



RF TEST REPORT

Applicant Quectel Wireless Solutions Co., Ltd.

FCC ID XMR2022BG955AGL

Product LTE Cat M1/NB1/GPRS/GNSS Module

Brand Quectel

Model BG955A-GL

Report No. R2208A0765-R5V1

Issue Date November 18, 2022

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 2 (2021)/ FCC CFR 47 Part 24E (2021)**. 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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Version	Revision description	Issue Date
Rev.0	Initial issue of report.	October 21, 2022
Rev.1	Update information.	November 18, 2022
Note: This revised report (Report No. R2208A0765-R5V1) supersedes and replaces the previously issued report (Report No. R2208A0765-R5). Please discard or destroy the previously issued report and dispose of it accordingly.		

Summary of measurement results

No.	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: September 8, 2022 ~ September 29, 2022			
Date of Sample Received: September 6, 2022			
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.
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City: Shanghai
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2. General Description of Equipment under Test

2.1. Applicant and Manufacturer Information

Applicant	Quectel Wireless Solutions Co., Ltd.
Applicant address	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China, 200233
Manufacturer	Quectel Wireless Solutions Co., Ltd.
Manufacturer address	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China, 200233

2.2. General information

EUT Description			
Model	BG955A-GL		
IMEI	868348060003740		
Hardware Version	R1.2		
Software Version	BG955AGLAAR02A01		
Power Supply	External power supply		
Antenna Type	External Antenna		
Antenna Gain	Mode	Frequency (MHz)	Gain (dBi)
	GSM1900	1840	1.36
		1860	1.25
		1880	1.38
		1900	1.59
		1920	1.36
	LTE eMTC Band 2	1840	1.36
		1860	1.25
		1880	1.38
		1900	1.59
		1920	1.36
	LTE eMTC Band 25	1840	1.36
		1860	1.25
		1880	1.38
		1900	1.59
		1920	1.36
Test Mode(s)	GSM1900; LTE eMTC Band 2/25;		
Test Modulation	(GPRS)GMSK (eMTC) QPSK, 16QAM		
GPRS Multislot Class	10		
LTE Category	M1		
Maximum E.I.R.P	GSM 1900:	31.23 dBm	
	LTE eMTC Band 2:	25.41 dBm	



	LTE eMTC Band 25:	25.38 dBm	
Rated Power Supply Voltage	DC 3.8V		
Operating Voltage	Minimum: 3.3 V Maximum: 4.3 V		
Operating Temperature	Lowest: -35°C Highest: +75°C		
Testing Temperature	Lowest: -30°C Highest: +50°C		
Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	GSM1900	1850 ~ 1910	1930 ~ 1990
	LTE eMTC Band 2	1850 ~ 1910	1930 ~ 1990
	LTE eMTC Band 25	1850 ~ 1915	1930 ~ 1995
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 (2021)

FCC CFR47 Part 2 (2021)

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, horizontal 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 GSM/ LTE eMTC is set based on the maximum RF Output Power.

Test modes are chosen to be reported as the worst case configuration below:

Test items	Modes/Modulation
	GSM 1900
RF Power Output and Effective Isotropic Radiated Power	GPRS
Occupied Bandwidth	GPRS(1Tx slot)
Band Edge Compliance	GPRS(1Tx slot)
Peak-to-Average Power Ratio	GPRS(1Tx slot)
Frequency Stability	GPRS(1Tx slot)
Spurious Emissions at Antenna Terminals	GPRS(1Tx slot)
Radiated Spurious Emission	GPRS(1Tx slot)



Test modes are chosen to be reported as the worst case configuration below for LTE eMTC Band 2/25:

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	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	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 testing.													

5. Test Case

5.1.RF Power Output and Effective Isotropic Radiated Power

Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

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.

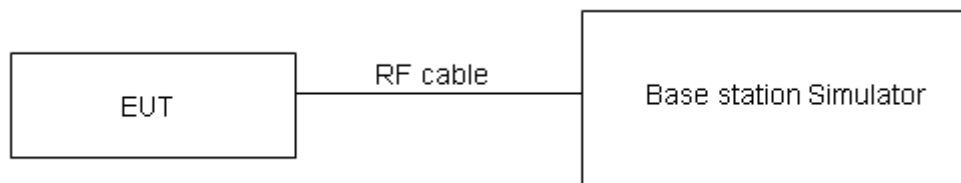
ERP can then be calculated as follows:

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

where:dBd refers to gain relative to an ideal dipole.

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

Test Setup



Limits

No specific RF power output requirements in part 2.1046.

Rule Part 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)
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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	Pressure
23°C ~25°C	45%~50%	101.5kPa

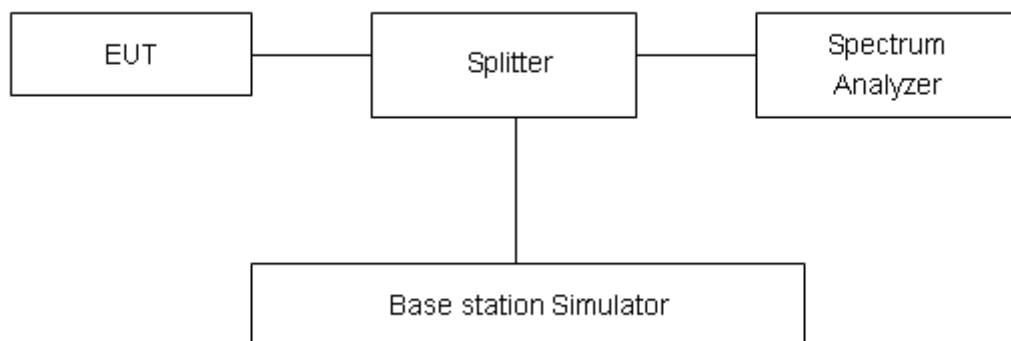
Method of Measurement

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

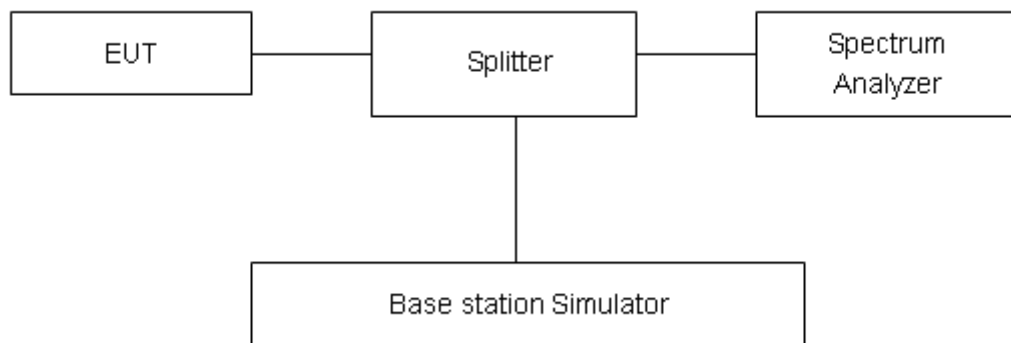
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

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
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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

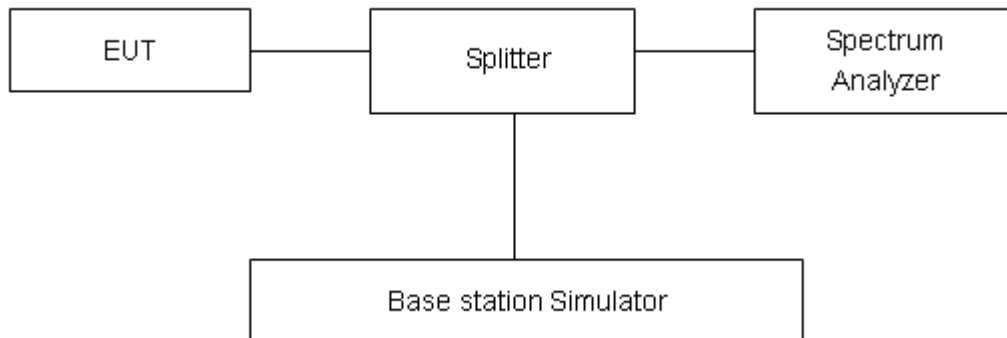
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

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

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	Pressure
23°C ~25°C	45%~50%	101.5kPa

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.

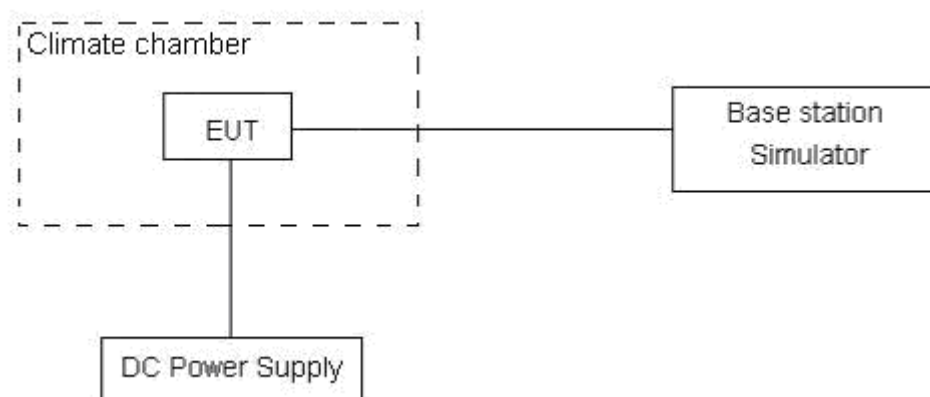
Frequency Stability (Voltage Variation)

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 3.3 V and 4.3 V, with a nominal voltage of 3.8V.

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	Pressure
23°C ~25°C	45%~50%	101.5kPa

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.

RBW is set to 1 kHz (0.009MHz~ 0.15 MHz),

RBW is set to 10 kHz (0.15 MHz~ 30 MHz)

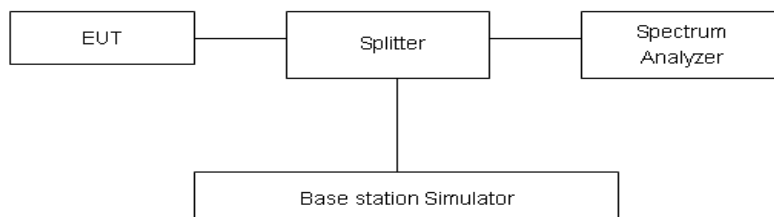
RBW is set to 100 kHz (30MHz~1000 MHz)

RBW is set to 1000 kHz (above 1000MHz)

Sweep is set to ATUO.

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
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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	Pressure
23°C ~25°C	45%~50%	101.5kPa

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:

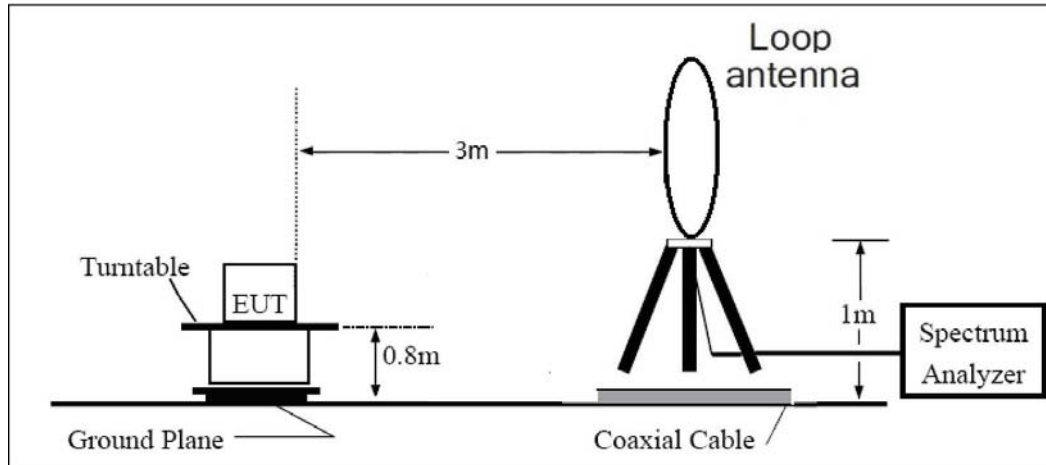
$$\text{Power(EIRP)} = \text{PMea} - \text{Pcl} + \text{Ga}$$
8. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dB) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP

= EIRP-2.15dB.

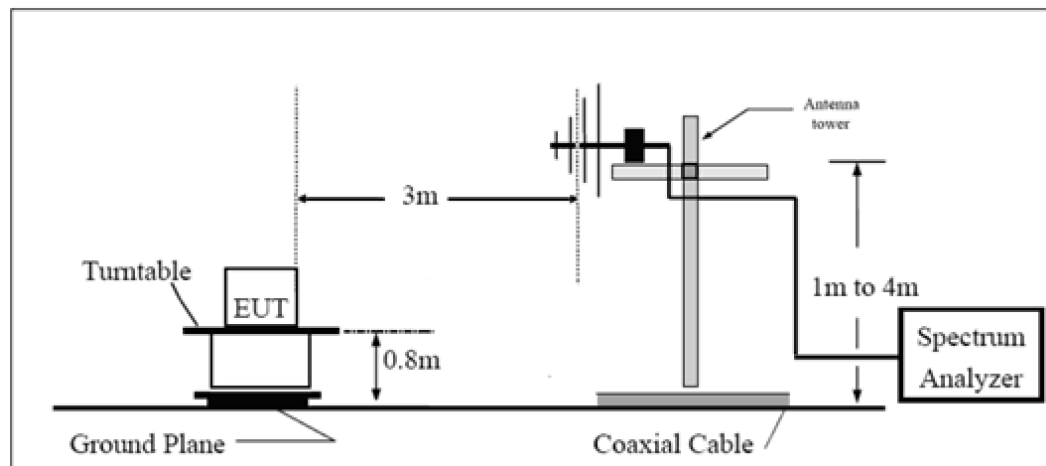
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

Test setup

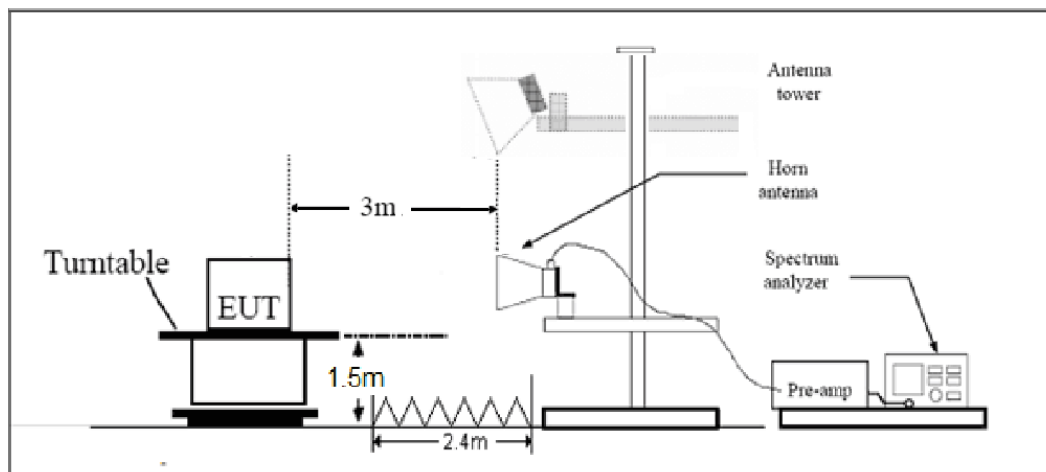
9KHz~ 30MHz



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
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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

GSM 1900		Maximum Output Power (dBm)			EIRP (dBm)		
		Channel/Frenqucy(MHz)			Channel/Frenqucy(MHz)		
		512/1850.2	661/1880	810/1909.8	512/1850.2	661/1880	810/1909.8
GPRS(GMSK)	1 Tx Slot	29.98	29.82	29.54	31.23	31.20	31.13
	2 Tx Slots	29.91	29.76	29.47	31.16	31.14	31.06

LTE eMTC Band 2	Channel/ Frequency(MHz)	Index	RB#	RB#	Maximum Output Power (dBm)		EIRP (dBm)	
			RBstart QPSK	RBstart 16QAM	QPSK	16QAM	QPSK	16QAM
1.4MHz	18607/1850.7	0	1#0	1#0	23.06	21.50	24.31	22.75
		0	6#0	5#0	21.72	21.44	22.97	22.69
	18900/1880	0	1#0	1#0	23.63	23.10	25.01	24.48
		0	6#0	5#0	21.90	21.87	23.28	23.25
	19193/1909.3	0	1#5	1#5	23.82	23.33	25.41	24.92
		0	6#0	5#0	22.07	22.29	23.66	23.88
3MHz	18615/1851.5	0	1#0	1#0	22.89	21.70	24.14	22.95
		0	6#0	5#0	21.46	20.92	22.71	22.17
	18900/1880	0	1#0	1#0	23.01	21.75	24.39	23.13
		0	6#0	5#0	21.65	21.13	23.03	22.51
	19185/1908.5	1	1#5	1#5	23.36	22.03	24.95	23.62
		1	6#0	5#0	21.84	21.40	23.43	22.99
5MHz	18625/1852.5	3	1#0	1#0	23.02	22.81	24.27	24.06
		0	6#0	5#0	22.30	20.72	23.55	21.97
	18900/1880	0	1#0	1#0	23.06	22.84	24.44	24.22
		0	6#0	5#0	22.47	20.88	23.85	22.26
	19175/1907.5	0	1#5	1#5	23.45	23.01	25.04	24.60
		3	6#0	5#0	22.69	21.06	24.28	22.65
10MHz	18650/1855	3	1#0	1#0	23.00	22.76	24.25	24.01
		0	4#0	4#0	22.96	21.56	24.21	22.81
	18900/1880	0	1#0	1#0	23.11	22.95	24.49	24.33
		0	4#0	4#0	23.33	21.82	24.71	23.20
	19150/1905	4	1#5	1#5	23.24	23.10	24.83	24.69
		7	4#2	4#2	22.93	20.96	24.52	22.55
15MHz	18675/1857.5	3	1#0	1#0	23.04	22.85	24.29	24.10
		0	6#0	5#0	23.24	22.69	24.49	23.94



20MHz	18900/1880	0	1#0	1#0	23.09	22.87	24.47	24.25
		0	6#0	5#0	23.43	22.83	24.81	24.21
	19125/1902.5	8	1#5	1#5	23.70	23.73	25.29	25.32
		11	6#0	5#0	23.51	23.23	25.10	24.82
	18700/1860	3	1#0	1#0	23.04	22.84	24.29	24.09
		0	6#0	5#0	22.95	22.66	24.20	23.91
	18900/1880	0	1#0	1#0	23.01	22.76	24.39	24.14
		0	6#0	5#0	23.45	22.75	24.83	24.13
	19100/1900	12	1#5	1#5	23.81	23.72	25.40	25.31
		15	6#0	5#0	23.34	23.22	24.93	24.81

LTE eMTC Band 25	Channel/ Frequency(MHz)	Index	RB#	RB#	Maximum Output Power (dBm)		EIRP (dBm)	
			RBstart QPSK	RBstart 16QAM	QPSK	16QAM	QPSK	16QAM
1.4MHz	26047/1850.7	0	1#0	1#0	23.10	21.54	24.35	22.79
		0	6#0	5#0	21.76	21.46	23.01	22.71
	26365/1882.5	0	1#0	1#0	23.14	21.59	24.52	22.97
		0	6#0	5#0	21.84	21.54	23.22	22.92
	26683/1914.3	0	1#5	1#5	23.36	22.00	24.72	23.36
		0	6#0	5#0	22.07	21.81	23.43	23.17
3MHz	26055/1851.5	0	1#0	1#0	23.16	21.67	24.41	22.92
		0	6#0	5#0	21.65	21.13	22.90	22.38
	26365/1882.5	0	1#0	1#0	23.41	21.91	24.79	23.29
		0	6#0	5#0	21.77	21.42	23.15	22.80
	26675/1913.5	1	1#5	1#5	23.48	22.06	24.84	23.42
		1	6#0	5#0	22.06	21.62	23.42	22.98
5MHz	26065/1852.5	3	1#0	1#0	23.12	22.67	24.37	23.92
		0	6#0	5#0	22.41	20.78	23.66	22.03
	26365/1882.5	0	1#0	1#0	23.18	22.70	24.56	24.08
		0	6#0	5#0	22.62	20.98	24.00	22.36
	26665/1912.5	0	1#5	1#5	23.37	23.05	24.73	24.41
		3	6#0	5#0	22.84	21.18	24.20	22.54
10MHz	26090/1855	3	1#0	1#0	23.07	22.69	24.32	23.94
		0	4#0	4#0	23.03	21.74	24.28	22.99
	26365/1882.5	0	1#0	1#0	23.23	22.85	24.61	24.23
		0	4#0	4#0	23.18	21.98	24.56	23.36
	26640/1910	4	1#5	1#5	23.65	23.67	25.01	25.03
		7	4#2	4#2	23.16	22.02	24.52	23.38
15MHz	26115/1857.5	3	1#0	1#0	23.71	23.38	24.96	24.63
		0	6#0	5#0	23.02	23.01	24.27	24.26
	26365/1882.5	0	1#0	1#0	23.17	22.75	24.55	24.13
		0	6#0	5#0	23.57	22.95	24.95	24.33
	26615/1907.5	8	1#5	1#5	23.34	23.06	24.93	24.65



		11	6#0	5#0	23.79	23.16	25.38	24.75
20MHz	26140/1860	3	1#0	1#0	23.09	22.72	24.34	23.97
		0	6#0	5#0	23.13	22.78	24.38	24.03
	26365/1882.5	0	1#0	1#0	23.20	22.81	24.58	24.19
		0	6#0	5#0	23.58	22.96	24.96	24.34
	26590/1905	12	1#5	1#5	23.41	23.19	25.00	24.78
		15	6#0	5#0	23.50	23.20	25.09	24.79

6.2.Occupied Bandwidth

Mode	Channel	Frequency (MHz)	99% Power Bandwidth (MHz)	-26dBc Bandwidth(MHz)
GPRS 1900 (GMSK)	512	1850.2	0.24065	0.3042
	661	1880	0.23951	0.3102
	810	1909.8	0.23963	0.3025

Mode	Bandwidth	Modulation	Channel/ Frequency(MHz)	RB	Index	Bandwidth(MHz)	
						99% Power	-26dBc
LTE eMTC Band 2	1.4MHz	QPSK	18900/1880	6#0	0	1.11540	1.322
		16QAM	18900/1880	5#0	0	0.95025	1.281
	3MHz	QPSK	18900/1880	6#0	0	1.10570	1.347
		16QAM	18900/1880	5#0	0	0.95897	1.302
	5MHz	QPSK	18900/1880	6#0	0	1.10340	1.330
		16QAM	18900/1880	5#0	0	0.97976	1.342
	10MHz	QPSK	18900/1880	6#0	0	1.10570	1.339
		16QAM	18900/1880	5#0	0	0.99529	1.316
	15MHz	QPSK	18900/1880	6#0	0	1.10540	1.341
		16QAM	18900/1880	5#0	0	0.99471	1.407
	20MHz	QPSK	18900/1880	6#0	0	1.10560	1.331
		16QAM	18900/1880	5#0	0	1.03440	1.361

Mode	Bandwidth	Modulation	Channel/ Frequency(MHz)	RB	Index	Bandwidth(MHz)	
						99% Power	-26dBc
LTE eMTC Band 25	1.4MHz	QPSK	26365/1882.5	6#0	0	1.11070	1.332
		16QAM	26365/1882.5	5#0	0	0.95963	1.318
	3MHz	QPSK	26365/1882.5	6#0	0	1.10270	1.329
		16QAM	26365/1882.5	5#0	0	0.96906	1.312
	5MHz	QPSK	26365/1882.5	6#0	0	1.09650	1.333
		16QAM	26365/1882.5	5#0	0	0.97581	1.314
	10MHz	QPSK	26365/1882.5	6#0	0	1.10790	1.347
		16QAM	26365/1882.5	5#0	0	0.99944	1.317
	15MHz	QPSK	26365/1882.5	6#0	0	1.11230	1.322
		16QAM	26365/1882.5	5#0	0	1.00310	1.467
	20MHz	QPSK	26365/1882.5	6#0	0	1.10970	1.316
		16QAM	26365/1882.5	5#0	0	1.00620	1.387

GSM1900 GPRS CH-Low



GSM 1900 GPRS CH-Middle



GSM 1900 GPRS CH-High





LTE eMTC Band 2 1.4MHz QPSK CH-Middle



LTE eMTC Band 2 3MHz QPSK CH-Middle



LTE eMTC Band 2 5MHz QPSK CH-Middle



LTE eMTC Band 2 10MHz QPSK CH-Middle



LTE eMTC Band 2 15MHz QPSK CH-Middle



LTE eMTC Band 2 20MHz QPSK CH-Middle



LTE eMTC Band 2 1.4MHz 16QAM CH-Middle



LTE eMTC Band 2 3MHz 16QAM CH-Middle



LTE eMTC Band 2 5MHz 16QAM CH-Middle



LTE eMTC Band 2 10MHz 16QAM CH-Middle



LTE eMTC Band 2 15MHz 16QAM CH-Middle



LTE eMTC Band 2 20MHz 16QAM CH-Middle



LTE eMTC Band 25 1.4MHz QPSK CH-Middle



LTE eMTC Band 25 3MHz QPSK CH-Middle



LTE eMTC Band 25 5MHz QPSK CH-Middle



LTE eMTC Band 25 10MHz QPSK CH-Middle



LTE eMTC Band 25 15MHz QPSK CH-Middle



LTE eMTC Band 25 20MHz QPSK CH-Middle



LTE eMTC Band 25 1.4MHz 16QAM CH-Middle



LTE eMTC Band 25 3MHz 16QAM CH-Middle



LTE eMTC Band 25 5MHz 16QAM CH-Middle



LTE eMTC Band 25 10MHz 16QAM CH-Middle



LTE eMTC Band 25 15MHz 16QAM CH-Middle



LTE eMTC Band 25 20MHz 16QAM CH-Middle



6.3. Band Edge Compliance

GSM1900 GPRS CH-Low



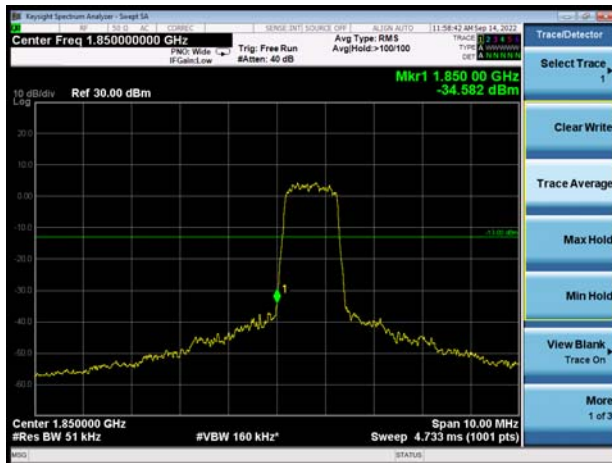
GSM 1900 GPRS CH-High



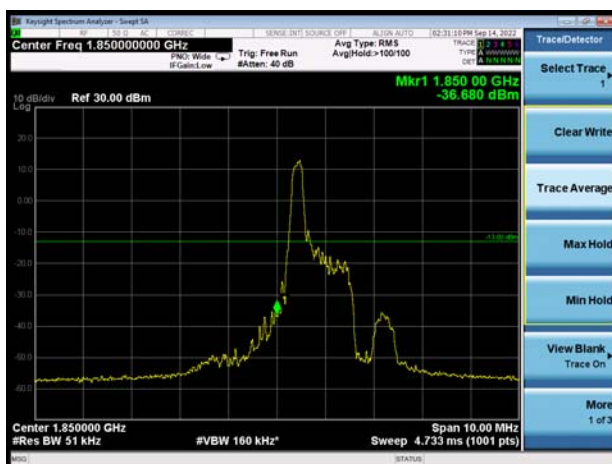
LTE eMTC Band 2 1.4MHz QPSK 1RB CH-Low



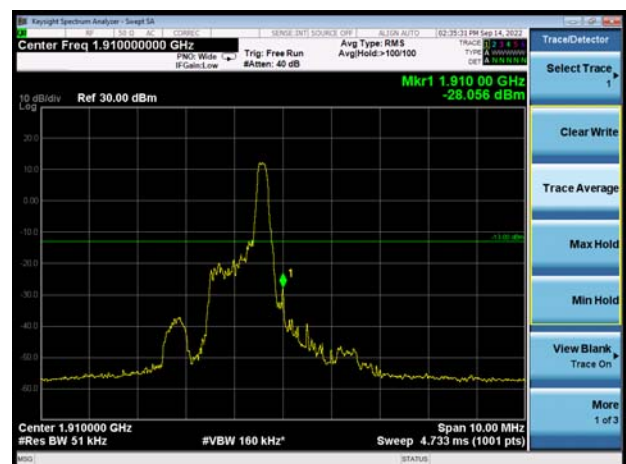
LTE eMTC Band 2 1.4MHz QPSK 1RB CH-High


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

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

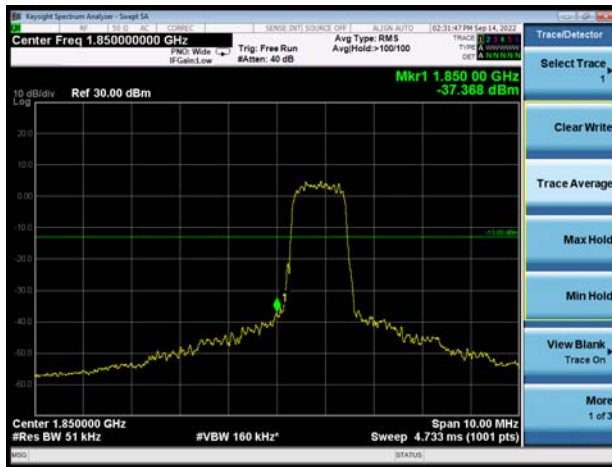

LTE eMTC Band 2 3MHz QPSK 1RB CH-Low



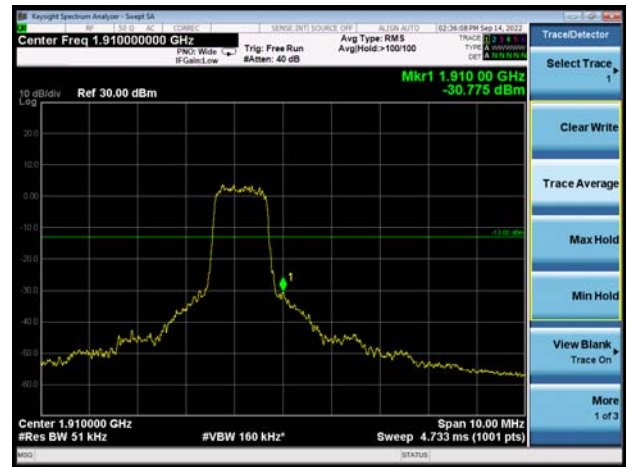
LTE eMTC Band 2 3MHz QPSK 1RB CH-High



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



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



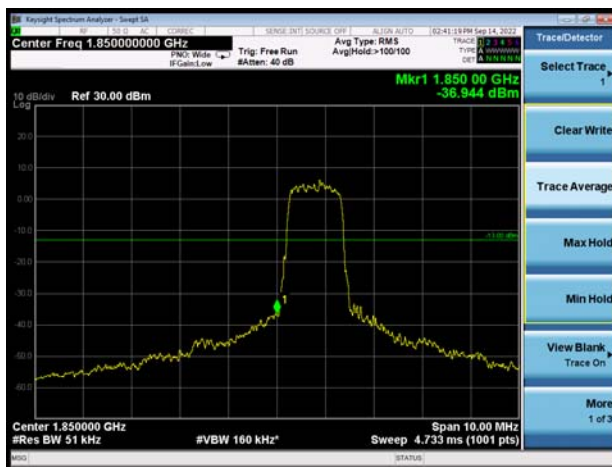
LTE eMTC Band 2 5MHz QPSK 1RB CH-Low



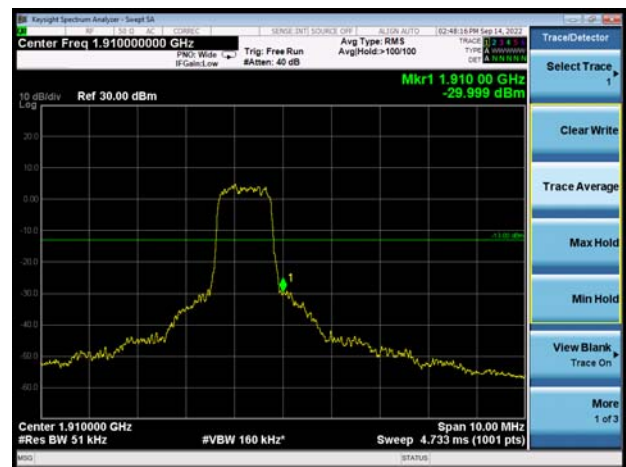
LTE eMTC Band 2 5MHz QPSK 1RB CH-High



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



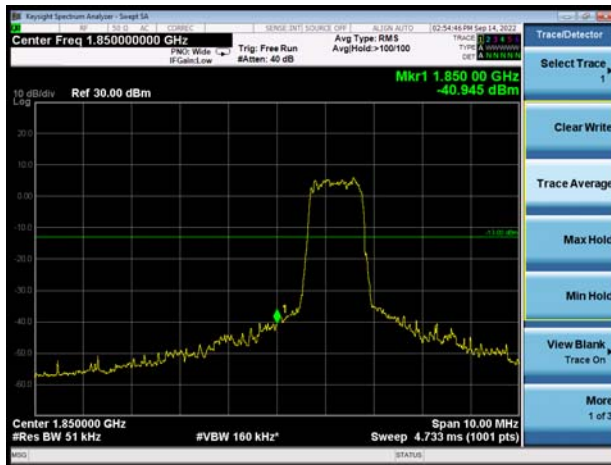
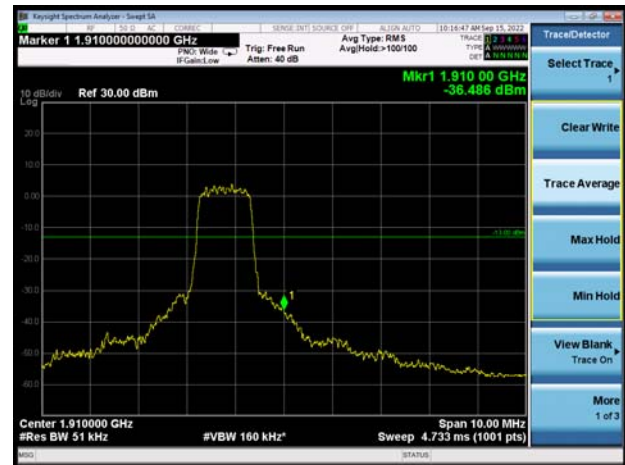
LTE eMTC Band 2 5MHz QPSK 100%RB CH-High



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



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


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

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


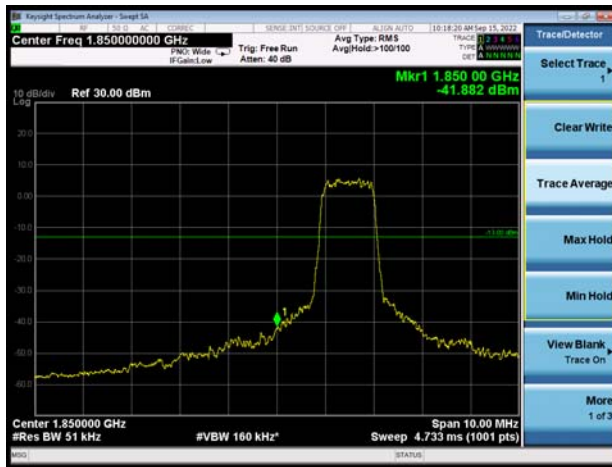
LTE eMTC Band 2 15MHz QPSK 1RB CH-Low



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



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



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



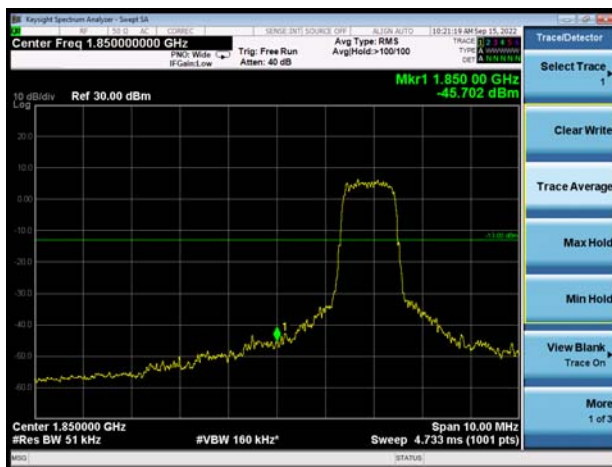
LTE eMTC Band 2 20MHz QPSK 1RB CH-Low



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



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



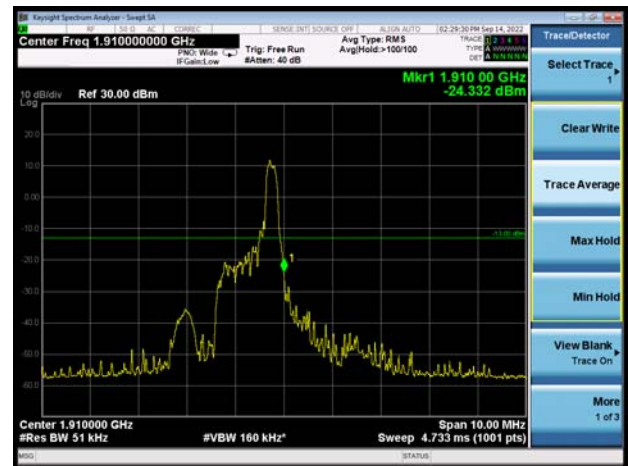
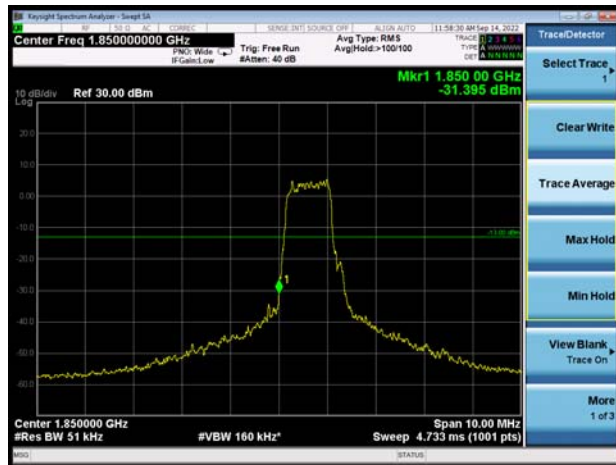
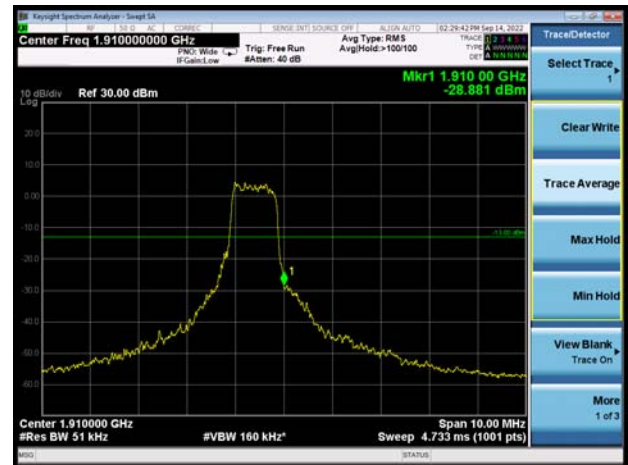
LTE eMTC Band 2 20MHz QPSK 100%RB CH-High



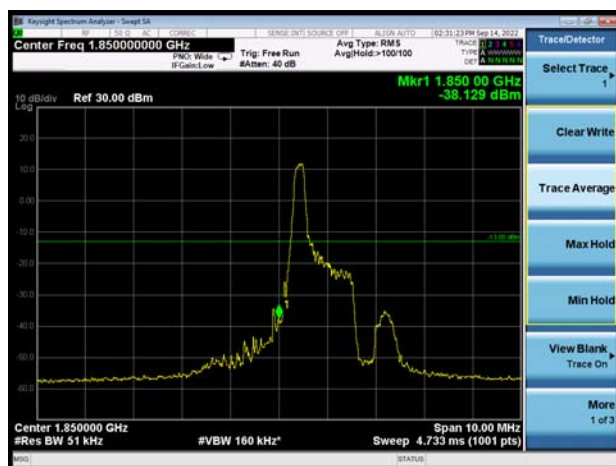
LTE eMTC Band 2 1.4MHz 16QAM 1RB CH-Low



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


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

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


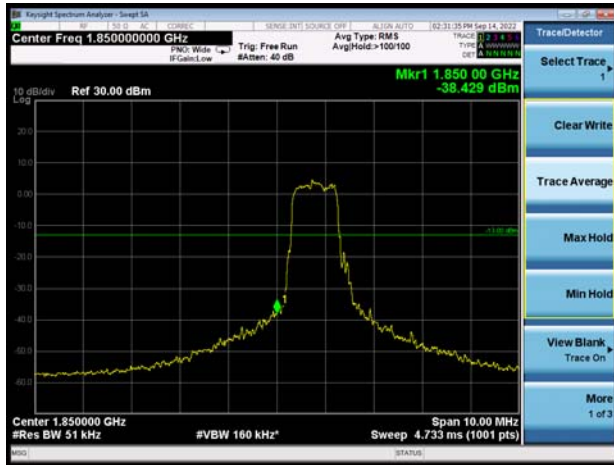
LTE eMTC Band 2 3MHz 16QAM 1RB CH-Low



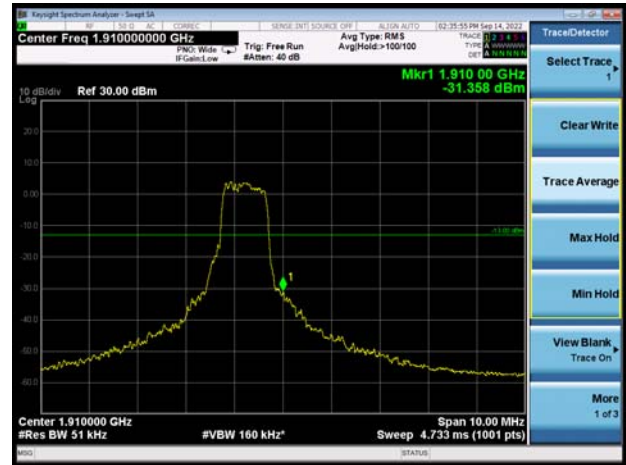
LTE eMTC Band 2 3MHz 16QAM 1RB CH-High



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



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



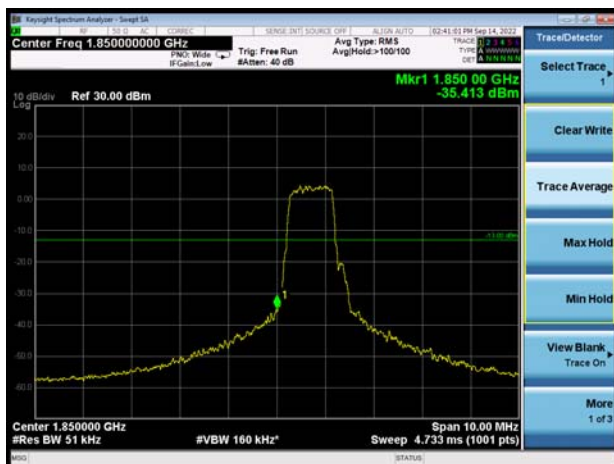
LTE eMTC Band 2 5MHz 16QAM 1RB CH-Low



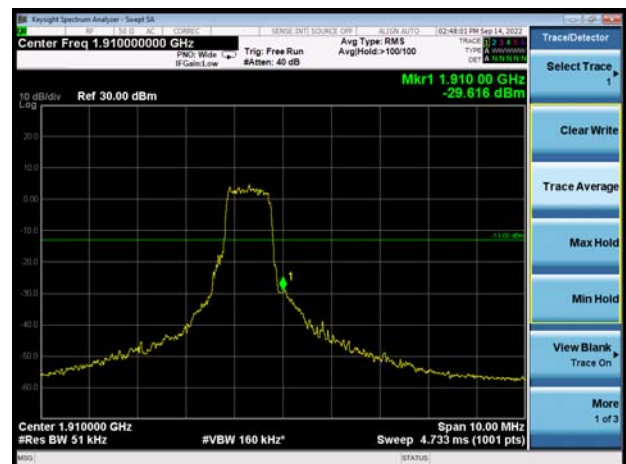
LTE eMTC Band 2 5MHz 16QAM 1RB CH-High



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



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

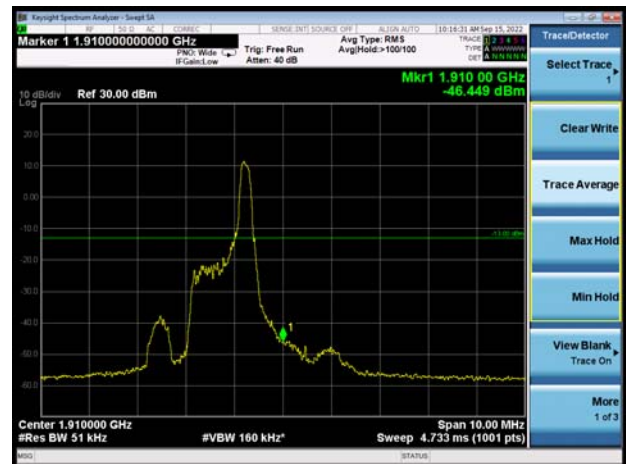
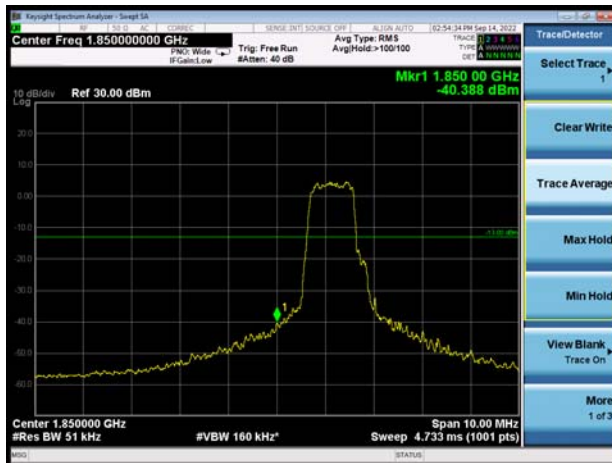
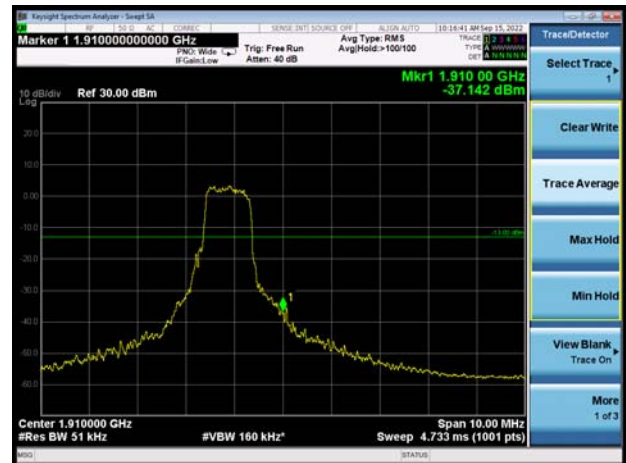




LTE eMTC Band 2 10MHz 16QAM 1RB CH-Low



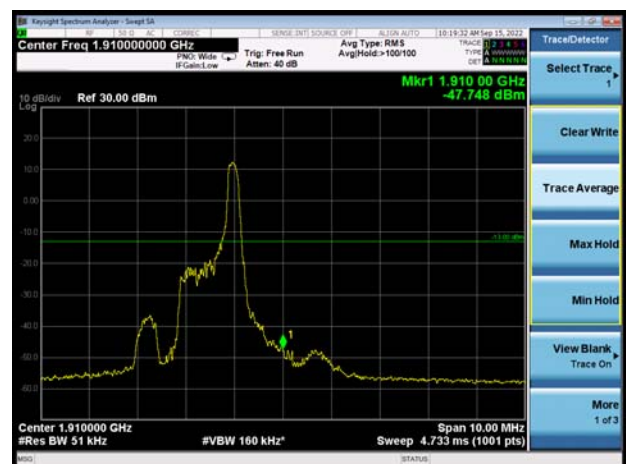
LTE eMTC Band 2 10MHz 16QAM 1RB CH-High

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

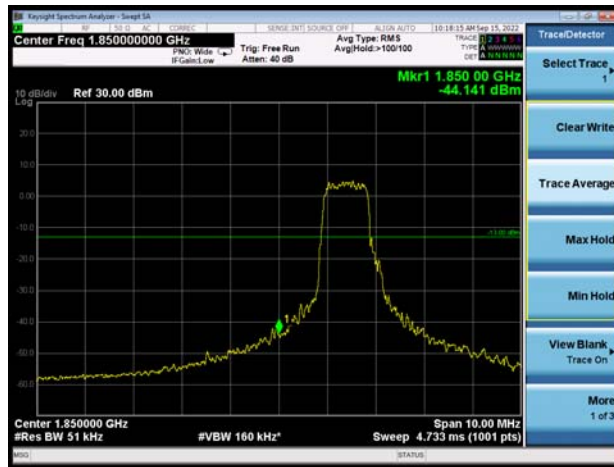
LTE eMTC Band 2 15MHz 16QAM 1RB CH-Low



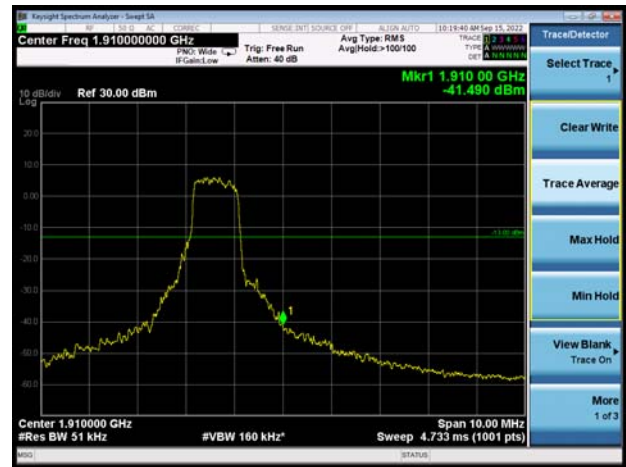
LTE eMTC Band 2 15MHz 16QAM 1RB CH-High



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



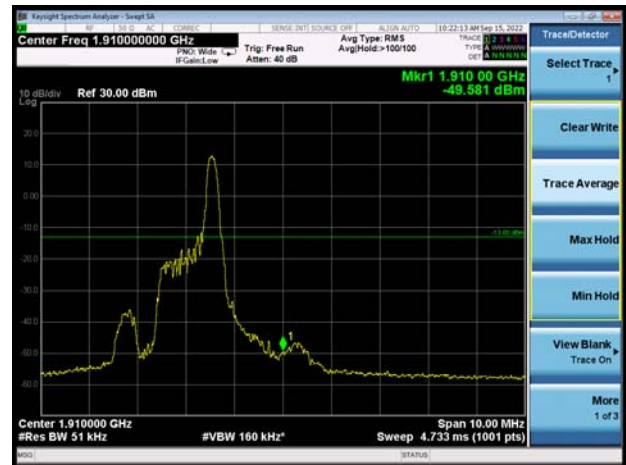
LTE eMTC Band 2 15MHz 16QAM 100%RB CH-High



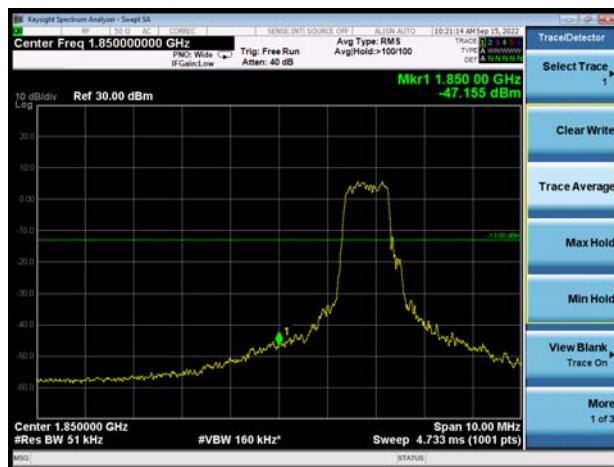
LTE eMTC Band 2 20MHz 16QAM 1RB CH-Low



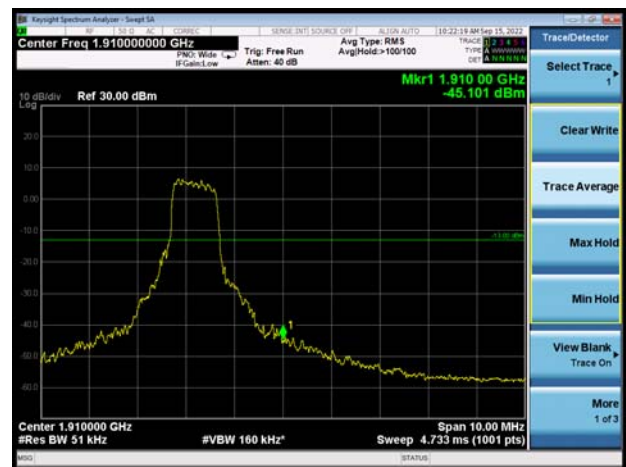
LTE eMTC Band 2 20MHz 16QAM 1RB CH-High



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



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

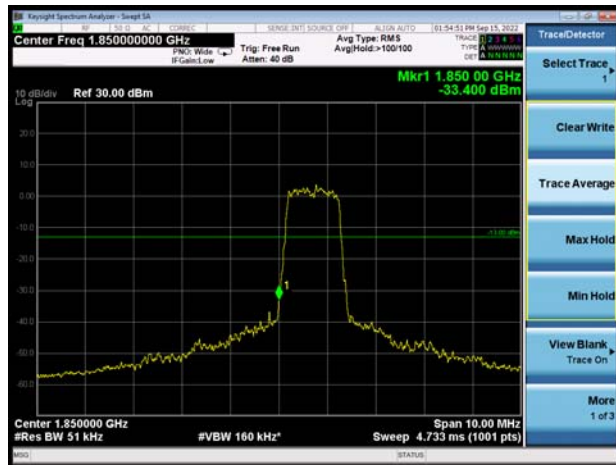
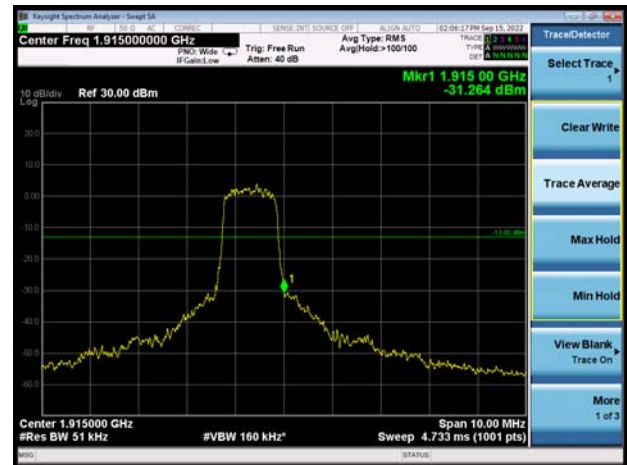




LTE eMTC Band 25 1.4MHz QPSK 1RB CH-Low



LTE eMTC Band 25 1.4MHz QPSK 1RB CH-High

LTE eMTC Band 25 1.4MHz QPSK 100%RB
CH-LowLTE eMTC Band 25 1.4MHz QPSK 100%RB
CH-High

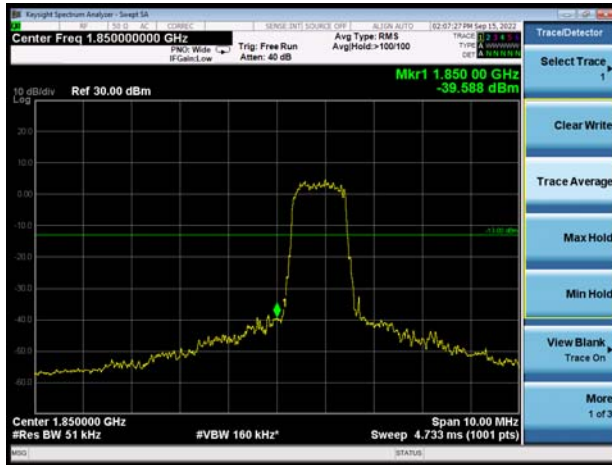
LTE eMTC Band 25 3MHz QPSK 1RB CH-Low



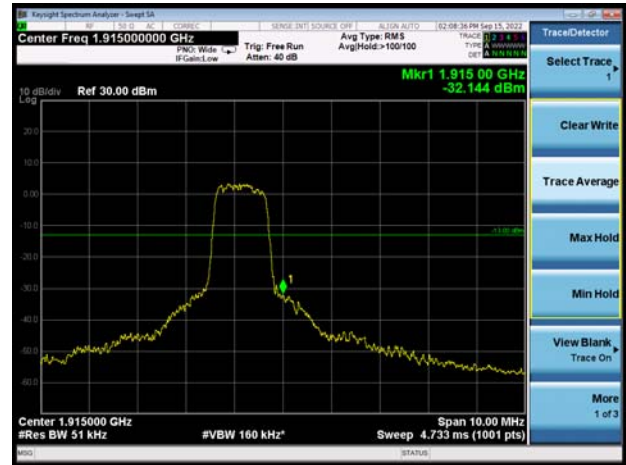
LTE eMTC Band 25 3MHz QPSK 1RB CH-High



LTE eMTC Band 25 3MHz QPSK 100%RB CH-Low



LTE eMTC Band 25 3MHz QPSK 100%RB CH-High



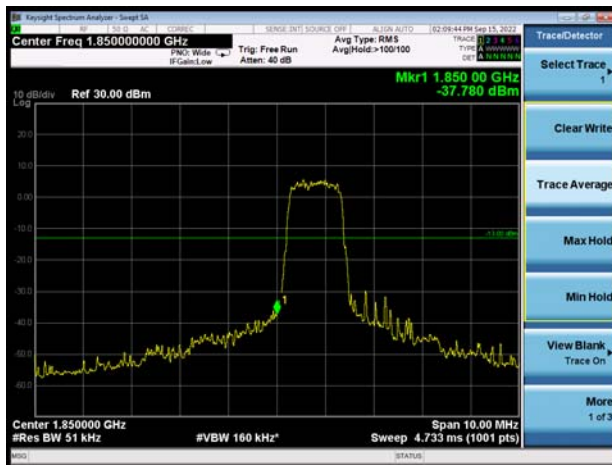
LTE eMTC Band 25 5MHz QPSK 1RB CH-Low



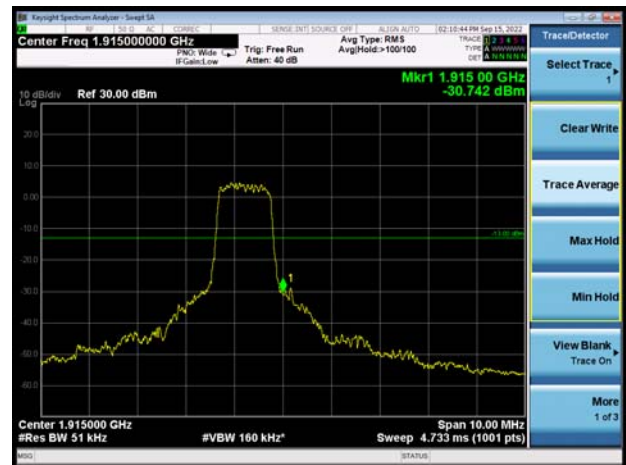
LTE eMTC Band 25 5MHz QPSK 1RB CH-High



LTE eMTC Band 25 5MHz QPSK 100%RB CH-Low



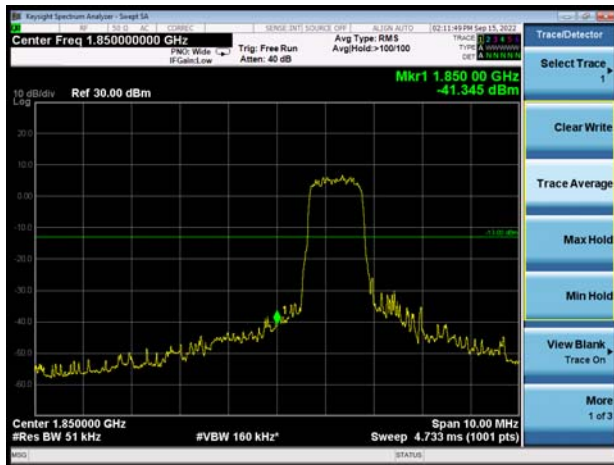
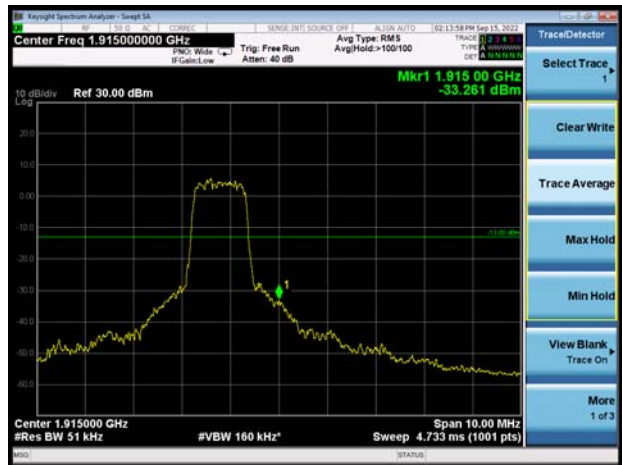
LTE eMTC Band 25 5MHz QPSK 100%RB CH-High



LTE eMTC Band 25 10MHz QPSK 1RB CH-Low



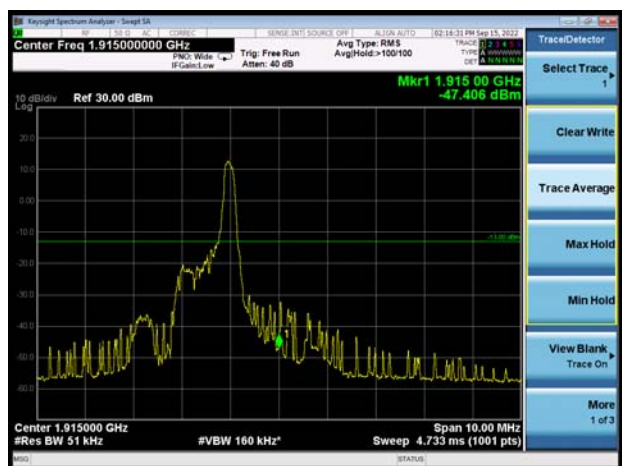
LTE eMTC Band 25 10MHz QPSK 1RB CH-High


LTE eMTC Band 25 10MHz QPSK 100%RB
CH-Low

LTE eMTC Band 25 10MHz QPSK 100%RB
CH-High


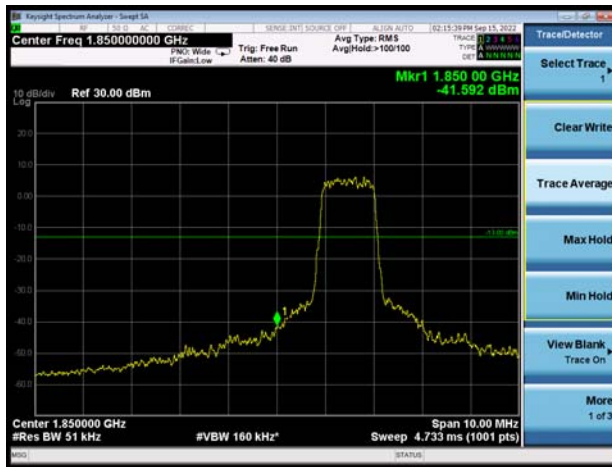
LTE eMTC Band 25 15MHz QPSK 1RB CH-Low



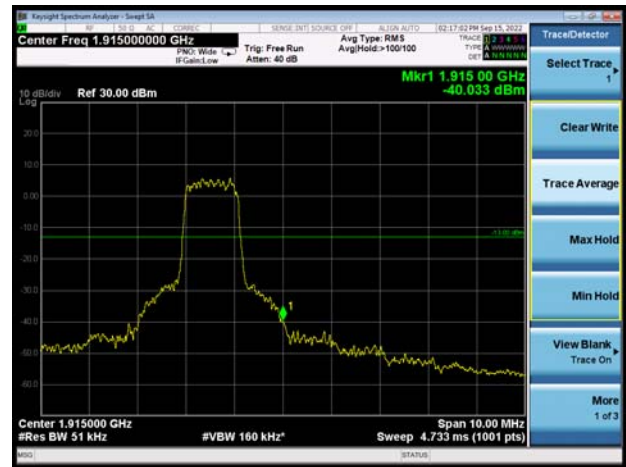
LTE eMTC Band 25 15MHz QPSK 1RB CH-High



LTE eMTC Band 25 15MHz QPSK 100%RB CH-Low



LTE eMTC Band 25 15MHz QPSK 100%RB CH-High



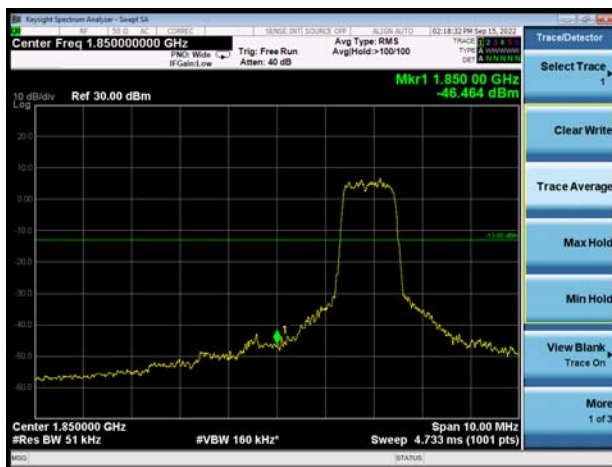
LTE eMTC Band 25 20MHz QPSK 1RB CH-Low



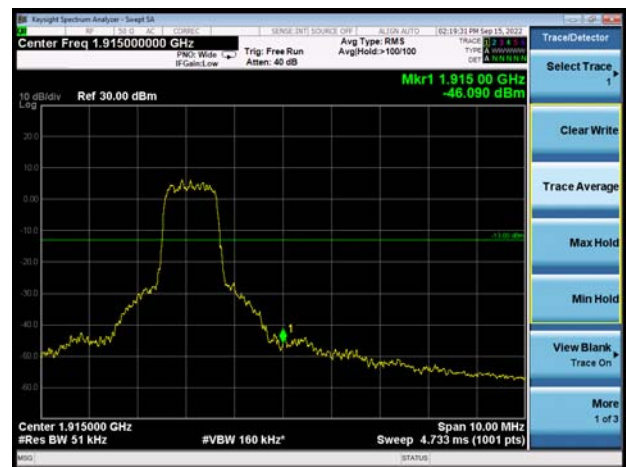
LTE eMTC Band 25 20MHz QPSK 1RB CH-High



LTE eMTC Band 25 20MHz QPSK 100%RB CH-Low



LTE eMTC Band 25 20MHz QPSK 100%RB CH-High



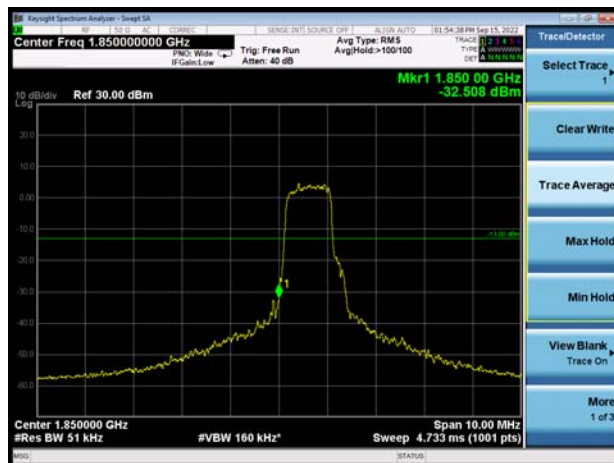
LTE eMTC Band 25 1.4MHz 16QAM 1RB CH-Low



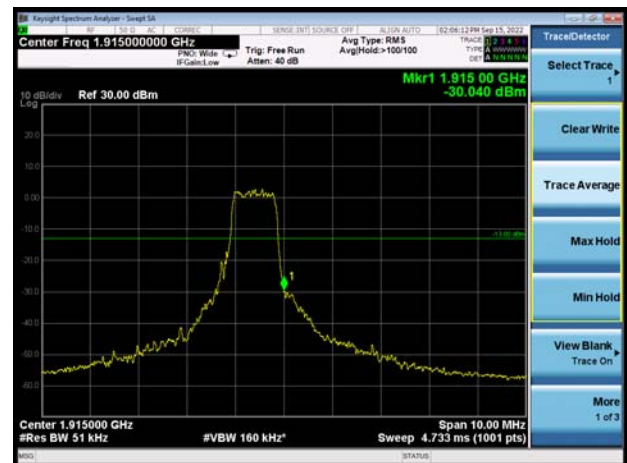
LTE eMTC Band 25 1.4MHz 16QAM 1RB CH-High



LTE eMTC Band 25 1.4MHz 16QAM 100%RB CH-Low



LTE eMTC Band 25 1.4MHz 16QAM 100%RB CH-High



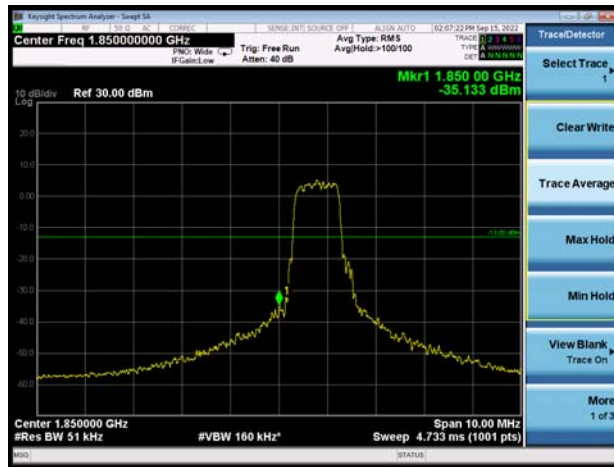
LTE eMTC Band 25 3MHz 16QAM 1RB CH-Low



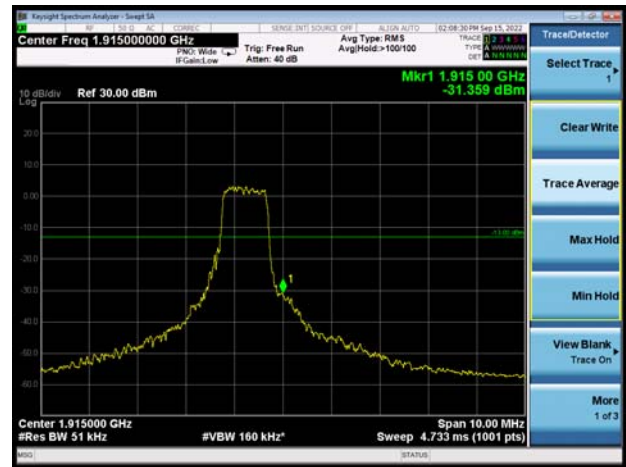
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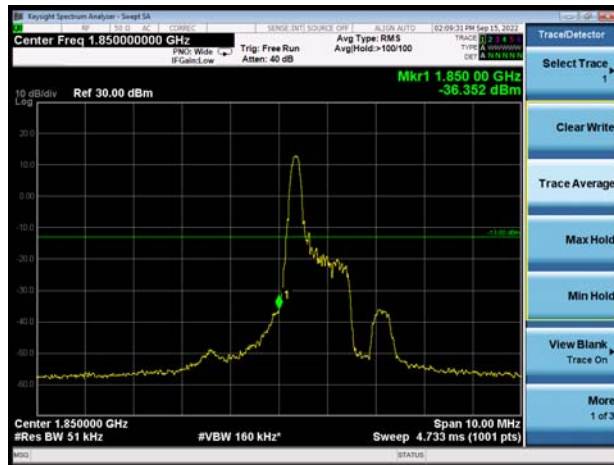
LTE eMTC Band 25 3MHz 16QAM 100%RB CH-Low



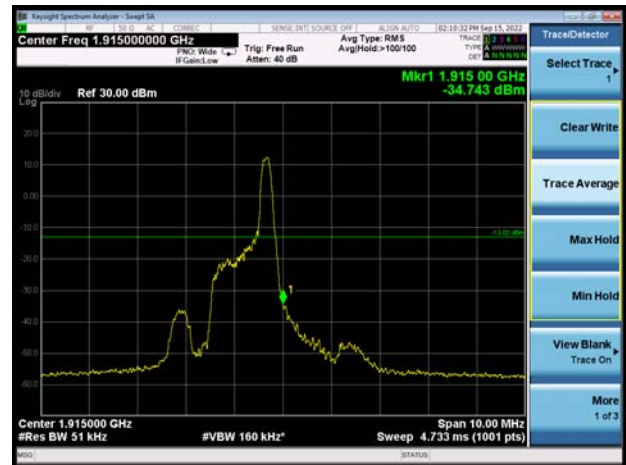
LTE eMTC Band 25 3MHz 16QAM 100%RB CH-High



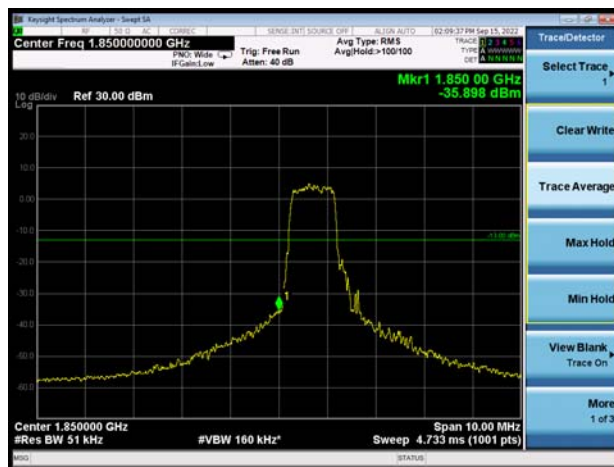
LTE eMTC Band 25 5MHz 16QAM 1RB CH-Low



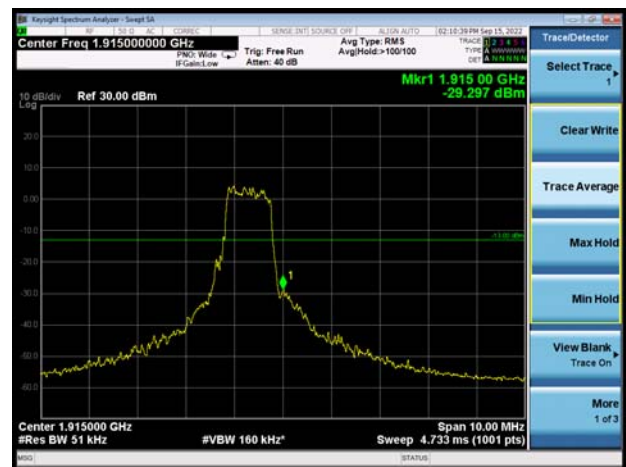
LTE eMTC Band 25 5MHz 16QAM 1RB CH-High



LTE eMTC Band 25 5MHz 16QAM 100%RB CH-Low



LTE eMTC Band 25 5MHz 16QAM 100%RB CH-High



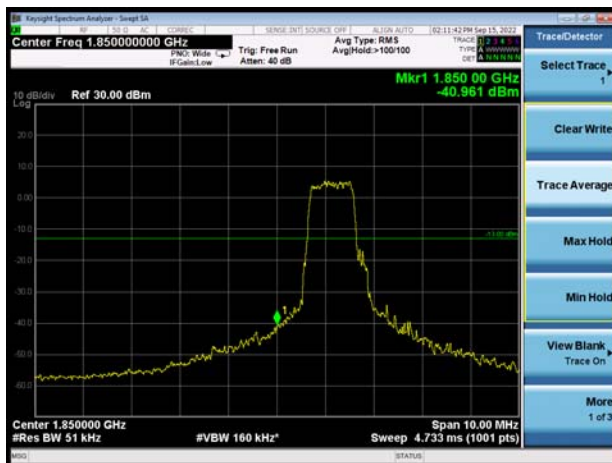
LTE eMTC Band 25 10MHz 16QAM 1RB CH-Low



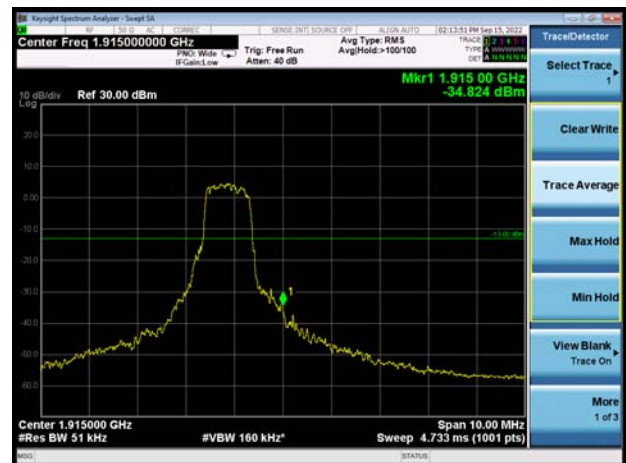
LTE eMTC Band 25 10MHz 16QAM 1RB CH-High



LTE eMTC Band 25 10MHz 16QAM 100%RB CH-Low



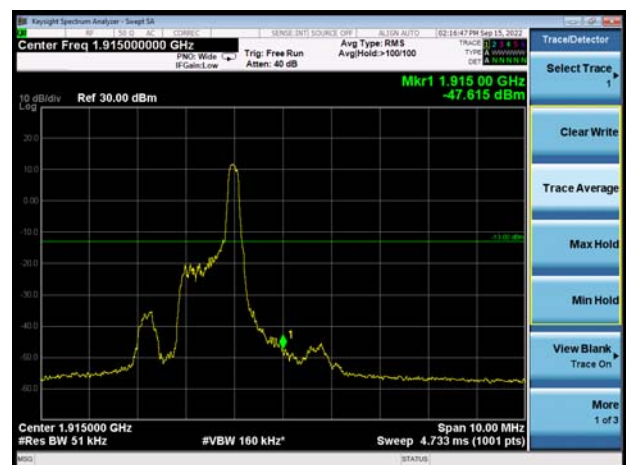
LTE eMTC Band 25 10MHz 16QAM 100%RB CH-High



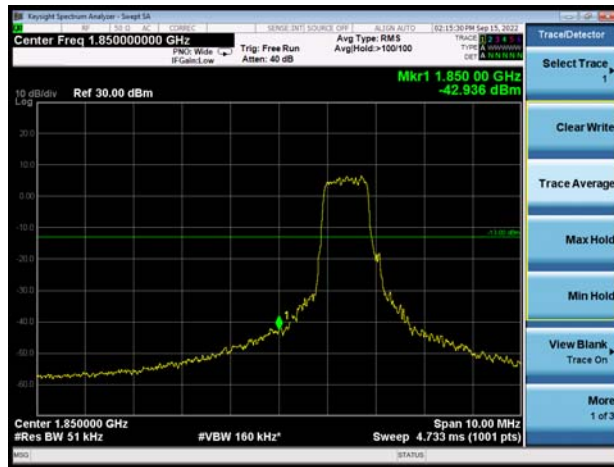
LTE eMTC Band 25 15MHz 16QAM 1RB CH-Low



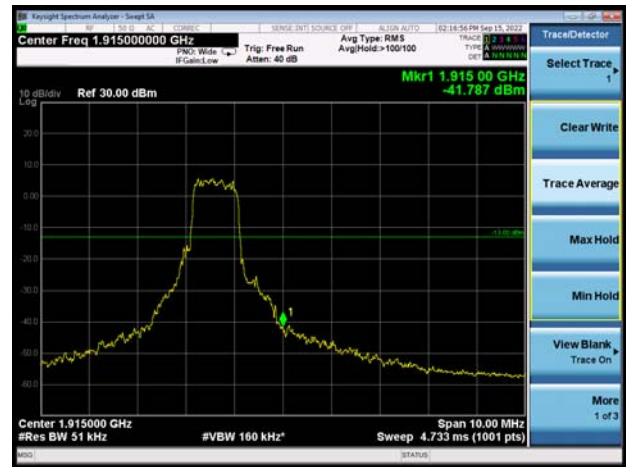
LTE eMTC Band 25 15MHz 16QAM 1RB CH-High



LTE eMTC Band 25 15MHz 16QAM 100%RB CH-Low



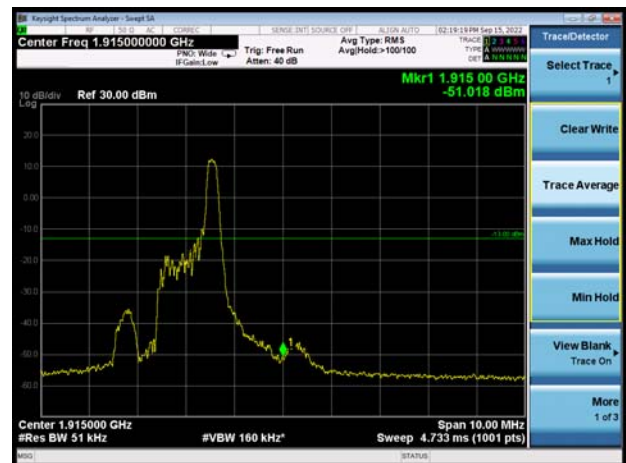
LTE eMTC Band 25 15MHz 16QAM 100%RB CH-High



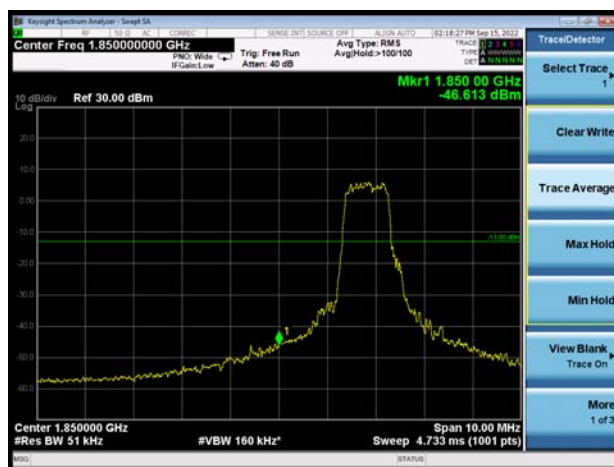
LTE eMTC Band 25 20MHz 16QAM 1RB CH-Low



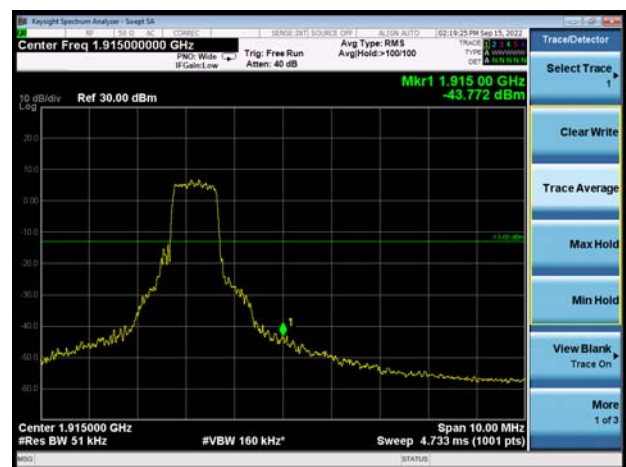
LTE eMTC Band 25 20MHz 16QAM 1RB CH-High



LTE eMTC Band 25 20MHz 16QAM 100%RB CH-Low



LTE eMTC Band 25 20MHz 16QAM 100%RB CH-High



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

Mode	Channel	Frequency (MHz)	Peak(dBm)	Avg(dBm)	PAPR(dB)	Limit(dB)	Conclusion
GSM 1900 (GMSK)	512	1850.2	31.46	28.58	2.88	≤13	PASS
	661	1880	31.15	28.23	2.92	≤13	PASS
	810	1909.8	29.51	26.56	2.95	≤13	PASS

Mode	Bandwidth	Modulation	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)		
				Peak(dBm)	Avg(dBm)	PAPR(dB)
LTE eMTC Band 2	1.4MHz	QPSK	18900/1880	27.57	17.62	9.95
		16QAM	18900/1880	28.27	17.21	11.06
	3MHz	QPSK	18900/1880	27.67	18.27	9.40
		16QAM	18900/1880	28.10	16.80	11.30
	5MHz	QPSK	18900/1880	28.47	18.59	9.88
		16QAM	18900/1880	28.01	17.35	10.66
	10MHz	QPSK	18900/1880	28.45	18.57	9.88
		16QAM	18900/1880	28.84	18.01	10.83
	15MHz	QPSK	18900/1880	29.29	20.00	9.29
		16QAM	18900/1880	29.55	19.16	10.39
	20MHz	QPSK	18900/1880	29.06	19.56	9.50
		16QAM	18900/1880	29.32	19.30	10.02

Mode	Bandwidth	Modulation	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)		
				Peak(dBm)	Avg(dBm)	PAPR(dB)
LTE eMTC Band 25	1.4MHz	QPSK	26365/1882.5	27.59	17.78	9.81
		16QAM	26365/1882.5	28.36	18.53	9.83
	3MHz	QPSK	26365/1882.5	27.60	17.31	10.29
		16QAM	26365/1882.5	28.19	18.12	10.07
	5MHz	QPSK	26365/1882.5	28.47	18.61	9.86
		16QAM	26365/1882.5	27.88	17.18	10.70
	10MHz	QPSK	26365/1882.5	28.58	19.49	9.09
		16QAM	26365/1882.5	28.89	18.04	10.85
	15MHz	QPSK	26365/1882.5	29.29	19.85	9.44
		16QAM	26365/1882.5	29.44	19.23	10.21
	20MHz	QPSK	26365/1882.5	29.29	20.01	9.28
		16QAM	26365/1882.5	29.61	19.48	10.13

6.5.Frequency Stability

	Condition		Freq.Error (Hz)	Frequency Stability(ppm)	Verdict
	Temperature	Voltage	GMSK	GMSK	
GSM1900	Normal (25℃)	Normal	12.90	0.00686	PASS
	Extreme (50℃)		5.07	0.00270	PASS
	Extreme (40℃)		4.77	0.00253	PASS
	Extreme (30℃)		15.87	0.00844	PASS
	Extreme (20℃)		6.16	0.00327	PASS
	Extreme (10℃)		9.78	0.00520	PASS
	Extreme (0℃)		15.05	0.00801	PASS
	Extreme (-10℃)		3.10	0.00165	PASS
	Extreme (-20℃)		15.91	0.00846	PASS
	Extreme (-30℃)		5.87	0.00312	PASS
	25℃	LV	5.71	0.00304	PASS
		HV	17.34	0.00922	PASS

	Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
	BANDWIDTH	1.4MHz	16QAM	QPSK	16QAM	QPSK	
LTE eMTC Band 2	Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	PASS
	Normal (25℃)	Normal	10.12	5.63	0.00538	0.00300	
	Extreme (50℃)		10.09	11.02	0.00537	0.00586	
	Extreme (40℃)		4.25	11.66	0.00226	0.00620	
	Extreme (30℃)		2.03	8.56	0.00108	0.00455	
	Extreme (20℃)		5.08	2.04	0.00270	0.00108	
	Extreme (10℃)		11.30	5.46	0.00601	0.00290	
	Extreme (0℃)		7.25	2.11	0.00386	0.00112	
	Extreme (-10℃)		7.07	13.77	0.00376	0.00732	
	Extreme (-20℃)		17.35	1.14	0.00923	0.00061	
	Extreme (-30℃)		17.66	7.84	0.00939	0.00417	
	25℃	LV	14.03	11.36	0.00746	0.00604	PASS
		HV	8.23	7.10	0.00438	0.00378	
	Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	PASS
	BANDWIDTH	3MHz	16QAM	QPSK	16QAM	QPSK	
	Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
	Normal (25℃)	Normal	9.17	8.30	0.00488	0.00441	
	Extreme (50℃)		16.30	13.28	0.00867	0.00706	
	Extreme (40℃)		10.91	6.57	0.00580	0.00349	



	Extreme (30℃)		9.91	13.55	0.00527	0.00721	PASS
	Extreme (20℃)		16.82	17.49	0.00895	0.00930	PASS
	Extreme (10℃)		9.21	17.72	0.00490	0.00943	PASS
	Extreme (0℃)		17.82	8.86	0.00948	0.00471	PASS
	Extreme (-10℃)		9.78	8.08	0.00520	0.00430	PASS
	Extreme (-20℃)		2.98	8.90	0.00159	0.00473	PASS
	Extreme (-30℃)		17.11	12.86	0.00910	0.00684	PASS
	25℃	LV	1.66	3.91	0.00089	0.00208	PASS
		HV	16.00	12.41	0.00851	0.00660	PASS
	Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
	BANDWIDTH	5MHz					
	Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
	Normal (25℃)		16.50	14.70	0.00878	0.00782	PASS
	Extreme (50℃)		12.95	8.66	0.00689	0.00461	PASS
	Extreme (40℃)		9.59	13.95	0.00510	0.00742	PASS
	Extreme (30℃)		6.56	3.90	0.00349	0.00208	PASS
	Extreme (20℃)		12.62	2.36	0.00671	0.00125	PASS
	Extreme (10℃)		17.30	8.29	0.00920	0.00441	PASS
	Extreme (0℃)		4.19	11.12	0.00223	0.00592	PASS
	Extreme (-10℃)		7.32	10.94	0.00390	0.00582	PASS
	Extreme (-20℃)		13.72	11.88	0.00730	0.00632	PASS
	Extreme (-30℃)		12.73	13.00	0.00677	0.00692	PASS
	25℃	LV	11.84	13.70	0.00630	0.00729	PASS
		HV	4.90	17.89	0.00261	0.00952	PASS
	Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
	BANDWIDTH	10MHz					
	Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
	Normal (25℃)		10.05	3.28	0.00535	0.00175	PASS
	Extreme (50℃)		17.04	10.83	0.00906	0.00576	PASS
	Extreme (40℃)		8.46	17.14	0.00450	0.00911	PASS
	Extreme (30℃)		1.11	7.80	0.00059	0.00415	PASS
	Extreme (20℃)		10.46	9.68	0.00556	0.00515	PASS
	Extreme (10℃)		16.64	8.06	0.00885	0.00428	PASS
	Extreme (0℃)		6.95	12.09	0.00370	0.00643	PASS
	Extreme (-10℃)		5.71	11.00	0.00304	0.00585	PASS
	Extreme (-20℃)		17.45	3.90	0.00928	0.00208	PASS
	Extreme (-30℃)		13.66	11.59	0.00727	0.00616	PASS
	25℃	LV	16.63	7.15	0.00884	0.00380	PASS
		HV	7.04	13.58	0.00375	0.00722	PASS
	Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict



	BANDWIDTH	15MHz					
	Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
	Normal (25℃)	Normal	5.12	17.19	0.00272	0.00914	PASS
	Extreme (50℃)		15.17	7.60	0.00807	0.00404	PASS
	Extreme (40℃)		10.99	16.67	0.00585	0.00887	PASS
	Extreme (30℃)		6.80	9.84	0.00362	0.00524	PASS
	Extreme (20℃)		7.38	3.63	0.00392	0.00193	PASS
	Extreme (10℃)		2.20	13.81	0.00117	0.00735	PASS
	Extreme (0℃)		2.61	10.15	0.00139	0.00540	PASS
	Extreme (-10℃)		14.89	15.63	0.00792	0.00831	PASS
	Extreme (-20℃)		9.40	13.20	0.00500	0.00702	PASS
	Extreme (-30℃)		2.12	5.60	0.00113	0.00298	PASS
	25℃	LV	11.48	5.58	0.00610	0.00297	PASS
		HV	4.36	9.50	0.00232	0.00506	PASS
	Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
	BANDWIDTH	20MHz					
	Temperature	Voltage					
	Normal (25℃)	Normal	17.12	9.61	0.00911	0.00511	PASS
	Extreme (50℃)		4.29	10.09	0.00228	0.00537	PASS
	Extreme (40℃)		10.49	2.92	0.00558	0.00155	PASS
	Extreme (30℃)		1.24	4.78	0.00066	0.00254	PASS
	Extreme (20℃)		13.33	6.75	0.00709	0.00359	PASS
	Extreme (10℃)		12.68	13.73	0.00674	0.00730	PASS
	Extreme (0℃)		2.87	15.78	0.00153	0.00839	PASS
	Extreme (-10℃)		10.22	11.22	0.00544	0.00597	PASS
	Extreme (-20℃)		10.94	10.90	0.00582	0.00580	PASS
	Extreme (-30℃)		12.44	9.55	0.00662	0.00508	PASS
	25℃	LV	10.38	12.28	0.00552	0.00653	PASS
		HV	4.40	10.98	0.00234	0.00584	PASS

LTE eMTC Band 25	Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
	BANDWIDTH	1.4MHz					
	Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
	Normal (25℃)	Normal	11.54	12.38	0.00614	0.00658	PASS
	Extreme (50℃)		15.02	17.06	0.00799	0.00907	PASS
	Extreme (40℃)		8.94	7.17	0.00476	0.00382	PASS
	Extreme (30℃)		13.91	3.34	0.00740	0.00177	PASS
	Extreme (20℃)		4.98	8.56	0.00265	0.00455	PASS
	Extreme (10℃)		1.71	7.77	0.00091	0.00413	PASS
	Extreme (0℃)		12.55	16.58	0.00668	0.00882	PASS
	Extreme (-10℃)		13.65	15.84	0.00726	0.00843	PASS
	Extreme (-20℃)		10.03	8.89	0.00533	0.00473	PASS
	Extreme (-30℃)		10.18	15.62	0.00542	0.00831	PASS
	25℃	LV	11.75	15.34	0.00625	0.00816	PASS
		HV	2.14	17.56	0.00114	0.00934	PASS
	Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
	BANDWIDTH	3MHz					
	Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
	Normal (25℃)	Normal	16.05	2.95	0.00854	0.00157	PASS
	Extreme (50℃)		1.27	4.45	0.00067	0.00236	PASS
	Extreme (40℃)		17.45	12.67	0.00928	0.00674	PASS
	Extreme (30℃)		10.71	12.44	0.00570	0.00662	PASS
	Extreme (20℃)		1.83	12.59	0.00097	0.00670	PASS
	Extreme (10℃)		6.32	2.88	0.00336	0.00153	PASS
	Extreme (0℃)		16.70	12.47	0.00888	0.00663	PASS
	Extreme (-10℃)		9.92	1.86	0.00528	0.00099	PASS
	Extreme (-20℃)		17.16	9.34	0.00913	0.00497	PASS
	Extreme (-30℃)		9.89	3.65	0.00526	0.00194	PASS
	25℃	LV	3.61	16.69	0.00192	0.00888	PASS
		HV	3.89	11.76	0.00207	0.00626	PASS
	Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
	BANDWIDTH	5MHz					
	Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
	Normal (25℃)	Normal	7.95	7.38	0.00423	0.00393	PASS
	Extreme (50℃)		5.65	4.37	0.00301	0.00232	PASS
	Extreme (40℃)		16.44	4.66	0.00875	0.00248	PASS
	Extreme (30℃)		14.90	4.55	0.00793	0.00242	PASS
	Extreme (20℃)		17.32	4.51	0.00921	0.00240	PASS
	Extreme (10℃)		7.89	13.53	0.00420	0.00719	PASS
	Extreme (0℃)		10.57	15.90	0.00562	0.00846	PASS
	Extreme (-10℃)		11.01	11.58	0.00586	0.00616	PASS
	Extreme (-20℃)		2.61	13.49	0.00139	0.00717	PASS



	Extreme (-30℃)		9.65	16.34	0.00513	0.00869	PASS
	25℃	LV	4.14	6.18	0.00220	0.00329	PASS
		HV	14.81	2.04	0.00788	0.00108	PASS
	Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
	BANDWIDTH	10MHz					
	Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
	Normal (25℃)	Normal	15.88	14.22	0.00845	0.00757	PASS
	Extreme (50℃)		7.94	10.67	0.00422	0.00568	PASS
	Extreme (40℃)		3.37	2.63	0.00179	0.00140	PASS
	Extreme (30℃)		8.34	1.26	0.00444	0.00067	PASS
	Extreme (20℃)		14.19	4.56	0.00755	0.00242	PASS
	Extreme (10℃)		5.44	1.94	0.00289	0.00103	PASS
	Extreme (0℃)		7.34	12.32	0.00391	0.00656	PASS
	Extreme (-10℃)		5.19	1.65	0.00276	0.00088	PASS
	Extreme (-20℃)		16.31	17.53	0.00867	0.00933	PASS
	Extreme (-30℃)		12.44	13.82	0.00662	0.00735	PASS
	25℃	LV	14.84	1.15	0.00789	0.00061	PASS
		HV	4.89	1.88	0.00260	0.00100	PASS
	Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
	BANDWIDTH	15MHz					
	Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
	Normal (25℃)	Normal	12.82	15.58	0.00682	0.00829	PASS
	Extreme (50℃)		9.64	11.77	0.00513	0.00626	PASS
	Extreme (40℃)		8.27	13.57	0.00440	0.00722	PASS
	Extreme (30℃)		13.84	5.13	0.00736	0.00273	PASS
	Extreme (20℃)		15.54	2.01	0.00827	0.00107	PASS
	Extreme (10℃)		1.90	9.98	0.00101	0.00531	PASS
	Extreme (0℃)		17.39	4.98	0.00925	0.00265	PASS
	Extreme (-10℃)		5.69	17.67	0.00303	0.00940	PASS
	Extreme (-20℃)		15.63	6.39	0.00832	0.00340	PASS
	Extreme (-30℃)		12.85	15.32	0.00683	0.00815	PASS
	25℃	LV	5.03	1.90	0.00267	0.00101	PASS
		HV	17.07	16.62	0.00908	0.00884	PASS
	Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
	BANDWIDTH	20MHz					
	Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
	Normal (25℃)	Normal	3.16	9.60	0.00168	0.00511	PASS
	Extreme (50℃)		5.98	5.37	0.00318	0.00285	PASS
	Extreme (40℃)		5.79	16.12	0.00308	0.00858	PASS
	Extreme (30℃)		14.26	7.94	0.00759	0.00422	PASS
	Extreme (20℃)		9.00	8.02	0.00479	0.00426	PASS
	Extreme (10℃)		7.44	4.13	0.00396	0.00220	PASS
	Extreme (0℃)		16.35	4.25	0.00870	0.00226	PASS



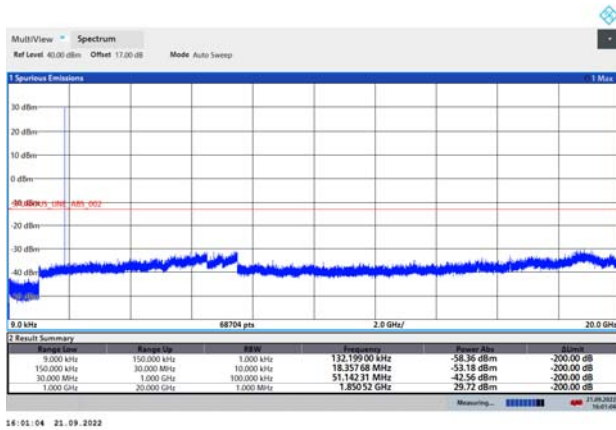
	Extreme (-10℃)		8.46	4.71	0.00450	0.00250	PASS
	Extreme (-20℃)		16.32	15.14	0.00868	0.00806	PASS
	Extreme (-30℃)		13.59	17.42	0.00723	0.00926	PASS
	25℃	LV	1.66	6.36	0.00088	0.00338	PASS
		HV	12.02	9.81	0.00639	0.00522	PASS

6.6. Spurious Emissions at Antenna Terminals

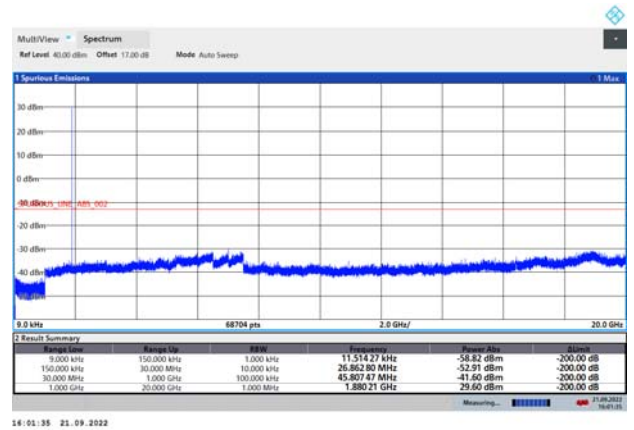
Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the emissions more than 20 dB below the limit are not reported.

The signal beyond the limit is carrier.

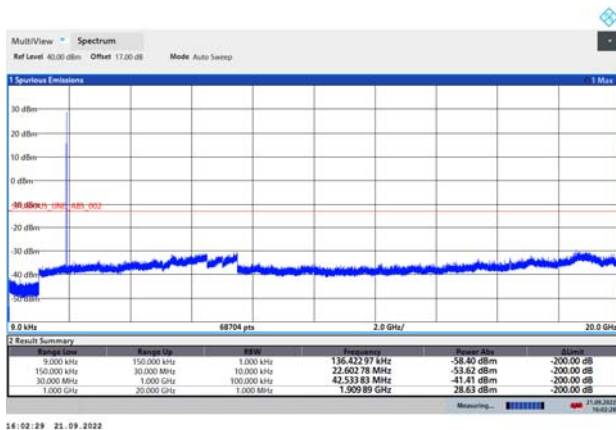
GPRS 1900 CH-Low 9kHz ~ 20GHz



GPRS 1900 CH- Middle 9kHz ~ 20GHz

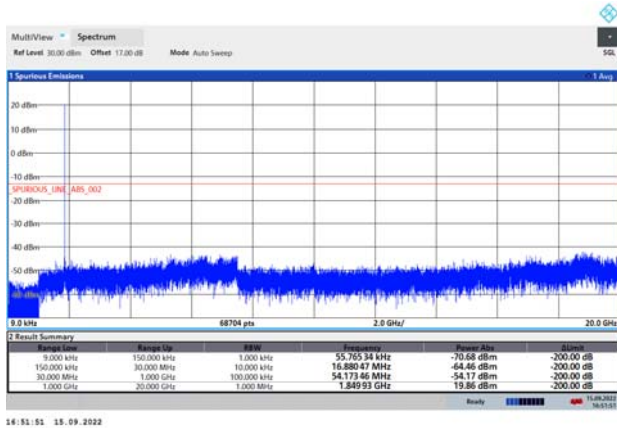


GPRS 1900 CH-High 9kHz ~ 20GHz

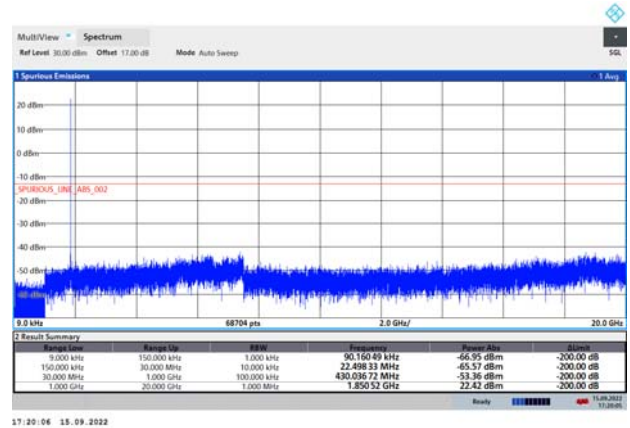




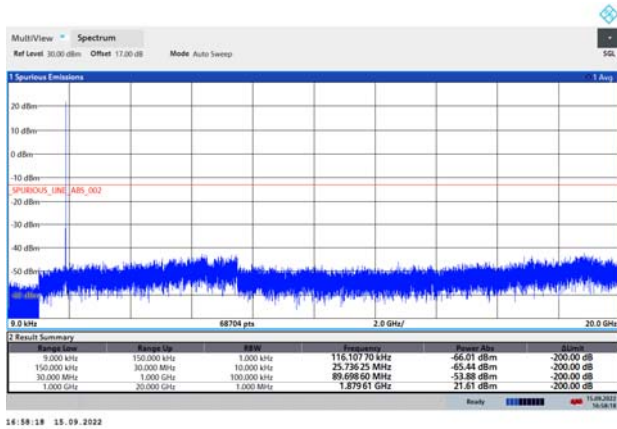
LTE eMTC Band 2 1.4MHz CH-Low 9kHz~20GHz



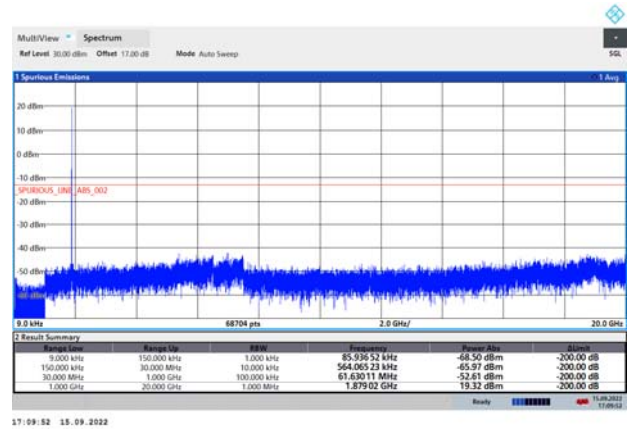
LTE eMTC Band 2 3MHz CH-Low 9kHz~20GHz



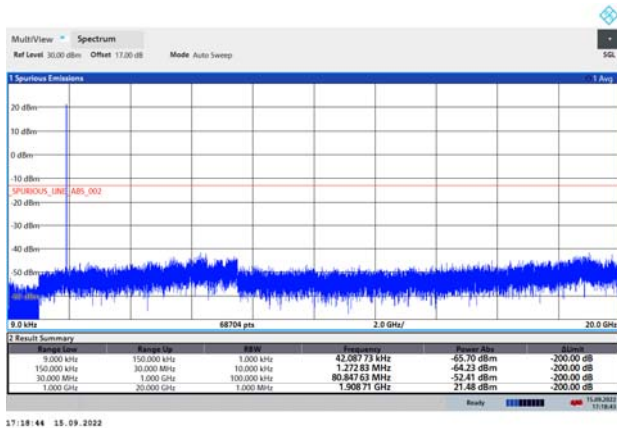
LTE eMTC Band 2 1.4MHz CH-Middle 9kHz~20GHz



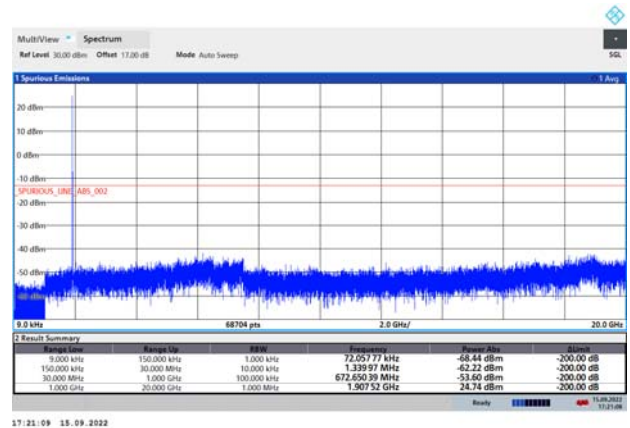
LTE eMTC Band 2 3MHz CH-Middle 9kHz~20GHz



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

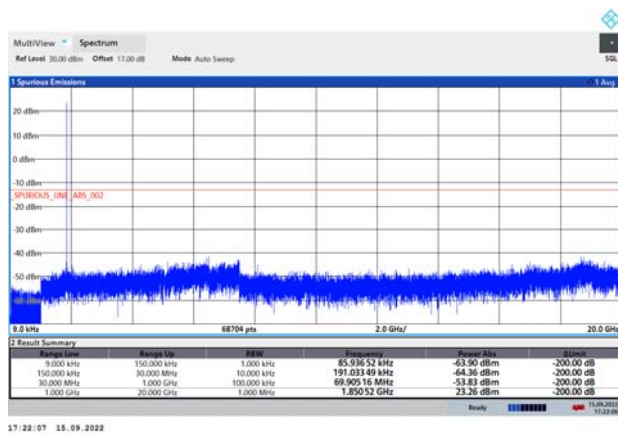


LTE eMTC Band 2 3MHz CH-High 9kHz~20GHz

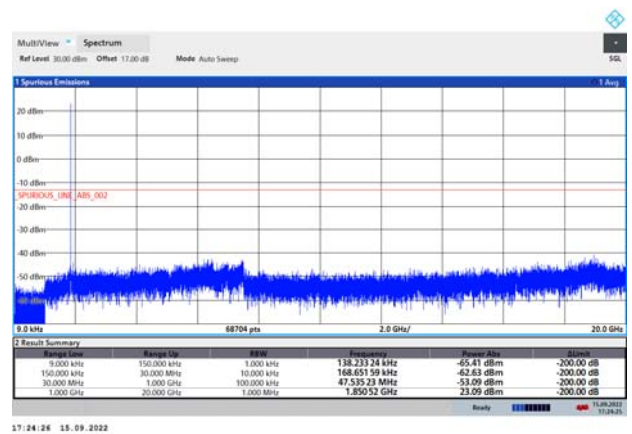




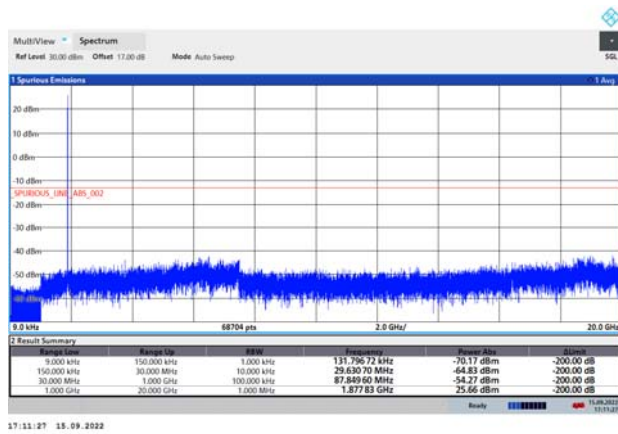
LTE eMTC Band 2 5MHz CH-Low 9kHz~20GHz



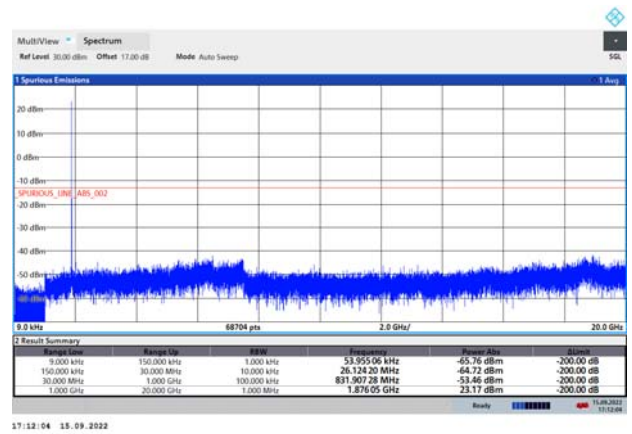
LTE eMTC Band 2 10MHz CH-Low 9kHz~20GHz



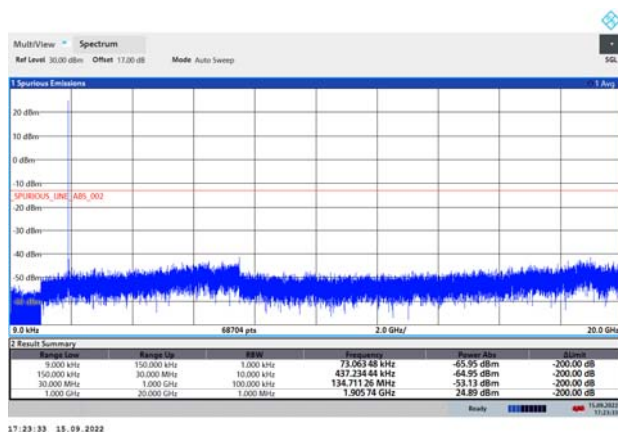
LTE eMTC Band 2 5MHz CH-Middle 9kHz~20GHz



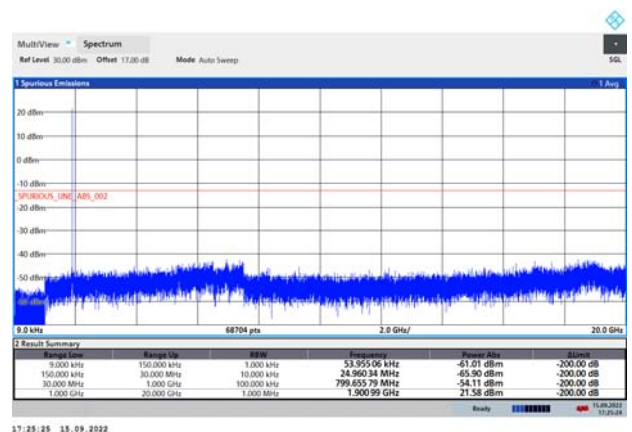
LTE eMTC Band 2 10MHz CH-Middle 9kHz~20GHz



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

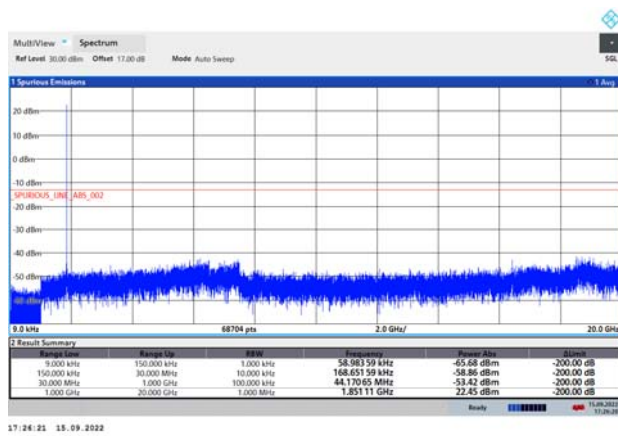


LTE eMTC Band 2 10MHz CH-High 9kHz~20GHz



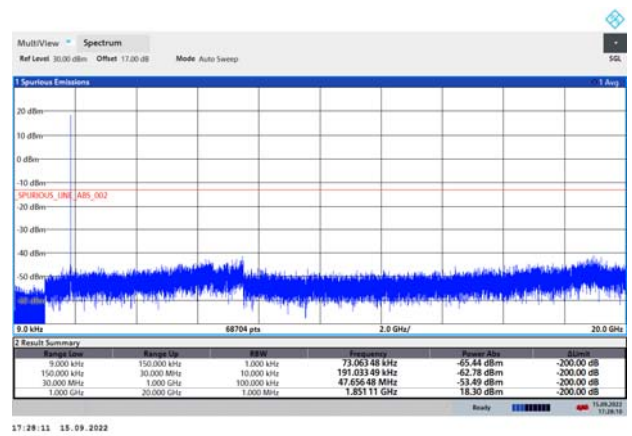


LTE eMTC Band 2 15MHz CH-Low 9kHz~20GHz



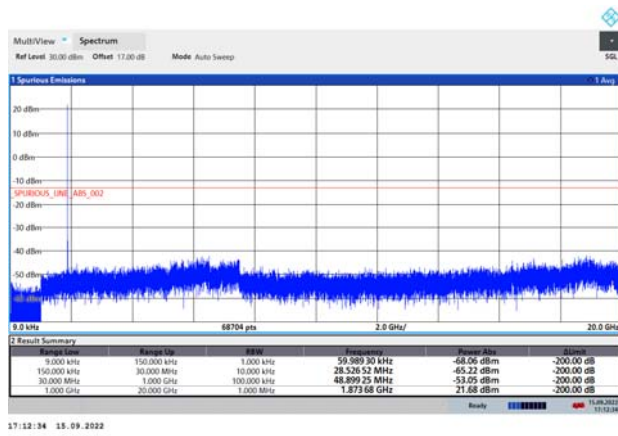
17:24:21 15.09.2022

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



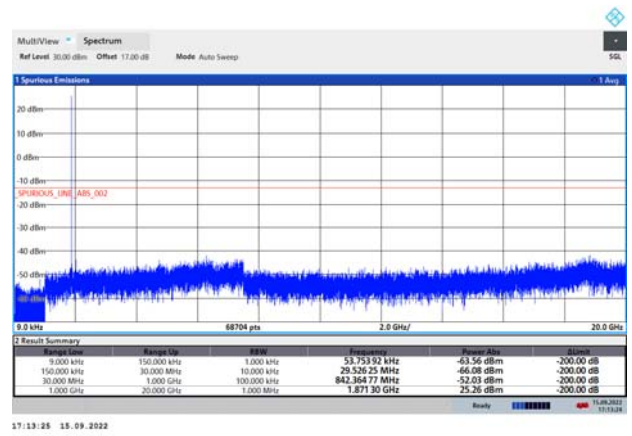
17:28:11 15.09.2022

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



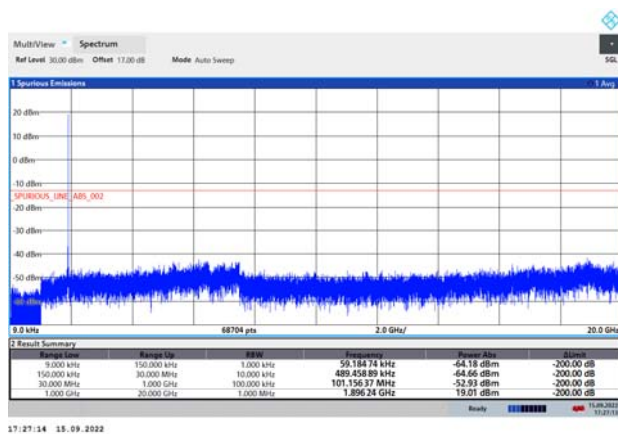
17:12:34 15.09.2022

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



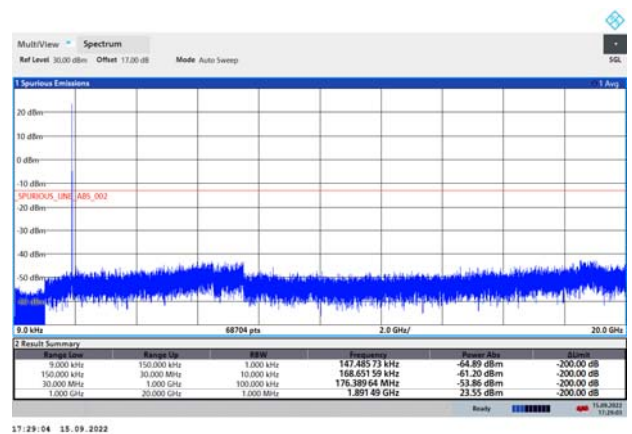
17:13:25 15.09.2022

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



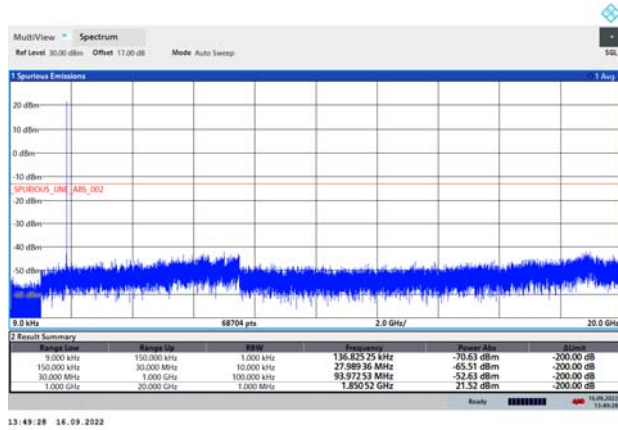
17:27:14 15.09.2022

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



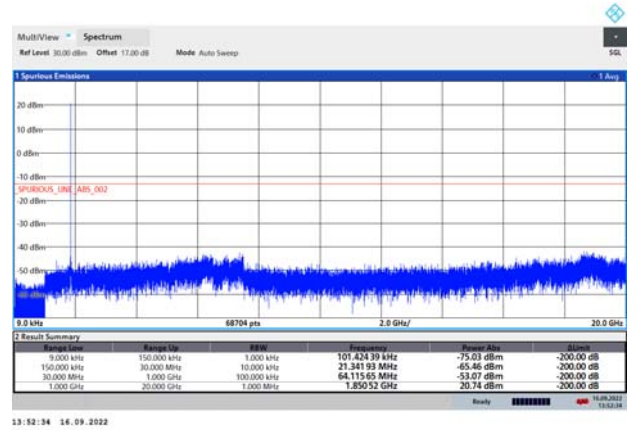
17:29:04 15.09.2022

LTE eMTC Band 25 1.4MHz CH-Low 9kHz~20GHz



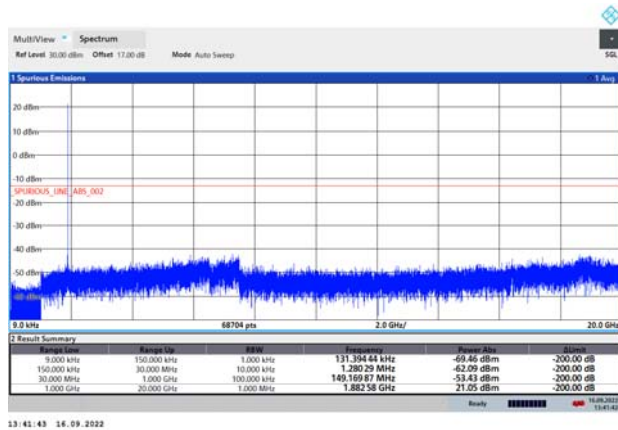
13:49:28 16.09.2022

LTE eMTC Band 25 3MHz CH-Low 9kHz~20GHz



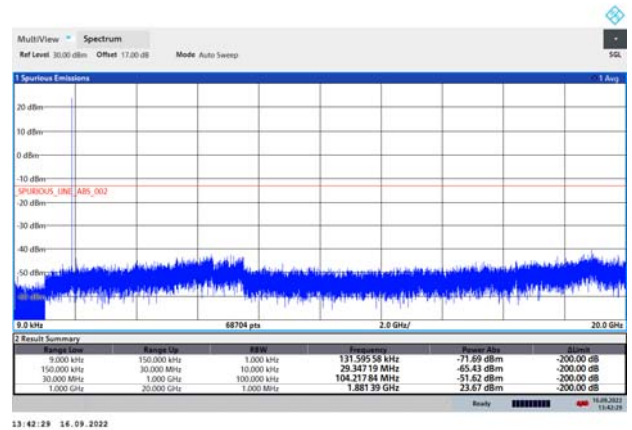
13:52:34 16.09.2022

LTE eMTC Band 25 1.4MHz CH-Middle 9kHz~20GHz



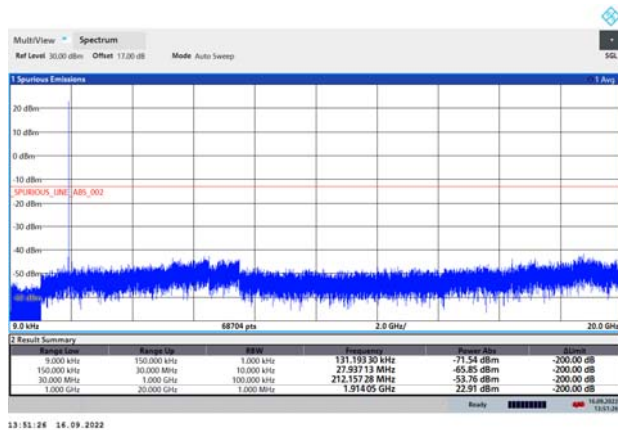
13:41:49 16.09.2022

LTE eMTC Band 25 3MHz CH-Middle 9kHz~20GHz



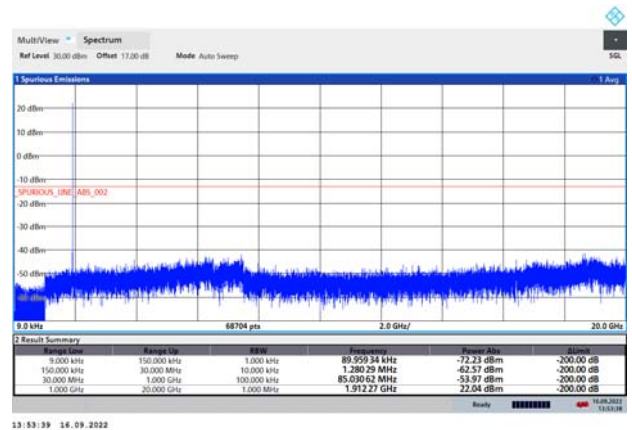
13:42:29 16.09.2022

LTE eMTC Band 25 1.4MHz CH-High 9kHz~20GHz



13:51:26 16.09.2022

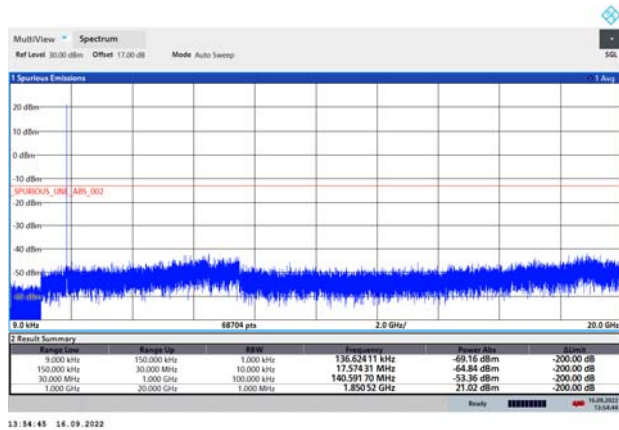
LTE eMTC Band 25 3MHz CH-High 9kHz~20GHz



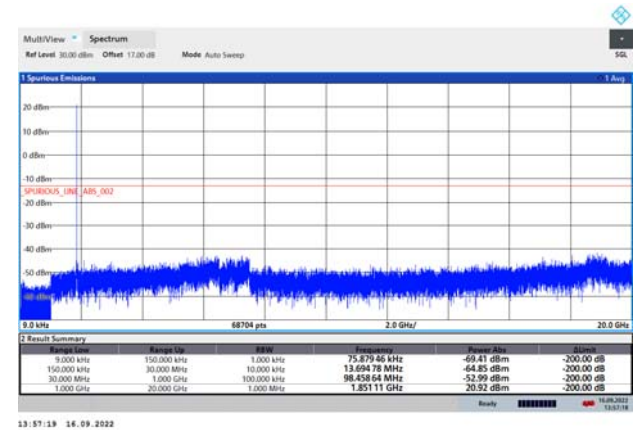
13:53:39 16.09.2022



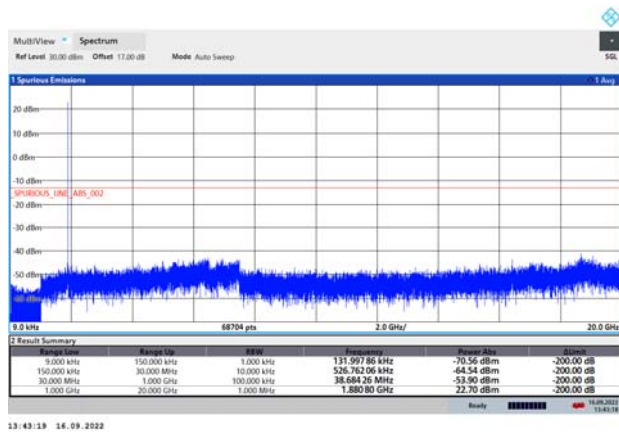
LTE eMTC Band 25 5MHz CH-Low 9kHz~20GHz



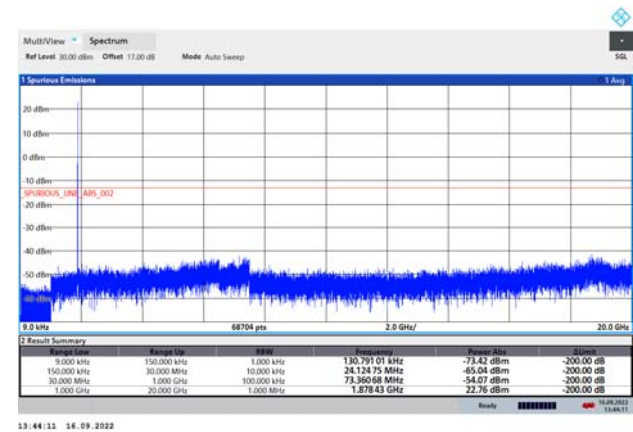
LTE eMTC Band 25 10MHz CH-Low 9kHz~20GHz



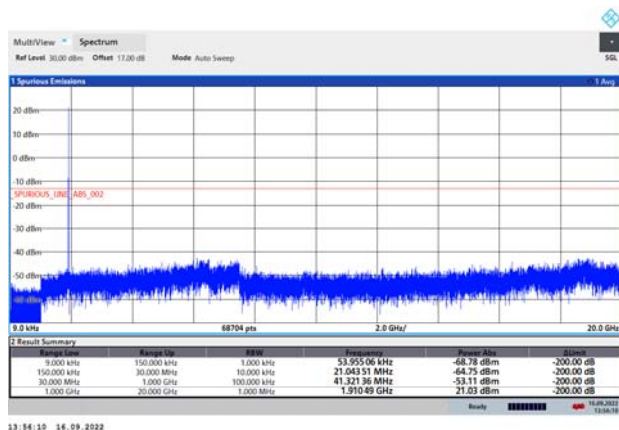
LTE eMTC Band 25 5MHz CH-Middle 9kHz~20GHz



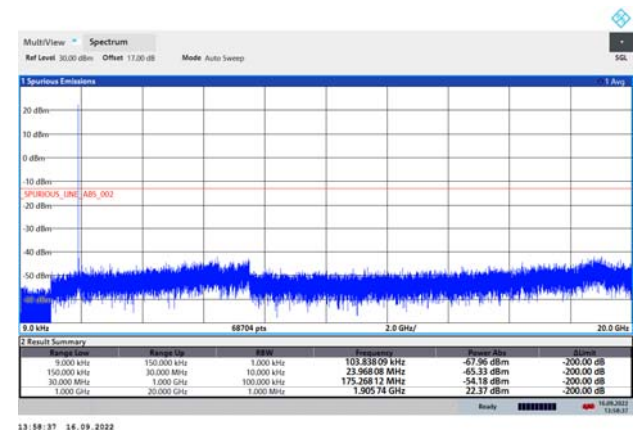
LTE eMTC Band 25 10MHz CH-Middle 9kHz~20GHz

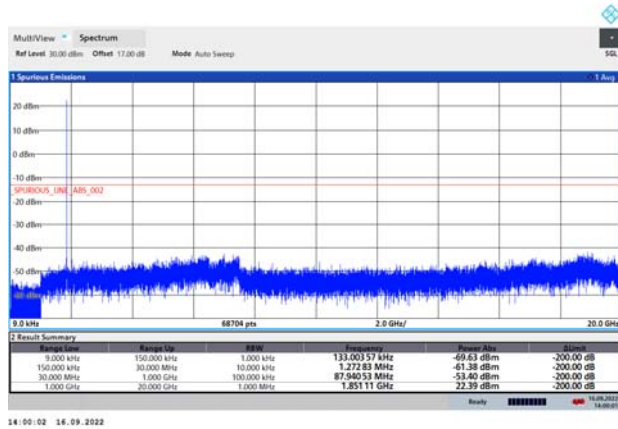


LTE eMTC Band 25 5MHz CH-High 9kHz~20GHz

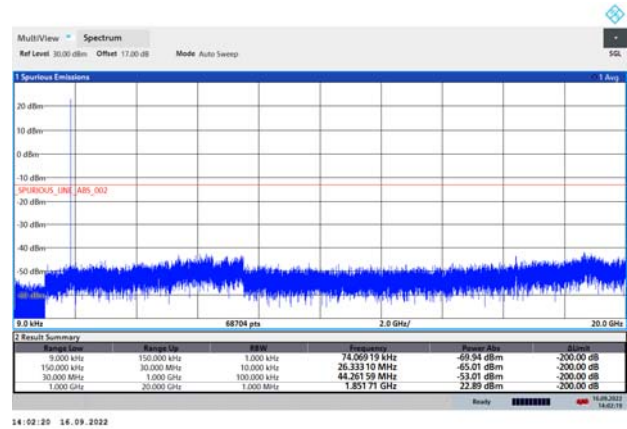


LTE eMTC Band 25 10MHz CH-High 9kHz~20GHz

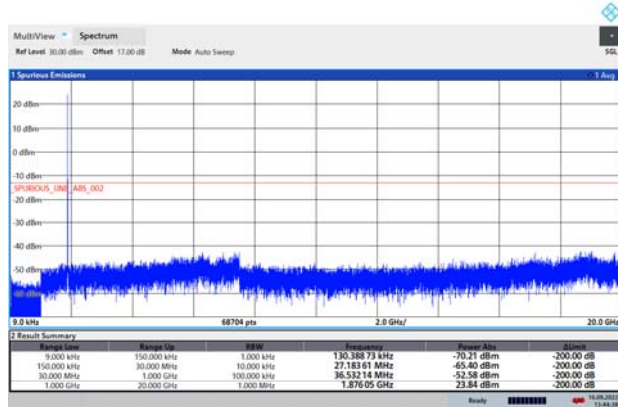


LTE eMTC Band 25 15MHz CH-Low
9kHz~20GHz

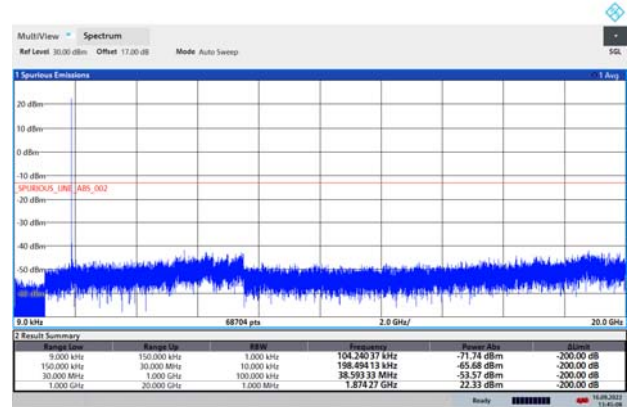
14:00:02 16.09.2022

LTE eMTC Band 25 20MHz CH-Low
9kHz~20GHz

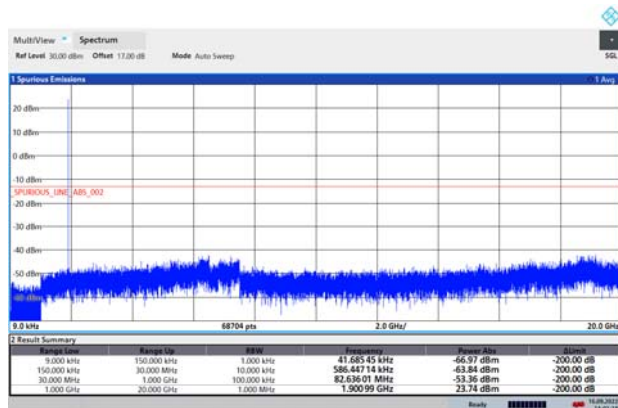
14:02:20 16.09.2022

LTE eMTC Band 25 15MHz CH-Middle
9kHz~20GHz

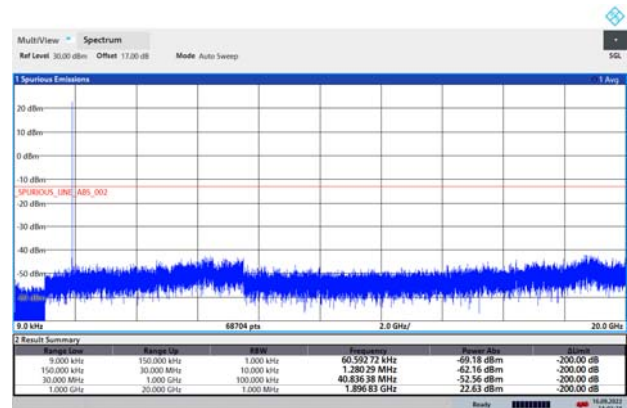
13:44:39 16.09.2022

LTE eMTC Band 25 20MHz CH-Middle
9kHz~20GHz

13:45:09 16.09.2022

LTE eMTC Band 25 15MHz CH-High
9kHz~20GHz

14:01:25 16.09.2022

LTE eMTC Band 25 20MHz CH-High
9kHz~20GHz

14:03:24 16.09.2022

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.

GSM 1900 CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3760.00	-54.07	2.60	12.50	Horizontal	-44.17	-13.00	31.17	0
3	5640.00	-58.80	3.30	12.50	Horizontal	-49.60	-13.00	36.60	225
4	7520.00	-56.30	4.20	12.20	Horizontal	-48.30	-13.00	35.30	315
5	9400.00	-53.32	4.30	11.10	Horizontal	-46.52	-13.00	33.52	90
6	11280.00	-49.26	5.90	11.90	Horizontal	-43.26	-13.00	30.26	45
7	13160.00	-52.72	5.70	14.00	Horizontal	-44.42	-13.00	31.42	225
8	15040.00	-51.56	5.80	13.10	Horizontal	-44.26	-13.00	31.26	180
9	16920.00	-49.96	6.10	14.60	Horizontal	-41.46	-13.00	28.46	90
10	18800.00	/	/	/	/	/	/	/	/
Note: 1. The other Spurious RF Radiated emissions level is no more than noise floor. 2. The worst emission was found in the antenna is Horizontal position.									

LTE eMTC 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	3758.90	-52.56	2.60	12.50	Horizontal	-42.66	-13.00	29.66	315
3	5638.88	-63.71	3.30	12.50	Horizontal	-54.51	-13.00	41.51	270
4	7520.00	-57.57	4.20	12.20	Horizontal	-49.57	-13.00	36.57	45
5	9400.00	-53.88	4.30	11.10	Horizontal	-47.08	-13.00	34.08	225
6	11280.00	-49.33	5.90	11.90	Horizontal	-43.33	-13.00	30.33	0
7	13160.00	-52.48	5.70	14.00	Horizontal	-44.18	-13.00	31.18	90
8	15040.00	-52.28	5.80	13.10	Horizontal	-44.98	-13.00	31.98	45
9	16920.00	-50.59	6.10	14.60	Horizontal	-42.09	-13.00	29.09	315
10	18800.00	/	/	/	/	/	/	/	/
Note: 1. The other Spurious RF Radiated emissions level is no more than noise floor. 2. The worst emission was found in the antenna is Horizontal position.									

LTE eMTC 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	3755.63	-52.50	2.60	12.50	Horizontal	-42.60	-13.00	29.60	45
3	5633.63	-59.93	3.30	12.50	Horizontal	-50.73	-13.00	37.73	180
4	7510.00	-57.88	4.20	12.20	Horizontal	-49.88	-13.00	36.88	90
5	9387.50	-53.84	4.30	11.10	Horizontal	-47.04	-13.00	34.04	0
6	11265.00	-50.53	5.90	11.90	Horizontal	-44.53	-13.00	31.53	45
7	13142.00	-52.94	5.70	14.00	Horizontal	-44.64	-13.00	31.64	135
8	15020.00	-51.53	5.80	13.10	Horizontal	-44.23	-13.00	31.23	90
9	16897.50	-50.98	6.10	14.60	Horizontal	-42.48	-13.00	29.48	225
10	18800.00	/	/	/	/	/	/	/	/

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2. The worst emission was found in the antenna is Horizontal position.

LTE eMTC 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	-54.58	2.60	12.50	Horizontal	-44.68	-13.00	31.68	0
3	5613.38	-62.93	3.30	12.50	Horizontal	-53.73	-13.00	40.73	90
4	7484.63	-58.25	4.20	12.20	Horizontal	-50.25	-13.00	37.25	0
5	9355.33	-53.68	4.30	11.10	Horizontal	-46.88	-13.00	33.88	45
6	11226.39	-49.21	5.90	11.90	Horizontal	-43.21	-13.00	30.21	315
7	13097.46	-52.64	5.70	14.00	Horizontal	-44.34	-13.00	31.34	90
8	14968.52	-52.67	5.80	13.10	Horizontal	-45.37	-13.00	32.37	45
9	16938.59	-50.74	6.10	14.60	Horizontal	-42.24	-13.00	29.24	225
10	18800.00	/	/	/	/	/	/	/	/

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2. The worst emission was found in the antenna is Horizontal position.

LTE eMTC Band 25 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	3765.00	-52.84	2.60	12.50	Horizontal	-42.94	-13.00	29.94	315
3	5647.50	-60.29	3.30	12.50	Horizontal	-51.09	-13.00	38.09	0
4	7530.00	-57.81	4.20	12.20	Horizontal	-49.81	-13.00	36.81	225
5	9412.50	-54.66	4.30	11.10	Horizontal	-47.86	-13.00	34.86	90
6	11295.00	-49.68	5.90	11.90	Horizontal	-43.68	-13.00	30.68	0
7	13177.50	-52.46	5.70	14.00	Horizontal	-44.16	-13.00	31.16	45
8	15060.00	-52.40	5.80	13.10	Horizontal	-45.10	-13.00	32.10	315
9	16942.50	-50.51	6.10	14.60	Horizontal	-42.01	-13.00	29.01	180
10	18825.00	/	/	/	/	/	/	/	/

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2. The worst emission was found in the antenna is Horizontal position.

LTE eMTC Band 25 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	3765.00	-54.06	2.60	12.50	Horizontal	-44.16	-13.00	31.16	0
3	5647.50	-61.02	3.30	12.50	Horizontal	-51.82	-13.00	38.82	270
4	7530.00	-58.30	4.20	12.20	Horizontal	-50.30	-13.00	37.30	225
5	9412.50	-54.11	4.30	11.10	Horizontal	-47.31	-13.00	34.31	315
6	11295.00	-49.63	5.90	11.90	Horizontal	-43.63	-13.00	30.63	90
7	13177.50	-52.16	5.70	14.00	Horizontal	-43.86	-13.00	30.86	0
8	15060.00	-52.45	5.80	13.10	Horizontal	-45.15	-13.00	32.15	45
9	16942.50	-50.80	6.10	14.60	Horizontal	-42.30	-13.00	29.30	180
10	18825.00	/	/	/	/	/	/	/	/

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2. The worst emission was found in the antenna is Horizontal position.

LTE eMTC Band 25 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	3748.13	-51.07	2.60	12.50	Horizontal	-41.17	-13.00	28.17	0
3	5622.00	-59.37	3.30	12.50	Horizontal	-50.17	-13.00	37.17	45
4	7496.00	-56.60	4.20	12.20	Horizontal	-48.60	-13.00	35.60	315
5	9370.00	-53.49	4.30	11.10	Horizontal	-46.69	-13.00	33.69	135
6	11244.00	-49.62	5.90	11.90	Horizontal	-43.62	-13.00	30.62	90
7	13118.00	-53.05	5.70	14.00	Horizontal	-44.75	-13.00	31.75	0
8	14992.00	-50.31	5.80	13.10	Horizontal	-43.01	-13.00	30.01	0
9	16866.00	-50.06	6.10	14.60	Horizontal	-41.56	-13.00	28.56	225
10	18740.00	/	/	/	/	/	/	/	/

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2. The worst emission was found in the antenna is Horizontal position.

7. Main Test Instruments

Name	Manufacturer	Type	Serial Number	Calibration Date	Expiration Date
Climatic Chamber	ESPEC	SU-242	93000506	2021-12-12	2022-12-11
Comprehensive measuring instrument	R&S	CMW500	150415	2022-05-14	2023-05-13
Spectrum Analyzer	Keysight	N9020A	MY50510203	2021-12-12	2022-12-11
Universal Radio Communication Tester	Agilent	E5515C	GB44400275	2021-12-12	2022-12-11
Universal Radio Communication Tester	StarPoint	SP8315	SP8315-1225	2022-05-14	2023-05-13
Spectrum Analyzer	R&S	FSV3030	101411	2021-12-12	2022-12-11
Radiated Spurious Emissions					
Signal Analyzer	R&S	FSV30	100815	2021-12-12	2022-12-11
Loop antenna	SCHWARZBECK	FMZB1519	1519-047	2020-04-02	2023-04-01
TRILOG Broadband Antenna	Schwarzbeck	VULB 9163	01439	2021-06-30	2024-06-29
Horn Antenna	Schwarzbeck	BBHA 9120D	1594	2020-12-17	2023-12-16
Horn Antenna	ETS-Lindgren	3160-09	00102643	2021-10-10	2024-10-09
Software	R&S	EMC32	10.35.10	/	/

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



ANNEX A: The EUT Appearance

The EUT Appearance is submitted separately.



ANNEX B: Test Setup Photos

The Test Setup Photos is submitted separately.