FCC Radio Test Report

FCC ID: 2AAGE-B48

This report concerns: Original Grant

Project No.	:	2201H015
Equipment	:	LTE Module
Brand Name	:	Vantron
Test Model	:	VT-MOD-CELL-B48
Series Model	:	N/A
Applicant	:	Chengdu Vantron Technology Co., Ltd.
Address	:	No.5 GaoPeng Road, Hi-Tech Zone, Chengdu, SiChuan, P.R. China 610045
Manufacturer	:	Chengdu Vantron Technology Co., Ltd.
Address	:	No.5 GaoPeng Road, Hi-Tech Zone, Chengdu, SiChuan, P.R. China 610045
Date of Receipt	:	Jan. 07, 2022
Date of Test	:	Jan. 10, 2022~ Jan. 26, 2022
Issued Date	:	Mar. 17, 2022
Report Version	:	R01
Test Sample	:	Engineering Sample No.: SH2022010745 for EUT SH2022010745-4 for adapter
Standard(s)	:	47 CFR Part 2&Part 96 ANSI/TIA-603-E ANSI C63.26-2015 FCC KDB 971168 D01 Power Meas License Digital Systems v03r01 FCC KDB 940660 D01 Part 96 CBRS Eqpt v03

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

47 CFR Part 2 and FCC KDB 940660 D01 Part 96 CBRS Eqpt v03 are not authorized within the scope of A2LA.

Maker Qi

Prepared by : Maker Qi

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TESTING CERT #5123.03

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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.

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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 No.	Version	Description	Issued Date	Note
BTL-FCCP-1-2201H015	R00	Original Issue.	Feb. 15, 2022	Invalid
BTL-FCCP-1-2201H015	R01	Revised report to address TCB's comments.	Mar. 17, 2022	Valid

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC Part 96 & Part 2			
Standard(s) Section	Test Item	Judgment	Remark
96.41(b)	Equivalent Isotropic Radiated	PASS	------
2.1046	Conducted Output Power	PASS	------
2.1049	Occupied Bandwidth	PASS	------
2.1051& 96.41(e)	Conducted Spurious Emissions	PASS	------
2.1053 & 96.41(e)	Radiated Spurious Emissions	PASS	------
2.1051 & 96.41(e)	Band Edge Measurements&ACLR	PASS	------
2.1055	Frequency Stability for Temperature & Voltage	PASS	------
96.41(g)	Peak To Average Ratio	PASS	------

Note:

(1)" N/A" denotes test is not applicable to this device.

1.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No. 29, Jintang Road, Tangzhen Industry Park, Pudong New Area, Shanghai 201210, China.
BTL's Test Firm Registration Number for FCC: 476765
BTL's Designation Number for FCC: CN1241

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 emissions test:

Test Site	Method	Measurement Frequency Range	Ant. H / V	U, (dB)
SH-CB02	CISPR	9 KHz~30 MHz	-	2.16
		30 MHz~200 MHz	V	4.04
		30 MHz~200 MHz	H	2.90
		200 MHz~1,000 MHz	V	3.76
		200 MHz~1,000 MHz	H	3.82
		1GHz ~ 6GHz	-	4.56
		6GHz ~ 18GHz	-	4.14
		18 ~ 26.5 GHz	-	3.48
		26.5 ~ 40 GHz	-	3.64

B. Conducted test:

Parameter	U
Output Power	±0.95 dB
Occupied Channel Bandwidth	±3.8 %
Conducted Spurious Emission	±2.71 dB
Temperature	±0.08 °C
Humidity	±1.5 %
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.

1.3TEST ENVIRONMENT CONDITIONS

Test Item	Temperature	Humidity	Test Voltage	Tested By
Output Power & EIRP	20°C	40%	AC 120V/60Hz	Danny Dang
Occupied Bandwidth	20°C	40%	AC 120V/60Hz	Danny Dang
Conducted Spurious Emissions	20°C	40%	AC 120V/60Hz	Danny Dang
Radiated Spurious Emissions	24°C	58%	AC 120V/60Hz	Forest Li
Band Edge	20°C	40%	AC 120V/60Hz	Danny Dang
Peak to Average Ratio	20°C	40%	AC 120V/60Hz	Danny Dang
Frequency Stability	Normal and Extreme			Danny Dang

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	LTE Module			
Brand Name	Vantron			
Test Model	VT-MOD-CELL-B48			
Series Model	N/A			
Model Difference(s)	N/A			
Hardware Version	V1.1			
Software Version	V100R001.F0000-03			
Power Source	DC voltage supplied from AC/DC adapter. Brand/ Model: Xinspower/ A241-0503000U			
Power Rating	I/P: 100-240V~50/60Hz 0.8A O/P: 5.0V⎓3000mA			
Modulation Type	LTE		UL: QPSK,16QAM,64QAM DL: QPSK,16QAM	
Max. EIRP	LTE	Channel Bandwidth (MHz)	QPSK (dBm)	16QAM (dBm)
	Band 48	5	22.40	22.48
		10	22.34	22.26
		15	22.42	22.36
		20	22.72	22.86

Note:

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

2. The Channel List:

LTE Band 48			
Test Frequency ID	Bandwidth (MHz)	EARFCN	Frequency (UL and DL) (MHz)
Low Range	5	55265	3552.5
	10	55290	3555.0
	15	55315	3557.5
	20	55340	3560.0
Mid Range	5/10/15/20	55990	3625.0
High Range	5	56715	3697.5
	10	56690	3695.0
	15	56665	3692.5
	20	56640	3690.0

3. Table for Filed Antenna:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Note
Ant.0	N/A	N/A	Internal PIFA Antenna	N/A	1	LTE Band 48

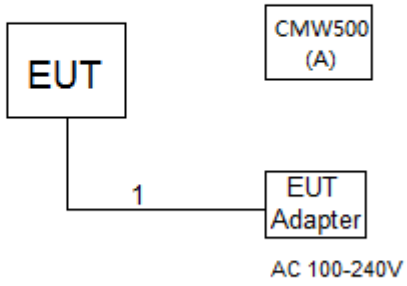
Note: The antenna gain is provided by the manufacturer.

2.2 DESCRIPTION OF TEST MODES AND TEST CONDITION

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

LTE BAND 48 MODE					
Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
Output Power & EIRP	55265 to 56715	55265, 55990, 56715	5MHz	QPSK, 16QAM	1RB/12RB/25RB
	55290 to 56690	55290, 55990, 56690	10MHz	QPSK, 16QAM	1RB/25RB/50RB
	55315 to 56665	55315, 55990, 56665	15MHz	QPSK, 16QAM	1RB/36RB/75RB
	55340 to 56640	55340, 55990, 56640	20MHz	QPSK, 16QAM	1RB/50RB/100RB
Occupied Bandwidth	55265 to 56715	55265, 55990, 56715	5MHz	QPSK, 16QAM	25RB
	55290 to 56690	55290, 55990, 56690	10MHz	QPSK, 16QAM	50RB
	55315 to 56665	55315, 55990, 56665	15MHz	QPSK, 16QAM	75RB
	55340 to 56640	55340, 55990, 56640	20MHz	QPSK, 16QAM	100RB
Conducted Spurious Emissions	55290 to 56690	55990	20MHz	QPSK	1RB
Radiated Spurious Emissions	55340 to 56640	55990	20MHz	QPSK	1RB
Band Edge& ACLR	55265 to 56715	55265, 55990, 56715	5MHz	QPSK	1RB/24RB/25RB
	55290 to 56690	55290, 55990, 56690	10MHz	QPSK	1RB/49RB/50RB
	55315 to 56665	55315, 55990, 56665	15MHz	QPSK	1RB/74RB/75RB
	55340 to 56640	55340, 55990, 56640	20MHz	QPSK	1RB/99RB/100RB
Peak To Average Ratio	55265 to 56715	55265, 55990, 56715	5MHz	QPSK, 16QAM	1RB
	55290 to 56690	55290, 55990, 56690	10MHz	QPSK, 16QAM	1RB
	55315 to 56665	55315, 55990, 56665	15MHz	QPSK, 16QAM	1RB
	55340 to 56640	55340, 55990, 56640	20MHz	QPSK, 16QAM	1RB
Frequency Stability for Temperature & Voltage	55340 to 56640	55340, 56640	20MHz	QPSK	1RB

2.3 BLOCK DIGRAM SHOWING THECONFIGURATION OF SYSTEM TESTED



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	CMW500	N/A	N/A	129246

Item	Cable Type	Shielded Type	Ferrite Core	Length
1	DC	N/A	N/A	1m

3. TEST RESULT

3.1 OUTPUT POWER & EIRP MEASUREMENT

3.1.1 LIMIT

EIRP for CBRS equipment as below table:

Device	Maximum EIRP (dBm/10 MHz)
End User Device	23
Category A CBSD	30
Category B CBSD	47

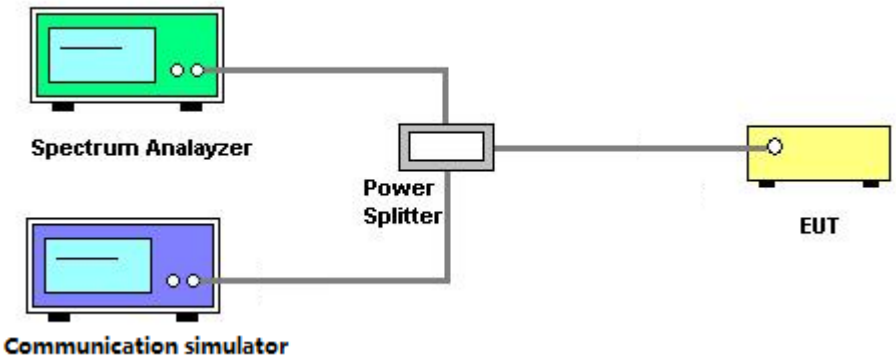
3.1.2 TEST PROCEDURE

The testing follows ANSI C63.26-2015 Section 5.2.4.4.2
Conducted Output Power:
The EUT can operate with a constant duty cycle.
a) Set span to 2 × to 3 × the OBW.
b) Set RBW = 1% to 5% of the OBW.
c) Set VBW ⩾ 3 × RBW.
d) Set number of measurement points in sweep ⩾ 2 × span / RBW.
e) Sweep time:
1) Set = auto-couple, or
2) Set ⩾ [10 × (number of points in sweep) × (transmission symbol period)] for single sweep (automation-compatible) measurement.
f) Detector = power averaging (rms).
g) Set sweep trigger to “free run.”
h) Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over the on and off time of the transmitter, it can be necessary to increase the number of traces to be averaged above 100, or if using a manually configured sweep time, increase the sweep time.
i) Compute power by integrating the spectrum across the OBW of the signal using the instrument’s band or channel power measurement function with band/channel limits set equal to the OBW band edges. If the instrument does not have a band or channel power function, sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
j) Add 10 log (1/duty cycle) to the measured power level to compute the average power during continuous transmission. For example, add [10 log (1/0.25)] = 6 dB if the duty cycle is a constant 25%.

EIRP Power:
The testing follows ANSI C63.26-2015 Section 5.2.5.5
According to KDB 412172 D01 Power Approach,
EIRP = PT + GT – LC, where
PT = transmitter output power in dBm
GT = gain of the transmitting antenna in dBi
LC = signal attenuation in the connecting cable between the transmitter and antenna in dB

3.1.3 TESTSETUP LAYOUT

Conducted Power Measurement



3.1.4 TEST DEVIATION

No deviation

3.1.5 TEST RESULTS

Please refer to the APPENDIX A.

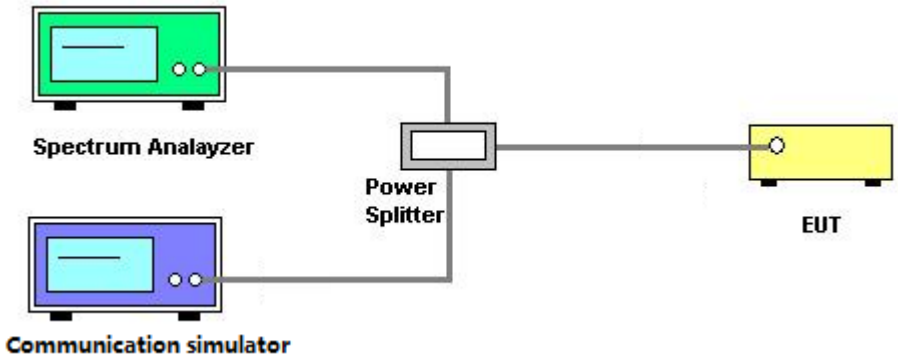
3.2 OCCUPIED BANDWIDTH MEASUREMENT

3.2.1 TEST PROCEDURE

The testing follows ANSI C63.26-2015 Section 5.4.3 (26dB) and Section 5.4.4 (99OB)

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. 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.
3. 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.
4. Set the detection mode to peak, and the trace mode to max hold.
5. 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)
6. Determine the “-26 dB down amplitude” as equal to (Reference Value – X).
7. 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.
8. Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.

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 EMISSIONS MEASUREMENT

3.3.1 LIMIT

The conducted power of emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.

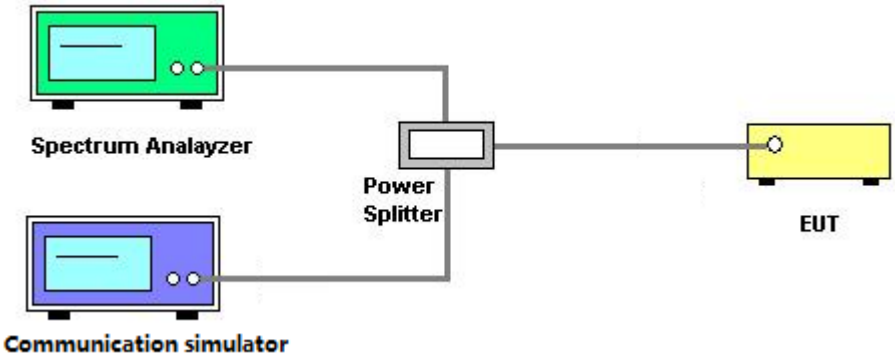
Between 3530 MHz and 3720 MHz is the band edge range.

3.3.2 TEST PROCEDURE

The testing follows ANSI C63.26-2015 Section 5.7

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. 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.
3. The middle channel for the highest RF power within the transmitting frequency was measured.
4. The conducted spurious emission for the whole frequency range was taken.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz.
6. Set spectrum analyzer with RMS detector.
7. Taking the record of maximum spurious emission.
8. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
9. The limit line is −40dBm/MHz.

3.3.3 TESTSETUP LAYOUT



3.3.4 TESTDEVIATION

No deviation

3.3.5 TEST RESULTS

Please refer to the APPENDIX C.

3.4 RADIATED EMISSIONS MEASUREMENT

3.4.1 LIMIT

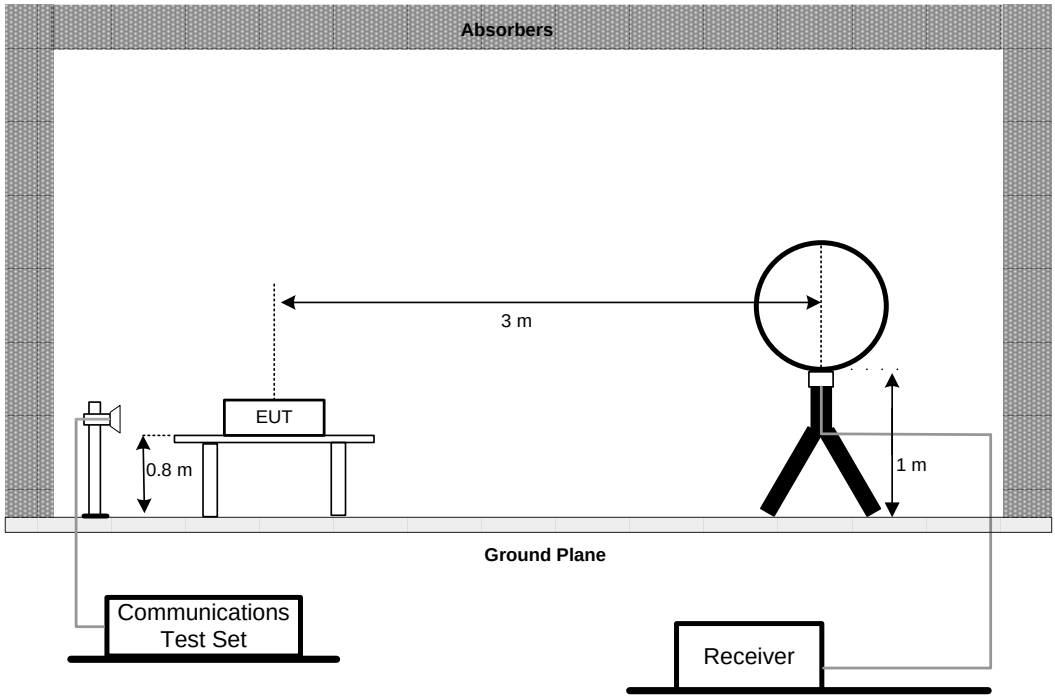
The power of any emission outside of the authorized operating frequency ranges shall not exceed -40dBm/MHz.

3.4.2 TEST PROCEDURES

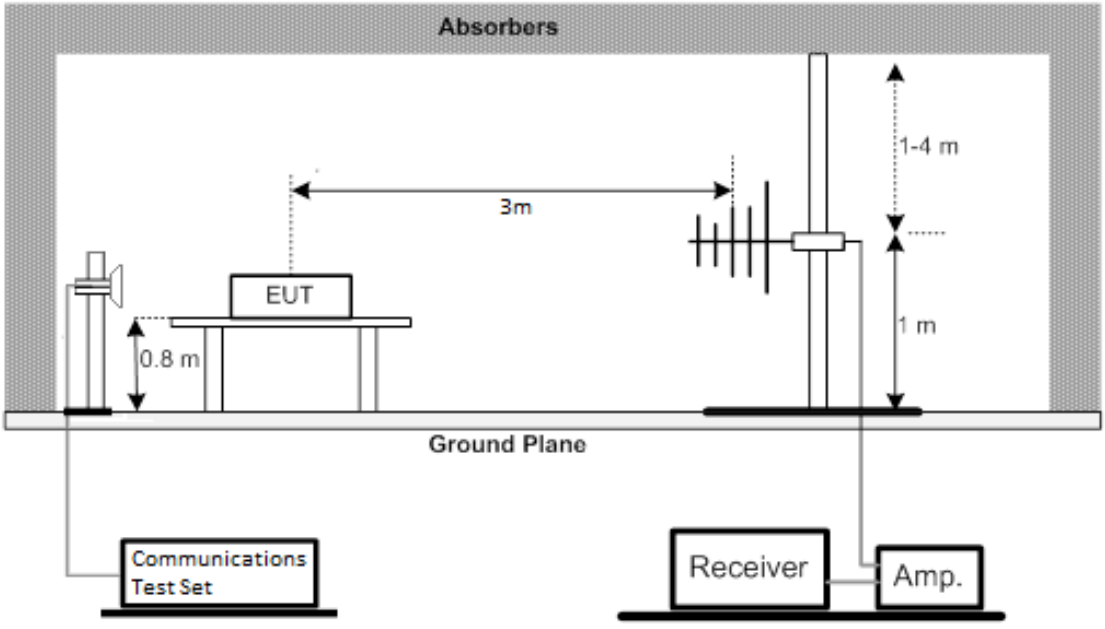
1. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 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. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.P.R power - 2.15dBi.
5. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

3.4.3TEST SETUP LAYOUT

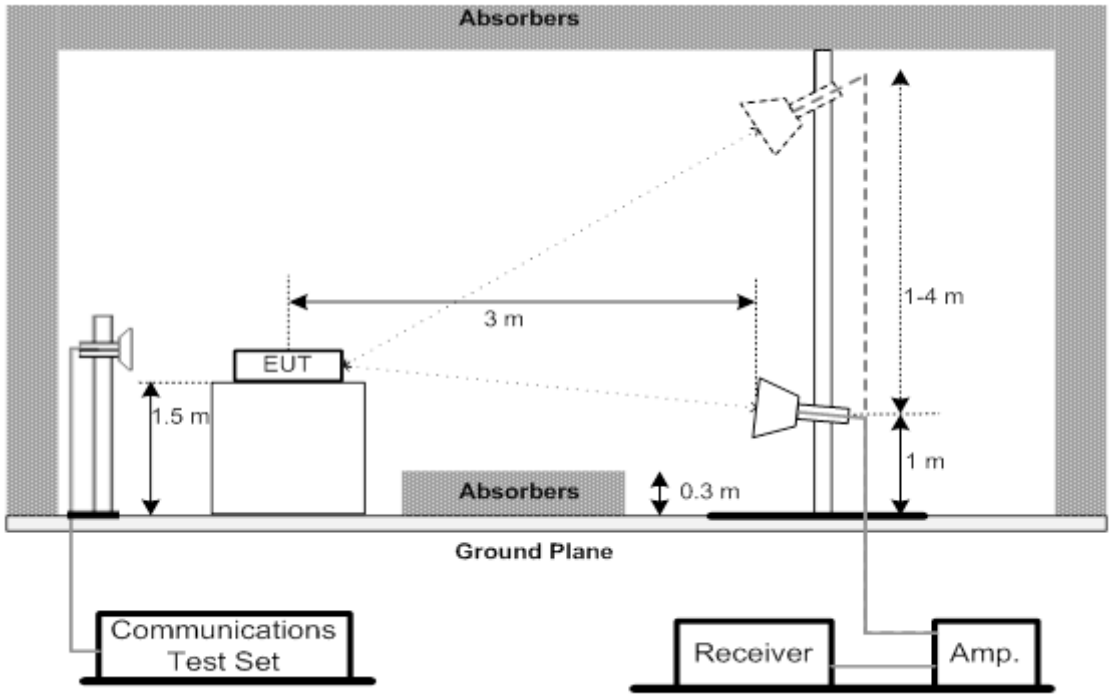
Below 30MHz



30MHz to 1000MHz



Above 1GHz



3.4.4 TESTDEVIATION

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 BAND EDGE MEASUREMENT

3.5.1 LIMIT

For channel and frequency assignments made by a CBSD to End User Devices,the conducted power of any End User Device emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed -13dBm/MHz within 0 to B megahertz (where B is the bandwidth in the assigned channel or multiple contiguous channels of the End User Device) above the upper CBSD-assigned channel edge and within 0 to B megahertz below the lower CBSD-assigned channel edge. At all frequencies greater than B megahertz above the upper CBSD assigned channel edge and less than B megahertz below the lower CBSD-assigned channel edge, the conducted power of any End User Device emission shall not exceed 25 dBm/Mhz.

Additional protection levels. Notwithstanding paragraph (e)(1) of this section, for CBSDs and End User Devices, the conducted power of emissions below 3540 MHz or above 3710 MHz shall not exceed -25 dBm/MHz, and the conducted power of emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.

Notwithstanding the emission limits in this paragraph, the Adjacent Channel Leakage Ratio for End User Devices shall be at least 30 dB.

3.5.2 TEST PROCEDURES

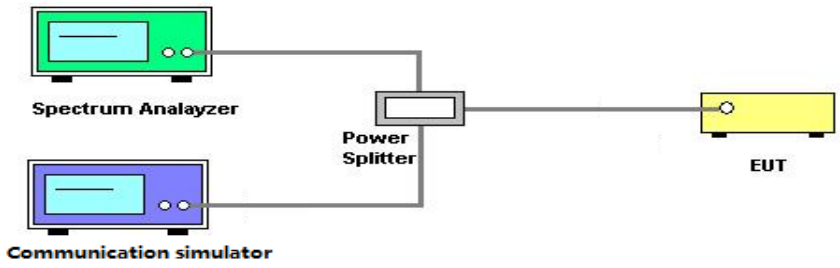
The testing follows FCC KDB 971168 D01 v03r01 Section 6.1.

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.
3. Set RBW >= 1% EBW in the 1MHz band immediately outside and adjacent to the band edge.
4. Beyond the 1 MHz band from the band edge, RBW=1MHz was used
5. Set spectrum analyzer with RMS detector.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

For Adjacent Channel Leakage Ratio (ACLR) measurement,

7. The Adjacent Channel Leakage Ratio (ACLR) is the ratio of the average power in the assigned aggregated channel bandwidth to the average power over the equivalent adjacent channel bandwidth.
8. The option ACLR of spectrum analyzer is used and measures the ACLR ratio by setting equivalent channel bandwidth.
9. The measured ACLR ratio shall be at least 30 dB.

3.5.3 TESTSETUP LAYOUT



3.5.4 TESTDEVIATION

No deviation

3.5.5 TEST RESULTS

Please refer to the APPENDIX G.

3.6 FREQUENCY STABILITY MEASUREMENT

3.6.1 LIMIT

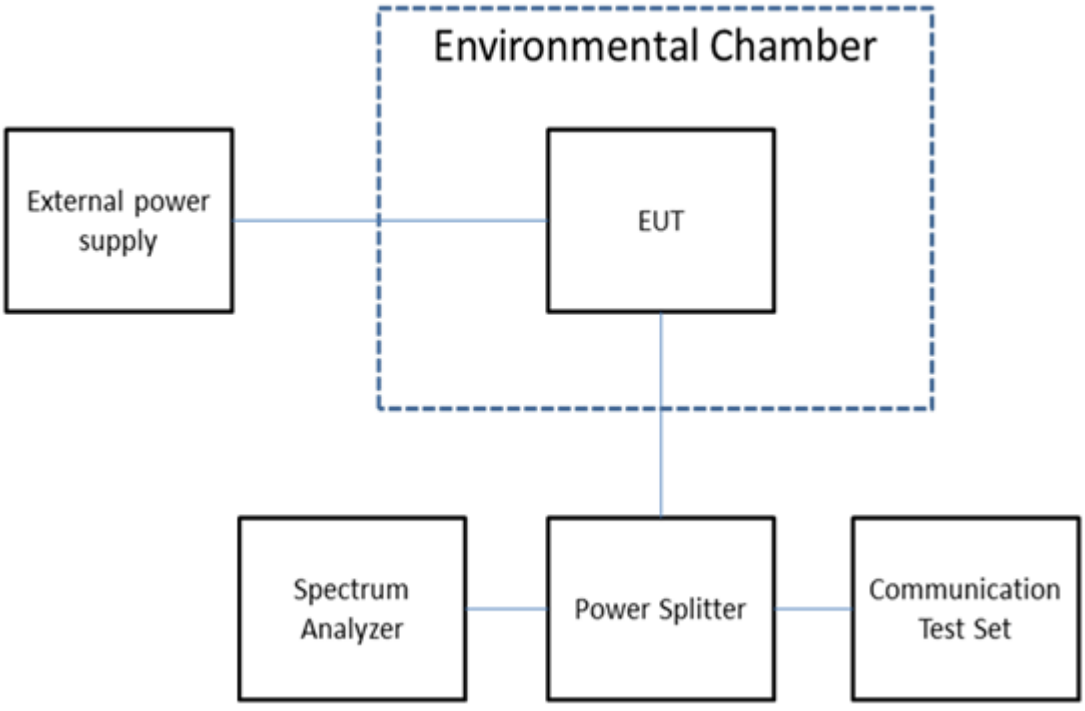
Limit is not defined in part 96 standard. BTL uses the following restrictions:The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

3.6.2 TEST PROCEDURES

The testing follows ANSI C63.26-2015 Section 5.6.

1. A reference point shall be established at the applicable unwanted emissions limit using a RBW equal to the RBW required by the unwantedemissions specification of the applicable regulatory standard. These reference points measuredusing the lowest and highest channel of operation shall be identified as f L and f H respectively. The worst-case frequency offset determined in the above methods shall be added or subtracted from the values of f L and f H and the resulting frequencies must remain within the band.
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.

3.6.3 TESTSETUP LAYOUT



3.6.4 TESTDEVIATION

No deviation

3.6.5 TEST RESULTS

Please refer to the APPENDIX H.

3.7 PEAK TO AVERAGE RATIO MEASUREMENT

3.7.1 LIMIT

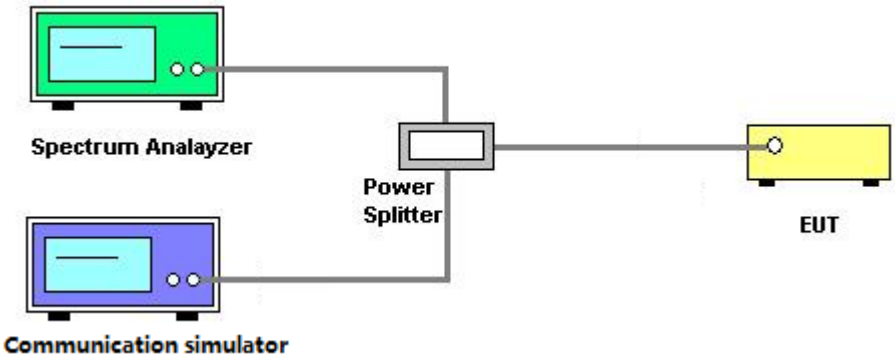
In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB.

3.7.2 TEST PROCEDURES

The testing follows ANSI C63.26-2015 Section 5.2.6.

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

3.7.3 TEST SETUP LAYOUT



3.7.4 TEST DEVIATION

No deviation

3.7.5 TEST RESULTS

Please refer to the APPENDIX I.

4. LIST OF MEASUREMENT EQUIPMENTS

Radiated Emission Measurement(9K-30M)					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Loop Antenna	EMCI	EMCI LPA600	275	May. 20, 2022
2	MXE EMI Receiver	Keysight	N9038A	MY56400088	Mar. 21, 2022
3	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
4	Wideband Radio Communication Test	R&S	CMW500	129246	Aug. 23, 2022

Radiated Emission Measurement(30M-1G)					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	TRILOG Broadband Antenna	Schwarzbeck	VULB 9160	9160-3233	Mar. 26, 2022
2	Pre-Amplifier	emci	EMC9135	980401	Mar. 20, 2022
3	MXE EMI Receiver	Keysight	N9038A	MY56400088	Mar. 21, 2022
4	Test Cable	emci	EMC104-SM-SM-7000	181020	Apr. 11, 2022
5	Test Cable	emci	EMC104-SM-SM-2500	170618	Apr. 11, 2022
6	Test Cable	emci	EMC104-SM-SM-800	170647	Apr. 11, 2022
7	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
8	Wideband Radio Communication Test	R&S	CMW500	129246	Aug. 23, 2022

Radiated Emission Measurement(1G-18G)					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Double Ridged Broadband Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-1817	Mar. 26, 2022
2	Pre-Amplifier	emci	EMC051845SE	980725	Aug. 23, 2022
3	EXA Spectrum Analyzer	Keysight	N9010A	MY56480579	Mar. 21, 2022
4	Test Cable	emci	EMC104-SM-SM-7000	181020	Apr. 11, 2022
5	Test Cable	emci	EMC104-SM-SM-2500	170618	Apr. 11, 2022
6	Test Cable	emci	EMC104-SM-SM-800	170647	Apr. 11, 2022
7	Double-Ridged Waveguide Horn Antenna	ETS-Lindgren	3116C	00203919	May 19, 2022
8	Pre-Amplifier	emci	EMC184045B	980265	Apr. 11, 2022
9	Test Cable	emci	EMC102-SM-SM-800	170335	Apr. 11, 2022
10	Test Cable	emci	EMC102-KM-KM-2500	170627	Apr. 11, 2022
11	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
12	Wideband Radio Communication Test	R&S	CMW500	129246	Aug. 23, 2022

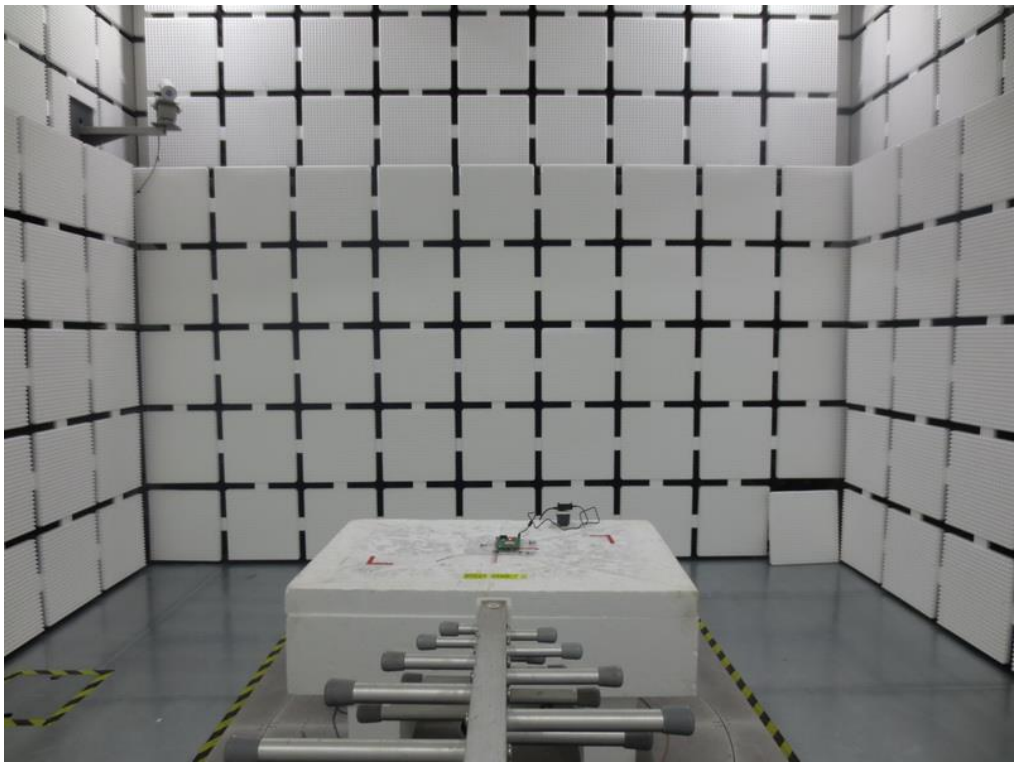
Conducted Emission & Band Edge & Occupied Bandwidth Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Wideband Radio Communication Test	R&S	CMW500	129246	Aug. 23, 2022
2	EXA Spectrum Analyzer	Keysight	N9010A	MY56480579	Mar. 21, 2022
3	Power Divider	JUK	PD-2SF-2060	N/A	N/A

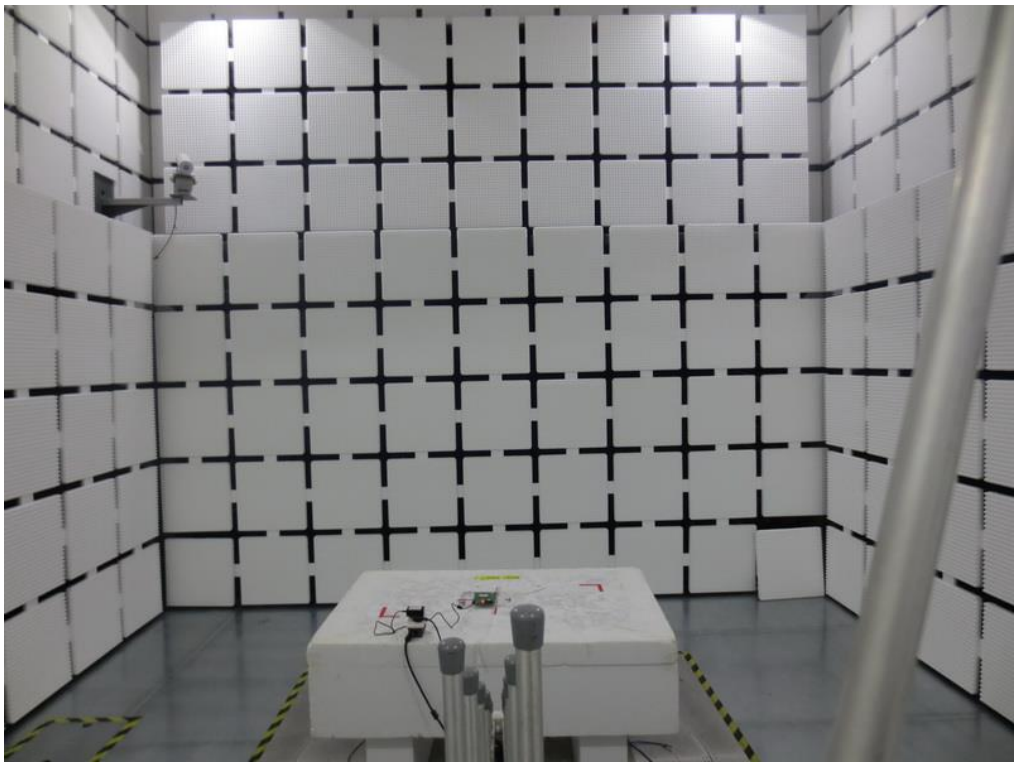
Remark: ”N/A” denotes no model name, serial no. or calibration specified.
Except * item, all calibration period of equipment list is one year.
“*” calibration period of equipment list is three year.

5. EUT TEST PHOTO

Radiated Emissions Test Photos

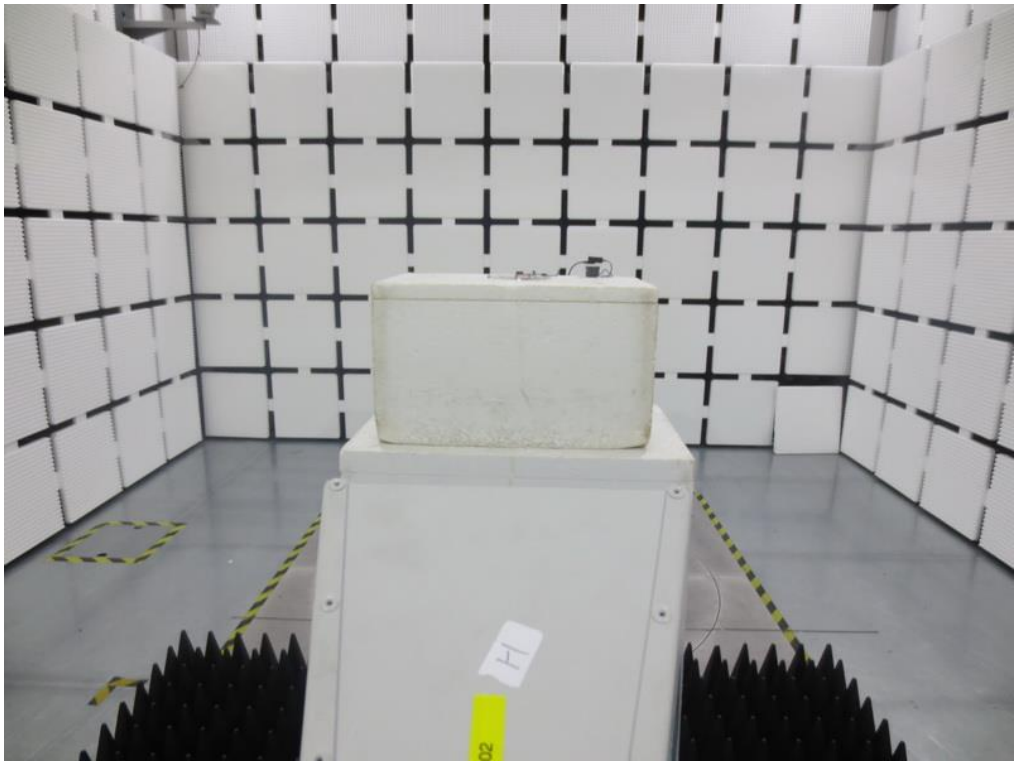
30 MHz to 1 GHz

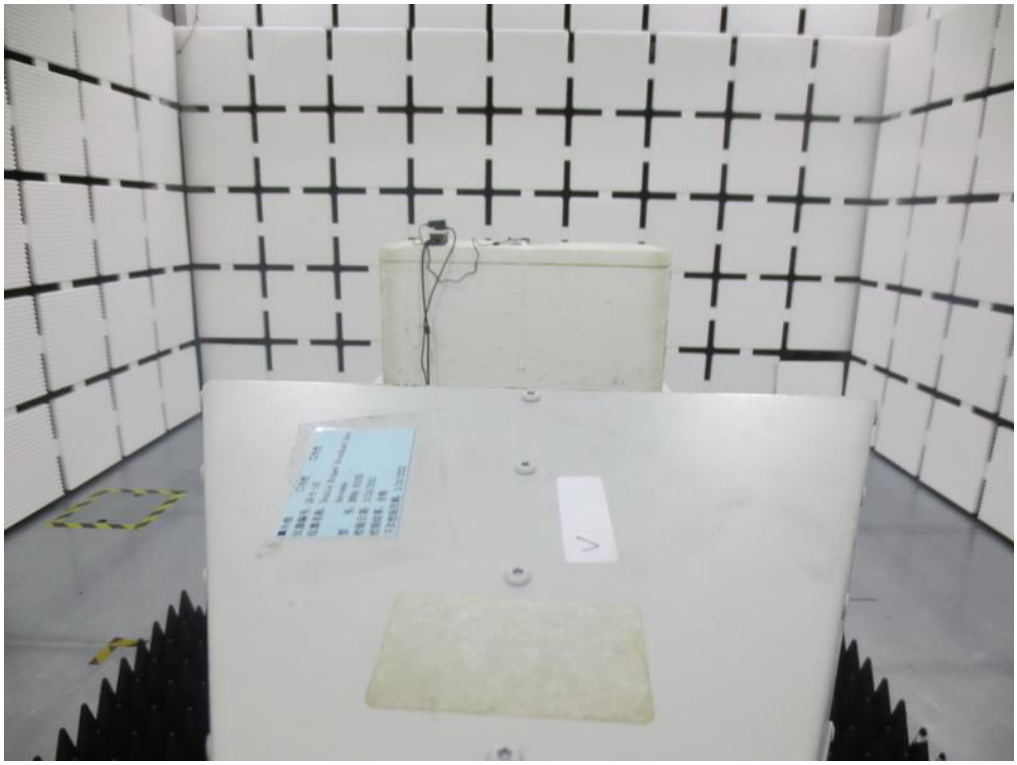




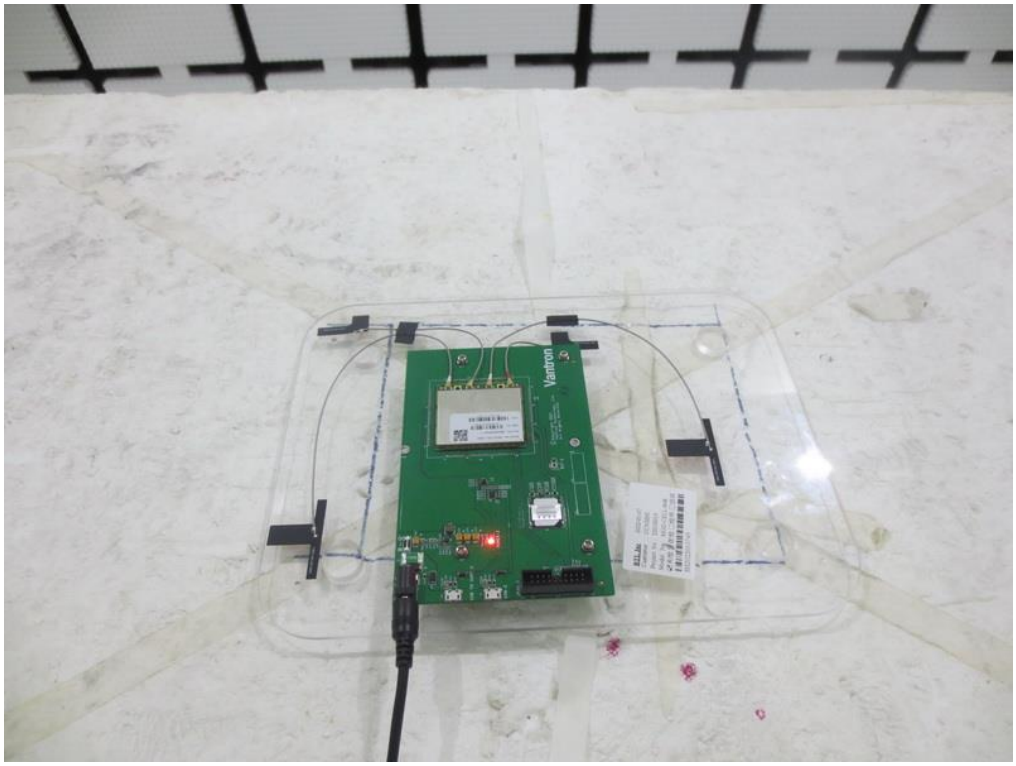
Radiated Emissions Test Photos

Above 1 GHz





close-up test photo



APPENDIX A - OUTPUT POWER & EIRP

Output Power (dBm):

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				55265CH	55990CH	56715CH
				3552.5MHz	3625.5MHz	3697.5MHz
5M	QPSK	1	0	19.46	20.10	21.13
		1	12	19.41	20.26	21.12
		1	24	19.43	20.14	21.08
		12	0	19.67	20.41	21.40
		12	7	19.48	20.18	21.15
		12	13	19.50	20.17	21.11
		25	0	19.49	20.18	21.13
	16QAM	1	0	19.70	20.49	21.47
		1	12	19.63	20.66	21.48
		1	24	19.66	20.53	21.44
		12	0	19.76	20.51	21.43
		12	7	19.57	20.29	21.19
		12	13	19.58	20.28	21.17
		25	0	19.52	20.21	21.20

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				55290CH	55990CH	56690CH
				3555MHz	3625.5MHz	3695MHz
10M	QPSK	1	0	19.56	20.23	21.34
		1	25	19.52	20.28	21.26
		1	49	19.62	20.45	21.25
		25	0	19.37	20.19	21.07
		25	12	19.46	20.08	21.19
		25	25	19.28	20.20	21.05
		49	0	19.24	20.06	21.05
	16QAM	1	0	19.40	20.37	21.19
		1	25	19.49	20.32	21.14
		1	49	19.59	20.38	21.13
		25	0	19.39	20.09	21.11
		25	12	19.46	20.16	21.26
		25	25	19.48	20.10	21.08
		49	0	19.42	20.09	21.06

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				55315CH	55990CH	56665CH
				3557.5MHz	3625.5MHz	3692.5MHz
15M	QPSK	1	0	19.86	20.27	21.42
		1	37	19.53	20.25	21.15
		1	74	19.82	20.62	21.37
		36	0	19.39	20.02	20.98
		36	20	19.27	20.20	20.95
		36	39	19.48	20.11	20.86
		75	0	19.43	20.09	20.94
	16QAM	1	0	20.01	20.30	21.36
		1	37	19.74	20.32	20.98
		1	74	20.21	20.71	21.20
		36	0	19.41	19.98	20.01
		36	20	19.52	20.02	20.00
		36	39	19.51	20.05	19.95
		75	0	19.48	20.04	20.03

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				55340CH	55990CH	56640CH
				3560MHz	3625.5MHz	3690MHz
20M	QPSK	1	0	20.05	20.69	21.72
		1	49	19.86	20.58	21.43
		1	99	20.52	20.71	21.52
		50	0	19.86	20.34	21.42
		50	24	19.87	20.42	21.30
		50	50	20.02	20.53	21.31
		99	0	19.89	20.47	21.37
	16QAM	1	0	20.09	20.37	21.86
		1	49	19.81	20.21	21.34
		1	99	20.38	20.64	21.54
		50	0	19.76	20.29	21.42
		50	24	19.77	20.34	21.41
		50	50	19.89	20.41	21.30
		99	0	19.81	20.36	21.33

EIRP Power (dBm):

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				55265CH	55990CH	56715CH
				3552.5MHz	3625.5MHz	3697.5MHz
5M	QPSK	1	0	20.46	21.10	22.13
		1	12	20.41	21.26	22.12
		1	24	20.43	21.14	22.08
		12	0	20.67	21.41	22.40
		12	7	20.48	21.18	22.15
		12	13	20.50	21.17	22.11
		25	0	20.49	21.18	22.13
	16QAM	1	0	20.70	21.49	22.47
		1	12	20.63	21.66	22.48
		1	24	20.66	21.53	22.44
		12	0	20.76	21.51	22.43
		12	7	20.57	21.29	22.19
		12	13	20.58	21.28	22.17
		25	0	20.52	21.21	22.20

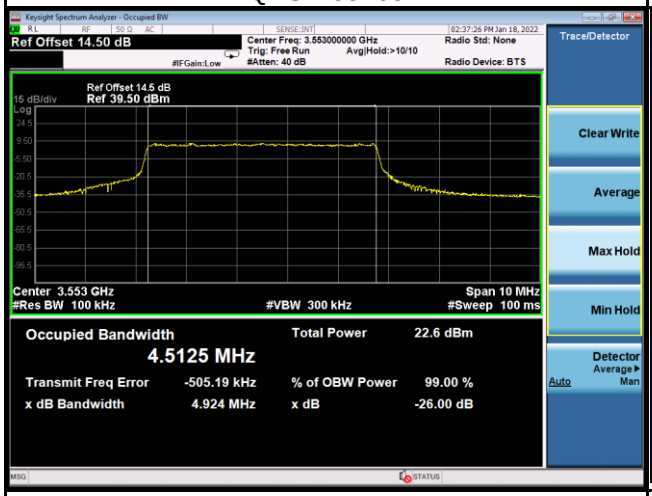
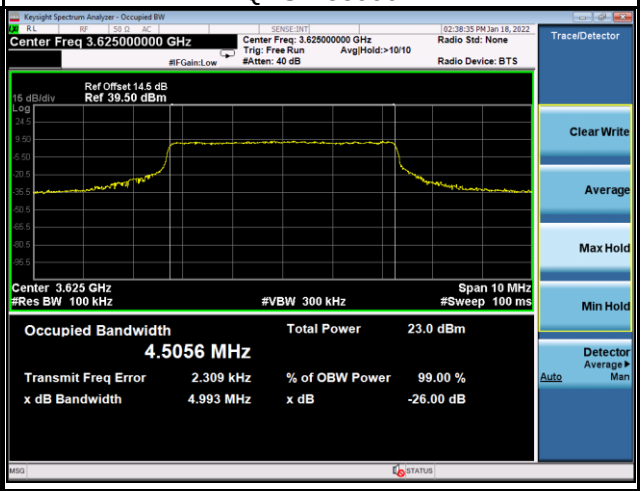
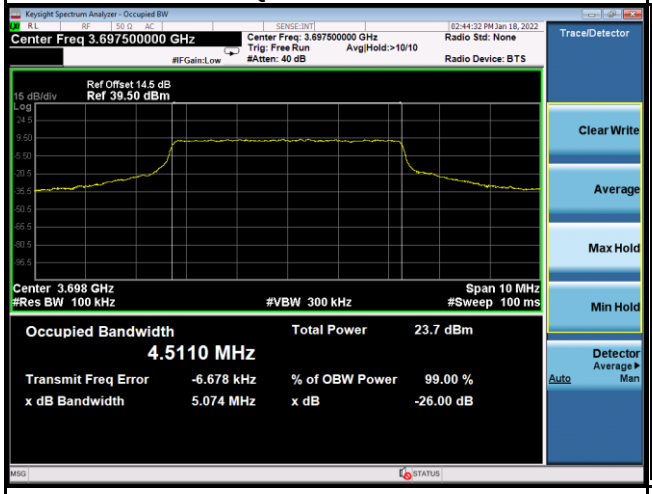
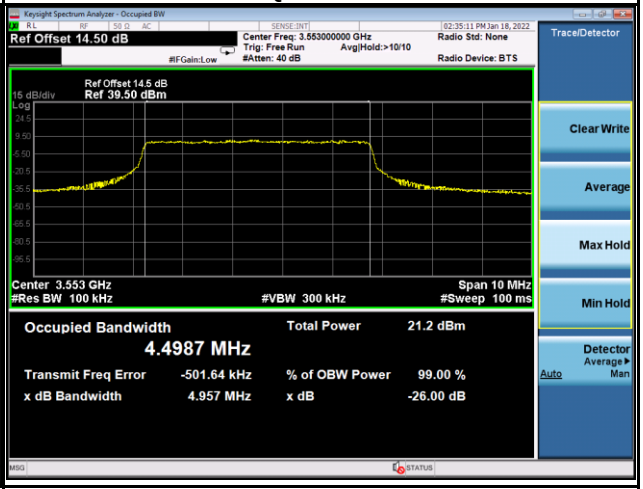
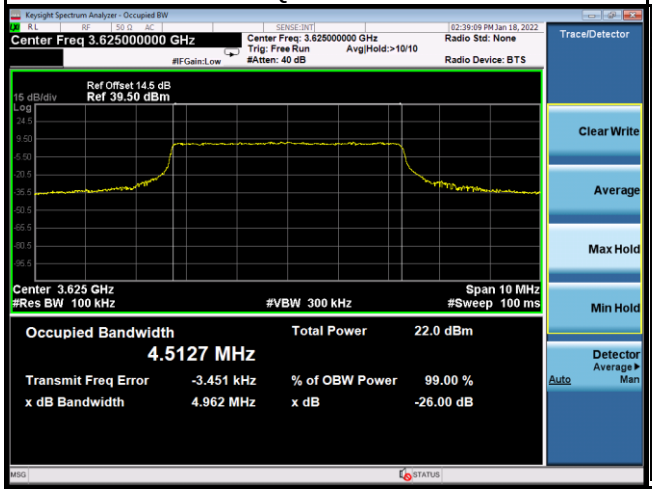
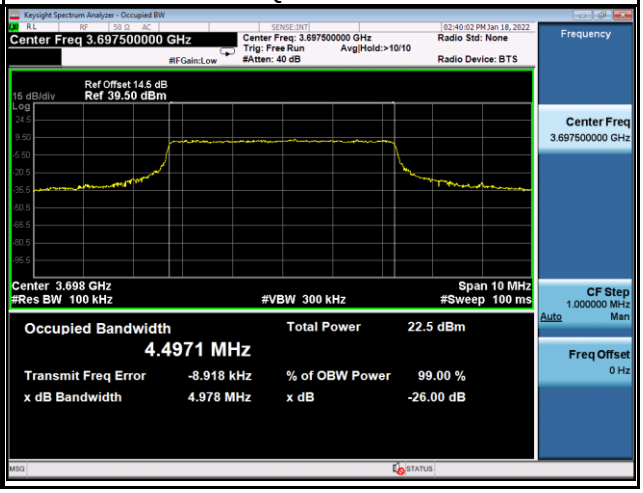
LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				55290CH	55990CH	56690CH
				3555MHz	3625.5MHz	3695MHz
10M	QPSK	1	0	20.56	21.23	22.34
		1	25	20.52	21.28	22.26
		1	49	20.62	21.45	22.25
		25	0	20.37	21.19	22.07
		25	12	20.46	21.08	22.19
		25	25	20.28	21.20	22.05
		49	0	20.24	21.06	22.05
	16QAM	1	0	20.40	21.37	22.19
		1	25	20.49	21.32	22.14
		1	49	20.59	21.38	22.13
		25	0	20.39	21.09	22.11
		25	12	20.46	21.16	22.26
		25	25	20.48	21.10	22.08
		49	0	20.42	21.09	22.06

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				55315CH	55990CH	56665CH
				3557.5MHz	3625.5MHz	3692.5MHz
15M	QPSK	1	0	20.86	21.27	22.42
		1	37	20.53	21.25	22.15
		1	74	20.82	21.62	22.37
		36	0	20.39	21.02	21.98
		36	20	20.27	21.20	21.95
		36	39	20.48	21.11	21.86
		75	0	20.43	21.09	21.94
	16QAM	1	0	21.01	21.30	22.36
		1	37	20.74	21.32	21.98
		1	74	21.21	21.71	22.20
		36	0	20.41	20.98	21.01
		36	20	20.52	21.02	21.00
		36	39	20.51	21.05	20.95
		75	0	20.48	21.04	21.03

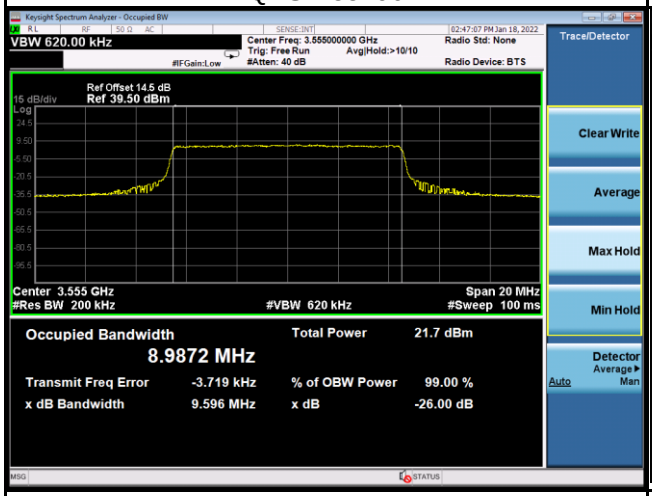
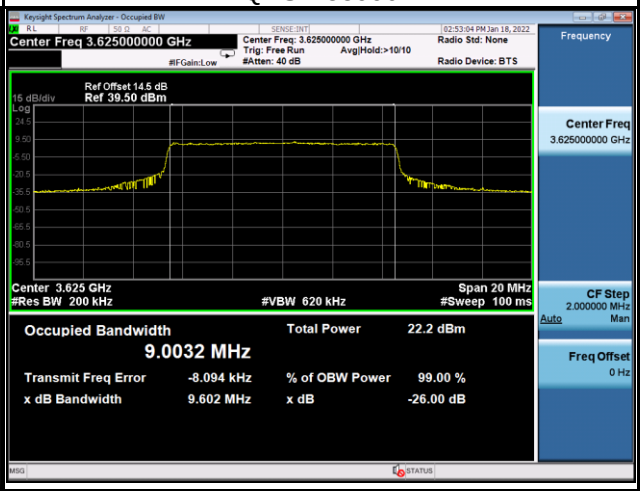
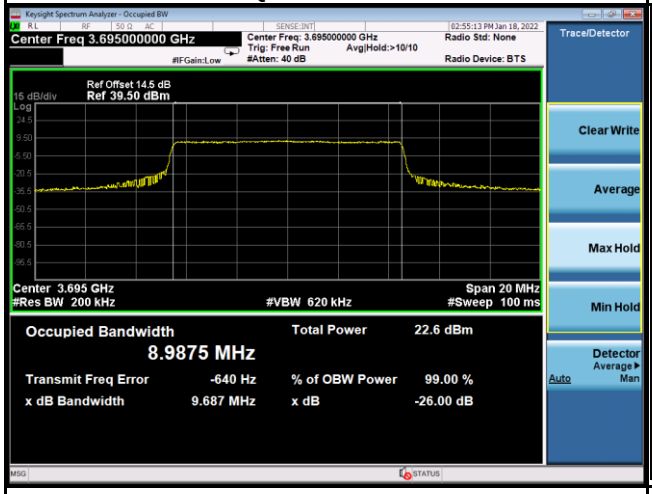
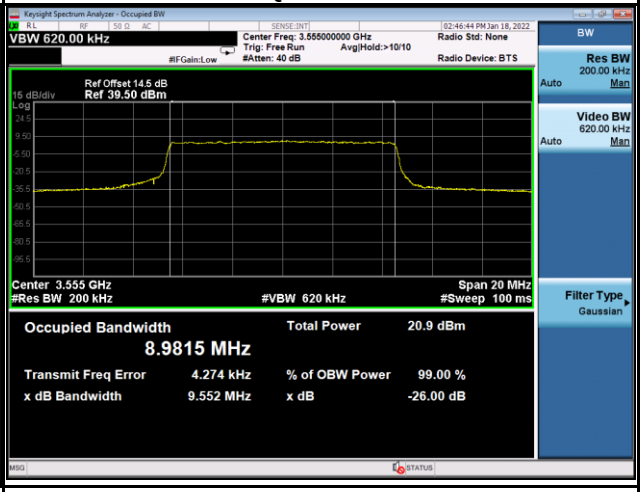
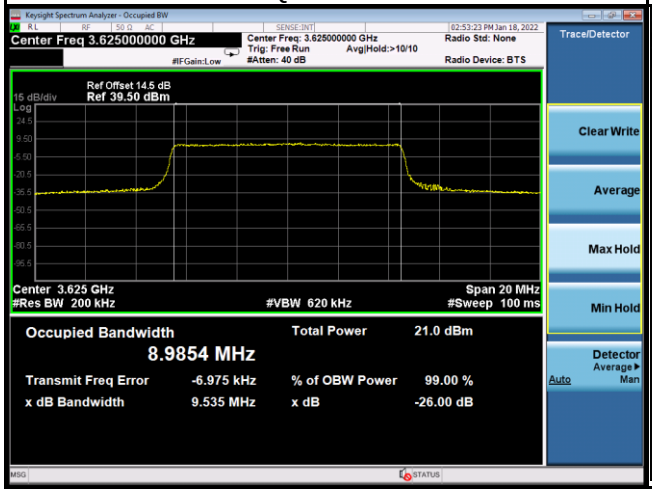
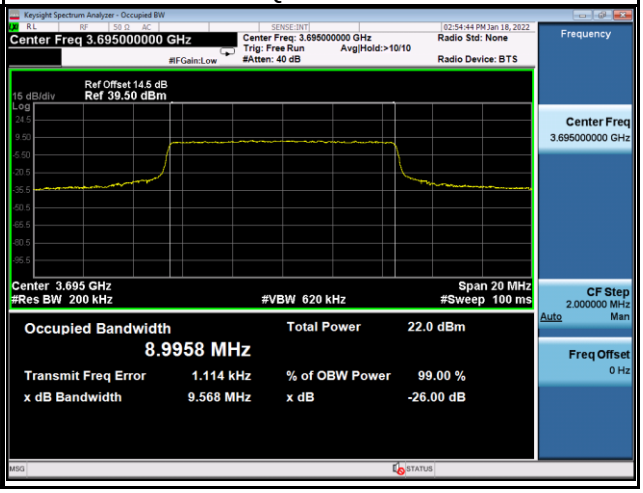
LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				55340CH	55990CH	56640CH
				3560MHz	3625.5MHz	3690MHz
20M	QPSK	1	0	21.05	21.69	22.72
		1	49	20.86	21.58	22.43
		1	99	21.52	21.71	22.52
		50	0	20.86	21.34	22.42
		50	24	20.87	21.42	22.30
		50	50	21.02	21.53	22.31
		99	0	20.89	21.47	22.37
	16QAM	1	0	21.09	21.37	22.86
		1	49	20.81	21.21	22.34
		1	99	21.38	21.64	22.54
		50	0	20.76	21.29	22.42
		50	24	20.77	21.34	22.41
		50	50	20.89	21.41	22.30
		99	0	20.81	21.36	22.33

APPENDIX B - OCCUPIED BANDWIDTH

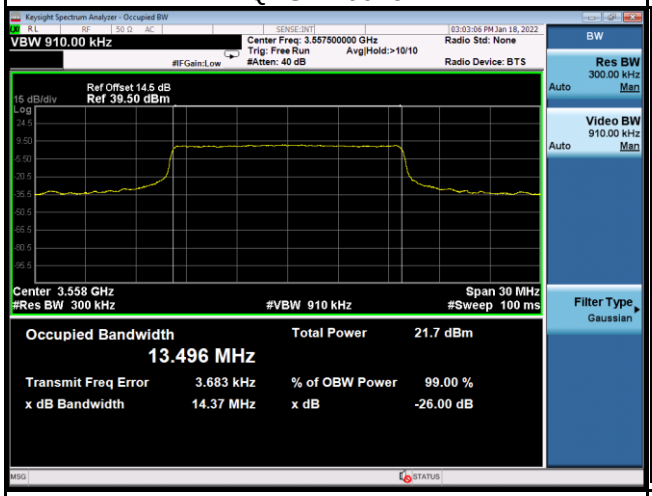
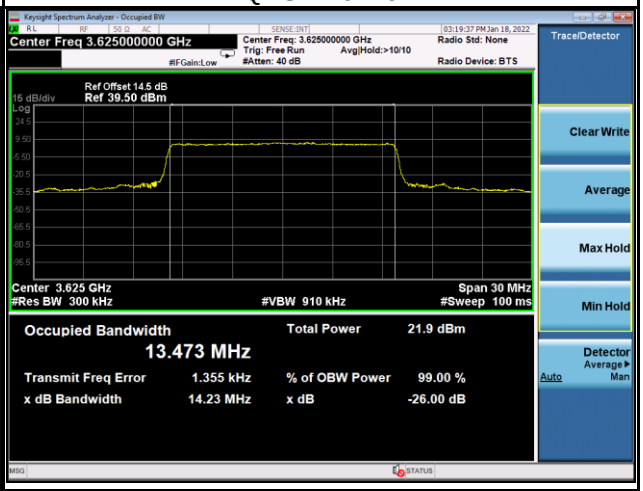
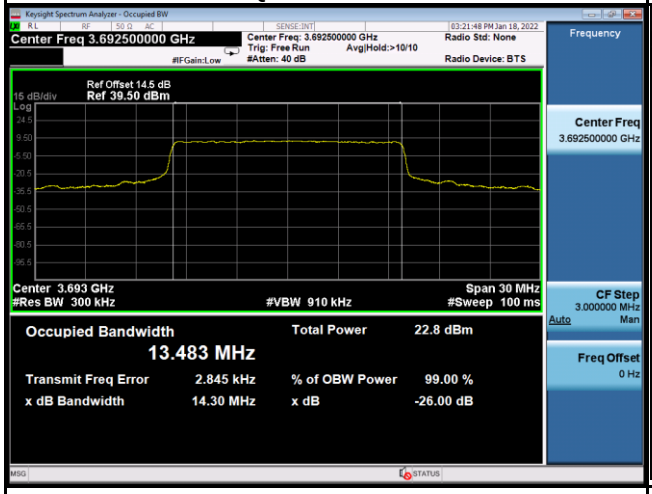
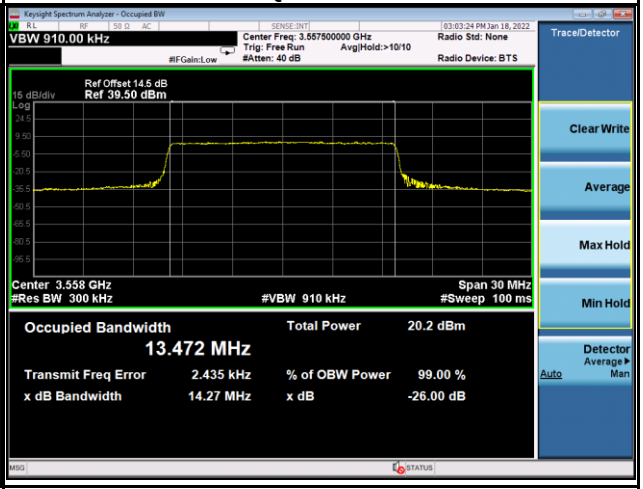
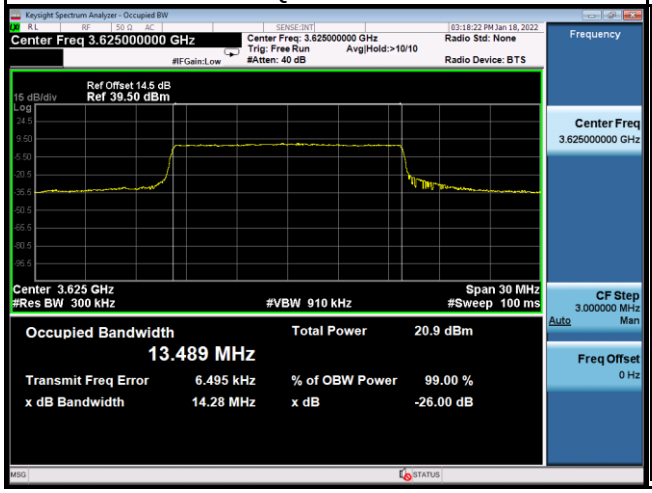
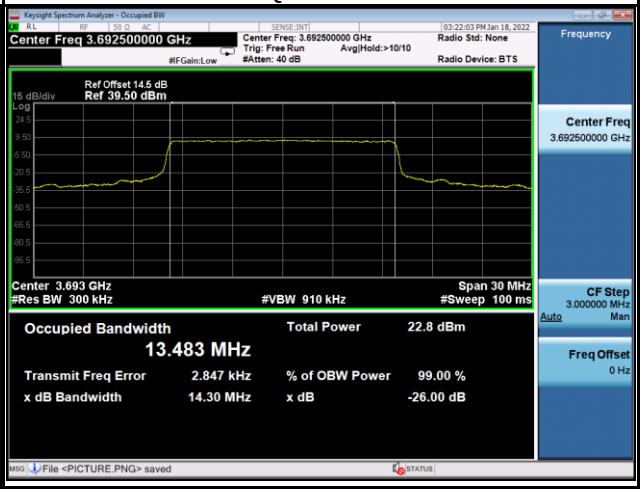
LTE Band 48_5 M					
QPSK			16QAM		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
55265	3552.5	4.5125	55265	3552.5	4.4987
55990	3625.5	4.5056	55990	3625.5	4.5127
56715	3697.5	4.5110	56715	3697.5	4.4971
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
55265	3552.5	4.924	55265	3552.5	4.957
55990	3625.5	4.993	55990	3625.5	4.962
56715	3697.5	5.074	56715	3697.5	4.978

Spectrum Plot	
QPSK-55265	QPSK-55990
	
QPSK-56715	16QAM-55262
	
16QAM-55990	16QAM-56715
	

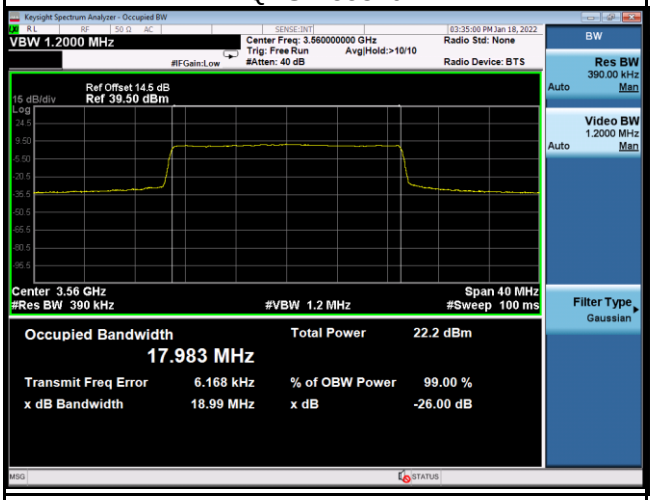
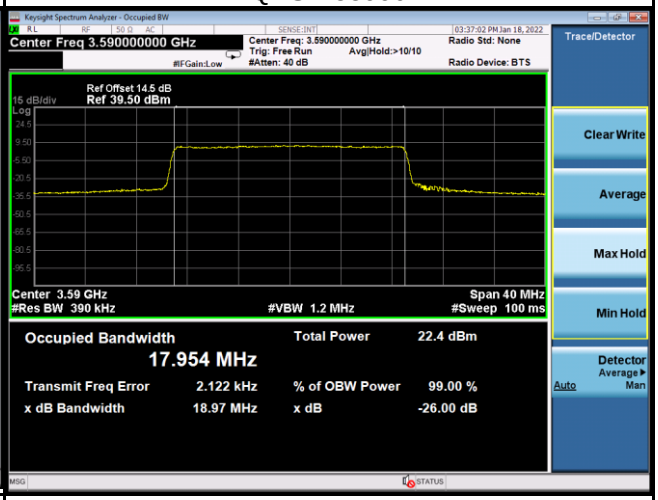
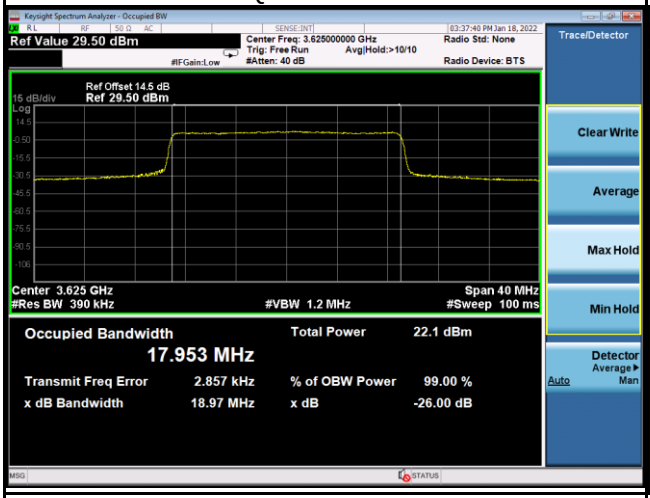
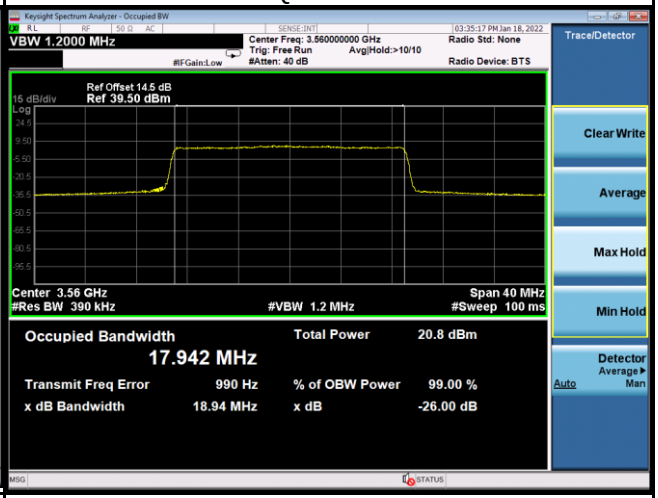
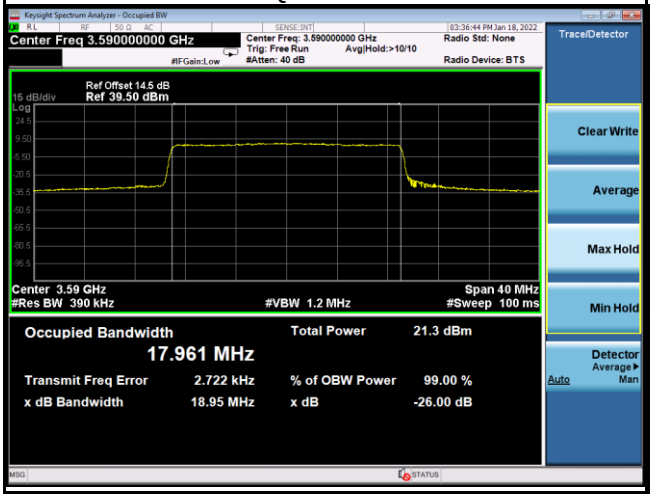
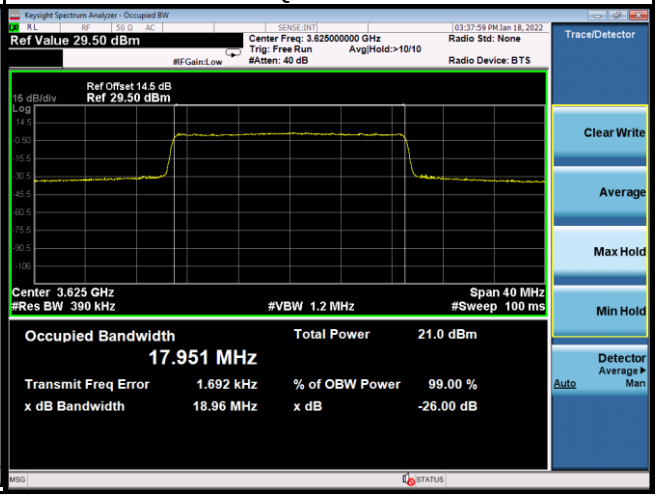
LTE Band 48_10M					
QPSK			16QAM		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
55290	3555	8.9872	55290	3555	8.9815
55990	3625.5	9.0032	55990	3625.5	8.9854
56690	3695	8.9875	56690	3695	8.9958
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
55290	3555	9.596	55290	3555	9.552
55990	3625.5	9.602	55990	3625.5	9.535
56690	3695	9.687	56690	3695	9.568

Spectrum Plot	
QPSK-55290	QPSK-55990
	
QPSK-56690	16QAM-55290
	
16QAM-55990	16QAM-56690
	

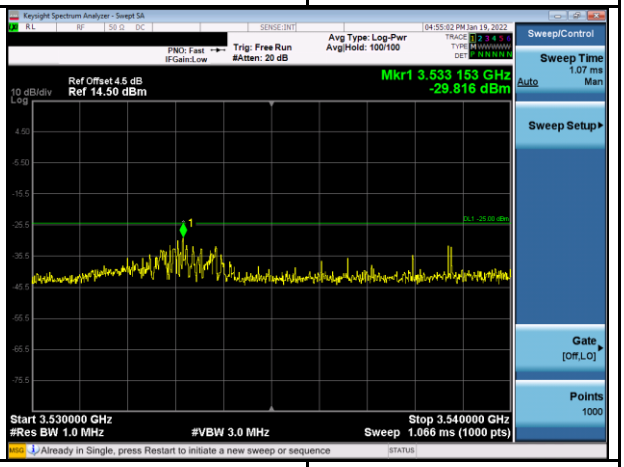
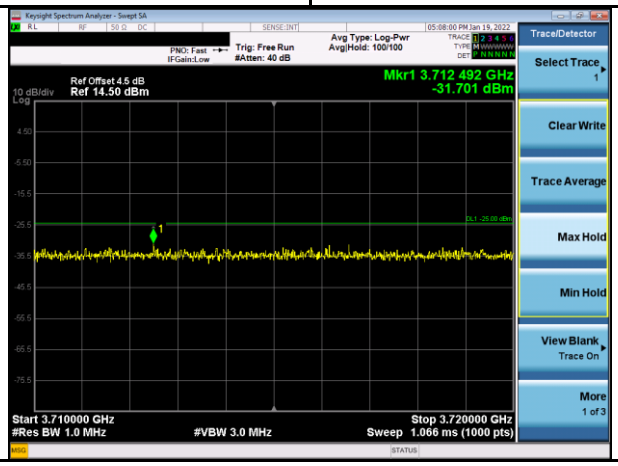
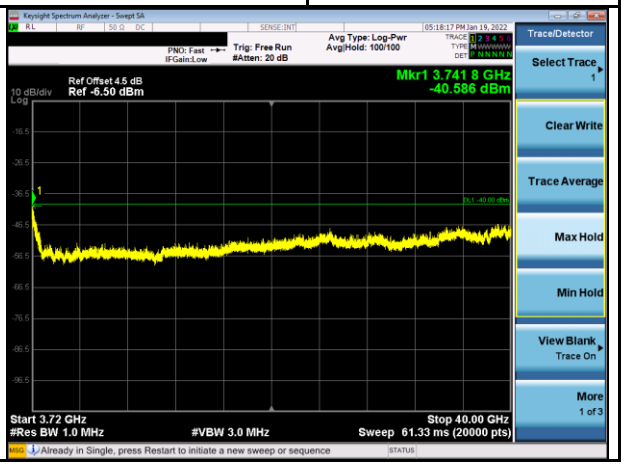
LTE Band 48_15M					
QPSK			16QAM		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
55315	3557.5	13.4960	55315	3557.5	13.4720
55990	3625.5	13.4730	55990	3625.5	13.4890
56665	3692.5	13.4830	56665	3692.5	13.4830
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
55315	3557.5	14.370	55315	3557.5	14.270
55990	3625.5	14.230	55990	3625.5	14.280
56665	3692.5	14.300	56665	3692.5	14.300

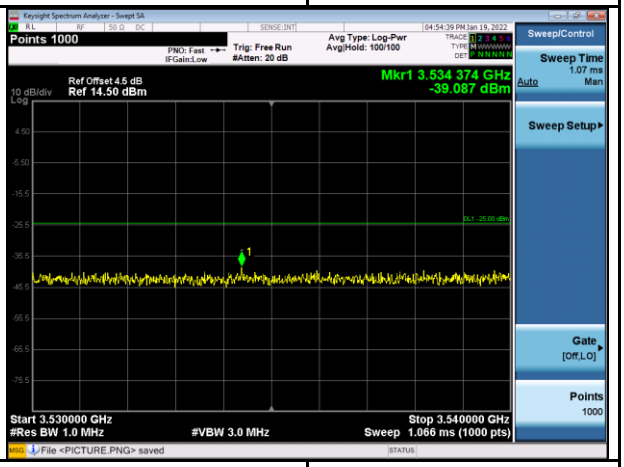
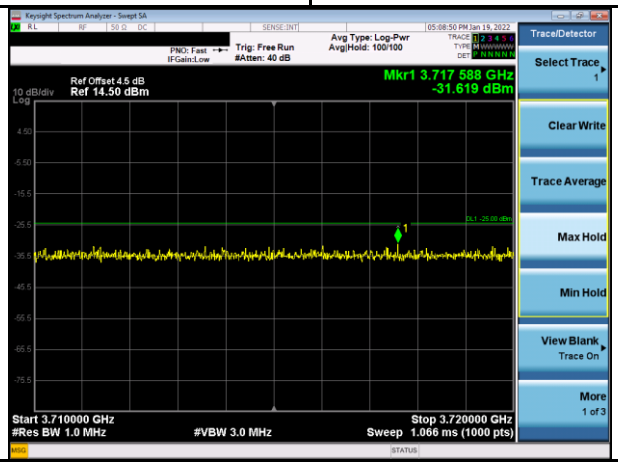
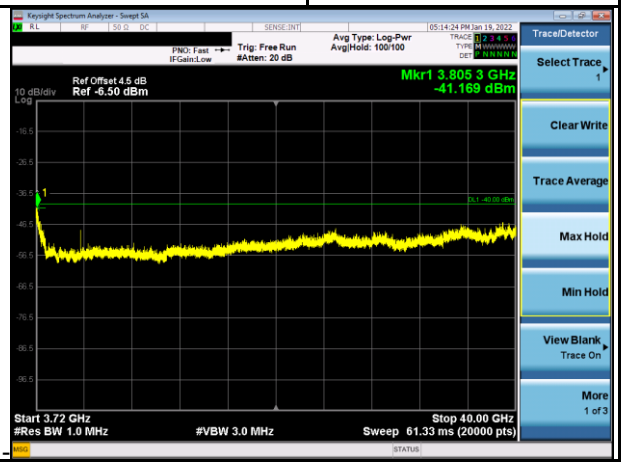
Spectrum Plot	
QPSK-19975	QPSK-20175
	
QPSK-20375	16QAM-19975
	
16QAM-20175	16QAM-20375
	

LTE Band 48_20M					
QPSK			16QAM		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
55340	3560	17.9830	55340	3560	17.9420
55990	3625.5	17.9540	55990	3625.5	17.9610
56640	3690	17.9530	56640	3690	17.9510
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
55340	3560	18.990	55340	3560	18.940
55990	3625.5	18.970	55990	3625.5	18.950
56640	3690	18.970	56640	3690	18.960

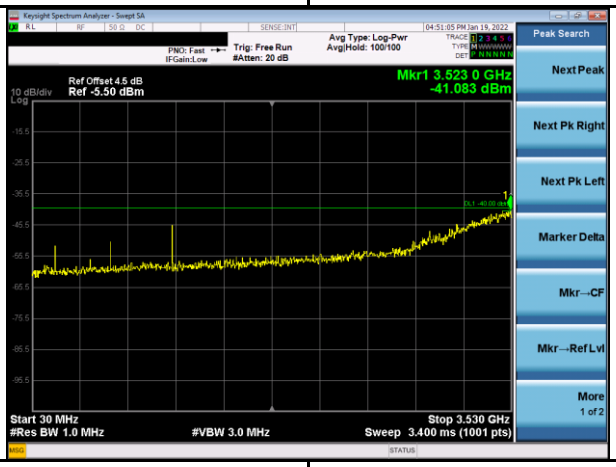
Spectrum Plot	
QPSK-55340	QPSK-55990
	
QPSK-56640	16QAM-55340
	
16QAM-55990	16QAM-56640
	

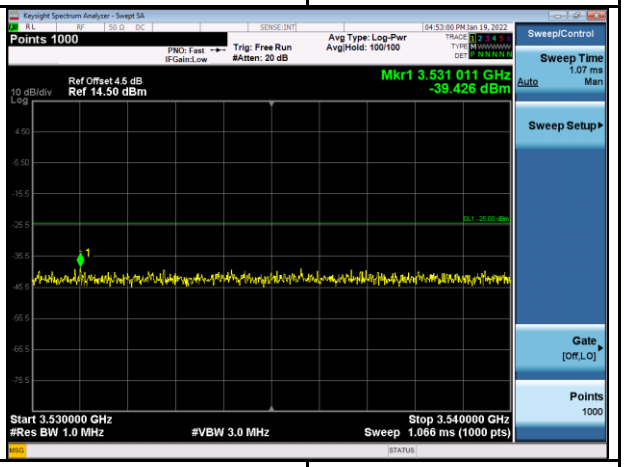
APPENDIX C - CONDUCTED EMISSIONS

LTE Band 48_20M(QPSK)			
Channel	Frequency(MHz)	Channel	Frequency(MHz)
55340	30-3530	55340	3530-3540
			
Channel	Frequency(MHz)	Channel	Frequency(MHz)
55340	3710-3720	55340	3720-40G-
			

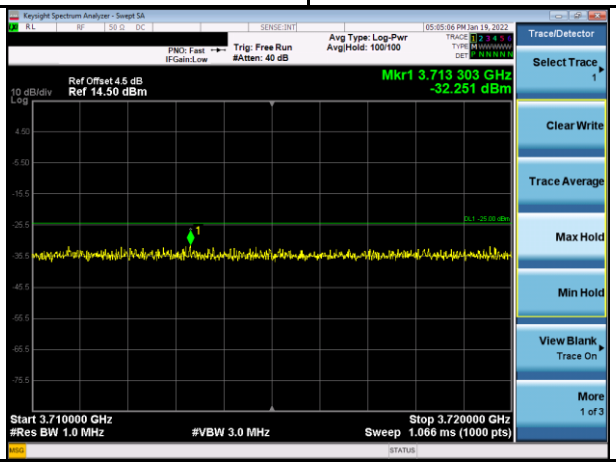
LTE Band 48_20M(16QAM)			
Channel	Frequency(MHz)	Channel	Frequency(MHz)
55340	30-3530	55340	3530-3540
			
Channel	Frequency(MHz)	Channel	Frequency(MHz)
55340	3710-3720	55340	3720-40G-
			

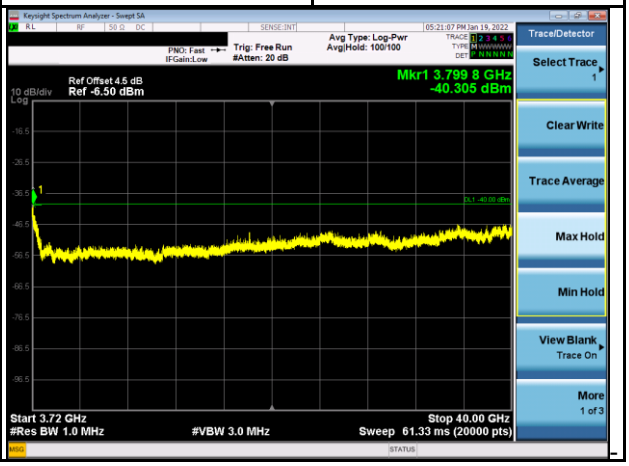
LTE Band 48_20M(QPSK)			
Channel	Frequency(MHz)	Channel	Frequency(MHz)
55990	30-3530	55990	3530-3540

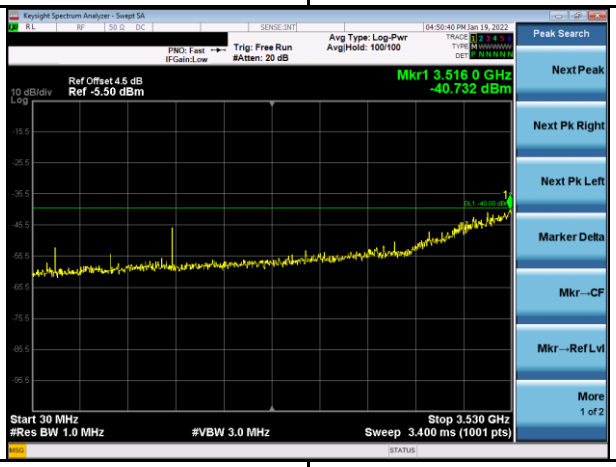
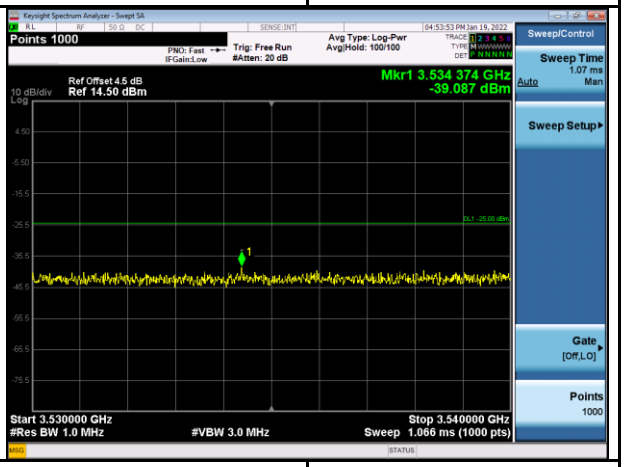




Channel	Frequency(MHz)	Channel	Frequency(MHz)
55990	3710-3720	55990	3720-40G-





LTE Band 48_20M(16QAM)			
Channel	Frequency(MHz)	Channel	Frequency(MHz)
55990	30-3530	55990	3530-3540
			
Channel	Frequency(MHz)	Channel	Frequency(MHz)
55990	3710-3720	55990	3720-40G-