FCC Radio Test Report

FCC ID: ZMOSC138NA

This report concerns: Original Grant

Project No.	:	2111C042
Equipment	:	LTE Module
Brand Name	:	Fibocom
Test Model	:	SC138-NA
Series Model	:	N/A
Applicant	:	Fibocom Wireless Inc.
Address	:	1101,Tower A, Building 6, Shenzhen International Innovation Valley, Dashi 1st Rd, Nanshan,Shenzhen,China
Manufacturer	:	Fibocom Wireless Inc.
Address	:	1101,Tower A, Building 6, Shenzhen International Innovation Valley, Dashi 1st Rd, Nanshan,Shenzhen,China
Factory	:	Huizhou HYE Technology Co., Ltd.
Address	:	No. 237, Sanhe group, Sanhe village, Tonghu Town, Zhongkai hi tech Zone, Huizhou
Date of Receipt	:	Nov. 03, 2021
Date of Test	:	Nov. 15, 2021 ~ Dec. 06, 2021
Issued Date	:	Dec. 23, 2021
Report Version	:	R01
Test Sample	:	Engineering Sample No.: DG20211115162
Standard(s)	:	47 CFR FCC Part 90 Subpart R 47 CFR FCC Part 2 ANSI/TIA/EIA-603-E-2016 FCC KDB 971168 D01 Power Meas License Digital Systems v03r01

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

Edward Li

Prepared by : Edward Li

Steven Lu

Approved by : Steven Lu

TESTING CERT #5123.02

Add: No. 3 Jinshagang 1st Rd. Shixia, Dalang Town, Dongguan City, Guangdong, People's Republic of China

Tel: +86-769-8318-3000

Web: www.newbtl.com

Declaration

BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

BTL's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

The report must not be used by the client to claim product certification, approval, or endorsement by NIST, A2LA, or any agency of the U.S. Government.

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BTL's laboratory quality assurance procedures are in compliance with the **ISO/IEC 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

BTL is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer which may affect the validity of results, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements of applied standards and in all the possible configurations as representative of its intended use.

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.
Please note that the measurement uncertainty is provided for informational purpose only and is not use in determining the Pass/Fail results.

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REPORT ISSUED HISTORY

Report Version	Description	Issued Date
R00	Original Issue.	Dec. 15, 2021
R01	Modified the comments of TCB.	Dec. 23, 2021

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC Part 90 Subpart R & Part 2			
Standard(s) Section	**Test Item**	**Judgment**	**Remark**
2.1046 & 90.542 (a)(7)	Effective Radiated Power	PASS	------
2.1049	Occupied Bandwidth	PASS	------
2.1053 & 90.543(e)(3)	Conducted Spurious Emissions	PASS	------
2.1053 & 90.543(e)(3) & 90.543(f)	Radiated Spurious Emissions	PASS	------
2.1051 & 90.210(n)	Mask Measurements	PASS	------
-	Peak To Average Ratio	PASS	Record Only
2.1053 & 90.543(e)(2)(3)	Condcted Band Edge Measurement	PASS	------
2.1055 & 90.539(e)	Frequency Stability	PASS	------

Note:

(1) “N/A” denotes test is not applicable in this test report.

1.1 TEST FACILITY

The test facilities used to collect the test data of radiated in this report is at the location of No. 3 Jinshagang 1st Rd. Shixia, Dalang Town, Dongguan City, Guangdong, People's Republic of China.

The test facilities used to collect the test data of conduted in this report is at the location of Room 108, Building 2, No.1, Yile Road, Songshan Lake Zone, Dongguan City, Guangdong, People's Republic of China.
BTL's Test Firm Registration Number for FCC: 357015
BTL's Designation Number for FCC: CN1240

1.2 MEASUREMENT UNCERTAINTY

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))
The BTL measurement uncertainty as below table:

A. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	U,(dB)
DG-CB01	CISPR	9kHz ~ 30MHz	2.36

Test Site	Method	Measurement Frequency Range	Ant. H / V	U,(dB)
DG-CB03	CISPR	30MHz ~ 200MHz	V	4.36
		30MHz ~ 200MHz	H	3.32
		200MHz ~ 1,000MHz	V	4.08
		200MHz ~ 1,000MHz	H	3.96
		1GHz ~ 6GHz	-	3.80
		6GHz ~ 18GHz	-	4.82

B. Other Measurement:

Parameter	Uncertainty
Spectrum Bandwidth	±3.8 %
Maximum Output Power	±0.95 dB
Power Spectral Density	±0.86 dB
Frequency Stability	±0.16 dB
Temperature	±0.08 °C
Time	±0.58 %
Supply voltages	±0.3 %

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

1.3 TEST ENVIRONMENT CONDITIONS

Test Item	Temperature	Humidity	Test Voltage	Tested By
Output Power & ERP	24°C	57%	DC 3.8V	Rick Liao
Occupied Bandwidth	24°C	57%	DC 3.8V	Rick Liao
Conducted Spurious Emissions	24°C	57%	DC 3.8V	Rick Liao
Radiated Spurious Emissions	22°C	55%	DC 3.8V	Kwok Guo
Band Edge	24°C	57%	DC 3.8V	Rick Liao
Peak to Average Ratio	24°C	57%	DC 3.8V	Rick Liao
Condcted Band Edge Measurement	24°C	57%	DC 3.8V	Rick Liao
Frequency Stability	Normal & Extreme	57%	Normal & Extreme	Rick Liao

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	LTE Module				
Brand Name	Fibocom				
Test Model	SC138-NA				
Series Model	N/A				
Model Difference(s)	N/A				
Hardware Version	SC138-NA				
Software Version	SC138-NA-Q62.00.104				
Power Source	DC Voltage supplied from external power supply.				
Power Rating	DC 3.5V ~ 4.2V				
IEMI No.	866280050002329				
Modulation Type	LTE	UL: QPSK,16QAM,64QAM DL: QPSK,16QAM,64QAM			
Max. ERP	LTE	Channel Bandwidth (MHz)	QPSK (dBm)	16QAM (dBm)	64QAM (dBm)
	Band 14	5	20.98	20.48	19.26
		10	20.82	19.85	19.06

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

2. Channel List:

LTE Band 14					
Test Frequency ID	Bandwidth (MHz)	N_{UL}	Frequency of Uplink (MHz)	N_{DL}	Frequency of Downlink (MHz)
Low Range	5	23305	790.5	5305	760.5
	10	23330	793	5330	763
Mid Range	5/10	23330	793	5330	763
High Range	5	23355	795.5	5.55	763.5
	10	23330	793	5330	763

3. Table for Filed Antenna:

Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Note
N/A	N/A	Dipole	SMA	0.5	LTE Band 14

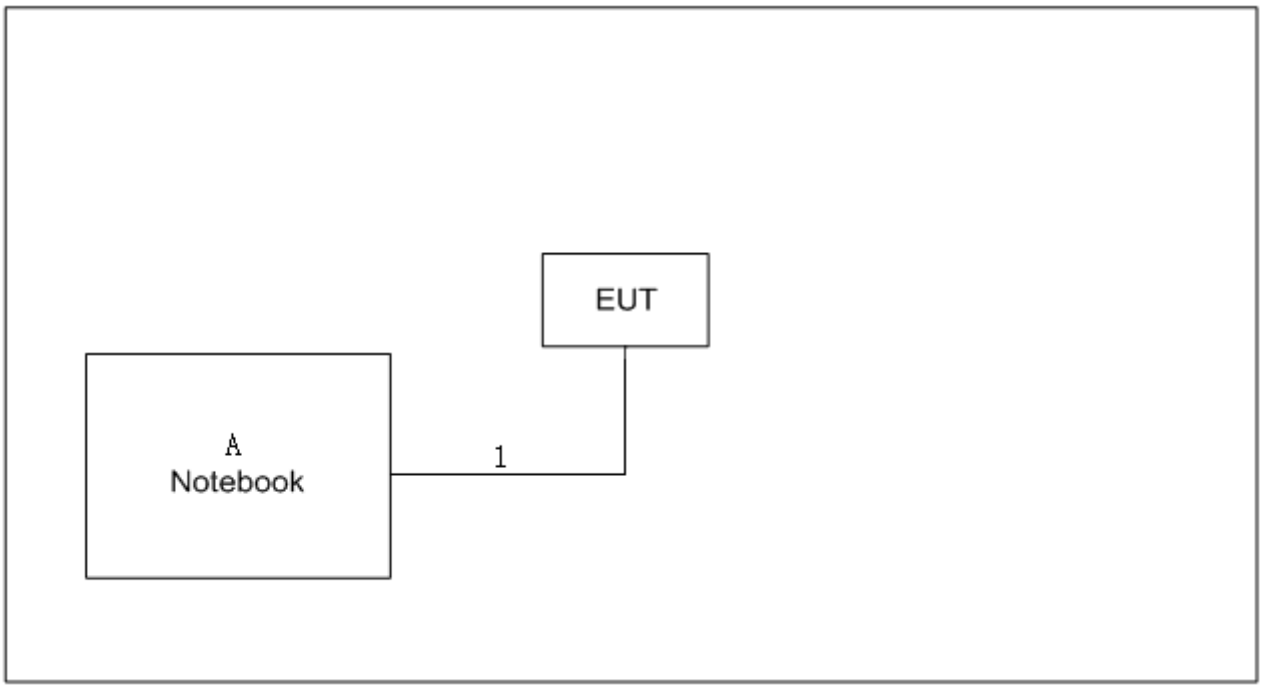
Note: The antenna gain is provided by the manufacturer.

2.2 DESCRIPTION OF TEST MODES

Following mode(s) is (were) found to be the worst case(s) and selected for the final test.

LTE BAND 14 MODE					
Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
Output Power &ERP	23305 to 23355	23305, 23330, 23355	5MHz	QPSK, 16QAM, 64QAM	1RB/12RB/25RB
	23330	23330	10MHz	QPSK, 16QAM, 64QAM	1RB/25RB/50RB
Occupied Bandwidth	23305 to 23355	23305, 23330, 23355	5MHz	QPSK, 16QAM, 64QAM	25RB
	23330	23330	10MHz	QPSK, 16QAM, 64QAM	50RB
Conducted Spurious Emissions	23305 to 23355	23330	5MHz	QPSK	1RB
	23330	23330	10MHz	QPSK	1RB
Radiated Spurious Emissions	23305 to 23355	23330	5MHz	QPSK	1RB
	23330	23330	10MHz	QPSK	1RB
Mask	23305 to 23355	23305, 23355	5MHz	QPSK	1RB
					25RB
	23330	23330	10MHz	QPSK	1RB
					50RB
Peak To Average Ratio	23305 to 23355	23305, 23330, 23355	5MHz	QPSK, 16QAM, 64QAM	1RB
	23330	23330	10MHz	QPSK, 16QAM, 64QAM	1RB
Condcted Band Edge Measurement	23305 to 23355	23305, 23355	5MHz	QPSK	1RB
					25RB
	23330	23330	10MHz	QPSK	1RB
					50RB
Frequency Stability	23305 to 23355	23330	10MHz	QPSK	1RB

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATIONOFSYSTEMTESTED



2.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.
A	Notebook	Lenovo	V310-14ISK	LR07GZNB

Item	Cable Type	Shielded Type	Ferrite Core	Length
1	USB Cable	NO	NO	0.8m

3. TEST RESULT

3.1 OUTPUT POWER MEASUREMENT

3.1.1 LIMIT

Mobile / Portable station are limited to 3 watts e.r.p.

3.1.2 TEST PROCEDURE

The testing follows FCC KDB 971168 v03r01 Section 5.0.

ERP:

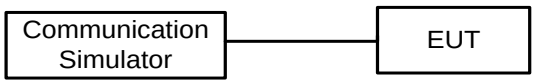
EIRP= Output Power + Antenan gain
ERP = EIPR - 2.15dBi.

Output Power:

The EUT was set up for the maximum power with GSM, GPRS, EDGE, WCDMA, CDMA, and LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

3.1.3 TEST SETUP LAYOUT

Output Power Measurement



3.1.4 TEST DEVIATION

No deviation

3.1.5 TEST RESULTS

Please refer to the APPENDIX A.

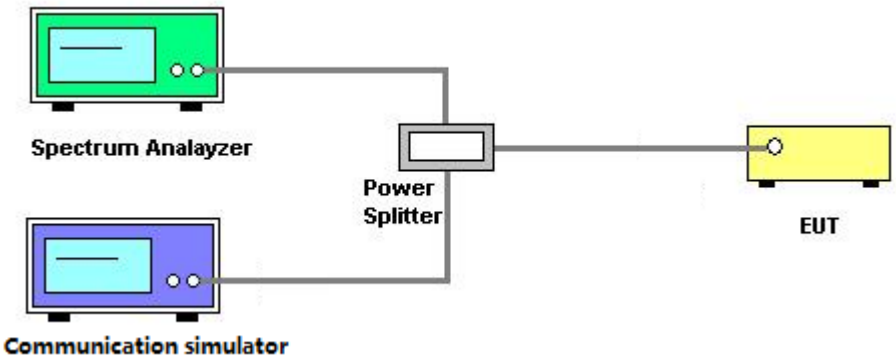
3.2 OCCUPIED BANDWIDTH MEASUREMENT

3.2.1 TEST PROCEDURE

The testing follows FCC KDB 971168 v03r01 Section 4.0.

1. The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth and 26dB bandwidth.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. RBW=(1% ~ 5%)*EBW
   VBW≥3* RBW
4. Set spectrum analyzer with RMS detector.

3.2.2 TEST SETUP LAYOUT



3.2.3 TEST DEVIATION

No deviation

3.2.4 TEST RESULTS

Please refer to the APPENDIX B.

3.3 CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

3.3.1 LIMIT

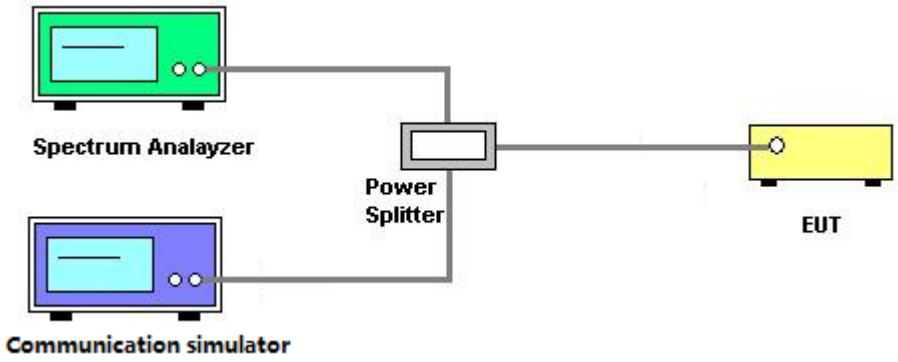
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit equal to -13dBm.

3.3.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 6.0.

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The band edges of low and high channels for the highest RF powers were measured. Set RBW>=1% EBW in the 1MHz band immediately outside and adjacent to the band edge.
3. Set spectrum analyzer with RMS detector.
4. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.3.3 TEST SETUP LAYOUT



3.3.4 TEST DEVIATION

No deviation

3.3.5 TEST RESULTS

Please refer to the APPENDIX C.

3.4 RADIATED SPURIOUS EMISSIONS MEASUREMENT

3.4.1 LIMIT

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit equal to -13dBm.

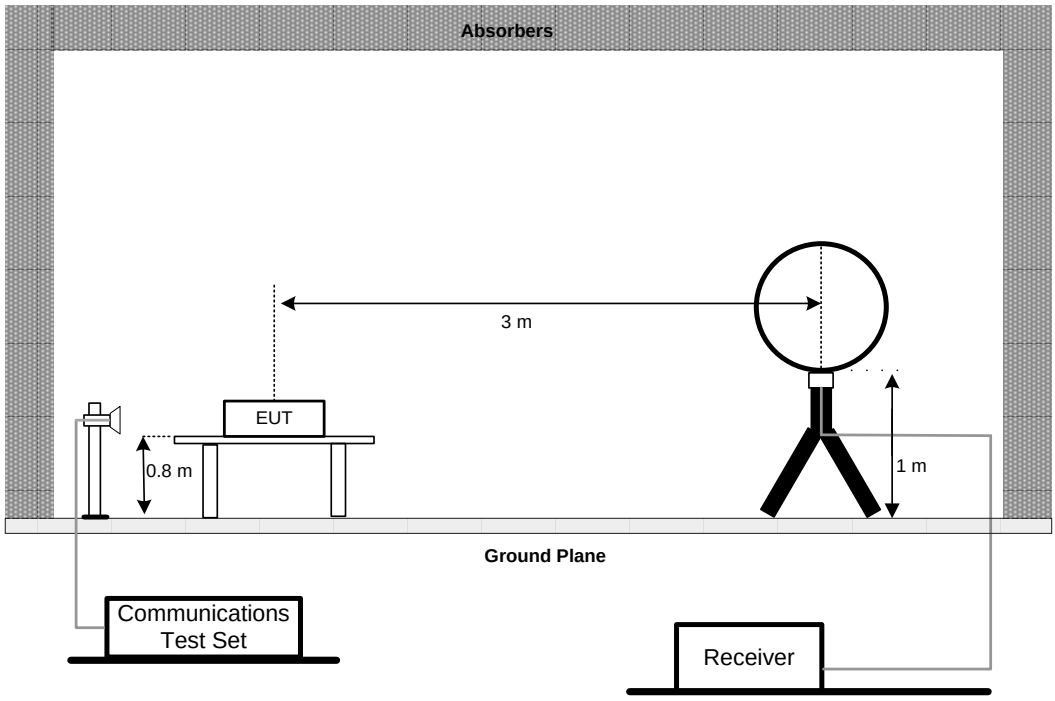
3.4.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 5.8.

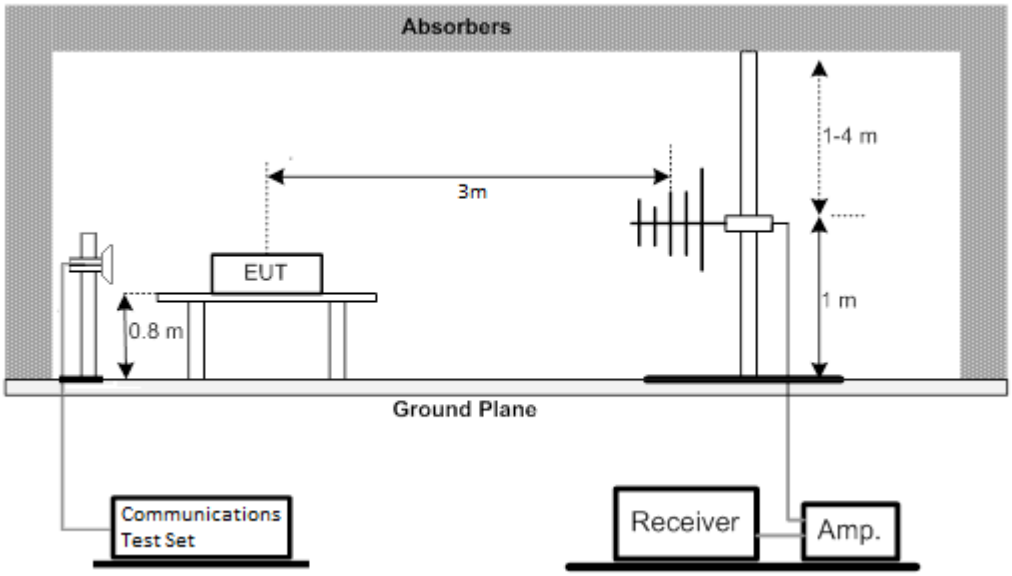
1. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
2. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value” of step a. Record the power level of S.G
3. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.
4. ERP can be calculated form EIRP by subtracting the gain of dipole, ERP = EIPR - 2.15dBi.
5. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

3.4.3 TEST SETUP LAYOUT

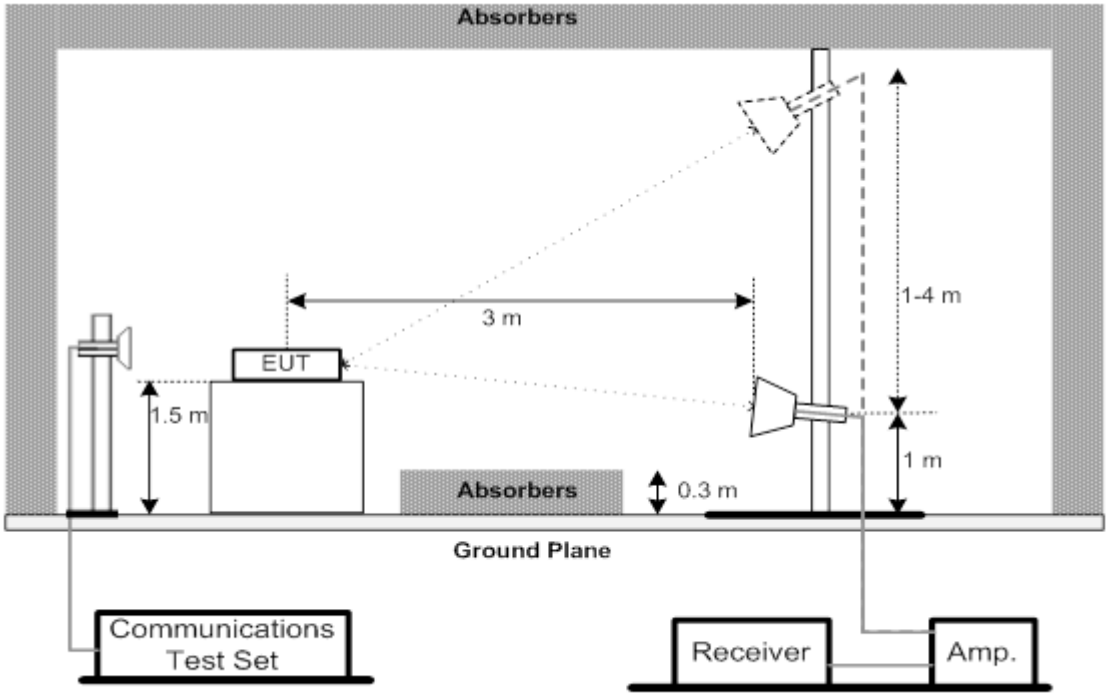
Below 30MHz



30MHz to 1000MHz



Above 1GHz



3.4.4 TEST DEVIATION

No deviation

3.4.5 TEST RESULTS (9KHZ TO 30MHZ)

Please refer to the APPENDIX D.

3.4.6 TEST RESULTS (30MHZ TO 1000MHZ)

Please refer to the APPENDIX E.

3.4.7 TEST RESULTS (ABOVE 1000MHZ)

Please refer to the APPENDIX F.

3.5 MASK MEASUREMENTS

3.5.1 LIMIT

<Mask B>

For transmitter that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.

(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.

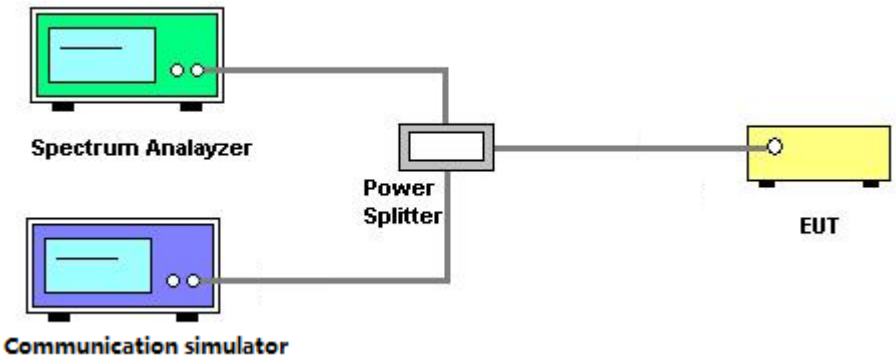
(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43+10log(P) dB.

3.5.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 6.0.

1. All measurements were done at low and high operational frequency range.
2. Set RBW=1% of 26dBc bandwidth, VBW=3 X RBW, detector=RMS, Sweep time = Auto.
3. Record the max trace plot into the test report.

3.5.3 TEST SETUP LAYOUT



3.5.4 TEST DEVIATION

No deviation

3.5.5 TEST RESULTS

Please refer to the APPENDIX G.

3.6 PEAK TO AVERAGE RATIO MEASUREMENT

3.6.1 LIMIT

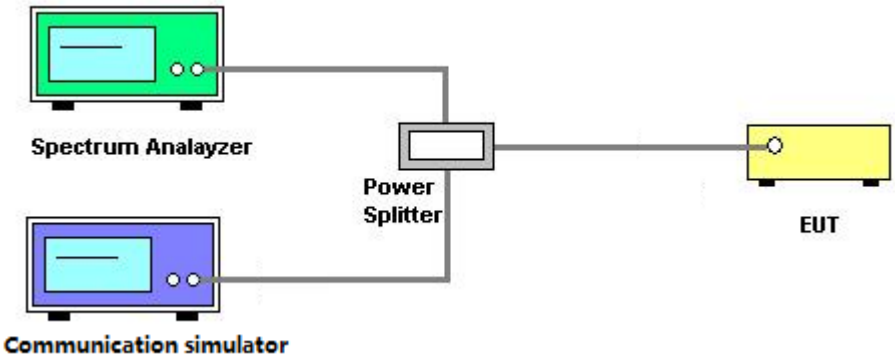
In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB.

3.6.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 5.7.

1. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1%.

3.6.3 TEST SETUP LAYOUT



3.6.4 TEST DEVIATION

No deviation

3.6.5 TEST RESULTS

Please refer to the APPENDIX H.

3.7 CONDUCTED BAND EDGE MEASUREMENT

3.7.1 LIMIT

(1) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than 76+10log(P) dB In a 6.25 KHz band segment, for base and fixed stations.

(2) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than 65+10log(P) dB In a 6.25 KHz band segment, for mobile and portable stations.

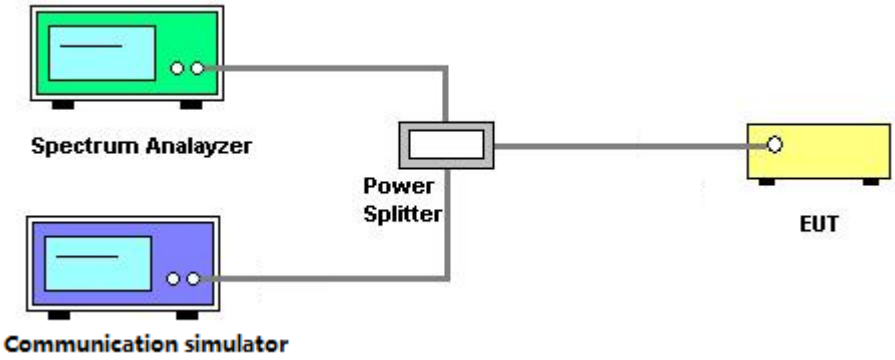
(3) On all frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, by at least 43+10log(P) dB.

3.7.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 6.

1. All measurements were done at low and high operational frequency range.
2. Record the max trace plot into the test report.

3.7.3 TEST SETUP LAYOUT



3.7.4 TEST DEVIATION

No deviation

3.7.5 TEST RESULTS

Please refer to the APPENDIX I.

3.8 FREQUENCY STABILITY MEASUREMENT

3.8.1 LIMIT

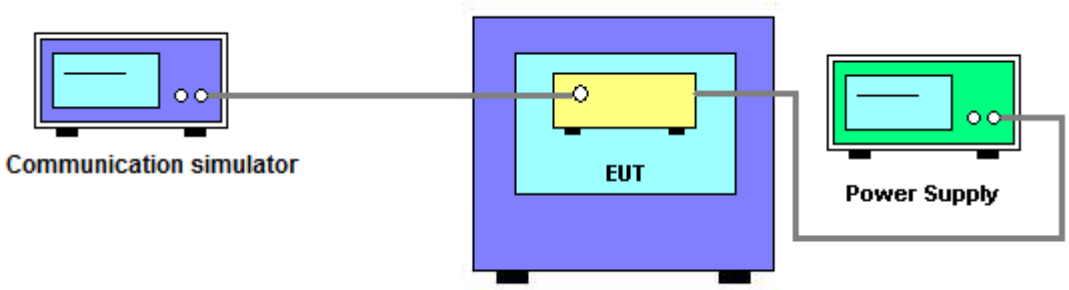
Tht frequency stability of mobile portable and control transmitters operating in the wideband segment must be 1.25 parts per million or better.

3.8.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 9.0.

1. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
2. EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
3. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ±0.5°C during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.
4. The frequency error was recorded frequency error from the communication simulator.

3.8.3 TEST SETUP LAYOUT



3.8.4 TEST DEVIATION

No deviation

3.8.5 TEST RESULTS

Please refer to the APPENDIX J.

4. LIST OF MEASUREMENT EQUIPMENTS

Radiated Emissions - 9 kHz to 30 MHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	MXE EMI Receiver	Keysight	N9038A	MY56400091	Feb. 27, 2022
2*	Active Loop Antenna	R&S	HFH2-Z2	830749/020	Aug. 23, 2024
3	Cable	N/A	RG 213/U (9kHz~1GHz)	N/A	May 27, 2022
4	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
5	wideband radio communication tester	R&S	CMW500	152372	Feb. 27, 2022
6	Wireless Communication Test SET	Agilent	E5515C	MY48364183	Feb. 28, 2022
7	966 Chamber Room	ETS	9*6*6	N/A	Jul. 17, 2022

Radiated Emissions - 30 MHz to 1 GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	Schwarzbeck	VULB9160	9160-3232	Mar. 15, 2022
2	Amplifier	HP	8447D	2944A08742	Feb. 28, 2022
3	Cable	emci	LMR-400	N/A	May 20, 2022
4	Controller	CT	SC100	N/A	N/A
5	Controller	MF	MF-7802	MF780208416	N/A
6	Receiver	Agilent	N9038A	MY52130039	Mar. 19, 2022
7	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
8	wideband radio communication tester	R&S	CMW500	152372	Feb. 27, 2022
9	Wireless Communication Test SET	Agilent	E5515C	MY48364183	Feb. 28, 2022
10	966 Chamber Room	RM	9*6*6	N/A	Jul. 24, 2022

Radiated Emissions - Above 1 GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Double Ridged Horn Antenna	ARA	DRG-118A	16554	Apr. 21, 2022
2	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Jun. 30, 2022
3	Amplifier	Agilent	8449B	3008A02584	Jul. 10, 2022
4	Controller	CT	SC100	N/A	N/A
5	Controller	MF	MF-7802	MF780208416	N/A
6	Receiver	Agilent	N9038A	MY52130039	Mar. 19, 2022
7	EXA Spectrum Analyzer	Keysight	N9010A	MY56480488	Feb. 28, 2022
8	Low Noise Amplifier	CONNPHY	CLN-18G40G -4330-K	619413	Jul. 16, 2022
9	Cable	N/A	A81-SMAMSMAM -12.5M	N/A	Oct. 15, 2022
10	Cable	Talent microwave	A40-2.92M2.92M -2.5M	N/A	Nov. 29, 2021 Nov. 30, 2022
11	Filter	STI	STI15-9912	N/A	Jul. 10, 2022
12	Measurement Software	Farad	EZ-EMC Ver.NB -03A1-01	N/A	N/A
13	wideband radio communication tester	R&S	CMW500	152372	Feb. 27, 2022
14	Wireless Communication Test SET	Agilent	E5515C	MY48364183	Feb. 28, 2022
15	966 Chamber Room	RM	9*6*6	N/A	Jul. 24, 2022

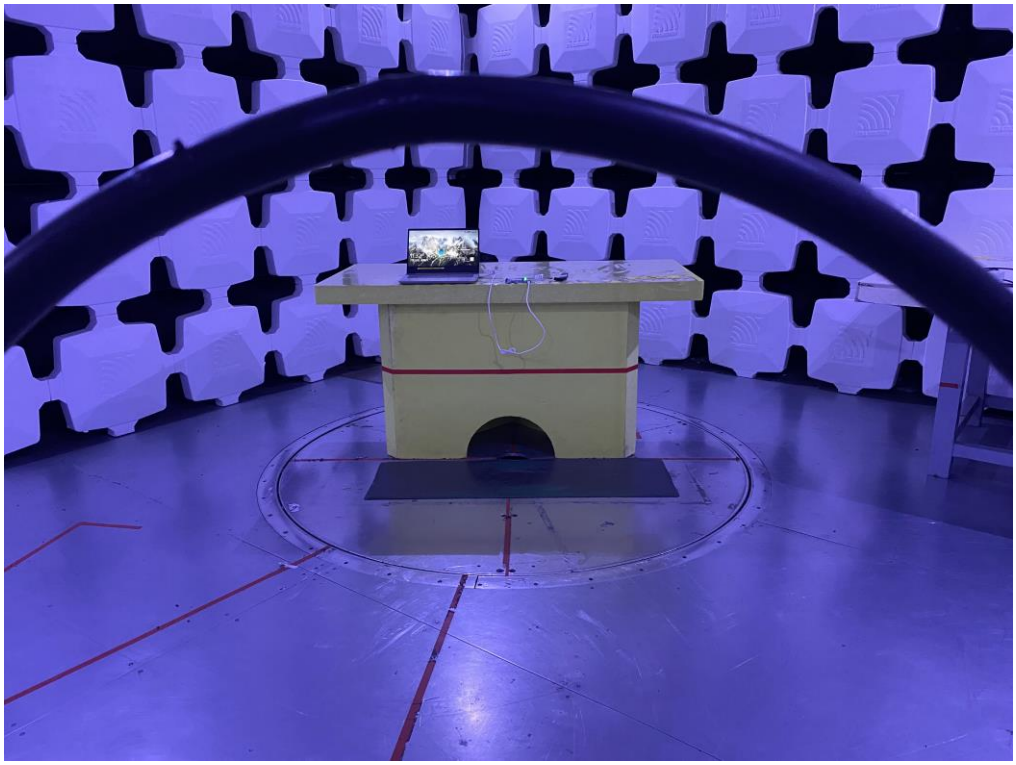
Conducted Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	8960 Series 10 Wireless Com Test set	Agilent	E5515E	MY52112163	Jul. 24, 2022
2	MXA Signal Analyzer	Keysight	N9020A	MY49100060	Jul. 24, 2022
3	Power Splitter	Mini-Circuits	ZFRSC-183-S+	SF103501511S	Jul. 24, 2022
4	wideband radio communication tester	R&S	CMW500	104462	Jul. 24, 2022
5	Const Temp. & Humidity Chamber	Bell	BTH-50C	20170306001	Feb. 27, 2022
6*	Multi-output DC Power Supply	GW Instek	GPC-3030DN	EK880675	Jul. 25, 2023

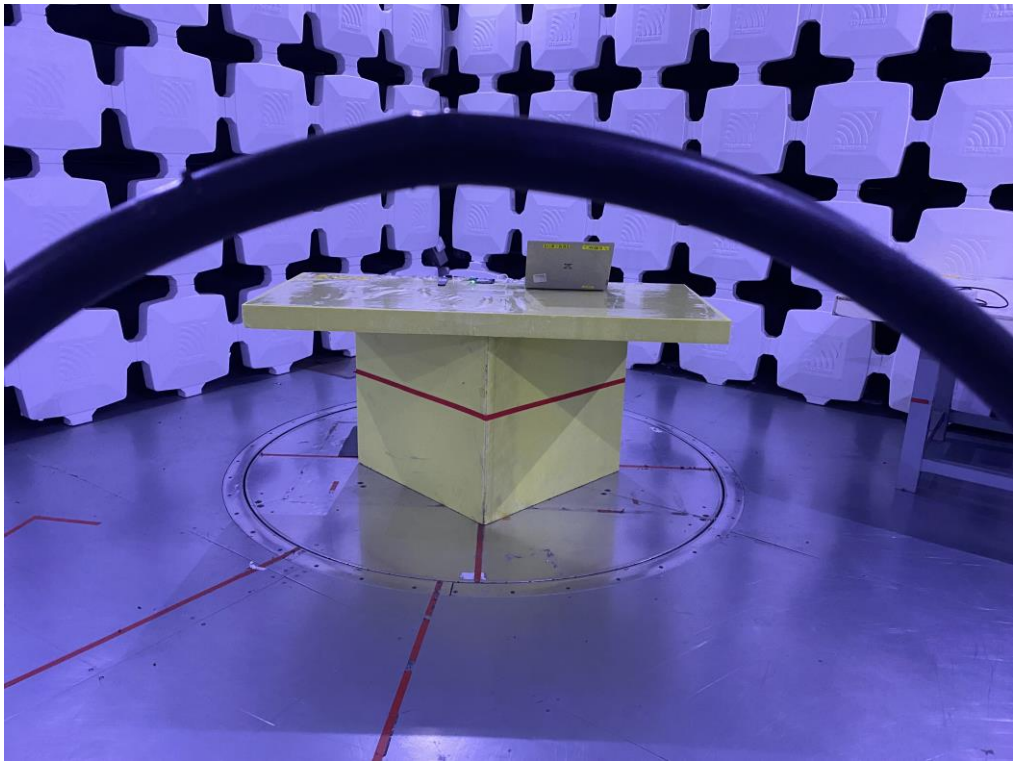
Remark: ”N/A” denotes no model name, serial no. or calibration specified.
Except * item, all calibration period of equipment list is one year.
“*” calibration period of equipment list is three year.

5. EUT TEST PHOTO

Radiated Emissions Test Photos

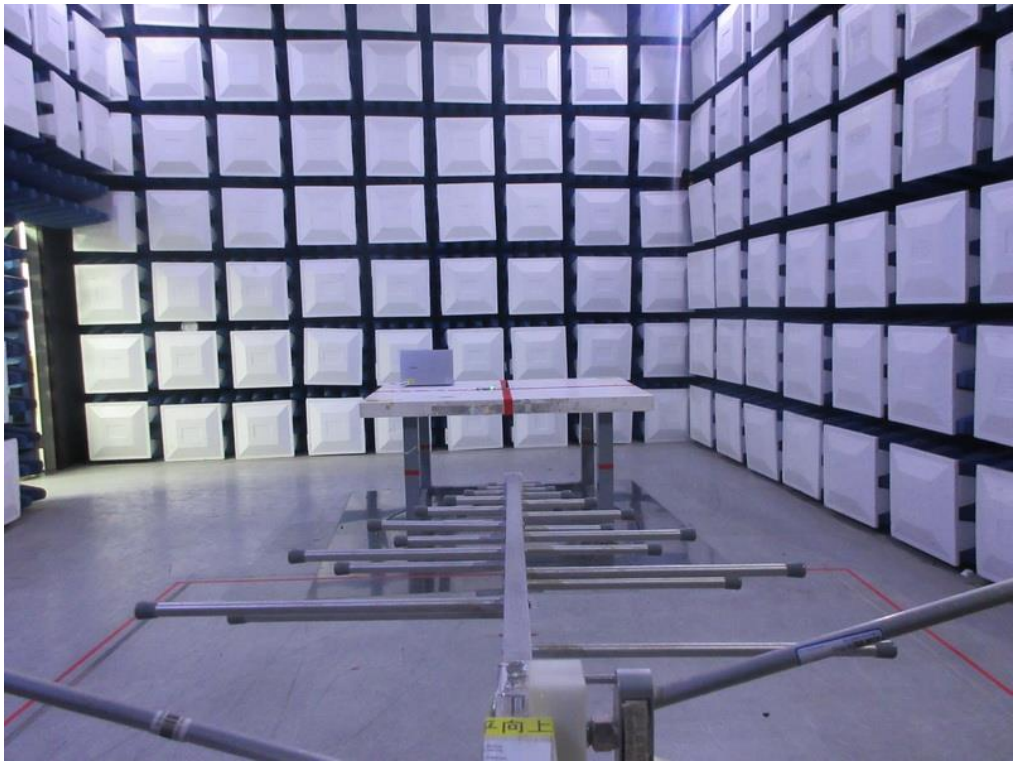
9 kHz to 30 MHz

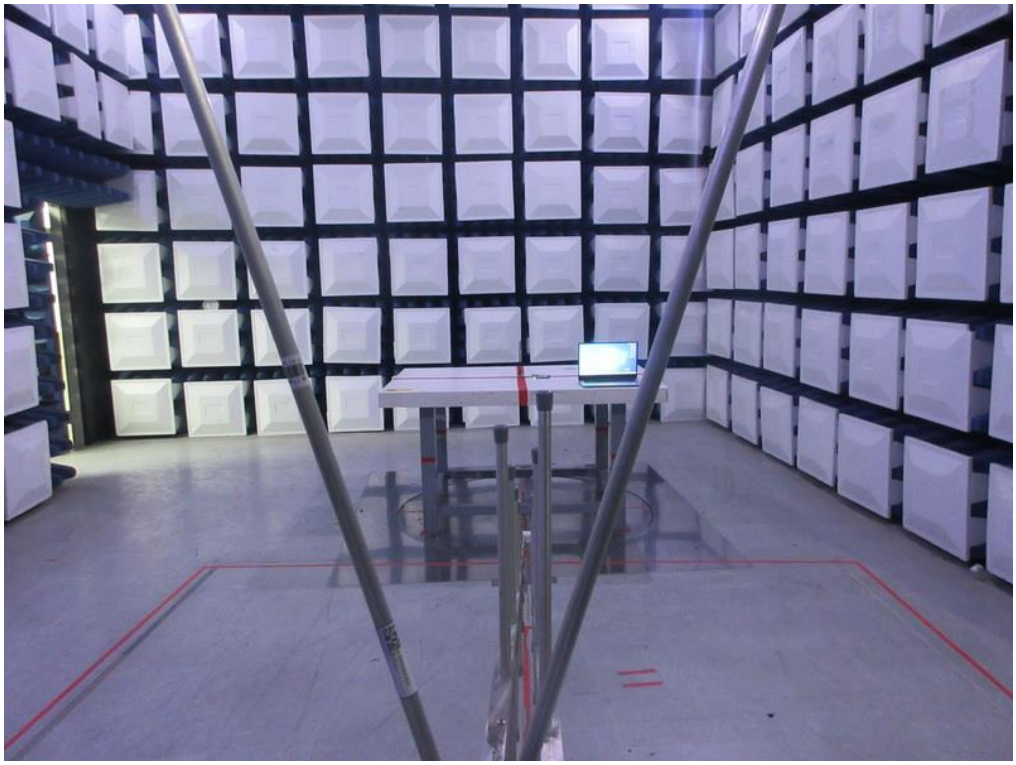




Radiated Emissions Test Photos

30 MHz to 1 GHz

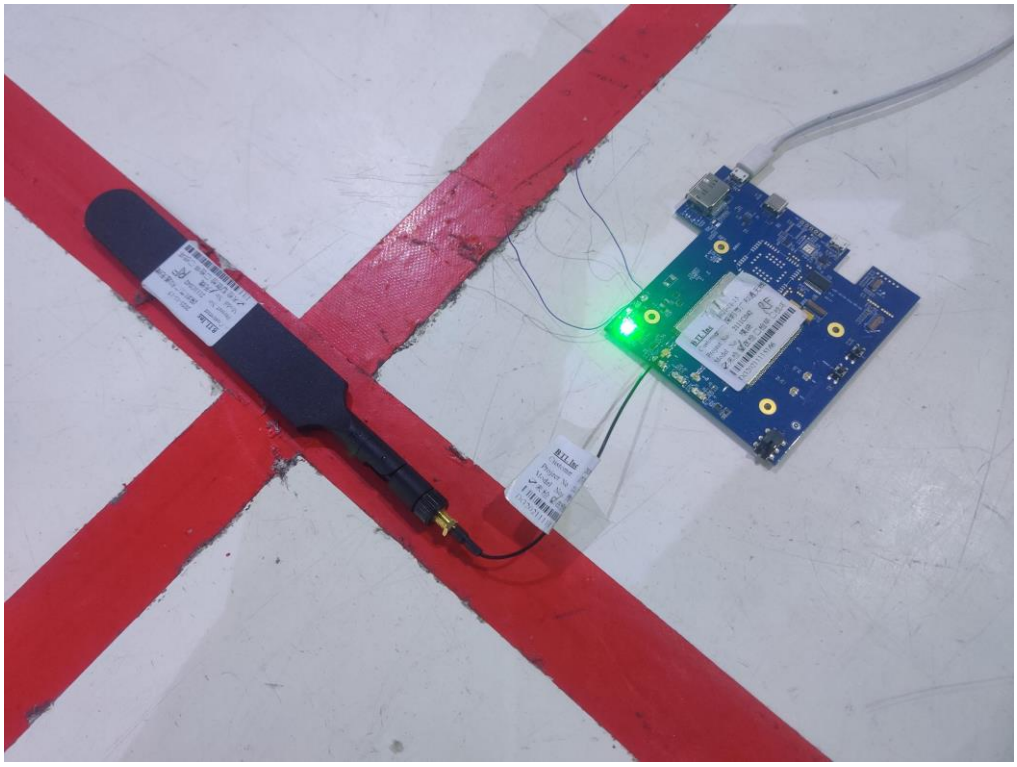




Radiated Emissions Test Photos

Above 1 GHz

Radiated Emissions Test Photos



APPENDIX A - OUTPUT POWER

Output Power (dBm)

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				23305CH	23330CH	23355CH
				790.5MHz	793MHz	795.5MHz
14 / 5M	QPSK	1	0	22.45	22.45	22.61
		1	13	22.48	22.60	22.63
		1	24	22.51	22.52	22.58
		12	0	21.46	21.56	21.51
		12	6	21.58	21.57	21.53
		12	11	21.54	21.54	21.48
		25	0	21.58	21.50	21.49
	16QAM	1	0	21.64	21.63	22.09
		1	13	21.66	21.80	22.13
		1	24	21.71	21.69	22.04
		12	0	20.59	20.67	20.70
		12	6	20.69	20.71	20.74
		12	11	20.66	20.68	20.68
		25	0	20.58	20.58	20.60
	64QAM	1	0	20.77	20.46	20.89
		1	13	20.80	20.60	20.91
		1	24	20.85	20.51	20.80
		12	0	19.60	19.68	19.57
		12	6	19.71	19.68	19.54
		12	11	19.68	19.65	19.50
		25	0	19.63	19.61	19.58

LTE Band / BW	Modulation	RB Size	RB Offset	Mid CH
				23330CH
				793MHz
14 / 10M	QPSK	1	0	22.43
		1	25	22.47
		1	49	22.43
		25	0	21.58
		25	13	21.57
		25	25	21.53
		50	0	21.53
	16QAM	1	0	21.44
		1	25	21.50
		1	49	21.42
		25	0	20.64
		25	13	20.63
		25	25	20.57
		50	0	20.60
	64QAM	1	0	20.71
		1	25	20.71
		1	49	20.68
		25	0	19.73
		25	13	19.72
		25	25	19.64
		50	0	19.59

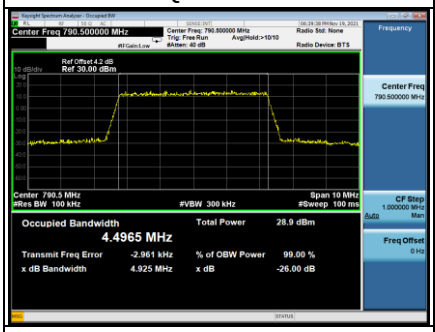
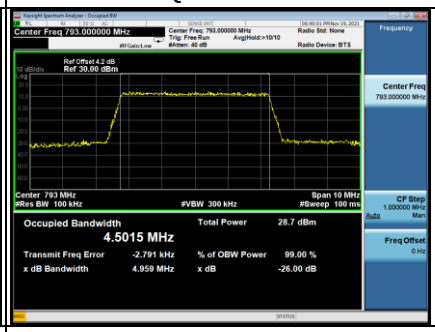
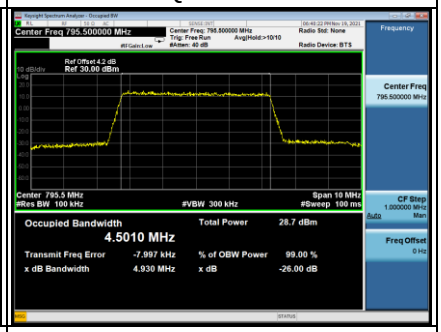
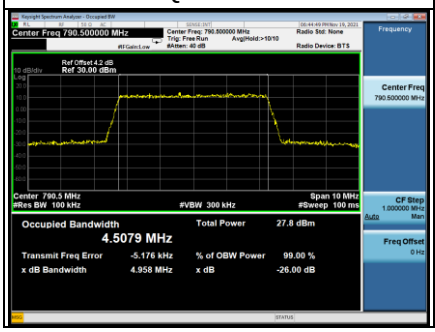
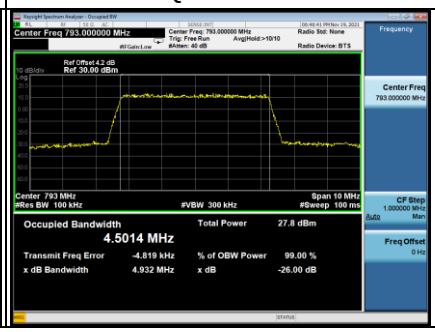
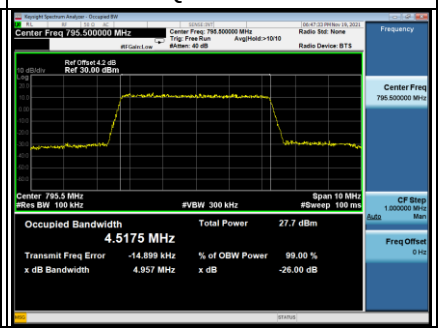
ERP (dBm)

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				23305CH	23330CH	23355CH
				790.5MHz	793MHz	795.5MHz
14 / 5M	QPSK	1	0	20.80	20.80	20.96
		1	13	20.83	20.95	20.98
		1	24	20.86	20.87	20.93
		12	0	19.81	19.91	19.86
		12	6	19.93	19.92	19.88
		12	11	19.89	19.89	19.83
		25	0	19.93	19.85	19.84
	16QAM	1	0	19.99	19.98	20.44
		1	13	20.01	20.15	20.48
		1	24	20.06	20.04	20.39
		12	0	18.94	19.02	19.05
		12	6	19.04	19.06	19.09
		12	11	19.01	19.03	19.03
		25	0	18.93	18.93	18.95
	64QAM	1	0	19.12	18.81	19.24
		1	13	19.15	18.95	19.26
		1	24	19.20	18.86	19.15
		12	0	17.95	18.03	17.92
		12	6	18.06	18.03	17.89
		12	11	18.03	18.00	17.85
		25	0	17.98	17.96	17.93

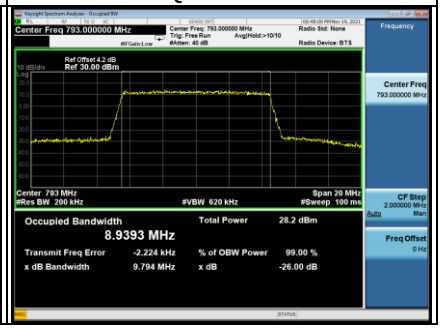
LTE Band / BW	Modulation	RB Size	RB Offset	Mid CH
				23330CH
				793MHz
14 / 10M	QPSK	1	0	20.78
		1	25	20.82
		1	49	20.78
		25	0	19.93
		25	13	19.92
		25	25	19.88
		50	0	19.88
	16QAM	1	0	19.79
		1	25	19.85
		1	49	19.77
		25	0	18.99
		25	13	18.98
		25	25	18.92
		50	0	18.95
	64QAM	1	0	19.06
		1	25	19.06
		1	49	19.03
		25	0	18.08
		25	13	18.07
		25	25	17.99
		50	0	17.94

APPENDIX B - OCCUPIED BANDWIDTH

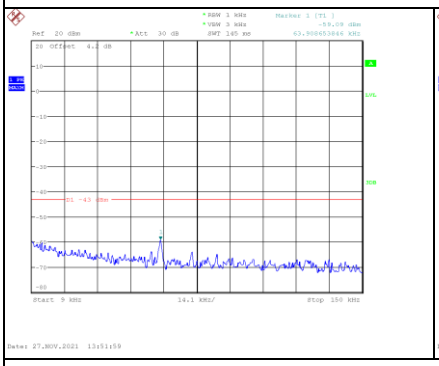
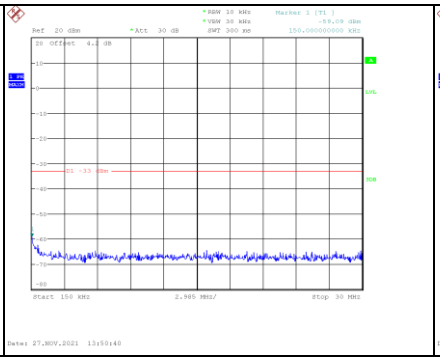
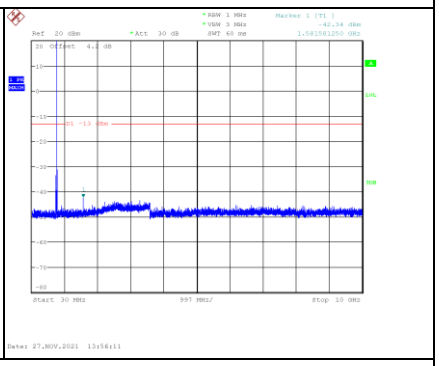
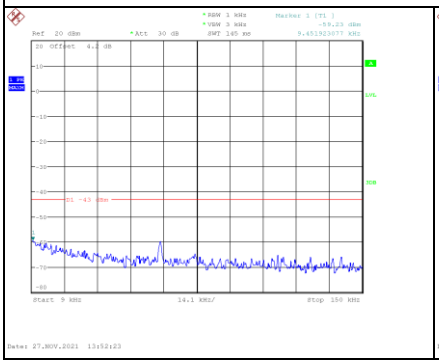
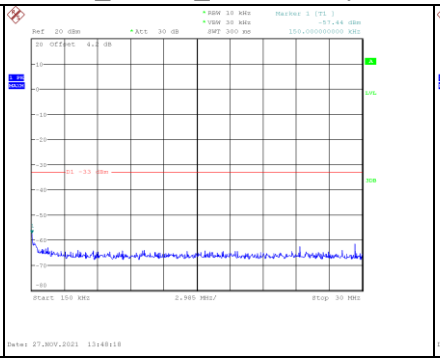
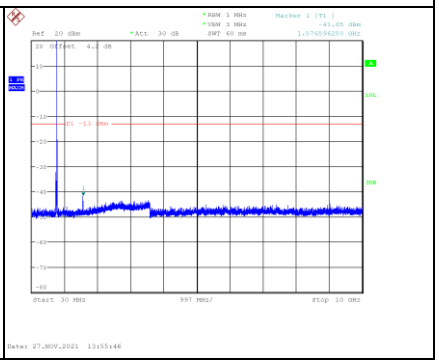
LTE Band 14_5MHz							
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			26dB Bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
23305	790.5	4.5295	4.4965	4.5079	4.933	4.925	4.958
23330	793	4.5000	4.5015	4.5014	4.970	4.959	4.932
23355	795.5	4.5105	4.5010	4.5175	4.934	4.930	4.957

Spectrum Plot		
QPSK-23305	QPSK-23330	QPSK-23355
		
16QAM-23305	16QAM-23330	16QAM-23355
		
64QAM-23305	64QAM-23330	64QAM-23355
		

LTE Band 14_10MHz							
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			26dB Bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
23330	793	8.9510	8.9516	8.9393	9.847	9.782	9.794

Spectrum Plot		
QPSK-23330	16QAM-23330	64QAM-23330
		

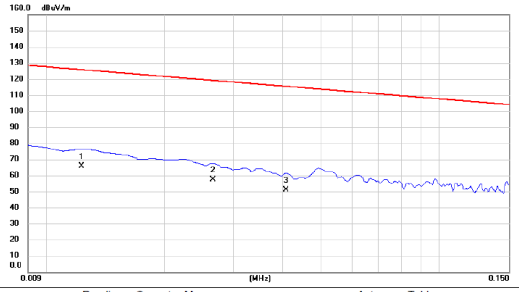
APPENDIX C - CONDUCTED SPURIOUS EMISSIONS

LTE Band 14_5MHz_CH23355 Spectrum Plot		
		
LTE Band 14_10MHz_CH26740 Spectrum Plot		
		

APPENDIX D - RADIATED SPURIOUS EMISSIONS (9KHZ TO 30MHZ)

Test Mode :	TX Mode

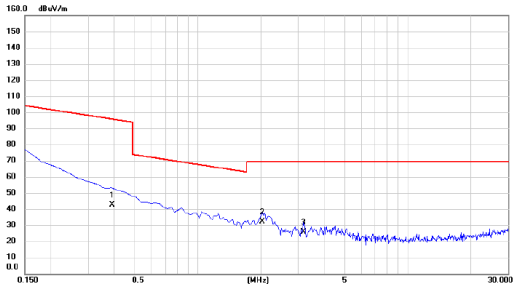
Ant 0°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	0.0123	49.23	16.71	65.94	125.81	-59.87	AVG			
2		0.0266	43.25	14.14	57.39	119.11	-61.72	AVG			
3		0.0407	37.12	13.81	50.93	115.41	-64.48	AVG			

Test Mode :	TX Mode

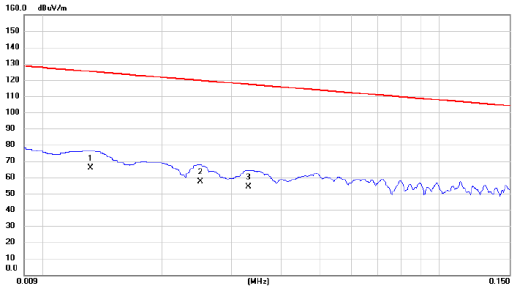
Ant 0°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		0.3914	29.15	13.46	42.61	95.75	-53.14	AVG			
2	*	2.0305	20.16	12.08	32.24	69.54	-37.30	QP			
3		3.1947	14.26	11.72	25.98	69.54	-43.56	QP			

Test Mode :	TX Mode

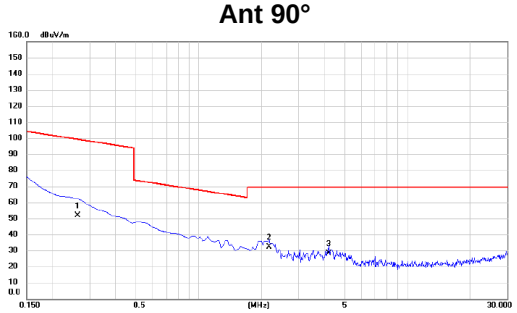
Ant 90°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	0.0132	49.26	16.43	65.69	125.19	-59.50	AVG			
2		0.0250	43.22	14.17	57.39	119.65	-62.26	AVG			
3		0.0330	40.16	13.99	54.15	117.23	-63.08	AVG			

Test Mode :	TX Mode

Ant 90°

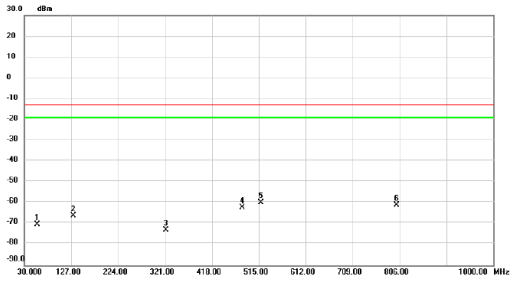


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		0.2621	38.16	13.59	51.75	99.24	-47.49	AVG			
2	*	2.1798	20.14	12.02	32.16	69.54	-37.38	QP			
3		4.1798	16.54	11.72	28.26	69.54	-41.28	QP			

APPENDIX E - RADIATED SPURIOUS EMISSIONS (30MHZ TO 1000MHZ)

Test Mode :	LTE Band 14_TX CH23330_5MHz

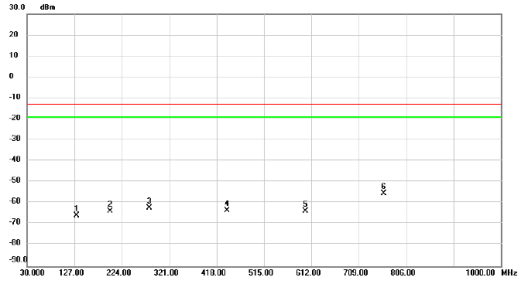
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		56.1900	-68.15	-2.23	-70.38	-13.00	-57.38	peak	
2		131.8500	-62.76	-3.36	-66.12	-13.00	-53.12	peak	
3		323.4250	-71.84	-1.06	-72.90	-13.00	-59.90	peak	
4		480.0800	-64.56	2.40	-62.16	-13.00	-49.16	peak	
5	*	519.8500	-62.86	3.03	-59.83	-13.00	-46.83	peak	
6		800.1800	-68.88	7.87	-61.01	-13.00	-48.01	peak	

Test Mode :	LTE Band 14_TX CH23330_5MHz

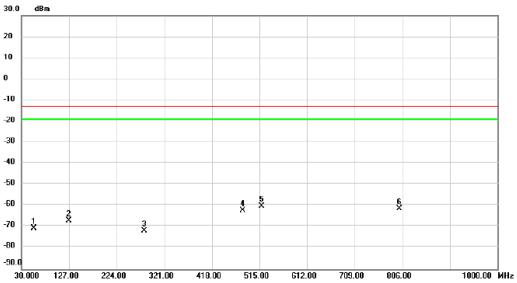
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		131.8500	-62.41	-3.36	-65.77	-13.00	-52.77	peak	
2		200.2350	-58.37	-5.32	-63.69	-13.00	-50.69	peak	
3		279.7750	-59.86	-2.24	-62.10	-13.00	-49.10	peak	
4		439.8250	-65.13	1.67	-63.46	-13.00	-50.46	peak	
5		599.8750	-68.99	5.23	-63.76	-13.00	-50.76	peak	
6	*	759.9250	-62.84	7.56	-55.28	-13.00	-42.28	peak	

Test Mode :	LTE Band 14_TX CH23330_10MHz

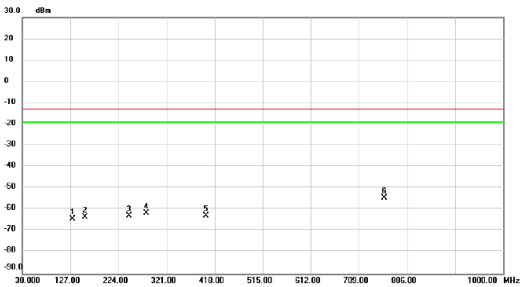
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		55.2200	-68.64	-2.13	-70.77	-13.00	-57.77	peak	
2		126.0300	-63.16	-3.87	-67.03	-13.00	-54.03	peak	
3		279.7750	-69.71	-2.24	-71.95	-13.00	-58.95	peak	
4		480.0800	-64.70	2.40	-62.30	-13.00	-49.30	peak	
5	*	519.8500	-63.32	3.03	-60.29	-13.00	-47.29	peak	
6		800.1800	-69.33	7.87	-61.46	-13.00	-48.46	peak	

Test Mode :	LTE Band 14_TX CH23330_10MHz

Horizontal

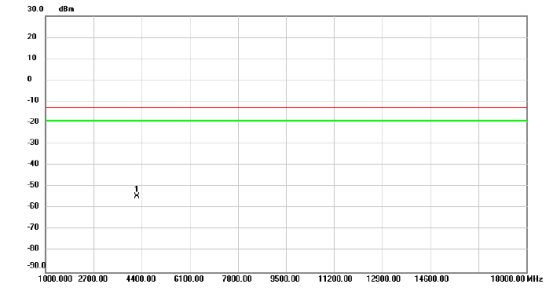


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		131.8500	-60.95	-3.36	-64.31	-13.00	-51.31	peak	
2		155.6150	-61.25	-2.08	-63.33	-13.00	-50.33	peak	
3		245.8250	-59.16	-3.56	-62.72	-13.00	-49.72	peak	
4		279.7750	-59.50	-2.24	-61.74	-13.00	-48.74	peak	
5		400.0550	-63.42	0.47	-62.95	-13.00	-49.95	peak	
6	*	759.9250	-62.12	7.56	-54.56	-13.00	-41.56	peak	

APPENDIX F - RADIATED SPURIOUS EMISSIONS (ABOVE 1000MHZ)

Test Mode :	LTE Band 14_TX CH23330_5MHz

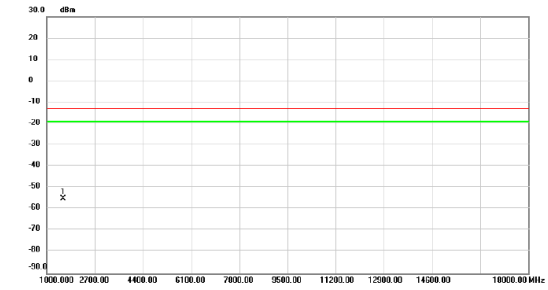
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	Detector	Comment
		MHz	dBm	dB	dBm	dBm	dB		
1	*	4238.500	-66.69	12.34	-54.35	-13.00	-41.35	peak	

Test Mode :	LTE Band 14_TX CH23330_5MHz

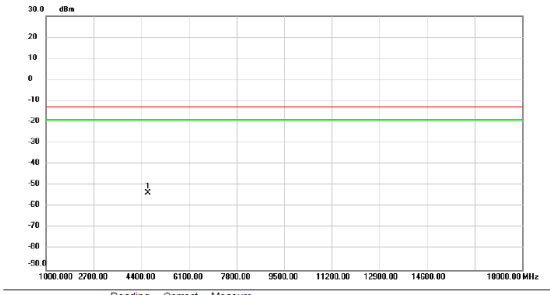
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	Detector	Comment
		MHz	dBm	dB	dBm	dBm	dB		
1	*	1578.000	-60.31	5.19	-55.12	-13.00	-42.12	peak	

Test Mode :	LTE Band 14_TX CH23330_10MHz

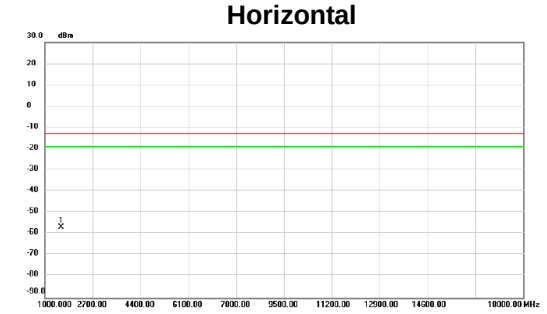
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	Detector	Comment
		MHz	dBm	dB	dBm	dBm	dB		
1	*	4629.500	-66.72	13.24	-53.48	-13.00	-40.48	peak	

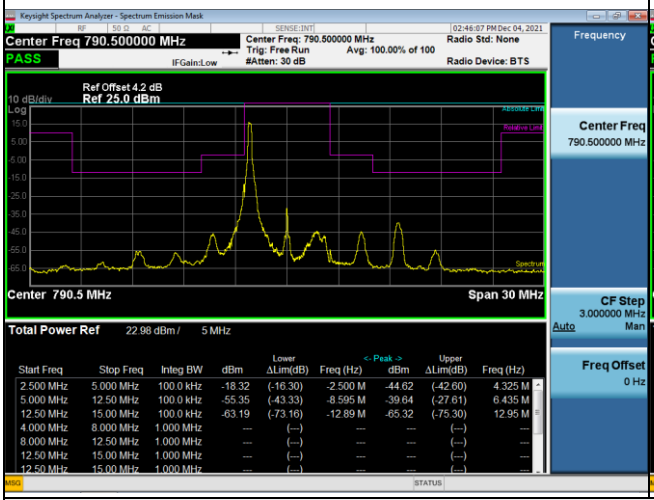
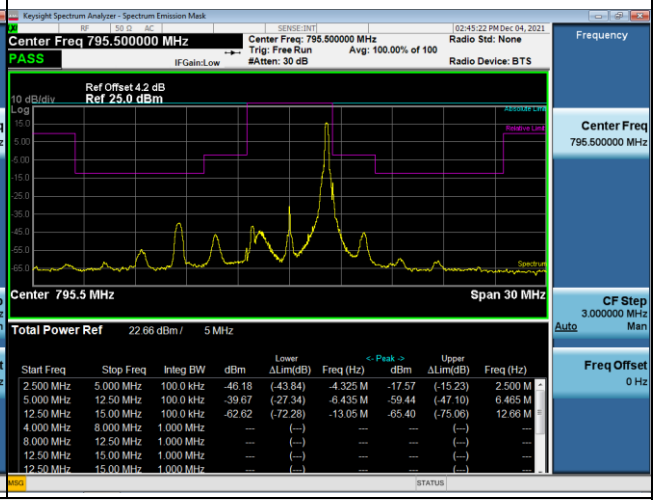
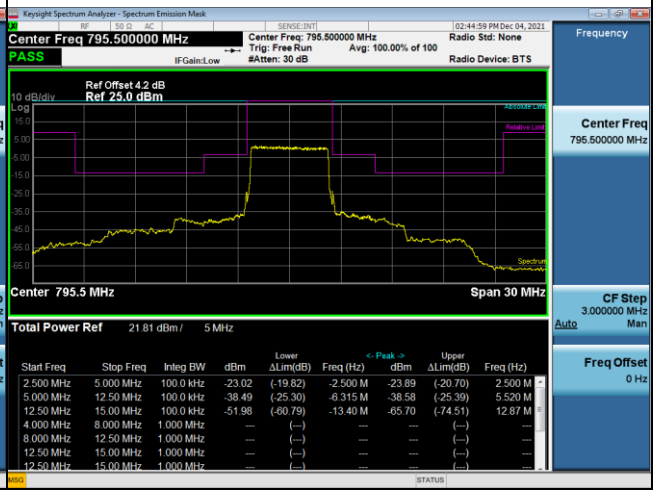
Test Mode :	LTE Band 14_TX CH23330_10MHz

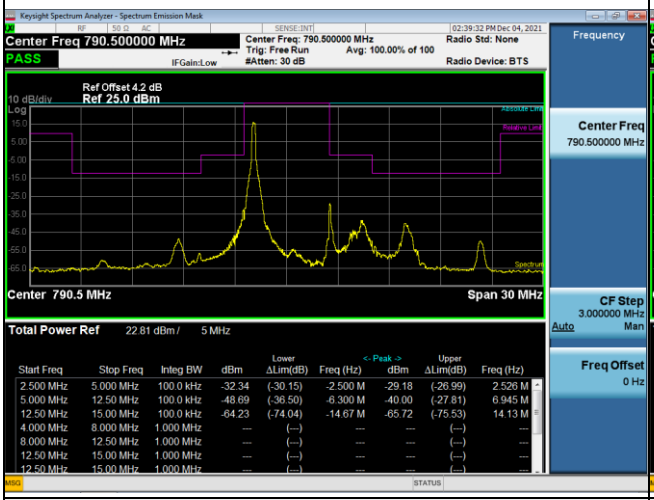
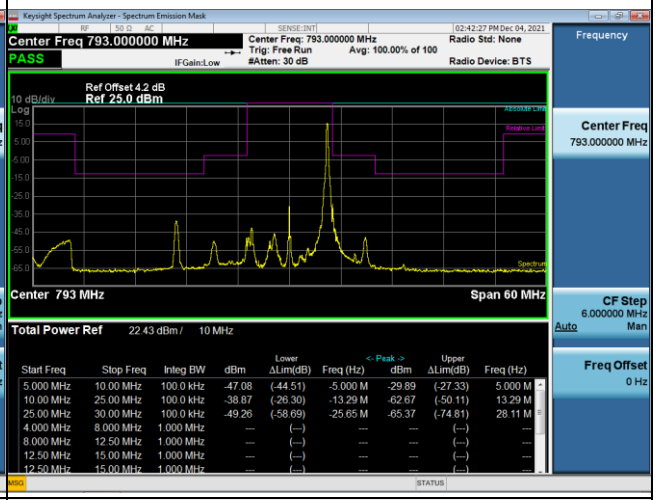
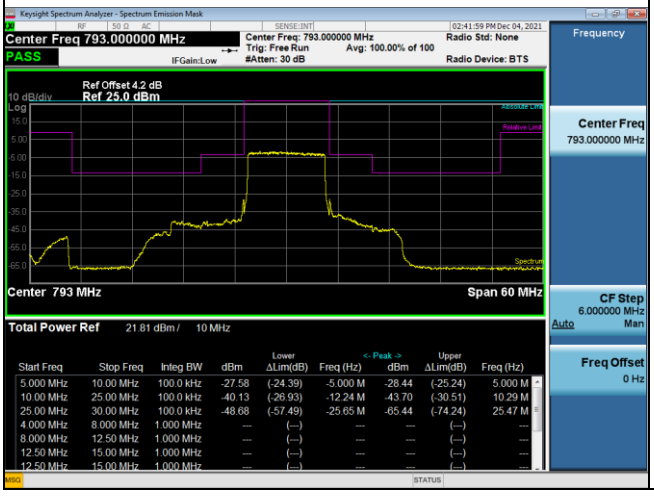
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	Detector	Comment
		MHz	dBm	dB	dBm	dBm	dB		
1	*	1578.000	-62.09	5.19	-56.90	-13.00	-43.90	peak	

APPENDIX G - MASK

LTE Band 14_5MHz			
1RB#0		1RB#24	
Channel	23305	Channel	23355
			
25RB#0			
Channel	23305	Channel	23355
			

LTE Band 14_10MHz			
1RB#0		1RB#49	
Channel	23330	Channel	23330
			
50RB#0		-	
Channel	23330	-	
		-	

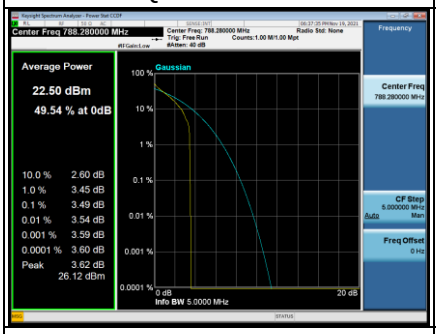
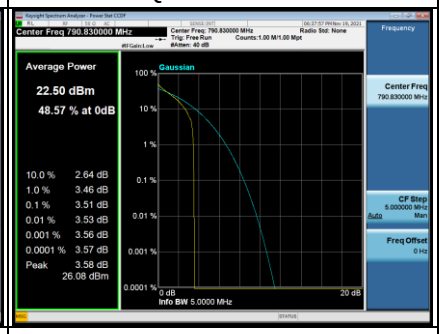
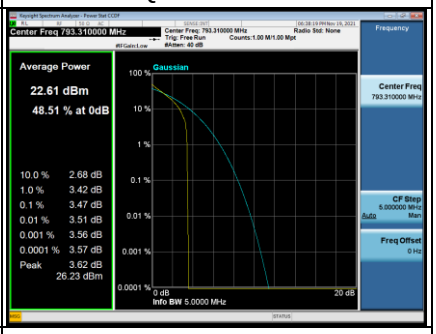
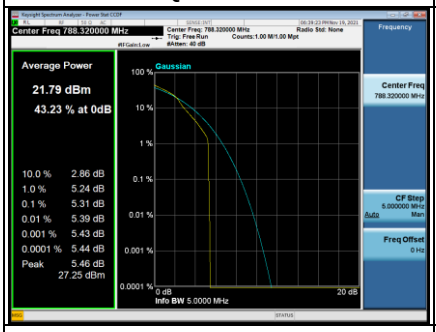
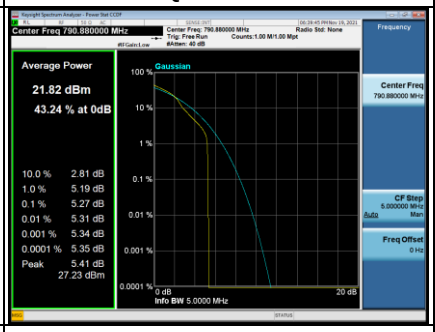
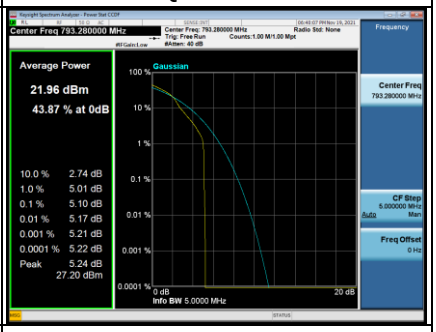
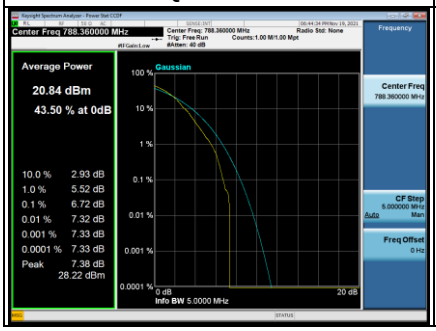
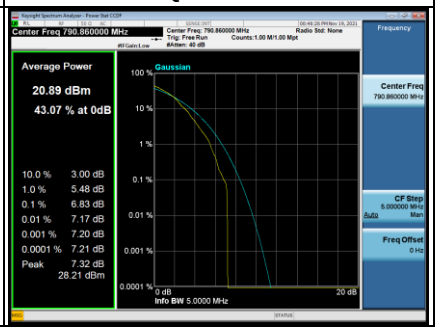
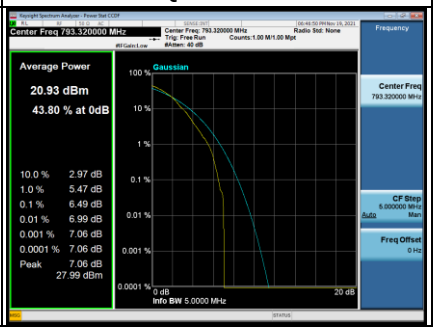
Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Lower Freq (Hz)	<- Peak -> dBm	Upper ΔLim(dB)	Upper Freq (Hz)
2.500 MHz	5.000 MHz	100.0 kHz	-32.34	(-30.15)	-2.500 M	-29.18	(-26.99)	2.526 M
5.000 MHz	12.50 MHz	100.0 kHz	-48.69	(-36.50)	-6.300 M	-40.00	(-27.81)	6.945 M
12.50 MHz	15.00 MHz	100.0 kHz	-64.23	(-74.04)	-14.67 M	-65.72	(-75.53)	14.13 M
4.000 MHz	8.000 MHz	1.000 MHz	---	(---)	---	---	(---)	---
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---

Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Lower Freq (Hz)	<- Peak -> dBm	Upper ΔLim(dB)	Upper Freq (Hz)
5.000 MHz	10.00 MHz	100.0 kHz	-47.08	(-44.51)	-5.000 M	-29.89	(-27.33)	5.000 M
10.00 MHz	25.00 MHz	100.0 kHz	-38.87	(-26.30)	-13.29 M	-62.67	(-50.11)	13.29 M
25.00 MHz	30.00 MHz	100.0 kHz	-49.26	(-58.69)	-25.65 M	-65.37	(-74.81)	28.11 M
4.000 MHz	8.000 MHz	1.000 MHz	---	(---)	---	---	(---)	---
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---

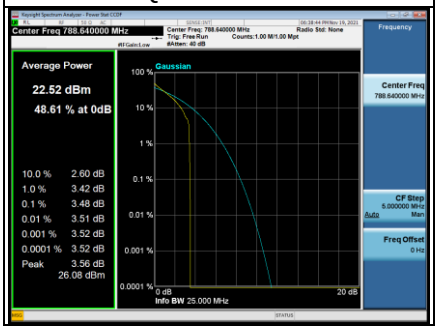
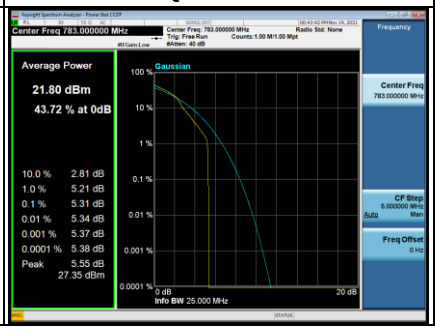
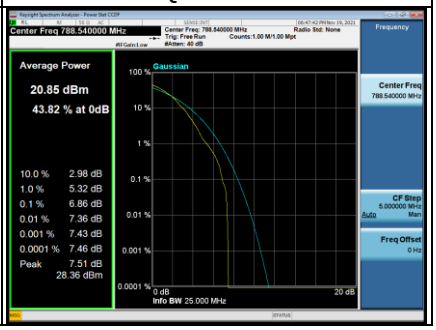
Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Lower Freq (Hz)	<- Peak -> dBm	Upper ΔLim(dB)	Upper Freq (Hz)
5.000 MHz	10.00 MHz	100.0 kHz	-27.58	(-24.39)	-5.000 M	-28.44	(-25.24)	5.000 M
10.00 MHz	25.00 MHz	100.0 kHz	-40.13	(-26.93)	-12.24 M	-43.70	(-30.51)	10.29 M
25.00 MHz	30.00 MHz	100.0 kHz	-48.68	(-57.49)	-25.65 M	-65.44	(-74.24)	25.47 M
4.000 MHz	8.000 MHz	1.000 MHz	---	(---)	---	---	(---)	---
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---

APPENDIX H - PEAK TO AVERAGE RATIO

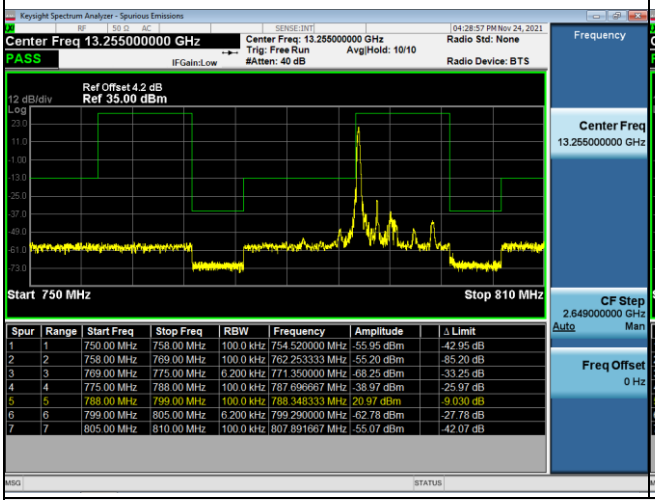
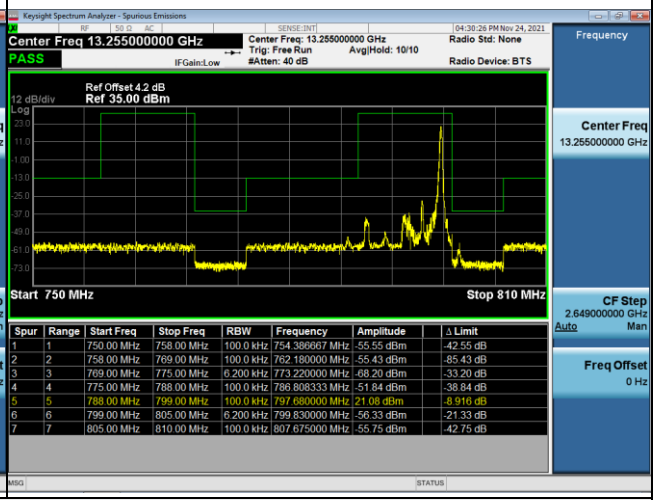
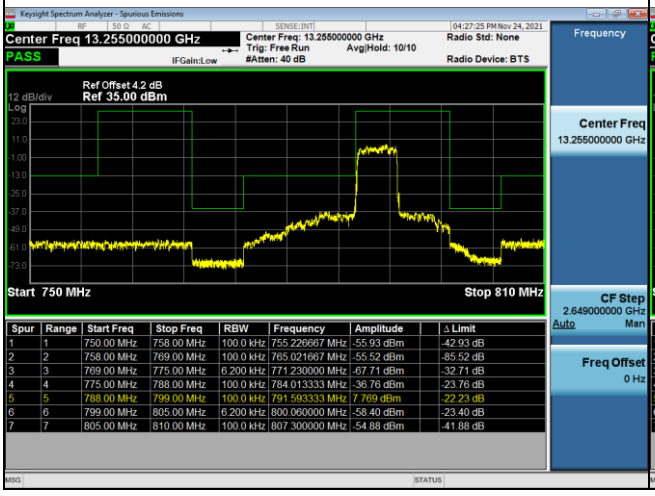
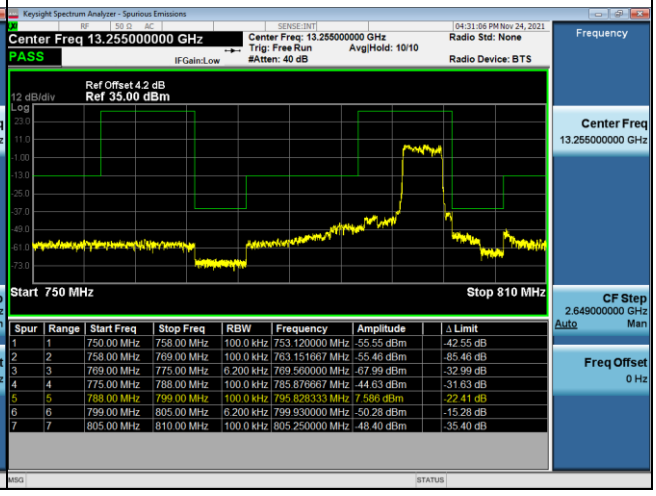
LTE Band 14_5MHz						
Channel	Frequency (MHz)	Peak To Average Ratio (dB)			Max. Limit (dB)	Result
		QPSK	16QAM	64QAM		
23305	790.5	3.49	5.31	6.72	13	Pass
23330	793	3.51	5.27	6.83	13	Pass
23355	795.5	3.47	5.10	6.49	13	Pass

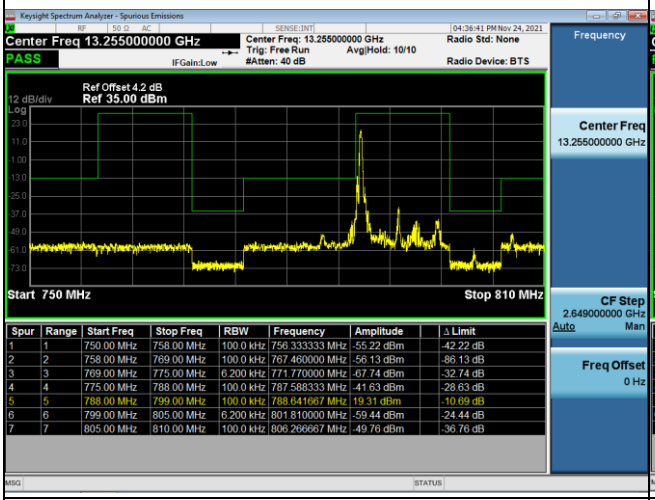
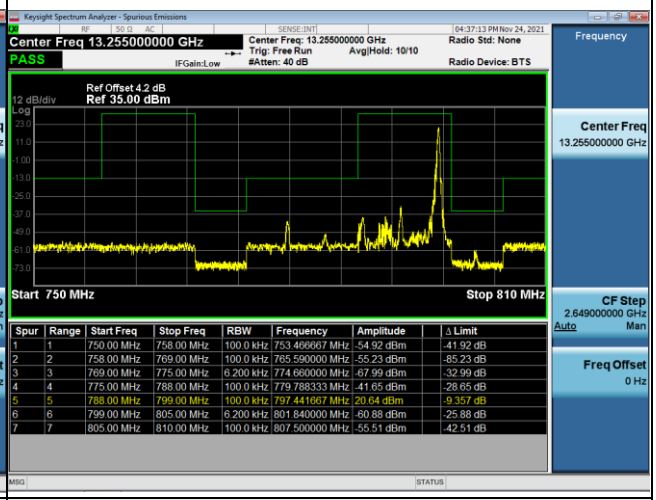
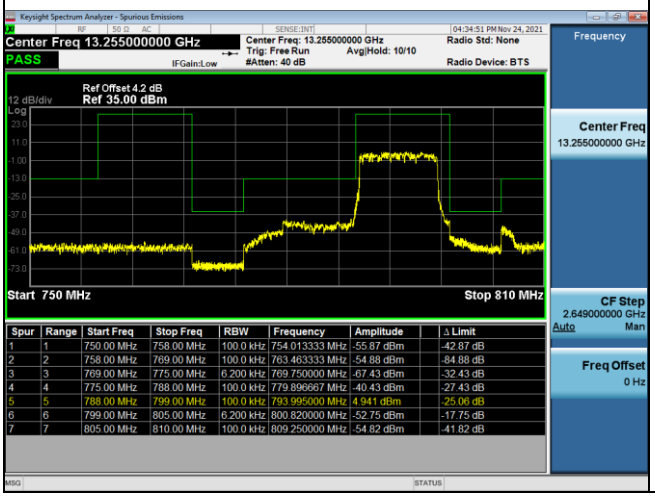
Spectrum Plot		
QPSK-23305	QPSK-23330	QPSK-23355
		
16QAM-23305	16QAM-23330	16QAM-23355
		
64QAM-23305	64QAM-23330	64QAM-23355
		

LTE Band 14_10MHz						
Channel	Frequency (MHz)	Peak To Average Ratio (dB)			Max. Limit (dB)	Result
		QPSK	16QAM	64QAM		
23330	793	3.48	5.31	6.86	13	Pass

Spectrum Plot		
QPSK-23330	16QAM-23330	64QAM-23330
		

APPENDIX I - CONDUCTED BAND EDGE MEASUREMENT

LTE Band 14_5MHz			
1RB#0		1RB#24	
Channel	23305	Channel	23355
			
25RB#0			
Channel	23305	Channel	23355
			

LTE Band 14_10MHz			
1RB#0		1RB#49	
Channel	23330	Channel	23330
			
50RB#0		-	
Channel	23330	-	
		-	

Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	750.00 MHz	758.00 MHz	100.0 kHz	756.333333 MHz	-55.22 dBm	-42.22 dB
2	2	758.00 MHz	769.00 MHz	100.0 kHz	767.460000 MHz	-56.13 dBm	-86.13 dB
3	3	769.00 MHz	775.00 MHz	6.200 kHz	771.770000 MHz	-67.74 dBm	-32.74 dB
4	4	775.00 MHz	788.00 MHz	100.0 kHz	787.588333 MHz	-41.63 dBm	-28.63 dB
5	5	788.00 MHz	799.00 MHz	100.0 kHz	788.641667 MHz	19.31 dBm	-10.69 dB
6	6	799.00 MHz	805.00 MHz	6.200 kHz	801.810000 MHz	-59.44 dBm	-24.44 dB
7	7	805.00 MHz	810.00 MHz	100.0 kHz	806.266667 MHz	-49.76 dBm	-36.76 dB

Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	750.00 MHz	758.00 MHz	100.0 kHz	753.466667 MHz	-54.92 dBm	-41.92 dB
2	2	758.00 MHz	769.00 MHz	100.0 kHz	765.590000 MHz	-55.23 dBm	-85.23 dB
3	3	769.00 MHz	775.00 MHz	6.200 kHz	774.660000 MHz	-67.99 dBm	-32.99 dB
4	4	775.00 MHz	788.00 MHz	100.0 kHz	779.788333 MHz	-41.65 dBm	-28.65 dB
5	5	788.00 MHz	799.00 MHz	100.0 kHz	797.441667 MHz	20.64 dBm	-9.357 dB
6	6	799.00 MHz	805.00 MHz	6.200 kHz	801.840000 MHz	-60.88 dBm	-25.88 dB
7	7	805.00 MHz	810.00 MHz	100.0 kHz	807.500000 MHz	-55.51 dBm	-42.51 dB

Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	750.00 MHz	758.00 MHz	100.0 kHz	754.013333 MHz	-55.87 dBm	-42.87 dB
2	2	758.00 MHz	769.00 MHz	100.0 kHz	763.463333 MHz	-54.88 dBm	-84.88 dB
3	3	769.00 MHz	775.00 MHz	6.200 kHz	769.750000 MHz	-67.43 dBm	-32.43 dB
4	4	775.00 MHz	788.00 MHz	100.0 kHz	779.896667 MHz	-40.43 dBm	-27.43 dB
5	5	788.00 MHz	799.00 MHz	100.0 kHz	793.995000 MHz	4.941 dBm	-25.06 dB
6	6	799.00 MHz	805.00 MHz	6.200 kHz	800.820000 MHz	-52.75 dBm	-17.75 dB
7	7	805.00 MHz	810.00 MHz	100.0 kHz	809.250000 MHz	-54.82 dBm	-41.82 dB

APPENDIX J - FREQUENCY STABILITY

Test Mode	LTE Band 14_CH23330_10MHz

Frequency error versus temperature and supply voltage			
Temperature (°C)	Frequency error (Hz)	ppm	Limit
50	10	0.01	±1.25ppm
40	-4	-0.01	
30	-16	-0.02	
20	4	0.01	
10	26	0.03	
0	25	0.03	
−10	-36	-0.05	
−20	-27	-0.03	
−30	48	0.06	
Minimum voltage	-33	-0.04	
Maximum voltage	-35	-0.04	
Nominal voltage	-36	-0.05	

Note: Nominal voltage= 3.8V, Maximum voltage= 4.2V, Minimum voltage= 3.5V.

End of Test Report