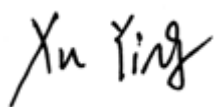


RF TEST REPORT

Applicant VivaChek Biotech (Hangzhou) Co., Ltd
FCC ID 2APAPVGM90
Product VivaChek Link Plus Blood Glucose
Monitoring System
Brand VivaChek
Model VGM90
Report No. R2306A0646-R1
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 CFR 47 Part 24E (2022)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.



Prepared by: Xu Ying



Approved by: Xu Kai

TA Technology (Shanghai) Co., Ltd.

Building 3, No.145, Jintang Rd, Pudong Shanghai, P.R.China

TEL: +86-021-50791141/2/3

FAX: +86-021-50791141/2/3-8000

TABLE OF CONTENT

1. Test Laboratory	4
1.1. Notes of the test report.....	4
1.2. Test facility	4
1.3. Testing Location	4
2. General Description of Equipment under Test.....	5
2.1. Applicant and Manufacturer Information.....	5
2.2. General information.....	5
3. Applied Standards	6
4. Test Configuration	7
5. Test Case	8
5.1. RF Power Output and Effective Isotropic Radiated Power	8
5.2. Occupied Bandwidth	9
5.3. Band Edge Compliance.....	10
5.4. Peak-to-Average Power Ratio (PAPR).....	11
5.5. Frequency Stability.....	12
5.6. Spurious Emissions at Antenna Terminals	14
5.7. Radiated Spurious Emission	15
6. Test Results	18
6.1. RF Power Output and Effective Isotropic Radiated Power	18
6.2. Occupied Bandwidth	19
6.3. Band Edge Compliance.....	22
6.4. Peak-to-Average Power Ratio (PAPR).....	30
6.5. Frequency Stability.....	31
6.6. Spurious Emissions at Antenna Terminals	34
6.7. Radiated Spurious Emission	37
7. Main Test Instruments	39
ANNEX A: The EUT Appearance	40
ANNEX B: Test Setup Photos	41

Summary of measurement results

LTE-M Band 2			
Number	Test Case	Clause in FCC rules	Verdict
1	RF Power Output and Effective Isotropic Radiated Power	2.1046 24.232(c)	PASS
2	Occupied Bandwidth	2.1049	PASS
3	Band Edge Compliance	2.1051 / 24.238(a)	PASS
4	Peak-to-Average Power Ratio	24.232/KDB 971168 D01(5.7)	PASS
5	Frequency Stability	2.1055 / 24.235	PASS
6	Spurious Emissions at Antenna Terminals	2.1051 / 24.238(a)	PASS
7	Radiated Spurious Emission	2.1053 / 24.238(a)	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
Contact: Xu Kai
Telephone: +86-021-50791141/2/3
Fax: +86-021-50791141/2/3-8000
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	3.84 dBi		
Test Mode(s)	LTE-M Band 2		
Test Modulation	QPSK, 16QAM		
LT-M Category	M1		
Maximum E.I.R.P	25.38 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)	Band	Tx (MHz)	Rx (MHz)
	LTE-M Band 2	1850 ~ 1910	1930 ~ 1990
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 CFR 47 Part 24E (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.

Test modes are chosen to be reported as the worst case configuration below for LTE-M Band 2:

Test items	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	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Occupied Bandwidth	O	O	O	O	O	O	O	O	-	-	O	-	O	-
Band Edge Compliance	O	O	O	O	O	O	O	O	O	-	O	O	-	O
Peak-to-Average Power Ratio	O	O	O	O	O	O	O	O	-	-	O	-	O	-
Frequency Stability	O	O	O	O	O	O	O	O	O	-	-	-	O	-
Spurious Emissions at Antenna Terminals	O	O	O	O	O	O	O	-	O	-	-	O	O	O
Radiated Spurious Emission	O	-	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

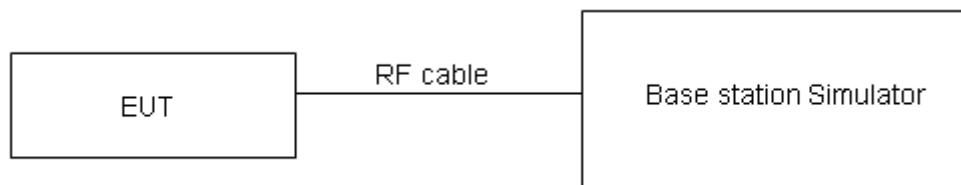
During the process of the testing, The EUT was connected to the Base Station Simulator with a known loss. The EUT is controlled by the Base Station Simulator test set to ensure max power transmission with proper modulation.

ERP can then be calculated as follows:

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

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

Test Setup



Limits

No specific RF power output requirements in part 2.1046.

Rule Part 24.232(c) Mobile and portable stations are limited to 2 watts EIRP.

Rule Part 24.232(e) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage.

Limit	$\leq 2 \text{ W}$ (33 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 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%

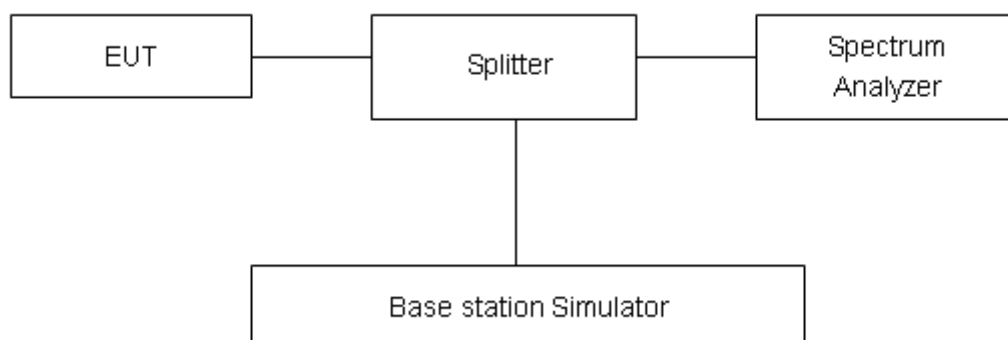
Method of Measurement

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

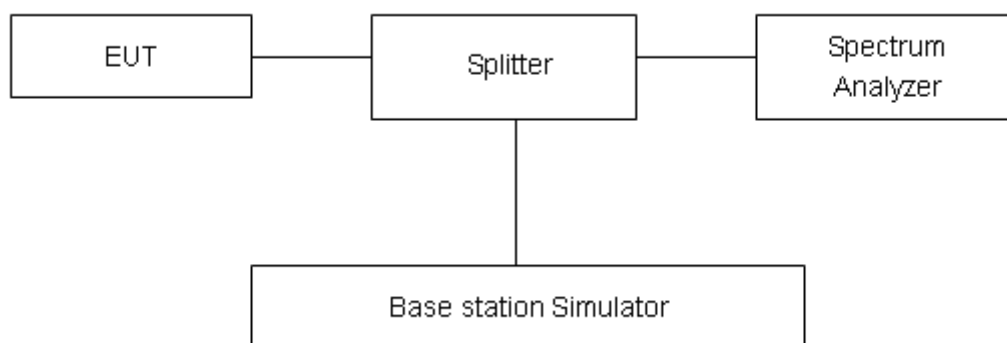
Temperature	Relative humidity
24.8°C	42%

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 Average detector is used and RBW is set to $\geq 1\%EBW$, VBW is set to 3x RBW.

Spectrum analyzer plots are included on the following pages.

Test Setup



Limits

Rule Part 24.238(a) specifies that “on any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least $43 + 10 \log_{10} (P)$ dB.”

Limit	-13 dBm
-------	---------

Measurement Uncertainty

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

Test Results

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

5.4. Peak-to-Average Power Ratio (PAPR)

Ambient condition

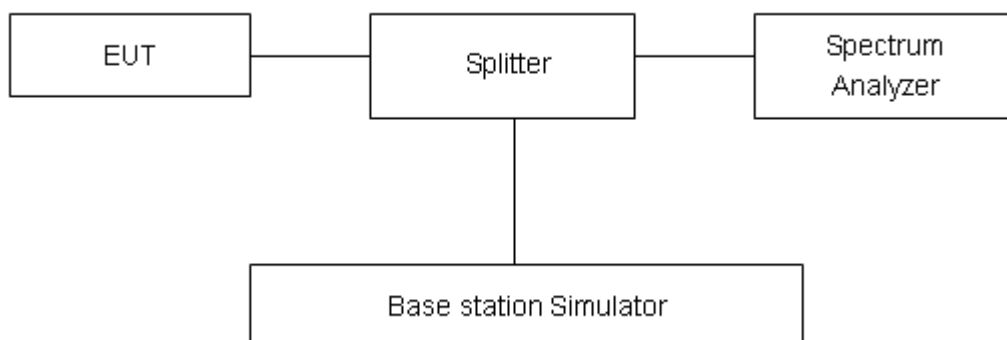
Temperature	Relative humidity
24.8°C	42%

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:

$PAPR (dB) = PPK (dBm) - PAvg (dBm)$.

Test Setup



Limits

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 in 24.232(d).

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 0°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.

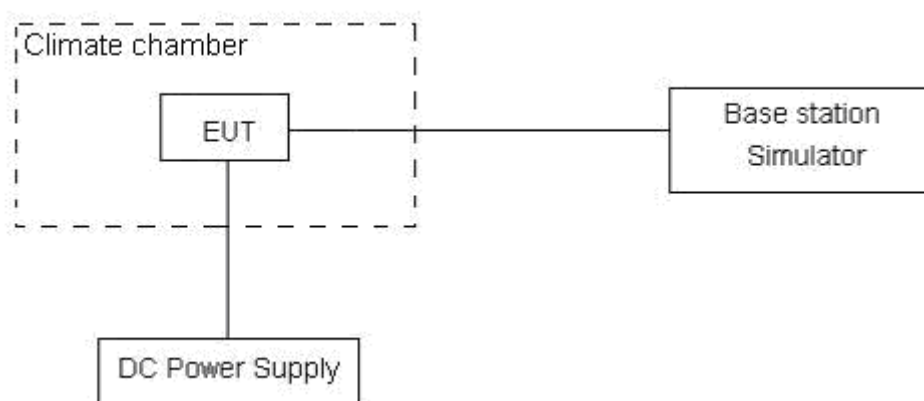
Frequency Stability (Voltage Variation)

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 emission stays within the authorized frequency block

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

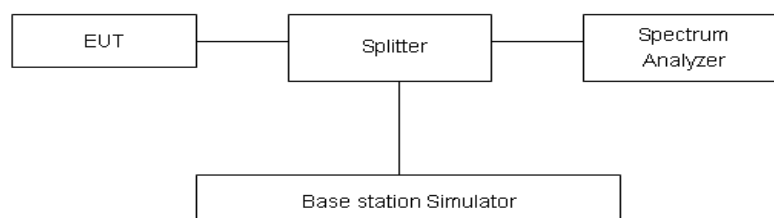
The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 9kHz to the 10th harmonic of the carrier. The peak detector is used.

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.

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

Test setup



Limits

Rule Part 24.238(a) specifies that “on any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least $43 + 10 \log_{10} (P)$ dB.”

Limit	-13 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 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=1MHz, VBW=3MHz, 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:

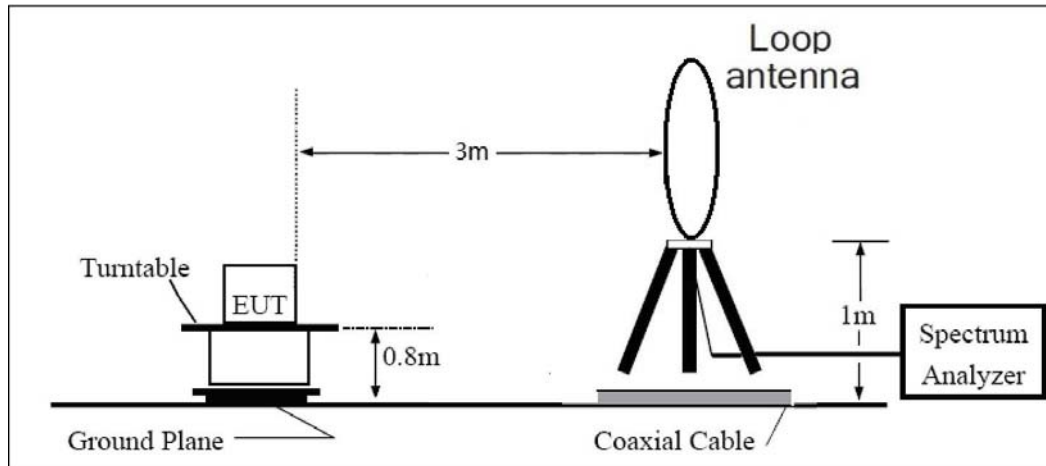
$$\text{Power(EIRP)} = \text{PMea} - \text{PAg} - \text{Pcl} + \text{Ga}$$
 The measurement results are amend as described below:

$$\text{Power(EIRP)} = \text{PMea} - \text{Pcl} + \text{Ga}$$
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, $\text{ERP} = \text{EIRP} - 2.15\text{dB}$.

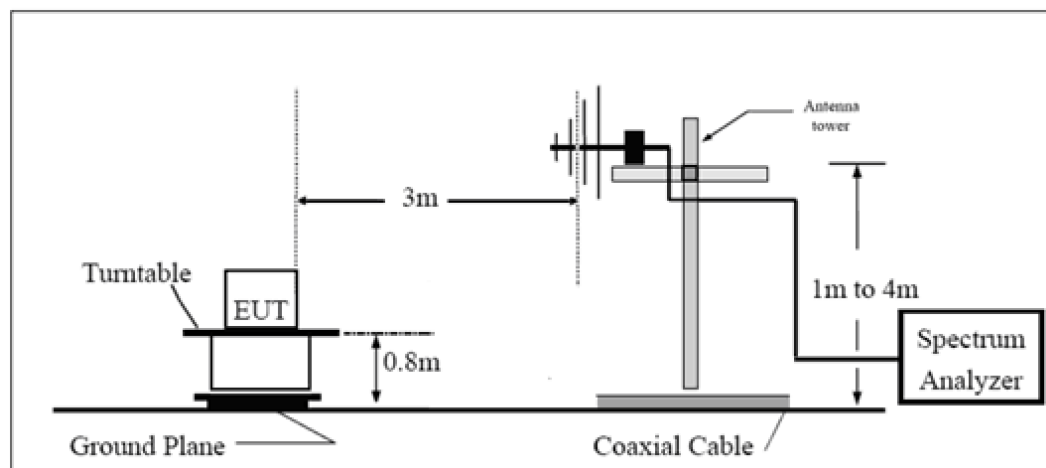
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

Test setup

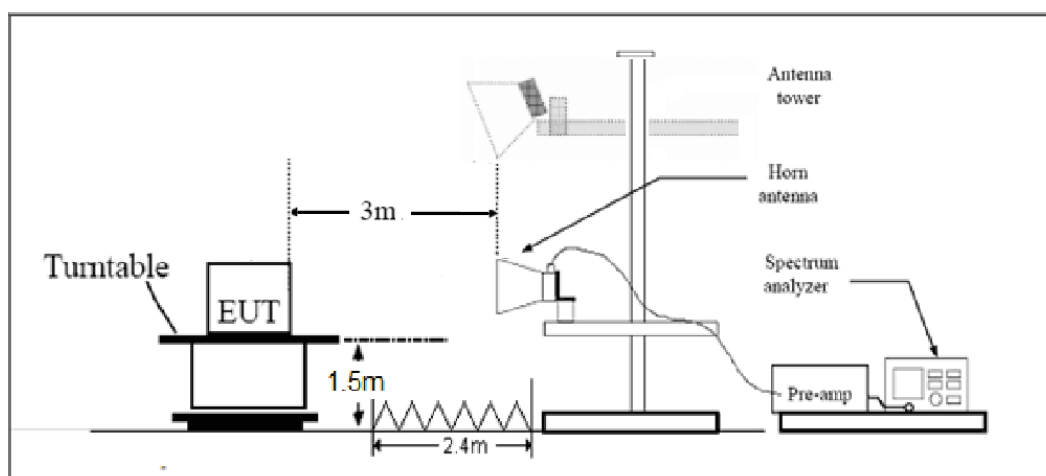
9KHz~ 30MHz



30MHz~ 1GHz



Above 1GHz



Note: Area side: 2.4mX3.6m

Limits

Rule Part 24.238(a) specifies that “on any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least $43 + 10 \log_{10} (P)$ dB.”

Limit	-13 dBm
-------	---------

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$, $U = 3.55$ 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 2	Channel/ Frequency(MHz)	Index	RB# RB start		Maximum Output Power (dBm)		EIRP (dBm)		Result
			QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	
1.4MHz	18607/1850.7	0	1#0	1#0	21.11	19.63	24.95	23.47	PASS
		0	6#0	5#0	19.05	18.99	22.89	22.83	PASS
	18900/1880	0	1#0	1#0	20.74	19.30	24.58	23.14	PASS
		0	6#0	5#0	18.60	18.58	22.44	22.42	PASS
	19193/1909.3	0	1#5	1#5	20.35	18.70	24.19	22.54	PASS
		0	6#0	5#0	18.35	18.23	22.19	22.07	PASS
3MHz	18615/1851.5	0	1#0	1#0	21.20	19.74	25.04	23.58	PASS
		0	6#0	5#0	19.14	19.19	22.98	23.03	PASS
	18900/1880	0	1#0	1#0	20.92	19.81	24.76	23.65	PASS
		0	6#0	5#0	18.62	18.45	22.46	22.29	PASS
	19185/1908.5	1	1#5	1#5	20.39	18.83	24.23	22.67	PASS
		1	6#0	5#0	18.53	18.48	22.37	22.32	PASS
5MHz	18625/1852.5	3	1#0	1#0	21.28	21.12	25.12	24.96	PASS
		0	6#0	5#0	19.94	20.31	23.78	24.15	PASS
	18900/1880	0	1#0	1#0	20.81	21.28	24.65	25.12	PASS
		0	6#0	5#0	19.45	19.54	23.29	23.38	PASS
	19175/1907.5	0	1#5	1#5	20.31	20.31	24.15	24.15	PASS
		3	6#0	5#0	19.30	19.52	23.14	23.36	PASS
10MHz	18650/1855	3	1#0	1#0	21.17	21.21	25.01	25.05	PASS
		0	4#0	4#0	21.22	20.72	25.06	24.56	PASS
	18900/1880	0	1#0	1#0	20.94	21.54	24.78	25.38	PASS
		0	4#0	4#0	20.82	20.75	24.66	24.59	PASS
	19150/1905	4	1#5	1#5	20.64	20.52	24.48	24.36	PASS
		7	4#2	4#2	20.62	20.49	24.46	24.33	PASS
15MHz	18675/1857.5	3	1#0	1#0	21.15	21.02	24.99	24.86	PASS
		0	6#0	5#0	21.06	21.24	24.90	25.08	PASS
	18900/1880	0	1#0	1#0	20.85	21.36	24.69	25.20	PASS
		0	6#0	5#0	20.76	20.79	24.60	24.63	PASS
	19125/1902.5	8	1#5	1#5	20.30	20.53	24.14	24.37	PASS
		11	6#0	5#0	20.37	20.64	24.21	24.48	PASS
20MHz	18700/1860	3	1#0	1#0	21.10	21.16	24.94	25.00	PASS
		0	6#0	5#0	21.08	21.21	24.92	25.05	PASS
	18900/1880	0	1#0	1#0	20.92	21.38	24.76	25.22	PASS
		0	6#0	5#0	20.78	20.88	24.62	24.72	PASS
	19100/1900	12	1#5	1#5	20.74	21.06	24.58	24.90	PASS
		15	6#0	5#0	20.43	20.88	24.27	24.72	PASS

6.2.Occupied Bandwidth

Results: Pass

LTE-M Band 2							
Mode	Bandwidth	Modulation	Channel/ Frequency(MHz)	RB	Index	Bandwidth(MHz)	
						99% Power	-26dBc
Band2	1.4MHz	QPSK	18900/1880	6#0	0	1.1040	1.351
		16QAM	18900/1880	5#0	0	0.9942	1.350
	3MHz	QPSK	18900/1880	6#0	0	1.1106	1.326
		16QAM	18900/1880	5#0	0	0.9733	1.490
	5MHz	QPSK	18900/1880	6#0	0	1.1193	1.341
		16QAM	18900/1880	5#0	0	0.9620	1.209
	10MHz	QPSK	18900/1880	6#0	0	1.1314	1.363
		16QAM	18900/1880	5#0	0	0.9816	1.278
	15MHz	QPSK	18900/1880	6#0	0	1.1506	1.352
		16QAM	18900/1880	5#0	0	0.9782	1.348
	20MHz	QPSK	18900/1880	6#0	0	1.1599	1.407
		16QAM	18900/1880	5#0	0	0.9906	1.307

LTE-M Band 2 1.4MHz QPSK CH-Low



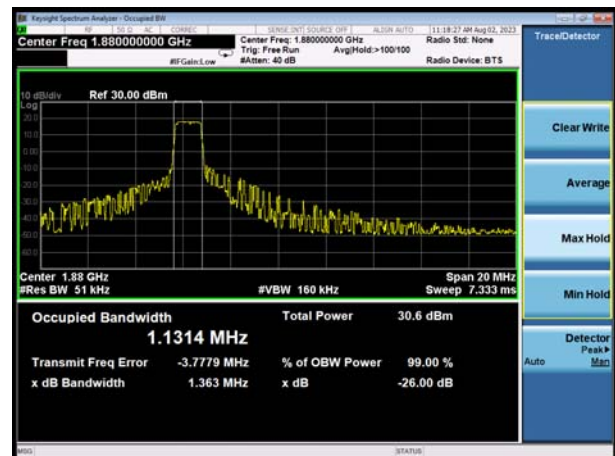
LTE-M Band 2 3MHz QPSK CH-Low



LTE-M Band 2 5MHz QPSK CH-Middle



LTE-M Band 2 10MHz QPSK CH-Middle



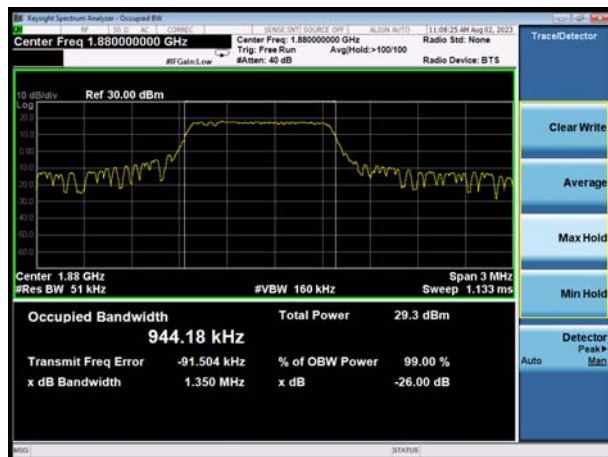
LTE-M Band 2 15MHz QPSK CH-High



LTE-M Band 2 20MHz QPSK CH-High



LTE-M Band 2 1.4MHz 16QAM CH-Low



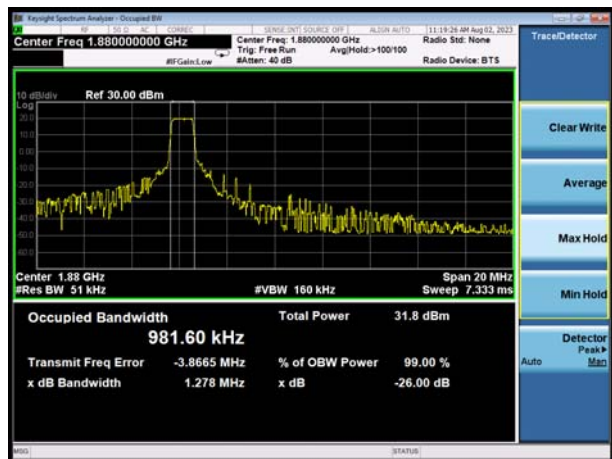
LTE-M Band 2 3MHz 16QAM CH-Low



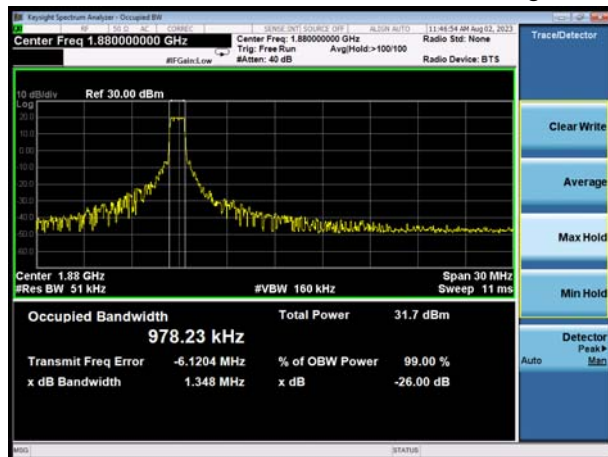
LTE-M Band 2 5MHz 16QAM CH-Middle



LTE-M Band 2 10MHz 16QAM CH-Middle



LTE-M Band 2 15MHz 16QAM CH-High



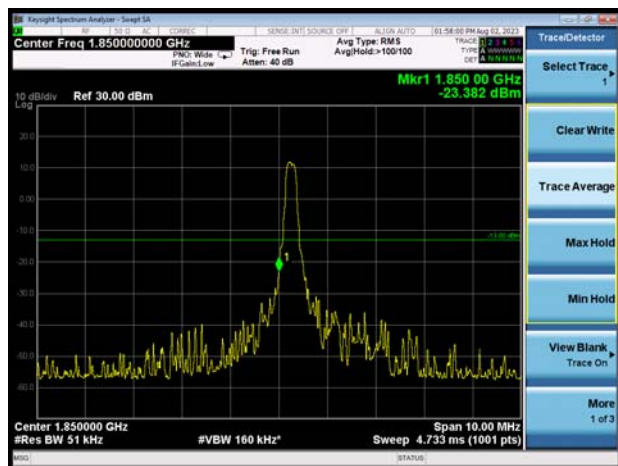
LTE-M Band 2 20MHz 16QAM CH-High



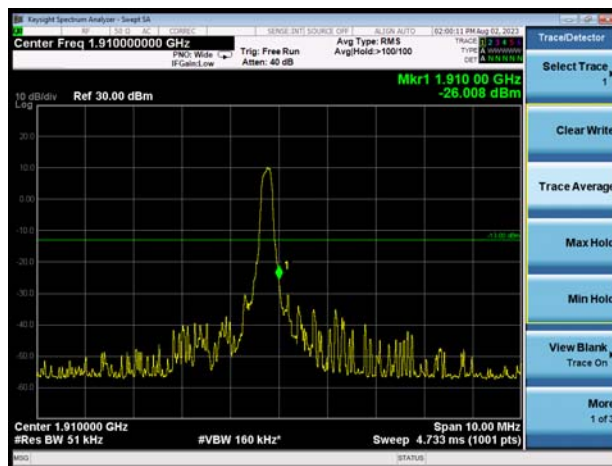
6.3. Band Edge Compliance

Results: Pass

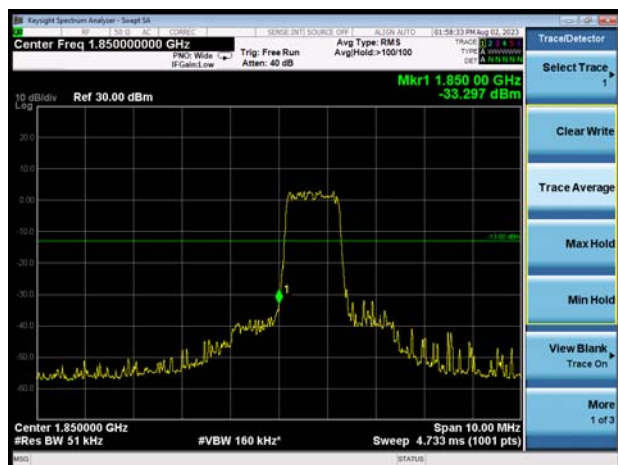
LTE-M Band 2 1.4MHz QPSK 1RB CH-Low



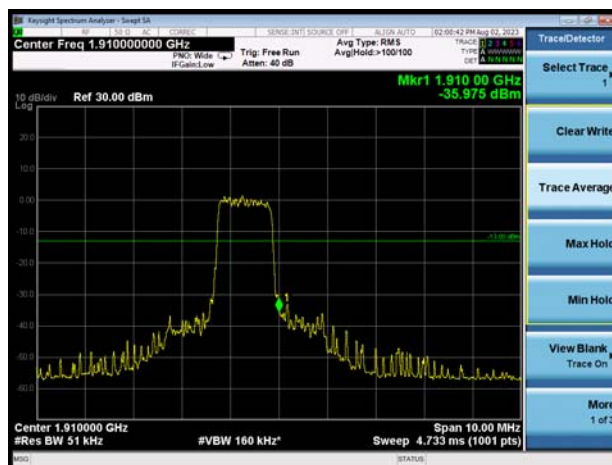
LTE-M Band 2 1.4MHz QPSK 1RB CH-High



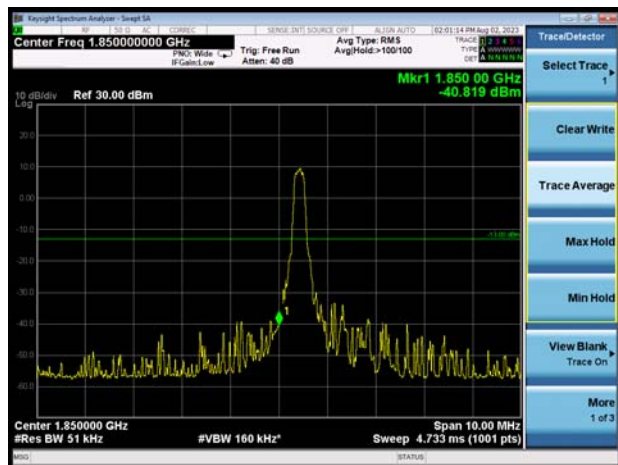
LTE-M Band 2 1.4MHz QPSK 100%RB CH-Low



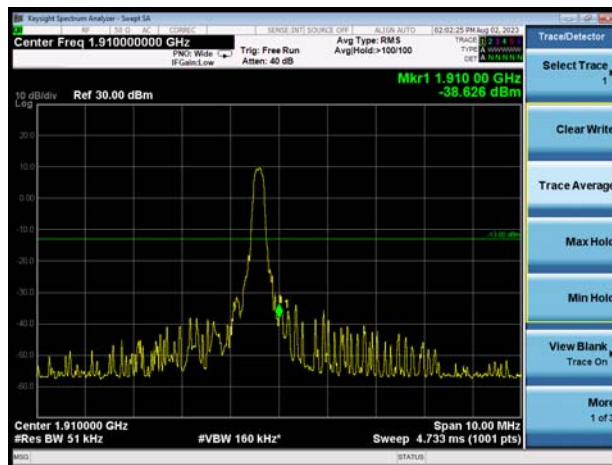
LTE-M Band 2 1.4MHz QPSK 100%RB CH-High



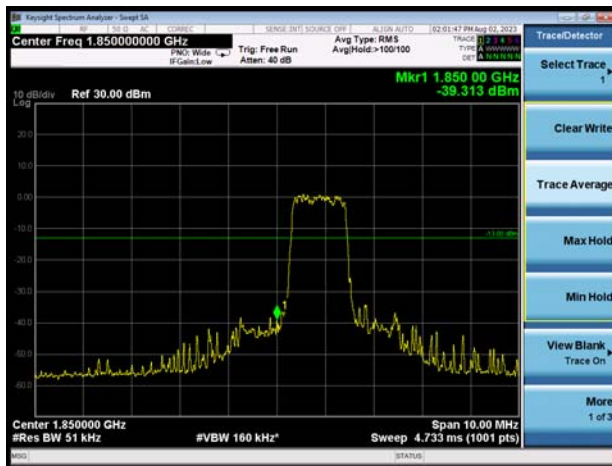
LTE-M Band 2 3MHz QPSK 1RB CH-Low



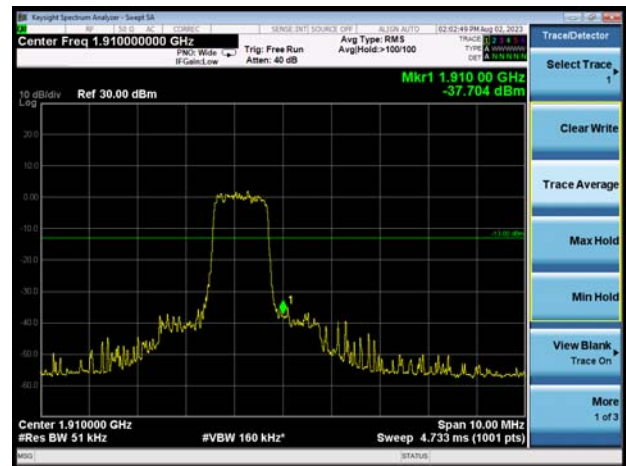
LTE-M Band 2 3MHz QPSK 1RB CH-High



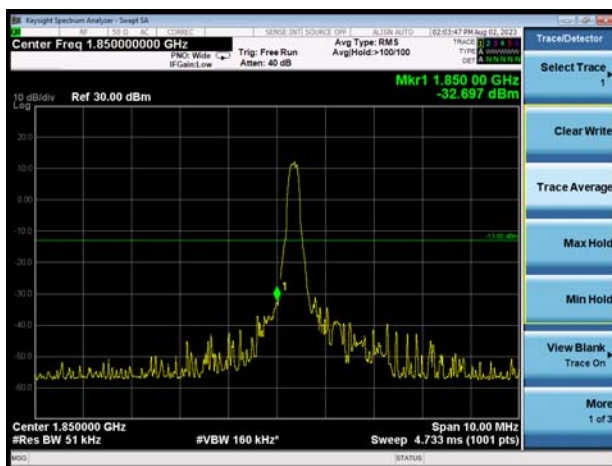
LTE-M Band 2 3MHz QPSK 100%RB CH-Low



LTE-M Band 2 3MHz QPSK 100%RB CH-High



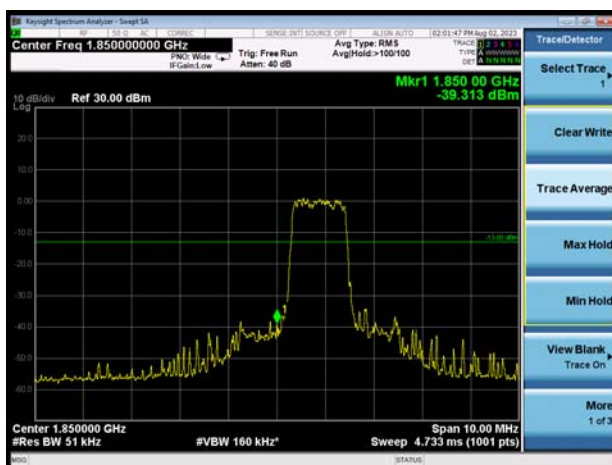
LTE-M Band 2 5MHz QPSK 1RB CH-Low



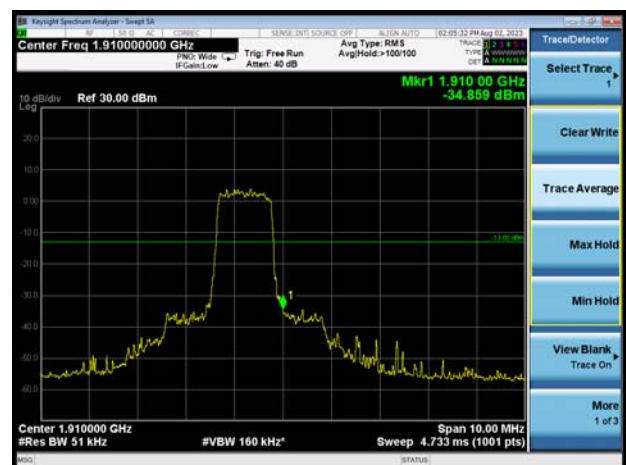
LTE-M Band 2 5MHz QPSK 1RB CH-High



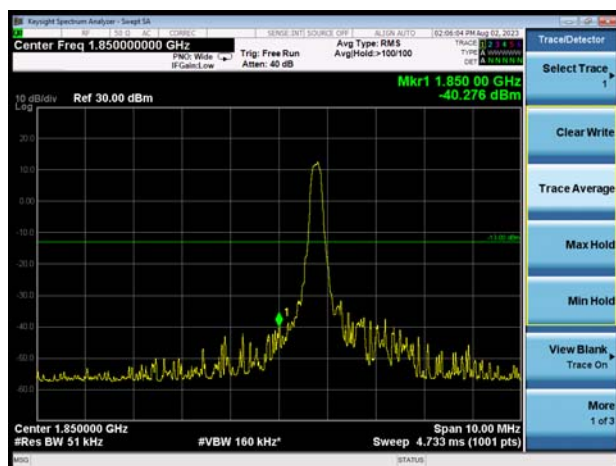
LTE-M Band 2 5MHz QPSK 100%RB CH-Low



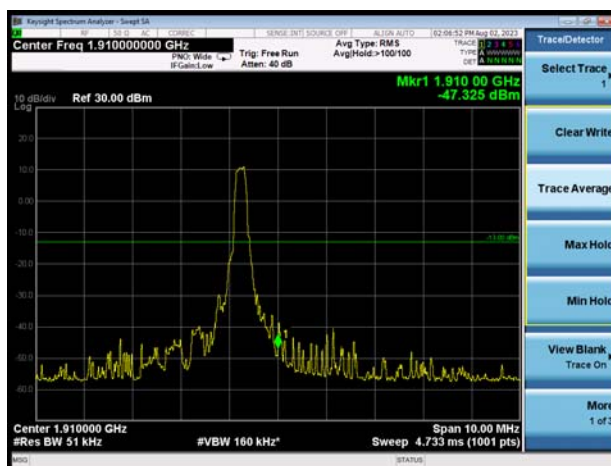
LTE-M Band 2 5MHz QPSK 100%RB CH-High



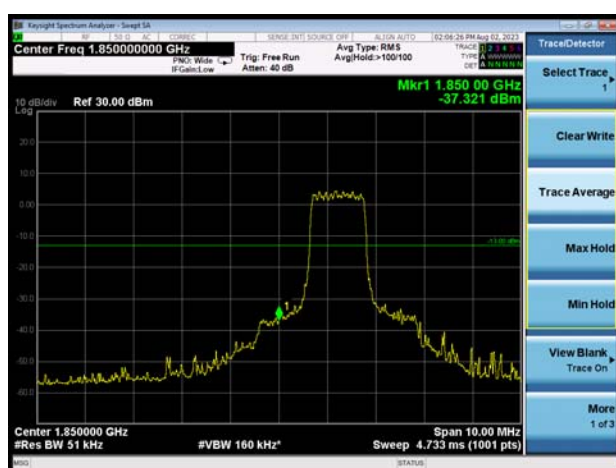
LTE-M Band 2 10MHz QPSK 1RB CH-Low



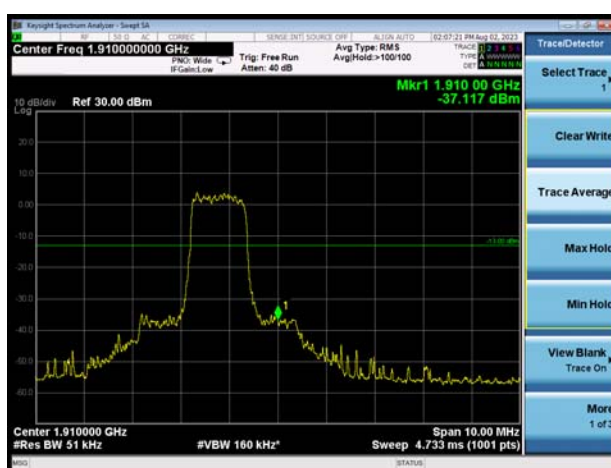
LTE-M Band 2 10MHz QPSK 1RB CH-High



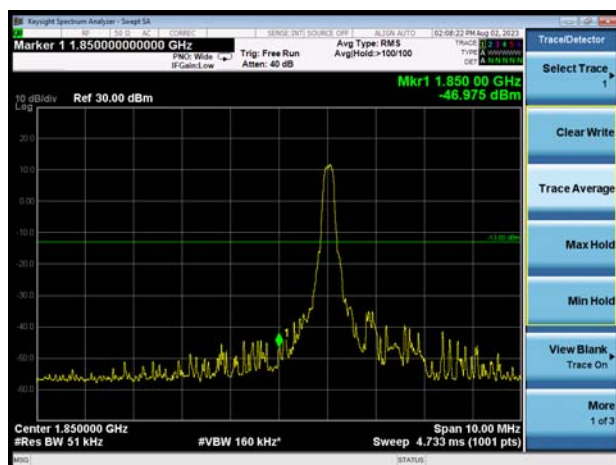
LTE-M Band 2 10MHz QPSK 100%RB CH-Low



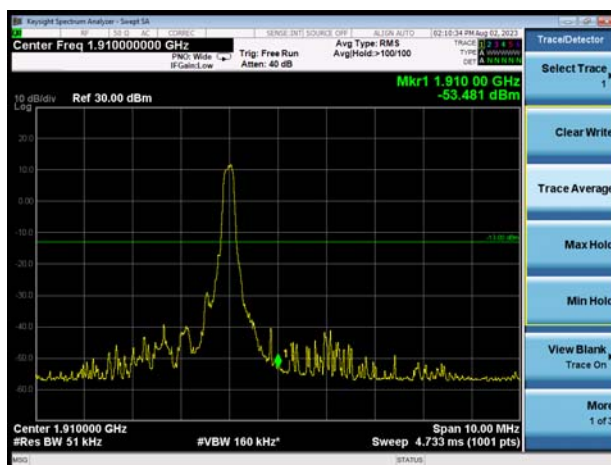
LTE-M Band 2 10MHz QPSK 100%RB CH-High



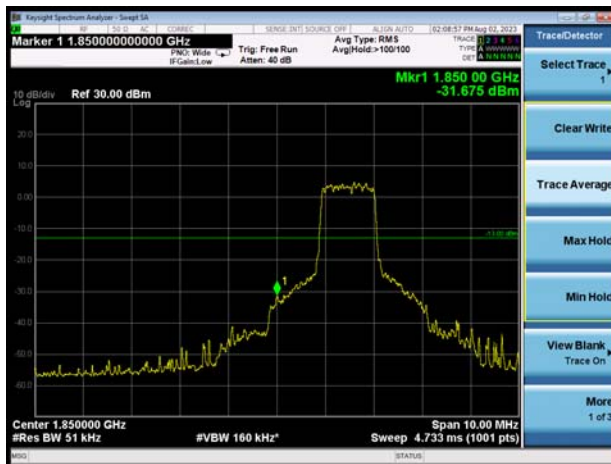
LTE-M Band 2 15MHz QPSK 1RB CH-Low



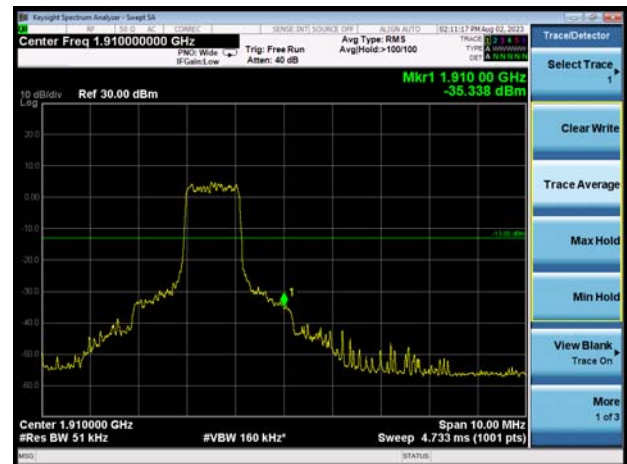
LTE-M Band 2 15MHz QPSK 1RB CH-High



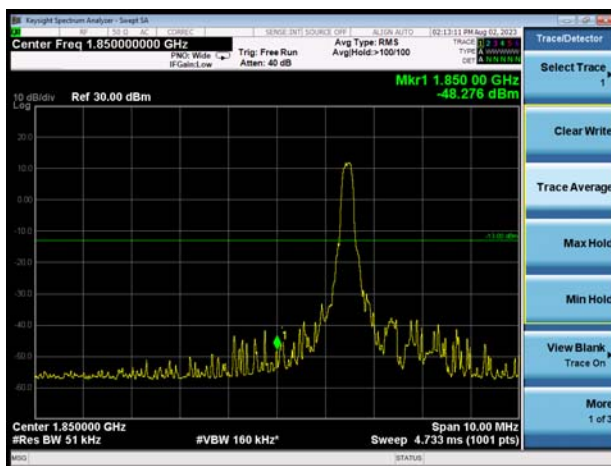
LTE-M Band 2 15MHz QPSK 100%RB CH-Low



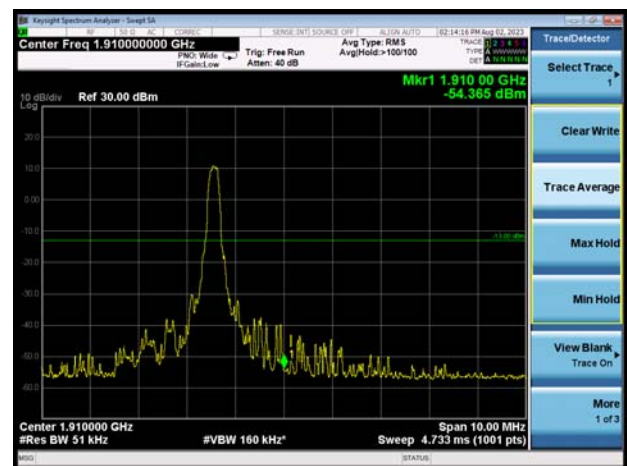
LTE-M Band 2 15MHz QPSK 100%RB CH-High



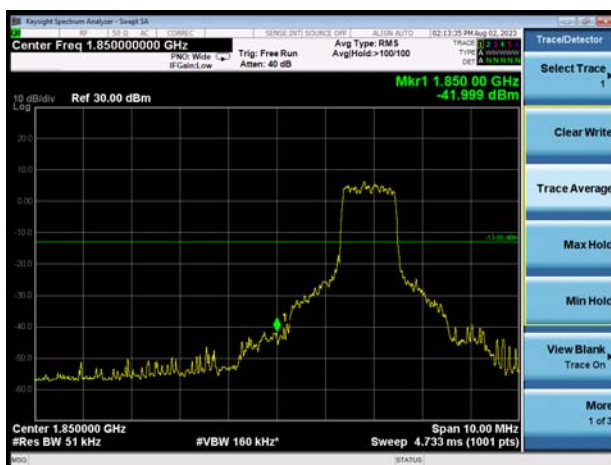
LTE-M Band 2 20MHz QPSK 1RB CH-Low



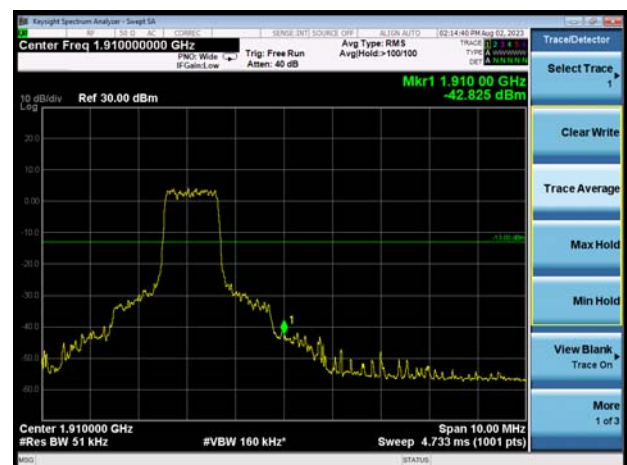
LTE-M Band 2 20MHz QPSK 1RB CH-High



LTE-M Band 2 20MHz QPSK 100%RB CH-Low



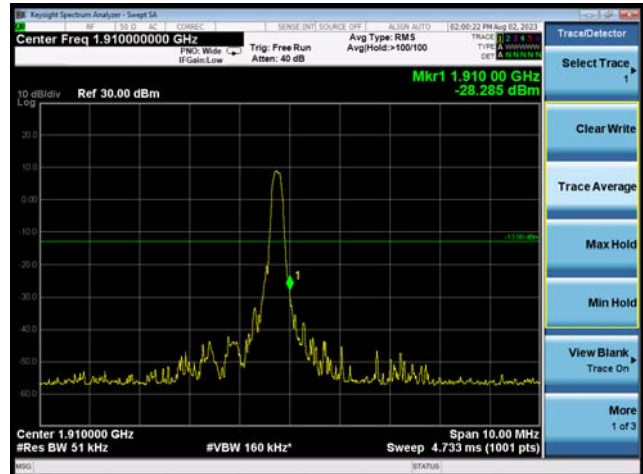
LTE-M Band 2 20MHz QPSK 100%RB CH-High



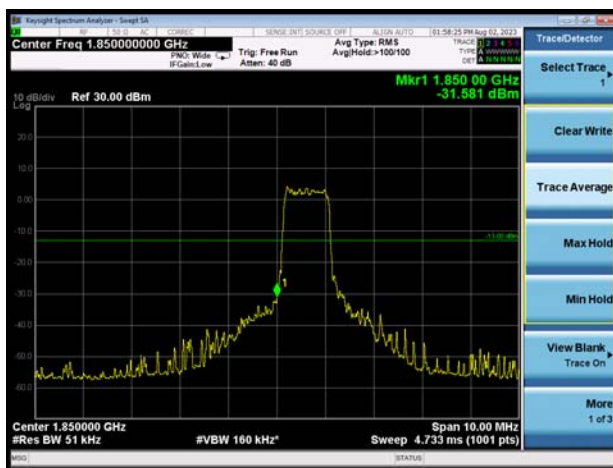
LTE-M Band 2 1.4MHz 16QAM 1RB CH-Low



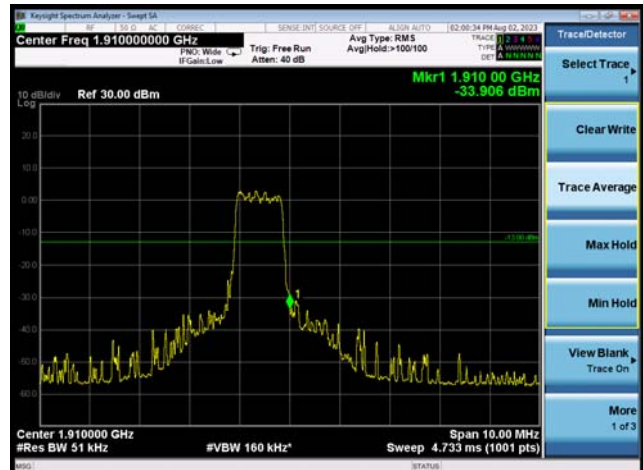
LTE-M Band 2 1.4MHz 16QAM 1RB CH-High



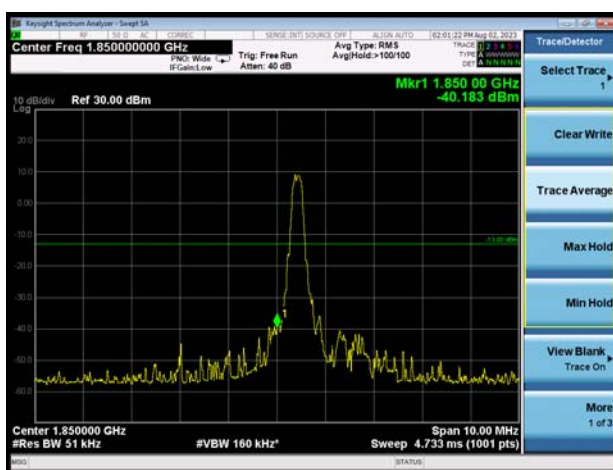
LTE-M Band 2 1.4MHz 16QAM 100%RB CH-Low



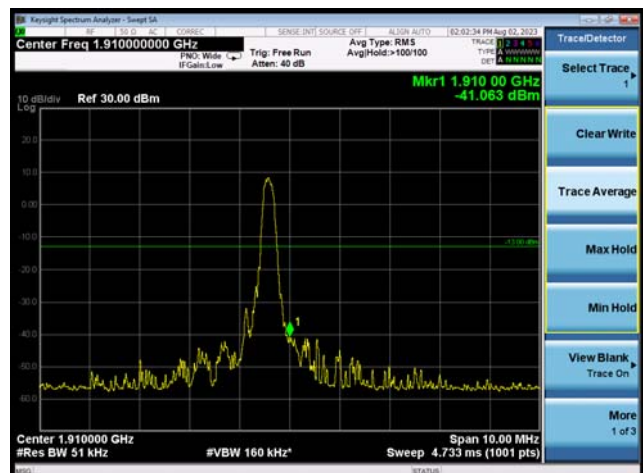
LTE-M Band 2 1.4MHz 16QAM 100%RB CH-High



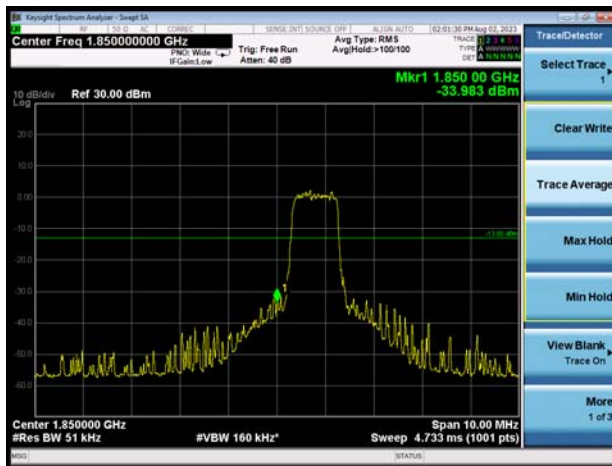
LTE-M Band 2 3MHz 16QAM 1RB CH-Low



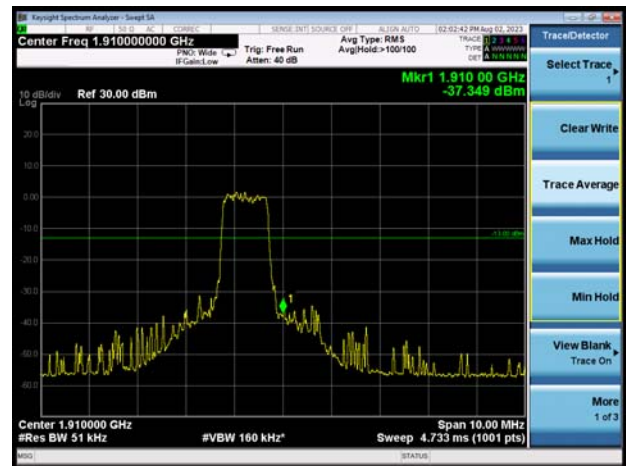
LTE-M Band 2 3MHz 16QAM 1RB CH-High



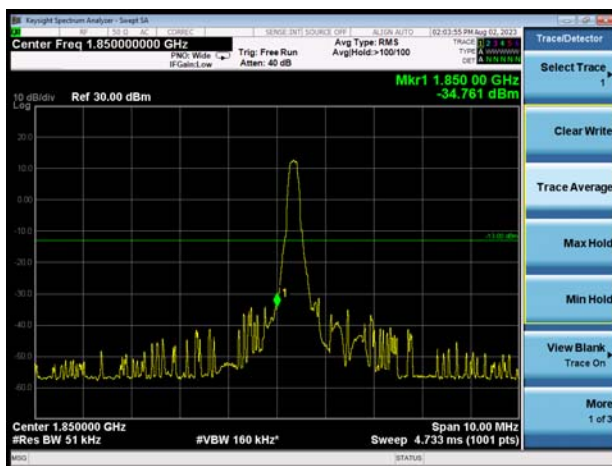
LTE-M Band 2 3MHz 16QAM 100%RB CH-Low



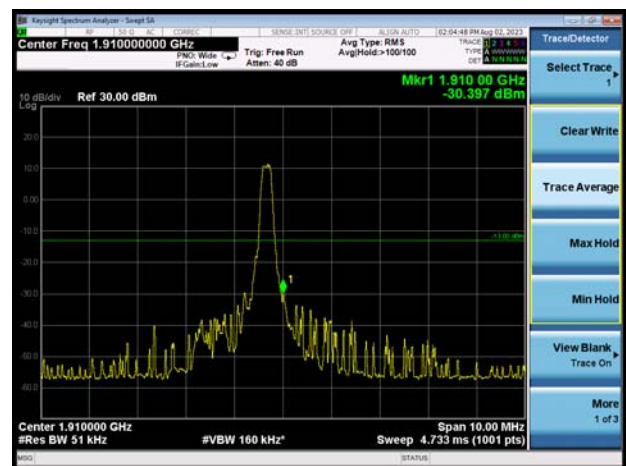
LTE-M Band 2 3MHz 16QAM 100%RB CH-High



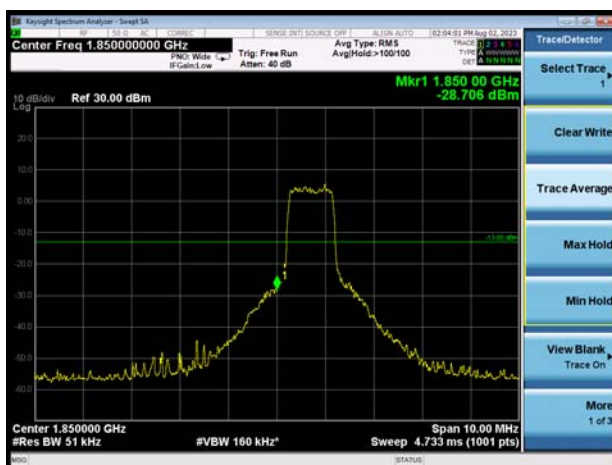
LTE-M Band 2 5MHz 16QAM 1RB CH-Low



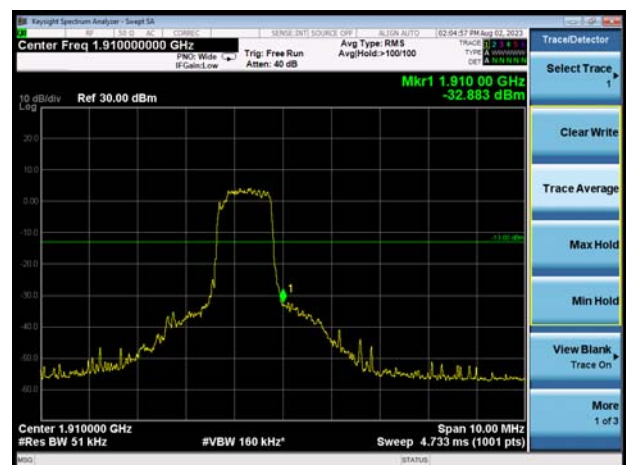
LTE-M Band 2 5MHz 16QAM 1RB CH-High



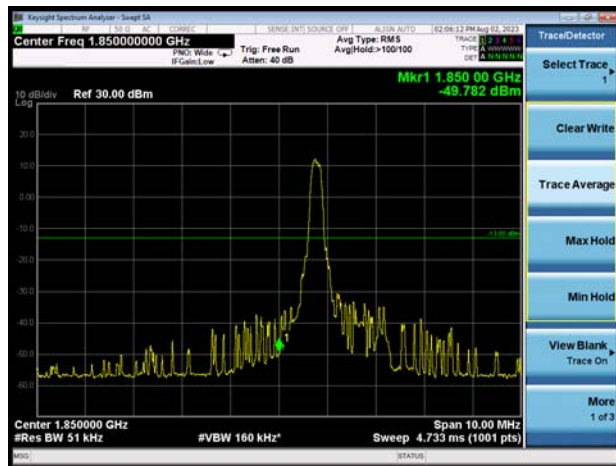
LTE-M Band 2 5MHz 16QAM 100%RB CH-Low



LTE-M Band 2 5MHz 16QAM 100%RB CH-High



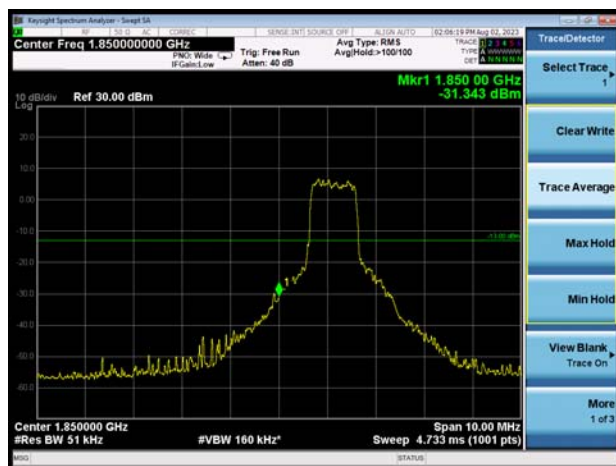
LTE-M Band 2 10MHz 16QAM 1RB CH-Low



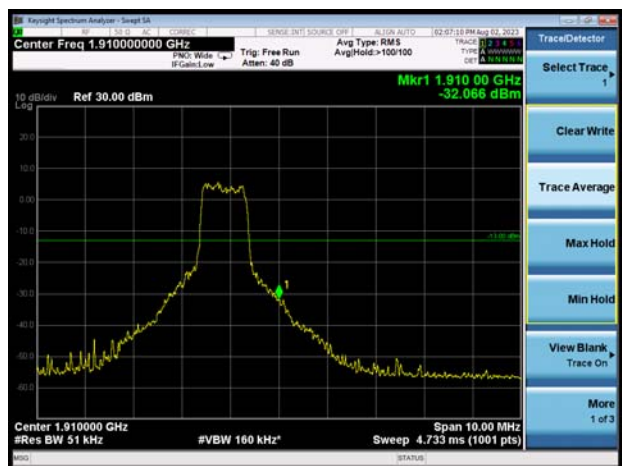
LTE-M Band 2 10MHz 16QAM 1RB CH-High



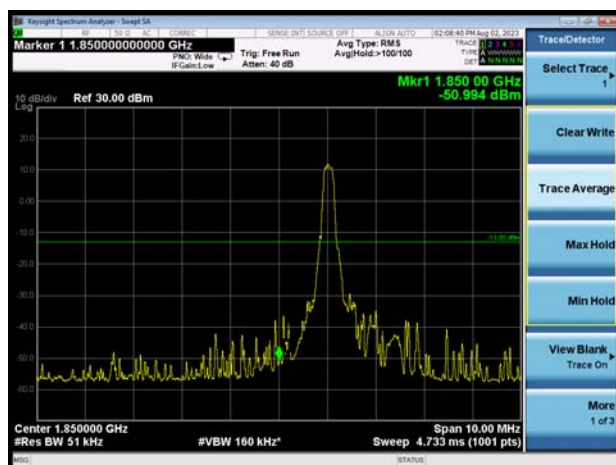
LTE-M Band 2 10MHz 16QAM 100%RB CH-Low



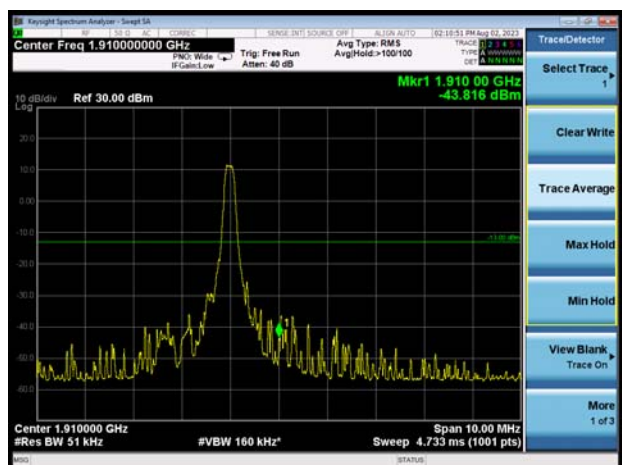
LTE-M Band 2 10MHz 16QAM 100%RB CH-High



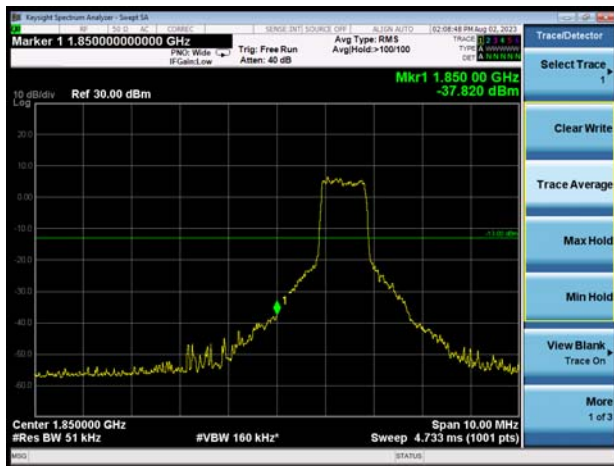
LTE-M Band 2 15MHz 16QAM 1RB CH-Low



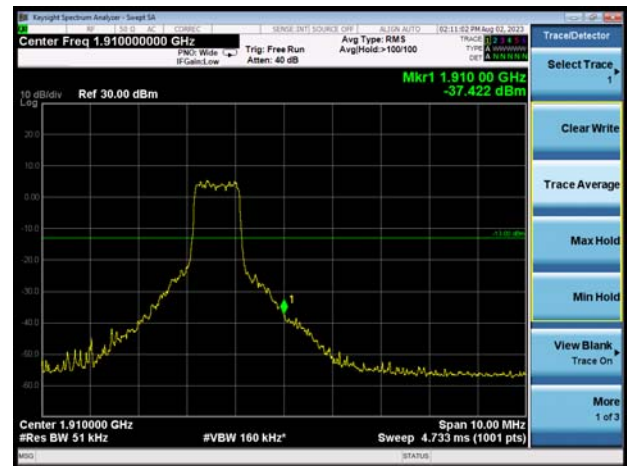
LTE-M Band 2 15MHz 16QAM 1RB CH-High



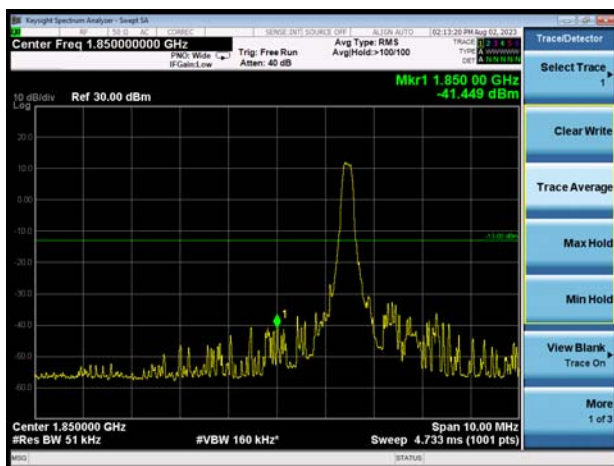
LTE-M Band 2 15MHz 16QAM 100%RB CH-Low



LTE-M Band 2 15MHz 16QAM 100%RB CH-High



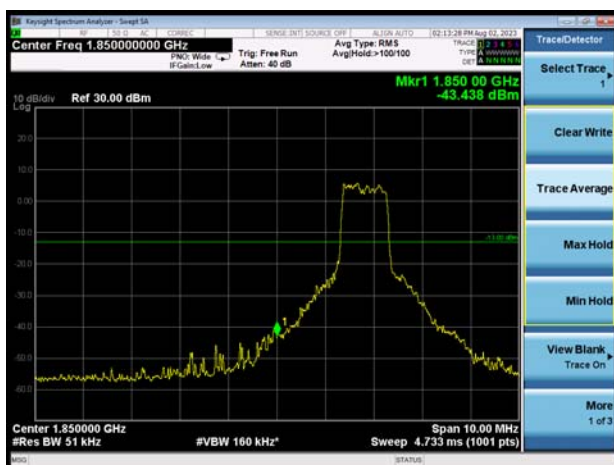
LTE-M Band 2 20MHz 16QAM 1RB CH-Low



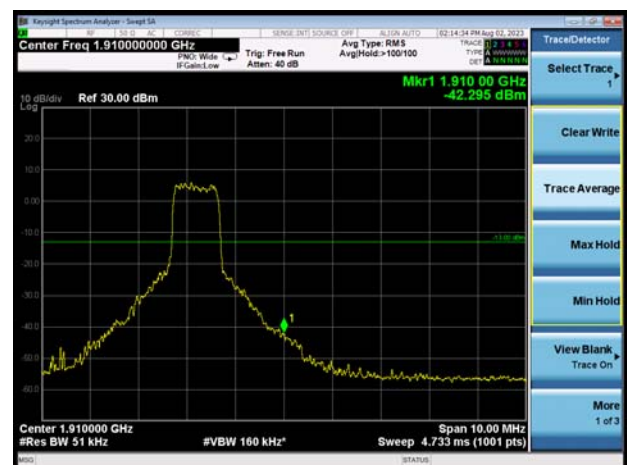
LTE-M Band 2 20MHz 16QAM 1RB CH-High



LTE-M Band 2 20MHz 16QAM 100%RB CH-Low



LTE-M Band 2 20MHz 16QAM 100%RB CH-High



6.4. Peak-to-Average Power Ratio (PAPR)

LTE-M Band 2							
Bandwidth (MHz)	Modulation	Channel/ Frequency (MHz)	Peak (dBm)	Avg (dBm)	PAPR (dB)	Limit (dB)	Conclusion
1.4	QPSK	18900/1880	25.17	13.13	12.04	≤13	PASS
	16QAM	18900/1880	25.69	14.53	11.16	≤13	PASS
3	QPSK	18900/1880	24.99	12.61	12.38	≤13	PASS
	16QAM	18900/1880	25.64	14.18	11.46	≤13	PASS
5	QPSK	18900/1880	25.67	16.00	9.67	≤13	PASS
	16QAM	18900/1880	26.24	16.72	9.52	≤13	PASS
10	QPSK	18900/1880	25.72	16.73	8.99	≤13	PASS
	16QAM	18900/1880	26.98	17.31	9.67	≤13	PASS
15	QPSK	18900/1880	26.36	17.55	8.81	≤13	PASS
	16QAM	18900/1880	26.94	17.79	9.15	≤13	PASS
20	QPSK	18900/1880	26.30	17.54	8.76	≤13	PASS
	16QAM	18900/1880	26.92	17.24	9.68	≤13	PASS

6.5. Frequency Stability

LTE-M Band 2						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Conclusion
Bandwidth	1.4MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	15.53	3.26	0.00826	0.00173	PASS
Extreme (50℃)		10.54	16.29	0.00561	0.00866	PASS
Extreme (40℃)		16.06	1.07	0.00854	0.00057	PASS
Extreme (30℃)		4.54	17.91	0.00241	0.00953	PASS
Extreme (20℃)		17.83	10.10	0.00948	0.00537	PASS
Extreme (10℃)		4.86	9.13	0.00258	0.00486	PASS
Extreme (0℃)		6.15	3.46	0.00327	0.00184	PASS
Extreme (-10℃)		17.57	9.29	0.00934	0.00494	PASS
Extreme (-20℃)		13.54	6.65	0.00720	0.00354	PASS
Extreme (-30℃)		10.33	16.60	0.00550	0.00883	PASS
25℃	LV	3.13	13.58	0.00167	0.00722	PASS
	HV	16.73	13.58	0.00890	0.00722	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Conclusion
Bandwidth	3MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	9.24	2.73	0.00492	0.00145	PASS
Extreme (50℃)		3.79	1.43	0.00201	0.00076	PASS
Extreme (40℃)		5.39	12.81	0.00287	0.00681	PASS
Extreme (30℃)		5.69	10.52	0.00303	0.00560	PASS
Extreme (20℃)		7.72	3.51	0.00411	0.00187	PASS
Extreme (10℃)		1.87	2.97	0.00099	0.00158	PASS
Extreme (0℃)		1.47	16.96	0.00078	0.00902	PASS
Extreme (-10℃)		15.87	2.17	0.00844	0.00115	PASS
Extreme (-20℃)		6.60	3.40	0.00351	0.00181	PASS
Extreme (-30℃)		4.63	4.63	0.00246	0.00246	PASS
25℃	LV	1.36	17.28	0.00072	0.00919	PASS
	HV	4.07	13.55	0.00217	0.00721	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Conclusion
Bandwidth	5MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	5.78	17.22	0.00308	0.00916	PASS
Extreme (50℃)		5.34	4.97	0.00284	0.00264	PASS

Extreme (40℃)		2.59	11.90	0.00138	0.00633	PASS
Extreme (30℃)		1.78	10.31	0.00095	0.00549	PASS
Extreme (20℃)		7.53	1.89	0.00400	0.00100	PASS
Extreme (10℃)		14.12	1.51	0.00751	0.00080	PASS
Extreme (0℃)		15.95	9.79	0.00848	0.00521	PASS
Extreme (-10℃)		6.40	16.87	0.00341	0.00897	PASS
Extreme (-20℃)		10.09	8.19	0.00537	0.00435	PASS
Extreme (-30℃)		11.57	7.49	0.00615	0.00398	PASS
25℃	LV	3.59	4.59	0.00191	0.00244	PASS
	HV	9.52	1.91	0.00506	0.00101	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Conclusion
Bandwidth	10MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	14.05	8.36	0.00747	0.00445	PASS
Extreme (50℃)		14.96	8.73	0.00796	0.00464	PASS
Extreme (40℃)		5.71	8.81	0.00304	0.00469	PASS
Extreme (30℃)		2.85	16.35	0.00151	0.00870	PASS
Extreme (20℃)		16.18	7.41	0.00861	0.00394	PASS
Extreme (10℃)		17.09	17.39	0.00909	0.00925	PASS
Extreme (0℃)		11.14	3.34	0.00593	0.00178	PASS
Extreme (-10℃)		16.21	1.36	0.00862	0.00073	PASS
Extreme (-20℃)		3.56	14.57	0.00189	0.00775	PASS
Extreme (-30℃)		1.68	16.36	0.00089	0.00870	PASS
25℃	LV	1.24	6.77	0.00066	0.00360	PASS
	HV	5.74	1.75	0.00305	0.00093	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Conclusion
Bandwidth	15MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	12.33	12.48	0.00656	0.00664	PASS
Extreme (50℃)		1.51	16.65	0.00081	0.00886	PASS
Extreme (40℃)		14.77	4.53	0.00786	0.00241	PASS
Extreme (30℃)		12.49	14.99	0.00664	0.00797	PASS
Extreme (20℃)		3.96	13.17	0.00211	0.00700	PASS
Extreme (10℃)		5.16	2.67	0.00274	0.00142	PASS
Extreme (0℃)		11.88	13.58	0.00632	0.00722	PASS
Extreme (-10℃)		11.39	10.48	0.00606	0.00557	PASS
Extreme (-20℃)		8.69	3.81	0.00462	0.00203	PASS
Extreme (-30℃)		2.57	9.50	0.00137	0.00505	PASS
25℃	LV	8.59	10.71	0.00457	0.00570	PASS

	HV	1.72	6.96	0.00091	0.00370	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Conclusion
Bandwidth	20MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	14.33	6.68	0.00762	0.00355	
Extreme (50℃)		6.84	6.80	0.00364	0.00361	PASS
Extreme (40℃)		10.15	5.60	0.00540	0.00298	PASS
Extreme (30℃)		1.03	3.93	0.00055	0.00209	PASS
Extreme (20℃)		13.22	5.75	0.00703	0.00306	PASS
Extreme (10℃)		13.90	3.23	0.00739	0.00172	PASS
Extreme (0℃)		16.61	1.61	0.00883	0.00086	PASS
Extreme (-10℃)		17.53	2.23	0.00932	0.00119	PASS
Extreme (-20℃)		12.46	10.81	0.00663	0.00575	PASS
Extreme (-30℃)		10.11	16.36	0.00538	0.00870	PASS
25℃	LV	17.79	10.88	0.00946	0.00579	PASS
	HV	6.09	2.40	0.00324	0.00128	PASS

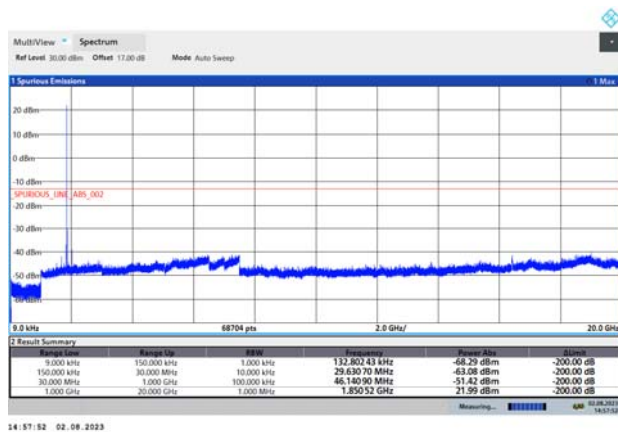
6.6. Spurious Emissions at Antenna Terminals

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.

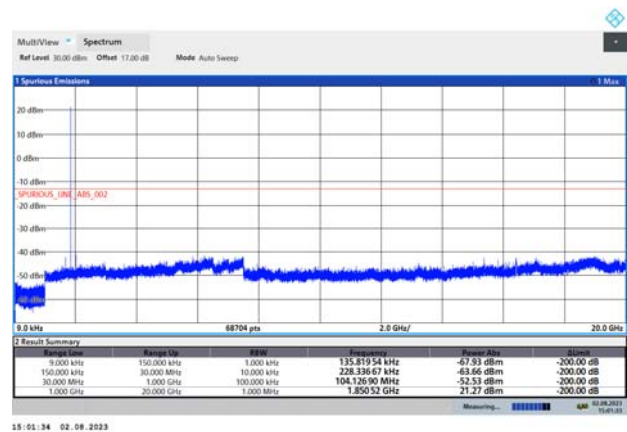
Results: Pass

The signal beyond the limit is carrier.

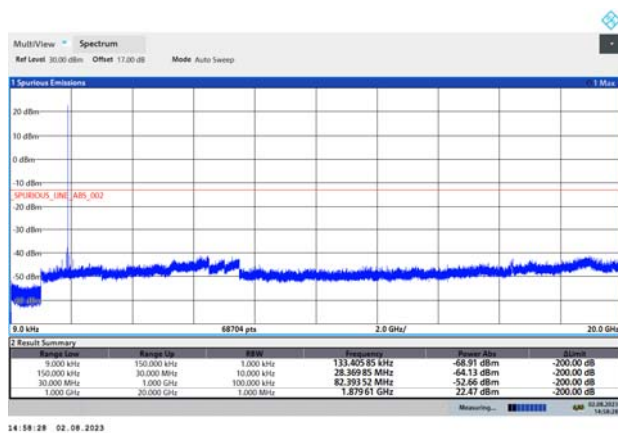
LTE-M Band 2 1.4MHz CH-Low 9kHz~20GHz



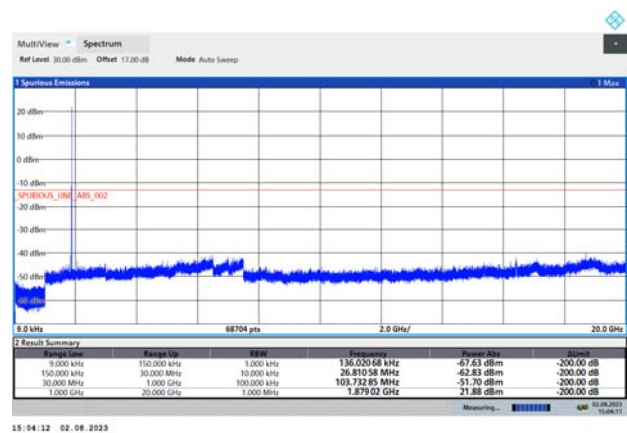
LTE-M Band 2 3MHz CH-Low 9kHz~20GHz



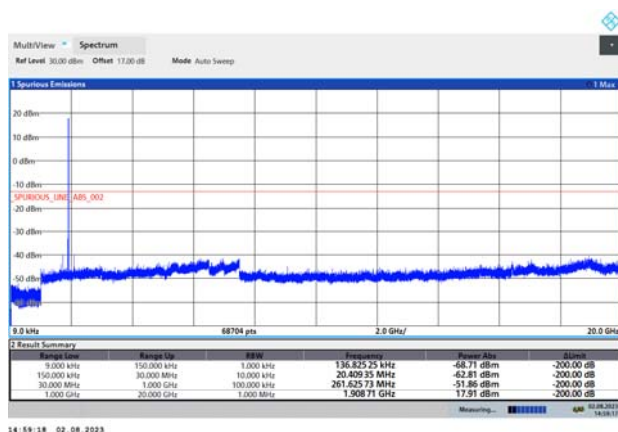
LTE-M Band 2 1.4MHz CH-Middle 9kHz~20GHz



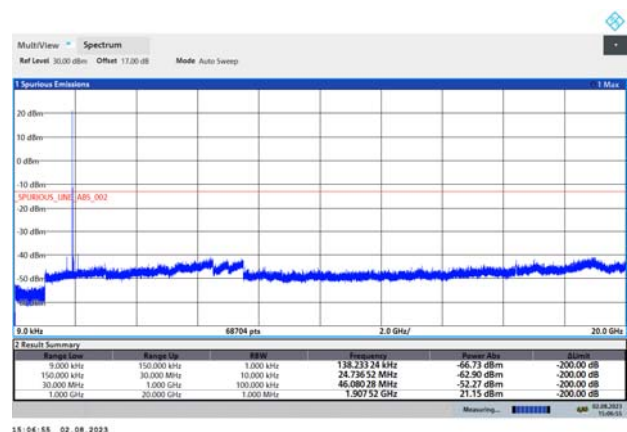
LTE-M Band 2 3MHz CH-Middle 9kHz~20GHz



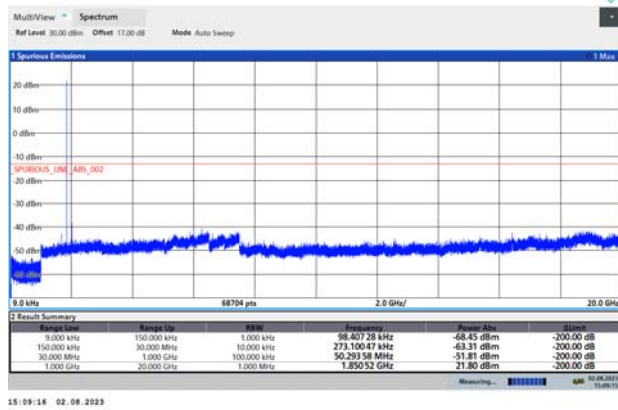
LTE-M Band 2 1.4MHz CH-High 9kHz~20GHz



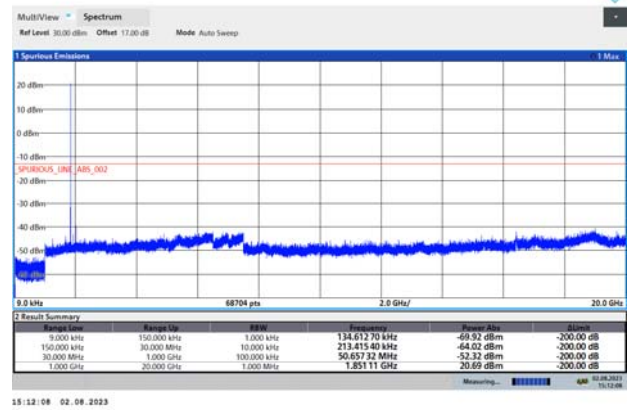
LTE-M Band 2 3MHz CH-High 9kHz~20GHz



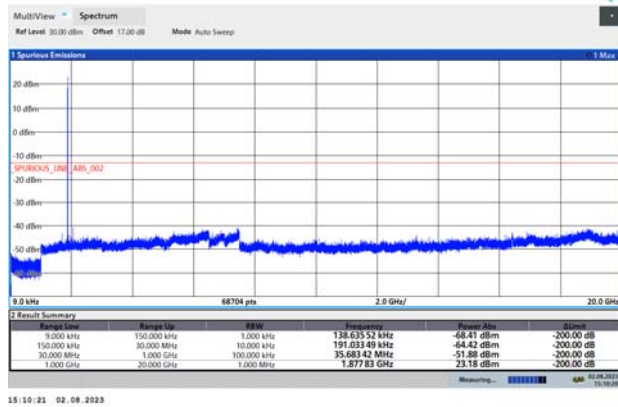
LTE-M Band 2 5MHz CH-Low 9kHz~20GHz



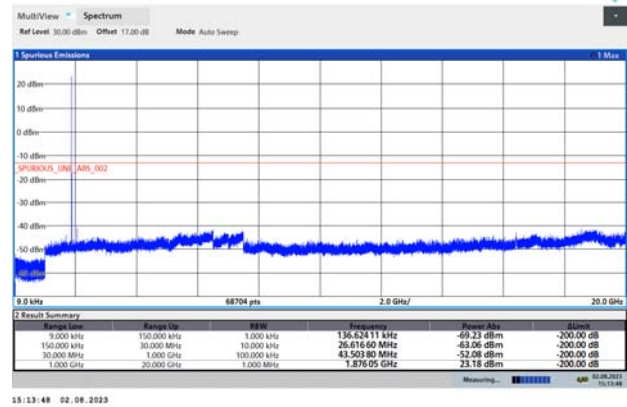
LTE-M Band 2 10MHz CH-Low 9kHz~20GHz



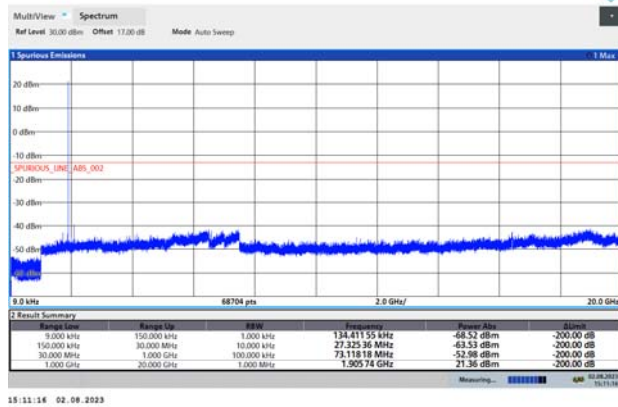
LTE-M Band 2 5MHz CH-Middle 9kHz~20GHz



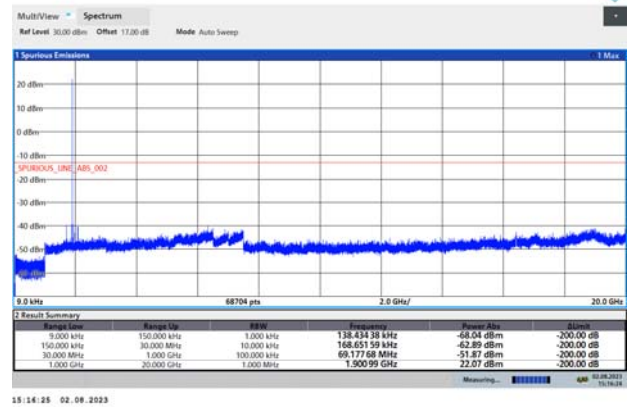
LTE-M Band 2 10MHz CH-Middle 9kHz~20GHz



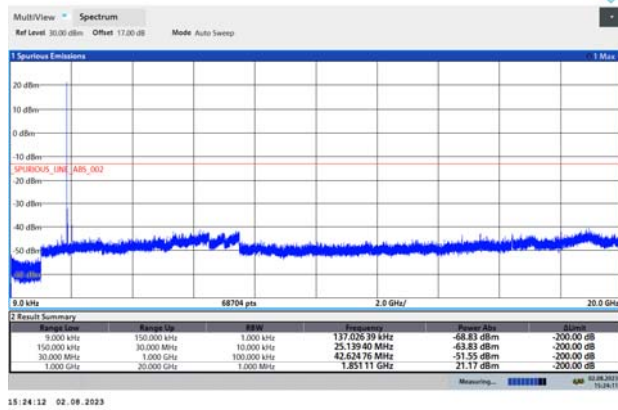
LTE-M Band 2 5MHz CH-High 9kHz~20GHz



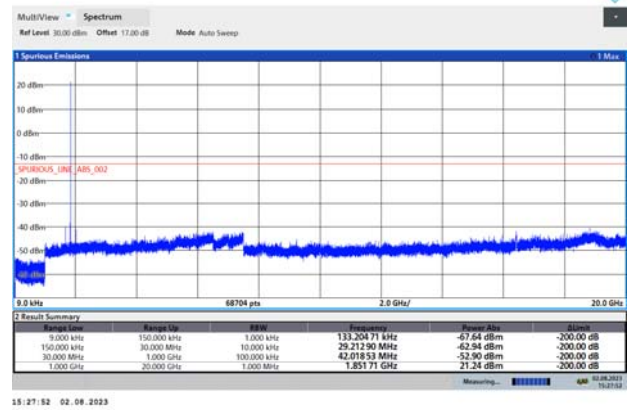
LTE-M Band 2 10MHz CH-High 9kHz~20GHz



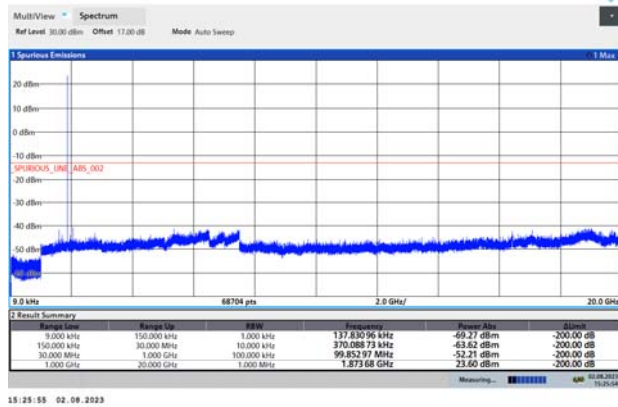
LTE-M Band 2 15MHz CH-Low 9kHz~20GHz



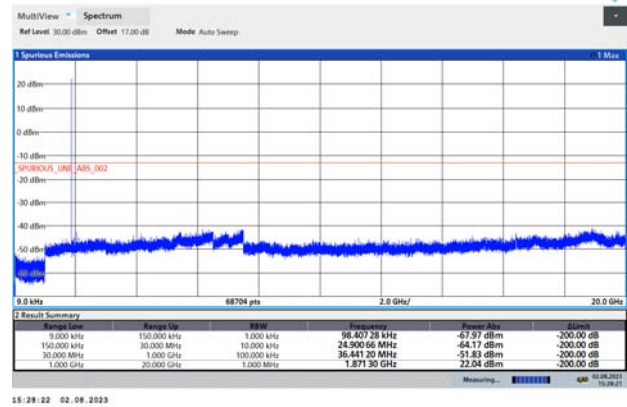
LTE-M Band 2 20MHz CH-Low 9kHz~20GHz



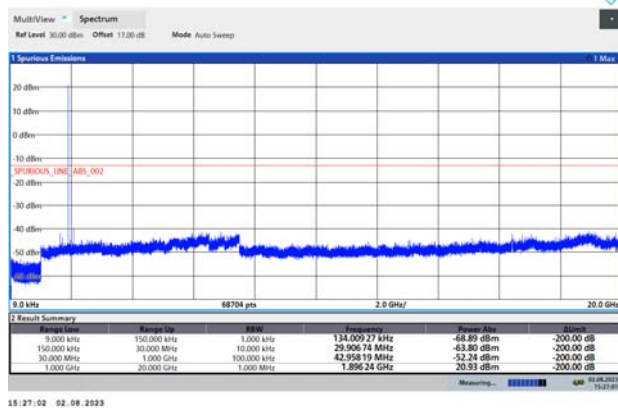
LTE-M Band 2 15MHz CH-Middle 9kHz~20GHz



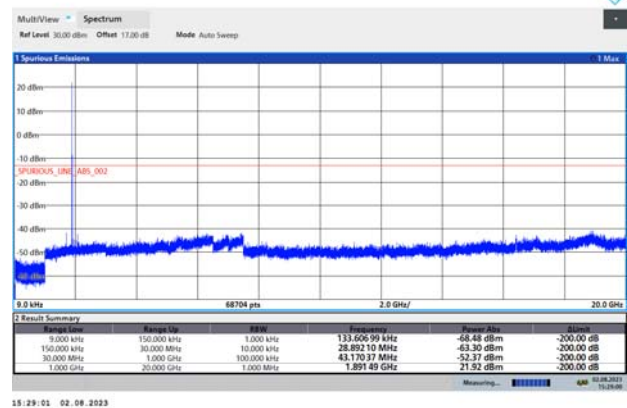
LTE-M Band 2 20MHz CH-Middle 9kHz~20GHz



LTE-M Band 2 15MHz CH-High 9kHz~20GHz



LTE-M Band 2 20MHz CH-High 9kHz~20GHz



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 2 1.4MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3759.00	-54.90	2.60	12.50	Vertical	-45.00	-13.00	32.00	9
3	5638.88	-63.96	3.30	12.50	Vertical	-54.76	-13.00	41.76	67
4	7520.00	-58.23	4.20	12.20	Vertical	-50.23	-13.00	37.23	176
5	9400.00	-54.00	4.30	11.10	Vertical	-47.20	-13.00	34.20	225
6	11280.00	-52.88	5.90	11.90	Vertical	-46.88	-13.00	33.88	27
7	13160.00	-52.82	5.70	14.00	Vertical	-44.52	-13.00	31.52	304
8	15040.00	-54.17	5.80	13.10	Vertical	-46.87	-13.00	33.87	2
9	16920.00	-51.60	6.10	14.60	Vertical	-43.10	-13.00	30.10	186
10	18800.00	/	/	/	/	/	/	/	/

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

LTE-M Band 2 5MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3755.70	-50.10	2.60	12.50	Vertical	-40.20	-13.00	27.20	247
3	5633.63	-53.71	3.30	12.50	Vertical	-44.51	-13.00	31.51	225
4	7510.00	-57.47	4.20	12.20	Vertical	-49.47	-13.00	36.47	3
5	9387.50	-52.56	4.30	11.10	Vertical	-45.76	-13.00	32.76	176
6	11265.00	-52.72	5.90	11.90	Vertical	-46.72	-13.00	33.72	18
7	13142.00	-51.60	5.70	14.00	Vertical	-43.30	-13.00	30.30	304
8	15020.00	-53.77	5.80	13.10	Vertical	-46.47	-13.00	33.47	225
9	16897.50	-51.28	6.10	14.60	Vertical	-42.78	-13.00	29.78	18
10	18800.00	/	/	/	/	/	/	/	/

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

LTE-M Band 2 20MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3742.13	-59.84	2.60	12.50	Vertical	-49.94	-13.00	36.94	3
3	5613.38	-64.40	3.30	12.50	Vertical	-55.20	-13.00	42.20	79
4	7484.63	-58.45	4.20	12.20	Vertical	-50.45	-13.00	37.45	46
5	9355.33	-52.58	4.30	11.10	Vertical	-45.78	-13.00	32.78	134
6	11226.39	-52.84	5.90	11.90	Vertical	-46.84	-13.00	33.84	225
7	13097.46	-52.24	5.70	14.00	Vertical	-43.94	-13.00	30.94	19
8	14968.52	-53.88	5.80	13.10	Vertical	-46.58	-13.00	33.58	304
9	16938.59	-51.90	6.10	14.60	Vertical	-43.40	-13.00	30.40	47
10	18800.00	/	/	/	/	/	/	/	/

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 is submitted separately.

ANNEX B: Test Setup Photos

The Test Setup Photos is submitted separately.

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