TEST REPORT

FCC LTE B71 Test for TFGMEIBBCD4
Class II Permissive Change

APPLICANT
LG Electronics Inc.

REPORT NO.
HCT-RF-2406-FC014

DATE OF ISSUE
September 26, 2024

Tested by
Jung Ki Lim

Technical Manager
Jong Seok Lee

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

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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
Product Name Model Name	GM Onstar Gen12 ROW TFGMEIBBCD4
Date of Test	May 07, 2024 ~ June 19, 2024
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 ID	BEJTFGMEIBBCD4
FCC Classification:	PCS Licensed Transmitter (PCB)
Test Standard Used	FCC Rule Part(s) : § 27
Test Results	PASS

REVISION HISTORY

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

Revision No.	Date of Issue	Description
0	September 26, 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).
When confirmation of authenticity of this test report is required, please contact www.hct.co.kr
The test results in this test report are not associated with the ((KS Q) ISO/IEC 17025) accreditation by KOLAS (Korea Laboratory Accreditation Scheme) / A2LA (American Association for Laboratory Accreditation) that are under the ILAC (International Laboratory Accreditation Cooperation) Mutual Recognition Agreement (MRA).

CONTENTS

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:	Class II Permissive Change
FCC Classification:	PCS Licensed Transmitter (PCB)
FCC Rule Part(s):	§ 27
EUT Type:	GM Onstar Gen12 ROW
Model(s):	TFGMEIBBCD4
Additional Model(s)	TFGMEIBBCD5,TFGMEIBBCD6,TFGMEIBBCD7,TFGMEIBBCD8, TFGMEIBBCD9, TFGMEIBBCDA, TFGMEIBBCDB, TFGMEIBBCDC
Tx Frequency:	665.5 MHz – 695.5 MHz (LTE – Band 71 (5 MHz)) 668.0 MHz – 693.0 MHz (LTE – Band 71 (10 MHz)) 670.5 MHz – 690.5 MHz (LTE – Band 71 (15 MHz)) 673.0 MHz – 688.0 MHz (LTE – Band 71 (20 MHz))
Date(s) of Tests:	May 07, 2024 ~ June 19, 2024
Serial number:	Radiated : EBR36018942K_#30 Conducted : EBR36018942K_#30
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 – Band71 (5)	665.5 - 695.5	4M51G7D	QPSK	0.140	21.46	0.940	29.73
		4M50W7D	16 QAM	0.120	20.78	0.813	29.10
		4M52W7D	64 QAM	0.094	19.73	0.618	27.91
		4M50W7D	256 QAM	0.047	16.68	0.321	25.07
LTE – Band71 (10)	668.0 - 693.0	8M96G7D	QPSK	0.146	21.65	0.962	29.83
		8M96W7D	16 QAM	0.126	21.01	0.832	29.20
		8M96W7D	64 QAM	0.095	19.76	0.630	27.99
		8M99W7D	256 QAM	0.048	16.83	0.318	25.03
LTE – Band71 (15)	670.5 - 690.5	13M5G7D	QPSK	0.152	21.83	0.986	29.94
		13M5W7D	16 QAM	0.123	20.90	0.828	29.18
		13M5W7D	64 QAM	0.102	20.10	0.640	28.06
		13M5W7D	256 QAM	0.049	16.86	0.318	25.03
LTE – Band71 (20)	673.0 - 688.0	18M0G7D	QPSK	0.150	21.75	1.028	30.12
		18M0W7D	16 QAM	0.126	20.99	0.873	29.41
		17M9W7D	64 QAM	0.097	19.88	0.665	28.23
		17M9W7D	256 QAM	0.049	16.93	0.330	25.18

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

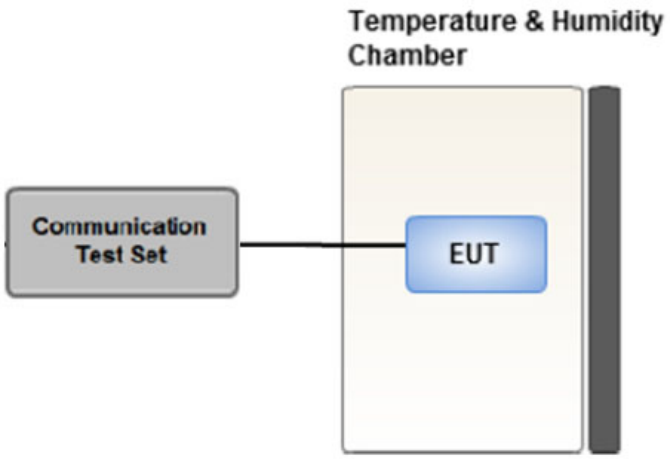
The Fully-anechoic chamber and conducted measurement facility used to collect the radiated data are located at the **74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea**

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
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.

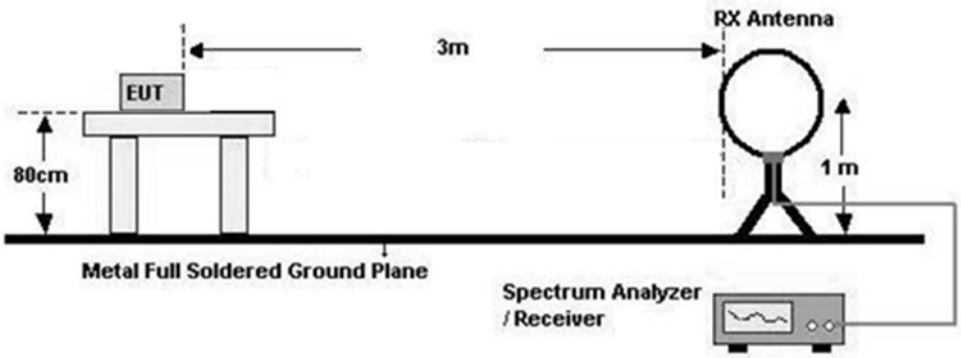
3.3 RADIATED TEST

Test Overview

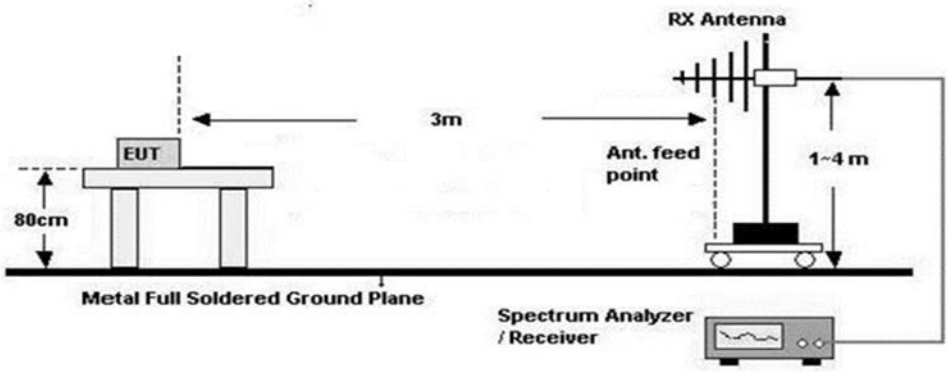
Radiated tests are performed in the semi-anechoic chamber. The equipment under test is placed on a non-conductive table on semi-anechoic chamber.

Test Configuration

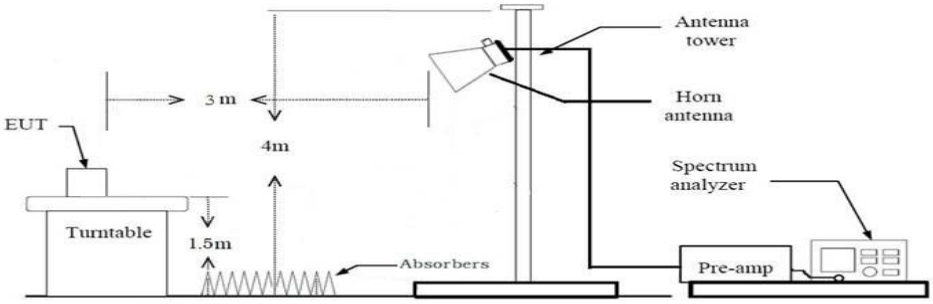
Below 30 MHz



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 10th 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.

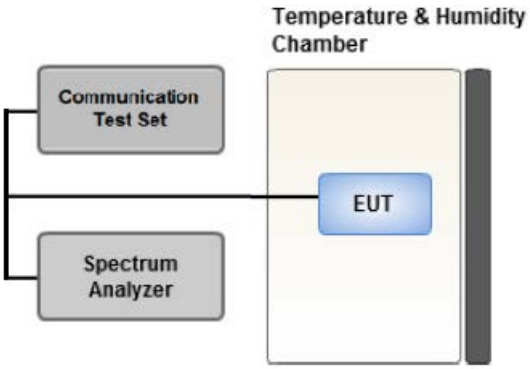
Below 1 GHz

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 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:

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

Test Settings(Peak Power)

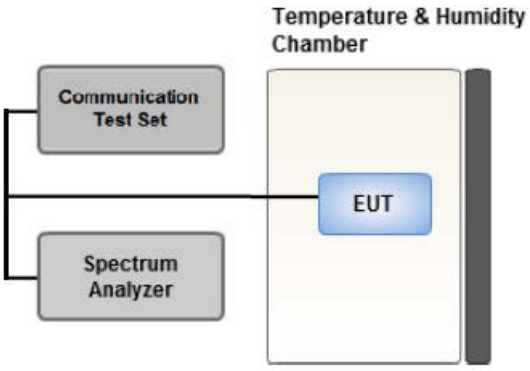
The measurement instrument must have a RBW that is greater than or equal to the OBW of the signal to be measured and a VBW ≥ 3 × RBW.

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.



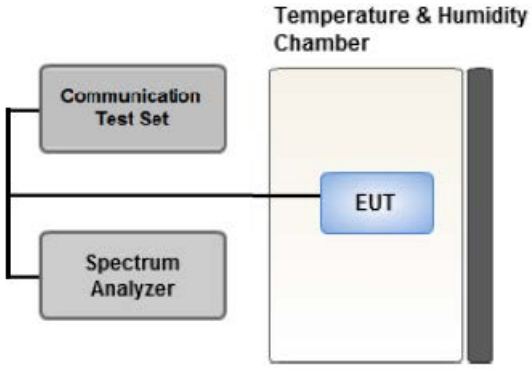
Test setup

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.

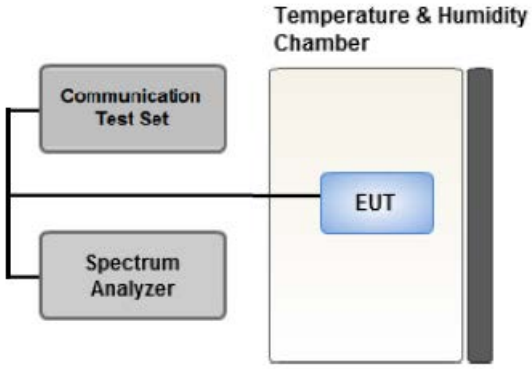
All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

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 = trace 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

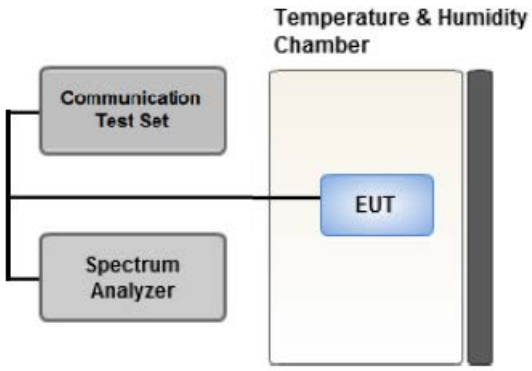
1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW > 1 % of the emission bandwidth
4. VBW > 3 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW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

  (Internal Antenna Worst case : 20 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, 16 QAM, 64 QAM 256 QAM,	See Section 9.1.1		Only X
Radiated Spurious and Harmonic Emissions	QPSK	See Section 9.2.1		Only X

[Internal Antenna Worst case]

Test Description	Modulation	RB size	RB offset	Axis
Effective Radiated Power	QPSK, 16 QAM, 64 QAM, 256 QAM	See Section 9.1.2		Z
Radiated Spurious and Harmonic Emissions	QPSK	See Section 9.2.2		X, Y

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, 16 QAM, 64 QAM, 256 QAM	5,10,15,20	Mid	Full RB	0
Band Edge	QPSK	5	Low	1	0
			High	1	24
		10	Low	1	0
			High	1	49
		15	Low	1	0
			High	1	74
		20	Low	1	0
			High	1	99
		5,10,15,20	Low, 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
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	CO3000/1542/ 57580623/G	N/A	N/A
Amp & Filter Bank Switch Controller	FBSM-01B	TNM system	TM20090001	N/A	N/A
RF Switch System	TMX0132C	TNM System	TM21100002	N/A	N/A
RF Switch System	FBSR-04C HPF1	TNM System	S5L1	03/12/2025	Annual
RF Switch System	FBSR-04C LNA1	TNM System	S5L4	03/12/2025	Annual
RF Switch System	FBSR-04C HPF2	TNM System	S5L5	03/12/2025	Annual
HIGHPASS FILTER	WHKX10-900-1000-15000-40SS	WAINWRIGHT INSTRUMENTS	16	07/24/2025	Annual
HIGHPASS FILTER	WHNX6.0/26.5G-6SS	WAINWRIGHT INSTRUMENTS	1	12/11/2024	Annual
Power Amplifier	CBL18265035	CERNEX	22966	11/17/2024	Annual
Power Amplifier	CBL26405040	CERNEX	25956	02/26/2025	Annual
Loop Antenna (9 kHz ~ 30 MHz)	FMZB1513	Schwarzbeck	1513-333	03/07/2026	Biennial
Horn Antenna(1 ~ 18 GHz)	HF907	ROHDE & SCHWARZ	103224	05/07/2026	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170342	09/20/2026	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	1135	08/19/2026	Biennial
Chamber	SU-642	ESPEC	93008124	02/19/2025	Annual
Power Splitter(DC~26.5 GHz)	11667B	Hewlett Packard	11275	02/19/2025	Annual
DC Power Supply	E3632A	Hewlett Packard	KR01009150	04/18/2025	Annual
4-Way Divider	ZC4PD-K1844+	Mini-Circuits	942907	09/10/2025	Annual
ATTENUATOR(20 dB)	8493C	Hewlett Packard	17280	04/17/2025	Annual
Spectrum Analyzer(10 Hz ~ 40 GHz)	FSV40	ROHDE & SCHWARZ	101510	03/28/2025	Annual
Base Station	8960 (E5515C)	Agilent	MY48360800	08/05/2025	Annual
Wideband Radio Communication Tester	MT8821C	Anritsu Corp.	6262287701	05/16/2025	Annual
Wideband Radio Communication Tester	MT8000A	Anritsu Corp.	6262302511	05/14/2025	Annual
Signal Analyzer (10 Hz ~ 26.5 GHz)	N9020A	Agilent	MY52090906	04/19/2025	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(g)	< 43 + 10log10 (P[Watts]) at Band Edge and for all out-of-band emissions	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
Effective Radiated Power	§ 27.50(c)(10)	< 3 Watts max. ERP	PASS
Radiated Spurious and Harmonic Emissions	§ 2.1053, § 27.53(g)	< 43 + 10log10 (P[Watts]) for all out-of band emissions	PASS

7. 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)		
				133147	133297	133447
				665.5 MHz	680.5 MHz	695.5 MHz
5 MHz	QPSK	1	0	23.69	23.68	23.74
		1	12	23.58	23.69	23.80
		1	24	23.54	23.55	23.49
		12	0	22.82	22.74	22.71
		12	6	22.73	22.69	22.69
		12	11	22.63	22.63	22.69
		25	0	22.71	22.71	22.66
	16 QAM	1	0	23.00	22.91	23.03
		1	12	22.87	22.86	22.90
		1	24	22.90	22.90	22.85
		12	0	21.86	21.76	21.75
		12	6	21.80	21.68	21.70
		12	11	21.69	21.73	21.72
		25	0	21.72	21.72	21.67
	64 QAM	1	0	21.88	21.98	21.92
		1	12	21.81	22.03	21.88
		1	24	21.81	21.87	21.80
		12	0	20.88	20.74	20.78
		12	6	20.77	20.73	20.72
		12	11	20.76	20.67	20.73
		25	0	20.70	20.66	20.69
	256 QAM	1	0	18.91	18.92	18.87
		1	12	18.84	18.83	18.75
		1	24	18.76	18.84	18.76
		12	0	18.86	18.76	18.75
		12	6	18.82	18.73	18.81
		12	11	18.72	18.69	18.74
		25	0	18.78	18.73	18.67

Bandwidth	Modulation	RB Size	RB Offset	Max.Average Power (dBm)		
				133172	133297	133422
				668 MHz	680.5 MHz	693 MHz
10 MHz	QPSK	1	0	23.71	23.65	23.63
		1	24	23.52	23.61	23.62
		1	49	23.52	23.77	23.48
		25	0	22.72	22.67	22.73
		25	12	22.72	22.69	22.81
		25	24	22.59	22.70	22.70
		50	0	22.65	22.69	22.69
	16 QAM	1	0	23.02	23.51	23.19
		1	24	22.88	22.83	22.88
		1	49	22.88	22.77	22.83
		25	0	21.75	21.72	21.72
		25	12	21.70	21.57	21.78
		25	24	21.69	21.73	21.73
		50	0	21.71	21.66	21.72
	64 QAM	1	0	22.06	21.81	21.88
		1	24	21.84	21.89	21.84
		1	49	21.82	22.06	21.72
		25	0	20.81	20.72	20.75
		25	12	20.74	20.77	20.80
		25	24	20.71	20.75	20.71
		50	0	20.73	20.58	20.78
	256 QAM	1	0	18.97	18.82	18.82
		1	24	18.83	18.79	18.92
		1	49	18.74	18.94	18.72
		25	0	18.82	18.80	18.81
		25	12	18.74	18.65	18.85
		25	24	18.61	18.74	18.86
		50	0	18.72	18.69	18.79

Bandwidth	Modulation	RB Size	RB Offset	Max.Average Power (dBm)		
				133197	133297	133397
				670.5 MHz	680.5 MHz	690.5 MHz
15 MHz	QPSK	1	0	23.66	23.67	23.68
		1	36	23.54	23.55	23.57
		1	74	23.44	23.51	23.43
		36	0	22.68	22.76	22.79
		36	18	22.75	22.71	22.73
		36	39	22.67	22.55	22.66
		75	0	22.70	22.65	22.70
	16 QAM	1	0	23.05	22.94	23.14
		1	36	22.90	22.96	22.83
		1	74	22.69	22.72	22.99
		36	0	21.71	21.77	21.79
		36	18	21.75	21.76	21.73
		36	39	21.65	21.61	21.71
		75	0	21.71	21.66	21.64
	64 QAM	1	0	21.89	21.96	21.84
		1	36	21.72	21.88	21.96
		1	74	21.78	21.97	21.77
		36	0	20.81	20.75	20.76
		36	18	20.73	20.70	20.75
		36	39	20.67	20.68	20.73
		75	0	20.64	20.67	20.70
	256 QAM	1	0	18.92	18.85	18.88
		1	36	18.56	18.67	18.84
		1	74	18.68	18.87	18.91
		36	0	18.70	18.76	18.76
		36	18	18.71	18.78	18.78
		36	39	18.76	18.68	18.70
		75	0	18.76	18.62	18.70

Bandwidth	Modulation	RB Size	RB Offset	Max.Average Power (dBm)		
				133222	133322	133372
				673 MHz	683 MHz	688 MHz
20 MHz	QPSK	1	0	23.67	23.70	23.64
		1	49	23.58	23.57	23.63
		1	99	23.40	23.53	23.61
		50	0	22.65	22.68	22.76
		50	25	22.70	22.65	22.74
		50	49	22.69	22.64	22.73
		100	0	22.73	22.68	22.78
	16 QAM	1	0	23.08	22.85	22.94
		1	49	22.83	22.89	22.81
		1	99	22.79	22.86	23.02
		50	0	21.74	21.75	21.76
		50	25	21.71	21.71	21.81
		50	49	21.68	21.72	21.77
		100	0	21.73	21.70	21.77
	64 QAM	1	0	21.90	22.00	21.81
		1	49	21.90	21.71	22.07
		1	99	21.89	21.87	21.93
		50	0	20.81	20.76	20.75
		50	25	20.69	20.76	20.72
		50	49	20.72	20.76	20.74
		100	0	20.84	20.72	20.75
	256 QAM	1	0	18.78	18.82	18.77
		1	49	18.79	18.90	18.78
		1	99	18.69	18.68	18.78
		50	0	18.70	18.75	18.76
		50	25	18.72	18.71	18.80
		50	49	18.74	18.77	18.76
		100	0	18.77	18.67	18.79

9. TEST DATA

9.1 EFFECTIVE RADIATED POWER

9.1.1 External Antenna

Freq (MHz)	Mod/ 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
665.5	LTE B71 (5 MHz)	QPSK	90.36	28.22	118.58	V	< 3.00	0.133	21.23	1	24
		16-QAM	89.60	28.22	117.82	V		0.111	20.47		
		64-QAM	87.94	28.22	116.16	V		0.076	18.81		
		256-QAM	85.48	28.22	113.70	V		0.043	16.35		
680.5		QPSK	90.38	28.43	118.81	V		0.140	21.46	1	0
		16-QAM	89.70	28.43	118.13	V		0.120	20.78		
		64-QAM	88.65	28.43	117.08	V		0.094	19.73		
		256-QAM	85.60	28.43	114.03	V		0.047	16.68		
695.5		QPSK	89.30	28.83	118.13	V		0.120	20.78	1	24
		16-QAM	88.60	28.83	117.43	V		0.102	20.08		
		64-QAM	87.53	28.83	116.36	V		0.080	19.01		
		256-QAM	84.50	28.83	113.33	V		0.040	15.98		

Freq (MHz)	Mod/ 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
668.0	LTE B71 (10 MHz)	QPSK	90.67	28.23	118.90	V	< 3.00	0.143	21.55	1	49
		16-QAM	90.00	28.23	118.23	V		0.123	20.88		
		64-QAM	88.85	28.23	117.08	V		0.094	19.73		
		256-QAM	85.87	28.23	114.10	V		0.047	16.75		
680.5		QPSK	90.57	28.43	119.00	V		0.146	21.65	1	0
		16-QAM	89.93	28.43	118.36	V		0.126	21.01		
		64-QAM	88.68	28.43	117.11	V		0.095	19.76		
		256-QAM	85.75	28.43	114.18	V		0.048	16.83		
693.0		QPSK	89.32	28.80	118.12	V		0.119	20.77	1	49
		16-QAM	88.77	28.80	117.57	V		0.105	20.22		
		64-QAM	87.50	28.80	116.30	V		0.079	18.95		

		256-QAM	84.30	28.80	113.10	V		0.038	15.75		

Freq (MHz)	Mod/ 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
670.5	LTE B71 (15 MHz)	QPSK	90.45	28.23	118.68	V	< 3.00	0.136	21.33	1	74
		16-QAM	89.80	28.23	118.03	V		0.117	20.68		
		64-QAM	88.65	28.23	116.88	V		0.090	19.53		
		256-QAM	85.81	28.23	114.04	V		0.047	16.69		
680.5		QPSK	90.75	28.43	119.18	V		0.152	21.83	1	0
		16-QAM	89.82	28.43	118.25	V		0.123	20.90		
		64-QAM	89.02	28.43	117.45	V		0.102	20.10		
		256-QAM	85.78	28.43	114.21	V		0.049	16.86		
690.5		QPSK	89.25	28.68	117.93	V		0.114	20.58	1	74
		16-QAM	88.63	28.68	117.31	V		0.099	19.96		
		64-QAM	87.42	28.68	116.10	V		0.075	18.75		
		256-QAM	84.45	28.68	113.13	V		0.038	15.78		

Freq (MHz)	Mod/ 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
673.0	LTE B71 (20 MHz)	QPSK	90.66	28.32	118.98	V	< 3.00	0.146	21.63	1	50
		16-QAM	89.68	28.32	118.00	V		0.116	20.65		
		64-QAM	88.75	28.32	117.07	V		0.094	19.72		
		256-QAM	85.80	28.32	114.12	V		0.048	16.77		
680.5		QPSK	90.67	28.43	119.10	V		0.150	21.75	1	0
		16-QAM	89.91	28.43	118.34	V		0.126	20.99		
		64-QAM	88.80	28.43	117.23	V		0.097	19.88		
		256-QAM	85.85	28.43	114.28	V		0.049	16.93		
688.0		QPSK	89.90	28.60	118.50	V		0.130	21.15	1	0
		16-QAM	89.16	28.60	117.76	V		0.110	20.41		
		64-QAM	88.13	28.60	116.73	V		0.087	19.38		
		256-QAM	85.01	28.60	113.61	V		0.042	16.26		

9.1.2 Internal Antenna

Freq (MHz)	Mod/ 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
665.5	LTE B71 (5 MHz)	QPSK	98.86	28.22	127.08	H	< 3.00	0.940	29.73	1	24
		16-QAM	98.20	28.22	126.42	H		0.807	29.07		
		64-QAM	97.00	28.22	125.22	H		0.612	27.87		
		256-QAM	94.20	28.22	122.42	H		0.321	25.07		
680.5		QPSK	98.63	28.43	127.06	H		0.935	29.71	1	0
		16-QAM	98.02	28.43	126.45	H		0.813	29.10		
		64-QAM	96.83	28.43	125.26	H		0.618	27.91		
		256-QAM	93.94	28.43	122.37	H		0.318	25.02		
695.5		QPSK	97.27	28.83	126.10	H		0.751	28.75	1	0
		16-QAM	96.80	28.83	125.63	H		0.674	28.28		
		64-QAM	95.75	28.83	124.58	H		0.529	27.23		
		256-QAM	92.51	28.83	121.34	H		0.251	23.99		

Freq (MHz)	Mod/ 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
668.0	LTE B71 (10 MHz)	QPSK	98.90	28.23	127.13	H	< 3.00	0.951	29.78	1	49
		16-QAM	98.30	28.23	126.53	H		0.828	29.18		
		64-QAM	97.11	28.23	125.34	H		0.630	27.99		
		256-QAM	94.12	28.23	122.35	H		0.316	25.00		
680.5		QPSK	98.75	28.43	127.18	H		0.962	29.83	1	0
		16-QAM	98.12	28.43	126.55	H		0.832	29.20		
		64-QAM	96.90	28.43	125.33	H		0.628	27.98		
		256-QAM	93.95	28.43	122.38	H		0.318	25.03		
693.0		QPSK	97.70	28.80	126.50	H		0.822	29.15	1	0
		16-QAM	97.23	28.80	126.03	H		0.738	28.68		
		64-QAM	96.15	28.80	124.95	H		0.575	27.60		
		256-QAM	92.90	28.80	121.70	H		0.272	24.35		

Freq (MHz)	Mod/ 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
670.5	LTE B71 (15 MHz)	QPSK	99.01	28.23	127.24	H	< 3.00	0.975	29.89	1	37
		16-QAM	98.24	28.23	126.47	H		0.817	29.12		
		64-QAM	97.14	28.23	125.37	H		0.634	28.02		
		256-QAM	94.13	28.23	122.36	H		0.317	25.01		
680.5		QPSK	98.86	28.43	127.29	H		0.986	29.94	1	0
		16-QAM	98.10	28.43	126.53	H		0.828	29.18		
		64-QAM	96.98	28.43	125.41	H		0.640	28.06		
		256-QAM	93.95	28.43	122.38	H		0.318	25.03		
690.5		QPSK	98.10	28.68	126.78	H		0.878	29.43	1	0
		16-QAM	97.50	28.68	126.18	H		0.765	28.83		
		64-QAM	96.33	28.68	125.01	H		0.584	27.66		
		256-QAM	93.20	28.68	121.88	H		0.284	24.53		

Freq (MHz)	Mod/ 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
673.0	LTE B71 (20 MHz)	QPSK	98.92	28.32	127.24	H	< 3.00	0.975	29.89	1	0
		16-QAM	98.23	28.32	126.55	H		0.832	29.20		
		64-QAM	96.74	28.32	125.06	H		0.590	27.71		
		256-QAM	93.70	28.32	122.02	H		0.293	24.67		
680.5		QPSK	99.04	28.43	127.47	H		1.028	30.12	1	0
		16-QAM	98.33	28.43	126.76	H		0.873	29.41		
		64-QAM	97.15	28.43	125.58	H		0.665	28.23		
		256-QAM	94.10	28.43	122.53	H		0.330	25.18		
688.0		QPSK	98.59	28.60	127.19	H		0.964	29.84	1	0
		16-QAM	97.94	28.60	126.54	H		0.830	29.19		
		64-QAM	96.73	28.60	125.33	H		0.628	27.98		
		256-QAM	93.70	28.60	122.30	H		0.313	24.95		

9.2 RADIATED SPURIOUS EMISSIONS

9.2.1 External Antenna

▣ MODE: LTE B71

▣ MODULATION SIGNAL: 15 MHz QPSK

▣ DISTANCE: 3 meters

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
133197 (670.5)	1 341.00	56.05	-18.75	37.30	V	-57.90	-13.00	1	74
	2 011.50	56.12	-13.36	42.76	V	-52.44	-13.00		
	2 682.00	52.83	-11.32	41.51	V	-53.69	-13.00		
	3 352.50	52.95	-8.50	44.45	V	-50.75	-13.00		
	4 023.00	61.47	-6.32	55.15	V	-40.05	-13.00		
133297 (680.5)	1 361.00	56.08	-18.48	37.60	V	-57.60	-13.00	1	0
	2 041.50	56.00	-13.19	42.81	V	-52.39	-13.00		
	2 722.00	53.05	-11.39	41.66	V	-53.54	-13.00		
	3 402.50	53.53	-8.23	45.30	V	-49.90	-13.00		
	4 083.00	63.11	-6.20	56.91	V	-38.29	-13.00		
133397 (690.5)	1 381.00	55.80	-18.21	37.59	V	-57.61	-13.00	1	74
	2 071.50	54.63	-13.34	41.29	V	-53.91	-13.00		
	2 762.00	53.21	-11.55	41.66	V	-53.54	-13.00		
	3 452.50	51.32	-8.41	42.92	V	-52.29	-13.00		
	4 143.00	55.03	-5.94	49.09	V	-46.11	-13.00		

9.2.2 Internal Antenna

▣ MODE: LTE B71

▣ MODULATION SIGNAL: 20 MHz QPSK

▣ DISTANCE: 3 meters

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
133222 (673.0)	1 346.00	70.45	-18.68	51.77	H	-43.43	-13.00	1	0
	2 019.00	58.64	-13.30	45.34	H	-49.86	-13.00		
	2 692.00	53.33	-11.29	42.04	V	-53.16	-13.00		
	3 365.00	52.04	-8.24	43.80	H	-51.40	-13.00		
	4 038.00	62.62	-6.36	56.26	V	-38.94	-13.00		
	4 711.00	49.13	-4.84	44.29	H	-50.91	-13.00		
133297 (680.5)	1 361.00	71.72	-18.48	53.24	H	-41.96	-13.00	1	0
	2 041.50	59.57	-13.19	46.38	H	-48.82	-13.00		
	2 722.00	56.65	-11.39	45.26	V	-49.94	-13.00		
	3 402.50	53.01	-8.23	44.78	H	-50.42	-13.00		
	4 083.00	62.80	-6.20	56.60	V	-38.60	-13.00		
	4 763.50	49.45	-4.60	44.85	H	-50.35	-13.00		
133372 (688.0)	1 376.00	72.90	-18.32	54.58	H	-40.62	-13.00	1	0
	2 064.00	59.62	-13.37	46.25	H	-48.95	-13.00		
	2 752.00	55.92	-11.50	44.42	V	-50.78	-13.00		
	3 440.00	54.00	-8.40	45.60	H	-49.60	-13.00		
	4 128.00	57.27	-5.97	51.30	H	-43.90	-13.00		
	4 816.00	49.21	-4.16	45.05	H	-50.15	-13.00		

9.3 PEAK-TO-AVERAGE RATIO

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (dB)
41	5 MHz	2593.0	QPSK	25	0	5.29
			16-QAM			6.06
			64-QAM			6.60
			256-QAM			6.62
	10 MHz		QPSK	50		5.31
			16-QAM			6.02
			64-QAM			6.58
			256-QAM			6.58
	15 MHz		QPSK	75		5.30
			16-QAM			5.99
			64-QAM			6.54
			256-QAM			6.56
	20 MHz		QPSK	100		5.22
			16-QAM			5.93
			64-QAM			6.49
			256-QAM			6.50

Note:

1. Plots of the EUT's Peak- to- Average Ratio are shown Page 69 ~ 84.

9.4 OCCUPIED BANDWIDTH

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (MHz)
71	5 MHz	680.5	QPSK	25	0	4.5076
			16-QAM			4.4967
			64-QAM			4.5159
			256-QAM			4.5041
	10 MHz		QPSK	50		8.9594
			16-QAM			8.9582
			64-QAM			8.9642
			256-QAM			8.9857
	15 MHz		QPSK	75		13.465
			16-QAM			13.476
			64-QAM			13.458
			256-QAM			13.477
	20 MHz		QPSK	100		17.987
			16-QAM			17.948
			64-QAM			17.932
			256-QAM			17.940

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 53 ~ 68.

9.5 CONDUCTED SPURIOUS EMISSIONS

Band	Band Width (MHz)	Frequency (MHz)	Frequency of Maximum Harmonic (GHz)	Factor (dB)	Measurement Maximum Data (dBm)	Result (dBm)	Limit (dBm)
71	5	665.5	3.1636	29.976	-67.431	-37.455	-13.00
		680.5	3.6765	29.976	-67.195	-37.219	
		695.5	3.6865	29.976	-67.134	-37.158	
	10	668.0	3.7015	29.976	-67.305	-37.329	
		680.5	3.7269	29.976	-67.179	-37.203	
		693.0	3.6890	29.976	-67.096	-37.120	
	15	670.5	3.7020	29.976	-67.169	-37.193	
		680.5	3.6970	29.976	-67.218	-37.242	
		690.5	3.7114	29.976	-67.319	-37.343	
	20	673.0	3.1780	29.976	-67.092	-37.116	
		680.5	3.6990	29.976	-67.112	-37.136	
		688.0	3.6720	29.976	-67.323	-37.347	

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 85 ~ 96.
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	27.270
1 – 5	29.976
5 – 10	30.591
10 – 15	31.116
15 – 20	31.489
Above 20(26.5)	32.131

9.6 BAND EDGE

- Plots of the EUT's Band Edge are shown Page 97 ~ 120.

9.7 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

▣ MODE: LTE B71

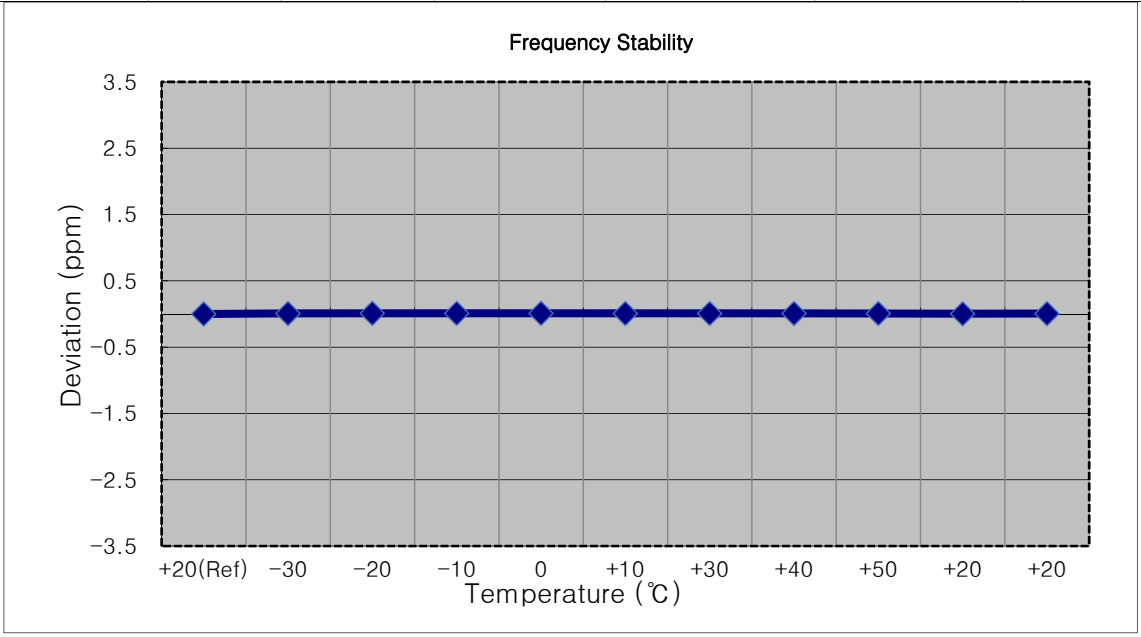
▣ OPERATING FREQUENCY: 665,500,000 Hz

▣ CHANNEL: 133147 (5 MHz)

▣ REFERENCE VOLTAGE: 13.500 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(℃)	(Hz)	(Hz)	(%)	
100 %	13.500	+20(Ref)	665 500 007	0.0	0.000 000	0.000
100 %		-30	665 500 013	5.8	0.000 001	0.009
100 %		-20	665 500 014	6.6	0.000 001	0.010
100 %		-10	665 500 013	6.2	0.000 001	0.009
100 %		0	665 500 014	6.3	0.000 001	0.009
100 %		+10	665 500 013	5.8	0.000 001	0.009
100 %		+30	665 500 012	5.2	0.000 001	0.008
100 %		+40	665 500 012	5.0	0.000 001	0.008
100 %		+50	665 500 012	4.8	0.000 001	0.007
85 %	11.475	+20	665 500 010	2.7	0.000 000	0.004
115 %	15.525	+20	665 500 012	4.4	0.000 001	0.007



▣ MODE: LTE B71

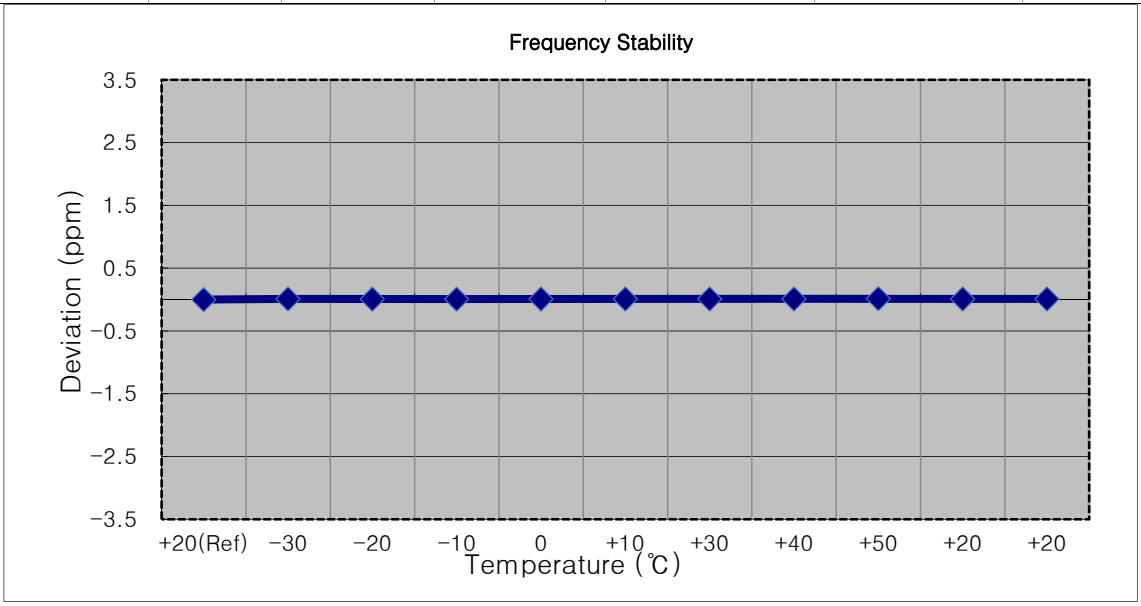
▣ OPERATING FREQUENCY: 668,000,000 Hz

▣ CHANNEL: 133172 (10 MHz)

▣ REFERENCE VOLTAGE: 13.500 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(℃)	(Hz)	(Hz)	(%)	
100 %	13.500	+20(Ref)	668 000 007	0.0	0.000 000	0.000
100 %		-30	668 000 013	6.1	0.000 001	0.009
100 %		-20	668 000 011	4.6	0.000 001	0.007
100 %		-10	668 000 011	4.3	0.000 001	0.006
100 %		0	668 000 013	6.0	0.000 001	0.009
100 %		+10	668 000 013	6.3	0.000 001	0.009
100 %		+30	668 000 012	5.6	0.000 001	0.008
100 %		+40	668 000 012	5.4	0.000 001	0.008
100 %		+50	668 000 016	9.3	0.000 001	0.014
85 %	11.475	+20	668 000 012	5.5	0.000 001	0.008
115 %	15.525	+20	668 000 013	6.1	0.000 001	0.009



▣ MODE: LTE B71

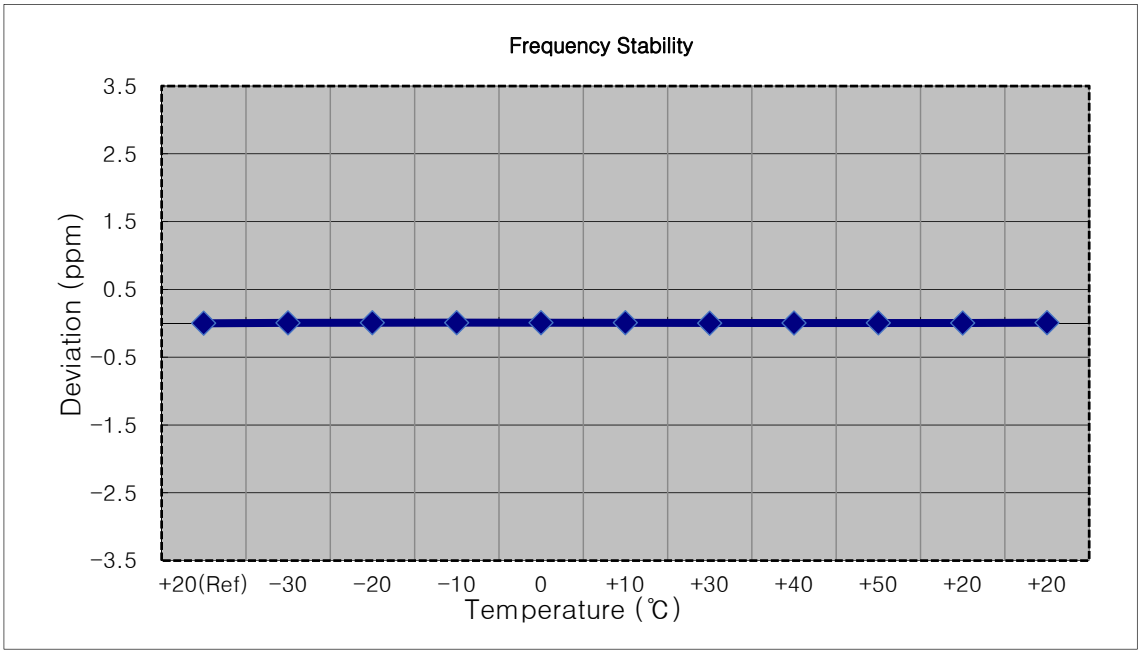
▣ OPERATING FREQUENCY: 670,500,000 Hz

▣ CHANNEL: 133197 (15 MHz)

▣ REFERENCE VOLTAGE: 13.500 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(℃)	(Hz)	(Hz)	(%)	
100 %	13.500	+20(Ref)	670 500 006	0.0	0.000 000	0.000
100 %		-30	670 500 010	3.8	0.000 001	0.006
100 %		-20	670 500 012	5.9	0.000 001	0.009
100 %		-10	670 500 011	5.3	0.000 001	0.008
100 %		0	670 500 011	4.9	0.000 001	0.007
100 %		+10	670 500 011	4.8	0.000 001	0.007
100 %		+30	670 500 007	1.2	0.000 000	0.002
100 %		+40	670 500 009	2.7	0.000 000	0.004
100 %		+50	670 500 009	2.9	0.000 000	0.004
85 %	11.475	+20	670 500 008	2.5	0.000 000	0.004
115 %	15.525	+20	670 500 011	4.9	0.000 001	0.007



▣ MODE: LTE B71

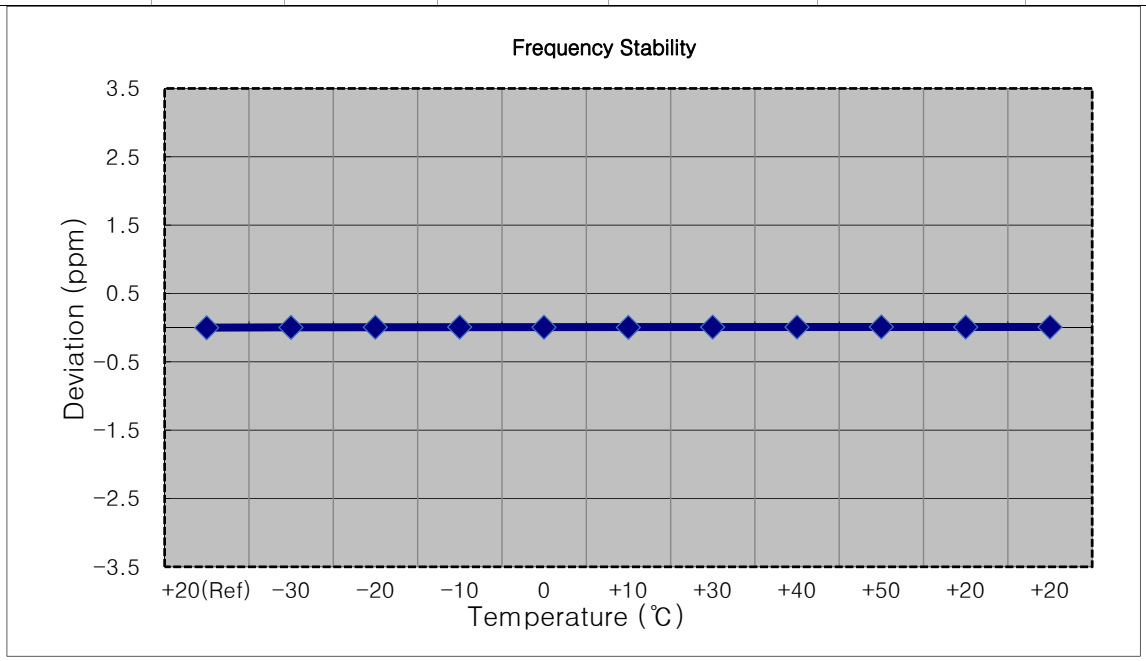
▣ OPERATING FREQUENCY: 673,000,000 Hz

▣ CHANNEL: 133222 (20 MHz)

▣ REFERENCE VOLTAGE: 13.500 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(℃)	(Hz)	(Hz)	(%)	
100 %	13.500	+20(Ref)	673 000 004	0.0	0.000 000	0.000
100 %		-30	673 000 007	3.3	0.000 000	0.005
100 %		-20	673 000 009	5.0	0.000 001	0.007
100 %		-10	673 000 009	5.4	0.000 001	0.008
100 %		0	673 000 008	4.1	0.000 001	0.006
100 %		+10	673 000 007	3.1	0.000 000	0.005
100 %		+30	673 000 009	5.6	0.000 001	0.008
100 %		+40	673 000 010	6.1	0.000 001	0.009
100 %		+50	673 000 011	6.8	0.000 001	0.010
85 %	11.475	+20	673 000 010	5.7	0.000 001	0.008
115 %	15.525	+20	673 000 010	5.8	0.000 001	0.009



▣ MODE: LTE B71

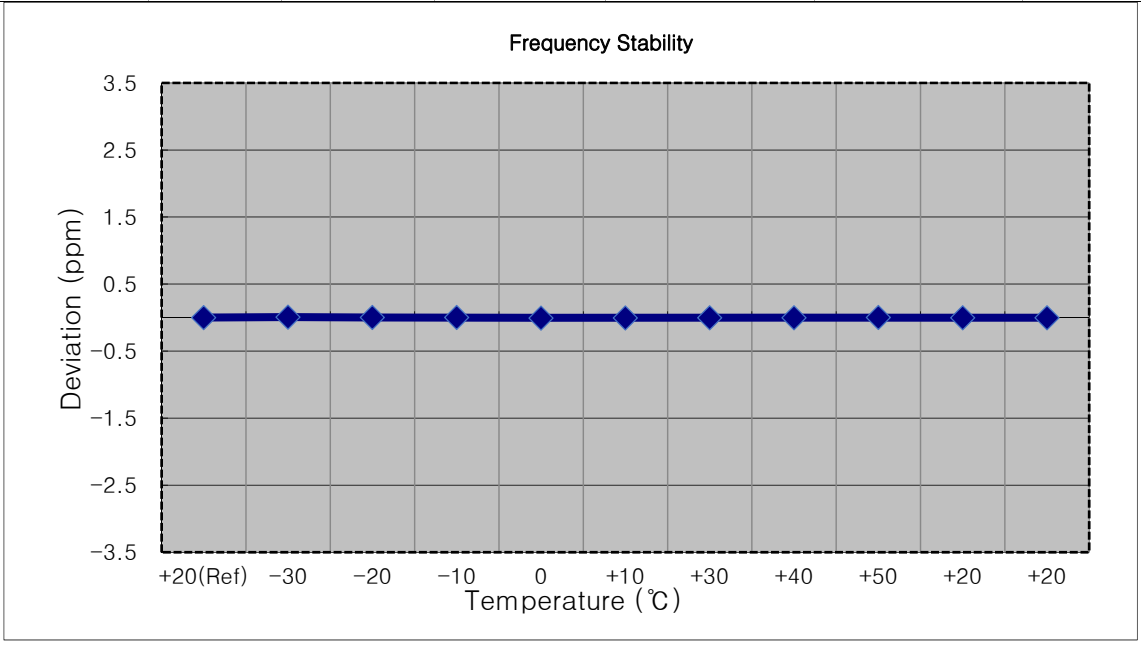
▣ OPERATING FREQUENCY: 680,500,000 Hz

▣ CHANNEL: 133297 (5 MHz)

▣ REFERENCE VOLTAGE: 13.500 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(℃)	(Hz)	(Hz)	(%)	
100 %	13.500	+20(Ref)	680 500 003	0.0	0.000 000	0.000
100 %		-30	680 500 008	5.2	0.000 001	0.008
100 %		-20	680 500 004	1.5	0.000 000	0.002
100 %		-10	680 500 005	2.0	0.000 000	0.003
100 %		0	680 499 998	-4.6	-0.000 001	-0.007
100 %		+10	680 500 000	-2.8	0.000 000	-0.004
100 %		+30	680 500 000	-2.4	0.000 000	-0.004
100 %		+40	680 500 000	-2.3	0.000 000	-0.003
100 %		+50	680 500 004	1.7	0.000 000	0.002
85 %	11.475	+20	680 500 001	-1.9	0.000 000	-0.003
115 %	15.525	+20	680 500 001	-2.2	0.000 000	-0.003



▣ MODE: LTE B71

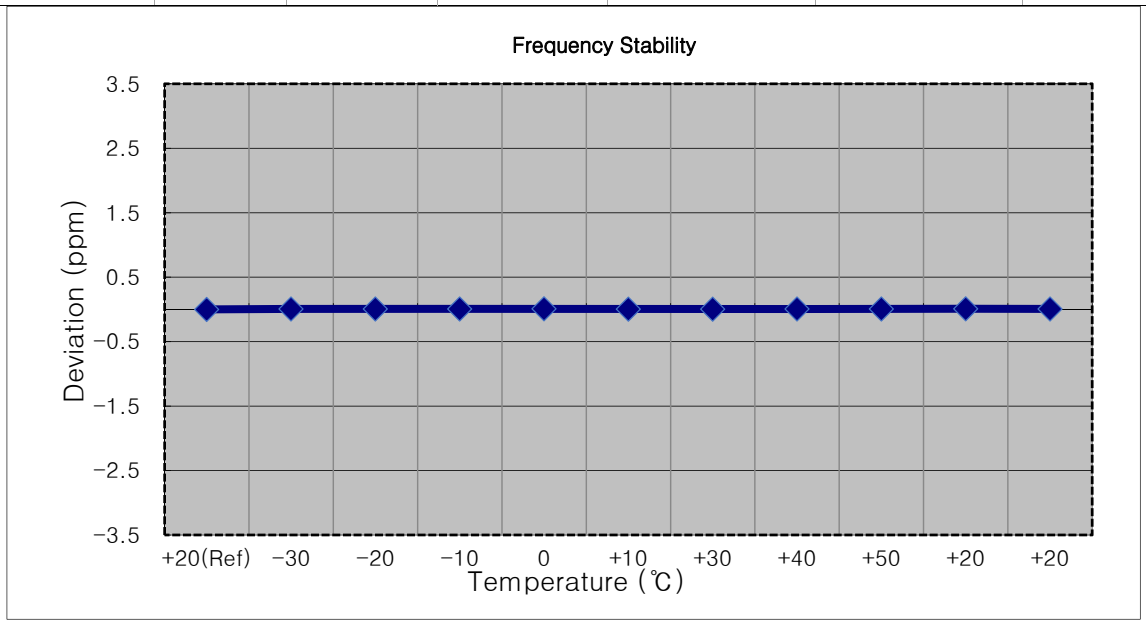
▣ OPERATING FREQUENCY: 680,500,000 Hz

▣ CHANNEL: 133297 (10 MHz)

▣ REFERENCE VOLTAGE: 13.500 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(℃)	(Hz)	(Hz)	(%)	
100 %	13.500	+20(Ref)	680 500 005	0.0	0.000 000	0.000
100 %		-30	680 500 010	5.2	0.000 001	0.008
100 %		-20	680 500 009	4.1	0.000 001	0.006
100 %		-10	680 500 010	4.9	0.000 001	0.007
100 %		0	680 500 012	6.6	0.000 001	0.010
100 %		+10	680 500 008	2.3	0.000 000	0.003
100 %		+30	680 500 007	2.1	0.000 000	0.003
100 %		+40	680 500 010	4.4	0.000 001	0.006
100 %		+50	680 500 010	4.6	0.000 001	0.007
85 %	11.475	+20	680 500 012	6.3	0.000 001	0.009
115 %	15.525	+20	680 500 010	5.0	0.000 001	0.007



▣ MODE: LTE B71

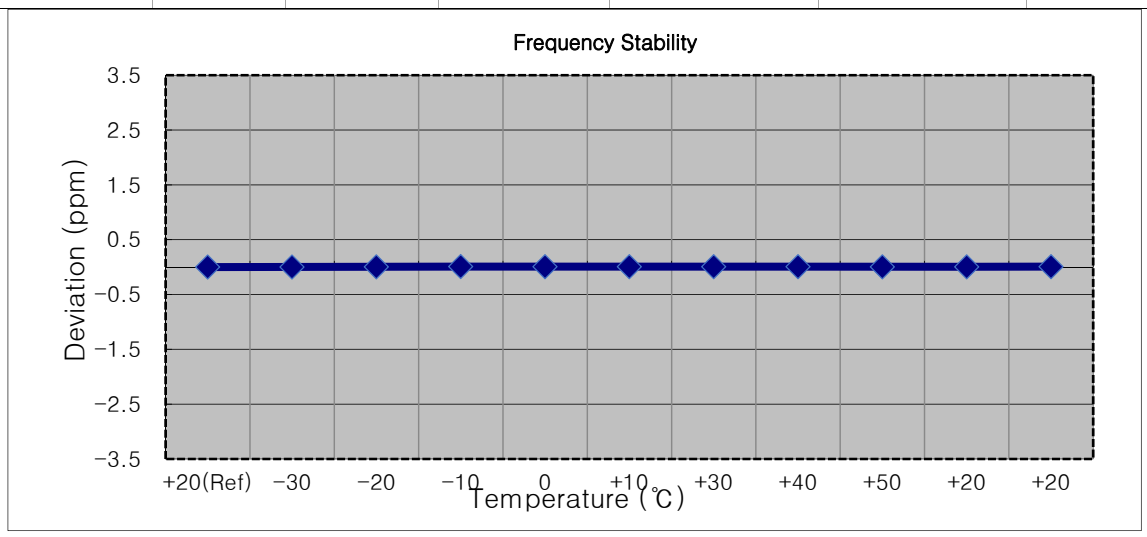
▣ OPERATING FREQUENCY: 680,500,000 Hz

▣ CHANNEL: 133297 (15 MHz)

▣ REFERENCE VOLTAGE: 13.500 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(℃)	(Hz)	(Hz)	(%)	
100 %	13.500	+20(Ref)	680 500 004	0.0	0.000 000	0.000
100 %		-30	680 500 006	1.9	0.000 000	0.003
100 %		-20	680 500 007	3.5	0.000 001	0.005
100 %		-10	680 500 010	6.6	0.000 001	0.010
100 %		0	680 500 008	4.7	0.000 001	0.007
100 %		+10	680 500 009	4.9	0.000 001	0.007
100 %		+30	680 500 008	4.2	0.000 001	0.006
100 %		+40	680 500 009	5.5	0.000 001	0.008
100 %		+50	680 500 007	2.9	0.000 000	0.004
85 %	11.475	+20	680 500 007	3.0	0.000 000	0.004
115 %	15.525	+20	680 500 008	4.3	0.000 001	0.006



▣ MODE: LTE B71

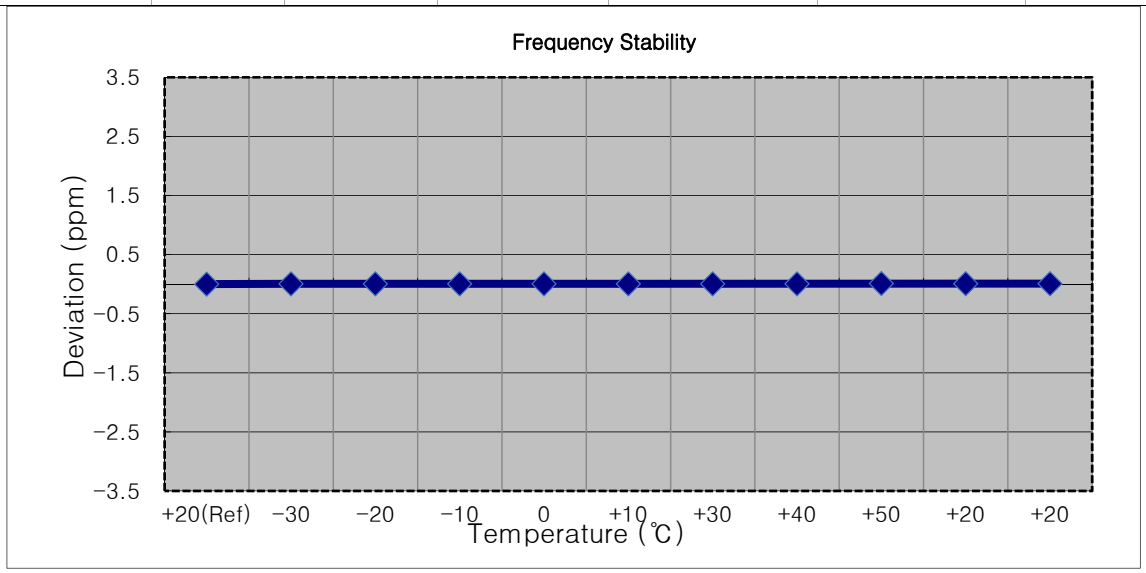
▣ OPERATING FREQUENCY: 680,500,000 Hz

▣ CHANNEL: 133297 (20 MHz)

▣ REFERENCE VOLTAGE: 13.500 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(℃)	(Hz)	(Hz)	(%)	
100 %	13.500	+20(Ref)	680 500 005	0.0	0.000 000	0.000
100 %		-30	680 500 008	3.0	0.000 000	0.004
100 %		-20	680 500 008	3.1	0.000 000	0.005
100 %		-10	680 500 009	4.0	0.000 001	0.006
100 %		0	680 500 009	3.6	0.000 001	0.005
100 %		+10	680 500 009	3.7	0.000 001	0.005
100 %		+30	680 500 008	3.0	0.000 000	0.004
100 %		+40	680 500 009	4.1	0.000 001	0.006
100 %		+50	680 500 013	7.5	0.000 001	0.011
85 %	11.475	+20	680 500 010	4.9	0.000 001	0.007
115 %	15.525	+20	680 500 011	5.3	0.000 001	0.008



▣ MODE: LTE B71

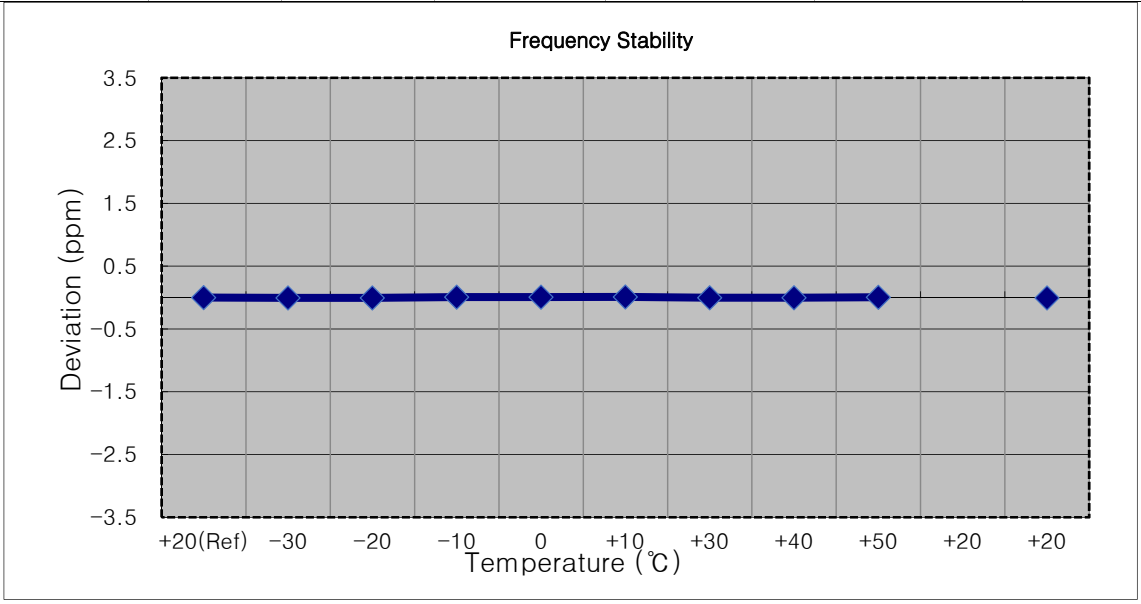
▣ OPERATING FREQUENCY: 695,500,000 Hz

▣ CHANNEL: 133447 (5 MHz)

▣ REFERENCE VOLTAGE: 13.500 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(℃)	(Hz)	(Hz)	(%)	
100 %	13.500	+20(Ref)	695 499 997	0.0	0.000 000	0.000
100 %		-30	695 499 993	-4.3	-0.000 001	-0.006
100 %		-20	695 499 994	-3.8	-0.000 001	-0.005
100 %		-10	695 500 002	4.6	0.000 001	0.007
100 %		0	695 500 002	4.2	0.000 001	0.006
100 %		+10	695 500 004	6.7	0.000 001	0.010
100 %		+30	695 499 995	-2.7	0.000 000	-0.004
100 %		+40	695 499 995	-2.9	0.000 000	-0.004
100 %		+50	695 500 001	3.4	0.000 000	0.005
85 %	11.475	+20	695 499 998	0.8	0.000 000	0.001
115 %	15.525	+20	695 499 994	-3.8	-0.000 001	-0.005



▣ MODE: LTE B71

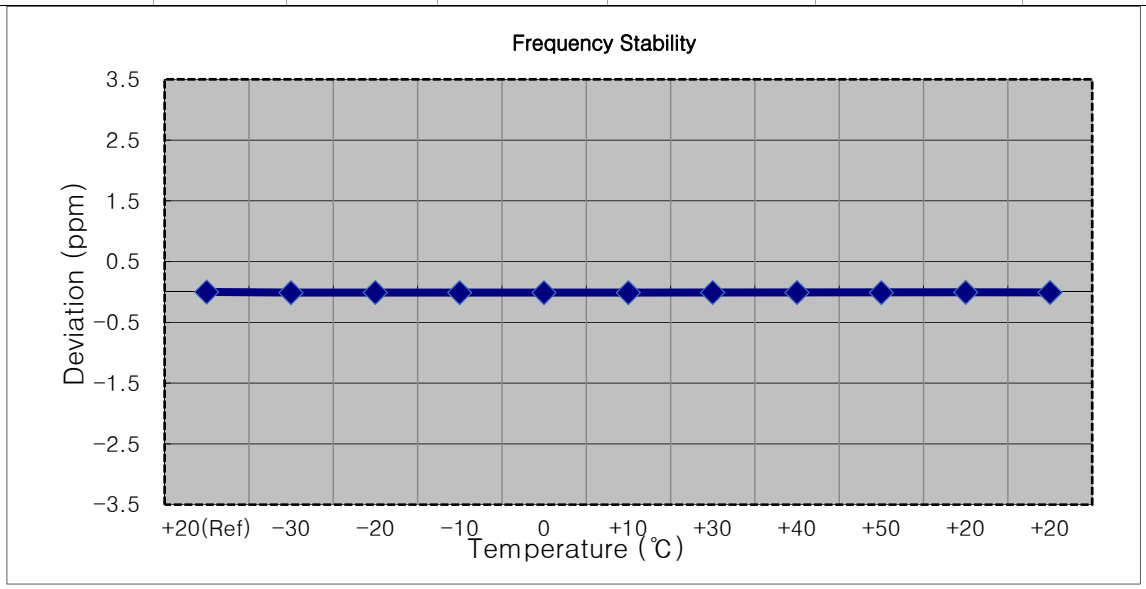
▣ OPERATING FREQUENCY: 693,000,000 Hz

▣ CHANNEL: 133422 (10 MHz)

▣ REFERENCE VOLTAGE: 13.500 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(℃)	(Hz)	(Hz)	(%)	
100 %	13.500	+20(Ref)	692 999 992	0.0	0.000 000	0.000
100 %		-30	692 999 985	-6.9	-0.000 001	-0.010
100 %		-20	692 999 987	-5.6	-0.000 001	-0.008
100 %		-10	692 999 985	-7.2	-0.000 001	-0.010
100 %		0	692 999 985	-7.1	-0.000 001	-0.010
100 %		+10	692 999 986	-6.8	-0.000 001	-0.010
100 %		+30	692 999 987	-5.3	-0.000 001	-0.008
100 %		+40	692 999 986	-6.4	-0.000 001	-0.009
100 %		+50	692 999 985	-7.1	-0.000 001	-0.010
85 %	11.475	+20	692 999 988	-4.1	-0.000 001	-0.006
115 %	15.525	+20	692 999 986	-6.0	-0.000 001	-0.009



▣ MODE: LTE B71

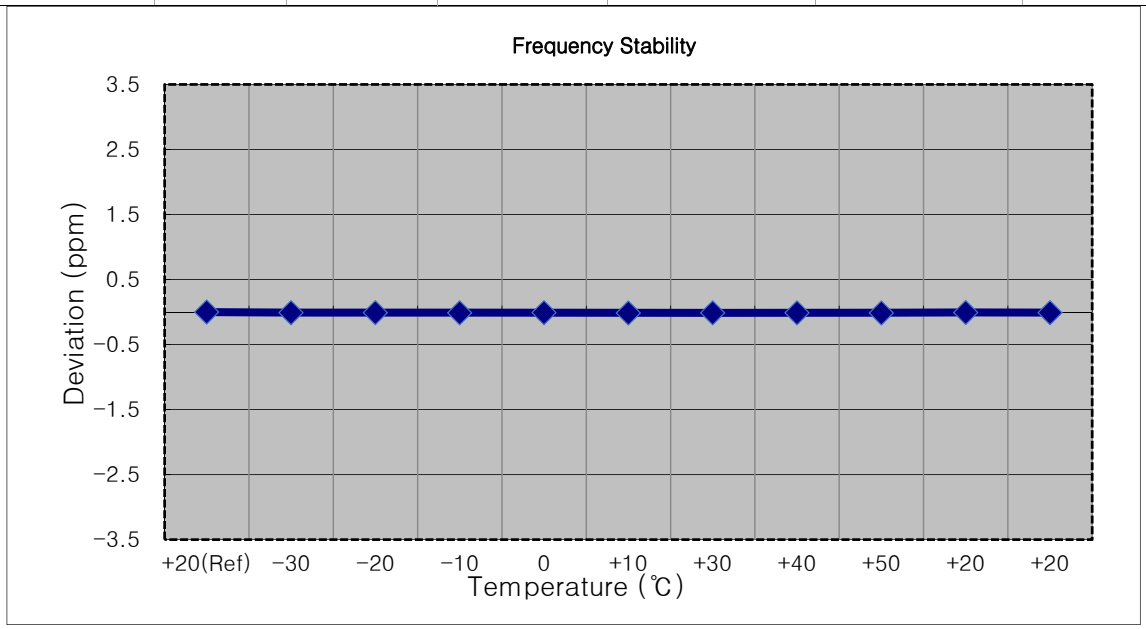
▣ OPERATING FREQUENCY: 690,500,000 Hz

▣ CHANNEL: 133397 (15 MHz)

▣ REFERENCE VOLTAGE: 13.500 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(℃)	(Hz)	(Hz)	(%)	
100 %	13.500	+20(Ref)	690 499 991	0.0	0.000 000	0.000
100 %		-30	690 499 984	-7.4	-0.000 001	-0.011
100 %		-20	690 499 985	-6.3	-0.000 001	-0.009
100 %		-10	690 499 983	-7.6	-0.000 001	-0.011
100 %		0	690 499 984	-6.7	-0.000 001	-0.010
100 %		+10	690 499 982	-9.2	-0.000 001	-0.013
100 %		+30	690 499 983	-8.3	-0.000 001	-0.012
100 %		+40	690 499 983	-8.4	-0.000 001	-0.012
100 %		+50	690 499 981	-9.9	-0.000 001	-0.014
85 %	11.475	+20	690 499 986	-5.5	-0.000 001	-0.008
115 %	15.525	+20	690 499 985	-6.3	-0.000 001	-0.009



▣ MODE: LTE B71

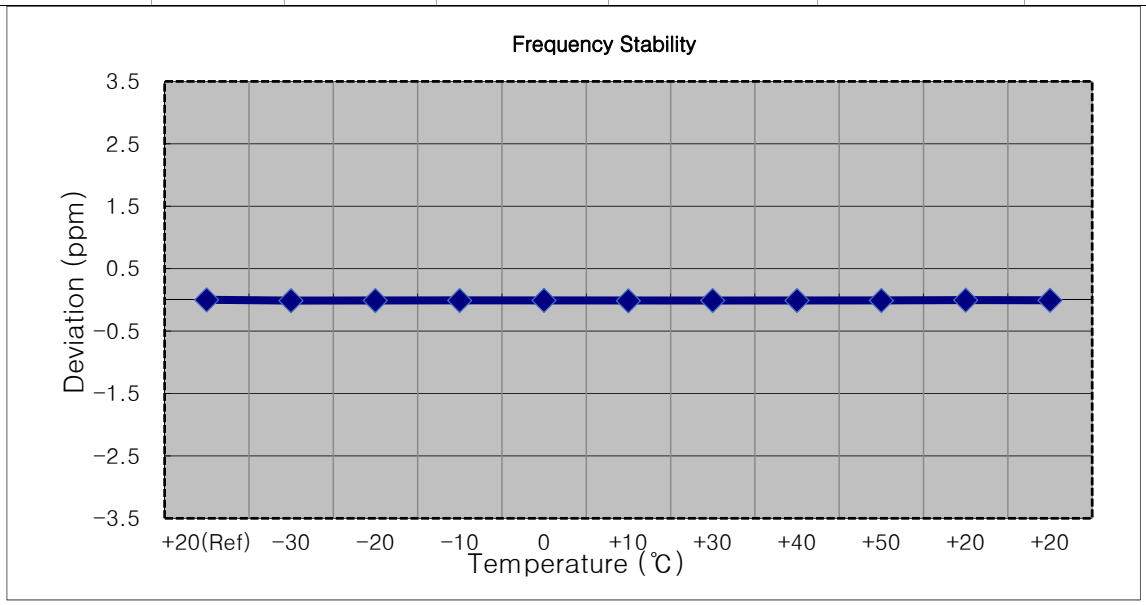
▣ OPERATING FREQUENCY: 688,000,000 Hz

▣ CHANNEL: 133372 (20 MHz)

▣ REFERENCE VOLTAGE: 13.500 VDC

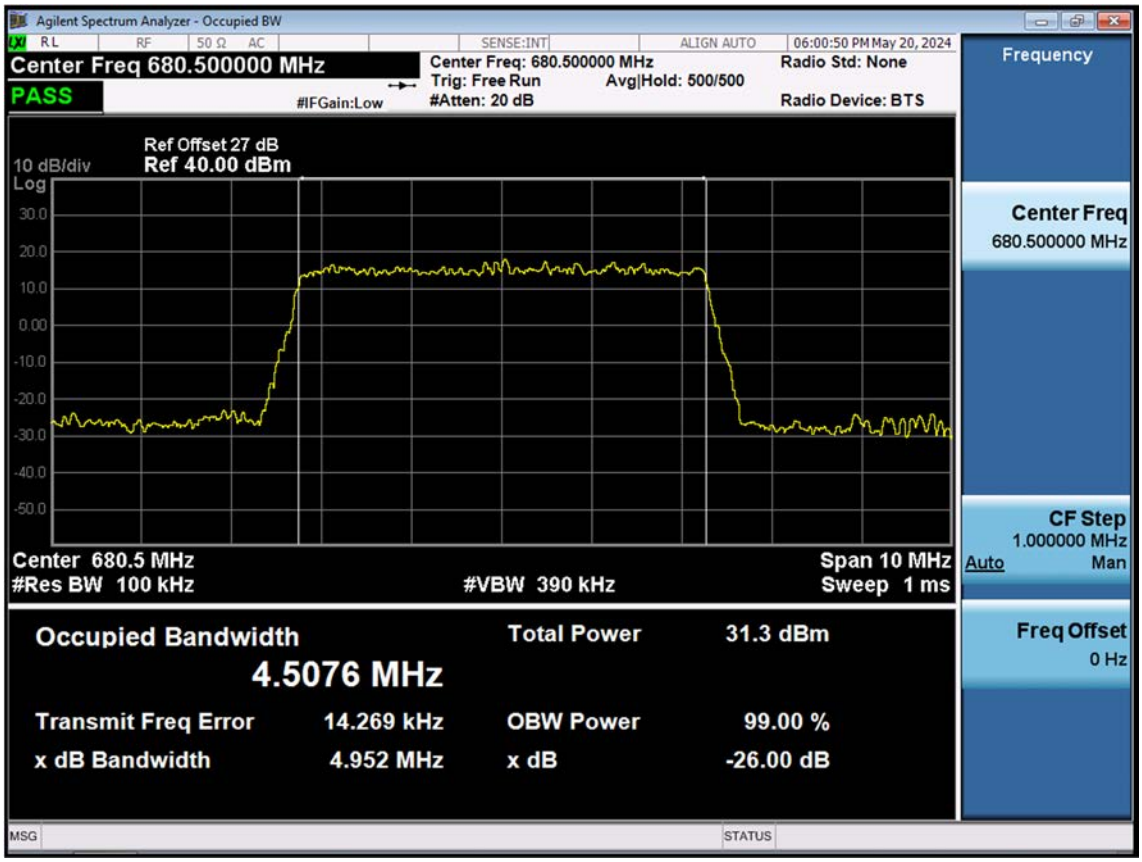
▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(℃)	(Hz)	(Hz)	(%)	
100 %	13.500	+20(Ref)	687 999 991	0.0	0.000 000	0.000
100 %		-30	687 999 981	-9.7	-0.000 001	-0.014
100 %		-20	687 999 985	-6.6	-0.000 001	-0.010
100 %		-10	687 999 984	-7.4	-0.000 001	-0.011
100 %		0	687 999 986	-5.0	-0.000 001	-0.007
100 %		+10	687 999 981	-10.3	-0.000 001	-0.015
100 %		+30	687 999 984	-7.3	-0.000 001	-0.011
100 %		+40	687 999 984	-7.2	-0.000 001	-0.010
100 %		+50	687 999 984	-7.0	-0.000 001	-0.010
85 %	11.475	+20	687 999 987	-4.1	-0.000 001	-0.006
115 %	15.525	+20	687 999 986	-5.6	-0.000 001	-0.008

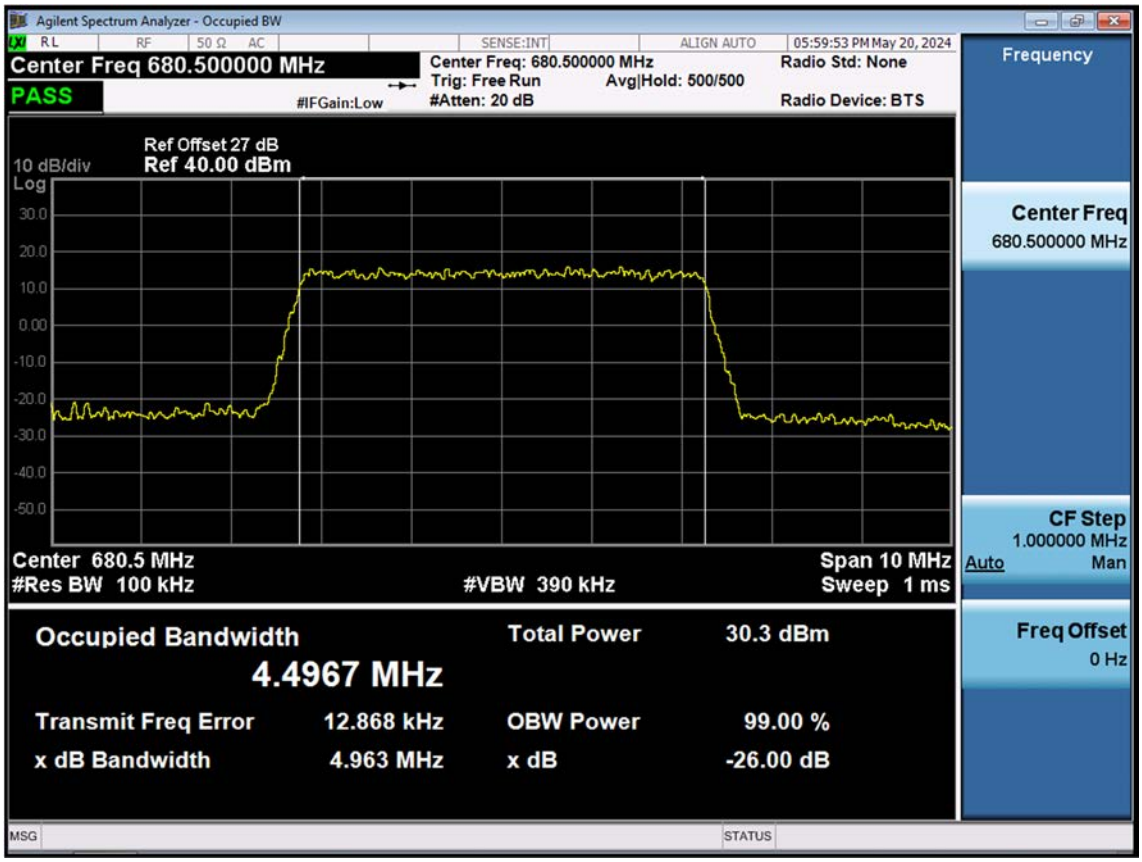


10. TEST PLOTS

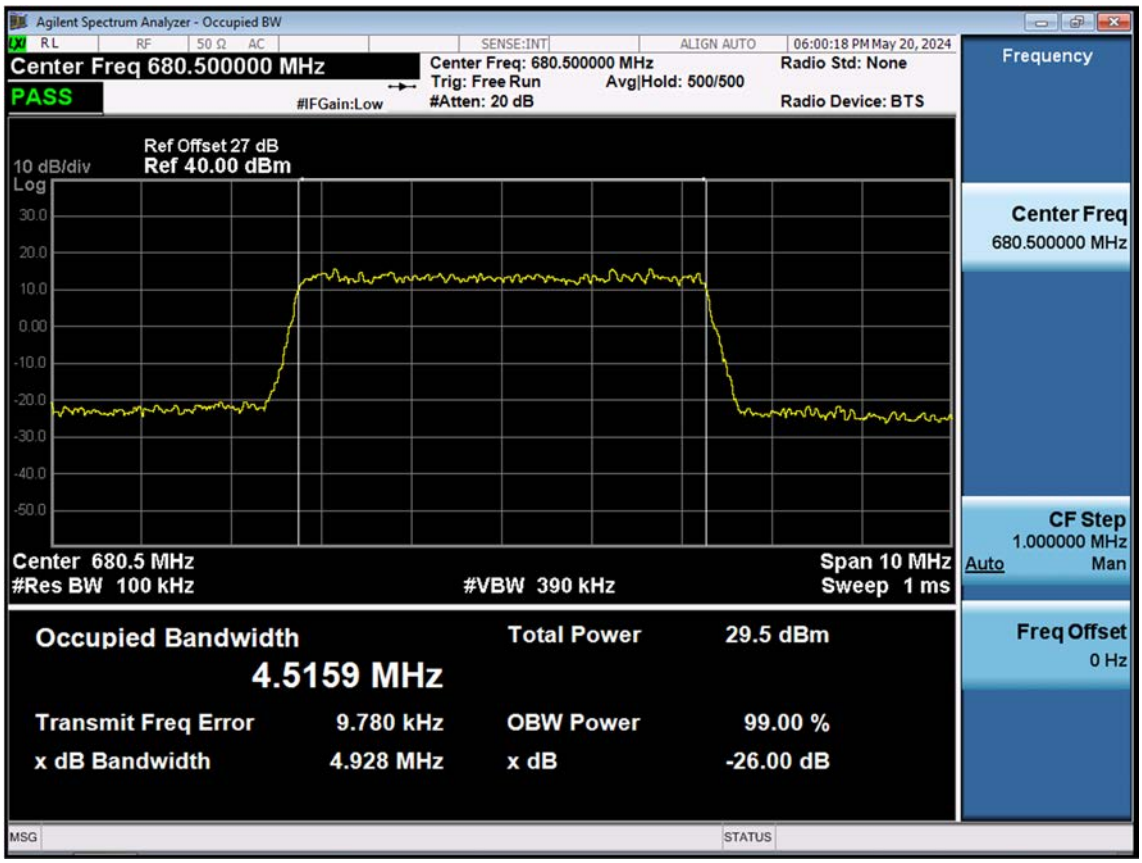
LTE B71_5 M_OBW_Mid_QPSK_FullRB



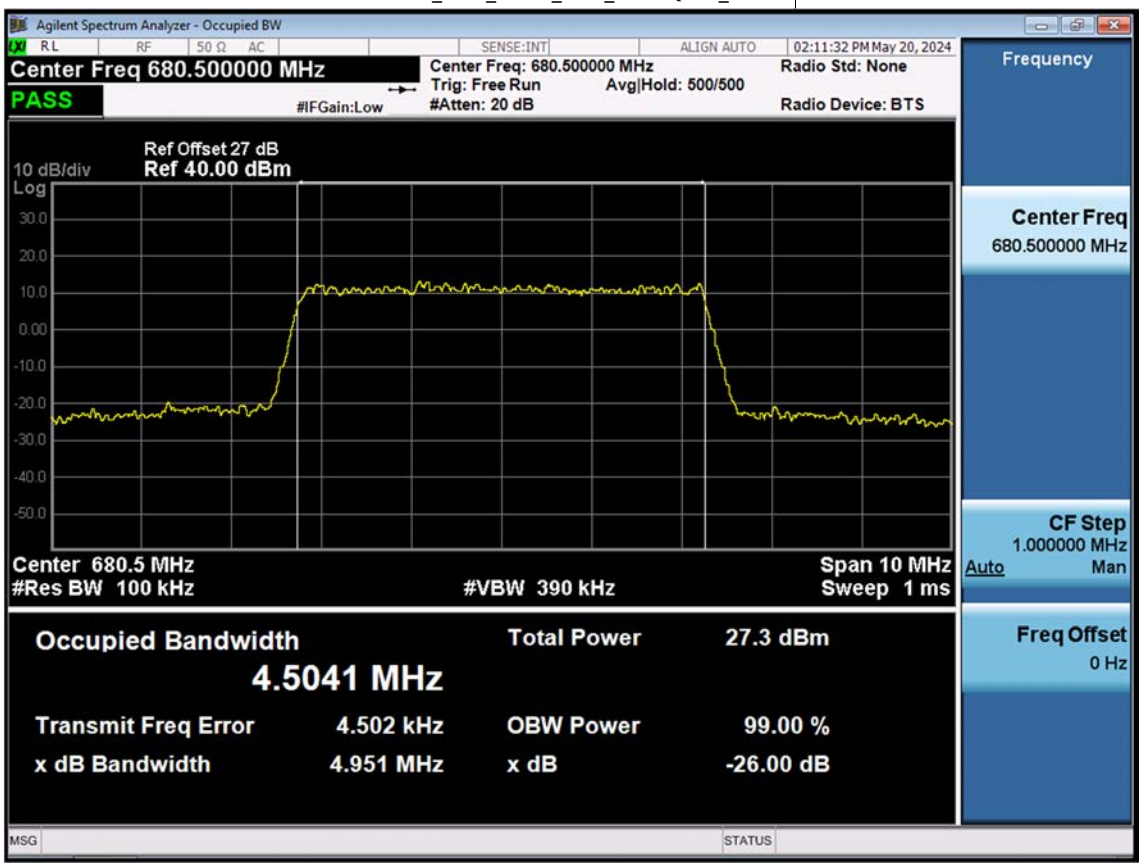
LTE B71_5 M_OBW_Mid_16 QAM_FullRB



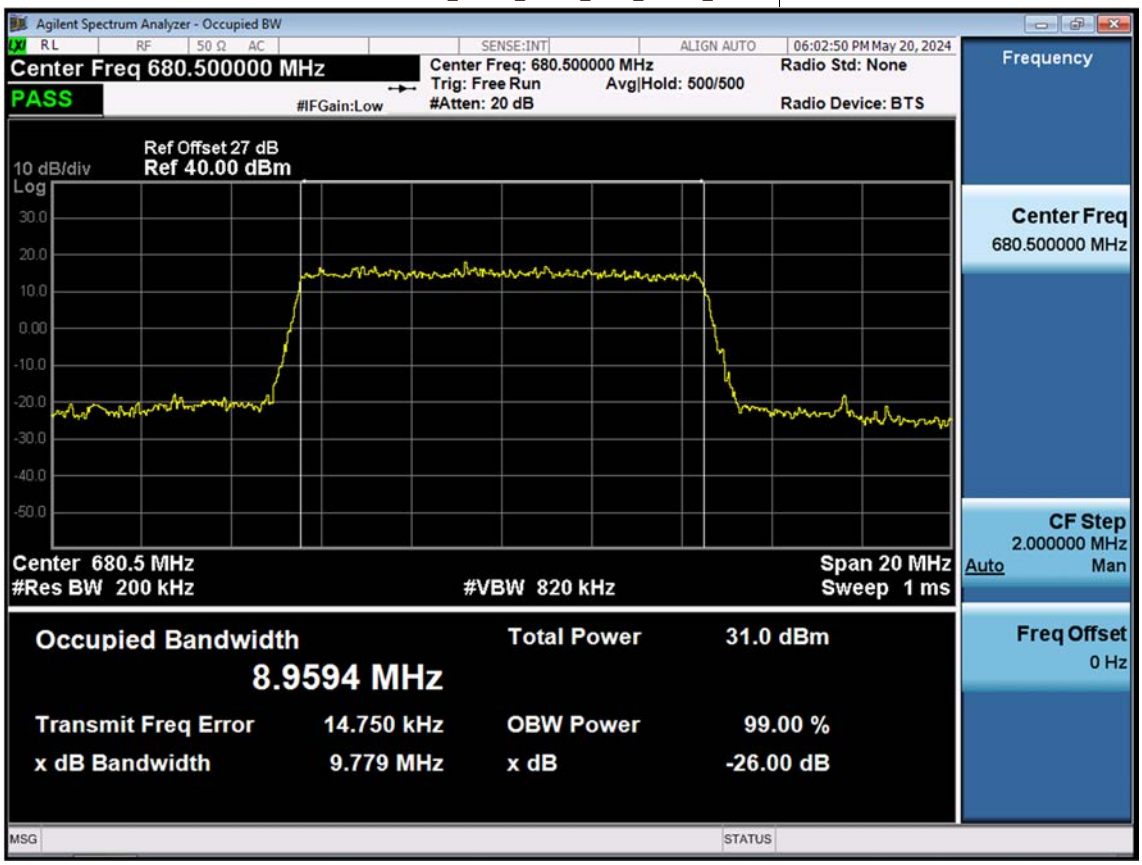
LTE B71_5 M_OBW_Mid_64 QAM_FullRB



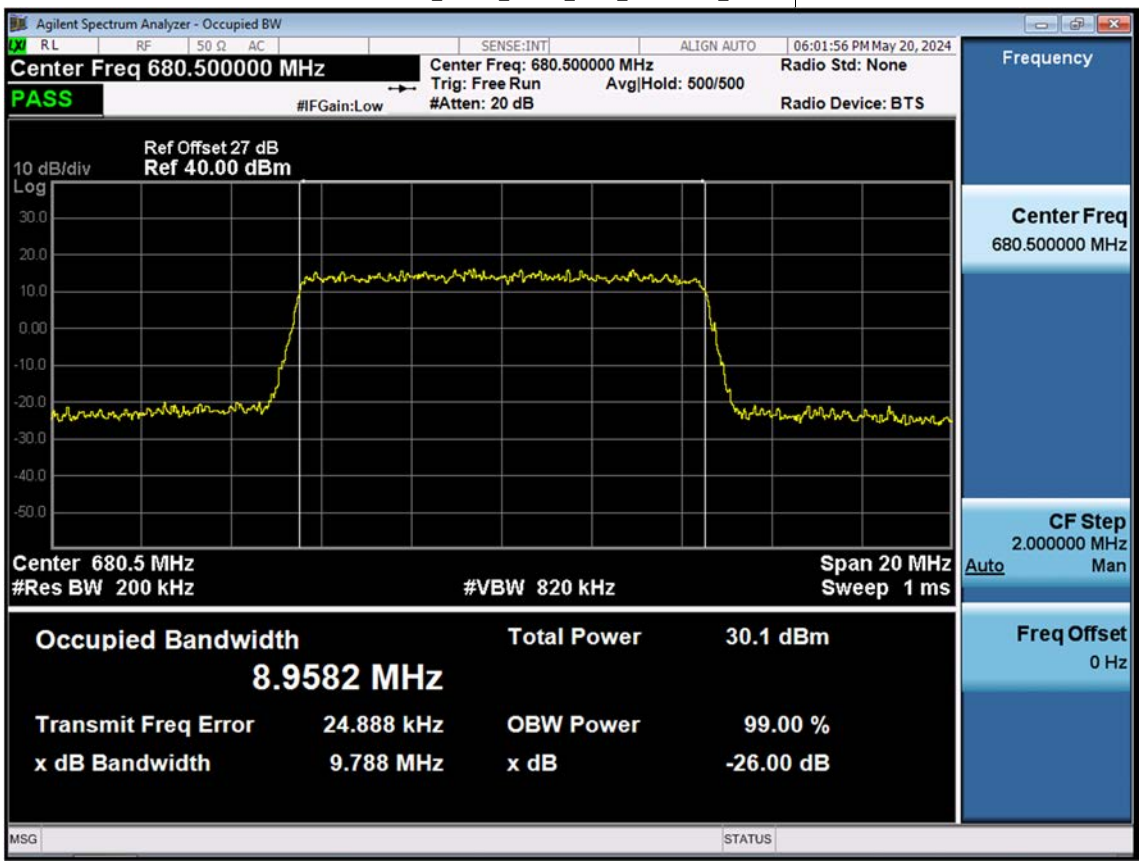
LTE B71_5 M_OBW_Mid_256 QAM_FullRB



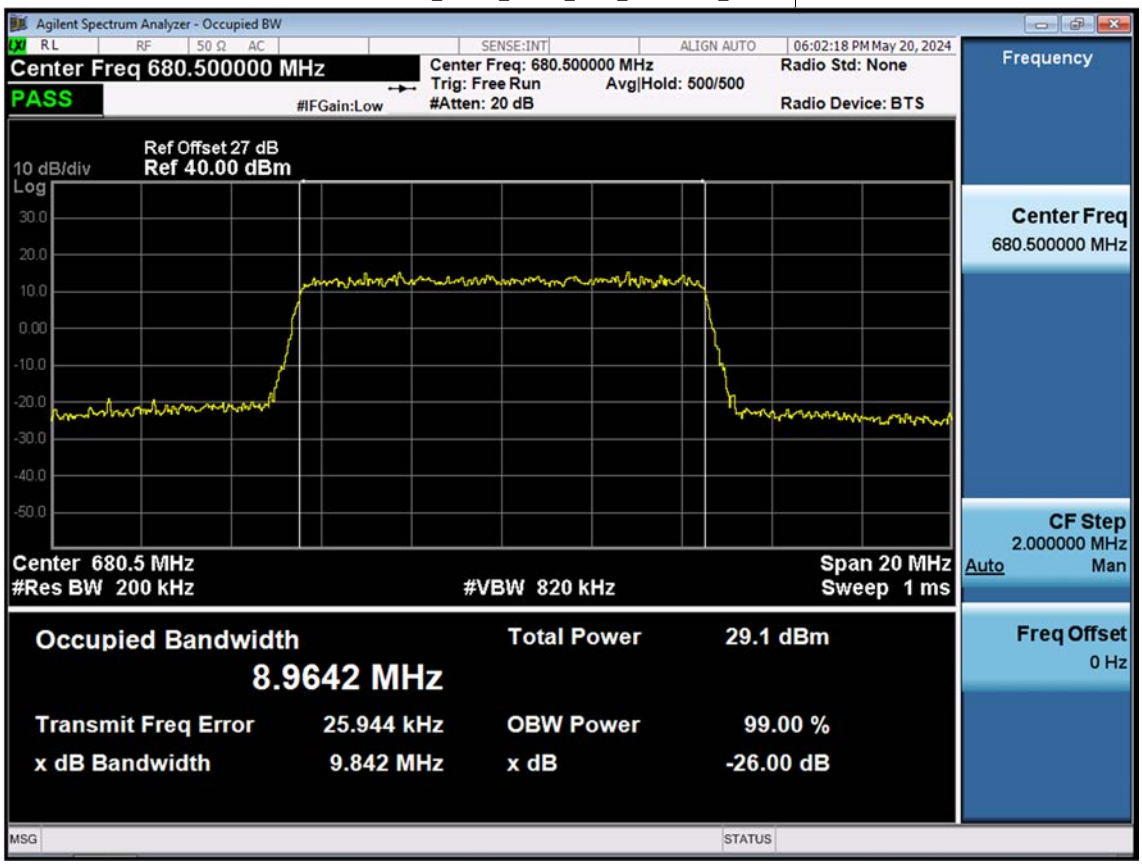
LTE B71_10 M_OBW_Mid_QPSK_FullRB



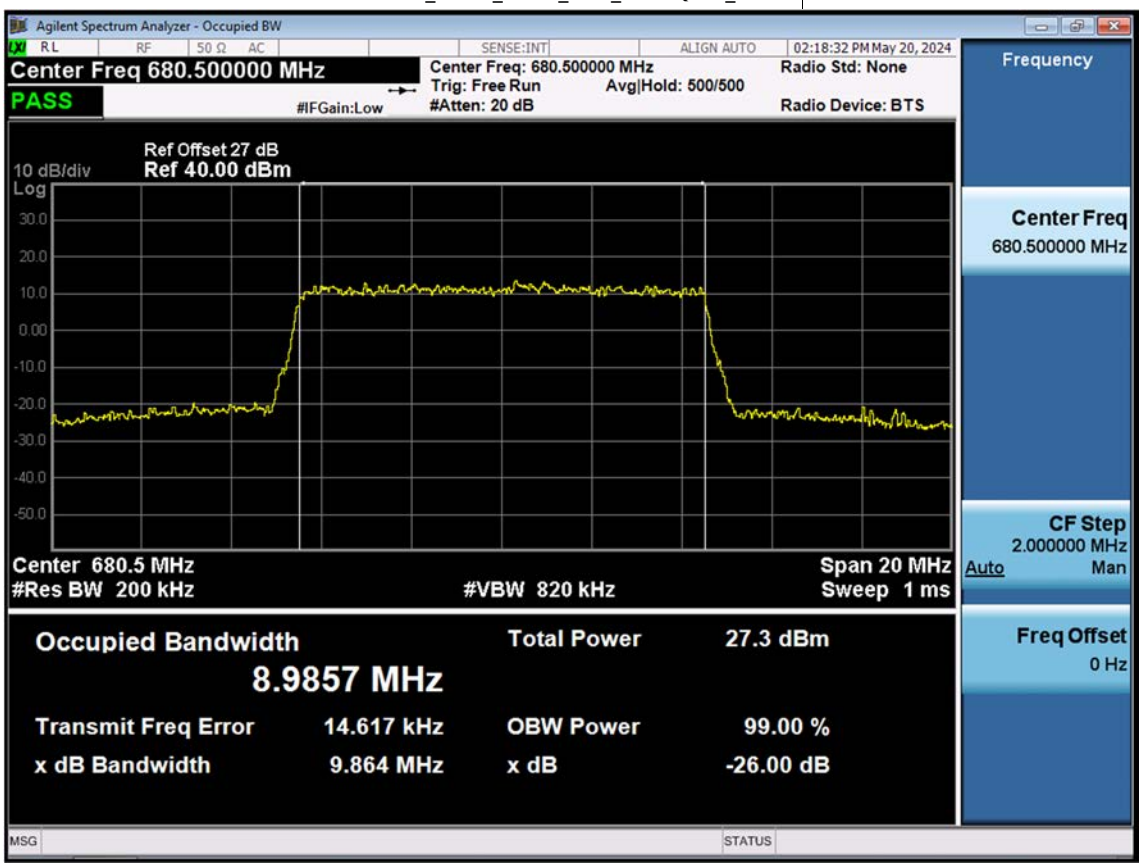
LTE B71_10 M_OBW_Mid_16 QAM_FullRB



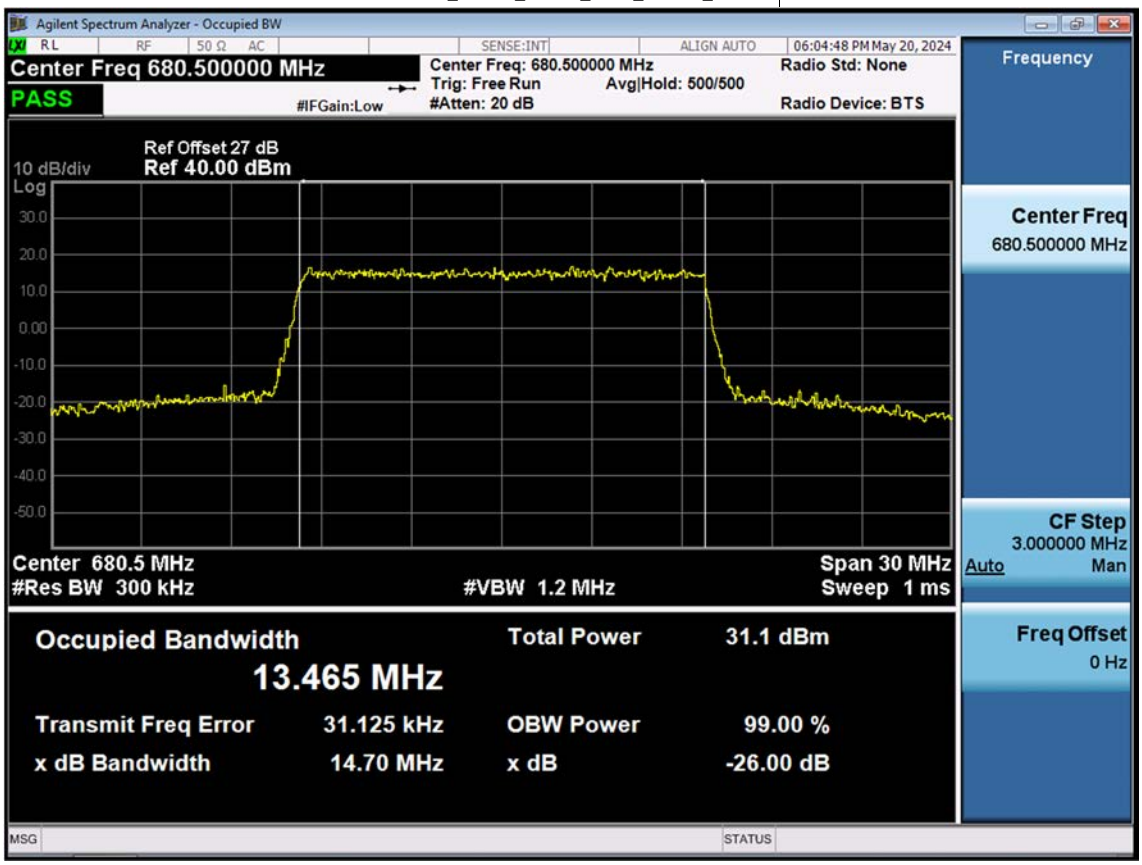
LTE B71_10 M_OBW_Mid_64 QAM_FullRB



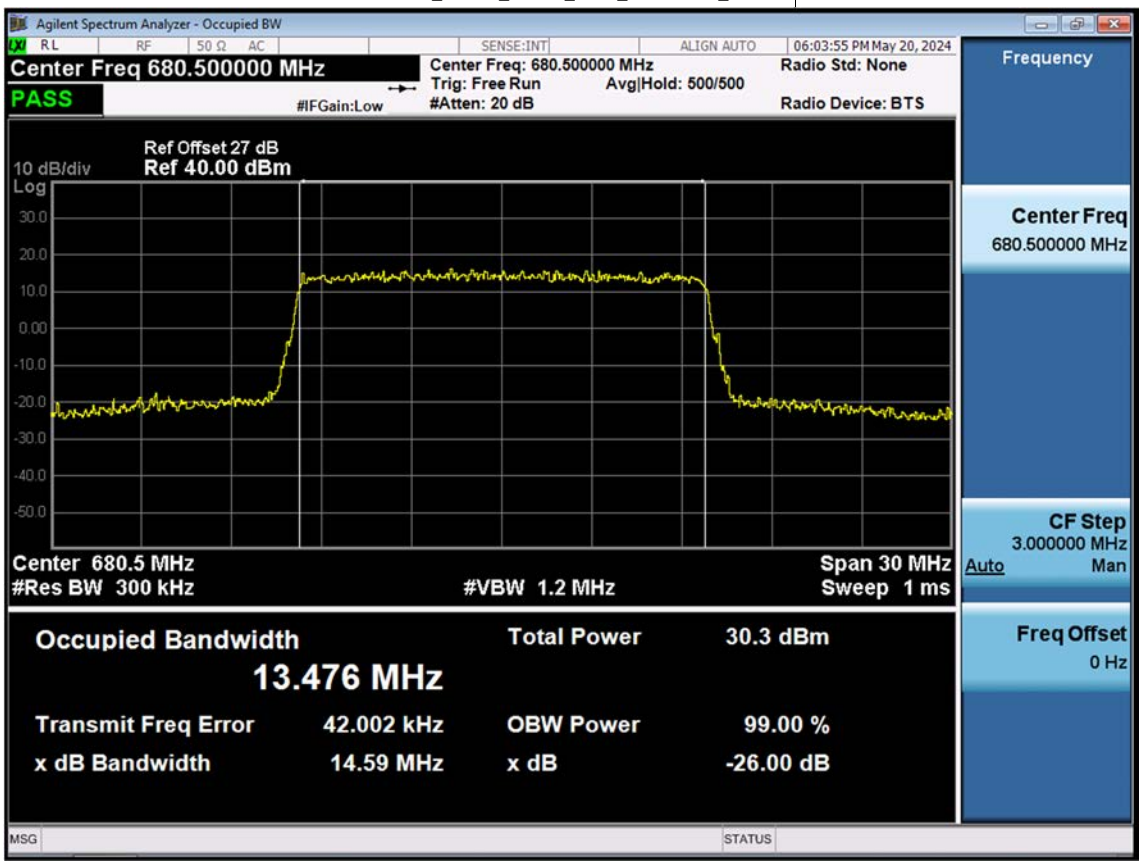
LTE B71_10 M_OBW_Mid_256 QAM_FullRB



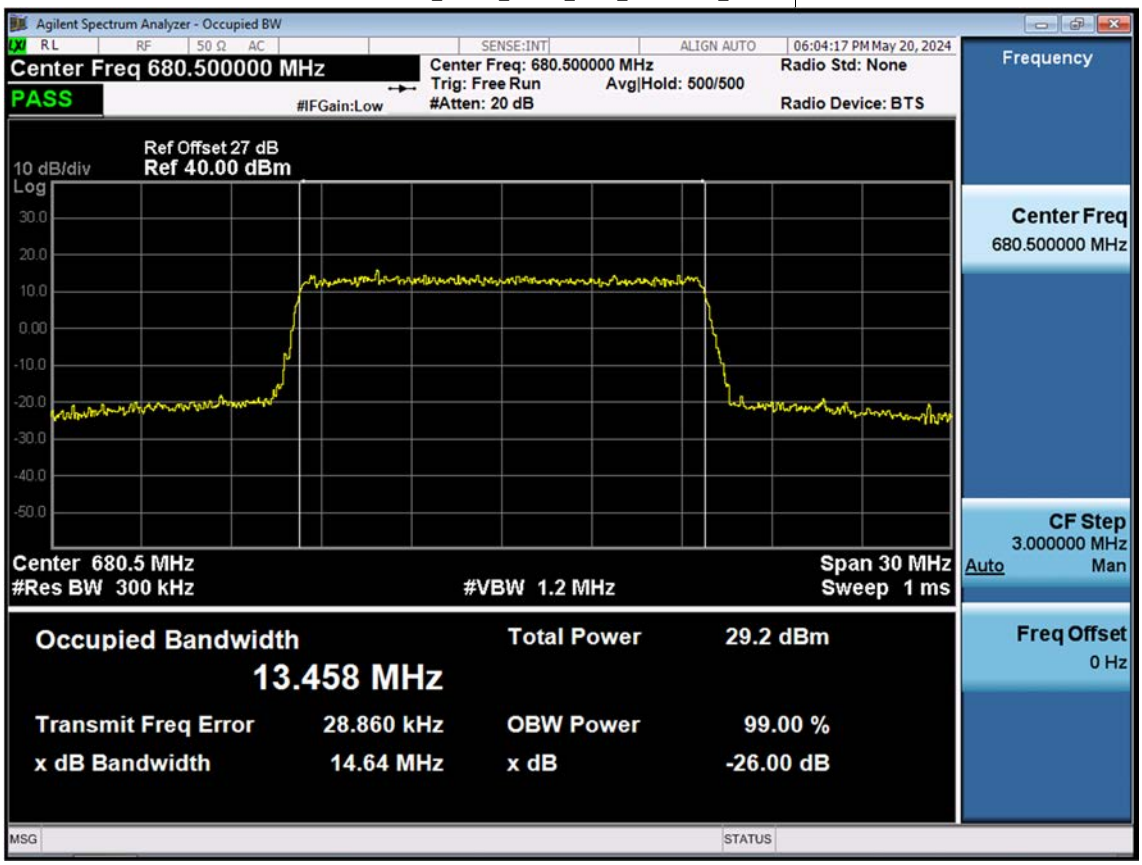
LTE B71_15 M_OBW_Mid_QPSK_FullRB



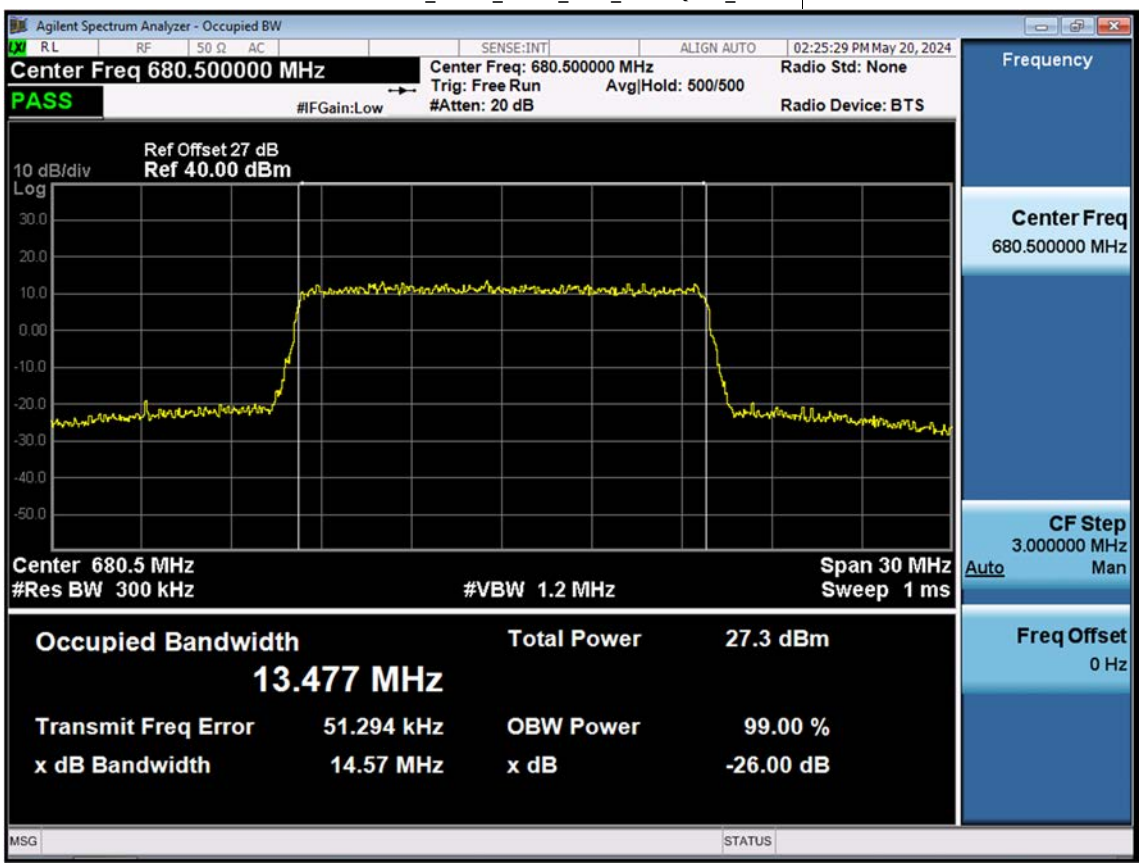
LTE B71_15 M_OBW_Mid_16 QAM_FullRB



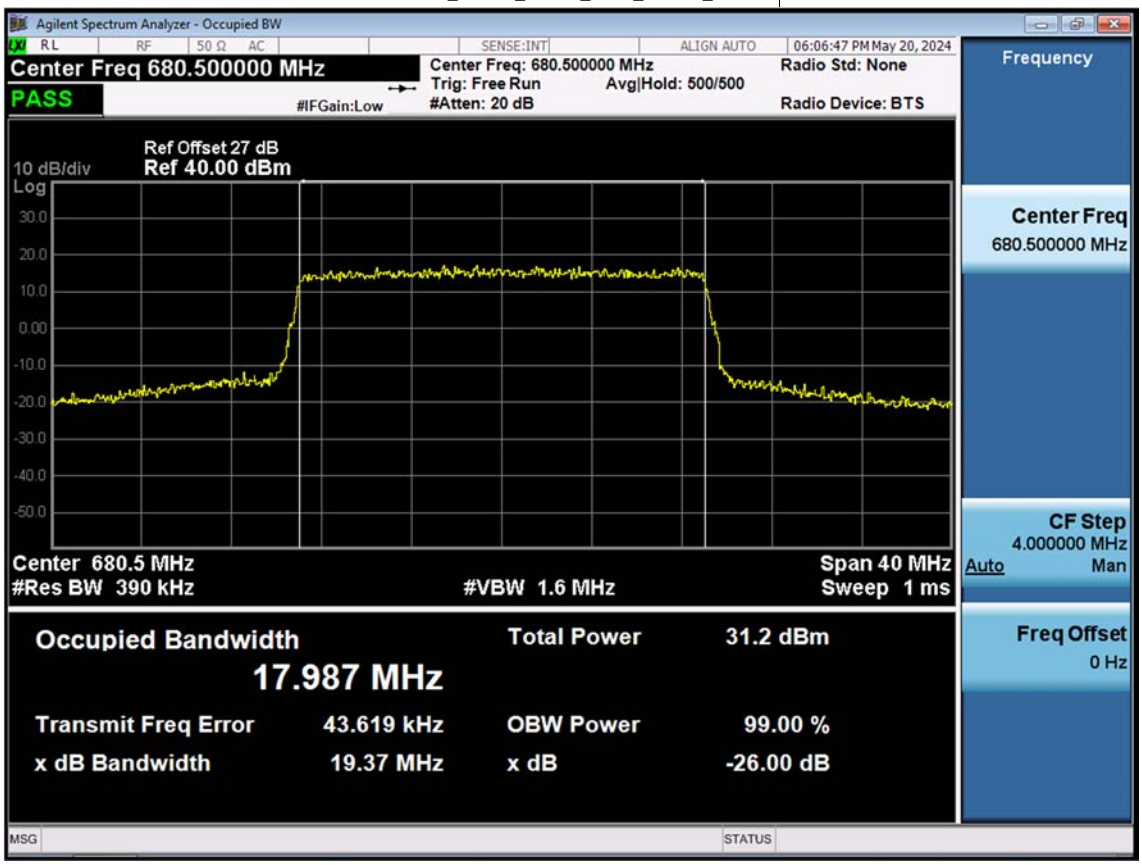
LTE B71_15 M_OBW_Mid_64 QAM_FullRB



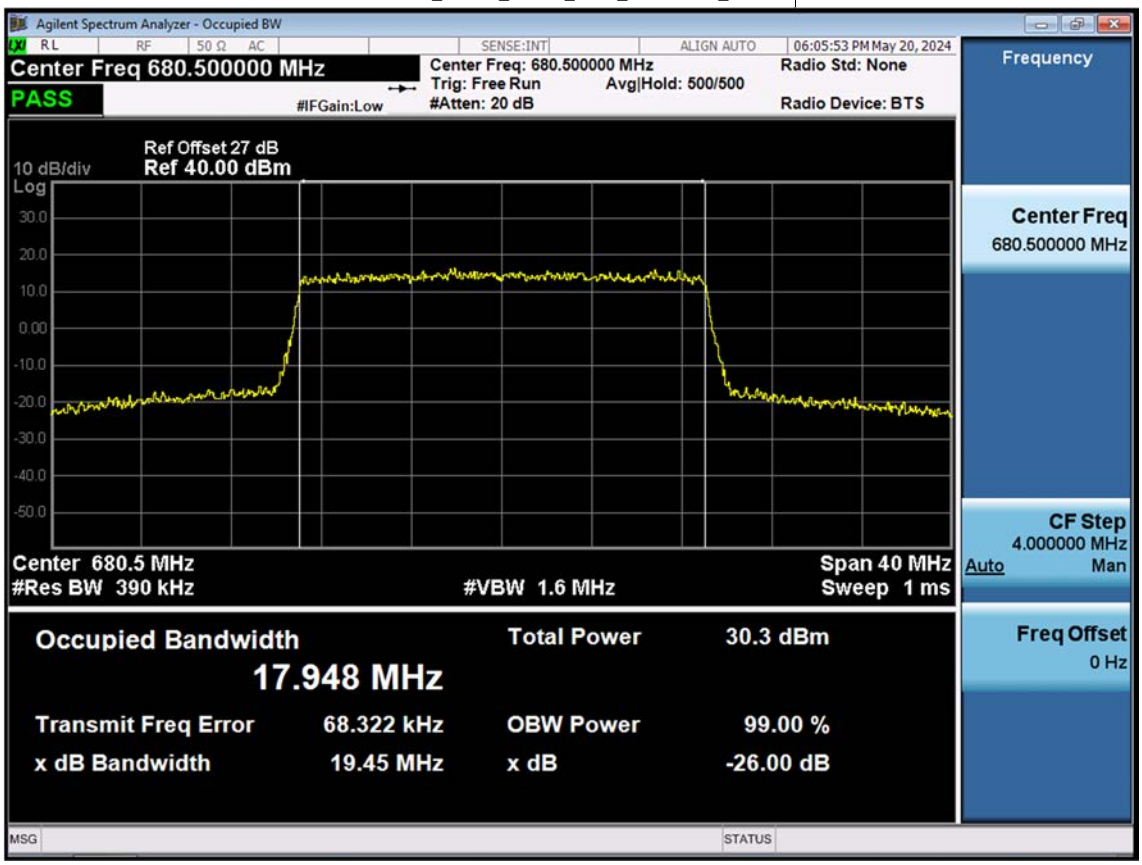
LTE B71_15 M_OBW_Mid_256 QAM_FullRB



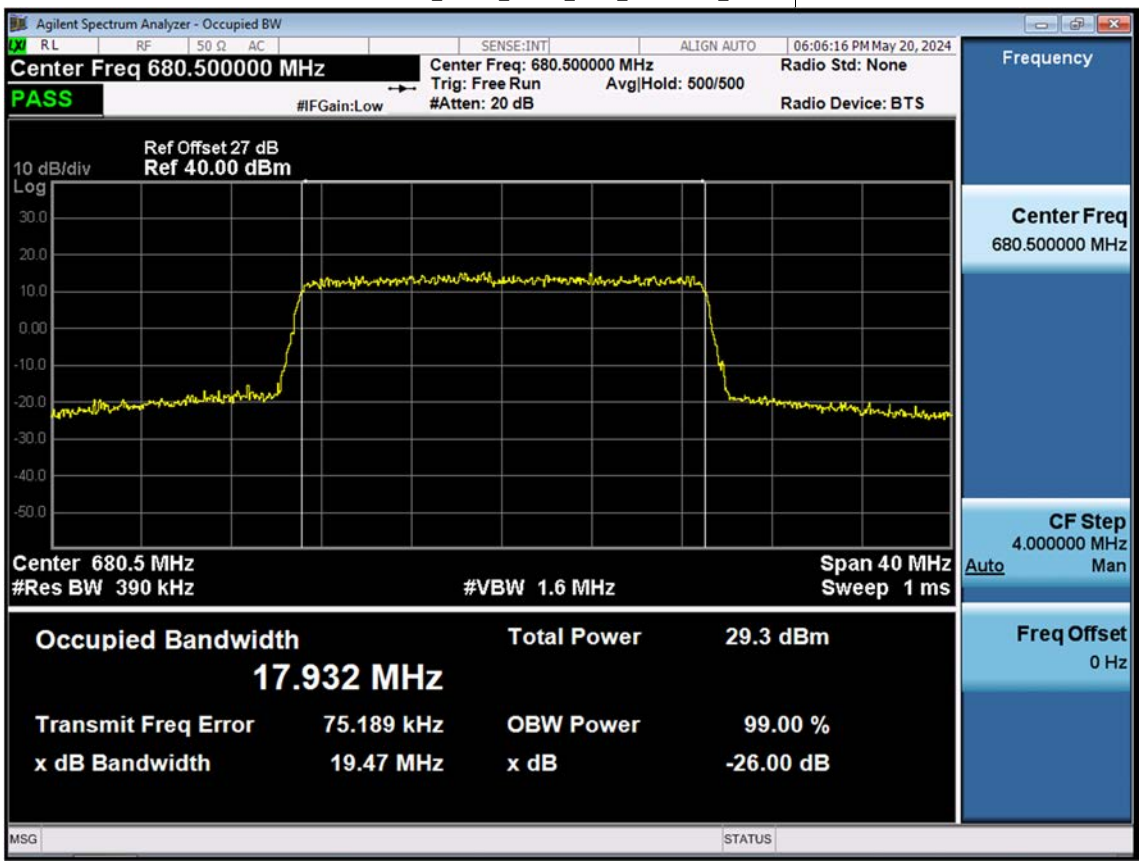
LTE B71_20 M_OBW_Mid_QPSK_FullRB



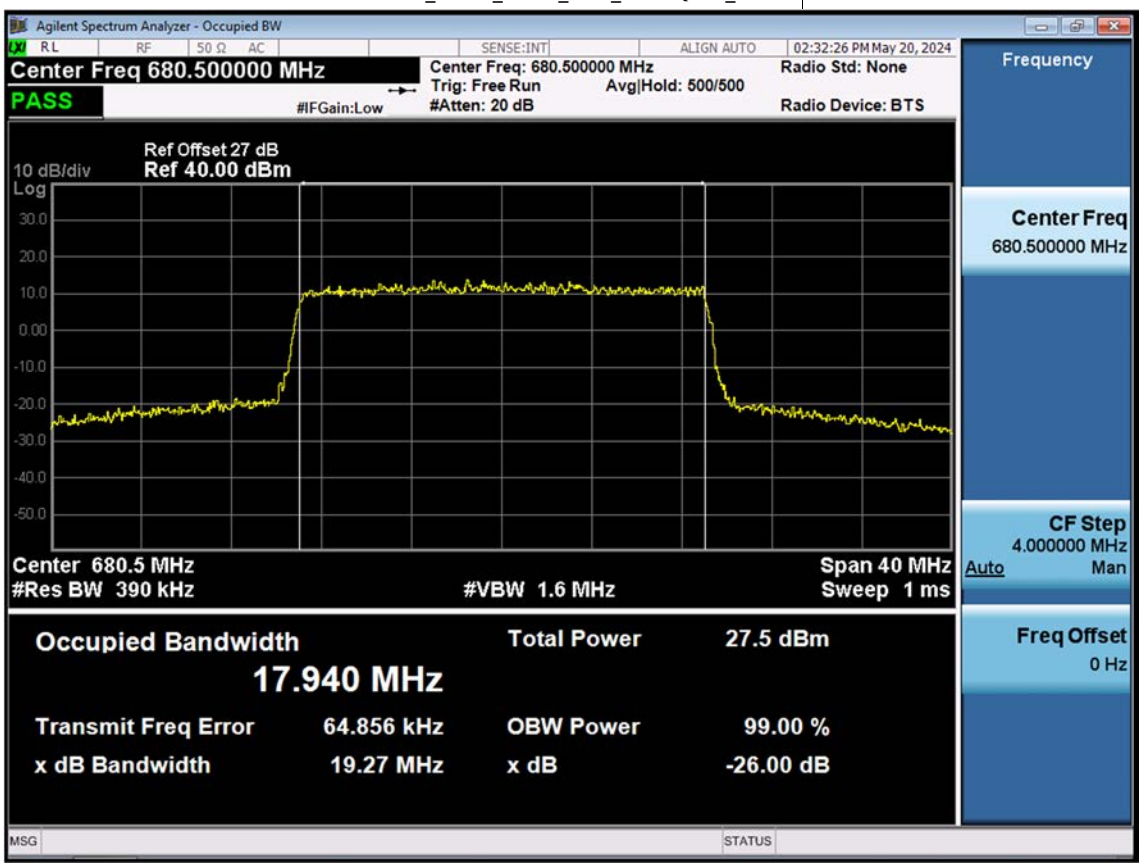
LTE B71_20 M_OBW_Mid_16 QAM_FullRB



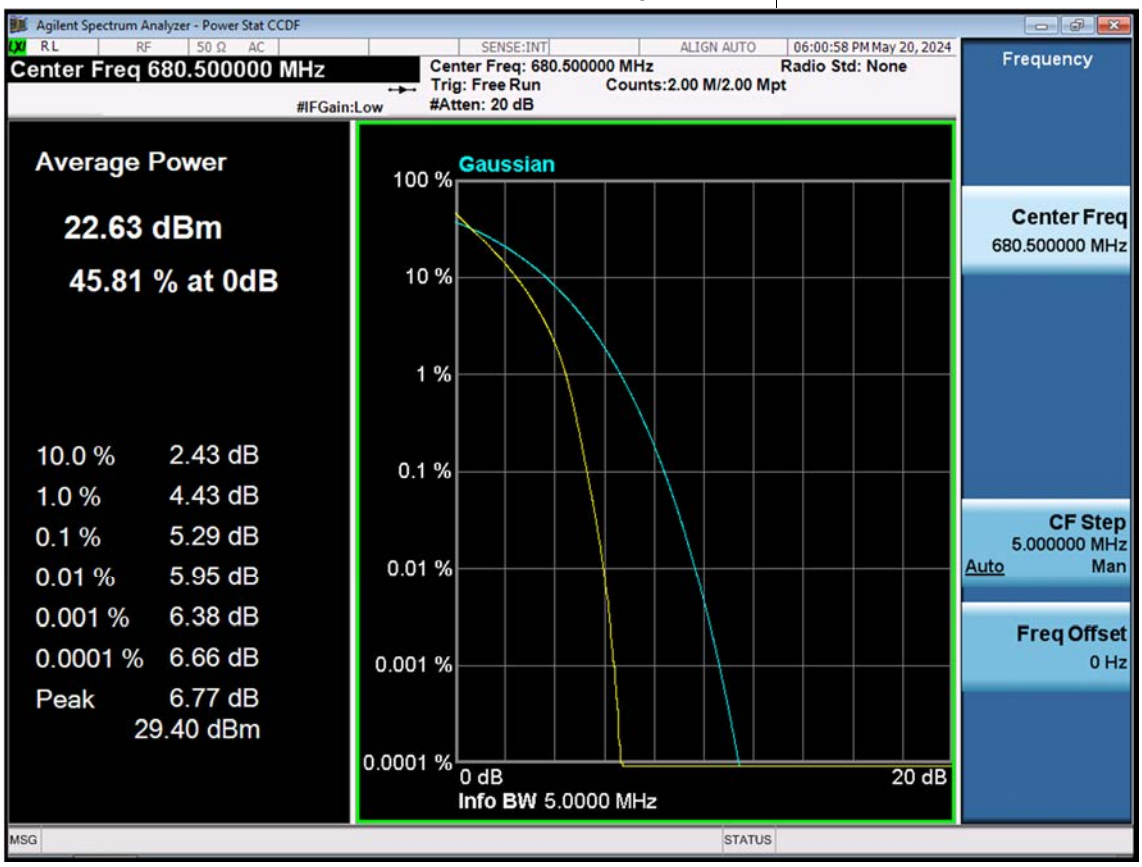
LTE B71_20 M_OBW_Mid_64 QAM_FullRB



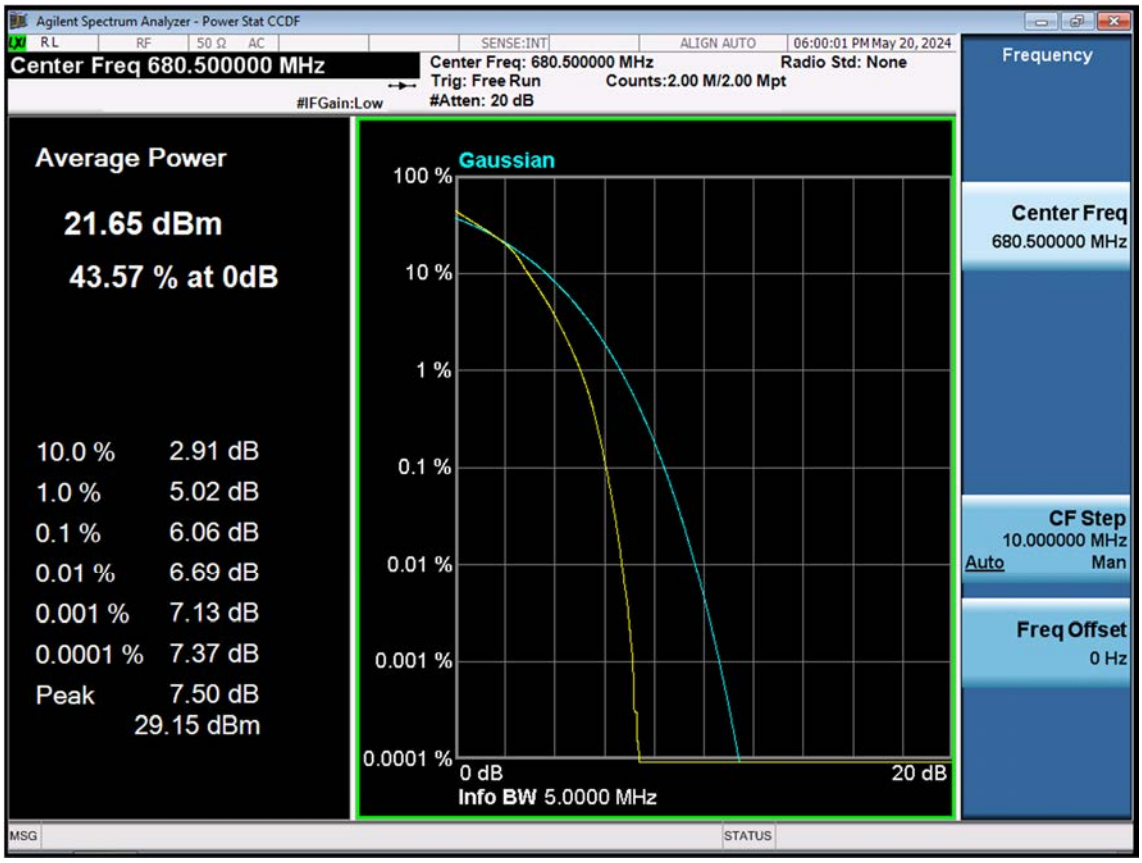
LTE B71_20 M_OBW_Mid_256 QAM_FullRB



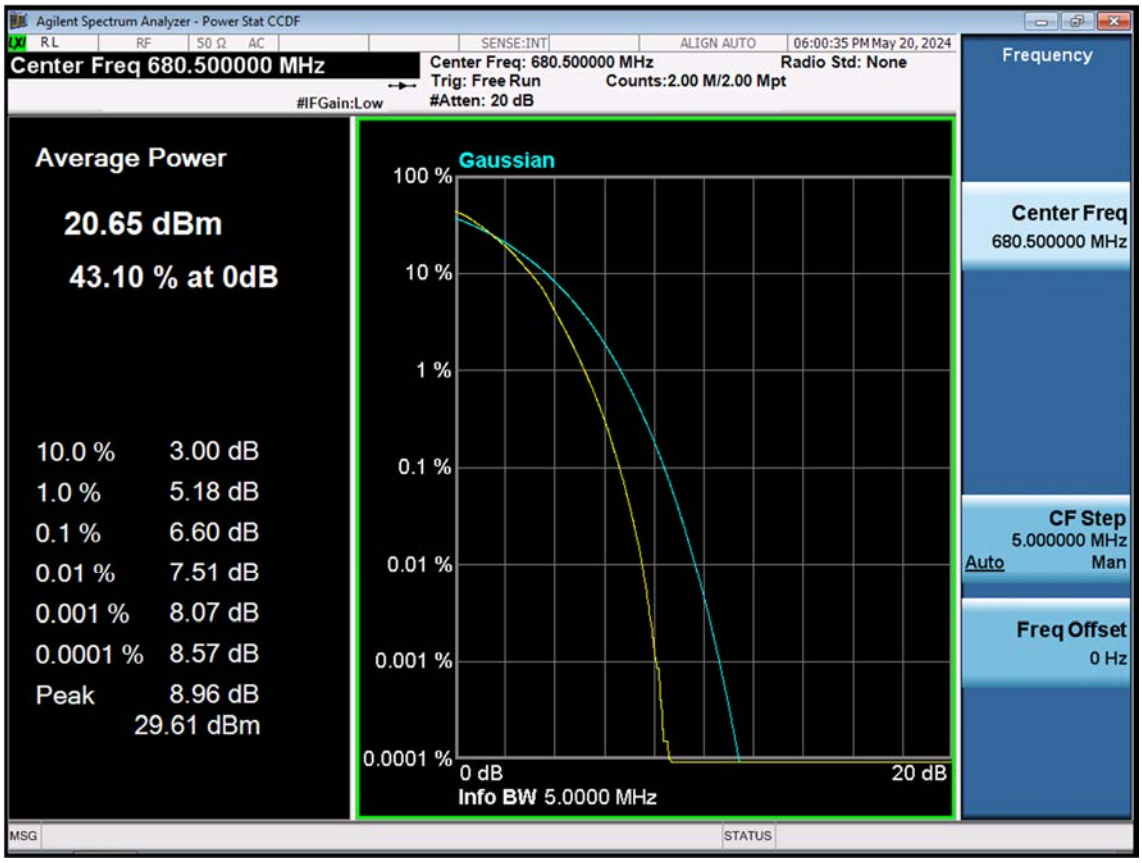
5 M_PAR_Mid Channel_QPSK_FullRB



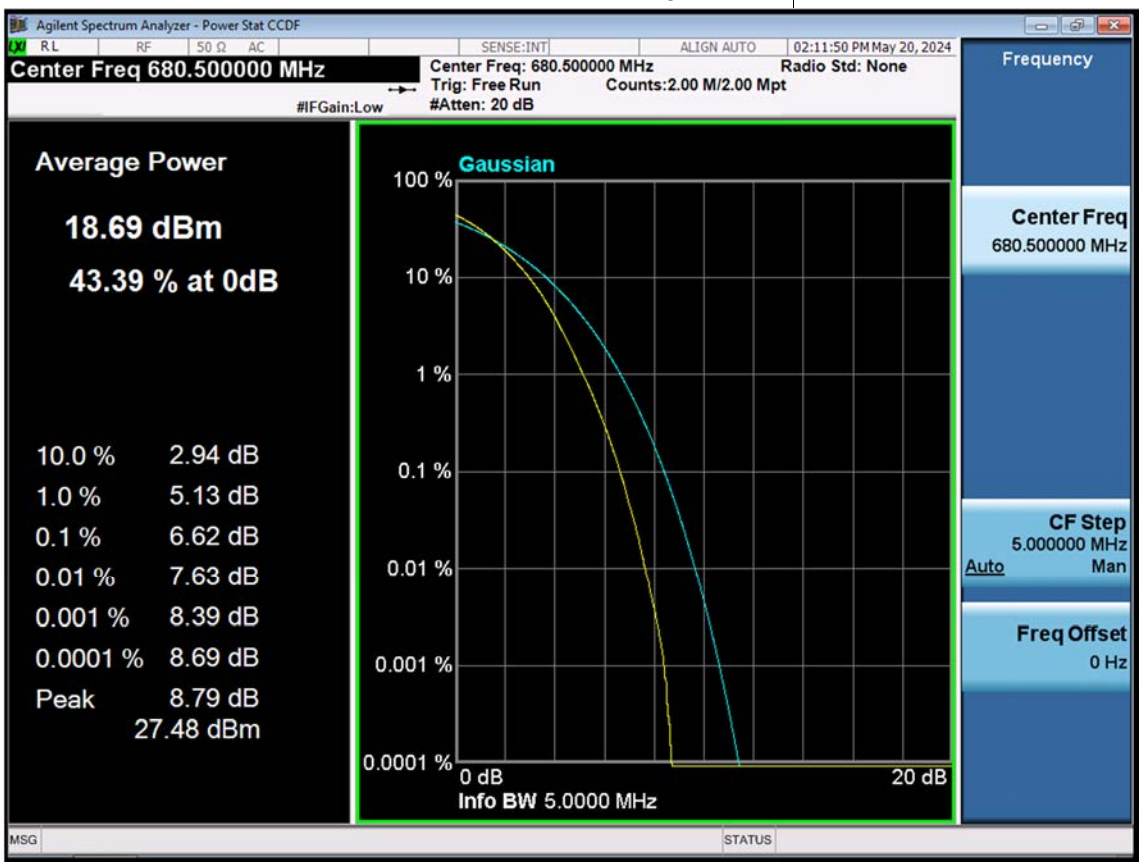
5 M_PAR_Mid Channel_16 QAM_FullRB



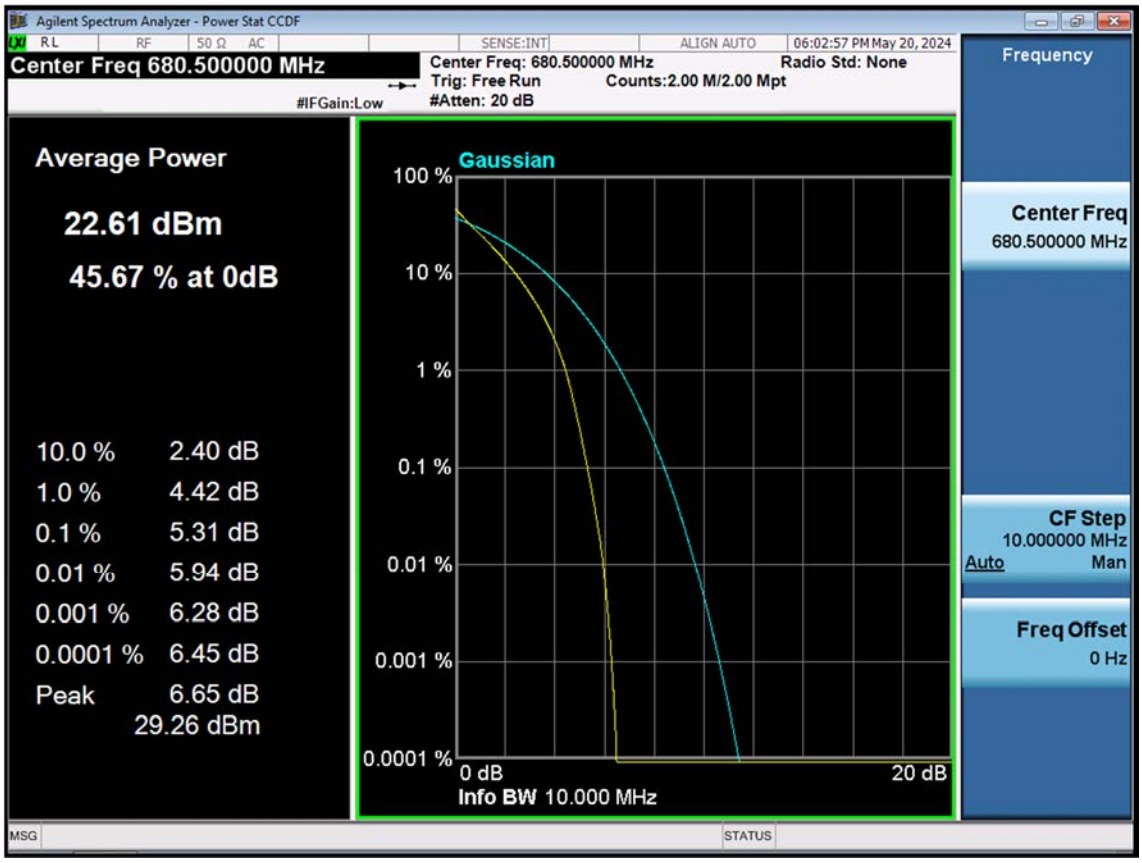
5 M_PAR_Mid Channel_64 QAM_FullRB



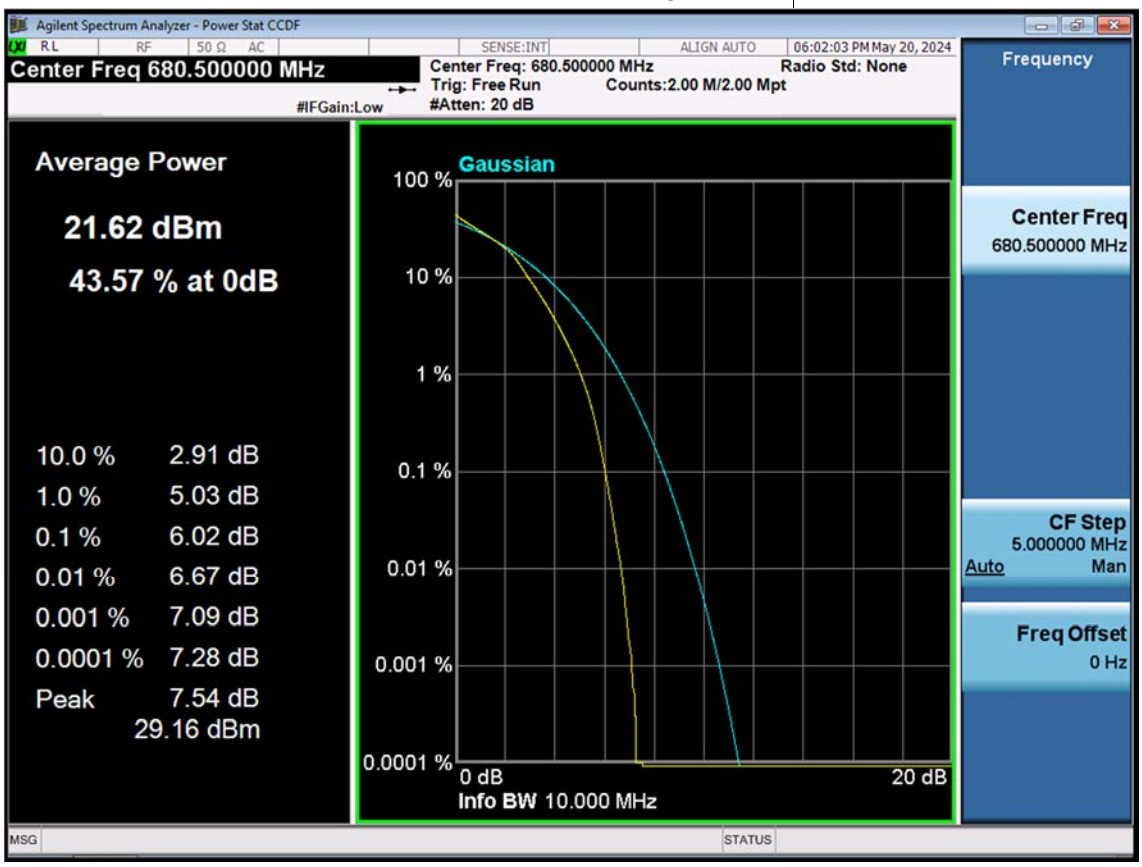
5 M_PAR_Mid Channel_256 QAM_FullRB



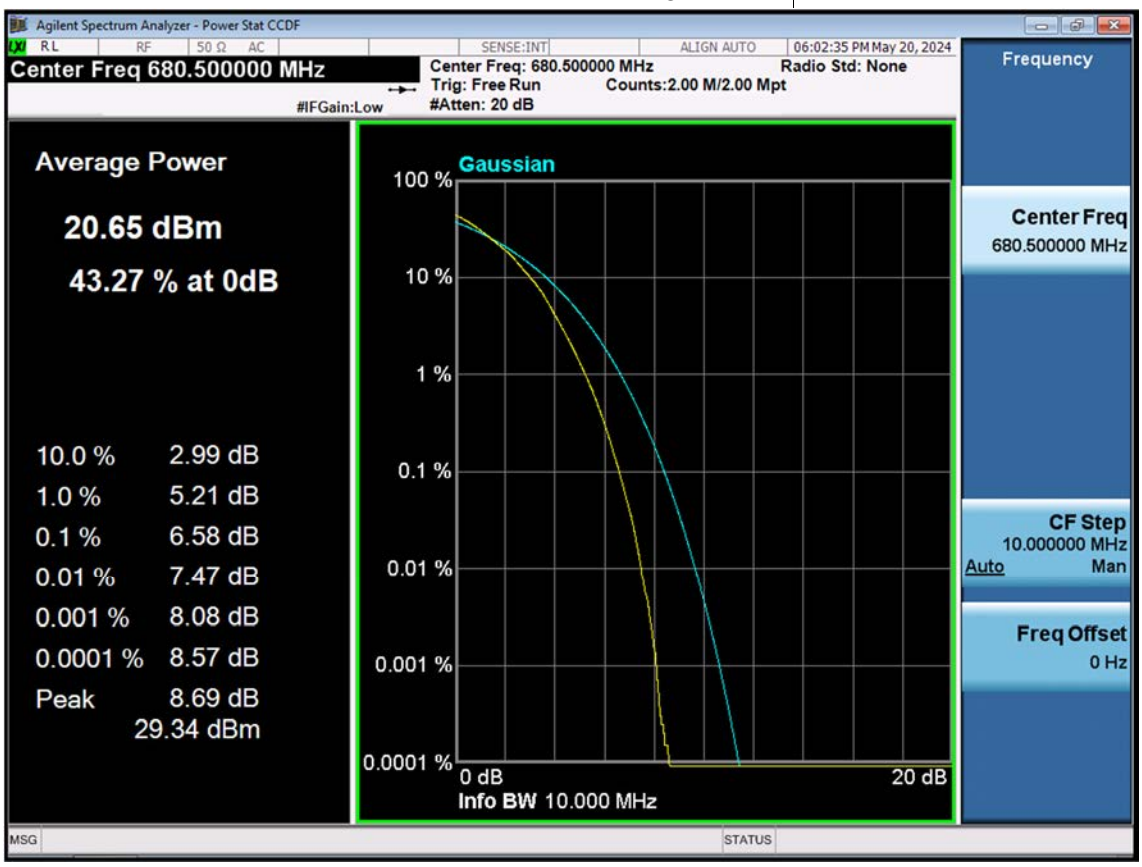
10 M_PAR_Mid Channel_ QPSK _FullRB



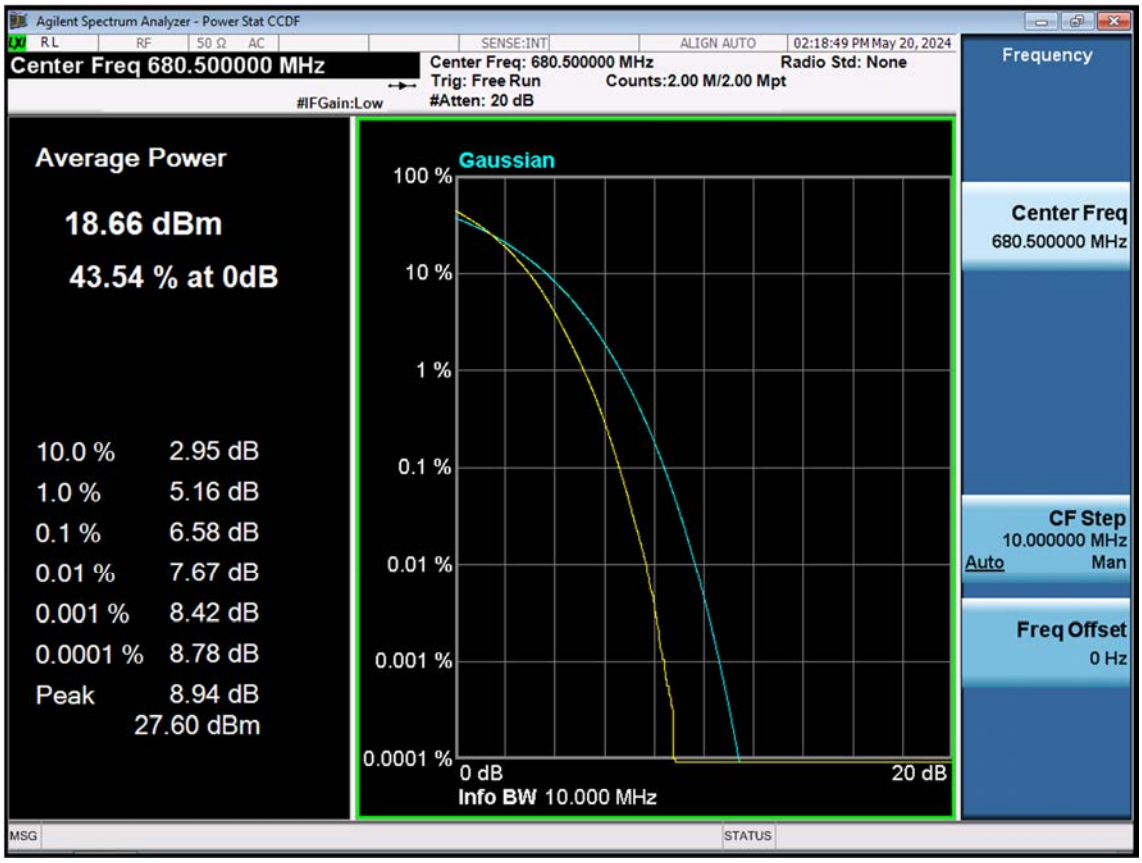
10 M_PAR_Mid Channel_16 QAM_FullRB



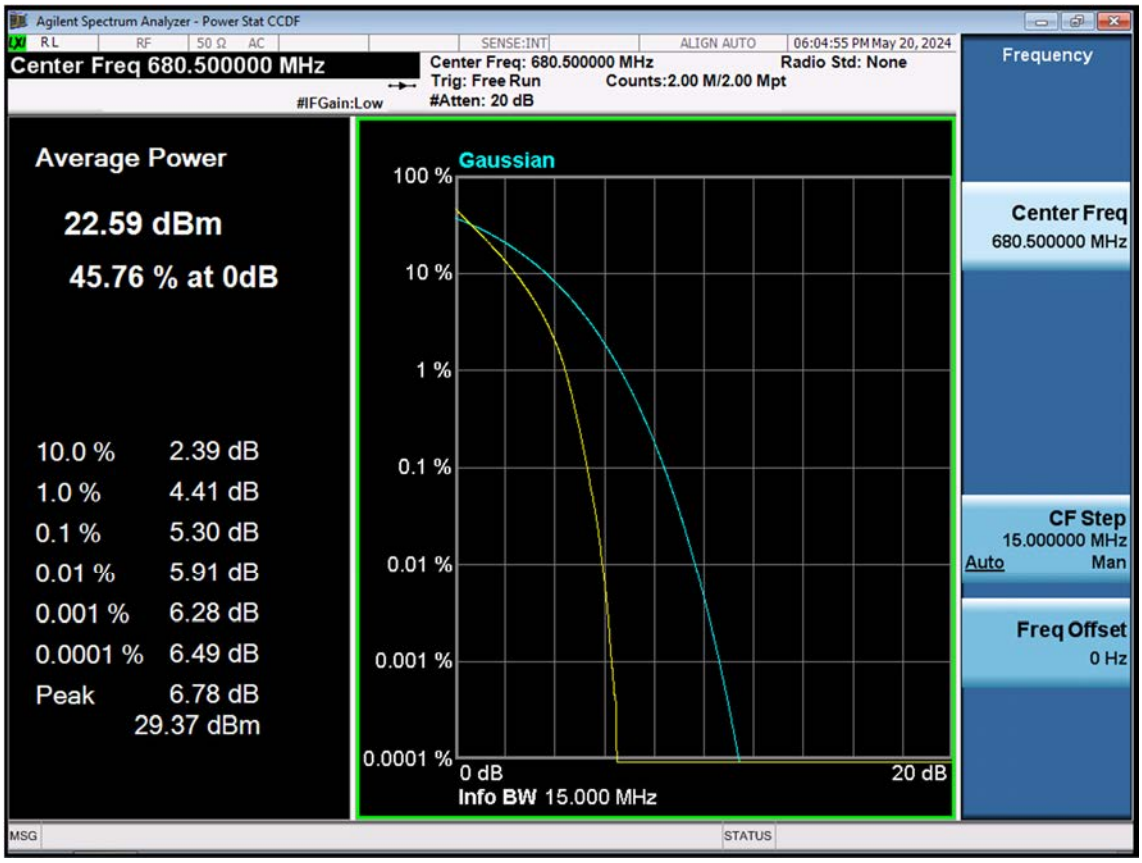
10 M_PAR_Mid Channel_64 QAM_FullRB



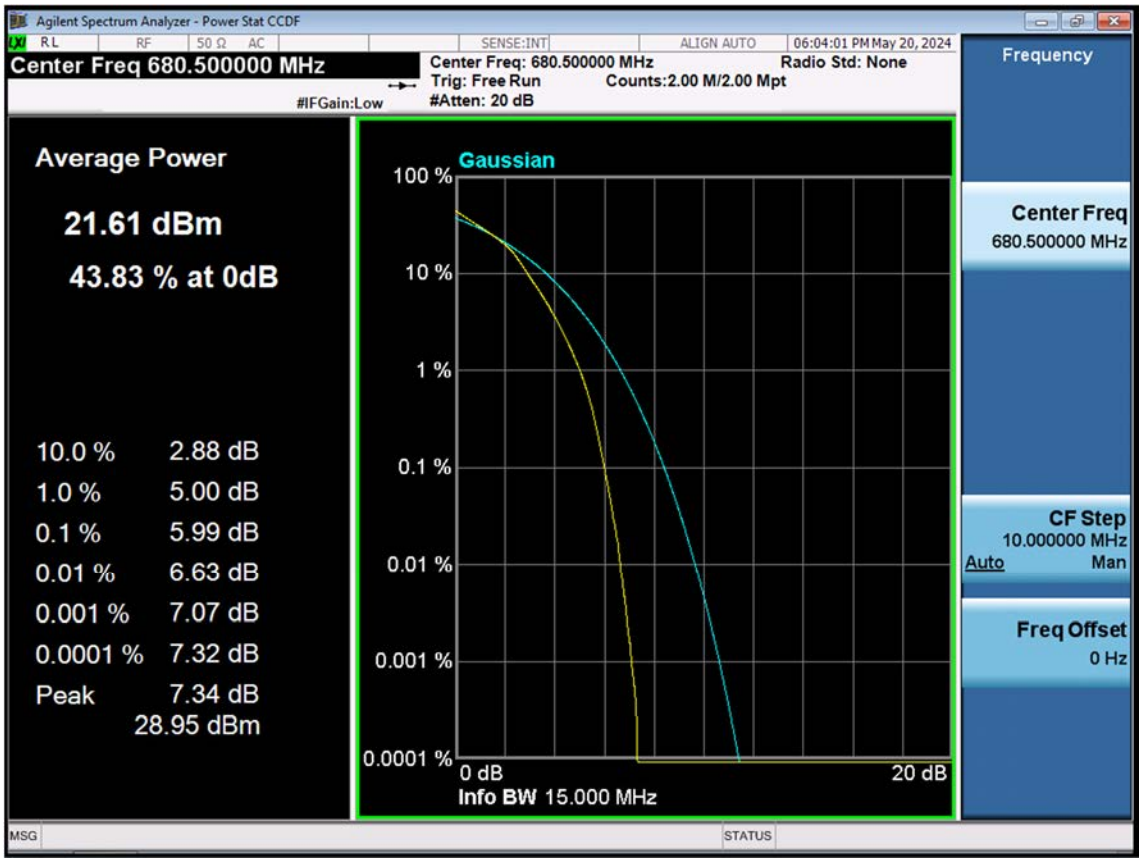
10 M_PAR_Mid Channel_256 QAM_FullRB



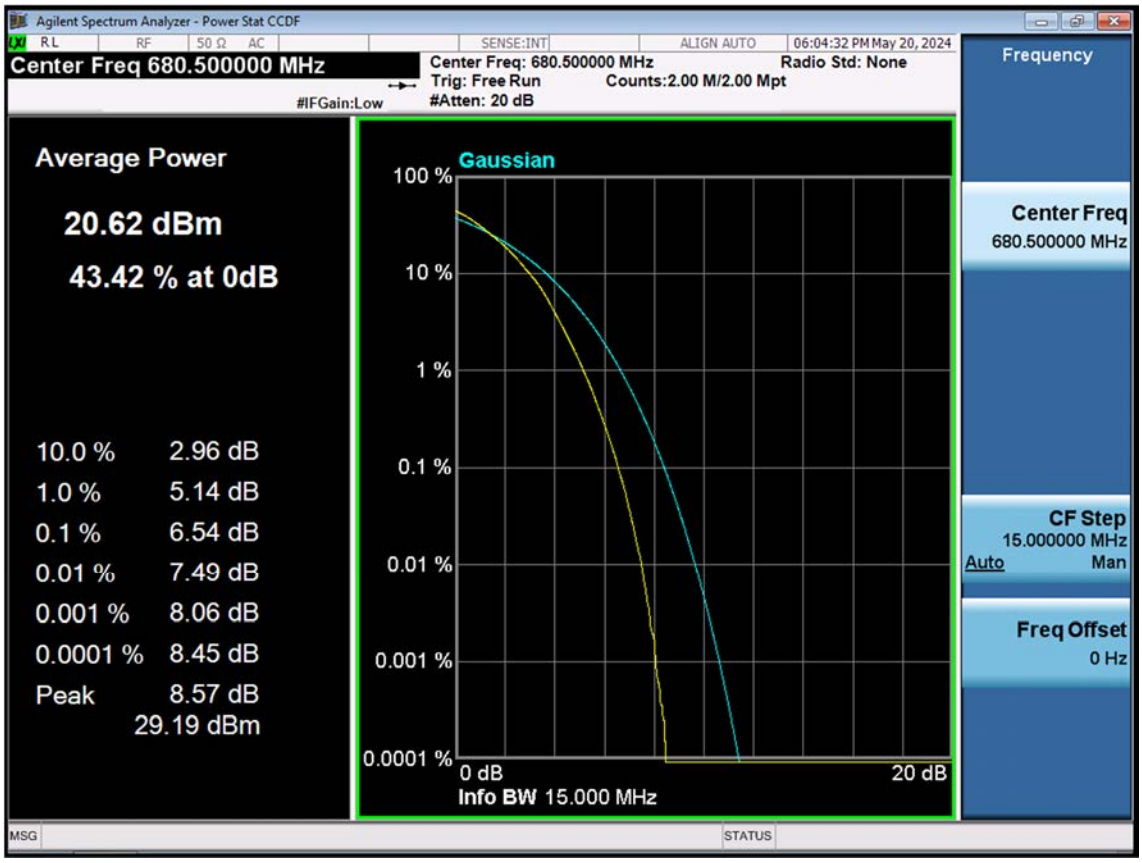
15 M_PAR_Mid Channel_QPSK_FullRB



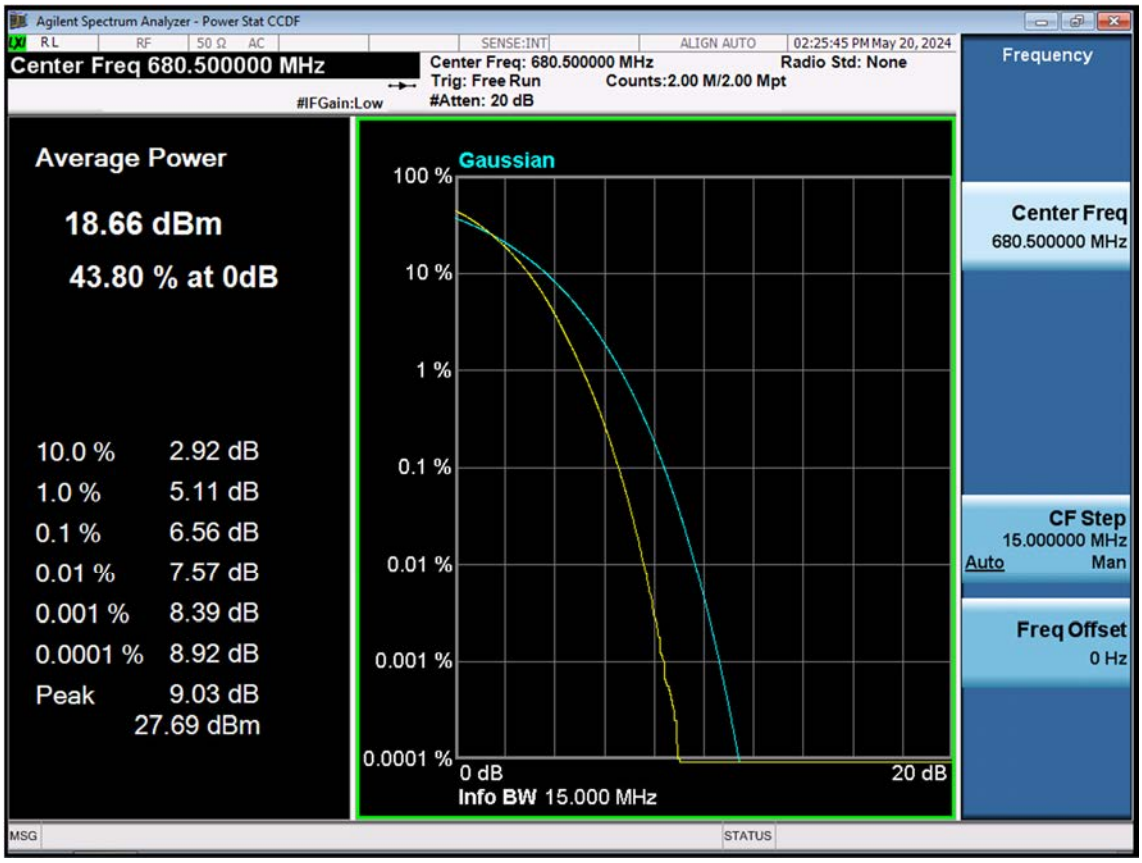
15 M_PAR_Mid Channel_16 QAM_FullRB



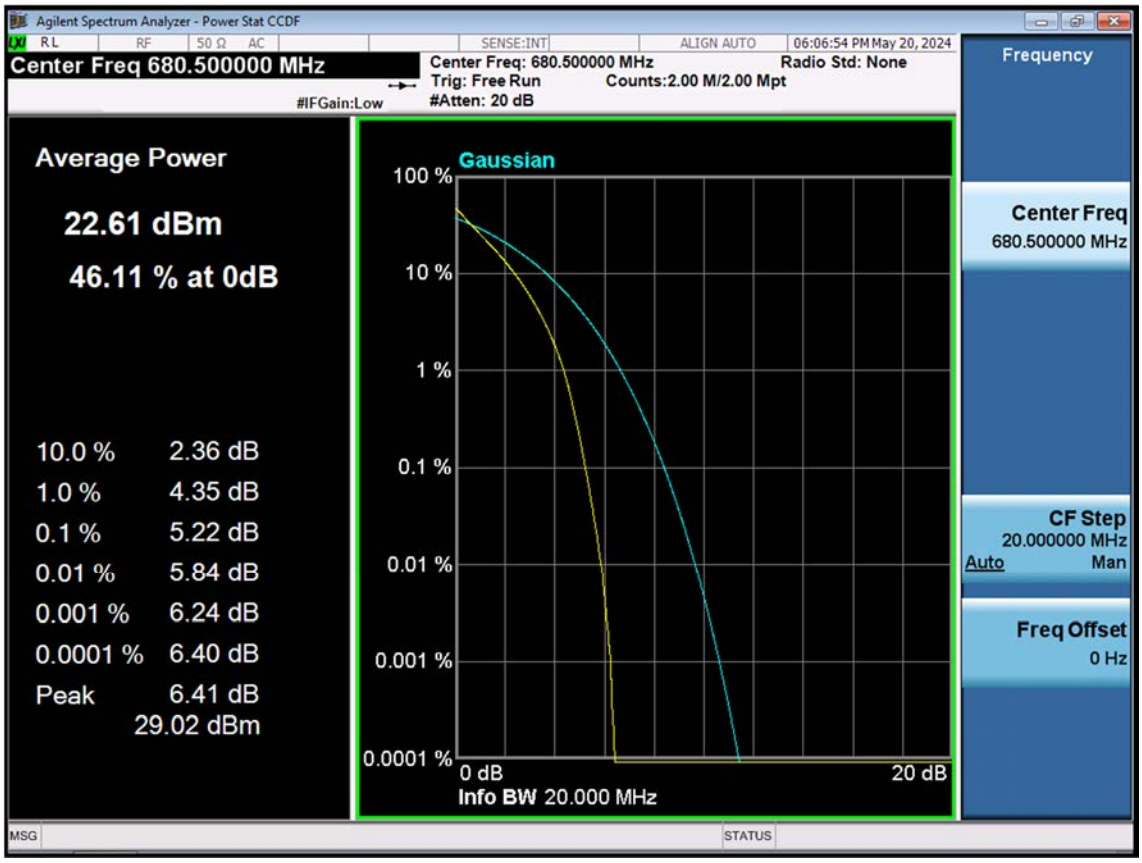
15 M_PAR_Mid Channel_64 QAM_FullRB



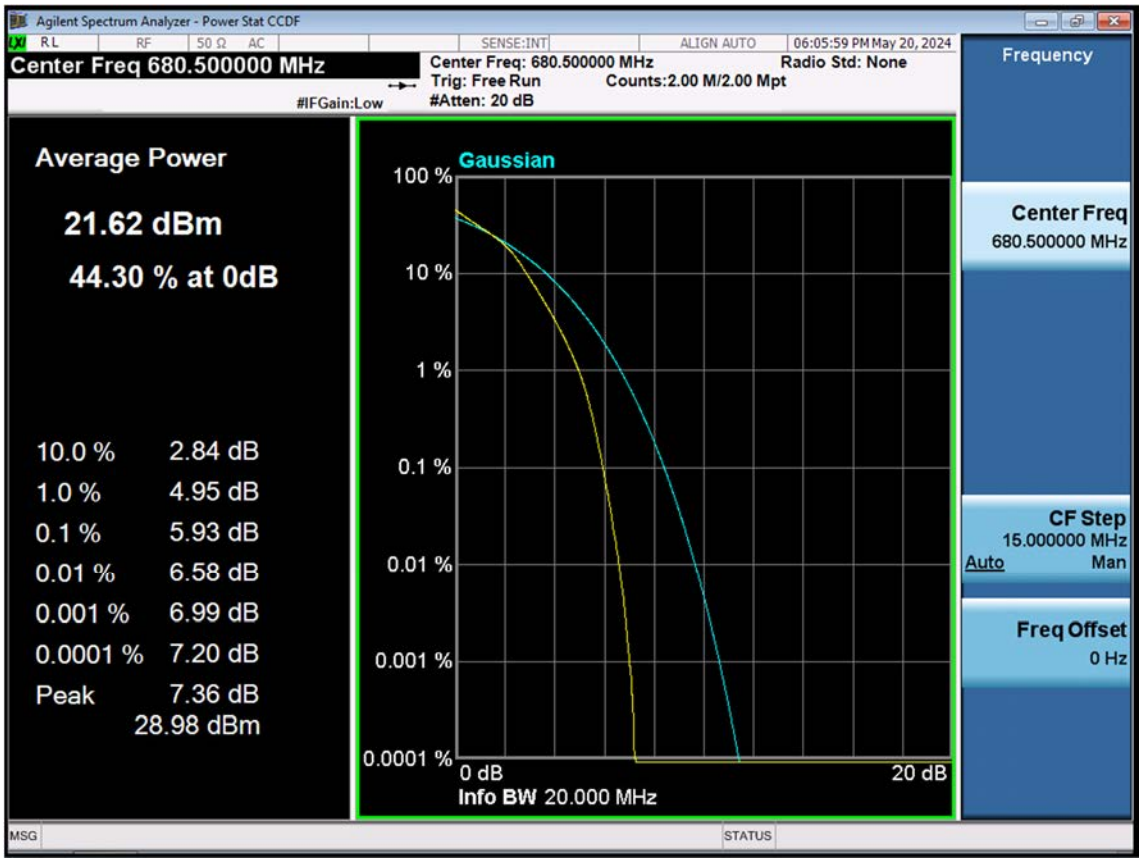
15 M_PAR_Mid Channel_256 QAM_FullRB



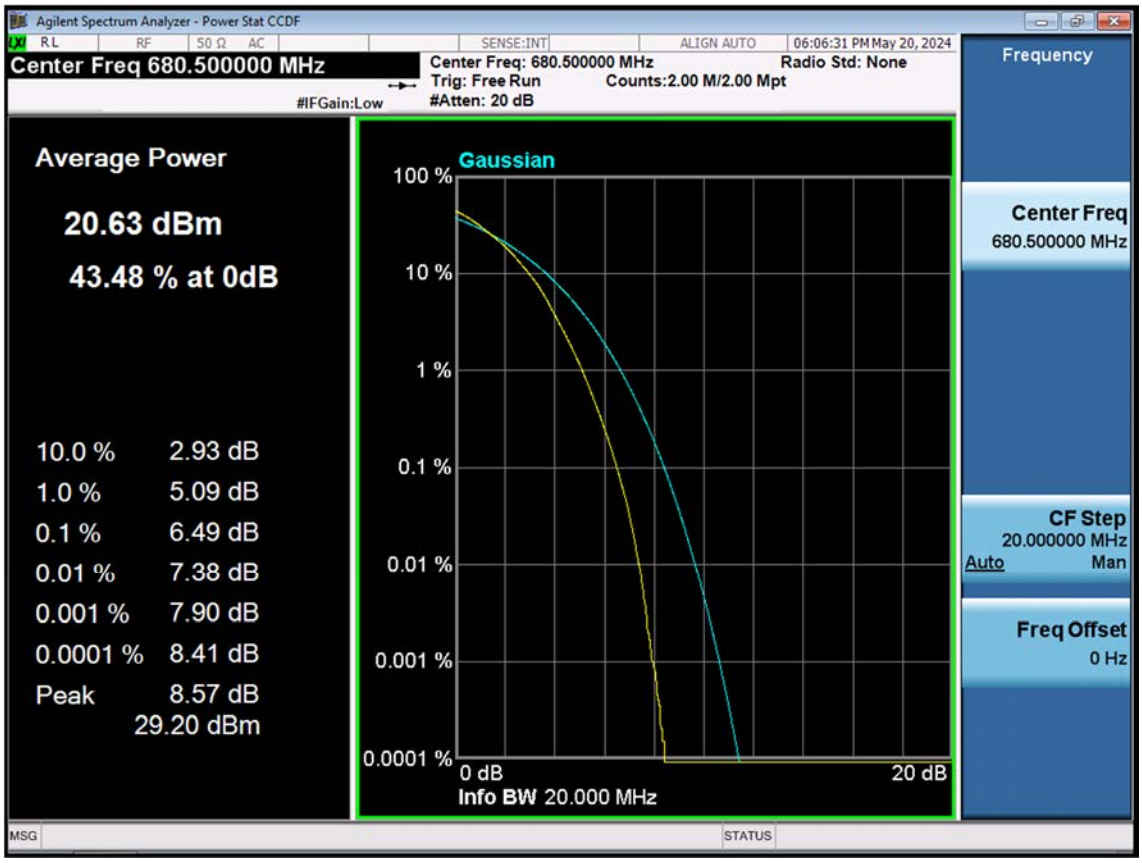
20 M_PAR_Mid Channel_ QPSK _FullRB



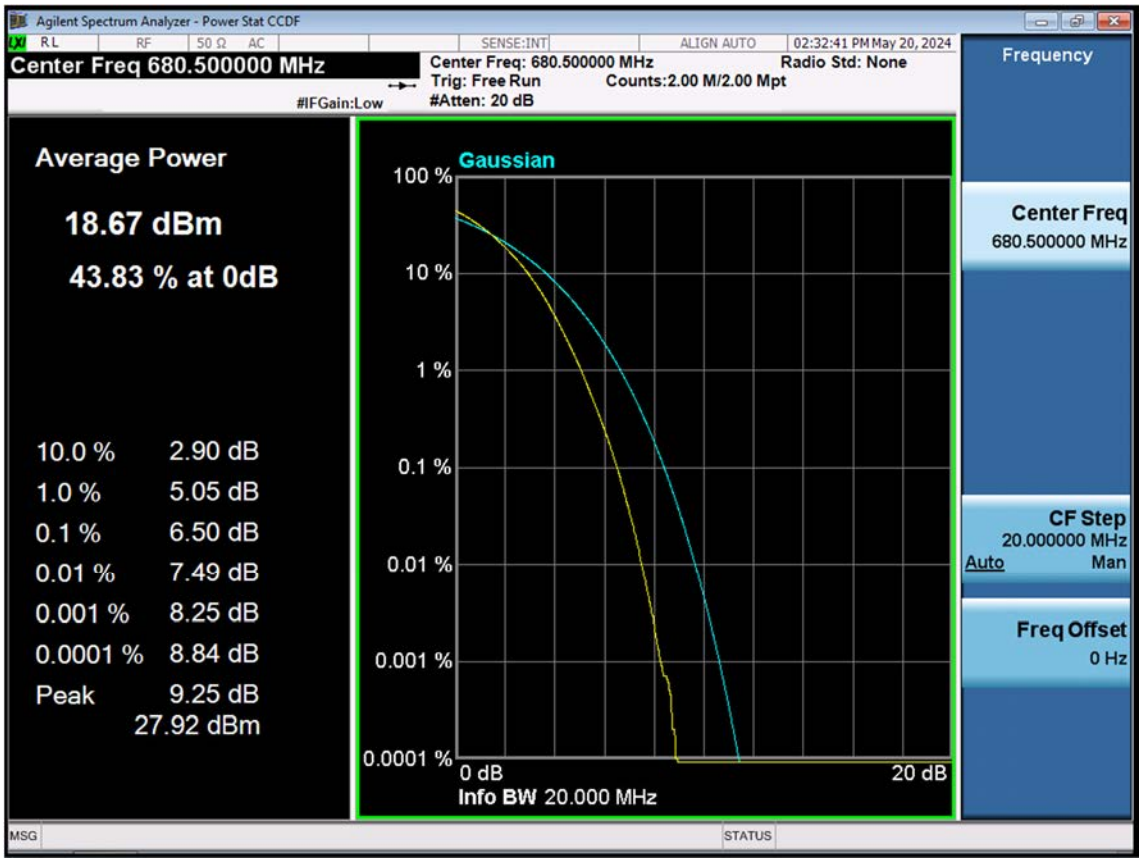
20 M_PAR_Mid Channel_16 QAM_FullRB



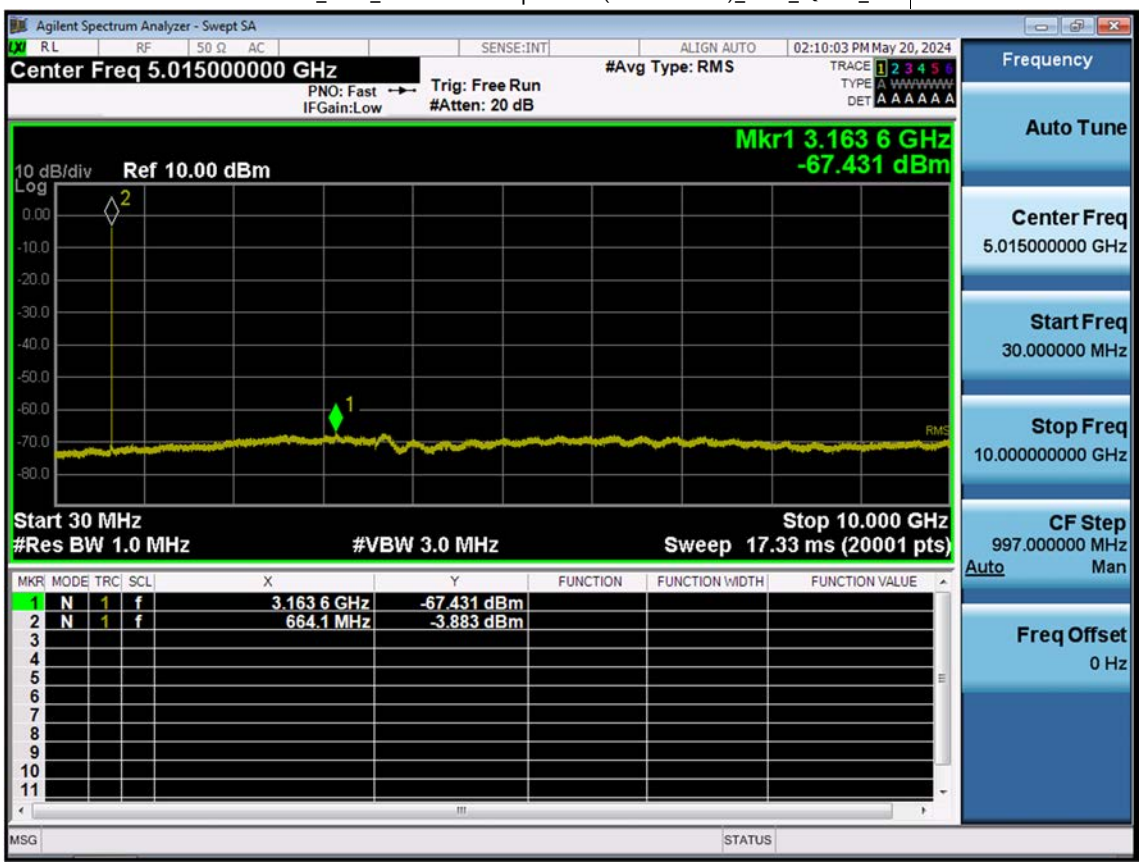
20 M_PAR_Mid Channel_64 QAM_FullRB



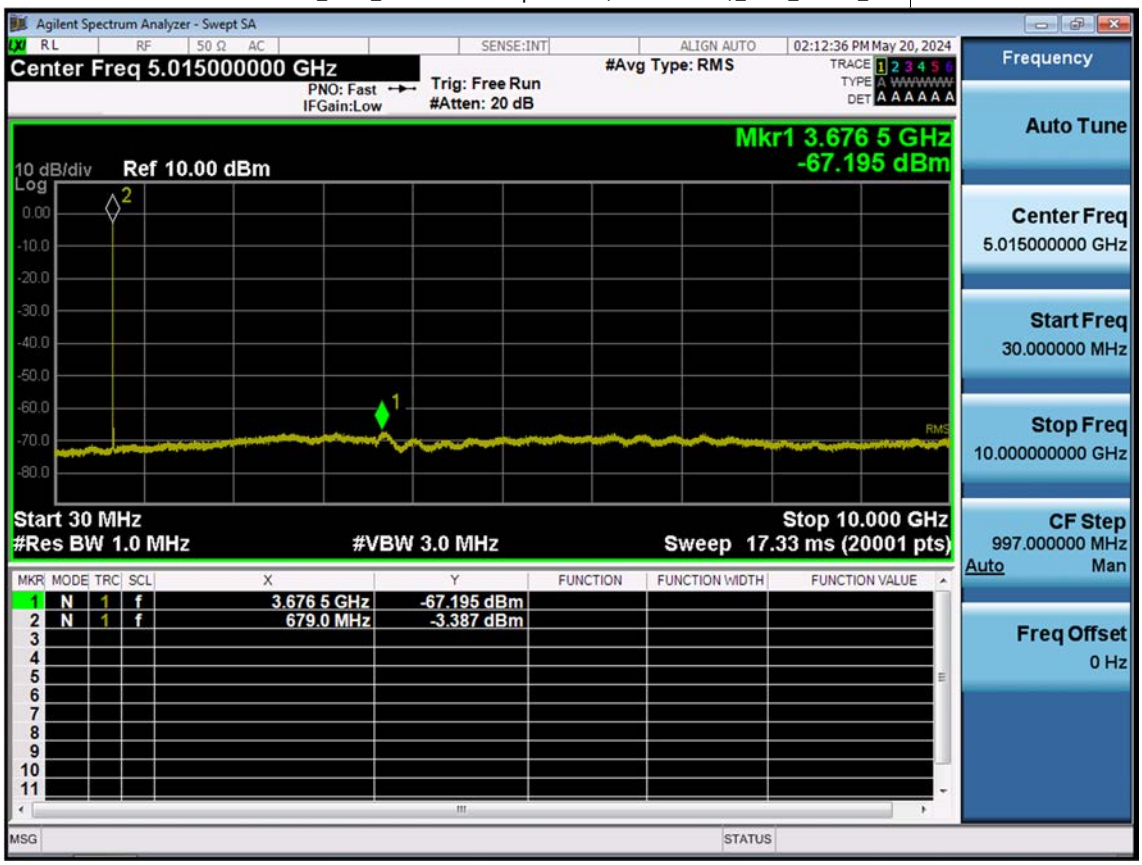
20 M_PAR_Mid Channel_256 QAM_FullRB



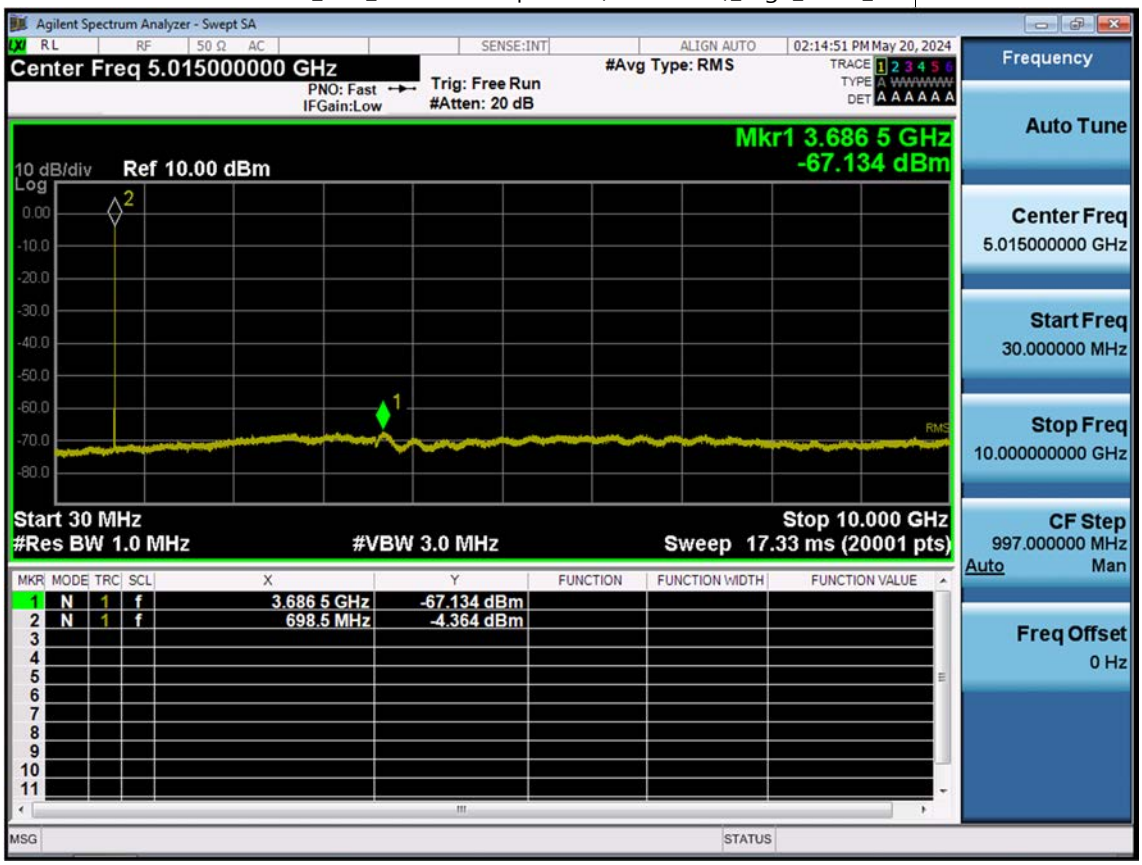
LTE B71_5 M_Conducted Spurious(30 M-10 G)_Low_QPSK_1RB



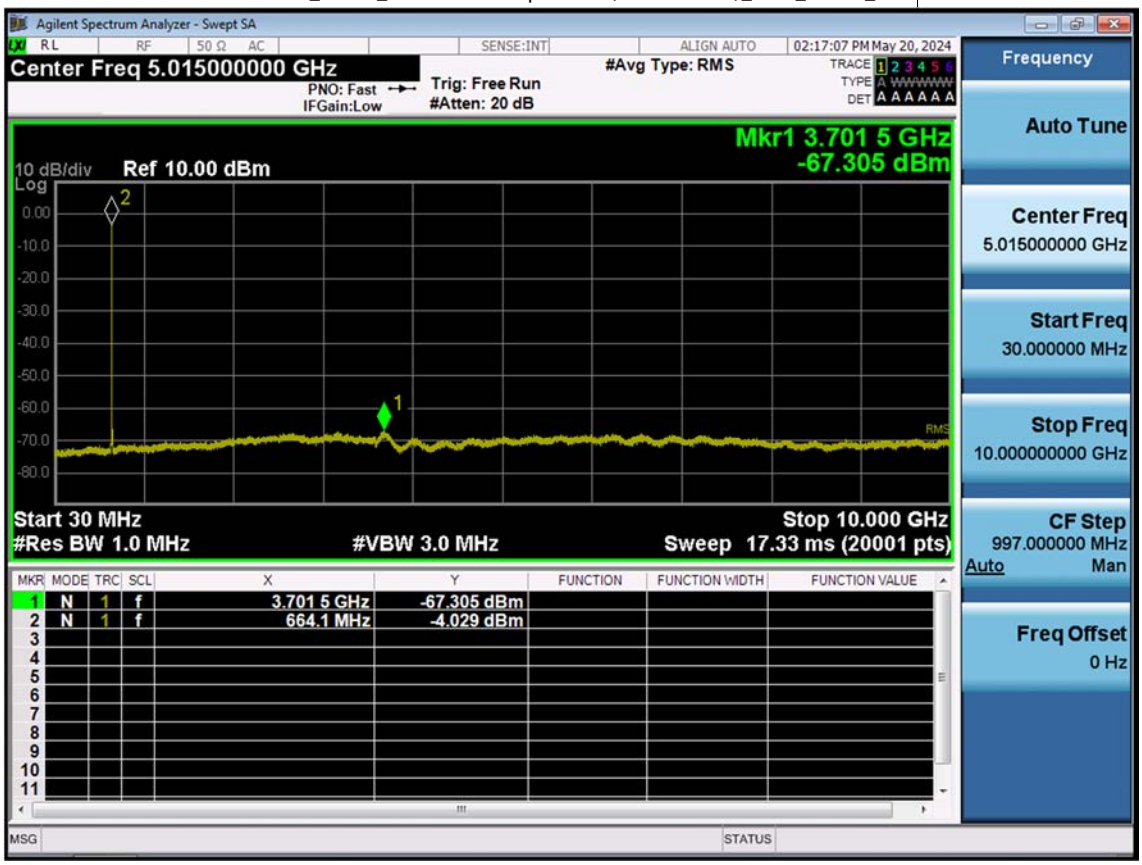
LTE B71_5 M_Conducted Spurious(30 M-10 G)_Mid_QPSK_1RB



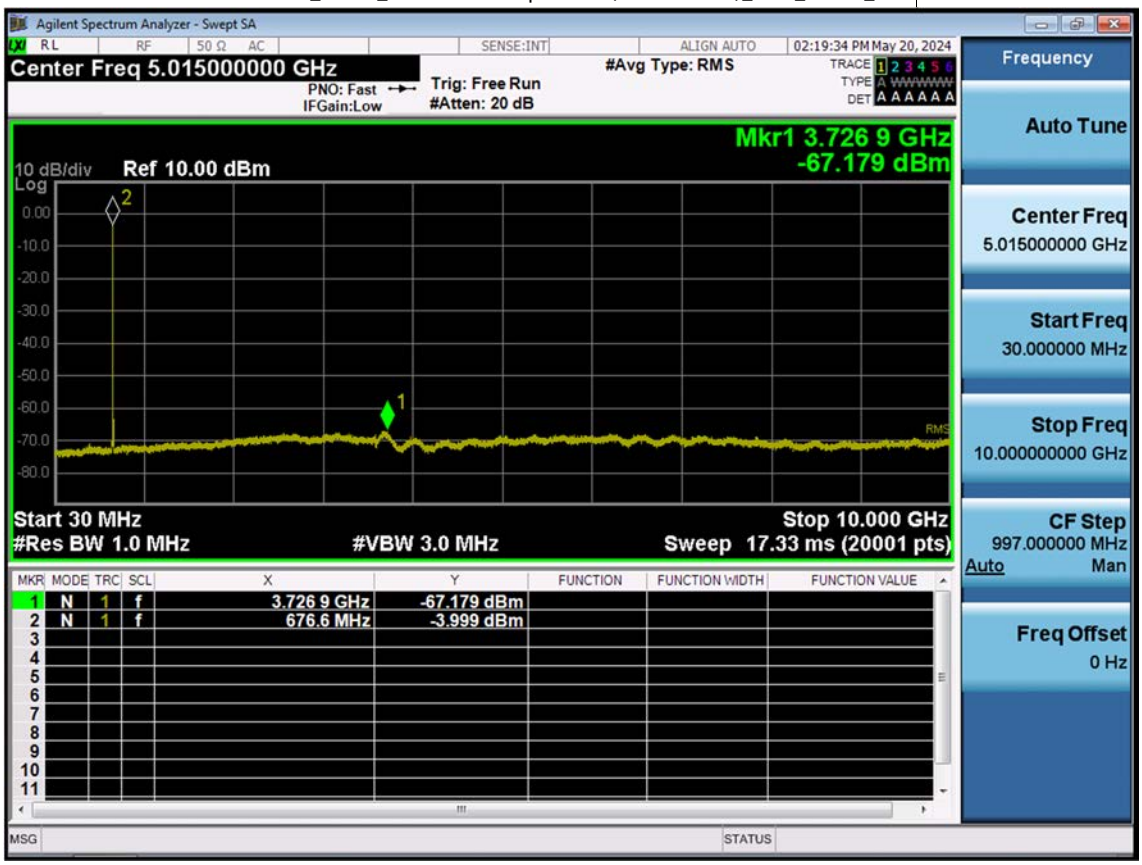
LTE B71_5 M_Conducted Spurious(30 M-10 G)_High_QPSK_1RB



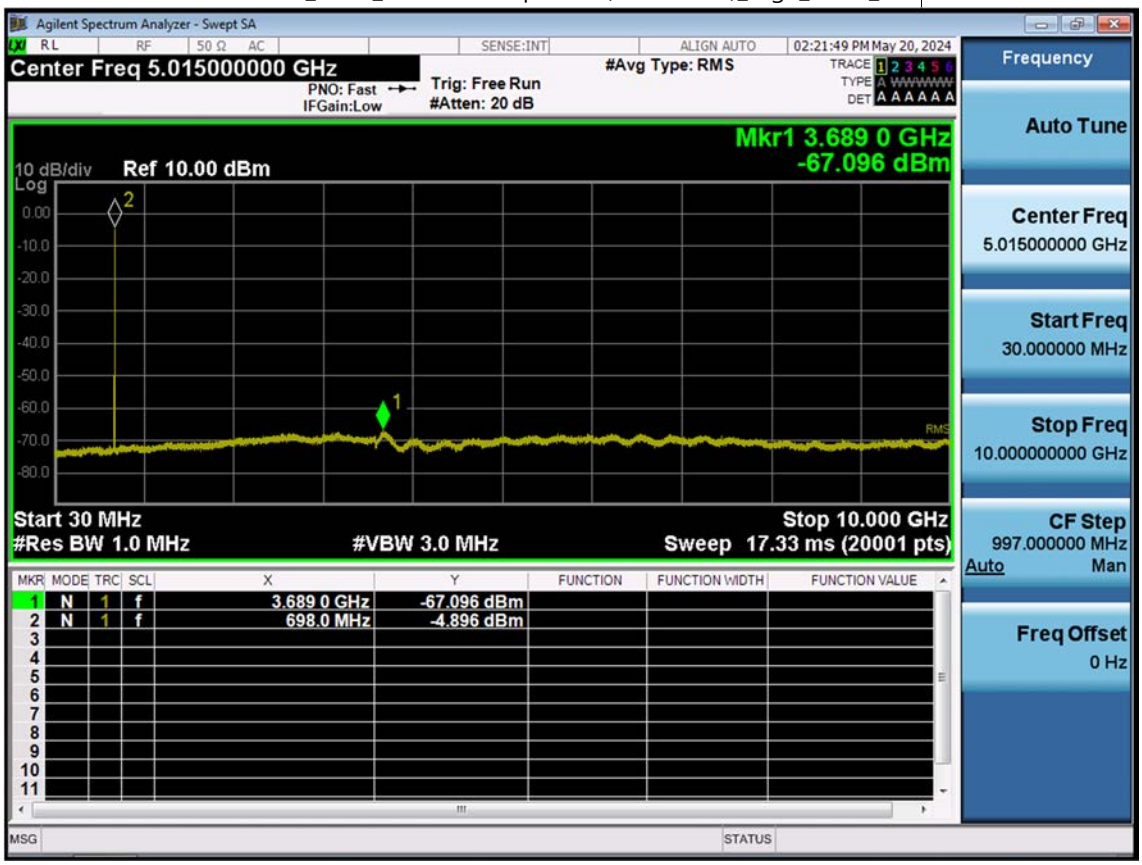
LTE B71_10 M_Conducted Spurious(30 M-10 G)_Low_QPSK_1RB



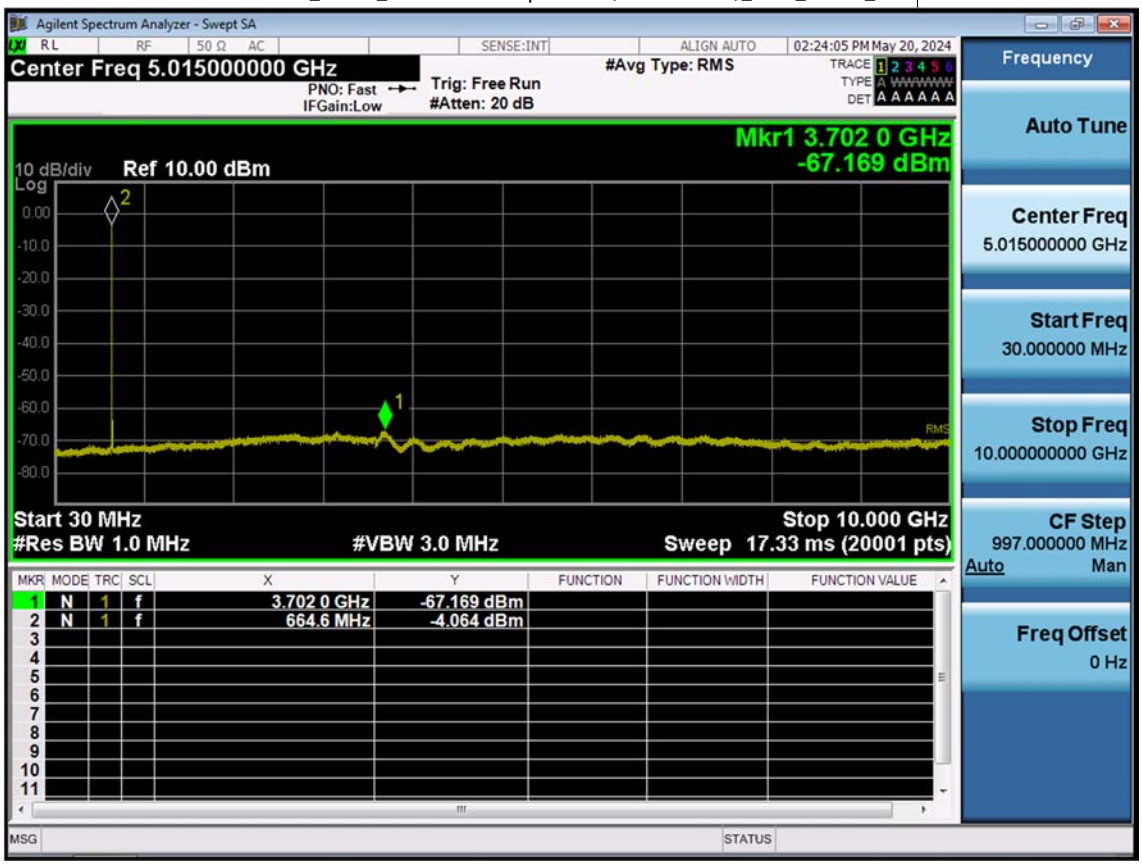
LTE B71_10 M_Conducted Spurious(30 M-10 G)_Mid_QPSK_1RB



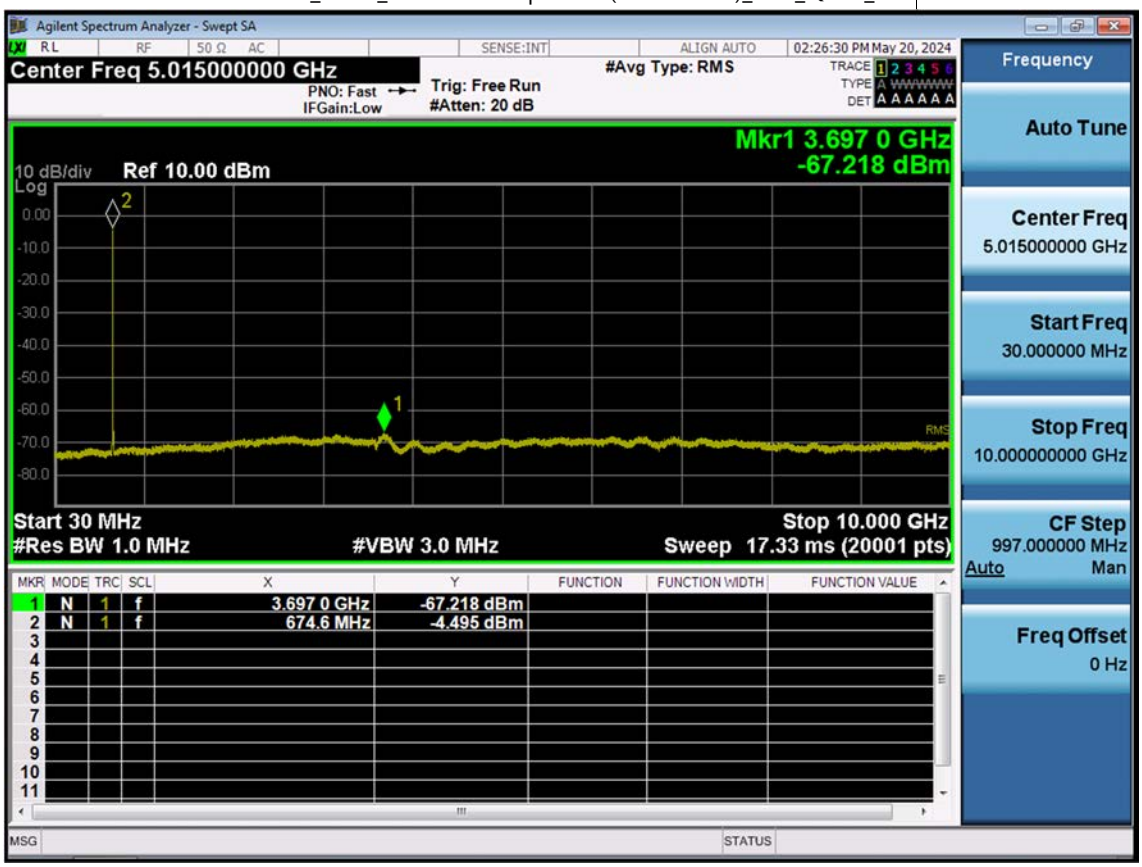
LTE B71_10 M_Conducted Spurious(30 M-10 G)_High_QPSK_1RB



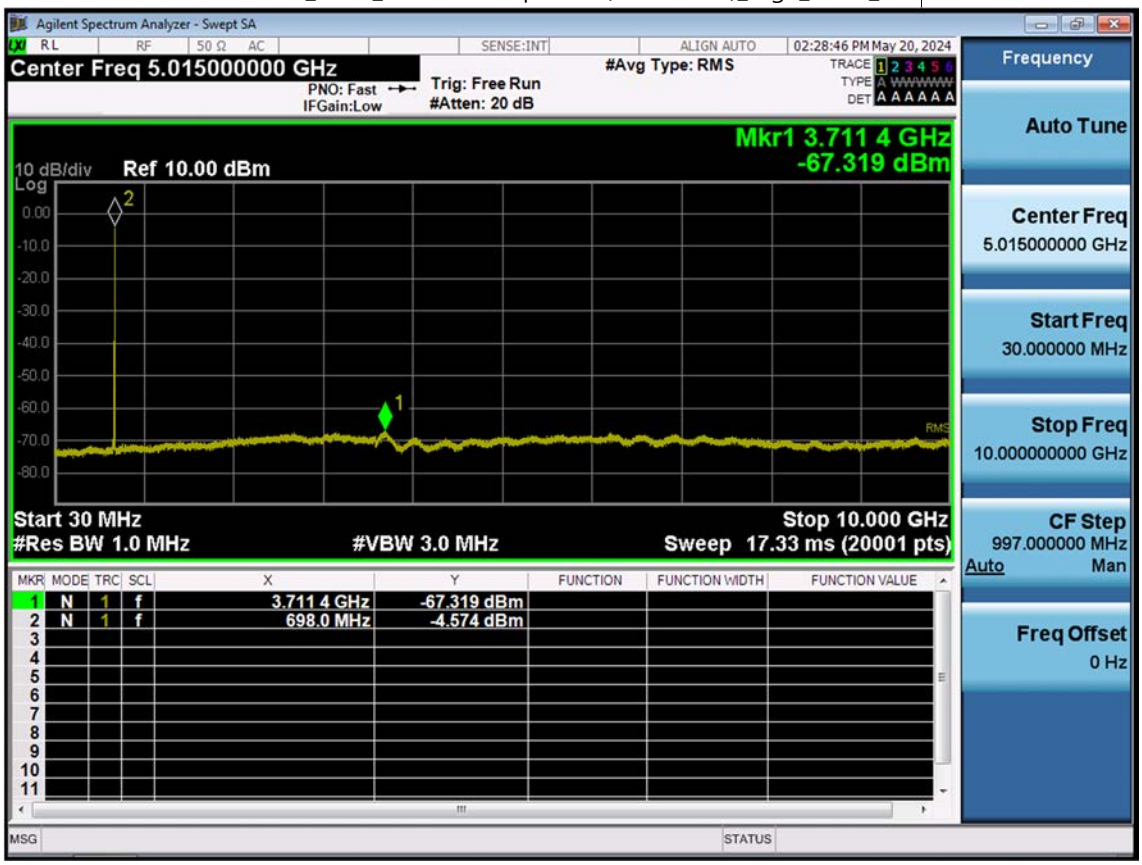
LTE B71_15 M_Conducted Spurious(30 M-10 G)_Low_QPSK_1RB



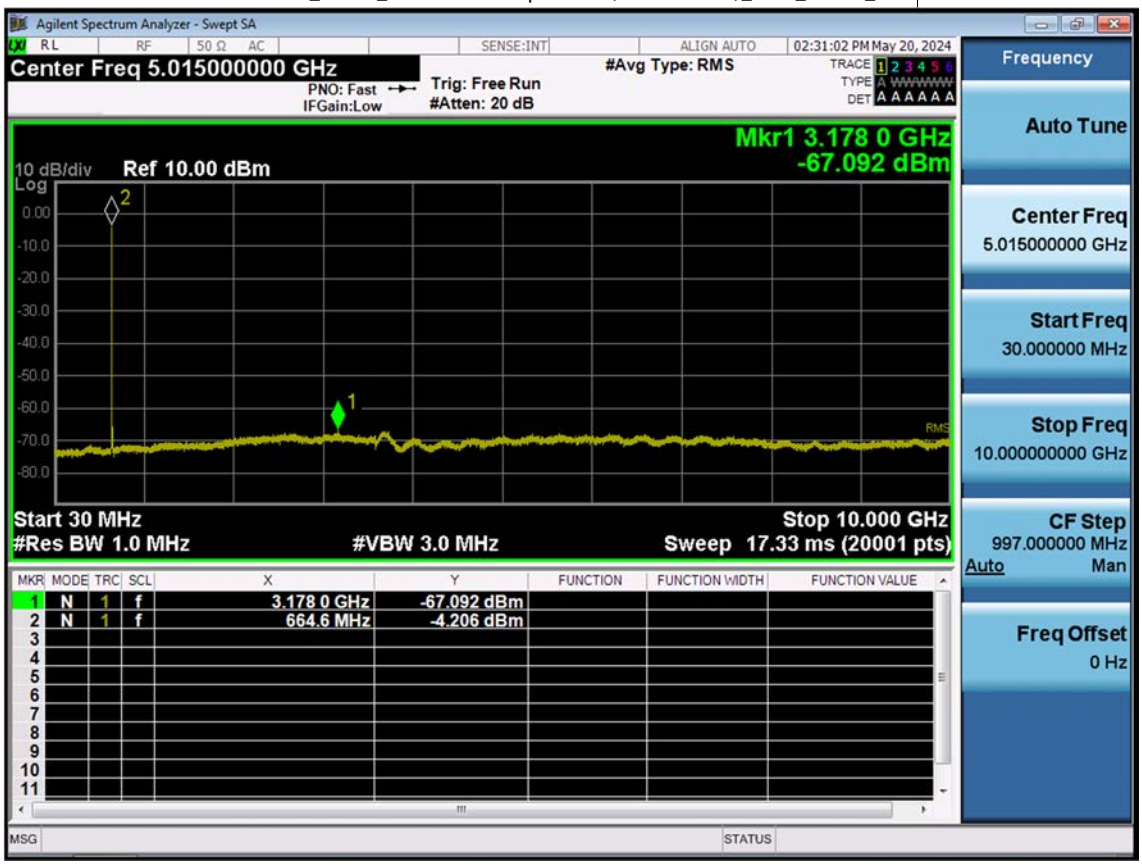
LTE B71_15 M_Conducted Spurious(30 M-10 G)_Mid_QPSK_1RB



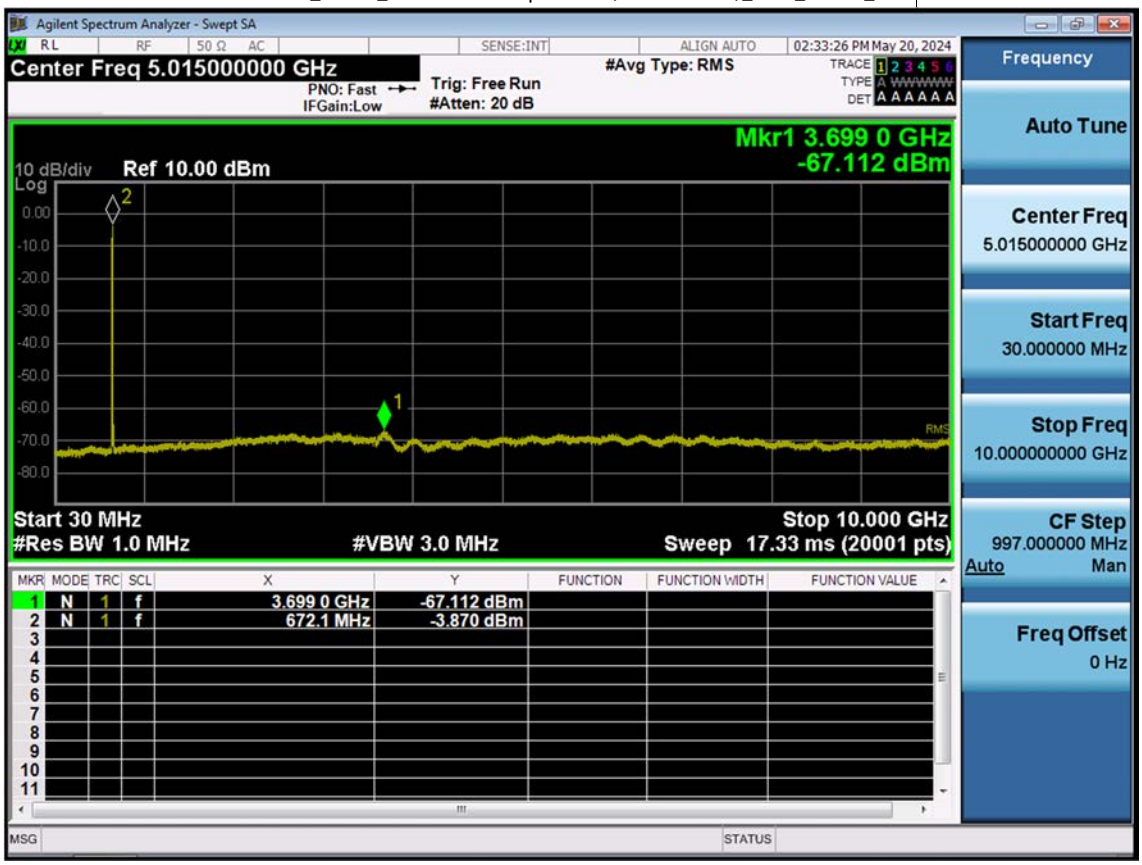
LTE B71_15 M_Conducted Spurious(30 M-10 G)_High_QPSK_1RB



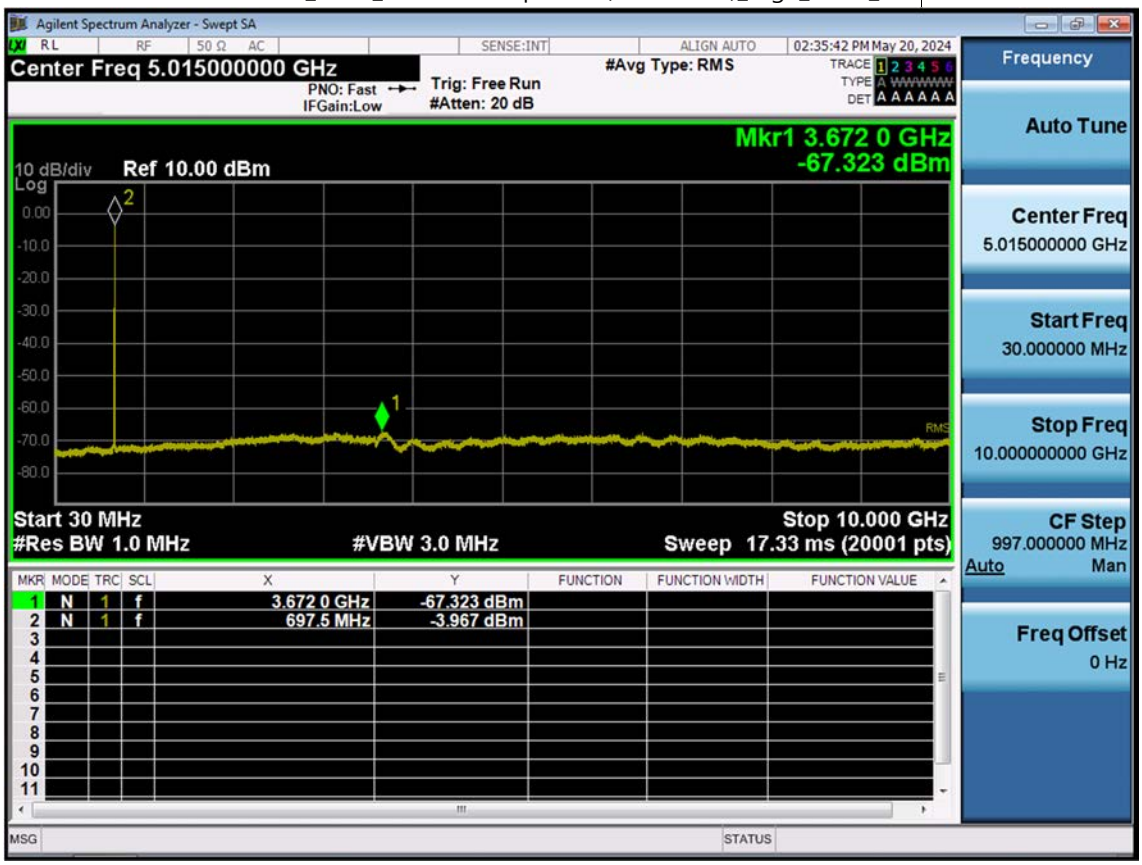
LTE B71_20 M_Conducted Spurious(30 M-10 G)_Low_QPSK_1RB



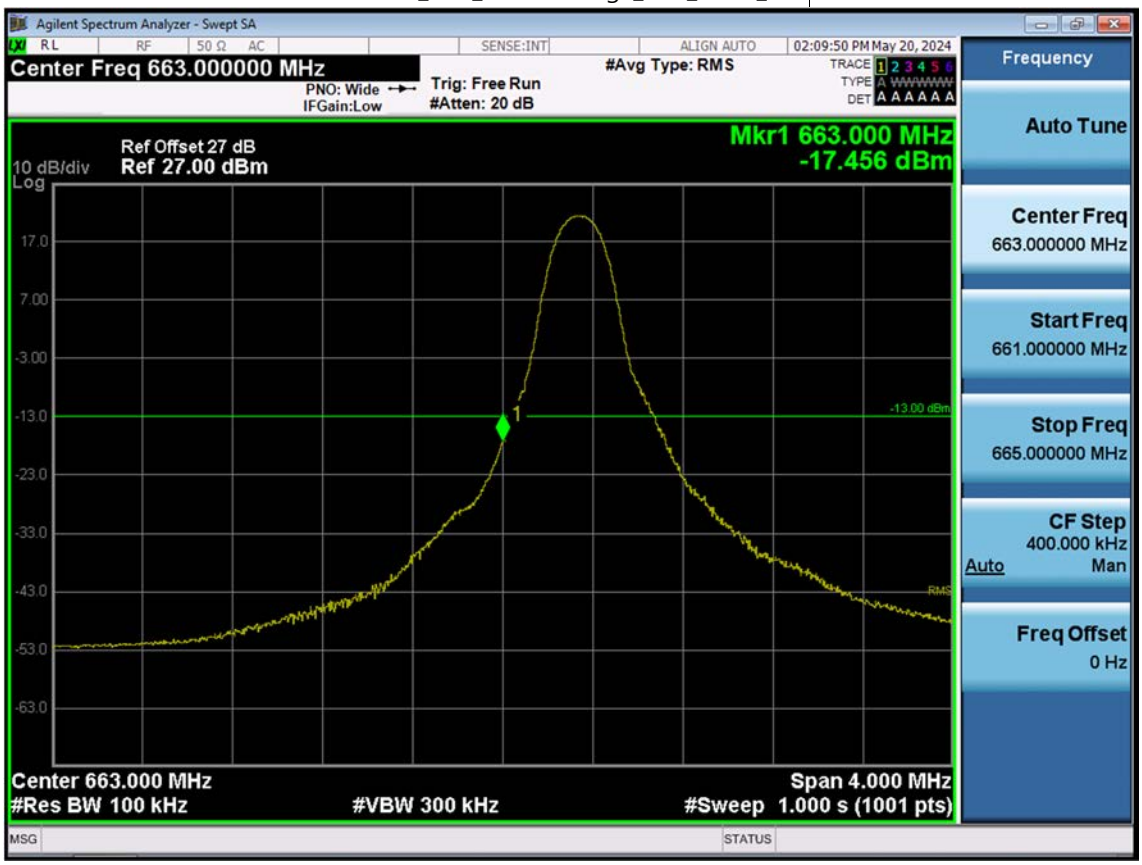
LTE B71_20 M_Conducted Spurious(30 M-10 G)_Mid_QPSK_1RB



LTE B71_20 M_Conducted Spurious(30 M-10 G)_High_QPSK_1RB



LTE B71_5 M_Channel Edge_Low_QPSK_1RB



LTE B71_5 M_Channel Edge_Low_QPSK_FullRB

LTE B71_5 M_Extended Channel Edge_Low_QPSK_FullRB

LTE B71_5 M_Channel Edge_High_QPSK_1RB

LTE B71_5 M_Channel Edge_High_QPSK_FullRB

LTE B71_5 M_Extended Channel Edge_High_QPSK_FullRB

LTE B71_10 M_Channel Edge_Low_QPSK_1RB

LTE B71_10 M_Channel Edge_Low_QPSK_FullRB

LTE B71_10 M_Extended Channel Edge_Low_QPSK_FullRB

LTE B71_10 M_Channel Edge_High_QPSK_1RB

LTE B71_10 M_Channel Edge_High_QPSK_FullRB

LTE B71_10 M_Extended Channel Edge_High_QPSK_FullRB

LTE B71_15 M_Channel Edge_Low_QPSK_1RB