TEST REPORT

FCC LTE B12(17) Test for SM-F741B
Certification

APPLICANT
SAMSUNG Electronics Co., Ltd.

REPORT NO.
HCT-RF-2405-FC004

DATE OF ISSUE
May 3, 2024

Tested by
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TEST REPORT

REPORT NO.
HCT-RF-2405-FC004

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Additional Model
-

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-F741B
Date of Test	February 22, 2024 ~ April 23, 2024
FCC ID	A3LSMF741B
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)
FCC Rule Part(s):	§ 27

REVISION HISTORY

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

Revision No.	Date of Issue	Description
0	May 03, 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).
According to the Evaluation report, all of the data contained herein is reused from the reference FCC ID : A3LSMF741U report. Note: Additional testing on Uplink-CA, the results were added and reported.

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:	A3LSMF741B
Application Type:	Certification
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part(s):	§ 27
EUT Type:	Mobile phone
Model(s):	SM-F741B
Additional Model(s)	-
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 12/17 (5 MHz)) 704.0 MHz – 711.0 MHz (LTE – Band 12/17 (10 MHz))
Date(s) of Tests:	February 22, 2024 ~ April 23, 2024
Serial number:	Radiated : R3CX20KJSJW, R3CX30N98SV(Uplink-CA) Conducted : 7b5599bdac507ece

1.1. MAXIMUM OUTPUT POWER

Mode (MHz)	Tx Frequency (MHz)	Emission Designator	Modulation	ERP	
				Max. Power (W)	Max. Power (dBm)
LTE – Band12 (1.4)	699.7 – 715.3	1M10G7D	QPSK	0.089	19.49
		1M10W7D	16QAM	0.069	18.37
		1M10W7D	64QAM	0.055	17.44
		1M10W7D	256QAM	0.028	14.42
LTE – Band12 (3)	700.5 – 714.5	2M71G7D	QPSK	0.087	19.38
		2M73W7D	16QAM	0.066	18.22
		2M73W7D	64QAM	0.054	17.35
		2M72W7D	256QAM	0.027	14.31
LTE – Band12/17 (5)	701.5 – 713.5	4M52G7D	QPSK	0.085	19.29
		4M51W7D	16QAM	0.066	18.17
		4M51W7D	64QAM	0.052	17.19
		4M51W7D	256QAM	0.026	14.19
LTE – Band12/17 (10)	704.0 – 711.0	8M96G7D	QPSK	0.086	19.33
		8M97W7D	16QAM	0.066	18.18
		8M98W7D	64QAM	0.052	17.19
		8M96W7D	256QAM	0.025	14.04

2. INTRODUCTION

2.1. DESCRIPTION OF EUT

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

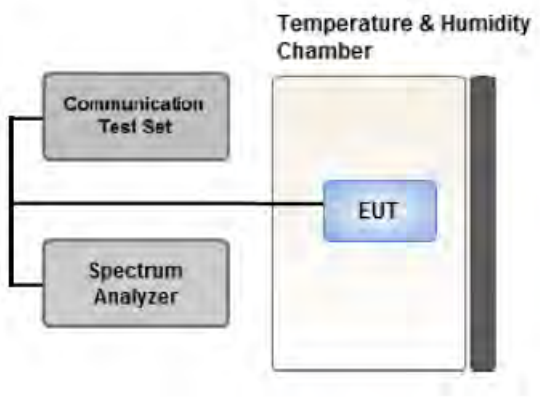
$$\text{Result}_{(dBm)} = \text{Pg}_{(dBm)} - \text{cable loss}_{(dB)} + \text{antenna gain}_{(dBi)}$$

   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.



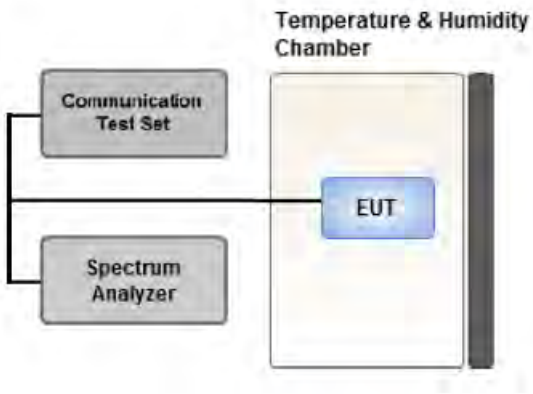
Test setup

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.

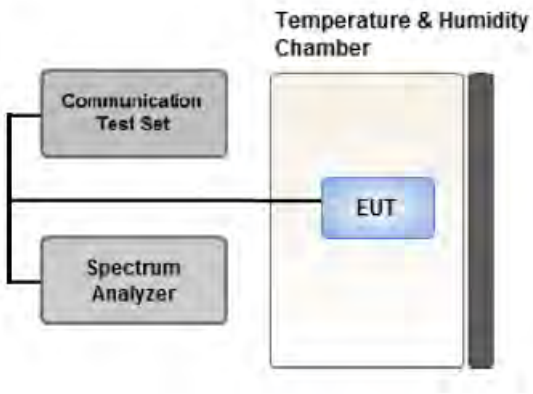
All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

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

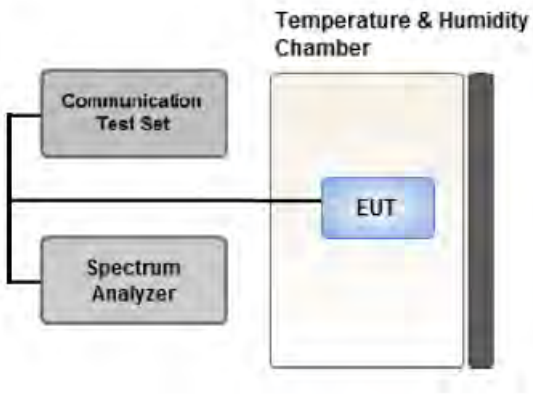
1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW > 1 % of the emission bandwidth
4. VBW > 3 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW
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
- We were performed the RSE test in condition of co-location.
  Mode : Stand alone, Simultaneous transmission scenarios
  Worst case : Stand alone
- In the case of radiated spurious emissions, all bandwidth of operation were investigated and the worst case bandwidth results are reported. (Worst case : 1.4 MHz)
- The EUT was tested in three modes(Open, Half-open, Closed), the worst case configuration results are reported.

  Worst case: Open mode.
- The worst case is reported with the EUT positioning, modulations, and paging service configurations shown in the test data
- LTE Band 12 (699 – 716 MHz, 5/10 MHz bandwidth) overlaps the entire frequency range of LTE Band 17 (704 - 716 MHz) and they have the same Tune-up power.
  Therefore, test data provided in this report covers Band 17 as well as Band 12.
- Please refer to the table below.

[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.
- LTE Band 12 (699 – 716 MHz, 5/10 MHz bandwidth) overlaps the entire frequency range of LTE Band 17 (704 - 716 MHz) and they have the same Tune-up power.
  Therefore, test data provided in this report covers Band 17 as well as Band 12.

[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	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
RF Switching System	FBSR-02B(1.2G HPF+LNA)	T&M SYSTEM	F1L1	12/11/2024	Annual
RF Switching System	FBSR-02B(3.3G HPF+LNA)	T&M SYSTEM	F1L2	12/11/2024	Annual
Power Splitter(DC ~ 26.5 GHz)	11667B	Hewlett Packard	5001	04/17/2025	Annual
DC Power Supply	E3632A	Agilent	MY40010147	06/23/2024	Annual
Dipole Antenna	UHAP	Schwarzbeck	557	03/09/2025	Biennial
Dipole Antenna	UHAP	Schwarzbeck	558	03/09/2025	Biennial
Chamber	SU-642	ESPEC	93008124	02/19/2025	Annual
Horn Antenna(1 ~ 18 GHz)	BBHA 9120D	Schwarzbeck	147	08/17/2025	Biennial
Horn Antenna(1 ~ 18 GHz)	BBHA 9120D	Schwarzbeck	9120D-1298	09/11/2025	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170342	09/29/2024	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170124	03/28/2025	Biennial
Signal Analyzer(10 Hz ~ 26.5 GHz)	N9020A	Agilent	MY52090906	04/19/2025	Annual
ATTENUATOR(20 dB)	8493C	Hewlett Packard	17280	04/17/2025	Annual
Spectrum Analyzer(10 Hz ~ 40 GHz)	FSV40	REOHDE & SCHWARZ	100931	08/17/2024	Annual
Base Station	8960 (E5515C)	Agilent	MY48360800	08/10/2024	Annual
Loop Antenna(9 kHz ~ 30 MHz)	FMZB1513	Schwarzbeck	1513-333	03/07/2026	Biennial
Trilog Broadband Antenna	VULB9168	Schwarzbeck	895	09/16/2024	Biennial
Trilog Broadband Antenna	VULB9168	Schwarzbeck	1135	09/16/2024	Biennial
Wideband Radio Communication Tester	MT8821C	Anritsu Corp.	6262094331	11/17/2024	Annual
Wideband Radio Communication Tester	MT8820C	Anritsu Corp.	6201026545	12/11/2024	Annual
SIGNAL GENERATOR (100 kHz ~ 40 GHz)	SMB100A	REOHDE & SCHWARZ	177633	06/22/2024	Annual
Signal Analyzer(5 Hz ~ 40.0 GHz)	N9030B	KEYSIGHT	MY55480167	05/24/2024	Annual
FCC LTE Mobile Conducted RF Automation Test Software	-	HCT CO., LTD.,	-	-	-

Note:

1. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.
2. 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	-28.80	30.32	-9.55	1.28	H	< 3.00	0.089	19.49	1	0
		16-QAM	-29.92	29.20	-9.55	1.28	H		0.069	18.37		
		64-QAM	-30.85	28.27	-9.55	1.28	H		0.055	17.44		
		256-QAM	-33.87	25.25	-9.55	1.28	H		0.028	14.42		
707.5		QPSK	-29.28	29.56	-9.55	1.28	H		0.075	18.73	1	0
		16-QAM	-30.37	28.47	-9.55	1.28	H		0.058	17.64		
		64-QAM	-31.40	27.44	-9.55	1.28	H		0.046	16.61		
		256-QAM	-34.30	24.54	-9.55	1.28	H		0.024	13.71		
715.3		QPSK	-30.39	28.86	-9.55	1.28	H		0.064	18.03	1	0
		16-QAM	-31.43	27.82	-9.55	1.28	H		0.050	16.99		
		64-QAM	-32.39	26.86	-9.55	1.28	H		0.040	16.03		
		256-QAM	-35.44	23.81	-9.55	1.28	H		0.020	12.98		

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	-28.84	30.21	-9.55	1.28	H	< 3.00	0.087	19.38	1	8
		16-QAM	-30.00	29.05	-9.55	1.28	H		0.066	18.22		
		64-QAM	-30.87	28.18	-9.55	1.28	H		0.054	17.35		
		256-QAM	-33.91	25.14	-9.55	1.28	H		0.027	14.31		
707.5		QPSK	-29.30	29.54	-9.55	1.28	H		0.074	18.71	1	0
		16-QAM	-30.36	28.48	-9.55	1.28	H		0.058	17.65		
		64-QAM	-31.36	27.48	-9.55	1.28	H		0.046	16.65		
		256-QAM	-34.39	24.45	-9.55	1.28	H		0.023	13.62		
714.5		QPSK	-30.24	28.97	-9.55	1.28	H		0.065	18.14	1	0
		16-QAM	-31.25	27.96	-9.55	1.28	H		0.052	17.13		
		64-QAM	-32.26	26.95	-9.55	1.28	H		0.041	16.12		
		256-QAM	-35.23	23.98	-9.55	1.28	H		0.021	13.15		

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 B12/17 (5 MHz)	QPSK	-28.83	30.12	-9.55	1.28	H	< 3.00	0.085	19.29	1	13
		16-QAM	-29.95	29.00	-9.55	1.28	H		0.066	18.17		
		64-QAM	-30.93	28.02	-9.55	1.28	H		0.052	17.19		
		256-QAM	-33.93	25.02	-9.55	1.28	H		0.026	14.19		
707.5		QPSK	-29.23	29.61	-9.55	1.28	H		0.076	18.78	1	0
		16-QAM	-30.24	28.60	-9.55	1.28	H		0.060	17.77		
		64-QAM	-31.27	27.57	-9.55	1.28	H		0.047	16.74		
		256-QAM	-34.32	24.52	-9.55	1.28	H		0.023	13.69		
713.5		QPSK	-30.04	29.09	-9.55	1.28	H		0.067	18.26	1	0
		16-QAM	-31.05	28.08	-9.55	1.28	H		0.053	17.25		
		64-QAM	-32.09	27.04	-9.55	1.28	H		0.042	16.21		
		256-QAM	-34.94	24.19	-9.55	1.28	H		0.022	13.36		

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 B12/17 (10 MHz)	QPSK	-28.75	30.16	-9.55	1.28	H	< 3.00	0.086	19.33	1	0
		16-QAM	-29.90	29.01	-9.55	1.28	H		0.066	18.18		
		64-QAM	-30.89	28.02	-9.55	1.28	H		0.052	17.19		
		256-QAM	-34.04	24.87	-9.55	1.28	H		0.025	14.04		
707.5		QPSK	-29.07	29.77	-9.55	1.28	H		0.078	18.94	1	0
		16-QAM	-30.11	28.73	-9.55	1.28	H		0.062	17.90		
		64-QAM	-31.15	27.69	-9.55	1.28	H		0.049	16.86		
		256-QAM	-34.20	24.64	-9.55	1.28	H		0.024	13.81		
711.0		QPSK	-29.79	29.26	-9.55	1.28	H		0.070	18.43	1	0
		16-QAM	-30.80	28.25	-9.55	1.28	H		0.055	17.42		
		64-QAM	-31.90	27.15	-9.55	1.28	H		0.043	16.32		
		256-QAM	-34.95	24.10	-9.55	1.28	H		0.021	13.27		

8.2 RADIATED SPURIOUS EMISSIONS

▣ MODE: LTE B12

▣ MODULATION SIGNAL: 1.4 MHz QPSK

▣ DISTANCE: 3 meters

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBd)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Limit (dBm)	RB	
									Size	Offset
23017 (699.7)	1 399.40	-59.55	7.40	-64.95	1.80	V	-59.35	-13.00	1	0
	2 099.10	-59.87	9.10	-65.23	2.28	V	-58.41	-13.00		
	2 798.80	-60.96	10.30	-64.83	2.68	V	-57.21	-13.00		
	3 498.50	-60.96	11.30	-63.61	3.00	V	-55.31	-13.00		
	4 198.20	-61.08	11.20	-60.72	3.30	V	-52.82	-13.00		
23095 (707.5)	1 415.00	-59.83	7.40	-66.28	1.80	V	-60.68	-13.00	1	0
	2 122.50	-60.18	9.10	-65.38	2.28	V	-58.56	-13.00		
	2 830.00	-59.96	10.30	-64.39	2.69	V	-56.78	-13.00		
	3 537.50	-60.65	11.30	-62.92	3.00	V	-54.62	-13.00		
	4 245.00	-60.91	11.20	-60.46	3.31	V	-52.57	-13.00		
23173 (715.3)	1 430.60	-58.13	7.40	-64.65	1.81	V	-59.06	-13.00	1	0
	2 145.90	-60.08	9.05	-65.10	2.33	V	-58.38	-13.00		
	2 861.20	-60.70	10.30	-64.15	2.72	V	-56.57	-13.00		
	3 576.50	-59.73	11.40	-61.79	3.00	V	-53.39	-13.00		
	4 291.80	-61.48	11.20	-60.24	3.33	V	-52.37	-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	1.0967
			16-QAM			1.1005
			64-QAM			1.0998
			256-QAM			1.0965
	3 MHz		QPSK	15		2.7065
			16-QAM			2.7254
			64-QAM			2.7288
			256-QAM			2.7182
12(17)	5 MHz		QPSK	25		4.5151
			16-QAM			4.5103
			64-QAM			4.5086
			256-QAM			4.5111
	10 MHz		QPSK	50		8.9589
			16-QAM			8.9744
			64-QAM			8.9843
			256-QAM			8.9562

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 43 ~ 58.

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	3.7000	27.976	-67.008	-39.032	-13.00
		707.5	3.7020	27.976	-67.158	-39.182	
		715.3	3.7109	27.976	-66.982	-39.006	
	3	700.5	3.7124	27.976	-66.948	-38.972	
		707.5	3.6870	27.976	-66.909	-38.933	
		714.5	3.7039	27.976	-67.126	-39.150	
12(17)	5	701.5	3.6965	27.976	-67.043	-39.067	
		707.5	3.7363	27.976	-67.314	-39.338	
		713.5	3.6735	27.976	-67.225	-39.249	
	10	704.0	3.7089	27.976	-66.917	-38.941	
		707.5	3.7049	27.976	-67.178	-39.202	
		711.0	3.6980	27.976	-67.103	-39.127	

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 59 ~ 70.
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

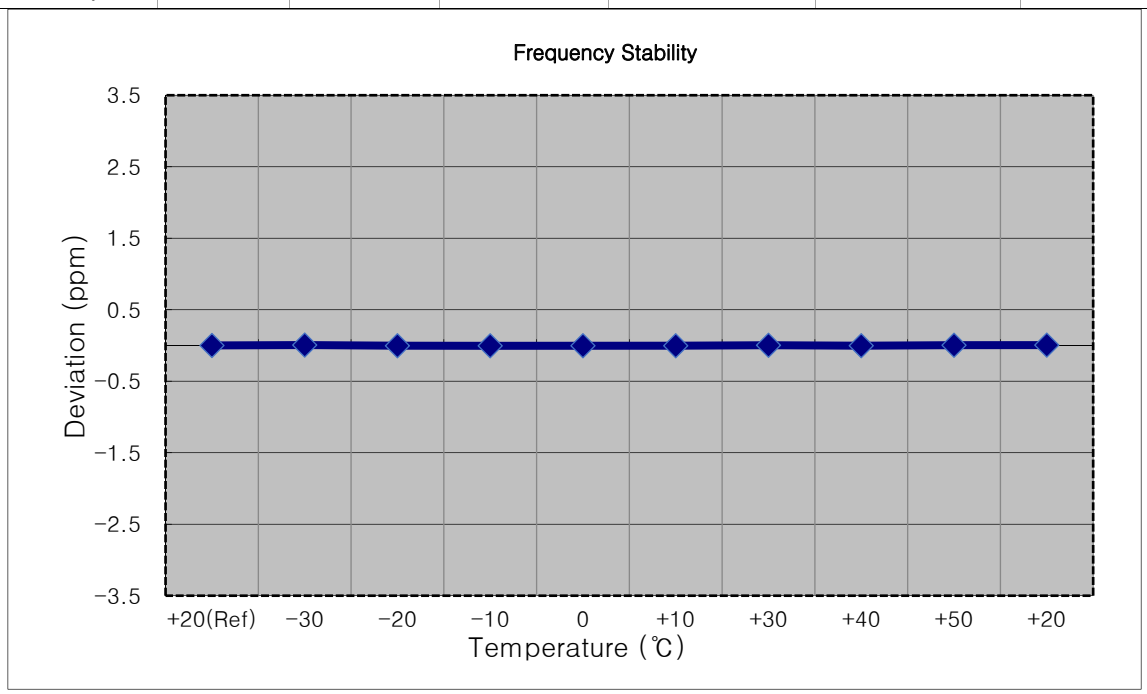
8.5 BAND EDGE

- Plots of the EUT's Band Edge are shown Page 71 ~ 98.

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)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	699 700 003	0.0	0.000 000	0.000
100 %		-30	699 700 006	3.8	0.000 001	0.005
100 %		-20	699 700 000	-2.5	0.000 000	-0.004
100 %		-10	699 700 000	-3.1	0.000 000	-0.004
100 %		0	699 700 000	-3.0	0.000 000	-0.004
100 %		+10	699 700 000	-2.7	0.000 000	-0.004
100 %		+30	699 700 005	2.1	0.000 000	0.003
100 %		+40	699 700 000	-2.3	0.000 000	-0.003
100 %		+50	699 700 005	2.6	0.000 000	0.004
Batt. Endpoint	3.300	+20	699 700 006	3.3	0.000 000	0.005



▣ MODE: LTE B12

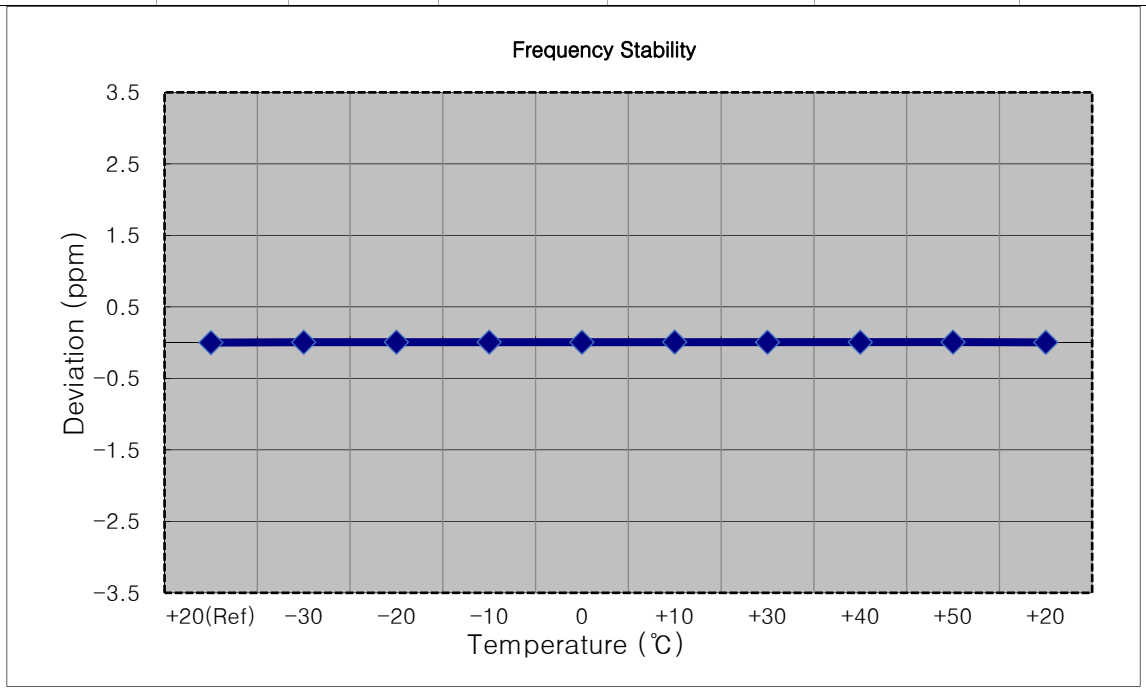
▣ OPERATING FREQUENCY: 700,500,000 Hz

▣ 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)	(℃)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	700 500 004	0.0	0.000 000	0.000
100 %		-30	700 500 008	3.6	0.000 001	0.005
100 %		-20	700 500 009	4.8	0.000 001	0.007
100 %		-10	700 500 009	4.5	0.000 001	0.006
100 %		0	700 500 008	3.3	0.000 000	0.005
100 %		+10	700 500 009	5.1	0.000 001	0.007
100 %		+30	700 500 008	3.4	0.000 000	0.005
100 %		+40	700 500 008	3.6	0.000 001	0.005
100 %		+50	700 500 009	4.7	0.000 001	0.007
Batt. Endpoint	3.300	+20	700 500 007	2.4	0.000 000	0.003



▣ MODE: LTE B12(17)

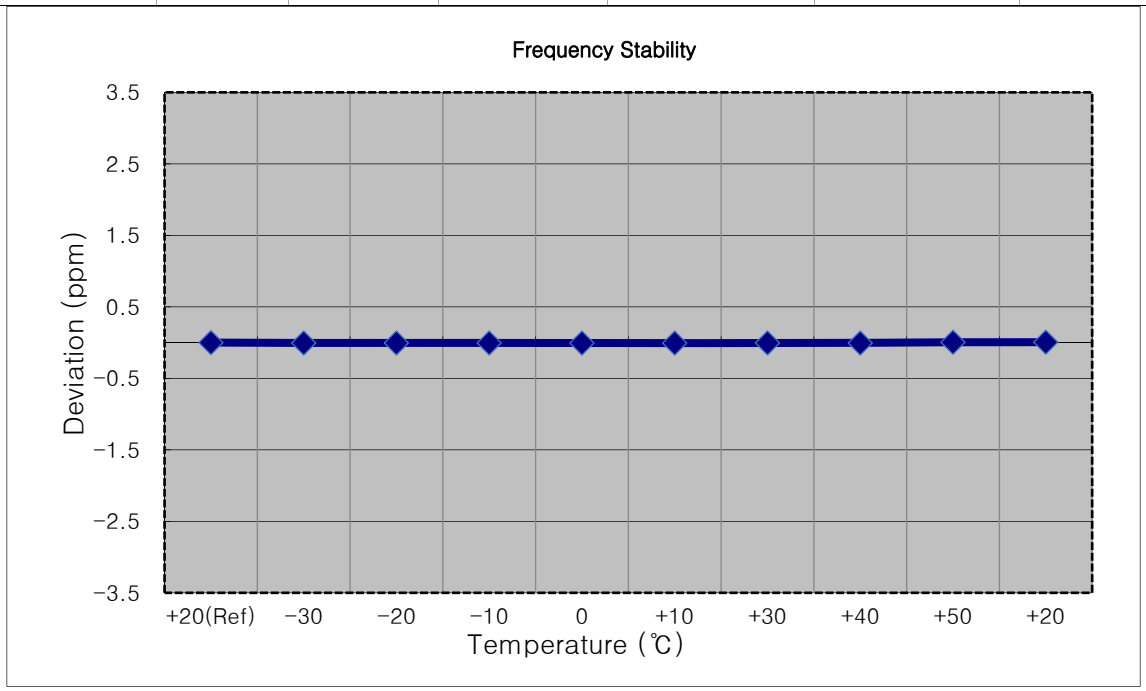
▣ OPERATING FREQUENCY: 701,500,000 Hz

▣ 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)	(℃)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	701 499 996	0.0	0.000 000	0.000
100 %		-30	701 499 992	-3.7	-0.000 001	-0.005
100 %		-20	701 499 992	-3.7	-0.000 001	-0.005
100 %		-10	701 499 992	-4.0	-0.000 001	-0.006
100 %		0	701 499 992	-4.2	-0.000 001	-0.006
100 %		+10	701 499 991	-4.6	-0.000 001	-0.007
100 %		+30	701 499 993	-3.4	0.000 000	-0.005
100 %		+40	701 499 992	-4.3	-0.000 001	-0.006
100 %		+50	701 499 999	3.3	0.000 000	0.005
Batt. Endpoint	3.300	+20	701 500 000	3.9	0.000 001	0.006



▣ MODE: LTE B12(17)

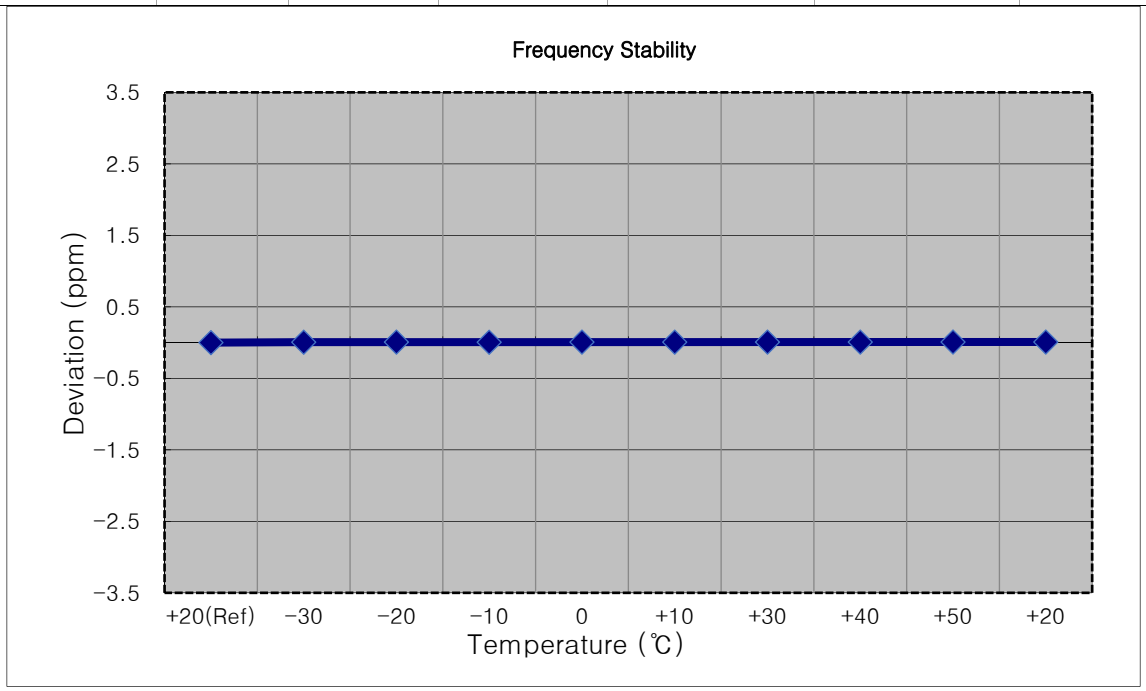
▣ OPERATING FREQUENCY: 704,000,000 Hz

▣ 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)	(℃)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	704 000 004	0.0	0.000 000	0.000
100 %		-30	704 000 008	4.3	0.000 001	0.006
100 %		-20	704 000 009	4.9	0.000 001	0.007
100 %		-10	704 000 008	3.8	0.000 001	0.005
100 %		0	704 000 009	4.9	0.000 001	0.007
100 %		+10	704 000 009	4.7	0.000 001	0.007
100 %		+30	704 000 009	5.3	0.000 001	0.008
100 %		+40	704 000 009	5.3	0.000 001	0.008
100 %		+50	704 000 010	5.7	0.000 001	0.008
Batt. Endpoint	3.300	+20	704 000 010	5.9	0.000 001	0.008



▣ MODE: LTE B12

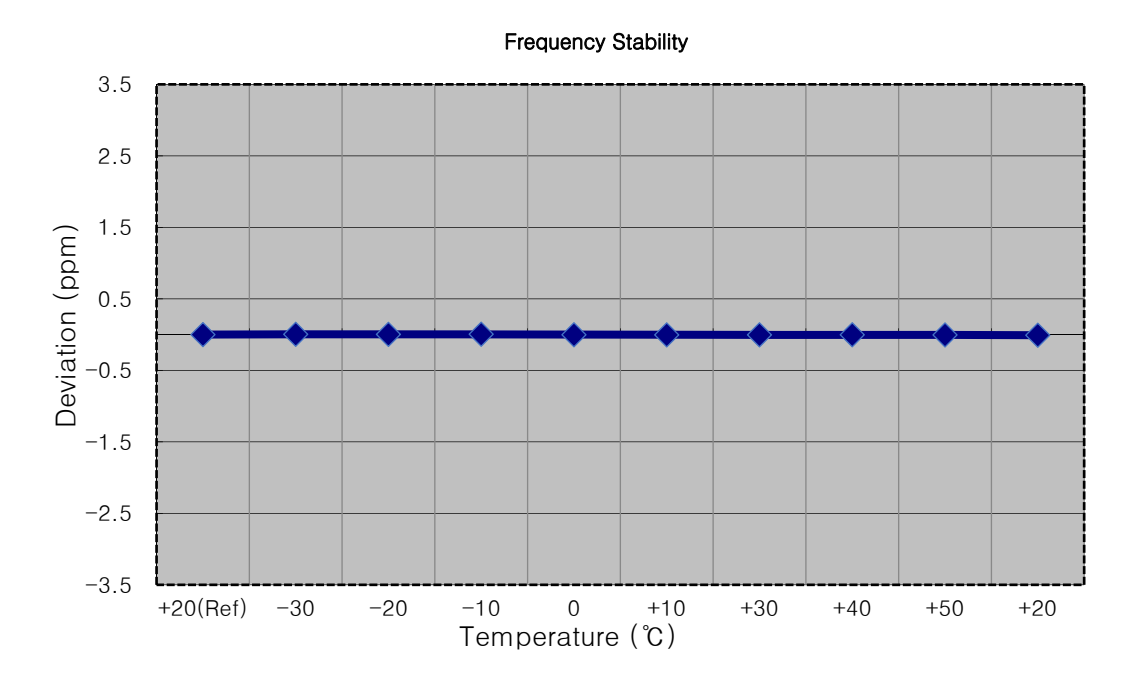
▣ OPERATING FREQUENCY: 707,500,000 Hz

▣ 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)	(℃)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	707 500 003	0.0	0.000 000	0.000
100 %		-30	707 500 005	2.9	0.000 000	0.004
100 %		-20	707 500 005	2.7	0.000 000	0.004
100 %		-10	707 500 007	4.1	0.000 001	0.006
100 %		0	707 500 001	-1.7	0.000 000	-0.002
100 %		+10	707 500 000	-2.8	0.000 000	-0.004
100 %		+30	707 500 000	-2.2	0.000 000	-0.003
100 %		+40	707 500 001	-1.9	0.000 000	-0.003
100 %		+50	707 499 999	-3.1	0.000 000	-0.004
Batt. Endpoint	3.300	+20	707 499 997	-5.9	-0.000 001	-0.008



▣ MODE: LTE B12

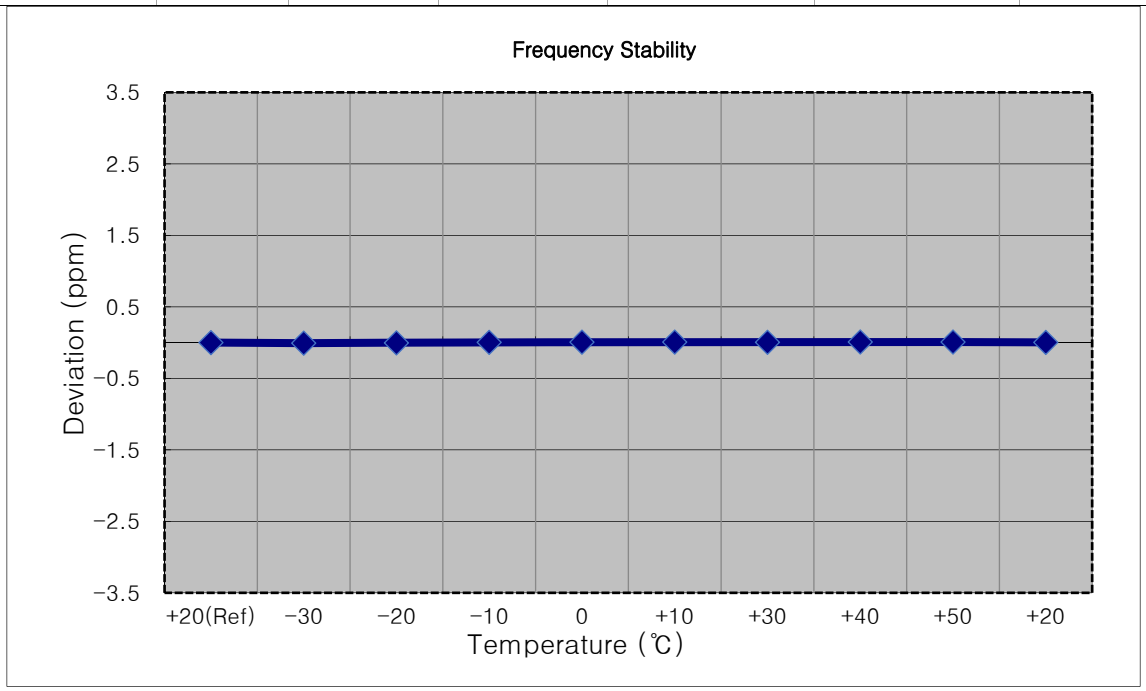
▣ OPERATING FREQUENCY: 707,500,000 Hz

▣ 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)	(℃)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	707 500 003	0.0	0.000 000	0.000
100 %		-30	707 499 998	-5.2	-0.000 001	-0.007
100 %		-20	707 500 000	-2.6	0.000 000	-0.004
100 %		-10	707 500 005	2.3	0.000 000	0.003
100 %		0	707 500 007	4.5	0.000 001	0.006
100 %		+10	707 500 008	5.1	0.000 001	0.007
100 %		+30	707 500 006	2.8	0.000 000	0.004
100 %		+40	707 500 009	6.3	0.000 001	0.009
100 %		+50	707 500 008	5.5	0.000 001	0.008
Batt. Endpoint	3.300	+20	707 500 005	2.0	0.000 000	0.003



▣ MODE: LTE B12(17)

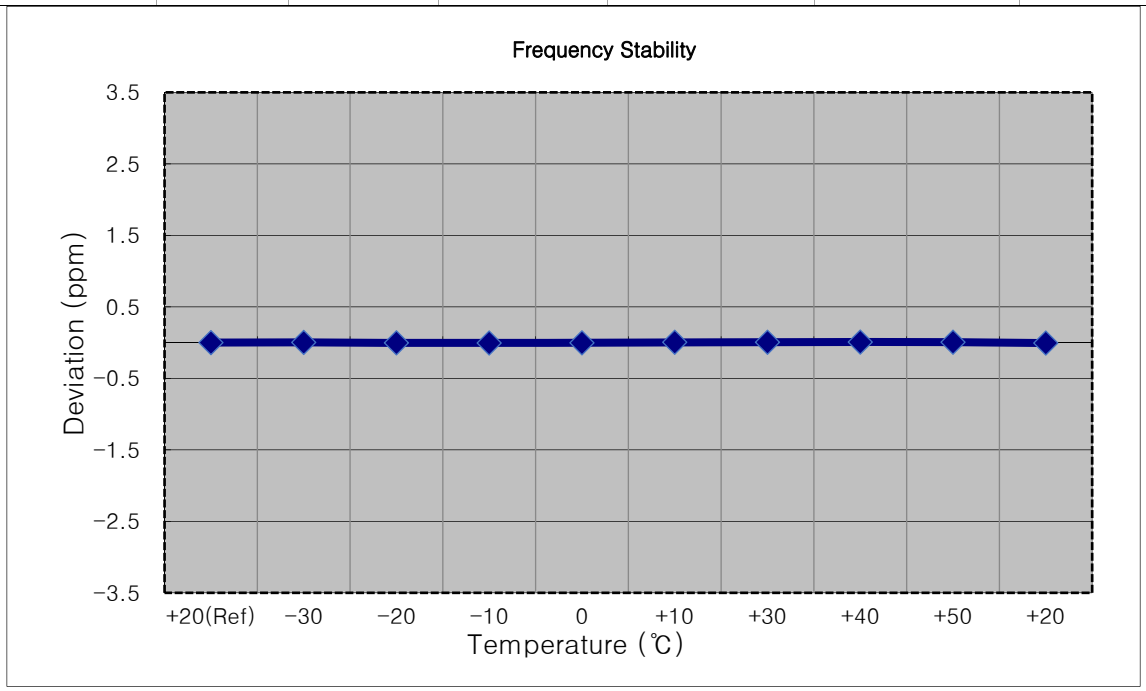
▣ OPERATING FREQUENCY: 707,500,000 Hz

▣ 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)	(℃)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	707 500 002	0.0	0.000 000	0.000
100 %		-30	707 500 004	2.0	0.000 000	0.003
100 %		-20	707 499 999	-2.3	0.000 000	-0.003
100 %		-10	707 499 998	-4.0	-0.000 001	-0.006
100 %		0	707 499 999	-2.5	0.000 000	-0.004
100 %		+10	707 500 005	3.7	0.000 001	0.005
100 %		+30	707 500 005	3.4	0.000 000	0.005
100 %		+40	707 500 007	5.3	0.000 001	0.007
100 %		+50	707 500 006	4.2	0.000 001	0.006
Batt. Endpoint	3.300	+20	707 499 997	-4.5	-0.000 001	-0.006



▣ MODE: LTE B12(17)

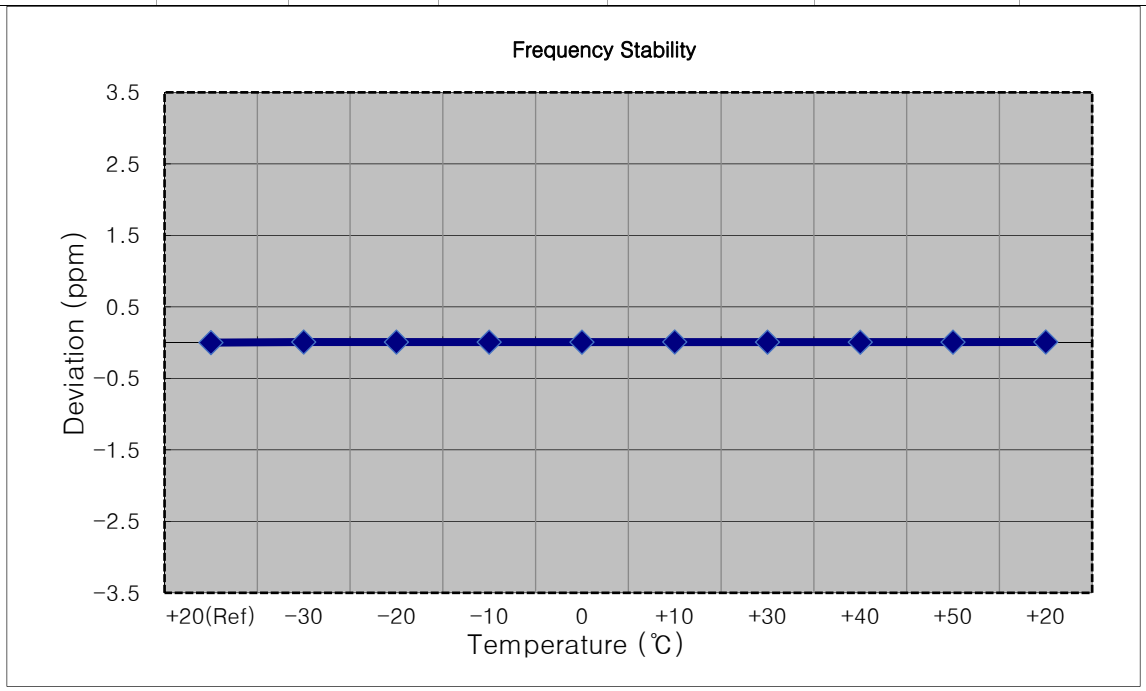
▣ OPERATING FREQUENCY: 707,500,000 Hz

▣ 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)	(℃)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	707 500 005	0.0	0.000 000	0.000
100 %		-30	707 500 011	5.6	0.000 001	0.008
100 %		-20	707 500 010	5.4	0.000 001	0.008
100 %		-10	707 500 010	4.8	0.000 001	0.007
100 %		0	707 500 009	4.4	0.000 001	0.006
100 %		+10	707 500 011	6.1	0.000 001	0.009
100 %		+30	707 500 010	4.6	0.000 001	0.007
100 %		+40	707 500 009	4.2	0.000 001	0.006
100 %		+50	707 500 010	4.7	0.000 001	0.007
Batt. Endpoint	3.300	+20	707 500 011	6.1	0.000 001	0.009



▣ MODE: LTE B12

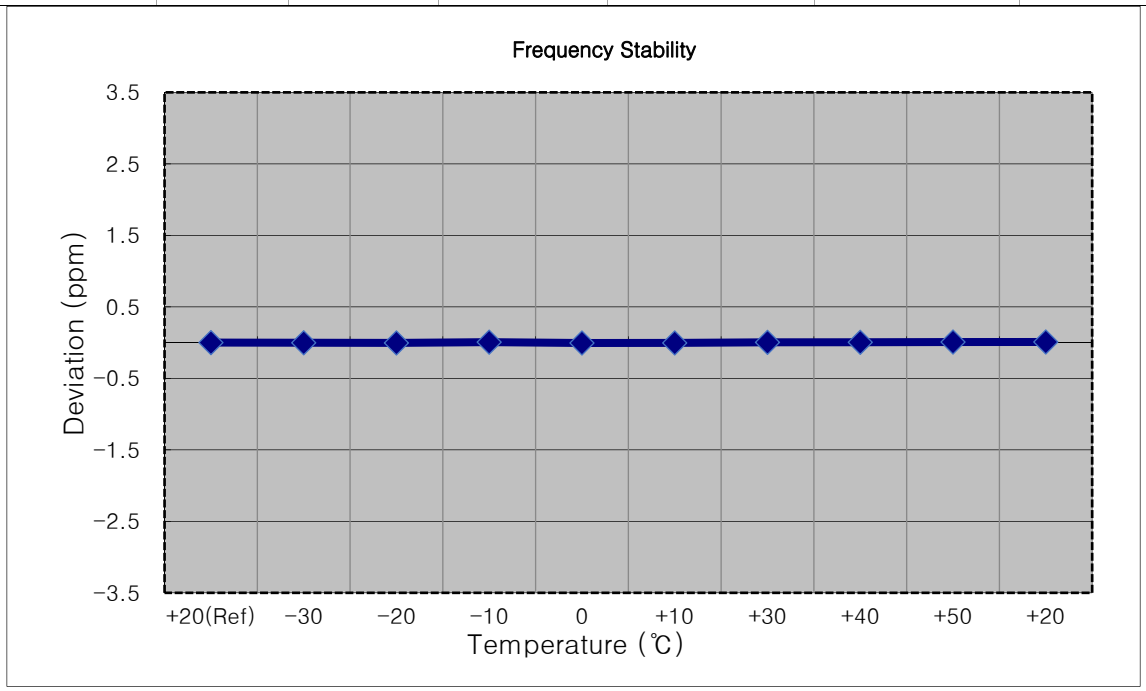
▣ OPERATING FREQUENCY: 715,300,000 Hz

▣ 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)	(℃)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	715 299 994	0.0	0.000 000	0.000
100 %		-30	715 299 992	-1.7	0.000 000	-0.002
100 %		-20	715 299 991	-3.1	0.000 000	-0.004
100 %		-10	715 299 998	4.6	0.000 001	0.006
100 %		0	715 299 990	-4.1	-0.000 001	-0.006
100 %		+10	715 299 990	-3.2	0.000 000	-0.004
100 %		+30	715 299 996	2.7	0.000 000	0.004
100 %		+40	715 299 997	3.3	0.000 000	0.005
100 %		+50	715 299 999	5.5	0.000 001	0.008
Batt. Endpoint	3.300	+20	715 300 000	6.3	0.000 001	0.009



▣ MODE: LTE B12

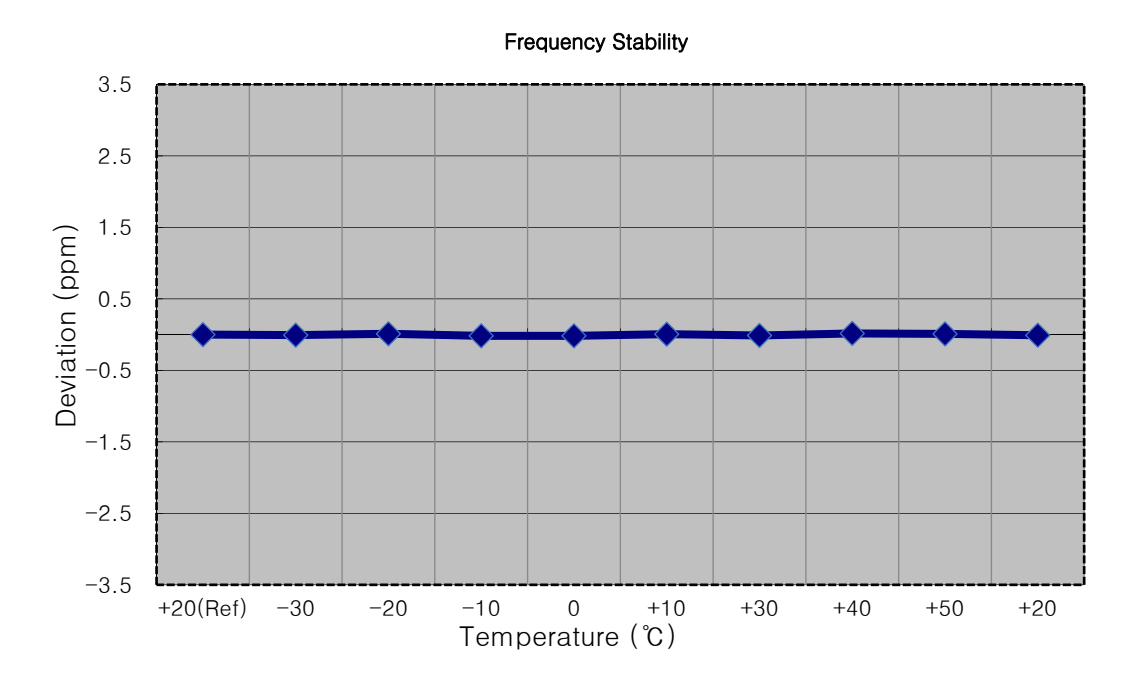
▣ OPERATING FREQUENCY: 714,500,000 Hz

▣ 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)	(℃)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	714 499 988	0.0	0.000 000	0.000
100 %		-30	714 499 983	-5.3	-0.000 001	-0.007
100 %		-20	714 499 996	7.9	0.000 001	0.011
100 %		-10	714 499 976	-12.4	-0.000 002	-0.017
100 %		0	714 499 976	-12.5	-0.000 002	-0.017
100 %		+10	714 499 992	4.3	0.000 001	0.006
100 %		+30	714 499 979	-8.8	-0.000 001	-0.012
100 %		+40	714 500 000	11.6	0.000 002	0.016
100 %		+50	714 499 995	6.9	0.000 001	0.010
Batt. Endpoint	3.300	+20	714 499 981	-6.7	-0.000 001	-0.009



▣ MODE: LTE B12(17)

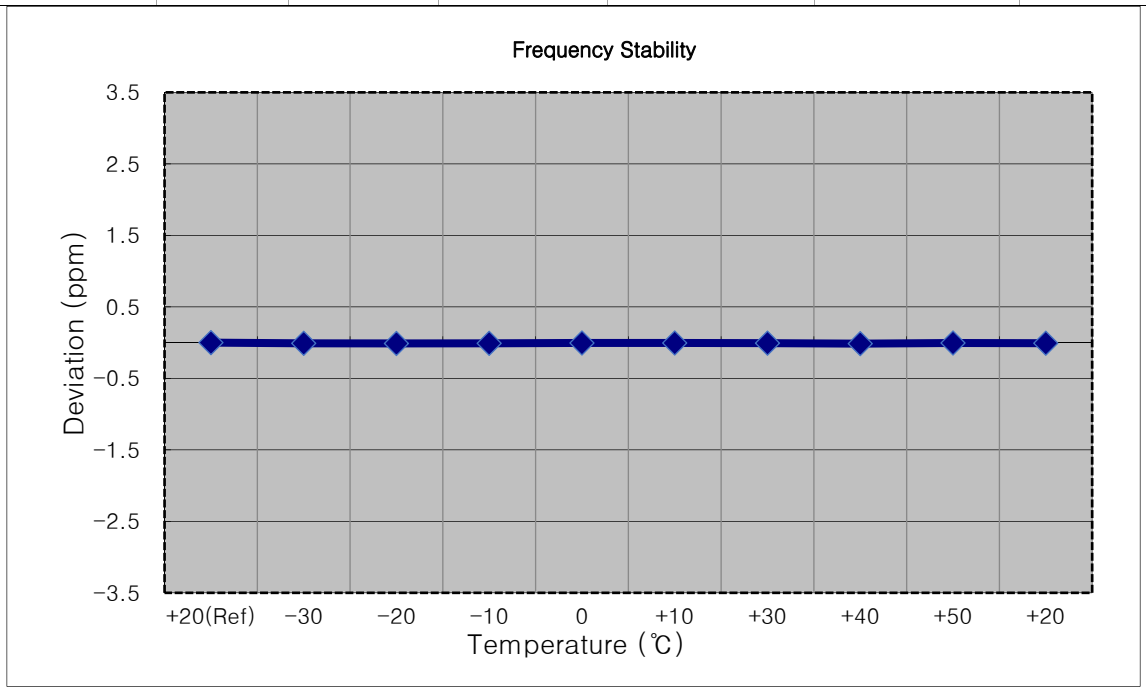
▣ OPERATING FREQUENCY: 713,500,000 Hz

▣ 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)	(℃)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	713 499 995	0.0	0.000 000	0.000
100 %		-30	713 499 988	-7.2	-0.000 001	-0.010
100 %		-20	713 499 987	-8.4	-0.000 001	-0.012
100 %		-10	713 499 988	-7.2	-0.000 001	-0.010
100 %		0	713 499 992	-3.8	-0.000 001	-0.005
100 %		+10	713 499 992	-3.6	-0.000 001	-0.005
100 %		+30	713 499 990	-5.5	-0.000 001	-0.008
100 %		+40	713 499 985	-10.4	-0.000 001	-0.015
100 %		+50	713 499 991	-4.1	-0.000 001	-0.006
Batt. Endpoint	3.300	+20	713 499 989	-6.1	-0.000 001	-0.009



▣ MODE: LTE B12(17)

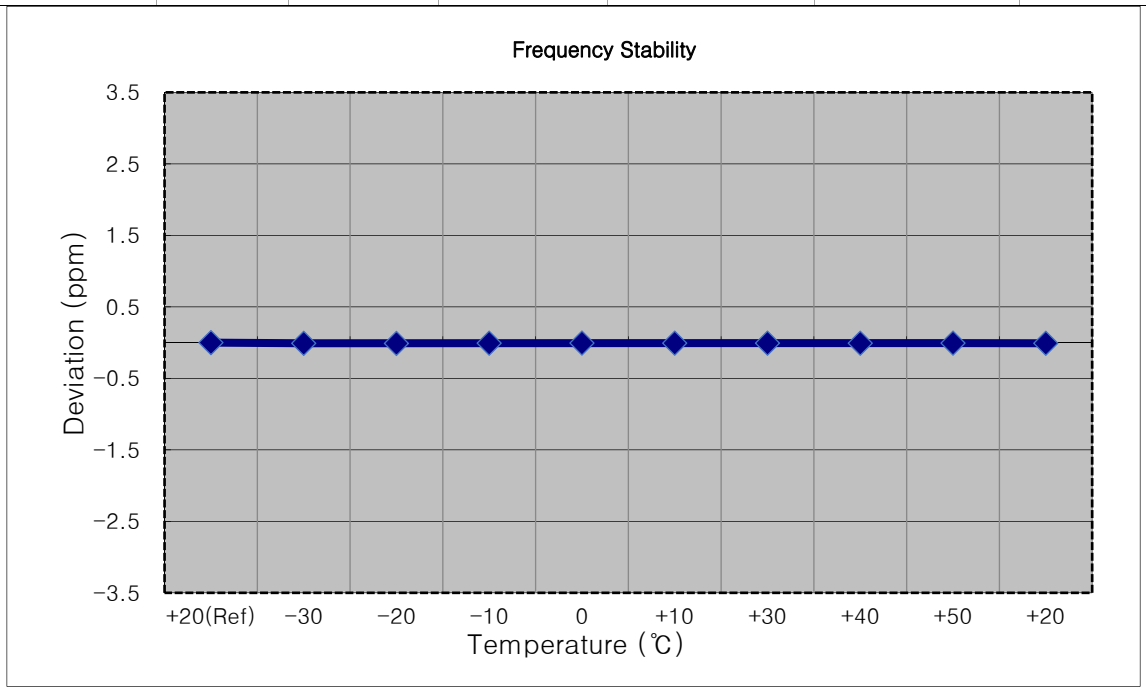
▣ OPERATING FREQUENCY: 711,000,000 Hz

▣ 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)	(℃)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	710 999 994	0.0	0.000 000	0.000
100 %		-30	710 999 987	-6.9	-0.000 001	-0.010
100 %		-20	710 999 986	-8.0	-0.000 001	-0.011
100 %		-10	710 999 989	-5.7	-0.000 001	-0.008
100 %		0	710 999 990	-4.3	-0.000 001	-0.006
100 %		+10	710 999 989	-5.2	-0.000 001	-0.007
100 %		+30	710 999 989	-5.7	-0.000 001	-0.008
100 %		+40	710 999 988	-6.2	-0.000 001	-0.009
100 %		+50	710 999 989	-5.0	-0.000 001	-0.007
Batt. Endpoint	3.300	+20	710 999 988	-6.6	-0.000 001	-0.009



8.7 UPLINK CARRIER AGGREGATION

Test Note

1. All tests were evaluated for the two bands using various combinations of RB size, RB offset, modulation, and channel bandwidth.
2. All modes of operation were investigated and the worst case configuration results are reported in this section.
   Please refer to the table below.
3. The worst case is reported with the modulations, RB sizes and offsets.
   - 12A(ANT A)-66A(ANT A)
     (PCC - Modulation: QPSK, RB: 1, RB Offset: 49, SCC - Modulation: QPSK, RB: 1, RB Offset: 0)
   - 12A(ANT A)-4A(ANT A)
     (PCC - Modulation: QPSK, RB: 1, RB Offset: 49, SCC - Modulation: QPSK, RB: 1, RB Offset: 0)

Radiated Spurious Emissions

PCC	SCC	PCC		SCC	
		BW(MHz)	Channel	BW(MHz)	Channel
12A(ANT I)	66A(ANT A)	10	23060	15	132322
12A(ANT I)	4A(ANT A)	10	23060	15	20325

8.7.1 RADIATED SPURIOUS EMISSIONS

12A(ANT A)(PCC)- 66A(ANT A)(SCC)

Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBi)	Substitute Level [dBm]	C.L	Pol.	Result (dBm)	Limit (dBm)
1 408.00	-53.59	7.68	-62.84	2.00	V	-57.16	-13.00
2 112.00	-58.26	9.45	-62.85	2.44	V	-55.84	-13.00
2 816.00	-58.50	10.80	-59.80	2.80	V	-51.80	-13.00

Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBi)	Substitute Level [dBm]	C.L	Pol.	Result (dBm)	Limit (dBm)
3 490.00	-55.83	12.34	-61.84	3.08	V	-52.58	-13.00
5 235.00	-58.07	12.84	-57.15	3.95	V	-48.26	-13.00
6 980.00	-58.51	11.40	-50.90	4.56	V	-44.06	-13.00

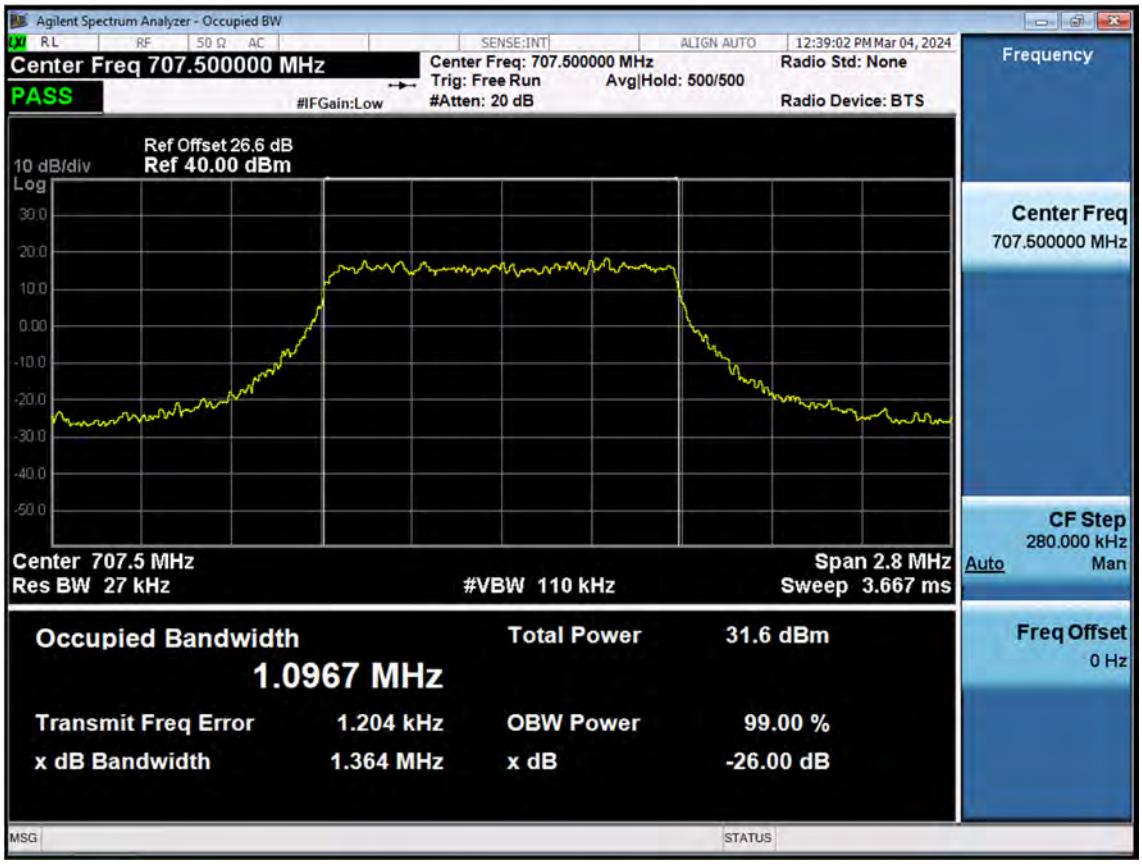
12A(ANT A)(PCC)- 4A(ANT A)(SCC)

Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBi)	Substitute Level [dBm]	C.L	Pol.	Result (dBm)	Limit (dBm)
1 408.00	-54.53	7.68	-63.78	2.00	V	-58.10	-13.00
2 112.00	-57.60	9.45	-62.19	2.44	V	-55.18	-13.00
2 816.00	-56.64	10.80	-57.94	2.80	V	-49.94	-13.00

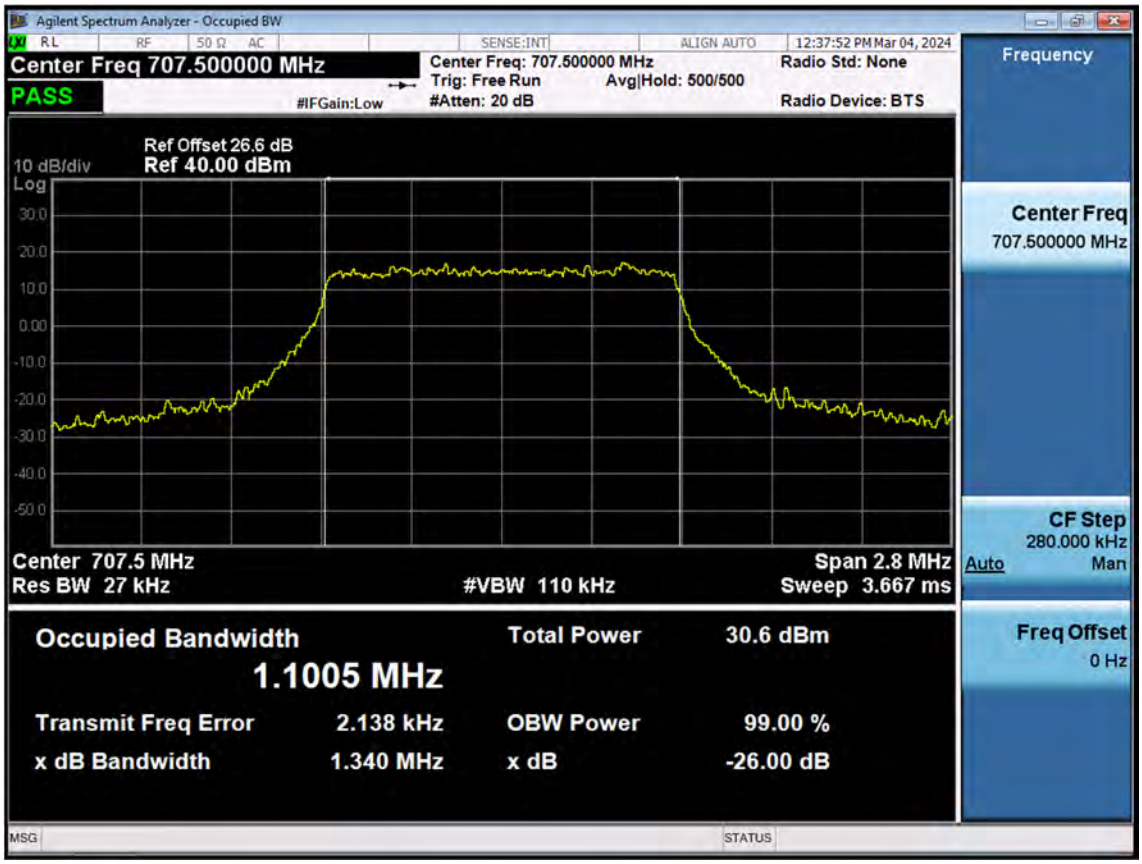
Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBi)	Substitute Level [dBm]	C.L	Pol.	Result (dBm)	Limit (dBm)
3 495.00	-56.75	12.34	-62.82	3.09	V	-53.57	-13.00
5 242.50	-57.86	12.87	-57.01	3.95	V	-48.09	-13.00
6 990.00	-59.25	11.36	-51.04	4.58	V	-44.26	-13.00

9. TEST PLOTS

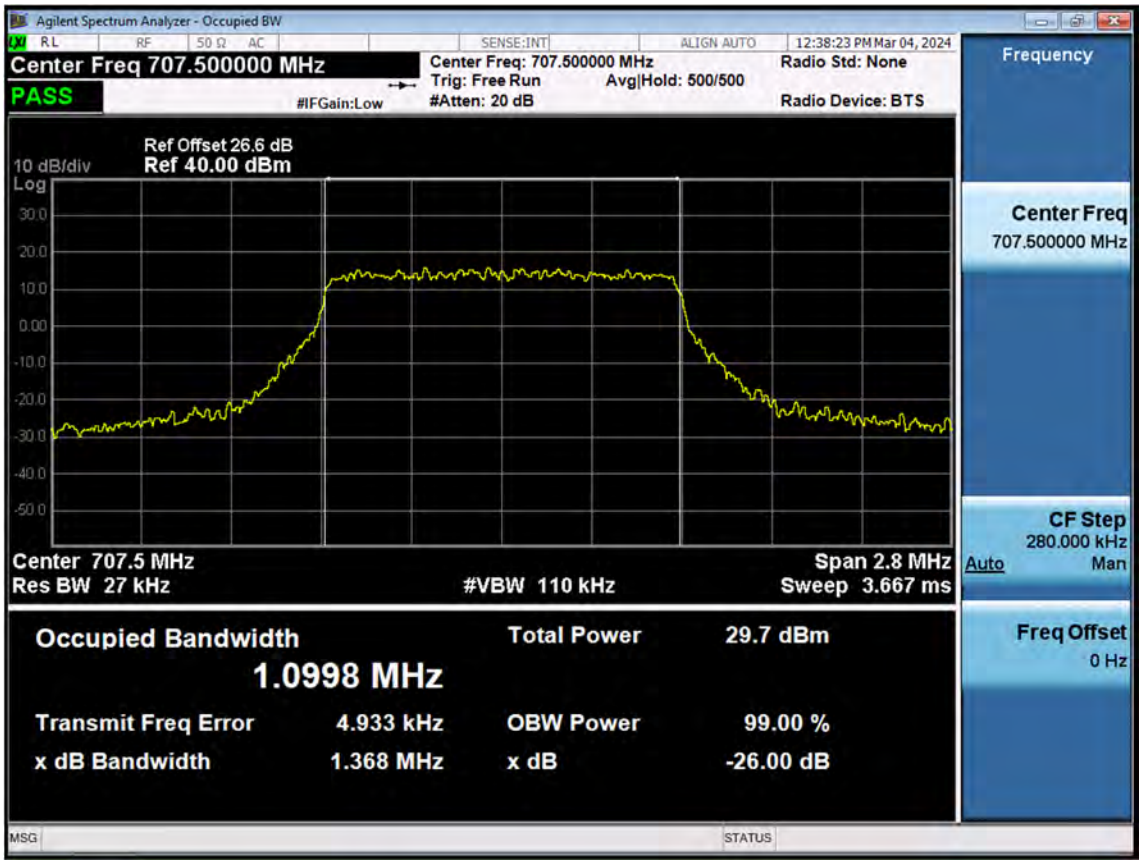
LTE B12_1.4M_OBW_Mid_QPSK_FullRB



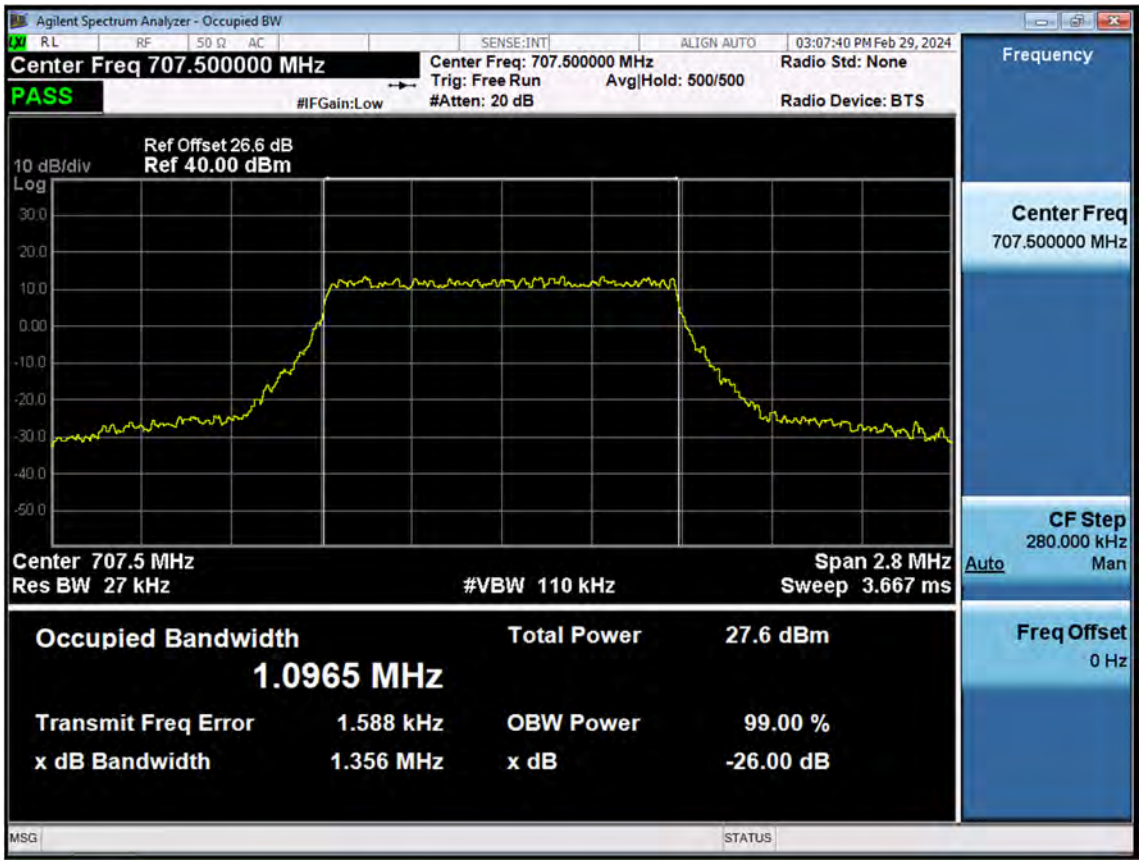
LTE B12_1.4M_OBW_Mid_16QAM_FullRB



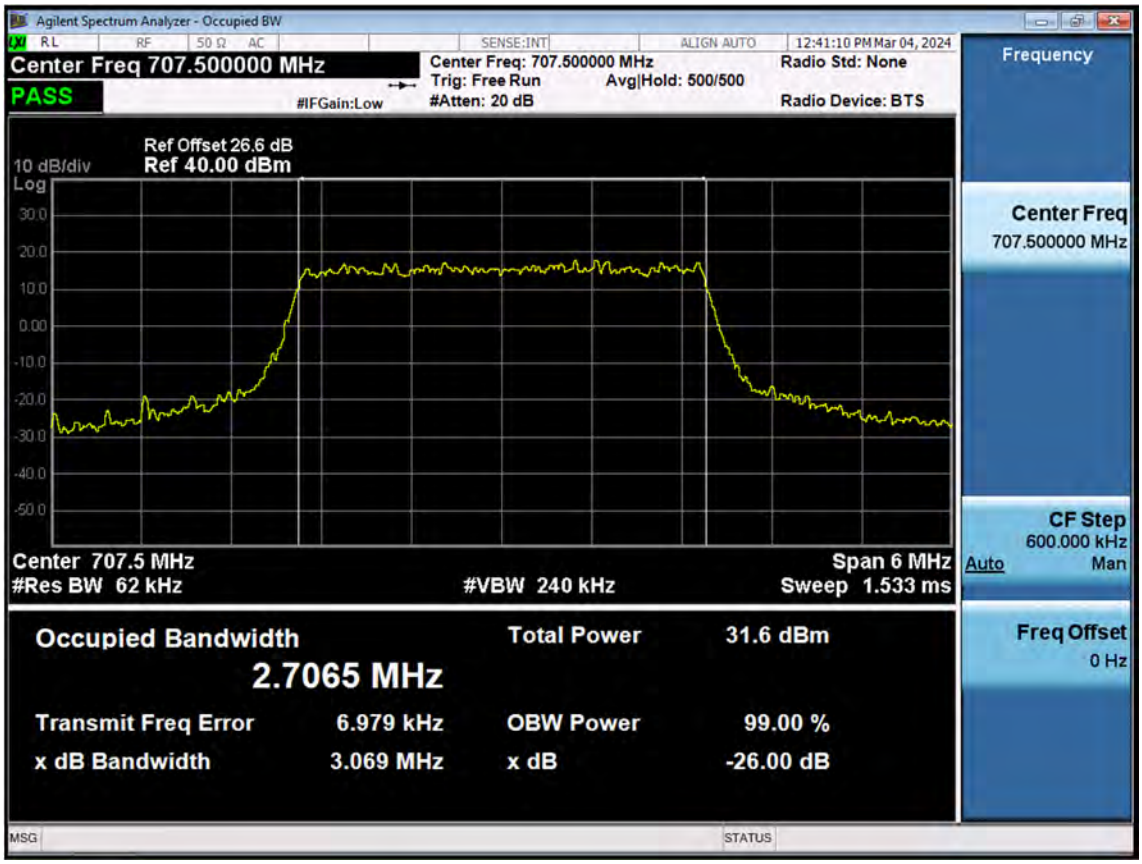
LTE B12_1.4M_OBW_Mid_64QAM_FullRB



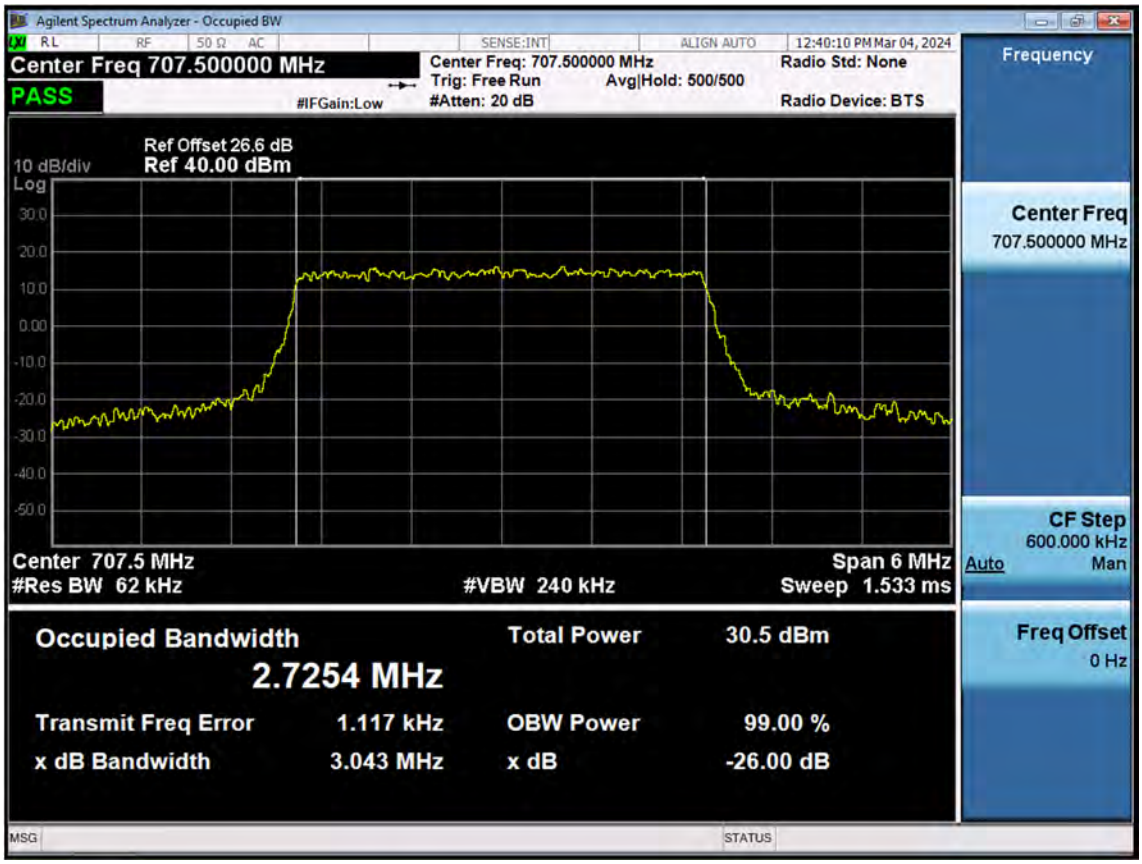
LTE B12_1.4M_OBW_Mid_256QAM_FullRB



LTE B12_3 M_OBW_Mid_QPSK_FullRB



LTE B12_3 M_OBW_Mid_16QAM_FullRB



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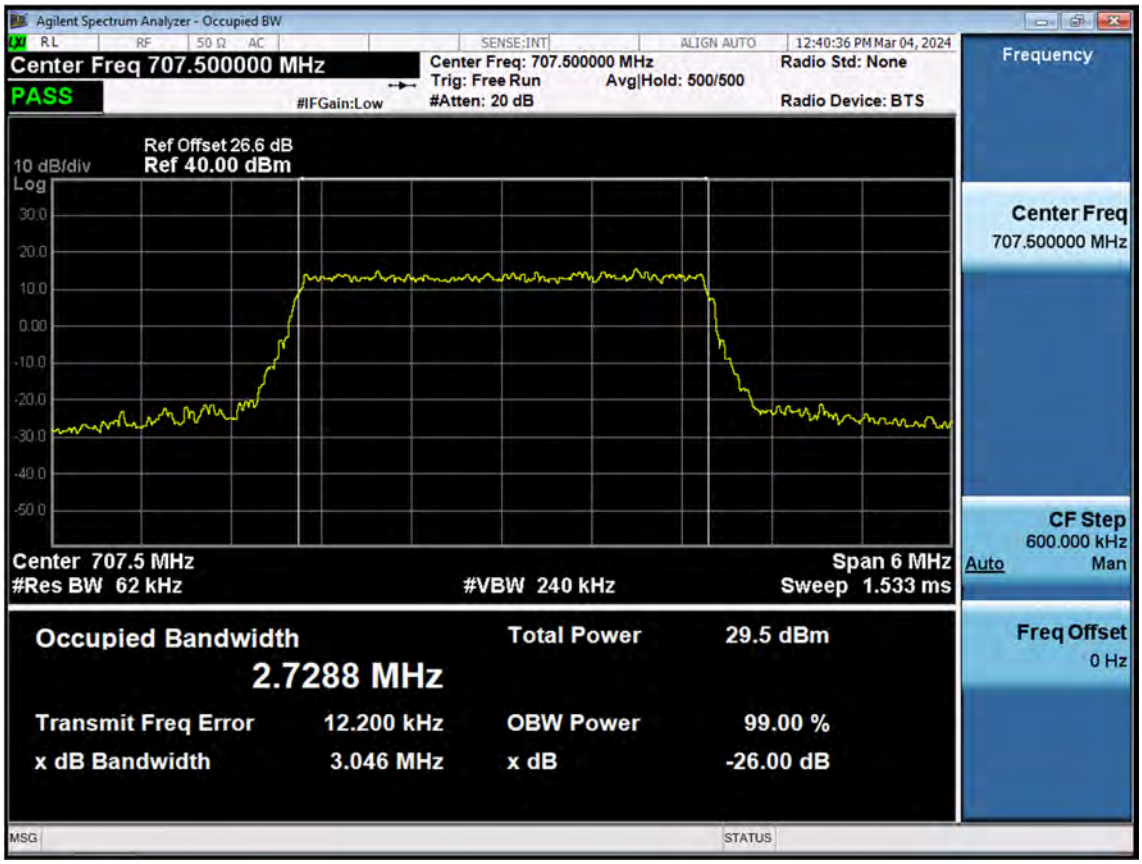
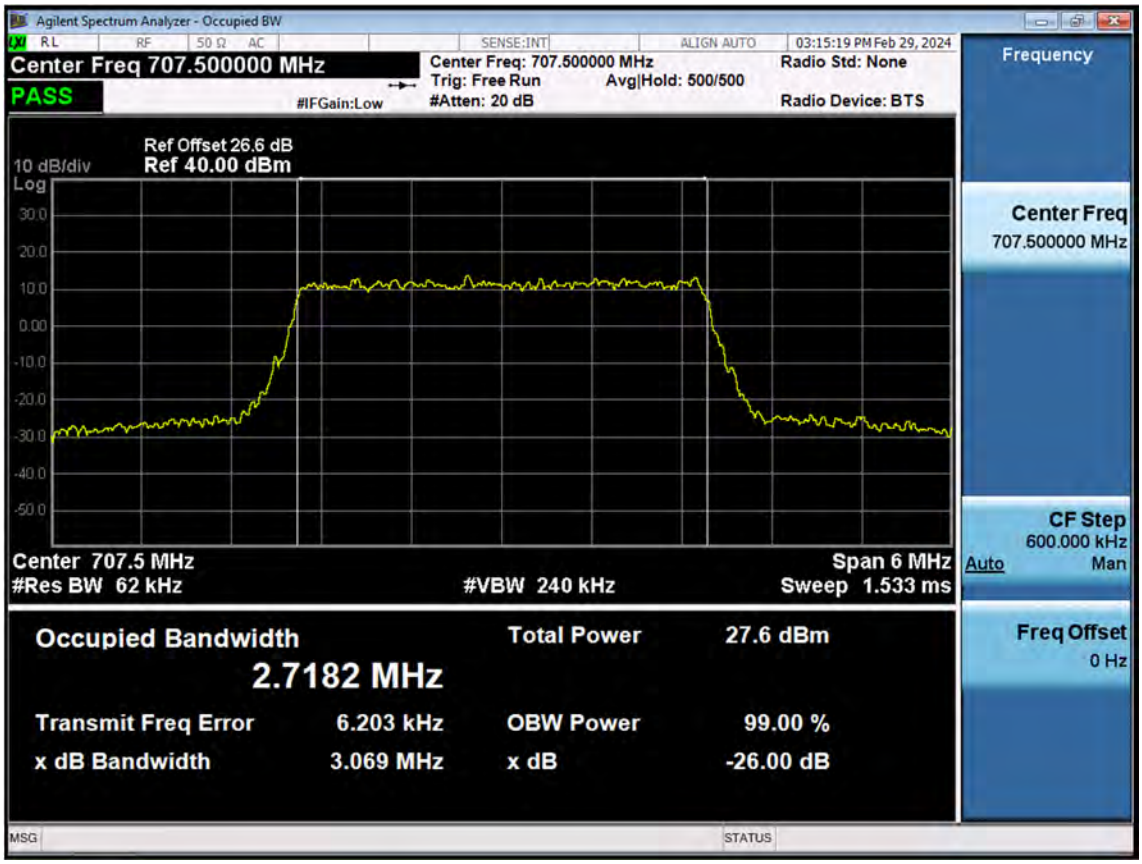
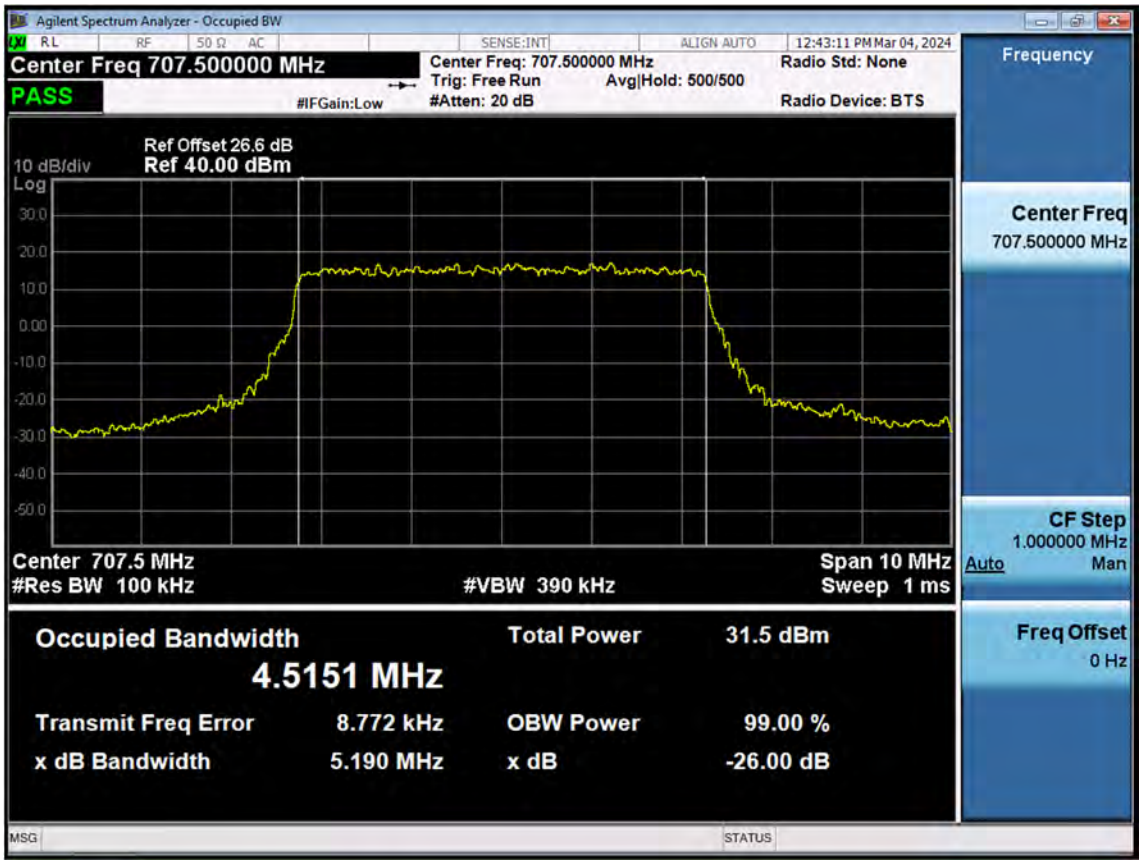


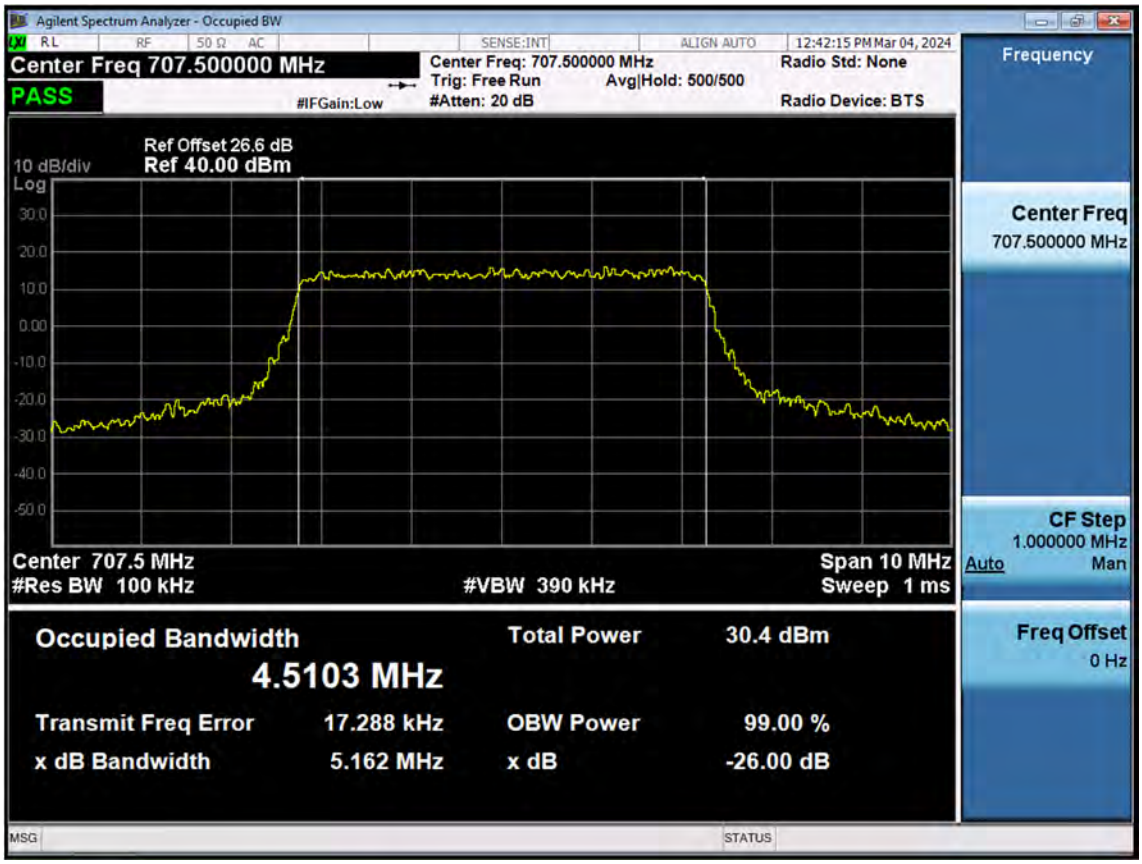
LTE B12_3 M_OBW_Mid_256QAM_FullRB



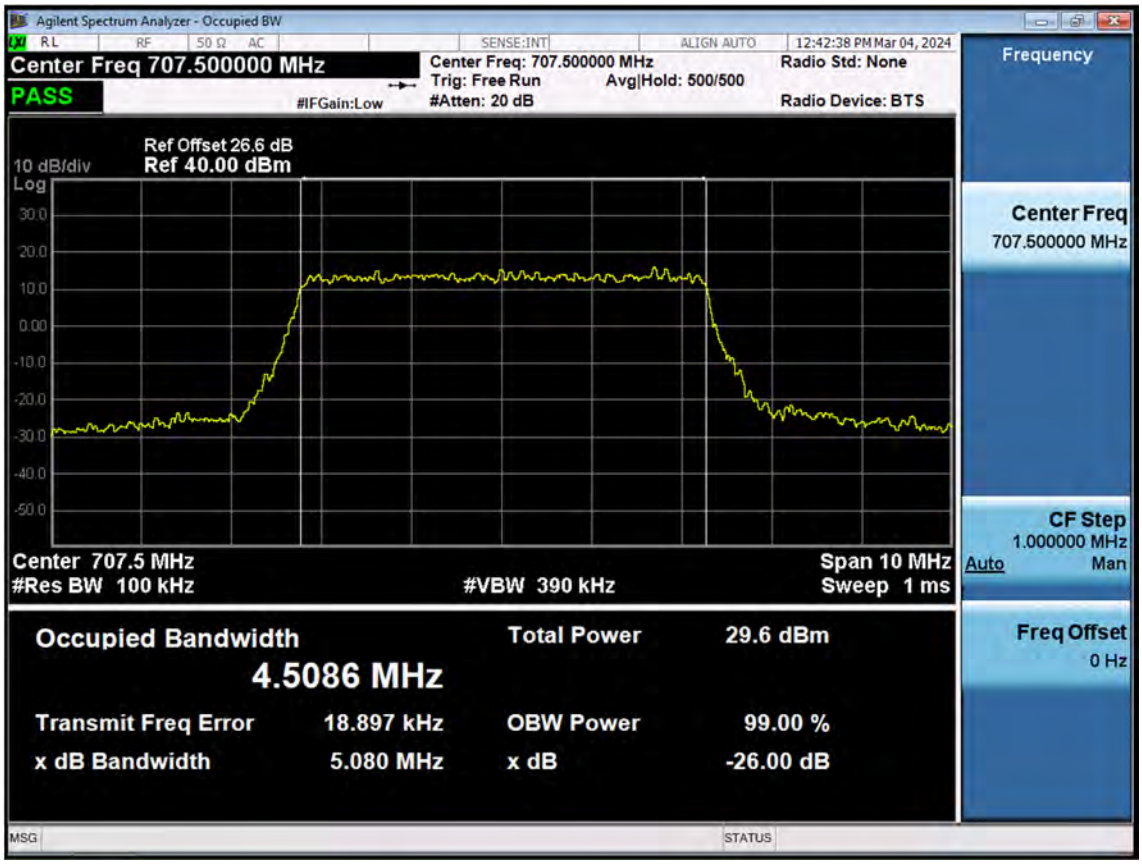
LTE B12(17)_5 M_OBW_Mid_QPSK_FullRB



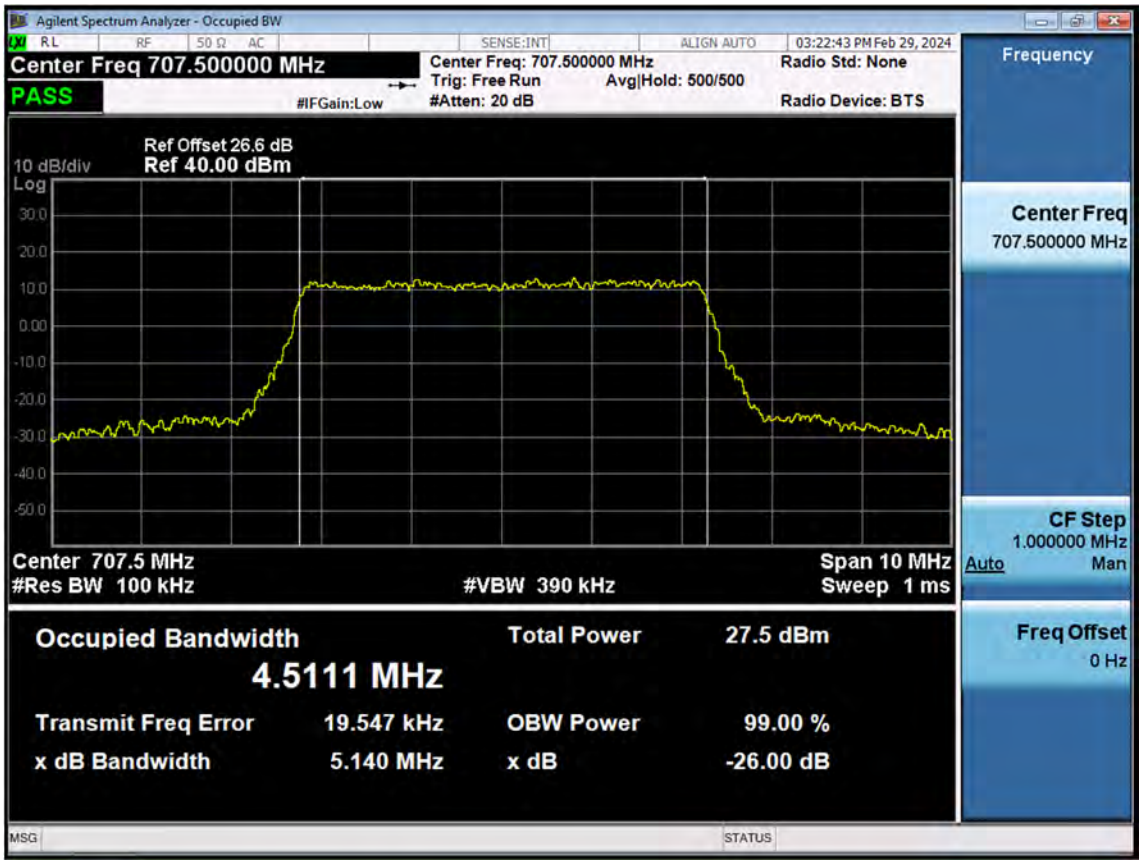
LTE B12(17)_5 M_OBW_Mid_16QAM_FullRB



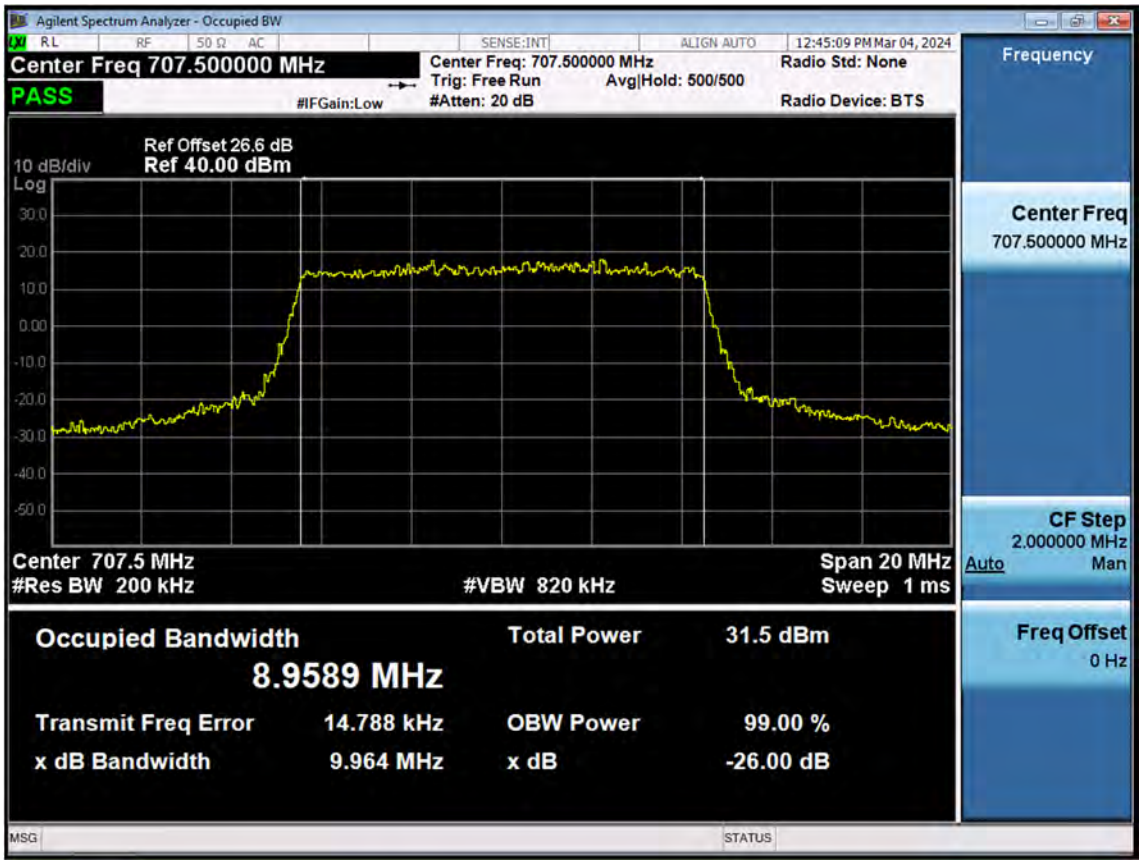
LTE B12(17)_5 M_OBW_Mid_64QAM_FullRB



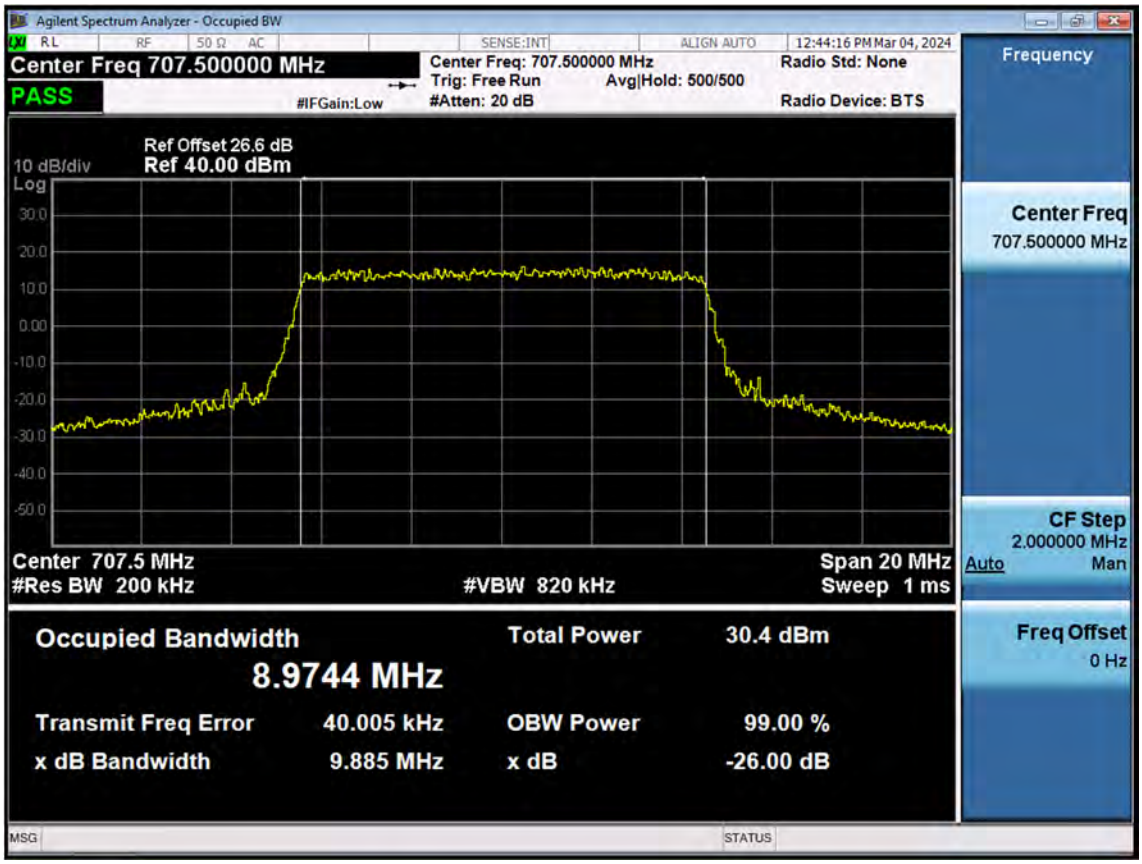
LTE B12(17)_5 M_OBW_Mid_256QAM_FullRB



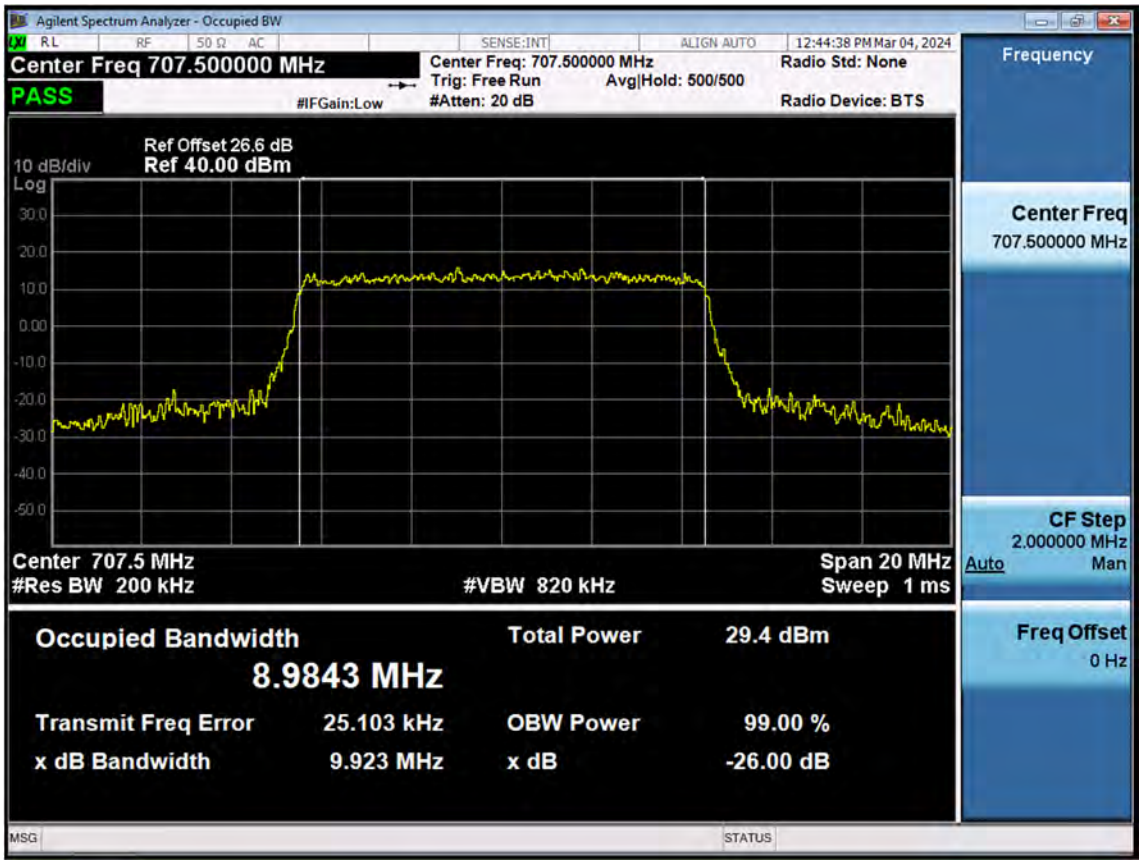
LTE B12(17)_10 M_OBW_Mid_QPSK_FullRB



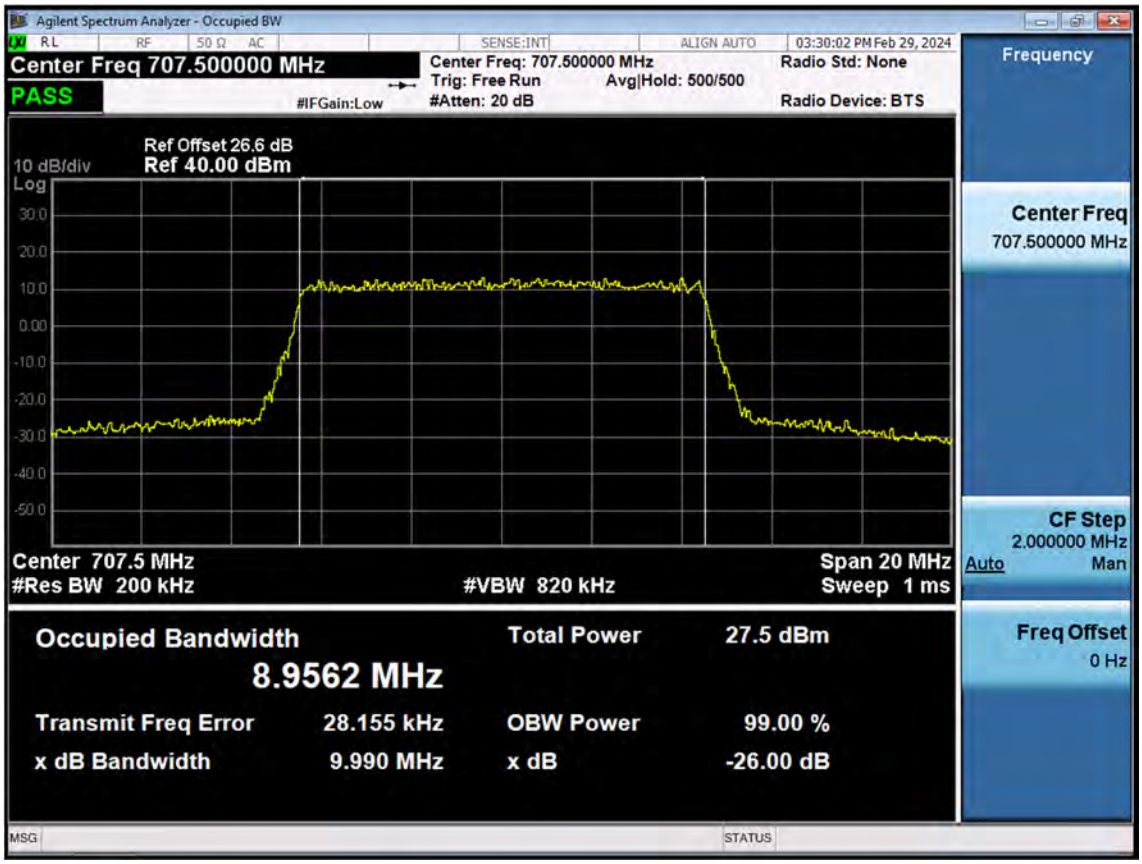
LTE B12(17)_10 M_OBW_Mid_16QAM_FullRB



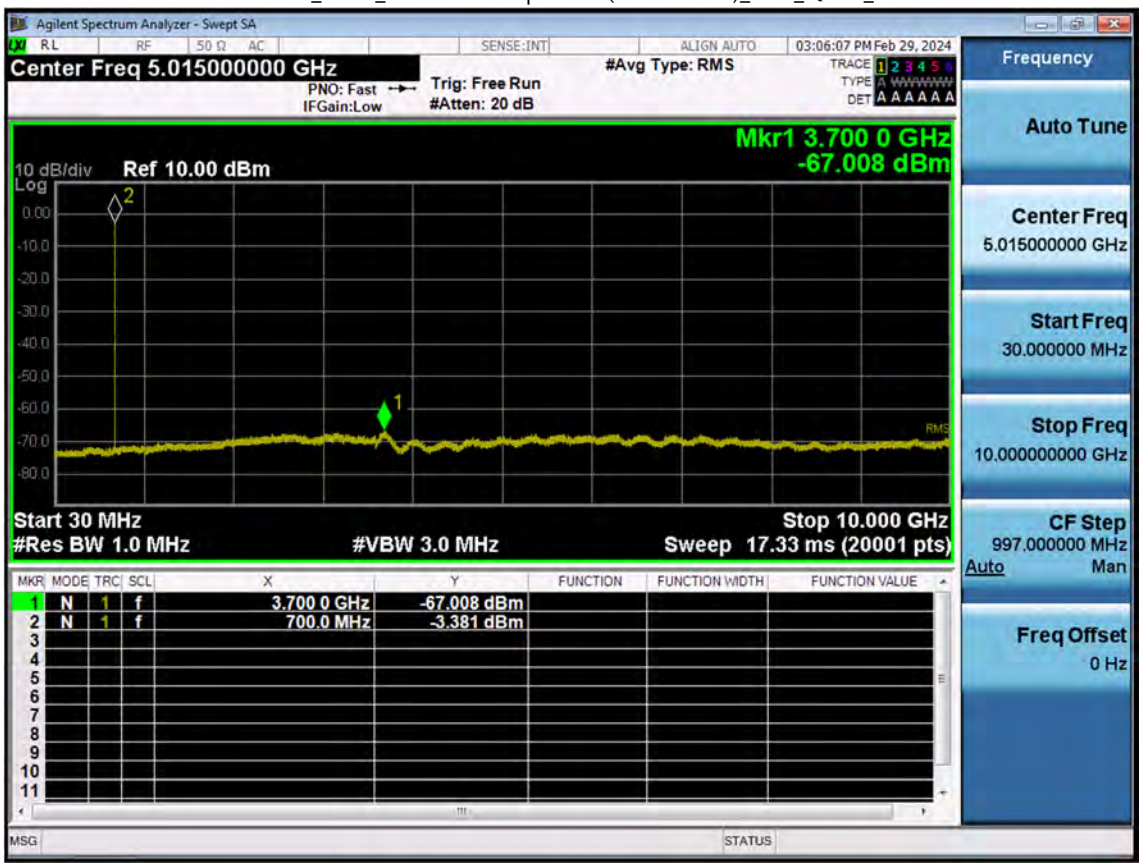
LTE B12(17)_10 M_OBW_Mid_64QAM_FullRB



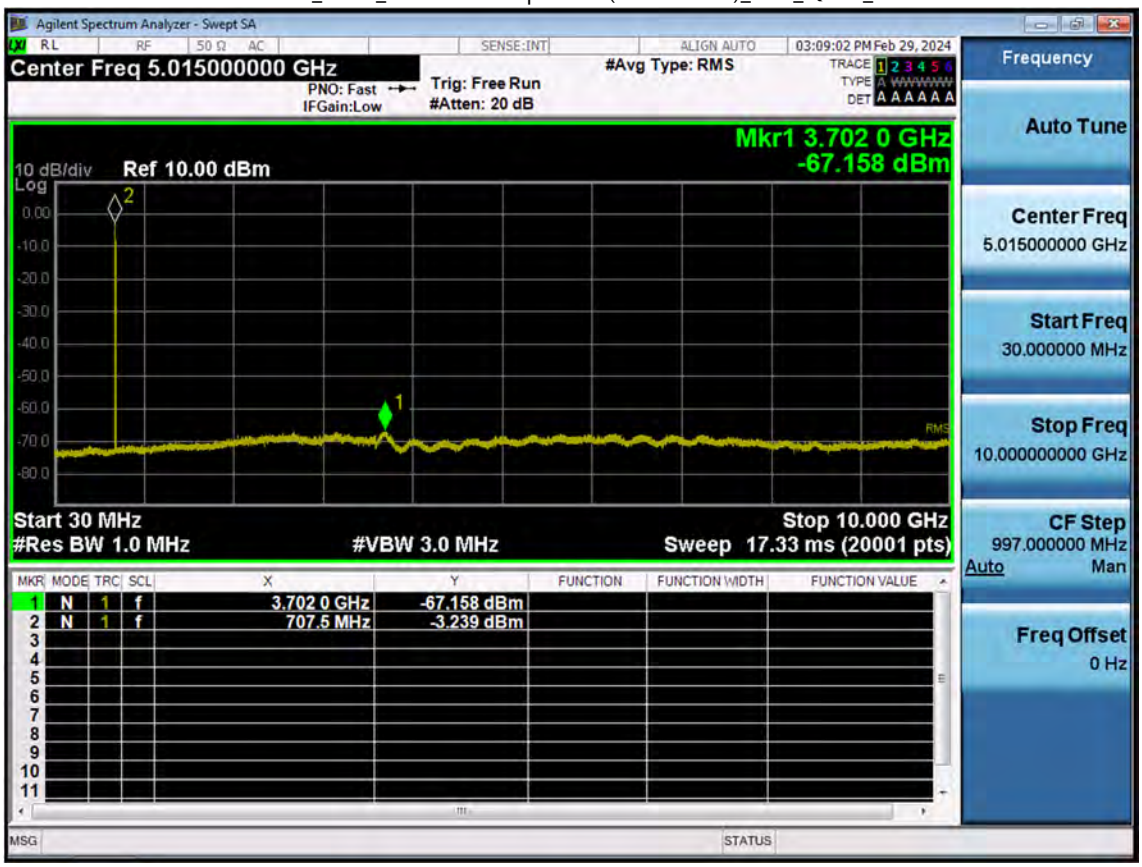
LTE B12(17)_10 M_OBW_Mid_256QAM_FullRB



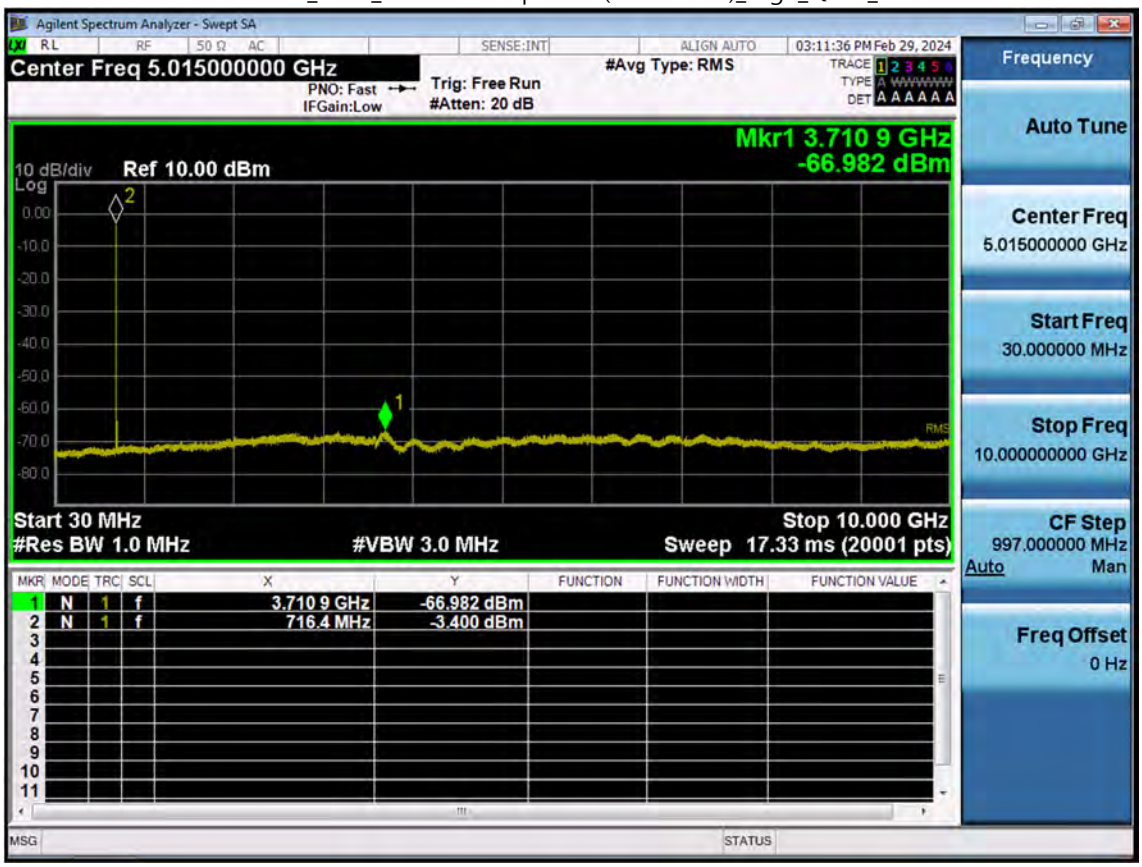
LTE B12_1.4M_Conducted Spurious(30 M-10 G)_Low_QPSK_1RB



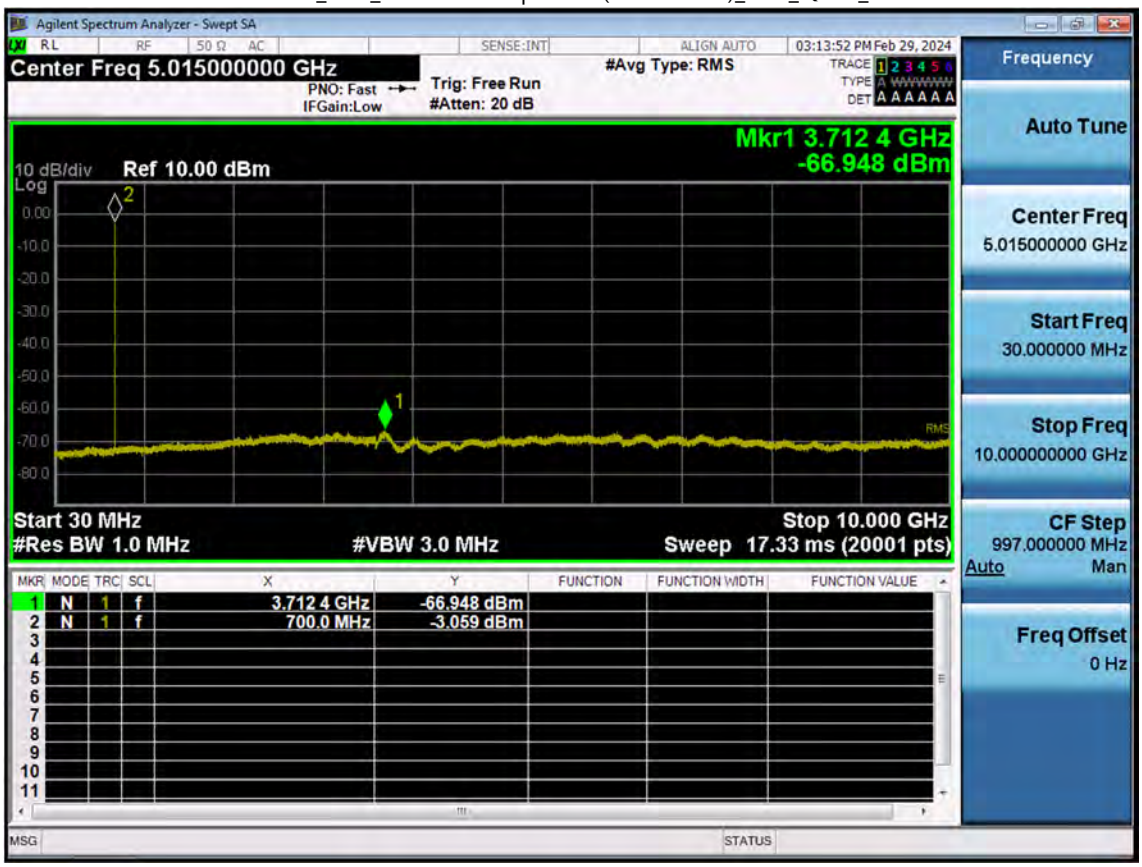
LTE B12_1.4M_Conducted Spurious(30 M-10 G)_Mid_QPSK_1RB



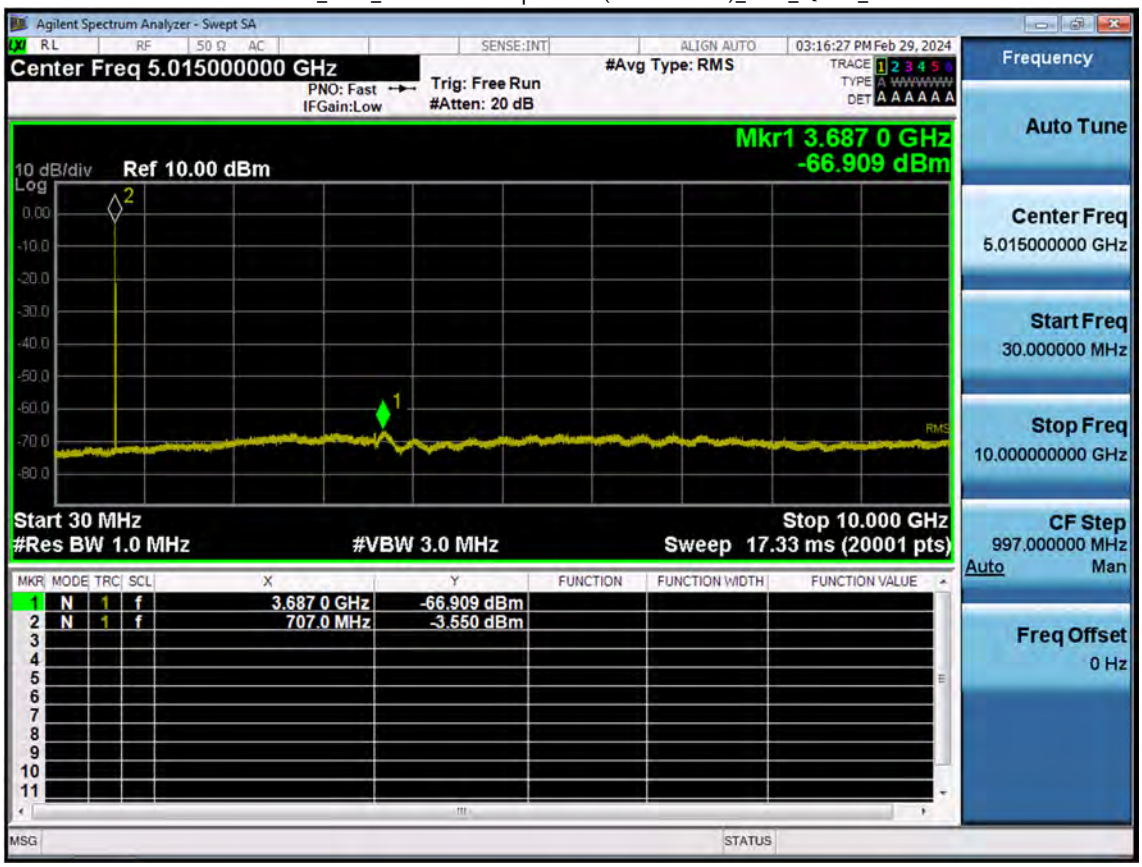
LTE B12_1.4M_Conducted Spurious(30 M-10 G)_High_QPSK_1RB



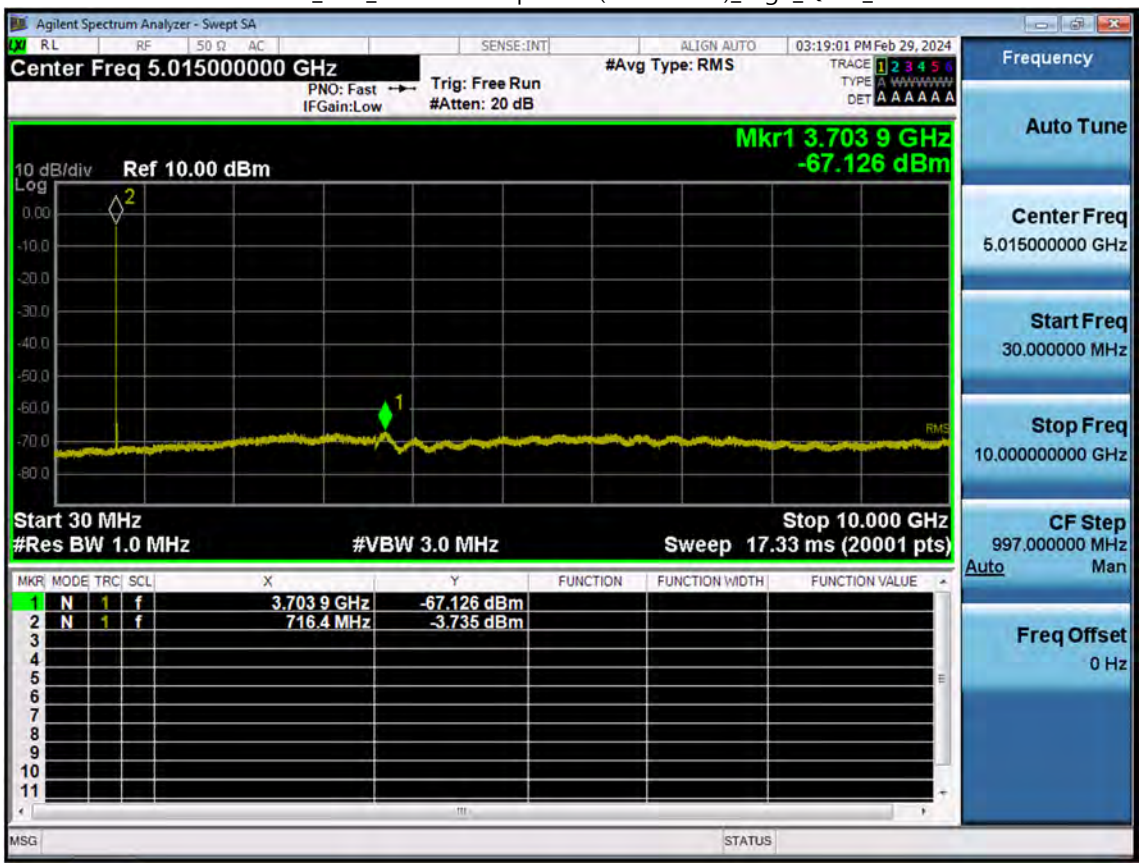
LTE B12_3 M_Conducted Spurious(30 M-10 G)_Low_QPSK_1RB



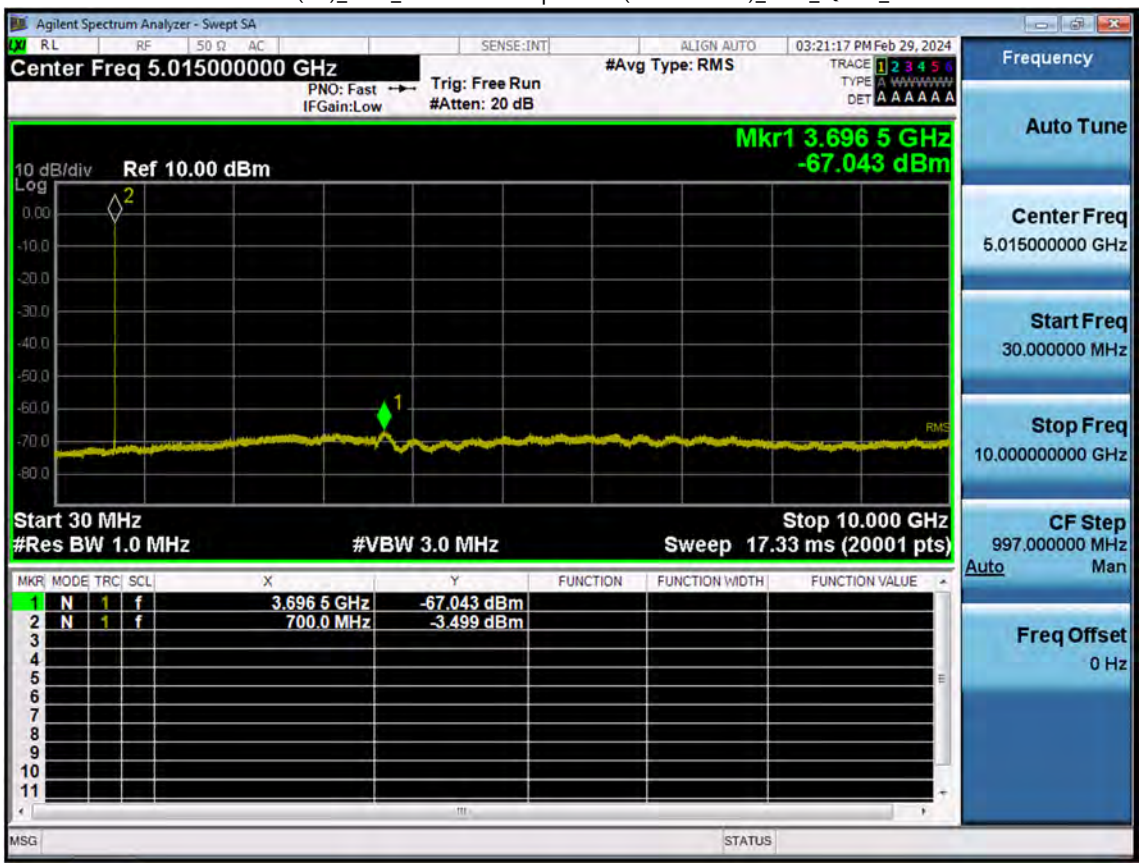
LTE B12_3 M_Conducted Spurious(30 M-10 G)_Mid_QPSK_1RB



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



LTE B12(17)_5 M_Conducted Spurious(30 M-10 G)_Low_QPSK_1RB



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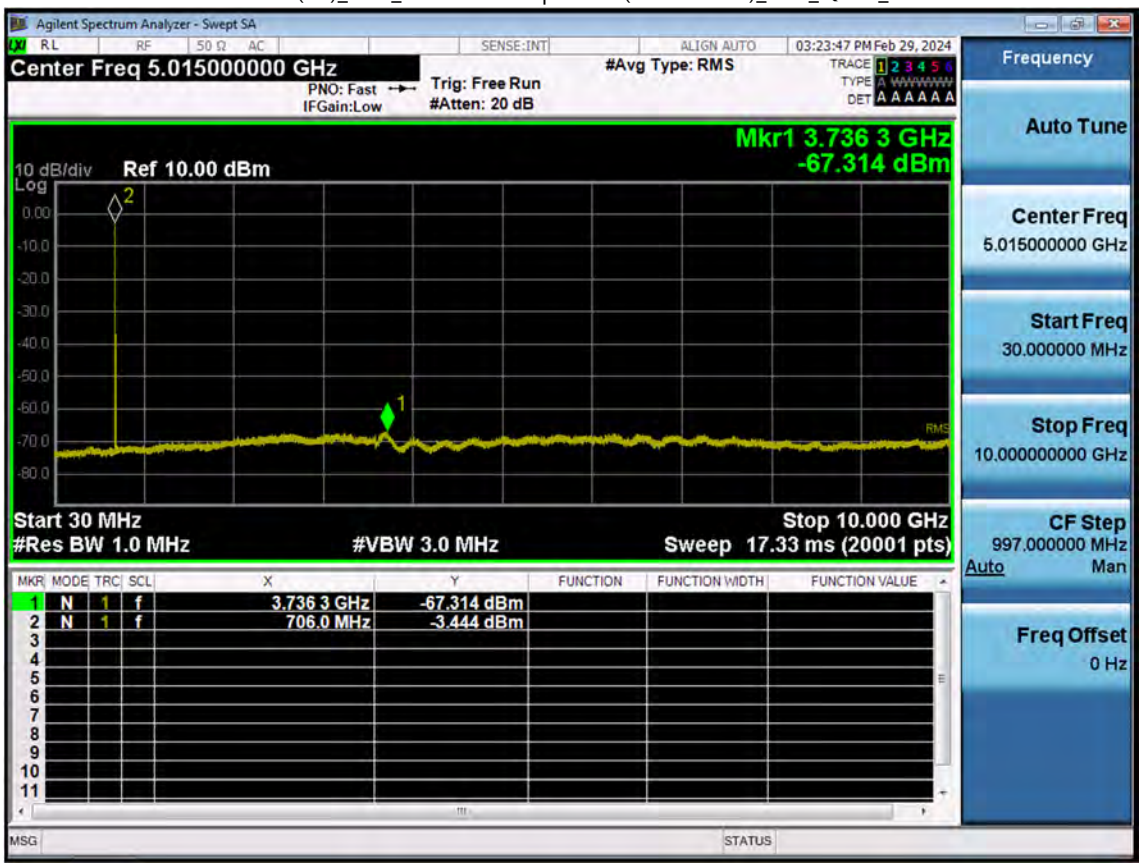
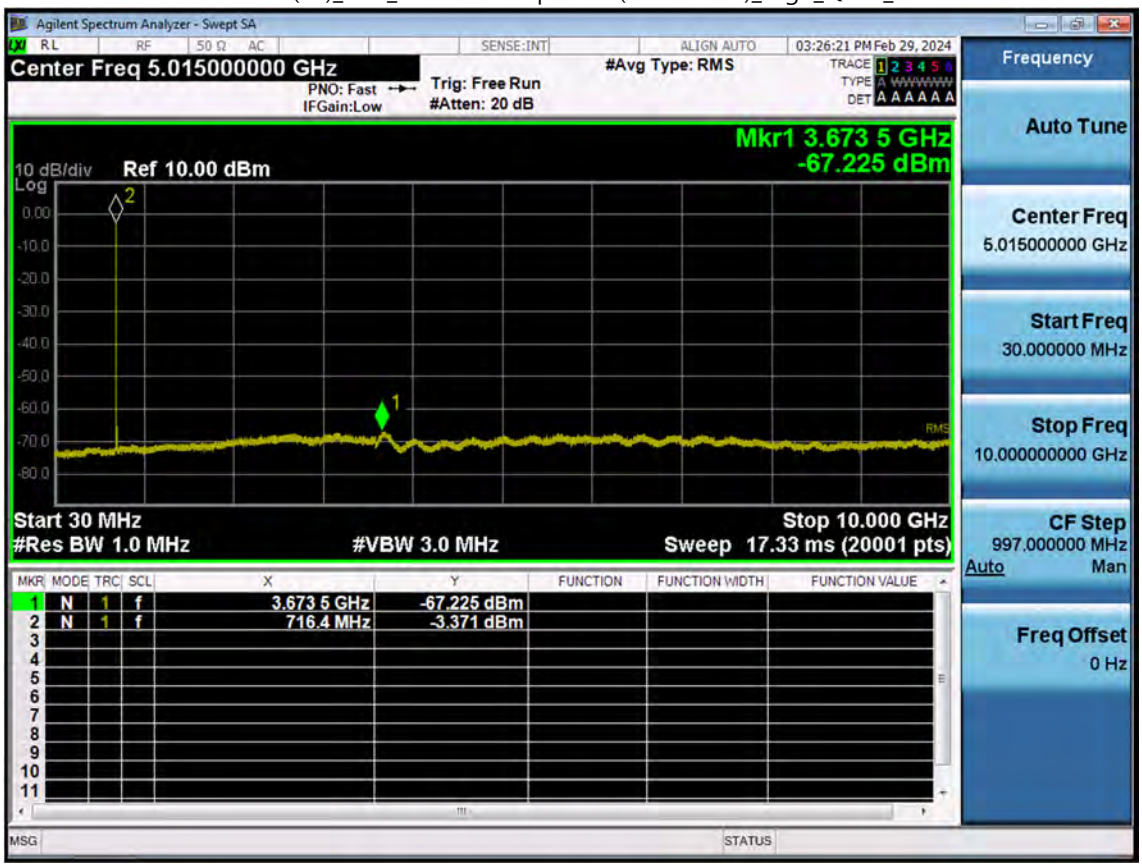
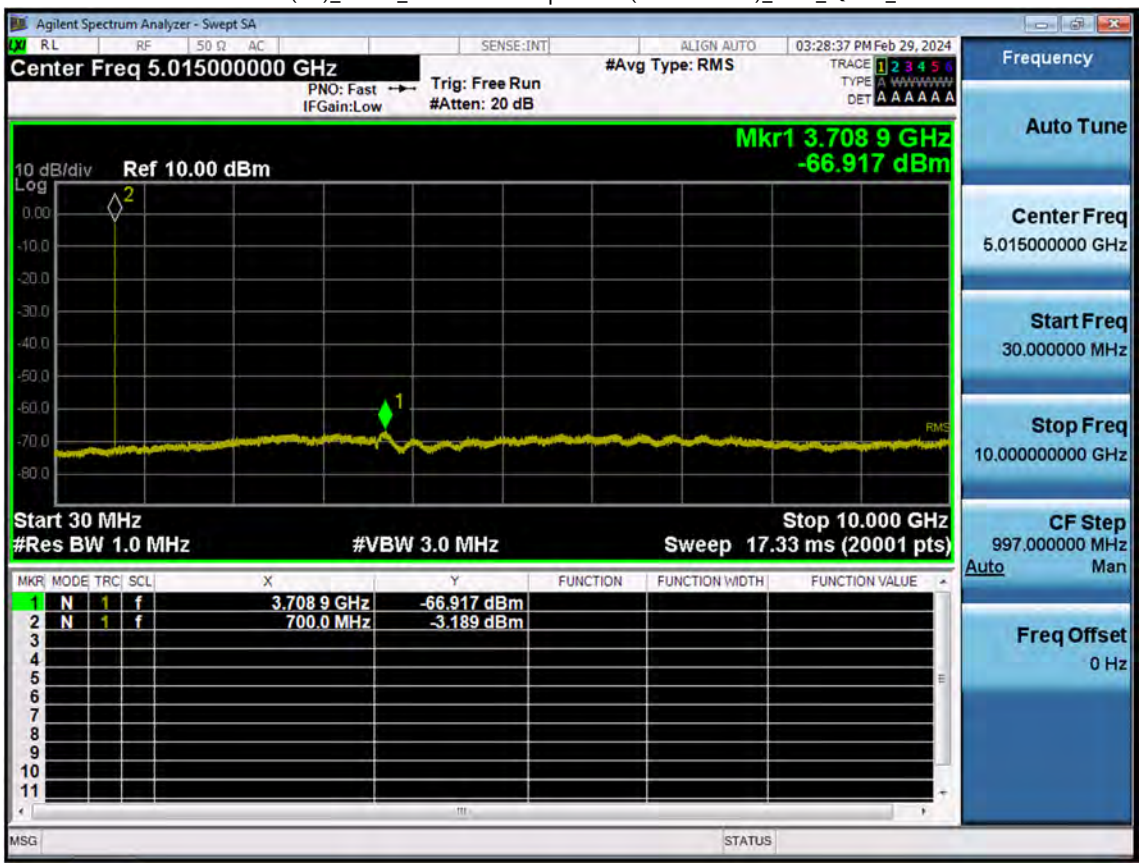


LTE B12(17)_5 M_Conducted Spurious(30 M-10 G)_High_QPSK_1RB



LTE B12(17)_10 M_Conducted Spurious(30 M-10 G)_Low_QPSK_1RB



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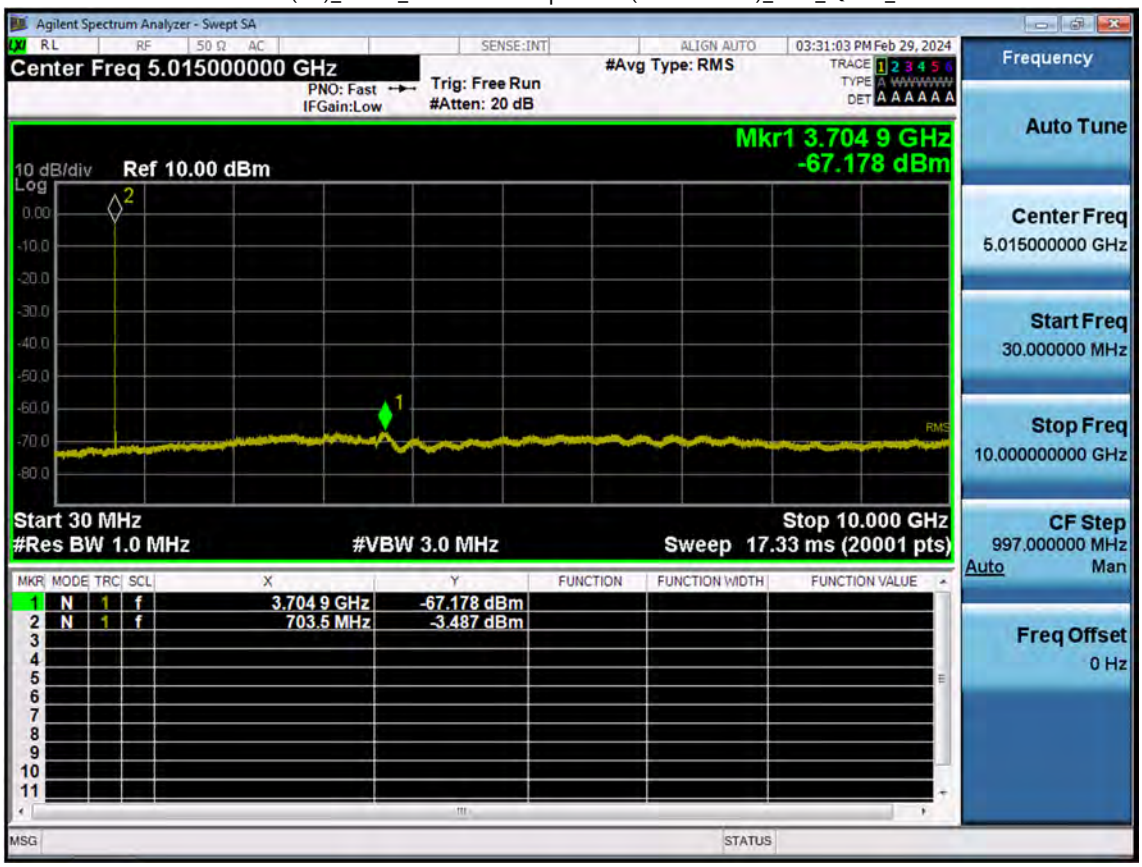
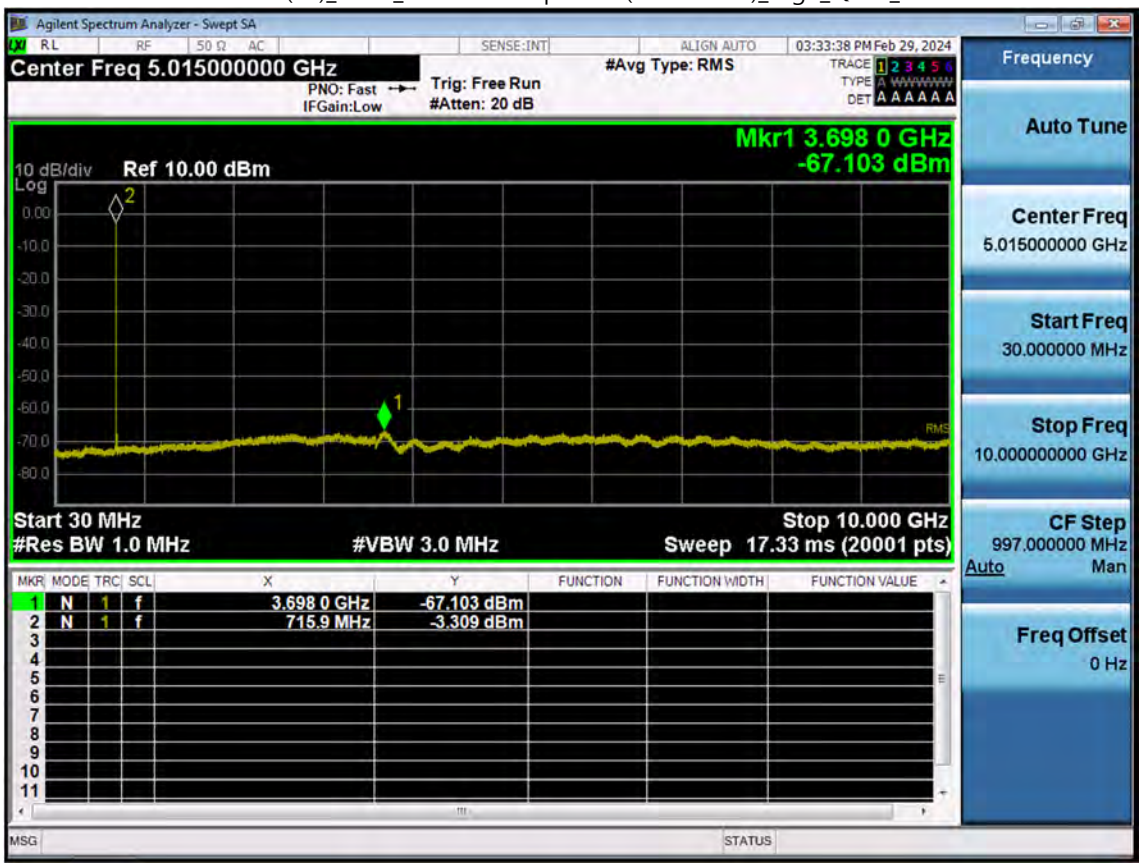


LTE B12(17)_10 M_Conducted Spurious(30 M-10 G)_High_QPSK_1RB



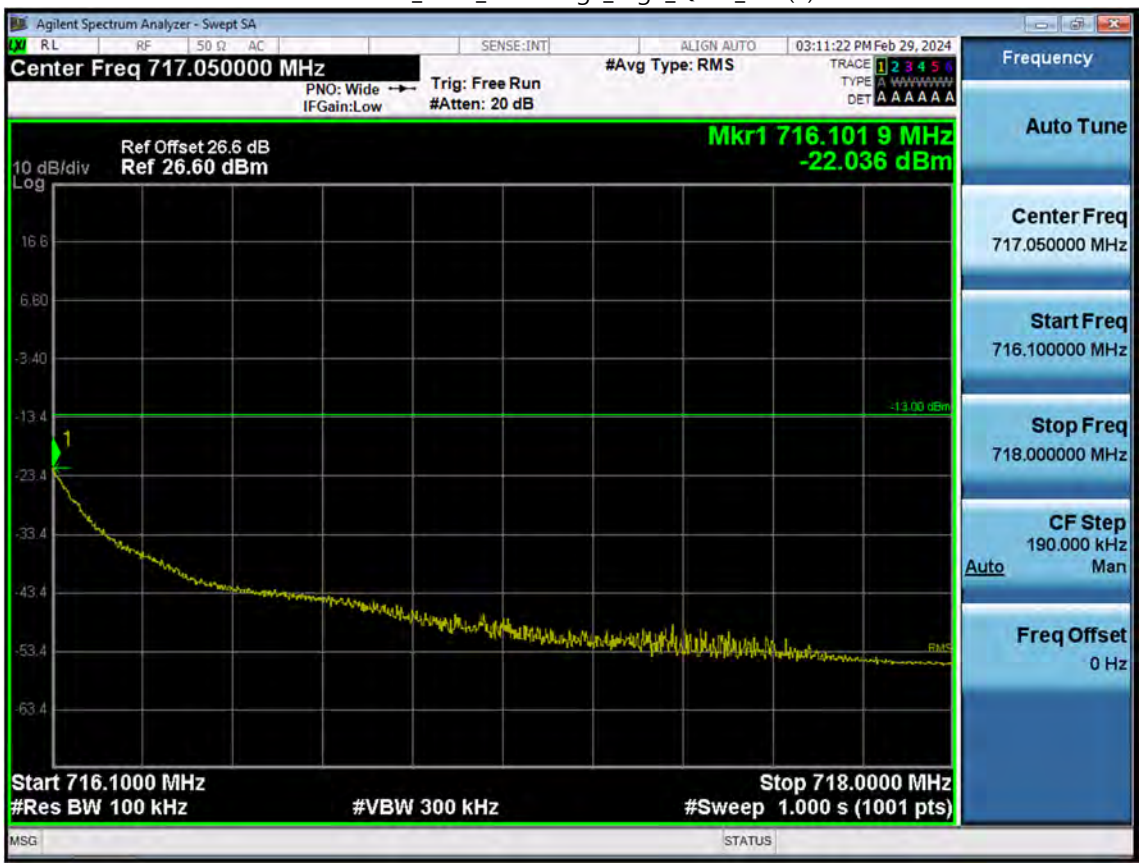
LTE B12_1.4M_Band Edge_Low_QPSK_1RB

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(17)_5 M_Band Edge_Low_QPSK_1RB

LTE B12(17)_5 M_Band Edge_Low_QPSK_FullRB

LTE B12(17)_5 M_Extended Band Edge_Low_QPSK_FullRB

LTE B12(17)_5 M_Band Edge_High_QPSK_1RB(1)

LTE B12(17)_5 M_Band Edge_High_QPSK_1RB(2)

LTE B12(17)_5 M_Band Edge_High_QPSK_FullRB

LTE B12(17)_5 M_Extended Band Edge_High_QPSK_FullRB

LTE B12(17)_10 M_Band Edge_Low_QPSK_1RB

LTE B12(17)_10 M_Band Edge_Low_QPSK_FullRB

LTE B12(17)_10 M_Extended Band Edge_Low_QPSK_FullRB

LTE B12(17)_10 M_Band Edge_High_QPSK_1RB(1)

LTE B12(17)_10 M_Band Edge_High_QPSK_1RB(2)

LTE B12(17)_10 M_Band Edge_High_QPSK_FullRB

LTE B12(17)_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-2405-FC004-P