Certificate #7130.01

FCC Radio Test Report

FCC ID: ZMOLE270LA

This report concerns: Original Grant

Project No.	:	2407C095
Equipment	:	LTE Module
Brand Name	:	Fibocom
Test Model	:	LE270-LA
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	:	Fibocom Wireless Inc.
Address	:	1101, Tower A, Building 6, Shenzhen International Innovation Valley, Dashi 1st Rd, Nanshan, Shenzhen, China
Date of Receipt	:	Aug. 07, 2024
Date of Test	:	Aug. 09, 2024 ~ Aug. 29, 2024
Issued Date	:	Sep. 04, 2024
Report Version	:	R00
Test Sample	:	Engineering Sample No.: SSL2024080742.
Standard(s)	:	47 CFR FCC Part 22 Subpart H 47 CFR FCC Part 2

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

Prepared by : Abel. Cao

Abel Cao

Approved by : Steven Lu

Steven Lu

Room 108, Building 2, No.1, Yile Road, Songshan Lake Zone, Dongguan City, Guangdong, People's Republic of China

Tel: +86-769-8318-3000 Web: www.newbtl.com Service mail: btl_qa@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 assumes no responsibility for the data provided by the customer, any statements, inferences or generalizations drawn by the customer or others from the reports issued by BTL.

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

This report is the confidential property of the client. As a mutual protection to the clients, the public and ourselves, the test report shall not be reproduced, except in full, without our written approval.

BTL's laboratory quality assurance procedures are in compliance with the ISO/IEC 17025: 2017 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 are not use in determining the Pass/Fail results.

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REPORT ISSUED HISTORY

Report No.	Version	Description	Issued Date	Note
BTL-FCCP-1-2407C095	R00	Original Report.	Sep. 04, 2024	Valid

1. APPLICABLE STANDARDS

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:
ANSI C63.26-2015
The following reference test guidance is not within the scope of accreditation of A2LA:
FCC KDB 971168 D01 Power Meas License Digital Systems v03r01

2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC Part 22 Subpart H & Part 2			
Standard(s) Section	**Test Item**	**Judgment**	**Remark**
2.1046	Output Power	PASS	------
22.913(a)(5)	Effective Radiated Power	PASS	------
2.1049	Occupied Bandwidth	PASS	------
2.1051 22.917(a)	Conducted Spurious Emissions	PASS	------
2.1053 22.917(a)	Radiated Spurious Emissions	PASS	------
22.917(a)	Band Edge Measurements	PASS	------
22.913(d)	Peak To Average Ratio	PASS	------
2.1055 22.355	Frequency Stability	PASS	------

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

2.1 TEST FACILITY

For Radiated items:
The test facilities used to collect the test data in this report is at the location of No.3, Jinshagang 1st Road, Dalang, Dongguan City, Guangdong People's Republic of China.

For other items:
The test facilities used to collect the test data 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 Registration Number for FCC: 747969
BTL's Designation Number for FCC: CN1377

2.2 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 (3m)	CISPR	30MHz ~ 200MHz	V	4.40
		30MHz ~ 200MHz	H	3.62
		200MHz ~ 1,000MHz	V	4.58
		200MHz ~ 1,000MHz	H	3.98

Test Site	Method	Measurement Frequency Range	*U*,(dB)
DG-CB03 (3m)	CISPR	1GHz ~ 6GHz	4.08
		6GHz ~ 18GHz	4.62

B. Other Measurement:

Parameter	Uncertainty
Spectrum Bandwidth	±1.74 %
Maximum Output Power	±0.87 dB
Frequency Stability	±53.10Hz
Temperature	±0.47 °C
Humidity	±1.37%

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

2.3 TEST ENVIRONMENT CONDITIONS

Test Item	Temperature	Humidity	Test Voltage	Tested By	Test Date
Output Power & ERP	25.3°C	49%	DC 3.8V	Mark Wu	Aug. 12, 2024~ Aug. 20, 2024
Occupied Bandwidth	25.3°C	49%	DC 3.8V	Mark Wu	Aug. 12, 2024~ Aug. 20, 2024
Conducted Spurious Emissions	25.3°C	49%	DC 3.8V	Mark Wu	Aug. 12, 2024~ Aug. 20, 2024
Radiated Spurious Emissions (9 kHz to 30 MHz)	26°C	41%	DC 3.8V	Hayden Chen	Aug. 28, 2024
Radiated Spurious Emissions (30 MHz to 1000 MHz)	24°C	55%	DC 3.8V	Jensen Zhou	Aug. 24, 2024
Radiated Spurious Emissions (Above 1000 MHz)	24°C	54%	DC 3.8V	Jensen Zhou	Aug. 27, 2024~ Aug. 28, 2024
Band Edge	25.3°C	49%	DC 3.8V	Mark Wu	Aug. 12, 2024~ Aug. 20, 2024
Peak to Average Ratio	25.3°C	49%	DC 3.8V	Mark Wu	Aug. 12, 2024~ Aug. 20, 2024
Frequency Stability	Normal & Extreme	49%	Normal & Extreme	Mark Wu	Aug. 12, 2024~ Aug. 20, 2024

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	LTE Module			
Brand Name	Fibocom			
Test Model	LE270-LA			
Series Model	N/A			
Model Difference(s)	N/A			
Hardware Version	V1.2			
Software Version	12007.6000.00.04.26.01			
Power Source	DC voltage supplied from external power supply.			
Power Rating	DC 3.4V - 4.5V, Typical: 3.8V			
IMEI No.	868317070000764			
Modulation Type	LTE		UL: QPSK, 16QAM DL: QPSK, 16QAM, 64QAM	
Max. ERP	LTE	Channel Bandwidth (MHz)	QPSK (dBm)	16QAM (dBm)
	Band 5	1.4	23.38	22.86
		3	23.35	22.67
		5	23.92	23.19
		10	24.01	23.26

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 5(UL: 824-849MHz, DL: 869-894MHz)					
Test Frequency ID	Bandwidth (MHz)	N_{UL}	Frequency of Uplink (MHz)	N_{DL}	Frequency of Downlink (MHz)
Low Range	1.4	20407	824.7	2407	869.7
	3	20415	825.5	2415	870.5
	5	20425	826.5	2425	871.5
	10	20450	829	2450	874
Mid Range	1.4/3/5/10	20525	836.5	2525	881.5
High Range	1.4	20643	848.3	2643	893.3
	3	20635	847.5	2635	892.5
	5	20625	846.5	2625	891.5
	10	20600	844	2600	889

3. Table for Filed Antenna:

Brand	P/N	Antenna Type	Connector	Gain (dBi)	Note
BGS	GHT-019A	Dipole	SMA Male J	1.32	LTE Band 5

Note:

(1) The antenna gain is provided by the manufacturer.

(2) The antenna is not attached when sales.

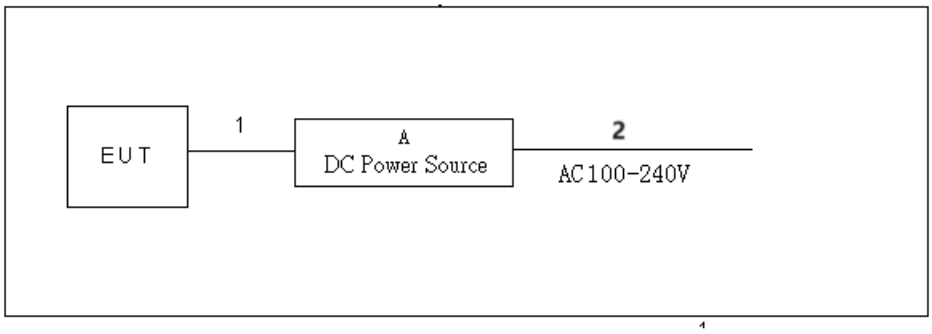
4. The UE capability is category 1, and the maximum RB Number is 27 when the modulation is 16QAM, so for the bandwidth of 10MHz, only tested to 27 RB when the modulationis 16QAM.

3.2 DESCRIPTION OF TEST MODES

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

LTE BAND 5 MODE					
Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
Output Power & ERP	20407 to 20643	20407, 20525, 20643	1.4MHz	QPSK, 16QAM	1RB/3RB/6RB
	20415 to 20635	20415, 20525, 20635	3MHz	QPSK, 16QAM	1RB/8RB/15RB
	20425 to 20625	20425, 20525, 20625	5MHz	QPSK, 16QAM	1RB/12RB/25RB
	20450 to 20600	20450, 20525, 20600	10MHz	QPSK	1RB/25RB/50RB
				16QAM	1RB/25RB/27RB
Occupied Bandwidth	20407 to 20643	20407, 20525, 20643	1.4MHz	QPSK, 16QAM	6RB
	20415 to 20635	20415, 20525, 20635	3MHz	QPSK, 16QAM	15RB
	20425 to 20625	20425, 20525, 20625	5MHz	QPSK, 16QAM	25RB
	20450 to 20600	20450, 20525, 20600	10MHz	QPSK	50RB
				16QAM	27RB
Conducted Spurious Emissions	20407 to 20643	20525	1.4MHz	QPSK	1RB
	20425 to 20625	20525	5MHz	QPSK	1RB
	20450 to 20600	20525	10MHz	QPSK	1RB
Radiated Spurious Emissions	20407 to 20643	20525	1.4MHz	QPSK	1RB
	20425 to 20625	20525	5MHz	QPSK	1RB
	20450 to 20600	20525	10MHz	QPSK	1RB
Band Edge	20407 to 20643	20407, 20643	1.4MHz	QPSK	1RB/6RB
	20415 to 20635	20415, 20635	3MHz	QPSK	1RB/15RB
	20425 to 20625	20425, 20625	5MHz	QPSK	1RB/25RB
	20450 to 20600	20450, 20600	10MHz	QPSK	1RB/50RB
Peak To Average Ratio	20407 to 20643	20407, 20525, 20643	1.4MHz	QPSK, 16QAM	1RB
	20415 to 20635	20415, 20525, 20635	3MHz	QPSK, 16QAM	1RB
	20425 to 20625	20425, 20525, 20625	5MHz	QPSK, 16QAM	1RB
	20450 to 20600	20450, 20525, 20600	10MHz	QPSK, 16QAM	1RB
Frequency Stability	20450 to 20600	20525	10MHz	QPSK	50RB

3.3 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.

For 9 kHz to 30 MHz:

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.
A	DC Power Source	N/A	ZN2PD2-14W-S+	SF654501927

Item	Cable Type	Shielded Type	Ferrite Core	Length
1	DC Cable	NO	NO	1.2m
2	AC Cable	NO	NO	1.2m

For other items:

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.
A	DC Power Source	UNI-T	UDP6721	AWP7224050031

Item	Cable Type	Shielded Type	Ferrite Core	Length
1	DC Cable	NO	NO	1.2m
2	AC Cable	NO	NO	1.2m

4. TEST RESULT

4.1 OUTPUT POWER MEASUREMENT

4.1.1 LIMIT

Mobile / Portable station are limited to 7 watts e.r.p.

4.1.2 TEST PROCEDURE

The testing follows FCC KDB 971168 v03r01 Section 5 or ANSI C63.26-2015 Section 5.2.

EIRP / ERP:

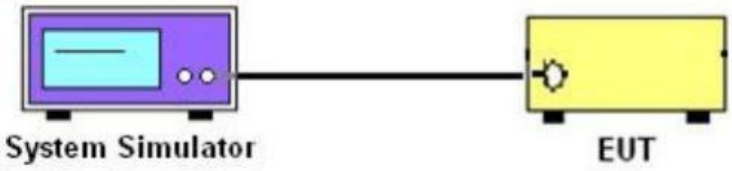
EIRP = Output Power + Antenan gain
ERP = EIPR - 2.15dBi

Output Power:

The EUT was set up for the maximum power with GSM, GPRS, EDGE, WCDMA 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.

4.1.3 TEST SETUP LAYOUT

Output Power Measurement



4.1.4 TEST DEVIATION

No deviation

4.1.5 TEST RESULTS

Please refer to the APPENDIX A.

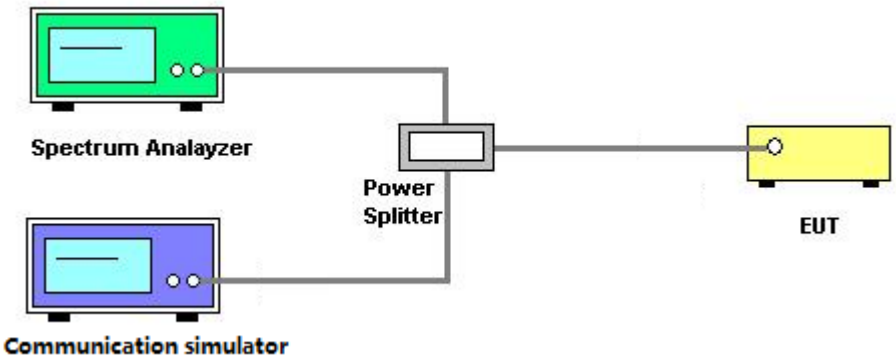
4.2 OCCUPIED BANDWIDTH MEASUREMENT

4.2.1 TEST PROCEDURE

The testing follows FCC KDB 971168 v03r01 Section 4 or ANSI C63.26-2015 Section 5.4.

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 Peak detector.

4.2.2 TEST SETUP LAYOUT



4.2.3 TEST DEVIATION

No deviation

4.2.4 TEST RESULTS

Please refer to the APPENDIX B.

4.3 CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

4.3.1 LIMIT

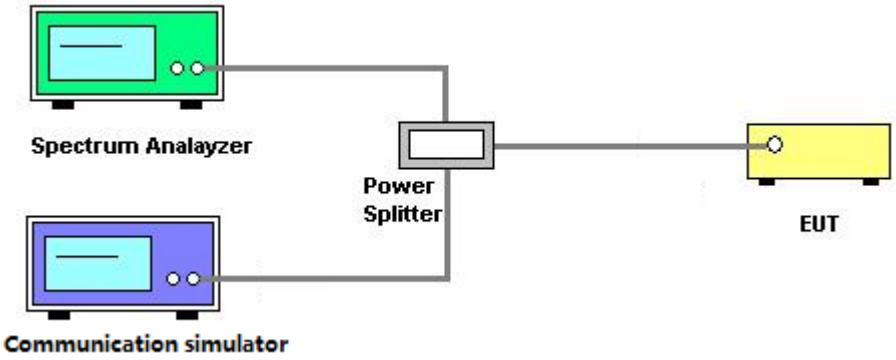
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit equal to -13dBm.

4.3.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 6 or ANSI C63.26-2015 Section 5.7.

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 Peak or RMS detector.
4. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

4.3.3 TEST SETUP LAYOUT



4.3.4 TEST DEVIATION

No deviation

4.3.5 TEST RESULTS

Please refer to the APPENDIX C.

4.4 RADIATED SPURIOUS EMISSIONS MEASUREMENT

4.4.1 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.

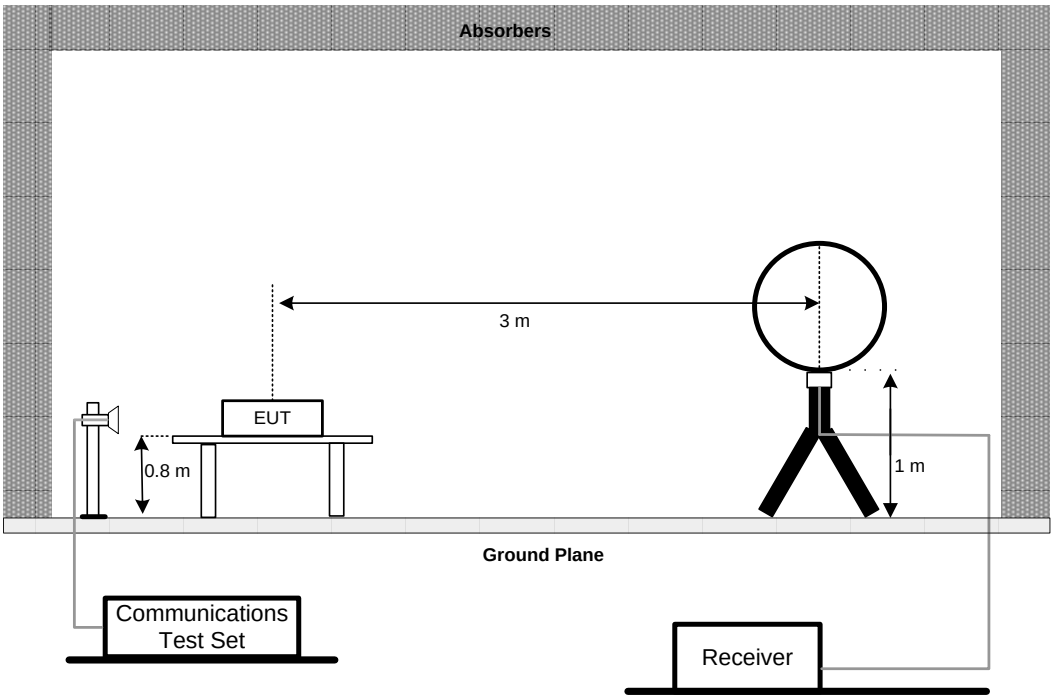
4.4.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 6.2 or ANSI C63.26-2015 Section 5.5.

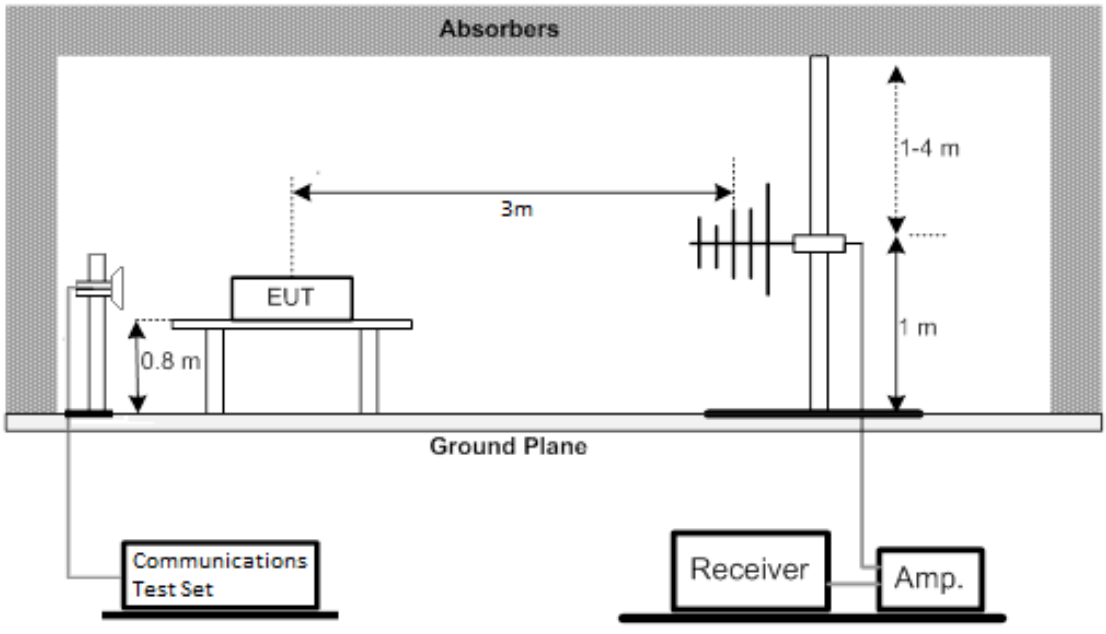
1. The EUT was placed on a turntable with 0.8 meter height for frequency below 1GHz and 1.5 meter height for frequency above 1GHz respectively above ground.
2. The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
3. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power.
4. Start the test, rotate the table 360° to find the worst Angle, maintain the worst Angle, raise the antenna to 1-4m to find the worst height, maintain the worst height, then rotate the table to determine the final worst Angle, grab the spectrum diagram.
5. EUT shall be placed in accordance with X,Y,Z as required by Figure 5 in ANSI C63.26.
   Repeat Step 5 above to find the worst placement. Test all bands according to the worst placement.
6. Then EIRP is then converted to field strength as follows in Equation
7. E (dBuV/m) = EIRP (dBm) - 20log(D) + 104.8; where D is the measurement distance (in the far field region) in m.The emission limit equal to 82.26dBuV/m.

4.4.3 TEST SETUP LAYOUT

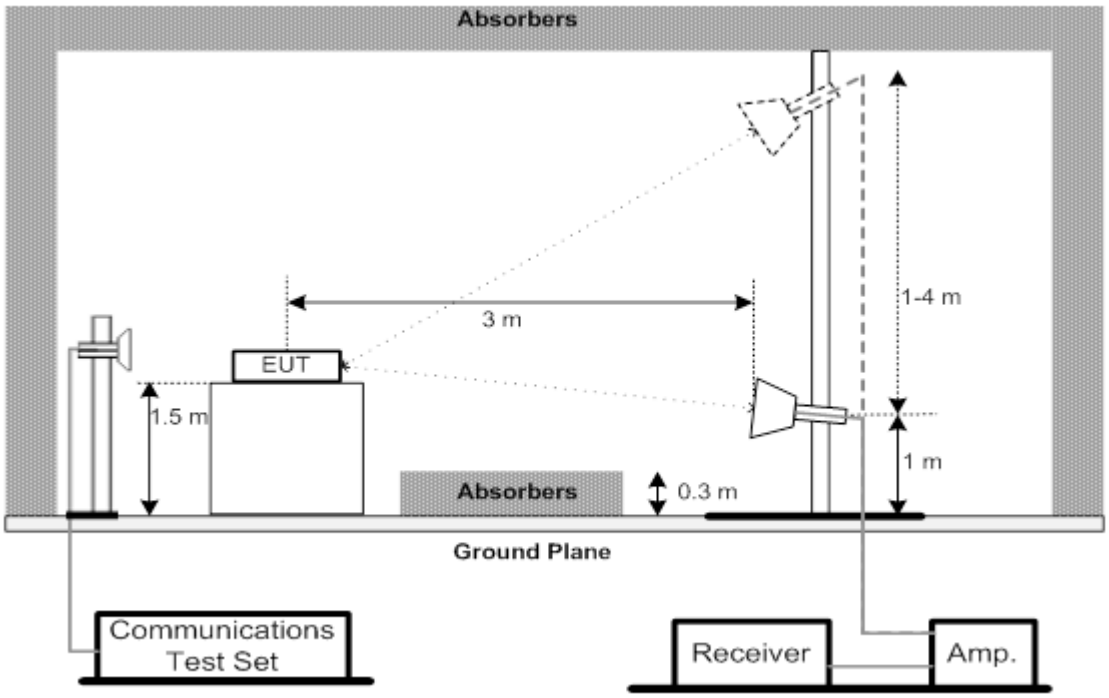
Below 30MHz



30MHz to 1000MHz



Above 1GHz



4.4.4 TEST DEVIATION

No deviation

4.4.5 TEST RESULTS (9KHZ TO 30MHZ)

Please refer to the APPENDIX D.

4.4.6 TEST RESULTS (30MHZ TO 1000MHZ)

Please refer to the APPENDIX E.

4.4.7 TEST RESULTS (ABOVE 1000MHZ)

Please refer to the APPENDIX F.

4.5 BAND EDGE MEASUREMENT

4.5.1 LIMIT

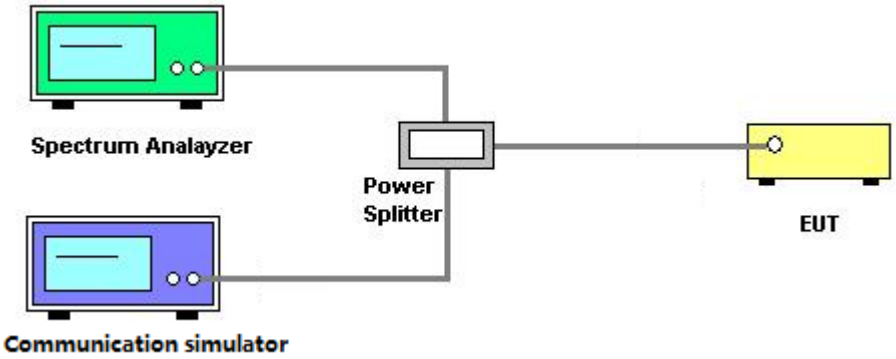
A Power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

4.5.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 6 or ANSI C63.26-2015 Section 5.7.

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

4.5.3 TEST SETUP LAYOUT



4.5.4 TEST DEVIATION

No deviation

4.5.5 TEST RESULTS

Please refer to the APPENDIX G.

4.6 PEAK TO AVERAGE RATIO MEASUREMENT

4.6.1 LIMIT

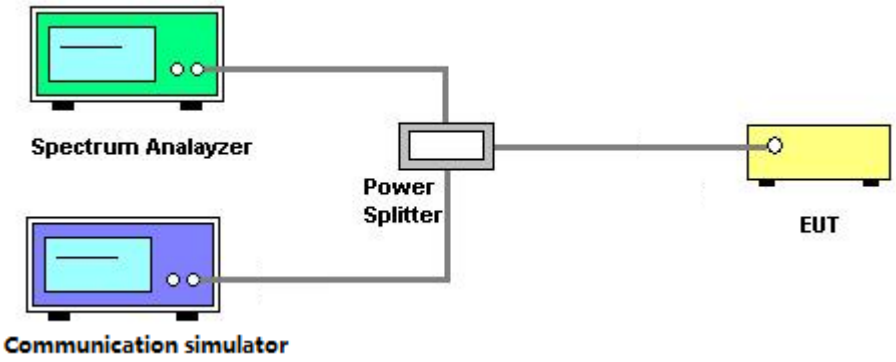
In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB.

4.6.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 5.7 or ANSI C63.26-2015 Section 5.2.6.

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%.

4.6.3 TEST SETUP LAYOUT



4.6.4 TEST DEVIATION

No deviation

4.6.5 TEST RESULTS

Please refer to the APPENDIX H.

4.7 FREQUENCY STABILITY MEASUREMENT

4.7.1 LIMIT

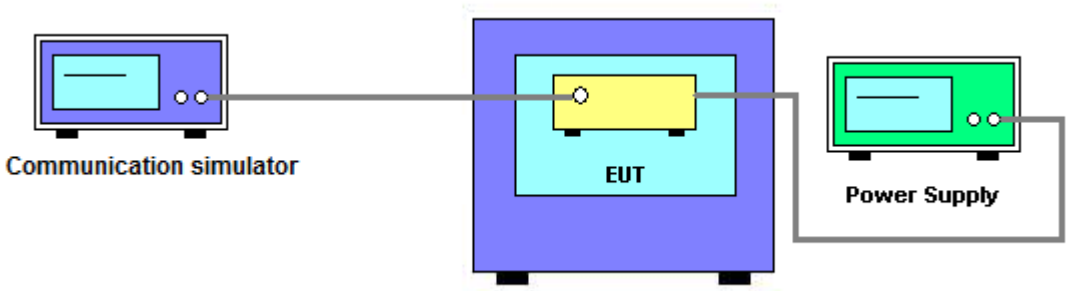
±1.5 ppm is for base and fixed station. ±2.5 ppm is for mobile station.

4.7.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 9 or ANSI C63.26-2015 Section 5.6.

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.

4.7.3 TEST SETUP LAYOUT



4.7.4 TEST DEVIATION

No deviation

4.7.5 TEST RESULTS

Please refer to the APPENDIX I.

4. LIST OF MEASUREMENT EQUIPMENTS

Radiated Emissions - 9 kHz to 30 MHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Active Loop Antenna	Schwarzbeck	FMZB 1513-60B	1513-60 B-034	Mar. 30, 2025
2	MXE EMI Receiver	Keysight	N9038A	MY56400091	Dec. 22, 2024
3	Cable	N/A	RW2350-3.8A-NM BM-1.5M	N/A	Jun. 09, 2025
4	Cable	N/A	RG 213/U	N/A	Jun. 09, 2025
5	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
6	966 Chamber room	ETS	9*6*6	N/A	May 16, 2025
7	wideband radio communication tester	R&S	CMW500	152372	Dec. 22, 2024
8	DC power supply	N/A	ZN2PD2-14W-S+	SF654501927	Jan. 19, 2025

Radiated Emissions - 30 MHz to 1 GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Trilog-Broadband Antenna	Schwarzbeck	VULB 9168	1462	Dec. 13, 2024
2	Attenuator	EMC INSTRUMENT	EMCI-N-6-06	AT-06009	Dec. 13, 2024
3	Preamplifier	EMC INSTRUMENT	EMC001330	980998	Nov. 17, 2024
4	Cable	RegalWay	LMR400-NMNM -12.5m	N/A	Jun. 06, 2025
5	Cable	RegalWay	LMR400-NMNM -3m	N/A	Jun. 06, 2025
6	Cable	RegalWay	LMR400-NMNM -0.5m	N/A	Jun. 06, 2025
7	Receiver	Agilent	N9038A	MY52130039	Dec. 22, 2024
8	Positioning Controller	MF	MF-7802	N/A	N/A
9	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
10	966 Chamber room	CM	9*6*6	N/A	May 16, 2025
11	wideband radio communication tester	R&S	CMW500	152372	Dec. 22, 2024
12	DC power supply	UNI-T	UDP6721	AWP7224050031	Mar. 20, 2025

Radiated Emissions - Above 1 GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Receiver	Agilent	N9038A	MY52130039	Dec. 22, 2024
2	Preamplifier	EMC INSTRUMENT	EMC118A45SE	980888	Nov. 17, 2024
3	Double Ridged Guide Antenna	ETS	3115	75789	Jun. 15, 2025
4	Cable	RegalWay	RWLP50-4.0A-SMSM-12.5M	N/A	Jul. 03, 2025
5	Cable	RegalWay	RWLP50-4.0A-NMRASM-2.5M	N/A	Jul. 03, 2025
6	Cable	RegalWay	RWLP50-4.0A-NMRASMRA-0.8M	N/A	Jul. 03, 2025
7	966 Chamber room	CM	9*6*6	N/A	May 19, 2025
8	Filter	Wairrwright Instruments Gmbh	WHK 1.5/15G-10ST	N/A	Dec. 22, 2024
9	Filter	COM-MW	ZHPF-M1-13G-W102	N/A	May 31, 2025
10	Filter	STI	STI15-9912	N/A	May 31, 2025
11	Positioning Controller	MF	MF-7802	N/A	N/A
12	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
13	wideband radio communication tester	R&S	CMW500	152372	Dec. 22, 2024
14	DC power supply	UNI-T	UDP6721	AWP7224050031	Mar. 20, 2025

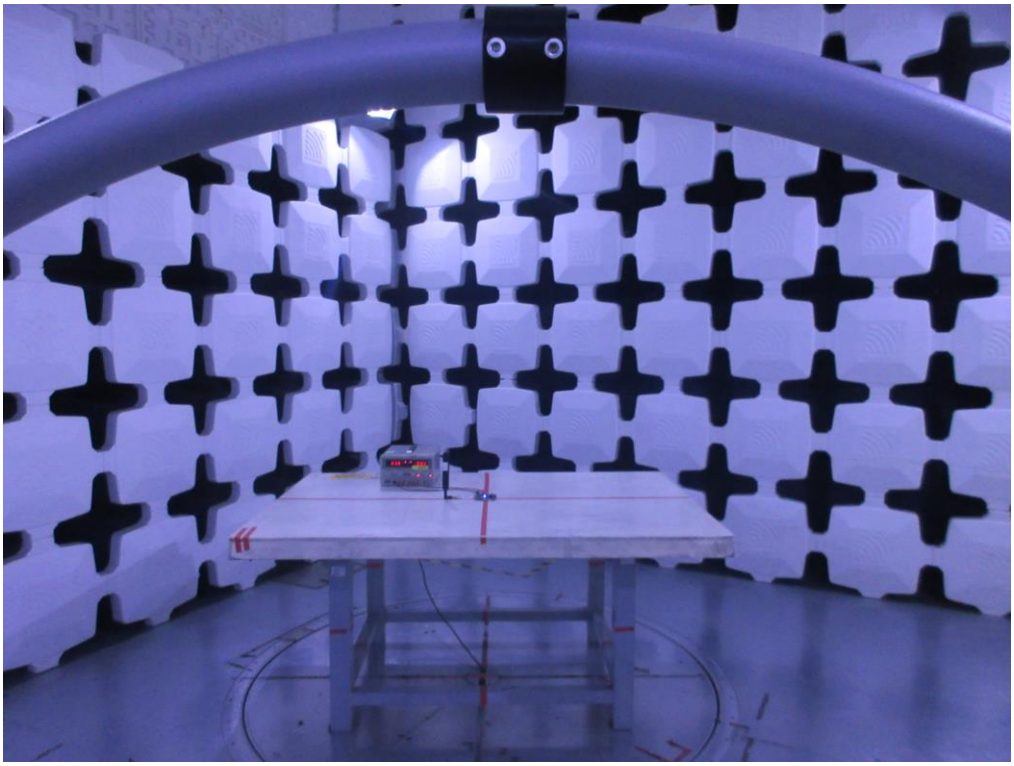
Conducted Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	MXA Signal Analyzer	Agilent Technologies	N9020A	MY49100060	Jun. 28, 2025
2	Wideband Radio Communication Tester	R&S	CWM 500	131463	Jan. 19, 2025
3	DC Source metter	Iteck	IT6154	006104126768201001	Jun. 28, 2025
4	Temperature Chamber	ESPEC	SU-242	93018786	Jun. 28, 2025

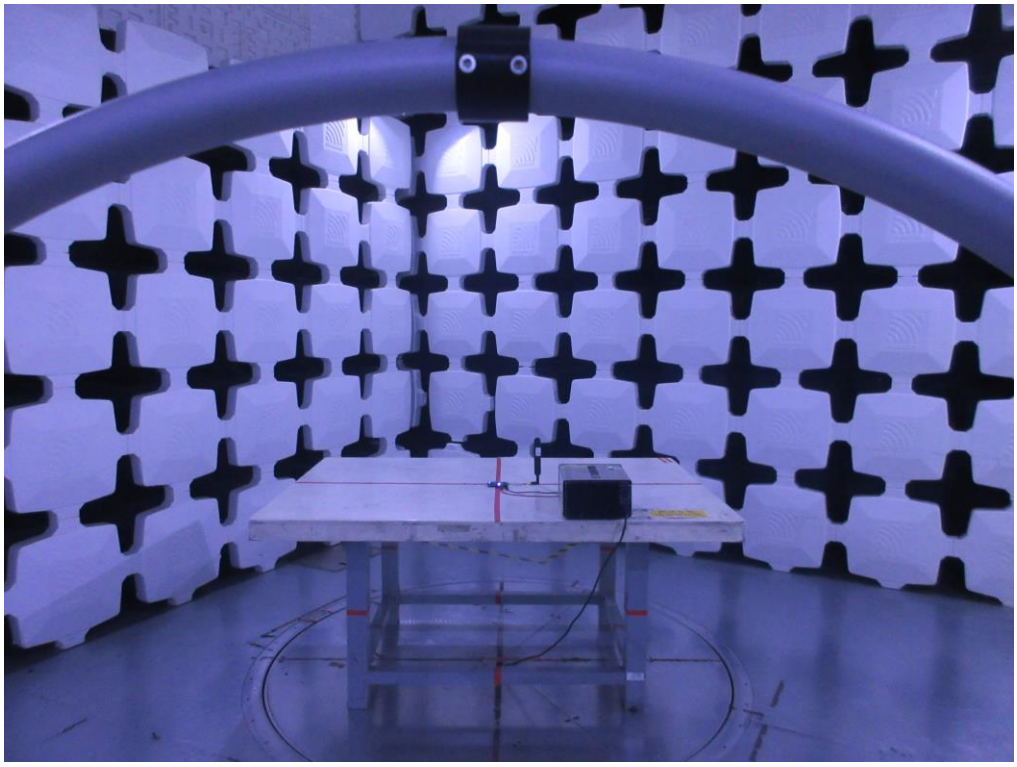
Remark: ”N/A” denotes no model name, serial no. or calibration specified.
All calibration period of equipment list is one year.

5. EUT TEST PHOTO

Radiated Emissions Test Photos

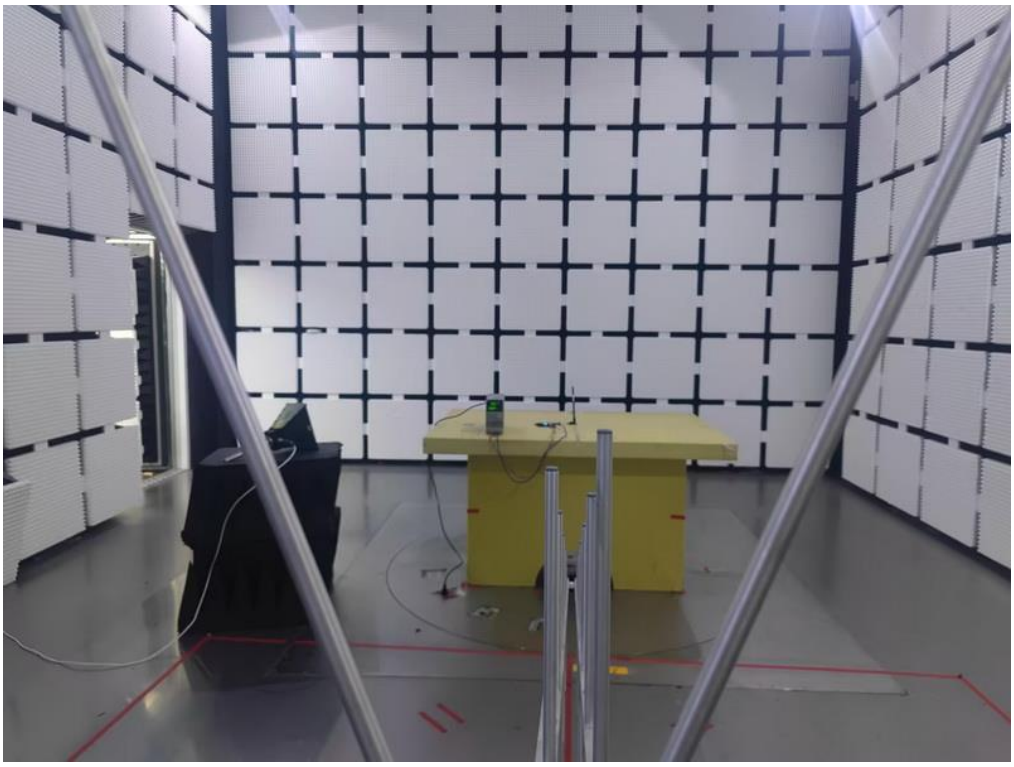
9 kHz to 30 MHz

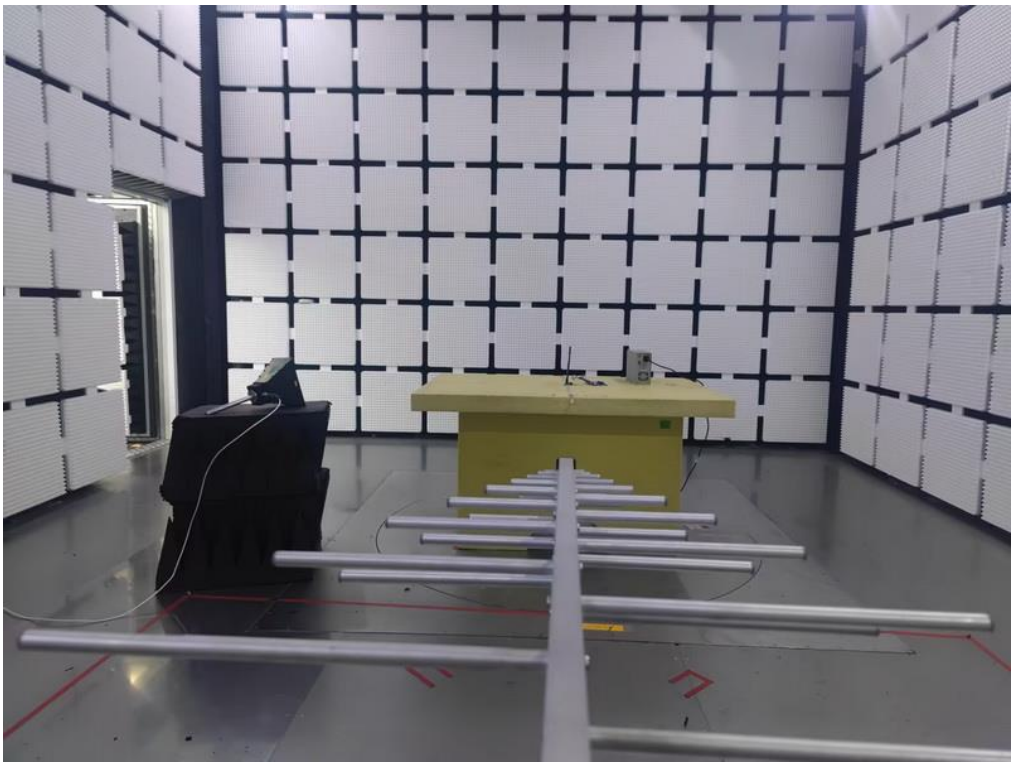




Radiated Emissions Test Photos

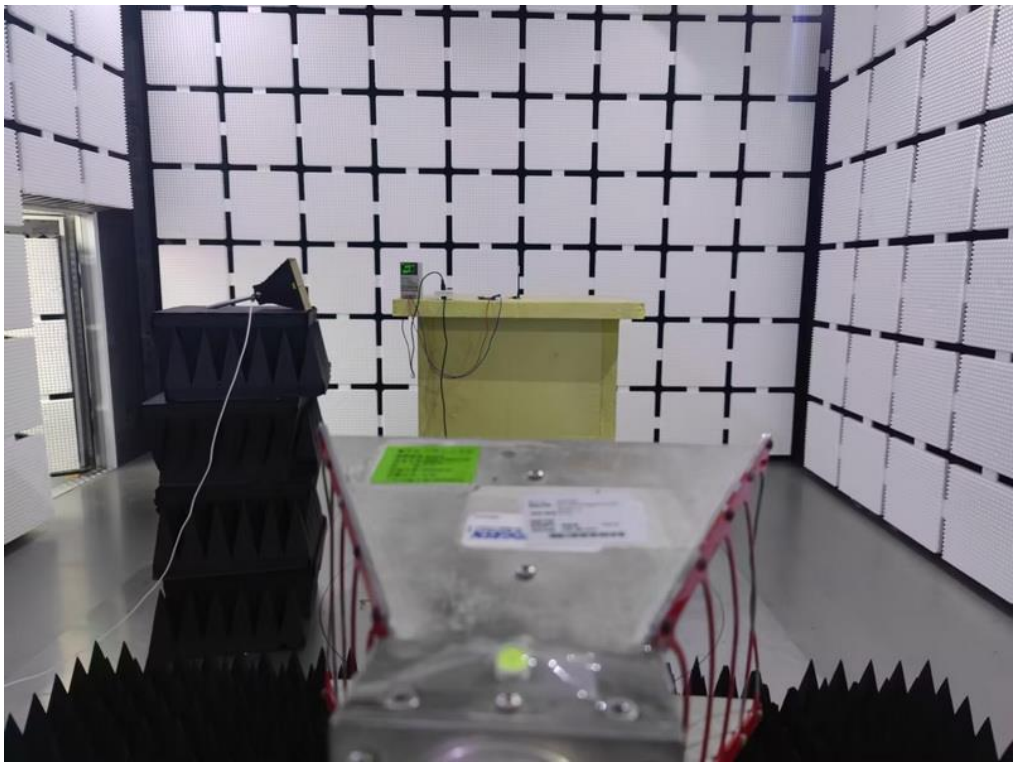
30 MHz to 1 GHz

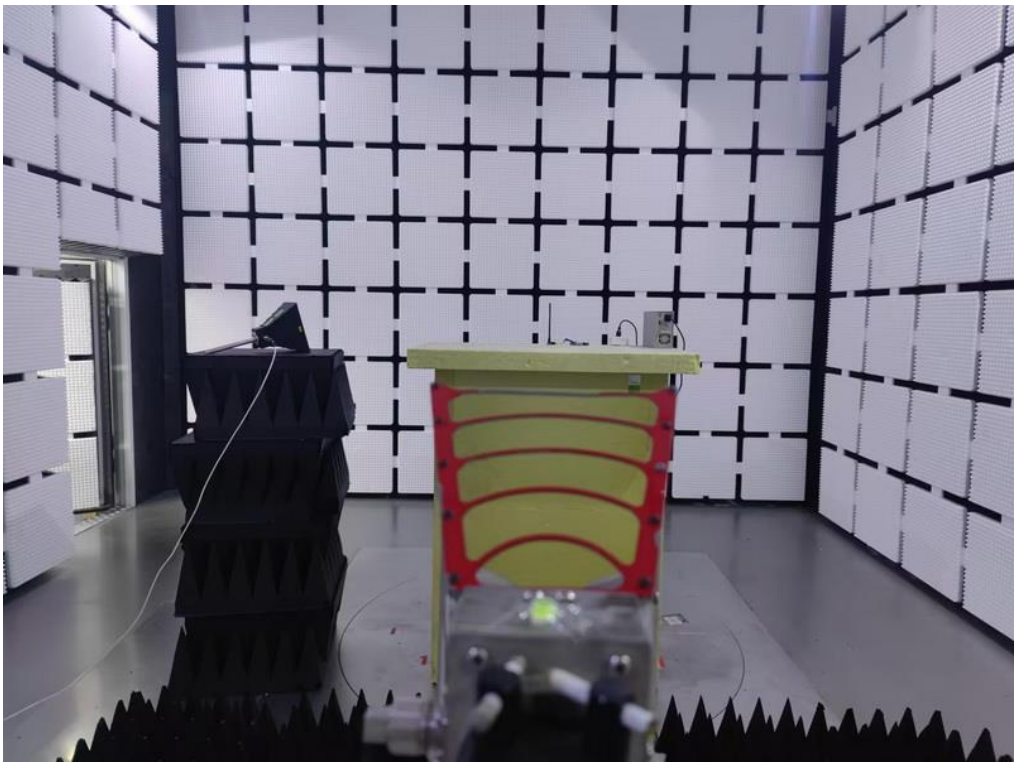




Radiated Emissions Test Photos

Above 1 GHz





APPENDIX A - OUTPUT POWER

Output Power (dBm)

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20407CH	20525CH	20643CH
				824.7MHz	836.5MHz	848.3MHz
5 / 1.4MHz	QPSK	1	0	24.19	24.14	23.97
		1	2	24.20	24.14	24.14
		1	5	24.21	24.06	24.08
		3	0	24.05	24.08	23.98
		3	1	24.07	24.11	24.13
		3	2	24.14	24.09	24.10
		6	0	23.22	23.22	23.06
	16QAM	1	0	23.38	23.64	23.30
		1	2	23.40	23.69	23.31
		1	5	23.52	23.59	23.29
		3	0	23.30	23.41	23.12
		3	1	23.34	23.44	23.13
		3	2	23.36	23.42	23.11
		6	0	22.36	22.49	22.22

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20415CH	20525CH	20635CH
				825.5MHz	836.5MHz	847.5MHz
5 / 3MHz	QPSK	1	0	23.62	24.06	23.74
		1	7	24.12	24.18	24.10
		1	14	23.96	24.09	23.98
		8	0	22.74	23.26	22.82
		8	4	22.85	23.29	22.94
		8	7	23.01	23.25	23.00
		15	0	22.92	23.21	22.97
	16QAM	1	0	22.89	23.39	22.90
		1	7	23.29	23.50	23.30
		1	14	23.24	23.29	23.22
		8	0	22.16	22.37	22.06
		8	4	22.27	22.39	22.20
		8	7	22.30	22.44	22.24
		15	0	21.99	22.31	22.09

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20425CH	20525CH	20625CH
				826.5MHz	836.5MHz	846.5MHz
5 / 5MHz	QPSK	1	0	24.22	24.62	24.45
		1	13	24.36	24.33	24.40
		1	24	24.61	24.45	24.75
		12	0	23.19	23.34	23.30
		12	6	23.22	23.22	23.38
		12	11	23.29	23.34	23.53
		25	0	23.26	23.29	23.47
	16QAM	1	0	23.55	23.90	23.71
		1	13	23.69	23.61	23.67
		1	24	23.92	23.82	24.02
		12	0	22.23	22.67	22.47
		12	6	22.36	22.58	22.45
		12	11	22.45	22.60	22.60
		25	0	22.38	22.57	22.48

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20450CH	20525CH	20600CH
				829.0MHz	836.5MHz	844.0MHz
5 / 10MHz	QPSK	1	0	23.94	24.52	24.45
		1	25	24.25	24.24	24.30
		1	49	24.36	24.42	24.84
		25	0	23.06	23.38	23.42
		25	13	23.16	23.28	23.35
		25	25	23.25	23.28	23.61
		50	0	23.42	23.65	23.81
	16QAM	1	0	23.25	23.79	23.80
		1	25	23.48	23.59	23.70
		1	49	23.50	23.64	24.09
		25	0	22.19	22.52	22.45
		25	13	22.34	22.48	22.52
		25	25	22.47	22.55	22.67
		27	0	22.54	22.48	22.57

ERP (dBm)

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20407CH	20525CH	20643CH
				824.7MHz	836.5MHz	848.3MHz
5 / 1.4MHz	QPSK	1	0	23.36	23.31	23.14
		1	2	23.37	23.31	23.31
		1	5	23.38	23.23	23.25
		3	0	23.22	23.25	23.15
		3	1	23.24	23.28	23.30
		3	2	23.31	23.26	23.27
		6	0	22.39	22.39	22.23
	16QAM	1	0	22.55	22.81	22.47
		1	2	22.57	22.86	22.48
		1	5	22.69	22.76	22.46
		3	0	22.47	22.58	22.29
		3	1	22.51	22.61	22.30
		3	2	22.53	22.59	22.28
		6	0	21.53	21.66	21.39

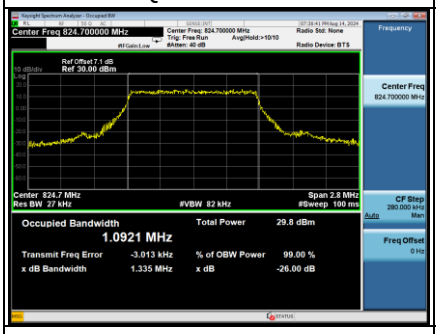
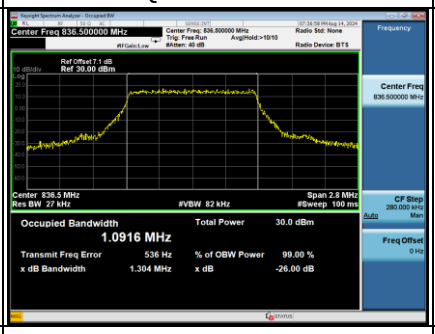
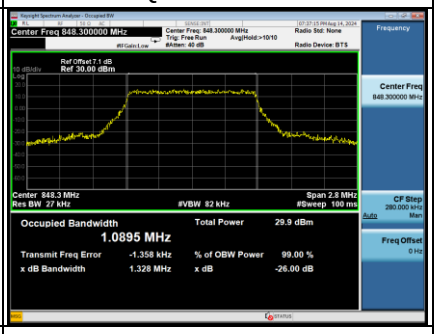
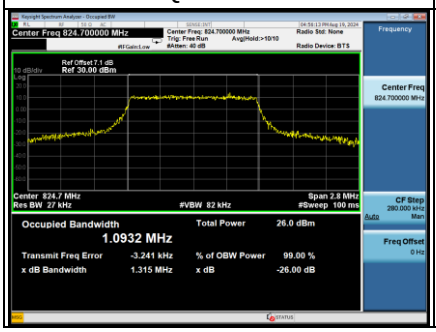
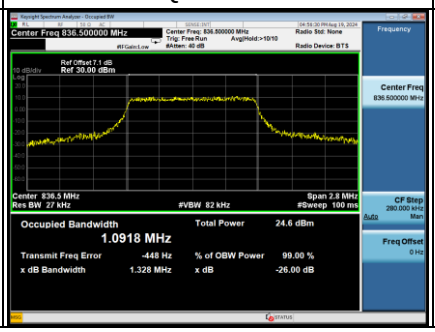
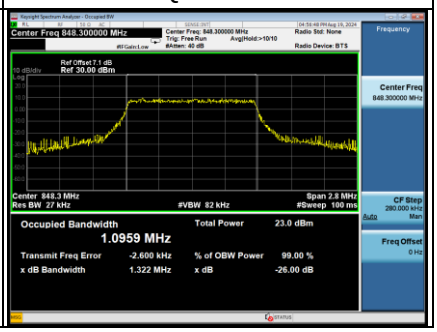
LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20415CH	20525CH	20635CH
				825.5MHz	836.5MHz	847.5MHz
5 / 3MHz	QPSK	1	0	22.79	23.23	22.91
		1	7	23.29	23.35	23.27
		1	14	23.13	23.26	23.15
		8	0	21.91	22.43	21.99
		8	4	22.02	22.46	22.11
		8	7	22.18	22.42	22.17
		15	0	22.09	22.38	22.14
	16QAM	1	0	22.06	22.56	22.07
		1	7	22.46	22.67	22.47
		1	14	22.41	22.46	22.39
		8	0	21.33	21.54	21.23
		8	4	21.44	21.56	21.37
		8	7	21.47	21.61	21.41
		15	0	21.16	21.48	21.26

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20425CH	20525CH	20625CH
				826.5MHz	836.5MHz	846.5MHz
5 / 5MHz	QPSK	1	0	23.39	23.79	23.62
		1	13	23.53	23.50	23.57
		1	24	23.78	23.62	23.92
		12	0	22.36	22.51	22.47
		12	6	22.39	22.39	22.55
		12	11	22.46	22.51	22.70
		25	0	22.43	22.46	22.64
	16QAM	1	0	22.72	23.07	22.88
		1	13	22.86	22.78	22.84
		1	24	23.09	22.99	23.19
		12	0	21.40	21.84	21.64
		12	6	21.53	21.75	21.62
		12	11	21.62	21.77	21.77
		25	0	21.55	21.74	21.65

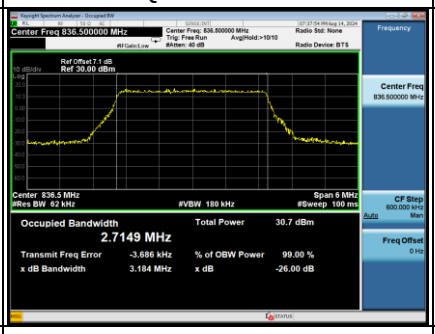
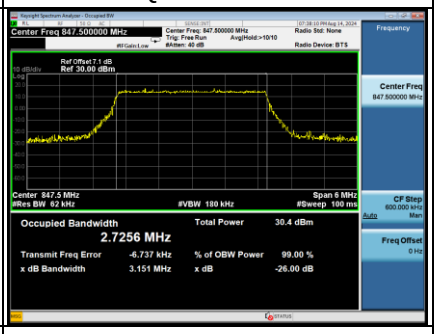
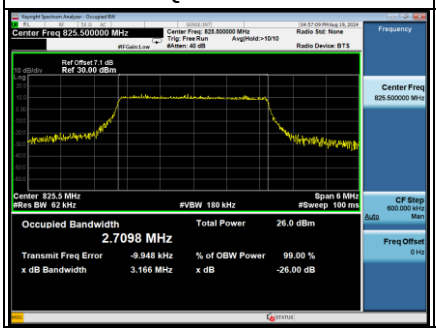
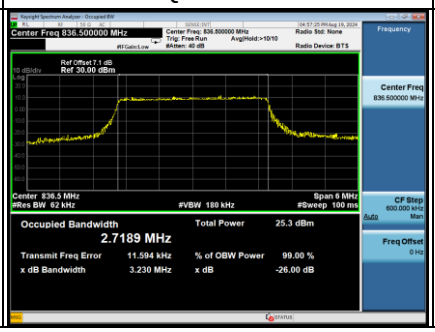
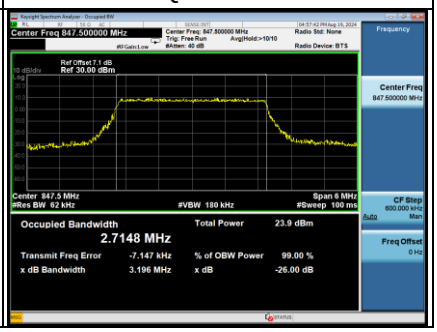
LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20450CH	20525CH	20600CH
				829.0MHz	836.5MHz	844.0MHz
5 / 10MHz	QPSK	1	0	23.11	23.69	23.62
		1	25	23.42	23.41	23.47
		1	49	23.53	23.59	24.01
		25	0	22.23	22.55	22.59
		25	13	22.33	22.45	22.52
		25	25	22.42	22.45	22.78
		50	0	22.59	22.82	22.98
	16QAM	1	0	22.42	22.96	22.97
		1	25	22.65	22.76	22.87
		1	49	22.67	22.81	23.26
		25	0	21.36	21.69	21.62
		25	13	21.51	21.65	21.69
		25	25	21.64	21.72	21.84
		27	0	21.71	21.65	21.74

APPENDIX B - OCCUPIED BANDWIDTH

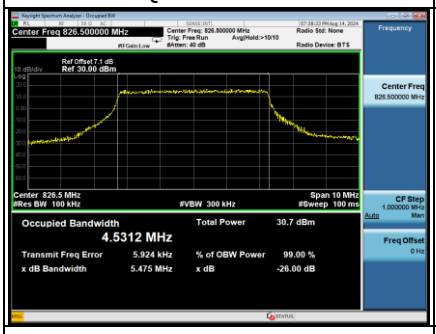
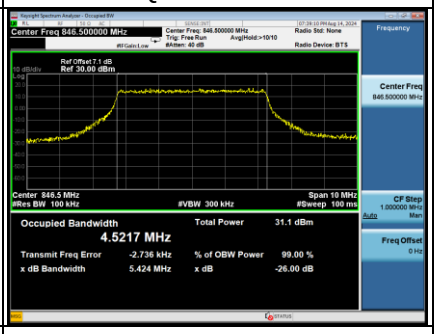
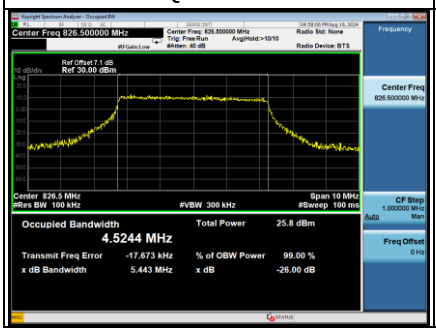
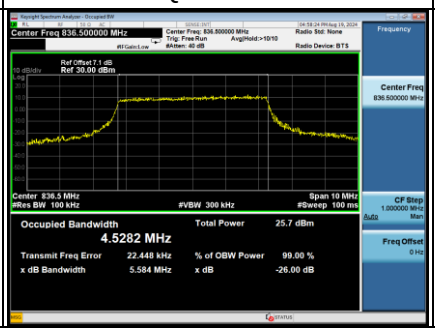
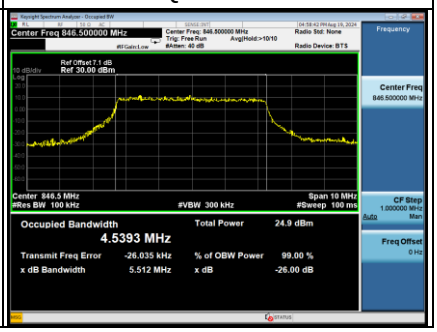
LTE Band 5_1.4MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)		26dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
20407	824.7	1.0921	1.0932	1.335	1.315
20525	836.5	1.0916	1.0918	1.304	1.328
20643	848.3	1.0895	1.0959	1.328	1.322

Spectrum Plot		
QPSK-20407	QPSK-20525	QPSK-20643
		
16QAM-20407	16QAM-20525	16QAM-20643
		

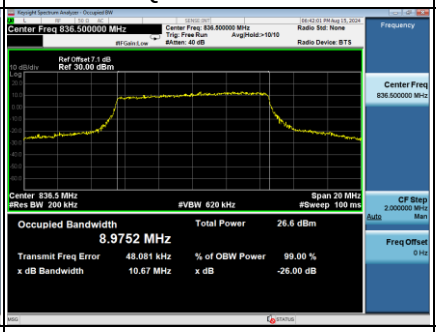
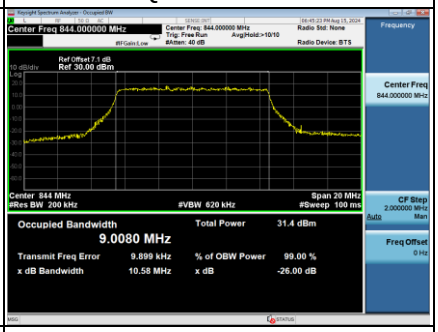
LTE Band 5_3MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)		26dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
20415	825.5	2.6940	2.7098	3.139	3.166
20525	836.5	2.7149	2.7189	3.184	3.230
20635	847.5	2.7256	2.7148	3.151	3.196

Spectrum Plot		
QPSK-20415	QPSK-20525	QPSK-20635
		
16QAM-20415	16QAM-20525	16QAM-20635
		

LTE Band 5_5MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)		26dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
20425	826.5	4.5312	4.5244	5.475	5.443
20525	836.5	4.5451	4.5282	5.478	5.584
20625	846.5	4.5217	4.5393	5.424	5.512

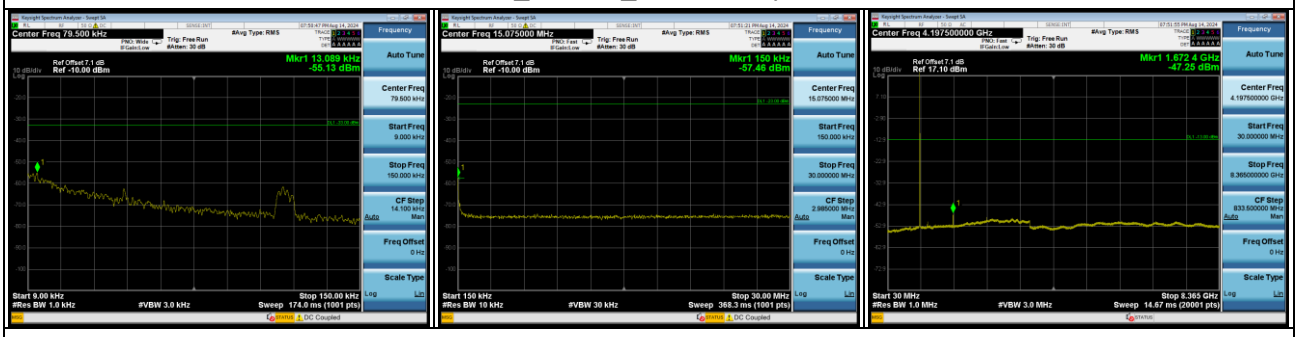
Spectrum Plot		
QPSK-20425	QPSK-20525	QPSK-20625
		
16QAM-20425	16QAM-20525	16QAM-20625
		

LTE Band 5_10MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)		26dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
20450	829.0	9.0600	5.0080	10.57	6.550
20525	836.5	8.9752	5.0728	10.67	6.471
20600	844.0	9.0080	5.0180	10.58	6.878

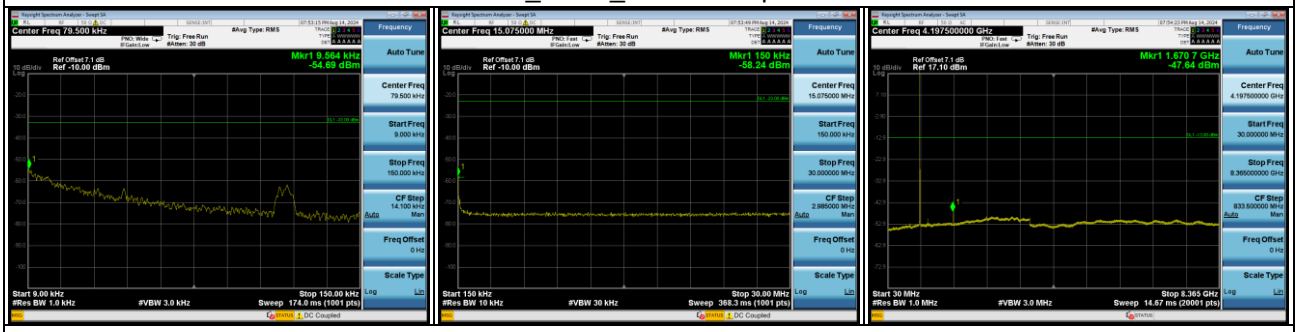
Spectrum Plot		
QPSK-20450	QPSK-20525	QPSK-20600
		
16QAM-20450	16QAM-20525	16QAM-20600
		

APPENDIX C - CONDUCTED SPURIOUS EMISSIONS

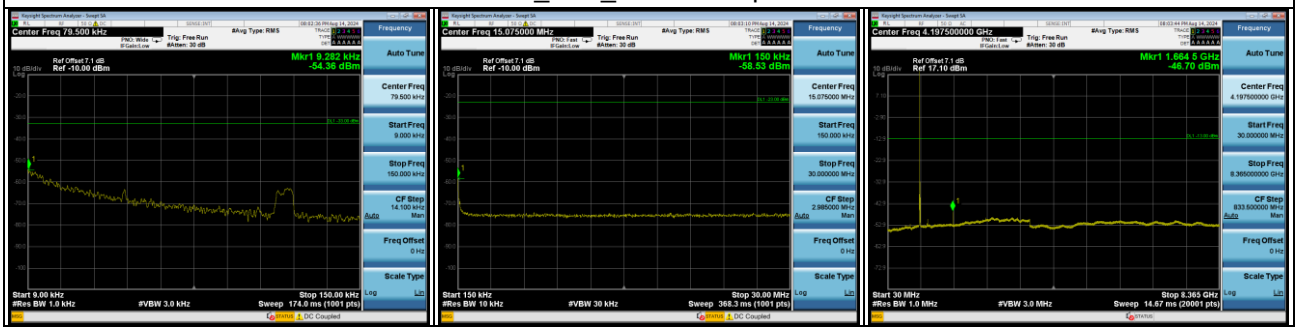
LTE Band 5_1.4MHz_CH20525 Spectrum Plot



LTE Band 5_5MHz_CH20525 Spectrum Plot



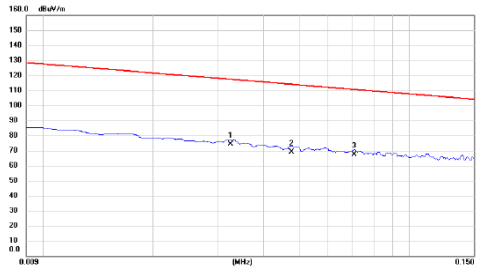
LTE Band 5_10M_CH20525 Spectrum Plot



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

Test Mode :	TX Mode

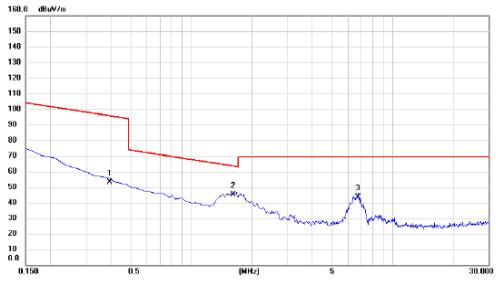
Ant 0°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	Detector	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1	*	0.0325	53.10	21.11	74.21	117.37	-43.16	AVG	
2		0.0476	47.85	21.19	69.04	114.05	-45.01	AVG	
3		0.0706	46.03	21.27	67.30	110.63	-43.33	AVG	

Test Mode :	TX Mode

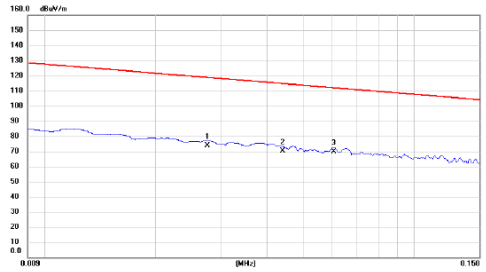
Ant 0°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	Detector	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1		0.3933	31.82	21.06	52.88	95.71	-42.83	AVG	
2	*	1.6126	23.69	21.14	44.83	63.45	-18.62	QP	
3		6.7470	22.31	21.19	43.50	69.54	-26.04	QP	

Test Mode :	TX Mode

Ant 90°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	Detector	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1		0.0276	52.69	21.03	73.72	118.79	-45.07	AVG	
2		0.0440	49.22	21.17	70.39	114.74	-44.35	AVG	
3	*	0.0606	48.76	21.24	70.00	111.96	-41.96	AVG	

Test Mode :	TX Mode

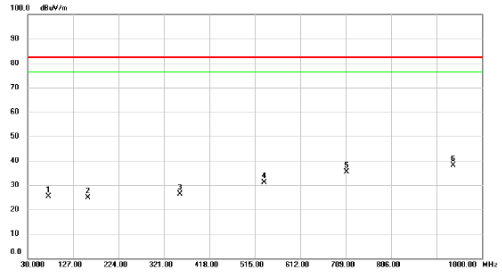
Ant 90°

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	Detector	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1		0.4237	28.69	21.06	49.75	95.06	-45.31	AVG	
2	*	1.7620	22.64	21.12	43.76	69.54	-25.78	QP	
3		6.6573	21.38	21.19	42.57	69.54	-26.97	QP	

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

Test Mode :	LTE Band 5_TX CH20525_1.4MHz

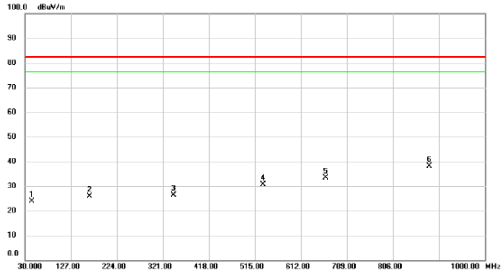
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		74.6200	39.67	-14.29	25.38	82.30	-56.92	peak	
2		158.0400	35.80	-10.91	24.89	82.30	-57.41	peak	
3		355.4350	35.74	-9.41	26.33	82.30	-55.97	peak	
4		534.8850	36.37	-5.31	31.06	82.30	-51.24	peak	
5		711.4250	37.32	-2.02	35.30	82.30	-47.00	peak	
6	*	938.4050	37.67	0.48	38.15	82.30	-44.15	peak	

Test Mode :	LTE Band 5_TX CH20525_1.4MHz

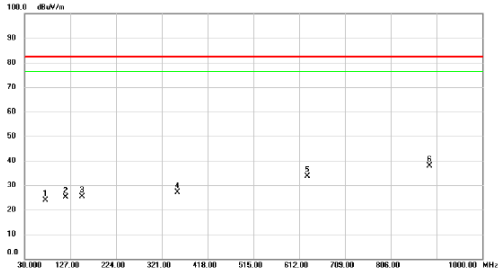
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		44.5500	35.24	-11.38	23.86	82.30	-58.44	peak	
2		165.8000	37.01	-11.08	25.93	82.30	-56.37	peak	
3		343.3100	35.89	-9.51	26.38	82.30	-55.92	peak	
4		532.4600	36.05	-5.35	30.70	82.30	-51.60	peak	
5		664.3800	36.18	-2.68	33.50	82.30	-48.80	peak	
6	*	883.1150	38.16	0.06	38.22	82.30	-44.08	peak	

Test Mode :	LTE Band 5_TX CH20525_5MHz

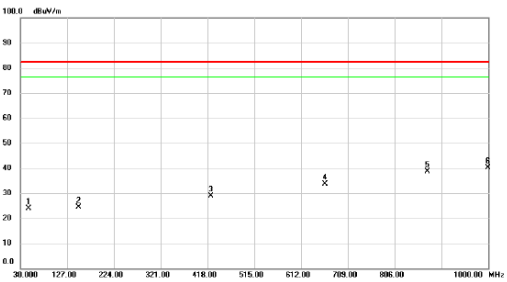
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		75.1050	38.34	-14.37	23.97	82.30	-58.33	peak	
2		116.8150	38.68	-13.51	25.17	82.30	-57.13	peak	
3		152.2200	36.55	-11.09	25.46	82.30	-56.84	peak	
4		353.4950	36.45	-9.42	27.03	82.30	-55.27	peak	
5		629.4600	36.82	-3.15	33.67	82.30	-48.63	peak	
6	*	888.4500	37.71	0.14	37.85	82.30	-44.45	peak	

Test Mode :	LTE Band 5_TX CH20525_5MHz

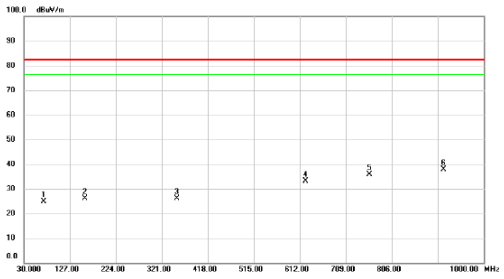
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		46.9750	35.13	-11.30	23.83	82.30	-58.47	peak	
2		150.7650	35.52	-11.14	24.38	82.30	-57.92	peak	
3		425.2750	36.33	-7.39	28.94	82.30	-53.36	peak	
4		661.9550	36.42	-2.70	33.72	82.30	-48.58	peak	
5		874.3850	38.64	-0.05	38.59	82.30	-43.71	peak	
6	*	999.0300	39.08	0.98	40.06	82.30	-42.24	peak	

Test Mode :	LTE Band 5_TX CH20525_10MHz

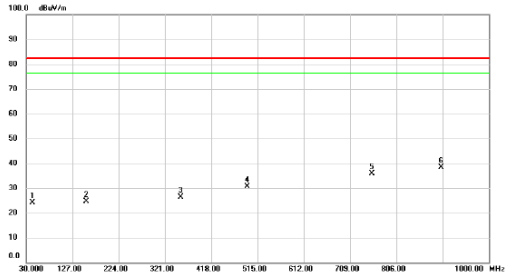
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		71.7100	38.57	-13.79	24.78	82.30	-57.52	peak	
2		159.0100	37.06	-10.87	26.19	82.30	-56.11	peak	
3		352.0400	35.64	-9.44	26.20	82.30	-56.10	peak	
4		623.6400	36.33	-3.24	33.09	82.30	-49.21	peak	
5		758.4700	37.03	-1.09	35.94	82.30	-46.36	peak	
6	*	914.6400	37.63	0.37	38.00	82.30	-44.30	peak	

Test Mode :	LTE Band 5_TX CH20525_10MHz

Horizontal

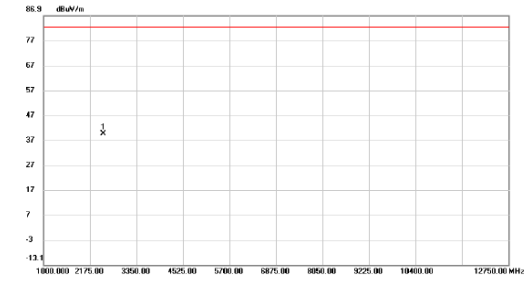


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		43.5800	35.52	-11.44	24.08	82.30	-58.22	peak	
2		155.6150	35.52	-10.98	24.54	82.30	-57.76	peak	
3		353.9800	35.87	-9.42	26.45	82.30	-55.85	peak	
4		493.1750	36.77	-6.12	30.65	82.30	-51.65	peak	
5		755.0750	37.04	-1.08	35.96	82.30	-46.34	peak	
6	*	899.6050	38.08	0.30	38.38	82.30	-43.92	peak	

APPENDIX F - RADIATED SPURIOUS EMISSIONS (ABOVE 1000MHZ)

Test Mode :	LTE Band 5_TX CH20525_1.4MHz

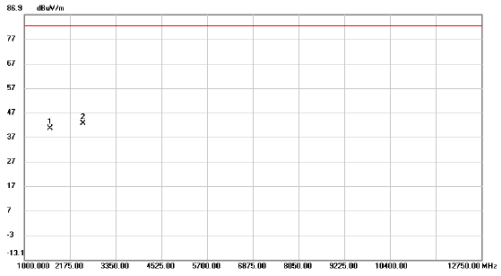
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2509.875	38.92	0.55	39.47	82.30	-42.83	peak	

Test Mode :	LTE Band 5_TX CH20525_1.4MHz

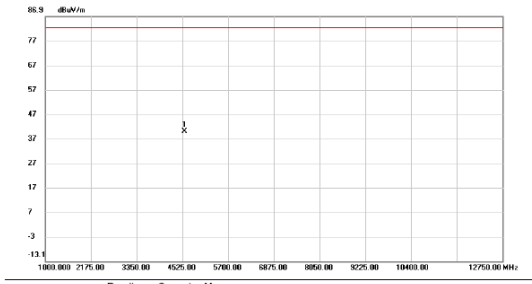
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		1669.750	42.59	-2.17	40.42	82.30	-41.88	peak	
2	*	2509.875	41.87	0.55	42.42	82.30	-39.88	peak	

Test Mode :	LTE Band 5_TX CH20525_5MHz

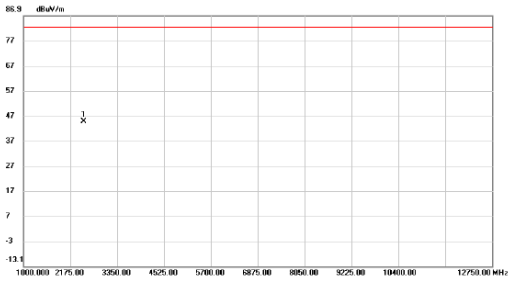
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4577.875	35.83	4.27	40.10	82.30	-42.20	peak	

Test Mode :	LTE Band 5_TX CH20525_5MHz

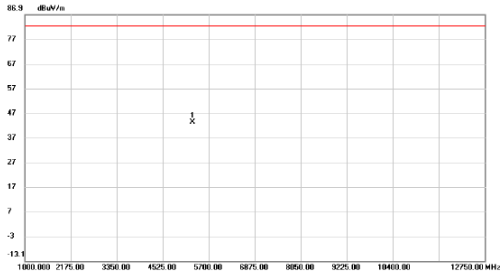
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2504.000	44.17	0.53	44.70	82.30	-37.60	peak	

Test Mode :	LTE Band 5_TX CH20525_10MHz

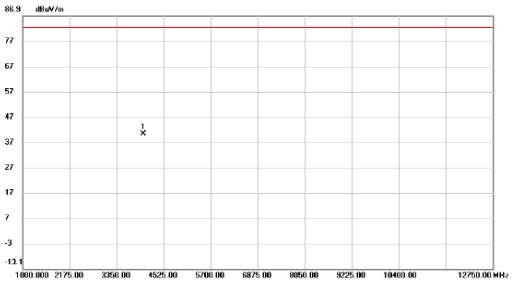
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	5288.750	37.76	5.51	43.27	82.30	-39.03	peak	

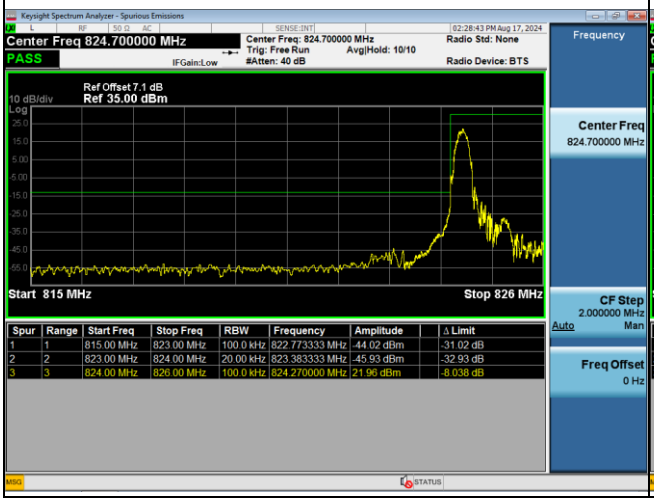
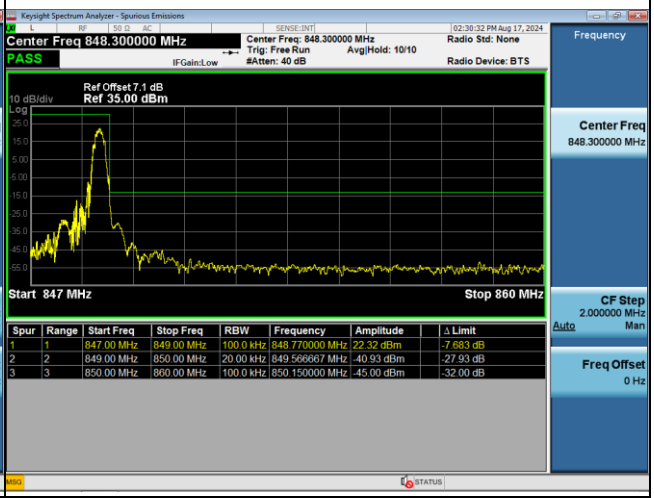
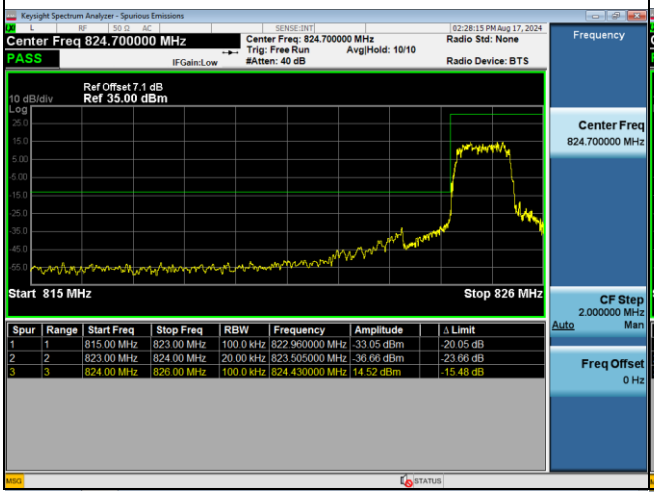
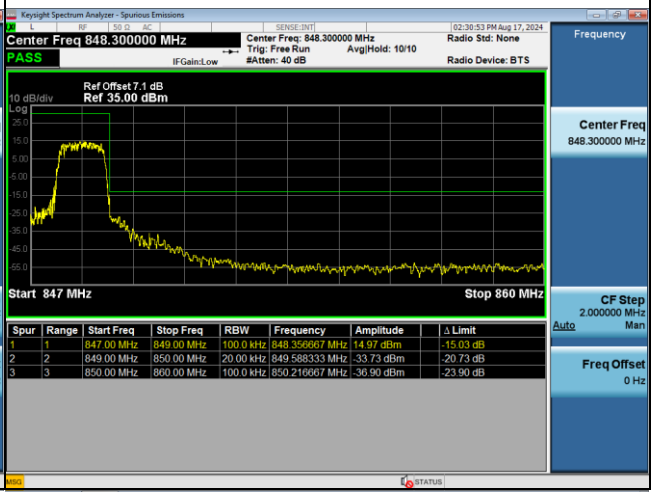
Test Mode :	LTE Band 5_TX CH20525_10MHz

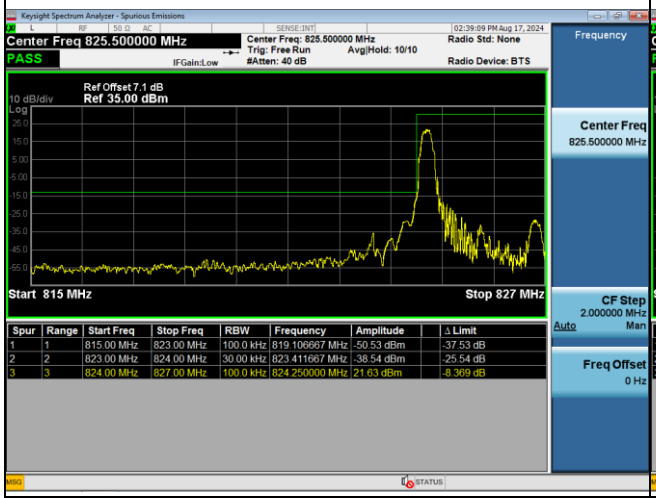
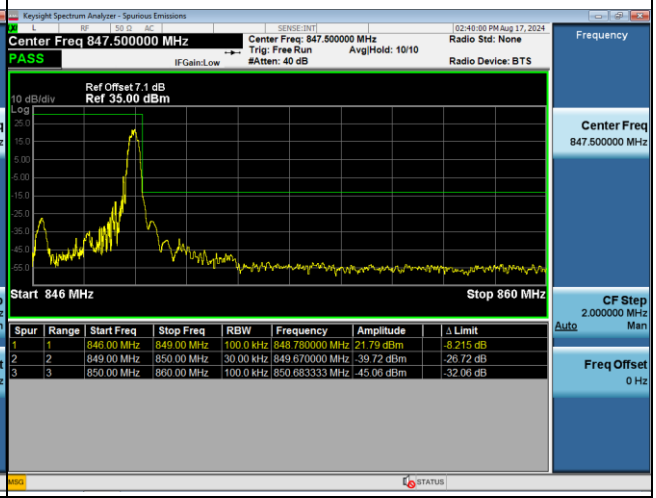
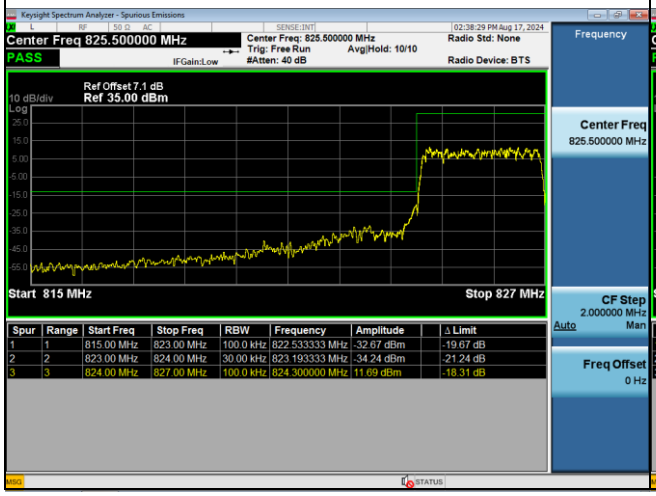
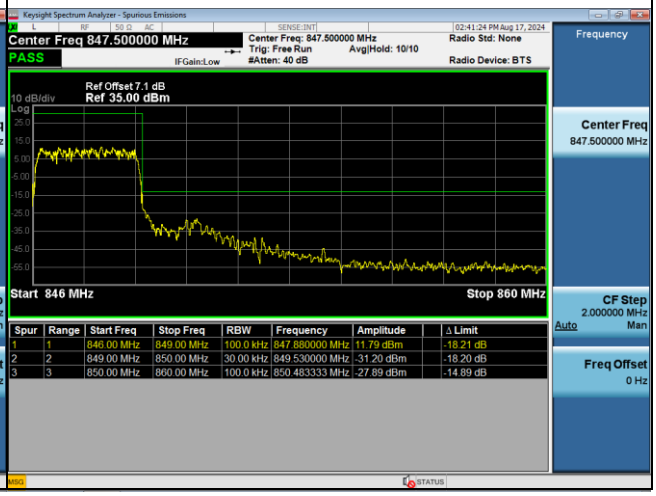
Horizontal

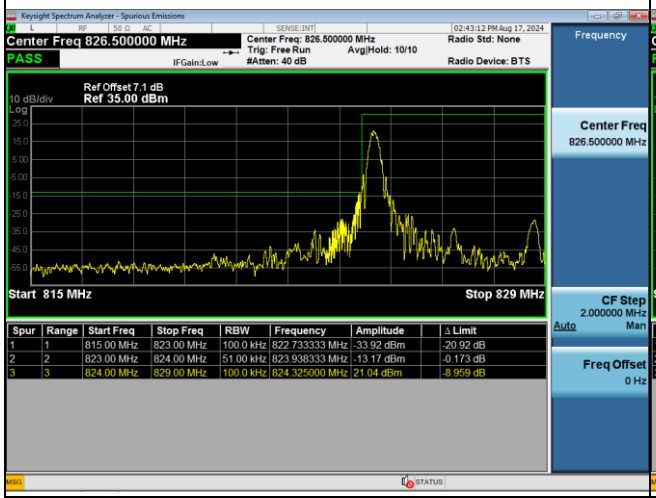
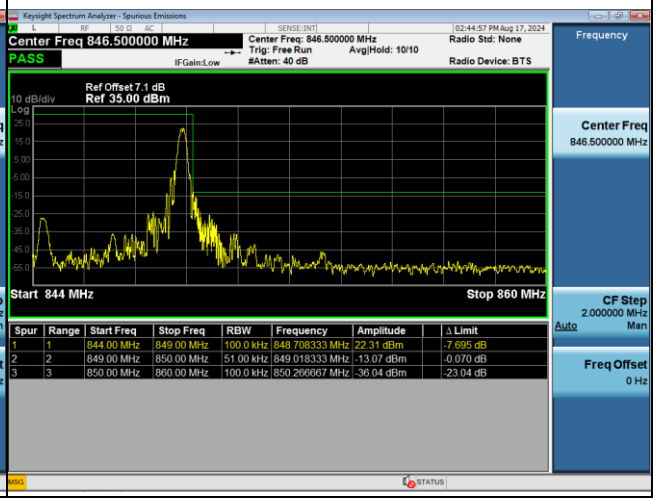
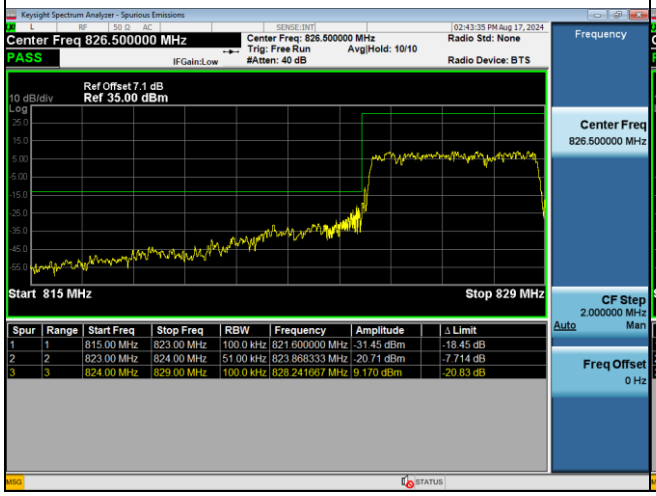
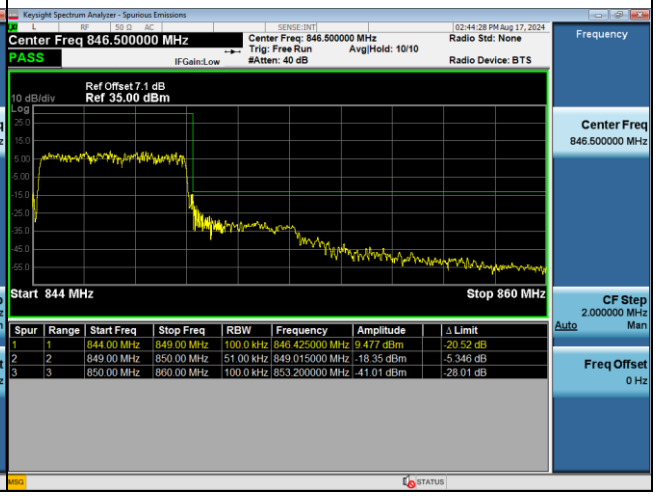


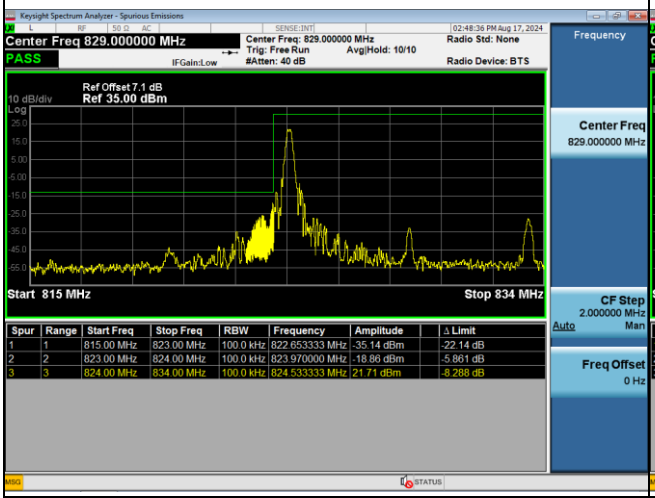
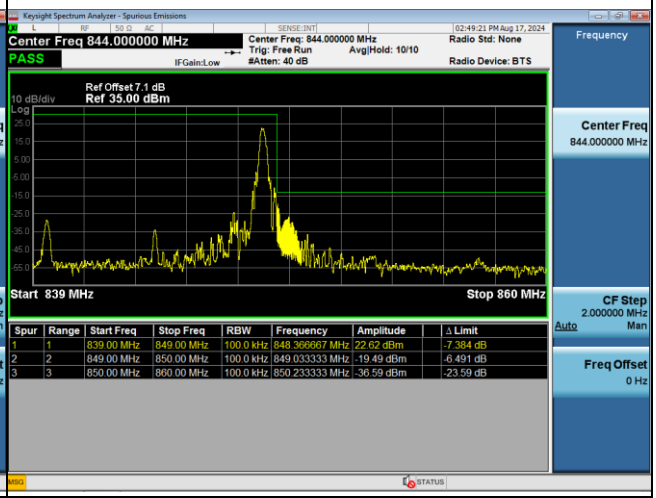
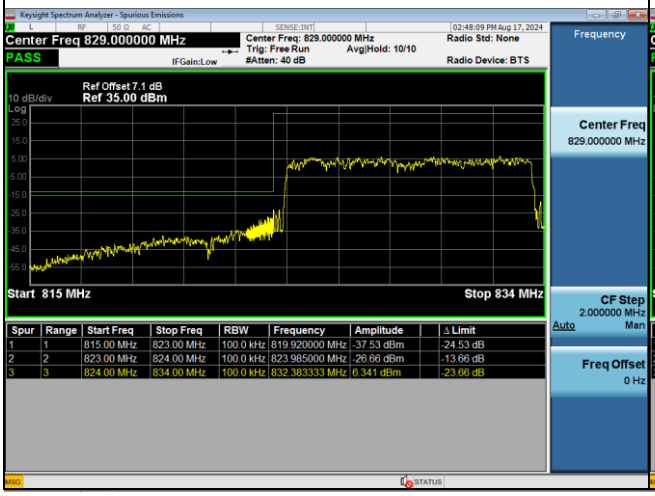
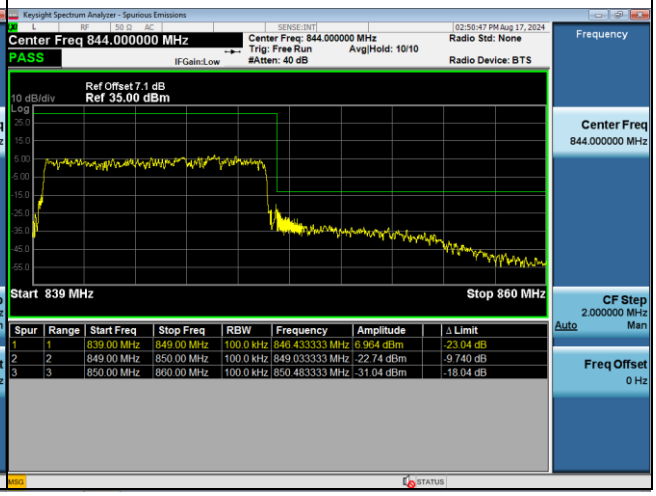
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4008.000	36.57	3.77	40.34	82.30	-41.96	peak	

APPENDIX G - BAND EDGE

LTE Band 5_1.4MHz Spectrum Plot			
1RB#0		1RB#5	
Channel	20407	Channel	20643
			
6RB#0			
Channel	20407	Channel	20643
			

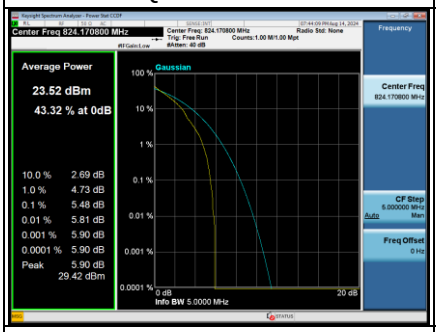
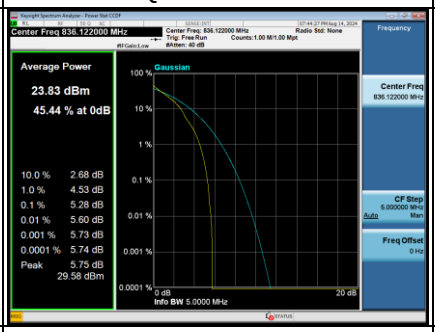
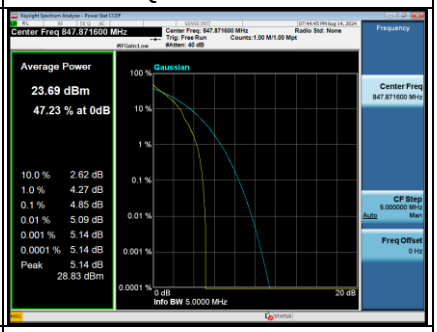
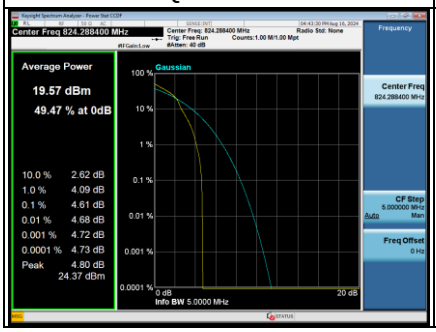
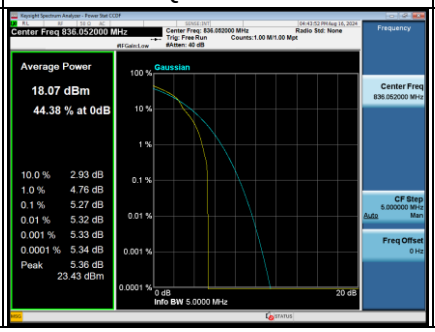
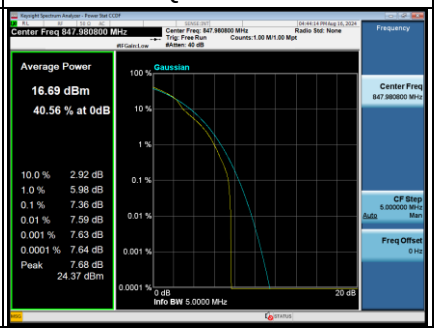
LTE Band 5_3MHz Spectrum Plot			
1RB#0		1RB#14	
Channel	20415	Channel	20635
			
15RB#0			
Channel	20415	Channel	20635
			

LTE Band 5_5MHz Spectrum Plot			
1RB#0		1RB#24	
Channel	20425	Channel	20625
			
25RB#0			
Channel	20425	Channel	20625
			

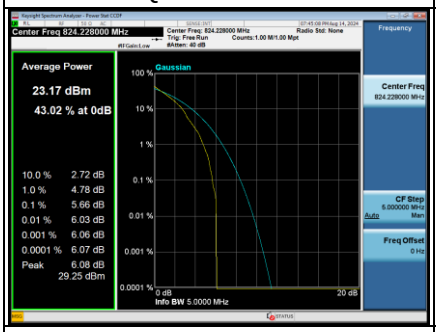
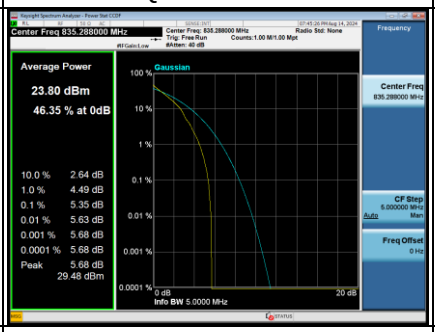
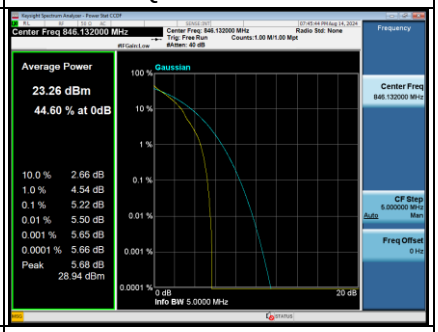
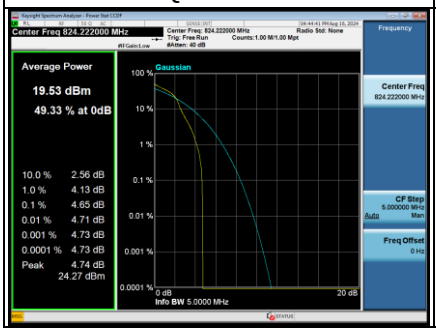
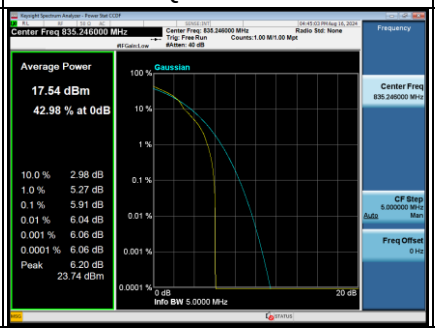
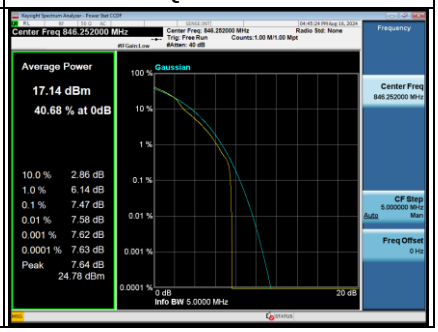
LTE Band 5_10MHz Spectrum Plot			
1RB#0		1RB#49	
Channel	20450	Channel	20600
			
50RB#0			
Channel	20450	Channel	20600
			

APPENDIX H - PEAK TO AVERAGE RATIO

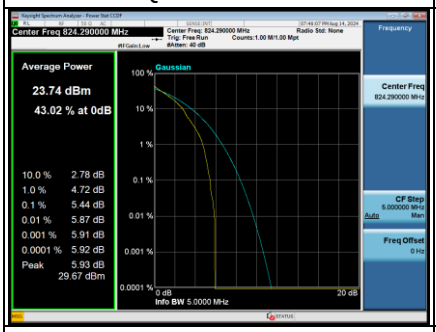
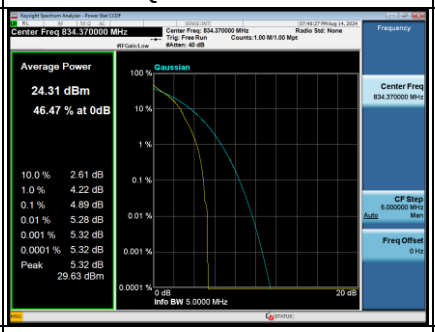
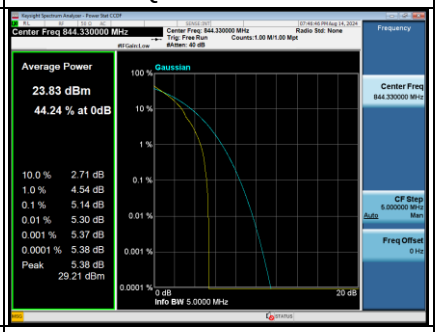
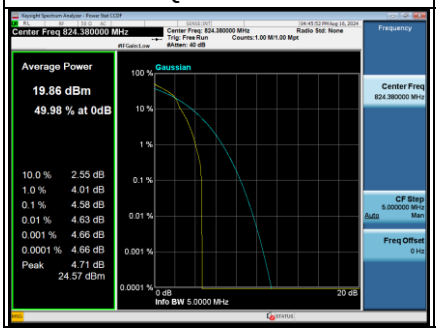
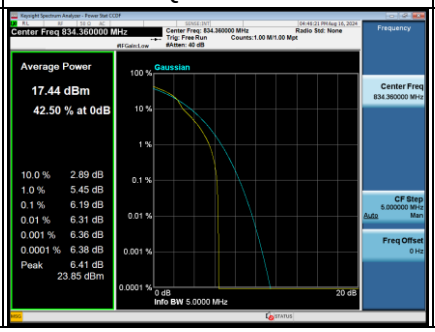
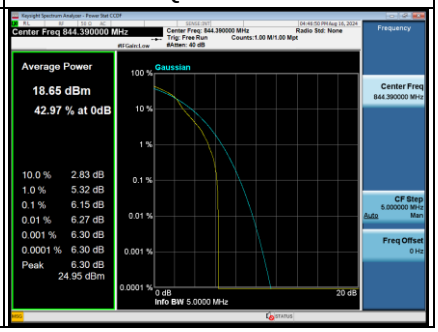
LTE Band 5_1.4MHz					
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		Max. Limit (dB)	Result
		QPSK	16QAM		
20407	824.7	5.48	4.61	13	Pass
20525	836.5	5.28	5.27	13	Pass
20643	848.3	4.85	7.36	13	Pass

Spectrum Plot		
QPSK-20407	QPSK-20525	QPSK-20643
		
16QAM-20407	16QAM-20525	16QAM-20643
		

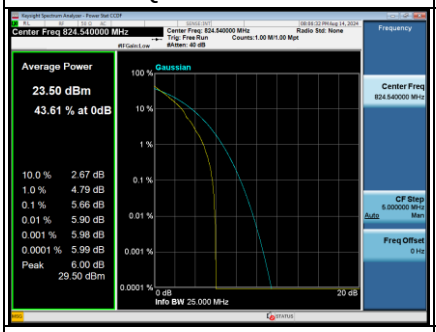
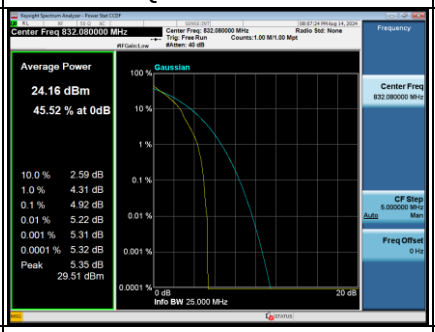
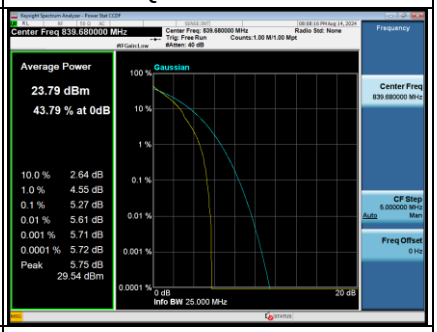
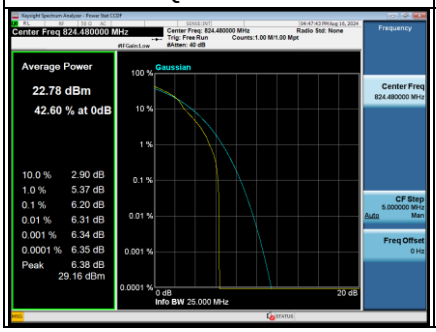
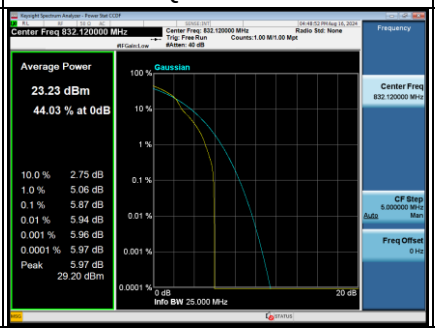
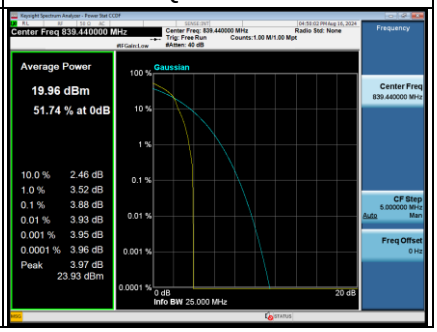
LTE Band 5_3MHz					
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		Max. Limit (dB)	Result
		QPSK	16QAM		
20415	825.5	5.66	4.65	13	Pass
20525	836.5	5.35	5.91	13	Pass
20635	847.5	5.22	7.47	13	Pass

Spectrum Plot		
QPSK-20415	QPSK-20525	QPSK-20635
		
16QAM-20415	16QAM-20525	16QAM-20635
		

LTE Band 5_5MHz					
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		Max. Limit (dB)	Result
		QPSK	16QAM		
20425	826.5	5.44	4.58	13	Pass
20525	836.5	4.89	6.19	13	Pass
20625	846.5	5.14	6.15	13	Pass

Spectrum Plot		
QPSK-20425	QPSK-20525	QPSK-20625
		
16QAM-20425	16QAM-20525	16QAM-20625
		

LTE Band 5_10MHz					
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		Max. Limit (dB)	Result
		QPSK	16QAM		
20450	829.0	5.66	6.20	13	Pass
20525	836.5	4.92	5.87	13	Pass
20600	844.0	5.27	3.88	13	Pass

Spectrum Plot		
QPSK-20450	QPSK-20525	QPSK-20600
		
16QAM-20450	16QAM-20525	16QAM-20600
		

APPENDIX I - FREQUENCY STABILITY

Test Mode	LTE Band 5_CH20525_10MHz

Frequency error versus temperature and supply voltage			
Temperature (°C)	Frequency error (Hz)	ppm	Limit
50	-0.64	-0.0008	±2.5ppm
40	0.77	0.0009	
30	-0.56	-0.0007	
20	1.09	0.0013	
10	0.31	0.0004	
0	0.84	0.0010	
−10	0.04	0.0000	
−20	1.16	0.0014	
−30	-0.34	-0.0004	
Minimum voltage	0.39	0.0005	
Maximum voltage	-0.04	0.0000	
Nominal voltage	0.21	0.0003	

Note: Nominal voltage= 3.8V, Maximum voltage= 4.5V, Minimum voltage= 3.4V.

End of Test Report