

# FCC LTE REPORT

## Certification

**Applicant Name:**  
SAMSUNG Electronics Co., Ltd.

**Date of Issue:**  
October 20, 2021

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

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

**Report No.:** HCT-RF-2109-FC050

**FCC ID:** A3LSMA136U

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

Model(s): SM-A136U  
 Additional Model(s): SM-A136U1, SM-S136DL  
 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	EIRP	
				Max. Power (W)	Max. Power (dBm)
LTE – Band66/4 (1.4)	1710.7 – 1779.3	1M10G7D	QPSK	0.181	22.58
		1M09W7D	16QAM	0.148	21.69
		1M10W7D	64QAM	0.120	20.79
LTE – Band66/4 (3)	1711.5 – 1778.5	2M71G7D	QPSK	0.175	22.43
		2M69W7D	16QAM	0.150	21.76
		2M70W7D	64QAM	0.122	20.85
LTE – Band66/4 (5)	1712.5 – 1777.5	4M52G7D	QPSK	0.186	22.70
		4M49W7D	16QAM	0.153	21.85
		4M52W7D	64QAM	0.124	20.92
LTE – Band66/4 (10)	1715.0 – 1775.0	8M99G7D	QPSK	0.191	22.82
		8M97W7D	16QAM	0.158	21.98
		8M99W7D	64QAM	0.125	20.96
LTE – Band66/4 (15)	1717.5 – 1772.5	13M4G7D	QPSK	0.186	22.70
		13M5W7D	16QAM	0.155	21.90
		13M5W7D	64QAM	0.122	20.85
LTE – Band66/4 (20)	1720.0 – 1770.0	18M0G7D	QPSK	0.182	22.61
		17M9W7D	16QAM	0.151	21.80
		17M9W7D	64QAM	0.118	20.72

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-2109-FC050

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REVIEWED BY



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

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

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

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

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

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# Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2109-FC050	October 20, 2021	- 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>	A3LSMA136U
<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-A136U
<b>Additional Model(s):</b>	SM-A136U1, SM-S136DL
<b>Tx Frequency:</b>	1710.7 MHz – 1779.3 MHz (LTE – Band 66/4 (1.4 MHz)) 1711.5 MHz – 1778.5 MHz (LTE – Band 66/4 (3 MHz)) 1712.5 MHz – 1777.5 MHz (LTE – Band 66/4 (5 MHz)) 1715.0 MHz – 1775.0 MHz (LTE – Band 66/4 (10 MHz)) 1717.5 MHz – 1772.5 MHz (LTE – Band 66/4 (15 MHz)) 1720.0 MHz – 1770.0 MHz (LTE – Band 66/4 (20 MHz))
<b>Date(s) of Tests:</b>	August 30, 2021 ~ September 29, 2021
<b>Serial number:</b>	Radiated: 420015e6dca788ff Conducted: R3CR807JS3X

## **2. INTRODUCTION**

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

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

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)
Peak- to- Average Ratio	- KDB 971168 D01 v03r01 – Section 5.7 - ANSI C63.26-2015 – Section 5.2.3.4 - ANSI C63.26-2015 – Section 5.2.6(only GSM)
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 1 MHz
3. VBW  $\geq$  3 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points  $>$  2 x span / RBW
6. Detector = RMS
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto".
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

#### Test Note

1. The turntable is rotated through 360 degrees, and the receiving antenna scans in order to determine the level of the maximized emission.
2. A half wave dipole is then substituted in place of the EUT. For emissions above 1 GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated.

The power is calculated by the following formula;

$$P_d \text{ (dBm)} = P_g \text{ (dBm)} - \text{cable loss (dB)} + \text{antenna gain (dB)}$$

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 = 100 kHz for emissions below 1 GHz and 1 MHz for emissions above 1 GHz
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 1 GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated. The spurious emissions is calculated by the following formula;

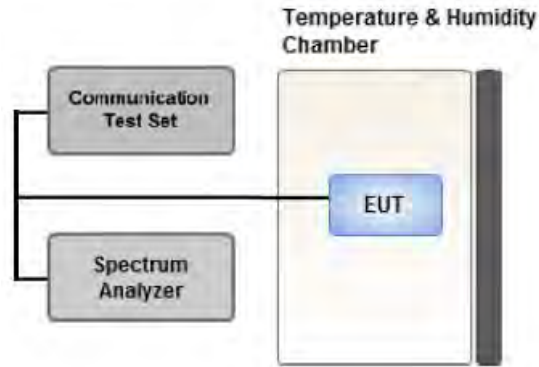
$$\text{Result}_{(dBm)} = P_g_{(dBm)} - \text{cable loss}_{(dB)} + \text{antenna gain}_{(dBi)}$$

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

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

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

### 3.4 PEAK- TO- AVERAGE RATIO



**Test setup**

#### ① CCDF Procedure for PAPR

##### **Test Settings**

1. Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Set the measurement interval as follows:
  - .- for continuous transmissions, set to 1 ms,
  - .- or burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.
4. Record the maximum PAPR level associated with a probability of 0.1 %.

**② Alternate Procedure for PAPR**

Use one of the procedures presented in 5.2(ANSI C63.26-2015) to measure the total peak power and record as  $P_{Pk}$ .  
Use one of the applicable procedures presented 5.2(ANSI C63.26-2015) to measure the total average power and record as  $P_{Avg}$ . Determine the P.A.R. from:

$$P.A.R. (dB) = P_{Pk} (dBm) - P_{Avg} (dBm) \quad (P_{Avg} = \text{Average Power} + \text{Duty cycle Factor})$$

**Test Settings(Peak Power)**

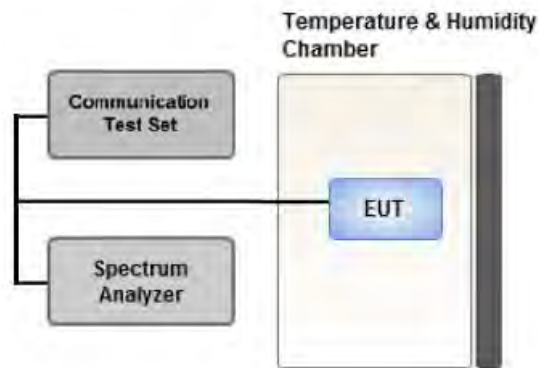
The measurement instrument must have a RBW that is greater than or equal to the OBW of the signal to be measured and a VBW  $\geq 3 \times$  RBW.

1. Set the RBW  $\geq$  OBW.
2. Set VBW  $\geq 3 \times$  RBW.
3. Set span  $\geq 2 \times$  OBW.
4. Sweep time  $\geq 10 \times$  (number of points in sweep)  $\times$  (transmission symbol period).
5. Detector = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the peak amplitude level.

**Test Settings(Average Power)**

1. Set span to  $2 \times$  to  $3 \times$  the OBW.
2. Set RBW  $\geq$  OBW.
3. Set VBW  $\geq 3 \times$  RBW.
4. Set number of measurement points in sweep  $\geq 2 \times$  span / RBW.
5. Sweep time:  
Set  $\geq [10 \times (\text{number of points in sweep}) \times (\text{transmission period})]$  for single sweep (automation-compatible) measurement. The transmission period is the (on + off) time.
6. Detector = power averaging (rms).
7. Set sweep trigger to "free run."
8. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. (To accurately determine the average power over the on and off period of the transmitter, it can be necessary to increase the number of traces to be averaged above 100 or, if using a manually configured sweep time, increase the sweep time.)
9. Use the peak marker function to determine the maximum amplitude level.
10. Add  $[10 \log (1/\text{duty cycle})]$  to the measured maximum power level to compute the average power during continuous transmission. For example, add  $[10 \log (1/0.25)] = 6$  dB if the duty cycle is a constant 25 %.

### 3.5 OCCUPIED BANDWIDTH.



#### Test setup

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

The EUT makes a call to the communication simulator.

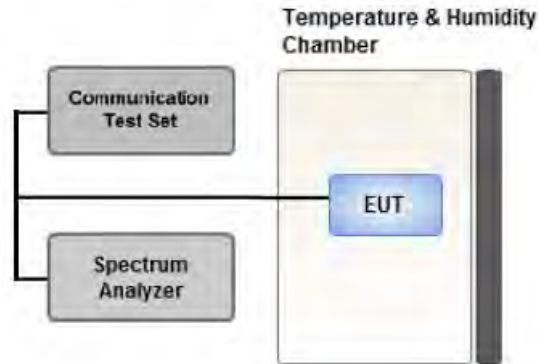
The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth

#### Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99 % occupied bandwidth and the 26 dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5 % of the expected OBW
3. VBW  $\geq 3 \times$  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

### 3.6 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL



**Test setup**

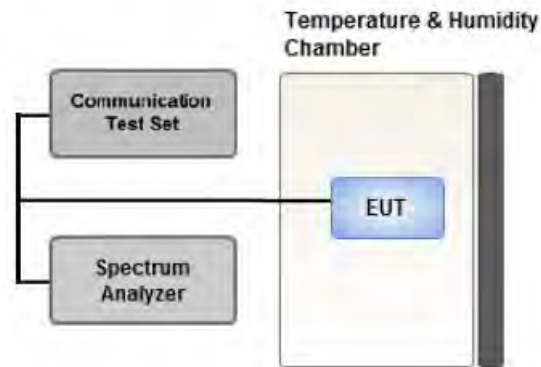
#### **Test Overview**

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

#### **Test Settings**

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

### 3.7 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  $\geq 2 \times \text{Span}/\text{RBW}$
7. Trace mode = trace average
8. Sweep time = auto couple
9. The trace was allowed to stabilize

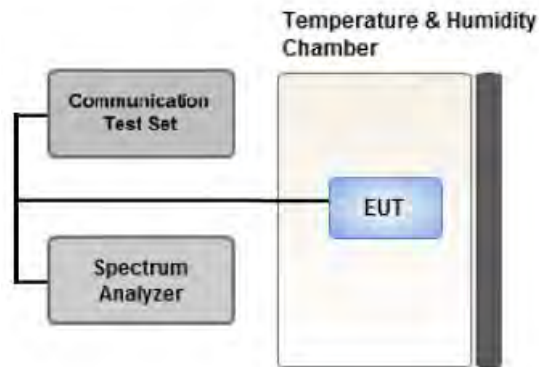
#### **Test Notes**

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.

### 3.8 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE



#### Test setup

#### Test Overview

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

The frequency stability of the transmitter is measured by:

1. Temperature:

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

2. Primary Supply Voltage:

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

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

#### Test Settings

1. The carrier frequency of the transmitter is measured at room temperature

(20 °C to provide a reference).

2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.

3. Frequency measurements are made at 10 °C intervals ranging from -30 °C to +50 °C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

**3.9 WORST CASE(RADIATED TEST)**

- The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
- All modes of operation were investigated and the worst case configuration results are reported.  
(In the case of radiated spurious emissions, only the B.W result that confirmed the maximum radiated power was reported.)
- The worst case is reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the test data.
- Please refer to the table below.
- LTE Band 66 (1710 – 1780 MHz) overlaps the entire frequency range of LTE Band 4 (1710 - 1755 MHz) and they have the same Tune-up power.  
Therefore, test data provided in this report covers Band 4 as well as Band 66.
- SM-A136U & additional models were tested and the worst case results are reported.  
(Worst case : SM-A136U)

[ Worst case ]

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



**3.10 WORST CASE(CONDUCTED TEST)**

- All modes of operation were investigated and the worst case configuration results are reported.
- LTE Band 66 (1710 – 1780 MHz) overlaps the entire frequency range of LTE Band 4 (1710 - 1755 MHz) and they have the same Tune-up power.

Therefore, test data provided in this report covers Band 4 as well as Band 66.

- SM-A136U & additional models were tested and the worst case results are reported.

(Worst case : SM-A136U)

[ Worst case ]

Test Description	Modulation	Bandwidth (MHz)	Frequency	RB size	RB offset		
Occupied Bandwidth	QPSK, 16QAM, 64QAM	1.4, 3, 5, 10, 15, 20	Mid	Full RB	0		
Peak-To-Average Ratio	QPSK, 16QAM, 64QAM	1.4, 3, 5, 10, 15, 20	Mid	Full RB	0		
Band Edge	QPSK	1.4	Low	1	0		
			High	1	5		
		3	Low	1	0		
			High	1	14		
		5	Low	1	0		
			High	1	24		
		10	Low	1	0		
			High	1	49		
		15	Low	1	0		
			High	1	74		
		20	Low	1	0		
			High	1	99		
				1.4, 3, 5, 10, 15, 20	Low, High	Full RB	0
		Spurious and Harmonic Emissions at Antenna Terminal	QPSK	1.4, 3, 5, 10, 15, 20	Low, Mid, High	1	0

#### 4. LIST OF TEST EQUIPMENT

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
H.P.F	FBSR-02B(WHK1.2/15 G-10EF)	T&M SYSTEM	-	03/02/2022	Annual
H.P.F	FBSR-02B(WHK3.3/18 G-10EF)	T&M SYSTEM	-	03/02/2022	Annual
Power Splitter(DC ~ 26.5 GHz)	11667B	Hewlett Packard	11275	04/07/2022	Annual
DC Power Supply	E3632A	Agilent	MY40010147	06/28/2022	Annual
Dipole Antenna	UHAP	Schwarzbeck	557	04/05/2023	Biennial
Dipole Antenna	UHAP	Schwarzbeck	558	04/05/2023	Biennial
Chamber	SU-642	ESPEC	93008124	03/15/2022	Annual
Horn Antenna(1 ~ 18 GHz)	BBHA 9120D	Schwarzbeck	147	08/30/2022	Biennial
Horn Antenna(1 ~ 18 GHz)	BBHA 9120D	Schwarzbeck	9120D-1298	09/15/2023	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170342	10/13/2022	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170124	02/11/2022	Biennial
Signal Analyzer(10 Hz ~ 26.5 GHz)	N9020A	Agilent	MY50200093	11/17/2021	Annual
ATTENUATOR(20 dB)	8493C	Hewlett Packard	17280	06/01/2022	Annual
Spectrum Analyzer(10 Hz ~ 40 GHz)	FSV40	REOHDE & SCHWARZ	100931	09/29/2022	Annual
Base Station	8960 (E5515C)	Agilent	MY48360800	08/18/2022	Annual
Loop Antenna(9 kHz ~ 30 MHz)	FMZB1513	Schwarzbeck	1513-333	03/19/2022	Biennial
Bilog Antenna	VULB9160	Schwarzbeck	3150	03/03/2023	Biennial
Hybrid Antenna	VULB9168	Schwarzbeck	760	02/22/2023	Biennial
Wideband Radio Communication Tester	MT8821C	Anritsu Corp.	6262116770	07/12/2022	Annual
Wideband Radio Communication Tester	MT8820C	Anritsu Corp.	6201026545	01/07/2022	Annual
SIGNAL GENERATOR (100 kHz ~ 40 GHz)	SMB100A	REOHDE & SCHWARZ	177633	07/05/2022	Annual
Signal Analyzer(5 Hz ~ 40.0 GHz)	N9030B	KEYSIGHT	MY55480167	06/02/2022	Annual
FCC LTE Mobile Conducted RF Automation Test Software	-	HCT CO., LTD.,	-	-	-

**Note:**

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 (Confidence level about 95 %, $k=2$ )
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40 (Confidence level about 95 %, $k=2$ )
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80 (Confidence level about 95 %, $k=2$ )
Radiated Disturbance (1 GHz ~ 18 GHz)	5.70 (Confidence level about 95 %, $k=2$ )
Radiated Disturbance (18 GHz ~ 40 GHz)	5.05 (Confidence level about 95 %, $k=2$ )

## 6. SUMMARY OF TEST RESULTS

### 6.1 Test Condition : Conducted Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Occupied Bandwidth	§2.1049	N/A	PASS
Band Edge / Spurious and Harmonic Emissions at Antenna Terminal.	§2.1051, §27.53(h)	< 43 + 10log10 (P[Watts]) at Band Edge and for all out-of-band emissions	PASS
Conducted Output Power	§2.1046	N/A	<b>See Note1</b>
Peak- to- Average Ratio	27.50(d)(5)	< 13 dB	PASS
Frequency stability / variation of ambient temperature	§2.1055, § 27.54	Emission must remain in band	PASS

**Note:**

1. See SAR Report

### 6.2 Test Condition : Radiated Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Equivalent Isotropic Radiated Power	27.50(d)(4)	< 1 Watts max. EIRP	PASS
Radiated Spurious and Harmonic Emissions	§2.1053, §27.53(h)	< 43 + 10log10 (P[Watts]) for all out-of band emissions	PASS

## 7. SAMPLE CALCULATION

### 7.1 ERP Sample Calculation

Ch./ Freq.		Measured Level(dBm)	Substitute Level(dBm)	Ant. Gain (dBd)	C.L	Pol.	ERP	
channel	Freq.(MHz)						W	dBm
128	824.20	-21.37	38.40	-10.61	0.95	H	0.483	26.84

**ERP = Substitute LEVEL(dBm) + Ant. Gain – CL(Cable Loss)**

- 1) The EUT mounted on a non-conductive turntable is 2.5 meter above test site ground level.
- 2) During the test , the turn table is rotated until the maximum signal is found.
- 3) Record the field strength meter's level.
- 4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
- 5) Increase the signal generator output till the field strength meter's level is equal to the item (3).
- 6) The signal generator output level with Ant. Gain and cable loss are the rating of effective radiated power.

### 7.2 EIRP Sample Calculation

Ch./ Freq.		Measured Level(dBm)	Substitute Level(dBm)	Ant. Gain (dBi)	C.L	Pol.	EIRP	
channel	Freq.(MHz)						W	dBm
132322	1,732.50	-15.75	18.45	9.90	1.76	H	0.456	26.59

**EIRP = Substitute LEVEL(dBm) + Ant. Gain – CL(Cable Loss)**

- 1) The EUT mounted on a non-conductive turntable is 2.5 meter above test site ground level.
- 2) During the test , the turn table is rotated until the maximum signal is found.
- 3) Record the field strength meter's level.
- 4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
- 5) Increase the signal generator output till the field strength meter's level is equal to the item (3).
- 6) The signal generator output level with Ant. Gain and cable loss are the rating of equivalent isotropic radiated power.

### 7.3. Emission Designator

#### GSM Emission Designator

**Emission Designator = 249KGXW**

GSM BW = 249 kHz

G = Phase Modulation

X = Cases not otherwise covered

W = Combination (Audio/Data)

#### EDGE Emission Designator

**Emission Designator = 249KG7W**

GSM BW = 249 kHz

G = Phase Modulation

7 = Quantized/Digital Info

W = Combination (Audio/Data)

#### WCDMA Emission Designator

**Emission Designator = 4M17F9W**

WCDMA BW = 4.17 MHz

F = Frequency Modulation

9 = Composite Digital Info

W = Combination (Audio/Data)

#### QPSK Modulation

**Emission Designator = 4M48G7D**

LTE BW = 4.48 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission; telemetry; telecommand

#### QAM Modulation

Emission Designator = 4M48W7D

LTE BW = 4.48 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Data transmission; telemetry; telecommand

## 8. TEST DATA

### 8.1 EQUIVALENT ISOTROPIC RADIATED POWER

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP	
								W	W	dBm
1710.7	LTE B66/ B4 1.4 MHz	QPSK	-20.39	13.40	10.04	2.05	H	< 1.00	0.138	21.39
		16-QAM	-21.20	12.59	10.04	2.05	H		0.114	20.58
		64-QAM	-22.23	11.56	10.04	2.05	H		0.090	19.55
1745.0		QPSK	-20.28	13.44	10.18	2.06	H		0.143	21.56
		16-QAM	-20.63	13.09	10.18	2.06	H		0.132	21.21
		64-QAM	-21.57	12.15	10.18	2.06	H		0.106	20.27
1779.3		QPSK	-19.29	14.39	10.26	2.07	H		0.181	22.58
		16-QAM	-20.18	13.50	10.26	2.07	H		0.148	21.69
		64-QAM	-21.08	12.60	10.26	2.07	H		0.120	20.79

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP	
								W	W	dBm
1711.5	LTE B66/ B4 3 MHz	QPSK	-20.34	13.45	10.04	2.05	H	< 1.00	0.139	21.44
		16-QAM	-21.14	12.65	10.04	2.05	H		0.116	20.64
		64-QAM	-22.20	11.59	10.04	2.05	H		0.091	19.58
1745.0		QPSK	-19.97	13.75	10.18	2.06	H		0.154	21.87
		16-QAM	-20.69	13.03	10.18	2.06	H		0.130	21.15
		64-QAM	-21.67	12.05	10.18	2.06	H		0.104	20.17
1778.5		QPSK	-19.44	14.24	10.26	2.07	H		0.175	22.43
		16-QAM	-20.11	13.57	10.26	2.07	H		0.150	21.76
		64-QAM	-21.02	12.66	10.26	2.07	H		0.122	20.85

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP	
								W	W	dBm
1712.5	LTE B66/ B4 5 MHz	QPSK	-20.21	13.58	10.04	2.05	H	< 1.00	0.143	21.57
		16-QAM	-21.04	12.75	10.04	2.05	H		0.118	20.74
		64-QAM	-22.07	11.72	10.04	2.05	H		0.093	19.71
1745.0		QPSK	-20.04	13.68	10.18	2.06	H		0.151	21.80
		16-QAM	-20.68	13.04	10.18	2.06	H		0.131	21.16
		64-QAM	-21.65	12.07	10.18	2.06	H		0.104	20.19
1777.5		QPSK	-19.17	14.51	10.26	2.07	H		0.186	22.70
		16-QAM	-20.02	13.66	10.26	2.07	H		0.153	21.85
		64-QAM	-20.95	12.73	10.26	2.07	H		0.124	20.92

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP	
								W	W	dBm
1715.0	LTE B66/ B4 10 MHz	QPSK	-20.22	13.53	10.06	2.05	H	< 1.00	0.143	21.54
		16-QAM	-21.02	12.73	10.06	2.05	H		0.119	20.74
		64-QAM	-22.10	11.65	10.06	2.05	H		0.092	19.66
1745.0		QPSK	-19.91	13.81	10.18	2.06	H		0.156	21.93
		16-QAM	-20.75	12.97	10.18	2.06	H		0.129	21.09
		64-QAM	-21.78	11.94	10.18	2.06	H		0.101	20.06
1775.0		QPSK	-19.05	14.64	10.25	2.07	H		0.191	22.82
		16-QAM	-19.89	13.80	10.25	2.07	H		0.158	21.98
		64-QAM	-20.91	12.78	10.25	2.07	H		0.125	20.96



Freq (MHz)	Mod/ Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP	
								W	W	dBm
1717.5	LTE B66/ B4 15 MHz	QPSK	-20.26	13.45	10.08	2.05	H	< 1.00	0.141	21.48
		16-QAM	-21.07	12.64	10.08	2.05	H		0.117	20.67
		64-QAM	-22.12	11.59	10.08	2.05	H		0.092	19.62
1745.0		QPSK	-19.95	13.77	10.18	2.06	H		0.155	21.89
		16-QAM	-20.77	12.95	10.18	2.06	H		0.128	21.07
		64-QAM	-21.78	11.94	10.18	2.06	H		0.101	20.06
1772.5		QPSK	-19.16	14.53	10.24	2.07	H		0.186	22.70
		16-QAM	-19.96	13.73	10.24	2.07	H		0.155	21.90
		64-QAM	-21.01	12.68	10.24	2.07	H		0.122	20.85

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP	
								W	W	dBm
1720.0	LTE B66/ B4 20 MHz	QPSK	-20.26	13.45	10.08	2.05	H	< 1.00	0.141	21.48
		16-QAM	-21.09	12.62	10.08	2.05	H		0.116	20.65
		64-QAM	-22.16	11.55	10.08	2.05	H		0.091	19.58
1745.0		QPSK	-20.04	13.68	10.18	2.06	H		0.151	21.80
		16-QAM	-20.88	12.84	10.18	2.06	H		0.125	20.96
		64-QAM	-21.91	11.81	10.18	2.06	H		0.098	19.93
1770.0		QPSK	-19.25	14.44	10.24	2.07	H		0.182	22.61
		16-QAM	-20.06	13.63	10.24	2.07	H		0.151	21.80
		64-QAM	-21.14	12.55	10.24	2.07	H		0.118	20.72

### 8.2 RADIATED SPURIOUS EMISSIONS

- ▣ OPERATING FREQUENCY: 1775.0 MHz
- ▣ MEASURED OUTPUT POWER: 22.85 dBm = 0.191 W
- ▣ MODE: LTE B66 / B4
- ▣ MODULATION SIGNAL: 10 MHz QPSK
- ▣ DISTANCE: 3 meters
- ▣ LIMIT:  $43 + 10 \log_{10}(W) =$  35.82 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	dBc
132022 (1715.0)	3 430.00	-54.00	12.54	-60.45	2.96	H	-50.87	73.69
	5 145.00	-56.59	12.29	-54.13	3.66	V	-45.49	68.31
	6 860.00	-55.33	11.98	-48.72	4.27	H	-41.01	63.83
132322 (1745.0)	3 490.00	-52.31	12.42	-58.41	2.97	H	-48.96	71.54
	5 235.00	-55.35	12.71	-54.55	3.70	V	-45.53	68.11
	6 980.00	-54.09	11.52	-45.91	4.28	H	-38.67	61.25
132622 (1775.0)	3 550.00	-53.63	12.40	-59.36	3.02	H	-49.98	72.80
	5 325.00	-55.53	13.00	-54.73	3.73	H	-45.46	68.28
	7 100.00	-54.00	10.90	-45.13	4.36	V	-38.59	61.41

**8.3 PEAK-TO-AVERAGE RATIO**

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (dB )
66/4	1.4 MHz	1745.0	QPSK	6	0	5.21
			16-QAM			5.93
			64-QAM			6.28
	3 MHz		QPSK	15		5.38
			16-QAM			5.99
			64-QAM			6.32
	5 MHz		QPSK	25		5.26
			16-QAM			5.96
			64-QAM			6.29
	10 MHz		QPSK	50		5.38
			16-QAM			6.02
			64-QAM			6.29
	15 MHz		QPSK	75		5.31
			16-QAM			5.98
			64-QAM			6.29
20 MHz	QPSK	100	5.27			
	16-QAM		5.99			
	64-QAM		6.30			

**Note:**

1. Plots of the EUT's Peak- to- Average Ratio are shown Page 104 ~ 121.

**8.4 OCCUPIED BANDWIDTH**

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data ( MHz )
66/4	1.4 MHz	1745.0	QPSK	6	0	1.0953
			16-QAM			1.0930
			64-QAM			1.0968
	3 MHz		QPSK	15		2.7061
			16-QAM			2.6905
			64-QAM			2.7022
	5 MHz		QPSK	25		4.5155
			16-QAM			4.4927
			64-QAM			4.5180
	10 MHz		QPSK	50		8.9895
			16-QAM			8.9740
			64-QAM			8.9869
	15 MHz		QPSK	75		13.437
			16-QAM			13.463
			64-QAM			13.463
20 MHz	QPSK	100	17.956			
	16-QAM		17.880			
	64-QAM		17.924			

**Note:**

1. Plots of the EUT's Occupied Bandwidth are shown Page 86 ~ 103.

**8.5 CONDUCTED SPURIOUS EMISSIONS**

Band	Band Width (MHz)	Frequency (MHz)	Frequency of Maximum Harmonic (GHz)	Factor (dB)	Measurement Maximum Data (dBm)	Result (dBm)	Limit (dBm)
66/4	1.4	1710.7	3.4213	27.976	-74.368	-46.392	-13.00
		1745.0	3.4896	27.976	-75.085	-47.109	
		1779.3	3.5604	27.976	-75.116	-47.140	
	3	1711.5	3.4213	27.976	-74.832	-46.856	
		1745.0	3.4881	27.976	-75.278	-47.302	
		1778.5	3.5599	27.976	-75.709	-47.733	
	5	1712.5	3.4213	27.976	-73.578	-45.602	
		1745.0	3.4861	27.976	-75.463	-47.487	
		1777.5	3.5599	27.976	-75.654	-47.678	
	10	1715.0	3.4218	27.976	-74.971	-46.995	
		1745.0	3.4816	27.976	-75.303	-47.327	
		1775.0	3.5594	27.976	-74.599	-46.623	
	15	1717.5	1.6845	27.976	-74.789	-46.813	
		1745.0	3.4771	27.976	-74.972	-46.996	
		1772.5	3.5589	27.976	-73.900	-45.924	
	20	1720.0	1.6760	27.976	-71.454	-43.478	
		1745.0	3.4726	27.976	-76.390	-48.414	
		1770.0	3.5584	27.976	-74.996	-47.020	

**Note:**

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 122 ~ 157.
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

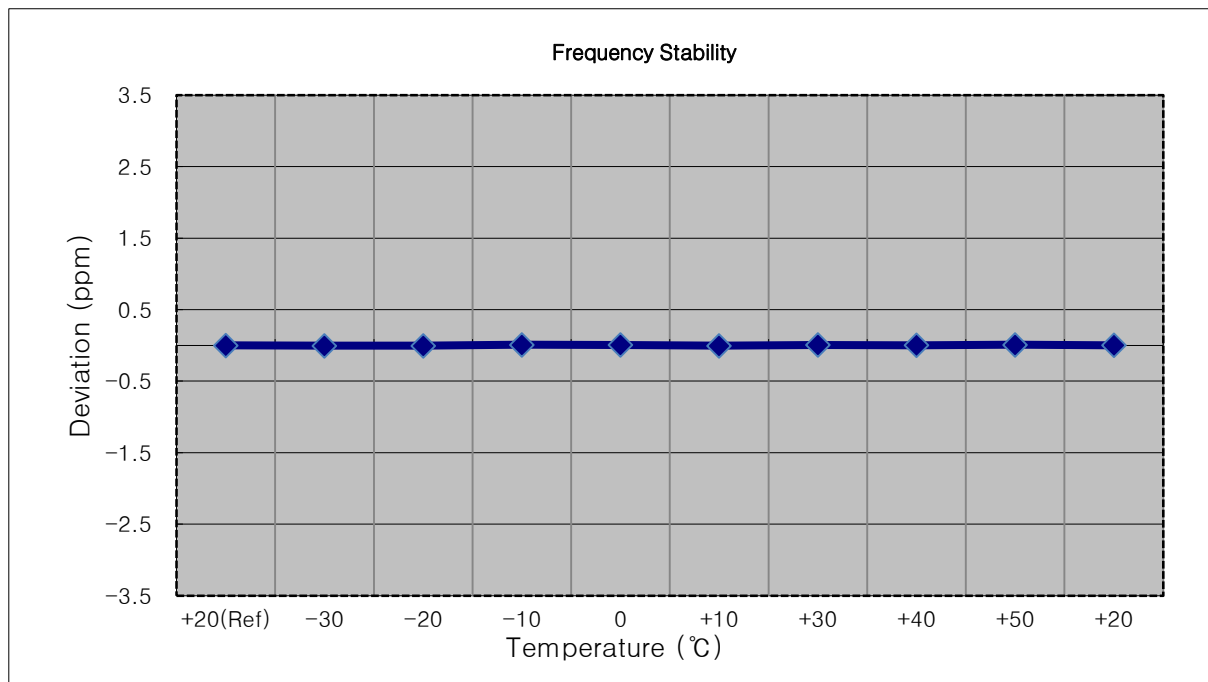
## 8.6 BAND EDGE

- Plots of the EUT's Band Edge are shown Page 50 ~ 85.

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

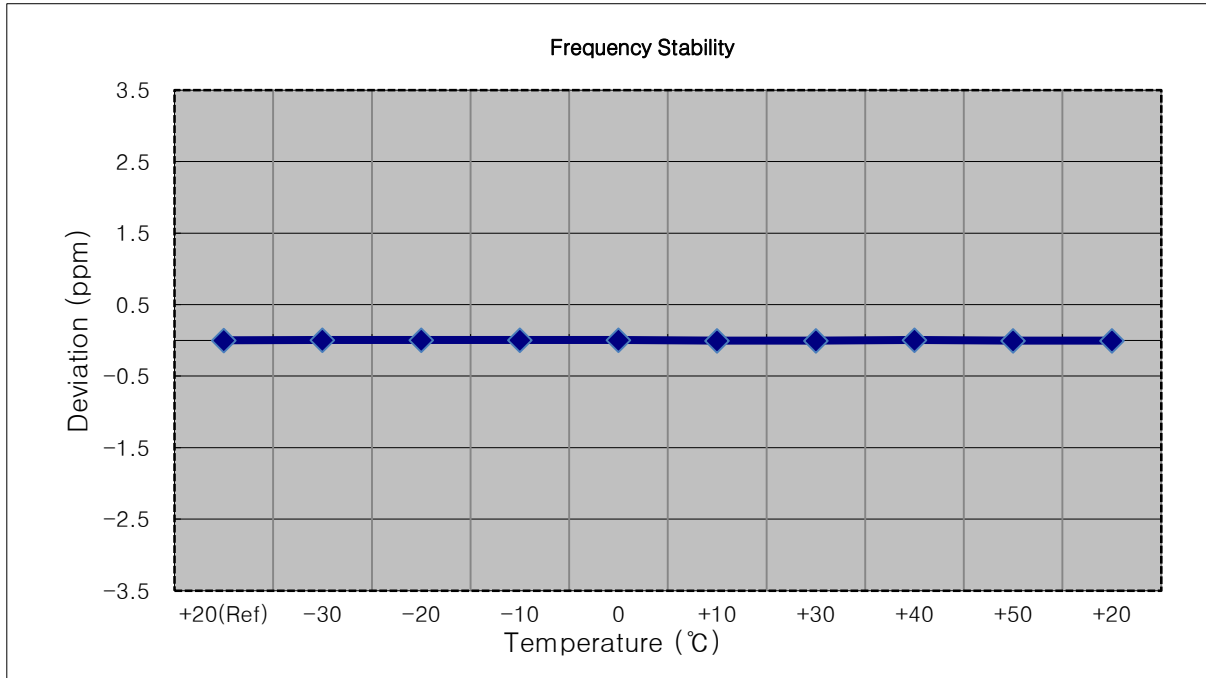
- ▣ MODE: LTE 66/4
- ▣ OPERATING FREQUENCY: 1710,700,000 Hz
- ▣ CHANNEL: 131979 (1.4 MHz)
- ▣ REFERENCE VOLTAGE: 3.850 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.850	+20(Ref)	1710 700 012	0.0	0.000 000	0.000
100 %		-30	1710 700 006	-6.4	0.000 000	-0.004
100 %		-20	1710 700 004	-8.1	0.000 000	-0.005
100 %		-10	1710 700 026	13.8	0.000 001	0.008
100 %		0	1710 700 025	12.6	0.000 001	0.007
100 %		+10	1710 700 006	-6.2	0.000 000	-0.004
100 %		+30	1710 700 023	11.3	0.000 001	0.007
100 %		+40	1710 700 016	3.9	0.000 000	0.002
100 %		+50	1710 700 027	15.2	0.000 001	0.009
Batt. Endpoint		3.400	+20	1710 700 015	2.9	0.000 000



- ▣ MODE: LTE 66/4
- ▣ OPERATING FREQUENCY: 1711,500,000 Hz
- ▣ CHANNEL: 131987 (3 MHz)
- ▣ REFERENCE VOLTAGE: 3.850 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

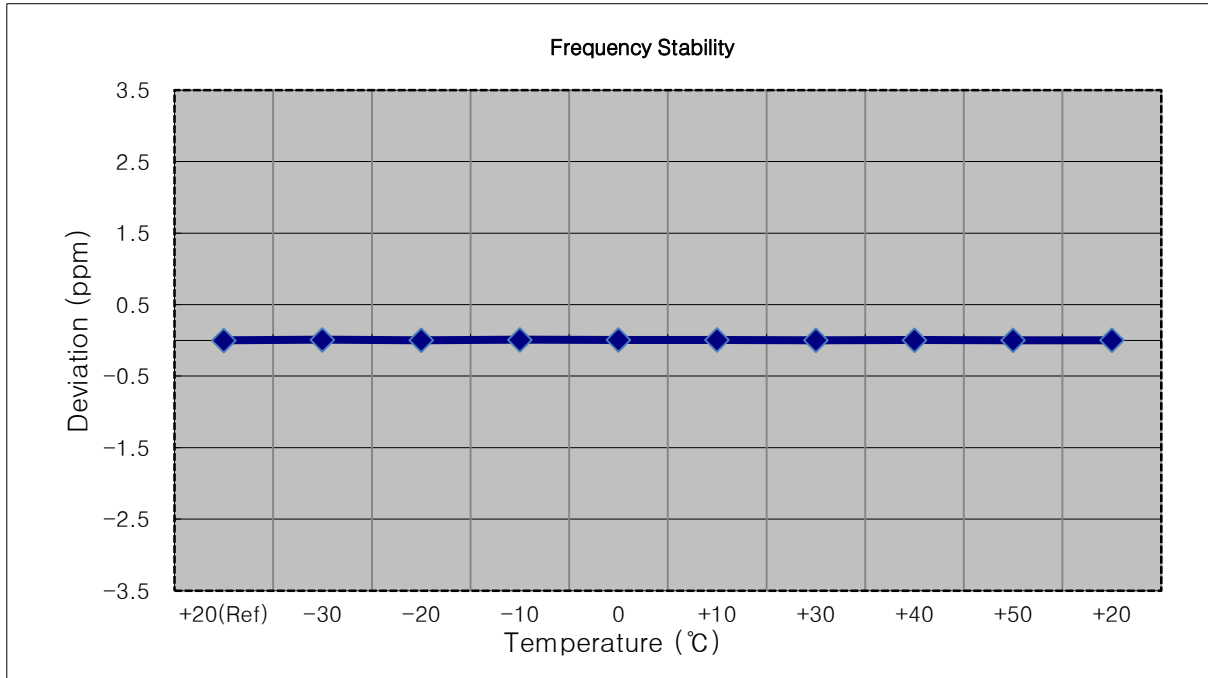
Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.850	+20(Ref)	1711 499 992	0.0	0.000 000	0.000
100 %		-30	1711 500 001	8.3	0.000 000	0.005
100 %		-20	1711 500 001	8.3	0.000 000	0.005
100 %		-10	1711 500 001	9.1	0.000 001	0.005
100 %		0	1711 499 999	6.4	0.000 000	0.004
100 %		+10	1711 499 985	-7.1	0.000 000	-0.004
100 %		+30	1711 499 985	-7.1	0.000 000	-0.004
100 %		+40	1711 500 001	8.4	0.000 000	0.005
100 %		+50	1711 499 985	-7.6	0.000 000	-0.004
Batt. Endpoint	3.400	+20	1711 499 985	-6.8	0.000 000	-0.004





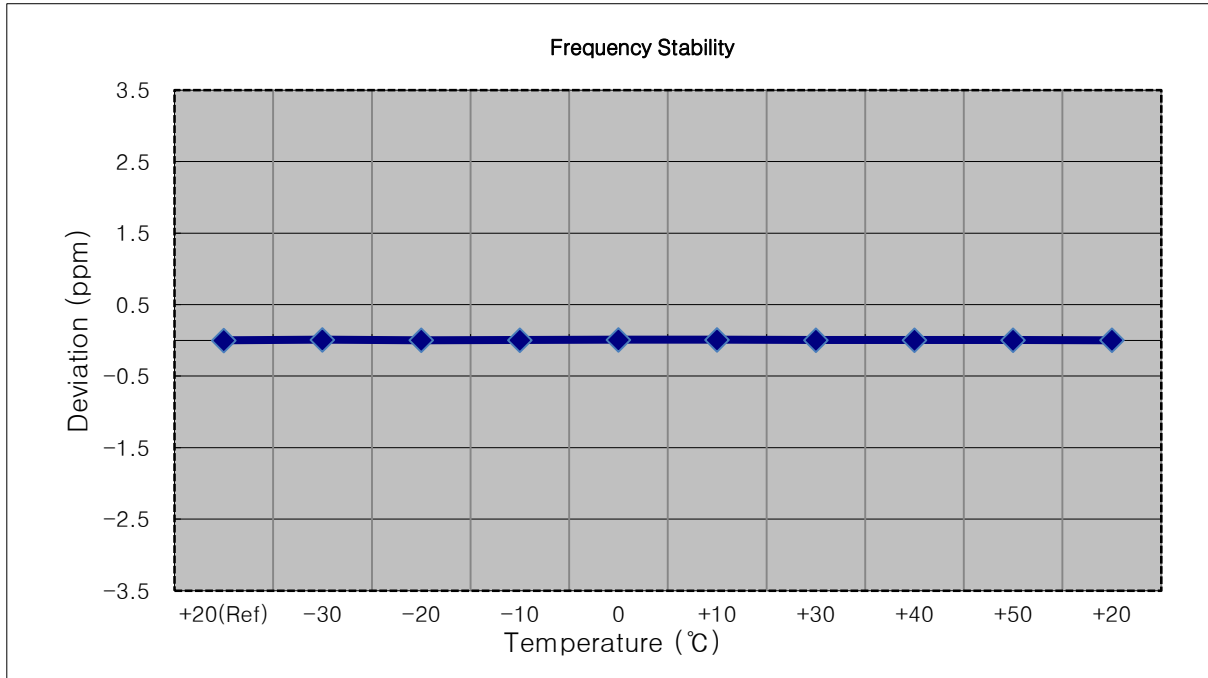
- ▣ MODE: LTE 66/4
- ▣ OPERATING FREQUENCY: 1712,500,000 Hz
- ▣ CHANNEL: 131997 (5 MHz)
- ▣ REFERENCE VOLTAGE: 3.850 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.850	+20(Ref)	1712 500 004	0.0	0.000 000	0.000
100 %		-30	1712 500 020	15.7	0.000 001	0.009
100 %		-20	1712 500 009	5.3	0.000 000	0.003
100 %		-10	1712 500 019	15.3	0.000 001	0.009
100 %		0	1712 500 014	10.0	0.000 001	0.006
100 %		+10	1712 500 015	11.2	0.000 001	0.007
100 %		+30	1712 500 009	5.0	0.000 000	0.003
100 %		+40	1712 500 012	8.3	0.000 000	0.005
100 %		+50	1712 500 009	4.7	0.000 000	0.003
Batt. Endpoint	3.400	+20	1712 500 009	4.8	0.000 000	0.003



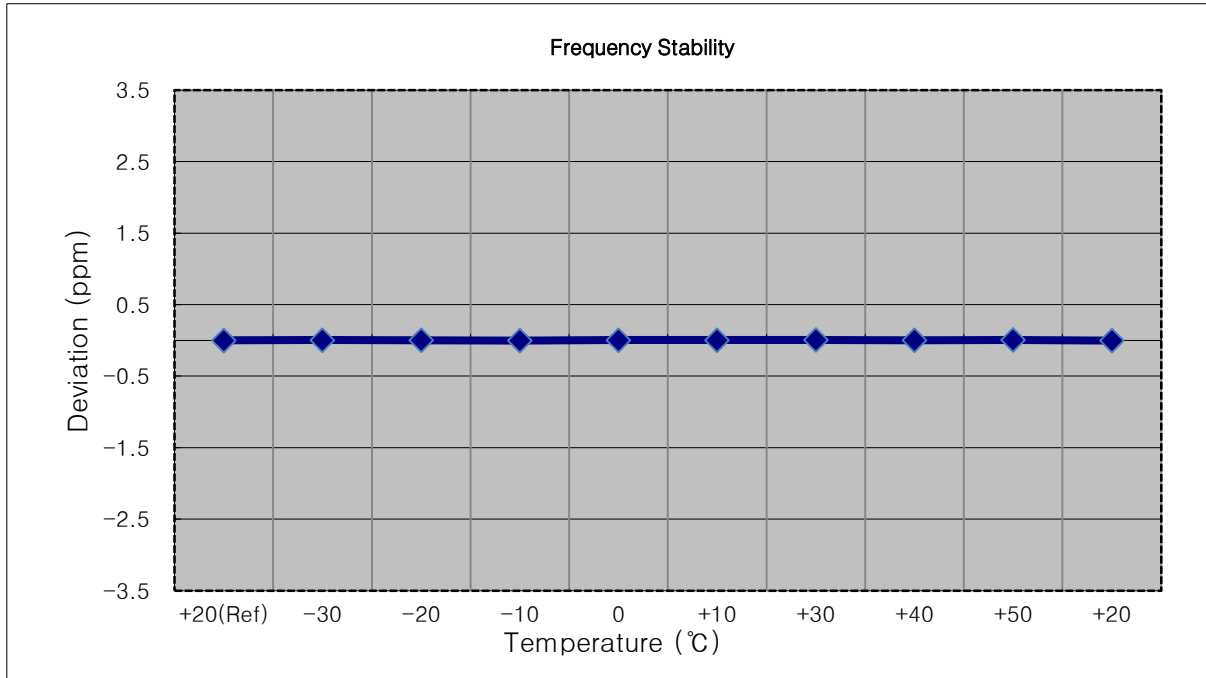
- ▣ MODE: LTE 66/4
- ▣ OPERATING FREQUENCY: 1715,000,000 Hz
- ▣ CHANNEL: 132022 (10 MHz)
- ▣ REFERENCE VOLTAGE: 3.850 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.850	+20(Ref)	1715 000 008	0.0	0.000 000	0.000
100 %		-30	1715 000 024	16.3	0.000 001	0.010
100 %		-20	1715 000 011	3.3	0.000 000	0.002
100 %		-10	1715 000 017	8.5	0.000 000	0.005
100 %		0	1715 000 022	14.2	0.000 001	0.008
100 %		+10	1715 000 024	15.5	0.000 001	0.009
100 %		+30	1715 000 015	6.5	0.000 000	0.004
100 %		+40	1715 000 015	7.0	0.000 000	0.004
100 %		+50	1715 000 016	7.7	0.000 000	0.004
Batt. Endpoint	3.400	+20	1715 000 011	3.2	0.000 000	0.002



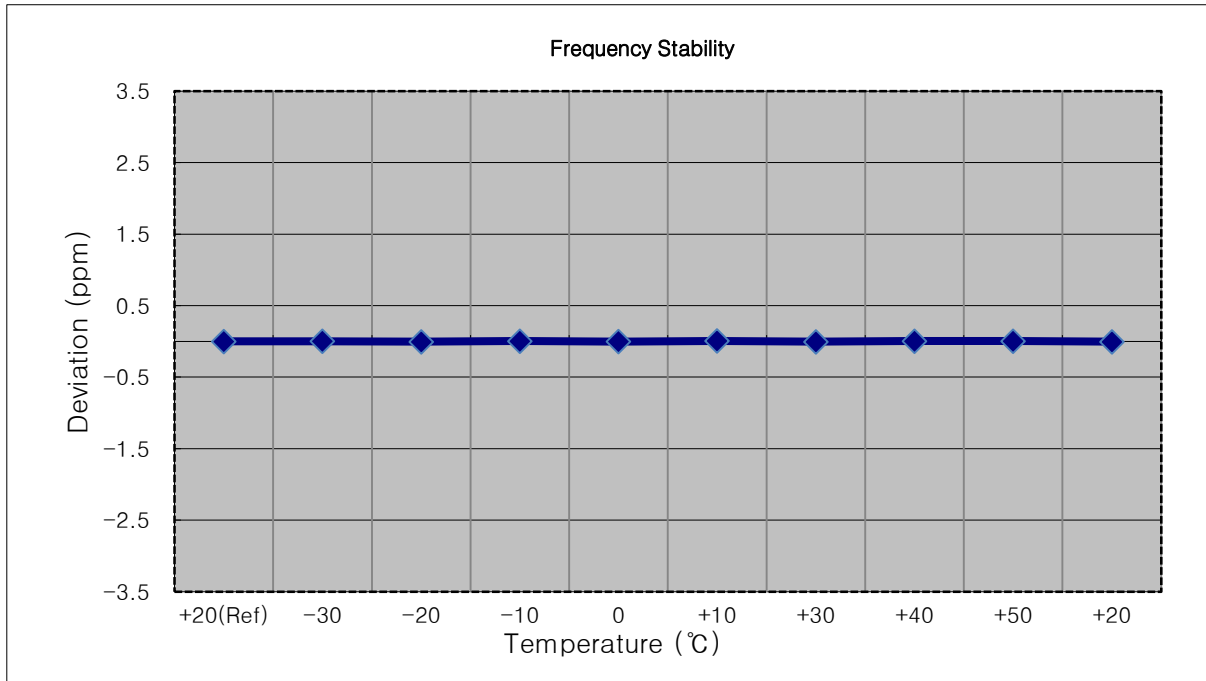
- ▣ MODE: LTE 66/4
- ▣ OPERATING FREQUENCY: 1717,500,000 Hz
- ▣ CHANNEL: 132047 (15 MHz)
- ▣ REFERENCE VOLTAGE: 3.850 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.850	+20(Ref)	1717 499 997	0.0	0.000 000	0.000
100 %		-30	1717 500 004	6.9	0.000 000	0.004
100 %		-20	1717 500 002	5.3	0.000 000	0.003
100 %		-10	1717 499 992	-4.9	0.000 000	-0.003
100 %		0	1717 500 003	6.3	0.000 000	0.004
100 %		+10	1717 500 004	7.2	0.000 000	0.004
100 %		+30	1717 500 008	10.7	0.000 001	0.006
100 %		+40	1717 500 001	3.9	0.000 000	0.002
100 %		+50	1717 500 007	9.6	0.000 001	0.006
Batt. Endpoint	3.400	+20	1717 499 993	-3.8	0.000 000	-0.002



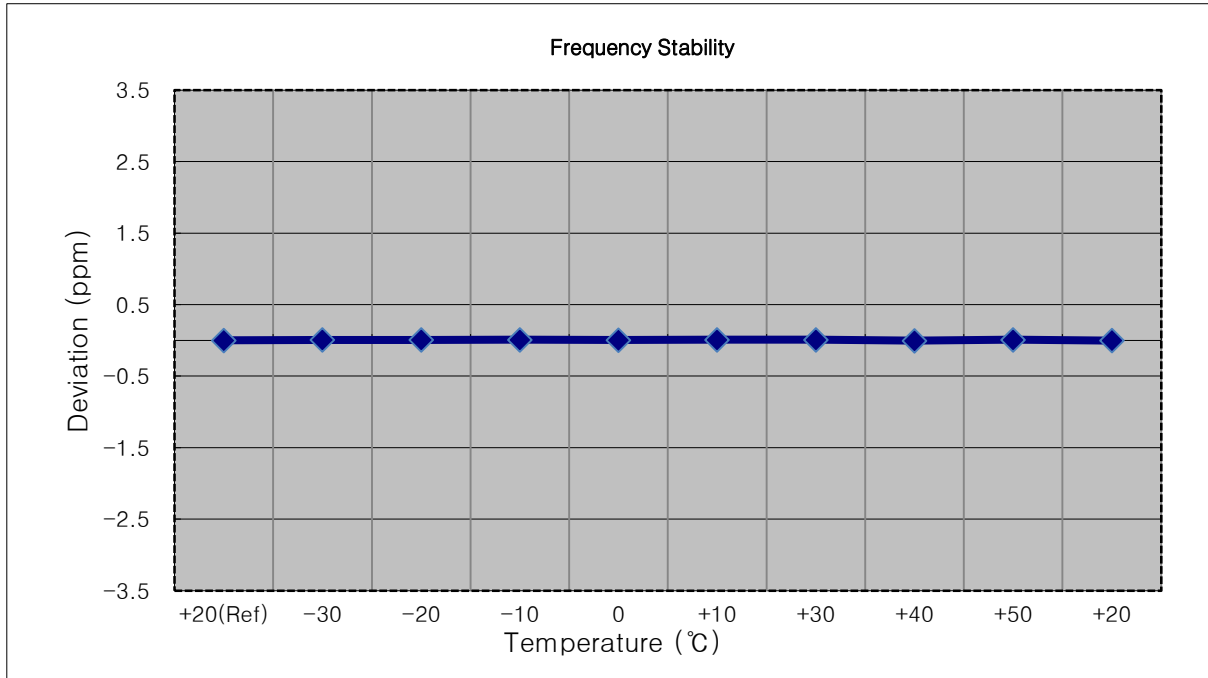
- ▣ MODE: LTE 66/4
- ▣ OPERATING FREQUENCY: 1720,000,000 Hz
- ▣ CHANNEL: 132072 (20 MHz)
- ▣ REFERENCE VOLTAGE: 3.850 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.850	+20(Ref)	1719 999 996	0.0	0.000 000	0.000
100 %		-30	1720 000 001	4.7	0.000 000	0.003
100 %		-20	1719 999 990	-5.9	0.000 000	-0.003
100 %		-10	1720 000 005	8.5	0.000 000	0.005
100 %		0	1719 999 994	-2.2	0.000 000	-0.001
100 %		+10	1720 000 006	10.3	0.000 001	0.006
100 %		+30	1719 999 989	-7.0	0.000 000	-0.004
100 %		+40	1720 000 003	7.4	0.000 000	0.004
100 %		+50	1720 000 004	8.2	0.000 000	0.005
Batt. Endpoint		3.400	+20	1719 999 987	-9.5	-0.000 001



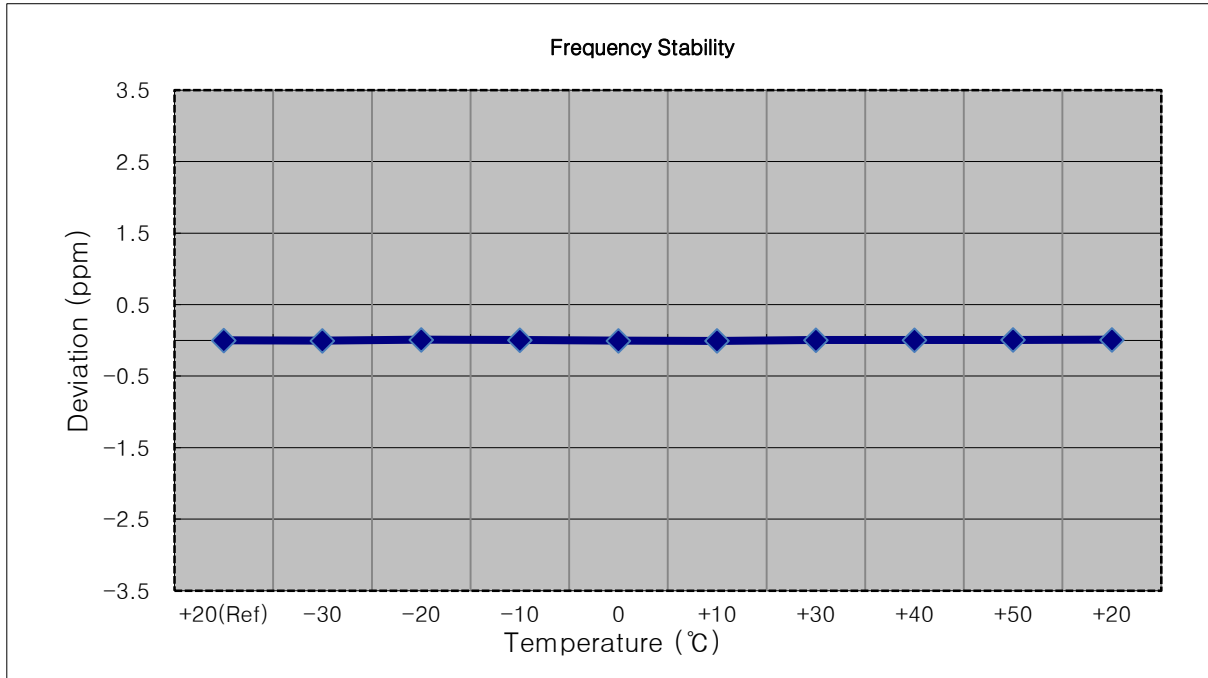
- ▣ MODE: LTE 66/4
- ▣ OPERATING FREQUENCY: 1745,000,000 Hz
- ▣ CHANNEL: 132322 (1.4 MHz)
- ▣ REFERENCE VOLTAGE: 3.850 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.850	+20(Ref)	1745 000 006	0.0	0.000 000	0.000
100 %		-30	1745 000 019	12.9	0.000 001	0.007
100 %		-20	1745 000 019	12.8	0.000 001	0.007
100 %		-10	1745 000 021	14.5	0.000 001	0.008
100 %		0	1745 000 016	9.6	0.000 001	0.006
100 %		+10	1745 000 023	17.1	0.000 001	0.010
100 %		+30	1745 000 023	16.4	0.000 001	0.009
100 %		+40	1745 000 000	-6.6	0.000 000	-0.004
100 %		+50	1745 000 021	15.3	0.000 001	0.009
Batt. Endpoint	3.400	+20	1745 000 001	-5.4	0.000 000	-0.003



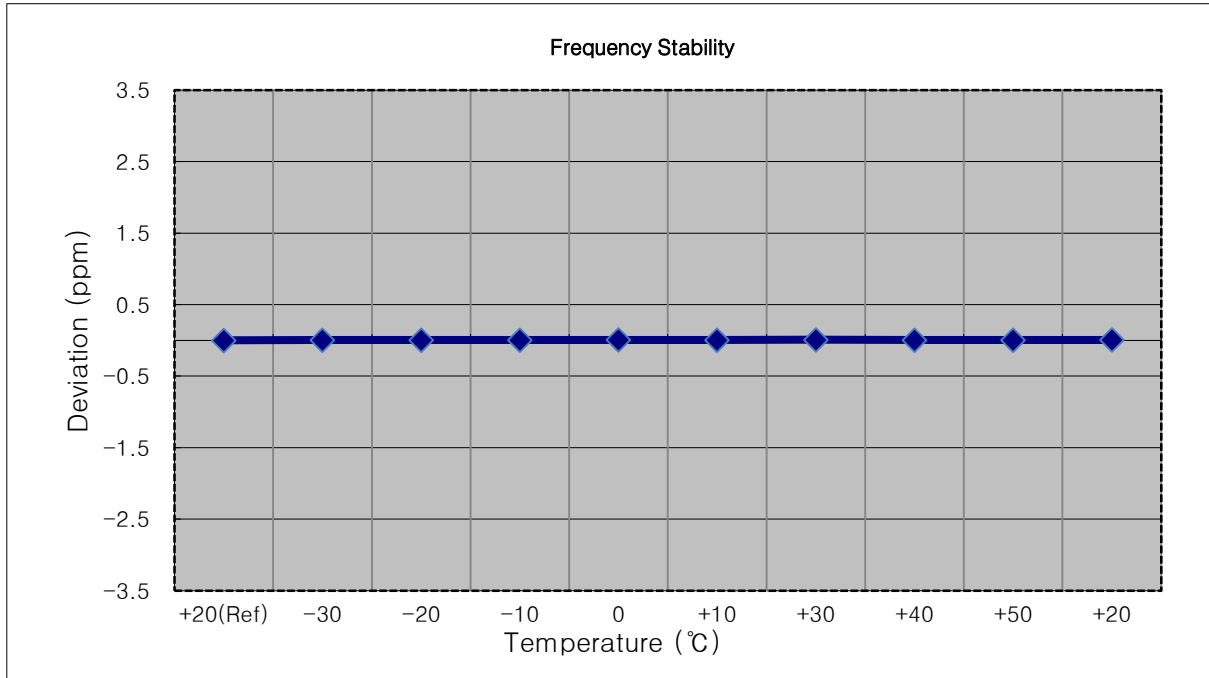
- ▣ MODE: LTE 66/4
- ▣ OPERATING FREQUENCY: 1745,000,000 Hz
- ▣ CHANNEL: 132322 (3 MHz)
- ▣ REFERENCE VOLTAGE: 3.850 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.850	+20(Ref)	1745 000 005	0.0	0.000 000	0.000
100 %		-30	1744 999 999	-6.7	0.000 000	-0.004
100 %		-20	1745 000 020	14.6	0.000 001	0.008
100 %		-10	1745 000 014	8.2	0.000 000	0.005
100 %		0	1744 999 999	-6.0	0.000 000	-0.003
100 %		+10	1744 999 994	-11.9	-0.000 001	-0.007
100 %		+30	1745 000 013	7.7	0.000 000	0.004
100 %		+40	1745 000 013	7.3	0.000 000	0.004
100 %		+50	1745 000 016	10.4	0.000 001	0.006
Batt. Endpoint	3.400	+20	1745 000 020	14.9	0.000 001	0.009



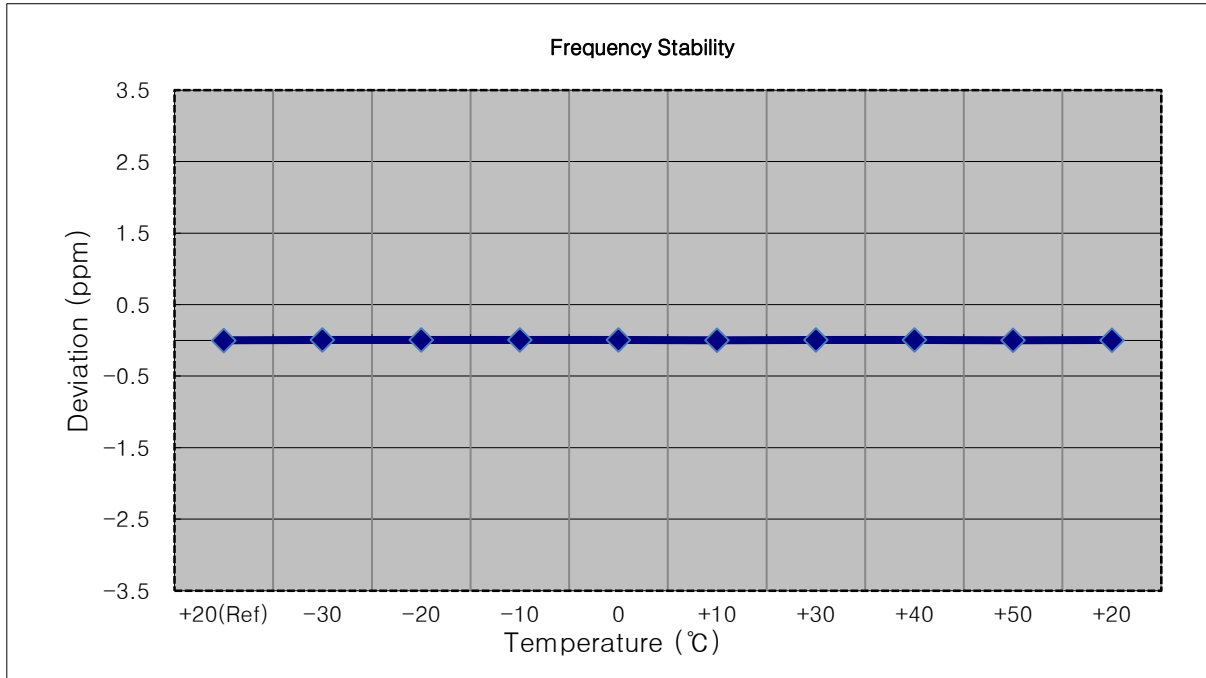
- ▣ MODE: LTE 66/4
- ▣ OPERATING FREQUENCY: 1745,000,000 Hz
- ▣ CHANNEL: 132322 (5 MHz)
- ▣ REFERENCE VOLTAGE: 3.850 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.850	+20(Ref)	1745 000 010	0.0	0.000 000	0.000
100 %		-30	1745 000 018	8.9	0.000 001	0.005
100 %		-20	1745 000 018	8.6	0.000 000	0.005
100 %		-10	1745 000 019	9.6	0.000 001	0.006
100 %		0	1745 000 022	12.5	0.000 001	0.007
100 %		+10	1745 000 019	9.2	0.000 001	0.005
100 %		+30	1745 000 025	15.8	0.000 001	0.009
100 %		+40	1745 000 019	9.6	0.000 001	0.006
100 %		+50	1745 000 016	6.7	0.000 000	0.004
Batt. Endpoint	3.400	+20	1745 000 022	12.3	0.000 001	0.007



- ▣ MODE: LTE 66/4
- ▣ OPERATING FREQUENCY: 1745,000,000 Hz
- ▣ CHANNEL: 132322 (10 MHz)
- ▣ REFERENCE VOLTAGE: 3.850 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

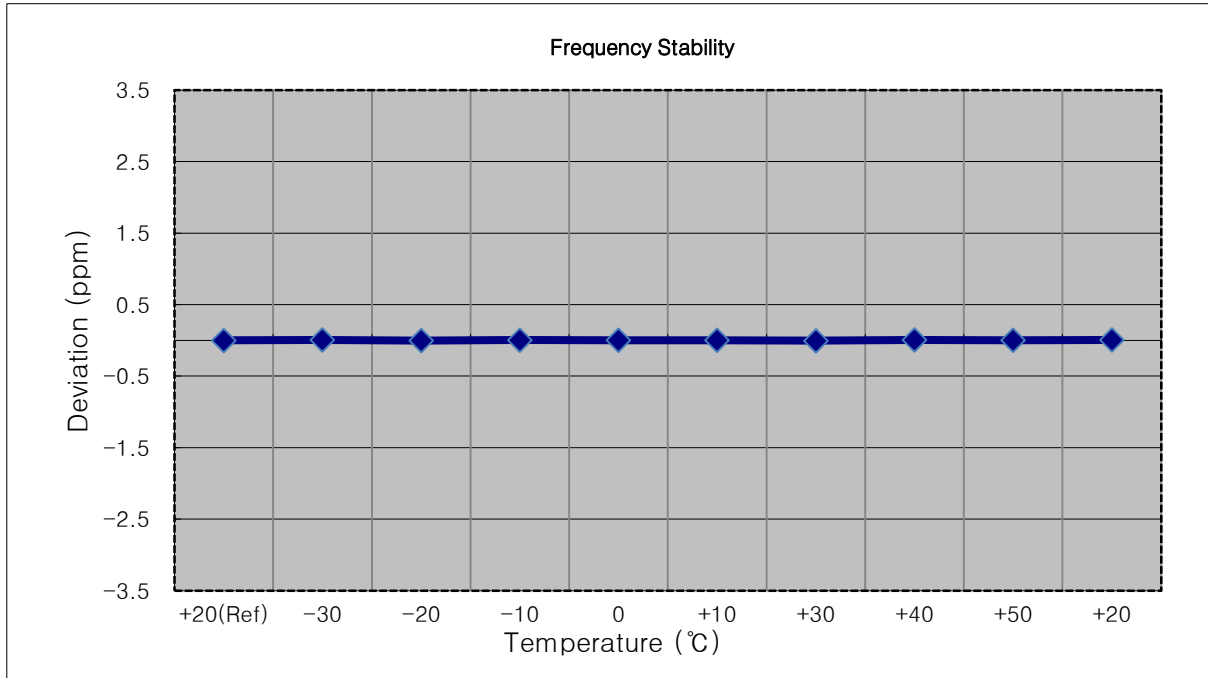
Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.850	+20(Ref)	1745 000 007	0.0	0.000 000	0.000
100 %		-30	1745 000 018	11.5	0.000 001	0.007
100 %		-20	1745 000 018	10.8	0.000 001	0.006
100 %		-10	1745 000 019	12.2	0.000 001	0.007
100 %		0	1745 000 020	13.4	0.000 001	0.008
100 %		+10	1745 000 011	4.5	0.000 000	0.003
100 %		+30	1745 000 017	10.1	0.000 001	0.006
100 %		+40	1745 000 020	12.8	0.000 001	0.007
100 %		+50	1745 000 012	5.5	0.000 000	0.003
Batt. Endpoint	3.400	+20	1745 000 016	9.1	0.000 001	0.005





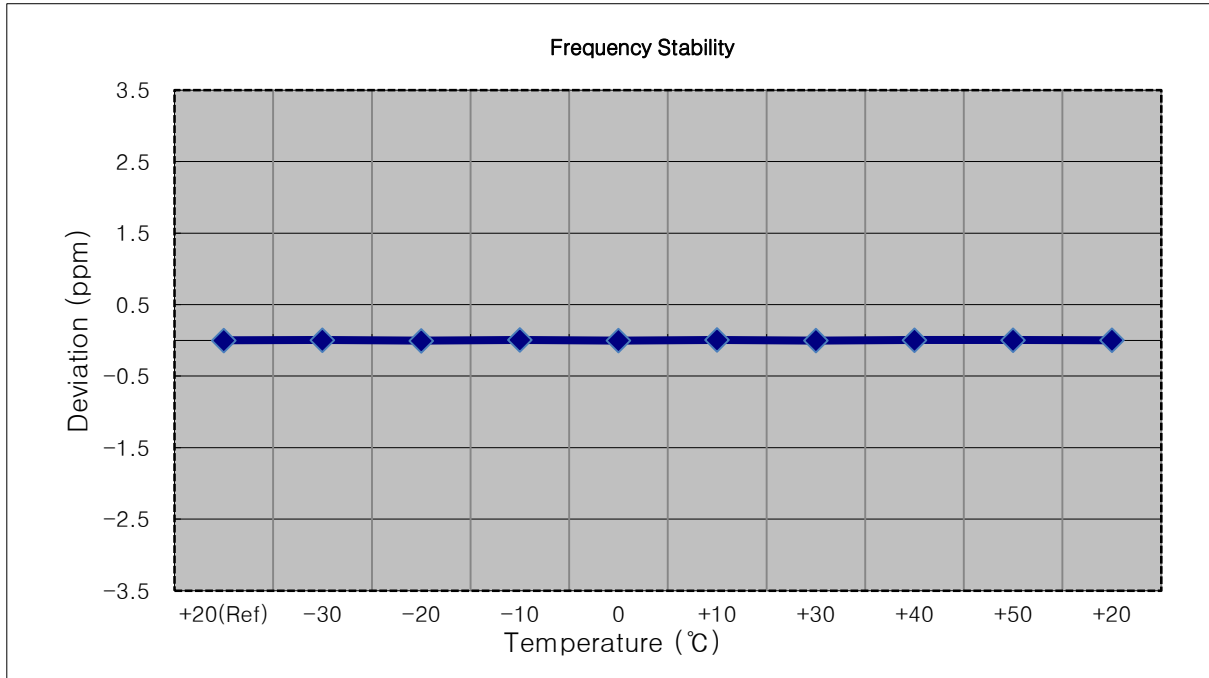
- ▣ MODE: LTE 66/4
- ▣ OPERATING FREQUENCY: 1745,000,000 Hz
- ▣ CHANNEL: 132322 (15 MHz)
- ▣ REFERENCE VOLTAGE: 3.850 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.850	+20(Ref)	1745 000 009	0.0	0.000 000	0.000
100 %		-30	1745 000 021	12.6	0.000 001	0.007
100 %		-20	1745 000 006	-2.8	0.000 000	-0.002
100 %		-10	1745 000 017	7.8	0.000 000	0.004
100 %		0	1745 000 012	3.2	0.000 000	0.002
100 %		+10	1745 000 013	3.9	0.000 000	0.002
100 %		+30	1745 000 001	-8.3	0.000 000	-0.005
100 %		+40	1745 000 020	10.9	0.000 001	0.006
100 %		+50	1745 000 011	2.5	0.000 000	0.001
Batt. Endpoint	3.400	+20	1745 000 021	12.1	0.000 001	0.007



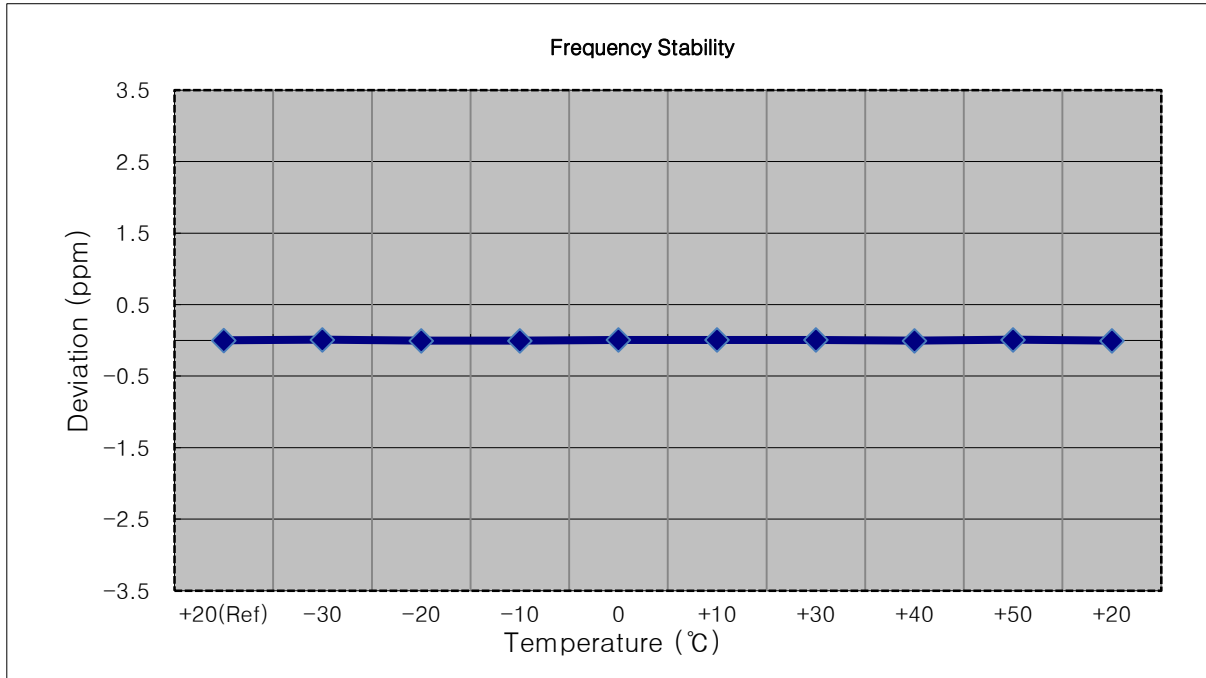
- ▣ MODE: LTE 66/4
- ▣ OPERATING FREQUENCY: 1745,000,000 Hz
- ▣ CHANNEL: 132322 (20 MHz)
- ▣ REFERENCE VOLTAGE: 3.850 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.850	+20(Ref)	1744 999 992	0.0	0.000 000	0.000
100 %		-30	1745 000 001	9.0	0.000 001	0.005
100 %		-20	1744 999 985	-7.6	0.000 000	-0.004
100 %		-10	1745 000 004	11.5	0.000 001	0.007
100 %		0	1744 999 987	-5.3	0.000 000	-0.003
100 %		+10	1745 000 004	11.6	0.000 001	0.007
100 %		+30	1744 999 987	-5.2	0.000 000	-0.003
100 %		+40	1744 999 999	6.7	0.000 000	0.004
100 %		+50	1744 999 999	6.4	0.000 000	0.004
Batt. Endpoint	3.400	+20	1744 999 997	5.0	0.000 000	0.003



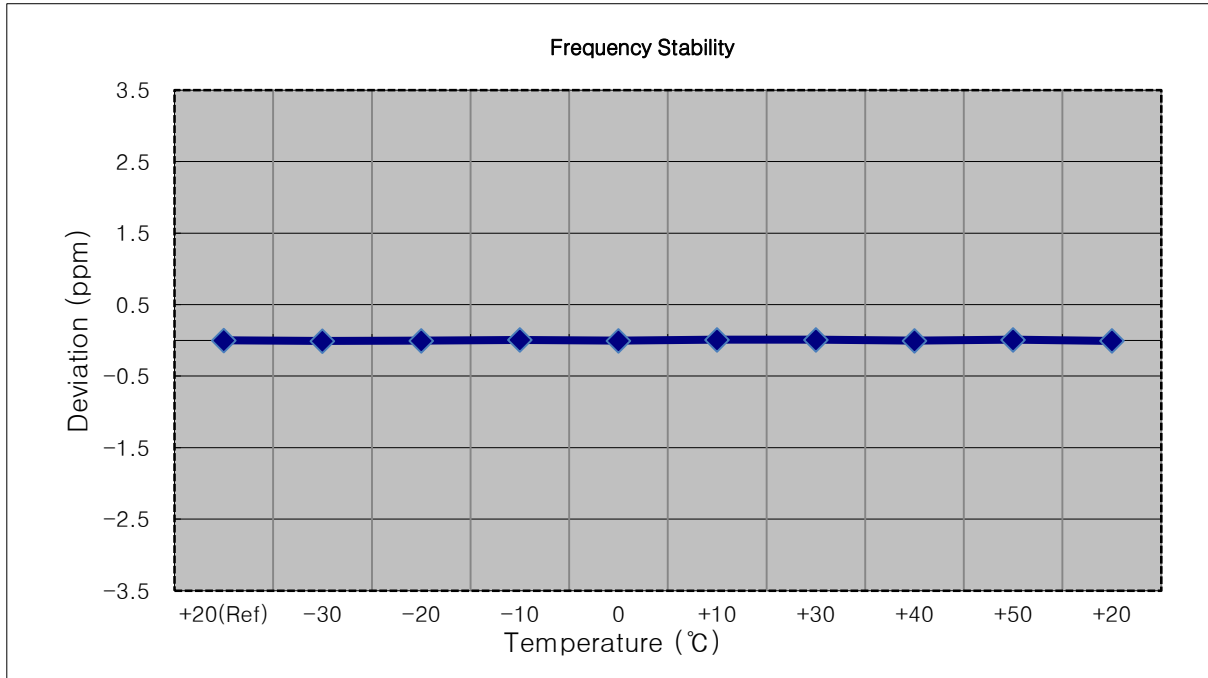
- ▣ MODE: LTE 66/4
- ▣ OPERATING FREQUENCY: 1779,300,000 Hz
- ▣ CHANNEL: 132665 (1.4 MHz)
- ▣ REFERENCE VOLTAGE: 3.850 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.850	+20(Ref)	1779 300 008	0.0	0.000 000	0.000
100 %		-30	1779 300 025	16.6	0.000 001	0.009
100 %		-20	1779 300 001	-7.1	0.000 000	-0.004
100 %		-10	1779 300 000	-8.2	0.000 000	-0.005
100 %		0	1779 300 021	12.6	0.000 001	0.007
100 %		+10	1779 300 021	12.7	0.000 001	0.007
100 %		+30	1779 300 021	12.7	0.000 001	0.007
100 %		+40	1779 300 001	-6.8	0.000 000	-0.004
100 %		+50	1779 300 022	14.1	0.000 001	0.008
Batt. Endpoint	3.400	+20	1779 300 001	-7.1	0.000 000	-0.004



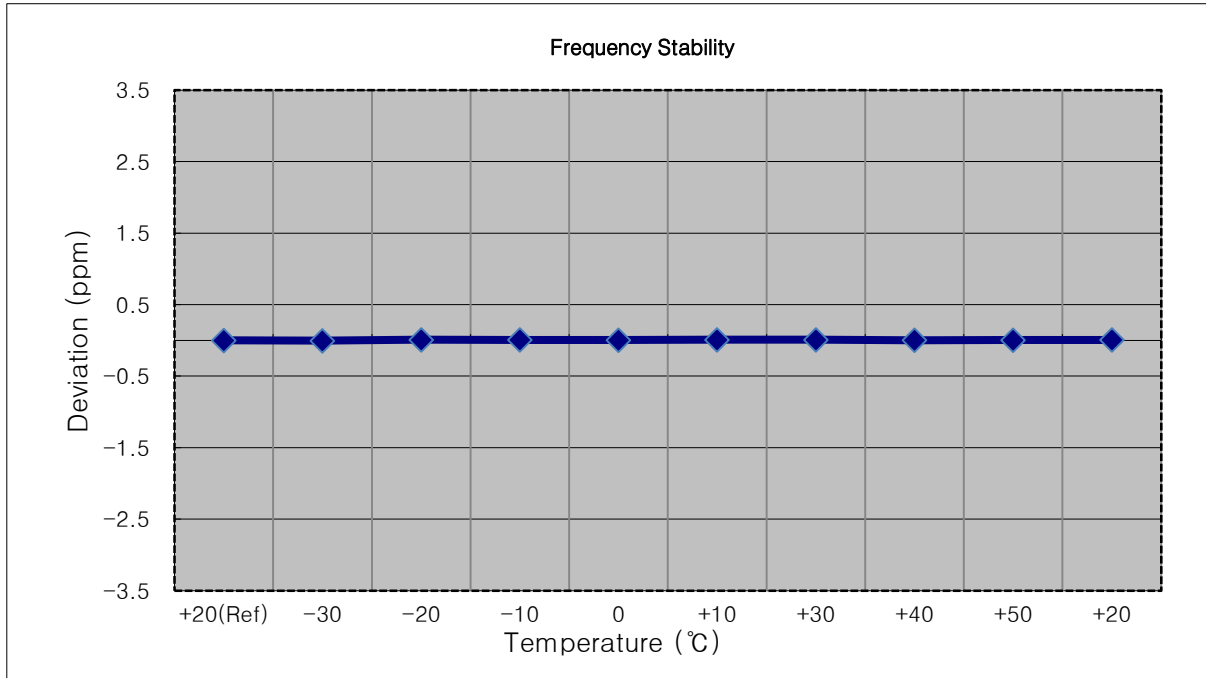
- ▣ MODE: LTE 66/4
- ▣ OPERATING FREQUENCY: 1778,500,000 Hz
- ▣ CHANNEL: 132657 (3 MHz)
- ▣ REFERENCE VOLTAGE: 3.850 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.850	+20(Ref)	1778 500 023	0.0	0.000 000	0.000
100 %		-30	1778 500 009	-14.7	-0.000 001	-0.008
100 %		-20	1778 500 016	-7.3	0.000 000	-0.004
100 %		-10	1778 500 035	11.2	0.000 001	0.006
100 %		0	1778 500 016	-7.7	0.000 000	-0.004
100 %		+10	1778 500 038	14.9	0.000 001	0.008
100 %		+30	1778 500 038	15.0	0.000 001	0.008
100 %		+40	1778 500 014	-9.5	-0.000 001	-0.005
100 %		+50	1778 500 040	17.1	0.000 001	0.010
Batt. Endpoint	3.400	+20	1778 500 010	-13.3	-0.000 001	-0.007



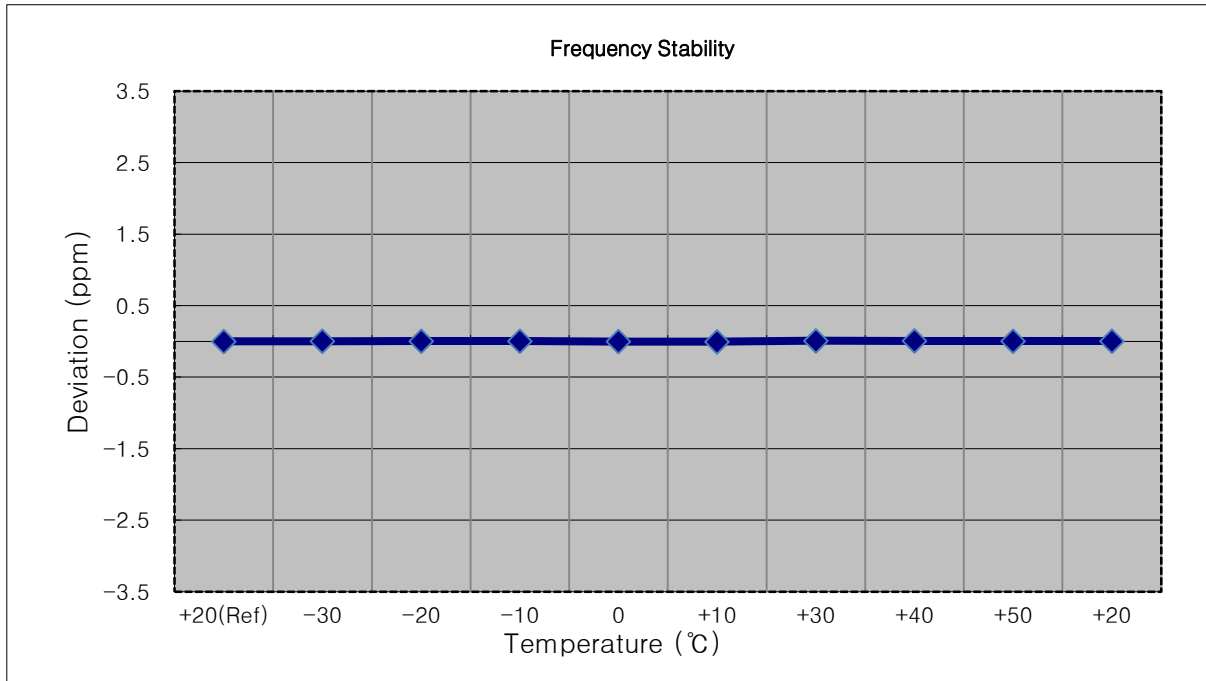
- ▣ MODE: LTE 66/4
- ▣ OPERATING FREQUENCY: 1777,500,000 Hz
- ▣ CHANNEL: 132647 (5 MHz)
- ▣ REFERENCE VOLTAGE: 3.850 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.850	+20(Ref)	1777 500 012	0.0	0.000 000	0.000
100 %		-30	1777 500 004	-8.4	0.000 000	-0.005
100 %		-20	1777 500 027	14.6	0.000 001	0.008
100 %		-10	1777 500 023	11.0	0.000 001	0.006
100 %		0	1777 500 020	8.4	0.000 000	0.005
100 %		+10	1777 500 026	14.4	0.000 001	0.008
100 %		+30	1777 500 029	17.5	0.000 001	0.010
100 %		+40	1777 500 018	5.6	0.000 000	0.003
100 %		+50	1777 500 021	9.5	0.000 001	0.005
Batt. Endpoint	3.400	+20	1777 500 022	10.3	0.000 001	0.006



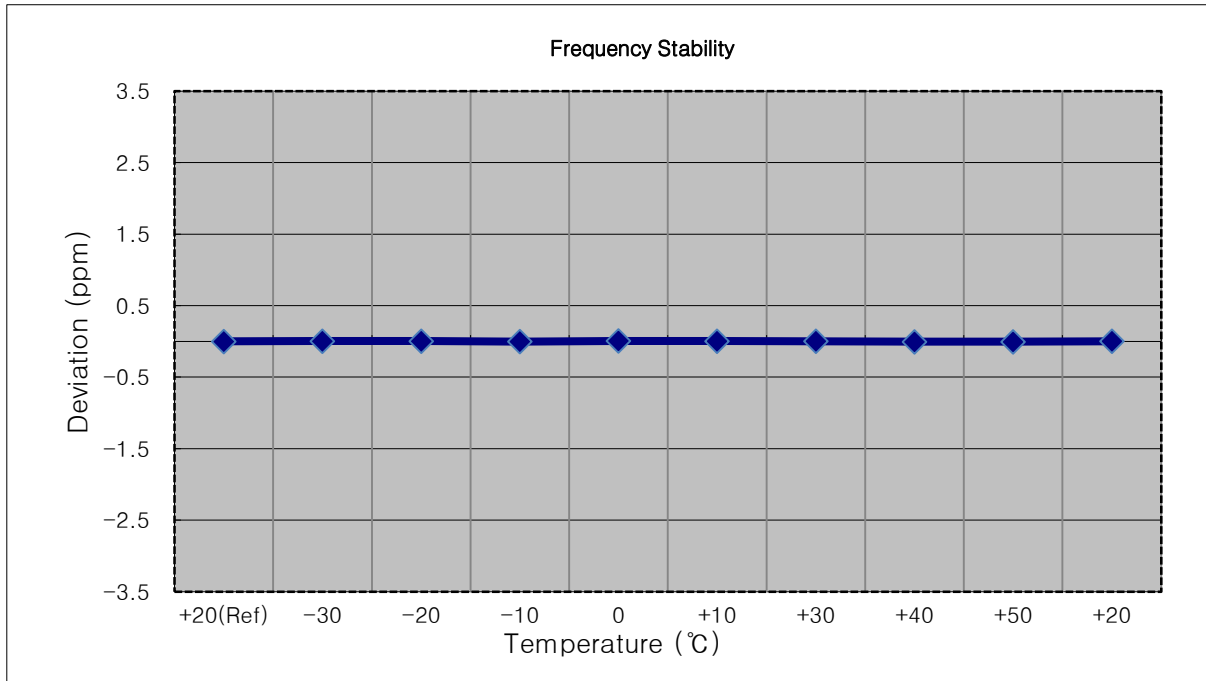
- ▣ MODE: LTE 66/4
- ▣ OPERATING FREQUENCY: 1775,000,000 Hz
- ▣ CHANNEL: 132622 (10 MHz)
- ▣ REFERENCE VOLTAGE: 3.850 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.850	+20(Ref)	1775 000 012	0.0	0.000 000	0.000
100 %		-30	1775 000 018	5.6	0.000 000	0.003
100 %		-20	1775 000 021	8.9	0.000 001	0.005
100 %		-10	1775 000 021	8.4	0.000 000	0.005
100 %		0	1775 000 006	-5.7	0.000 000	-0.003
100 %		+10	1775 000 004	-8.6	0.000 000	-0.005
100 %		+30	1775 000 026	14.3	0.000 001	0.008
100 %		+40	1775 000 025	12.5	0.000 001	0.007
100 %		+50	1775 000 019	6.7	0.000 000	0.004
Batt. Endpoint		3.400	+20	1775 000 019	6.9	0.000 000



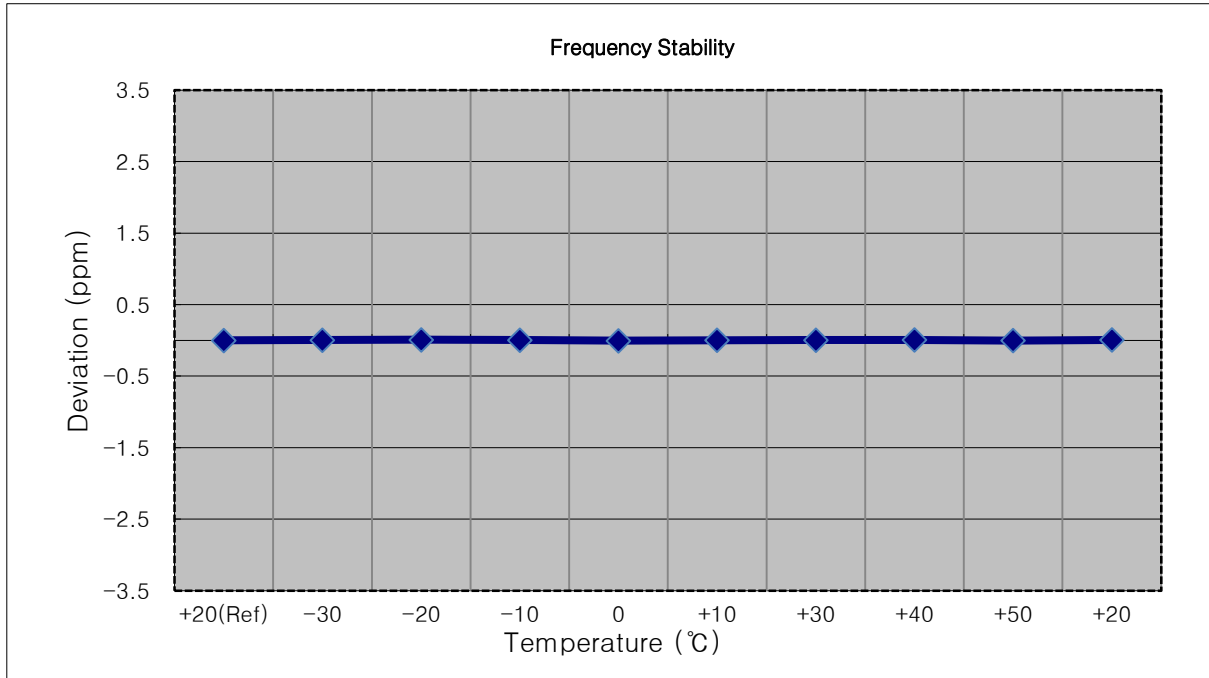
- ▣ MODE: LTE 66/4
- ▣ OPERATING FREQUENCY: 1772,500,000 Hz
- ▣ CHANNEL: 132597 (15 MHz)
- ▣ REFERENCE VOLTAGE: 3.850 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.850	+20(Ref)	1772 499 994	0.0	0.000 000	0.000
100 %		-30	1772 500 003	8.9	0.000 001	0.005
100 %		-20	1772 500 003	8.8	0.000 000	0.005
100 %		-10	1772 499 988	-5.9	0.000 000	-0.003
100 %		0	1772 500 005	11.3	0.000 001	0.006
100 %		+10	1772 500 003	8.4	0.000 000	0.005
100 %		+30	1772 499 999	4.5	0.000 000	0.003
100 %		+40	1772 499 986	-7.9	0.000 000	-0.004
100 %		+50	1772 499 988	-6.6	0.000 000	-0.004
Batt. Endpoint		3.400	+20	1772 499 999	5.2	0.000 000



- ▣ MODE: LTE 66/4
- ▣ OPERATING FREQUENCY: 1770,000,000 Hz
- ▣ CHANNEL: 132572 (20 MHz)
- ▣ REFERENCE VOLTAGE: 3.850 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.850	+20(Ref)	1770 000 009	0.0	0.000 000	0.000
100 %		-30	1770 000 016	7.3	0.000 000	0.004
100 %		-20	1770 000 024	15.0	0.000 001	0.008
100 %		-10	1770 000 016	7.3	0.000 000	0.004
100 %		0	1770 000 000	-8.7	0.000 000	-0.005
100 %		+10	1770 000 014	5.6	0.000 000	0.003
100 %		+30	1770 000 015	6.4	0.000 000	0.004
100 %		+40	1770 000 019	10.5	0.000 001	0.006
100 %		+50	1770 000 004	-4.7	0.000 000	-0.003
Batt. Endpoint	3.400	+20	1770 000 019	10.9	0.000 001	0.006



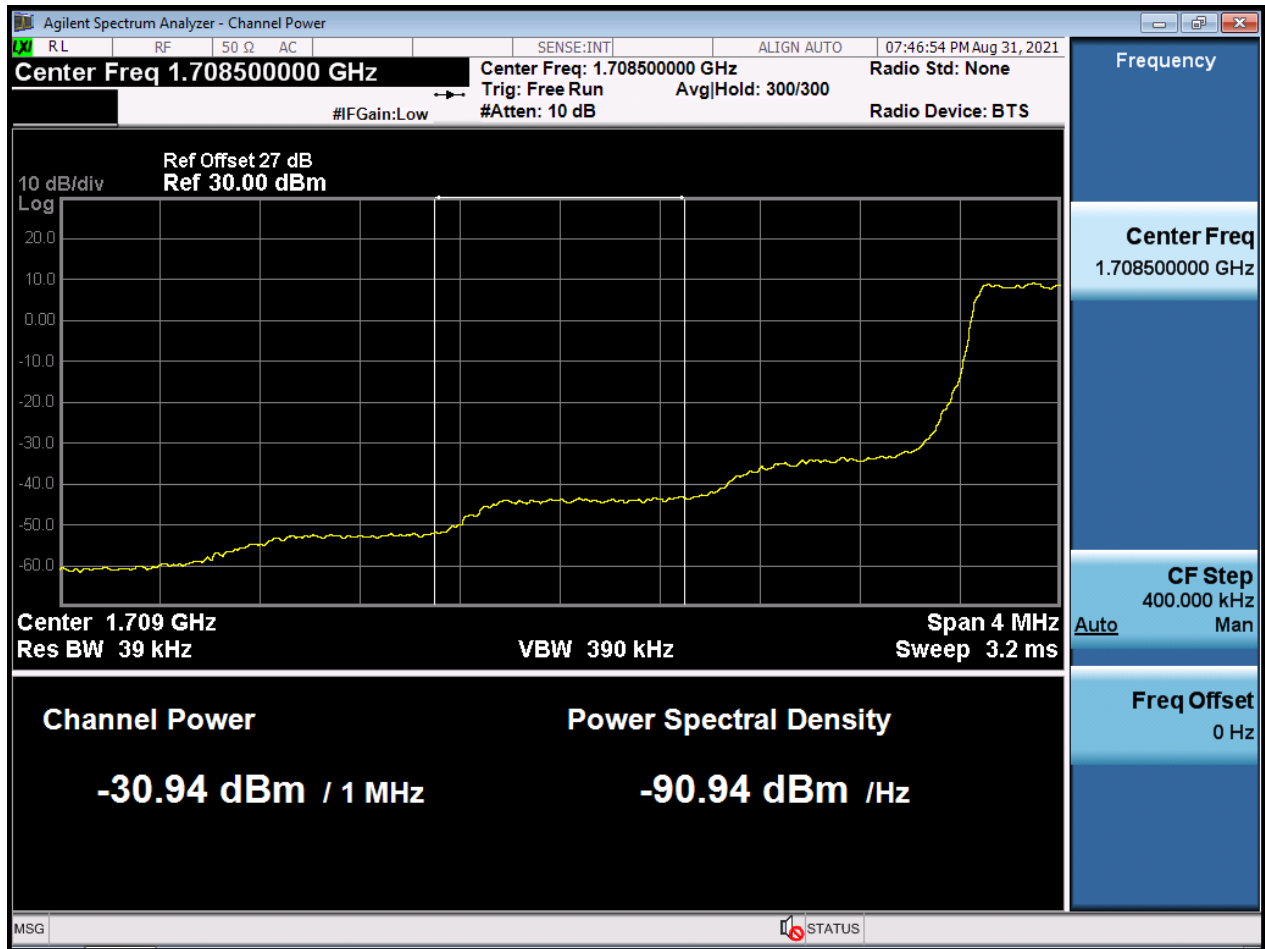


## 9. TEST PLOTS

BW1.4 M\_BandEdge\_Lowest Channel\_QPSK\_FullRB(1)



BW1.4 M\_BandEdge\_Lowest Channel\_QPSK\_FullRB(2)



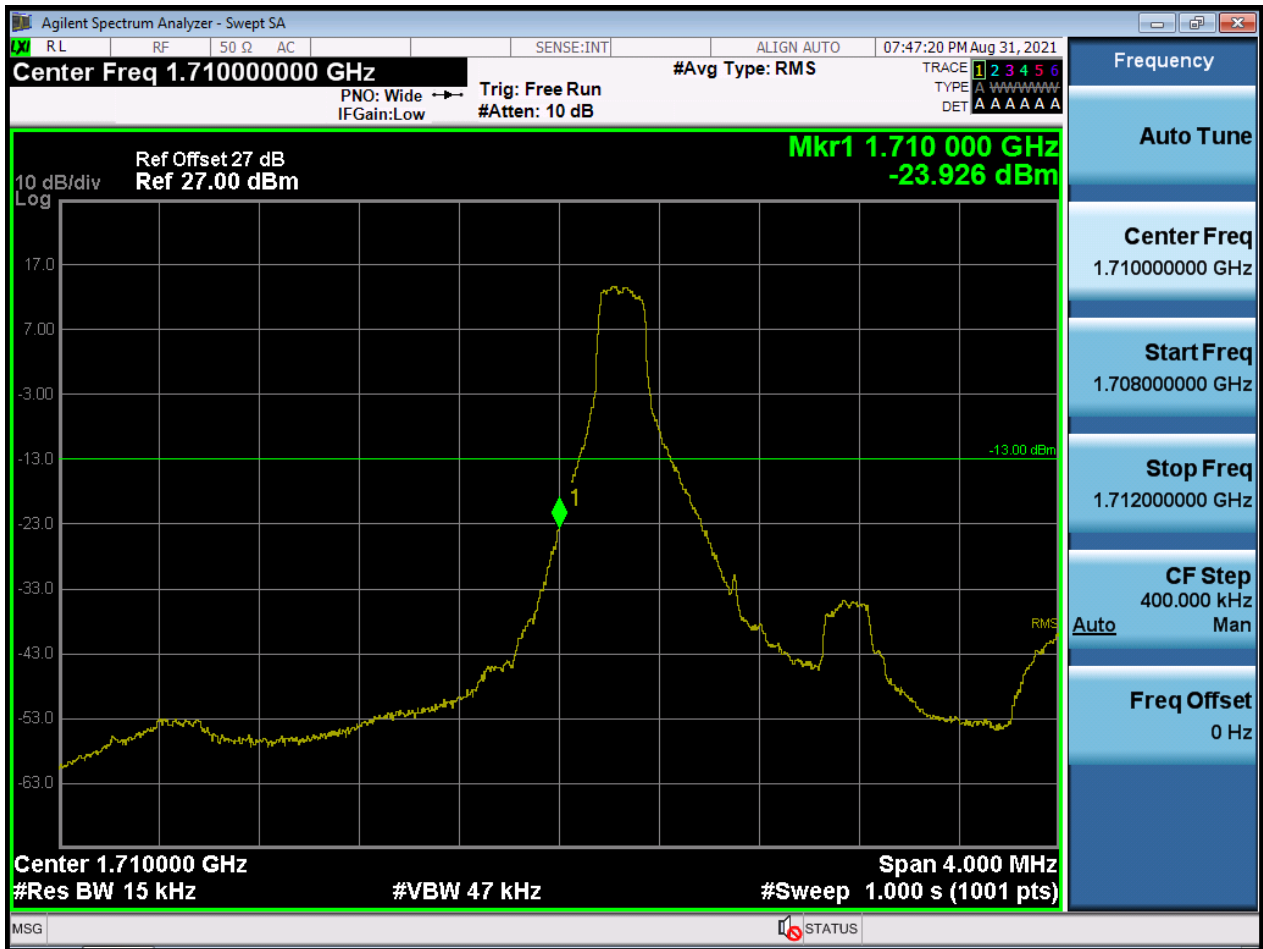
BW1.4 M\_BandEdge\_Highest Channel\_QPSK\_FullIRB(1)



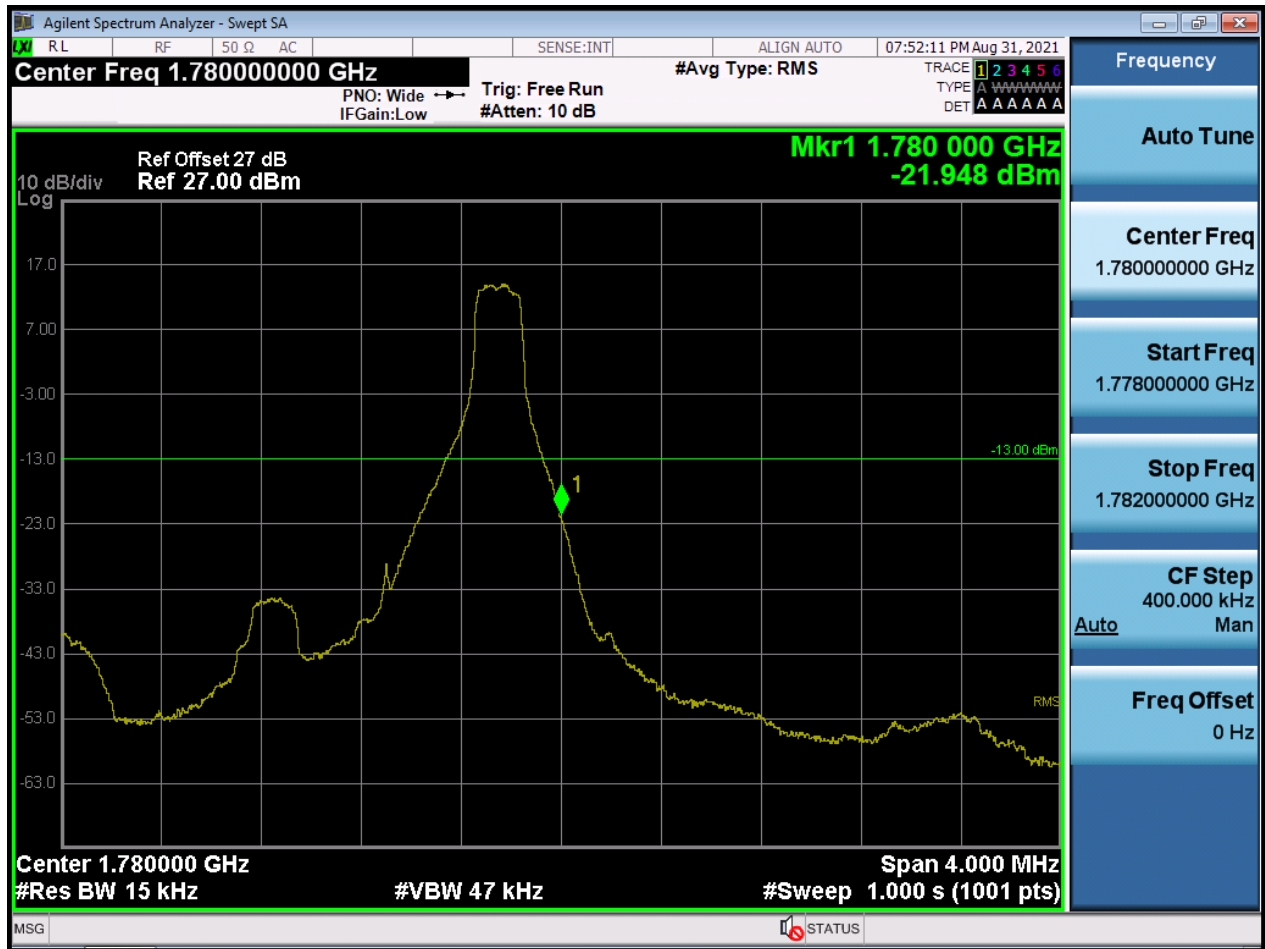
BW1.4 M\_BandEdge\_Highest Channel\_QPSK\_FullIRB(2)



BW1.4 M\_BandEdge\_Lowest Channel\_QPSK\_1RB



BW1.4 M\_BandEdge\_Highest Channel\_QPSK\_1RB

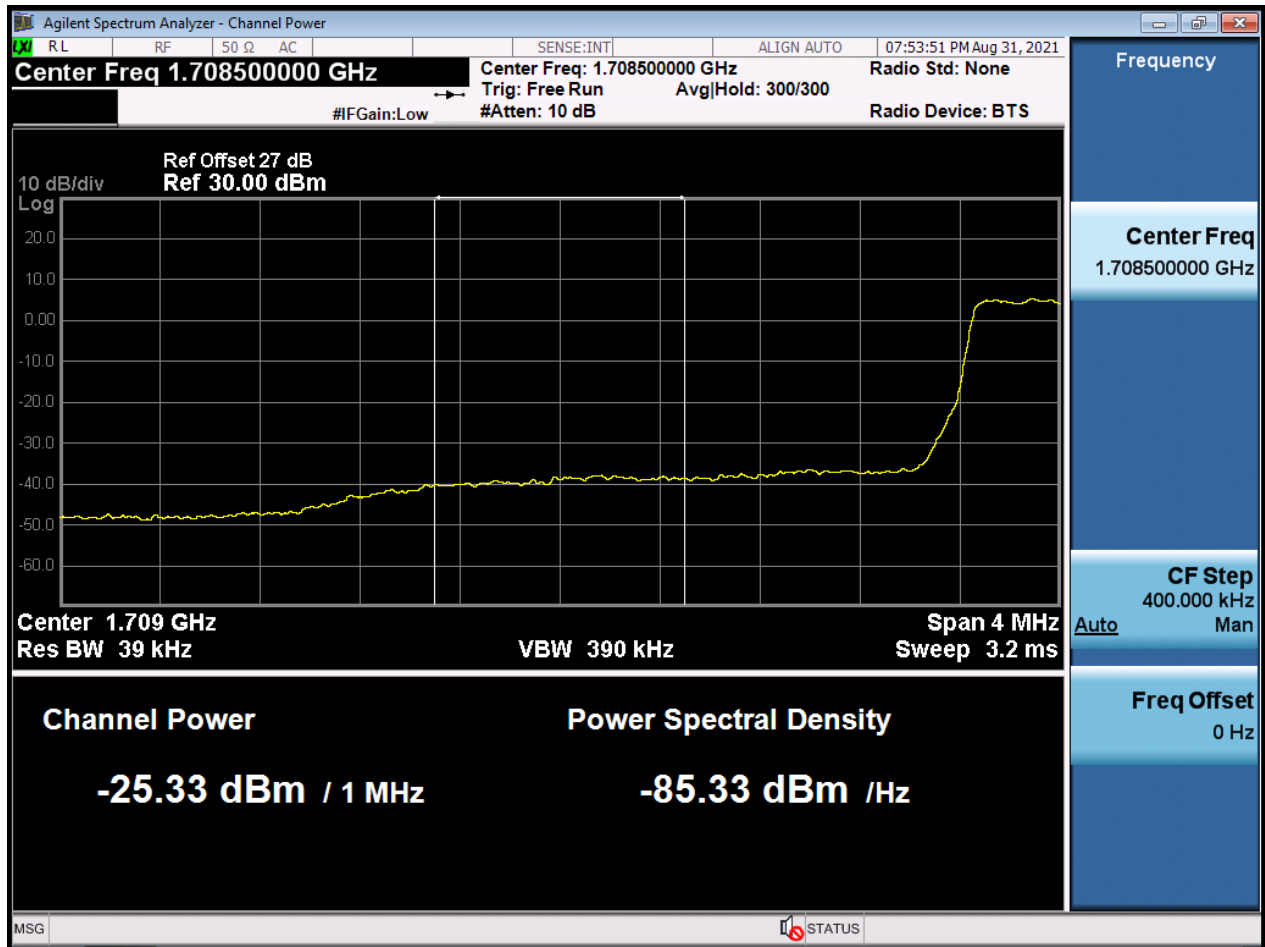


BW3 M\_BandEdge\_Lowest Channel\_QPSK\_FullIRB(1)



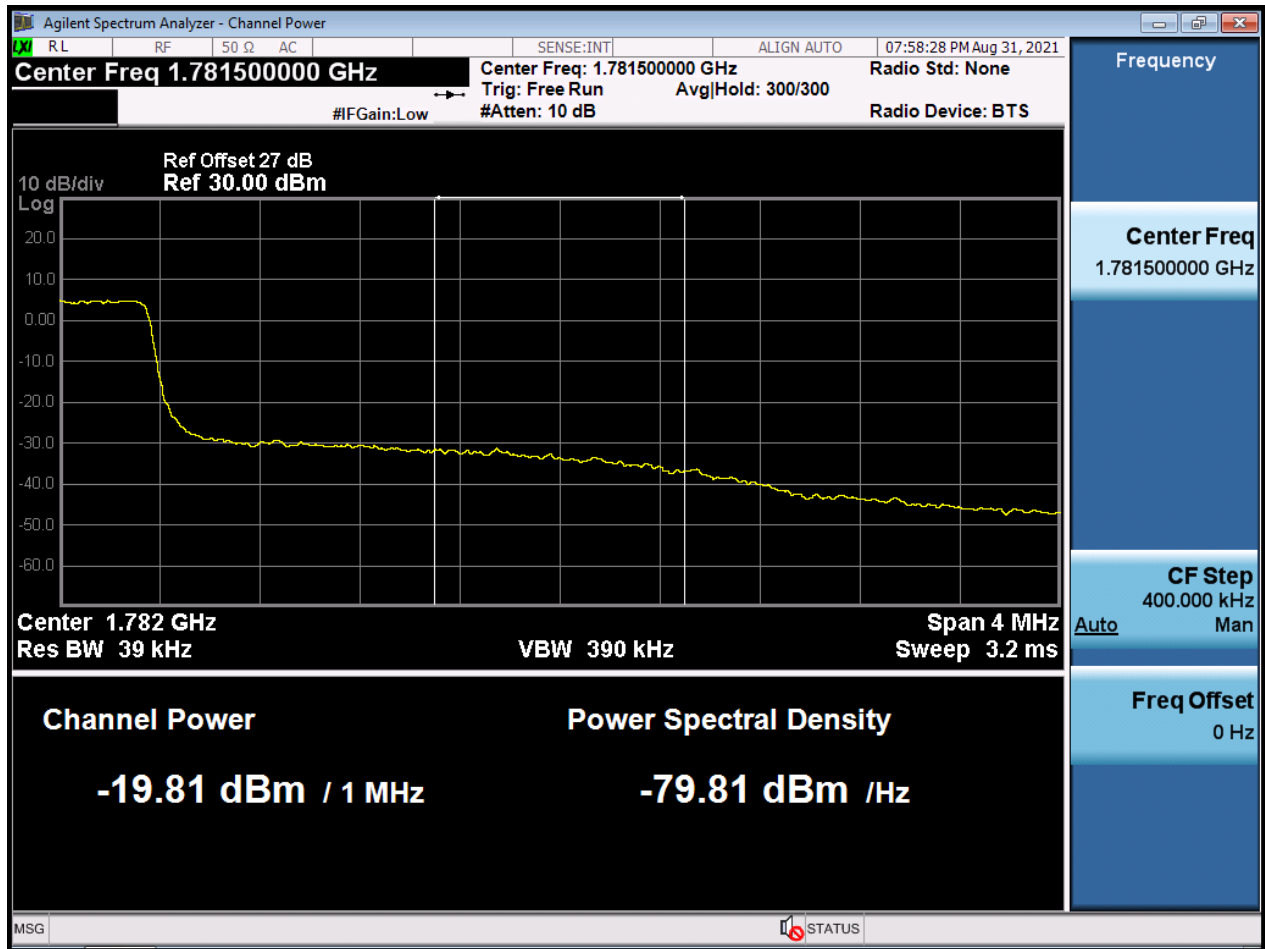


BW3 M\_BandEdge\_Lowest Channel\_QPSK\_FullIRB(2)

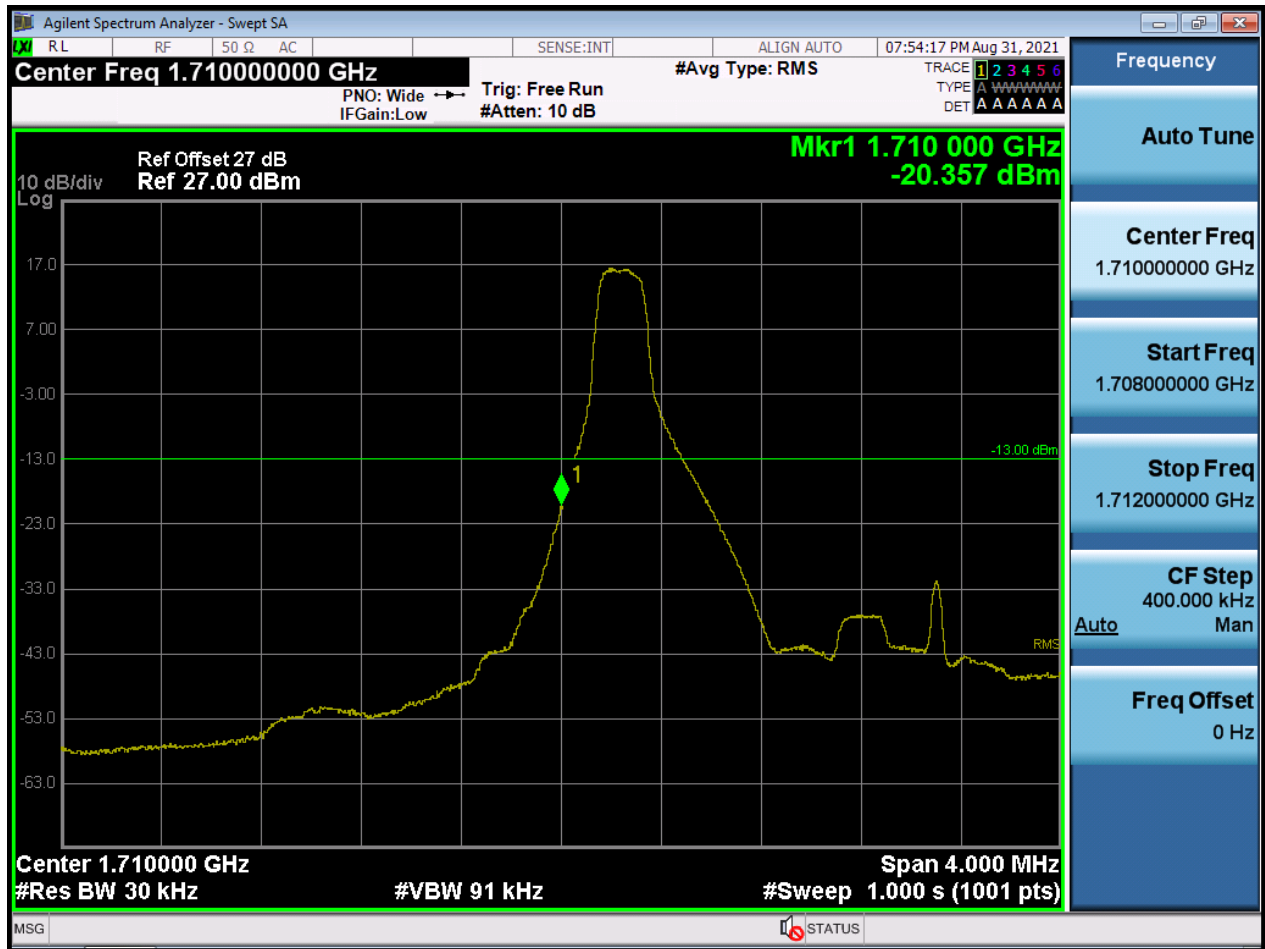




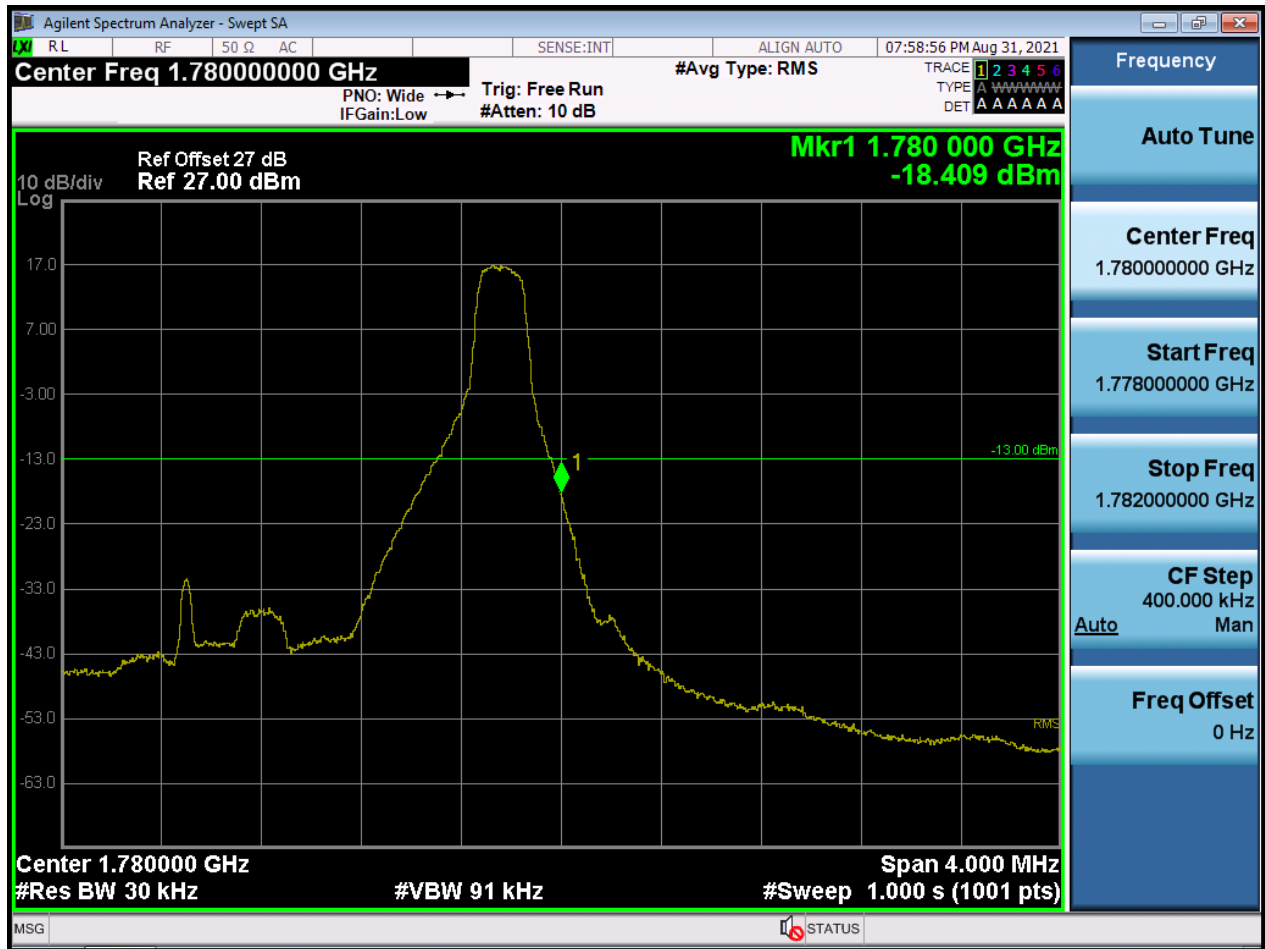
BW3 M\_BandEdge\_Highest Channel\_QPSK\_FullRB(2)



BW3 M\_BandEdge\_Lowest Channel\_QPSK\_1RB



BW3 M\_BandEdge\_Highest Channel\_QPSK\_1RB



BW5 M\_BandEdge\_Lowest Channel\_QPSK\_FullIRB(1)



BW5 M\_BandEdge\_Lowest Channel\_QPSK\_FullIRB(2)

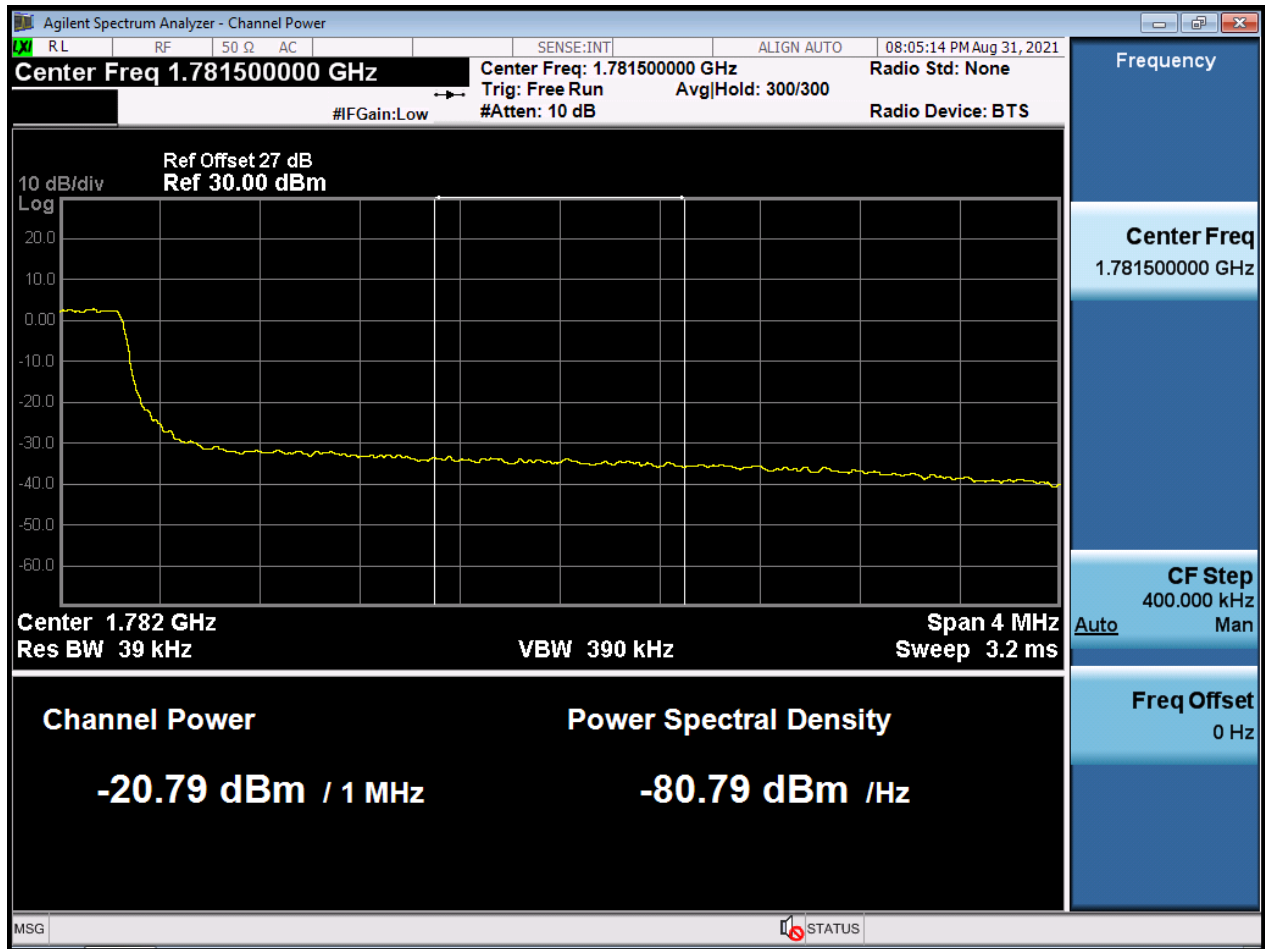


BW5 M\_BandEdge\_Highest Channel\_QPSK\_FullRB(1)

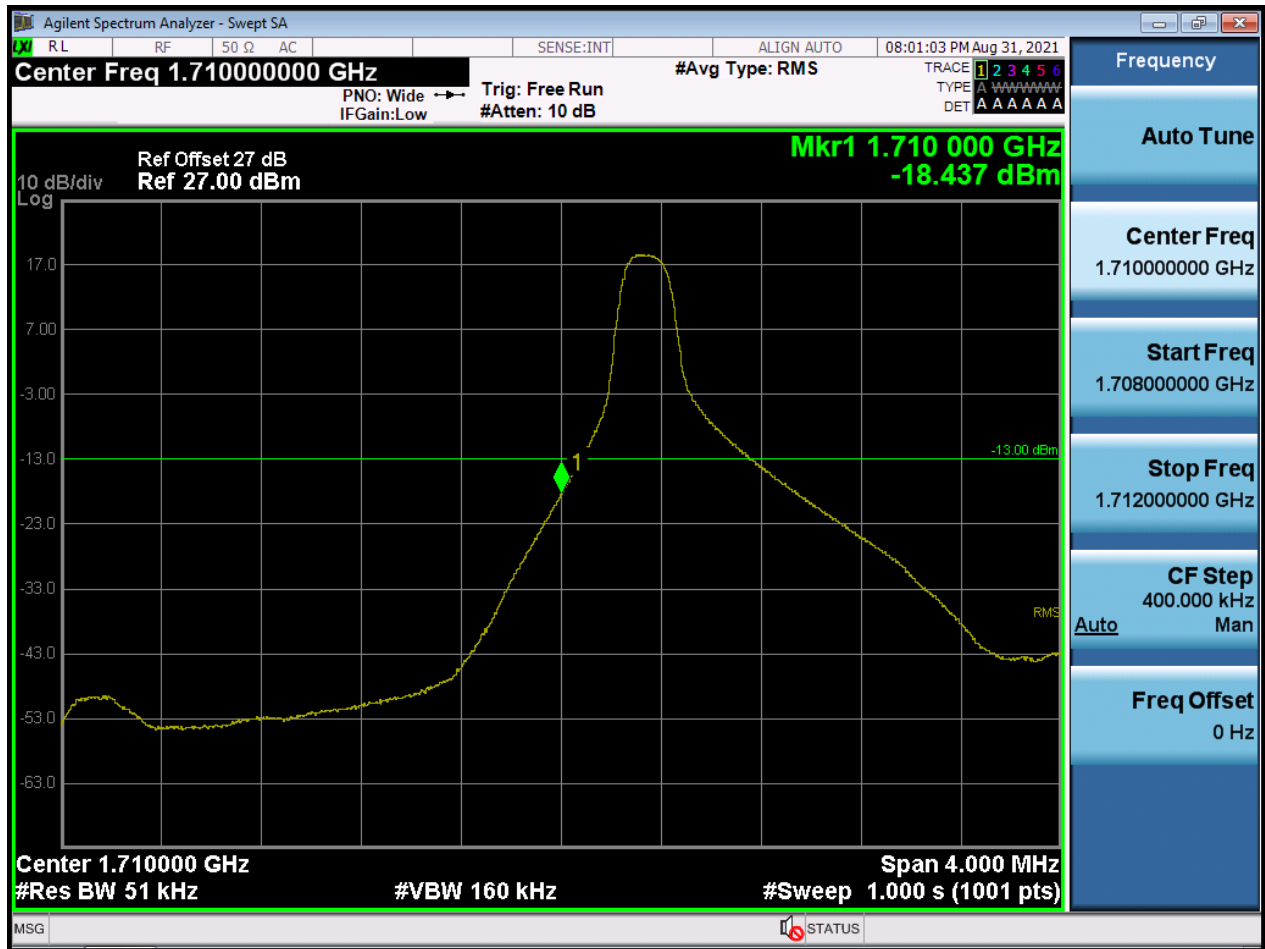




BW5 M\_BandEdge\_Highest Channel\_QPSK\_FullRB(2)



BW5 M\_BandEdge\_Lowest Channel\_QPSK\_1RB



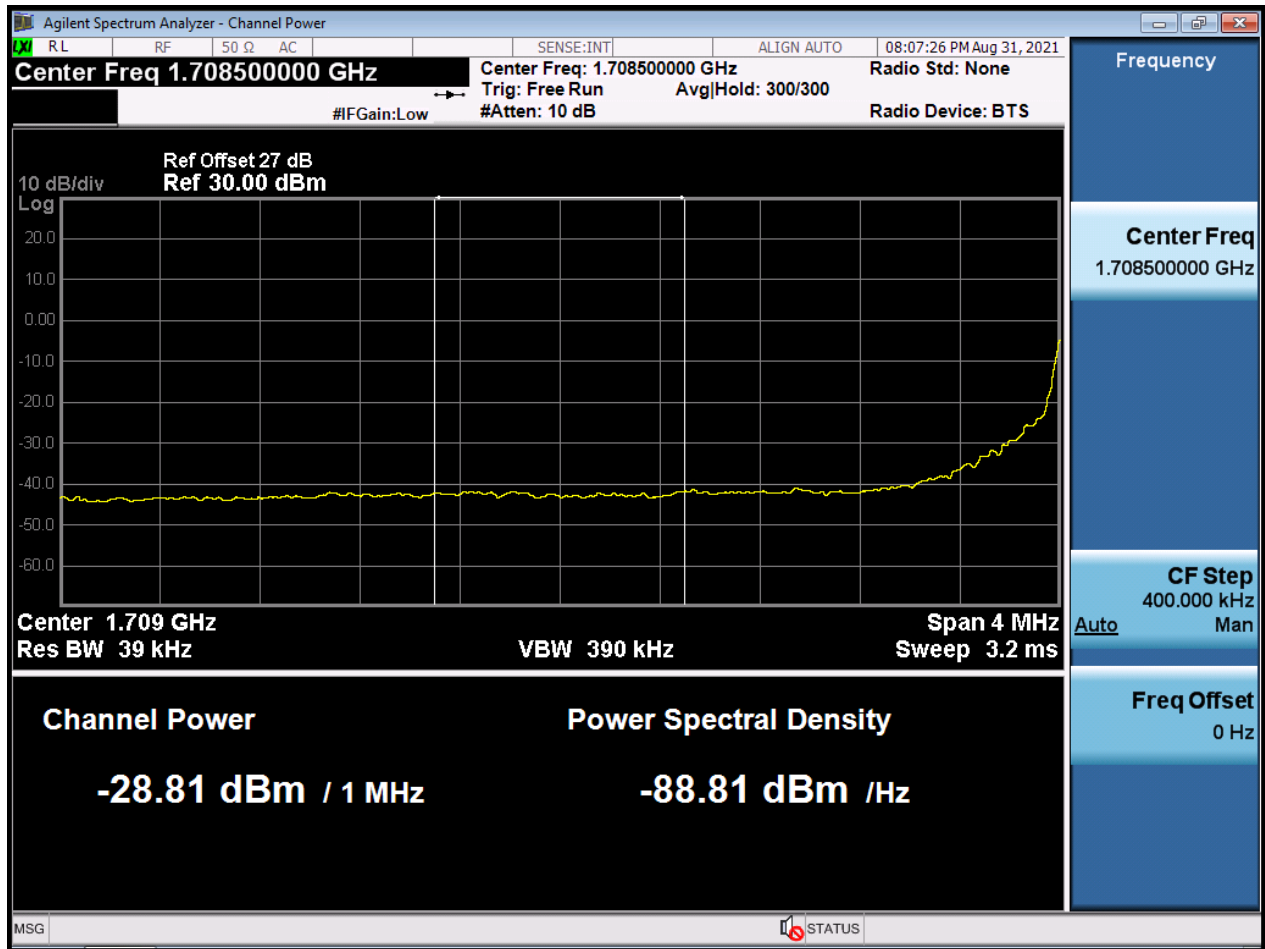
BW5 M\_BandEdge\_Highest Channel\_QPSK\_1RB



BW10 M\_BandEdge\_Lowest Channel\_QPSK\_FullIRB(1)



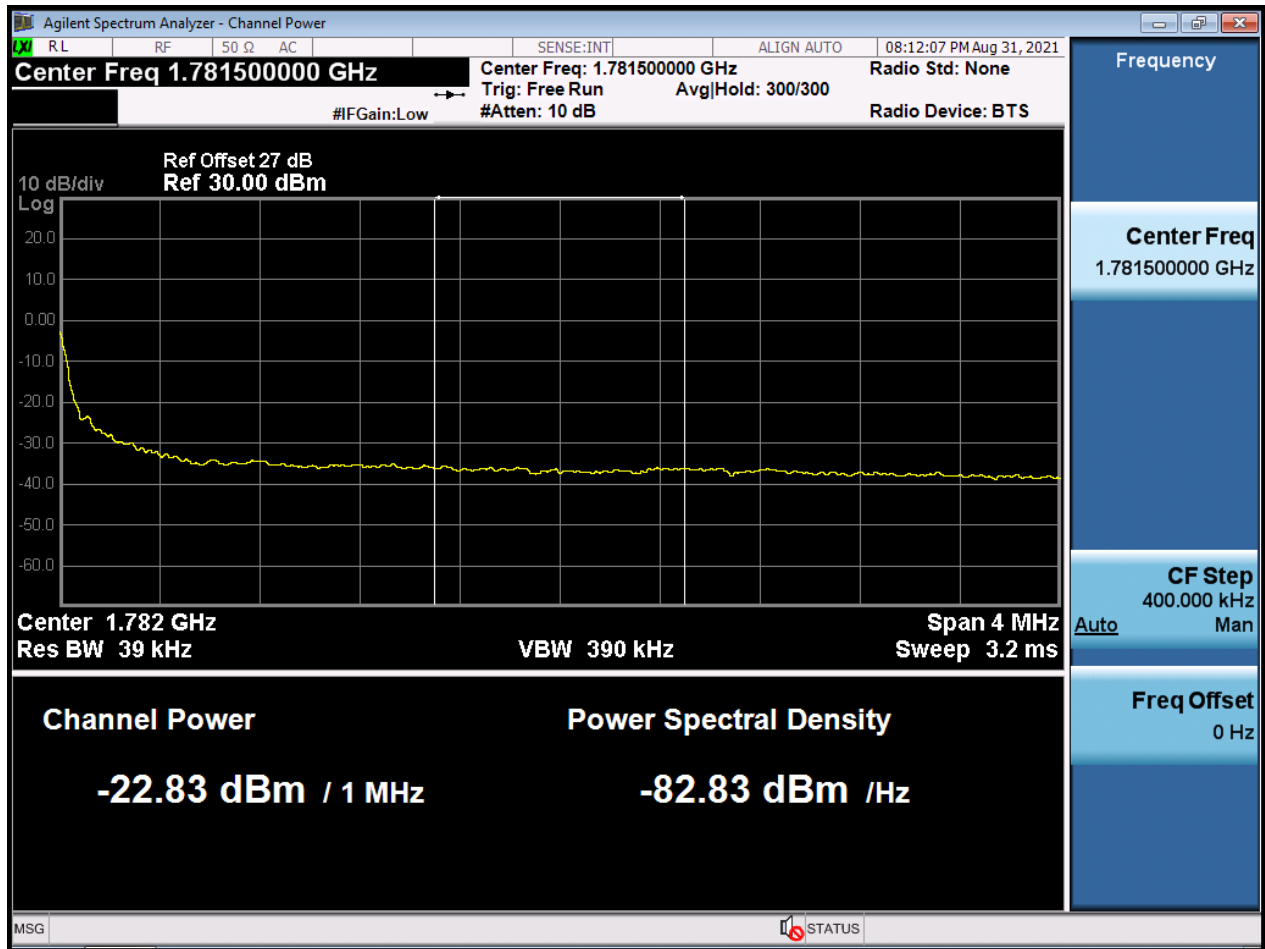
BW10 M\_BandEdge\_Lowest Channel\_QPSK\_FullRB(2)



BW10 M\_BandEdge\_Highest Channel\_QPSK\_FullRB(1)



BW10 M\_BandEdge\_Highest Channel\_QPSK\_FullRB(2)

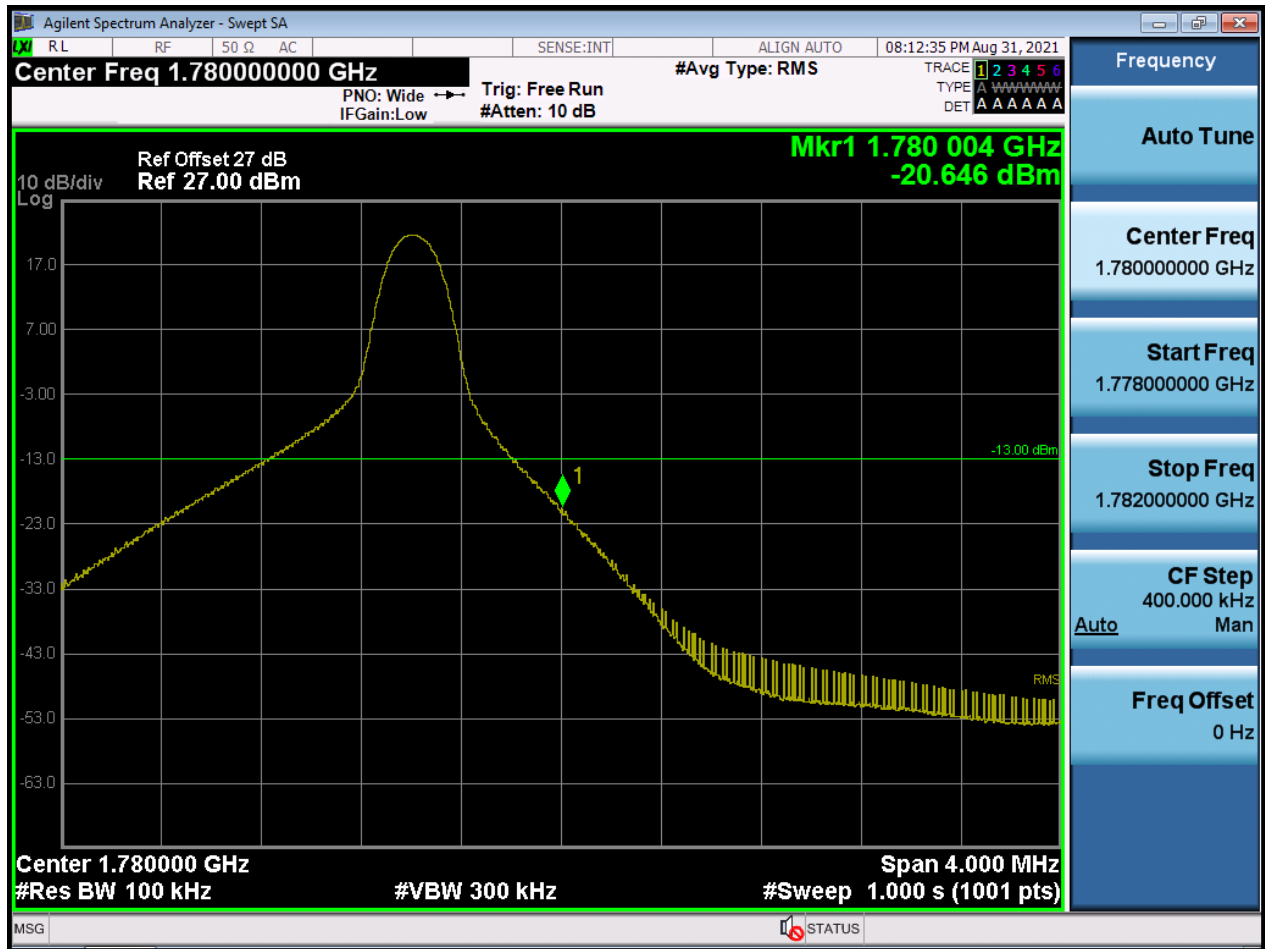


BW10 M\_BandEdge\_Lowest Channel\_QPSK\_1RB





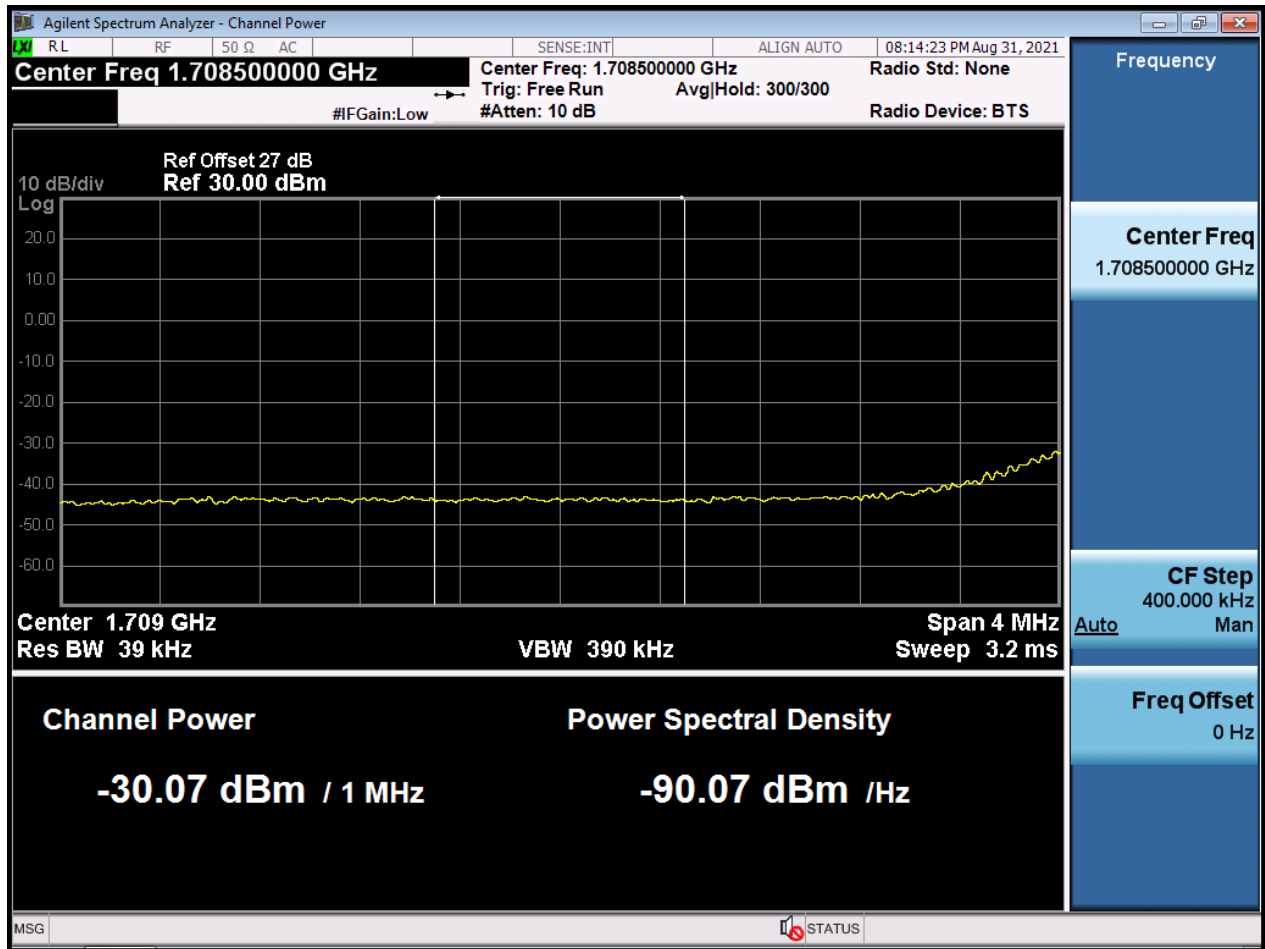
BW10 M\_BandEdge\_Highest Channel\_QPSK\_1RB



BW15 M\_BandEdge\_Lowest Channel\_QPSK\_FullIRB(1)



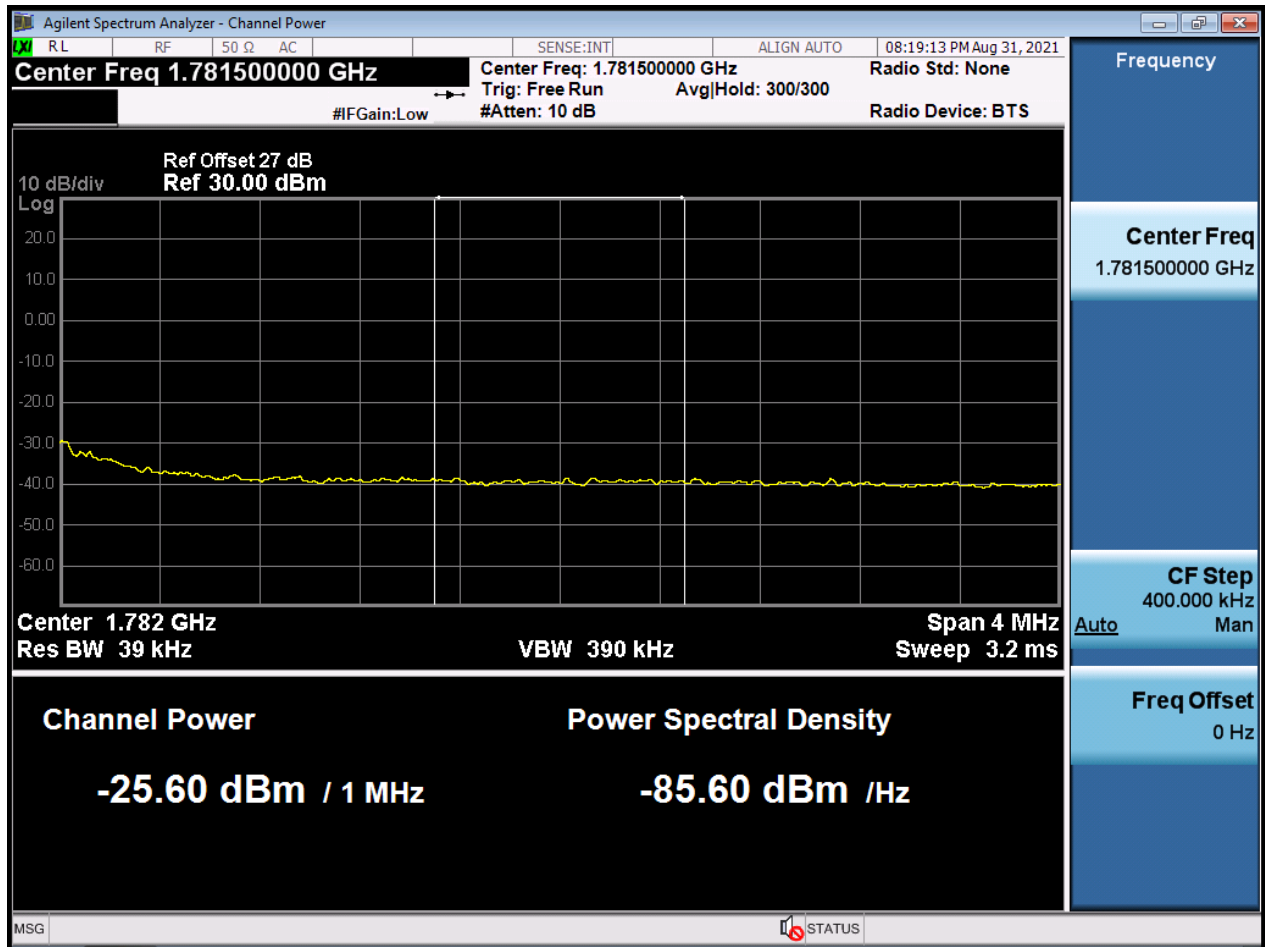
BW15 M\_BandEdge\_Lowest Channel\_QPSK\_FullRB(2)



BW15 M\_BandEdge\_Highest Channel\_QPSK\_FullRB(1)



BW15 M\_BandEdge\_Highest Channel\_QPSK\_FullRB(2)



BW15 M\_BandEdge\_Lowest Channel\_QPSK\_1RB



BW15 M\_BandEdge\_Highest Channel\_QPSK\_1RB

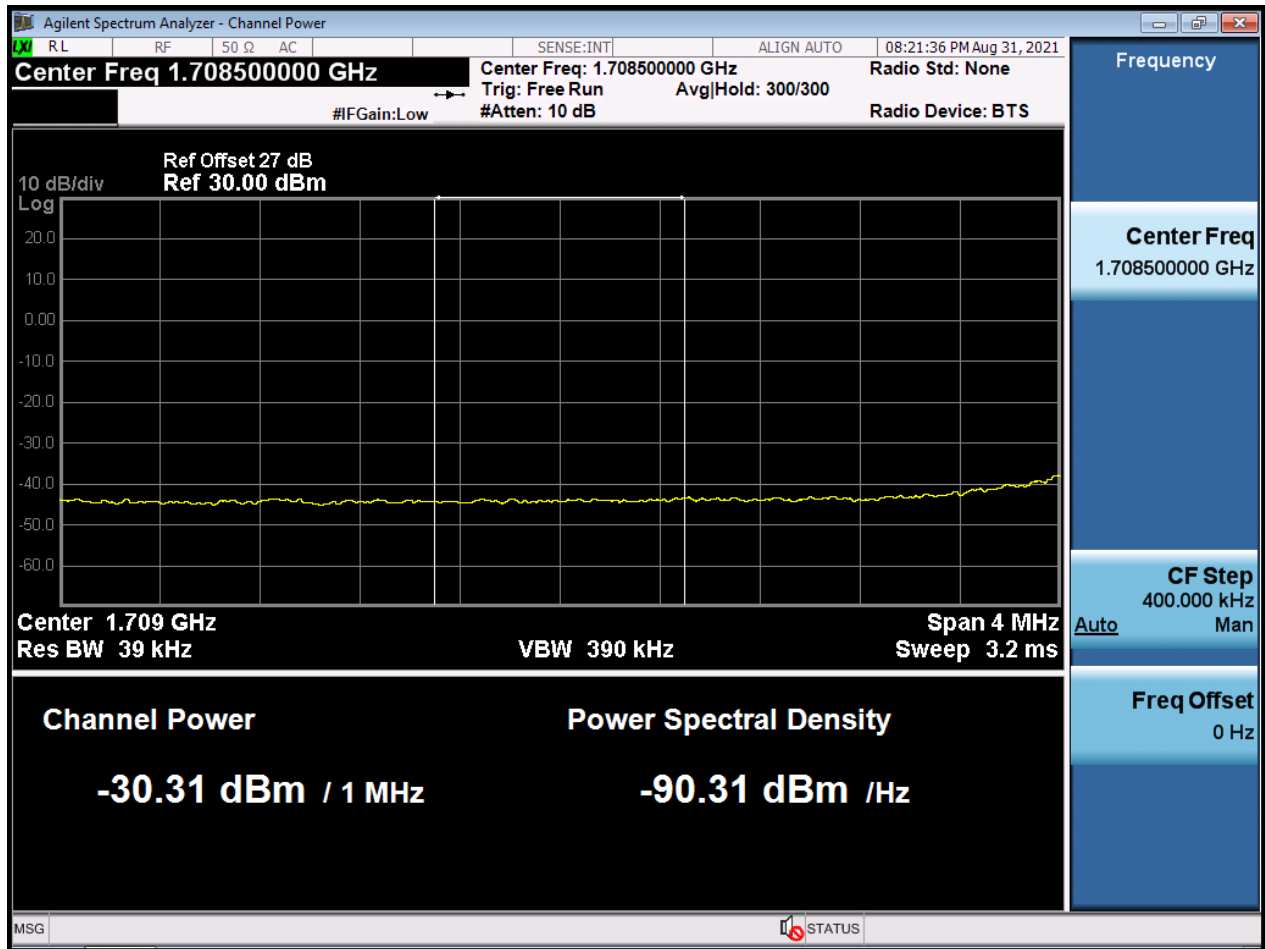


BW20 M\_BandEdge\_Lowest Channel\_QPSK\_FullIRB(1)





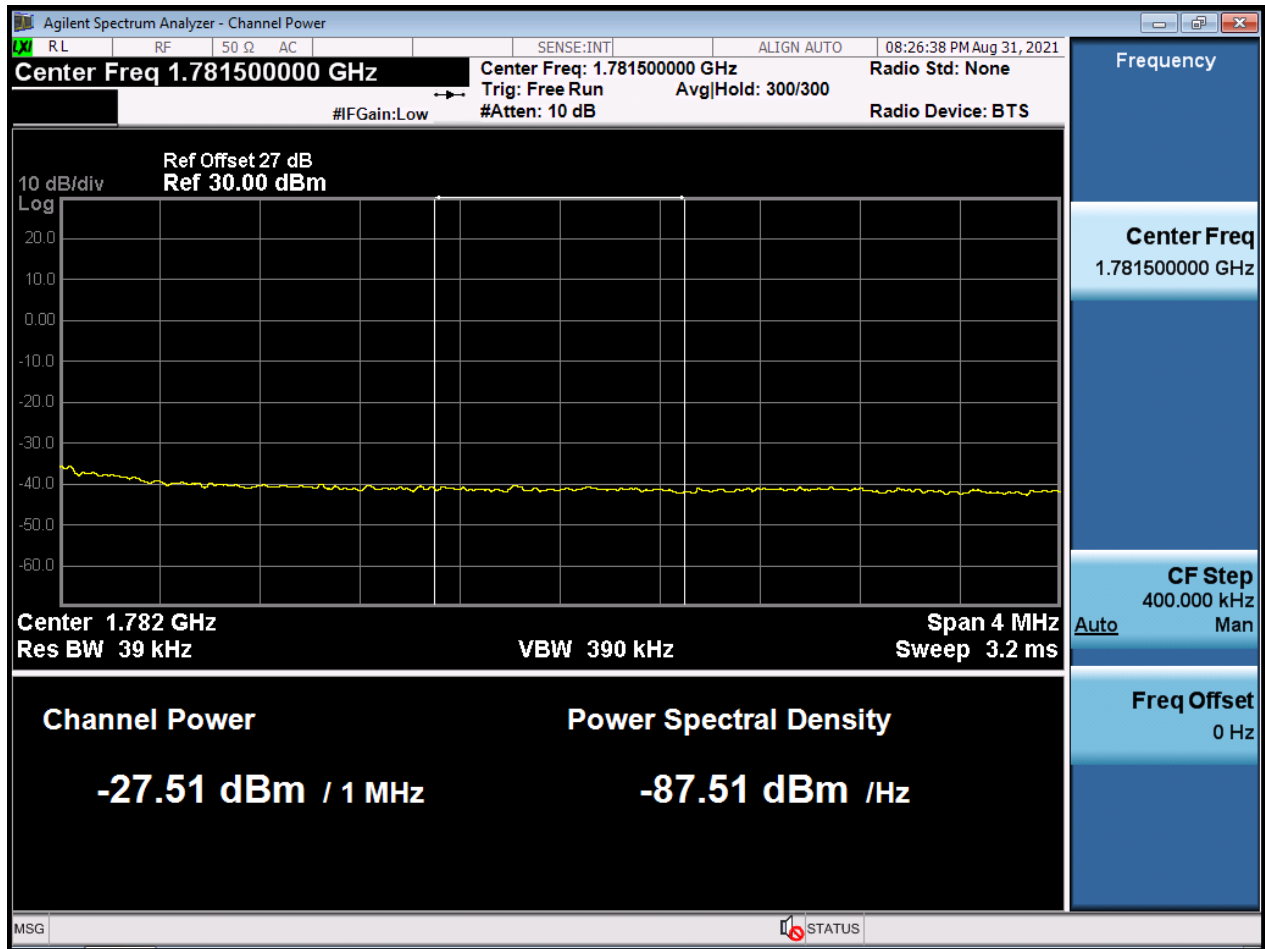
BW20 M\_BandEdge\_Lowest Channel\_QPSK\_FullIRB(2)



BW20 M\_BandEdge\_Highest Channel\_QPSK\_FullRB(1)



BW20 M\_BandEdge\_Highest Channel\_QPSK\_FullRB(2)



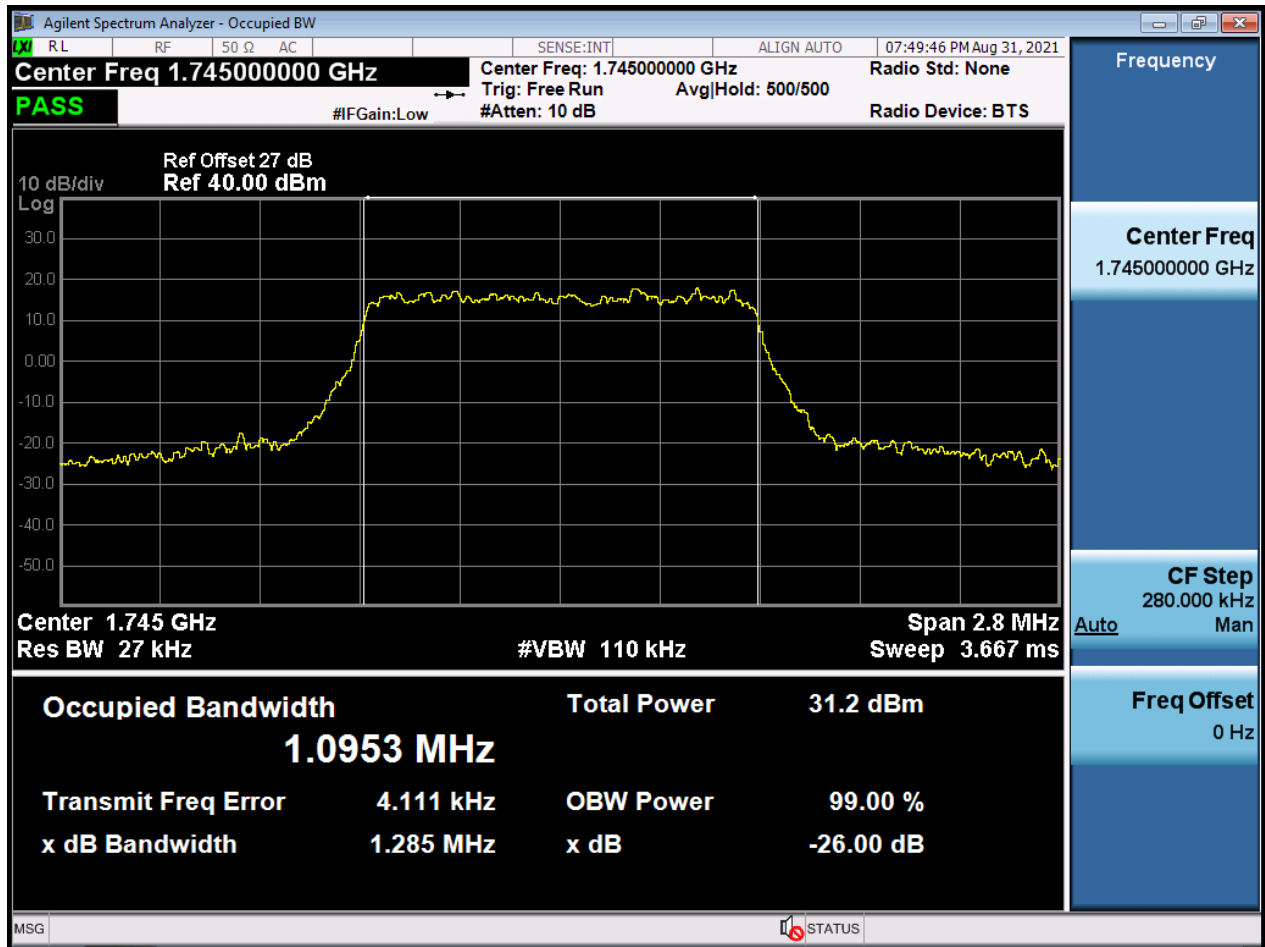
BW20 M\_BandEdge\_Lowest Channel\_QPSK\_1RB



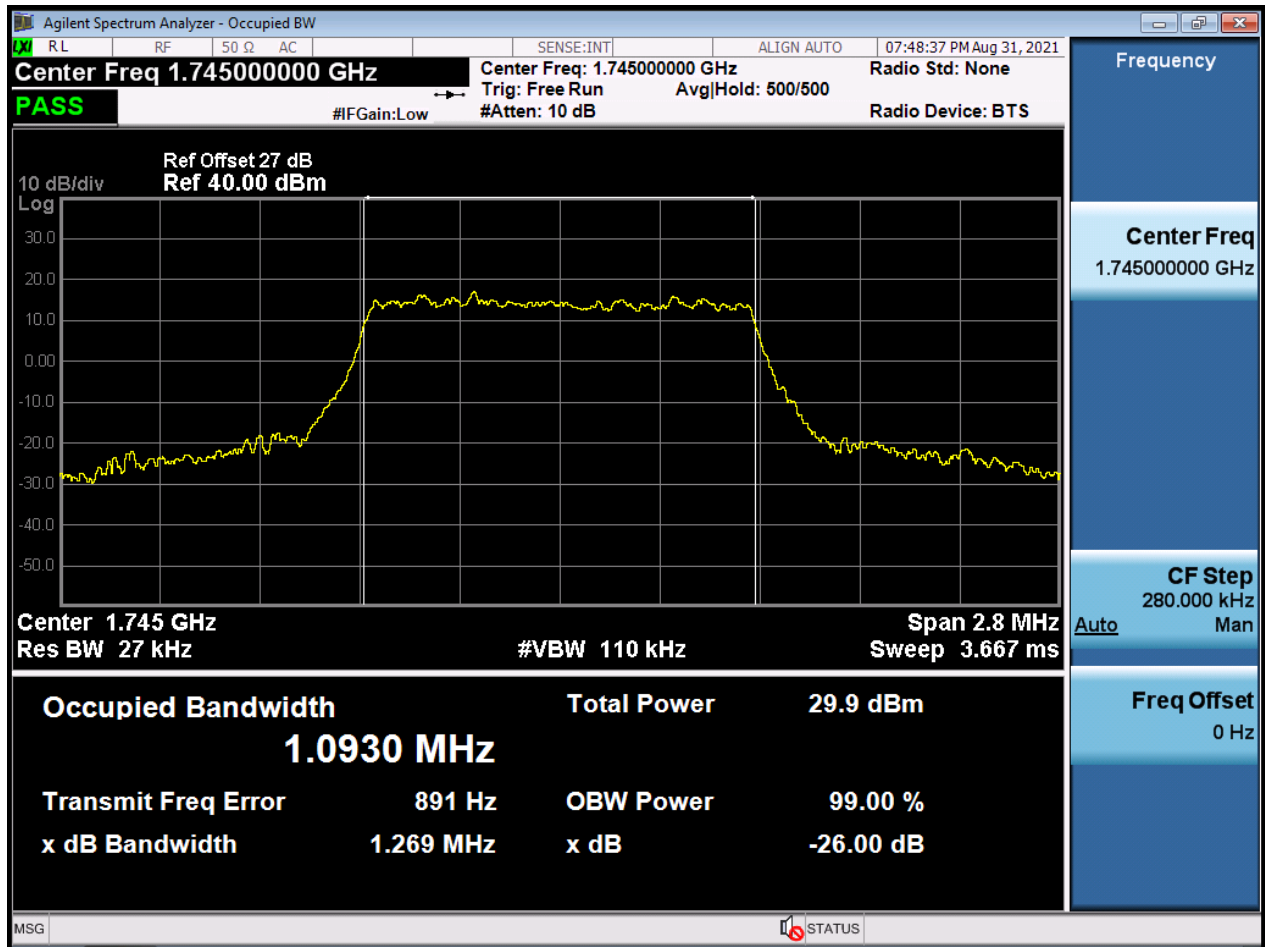
BW20 M\_BandEdge\_Highest Channel\_QPSK\_1RB



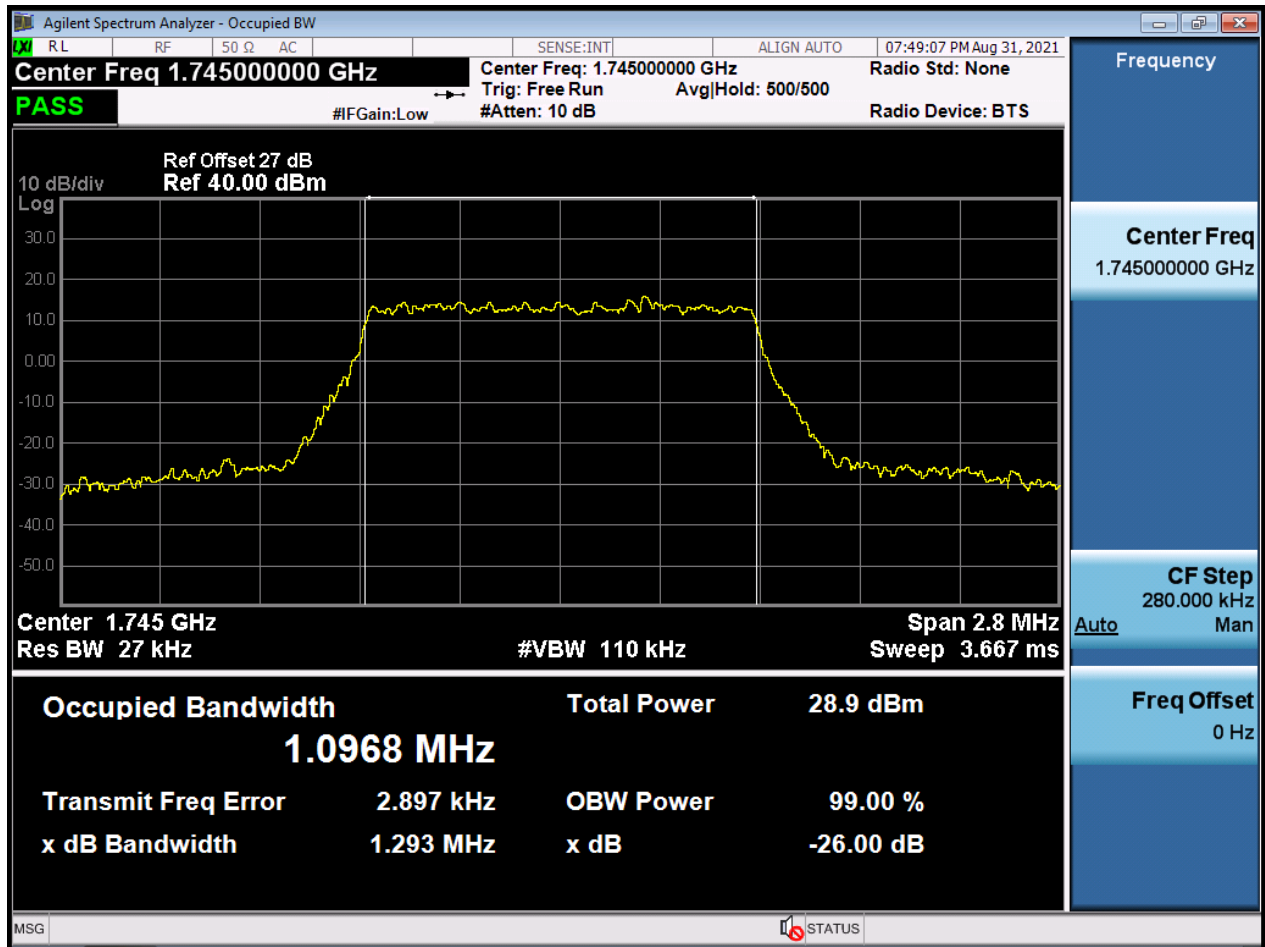
BW1.4 M\_OBW\_Middle Channel\_QPSK\_FullIRB



BW1.4 M\_OBW\_Middle Channel\_16QAM\_FullRB

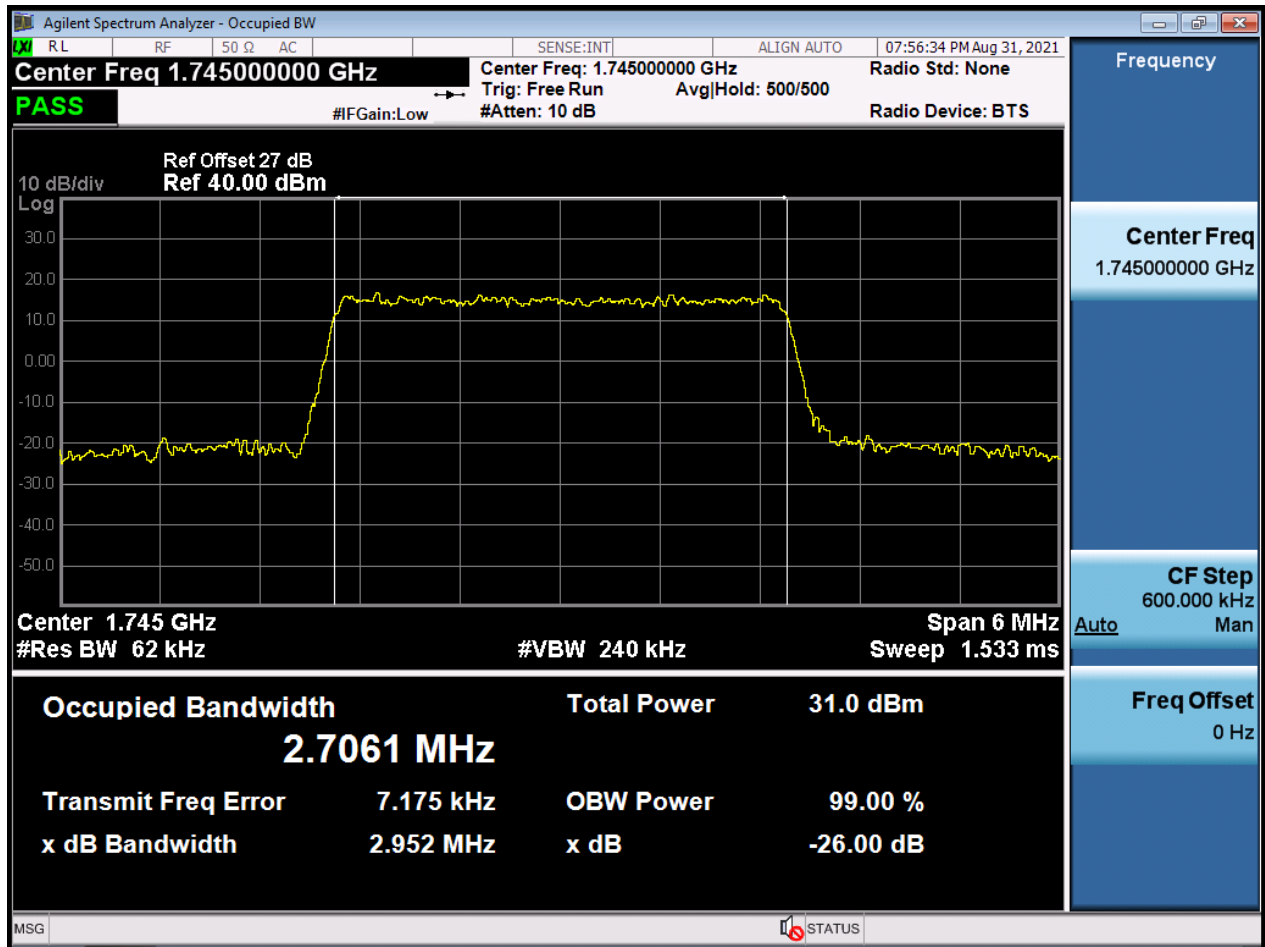


BW1.4 M\_OBW\_Middle Channel\_64QAM\_FullRB

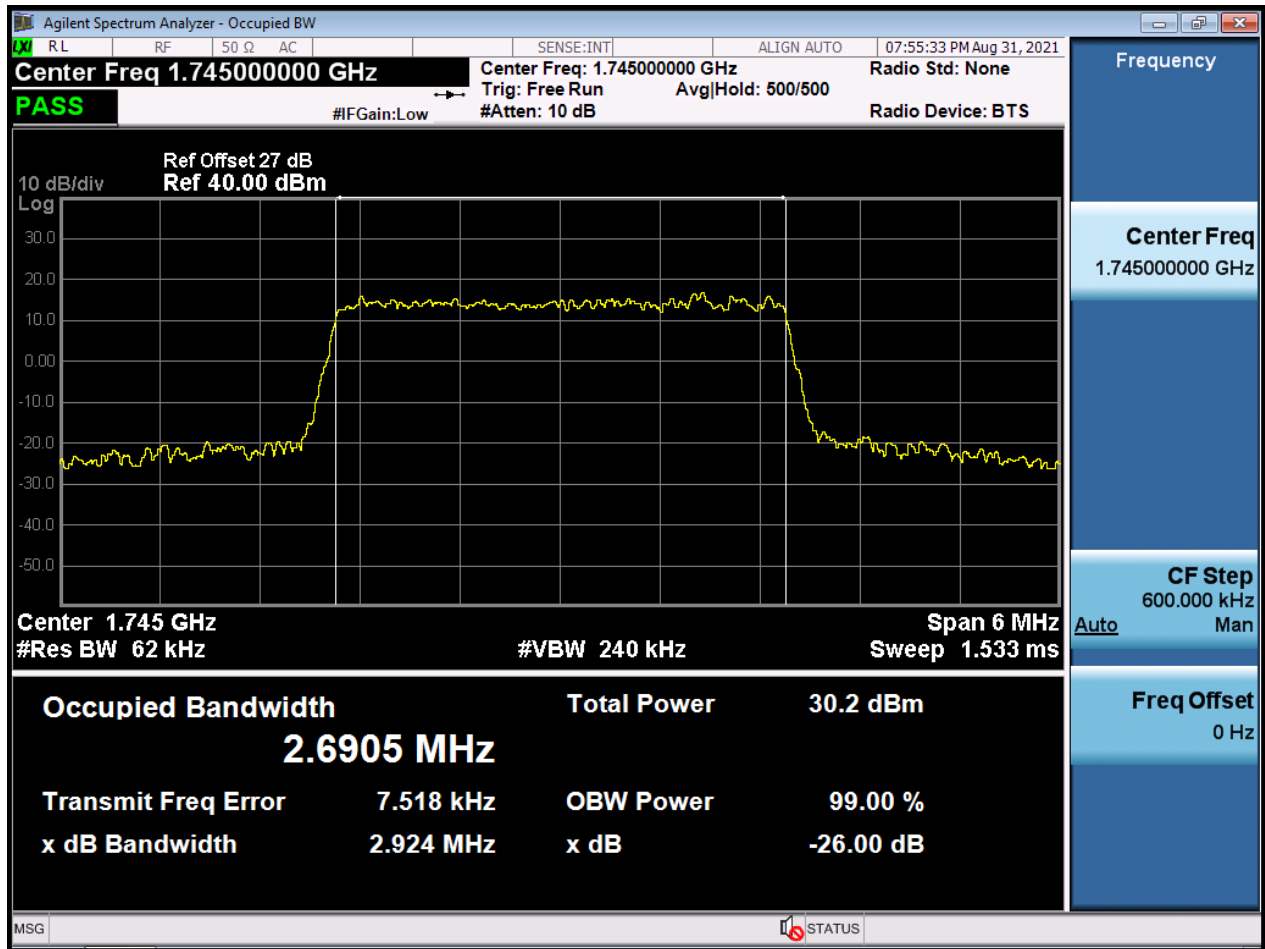




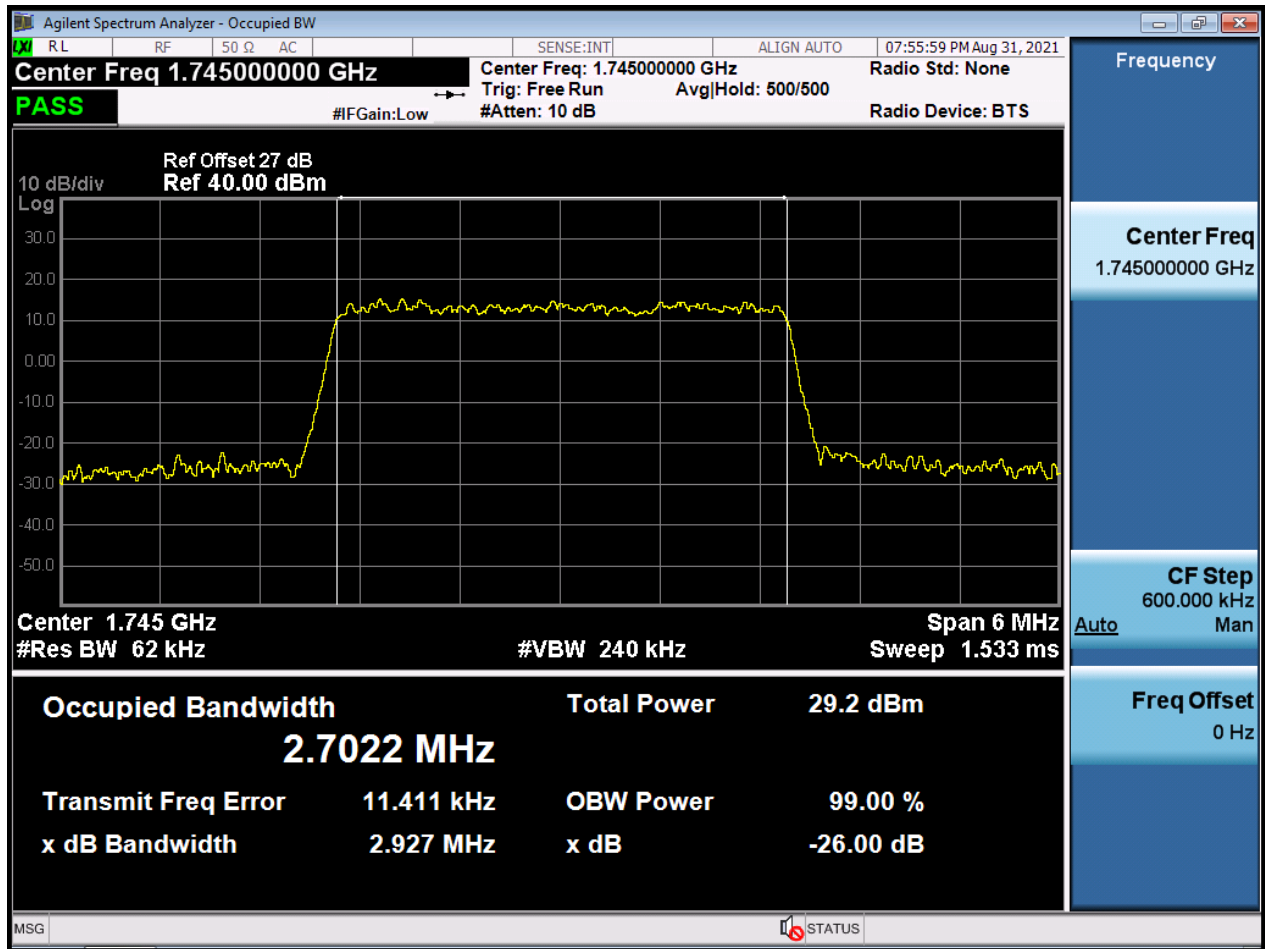
BW3 M\_OBW\_Middle Channel\_QPSK\_FullIRB



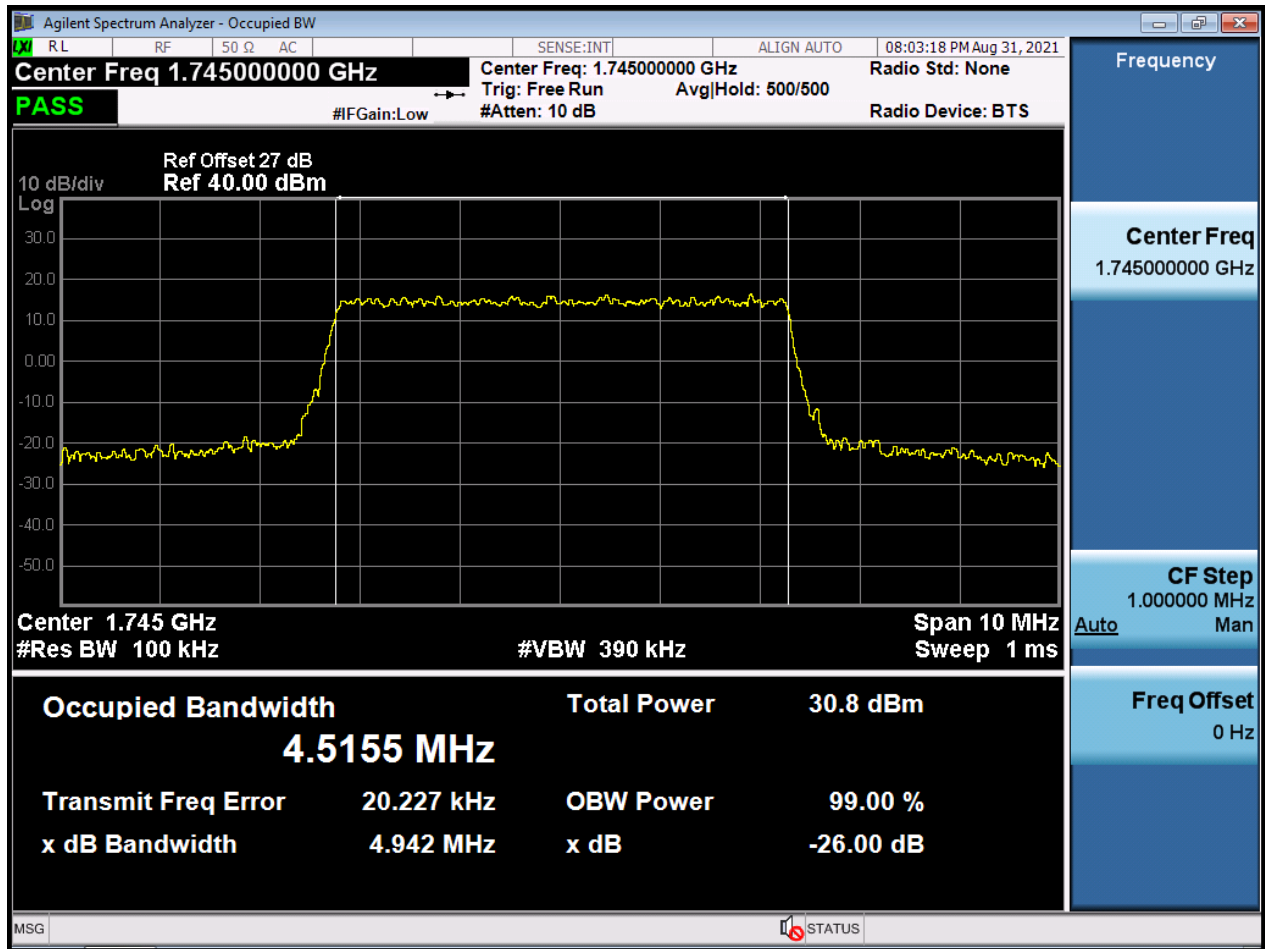
BW3 M\_OBW\_Middle Channel\_16QAM\_FullIRB



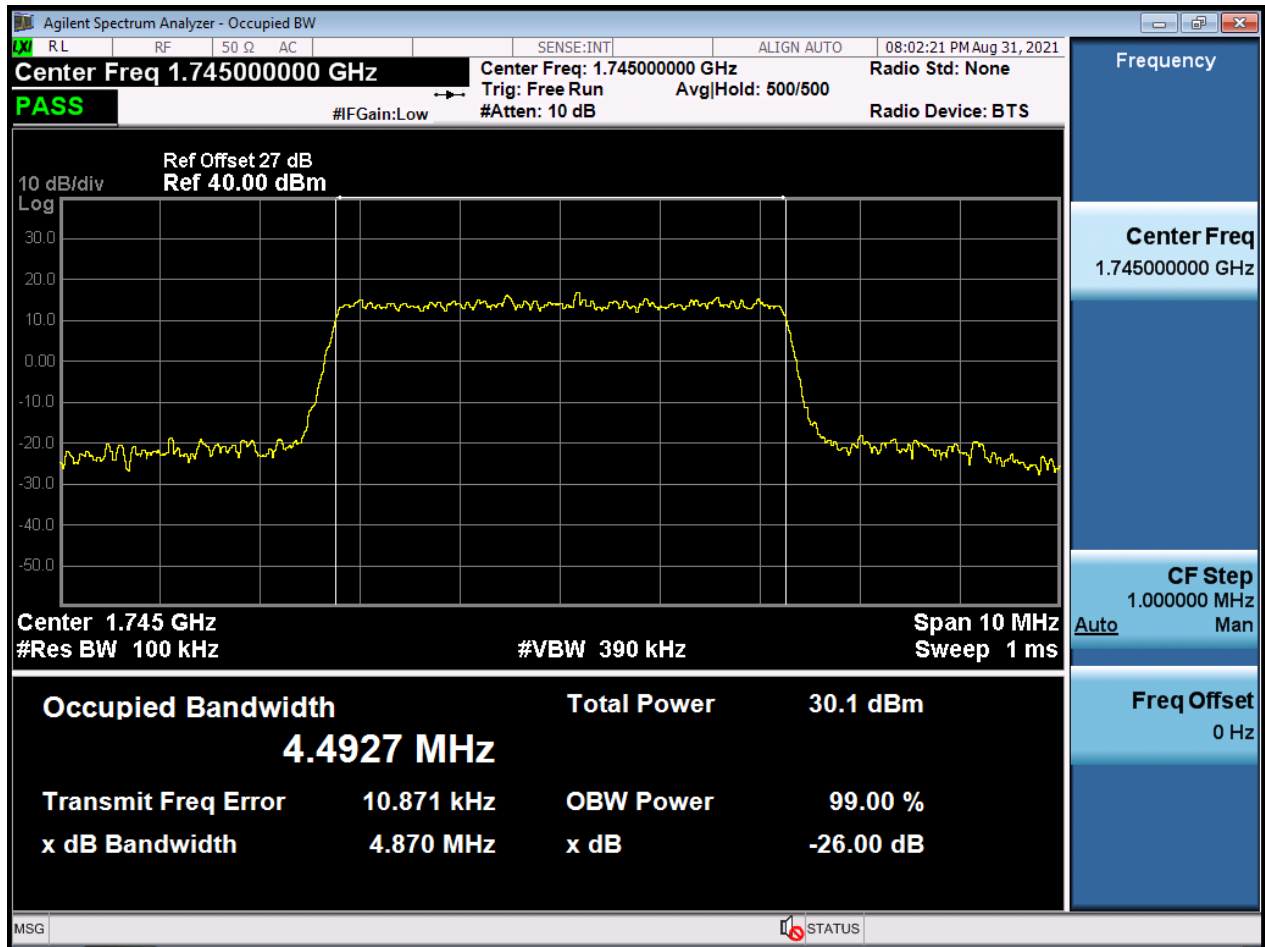
BW3 M\_OBW\_Middle Channel\_64QAM\_FullIRB



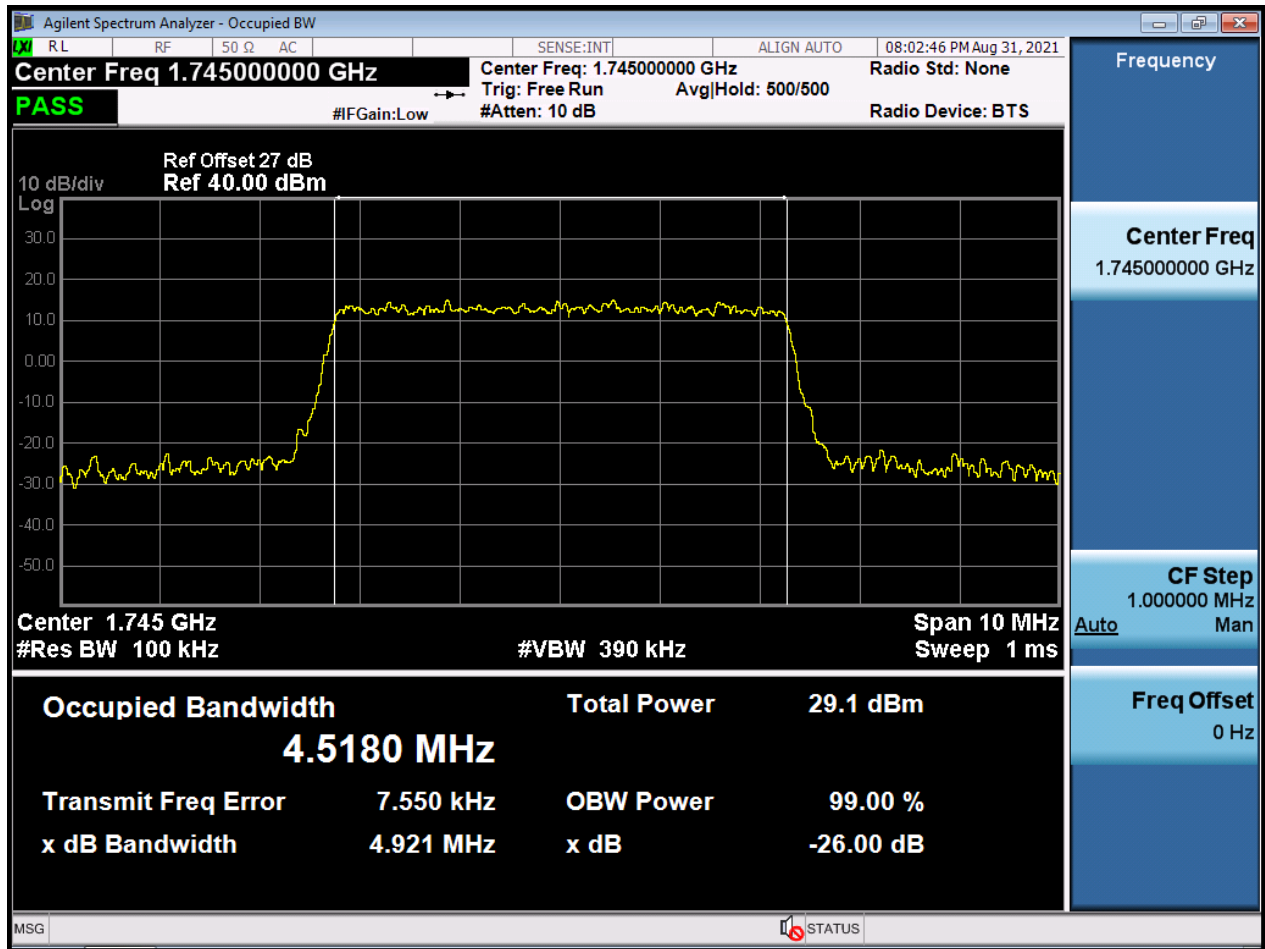
BW5 M\_OBW\_Middle Channel\_QPSK\_FullIRB



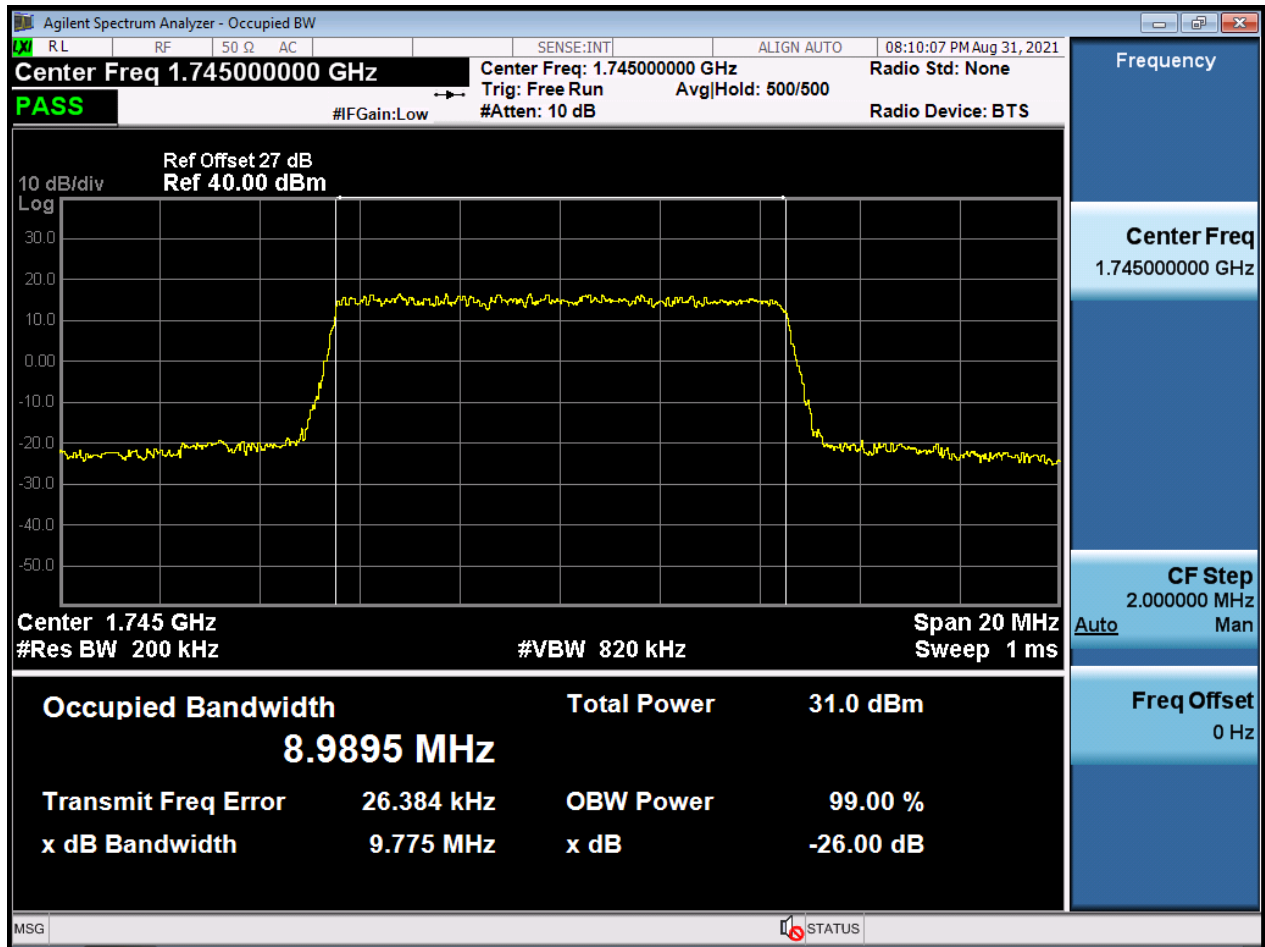
BW5 M\_OBW\_Middle Channel\_16QAM\_FullIRB



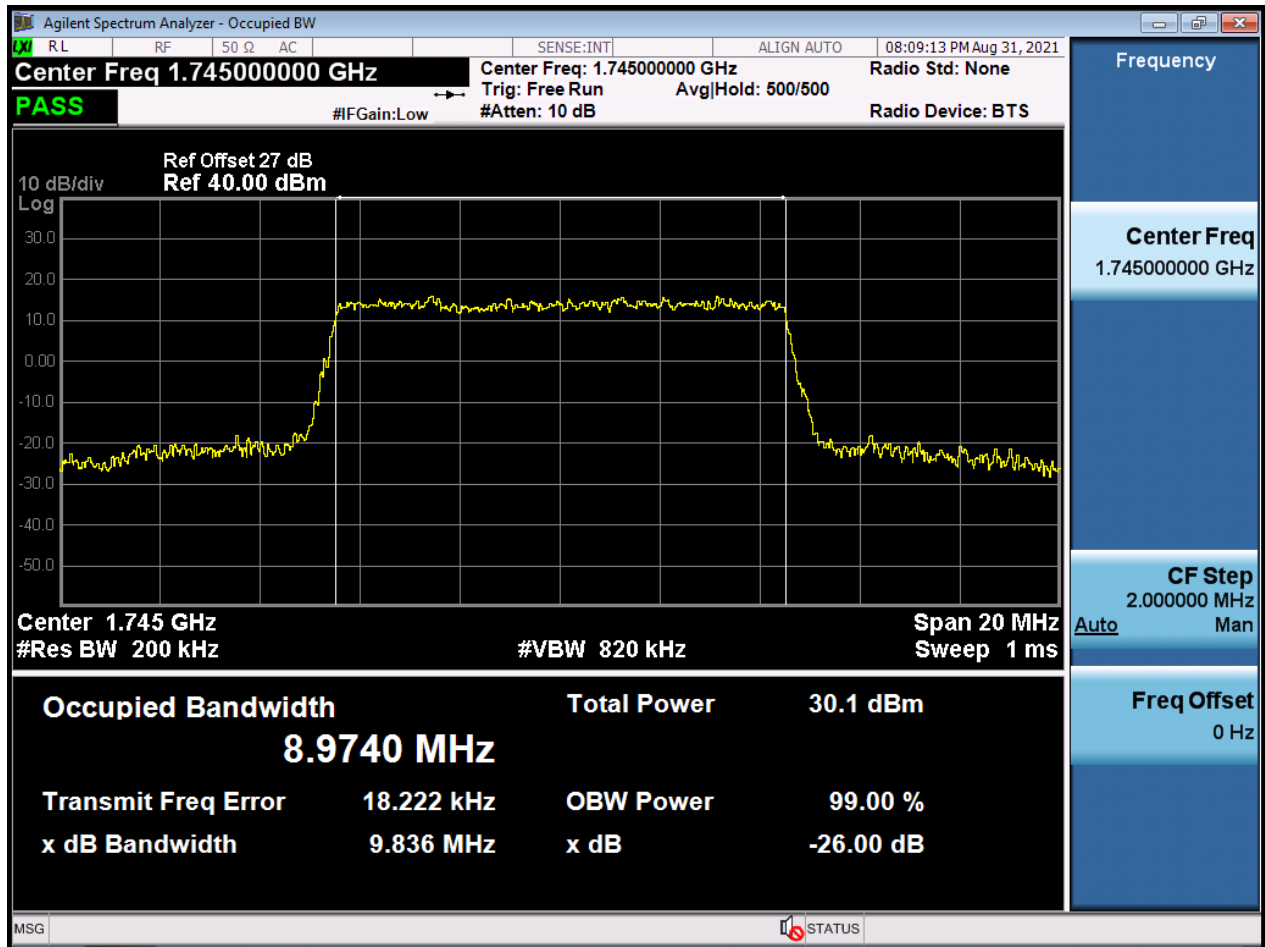
BW5 M\_OBW\_Middle Channel\_64QAM\_FullIRB



BW10 M\_OBW\_Middle Channel\_QPSK\_FullIRB

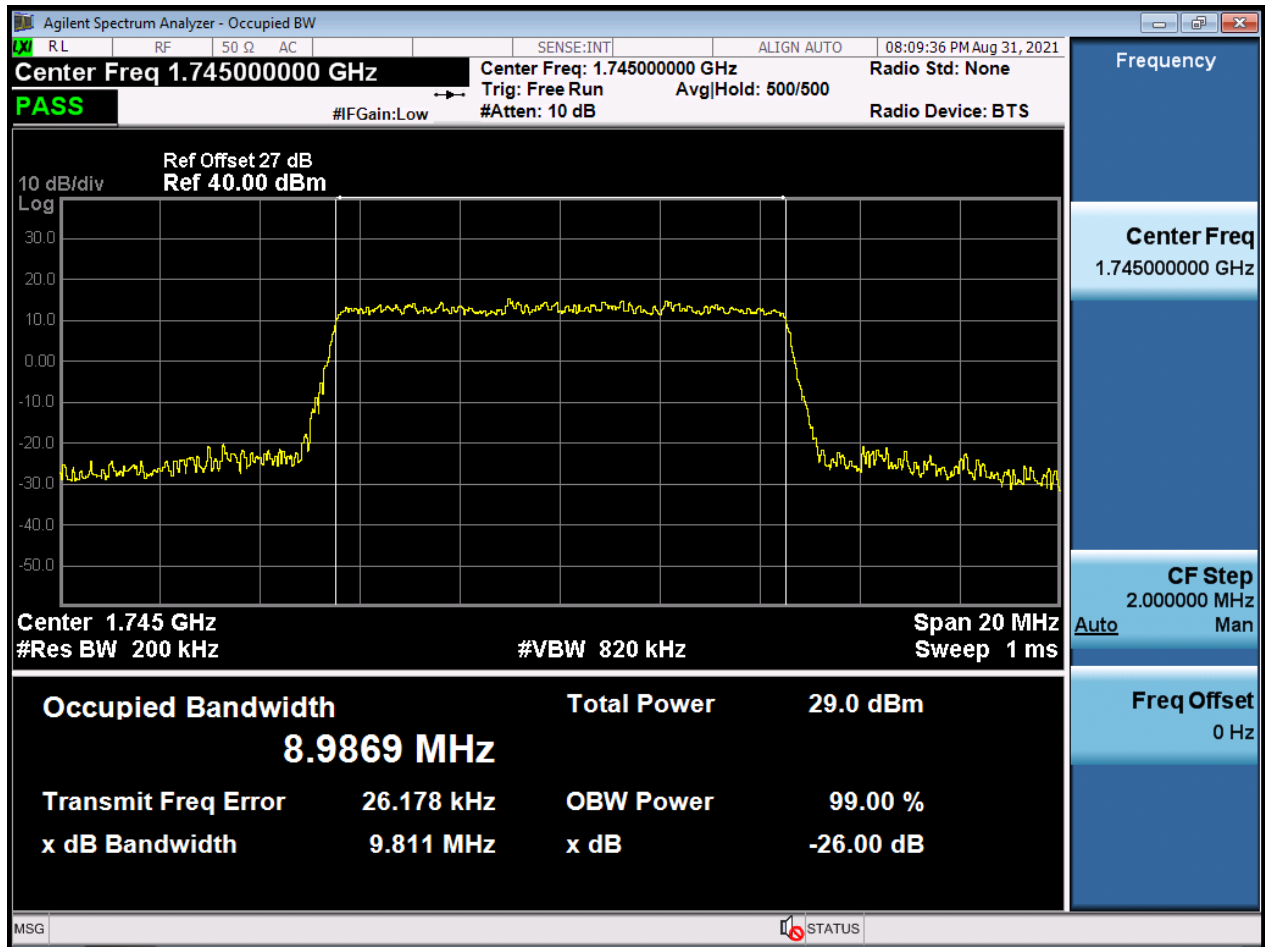


BW10 M\_OBW\_Middle Channel\_16QAM\_FullIRB

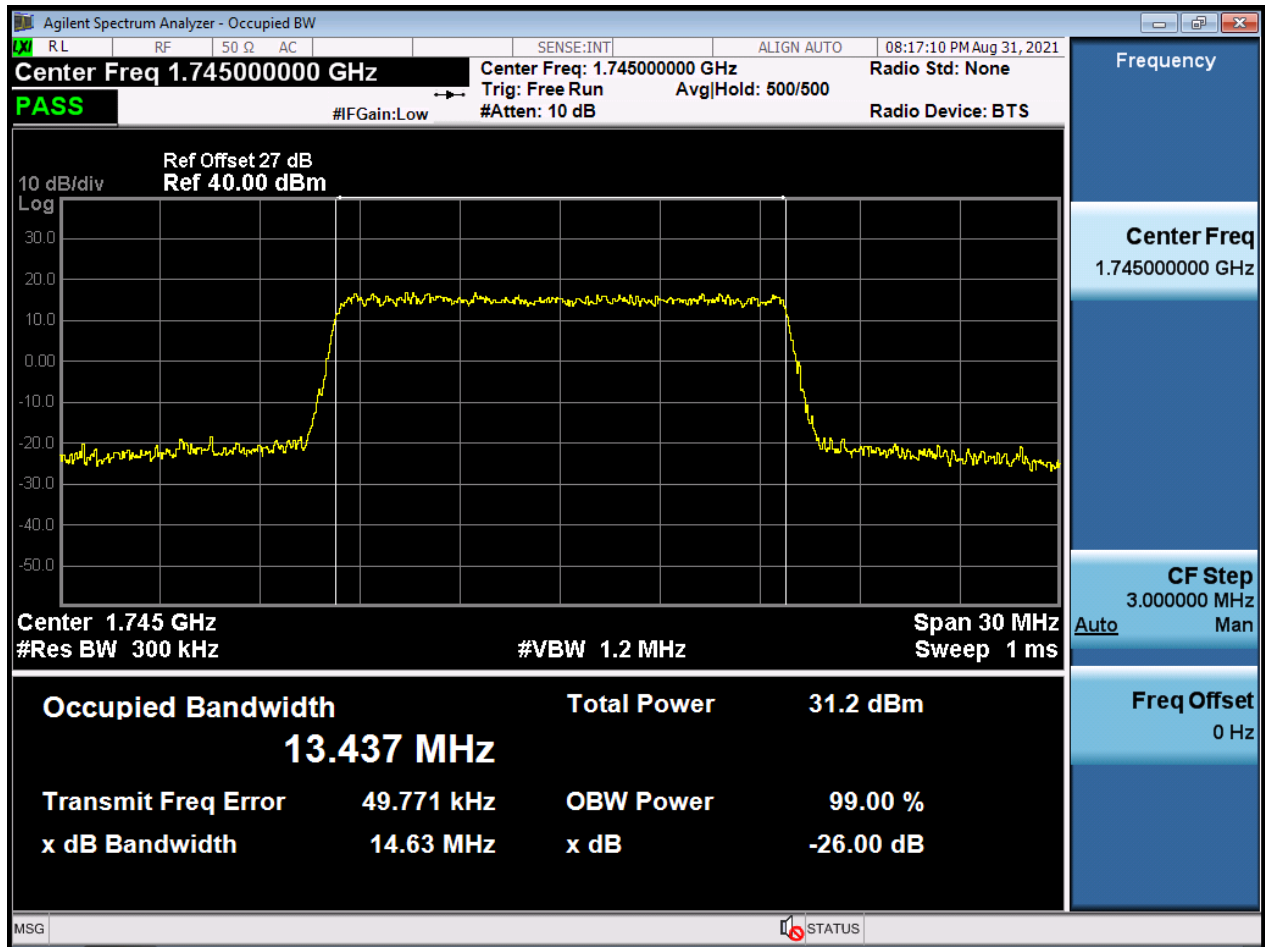




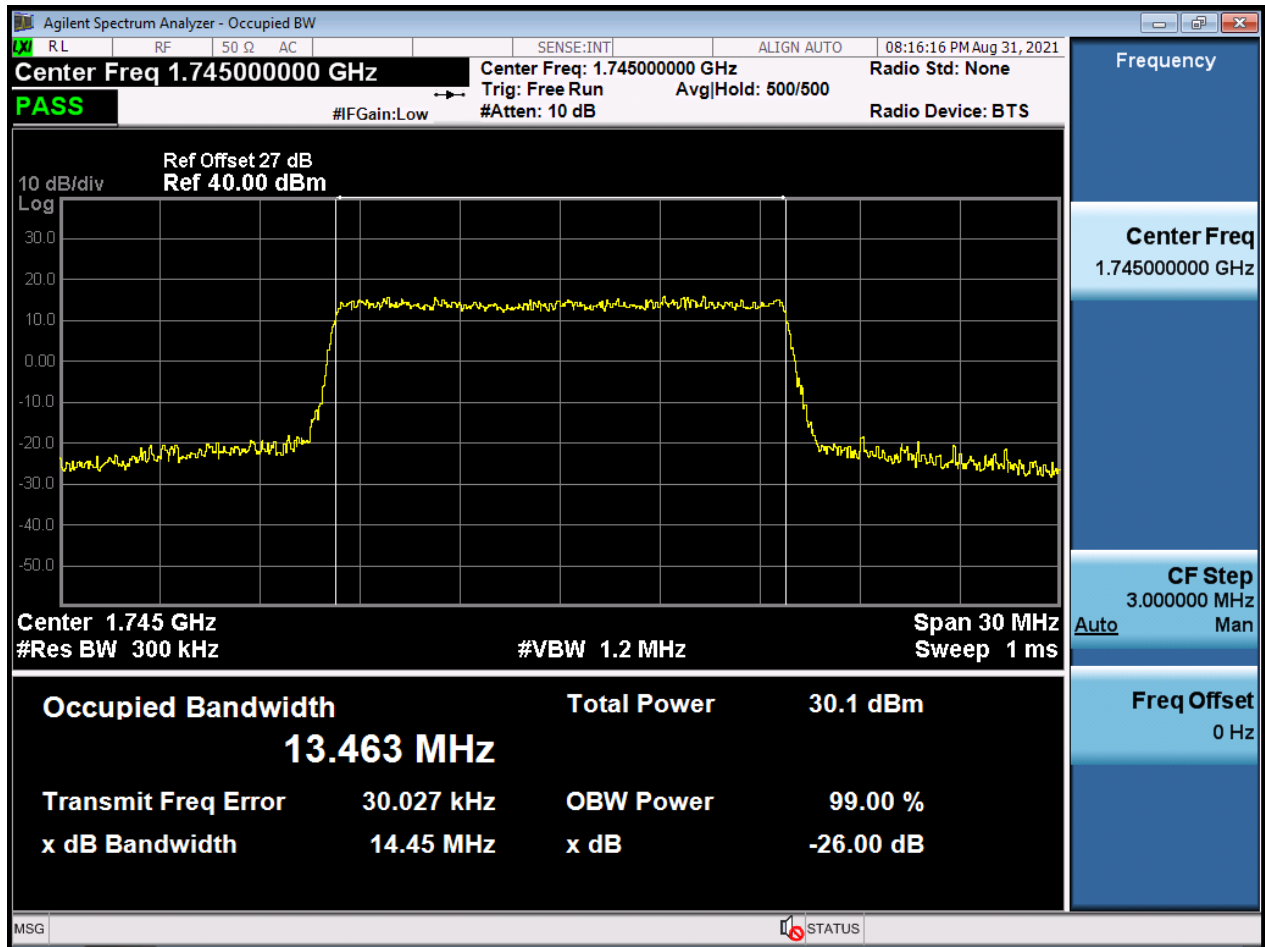
BW10 M\_OBW\_Middle Channel\_64QAM\_FullIRB



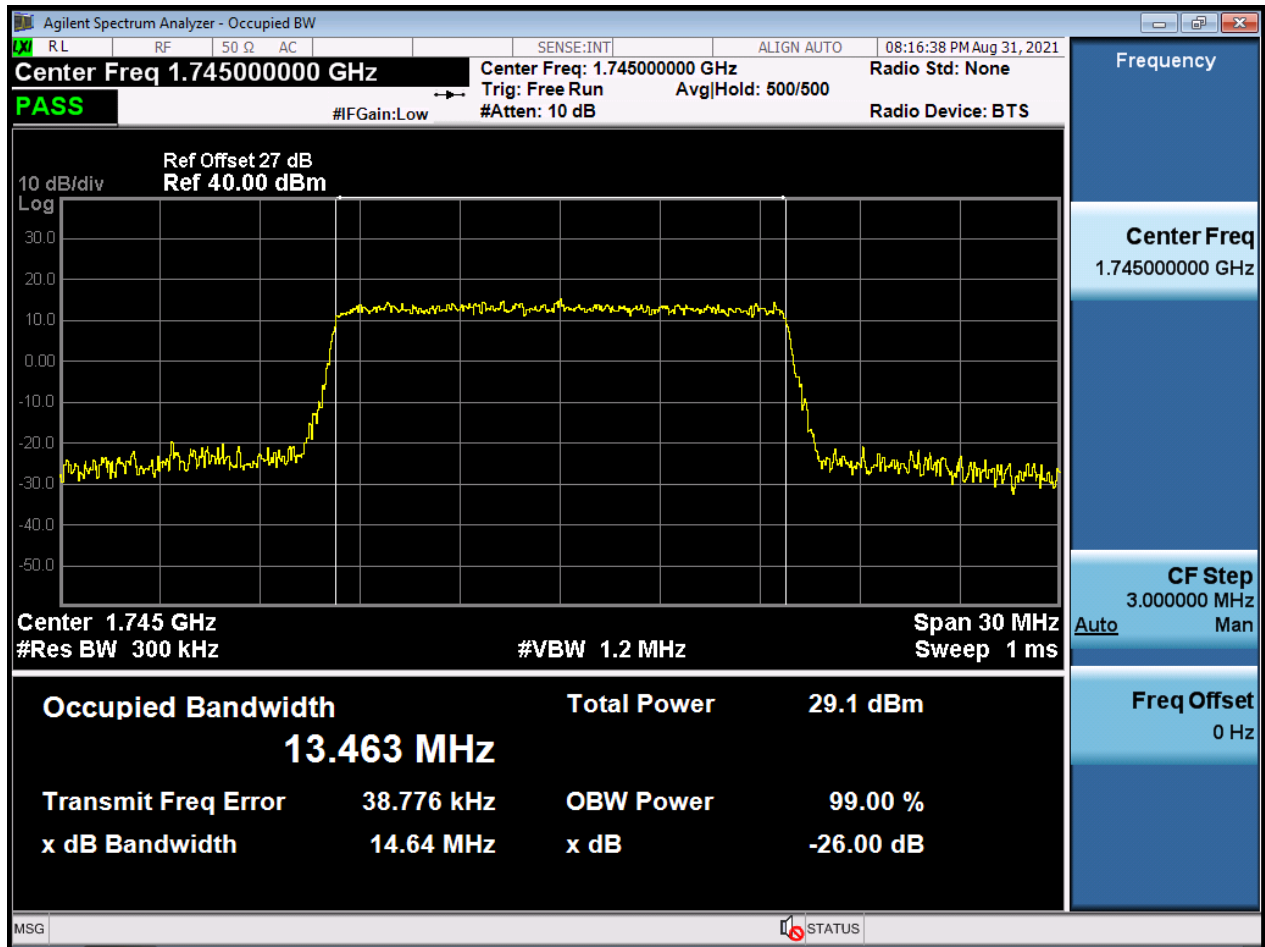
BW15 M\_OBW\_Middle Channel\_QPSK\_FullIRB



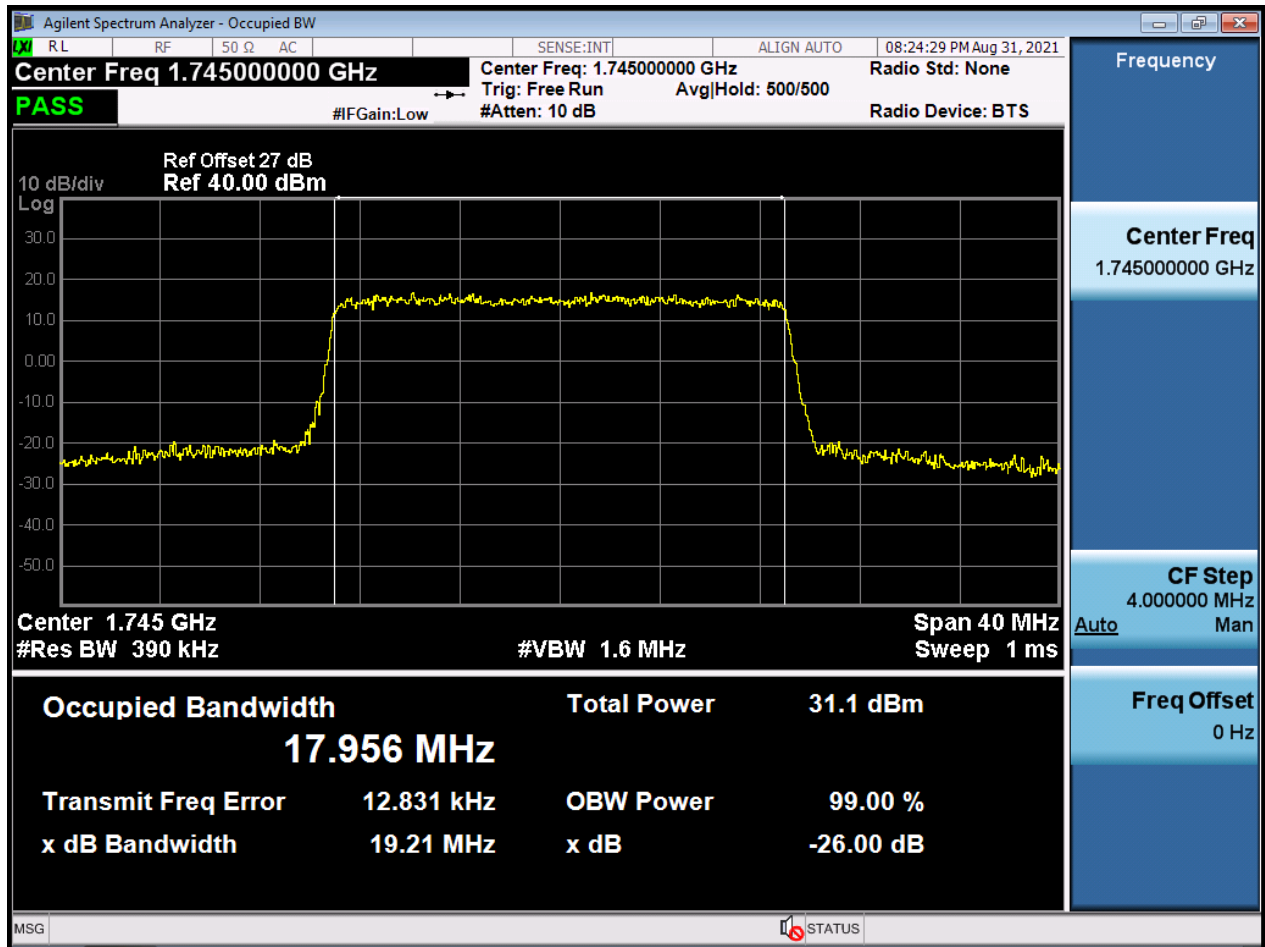
BW15 M\_OBW\_Middle Channel\_16QAM\_FullIRB



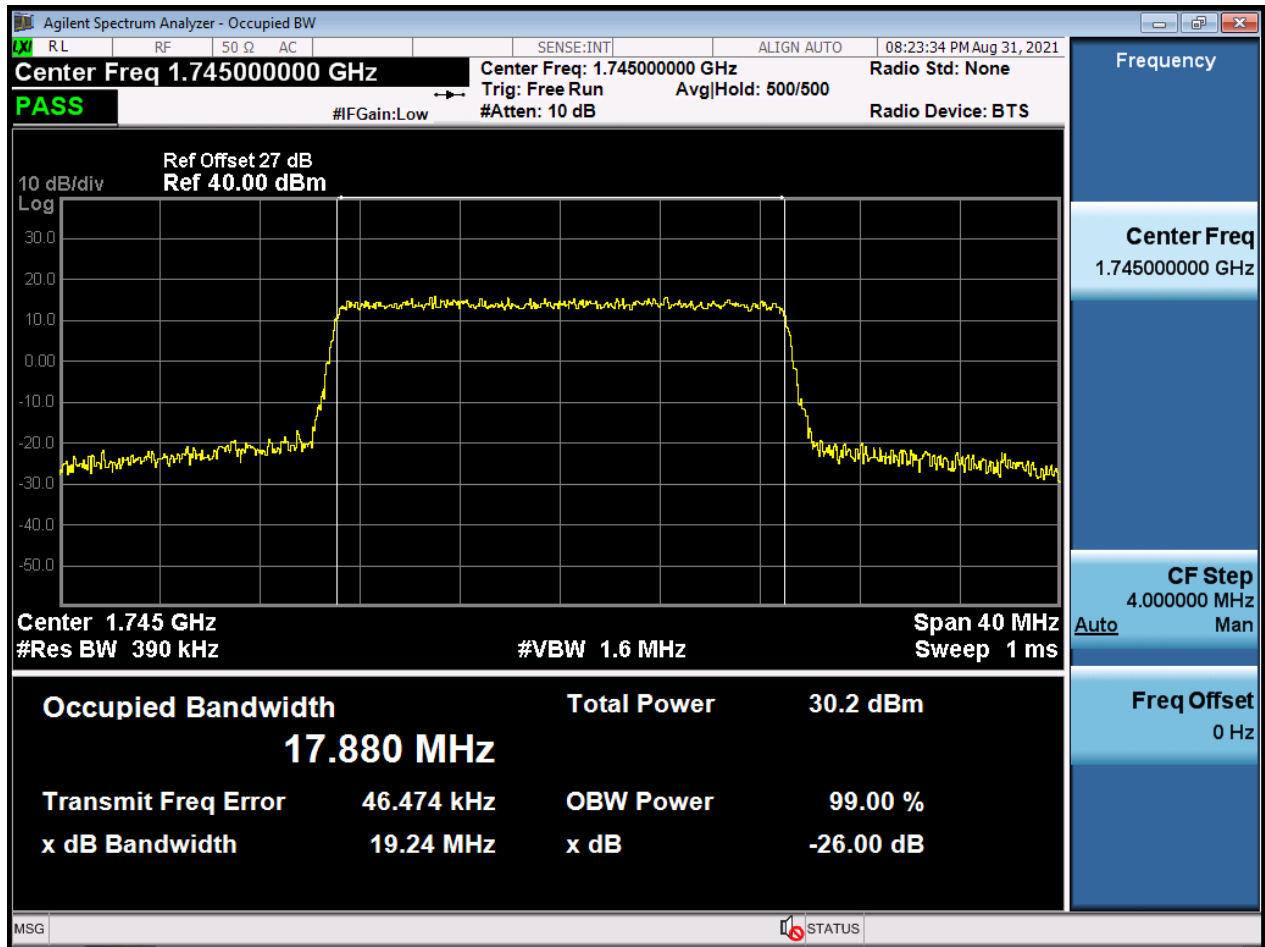
BW15 M\_OBW\_Middle Channel\_64QAM\_FullIRB



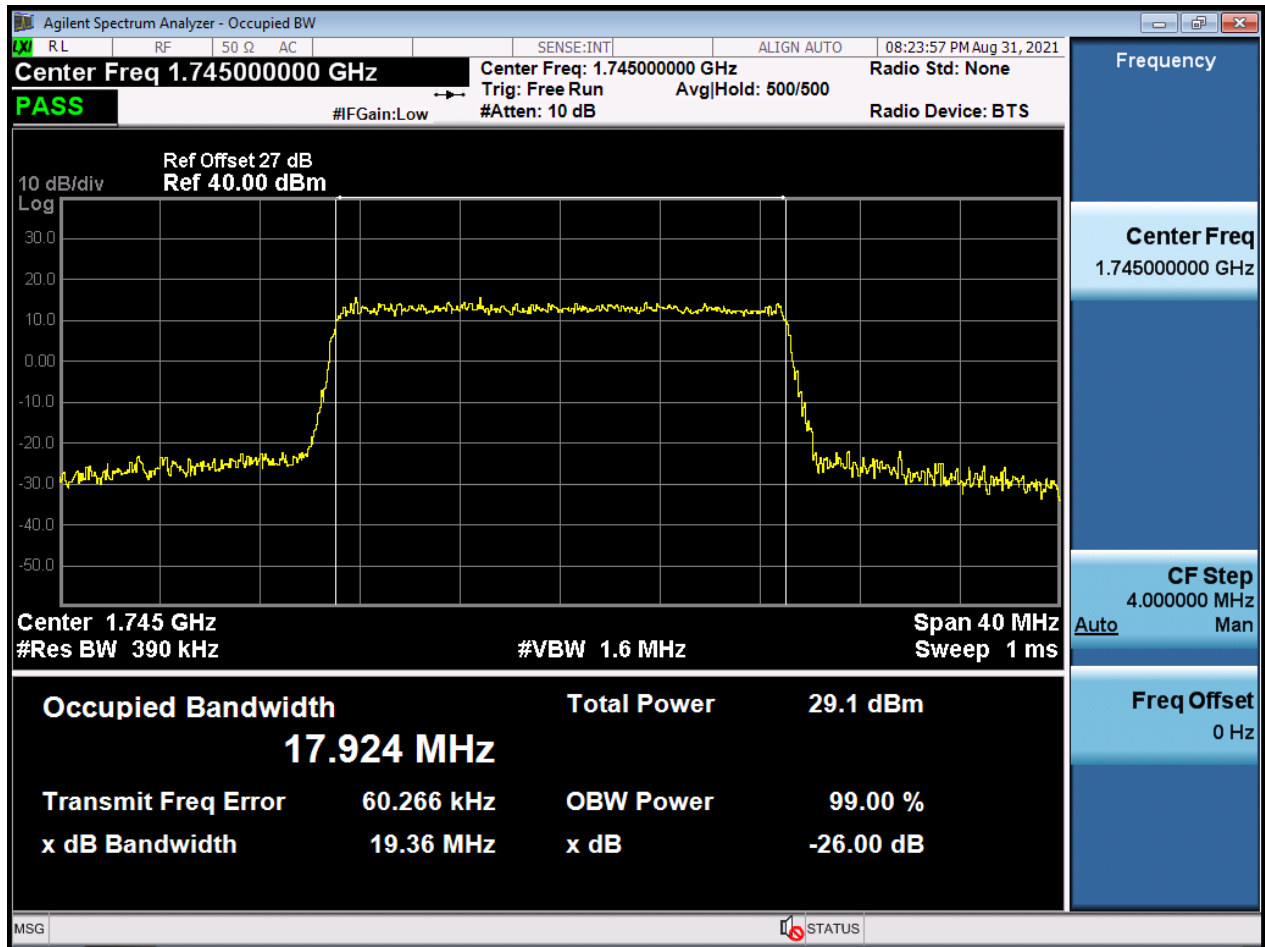
BW20 M\_OBW\_Middle Channel\_QPSK\_FullIRB



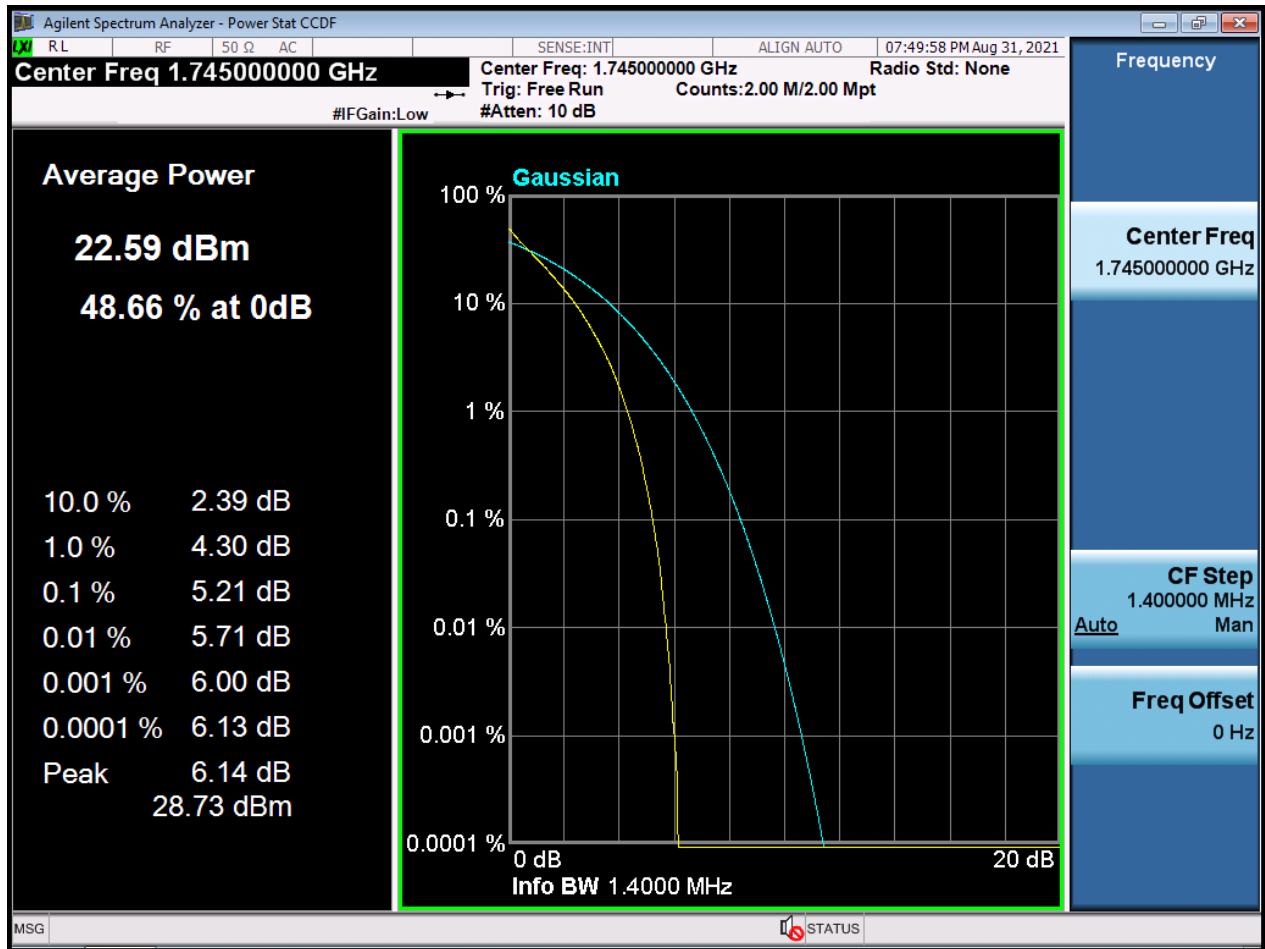
BW20 M\_OBW\_Middle Channel\_16QAM\_FullIRB



BW20 M\_OBW\_Middle Channel\_64QAM\_FullIRB

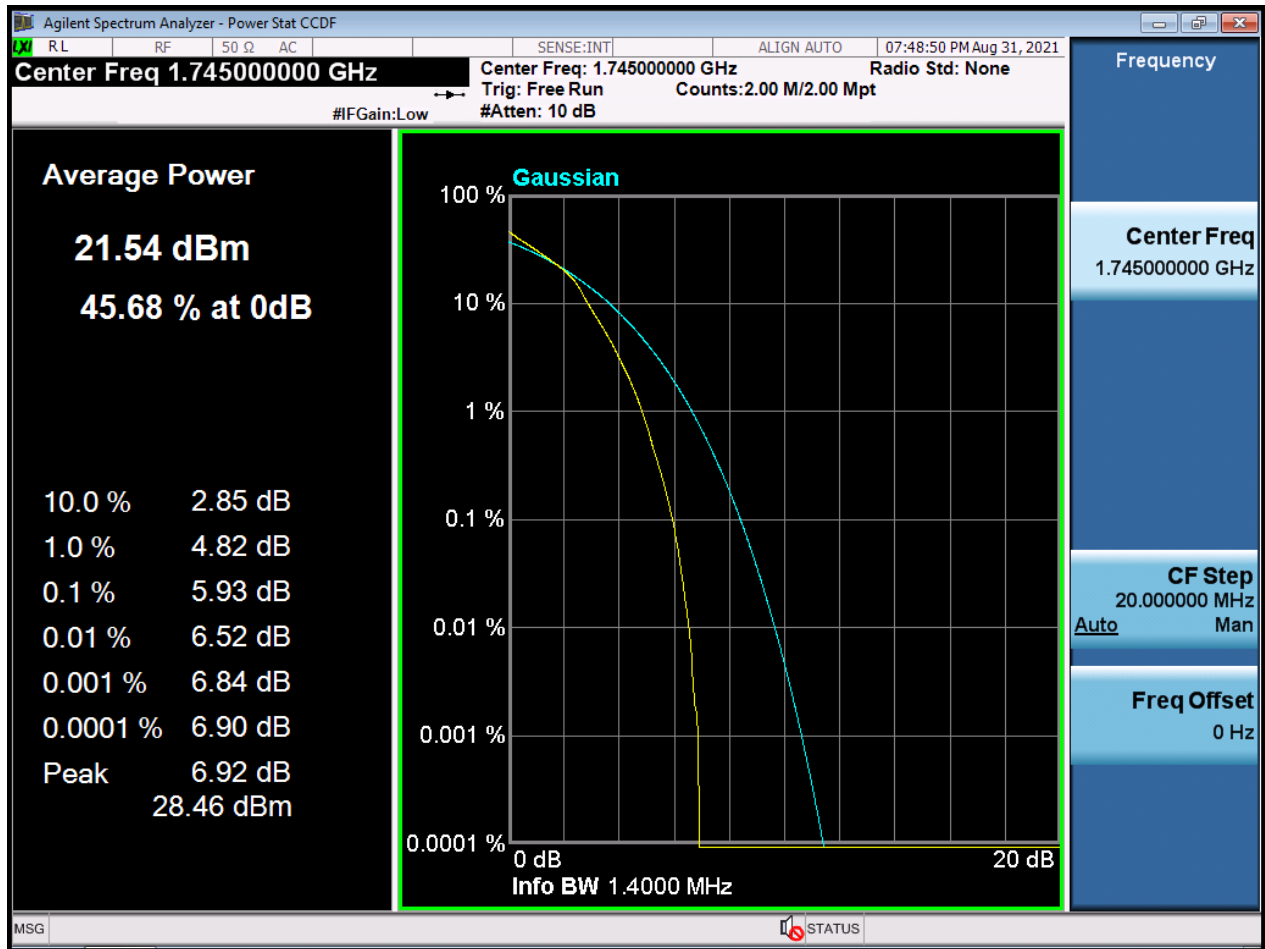


BW1.4 M\_PAR\_Middle Channel\_QPSK\_FullIRB

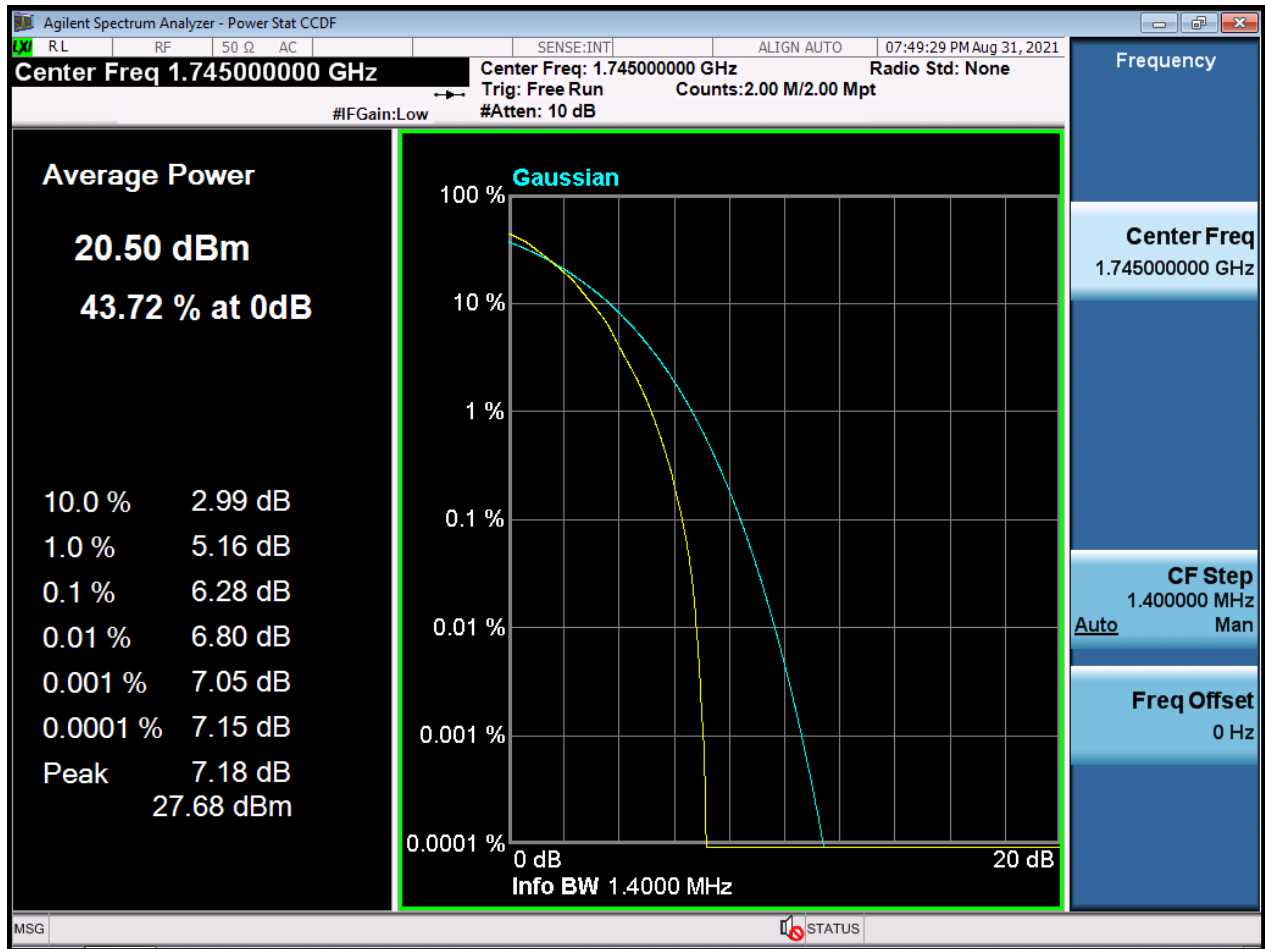




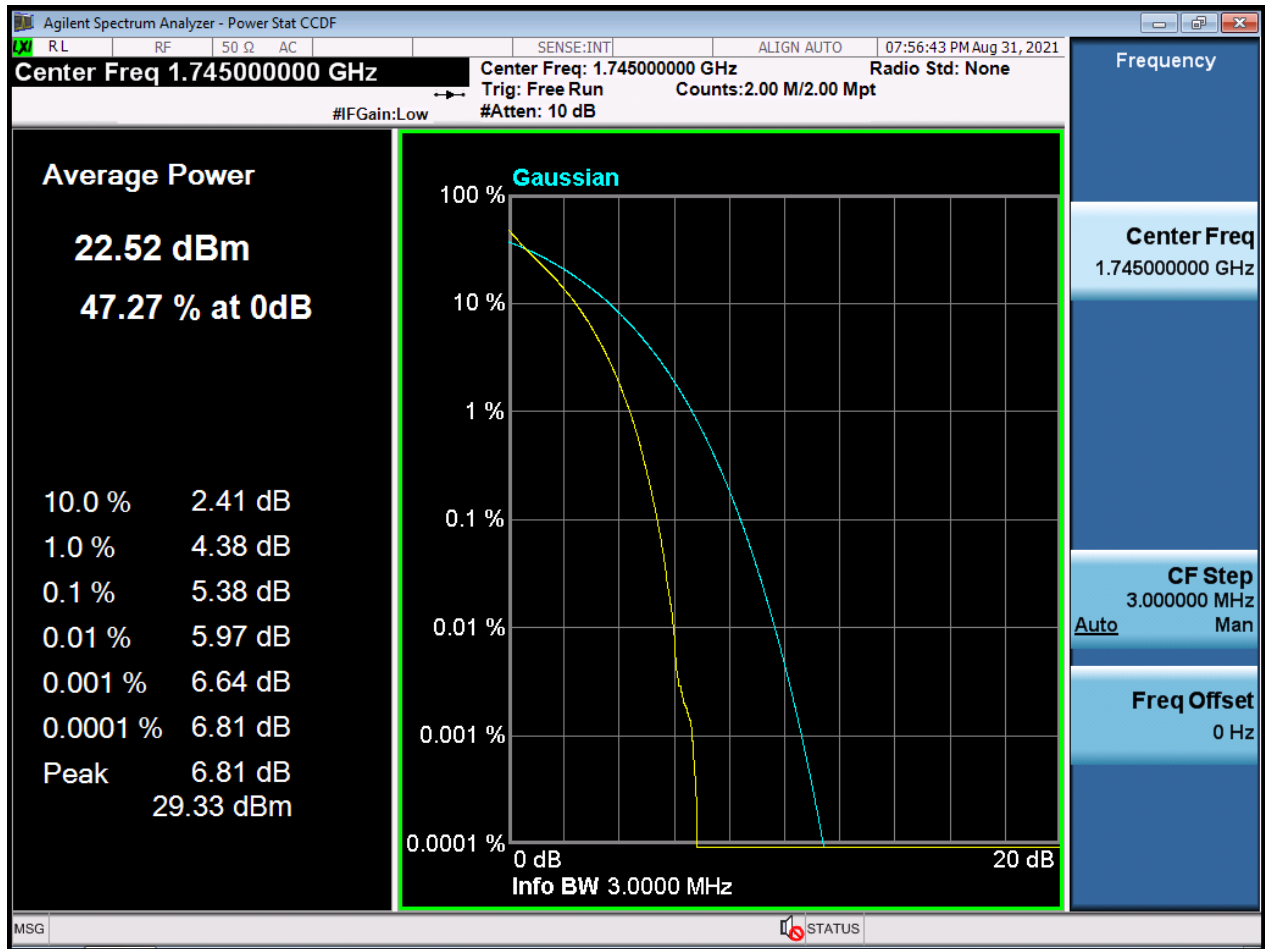
BW1.4 M\_PAR\_Middle Channel\_16QAM\_FullIRB



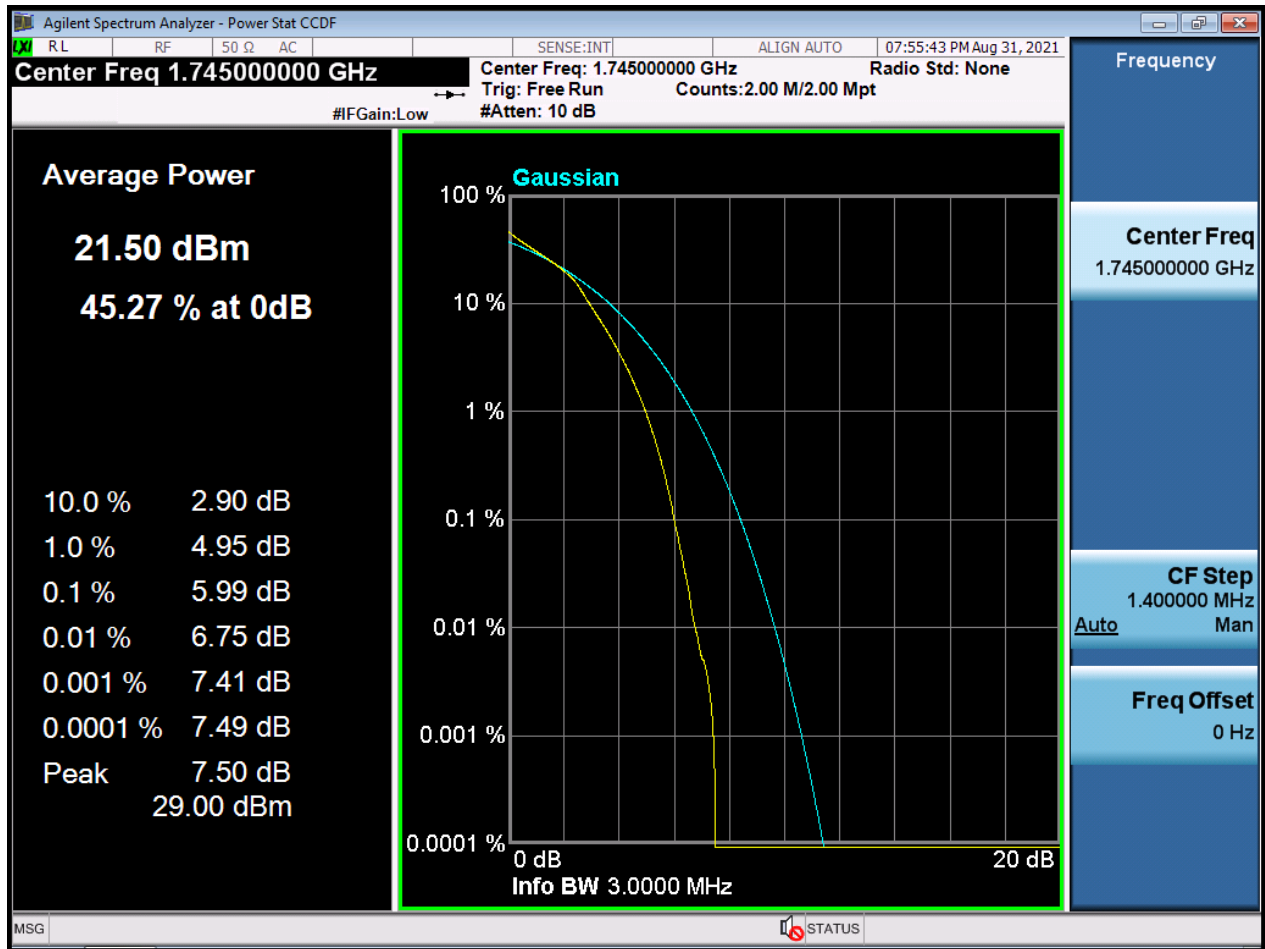
BW1.4 M\_PAR\_Middle Channel\_64QAM\_FullIRB



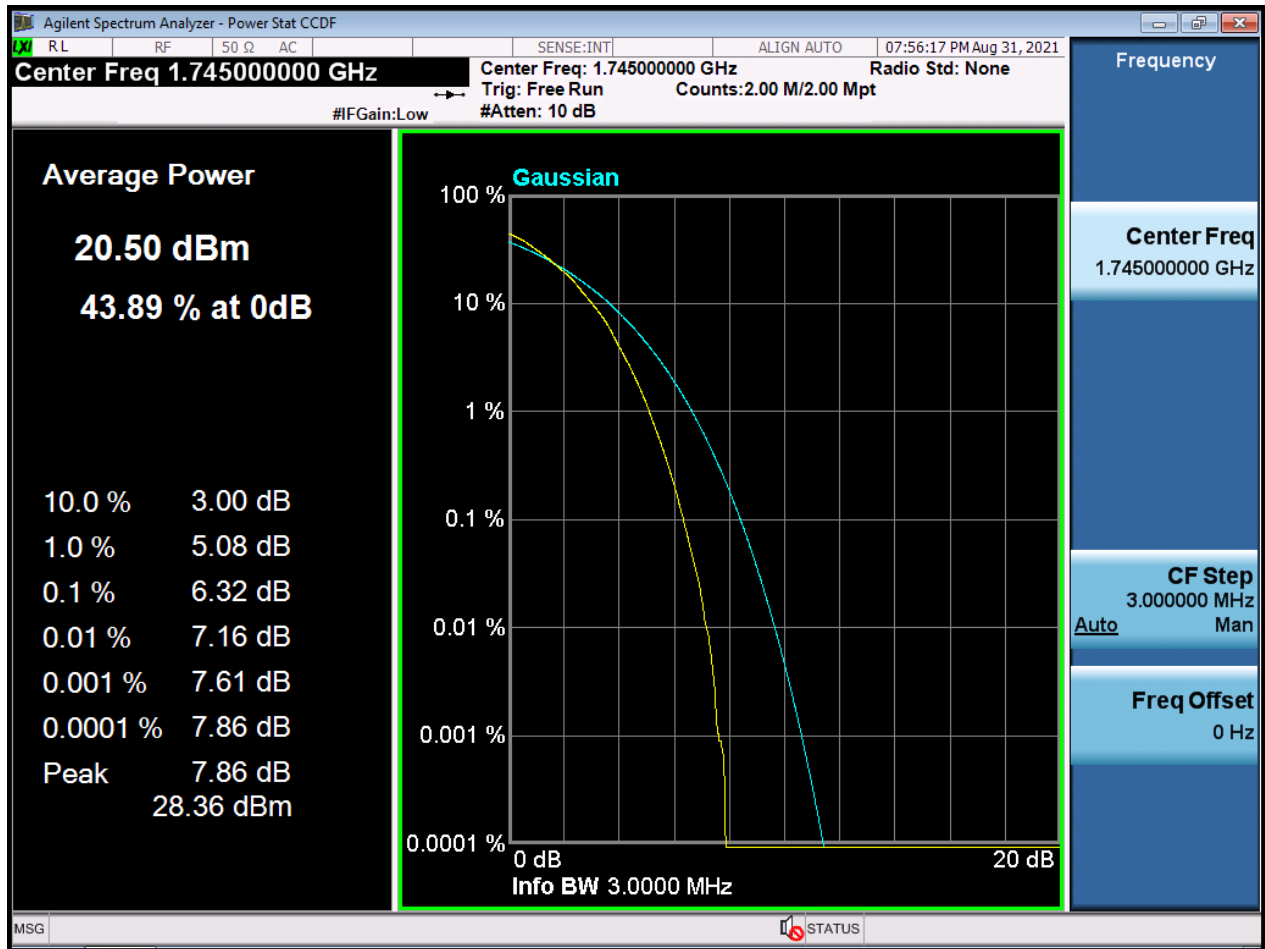
BW3 M\_PAR\_Middle Channel\_QPSK\_FullIRB



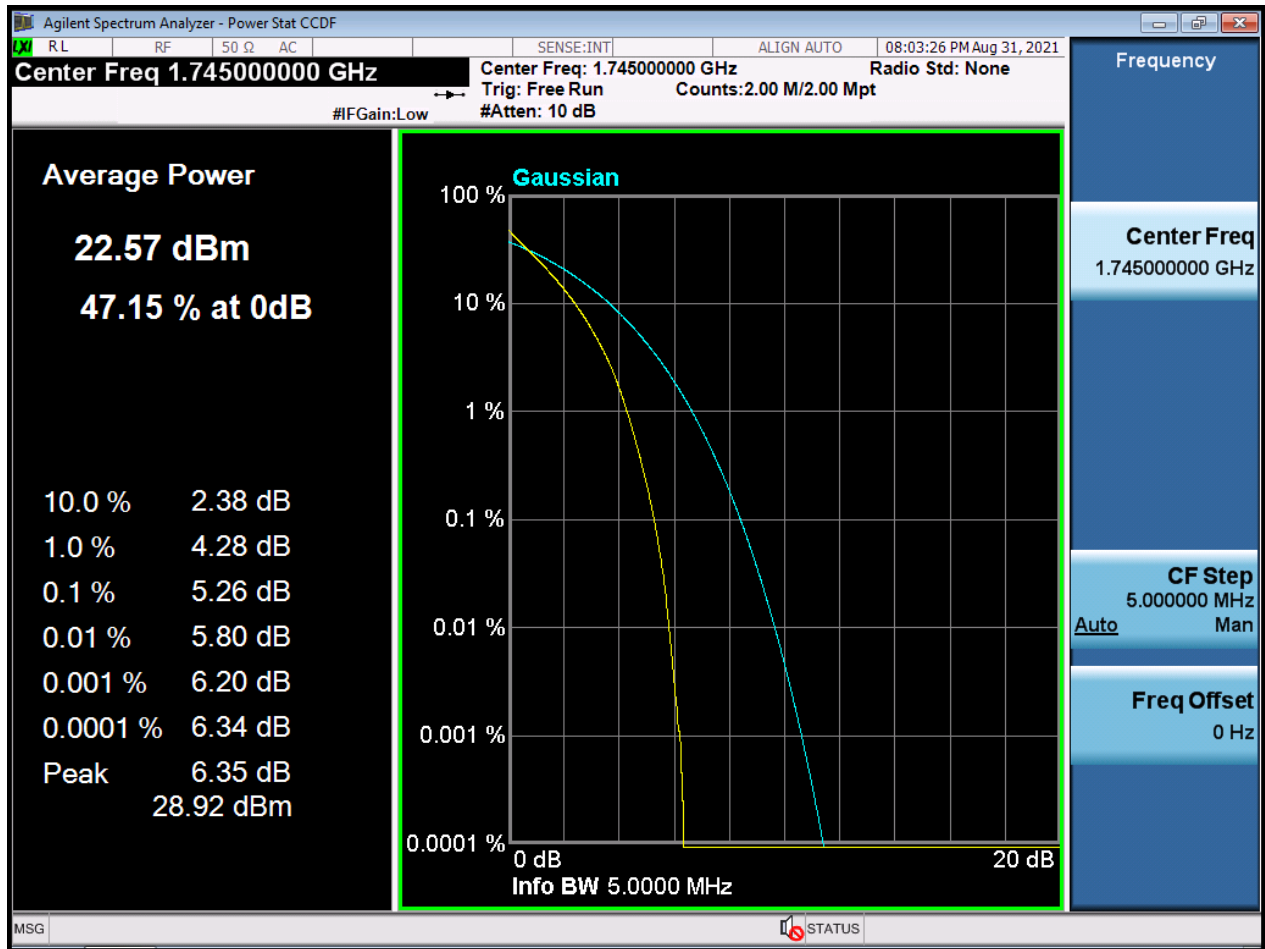
BW3 M\_PAR\_Middle Channel\_16QAM\_FullRB



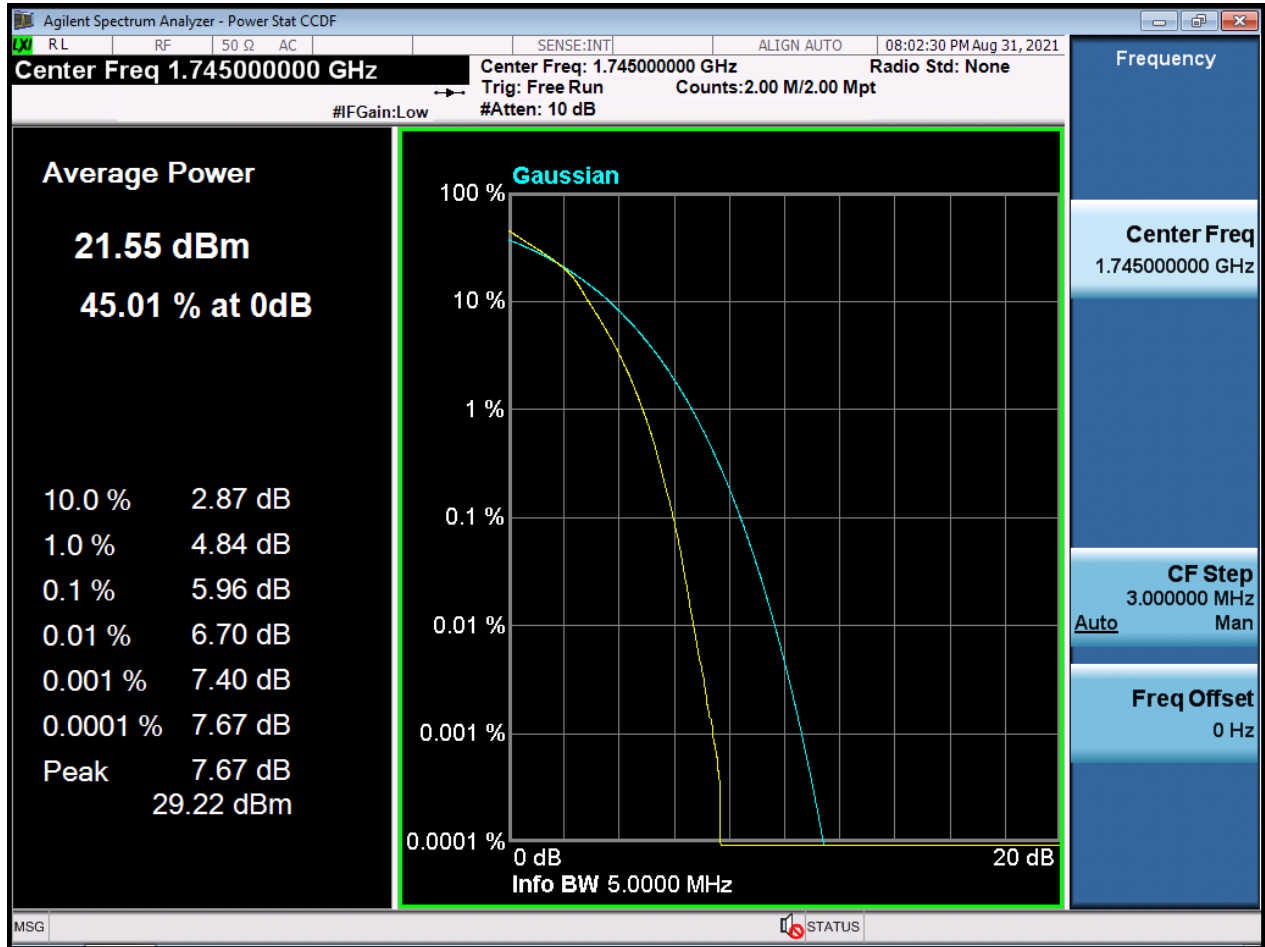
BW3 M\_PAR\_Middle Channel\_64QAM\_FullRB



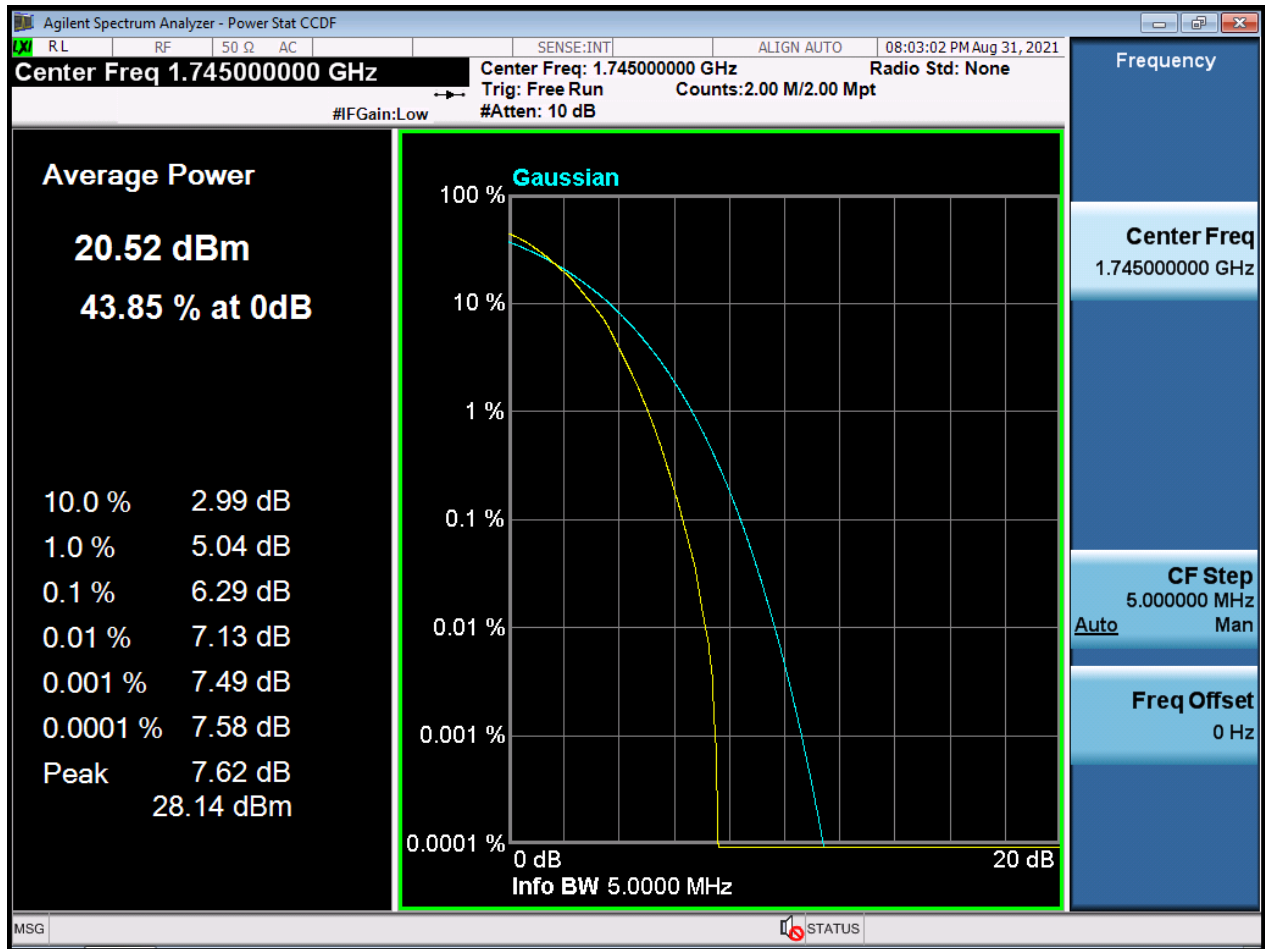
BW5 M\_PAR\_Middle Channel\_QPSK\_FullIRB



BW5 M\_PAR\_Middle Channel\_16QAM\_FullRB

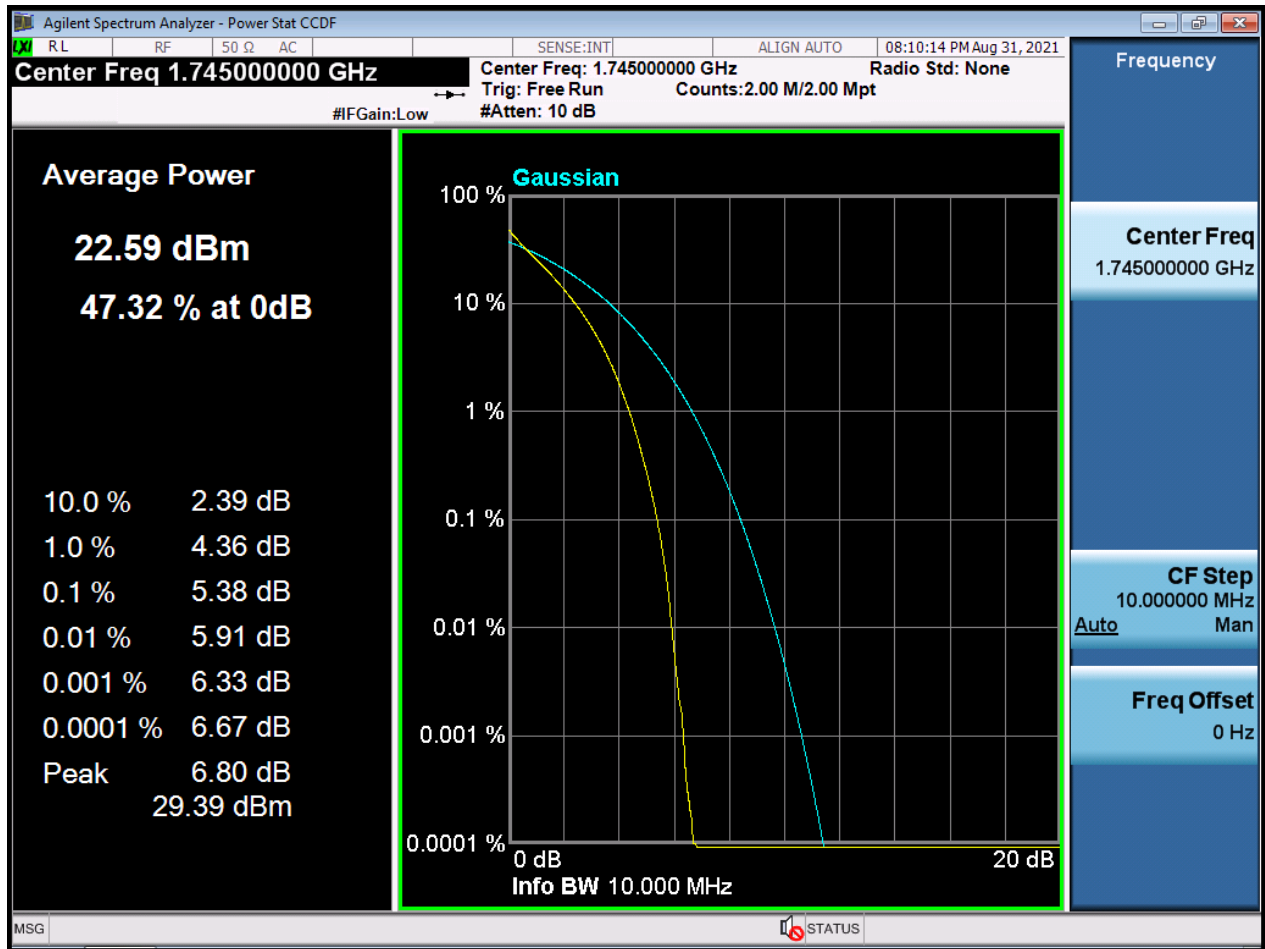


BW5 M\_PAR\_Middle Channel\_64QAM\_FullRB

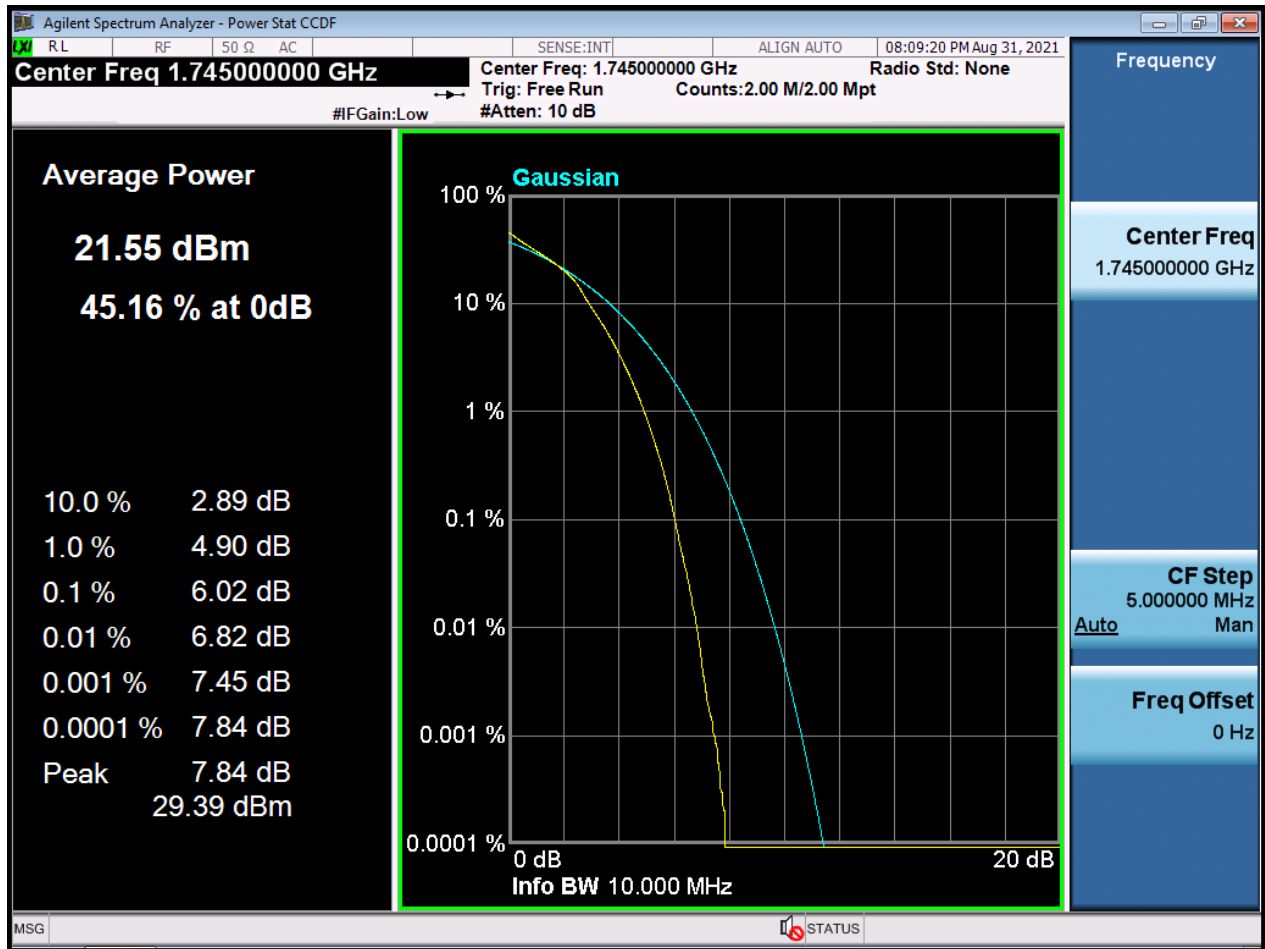




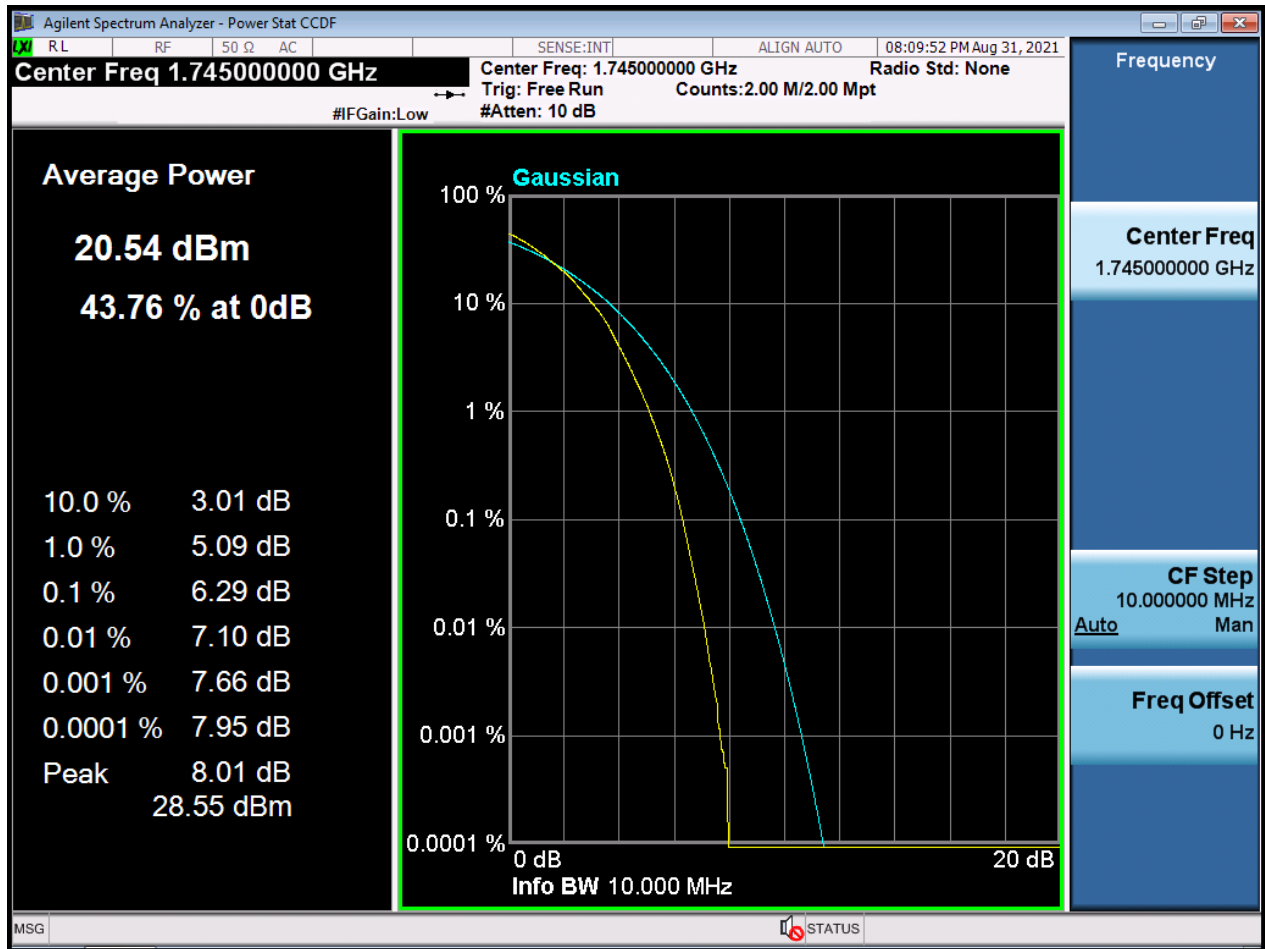
BW10 M\_PAR\_Middle Channelz\_QPSK\_FullRB



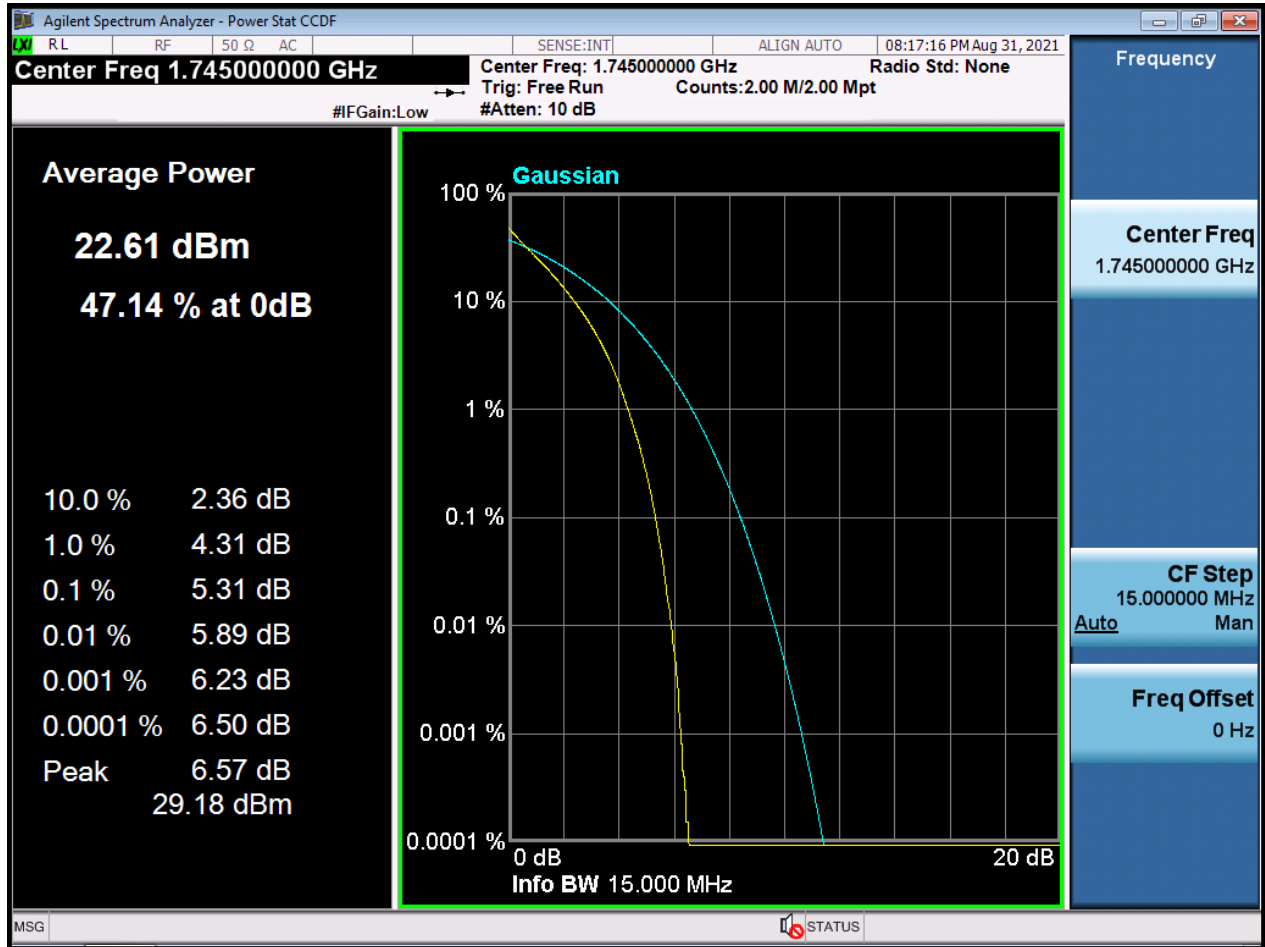
BW10 M\_PAR\_Middle Channel\_16QAM\_FullRB



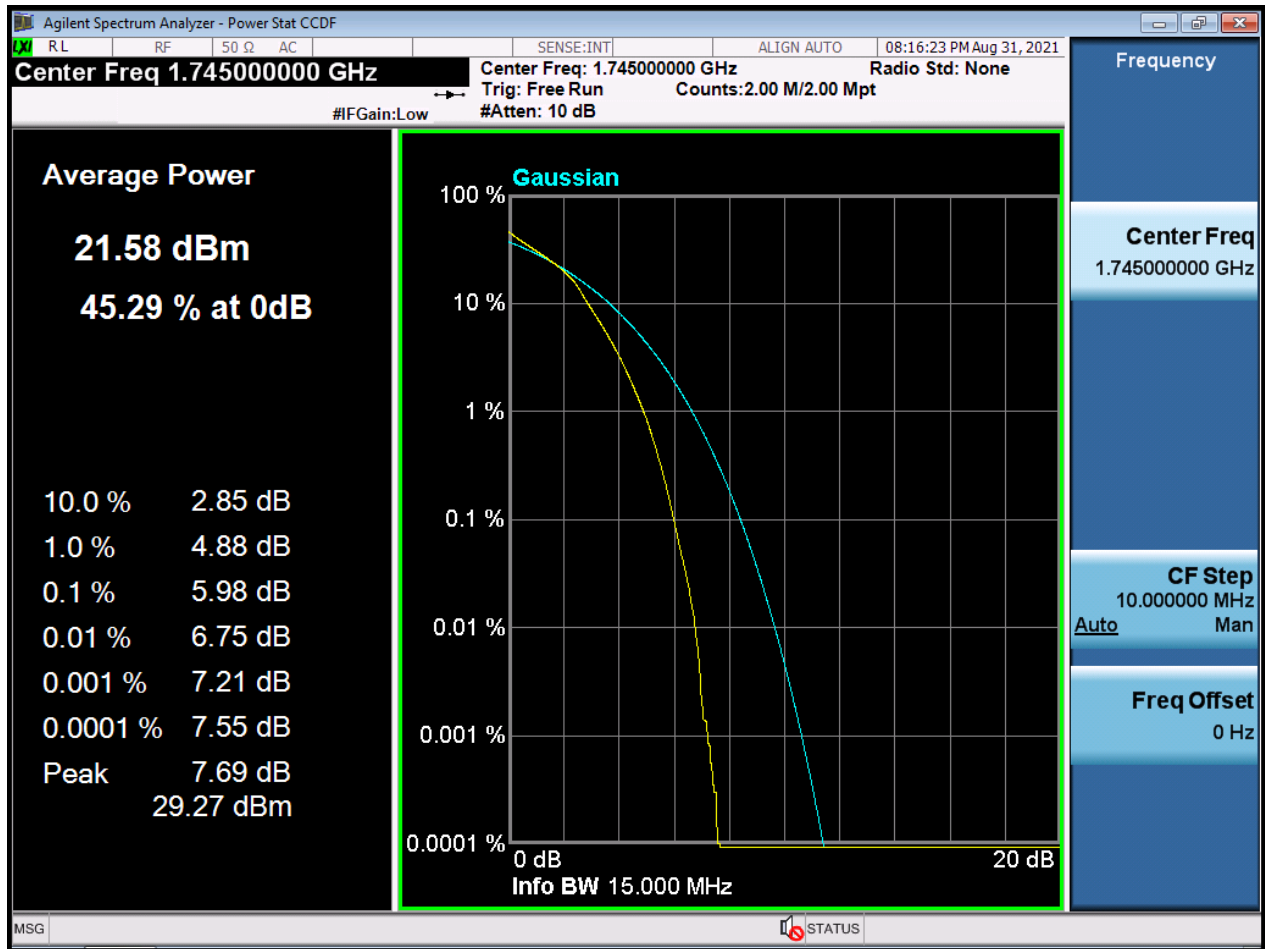
BW10 M\_PAR\_Middle Channel\_64QAM\_FullRB



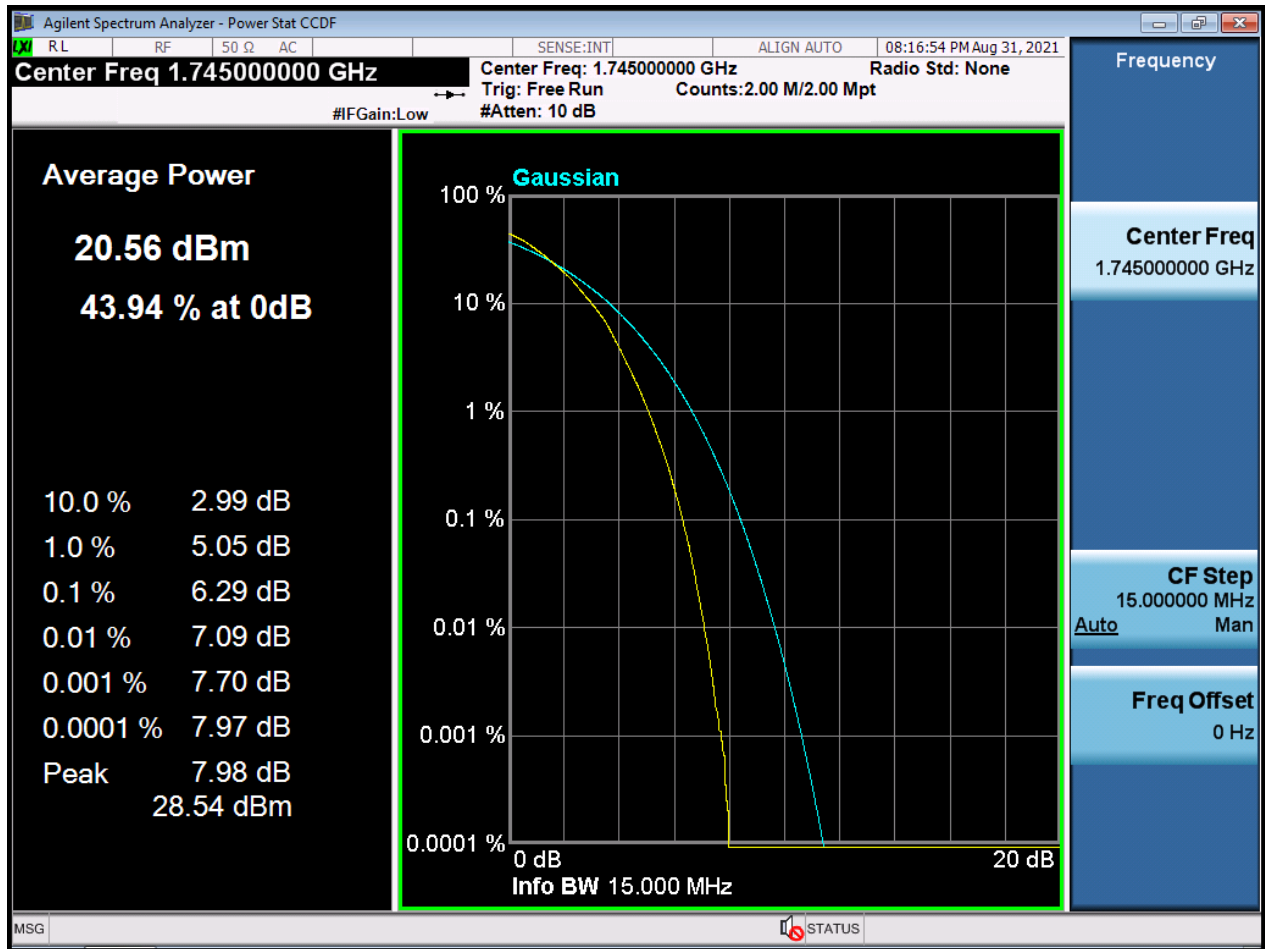
BW15 M\_PAR\_Middle Channel\_QPSK\_FullRB



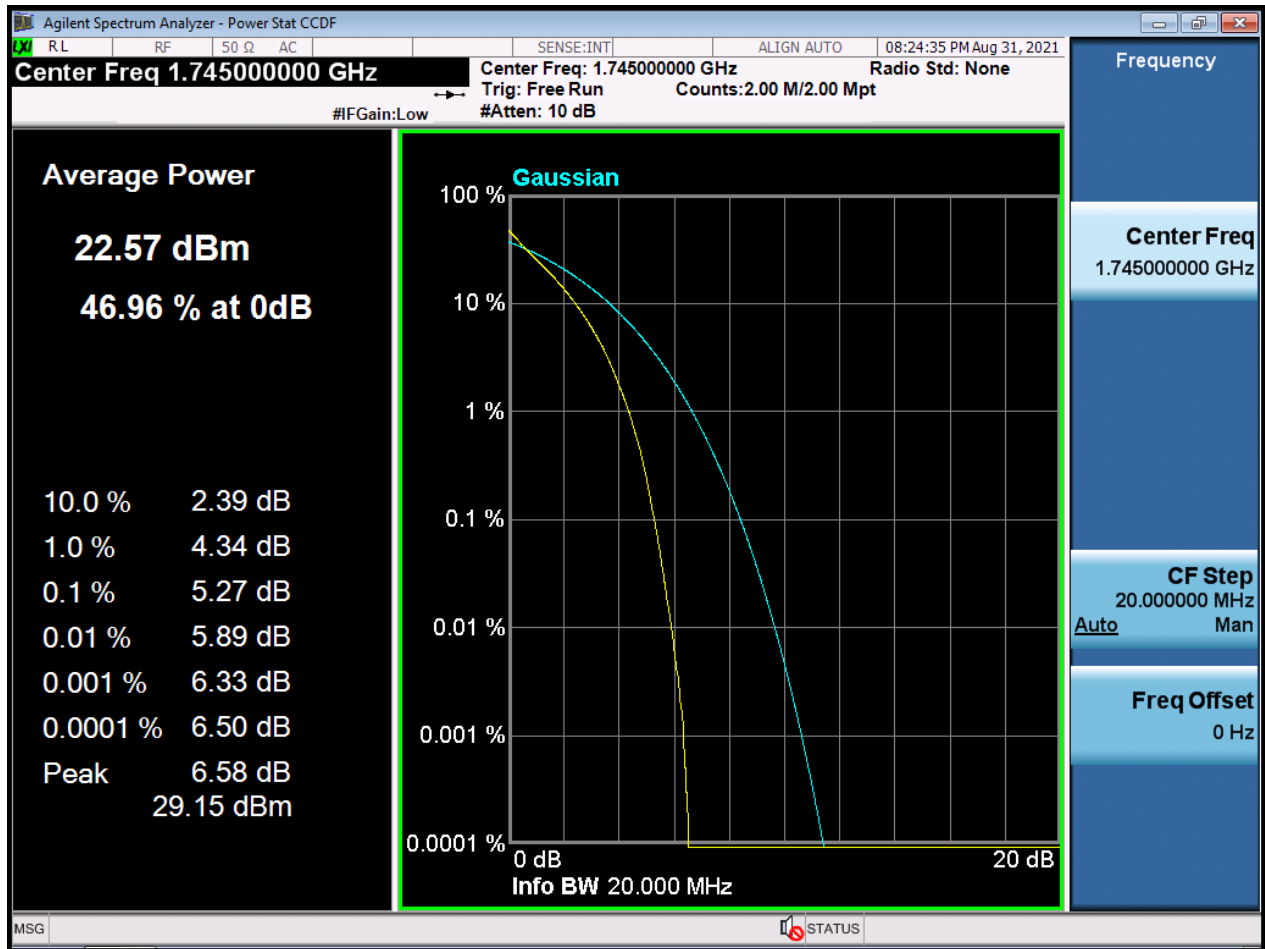
BW15 M\_PAR\_Middle Channel\_16QAM\_FullRB



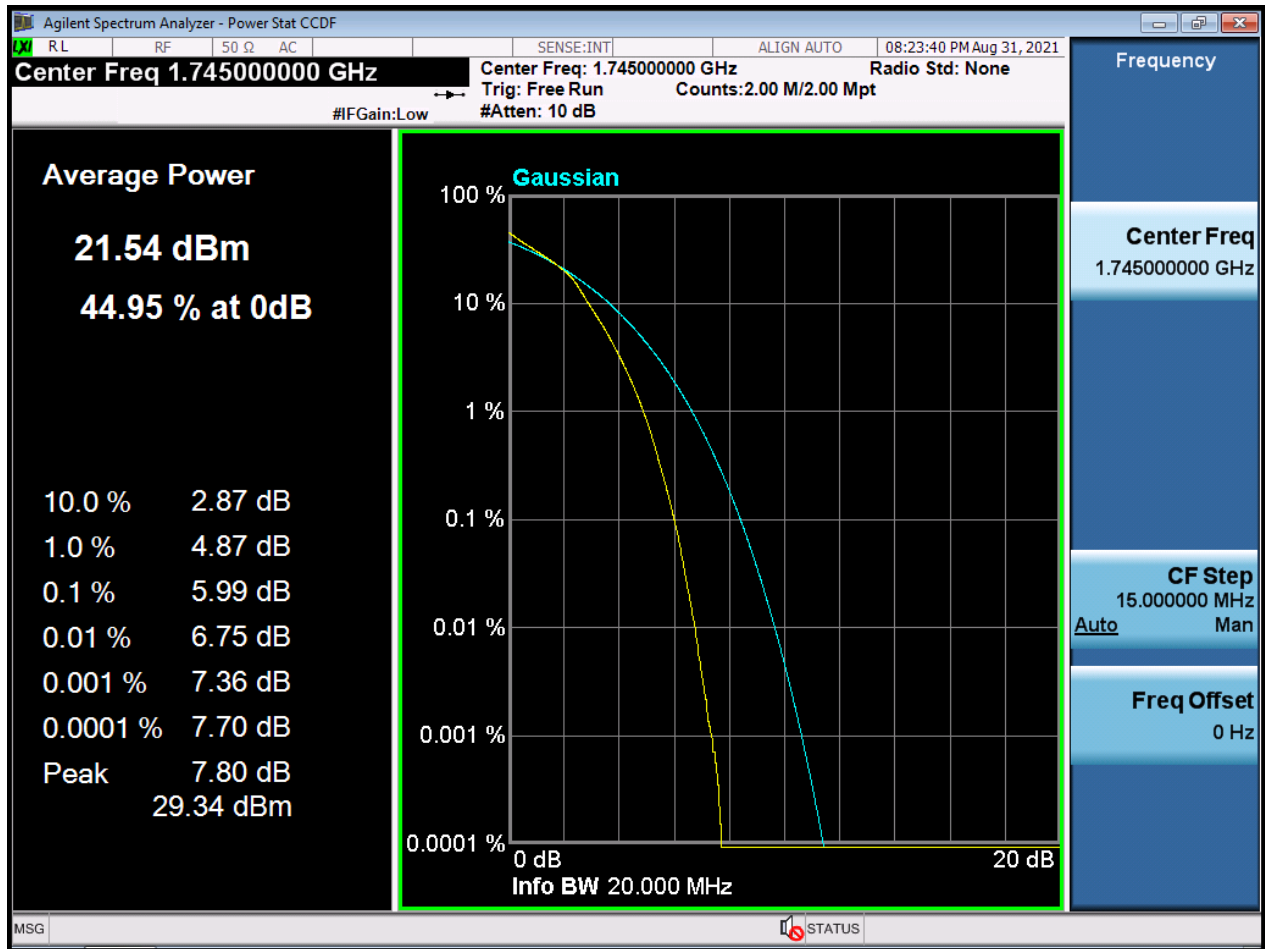
BW15 M\_PAR\_Middle Channel\_64QAM\_FullRB



BW20 M\_PAR\_Middle Channel\_QPSK\_FullRB

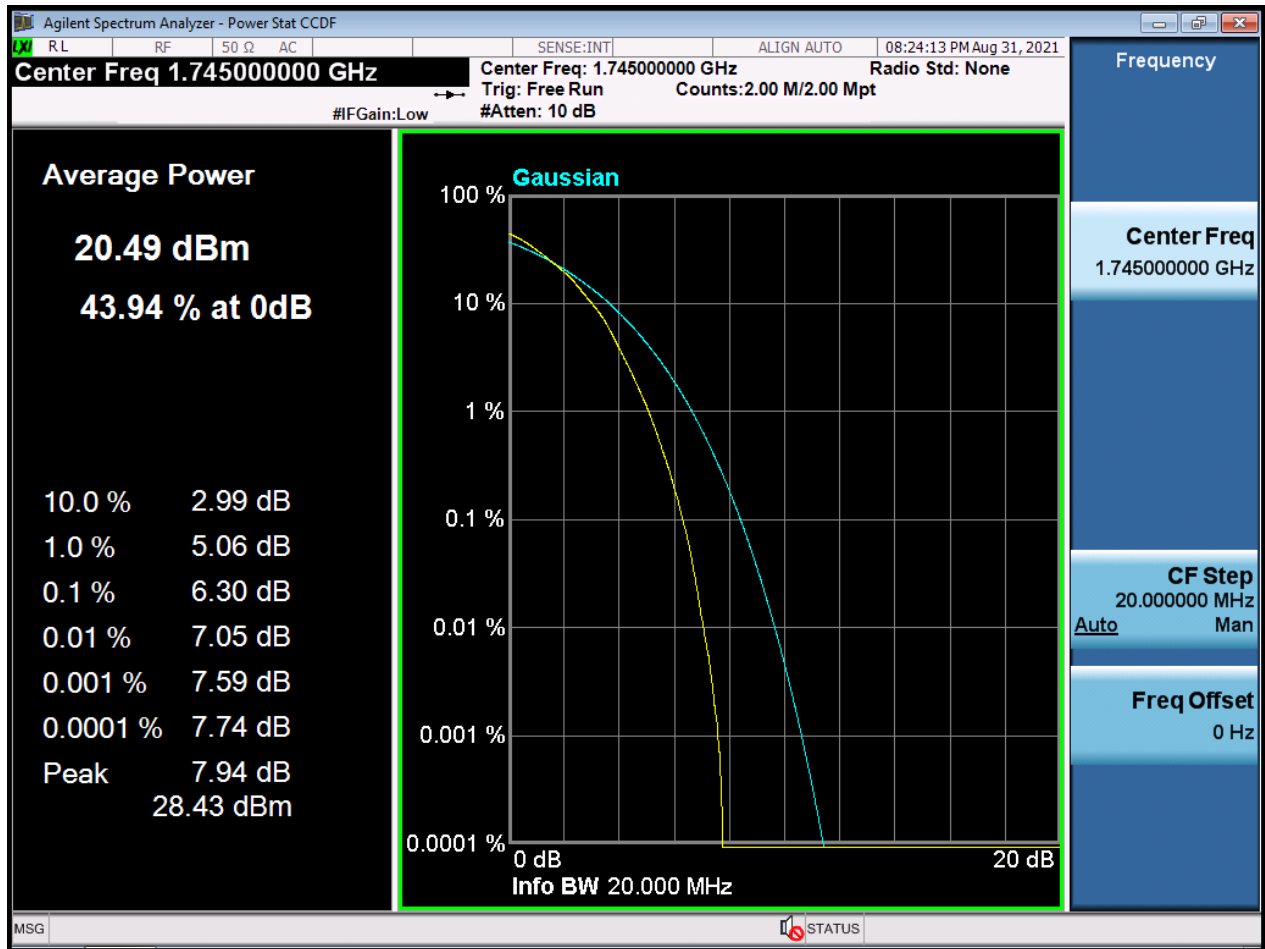


BW20 M\_PAR\_Middle Channel\_16QAM\_FullRB

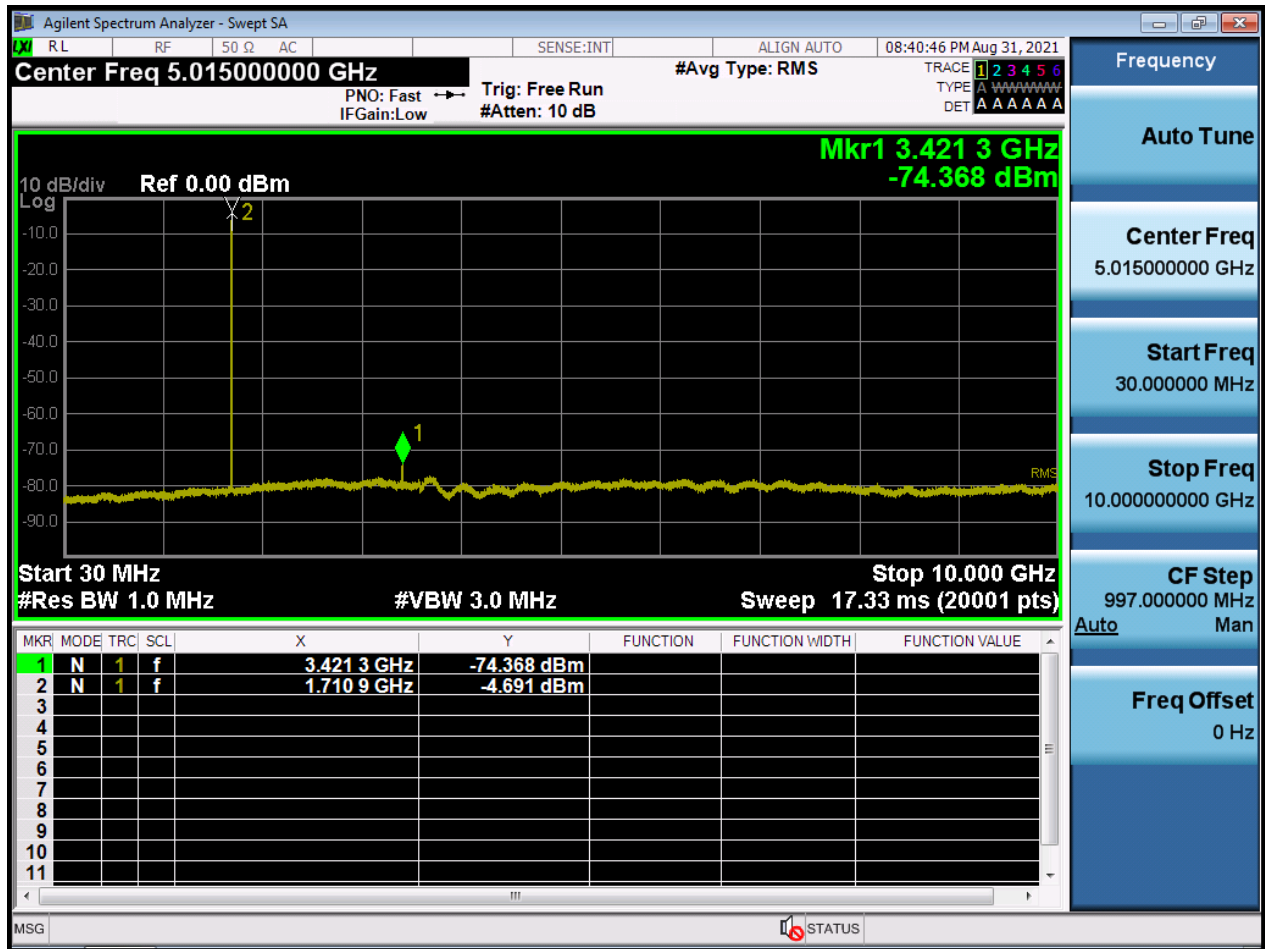




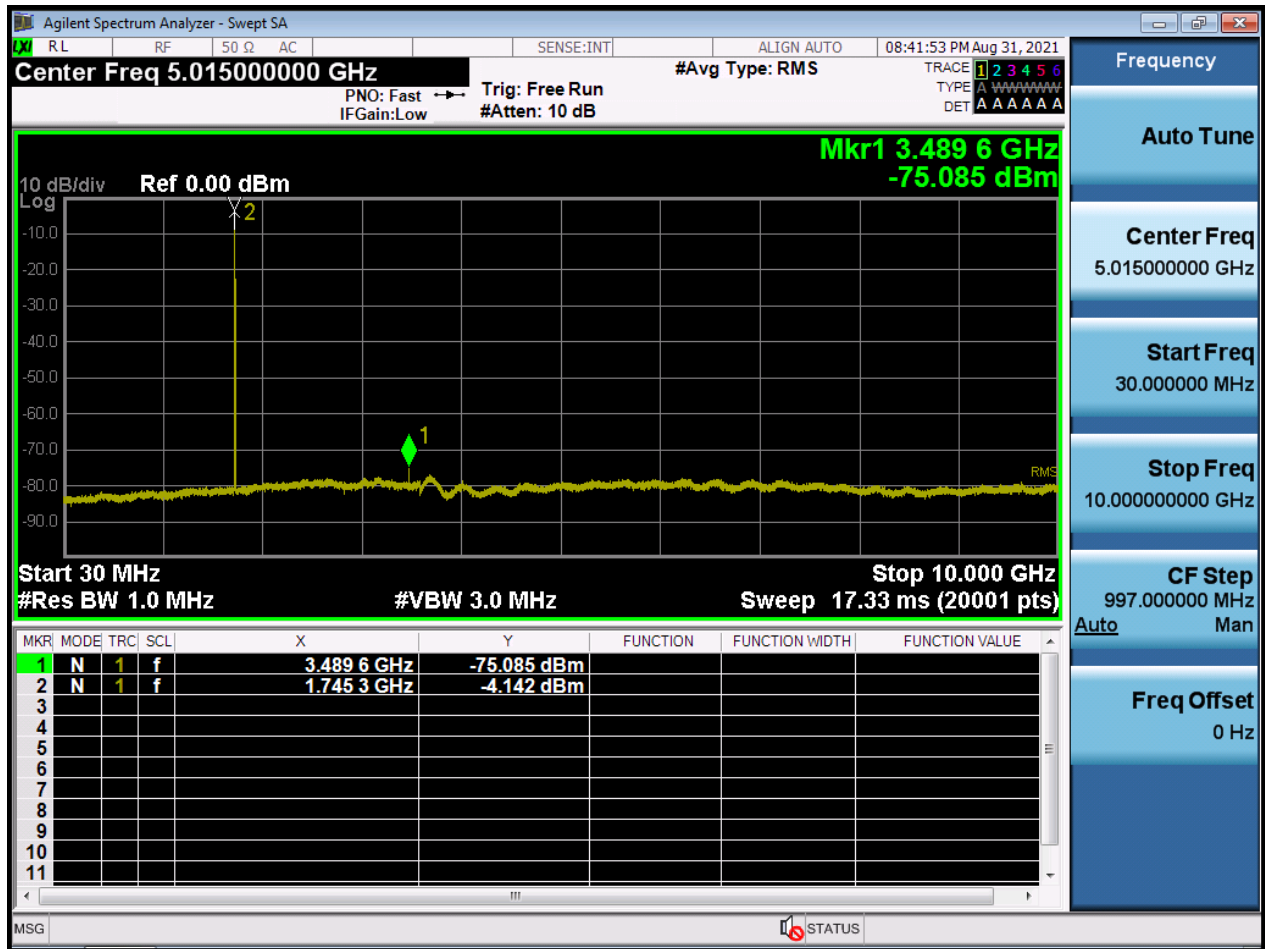
BW20 M\_PAR\_Middle Channel\_64QAM\_FullRB



BW1.4 M\_CSE(30 M-10 G)\_Lowest Channel\_QPSK\_1RB



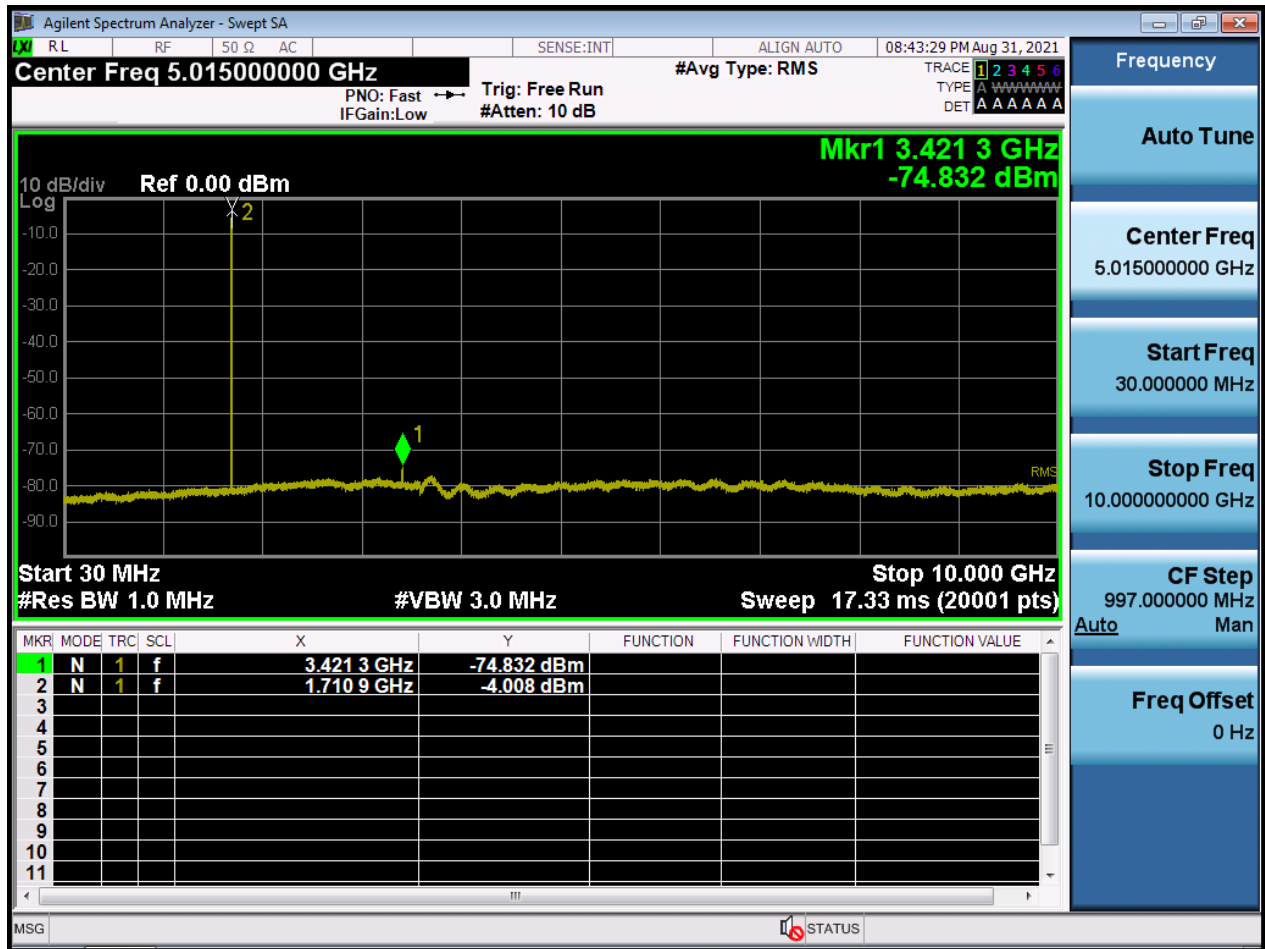
BW1.4 M\_CSE(30 M-10 G)\_Middle Channel\_QPSK\_1RB



BW1.4 M\_CSE(30 M-10 G)\_Highest Channel\_QPSK\_1RB



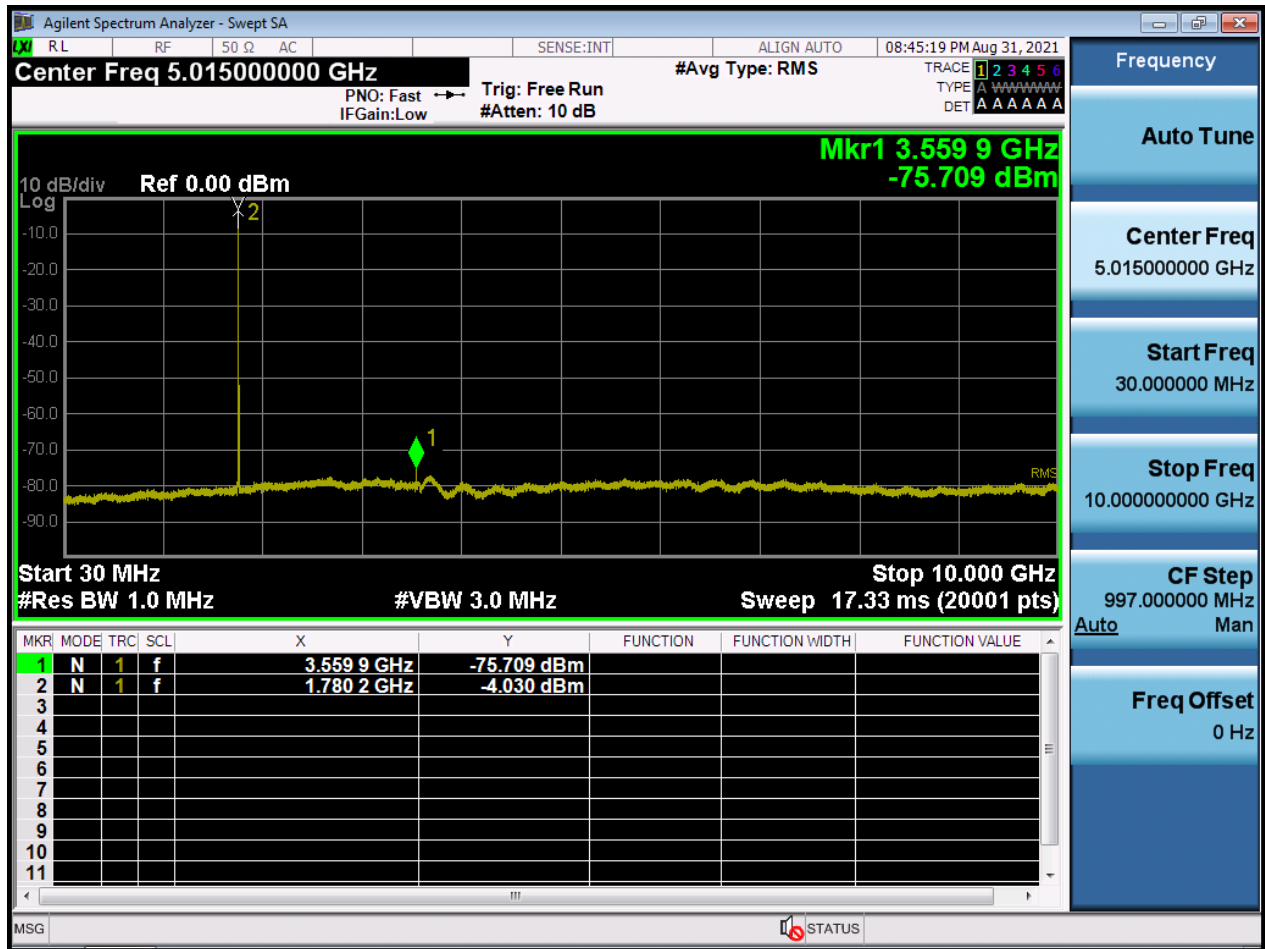
BW3 M\_CSE(30 M-10 G)\_Lowest Channel\_QPSK\_1RB



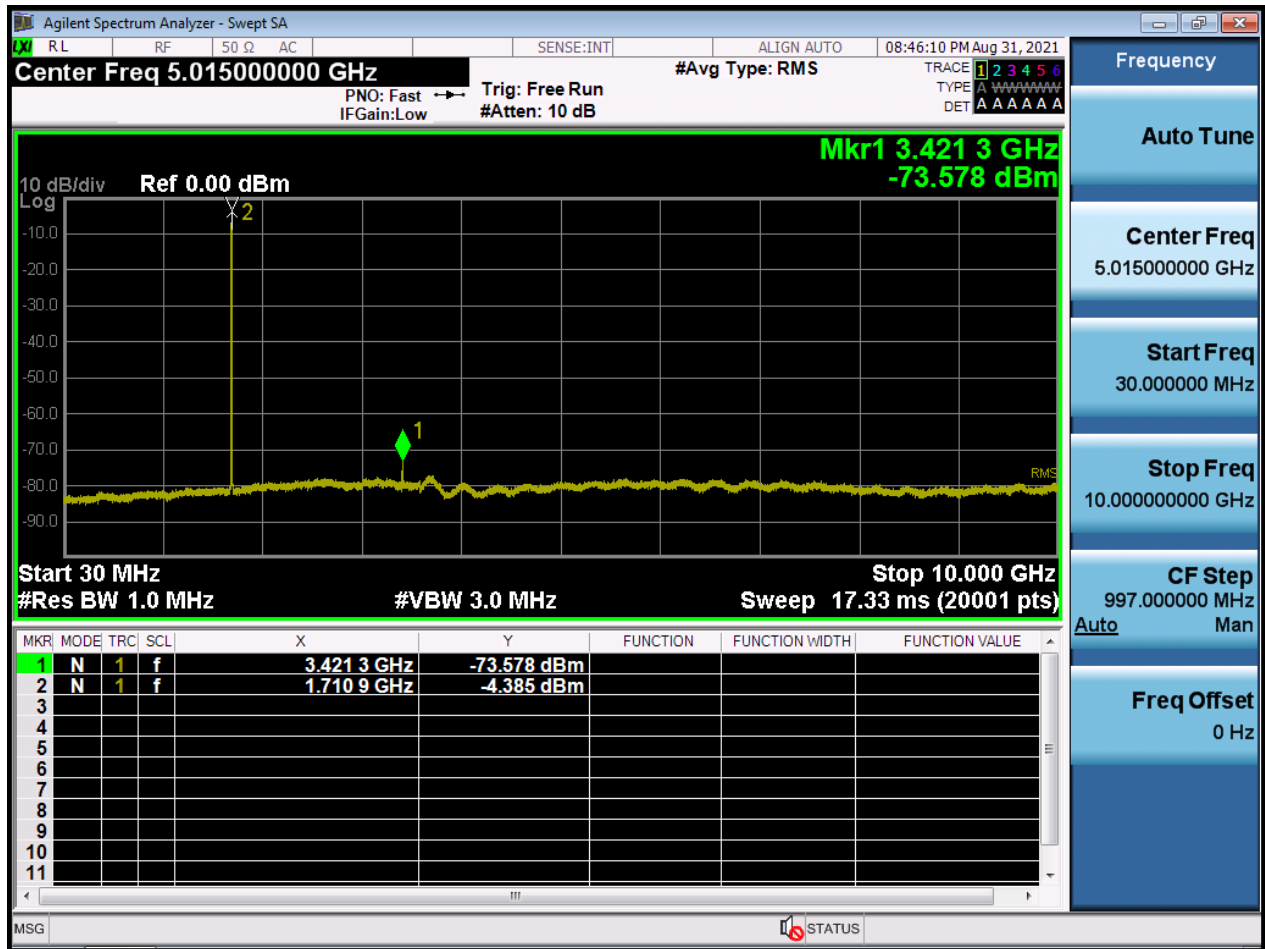
BW3 M\_CSE(30 M-10 G)\_Middle Channel\_QPSK\_1RB



BW3 M\_CSE(30 M-10 G)\_Highest Channel\_QPSK\_1RB

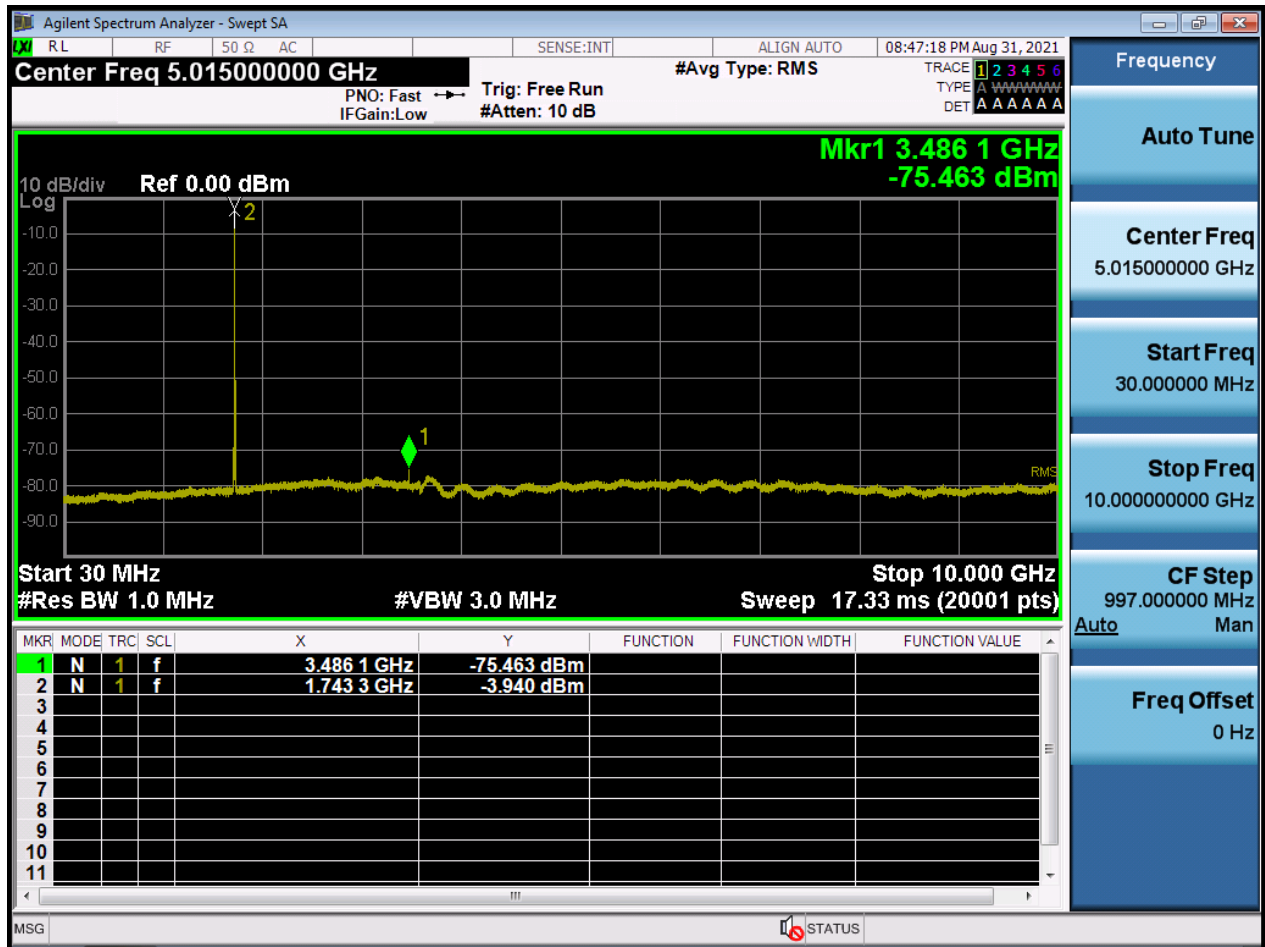


BW5 M\_CSE(30 M-10 G)\_Lowest Channel\_QPSK\_1RB

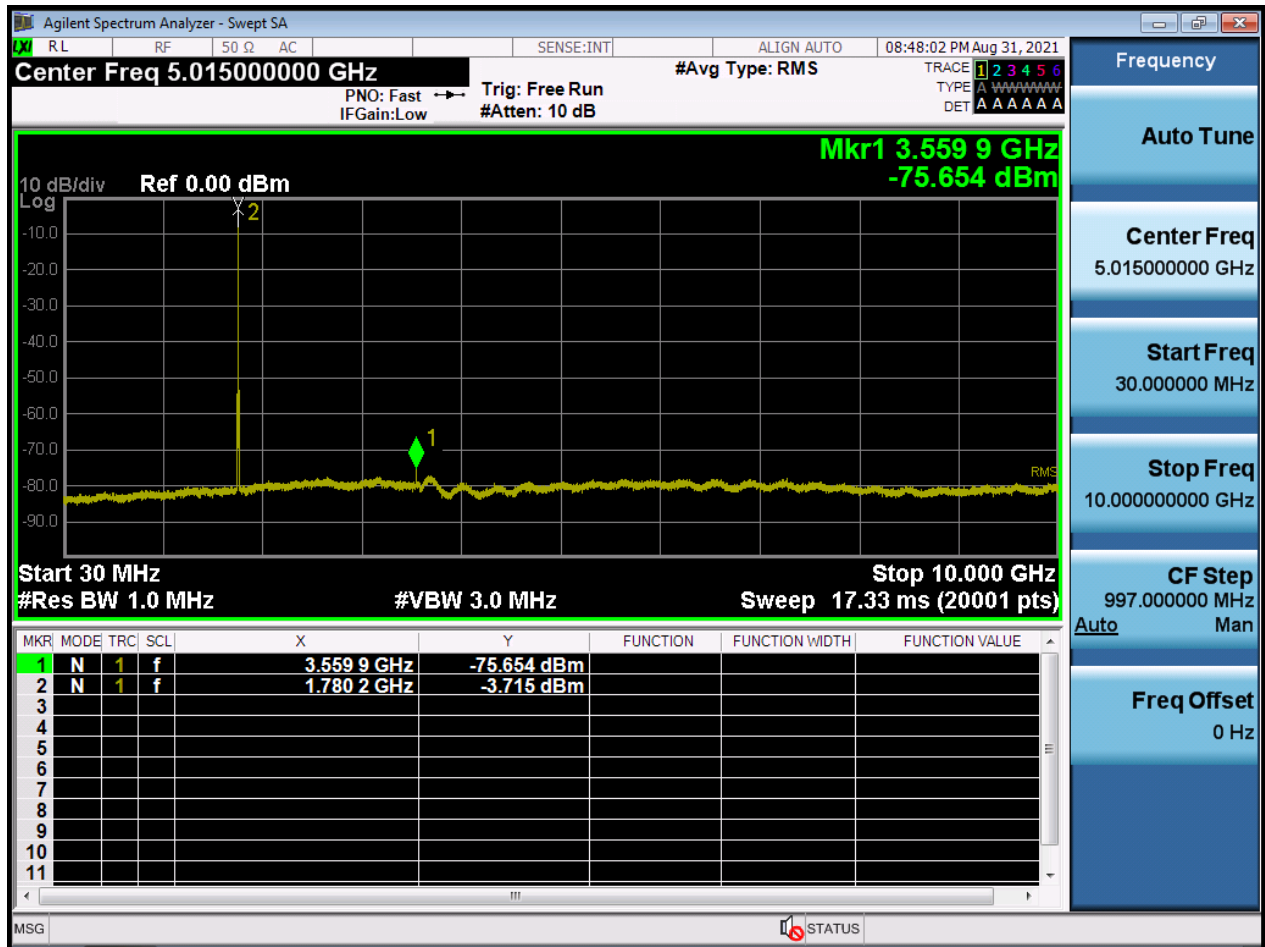




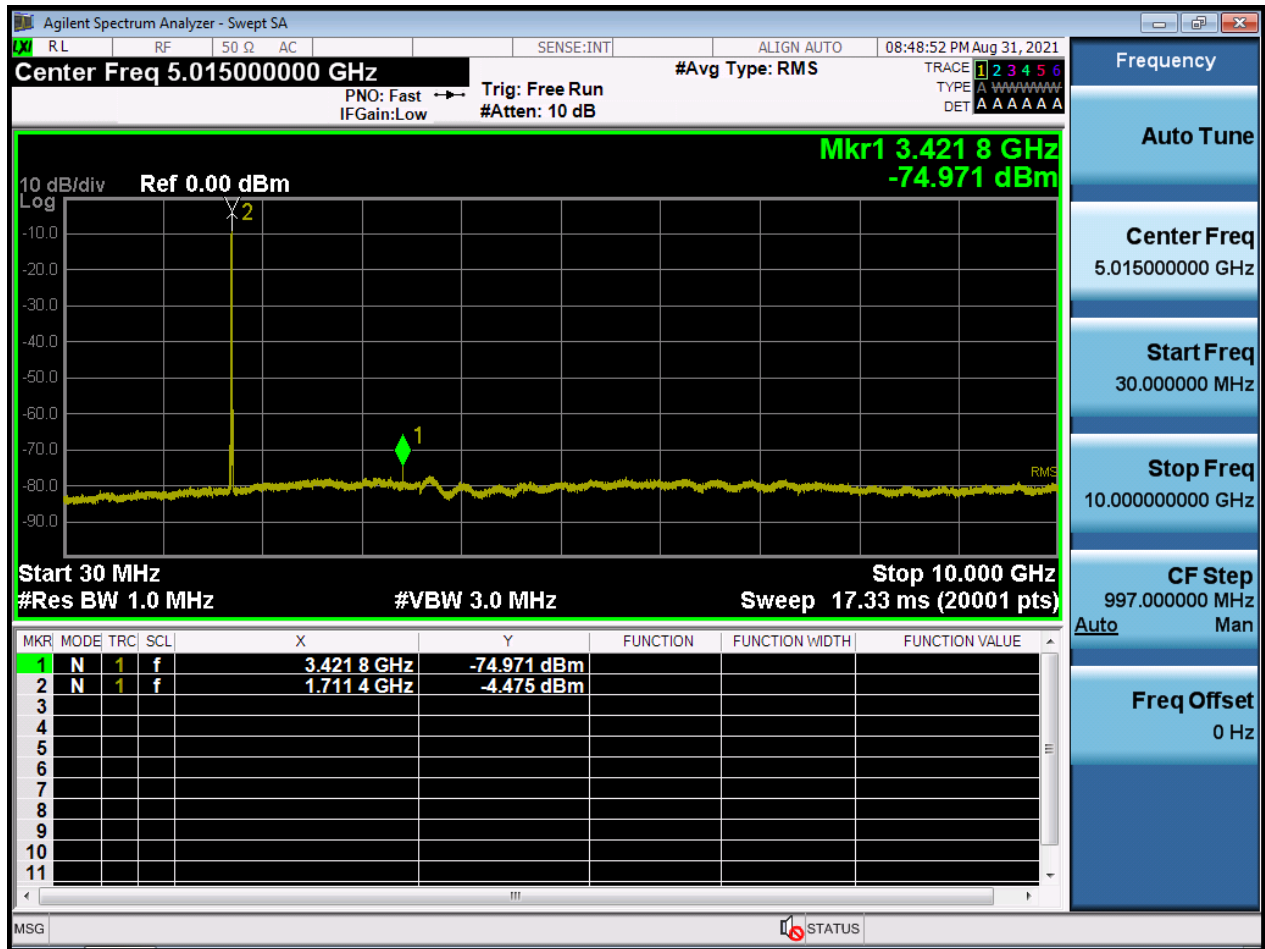
BW5 M\_CSE(30 M-10 G)\_Middle Channel\_QPSK\_1RB



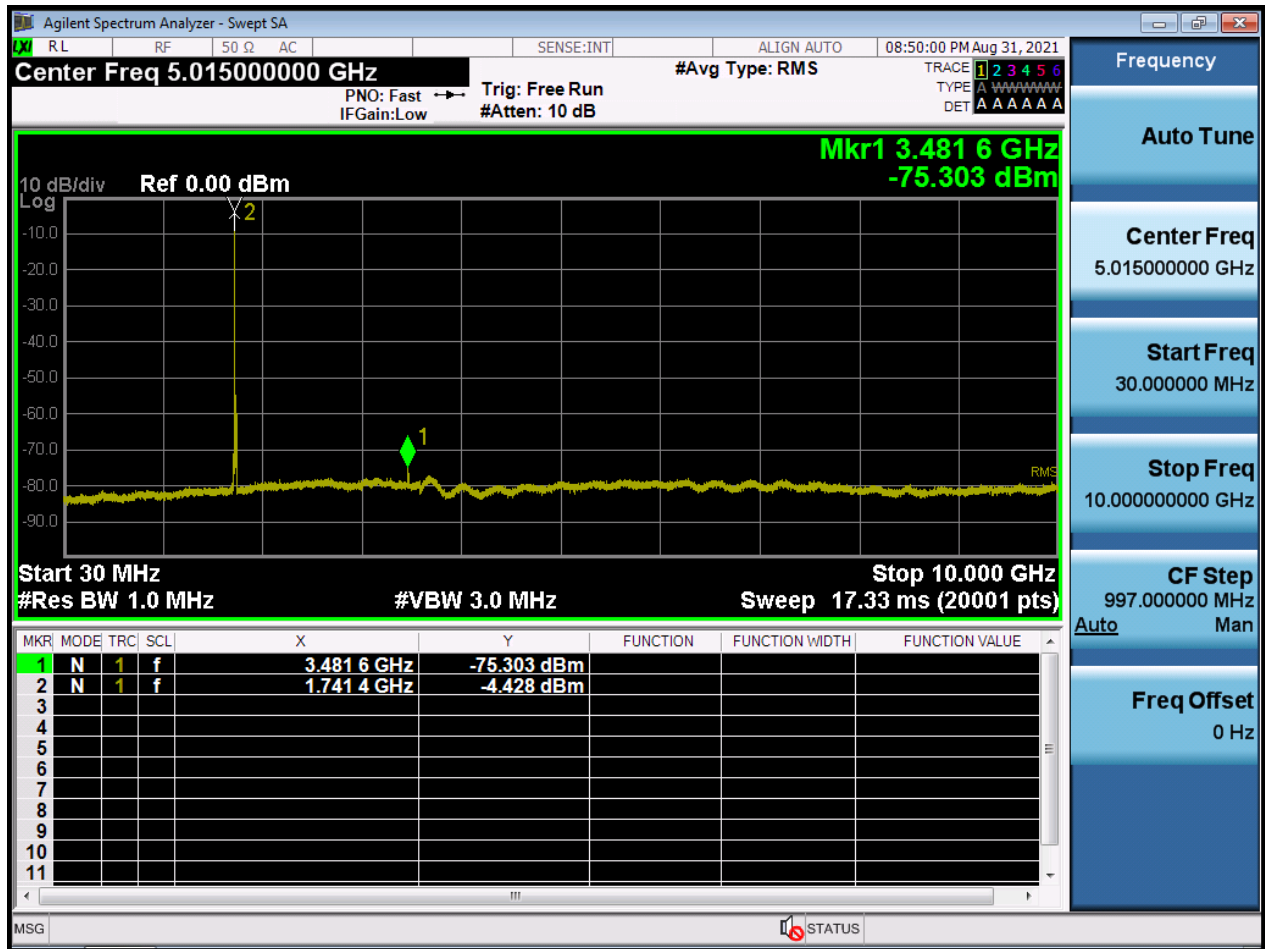
BW5 M\_CSE(30 M-10 G)\_Highest Channel\_QPSK\_1RB



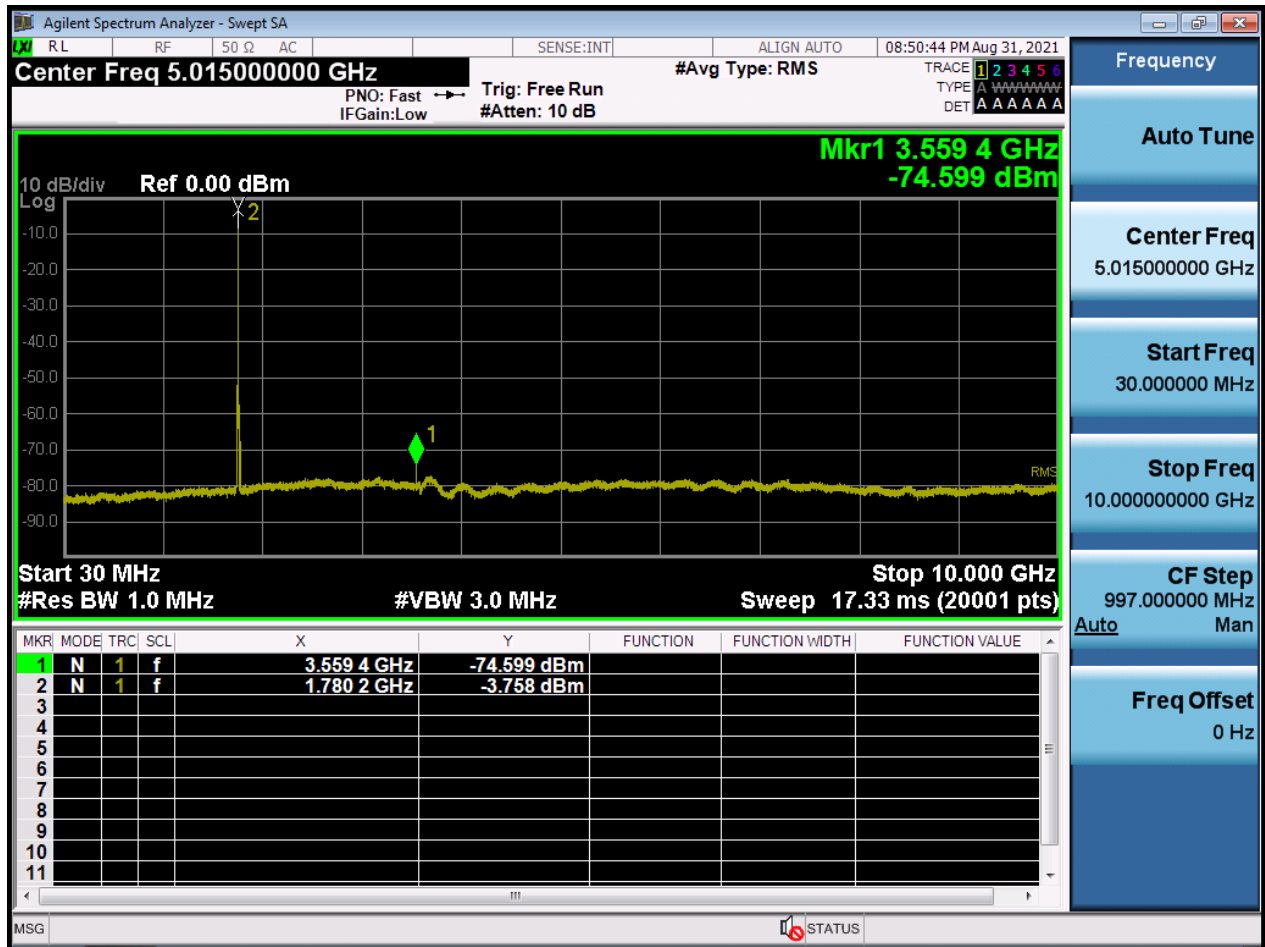
BW10 M\_CSE(30 M-10 G)\_Lowest Channel\_QPSK\_1RB



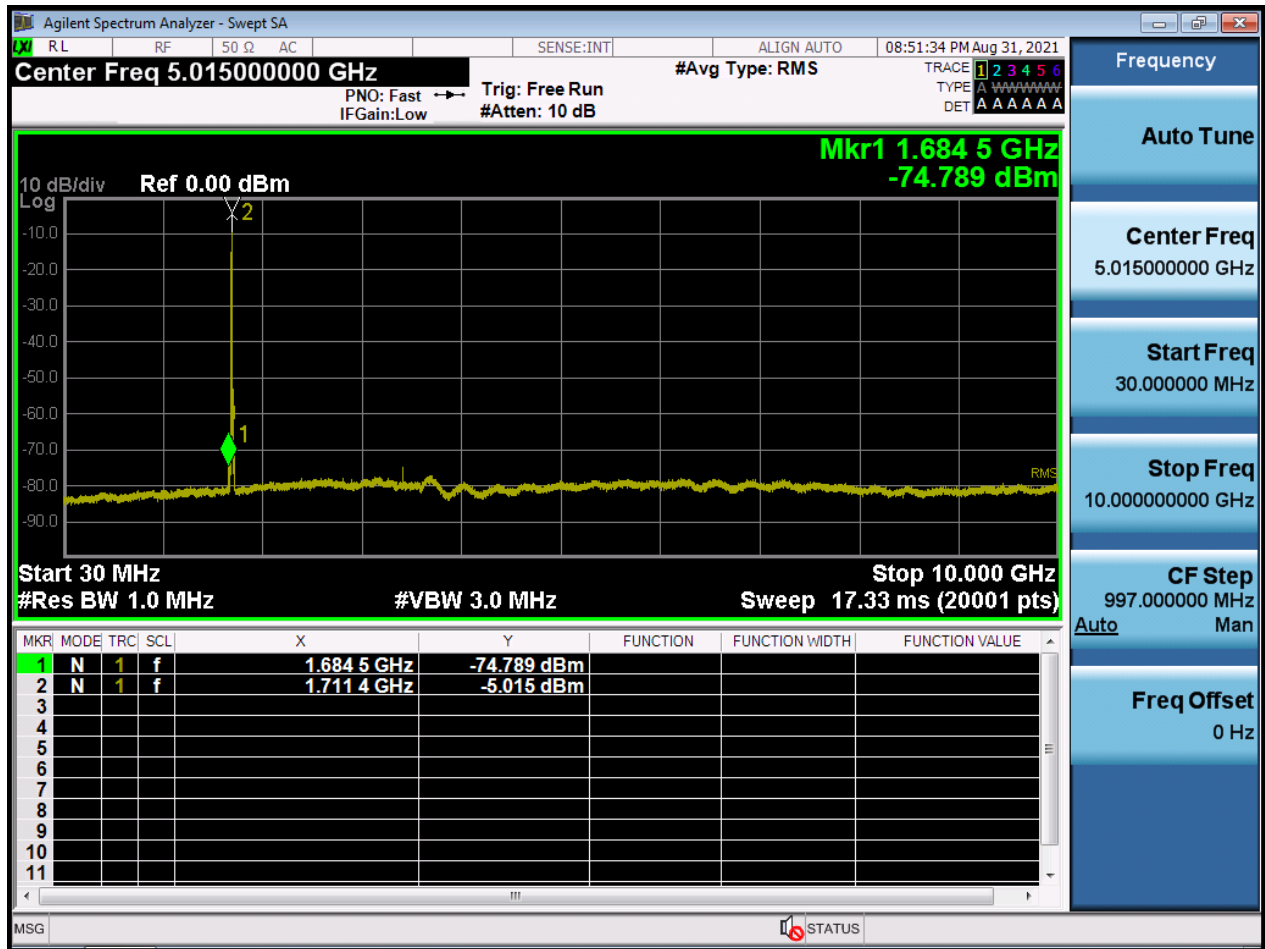
BW10 M\_CSE(30 M-10 G)\_Middle Channel\_QPSK\_1RB



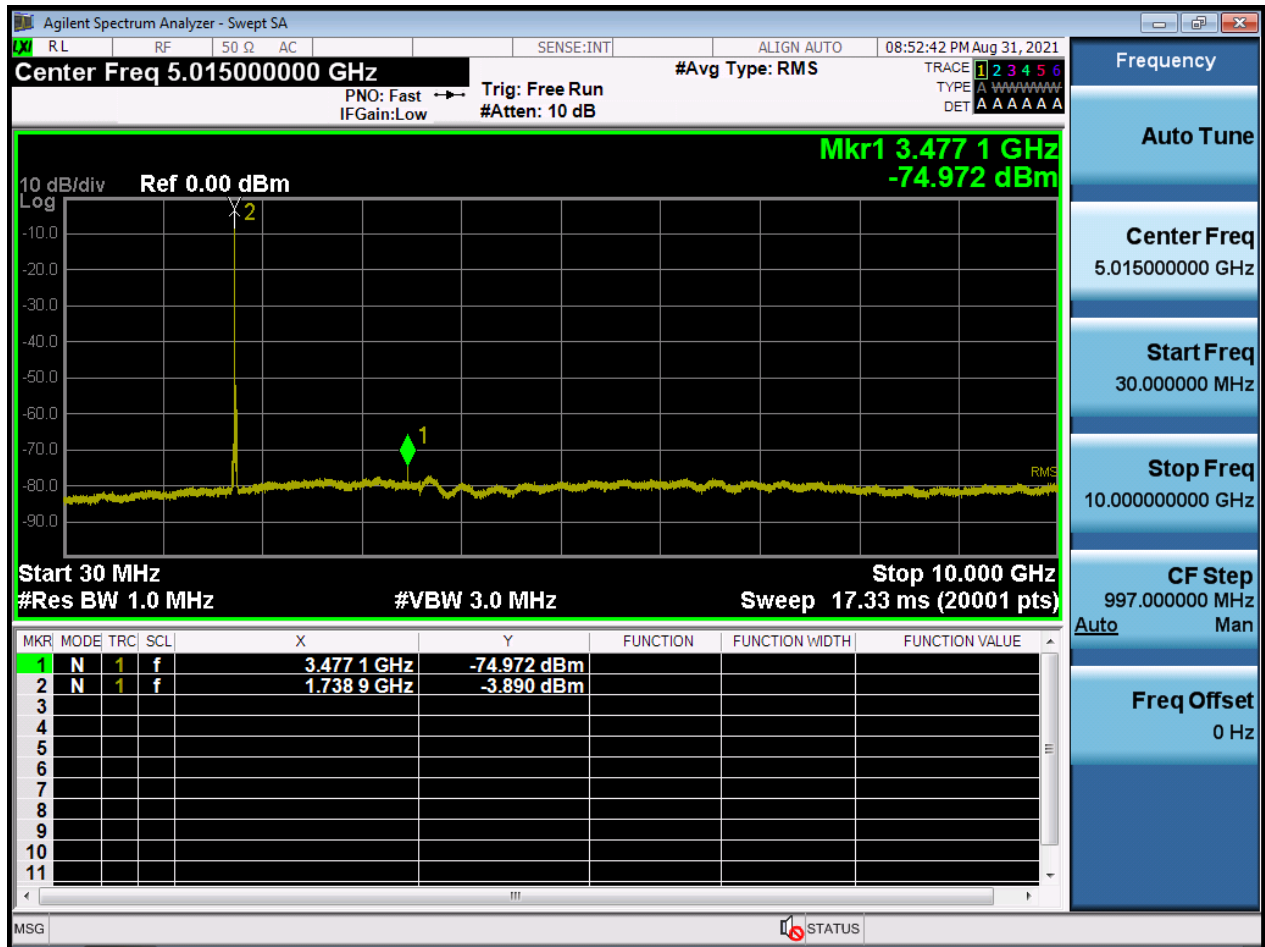
BW10 M\_CSE(30 M-10 G)\_Highest Channel\_QPSK\_1RB



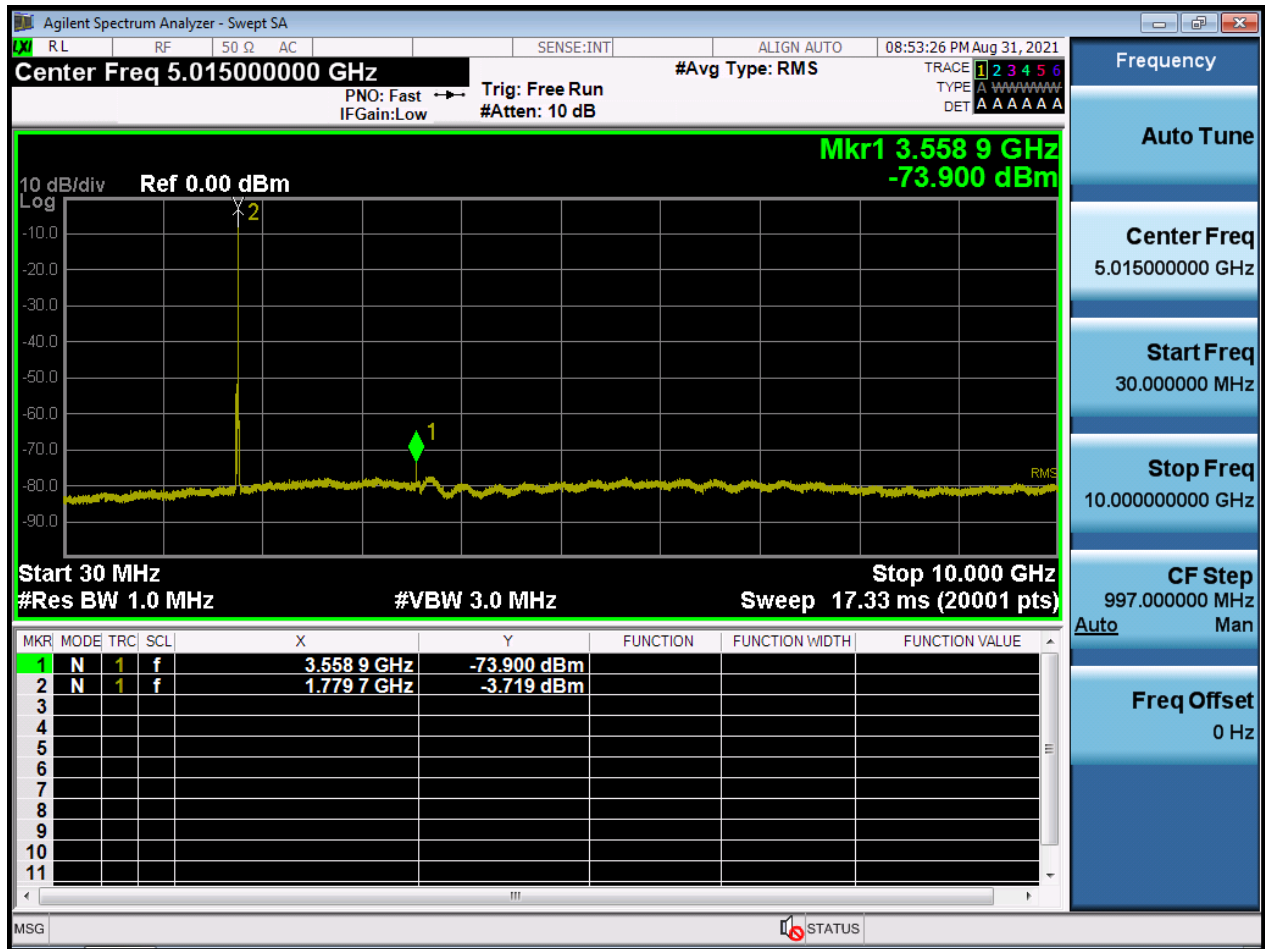
BW15 M\_CSE(30 M-10 G)\_Lowest Channel\_QPSK\_1RB



BW15 M\_CSE(30 M-10 G)\_Middle Channel\_QPSK\_1RB

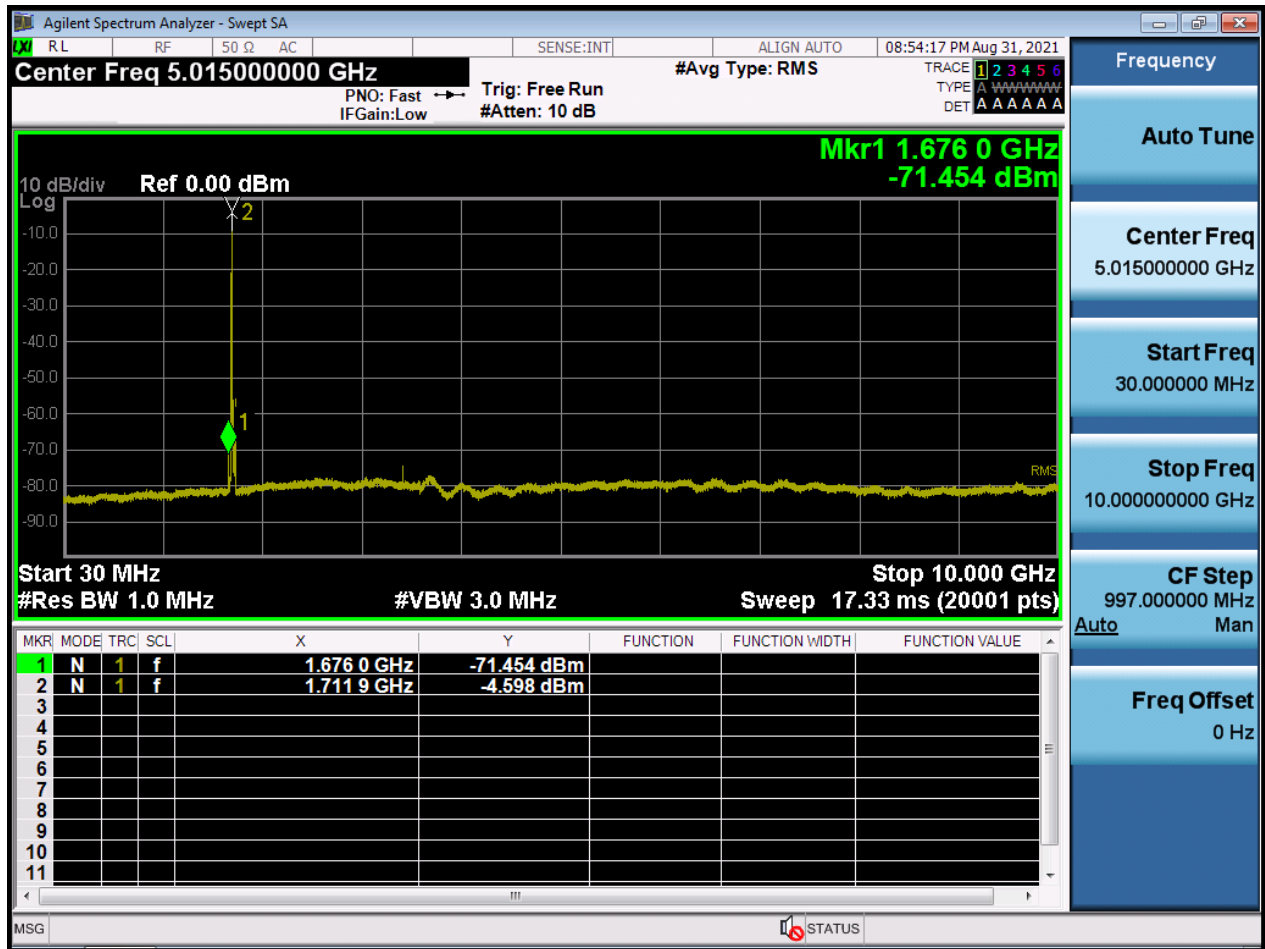


BW15 M\_CSE(30 M-10 G)\_Highest Channel\_QPSK\_1RB

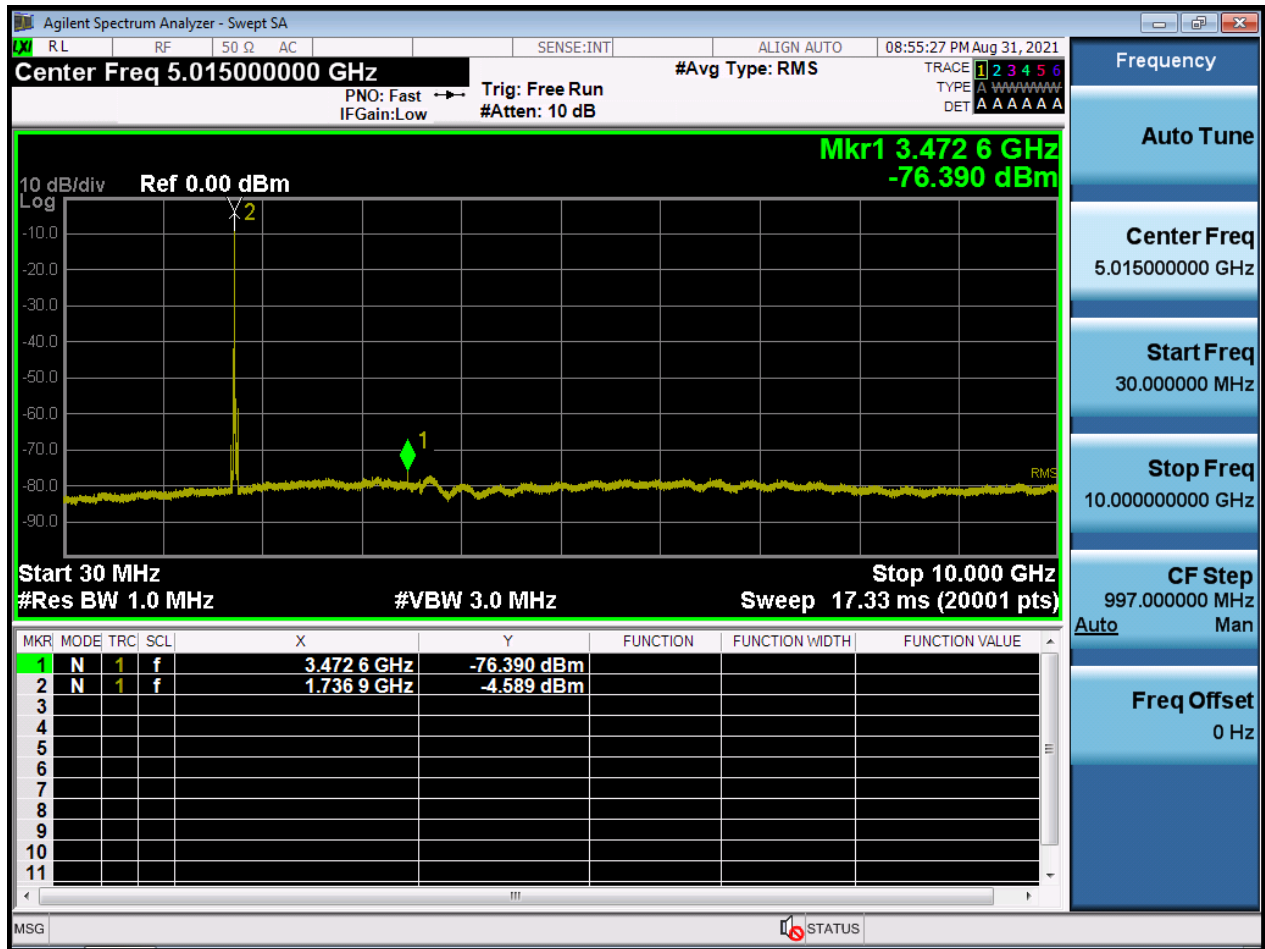




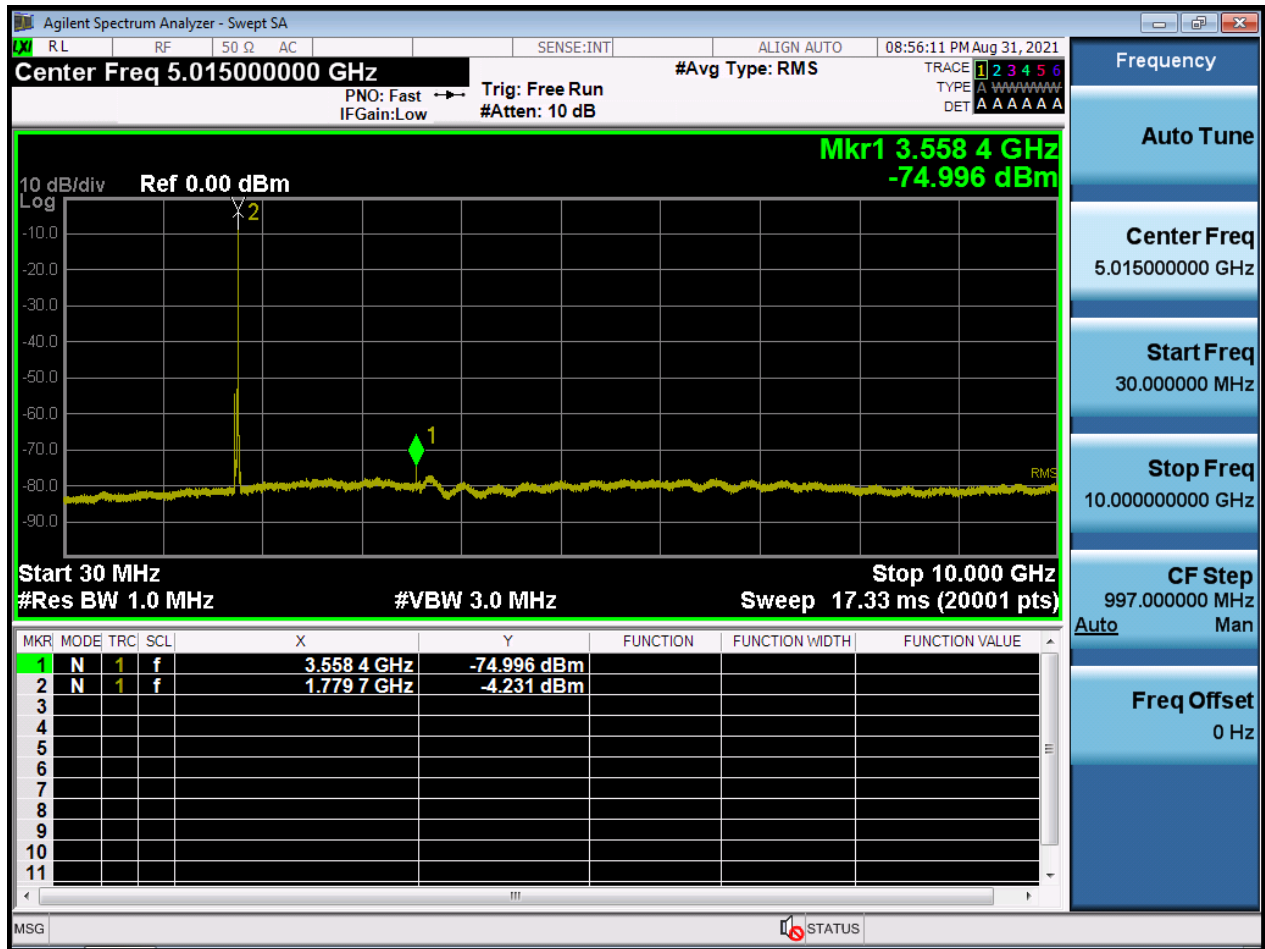
BW20 M\_CSE(30 M-10 G)\_Lowest Channel\_QPSK\_1RB



BW20 M\_CSE(30 M-10 G)\_Middle Channel\_QPSK\_1RB



BW20 M\_CSE(30 M-10 G)\_Highest Channel\_QPSK\_1RB



BW1.4 M\_CSE(10 G-26.5 G)\_Lowest Channel\_QPSK\_1RB

