FCC RF Test Report

APPLICANT	:	Shenzhen Gongjin Electronics Co.,Ltd.
EQUIPMENT	:	Nokia Smart Node
BRAND NAME	:	Nokia
MODEL NAME	:	Nokia Multi-Standard Smart Node B2B14B66 (SN4IBN)
FCC ID	:	V4V1SN4IBN
STANDARD	:	47 CFR Part 2, 24(E), 27(L)
CLASSIFICATION	:	PCS Licensed Transmitter (PCB)
TEST DATE(S)	:	Sep. 21, 2023 ~ Nov. 07, 2023

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

Sporton International Inc. (Kunshan)
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APPENDIX A. TEST RESULTS OF CONDUCTED TEST

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG151309-02A	Rev. 01	Initial issue of report	Nov. 30, 2023

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.4	§2.1046	Conducted Output Power	-	Report Only	-
	§24.232(c)	Equivalent Isotropic Radiated Power (Band 2)	EIRP < 1640Watt	PASS	-
	§27.50(d)(4)	Equivalent Isotropic Radiated Power (Band 66)	EIRP < 1640Watt		-
3.7	§2.1051 §24.238(a) §27.53(h)	Conducted Band Edge Measurement (Band 2) (Band 66)	< 43+10log10(P[Watts])	PASS	-
3.8	§2.1051 §24.238(a) §27.53(h)	Conducted Spurious Emission (Band 2) (Band 66)	< 43+10log10(P[Watts])	PASS	-
4.4	§2.1053 §24.238(a) §27.53(h)	Radiated Spurious Emission (Band 2) (Band 66)	< $43+10\log_{10}$(P[Watts])	PASS	Under limit 32.67 dB at 7836.000 MHz

Note: This is a variant report. The change note could be referred to Nokia Multi-Standard Smart Node B2B14B66 (SN4IBN)_Class II Permissive Change letter which is exhibit separately. According to the change, only the worst case of Coducted Power, Band Edge, CSE and RSE from original test report (Sporton Report Number FG151309A) were verified for the differences.

Conformity Assessment Condition:
1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account. 2. The measurement uncertainty please refer to each test result in the section “Measurement Uncertainty”
Disclaimer:
The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

1 General Description

1.1 Applicant

Shenzhen Gongjin Electronics Co.,Ltd.
No.2 Danzi North Road, Kengzi Street, Pingshan District, Shenzhen, Guangdong, 518122, P.R. China

1.2 Manufacturer

Shenzhen Gongjin Electronics Co.,Ltd.
No.2 Danzi North Road, Kengzi Street, Pingshan District, Shenzhen, Guangdong, 518122, P.R. China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Nokia Smart Node
Brand Name	Nokia
Model Name	Nokia Multi-Standard Smart Node B2B14B66 (SN4IBN)
FCC ID	V4V1SN4IBN
HW Version	V03
SW Version	56850
EUT Stage	Production Unit

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx Frequency	LTE Band 2 : 1930 MHz ~ 1990 MHz LTE Band 66 : 2110 MHz~ 2180 MHz
Rx Frequency	LTE Band 2 : 1850 MHz ~ 1910 MHz LTE Band 66 : 1710 MHz ~ 1780 MHz
Bandwidth	LTE: LTE Band 2 : 5MHz / 10MHz / 15MHz / 20MHz LTE Band 66 : 5MHz / 10MHz / 15MHz / 20MHz NB-IOT Category NB1: 200kHz
Sub-carrier Speacing	NB-IOT Category NB1: LTE Band 2 : 15kHz LTE Band 66 : 15kHz
NB-IoT Operating Type	Guard-band
Maximum Output Power to Antenna	LTE: <MIMO Ant. 1+2> LTE Band 2 : 24.29 dBm <MIMO Ant. 3+4> LTE Band 66 : 24.58 dBm NB-IOT Category NB1: <MIMO Ant. 1+2> LTE Band 2 : 23.91 dBm <MIMO Ant. 3+4> LTE Band 66 : 24.65 dBm

Antenna Type	WWAN : Dipole Antenna
Antenna Gain	<SISO Ant. 1/2> LTE Band 2 : 3.20 dBi <SISO Ant. 3/4> LTE Band 66 : 2.90 dBi <MIMO Ant. 1+2> LTE Band 2 : 6.21 dBi <MIMO Ant. 3+4> LTE Band 66 : 5.91 dBi
Type of Modulation	LTE: QPSK / 16QAM / 64QAM NB-IOT Category NB1 : QPSK

Note:

1. For SISO & MIMO mode, the RSE testing has assessed only MIMO mode by referring to their higher conducted power.
2. The maximum ERP/EIRP is calculated from max output power and max antenna gain, only the maximum ERP/EIRP is shown on the report for MIMO mode.
3. LTE Tx is non-signaling mode.
4. LTE only support full RB mode.
5. LTE supports Category NB1 and can only be used with LTE at the same time.
6. MIMO Gain = SISO Gain + Array Gain(10log 2)

1.5 Modification of EUT

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

1.6 Maximum EIRP Power

LTE:

LTE Band 2_UL MIMO		**QPSK**
BW (MHz)	**Frequency Range (MHz)**	**Maximum EIRP(W)**
20	1940.0 ~ 1980.0	1.1224
LTE Band 66_UL MIMO		**QPSK**
BW (MHz)	**Frequency Range (MHz)**	**Maximum EIRP(W)**
20	2120.0 ~ 2170.0	1.1187

Note: All modulations have been tested, only the maximum bandwidth and the worst modulation test results are shown in the report.

NB-IOT Category NB1:

LTE Band 2_UL MIMO		QPSK
BW (MHz)	**Frequency Range (MHz)**	**Maximum EIRP(W)**
20	1940.0 ~ 1980.0	1.0282
LTE Band 66_UL MIMO		**QPSK**
BW (MHz)	**Frequency Range (MHz)**	**Maximum EIRP(W)**
20	2120.0 ~ 2170.0	1.1380

Note: Test combination is LTE Band 2 + NB-IOT, LTE Band 66 + NB-IOT.

1.7 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		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	03CH04-KS TH01-KS	CN1257	314309

1.8 Test Software

Item	Site	Manufacture	Name	Version
1.	03CH04-KS	AUDIX	E3	210616

1.9 Applicable Standards

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

- 47 CFR Part 2, 24(E), 27(L)
- 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.

The WWAN Tx mode was pre-scanned for harmonics in three orthogonal panels (Y, Z and X planes) for both horizontal and vertical polarizations, and then the worst mode(X planes) was performed the full test and recorded in this report.

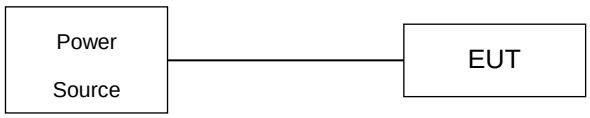
LTE:

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		
	66	-	-				v	v			-	-	v	v		
Conducted Band Edge	2	-	-	v	v	v	v	v			-	-	v	v		
	66	-	-	v	v	v	v	v			-	-	v	v		
Conducted Spurious Emission	2	-	-	v	v	v	v	v			-	-	v	v		
	66	-	-	v	v	v	v	v			-	-	v	v		
E.I.R.P.	2	-	-				v	v			-	-	v	v		
	66	-	-				v	v			-	-	v	v		
Radiated Spurious Emission	2	Worst Case													v	
	66	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.															

NB-IOT Category NB1:

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		
	66	-	-	-			v	v	-	-	-	-	v	v		
Conducted Band Edge	2	-	-	-	v	v	v	v	-	-	-	-	v	v		
	66	-	-	-	v	v	v	v	-	-	-	-	v	v		
Conducted Spurious Emission	2	-	-	-	v	v	v	v	-	-	-	-	v	v		
	66	-	-	-	v	v	v	v	-	-	-	-	v	v		
E.I.R.P.	2	-	-	-	v	v	v	v	-	-	-	-	v	v		
	66	-	-	-	v	v	v	v	-	-	-	-	v	v		
Radiated Spurious Emission	2	Worst Case													v	
	66	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. 4. Pretest the power of guard band with LTE L/M/H channel, and only the worst power (Low Location with Low channel) of NB-IOT show in the report. 5. Test combination is LTE Band 2 + NB-IOT, LTE Band 66 + NB-IOT.															

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

2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor 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 and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 8.51 dB and 20dB attenuator.

Example :

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 8.51 + 20 = 28.51 (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	700	900	1100
	Frequency	1940	1960	1980
15	Channel	675	900	1125
	Frequency	1937.5	1960	1982.5
10	Channel	650	900	1150
	Frequency	1935	1960	1985
5	Channel	625	900	1175
	Frequency	1932.5	1960	1987.5

LTE Band 66 Channel and Frequency List				
BW [MHz]	**Channel/Frequency(MHz)**	**Lowest**	**Middle**	**Highest**
20	Channel	66536	66786	67036
	Frequency	2120	2145	2170
15	Channel	66511	66786	67061
	Frequency	2117.5	2145	2172.5
10	Channel	66486	66786	67086
	Frequency	2115	2145	2175
5	Channel	66461	66786	67111
	Frequency	2112.5	2145	2177.5

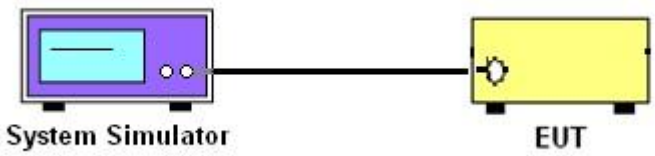
3 Conducted Test Items

3.1 Measuring Instruments

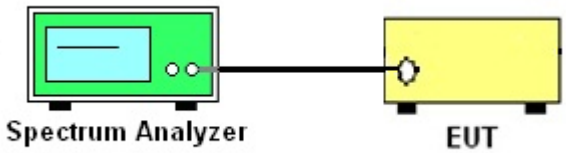
See list of measuring instruments of this test report.

3.2 Test Setup

3.2.1 Conducted Output Power



3.2.2 Conducted Band-Edge and Conducted Spurious Emission



3.3 Test Result of Conducted Test

Please refer to Appendix A.

3.4 Conducted Output Power and EIRP

3.4.1 Description of the Conducted Output Power Measurement and EIRP Measurement

LTE Band 2

§24.232 (a)(2)Base stations with an emission bandwidth greater than 1 MHz are limited to 1640 watts/MHz equivalent isotropically radiated power (EIRP)

LTE Band 66

§27.50(d)(2) The power of each fixed or base station transmitting in the 1995-2000 MHz, the 2110-2155 MHz 2155-2180 MHz band, or 2180-2200 MHz band and situated in any geographic location other than that described in paragraph (d)(1) of this section is limited to:

(ii) An EIRP of 1640 watts/MHz when transmitting with an emission bandwidth greater than 1 MHz;

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 power meter.
3. Set EUT at maximum power perform non-signaling mode.
4. Select lowest, middle, and highest channels for each band and different modulation.
5. Measure and record the power level from the power meter.

3.5 Conducted Band Edge

3.5.1 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 2110-2155 MHz and 2155-2180 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.

3.5.2 Test Procedures

1. The testing follows ANSI C63.26 section 5.7
2. The EUT was connected to spectrum analyzer and perform non-signaling mode.
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.

3.6 Conducted Spurious Emission

3.6.1 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 10th harmonic.

3.6.2 Test Procedures

1. The testing follows ANSI C63.26 section 5.7
2. The EUT was connected to spectrum analyzer and perform non-signaling mode.
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.

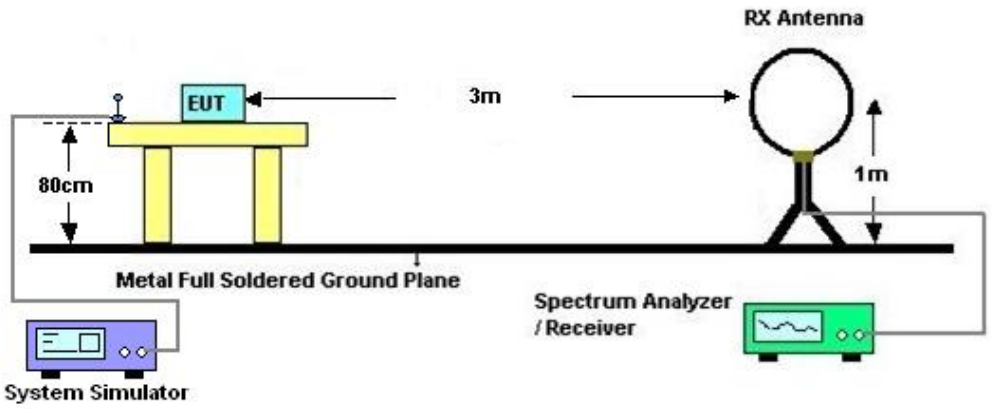
4 Radiated Test Items

4.1 Measuring Instruments

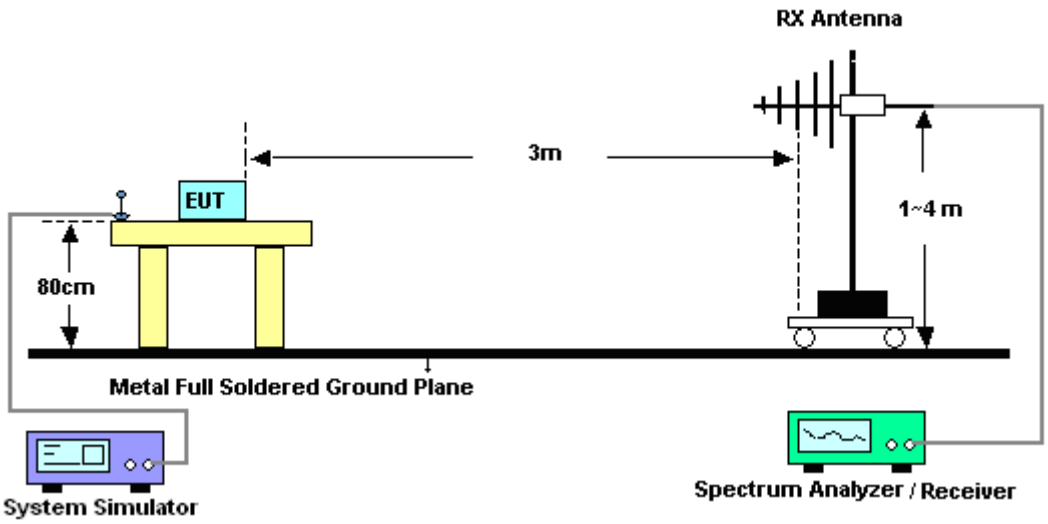
See list of measuring instruments of this test report.

4.2 Test Setup

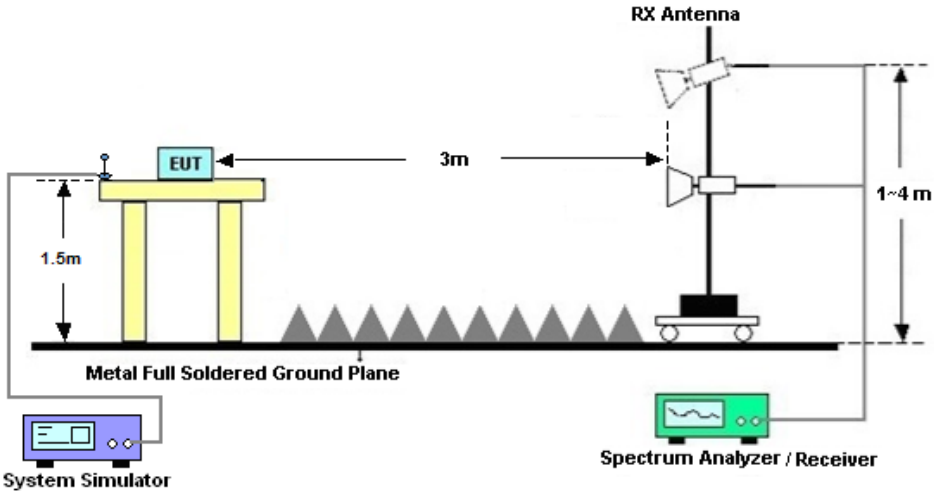
4.2.1 For radiated test below 30MHz



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.

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, 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.

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. 12, 2022	Oct. 09, 2023~ Nov. 07, 2023	Oct. 11, 2023	Conducted (TH01-KS)
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Oct. 11, 2023		Oct. 10, 2024	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 05, 2023	Oct. 09, 2023~ Nov. 07, 2023	Jan. 04, 2024	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 05, 2023	Oct. 09, 2023~ Nov. 07, 2023	Jan. 04, 2024	Conducted (TH01-KS)
Temperature & humidity chamber	Hongzhan	LP-150U	H2014011440	-40~+150°C 20%~95%RH	Jul. 06, 2023	Oct. 09, 2023~ Nov. 07, 2023	Jul. 05, 2024	Conducted (TH01-KS)
EXA Spectrum Analyzer	Keysight	N9010B	MY57471079	10Hz-44G,MAX 30dB	Oct. 12, 2022	Sep. 21, 2023	Oct. 11, 2023	Radiation (03CH04-KS)
Loop Antenna	R&S	HFH2-Z2E	101125	9kHz~30MHz	Sep. 11 2023	Sep. 21, 2023	Sep. 10, 2024	Radiation (03CH04-KS)
Bilog Antenna	TeseQ	CBL6111D	49922	30MHz-1GHz	Apr. 09, 2023	Sep. 21, 2023	Apr. 08, 2024	Radiation (03CH04-KS)
Horn Antenna	Schwarzbeck	BBHA9120D	1284	1GHz~18GHz	Oct. 16, 2022	Sep. 21, 2023	Oct. 15, 2023	Radiation (03CH04-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 08, 2023	Sep. 21, 2023	Jan. 07, 2024	Radiation (03CH04-KS)
Amplifier	SONOMA	310N	380827	9KHz-1GHz	Jul 06, 2023	Sep. 21, 2023	Jul 05, 2024	Radiation (03CH04-KS)
Amplifier	MITEQ	EM18G40G GA	060728	18~40GHz	Jan. 05, 2023	Sep. 21, 2023	Jan. 04, 2024	Radiation (03CH04-KS)
high gain Amplifier	EM	EM01G18G A	060840	1Ghz-18Ghz	Oct. 12, 2022	Sep. 21, 2023	Oct. 11, 2023	Radiation (03CH04-KS)
Amplifier	Agilent	8449B	3008A02370	1Ghz-18Ghz	Oct. 12, 2022	Sep. 21, 2023	Oct. 11, 2023	Radiation (03CH04-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Sep. 21, 2023	NCR	Radiation (03CH04-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Sep. 21, 2023	NCR	Radiation (03CH04-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Sep. 21, 2023	NCR	Radiation (03CH04-KS)
High Pass Filter	Wainwright Instruments Gmbh	WHKX12-28 05-3000-180 00-40ST	2	3G High Pass	Jun. 29, 2023	Sep. 21, 2023	Jun. 28, 2024	Radiation (03CH04-KS)
High Pass Filter	Wainwright Instruments Gmbh	WHKX12-93 5-1000-1500 0-40ST	2	1G High Pass	Jun. 29, 2023	Sep. 21, 2023	Jun. 28, 2024	Radiation (03CH04-KS)

NCR: No Calibration Required

6 Measurement Uncertainty

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 Conducted Measurement

Test Item	Uncertainty
Conducted Power	±0.46 dB
Conducted Emissions	±2.26 dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.82dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.56dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.54dB

Appendix A. Test Results of Conducted Test

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

Conducted Output Power(Average power) and EIRP

LTE:

LTE Band 2:

Ant.	BW	Modulation	Channel	Frequency (MHz)	Gain (dB)	Power (dBm)	EIRP (dbm)	EIRP power (W)
1+2	20M	QPSK	700	1940	6.21	24.29	30.50	1.1224
		QPSK	900	1960	6.21	24.05	30.26	1.0606
		QPSK	1100	1980	6.21	23.64	29.85	0.9662

LTE Band 66:

Ant.	BW	Modulation	Channel	Frequency (MHz)	Gain (dB)	Power (dBm)	EIRP (dbm)	EIRP power (W)
3+4	20M	QPSK	66536	2120	5.91	24.17	30.08	1.0175
		QPSK	66786	2145	5.91	24.58	30.49	1.1187
		QPSK	67036	2170	5.91	24.57	30.48	1.1181

NB-IOT Category NB1:

LTE Band 2:

Ant.	BW	Modulation	Channel	Frequency (MHz)	Gain (dB)	Power (dBm)	EIRP (dbm)	EIRP power (W)
1+2	20M	QPSK	700	1940	6.21	23.91	30.12	1.0282
		QPSK	900	1960	6.21	23.89	30.10	1.0224
		QPSK	1100	1980	6.21	23.74	29.95	0.9887

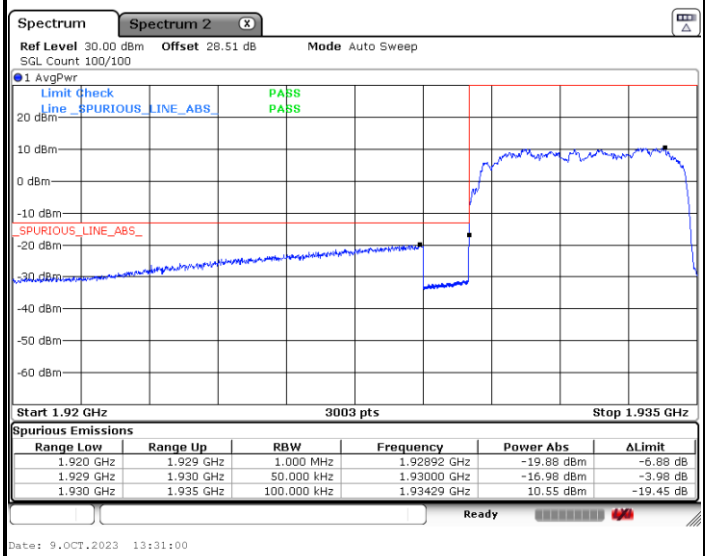
LTE Band 66:

Ant.	BW	Modulation	Channel	Frequency (MHz)	Gain (dB)	Power (dBm)	EIRP (dbm)	EIRP power (W)
3+4	20M	QPSK	66536	2120	5.91	24.64	30.55	1.1341
		QPSK	66786	2145	5.91	24.65	30.56	1.1380
		QPSK	67036	2170	5.91	24.49	30.40	1.0976

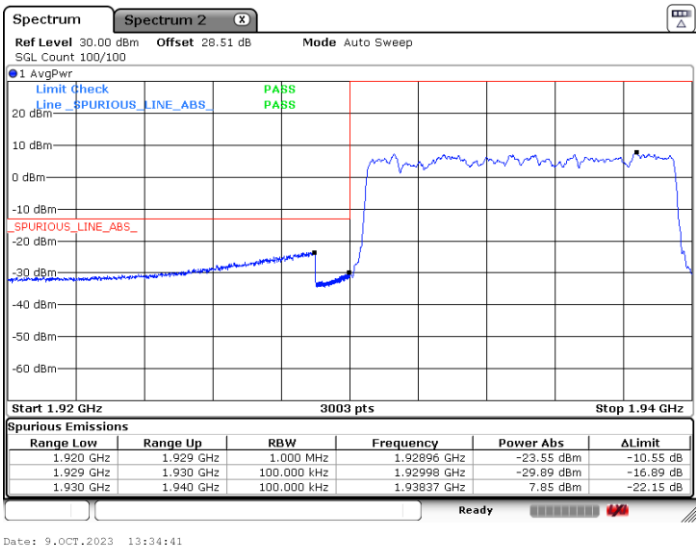
For LTE:
LTE Band 2 MIMO Ant. 1

Conducted Band Edge

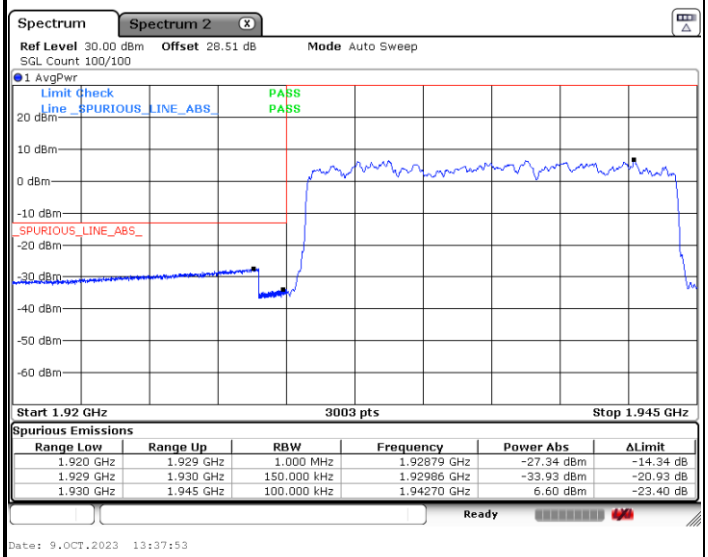
LTE Band 2 / 5MHz / QPSK
Lowest Band Edge / Full RB



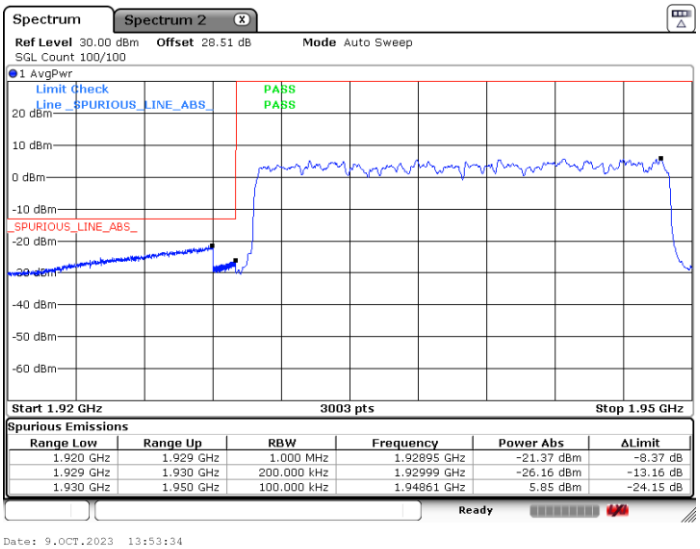
LTE Band 2 / 10MHz / QPSK
Lowest Band Edge / Full RB



LTE Band 2 / 15MHz / QPSK
Lowest Band Edge / Full RB



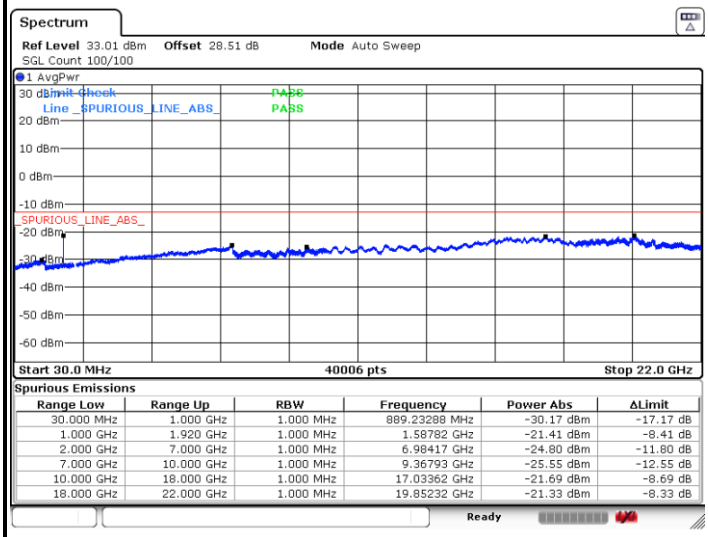
LTE Band 2 / 20MHz / QPSK
Lowest Band Edge / Full RB



Conducted Spurious Emission

LTE Band 2 / 5MHz

Lowest Channel / QPSK



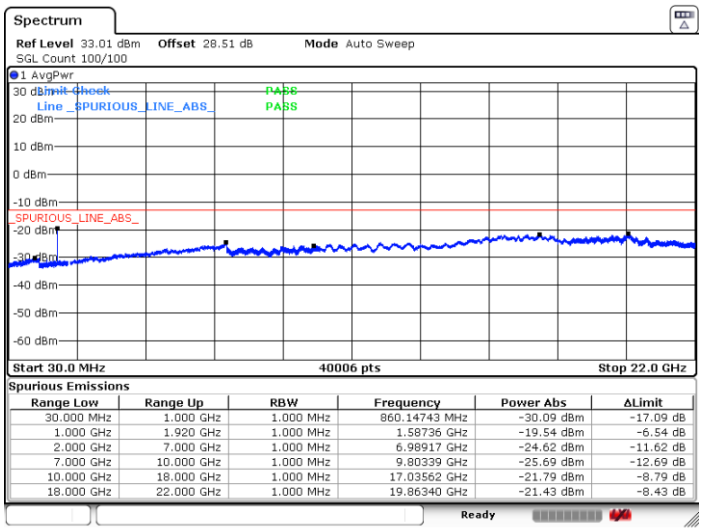
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	889.23288 MHz	-30.17 dBm	-17.17 dB
1.000 GHz	1.920 GHz	1.000 MHz	1.58782 GHz	-21.41 dBm	-8.41 dB
2.000 GHz	7.000 GHz	1.000 MHz	6.98417 GHz	-24.80 dBm	-11.80 dB
7.000 GHz	10.000 GHz	1.000 MHz	9.36793 GHz	-25.55 dBm	-12.55 dB
10.000 GHz	18.000 GHz	1.000 MHz	17.03362 GHz	-21.69 dBm	-8.69 dB
18.000 GHz	22.000 GHz	1.000 MHz	19.85232 GHz	-21.33 dBm	-8.33 dB

Date: 9.OCT.2023 13:25:02

LTE Band 2 / 10MHz

Lowest Channel / QPSK



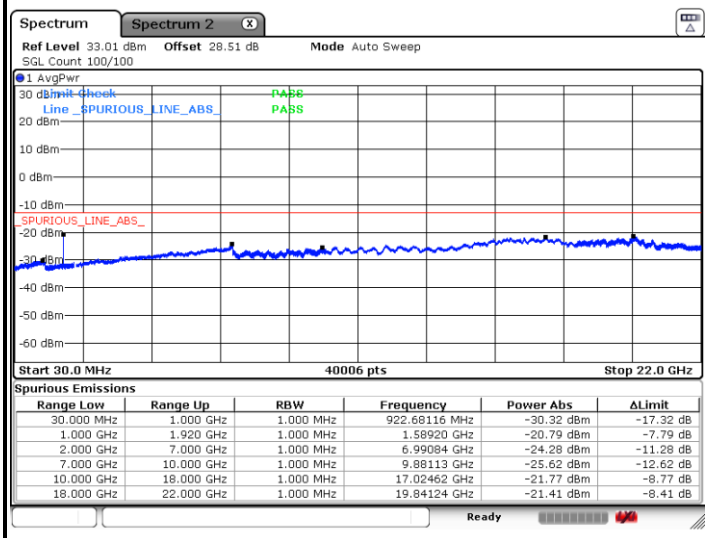
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	860.14743 MHz	-30.09 dBm	-17.09 dB
1.000 GHz	1.920 GHz	1.000 MHz	1.58736 GHz	-19.54 dBm	-6.54 dB
2.000 GHz	7.000 GHz	1.000 MHz	6.98917 GHz	-24.62 dBm	-11.62 dB
7.000 GHz	10.000 GHz	1.000 MHz	9.80339 GHz	-25.69 dBm	-12.69 dB
10.000 GHz	18.000 GHz	1.000 MHz	17.03562 GHz	-21.79 dBm	-8.79 dB
18.000 GHz	22.000 GHz	1.000 MHz	19.86340 GHz	-21.43 dBm	-8.43 dB

Date: 9.OCT.2023 12:00:42

LTE Band 2 / 15MHz

Lowest Channel / QPSK



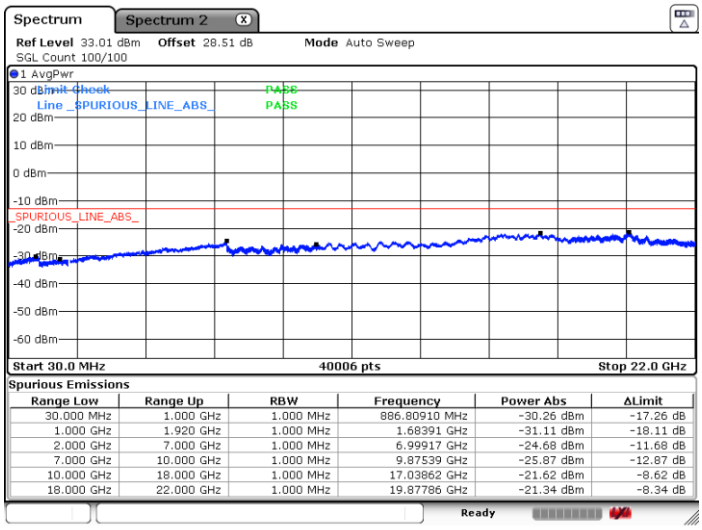
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	922.68116 MHz	-30.32 dBm	-17.32 dB
1.000 GHz	1.920 GHz	1.000 MHz	1.58920 GHz	-20.79 dBm	-7.79 dB
2.000 GHz	7.000 GHz	1.000 MHz	6.99084 GHz	-24.28 dBm	-11.28 dB
7.000 GHz	10.000 GHz	1.000 MHz	9.88113 GHz	-25.62 dBm	-12.62 dB
10.000 GHz	18.000 GHz	1.000 MHz	17.02462 GHz	-21.77 dBm	-8.77 dB
18.000 GHz	22.000 GHz	1.000 MHz	19.84124 GHz	-21.41 dBm	-8.41 dB

Date: 9.OCT.2023 13:39:47

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	886.80910 MHz	-30.26 dBm	-17.26 dB
1.000 GHz	1.920 GHz	1.000 MHz	1.68391 GHz	-31.11 dBm	-18.11 dB
2.000 GHz	7.000 GHz	1.000 MHz	6.99917 GHz	-24.68 dBm	-11.68 dB
7.000 GHz	10.000 GHz	1.000 MHz	9.87539 GHz	-25.87 dBm	-12.87 dB
10.000 GHz	18.000 GHz	1.000 MHz	17.03862 GHz	-21.62 dBm	-8.62 dB
18.000 GHz	22.000 GHz	1.000 MHz	19.87786 GHz	-21.34 dBm	-8.34 dB

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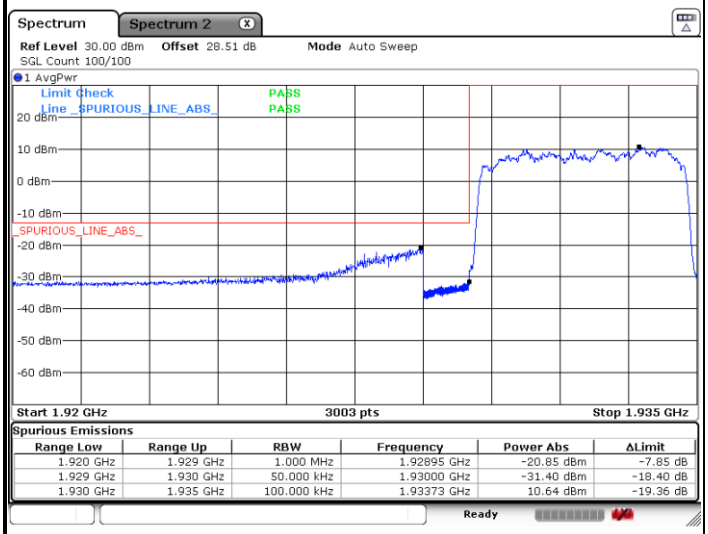
LTE Band 2 MIMO Ant. 2

Conducted Band Edge

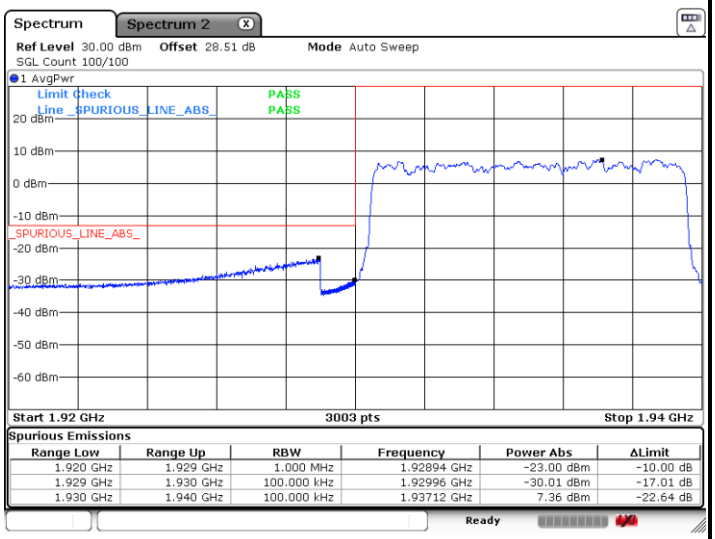
LTE Band 2 / 5MHz / QPSK

Lowest Band Edge / Full RB



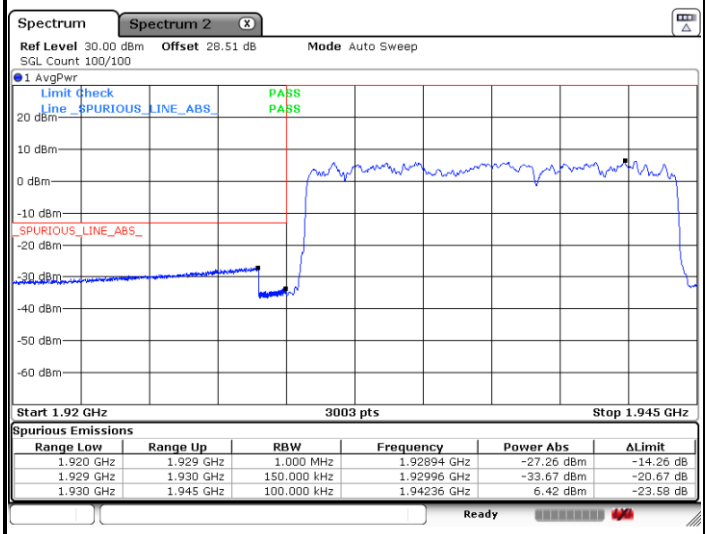
LTE Band 2 / 10MHz / QPSK

Lowest Band Edge / Full RB



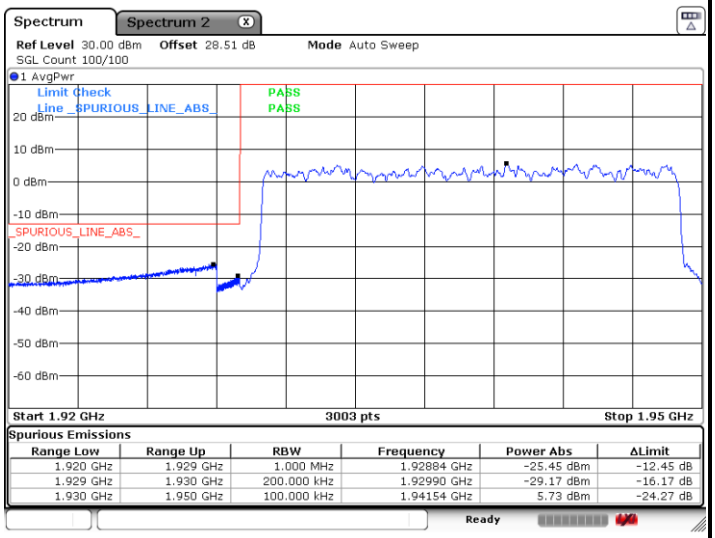
LTE Band 2 / 15MHz / QPSK

Lowest Band Edge / Full RB



LTE Band 2 / 20MHz / QPSK

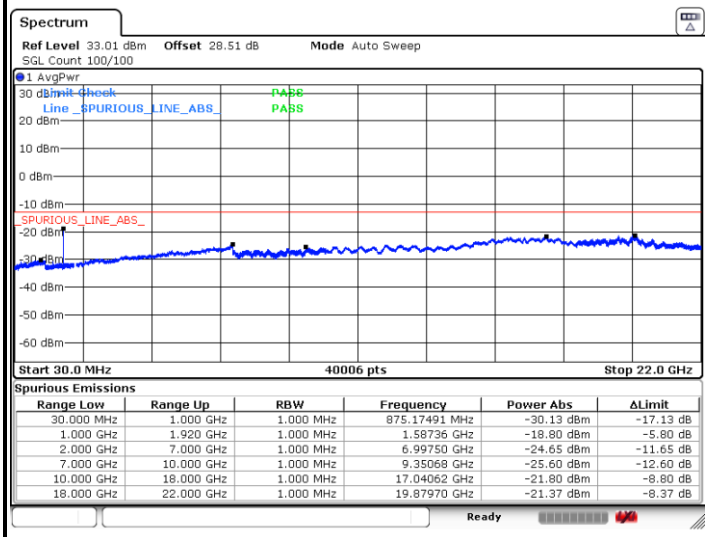
Lowest Band Edge / Full RB



Conducted Spurious Emission

LTE Band 2 / 5MHz

Lowest Channel / QPSK



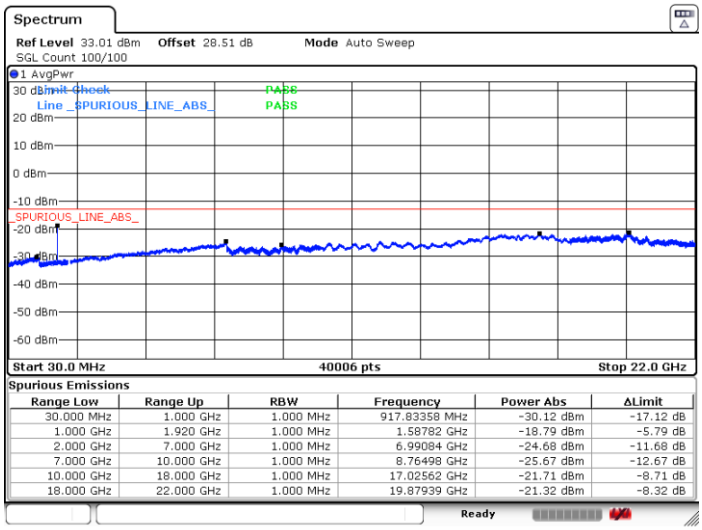
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	875.17491 MHz	-30.13 dBm	-17.13 dB
1.000 GHz	1.920 GHz	1.000 MHz	1.58736 GHz	-18.80 dBm	-5.80 dB
2.000 GHz	7.000 GHz	1.000 MHz	6.99750 GHz	-24.65 dBm	-11.65 dB
7.000 GHz	10.000 GHz	1.000 MHz	9.35068 GHz	-25.60 dBm	-12.60 dB
10.000 GHz	18.000 GHz	1.000 MHz	17.04062 GHz	-21.80 dBm	-8.80 dB
18.000 GHz	22.000 GHz	1.000 MHz	19.87970 GHz	-21.37 dBm	-8.37 dB

Date: 9.OCT.2023 12:01:57

LTE Band 2 / 10MHz

Lowest Channel / QPSK



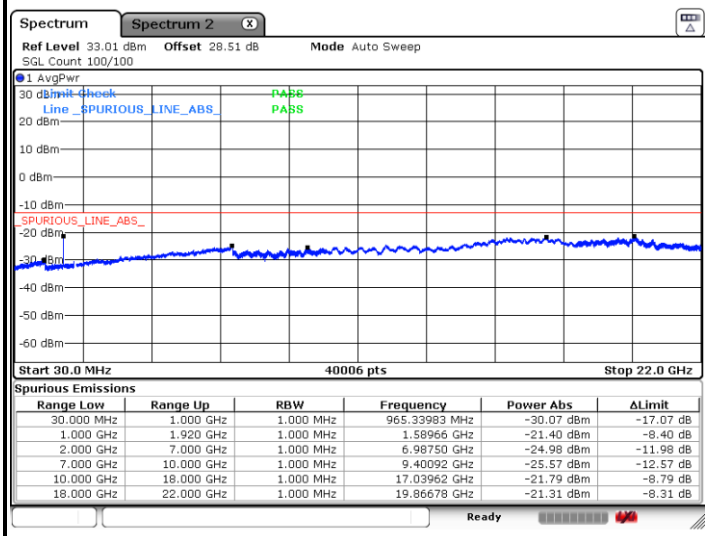
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	917.83358 MHz	-30.12 dBm	-17.12 dB
1.000 GHz	1.920 GHz	1.000 MHz	1.58782 GHz	-18.79 dBm	-5.79 dB
2.000 GHz	7.000 GHz	1.000 MHz	6.99084 GHz	-24.68 dBm	-11.68 dB
7.000 GHz	10.000 GHz	1.000 MHz	8.76498 GHz	-25.67 dBm	-12.67 dB
10.000 GHz	18.000 GHz	1.000 MHz	17.02562 GHz	-21.71 dBm	-8.71 dB
18.000 GHz	22.000 GHz	1.000 MHz	19.87939 GHz	-21.32 dBm	-8.32 dB

Date: 9.OCT.2023 13:29:15

LTE Band 2 / 15MHz

Lowest Channel / QPSK



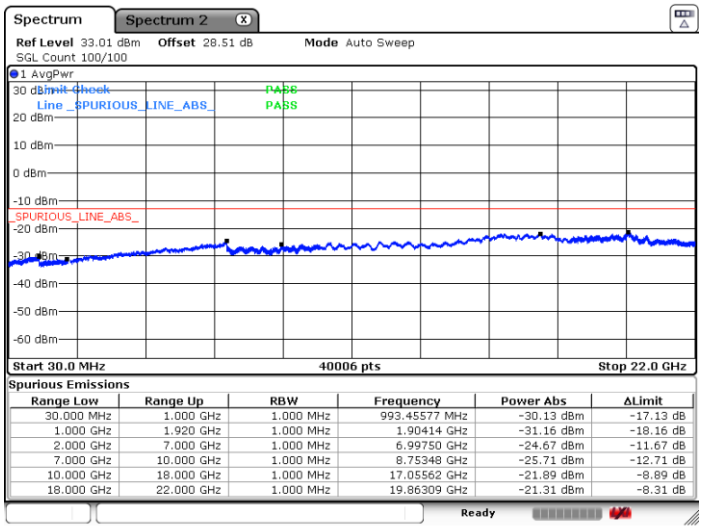
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	965.33983 MHz	-30.07 dBm	-17.07 dB
1.000 GHz	1.920 GHz	1.000 MHz	1.58966 GHz	-21.40 dBm	-8.40 dB
2.000 GHz	7.000 GHz	1.000 MHz	6.98750 GHz	-24.98 dBm	-11.98 dB
7.000 GHz	10.000 GHz	1.000 MHz	9.40092 GHz	-25.57 dBm	-12.57 dB
10.000 GHz	18.000 GHz	1.000 MHz	17.03962 GHz	-21.79 dBm	-8.79 dB
18.000 GHz	22.000 GHz	1.000 MHz	19.86678 GHz	-21.31 dBm	-8.31 dB

Date: 9.OCT.2023 13:40:37

LTE Band 2 / 20MHz

Lowest Channel / QPSK



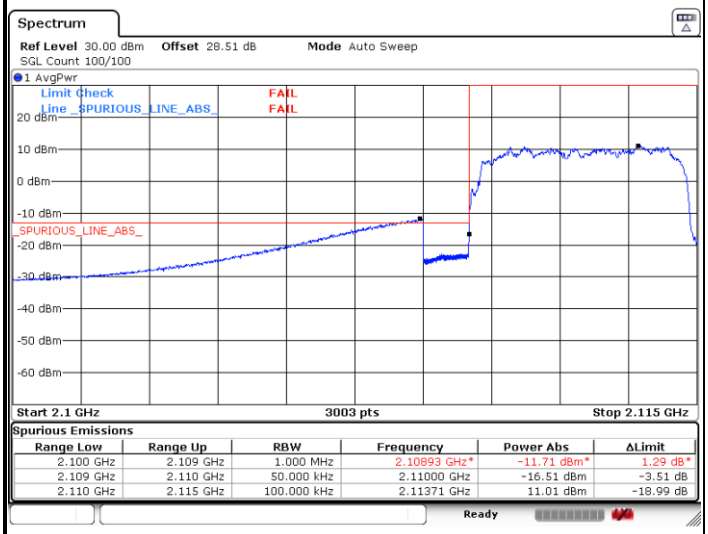
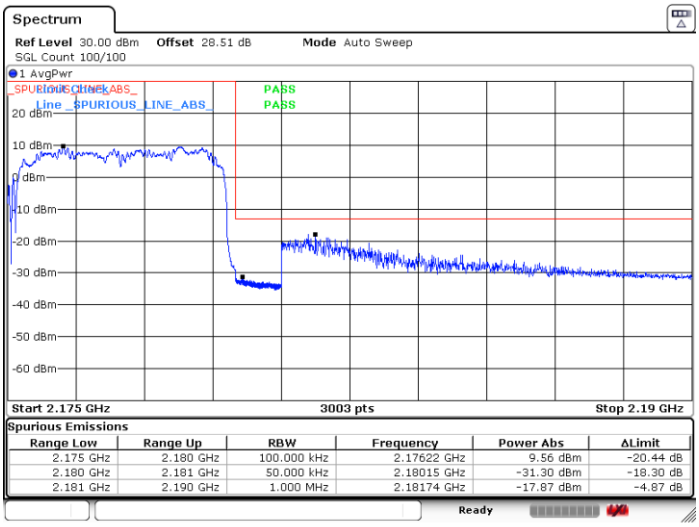
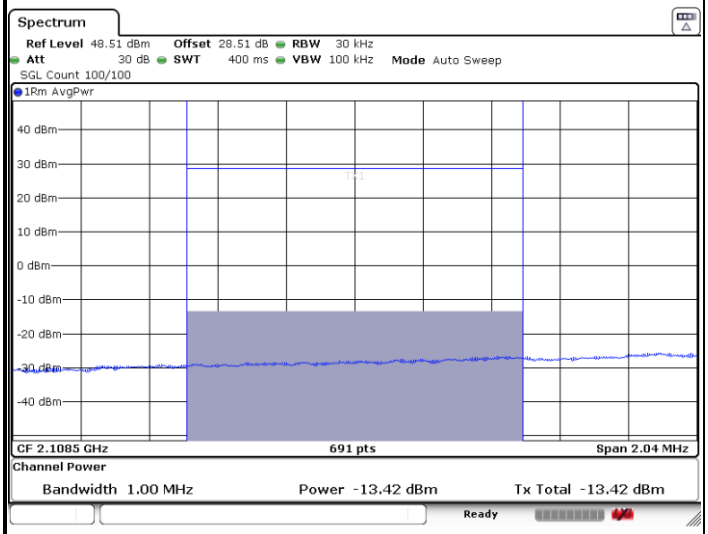
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	993.45577 MHz	-30.13 dBm	-17.13 dB
1.000 GHz	1.920 GHz	1.000 MHz	1.90414 GHz	-31.16 dBm	-18.16 dB
2.000 GHz	7.000 GHz	1.000 MHz	6.99750 GHz	-24.67 dBm	-11.67 dB
7.000 GHz	10.000 GHz	1.000 MHz	8.75348 GHz	-25.71 dBm	-12.71 dB
10.000 GHz	18.000 GHz	1.000 MHz	17.05562 GHz	-21.89 dBm	-8.89 dB
18.000 GHz	22.000 GHz	1.000 MHz	19.86309 GHz	-21.31 dBm	-8.31 dB

Date: 9.OCT.2023 13:56:48

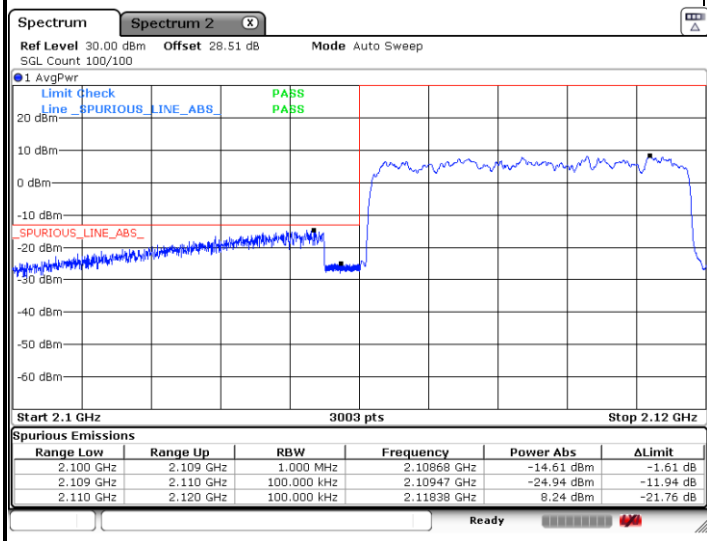
LTE Band 66 MIMO Ant. 3

Conducted Band Edge

LTE Band 66 / 5MHz / QPSK	LTE Band 66 / 5MHz / QPSK
Lowest Band Edge / Full RB	**Highest Band Edge / Full RB**
	
LTE Band 66 / 5MHz / QPSK	**-**
Lowest Band Edge / Full RB / Channel power	**-**
	-

LTE Band 66 / 10MHz / QPSK

Lowest Band Edge / Full RB



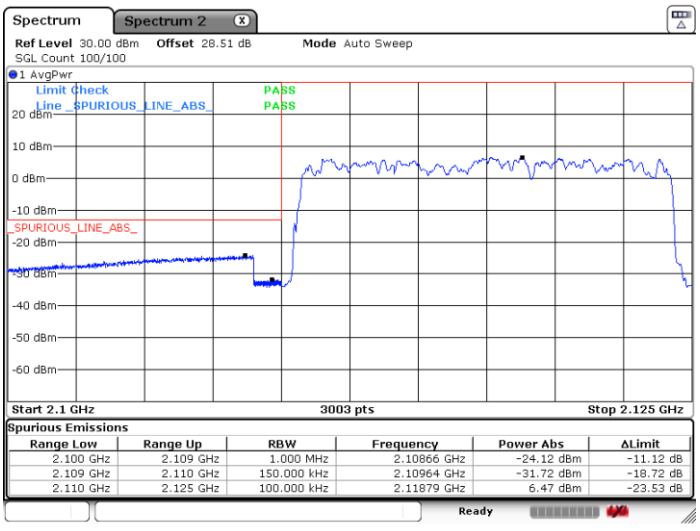
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
2.100 GHz	2.109 GHz	1.000 MHz	2.10868 GHz	-14.61 dBm	-1.61 dB
2.109 GHz	2.110 GHz	100.000 kHz	2.10947 GHz	-24.94 dBm	-11.94 dB
2.110 GHz	2.120 GHz	100.000 kHz	2.11838 GHz	8.24 dBm	-21.76 dB

Date: 9.OCT.2023 14:54:02

LTE Band 66 / 15MHz / QPSK

Lowest Band Edge / Full RB



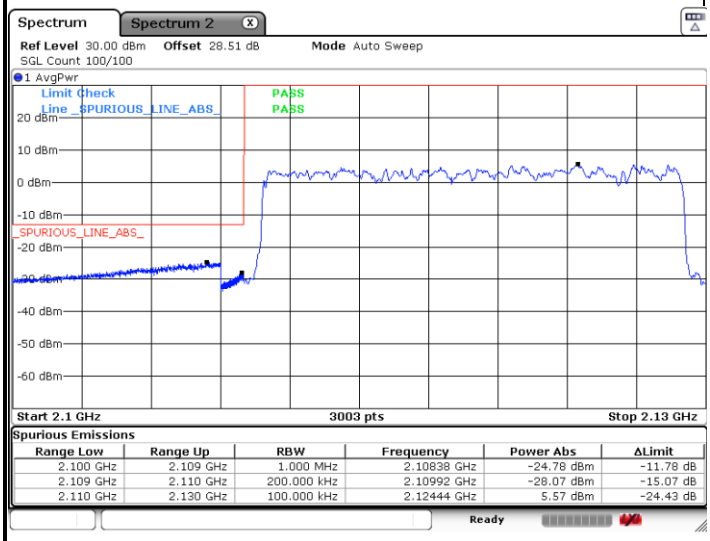
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
2.100 GHz	2.109 GHz	1.000 MHz	2.10866 GHz	-24.12 dBm	-11.12 dB
2.109 GHz	2.110 GHz	150.000 kHz	2.10964 GHz	-31.72 dBm	-18.72 dB
2.110 GHz	2.125 GHz	100.000 kHz	2.11879 GHz	6.47 dBm	-23.53 dB

Date: 9.OCT.2023 14:50:14

LTE Band 66 / 20MHz / QPSK

Lowest Band Edge / Full RB



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
2.100 GHz	2.109 GHz	1.000 MHz	2.10838 GHz	-24.78 dBm	-11.78 dB
2.109 GHz	2.110 GHz	200.000 kHz	2.10992 GHz	-28.07 dBm	-15.07 dB
2.110 GHz	2.130 GHz	100.000 kHz	2.12444 GHz	5.57 dBm	-24.43 dB

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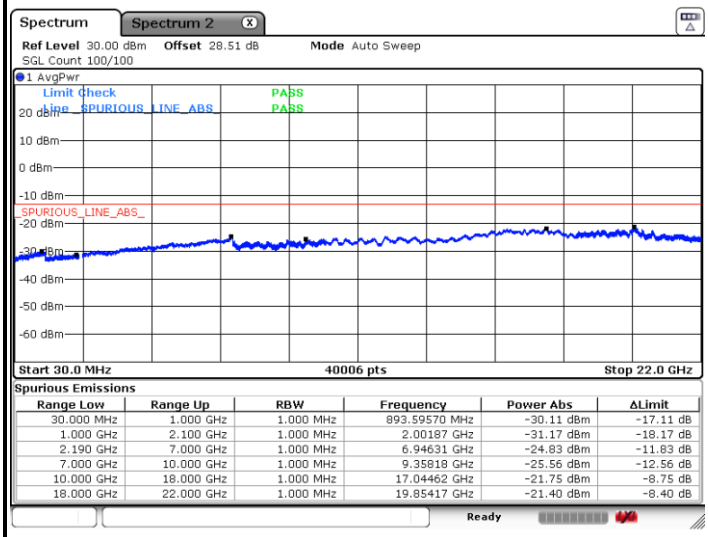
Conducted Spurious Emission

LTE Band 66 / 5MHz

Lowest Channel / QPSK



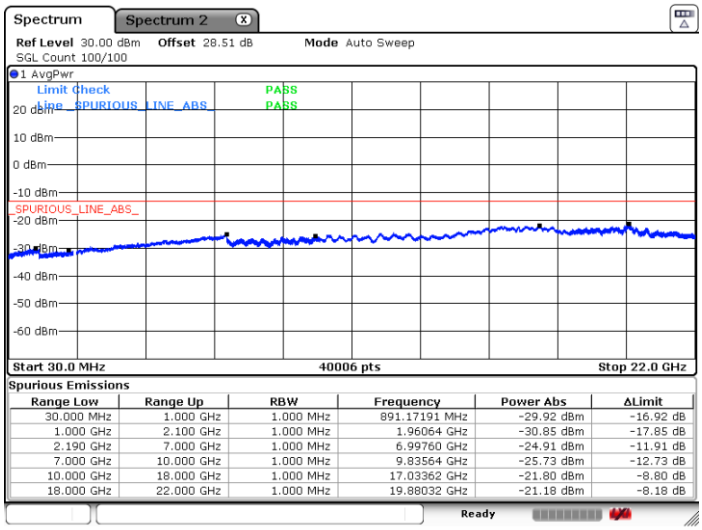
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	893.59570 MHz	-30.11 dBm	-17.11 dB
1.000 GHz	2.100 GHz	1.000 MHz	2.00187 GHz	-31.17 dBm	-18.17 dB
2.190 GHz	7.000 GHz	1.000 MHz	6.94631 GHz	-24.83 dBm	-11.83 dB
7.000 GHz	10.000 GHz	1.000 MHz	9.35818 GHz	-25.56 dBm	-12.56 dB
10.000 GHz	18.000 GHz	1.000 MHz	17.04462 GHz	-21.75 dBm	-8.75 dB
18.000 GHz	22.000 GHz	1.000 MHz	19.85417 GHz	-21.40 dBm	-8.40 dB

Date: 9.OCT.2023 15:06:01

LTE Band 66 / 10MHz

Lowest Channel / QPSK



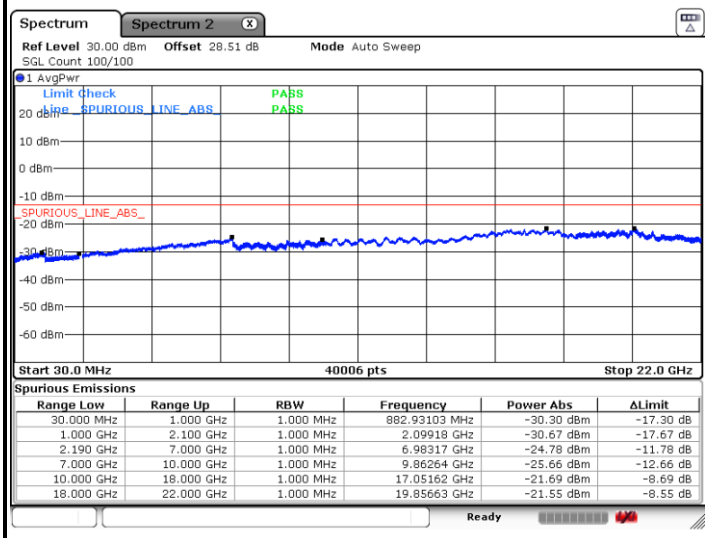
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	891.17191 MHz	-29.92 dBm	-16.92 dB
1.000 GHz	2.100 GHz	1.000 MHz	1.96064 GHz	-30.85 dBm	-17.85 dB
2.190 GHz	7.000 GHz	1.000 MHz	6.99760 GHz	-24.91 dBm	-11.91 dB
7.000 GHz	10.000 GHz	1.000 MHz	9.83564 GHz	-25.73 dBm	-12.73 dB
10.000 GHz	18.000 GHz	1.000 MHz	17.03362 GHz	-21.80 dBm	-8.80 dB
18.000 GHz	22.000 GHz	1.000 MHz	19.88032 GHz	-21.18 dBm	-8.18 dB

Date: 9.OCT.2023 15:06:49

LTE Band 66 / 15MHz

Lowest Channel / QPSK



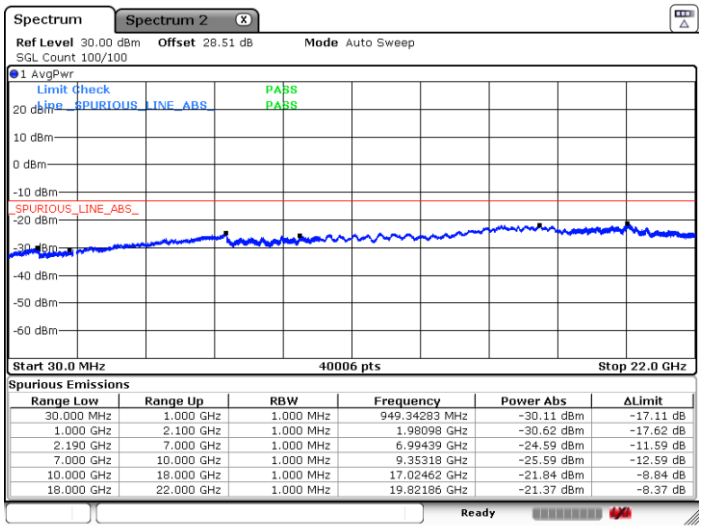
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	882.93103 MHz	-30.30 dBm	-17.30 dB
1.000 GHz	2.100 GHz	1.000 MHz	2.09918 GHz	-30.67 dBm	-17.67 dB
2.190 GHz	7.000 GHz	1.000 MHz	6.98317 GHz	-24.78 dBm	-11.78 dB
7.000 GHz	10.000 GHz	1.000 MHz	9.86264 GHz	-25.66 dBm	-12.66 dB
10.000 GHz	18.000 GHz	1.000 MHz	17.05162 GHz	-21.69 dBm	-8.69 dB
18.000 GHz	22.000 GHz	1.000 MHz	19.85663 GHz	-21.55 dBm	-8.55 dB

Date: 9.OCT.2023 15:07:41

LTE Band 66 / 20MHz

Lowest Channel / QPSK



Spurious Emissions

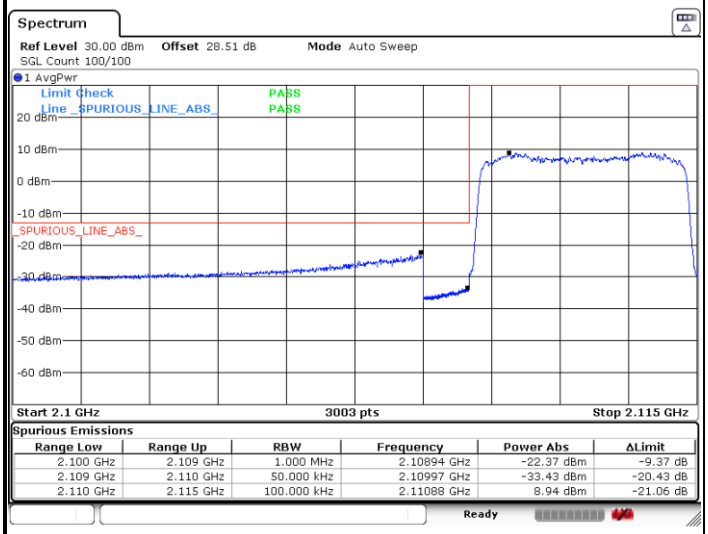
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	949.34283 MHz	-30.11 dBm	-17.11 dB
1.000 GHz	2.100 GHz	1.000 MHz	1.98098 GHz	-30.62 dBm	-17.62 dB
2.190 GHz	7.000 GHz	1.000 MHz	6.99439 GHz	-24.59 dBm	-11.59 dB
7.000 GHz	10.000 GHz	1.000 MHz	9.35318 GHz	-25.59 dBm	-12.59 dB
10.000 GHz	18.000 GHz	1.000 MHz	17.02462 GHz	-21.84 dBm	-8.84 dB
18.000 GHz	22.000 GHz	1.000 MHz	19.82186 GHz	-21.37 dBm	-8.37 dB

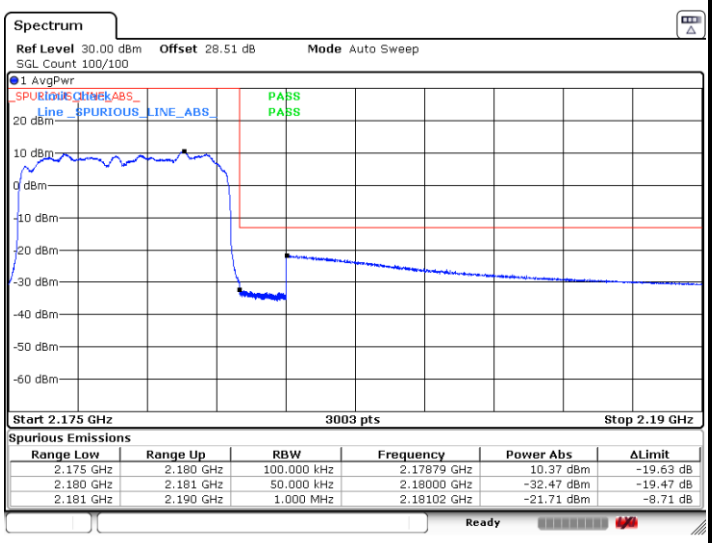
Date: 9.OCT.2023 15:08:45

LTE Band 66 MIMO Ant. 4

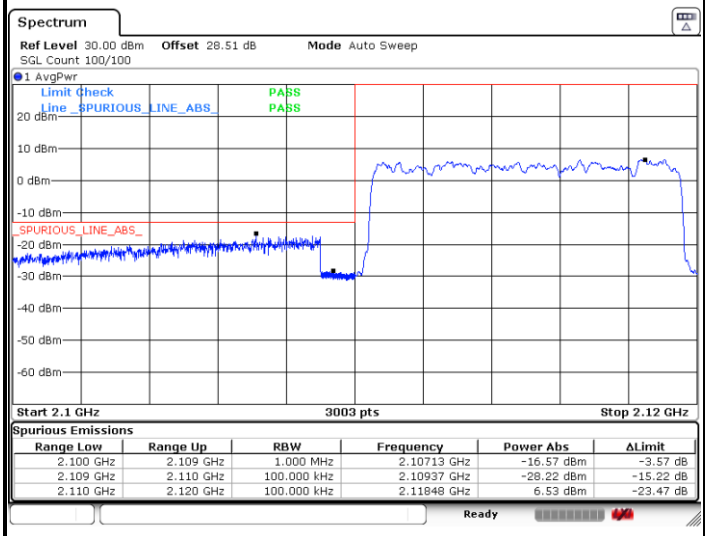
Conducted Band Edge

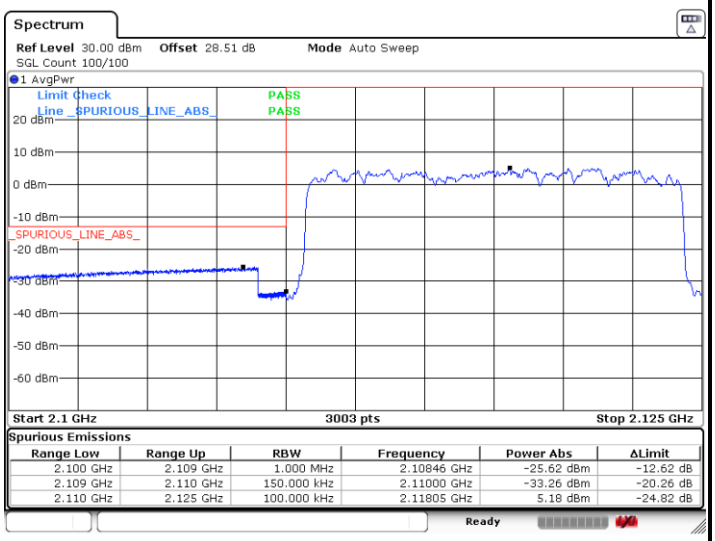
LTE Band 66 / 5MHz / QPSK	LTE Band 66 / 5MHz / QPSK
Lowest Band Edge / Full RB	Highest Band Edge / Full RB

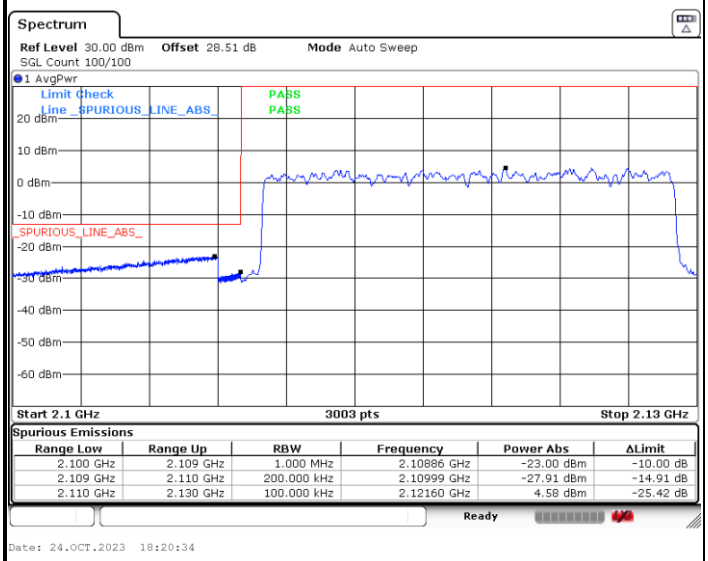




LTE Band 66 / 10MHz / QPSK	LTE Band 66 / 15MHz / QPSK
Lowest Band Edge / Full RB	Lowest Band Edge / Full RB



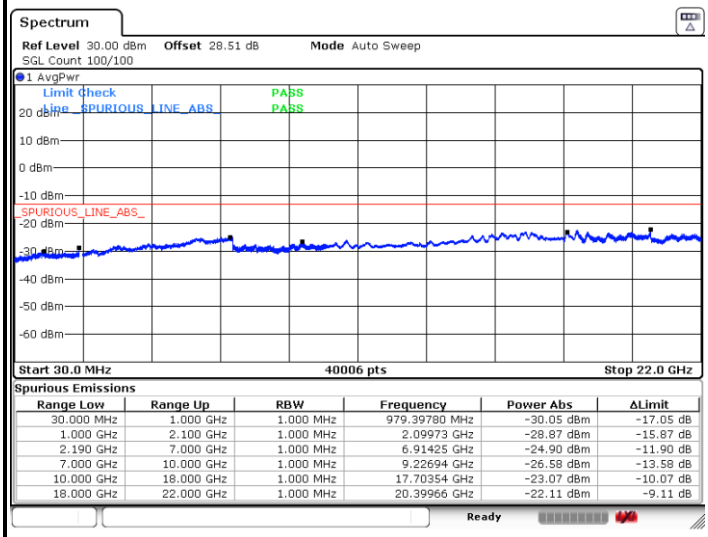


LTE Band 66 / 20MHz / QPSK	-
Lowest Band Edge / Full RB	**-**
	-

Conducted Spurious Emission

LTE Band 66 / 5MHz

Lowest Channel / QPSK



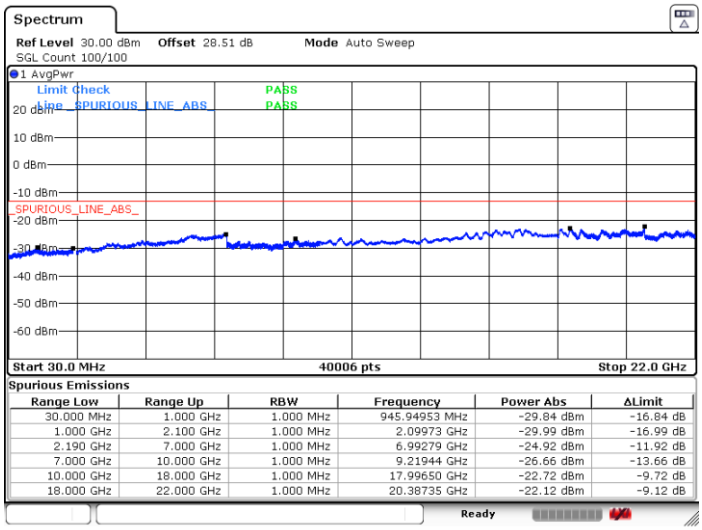
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	979.39780 MHz	-30.05 dBm	-17.05 dB
1.000 GHz	2.100 GHz	1.000 MHz	2.09973 GHz	-28.87 dBm	-15.87 dB
2.190 GHz	7.000 GHz	1.000 MHz	6.91425 GHz	-24.90 dBm	-11.90 dB
7.000 GHz	10.000 GHz	1.000 MHz	9.22694 GHz	-26.58 dBm	-13.58 dB
10.000 GHz	18.000 GHz	1.000 MHz	17.70354 GHz	-23.07 dBm	-10.07 dB
18.000 GHz	22.000 GHz	1.000 MHz	20.39966 GHz	-22.11 dBm	-9.11 dB

Date: 24.OCT.2023 17:58:47

LTE Band 66 / 10MHz

Lowest Channel / QPSK



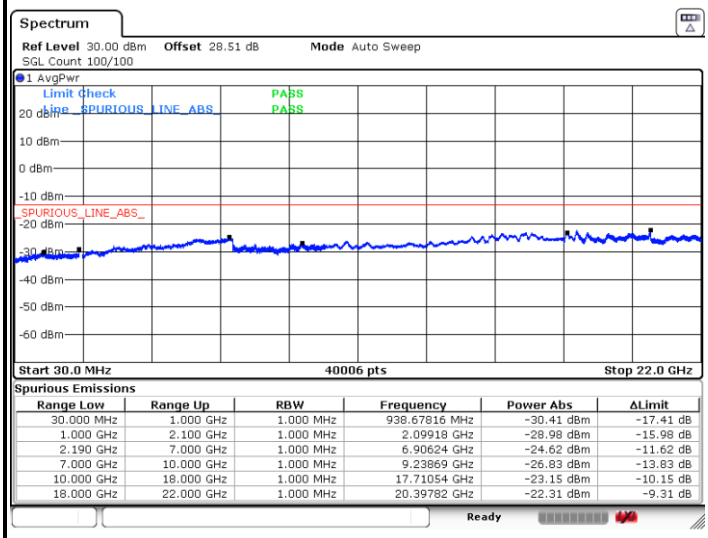
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	945.94953 MHz	-29.84 dBm	-16.84 dB
1.000 GHz	2.100 GHz	1.000 MHz	2.09973 GHz	-29.99 dBm	-16.99 dB
2.190 GHz	7.000 GHz	1.000 MHz	6.99279 GHz	-24.92 dBm	-11.92 dB
7.000 GHz	10.000 GHz	1.000 MHz	9.21944 GHz	-26.66 dBm	-13.66 dB
10.000 GHz	18.000 GHz	1.000 MHz	17.99650 GHz	-22.72 dBm	-9.72 dB
18.000 GHz	22.000 GHz	1.000 MHz	20.38735 GHz	-22.12 dBm	-9.12 dB

Date: 24.OCT.2023 18:10:29

LTE Band 66 / 15MHz

Lowest Channel / QPSK



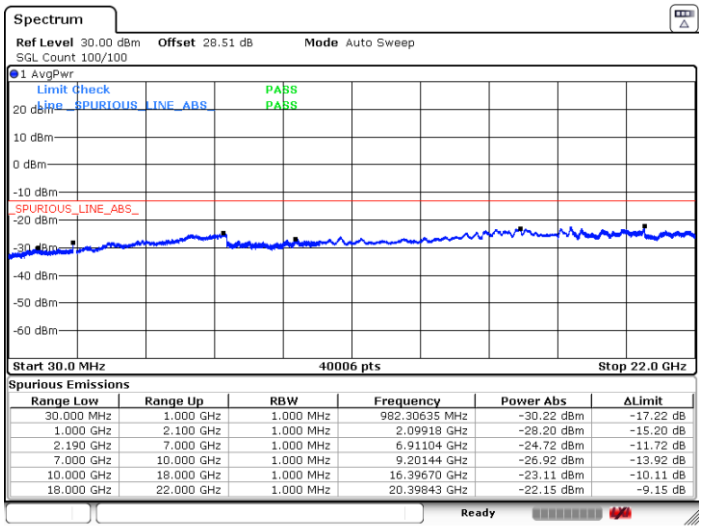
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	938.67816 MHz	-30.41 dBm	-17.41 dB
1.000 GHz	2.100 GHz	1.000 MHz	2.09918 GHz	-28.98 dBm	-15.98 dB
2.190 GHz	7.000 GHz	1.000 MHz	6.90624 GHz	-24.62 dBm	-11.62 dB
7.000 GHz	10.000 GHz	1.000 MHz	9.23869 GHz	-26.83 dBm	-13.83 dB
10.000 GHz	18.000 GHz	1.000 MHz	17.71054 GHz	-23.15 dBm	-10.15 dB
18.000 GHz	22.000 GHz	1.000 MHz	20.39782 GHz	-22.31 dBm	-9.31 dB

Date: 24.OCT.2023 18:17:15

LTE Band 66 / 20MHz

Lowest Channel / QPSK



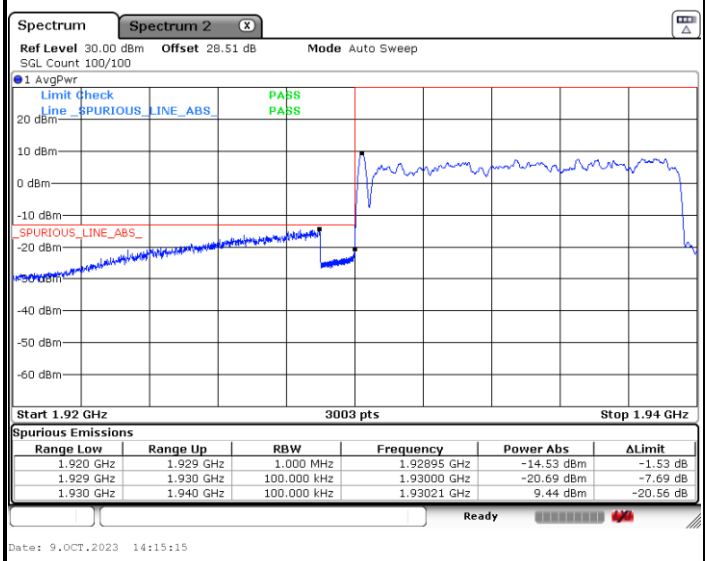
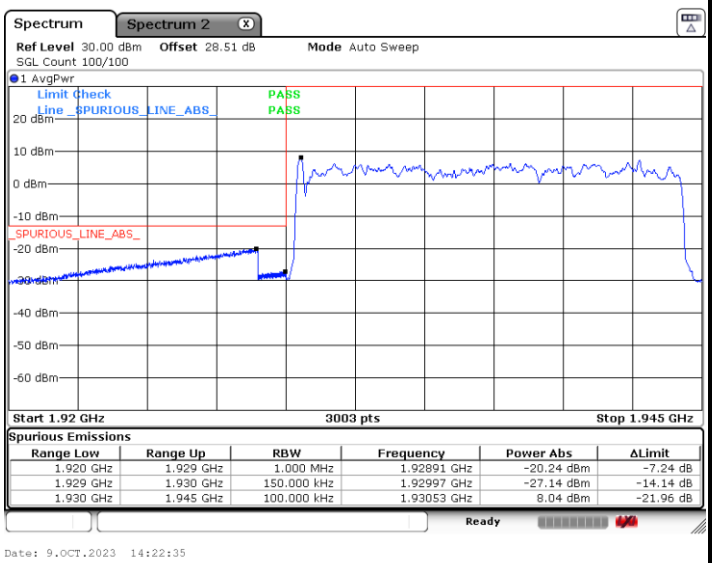
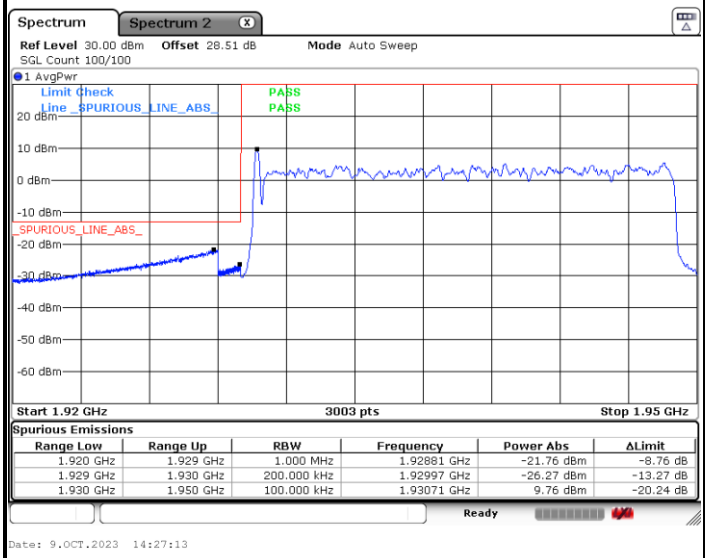
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	982.30635 MHz	-30.22 dBm	-17.22 dB
1.000 GHz	2.100 GHz	1.000 MHz	2.09918 GHz	-28.20 dBm	-15.20 dB
2.190 GHz	7.000 GHz	1.000 MHz	6.91104 GHz	-24.72 dBm	-11.72 dB
7.000 GHz	10.000 GHz	1.000 MHz	9.20144 GHz	-26.92 dBm	-13.92 dB
10.000 GHz	18.000 GHz	1.000 MHz	16.39670 GHz	-23.11 dBm	-10.11 dB
18.000 GHz	22.000 GHz	1.000 MHz	20.39843 GHz	-22.15 dBm	-9.15 dB

Date: 24.OCT.2023 18:20:03

For NB-IOT Category NB1:
LTE Band 2 MIMO Ant. 1

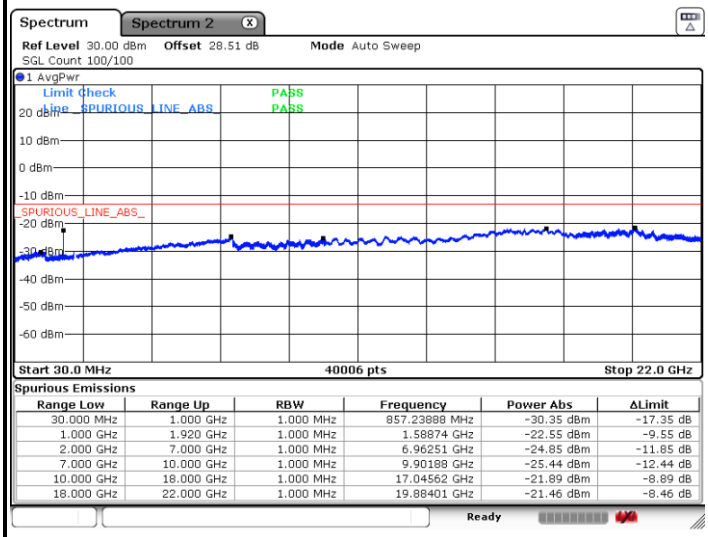
Conducted Band Edge

LTE Band 2 / 10MHz / QPSK	LTE Band 2 / 15MHz / QPSK
Lowest Band Edge / Full RB	**Lowest Band Edge / Full RB**
	
LTE Band 2 / 20MHz / QPSK	**-**
Lowest Band Edge / Full RB	**-**
	-

Conducted Spurious Emission

LTE Band 2 / 10MHz

Lowest Channel / QPSK



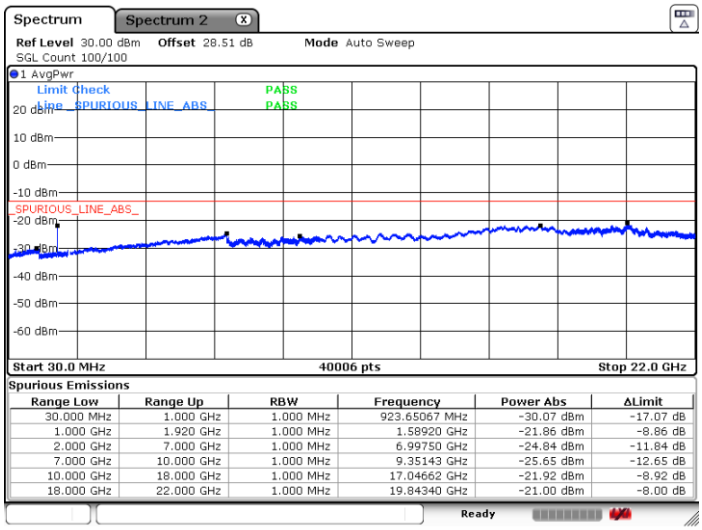
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	857.23888 MHz	-30.35 dBm	-17.35 dB
1.000 GHz	1.920 GHz	1.000 MHz	1.58874 GHz	-22.55 dBm	-9.55 dB
2.000 GHz	7.000 GHz	1.000 MHz	6.96251 GHz	-24.85 dBm	-11.85 dB
7.000 GHz	10.000 GHz	1.000 MHz	9.90188 GHz	-25.44 dBm	-12.44 dB
10.000 GHz	18.000 GHz	1.000 MHz	17.04562 GHz	-21.89 dBm	-8.89 dB
18.000 GHz	22.000 GHz	1.000 MHz	19.88401 GHz	-21.46 dBm	-8.46 dB

Date: 9.OCT.2023 14:16:46

LTE Band 2 / 15MHz

Lowest Channel / QPSK



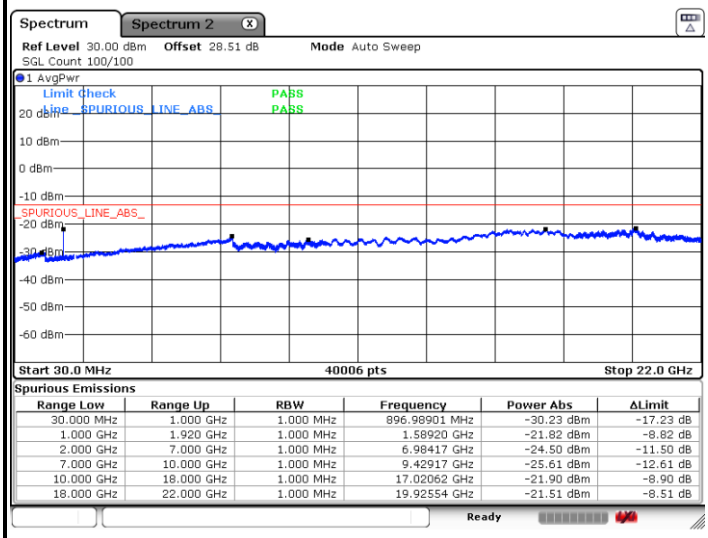
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	923.65067 MHz	-30.07 dBm	-17.07 dB
1.000 GHz	1.920 GHz	1.000 MHz	1.58920 GHz	-21.86 dBm	-8.86 dB
2.000 GHz	7.000 GHz	1.000 MHz	6.99750 GHz	-24.84 dBm	-11.84 dB
7.000 GHz	10.000 GHz	1.000 MHz	9.35143 GHz	-25.65 dBm	-12.65 dB
10.000 GHz	18.000 GHz	1.000 MHz	17.04662 GHz	-21.92 dBm	-8.92 dB
18.000 GHz	22.000 GHz	1.000 MHz	19.84340 GHz	-21.00 dBm	-8.00 dB

Date: 9.OCT.2023 14:20:52

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	896.98901 MHz	-30.23 dBm	-17.23 dB
1.000 GHz	1.920 GHz	1.000 MHz	1.58920 GHz	-21.82 dBm	-8.82 dB
2.000 GHz	7.000 GHz	1.000 MHz	6.98417 GHz	-24.50 dBm	-11.50 dB
7.000 GHz	10.000 GHz	1.000 MHz	9.42917 GHz	-25.61 dBm	-12.61 dB
10.000 GHz	18.000 GHz	1.000 MHz	17.02062 GHz	-21.90 dBm	-8.90 dB
18.000 GHz	22.000 GHz	1.000 MHz	19.92554 GHz	-21.51 dBm	-8.51 dB

Date: 9.OCT.2023 14:28:13

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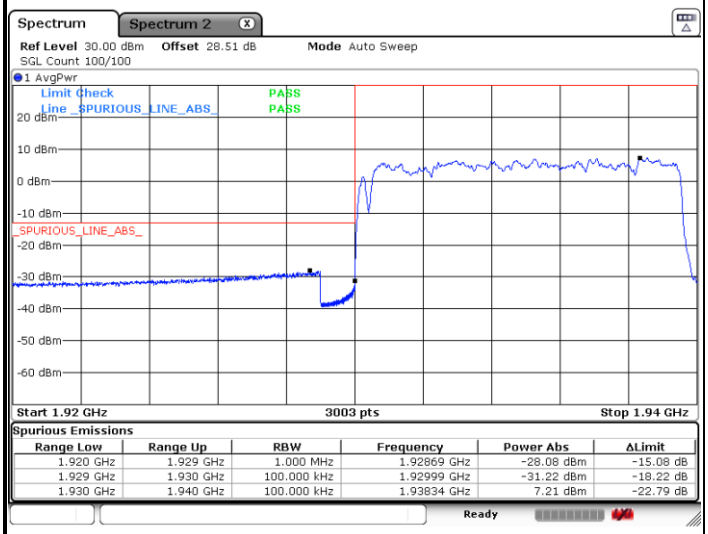
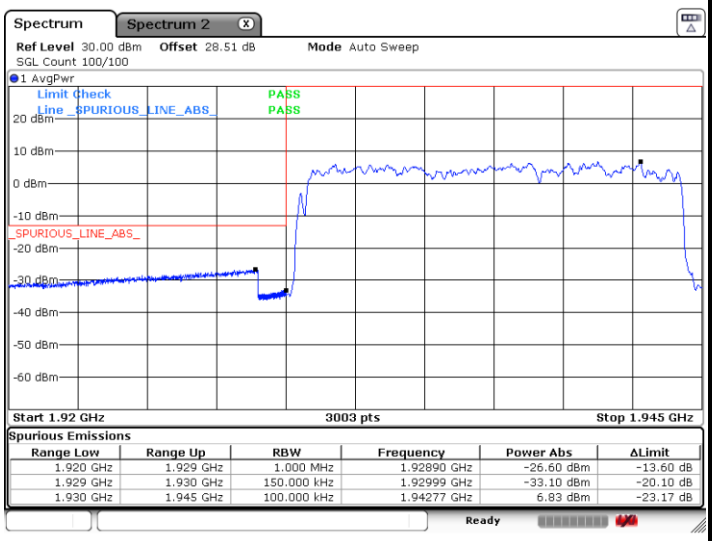
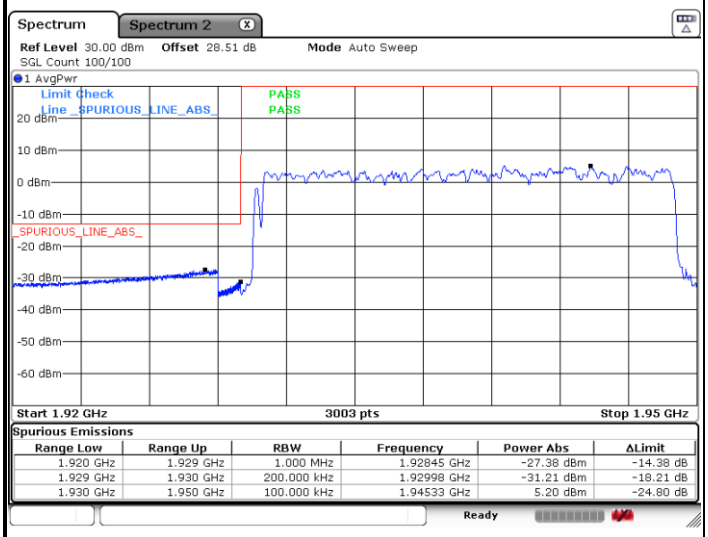
LTE Band 2 MIMO Ant. 2

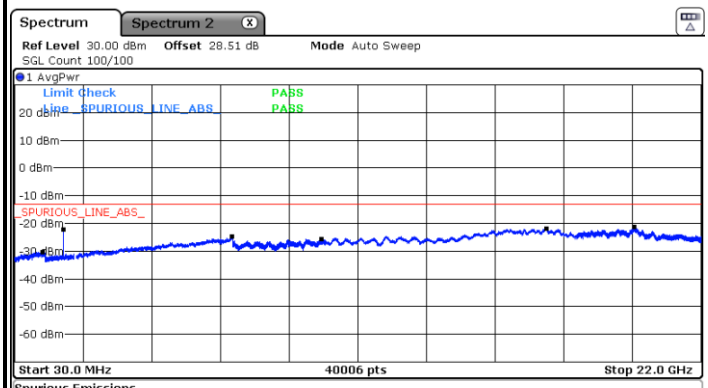
Conducted Band Edge

LTE Band 2 / 10MHz / QPSK	LTE Band 2 / 15MHz / QPSK
Lowest Band Edge / Full RB	Lowest Band Edge / Full RB
 Spectrum Spectrum 2 Ref Level 30.00 dBm Offset 28.51 dB Mode Auto Sweep SGL Count 100/100 1 AvgPwr Limit Check PASS Line _SPURIOUS_LINE_ABS_ PASS Start 1.92 GHz 3003 pts Stop 1.94 GHz Spurious Emissions Range Low / Range Up / RBW / Frequency / Power Abs / ΔLimit 1.920 GHz / 1.929 GHz / 1.000 MHz / 1.92869 GHz / -28.08 dBm / -15.08 dB 1.929 GHz / 1.930 GHz / 100.000 kHz / 1.92999 GHz / -31.22 dBm / -18.22 dB 1.930 GHz / 1.940 GHz / 100.000 kHz / 1.93834 GHz / 7.21 dBm / -22.79 dB Ready Date: 9.OCT.2023 14:14:19	 Spectrum Spectrum 2 Ref Level 30.00 dBm Offset 28.51 dB Mode Auto Sweep SGL Count 100/100 1 AvgPwr Limit Check PASS Line _SPURIOUS_LINE_ABS_ PASS Start 1.92 GHz 3003 pts Stop 1.945 GHz Spurious Emissions Range Low / Range Up / RBW / Frequency / Power Abs / ΔLimit 1.920 GHz / 1.929 GHz / 1.000 MHz / 1.92890 GHz / -26.60 dBm / -13.60 dB 1.929 GHz / 1.930 GHz / 150.000 kHz / 1.92999 GHz / -33.10 dBm / -20.10 dB 1.930 GHz / 1.945 GHz / 100.000 kHz / 1.94277 GHz / 6.83 dBm / -23.17 dB Ready Date: 9.OCT.2023 14:23:26
LTE Band 2 / 20MHz / QPSK	**-**
Lowest Band Edge / Full RB	**-**
 Spectrum Spectrum 2 Ref Level 30.00 dBm Offset 28.51 dB Mode Auto Sweep SGL Count 100/100 1 AvgPwr Limit Check PASS Line _SPURIOUS_LINE_ABS_ PASS Start 1.92 GHz 3003 pts Stop 1.95 GHz Spurious Emissions Range Low / Range Up / RBW / Frequency / Power Abs / ΔLimit 1.920 GHz / 1.929 GHz / 1.000 MHz / 1.92845 GHz / -27.38 dBm / -14.38 dB 1.929 GHz / 1.930 GHz / 200.000 kHz / 1.92998 GHz / -31.21 dBm / -18.21 dB 1.930 GHz / 1.950 GHz / 100.000 kHz / 1.94533 GHz / 5.20 dBm / -24.80 dB Ready Date: 9.OCT.2023 14:26:20	**-**

Conducted Spurious Emission

LTE Band 2 / 10MHz

Lowest Channel / QPSK



Spurious Emissions

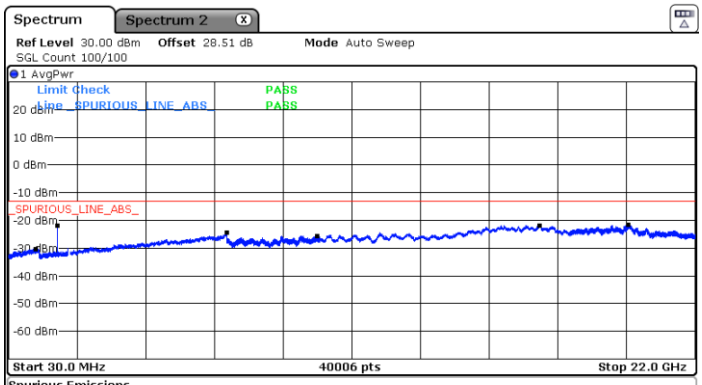
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	921.22689 MHz	-30.25 dBm	-17.25 dB
1.000 GHz	1.920 GHz	1.000 MHz	1.58920 GHz	-22.25 dBm	-9.25 dB
2.000 GHz	7.000 GHz	1.000 MHz	6.98584 GHz	-24.65 dBm	-11.65 dB
7.000 GHz	10.000 GHz	1.000 MHz	9.84639 GHz	-25.71 dBm	-12.71 dB
10.000 GHz	18.000 GHz	1.000 MHz	17.04362 GHz	-21.87 dBm	-8.87 dB
18.000 GHz	22.000 GHz	1.000 MHz	19.84709 GHz	-21.33 dBm	-8.33 dB

Ready

Date: 9.OCT.2023 14:17:36

LTE Band 2 / 15MHz

Lowest Channel / QPSK



Spurious Emissions

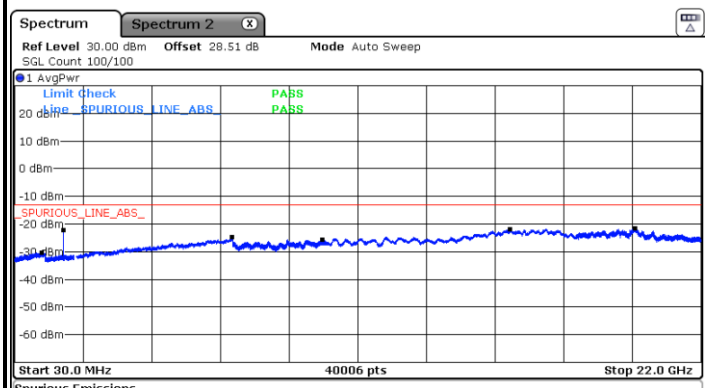
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	880.02249 MHz	-30.33 dBm	-17.33 dB
1.000 GHz	1.920 GHz	1.000 MHz	1.58920 GHz	-21.84 dBm	-8.84 dB
2.000 GHz	7.000 GHz	1.000 MHz	6.99917 GHz	-24.48 dBm	-11.48 dB
7.000 GHz	10.000 GHz	1.000 MHz	9.89763 GHz	-25.65 dBm	-12.65 dB
10.000 GHz	18.000 GHz	1.000 MHz	17.03462 GHz	-21.77 dBm	-8.77 dB
18.000 GHz	22.000 GHz	1.000 MHz	19.84494 GHz	-21.49 dBm	-8.49 dB

Ready

Date: 9.OCT.2023 14:21:41

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	906.19940 MHz	-30.28 dBm	-17.28 dB
1.000 GHz	1.920 GHz	1.000 MHz	1.58874 GHz	-22.10 dBm	-9.10 dB
2.000 GHz	7.000 GHz	1.000 MHz	6.98917 GHz	-24.69 dBm	-11.69 dB
7.000 GHz	10.000 GHz	1.000 MHz	9.86339 GHz	-25.63 dBm	-12.63 dB
10.000 GHz	18.000 GHz	1.000 MHz	15.88576 GHz	-21.83 dBm	-8.83 dB
18.000 GHz	22.000 GHz	1.000 MHz	19.87263 GHz	-21.44 dBm	-8.44 dB

Ready

Date: 9.OCT.2023 14:29:01

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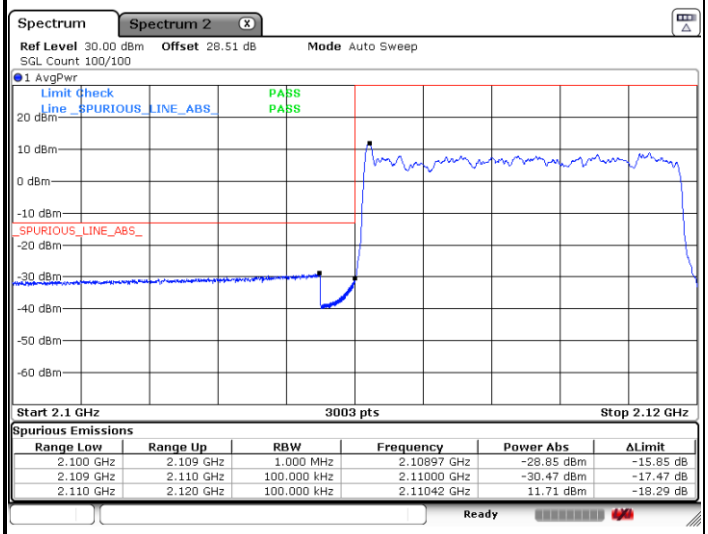
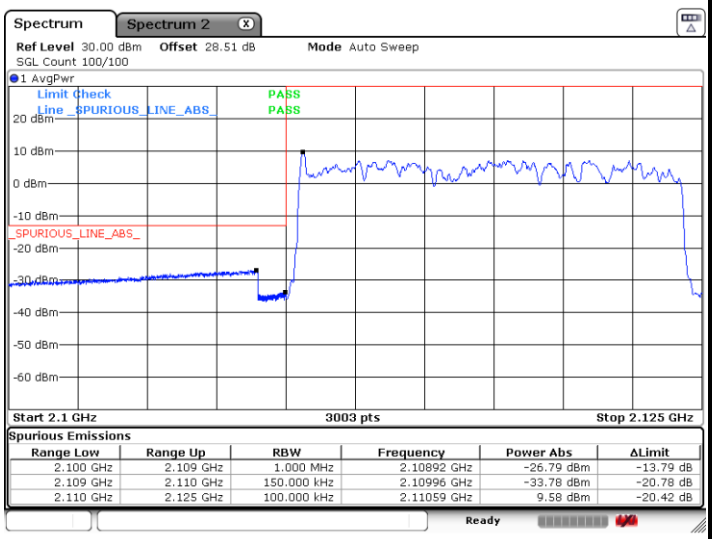
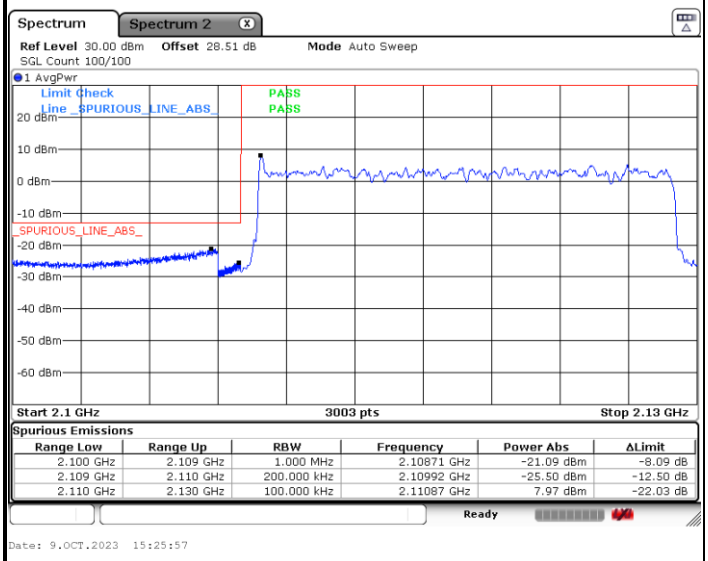
LTE Band 66 MIMO Ant. 3

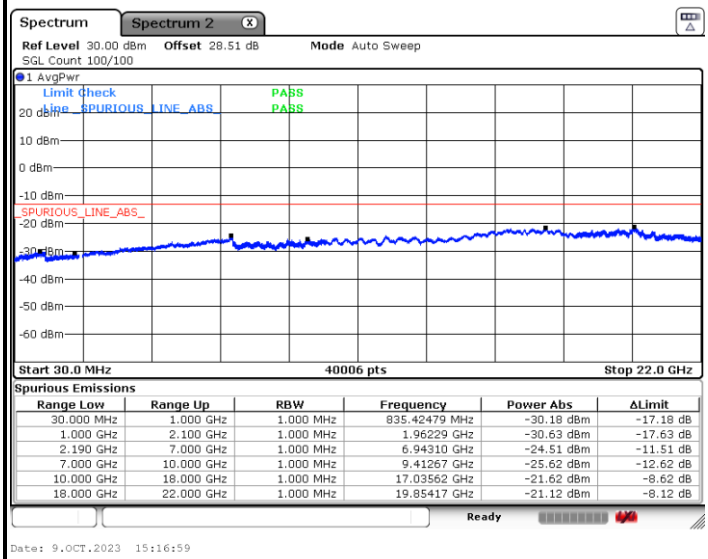
Conducted Band Edge

LTE Band 66 / 10MHz / QPSK	LTE Band 66 / 15MHz / QPSK
Lowest Band Edge / Full RB	Lowest Band Edge / Full RB
	
LTE Band 66 / 20MHz / QPSK	-
Lowest Band Edge / Full RB	-
	-

Conducted Spurious Emission

LTE Band 66 / 10MHz

Lowest Channel / QPSK



Spurious Emissions

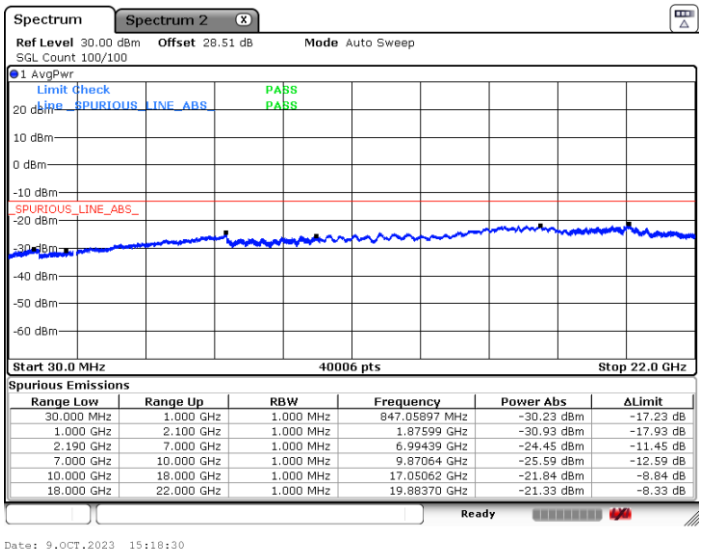
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	835.42479 MHz	-30.18 dBm	-17.18 dB
1.000 GHz	2.100 GHz	1.000 MHz	1.96229 GHz	-30.63 dBm	-17.63 dB
2.190 GHz	7.000 GHz	1.000 MHz	6.94310 GHz	-24.51 dBm	-11.51 dB
7.000 GHz	10.000 GHz	1.000 MHz	9.41267 GHz	-25.62 dBm	-12.62 dB
10.000 GHz	18.000 GHz	1.000 MHz	17.03562 GHz	-21.62 dBm	-8.62 dB
18.000 GHz	22.000 GHz	1.000 MHz	19.85417 GHz	-21.12 dBm	-8.12 dB

Ready

Date: 9.OCT.2023 15:16:59

LTE Band 66 / 15MHz

Lowest Channel / QPSK



Spurious Emissions

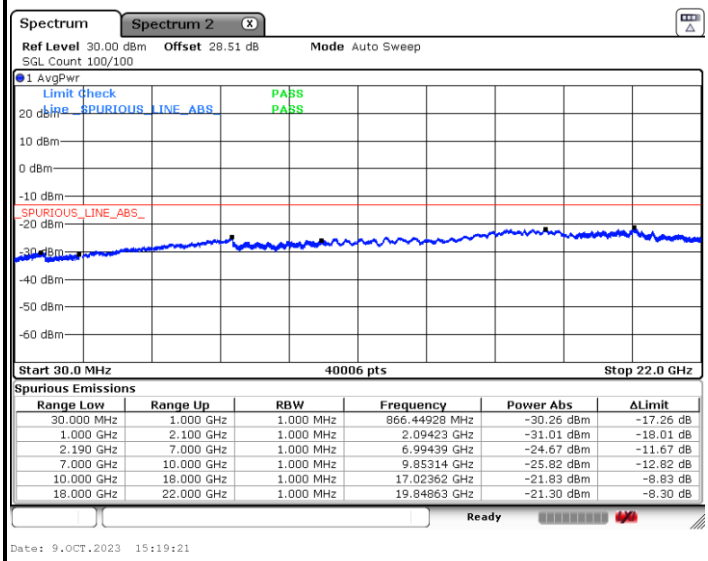
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	847.05897 MHz	-30.23 dBm	-17.23 dB
1.000 GHz	2.100 GHz	1.000 MHz	1.87599 GHz	-30.93 dBm	-17.93 dB
2.190 GHz	7.000 GHz	1.000 MHz	6.99439 GHz	-24.45 dBm	-11.45 dB
7.000 GHz	10.000 GHz	1.000 MHz	9.87064 GHz	-25.59 dBm	-12.59 dB
10.000 GHz	18.000 GHz	1.000 MHz	17.05062 GHz	-21.84 dBm	-8.84 dB
18.000 GHz	22.000 GHz	1.000 MHz	19.88370 GHz	-21.33 dBm	-8.33 dB

Ready

Date: 9.OCT.2023 15:18:30

LTE Band 66 / 20MHz

Lowest Channel / QPSK



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	866.44928 MHz	-30.26 dBm	-17.26 dB
1.000 GHz	2.100 GHz	1.000 MHz	2.09423 GHz	-31.01 dBm	-18.01 dB
2.190 GHz	7.000 GHz	1.000 MHz	6.99439 GHz	-24.67 dBm	-11.67 dB
7.000 GHz	10.000 GHz	1.000 MHz	9.85314 GHz	-25.82 dBm	-12.82 dB
10.000 GHz	18.000 GHz	1.000 MHz	17.02362 GHz	-21.83 dBm	-8.83 dB
18.000 GHz	22.000 GHz	1.000 MHz	19.84863 GHz	-21.30 dBm	-8.30 dB

Ready

Date: 9.OCT.2023 15:19:21

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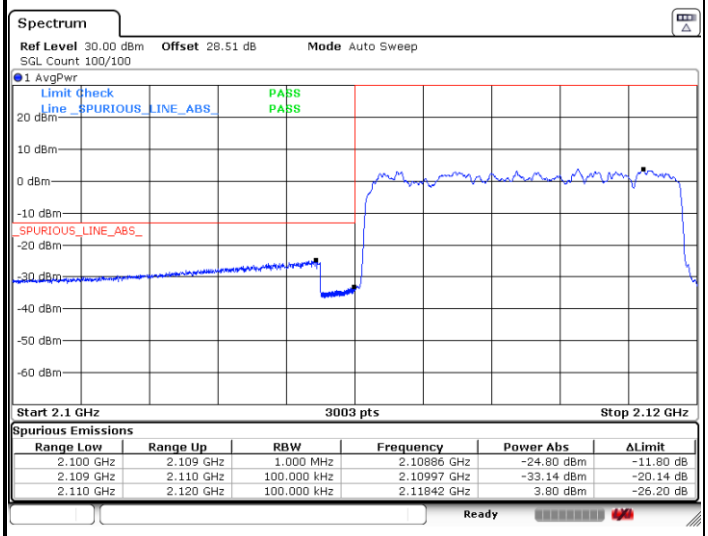
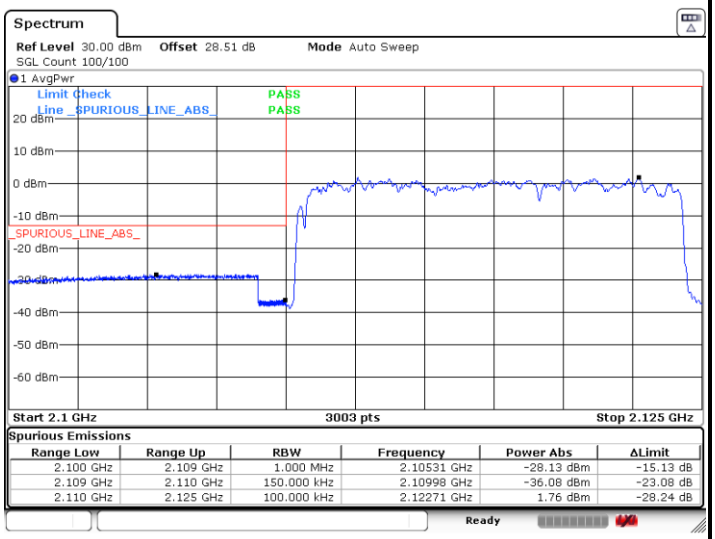
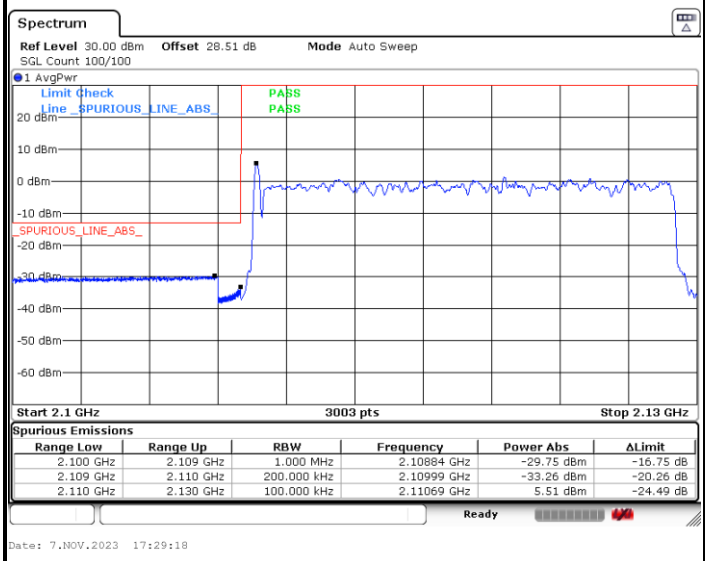
LTE Band 66 MIMO Ant. 4

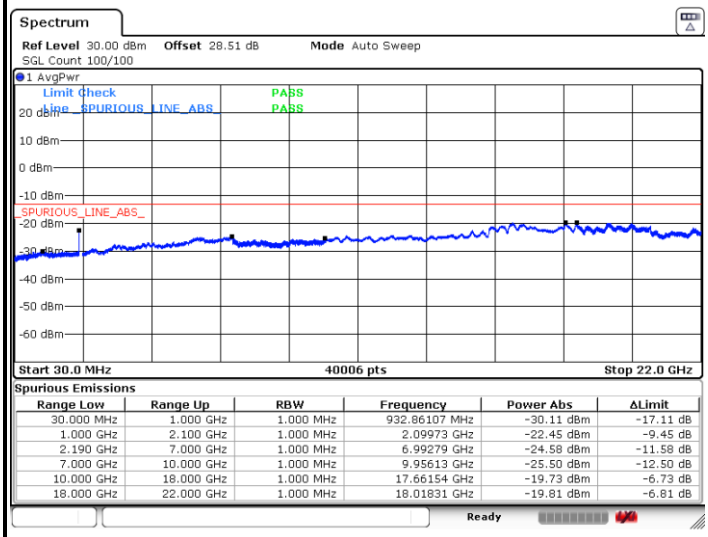
Conducted Band Edge

LTE Band 66 / 10MHz / QPSK	LTE Band 66 / 15MHz / QPSK
Lowest Band Edge / Full RB	**Lowest Band Edge / Full RB**
	
LTE Band 66 / 20MHz / QPSK	**-**
Lowest Band Edge / Full RB	**-**
	-

Conducted Spurious Emission

LTE Band 66 / 10MHz

Lowest Channel / QPSK



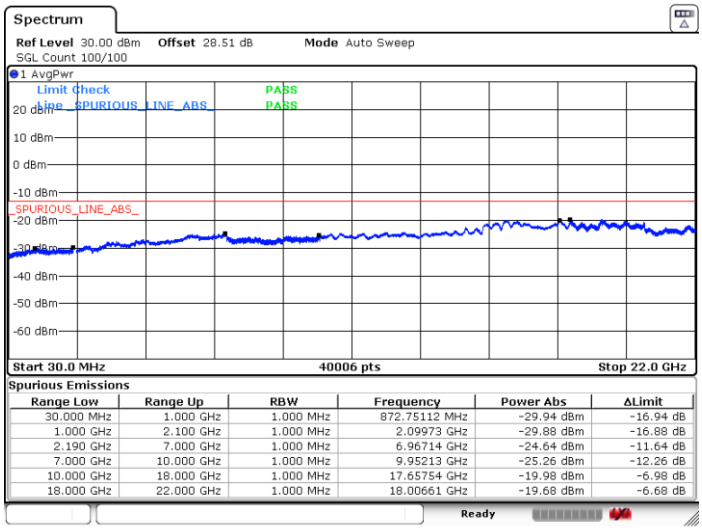
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	932.86107 MHz	-30.11 dBm	-17.11 dB
1.000 GHz	2.100 GHz	1.000 MHz	2.09973 GHz	-22.45 dBm	-9.45 dB
2.190 GHz	7.000 GHz	1.000 MHz	6.99279 GHz	-24.58 dBm	-11.58 dB
7.000 GHz	10.000 GHz	1.000 MHz	9.95613 GHz	-25.50 dBm	-12.50 dB
10.000 GHz	18.000 GHz	1.000 MHz	17.66154 GHz	-19.73 dBm	-6.73 dB
18.000 GHz	22.000 GHz	1.000 MHz	18.01831 GHz	-19.81 dBm	-6.81 dB

Date: 7.NOV.2023 17:22:45

LTE Band 66 / 15MHz

Lowest Channel / QPSK



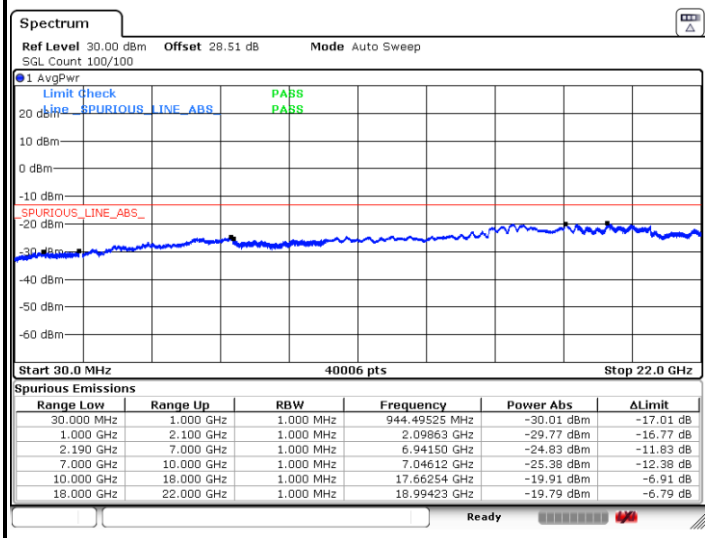
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	872.75112 MHz	-29.94 dBm	-16.94 dB
1.000 GHz	2.100 GHz	1.000 MHz	2.09973 GHz	-29.88 dBm	-16.88 dB
2.190 GHz	7.000 GHz	1.000 MHz	6.96714 GHz	-24.64 dBm	-11.64 dB
7.000 GHz	10.000 GHz	1.000 MHz	9.95213 GHz	-25.26 dBm	-12.26 dB
10.000 GHz	18.000 GHz	1.000 MHz	17.65754 GHz	-19.98 dBm	-6.98 dB
18.000 GHz	22.000 GHz	1.000 MHz	18.00661 GHz	-19.68 dBm	-6.68 dB

Date: 7.NOV.2023 17:25:17

LTE Band 66 / 20MHz

Lowest Channel / QPSK



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	944.49525 MHz	-30.01 dBm	-17.01 dB
1.000 GHz	2.100 GHz	1.000 MHz	2.09863 GHz	-29.77 dBm	-16.77 dB
2.190 GHz	7.000 GHz	1.000 MHz	6.94150 GHz	-24.83 dBm	-11.83 dB
7.000 GHz	10.000 GHz	1.000 MHz	7.04612 GHz	-25.38 dBm	-12.38 dB
10.000 GHz	18.000 GHz	1.000 MHz	17.66254 GHz	-19.91 dBm	-6.91 dB
18.000 GHz	22.000 GHz	1.000 MHz	18.99423 GHz	-19.79 dBm	-6.79 dB

Date: 7.NOV.2023 17:30:08

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Appendix B. Test Results of Radiated Test

Radiated Spurious Emission

Test Engineer :	Carl Ni	Temperature :	22~23℃
		Relative Humidity :	41~42%

LTE:

LTE Band 2 / 20MHz / QPSK								
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	3921	-55.61	-13	-42.61	-67.87	2.64	14.90	H
	5880	-50.04	-13	-37.04	-61.90	2.94	14.80	H
	7836	-47.73	-13	-34.73	-57.50	3.39	13.16	H
	3921	-57.37	-13	-44.37	-69.63	2.64	14.90	V
	5880	-48.56	-13	-35.56	-60.42	2.94	14.80	V
	7836	-50.15	-13	-37.15	-59.92	3.39	13.16	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

LTE Band 66 / 20MHz / QPSK								
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	4312	-51.22	-13	-38.22	-61.96	2.604	13.34	H
	6464	-60.83	-13	-47.83	-71.34	3.011	13.52	H
	8620	-53.30	-13	-40.30	-63.50	3.271	13.47	H
	10780	-54.64	-13	-41.64	-61.61	5.527	12.5	H
	12930	-55.72	-13	-42.72	-62.58	6.038	12.9	H
	15080	-58.07	-13	-45.07	-65.27	6.726	13.93	H
	17240	-55.15	-13	-42.15	-62.59	6.963	14.4	H
	4312	-48.94	-13	-35.94	-59.68	2.604	13.34	V
	6464	-57.23	-13	-44.23	-67.74	3.011	13.52	V
	8620	-47.59	-13	-34.59	-57.79	3.271	13.47	V
	10780	-55.31	-13	-42.31	-62.28	5.527	12.50	V
	12930	-55.92	-13	-42.92	-62.78	6.038	12.90	V
	15080	-55.33	-13	-42.33	-62.53	6.726	13.93	V
	17240	-54.49	-13	-41.49	-61.93	6.963	14.40	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

NB-IOT Category NB1:

NB-IOT Band 2 Upper Location / 20MHz / QPSK								
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	3921	-56.26	-13	-43.26	-68.52	2.64	14.90	H
	5880	-51.65	-13	-38.65	-63.51	2.94	14.80	H
	7836	-46.55	-13	-33.55	-56.32	3.39	13.16	H
	3921	-55.62	-13	-42.62	-67.88	2.64	14.90	V
	5880	-50.96	-13	-37.96	-62.82	2.94	14.80	V
	7836	-45.67	-13	-32.67	-55.44	3.39	13.16	V

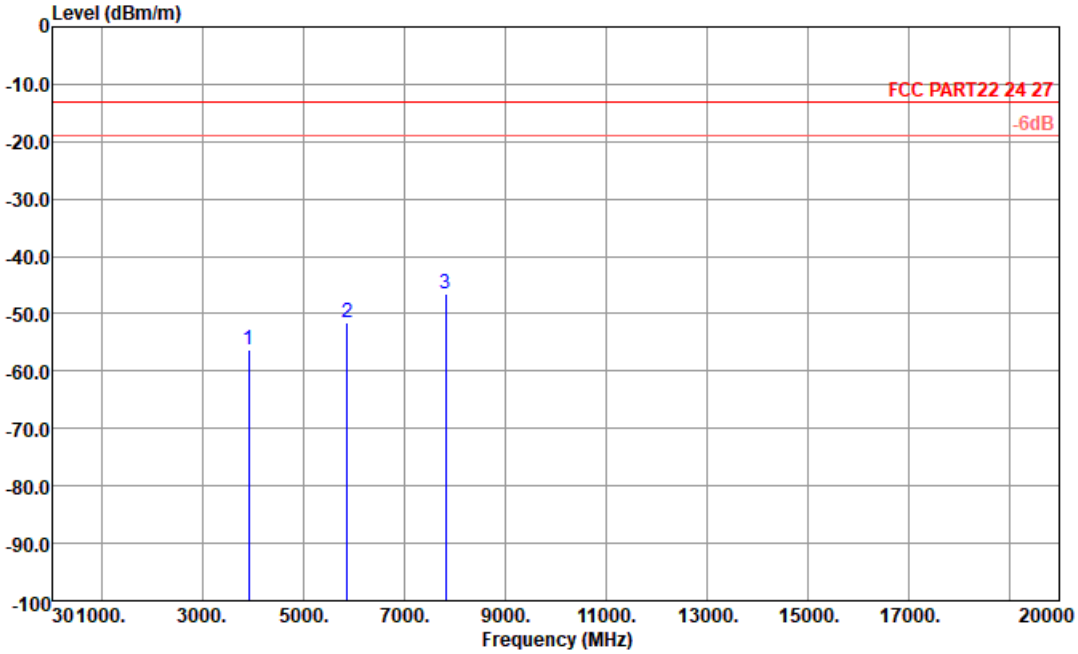
Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

NB-IOT Band 66 Upper Location / 20MHz / QPSK								
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	4312	-50.38	-13	-37.38	-61.12	2.604	13.34	H
	6464	-60.08	-13	-47.08	-70.59	3.011	13.52	H
	8620	-48.28	-13	-35.28	-58.48	3.271	13.47	H
	10780	-54.19	-13	-41.19	-61.16	5.527	12.50	H
	12930	-55.03	-13	-42.03	-61.89	6.038	12.90	H
	15080	-57.36	-13	-44.36	-64.56	6.726	13.93	H
	17240	-55.68	-13	-42.68	-63.12	6.963	14.40	H
	4312	-49.26	-13	-36.26	-60.00	2.604	13.34	V
	6464	-59.78	-13	-46.78	-70.29	3.011	13.52	V
	8620	-46.69	-13	-33.69	-56.89	3.271	13.47	V
	10780	-56.26	-13	-43.26	-63.23	5.527	12.50	V
	12930	-55.86	-13	-42.86	-62.72	6.038	12.90	V
	15080	-58.08	-13	-45.08	-65.28	6.726	13.93	V
	17240	-53.62	-13	-40.62	-61.06	6.963	14.40	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

Worst test plots

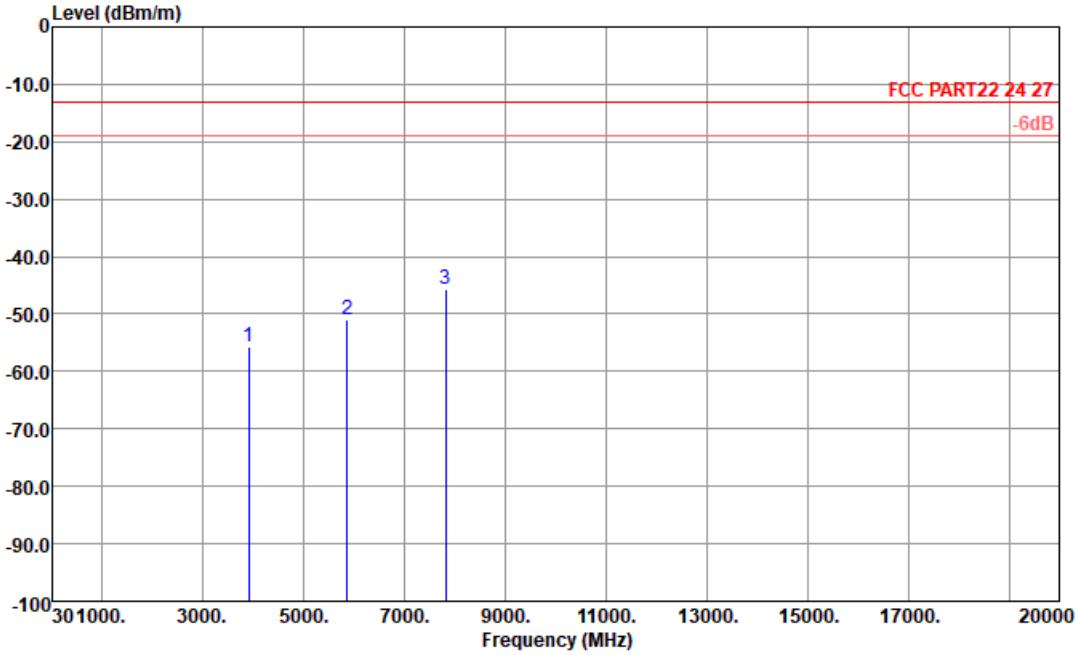
NB-IOT Band 2 Upper Location / 20MHz / QPSK for middle channel



Site : 03CH04-KS
Condition : FCC PART22 24 27 3m HF PART 22/24/27 HORIZONTAL

: BW 20 QPSK+NB IOT B2 SCS15K QPSK

	Freq	Level	Over Limit	Limit Line	Read Level	Pol/Phase
	MHz	dBm/m	dB	dBm/m	dBm	
1	3921.00	-56.26	-43.26	-13.00	-73.89	HORIZONTAL
2	5880.00	-51.65	-38.65	-13.00	-73.00	HORIZONTAL
3	7836.00	-46.55	-33.55	-13.00	-71.20	HORIZONTAL



Site : 03CH04-KS
Condition : FCC PART22 24 27 3m HF PART 22/24/27 VERTICAL

: BW 20 QPSK+NB IOT B2 SCS15K QPSK

	Freq	Level	Over Limit	Limit Line	Read Level	Pol/Phase
	MHz	dBm/m	dB	dBm/m	dBm	
1	3921.00	-55.62	-42.62	-13.00	-73.75	VERTICAL
2	5880.00	-50.96	-37.96	-13.00	-72.62	VERTICAL
3	7836.00	-45.67	-32.67	-13.00	-70.36	VERTICAL