

RF TEST REPORT

Applicant VivaChek Biotech (Hangzhou) Co., Ltd

FCC ID 2APAPVGM90

Product VivaChek Link Plus Blood Glucose
Monitoring System

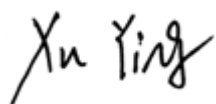
Brand VivaChek

Model VGM90

Report No. R2306A0646-R2

Issue Date August 28, 2023

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 2 (2022)/ FCC CFR47 Part 27C (2022)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.



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Summary of Measurement Results

LTE-M Band 4			
Number	Test Case	Clause in FCC rules	Verdict
1	RF Power Output and Effective Isotropic Radiated Power	2.1046/ 27.50(d)(4)	PASS
2	Occupied Bandwidth	2.1049	PASS
3	Band Edge Compliance	27.53(h)	PASS
4	Peak-to-Average Power Ratio	27.50(d)/ KDB971168 D01(5.7)	PASS
5	Frequency Stability	2.1055/ 27.54	PASS
6	Spurious Emissions at Antenna Terminals	2.1051/ 27.53(h)	PASS
7	Radiated Spurious Emission	2.1053/ 27.53(h)	PASS
Date of Testing: June 19, 2023 ~ August 4, 2023 and August 22, 2023			
Date of Sample Received: June 14, 2023			
Note: PASS: The EUT complies with the essential requirements in the standard. FAIL: The EUT does not comply with the essential requirements in the standard. All indications of Pass/Fail in this report are opinions expressed by TA Technology (Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only.			

LTE-M Band 12			
Number	Test Case	Clause in FCC rules	Verdict
1	RF Power Output and Effective Isotropic Radiated Power	2.1046/ 27.50(c)(10)	PASS
2	Occupied Bandwidth	2.1049	PASS
3	Band Edge Compliance	27.53(g)	PASS
4	Peak-to-Average Power Ratio	27.50(d)/ KDB971168 D01(5.7)	PASS
5	Frequency Stability	2.1055/ 27.54	PASS
6	Spurious Emissions at Antenna Terminals	2.1051/ 27.53(g)	PASS
7	Radiated Spurious Emission	2.1053/ 27.53(g)	PASS
Date of Testing: June 19, 2023 ~ August 4, 2023 and August 22, 2023 Date of Sample Received: June 14, 2023 Note: PASS: The EUT complies with the essential requirements in the standard. FAIL: The EUT does not comply with the essential requirements in the standard. All indications of Pass/Fail in this report are opinions expressed by TA Technology (Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only.			

LTE-M Band 13			
Number	Test Case	Clause in FCC rules	Verdict
1	RF Power Output and Effective Isotropic Radiated Power	2.1046/ 27.50(b)(10)	PASS
2	Occupied Bandwidth	2.1049	PASS
3	Band Edge Compliance	27.53(f)/ 27.53(c)	PASS
4	Peak-to-Average Power Ratio	27.50(d)/ KDB971168 D01(5.7)	PASS
5	Frequency Stability	2.1055/ 27.54	PASS
6	Spurious Emissions at Antenna Terminals	2.1051/ 27.53(f)/ 27.53(c)	PASS
7	Radiated Spurious Emission	2.1053/ 27.53(f)/ 27.53(c)	PASS
Date of Testing: June 19, 2023 ~ August 4, 2023 and August 22, 2023			
Date of Sample Received: June 14, 2023			
Note: PASS: The EUT complies with the essential requirements in the standard. FAIL: The EUT does not comply with the essential requirements in the standard. All indications of Pass/Fail in this report are opinions expressed by TA Technology (Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only.			

1 Test Laboratory

1.1 Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **TA Technology (Shanghai) Co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein .Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

1.2. Test facility

FCC (Designation number: CN1179, Test Firm Registration Number: 446626)

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform measurements.

A2LA (Certificate Number: 3857.01)

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform measurement.

1.3 Testing Location

Company:	TA Technology (Shanghai) Co., Ltd.
Address:	Building 3, No.145, Jintang Rd, Pudong Shanghai, P.R.China
City:	Shanghai
Post code:	201201
Country:	P. R. China
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Website:	http://www.ta-shanghai.com
E-mail:	xukai@ta-shanghai.com

2 General Description of Equipment under Test

2.1 Applicant and Manufacturer Information

Applicant	VivaChek Biotech (Hangzhou) Co., Ltd
Applicant address	Level 2, Block 2, 146 East Chaofeng Rd., Yuhang Economy Development Zone, Hangzhou, Zhejiang, P.R. China
Manufacturer	VivaChek Biotech (Hangzhou) Co., Ltd
Manufacturer address	Level 2, Block 2, 146 East Chaofeng Rd., Yuhang Economy Development Zone, Hangzhou, Zhejiang, P.R. China

2.2 General information

EUT Description			
Model	VGM90		
SN	397A0000002		
Hardware Version	PCBA #2079027101		
Software Version	01		
Power Supply	Battery		
Antenna Type	FPC Antenna		
Antenna Gain	LTE-M Band 4	3.96 dBi	
	LTE-M Band 12	-1.18 dBi	
	LTE-M Band 13	-1.63 dBi	
Test Mode(s)	LTE-M Band 4; LTE-M Band 12; LTE-M Band 13		
Test Modulation	QPSK, 16QAM		
LTE-M Category	M1		
Maximum E.I.R.P./ E.R.P.	LTE-M Band 4	26.08 dBm	
	LTE-M Band 12	17.73 dBm	
	LTE-M Band 13	17.68 dBm	
Rated Power Supply Voltage	3.7V		
Operating Voltage	Minimum: 3.6V Maximum: 4.2V		
Operating Temperature	Lowest: 5°C Highest: 45°C		
Testing Temperature	Lowest: -30°C Highest: 50°C		
Operating Frequency Range(s)	Mode	Tx (MHz)	Rx (MHz)
	LTE-M Band 4	1710 ~ 1755	2110 ~ 2155
	LTE-M Band 12	699 ~ 716	729 ~ 746

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	LTE-M Band 13	777 ~ 787	746 ~ 756
EUT Accessory			
Battery	Manufacturer: Dongguan Xinkeda Energy Co., Ltd Model: 453450		
Type-C Cable	Manufacturer: Jiangxi Dishuo Technology Co., Ltd P/No: 1405013401		
Auxiliary Test Equipment			
Adapter	Manufacturer: Huawei Model: HW-050200C02		
Note:			
1. The EUT is sent from the applicant to TA and the information of the EUT is declared by the applicant.			

3 Applied Standards

According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

Test standards:

FCC CFR47 Part 27C (2022)

FCC CFR47 Part 2 (2022)

Reference standard:

ANSI C63.26-2015

KDB 971168 D01 Power Meas License Digital Systems v03r01

4 Test Configuration

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes. EUT stand-up position (Z axis), lie-down position (X, Y axis). Receiver antenna polarization (horizontal and vertical), the worst emission was found in position (X axis, vertical polarization) and the worst case was recorded.

All mode and data rates and positions and RB size and modulations were investigated.

Subsequently, only the worst case emissions are reported.

The following testing in LTE-M is set based on the maximum RF Output Power.

The following testing in different Bandwidth is set to detail in the following table

Test modes are chosen to be reported as the worst case configuration below for LTE-M Band 4/12/13:

Test items	Modes	Bandwidth (MHz)						Modulation		RB			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	1	50%	100%	L	M	H
RF Power Output and Effective Isotropic Radiated Power	LTE-M 4	O	O	O	O	O	O	O	O	O	O	O	O	O	O
	LTE-M 12	O	O	O	O	-	-	O	O	O	O	O	O	O	O
	LTE-M 13	-	-	O	O	-	-	O	O	O	O	O	O	O	O
Occupied Bandwidth	LTE-M 4	O	O	O	O	O	O	O	O	-	-	O	-	O	-
	LTE-M 12	O	O	O	O	-	-	O	O	-	-	O	-	O	-
	LTE-M 13	-	-	O	O	-	-	O	O	-	-	O	-	O	-
Band Edge Compliance	LTE-M 4	O	O	O	O	O	O	O	O	O	-	O	O	-	O
	LTE-M 12	O	O	O	O	-	-	O	O	O	-	O	O	-	O
	LTE-M 13	-	-	O	O	-	-	O	O	O	-	O	O	-	O
Peak-to-Average Power Ratio	LTE-M 4	O	O	O	O	O	O	O	O	-	-	O	-	O	-
	LTE-M 12	O	O	O	O	-	-	O	O	-	-	O	-	O	-
	LTE-M 13	-	-	O	O	-	-	O	O	-	-	O	-	O	-
Frequency Stability	LTE-M 4	O	O	O	O	O	O	O	O	O	-	-	-	O	-
	LTE-M 12	O	O	O	O	-	-	O	O	O	-	-	-	O	-
	LTE-M 13	-	-	O	O	-	-	O	O	O	-	-	-	O	-
Spurious Emissions at Antenna Terminals	LTE-M 4	O	O	O	O	O	O	O	-	O	-	-	O	O	O
	LTE-M 12	O	O	O	O	-	-	O	-	O	-	-	O	O	O
	LTE-M 13	-	-	O	O	-	-	O	-	O	-	-	O	O	O
Radiated Spurious Emission	LTE-M 4	O	-	O	-	-	O	O	-	O	-	-	-	O	-
	LTE-M 12	O	-	O	O	-	-	O	-	O	-	-	-	O	-
	LTE-M 13	-	-	O	O	-	-	O	-	O	-	-	-	O	-
Note	1. The mark "O" means that this configuration is chosen for testing. 2. The mark "-" means that this configuration is not chosen for testing.														

5 Test Case

5.1 RF Power Output and Effective Isotropic Radiated Power

Ambient condition

Temperature	Relative humidity
24.8°C	42%

Methods of Measurement

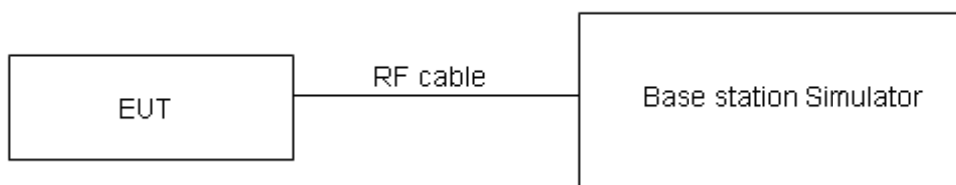
During the process of the testing, The EUT was connected to the Base Station Simulator with a known loss. The EUT is controlled by the Base Station Simulator test set to ensure max power transmission with proper modulation.

ERP can then be calculated as follows:

$EIRP \text{ (dBm)} = \text{Output Power (dBm)} + \text{Antenna Gain (dBi)}$

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

Test Setup



Limits

No specific RF power output requirements in part 2.1046.

Rule Part 27.50(b) (10) specifies that “Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP”

Rule Part 27.50(c) (10) specifies that “Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP”

Rule Part 27.50(d) (4) specifies that “Fixed, mobile and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP”

Part 27.50(b)(10)Limit	$\leq 3 \text{ W}$ (34.77 dBm)
Part 27.50(c)(10)Limit	$\leq 3 \text{ W}$ (34.77 dBm)
Part 27.50(d)(4)Limit	$\leq 1 \text{ W}$ (30 dBm)

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U=0.4 \text{ dB}$ for RF power output, $k = 2$, $U= 1.19 \text{ dB}$ for ERP/EIRP.

Test Results

Refer to the section 6.1 of this report for test data.

5.2 Occupied Bandwidth

Ambient condition

Temperature	Relative humidity
24.8°C	42%

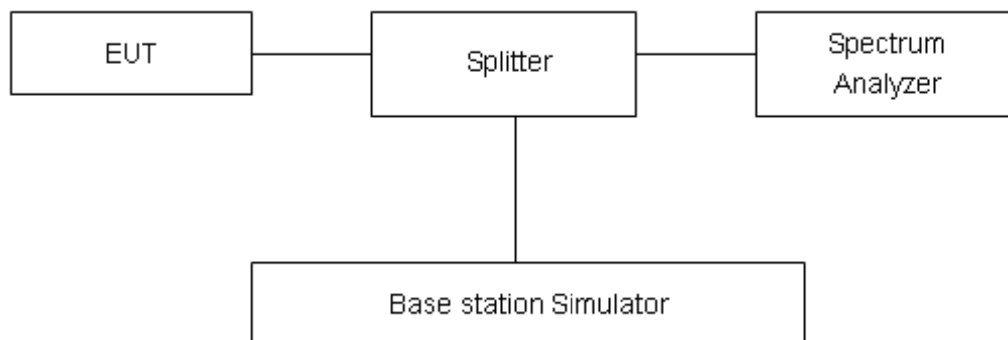
Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The occupied bandwidth is measured using spectrum analyzer.

RBW is set to $\geq 1\%EBW$, VBW is set to 3x RBW.

99% power and -26dBc occupied bandwidths are recorded. Spectrum analyzer plots are included on the following pages.

Test Setup



Limits

No specific occupied bandwidth requirements in part 2.1049.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U=624\text{Hz}$.

Test Results

Refer to the section 6.2 of this report for test data.

5.3 Band Edge Compliance

Ambient condition

Temperature	Relative humidity
24.8°C	42%

Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The band edge of the lowest and highest channels were measured.

The testing follows KDB 971168 D01 v03r01 Section 6.0

The EUT was connected to spectrum analyzer and system simulator via a power divider.

The band edges of low and high channels for the highest RF powers were measured.

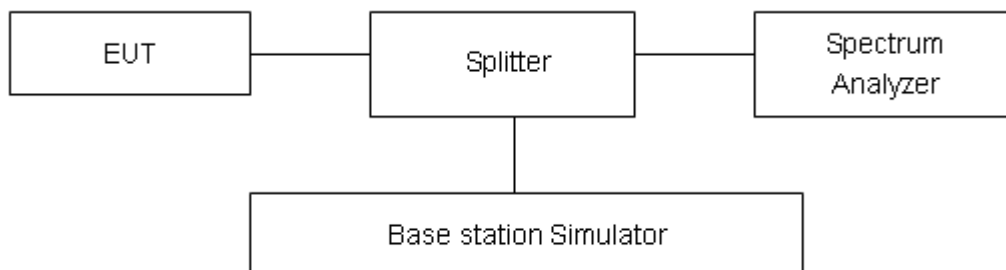
RBW is set to $\geq 1\%EBW$, VBW is set to $3 \times RBW$ on spectrum analyzer.

Set spectrum analyzer with RMS detector.

The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

Checked that all the results comply with the emission limit line.

Test Setup



Limits

Rule Part 27.53(h) specifies that “ for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10} (P)$ dB”

Rule Part 27.53(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

Rule Part 27.53(f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands,

emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

Rule Part 27.53 (c) For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

- (1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;
- (2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;
- (3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $76 + 10 \log (P)$ dB in a 6.25 kHz band segment, for base and fixed stations;
- (4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $65 + 10 \log (P)$ dB in a 6.25 kHz band segment, for mobile and portable stations;
- (5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$, $U=0.684$ dB.

Test Results

Refer to the section 6.3 of this report for test data.

5.4 Peak-to-Average Power Ratio (PAPR)

Ambient condition

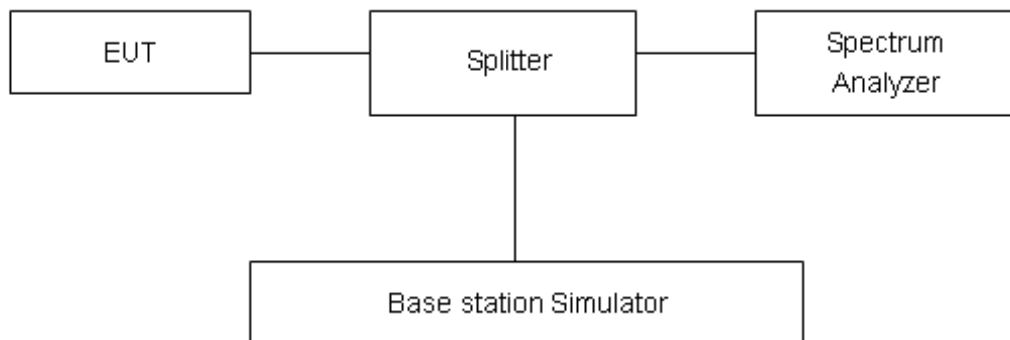
Temperature	Relative humidity
24.8°C	42%

Methods of Measurement

Measure the total peak power and record as PPk. And measure the total average power and record as PAvg. Both the peak and average power levels must be expressed in the same logarithmic units (e.g., dBm). Determine the PAPR from:

$$\text{PAPR (dB)} = \text{PPk (dBm)} - \text{PAvg (dBm)}.$$

Test Setup



Limits

Rule Part 27.50(d)(5) Equipment employed must be authorized in accordance with the provisions of 24.51. Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (d)(6) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U = 0.4$ dB.

Test Results

Refer to the section 6.4 of this report for test data.

5.5 Frequency Stability

Ambient condition

Temperature	Relative humidity
24.8°C	42%

Method of Measurement

Frequency Stability (Temperature Variation)

The temperature inside the climate chamber is varied from -30°C to +50°C in 10°C step size.

(1) With all power removed, the temperature was decreased to -10°C and permitted to stabilize for three hours.

(2) Measure the carrier frequency with the test equipment in a “call mode”. These measurements should be made within 1 minute of powering up the mobile station, to prevent significant self warming.

(3) Repeat the above measurements at 10°C increments from -30°C to +50°C. Allow at least 1.5 hours at each temperature, un-powered, before making measurements.

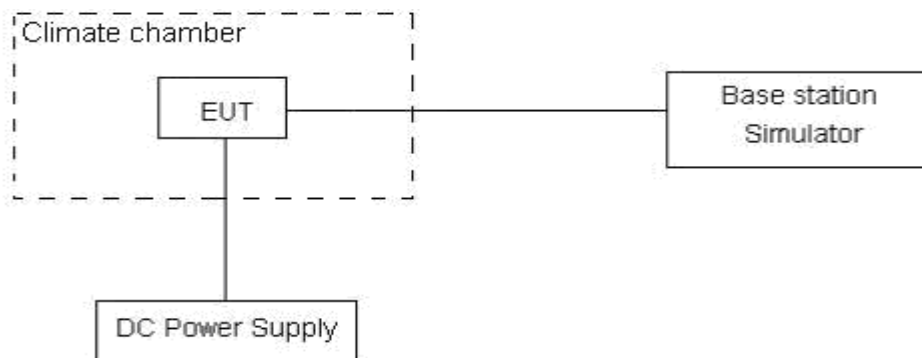
Frequency Stability (Voltage Variation)

The frequency stability shall be measured with variation of primary supply voltage as follows:

Primary Supply Voltage: The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

This transceiver is specified to operate with an input voltage of between 3.6 V and 4.2 V, with a nominal voltage of 3.7V.

Test setup



Limits

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 99.75% confidence level for the normal distribution is with the coverage factor $k = 3, U = 0.01\text{ppm}$.

Test Results

Refer to the section 6.5 of this report for test data.

5.6 Spurious Emissions at Antenna Terminals

Ambient condition

Temperature	Relative humidity
24.8°C	42%

Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 9kHz to the 10th harmonic of the carrier. The peak detector is used.

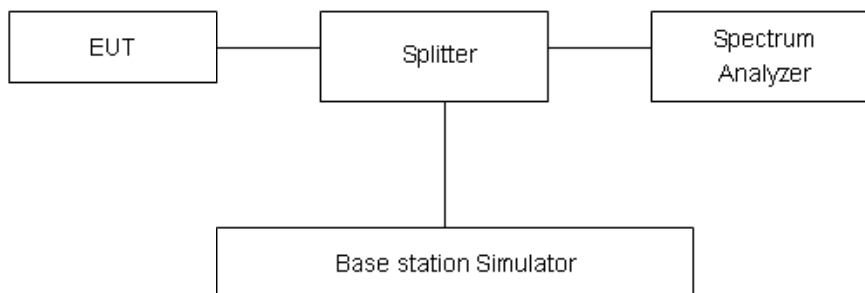
Frequency	RBW
0.009MHz ~ 0.15 MHz	: 1 kHz
0.15 MHz ~ 30 MHz	: 10 kHz
30MHz ~ 1000 MHz	: 100 kHz
Above 1000MHz	: 1000 kHz

Sweep is set to AUTO.

Of those disturbances below (limit – 20 dB), the mark is not required for the EUT.

The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

Test setup



Limits

Rule Part 27.53(h) specifies that “for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB.”

Rule Part 27.53 (g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log(P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands

immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

Rule Part 27.53(f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

Part 27.53 (c) For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

- (1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;
- (2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;
- (3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $76 + 10 \log (P)$ dB in a 6.25 kHz band segment, for base and fixed stations;
- (4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $65 + 10 \log (P)$ dB in a 6.25 kHz band segment, for mobile and portable stations;
- (5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

Part 27.53(h)/(g) Limit		-13 dBm
Part 27.53(f) Limit	Limit out of the band 1559-1610 MHz	-13 dBm
	Limit in the band 1559-1610 MHz	-40 dBm

Measurement Uncertainty

The assessed measurement uncertainty to ensure 99.75% confidence level for the normal distribution is with the coverage factor $k = 1.96$.

Frequency	Uncertainty
9kHz-1GHz	0.684 dB
1GHz-20GHz	1.407 dB

Test Results

Refer to the section 6.6 of this report for test data.

5.7 Radiated Spurious Emission

Ambient condition

Temperature	Relative humidity
24.8°C	42%

Method of Measurement

1. The testing follows FCC KDB 971168 D01 v03r01 Section 5.8 and ANSI C63.26-2015.
2. Below 1GHz: The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H). Above 1GHz: (Note: the FCC's permission to use 1.5m as an alternative per TCBC Conf call of Dec. 2, 2014.) The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).
3. A loop antenna, A log-periodic antenna or horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
4. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=100kHz, VBW=300kHz for 30MHz to 1GHz and RBW=1MHz, VBW=3MHz for above 1GHz, and the maximum value of the receiver should be recorded as (Pr).
5. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
6. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
7. The measurement results are obtained as described below:

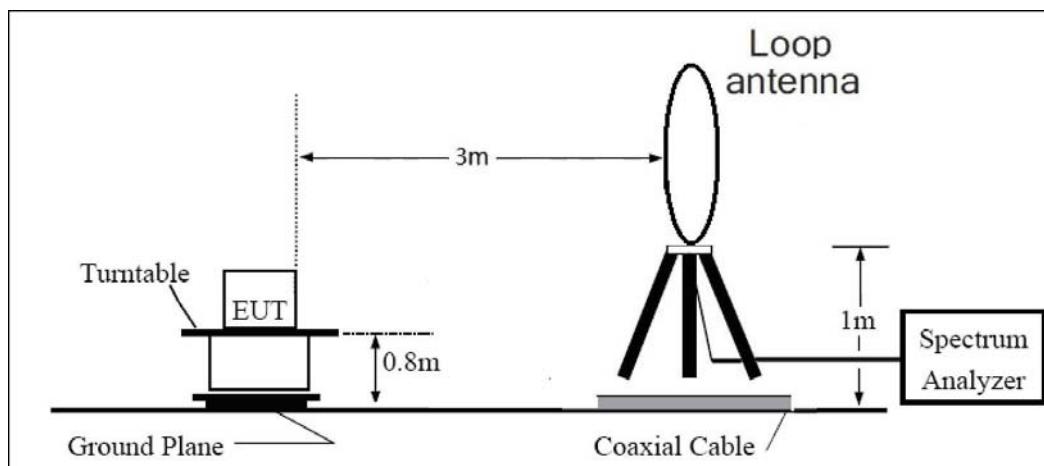
$$\text{Power(EIRP)} = \text{PMea} - \text{PAg} - \text{Pcl} + \text{Ga}$$
The measurement results are amend as described below:

$$\text{Power(EIRP)} = \text{PMea} - \text{Pcl} + \text{Ga}$$
8. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dB) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, $\text{ERP} = \text{EIRP} - 2.15\text{dB}$.

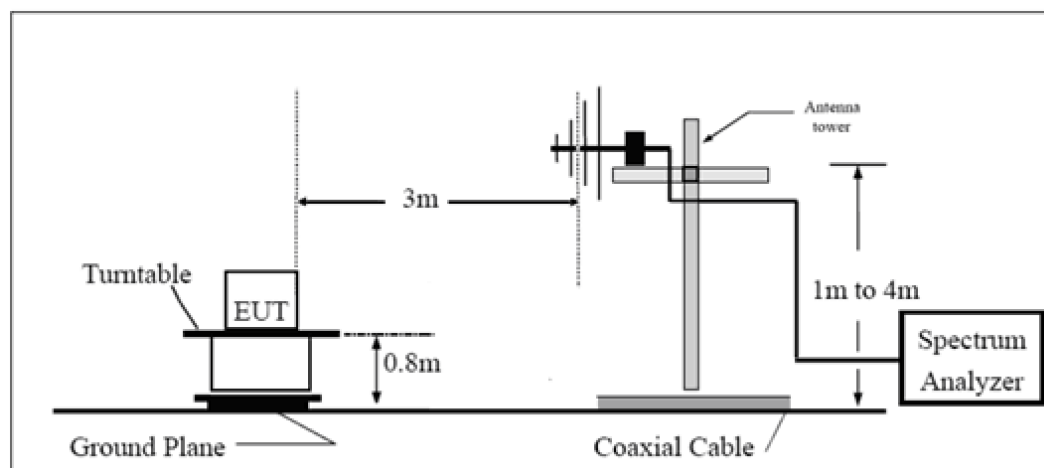
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

Test setup

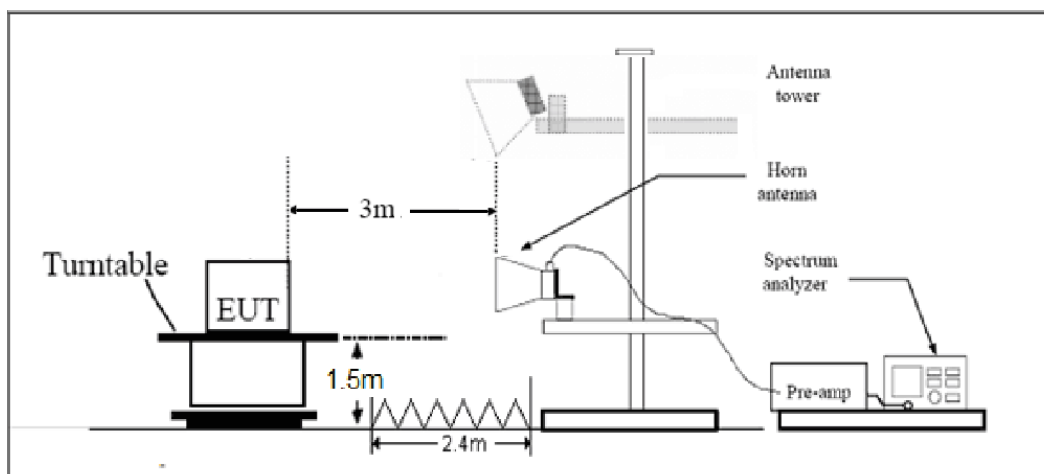
9KHz~ 30MHz



30MHz~ 1GHz



Above 1GHz



Note: Area side:2.4mX3.6m

Limits

Rule Part 27.53(h) specifies that “for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10} (P)$ dB.”

Rule Part 27.53 (g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

Rule Part 27.53(f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

Part 27.53 (c) For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

- (1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;
- (2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;
- (3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $76 + 10 \log (P)$ dB in a 6.25 kHz band segment, for base and fixed stations;
- (4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $65 + 10 \log (P)$ dB in a 6.25 kHz band segment, for mobile and portable stations;
- (5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

Part 27.53 (h)/(g) Limit		-13 dBm
Part 27.53(f) Limit	Limit out of the band 1559-1610 MHz	-13 dBm
	Limit in the band 1559-1610 MHz	-40 dBm

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = \pm 1.96$, $U = \pm 3.55$ dB.

Test Results

Refer to the section 6.7 of this report for test data.

6 Test Results

6.1 RF Power Output and Effective Isotropic Radiated Power

LTE-M Band 4	Channel/ Frequency(MHz)	Index	RB# RB start		Maximum Output Power (dBm)		EIRP (dBm)		Result
			QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	
1.4MHz	19957 1710.7	0	1#0	1#0	21.83	20.98	25.79	24.94	PASS
		0	6#0	5#0	19.68	19.61	23.64	23.57	PASS
	20175/1732.5	0	1#0	1#0	21.56	20.11	25.52	24.07	PASS
		0	6#0	5#0	19.47	19.51	23.43	23.47	PASS
	20393/1754.3	0	1#5	1#5	21.49	20.11	25.45	24.07	PASS
		0	6#0	5#0	19.64	19.60	23.60	23.56	PASS
3MHz	19965/1711.5	0	1#0	1#0	21.86	20.47	25.82	24.43	PASS
		0	6#0	5#0	19.67	19.75	23.63	23.71	PASS
	20175/1732.5	0	1#0	1#0	21.68	20.20	25.64	24.16	PASS
		0	6#0	5#0	19.50	19.46	23.46	23.42	PASS
	20385/1753.5	1	1#5	1#5	21.45	20.16	25.41	24.12	PASS
		1	6#0	5#0	19.67	19.69	23.63	23.65	PASS
5MHz	19975/1712.5	3	1#0	1#0	21.86	21.68	25.82	25.64	PASS
		0	6#0	5#0	20.71	20.80	24.67	24.76	PASS
	20175/1732.5	0	1#0	1#0	21.72	21.97	25.68	25.93	PASS
		0	6#0	5#0	20.32	20.78	24.28	24.74	PASS
	20375/1752.5	0	1#5	1#5	21.53	21.36	25.49	25.32	PASS
		3	6#0	5#0	20.54	20.57	24.50	24.53	PASS
10MHz	20000/1715	3	1#0	1#0	21.81	21.85	25.77	25.81	PASS
		0	4#0	4#0	21.84	21.46	25.80	25.42	PASS
	20175/1732.5	0	1#0	1#0	21.75	21.91	25.71	25.87	PASS
		0	4#0	4#0	21.49	21.34	25.45	25.30	PASS
	20350/1750	4	1#5	1#5	21.64	21.39	25.60	25.35	PASS
		7	4#2	4#2	21.72	21.23	25.68	25.19	PASS
15MHz	20025/1717.5	3	1#0	1#0	21.92	21.71	25.88	25.67	PASS
		0	6#0	5#0	21.69	22.12	25.65	26.08	PASS
	20175/1732.5	0	1#0	1#0	21.84	22.12	25.80	26.08	PASS
		0	6#0	5#0	21.66	21.63	25.62	25.59	PASS
	20325/1747.5	8	1#5	1#5	21.49	21.54	25.45	25.50	PASS
		11	6#0	5#0	21.79	21.98	25.75	25.94	PASS
20MHz	20050/1720	3	1#0	1#0	21.76	21.71	25.72	25.67	PASS
		0	6#0	5#0	21.68	21.76	25.64	25.72	PASS
	20175/1732.5	0	1#0	1#0	21.84	21.92	25.80	25.88	PASS
		0	6#0	5#0	21.64	21.61	25.60	25.57	PASS
	20300/1745	12	1#5	1#5	21.51	21.27	25.47	25.23	PASS

		15	6#0	5#0	21.74	21.80	25.70	25.76	PASS
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LTE-M Band 12	Channel/ Frequency(MHz)	Index	RB# RB start		Maximum Output Power (dBm)		ERP (dBm)		Result
			QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	
1.4MHz	23017/699.7	0	1#0	1#0	20.35	19.31	17.02	15.98	PASS
		0	6#0	5#0	18.05	18.13	14.72	14.80	PASS
	23095/707.5	0	1#0	1#0	20.60	19.39	17.27	16.06	PASS
		0	6#0	5#0	18.02	18.24	14.69	14.91	PASS
	23173/715.3	0	1#5	1#5	20.51	19.55	17.18	16.22	PASS
		0	6#0	5#0	18.29	18.01	14.96	14.68	PASS
3MHz	23025/700.5	0	1#0	1#0	20.13	19.04	16.80	15.71	PASS
		0	6#0	5#0	18.02	18.00	14.69	14.67	PASS
	23095/707.5	0	1#0	1#0	20.56	19.35	17.23	16.02	PASS
		0	6#0	5#0	18.28	18.25	14.95	14.92	PASS
	23165/714.5	1	1#5	1#5	20.48	19.23	17.15	15.90	PASS
		1	6#0	5#0	18.25	18.16	14.92	14.83	PASS
5MHz	23035/701.5	3	1#0	1#0	20.38	20.74	17.05	17.41	PASS
		0	6#0	5#0	19.15	19.10	15.82	15.77	PASS
	23095/707.5	0	1#0	1#0	20.67	20.76	17.34	17.43	PASS
		0	6#0	5#0	19.18	19.31	15.85	15.98	PASS
	23155/713.5	0	1#5	1#5	20.66	21.06	17.33	17.73	PASS
		3	6#0	5#0	19.53	19.53	16.20	16.20	PASS
10MHz	23060/704	3	1#0	1#0	20.42	20.87	17.09	17.54	PASS
		0	4#0	4#0	20.21	20.07	16.88	16.74	PASS
	23095/707.5	0	1#0	1#0	20.61	20.69	17.28	17.36	PASS
		0	4#0	4#0	20.34	20.19	17.01	16.86	PASS
	23130/711	4	1#5	1#5	20.69	20.37	17.36	17.04	PASS
		7	4#2	4#2	20.50	20.13	17.17	16.80	PASS

LTE-M Band 13	Channel/ Frequency(MHz)	Index	RB# RB start		Maximum Output Power (dBm)		ERP (dBm)		Result
			QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	
5MHz	23205/779.5	3	1#0	1#0	21.30	21.46	17.52	17.68	PASS
		0	6#0	5#0	19.48	19.53	15.70	15.75	PASS
	23230/782	0	1#0	1#0	21.18	21.39	17.40	17.61	PASS
		0	6#0	5#0	19.67	19.58	15.89	15.80	PASS
	23255/784.5	0	1#5	1#5	21.04	21.26	17.26	17.48	PASS
		3	6#0	5#0	19.84	20.02	16.06	16.24	PASS
10MHz	23230/782	0	1#0	1#0	21.18	21.29	17.40	17.51	PASS
		0	4#0	4#0	20.71	20.70	16.93	16.92	PASS

6.2 Occupied Bandwidth

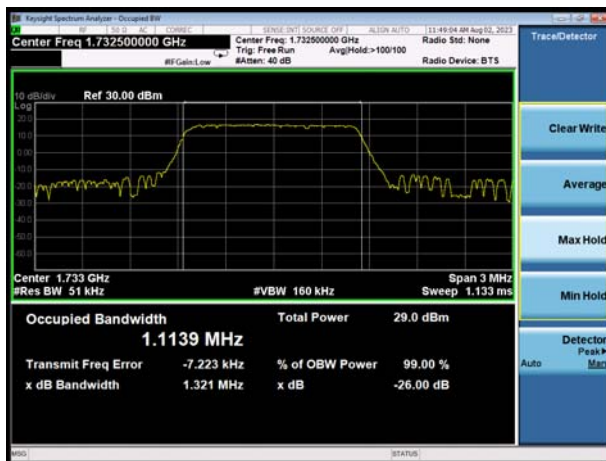
Results: Pass

LTE-M Band 4							
Mode	Bandwidth	Modulation	Channel/ Frequency(MHz)	RB	Index	Bandwidth(MHz)	
						99% Power	-26dBc
Band4	1.4MHz	QPSK	20175/1732.5	6#0	0	1.1139	1.321
		16QAM	20175/1732.5	5#0	0	0.9548	1.352
	3MHz	QPSK	20175/1732.5	6#0	0	1.1147	1.390
		16QAM	20175/1732.5	5#0	0	0.9549	1.172
	5MHz	QPSK	20175/1732.5	6#0	0	1.1205	1.335
		16QAM	20175/1732.5	5#0	0	0.9639	1.232
	10MHz	QPSK	20175/1732.5	6#0	0	1.1324	1.431
		16QAM	20175/1732.5	5#0	0	0.9790	1.245
	15MHz	QPSK	20175/1732.5	6#0	0	1.1400	1.385
		16QAM	20175/1732.5	5#0	0	0.9776	1.246
	20MHz	QPSK	20175/1732.5	6#0	0	1.1481	1.382
		16QAM	20175/1732.5	5#0	0	0.9891	1.316

LTE-M Band 12							
Mode	Bandwidth	Modulation	Channel/ Frequency(MHz)	RB	Index	Bandwidth(MHz)	
						99% Power	-26dBc
Band12	1.4MHz	QPSK	23095/707.5	6#0	0	1.1025	1.340
		16QAM	23095/707.5	5#0	0	0.9429	1.416
	3MHz	QPSK	23095/707.5	6#0	0	1.1134	1.379
		16QAM	23095/707.5	5#0	0	0.9605	1.172
	5MHz	QPSK	23095/707.5	6#0	0	1.1140	1.353
		16QAM	23095/707.5	5#0	0	0.9522	1.250
	10MHz	QPSK	23095/707.5	6#0	0	1.1359	1.384
		16QAM	23095/707.5	5#0	0	0.9738	1.239

LTE-M Band 13							
Mode	Bandwidth	Modulation	Channel/ Frequency(MHz)	RB	Index	Bandwidth(MHz)	
						99% Power	-26dBc
Band13	5MHz	QPSK	23230/782	6#0	0	1.1310	1.354
		16QAM	23230/782	5#0	0	0.9591	1.202
	10MHz	QPSK	23230/782	6#0	0	1.1209	1.345
		16QAM	23230/782	5#0	0	0.9783	1.244

LTE-M Band 4 QPSK 1.4MHz CH-Middle



LTE-M Band 4 QPSK 3MHz CH-Middle



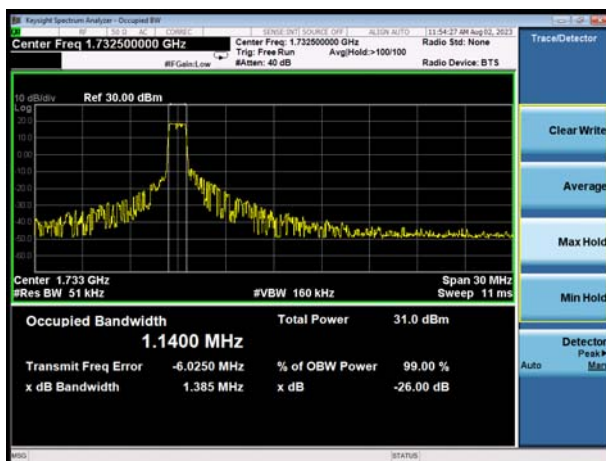
LTE-M Band 4 QPSK 5MHz CH-Middle



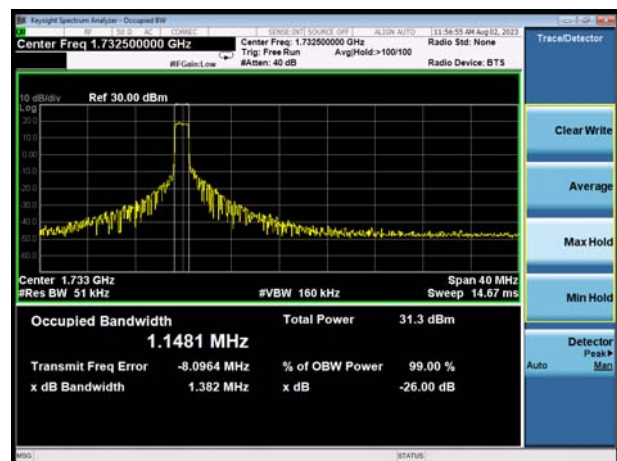
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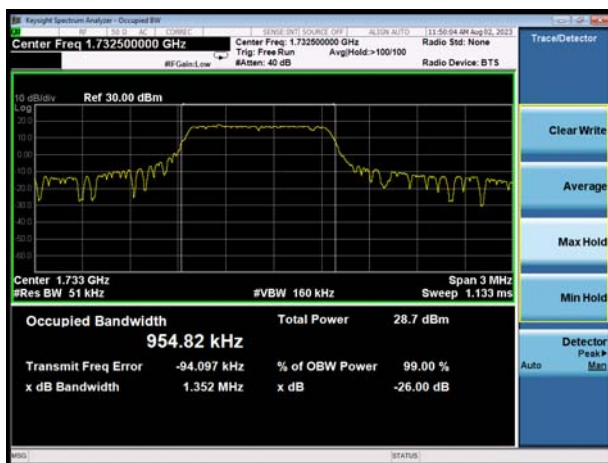
LTE-M Band 4 QPSK 15MHz CH-Middle



LTE-M Band 4 QPSK 20MHz CH-Middle



LTE-M Band 4 16QAM 1.4MHz CH-Middle



LTE-M Band 4 16QAM 3MHz CH-Middle



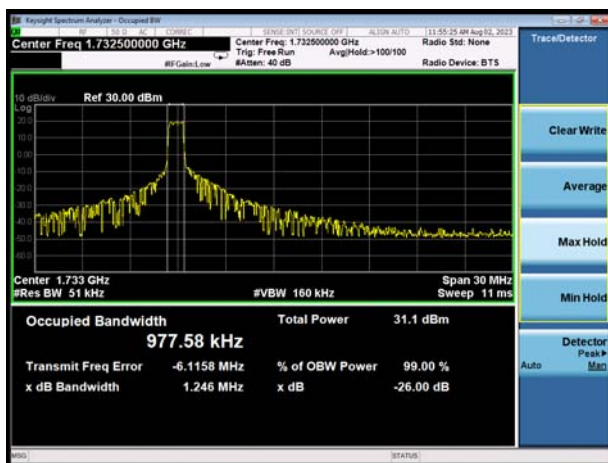
LTE-M Band 4 16QAM 5MHz CH-Middle



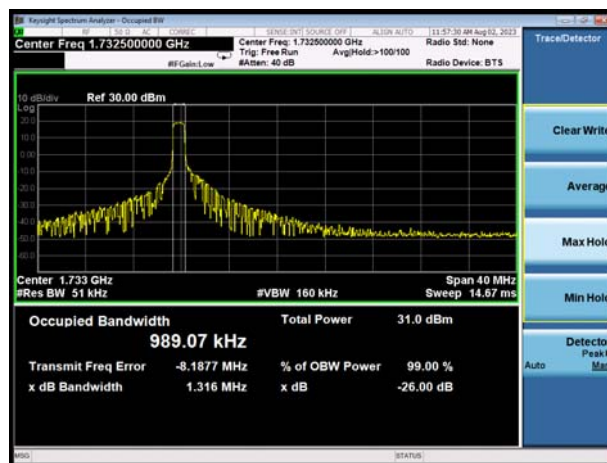
LTE-M Band 4 16QAM 10MHz CH-Middle



LTE-M Band 4 16QAM 15MHz CH-Middle



LTE-M Band 4 16QAM 20MHz CH-Middle



LTE-M Band 12 QPSK 1.4MHz CH-Middle



LTE-M Band 12 QPSK 3MHz CH-Middle



LTE-M Band 12 QPSK 5MHz CH-Middle



LTE-M Band 12 QPSK 10MHz CH-Middle



LTE-M Band 12 16QAM 1.4MHz CH-Middle



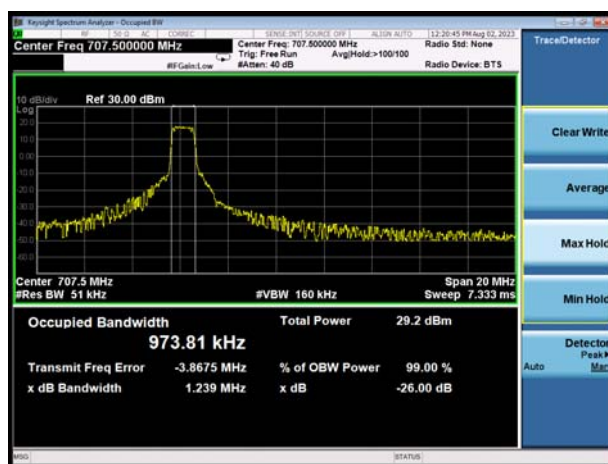
LTE-M Band 12 16QAM 3MHz CH-Middle



LTE-M Band 12 16QAM 5MHz CH-Middle



LTE-M Band 12 16QAM 10MHz CH-Middle



LTE-M Band 13 QPSK 5MHz CH-Middle



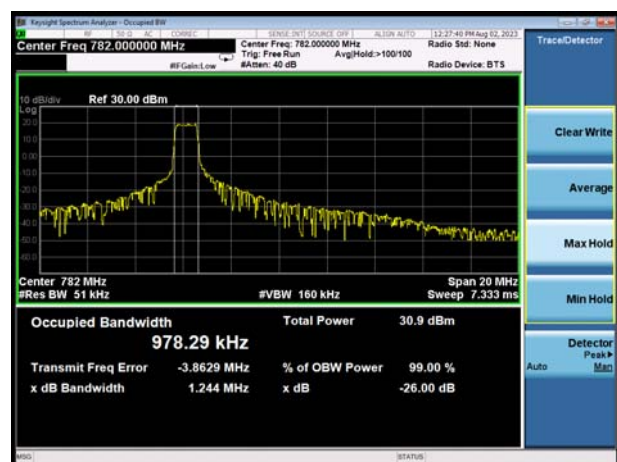
LTE-M Band 13 QPSK 10MHz CH-Middle



LTE-M Band 13 16QAM 5MHz CH-Middle



LTE-M Band 13 16QAM 10MHz CH-Middle

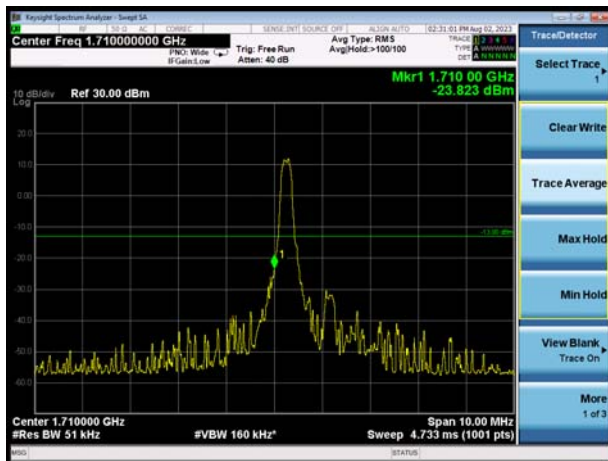


6.3 Band Edge Compliance

Results: Pass

All the test traces in the plots shows the test results clearly.

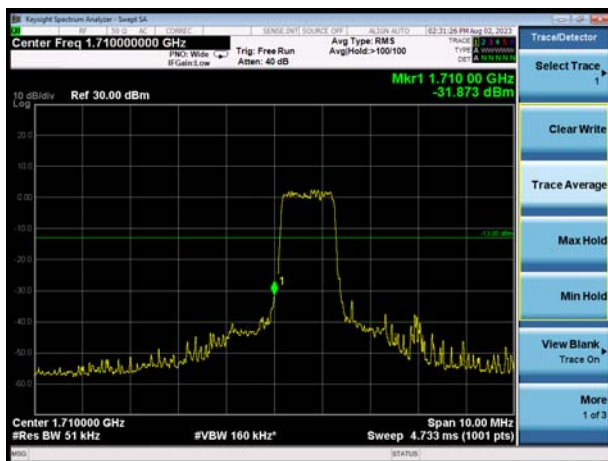
LTE-M Band 4 QPSK 1.4MHz CH-Low, 1 RB



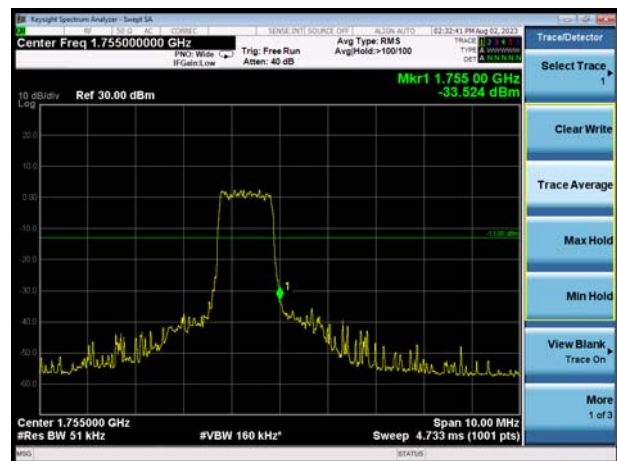
LTE-M Band 4 QPSK 1.4MHz CH-High, 1 RB



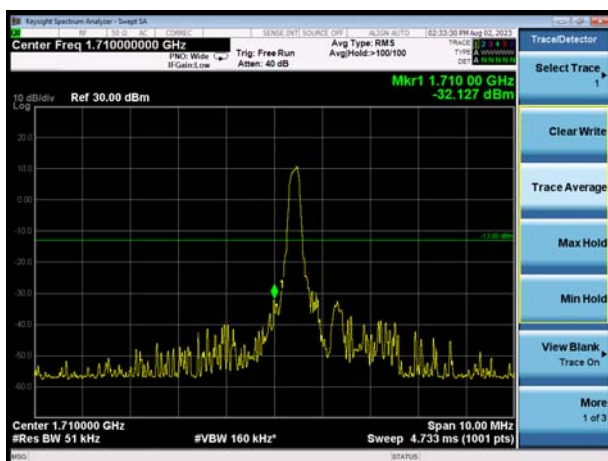
LTE-M Band 4 QPSK 1.4MHz CH-Low, 100%RB



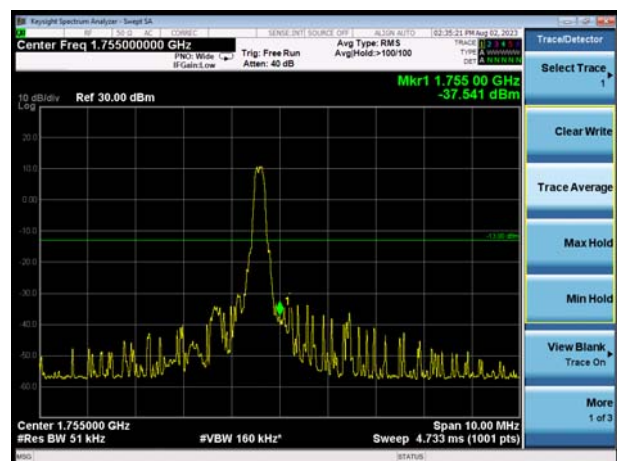
LTE-M Band 4 QPSK 1.4MHz CH-High, 100%RB



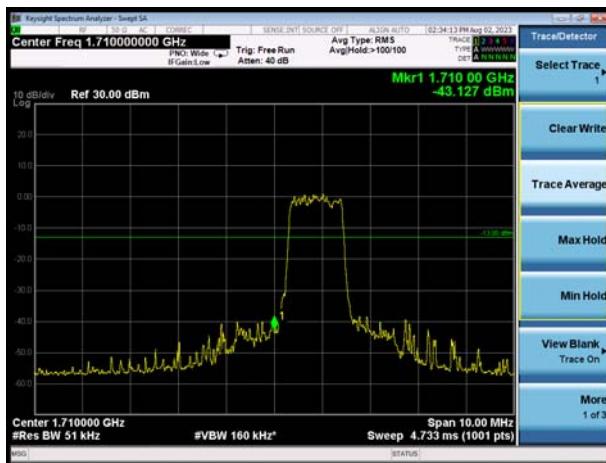
LTE-M Band 4 QPSK 3MHz CH-Low, 1 RB



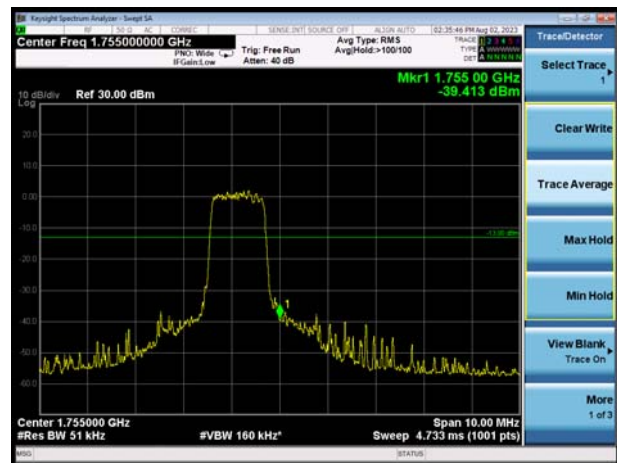
LTE-M Band 4 QPSK 3MHz CH-High, 1 RB



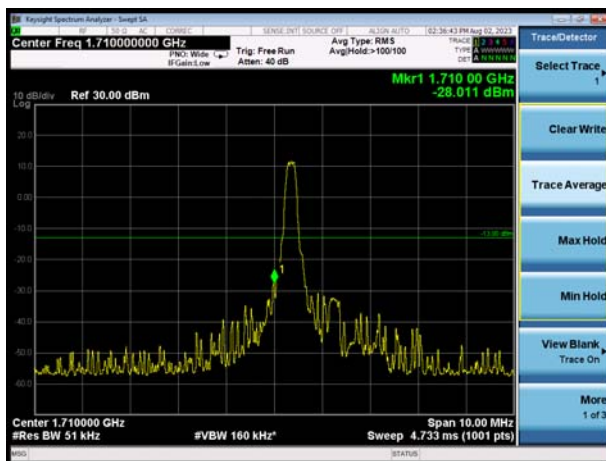
LTE-M Band 4 QPSK 3MHz CH-Low, 100%RB



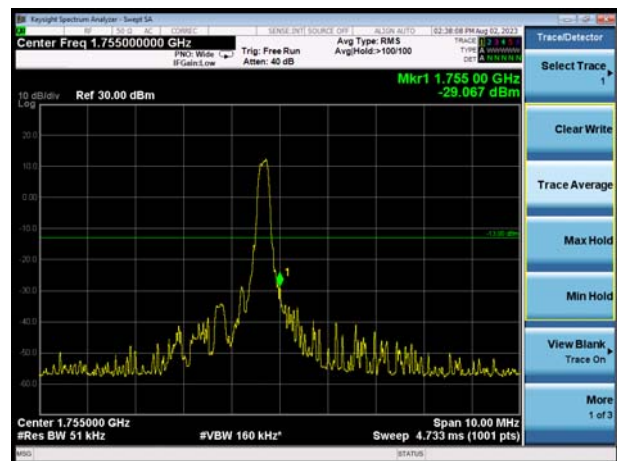
LTE-M Band 4 QPSK 3MHz CH-High, 100%RB



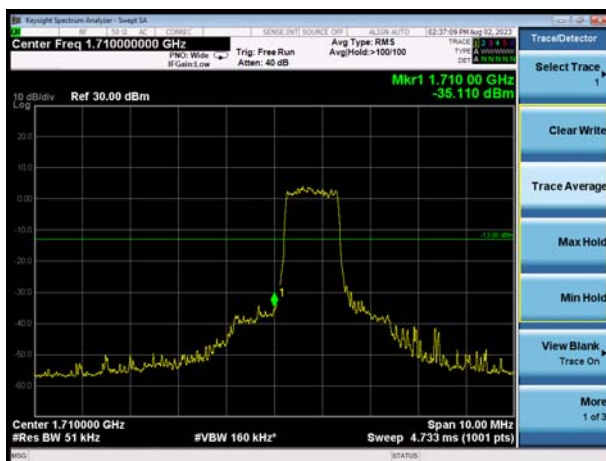
LTE-M Band 4 QPSK 5MHz CH-Low, 1 RB



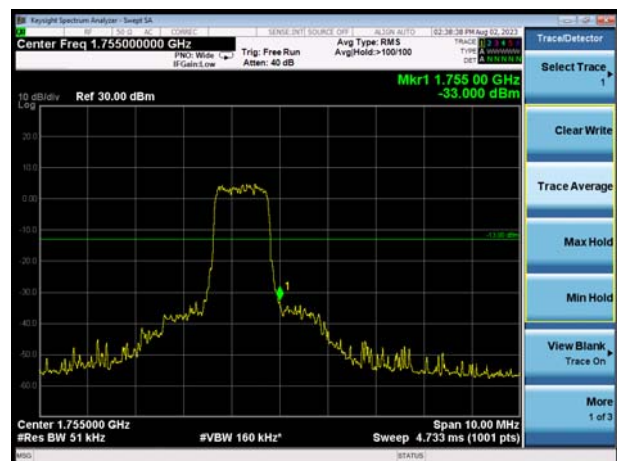
LTE-M Band 4 QPSK 5MHz CH-High, 1 RB



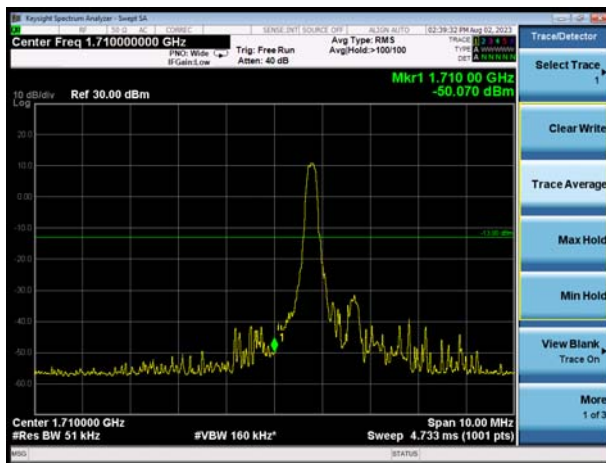
LTE-M Band 4 QPSK 5MHz CH-Low, 100%RB



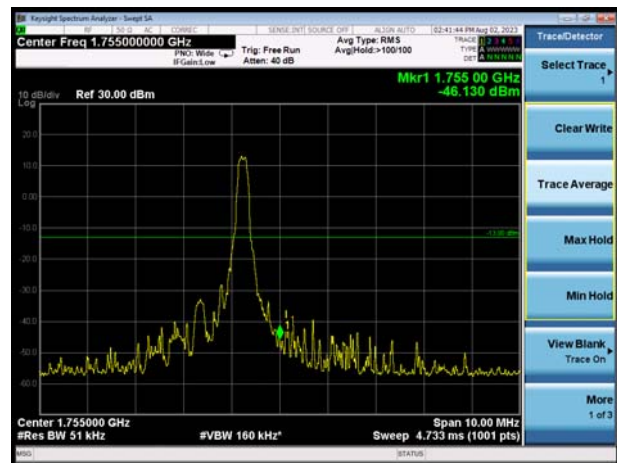
LTE-M Band 4 QPSK 5MHz CH-High, 100%RB



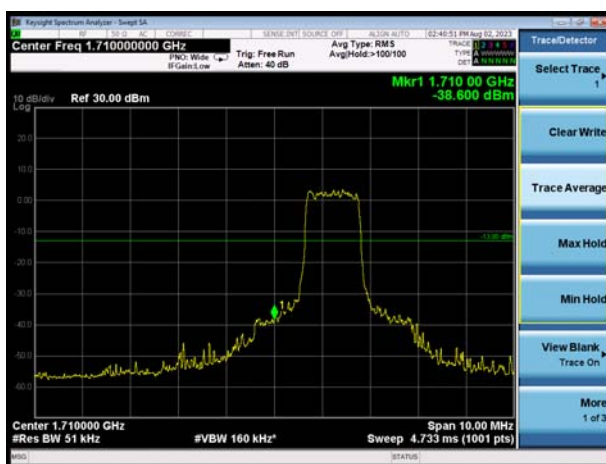
LTE-M Band 4 QPSK 10MHz CH-Low, 1 RB



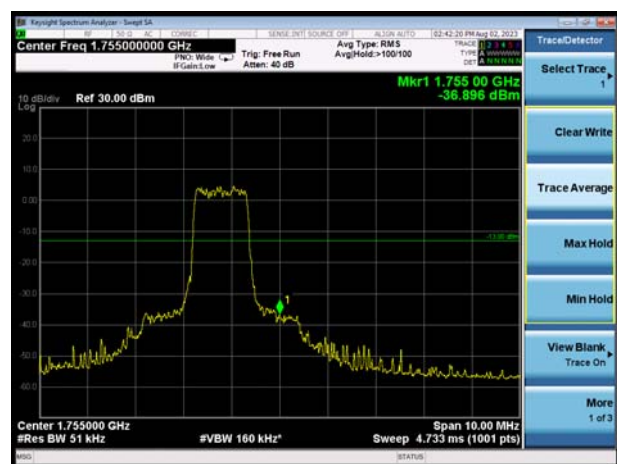
LTE-M Band 4 QPSK 10MHz CH-High, 1 RB



LTE-M Band 4 QPSK 10MHz CH-Low, 100%RB



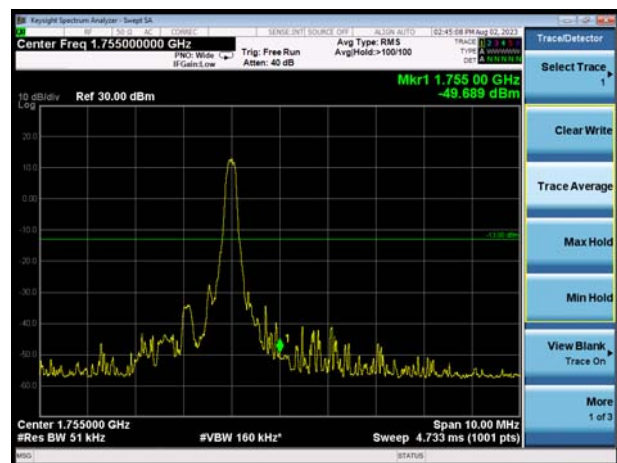
LTE-M Band 4 QPSK 10MHz CH-High, 100%RB



LTE-M Band 4 QPSK 15MHz CH-Low, 1 RB



LTE-M Band 4 QPSK 15MHz CH-High, 1 RB



LTE-M Band 4 QPSK 15MHz CH-Low, 100%RB



LTE-M Band 4 QPSK 15MHz CH-High, 100%RB



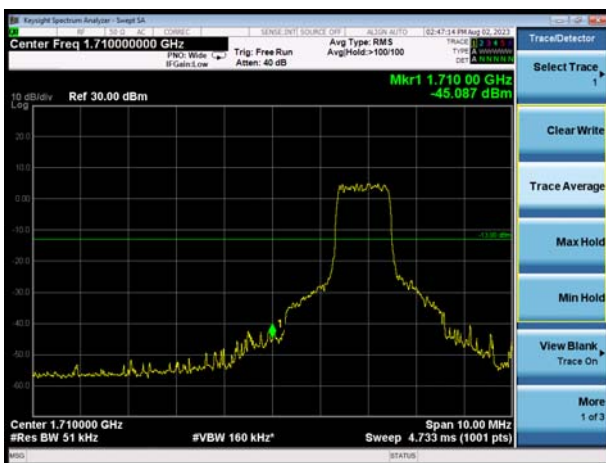
LTE-M Band 4 QPSK 20MHz CH-Low, 1 RB



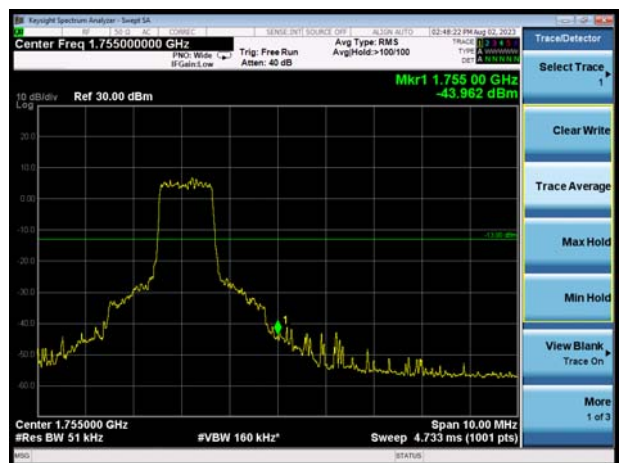
LTE-M Band 4 QPSK 20MHz CH-High, 1 RB



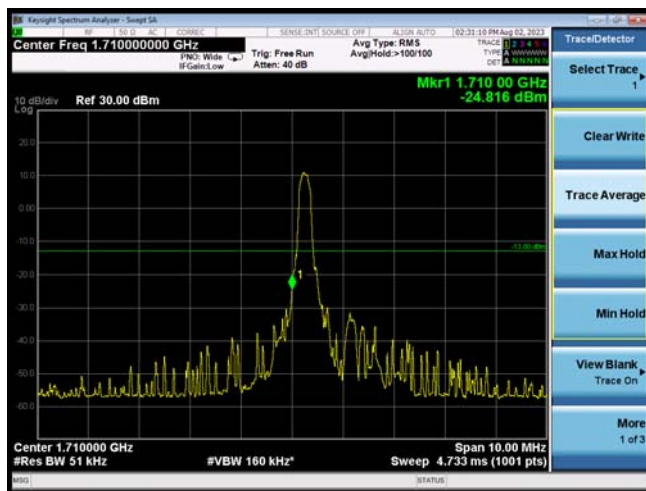
LTE-M Band 4 QPSK 20MHz CH-Low, 100%RB



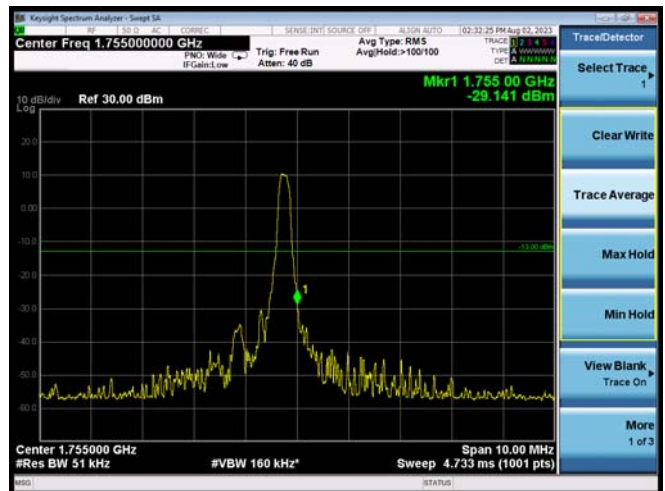
LTE-M Band 4 QPSK 20MHz CH-High, 100%RB



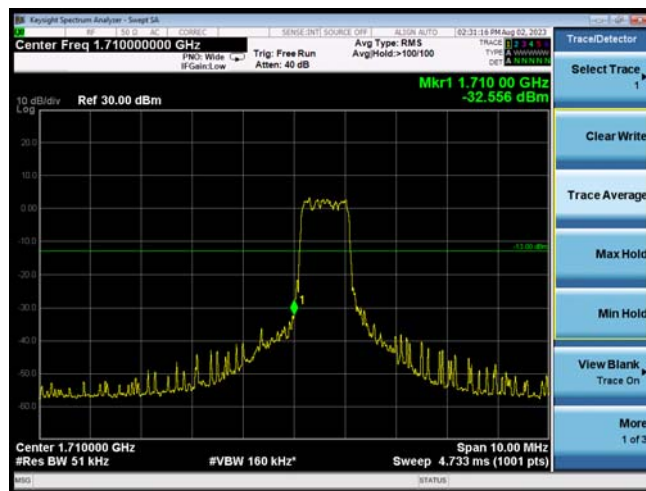
LTE-M Band 4 16QAM 1.4MHz CH-Low, 1 RB



LTE-M Band 4 16QAM 1.4MHz CH-High, 1 RB



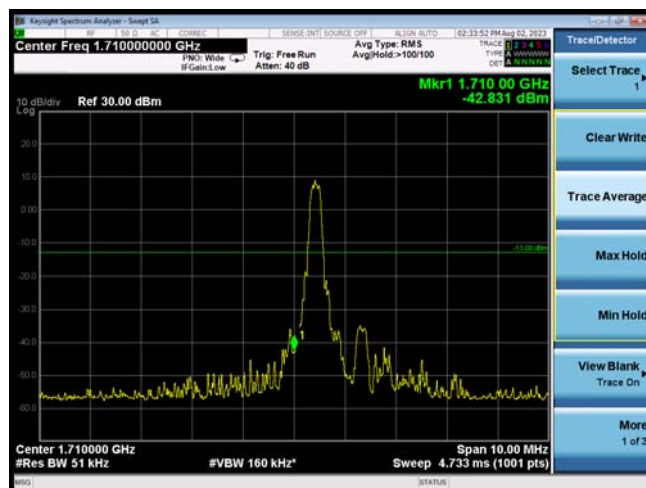
LTE-M Band 4 16QAM 1.4MHz CH-Low, 100%RB



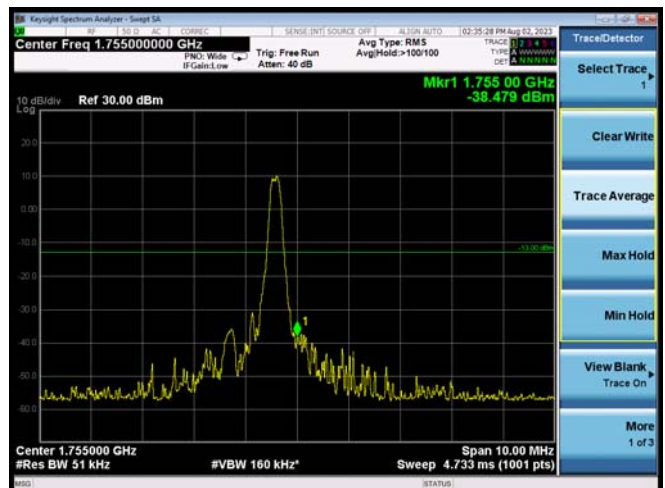
LTE-M Band 4 16QAM 1.4MHz CH-High, 100%RB



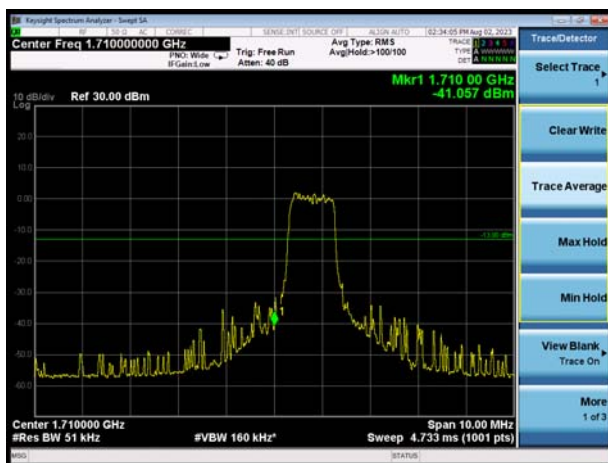
LTE-M Band 4 16QAM 3MHz CH-Low, 1 RB



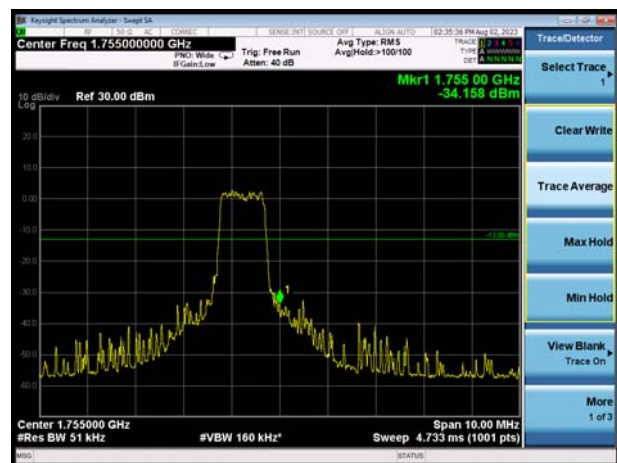
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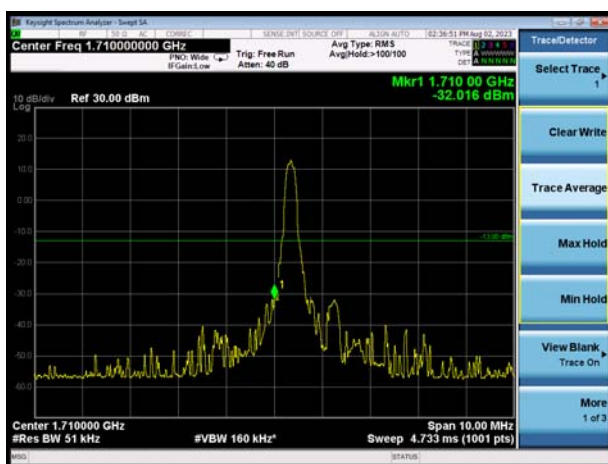
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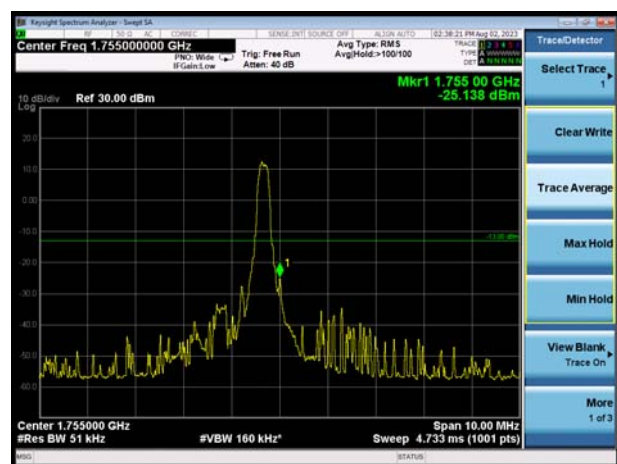
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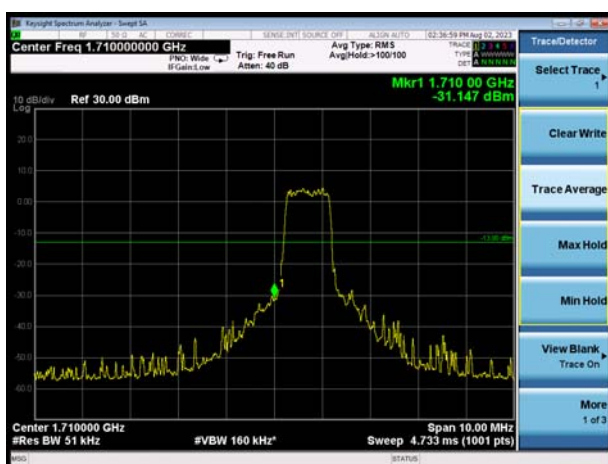
LTE-M Band 4 16QAM 5MHz CH-Low, 1 RB



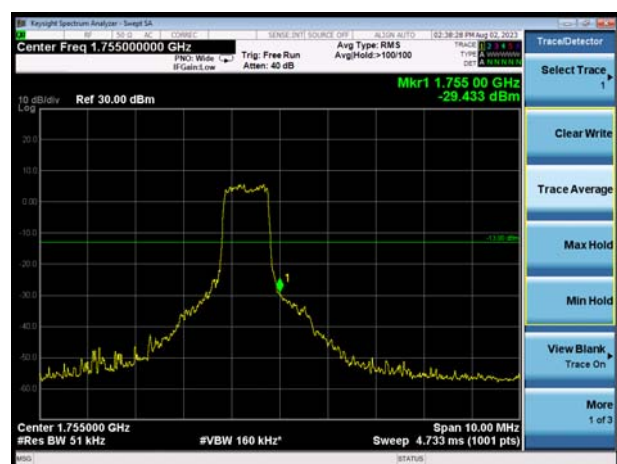
LTE-M Band 4 16QAM 5MHz CH-High, 1 RB



LTE-M Band 4 16QAM 5MHz CH-Low, 100%RB



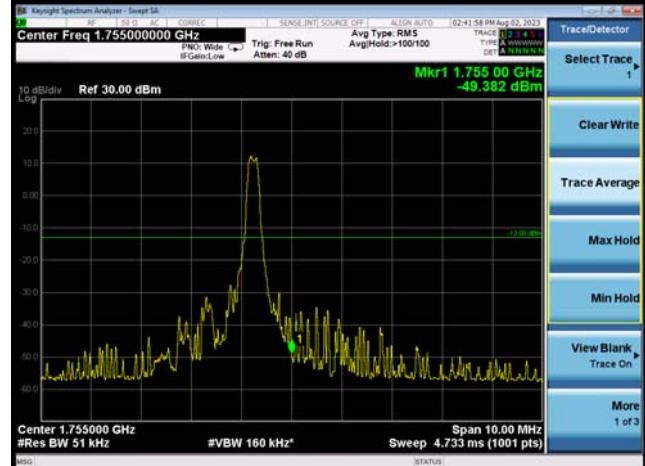
LTE-M Band 4 16QAM 5MHz CH-High, 100%RB



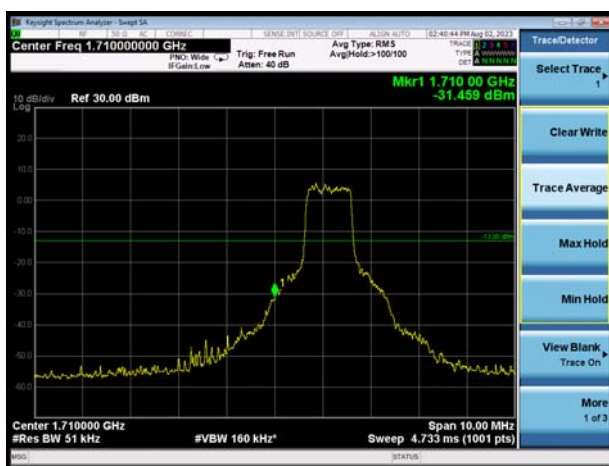
LTE-M Band 4 16QAM 10MHz CH-Low, 1 RB



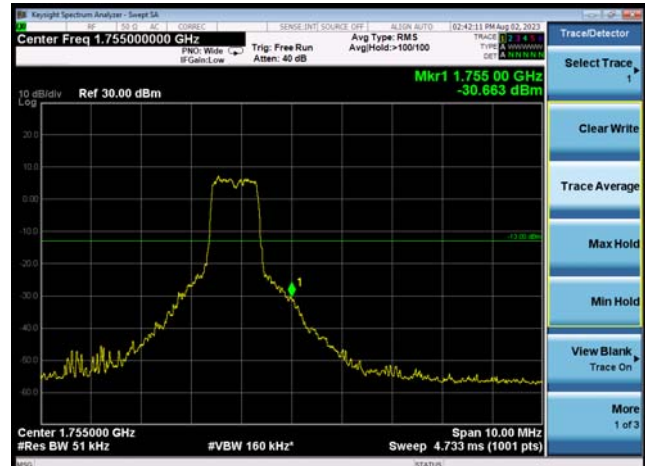
LTE-M Band 4 16QAM 10MHz CH-High, 1 RB



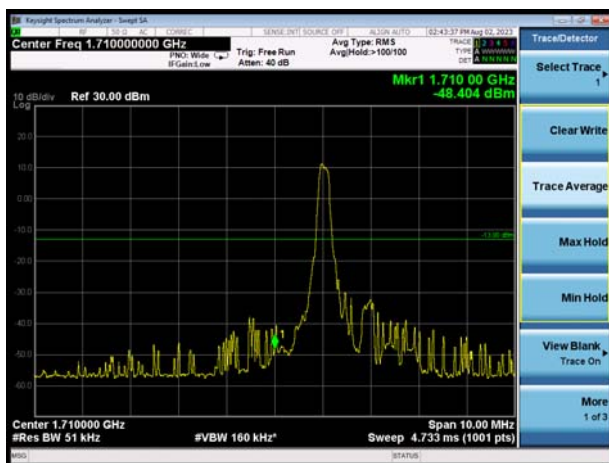
LTE-M Band 4 16QAM 10MHz CH-Low, 100%RB



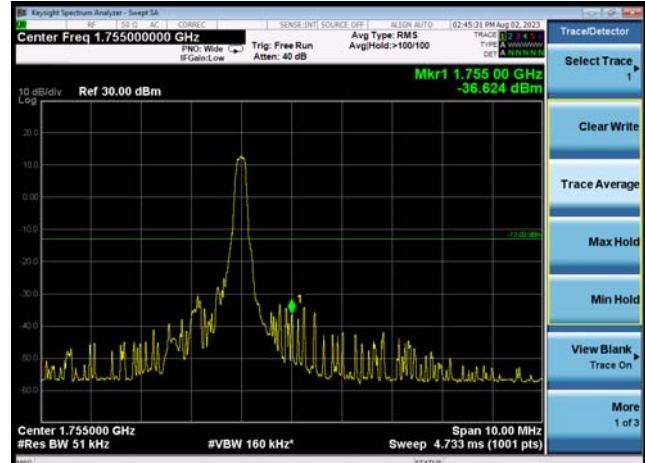
LTE-M Band 4 16QAM 10MHz CH-High, 100%RB



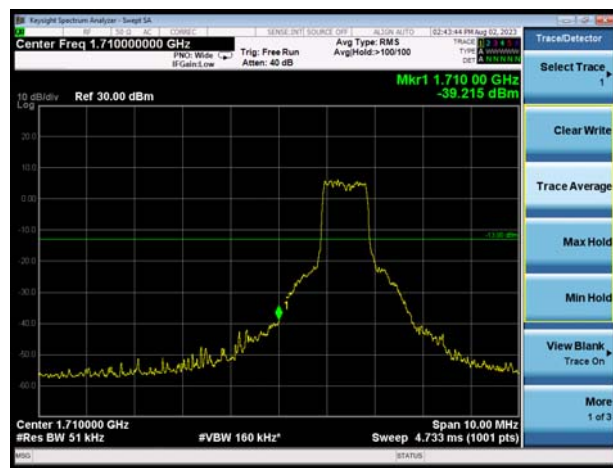
LTE-M Band 4 16QAM 15MHz CH-Low, 1 RB



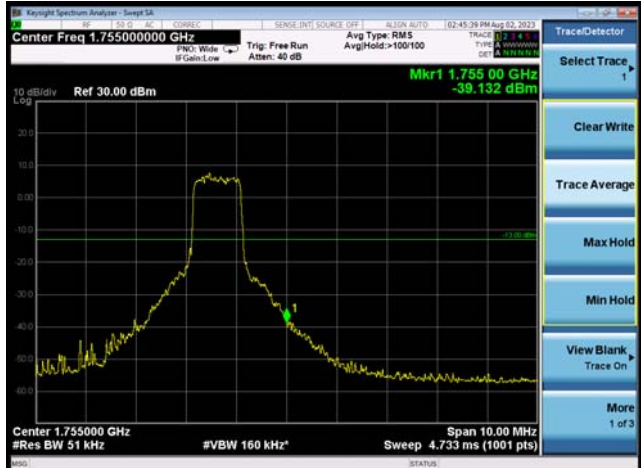
LTE-M Band 4 16QAM 15MHz CH-High, 1 RB



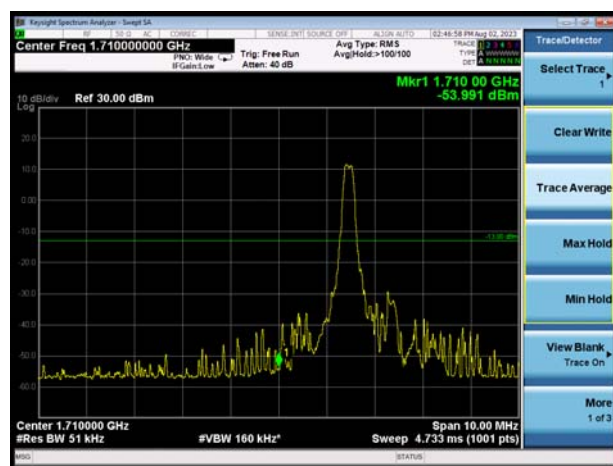
LTE-M Band 4 16QAM 15MHz CH-Low, 100%RB



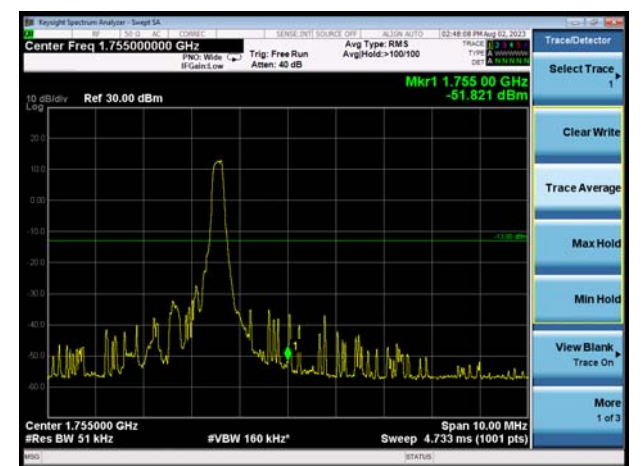
LTE-M Band 4 16QAM 15MHz CH-High, 100%RB



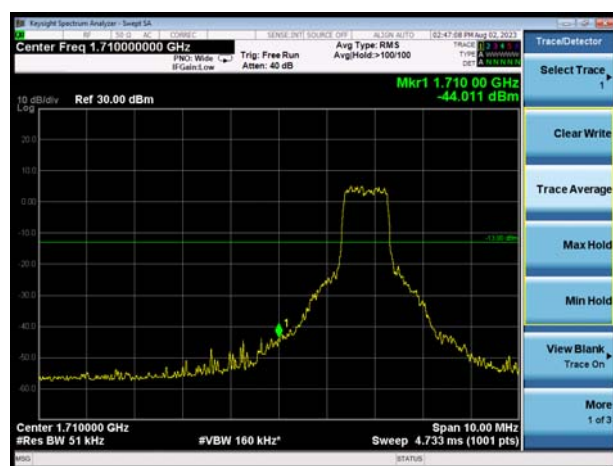
LTE-M Band 4 16QAM 20MHz CH-Low, 1 RB



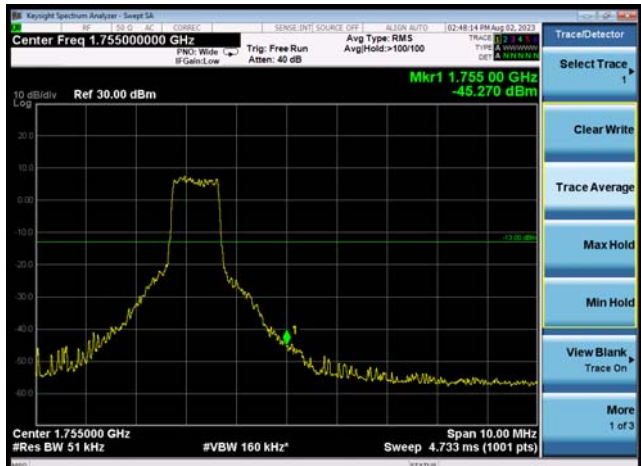
LTE-M Band 4 16QAM 20MHz CH-High, 1 RB



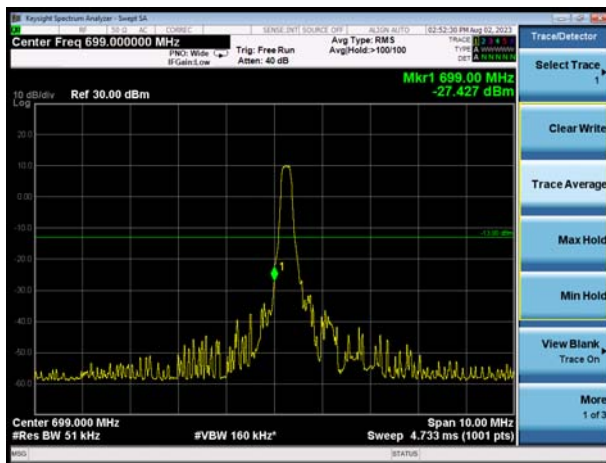
LTE-M Band 4 16QAM 20MHz CH-Low, 100%RB



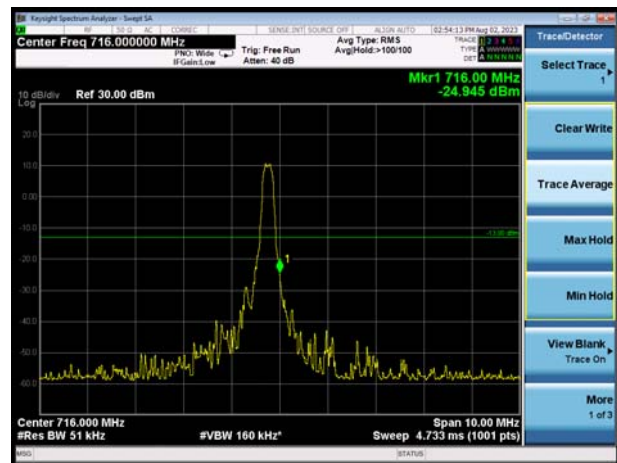
LTE-M Band 4 16QAM 20MHz CH-High, 100%RB



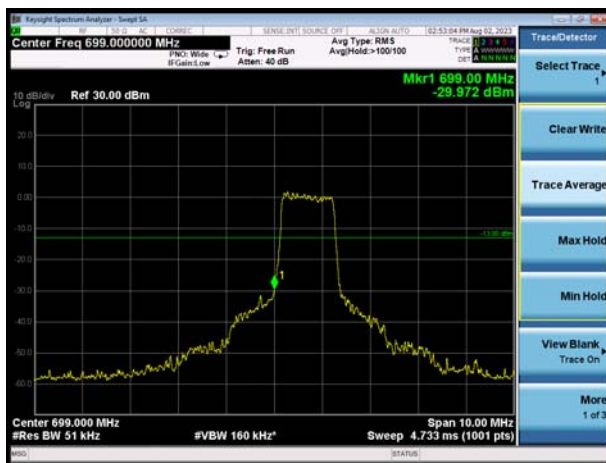
LTE Band 12 QPSK 1.4MHz CH-Low, 1 RB



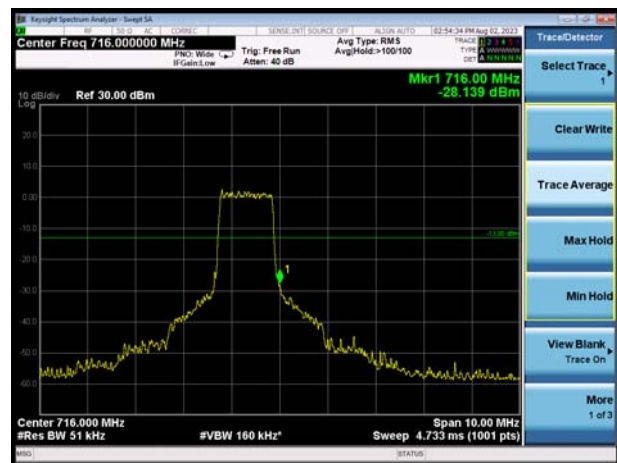
LTE Band 12 QPSK 1.4MHz CH-High, 1 RB



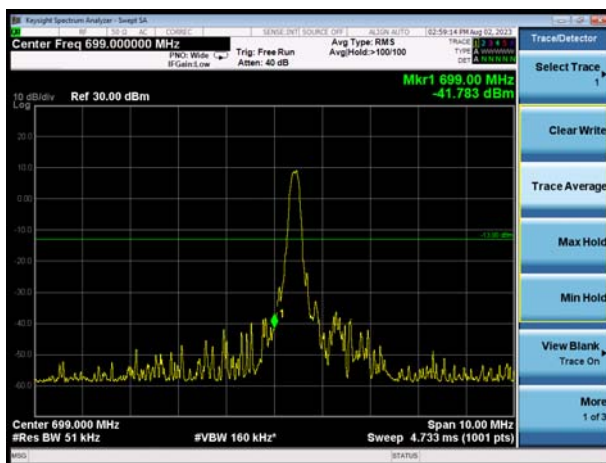
LTE Band 12 QPSK 1.4MHz CH-Low, 100%RB



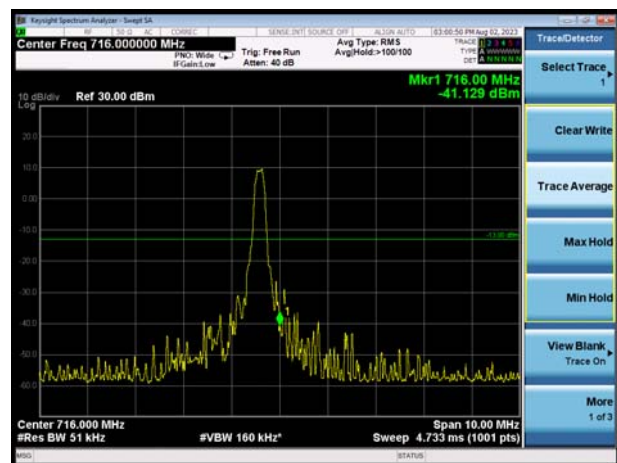
LTE Band 12 QPSK 1.4MHz CH-High, 100%RB



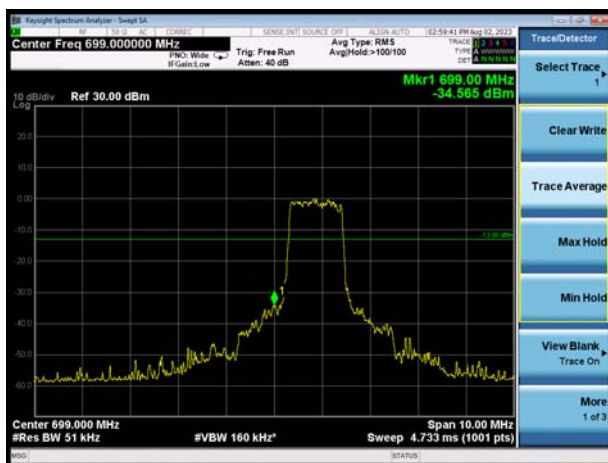
LTE Band 12 QPSK 3MHz CH-Low, 1 RB



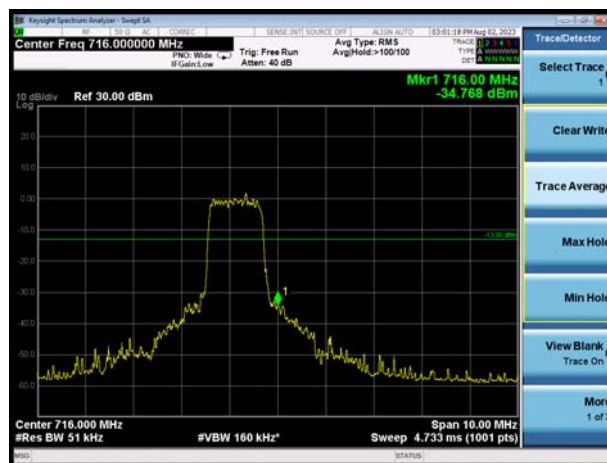
LTE Band 12 QPSK 3MHz CH-High, 1 RB



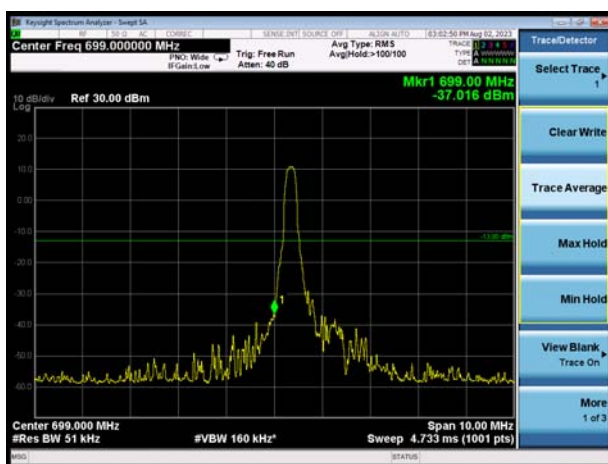
LTE Band 12 QPSK 3MHz CH-Low, 100%RB



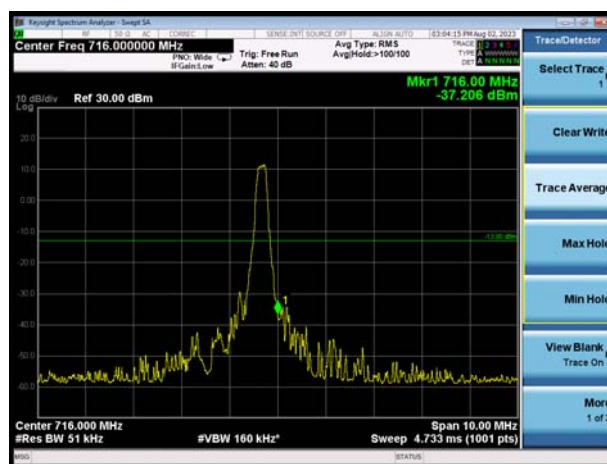
LTE Band 12 QPSK 3MHz CH-High, 100%RB



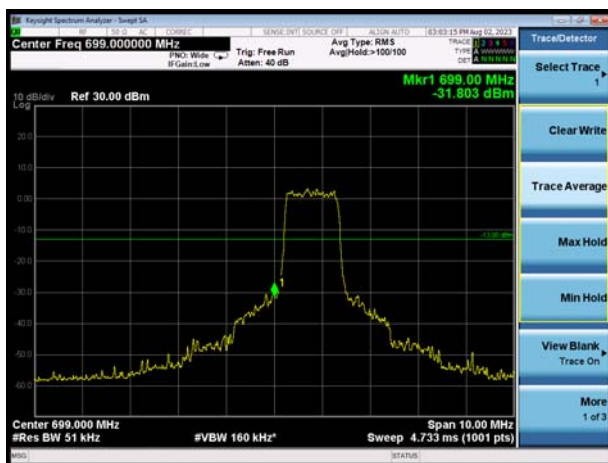
LTE Band 12 QPSK 5MHz CH-Low, 1 RB



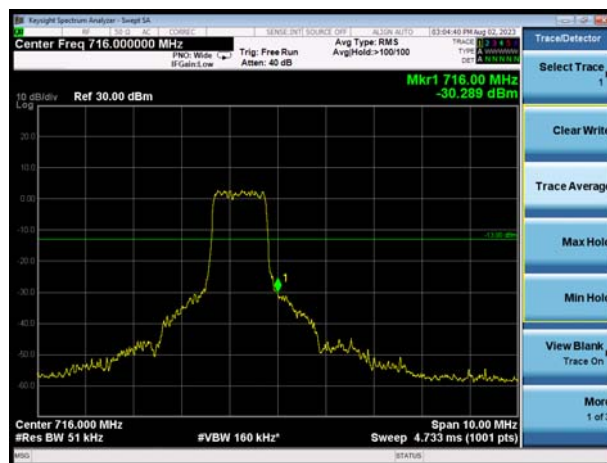
LTE Band 12 QPSK 5MHz CH-High, 1 RB



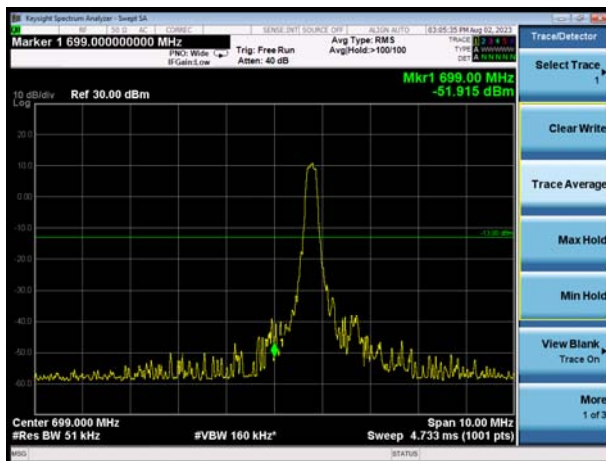
LTE Band 12 QPSK 5MHz CH-Low, 100%RB



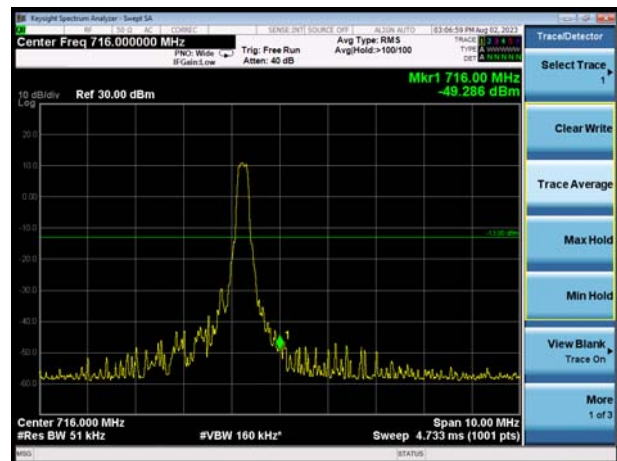
LTE Band 12 QPSK 5MHz CH-High, 100%RB



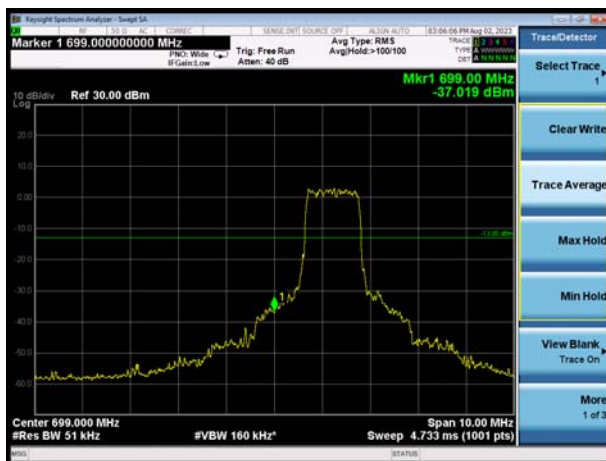
LTE Band 12 QPSK 10MHz CH-Low, 1 RB



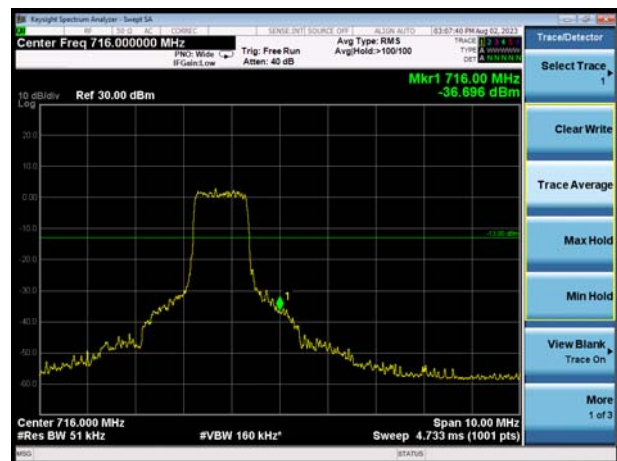
LTE Band 12 QPSK 10MHz CH-High, 1 RB



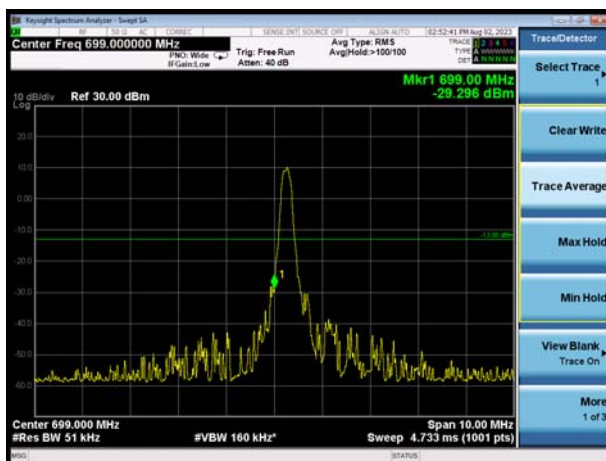
LTE Band 12 QPSK 10MHz CH-Low, 100%RB



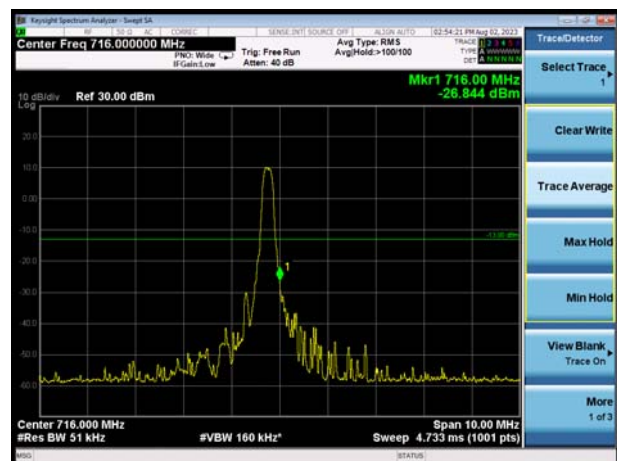
LTE Band 12 QPSK 10MHz CH-High, 100%RB



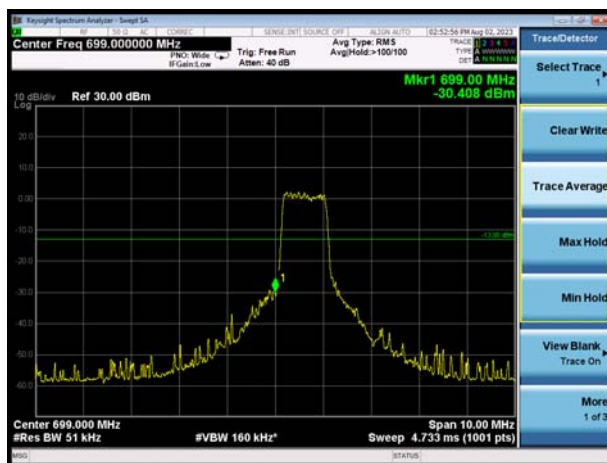
LTE Band 12 16QAM 1.4MHz CH-Low, 1 RB



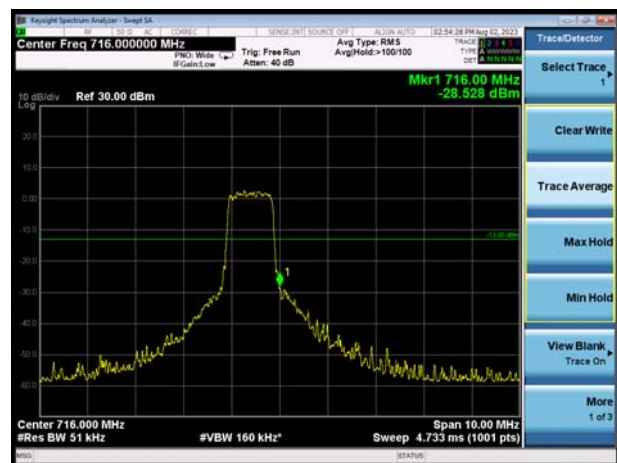
LTE Band 12 16QAM 1.4MHz CH-High, 1 RB



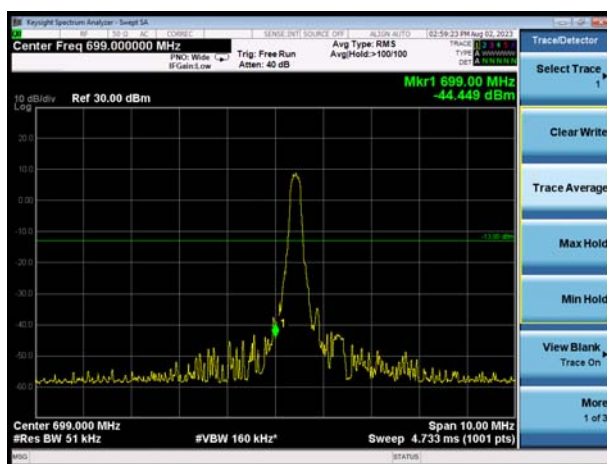
LTE Band 12 16QAM 1.4MHz CH-Low, 100%RB



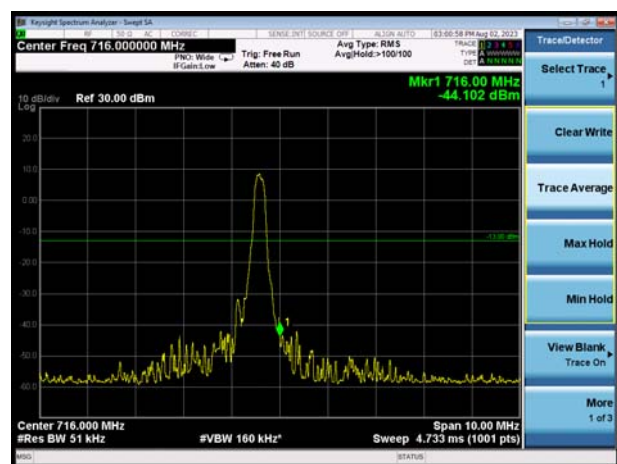
LTE Band 12 16QAM 1.4MHz CH-High, 100%RB



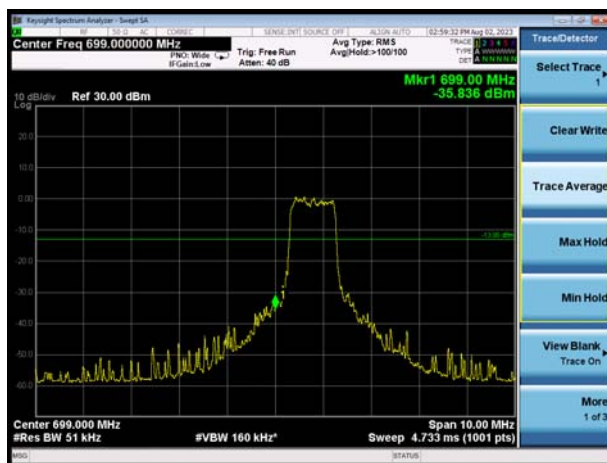
LTE Band 12 16QAM 3MHz CH-Low, 1 RB



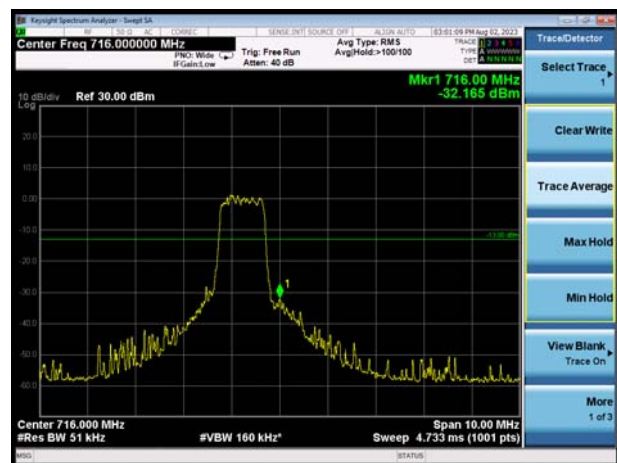
LTE Band 12 16QAM 3MHz CH-High, 1 RB



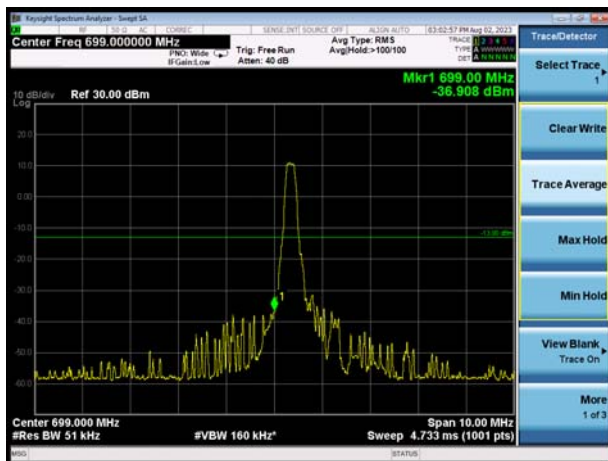
LTE Band 12 16QAM 3MHz CH-Low, 100%RB



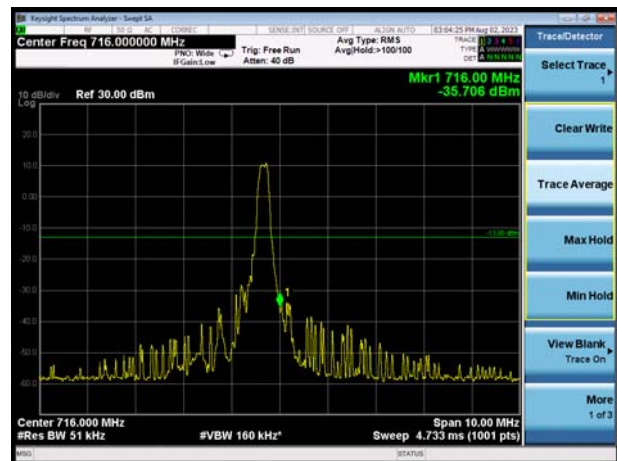
LTE Band 12 16QAM 3MHz CH-High, 100%RB



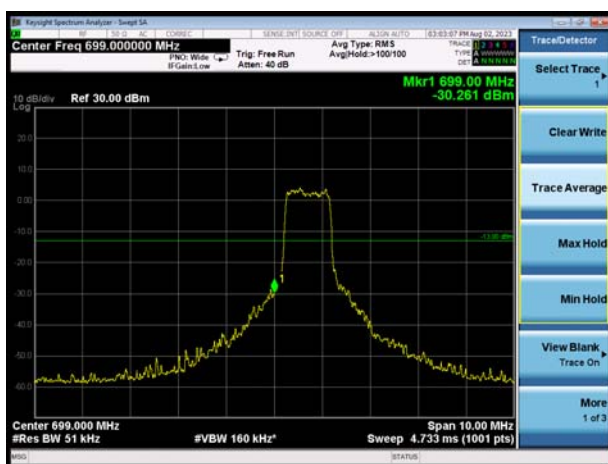
LTE Band 12 16QAM 5MHz CH-Low, 1 RB



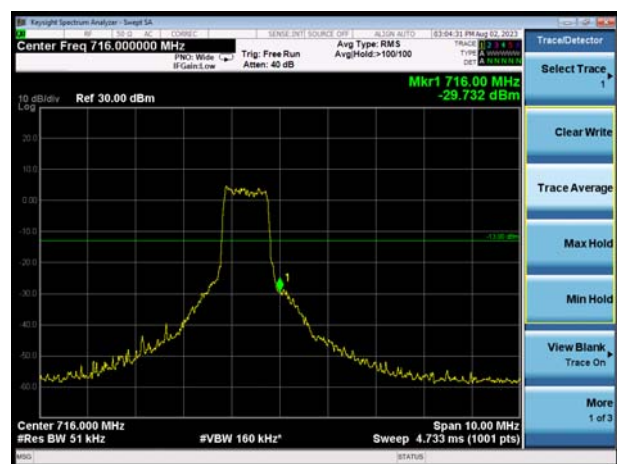
LTE Band 12 16QAM 5MHz CH-High, 1 RB



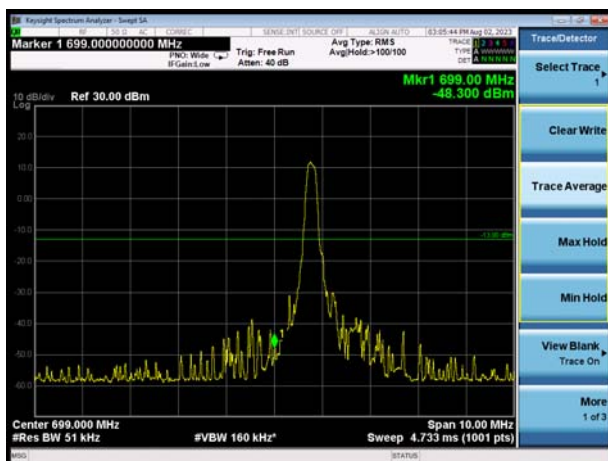
LTE Band 12 16QAM 5MHz CH-Low, 100%RB



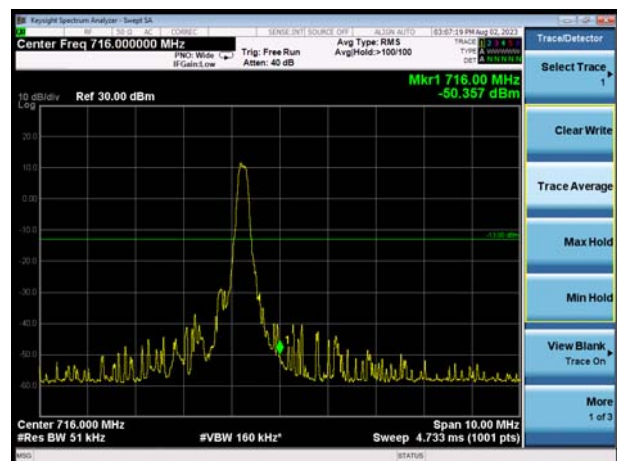
LTE Band 12 16QAM 5MHz CH-High, 100%RB



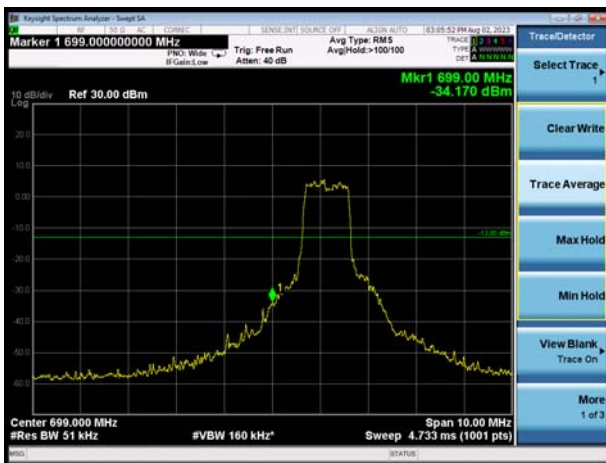
LTE Band 12 16QAM 10MHz CH-Low, 1 RB



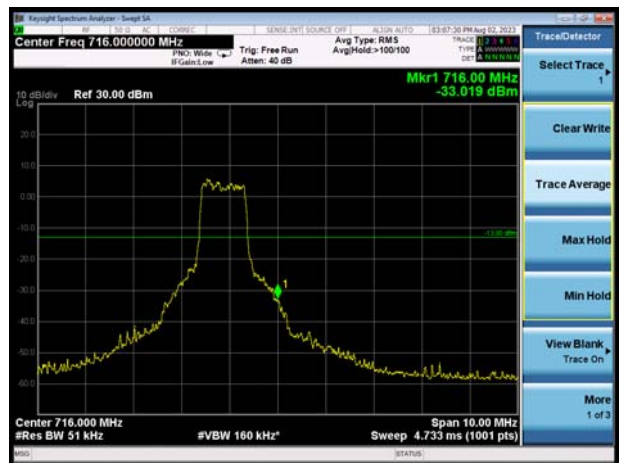
LTE Band 12 16QAM 10MHz CH-High, 1 RB



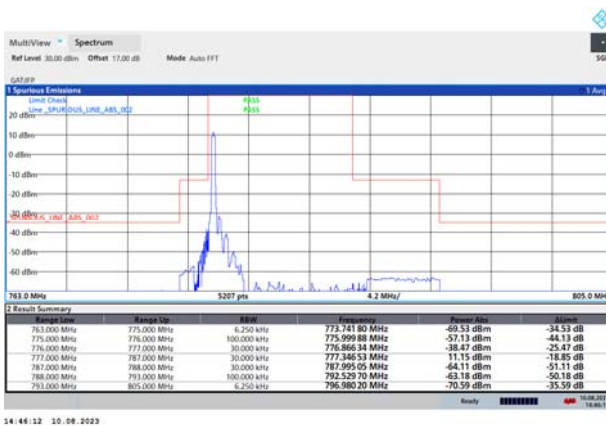
LTE Band 12 16QAM 10MHz CH-Low, 100%RB



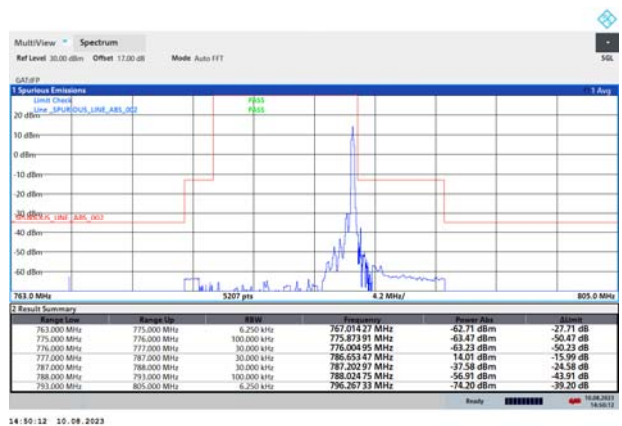
LTE Band 12 16QAM 10MHz CH-High, 100%RB



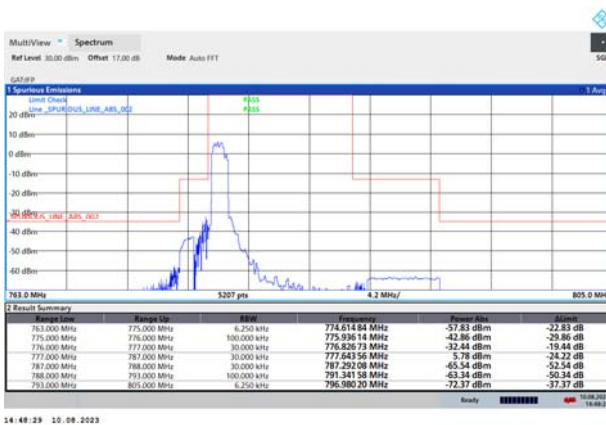
LTE Band 13 QPSK 5MHz CH-Low, 1 RB



LTE Band 13 QPSK 5MHz CH-High, 1 RB



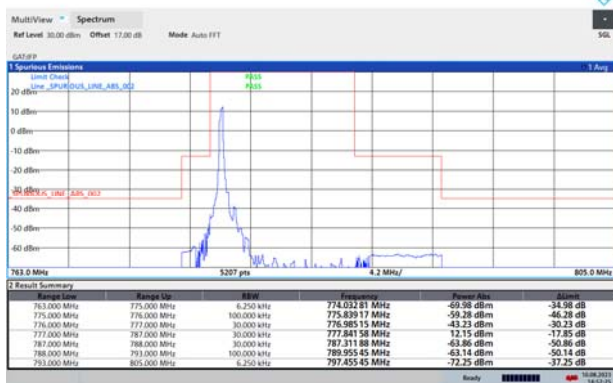
LTE Band 13 QPSK 5MHz CH-Low, 100%RB



LTE Band 13 QPSK 5MHz CH-High, 100%RB

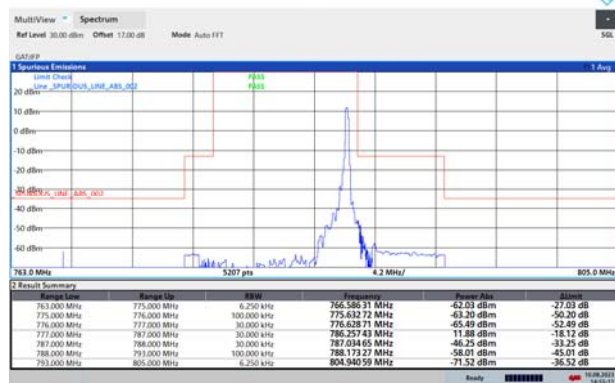


LTE Band 13 QPSK 10MHz CH-Low, 1 RB



14:52:26 10-08-2023

LTE Band 13 QPSK 10MHz CH-High, 1 RB



14:55:12 10-08-2023

LTE Band 13 QPSK 10MHz CH-Low, 100%RB



14:53:53 10-08-2023

LTE Band 13 QPSK 10MHz CH-High, 100%RB



14:57:10 10-08-2023

LTE Band 13 16QAM 5MHz CH-Low, 1 RB



14:46:58 10-08-2023

LTE Band 13 16QAM 5MHz CH-High, 1 RB

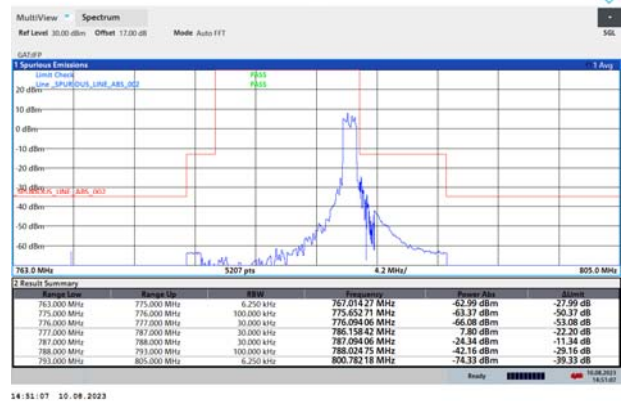


14:50:45 10-08-2023

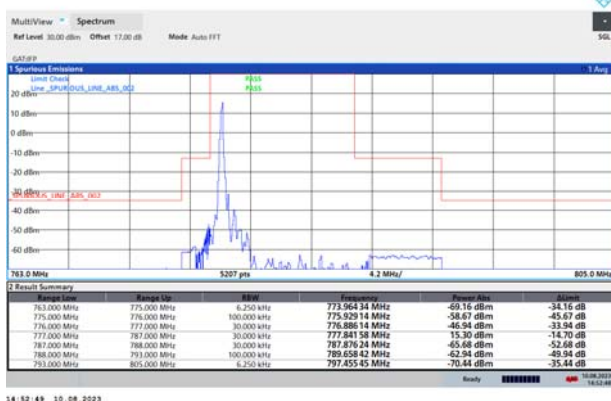
LTE Band 13 16QAM 5MHz CH-Low, 100%RB



LTE Band 13 16QAM 5MHz CH-High, 100%RB



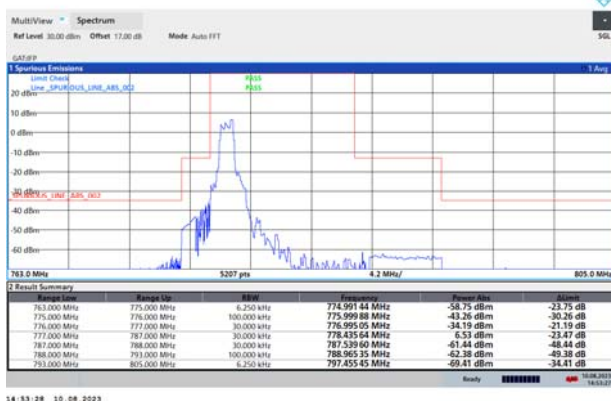
LTE Band 13 16QAM 10MHz CH-Low, 1 RB



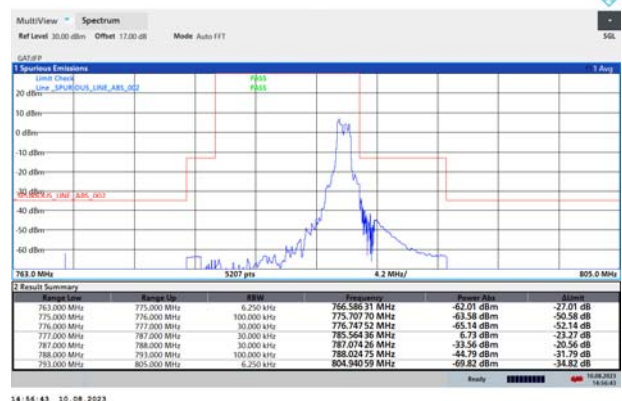
LTE Band 13 16QAM 10MHz CH-High, 1 RB



LTE Band 13 16QAM 10MHz CH-Low, 100%RB



LTE Band 13 16QAM 10MHz CH-High, 100%RB



6.4 Peak-to-Average Power Ratio (PAPR)

LTE-M Band 4							
Bandwidth (MHz)	Modulation	Channel/ Frequency (MHz)	Peak (dBm)	Avg (dBm)	PAPR (dB)	Limit (dB)	Conclusion
1.4	QPSK	20175/1732.5	24.48	12.73	11.75	≤13	PASS
	16QAM	20175/1732.5	25.06	12.94	12.12	≤13	PASS
3	QPSK	20175/1732.5	24.51	14.90	9.61	≤13	PASS
	16QAM	20175/1732.5	25.27	14.74	10.53	≤13	PASS
5	QPSK	20175/1732.5	25.22	15.73	9.49	≤13	PASS
	16QAM	20175/1732.5	25.68	16.03	9.65	≤13	PASS
10	QPSK	20175/1732.5	25.11	15.64	9.47	≤13	PASS
	16QAM	20175/1732.5	26.13	17.37	8.76	≤13	PASS
15	QPSK	20175/1732.5	25.82	17.01	8.81	≤13	PASS
	16QAM	20175/1732.5	26.08	16.66	9.42	≤13	PASS
20	QPSK	20175/1732.5	25.66	17.03	8.63	≤13	PASS
	16QAM	20175/1732.5	26.03	16.73	9.30	≤13	PASS

LTE-M Band 12							
Bandwidth (MHz)	Modulation	Channel/ Frequency (MHz)	Peak (dBm)	Avg (dBm)	PAPR (dB)	Limit (dB)	Conclusion
1.4	QPSK	23095/707.5	22.65	11.01	11.64	≤13	PASS
	16QAM	23095/707.5	23.23	11.10	12.13	≤13	PASS
3	QPSK	23095/707.5	22.67	13.08	9.59	≤13	PASS
	16QAM	23095/707.5	23.42	12.84	10.58	≤13	PASS
5	QPSK	23095/707.5	23.61	14.18	9.43	≤13	PASS
	16QAM	23095/707.5	24.27	14.26	10.01	≤13	PASS
10	QPSK	23095/707.5	23.75	14.15	9.60	≤13	PASS
	16QAM	23095/707.5	24.99	15.69	9.30	≤13	PASS

LTE-M Band 13							
Bandwidth (MHz)	Modulation	Channel/ Frequency (MHz)	Peak (dBm)	Avg (dBm)	PAPR (dB)	Limit (dB)	Conclusion
5	QPSK	23230/782	24.95	15.06	9.89	≤13	PASS
	16QAM	23230/782	25.63	15.08	10.55	≤13	PASS
10	QPSK	23230/782	24.77	13.57	11.20	≤13	PASS
	16QAM	23230/782	26.05	15.98	10.07	≤13	PASS

6.5 Frequency Stability

LTE-M Band 4						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (pm)	Frequency Stability (pm)	Conclus ion
Bandwidth	1.4MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	16.78	17.87	0.00962	0.01024	PASS
Extreme (50℃)		4.08	9.69	0.00234	0.00555	PASS
Extreme (40℃)		12.02	1.30	0.00689	0.00075	PASS
Extreme (30℃)		7.96	13.15	0.00456	0.00753	PASS
Extreme (20℃)		14.89	12.02	0.00853	0.00689	PASS
Extreme (10℃)		11.00	13.81	0.00630	0.00792	PASS
Extreme (0℃)		13.81	4.20	0.00792	0.00240	PASS
Extreme (-10℃)		15.24	7.78	0.00873	0.00446	PASS
Extreme (-20℃)		10.99	14.46	0.00630	0.00829	PASS
Extreme (-30℃)		13.28	5.12	0.00761	0.00293	PASS
25℃	LV	2.89	8.79	0.00165	0.00504	PASS
	HV	14.64	5.55	0.00839	0.00318	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (pm)	Frequency Stability (pm)	Conclus ion
Bandwidth	3MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	13.73	4.63	0.00787	0.00266	PASS
Extreme (50℃)		14.22	1.66	0.00815	0.00095	PASS
Extreme (40℃)		9.45	13.24	0.00542	0.00759	PASS
Extreme (30℃)		15.16	17.33	0.00869	0.00993	PASS
Extreme (20℃)		13.01	12.17	0.00745	0.00698	PASS
Extreme (10℃)		8.18	11.81	0.00469	0.00677	PASS
Extreme (0℃)		10.86	7.93	0.00622	0.00455	PASS
Extreme (-10℃)		2.01	11.06	0.00115	0.00634	PASS
Extreme (-20℃)		9.08	17.39	0.00520	0.00997	PASS
Extreme (-30℃)		7.49	14.38	0.00429	0.00824	PASS
25℃	LV	9.91	1.82	0.00568	0.00105	PASS
	HV	12.59	16.11	0.00722	0.00923	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (pm)	Frequency Stability (pm)	Conclus ion
Bandwidth	5MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	6.82	6.88	0.00391	0.00394	PASS
Extreme (50℃)		12.91	13.27	0.00740	0.00760	PASS

Extreme (40℃)		4.32	4.27	0.00248	0.00245	PASS
Extreme (30℃)		7.74	2.72	0.00443	0.00156	PASS
Extreme (20℃)		6.96	1.24	0.00399	0.00071	PASS
Extreme (10℃)		2.25	4.77	0.00129	0.00273	PASS
Extreme (0℃)		10.72	16.87	0.00614	0.00967	PASS
Extreme (-10℃)		13.38	1.96	0.00767	0.00112	PASS
Extreme (-20℃)		10.31	15.78	0.00591	0.00904	PASS
Extreme (-30℃)		5.59	10.27	0.00320	0.00588	PASS
25℃	LV	2.27	12.84	0.00130	0.00736	PASS
	HV	6.87	11.00	0.00394	0.00630	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (pm)	Frequency Stability (pm)	Conclus ion
Bandwidth	10MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	17.89	9.68	0.01025	0.00554	PASS
Extreme (50℃)		15.02	9.00	0.00861	0.00516	PASS
Extreme (40℃)		15.97	5.82	0.00915	0.00333	PASS
Extreme (30℃)		12.16	15.99	0.00697	0.00917	PASS
Extreme (20℃)		1.34	17.53	0.00077	0.01005	PASS
Extreme (10℃)		5.68	15.76	0.00325	0.00903	PASS
Extreme (0℃)		15.96	3.74	0.00915	0.00214	PASS
Extreme (-10℃)		8.16	7.95	0.00468	0.00455	PASS
Extreme (-20℃)		9.99	4.49	0.00573	0.00257	PASS
Extreme (-30℃)		12.90	2.70	0.00739	0.00155	PASS
25℃	LV	15.94	6.73	0.00913	0.00386	PASS
	HV	15.85	11.29	0.00908	0.00647	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (pm)	Frequency Stability (pm)	Conclus ion
Bandwidth	15MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	7.79	10.82	0.00447	0.00620	PASS
Extreme (50℃)		15.60	9.32	0.00894	0.00534	PASS
Extreme (40℃)		13.20	1.20	0.00757	0.00068	PASS
Extreme (30℃)		3.09	11.22	0.00177	0.00643	PASS
Extreme (20℃)		10.34	3.62	0.00593	0.00208	PASS
Extreme (10℃)		12.07	12.75	0.00691	0.00731	PASS
Extreme (0℃)		13.22	12.61	0.00758	0.00723	PASS
Extreme (-10℃)		6.90	14.20	0.00396	0.00814	PASS
Extreme (-20℃)		13.33	14.32	0.00764	0.00821	PASS
Extreme (-30℃)		9.13	6.77	0.00523	0.00388	PASS
25℃	LV	4.84	9.65	0.00278	0.00553	PASS

	HV	6.69	1.20	0.00384	0.00069	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (pm)	Frequency Stability (pm)	Conclus ion
Bandwidth	20MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	13.64	17.64	0.00782	0.01011	
Extreme (50℃)		3.27	10.80	0.00187	0.00619	PASS
Extreme (40℃)		5.65	4.14	0.00324	0.00238	PASS
Extreme (30℃)		5.64	10.10	0.00323	0.00579	PASS
Extreme (20℃)		14.37	12.48	0.00823	0.00715	PASS
Extreme (10℃)		9.67	6.15	0.00554	0.00352	PASS
Extreme (0℃)		13.36	6.87	0.00765	0.00394	PASS
Extreme (-10℃)		12.13	10.63	0.00695	0.00609	PASS
Extreme (-20℃)		6.67	3.64	0.00382	0.00208	PASS
Extreme (-30℃)		2.65	15.04	0.00152	0.00862	PASS
25℃	LV	9.24	13.14	0.00530	0.00753	PASS
	HV	13.60	9.34	0.00779	0.00535	PASS

LTE-M Band 12						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (pm)	Frequency Stability (pm)	Conclus ion
Bandwidth	1.4MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25°C)	Normal	9.93	15.99	0.01401	0.02255	PASS
Extreme (50°C)		4.22	8.19	0.00595	0.01156	PASS
Extreme (40°C)		5.59	6.87	0.00789	0.00969	PASS
Extreme (30°C)		6.71	10.18	0.00947	0.01436	PASS
Extreme (20°C)		7.34	6.10	0.01035	0.00861	PASS
Extreme (10°C)		11.14	15.20	0.01571	0.02143	PASS
Extreme (0°C)		5.70	8.19	0.00804	0.01155	PASS
Extreme (-10°C)		13.95	9.56	0.01968	0.01348	PASS
Extreme (-20°C)		9.57	4.86	0.01350	0.00686	PASS
Extreme (-30°C)		4.98	6.00	0.00703	0.00846	PASS
25°C	LV	3.39	9.93	0.00479	0.01400	PASS
	HV	4.99	5.35	0.00704	0.00755	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (pm)	Frequency Stability (pm)	Conclus ion
Bandwidth	3MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25°C)	Normal	12.64	17.98	0.01783	0.02536	PASS
Extreme (50°C)		15.16	17.66	0.02138	0.02491	PASS
Extreme (40°C)		12.40	5.29	0.01748	0.00746	PASS
Extreme (30°C)		7.31	11.38	0.01031	0.01604	PASS
Extreme (20°C)		2.66	2.93	0.00376	0.00413	PASS
Extreme (10°C)		14.50	16.26	0.02046	0.02293	PASS
Extreme (0°C)		8.52	8.08	0.01202	0.01139	PASS
Extreme (-10°C)		3.28	15.69	0.00462	0.02212	PASS
Extreme (-20°C)		2.59	11.67	0.00365	0.01645	PASS
Extreme (-30°C)		4.27	11.67	0.00603	0.01645	PASS
25°C	LV	1.08	2.42	0.00152	0.00342	PASS
	HV	6.01	12.70	0.00848	0.01791	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (pm)	Frequency Stability (pm)	Conclus ion
Bandwidth	5MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25°C)	Normal	13.72	7.64	0.01935	0.01077	PASS
Extreme (50°C)		4.06	11.69	0.00572	0.01649	PASS
Extreme (40°C)		16.00	7.86	0.02256	0.01109	PASS

Extreme (30℃)		10.34	8.95	0.01458	0.01262	PASS
Extreme (20℃)		14.41	9.43	0.02032	0.01330	PASS
Extreme (10℃)		6.25	3.35	0.00882	0.00473	PASS
Extreme (0℃)		13.14	3.83	0.01853	0.00541	PASS
Extreme (-10℃)		11.47	7.02	0.01618	0.00991	PASS
Extreme (-20℃)		13.14	7.12	0.01853	0.01004	PASS
Extreme (-30℃)		15.76	7.79	0.02222	0.01099	PASS
25℃	LV	15.95	17.48	0.02250	0.02466	PASS
	HV	13.56	6.86	0.01913	0.00968	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (pm)	Frequency Stability (pm)	Conclus ion
Bandwidth	10MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	16.48	17.51	0.02324	0.02469	PASS
Extreme (50℃)		6.06	15.70	0.00855	0.02215	PASS
Extreme (40℃)		11.74	10.51	0.01656	0.01482	PASS
Extreme (30℃)		1.27	10.41	0.00180	0.01468	PASS
Extreme (20℃)		5.28	13.31	0.00744	0.01877	PASS
Extreme (10℃)		10.88	3.75	0.01534	0.00529	PASS
Extreme (0℃)		12.68	7.46	0.01788	0.01052	PASS
Extreme (-10℃)		3.53	2.21	0.00498	0.00312	PASS
Extreme (-20℃)		8.76	13.08	0.01236	0.01845	PASS
Extreme (-30℃)		8.65	1.79	0.01220	0.00253	PASS
25℃	LV	6.33	8.39	0.00892	0.01183	PASS
	HV	13.06	2.24	0.01843	0.00316	PASS

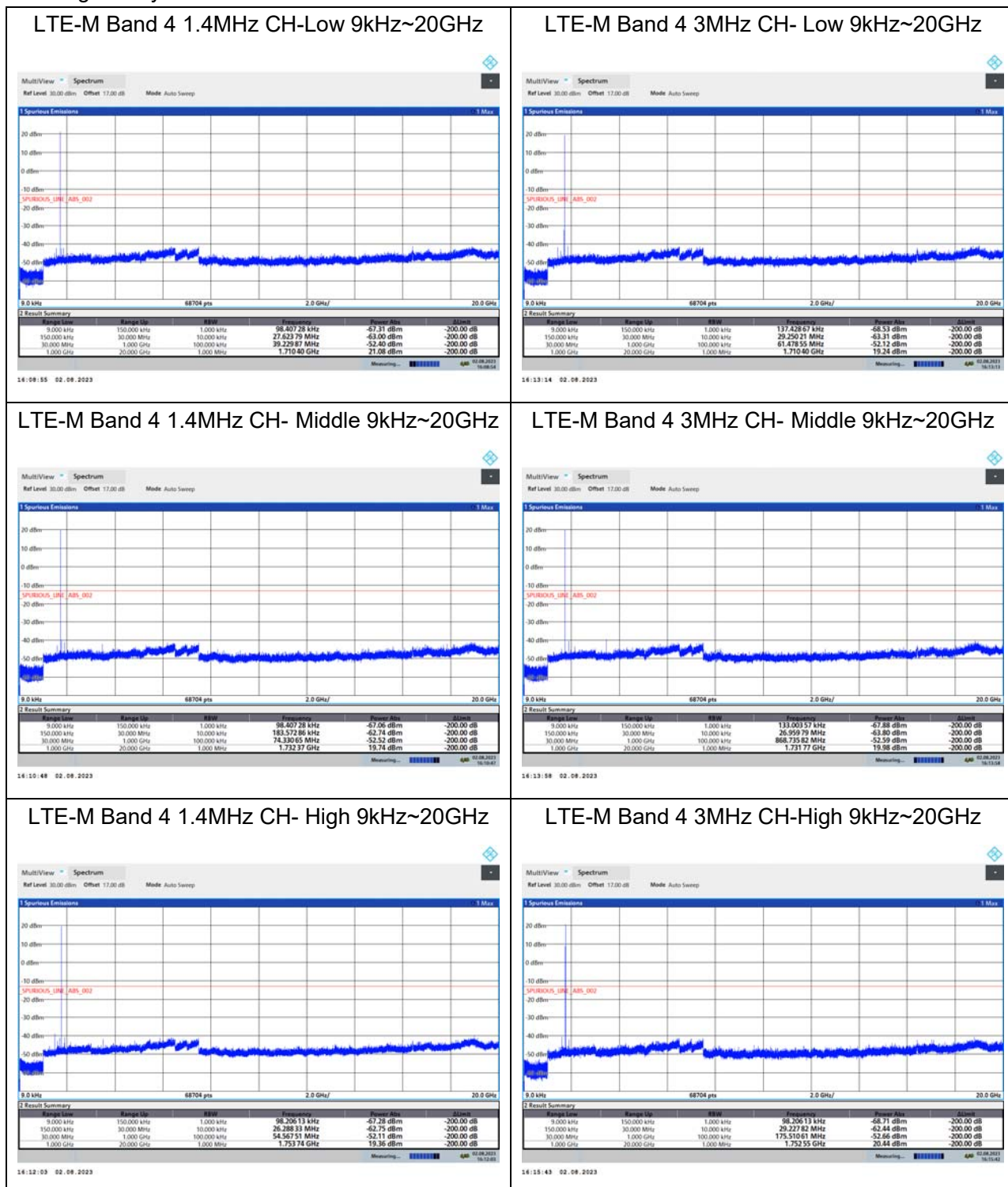
LTE-M Band 13						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (pm)	Frequency Stability (pm)	Conclus ion
Bandwidth	5MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25°C)	Normal	17.95	13.47	0.02295	0.01722	PASS
Extreme (50°C)		8.76	7.48	0.01120	0.00956	PASS
Extreme (40°C)		14.21	6.31	0.01818	0.00807	PASS
Extreme (30°C)		3.68	17.08	0.00471	0.02184	PASS
Extreme (20°C)		3.45	15.81	0.00441	0.02021	PASS
Extreme (10°C)		8.70	17.95	0.01113	0.02295	PASS
Extreme (0°C)		8.66	16.99	0.01107	0.02172	PASS
Extreme (-10°C)		8.04	12.01	0.01028	0.01536	PASS
Extreme (-20°C)		5.84	11.56	0.00747	0.01478	PASS
Extreme (-30°C)		2.33	11.61	0.00298	0.01485	PASS
25°C	LV	1.43	6.39	0.00183	0.00818	PASS
	HV	11.31	8.81	0.01446	0.01126	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (pm)	Frequency Stability (pm)	Conclus ion
Bandwidth	10MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25°C)	Normal	17.10	15.78	0.02186	0.02018	PASS
Extreme (50°C)		5.87	11.69	0.00751	0.01495	PASS
Extreme (40°C)		3.59	10.33	0.00459	0.01321	PASS
Extreme (30°C)		17.33	5.93	0.02216	0.00758	PASS
Extreme (20°C)		7.90	3.20	0.01011	0.00409	PASS
Extreme (10°C)		10.33	14.90	0.01321	0.01905	PASS
Extreme (0°C)		11.61	5.24	0.01485	0.00670	PASS
Extreme (-10°C)		8.49	10.10	0.01086	0.01291	PASS
Extreme (-20°C)		11.37	13.02	0.01454	0.01664	PASS
Extreme (-30°C)		17.92	12.83	0.02292	0.01641	PASS
25°C	LV	5.39	5.00	0.00689	0.00640	PASS
	HV	1.20	9.61	0.00154	0.01229	PASS

6.6 Spurious Emissions at Antenna Terminals

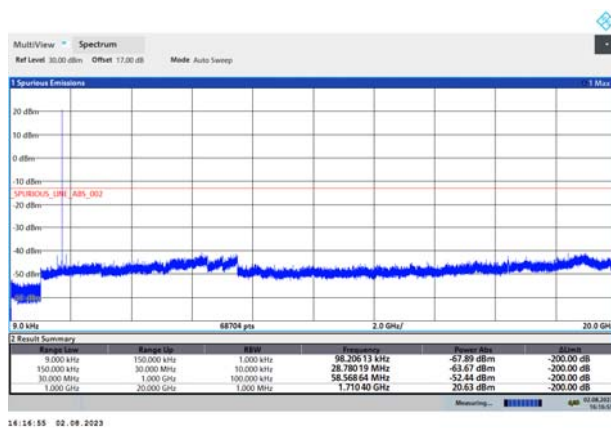
Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the emissions more than 20 dB below the limit are not reported.

Results: Pass

The signal beyond the limit is carrier.

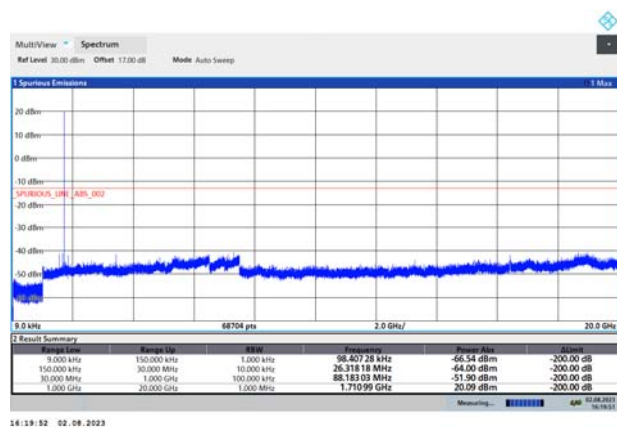


LTE-M Band 4 5MHz CH- Low 9kHz~20GHz



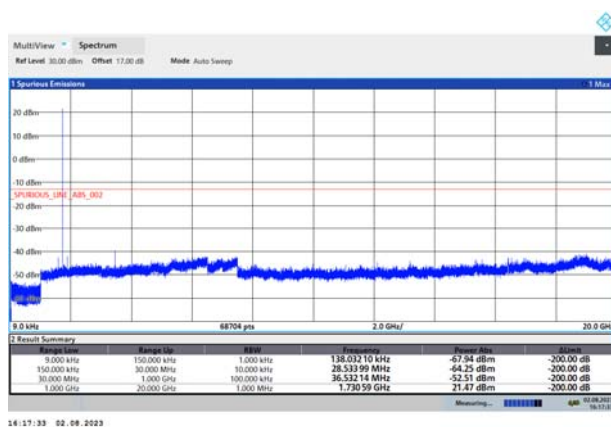
14:14:55 02-08-2023

LTE-M Band 4 10MHz CH-Low 9kHz~20GHz



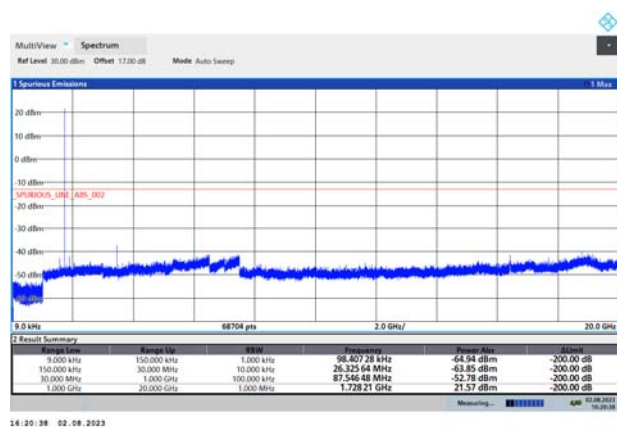
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LTE-M Band 4 5MHz CH- Middle 9kHz~20GHz



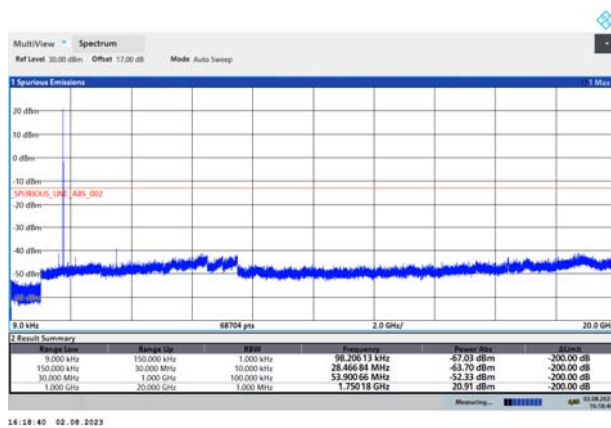
14:17:33 02-08-2023

LTE-M Band 4 10MHz CH- Middle 9kHz~20GHz



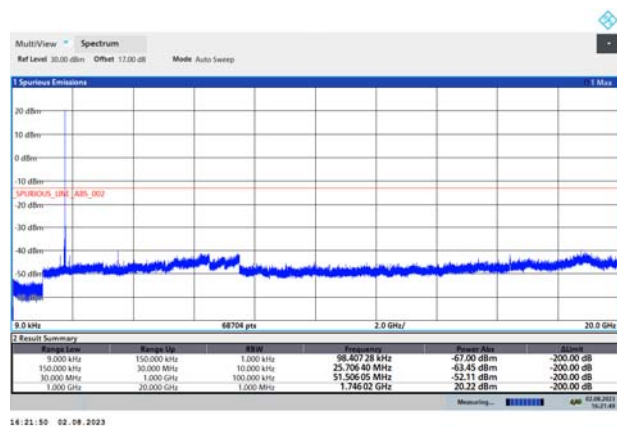
14:20:38 02-08-2023

LTE-M Band 4 5MHz CH-High 9kHz~20GHz



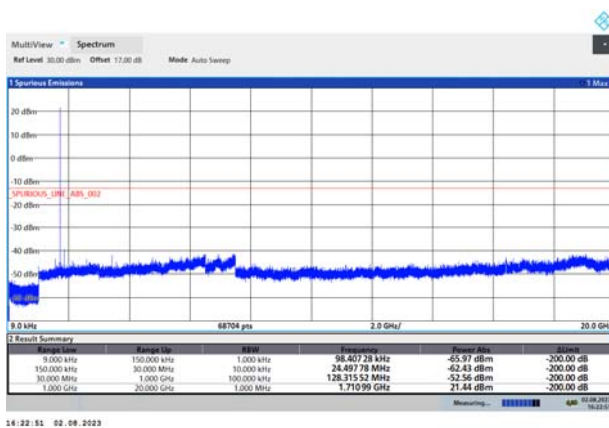
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LTE-M Band 4 10MHz CH- High 9kHz~20GHz



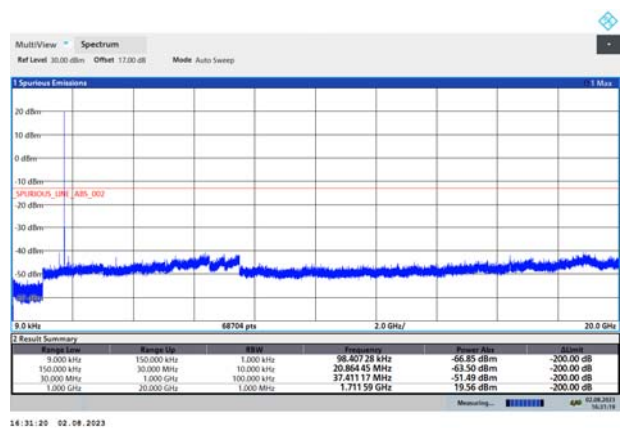
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LTE-M Band 4 15MHz CH- Low 9kHz~20GHz



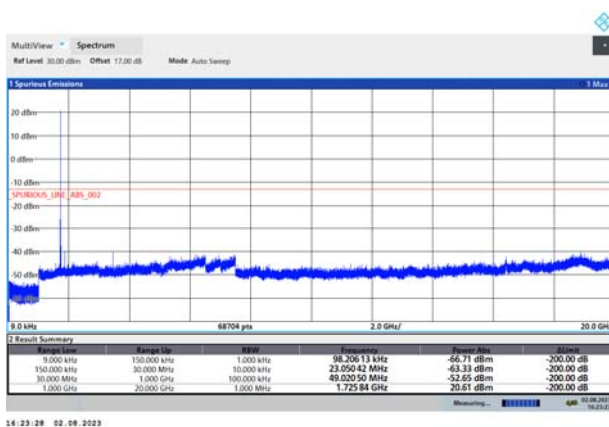
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LTE-M Band 4 20MHz CH-Low 9kHz~20GHz



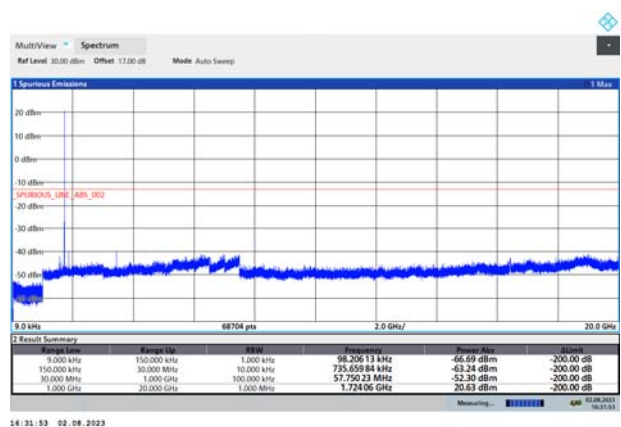
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LTE-M Band 4 15MHz CH- Middle 9kHz~20GHz



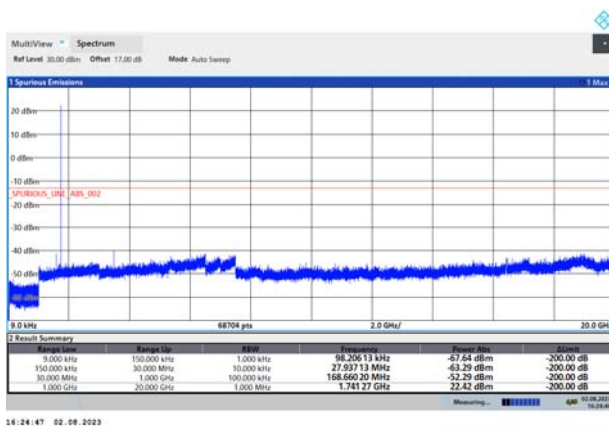
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LTE-M Band 4 20MHz CH- Middle 9kHz~20GHz



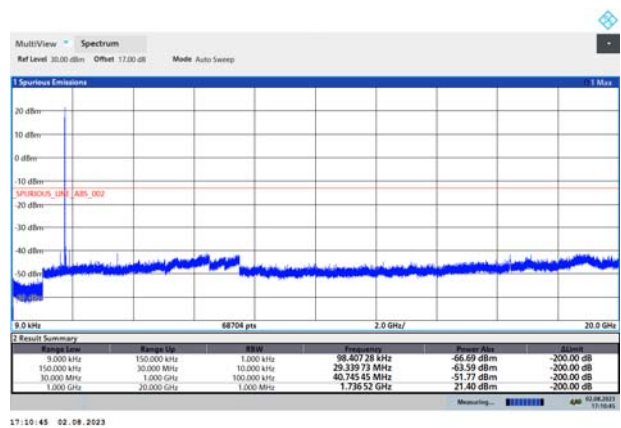
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LTE-M Band 4 15MHz CH-High 9kHz~20GHz



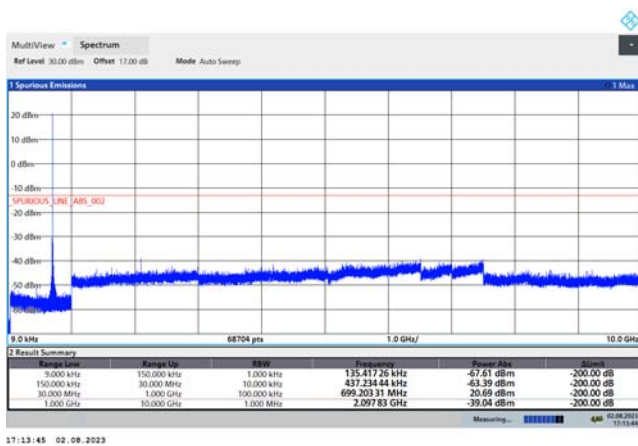
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LTE-M Band 4 20MHz CH- High 9kHz~20GHz

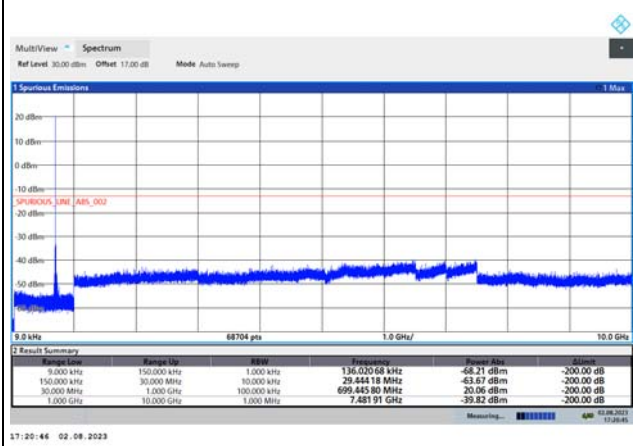


17:10:45 02-08-2023

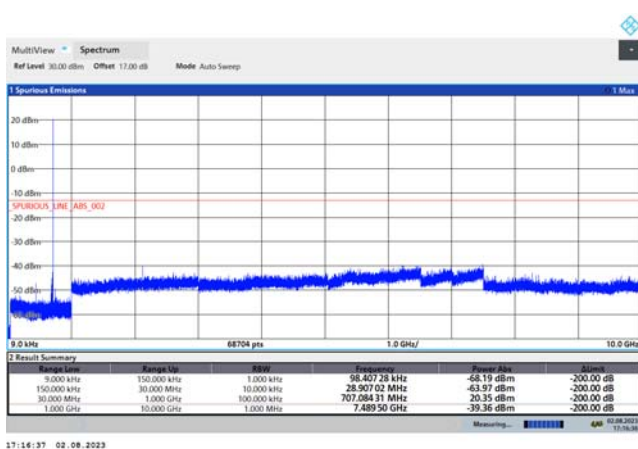
LTE-M Band 12 1.4MHz CH-Low 9kHz ~10GHz



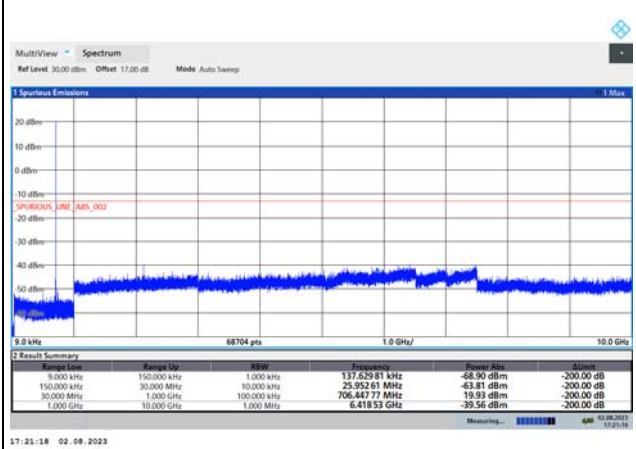
LTE-M Band 12 3MHz CH-Low 9kHz ~10GHz



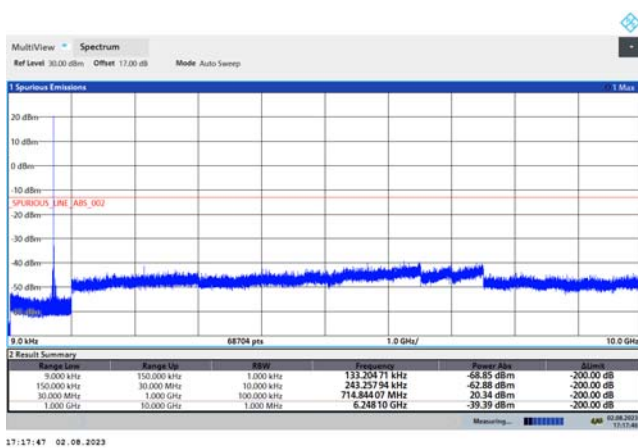
LTE-M Band 12 1.4MHz CH- Middle 9kHz ~10GHz



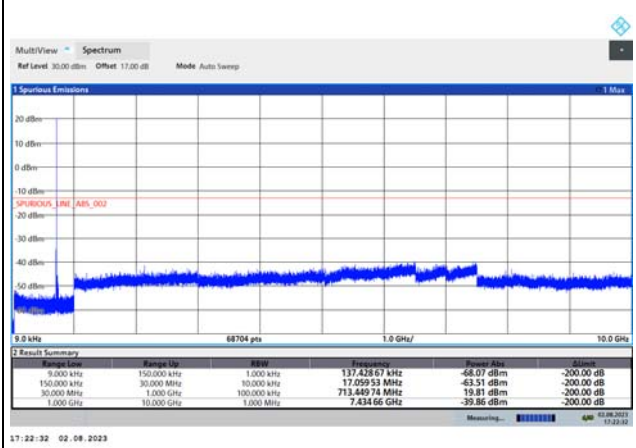
LTE-M Band 12 3MHz CH- Middle 9kHz ~10GHz



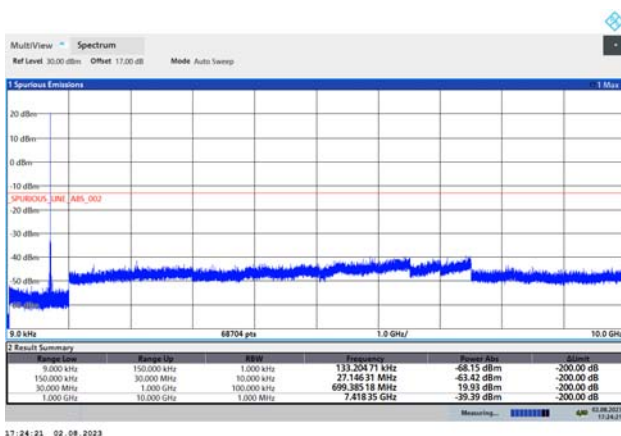
LTE-M Band 12 1.4MHz CH-High 9kHz ~10GHz



LTE-M Band 12 3MHz CH-High 9kHz ~10GHz

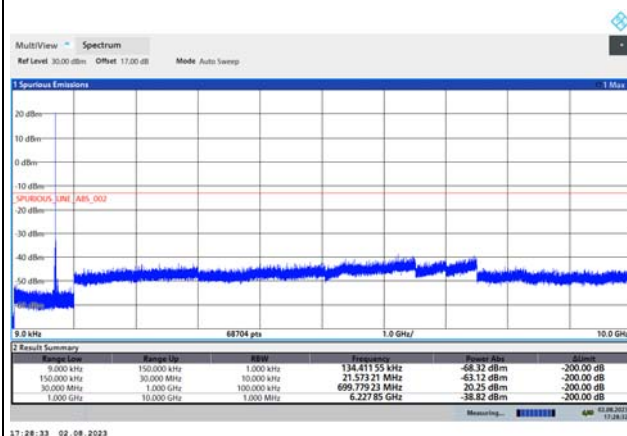


LTE-M Band 12 5MHz CH-Low 9kHz ~10GHz



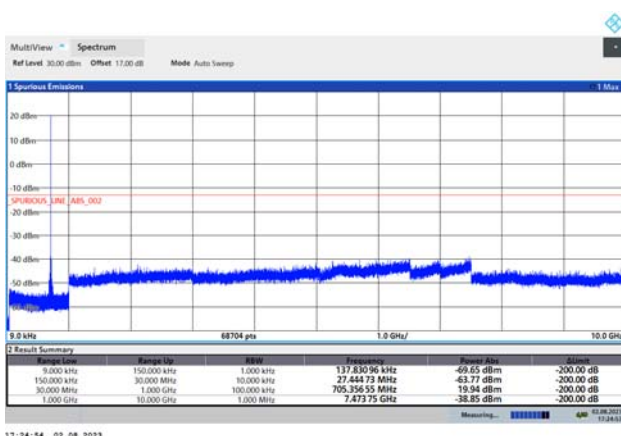
17:24:21 02.08.2023

LTE-M Band 12 10MHz CH-Low 9kHz ~10GHz



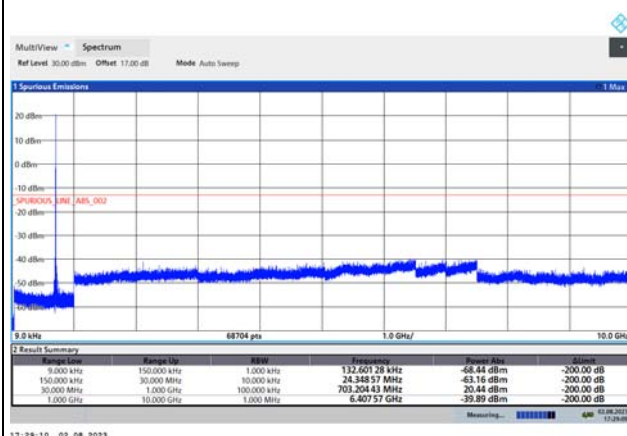
17:28:33 02.08.2023

LTE-M Band 12 5MHz CH- Middle 9kHz ~10GHz



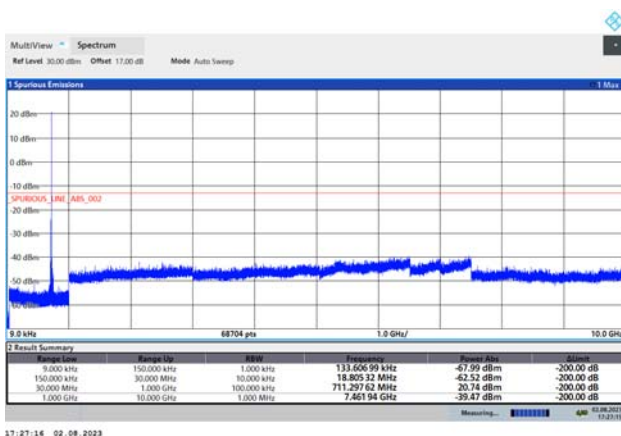
17:24:54 02.08.2023

LTE-M Band 12 10MHz CH- Middle 9kHz ~10GHz



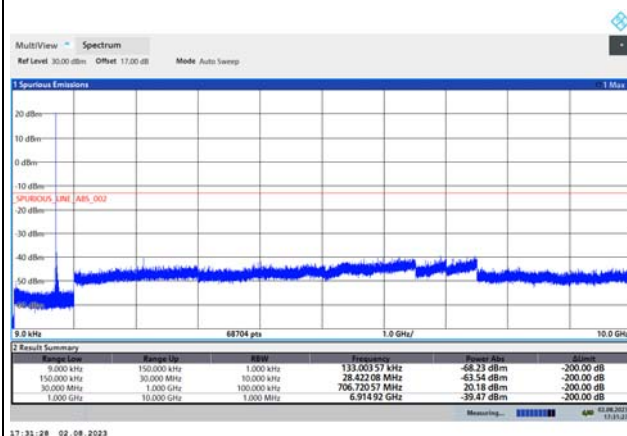
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LTE-M Band 12 5MHz CH-High 9kHz ~10GHz



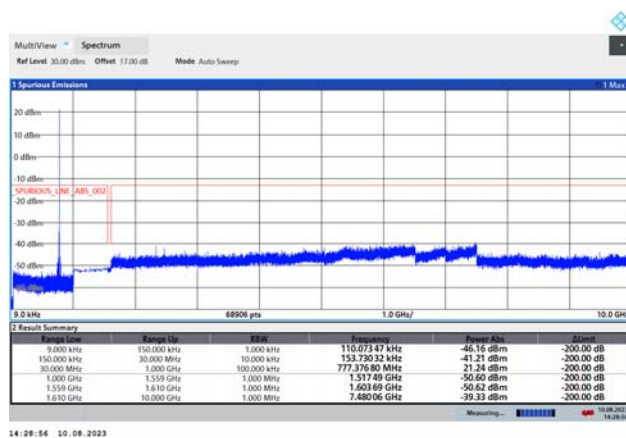
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LTE-M Band 12 10MHz CH-High 9kHz ~10GHz



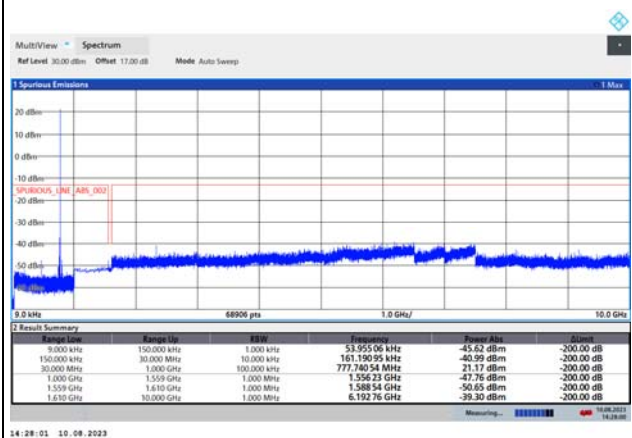
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LTE-M Band 13 5MHz CH-Low 9kHz ~10GHz



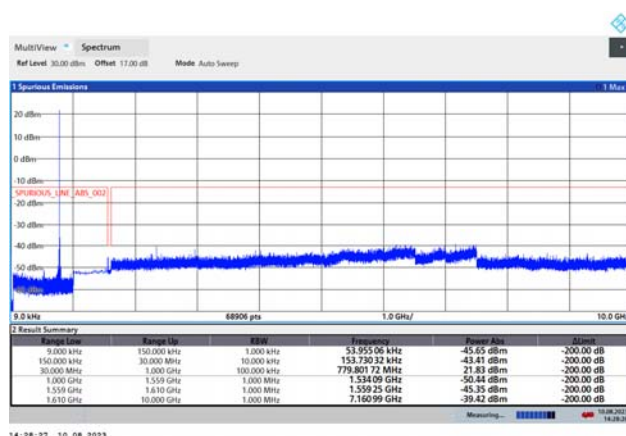
14:28:54 10.08.2023

LTE-M Band 13 10MHz CH-Middle 9kHz ~10GHz



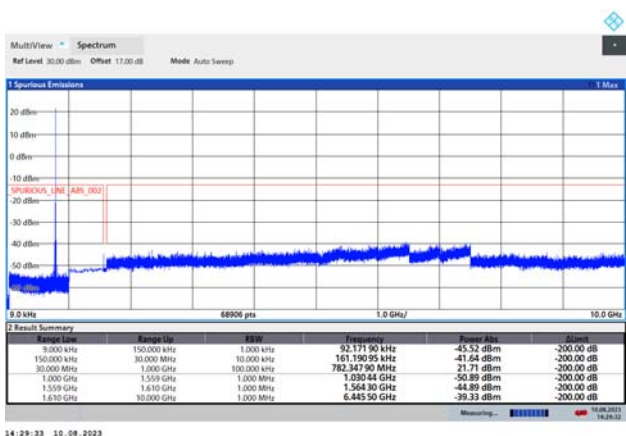
14:28:01 10.08.2023

LTE-M Band 13 5MHz CH-Middle 9kHz ~10GHz



14:28:27 10.08.2023

LTE-M Band 13 5MHz CH-High 9kHz ~10GHz



14:29:33 10.08.2023

6.7 Radiated Spurious Emission

Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the emissions below the noise floor will not be recorded in the report.

Results: Pass

LTE-M Band 4 QPSK 1.4MHz CH-Middle, RB 1

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3464.25	-55.55	2.70	12.70	Vertical	-45.55	-13.00	32.55	3
3	5197.50	-69.42	3.20	12.50	Vertical	-60.12	-13.00	47.12	246
4	6930.00	-72.49	4.20	11.80	Vertical	-64.89	-13.00	51.89	7
5	8662.50	-66.51	4.40	12.50	Vertical	-58.41	-13.00	45.41	176
6	10395.00	-62.70	4.70	11.30	Vertical	-56.10	-13.00	43.10	304
7	12127.50	-64.85	5.20	13.80	Vertical	-56.25	-13.00	43.25	24
8	13860.00	-60.93	5.70	11.30	Vertical	-55.33	-13.00	42.33	276
9	15592.50	-70.48	6.10	16.80	Vertical	-59.78	-13.00	46.78	90
10	17325.00	-62.03	6.10	14.20	Vertical	-53.93	-13.00	40.93	146
Note: The other Spurious RF Radiated emissions level is no more than noise floor.									

LTE-M Band 4 QPSK 5MHz CH-Middle, RB 1

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3460.50	-55.52	2.70	12.70	Vertical	-45.52	-13.00	32.52	224
3	5191.50	-66.58	3.20	12.50	Vertical	-57.28	-13.00	44.28	36
4	6930.00	-72.51	4.20	11.80	Vertical	-64.91	-13.00	51.91	79
5	8662.50	-66.85	4.40	12.50	Vertical	-58.75	-13.00	45.75	304
6	10380.00	-62.81	4.70	11.30	Vertical	-56.21	-13.00	43.21	223
7	12110.00	-64.29	5.20	13.80	Vertical	-55.69	-13.00	42.69	146
8	13840.00	-59.80	5.70	11.30	Vertical	-54.20	-13.00	41.20	30
9	15570.00	-69.15	6.10	16.80	Vertical	-58.45	-13.00	45.45	22
10	17300.00	-63.68	6.10	14.20	Vertical	-55.58	-13.00	42.58	17
Note: The other Spurious RF Radiated emissions level is no more than noise floor.									

LTE-M Band 4 QPSK 20MHz CH-Middle, RB 1

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3447.75	-53.93	2.70	12.70	Vertical	-43.93	-13.00	30.93	267
3	5170.88	-70.80	3.20	12.50	Vertical	-61.50	-13.00	48.50	34
4	6930.00	-72.89	4.20	11.80	Vertical	-65.29	-13.00	52.29	79
5	8662.50	-66.32	4.40	12.50	Vertical	-58.22	-13.00	45.22	174
6	10395.00	-63.44	4.70	11.30	Vertical	-56.84	-13.00	43.84	226
7	12127.50	-64.80	5.20	13.80	Vertical	-56.20	-13.00	43.20	3
8	13860.00	-61.03	5.70	11.30	Vertical	-55.43	-13.00	42.43	27
9	15592.50	-69.30	6.10	16.80	Vertical	-58.60	-13.00	45.60	16
10	17325.00	-63.68	6.10	14.20	Vertical	-55.58	-13.00	42.58	314
Note: The other Spurious RF Radiated emissions level is no more than noise floor.									

LTE-M Band 12 QPSK 1.4MHz CH-Middle, RB 1

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1413.60	-59.20	1.70	8.70	Vertical	-54.35	-13.00	41.35	18
3	2120.40	-51.72	2.10	11.10	Vertical	-44.87	-13.00	31.87	29
4	2827.20	-60.06	2.30	13.10	Vertical	-51.41	-13.00	38.41	315
5	3537.50	-64.57	2.60	12.70	Vertical	-56.62	-13.00	43.62	234
6	4245.00	-64.06	3.30	12.50	Vertical	-57.01	-13.00	44.01	79
7	4952.50	-60.41	3.40	12.50	Vertical	-53.46	-13.00	40.46	246
8	5660.00	-61.98	3.30	12.50	Vertical	-54.93	-13.00	41.93	30
9	6367.50	-60.15	3.80	11.50	Vertical	-54.60	-13.00	41.60	9
10	7075.00	-58.62	4.20	11.80	Vertical	-53.17	-13.00	40.17	135
Note: The other Spurious RF Radiated emissions level is no more than noise floor.									

LTE-M Band 12 QPSK 5MHz CH-Middle, RB 1

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1410.60	-58.85	1.70	8.70	Vertical	-54.00	-13.00	41.00	287
3	2115.90	-51.01	2.10	11.10	Vertical	-44.16	-13.00	31.16	18
4	2820.00	-57.92	2.30	13.10	Vertical	-49.27	-13.00	36.27	62
5	3525.00	-60.41	2.60	12.70	Vertical	-52.46	-13.00	39.46	303
6	4230.00	-62.70	3.30	12.50	Vertical	-55.65	-13.00	42.65	176
7	4935.00	-60.34	3.40	12.50	Vertical	-53.39	-13.00	40.39	22
8	5640.00	-62.85	3.30	12.50	Vertical	-55.80	-13.00	42.80	304
9	6345.00	-60.28	3.80	11.50	Vertical	-54.73	-13.00	41.73	9
10	7050.00	-58.63	4.20	11.80	Vertical	-53.18	-13.00	40.18	167

Note: The other Spurious RF Radiated emissions level is no more than noise floor.

LTE-M Band 12 QPSK 10MHz CH-Middle, RB 1

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1405.00	-58.97	1.70	8.70	Vertical	-54.12	-13.00	41.12	41
3	2107.50	-51.77	2.10	11.10	Vertical	-44.92	-13.00	31.92	0
4	2810.00	-58.94	2.30	13.10	Vertical	-50.29	-13.00	37.29	85
5	3512.50	-62.19	2.60	12.70	Vertical	-54.24	-13.00	41.24	47
6	4215.00	-63.51	3.30	12.50	Vertical	-56.46	-13.00	43.46	306
7	4917.50	-62.06	3.40	12.50	Vertical	-55.11	-13.00	42.11	167
8	5620.00	-62.80	3.30	12.50	Vertical	-55.75	-13.00	42.75	225
9	6322.50	-60.06	3.80	11.50	Vertical	-54.51	-13.00	41.51	97
10	7025.00	-59.02	4.20	11.80	Vertical	-53.57	-13.00	40.57	13

Note: The other Spurious RF Radiated emissions level is no more than noise floor.

LTE-M Band 13 QPSK 5MHz CH-Middle, RB 1

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1558.93	-60.85	1.70	8.70	Vertical	-53.85	-40.00	13.85	284
Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
3	2339.40	-53.54	2.10	12.00	Vertical	-45.79	-13.00	32.79	315
4	3118.00	-56.36	2.30	13.10	Vertical	-47.71	-13.00	34.71	30
5	3897.50	-62.10	2.90	12.50	Vertical	-54.65	-13.00	41.65	11
6	4677.00	-62.65	3.10	12.50	Vertical	-55.40	-13.00	42.40	279
7	5456.50	-61.66	3.30	12.50	Vertical	-54.61	-13.00	41.61	304
8	6236.00	-62.25	3.50	12.80	Vertical	-55.10	-13.00	42.10	90
9	7015.50	-58.72	4.20	11.80	Vertical	-53.27	-13.00	40.27	247
10	7795.00	-57.36	4.40	12.30	Vertical	-51.61	-13.00	38.61	13
Note: The other Spurious RF Radiated emissions level is no more than noise floor.									

LTE-M Band 13 QPSK 10MHz CH-Middle, RB 1

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1571.32	-79.12	1.70	8.70	Vertical	-74.27	-40.00	34.27	0
3	2333.32	-54.49	2.10	12.00	Vertical	-46.74	-13.00	33.74	315
4	3108.00	-57.12	2.30	13.10	Vertical	-48.47	-13.00	35.47	69
5	3885.00	-63.61	2.90	12.50	Vertical	-56.16	-13.00	43.16	147
6	4662.00	-62.06	3.10	12.50	Vertical	-54.81	-13.00	41.81	214
7	5439.00	-60.95	3.30	12.50	Vertical	-53.90	-13.00	40.90	79
8	6216.00	-61.48	3.50	12.80	Vertical	-54.33	-13.00	41.33	248
9	6993.00	-60.06	4.20	11.80	Vertical	-54.61	-13.00	41.61	3
10	7770.00	-57.15	4.40	12.30	Vertical	-51.40	-13.00	38.40	186
Note: The other Spurious RF Radiated emissions level is no more than noise floor.									

7 Main Test Instruments

Name	Manufacturer	Type	Serial Number	Calibration Date	Expiration Date
Climate Chamber	WEISS	VT 4002	582261194500 10	2023-05-12	2024-05-11
Wireless Communication Tester	R&S	CMW500	150415	2023-05-12	2024-05-11
Spectrum Analyzer	Keysight	N9020A	MY50510203	2023-05-12	2024-05-11
DC Power Supply	UNI-T	UTP1310+	C220795889	2023-05-12	2024-05-11
Spectrum Analyzer	R&S	FSV3030	101411	2022-12-10	2023-12-09
Signal Analyzer	R&S	FSV30	104028	2023-05-12	2024-05-11
Loop Antenna	Schwarzbeck	FMZB1519	1519-047	2023-04-16	2026-04-15
TRILOG Broadband Antenna	Schwarzbeck	VULB 9163	01439	2021-06-30	2024-06-29
Horn Antenna	ETS-Lindgren	3160-09	00102643	2021-10-10	2024-10-09
Software	R&S	EMC32	10.35.10	/	/

ANNEX A: The EUT Appearance

The EUT Appearance are submitted separately.

ANNEX B: Test Setup Photos

The Test Setup Photos are submitted separately.

***** END OF REPORT *****