TEST REPORT

FCC LTE B12 Test for SM-S721U
Certification

APPLICANT
SAMSUNG Electronics Co., Ltd.

REPORT NO.
HCT-RF-2407-FC022

DATE OF ISSUE
July 19, 2024

Tested by
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TEST REPORT

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HCT-RF-2407-FC022

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Additional Model
SM-S721U1

Applicant	**SAMSUNG Electronics Co., Ltd.** 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
Product Name Model Name	Mobile Phone SM-S721U
Date of Test	May 16, 2024 ~ July 19, 2024
FCC ID	A3LSMS721U
Location of Test	■ Permanent Testing Lab ☐ On Site Testing (Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 Republic of Korea)
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
Test Standard Used	FCC Rule Part: § 27
Test Results	PASS

REVISION HISTORY

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

Revision No.	Date of Issue	Description
0	July 19, 2024	Initial Release

Notice

Content
The measurements shown in this report were made in accordance with the procedures specified in CFR47 section § 2.947. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a)
The results shown in this test report only apply to the sample(s), as received, provided by the applicant, unless otherwise stated. The test results have only been applied with the test methods required by the standard(s).
The laboratory is not accredited for the test results marked *. Information provided by the applicant is marked **. Test results provided by external providers are marked ***.
When confirmation of authenticity of this test report is required, please contact www.hct.co.kr
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:	SAMSUNG Electronics Co., Ltd.
Address:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
FCC ID:	A3LSMS721U
Application Type:	Certification
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part(s):	§ 27
EUT Type:	Mobile phone
Model(s):	SM-S721U
Additional Model(s)	SM-S721U1
Tx Frequency:	699.7 MHz – 715.3 MHz (LTE – Band 12 (1.4 MHz)) 700.5 MHz – 714.5 MHz (LTE – Band 12 (3 MHz)) 701.5 MHz – 713.5 MHz (LTE – Band 12 (5 MHz)) 704.0 MHz – 711.0 MHz (LTE – Band 12 (10 MHz))
Date(s) of Tests:	May 16, 2024 ~ July 19, 2024
Serial number:	Radiated : 67d50ecc63197ece Conducted : R3CX40SV75R

1.1. MAXIMUM OUTPUT POWER

Mode (MHz)	Tx Frequency (MHz)	Emission Designator	Modulation	ERP	
				Max. Power (W)	Max. Power (dBm)
LTE – Band 12 (1.4)	699.7 – 715.3	1M10G7D	QPSK	0.067	18.27
		1M10W7D	16QAM	0.057	17.54
		1M11W7D	64QAM	0.044	16.46
		1M09W7D	256QAM	0.022	13.47
LTE – Band 12 (3)	700.5 – 714.5	2M72G7D	QPSK	0.071	18.53
		2M71W7D	16QAM	0.059	17.71
		2M72W7D	64QAM	0.046	16.67
		2M71W7D	256QAM	0.023	13.61
LTE – Band 12 (5)	701.5 – 713.5	4M52G7D	QPSK	0.069	18.39
		4M53W7D	16QAM	0.058	17.65
		4M54W7D	64QAM	0.046	16.60
		4M51W7D	256QAM	0.023	13.59
LTE – Band 12 (10)	704.0 – 711.0	9M01G7D	QPSK	0.070	18.45
		9M02W7D	16QAM	0.058	17.66
		9M03W7D	64QAM	0.045	16.55
		8M99W7D	256QAM	0.023	13.68

2. INTRODUCTION

2.1. DESCRIPTION OF EUT

The EUT was a Mobile Phone with GSM/GPRS/EGPRS/UMTS and LTE, Sub 6, mmWave.
It also supports IEEE 802.11 a/b/g/n/ac/ax (20/40/80/160 MHz), Bluetooth(iPA, ePA), BT LE(iPA, ePA), NFC, WPT, WIFI 6E.

2.2. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

2.3. TEST FACILITY

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

3. DESCRIPTION OF TESTS

3.1 TEST PROCEDURE

Test Description	Test Procedure Used
Occupied Bandwidth	- KDB 971168 D01 v03r01 – Section 4.3 - ANSI C63.26-2015 – Section 5.4.4
Band Edge	- KDB 971168 D01 v03r01 – Section 6.0 - ANSI C63.26-2015 – Section 5.7
Spurious and Harmonic Emissions at Antenna Terminal	- KDB 971168 D01 v03r01 – Section 6.0 - ANSI C63.26-2015 – Section 5.7
Conducted Output Power	- N/A (See SAR Report)
Frequency stability	- ANSI C63.26-2015 – Section 5.6
Effective Radiated Power/ Effective Isotropic Radiated Power	- KDB 971168 D01 v03r01 – Section 5.2 & 5.8 - ANSI/TIA-603-E-2016 – Section 2.2.17
Radiated Spurious and Harmonic Emissions	- KDB 971168 D01 v03r01 – Section 6.2 - ANSI/TIA-603-E-2016 – Section 2.2.12

3.2 RADIATED POWER

Test Overview

Radiated tests are performed in the Fully-anechoic chamber.
The equipment under test is placed on a non-conductive table 3-meters away from the receive antenna in accordance with ANSI/TIA-603-E-2016 Clause 2.2.17.

Test Settings

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

Test Note

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

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

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

3.3 RADIATED SPURIOUS EMISSIONS

Test Overview

Radiated tests are performed in the Fully-anechoic chamber.

Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA-603-E-2016.

Test Settings

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

Test Note

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

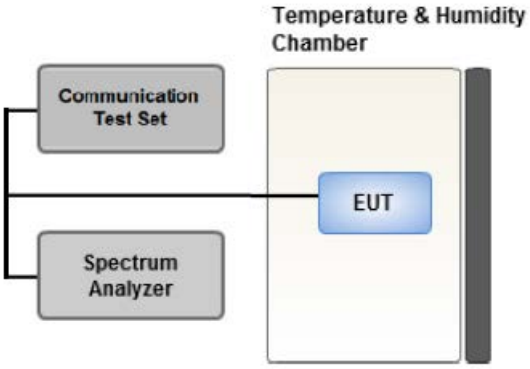
$$\text{Result}_{(dBm)} = \text{Pg}_{(dBm)} - \text{cable loss}_{(dB)} + \text{antenna gain}_{(dBi)}$$

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

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

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

3.4 OCCUPIED BANDWIDTH.



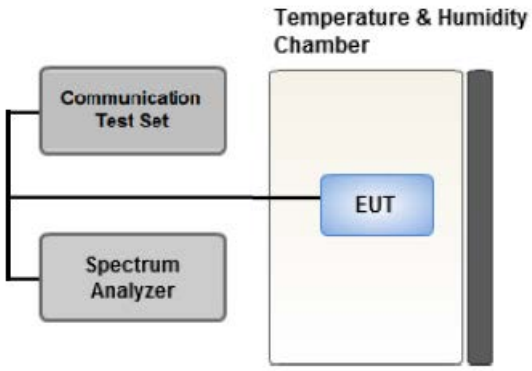
Test setup

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

Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99 % occupied bandwidth and the 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

3.5 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL



Test setup

Test Overview

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic.

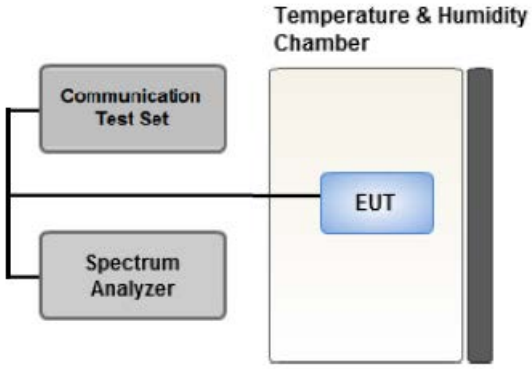
All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Settings

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

3.6 BAND EDGE



Test setup

Test Overview

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Settings

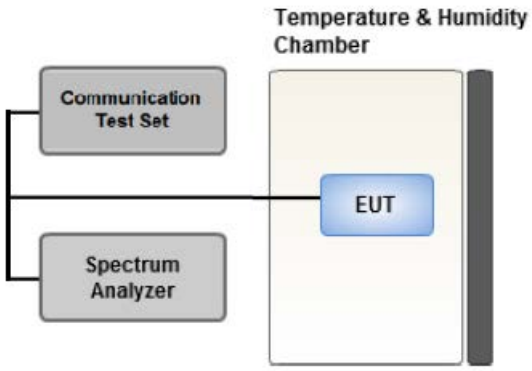
1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW > 1 % of the emission bandwidth
4. VBW > 3 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW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

3.7 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE



Test setup

Test Overview

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

The frequency stability of the transmitter is measured by:

1. Temperature:

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

2. Primary Supply Voltage:

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

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

Test Settings

1. The carrier frequency of the transmitter is measured at room temperature (20 °C to provide a reference).
2. The equipment is turned on in a “standby” condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10 °C intervals ranging from -30 °C to +50 °C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

3.8 WORST CASE(RADIATED TEST)

- The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
- All modes of operation were investigated and the worst case configuration results are reported.
  Mode : Stand alone, Stand alone + External accessories (Earphone, AC adapter, etc)
  Worst case : Stand alone
- All simultaneous transmission scenarios of operation were investigated, and the test results showed no additional significant emissions relative to the least restrictive limit were observed.
  Therefore, only the worst case(stand-alone) results were reported.
- In the case of radiated spurious emissions, all bandwidth of operation were investigated and the worst case bandwidth results are reported. (Worst case : 3 MHz)
- 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.
- SM-S721U & additional models were tested and the worst case results are reported.
  (Worst case : SM-S721U)

[Worst case]

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

3.9 WORST CASE(CONDUCTED TEST)

- All modes of operation were investigated and the worst case configuration results are reported.
- SM-S721U & additional models were tested and the worst case results are reported.
(Worst case : SM-S721U)

[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
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	Manufacture	Serial No.	Due to Calibration	Calibration Interval
Precision Dipole Antenna	UHAP	Schwarzbeck	01273	03/10/2026	Biennial
Precision Dipole Antenna	UHAP	Schwarzbeck	01274	03/10/2026	Biennial
Horn Antenna(1~18 GHz)	BBHA 9120D	Schwarzbeck	02289	02/14/2026	Biennial
Horn Antenna(1~18 GHz)	BBHA 9120D	Schwarzbeck	9120D-1299	04/27/2025	Biennial
Horn Antenna(15~40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170342	09/29/2024	Biennial
Horn Antenna(15~40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170124	03/28/2025	Biennial
Loop Antenna(9 kHz~30 MHz)	FMZB1513	Rohde & Schwarz	1513-175	01/16/2025	Biennial
Bilog Antenna	VULB9160	Schwarzbeck	3150	03/09/2025	Biennial
Hybrid Antenna	VULB9160	Schwarzbeck	760	02/24/2025	Biennial
RF Switching System	FBSR-06B (1G HPF + LNA)	T&M SYSTEM	F3L1	05/14/2025	Annual
RF Switching System	FBSR-06B (3G HPF + LNA)	T&M SYSTEM	F3L2	05/14/2025	Annual
RF Switching System	FBSR-06B (6G HPF + LNA)	T&M SYSTEM	F3L3	05/14/2025	Annual
RF Switching System	FBSR-06B (LNA)	T&M SYSTEM	F3L4	05/14/2025	Annual
Power Amplifier	CBL18265035	CERNEX	22966	11/17/2024	Annual
Power Amplifier	CBL26405040	CERNEX	25956	02/26/2025	Annual
DC Power Supply	E3632A	Hewlett Packard	MY40004427	08/25/2024	Annual
Power Splitter(DC~26.5 GHz)	11667B	Hewlett Packard	11275	02/29/2025	Annual
Chamber	SU-642	ESPEC	93008124	02/19/2025	Annual
Signal Analyzer(10 Hz~26.5 GHz)	N9020A	Agilent	MY51110063	04/04/2025	Annual
ATTENUATOR(20 dB)	8493C	Hewlett Packard	17280	04/17/2025	Annual
Spectrum Analyzer(10 Hz~40 GHz)	FSV40	REOHDE & SCHWARZ	101436	02/13/2025	Annual
Base Station	8960 (E5515C)	Agilent	MY48360800	08/10/2024	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(5 Hz~40.0 GHz)	N9030B	KEYSIGHT	MY55480167	05/17/2025	Annual
4-Way Divider	ZC4PD-K1844+	Mini-Circuits	942907	09/19/2024	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. 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	See Note1
Frequency stability / variation of ambient temperature	§ 2.1055, § 27.54	Emission must remain in band	PASS

Note:

1. See SAR Report

6.2 Test Condition: Radiated Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Effective Radiated Power	§ 27.50(c)(10)	< 3 Watts max. ERP	PASS
Radiated Spurious and Harmonic Emissions	§ 2.1053, § 27.53(g)	< 43 + 10log10 (P[Watts]) for all out-of band emissions	PASS

7. SAMPLE CALCULATION

7.1 ERP Sample Calculation

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

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

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

7.2 EIRP Sample Calculation

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

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

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

7.3. Emission Designator

GSM Emission Designator

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

EDGE Emission Designator

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

WCDMA Emission Designator

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

QPSK Modulation

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

QAM Modulation

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

8. TEST DATA

8.1 EFFECTIVE RADIATED POWER

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBd)	C.L	Pol	Limit	ERP		RB	
								W	W	dBm	Size	Offset
699.7	LTE B12 (1.4 MHz)	QPSK	-30.55	28.57	-9.55	1.28	H	< 3.00	0.059	17.74	1	0
		16-QAM	-31.26	27.86	-9.55	1.28	H		0.050	17.03		
		64-QAM	-32.26	26.86	-9.55	1.28	H		0.040	16.03		
		256-QAM	-35.38	23.74	-9.55	1.28	H		0.020	12.91		
707.5		QPSK	-29.90	28.94	-9.55	1.28	H		0.065	18.11	1	0
		16-QAM	-30.69	28.15	-9.55	1.28	H		0.054	17.32		
		64-QAM	-31.71	27.13	-9.55	1.28	H		0.043	16.30		
		256-QAM	-34.68	24.16	-9.55	1.28	H		0.022	13.33		
715.3		QPSK	-30.15	29.10	-9.55	1.28	H		0.067	18.27	1	0
		16-QAM	-30.88	28.37	-9.55	1.28	H		0.057	17.54		
		64-QAM	-31.96	27.29	-9.55	1.28	H		0.044	16.46		
		256-QAM	-34.95	24.30	-9.55	1.28	H		0.022	13.47		

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBd)	C.L	Pol	Limit	ERP		RB	
								W	W	dBm	Size	Offset
700.5	LTE B12 (3 MHz)	QPSK	-30.50	28.55	-9.55	1.28	H	< 3.00	0.059	17.72	1	0
		16-QAM	-31.21	27.84	-9.55	1.28	H		0.050	17.01		
		64-QAM	-32.20	26.85	-9.55	1.28	H		0.040	16.02		
		256-QAM	-35.30	23.75	-9.55	1.28	H		0.020	12.92		
707.5		QPSK	-29.66	29.18	-9.55	1.28	H		0.068	18.35	1	0
		16-QAM	-30.49	28.35	-9.55	1.28	H		0.056	17.52		
		64-QAM	-31.51	27.33	-9.55	1.28	H		0.045	16.50		
		256-QAM	-34.55	24.29	-9.55	1.28	H		0.022	13.46		
714.5		QPSK	-29.85	29.36	-9.55	1.28	H		0.071	18.53	1	0
		16-QAM	-30.67	28.54	-9.55	1.28	H		0.059	17.71		
		64-QAM	-31.71	27.50	-9.55	1.28	H		0.046	16.67		
		256-QAM	-34.77	24.44	-9.55	1.28	H		0.023	13.61		

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBd)	C.L	Pol	Limit	ERP		RB	
								W	W	dBm	Size	Offset
701.5	LTE B12 (5 MHz)	QPSK	-30.48	28.47	-9.55	1.28	H	< 3.00	0.058	17.64	1	0
		16-QAM	-31.18	27.77	-9.55	1.28	H		0.049	16.94		
		64-QAM	-32.22	26.73	-9.55	1.28	H		0.039	15.90		
		256-QAM	-35.30	23.65	-9.55	1.28	H		0.019	12.82		
707.5		QPSK	-29.76	29.08	-9.55	1.28	H		0.067	18.25	1	0
		16-QAM	-30.46	28.38	-9.55	1.28	H		0.057	17.55		
		64-QAM	-31.48	27.36	-9.55	1.28	H		0.045	16.53		
		256-QAM	-34.55	24.29	-9.55	1.28	H		0.022	13.46		
713.5		QPSK	-29.91	29.22	-9.55	1.28	H		0.069	18.39	1	0
		16-QAM	-30.65	28.48	-9.55	1.28	H		0.058	17.65		
		64-QAM	-31.70	27.43	-9.55	1.28	H		0.046	16.60		
		256-QAM	-34.71	24.42	-9.55	1.28	H		0.023	13.59		

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBd)	C.L	Pol	Limit	ERP		RB	
								W	W	dBm	Size	Offset
704.0	LTE B12 (10 MHz)	QPSK	-30.46	28.45	-9.55	1.28	H	< 3.00	0.058	17.62	1	0
		16-QAM	-31.33	27.58	-9.55	1.28	H		0.047	16.75		
		64-QAM	-32.29	26.62	-9.55	1.28	H		0.038	15.79		
		256-QAM	-35.32	23.59	-9.55	1.28	H		0.019	12.76		
707.5		QPSK	-29.68	29.16	-9.55	1.28	H		0.068	18.33	1	0
		16-QAM	-30.51	28.33	-9.55	1.28	H		0.056	17.50		
		64-QAM	-31.56	27.28	-9.55	1.28	H		0.044	16.45		
		256-QAM	-34.51	24.33	-9.55	1.28	H		0.022	13.50		
711.0		QPSK	-29.77	29.28	-9.55	1.28	H		0.070	18.45	1	0
		16-QAM	-30.56	28.49	-9.55	1.28	H		0.058	17.66		
		64-QAM	-31.67	27.38	-9.55	1.28	H		0.045	16.55		
		256-QAM	-34.54	24.51	-9.55	1.28	H		0.023	13.68		

8.2 RADIATED SPURIOUS EMISSIONS

▣ MODE: LTE B12

▣ MODULATION SIGNAL: 3 MHz QPSK

▣ DISTANCE: 3 meters

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Limit (dBm)	RB	
									Size	Offset
23025 (700.5)	1 401.00	-52.65	7.40	-58.05	1.80	H	-52.45	-13.00	1	0
	2 101.50	-54.92	9.10	-60.28	2.28	V	-53.46	-13.00		
	2 802.00	-57.96	10.30	-61.83	2.68	V	-54.21	-13.00		
23095 (707.5)	1 415.00	-52.97	7.40	-59.42	1.80	H	-53.82	-13.00	1	0
	2 122.50	-55.88	9.10	-61.08	2.28	V	-54.26	-13.00		
	2 830.00	-58.30	10.30	-62.73	2.69	V	-55.12	-13.00		
23165 (714.5)	1 429.00	-52.17	7.40	-58.69	1.81	H	-53.10	-13.00	1	0
	2 143.50	-54.85	9.10	-59.62	2.30	V	-52.82	-13.00		
	2 858.00	-58.14	10.30	-61.59	2.72	V	-54.01	-13.00		

8.3 OCCUPIED BANDWIDTH

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (MHz)
12	1.4 MHz	707.5	QPSK	6	0	1.0989
			16-QAM			1.0983
			64-QAM			1.1074
			256-QAM			1.0930
	3 MHz		QPSK	15		2.7208
			16-QAM			2.7140
			64-QAM			2.7189
			256-QAM			2.7058
	5 MHz		QPSK	25		4.5168
			16-QAM			4.5333
			64-QAM			4.5380
			256-QAM			4.5123
	10 MHz		QPSK	50		9.0096
			16-QAM			9.0202
			64-QAM			9.0301
			256-QAM			8.9850

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 41 ~ 56.

8.4 CONDUCTED SPURIOUS EMISSIONS

Band	Band Width (MHz)	Frequency (MHz)	Frequency of Maximum Harmonic (GHz)	Factor (dB)	Measurement Maximum Data (dBm)	Result (dBm)	Limit (dBm)
12	1.4	699.7	3.6930	27.976	-67.369	-39.393	-13.00
		707.5	3.7154	27.976	-67.034	-39.058	
		715.3	3.6880	27.976	-67.276	-39.300	
	3	700.5	3.7184	27.976	-67.375	-39.399	
		707.5	3.6840	27.976	-66.914	-38.938	
		714.5	3.7159	27.976	-67.118	-39.142	
	5	701.5	3.7119	27.976	-67.135	-39.159	
		707.5	3.7119	27.976	-67.470	-39.494	
		713.5	3.6905	27.976	-67.141	-39.165	
	10	704.0	3.7124	27.976	-67.450	-39.474	
		707.5	3.7089	27.976	-67.163	-39.187	
		711.0	3.6970	27.976	-67.263	-39.287	

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 57 ~ 68.
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

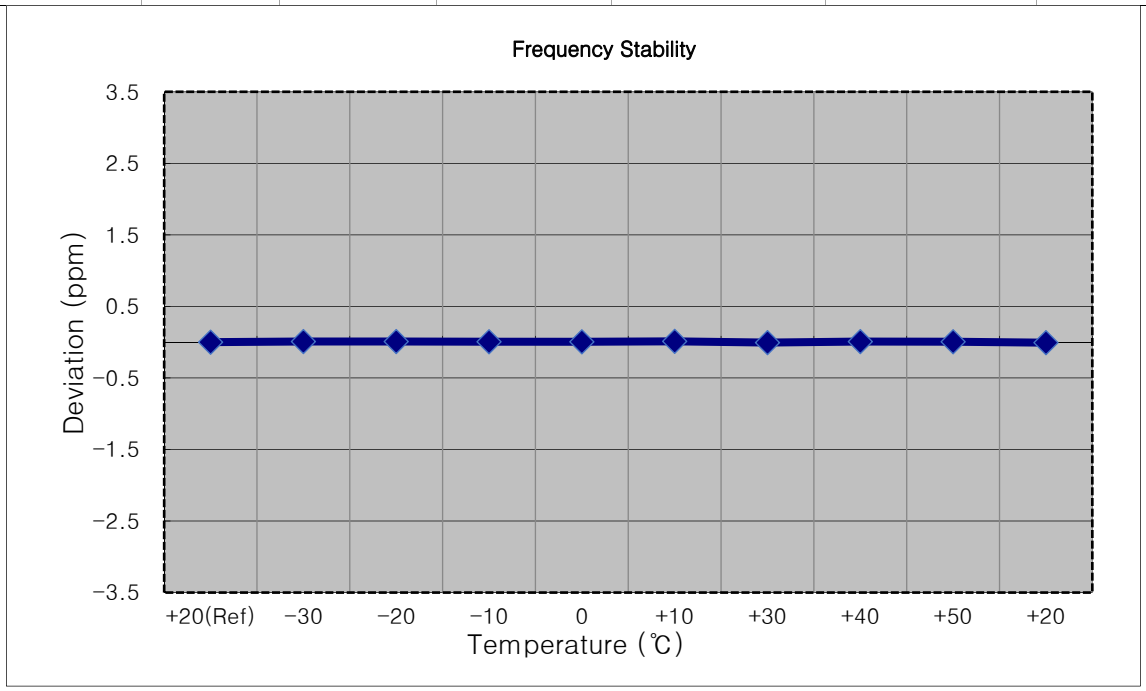
8.5 BAND EDGE

- Plots of the EUT's Band Edge are shown Page 69 ~ 96.

8.6 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

▣ MODE: LTE B12
▣ OPERATING FREQUENCY: 699,700,000 Hz
▣ CHANNEL: 23017 (1.4 MHz)
▣ REFERENCE VOLTAGE: 3.880 VDC
▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(℃)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	699 700 005	0.0	0.000 000	0.000
100 %		-30	699 700 012	6.4	0.000 001	0.009
100 %		-20	699 700 012	6.3	0.000 001	0.009
100 %		-10	699 700 010	4.4	0.000 001	0.006
100 %		0	699 700 009	3.7	0.000 001	0.005
100 %		+10	699 700 014	8.3	0.000 001	0.012
100 %		+30	699 700 001	-4.1	-0.000 001	-0.006
100 %		+40	699 700 011	5.9	0.000 001	0.008
100 %		+50	699 700 010	4.4	0.000 001	0.006
Batt. Endpoint	3.300	+20	699 700 001	-4.8	-0.000 001	-0.007



▣ MODE: LTE B12

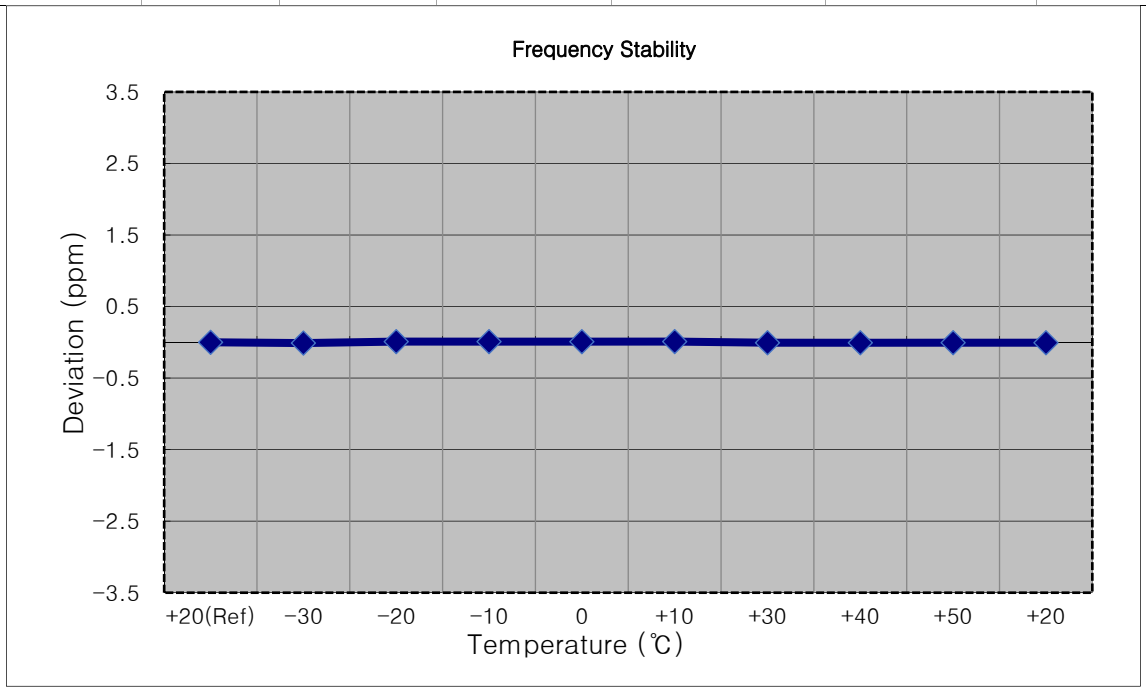
▣ OPERATING FREQUENCY: 700,500,000 Hz

▣ CHANNEL: 23025 (3 MHz)

▣ REFERENCE VOLTAGE: 3.880 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	700 500 004	0.0	0.000 000	0.000
100 %		-30	700 499 997	-7.4	-0.000 001	-0.011
100 %		-20	700 500 011	6.8	0.000 001	0.010
100 %		-10	700 500 011	6.7	0.000 001	0.010
100 %		0	700 500 011	6.4	0.000 001	0.009
100 %		+10	700 500 011	7.1	0.000 001	0.010
100 %		+30	700 500 000	-4.0	-0.000 001	-0.006
100 %		+40	700 500 000	-4.3	-0.000 001	-0.006
100 %		+50	700 500 001	-3.8	-0.000 001	-0.005
Batt. Endpoint	3.300	+20	700 500 000	-4.1	-0.000 001	-0.006



▣ MODE: LTE B12

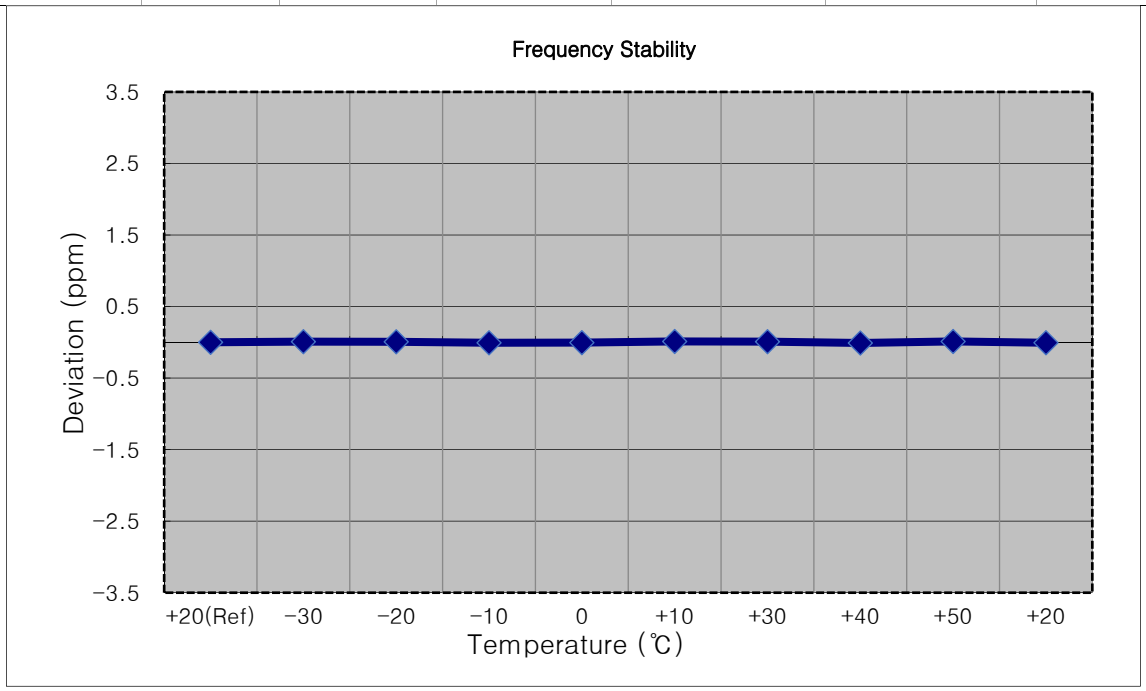
▣ OPERATING FREQUENCY: 701,500,000 Hz

▣ CHANNEL: 23035 (5 MHz)

▣ REFERENCE VOLTAGE: 3.880 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	701 499 993	0.0	0.000 000	0.000
100 %		-30	701 500 000	6.4	0.000 001	0.009
100 %		-20	701 499 998	5.0	0.000 001	0.007
100 %		-10	701 499 988	-4.7	-0.000 001	-0.007
100 %		0	701 499 990	-2.9	0.000 000	-0.004
100 %		+10	701 500 002	8.6	0.000 001	0.012
100 %		+30	701 499 999	6.3	0.000 001	0.009
100 %		+40	701 499 986	-6.8	-0.000 001	-0.010
100 %		+50	701 500 002	8.6	0.000 001	0.012
Batt. Endpoint	3.300	+20	701 499 989	-4.4	-0.000 001	-0.006



▣ MODE: LTE B12

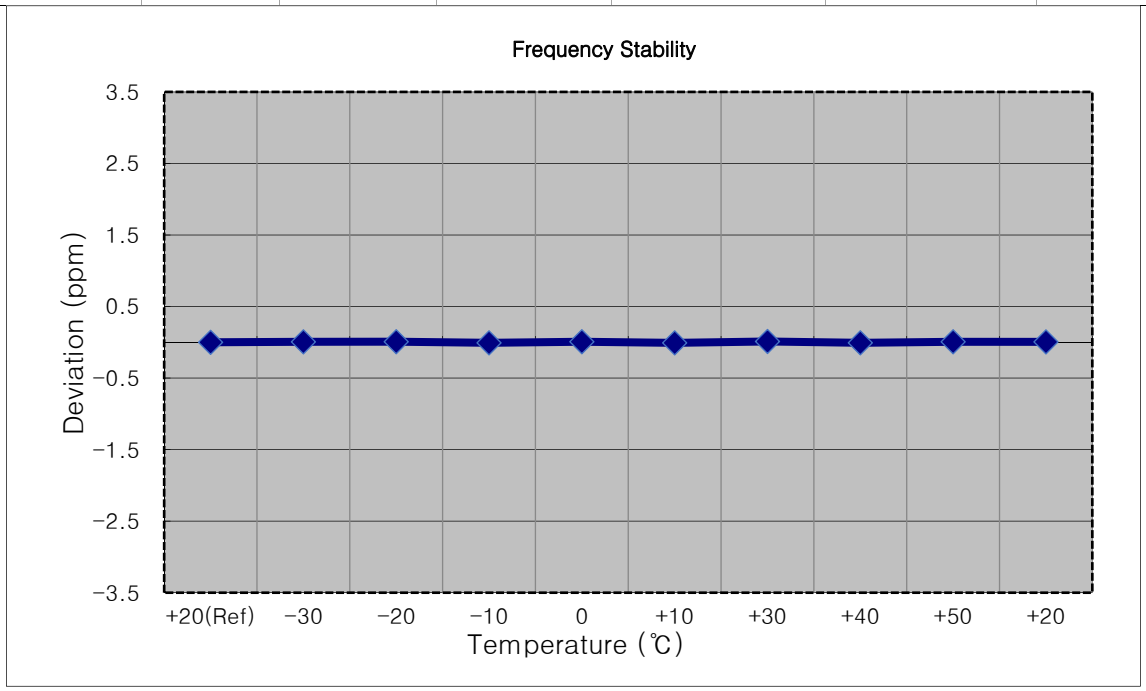
▣ OPERATING FREQUENCY: 704,000,000 Hz

▣ CHANNEL: 23060 (10 MHz)

▣ REFERENCE VOLTAGE: 3.880 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	703 999 994	0.0	0.000 000	0.000
100 %		-30	703 999 999	4.8	0.000 001	0.007
100 %		-20	704 000 000	5.9	0.000 001	0.008
100 %		-10	703 999 989	-5.2	-0.000 001	-0.007
100 %		0	704 000 000	5.5	0.000 001	0.008
100 %		+10	703 999 989	-5.4	-0.000 001	-0.008
100 %		+30	704 000 002	8.2	0.000 001	0.012
100 %		+40	703 999 989	-5.0	-0.000 001	-0.007
100 %		+50	703 999 999	5.2	0.000 001	0.007
Batt. Endpoint	3.300	+20	703 999 998	4.3	0.000 001	0.006



▣ MODE: LTE B12

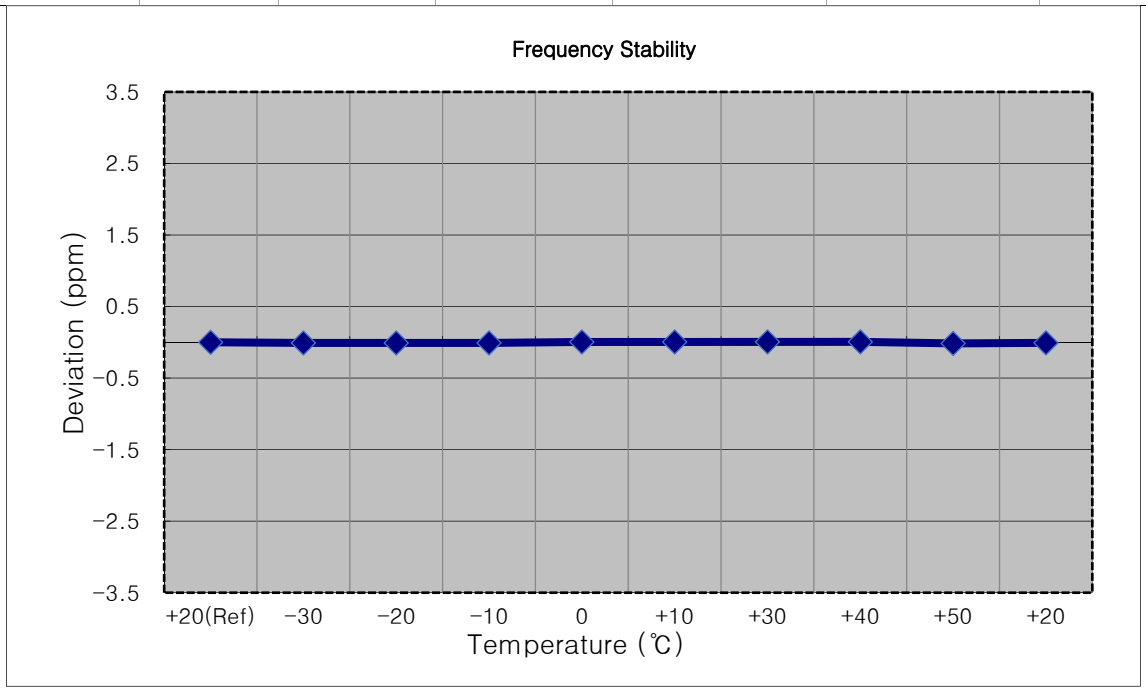
▣ OPERATING FREQUENCY: 707,500,000 Hz

▣ CHANNEL: 23095 (1.4 MHz)

▣ REFERENCE VOLTAGE: 3.880 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	707 499 993	0.0	0.000 000	0.000
100 %		-30	707 499 987	-6.2	-0.000 001	-0.009
100 %		-20	707 499 987	-6.1	-0.000 001	-0.009
100 %		-10	707 499 987	-5.9	-0.000 001	-0.008
100 %		0	707 499 996	3.5	0.000 000	0.005
100 %		+10	707 499 996	3.5	0.000 000	0.005
100 %		+30	707 499 997	4.2	0.000 001	0.006
100 %		+40	707 499 998	4.7	0.000 001	0.007
100 %		+50	707 499 982	-10.9	-0.000 002	-0.015
Batt. Endpoint	3.300	+20	707 499 988	-5.3	-0.000 001	-0.007



▣ MODE: LTE B12

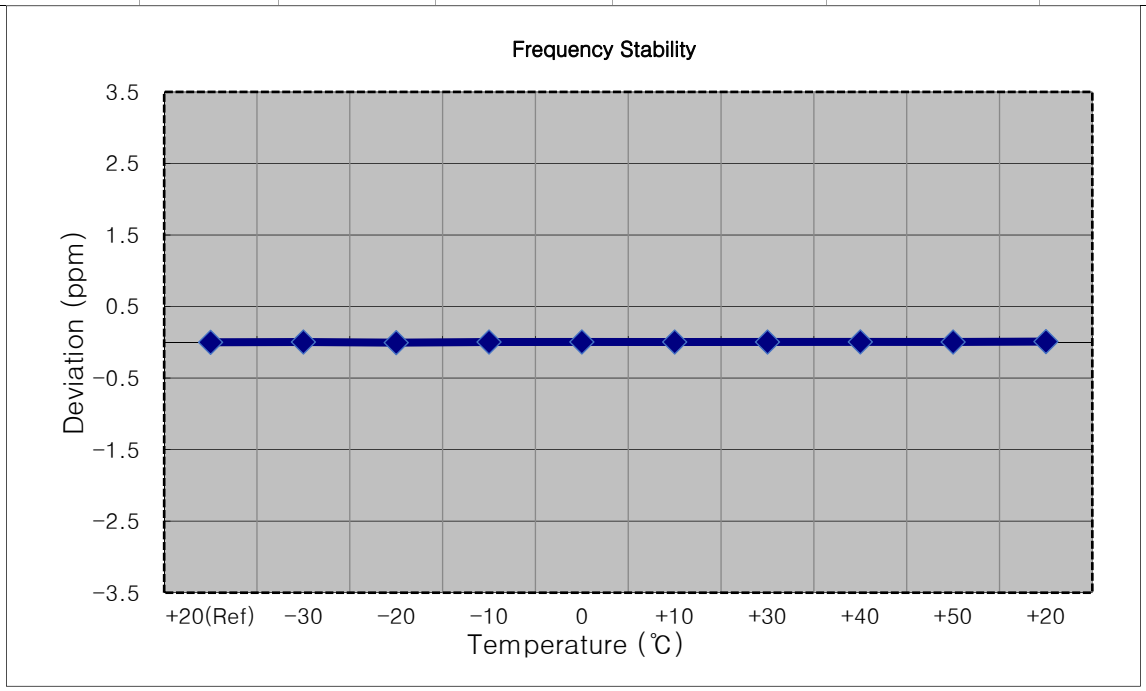
▣ OPERATING FREQUENCY: 707,500,000 Hz

▣ CHANNEL: 23095 (3 MHz)

▣ REFERENCE VOLTAGE: 3.880 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	707 500 002	0.0	0.000 000	0.000
100 %		-30	707 500 005	3.0	0.000 000	0.004
100 %		-20	707 499 999	-3.3	0.000 000	-0.005
100 %		-10	707 500 005	3.1	0.000 000	0.004
100 %		0	707 500 006	3.5	0.000 000	0.005
100 %		+10	707 500 005	3.1	0.000 000	0.004
100 %		+30	707 500 006	3.3	0.000 000	0.005
100 %		+40	707 500 006	4.0	0.000 001	0.006
100 %		+50	707 500 006	3.3	0.000 000	0.005
Batt. Endpoint	3.300	+20	707 500 010	7.3	0.000 001	0.010



▣ MODE: LTE B12

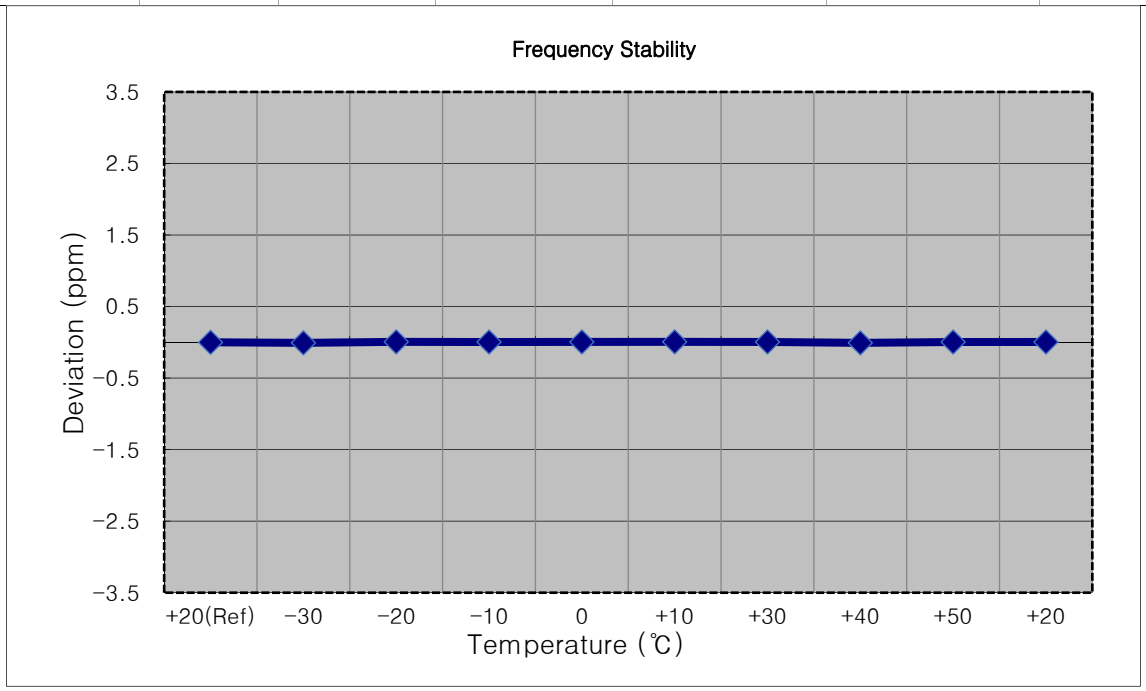
▣ OPERATING FREQUENCY: 707,500,000 Hz

▣ CHANNEL: 23095 (5 MHz)

▣ REFERENCE VOLTAGE: 3.880 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	707 499 997	0.0	0.000 000	0.000
100 %		-30	707 499 992	-5.4	-0.000 001	-0.008
100 %		-20	707 500 002	4.7	0.000 001	0.007
100 %		-10	707 500 000	3.0	0.000 000	0.004
100 %		0	707 500 001	3.7	0.000 001	0.005
100 %		+10	707 500 002	4.5	0.000 001	0.006
100 %		+30	707 500 001	3.6	0.000 001	0.005
100 %		+40	707 499 992	-5.5	-0.000 001	-0.008
100 %		+50	707 500 000	3.1	0.000 000	0.004
Batt. Endpoint	3.300	+20	707 500 000	3.3	0.000 000	0.005



▣ MODE: LTE B12

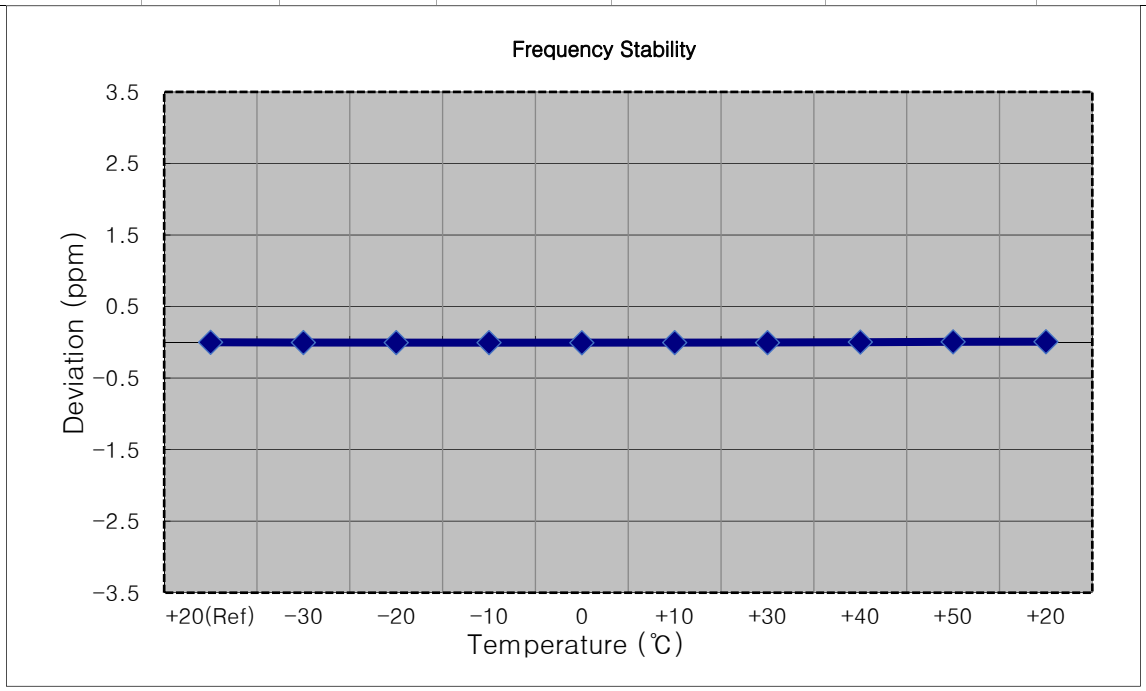
▣ OPERATING FREQUENCY: 707,500,000 Hz

▣ CHANNEL: 23095 (10 MHz)

▣ REFERENCE VOLTAGE: 3.880 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	707 500 003	0.0	0.000 000	0.000
100 %		-30	707 500 001	-2.3	0.000 000	-0.003
100 %		-20	707 500 001	-2.4	0.000 000	-0.003
100 %		-10	707 500 000	-3.4	0.000 000	-0.005
100 %		0	707 499 999	-4.4	-0.000 001	-0.006
100 %		+10	707 500 001	-2.6	0.000 000	-0.004
100 %		+30	707 500 000	-3.0	0.000 000	-0.004
100 %		+40	707 500 006	2.4	0.000 000	0.003
100 %		+50	707 500 008	4.9	0.000 001	0.007
Batt. Endpoint	3.300	+20	707 500 009	5.8	0.000 001	0.008



▣ MODE: LTE B12

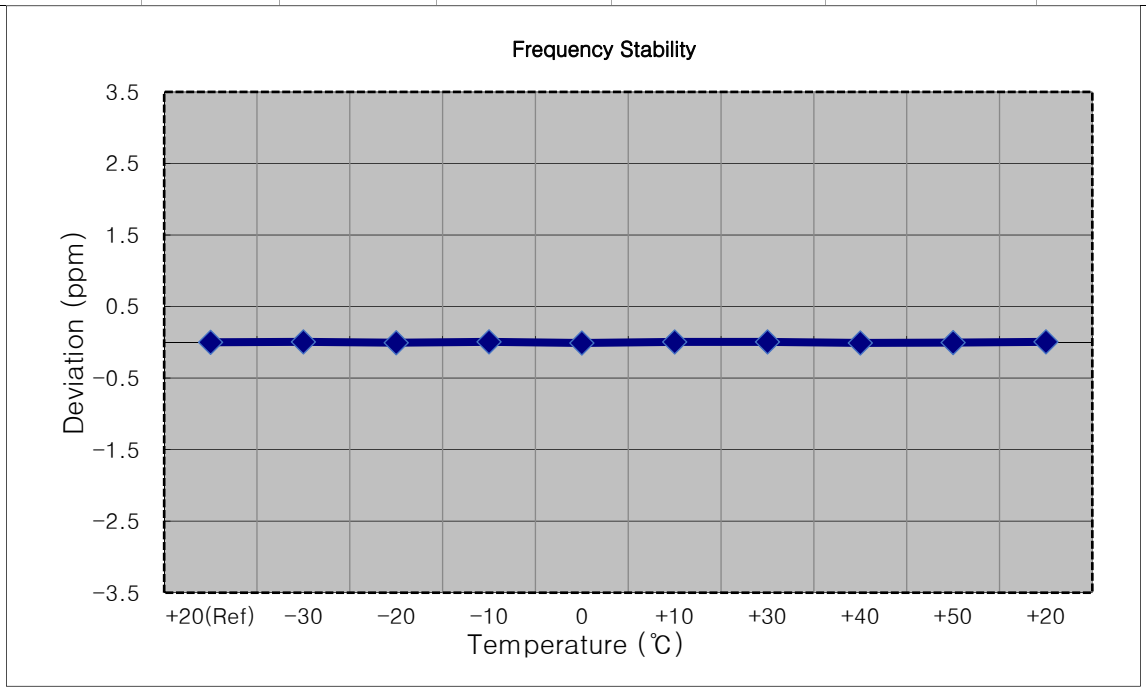
▣ OPERATING FREQUENCY: 715,300,000 Hz

▣ CHANNEL: 23173 (1.4 MHz)

▣ REFERENCE VOLTAGE: 3.880 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	715 299 996	0.0	0.000 000	0.000
100 %		-30	715 300 001	4.3	0.000 001	0.006
100 %		-20	715 299 992	-4.2	-0.000 001	-0.006
100 %		-10	715 300 001	4.6	0.000 001	0.006
100 %		0	715 299 990	-6.7	-0.000 001	-0.009
100 %		+10	715 300 000	3.8	0.000 001	0.005
100 %		+30	715 300 001	4.2	0.000 001	0.006
100 %		+40	715 299 990	-6.2	-0.000 001	-0.009
100 %		+50	715 299 994	-2.9	0.000 000	-0.004
Batt. Endpoint	3.300	+20	715 300 001	4.7	0.000 001	0.007



▣ MODE: LTE B12

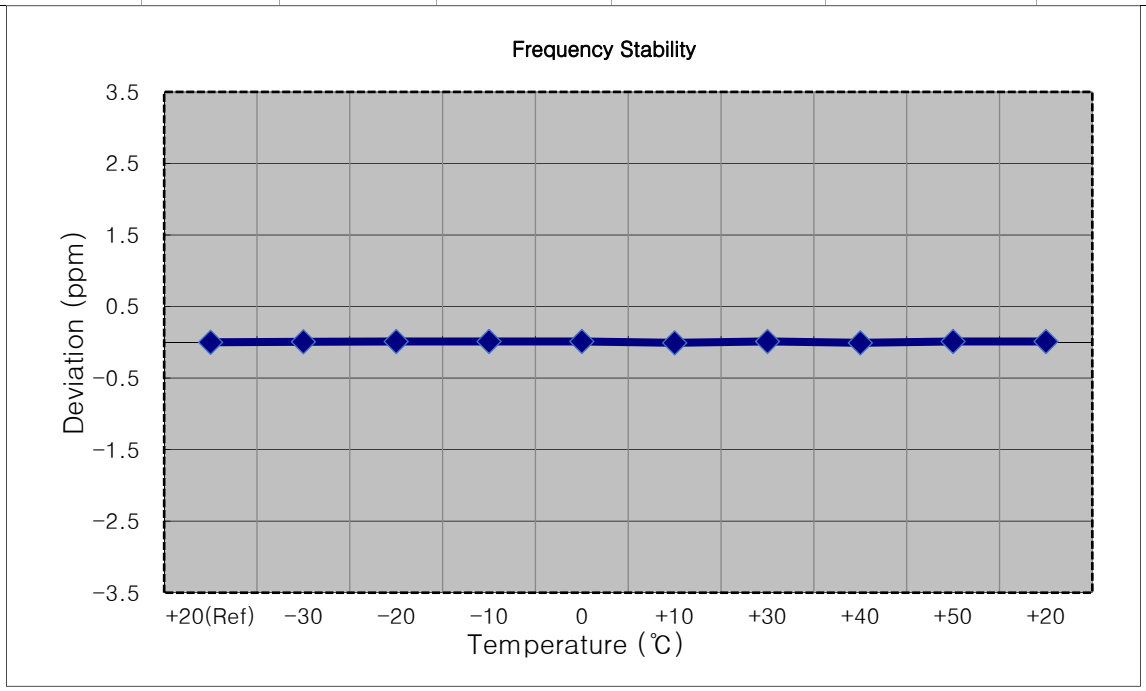
▣ OPERATING FREQUENCY: 714,500,000 Hz

▣ CHANNEL: 23165 (3 MHz)

▣ REFERENCE VOLTAGE: 3.880 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	714 500 006	0.0	0.000 000	0.000
100 %		-30	714 500 011	5.2	0.000 001	0.007
100 %		-20	714 500 014	8.2	0.000 001	0.011
100 %		-10	714 500 014	8.4	0.000 001	0.012
100 %		0	714 500 014	8.3	0.000 001	0.012
100 %		+10	714 500 001	-5.1	-0.000 001	-0.007
100 %		+30	714 500 014	8.7	0.000 001	0.012
100 %		+40	714 500 001	-5.1	-0.000 001	-0.007
100 %		+50	714 500 014	8.4	0.000 001	0.012
Batt. Endpoint	3.300	+20	714 500 014	8.2	0.000 001	0.011



▣ MODE: LTE B12

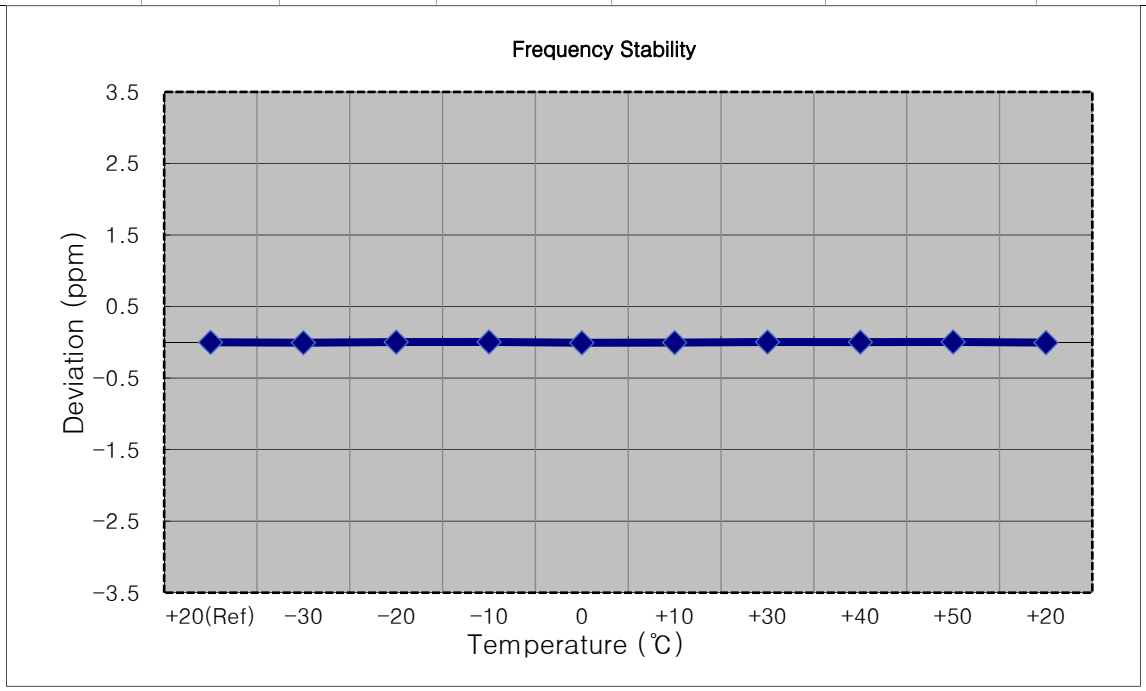
▣ OPERATING FREQUENCY: 713,500,000 Hz

▣ CHANNEL: 23155 (5 MHz)

▣ REFERENCE VOLTAGE: 3.880 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	713 500 004	0.0	0.000 000	0.000
100 %		-30	713 499 999	-4.1	-0.000 001	-0.006
100 %		-20	713 500 006	2.3	0.000 000	0.003
100 %		-10	713 500 007	3.6	0.000 001	0.005
100 %		0	713 499 999	-4.8	-0.000 001	-0.007
100 %		+10	713 500 001	-2.8	0.000 000	-0.004
100 %		+30	713 500 007	3.0	0.000 000	0.004
100 %		+40	713 500 006	2.0	0.000 000	0.003
100 %		+50	713 500 007	3.7	0.000 001	0.005
Batt. Endpoint	3.300	+20	713 500 000	-3.2	0.000 000	-0.004



▣ MODE: LTE B12

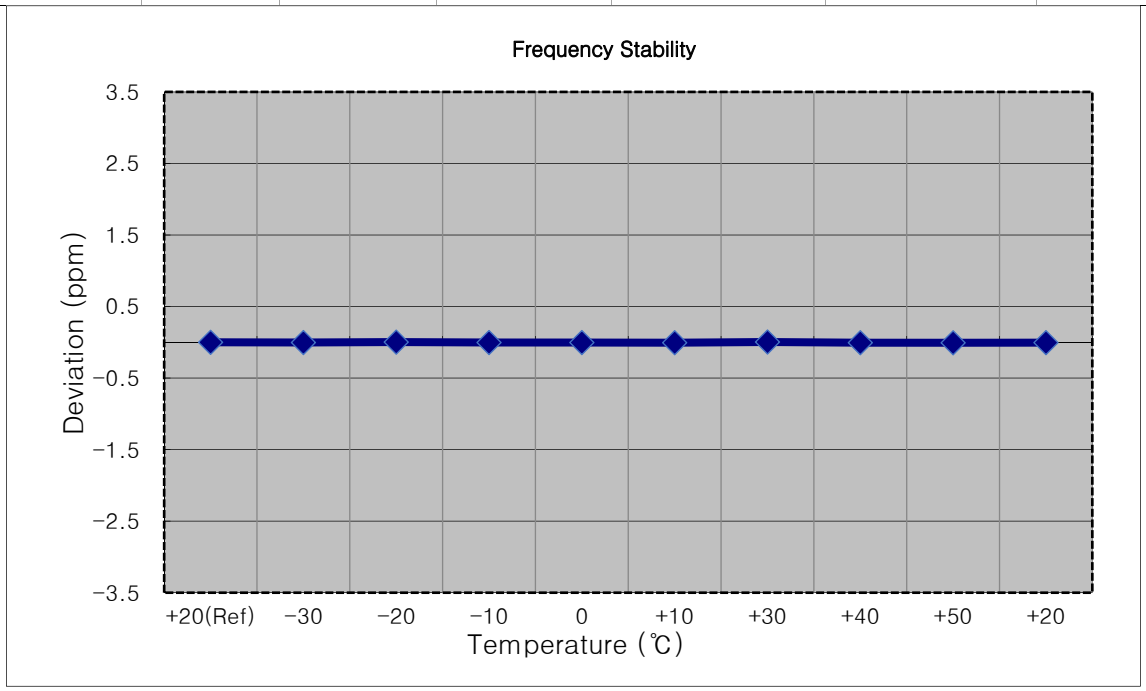
▣ OPERATING FREQUENCY: 711,000,000 Hz

▣ CHANNEL: 23130 (10 MHz)

▣ REFERENCE VOLTAGE: 3.880 VDC

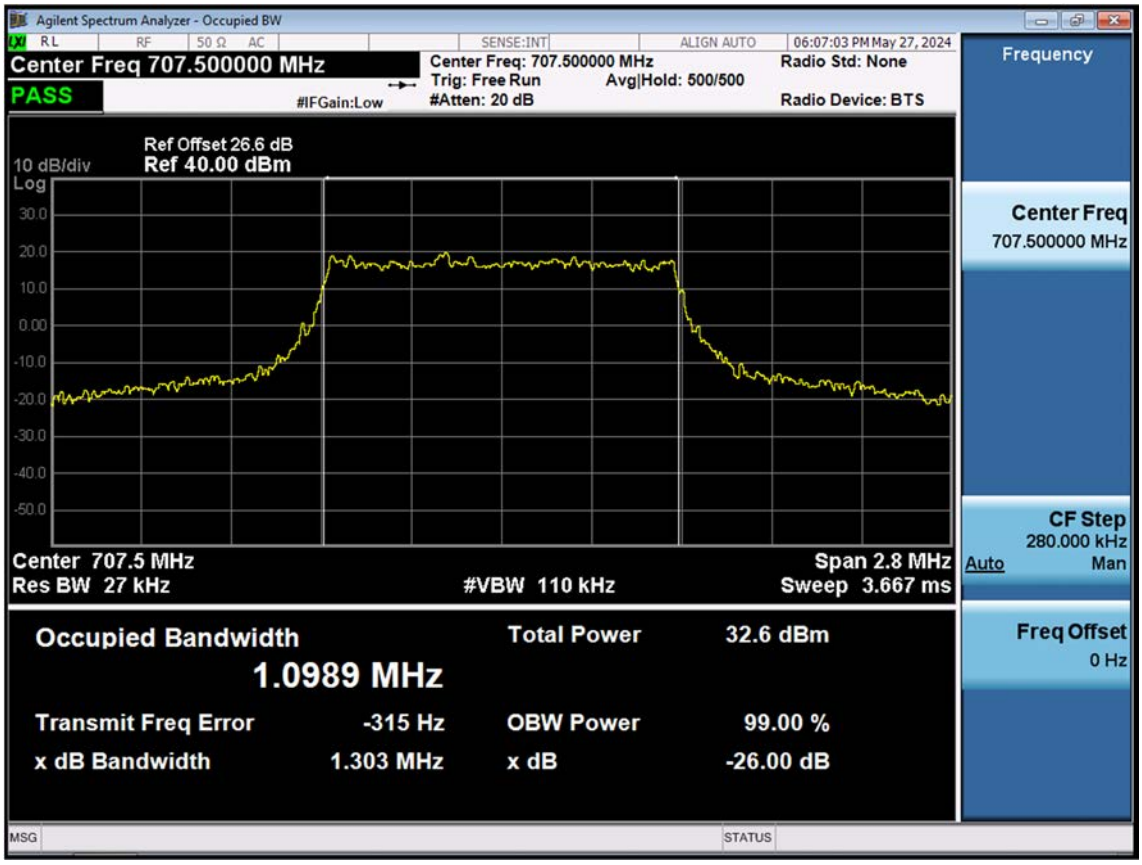
▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	711 000 002	0.0	0.000 000	0.000
100 %		-30	711 000 000	-2.0	0.000 000	-0.003
100 %		-20	711 000 005	2.3	0.000 000	0.003
100 %		-10	711 000 000	-2.1	0.000 000	-0.003
100 %		0	711 000 000	-2.4	0.000 000	-0.003
100 %		+10	710 999 998	-3.9	-0.000 001	-0.005
100 %		+30	711 000 005	2.9	0.000 000	0.004
100 %		+40	710 999 999	-3.8	-0.000 001	-0.005
100 %		+50	710 999 998	-4.7	-0.000 001	-0.007
Batt. Endpoint	3.300	+20	710 999 999	-3.4	0.000 000	-0.005

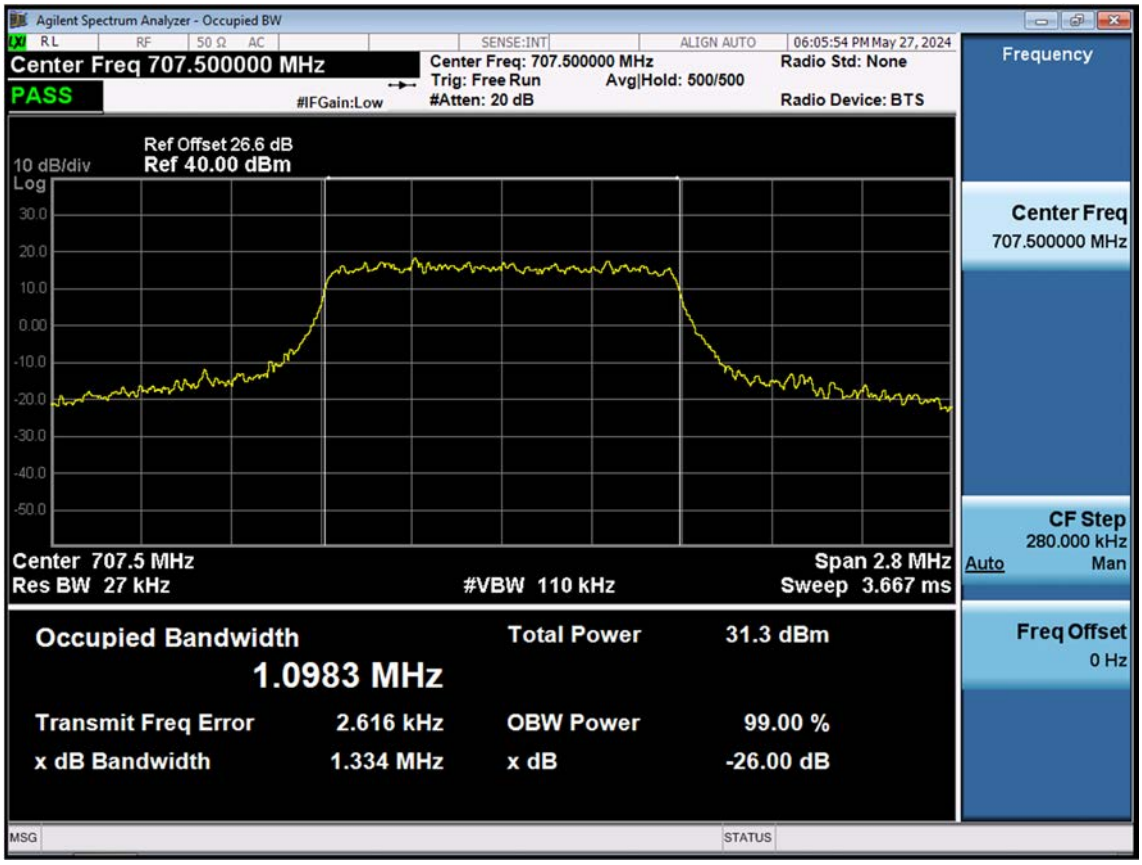


9. TEST PLOTS

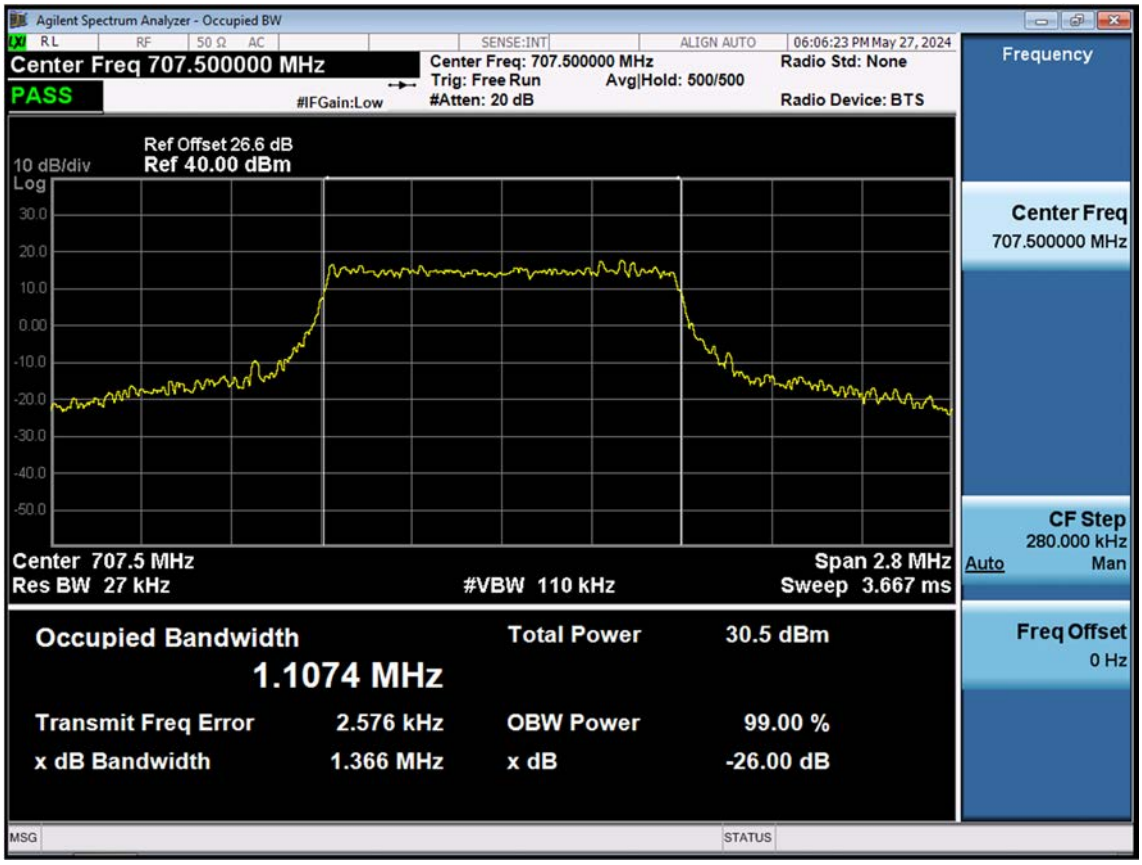
LTE B12_1.4M_OBW_Mid_QPSK_FullRB



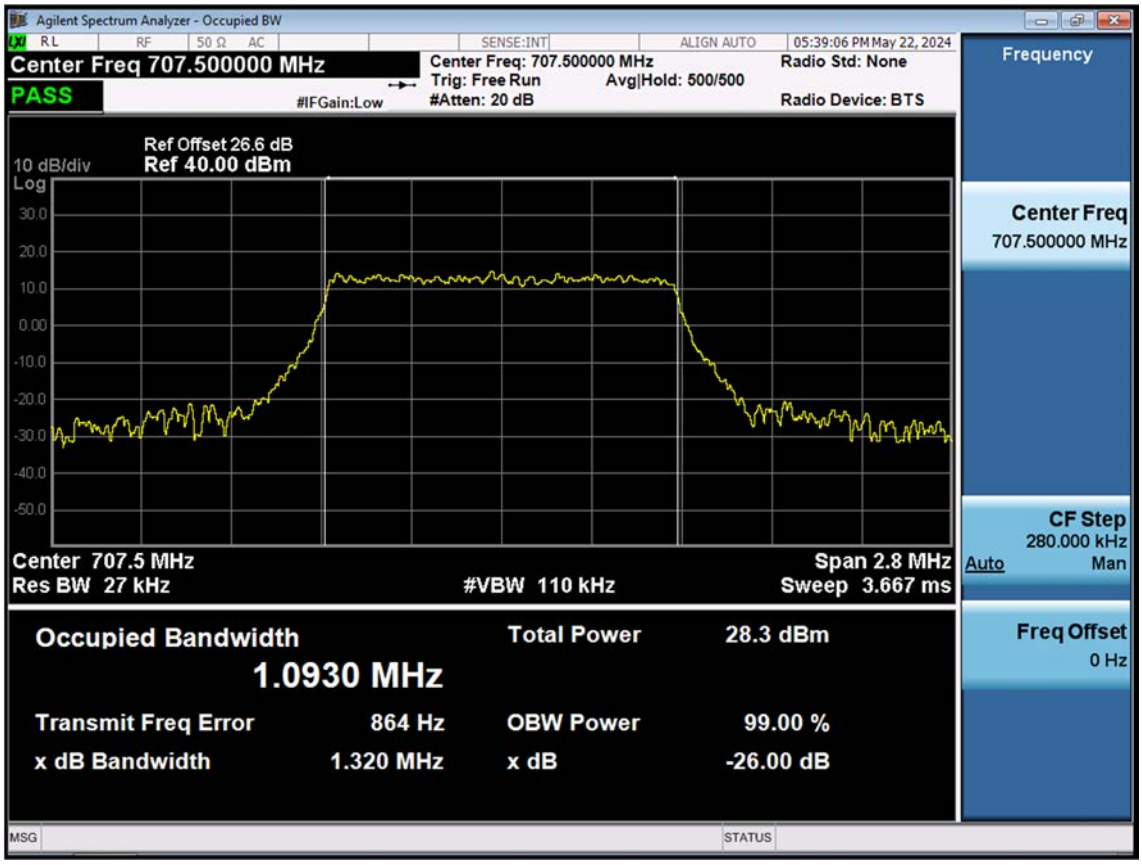
LTE B12_1.4M_OBW_Mid_16QAM_FullRB



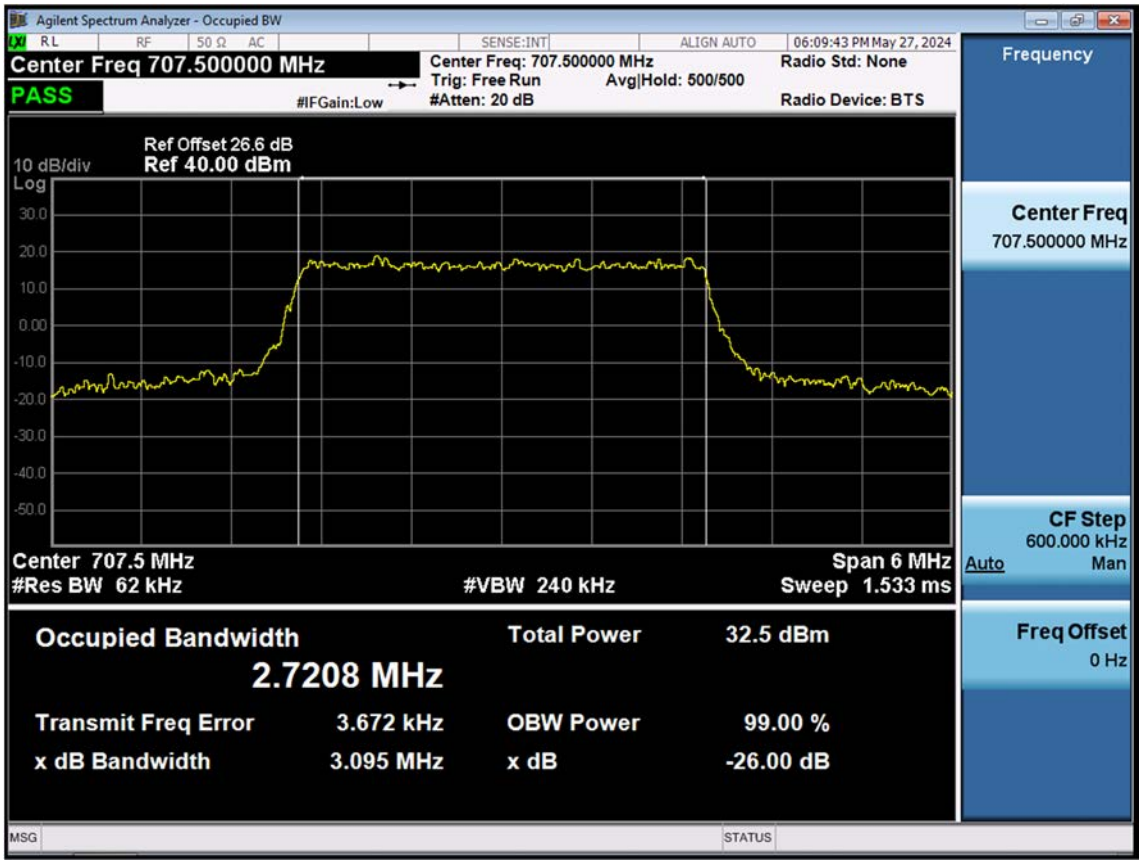
LTE B12_1.4M_OBW_Mid_64QAM_FullRB



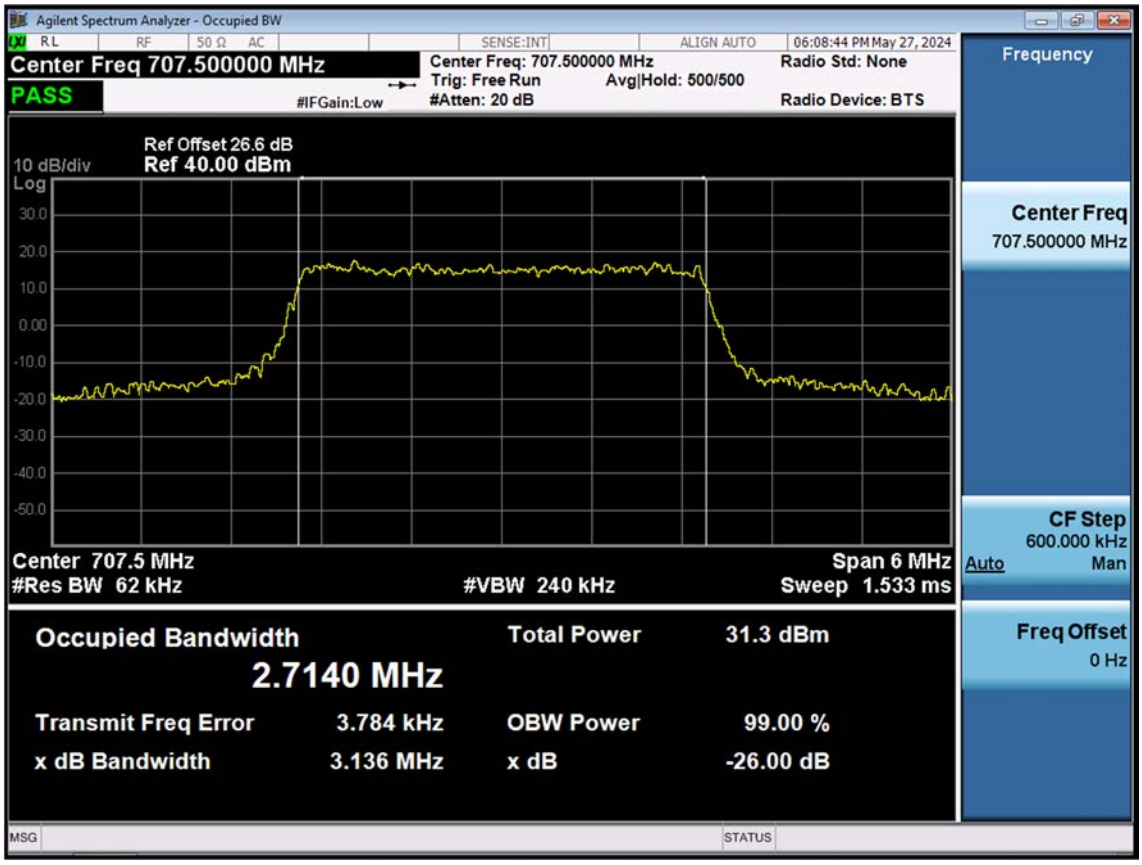
LTE B12_1.4M_OBW_Mid_256QAM_FullRB



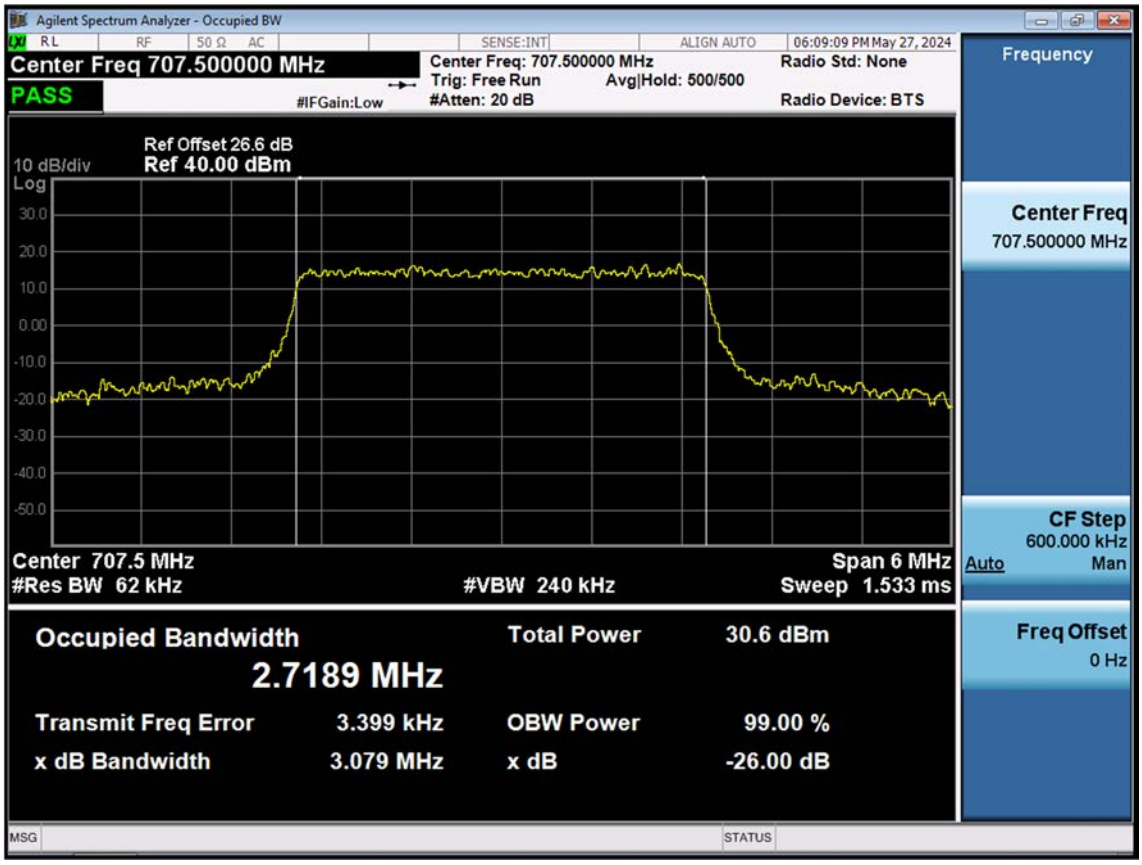
LTE B12_3 M_OBW_Mid_QPSK_FullRB



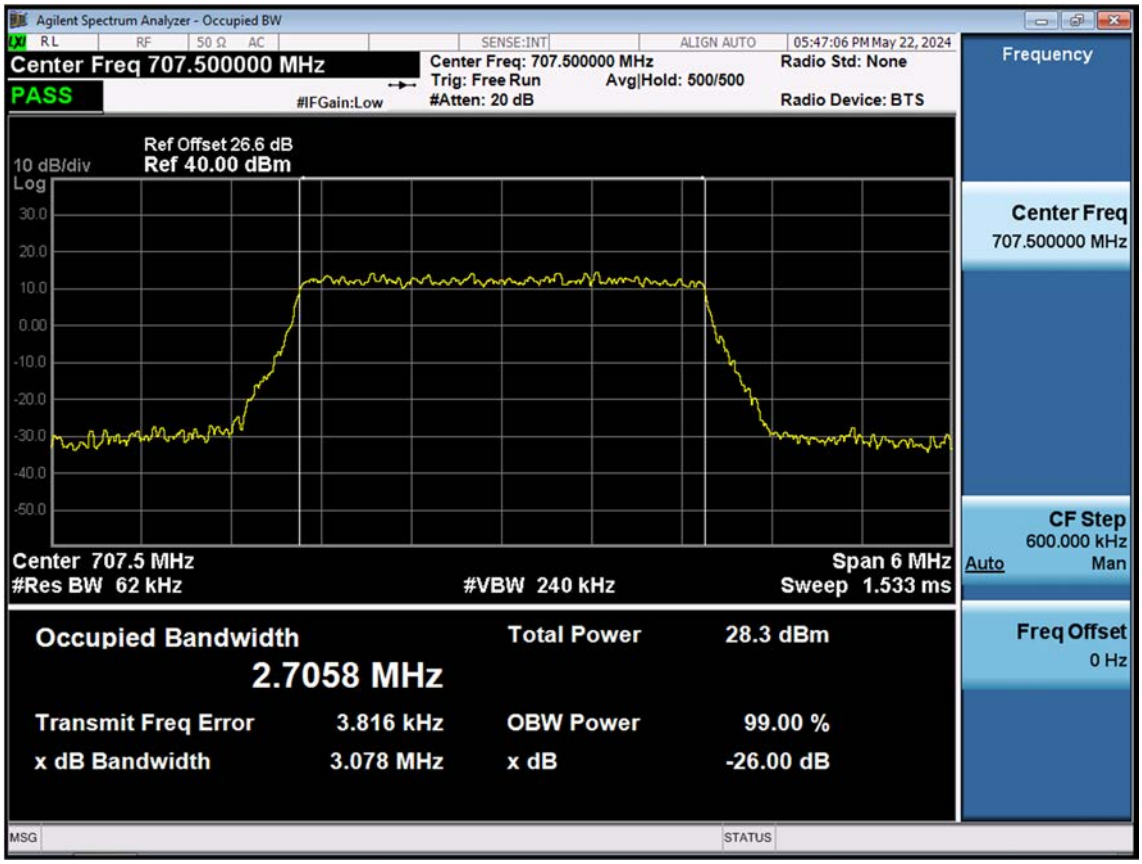
LTE B12_3 M_OBW_Mid_16QAM_FullRB



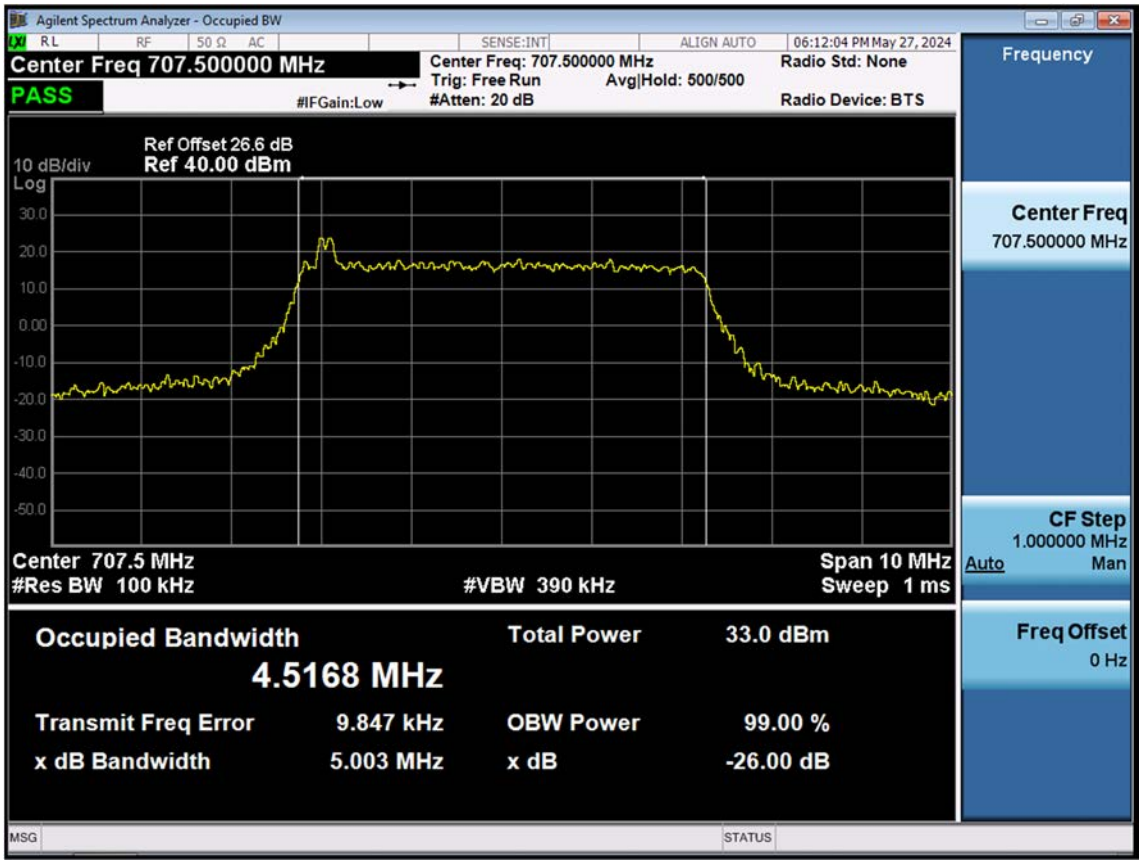
LTE B12_3 M_OBW_Mid_64QAM_FullRB



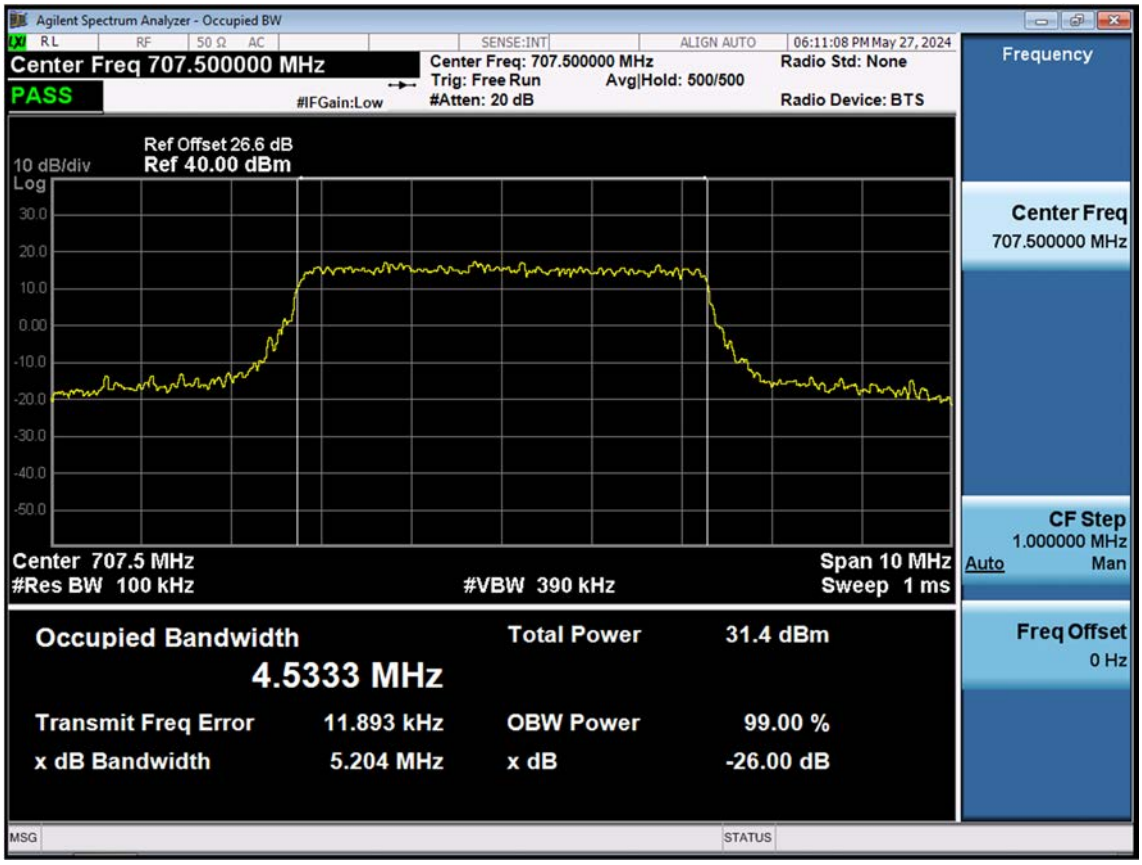
LTE B12_3 M_OBW_Mid_256QAM_FullRB



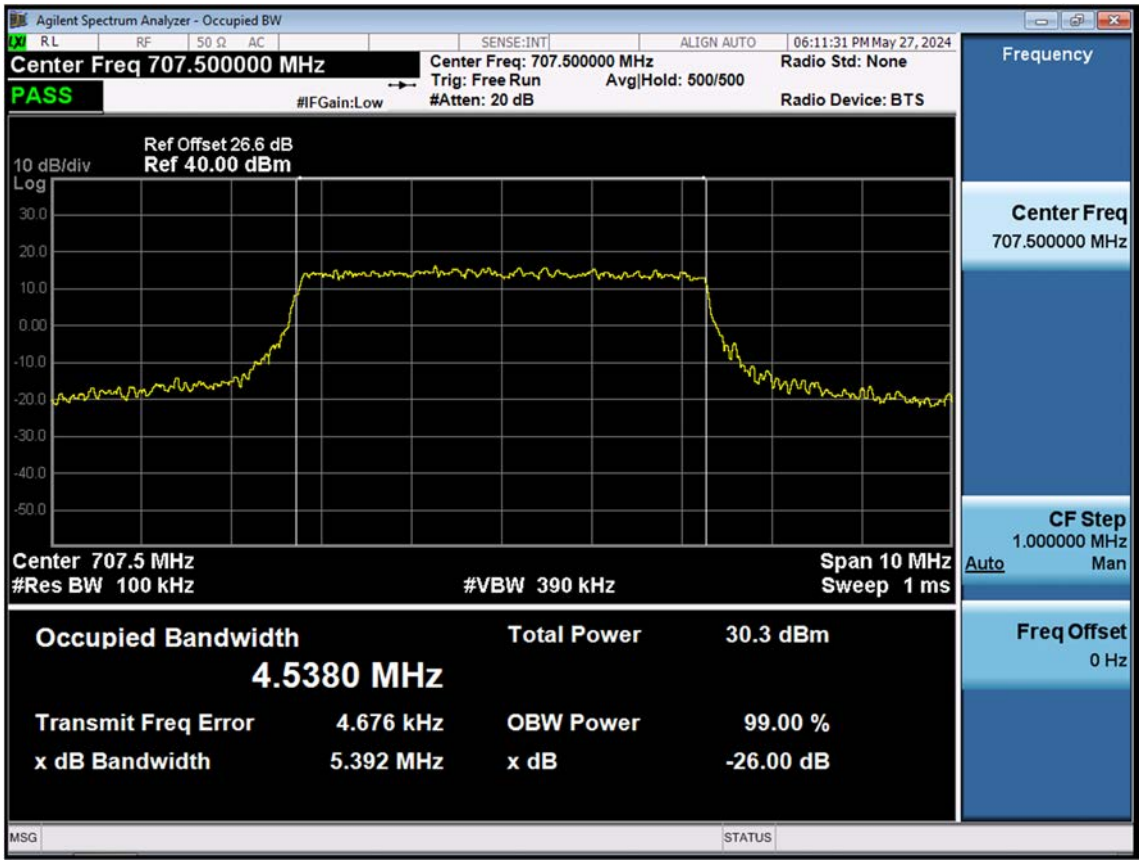
LTE B12_5 M_OBW_Mid_QPSK_FullRB



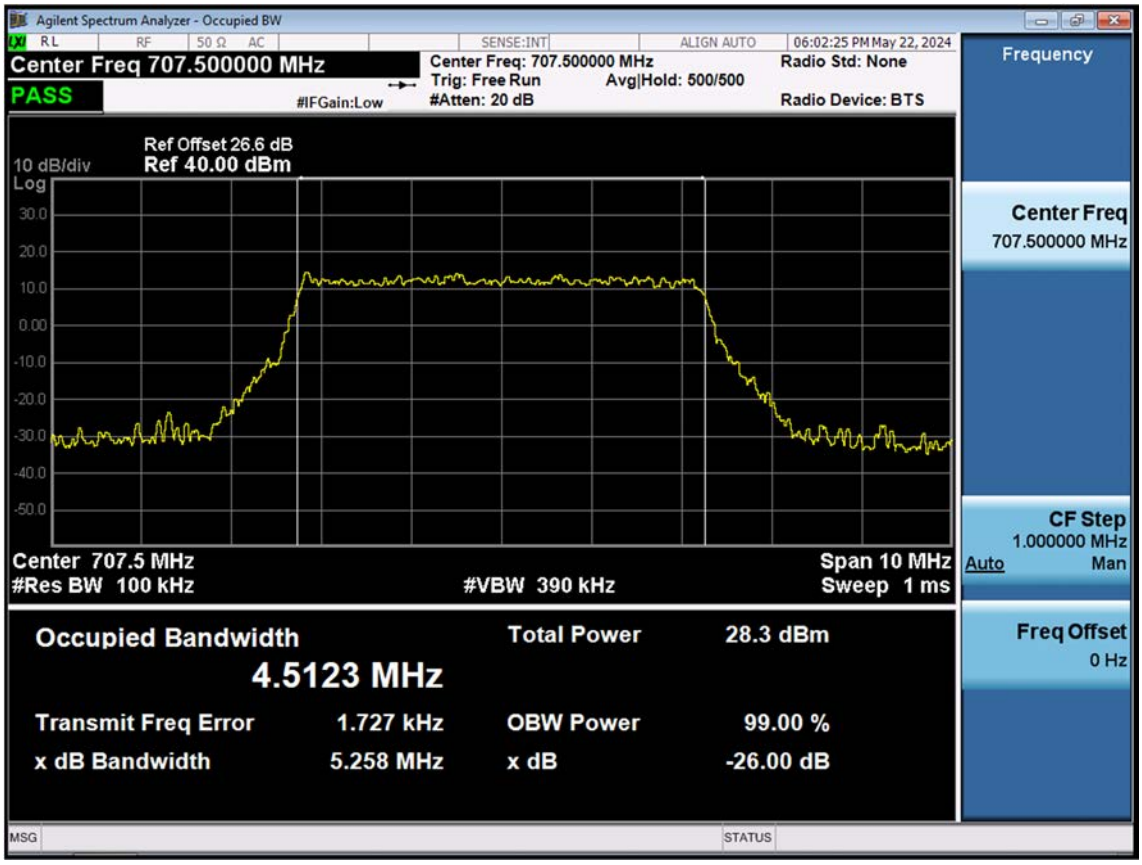
LTE B12_5 M_OBW_Mid_16QAM_FullRB



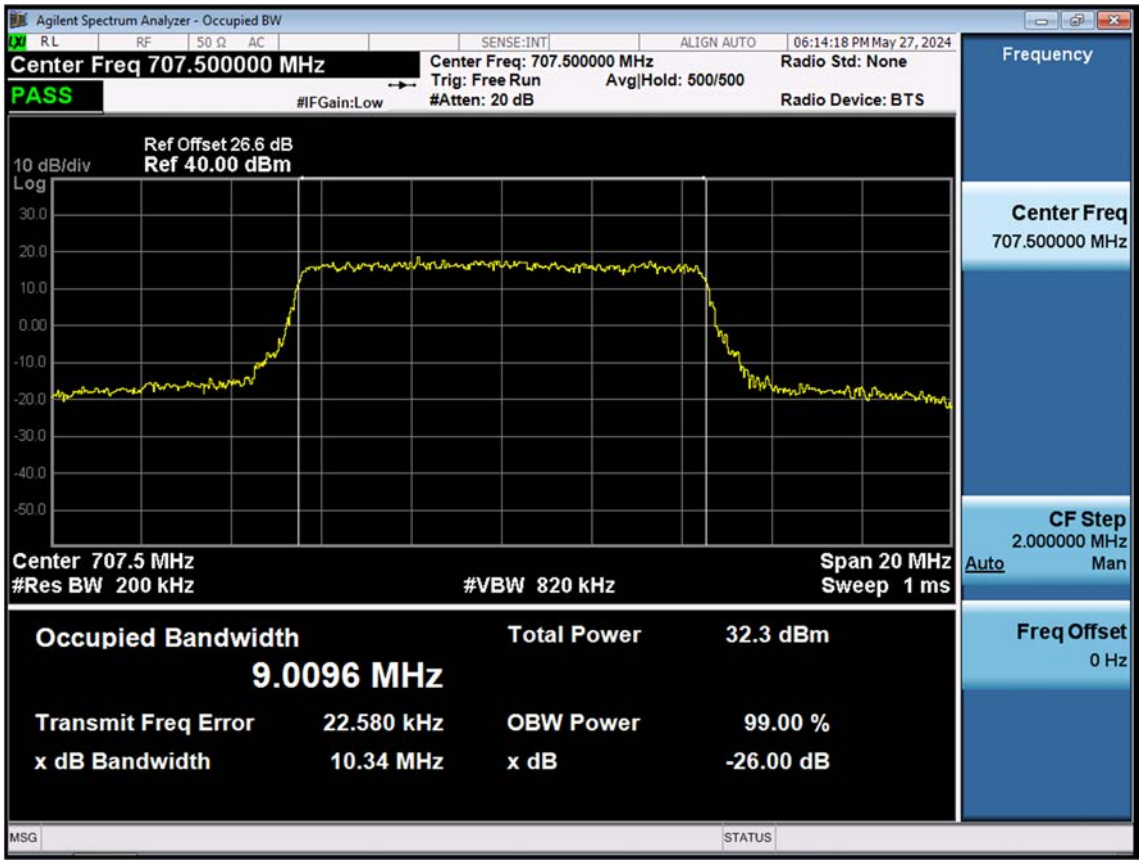
LTE B12_5 M_OBW_Mid_64QAM_FullRB



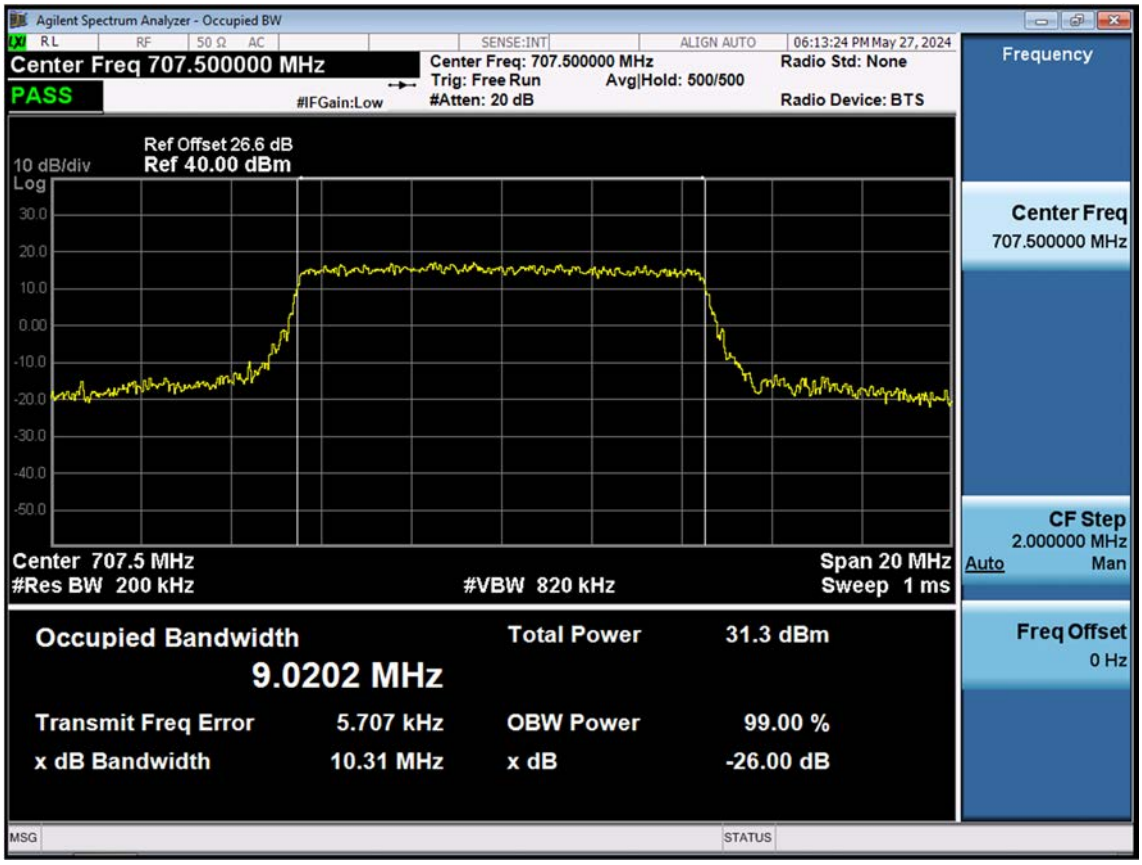
LTE B12_5 M_OBW_Mid_256QAM_FullRB



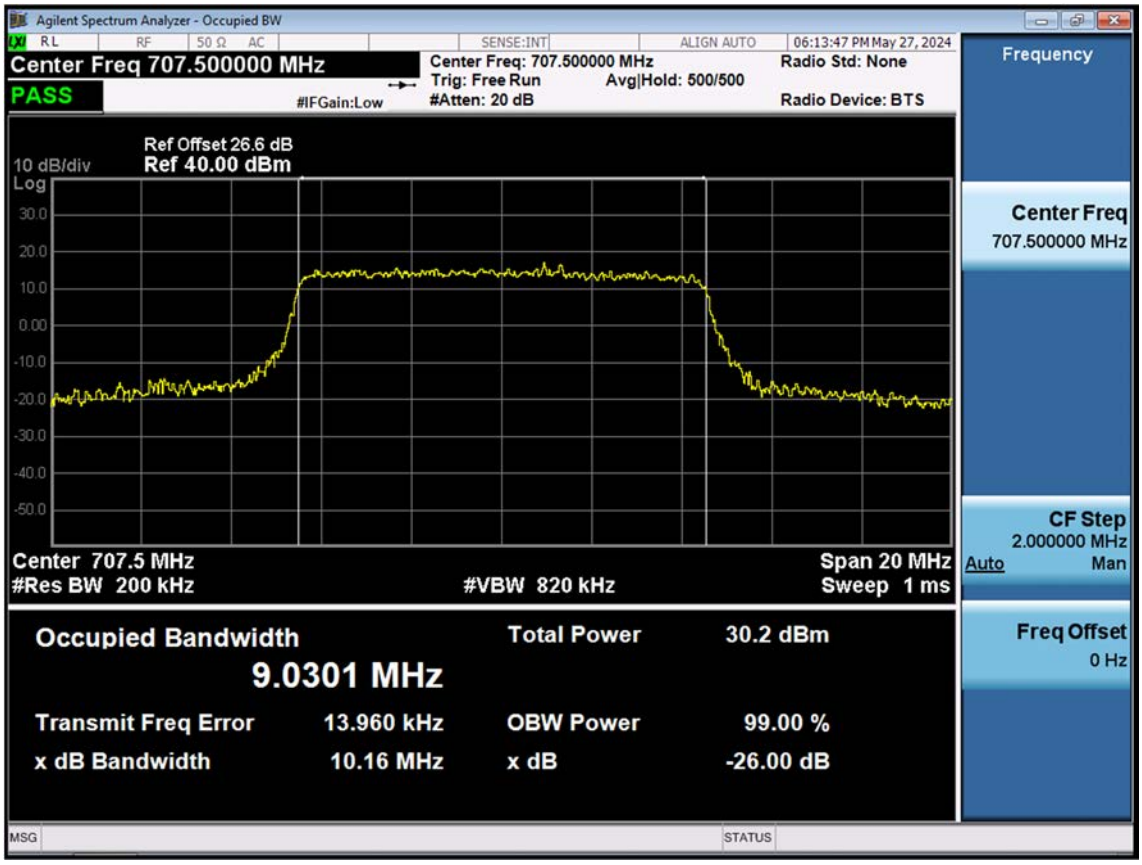
LTE B12_10 M_OBW_Mid_QPSK_FullRB



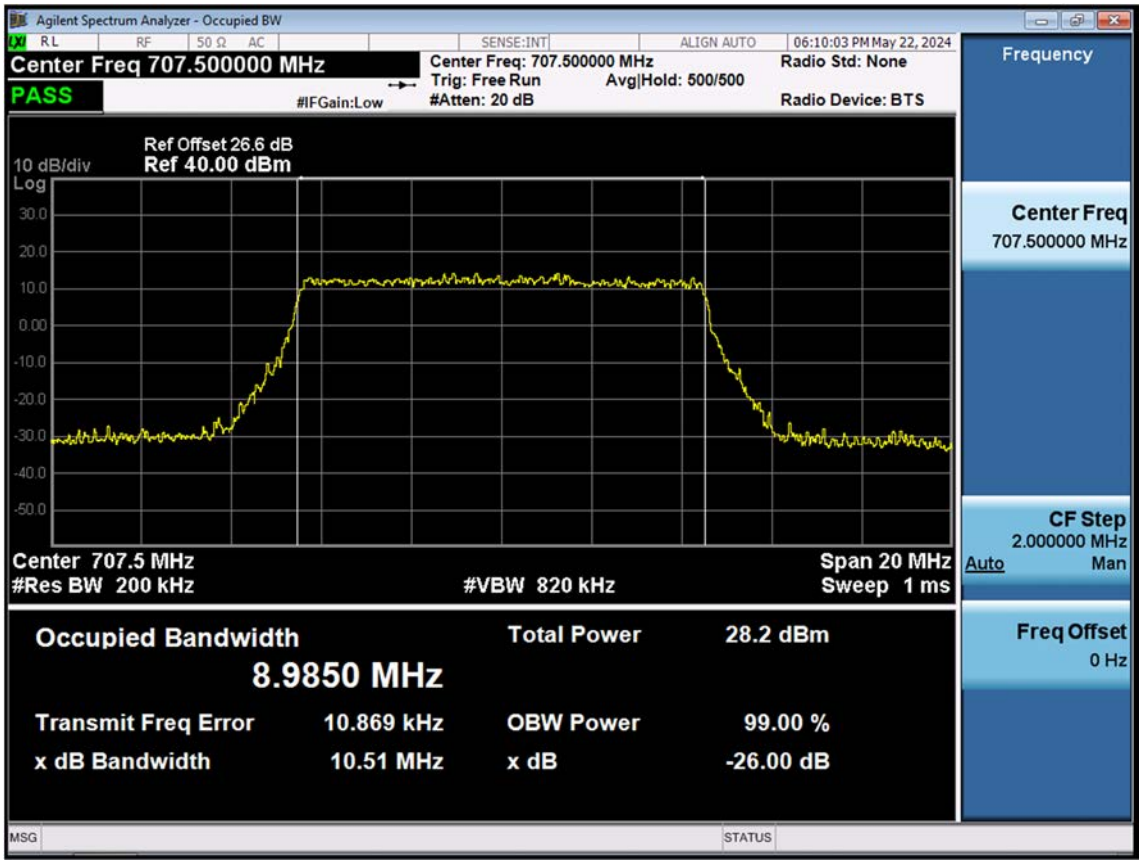
LTE B12_10 M_OBW_Mid_16QAM_FullRB



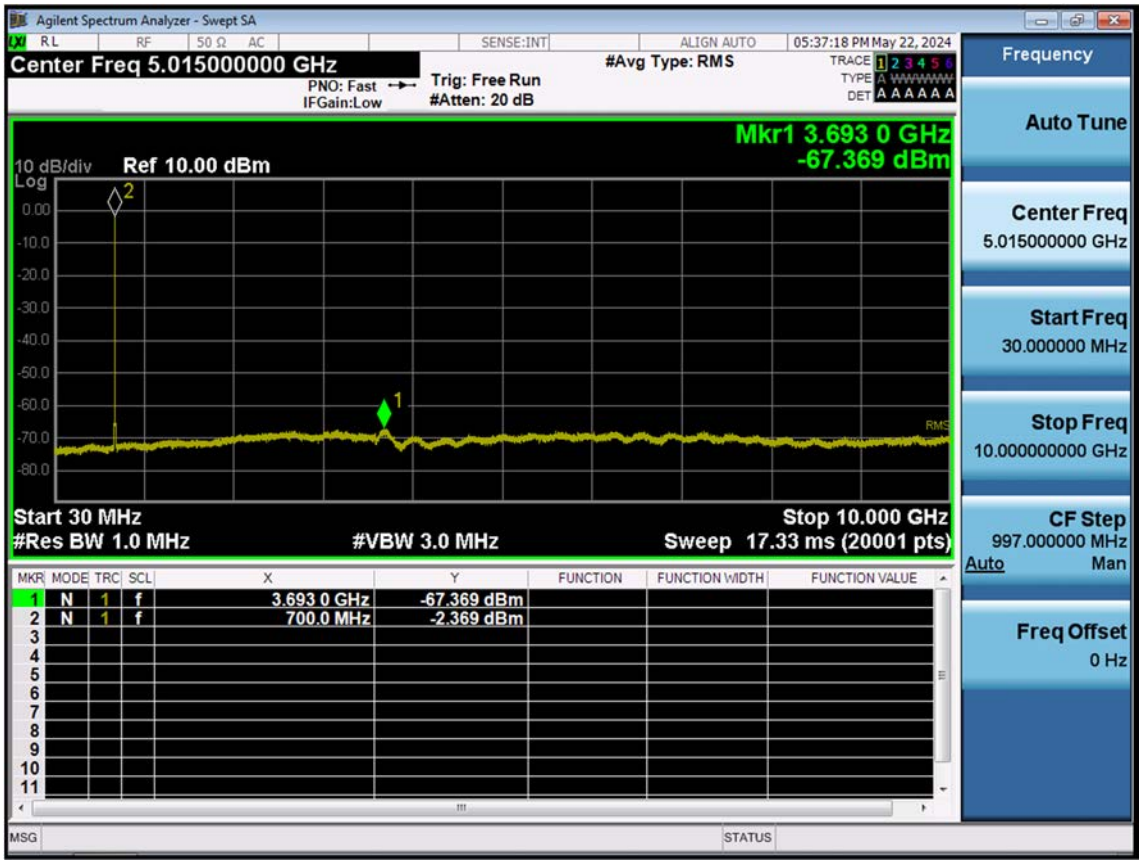
LTE B12_10 M_OBW_Mid_64QAM_FullRB



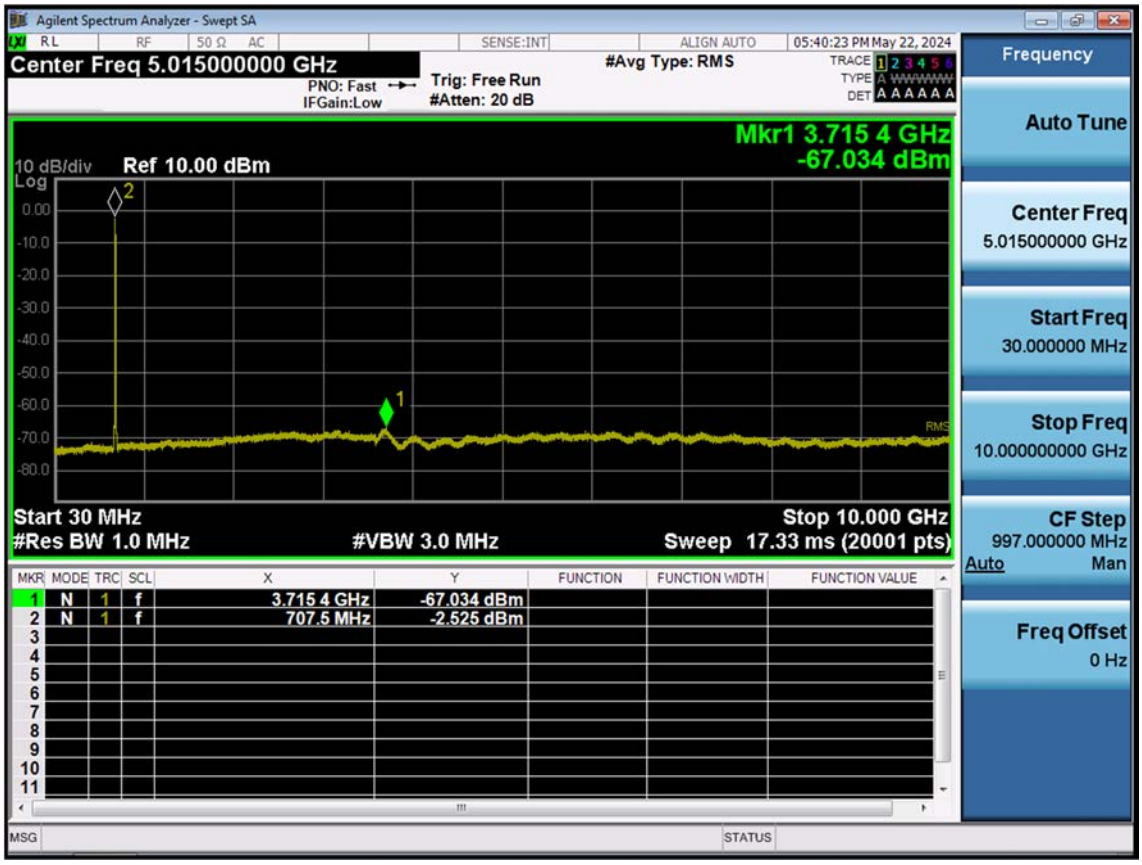
LTE B12_10 M_OBW_Mid_256QAM_FullRB



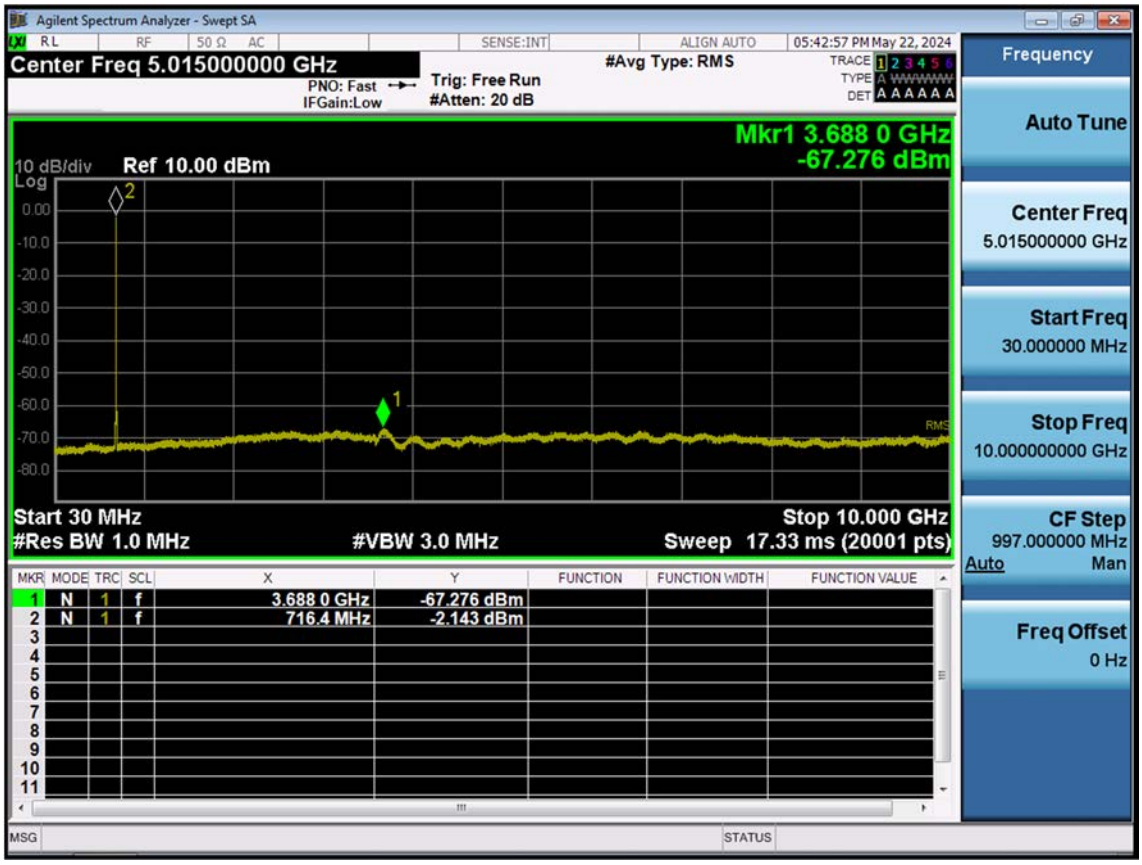
LTE B12_1.4M_Conducted Spurious(30 M-10 G)_Low_QPSK_1RB



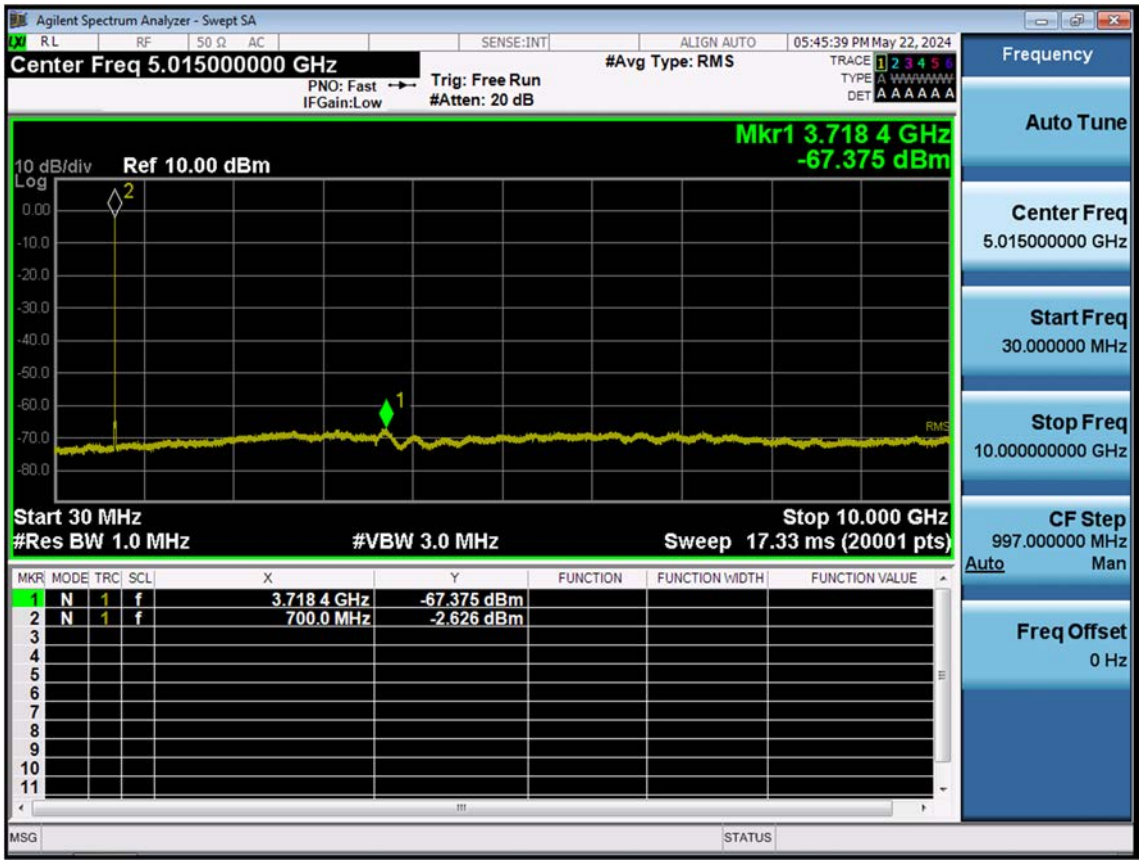
LTE B12_1.4M_Conducted Spurious(30 M-10 G)_Mid_QPSK_1RB



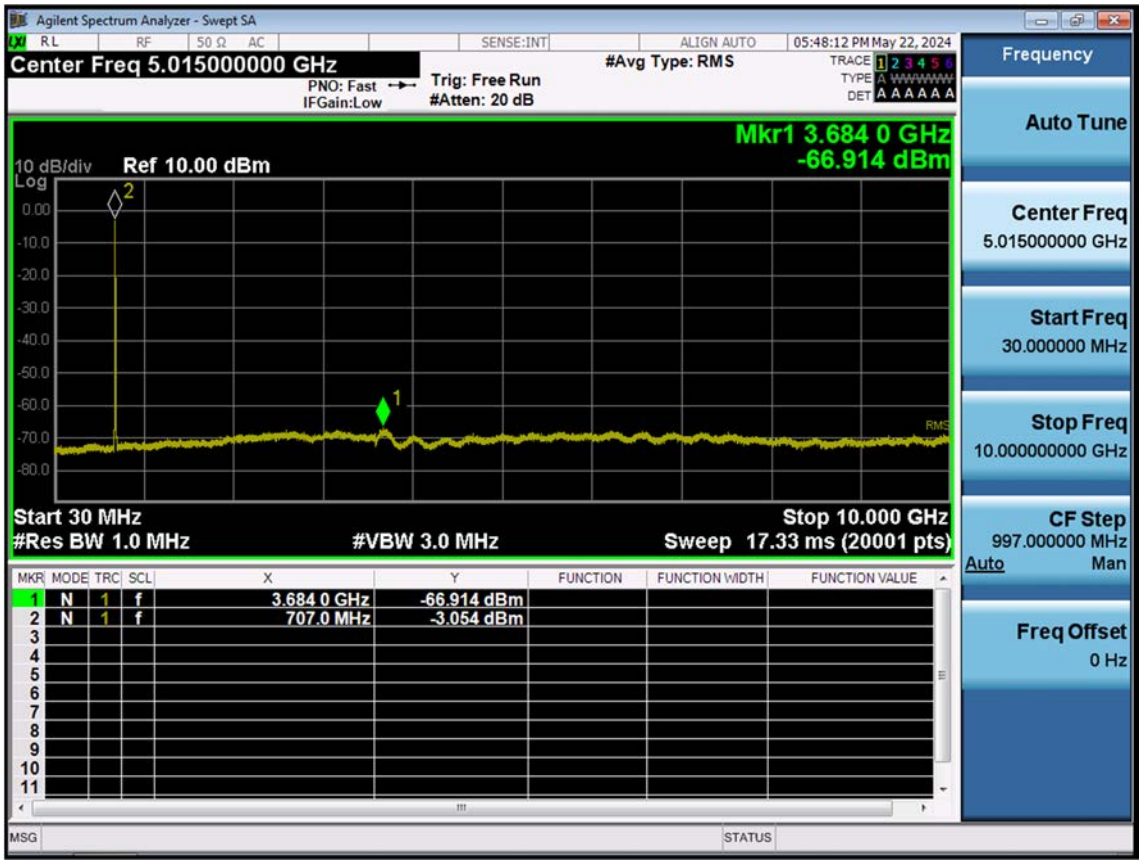
LTE B12_1.4M_Conducted Spurious(30 M-10 G)_High_QPSK_1RB



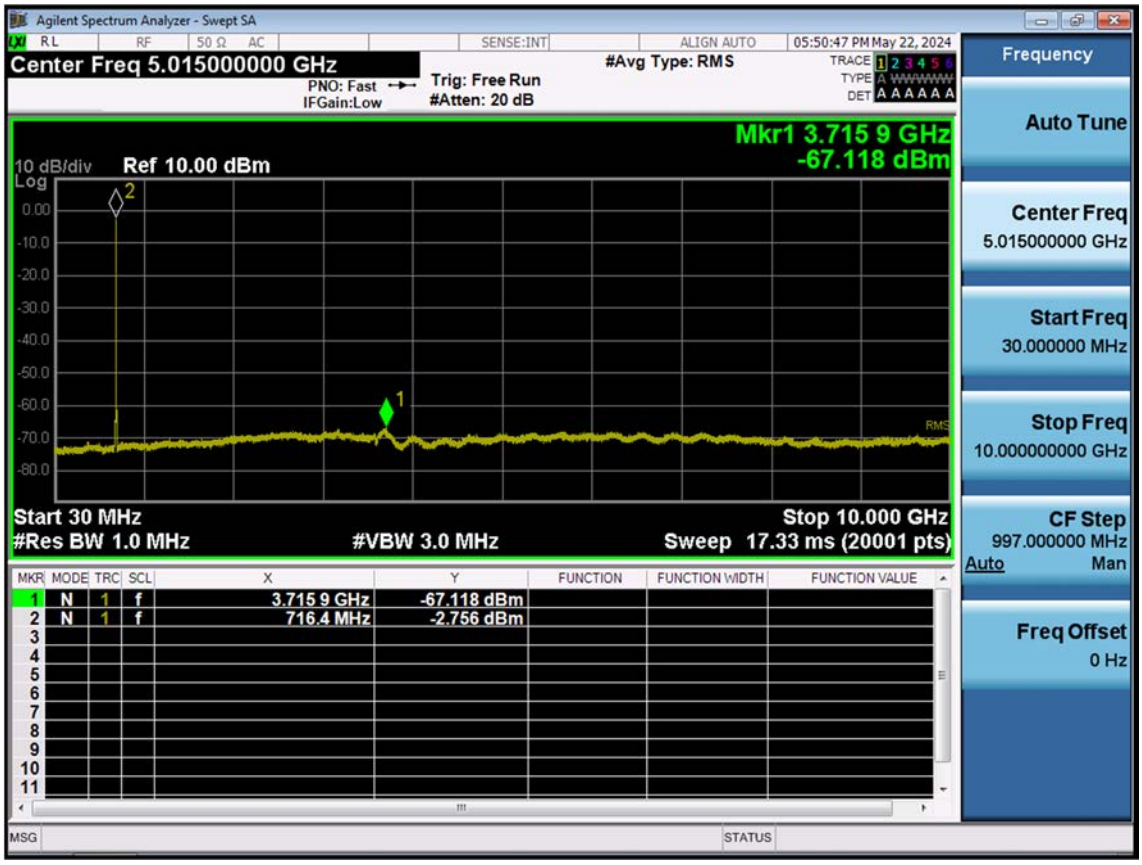
LTE B12_3 M_Conducted Spurious(30 M-10 G)_Low_QPSK_1RB



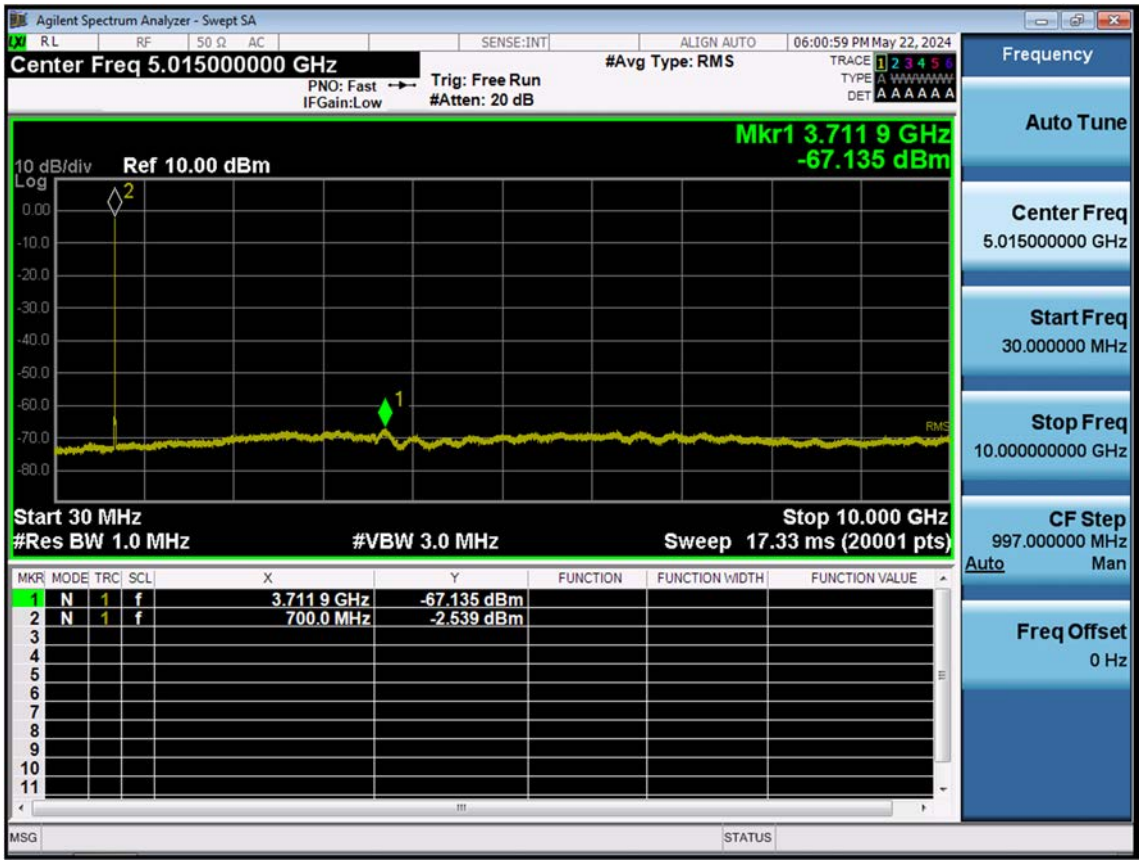
LTE B12_3 M_Conducted Spurious(30 M-10 G)_Mid_QPSK_1RB



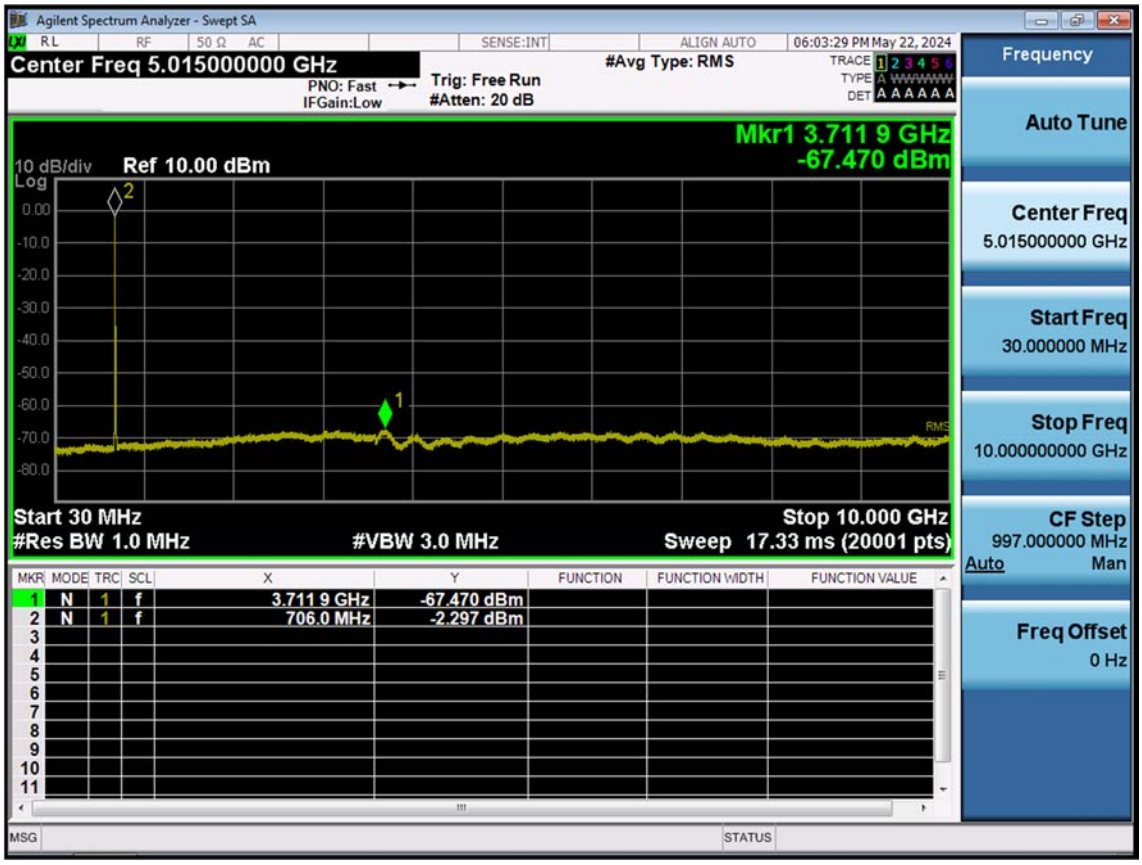
LTE B12_3 M_Conducted Spurious(30 M-10 G)_High_QPSK_1RB



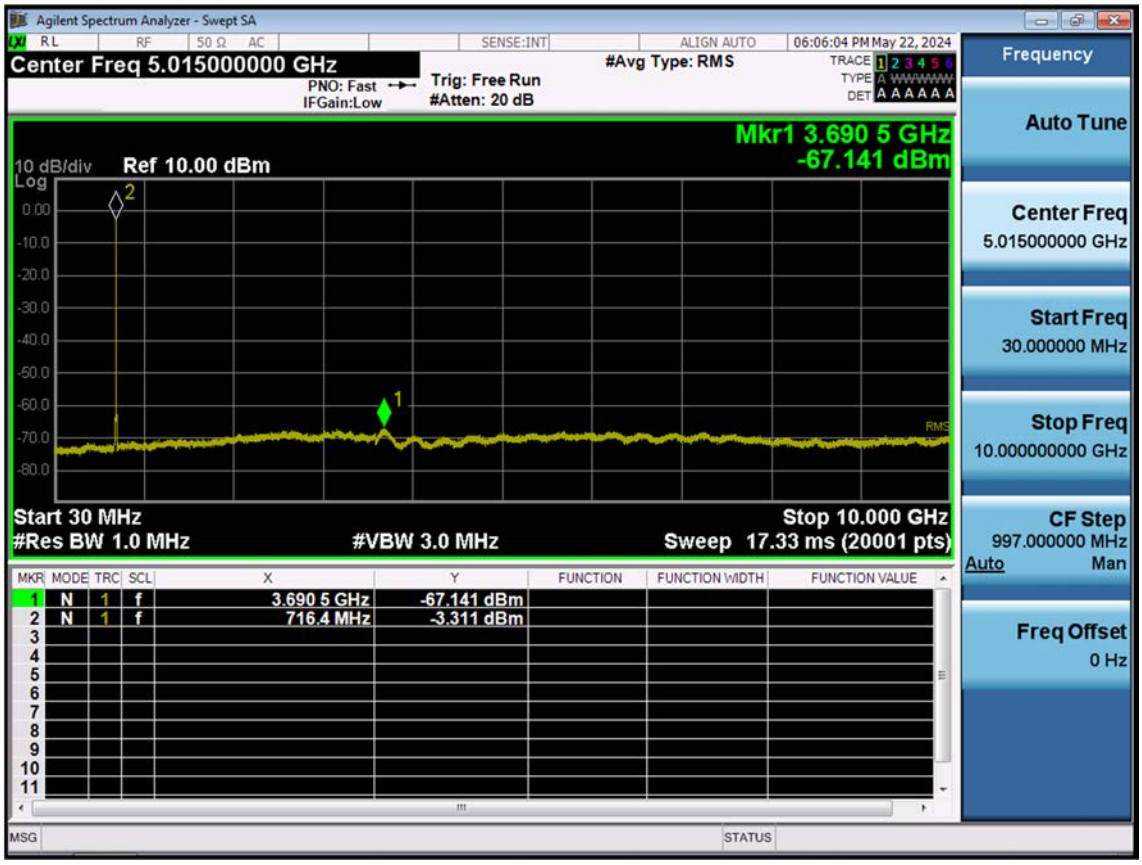
LTE B12_5 M_Conducted Spurious(30 M-10 G)_Low_QPSK_1RB



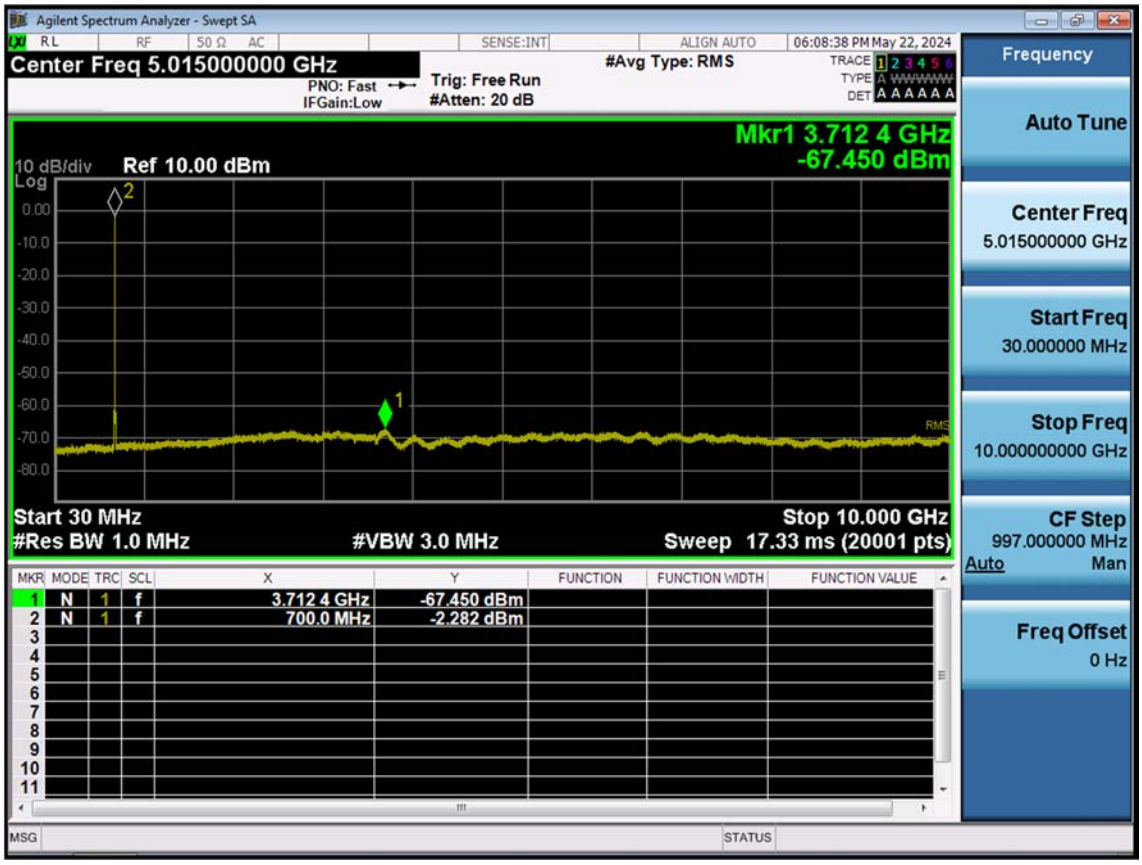
LTE B12_5 M_Conducted Spurious(30 M-10 G)_Mid_QPSK_1RB



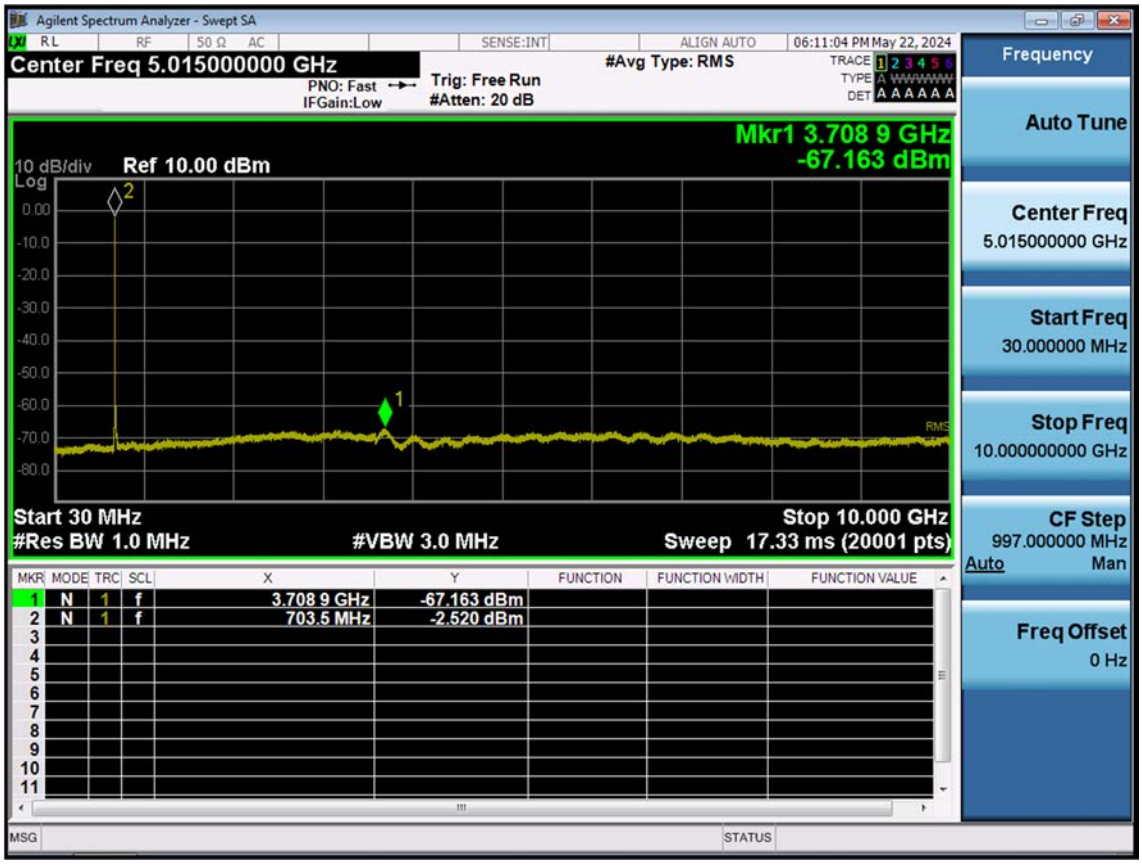
LTE B12_5 M_Conducted Spurious(30 M-10 G)_High_QPSK_1RB



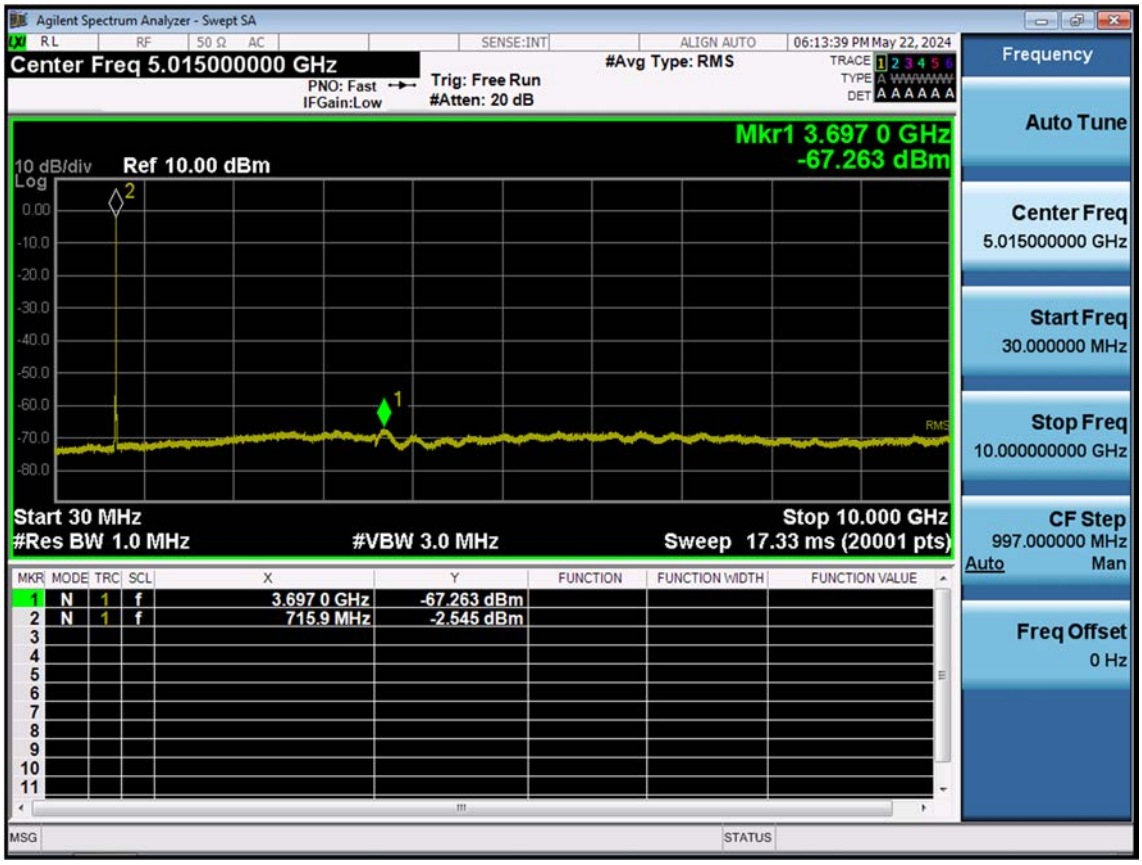
LTE B12_10 M_Conducted Spurious(30 M-10 G)_Low_QPSK_1RB



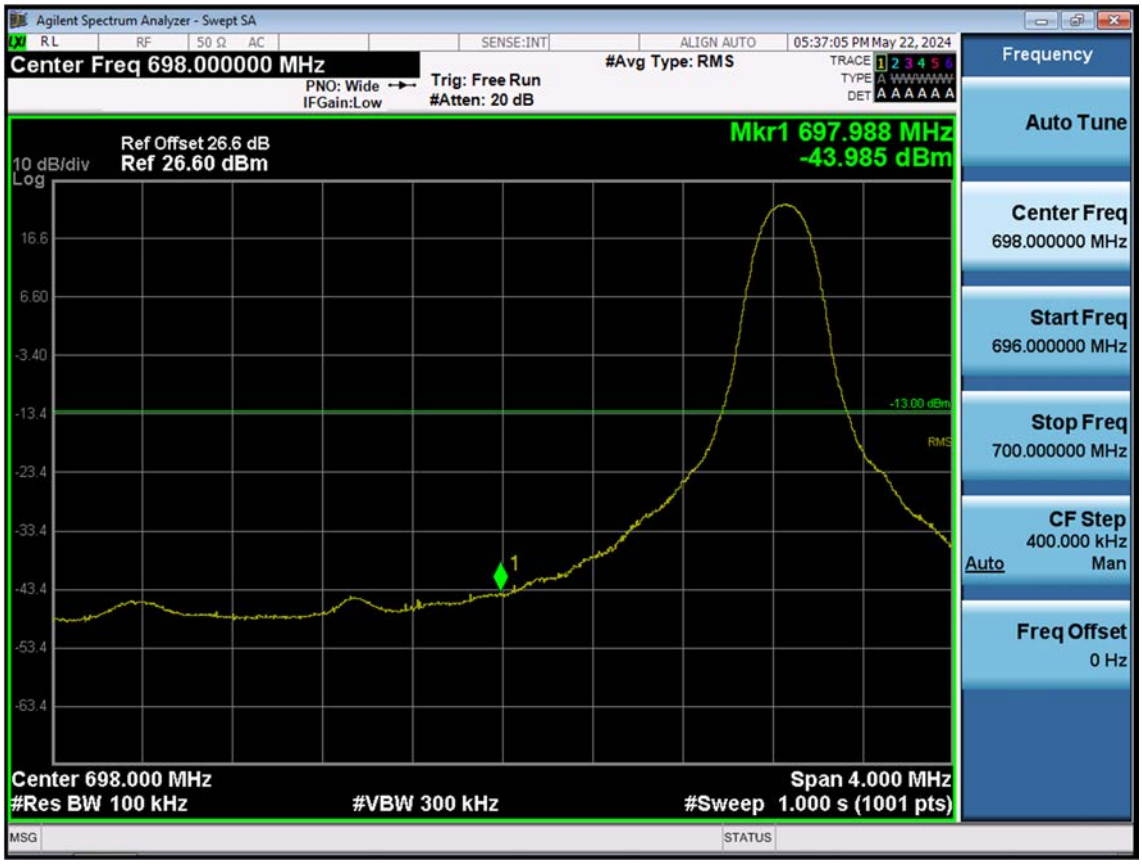
LTE B12_10 M_Conducted Spurious(30 M-10 G)_Mid_QPSK_1RB



LTE B12_10 M_Conducted Spurious(30 M-10 G)_High_QPSK_1RB



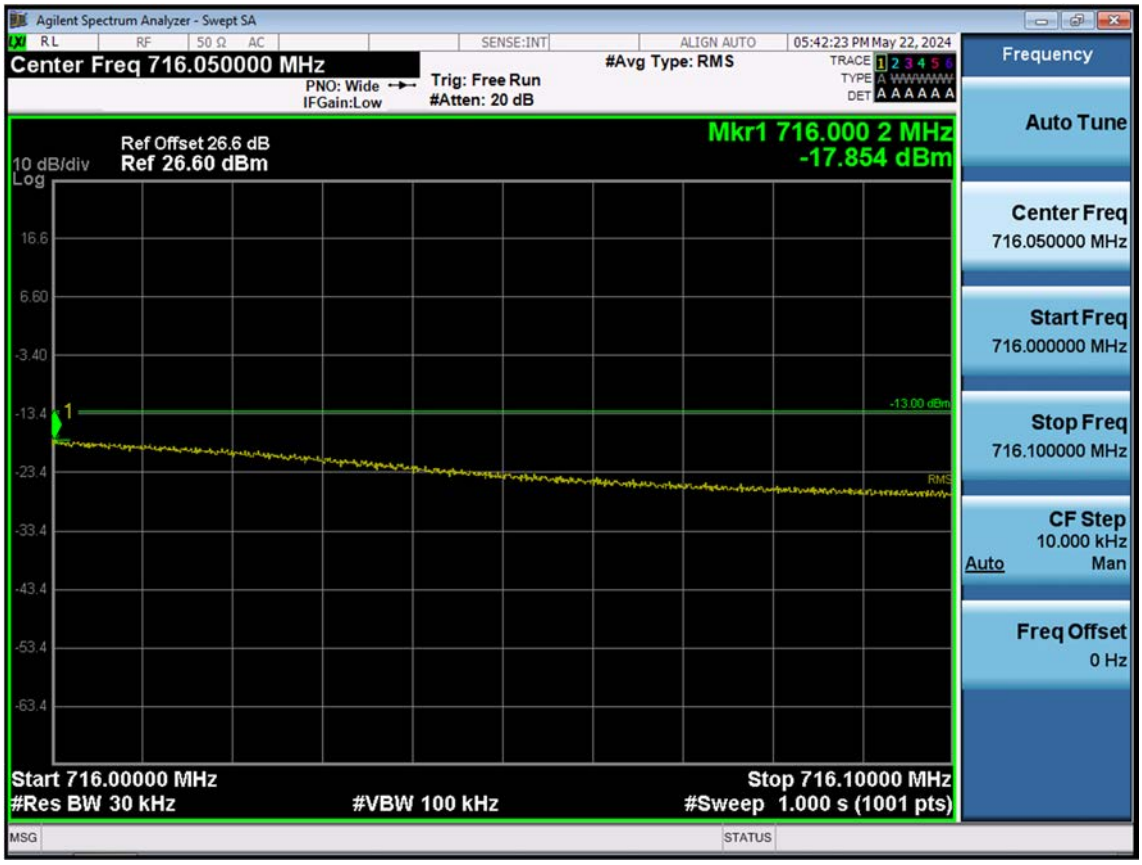
LTE B12_1.4M_Band Edge_Low_QPSK_1RB



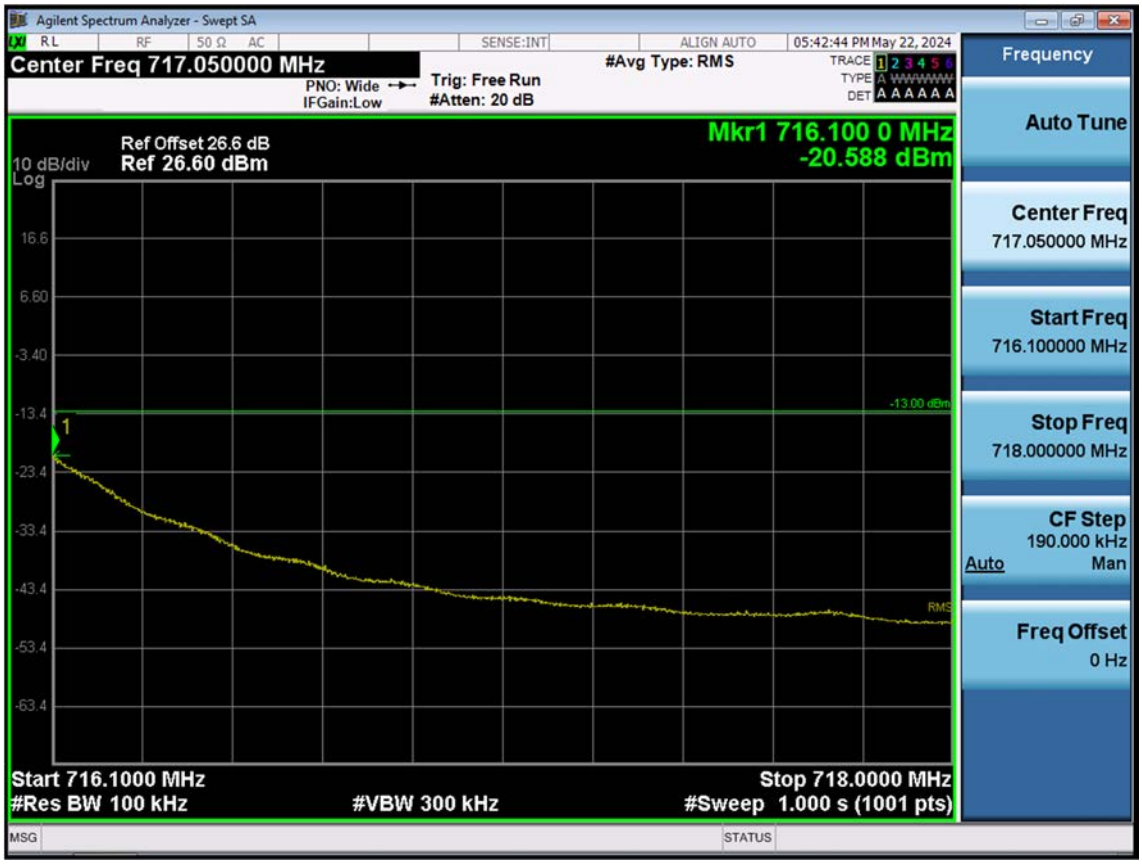
LTE B12_1.4M_Band Edge_Low_QPSK_FullRB

LTE B12_1.4M_Extended Band Edge_Low_QPSK_FullRB

LTE B12_1.4M_Band Edge_High_QPSK_1RB(1)



LTE B12_1.4M_Band Edge_High_QPSK_1RB(2)



LTE B12_1.4M_Band Edge_High_QPSK_FullRB

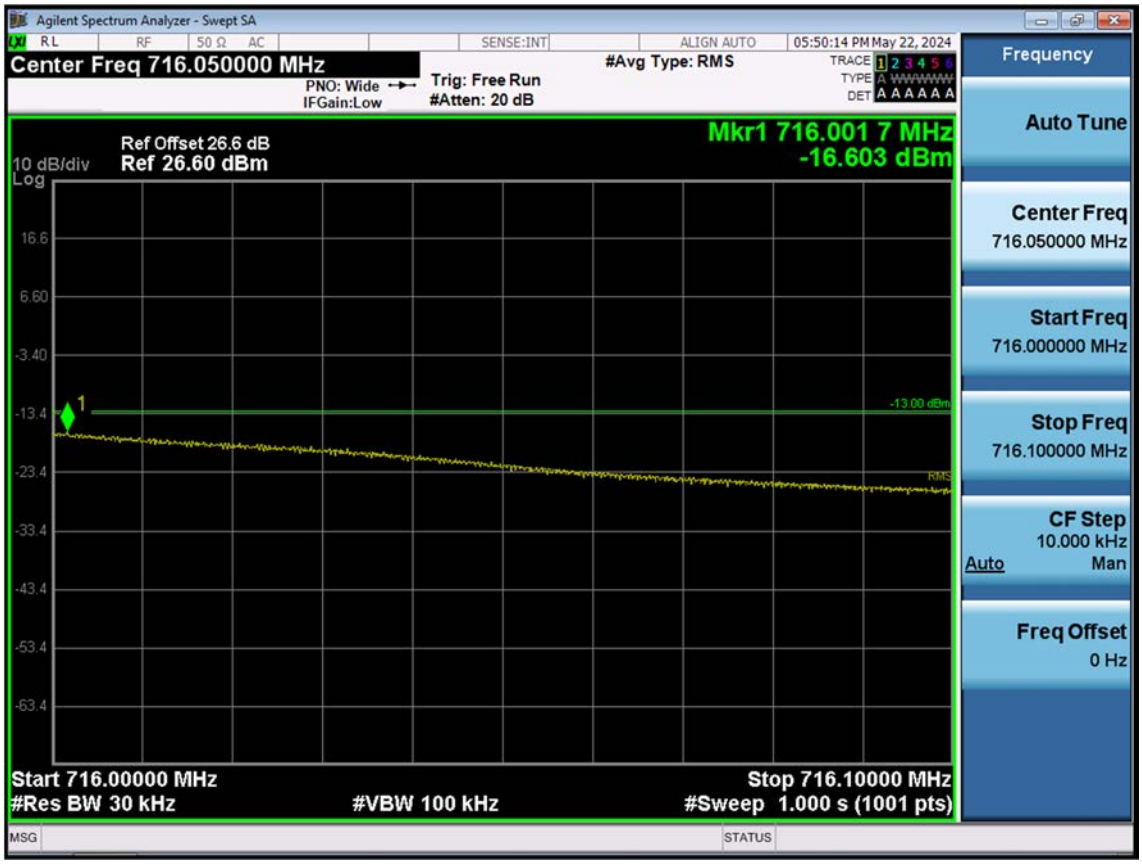
LTE B12_1.4M_Extended Band Edge_High_QPSK_FullRB

LTE B12_3 M_Band Edge_Low_QPSK_1RB

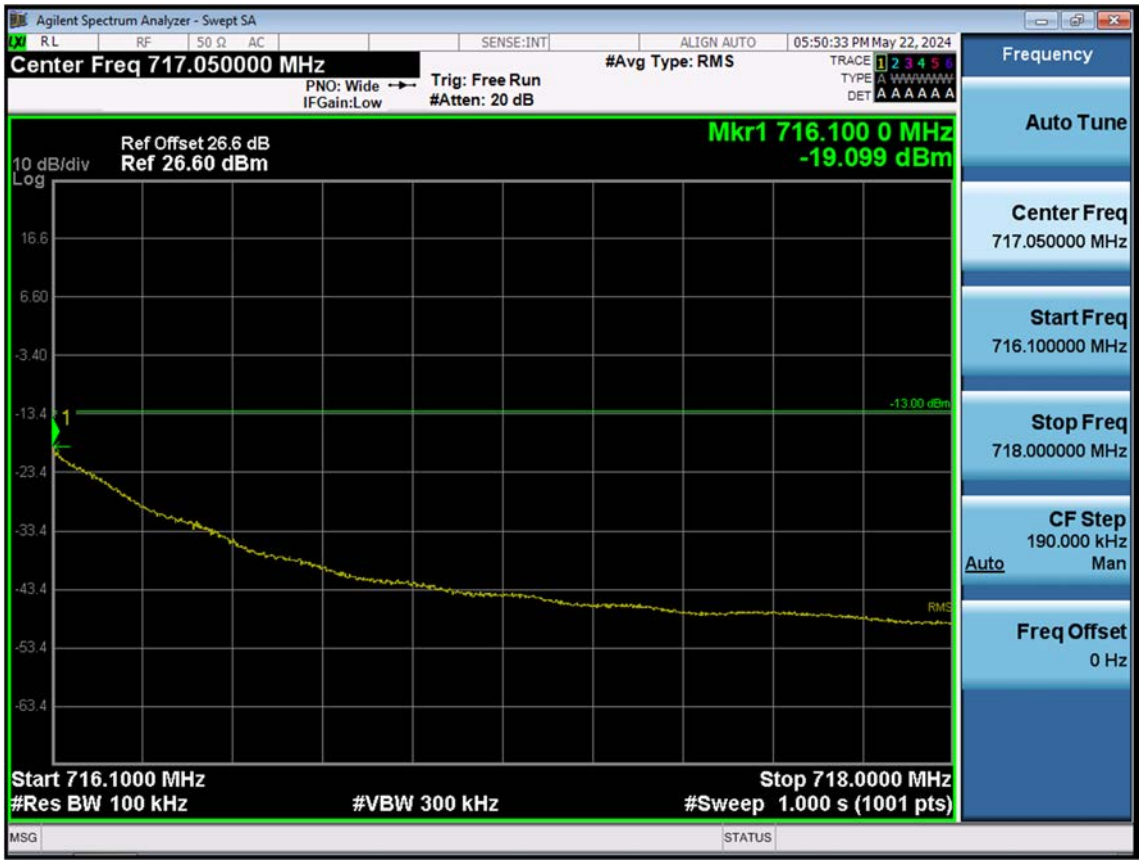
LTE B12_3 M_Band Edge_Low_QPSK_FullRB

LTE B12_3 M_Extended Band Edge_Low_QPSK_FullRB

LTE B12_3 M_Band Edge_High_QPSK_1RB(1)



LTE B12_3 M_Band Edge_High_QPSK_1RB(2)

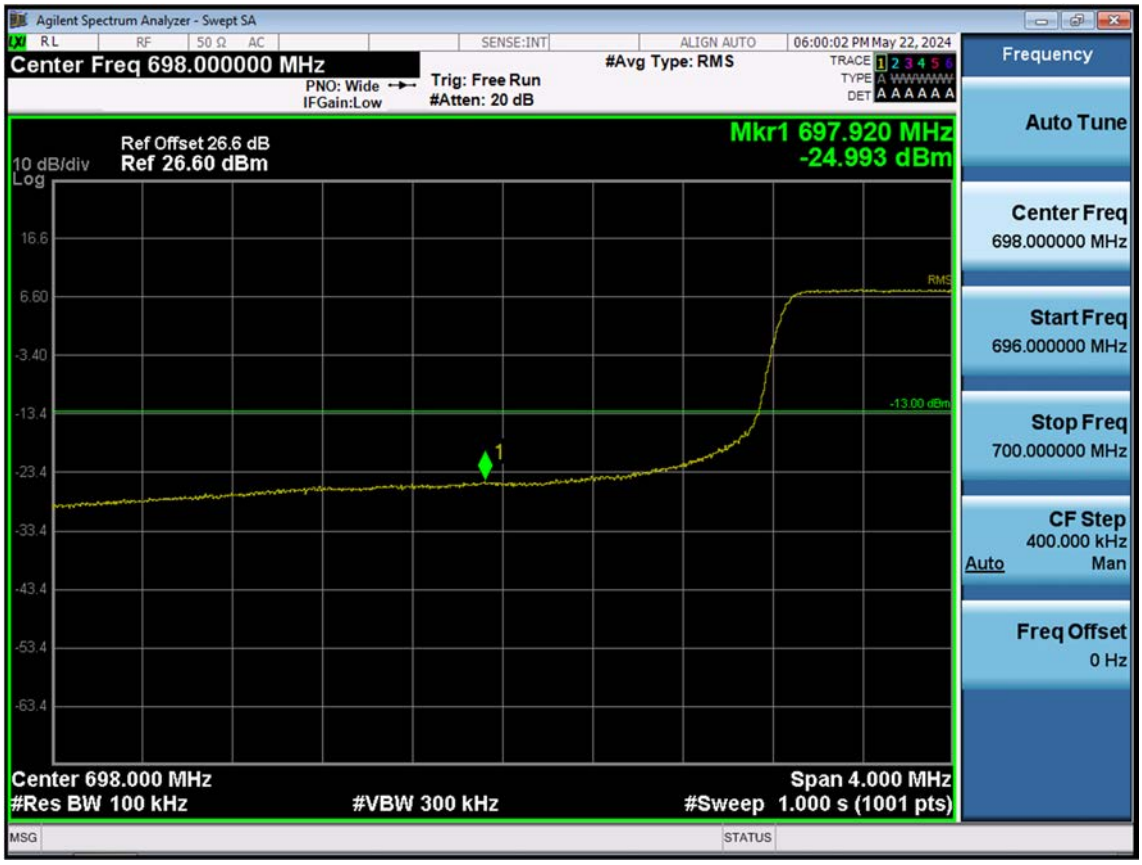


LTE B12_3 M_Band Edge_High_QPSK_FullRB

LTE B12_3 M_Extended Band Edge_High_QPSK_FullRB

LTE B12_5 M_Band Edge_Low_QPSK_1RB

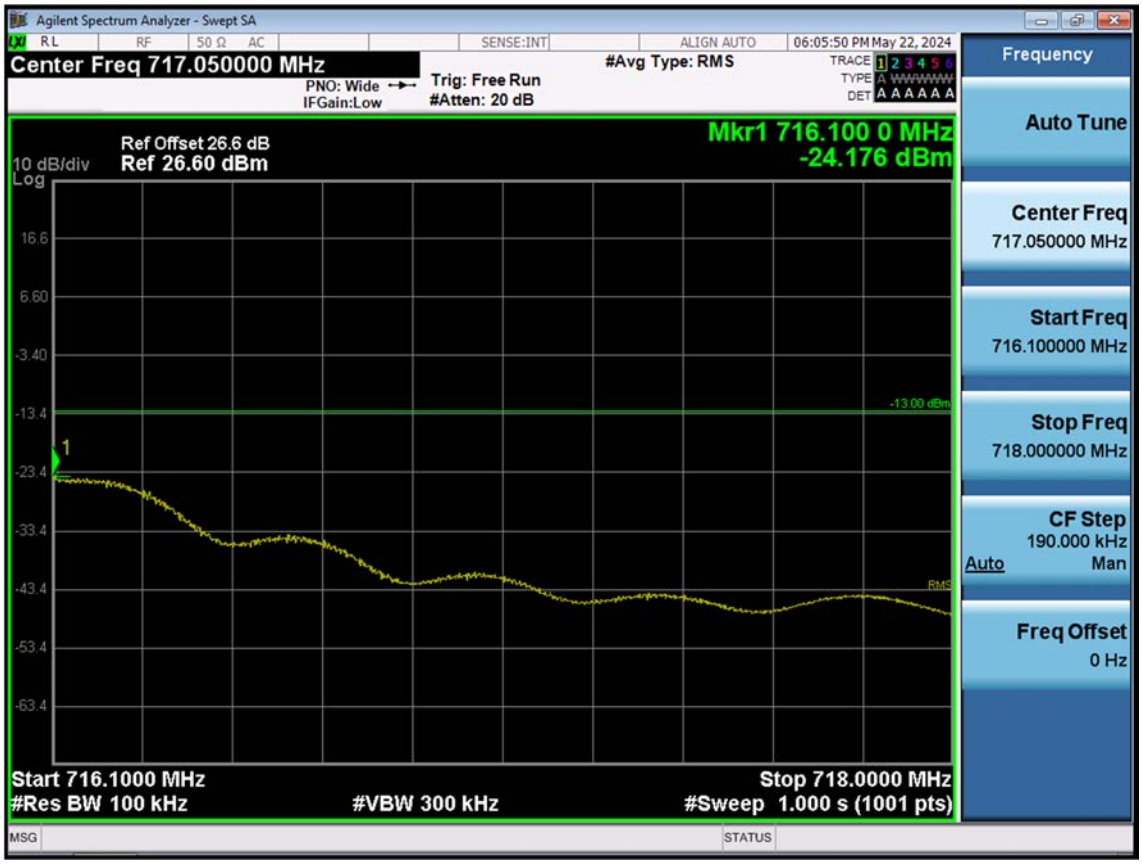
LTE B12_5 M_Band Edge_Low_QPSK_FullRB



LTE B12_5 M_Extended Band Edge_Low_QPSK_FullRB

LTE B12_5 M_Band Edge_High_QPSK_1RB(1)

LTE B12_5 M_Band Edge_High_QPSK_1RB(2)

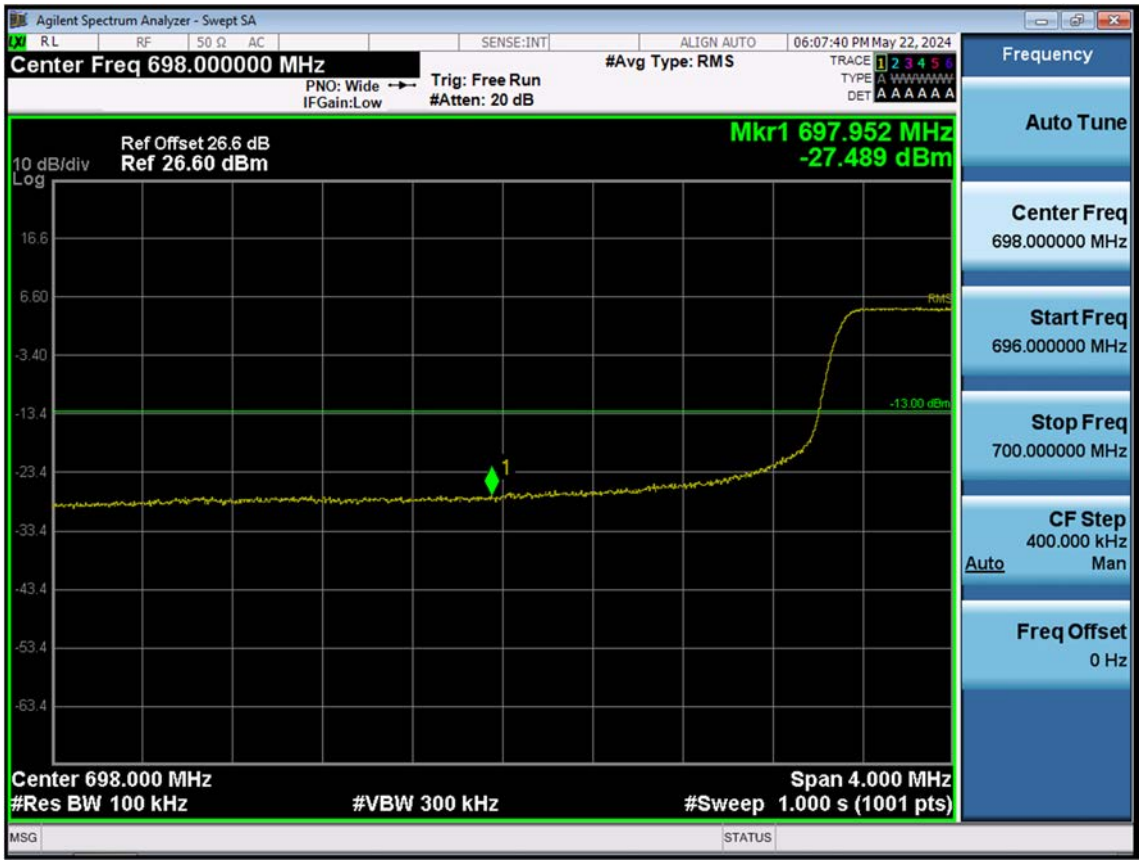


LTE B12_5 M_Band Edge_High_QPSK_FullRB

LTE B12_5 M_Extended Band Edge_High_QPSK_FullRB

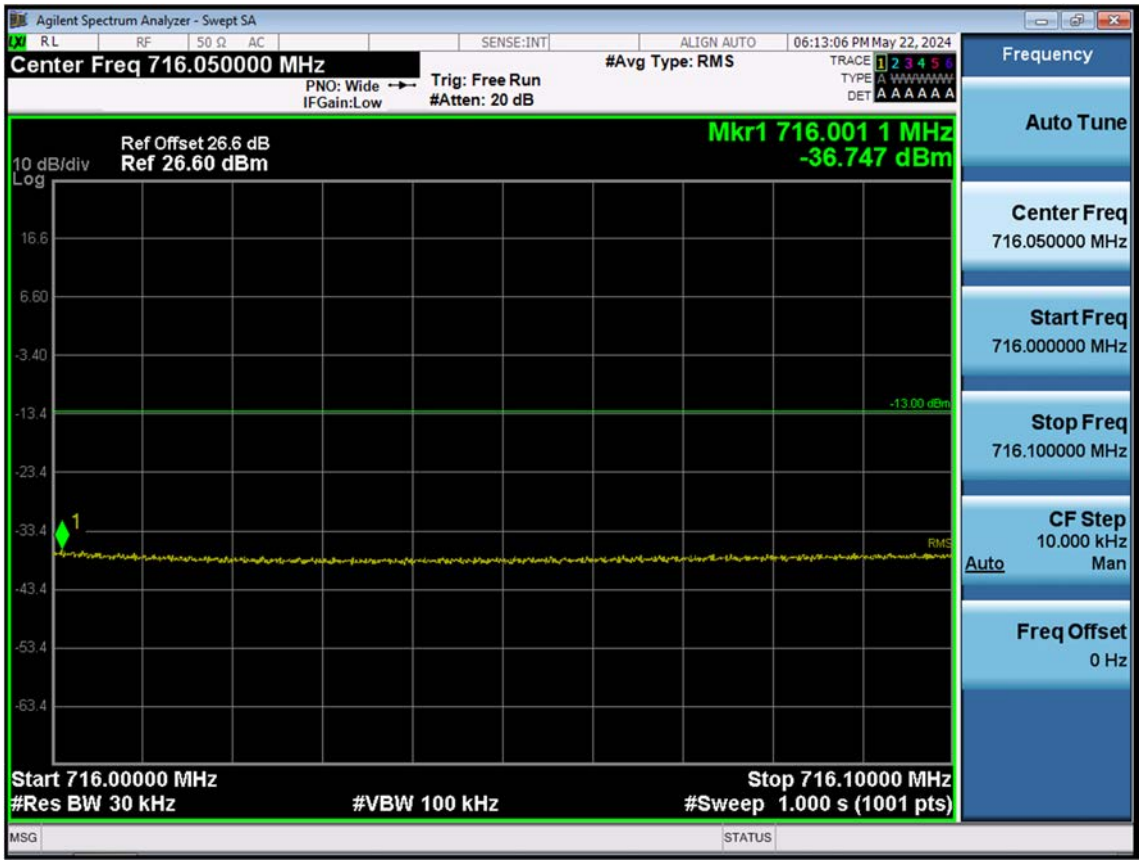
LTE B12_10 M_Band Edge_Low_QPSK_1RB

LTE B12_10 M_Band Edge_Low_QPSK_FullRB



LTE B12_10 M_Extended Band Edge_Low_QPSK_FullRB

LTE B12_10 M_Band Edge_High_QPSK_1RB(1)



LTE B12_10 M_Band Edge_High_QPSK_1RB(2)

LTE B12_10 M_Band Edge_High_QPSK_FullRB

LTE B12_10 M_Extended Band Edge_High_QPSK_FullRB

10. ANNEX A_ TEST SETUP PHOTO

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

No.	Description
1	HCT-RF-2407-FC022-P