HCT
Testing and Certification

TEST REPORT

FCC LTE B41(38) Test for TM19FNEUHD2
Certification

APPLICANT
LG Electronics Inc.

REPORT NO.
HCT-RF-2412-FC054

DATE OF ISSUE
December 20, 2024

Tested by
Jae Ryang Do

Technical Manager
Jong Seok Lee

Accredited by KOLAS, Republic of KOREA

HCT CO., LTD.
BongJai Huh / CEO

HCT CO., LTD. 2-6, 73, 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea Tel. +82 31 645 6300 Fax. +82 31 645 6401

HCT CO.,LTD.
2-6, 73, 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea
Tel. +82 31 645 6300 Fax. +82 31 645 6401

TEST REPORT

REPORT NO.
HCT-RF-2412-FC054

DATE OF ISSUE
December 20, 2024

Applicant	**LG Electronics Inc.** 128, Yeoui-daero, Yeongdeungpo-gu, Seoul, Republic of Korea
Product Name Model Name	Telematics TM19FNEUHD2
Date of Test	October 07, 2024 ~ December 10, 2024
FCC ID	BEJTM19FNEUHD2
Location of Test	■ Permanent Testing Lab ☐ On Site Testing (Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea)
FCC Classification:	PCB Licensed Transmitter (PCB)
Test Standard Used	FCC Rule Part: § 27
Test Results	PASS

REVISION HISTORY

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

Revision No.	Date of Issue	Description
0	December 20, 2024	Initial Release

Notice

Content
The measurements shown in this report were made in accordance with the procedures specified in CFR47 section § 2.947. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a) The results shown in this test report only apply to the sample(s), as received, provided by the applicant, unless otherwise stated. The test results have only been applied with the test methods required by the standard(s). The laboratory is not accredited for the test results marked *. Information provided by the applicant is marked **. Test results provided by external providers are marked ***. When confirmation of authenticity of this test report is required, please contact www.hct.co.kr This test report provides test result(s) under the scope accredited by the Korea Laboratory Accreditation Scheme (KOLAS), which signed the ILAC-MRA. (KOLAS (KS Q ISO/IEC 17025) Accreditation No. KT197)

CONTENTS

MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name:	LG Electronics Inc.
Address:	128, Yeoui-daero, Yeongdeungpo-gu, Seoul, Republic of Korea
FCC ID:	BEJTM19FNEUHD2
Application Type:	Certification
FCC Classification:	PCB Licensed Transmitter (PCB)
FCC Rule Part(s):	§ 27
EUT Type:	Telematics
Model(s):	TM19FNEUHD2
Tx Frequency:	2498.5 – 2687.5 : 5 MHz 2501.0 – 2685.0 : 10 MHz 2503.5 – 2682.5 : 15 MHz 2506.0 – 2680.0 : 20 MHz
Date(s) of Tests:	October 07, 2024 ~ December 10, 2024
Serial number:	Honda MY26 #23
Antenna Information	Please refer to the Antenna Approval Specification document.

1.1. MAXIMUM OUTPUT POWER

Mode (MHz)	Tx Frequency (MHz)	Emission Designator	Modulation	Conducted Output Power	
				Max. Power (W)	Max. Power (dBm)
LTE – Band 41(38) (5)	2498.5 – 2687.5	4M50G7D	QPSK	0.189	22.76
		4M50W7D	16QAM	0.165	22.17
		4M50W7D	64QAM	0.136	21.32
		4M49W7D	256QAM	0.065	18.10
LTE – Band 41(38) (10)	2501.0 – 2685.0	9M00G7D	QPSK	0.192	22.84
		9M00W7D	16QAM	0.166	22.19
		8M96W7D	64QAM	0.136	21.35
		8M97W7D	256QAM	0.067	18.27
LTE – Band 41(38) (15)	2503.5 – 2682.5	13M5G7D	QPSK	0.215	23.32
		13M5W7D	16QAM	0.165	22.18
		13M5W7D	64QAM	0.135	21.29
		13M4W7D	256QAM	0.065	18.13
LTE – Band 41(38) (20)	2506.0 – 2680.0	17M9G7D	QPSK	0.199	22.99
		17M9W7D	16QAM	0.168	22.25
		17M9W7D	64QAM	0.132	21.19
		17M9W7D	256QAM	0.067	18.26

2. INTRODUCTION

2.1. DESCRIPTION OF EUT

The EUT was a Telematics with GSM/GPRS/EGPRS/UMTS and LTE, Sub 6.

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

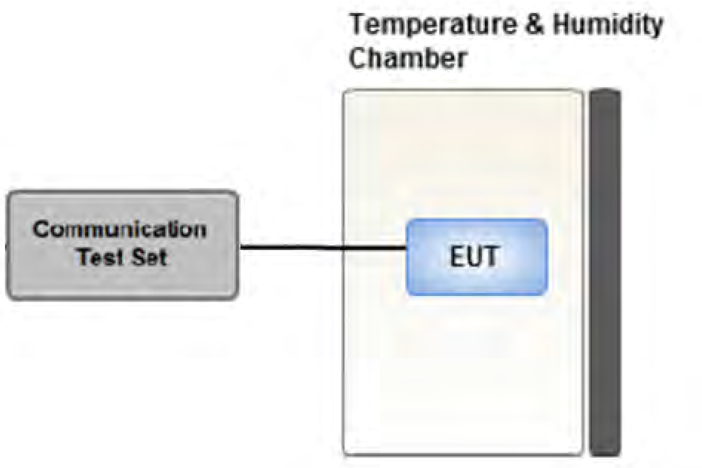
The Fully-anechoic chamber and conducted measurement facility used to collect the radiated data are located at the **74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea.**

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	- KDB 971168 D01 v03r01 - Section 5.2.4 - ANSI C63.26-2015 - Section 5.2.1 & 5.2.4.2
Peak- to- Average Ratio	- KDB 971168 D01 v03r01 – Section 5.7 - ANSI C63.26-2015 – Section 5.2.3.4
Frequency stability	- ANSI C63.26-2015 – Section 5.6
Radiated Power	- ANSI C63.26-2015 – Section 5.2.4.4 - KDB 971168 D01 v03r01 – Section 5.8
Radiated Spurious and Harmonic Emissions	- ANSI C63.26-2015 – Section 5.5.3 - KDB 971168 D01 v03r01 – Section 5.8

3.2 CONDUCTED OUTPUT POWER



Test setup

Test Overview

When an average power meter is used to perform RF output power measurements, the fundamental condition that measurements be performed only over durations of active transmissions at maximum output power level applies.

Conducted Output Power was tested in accordance with KDB971168 D01 Power Meas License Digital Systems v03r01, Section 5.2.

3.3 RADIATED POWER

Test Overview

Radiated tests are performed in the Fully-anechoic chamber.
The equipment under test is placed on a non-conductive table 3-meters away from the receive antenna.

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
2. RBW = 1 – 5 % of the expected OBW, not to exceed 1 MHz
3. VBW ≥ 3 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points > 2 x span / RBW
6. Detector = RMS
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto".
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

Test Note

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

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

   Where: P_d is the dipole equivalent power and P_g is the generator output power into the substitution antenna.
3. The maximum value is calculated by adding the forward power to the calibrated source plus its appropriate gain value.
   These steps are repeated with the receiving antenna in both vertical and horizontal polarization. the difference between the gain of the horn and an isotropic antenna are taken into consideration
4. The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
5. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

3.4 RADIATED SPURIOUS EMISSIONS

Test Overview

Radiated tests are performed in the Fully-anechoic chamber.

Radiated Spurious Emission Measurements at 3 meters by Substitution Method.

Test Settings

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

Test Note

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

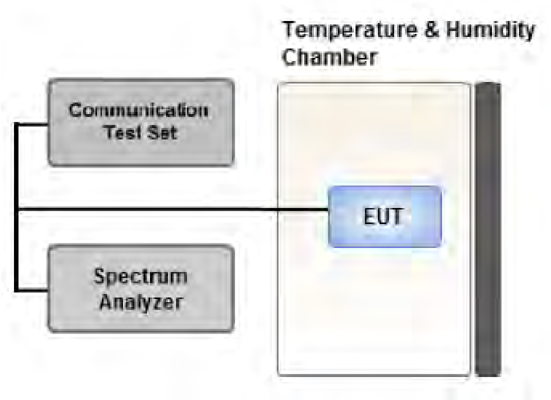
$$\text{Result}_{(dBm)} = \text{Pg}_{(dBm)} - \text{cable loss}_{(dB)} + \text{antenna gain}_{(dBi)}$$

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

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

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

3.5 PEAK- TO- AVERAGE RATIO



Test setup

① CCDF Procedure for PAPR

Test Settings

1. Set resolution/measurement bandwidth ≥ 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 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)

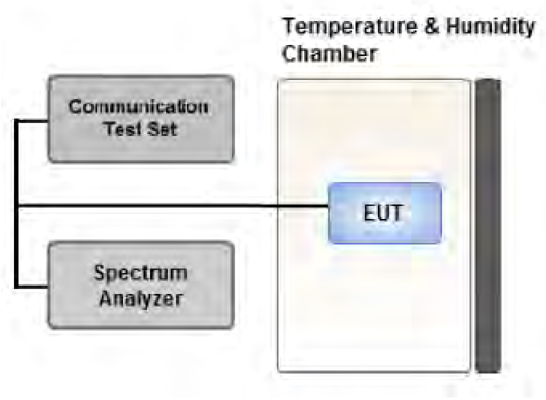
The measurement instrument must have a RBW that is greater than or equal to the OBW of the signal to be measured and a VBW ≥ 3 × RBW.

1. Set the RBW ≥ OBW.
2. Set VBW ≥ 3 × RBW.
3. Set span ≥ 2 × OBW.
4. Sweep time ≥ 10 × (number of points in sweep) × (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 × to 3 × the OBW.
2. Set RBW ≥ OBW.
3. Set VBW ≥ 3 × RBW.
4. Set number of measurement points in sweep ≥ 2 × span / RBW.
5. Sweep time:
   Set ≥ [10 × (number of points in sweep) × (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/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 %.

3.6 OCCUPIED BANDWIDTH.



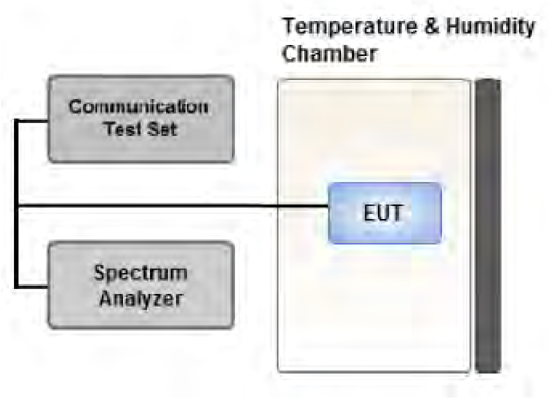
Test setup

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.
The EUT makes a call to the communication simulator.
The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency.
Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth

Test Settings

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

3.7 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL



Test setup

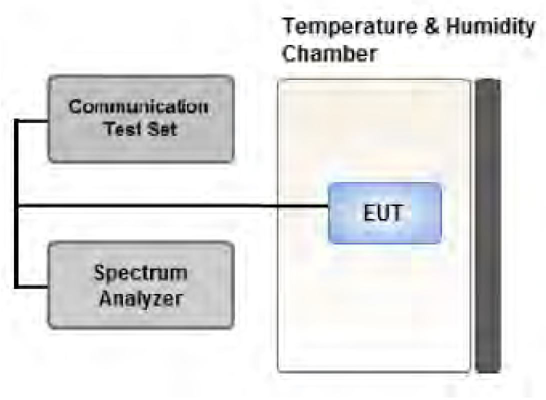
Test Overview

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

Test Settings

1. RBW = 1 MHz
2. VBW ≥ 3 MHz
3. Detector = Peak
4. Trace Mode = Max Hold
5. Sweep time = auto
6. Number of points in sweep ≥ 2 x Span / RBW

3.8 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

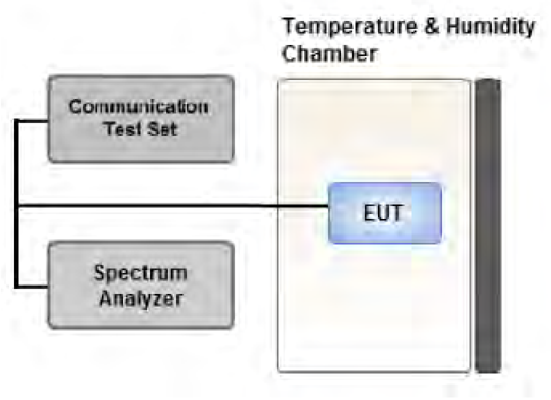
1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW > 1 % of the emission bandwidth
4. VBW > 3 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW
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.

Where Margin < 1 dB the emission level is either corrected by 10 log(1 MHz/ RB) or the emission is integrated over a 1 MHz bandwidth to determine the final result. When using the integration method the integration window is either centered on the emission or, for emissions at the band edge, centered by an offset of 500 kHz from the block edge so that the integration window is the 1 MHz adjacent to the block edge.

3.9 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.
- All simultaneous transmission scenarios of operation were investigated, and the test results showed no additional significant emissions relative to the least restrictive limit were observed.
  Therefore, only the worst case(stand-alone) results were reported.
- LTE Band 41(5 M/10 M/15 M/20 M) overlaps the entire frequency range of LTE Band 38(5 M/10 M/ 15 M/20 M) and they have the same Tune-up power.
- The worst case is reported with the EUT positioning, modulations, and paging service configurations shown in the test data
- Please refer to the table below.

[Worst case]

Test Description	Modulation	RB size	RB offset	Axis
Effective Isotropic Radiated Power	QPSK, 16QAM, 64QAM, 256QAM	See Section 8.2		Z
Radiated Spurious and Harmonic Emissions	QPSK	See Section 8.3		Y

3.10 WORST CASE(CONDUCTED TEST)

- All modes of operation were investigated and the worst case configuration results are reported.
- LTE Band 41(5 M/10 M/15 M/20 M) overlaps the entire frequency range of LTE Band 38(5 M/10 M/15 M/20 M) and they have the same Tune-up power.

[Worst case]

Test Description	Modulation	Bandwidth (MHz)	Frequency	RB size	RB offset
Occupied Bandwidth	QPSK, 16QAM, 64QAM, 256QAM	5, 10, 15, 20	Mid	Full RB	0
Peak-To-Average Radio	QPSK, 16QAM, 64QAM, 256QAM	5, 10, 15, 20	Mid	Full RB	0
Channel Edge	QPSK	5	Low	1	0
			High	1	24
		10	Low	1	0
			High	1	49
		15	Low	1	0
			High	1	74
		20	Low	1	0
			High	1	99
		5, 10, 15, 20	Low, Mid, High	Full RB	0
Spurious and Harmonic Emissions at Antenna Terminal	QPSK	5, 10, 15, 20	Low, Mid, High	1	0

4. LIST OF TEST EQUIPMENT

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
RF Switching System	Switch box(1.2 G HPF+LNA)	HCT CO., LTD.,	F1L1	11/11/2025	Annual
RF Switching System	Switch box(3.3 G HPF+LNA)	HCT CO., LTD.,	F1L2	11/11/2025	Annual
RF Switching System	Switch box(LNA)	HCT CO., LTD.,	F1L4	11/11/2025	Annual
RF Switching System	Switch box(6 G HPF+LNA)	HCT CO., LTD.,	F1L7	11/11/2025	Annual
Power Splitter(DC ~ 26.5 GHz)	11667B	Hewlett Packard	5001	04/17/2025	Annual
DC Power Supply	E3632A	Agilent	MY40010147	08/06/2025	Annual
Dipole Antenna	UHAP	Schwarzbeck	01274	03/10/2026	Biennial
Dipole Antenna	UHAP	Schwarzbeck	01288	08/07/2026	Biennial
Chamber	SU-642	ESPEC	93008124	02/19/2025	Annual
Horn Antenna(1 ~ 18 GHz)	BBHA 9120D	Schwarzbeck	147	08/17/2025	Biennial
Horn Antenna(1 ~ 18 GHz)	BBHA 9120D	Schwarzbeck	9120D-1298	09/11/2025	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170342	09/20/2026	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170124	03/28/2025	Biennial
Signal Analyzer(10 Hz ~ 26.5 GHz)	N9020A	Agilent	MY52090906	04/19/2025	Annual
ATTENUATOR(20 dB)	8493C	Hewlett Packard	17280	04/17/2025	Annual
Spectrum Analyzer(10 Hz ~ 40 GHz)	FSV40	REOHDE & SCHWARZ	100931	08/06/2025	Annual
Base Station	8960 (E5515C)	Agilent	MY48360800	08/05/2025	Annual
Loop Antenna(9 kHz ~ 30 MHz)	FMZB1513	Schwarzbeck	1513-333	03/07/2026	Biennial
Trilog Broadband Antenna	VULB9168	Schwarzbeck	895	08/28/2026	Biennial
Trilog Broadband Antenna	VULB9168	Schwarzbeck	1135	08/19/2026	Biennial
Wideband Radio Communication Tester	MT8821C	Anritsu Corp.	6262094331	11/13/2025	Annual
Wideband Radio Communication Tester	MT8820C	Anritsu Corp.	6201026545	11/20/2025	Annual
SIGNAL GENERATOR (100 kHz ~ 40 GHz)	SMB100A	REOHDE & SCHWARZ	177633	07/26/2025	Annual
Signal Analyzer(5 Hz ~ 40.0 GHz)	N9030B	KEYSIGHT	MY55480167	05/17/2025	Annual
FCC LTE Mobile Conducted RF Automation Test Software	-	HCT CO., LTD.,	-	-	-

Note:

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

5. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4:2014.

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

Parameter	Expanded Uncertainty (±dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.98 (Confidence level about 95 %, k=2)
Radiated Disturbance (9 kHz ~ 30 MHz)	4.36 (Confidence level about 95 %, k=2)
Radiated Disturbance (30 MHz ~ 1 GHz)	5.70 (Confidence level about 95 %, k=2)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.52 (Confidence level about 95 %, k=2)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.66 (Confidence level about 95 %, k=2)
Radiated Disturbance (Above 40 GHz)	5.58 (Confidence level about 95 %, k=2)

6. SUMMARY OF TEST RESULTS

6.1 Test Condition: Conducted Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Occupied Bandwidth	§ 2.1049	N/A	PASS
Band Edge / Spurious and Harmonic Emissions at Antenna Terminal.	§ 2.1051, § 27.53(m)(4)	■ < 40 + 10log10 (P[Watts]) at Channel edges ■ < 43 + 10log10 (P[Watts]) between 5 and X MHz from Channel edges ■ < 55 + 10log10 (P[Watts]) beyond X MHz beyond from Channel edges ■ < 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz	PASS
Conducted Output Power	§ 2.1046	N/A	PASS
Frequency stability / variation of ambient temperature	§ 2.1055, § 27.54	Emission must remain in band	PASS

6.2 Test Condition: Radiated Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Equivalent Isotropic Radiated Power	§ 27.50(h)(2)	< 2 Watts max. EIRP	PASS
Radiated Spurious and Harmonic Emissions	§ 2.1053, § 27.53(m)(4)	< 55 + 10log10 (P[Watts])	PASS

7. SAMPLE CALCULATION

7.1 ERP Sample Calculation

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

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

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

7.2 EIRP Sample Calculation

Ch./ Freq.		Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBi)	C.L	Pol.	EIRP	
channel	Freq.(MHz)						W	dBm
20175	1,732.50	-15.75	18.45	9.90	1.76	H	0.456	26.59

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

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

7.3. Emission Designator

GSM Emission Designator

Emission Designator = 249KGXW
GSM BW = 249 kHz
G = Phase Modulation
X = Cases not otherwise covered
W = Combination (Audio/Data)

EDGE Emission Designator

Emission Designator = 249KG7W
GSM BW = 249 kHz
G = Phase Modulation
7 = Quantized/Digital Info
W = Combination (Audio/Data)

WCDMA Emission Designator

Emission Designator = 4M17F9W
WCDMA BW = 4.17 MHz
F = Frequency Modulation
9 = Composite Digital Info
W = Combination (Audio/Data)

QPSK Modulation

Emission Designator = 4M48G7D
LTE BW = 4.48 MHz
G = Phase Modulation
7 = Quantized/Digital Info
D = Data transmission; telemetry; telecommand

QAM Modulation

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

8. TEST DATA

8.1 Conducted Output Power

Bandwidth	Modulation	RB Size	RB Offset	Max.Average Power (dBm)			Target MPR (dB)	Target Power
				39675 2498.5 MHz	40620 2593 MHz	41565 2687.5 MHz		
5 MHz	QPSK	1	0	22.70	22.63	22.53	0	23
		1	12	22.73	22.71	22.59	0	23
		1	24	22.76	22.63	22.55	0	23
		12	0	21.89	21.74	21.61	1	22
		12	6	21.89	21.79	21.69	1	22
		12	11	21.87	21.74	21.62	1	22
		25	0	21.88	21.76	21.65	1	22
	16QAM	1	0	22.09	22.00	21.86	1	22
		1	12	22.13	22.00	21.88	1	22
		1	24	22.17	21.92	21.84	1	22
		12	0	20.94	20.79	20.65	2	21
		12	6	20.99	20.89	20.80	2	21
		12	11	20.96	20.80	20.68	2	21
		25	0	20.97	20.84	20.69	2	21
	64QAM	1	0	21.20	21.14	20.87	2	21
		1	12	21.17	21.10	20.92	2	21
		1	24	21.32	21.17	20.91	2	21
		12	0	20.04	19.84	19.68	3	20
		12	6	20.08	19.87	19.72	3	20
		12	11	20.03	19.84	19.72	3	20
		25	0	20.03	19.84	19.67	3	20
	256QAM	1	0	18.03	17.95	17.82	5	18
		1	12	18.06	18.01	17.76	5	18
		1	24	18.10	17.87	17.78	5	18
		12	0	17.99	17.82	17.59	5	18
		12	6	18.05	17.88	17.71	5	18
		12	11	17.99	17.84	17.68	5	18
		25	0	17.99	17.83	17.59	5	18

Bandwidth	Modulation	RB Size	RB Offset	Max.Average Power (dBm)			Target MPR (dB)	Target Power
				39700	40620	41540		
				2501 MHz	2593 MHz	2685 MHz		
10 MHz	QPSK	1	0	22.81	22.84	22.61	0	23
		1	24	22.72	22.77	22.58	0	23
		1	49	22.81	22.70	22.54	0	23
		25	0	21.86	21.86	21.65	1	22
		25	12	21.95	21.93	21.73	1	22
		25	24	21.97	21.86	21.67	1	22
		50	0	21.94	21.89	21.73	1	22
	16QAM	1	0	22.16	22.11	21.91	1	22
		1	24	22.19	22.08	22.08	1	22
		1	49	22.18	22.01	21.95	1	22
		25	0	20.87	20.89	20.65	2	21
		25	12	20.97	20.98	20.74	2	21
		25	24	20.98	20.88	20.71	2	21
		50	0	20.96	20.95	20.72	2	21
	64QAM	1	0	21.07	21.25	20.96	2	21
		1	24	21.21	21.35	21.06	2	21
		1	49	21.12	21.17	20.94	2	21
		25	0	19.89	19.93	19.67	3	20
		25	12	20.01	19.96	19.76	3	20
		25	24	19.97	19.92	19.72	3	20
		50	0	20.01	19.93	19.78	3	20
	256QAM	1	0	18.23	18.22	17.81	5	18
		1	24	18.27	18.11	17.83	5	18
		1	49	18.12	17.92	17.85	5	18
		25	0	17.95	17.89	17.68	5	18
		25	12	18.01	17.96	17.76	5	18
		25	24	18.04	17.93	17.71	5	18
		50	0	18.01	17.94	17.76	5	18

Bandwidth	Modulation	RB Size	RB Offset	Max.Average Power (dBm)			Target MPR (dB)	Target Power
				39725	40620	41515		
				2503.5 MHz	2593 MHz	2682.5 MHz		
15 MHz	QPSK	1	0	22.61	22.80	22.50	0	23
		1	36	23.32	22.68	22.96	0	23
		1	74	22.52	22.70	22.95	0	23
		36	0	21.80	21.87	21.59	1	22
		36	18	21.72	21.76	21.52	1	22
		36	39	21.74	21.83	21.60	1	22
		75	0	21.80	21.87	21.54	1	22
	16QAM	1	0	22.10	22.18	21.88	1	22
		1	36	21.90	21.99	21.85	1	22
		1	74	21.93	21.99	21.84	1	22
		36	0	20.81	20.88	20.62	2	21
		36	18	20.78	20.83	20.62	2	21
		36	39	20.80	20.82	20.63	2	21
		75	0	20.81	20.88	20.59	2	21
	64QAM	1	0	21.29	21.15	20.88	2	21
		1	36	21.03	21.15	20.87	2	21
		1	74	21.09	21.12	20.99	2	21
		36	0	19.86	19.90	19.60	3	20
		36	18	19.79	19.84	19.56	3	20
		36	39	19.78	19.83	19.66	3	20
		75	0	19.85	19.91	19.62	3	20
	256QAM	1	0	17.94	18.13	17.84	5	18
		1	36	17.96	17.98	17.67	5	18
		1	74	17.87	17.94	17.80	5	18
		36	0	17.87	17.91	17.68	5	18
		36	18	17.83	17.87	17.64	5	18
		36	39	17.84	17.87	17.70	5	18
		75	0	17.90	17.94	17.63	5	18

Bandwidth	Modulation	RB Size	RB Offset	Max.Average Power (dBm)			Target MPR (dB)	Target Power
				39750	40620	41490		
				2506 MHz	2593 MHz	2680 MHz		
20 MHz	QPSK	1	0	22.65	22.95	22.59	0	23
		1	49	22.55	22.70	22.98	0	23
		1	99	22.68	22.71	22.99	0	23
		50	0	21.86	21.88	21.64	1	22
		50	25	21.93	21.88	21.60	1	22
		50	49	21.93	21.81	21.66	1	22
		100	0	21.92	21.87	21.62	1	22
	16QAM	1	0	22.13	22.25	21.96	1	22
		1	49	22.04	22.02	21.92	1	22
		1	99	22.13	21.90	21.82	1	22
		50	0	20.89	20.87	20.64	2	21
		50	25	20.95	20.89	20.63	2	21
		50	49	20.94	20.83	20.67	2	21
		100	0	20.96	20.91	20.61	2	21
	64QAM	1	0	20.95	21.19	21.16	2	21
		1	49	20.89	21.05	20.86	2	21
		1	99	21.04	21.09	20.78	2	21
		50	0	19.90	19.91	19.69	3	20
		50	25	19.95	19.93	19.62	3	20
		50	49	19.99	19.85	19.66	3	20
		100	0	19.94	19.90	19.61	3	20
	256QAM	1	0	18.12	18.26	17.84	5	18
		1	49	18.01	17.87	17.71	5	18
		1	99	18.04	17.95	17.81	5	18
		50	0	17.92	17.96	17.70	5	18
		50	25	17.98	17.92	17.65	5	18
		50	49	17.96	17.86	17.68	5	18
		100	0	17.97	17.95	17.64	5	18

8.2 EQUIVALENT ISOTROPIC RADIATED POWER

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBi)	C.L	Pol	Limit	EIRP		RB	
								W	W	dBm	Size	Offset
2498.5	LTE B41(38)/ 5 MHz	QPSK	-20.62	16.35	10.70	2.50	H	< 2.00	0.285	24.55	1	0
		16-QAM	-21.43	15.54	10.70	2.50	H		0.237	23.74		
		64-QAM	-22.33	14.64	10.70	2.50	H		0.192	22.84		
		256-QAM	-25.39	11.58	10.70	2.50	H		0.095	19.78		
2593.0		QPSK	-20.26	17.17	10.61	2.55	H		0.333	25.23	1	0
		16-QAM	-21.07	16.36	10.61	2.55	H		0.277	24.42		
		64-QAM	-22.03	15.40	10.61	2.55	H		0.222	23.46		
		256-QAM	-25.06	12.37	10.61	2.55	H		0.110	20.43		
2687.5		QPSK	-22.20	15.73	10.78	2.60	H		0.246	23.91	1	0
		16-QAM	-22.98	14.95	10.78	2.60	H		0.206	23.13		
		64-QAM	-24.05	13.88	10.78	2.60	H		0.161	22.06		
		256-QAM	-27.10	10.83	10.78	2.60	H		0.080	19.01		

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBi)	C.L	Pol	Limit	EIRP		RB	
								W	W	dBm	Size	Offset
2501.0	LTE B41(38)/ 10 MHz	QPSK	-20.64	16.33	10.70	2.50	H	< 2.00	0.284	24.53	1	0
		16-QAM	-21.31	15.66	10.70	2.50	H		0.243	23.86		
		64-QAM	-22.36	14.61	10.70	2.50	H		0.191	22.81		
		256-QAM	-25.35	11.62	10.70	2.50	H		0.096	19.82		
2593.0		QPSK	-20.21	17.22	10.61	2.55	H		0.337	25.28	1	0
		16-QAM	-20.99	16.44	10.61	2.55	H		0.282	24.50		
		64-QAM	-22.07	15.36	10.61	2.55	H		0.220	23.42		
		256-QAM	-25.07	12.36	10.61	2.55	H		0.110	20.42		
2685.0		QPSK	-22.03	15.93	10.77	2.61	H		0.256	24.09	1	0
		16-QAM	-22.83	15.13	10.77	2.61	H		0.213	23.29		
		64-QAM	-23.90	14.06	10.77	2.61	H		0.167	22.22		
		256-QAM	-26.88	11.08	10.77	2.61	H		0.084	19.24		

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBi)	C.L	Pol	Limit	EIRP		RB	
								W	W	dBm	Size	Offset
2503.5	LTE B41(38)/ 15 MHz	QPSK	-20.66	16.36	10.70	2.51	H	< 2.00	0.285	24.55	1	0
		16-QAM	-21.40	15.62	10.70	2.51	H		0.240	23.81		
		64-QAM	-22.43	14.59	10.70	2.51	H		0.190	22.78		
		256-QAM	-25.39	11.63	10.70	2.51	H		0.096	19.82		
2593.0		QPSK	-19.99	17.44	10.61	2.55	H		0.355	25.50	1	0
		16-QAM	-20.78	16.65	10.61	2.55	H		0.296	24.71		
		64-QAM	-21.81	15.62	10.61	2.55	H		0.233	23.68		
		256-QAM	-24.80	12.63	10.61	2.55	H		0.117	20.69		
2682.5		QPSK	-21.51	16.45	10.77	2.61	H		0.289	24.61	1	0
		16-QAM	-22.26	15.70	10.77	2.61	H		0.243	23.86		
		64-QAM	-23.29	14.67	10.77	2.61	H		0.192	22.83		
		256-QAM	-26.30	11.66	10.77	2.61	H		0.096	19.82		

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBi)	C.L	Pol	Limit	EIRP		RB	
								W	W	dBm	Size	Offset
2506.0	LTE B41(38)/ 20 MHz	QPSK	-20.85	16.17	10.70	2.51	H	< 2.00	0.273	24.36	1	0
		16-QAM	-21.57	15.45	10.70	2.51	H		0.231	23.64		
		64-QAM	-22.61	14.41	10.70	2.51	H		0.182	22.60		
		256-QAM	-25.53	11.49	10.70	2.51	H		0.093	19.68		
2593.0		QPSK	-20.11	17.32	10.61	2.55	H		0.345	25.38	1	0
		16-QAM	-20.95	16.48	10.61	2.55	H		0.284	24.54		
		64-QAM	-22.00	15.43	10.61	2.55	H		0.223	23.49		
		256-QAM	-25.01	12.42	10.61	2.55	H		0.112	20.48		
2680.0		QPSK	-21.42	16.56	10.76	2.61	H		0.296	24.71	1	0
		16-QAM	-22.25	15.73	10.76	2.61	H		0.244	23.88		
		64-QAM	-23.23	14.75	10.76	2.61	H		0.195	22.90		
		256-QAM	-26.27	11.71	10.76	2.61	H		0.097	19.86		

8.3 RADIATED SPURIOUS EMISSIONS

- MODE: LTE B41(38)
- MODULATION SIGNAL: 5 MHz QPSK
- DISTANCE: 1 meters
- LIMIT: 55 + 10 log10 (W) = - 25 dBm

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	RB	
								Size	Offset
39675 (2498.5)	4 997.00	-54.67	12.65	-65.65	3.70	V	-56.70	1	0
	7 495.50	-53.01	10.94	-53.63	4.61	V	-47.30		
	9 994.00	-56.22	10.57	-50.54	5.47	V	-45.44		
40620 (2593.0)	5 186.00	-51.71	12.45	-62.88	3.80	V	-54.23	1	0
	7 779.00	-53.03	11.55	-53.40	4.70	V	-46.55		
	10 372.00	-56.57	10.52	-49.45	5.55	V	-44.48		
41565 (2687.5)	5 375.00	-51.40	13.21	-62.70	3.91	V	-53.40	1	0
	8 062.50	-55.16	10.89	-53.29	4.82	V	-47.22		
	10 750.00	-58.20	10.60	-51.45	5.64	V	-46.49		

▣ MODE: LTE B41(38)

▣ MODULATION SIGNAL: 10 MHz QPSK

▣ DISTANCE: 1 meters

▣ LIMIT: 55 + 10 log10 (W) = - 25 dBm

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	RB	
								Size	Offset
39700 (2501.0)	5 002.00	-51.70	12.55	-62.94	3.71	V	-54.10	1	0
	7 503.00	-53.60	10.98	-53.73	4.60	V	-47.35		
	10 004.00	-56.75	10.61	-51.47	5.47	V	-46.33		
40620 (2593.0)	5 186.00	-51.33	12.45	-62.50	3.80	V	-53.85	1	0
	7 779.00	-53.90	11.55	-54.27	4.70	V	-47.42		
	10 372.00	-56.02	10.52	-48.90	5.55	V	-43.93		
41540 (2685.0)	5 370.00	-51.25	13.21	-62.53	3.92	V	-53.24	1	0
	8 055.00	-55.32	10.89	-53.57	4.81	V	-47.49		
	10 740.00	-56.59	10.67	-49.99	5.64	V	-44.96		

- MODE: LTE B41(38)
- MODULATION SIGNAL: 15 MHz QPSK
- DISTANCE: 1 meters
- LIMIT: 55 + 10 log10 (W) = - 25 dBm

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	RB	
								Size	Offset
39725 (2503.5)	5 007.00	-50.93	12.55	-62.43	3.71	V	-53.59	1	0
	7 510.50	-52.44	10.98	-52.37	4.60	V	-45.99		
	10 014.00	-56.23	10.61	-51.51	5.47	H	-46.37		
40620 (2593.0)	5 186.00	-50.07	12.45	-61.24	3.80	V	-52.59	1	0
	7 779.00	-52.64	11.55	-53.01	4.70	V	-46.16		
	10 372.00	-55.33	10.52	-48.21	5.55	V	-43.24		
41515 (2682.5)	5 365.00	-51.68	13.21	-62.99	3.91	H	-53.69	1	0
	8 047.50	-53.88	10.89	-52.20	4.81	V	-46.12		
	10 730.00	-55.47	10.67	-48.99	5.65	H	-43.97		

▣ MODE: LTE B41(38)

▣ MODULATION SIGNAL: 20 MHz QPSK

▣ DISTANCE: 1 meters

▣ LIMIT: 55 + 10 log10 (W) = - 25 dBm

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	RB	
								Size	Offset
39750 (2506.0)	5 012.00	-51.51	12.55	-63.27	3.72	V	-54.44	1	0
	7 518.00	-52.76	10.98	-52.57	4.61	V	-46.20		
	10 024.00	-56.64	10.61	-52.26	5.47	V	-47.12		
40620 (2593.0)	5 186.00	-51.11	12.45	-62.28	3.80	V	-53.63	1	0
	7 779.00	-53.81	11.55	-54.18	4.70	V	-47.33		
	10 372.00	-56.39	10.52	-49.27	5.55	V	-44.30		
41490 (2680.0)	5 360.00	-51.51	13.21	-62.86	3.90	V	-53.55	1	0
	8 040.00	-54.95	10.92	-53.26	4.80	V	-47.14		
	10 720.00	-57.12	10.67	-50.71	5.64	V	-45.68		

8.4 PEAK-TO-AVERAGE RATIO

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (dB)
41(38)	5 MHz	2593.0	QPSK	25	0	5.65
			16-QAM			6.54
			64-QAM			6.70
			256-QAM			7.12
	10 MHz		QPSK	50		5.62
			16-QAM			6.25
			64-QAM			6.66
			256-QAM			7.11
	15 MHz		QPSK	75		5.37
			16-QAM			6.17
			64-QAM			6.63
			256-QAM			7.17
	20 MHz		QPSK	100		5.31
			16-QAM			6.04
			64-QAM			6.59
			256-QAM			7.07

Note:

1. Plots of the EUT's Peak- to- Average Ratio are shown Page 53 ~ 68.

8.5 OCCUPIED BANDWIDTH

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (MHz)
41(38)	5 MHz	2593.0	QPSK	25	0	4.4981
			16-QAM			4.5015
			64-QAM			4.4993
			256-QAM			4.4942
	10 MHz		QPSK	50		8.9960
			16-QAM			9.0036
			64-QAM			8.9603
			256-QAM			8.9663
	15 MHz		QPSK	75		13.453
			16-QAM			13.475
			64-QAM			13.467
			256-QAM			13.433
	20 MHz		QPSK	100		17.902
			16-QAM			17.922
			64-QAM			17.916
			256-QAM			17.857

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 69 ~ 84.

8.6 CONDUCTED SPURIOUS EMISSIONS

Band	Band Width (MHz)	Frequency (MHz)	Frequency of Maximum Harmonic (GHz)	Factor (dB)	Measurement Maximum Data (dBm)	Result (dBm)	Limit (dBm)
41(38)	5	2498.5	26.2520	34.189	-66.320	-32.131	-25.00
		2593.0	26.2860	34.189	-66.322	-32.133	
		2687.5	26.0990	34.189	-66.930	-32.741	
	10	2501.0	26.2350	34.189	-66.544	-32.355	
		2593.0	25.6570	34.189	-66.986	-32.797	
		2685.0	26.4050	34.189	-66.089	-31.900	
	15	2503.5	25.8950	34.189	-66.883	-32.694	
		2593.0	26.2010	34.189	-66.930	-32.741	
		2682.5	25.8100	34.189	-65.985	-31.796	
	20	2506.0	25.7930	34.189	-67.138	-32.949	
		2593.0	25.8610	34.189	-67.140	-32.951	
		2680.0	25.7080	34.189	-66.548	-32.359	

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 85 ~ 108.
2. Conducted Spurious Emissions was Tested QPSK Modulation, Resource Block Size 1 and Resource Block Offset 0
3. Duty Cycle factor already applied on the factor.
   - Duty Cycle factor(dB) = 3.979
   - Factor(dB) = Duty Cycle factor + Cable Loss + Ext. Attenuator + Power Splitter
   - Result(dBm) = Reading + Factor

Frequency Range (GHz)	Factor [dB]
0.03 – 1	31.479
1 – 5	32.091
5 – 10	32.613
10 – 15	33.224
15 – 20	33.490
Above 20	34.189

8.7 CHANNEL EDGE

Band Width	Frequency (MHz)	Modulation	RB (Size/ Offset)	2 495 MHz ~ 2 496 MHz	C.E ~ (C.E +1 MHz)	2 490.5 MHz ~ 2 495 MHz	(C.E + 1 MHz) ~ (C.E + 5 MHz)	Below 2 490.5 MHz	(C.E + 5 MHz) ~ (C.E + X MHz)	Above (C.E + X MHz)
				Lower	Upper	Lower	Upper	Lower	Upper	Upper
5 MHz	2498.5	QPSK	25/0	-27.55	-25.22	-25.52	-23.22	-30.77	-29.56	-29.13
10 MHz	2501.0	QPSK	50/0	-28.66	-28.16	-25.36	-25.96	-29.53	-25.91	-30.01
15 MHz	2503.5	QPSK	75/0	-29.59	-29.08	-28.12	-27.96	-31.83	-28.41	-30.91
20 MHz	2506.0	QPSK	100/0	-28.77	-29.38	-26.13	-28.97	-29.70	-28.05	-30.92
Limit(dBm)				-13.0	-10.0	-13.0	-10.0	-25.0	-13.0	-25.0

Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	C.E ~ (C.E ± 1 MHz)		(C.E ± 1 MHz) ~ (C.E ± 5 MHz)	
					Lower	Upper	Lower	Upper
5 MHz	2593.0	QPSK	25	0	-26.55	-27.46	-25.23	-27.27
	2687.5	QPSK	25	0	-25.72	-25.85	-21.83	-22.39
10 MHz	2593.0	QPSK	50	0	-29.01	-29.67	-27.46	-28.29
	2685.0	QPSK	50	0	-27.84	-29.25	-25.02	-26.14
15 MHz	2593.0	QPSK	75	0	-29.90	-30.81	-28.48	-28.08
	2682.5	QPSK	75	0	-29.63	-30.83	-26.60	-26.84
20 MHz	2593.0	QPSK	100	0	-30.38	-30.09	-29.74	-27.96
	2680.0	QPSK	100	0	-30.98	-30.47	-29.14	-27.98
Limit(dBm)					-10.0		-10.0	

Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	(C.E ± 5 MHz) ~ (C.E ± X MHz)		Above (C.E ± X MHz)	
					Lower	Upper	Lower	Upper
5 MHz	2593.0	QPSK	25	0	-32.45	-32.53	-32.01	-32.47
	2687.5	QPSK	25	0	-34.45	-34.93	-36.37	-36.70
10 MHz	2593.0	QPSK	50	0	-30.60	-32.69	-32.47	-34.22
	2685.0	QPSK	50	0	-31.80	-29.52	-38.73	-40.21
15 MHz	2593.0	QPSK	75	0	-32.57	-30.98	-35.09	-35.87
	2682.5	QPSK	75	0	-31.17	-29.44	-40.07	-42.10
20 MHz	2593.0	QPSK	100	0	-31.45	-31.87	-35.48	-36.83
	2680.0	QPSK	100	0	-32.47	-31.56	-40.50	-42.89
Limit(dBm)					-13.0		-25.0	

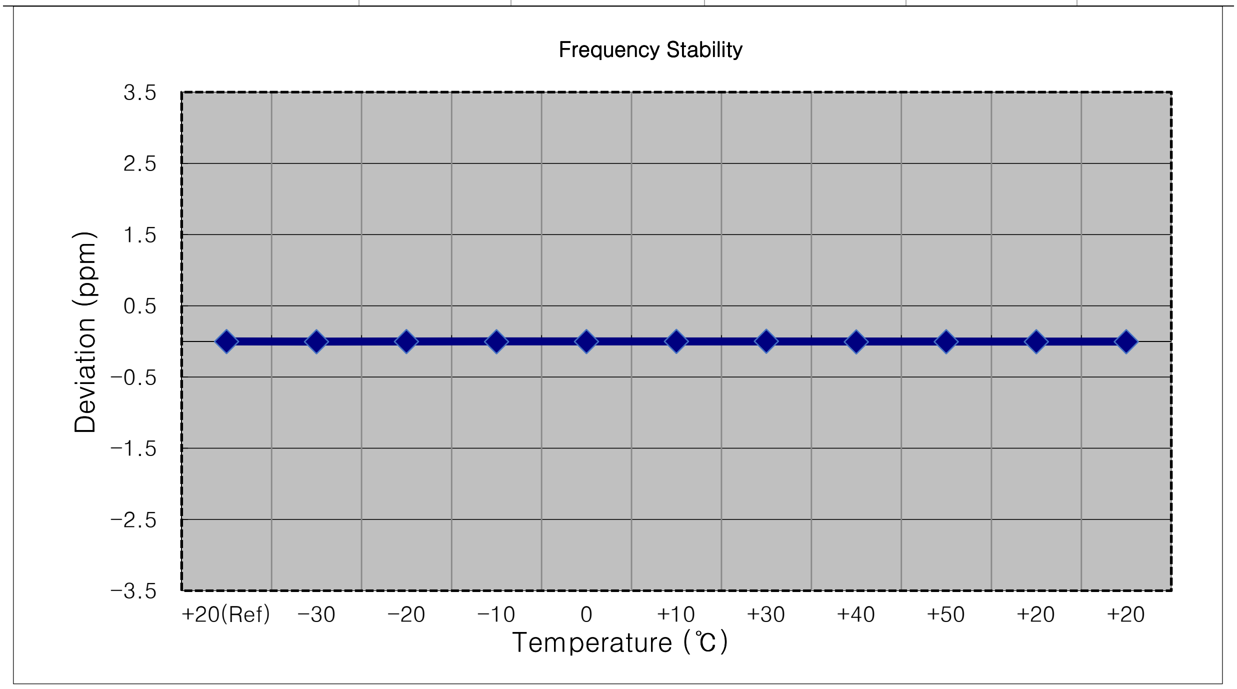
Note:

1. C.E = Channel Edge
2. X = X is the greater of 6 MHz or the actual emission bandwidth.
3. X = 6 MHz(5 MHz Bandwidth), 10 MHz(10 MHz Bandwidth), 15 MHz(15 MHz Bandwidth), 20 MHz(20 MHz Bandwidth)
4. RB = Resource Block
5. Duty Cycle factor already applied on the factor.
   - Factor(dB) = Duty Cycle factor + Cable Loss + Ext. Attenuator + Power Splitter
   - Result(dBm) = Reading + Factor
   - Duty Cycle Factor(dB) = 3.979
6. Plots of the EUT's Channel Edge are shown Page 109 ~ 136. (1RB & Full RB)

8.8 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

- ▣ MODE: LTE 41(38)
- ▣ OPERATING FREQUENCY: 2498,500,000 Hz
- ▣ BANDWIDTH: 39675 (5 MHz)
- ▣ REFERENCE VOLTAGE: 13.200 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	13.200	+20(Ref)	2498 499 984	0.0	0.000 000	0.000
100 %		-30	2498 499 975	-9.6	0.000 000	-0.004
100 %		-20	2498 499 981	-3.3	0.000 000	-0.001
100 %		-10	2498 499 975	-9.3	0.000 000	-0.004
100 %		0	2498 499 980	-4.4	0.000 000	-0.002
100 %		+10	2498 499 989	5.0	0.000 000	0.002
100 %		+30	2498 499 990	5.8	0.000 000	0.002
100 %		+40	2498 499 972	-12.5	-0.000 001	-0.005
100 %		+50	2498 499 974	-10.5	0.000 000	-0.004
115 %		+20	2498 499 978	-5.9	0.000 000	-0.002
85		+20	2498 499 977	-7.1	0.000 000	-0.003



▣ MODE: LTE 41(38)

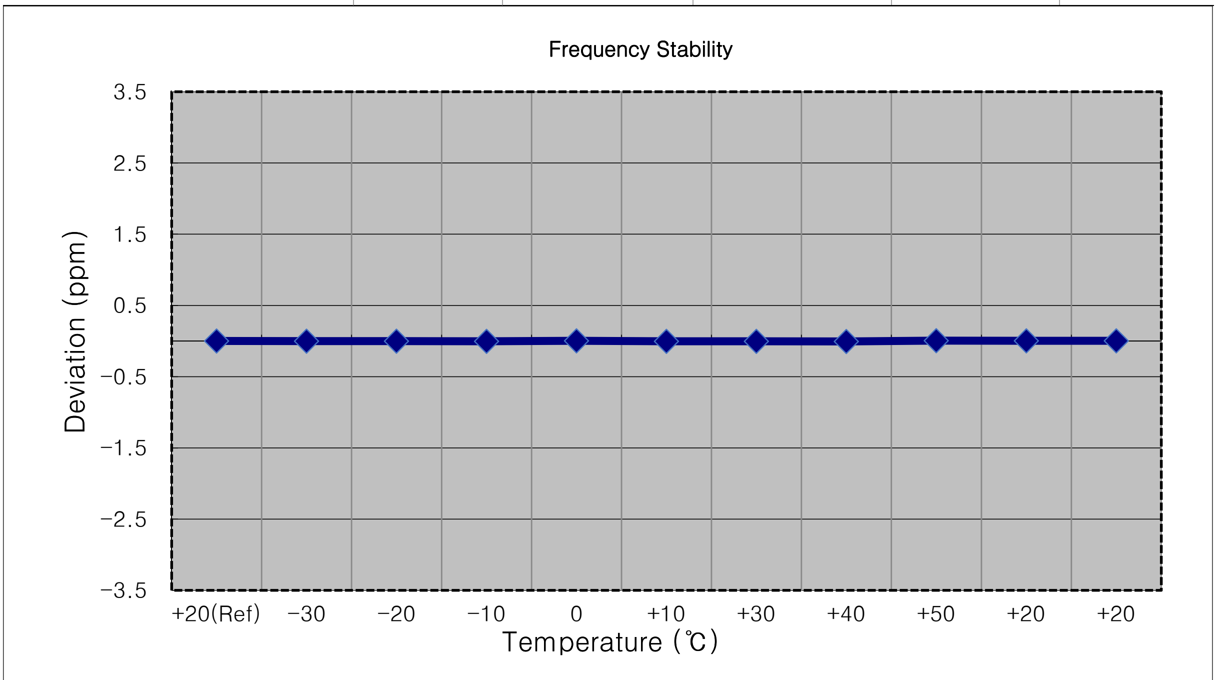
▣ OPERATING FREQUENCY: 2501,000,000 Hz

▣ BANDWIDTH: 39700 (10 MHz)

▣ REFERENCE VOLTAGE: 13.200 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	13.200	+20(Ref)	2500 999 992	0.0	0.000 000	0.000
100 %		-30	2500 999 989	-2.9	0.000 000	-0.001
100 %		-20	2500 999 986	-5.5	0.000 000	-0.002
100 %		-10	2500 999 981	-10.4	0.000 000	-0.004
100 %		0	2501 000 001	9.4	0.000 000	0.004
100 %		+10	2500 999 981	-10.6	0.000 000	-0.004
100 %		+30	2500 999 980	-11.5	0.000 000	-0.005
100 %		+40	2500 999 978	-13.3	-0.000 001	-0.005
100 %		+50	2501 000 004	12.1	0.000 000	0.005
115 %		+20	2500 999 996	3.9	0.000 000	0.002
85 %		+20	2500 999 996	4.8	0.000 000	0.002



▣ MODE: LTE 41(38)

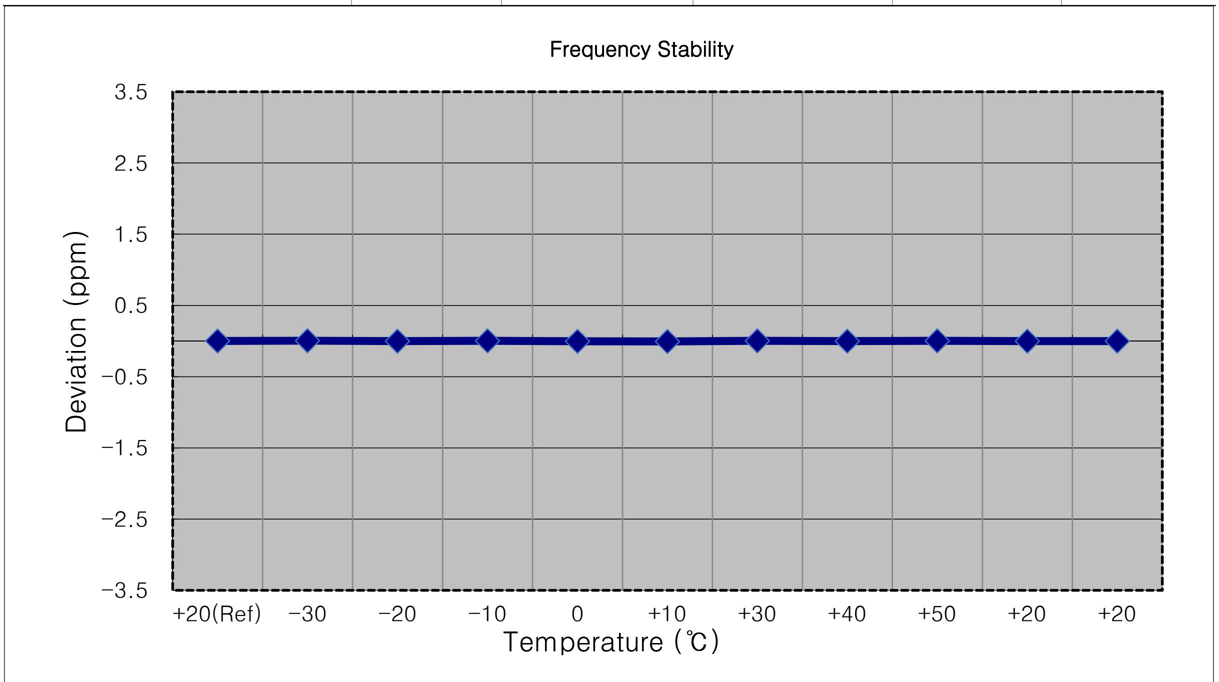
▣ OPERATING FREQUENCY: 2503,500,000 Hz

▣ BANDWIDTH: 39725 (15 MHz)

▣ REFERENCE VOLTAGE: 13.200 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	13.200	+20(Ref)	2503 499 989	0.0	0.000 000	0.000
100 %		-30	2503 500 002	12.1	0.000 000	0.005
100 %		-20	2503 499 983	-6.6	0.000 000	-0.003
100 %		-10	2503 499 999	9.2	0.000 000	0.004
100 %		0	2503 499 981	-8.6	0.000 000	-0.003
100 %		+10	2503 499 976	-13.4	-0.000 001	-0.005
100 %		+30	2503 499 997	7.8	0.000 000	0.003
100 %		+40	2503 499 986	-3.1	0.000 000	-0.001
100 %		+50	2503 499 996	6.5	0.000 000	0.003
115 %		+20	2503 499 986	-3.8	0.000 000	-0.002
85 %		+20	2503 499 983	-6.2	0.000 000	-0.002



▣ MODE: LTE 41(38)

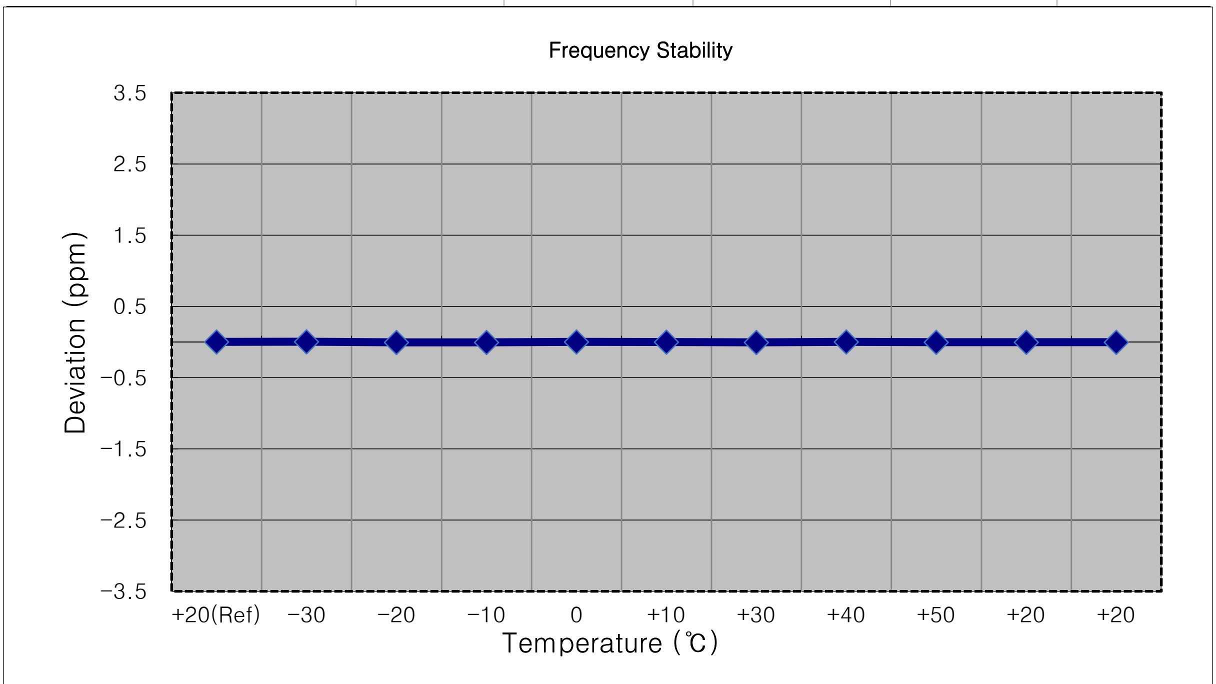
▣ OPERATING FREQUENCY: 2506,000,000 Hz

▣ BANDWIDTH: 39750 (20 MHz)

▣ REFERENCE VOLTAGE: 13.200 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	13.200	+20(Ref)	2505 999 995	0.0	0.000 000	0.000
100 %		-30	2506 000 003	8.3	0.000 000	0.003
100 %		-20	2505 999 982	-12.5	0.000 000	-0.005
100 %		-10	2505 999 981	-13.6	-0.000 001	-0.005
100 %		0	2506 000 000	4.8	0.000 000	0.002
100 %		+10	2505 999 990	-4.3	0.000 000	-0.002
100 %		+30	2505 999 983	-12.0	0.000 000	-0.005
100 %		+40	2505 999 997	2.1	0.000 000	0.001
100 %		+50	2505 999 988	-6.5	0.000 000	-0.003
115 %		+20	2505 999 987	-7.4	0.000 000	-0.003
85 %		+20	2505 999 984	-10.6	0.000 000	-0.004



▣ MODE: LTE 41(38)

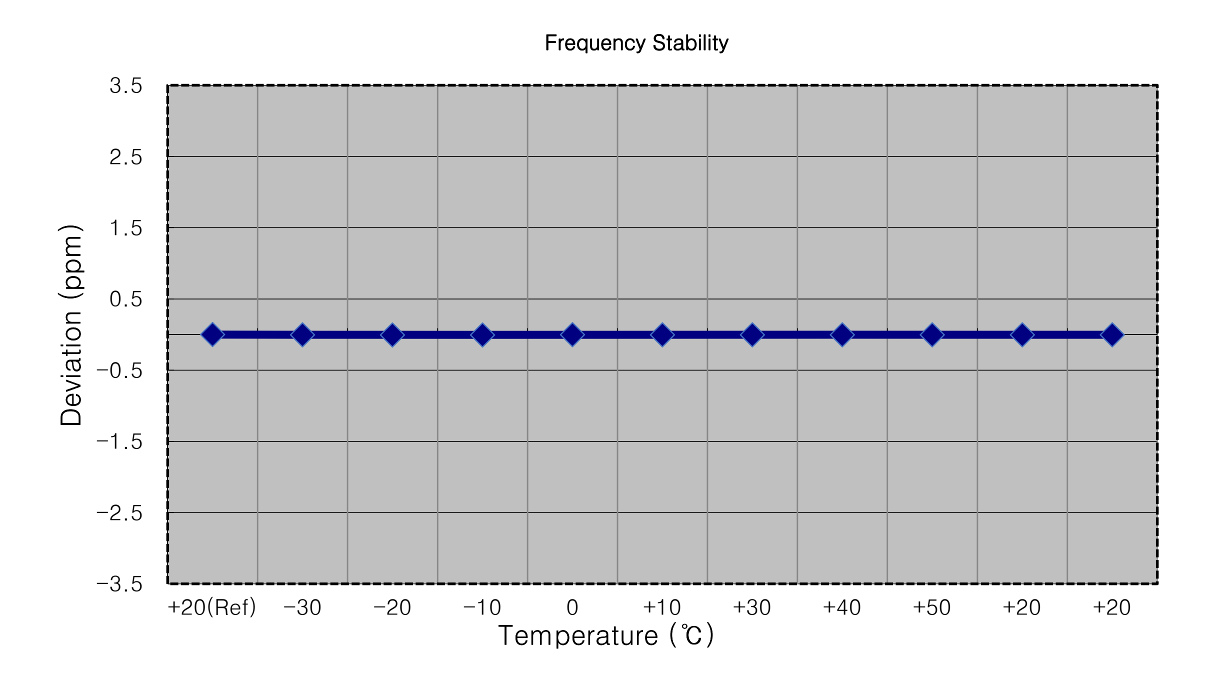
▣ OPERATING FREQUENCY: 2593,000,000 Hz

▣ BANDWIDTH: 40620 (5 MHz)

▣ REFERENCE VOLTAGE: 13.200 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	13.200	+20(Ref)	2592 999 992	0.0	0.000 000	0.000
100 %		-30	2592 999 983	-8.2	0.000 000	-0.003
100 %		-20	2592 999 978	-13.8	-0.000 001	-0.005
100 %		-10	2592 999 978	-14.1	-0.000 001	-0.005
100 %		0	2592 999 987	-4.8	0.000 000	-0.002
100 %		+10	2592 999 981	-10.8	0.000 000	-0.004
100 %		+30	2592 999 980	-11.5	0.000 000	-0.004
100 %		+40	2592 999 979	-12.8	0.000 000	-0.005
100 %		+50	2592 999 982	-9.5	0.000 000	-0.004
115 %		+20	2592 999 981	-10.5	0.000 000	-0.004
85 %		+20	2592 999 979	-12.9	0.000 000	-0.005



▣ MODE: LTE 41(38)

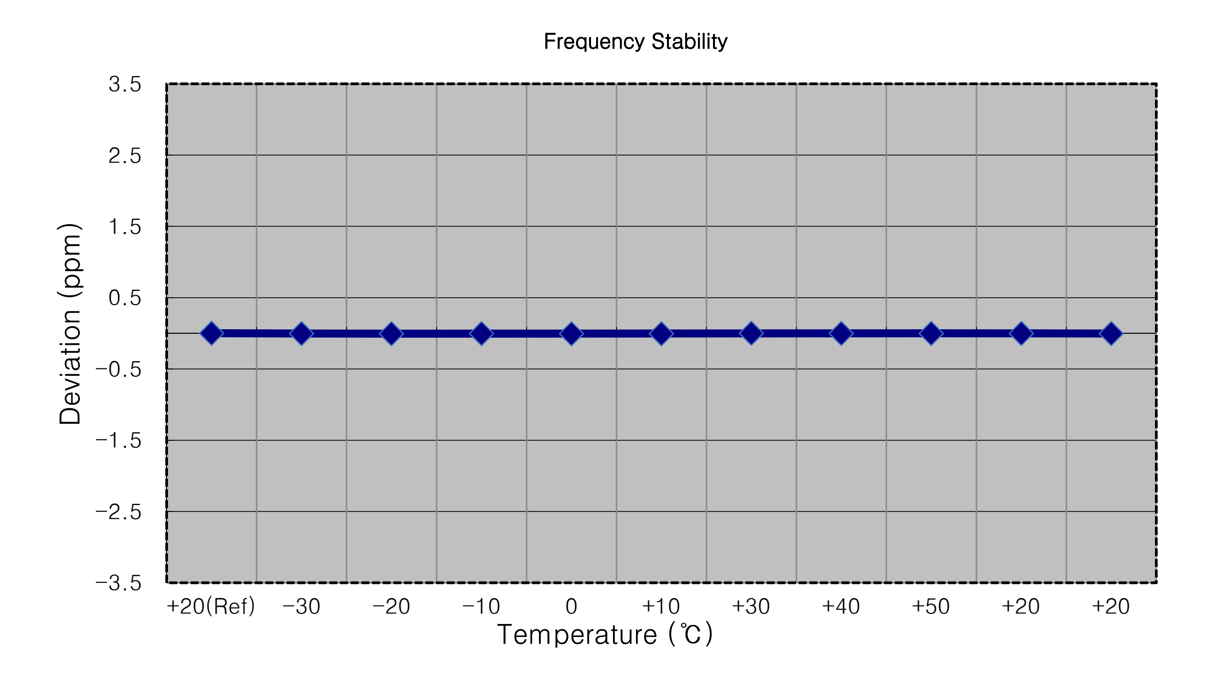
▣ OPERATING FREQUENCY: 2593,000,000 Hz

▣ BANDWIDTH: 40620 (10 MHz)

▣ REFERENCE VOLTAGE: 13.200 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	13.200	+20(Ref)	2592 999 982	0.0	0.000 000	0.000
100 %		-30	2592 999 970	-11.9	0.000 000	-0.005
100 %		-20	2592 999 968	-13.7	-0.000 001	-0.005
100 %		-10	2592 999 970	-11.5	0.000 000	-0.004
100 %		0	2592 999 967	-14.1	-0.000 001	-0.005
100 %		+10	2592 999 965	-16.1	-0.000 001	-0.006
100 %		+30	2592 999 985	3.5	0.000 000	0.001
100 %		+40	2592 999 976	-5.6	0.000 000	-0.002
100 %		+50	2592 999 979	-2.5	0.000 000	-0.001
115 %		+20	2592 999 974	-7.3	0.000 000	-0.003
85 %		+20	2592 999 973	-8.7	0.000 000	-0.003



■ MODE: LTE 41(38)

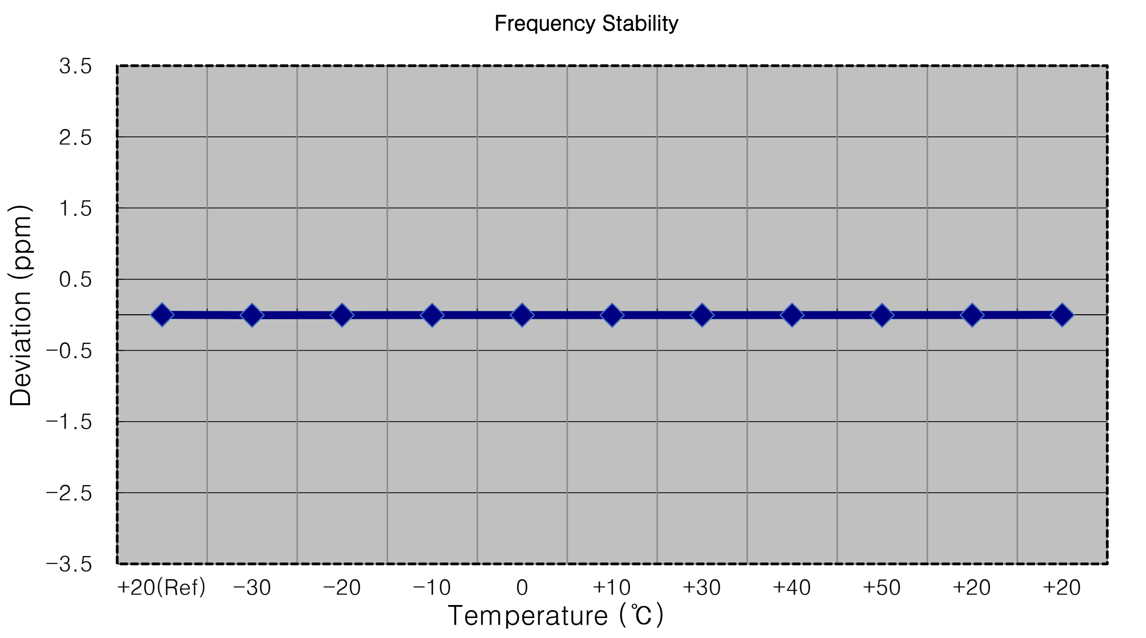
■ OPERATING FREQUENCY: 2593,000,000 Hz

■ BANDWIDTH: 40620 (15 MHz)

■ REFERENCE VOLTAGE: 13.200 VDC

■ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	13.200	+20(Ref)	2592 999 988	0.0	0.000 000	0.000
100 %		-30	2592 999 973	-15.3	-0.000 001	-0.006
100 %		-20	2592 999 977	-11.7	0.000 000	-0.005
100 %		-10	2592 999 973	-14.9	-0.000 001	-0.006
100 %		0	2592 999 977	-11.5	0.000 000	-0.004
100 %		+10	2592 999 974	-14.6	-0.000 001	-0.006
100 %		+30	2592 999 975	-13.4	-0.000 001	-0.005
100 %		+40	2592 999 978	-9.9	0.000 000	-0.004
100 %		+50	2592 999 974	-14.5	-0.000 001	-0.006
115 %		+20	2592 999 981	-7.7	0.000 000	-0.003
85 %		+20	2592 999 982	-6.5	0.000 000	-0.003



▣ MODE: LTE 41(38)

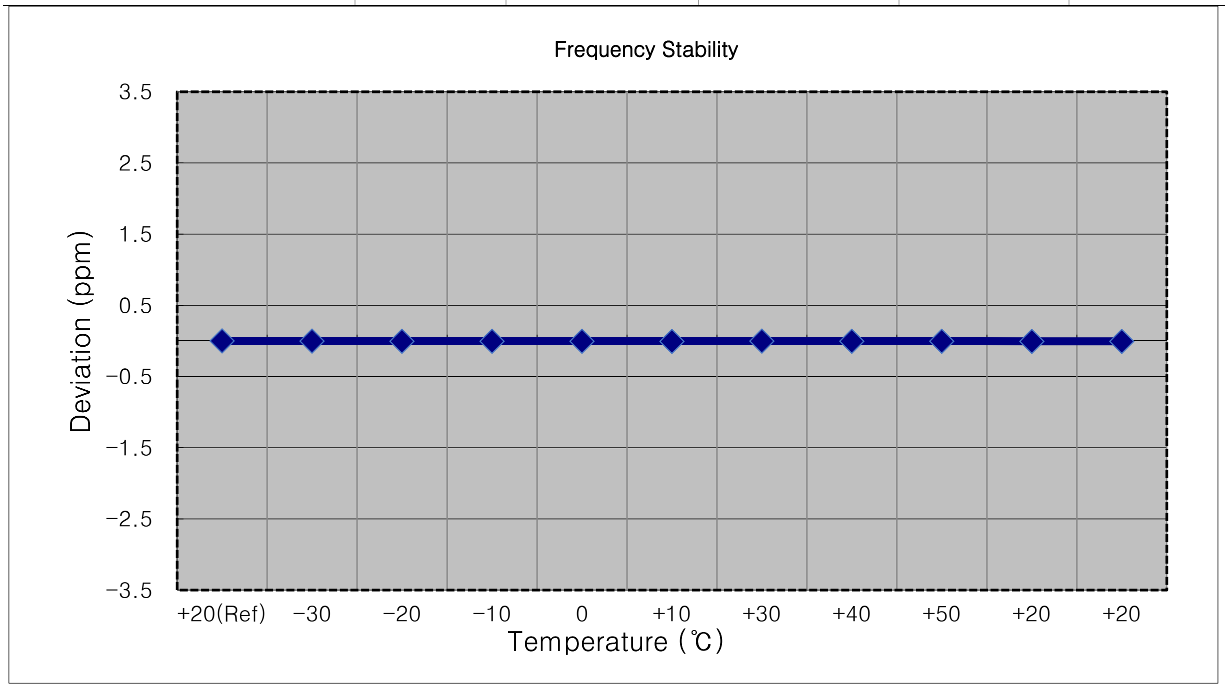
▣ OPERATING FREQUENCY: 2593,000,000 Hz

▣ BANDWIDTH: 40620 (20 MHz)

▣ REFERENCE VOLTAGE: 13.200 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	13.200	+20(Ref)	2592 999 982	0.0	0.000 000	0.000
100 %		-30	2592 999 977	-5.4	0.000 000	-0.002
100 %		-20	2592 999 972	-9.8	0.000 000	-0.004
100 %		-10	2592 999 973	-9.2	0.000 000	-0.004
100 %		0	2592 999 972	-10.4	0.000 000	-0.004
100 %		+10	2592 999 968	-14.7	-0.000 001	-0.006
100 %		+30	2592 999 979	-2.9	0.000 000	-0.001
100 %		+40	2592 999 971	-11.1	0.000 000	-0.004
100 %		+50	2592 999 969	-12.8	0.000 000	-0.005
115 %		+20	2592 999 967	-15.5	-0.000 001	-0.006
85 %		+20	2592 999 966	-16.4	-0.000 001	-0.006



▣ MODE: LTE 41(38)

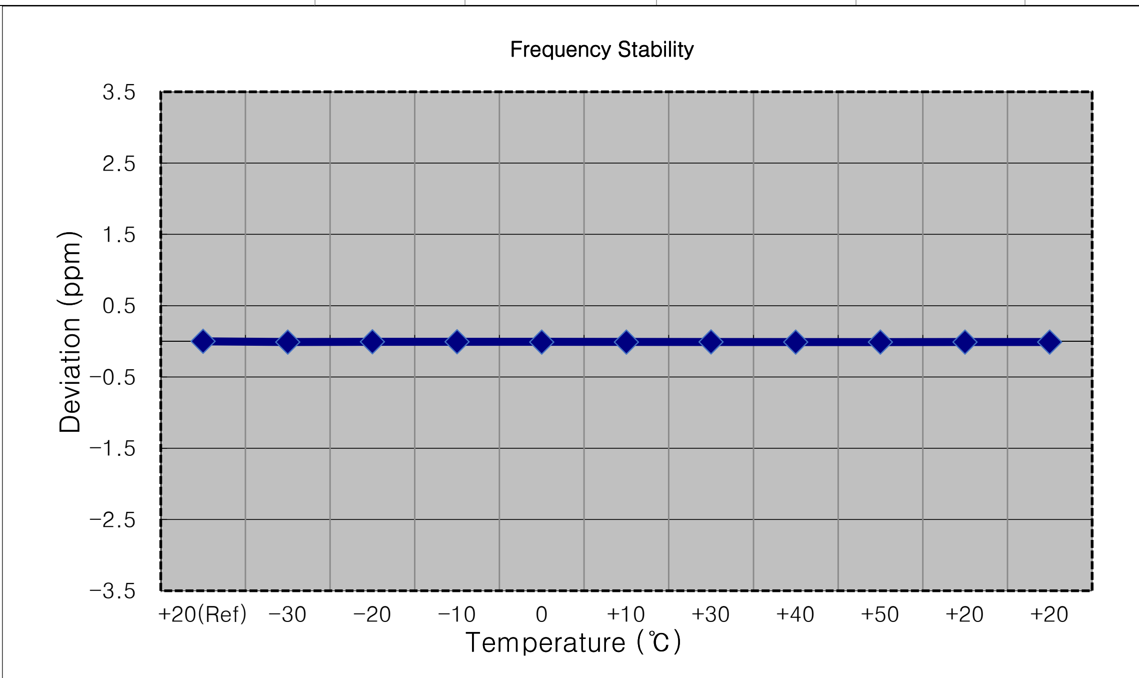
▣ OPERATING FREQUENCY: 2687,500,000 Hz

▣ BANDWIDTH: 41565 (5 MHz)

▣ REFERENCE VOLTAGE: 13.200 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	13.200	+20(Ref)	2687 499 978	0.0	0.000 000	0.000
100 %		-30	2687 499 952	-26.5	-0.000 001	-0.010
100 %		-20	2687 499 963	-14.7	-0.000 001	-0.005
100 %		-10	2687 499 959	-19.1	-0.000 001	-0.007
100 %		0	2687 499 951	-27.1	-0.000 001	-0.010
100 %		+10	2687 499 950	-28.5	-0.000 001	-0.011
100 %		+30	2687 499 956	-21.7	-0.000 001	-0.008
100 %		+40	2687 499 952	-26.5	-0.000 001	-0.010
100 %		+50	2687 499 948	-30.1	-0.000 001	-0.011
115 %		+20	2687 499 952	-26.4	-0.000 001	-0.010
85 %		+20	2687 499 951	-27.2	-0.000 001	-0.010



▣ MODE: LTE 41(38)

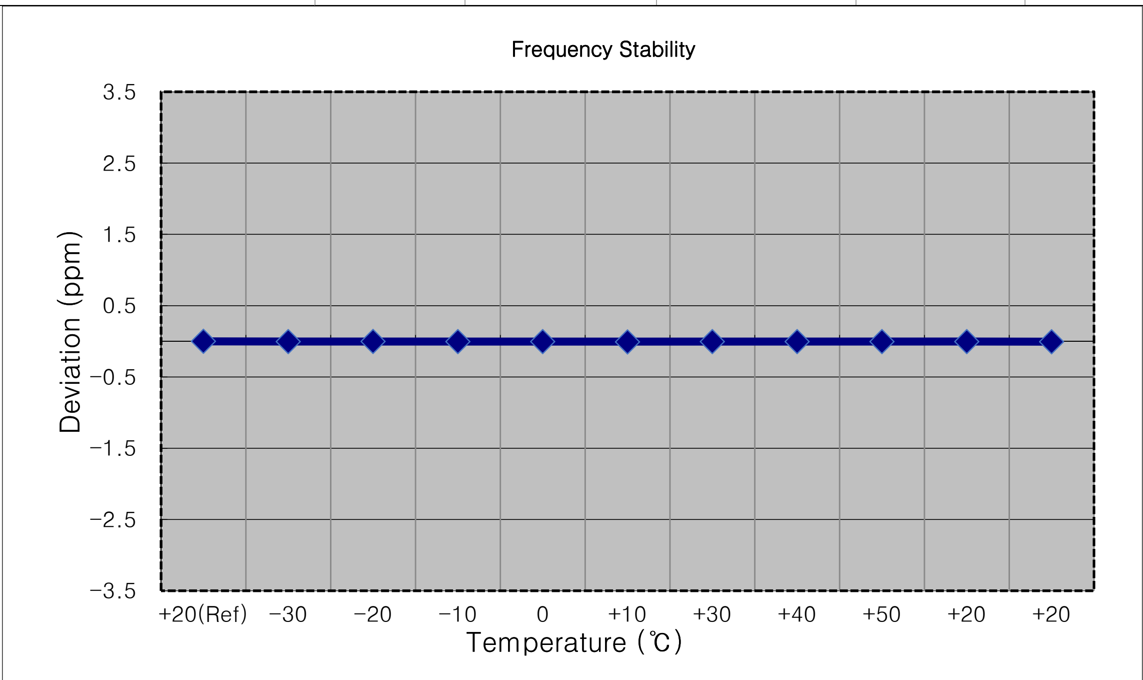
▣ OPERATING FREQUENCY: 2685,000,000 Hz

▣ BANDWIDTH: 41540 (10 MHz)

▣ REFERENCE VOLTAGE: 13.200 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	13.200	+20(Ref)	2684 999 992	0.0	0.000 000	0.000
100 %		-30	2684 999 979	-13.2	0.000 000	-0.005
100 %		-20	2684 999 985	-7.3	0.000 000	-0.003
100 %		-10	2684 999 983	-8.9	0.000 000	-0.003
100 %		0	2684 999 982	-10.2	0.000 000	-0.004
100 %		+10	2684 999 971	-21.0	-0.000 001	-0.008
100 %		+30	2684 999 979	-12.6	0.000 000	-0.005
100 %		+40	2684 999 981	-11.3	0.000 000	-0.004
100 %		+50	2684 999 983	-8.7	0.000 000	-0.003
115 %		+20	2684 999 981	-11.1	0.000 000	-0.004
85 %		+20	2684 999 978	-14.4	-0.000 001	-0.005



▣ MODE: LTE 41(38)

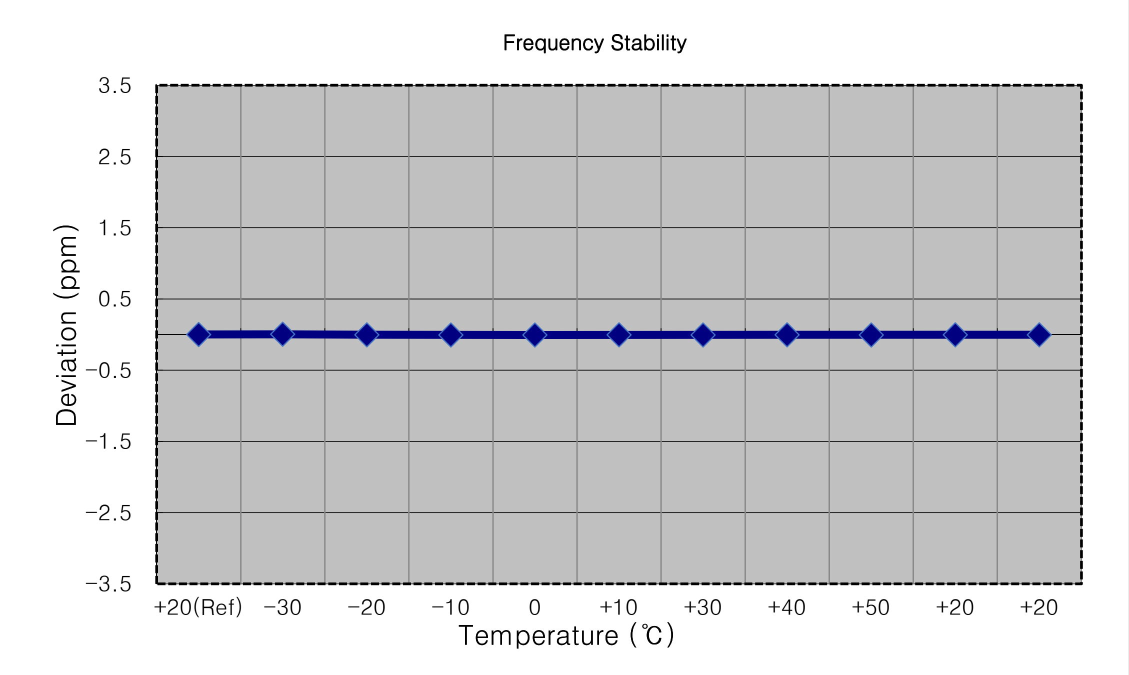
▣ OPERATING FREQUENCY: 2682,500,000 Hz

▣ BANDWIDTH: 41515 (15 MHz)

▣ REFERENCE VOLTAGE: 13.200 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	13.200	+20(Ref)	2682 499 986	0.0	0.000 000	0.000
100 %		-30	2682 499 996	10.6	0.000 000	0.004
100 %		-20	2682 499 974	-11.6	0.000 000	-0.004
100 %		-10	2682 499 970	-15.5	-0.000 001	-0.006
100 %		0	2682 499 967	-18.5	-0.000 001	-0.007
100 %		+10	2682 499 978	-8.0	0.000 000	-0.003
100 %		+30	2682 499 972	-14.3	-0.000 001	-0.005
100 %		+40	2682 499 972	-13.8	-0.000 001	-0.005
100 %		+50	2682 499 970	-15.7	-0.000 001	-0.006
115 %		+20	2682 499 977	-8.7	0.000 000	-0.003
85 %		+20	2682 499 974	-11.8	0.000 000	-0.004



▣ MODE: LTE 41(38)

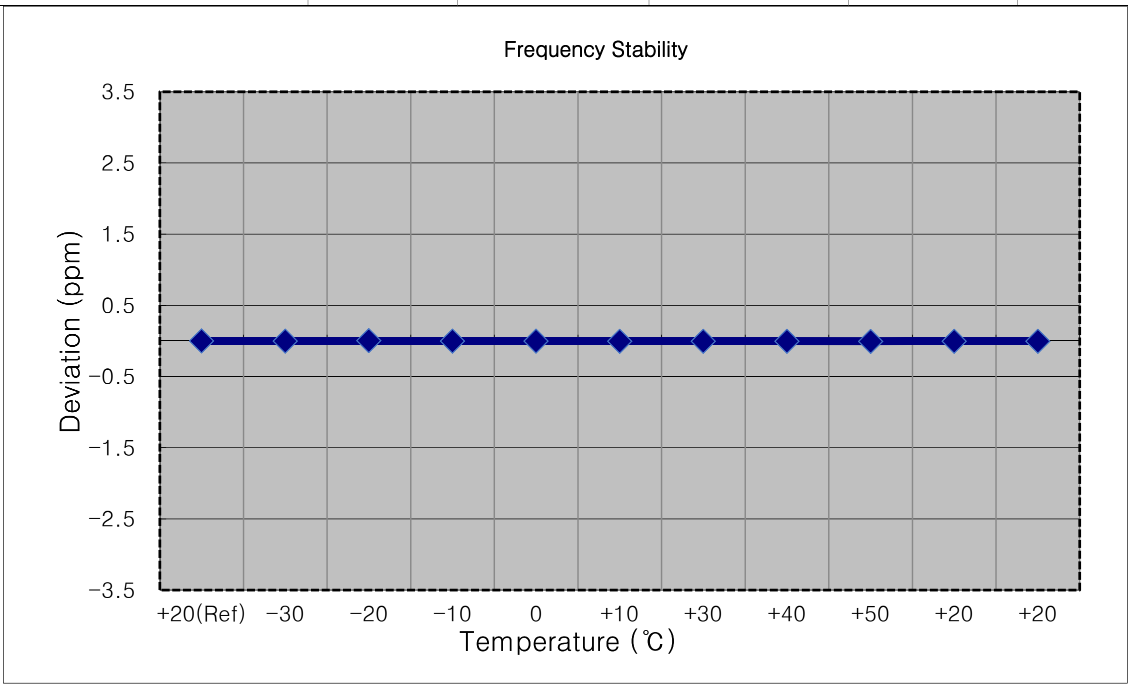
▣ OPERATING FREQUENCY: 2680,000,000 Hz

▣ BANDWIDTH: 41490 (20 MHz)

▣ REFERENCE VOLTAGE: 13.200 VDC

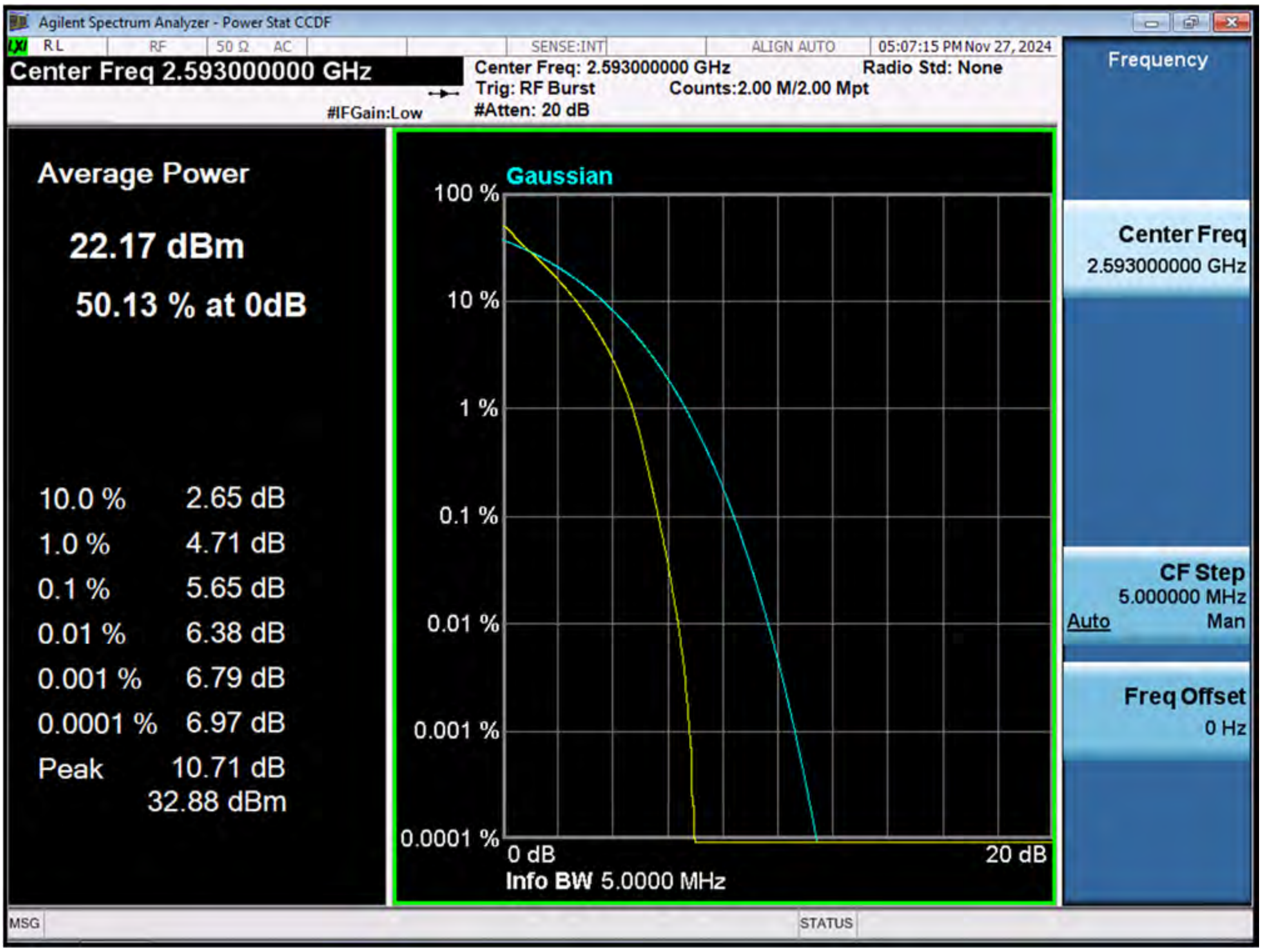
▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	13.200	+20(Ref)	2679 999 988	0.0	0.000 000	0.000
100 %		-30	2679 999 982	-6.1	0.000 000	-0.002
100 %		-20	2679 999 998	9.2	0.000 000	0.003
100 %		-10	2679 999 985	-3.8	0.000 000	-0.001
100 %		0	2679 999 981	-7.7	0.000 000	-0.003
100 %		+10	2679 999 977	-11.0	0.000 000	-0.004
100 %		+30	2679 999 975	-13.8	-0.000 001	-0.005
100 %		+40	2679 999 974	-14.2	-0.000 001	-0.005
100 %		+50	2679 999 973	-15.9	-0.000 001	-0.006
115 %		+20	2679 999 974	-14.7	-0.000 001	-0.005
85 %		+20	2679 999 975	-13.4	-0.000 001	-0.005

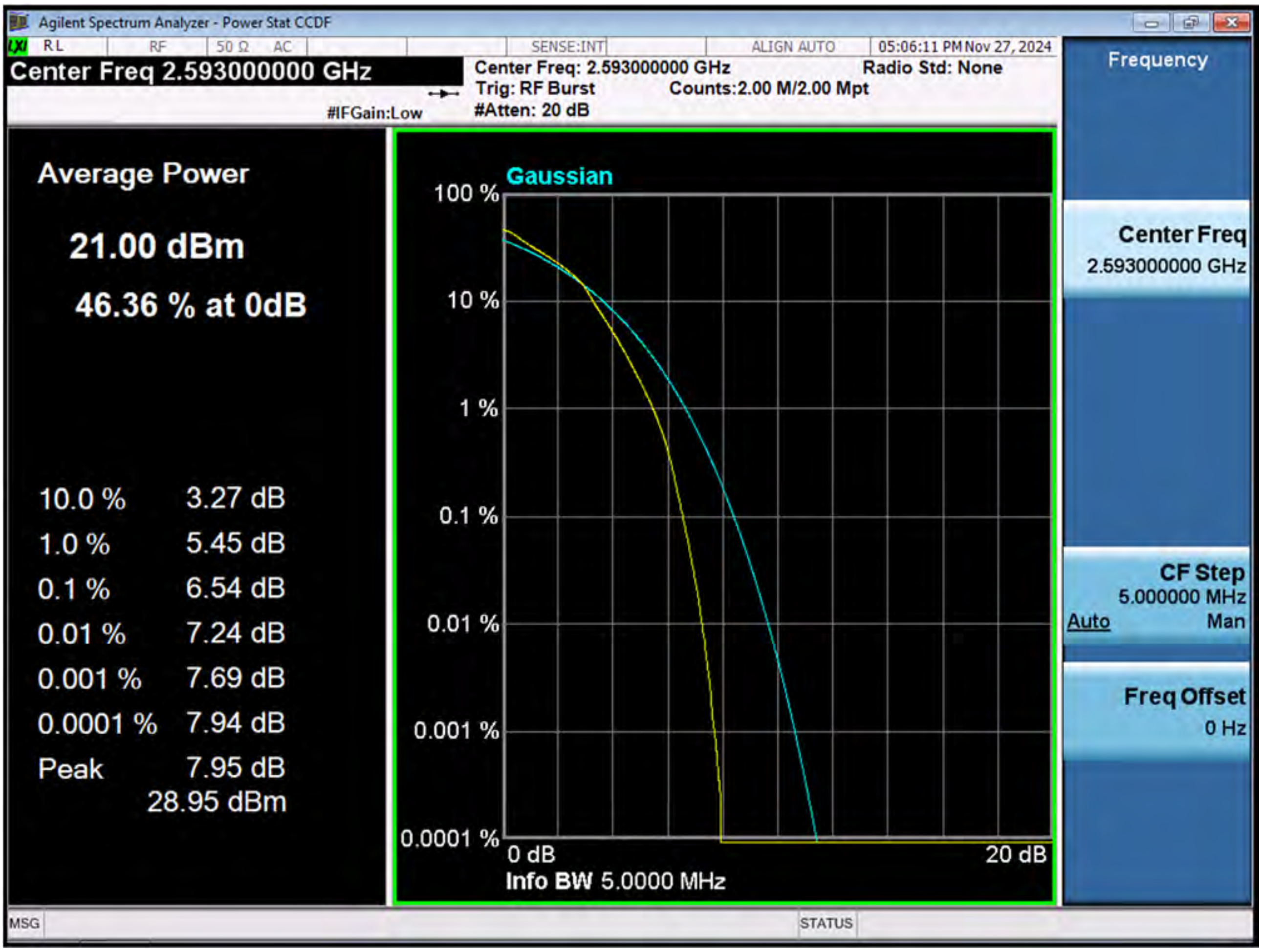


9. TEST PLOTS

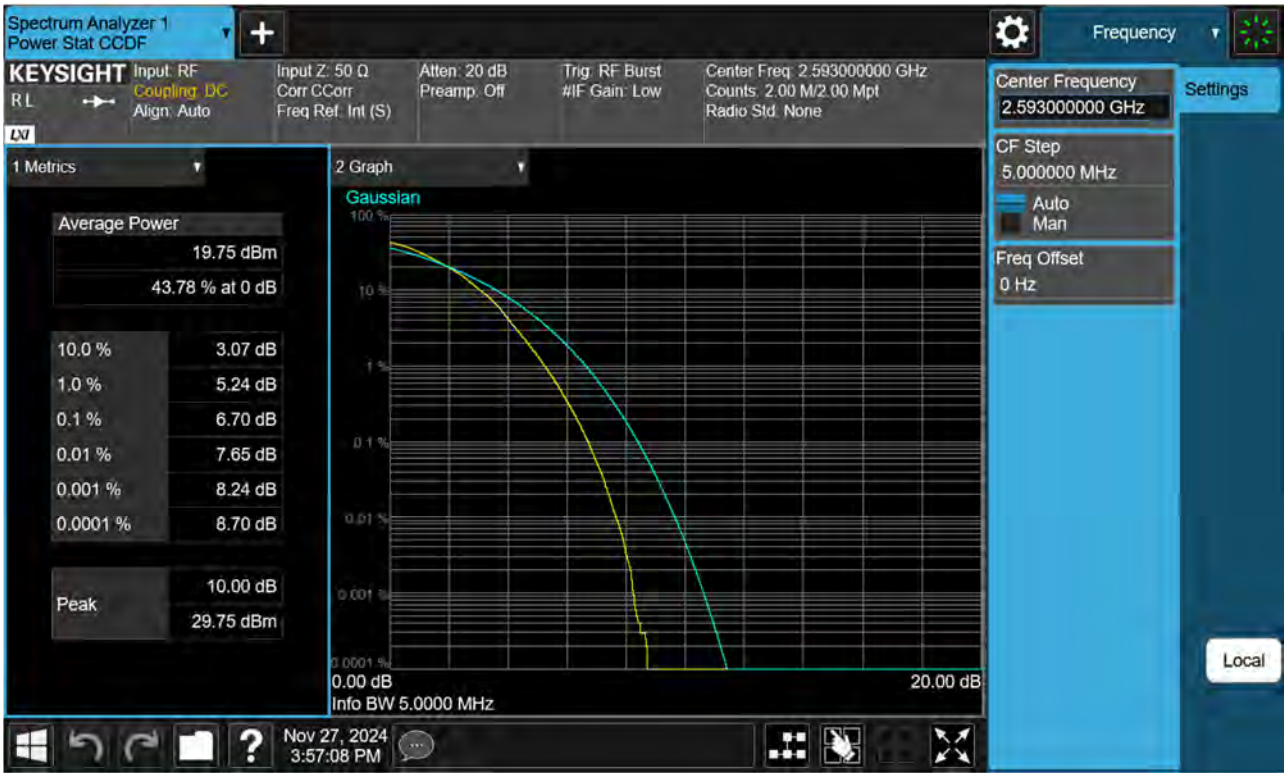
5 M_PAR_Mid_QPSK_FullRB



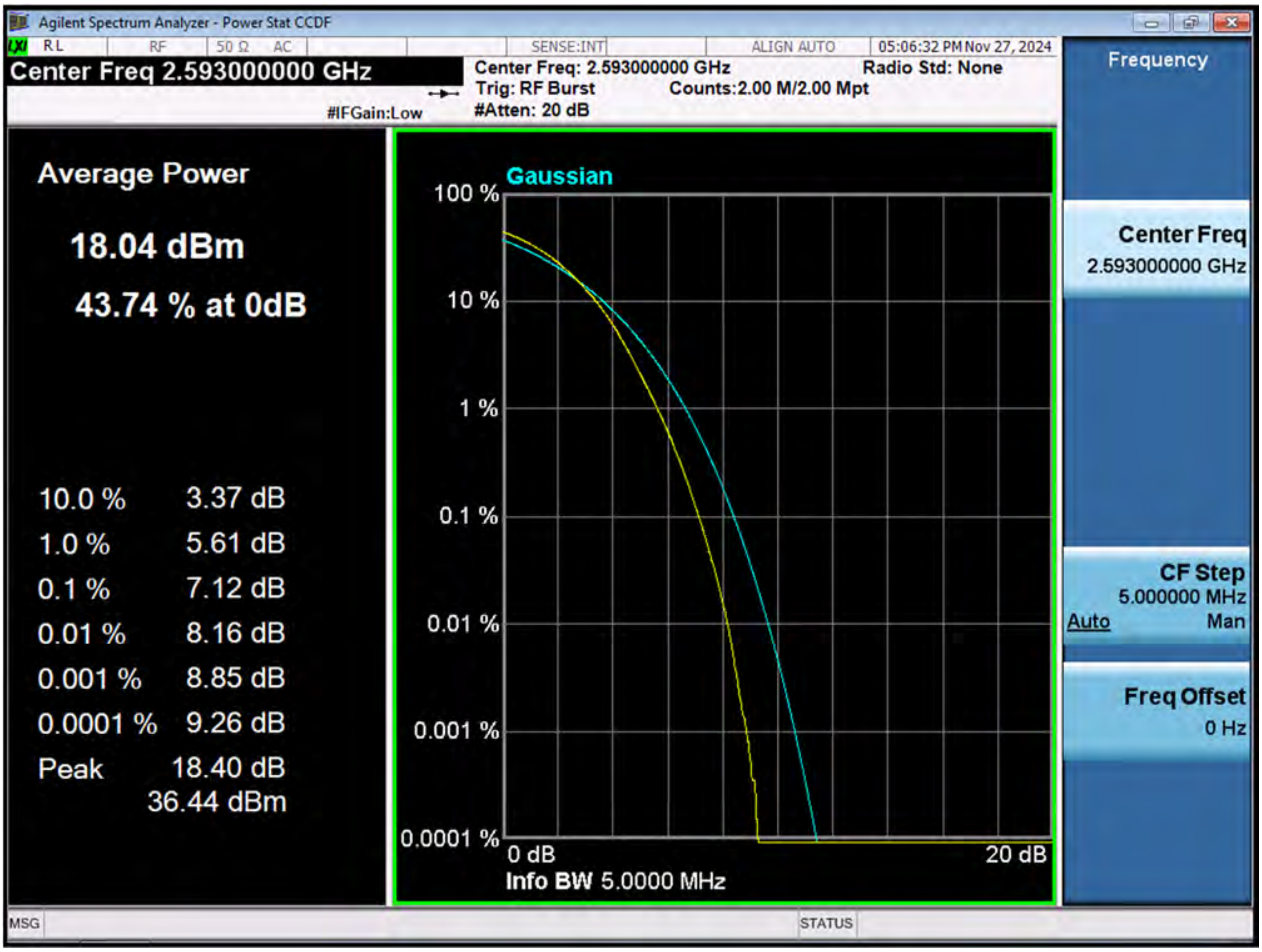
5 M_PAR_Mid_16QAM_FullRB



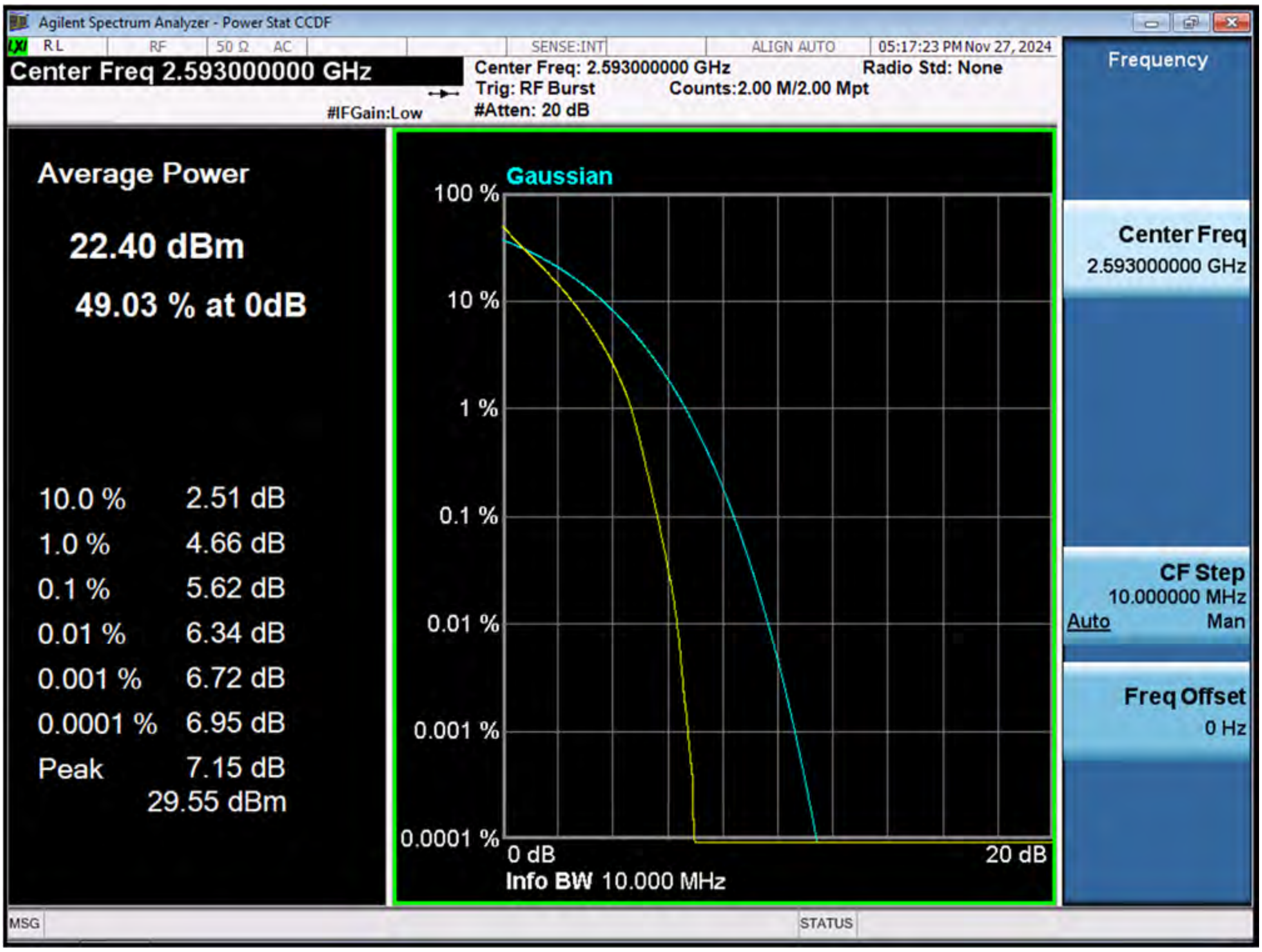
5 M_PAR_Mid_64QAM_FullRB



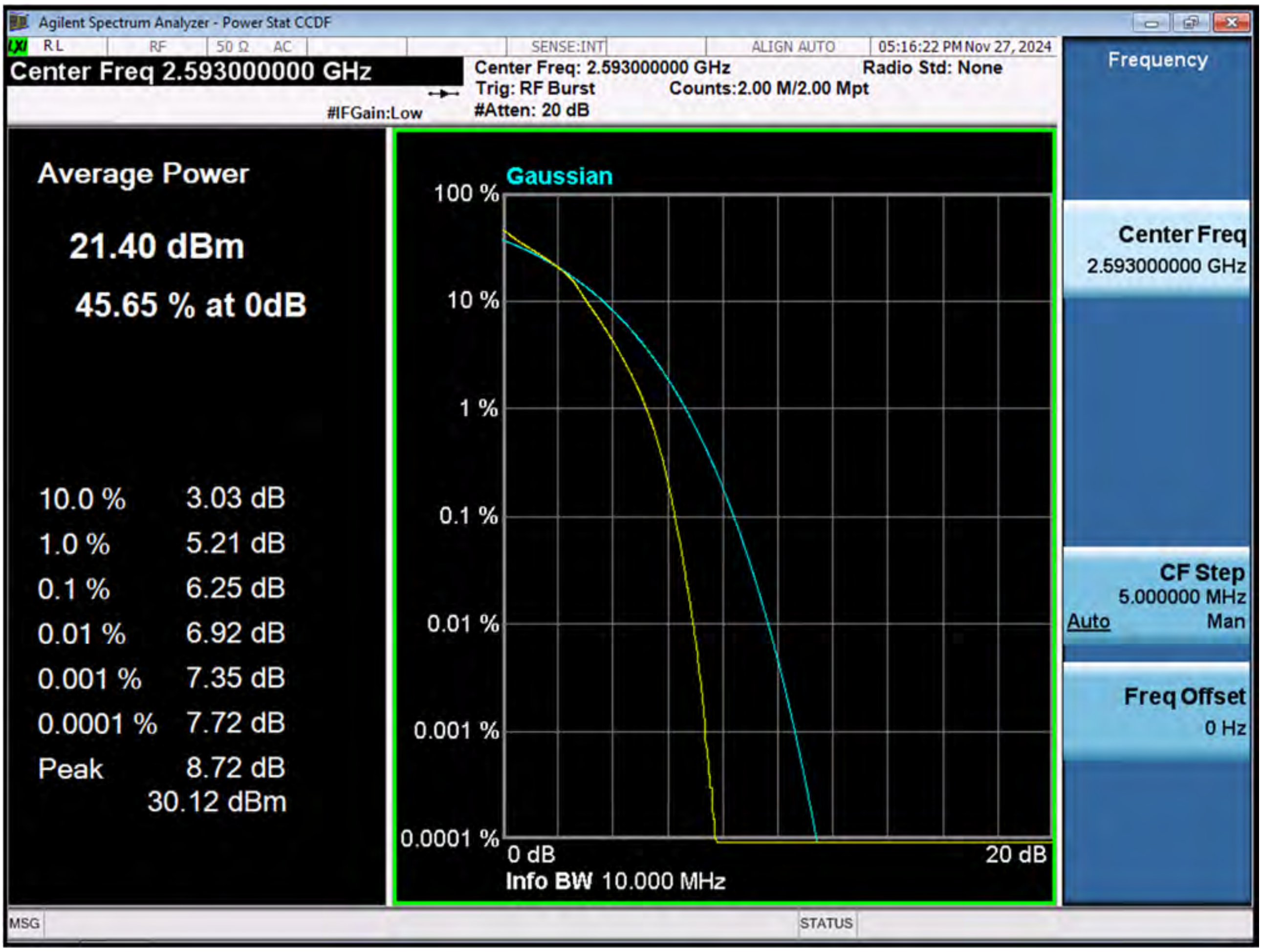
5 M_PAR_Mid_256QAM_FullRB



10 M_PAR_Mid_QPSK_FullRB

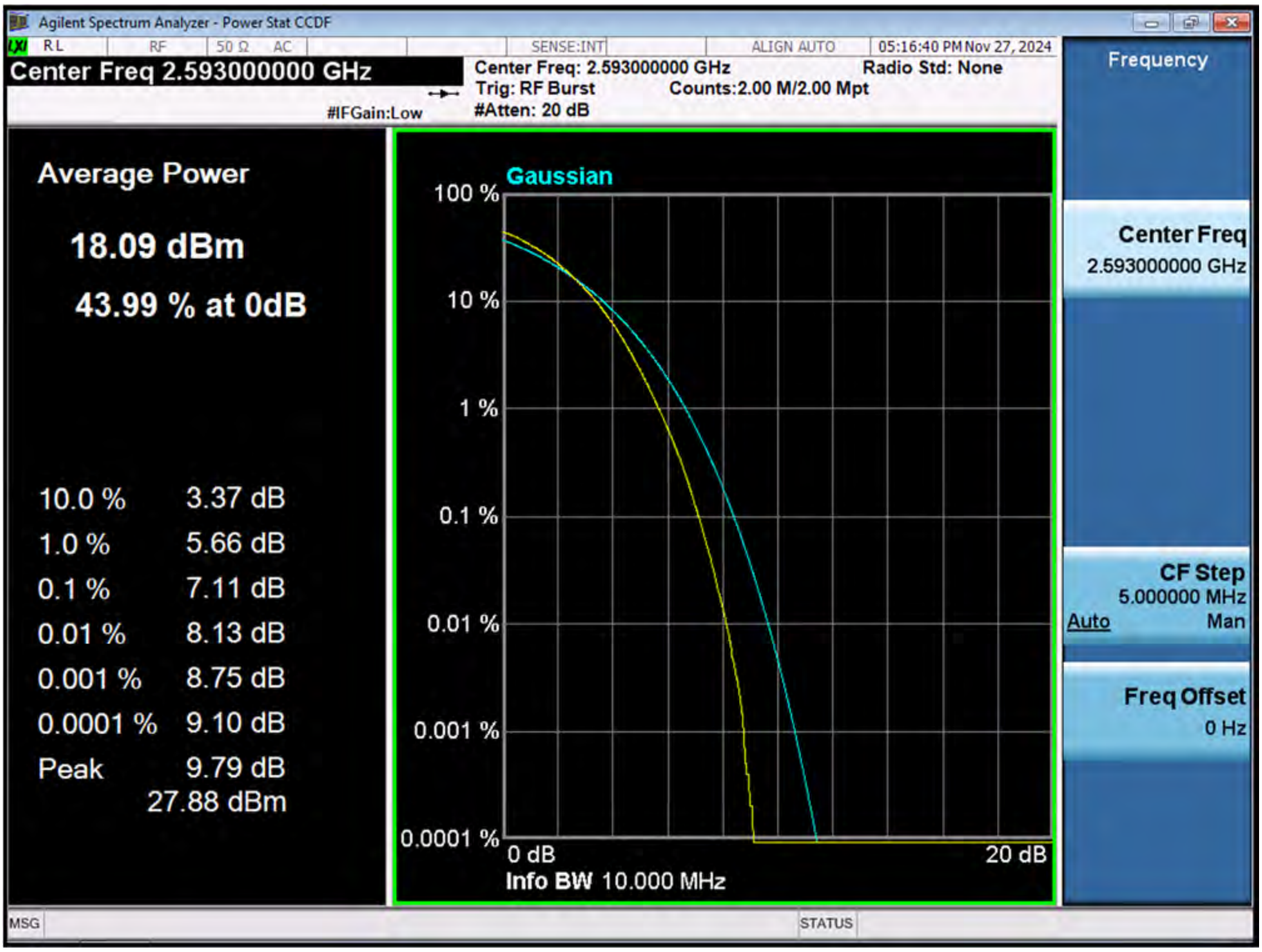


10 M_PAR_Mid_16QAM_FullRB

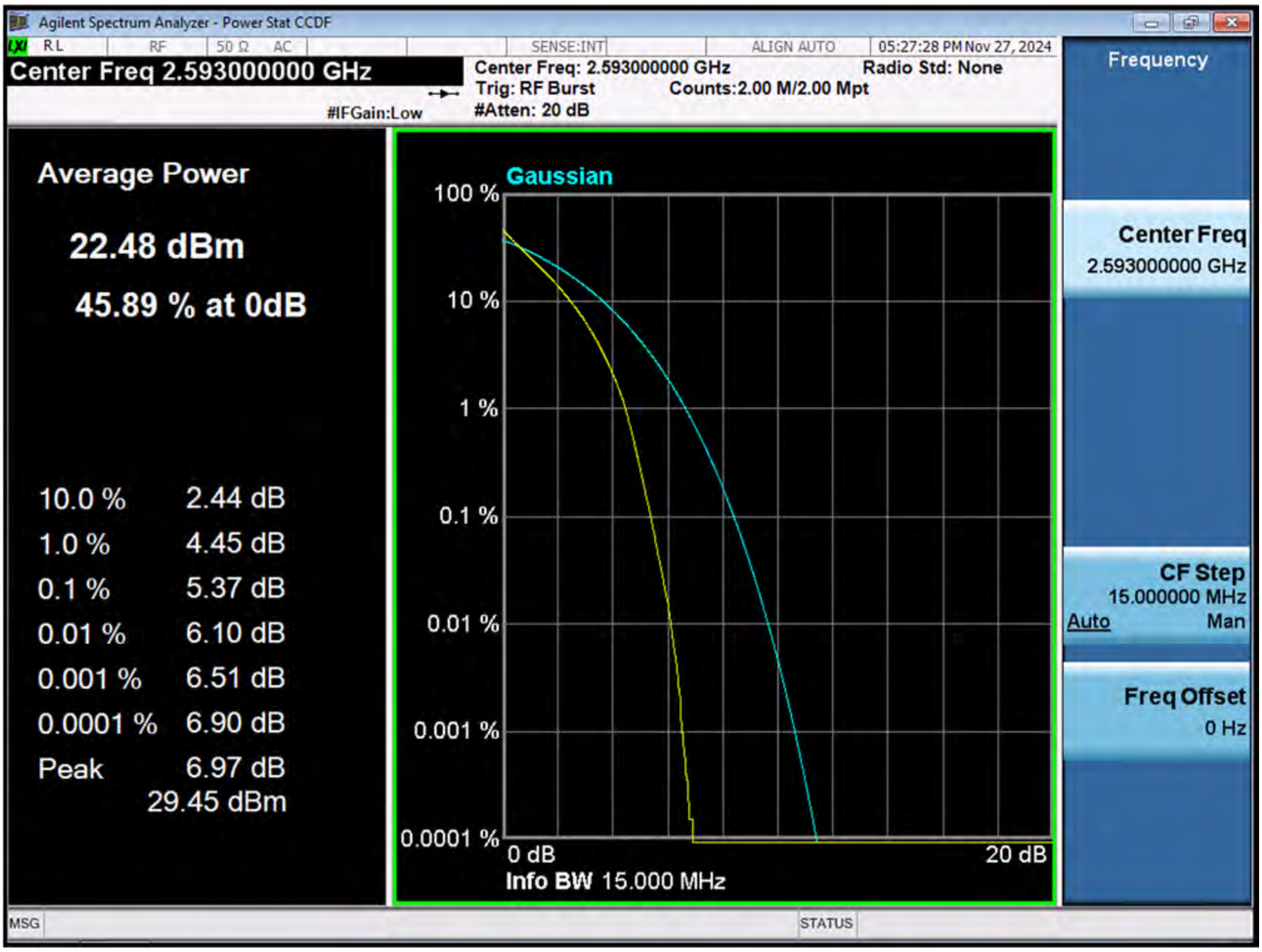


10 M_PAR_Mid_64QAM_FullRB

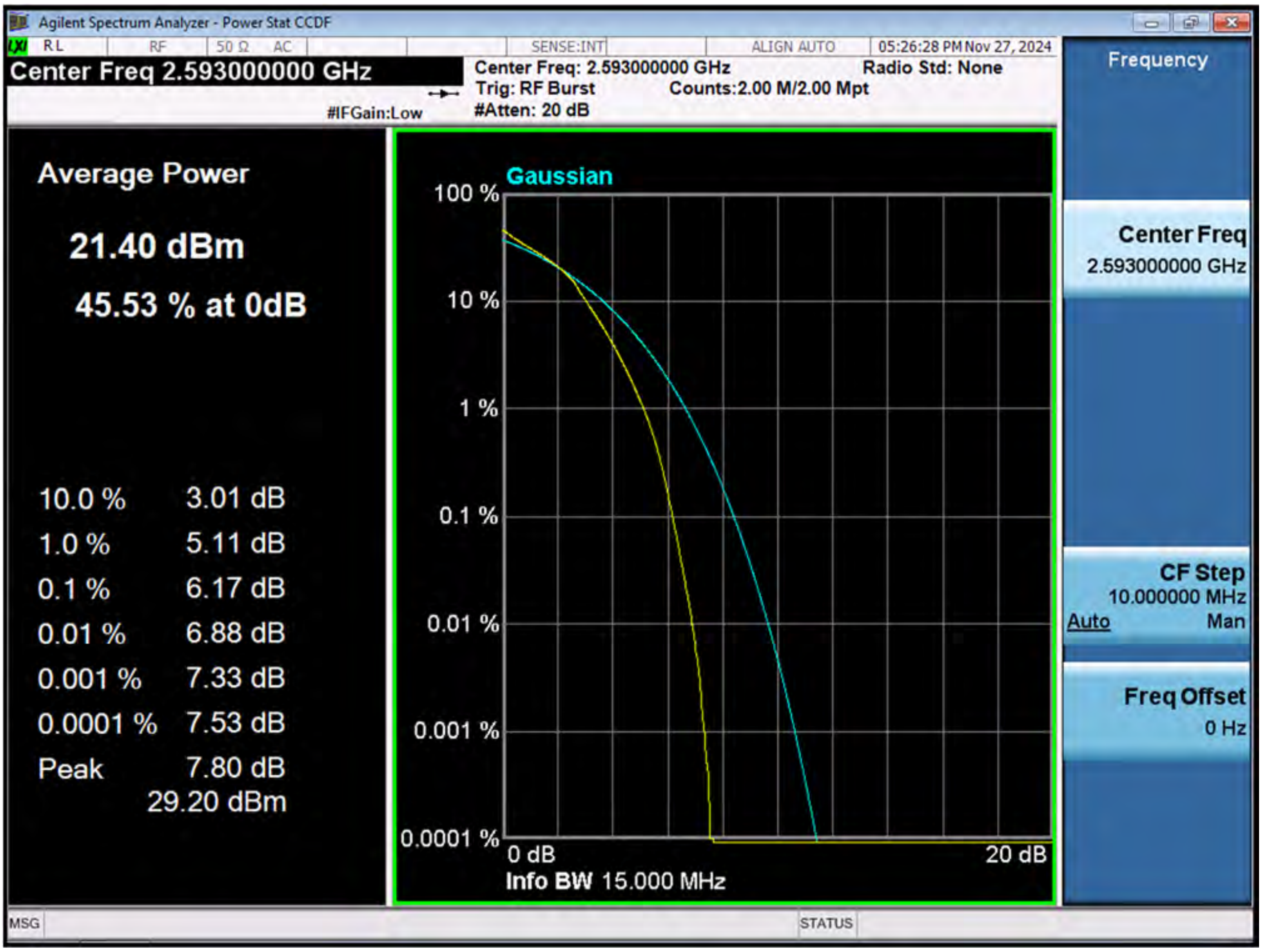
10 M_PAR_Mid_256QAM_FullRB



15 M_PAR_Mid_QPSK_FullRB

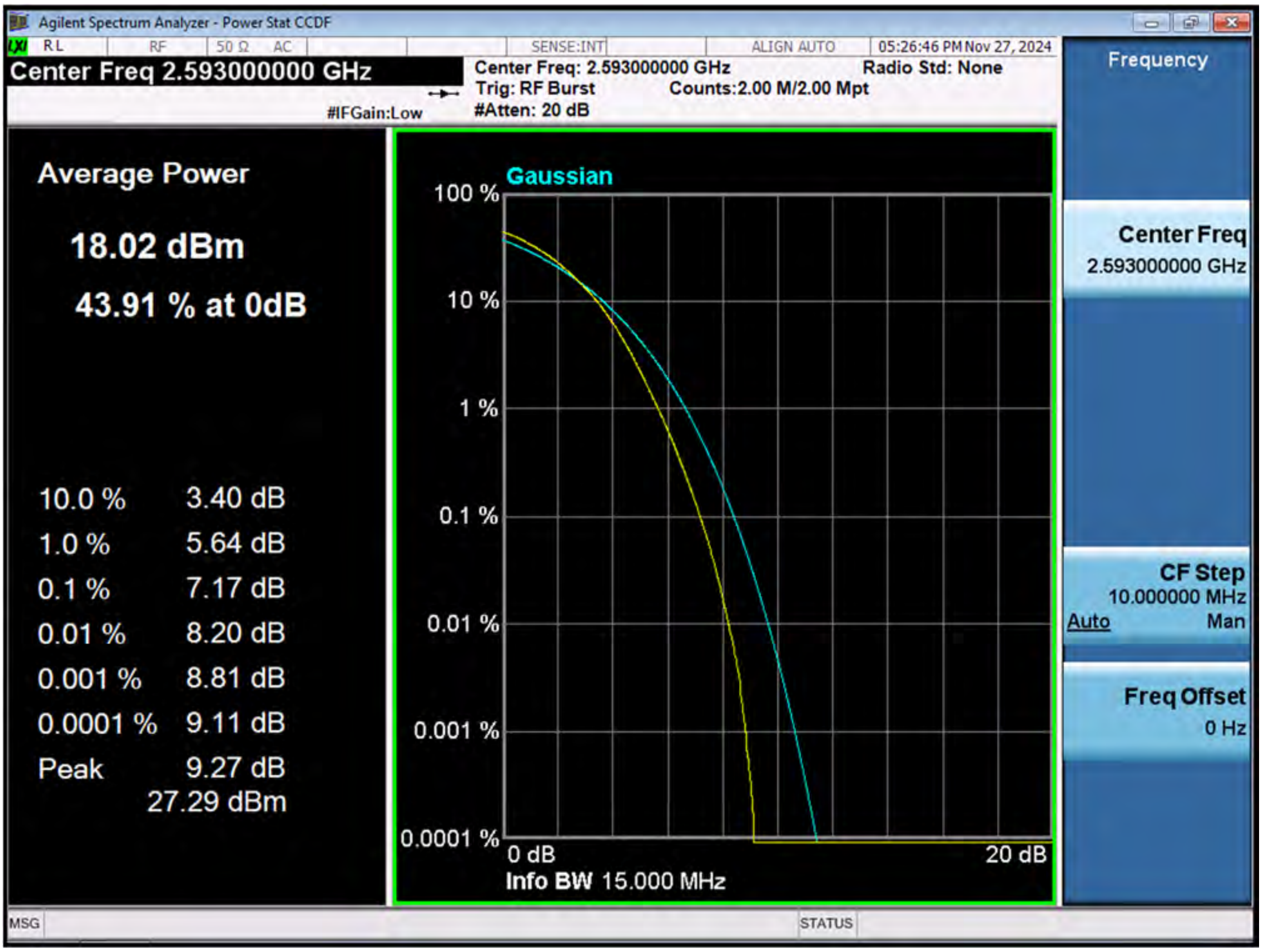


15 M_PAR_Mid_16QAM_FullRB

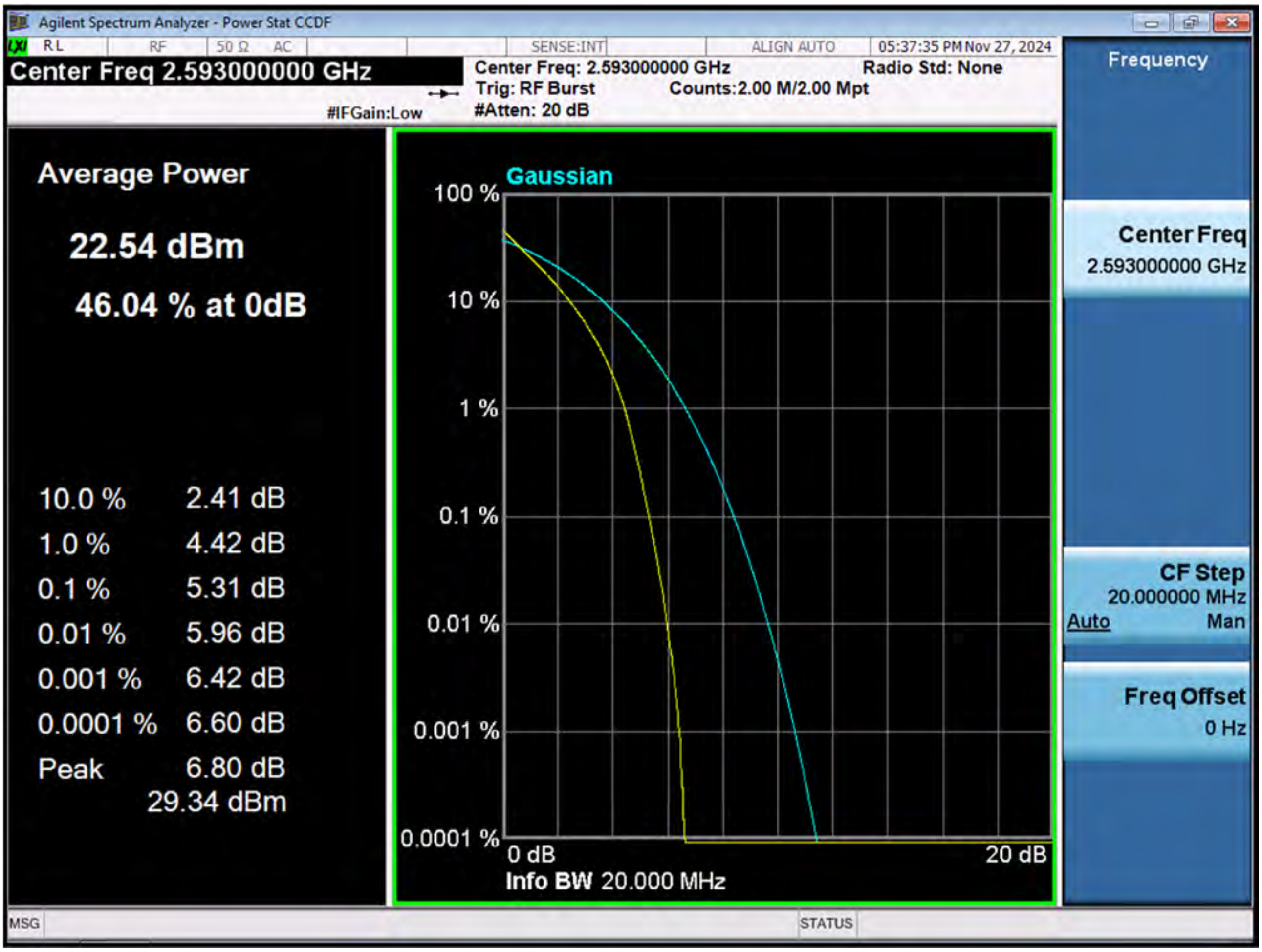


15 M_PAR_Mid_64QAM_FullRB

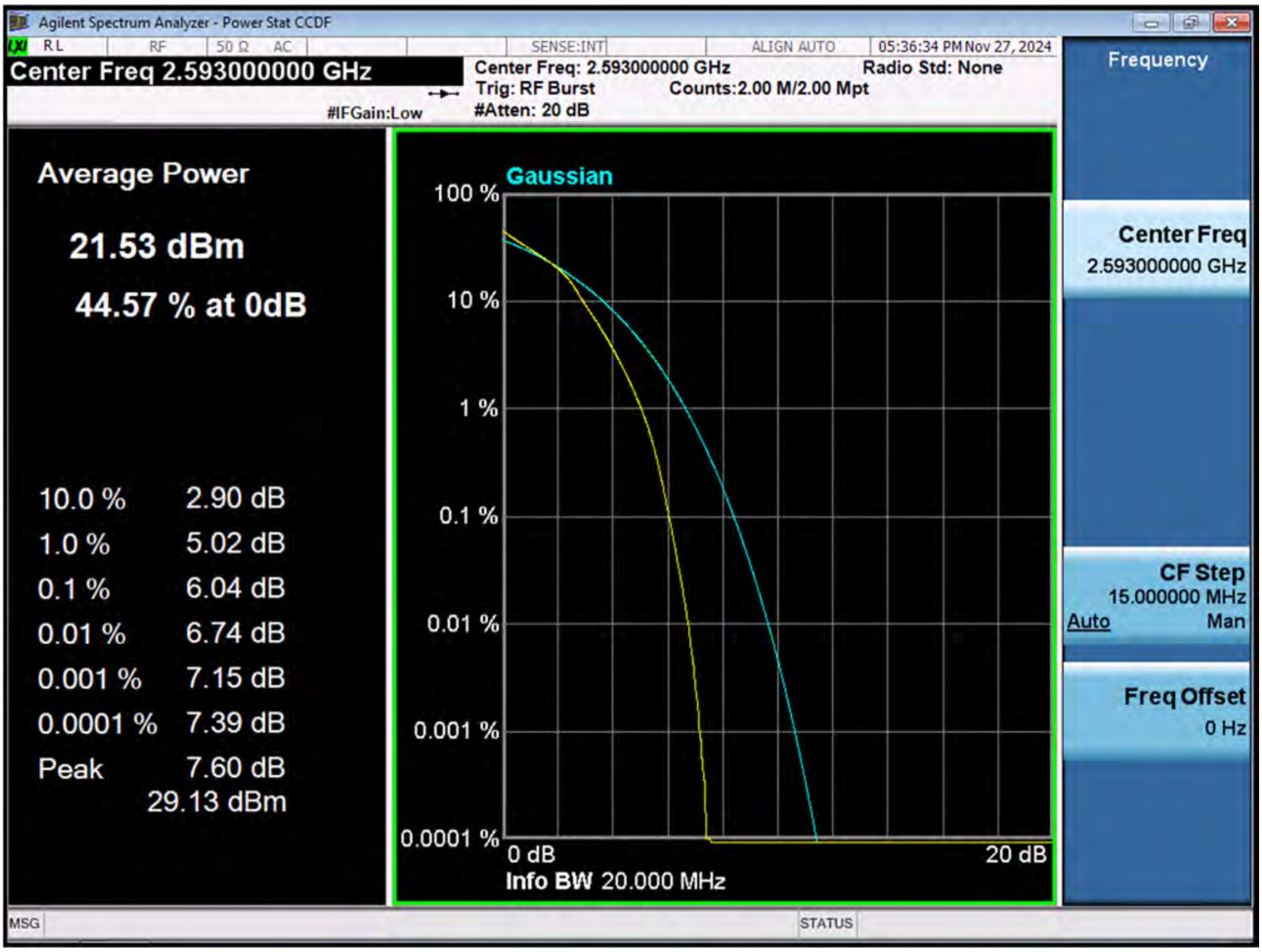
15 M_PAR_Mid_256QAM_FullRB



20 M_PAR_Mid_QPSK_FullRB

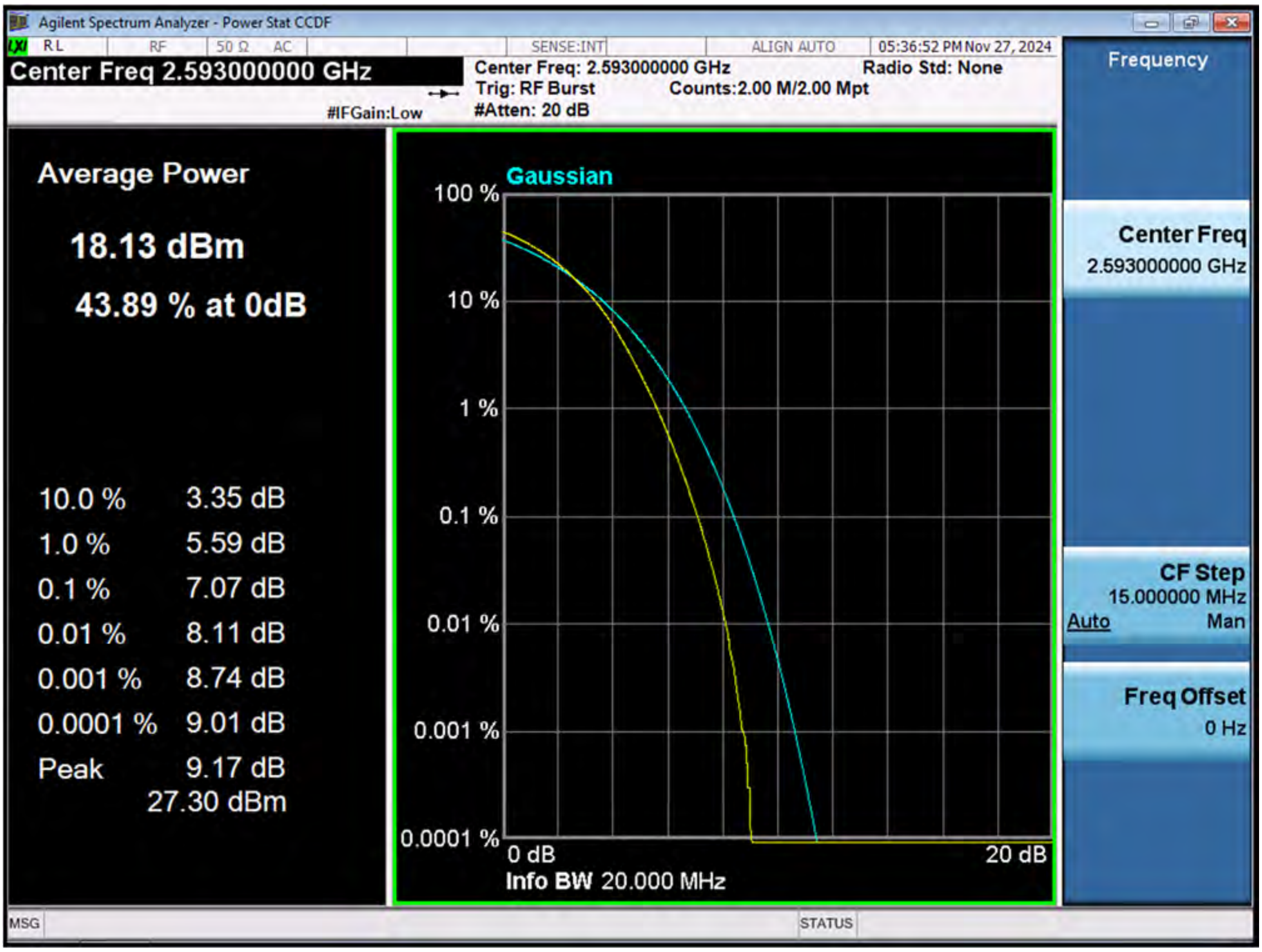


20 M_PAR_Mid_16QAM_FullRB

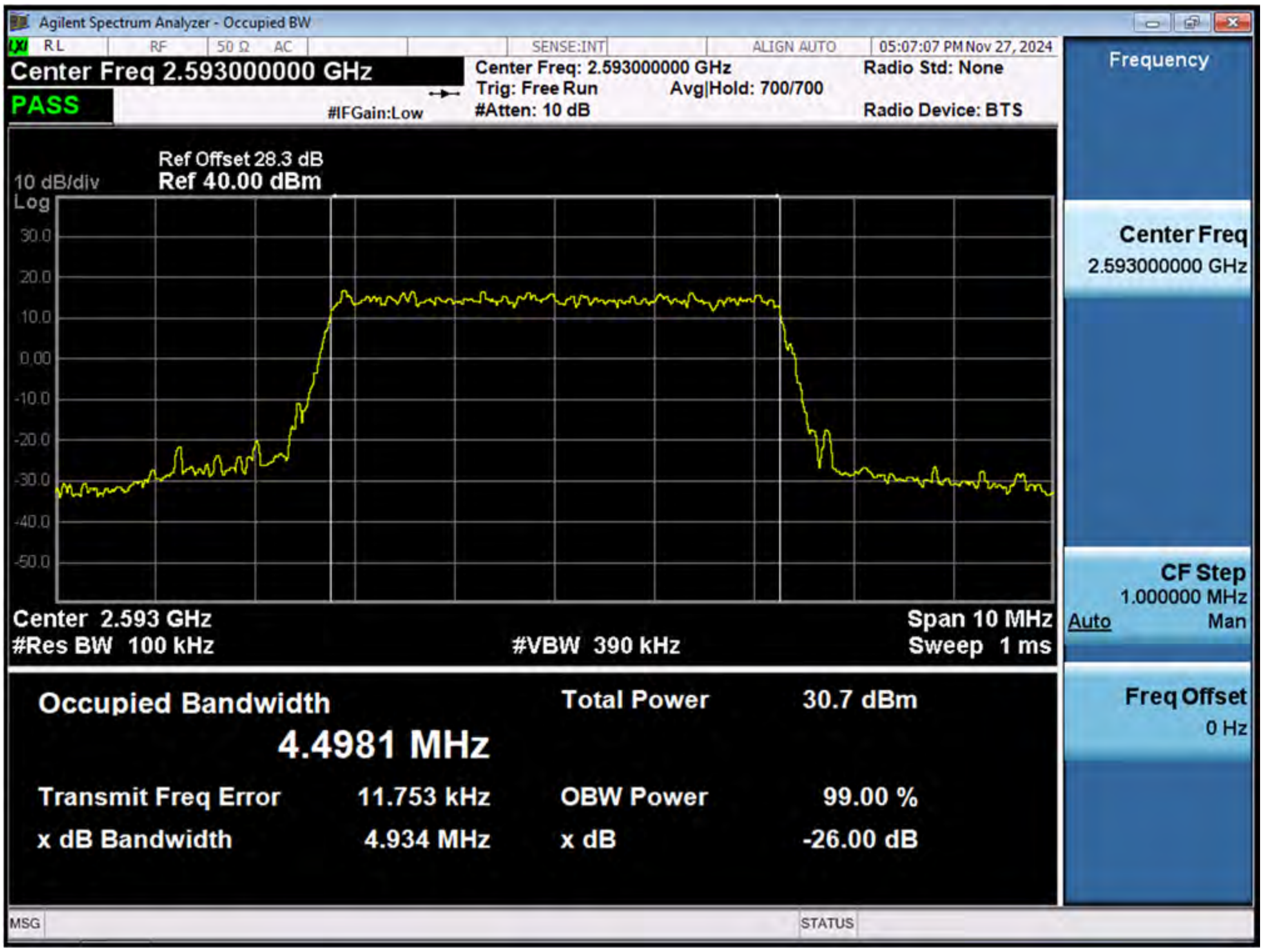


20 M_PAR_Mid_64QAM_FullRB

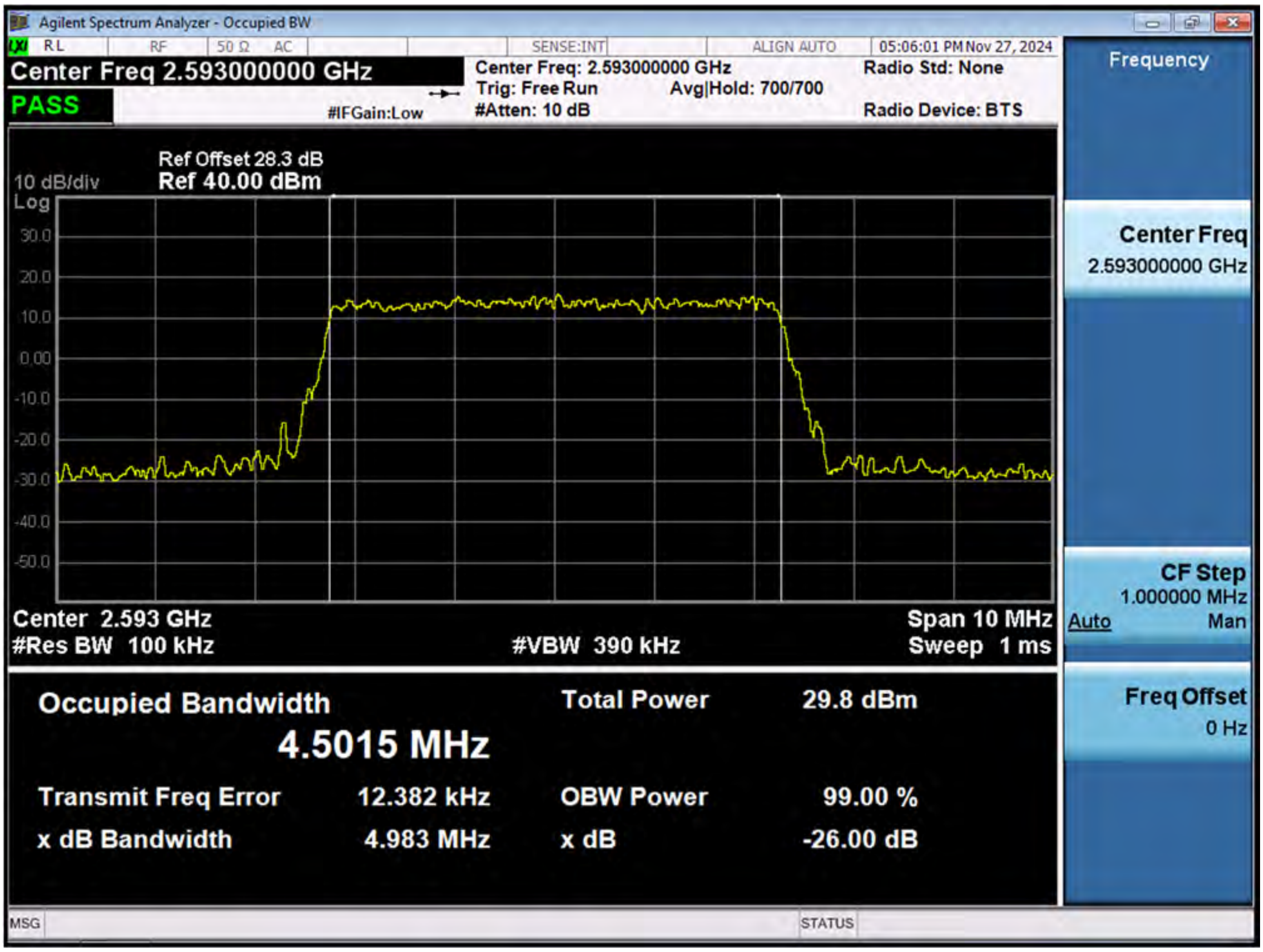
20 M_PAR_Mid_256QAM_FullRB



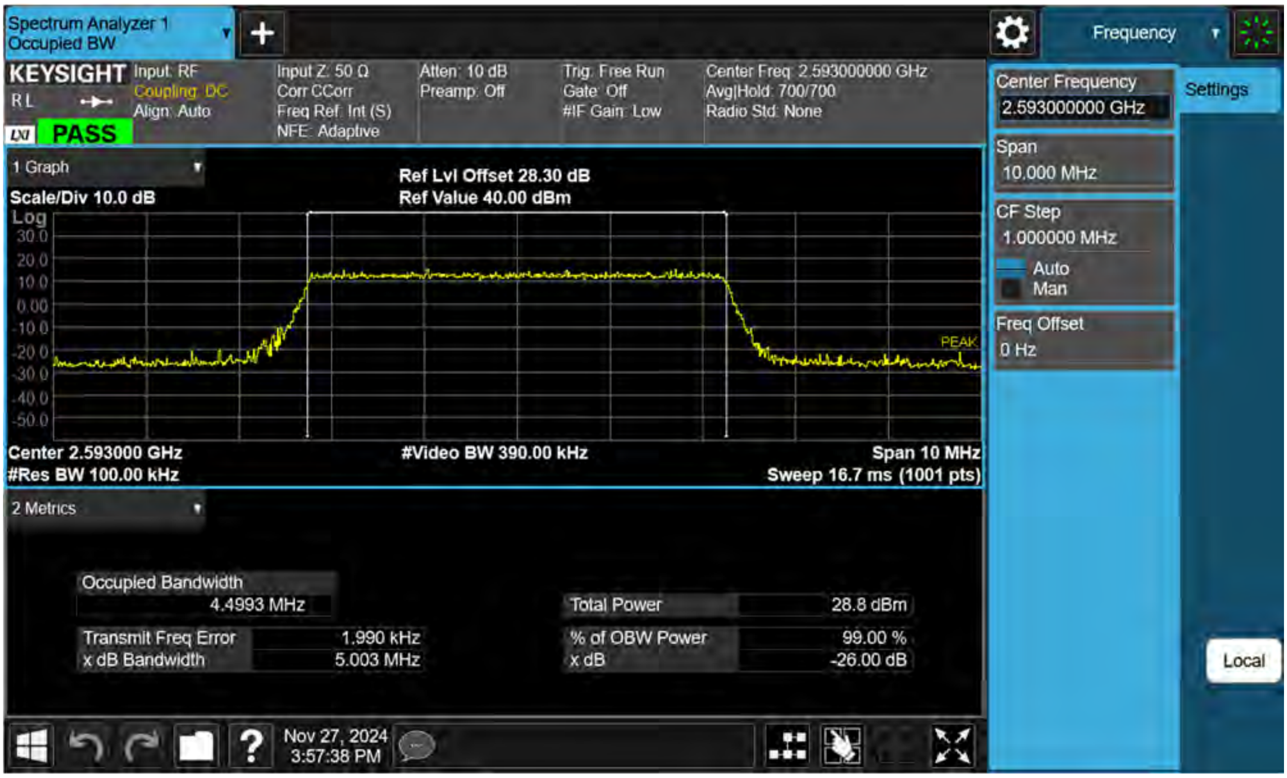
5 M_OBW_Mid_QPSK_FullRB



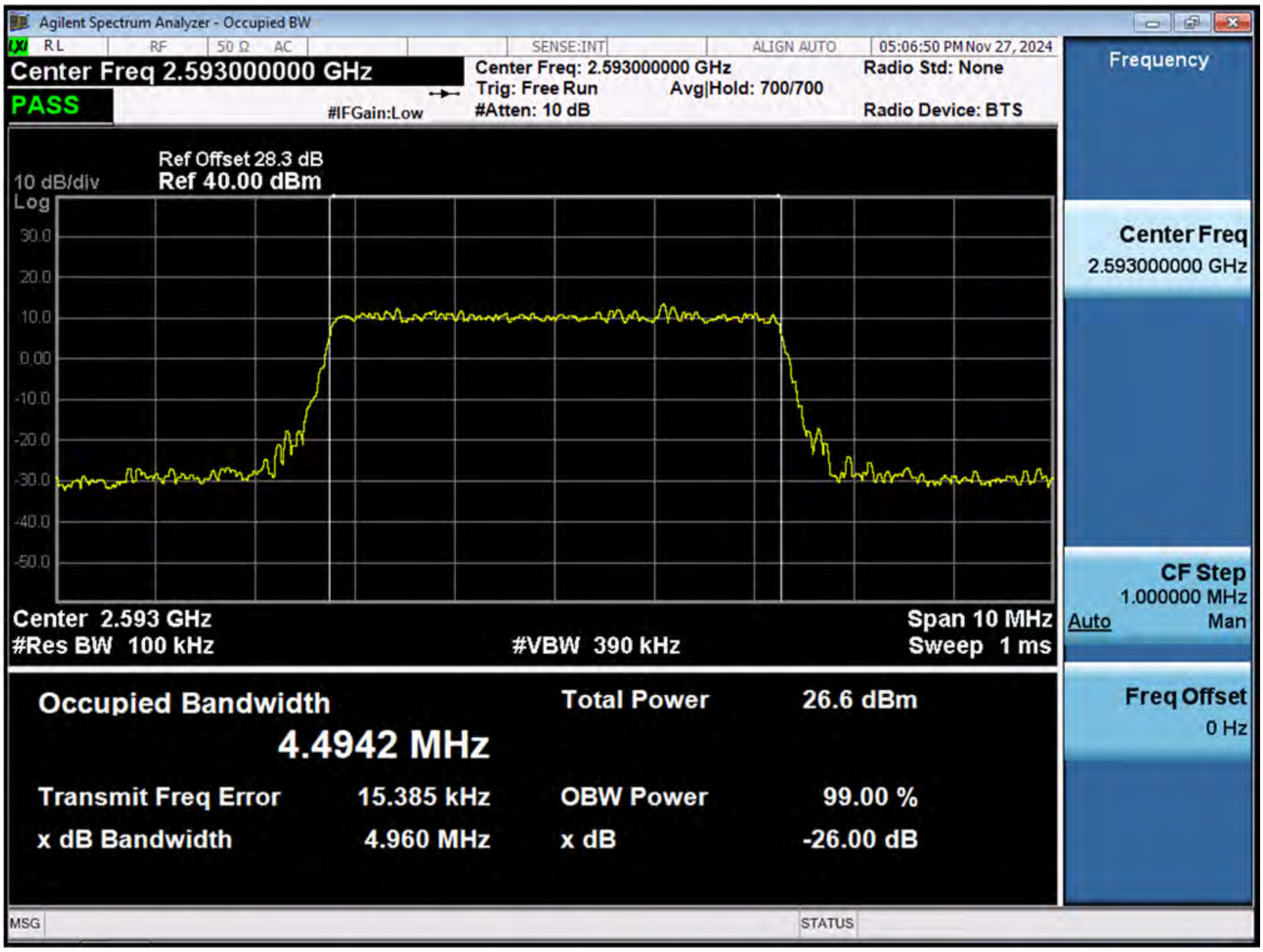
5 M_OBW_Mid_16QAM_FullRB



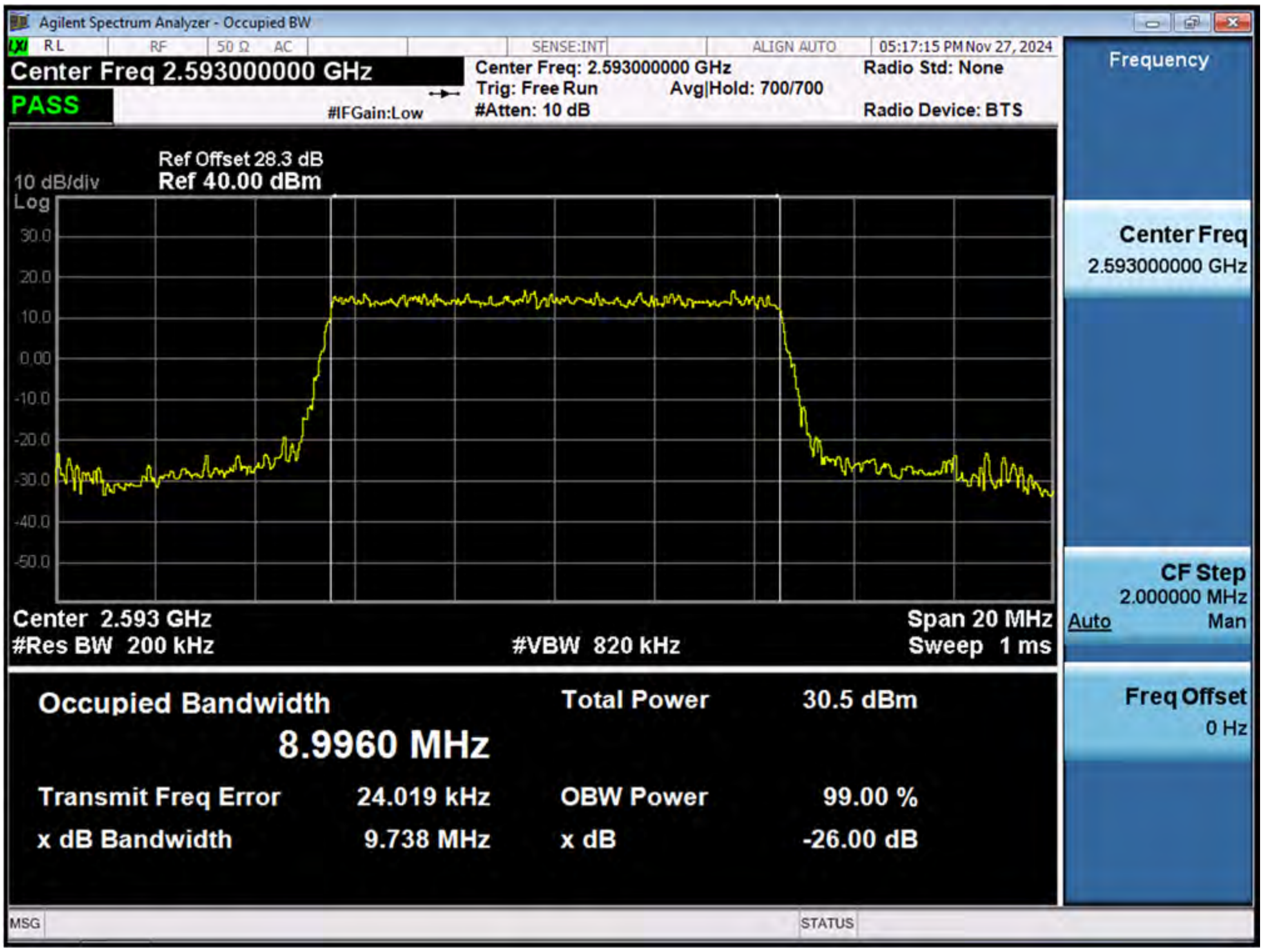
5 M_OBW_Mid_64QAM_FullRB



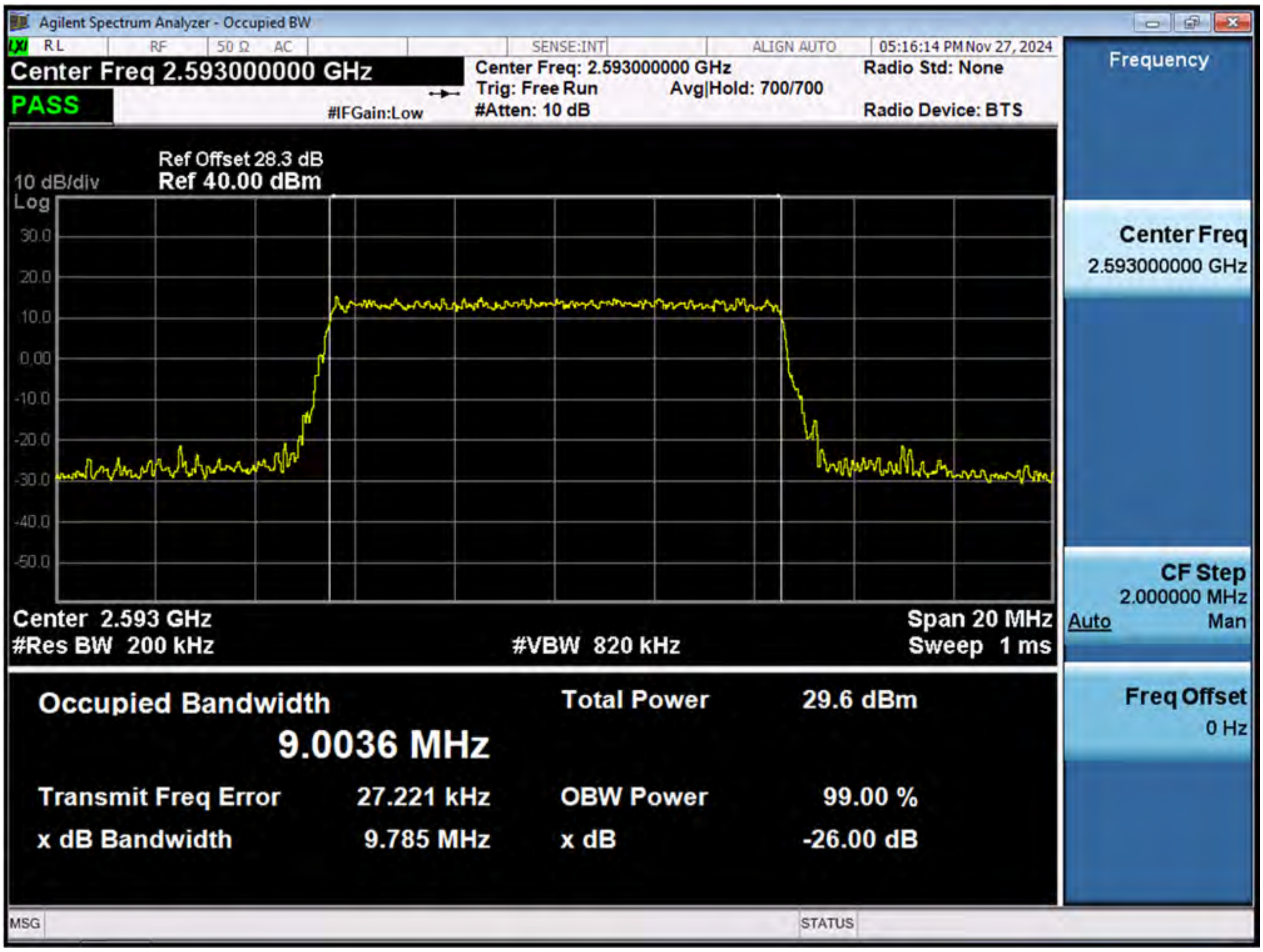
5 M_OBW_Mid_256QAM_FullRB



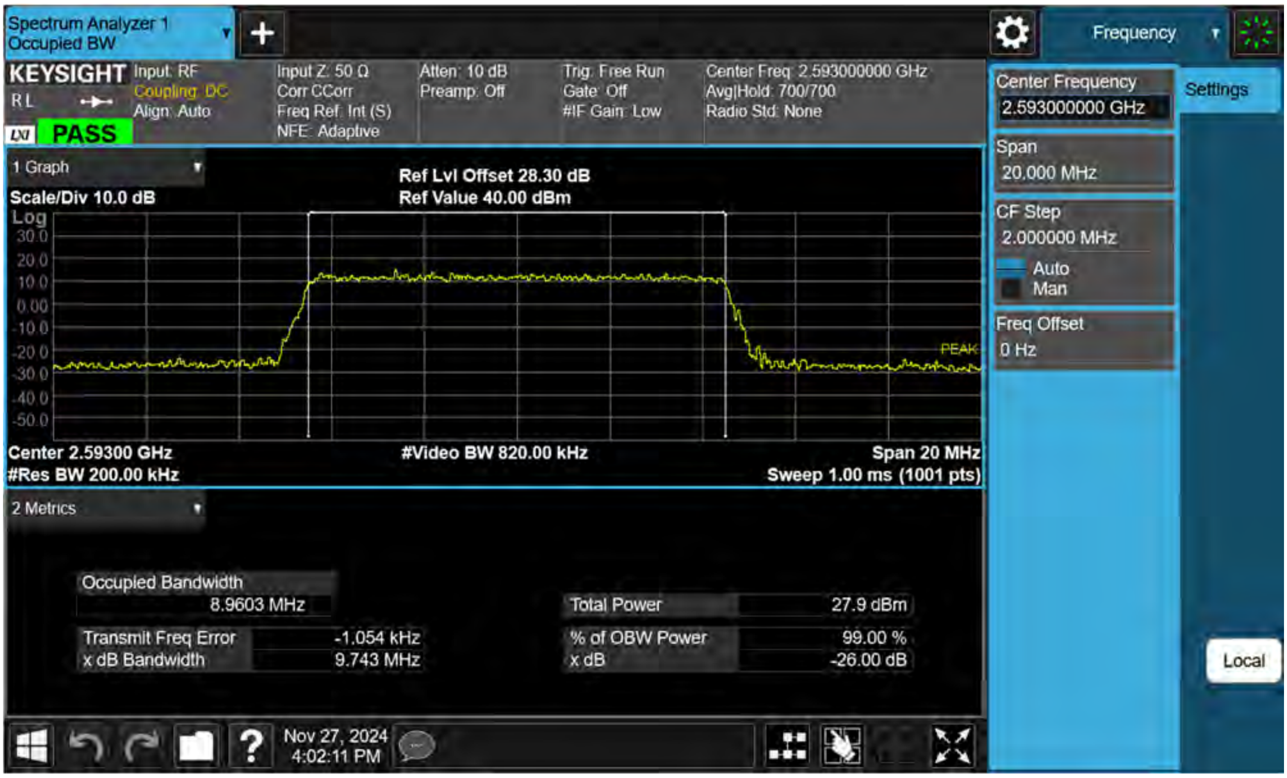
10 M_OBW_Mid_QPSK_FullRB



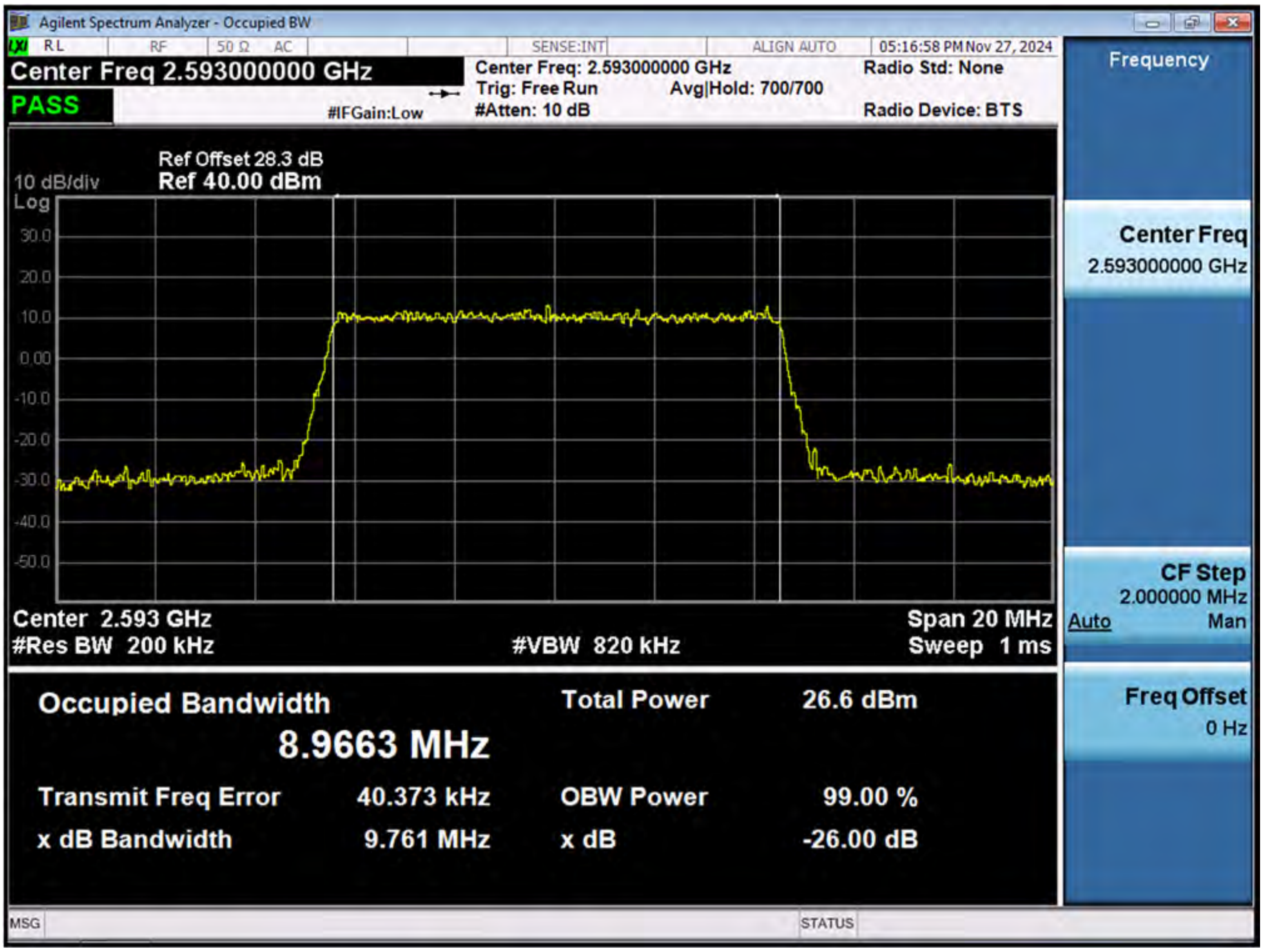
10 M_OBW_Mid_16QAM_FullRB



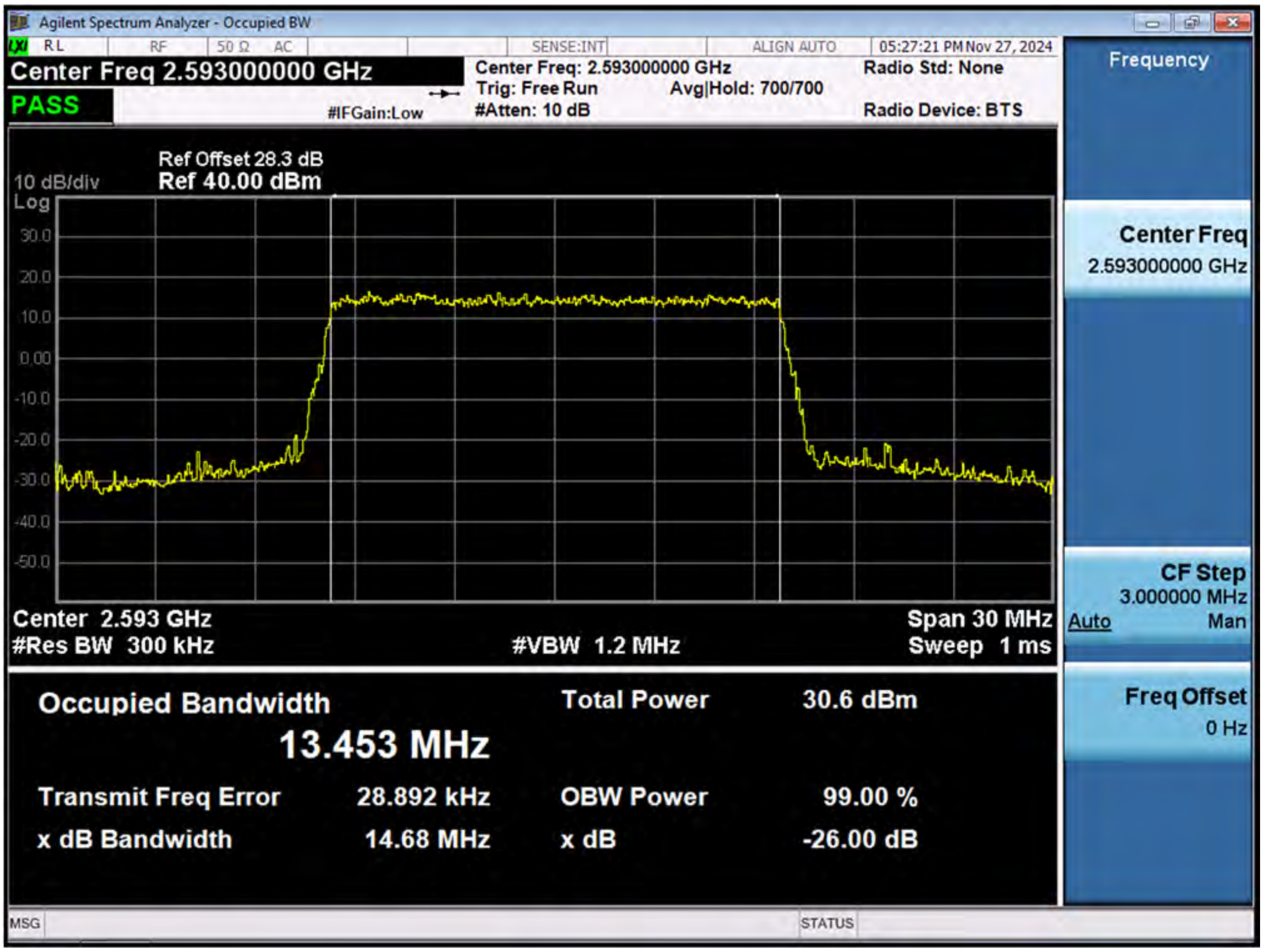
10 M_OBW_Mid_64QAM_FullRB



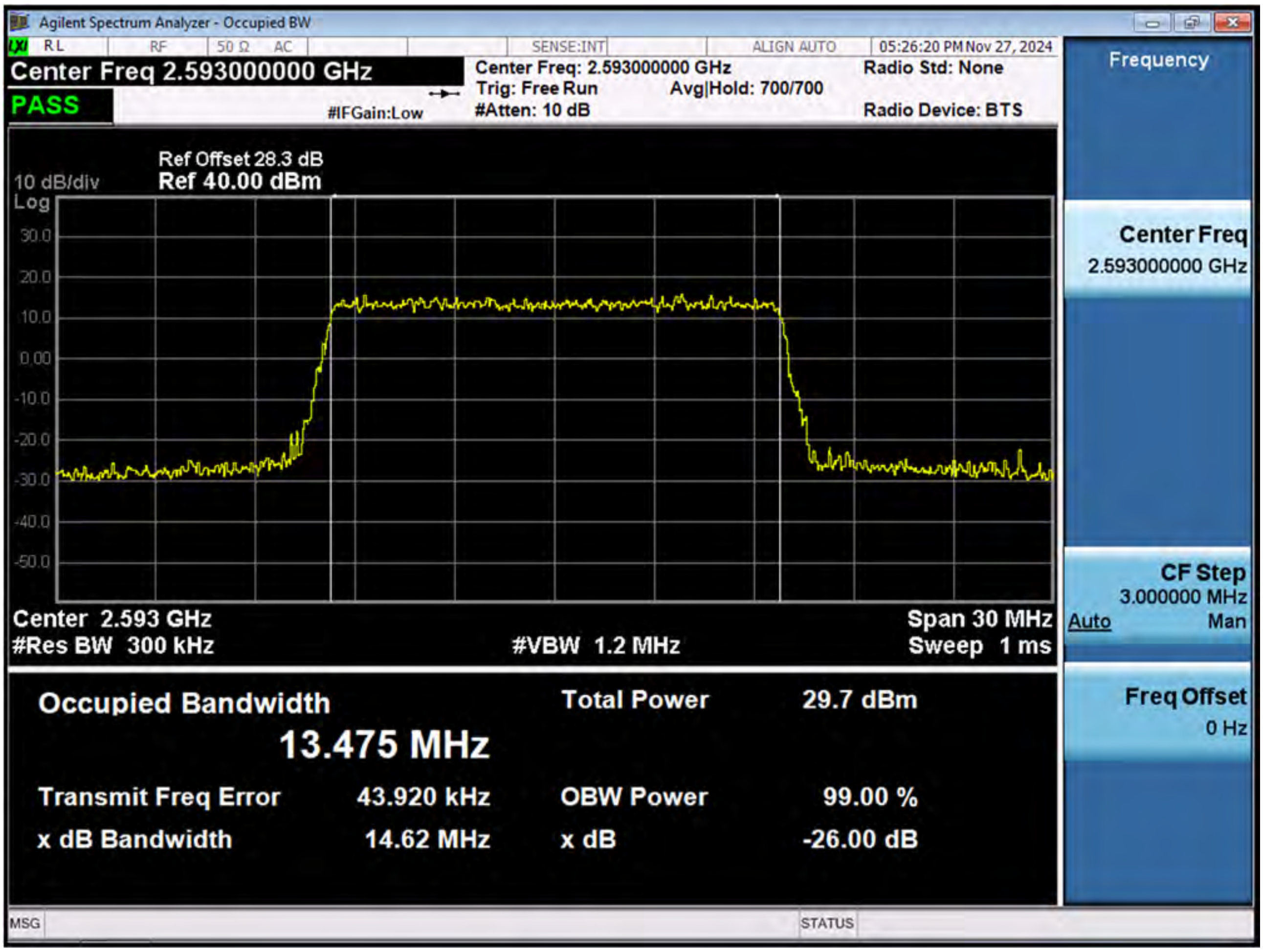
10 M_OBW_Mid_256QAM_FullRB



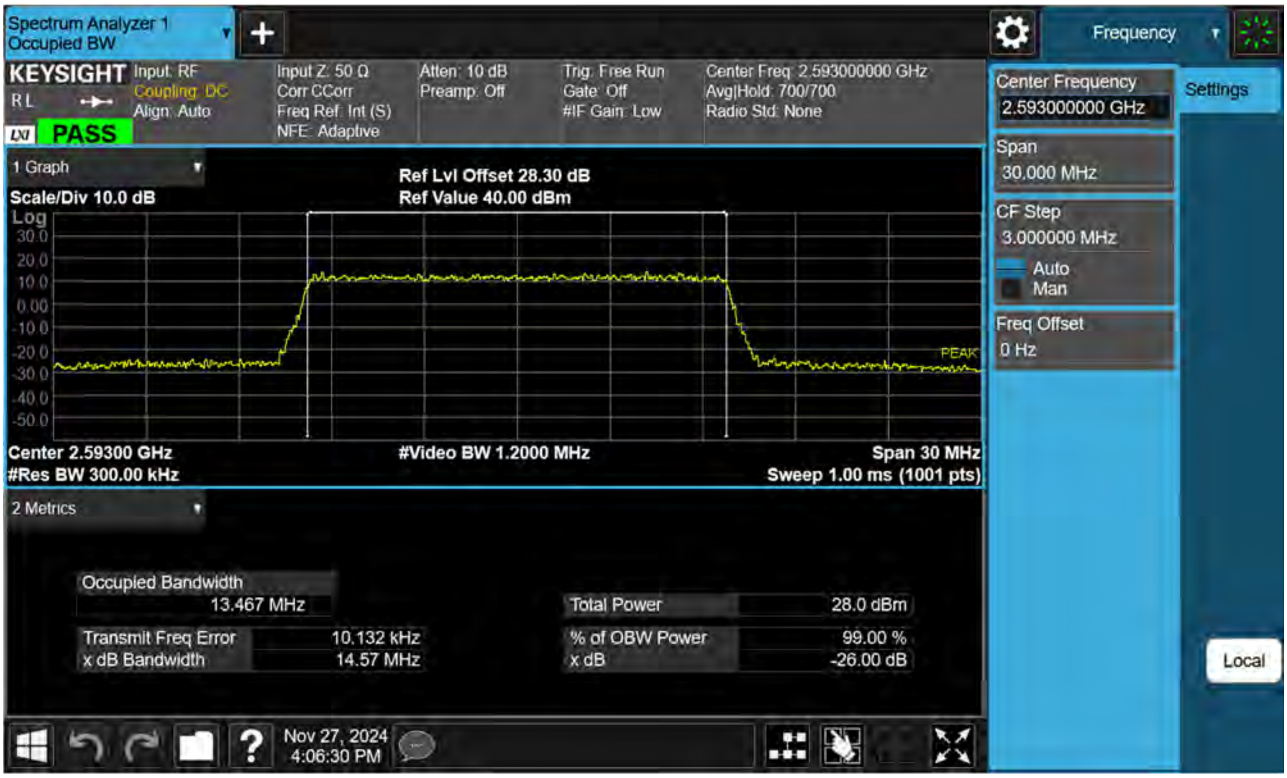
15 M_OBW_Mid_QPSK_FullRB



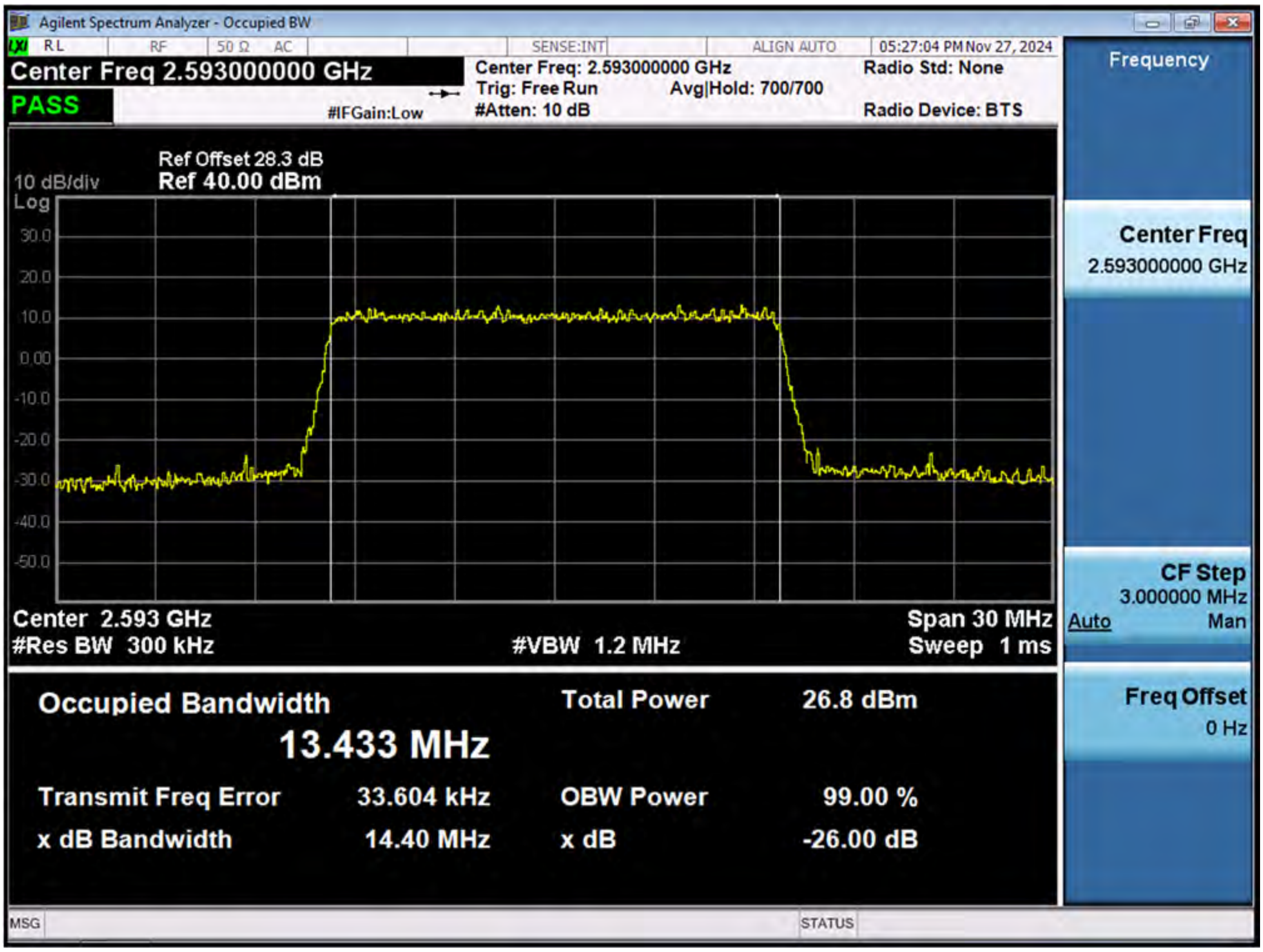
15 M_OBW_Mid_16QAM_FullRB



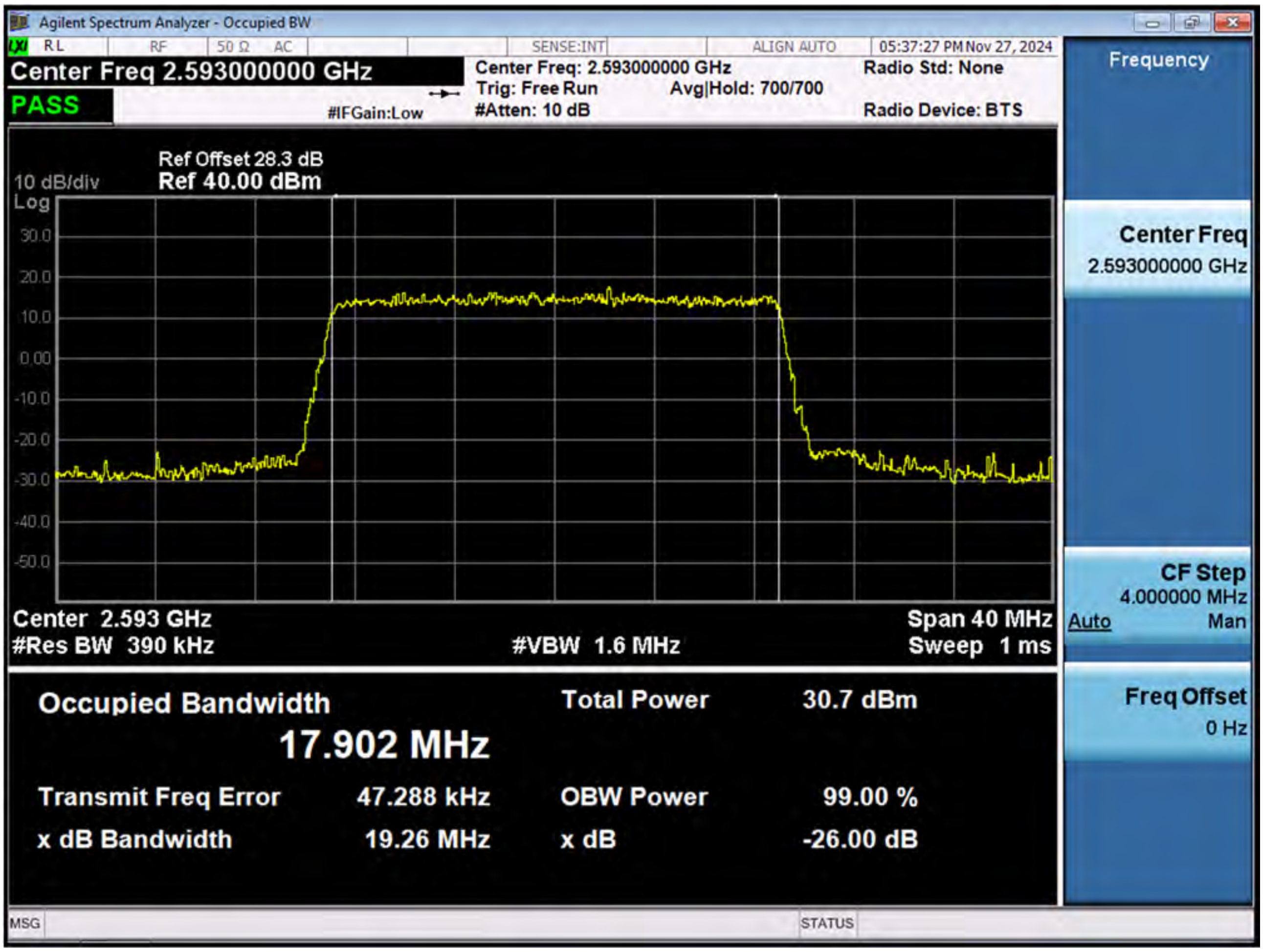
15 M_OBW_Mid_64QAM_FullRB



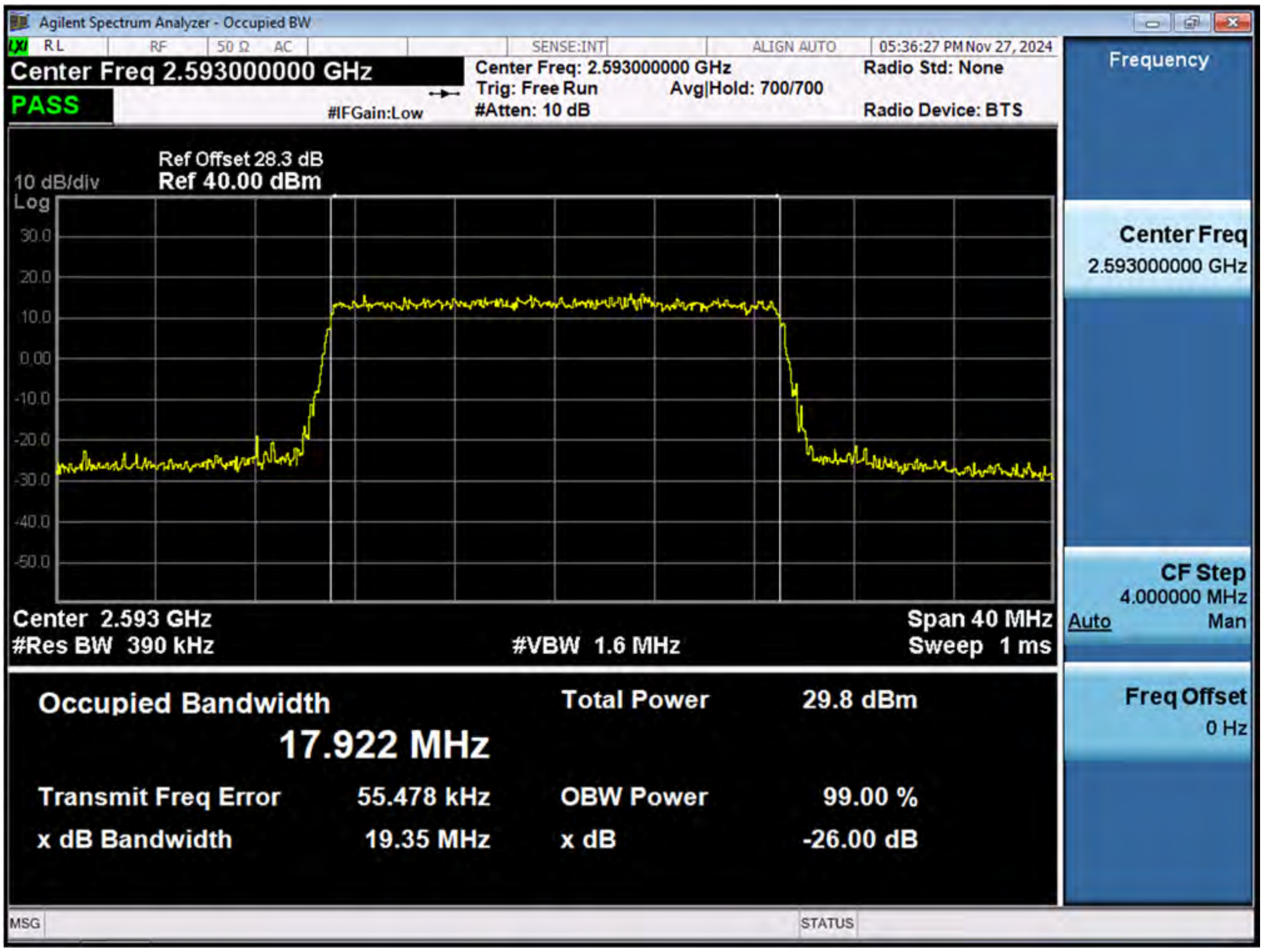
15 M_OBW_Mid_256QAM_FullRB



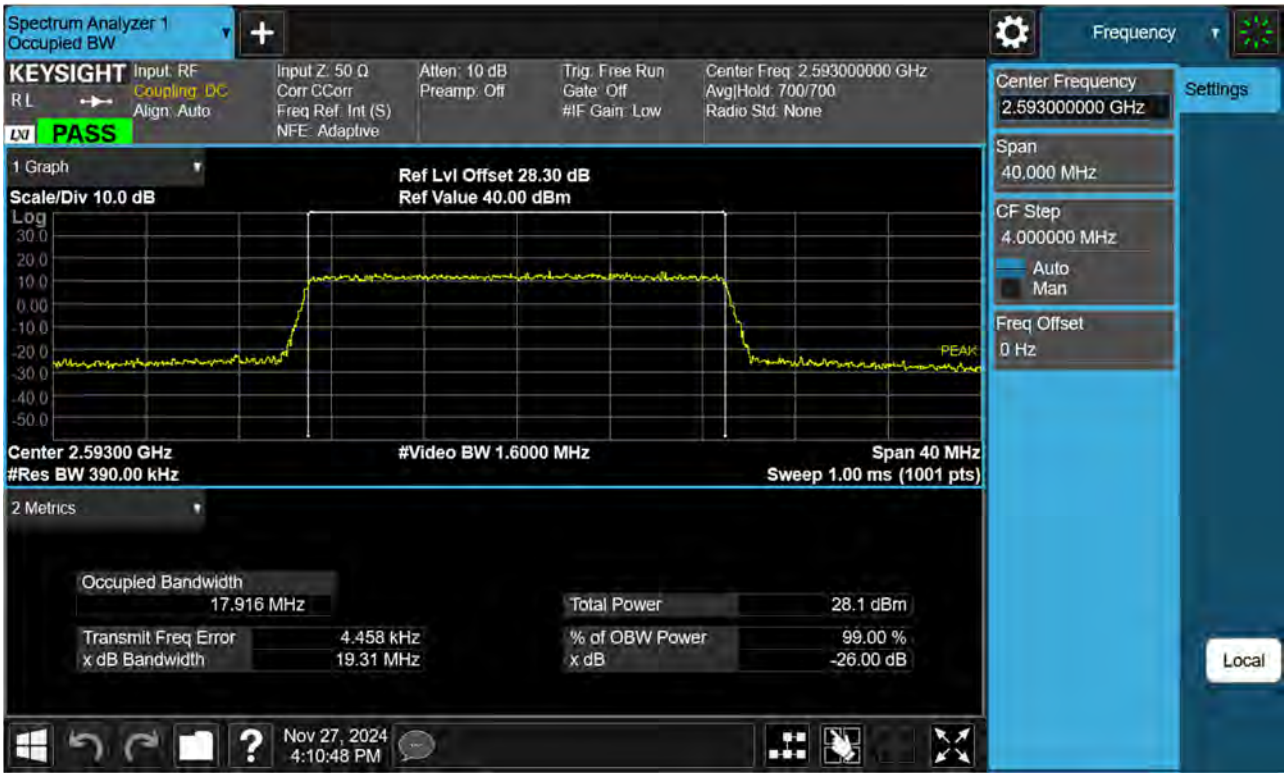
20 M_OBW_Mid_QPSK_FullRB



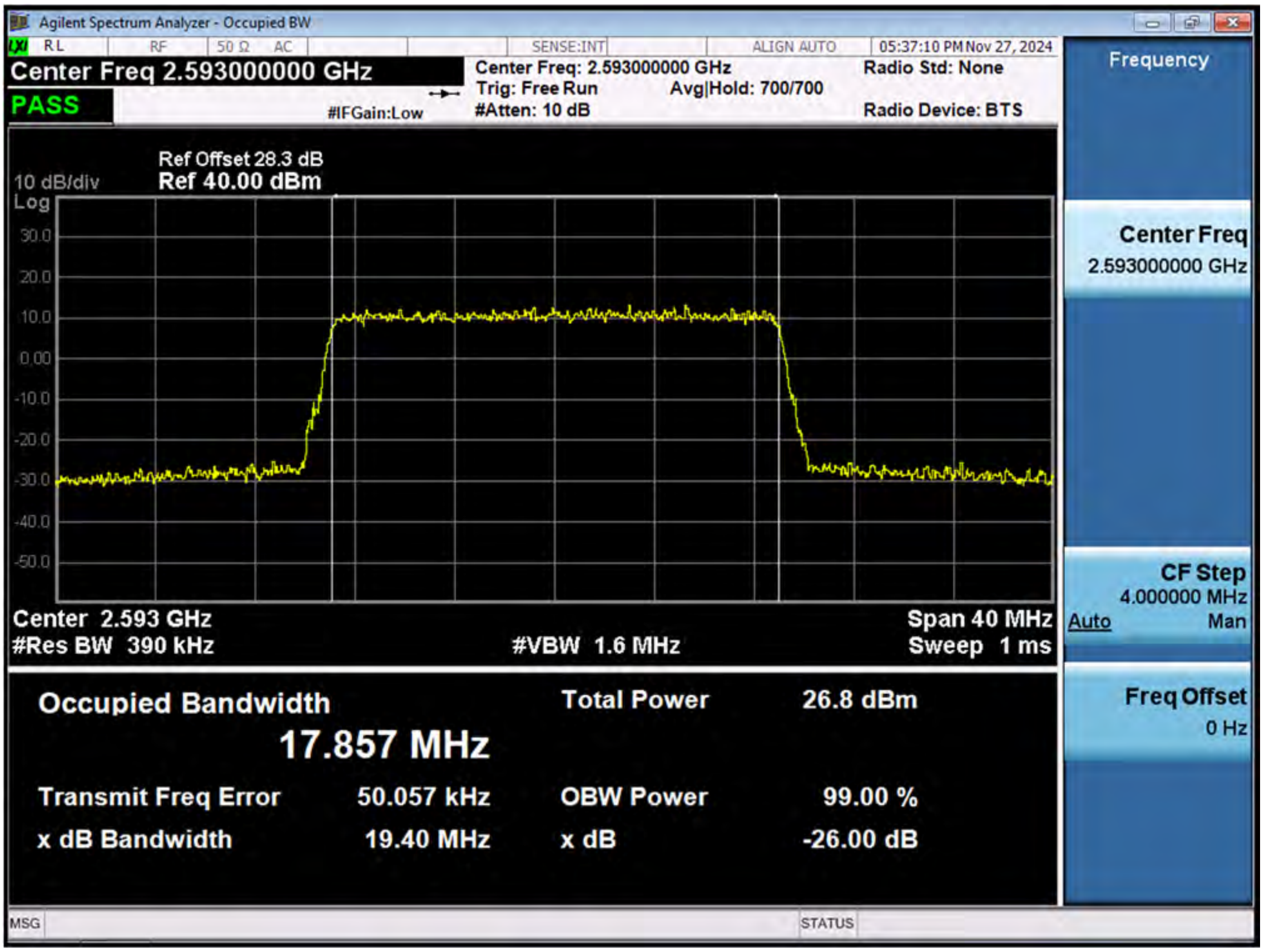
20 M_OBW_Mid_16QAM_FullRB



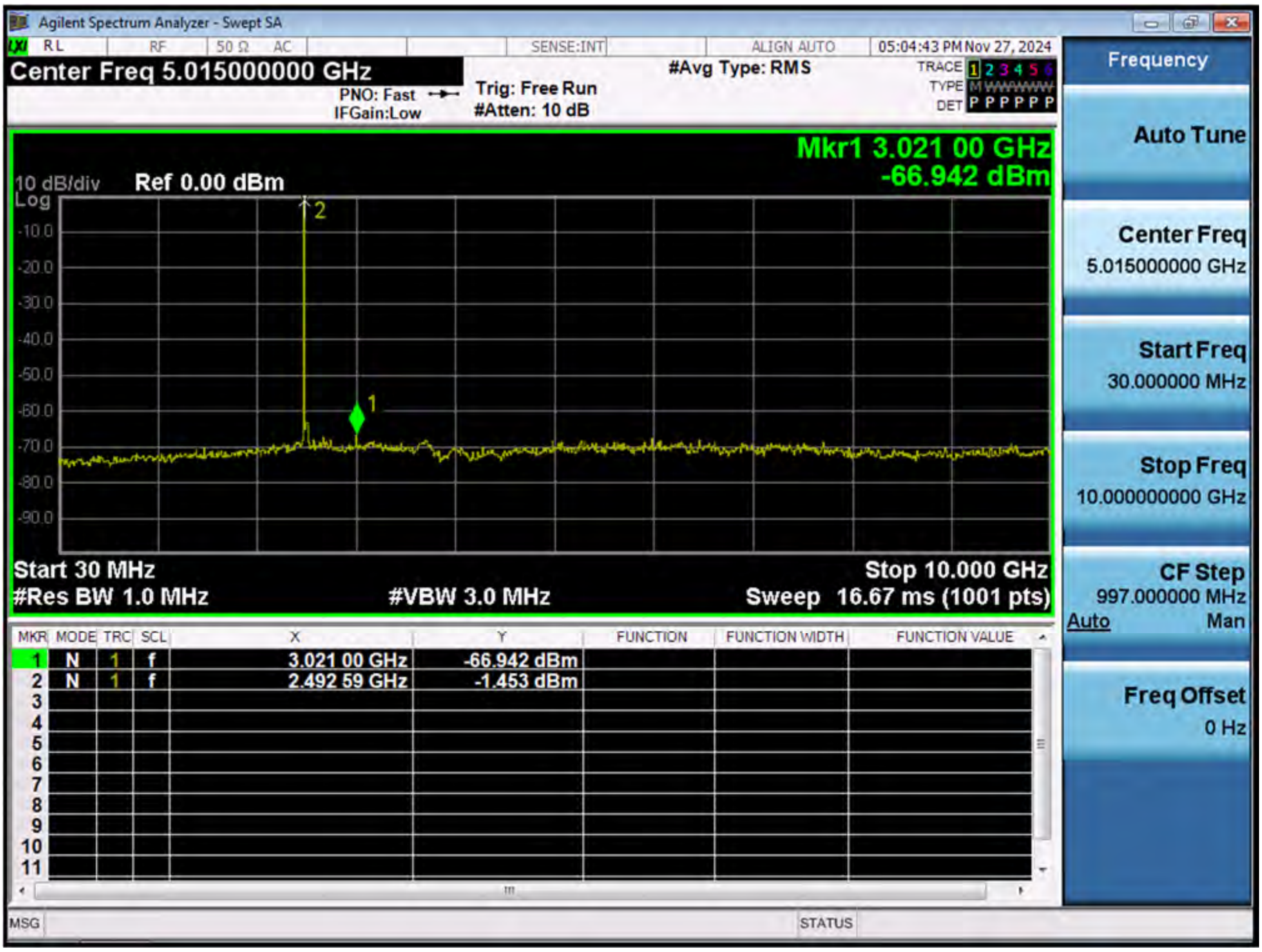
20 M_OBW_Mid_64QAM_FullRB



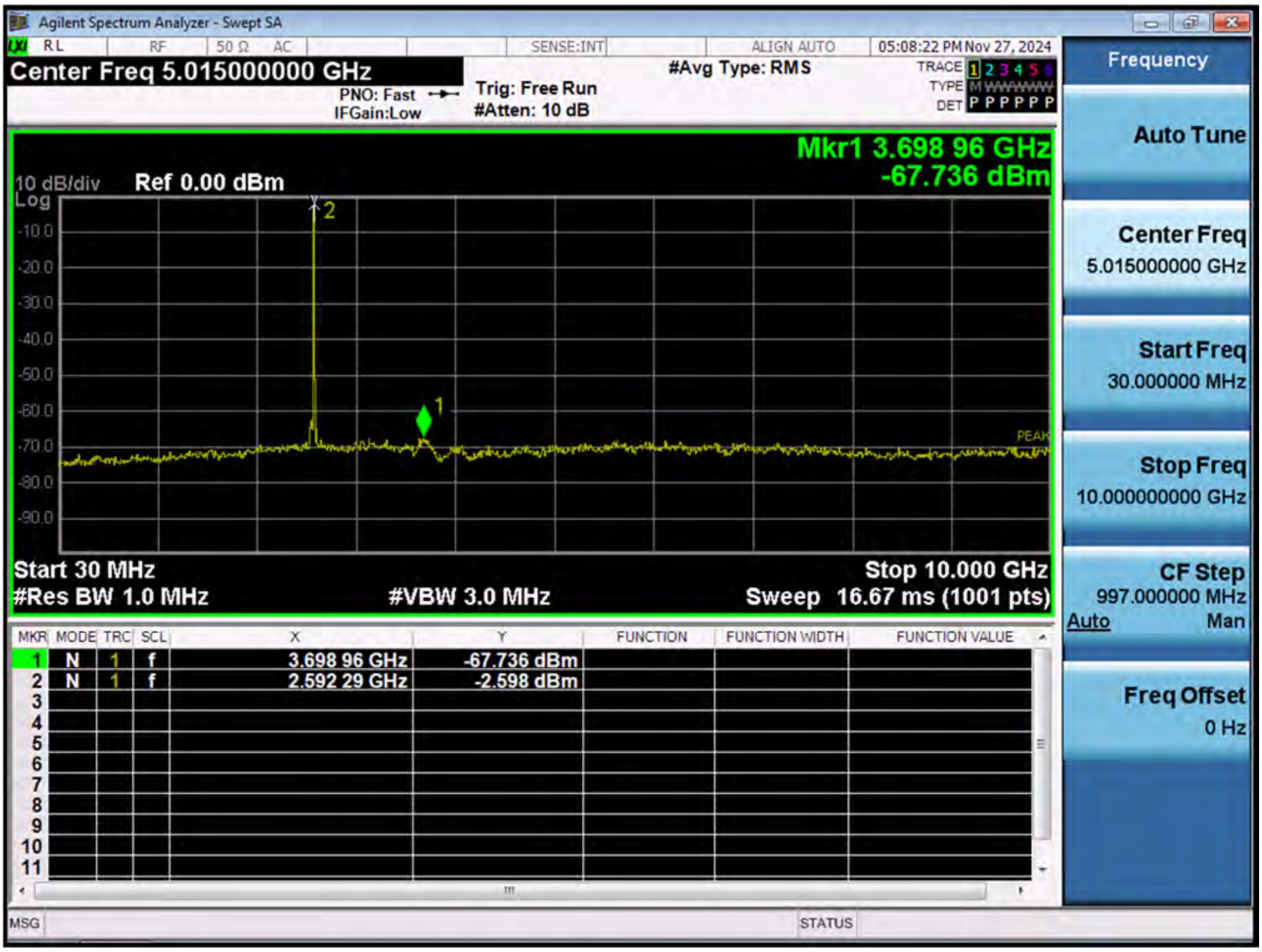
20 M_OBW_Mid_256QAM_FullRB



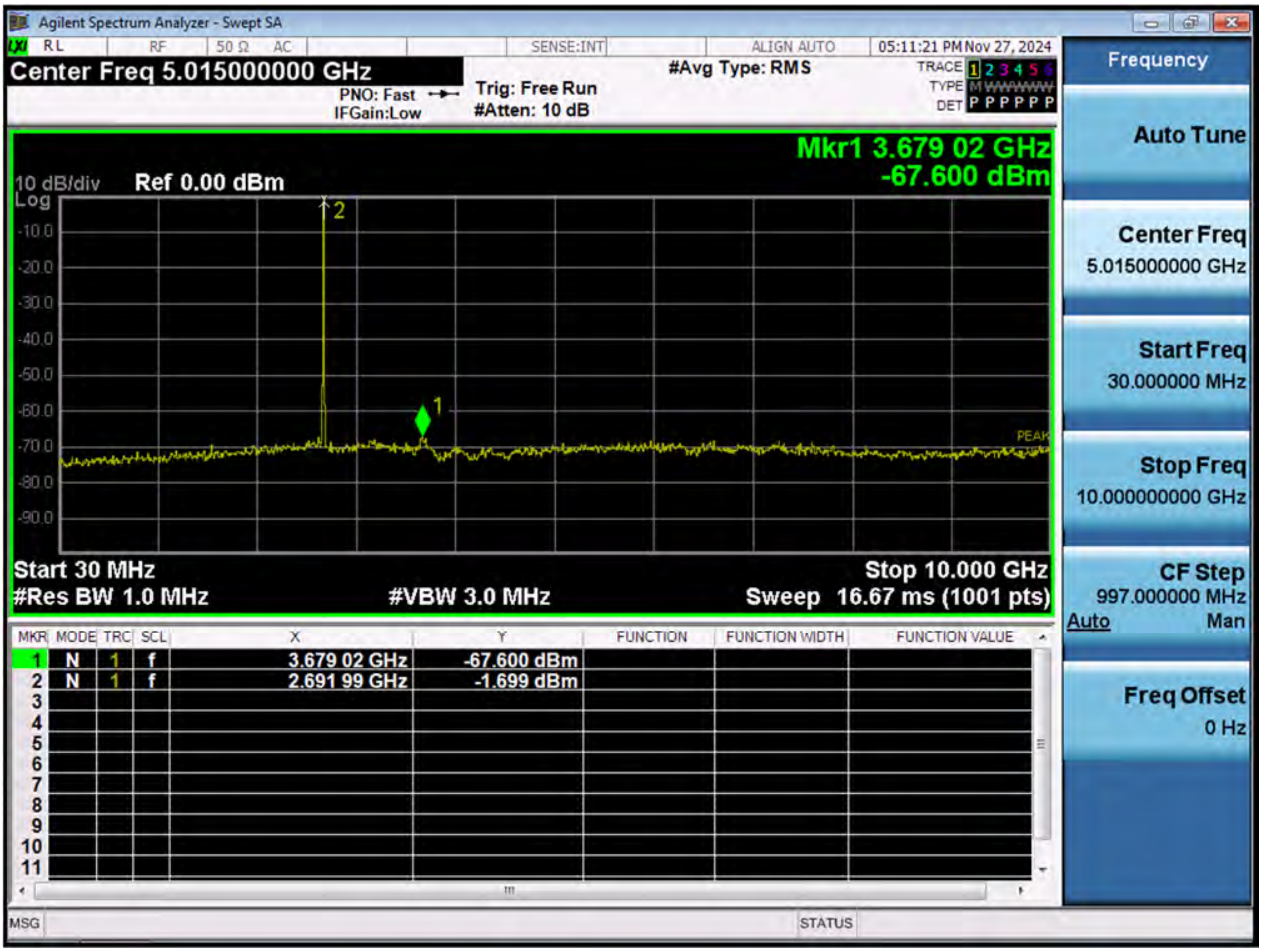
5 M_Conducted Spurious(30 M-10 G)_Low_QPSK_1RB



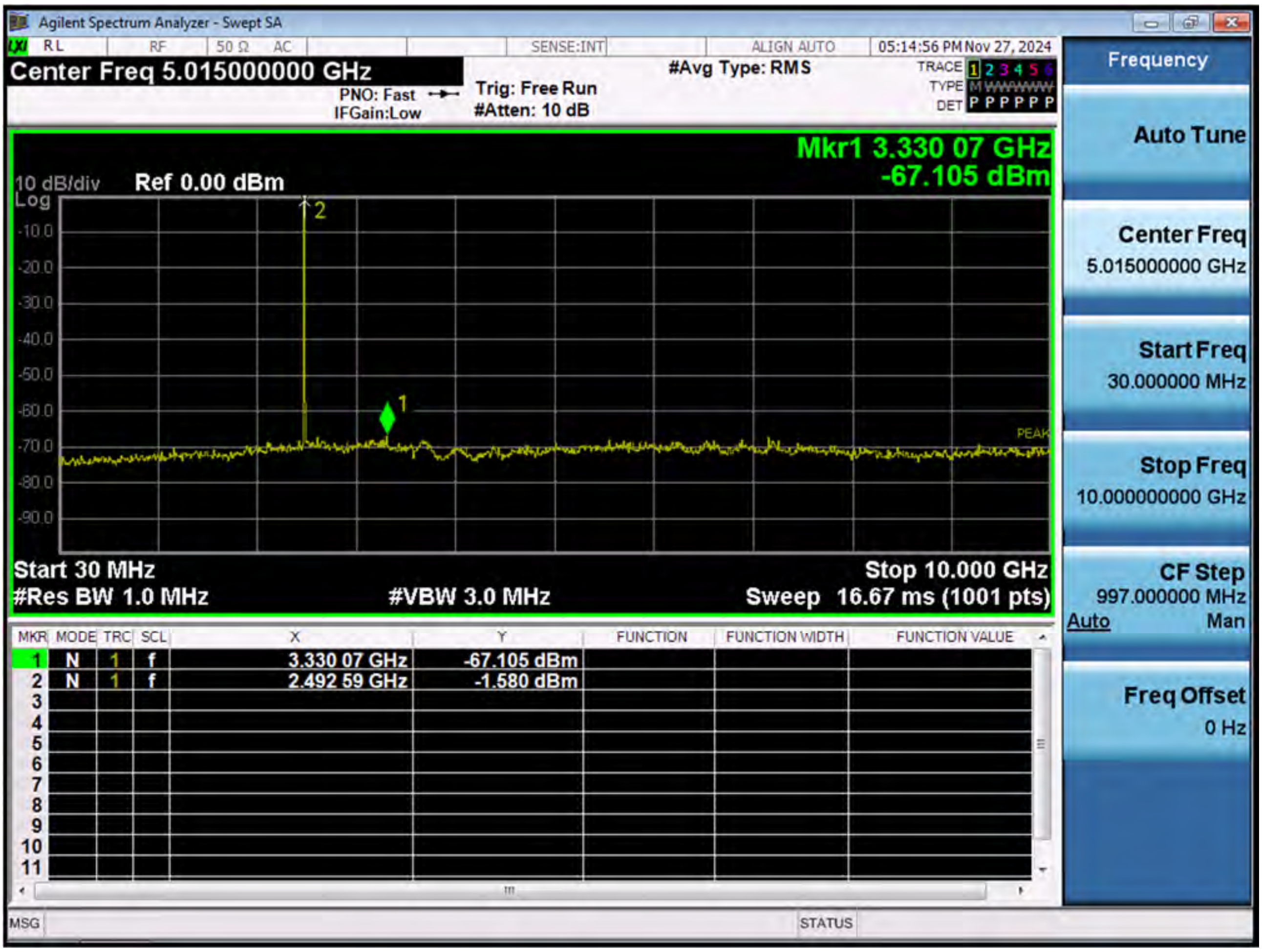
5 M_Conducted Spurious(30 M-10 G)_Mid_QPSK_1RB



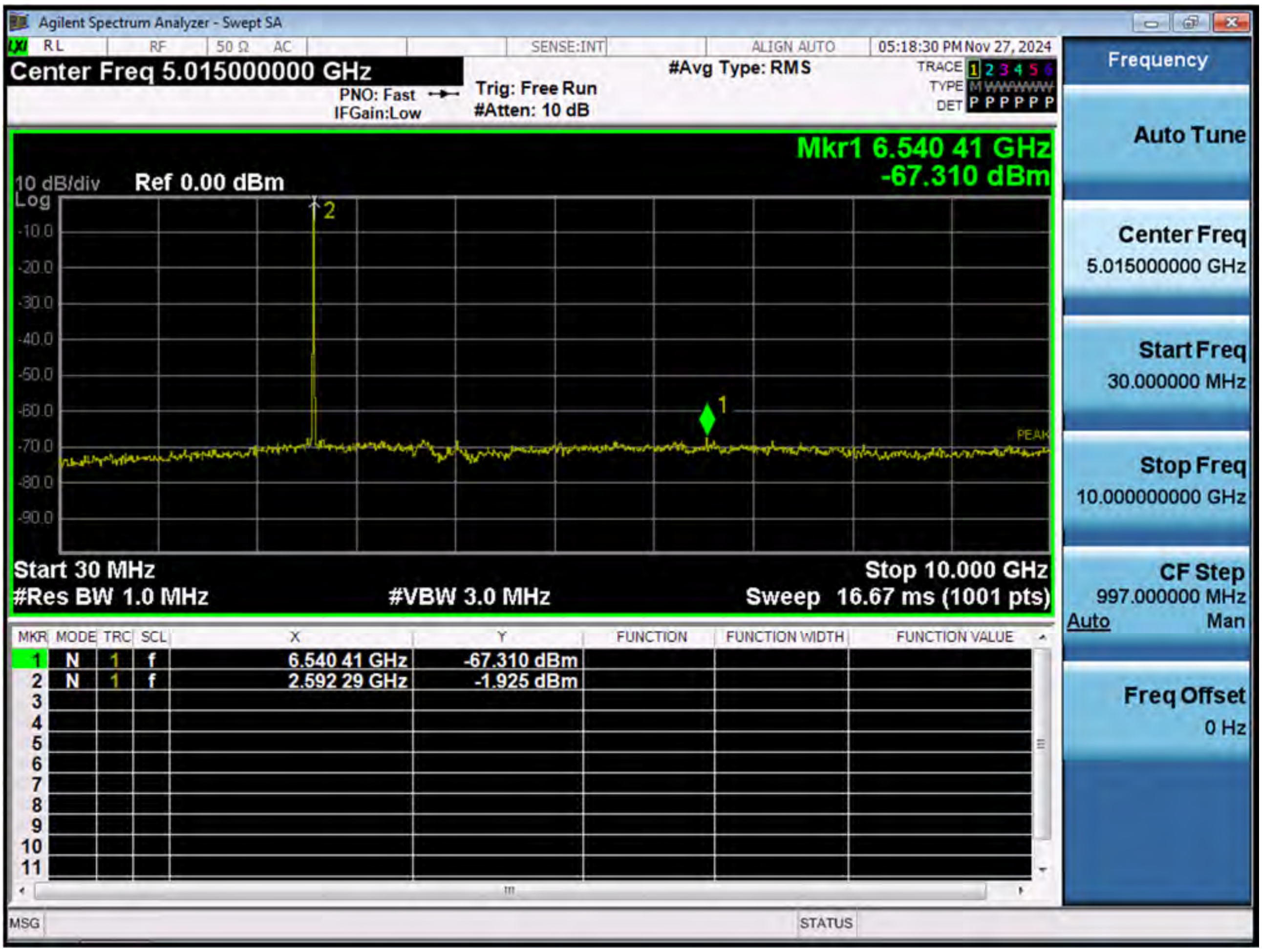
5 M_Conducted Spurious(30 M-10 G)_High_QPSK_1RB



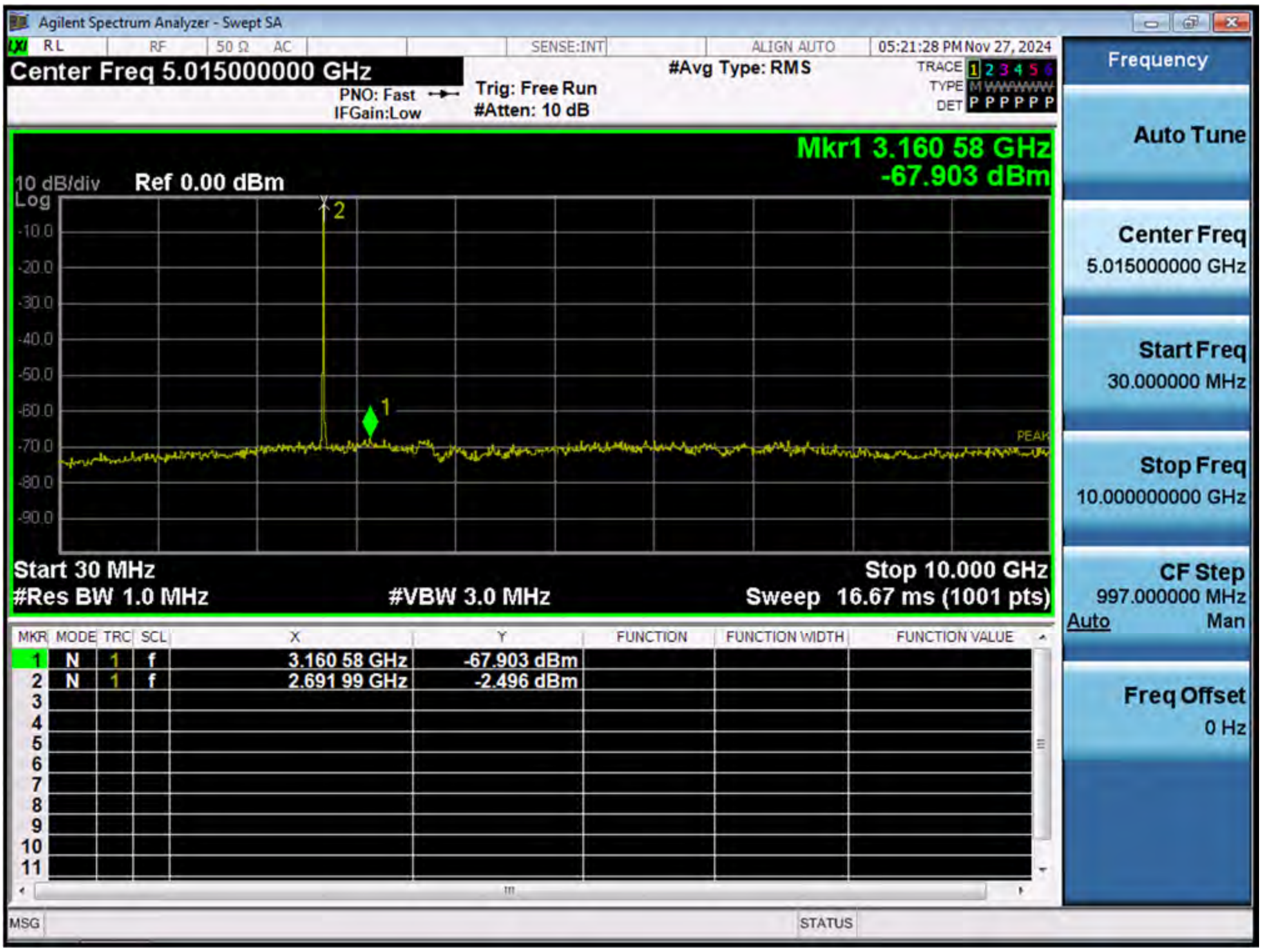
10 M_Conducted Spurious(30 M-10 G)_Low_QPSK_1RB



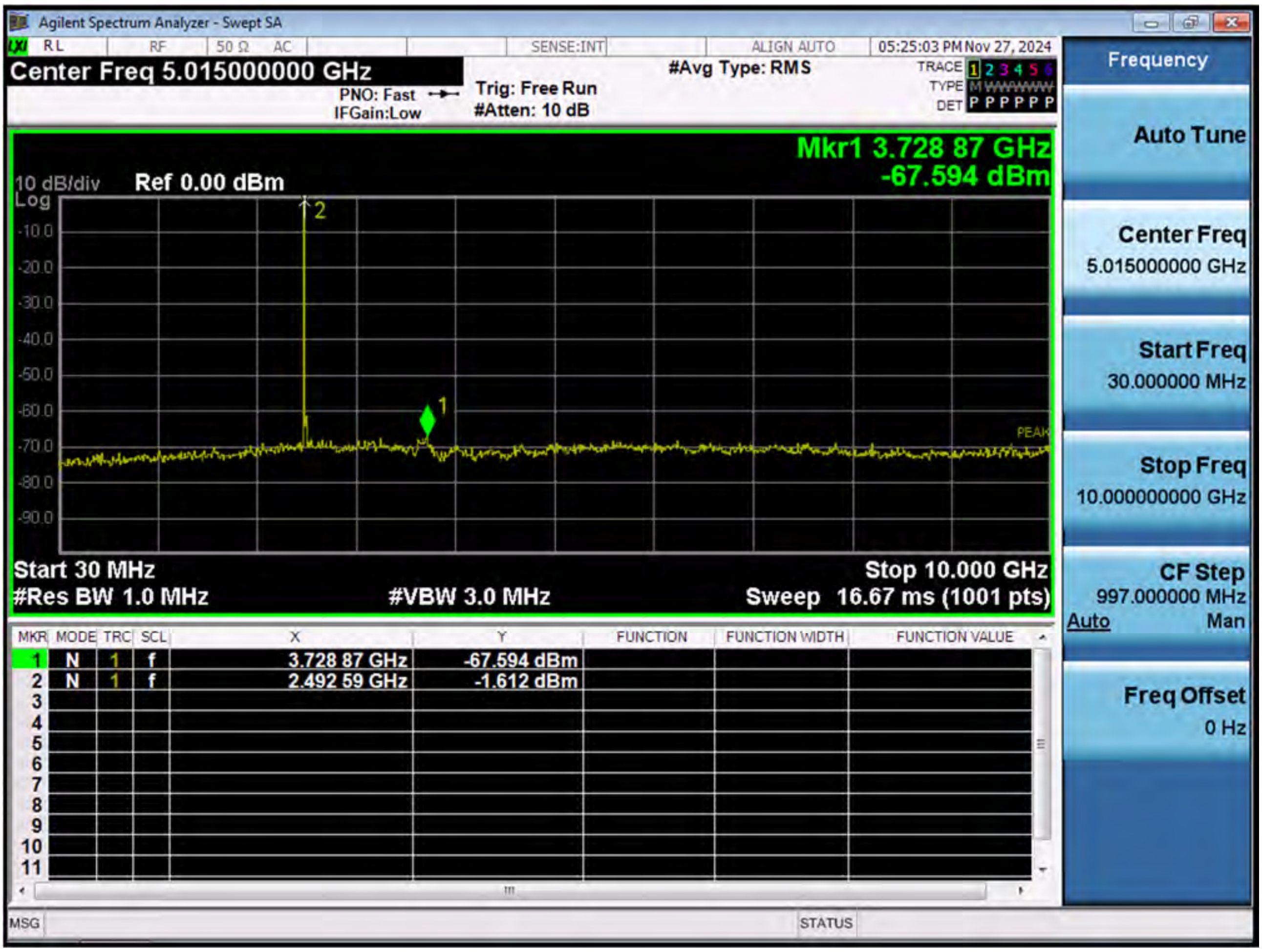
10 M_Conducted Spurious(30 M-10 G)_Mid_QPSK_1RB



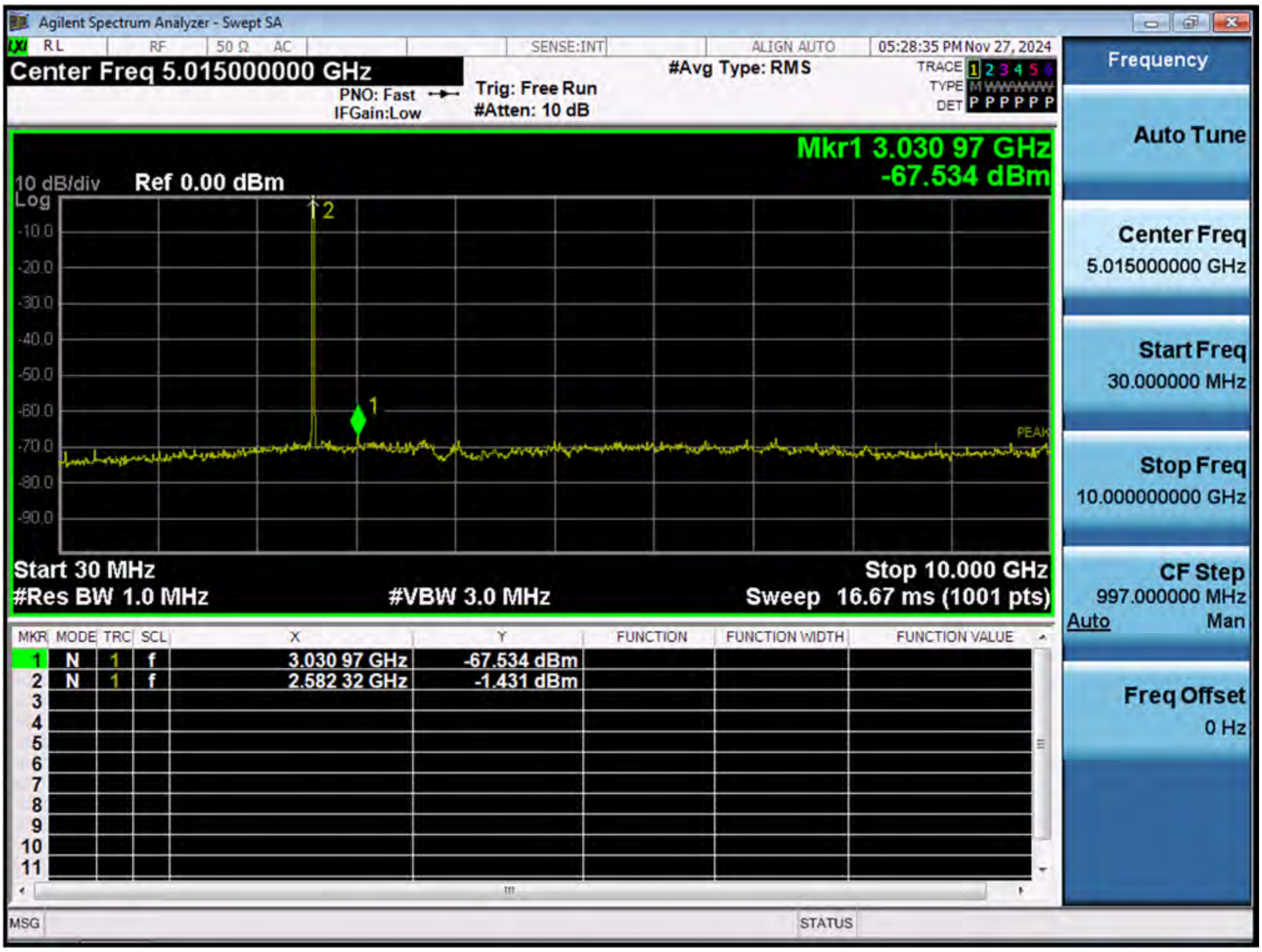
10 M_Conducted Spurious(30 M-10 G)_High_QPSK_1RB



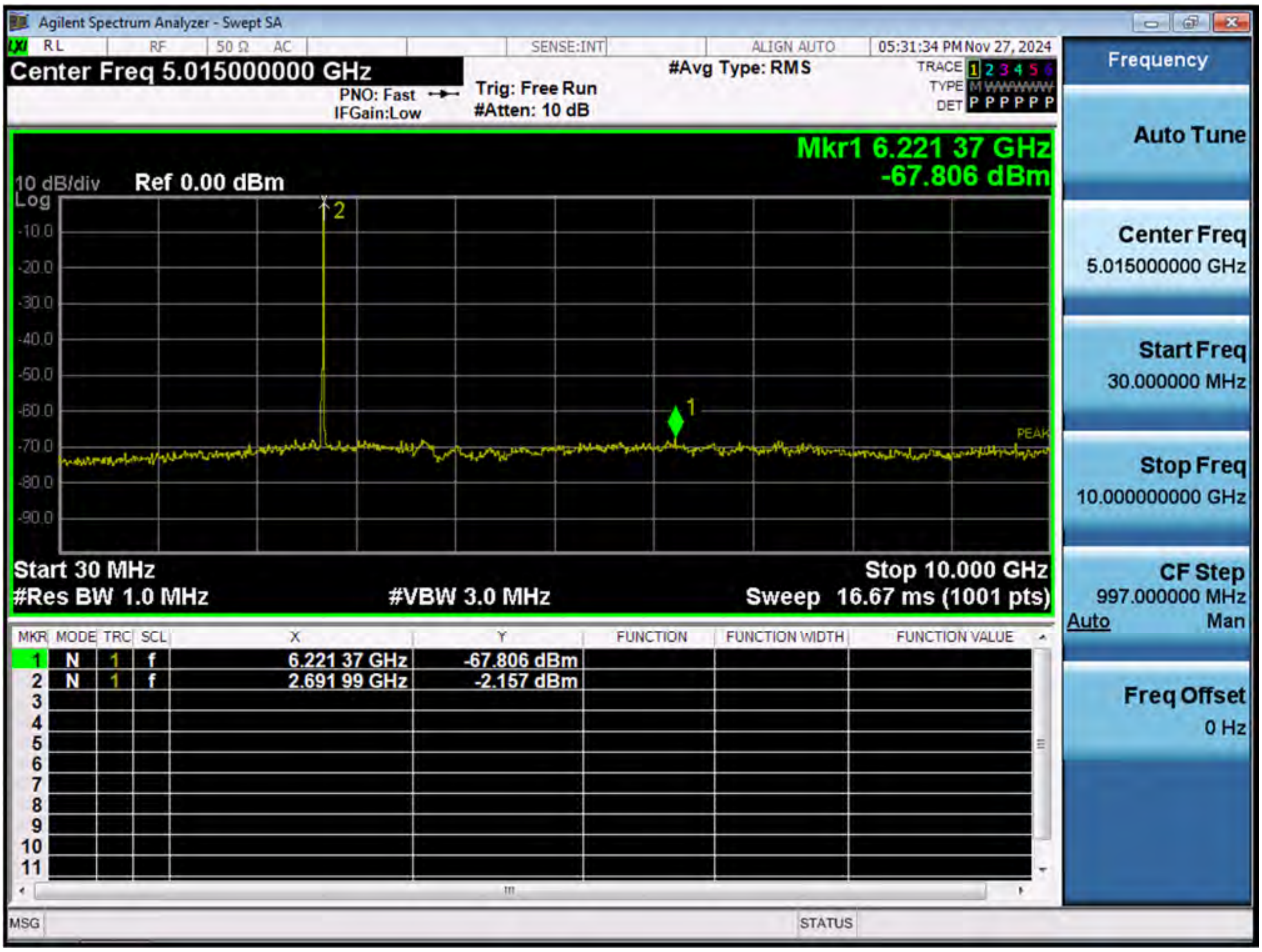
15 M_Conducted Spurious(30 M-10 G)_Low_QPSK_1RB



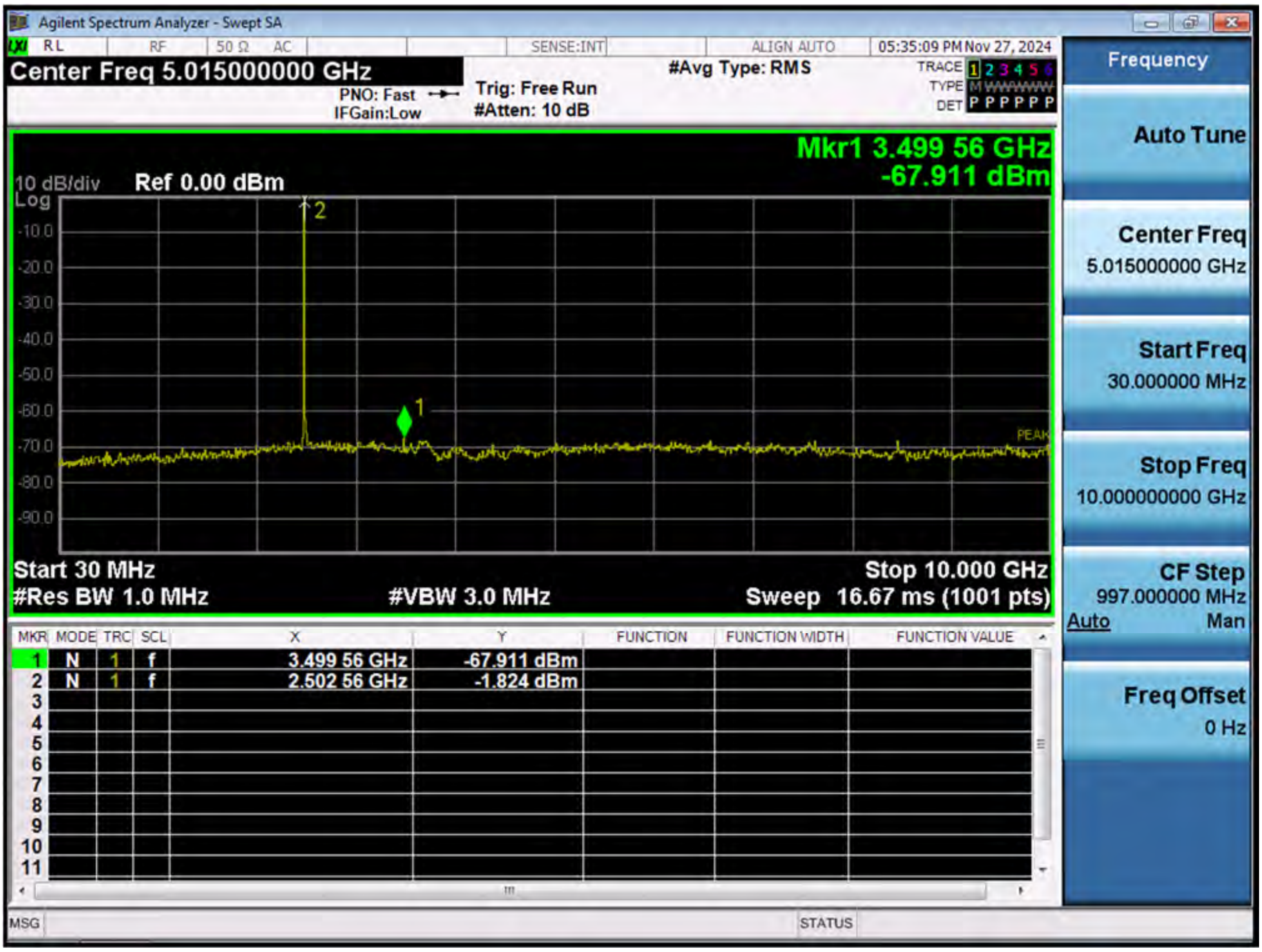
15 M_Conducted Spurious(30 M-10 G)_Mid_QPSK_1RB



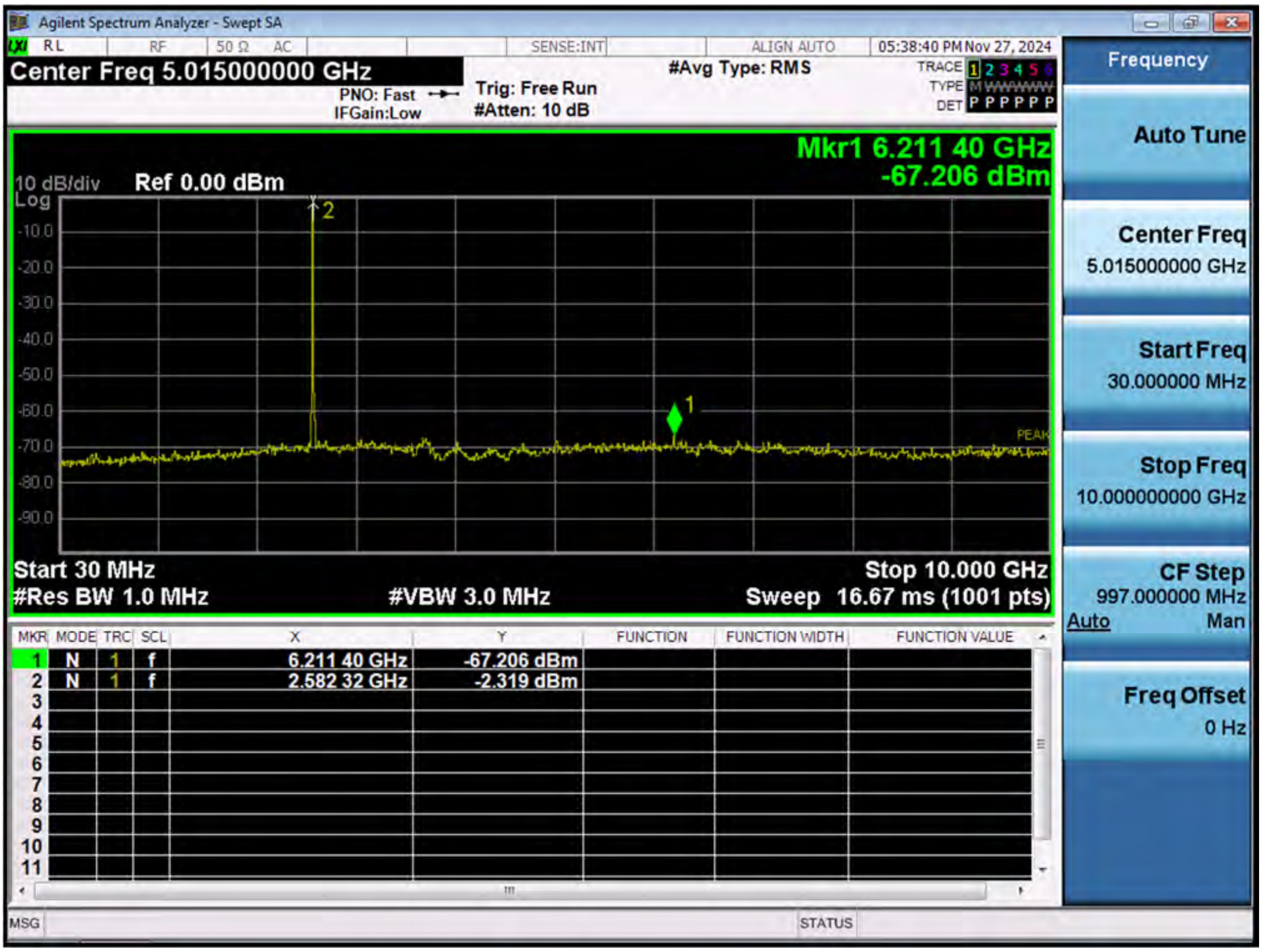
15 M_Conducted Spurious(30 M-10 G)_High_QPSK_1RB



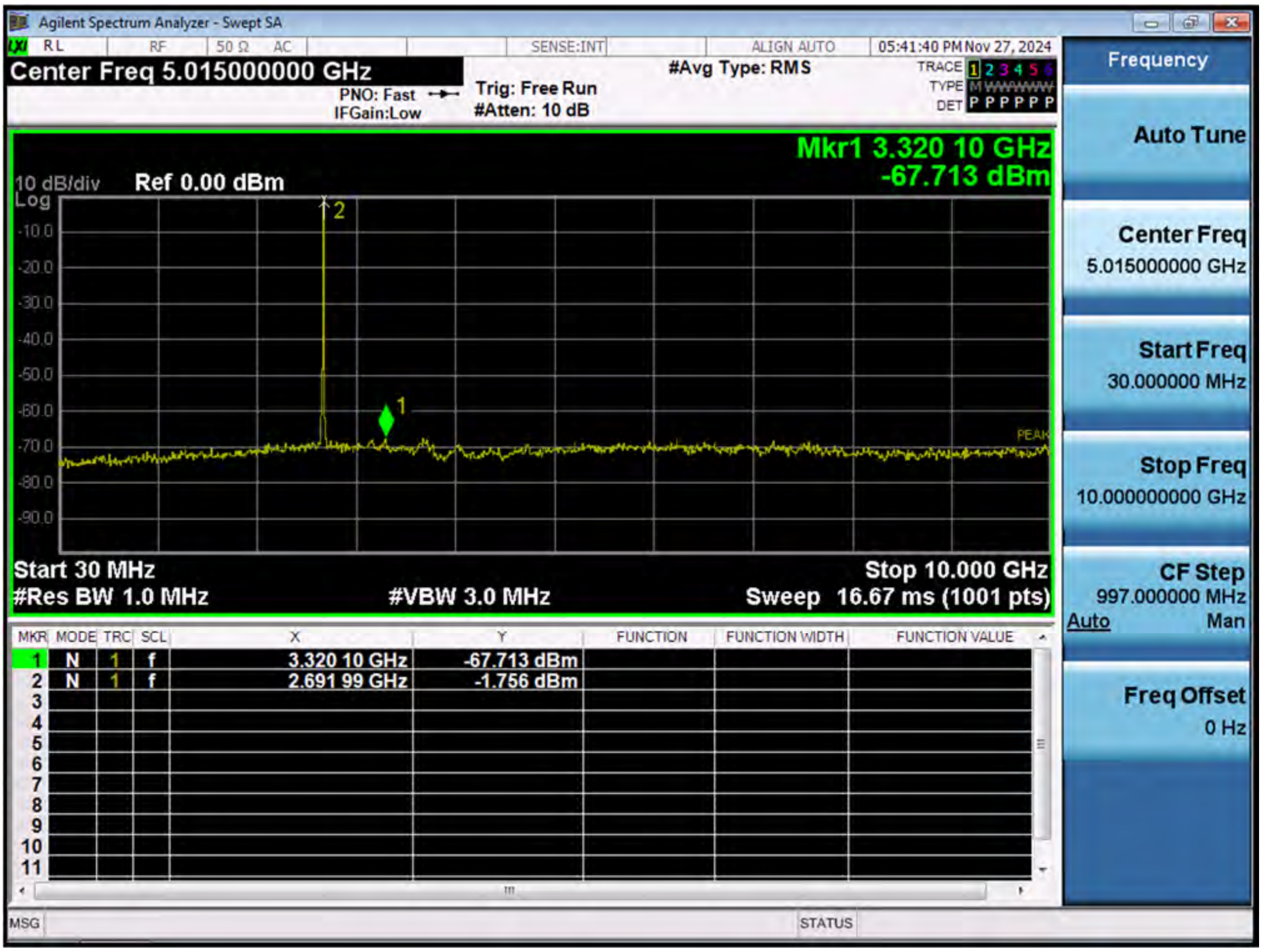
20 M_Conducted Spurious(30 M-10 G)_Low_QPSK_1RB



20 M_Conducted Spurious(30 M-10 G)_Mid_QPSK_1RB



20 M_Conducted Spurious(30 M-10 G)_High_QPSK_1RB



5 M_Conducted Spurious(Above10 G)_Low_QPSK_1RB

5 M_Conducted Spurious(Above10 G)_Mid_QPSK_1RB

5 M_Conducted Spurious(Above10 G)_High_QPSK_1RB

10 M_Conducted Spurious(Above10 G)_Low_QPSK_1RB

10 M_Conducted Spurious(Above10 G)_Mid_QPSK_1RB

10 M_Conducted Spurious(Above10 G)_High_QPSK_1RB

15 M_Conducted Spurious(Above10 G)_Low_QPSK_1RB

15 M_Conducted Spurious(Above10 G)_Mid_QPSK_1RB

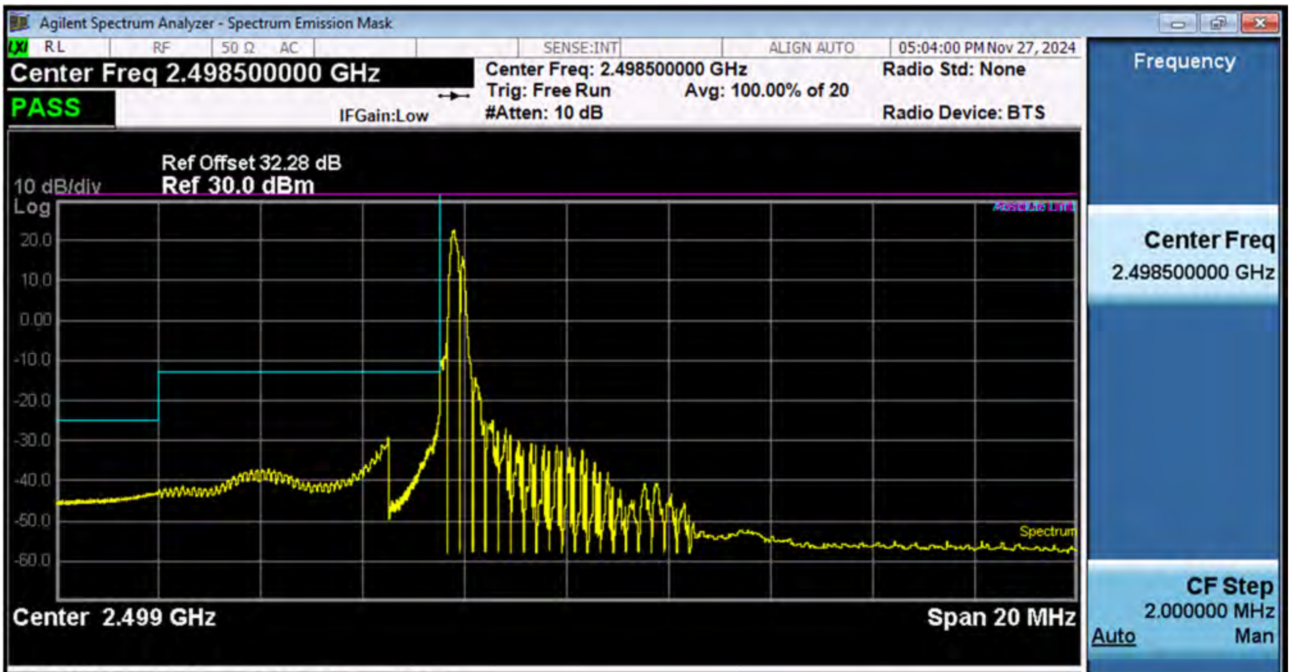
15 M_Conducted Spurious(Above10 G)_High_QPSK_1RB

20 M_Conducted Spurious(Above10 G)_Low_QPSK_1RB

20 M_Conducted Spurious(Above10 G)_Mid_QPSK_1RB

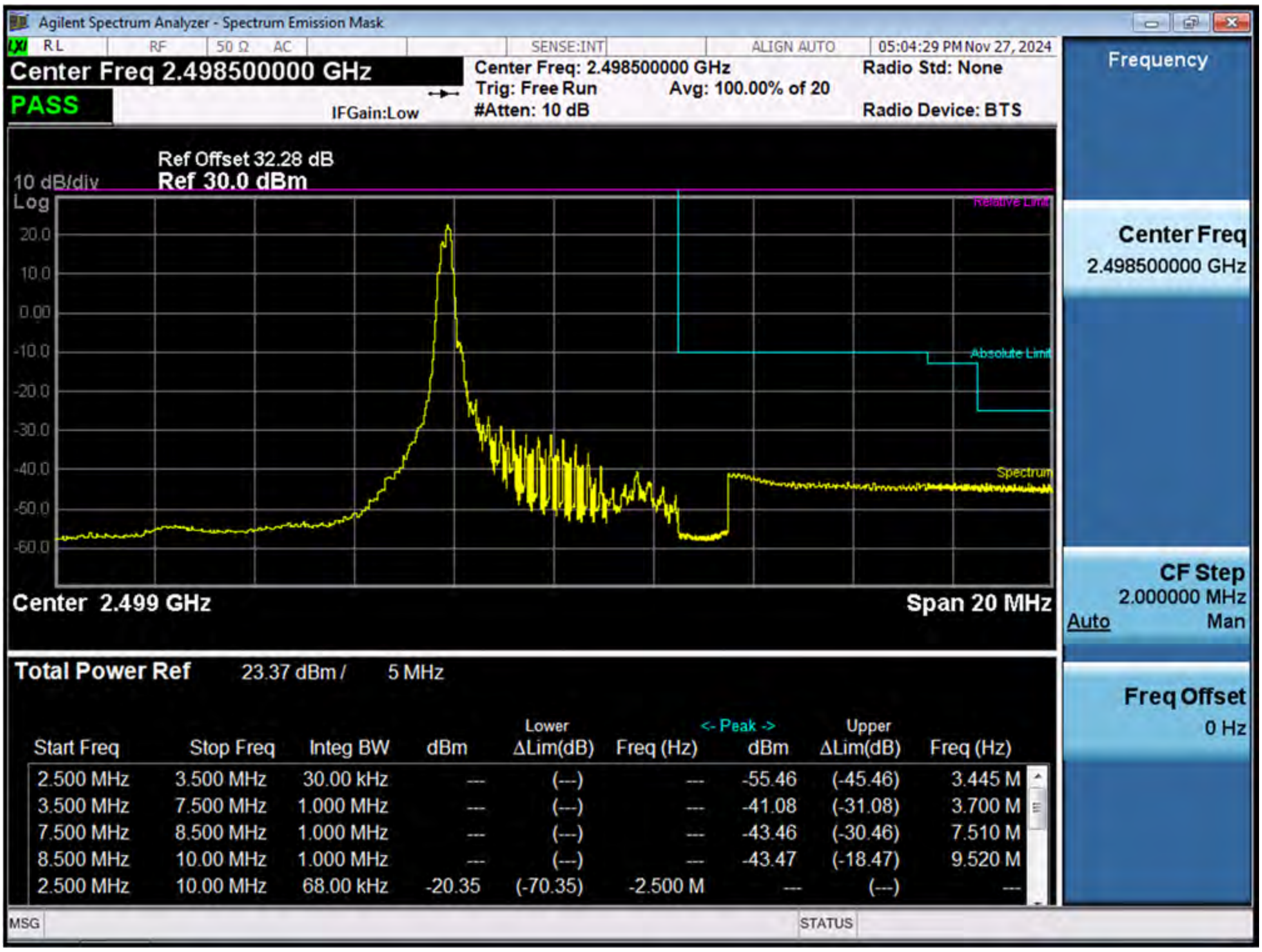
20 M_Conducted Spurious(Above10 G)_High_QPSK_1RB

5 M_Channel Edge_Lower_Low_QPSK_1RB



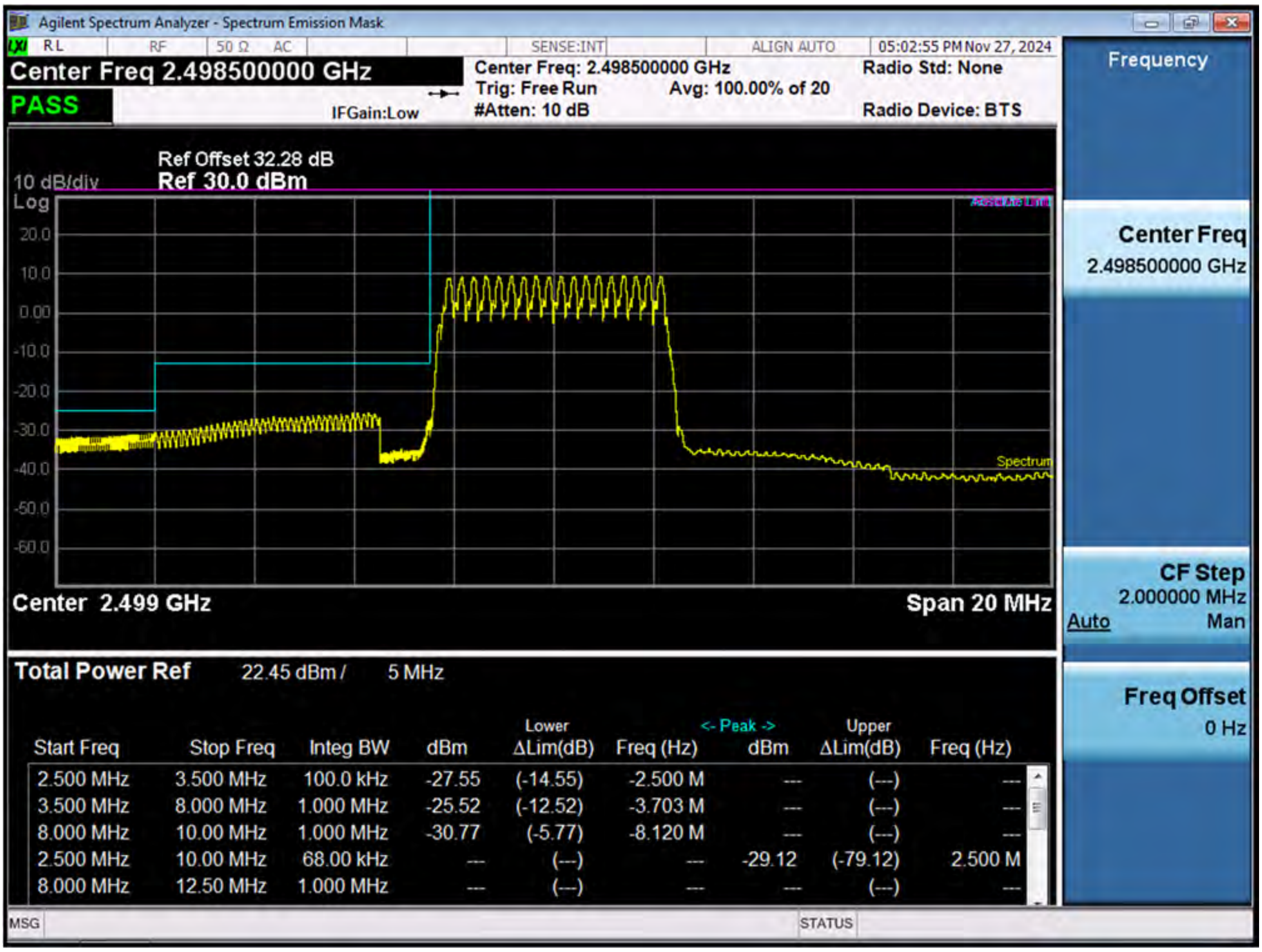
Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	dBm	Upper ΔLim(dB)	Freq (Hz)
2.500 MHz	3.500 MHz	30.00 kHz	-23.85	(-10.85)	-2.500 M	---	(---)	---
3.500 MHz	8.000 MHz	1.000 MHz	-29.29	(-16.29)	-3.500 M	---	(---)	---
8.000 MHz	10.00 MHz	1.000 MHz	-43.03	(-18.03)	-8.030 M	---	(---)	---
2.500 MHz	10.00 MHz	68.00 kHz	---	(---)	---	-52.31	(-102.31)	3.416 M
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---

5 M_Channel Edge_Upper_Low_QPSK_1RB



Start Freq	Stop Freq	Integ BW	Lower dBm	Lower ΔLim(dB)	Lower Freq (Hz)	Upper dBm	Upper ΔLim(dB)	Upper Freq (Hz)
2.500 MHz	3.500 MHz	30.00 kHz	---	(---)	---	-55.46	(-45.46)	3.445 M
3.500 MHz	7.500 MHz	1.000 MHz	---	(---)	---	-41.08	(-31.08)	3.700 M
7.500 MHz	8.500 MHz	1.000 MHz	---	(---)	---	-43.46	(-30.46)	7.510 M
8.500 MHz	10.00 MHz	1.000 MHz	---	(---)	---	-43.47	(-18.47)	9.520 M
2.500 MHz	10.00 MHz	68.00 kHz	-20.35	(-70.35)	-2.500 M	---	(---)	---

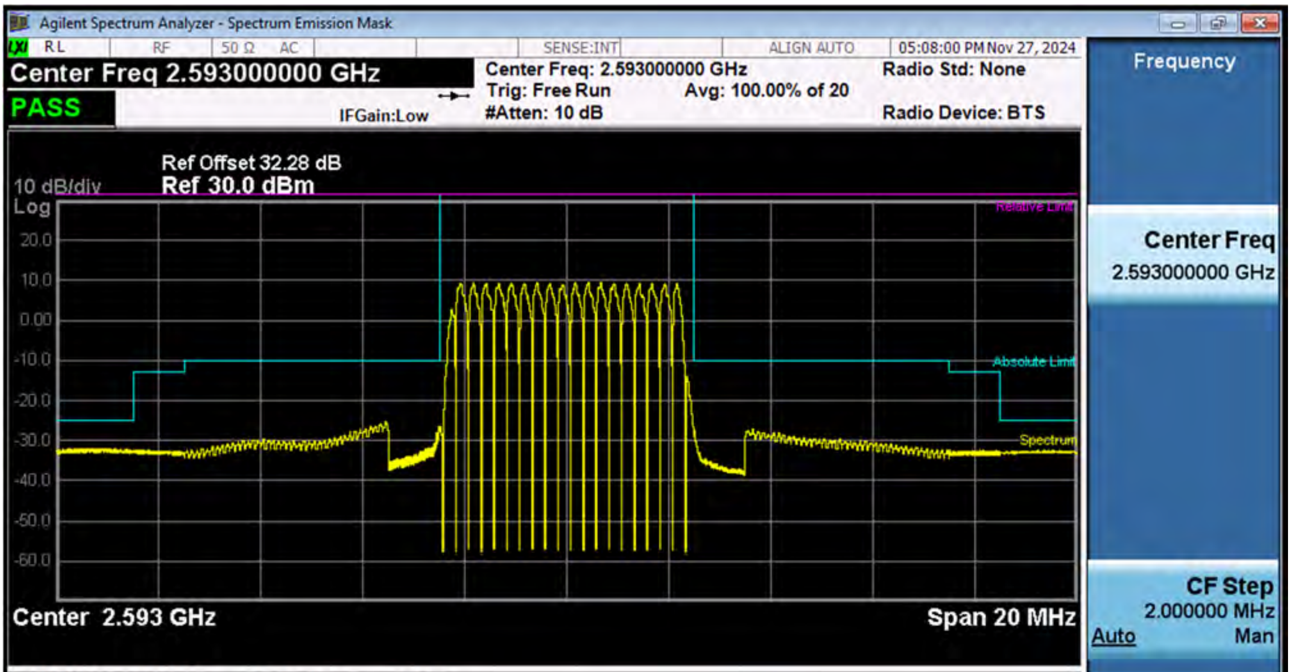
5 M_Channel Edge_Lower_Low_QPSK_FullRB



5 M_Channel Edge_Upper_Low_QPSK_FullRB

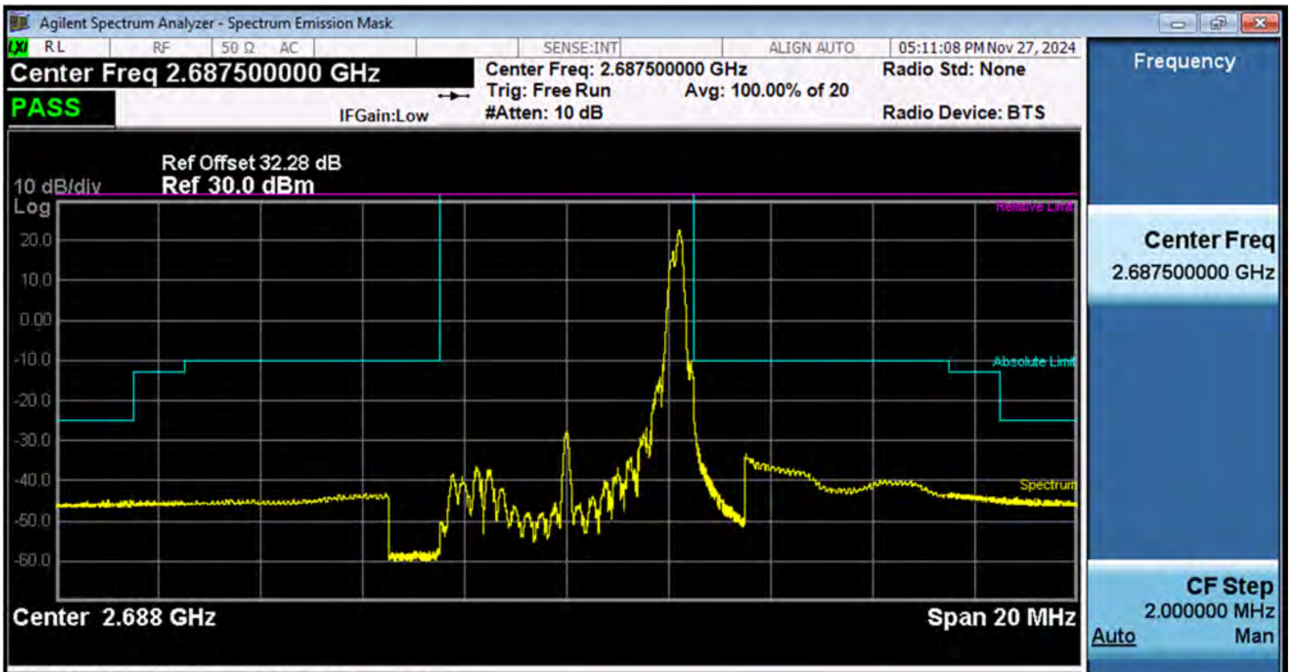
Start Freq	Stop Freq	Integ BW	Lower dBm	Lower ΔLim(dB)	Lower Freq (Hz)	Upper dBm	Upper ΔLim(dB)	Upper Freq (Hz)
2.500 MHz	3.500 MHz	100.0 kHz	---	(---)	---	-25.22	(-15.22)	2.500 M
3.500 MHz	7.500 MHz	1.000 MHz	---	(---)	---	-23.22	(-13.22)	3.580 M
7.500 MHz	8.500 MHz	1.000 MHz	---	(---)	---	-29.56	(-16.56)	7.530 M
8.500 MHz	10.00 MHz	1.000 MHz	---	(---)	---	-29.13	(-4.13)	9.985 M
2.500 MHz	10.00 MHz	68.00 kHz	-30.00	(-80.00)	-2.500 M	---	(---)	---

5 M_Channel Edge_Mid_QPSK_FullRB



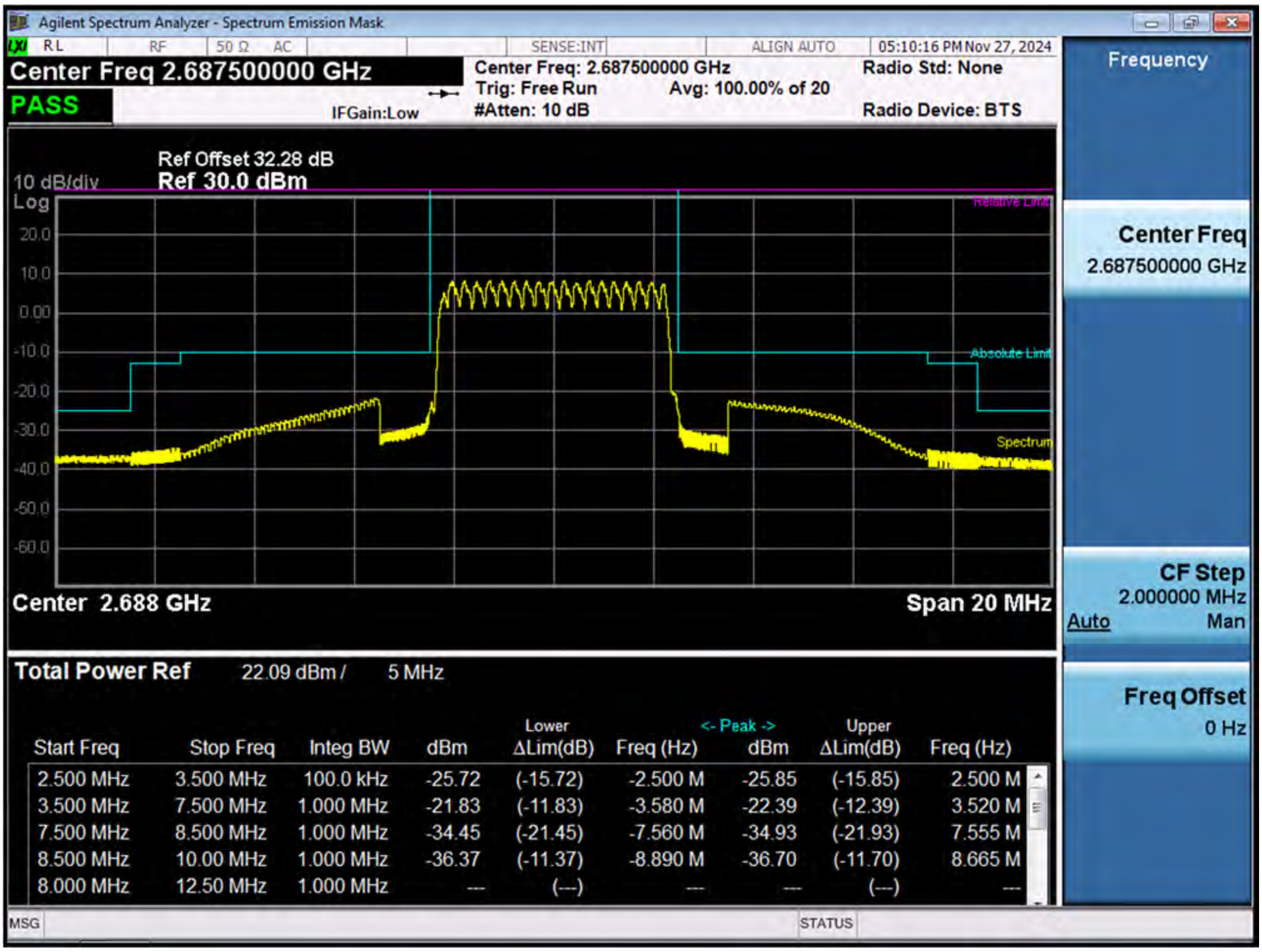
Start Freq	Stop Freq	Integ BW	Lower dBm	Lower ΔLim(dB)	Lower Freq (Hz)	Upper dBm	Upper ΔLim(dB)	Upper Freq (Hz)
2.500 MHz	3.500 MHz	100.0 kHz	-26.55	(-16.55)	-2.500 M	-27.46	(-17.46)	2.500 M
3.500 MHz	7.500 MHz	1.000 MHz	-25.23	(-15.23)	-3.540 M	-27.27	(-17.27)	3.660 M
7.500 MHz	8.500 MHz	1.000 MHz	-32.45	(-19.45)	-8.470 M	-32.53	(-19.53)	8.435 M
8.500 MHz	10.00 MHz	1.000 MHz	-32.01	(-7.01)	-9.430 M	-32.47	(-7.47)	9.370 M
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---

5 M_Channel Edge_High_QPSK_1RB



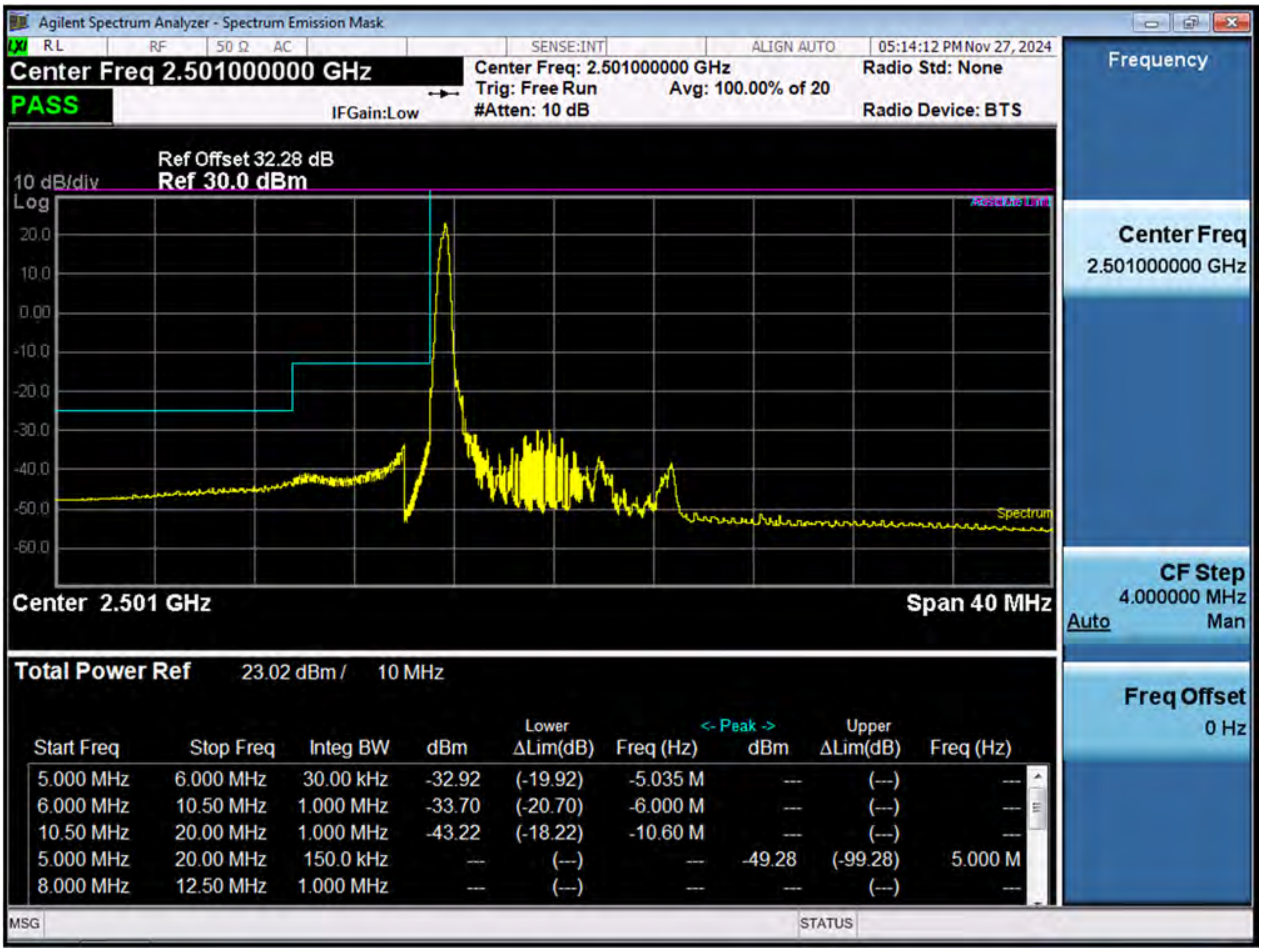
Start Freq	Stop Freq	Integ BW	dBm (Lower)	ΔLim(dB) (Lower)	Freq (Hz) (Lower)	dBm (Upper)	ΔLim(dB) (Upper)	Freq (Hz) (Upper)
2.500 MHz	3.500 MHz	30.00 kHz	-56.85	(-46.85)	-2.515 M	-25.66	(-15.66)	2.500 M
3.500 MHz	7.500 MHz	1.000 MHz	-43.39	(-33.39)	-3.940 M	-33.21	(-23.21)	3.520 M
7.500 MHz	8.500 MHz	1.000 MHz	-45.02	(-32.02)	-7.675 M	-43.03	(-30.03)	7.555 M
8.500 MHz	10.00 MHz	1.000 MHz	-44.74	(-19.74)	-8.553 M	-44.30	(-19.30)	8.590 M
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---

5 M_Channel Edge_High_QPSK_FullRB



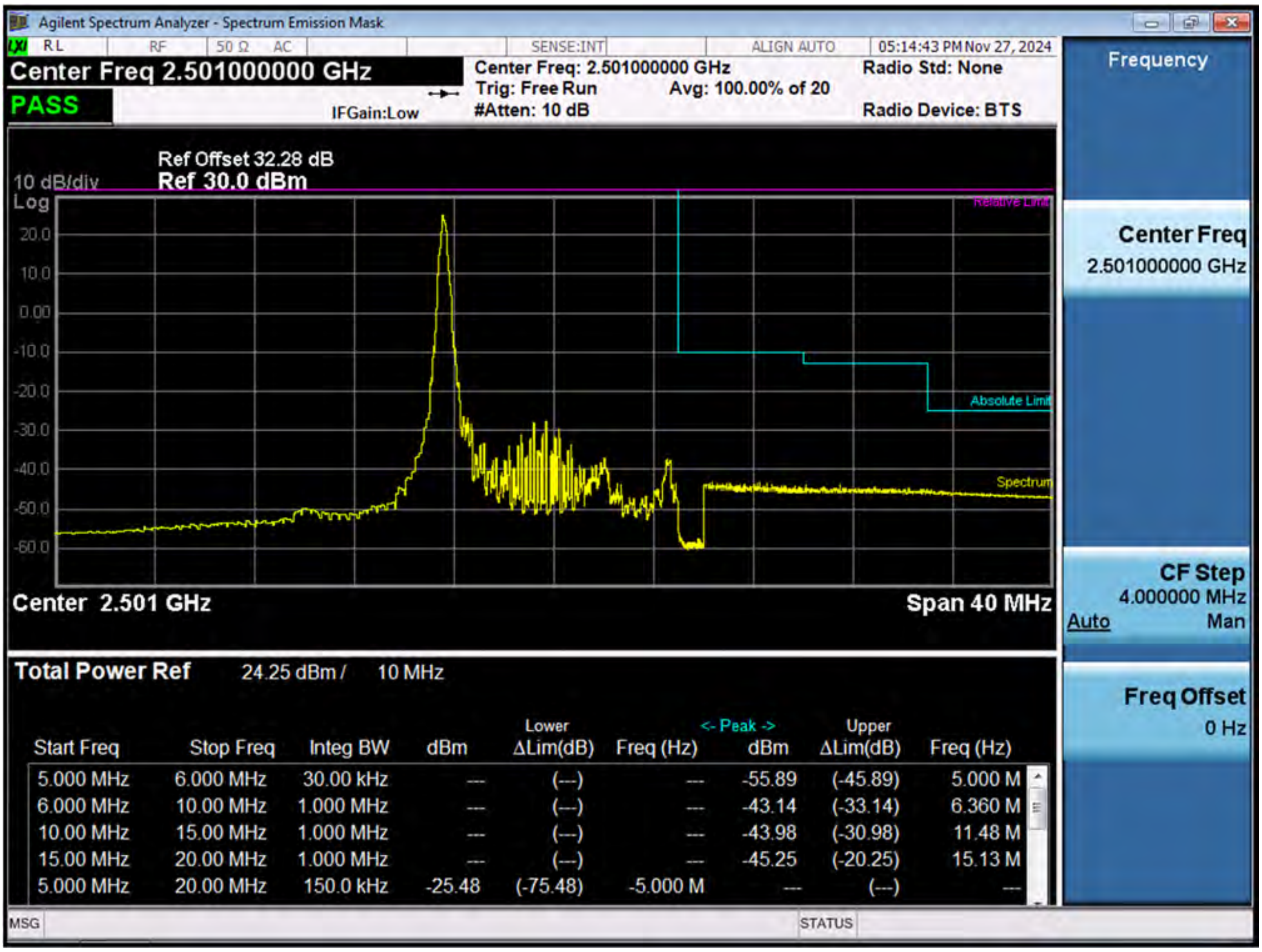
Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	dBm	Upper ΔLim(dB)	Freq (Hz)
2.500 MHz	3.500 MHz	100.0 kHz	-25.72	(-15.72)	-2.500 M	-25.85	(-15.85)	2.500 M
3.500 MHz	7.500 MHz	1.000 MHz	-21.83	(-11.83)	-3.580 M	-22.39	(-12.39)	3.520 M
7.500 MHz	8.500 MHz	1.000 MHz	-34.45	(-21.45)	-7.560 M	-34.93	(-21.93)	7.555 M
8.500 MHz	10.00 MHz	1.000 MHz	-36.37	(-11.37)	-8.890 M	-36.70	(-11.70)	8.665 M
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---

10 M_Channel Edge_Lower_Low_QPSK_1RB



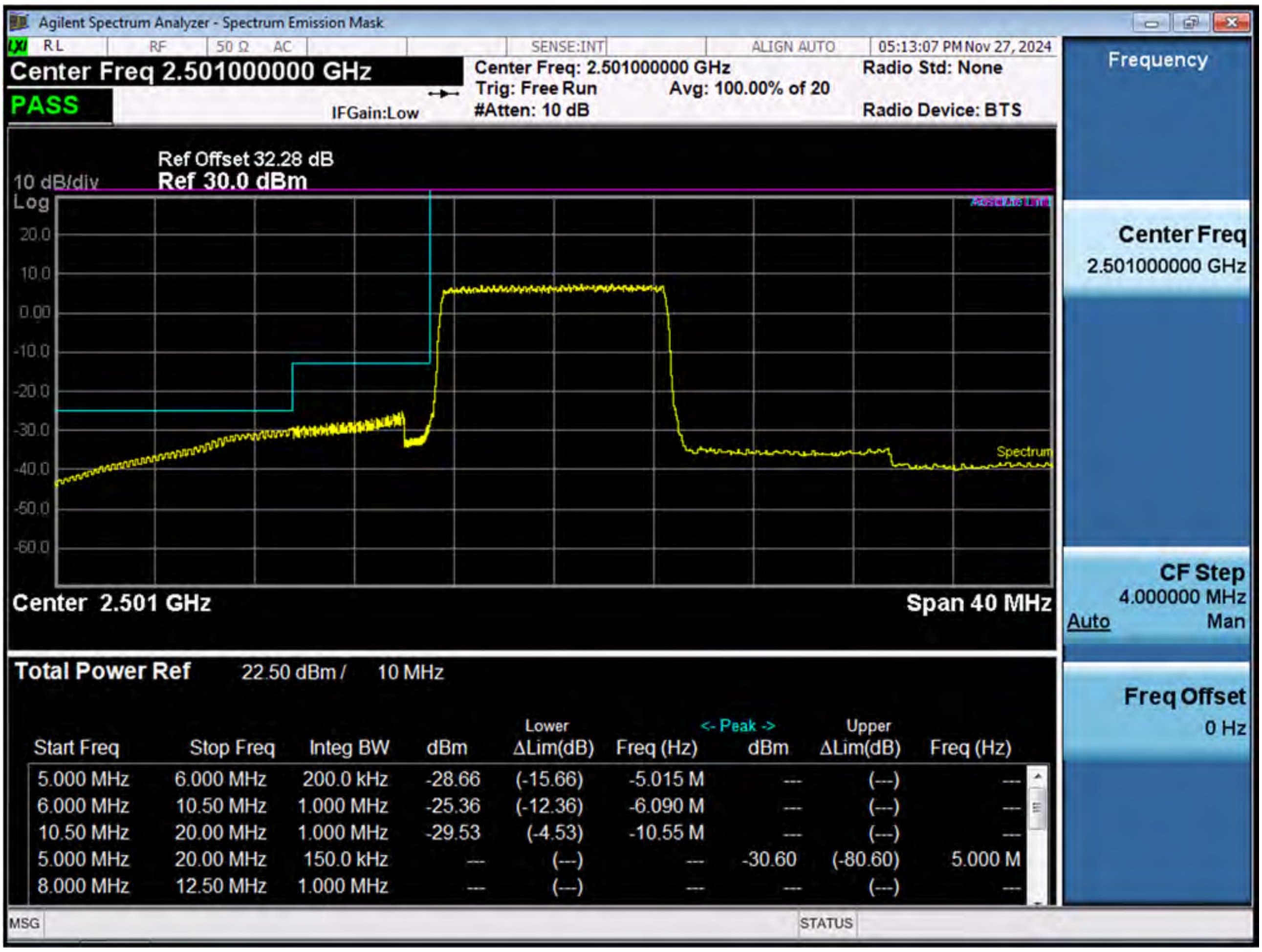
Start Freq	Stop Freq	Integ BW	Lower dBm	Lower ΔLim(dB)	Lower Freq (Hz)	Upper dBm	Upper ΔLim(dB)	Upper Freq (Hz)
5.000 MHz	6.000 MHz	30.00 kHz	-32.92	(-19.92)	-5.035 M	---	(---)	---
6.000 MHz	10.50 MHz	1.000 MHz	-33.70	(-20.70)	-6.000 M	---	(---)	---
10.50 MHz	20.00 MHz	1.000 MHz	-43.22	(-18.22)	-10.60 M	---	(---)	---
5.000 MHz	20.00 MHz	150.0 kHz	---	(---)	---	-49.28	(-99.28)	5.000 M
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---

10 M_Channel Edge_Upper_Low_QPSK_1RB



Start Freq	Stop Freq	Integ BW	Lower dBm	Lower ΔLim(dB)	Lower Freq (Hz)	Upper dBm	Upper ΔLim(dB)	Upper Freq (Hz)
5.000 MHz	6.000 MHz	30.00 kHz	---	(---)	---	-55.89	(-45.89)	5.000 M
6.000 MHz	10.00 MHz	1.000 MHz	---	(---)	---	-43.14	(-33.14)	6.360 M
10.00 MHz	15.00 MHz	1.000 MHz	---	(---)	---	-43.98	(-30.98)	11.48 M
15.00 MHz	20.00 MHz	1.000 MHz	---	(---)	---	-45.25	(-20.25)	15.13 M
5.000 MHz	20.00 MHz	150.0 kHz	-25.48	(-75.48)	-5.000 M	---	(---)	---

10 M_Channel Edge_Lower_Low_QPSK_FullRB

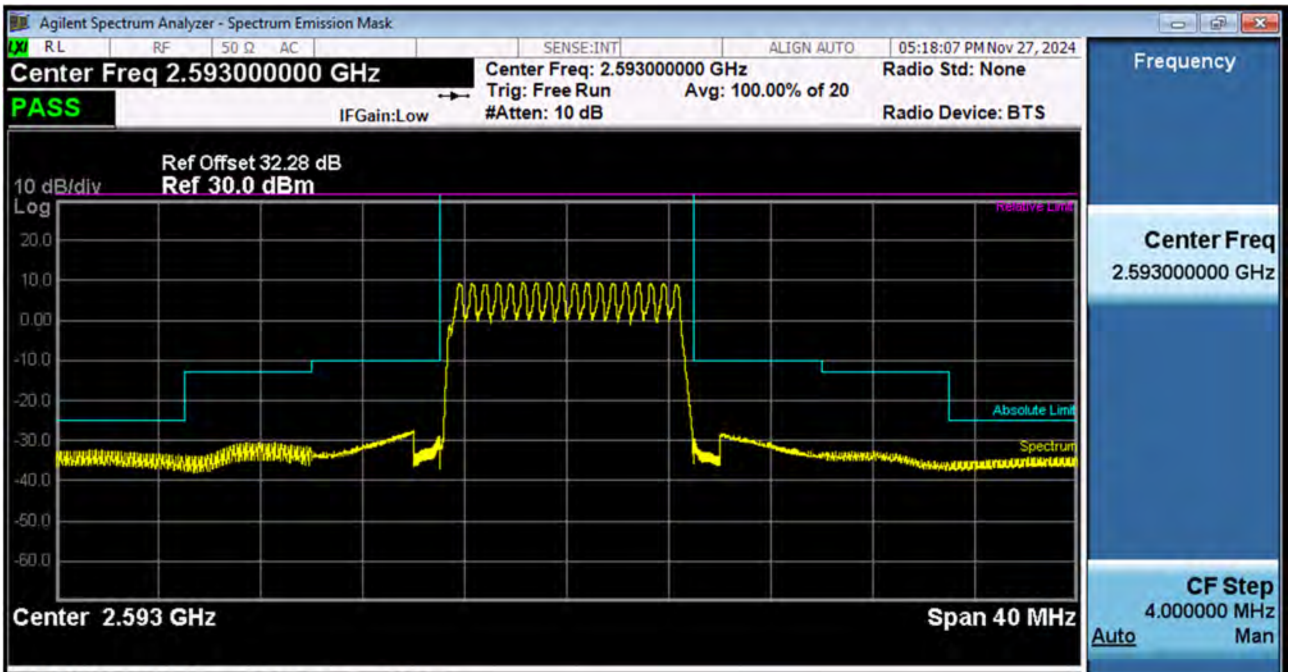


Start Freq	Stop Freq	Integ BW	Lower dBm	Lower ΔLim(dB)	Lower Freq (Hz)	Upper dBm	Upper ΔLim(dB)	Upper Freq (Hz)
5.000 MHz	6.000 MHz	200.0 kHz	-28.66	(-15.66)	-5.015 M	---	(---)	---
6.000 MHz	10.50 MHz	1.000 MHz	-25.36	(-12.36)	-6.090 M	---	(---)	---
10.50 MHz	20.00 MHz	1.000 MHz	-29.53	(-4.53)	-10.55 M	---	(---)	---
5.000 MHz	20.00 MHz	150.0 kHz	---	(---)	---	-30.60	(-80.60)	5.000 M
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---

10 M_Channel Edge_Upper_Low_QPSK_FullRB

Start Freq	Stop Freq	Integ BW	Lower dBm	Lower ΔLim(dB)	Lower Freq (Hz)	Upper dBm	Upper ΔLim(dB)	Upper Freq (Hz)
5.000 MHz	6.000 MHz	200.0 kHz	---	(---)	---	-28.16	(-18.16)	5.005 M
6.000 MHz	10.00 MHz	1.000 MHz	---	(---)	---	-25.96	(-15.96)	6.400 M
10.00 MHz	15.00 MHz	1.000 MHz	---	(---)	---	-25.91	(-12.91)	10.58 M
15.00 MHz	20.00 MHz	1.000 MHz	---	(---)	---	-30.01	(-5.01)	18.08 M
5.000 MHz	20.00 MHz	150.0 kHz	-30.67	(-80.67)	-5.000 M	---	(---)	---

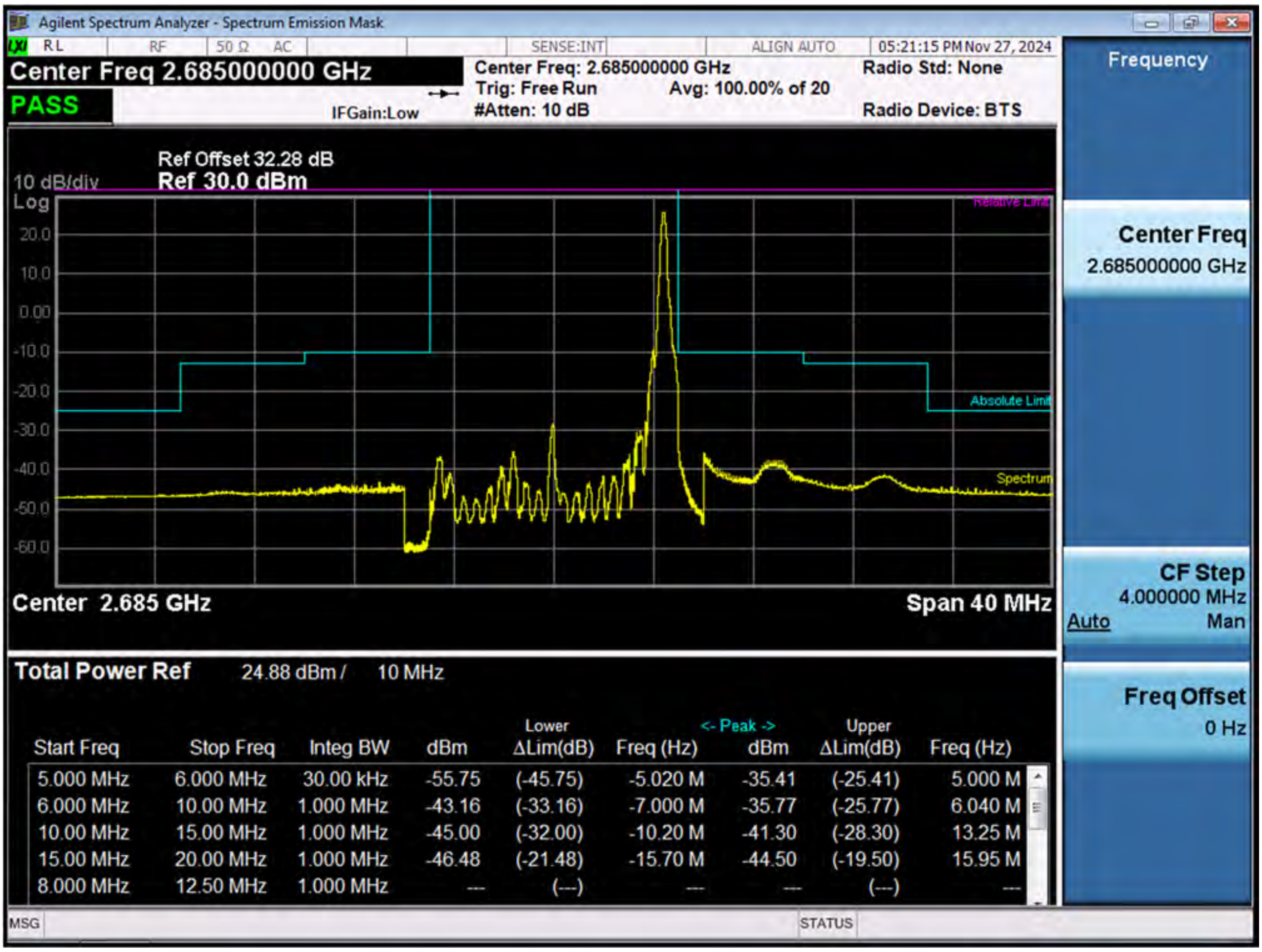
10 M_Channel Edge_Mid_QPSK_FullRB



Total Power Ref 22.51 dBm / 10 MHz

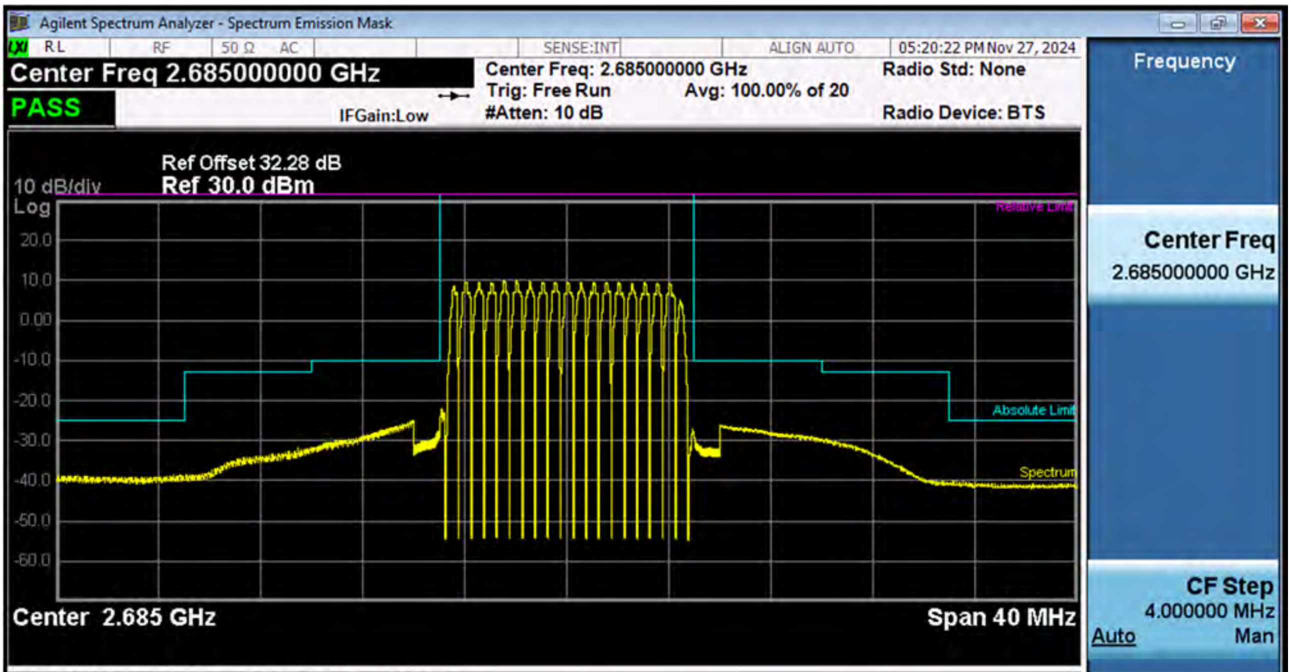
Start Freq	Stop Freq	Integ BW	Lower dBm	Lower ΔLim(dB)	Lower Peak Freq (Hz)	Upper dBm	Upper ΔLim(dB)	Upper Peak Freq (Hz)
5.000 MHz	6.000 MHz	200.0 kHz	-29.01	(-19.01)	-5.005 M	-29.67	(-19.67)	5.000 M
6.000 MHz	10.00 MHz	1.000 MHz	-27.46	(-17.46)	-6.000 M	-28.29	(-18.29)	6.060 M
10.00 MHz	15.00 MHz	1.000 MHz	-30.60	(-17.60)	-12.43 M	-32.69	(-19.69)	11.18 M
15.00 MHz	20.00 MHz	1.000 MHz	-32.47	(-7.47)	-18.45 M	-34.22	(-9.22)	19.70 M
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---

10 M_Channel Edge_High_QPSK_1RB



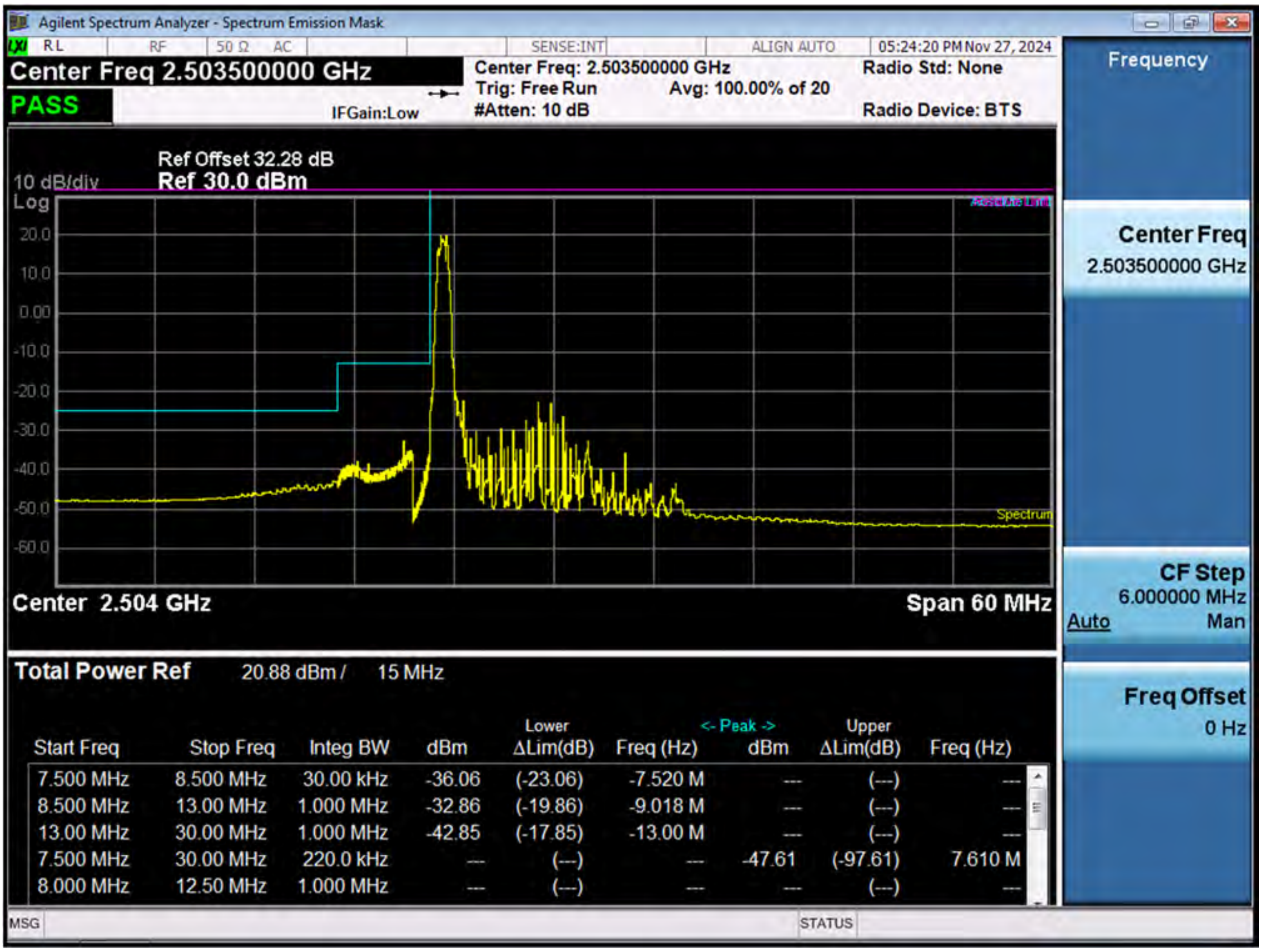
Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	dBm	Upper ΔLim(dB)	Freq (Hz)
5.000 MHz	6.000 MHz	30.00 kHz	-55.75	(-45.75)	-5.020 M	-35.41	(-25.41)	5.000 M
6.000 MHz	10.00 MHz	1.000 MHz	-43.16	(-33.16)	-7.000 M	-35.77	(-25.77)	6.040 M
10.00 MHz	15.00 MHz	1.000 MHz	-45.00	(-32.00)	-10.20 M	-41.30	(-28.30)	13.25 M
15.00 MHz	20.00 MHz	1.000 MHz	-46.48	(-21.48)	-15.70 M	-44.50	(-19.50)	15.95 M
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---

10 M_Channel Edge_High_QPSK_FullRB



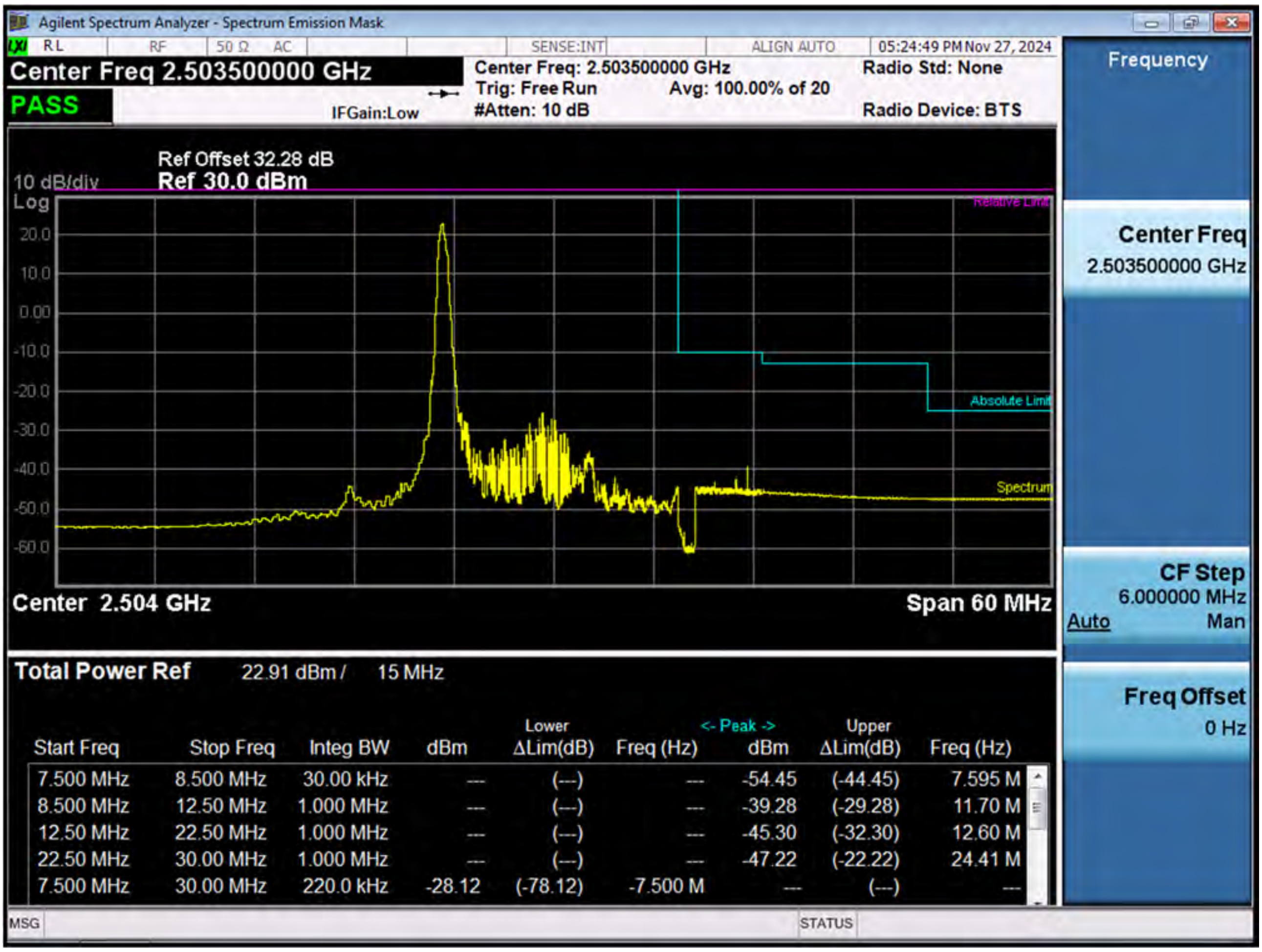
Start Freq	Stop Freq	Integ BW	Lower dBm	Lower ΔLim(dB)	Lower Peak Freq (Hz)	Upper dBm	Upper ΔLim(dB)	Upper Peak Freq (Hz)
5.000 MHz	6.000 MHz	200.0 kHz	-27.84	(-17.84)	-5.015 M	-29.25	(-19.25)	5.015 M
6.000 MHz	10.00 MHz	1.000 MHz	-25.02	(-15.02)	-6.040 M	-26.14	(-16.14)	6.000 M
10.00 MHz	15.00 MHz	1.000 MHz	-31.80	(-18.80)	-10.03 M	-29.52	(-16.52)	10.03 M
15.00 MHz	20.00 MHz	1.000 MHz	-38.73	(-13.73)	-15.15 M	-40.21	(-15.21)	15.15 M
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---

15 M_Channel Edge_Lower_Low_QPSK_1RB



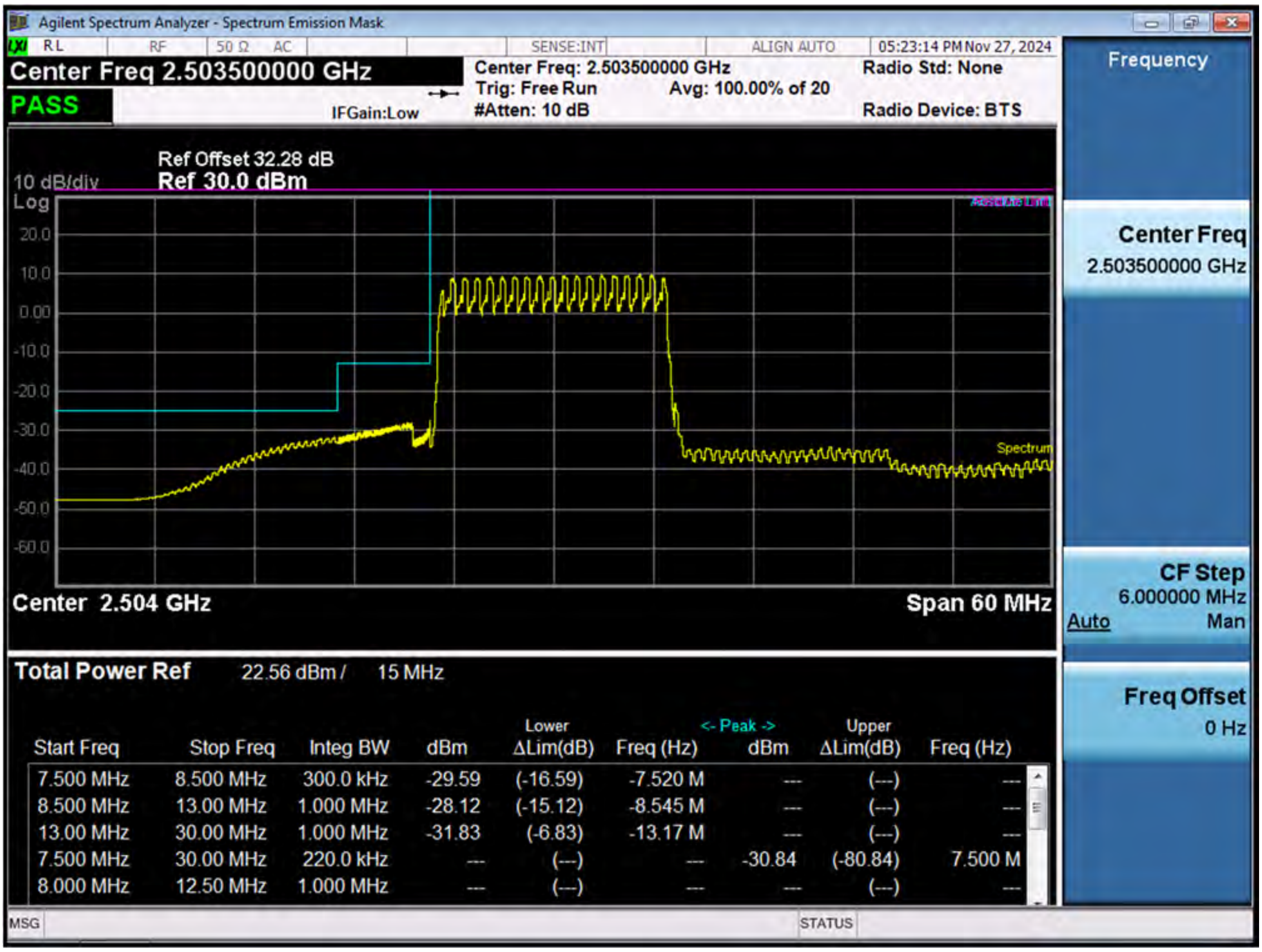
Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	dBm	Upper ΔLim(dB)	Freq (Hz)
7.500 MHz	8.500 MHz	30.00 kHz	-36.06	(-23.06)	-7.520 M	---	(---)	---
8.500 MHz	13.00 MHz	1.000 MHz	-32.86	(-19.86)	-9.018 M	---	(---)	---
13.00 MHz	30.00 MHz	1.000 MHz	-42.85	(-17.85)	-13.00 M	---	(---)	---
7.500 MHz	30.00 MHz	220.0 kHz	---	(---)	---	-47.61	(-97.61)	7.610 M
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---

15 M_Channel Edge_Upper_Low_QPSK_1RB



Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	Peak dBm	Upper ΔLim(dB)	Freq (Hz)
7.500 MHz	8.500 MHz	30.00 kHz	---	(---)	---	-54.45	(-44.45)	7.595 M
8.500 MHz	12.50 MHz	1.000 MHz	---	(---)	---	-39.28	(-29.28)	11.70 M
12.50 MHz	22.50 MHz	1.000 MHz	---	(---)	---	-45.30	(-32.30)	12.60 M
22.50 MHz	30.00 MHz	1.000 MHz	---	(---)	---	-47.22	(-22.22)	24.41 M
7.500 MHz	30.00 MHz	220.0 kHz	-28.12	(-78.12)	-7.500 M	---	(---)	---

15 M_Channel Edge_Lower_Low_QPSK_FullRB

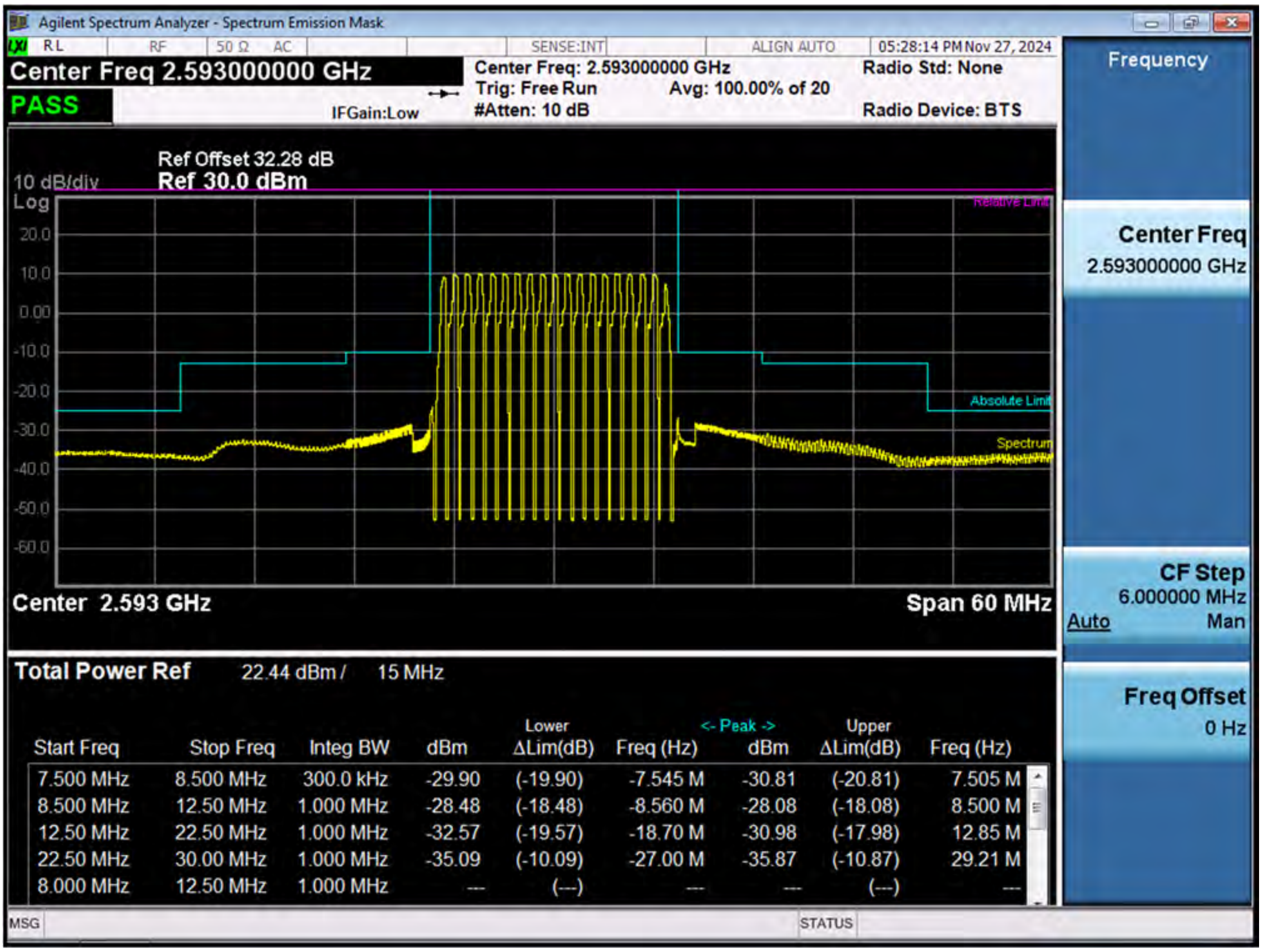


Start Freq	Stop Freq	Integ BW	Lower dBm	Lower ΔLim(dB)	Lower Freq (Hz)	Upper dBm	Upper ΔLim(dB)	Upper Freq (Hz)
7.500 MHz	8.500 MHz	300.0 kHz	-29.59	(-16.59)	-7.520 M	---	(---)	---
8.500 MHz	13.00 MHz	1.000 MHz	-28.12	(-15.12)	-8.545 M	---	(---)	---
13.00 MHz	30.00 MHz	1.000 MHz	-31.83	(-6.83)	-13.17 M	---	(---)	---
7.500 MHz	30.00 MHz	220.0 kHz	---	(---)	---	-30.84	(-80.84)	7.500 M
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---

15 M_Channel Edge_Upper_Low_QPSK_FullRB

Start Freq	Stop Freq	Integ BW	Lower dBm	Lower ΔLim(dB)	Lower Freq (Hz)	Upper dBm	Upper ΔLim(dB)	Upper Freq (Hz)
7.500 MHz	8.500 MHz	300.0 kHz	---	(---)	---	-29.08	(-19.08)	7.545 M
8.500 MHz	12.50 MHz	1.000 MHz	---	(---)	---	-27.96	(-17.96)	9.260 M
12.50 MHz	22.50 MHz	1.000 MHz	---	(---)	---	-28.41	(-15.41)	16.30 M
22.50 MHz	30.00 MHz	1.000 MHz	---	(---)	---	-30.91	(-5.91)	29.74 M
7.500 MHz	30.00 MHz	220.0 kHz	-32.05	(-82.05)	-7.500 M	---	(---)	---

15 M_Channel Edge_Mid_QPSK_FullRB

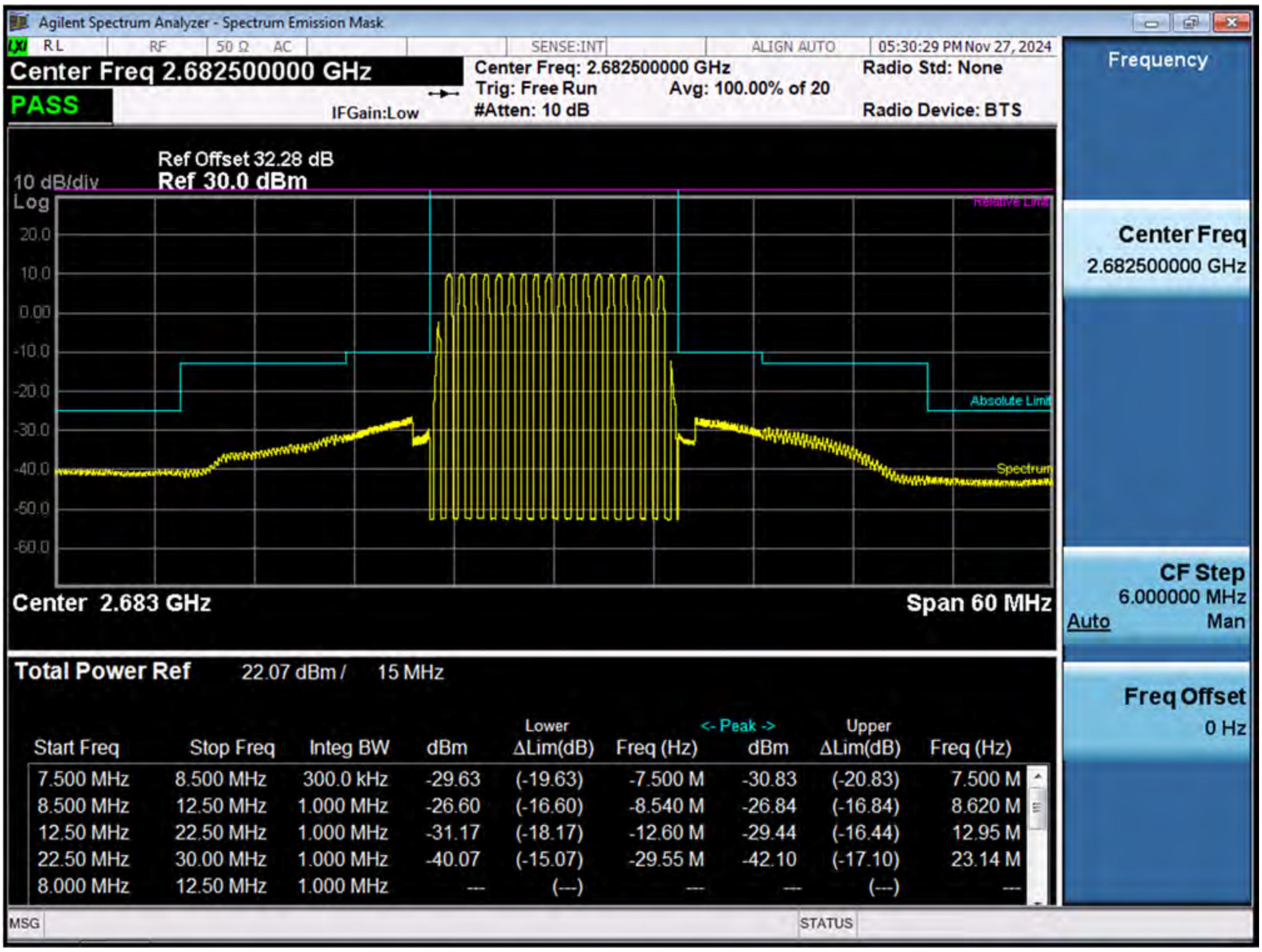


Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	dBm	Upper ΔLim(dB)	Freq (Hz)
7.500 MHz	8.500 MHz	300.0 kHz	-29.90	(-19.90)	-7.545 M	-30.81	(-20.81)	7.505 M
8.500 MHz	12.50 MHz	1.000 MHz	-28.48	(-18.48)	-8.560 M	-28.08	(-18.08)	8.500 M
12.50 MHz	22.50 MHz	1.000 MHz	-32.57	(-19.57)	-18.70 M	-30.98	(-17.98)	12.85 M
22.50 MHz	30.00 MHz	1.000 MHz	-35.09	(-10.09)	-27.00 M	-35.87	(-10.87)	29.21 M
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---

15 M_Channel Edge_High_QPSK_1RB

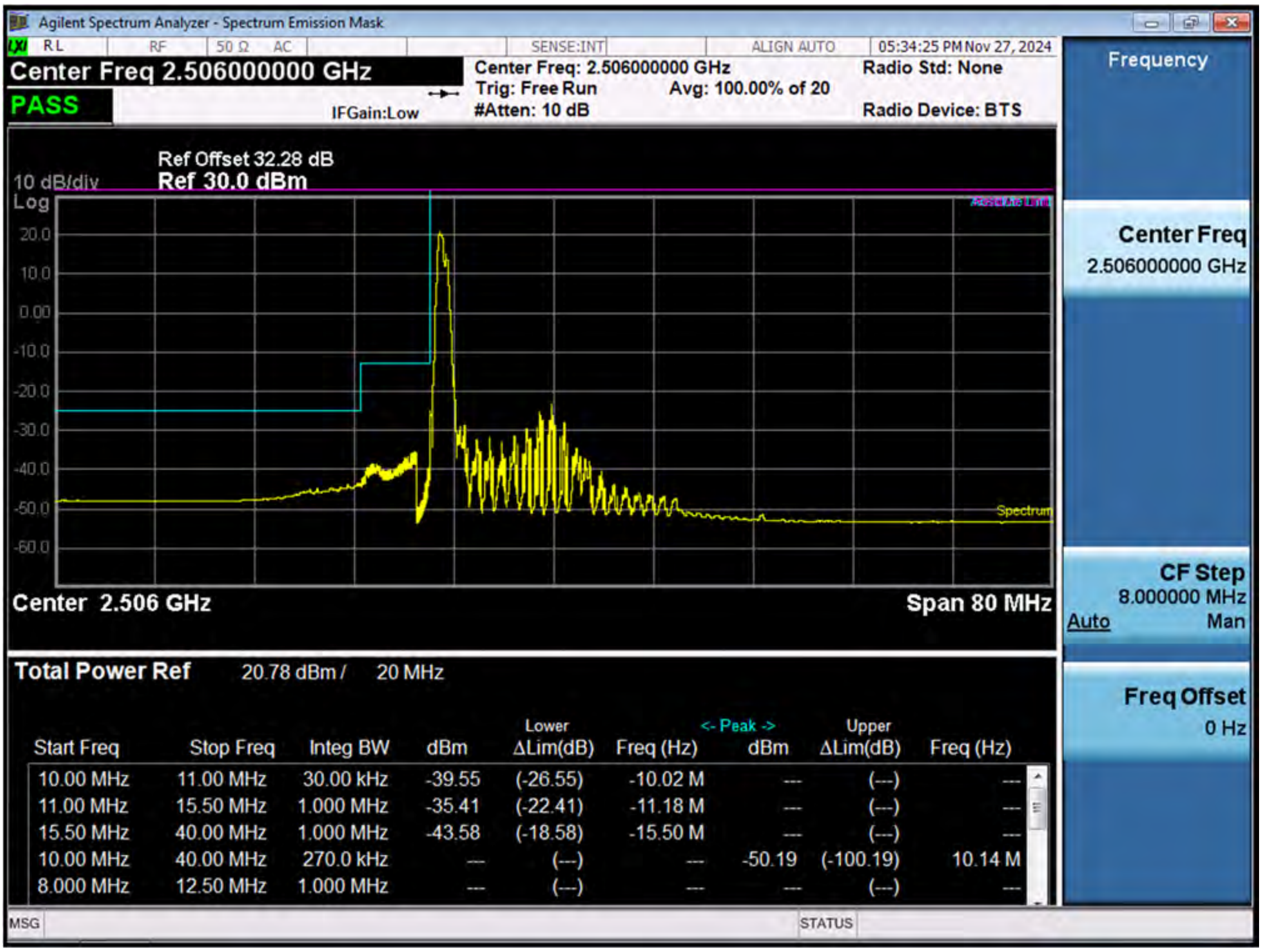
Start Freq	Stop Freq	Integ BW	Lower dBm	Lower ΔLim(dB)	Lower Peak Freq (Hz)	Upper dBm	Upper ΔLim(dB)	Upper Peak Freq (Hz)
7.500 MHz	8.500 MHz	30.00 kHz	-53.33	(-43.33)	-7.965 M	-38.47	(-28.47)	7.510 M
8.500 MHz	12.50 MHz	1.000 MHz	-40.76	(-30.76)	-11.00 M	-34.65	(-24.65)	8.860 M
12.50 MHz	22.50 MHz	1.000 MHz	-46.01	(-33.01)	-13.45 M	-38.06	(-25.06)	13.30 M
22.50 MHz	30.00 MHz	1.000 MHz	-47.11	(-22.11)	-22.65 M	-45.85	(-20.85)	22.99 M
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---

15 M_Channel Edge_High_QPSK_FullRB



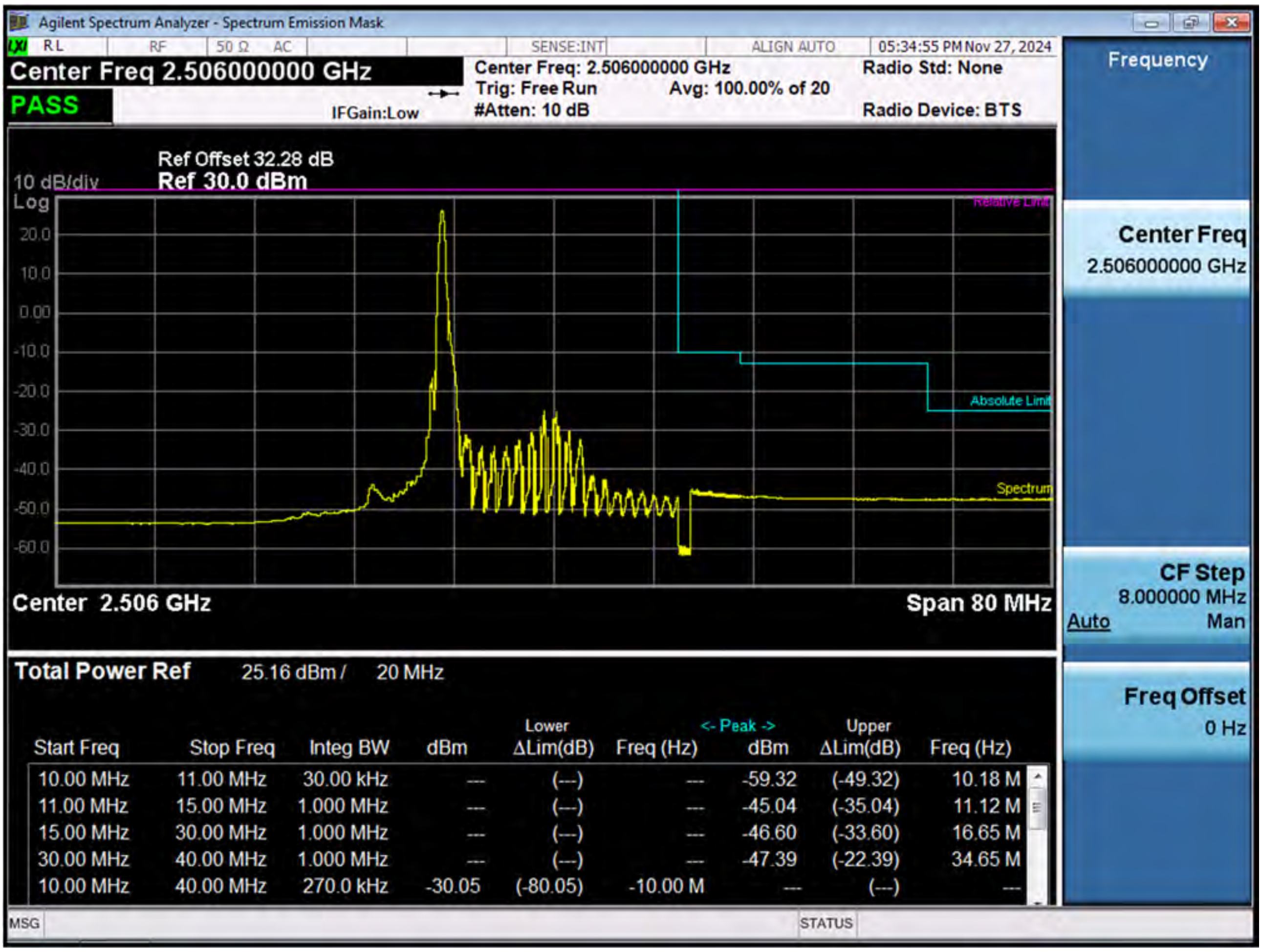
Start Freq	Stop Freq	Integ BW	Lower dBm	Lower ΔLim(dB)	Lower Peak Freq (Hz)	Upper dBm	Upper ΔLim(dB)	Upper Peak Freq (Hz)
7.500 MHz	8.500 MHz	300.0 kHz	-29.63	(-19.63)	-7.500 M	-30.83	(-20.83)	7.500 M
8.500 MHz	12.50 MHz	1.000 MHz	-26.60	(-16.60)	-8.540 M	-26.84	(-16.84)	8.620 M
12.50 MHz	22.50 MHz	1.000 MHz	-31.17	(-18.17)	-12.60 M	-29.44	(-16.44)	12.95 M
22.50 MHz	30.00 MHz	1.000 MHz	-40.07	(-15.07)	-29.55 M	-42.10	(-17.10)	23.14 M
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---

20 M_Channel Edge_Lower_Low_QPSK_1RB

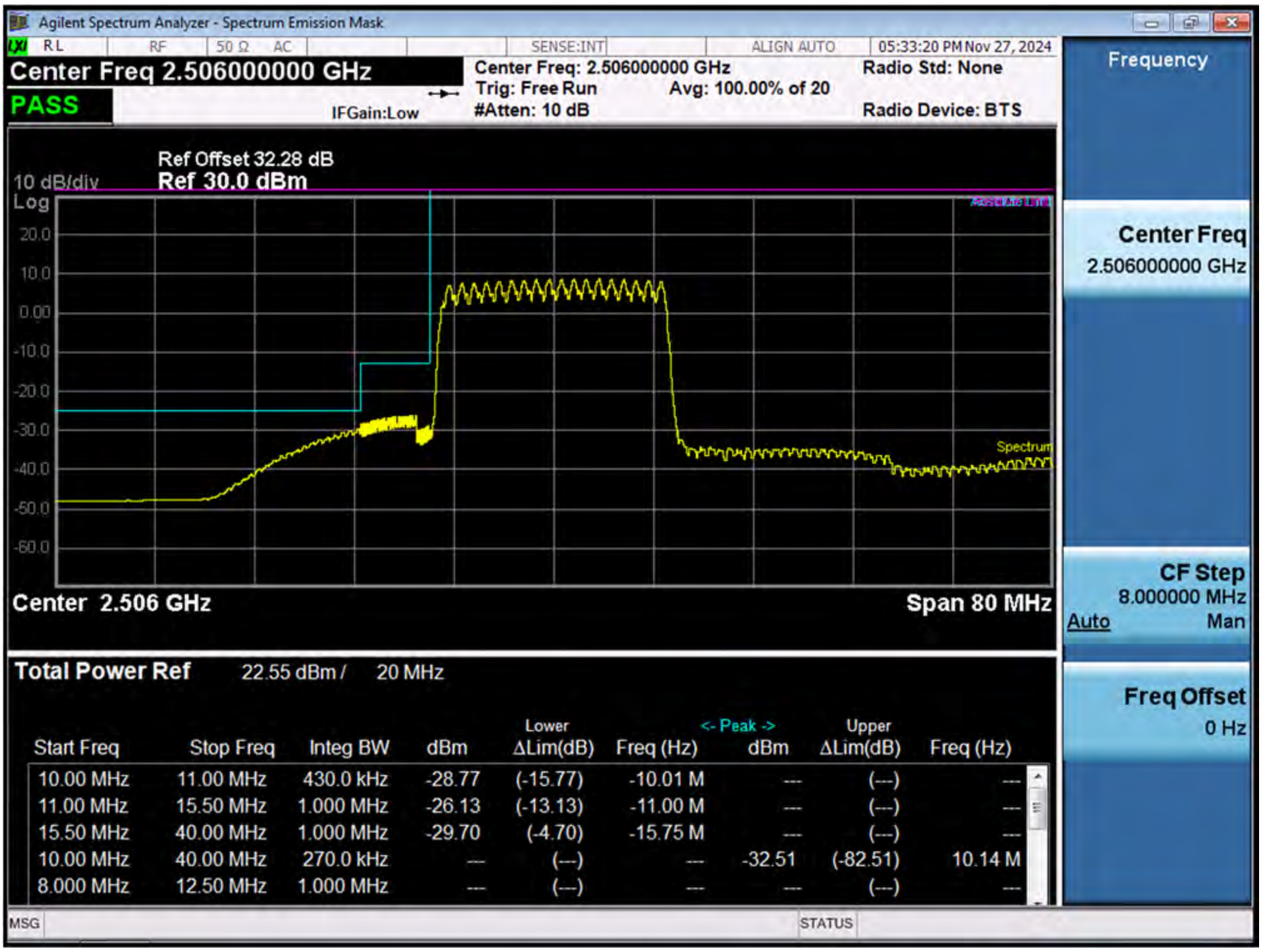


Start Freq	Stop Freq	Integ BW	Lower dBm	Lower ΔLim(dB)	Lower Peak Freq (Hz)	Upper dBm	Upper ΔLim(dB)	Upper Peak Freq (Hz)
10.00 MHz	11.00 MHz	30.00 kHz	-39.55	(-26.55)	-10.02 M	---	(---)	---
11.00 MHz	15.50 MHz	1.000 MHz	-35.41	(-22.41)	-11.18 M	---	(---)	---
15.50 MHz	40.00 MHz	1.000 MHz	-43.58	(-18.58)	-15.50 M	---	(---)	---
10.00 MHz	40.00 MHz	270.0 kHz	---	(---)	---	-50.19	(-100.19)	10.14 M
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---

20 M_Channel Edge_Upper_Low_QPSK_1RB



20 M_Channel Edge_Lower_Low_QPSK_FullRB

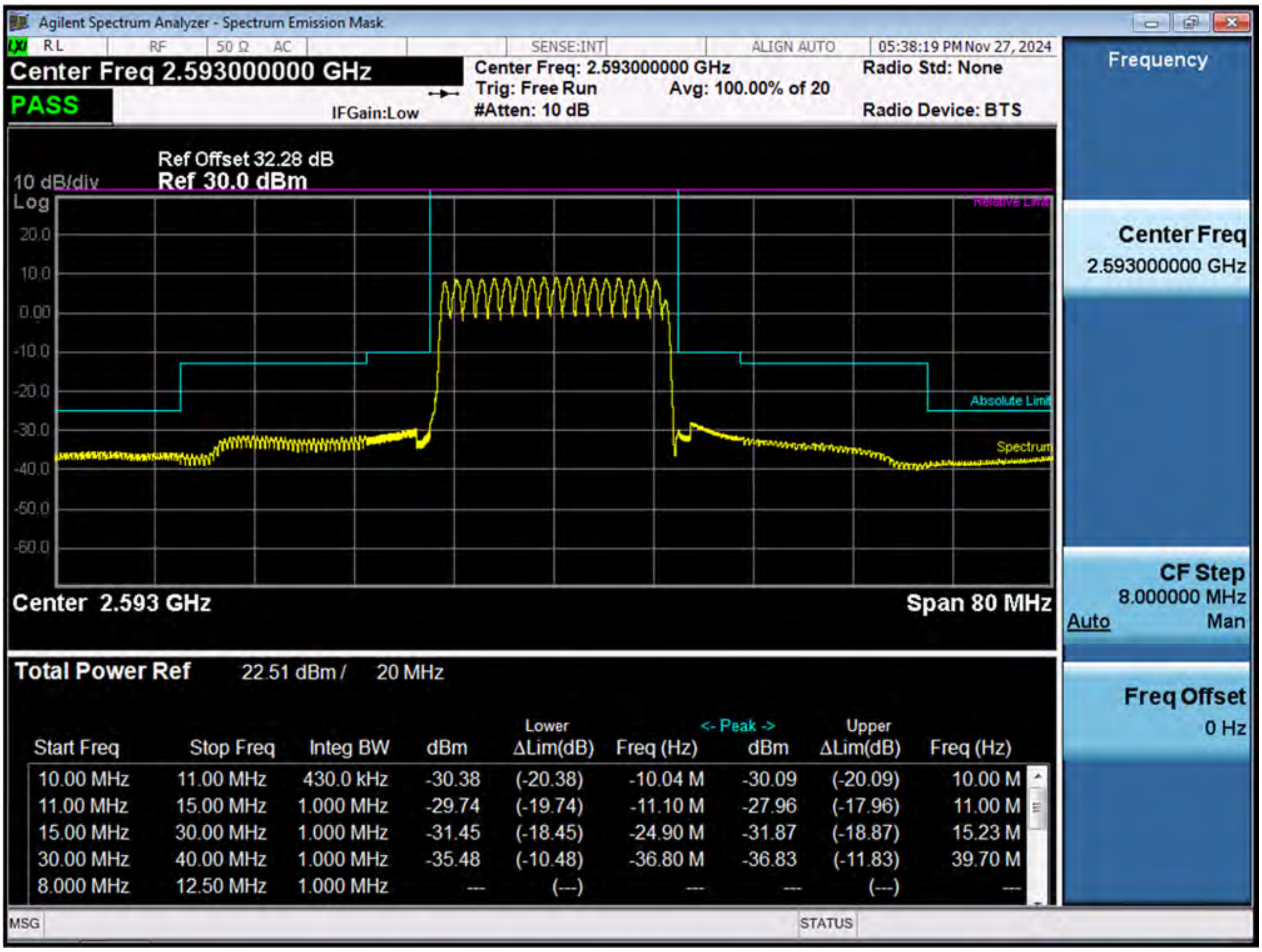


Start Freq	Stop Freq	Integ BW	Lower dBm	Lower ΔLim(dB)	Lower Peak Freq (Hz)	Upper dBm	Upper ΔLim(dB)	Upper Peak Freq (Hz)
10.00 MHz	11.00 MHz	430.0 kHz	-28.77	(-15.77)	-10.01 M	---	(---)	---
11.00 MHz	15.50 MHz	1.000 MHz	-26.13	(-13.13)	-11.00 M	---	(---)	---
15.50 MHz	40.00 MHz	1.000 MHz	-29.70	(-4.70)	-15.75 M	---	(---)	---
10.00 MHz	40.00 MHz	270.0 kHz	---	(---)	---	-32.51	(-82.51)	10.14 M
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---

20 M_Channel Edge_Upper_Low_QPSK_FullRB

Start Freq	Stop Freq	Integ BW	Lower dBm	Lower ΔLim(dB)	Lower Freq (Hz)	Upper dBm	Upper ΔLim(dB)	Upper Freq (Hz)
10.00 MHz	11.00 MHz	430.0 kHz	---	(---)	---	-29.38	(-19.38)	10.02 M
11.00 MHz	15.00 MHz	1.000 MHz	---	(---)	---	-28.97	(-18.97)	12.82 M
15.00 MHz	30.00 MHz	1.000 MHz	---	(---)	---	-28.05	(-15.05)	18.98 M
30.00 MHz	40.00 MHz	1.000 MHz	---	(---)	---	-30.92	(-5.92)	39.75 M
10.00 MHz	40.00 MHz	270.0 kHz	-31.53	(-81.53)	-10.27 M	---	(---)	---

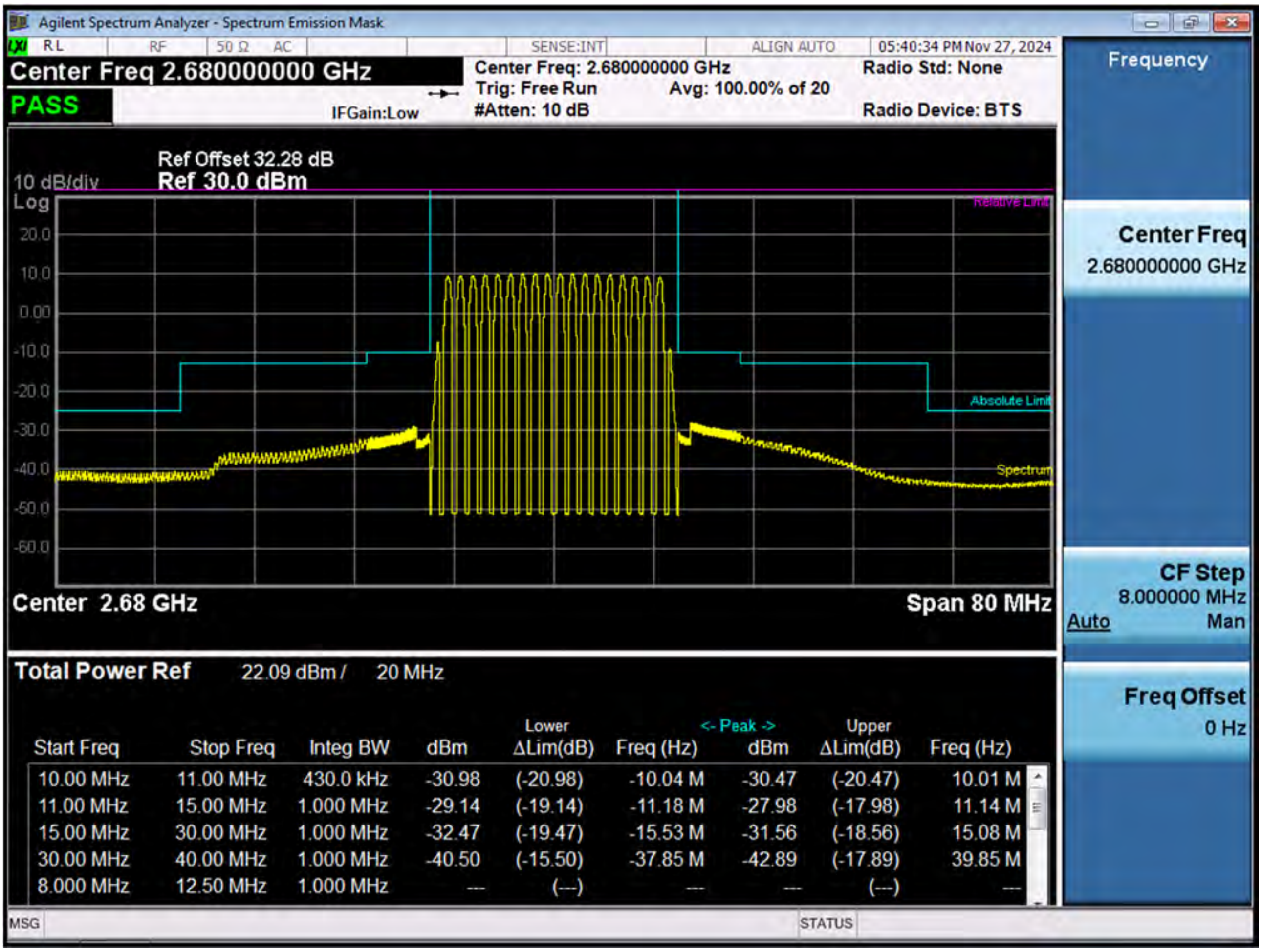
20 M_Channel Edge_Mid_QPSK_FullRB



Start Freq	Stop Freq	Integ BW	Lower dBm	Lower ΔLim(dB)	Lower Peak Freq (Hz)	Upper dBm	Upper ΔLim(dB)	Upper Peak Freq (Hz)
10.00 MHz	11.00 MHz	430.0 kHz	-30.38	(-20.38)	-10.04 M	-30.09	(-20.09)	10.00 M
11.00 MHz	15.00 MHz	1.000 MHz	-29.74	(-19.74)	-11.10 M	-27.96	(-17.96)	11.00 M
15.00 MHz	30.00 MHz	1.000 MHz	-31.45	(-18.45)	-24.90 M	-31.87	(-18.87)	15.23 M
30.00 MHz	40.00 MHz	1.000 MHz	-35.48	(-10.48)	-36.80 M	-36.83	(-11.83)	39.70 M
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---

20 M_Channel Edge_High_QPSK_1RB

20 M_Channel Edge_High_QPSK_FullRB



10. ANNEX A_ TEST SETUP PHOTO

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

No.	Description
1	HCT-RF-2412-FC054-P