FCC RF Test Report

APPLICANT	:	HMD Global Oy
EQUIPMENT	:	GSM/WCDMA/LTE Mobile Phone
BRAND NAME	:	NOKIA
MODEL NAME	:	TA-1483
FCC ID	:	2AJOTTA-1483
STANDARD	:	47 CFR Part 2, 22(H), 24(E), 27(L), 27(M)
CLASSIFICATION	:	PCS Licensed Transmitter Held to Ear (PCE)
TEST DATE(S)	:	May 19, 2022 ~ Jun. 03, 2022

We, Sporton International Inc. (Kunshan), would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.26-2015 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.

Jason Jia

Approved by: Jason Jia

ACCREDITED Cert #5145.02

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People's Republic of China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG241204B	Rev. 01	Initial issue of report	Jun. 15, 2022

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.4	§2.1046	Conducted Output Power	-	Report Only	-
	§22.913(a)(5)	Effective Radiated Power (Band 5)	ERP < 7 Watt	PASS	-
	§24.232(c) §27.50(h)(2)	Equivalent Isotropic Radiated Power (Band 2) (Band 7)	EIRP < 2Watt		-
	§27.50(d)(4)	Equivalent Isotropic Radiated Power (Band 4)	EIRP < 1Watt		-
3.5	§24.232(d)	Peak-to-Average Ratio	<13 dB	PASS	-
3.6	§2.1049	Occupied Bandwidth	-	Report Only	-
3.7	§2.1051 §24.238(a)	Conducted Band Edge Measurement (Band 2) (Band 4)	< 43+10log10(P[Watts])	PASS	-
3.8	§2.1051 §24.238(a)	Conducted Spurious Emission (Band 2) (Band 4)	< 43+10log10(P[Watts])	PASS	-
3.9	§2.1055 §24.235	Frequency Stability Temperature & Voltage	Within Authorized Band	PASS	-
4.4	§2.1053 §22.917(a) §24.238(a)	Radiated Spurious Emission (Band 2) (Band 4) (Band 5)	< $43+10\log_{10}$(P[Watts])	PASS	Under limit 18.22 dB at 7576.000 MHz
	§2.1053 §27.53(m)(4)	Radiated Spurious Emission (Band 7)	< $55+10\log_{10}$(P[Watts])		

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

1 General Description

1.1 Applicant

HMD Global Oy
Bertel Jungin aukio 9, 02600 Espoo, Finland

1.2 Manufacturer

HMD Global Oy
Bertel Jungin aukio 9, 02600 Espoo, Finland

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	GSM/WCDMA/LTE Mobile Phone
Brand Name	NOKIA
Model Name	TA-1483
FCC ID	2AJOTTA-1483
IMEI Code	Conducted: 356517420000674/356517420003231 Radiation: 356517420000211/356174200002779
HW Version	0107
SW Version	0.2221.15.10
EUT Stage	Identical Prototype

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx Frequency	LTE Band 2 : 1850 MHz ~ 1910 MHz LTE Band 4 : 1710 MHz ~ 1755 MHz LTE Band 5 : 824 MHz ~ 849 MHz LTE Band 7 : 2500 MHz ~ 2570 MHz
Rx Frequency	LTE Band 2 : 1930 MHz ~ 1990 MHz LTE Band 4 : 2110 MHz ~ 2155 MHz LTE Band 5 : 869 MHz ~ 894 MHz LTE Band 7 : 2620 MHz ~ 2690 MHz
Bandwidth	LTE Band 2 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz LTE Band 4 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz LTE Band 5 : 1.4MHz / 3MHz / 5MHz / 10MHz LTE Band 7 : 5MHz/ 10MHz / 15MHz / 20MHz
Maximum Output Power to Antenna	LTE Band 2 : 23.36 dBm LTE Band 4 : 23.16 dBm LTE Band 5 : 23.59 dBm LTE Band 7 : 23.93 dBm
Antenna Gain	LTE Band 2 : 2.05 dBi LTE Band 4 : 1.72 dBi LTE Band 5 : 2.11 dBi LTE Band 7 : 1.92 dBi
Type of Modulation	QPSK / 16QAM

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Re-use of Measured Data

1.6.1 Introduction Section

This application re-uses data collected on a similar device. The subject device of this application (Model: TA-1483, FCC ID: 2AJOTTA-1483) is electrically identical to the reference device (Model: TA-1489, FCC ID: 2AJOTTA-1489) for the portions of the circuitry corresponding to the data being re-used. Based on their similarity, the FCC Part 22H, 27M for LTE Band 5 and LTE Band 7 (equipment class: TNE) reuse the original model's result and do spot-check, following the FCC KDB 484596 D01 v01.

The applicant takes full responsibility that the test data as referenced in this report represent compliance for this FCC ID: 2AJOTTA-1483

1.6.2 Model Difference Information

The **main** difference between FCC ID: 2AJOTTA-1489 and FCC ID: 2AJOTTA-1483 is that the two models support different WWAN bands.
The details of above information can be found in the confidential documents (TA-1483_Operational Description of Product Equality Declaration).

1.6.3 Reference detail Section:

Rule Part	Equipment Class	Frequency Band	Reference FCC ID (Parent)	Reference Title	Report Title/Section
22, 27	TNE (LTE)	B5	2AJOTTA-1489	FG241202B	All sections applicable for except ERP/EIRP and RSE
	TNE (LTE)	B7	2AJOTTA-1489	FG241202B	All sections applicable for except ERP/EIRP and RSE

1.6.4 Spot Check Verification Data Section

Conducted power test against the variant model based on the worst-case condition from the original model was performed in this filing to demonstrate the test data from original model remains representative for the variant model

Summary for power spot check for each rule entry and technology is listed as below:

Test Item	Mode	2AJOTTA-1489 (Parent) Worst Result	2AJOTTA-1483 (Variant) Check Result	Difference (dB)
Conducted Power (dBm)	LTE Band 5	23.39	23.59	-0.2
	LTE Band 7	23.57	23.93	-0.36
Radiated Spurious Emission(dBm)	LTE Band 5	-41.71	-47.00	-5.29
	LTE Band 7	-16.19	-18.22	-2.03

Conclusion:

Radiated spurious emission test against the variant model based on the worst-case condition from the original model was performed in this filing to demonstrate the test data from original model remains representative for the variant model.

Based on the spot check test result, the test data from the original model is representative for the variant model. The power level and RSE spot check are shown within expected level compliant to limit line.

We confirm that the test data reuse policy of FCC KDB 484596 D01 Referencing Test Data v01 has been followed and the test data as referenced from the parent model report represents compliance with new FCC ID.

1.7 Maximum ERP/EIRP Power and Emission Designator

LTE Band 2		QPSK		16QAM	
BW (MHz)	Frequency Range (MHz)	Maximum EIRP(W)	Emission Designator (99%OBW)	Maximum EIRP(W)	Emission Designator (99%OBW)
20	1860.0 ~ 1900.0	0.3475	18M4G7D	0.2793	5M47W7D
LTE Band 4		**QPSK**		**16QAM**	
BW (MHz)	Frequency Range (MHz)	Maximum EIRP(W)	Emission Designator (99%OBW)	Maximum EIRP(W)	Emission Designator (99%OBW)
20	1720.0 ~ 1745.0	0.3076	17M9G7D	0.2512	6M67W7D
LTE Band 5		**QPSK**		**16QAM**	
BW (MHz)	Frequency Range (MHz)	Maximum ERP(W)	Emission Designator (99%OBW)	Maximum ERP(W)	Emission Designator (99%OBW)
10	829.0 ~ 844.0	0.2265	-	0.1832	-
LTE Band 7		**QPSK**		**16QAM**	
BW (MHz)	Frequency Range (MHz)	Maximum EIRP(W)	Emission Designator (99%OBW)	Maximum EIRP(W)	Emission Designator (99%OBW)
20	2510.0 ~ 2560.0	0.3846	-	0.2917	-

Note:
1. Based on engineering evaluation, only the maximum bandwidth test results are shown in the report.
2. The device supports Category 1.

1.8 Testing Location

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	03CH04-KS TH01-KS	CN1257	314309

1.9 Test Software

Item	Site	Manufacture	Name	Version
1.	03CH04-KS	AUDIX	E3	6.2009-8-24a

1.10 Applicable Standards

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

- 47 CFR Part 2, 22(H), 24(E), 27(L), 27(M)
- ANSI C63.26-2015
- FCC KDB 971168 D01 Power Meas License Digital Systems v03r01
- FCC KDB 412172 D01 Determining ERP and EIRP v01r01

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

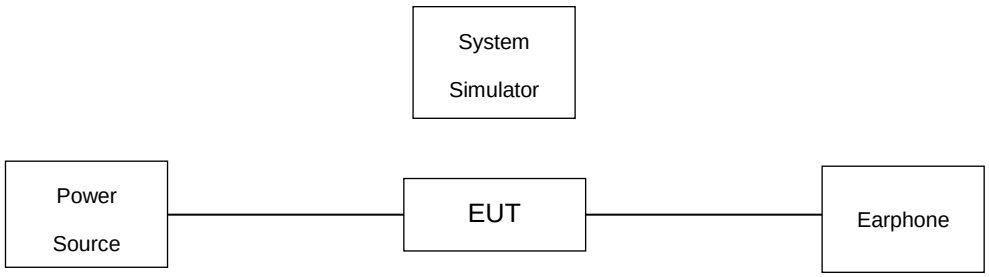
2.1 Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas License Digital Systems v03r01 with maximum output power.

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes to find the maximum emission (Z plane).

Test Items	Band	Bandwidth (MHz)						Modulation			RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full	L	M	H
Max. Output Power	2	v	v	v	v	v	v	v	v	-	v	v	v	v	v	v
	4	v	v	v	v	v	v	v	v	-	v	v	v	v	v	v
	5	v	v	v	v	-	-	v	v	-	v	v	v	v	v	v
	7	-	-	v	v	v	v	v	v	-	v	v	v	v	v	v
Peak-to-Average Ratio	2						v	v	v	-			v		v	
	4						v	v	v	-			v		v	
26dB and 99% Bandwidth	2						v	v	v	-			v		v	
	4						v	v	v	-			v		v	
Conducted Band Edge	2	v	v	v	v	v	v	v	v	-	v		v	v		v
	4	v	v	v	v	v	v	v	v	-	v		v	v		v
Conducted Spurious Emission	2	v	v	v	v	v	v	v	v	-	v			v	v	v
	4	v	v	v	v	v	v	v	v	-	v			v	v	v
Frequency Stability	2				v			v		-			v		v	
	4				v			v		-			v		v	
E.R.P / E.I.R.P	2	v	v	v	v	v	v	v	v	-	v			v	v	v
	4	v	v	v	v	v	v	v	v	-	v			v	v	v
	5	v	v	v	v	-	-	v	v	-	v			v	v	v
	7	-	-	v	v	v	v	v	v	-	v			v	v	v
Radiated Spurious Emission	2	Worst Case													v	
	4	Worst Case													v	
	5	Worst Case													v	
	7	Worst Case													v	
Note	1. The mark "**v** " means that this configuration is chosen for testing 2. The mark "-" means that this bandwidth is not supported. 3. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported 4. All test items are based on engineering evaluation..															

2.2 Connection Diagram of Test System



This example is connection diagram of EUT test configurations.

. For detail, please refer to test mode configuration and setup photographs for each test item.

2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	Power Supply	GWINSTEK	PSS-2002	N/A	N/A	Unshielded, 1.8 m
2.	System Simulator	Anritsu	MT8820/8821		N/A	hielded, 1.8 m

2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss.

Offset = RF cable loss.

Following shows an offset computation example with cable loss 5.4dB.

Example :

Offset(dB) = RF cable loss(dB).

= 5.4 (dB)

2.5 Frequency List of Low/Middle/High Channels

LTE Band 2 Channel and Frequency List				
BW [MHz]	**Channel/Frequency(MHz)**	**Lowest**	**Middle**	**Highest**
20	Channel	18700	18900	19100
	Frequency	1860	1880	1900
15	Channel	18675	18900	19125
	Frequency	1857.5	1880	1902.5
10	Channel	18650	18900	19150
	Frequency	1855	1880	1905
5	Channel	18625	18900	19175
	Frequency	1852.5	1880	1907.5
3	Channel	18615	18900	19185
	Frequency	1851.5	1880	1908.5
1.4	Channel	18607	18900	19193
	Frequency	1850.7	1880	1909.3

LTE Band 4 Channel and Frequency List				
BW [MHz]	**Channel/Frequency(MHz)**	**Lowest**	**Middle**	**Highest**
20	Channel	20050	20175	20300
	Frequency	1720	1732.5	1745
15	Channel	20025	20175	20325
	Frequency	1717.5	1732.5	1747.5
10	Channel	20000	20175	20350
	Frequency	1715	1732.5	1750
5	Channel	19975	20175	20375
	Frequency	1712.5	1732.5	1752.5
3	Channel	19965	20175	20385
	Frequency	1711.5	1732.5	1753.5
1.4	Channel	19957	20175	20393
	Frequency	1710.7	1732.5	1754.3

LTE Band 5 Channel and Frequency List				
BW [MHz]	**Channel/Frequency(MHz)**	**Lowest**	**Middle**	**Highest**
10	Channel	20450	20525	20600
	Frequency	829	836.5	844
5	Channel	20425	20525	20625
	Frequency	826.5	836.5	846.5
3	Channel	20415	20525	20635
	Frequency	825.5	836.5	847.5
1.4	Channel	20407	20525	20643
	Frequency	824.7	836.5	848.3

LTE Band 7 Channel and Frequency List				
BW [MHz]	**Channel/Frequency(MHz)**	**Lowest**	**Middle**	**Highest**
20	Channel	20850	21100	21350
	Frequency	2510	2535	2560
15	Channel	20825	21100	21375
	Frequency	2507.5	2535	2562.5
10	Channel	20800	21100	21400
	Frequency	2505	2535	2565
5	Channel	20775	21100	21425
	Frequency	2502.5	2535	2567.5

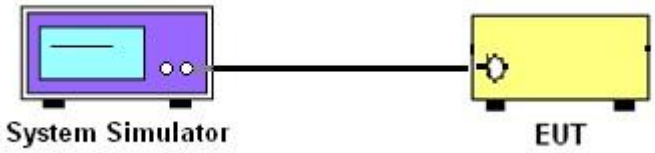
3 Conducted Test Items

3.1 Measuring Instruments

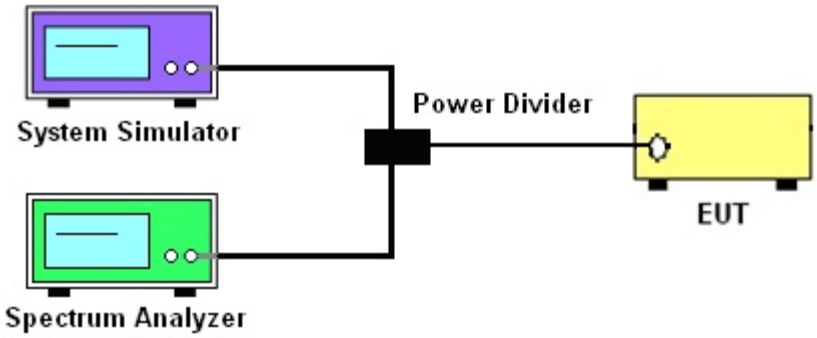
See list of measuring instruments of this test report.

3.2 Test Setup

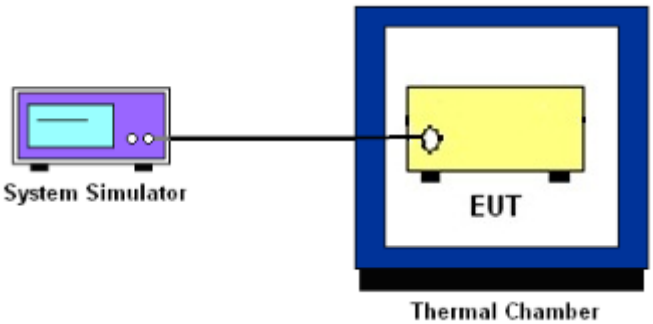
3.2.1 Conducted Output Power



3.2.2 Peak-to-Average Ratio, Occupied Bandwidth, Conducted Band-Edge and Conducted Spurious Emission



3.2.3 Frequency Stability



3.3 Test Result of Conducted Test

Please refer to Appendix A.

3.4 Conducted Output Power and ERP/EIRP

3.4.1 Description of the Conducted Output Power Measurement and ERP/EIRP Measurement

A system simulator was used to establish communication with the EUT. Its parameters were set to force the EUT transmitting at maximum output power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

The ERP of mobile transmitters must not exceed 7 Watts for LTE Band 5.

The EIRP of mobile transmitters must not exceed 2 Watts for LTE Band 2 and Band 7.

The EIRP of mobile transmitters must not exceed 1 Watts for LTE Band 4.

According to KDB 412172 D01 Power Approach,

$EIRP = P_T + G_T – L_C$, $ERP = EIRP - 2.15$, where

P_T = transmitter output power in dBm

G_T = gain of the transmitting antenna in dBi

L_C = signal attenuation in the connecting cable between the transmitter and antenna in dB

3.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.2
2. The transmitter output port was connected to the system simulator.
3. Set EUT at maximum power through the system simulator.
4. Select lowest, middle, and highest channels for each band and different modulation.
5. Measure and record the power level from the system simulator.

3.5 Peak-to-Average Ratio

3.5.1 Description of the PAR Measurement

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. 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.

3.5.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.2.3.4 (CCDF).
2. The EUT was connected to spectrum and system simulator via a power divider.
3. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
4. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
5. Record the deviation as Peak to Average Ratio.

3.6 Occupied Bandwidth

3.6.1 Description of Occupied Bandwidth Measurement

The occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

The 26 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 26 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.

3.6.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.4
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be between two and five times the anticipated OBW.
4. The nominal resolution bandwidth (RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
5. Set the detection mode to peak, and the trace mode to max hold.
6. Determine the reference value: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace. (this is the reference value)
7. Determine the “-26 dB down amplitude” as equal to (Reference Value – X).
8. Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the “–X dB down amplitude” determined in step 6. If a marker is below this “-X dB down amplitude” value it shall be placed as close as possible to this value. The OBW is the positive frequency difference between the two markers.
9. Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.

3.7 Conducted Band Edge

3.7.1 Description of Conducted Band Edge Measurement

24.238 (a)

For operations in the 1850-1910 and 1930-1990 MHz band, the FCC limit is 43 + $10\log_{10}$(P[Watts]) dB below the transmitter power P(Watts) in a 1MHz bandwidth. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

27.53 (h)

For operations in the 1710 – 1755 MHz band, the FCC limit is 43 + $10\log_{10}$(P[Watts]) dB below the transmitter power P(Watts) in a 1 MHz bandwidth. However, in the 1MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

3.7.2 Test Procedures

1. The testing follows ANSI C63.26 section 5.7
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The band edges of low and high channels for the highest RF powers were measured.
4. Set RBW >= 1% EBW in the 1MHz band immediately outside and adjacent to the band edge.
5. Beyond the 1 MHz band from the band edge, RBW=1MHz was used.
6. Set spectrum analyzer with RMS detector.
7. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
8. Checked that all the results comply with the emission limit line.
   Example:
   The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)
   = P(W)- [43 + 10log(P)] (dB)
   = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB) = -13dBm.
9. When using the integration method, the starting frequency of the integration shall be centered at one-half of the RBW away from the band edge.

3.8 Conducted Spurious Emission

3.8.1 Description of Conducted Spurious Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.

It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10^{th} harmonic.

3.8.2 Test Procedures

1. The testing follows ANSI C63.26 section 5.7
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
4. The middle channel for the highest RF power within the transmitting frequency was measured.
5. The conducted spurious emission for the whole frequency range was taken.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz.
7. Set spectrum analyzer with RMS detector.
8. Taking the record of maximum spurious emission.
9. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
10. The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)
    = P(W)- [43 + 10log(P)] (dB)
    = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
    = -13dBm.

3.9 Frequency Stability

3.9.1 Description of Frequency Stability Measurement

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency.

3.9.2 Test Procedures for Temperature Variation

1. The testing follows ANSI C63.26 section 5.6.4
2. The EUT was set up in the thermal chamber and connected with the system simulator.
3. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
4. With power OFF, the temperature was raised in 10°C step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

3.9.3 Test Procedures for Voltage Variation

1. The testing follows ANSI C63.26 section 5.6.5
2. The EUT was placed in a temperature chamber at 20±5°C and connected with the system simulator.
3. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value for other than hand carried battery equipment.
4. For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.
5. The variation in frequency was measured for the worst case.

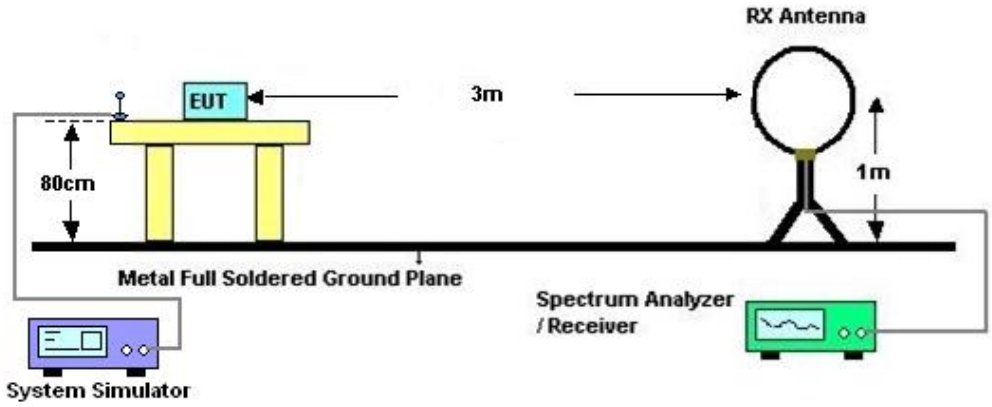
4 Radiated Test Items

4.1 Measuring Instruments

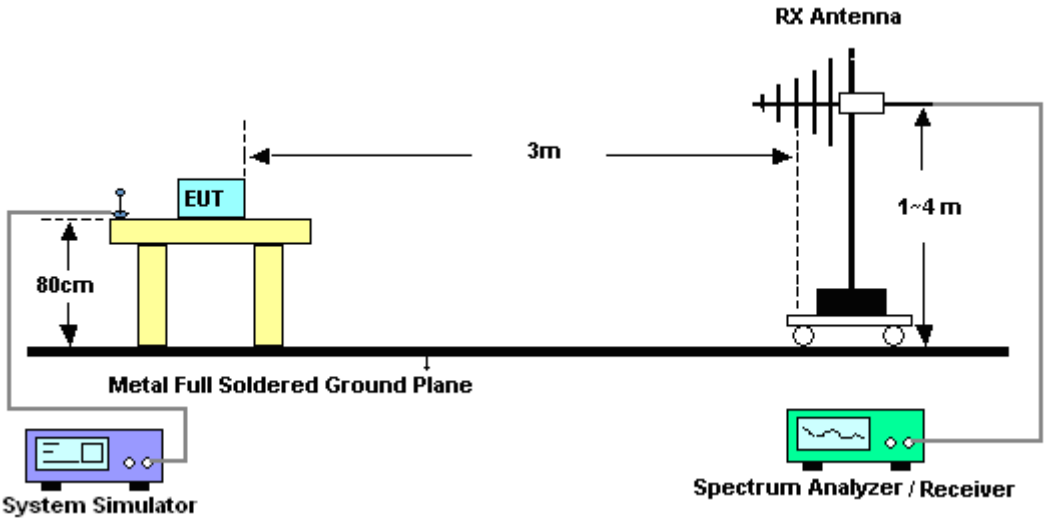
See list of measuring instruments of this test report.

4.2 Test Setup

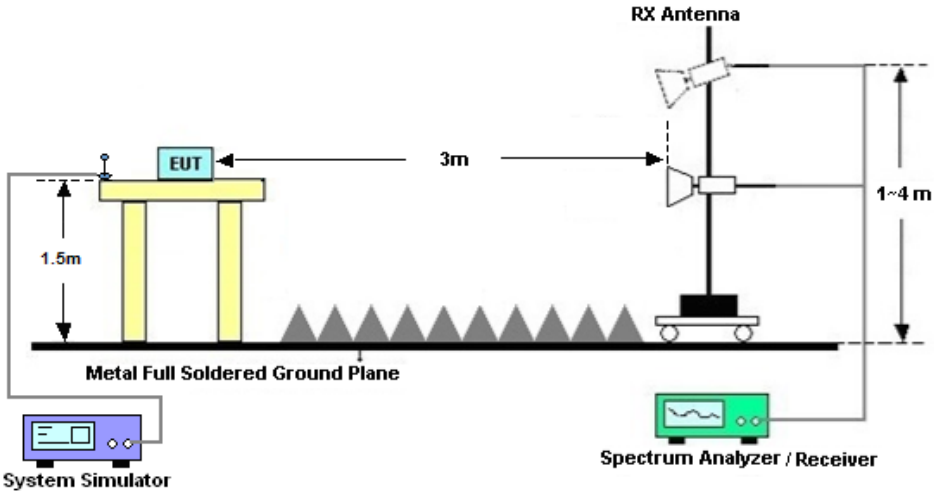
4.2.1 For radiated test below 30MHz



4.2.2 For radiated test from 30MHz to 1GHz



4.2.3 For radiated test above 1GHz



4.3 Test Result of Radiated Test

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

Please refer to Appendix B.

4.4 Radiated Spurious Emission

4.4.1 Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI C63.26. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.

For Band 7

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 55 + 10 log (P) dB.

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

4.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.5
2. The EUT was placed on a turntable with 0.8 meter height for frequency below 1GHz and 1.5 meter height for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between 1m to 4m to search the maximum spurious emission for both horizontal and vertical polarizations.
6. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power.
7. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
8. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
9. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
10. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
11. ERP (dBm) = EIRP - 2.15
12. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
    The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)
    = P(W)- [43 + 10log(P)] (dB)
    = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
    = -13dBm.
13. For Band 7:
    The limit line is derived from 55 + 10log(P)dB below the transmitter power P(Watts)

5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Oct. 14, 2021	May 19, 2022~ Jun. 03, 2022	Oct. 13, 2022	Conducted (TH01-KS)
Power divider	STI	STI08-0055	-	0.5~40GHz	Aug. 26, 2021	May 19, 2022~ Jun. 03, 2022	Aug. 25, 2022	Conducted (TH01-KS)
Temperature &humidity chamber	Hongzhan	LP-150U	H2014011440	-40~+150°C 20%~95%RH	Jul. 12, 2021	May 19, 2022~ Jun. 03, 2022	Jul. 11, 2022	Conducted (TH01-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz-44G,MAX 30dB	Apr. 13, 2022	May 26, 2022	Apr. 12, 2023	Radiation (03CH04-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 30, 2021	May 26, 2022	Oct. 29, 2022	Radiation (03CH04-KS)
Bilog Antenna	TeseQ	CBL6111D	49922	30MHz-1GHz	May 30, 2021	May 26, 2022	May 29, 2022	Radiation (03CH04-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Oct. 30, 2021	May 26, 2022	Oct. 29, 2022	Radiation (03CH04-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 05, 2022	May 26, 2022	Jan. 04, 2023	Radiation (03CH04-KS)
Amplifier	SONOMA	310N	187289	9KHz-1GHz	Jan. 05, 2022	May 26, 2022	Jan. 04, 2023	Radiation (03CH04-KS)
Amplifier	MITEQ	EM18G40GGA	060728	18~40GHz	Jan. 05, 2022	May 26, 2022	Jan. 04, 2023	Radiation (03CH04-KS)
high gain Amplifier	MITEQ	AMF-7D-00101800-30-10P	2025788	1Ghz-18Ghz	Jul. 30, 2021	May 26, 2022	Jul. 29, 2022	Radiation (03CH04-KS)
Amplifier	Keysight	83017A	MY57280106	500MHz~26.5GHz	Oct. 13, 2021	May 26, 2022	Oct. 12, 2022	Radiation (03CH04-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	May 26, 2022	NCR	Radiation (03CH04-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	May 26, 2022	NCR	Radiation (03CH04-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	May 26, 2022	NCR	Radiation (03CH04-KS)

NCR: No Calibration Required

6 Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.26-2015. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.3dB**

Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.8dB**

Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.8dB**

Appendix A. Test Results of Conducted Test

Test Engineer :	Simle Wang	Temperature :	22~23℃
		Relative Humidity :	40~42%

Conducted Output Power(Average power) and ERP/EIRP

LTE Band 2:

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	EIRP(W)		
Channel				18700	18900	19100			
Frequency (MHz)				1860	1880	1900	L	M	H
20	QPSK	1	0	23.26	23.36	23.14	0.3396	0.3475	0.3304
20	QPSK	1	99	23.22	23.33	23.07	0.3365	0.3451	0.3251
20	QPSK	100	0	22.28	22.38	22.26	0.2710	0.2773	0.2698
20	16QAM	1	0	22.23	22.41	22.22	0.2679	0.2793	0.2673
Channel				18675	18900	19125	EIRP(W)		
Frequency (MHz)				1857.5	1880	1902.5	L	M	H
15	QPSK	1	0	23.23	23.34	23.07	0.3373	0.3459	0.3251
15	16QAM	1	0	22.21	22.33	22.20	0.2667	0.2742	0.2661
Channel				18650	18900	19150	EIRP(W)		
Frequency (MHz)				1855	1880	1905	L	M	H
10	QPSK	1	0	23.17	23.33	23.06	0.3327	0.3451	0.3243
10	16QAM	1	0	22.17	22.32	22.19	0.2642	0.2735	0.2655
Channel				18625	18900	19175	EIRP(W)		
Frequency (MHz)				1852.5	1880	1907.5	L	M	H
5	QPSK	1	0	23.19	23.33	23.02	0.3342	0.3451	0.3214
5	16QAM	1	0	22.18	22.20	22.27	0.2649	0.2661	0.2704
Channel				18615	18900	19185	EIRP(W)		
Frequency (MHz)				1851.5	1880	1908.5	L	M	H
3	QPSK	1	0	23.10	23.35	23.00	0.3273	0.3467	0.3199
3	16QAM	1	0	22.20	22.29	22.18	0.2661	0.2716	0.2649
Channel				18607	18900	19193	EIRP(W)		
Frequency (MHz)				1850.7	1880	1909.3	L	M	H
1.4	QPSK	1	0	23.29	23.31	23.34	0.3420	0.3436	0.3459
1.4	16QAM	1	0	22.24	22.35	22.20	0.2685	0.2754	0.2661

LTE Band 4:

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	EIRP(W)		
Channel				20050	20175	20300			
Frequency (MHz)				1720	1732.5	1745	L	M	H
20	QPSK	1	0	23.09	23.16	22.87	0.3027	0.3076	0.2877
20	QPSK	1	99	23.02	23.13	22.84	0.2979	0.3055	0.2858
20	QPSK	100	0	21.99	22.10	21.78	0.2350	0.2410	0.2239
20	16QAM	1	0	21.92	22.28	21.80	0.2312	0.2512	0.2249
Channel				20025	20175	20325	EIRP(W)		
Frequency (MHz)				1717.5	1732.5	1747.5	L	M	H
15	QPSK	1	0	22.98	23.13	22.82	0.2951	0.3055	0.2844
15	16QAM	1	0	21.95	22.08	21.82	0.2328	0.2399	0.2259
Channel				20000	20175	20350	EIRP(W)		
Frequency (MHz)				1715	1732.5	1750	L	M	H
10	QPSK	1	0	22.93	23.14	22.78	0.2917	0.3062	0.2818
10	16QAM	1	0	21.88	22.11	21.81	0.2291	0.2415	0.2254
Channel				19975	20175	20375	EIRP(W)		
Frequency (MHz)				1712.5	1732.5	1752.5	L	M	H
5	QPSK	1	0	23.04	23.13	22.80	0.2992	0.3055	0.2831
5	16QAM	1	0	21.90	22.08	21.77	0.2301	0.2399	0.2234
Channel				19965	20175	20385	EIRP(W)		
Frequency (MHz)				1711.5	1732.5	1753.5	L	M	H
3	QPSK	1	0	23.08	23.15	22.87	0.3020	0.3069	0.2877
3	16QAM	1	0	21.89	22.11	21.81	0.2296	0.2415	0.2254
Channel				19950	20175	20393	EIRP(W)		
Frequency (MHz)				1710	1732.5	1754.3	L	M	H
1.4	QPSK	1	0	23.05	23.14	23.06	0.2999	0.3062	0.3006
1.4	16QAM	1	0	22.24	22.13	22.17	0.2489	0.2427	0.2449

LTE Band 5:

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	ERP(W)		
Channel				20450	20525	20600			
Frequency (MHz)				829	836.5	844	L	M	H
10	QPSK	1	0	23.41	23.59	23.38	0.2173	0.2265	0.2158
10	QPSK	1	49	23.41	23.54	23.32	0.2173	0.2239	0.2128
10	QPSK	50	0	22.25	22.38	22.28	0.1663	0.1714	0.1675
10	16QAM	1	0	22.24	22.67	22.27	0.1660	0.1832	0.1671
Channel				20425	20525	20625	ERP(W)		
Frequency (MHz)				826.5	836.5	846.5	L	M	H
5	QPSK	1	0	23.39	23.56	23.33	0.2163	0.2249	0.2133
5	16QAM	1	0	22.16	22.27	22.18	0.1629	0.1671	0.1637
Channel				20415	20525	20635	ERP(W)		
Frequency (MHz)				825.5	836.5	847.5	L	M	H
3	QPSK	1	0	23.42	23.58	23.25	0.2178	0.2259	0.2094
3	16QAM	1	0	22.10	22.28	22.13	0.1607	0.1675	0.1618
Channel				20407	20525	20643	ERP(W)		
Frequency (MHz)				824.7	836.5	848.3	L	M	H
1.4	QPSK	1	0	23.36	23.50	23.21	0.2148	0.2218	0.2075
1.4	16QAM	1	0	22.49	22.35	22.51	0.1758	0.1702	0.1766

LTE Band 7:

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	EIRP(W)		
Channel				20850	20850	21350			
Frequency (MHz)				2510	2535	2560	L	M	H
20	QPSK	1	0	23.83	23.93	23.78	0.3758	0.3846	0.3715
20	QPSK	1	99	23.77	23.89	23.73	0.3707	0.3811	0.3673
20	QPSK	100	0	22.71	22.76	22.71	0.2904	0.2938	0.2904
20	16QAM	1	0	22.67	22.73	22.67	0.2877	0.2917	0.2877
Channel				20825	21100	21375	EIRP(W)		
Frequency (MHz)				2507.5	2535	2562.5	L	M	H
15	QPSK	1	0	23.80	23.92	23.74	0.3733	0.3837	0.3681
15	16QAM	1	0	22.67	22.70	22.65	0.2877	0.2897	0.2864
Channel				20800	21100	21400	EIRP(W)		
Frequency (MHz)				2505	2535	2565	L	M	H
10	QPSK	1	0	23.79	23.90	23.73	0.3724	0.3819	0.3673
10	16QAM	1	0	22.66	22.68	22.64	0.2871	0.2884	0.2858
Channel				20775	21100	21425	EIRP(W)		
Frequency (MHz)				2502.5	2535	2567.5	L	M	H
5	QPSK	1	0	23.80	23.90	23.72	0.3733	0.3819	0.3664
5	16QAM	1	0	22.56	22.69	22.62	0.2805	0.2891	0.2844

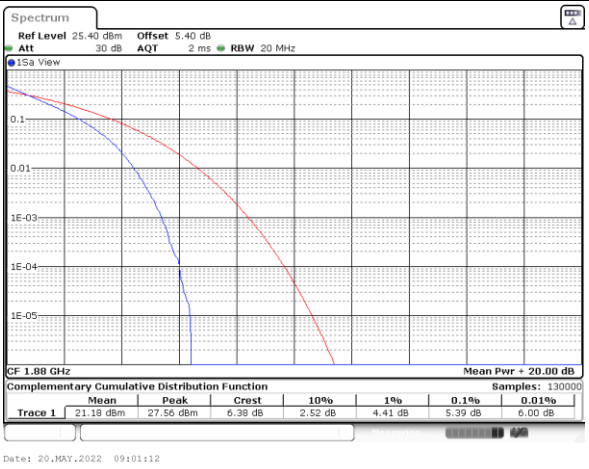
LTE Band 2

Peak-to-Average Ratio

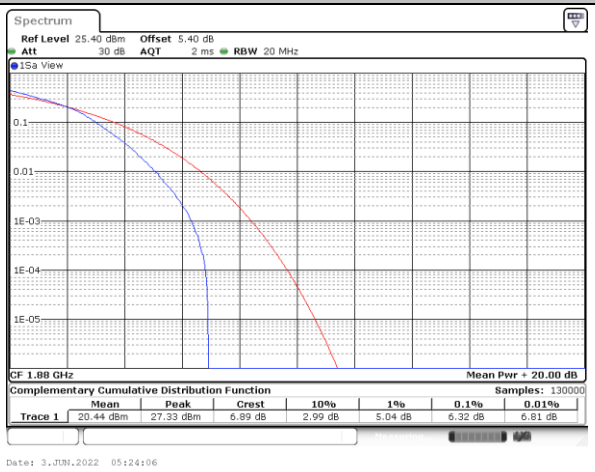
Mode	LTE Band 2 / 20MHz			
Mod.	QPSK	16QAM		Limit: 13dB
RB Size	Full RB	Full RB		Result
Middle CH	5.39	6.32		PASS

LTE Band 2 / 20MHz

Middle Channel / Full RB/ QPSK



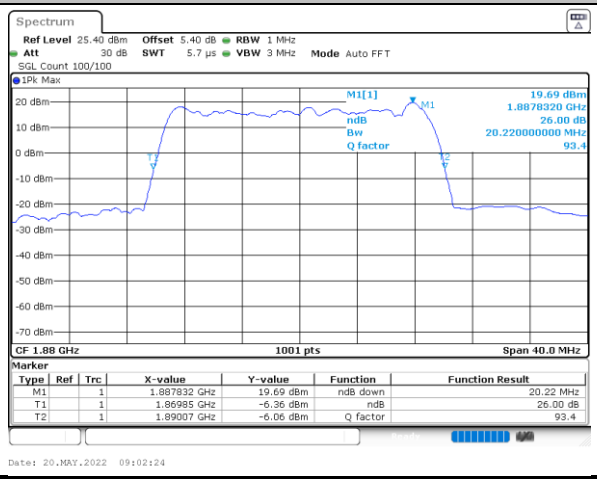
Middle Channel / Full RB/ 16QAM

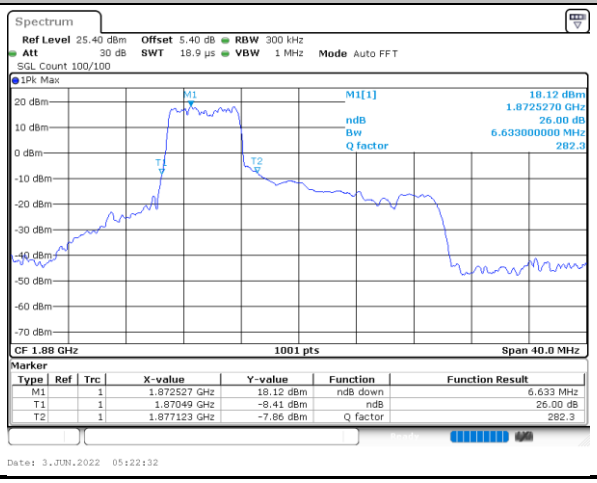


26dB Bandwidth

Mode	LTE Band 2 : 26dB BW(MHz)	
BW	20MHz	
Mod.	QPSK	16QAM
Middle CH	20.22	6.63

LTE Band 2	
Middle Channel / 20MHz / QPSK	Middle Channel / 20MHz / 16QAM

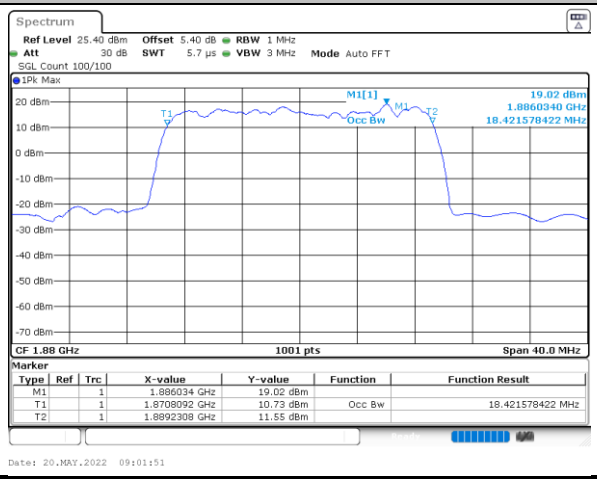


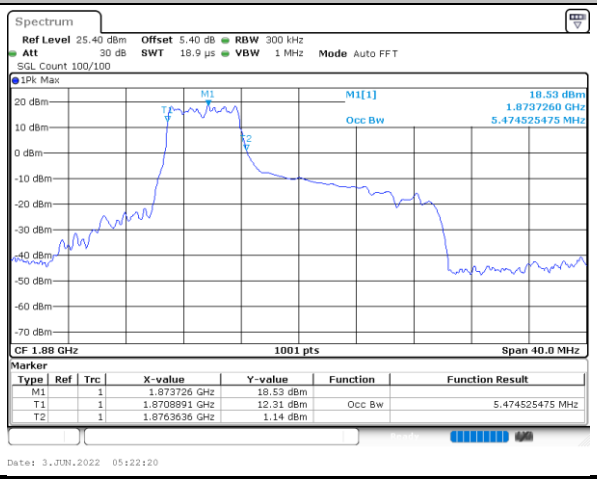


Occupied Bandwidth

Mode	LTE Band 2 : 99%OBW(MHz)	
BW	20MHz	
Mod.	QPSK	16QAM
Middle CH	18.42	5.47

LTE Band 2	
Middle Channel / 20MHz / QPSK	Middle Channel / 20MHz / 16QAM

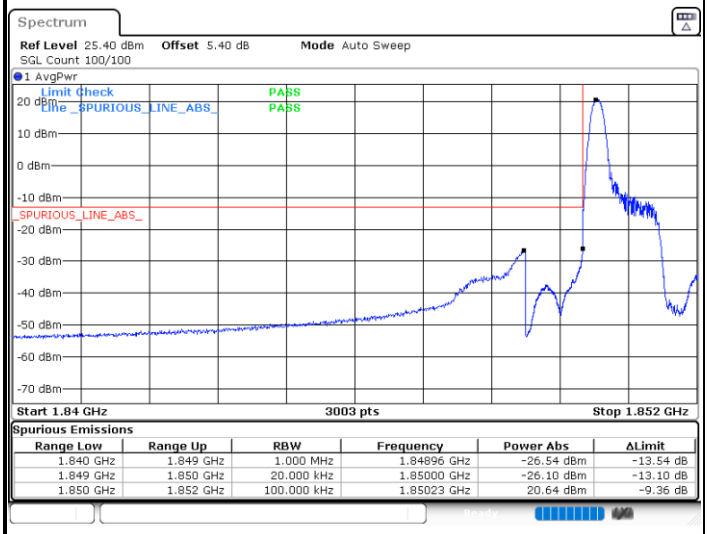




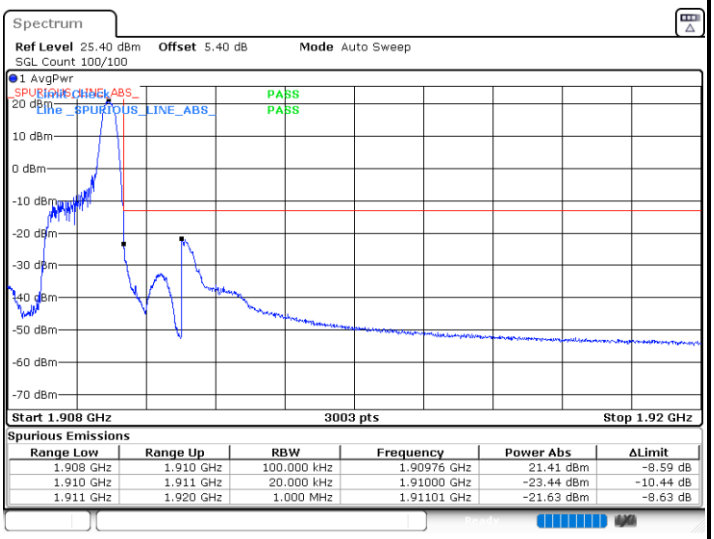
Conducted Band Edge

LTE Band 2 / 1.4MHz / QPSK

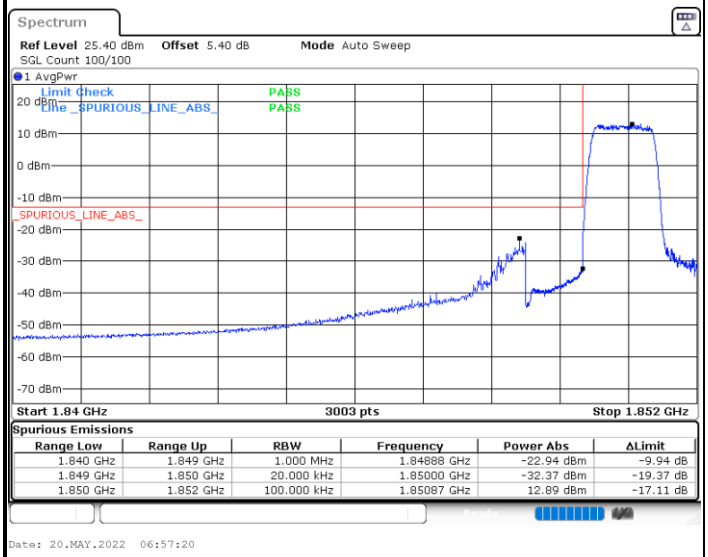
Lowest Band Edge / 1RB



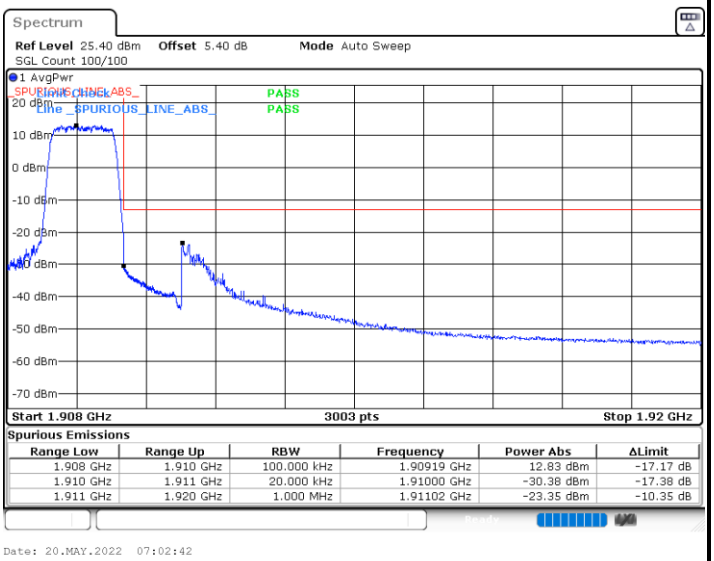
Highest Band Edge / 1RB



Lowest Band Edge / Full RB

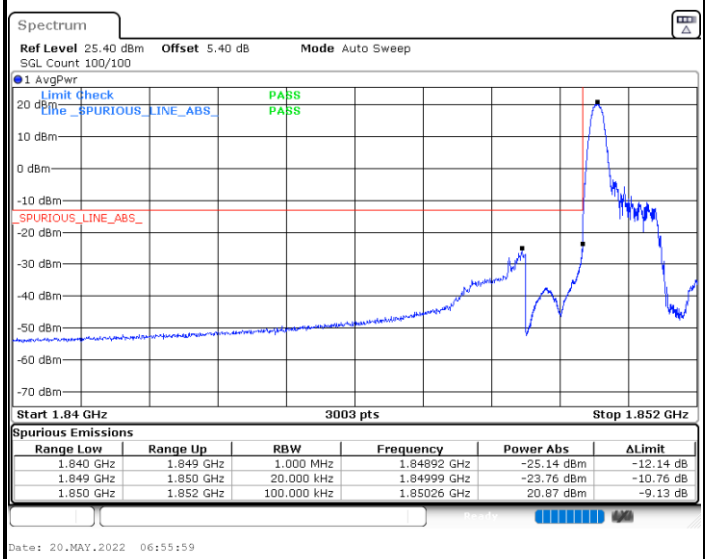


Highest Band Edge / Full RB



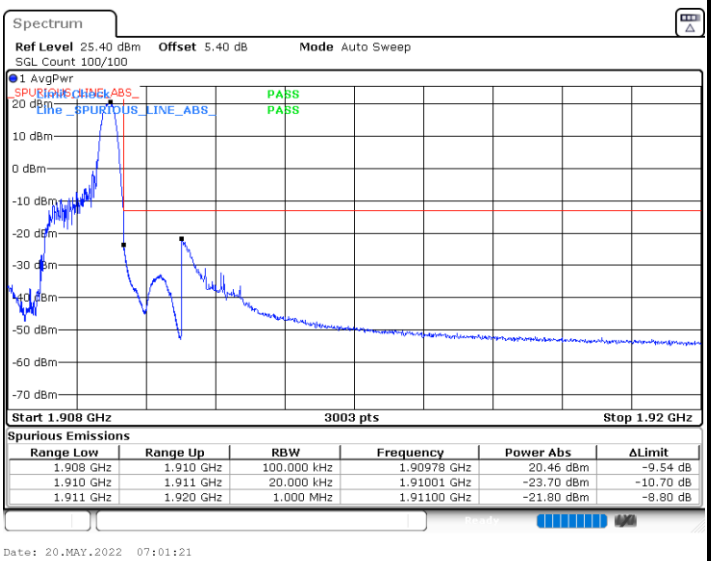
LTE Band 2 / 1.4MHz / 16QAM

Lowest Band Edge / 1 RB



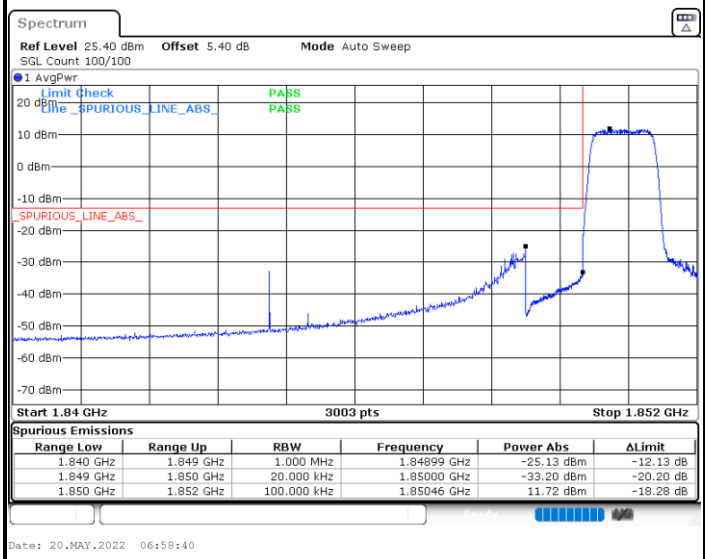
Date: 20.MAY.2022 06:55:59

Highest Band Edge / 1 RB



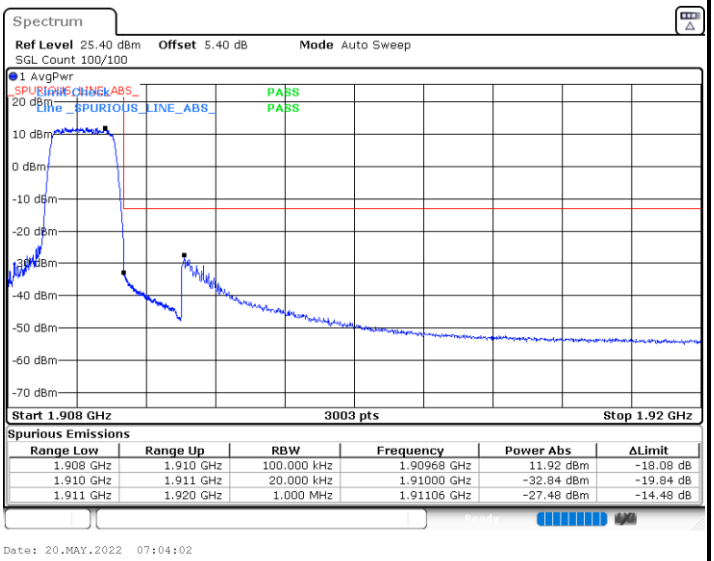
Date: 20.MAY.2022 07:01:21

Lowest Band Edge / Full RB

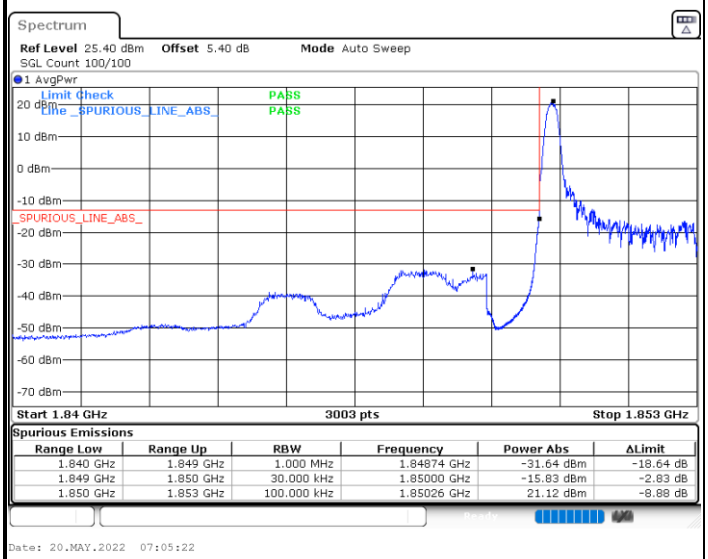
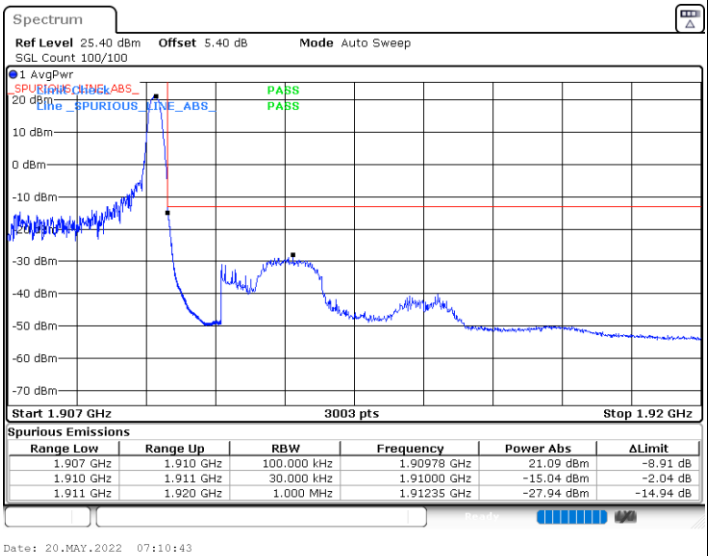
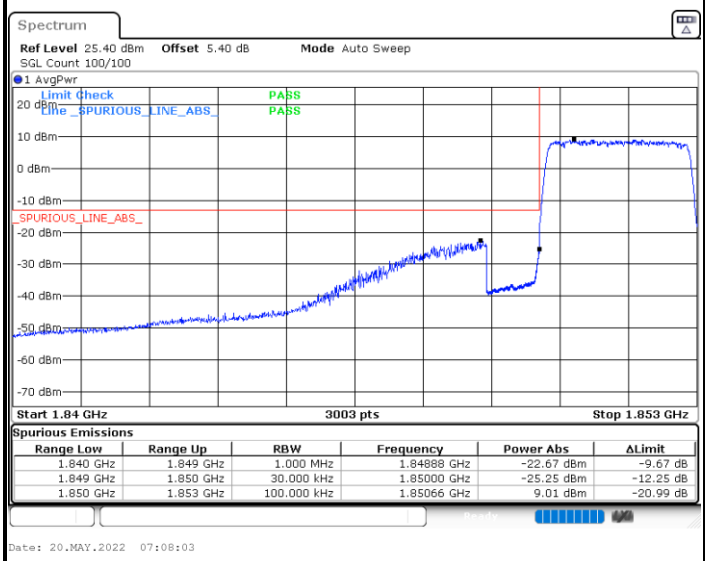
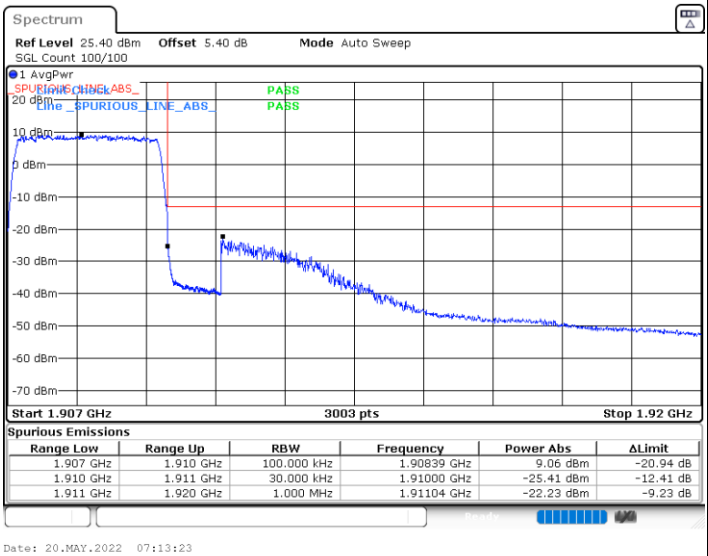


Date: 20.MAY.2022 06:58:40

Highest Band Edge / Full RB

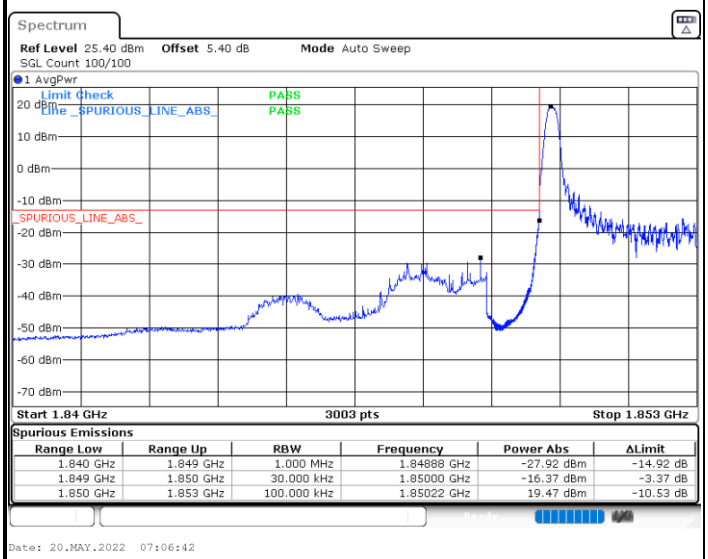


Date: 20.MAY.2022 07:04:02

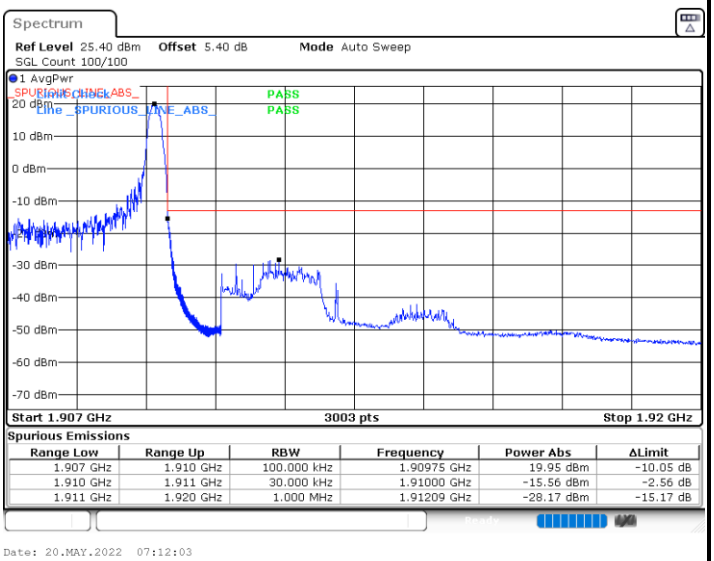
LTE Band 2 / 3MHz / QPSK	
Lowest Band Edge / 1RB	**Highest Band Edge / 1 RB**
	
Lowest Band Edge / Full RB	**Highest Band Edge / Full RB**
	

LTE Band 2 / 3MHz / 16QAM

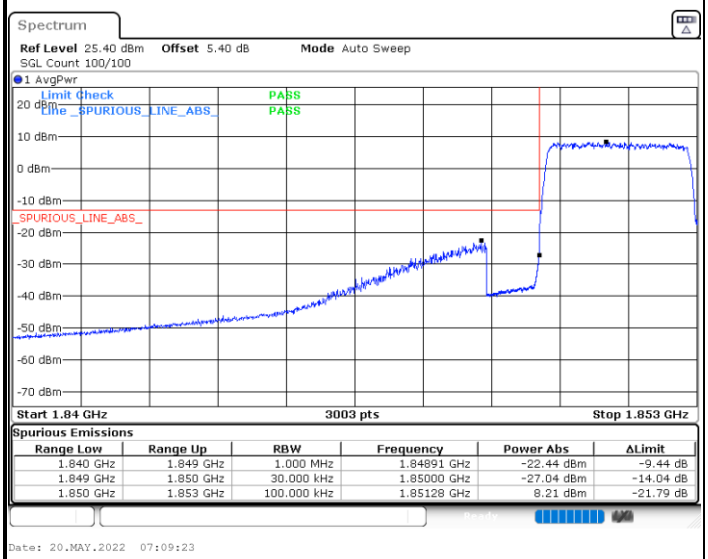
Lowest Band Edge / 1 RB



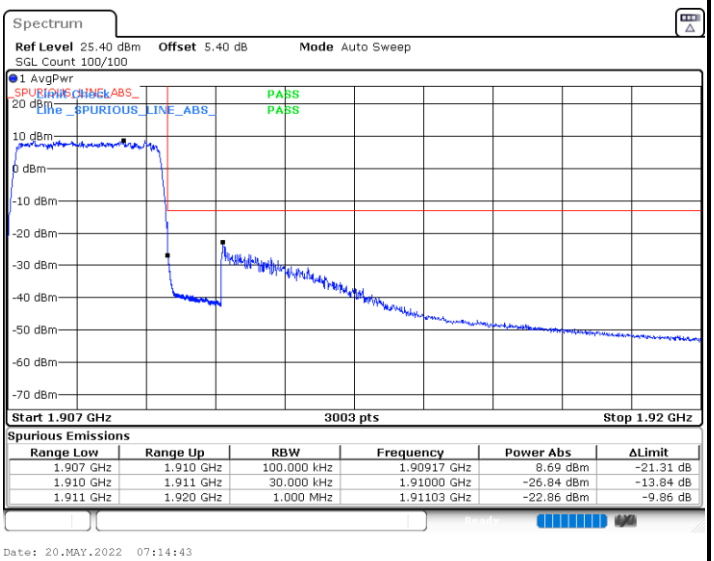
Highest Band Edge /1 RB



Lowest Band Edge / Full RB

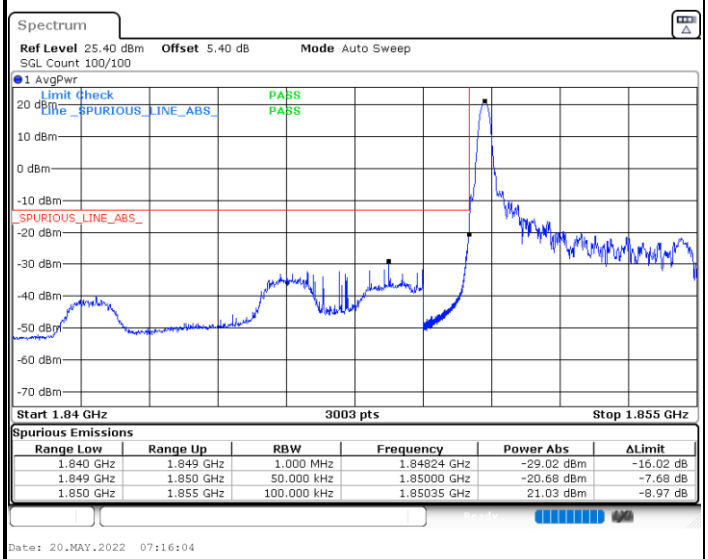


Highest Band Edge / Full RB

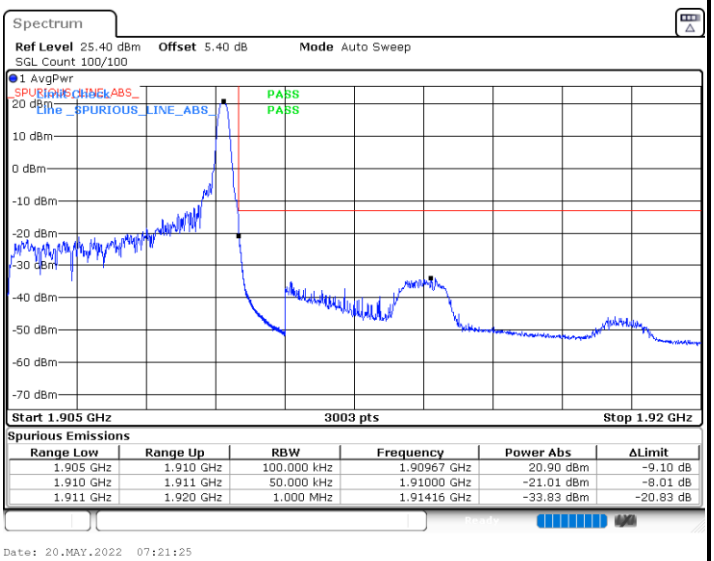


LTE Band 2 / 5MHz / QPSK

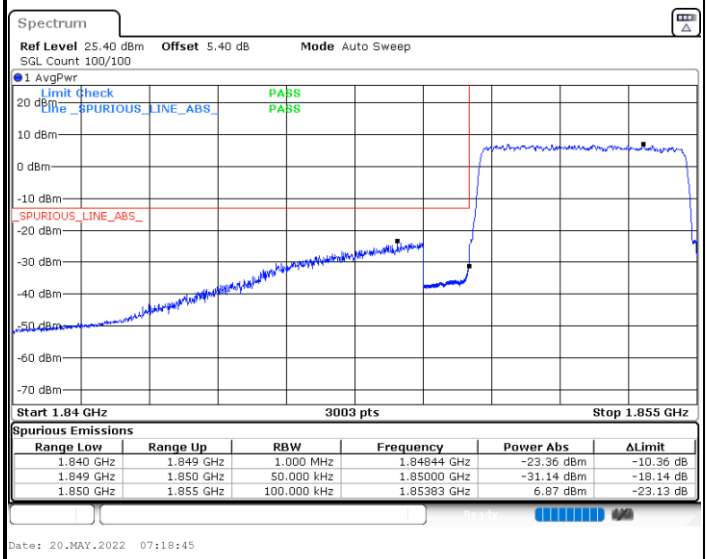
Lowest Band Edge / 1 RB



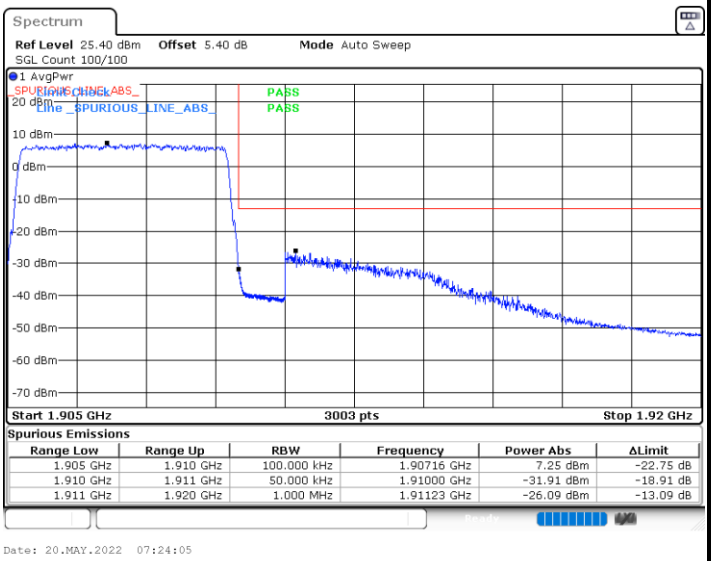
Highest Band Edge / 1 RB



Lowest Band Edge / Full RB

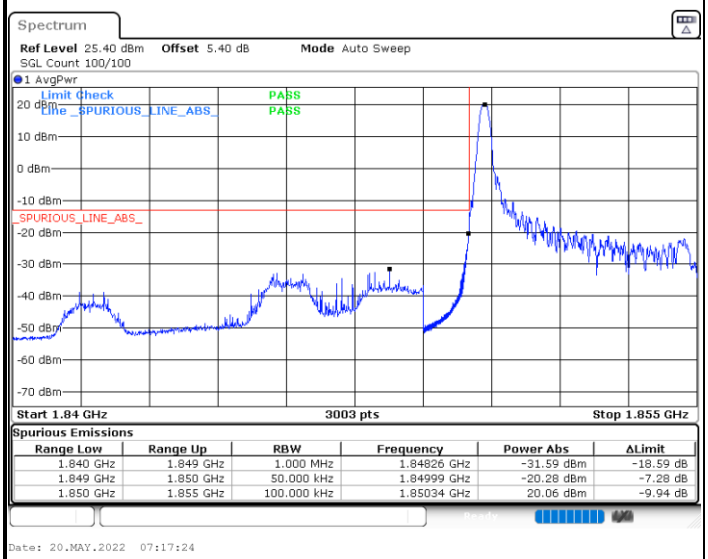


Highest Band Edge / Full RB



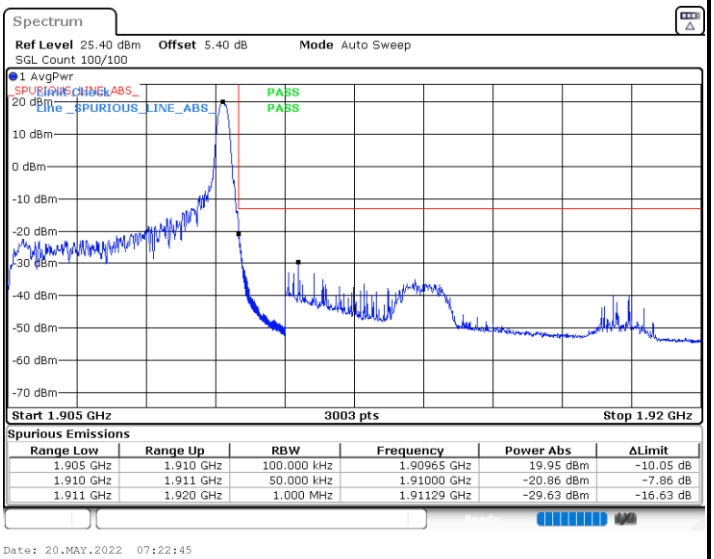
LTE Band 2 / 5MHz / 16QAM

Lowest Band Edge / 1RB



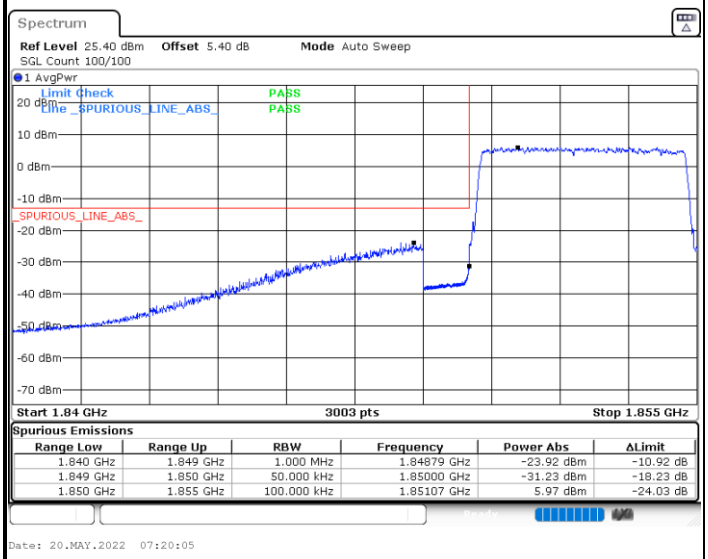
Date: 20.MAY.2022 07:17:24

Highest Band Edge / 1 RB



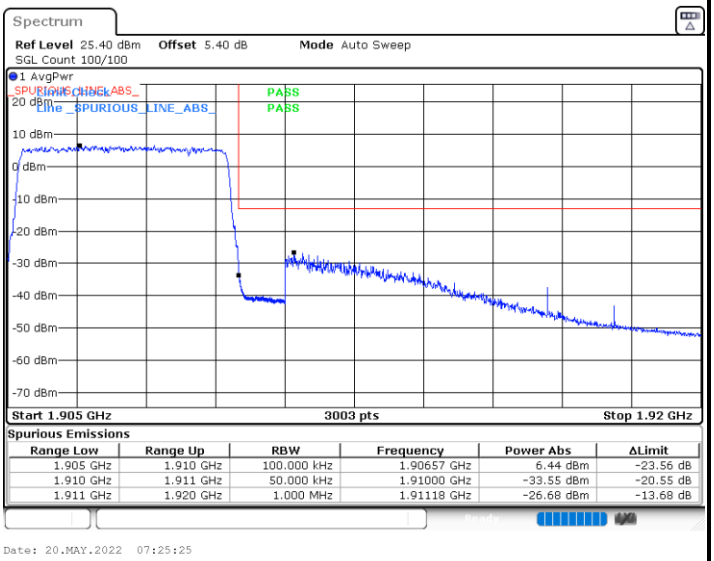
Date: 20.MAY.2022 07:22:45

Lowest Band Edge / Full RB



Date: 20.MAY.2022 07:20:05

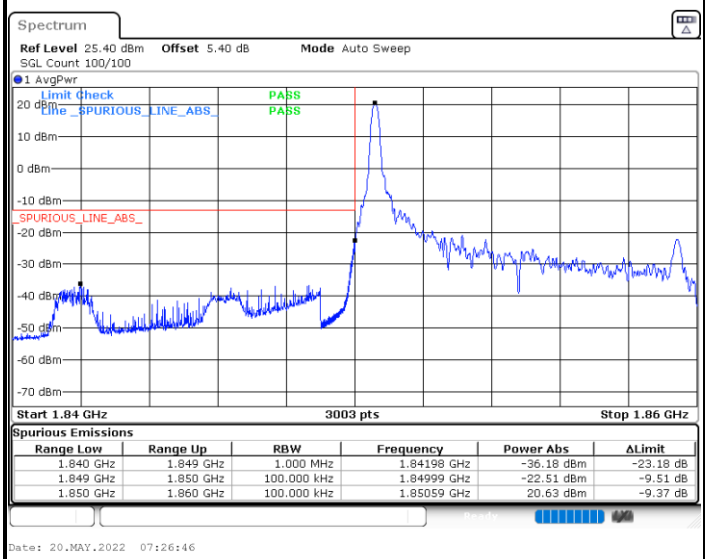
Highest Band Edge / Full RB



Date: 20.MAY.2022 07:25:25

LTE Band 2 / 10MHz / QPSK

Lowest Band Edge / 1 RB

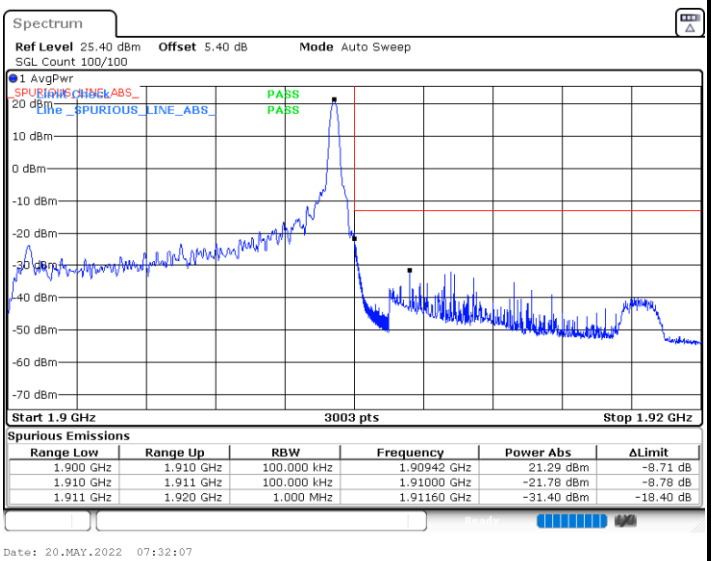


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.840 GHz	1.849 GHz	1.000 MHz	1.84198 GHz	-36.18 dBm	-23.18 dB
1.849 GHz	1.850 GHz	100.000 kHz	1.84999 GHz	-22.51 dBm	-9.51 dB
1.850 GHz	1.860 GHz	100.000 kHz	1.85059 GHz	20.63 dBm	-9.37 dB

Date: 20.MAY.2022 07:26:46

Highest Band Edge / 1 RB

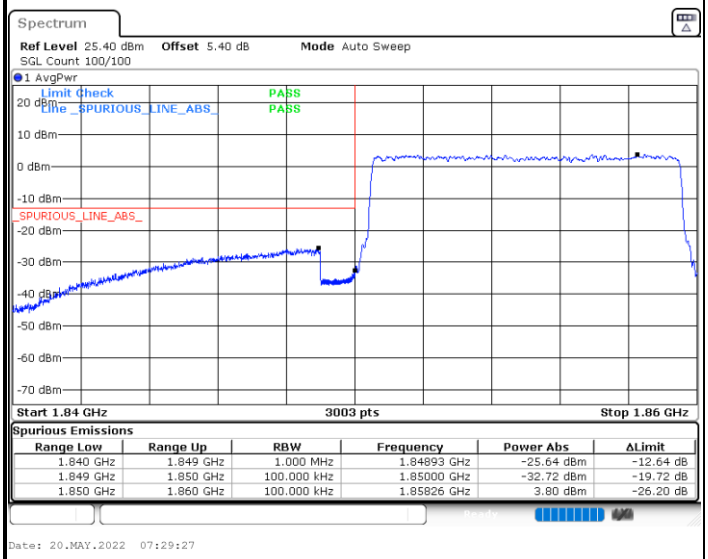


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.900 GHz	1.910 GHz	100.000 kHz	1.90942 GHz	21.29 dBm	-8.71 dB
1.910 GHz	1.911 GHz	100.000 kHz	1.91000 GHz	-21.78 dBm	-8.78 dB
1.911 GHz	1.920 GHz	1.000 MHz	1.91160 GHz	-31.40 dBm	-18.40 dB

Date: 20.MAY.2022 07:32:07

Lowest Band Edge / Full RB

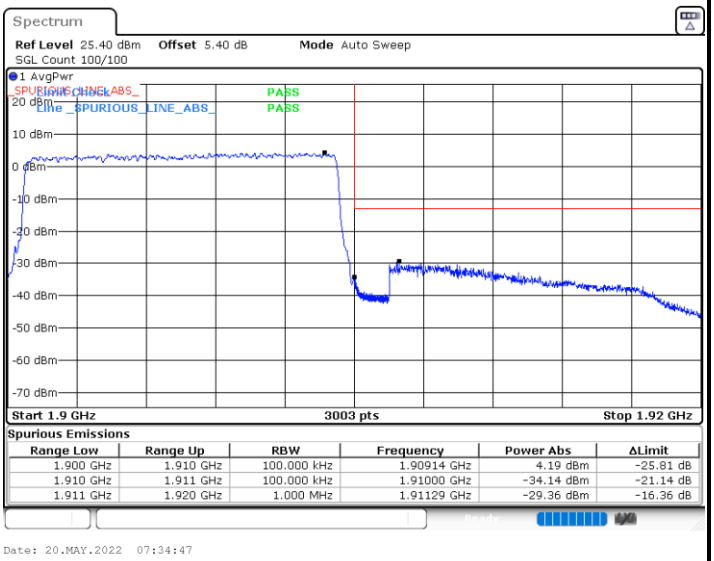


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.840 GHz	1.849 GHz	1.000 MHz	1.84893 GHz	-25.64 dBm	-12.64 dB
1.849 GHz	1.850 GHz	100.000 kHz	1.85000 GHz	-32.72 dBm	-19.72 dB
1.850 GHz	1.860 GHz	100.000 kHz	1.85826 GHz	3.80 dBm	-26.20 dB

Date: 20.MAY.2022 07:29:27

Highest Band Edge / Full RB



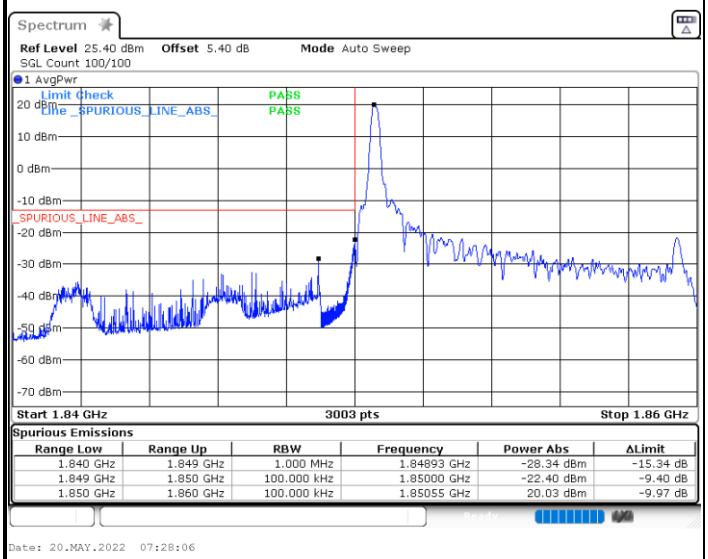
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.900 GHz	1.910 GHz	100.000 kHz	1.90914 GHz	4.19 dBm	-25.81 dB
1.910 GHz	1.911 GHz	100.000 kHz	1.91000 GHz	-34.14 dBm	-21.14 dB
1.911 GHz	1.920 GHz	1.000 MHz	1.91129 GHz	-29.36 dBm	-16.36 dB

Date: 20.MAY.2022 07:34:47

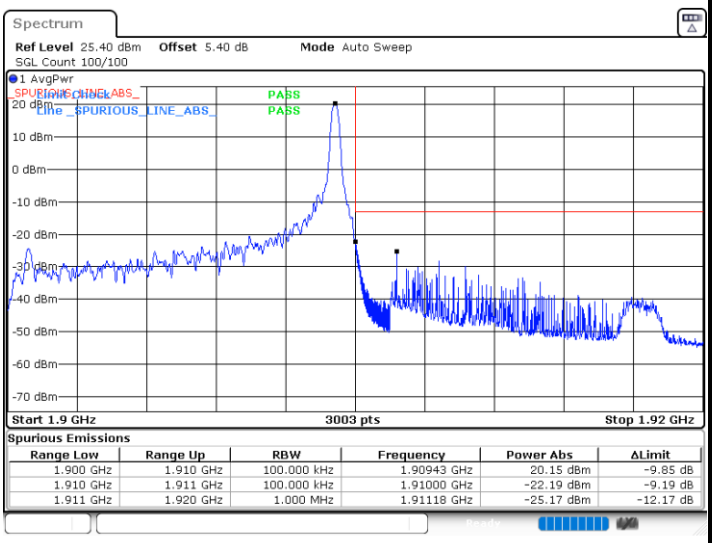
LTE Band 2 / 10MHz / 16QAM

Lowest Band Edge / 1 RB



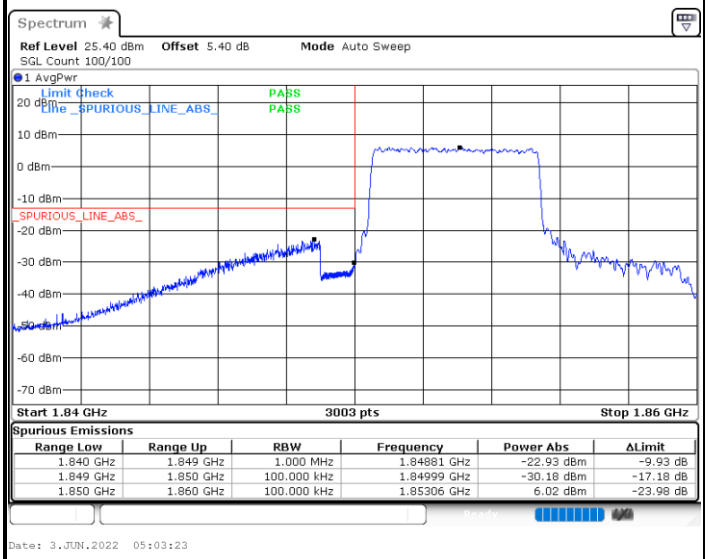
Date: 20.MAY.2022 07:28:06

Highest Band Edge / 1 RB



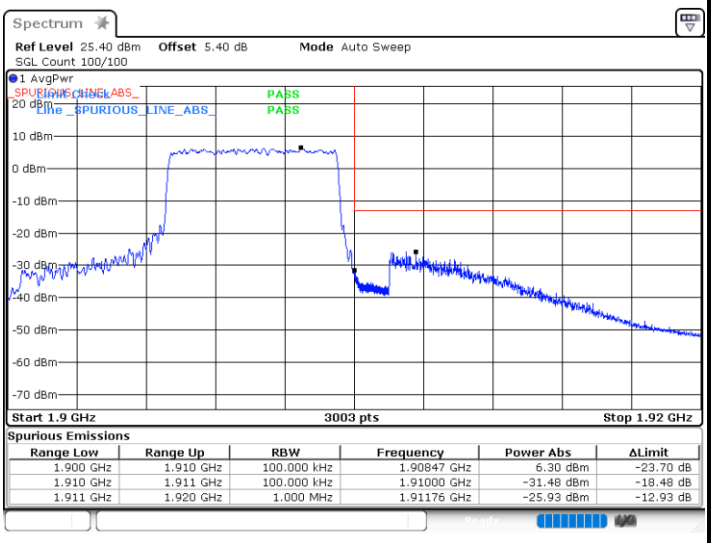
Date: 20.MAY.2022 07:33:27

Lowest Band Edge / Full RB



Date: 3.JUN.2022 05:03:23

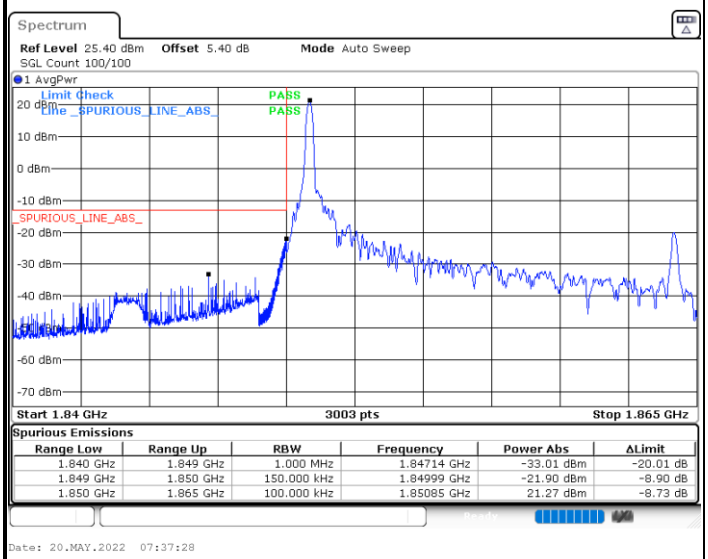
Highest Band Edge / Full RB



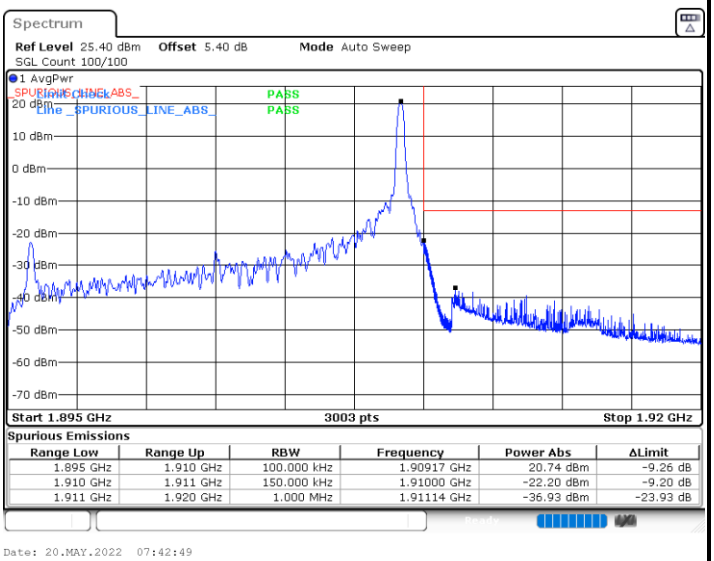
Date: 3.JUN.2022 05:04:15

LTE Band 2 / 15MHz / QPSK

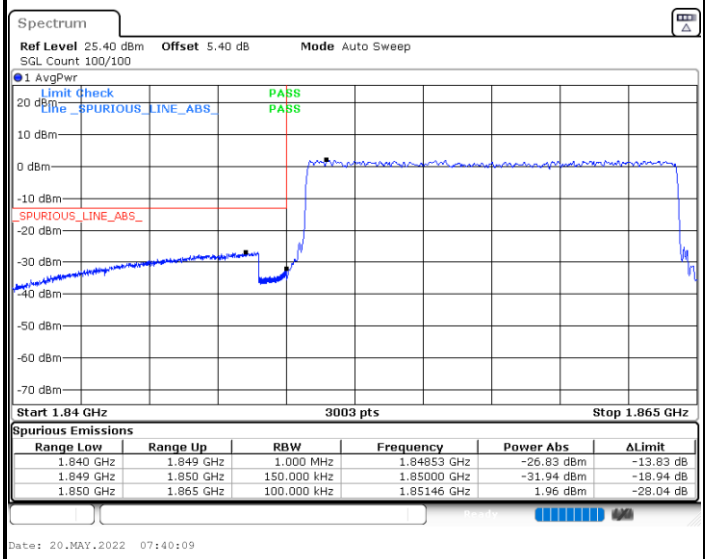
Lowest Band Edge / 1 RB



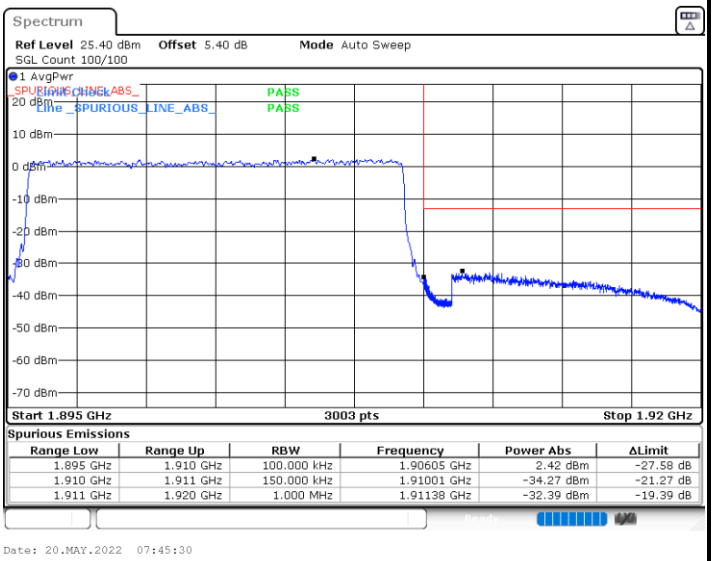
Highest Band Edge / 1 RB



Lowest Band Edge / Full RB

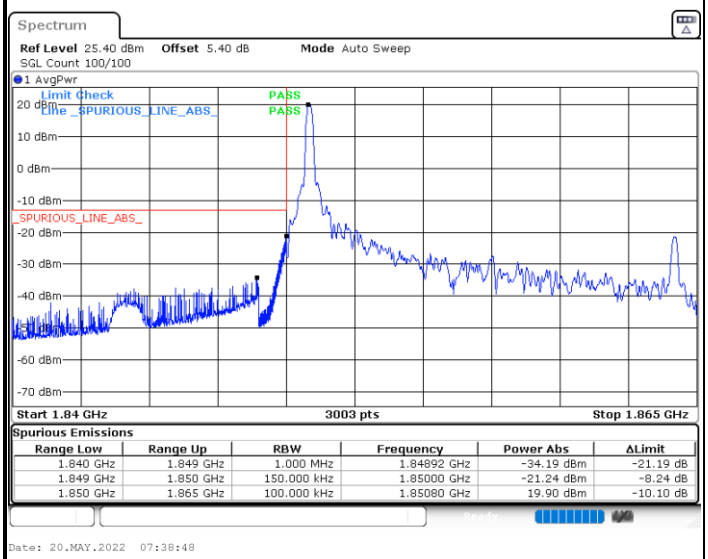


Highest Band Edge / Full RB

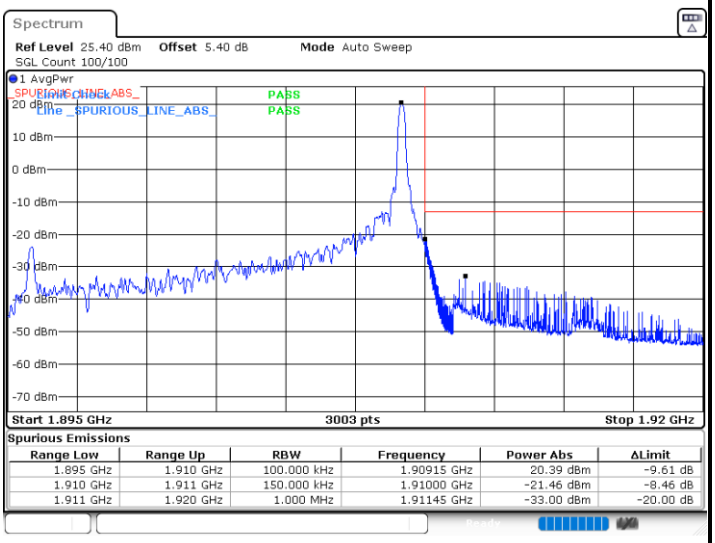


LTE Band 2 / 15MHz / 16QAM

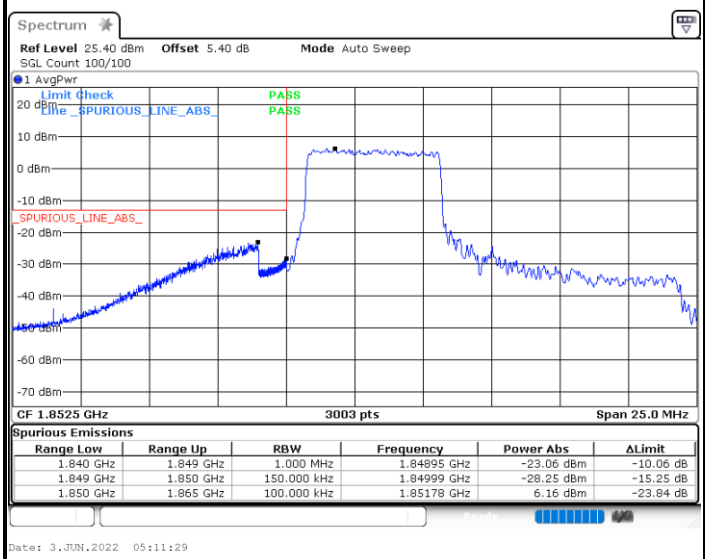
Lowest Band Edge / 1 RB



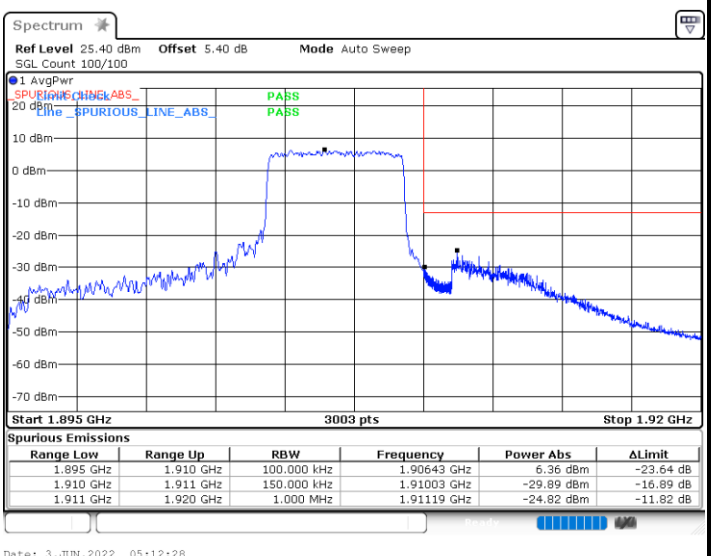
Highest Band Edge / 1 RB



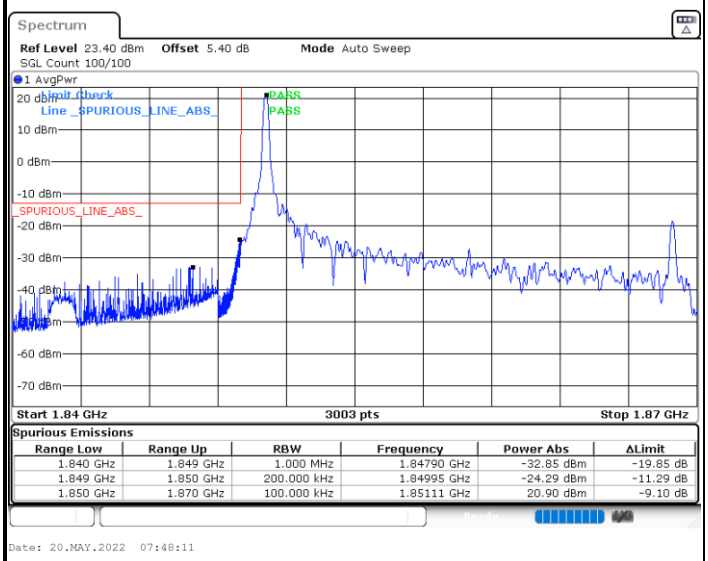
Lowest Band Edge / Full RB

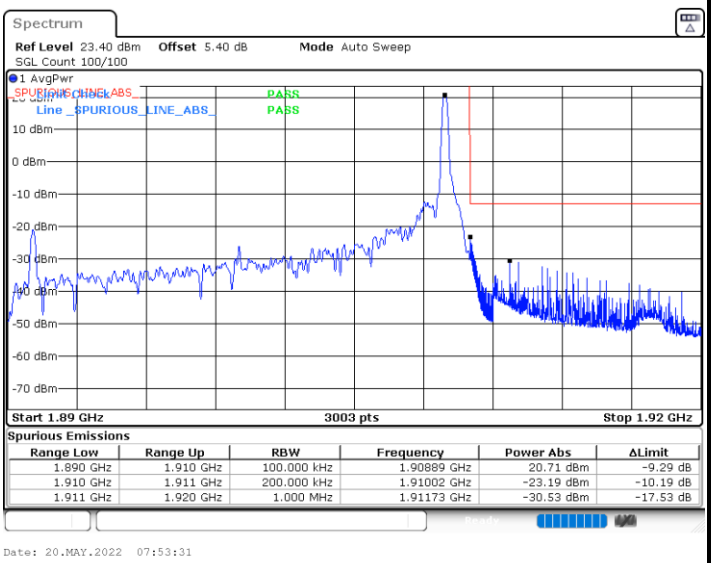


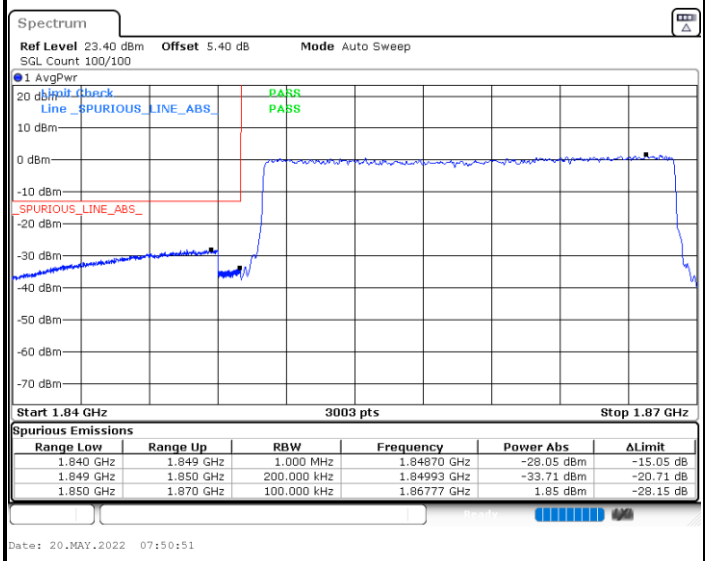
Highest Band Edge / Full RB

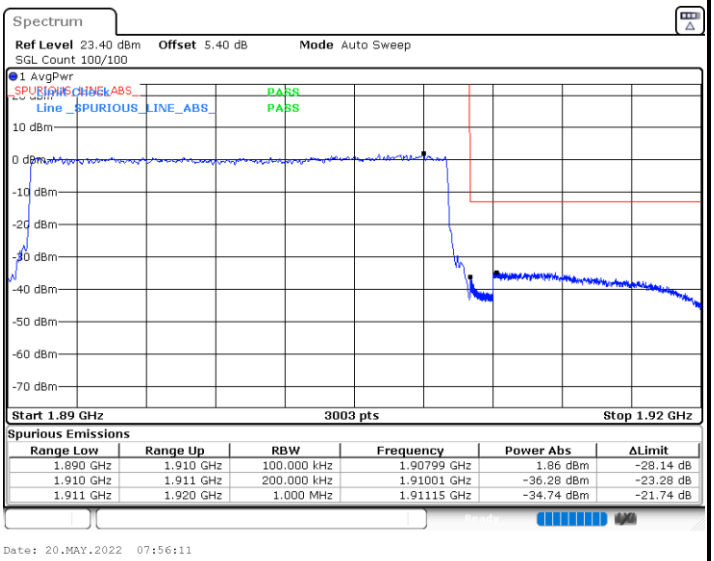


LTE Band 2 / 20MHz / QPSK	
Lowest Band Edge / 1 RB	**Highest Band Edge / 1 RB**
Lowest Band Edge / Full RB	**Highest Band Edge / Full RB**



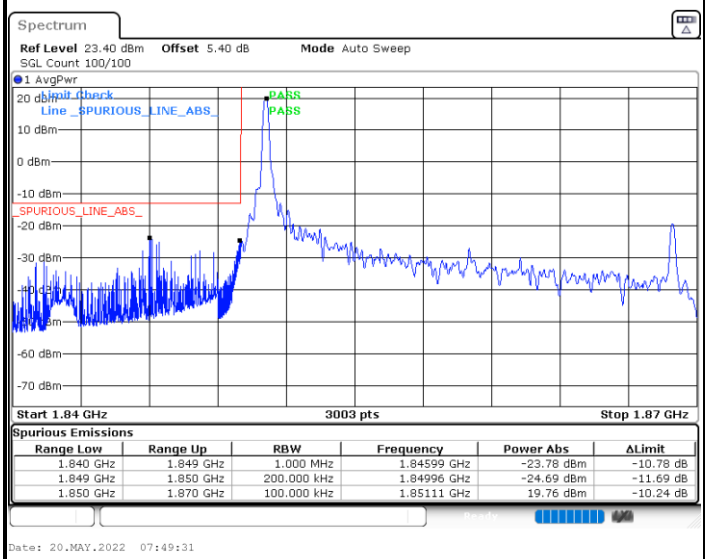






LTE Band 2 / 20MHz / 16QAM

Lowest Band Edge / 1 RB



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.840 GHz	1.849 GHz	1.000 MHz	1.84599 GHz	-23.78 dBm	-10.78 dB
1.849 GHz	1.850 GHz	200.000 kHz	1.84996 GHz	-24.69 dBm	-11.69 dB
1.850 GHz	1.870 GHz	100.000 kHz	1.85111 GHz	19.76 dBm	-10.24 dB

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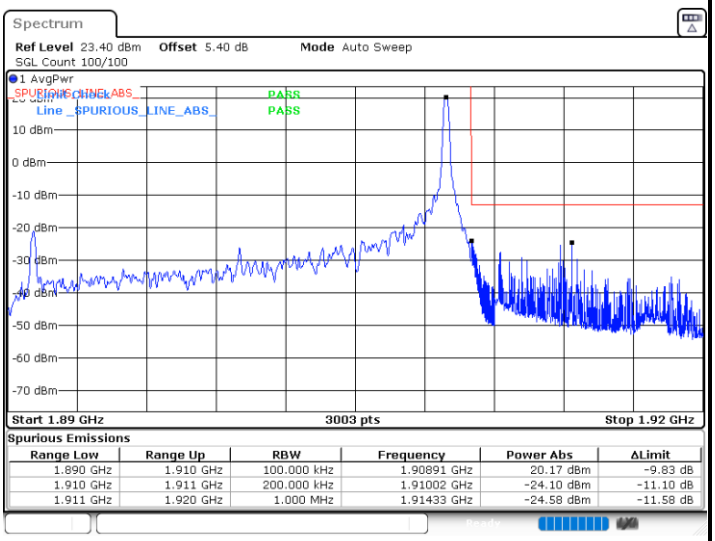
Highest Band Edge / 1 RB

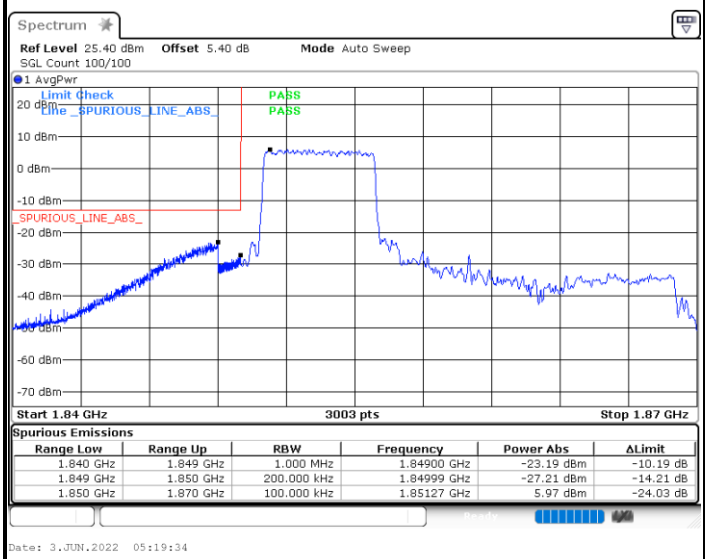


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.890 GHz	1.910 GHz	100.000 kHz	1.90891 GHz	20.17 dBm	-9.83 dB
1.910 GHz	1.911 GHz	200.000 kHz	1.91002 GHz	-24.10 dBm	-11.10 dB
1.911 GHz	1.920 GHz	1.000 MHz	1.91433 GHz	-24.58 dBm	-11.58 dB

Date: 20.MAY.2022 07:54:51

Lowest Band Edge / Full RB

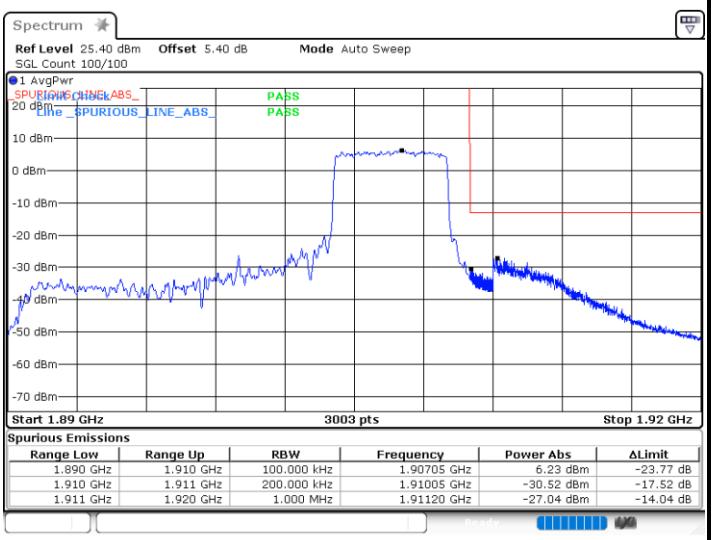


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.840 GHz	1.849 GHz	1.000 MHz	1.84900 GHz	-23.19 dBm	-10.19 dB
1.849 GHz	1.850 GHz	200.000 kHz	1.84999 GHz	-27.21 dBm	-14.21 dB
1.850 GHz	1.870 GHz	100.000 kHz	1.85127 GHz	5.97 dBm	-24.03 dB

Date: 3.JUN.2022 05:19:34

Highest Band Edge / Full RB



Spurious Emissions

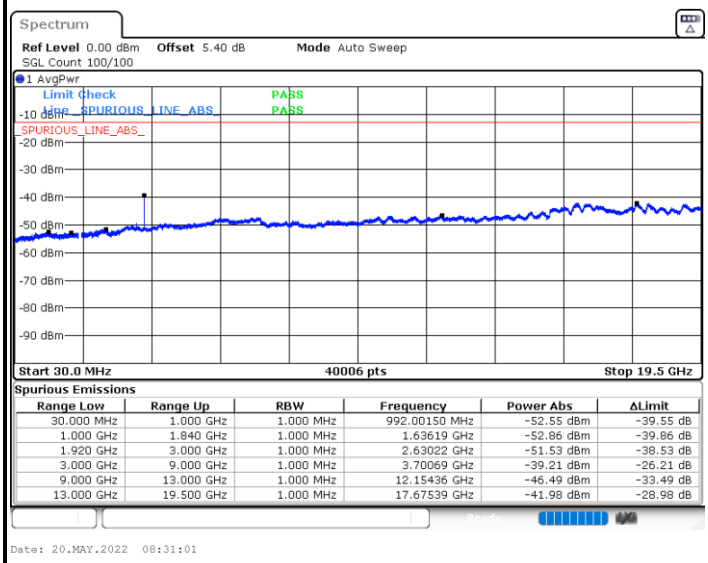
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.890 GHz	1.910 GHz	100.000 kHz	1.90705 GHz	6.23 dBm	-23.77 dB
1.910 GHz	1.911 GHz	200.000 kHz	1.91005 GHz	-30.52 dBm	-17.52 dB
1.911 GHz	1.920 GHz	1.000 MHz	1.91120 GHz	-27.04 dBm	-14.04 dB

Date: 3.JUN.2022 05:21:15

Conducted Spurious Emission

LTE Band 2 / 1.4MHz

Lowest Channel / QPSK

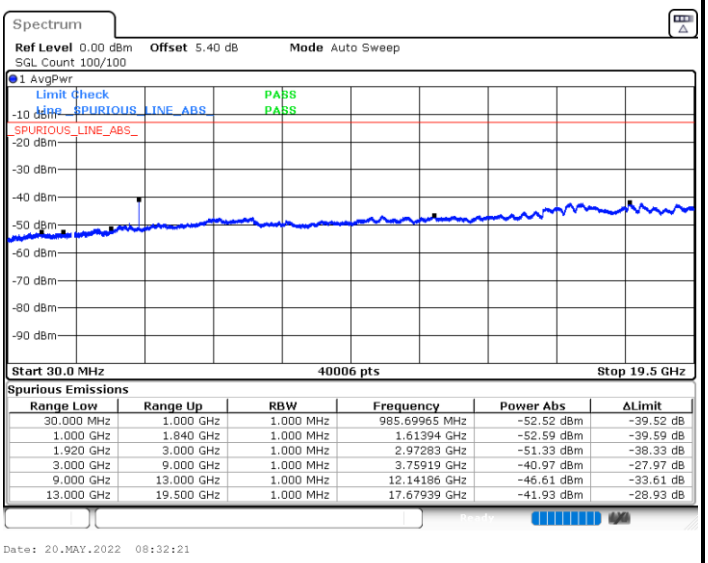


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	992.00150 MHz	-52.55 dBm	-39.55 dB
1.000 GHz	1.840 GHz	1.000 MHz	1.63619 GHz	-52.86 dBm	-39.86 dB
1.920 GHz	3.000 GHz	1.000 MHz	2.63022 GHz	-51.53 dBm	-38.53 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.70069 GHz	-39.21 dBm	-26.21 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.15436 GHz	-46.49 dBm	-33.49 dB
13.000 GHz	19.500 GHz	1.000 MHz	17.67539 GHz	-41.98 dBm	-28.98 dB

Date: 20.MAY.2022 08:31:01

Middle Channel / QPSK



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	985.69965 MHz	-52.52 dBm	-39.52 dB
1.000 GHz	1.840 GHz	1.000 MHz	1.61394 GHz	-52.59 dBm	-39.59 dB
1.920 GHz	3.000 GHz	1.000 MHz	2.97283 GHz	-51.33 dBm	-38.33 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.75919 GHz	-40.97 dBm	-27.97 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.14186 GHz	-46.61 dBm	-33.61 dB
13.000 GHz	19.500 GHz	1.000 MHz	17.67939 GHz	-41.93 dBm	-28.93 dB

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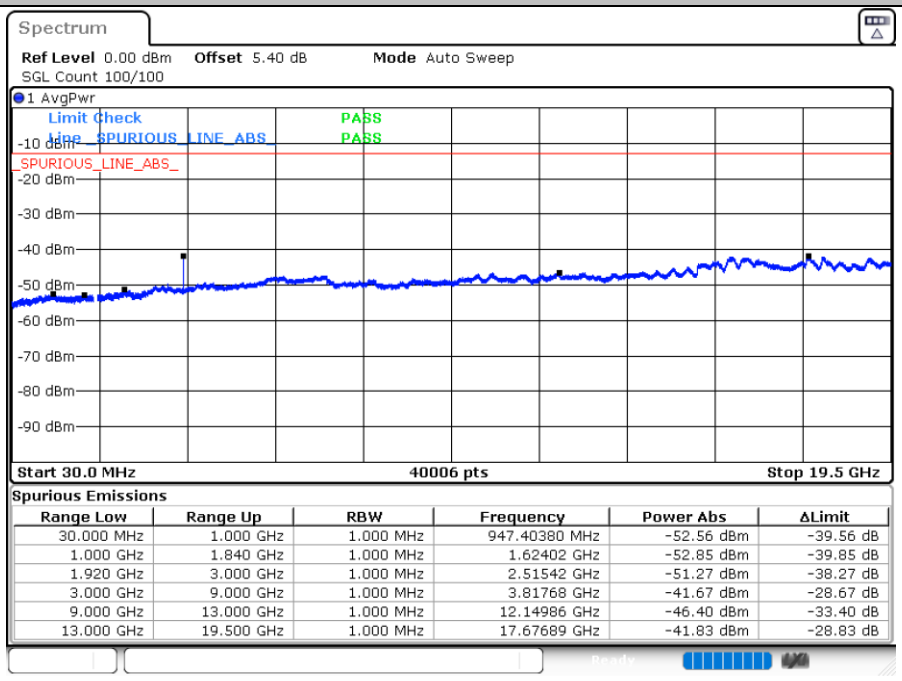
Highest Channel / QPSK



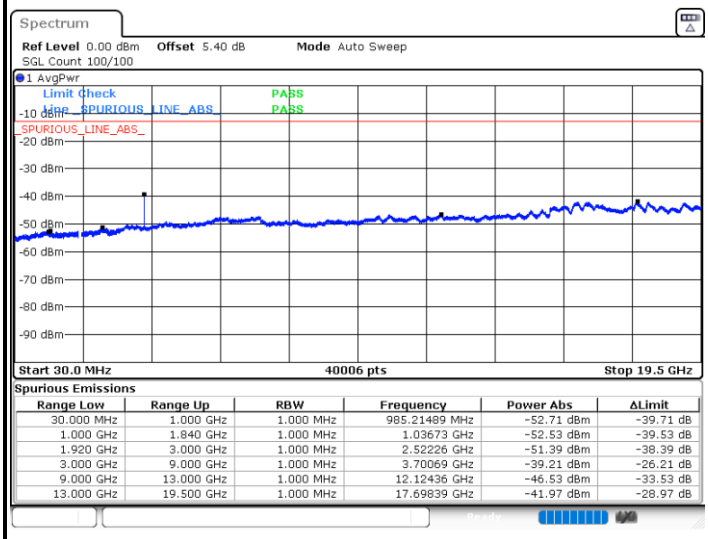
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	947.40380 MHz	-52.56 dBm	-39.56 dB
1.000 GHz	1.840 GHz	1.000 MHz	1.62402 GHz	-52.85 dBm	-39.85 dB
1.920 GHz	3.000 GHz	1.000 MHz	2.51542 GHz	-51.27 dBm	-38.27 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.81768 GHz	-41.67 dBm	-28.67 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.14986 GHz	-46.40 dBm	-33.40 dB
13.000 GHz	19.500 GHz	1.000 MHz	17.67689 GHz	-41.83 dBm	-28.83 dB

Date: 20.MAY.2022 08:33:41

LTE Band 2 / 3MHz

Lowest Channel / QPSK

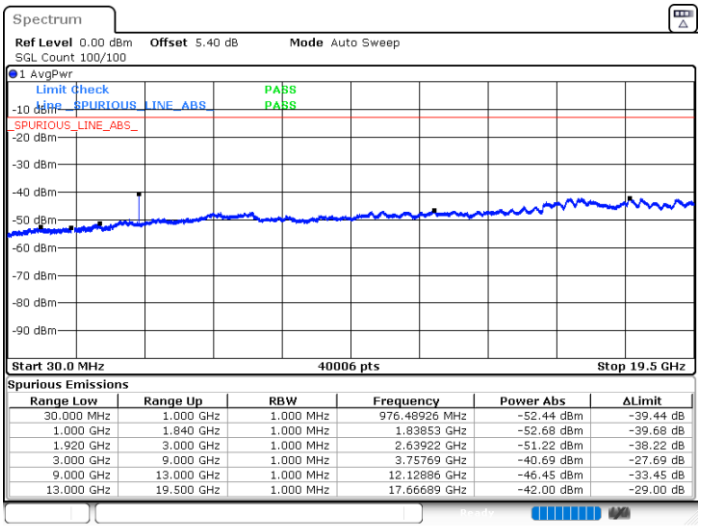


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	985.21489 MHz	-52.71 dBm	-39.71 dB
1.000 GHz	1.840 GHz	1.000 MHz	1.03673 GHz	-52.53 dBm	-39.53 dB
1.920 GHz	3.000 GHz	1.000 MHz	2.52226 GHz	-51.39 dBm	-38.39 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.70069 GHz	-39.21 dBm	-26.21 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.12436 GHz	-46.53 dBm	-33.53 dB
13.000 GHz	19.500 GHz	1.000 MHz	17.69839 GHz	-41.97 dBm	-28.97 dB

Date: 20.MAY.2022 08:35:01

Middle Channel / QPSK

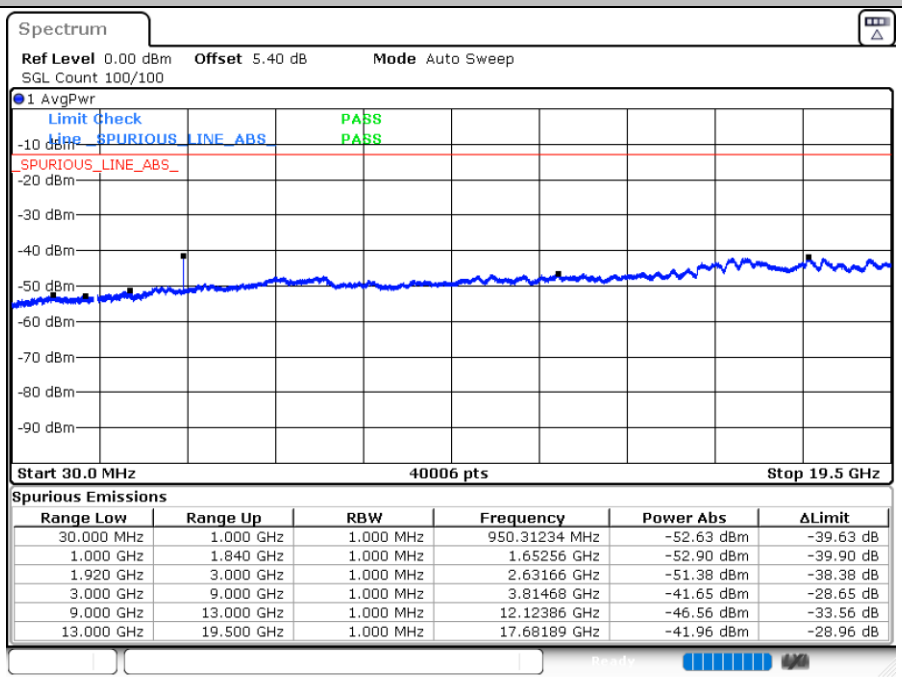


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	976.48926 MHz	-52.44 dBm	-39.44 dB
1.000 GHz	1.840 GHz	1.000 MHz	1.83853 GHz	-52.68 dBm	-39.68 dB
1.920 GHz	3.000 GHz	1.000 MHz	2.63922 GHz	-51.22 dBm	-38.22 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.75769 GHz	-40.69 dBm	-27.69 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.12886 GHz	-46.45 dBm	-33.45 dB
13.000 GHz	19.500 GHz	1.000 MHz	17.66689 GHz	-42.00 dBm	-29.00 dB

Date: 20.MAY.2022 08:36:21

Highest Channel / QPSK



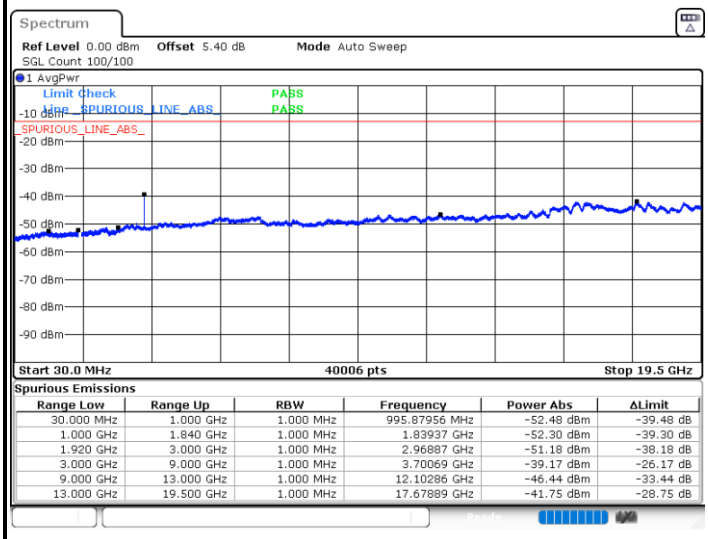
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	950.31234 MHz	-52.63 dBm	-39.63 dB
1.000 GHz	1.840 GHz	1.000 MHz	1.65256 GHz	-52.90 dBm	-39.90 dB
1.920 GHz	3.000 GHz	1.000 MHz	2.63166 GHz	-51.38 dBm	-38.38 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.81468 GHz	-41.65 dBm	-28.65 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.12386 GHz	-46.56 dBm	-33.56 dB
13.000 GHz	19.500 GHz	1.000 MHz	17.68189 GHz	-41.96 dBm	-28.96 dB

Date: 20.MAY.2022 08:37:41

LTE Band 2 / 5MHz

Lowest Channel / QPSK

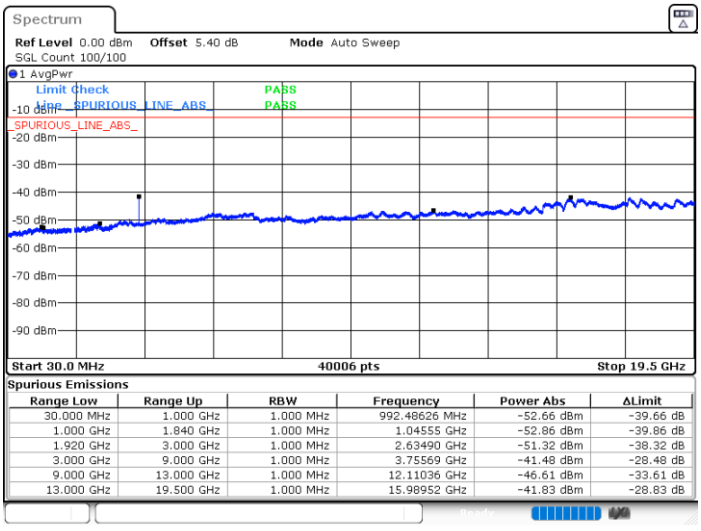


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	995.87956 MHz	-52.48 dBm	-39.48 dB
1.000 GHz	1.840 GHz	1.000 MHz	1.83937 GHz	-52.30 dBm	-39.30 dB
1.920 GHz	3.000 GHz	1.000 MHz	2.96887 GHz	-51.18 dBm	-38.18 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.70069 GHz	-39.17 dBm	-26.17 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.10286 GHz	-46.44 dBm	-33.44 dB
13.000 GHz	19.500 GHz	1.000 MHz	17.67889 GHz	-41.75 dBm	-28.75 dB

Date: 20.MAY.2022 08:39:01

Middle Channel / QPSK

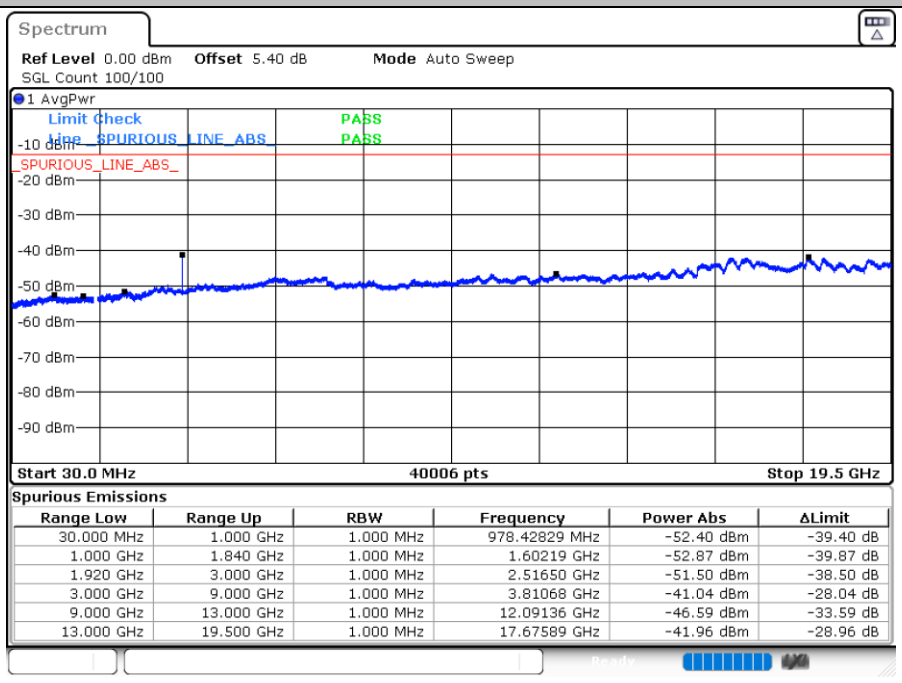


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	992.48626 MHz	-52.66 dBm	-39.66 dB
1.000 GHz	1.840 GHz	1.000 MHz	1.04555 GHz	-52.86 dBm	-39.86 dB
1.920 GHz	3.000 GHz	1.000 MHz	2.63490 GHz	-51.32 dBm	-38.32 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.75569 GHz	-41.48 dBm	-28.48 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.11036 GHz	-46.61 dBm	-33.61 dB
13.000 GHz	19.500 GHz	1.000 MHz	15.98952 GHz	-41.83 dBm	-28.83 dB

Date: 20.MAY.2022 08:40:21

Highest Channel / QPSK



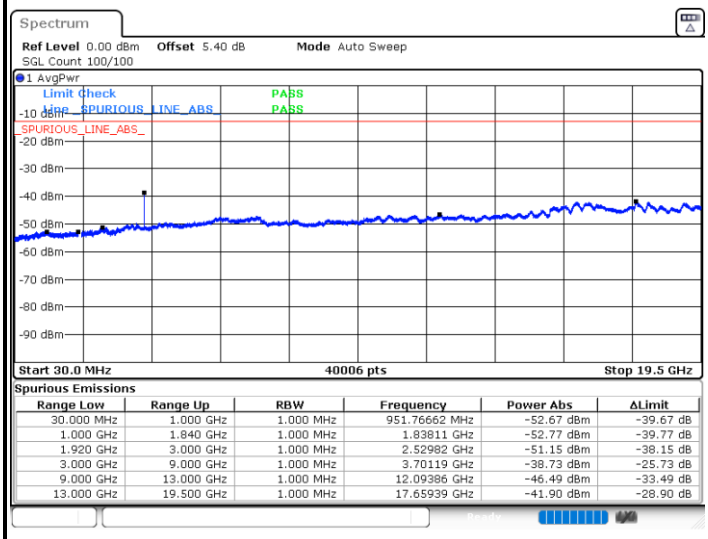
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	978.42829 MHz	-52.40 dBm	-39.40 dB
1.000 GHz	1.840 GHz	1.000 MHz	1.60219 GHz	-52.87 dBm	-39.87 dB
1.920 GHz	3.000 GHz	1.000 MHz	2.51650 GHz	-51.50 dBm	-38.50 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.81068 GHz	-41.04 dBm	-28.04 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.09136 GHz	-46.59 dBm	-33.59 dB
13.000 GHz	19.500 GHz	1.000 MHz	17.67589 GHz	-41.96 dBm	-28.96 dB

Date: 20.MAY.2022 08:41:41

LTE Band 2 / 10MHz

Lowest Channel / QPSK

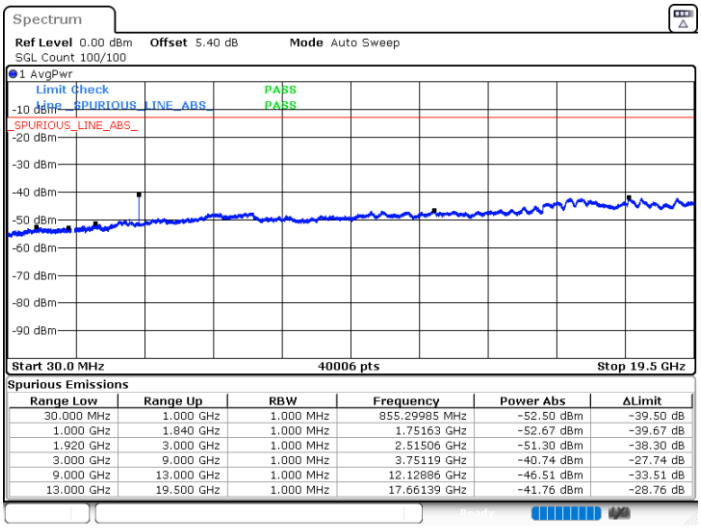


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	951.76662 MHz	-52.67 dBm	-39.67 dB
1.000 GHz	1.840 GHz	1.000 MHz	1.83811 GHz	-52.77 dBm	-39.77 dB
1.920 GHz	3.000 GHz	1.000 MHz	2.52982 GHz	-51.15 dBm	-38.15 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.70119 GHz	-38.73 dBm	-25.73 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.09386 GHz	-46.49 dBm	-33.49 dB
13.000 GHz	19.500 GHz	1.000 MHz	17.65939 GHz	-41.90 dBm	-28.90 dB

Date: 20.MAY.2022 08:43:01

Middle Channel / QPSK

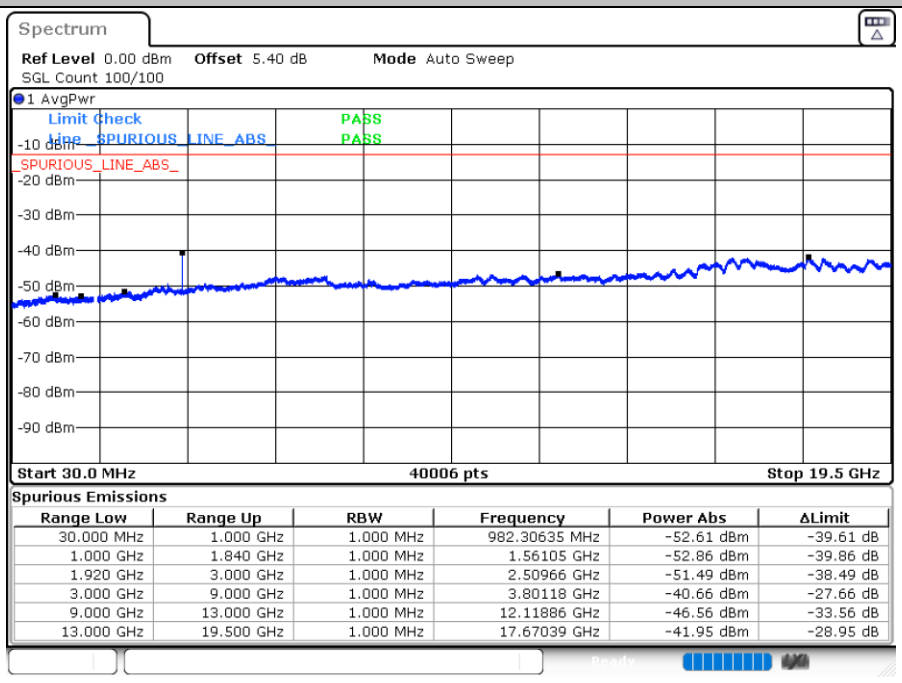


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	855.29985 MHz	-52.50 dBm	-39.50 dB
1.000 GHz	1.840 GHz	1.000 MHz	1.75163 GHz	-52.67 dBm	-39.67 dB
1.920 GHz	3.000 GHz	1.000 MHz	2.51506 GHz	-51.30 dBm	-38.30 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.75119 GHz	-40.74 dBm	-27.74 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.12886 GHz	-46.51 dBm	-33.51 dB
13.000 GHz	19.500 GHz	1.000 MHz	17.66139 GHz	-41.76 dBm	-28.76 dB

Date: 20.MAY.2022 08:44:21

Highest Channel / QPSK



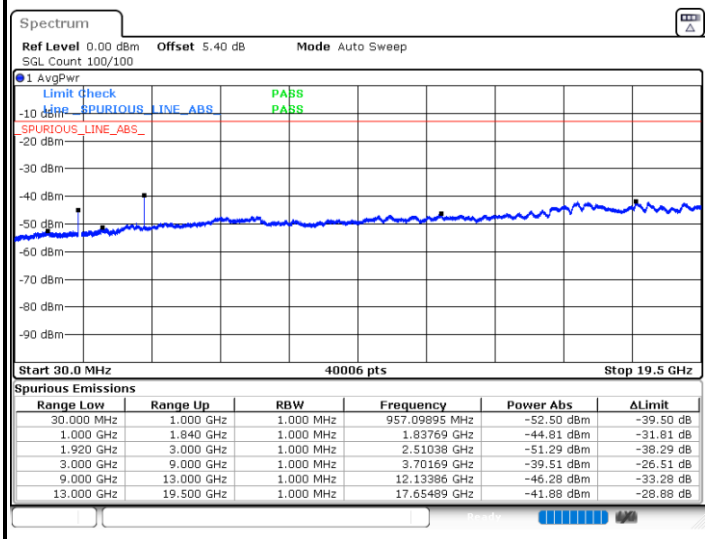
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	982.30635 MHz	-52.61 dBm	-39.61 dB
1.000 GHz	1.840 GHz	1.000 MHz	1.56105 GHz	-52.86 dBm	-39.86 dB
1.920 GHz	3.000 GHz	1.000 MHz	2.50966 GHz	-51.49 dBm	-38.49 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.80118 GHz	-40.66 dBm	-27.66 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.11886 GHz	-46.56 dBm	-33.56 dB
13.000 GHz	19.500 GHz	1.000 MHz	17.67039 GHz	-41.95 dBm	-28.95 dB

Date: 20.MAY.2022 08:45:41

LTE Band 2 / 15MHz

Lowest Channel / QPSK

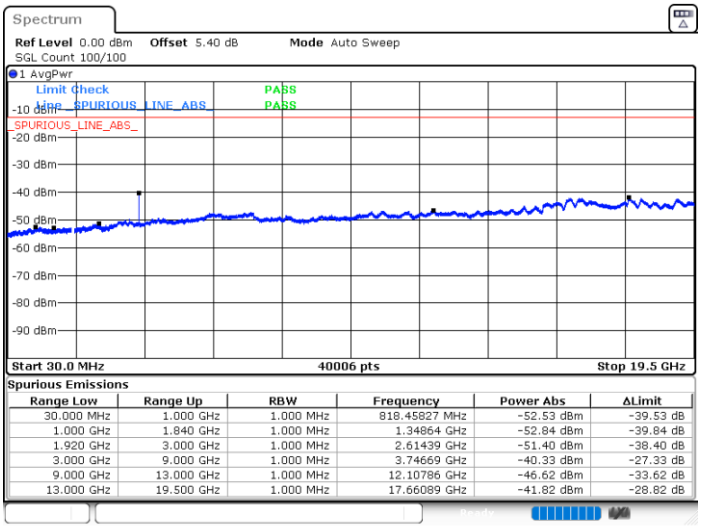


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	957.09895 MHz	-52.50 dBm	-39.50 dB
1.000 GHz	1.840 GHz	1.000 MHz	1.83769 GHz	-44.81 dBm	-31.81 dB
1.920 GHz	3.000 GHz	1.000 MHz	2.51038 GHz	-51.29 dBm	-38.29 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.70169 GHz	-39.51 dBm	-26.51 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.13386 GHz	-46.28 dBm	-33.28 dB
13.000 GHz	19.500 GHz	1.000 MHz	17.65489 GHz	-41.88 dBm	-28.88 dB

Date: 20.MAY.2022 08:47:01

Middle Channel / QPSK

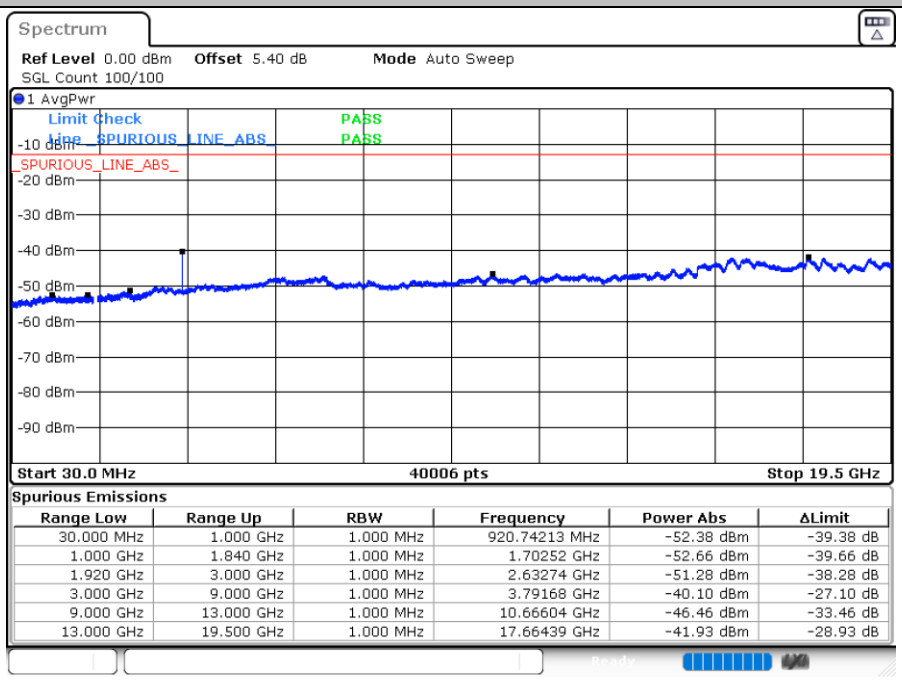


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	818.45827 MHz	-52.53 dBm	-39.53 dB
1.000 GHz	1.840 GHz	1.000 MHz	1.34864 GHz	-52.84 dBm	-39.84 dB
1.920 GHz	3.000 GHz	1.000 MHz	2.61439 GHz	-51.40 dBm	-38.40 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.74669 GHz	-40.33 dBm	-27.33 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.10786 GHz	-46.62 dBm	-33.62 dB
13.000 GHz	19.500 GHz	1.000 MHz	17.66089 GHz	-41.82 dBm	-28.82 dB

Date: 20.MAY.2022 08:48:21

Highest Channel / QPSK



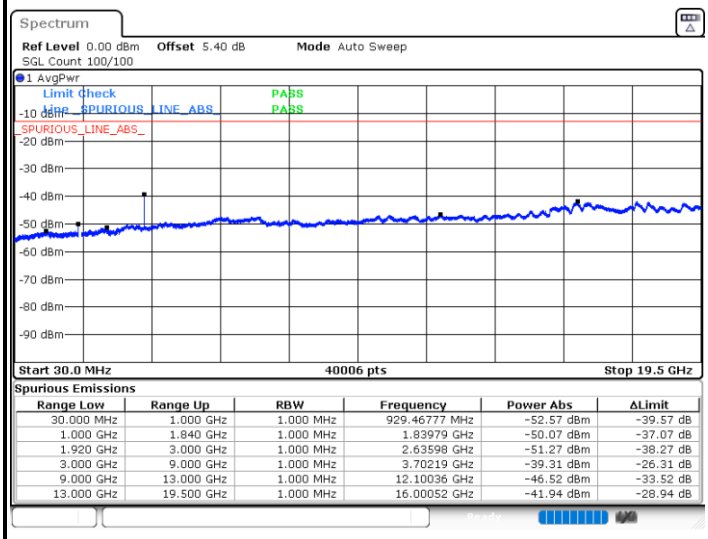
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	920.74213 MHz	-52.38 dBm	-39.38 dB
1.000 GHz	1.840 GHz	1.000 MHz	1.70252 GHz	-52.66 dBm	-39.66 dB
1.920 GHz	3.000 GHz	1.000 MHz	2.63274 GHz	-51.28 dBm	-38.28 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.79168 GHz	-40.10 dBm	-27.10 dB
9.000 GHz	13.000 GHz	1.000 MHz	10.66604 GHz	-46.46 dBm	-33.46 dB
13.000 GHz	19.500 GHz	1.000 MHz	17.66439 GHz	-41.93 dBm	-28.93 dB

Date: 20.MAY.2022 08:49:41

LTE Band 2 / 20MHz

Lowest Channel / QPSK

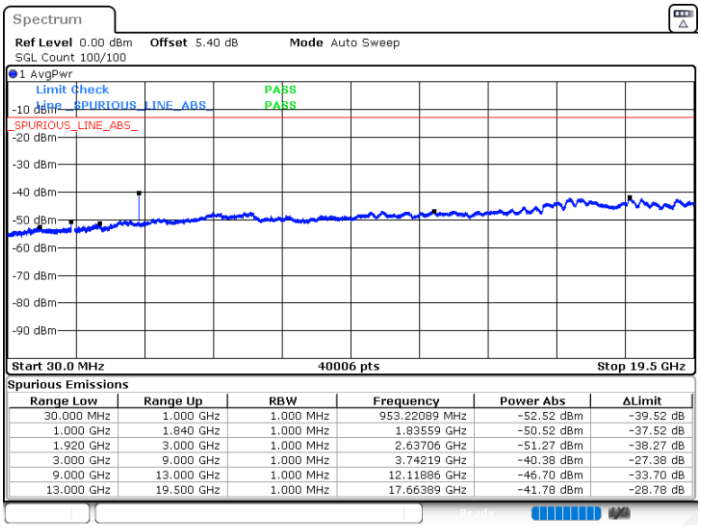


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	929.46777 MHz	-52.57 dBm	-39.57 dB
1.000 GHz	1.840 GHz	1.000 MHz	1.83979 GHz	-50.07 dBm	-37.07 dB
1.920 GHz	3.000 GHz	1.000 MHz	2.63598 GHz	-51.27 dBm	-38.27 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.70219 GHz	-39.31 dBm	-26.31 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.10036 GHz	-46.52 dBm	-33.52 dB
13.000 GHz	19.500 GHz	1.000 MHz	16.00052 GHz	-41.94 dBm	-28.94 dB

Date: 20.MAY.2022 08:51:02

Middle Channel / QPSK

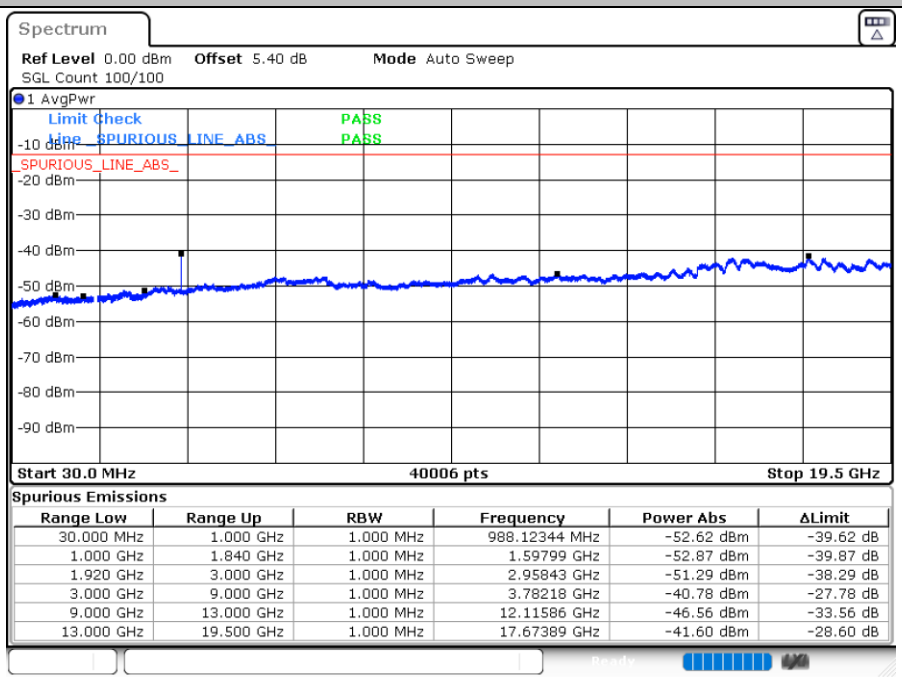


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	953.22089 MHz	-52.52 dBm	-39.52 dB
1.000 GHz	1.840 GHz	1.000 MHz	1.83559 GHz	-50.52 dBm	-37.52 dB
1.920 GHz	3.000 GHz	1.000 MHz	2.63706 GHz	-51.27 dBm	-38.27 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.74219 GHz	-40.38 dBm	-27.38 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.11886 GHz	-46.70 dBm	-33.70 dB
13.000 GHz	19.500 GHz	1.000 MHz	17.66389 GHz	-41.78 dBm	-28.78 dB

Date: 20.MAY.2022 08:52:21

Highest Channel / QPSK



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	988.12344 MHz	-52.62 dBm	-39.62 dB
1.000 GHz	1.840 GHz	1.000 MHz	1.59799 GHz	-52.87 dBm	-39.87 dB
1.920 GHz	3.000 GHz	1.000 MHz	2.95843 GHz	-51.29 dBm	-38.29 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.78218 GHz	-40.78 dBm	-27.78 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.11586 GHz	-46.56 dBm	-33.56 dB
13.000 GHz	19.500 GHz	1.000 MHz	17.67389 GHz	-41.60 dBm	-28.60 dB

Date: 20.MAY.2022 08:53:41

Frequency Stability

Test Conditions		LTE Band 2 (QPSK) / Middle Channel	Limit
Temperature (°C)	Voltage (Volt)	BW 10MHz	Note 2.
		Deviation (ppm)	Result
50	Normal Voltage	0.0011	PASS
40	Normal Voltage	0.0021	
30	Normal Voltage	0.0015	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0010	
0	Normal Voltage	0.0006	
-10	Normal Voltage	0.0008	
-20	Normal Voltage	0.0022	
-30	Normal Voltage	0.0015	
20	Maximum Voltage	0.0016	
20	Normal Voltage	0.0028	
20	Battery End Point	0.0012	

Note:

1. Normal Voltage =3.8 V. ; Battery End Point (BEP) =3.6 V. ; Maximum Voltage =4.2 V.

2. Note: The frequency fundamental emissions stay within the authorized frequency block.

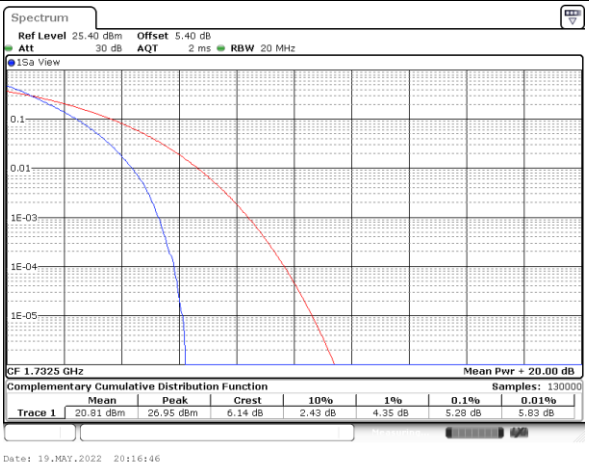
LTE Band 4

Peak-to-Average Ratio

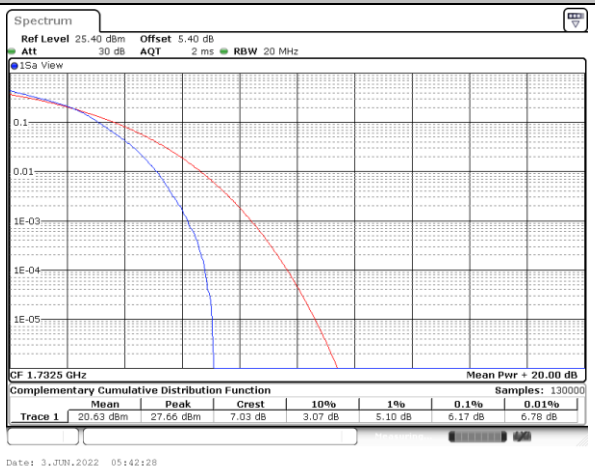
Mode	LTE Band 4 / 20MHz			
Mod.	QPSK	16QAM		Limit: 13dB
RB Size	Full RB	Full RB		Result
Middle CH	5.28	6.17		PASS

LTE Band 4 / 20MHz

Middle Channel / Full RB/ QPSK



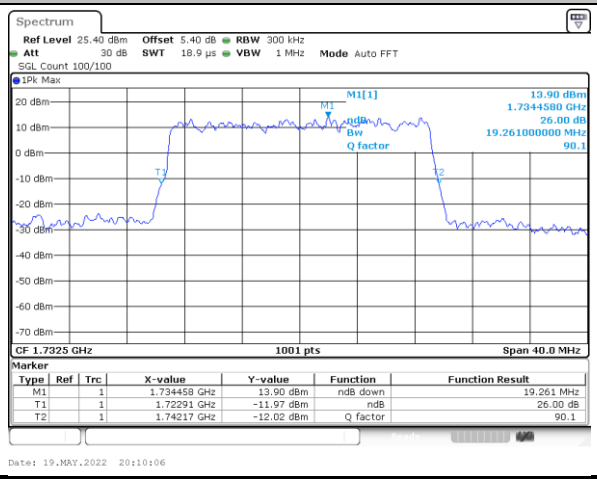
Middle Channel / Full RB/ 16QAM

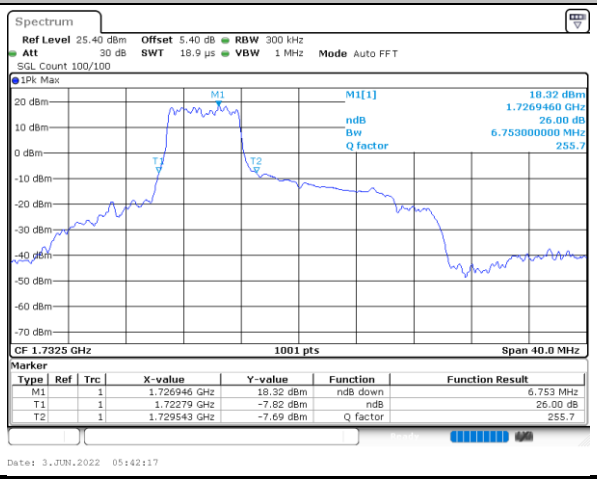


26dB Bandwidth

Mode	LTE Band 4 : 26dB BW(MHz)	
BW	20MHz	
Mod.	QPSK	16QAM
Middle CH	19.26	6.75

LTE Band 4	
Middle Channel / 20MHz / QPSK	Middle Channel / 20MHz / 16QAM

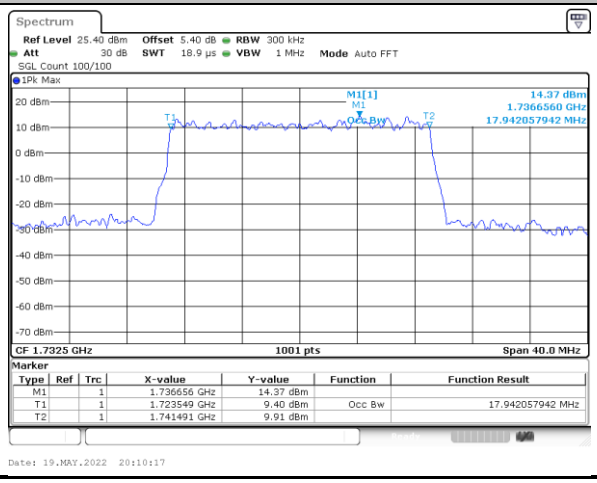


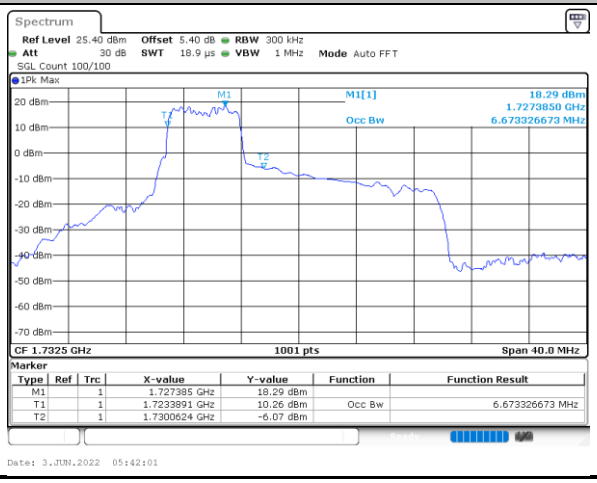


Occupied Bandwidth

Mode	LTE Band 4 : 99%OBW(MHz)	
BW	20MHz	
Mod.	QPSK	16QAM
Middle CH	17.94	6.67

LTE Band 4	
Middle Channel / 20MHz / QPSK	Middle Channel / 20MHz / 16QAM

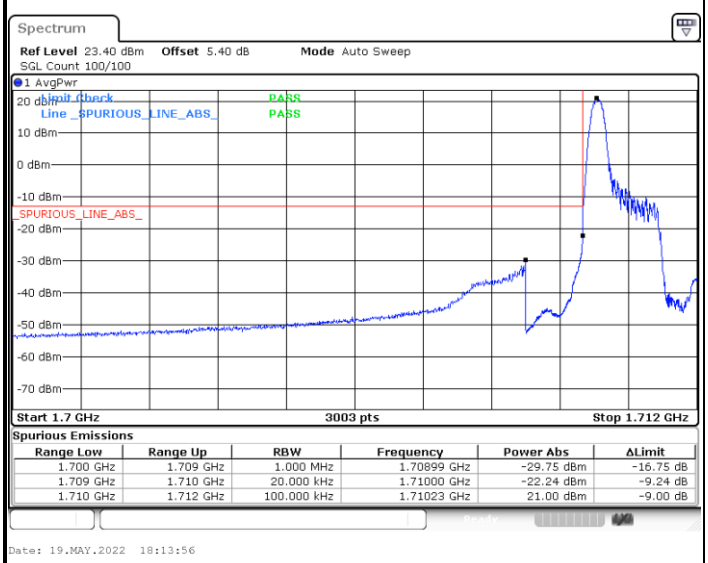




Conducted Band Edge

LTE Band 4 / 1.4MHz / QPSK

Lowest Band Edge / 1RB

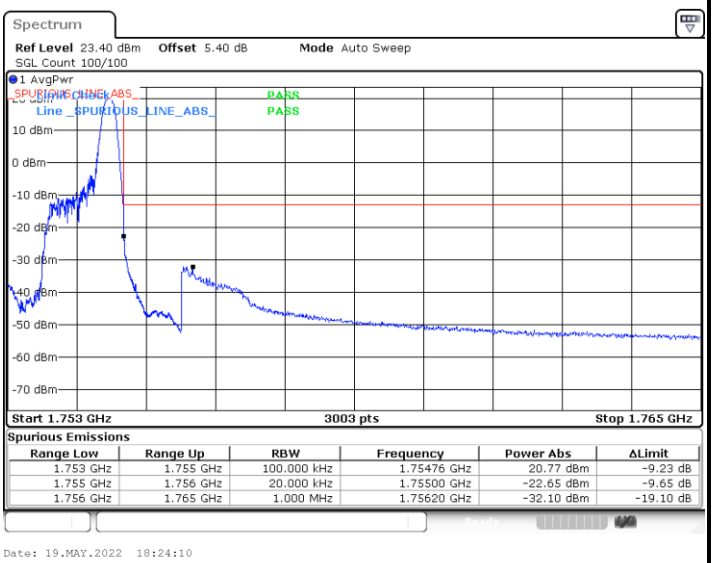


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.700 GHz	1.709 GHz	1.000 MHz	1.70899 GHz	-29.75 dBm	-16.75 dB
1.709 GHz	1.710 GHz	20.000 kHz	1.71000 GHz	-22.24 dBm	-9.24 dB
1.710 GHz	1.712 GHz	100.000 kHz	1.71023 GHz	21.00 dBm	-9.00 dB

Date: 19.MAY.2022 18:13:56

Highest Band Edge / 1RB

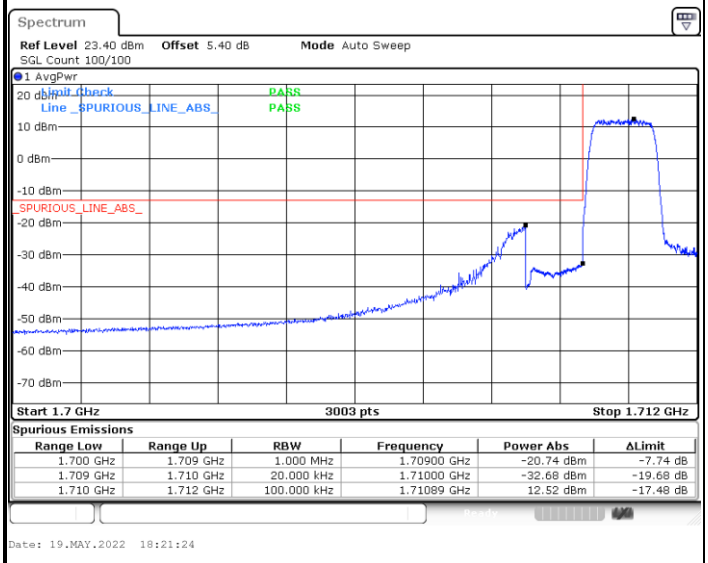


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.753 GHz	1.755 GHz	100.000 kHz	1.75476 GHz	20.77 dBm	-9.23 dB
1.755 GHz	1.756 GHz	20.000 kHz	1.75500 GHz	-22.65 dBm	-9.65 dB
1.756 GHz	1.765 GHz	1.000 MHz	1.75620 GHz	-32.10 dBm	-19.10 dB

Date: 19.MAY.2022 18:24:10

Lowest Band Edge / Full RB

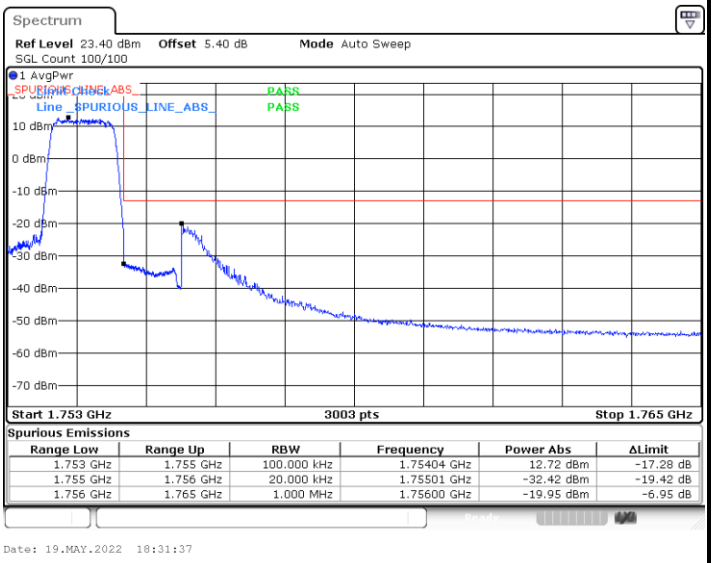


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.700 GHz	1.709 GHz	1.000 MHz	1.70900 GHz	-20.74 dBm	-7.74 dB
1.709 GHz	1.710 GHz	20.000 kHz	1.71000 GHz	-32.68 dBm	-19.68 dB
1.710 GHz	1.712 GHz	100.000 kHz	1.71089 GHz	12.52 dBm	-17.48 dB

Date: 19.MAY.2022 18:21:24

Highest Band Edge / Full RB



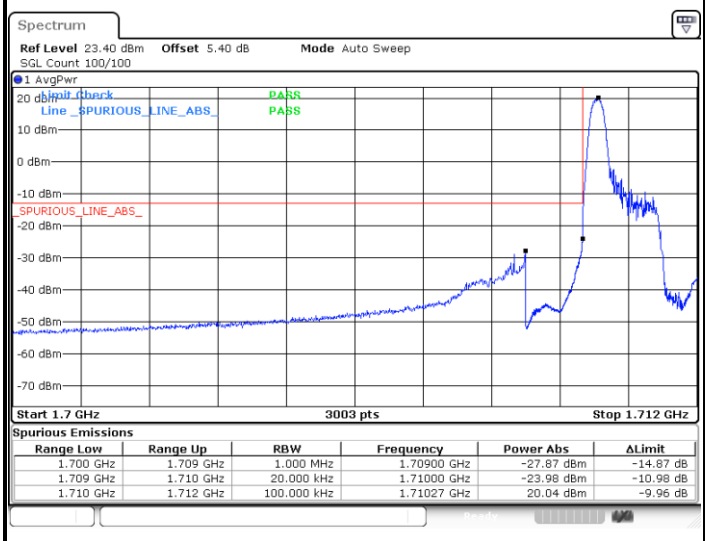
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.753 GHz	1.755 GHz	100.000 kHz	1.75404 GHz	12.72 dBm	-17.28 dB
1.755 GHz	1.756 GHz	20.000 kHz	1.75501 GHz	-32.42 dBm	-19.42 dB
1.756 GHz	1.765 GHz	1.000 MHz	1.75600 GHz	-19.95 dBm	-6.95 dB

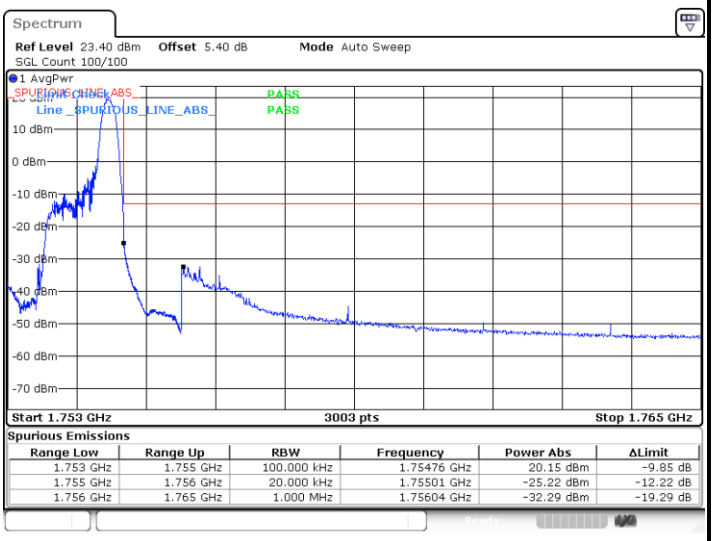
Date: 19.MAY.2022 18:31:37

LTE Band 4 / 1.4MHz / 16QAM

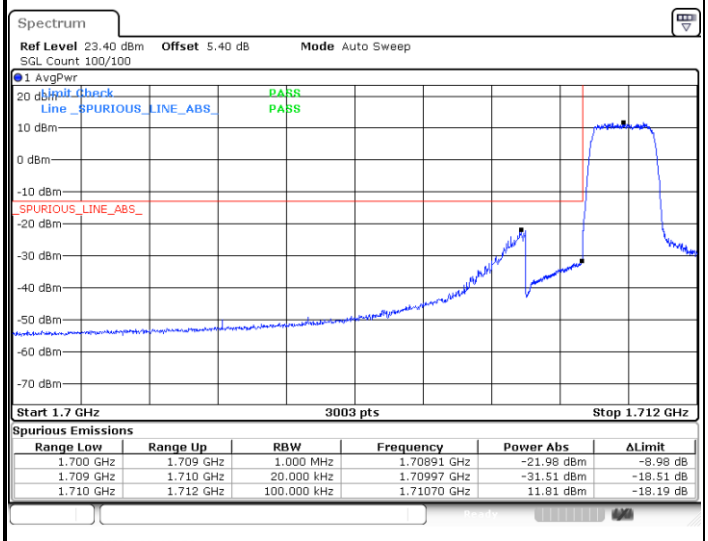
Lowest Band Edge / 1 RB



Highest Band Edge / 1 RB



Lowest Band Edge / Full RB



Highest Band Edge / Full RB