

# FCC LTE REPORT

## Certification

<b>Applicant Name:</b> SAMSUNG Electronics Co., Ltd.	<b>Date of Issue:</b> September 15, 2020
<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-2009-FC007

**FCC ID:** A3LSMA426B

**APPLICANT:** SAMSUNG Electronics Co., Ltd.

Model(s): SM-A426B/DS  
 Additional Model(s): SM-A426B  
 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 – Band12 (1.4)	699.7 – 715.3	1M10G7D	QPSK	0.054	17.31
		1M09W7D	16QAM	0.046	16.61
		1M09W7D	64QAM	0.036	15.57
LTE – Band12 (3)	700.5 – 714.5	2M72G7D	QPSK	0.056	17.44
		2M70W7D	16QAM	0.047	16.72
		2M70W7D	64QAM	0.037	15.72
LTE – Band12/17 (5)	701.5 – 713.5	4M50G7D	QPSK	0.055	17.40
		4M49W7D	16QAM	0.047	16.70
		4M49W7D	64QAM	0.037	15.68
LTE – Band12/17 (10)	704.0 – 711.0	8M94G7D	QPSK	0.055	17.39
		8M96W7D	16QAM	0.047	16.75
		8M95W7D	64QAM	0.036	15.58

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-2009-FC007

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REVIEWED BY



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Report prepared by : Jae Ryang 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-2009-FC007	September 15, 2020	- First Approval Report

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

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# MEASUREMENT REPORT

## 1. GENERAL INFORMATION

<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>	A3LSMA426B
<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-A426B/DS
<b>Additional Model(s):</b>	SM-A426B
<b>Tx Frequency:</b>	699.7 MHz – 715.3 MHz (LTE – Band 12 (1.4 MHz)) 700.5 MHz – 714.5 MHz (LTE – Band 12 (3 MHz)) 701.5 MHz – 713.5 MHz (LTE – Band 12/17 (5 MHz)) 704.0 MHz – 711.0 MHz (LTE – Band 12/17 (10 MHz))
<b>Date(s) of Tests:</b>	August 20, 2020 ~ September 14, 2020

## **2. INTRODUCTION**

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

The EUT was a Mobile Phone with GSM/GPRS/EGPRS/UMTS and LTE.

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

### **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;

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

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;

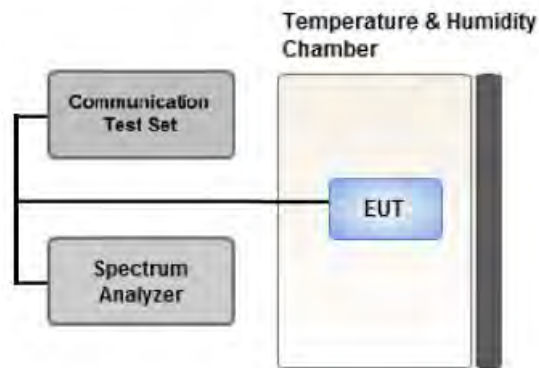
$$\text{Result}_{(\text{dBm})} = P_{g(\text{dBm})} - \text{cable loss}_{(\text{dB})} + \text{antenna gain}_{(\text{dBi})}$$

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.

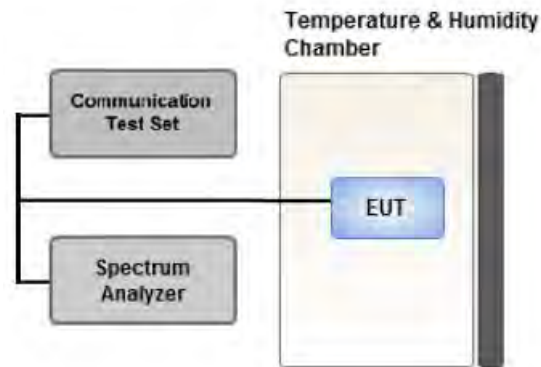
The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

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 x RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the 99% occupied bandwidth observed in Step 7

### 3.5 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL



**Test setup**

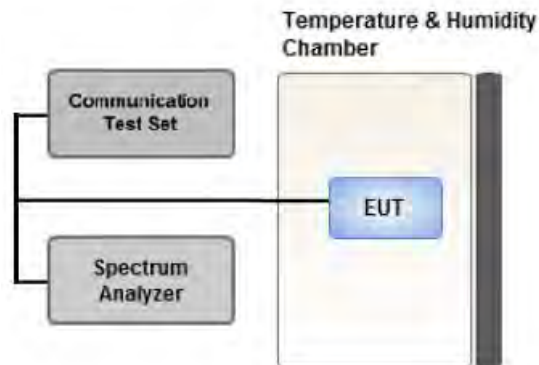
#### **Test Overview**

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 \* 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

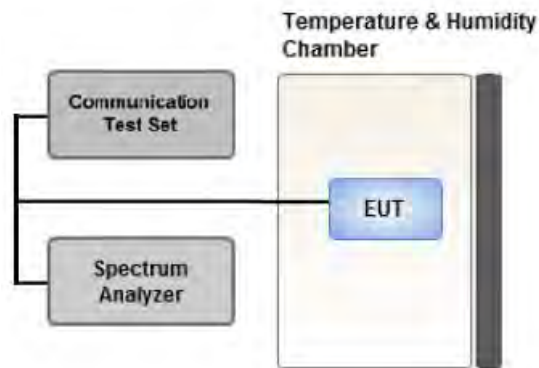
#### **Test Notes**

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.
- The worst case is reported with the EUT positioning, modulations, and paging service configurations shown in the test data.
- LTE Band 12 (699 – 716 MHz, 5/10MHzbandwidth) overlaps the entire frequency range of LTE Band 17 (704 - 716 MHz) and they have the same Tune-up power.

Therefore, test data provided in this report covers Band 17 as well as Band 12.

- SM-A426B/DS & additional models were tested and the worst case results are reported.

(Worst case : SM-A426B/DS)

[ 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	Y

**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.

- LTE Band 12 (699 – 716 MHz, 5/10MHzbandwidth) overlaps the entire frequency range of LTE Band 17 (704 - 716 MHz) and they have the same Tune-up power.

Therefore, test data provided in this report covers Band 17 as well as Band 12.

- SM-A426B/DS & additional models were tested and the worst case results are reported.

(Worst case : SM-A426B/DS)

[ Worst case ]

Test Description	Modulation	Bandwidth (MHz)	Frequency	RB size	RB offset
<b>Occupied Bandwidth</b>	QPSK, 16QAM, 64QAM,	1.4, 3, 5, 10	Mid	Full RB	0
<b>Band Edge</b>	QPSK	1.4	Low	1	0
			High	1	5
		3	Low	1	0
			High	1	14
		5	Low	1	0
			High	1	24
		10	Low	1	0
			High	1	49
		1.4, 3, 5, 10	Low, High	Full RB	0
<b>Spurious and Harmonic Emissions at Antenna Terminal</b>	QPSK	1.4, 3, 5, 10	Low, Mid, High	1	0

#### 4. LIST OF TEST EQUIPMENT

Manufacture	Model/ Equipment	Serial Number	Calibration Date	Calibrati on Interval	Calibration Due
T&M SYSTEM	FBSR-02B(WHK1.2/15G-10EF)/H.P.F	-	03/09/2020	Annual	03/09/2021
T&M SYSTEM	FBSR-02B(WHK3.3/18G-10EF)/H.P.F	-	03/09/2020	Annual	03/09/2021
Hewlett Packard	11667B / Power Splitter(DC~26.5 GHz)	11275	04/27/2020	Annual	04/27/2021
Hewlett Packard	E3632A/DC Power Supply	MY4004427	09/27/2019	Annual	09/27/2020
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	93008124	03/18/2020	Annual	03/18/2021
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	02/11/2020	Biennial	02/11/2022
Agilent	N9020A/Signal Analyzer(10Hz~26.5GHz)	MY51110063	04/27/2020	Annual	04/27/2021
Hewlett Packard	8493C/ATTENUATOR(20dB)	17280	06/04/2020	Annual	06/04/2021
REOHDE & SCHWARZ	FSV40/Spectrum Analyzer(10Hz~40GHz)	100931	10/14/2019	Annual	10/14/2020
Agilent	8960 (E5515C)/ Base Station	MY48360800	08/26/2020	Annual	08/26/2021
Schwarzbeck	FMZB1513/ Loop Antenna(9kHz~30MHz)	1513-175	04/26/2019	Biennial	04/26/2021
Schwarzbeck	VULB9160/ Bilog Antenna	3150	03/12/2019	Biennial	03/12/2021
Schwarzbeck	VULB9160/ Hybrid Antenna	760	03/22/2019	Biennial	03/22/2021
Anritsu Corp.	MT8821C/Wideband Radio Communication Tester	6262116770	07/22/2020	Annual	07/22/2021
Anritsu Corp.	MT8820C/Wideband Radio Communication Tester	6201026545	01/22/2020	Annual	01/22/2021
REOHDE & SCHWARZ	SMB100A/ SIGNAL GENERATOR (100kHz~40GHz)	177633	07/13/2020	Annual	07/13/2021
KEYSIGHT	N9030B / Signal Analyzer(5Hz~40.0GHz)	MY55480167	06/04/2020	Annual	06/04/2021
HCT CO., LTD.,	FCC LTE Mobile Conducted RF Automation Test Software	-	-	-	-

**Note:**

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



## 5. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4:2014. All measurement uncertainty values are shown with a coverage factor of  $k = 2$  to indicate a 95 % level of confidence. The measurement data shown herein meets or exceeds the  $U_{\text{CISPR}}$  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)	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)	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
2. The same samples were used for SAR and EMC

### 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

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

- 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
699.7	LTE B12 (1.4 MHz)	QPSK	-32.39	28.51	-9.92	1.28	V	< 3.00	0.054	17.31
		16-QAM	-33.09	27.81	-9.92	1.28	V		0.046	16.61
		64-QAM	-34.13	26.77	-9.92	1.28	V		0.036	15.57
707.5		QPSK	-32.62	28.21	-9.93	1.29	V		0.050	16.99
		16-QAM	-33.30	27.53	-9.93	1.29	V		0.043	16.31
		64-QAM	-34.36	26.47	-9.93	1.29	V		0.034	15.25
715.3		QPSK	-32.95	27.68	-9.94	1.30	V		0.044	16.44
		16-QAM	-33.60	27.03	-9.94	1.30	V		0.038	15.79
		64-QAM	-34.67	25.96	-9.94	1.30	V		0.030	14.72

Freq (MHz)	Mod (Bandwidth)	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBd)	C.L	Pol	Limit	ERP	
								W	W	dBm
700.5	LTE B12 (3 MHz)	QPSK	-32.27	28.64	-9.92	1.28	V	< 3.00	0.056	17.44
		16-QAM	-32.99	27.92	-9.92	1.28	V		0.047	16.72
		64-QAM	-33.99	26.92	-9.92	1.28	V		0.037	15.72
707.5		QPSK	-32.50	28.33	-9.93	1.29	V		0.051	17.11
		16-QAM	-33.16	27.67	-9.93	1.29	V		0.044	16.45
		64-QAM	-34.22	26.61	-9.93	1.29	V		0.035	15.39
714.5		QPSK	-32.74	27.89	-9.94	1.30	V		0.046	16.65
		16-QAM	-33.38	27.25	-9.94	1.30	V		0.040	16.01
		64-QAM	-34.49	26.14	-9.94	1.30	V		0.031	14.90

Freq (MHz)	Mod (Bandwidth)	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBd)	C.L	Pol	Limit	ERP	
								W	W	dBm
701.5	LTE B12/17 (5 MHz)	QPSK	-32.32	28.60	-9.92	1.28	V	< 3.00	0.055	17.40
		16-QAM	-33.02	27.90	-9.92	1.28	V		0.047	16.70
		64-QAM	-34.04	26.88	-9.92	1.28	V		0.037	15.68
707.5		QPSK	-32.50	28.33	-9.93	1.29	V		0.051	17.11
		16-QAM	-33.19	27.64	-9.93	1.29	V		0.044	16.42
		64-QAM	-34.26	26.57	-9.93	1.29	V		0.034	15.35
713.5		QPSK	-32.70	27.97	-9.94	1.29	V		0.047	16.74
		16-QAM	-33.36	27.31	-9.94	1.29	V		0.041	16.08
		64-QAM	-34.42	26.25	-9.94	1.29	V		0.032	15.02

Freq (MHz)	Mod (Bandwidth)	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBd)	C.L	Pol	Limit	ERP	
								W	W	dBm
704.0	LTE B12/17 (10 MHz)	QPSK	-32.32	28.59	-9.92	1.28	V	< 3.00	0.055	17.39
		16-QAM	-32.96	27.95	-9.92	1.28	V		0.047	16.75
		64-QAM	-34.13	26.78	-9.92	1.28	V		0.036	15.58
707.5		QPSK	-32.45	28.38	-9.93	1.29	V		0.052	17.16
		16-QAM	-33.11	27.72	-9.93	1.29	V		0.045	16.50
		64-QAM	-34.21	26.62	-9.93	1.29	V		0.035	15.40
711.0		QPSK	-32.53	28.28	-9.94	1.29	V		0.051	17.05
		16-QAM	-33.17	27.64	-9.94	1.29	V		0.044	16.41
		64-QAM	-34.26	26.55	-9.94	1.29	V		0.034	15.32

**8.2 RADIATED SPURIOUS EMISSIONS**

- ▣ MODE: LTE B12
- ▣ MODULATION SIGNAL: 1.4 MHz QPSK
- ▣ DISTANCE: 3 meters

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Limit
23017 (699.7)	1 399.40	-51.92	7.60	-60.18	1.85	H	-54.43	-13.00
	2 099.10	-56.00	9.80	-59.61	2.27	H	-52.08	-13.00
	2 798.80	-55.86	10.90	-57.28	2.67	H	-49.05	-13.00
23095 (707.5)	1 415.00	-51.21	7.72	-59.61	1.86	V	-53.75	-13.00
	2 122.50	-56.02	9.55	-59.01	2.28	H	-51.74	-13.00
	2 830.00	-57.30	10.95	-58.58	2.65	V	-50.28	-13.00
23173 (715.3)	1 430.60	-51.35	7.75	-59.66	1.86	V	-53.77	-13.00
	2 145.90	-55.39	9.37	-58.16	2.29	V	-51.09	-13.00
	2 861.20	-56.71	11.03	-57.80	2.67	H	-49.44	-13.00

MODE: LTE B12  
 MODULATION SIGNAL: 3 MHz QPSK  
 DISTANCE: 3 meters

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Limit
23025 (700.5)	1 401.00	-51.12	7.60	-59.38	1.85	V	-53.63	-13.00
	2 101.50	-55.90	9.80	-59.51	2.27	H	-51.98	-13.00
	2 802.00	-56.43	10.90	-57.85	2.67	H	-49.62	-13.00
23095 (707.5)	1 415.00	-52.90	7.72	-61.30	1.86	H	-55.44	-13.00
	2 122.50	-56.21	9.55	-59.20	2.28	H	-51.93	-13.00
	2 830.00	-57.49	10.95	-58.77	2.65	H	-50.47	-13.00
23165 (714.5)	1 429.00	-51.00	7.75	-59.31	1.86	H	-53.42	-13.00
	2 143.50	-56.39	9.37	-58.94	2.29	V	-51.86	-13.00
	2 858.00	-57.65	11.03	-58.74	2.67	V	-50.38	-13.00



MODE: LTE B12/17  
 MODULATION SIGNAL: 5 MHz QPSK  
 DISTANCE: 3 meters

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Limit
23035 (701.5)	1 403.00	-51.37	7.60	-59.63	1.85	V	-53.88	-13.00
	2 104.50	-56.83	9.74	-60.41	2.28	H	-52.94	-13.00
	2 806.00	-57.31	10.92	-58.80	2.67	H	-50.55	-13.00
23095 (707.5)	1 415.00	-52.55	7.72	-60.95	1.86	H	-55.09	-13.00
	2 122.50	-56.01	9.55	-59.00	2.28	H	-51.73	-13.00
	2 830.00	-57.61	10.95	-58.89	2.65	V	-50.59	-13.00
23155 (713.5)	1 427.00	-52.21	7.75	-60.52	1.86	V	-54.63	-13.00
	2 140.50	-56.19	9.43	-58.80	2.29	V	-51.66	-13.00
	2 854.00	-57.10	11.02	-58.30	2.68	H	-49.96	-13.00

MODE: LTE B12/17  
 MODULATION SIGNAL: 10 MHz QPSK  
 DISTANCE: 3 meters

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Limit
23060 (704.0)	1 408.00	-52.87	7.68	-61.46	1.85	H	-55.63	-13.00
	2 112.00	-56.25	9.68	-59.79	2.28	V	-52.39	-13.00
	2 816.00	-57.80	10.94	-59.17	2.65	H	-50.88	-13.00
23095 (707.5)	1 415.00	-52.47	7.72	-60.87	1.86	V	-55.01	-13.00
	2 122.50	-56.59	9.55	-59.58	2.28	V	-52.31	-13.00
	2 830.00	-57.57	10.95	-58.85	2.65	H	-50.55	-13.00
23130 (711.0)	1 422.00	-51.96	7.75	-60.17	1.86	V	-54.28	-13.00
	2 133.00	-57.62	9.55	-60.75	2.29	H	-53.49	-13.00
	2 844.00	-56.57	10.99	-57.64	2.69	V	-49.33	-13.00

**8.3 OCCUPIED BANDWIDTH**

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data ( MHz )
12	1.4 MHz	707.5	QPSK	6	0	1.0965
			16-QAM			1.0855
			64-QAM			1.0938
	3 MHz		QPSK	15		2.7161
			16-QAM			2.6998
			64-QAM			2.6995
12(17)	5 MHz		QPSK	25		4.5011
			16-QAM			4.4936
			64-QAM			4.4938
	10 MHz	QPSK	50	8.9383		
		16-QAM		8.9592		
		64-QAM		8.9451		

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 42 ~ 53.

**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)
12	1.4	699.7	3.1516	27.976	-67.214	-39.238	-13.00
		707.5	3.6995	27.976	-67.353	-39.377	
		715.3	3.1656	27.976	-67.162	-39.186	
	3	700.5	3.1561	27.976	-67.423	-39.447	
		707.5	3.7284	27.976	-66.983	-39.007	
		714.5	3.7039	27.976	-67.200	-39.224	
12(17)	5	701.5	3.1626	27.976	-67.390	-39.414	
		707.5	3.7039	27.976	-67.001	-39.025	
		713.5	3.7104	27.976	-67.085	-39.109	
	10	704.0	3.6790	27.976	-67.236	-39.260	
		707.5	3.6780	27.976	-67.199	-39.223	
		711.0	3.6985	27.976	-67.153	-39.177	

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 82 ~ 93.
2. Conducted Spurious Emissions was Tested QPSK Modulation, Resource Block Size 1 and Resource Block Offset 0
3. Result (dBm) = Measurement Maximum Data (dBm) + Factor (dB)
4. Factor(dB) = Cable Loss + 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

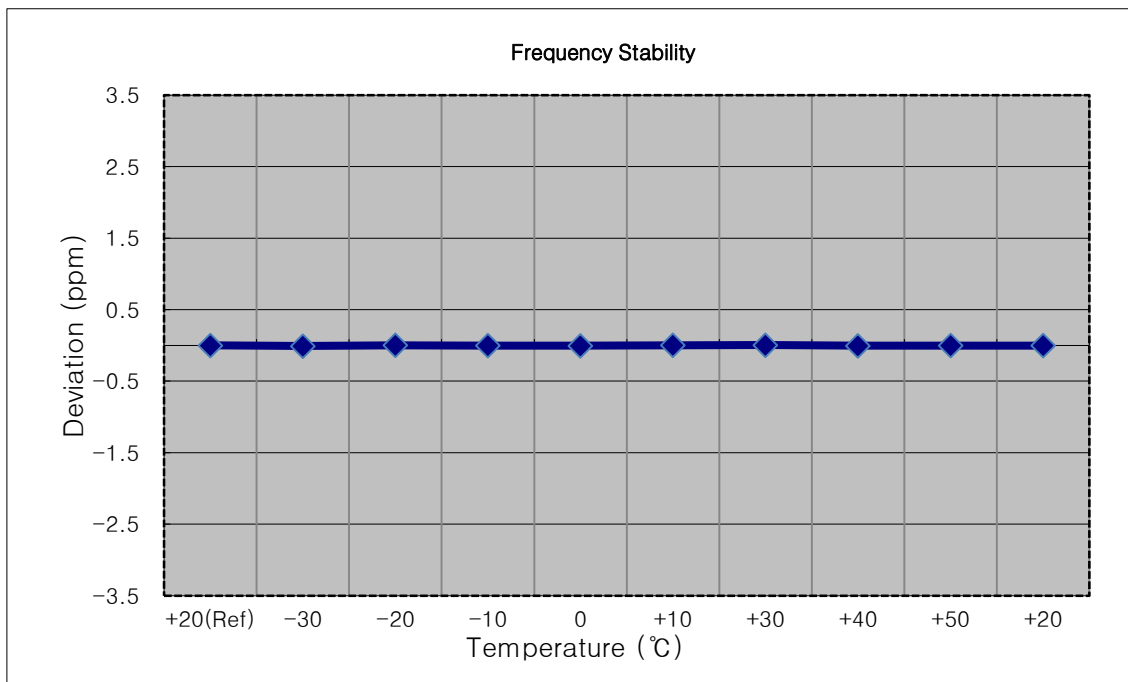
**8.5 BAND EDGE**

- Plots of the EUT's Band Edge are shown Page 54 ~ 81.

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

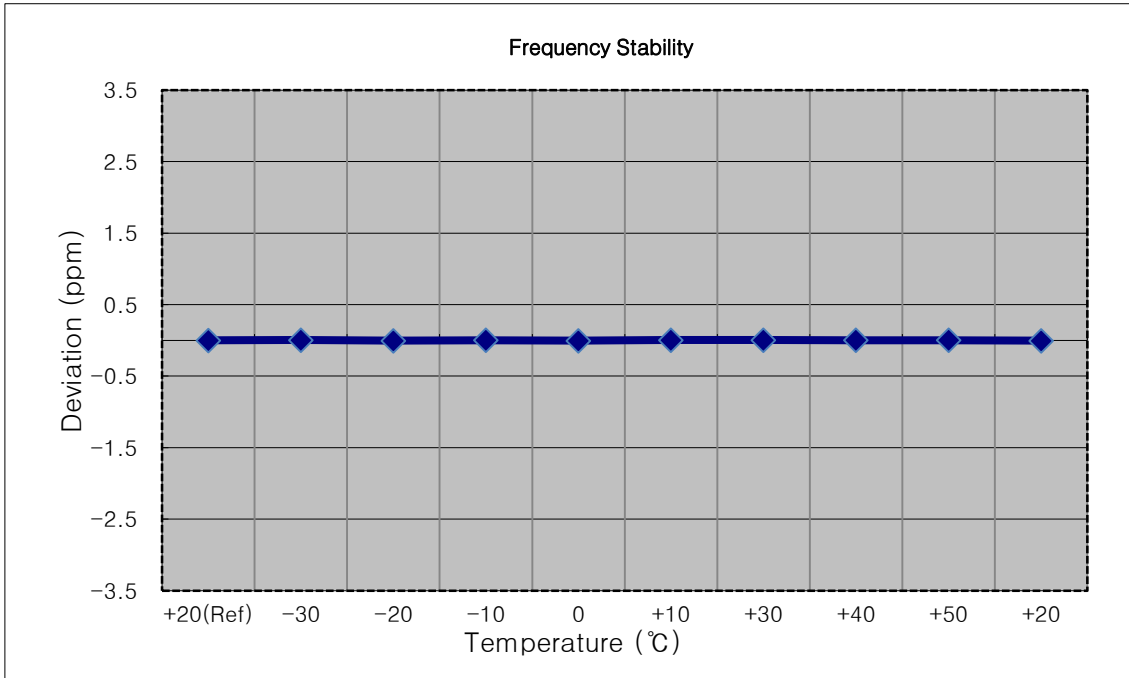
- ▣ MODE: LTE B12
- ▣ OPERATING FREQUENCY: 699,700,000 Hz
- ▣ CHANNEL: 23017 (1.4 MHz)
- ▣ REFERENCE VOLTAGE: 3.86 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.860	+20(Ref)	699 699 998	0.0	0.000 000	0.000
100%		-30	699 699 992	-6.4	-0.000 001	-0.009
100%		-20	699 700 000	2.0	0.000 000	0.003
100%		-10	699 699 996	-2.0	0.000 000	-0.003
100%		0	699 699 995	-3.0	0.000 000	-0.004
100%		+10	699 700 000	1.9	0.000 000	0.003
100%		+30	699 700 001	3.2	0.000 000	0.005
100%		+40	699 699 995	-2.7	0.000 000	-0.004
100%		+50	699 699 996	-2.1	0.000 000	-0.003
Batt. Endpoint		3.400	+20	699 699 996	-1.7	0.000 000



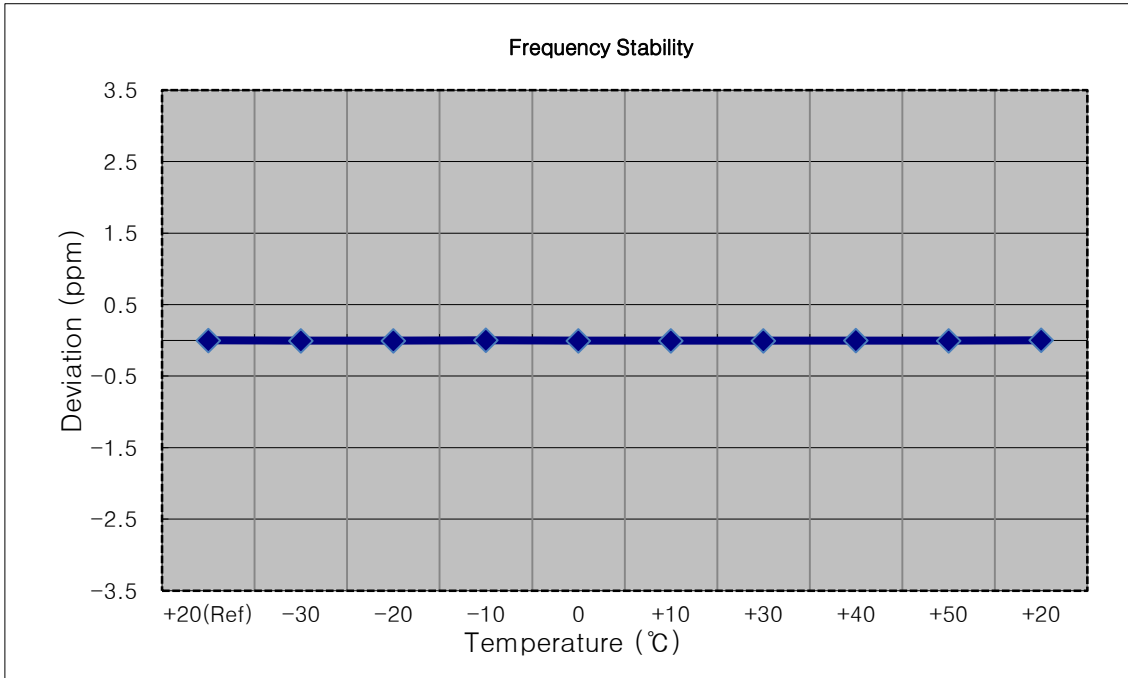
- ▣ MODE: LTE B12
- ▣ OPERATING FREQUENCY: 700,500,000 Hz
- ▣ CHANNEL: 23025 (3 MHz)
- ▣ REFERENCE VOLTAGE: 3.86 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.860	+20(Ref)	700 499 996	0.0	0.000 000	0.000
100%		-30	700 499 999	2.4	0.000 000	0.003
100%		-20	700 499 993	-3.5	0.000 000	-0.005
100%		-10	700 499 999	2.3	0.000 000	0.003
100%		0	700 499 993	-3.2	0.000 000	-0.005
100%		+10	700 499 999	2.5	0.000 000	0.004
100%		+30	700 499 999	2.6	0.000 000	0.004
100%		+40	700 499 999	2.3	0.000 000	0.003
100%		+50	700 499 999	2.3	0.000 000	0.003
Batt. Endpoint	3.400	+20	700 499 994	-2.5	0.000 000	-0.004



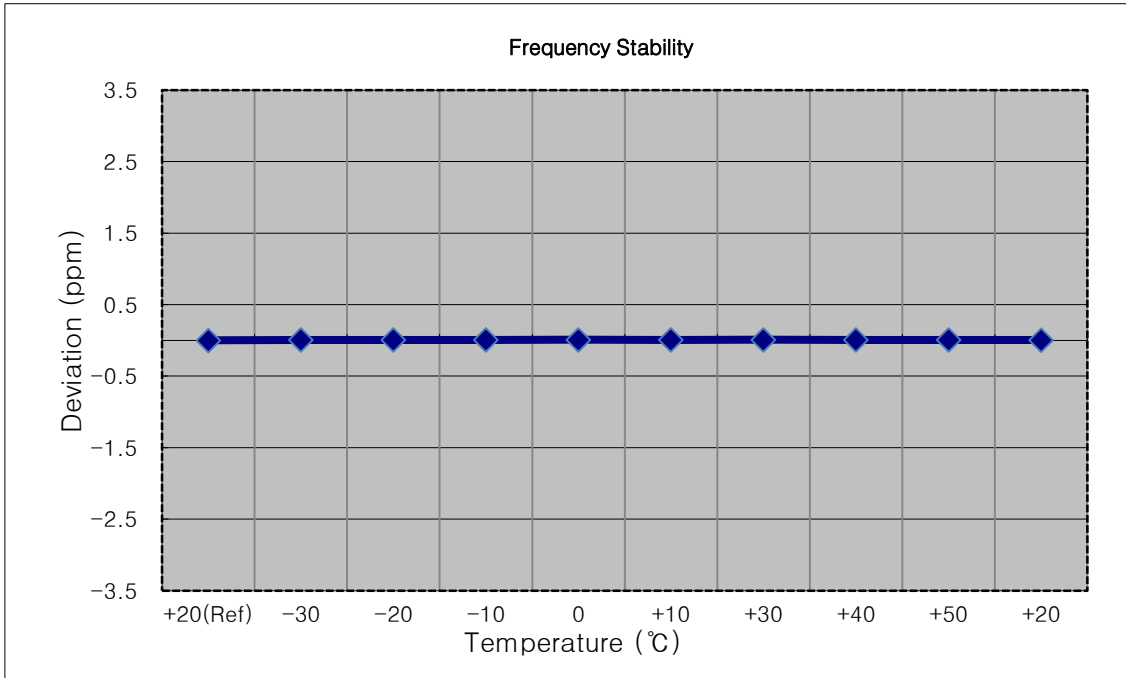
- ▣ MODE: LTE B12/17
- ▣ OPERATING FREQUENCY: 701,500,000 Hz
- ▣ CHANNEL: 23035 (5 MHz)
- ▣ REFERENCE VOLTAGE: 3.86 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.860	+20(Ref)	701 499 997	0.0	0.000 000	0.000
100%		-30	701 499 994	-3.3	0.000 000	-0.005
100%		-20	701 499 995	-2.6	0.000 000	-0.004
100%		-10	701 499 999	2.1	0.000 000	0.003
100%		0	701 499 994	-3.3	0.000 000	-0.005
100%		+10	701 499 995	-2.6	0.000 000	-0.004
100%		+30	701 499 995	-2.6	0.000 000	-0.004
100%		+40	701 499 996	-1.8	0.000 000	-0.003
100%		+50	701 499 995	-2.7	0.000 000	-0.004
Batt. Endpoint	3.400	+20	701 499 999	2.1	0.000 000	0.003



- ▣ MODE: LTE B12/17
- ▣ OPERATING FREQUENCY: 704,000,000 Hz
- ▣ CHANNEL: 23060 (10 MHz)
- ▣ REFERENCE VOLTAGE: 3.86 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

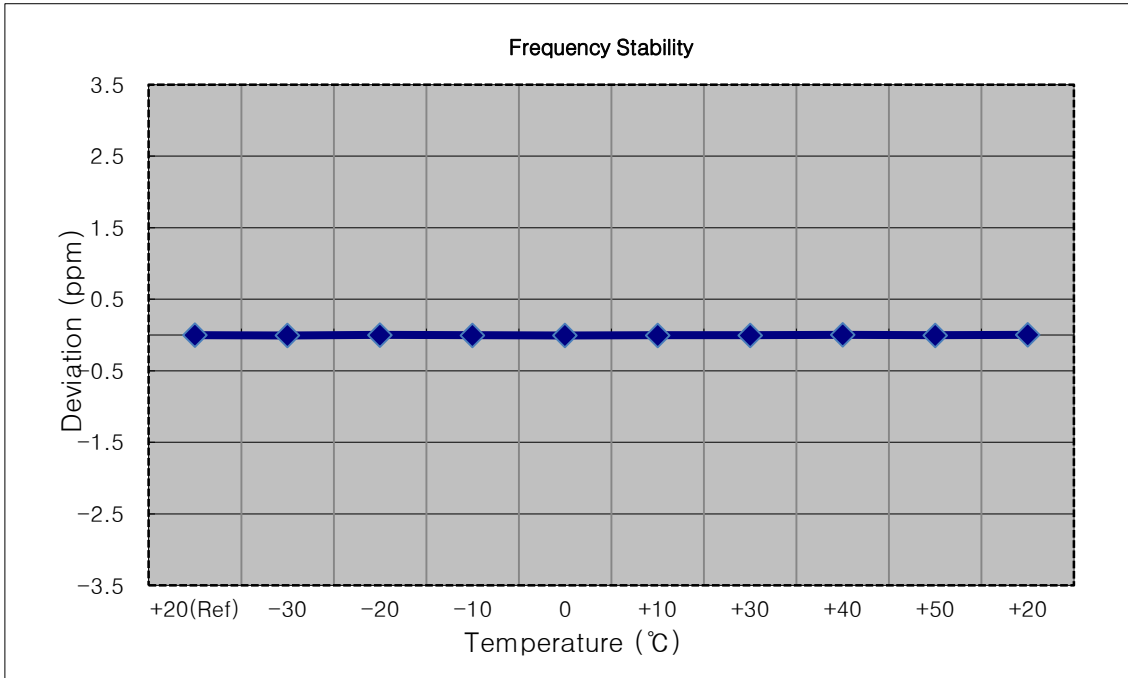
Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.860	+20(Ref)	704 000 006	0.0	0.000 000	0.000
100%		-30	704 000 010	4.8	0.000 001	0.007
100%		-20	704 000 010	4.7	0.000 001	0.007
100%		-10	704 000 011	5.1	0.000 001	0.007
100%		0	704 000 011	5.5	0.000 001	0.008
100%		+10	704 000 010	4.6	0.000 001	0.007
100%		+30	704 000 012	6.3	0.000 001	0.009
100%		+40	704 000 010	4.1	0.000 001	0.006
100%		+50	704 000 010	4.2	0.000 001	0.006
Batt. Endpoint	3.400	+20	704 000 009	3.7	0.000 001	0.005





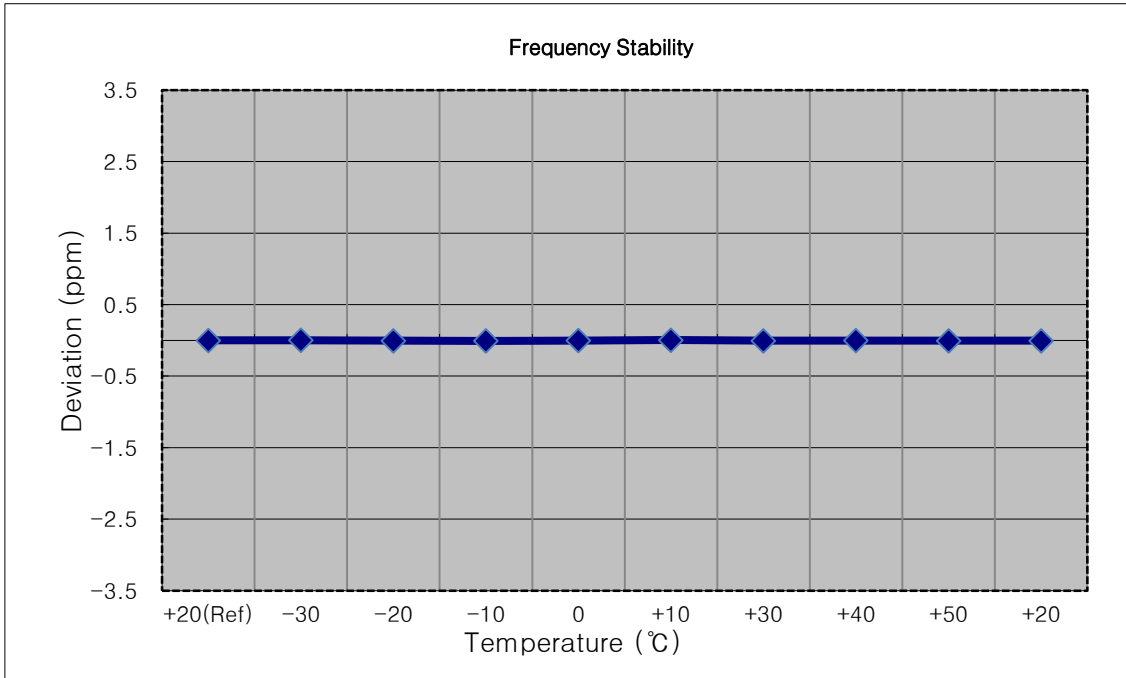
- ▣ MODE: LTE B12
- ▣ OPERATING FREQUENCY: 707,500,000 Hz
- ▣ CHANNEL: 23095 (1.4 MHz)
- ▣ REFERENCE VOLTAGE: 3.86 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.860	+20(Ref)	707 500 006	0.0	0.000 000	0.000
100%		-30	707 500 001	-4.4	-0.000 001	-0.006
100%		-20	707 500 007	1.7	0.000 000	0.002
100%		-10	707 500 003	-2.5	0.000 000	-0.004
100%		0	707 500 002	-3.5	0.000 000	-0.005
100%		+10	707 500 003	-2.9	0.000 000	-0.004
100%		+30	707 500 004	-2.0	0.000 000	-0.003
100%		+40	707 500 009	3.2	0.000 000	0.005
100%		+50	707 500 003	-2.9	0.000 000	-0.004
Batt. Endpoint	3.400	+20	707 500 009	3.1	0.000 000	0.004



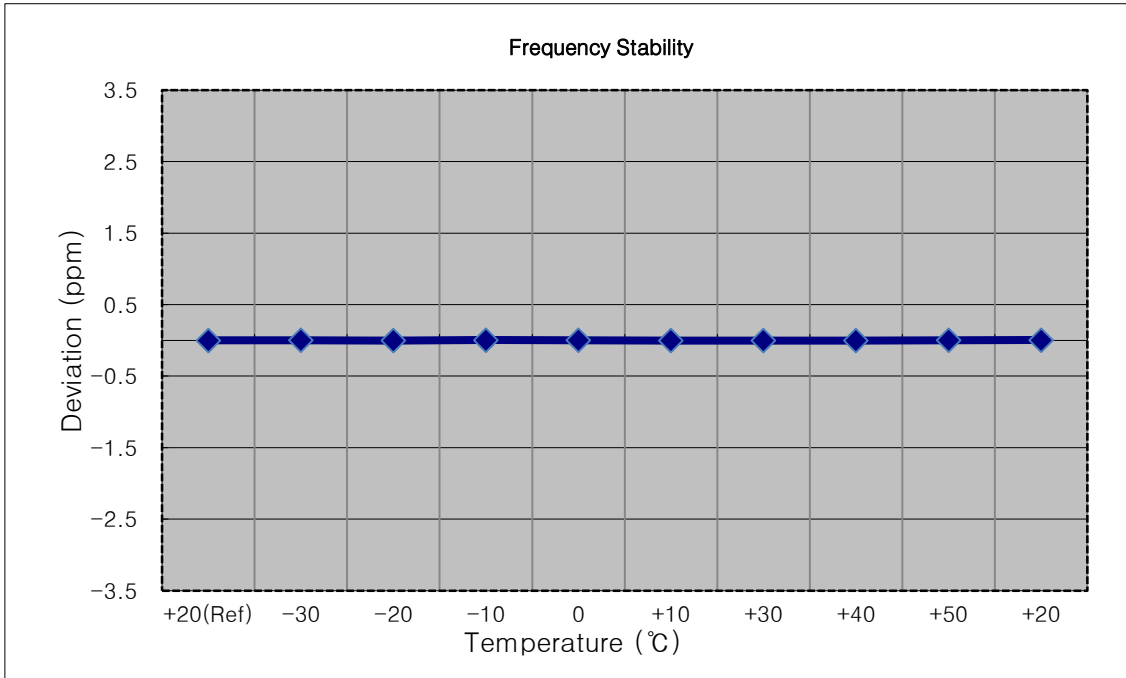
- ▣ MODE: LTE B12
- ▣ OPERATING FREQUENCY: 707,500,000 Hz
- ▣ CHANNEL: 23095 (3 MHz)
- ▣ REFERENCE VOLTAGE: 3.86 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.860	+20(Ref)	707 499 998	0.0	0.000 000	0.000
100%		-30	707 500 000	2.2	0.000 000	0.003
100%		-20	707 499 995	-2.7	0.000 000	-0.004
100%		-10	707 499 993	-4.6	-0.000 001	-0.007
100%		0	707 499 996	-2.0	0.000 000	-0.003
100%		+10	707 500 000	2.5	0.000 000	0.004
100%		+30	707 499 994	-3.8	-0.000 001	-0.005
100%		+40	707 499 996	-2.0	0.000 000	-0.003
100%		+50	707 499 995	-2.7	0.000 000	-0.004
Batt. Endpoint	3.400	+20	707 499 994	-3.4	0.000 000	-0.005



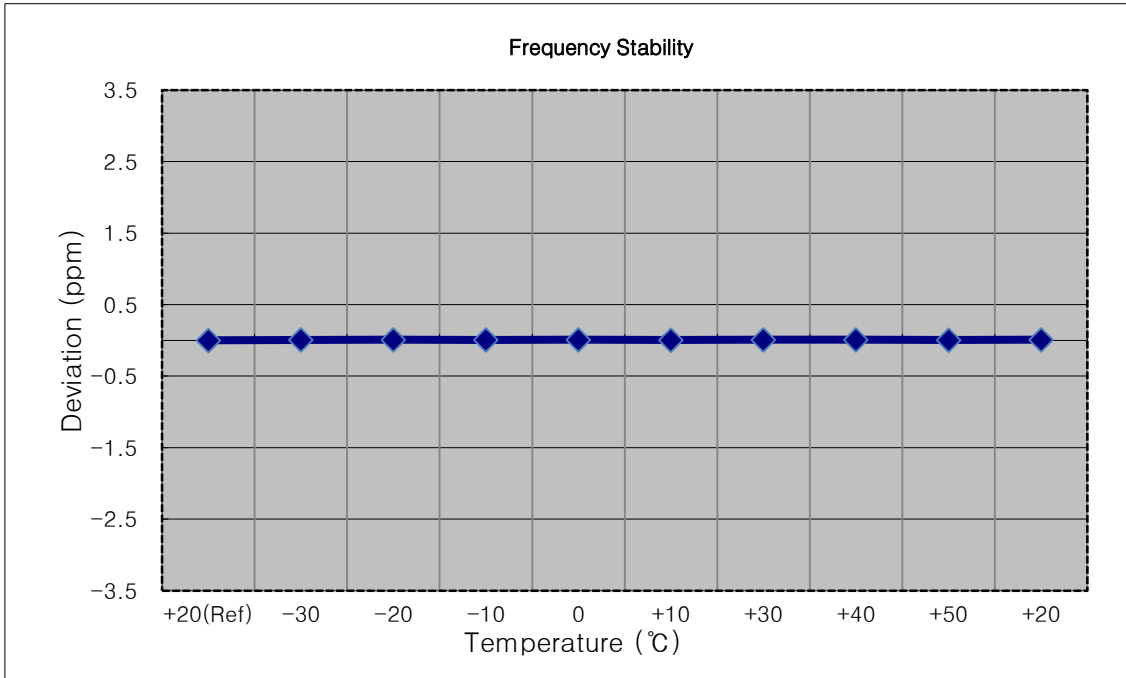
- ▣ MODE: LTE B12/17
- ▣ OPERATING FREQUENCY: 707,500,000 Hz
- ▣ CHANNEL: 23095 (5 MHz)
- ▣ REFERENCE VOLTAGE: 3.86 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.860	+20(Ref)	707 500 002	0.0	0.000 000	0.000
100%		-30	707 500 004	2.0	0.000 000	0.003
100%		-20	707 500 000	-1.8	0.000 000	-0.003
100%		-10	707 500 005	3.1	0.000 000	0.004
100%		0	707 500 004	2.1	0.000 000	0.003
100%		+10	707 500 000	-2.2	0.000 000	-0.003
100%		+30	707 500 001	-1.5	0.000 000	-0.002
100%		+40	707 500 000	-2.0	0.000 000	-0.003
100%		+50	707 500 003	1.4	0.000 000	0.002
Batt. Endpoint	3.400	+20	707 500 005	2.6	0.000 000	0.004



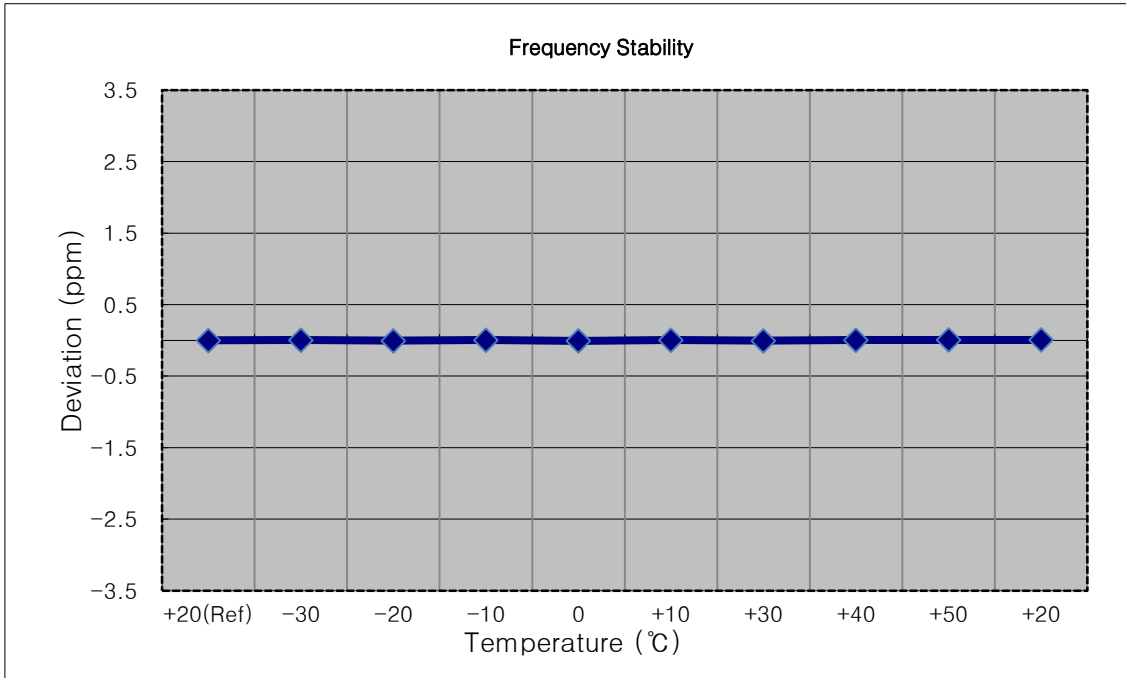
- ▣ MODE: LTE B12/17
- ▣ OPERATING FREQUENCY: 707,500,000 Hz
- ▣ CHANNEL: 23095 (10 MHz)
- ▣ REFERENCE VOLTAGE: 3.86 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.860	+20(Ref)	707 500 007	0.0	0.000 000	0.000
100%		-30	707 500 012	5.1	0.000 001	0.007
100%		-20	707 500 014	6.9	0.000 001	0.010
100%		-10	707 500 012	5.0	0.000 001	0.007
100%		0	707 500 014	6.5	0.000 001	0.009
100%		+10	707 500 011	3.6	0.000 001	0.005
100%		+30	707 500 013	6.1	0.000 001	0.009
100%		+40	707 500 013	6.0	0.000 001	0.008
100%		+50	707 500 011	3.8	0.000 001	0.005
Batt. Endpoint	3.400	+20	707 500 013	6.0	0.000 001	0.008



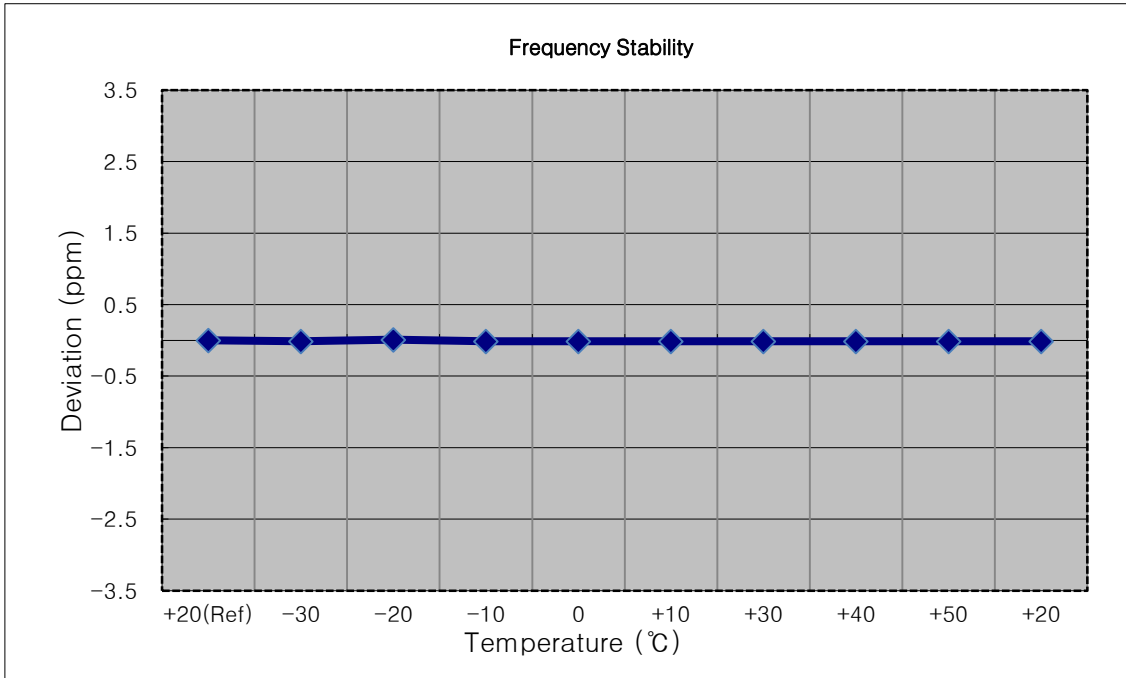
- ▣ MODE: LTE B12
- ▣ OPERATING FREQUENCY: 715,300,000 Hz
- ▣ CHANNEL: 23173 (1.4 MHz)
- ▣ REFERENCE VOLTAGE: 3.86 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.860	+20(Ref)	715 299 994	0.0	0.000 000	0.000
100%		-30	715 299 998	3.5	0.000 000	0.005
100%		-20	715 299 991	-3.4	0.000 000	-0.005
100%		-10	715 299 997	2.6	0.000 000	0.004
100%		0	715 299 990	-4.3	-0.000 001	-0.006
100%		+10	715 299 997	3.2	0.000 000	0.004
100%		+30	715 299 991	-2.7	0.000 000	-0.004
100%		+40	715 299 998	3.9	0.000 001	0.005
100%		+50	715 299 998	4.2	0.000 001	0.006
Batt. Endpoint	3.400	+20	715 299 999	5.4	0.000 001	0.008



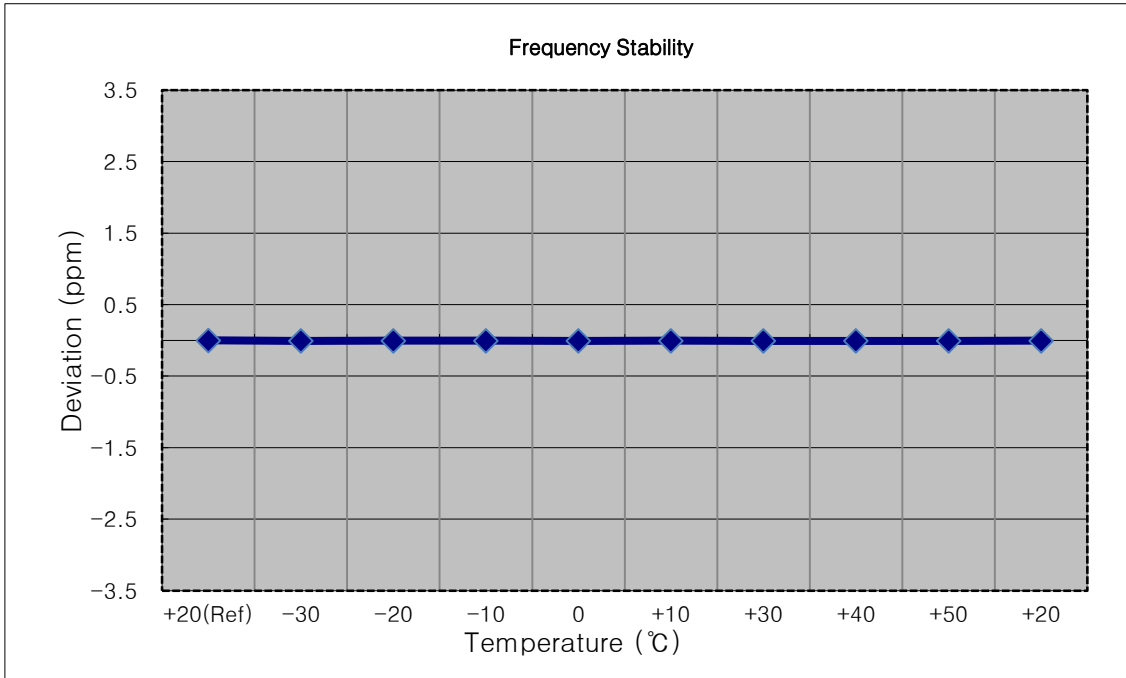
- ▣ MODE: LTE B12
- ▣ OPERATING FREQUENCY: 714,500,000 Hz
- ▣ CHANNEL: 23165 (3 MHz)
- ▣ REFERENCE VOLTAGE: 3.86 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.860	+20(Ref)	714 499 991	0.0	0.000 000	0.000
100%		-30	714 499 982	-8.9	-0.000 001	-0.012
100%		-20	714 499 997	6.3	0.000 001	0.009
100%		-10	714 499 981	-9.1	-0.000 001	-0.013
100%		0	714 499 981	-10.0	-0.000 001	-0.014
100%		+10	714 499 982	-9.0	-0.000 001	-0.013
100%		+30	714 499 981	-9.6	-0.000 001	-0.013
100%		+40	714 499 980	-10.3	-0.000 001	-0.014
100%		+50	714 499 981	-9.6	-0.000 001	-0.013
Batt. Endpoint	3.400	+20	714 499 980	-10.1	-0.000 001	-0.014



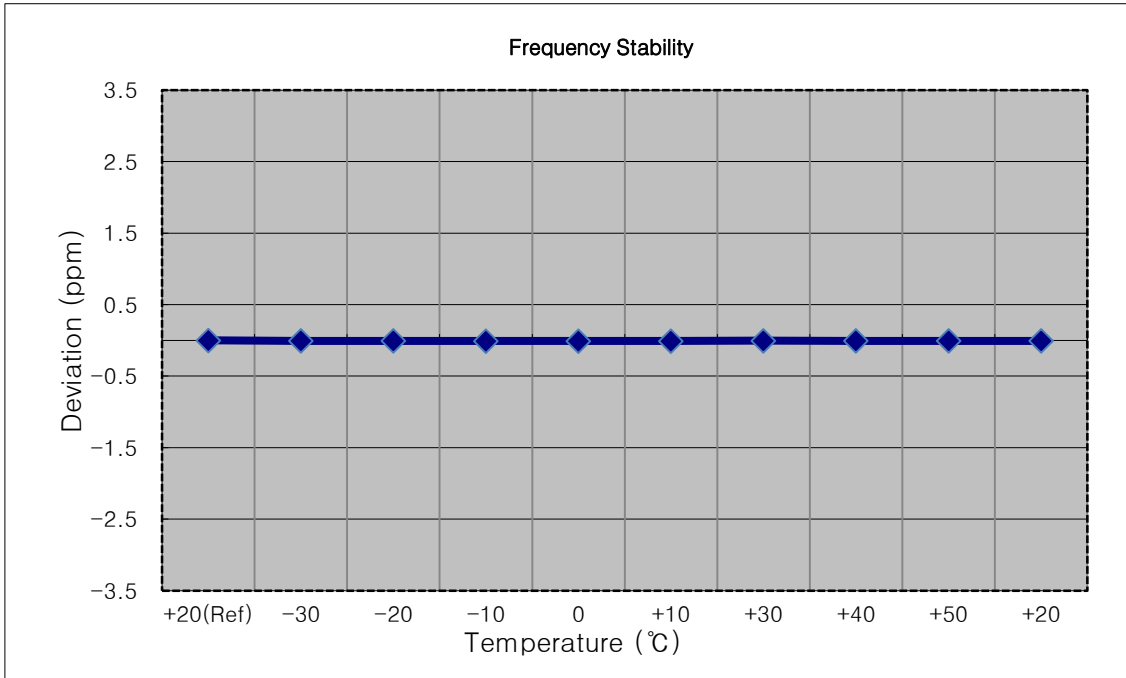
- ▣ MODE: LTE B12/17
- ▣ OPERATING FREQUENCY: 713,500,000 Hz
- ▣ CHANNEL: 23155 (5 MHz)
- ▣ REFERENCE VOLTAGE: 3.86 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.860	+20(Ref)	713 499 996	0.0	0.000 000	0.000
100%		-30	713 499 992	-4.2	-0.000 001	-0.006
100%		-20	713 499 992	-3.8	-0.000 001	-0.005
100%		-10	713 499 993	-3.4	0.000 000	-0.005
100%		0	713 499 992	-4.2	-0.000 001	-0.006
100%		+10	713 499 993	-3.1	0.000 000	-0.004
100%		+30	713 499 991	-4.8	-0.000 001	-0.007
100%		+40	713 499 991	-5.0	-0.000 001	-0.007
100%		+50	713 499 992	-4.3	-0.000 001	-0.006
Batt. Endpoint	3.400	+20	713 499 993	-3.1	0.000 000	-0.004



- ▣ MODE: LTE B12/17
- ▣ OPERATING FREQUENCY: 711,000,000 Hz
- ▣ CHANNEL: 23130 (10 MHz)
- ▣ REFERENCE VOLTAGE: 3.86 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

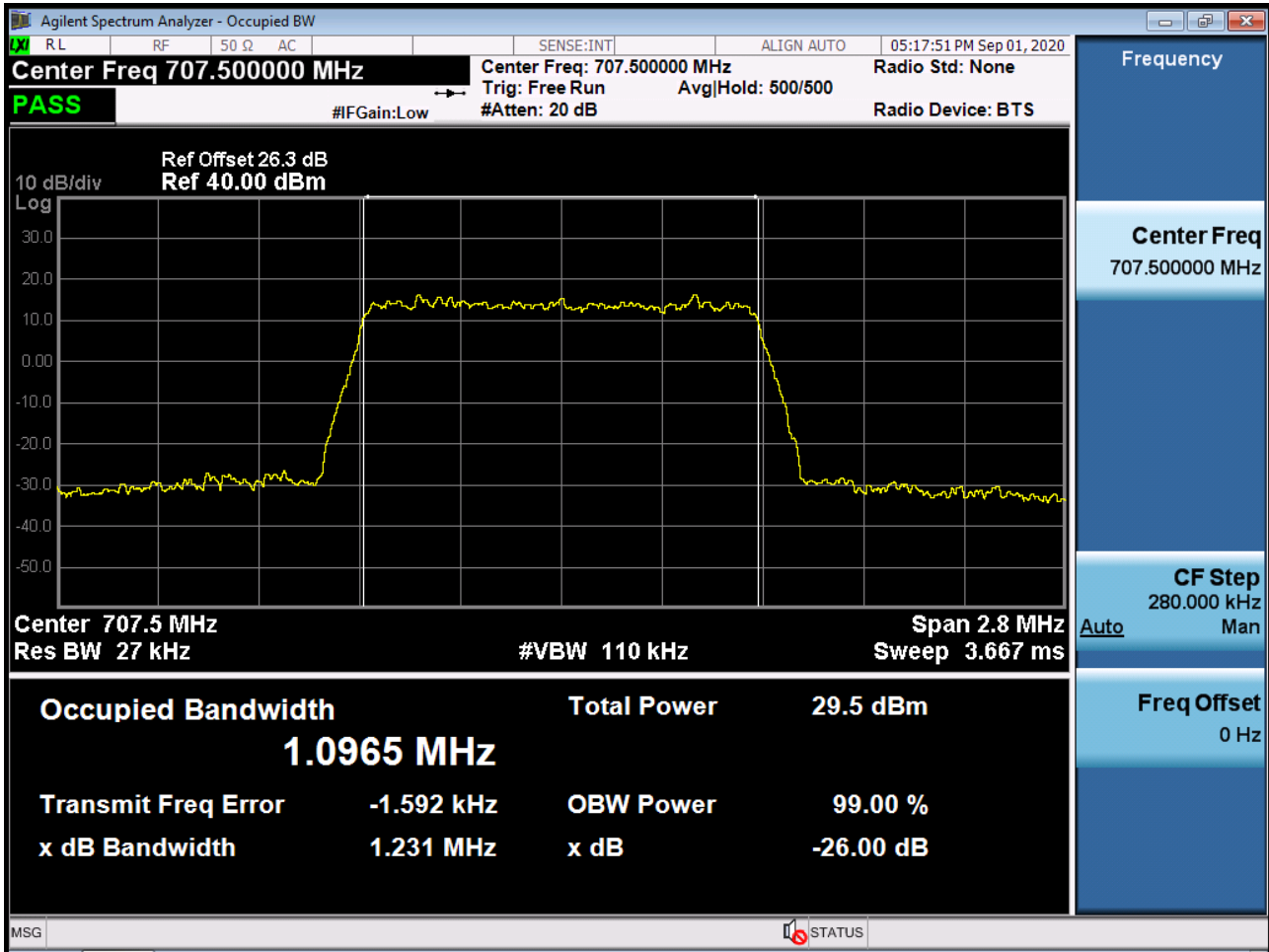
Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.860	+20(Ref)	710 999 993	0.0	0.000 000	0.000
100%		-30	710 999 989	-4.8	-0.000 001	-0.007
100%		-20	710 999 989	-4.7	-0.000 001	-0.007
100%		-10	710 999 987	-6.0	-0.000 001	-0.008
100%		0	710 999 988	-5.6	-0.000 001	-0.008
100%		+10	710 999 988	-5.6	-0.000 001	-0.008
100%		+30	710 999 990	-3.9	-0.000 001	-0.005
100%		+40	710 999 989	-4.8	-0.000 001	-0.007
100%		+50	710 999 989	-4.9	-0.000 001	-0.007
Batt. Endpoint	3.400	+20	710 999 989	-4.3	-0.000 001	-0.006



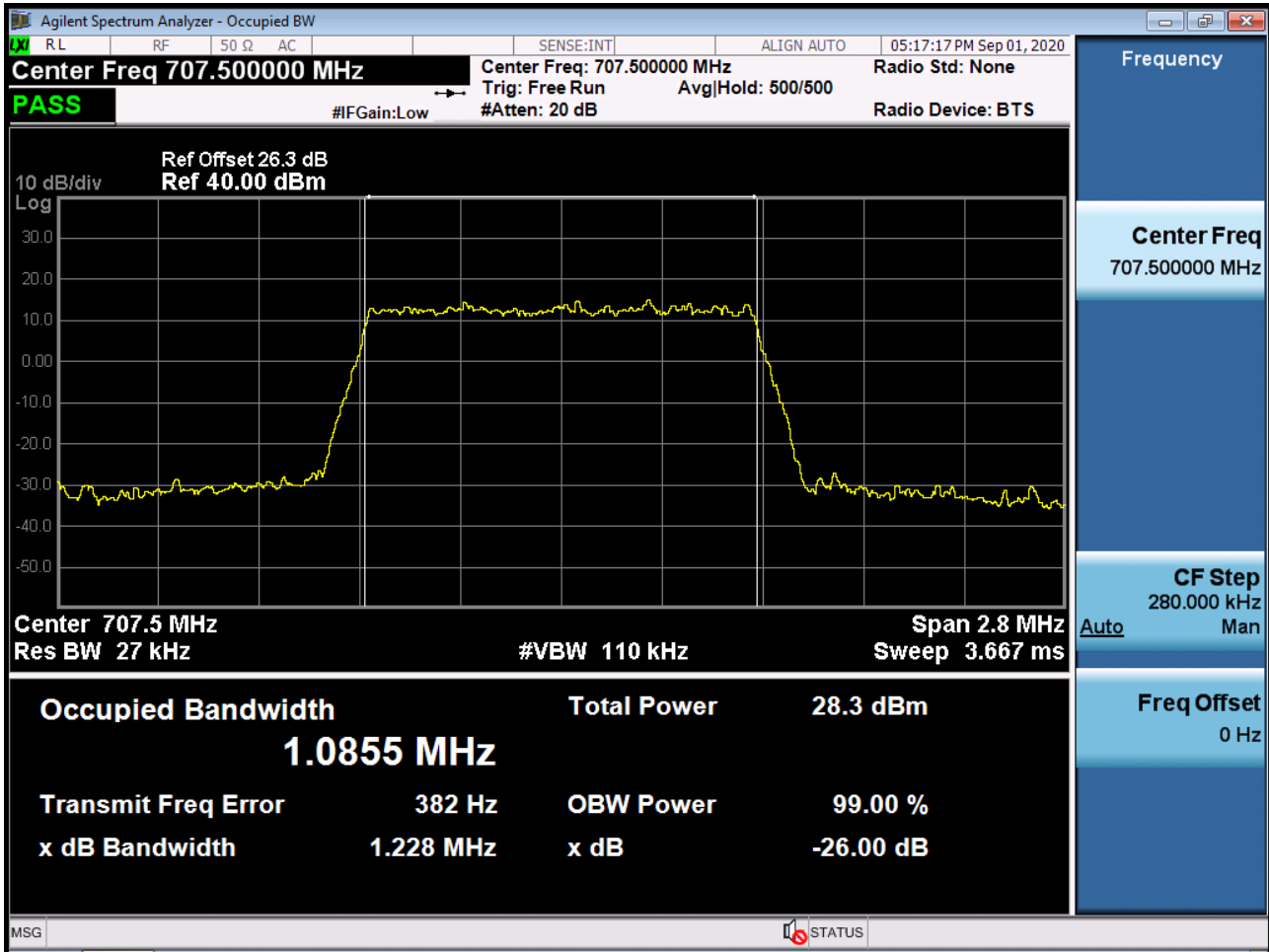


## 9. TEST PLOTS

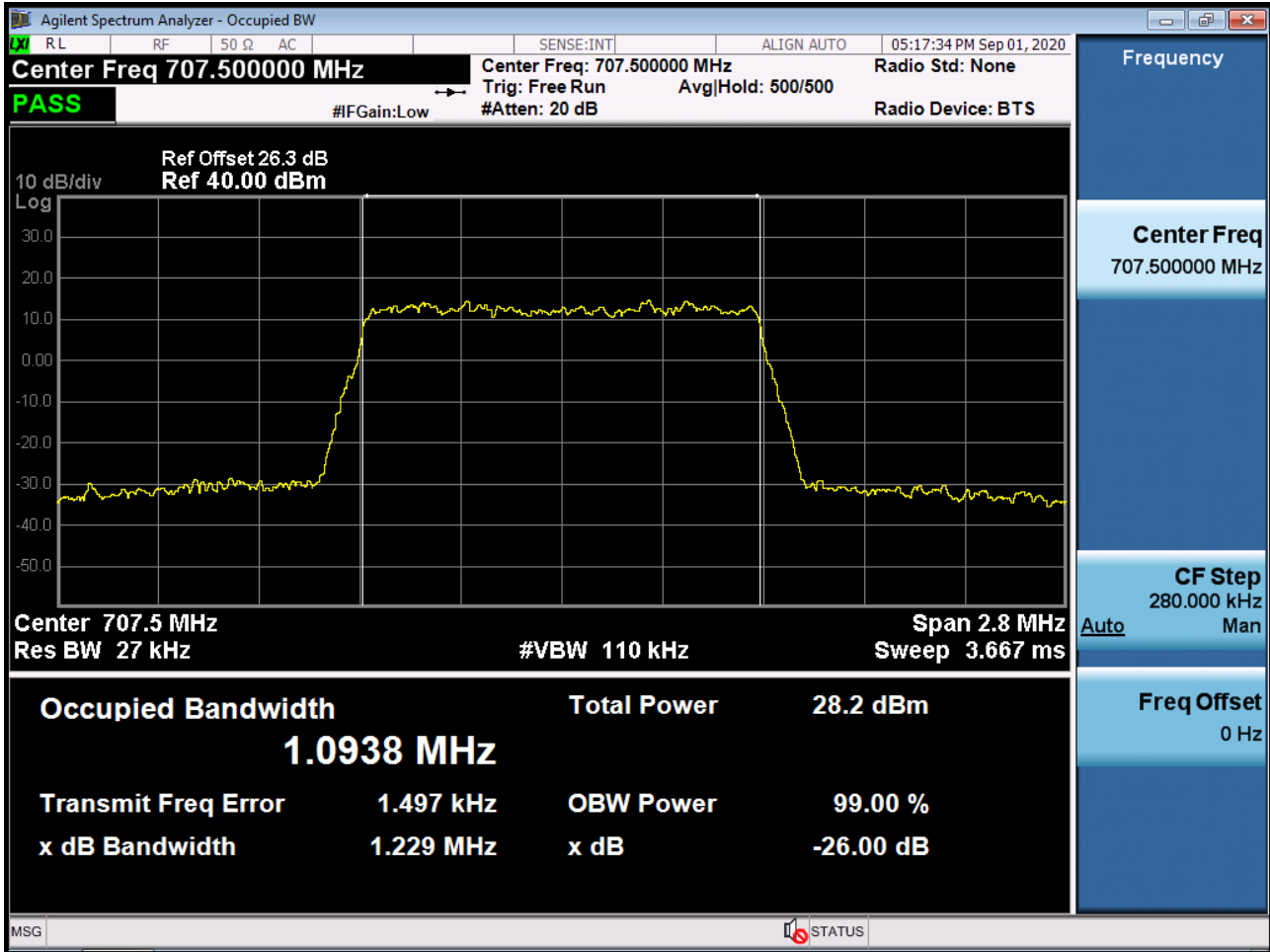
BAND 12. Occupied Bandwidth Plot (1.4M BW Ch.23095 QPSK\_RB6\_0)



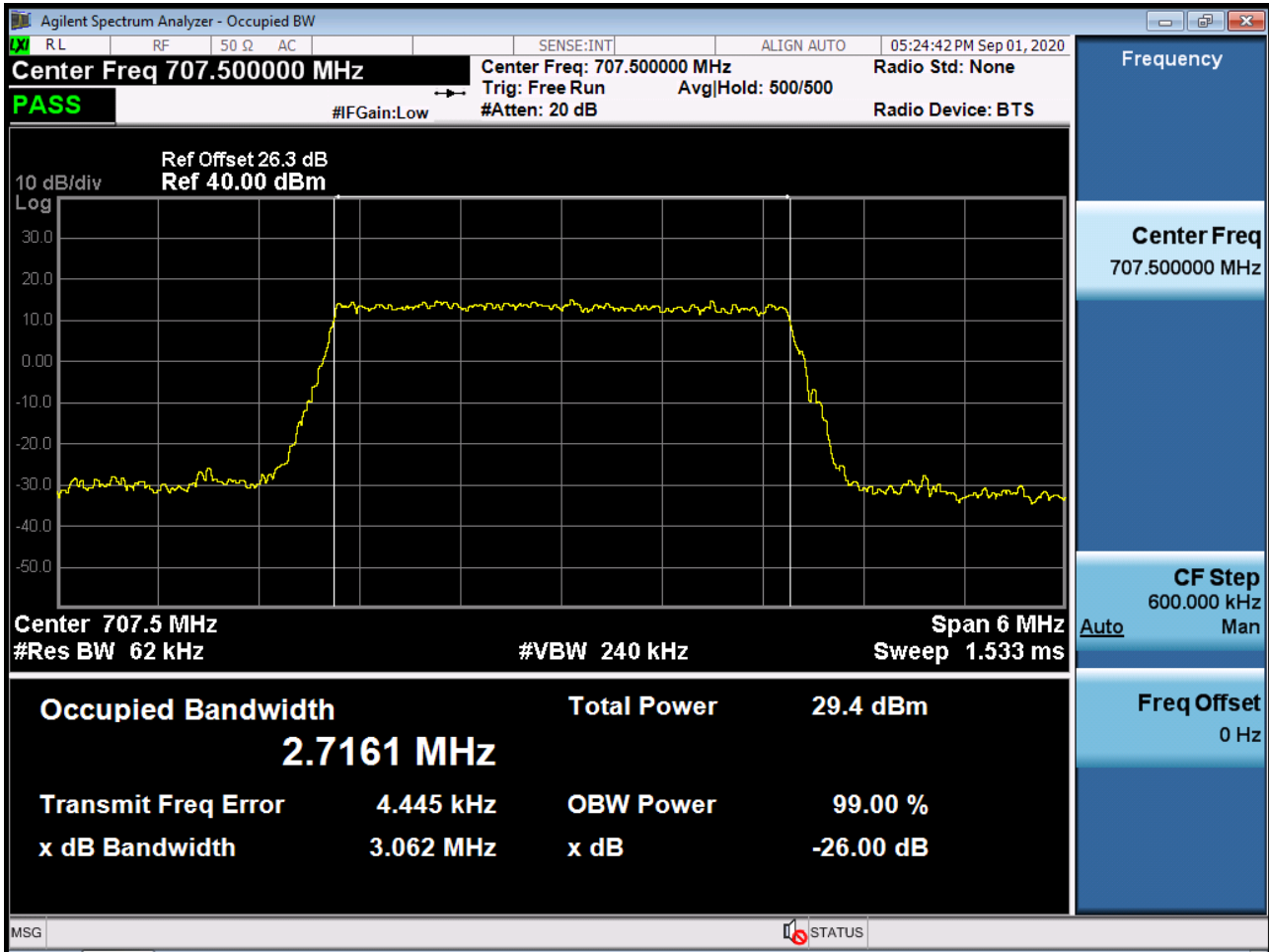
BAND 12. Occupied Bandwidth Plot (1.4M BW Ch.23095 16QAM\_RB6\_0)



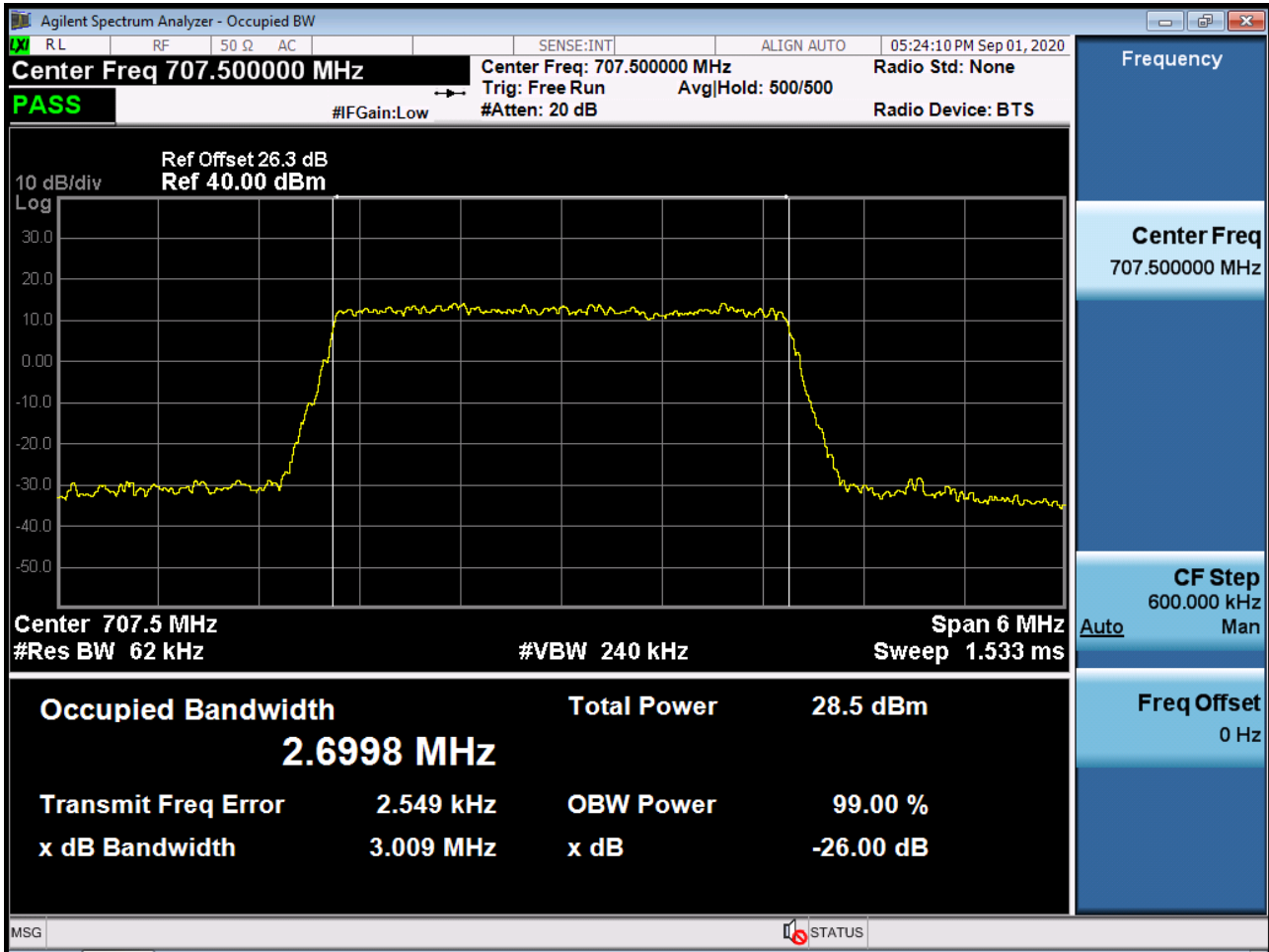
BAND 12. Occupied Bandwidth Plot (1.4M BW Ch.23095 64QAM\_RB6\_0)



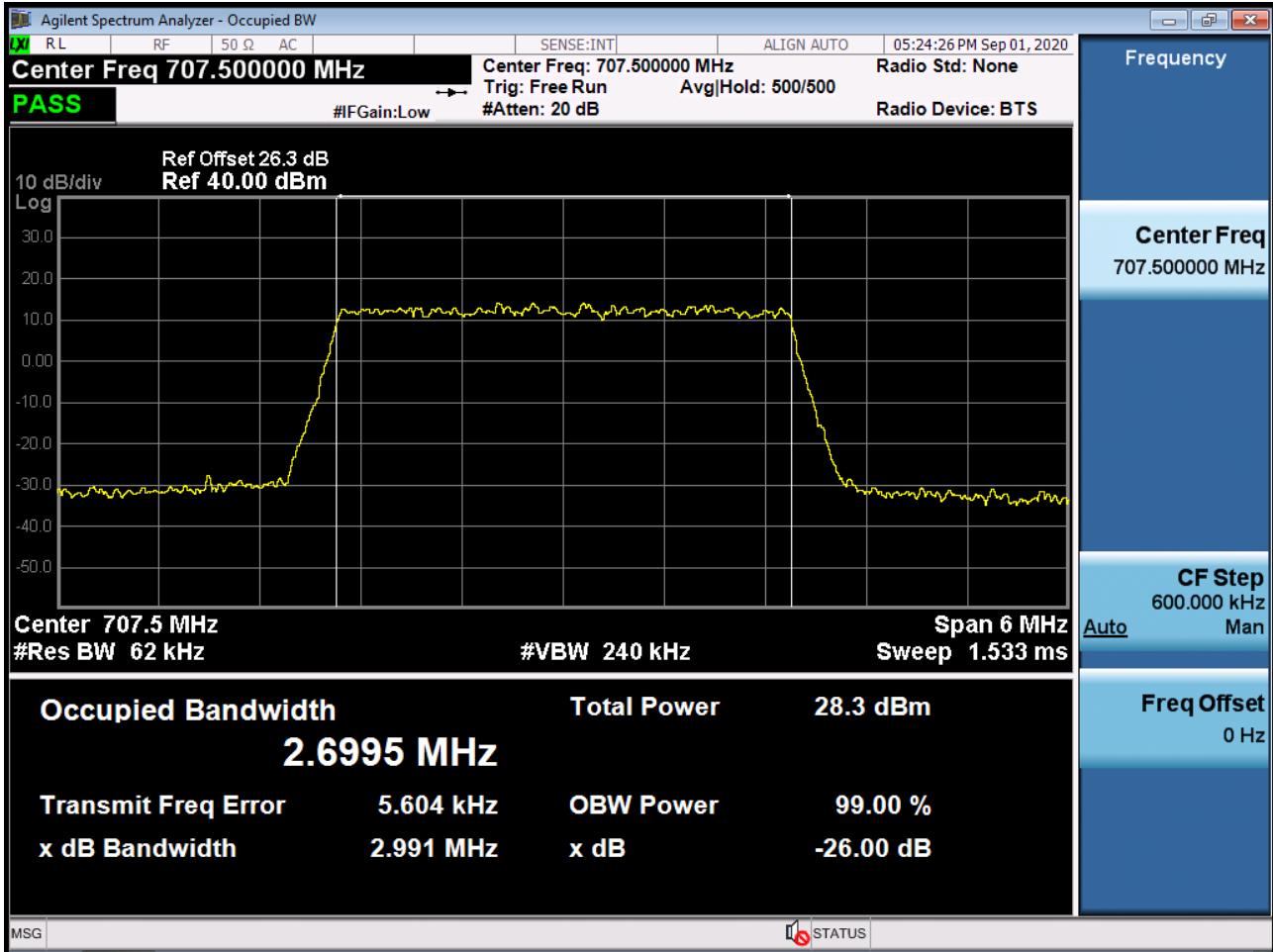
BAND 12. Occupied Bandwidth Plot (3M BW Ch.23095 QPSK\_RB15\_0)



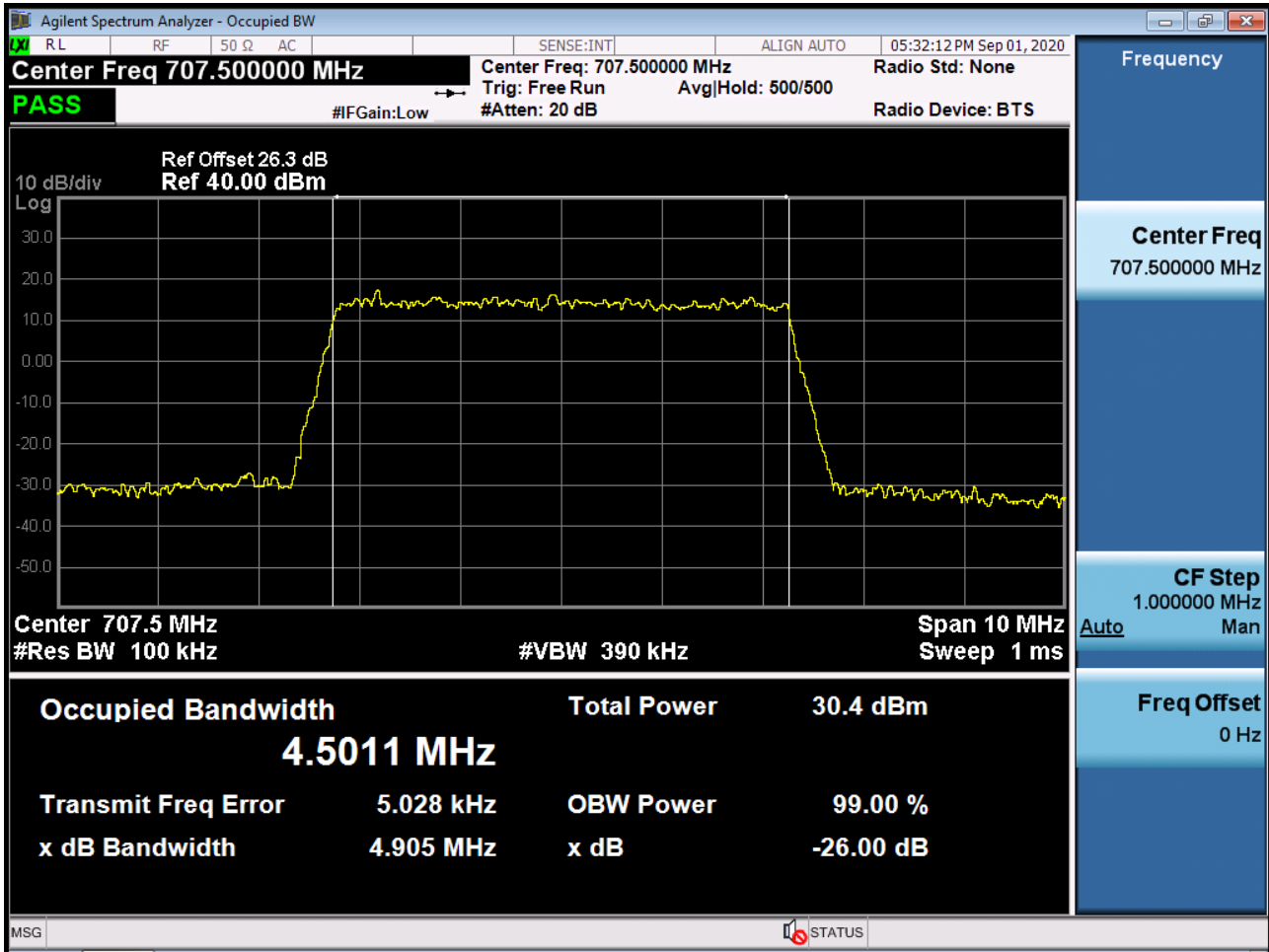
BAND 12. Occupied Bandwidth Plot (3M BW Ch.23095 16QAM\_RB15\_0)



BAND 12. Occupied Bandwidth Plot (3M BW Ch.23095 64QAM\_RB15\_0)

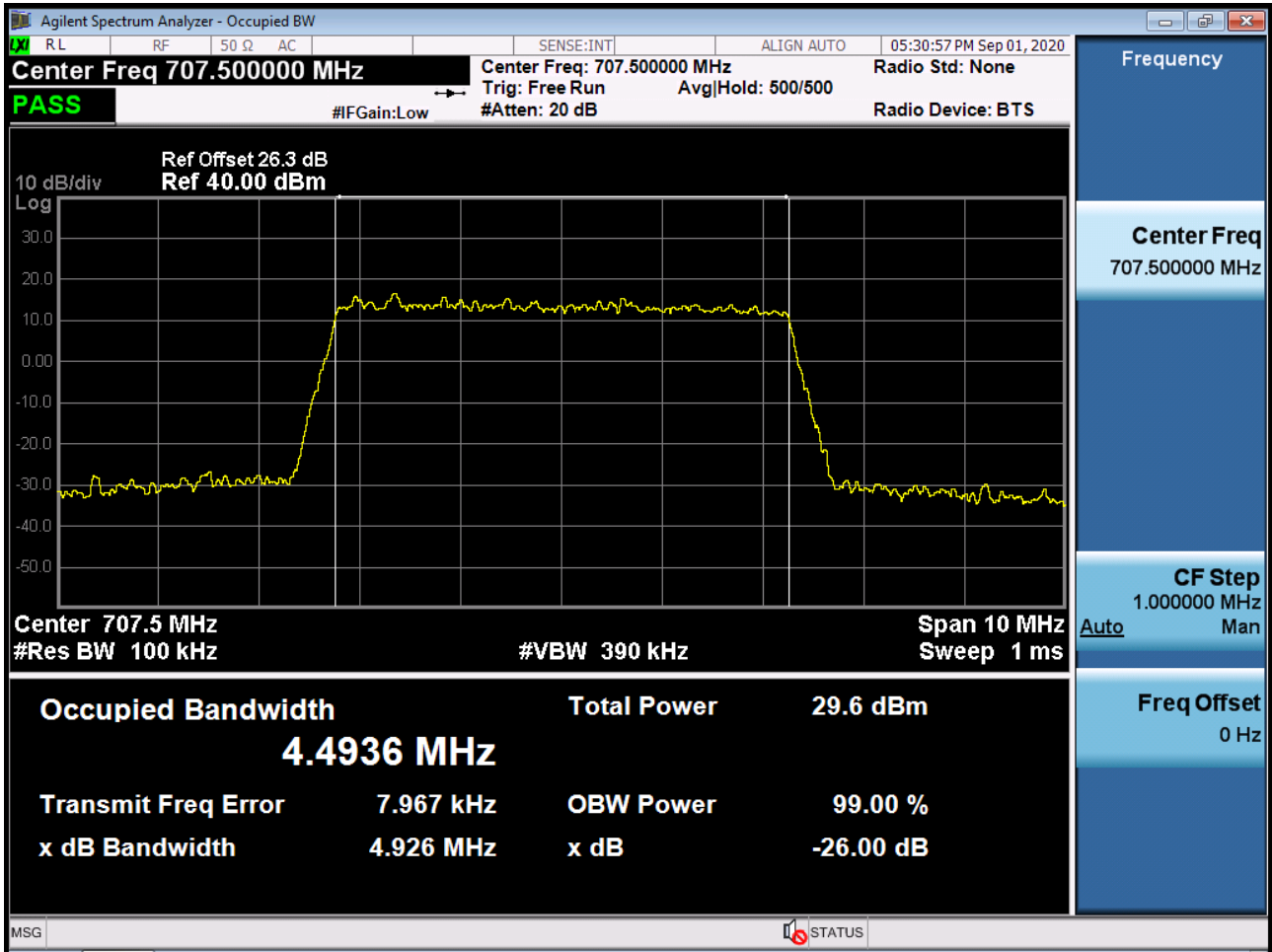


BAND 12/17. Occupied Bandwidth Plot (5M BW Ch.23095 QPSK\_RB25\_0)

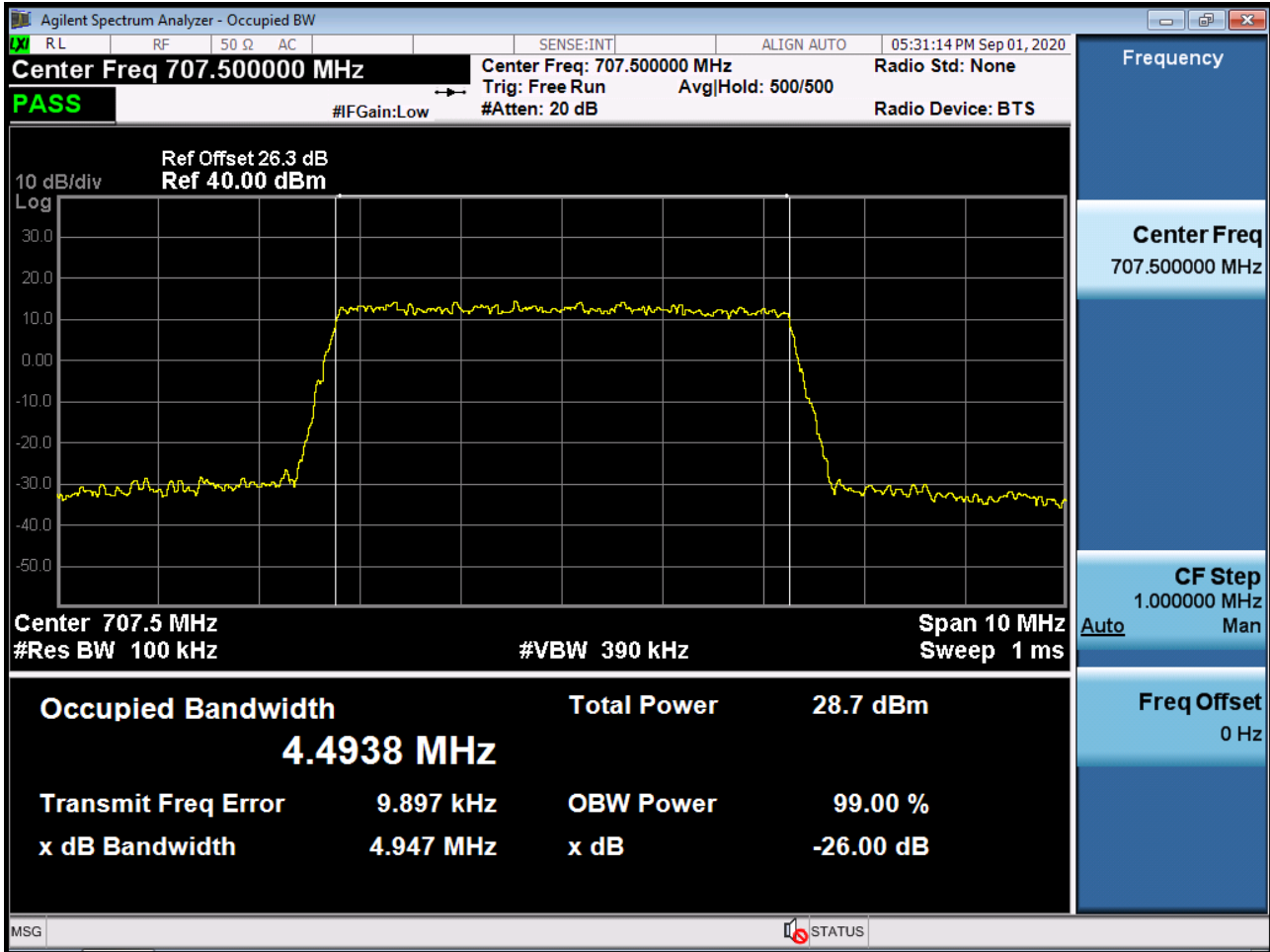




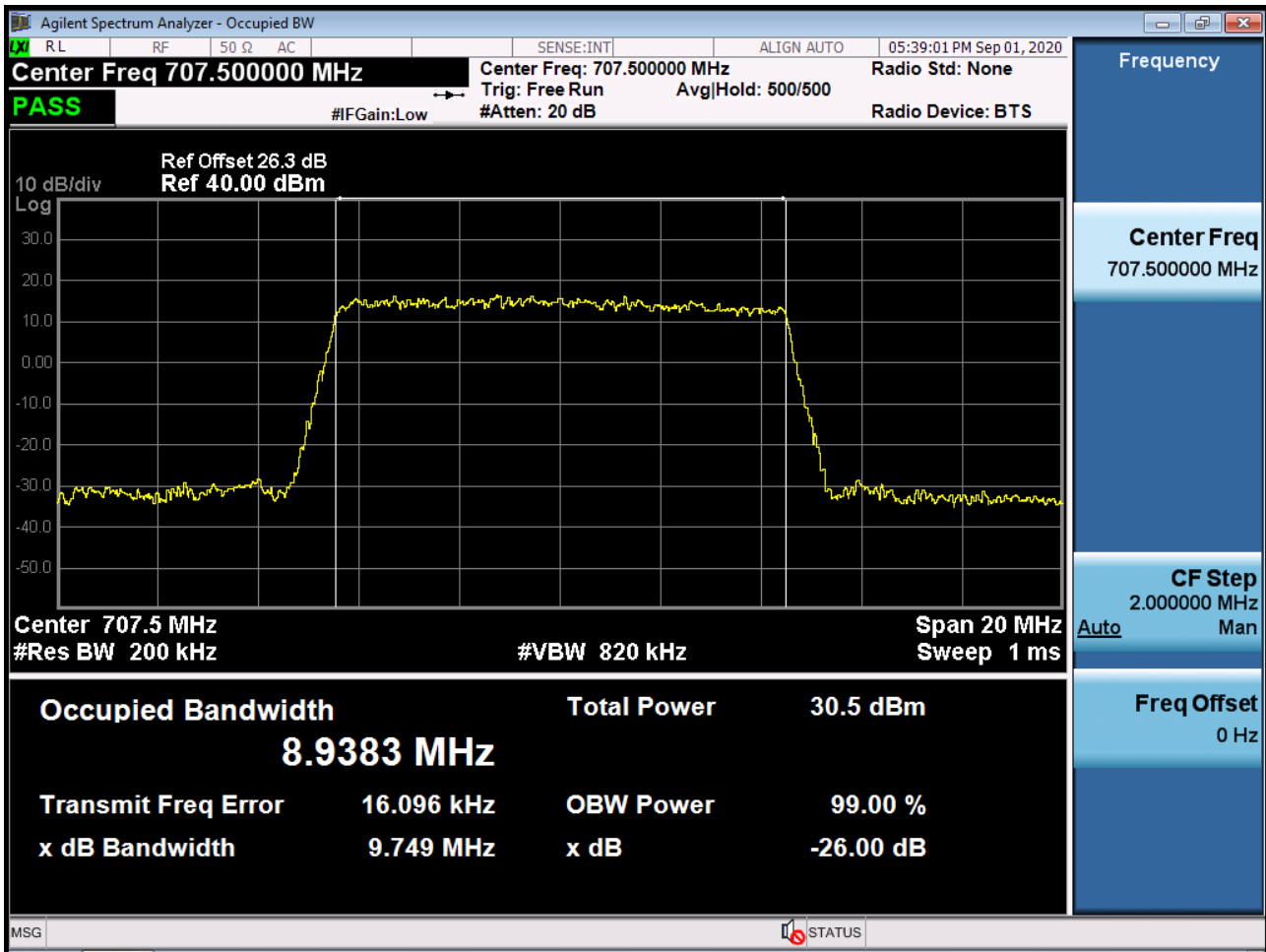
BAND 12/17. Occupied Bandwidth Plot (5M BW Ch.23095 16QAM\_RB25\_0)



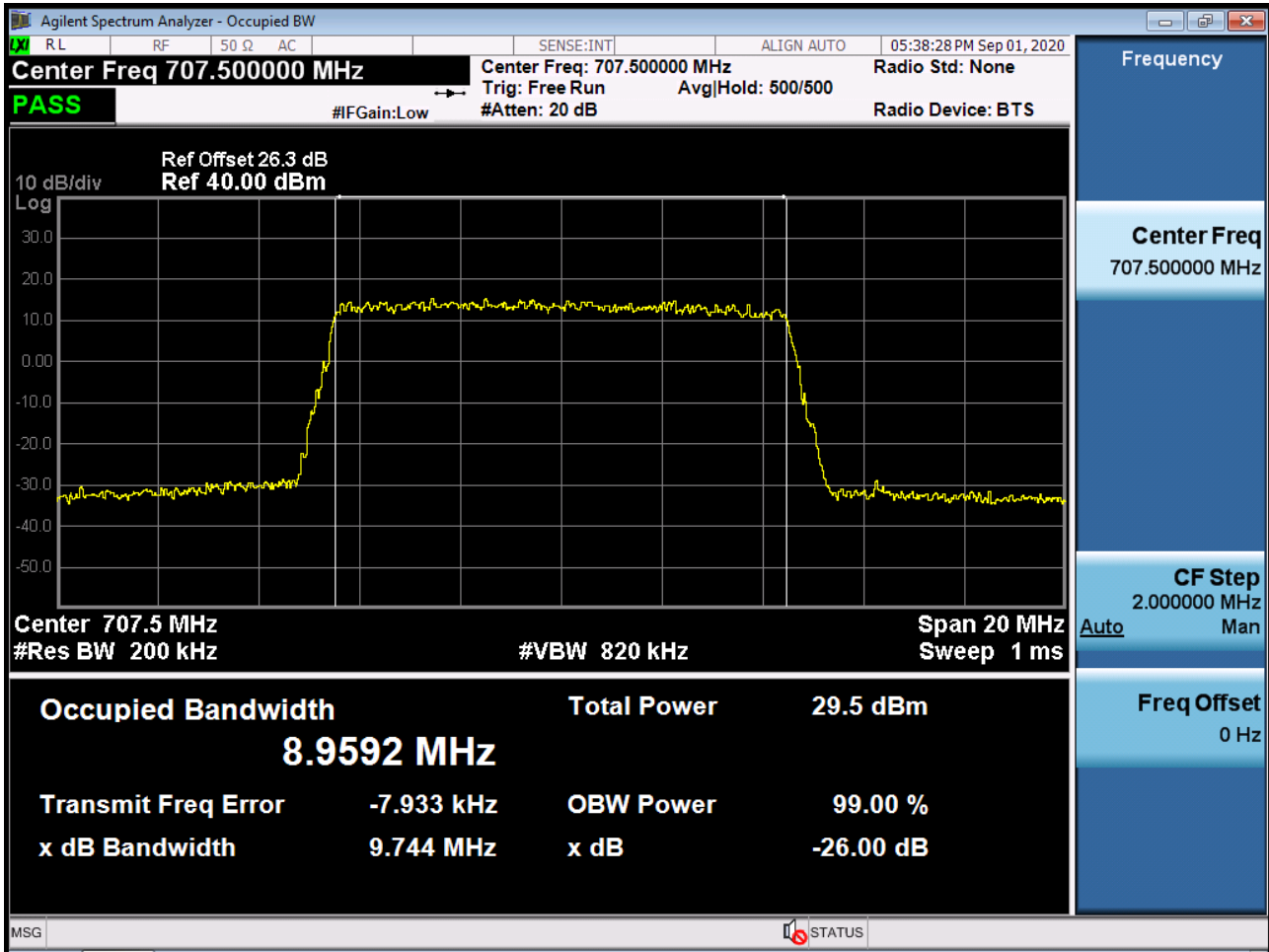
BAND 12/17. Occupied Bandwidth Plot (5M BW Ch.23095 64QAM\_RB25\_0)



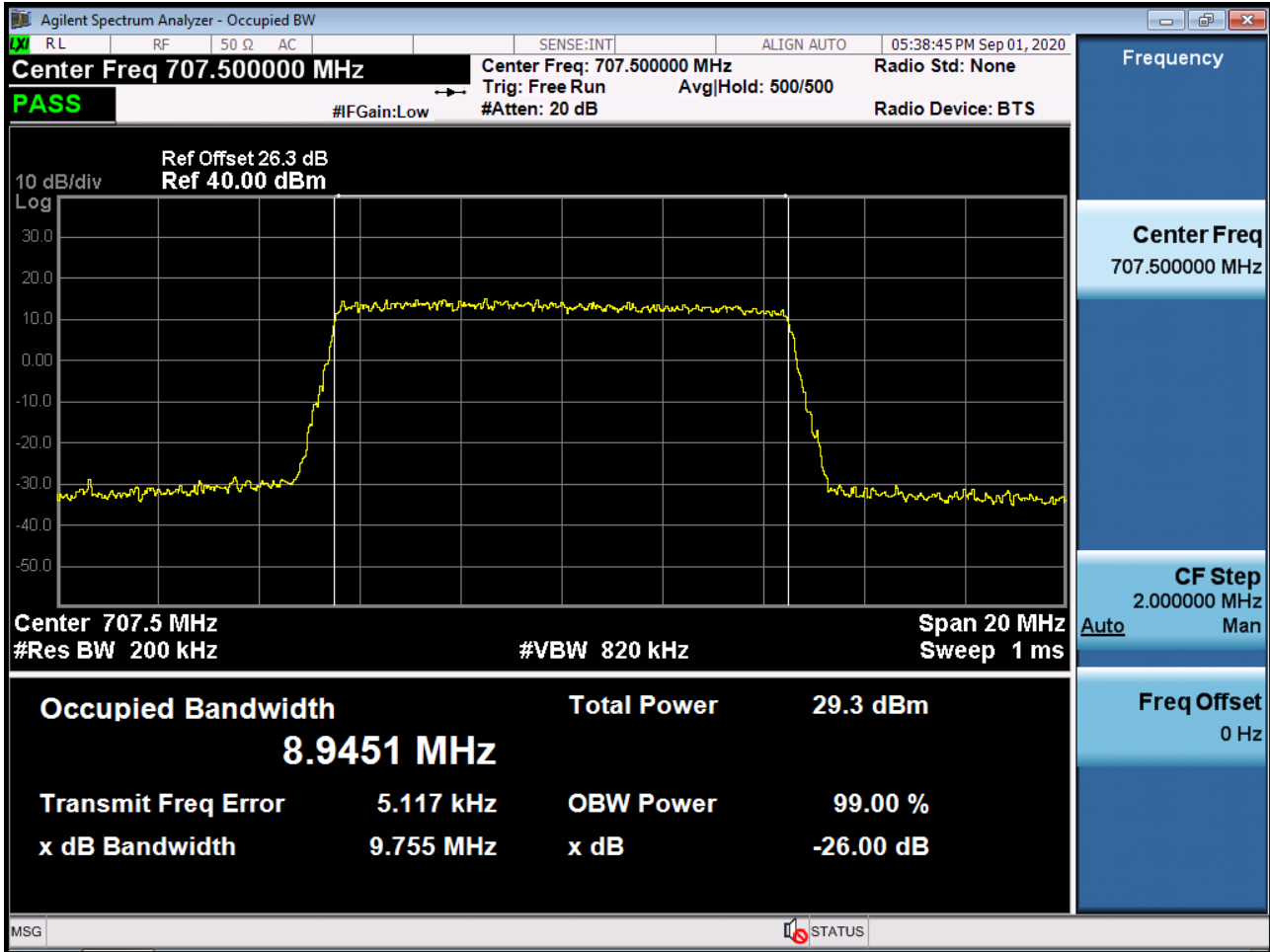
BAND 12/17. Occupied Bandwidth Plot (10M BW Ch.23095 QPSK\_RB50\_0)



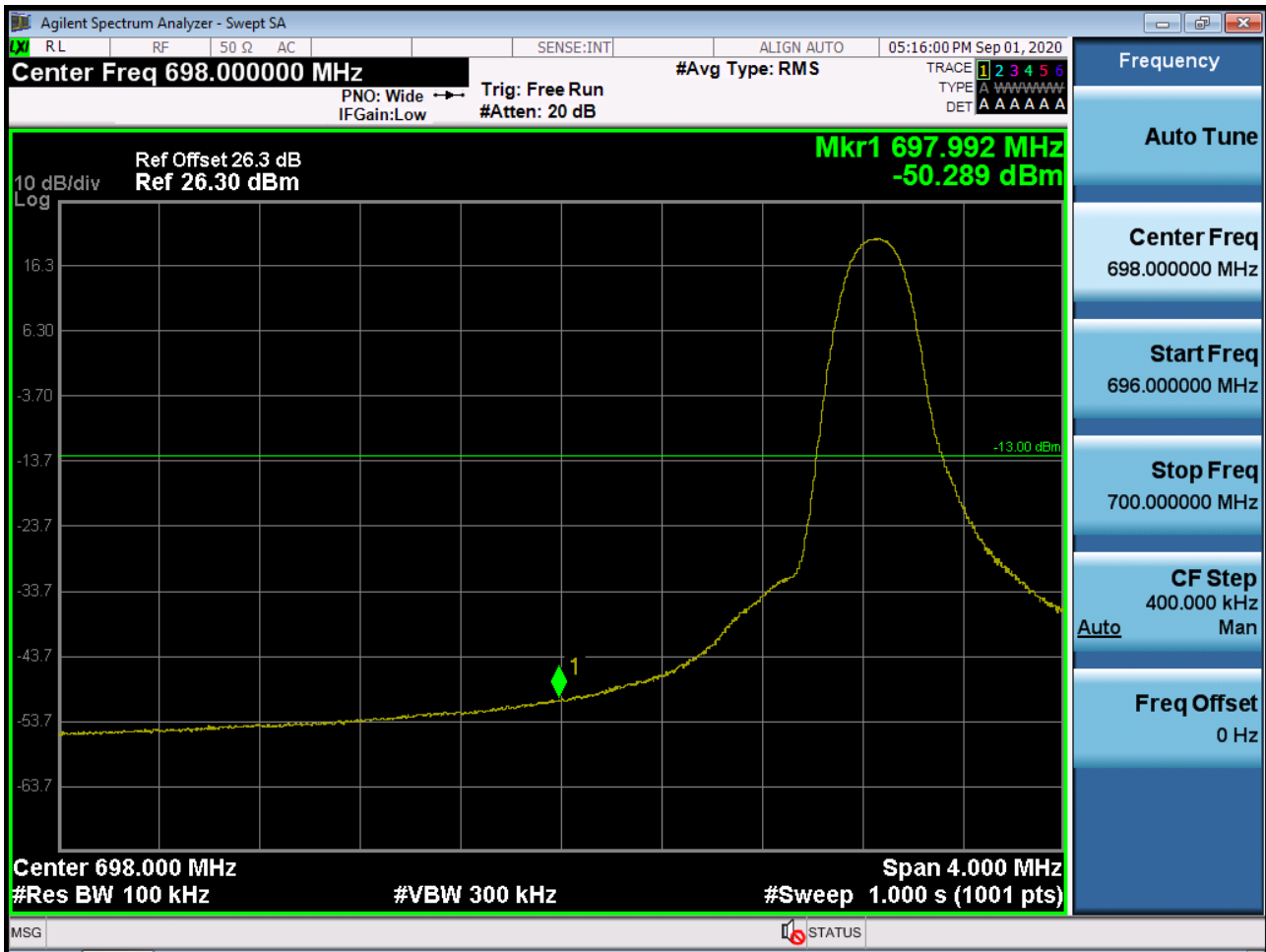
BAND 12/17. Occupied Bandwidth Plot (10M BW Ch.23095 16QAM\_RB50\_0)



BAND 12/17. Occupied Bandwidth Plot (10M BW Ch.23095 64QAM\_RB50\_0)



BAND 12. Lower Band Edge Plot (1.4M BW Ch.23017 QPSK\_RB1\_Offset 0)



BAND 12. Lower Band Edge Plot (1.4M BW Ch.23017 QPSK\_RB6\_Offset 0)



BAND 12. Lower Extended Band Edge Plot (1.4M BW Ch.23017 QPSK\_RB6\_0)





BAND 12. Lower Band Edge Plot (3M BW Ch.23025 QPSK\_RB1\_Offset 0)



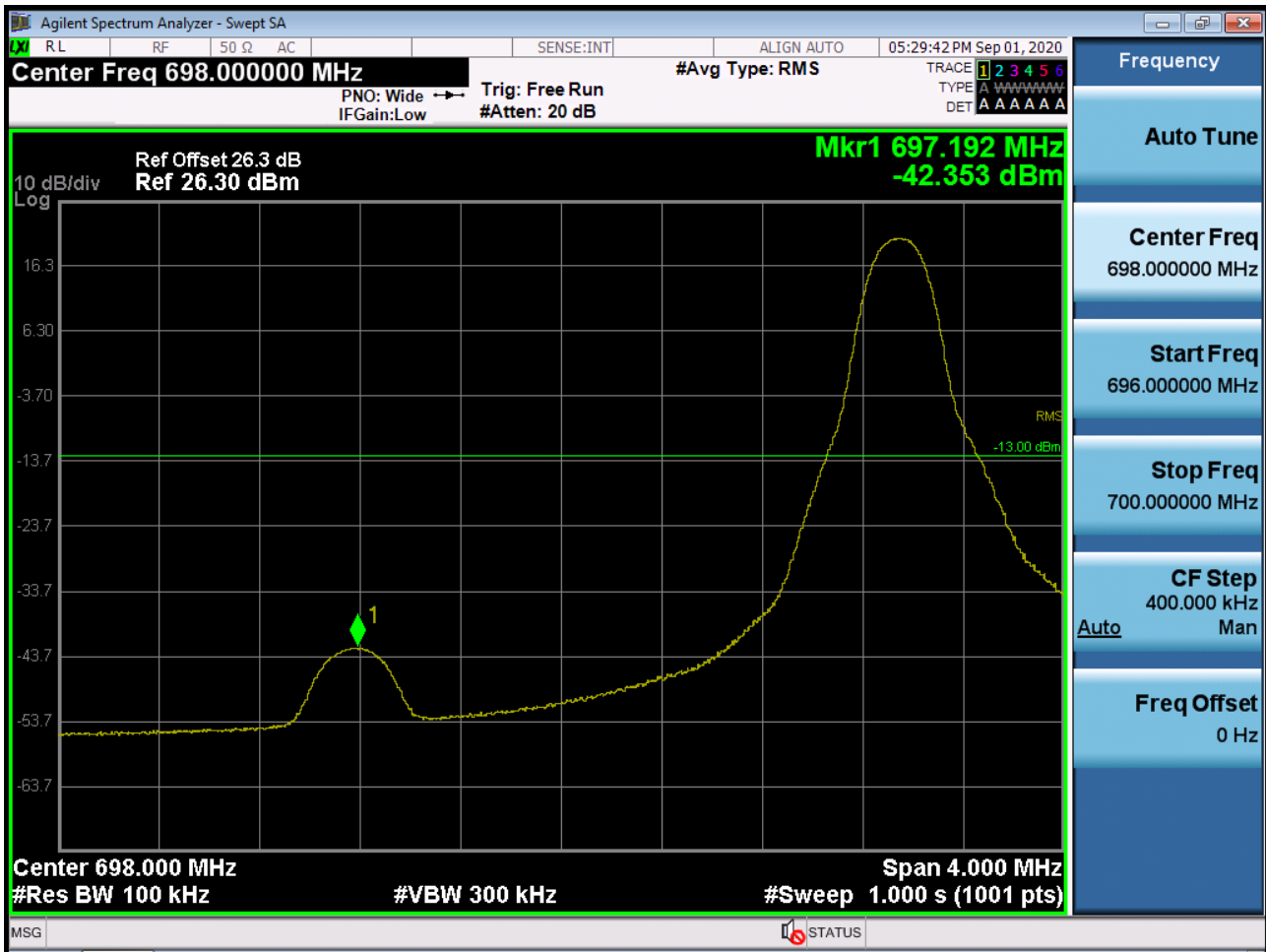
BAND 12. Lower Band Edge Plot (3M BW Ch.23025 QPSK\_RB15\_Offset 0)



BAND 12. Lower Extended Band Edge Plot (3M BW Ch.23025 QPSK\_RB15\_0)



BAND 12/17. Lower Band Edge Plot (5M BW Ch.23035 QPSK\_RB1\_Offset 0)



BAND 12/17. Lower Band Edge Plot (5M BW Ch.23035 QPSK\_RB25\_Offset 0)



BAND 12/17. Lower Extended Band Edge Plot (5M BW Ch.23035 QPSK\_RB25\_0)



BAND 12/17. Lower Band Edge Plot (10M BW Ch.23060 QPSK\_RB1\_Offset 0)



BAND 12/17. Lower Band Edge Plot (10M BW Ch.23060 QPSK\_RB50\_Offset 0)

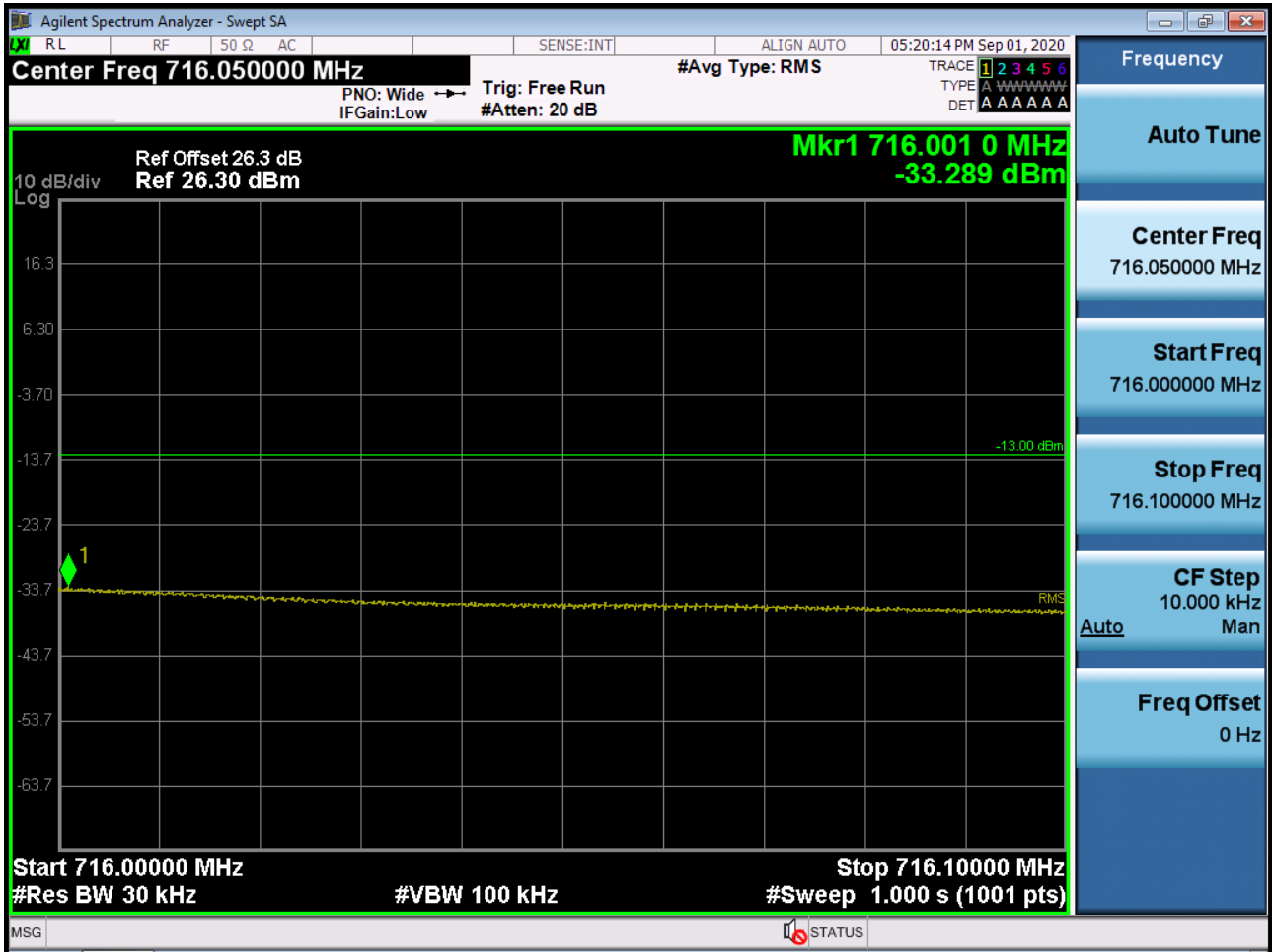




BAND 12/17. Lower Extended Band Edge Plot (10M BW Ch.23060 QPSK\_RB50\_0)



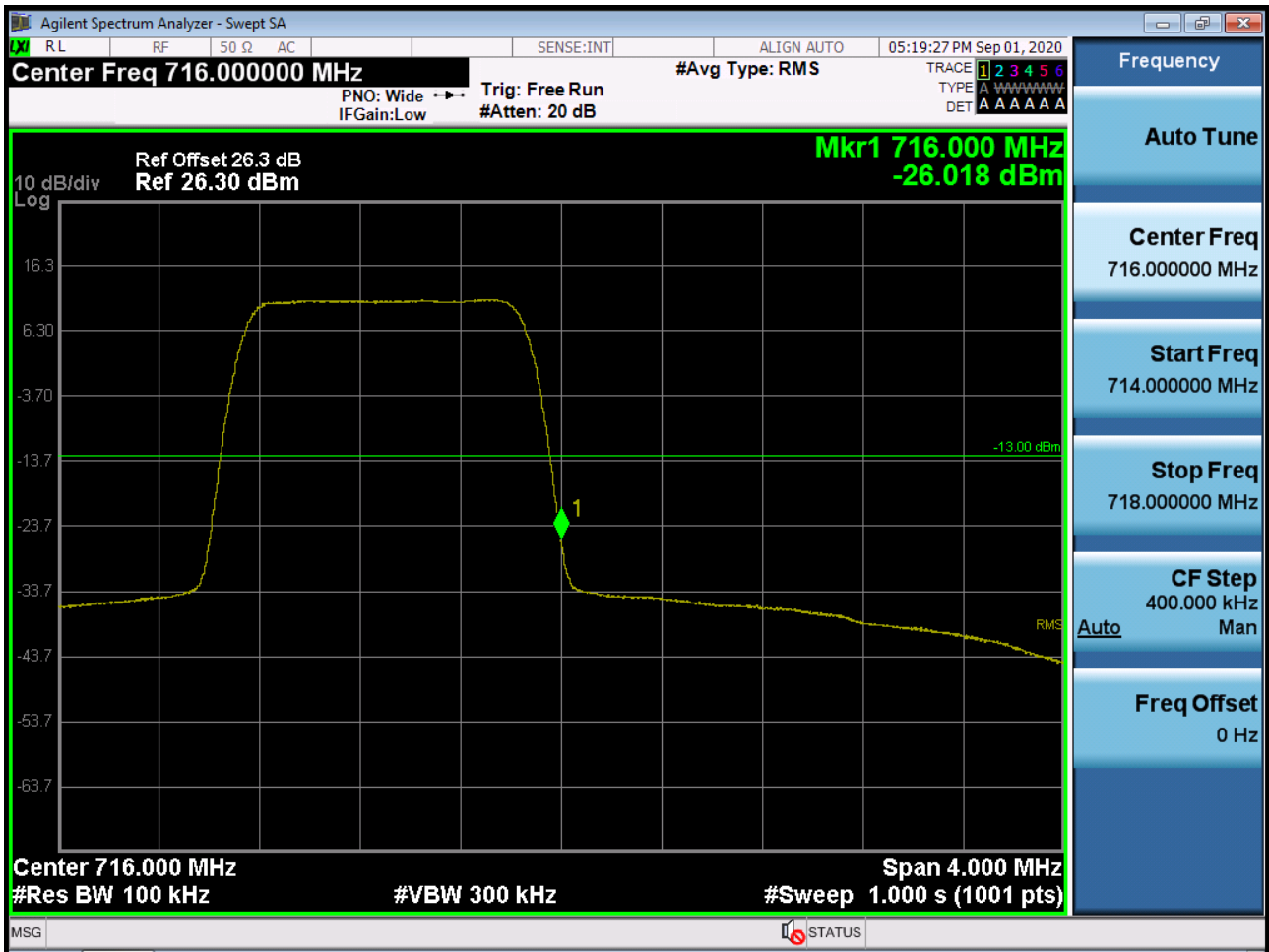
BAND 12. Upper Band Edge Plot (1.4M BW Ch.23173 QPSK\_RB1\_Offset 5)\_1



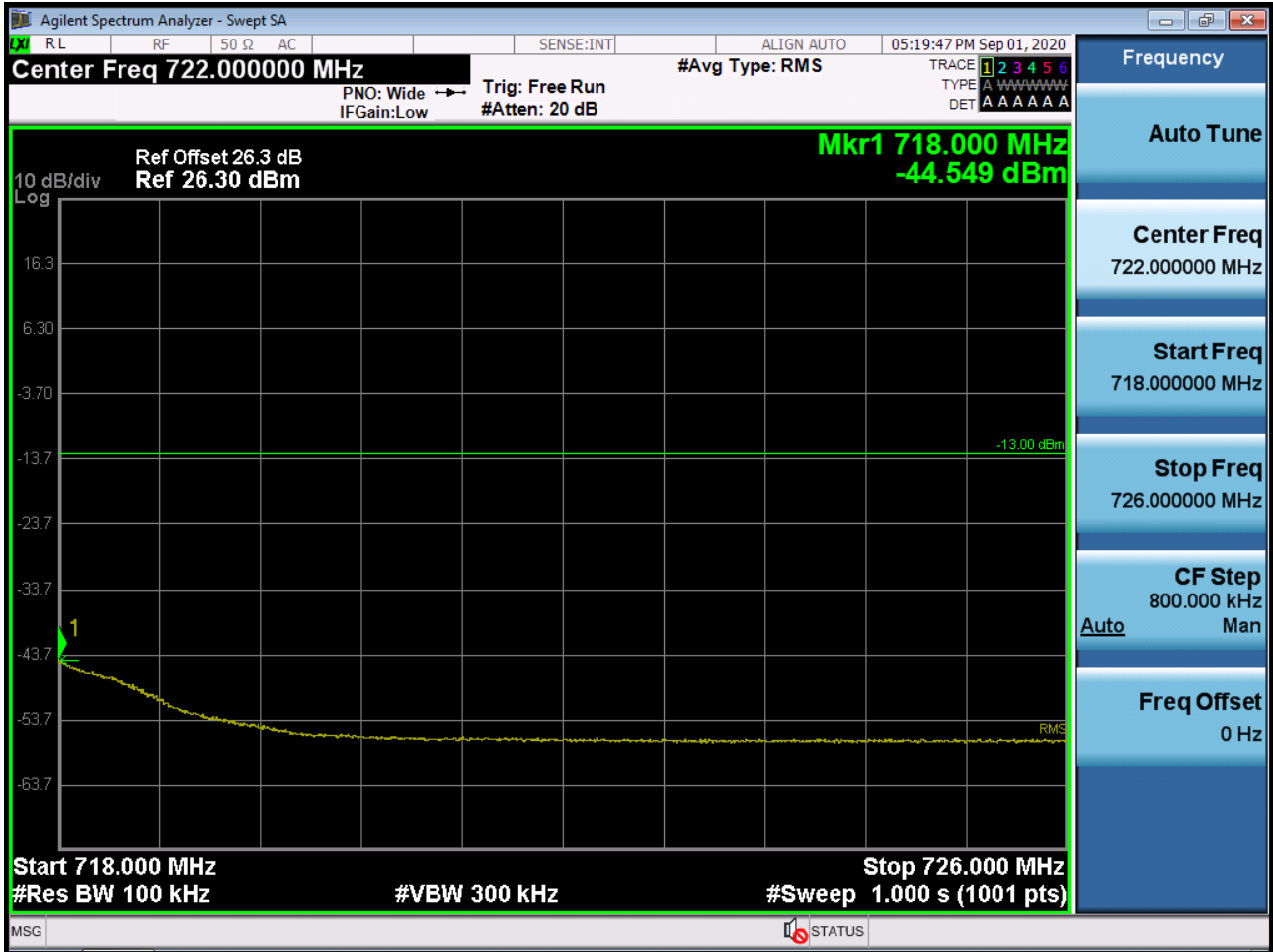
BAND 12. Upper Band Edge Plot (1.4M BW Ch.23173 QPSK\_RB1\_Offset 5)\_2



BAND 12. Upper Band Edge Plot (1.4M BW Ch.23173 QPSK\_RB6\_Offset 0)



BAND 12. Upper Extended Band Edge Plot (1.4M BW Ch.23173 QPSK\_RB6\_0)



BAND 12. Upper Band Edge Plot (3M BW Ch.23165 QPSK\_RB1\_Offset 14)-1



BAND 12. Upper Band Edge Plot (3M BW Ch.23165 QPSK\_RB1\_Offset 14)-2



BAND 12. Upper Band Edge Plot (3M BW Ch.23165 QPSK\_RB15\_Offset 0)





BAND 12. Upper Extended Band Edge Plot (3M BW Ch.23165 QPSK\_RB15\_0)



BAND 12/17. Upper Band Edge Plot (5M BW Ch.23155 QPSK\_RB1\_Offset 24)\_1



BAND 12/17. Upper Band Edge Plot (5M BW Ch.23155 QPSK\_RB1\_Offset 24)\_2



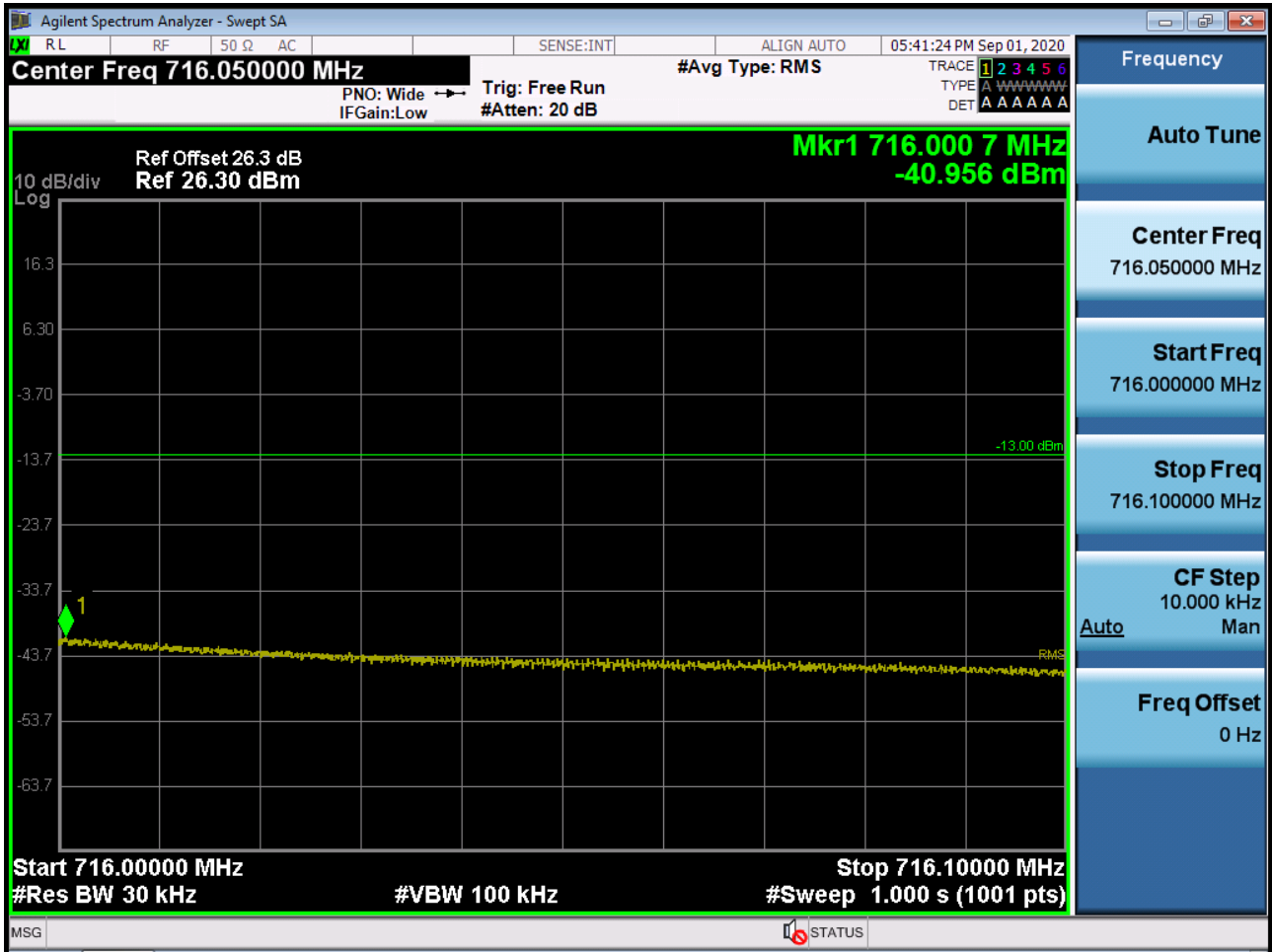
BAND 12/17. Upper Band Edge Plot (5M BW Ch.23155 QPSK\_RB25\_Offset 0)



BAND 12/17. Upper Extended Band Edge Plot (5M BW Ch.23155 QPSK\_RB25\_0)



BAND 12/17. Upper Band Edge Plot (10M BW Ch.23130 QPSK\_RB1\_Offset 49)\_1



BAND 12/17. Upper Band Edge Plot (10M BW Ch.23130 QPSK\_RB1\_Offset 49)\_2



BAND 12/17. Upper Band Edge Plot (10M BW Ch.23130 QPSK\_RB50\_Offset 0)

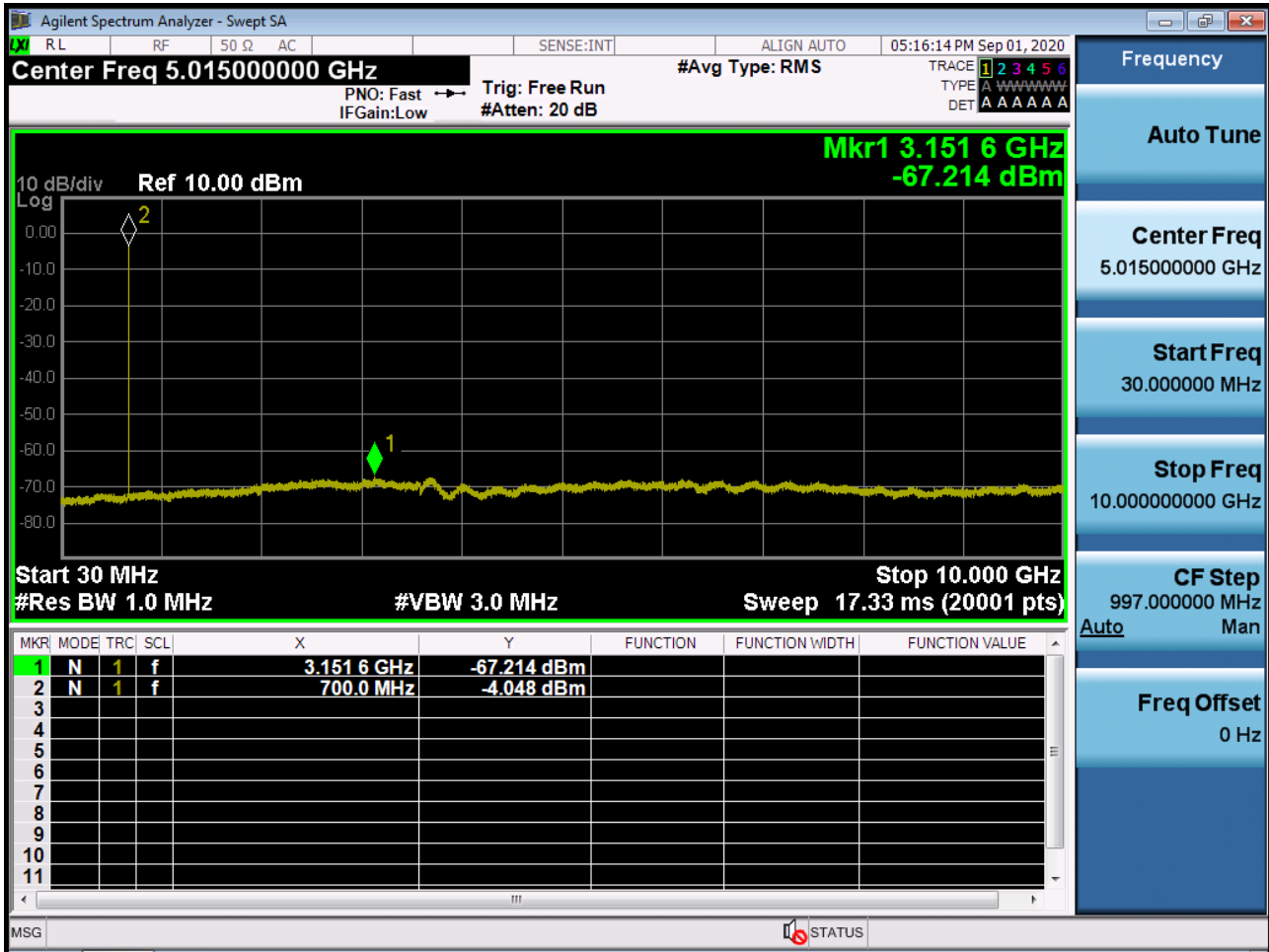




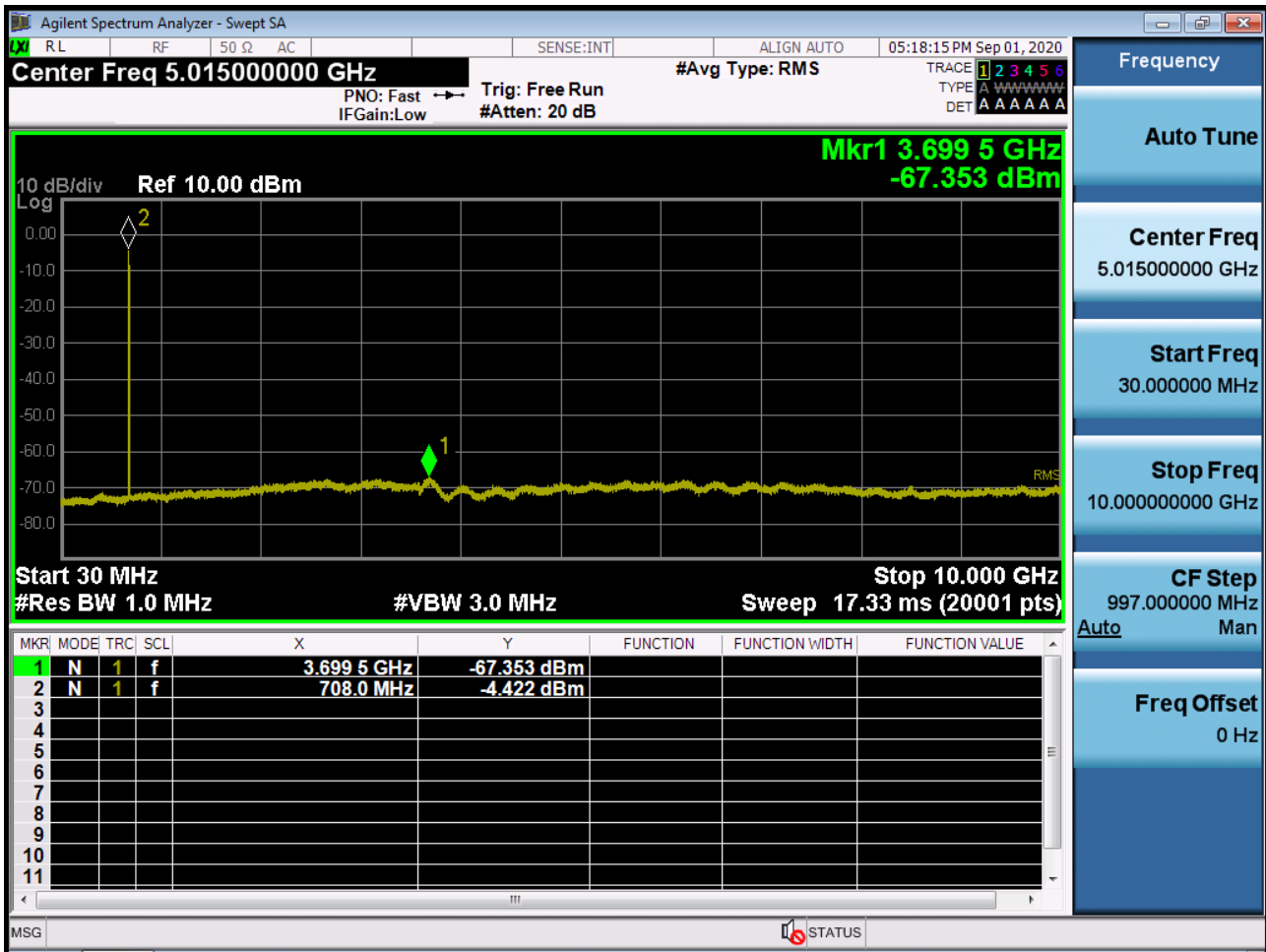
BAND 12/17. Upper Extended Band Edge Plot (10M BW Ch.23130 QPSK\_RB50\_0)



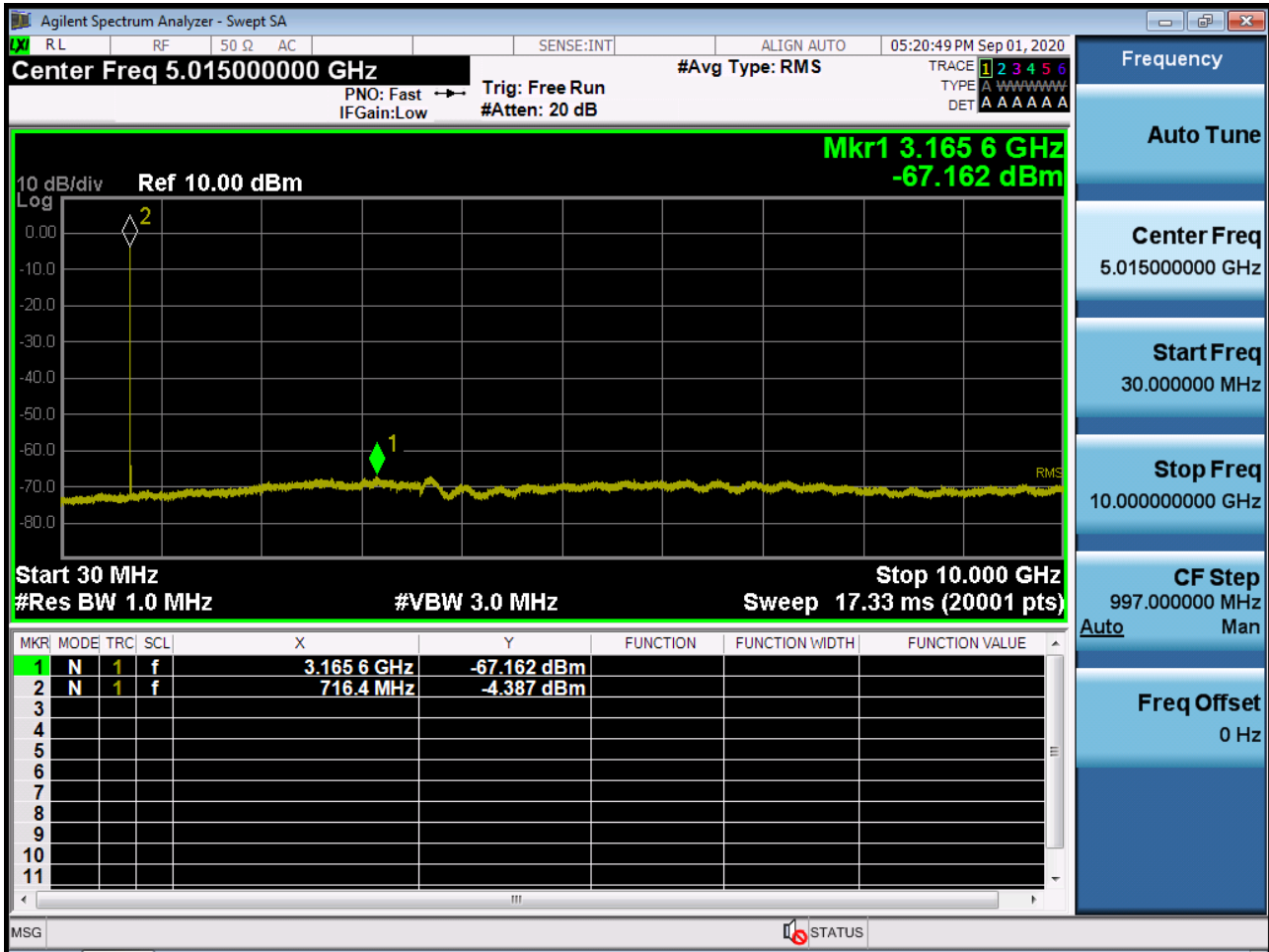
BAND 12. Conducted Spurious Plot \_ (23017ch\_1.4MHz\_QPSK\_RB 1\_0)



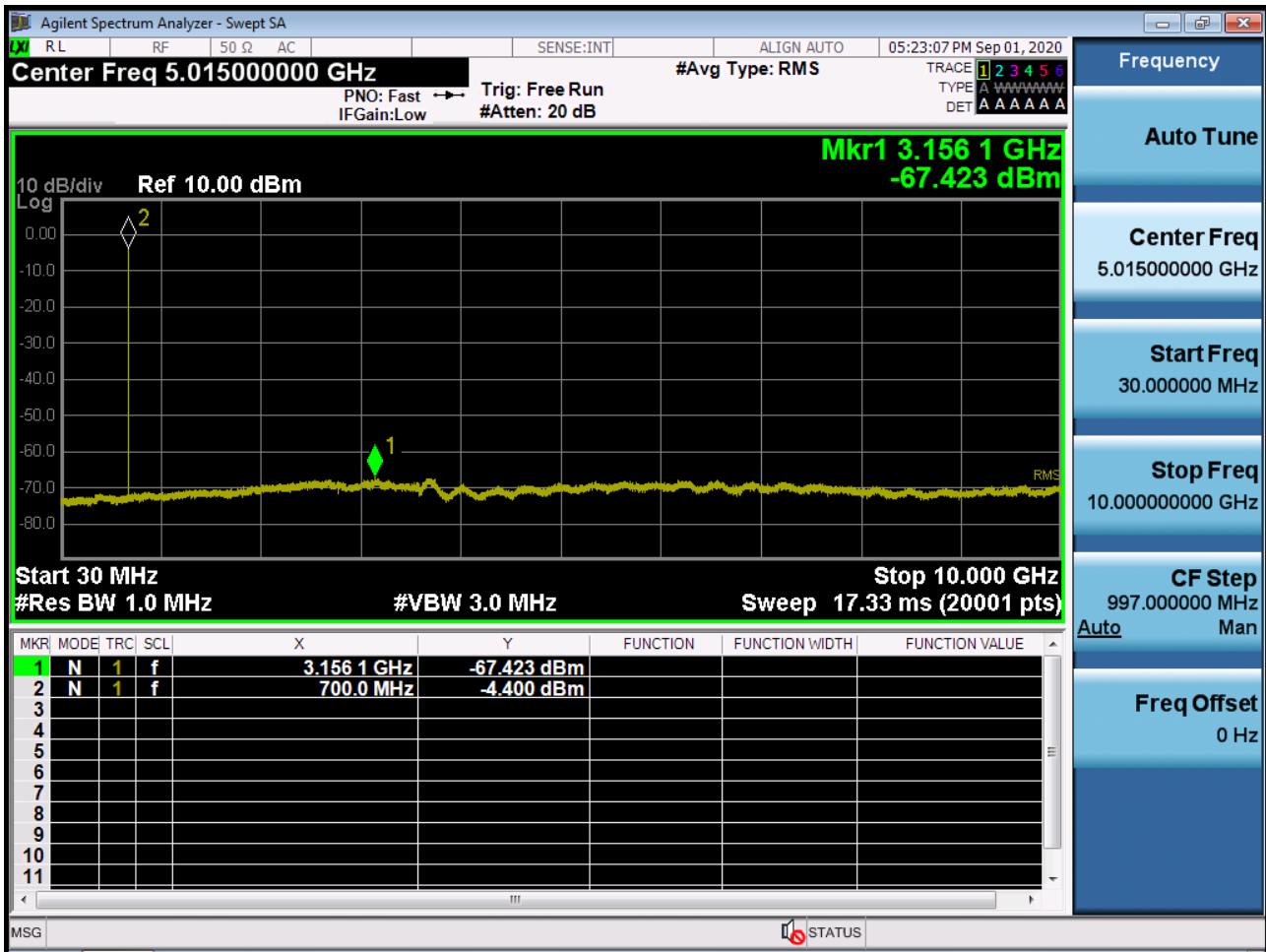
BAND 12. Conducted Spurious Plot \_ (23095ch\_1.4MHz\_QPSK\_RB 1\_0)



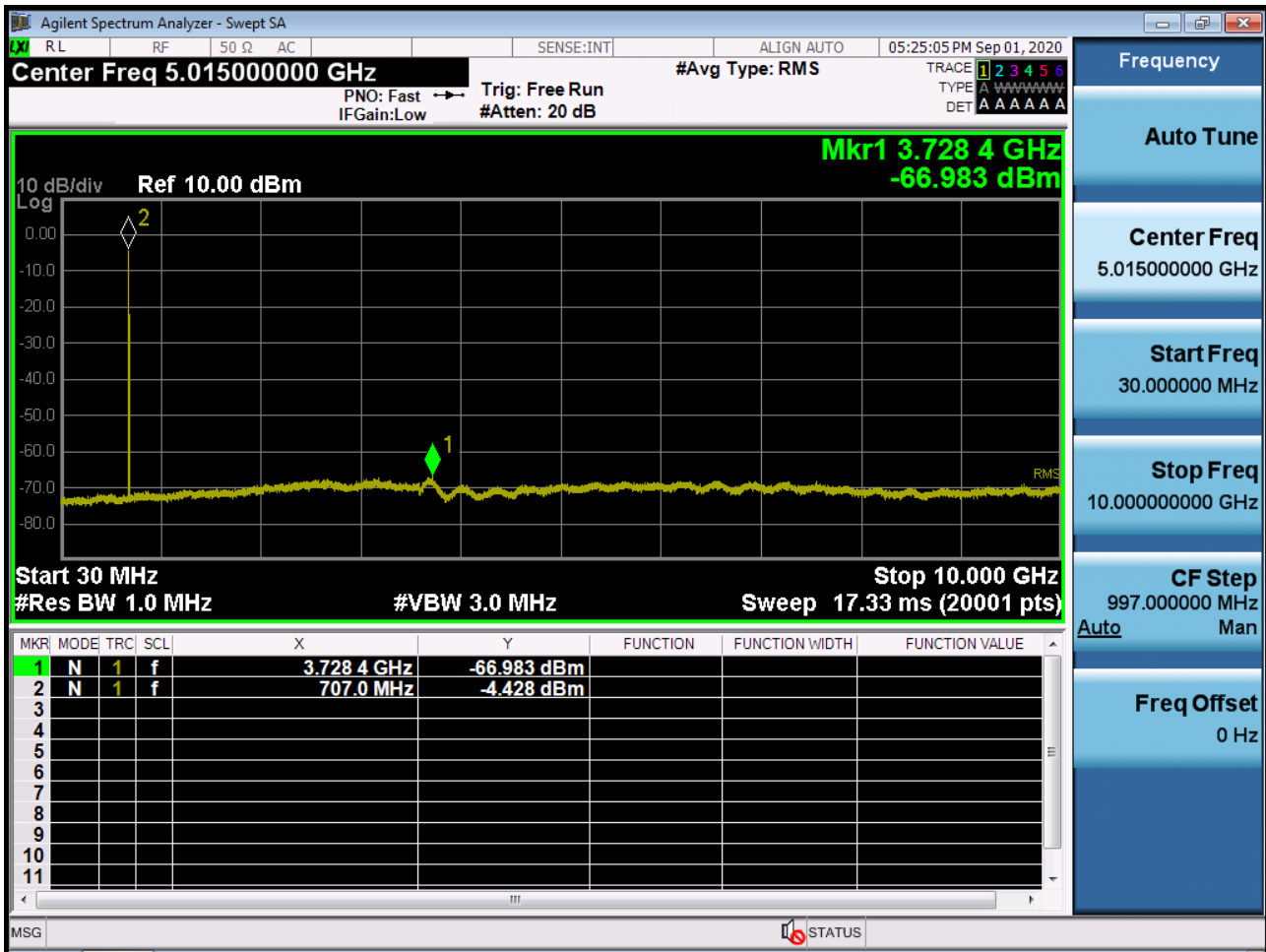
BAND 12. Conducted Spurious Plot \_ (23173ch\_1.4MHz\_QPSK\_RB 1\_0)



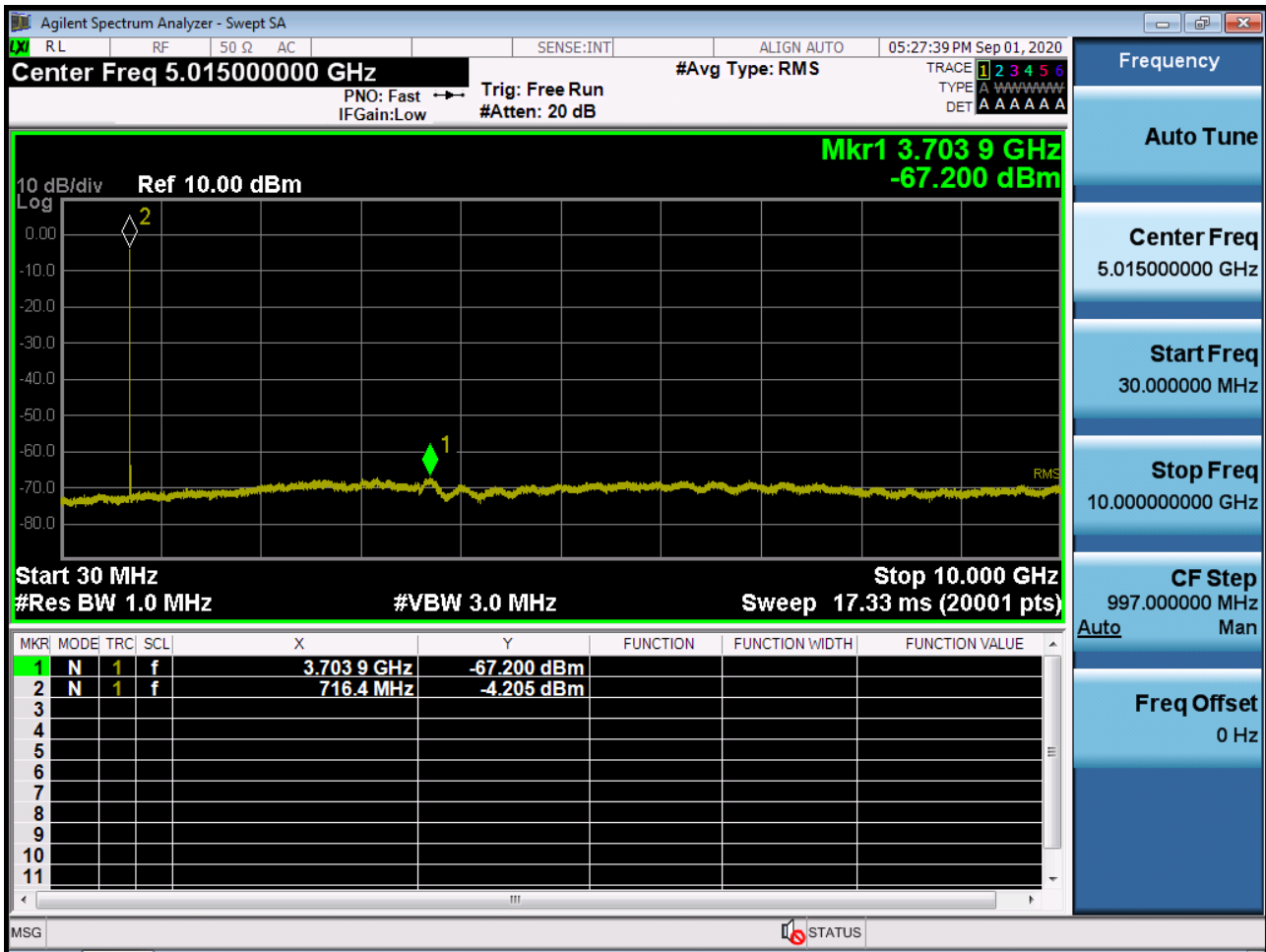
BAND 12. Conducted Spurious Plot \_ (23025ch\_3MHz\_QPSK\_RB 1\_0)



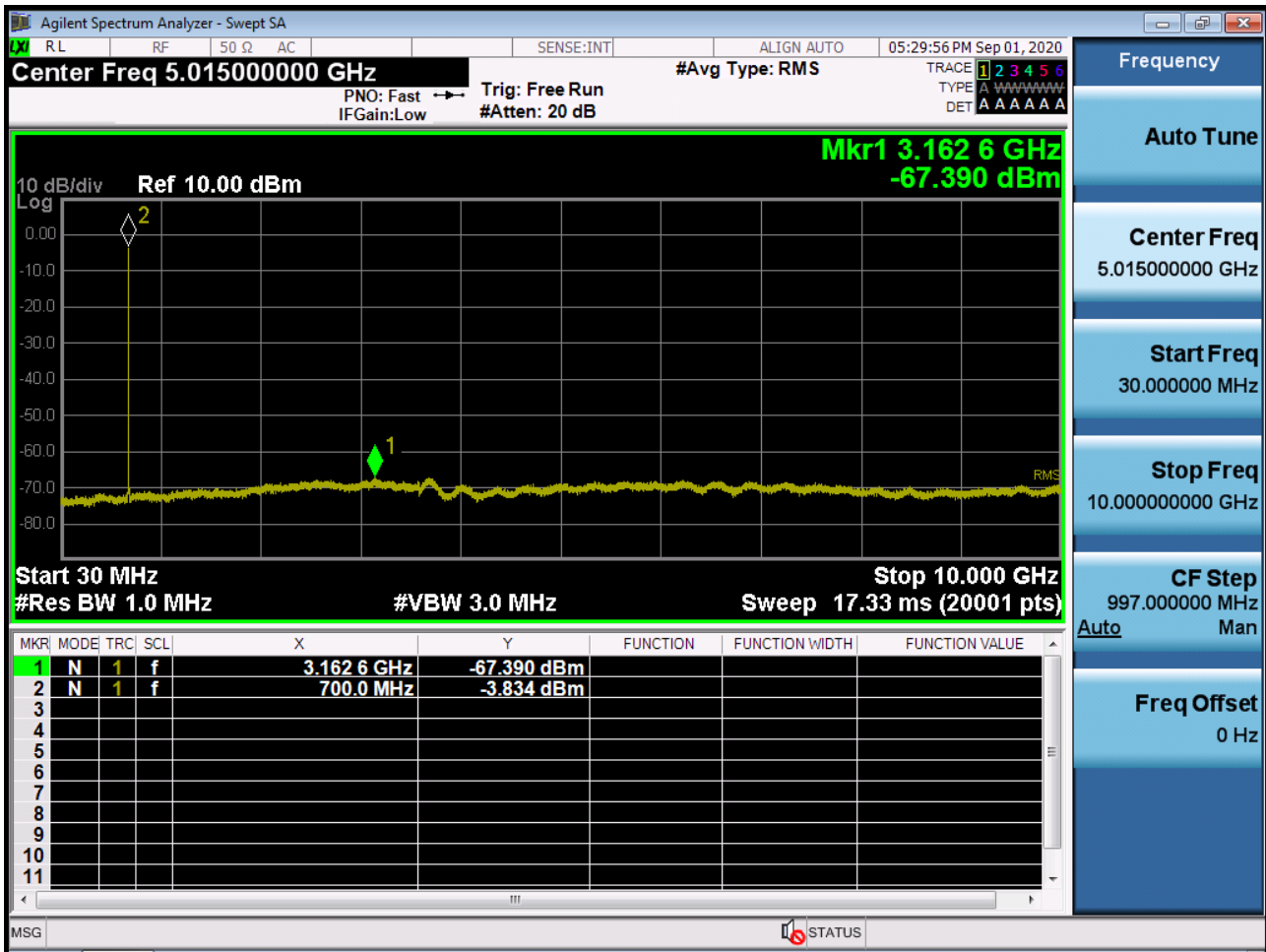
BAND 12. Conducted Spurious Plot \_ (23095ch\_3MHz\_QPSK\_RB 1\_0)



BAND 12. Conducted Spurious Plot \_ (23165ch\_3MHz\_QPSK\_RB 1\_0)

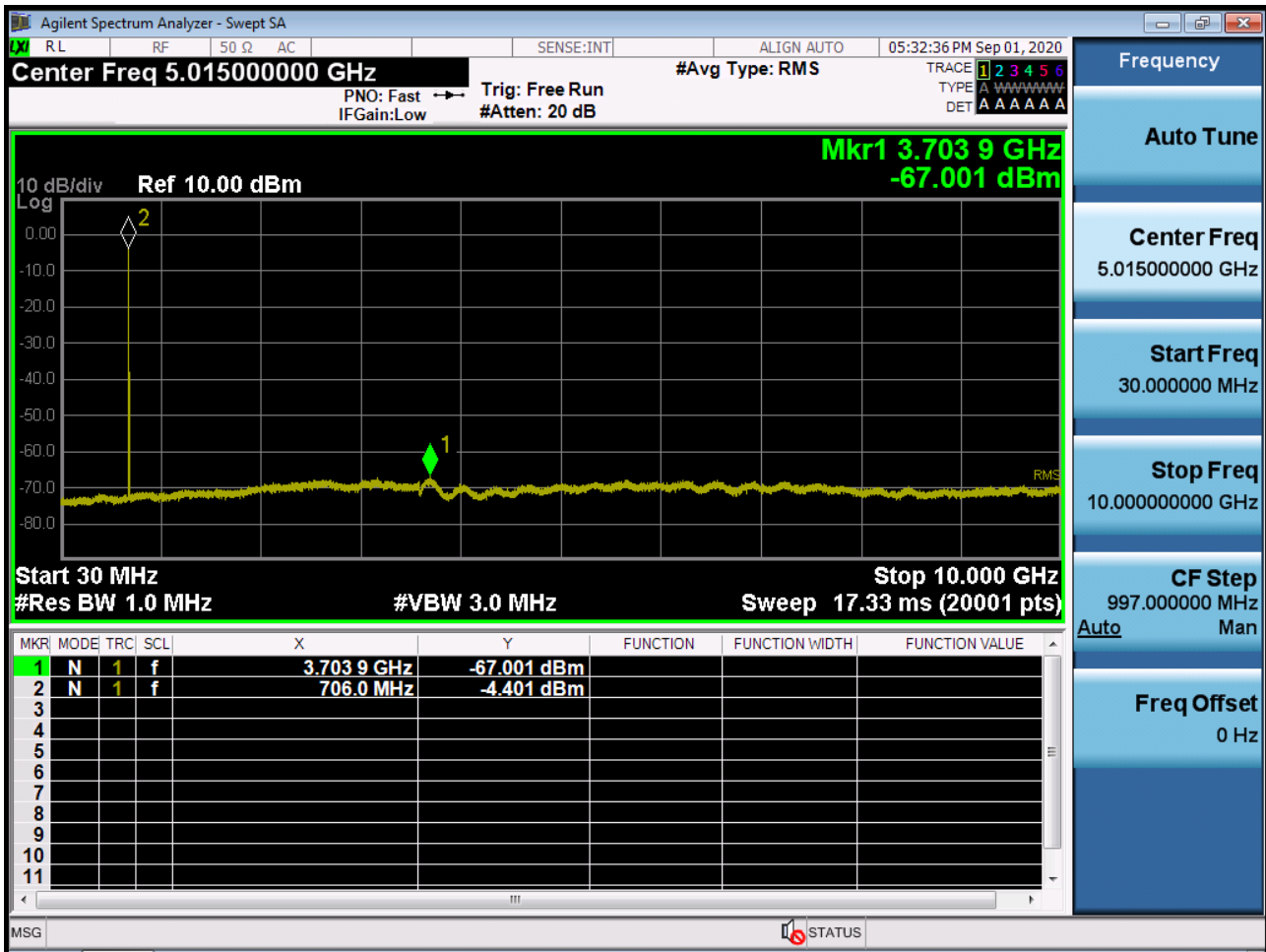


BAND 12/17. Conducted Spurious Plot \_ (23035ch\_5MHz\_QPSK\_RB 1\_0)

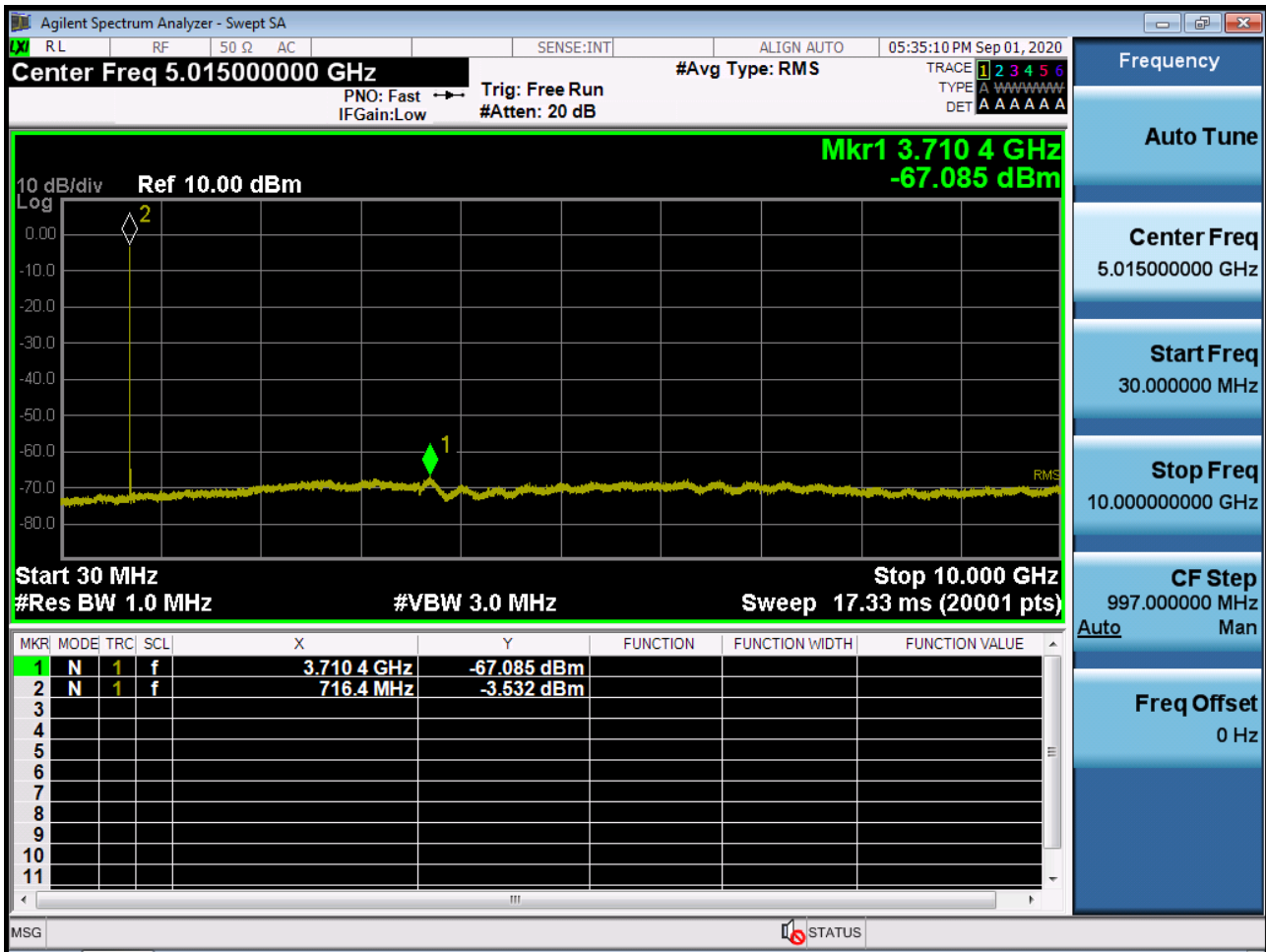




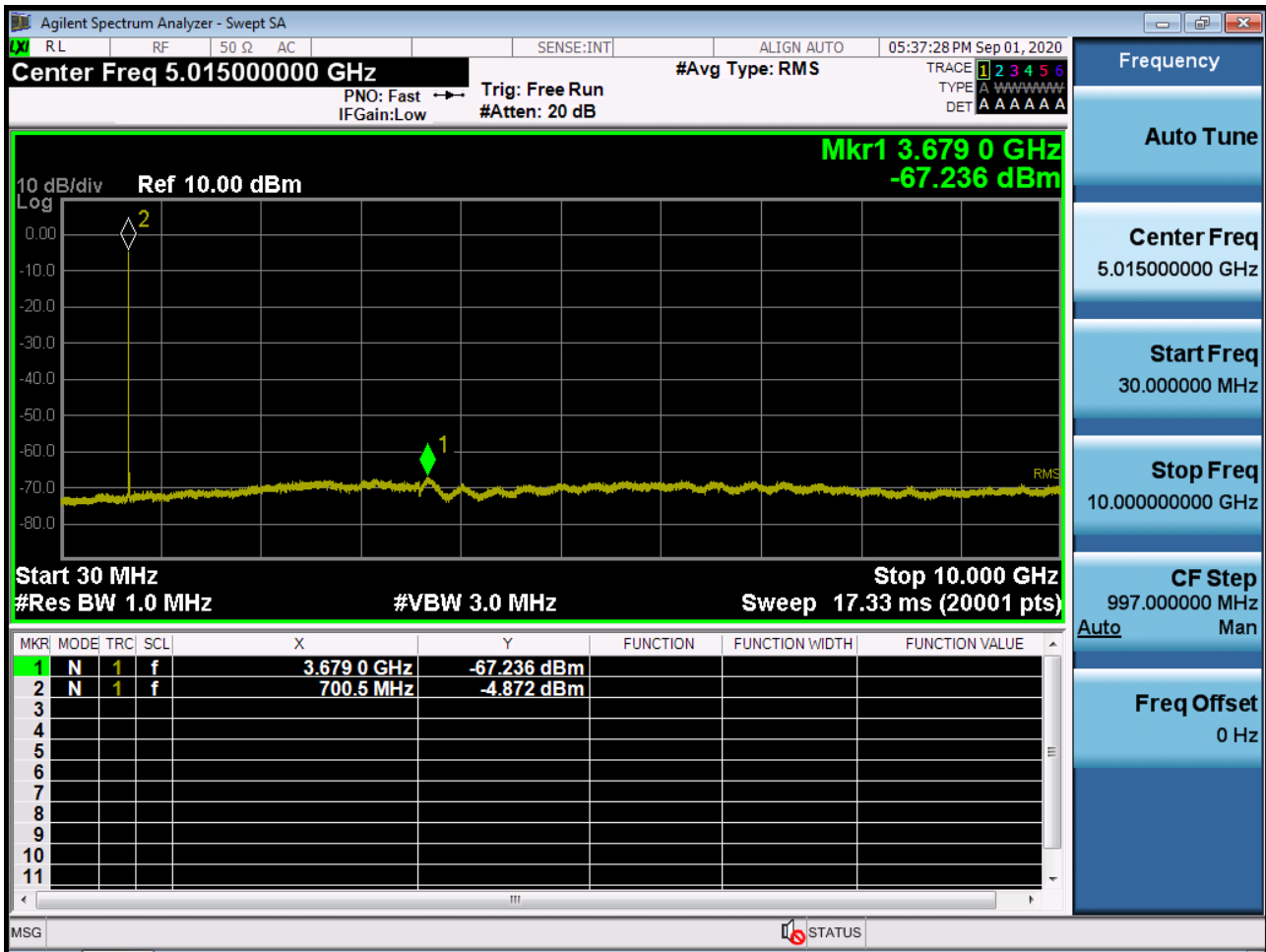
BAND 12/17. Conducted Spurious Plot \_ (23095ch\_5MHz\_QPSK\_RB 1\_0)



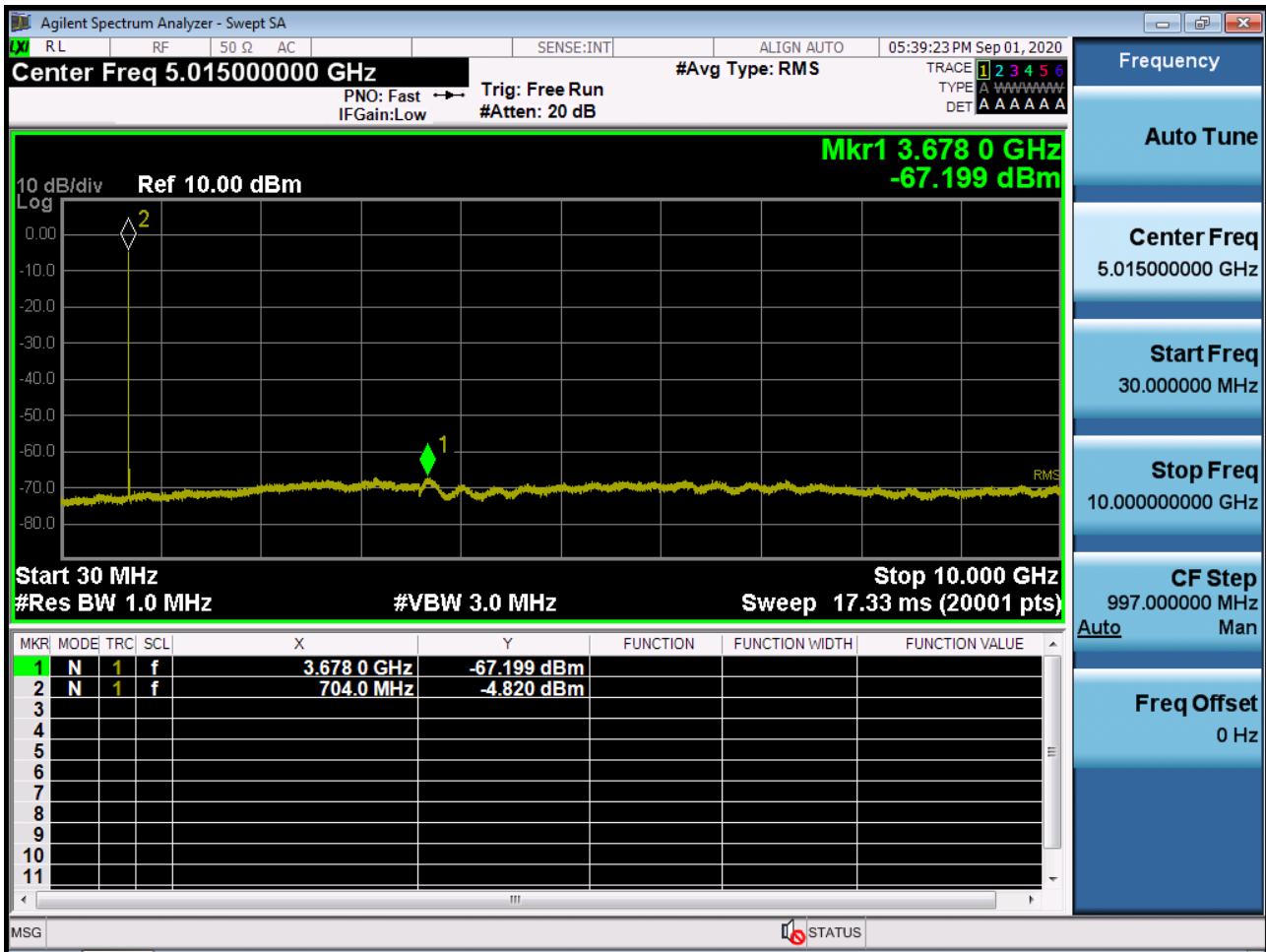
BAND 12/17. Conducted Spurious Plot \_ (23155ch\_5MHz\_QPSK\_RB 1\_0)



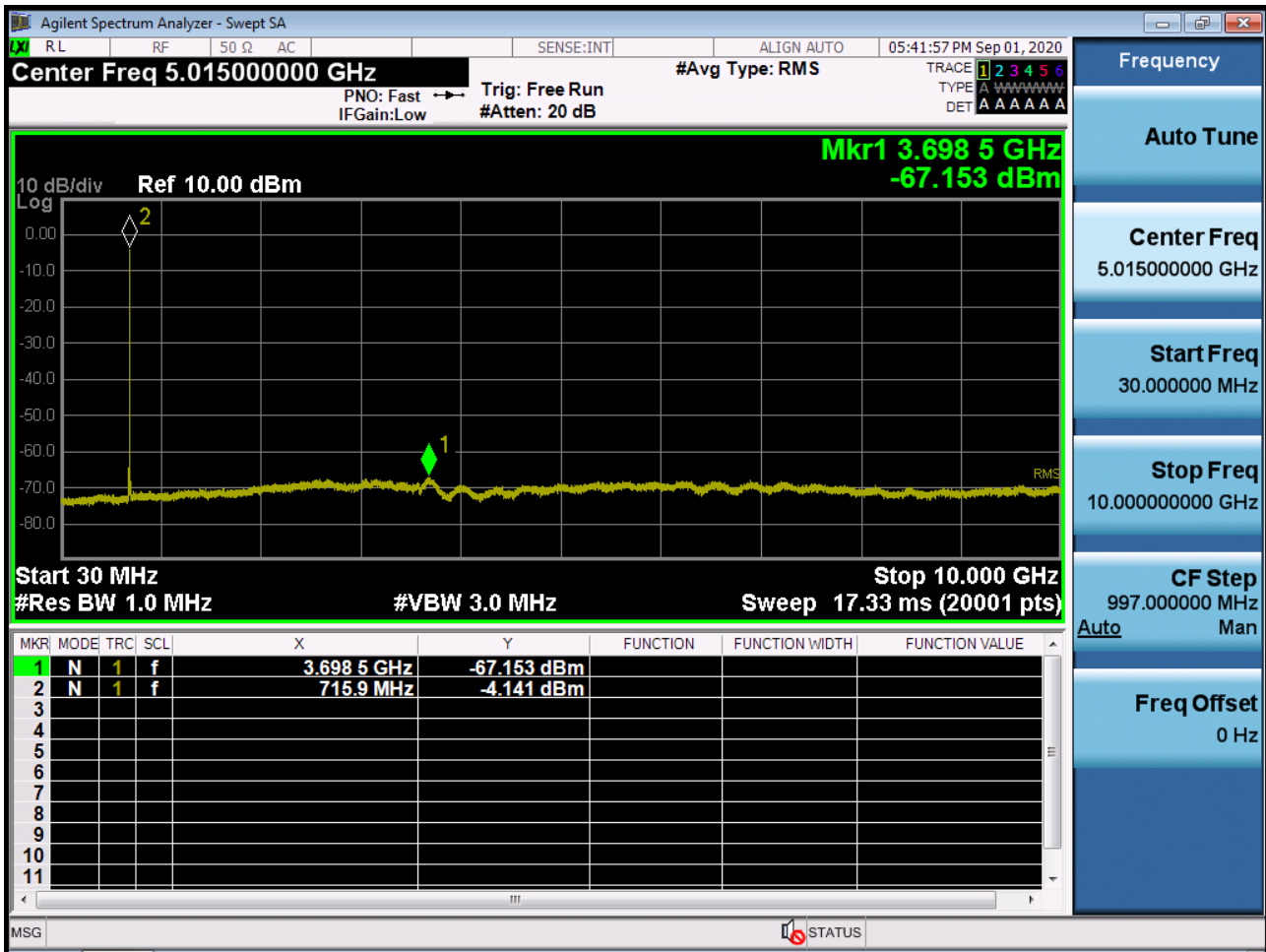
BAND 12/17. Conducted Spurious Plot \_ (23060ch\_10MHz\_QPSK\_RB 1\_0)



BAND 12/17. Conducted Spurious Plot \_ (23095ch\_10MHz\_QPSK\_RB 1\_0)



BAND 12/17. Conducted Spurious Plot \_ (23130ch\_10MHz\_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-2009-FC007-P