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TEST REPORT

FCC LTE Test for TFGMEIBBCD4
Certification

APPLICANT
LG Electronics Inc.

REPORT NO.
HCT-RF-2308-FC005-R1

DATE OF ISSUE
October 19, 2023

Tested by
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TEST REPORT

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Additional Model
TFGMEIBBCD5, TFGMEIBBCD6, TFGMEIBBCD7, TFGMEIBBCD8, TFGMEIBBCD9, TFGMEIBBCDA, TFGMEIBBCDB, TFGMEIBBCDC

Applicant	**LG Electronics Inc.** 10, MagokJungang-ro, Gangseo-gu, Seoul 07796, Republic of Korea
Eut Type Model Name	GM Onstar Gen12 ROW TFGMEIBBCD4
FCC ID	BEJTFGMEIBBCD4
FCC Classification:	PCS Licensed Transmitter (PCB)
FCC Rule Part(s):	§ 22

The result shown in this test report refer only to the sample(s) tested unless otherwise stated.
This test results were applied only to the test methods required by the standard.

REVISION HISTORY

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

Revision No.	Date of Issue	Description
0	October 05, 2023	Initial Release
1	October 19, 2023	Deleted the Inter Band ULCA results

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)

Test Report Statement:
The above Test Report is not related to the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme) / A2LA(American Association for Laboratory Accreditation), which signed the ILAC-MRA.

If this report is required to confirmation of authenticity, please contact to www.hct.co.kr

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MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name:	LG Electronics Inc.
Address:	10, Magok Jungang-ro, Gangseo-gu, Seoul 07796, Republic of Korea
FCC ID:	BEJTFGMEIBBCD4
Application Type:	Certification
FCC Classification:	PCS Licensed Transmitter (PCB)
FCC Rule Part(s):	§ 22
EUT Type:	GM Onstar Gen12 ROW
Model(s):	TFGMEIBBCD4
Additional Model:	TFGMEIBBCD5,TFGMEIBBCD6,TFGMEIBBCD7,TFGMEIBBCD8, TFGMEIBBCD9, TFGMEIBBCDA, TFGMEIBBCDB, TFGMEIBBCDC
Tx Frequency:	824.7 MHz – 848.3 MHz : 1.4 MHz 825.5 MHz – 847.5 MHz : 3 MHz 826.5 MHz – 846.5 MHz : 5 MHz 829.0 MHz – 844.0 MHz : 10 MHz
Date(s) of Tests:	February 27, 2023 ~ October 05, 2023
Serial number:	Radiated - External Antenna : EBR36018942_#30 - Internal Antenna : EBR36018942K_#14 Conducted : EBR36018829_#75
External Antenna Information	ANT5 : 86531607 ANT4 : 86575530 DUT4 : 85608774

1.1. MAXIMUM OUTPUT POWER

Mode (MHz)	Tx Frequency (MHz)	Emission Designator	Modulation	ERP External Antenna		ERP Internal Antenna	
				Max. Power (W)	Max. Power (dBm)	Max. Power (W)	Max. Power (dBm)
LTE – Band5 (1.4)	824.7 – 848.3	1M09G7D	QPSK	0.305	24.84	0.326	25.13
		1M10W7D	16QAM	0.259	24.13	0.269	24.29
		1M10W7D	64QAM	0.171	22.33	0.204	23.10
		1M09W7D	256QAM	0.103	20.13	0.104	20.19
LTE – Band5 (3)	825.5 – 847.5	2M71G7D	QPSK	0.319	25.04	0.324	25.10
		2M71W7D	16QAM	0.274	24.38	0.279	24.45
		2M70W7D	64QAM	0.174	22.40	0.214	23.31
		2M70W7D	256QAM	0.110	20.42	0.109	20.39
LTE – Band5 (5)	826.5 – 846.5	4M51G7D	QPSK	0.303	24.82	0.327	25.14
		4M50W7D	16QAM	0.253	24.03	0.282	24.50
		4M50W7D	64QAM	0.183	22.63	0.217	23.37
		4M50W7D	256QAM	0.107	20.30	0.111	20.44
LTE – Band5 (10)	829.0 – 844.0	8M97G7D	QPSK	0.304	24.83	0.330	25.19
		8M98W7D	16QAM	0.264	24.21	0.282	24.51
		8M99W7D	64QAM	0.200	23.02	0.216	23.35
		8M97W7D	256QAM	0.110	20.42	0.107	20.30

2. INTRODUCTION

2.1. DESCRIPTION OF EUT

The EUT was a GM Onstar Gen12 ROW with GSM/GPRS/EGPRS/UMTS and LTE, Sub6.

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

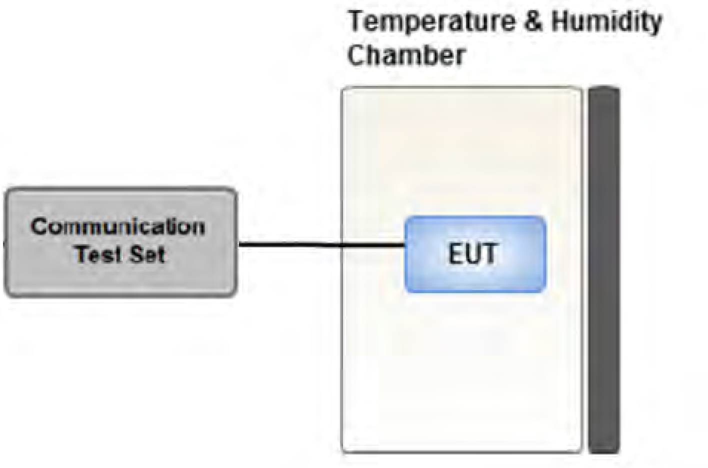
The Fully-anechoic chamber and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA.

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	- KDB 971168 D01 v03r01 – Section 5.2
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
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 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.

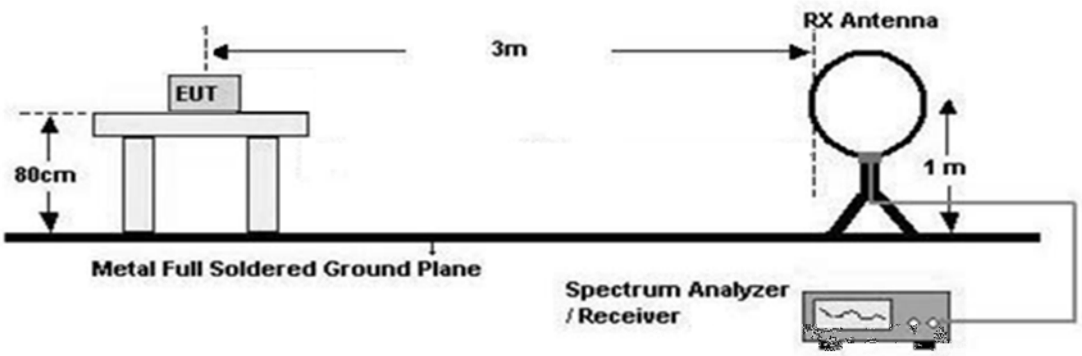
3.3 RADIATED TEST

Test Overview

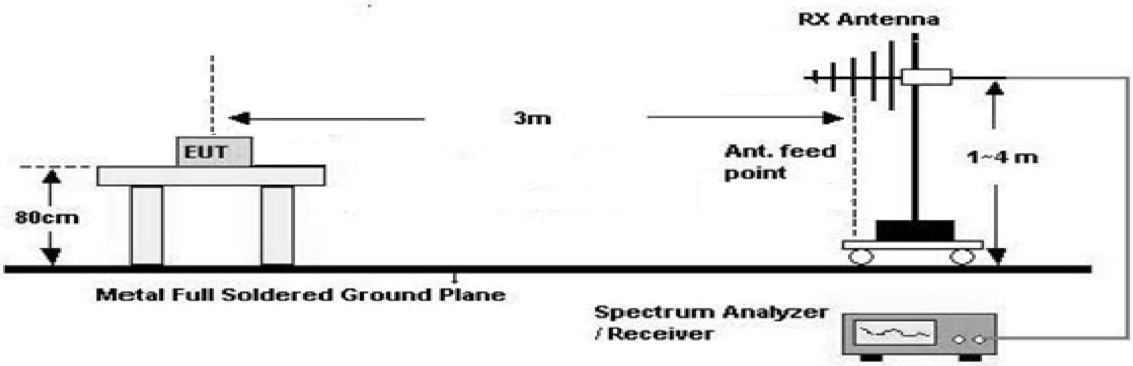
Radiated tests are performed in the semi-anechoic chamber. The equipment under test is placed on a non-conductive table on semi-anechoic chamber.

Test Configuration

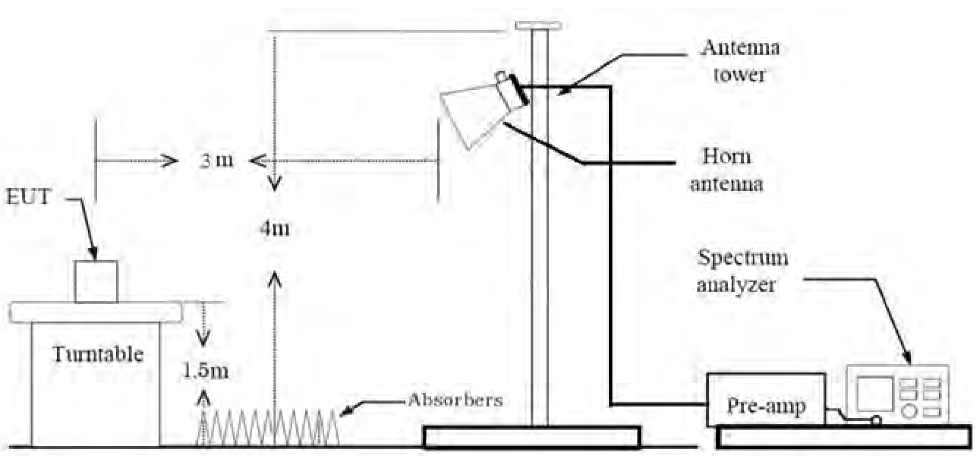
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



3.3.1 RADIATED POWER

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 EUT is placed on a turntable, which is 0.8 m above ground plane. (Below 1 GHz)
2. The EUT is placed on a turntable, which is 1.5 m above ground plane. (Above 1 GHz)
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
4. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
5. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
6. 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.
7. Total(dBμV/m) = Measured Value(dBμV) + Cable Loss(dB) + Antenna Factor(dB/m) + Distance Factor(D.F)
8. EIRP (dBm)

   = Total (dBμV/m) + 20 log D − 104.8 (where D is the measurement distance in meters. D=3)

   = Total (dBμV/m) - 95.2(dB)
9. ERP(dBm) = EIRP(dBm) - 2.15(dB)

3.3.2 RADIATED SPURIOUS EMISSIONS

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. 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
2. 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.

Below 30 MHz

1. The loop antenna was placed at a location 3 m from the EUT
2. The EUT is placed on a turntable, which is 0.8 m above ground plane.
3. We have done x, y, z planes in EUT and horizontal and vertical polarization and Parallel to the ground plane in detecting antenna.
4. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
5. Distance Correction Factor(0.009 MHz – 0.490 MHz) = 40log(3 m/300 m) = - 80 dB
   Measurement Distance : 3 m
6. Distance Correction Factor(0.490 MHz – 30 MHz) = 40log(3 m/30 m) = - 40 dB
   Measurement Distance : 3 m
7. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)
8. EIRP (dBm)
   = Total (dBμV/m) + 20 log D − 104.8 (where D is the measurement distance in meters. D=3)
   = Total (dBμV/m) - 95.2(dB)
9. ERP(dBm) = EIRP(dBm) - 2.15(dB)

KDB 414788 OFS and Chamber Correlation Justification

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

Below 1 GHz

1. The EUT is placed on a turntable, which is 0.8 m above ground plane.
2. The Hybrid antenna was placed at a location 3 m from the EUT, which is varied from 1 m to 4 m to find out the highest emissions.
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
4. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
5. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L)
7. Total(dBμV/m) = Measured Value(dBμV) + Cable Loss(dB) + Antenna Factor(dB/m) + Distance Factor(D.F)
8. EIRP (dBm)

   = Total (dBμV/m) + 20 log D – 104.8 (where D is the measurement distance in meters. D=3)

   = Total (dBμV/m) - 95.2(dB)
9. ERP(dBm) = EIRP(dBm) - 2.15(dB)

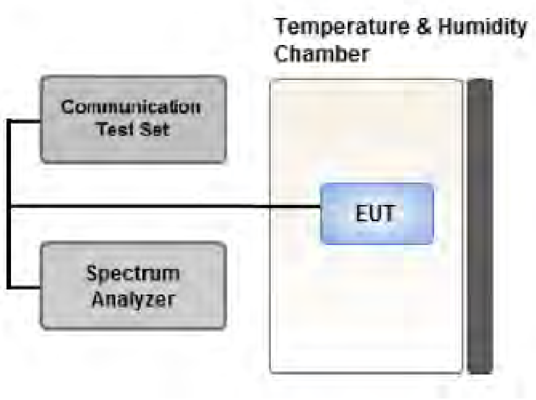
Above 1 GHz

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. Total(dBμV/m) = Measured Value(dBμV) + Cable Loss(dB) + Antenna Factor(dB/m) + Distance Factor(D.F) + H.P.F(dB) - Amp Gain(dB)
8. EIRP (dBm)

   = Total (dBμV/m) + 20 log D – 104.8 (where D is the measurement distance in meters. D=3)

   = Total (dBμV/m) - 95.2(dB)

3.4 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)

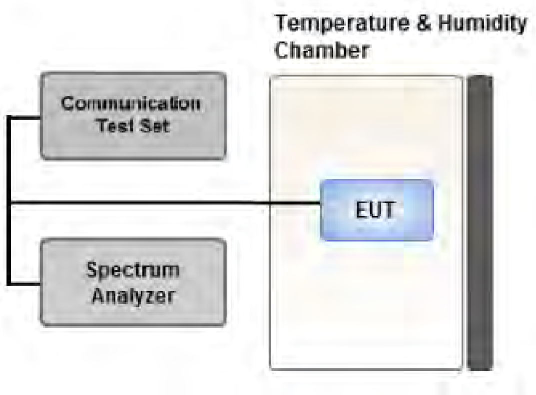
The measurement instrument must have a RBW that is greater than or equal to the OBW of the signal to be measured and a VBW ≥ 3 × RBW.

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 %.

3.5 OCCUPIED BANDWIDTH



Test setup

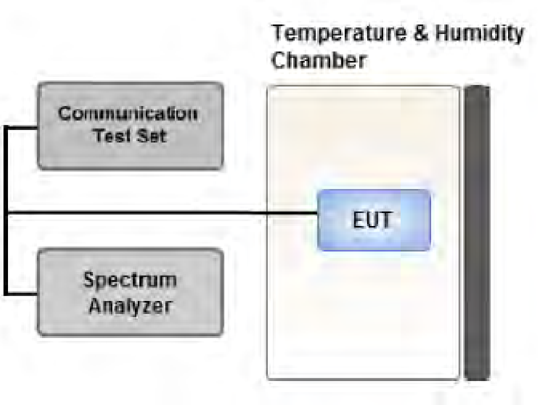
The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

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 ≥ 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

3.6 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL



Test setup

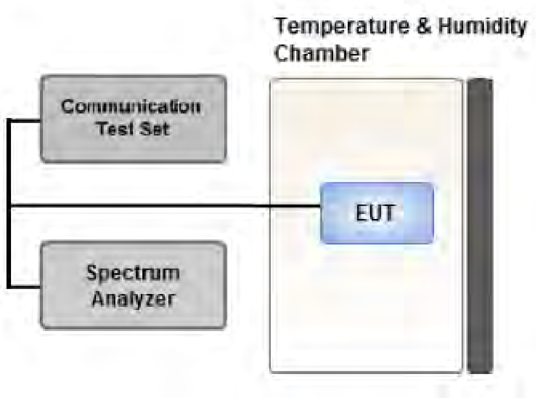
Test Overview

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 ≥ 3 MHz
3. Detector = RMS
4. Trace Mode = Average
5. Sweep time = auto
6. Number of points in sweep ≥ 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

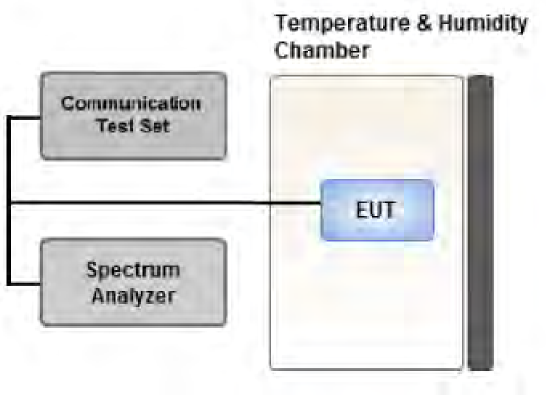
1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW > 1 % of the emission bandwidth
4. VBW > 3 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW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

3.8 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.
  Mode : Internal Antenna, External Antenna (ANT 5, ANT 4, DUT 4)
  Worst case : Internal Antenna, External Antenna (ANT 5)
- 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.
- In the case of radiated spurious emissions, all bandwidth of operation were investigated and the worst case bandwidth results are reported.
  (External Antenna Worst case : 3 MHz)
  (Internal Antenna Worst case : 10 MHz)
- TFGMEIBBCD4 & additional models were tested and the worst case results are reported.
  (Worst case : TFGMEIBBCD4)

[External Antenna Worst case]

Test Description	Modulation	RB size	RB offset	Axis
Effective Radiated Power	QPSK, 16QAM, 64QAM, 256QAM	See Section 8.1		Only X
Radiated Spurious and Harmonic Emissions	QPSK	See Section 8.2		Only X

[Internal Antenna Worst case]

Test Description	Modulation	RB size	RB offset	Axis
Effective Radiated Power	QPSK, 16QAM, 64QAM, 256QAM	See Section 9.1		Z
Radiated Spurious and Harmonic Emissions	QPSK	See Section 9.2		X

3.10 WORST CASE(CONDUCTED TEST)

- All modes of operation were investigated and the worst case configuration results are reported.
- TFGMEIBBCD4 & additional models were tested and the worst case results are reported.
  (Worst case : TFGMEIBBCD4)

[Worst case]

Test Description	Modulation	Bandwidth (MHz)	Frequency	RB size	RB offset
Occupied Bandwidth	QPSK, 16QAM, 64QAM, 256QAM	1.4, 3, 5, 10	Mid	Full RB	0
Peak-To-Average Ratio	QPSK, 16QAM, 64QAM, 256QAM	1.4, 3, 5, 10	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
		1.4, 3, 5, 10	Low, High	Full RB	0
Spurious and Harmonic Emissions at Antenna Terminal	QPSK	1.4, 3, 5, 10	Low, Mid, High	1	0

4. LIST OF TEST EQUIPMENT

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
Antenna Position Tower	MA4640/800-XP-ET	Innco systems	N/A	N/A	N/A
Turn Table	DS2000-S	Innco systems	N/A	N/A	N/A
Turn Table	Turn Table	Ets	N/A	N/A	N/A
Controller (Antenna mast & Turn Table)	CO3000	Innco systems	CO3000/1251/489 20320/P	N/A	N/A
Amp & Filter Bank Switch Controller	FBSM-01B	TNM system	TM20090002	N/A	N/A
RF Switch System	TMX0132C	TNM System	TM21100002	N/A	N/A
RF Switch System	FBSR-04C(3G HPF+LNA)	TNM System	S4L1	08/18/2024	Annual
RF Switch System	FBSR-04C(LNA)	TNM System	S4L4	08/18/2024	Annual
RF Switch System	FBSR-04C(Thru)	TNM System	S4L6	08/18/2024	Annual
HIGHPASS FILTER	WHKX10-900-1000-15000-40SS	WAINWRIGHT INSTRUMENTS	16	08/01/2024	Annual
HIGHPASS FILTER	WHNX6.0/26.5G-6SS	WAINWRIGHT INSTRUMENTS	1	01/19/2024	Annual
Power Amplifier	CBL18265035	CERNEX	22966	12/01/2023	Annual
Power Amplifier	CBL26405040	CERNEX	25956	03/02/2024	Annual
Loop Antenna(9 kHz ~ 30 MHz)	FMZB1513	Schwarzbeck	1513-333	03/17/2024	Biennial
Horn Antenna(1 ~ 18 GHz)	BBHA 9120	Schwarzbeck	937	02/13/2025	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170342	09/29/2024	Biennial
Bilog Antenna	VULB9160	Schwarzbeck	3150	03/09/2025	Biennial
Hybrid Antenna	VULB9160	Schwarzbeck	760	02/24/2025	Biennial
Trilog Broadband Antenna	VULB 9168	Schwarzbeck	895	08/16/2024	Biennial
Chamber	SU-642	ESPEC	93008124	02/22/2024	Annual
Power Splitter(DC~26.5 GHz)	11667B	Hewlett Packard	11275	03/02/2024	Annual
DC Power Supply	E3632A	Agilent	MY40010147	06/23/2024	Annual
4-Way Divider	ZC4PD-K1844+	Mini-Circuits	942907	09/19/2024	Annual
ATTENUATOR(20 dB)	8493C	Hewlett Packard	17280	04/19/2024	Annual
Spectrum Analyzer(10 Hz ~ 40 GHz)	FSV40	REOHDE & SCHWARZ	101436	02/22/2024	Annual
Base Station	8960 (E5515C)	Agilent	MY48360800	08/10/2024	Annual
Wideband Radio Communication Tester	MT8821C	Anritsu Corp.	6262287701	05/22/2024	Annual
Wideband Radio Communication Tester	MT8000A	Anritsu Corp.	6262302511	05/23/2024	Annual
SIGNAL GENERATOR (100 kHz ~ 40 GHz)	SMB100A	REOHDE & SCHWARZ	177633	06/22/2024	Annual

Signal Analyzer(10 Hz ~ 26.5 GHz)	N9020A	Agilent	MY52090906	04/20/2024	Annual
Signal Analyzer(5 Hz ~ 40.0 GHz)	N9030B	KEYSIGHT	MY55480167	05/24/2024	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. Espectially, 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)	1.90 (Confidence level about 95 %, k=2)
Radiated Disturbance (9 kHz ~ 30 MHz)	4.14 (Confidence level about 95 %, k=2)
Radiated Disturbance (30 MHz ~ 1 GHz)	5.82 (Confidence level about 95 %, k=2)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.74 (Confidence level about 95 %, k=2)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.76 (Confidence level about 95 %, k=2)
Radiated Disturbance (Above 40 GHz)	5.52 (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, § 22.917(a)	< 43 + 10log10 (P[Watts]) at Band Edge and for all out-of-band emissions	PASS
Conducted Output Power	§ 2.1046	N/A	PASS
Peak- to- Average Ratio	§ 22.913(d)	< 13 dB	PASS
Frequency stability / variation of ambient temperature	§ 2.1055, § 22.355	< 2.5 ppm	PASS

6.2 Test Condition : Radiated Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Effective Radiated Power	§ 22.913(a)(5)	< 7 Watts max. ERP	PASS
Radiated Spurious and Harmonic Emissions	§ 2.1053, § 22.917(a)	< 43 + 10log10 (P[Watts]) for all out-of band emissions	PASS

7. 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)		
				20407	20525	20643
				824.7 MHz	836.5 MHz	848.3 MHz
1.4 MHz	QPSK	1	0	23.64	23.57	23.60
		1	3	23.66	23.69	23.57
		1	5	23.64	23.58	23.54
		3	0	23.66	23.62	23.55
		3	1	23.69	23.68	23.65
		3	3	23.63	23.63	23.57
		6	0	22.71	22.70	22.65
	16QAM	1	0	22.86	22.86	23.00
		1	3	23.04	23.21	22.96
		1	5	23.01	23.11	22.89
		3	0	22.79	22.83	22.85
		3	1	22.87	22.94	22.75
		3	3	22.83	22.89	22.76
		6	0	21.85	21.83	21.67
	64QAM	1	0	22.09	21.87	21.61
		1	3	22.07	22.05	21.70
		1	5	21.95	21.86	21.62
		3	0	21.99	21.83	21.55
		3	1	21.95	21.93	21.56
		3	3	21.92	21.89	21.57
		6	0	20.94	20.80	20.51
	256QAM	1	0	18.85	18.77	18.78
		1	3	18.91	18.92	18.96
		1	5	18.78	18.76	18.73
		3	0	18.87	18.88	18.89
		3	1	19.00	18.96	18.94
		3	3	18.81	18.81	18.84
		6	0	18.81	18.73	18.70

Bandwidth	Modulation	RB Size	RB Offset	Max.Average Power (dBm)		
				20415	20525	20635
				825.5 MHz	836.5 MHz	847.5 MHz
3 MHz	QPSK	1	0	23.81	23.67	23.77
		1	7	23.64	23.68	23.56
		1	14	23.57	23.70	23.57
		8	0	22.79	22.80	22.78
		8	3	22.85	22.84	22.73
		8	7	22.76	22.74	22.70
		15	0	22.76	22.79	22.76
	16QAM	1	0	23.02	22.93	22.94
		1	7	22.88	23.08	22.85
		1	14	22.87	22.99	22.67
		8	0	21.93	21.80	21.85
		8	3	21.87	21.88	21.85
		8	7	21.75	21.81	21.70
		15	0	21.78	21.78	21.74
	64QAM	1	0	22.16	21.87	21.86
		1	7	21.98	21.88	21.61
		1	14	21.92	21.98	21.58
		8	0	20.90	20.83	20.43
		8	3	20.83	20.94	20.41
		8	7	20.79	20.85	20.55
		15	0	20.82	20.89	20.54
	256QAM	1	0	19.01	18.92	19.07
		1	7	18.97	18.93	18.83
		1	14	18.81	18.94	18.65
		8	0	18.89	18.78	18.81
		8	3	18.78	16.57	18.88
		8	7	18.78	18.78	18.78
		15	0	18.76	18.81	18.84

Bandwidth	Modulation	RB Size	RB Offset	Max.Average Power (dBm)		
				20425	20525	20625
				826.5 MHz	836.5 MHz	846.5 MHz
5 MHz	QPSK	1	0	23.76	23.72	23.71
		1	12	23.67	23.68	23.65
		1	24	23.63	23.66	23.60
		12	0	22.90	22.81	22.81
		12	6	22.83	22.85	22.74
		12	11	22.77	22.79	22.68
		25	0	22.81	22.81	22.70
	16QAM	1	0	23.07	23.02	23.18
		1	12	22.94	22.94	22.86
		1	24	22.93	23.02	22.82
		12	0	21.89	21.83	21.84
		12	6	21.81	21.84	21.76
		12	11	21.82	21.81	21.84
		25	0	21.84	21.81	21.68
	64QAM	1	0	21.98	22.02	21.73
		1	12	21.86	21.90	21.61
		1	24	21.93	21.92	21.60
		12	0	20.85	20.85	20.52
		12	6	20.83	20.88	20.48
		12	11	20.77	20.80	20.50
		25	0	20.79	20.80	20.57
	256QAM	1	0	19.05	19.02	19.00
		1	12	18.97	19.01	18.95
		1	24	18.90	18.83	18.98
		12	0	18.84	18.81	18.88
		12	6	18.80	18.82	18.80
		12	11	18.71	18.85	18.83
		25	0	18.84	18.86	18.79

Bandwidth	Modulation	RB Size	RB Offset	Max.Average Power (dBm)		
				20450	20525	20600
				829 MHz	836.5 MHz	844 MHz
10 MHz	QPSK	1	0	23.65	23.62	23.66
		1	24	23.56	23.77	23.75
		1	49	23.70	23.77	23.56
		25	0	22.69	22.73	22.78
		25	12	22.77	22.80	22.78
		25	24	22.71	22.74	22.80
		50	0	22.78	22.83	22.72
	16QAM	1	0	23.09	22.90	23.05
		1	24	22.82	22.98	22.93
		1	49	22.91	22.85	23.02
		25	0	21.70	21.82	21.78
		25	12	21.84	21.86	21.83
		25	24	21.71	21.85	21.76
		50	0	21.80	21.83	21.69
	64QAM	1	0	21.86	21.96	21.87
		1	24	21.88	21.90	21.87
		1	49	21.96	21.87	21.78
		25	0	20.74	20.72	20.79
		25	12	20.86	20.92	20.81
		25	24	20.75	20.64	20.60
		50	0	20.87	20.85	20.88
	256QAM	1	0	18.88	18.77	19.00
		1	24	18.72	18.81	18.99
		1	49	18.65	18.57	18.84
		25	0	18.73	18.78	18.89
		25	12	18.84	18.96	18.85
		25	24	18.76	18.73	18.79
		50	0	18.84	18.88	18.86

8.2 EFFECTIVE RADIATED POWER

8.2.1 External Antenna

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	ERP		RB	
							W	W	dBm	Size	Offset
824.7	LTE B5/ 1.4 MHz	QPSK	91.10	29.98	121.08	V	< 7.00	0.236	23.73	1	5
		16-QAM	90.50	29.98	120.48	V		0.206	23.13		
		64-QAM	88.80	29.98	118.78	V		0.139	21.43		
		256-QAM	86.38	29.98	116.36	V		0.080	19.01		
836.5		QPSK	91.83	29.98	121.81	V		0.279	24.46	1	5
		16-QAM	91.17	29.98	121.15	V		0.240	23.80		
		64-QAM	89.70	29.98	119.68	V		0.171	22.33		
		256-QAM	87.14	29.98	117.12	V		0.095	19.77		
848.3		QPSK	92.12	30.07	122.19	V		0.305	24.84	1	0
		16-QAM	91.41	30.07	121.48	V		0.259	24.13		
		64-QAM	89.40	30.07	119.47	V		0.163	22.12		
		256-QAM	87.41	30.07	117.48	V		0.103	20.13		

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	ERP		RB	
							W	W	dBm	Size	Offset
825.5	LTE B5/ 3 MHz	QPSK	91.45	29.98	121.43	V	< 7.00	0.256	24.08	1	0
		16-QAM	90.38	29.98	120.36	V		0.200	23.01		
		64-QAM	88.60	29.98	118.58	V		0.133	21.23		
		256-QAM	86.40	29.98	116.38	V		0.080	19.03		
836.5		QPSK	91.75	29.98	121.73	V		0.274	24.38	1	14
		16-QAM	91.20	29.98	121.18	V		0.242	23.83		
		64-QAM	89.77	29.98	119.75	V		0.174	22.40		
		256-QAM	87.11	29.98	117.09	V		0.094	19.74		
847.5		QPSK	92.32	30.07	122.39	V		0.319	25.04	1	0
		16-QAM	91.66	30.07	121.73	V		0.274	24.38		
		64-QAM	89.55	30.07	119.62	V		0.169	22.27		
		256-QAM	87.70	30.07	117.77	V		0.110	20.42		

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	ERP		RB	
							W	W	dBm	Size	Offset
826.5	LTE B5/ 5 MHz	QPSK	91.27	29.98	121.25	V	< 7.00	0.246	23.90	1	24
		16-QAM	90.45	29.98	120.43	V		0.203	23.08		
		64-QAM	89.20	29.98	119.18	V		0.152	21.83		
		256-QAM	86.50	29.98	116.48	V		0.082	19.13		
836.5		QPSK	92.00	29.98	121.98	V		0.290	24.63	1	24
		16-QAM	91.22	29.98	121.20	V		0.243	23.85		
		64-QAM	90.00	29.98	119.98	V		0.183	22.63		
		256-QAM	87.50	29.98	117.48	V		0.103	20.13		
846.5		QPSK	92.10	30.07	122.17	V		0.303	24.82	1	12
		16-QAM	91.31	30.07	121.38	V		0.253	24.03		
		64-QAM	89.41	30.07	119.48	V		0.163	22.13		
		256-QAM	87.58	30.07	117.65	V		0.107	20.30		

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	ERP		RB	
							W	W	dBm	Size	Offset
829.0	LTE B5/ 10 MHz	QPSK	91.26	30.09	121.35	V	< 7.00	0.251	24.00	1	49
		16-QAM	90.66	30.09	120.75	V		0.219	23.40		
		64-QAM	89.21	30.09	119.30	V		0.157	21.95		
		256-QAM	86.58	30.09	116.67	V		0.086	19.32		
836.5		QPSK	92.15	29.98	122.13	V		0.301	24.78	1	49
		16-QAM	91.58	29.98	121.56	V		0.264	24.21		
		64-QAM	90.39	29.98	120.37	V		0.200	23.02		
		256-QAM	87.45	29.98	117.43	V		0.102	20.08		
844.0		QPSK	92.11	30.07	122.18	V		0.304	24.83	1	25
		16-QAM	91.45	30.07	121.52	V		0.261	24.17		
		64-QAM	89.48	30.07	119.55	V		0.166	22.20		
		256-QAM	87.70	30.07	117.77	V		0.110	20.42		

8.2.2 Internal Antenna

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	ERP		RB	
							W	W	dBm	Size	Offset
824.7	LTE B5/ 1.4 MHz	QPSK	92.50	29.98	122.48	H	< 7.00	0.326	25.13	1	0
		16-QAM	91.66	29.98	121.64	H		0.269	24.29		
		64-QAM	90.47	29.98	120.45	H		0.204	23.10		
		256-QAM	87.56	29.98	117.54	H		0.104	20.19		
836.5		QPSK	91.77	29.98	121.75	H		0.275	24.40	1	0
		16-QAM	91.06	29.98	121.04	H		0.234	23.69		
		64-QAM	89.67	29.98	119.65	H		0.170	22.30		
		256-QAM	86.86	29.98	116.84	H		0.089	19.49		
848.3		QPSK	89.33	30.07	119.40	H		0.160	22.05	1	0
		16-QAM	88.70	30.07	118.77	H		0.139	21.42		
		64-QAM	87.57	30.07	117.64	H		0.107	20.29		
		256-QAM	84.45	30.07	114.52	H		0.052	17.17		

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	ERP		RB	
							W	W	dBm	Size	Offset
825.5	LTE B5/ 3 MHz	QPSK	92.47	29.98	122.45	H	< 7.00	0.324	25.10	1	0
		16-QAM	91.82	29.98	121.80	H		0.279	24.45		
		64-QAM	90.68	29.98	120.66	H		0.214	23.31		
		256-QAM	87.76	29.98	117.74	H		0.109	20.39		
836.5		QPSK	92.01	29.98	121.99	H		0.291	24.64	1	0
		16-QAM	91.33	29.98	121.31	H		0.249	23.96		
		64-QAM	89.48	29.98	119.46	H		0.163	22.11		
		256-QAM	87.10	29.98	117.08	H		0.094	19.73		
847.5		QPSK	89.56	30.07	119.63	H		0.169	22.28	1	0
		16-QAM	88.68	30.07	118.75	H		0.138	21.40		
		64-QAM	86.83	30.07	116.90	H		0.090	19.55		
		256-QAM	85.03	30.07	115.10	H		0.060	17.75		

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	ERP		RB	
							W	W	dBm	Size	Offset
826.5	LTE B5/ 5 MHz	QPSK	92.51	29.98	122.49	H	< 7.00	0.327	25.14	1	0
		16-QAM	91.87	29.98	121.85	H		0.282	24.50		
		64-QAM	90.74	29.98	120.72	H		0.217	23.37		
		256-QAM	87.81	29.98	117.79	H		0.111	20.44		
836.5		QPSK	92.05	29.98	122.03	H		0.294	24.68	1	0
		16-QAM	91.42	29.98	121.40	H		0.254	24.05		
		64-QAM	89.71	29.98	119.69	H		0.171	22.34		
		256-QAM	87.23	29.98	117.21	H		0.097	19.86		
846.5		QPSK	89.70	30.07	119.77	H		0.175	22.42	1	0
		16-QAM	88.96	30.07	119.03	H		0.147	21.68		
		64-QAM	87.23	30.07	117.30	H		0.099	19.95		
		256-QAM	85.61	30.07	115.68	H		0.068	18.33		

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	ERP		RB	
							W	W	dBm	Size	Offset
829.0	LTE B5/ 10 MHz	QPSK	92.45	30.09	122.54	H	< 7.00	0.330	25.19	1	0
		16-QAM	91.77	30.09	121.86	H		0.282	24.51		
		64-QAM	90.61	30.09	120.70	H		0.216	23.35		
		256-QAM	87.56	30.09	117.65	H		0.107	20.30		
836.5		QPSK	92.24	29.98	122.22	H		0.307	24.87	1	0
		16-QAM	91.71	29.98	121.69	H		0.272	24.34		
		64-QAM	90.52	29.98	120.50	H		0.207	23.15		
		256-QAM	87.36	29.98	117.34	H		0.100	19.99		
844.0		QPSK	91.41	30.07	121.48	H		0.259	24.13	1	0
		16-QAM	90.64	30.07	120.71	H		0.217	23.36		
		64-QAM	89.51	30.07	119.58	H		0.167	22.23		
		256-QAM	86.51	30.07	116.58	H		0.084	19.23		

8.3 RADIATED SPURIOUS EMISSIONS

8.3.1 External Antenna

- MODE: LTE B5
- MODULATION SIGNAL: 3 MHz QPSK
- DISTANCE: 3 meters
- LIMIT: -13.00 dBm

Ch	Freq (MHz)	Measured Level (dBμV)	A.F+C.L+D.F+H.P.F -A.G (dB/m)	Total (dBμV/m)	Pol.	Result (dBm)	Limit (dBm)	RB	
								Size	Offset
20415 (825.5)	1 651.00	62.98	-18.58	44.40	V	-50.80	-13.00	1	0
	2 476.50	59.31	-15.12	44.19	V	-51.01	-13.00		
	3 302.00	56.10	-13.43	42.67	V	-52.53	-13.00		
	4 127.50	55.89	-11.01	44.88	V	-50.32	-13.00		
	4 953.00	52.46	-8.07	44.39	V	-50.81	-13.00		
20525 (836.5)	1 673.00	64.27	-18.57	45.70	V	-49.50	-13.00	1	14
	2 509.50	59.04	-14.87	44.17	V	-51.03	-13.00		
	3 346.00	56.12	-13.55	42.57	V	-52.63	-13.00		
	4 182.50	55.49	-10.81	44.68	V	-50.52	-13.00		
	5 019.00	52.06	-7.78	44.28	V	-50.92	-13.00		
20635 (847.5)	1 695.00	62.19	-18.55	43.64	V	-51.56	-13.00	1	0
	2 542.50	56.63	-14.82	41.81	V	-53.39	-13.00		
	3 390.00	56.51	-13.26	43.25	V	-51.95	-13.00		
	4 237.50	54.30	-10.57	43.73	V	-51.47	-13.00		
	5 085.00	52.50	-7.41	45.09	V	-50.11	-13.00		

8.3.2 Internal Antenna

- MODE: LTE B5
- MODULATION SIGNAL: 10 MHz QPSK
- DISTANCE: 3 meters
- LIMIT: -13.00 dBm

Ch	Freq (MHz)	Measured Level (dBµV)	A.F+C.L+D.F+H.P.F -A.G (dB/m)	Total (dBµV/m)	Pol.	Result (dBm)	Limit (dBm)	RB	
								Size	Offset
20450 (829.0)	1 658.00	59.78	-18.56	41.22	H	-53.98	-13.00	1	0
	2 487.00	70.39	-15.05	55.34	V	-39.86	-13.00		
	3 316.00	54.19	-13.43	40.76	H	-54.44	-13.00		
	4 145.00	59.76	-11.02	48.74	V	-46.46	-13.00		
20525 (836.5)	1 673.00	58.76	-18.57	40.19	H	-55.01	-13.00	1	0
	2 509.50	67.63	-14.87	52.76	V	-42.44	-13.00		
	3 346.00	54.35	-13.55	40.80	V	-54.40	-13.00		
	4 182.50	58.67	-10.81	47.86	V	-47.34	-13.00		
20600 (844.0)	1 688.00	61.08	-18.53	42.55	H	-52.65	-13.00	1	0
	2 532.00	63.39	-14.84	48.55	V	-46.65	-13.00		
	3 376.00	54.64	-13.40	41.24	H	-53.96	-13.00		
	4 220.00	58.55	-10.58	47.97	H	-47.23	-13.00		

8.4 PEAK-TO-AVERAGE RATIO

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (dB)
5	1.4 MHz	836.5	QPSK	6	0	5.50
			16-QAM			6.17
			64-QAM			6.80
			256-QAM			6.74
	3 MHz		QPSK	15		5.35
			16-QAM			6.09
			64-QAM			6.71
			256-QAM			6.71
	5 MHz		QPSK	25		5.36
			16-QAM			6.08
			64-QAM			6.69
			256-QAM			6.67
	10 MHz		QPSK	50		5.36
			16-QAM			6.08
			64-QAM			6.63
			256-QAM			6.69

Note:

1. Plots of the EUT's Peak- to- Average Ratio are shown Page 85 ~ 100.

8.5 OCCUPIED BANDWIDTH

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (MHz)
5	1.4 MHz	836.5	QPSK	6	0	1.0916
			16-QAM			1.0972
			64-QAM			1.0965
			256-QAM			1.0896
	3 MHz		QPSK	15		2.7090
			16-QAM			2.7071
			64-QAM			2.7019
			256-QAM			2.6954
	5 MHz		QPSK	25		4.5068
			16-QAM			4.5026
			64-QAM			4.5001
			256-QAM			4.4962
	10 MHz		QPSK	50		8.9680
			16-QAM			8.9800
			64-QAM			8.9863
			256-QAM			8.9714

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)
5	1.4	824.7	3.7184	27.976	-67.333	-39.357	-13.00
		836.5	3.7124	27.976	-66.985	-39.009	
		848.3	3.7134	27.976	-67.156	-39.180	
	3	825.5	3.6970	27.976	-67.033	-39.057	
		836.5	3.7104	27.976	-67.265	-39.289	
		847.5	3.6770	27.976	-67.349	-39.373	
	5	826.5	3.7079	27.976	-67.086	-39.110	
		836.5	3.7079	27.976	-67.065	-39.089	
		846.5	3.7069	27.976	-67.243	-39.267	
	10	829.0	3.6960	27.976	-66.980	-39.004	
		836.5	3.6935	27.976	-67.286	-39.310	
		844.0	3.6945	27.976	-67.119	-39.143	

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 101 ~ 112.
2. Conducted Spurious Emissions was Tested QPSK Modulation, Resource Block Size 1 and Resource Block Offset 0
3. Result (dBm) = Measurement Maximum Data (dBm) + Factor (dB)
4. Factor(dB) = Cable Loss + Attenuator + Power Splitter

Frequency Range (GHz)	Factor [dB]
0.03 – 1	25.270
1 – 5	27.976
5 – 10	28.591
10 – 15	29.116
15 – 20	29.489
Above 20(26.5)	30.131

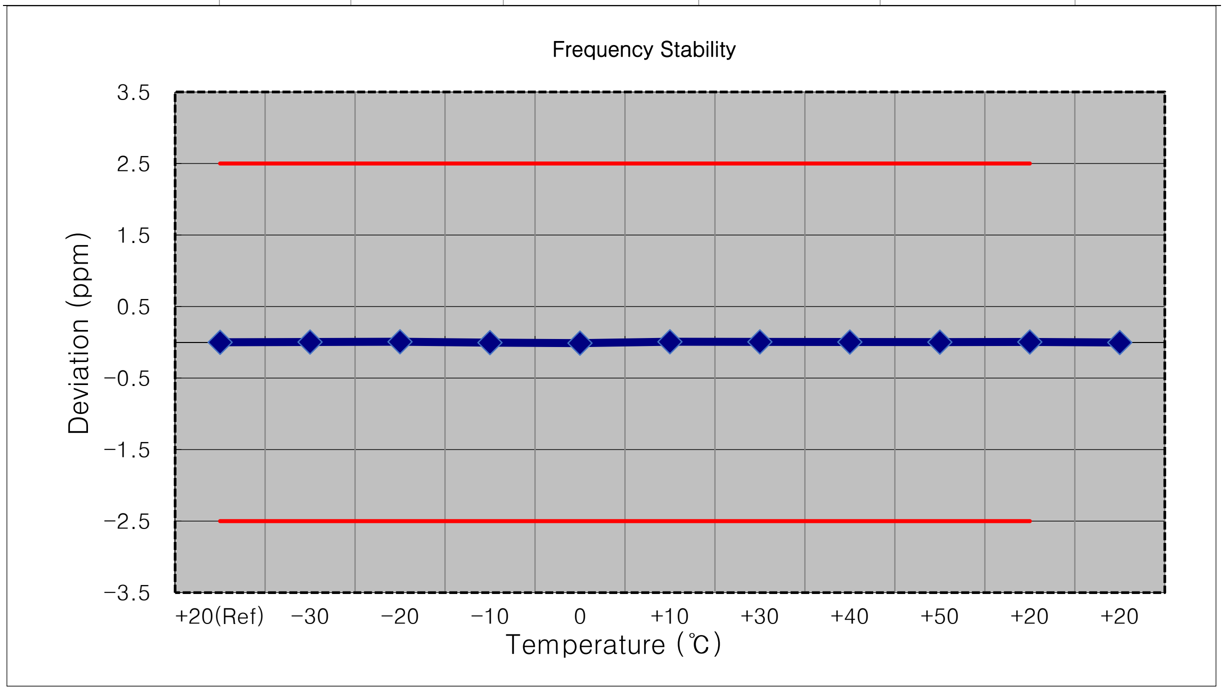
8.7 BAND EDGE

Plots of the EUT's Band Edge are shown Page 45 ~ 68.

8.8 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

- ▣ MODE: LTE B5
- ▣ OPERATING FREQUENCY: 836,500,000 Hz
- ▣ CHANNEL: 20525 (1.4 MHz)
- ▣ REFERENCE VOLTAGE: 13.500 VDC
- ▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	13.500	+20(Ref)	836 499 993	0.0	0.000 000	0.000
100%		-30	836 499 996	3.1	0.000 000	0.004
100%		-20	836 499 999	6.1	0.000 001	0.007
100%		-10	836 499 988	-4.1	0.000 000	-0.005
100%		0	836 499 983	-9.5	-0.000 001	-0.011
100%		+10	836 499 999	6.4	0.000 001	0.008
100%		+30	836 499 997	4.6	0.000 001	0.005
100%		+40	836 499 996	3.1	0.000 000	0.004
100%		+50	836 499 995	2.0	0.000 000	0.002
85%	11.475	+20	836 499 996	3.6	0.000 000	0.004
115%	15.525	+20	836 499 990	-2.4	0.000 000	-0.003



▣ MODE: LTE B5

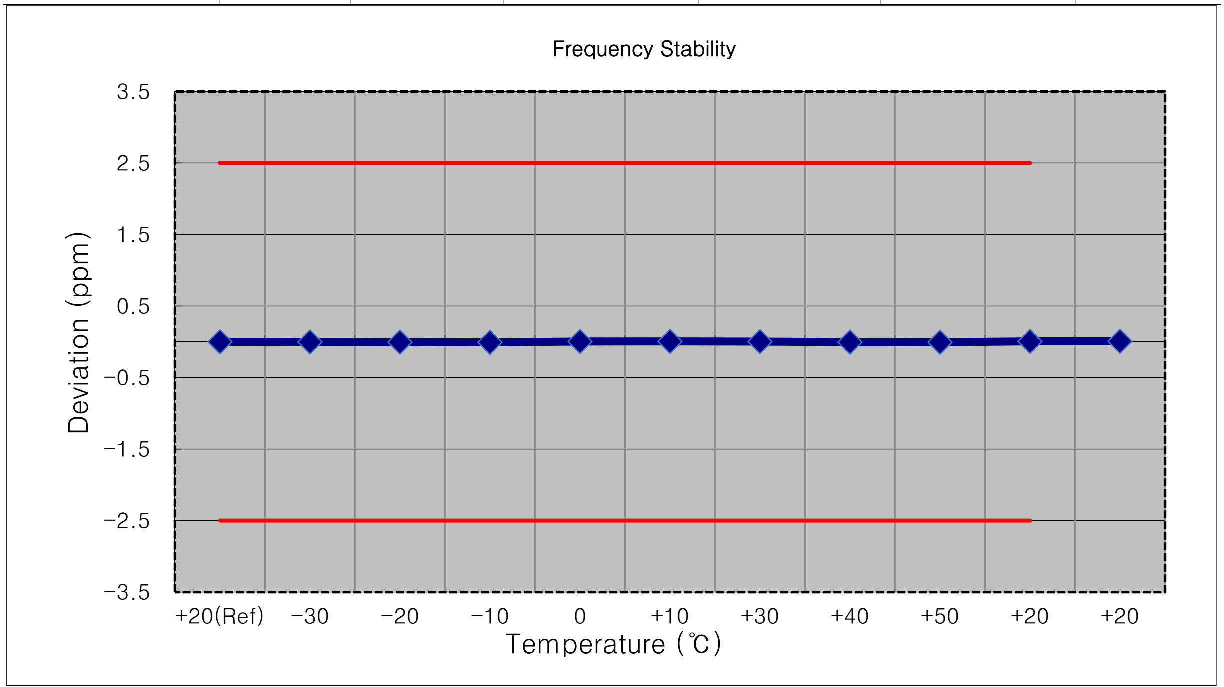
▣ OPERATING FREQUENCY: 836,500,000 Hz

▣ CHANNEL: 20525(3 MHz)

▣ REFERENCE VOLTAGE: 13.500 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage	Power	Temp.	Frequency	Frequency	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	
100%	13.500	+20(Ref)	836 500 005	0.0	0.000 000	0.000
100%		-30	836 500 003	-2.0	0.000 000	-0.002
100%		-20	836 500 001	-3.6	0.000 000	-0.004
100%		-10	836 499 999	-5.9	-0.000 001	-0.007
100%		0	836 500 008	3.1	0.000 000	0.004
100%		+10	836 500 009	4.5	0.000 001	0.005
100%		+30	836 500 007	2.5	0.000 000	0.003
100%		+40	836 500 001	-3.7	0.000 000	-0.004
100%		+50	836 500 000	-5.1	-0.000 001	-0.006
85%	11.475	+20	836 500 010	4.9	0.000 001	0.006
115%	15.525	+20	836 500 011	6.2	0.000 001	0.007



▣ MODE: LTE B5

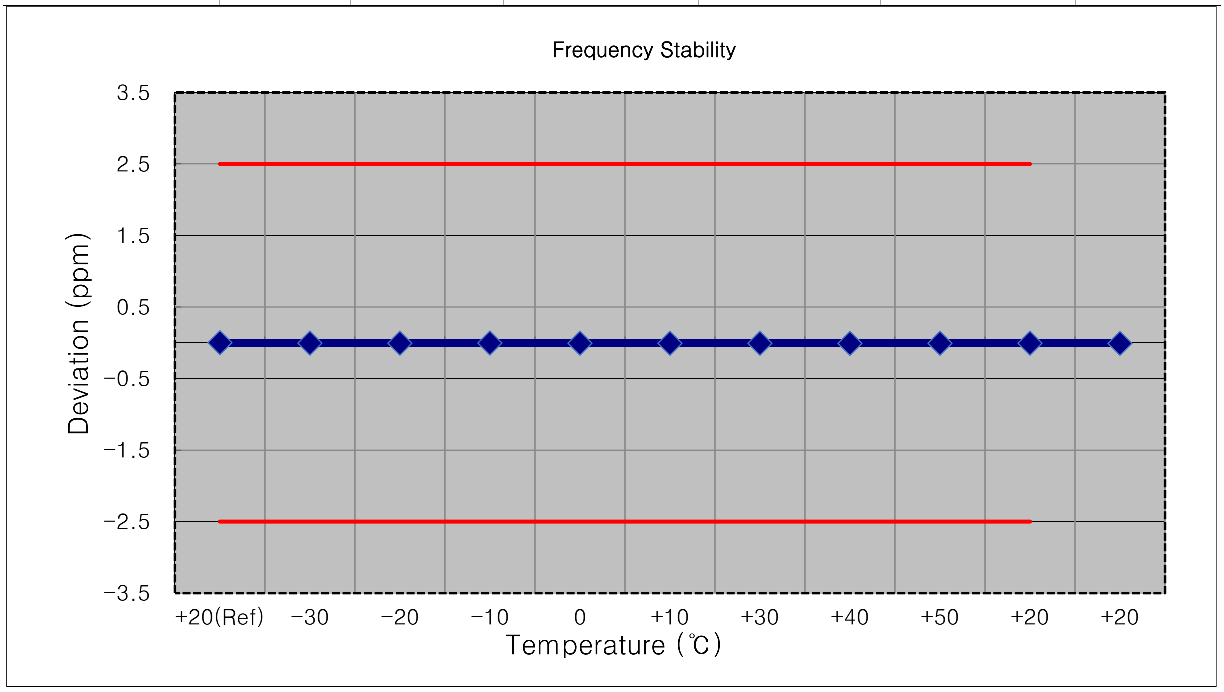
▣ OPERATING FREQUENCY: 836,500,000 Hz

▣ CHANNEL: 20525(5 MHz)

▣ REFERENCE VOLTAGE: 13.500 VDC

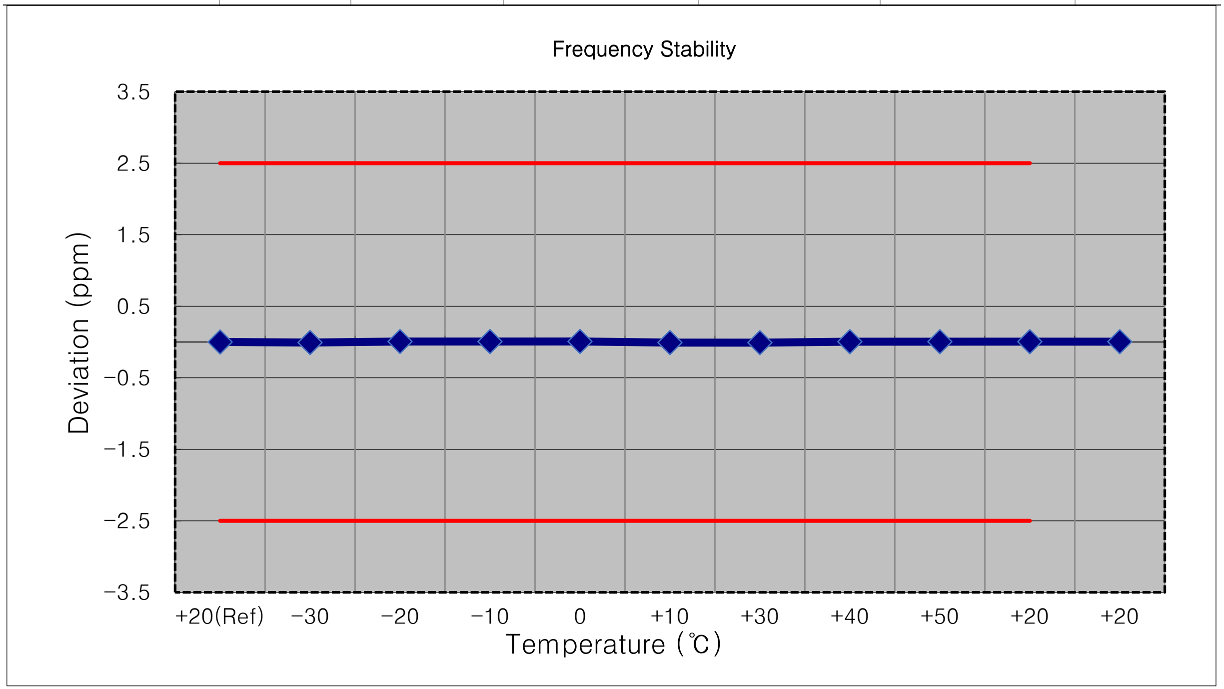
▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	13.500	+20(Ref)	836 499 996	0.0	0.000 000	0.000
100%		-30	836 499 992	-4.0	0.000 000	-0.005
100%		-20	836 499 991	-4.3	-0.000 001	-0.005
100%		-10	836 499 992	-3.3	0.000 000	-0.004
100%		0	836 499 991	-4.7	-0.000 001	-0.006
100%		+10	836 499 991	-4.9	-0.000 001	-0.006
100%		+30	836 499 990	-5.2	-0.000 001	-0.006
100%		+40	836 499 989	-6.3	-0.000 001	-0.008
100%		+50	836 499 991	-5.0	-0.000 001	-0.006
85%	11.475	+20	836 499 991	-4.7	-0.000 001	-0.006
115%	15.525	+20	836 499 989	-6.2	-0.000 001	-0.007



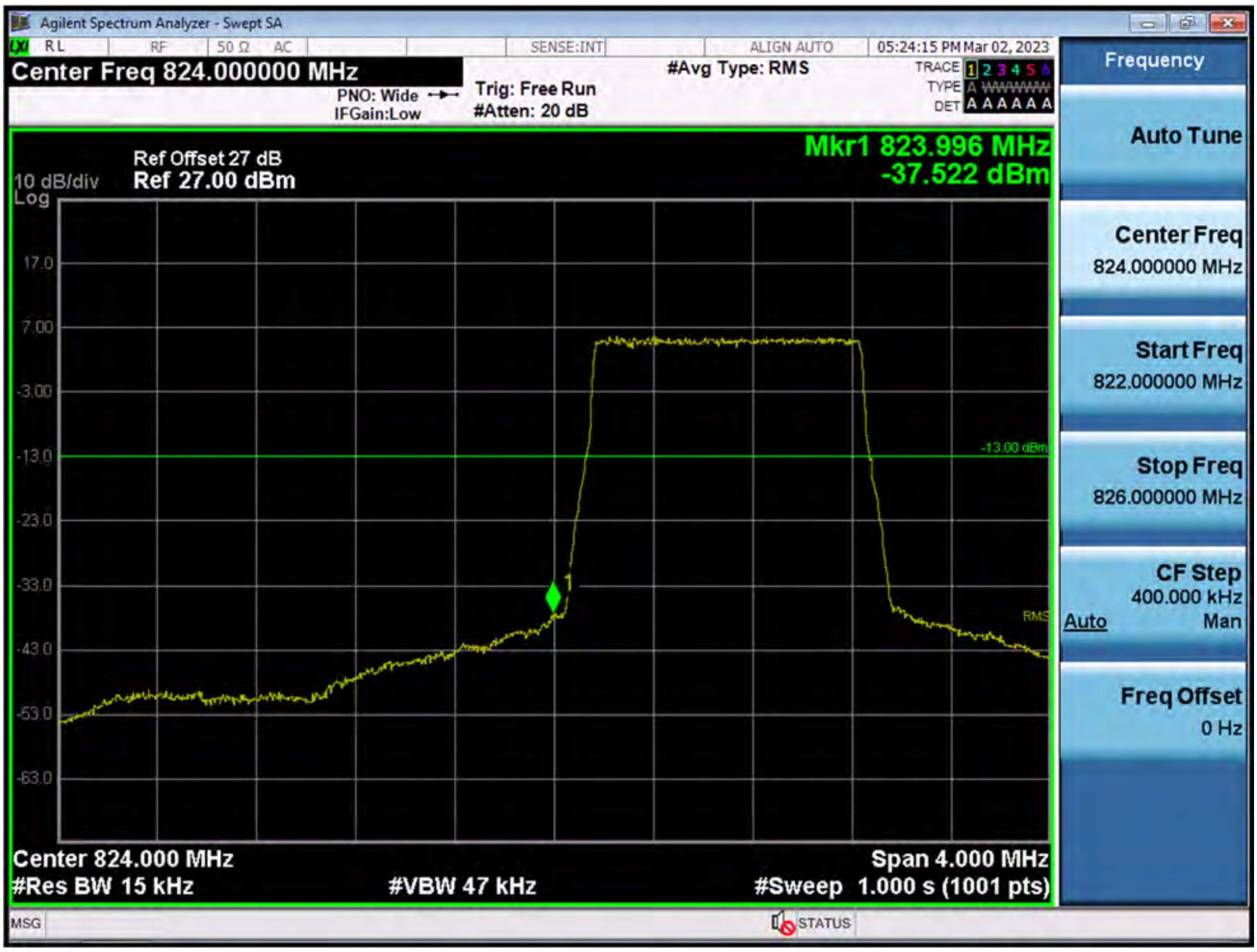
- MODE: LTE B5
- OPERATING FREQUENCY: 836,500,000 Hz
- CHANNEL: 20525(10 MHz)
- REFERENCE VOLTAGE: 13.500 VDC
- DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	13.500	+20(Ref)	836 500 006	0.0	0.000 000	0.000
100%		-30	836 500 000	-6.5	-0.000 001	-0.008
100%		-20	836 500 012	5.4	0.000 001	0.006
100%		-10	836 500 011	5.0	0.000 001	0.006
100%		0	836 500 012	5.8	0.000 001	0.007
100%		+10	836 499 999	-7.2	-0.000 001	-0.009
100%		+30	836 499 999	-7.4	-0.000 001	-0.009
100%		+40	836 500 010	3.4	0.000 000	0.004
100%		+50	836 500 010	3.3	0.000 000	0.004
85%	11.475	+20	836 500 010	3.9	0.000 000	0.005
115%	15.525	+20	836 500 010	3.3	0.000 000	0.004



9. TEST PLOTS

1.4 M_BandEdge_Lowest Channel_QPSK_FullRB(1)



1.4 M_BandEdge_Lowest Channel_QPSK_FullRB(2)

1.4 M_BandEdge_Highest Channel_QPSK_FullRB(1)

1.4 M_BandEdge_Highest Channel_QPSK_FullRB(2)

1.4 M_BandEdge_Lowest Channel_QPSK_1RB

1.4 M_BandEdge_Highest Channel_QPSK_1RB

3 M_BandEdge_Lowest Channel_QPSK_FullRB(1)

3 M_BandEdge_Lowest Channel_QPSK_FullRB(2)

3 M_BandEdge_Highest Channel_QPSK_FullRB(1)

3 M_BandEdge_Highest Channel_QPSK_FullRB(2)

3 M_BandEdge_Lowest Channel_QPSK_1RB

3 M_BandEdge_Highest Channel_QPSK_1RB

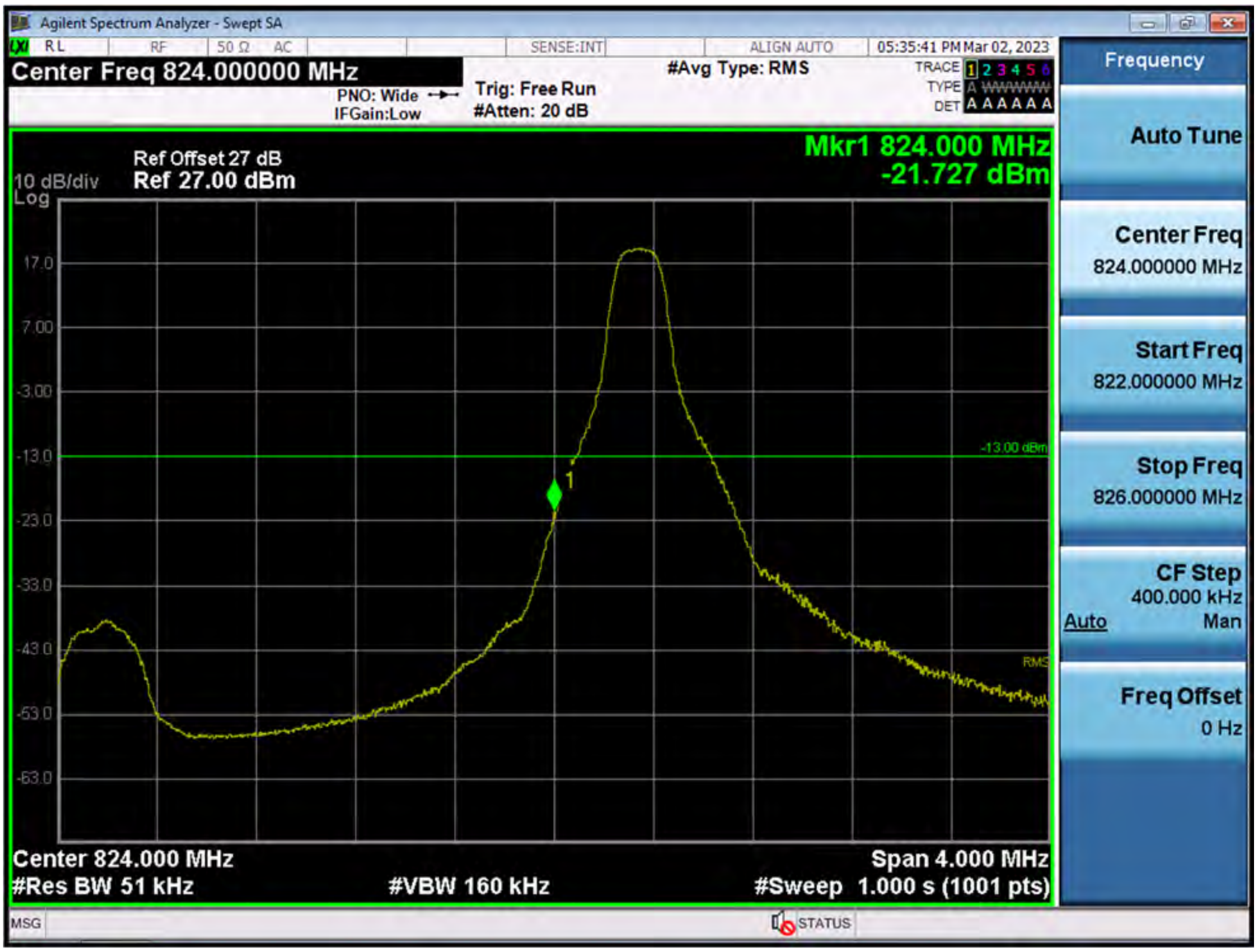
5 M_BandEdge_Lowest Channel_QPSK_FullRB(1)

5 M_BandEdge_Lowest Channel_QPSK_FullRB(2)

5 M_BandEdge_Highest Channel_QPSK_FullRB(1)

5 M_BandEdge_Highest Channel_QPSK_FullRB(2)

5 M_BandEdge_Lowest Channel_QPSK_1RB



5 M_BandEdge_Highest Channel_QPSK_1RB

10 M_BandEdge_Lowest Channel_QPSK_FullRB(1)

10 M_BandEdge_Lowest Channel_QPSK_FullRB(2)

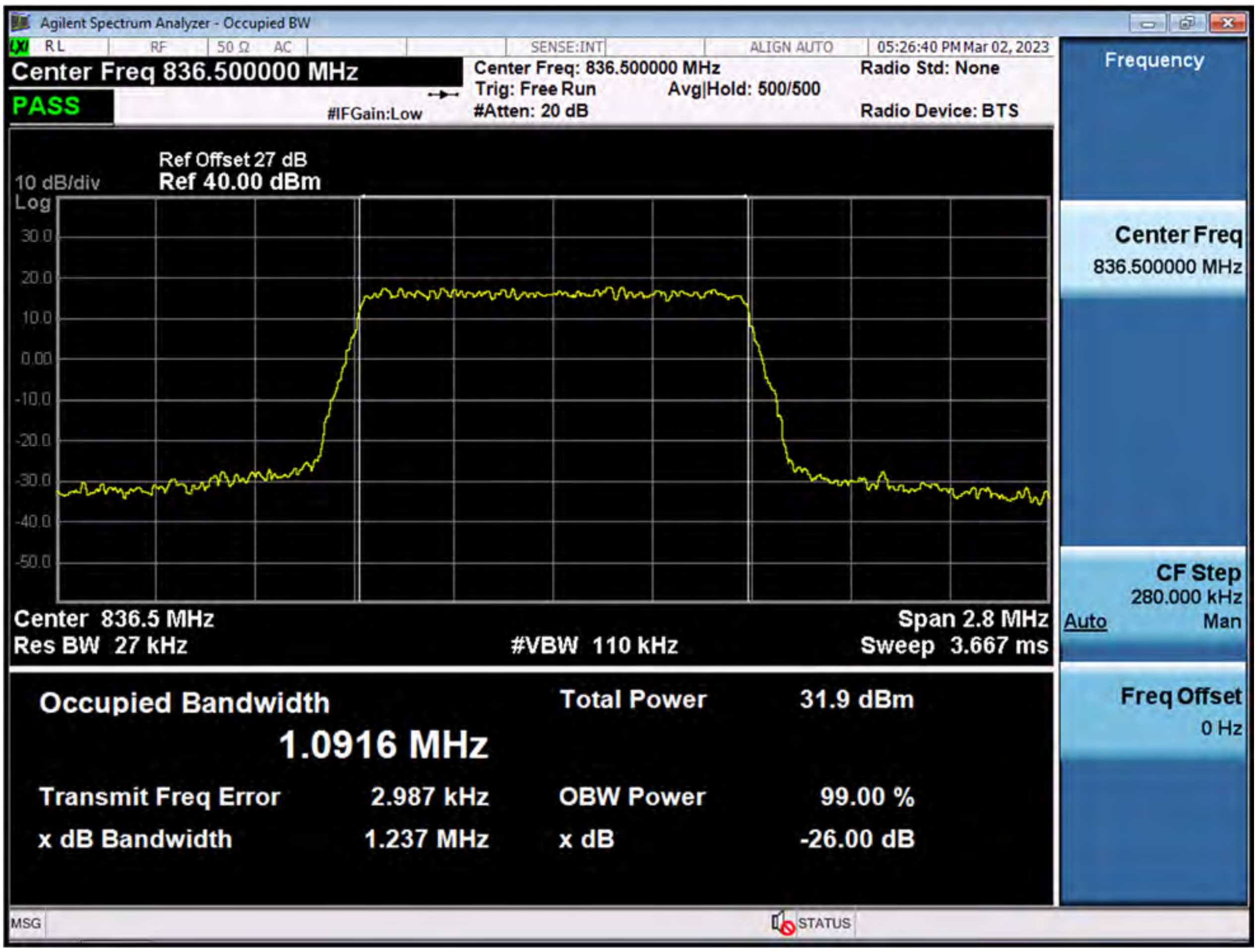
10 M_BandEdge_Highest Channel_QPSK_FullRB(1)

10 M_BandEdge_Highest Channel_QPSK_FullRB(2)

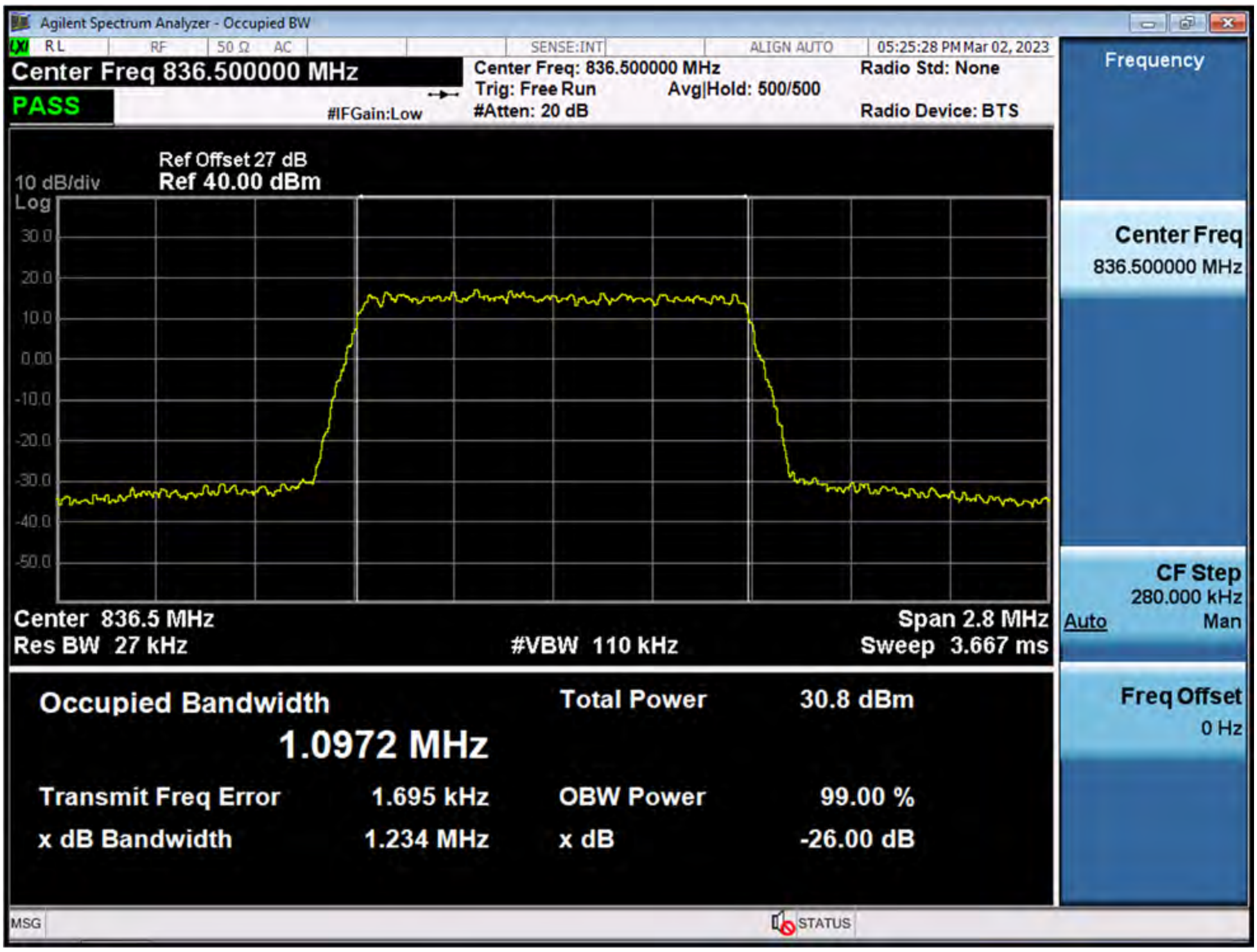
10 M_BandEdge_Lowest Channel_QPSK_1RB

10 M_BandEdge_Highest Channel_QPSK_1RB

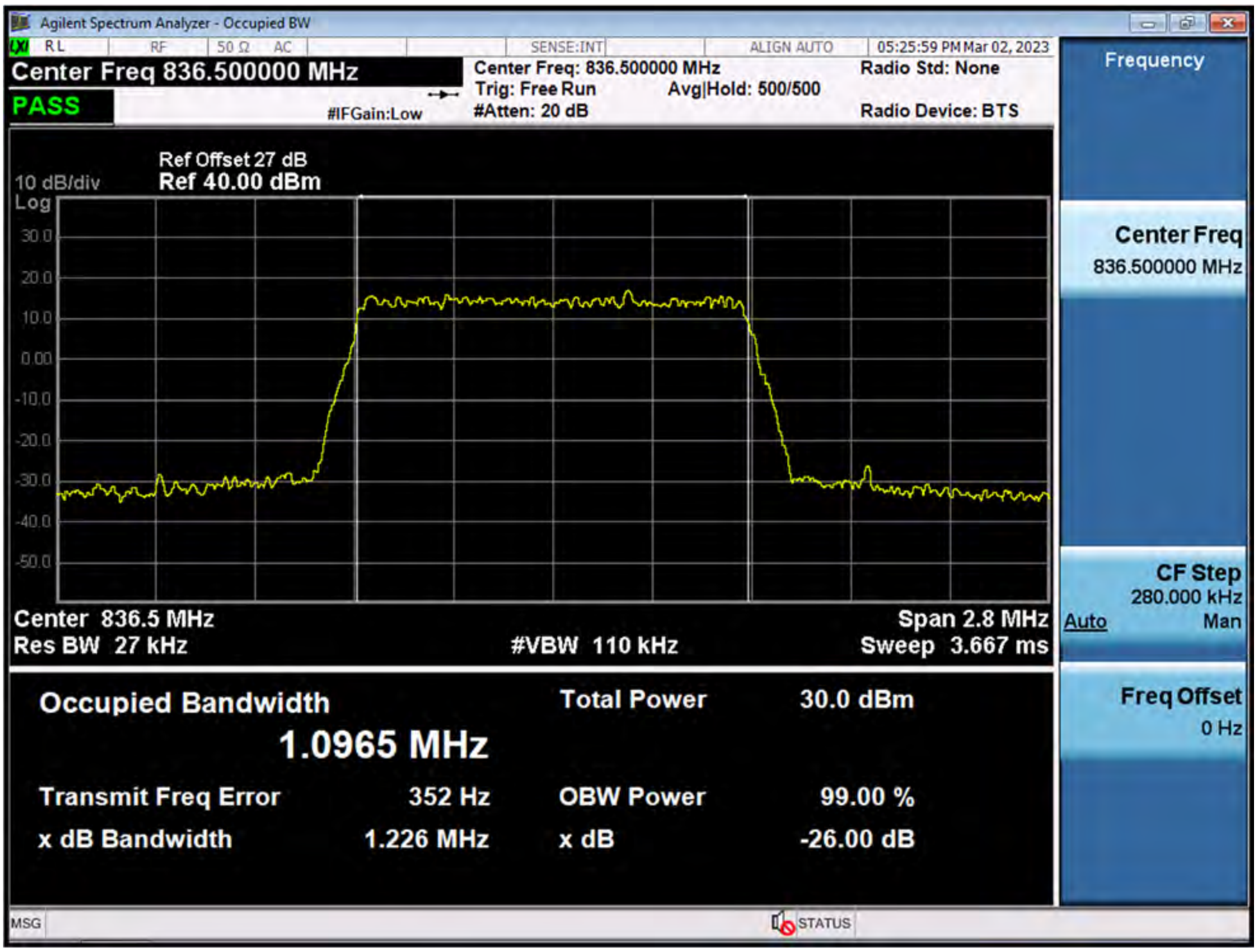
1.4 M_OBW_Mid Channel_QPSK_FullRB



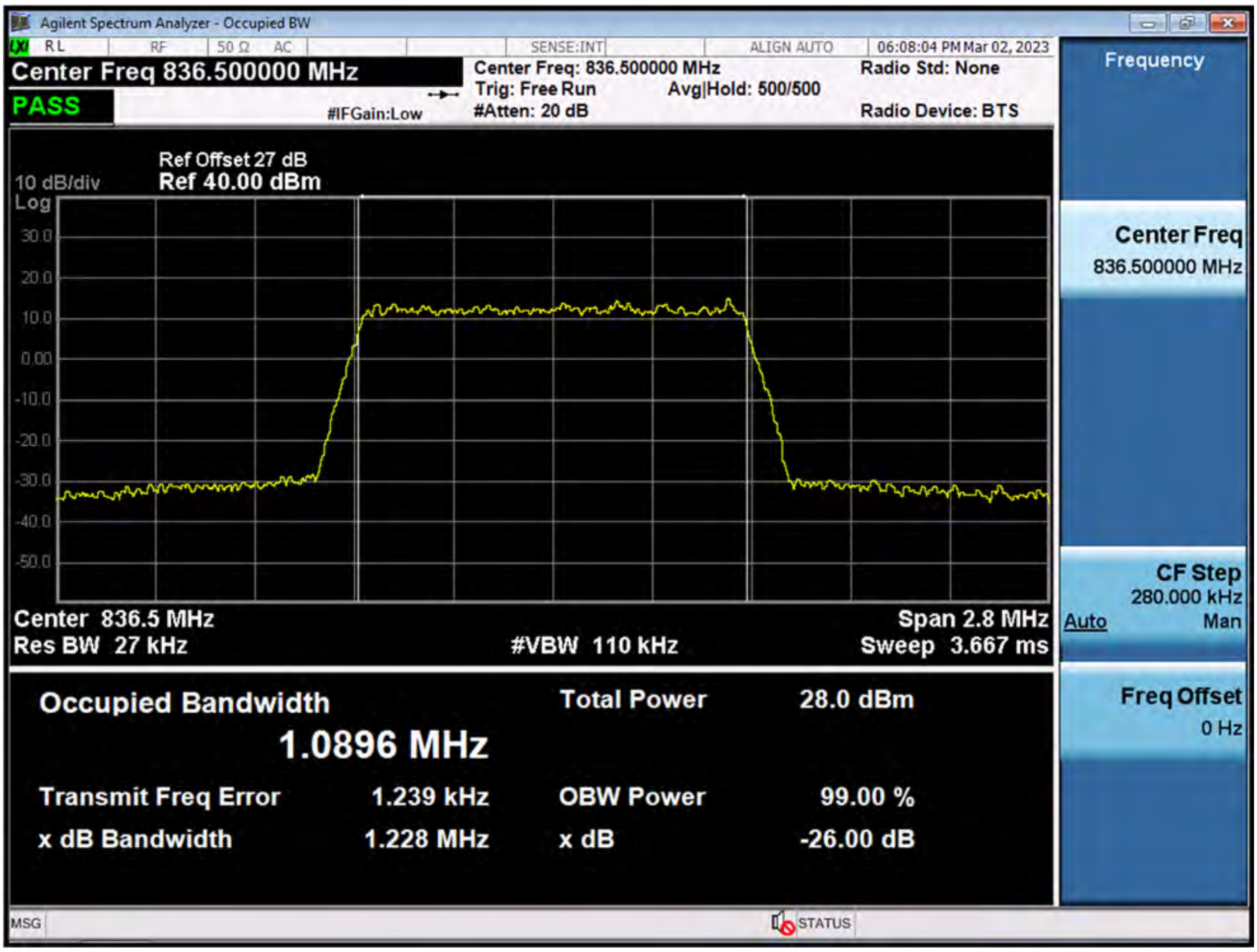
1.4 M_OBW_Mid Channel_16QAM_FullRB



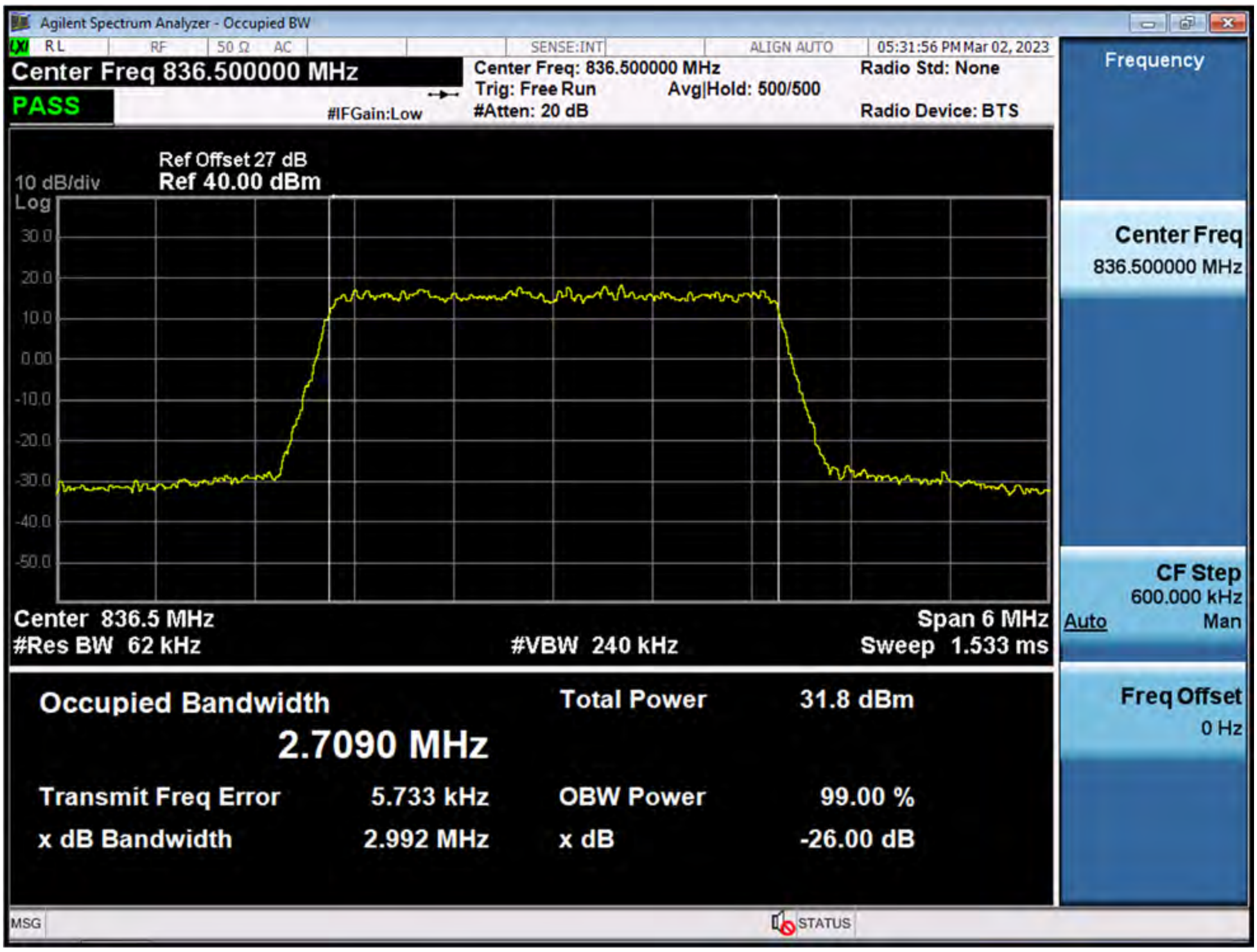
1.4 M_OBW_Mid Channel_64QAM_FullRB



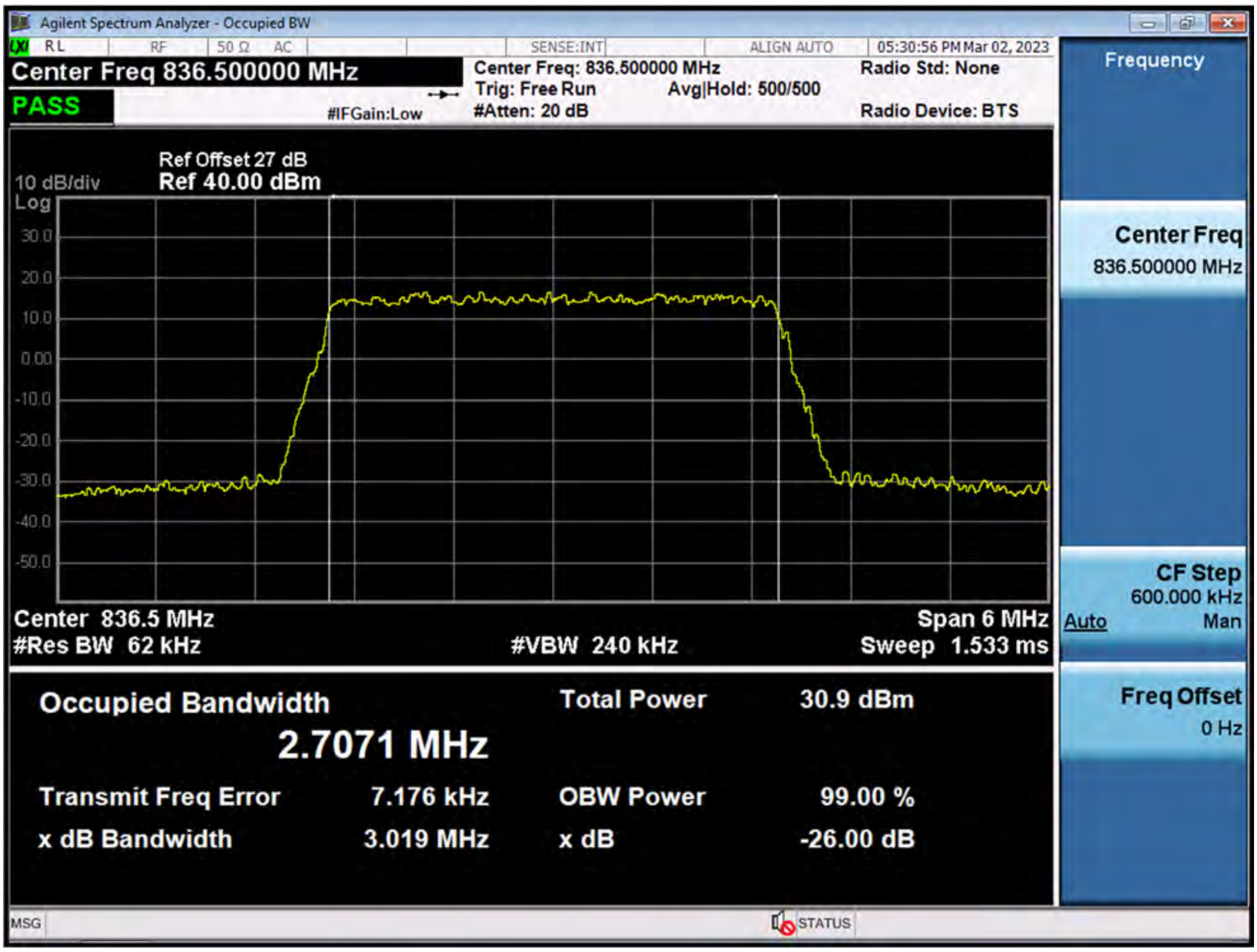
1.4 M_OBW_Mid Channel_256QAM_FullRB



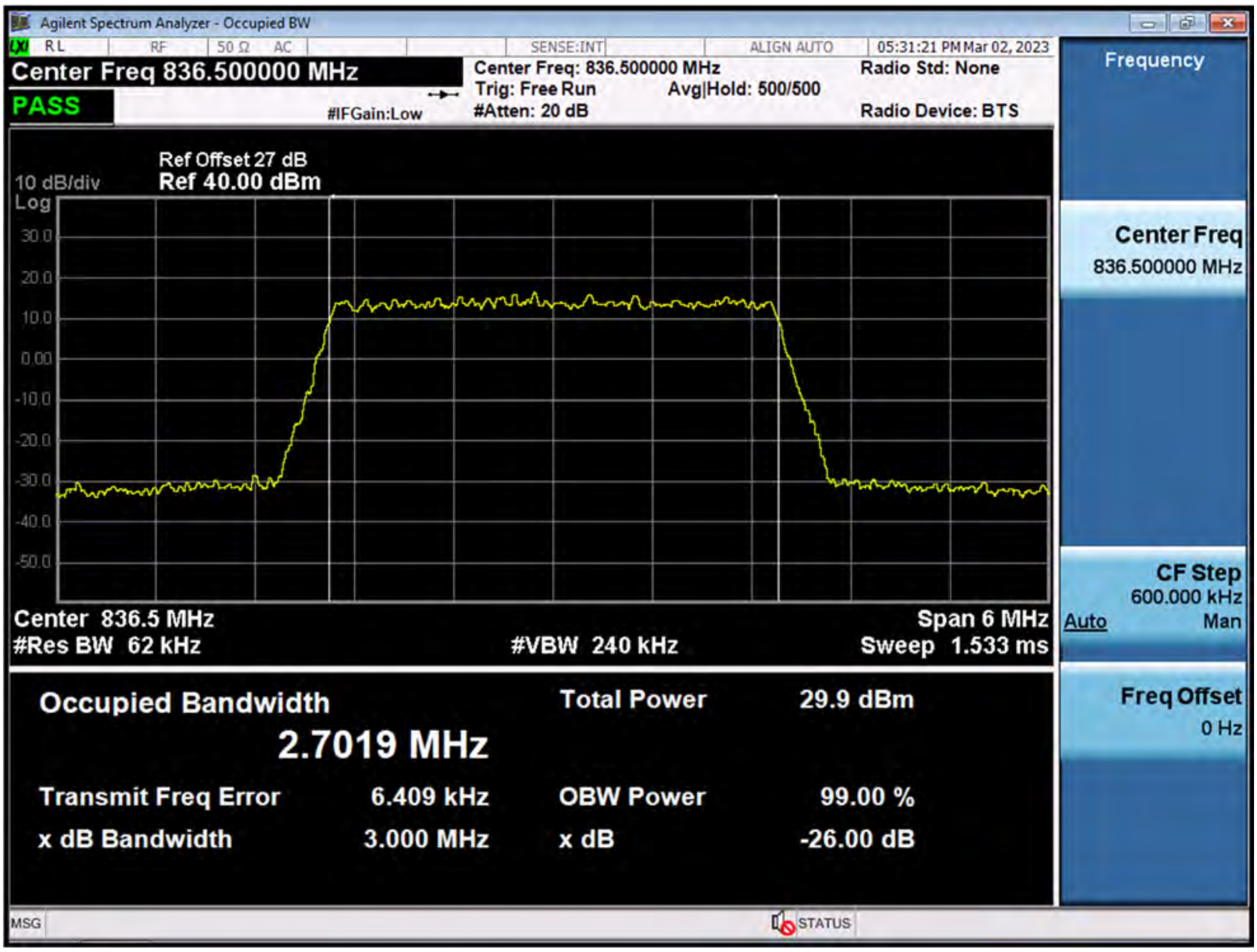
3 M_OBW_Mid Channel_QPSK_FullRB



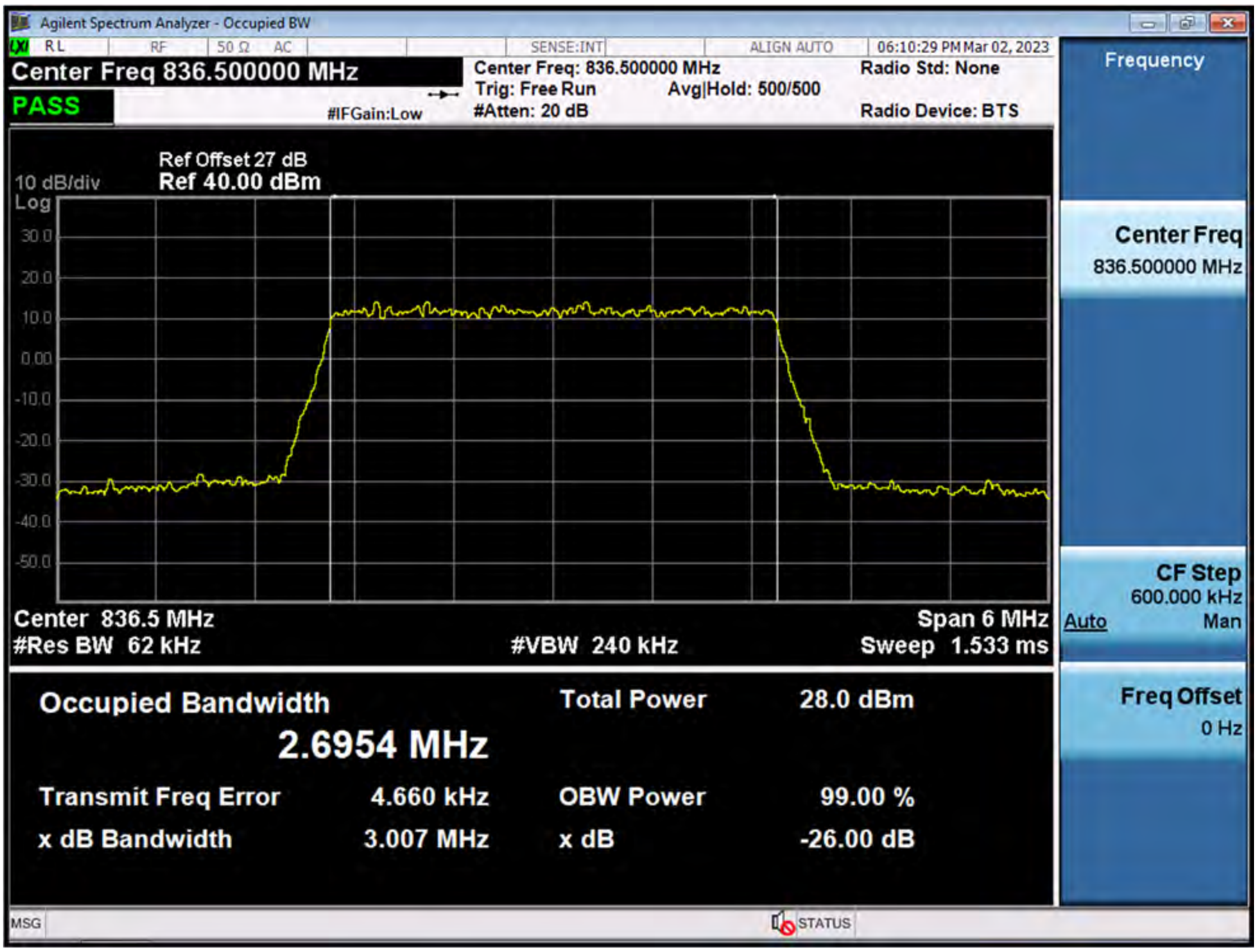
3 M_OBW_Mid Channel_16QAM_FullRB



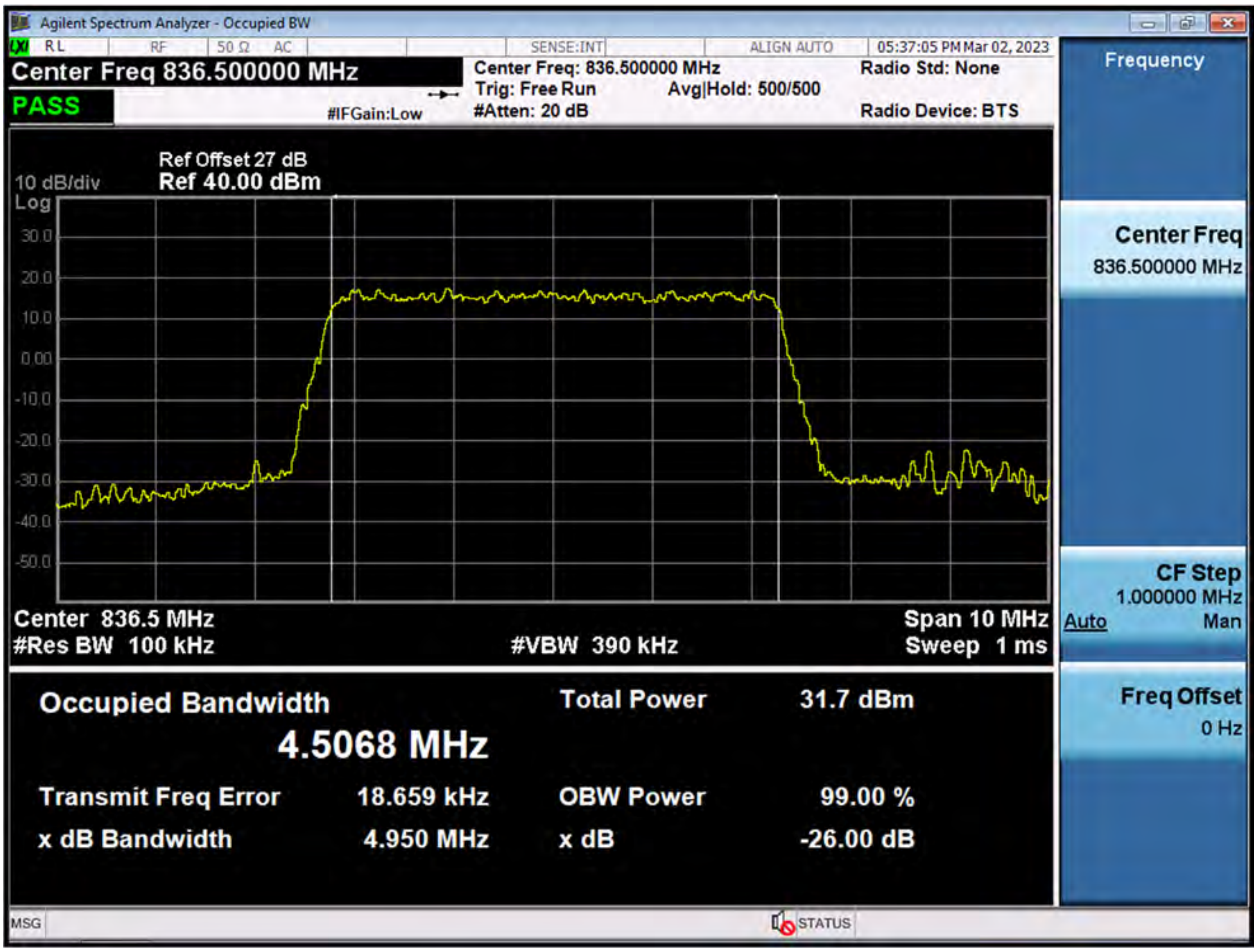
3 M_OBW_Mid Channel_64QAM_FullRB



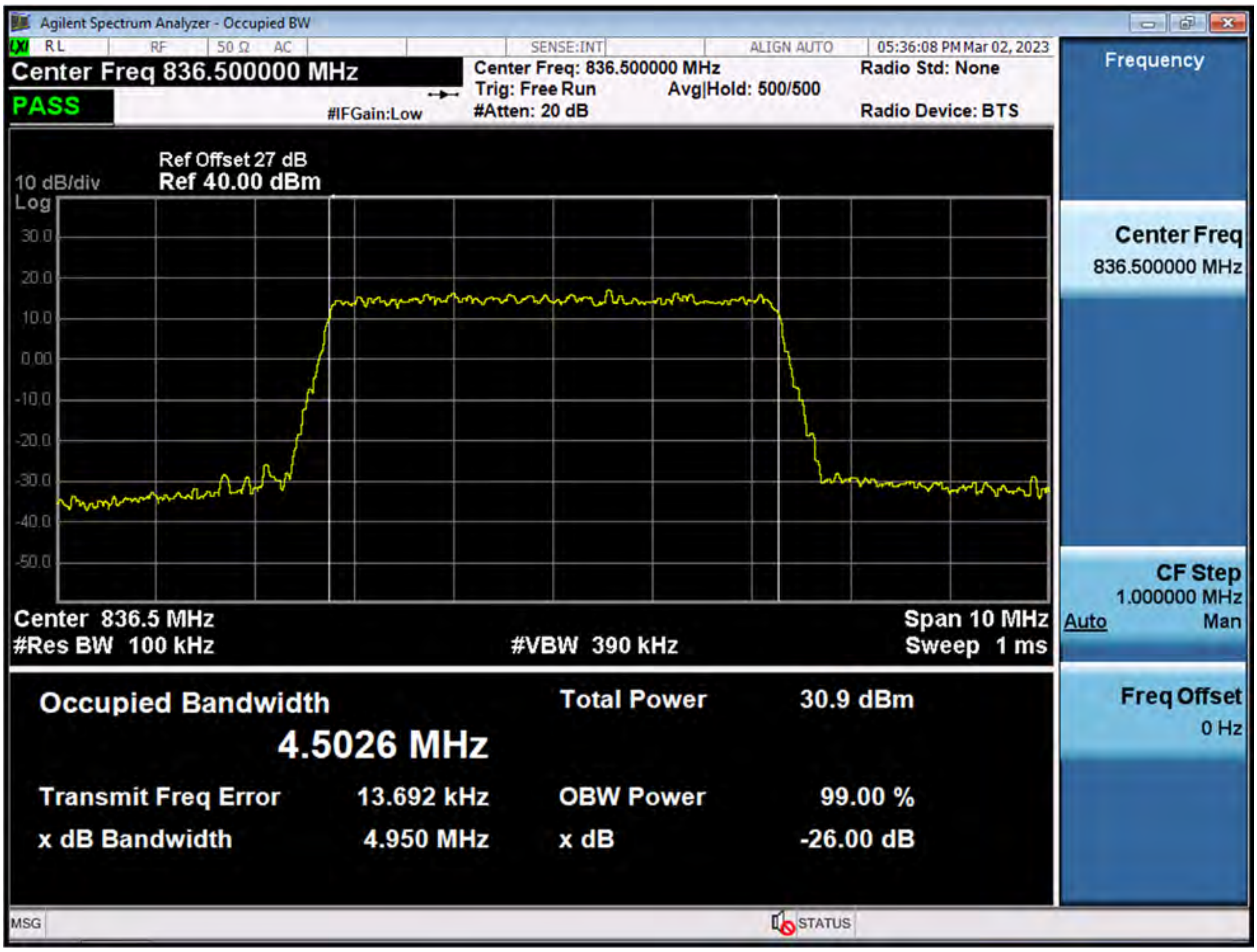
3 M_OBW_Mid Channel_256QAM_FullRB



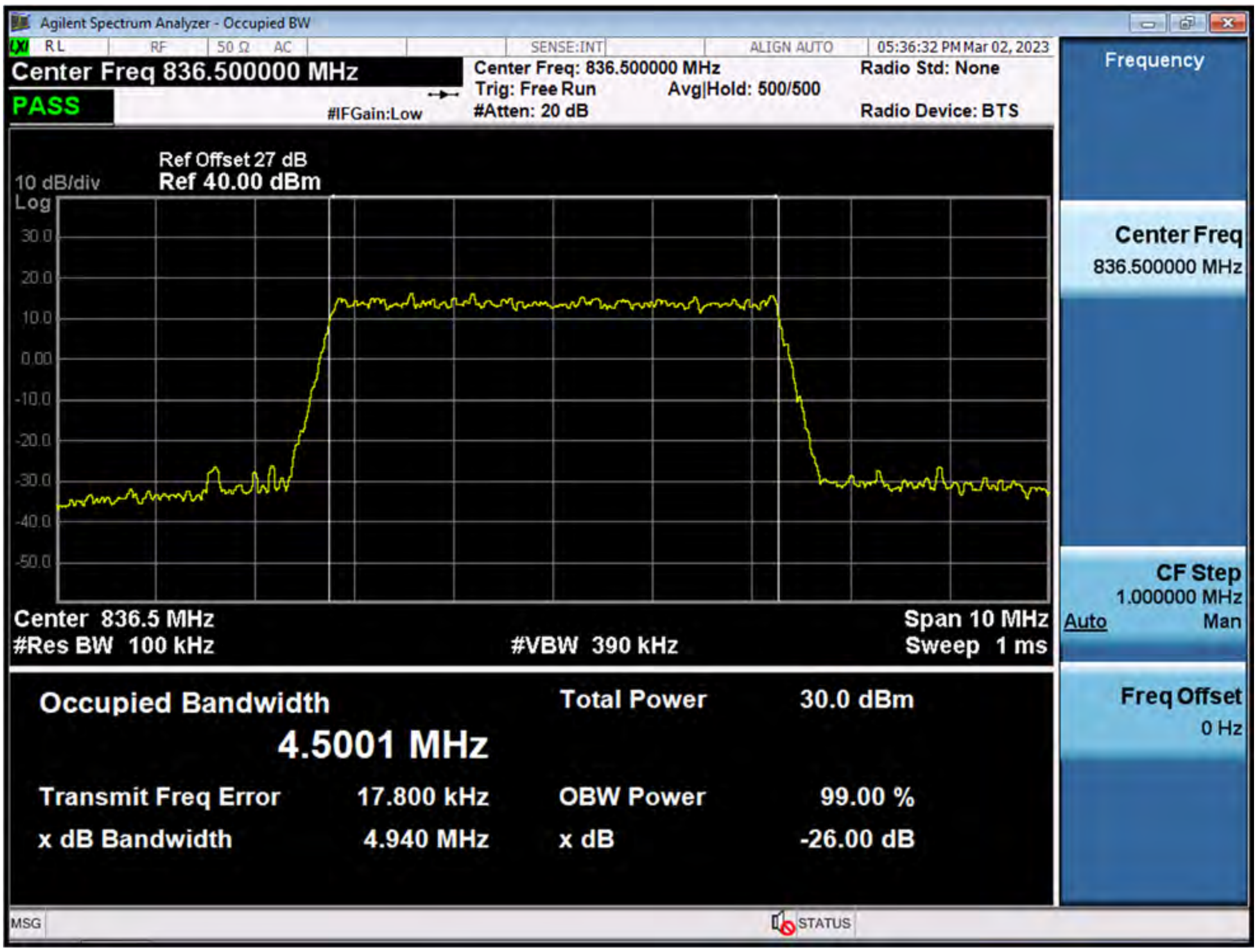
5 M_OBW_Mid Channel_QPSK_FullRB



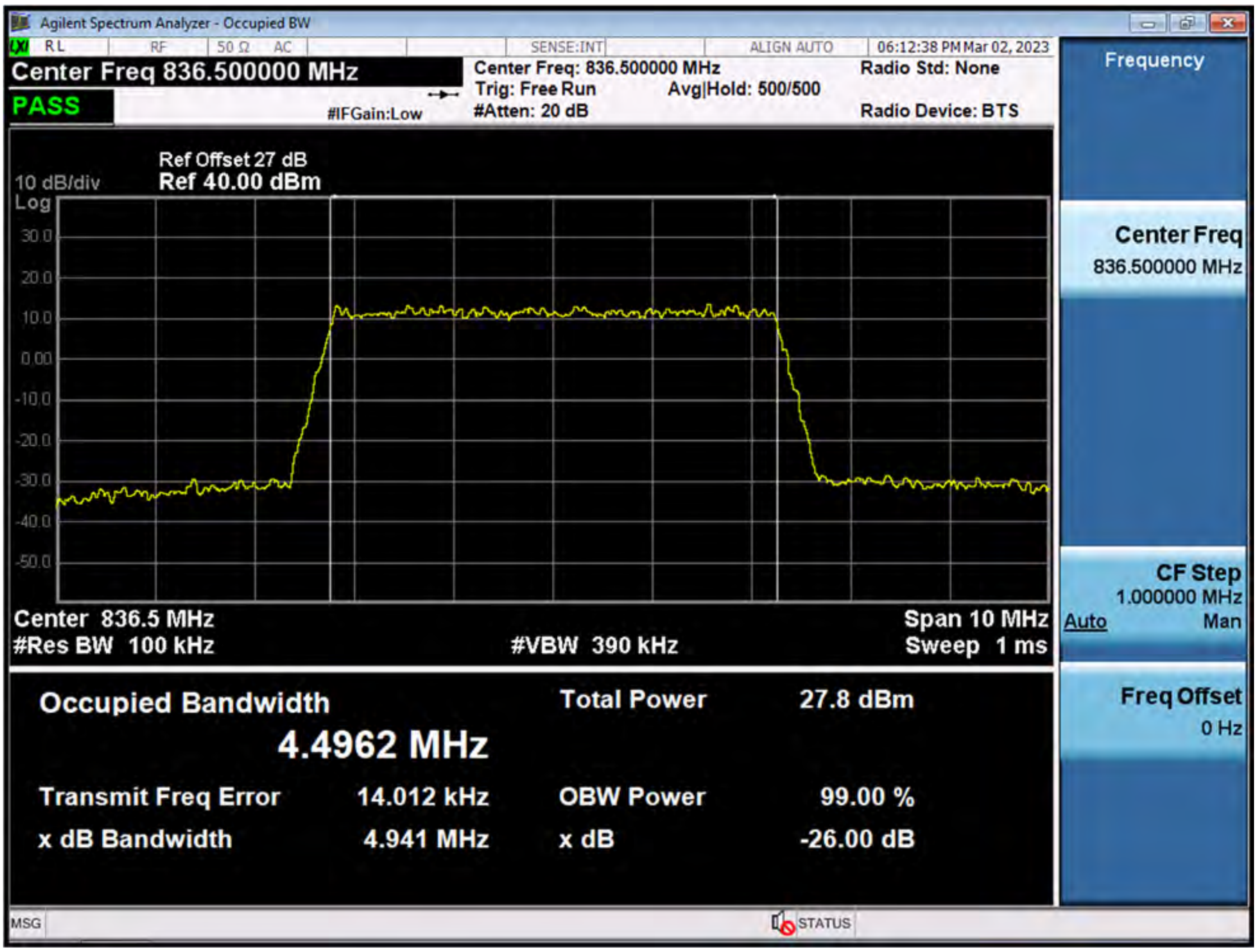
5 M_OBW_Mid Channel_16QAM_FullRB



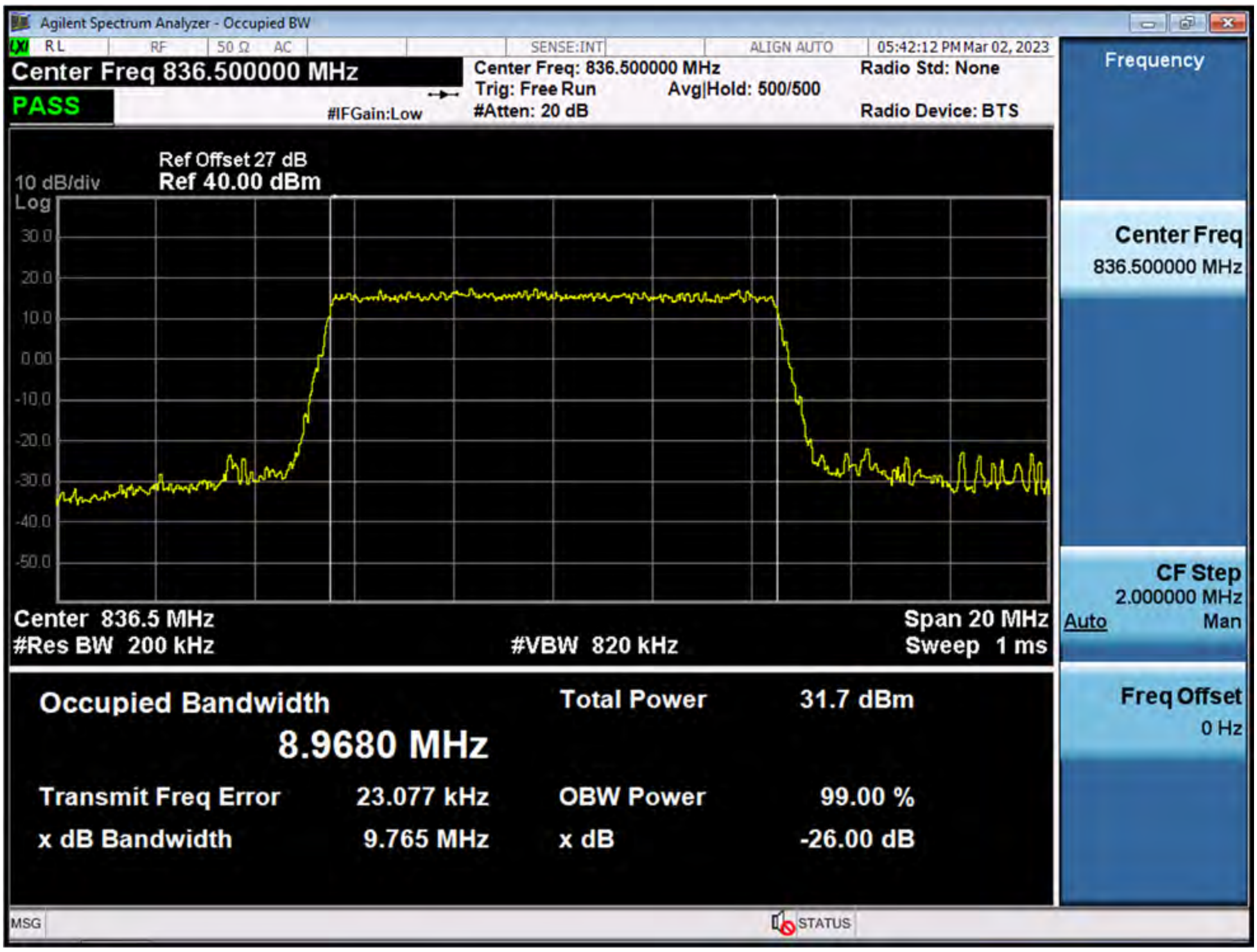
5 M_OBW_Mid Channel_64QAM_FullRB



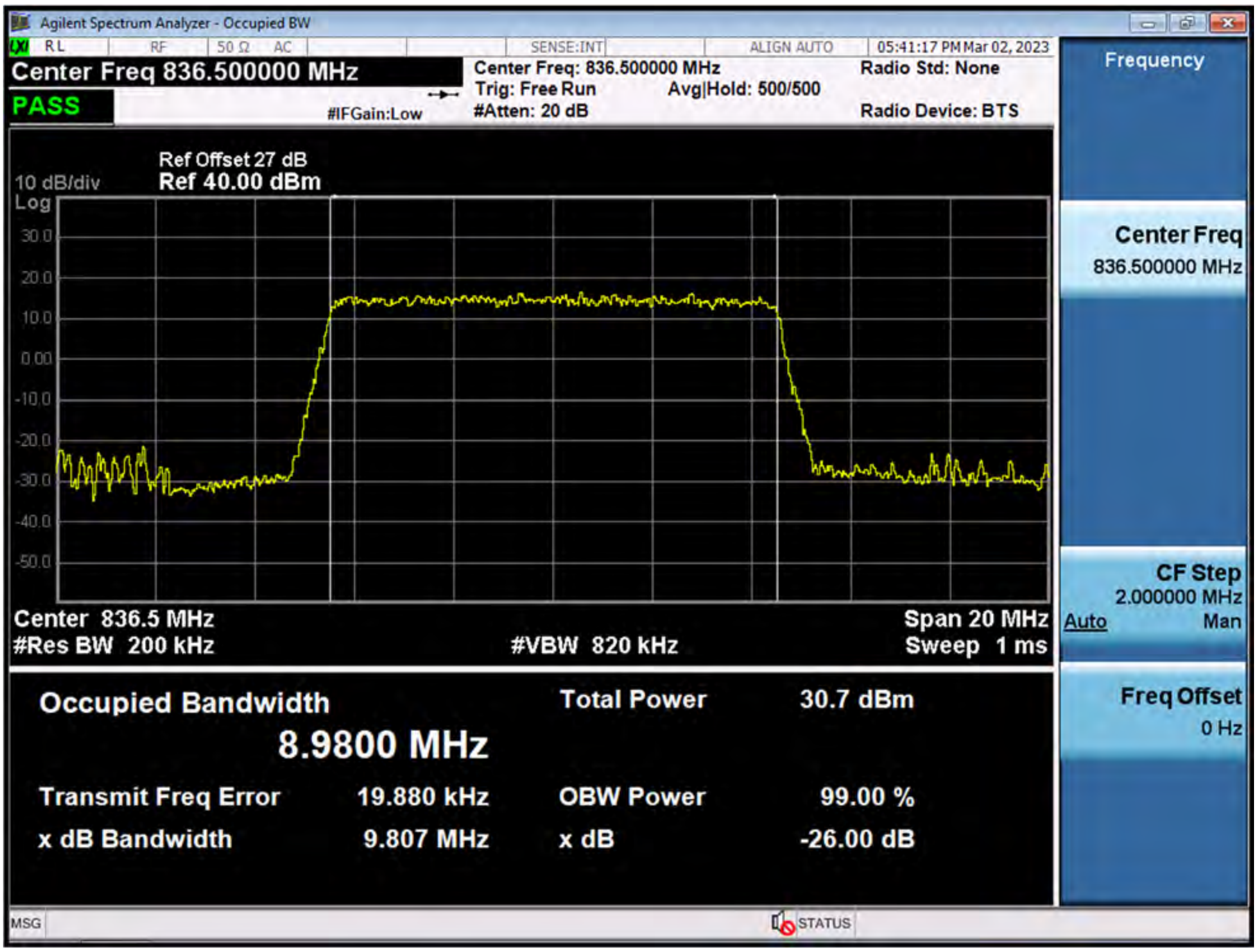
5 M_OBW_Mid Channel_256QAM_FullRB



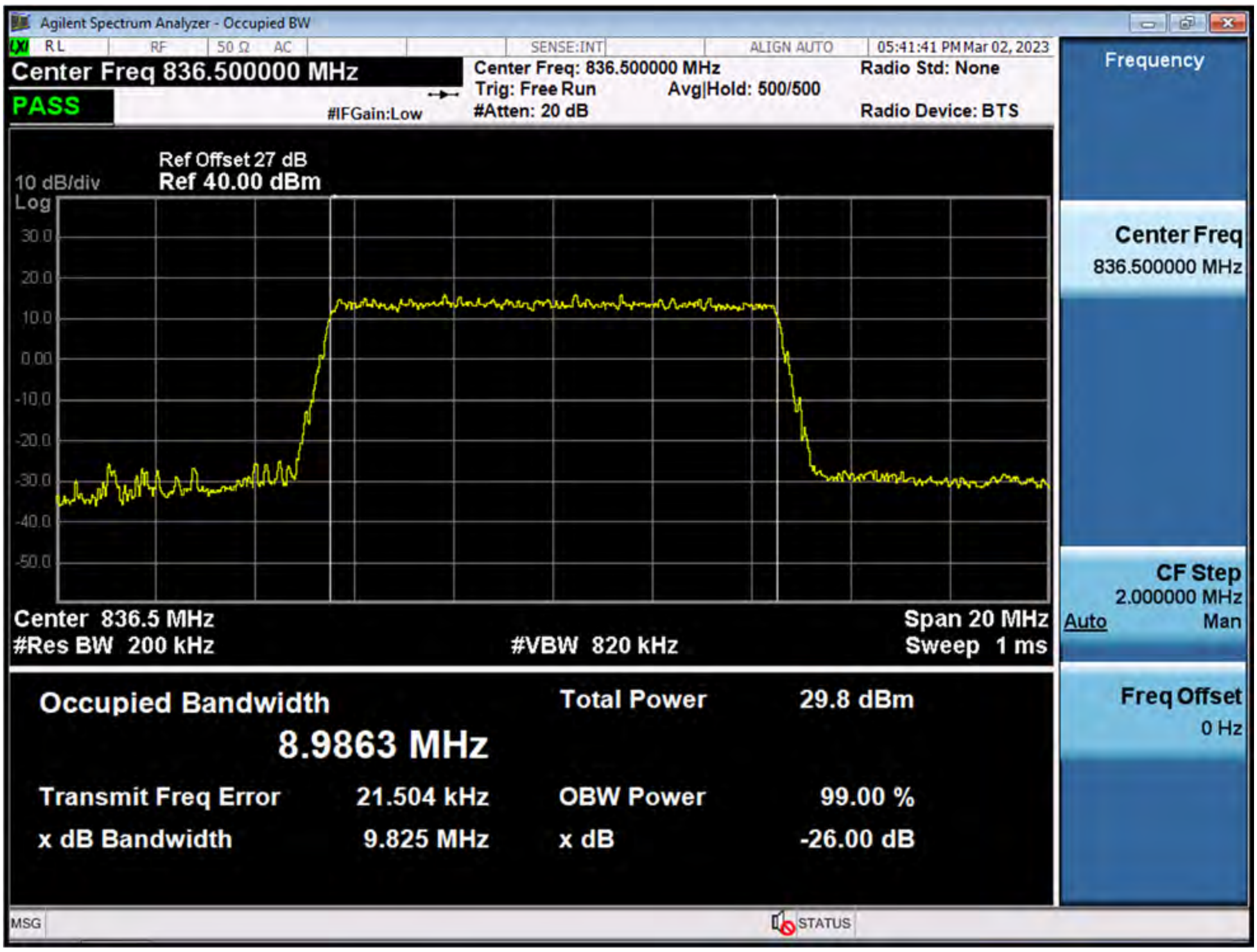
10 M_OBW_Mid Channel_QPSK_FullRB



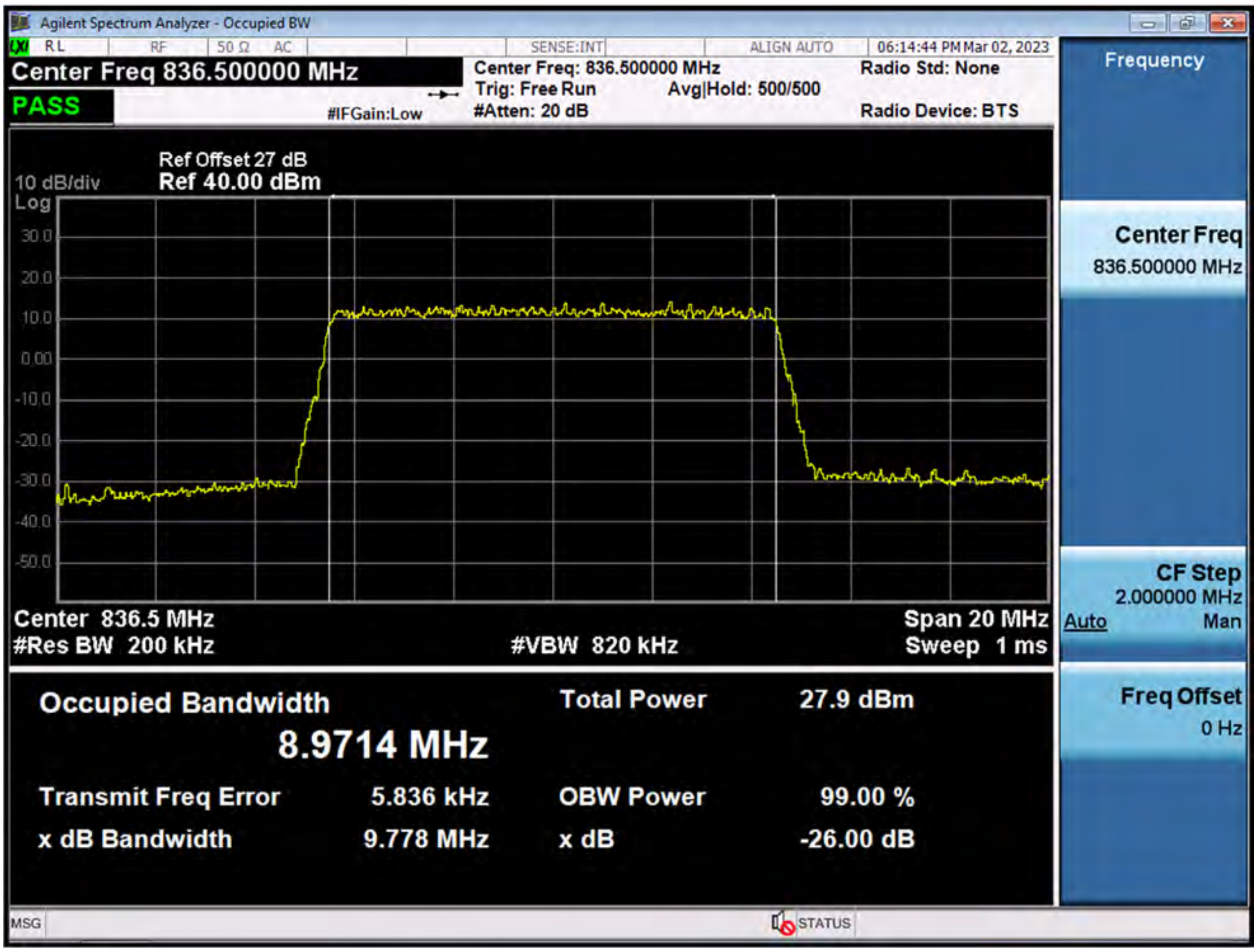
10 M_OBW_Mid Channel_16QAM_FullRB



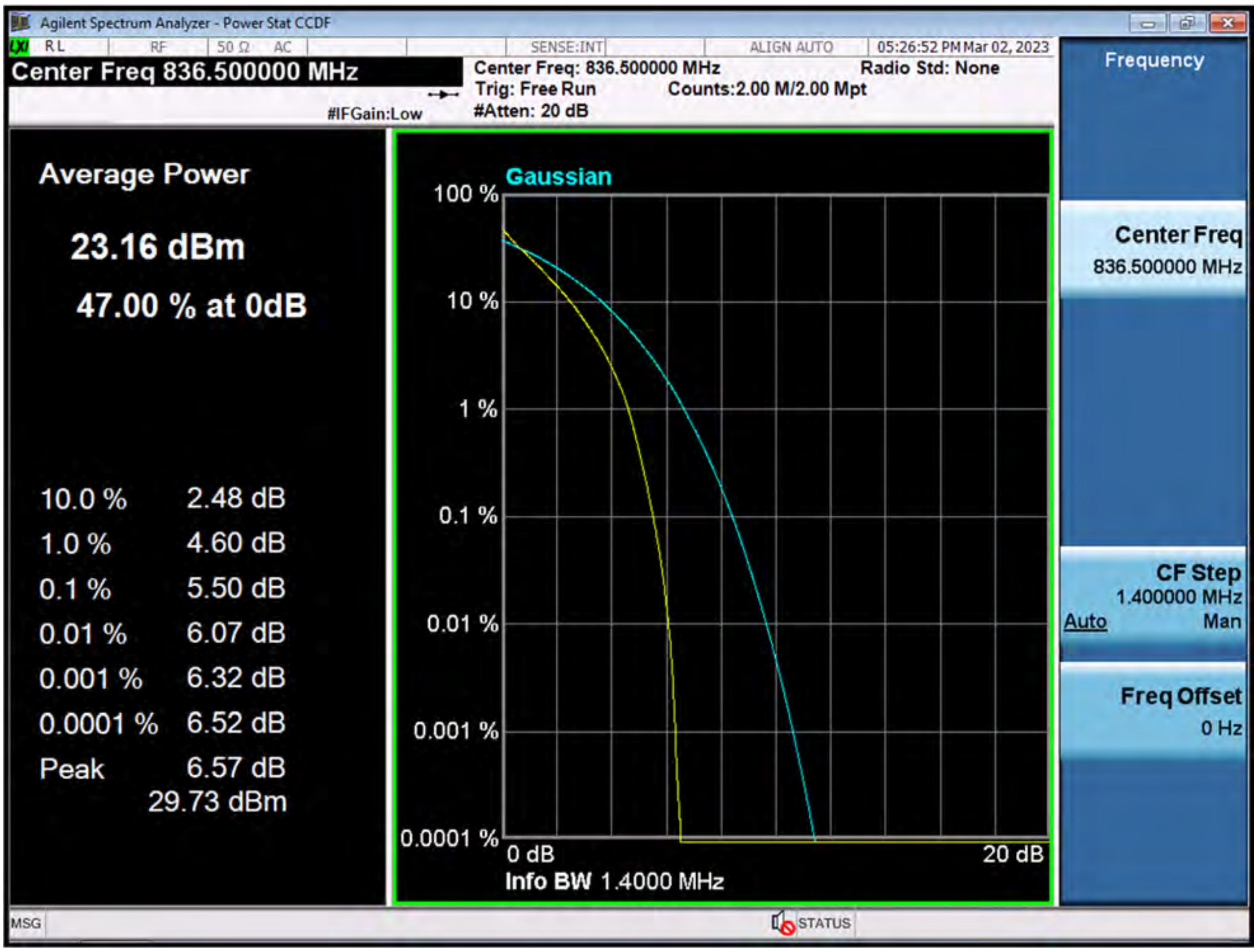
10 M_OBW_Mid Channel_64QAM_FullRB



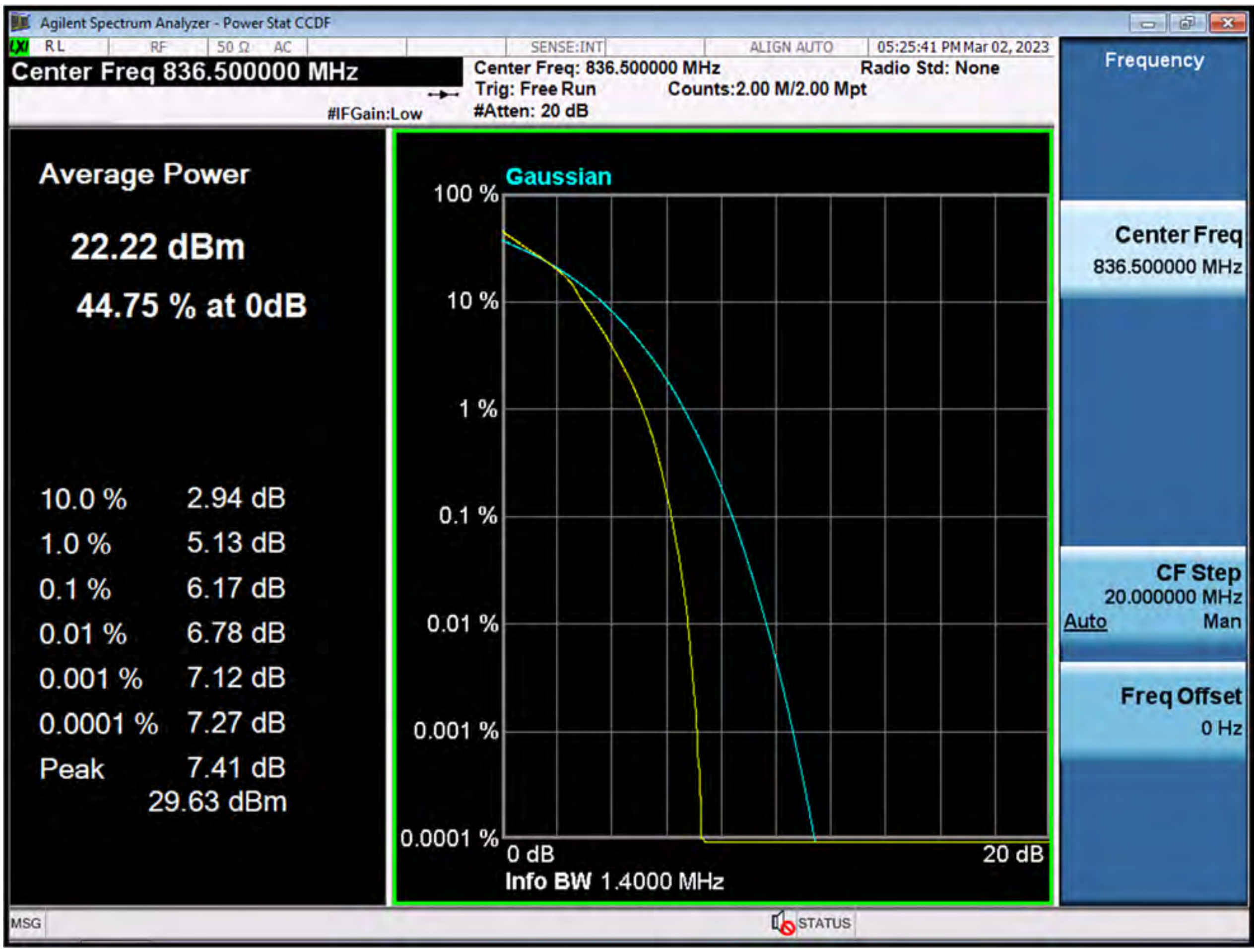
10 M_OBW_Mid Channel_256QAM_FullRB



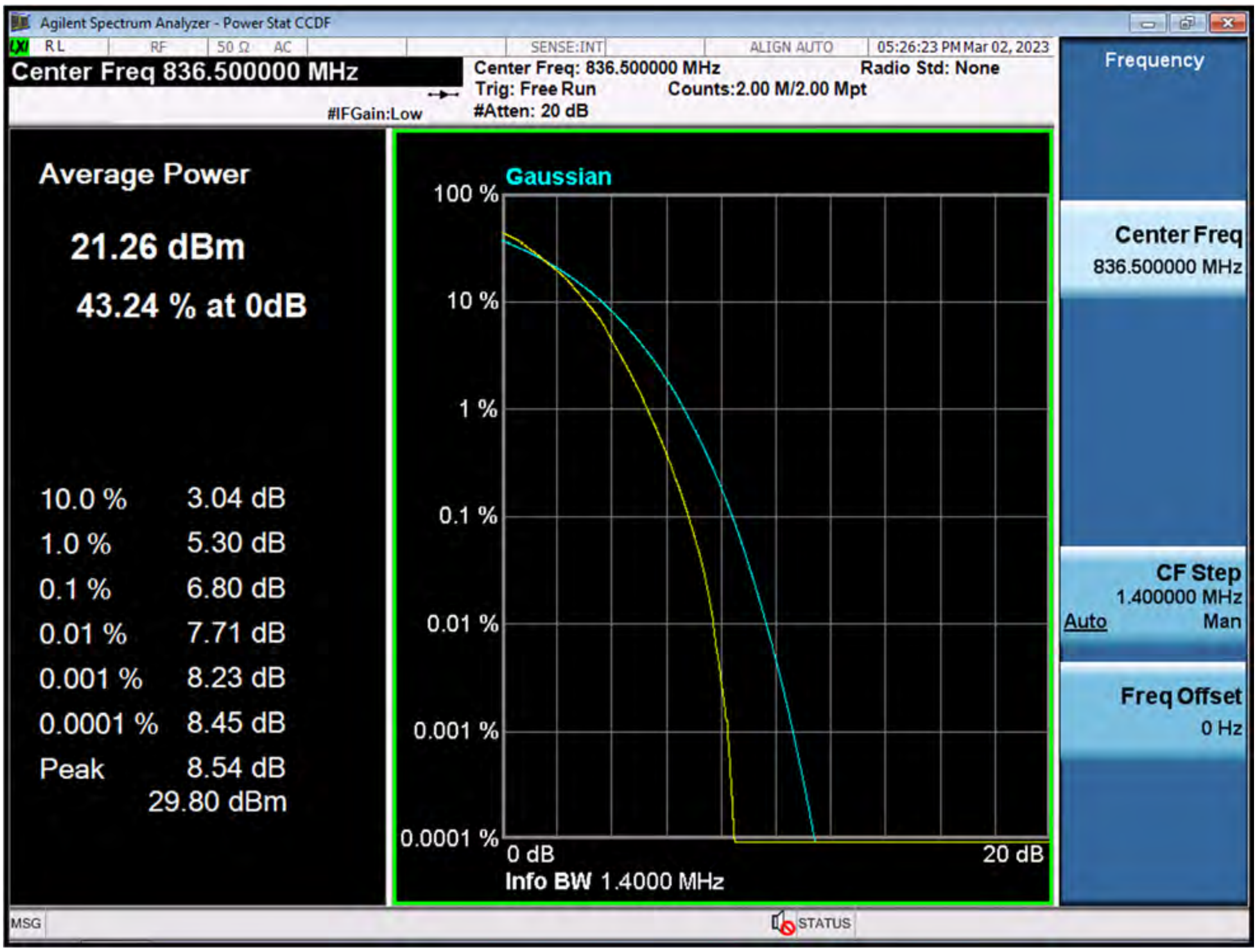
1.4 M_PAR_Mid Channel_QPSK_FullRB



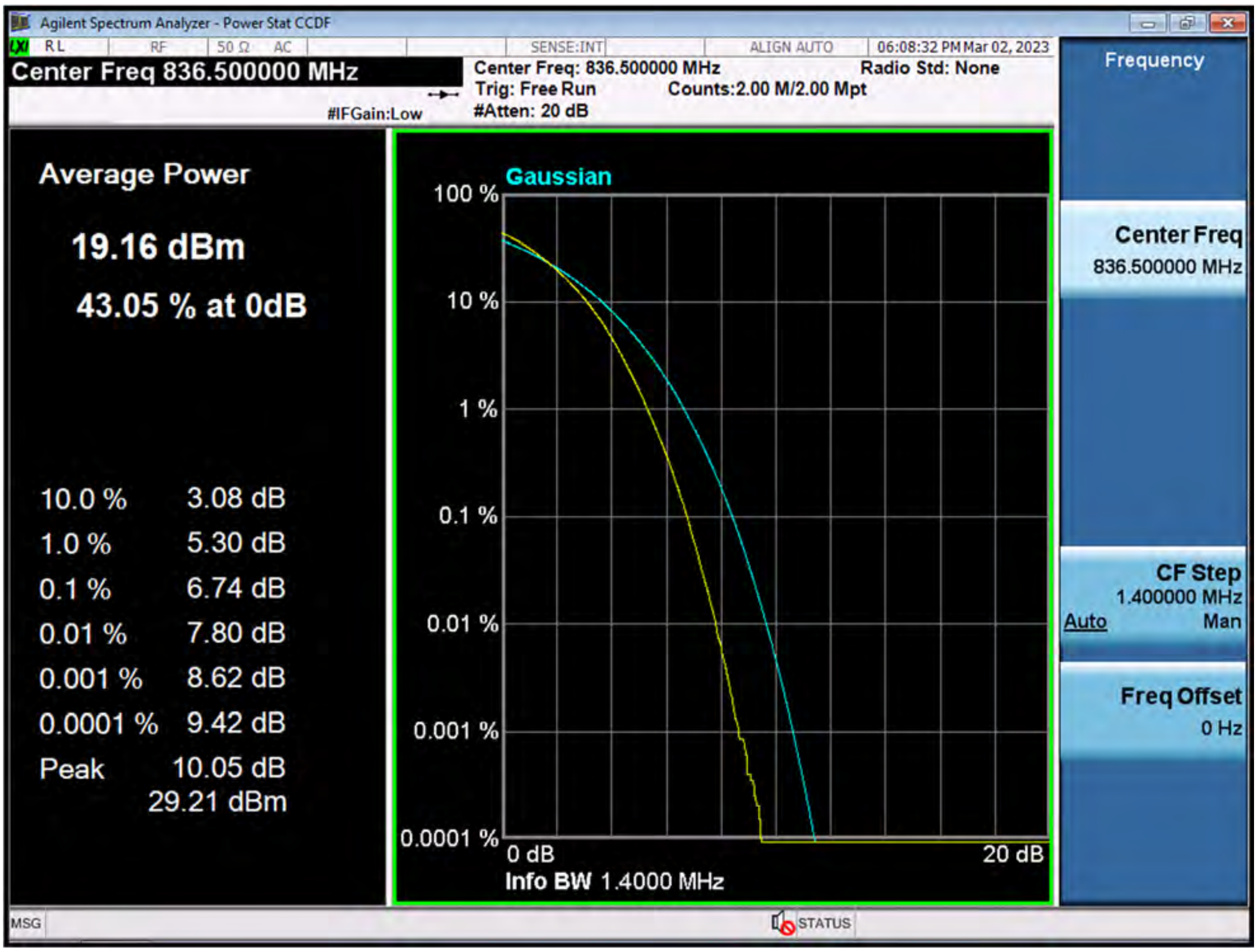
1.4 M_PAR_Mid Channel_16QAM_FullRB



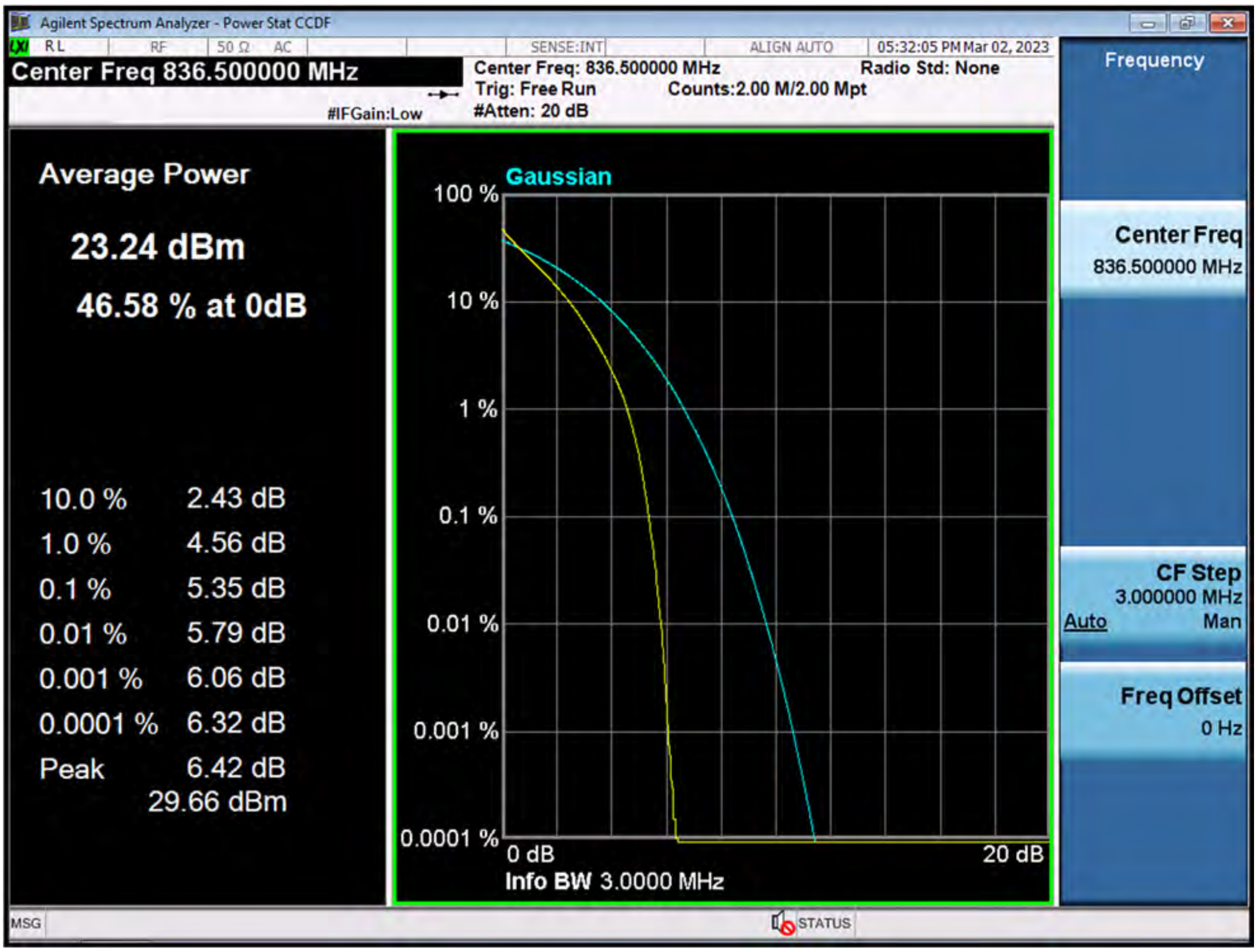
1.4 M_PAR_Mid Channelz_64QAM_FullRB



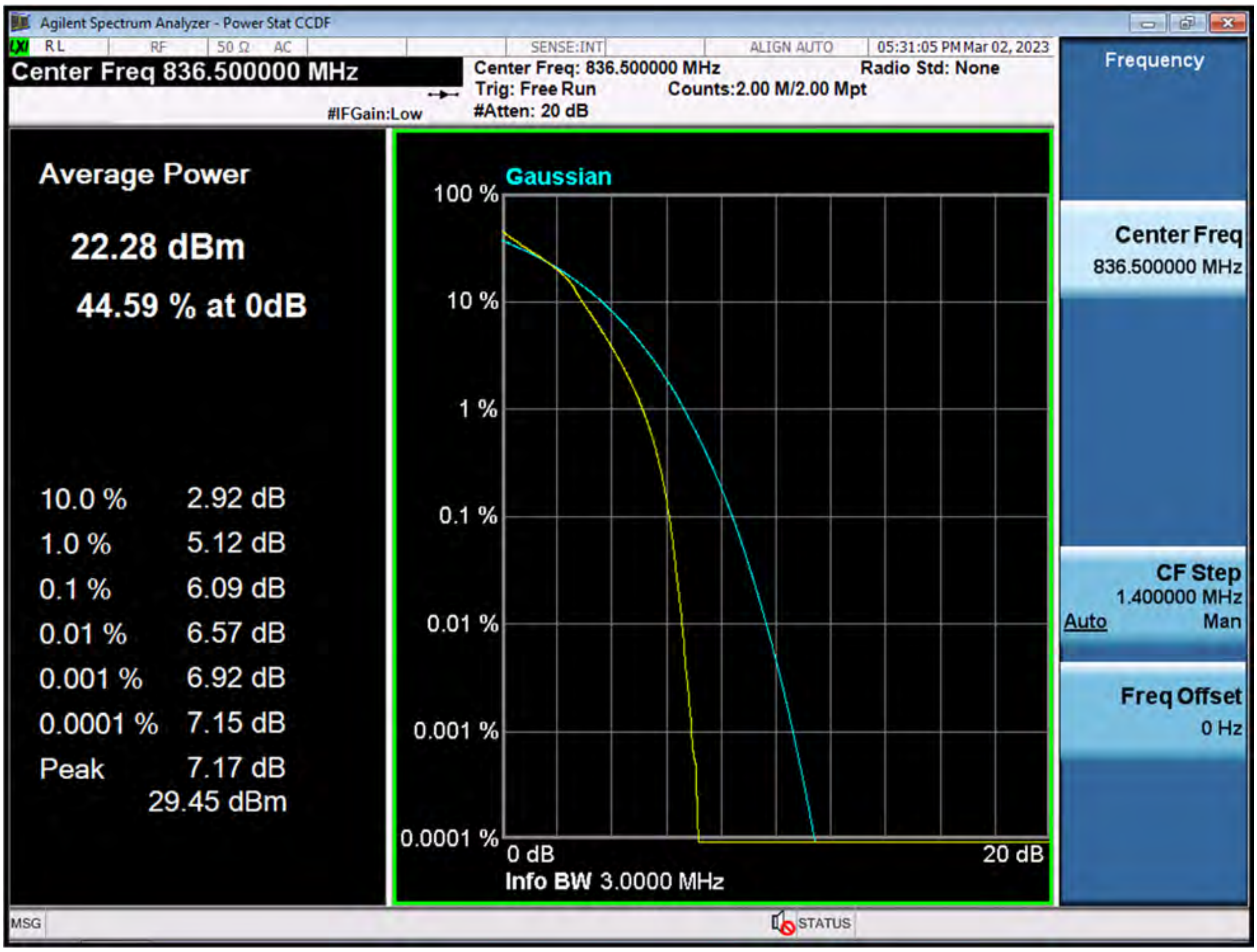
1.4 M_PAR_Mid Channel_256QAM_FullRB



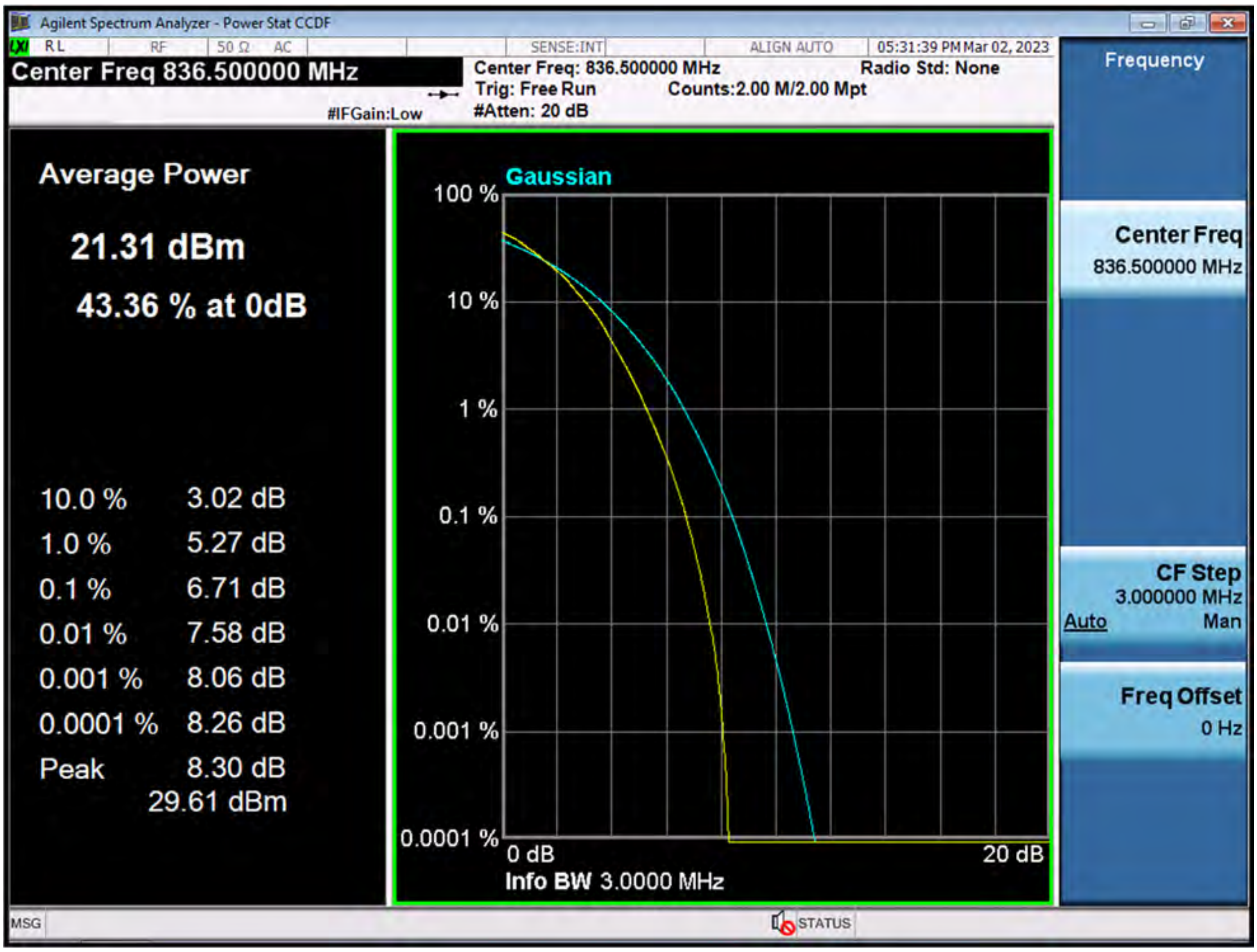
3 M_PAR_Mid Channel_QPSK_FullRB



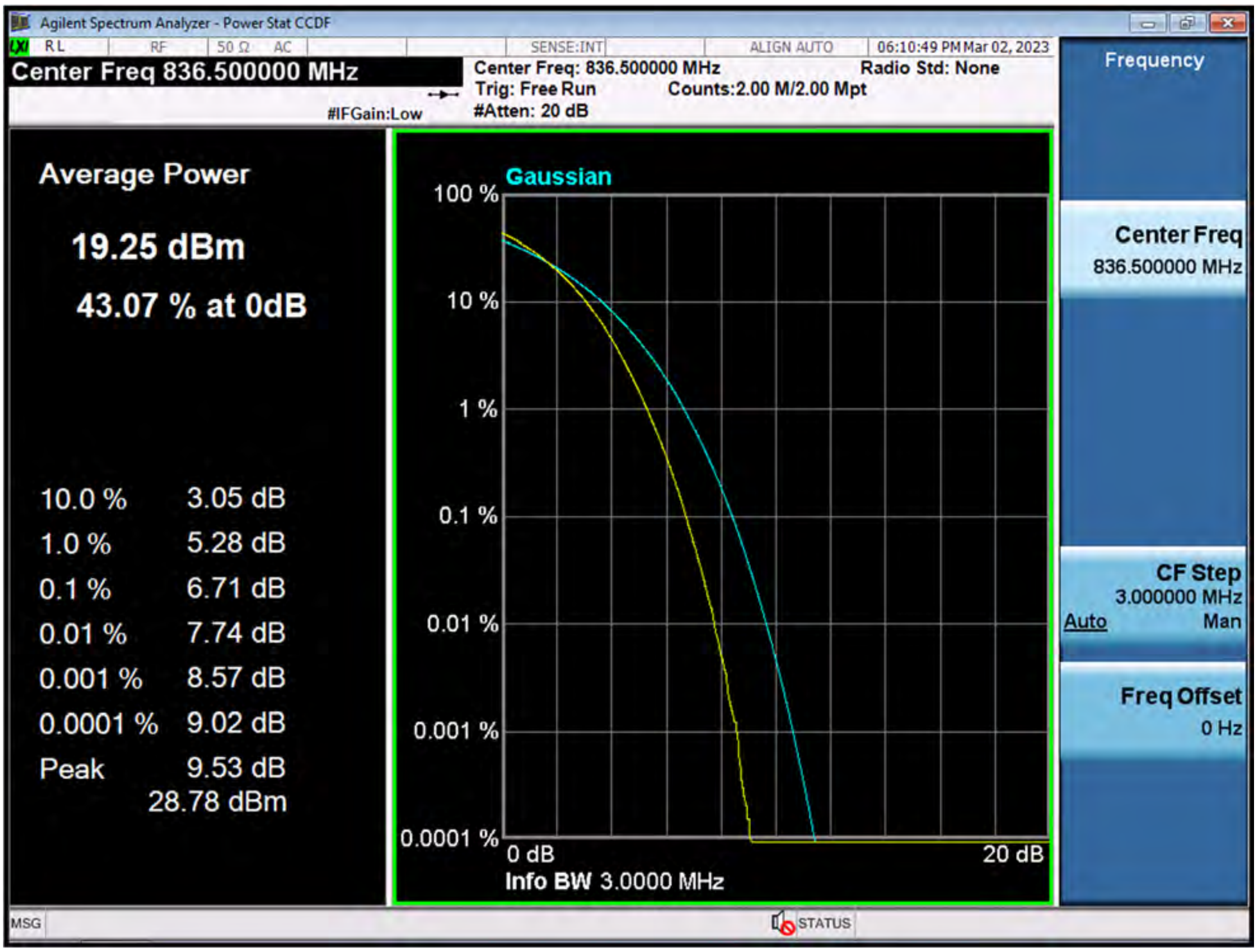
3 M_PAR_Mid Channel_16QAM_FullRB



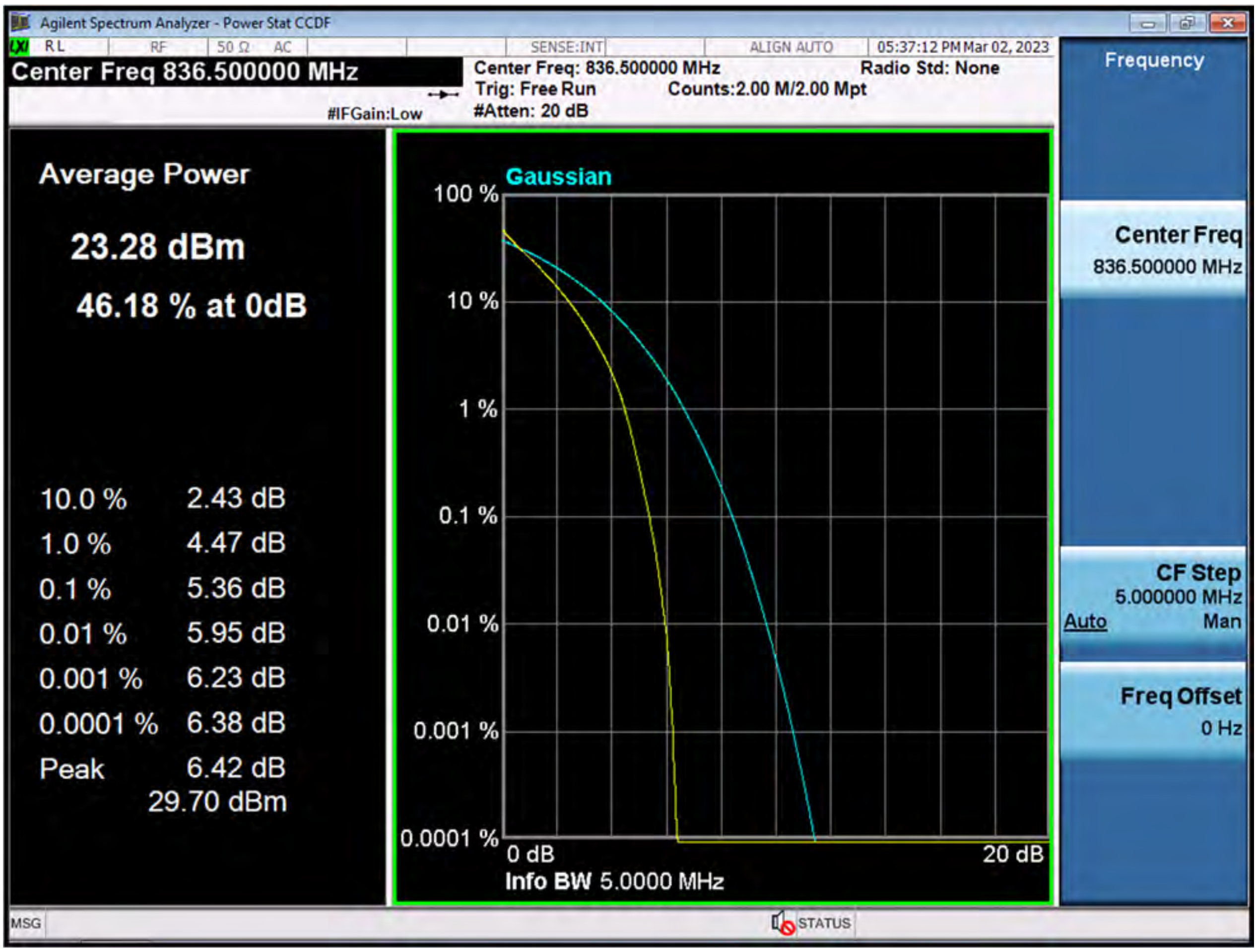
3 M_PAR_Mid Channel_64QAM_FullRB



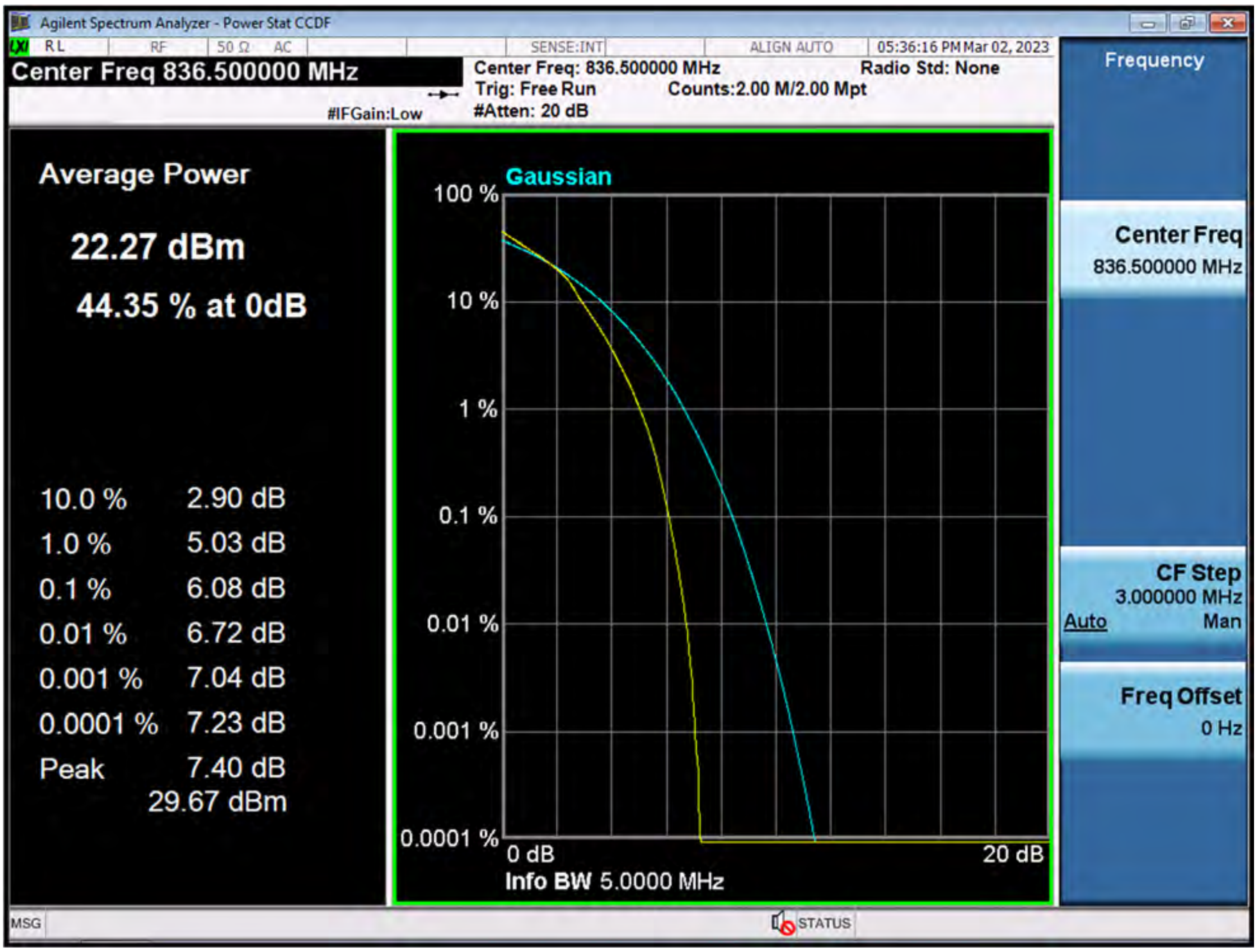
3 M_PAR_Mid Channel_256QAM_FullRB



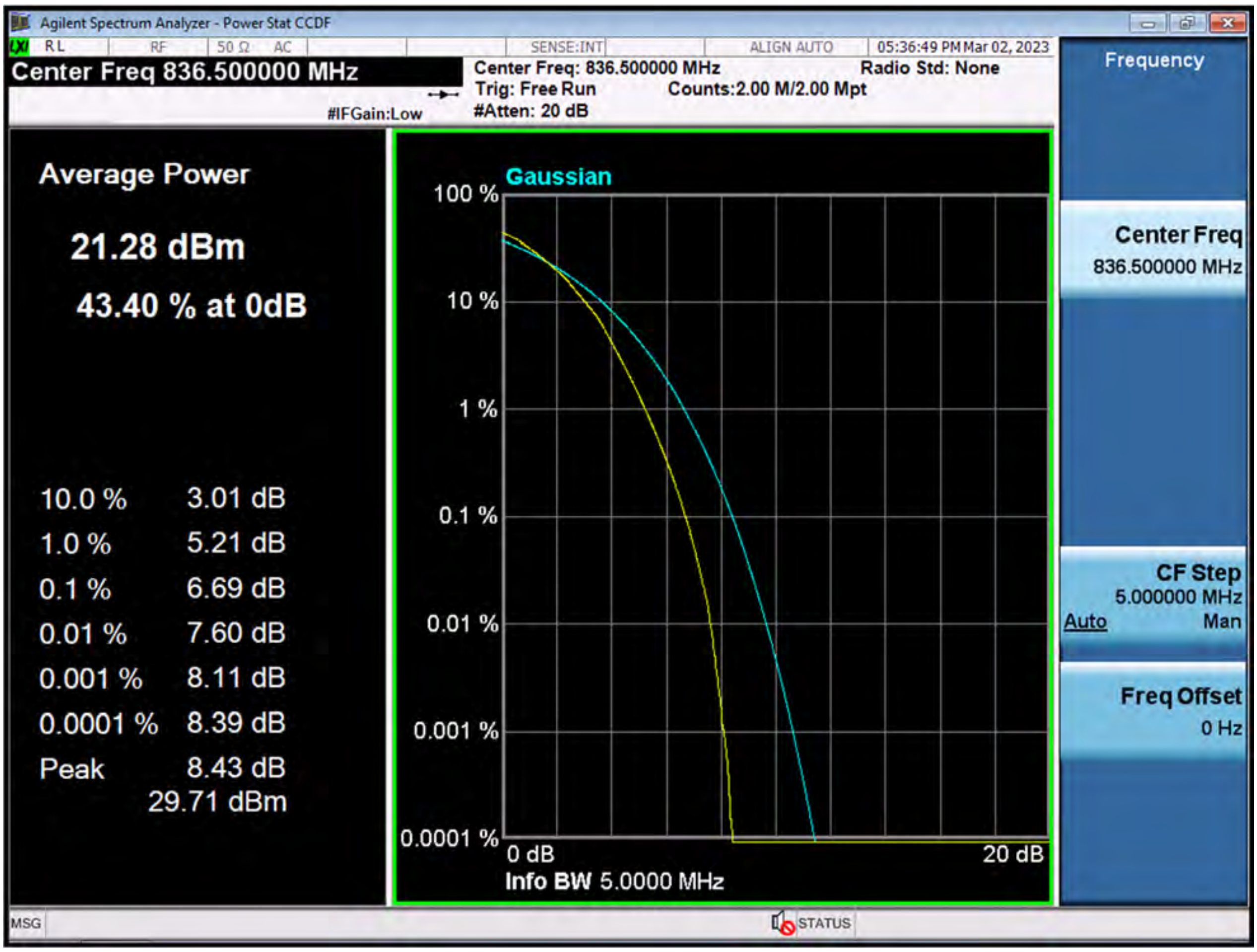
5 M_PAR_Mid Channel_QPSK_FullRB



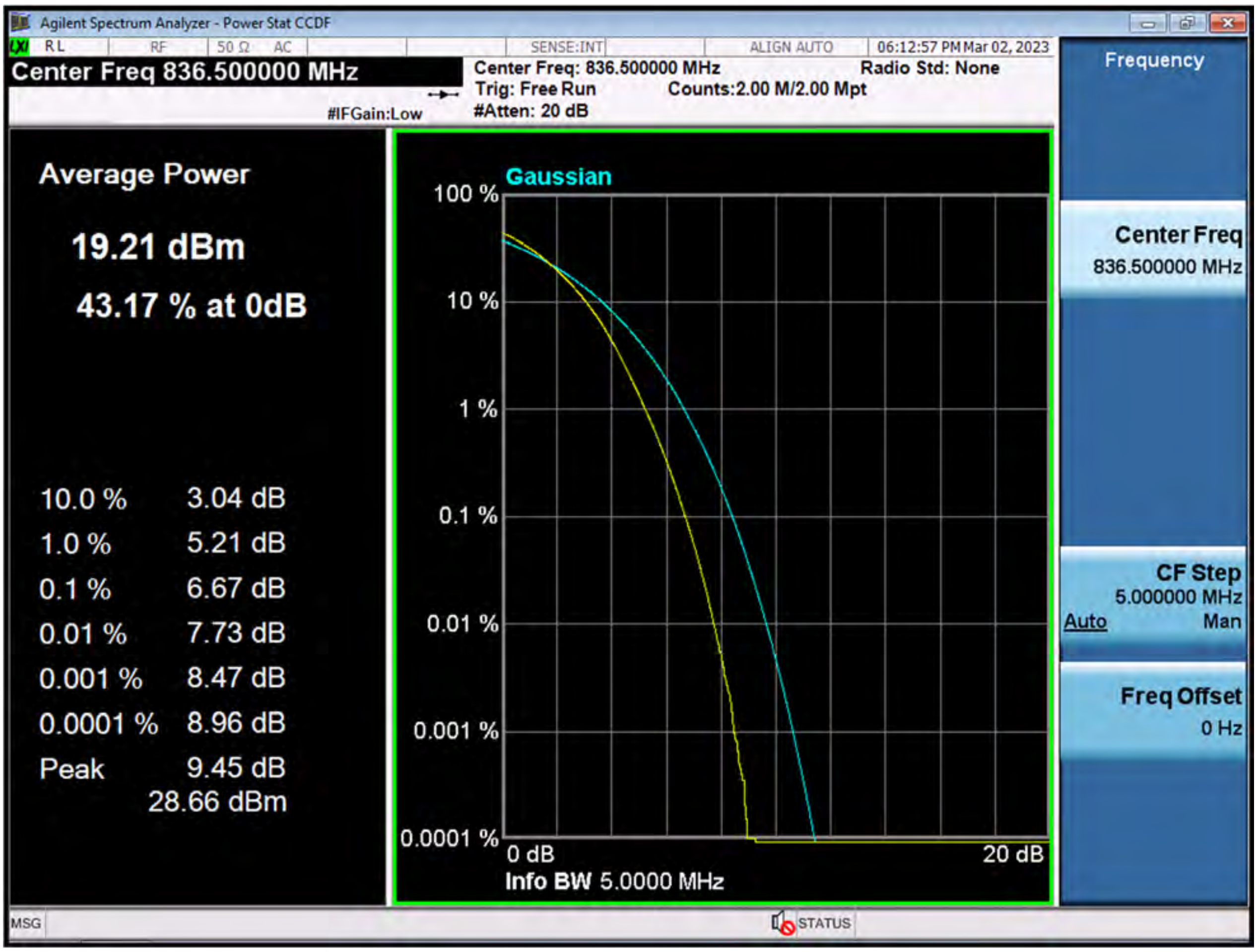
5 M_PAR_Mid Channel_16QAM_FullRB



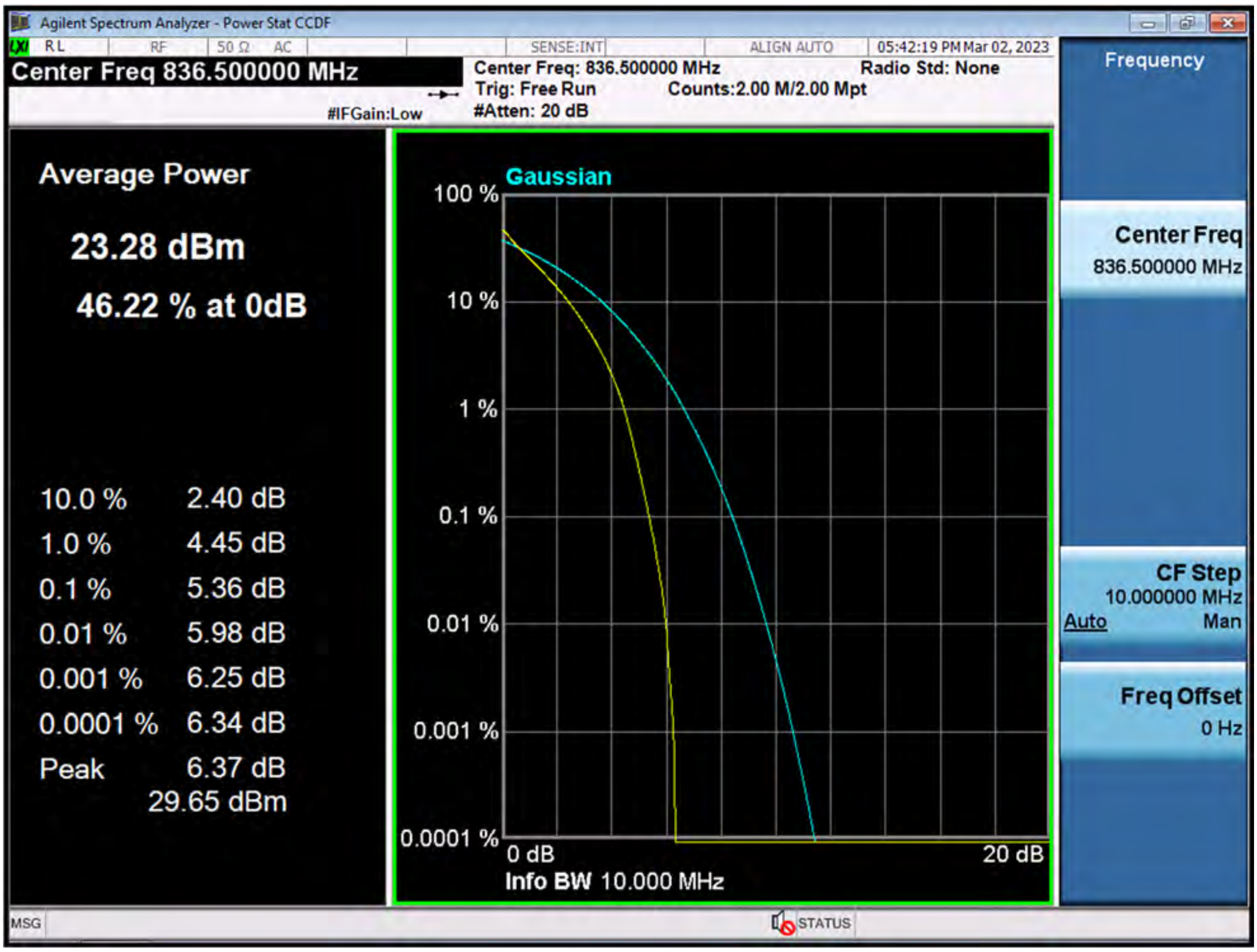
5 M_PAR_Mid Channel_64QAM_FullRB



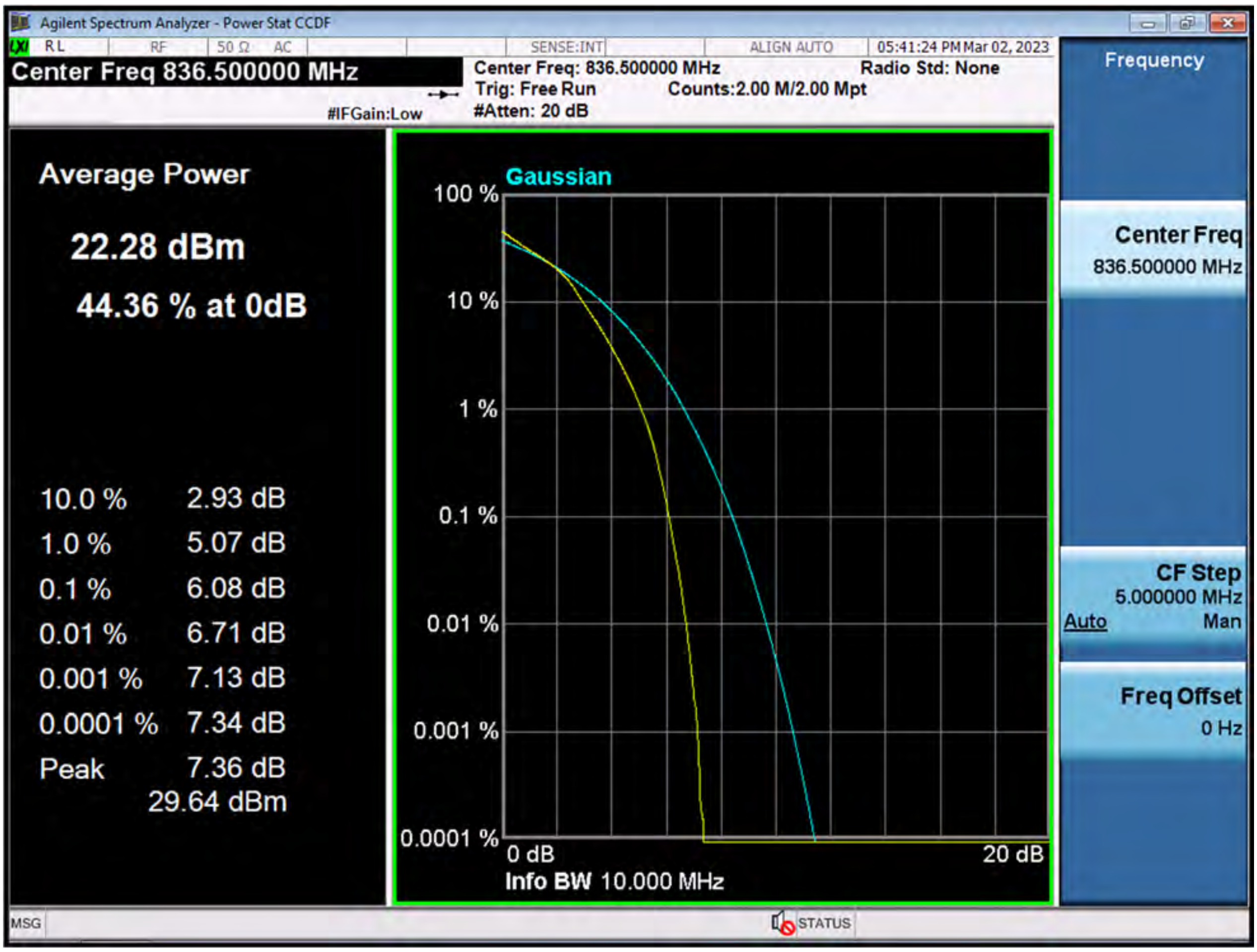
5 M_PAR_Mid Channel_256QAM_FullRB



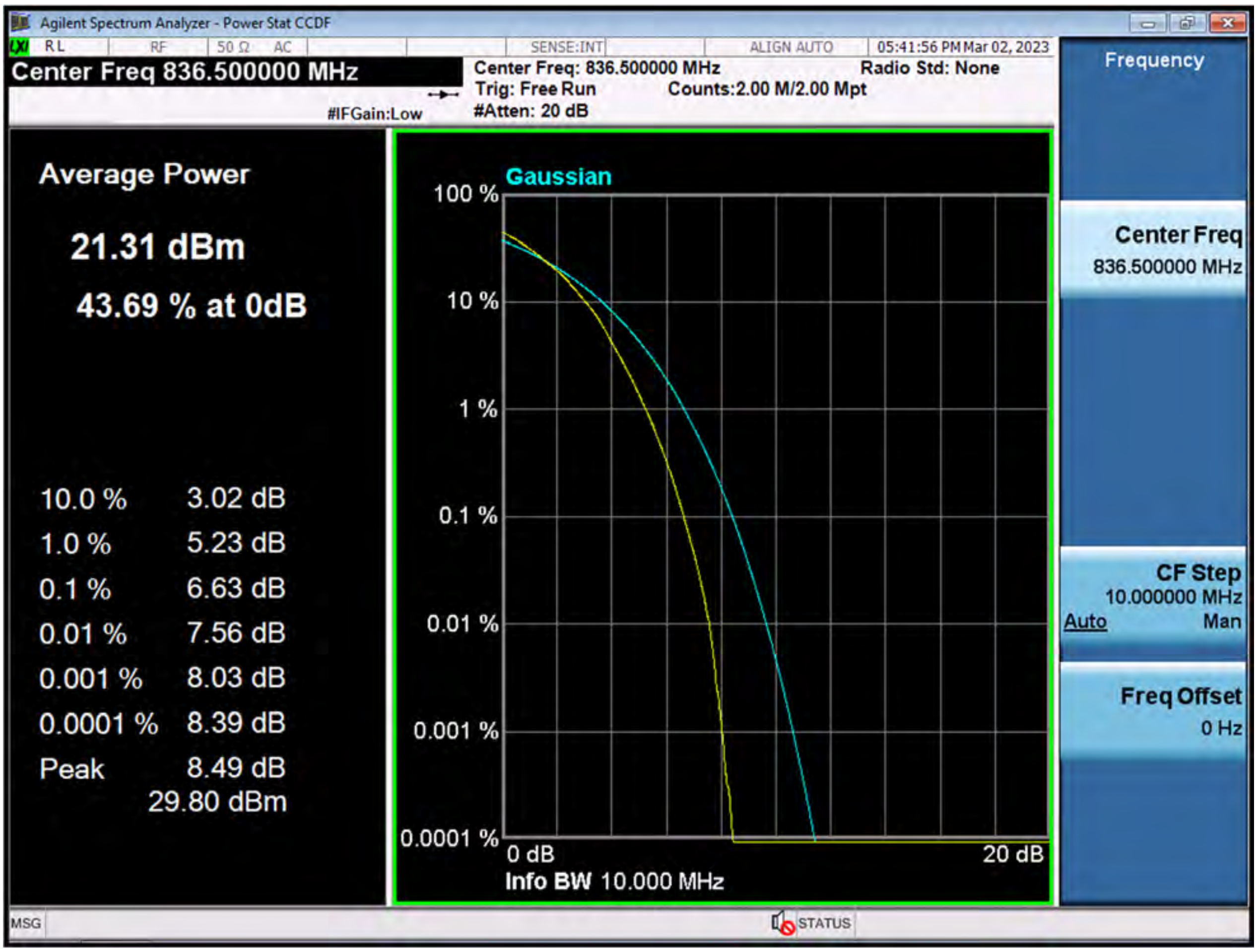
10 M_PAR_Mid Channel_QPSK_FullRB



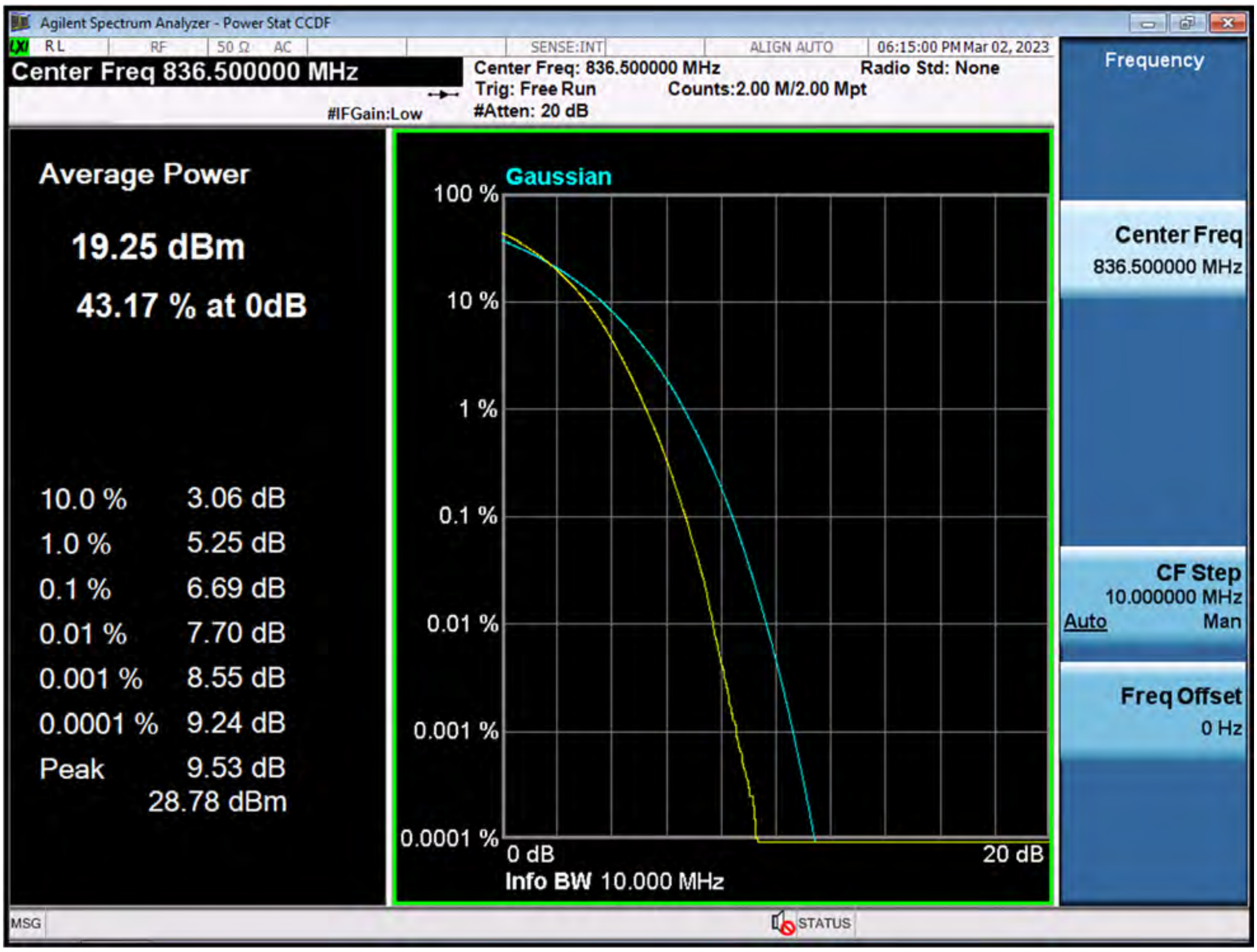
10 M_PAR_Mid Channel_16QAM_FullRB



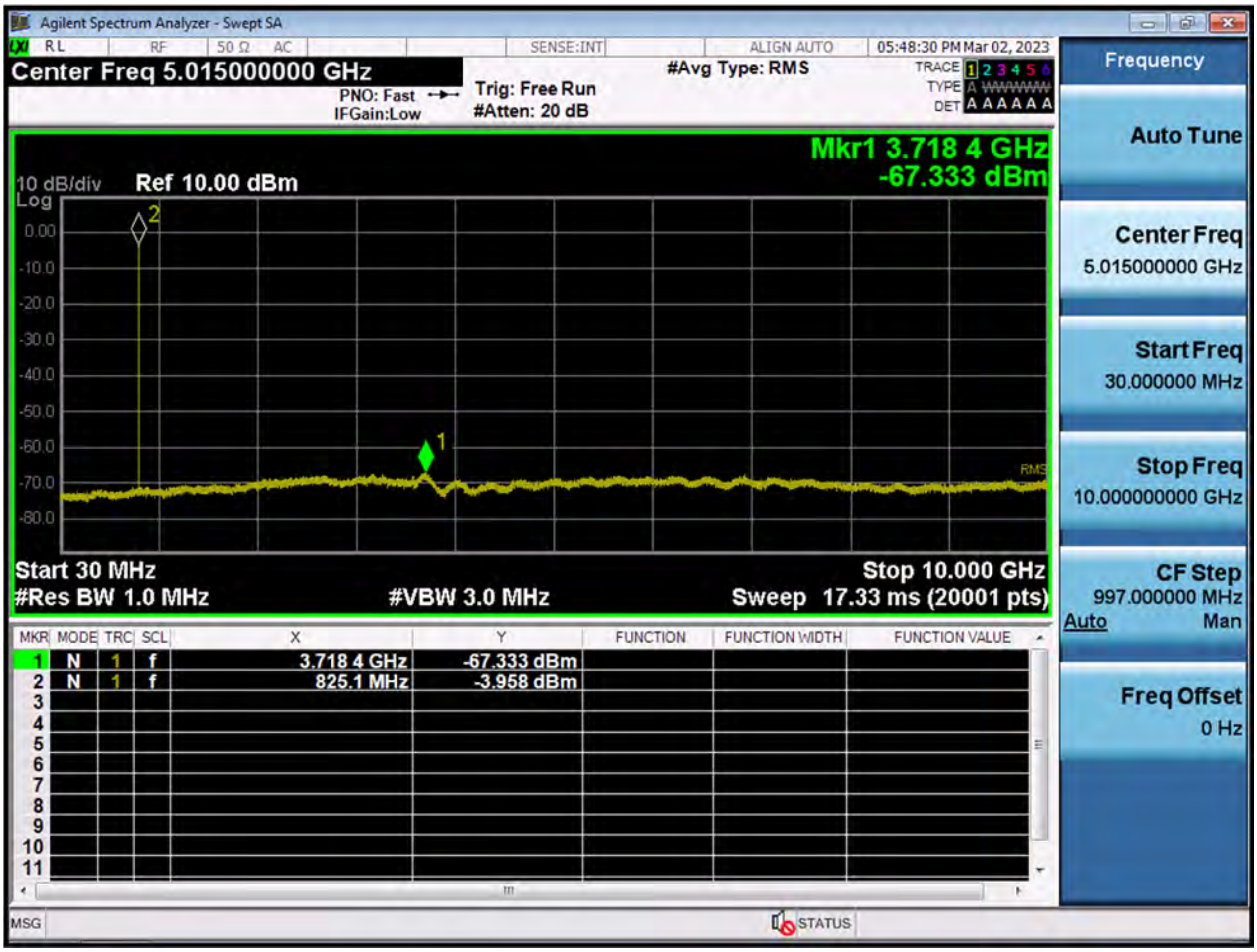
10 M_PAR_Mid Channel_64QAM_FullRB



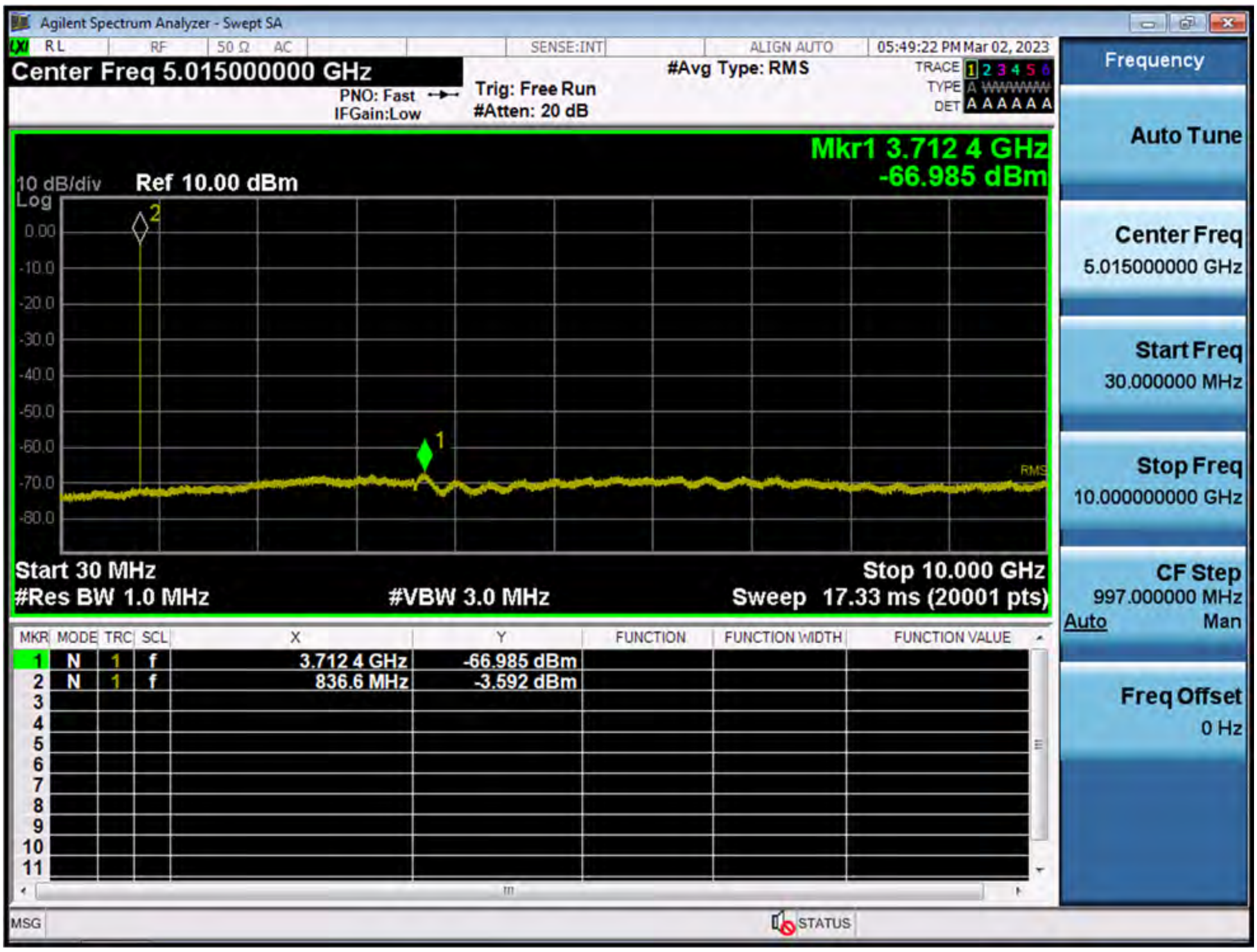
10 M_PAR_Mid Channel_256QAM_FullRB



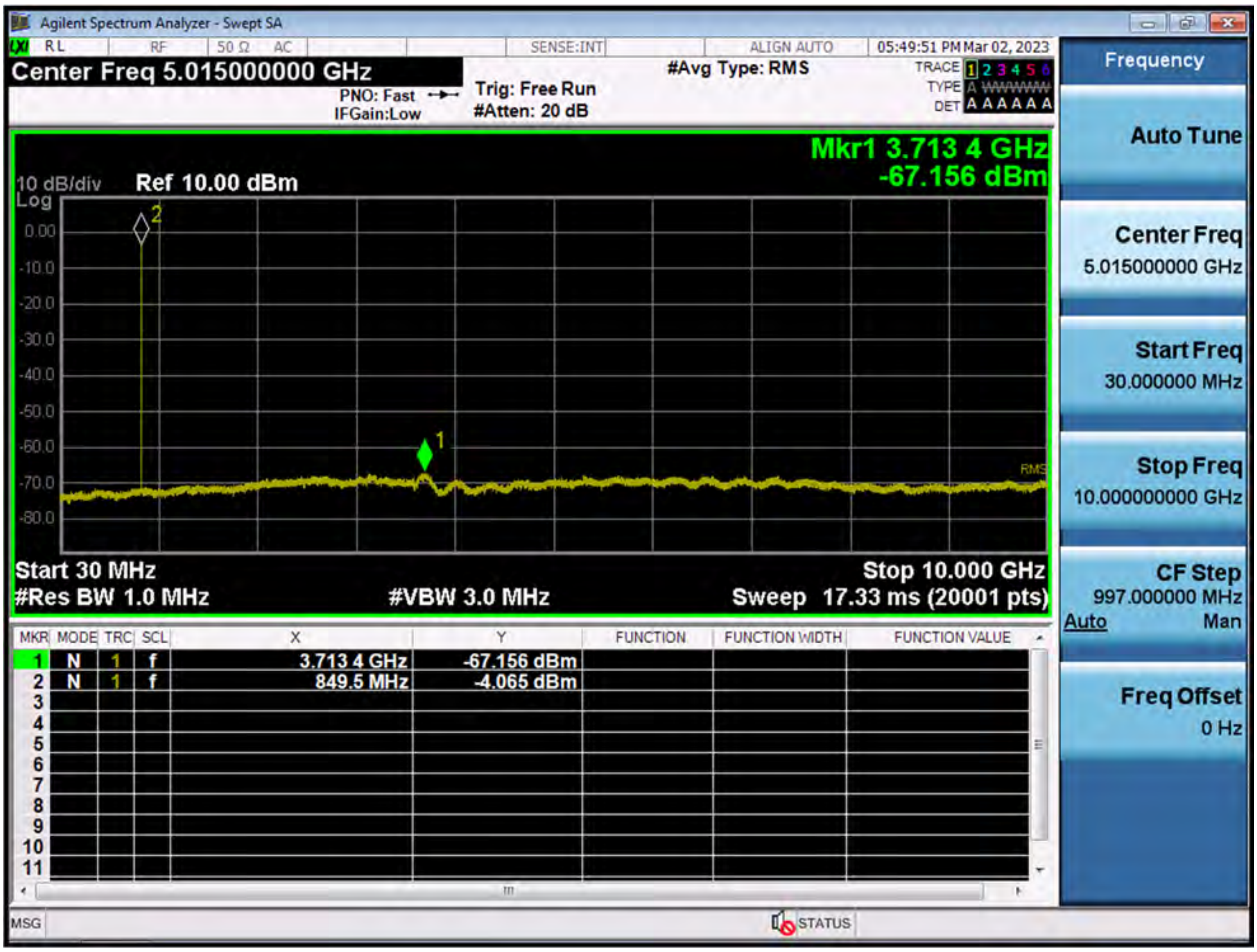
1.4 M_CSE(30 M-10 G)_Lowest Channel_QPSK_1RB



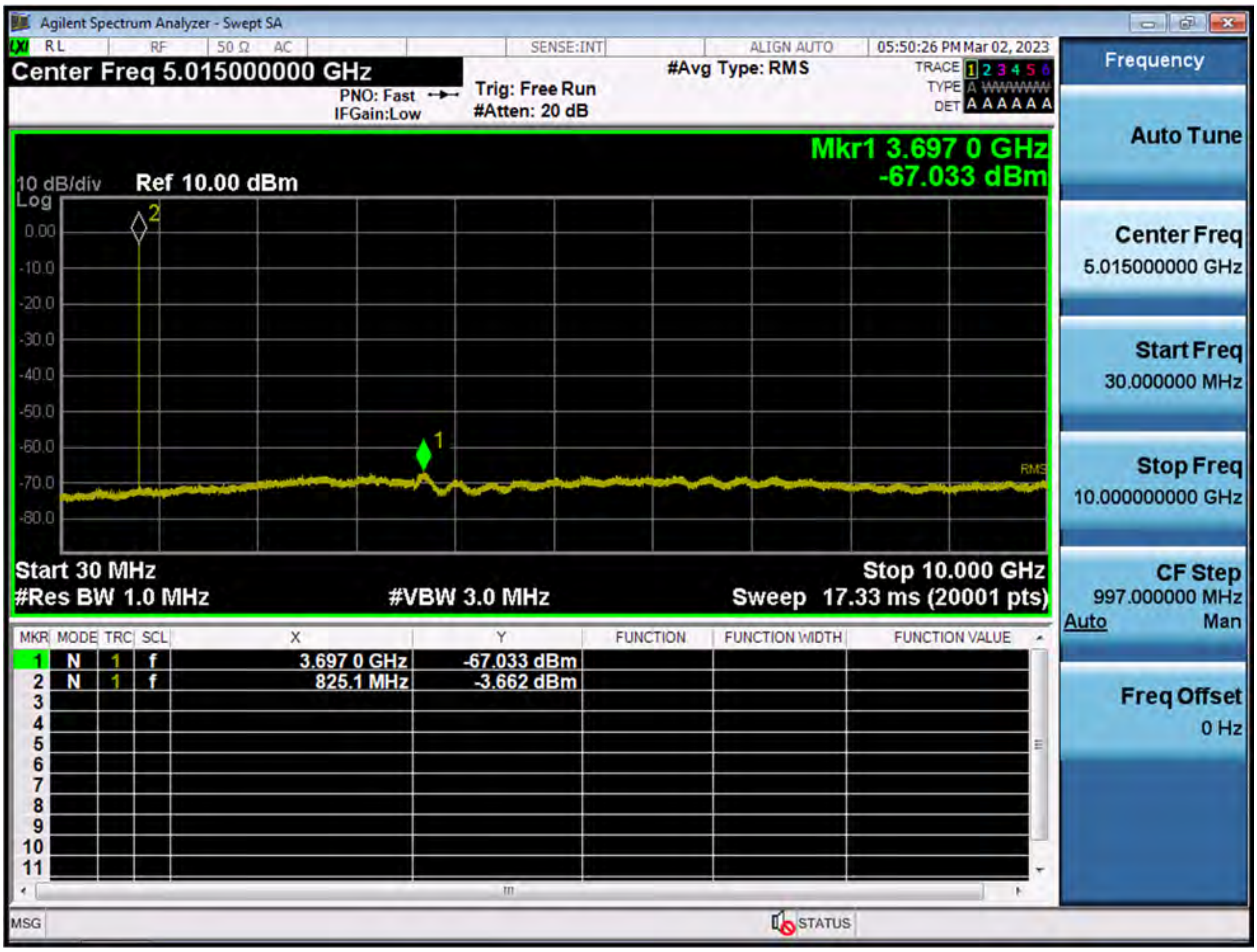
1.4 M_CSE(30 M-10 G)_Mid Channel_QPSK_1RB



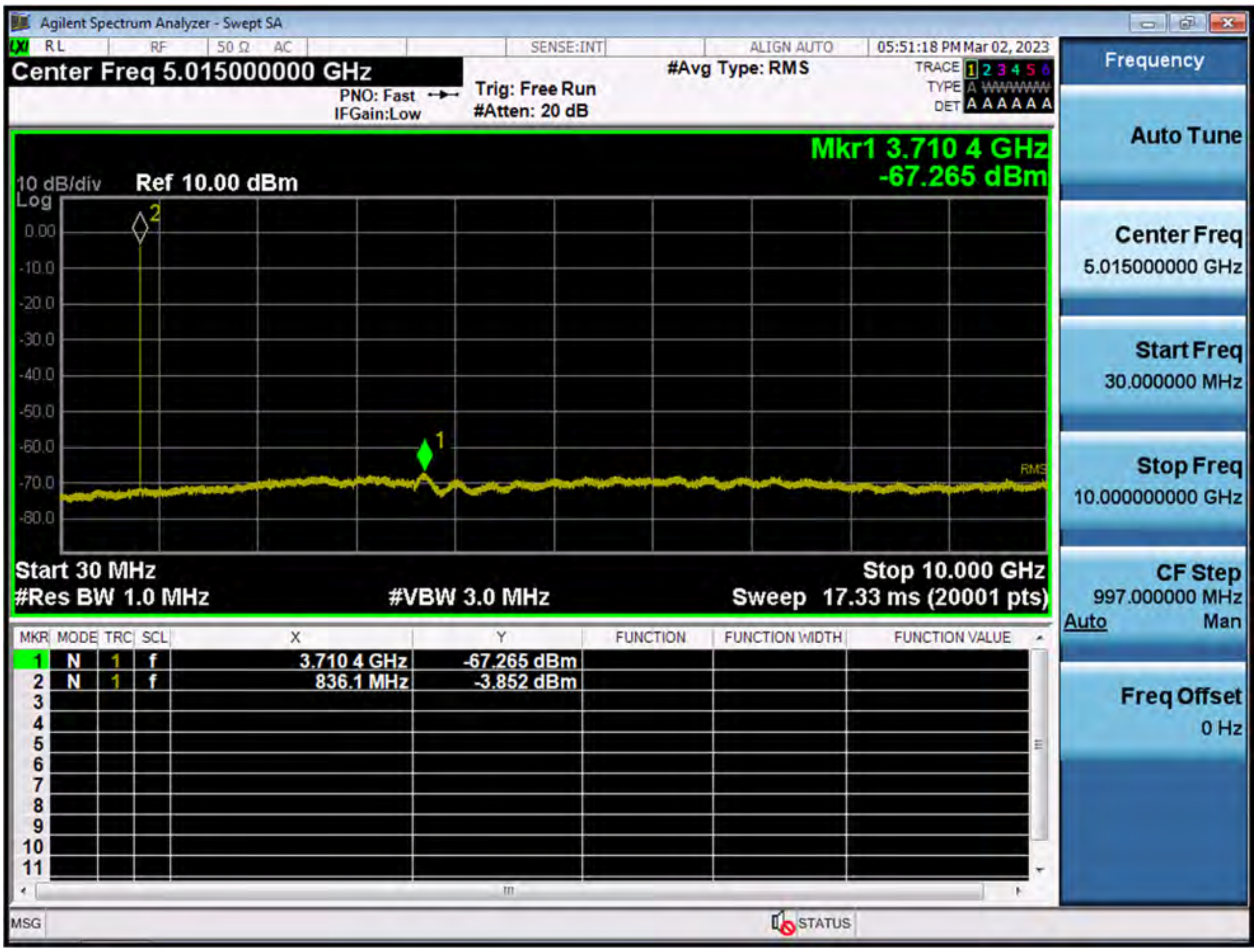
1.4 M_CSE(30 M-10 G)_Highest Channel_QPSK_1RB



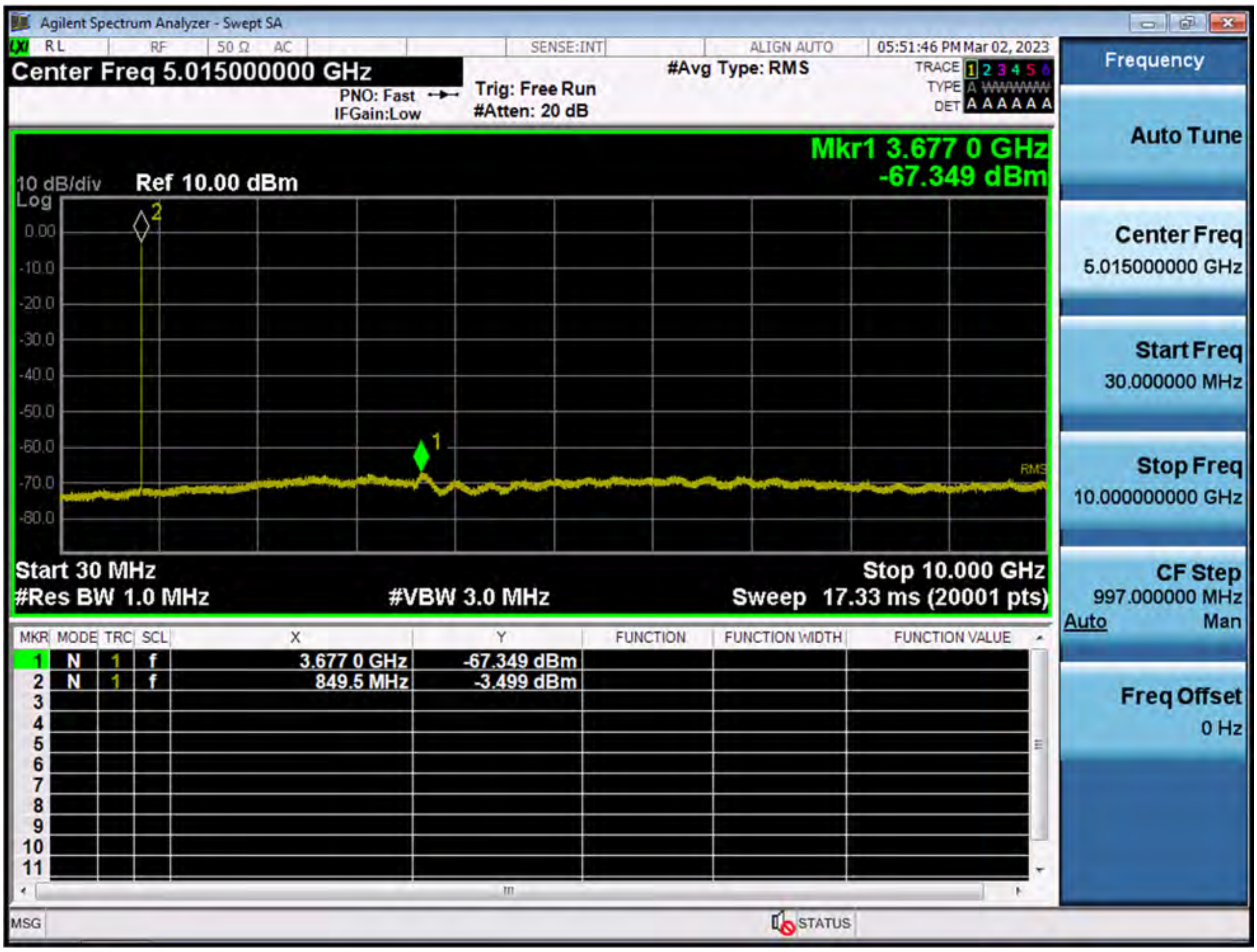
3 M_CSE(30 M-10 G)_Lowest Channel_QPSK_1RB



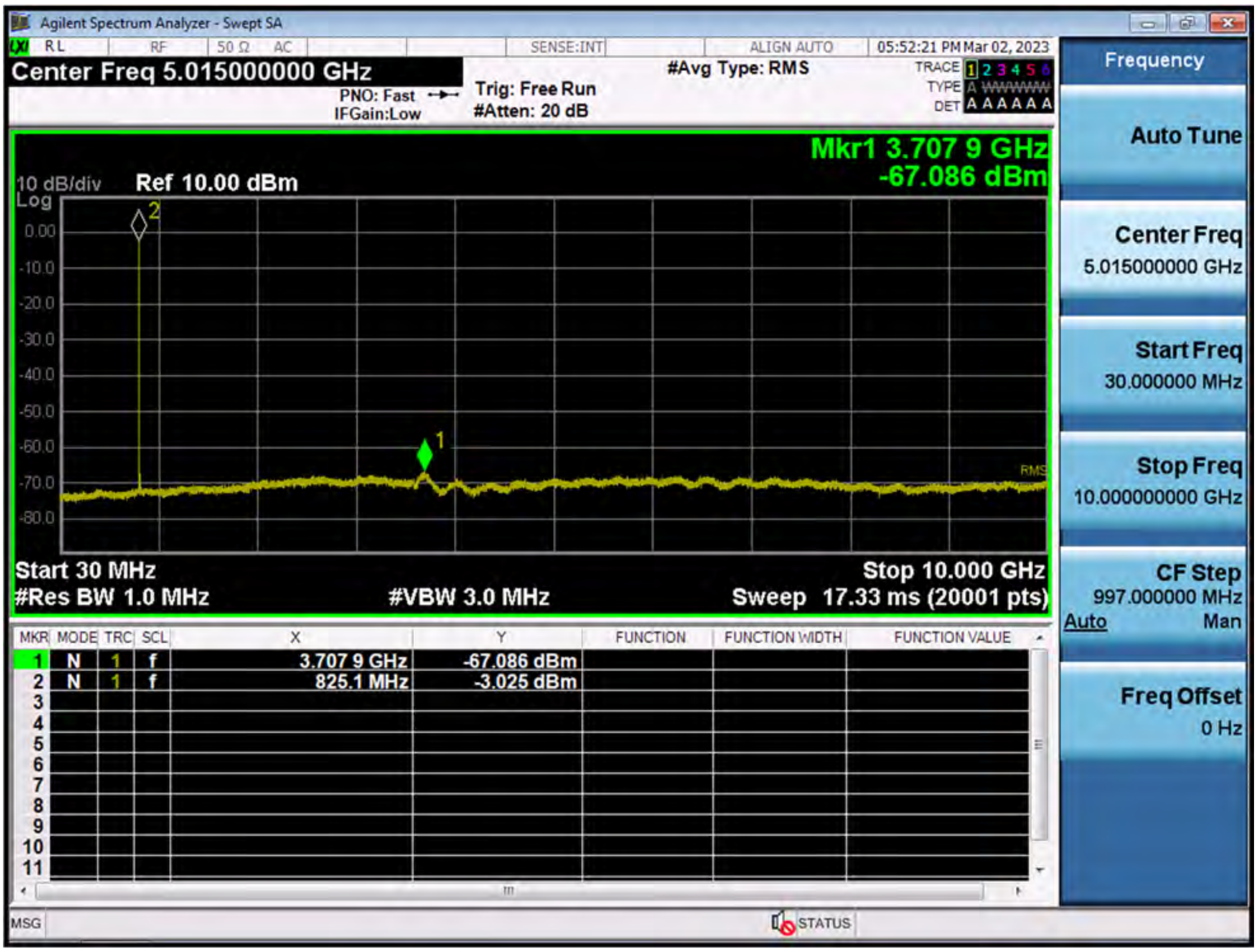
3 M_CSE(30 M-10 G)_Mid Channel_QPSK_1RB



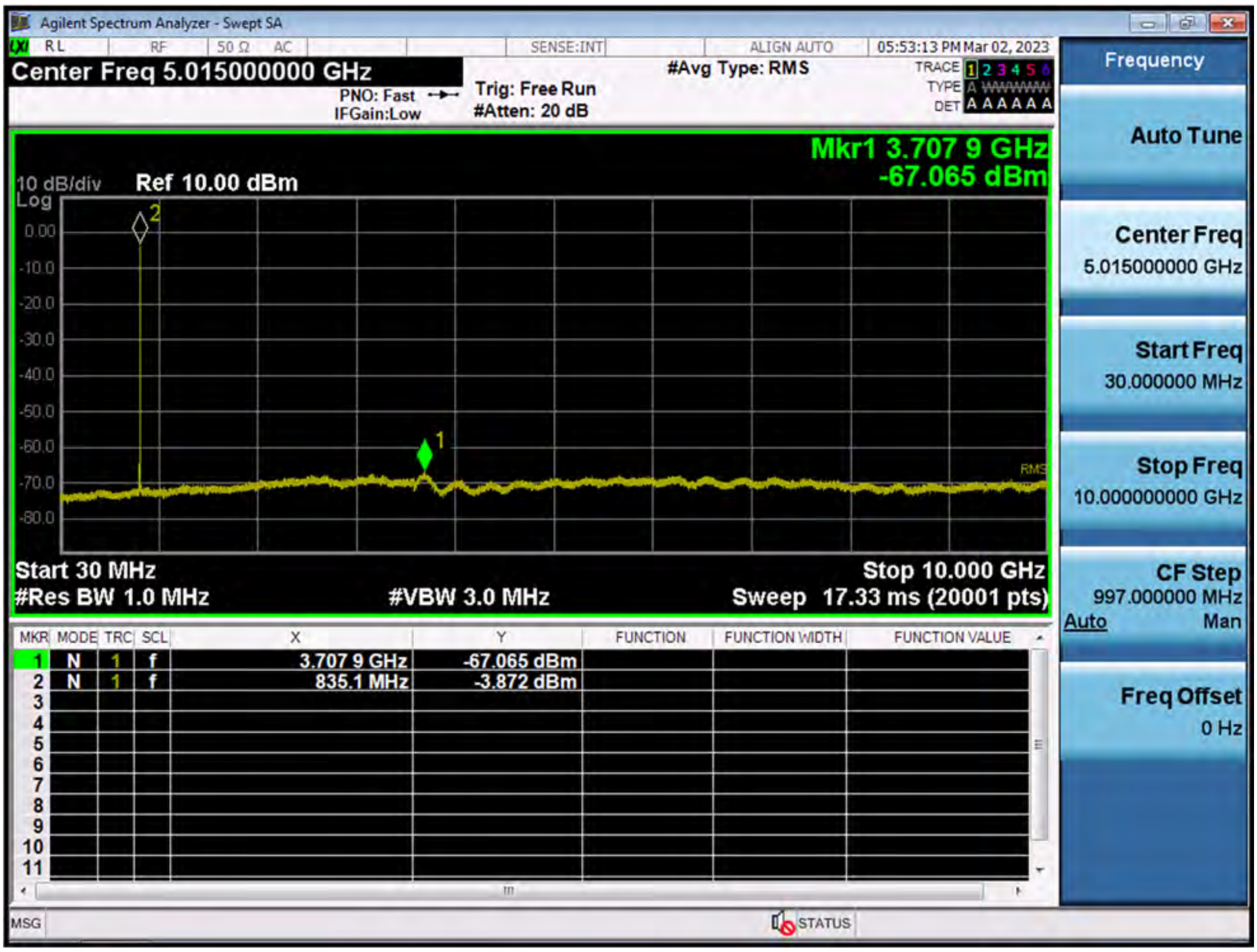
3 M_CSE(30 M-10 G)_Highest Channel_QPSK_1RB



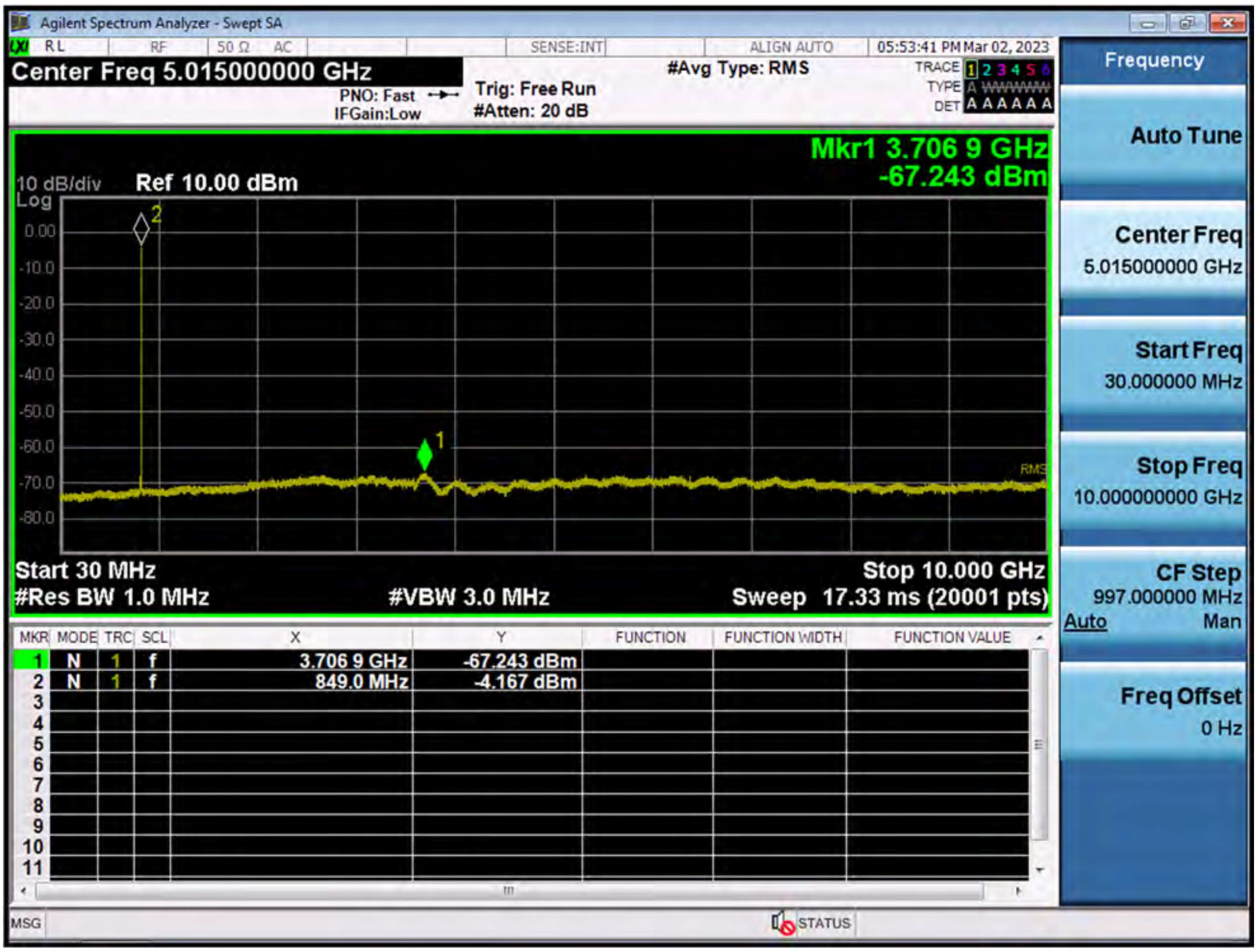
5 M_CSE(30 M-10 G)_Lowest Channel_QPSK_1RB



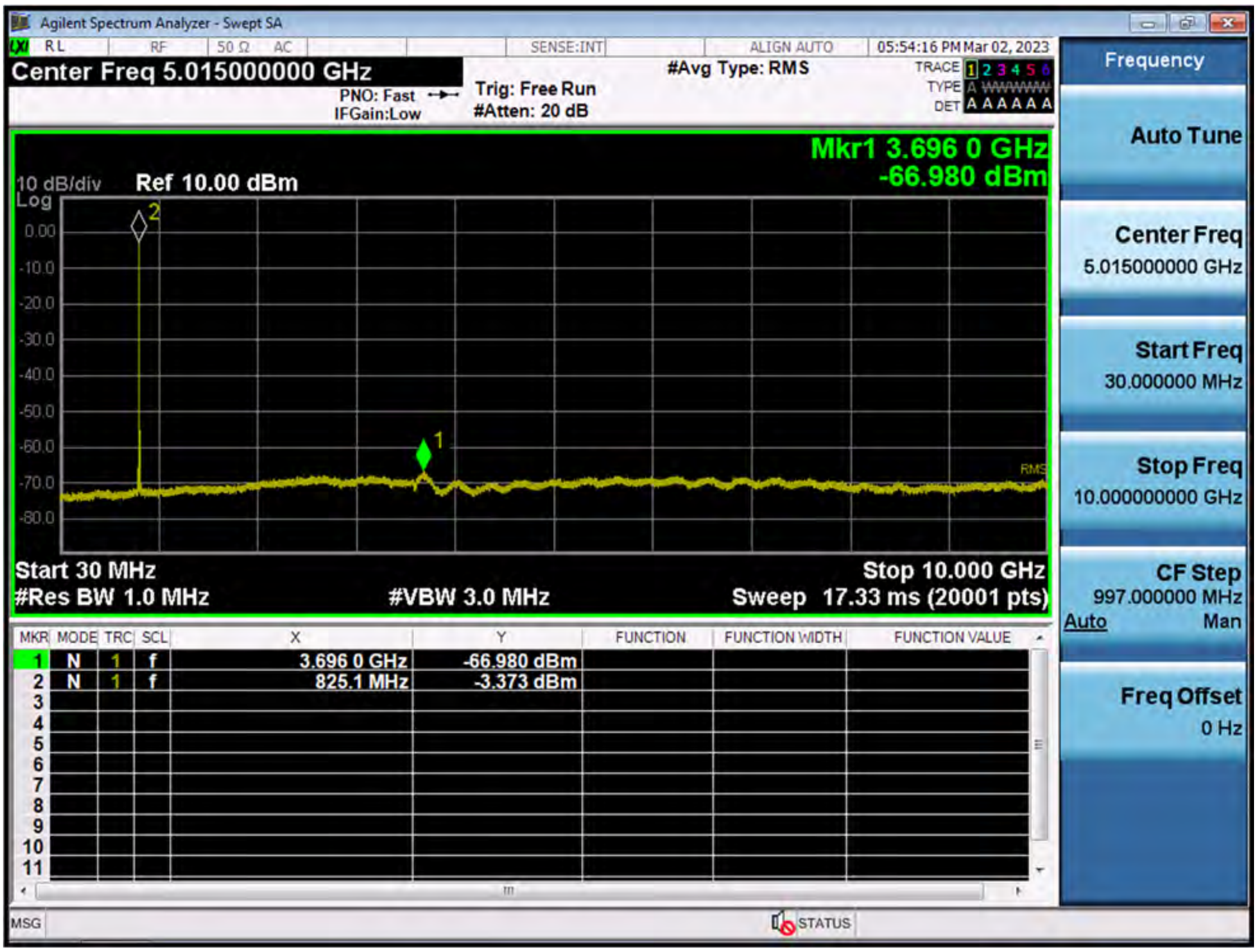
5 M_CSE(30 M-10 G)_Mid Channel_QPSK_1RB



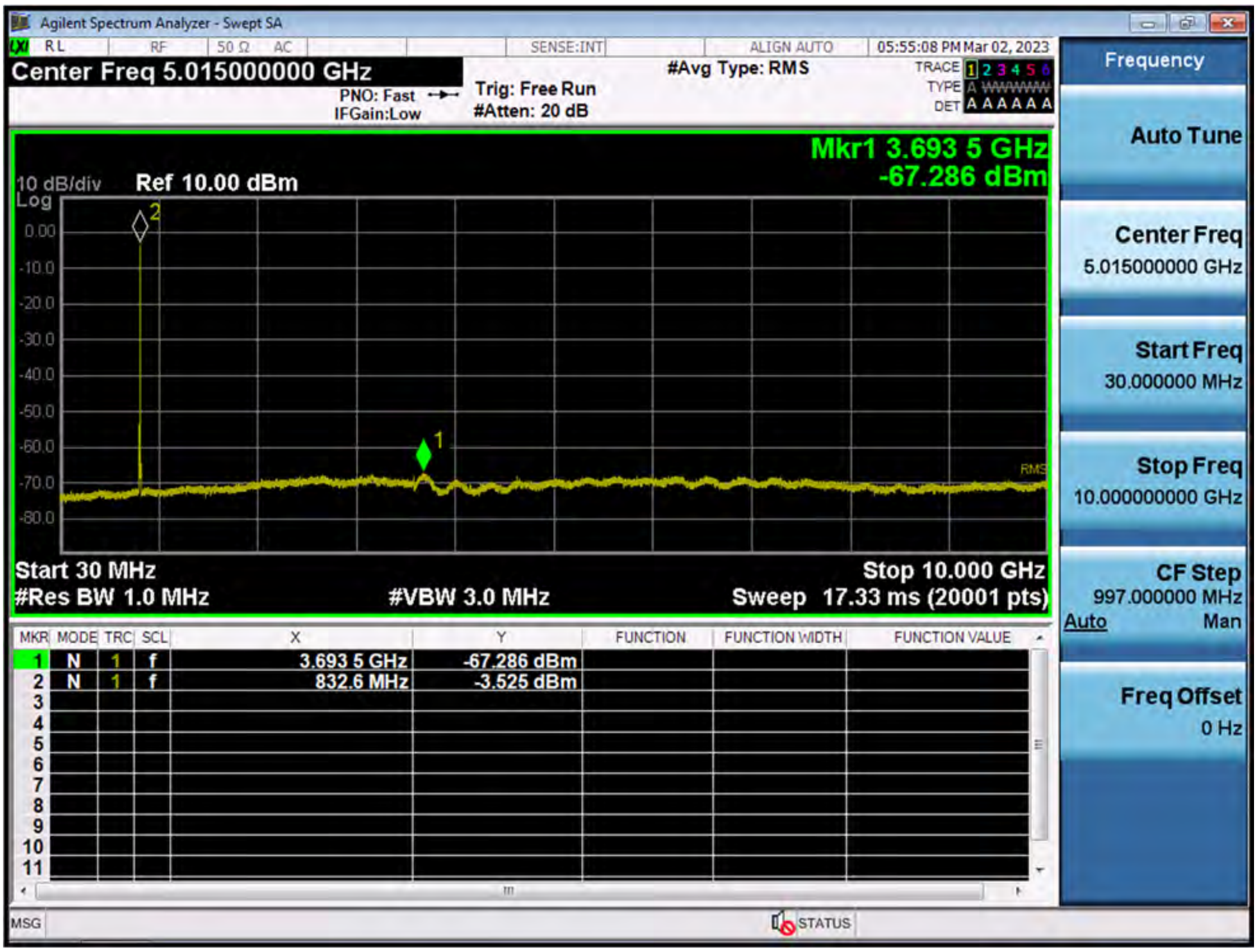
5 M_CSE(30 M-10 G)_Highest Channel_QPSK_1RB



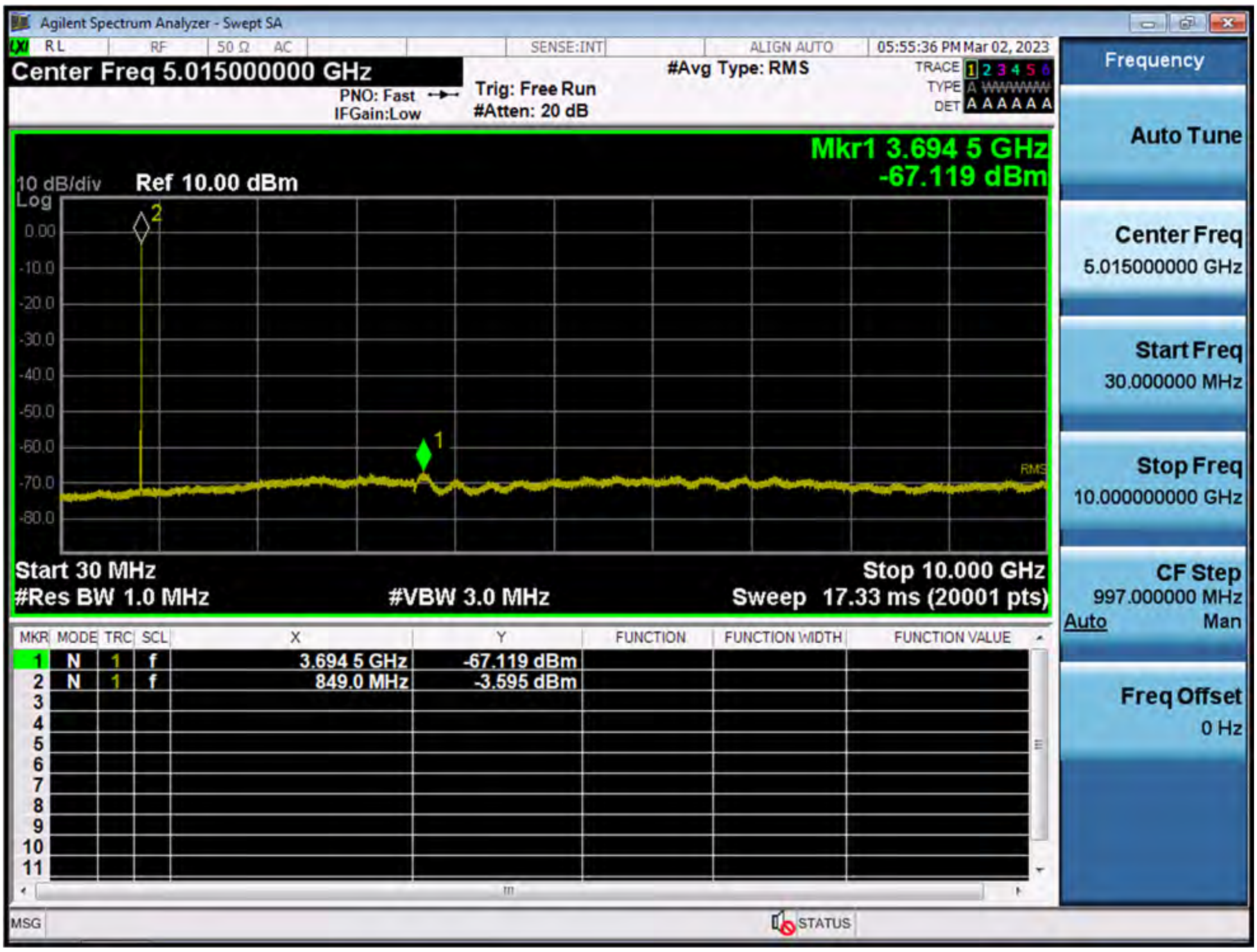
10 M_CSE(30 M-10 G)_Lowest Channel_QPSK_1RB



10 M_CSE(30 M-10 G)_Mid Channel_QPSK_1RB



10 M_CSE(30 M-10 G)_Highest Channel_QPSK_1RB



10. ANNEX A_ TEST SETUP PHOTO

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

No.	Description
1	HCT-RF-2308-FC005-P