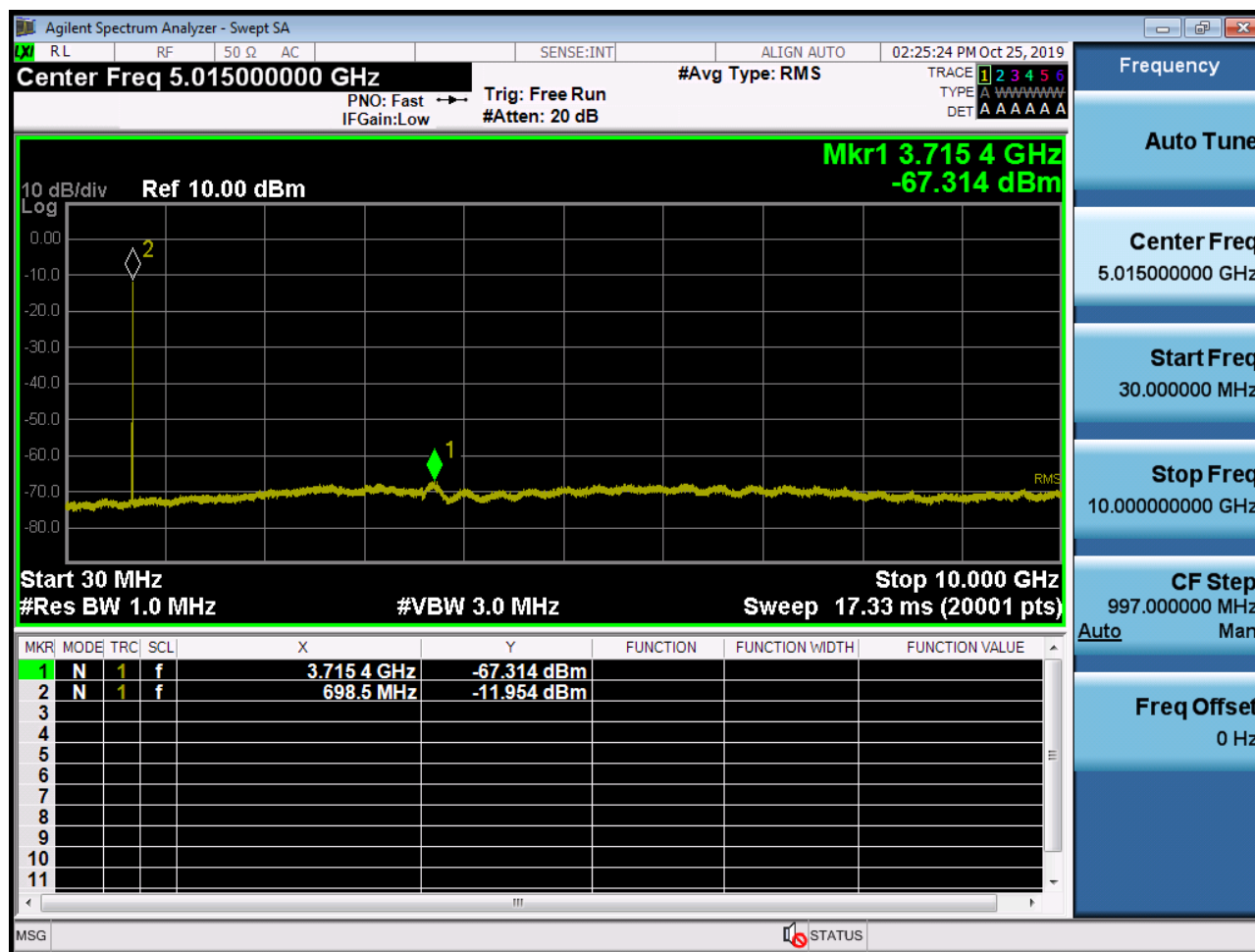
BAND 71. Conducted Spurious Plot _ (133147ch_5MHz_QPSK_RB 1_0)



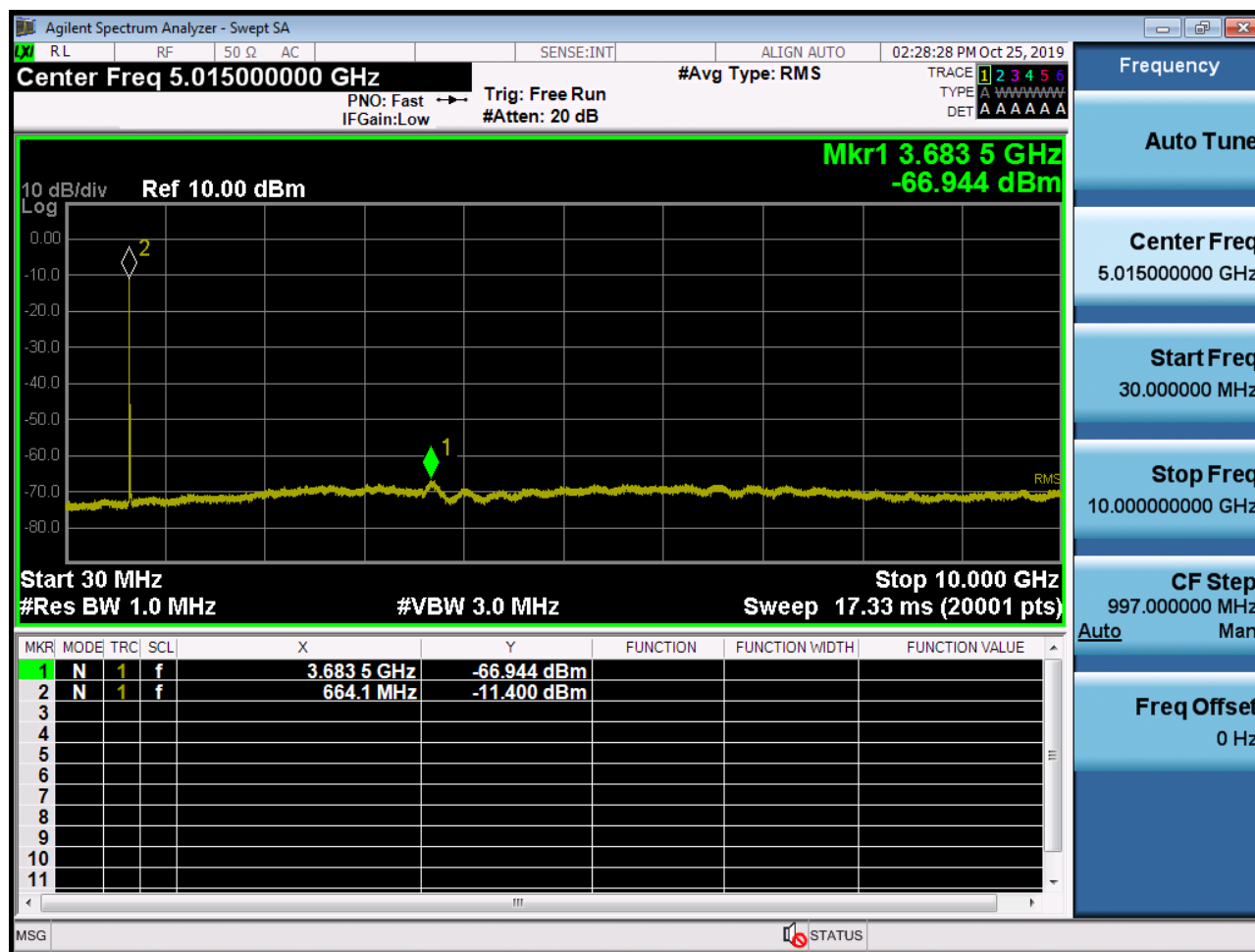
BAND 71. Conducted Spurious Plot _ (133297ch_5MHz_QPSK_RB 1_0)



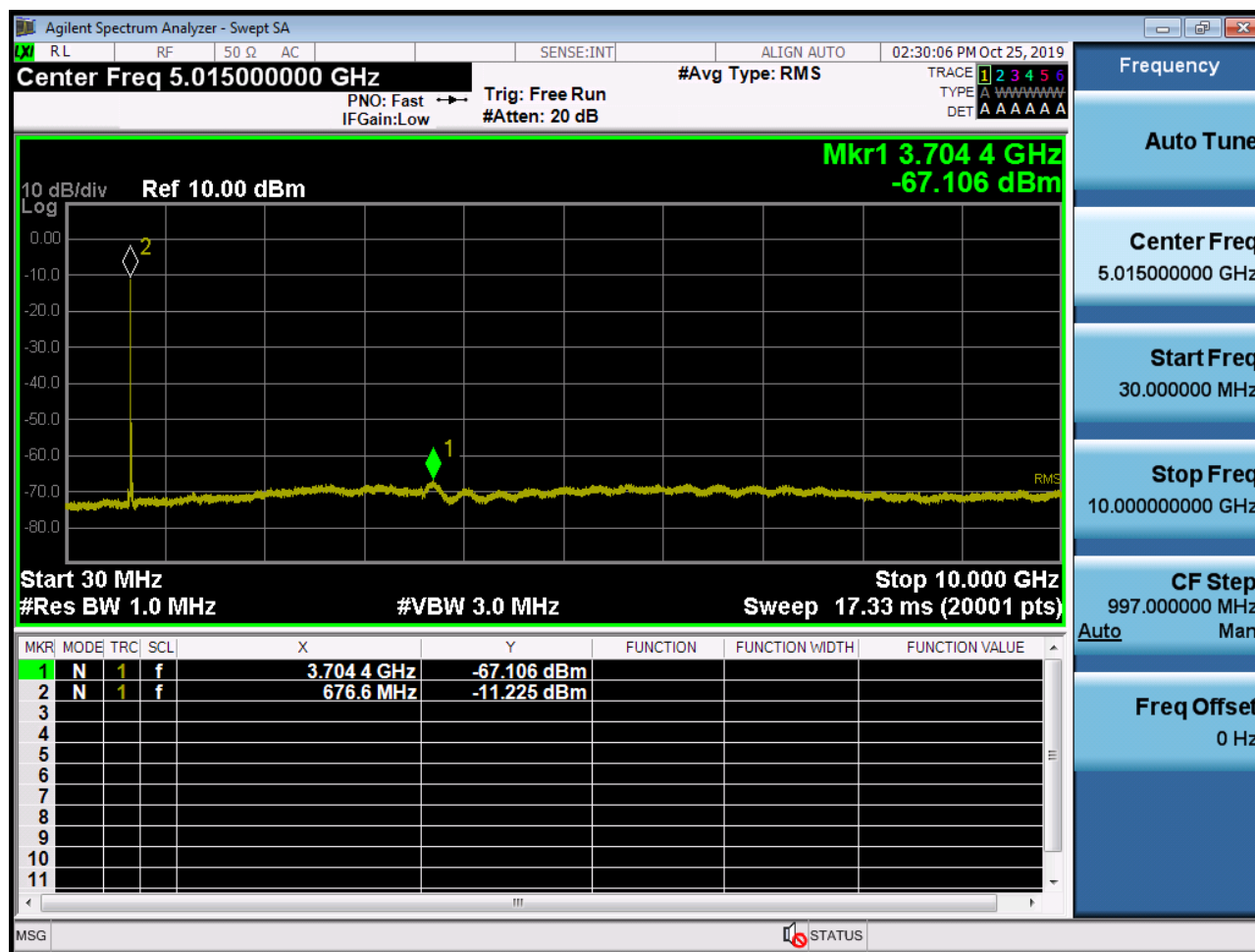
BAND 71. Conducted Spurious Plot _ (133447ch_5MHz_QPSK_RB 1_0)



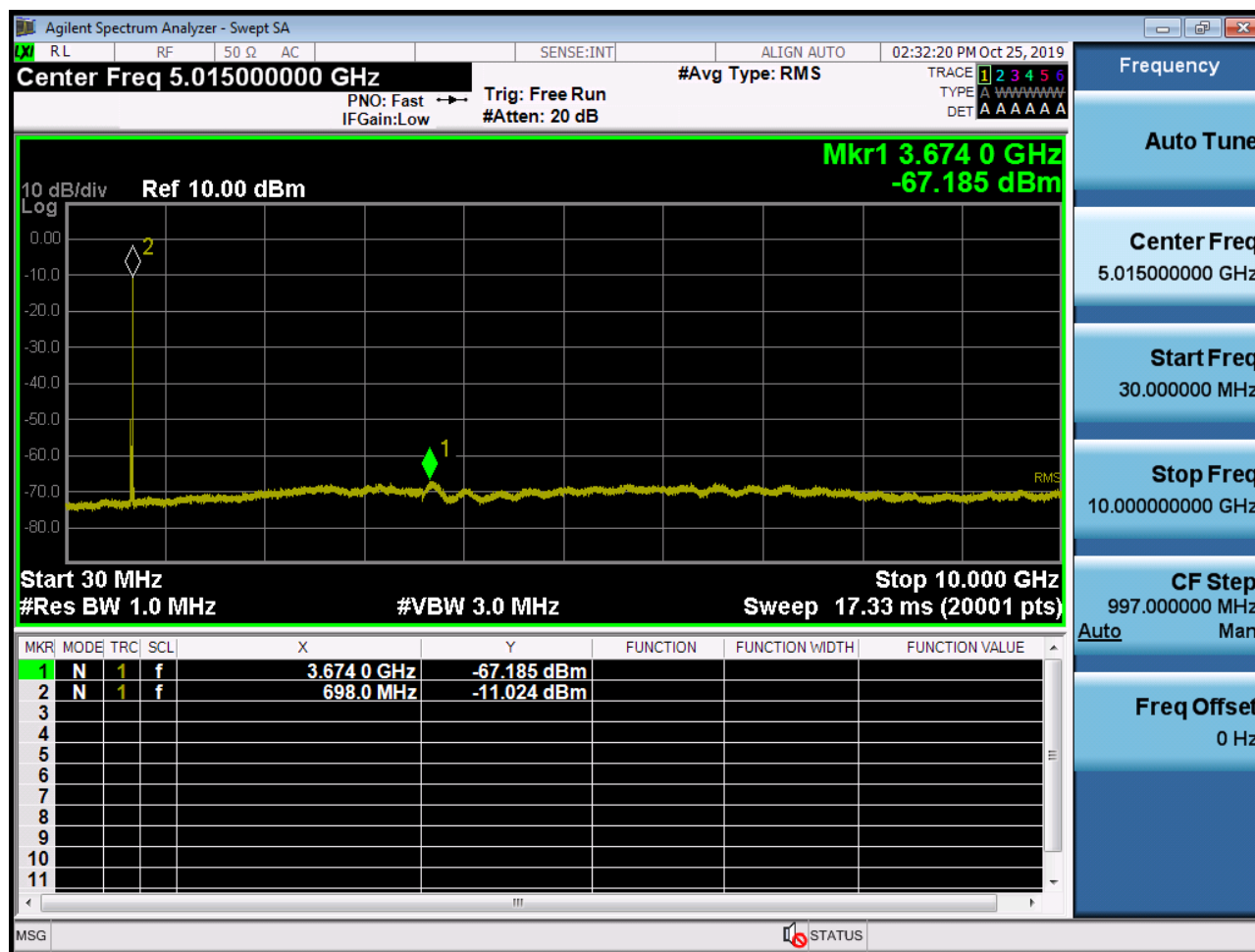
BAND 71. Conducted Spurious Plot _ (133172ch_10M Hz_QPSK_RB 1_0)



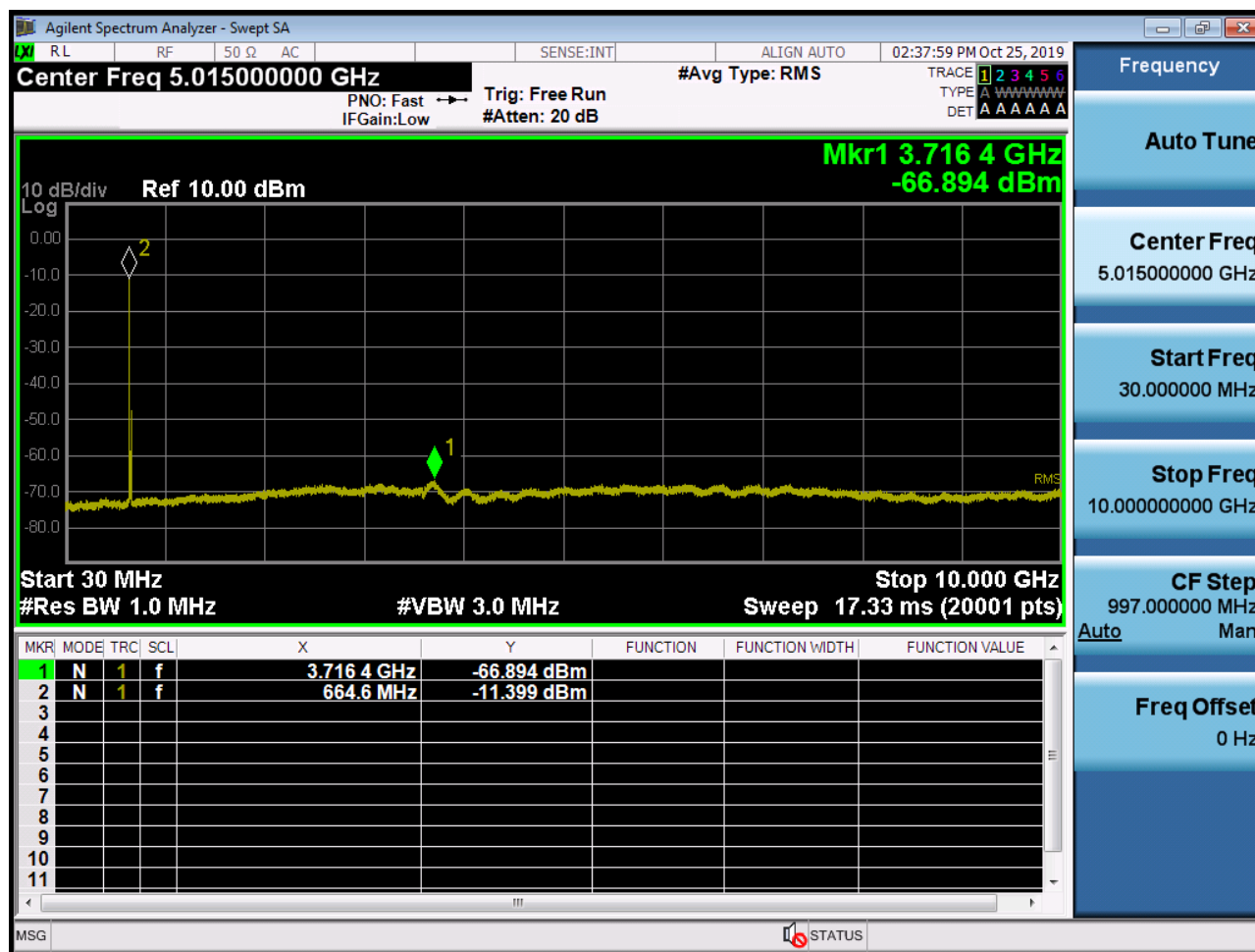
BAND 71. Conducted Spurious Plot _ (133297ch_10M Hz_QPSK_RB 1_0)



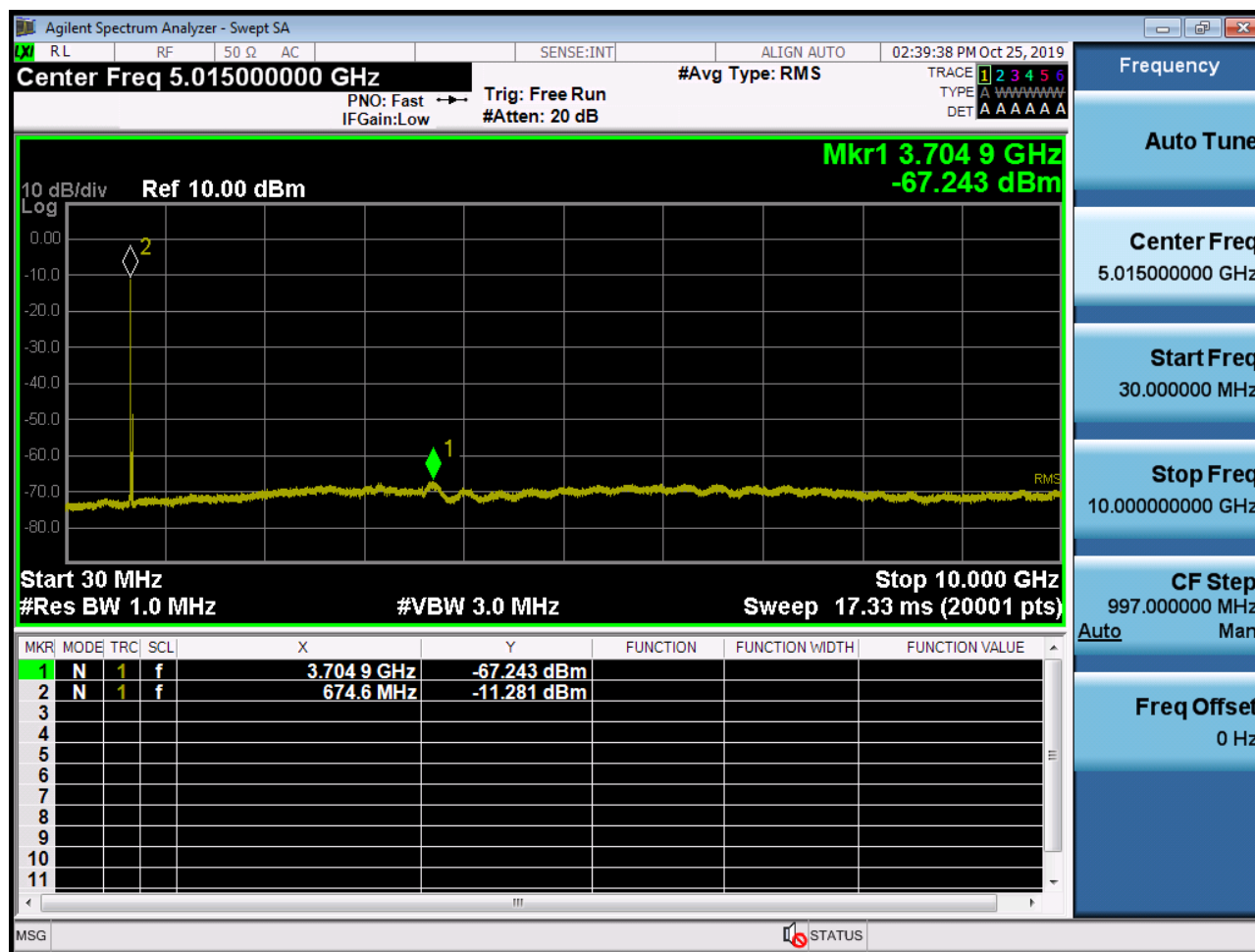
BAND 71. Conducted Spurious Plot _ (133422ch_10M Hz_QPSK_RB 1_0)



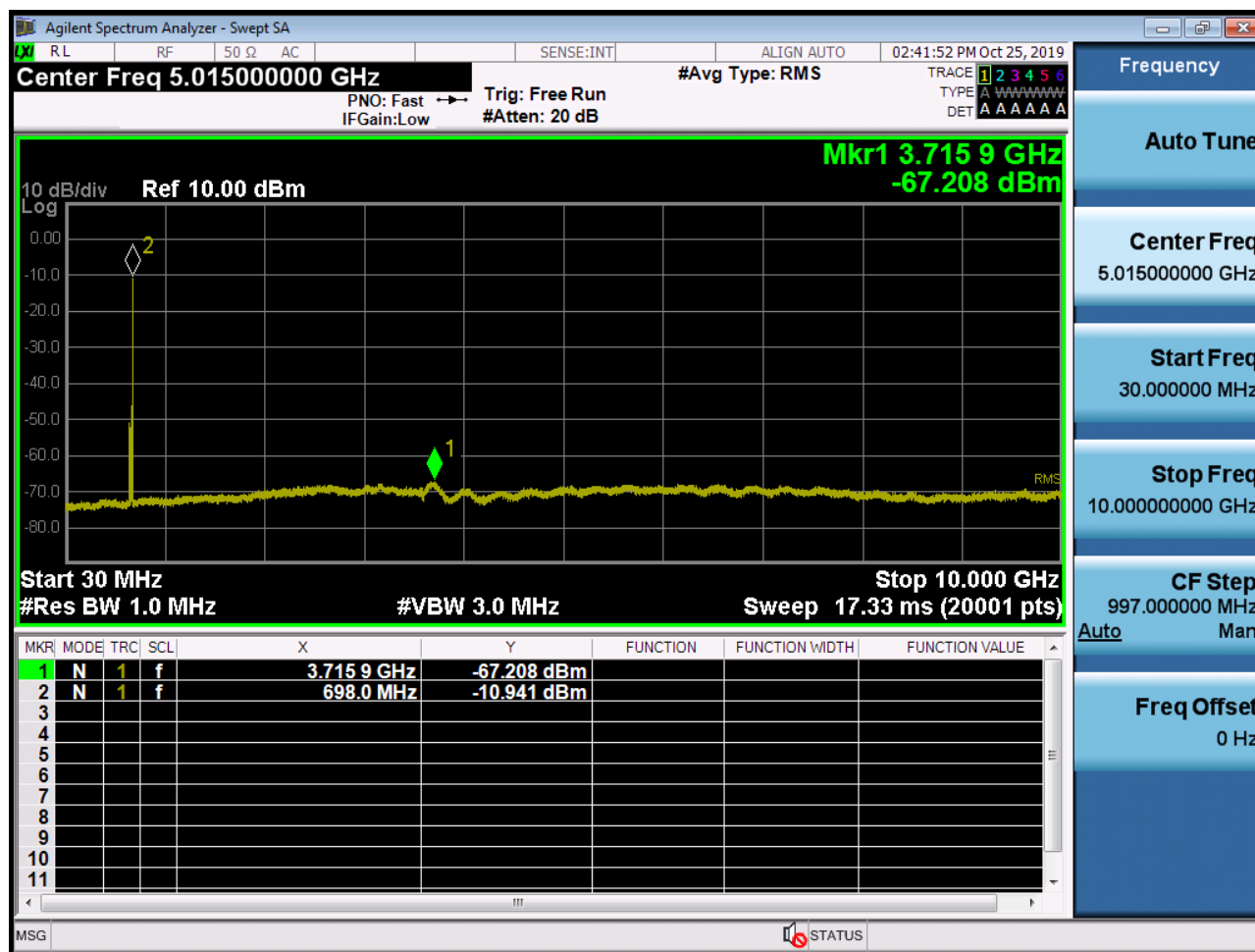
BAND 71. Conducted Spurious Plot _ (133197ch_15MHz_QPSK_RB 1_0)



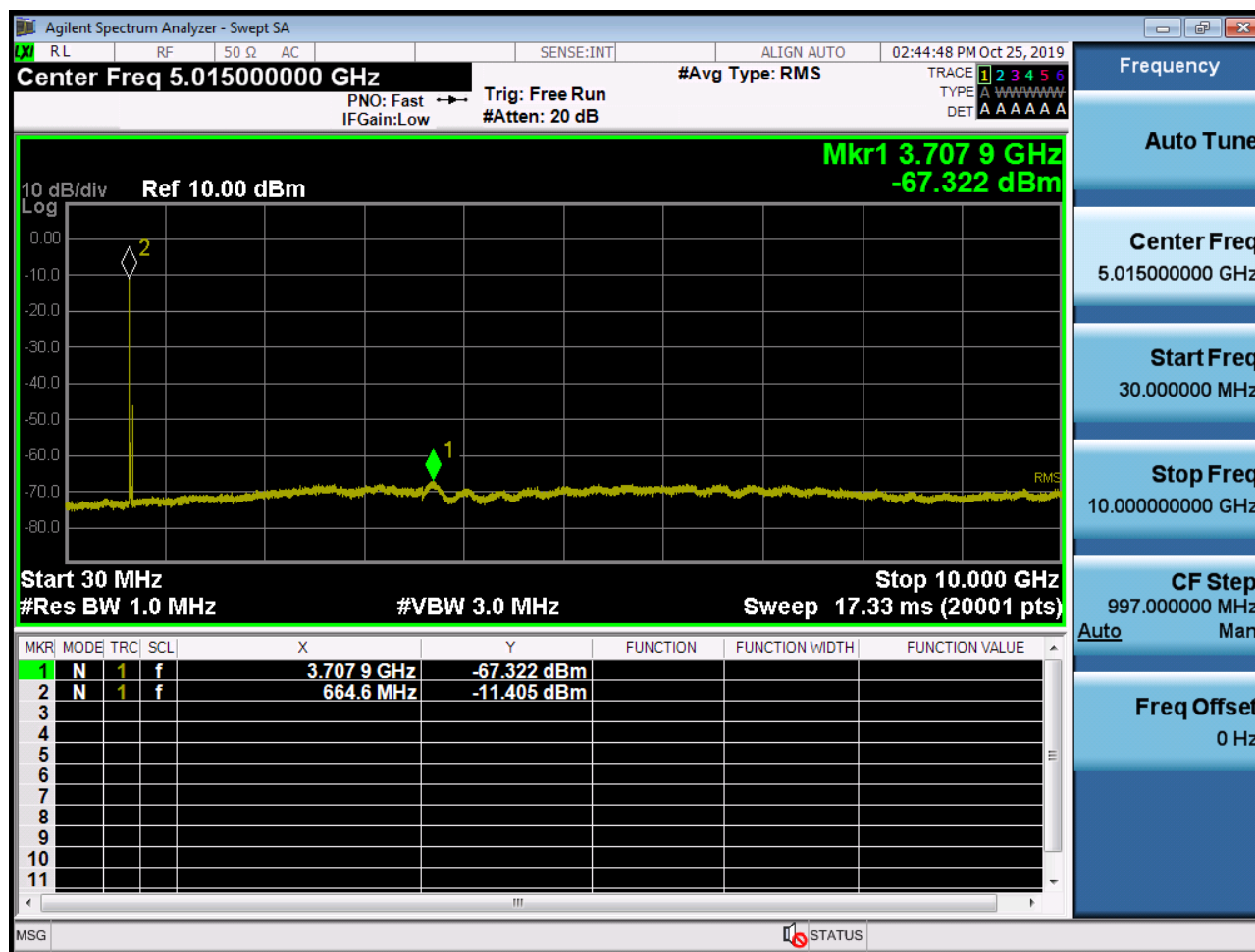
BAND 71. Conducted Spurious Plot _ (133297ch_15MHz_QPSK_RB 1_0)



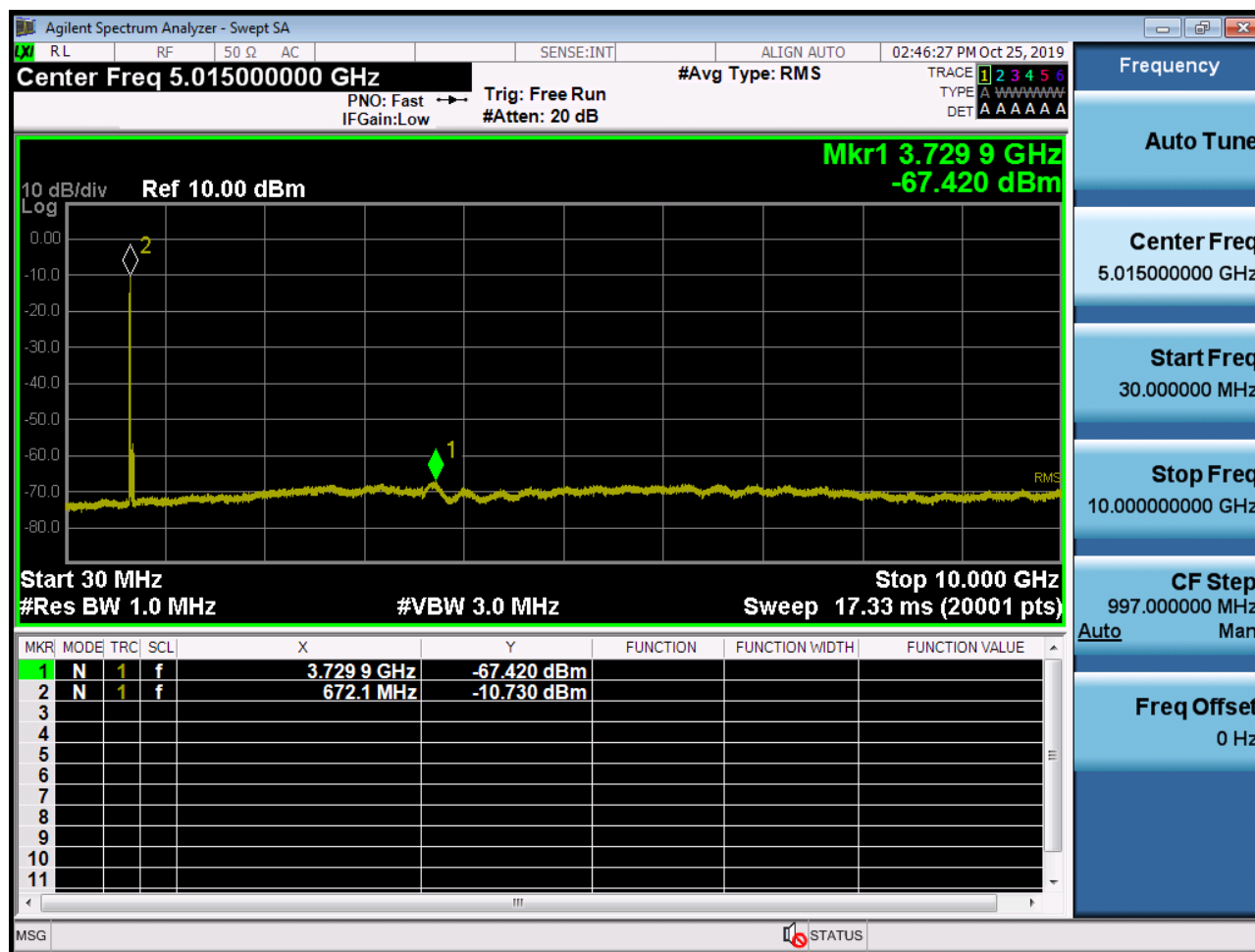
BAND 71. Conducted Spurious Plot _ (133397ch_15MHz_QPSK_RB 1_0)



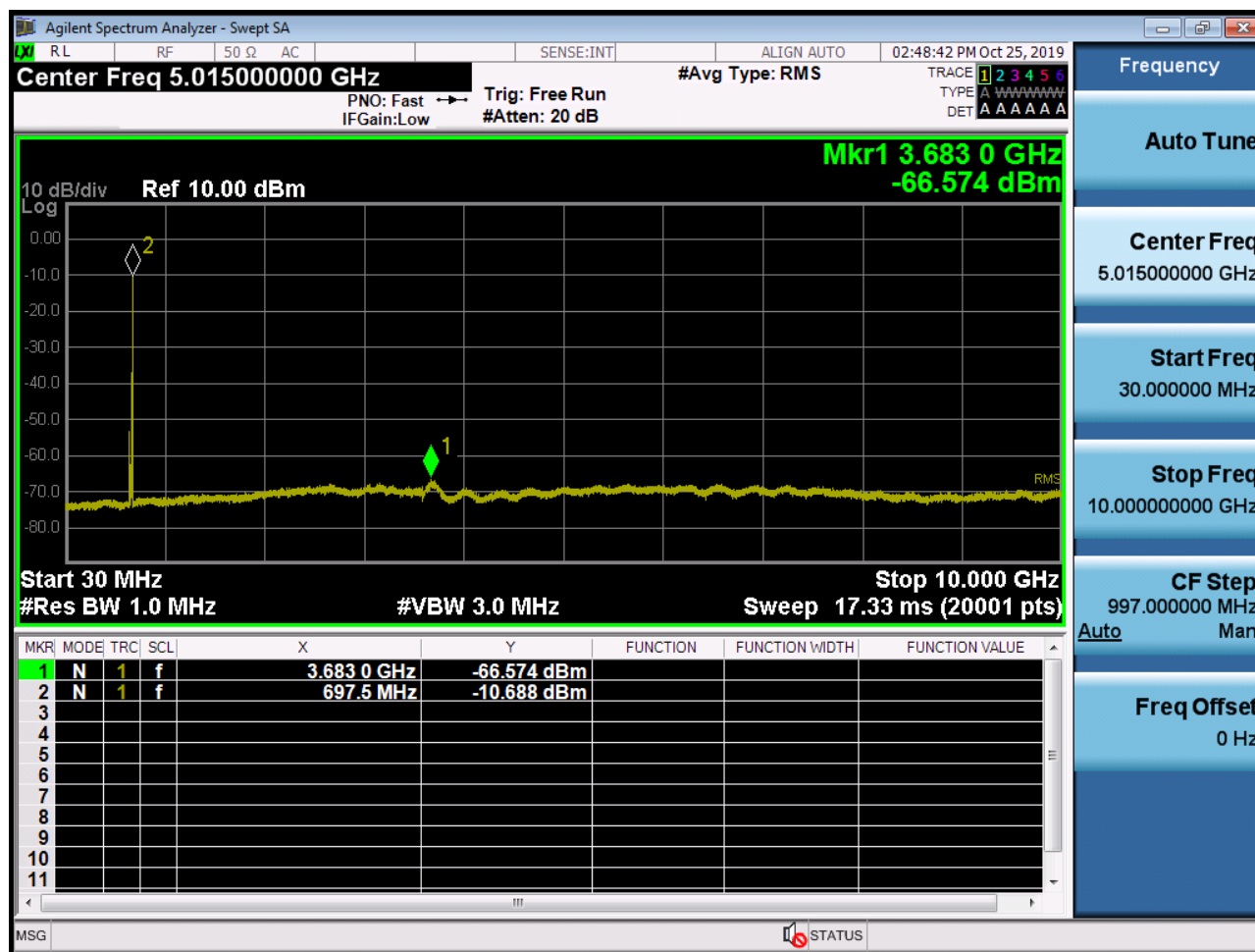
BAND 71. Conducted Spurious Plot _ (133222ch_20MHz_QPSK_RB 1_0)



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-1912-FI011-P