FCC RF Test Report

APPLICANT	:	Suzhou Aquila Solutions Inc.
EQUIPMENT	:	LTE Module
BRAND NAME	:	AQUILA
MODEL NAME	:	MG401
FCC ID	:	2ASRY-MG401
STANDARD	:	47 CFR Part 2, 27
CLASSIFICATION	:	PCS Licensed Transmitter (PCB)
TEST DATE(S)	:	Sep. 13, 2021 ~ Sep. 17, 2021

We, Sporton International (Kunshan) Inc., 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 (Kunshan) Inc., the test report shall not be reproduced except in full.

Jason Jia

Reviewed by: Jason Jia / Supervisor

Alex Wang

Approved by: Alex Wang / Manager

ACCREDITED
Cert #5145.02

Sporton International (Kunshan) Inc.

No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG8N3015-04	Rev. 01	Initial issue of report	Sep. 28, 2021

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.4	§2.1046	Conducted Output Power	—	Report Only	-
3.5	§ 27.1507(d)	Peak-to-Average Ratio (PAR)	< 13 dB	PASS	-
3.6	§ 27.1507(d)	Effective Radiated Power	< 10W	PASS	-
3.7	§2.1049	Occupied Bandwidth	—	Report Only	-
3.8	§2.1051 §27.1509 (a)	Conducted Band Edge Measurement	< 43+10log10(P[Watts])	PASS	-
3.9	§2.1051 §27.1509 (a)	Conducted Spurious Emission	< 43+10log10(P[Watts])	PASS	-
3.10	§2.1055	Frequency Stability Temperature & Voltage	Within the band	PASS	-
4.4	§2.1053 §27.1509 (a)	Radiated Spurious Emission	< 43+10log10(P[Watts])	PASS	Under limit 16.43 dB at 3582.000 MHz

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

Suzhou Aquila Solutions Inc.
Room 201, Building 3, 18 Dongchang Road,Suzhou Industry ParkSuzhou, 215000 China

1.2 Manufacturer

Suzhou Aquila Solutions Inc.
Room 201, Building 3, 18 Dongchang Road,Suzhou Industry ParkSuzhou, 215000 China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	LTE Module
Brand Name	AQUILA
Model Name	MG401
FCC ID	2ASRY-MG401
HW Version	V1.2
SW Version	CAT4_GS_BYPASS_0.3.3.2_V1.4
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Product Specification of Equipment Under Test

Product Feature	
Tx Frequency	LTE Band 8 : 897.5 MHz ~ 900.5 MHz
Rx Frequency	LTE Band 8 : 936.5 MHz ~ 939.5 MHz
Bandwidth	1.4MHz / 3MHz
Maximum Output Power to Antenna	24.02 dBm
Antenna Gain	0.52 dBi
Type of Modulation	QPSK / 16QAM

1.5 Modification of EUT

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

1.6 Maximum ERP Power and Emission Designator

LTE Band 8		QPSK		16QAM	
BW (MHz)	Frequency Range (MHz)	Maximum ERP(W)	Emission Designator (99%OBW)	Maximum ERP(W)	Emission Designator (99%OBW)
3	899	0.1734	2M75G7D	0.1570	2M70W7D

1.7 Testing Site

<FCC>-KS

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

Test Firm	Sporton International (Kunshan) Inc.		
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

1.8 Test Software

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

1.9 Applied Standards

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

- 47 CFR Part 2, Part 27 Subpart P
- ANSI C63.26-2015
- FCC KDB 971168 Power Meas License Digital Systems D01 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

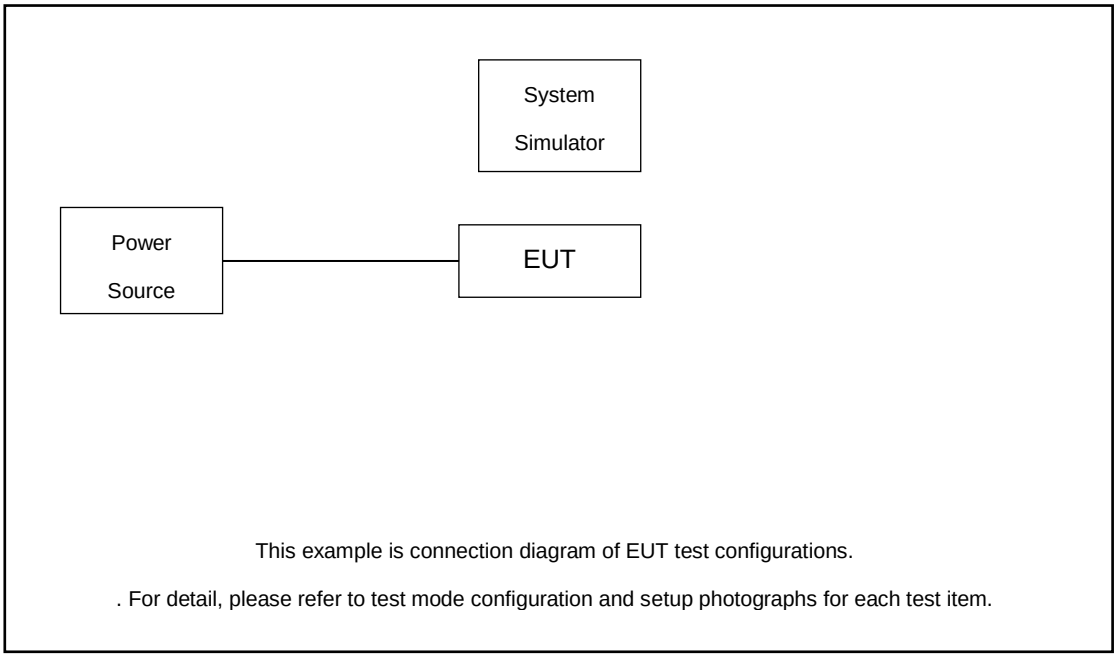
2.1 Test Mode

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. (The worst plane: Y)

Conducted Test Cases	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	8	V	-	-	-	-	-	V	V	-	V		V	V	V	V
		-	V	-	-	-	-	V	V	-	V		V		V	
Peak-to-Average Ratio	8	-	V	-	-	-	-	V	V	-	V		V		V	
E.R.P	8	V	-	-	-	-	-	V	V	-	V		V	V	V	V
		-	V	-	-	-	-	V	V	-	V		V		V	
26dB and 99% Bandwidth	8	-	V	-	-	-	-	V	V	-			V		V	
Conducted Band Edge	8	V	-	-	-	-	-	V	V	-	V		V	V		V
		-	V	-	-	-	-	V	V	-	V		V		V	
Conducted Spurious Emission	8	V	-	-	-	-	-	V		-	V			V	V	V
		-	V	-	-	-	-	V		-	V				V	
Frequency Stability	8	-	V	-	-	-	-	V		-			V		V	
Radiated Spurious Emission	8	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.															

2.2 Connection Diagram of Test System



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.	LTE Base Station	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
3.	Fixture Board	N/A	N/A	N/A	N/A	N/A
4.	Adapter	N/A	N/A	N/A	N/A	N/A

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 4.70 dB.

Example :

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

= 4.70 (dB)

2.5 Frequency List of Low/Middle/High Channels

LTE Band 8 Channel and Frequency List				
BW [MHz]	**Channel/Frequency(MHz)**	**Lowest**	**Middle**	**Highest**
3	Channel	-	21640	-
	Frequency	-	899	-
1.4	Channel	21632	21640	21648
	Frequency	898.2	899	899.8

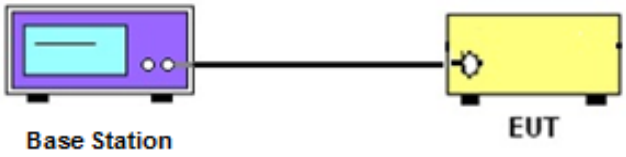
3 Conducted Test Items

3.1 Measuring Instruments

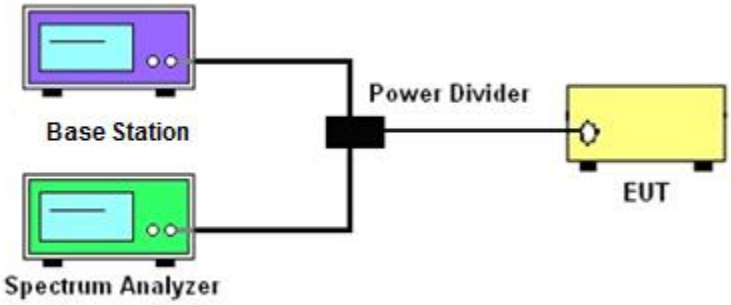
See list of measuring instruments of this test report.

3.2 Test Setup

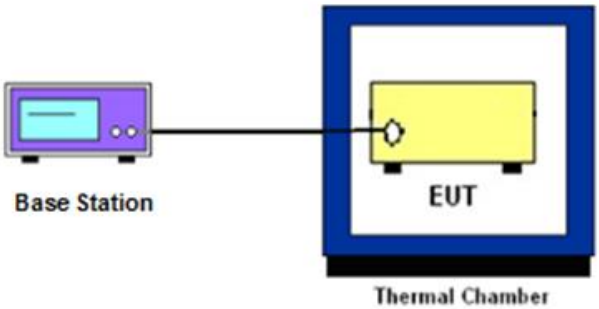
3.2.1 Conducted Output Power



3.2.2 Peak-to-Average Ratio, Occupied / 26dB Bandwidth ,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 Measurement

3.4.1 Description of the Conducted Output Power Measurement

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

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 Effective Radiated Power Limits

3.6.1 Description of ERP

Must not exceed 10 watts ERP.

3.6.2 Test Procedures

1. According to KDB 412172 D01 Power Approach,
2. 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

3.7 Occupied Bandwidth

3.7.1 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.

3.7.2 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.

3.8 Conducted Band Edge Measurement

3.8.1 Description of Conducted Band Edge Measurement

27.1509:

The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) in watts by at least the following amounts:

(a) For 900 MHz broadband operations in 897.5-900.5 MHz band by at least 43 + 10 log (P) dB.

(b) For 900 MHz broadband operations in the 936.5-939.5 MHz band, by at least 50 + 10 log (P) dB.

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 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 or a narrower RBW was used and the measured power was integrated over the full required measurement bandwidth of 1 MHz.
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.

3.9 Conducted Spurious Emission Measurement

3.9.1 Description of Conducted Spurious Emission Measurement

27.1509:

The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) in watts by at least the following amounts:

(a) For 900 MHz broadband operations in 897.5-900.5 MHz band by at least 43 + 10 log (P) dB.

3.9.2 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

3.10 Frequency Stability Measurement

3.10.1 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.

3.10.2 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.

3.10.3 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.

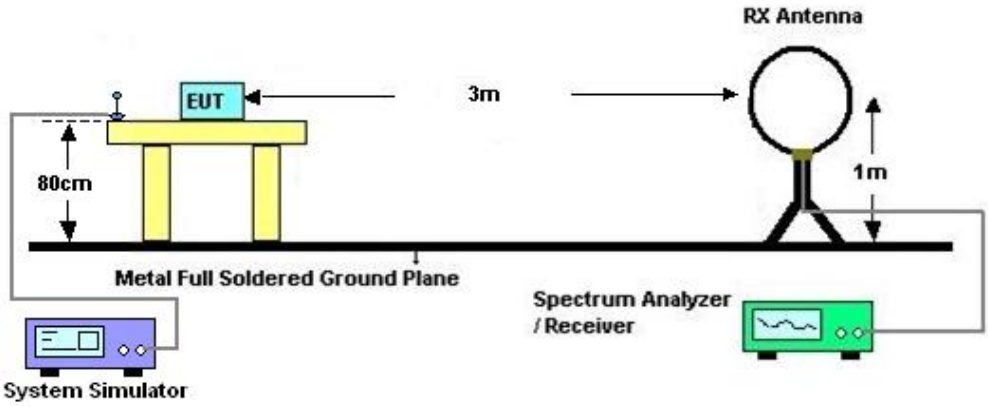
4 Radiated Test Items

4.1 Measuring Instruments

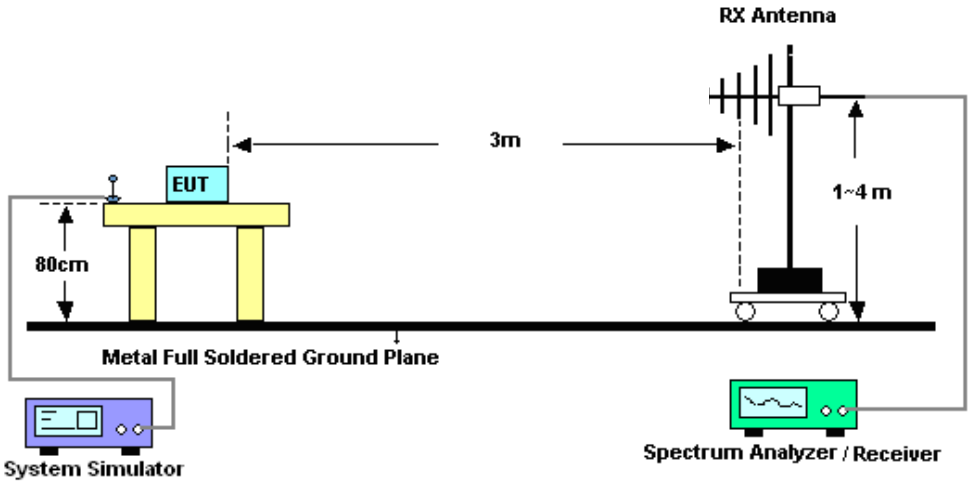
See list of measuring instruments of this test report.

4.2 Test Setup

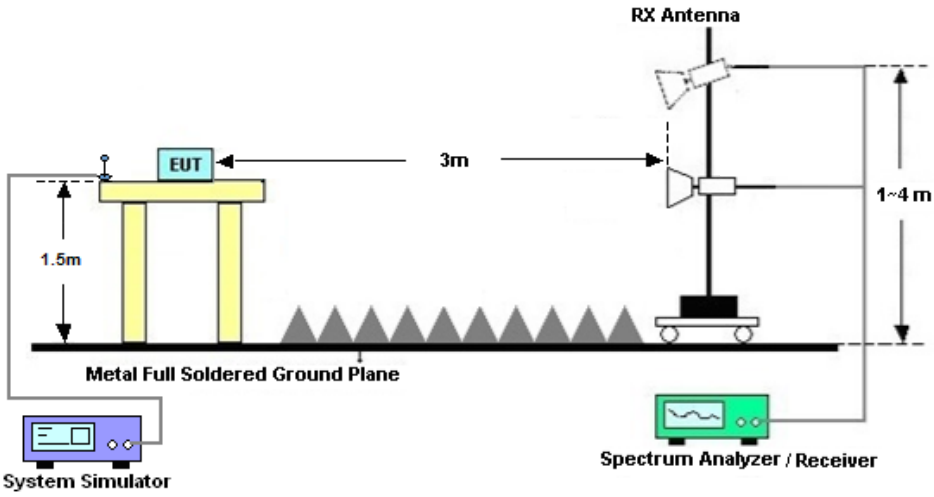
4.2.1 For radiated test below 30MHz



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 Measurement

4.4.1 Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI/TIA-603-E. 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, 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.
   EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
   ERP (dBm) = EIRP - 2.15
10. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
    The limit line is derived from 43 + 10 log (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	Nov. 01, 2020	Sep. 13, 2021	Oct. 31, 2021	Conducted (TH01-KS)
Power divider	STI	STI08-0055	-	0.5~40GHz	Aug. 26, 2021	Sep. 13, 2021	Aug. 25, 2022	Conducted (TH01-KS)
Temperature &humidity chamber	Hongzhan	LP-150U	H2014011440	-40~+150°C 20%~95%RH	Jul. 12, 2021	Sep. 13, 2021	Jul. 11, 2022	Conducted (TH01-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz-44G,MAX 30dB	Apr. 13, 2021	Sep. 17, 2021	Apr. 12, 2022	Radiation (03CH04-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Nov. 01, 2020	Sep. 17, 2021	Oct. 31, 2021	Radiation (03CH04-KS)
Bilog Antenna	TeseQ	CBL6111D	49922	30MHz-1GHz	May 30, 2021	Sep. 17, 2021	May 29, 2022	Radiation (03CH04-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Nov. 01, 2020	Sep. 17, 2021	Oct. 31, 2021	Radiation (03CH04-KS)
SHF-EHF Horn	Com-power	AH-840	101115	18GHz~40GHz	Jan. 06, 2021	Sep. 17, 2021	Jan. 05, 2022	Radiation (03CH04-KS)
Amplifier	SONOMA	310N	187289	9KHz-1GHz	Jan. 06, 2021	Sep. 17, 2021	Jan. 05, 2022	Radiation (03CH04-KS)
Amplifier	MITEQ	EM18G40GGA	060728	18~40GHz	Jan. 07, 2021	Sep. 17, 2021	Jan. 06, 2022	Radiation (03CH04-KS)
high gain Amplifier	MITEQ	AMF-7D-00101800-30-10P	2025788	1Ghz-18Ghz	Jan. 06, 2021	Sep. 17, 2021	Jan. 05, 2022	Radiation (03CH04-KS)
Amplifier	Keysight	83017A	MY57280106	500MHz~26.5GHz	Oct. 14, 2020	Sep. 17, 2021	Oct. 13, 2021	Radiation (03CH04-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Sep. 17, 2021	NCR	Radiation (03CH04-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Sep. 17, 2021	NCR	Radiation (03CH04-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Sep. 17, 2021	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 ~ 40 GHz)

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

——— **THE END** ———

Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power) and ERP

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	ERP(W)		
Channel					21640				
Frequency (MHz)					899		L	M	H
3	QPSK	1	0		24.02			0.1734	
3	QPSK	1	14		23.55			0.1556	
3	QPSK	15	0		22.69			0.1276	
3	16QAM	1	0		23.59			0.1570	
Channel				21632	21640	21648	ERP(W)		
Frequency (MHz)				898.2	899	899.8	L	M	H
1.4	QPSK	1	0	23.55	23.87	23.78	0.1556	0.1675	0.1641
1.4	16QAM	1	0	22.91	23.16	22.88	0.1343	0.1422	0.1334

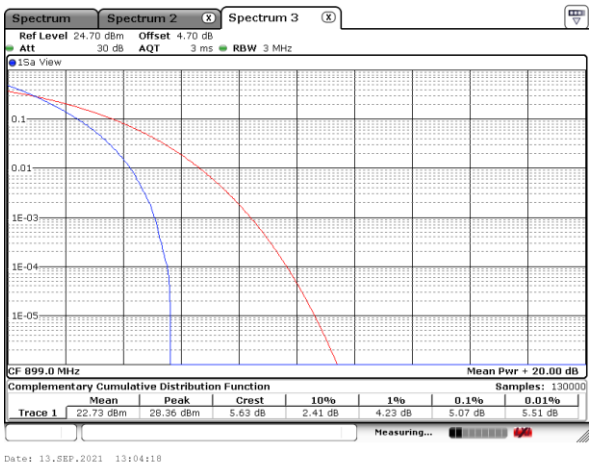
LTE Band 8

Peak-to-Average Ratio

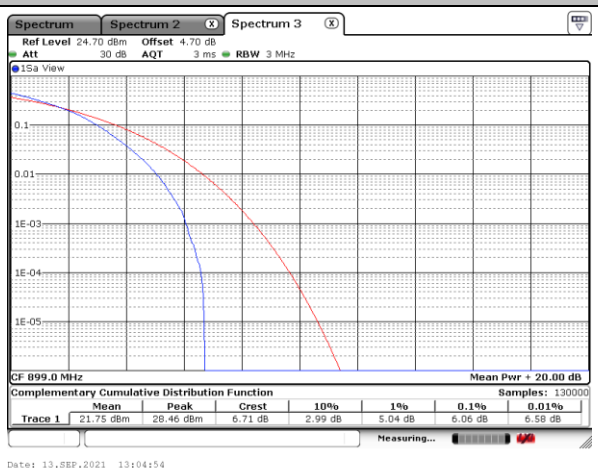
Mode	LTE Band 8 / 3MHz			
Mod.	QPSK	16QAM		Limit: 13dB
RB Size	Full RB	Full RB		Result
Middle CH	5.07	6.06		PASS

LTE Band 8 / 3MHz

Middle Channel / Full RB/ QPSK



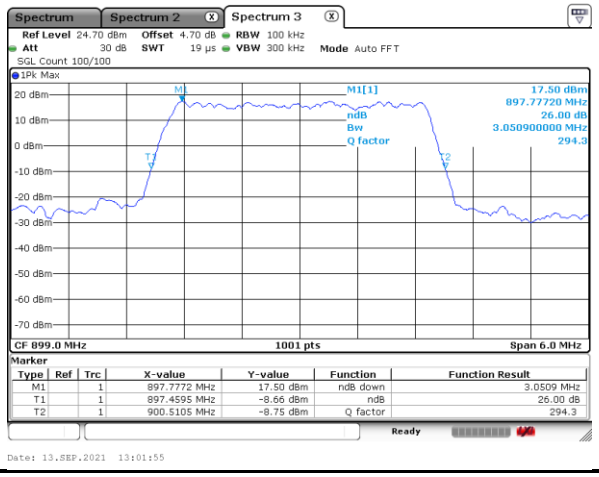
Middle Channel / Full RB/ 16QAM

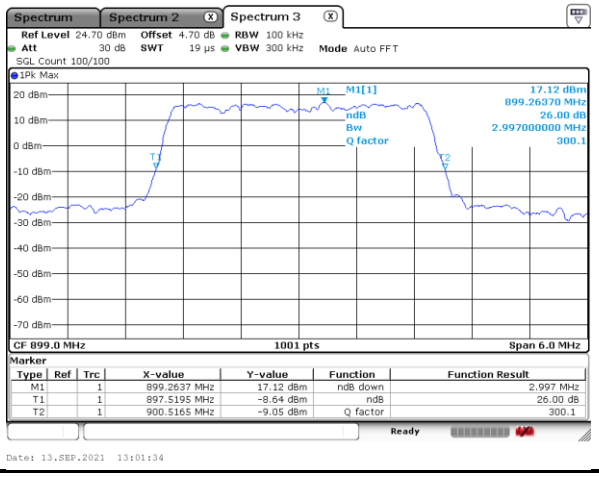


26dB Bandwidth

Mode	LTE Band 8 : 26dB BW(MHz)	
BW	3MHz	
Mod.	QPSK	16QAM
Middle CH	3.05	3.00

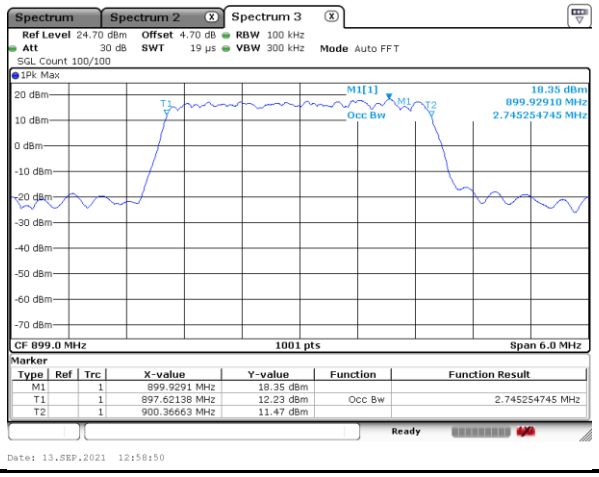
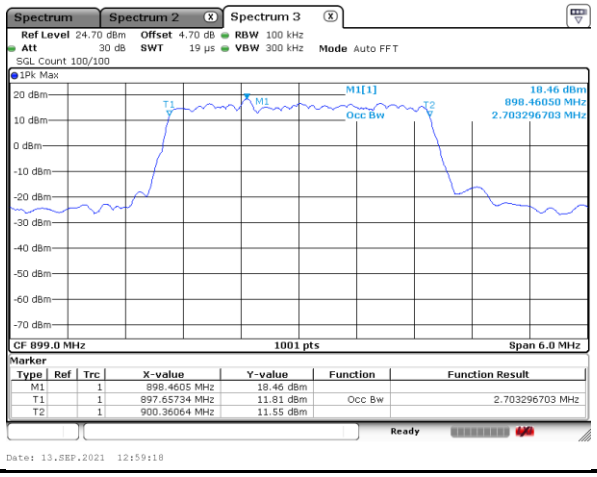
LTE Band8	
Middle Channel / 3MHz / QPSK	Middle Channel / 3MHz / 16QAM





Occupied Bandwidth

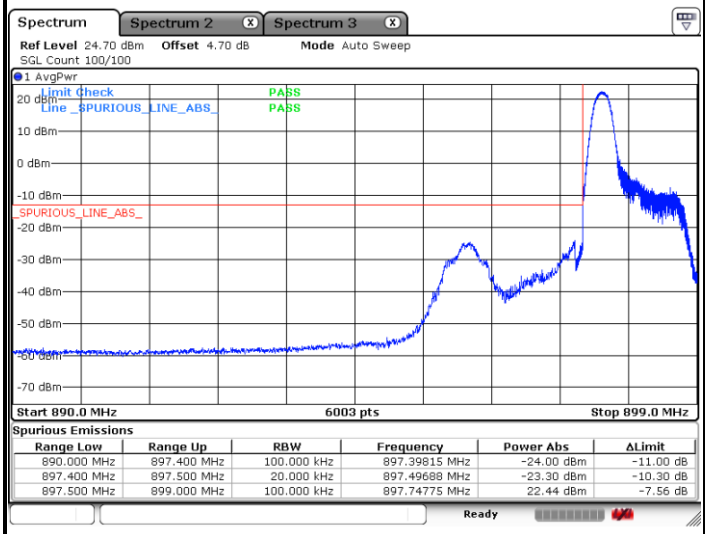
Mode	LTE Band 8 : 99%OBW(MHz)	
BW	3MHz	
Mod.	QPSK	16QAM
Middle CH	2.75	2.70

LTE Band 8	
Middle Channel / 3MHz / QPSK	Middle Channel / 3MHz / 16QAM
	

Conducted Band Edge

LTE Band8 / 1.4MHz / QPSK

Lowest Band Edge / 1RB

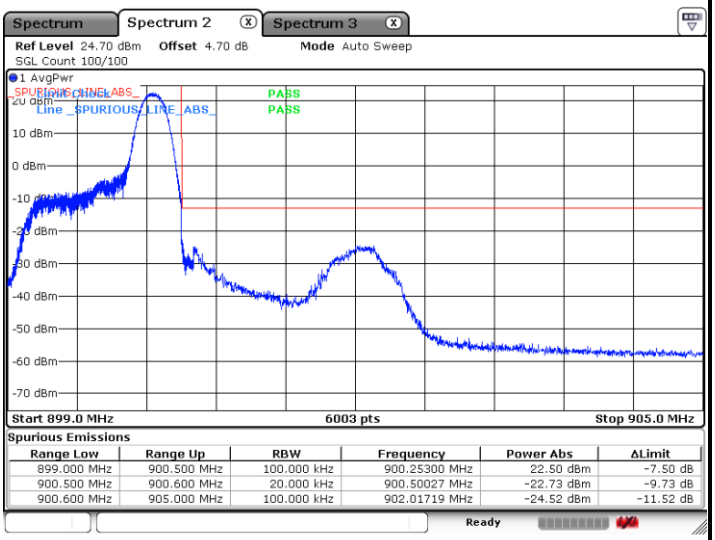


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
890.000 MHz	897.400 MHz	100.000 kHz	897.39815 MHz	-24.00 dBm	-11.00 dB
897.400 MHz	897.500 MHz	20.000 kHz	897.49688 MHz	-23.30 dBm	-10.30 dB
897.500 MHz	899.000 MHz	100.000 kHz	897.74775 MHz	22.44 dBm	-7.56 dB

Date: 13.SEP.2021 12:36:01

Highest Band Edge / 1RB

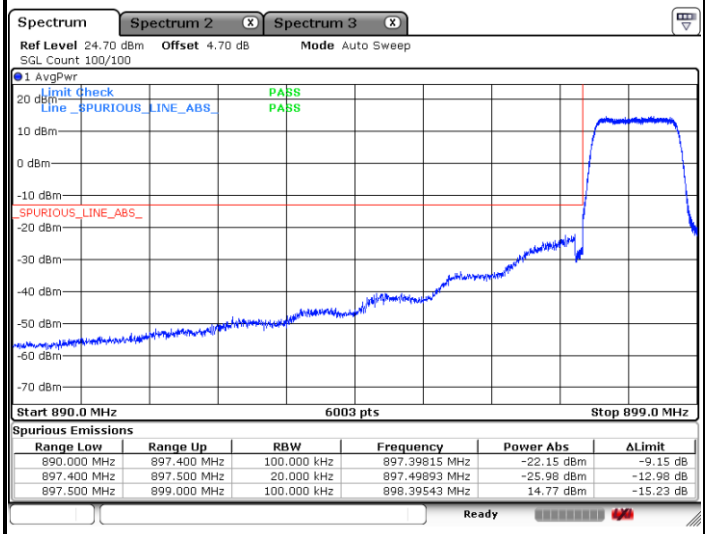


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
899.000 MHz	900.500 MHz	100.000 kHz	900.25300 MHz	22.50 dBm	-7.50 dB
900.500 MHz	900.600 MHz	20.000 kHz	900.50027 MHz	-22.73 dBm	-9.73 dB
900.600 MHz	905.000 MHz	100.000 kHz	902.01719 MHz	-24.52 dBm	-11.52 dB

Date: 13.SEP.2021 12:42:51

Lowest Band Edge / Full RB

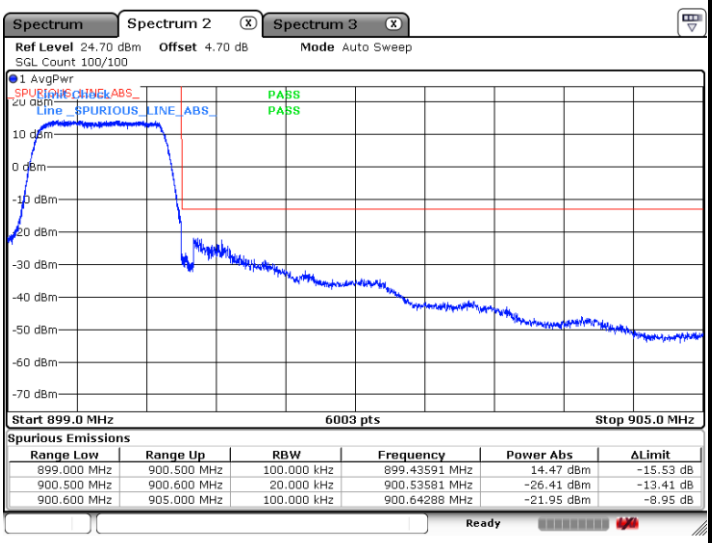


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
890.000 MHz	897.400 MHz	100.000 kHz	897.39815 MHz	-22.15 dBm	-9.15 dB
897.400 MHz	897.500 MHz	20.000 kHz	897.49893 MHz	-25.98 dBm	-12.98 dB
897.500 MHz	899.000 MHz	100.000 kHz	898.39543 MHz	14.77 dBm	-15.23 dB

Date: 13.SEP.2021 12:33:46

Highest Band Edge / Full RB



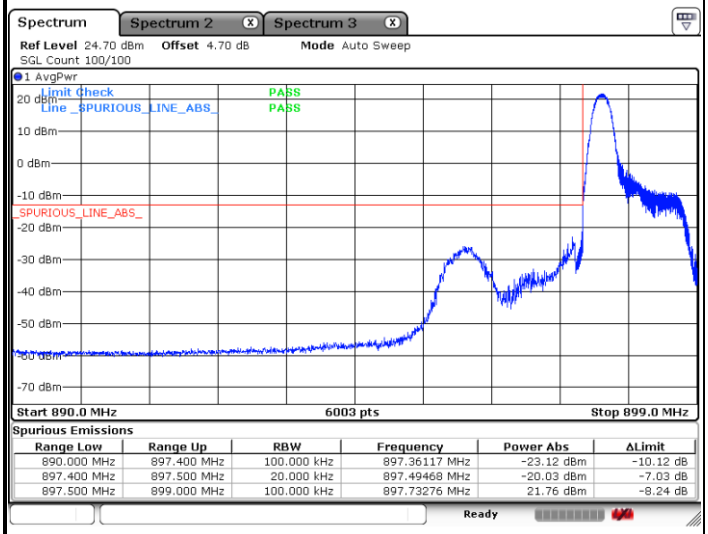
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
899.000 MHz	900.500 MHz	100.000 kHz	899.43591 MHz	14.47 dBm	-15.53 dB
900.500 MHz	900.600 MHz	20.000 kHz	900.53581 MHz	-26.41 dBm	-13.41 dB
900.600 MHz	905.000 MHz	100.000 kHz	900.64288 MHz	-21.95 dBm	-8.95 dB

Date: 13.SEP.2021 12:40:51

LTE Band 8 / 1.4MHz / 16QAM

Lowest Band Edge / 1 RB

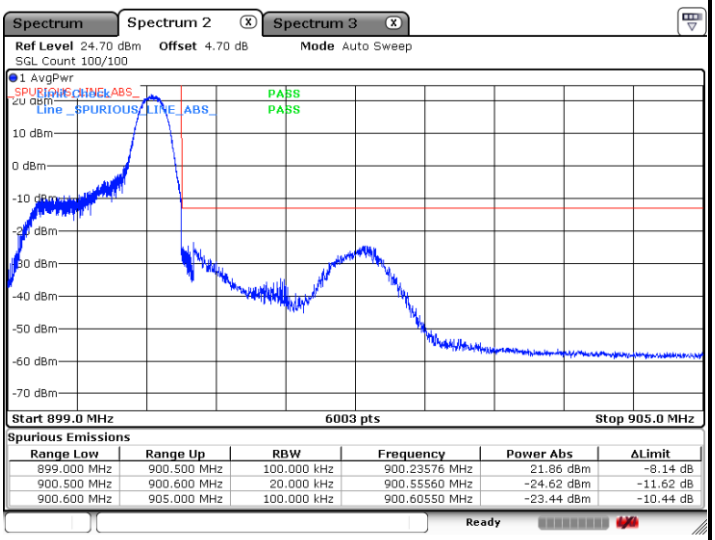


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
890.000 MHz	897.400 MHz	100.000 kHz	897.36117 MHz	-23.12 dBm	-10.12 dB
897.400 MHz	897.500 MHz	20.000 kHz	897.49468 MHz	-20.03 dBm	-7.03 dB
897.500 MHz	899.000 MHz	100.000 kHz	897.73276 MHz	21.76 dBm	-8.24 dB

Date: 13.SEP.2021 12:35:40

Highest Band Edge / 1 RB

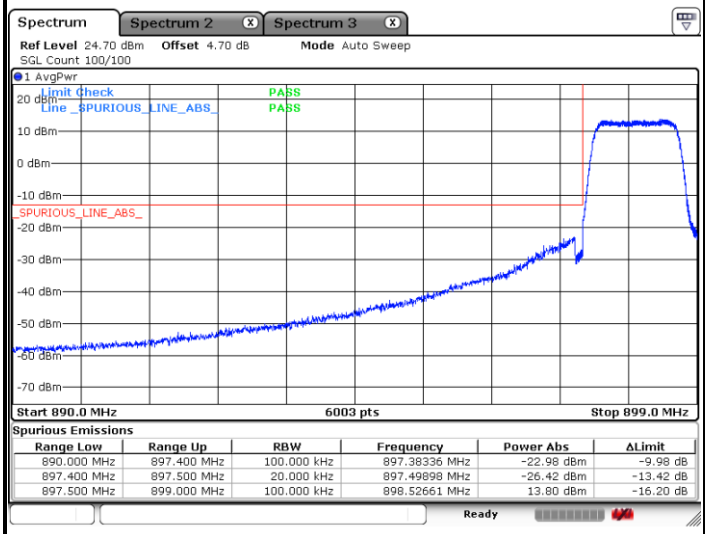


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
899.000 MHz	900.500 MHz	100.000 kHz	900.23576 MHz	21.86 dBm	-8.14 dB
900.500 MHz	900.600 MHz	20.000 kHz	900.55560 MHz	-24.62 dBm	-11.62 dB
900.600 MHz	905.000 MHz	100.000 kHz	900.60550 MHz	-23.44 dBm	-10.44 dB

Date: 13.SEP.2021 12:42:30

Lowest Band Edge / Full RB

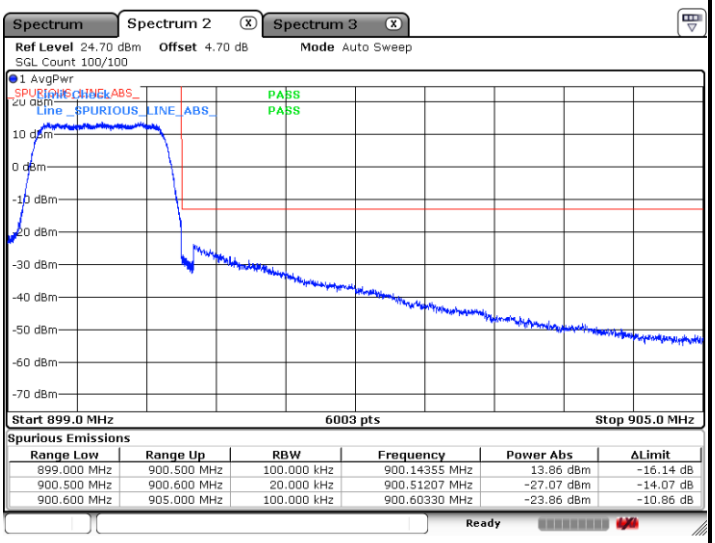


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
890.000 MHz	897.400 MHz	100.000 kHz	897.38336 MHz	-22.98 dBm	-9.98 dB
897.400 MHz	897.500 MHz	20.000 kHz	897.49898 MHz	-26.42 dBm	-13.42 dB
897.500 MHz	899.000 MHz	100.000 kHz	898.52661 MHz	13.80 dBm	-16.20 dB

Date: 13.SEP.2021 12:34:33

Highest Band Edge / Full RB



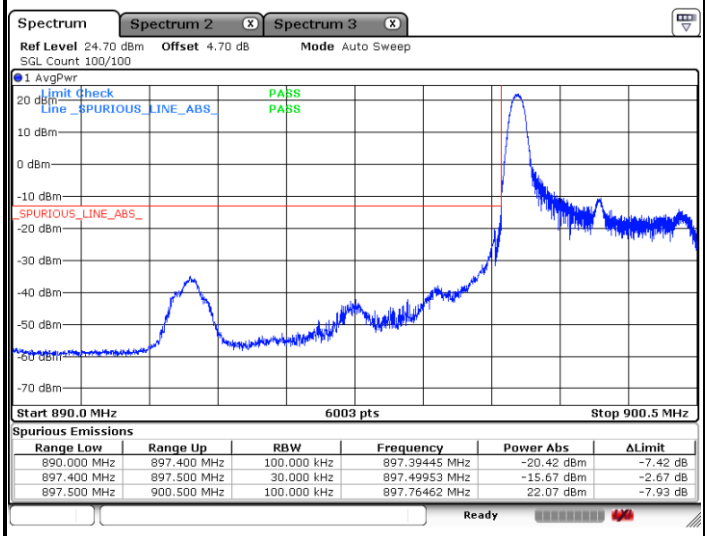
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
899.000 MHz	900.500 MHz	100.000 kHz	900.14355 MHz	13.86 dBm	-16.14 dB
900.500 MHz	900.600 MHz	20.000 kHz	900.51207 MHz	-27.07 dBm	-14.07 dB
900.600 MHz	905.000 MHz	100.000 kHz	900.60330 MHz	-23.86 dBm	-10.86 dB

Date: 13.SEP.2021 12:41:12

LTE Band 8 / 3MHz / QPSK

Lowest Band Edge / 1RB

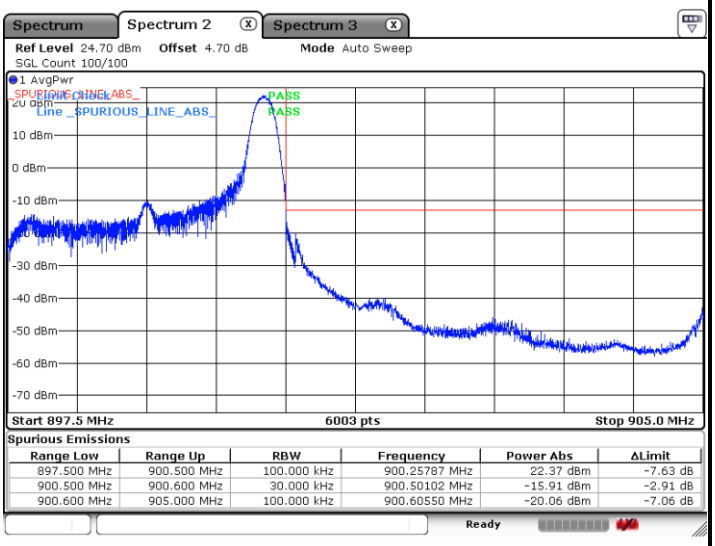


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
890.000 MHz	897.400 MHz	100.000 kHz	897.39445 MHz	-20.42 dBm	-7.42 dB
897.400 MHz	897.500 MHz	30.000 kHz	897.49953 MHz	-15.67 dBm	-2.67 dB
897.500 MHz	900.500 MHz	100.000 kHz	897.76462 MHz	22.07 dBm	-7.93 dB

Date: 13.SEP.2021 12:50:27

Highest Band Edge / 1 RB

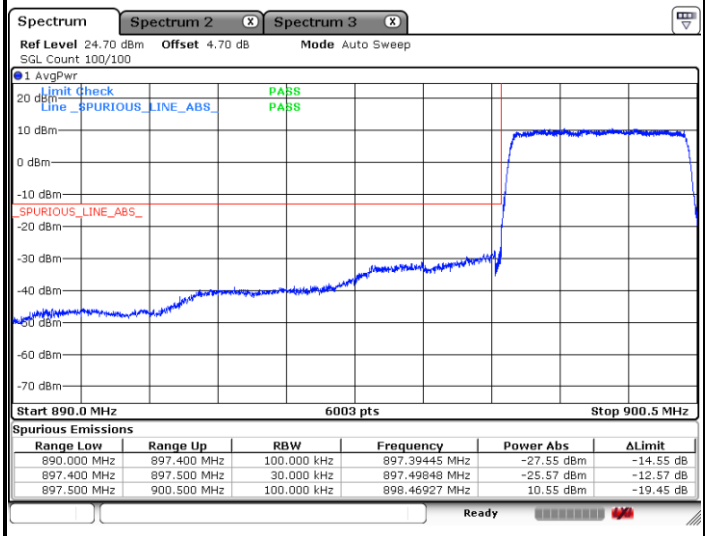


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
897.500 MHz	900.500 MHz	100.000 kHz	900.25787 MHz	22.37 dBm	-7.63 dB
900.500 MHz	900.600 MHz	30.000 kHz	900.50102 MHz	-15.91 dBm	-2.91 dB
900.600 MHz	905.000 MHz	100.000 kHz	900.60550 MHz	-20.06 dBm	-7.06 dB

Date: 13.SEP.2021 12:53:47

Lowest Band Edge / Full RB

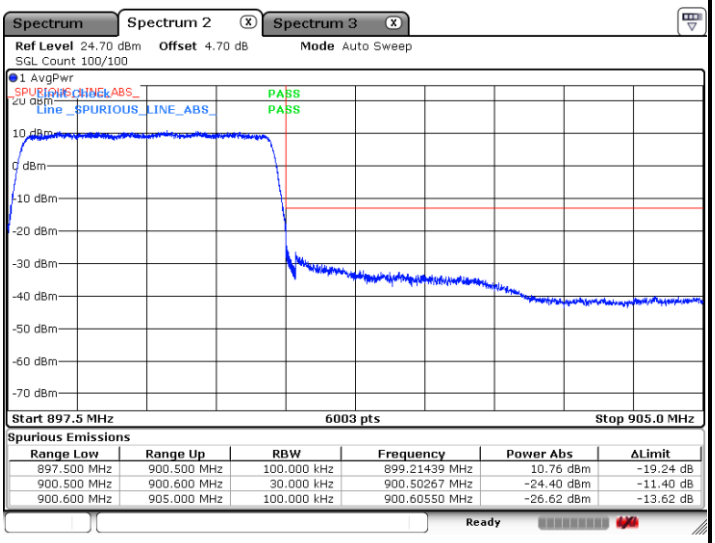


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
890.000 MHz	897.400 MHz	100.000 kHz	897.39445 MHz	-27.55 dBm	-14.55 dB
897.400 MHz	897.500 MHz	30.000 kHz	897.49848 MHz	-25.57 dBm	-12.57 dB
897.500 MHz	900.500 MHz	100.000 kHz	898.46927 MHz	10.55 dBm	-19.45 dB

Date: 13.SEP.2021 12:50:09

Highest Band Edge / Full RB



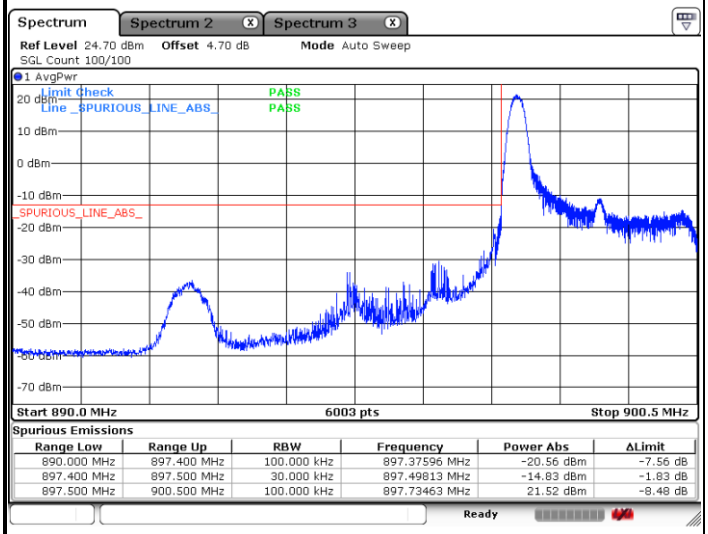
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
897.500 MHz	900.500 MHz	100.000 kHz	899.21439 MHz	10.76 dBm	-19.24 dB
900.500 MHz	900.600 MHz	30.000 kHz	900.50267 MHz	-24.40 dBm	-11.40 dB
900.600 MHz	905.000 MHz	100.000 kHz	900.60550 MHz	-26.62 dBm	-13.62 dB

Date: 13.SEP.2021 12:55:57

LTE Band 8/ 3MHz / 16QAM

Lowest Band Edge / 1 RB

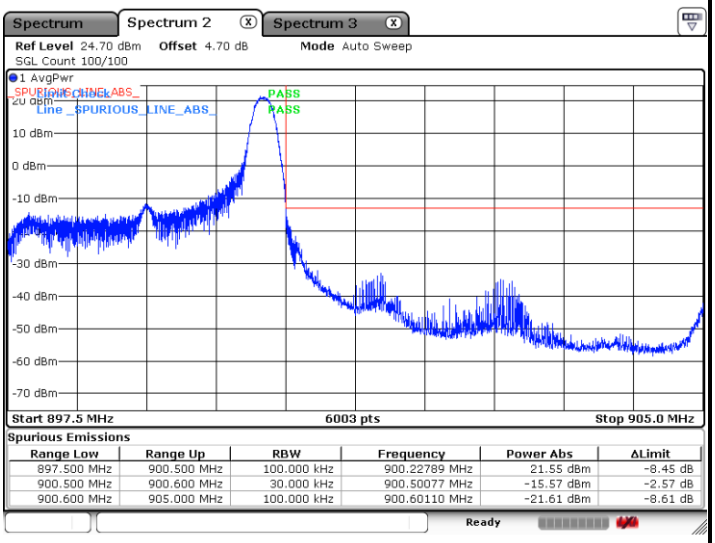


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
890.000 MHz	897.400 MHz	100.000 kHz	897.37596 MHz	-20.56 dBm	-7.56 dB
897.400 MHz	897.500 MHz	30.000 kHz	897.49813 MHz	-14.83 dBm	-1.83 dB
897.500 MHz	900.500 MHz	100.000 kHz	897.73463 MHz	21.52 dBm	-8.48 dB

Date: 13.SEP.2021 12:50:51

Highest Band Edge /1 RB

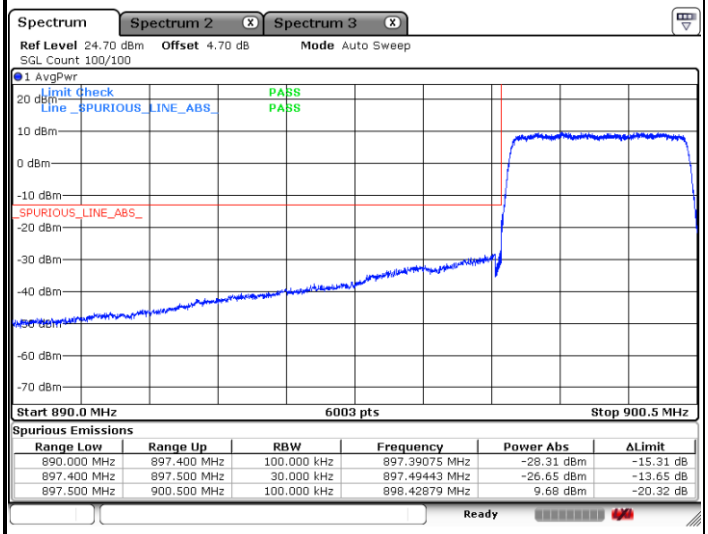


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
897.500 MHz	900.500 MHz	100.000 kHz	900.22789 MHz	21.55 dBm	-8.45 dB
900.500 MHz	900.600 MHz	30.000 kHz	900.50077 MHz	-15.57 dBm	-2.57 dB
900.600 MHz	905.000 MHz	100.000 kHz	900.60110 MHz	-21.61 dBm	-8.61 dB

Date: 13.SEP.2021 12:54:17

Lowest Band Edge / Full RB

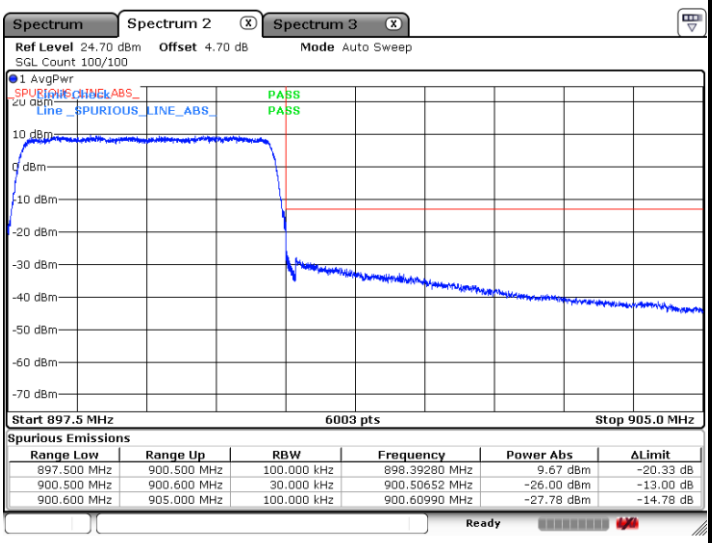


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
890.000 MHz	897.400 MHz	100.000 kHz	897.39075 MHz	-28.31 dBm	-15.31 dB
897.400 MHz	897.500 MHz	30.000 kHz	897.49443 MHz	-26.65 dBm	-13.65 dB
897.500 MHz	900.500 MHz	100.000 kHz	898.42879 MHz	9.68 dBm	-20.32 dB

Date: 13.SEP.2021 12:49:53

Highest Band Edge / Full RB



Spurious Emissions

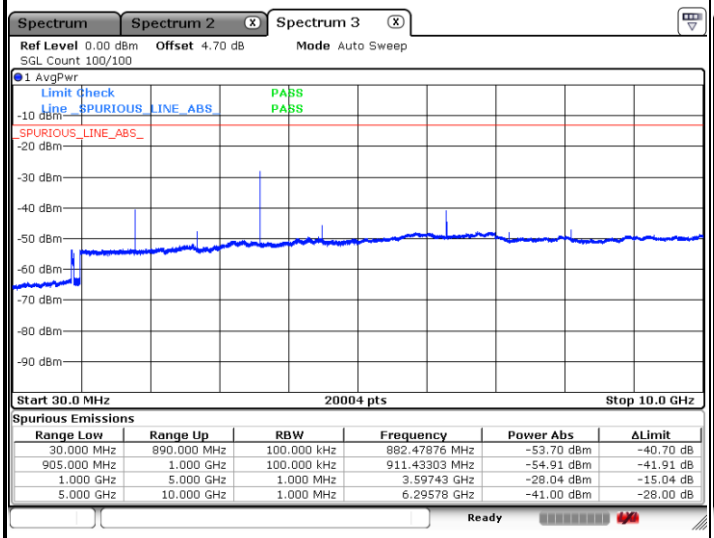
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
897.500 MHz	900.500 MHz	100.000 kHz	898.39280 MHz	9.67 dBm	-20.33 dB
900.500 MHz	900.600 MHz	30.000 kHz	900.50652 MHz	-26.00 dBm	-13.00 dB
900.600 MHz	905.000 MHz	100.000 kHz	900.60990 MHz	-27.78 dBm	-14.78 dB

Date: 13.SEP.2021 12:55:39

Conducted Spurious Emission

LTE Band 8 / 1.4MHz

Lowest Channel / QPSK

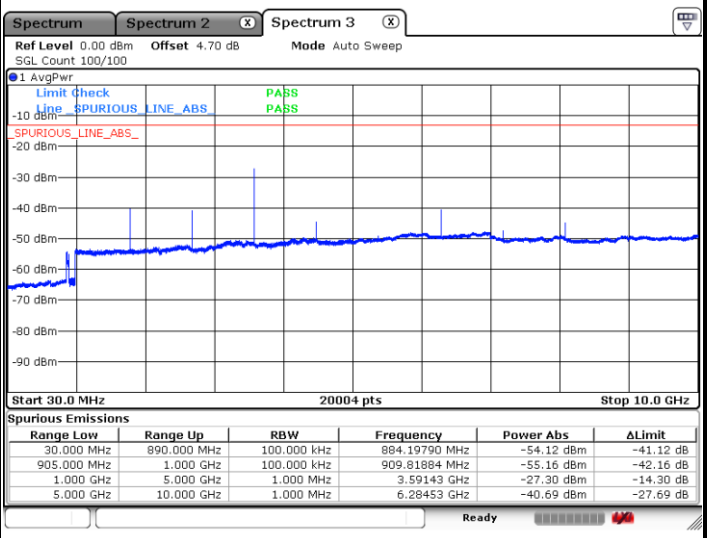


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	890.000 MHz	100.000 kHz	882.47876 MHz	-53.70 dBm	-40.70 dB
905.000 MHz	1.000 GHz	100.000 kHz	911.43303 MHz	-54.91 dBm	-41.91 dB
1.000 GHz	5.000 GHz	1.000 MHz	3.59743 GHz	-28.04 dBm	-15.04 dB
5.000 GHz	10.000 GHz	1.000 MHz	6.29578 GHz	-41.00 dBm	-28.00 dB

Date: 13.SEP.2021 12:38:46

Middle Channel / QPSK

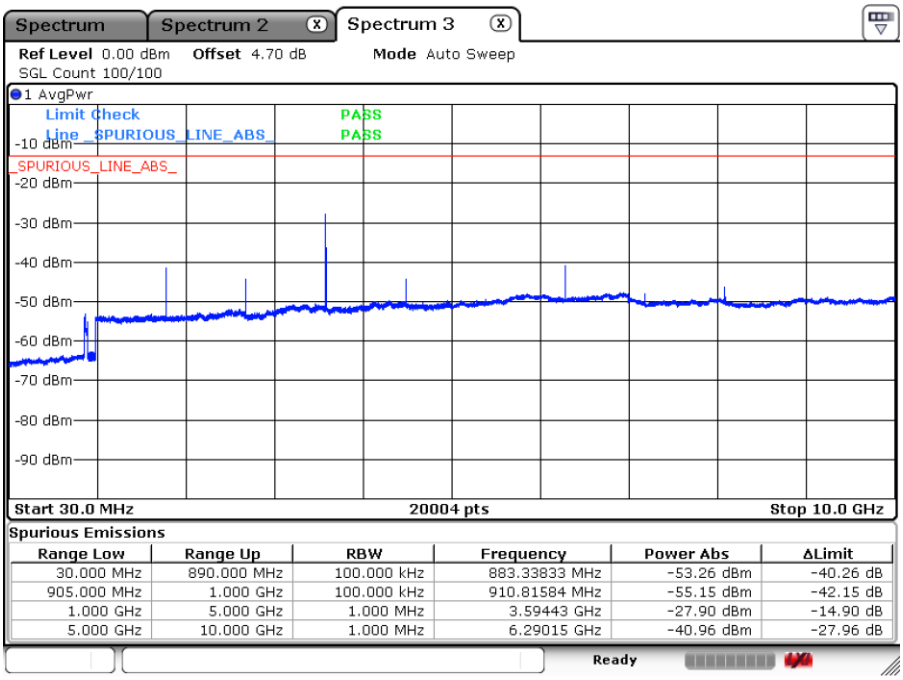


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	890.000 MHz	100.000 kHz	884.19790 MHz	-54.12 dBm	-41.12 dB
905.000 MHz	1.000 GHz	100.000 kHz	909.81884 MHz	-55.16 dBm	-42.16 dB
1.000 GHz	5.000 GHz	1.000 MHz	3.59143 GHz	-27.30 dBm	-14.30 dB
5.000 GHz	10.000 GHz	1.000 MHz	6.28453 GHz	-40.69 dBm	-27.69 dB

Date: 13.SEP.2021 12:40:03

Highest Channel / QPSK

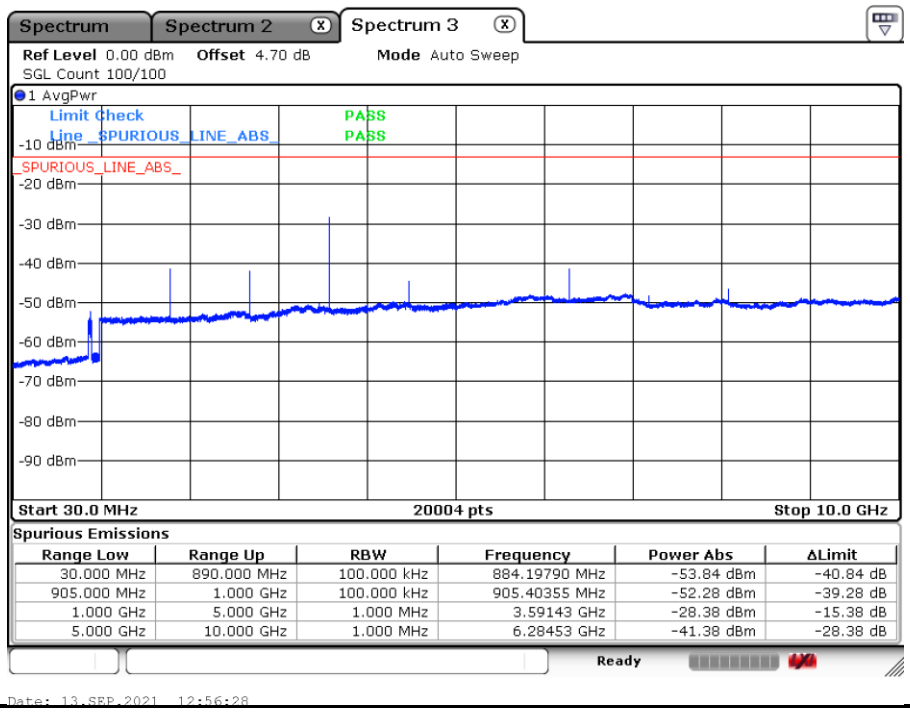


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	890.000 MHz	100.000 kHz	883.33833 MHz	-53.26 dBm	-40.26 dB
905.000 MHz	1.000 GHz	100.000 kHz	910.81584 MHz	-55.15 dBm	-42.15 dB
1.000 GHz	5.000 GHz	1.000 MHz	3.59443 GHz	-27.90 dBm	-14.90 dB
5.000 GHz	10.000 GHz	1.000 MHz	6.29015 GHz	-40.96 dBm	-27.96 dB

Date: 13.SEP.2021 12:39:30

LTE Band 8 / 3MHz
Middle Channel / QPSK



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	890.000 MHz	100.000 kHz	884.19790 MHz	-53.84 dBm	-40.84 dB
905.000 MHz	1.000 GHz	100.000 kHz	905.40355 MHz	-52.28 dBm	-39.28 dB
1.000 GHz	5.000 GHz	1.000 MHz	3.59143 GHz	-28.38 dBm	-15.38 dB
5.000 GHz	10.000 GHz	1.000 MHz	6.28453 GHz	-41.38 dBm	-28.38 dB

Frequency Stability

Test Conditions		LTE Band8 (QPSK) / Middle Channel	Limit
Temperature (°C)	Voltage (Volt)	BW 3MHz	Note 2.
		Deviation (ppm)	Result
50	Normal Voltage	0.0007	PASS
40	Normal Voltage	0.0014	
30	Normal Voltage	0.0005	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0025	
0	Normal Voltage	0.0000	
-10	Normal Voltage	0.0001	
-20	Normal Voltage	0.0011	
-30	Normal Voltage	0.0012	
20	Maximum Voltage	0.0023	
20	Normal Voltage	0.0002	
20	Battery End Point	0.0016	

Note:

1. Normal Voltage =3.3 V.；Battery End Point (BEP) =3.2 V.；Maximum Voltage =3.6 V.
2. Note: The frequency fundamental emissions stay within the authorized frequency block.

Appendix B. Test Results of Radiated Test

Radiated Spurious Emission

LTE Band 8 / 3MHz / 16QAM								
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	1792	-52.22	-13	-39.22	-59.19	1.58	10.70	H
	2688	-48.77	-13	-35.77	-57.02	2.10	12.50	H
	3582	-29.43	-13	-16.43	-38.32	2.86	13.90	H
	4482	-55.86	-13	-42.86	-64.32	2.69	13.30	H
	5376	-59.60	-13	-46.60	-67.36	3.09	13.00	H
	6276	-50.09	-13	-37.09	-58.86	3.18	14.10	H
	7170	-55.69	-13	-42.69	-62.93	3.31	12.70	H
	8064	-49.60	-13	-36.60	-57.19	3.41	13.15	H
	1792	-56.15	-13	-43.15	-63.12	1.58	10.70	V
	2688	-56.35	-13	-43.35	-64.60	2.10	12.50	V
	3582	-44.92	-13	-31.92	-53.81	2.86	13.90	V
	4482	-57.07	-13	-44.07	-65.53	2.69	13.30	V
	5376	-59.75	-13	-46.75	-67.51	3.09	13.00	V
	6276	-54.95	-13	-41.95	-63.72	3.18	14.10	V
	7170	-57.88	-13	-44.88	-65.12	3.31	12.70	V
	8064	-53.71	-13	-40.71	-61.30	3.41	13.15	V

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