FCC RF Test Report

APPLICANT	: Emerson Digital Cold Chain, Inc.
EQUIPMENT	: Global PCBA
BRAND NAME	: Emerson
MODEL NAME	: NNT-TG05
FCC ID	: AMH101019
STANDARD	: 47 CFR Part 2, 27(L)
CLASSIFICATION	: PCS Licensed Transmitter (PCB)
TEST DATE(S)	: Jun. 24, 2022 ~ Jul. 06, 2022

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

Jason Jia

Approved by: Jason Jia

Sporton International Inc. (ShenZhen)

1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055

People's Republic of China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG260705C	Rev. 01	Initial issue of report	Sep. 30, 2022

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.4	§2.1046	Conducted Output Power	Reporting Only	PASS	-
	§27.50(d)(4)	Equivalent Isotropic Radiated Power (Band 4)	EIRP < 1Watt	PASS	-
3.5	N/A	Peak-to-Average Ratio	<13 dB	PASS	-
3.6	§2.1049	Occupied Bandwidth	Reporting Only	PASS	-
3.7	§2.1051 §27.53(h)	Conducted Band Edge Measurement (Band 4)	< 43+10log10(P[Watts])	PASS	-
3.8	§2.1051 §27.53(h)	Conducted Spurious Emission (Band 4)	< 43+10log10(P[Watts])	PASS	-
3.9	§2.1055 §27.54	Frequency Stability Temperature & Voltage	Within Authorized Band	PASS	-
4.4	§2.1053 §27.53(h)	Radiated Spurious Emission (Band 4)	< $43+10\log_{10}$(P[Watts])	PASS	Under limit 20.16 dB at 3420.000 MHz
Remark: For NB-IOT Category NB1 Band 4, all test items are full test.					

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

Emerson Digital Cold Chain, Inc.
7121 Fairway Dr. Suite #400 | Palm Beach Gardens, FL 33418 USA

1.2 Manufacturer

Konka Smart Technology Co. , Ltd
No.12, West Section of Gangyuan Road, Guoxing Avenue, Lingang Economic Development Zone, Yibin City, P.R.China ZIP:511581

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Global PCBA
Brand Name	Emerson
Model Name	NNT-TG05
FCC	AMH101019
IMEI Code	Conducted: 860640054293198 Radiation: 860640054180619
HW Version	BR0C
SW	Ver 1.0.a18
EUT Stage	Production Unit

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx Frequency	LTE Band 4 : 1710 MHz ~ 1755 MHz
Rx Frequency	LTE Band 4 : 2110 MHz ~ 2155 MHz
Bandwidth	NB-IOT Category NB1 :200KHz
Sub-carrier Speacing	NB-IOT Category NB1 : LTE Band 4 : 3.75KHz / 15KHz
Maximum Output Power to Antenna	NB-IOT Category NB1: LTE Band 4 : 22.29 dBm
Antenna Gain	LTE Band 4 : -4.11 dBi
Type of Modulation	NB-IOT Category NB1 : BPSK / QPSK

1.5 Modification of EUT

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

1.6 Maximum Conducted Power

NB-IOT Category NB1:

LTE Band 4		BPSK		QPSK	
Sub-carrier Spacing (KHz)	**Frequency Range (MHz)**	**Emission Designator (99%OBW)**	**Maximum Conducted power (W)**	**Emission Designator (99%OBW)**	**Maximum Conducted power (W)**
3.75	1710.1 ~ 1754.9	5K68G7D	0.1517	5K70G7D	0.1589
15	1710.1 ~ 1754.9	22K3G7D	0.1690	196KG7D	0.1694

1.7 Testing Location

Sporton International Inc. (Shenzhen) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

Test Firm	Sporton International Inc. (Shenzhen)		
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055 People's Republic of China TEL: +86-755-86379589 FAX: +86-755-86379595		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	TH01-SZ	CN1256	421272

Test Firm	Sporton International Inc. (Shenzhen)		
Test Site Location	101, 1st Floor, Block B, Building 1, No. 2, Tengfeng 4th Road, Fenghuang Community, Fuyong Street, Baoan District, Shenzhen City Guangdong Province China 518103 TEL: +86-755-33202398		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	03CH01-SZ	CN1256	421272

1.8 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH01-SZ	AUDIX	E3	6.2009-8-24

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, 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

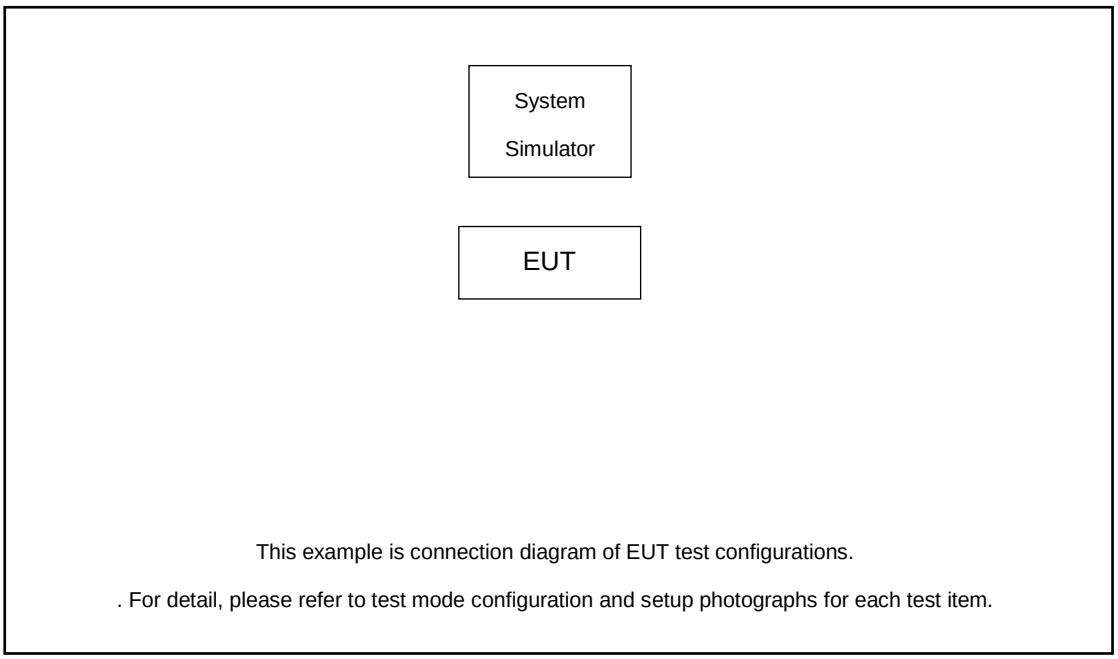
Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas License Digital Systems v03r01 with maximum output power.

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

NB-IOT Category NB1:

Test Items	Band	Sub-carrier Spacing (KHz)		Modulation				Tones #			Test Channel		
		3.75	15	BPSK	QPSK	16QAM	64QAM	1	-	12	L	M	H
Max. Output Power	4	v	v	v	v	-	-	v	-	v	v	v	v
Peak-to-Average Ratio	4	v	v	v	v	-	-	v	-	v	v	v	v
26dB and 99% Bandwidth	4	v	v	v	v	-	-	v	-	v	v	v	v
Conducted Band Edge	4	v	v	v	v	-	-	v	-	v	v		v
Conducted Spurious Emission	4	v	v	v	v	-	-	v	-		v	v	v
Frequency Stability	4	v	v		v	-	-		-	v		v	
E.R.P / E.I.R.P	4	v	v	v	v	-	-	v	-		v	v	v
Radiated Spurious Emission	4	Worst case									v	v	v
	4	Worst case									v	v	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.	LTE Base Station	Anritsu	MT8820C	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 4.5 dB and 10dB attenuator.

Example :

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

= 4.5 + 10 = 14.5 (dB)

2.5 Frequency List of Low/Middle/High Channels

NB-IOT Category NB1:

LTE Band 4 Channel and Frequency List				
Sub-carrier Speacing (KHz)	**Channel / Frequency (MHz)**	**Lowest**	**Middle**	**Highest**
3.75	Channel	19951	20170	20399
	Frequency	1710.1	1733	1754.9
15	Channel	19951	20170	20399
	Frequency	1710.1	1733	1754.9

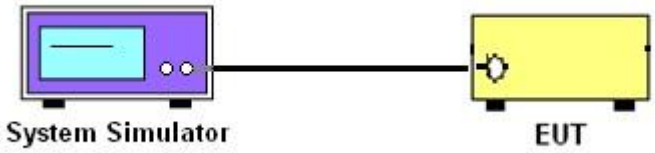
3 Conducted Test Items

3.1 Measuring Instruments

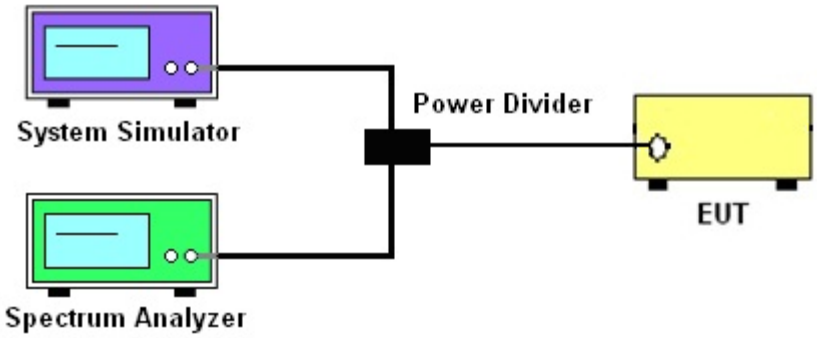
See list of measuring instruments of this test report.

3.2 Test Setup

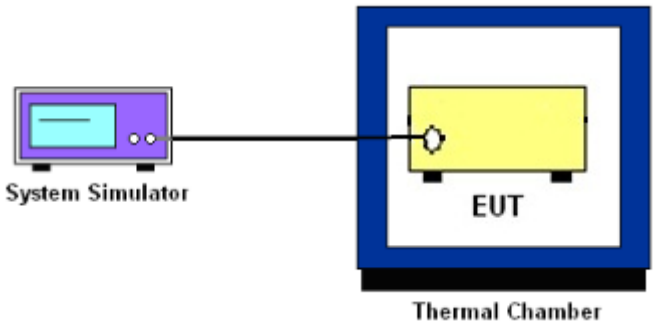
3.2.1 Conducted Output Power



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



3.2.3 Frequency Stability



3.3 Test Result of Conducted Test

Please refer to Appendix A.

3.4 Conducted Output Power and EIRP

3.4.1 Description of the Conducted Output Power Measurement and EIRP Measurement

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

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

According to KDB 412172 D01 Power Approach,

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

P_T = transmitter output power in dBm

G_T = gain of the transmitting antenna in dBi

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

3.4.2 Test Procedures

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

3.5 Peak-to-Average Ratio

3.5.1 Description of the PAR Measurement

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

3.5.2 Test Procedures

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

3.6 Occupied Bandwidth

3.6.1 Description of Occupied Bandwidth Measurement

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

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

3.6.2 Test Procedures

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

3.7 Conducted Band Edge

3.7.1 Description of Conducted Band Edge Measurement

RSS-139 (Section 6.6)

In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 log10 p (watts) dB. After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 log10 p (watts) dB.

3.7.2 Test Procedures

1. The testing follows ANSI C63.26 section 5.7
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The band edges of low and high channels for the highest RF powers were measured.
4. Set RBW >= 1% EBW in the 1MHz band immediately outside and adjacent to the band edge.
5. Beyond the 1 MHz band from the band edge, RBW=1MHz was used.
6. Set spectrum analyzer with RMS detector.
7. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
8. Checked that all the results comply with the emission limit line.

   Example:

   The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)

   = P(W)- [43 + 10log(P)] (dB)

   = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB) = -13dBm.

3.8 Conducted Spurious Emission

3.8.1 Description of Conducted Spurious Emission Measurement

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

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

3.8.2 Test Procedures

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

3.9 Frequency Stability

3.9.1 Description of Frequency Stability Measurement

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

3.9.2 Test Procedures for Temperature Variation

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

3.9.3 Test Procedures for Voltage Variation

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

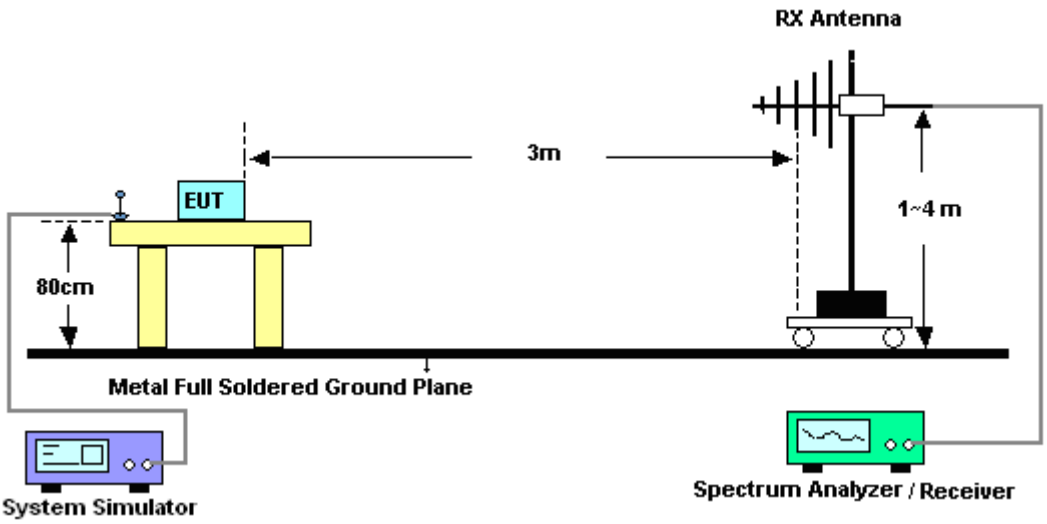
4 Radiated Test Items

4.1 Measuring Instruments

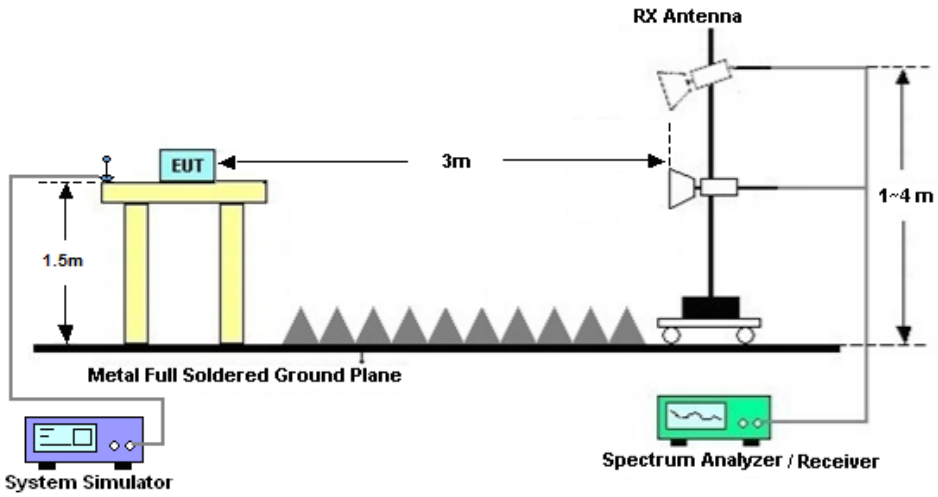
See list of measuring instruments of this test report.

4.2 Test Setup

4.2.1 For radiated test from 30MHz to 1GHz



4.2.2 For radiated test above 1GHz



4.3 Test Result of Radiated Test

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, the system simulator parameters were set to force the EUT transmitting at maximum output power.
7. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
8. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
9. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
10. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
11. ERP (dBm) = EIRP - 2.15
12. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
    The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)
    = P(W)- [43 + 10log(P)] (dB)
    = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
    = -13dBm.

5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 07, 2022	Jul. 05, 2022~ Jul. 06, 2022	Apr. 08, 2023	Conducted (TH01-SZ)
Power Divider	TOJOIN	PS-2SM-04 265	60.06.020.007 7	0.4GHz~26.5GHz	Dec. 25, 2021	Jul. 05, 2022~ Jul. 06, 2022	Dec. 24, 2022	Conducted (TH01-SZ)
Thermal Chamber	Ten Billion Hongzhangroup	LP-150U	H2014081803	-40~+150°C	Jul. 14, 2021	Jul. 05, 2022~ Jul. 06, 2022	Jul. 13, 2022	Conducted (TH01-SZ)
EMI Test Receiver&SA	Agilent	N9038A	MY52260185	20Hz~26.5GHz	Dec. 27, 2021	Jun. 24, 2022	Dec. 26, 2022	Radiation (03CH01-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	Jun. 22, 2020	Jun. 24, 2022	Jun. 21, 2022	Radiation (03CH01-SZ)
HF Amplifier	KEYSIGHT	83017A	MY53270105	0.5GHz~26.5Ghz	Oct. 22, 2021	Jun. 24, 2022	Oct. 21, 2022	Radiation (03CH01-SZ)
Bilog Antenna	TeseQ	CBL6112D	35407	30MHz-2GHz	Sep. 28, 2021	Jun. 24, 2022	Sep. 27, 2022	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00119436	1GHz~18GHz	Jul. 18, 2021	Jun. 24, 2022	Jul. 17, 2022	Radiation (03CH01-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18Ghz-40GHz	Apr. 10, 2022	Jun. 24, 2022	Apr. 09, 2023	Radiation (03CH01-SZ)
LF Amplifier	Burgeon	BPA-530	102209	0.01~3000Mhz	Apr. 06, 2022	Jun. 24, 2022	Apr. 05, 2023	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	AMF-7D-00 101800-30-1 0P-R	1943528	1GHz~18GHz	Oct. 22, 2021	Jun. 24, 2022	Oct. 21, 2022	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	TTA1840-35 -HG	1871923	18GHz~40GHz	Jul. 13, 2021	Jun. 24, 2022	Jul. 12, 2022	Radiation (03CH01-SZ)
AC Power Source	Chroma	61601	616010001985	N/A	NCR	Jun. 24, 2022	NCR	Radiation (03CH01-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Jun. 24, 2022	NCR	Radiation (03CH01-SZ)

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 Conducted Measurement

Test Item	Uncertainty
Conducted Power	±1.34 dB
Conducted Emissions	±1.34 dB
Occupied Channel Bandwidth	±0.13 %

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.48dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.53dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.02dB

Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power)

Test Engineer :	Sam Zheng	Temperature :	24~26℃
		Relative Humidity :	50~53%

NB-IOT Category NB1:

LTE Band 4

Sub-carrier Speacing (KHz)	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.
Channel				19951	20170	20399
Frequency (MHz)				1710.1	1733	1754.9
3.75	BPSK	1	0	21.78	21.69	21.66
3.75	BPSK	1	47	21.81	21.27	21.21
3.75	QPSK	1	0	22.00	21.24	21.00
3.75	QPSK	1	47	22.01	21.47	21.13
15	BPSK	1	0	22.28	22.19	22.22
15	BPSK	1	11	22.01	21.40	21.46
15	QPSK	1	0	22.27	21.38	21.31
15	QPSK	1	11	22.22	21.39	21.42
15	QPSK	12	0	22.29	21.89	21.82

EIRP

NB-IOT Category NB1:

LTE Band 4 (GT - LC = -4.11 dB) BPSK						
Sub-carrier Spacing	3.75K			15K		
Channel	19951	20170	20399	19951	20170	20399
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency (MHz)	1710.1	1733	1754.9	1710.1	1733	1754.9
Conducted Power (dBm)	21.81	21.27	21.21	22.28	22.19	22.22
Conducted Power (Watts)	0.1517	0.1340	0.1321	0.1690	0.1656	0.1667
EIRP(dBm)	17.70	17.16	17.10	18.17	18.08	18.11
EIRP(Watts)	0.0589	0.0520	0.0513	0.0656	0.0643	0.0647

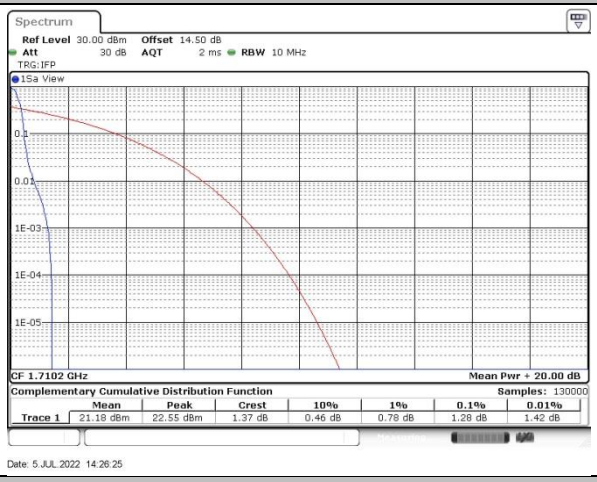
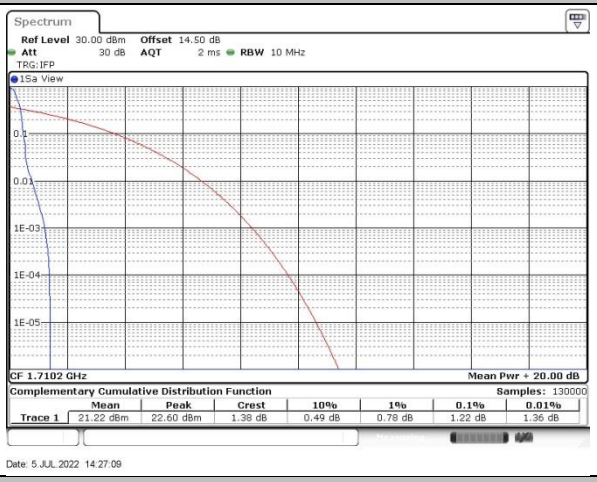
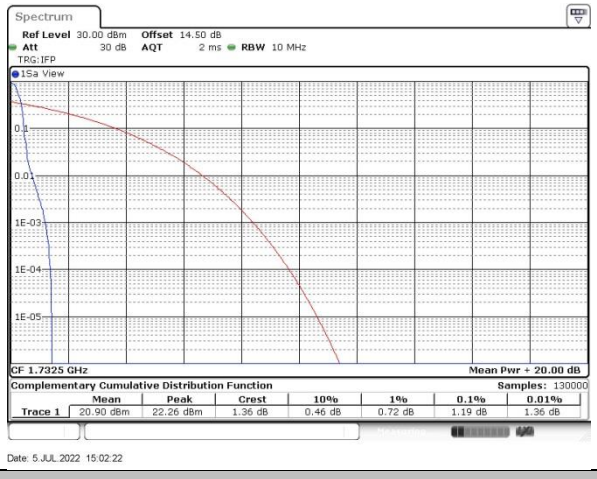
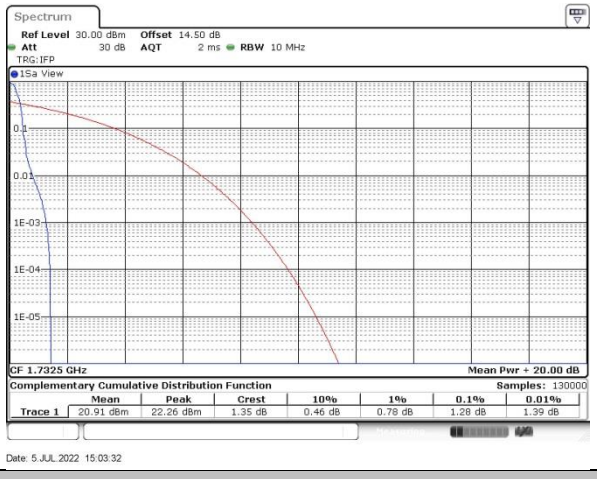
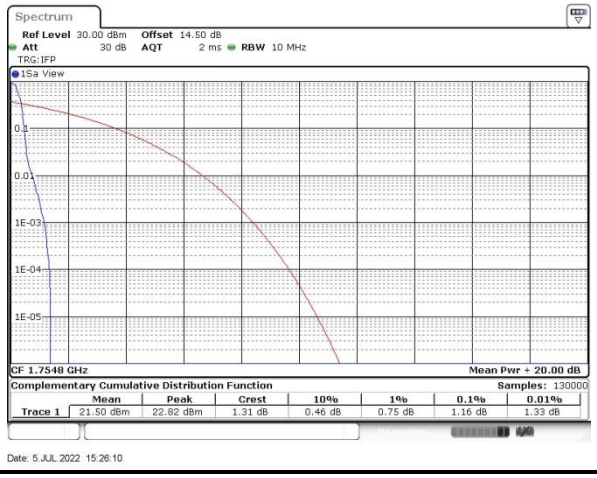
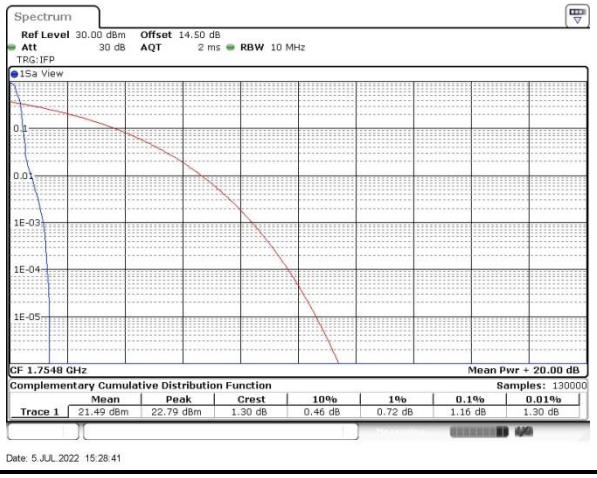
LTE Band 4 (GT - LC = -4.11 dB) QPSK						
Sub-carrier Spacing	3.75K			15K		
Channel	19951	20170	20399	19951	20170	20399
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency (MHz)	1710.1	1733	1754.9	1710.1	1733	1754.9
Conducted Power (dBm)	22.01	21.47	21.13	22.29	21.89	21.82
Conducted Power (Watts)	0.1589	0.1403	0.1297	0.1694	0.1545	0.1521
EIRP(dBm)	17.90	17.36	17.02	18.18	17.78	17.71
EIRP(Watts)	0.0617	0.0545	0.0504	0.0658	0.0600	0.0590

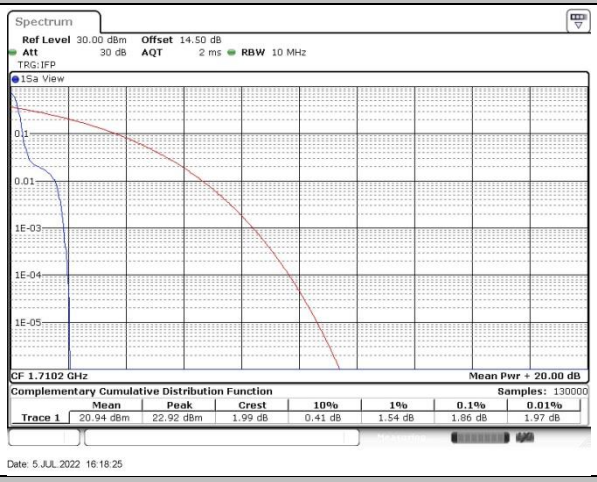
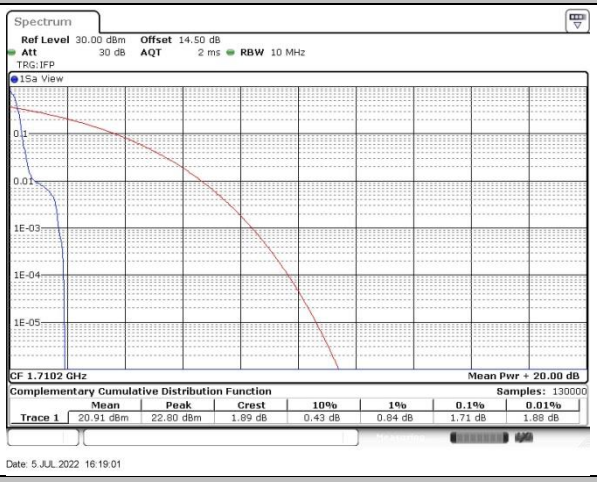
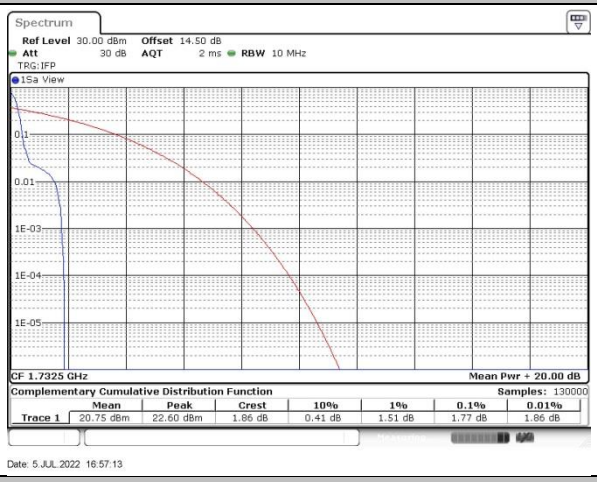
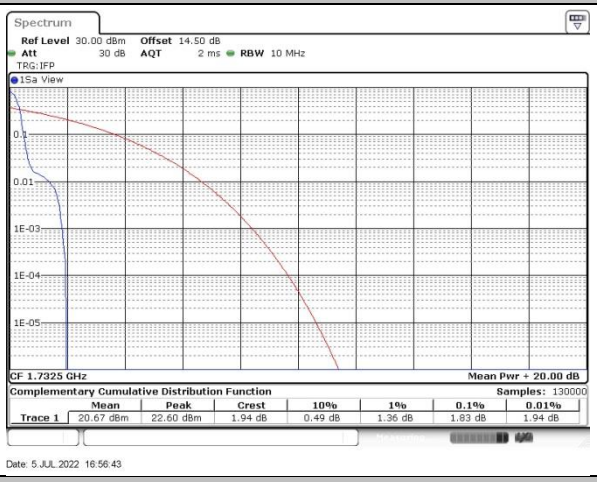
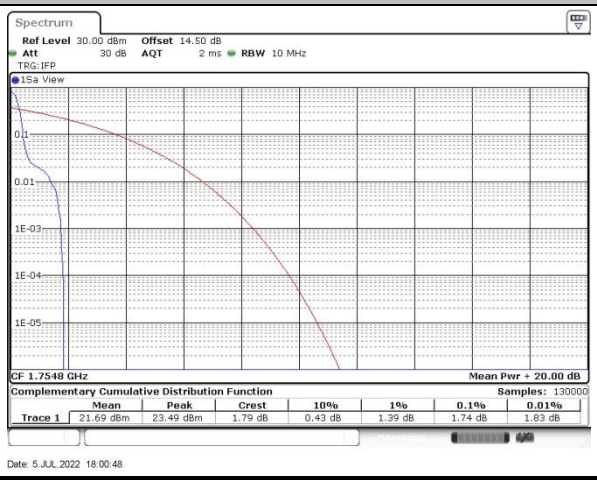
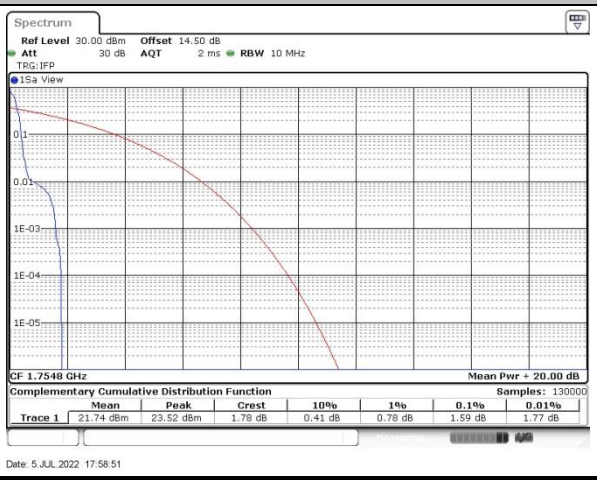
LTE Band 4 NB-IOT Category NB1

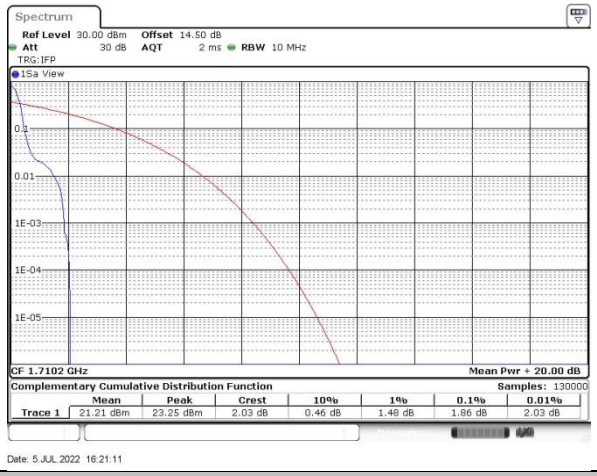
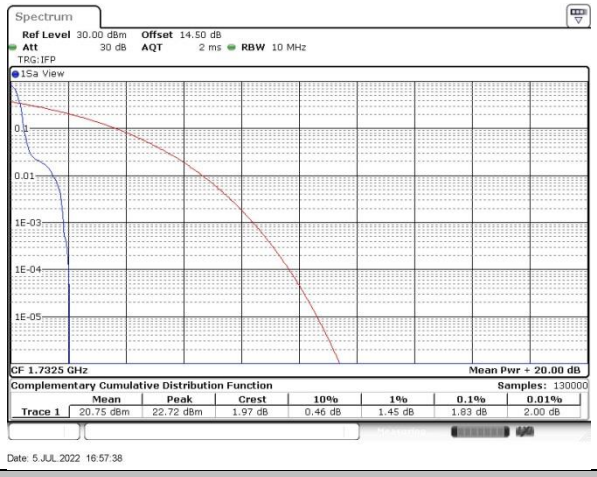
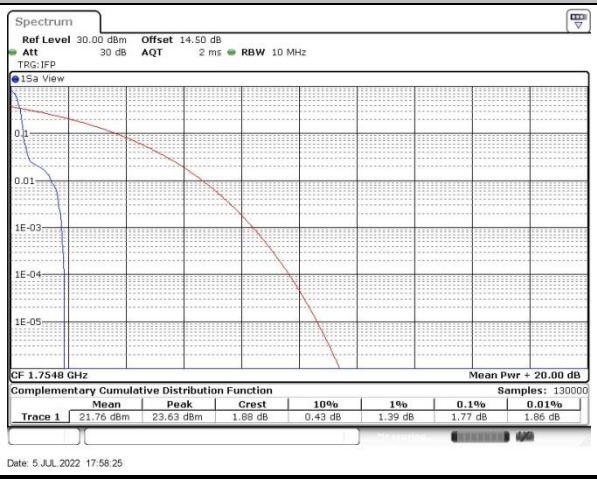
Peak-to-Average Ratio

Mode	LTE Band 4 / 3.75K				
Mod.	BPSK		QPSK		Limit: 13dB
RB Size	1SC0	N/A	1SC0	N/A	Result
Lowest CH	1.28		1.22		PASS
Middle CH	1.19		1.28		
Highest CH	1.16		1.16		

Mode	LTE Band 4 / 15K				
Mod.	BPSK		QPSK		Limit: 13dB
RB Size	1SC0	N/A	1SC0	12SC0	Result
Lowest CH	1.86		1.71	1.86	PASS
Middle CH	1.77		1.83	1.83	
Highest CH	1.74		1.59	1.77	

LTE Band 4 / 3.75K	
Lowest Channel / 1SC0 / BPSK	**Lowest Channel / 1SC0 / QPSK**
	
Middle Channel / 1SC0 / BPSK	**Middle Channel / 1SC0 / QPSK**
	
Highest Channel / 1SC0 / BPSK	**Highest Channel / 1SC0 / QPSK**
	

LTE Band 4 / 15K	
Lowest Channel / 1SC0 / BPSK	**Lowest Channel / 1SC0 / QPSK**
	
Middle Channel / 1SC0 / BPSK	**Middle Channel / 1SC0 / QPSK**
	
Highest Channel / 1SC0 / BPSK	**Highest Channel / 1SC0 / QPSK**
	

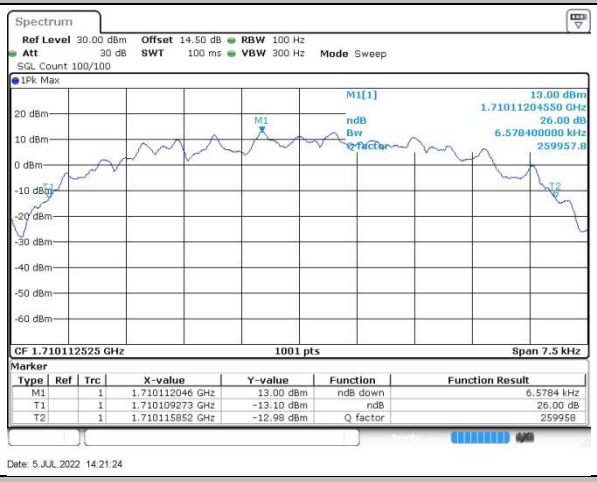
LTE Band 4 / 15K	
Lowest Channel / 12SC0 / QPSK	**N/A**
	
Middle Channel / 12SC0 / QPSK	**N/A**
	
Highest Channel / 12SC0 / QPSK	**N/A**
	

26dB Bandwidth

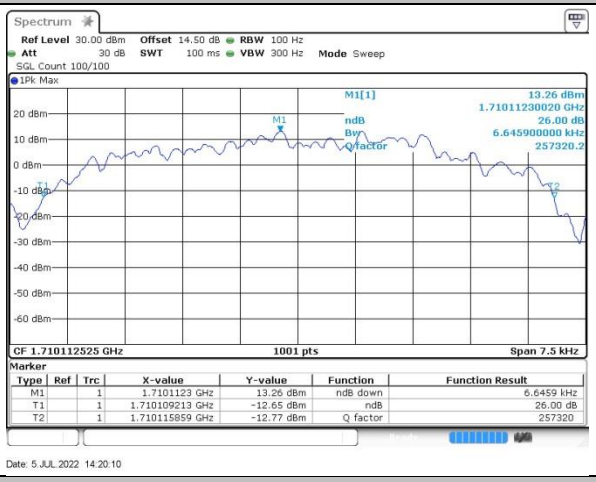
Mode	LTE Band 4 : 26dB BW(KHz)											
BW	3.75K		15K			N/A		N/A		N/A		
Mod.	BPSK	QPSK	BPSK	QPSK	QPSK							
RB Size	1SC0	1SC0	1SC0	1SC0	12SC0							
Lowest CH	6.58	6.65	25.83	26.28	226.81							
Middle CH	6.59	6.65	25.80	26.37	227.25							
Highest CH	6.60	6.64	25.45	25.92	227.25							

LTE Band 4 3.75K

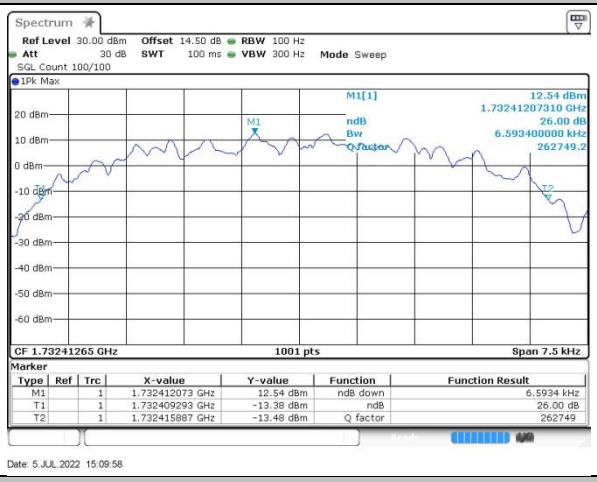
Lowest Channel / 1SC0 / BPSK



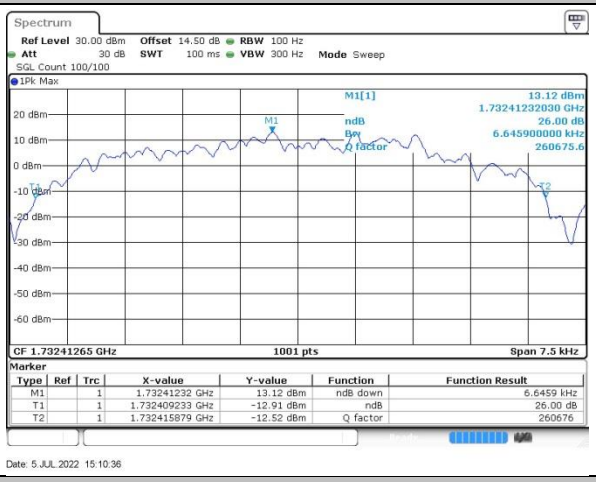
Lowest Channel / 1SC0 / QPSK



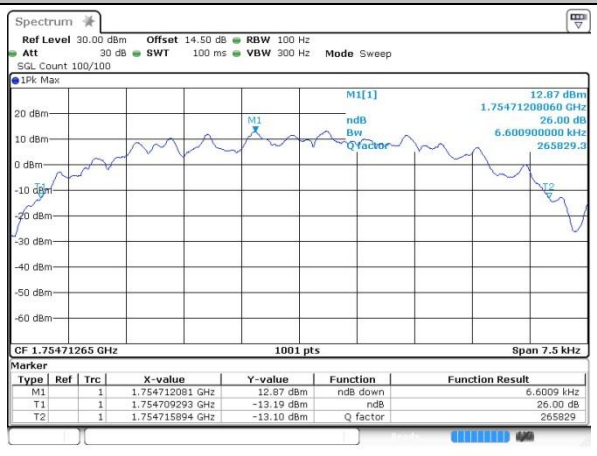
Middle Channel / 1SC0 / BPSK



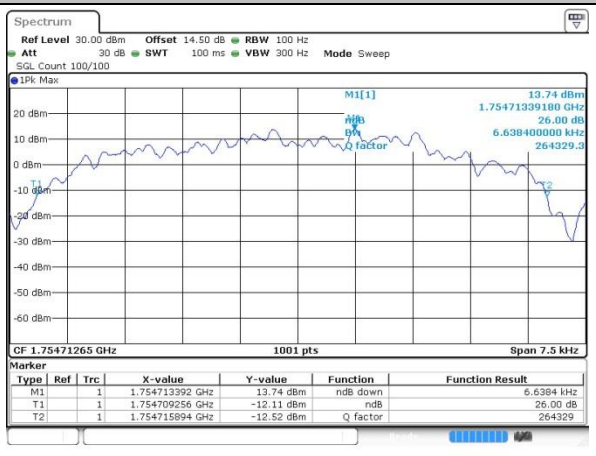
Middle Channel / 1SC0 / QPSK



Highest Channel / 1SC0 / BPSK

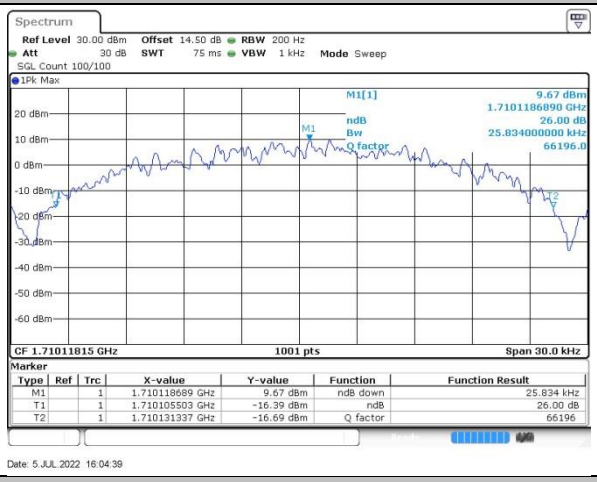


Highest Channel / 1SC0 / QPSK

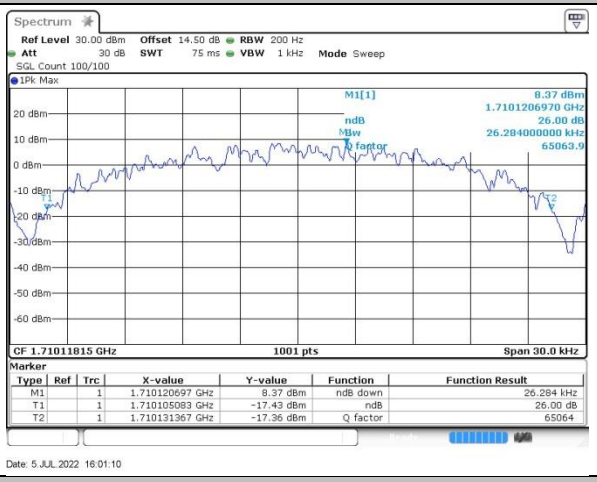


LTE Band 4 15K

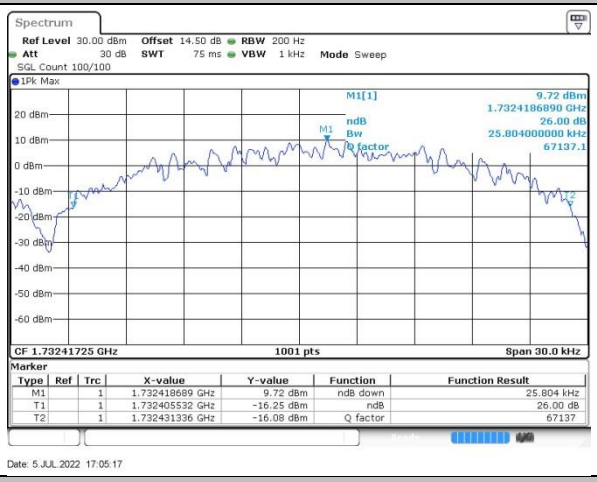
Lowest Channel / 1SC0 / BPSK



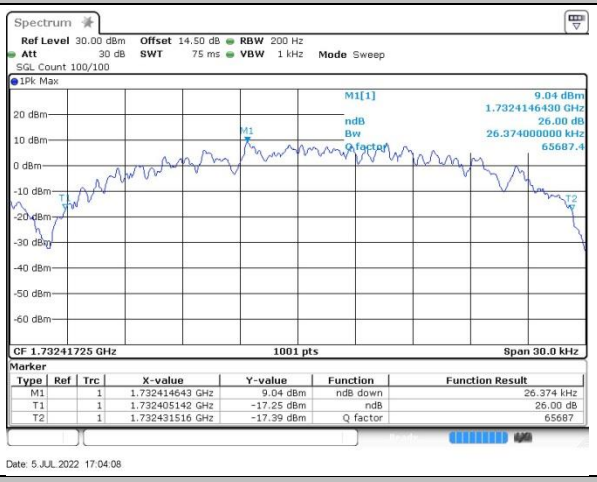
Lowest Channel / 1SC0 / QPSK



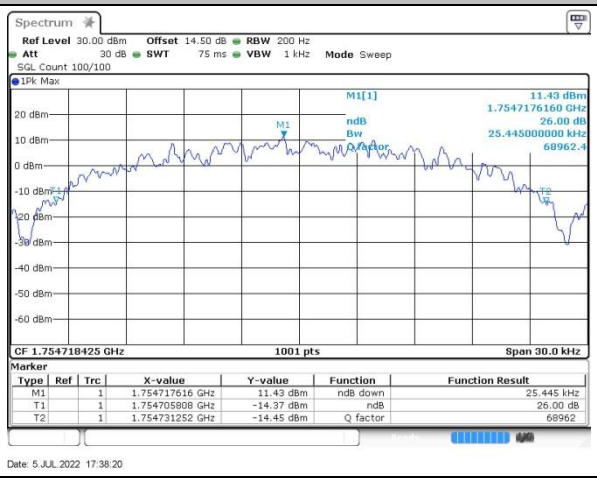
Middle Channel / 1SC0 / BPSK



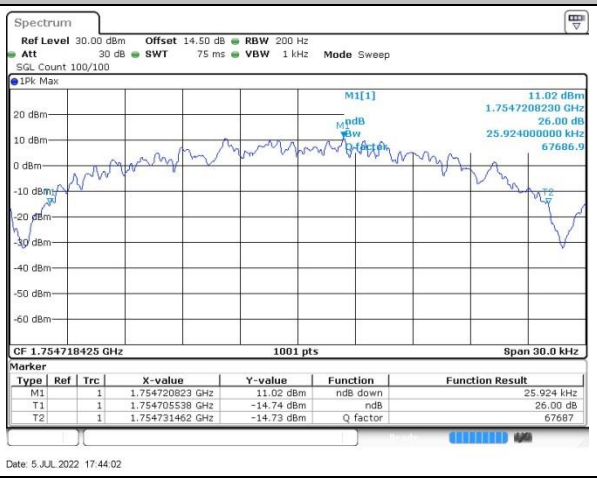
Middle Channel / 1SC0 / QPSK

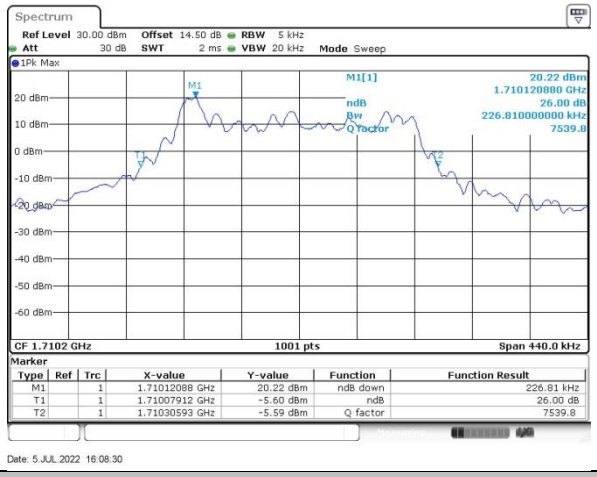
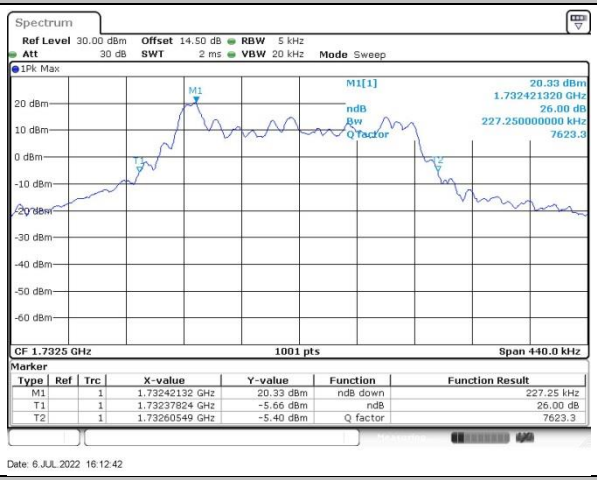
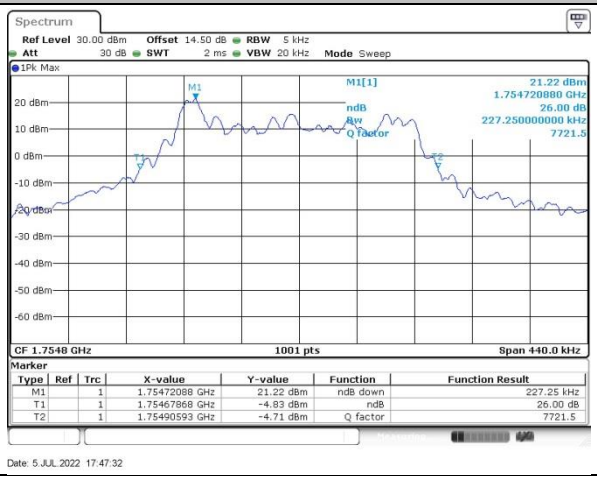


Highest Channel / 1SC0 / BPSK



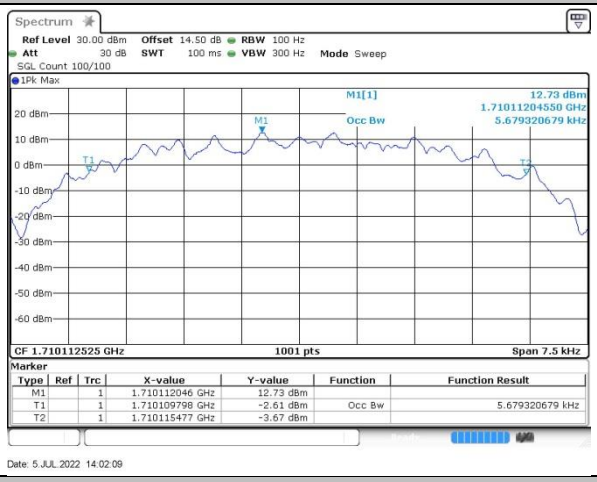
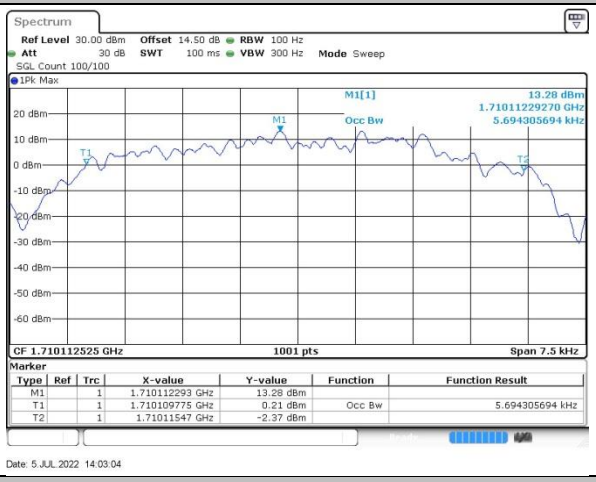
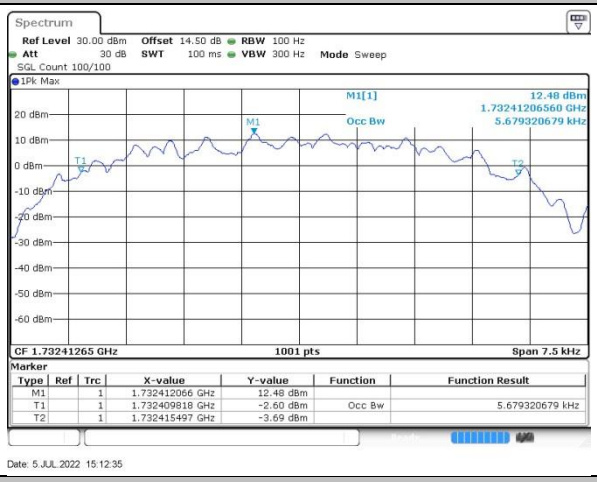
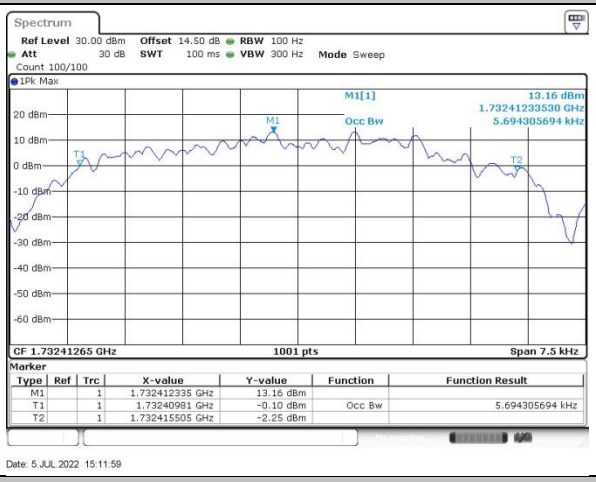
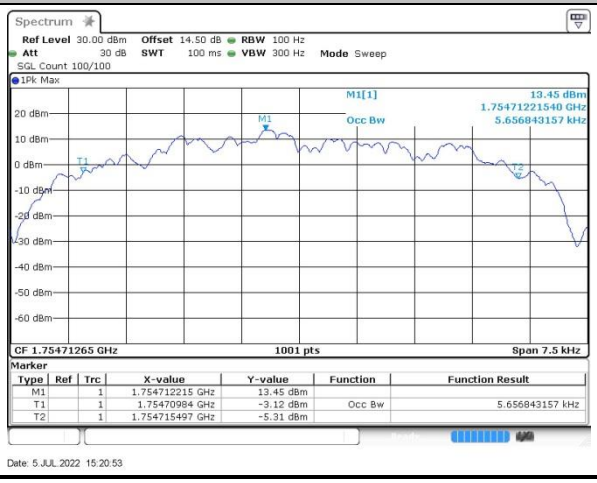
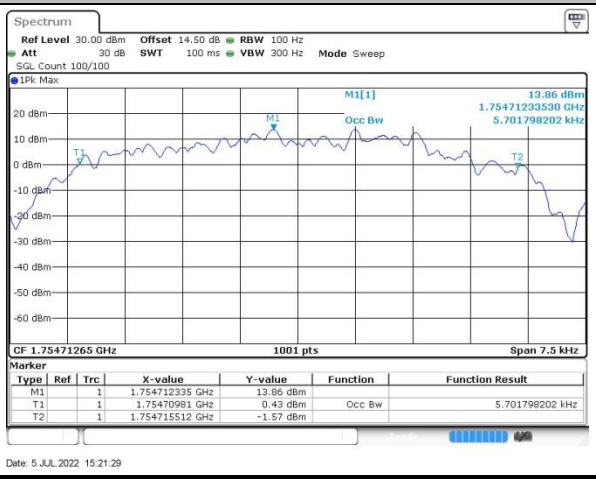
Highest Channel / 1SC0 / QPSK

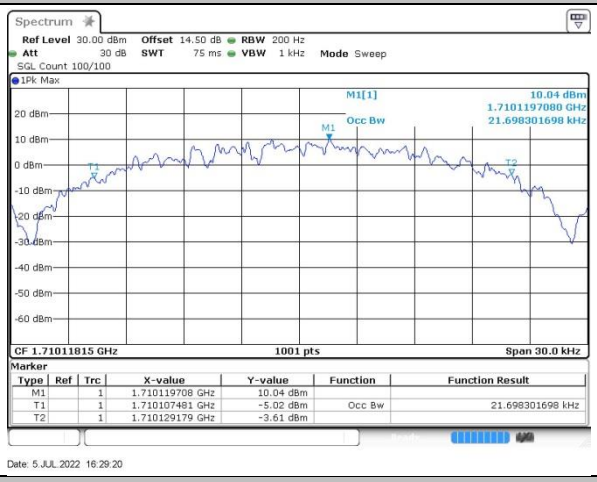
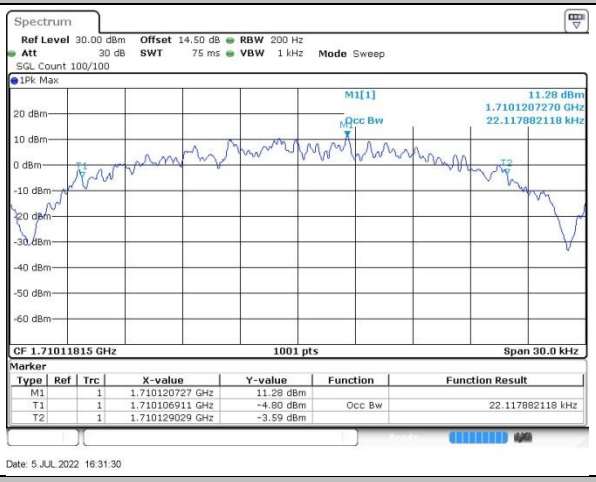
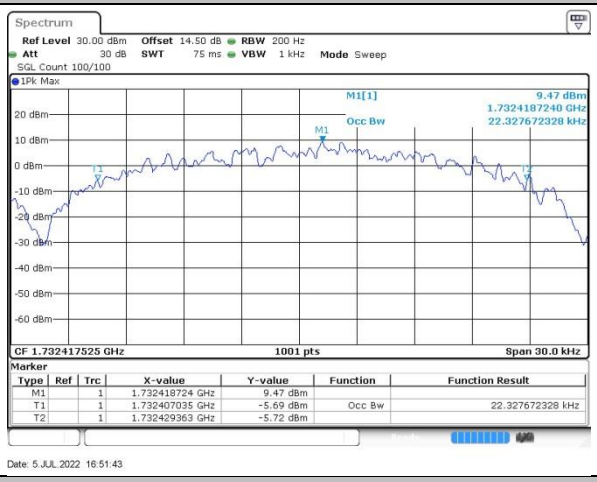
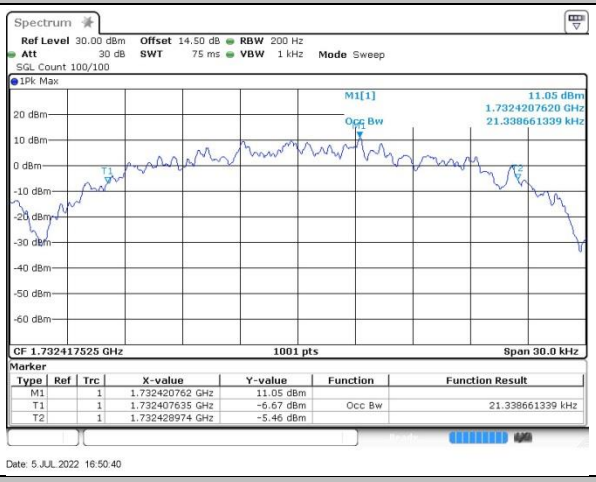
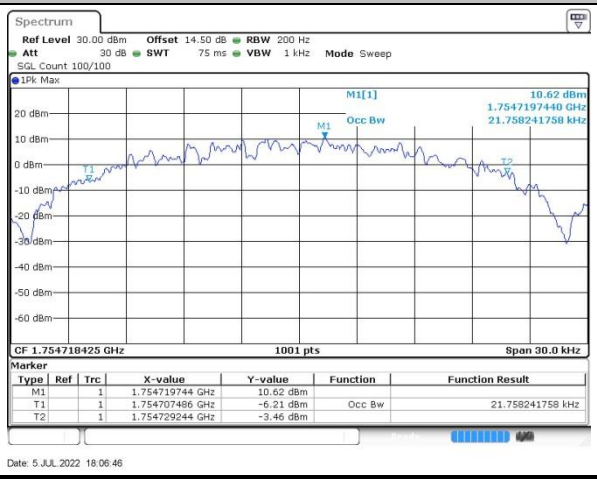
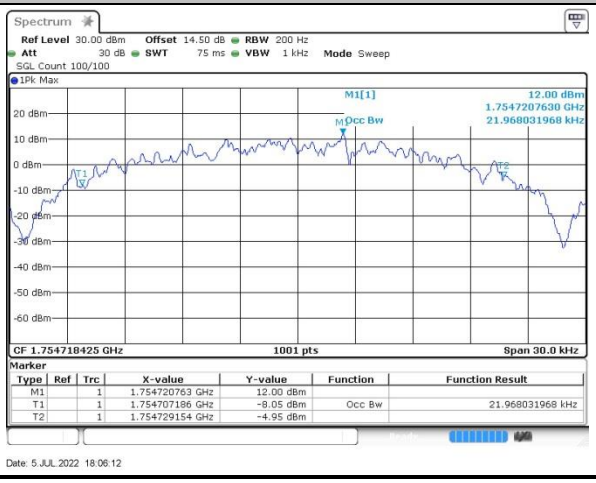


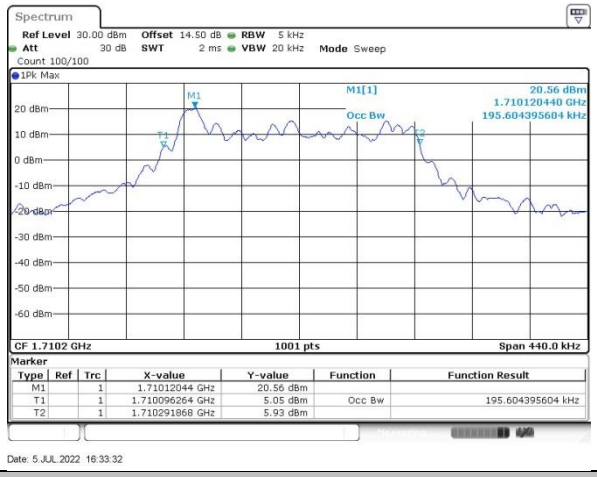
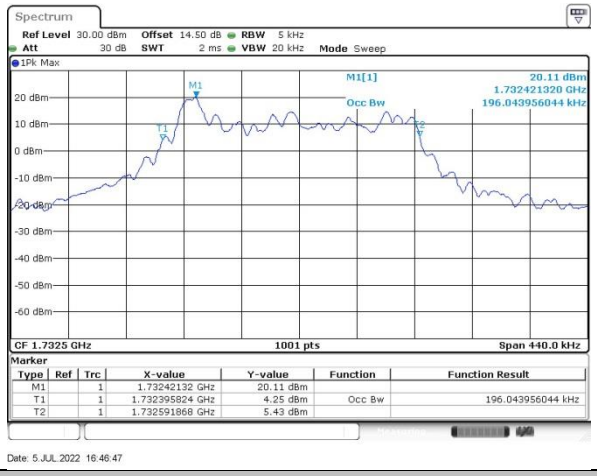
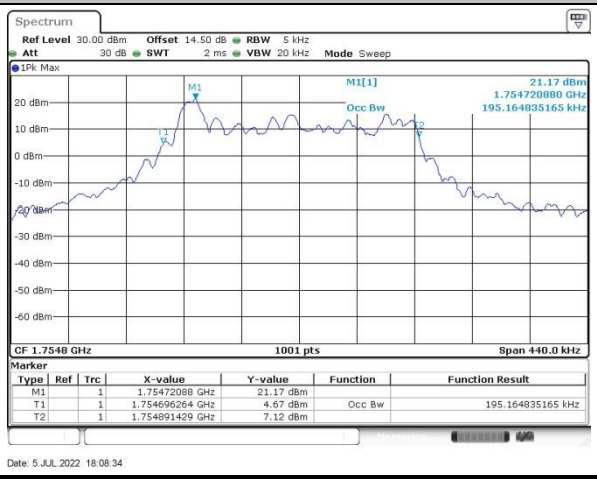
LTE Band 4 15K	
Lowest Channel / 12SC0 / QPSK	**N/A**
	
Middle Channel / 12SC0 / QPSK	**N/A**
	
Highest Channel / 12SC0 / QPSK	**N/A**
	

Occupied Bandwidth

Mode	LTE Band 4 : 99%OBW(KHz)											
BW	3.75K		15K			N/A		N/A		N/A		
Mod.	BPSK	QPSK	BPSK	QPSK	QPSK							
RB Size	1SC0	1SC0	1SC0	1SC0	12SC0							
Lowest CH	5.68	5.69	21.70	21.12	195.60							
Middle CH	5.68	5.69	22.33	21.34	196.04							
Highest CH	5.66	5.70	21.76	21.97	195.16							

LTE Band 4 3.75K	
Lowest Channel / 1SC0 / BPSK	**Lowest Channel / 1SC0 / QPSK**
	
Middle Channel / 1SC0 / BPSK	**Middle Channel / 1SC0 / QPSK**
	
Highest Channel / 1SC0 / BPSK	**Highest Channel / 1SC0 / QPSK**
	

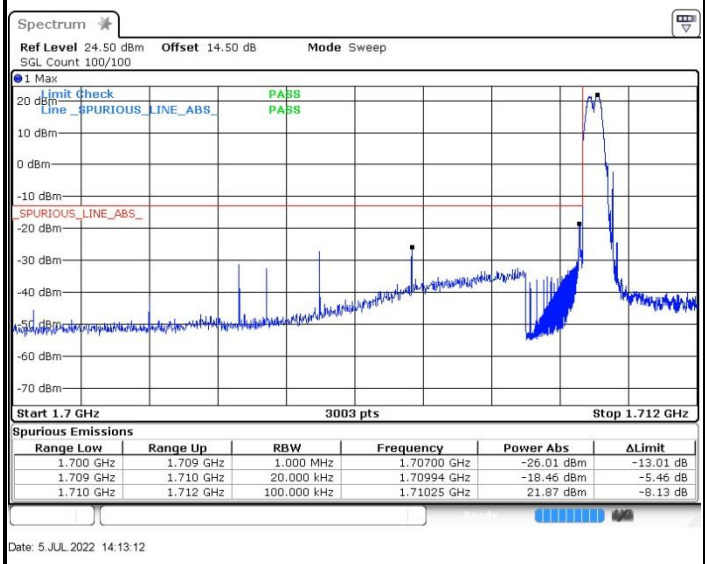
LTE Band 4 15K	
Lowest Channel / 1SC0 / BPSK	**Lowest Channel / 1SC0 / QPSK**
	
Middle Channel / 1SC0 / BPSK	**Middle Channel / 1SC0 / QPSK**
	
Highest Channel / 1SC0 / BPSK	**Highest Channel / 1SC0 / QPSK**
	

LTE Band 4 15K	
Lowest Channel / 12SC0 / QPSK	
	
Middle Channel / 12SC0 / QPSK	
	
Highest Channel / 12SC0 / QPSK	
	

Conducted Band Edge

LTE Band 4 / 3.75K

Lowest Band Edge / 1SC0 / BPSK

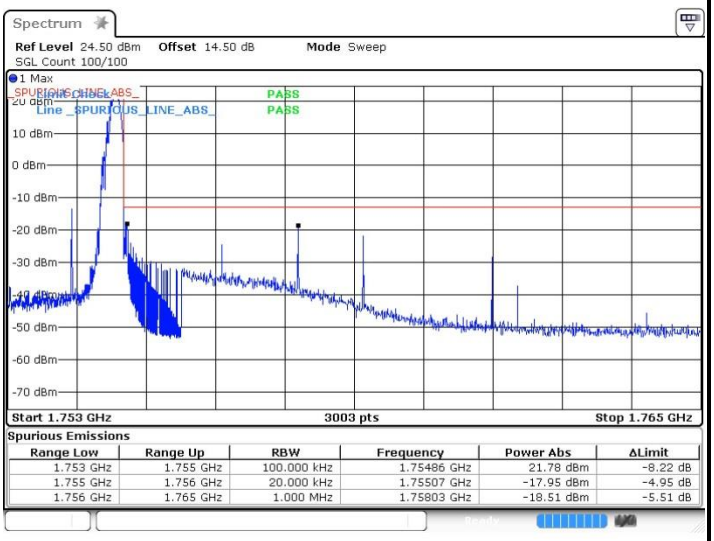


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.700 GHz	1.709 GHz	1.000 MHz	1.70700 GHz	-26.01 dBm	-13.01 dB
1.709 GHz	1.710 GHz	20.000 kHz	1.70994 GHz	-18.46 dBm	-5.46 dB
1.710 GHz	1.712 GHz	100.000 kHz	1.71025 GHz	21.87 dBm	-8.13 dB

Date: 5.JUL.2022 14:13:12

Highest Band Edge / 1SC47 / BPSK

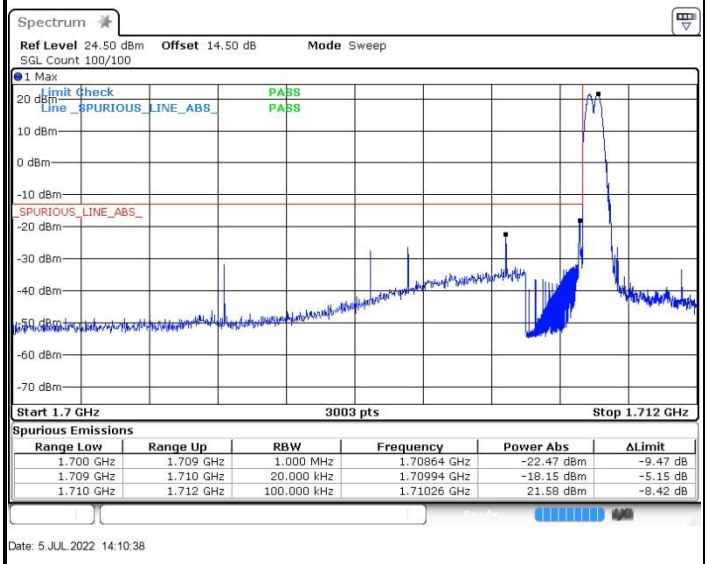


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.753 GHz	1.755 GHz	100.000 kHz	1.75486 GHz	21.78 dBm	-8.22 dB
1.755 GHz	1.756 GHz	20.000 kHz	1.75507 GHz	-17.95 dBm	-4.95 dB
1.756 GHz	1.765 GHz	1.000 MHz	1.75803 GHz	-18.51 dBm	-5.51 dB

Date: 5.JUL.2022 15:35:24

Lowest Band Edge / 1SC0 / QPSK



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.700 GHz	1.709 GHz	1.000 MHz	1.70864 GHz	-22.47 dBm	-9.47 dB
1.709 GHz	1.710 GHz	20.000 kHz	1.70994 GHz	-18.15 dBm	-5.15 dB
1.710 GHz	1.712 GHz	100.000 kHz	1.71026 GHz	21.58 dBm	-8.42 dB

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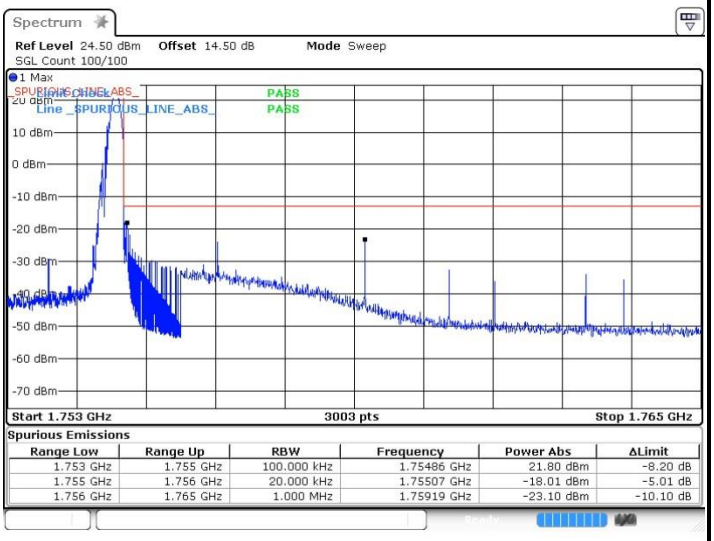
Highest Band Edge / 1SC47 / QPSK



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.753 GHz	1.755 GHz	100.000 kHz	1.75486 GHz	21.80 dBm	-8.20 dB
1.755 GHz	1.756 GHz	20.000 kHz	1.75507 GHz	-18.01 dBm	-5.01 dB
1.756 GHz	1.765 GHz	1.000 MHz	1.75919 GHz	-23.10 dBm	-10.10 dB

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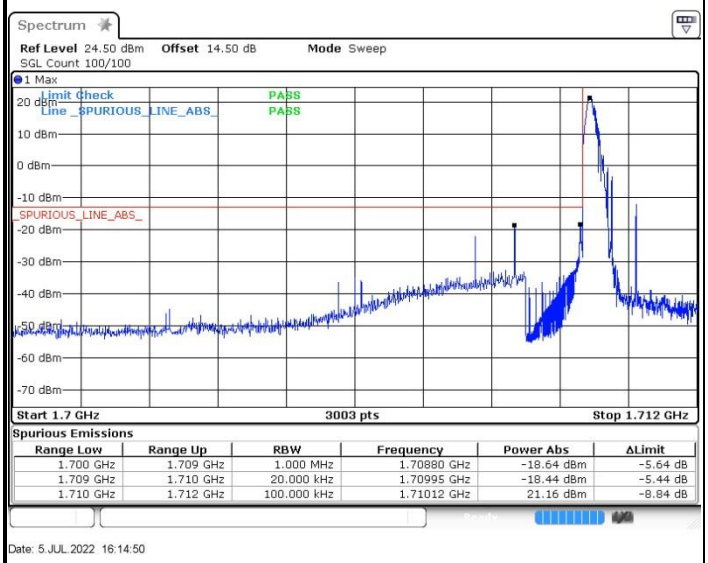
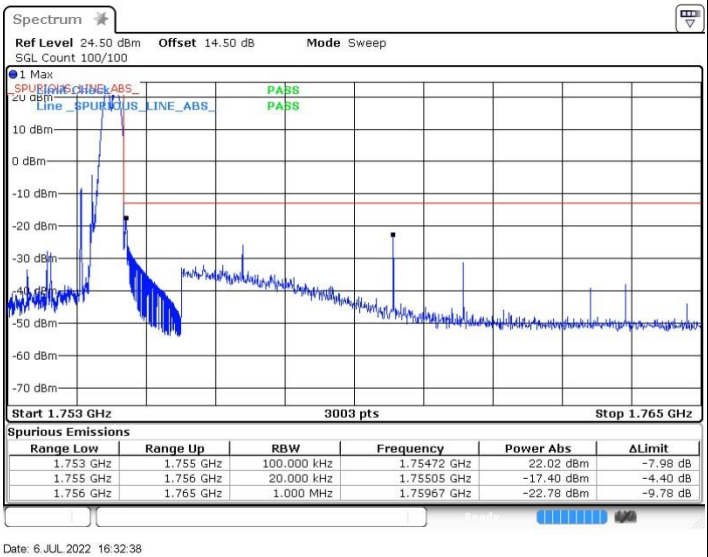
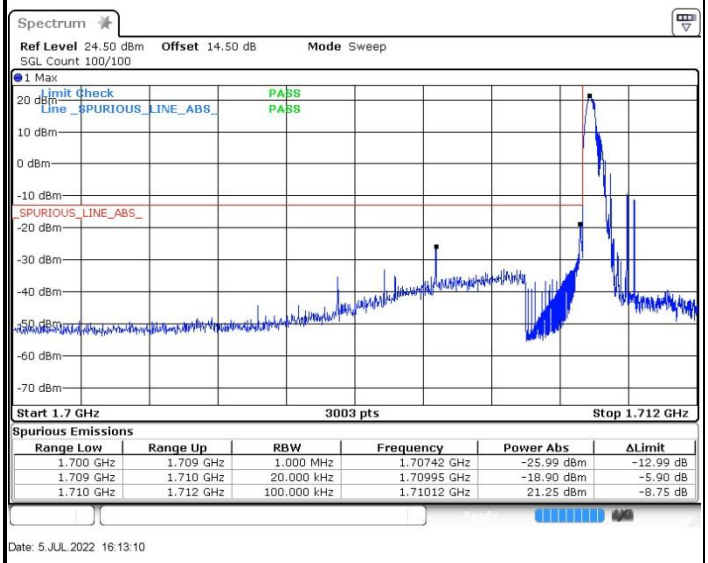
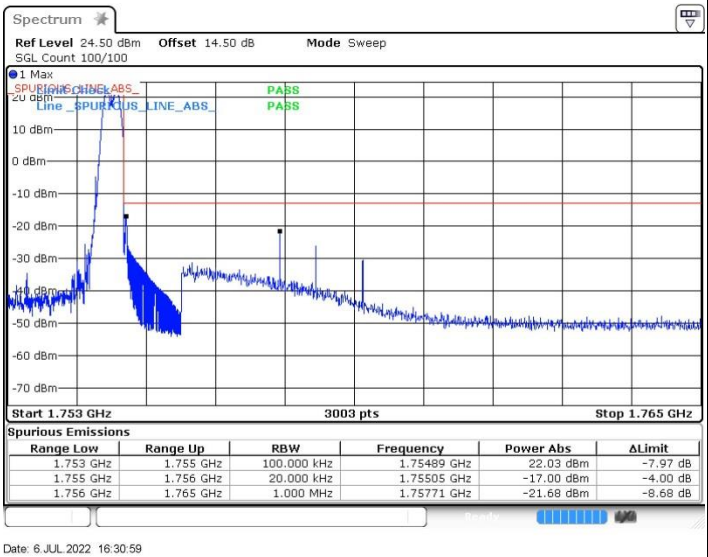
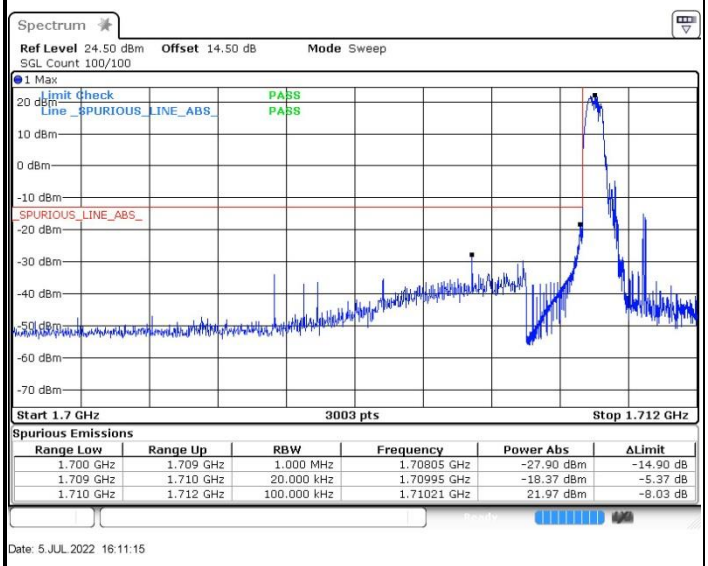
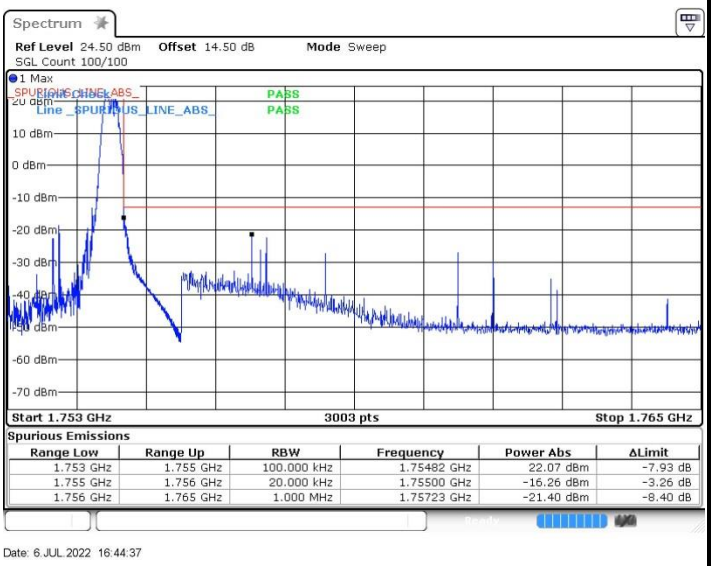
LTE Band 4 / 15K	
Lowest Band Edge / 1SC0 / BPSK	**Highest Band Edge / 1SC11 / BPSK**
	
Date: 5.JUL.2022 16:14:50	Date: 6.JUL.2022 16:32:38
Lowest Band Edge / 1SC0 / QPSK	**Highest Band Edge / 1SC11 / QPSK**
	
Date: 5.JUL.2022 16:13:10	Date: 6.JUL.2022 16:30:59

LTE Band 4 / 15K	
Lowest Band Edge / 12SC0 / QPSK	**Highest Band Edge / 12SC0 / QPSK**

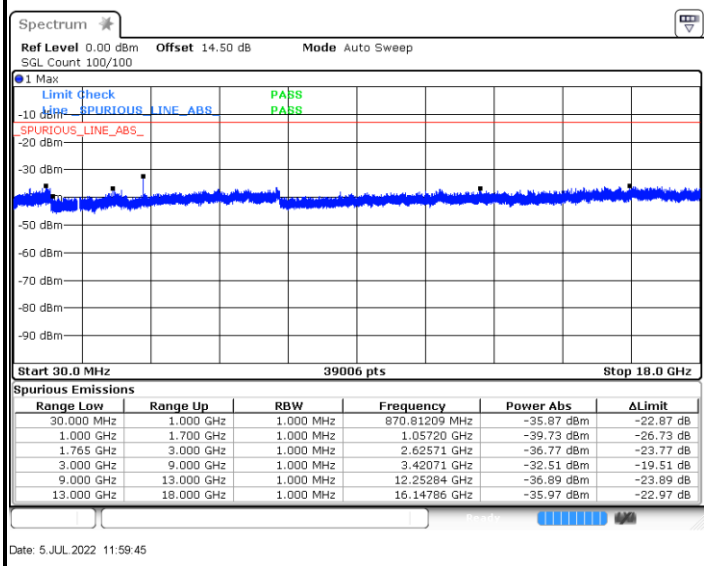




Conducted Spurious Emission

LTE Band 4 / 3.75K

Lowest Channel / 1SC0 / BPSK



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	870.81209 MHz	-35.87 dBm	-22.87 dB
1.000 GHz	1.700 GHz	1.000 MHz	1.05720 GHz	-39.73 dBm	-26.73 dB
1.765 GHz	3.000 GHz	1.000 MHz	2.62571 GHz	-36.77 dBm	-23.77 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.42071 GHz	-32.51 dBm	-19.51 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.25284 GHz	-36.89 dBm	-23.89 dB
13.000 GHz	18.000 GHz	1.000 MHz	16.14786 GHz	-35.97 dBm	-22.97 dB

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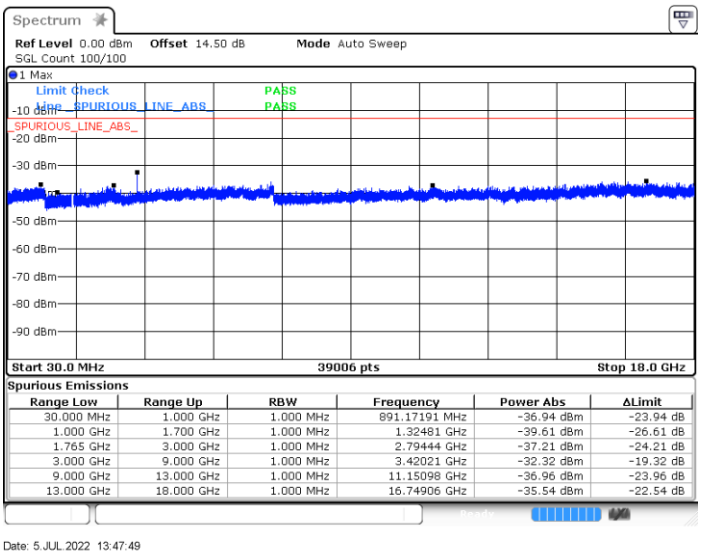
Lowest Channel / 1SC0 / QPSK



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	891.17191 MHz	-36.94 dBm	-23.94 dB
1.000 GHz	1.700 GHz	1.000 MHz	1.32481 GHz	-39.61 dBm	-26.61 dB
1.765 GHz	3.000 GHz	1.000 MHz	2.79444 GHz	-37.21 dBm	-24.21 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.42021 GHz	-32.32 dBm	-19.32 dB
9.000 GHz	13.000 GHz	1.000 MHz	11.15098 GHz	-36.96 dBm	-23.96 dB
13.000 GHz	18.000 GHz	1.000 MHz	16.74906 GHz	-35.54 dBm	-22.54 dB

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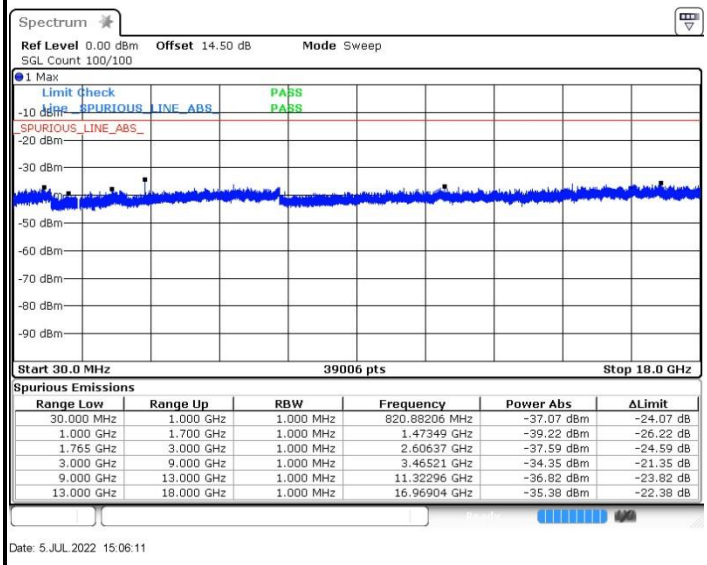
Middle Channel / 1SC0 / BPSK



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	820.88206 MHz	-37.07 dBm	-24.07 dB
1.000 GHz	1.700 GHz	1.000 MHz	1.47349 GHz	-39.22 dBm	-26.22 dB
1.765 GHz	3.000 GHz	1.000 MHz	2.60637 GHz	-37.59 dBm	-24.59 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.46521 GHz	-34.35 dBm	-21.35 dB
9.000 GHz	13.000 GHz	1.000 MHz	11.32296 GHz	-36.82 dBm	-23.82 dB
13.000 GHz	18.000 GHz	1.000 MHz	16.96904 GHz	-35.38 dBm	-22.38 dB

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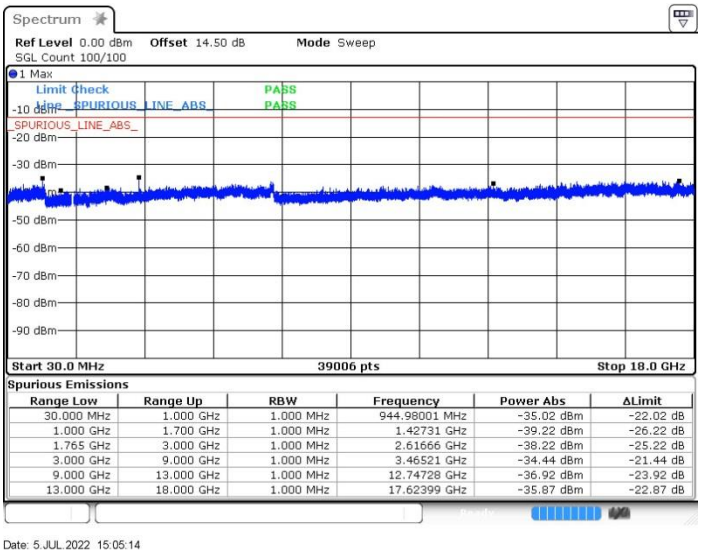
Middle Channel / 1SC0 / QPSK



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	944.98001 MHz	-35.02 dBm	-22.02 dB
1.000 GHz	1.700 GHz	1.000 MHz	1.42731 GHz	-39.22 dBm	-26.22 dB
1.765 GHz	3.000 GHz	1.000 MHz	2.61666 GHz	-38.22 dBm	-25.22 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.46521 GHz	-34.44 dBm	-21.44 dB
9.000 GHz	13.000 GHz	1.000 MHz	12.74728 GHz	-36.92 dBm	-23.92 dB
13.000 GHz	18.000 GHz	1.000 MHz	17.62399 GHz	-35.87 dBm	-22.87 dB

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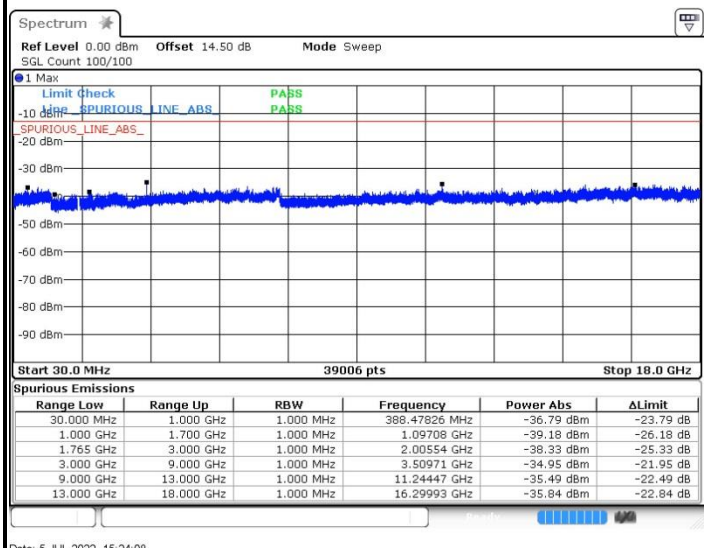
LTE Band 4 / 3.75K	
Highest Channel / 1SC0 / BPSK	**Highest Channel / 1SC0 / QPSK**



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	388.47826 MHz	-36.79 dBm	-23.79 dB
1.000 GHz	1.700 GHz	1.000 MHz	1.09708 GHz	-39.18 dBm	-26.18 dB
1.765 GHz	3.000 GHz	1.000 MHz	2.00554 GHz	-38.33 dBm	-25.33 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.50971 GHz	-34.95 dBm	-21.95 dB
9.000 GHz	13.000 GHz	1.000 MHz	11.24447 GHz	-35.49 dBm	-22.49 dB
13.000 GHz	18.000 GHz	1.000 MHz	16.29993 GHz	-35.84 dBm	-22.84 dB

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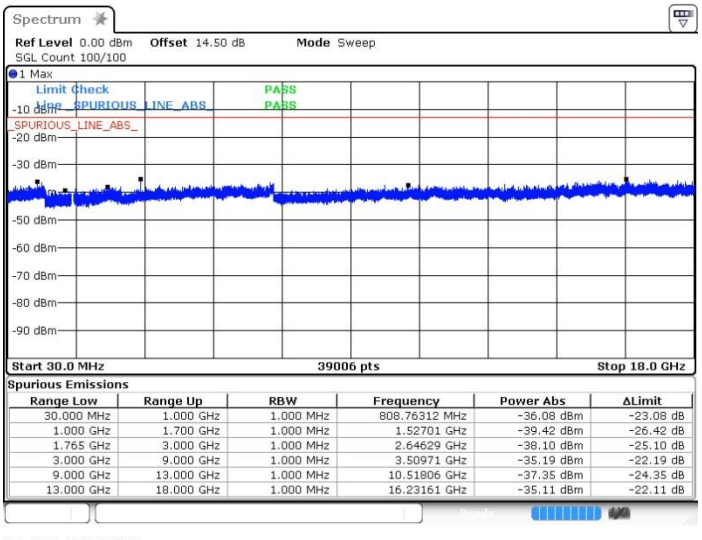

Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	808.76312 MHz	-36.08 dBm	-23.08 dB
1.000 GHz	1.700 GHz	1.000 MHz	1.52701 GHz	-39.42 dBm	-26.42 dB
1.765 GHz	3.000 GHz	1.000 MHz	2.64629 GHz	-38.10 dBm	-25.10 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.50971 GHz	-35.19 dBm	-22.19 dB
9.000 GHz	13.000 GHz	1.000 MHz	10.51806 GHz	-37.35 dBm	-24.35 dB
13.000 GHz	18.000 GHz	1.000 MHz	16.23161 GHz	-35.11 dBm	-22.11 dB

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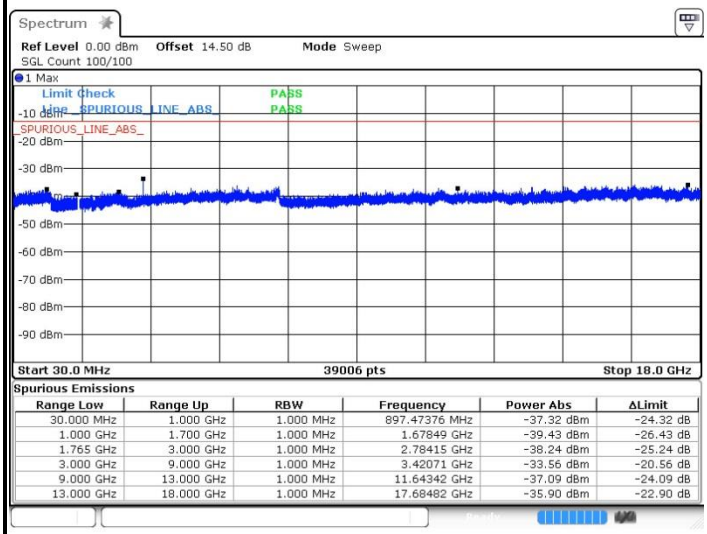
LTE Band 4 / 15K

Lowest Channel / 1SC0 / BPSK



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	897.47376 MHz	-37.32 dBm	-24.32 dB
1.000 GHz	1.700 GHz	1.000 MHz	1.67849 GHz	-39.43 dBm	-26.43 dB
1.765 GHz	3.000 GHz	1.000 MHz	2.78415 GHz	-38.24 dBm	-25.24 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.42071 GHz	-33.56 dBm	-20.56 dB
9.000 GHz	13.000 GHz	1.000 MHz	11.64342 GHz	-37.09 dBm	-24.09 dB
13.000 GHz	18.000 GHz	1.000 MHz	17.68482 GHz	-35.90 dBm	-22.90 dB

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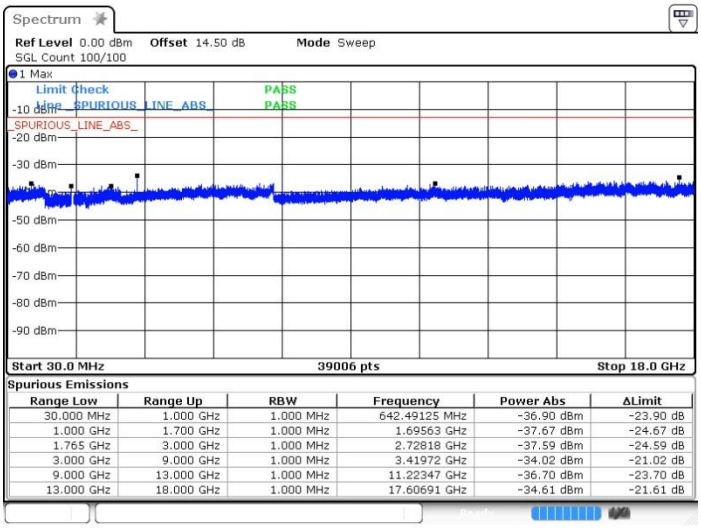
Lowest Channel / 1SC0 / QPSK



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	642.49125 MHz	-36.90 dBm	-23.90 dB
1.000 GHz	1.700 GHz	1.000 MHz	1.69563 GHz	-37.67 dBm	-24.67 dB
1.765 GHz	3.000 GHz	1.000 MHz	2.72818 GHz	-37.59 dBm	-24.59 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.41972 GHz	-34.02 dBm	-21.02 dB
9.000 GHz	13.000 GHz	1.000 MHz	11.22347 GHz	-36.70 dBm	-23.70 dB
13.000 GHz	18.000 GHz	1.000 MHz	17.60691 GHz	-34.61 dBm	-21.61 dB

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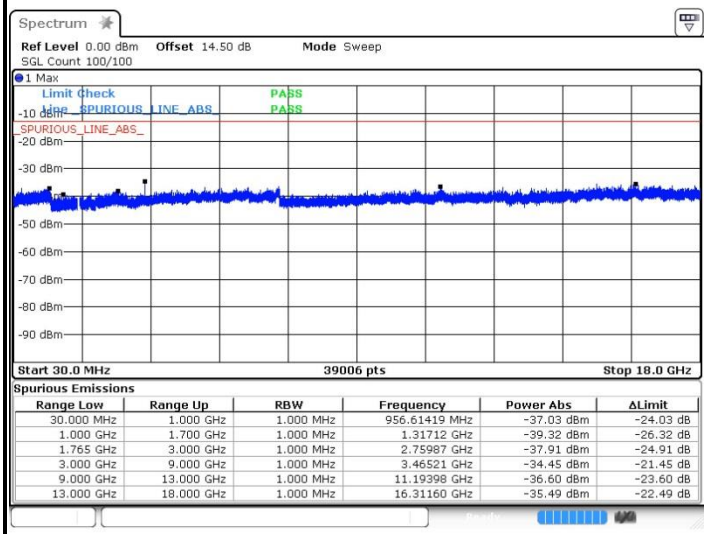
Middle Channel / 1SC0 / BPSK



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	956.61419 MHz	-37.03 dBm	-24.03 dB
1.000 GHz	1.700 GHz	1.000 MHz	1.31712 GHz	-39.32 dBm	-26.32 dB
1.765 GHz	3.000 GHz	1.000 MHz	2.75987 GHz	-37.91 dBm	-24.91 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.46521 GHz	-34.45 dBm	-21.45 dB
9.000 GHz	13.000 GHz	1.000 MHz	11.19398 GHz	-36.60 dBm	-23.60 dB
13.000 GHz	18.000 GHz	1.000 MHz	16.31160 GHz	-35.49 dBm	-22.49 dB

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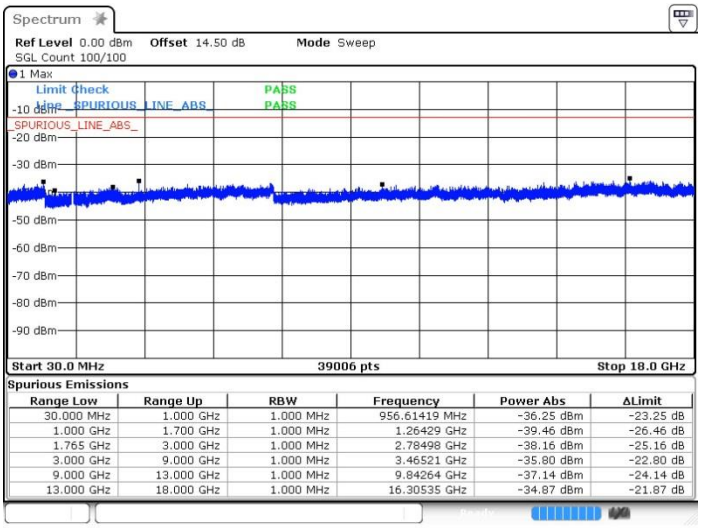
Middle Channel / 1SC0 / QPSK



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	956.61419 MHz	-36.25 dBm	-23.25 dB
1.000 GHz	1.700 GHz	1.000 MHz	1.26429 GHz	-39.46 dBm	-26.46 dB
1.765 GHz	3.000 GHz	1.000 MHz	2.78498 GHz	-38.16 dBm	-25.16 dB
3.000 GHz	9.000 GHz	1.000 MHz	3.46521 GHz	-35.80 dBm	-22.80 dB
9.000 GHz	13.000 GHz	1.000 MHz	9.84264 GHz	-37.14 dBm	-24.14 dB
13.000 GHz	18.000 GHz	1.000 MHz	16.30535 GHz	-34.87 dBm	-21.87 dB

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