FCC Radio Test Report

FCC ID: 2AH4HATD600

This report concerns: Original Grant

Project No.	:	2107C193
Equipment	:	LTE Cat-M1 Tracker
Brand Name	:	Mobilogix
Test Model	:	ATD600S
Series Model	:	N/A
Applicant	:	Mobilogix, Inc.
Address	:	5500 Trabuco Rd Suite 150 Irvine, CA, USA
Manufacturer	:	Mobilogix, Inc.
Address	:	5500 Trabuco Rd Suite 150 Irvine, CA, USA
Factory	:	Suga Electronics (Dongguan) Co., Ltd.
Address	:	No.8 Fulong Road, Qingxi Town, Dongguan City
Date of Receipt	:	Jul. 29, 2021
Date of Test	:	Jul. 30, 2021 ~ Sep. 10, 2021
Issued Date	:	Sep. 18, 2021
Report Version	:	R00
Test Sample	:	Engineering Sample No.: DG2021081225 for radiated, DG2021081224 for conducted.
Standard(s)	:	47 CFR FCC Part 22 Subpart H 47 CFR FCC Part 2 ANSI/TIA/EIA-603-E-2016 FCC KDB 971168 D01 Power Meas License Digital Systems v03r01

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

Vegeta Li

Prepared by : Vegeta Li

Steven Lu

Approved by : Steven Lu

TESTING CERT #5123.02

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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.

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

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** 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.

Table of Contents Page

Table of Contents Page

REPORT ISSUED HISTORY

Report Version	Description	Issued Date
R00	Original Issue.	Sep. 18, 2021

1. 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 22.913(a)(5)	Output Power & 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	------
-	Peak To Average Ratio	PASS	Record Only
2.1055 22.355	Frequency Stability	PASS	------

Note:

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

1.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No. 3 Jinshagang 1st Rd. Shixia, Dalang Town, Dongguan City, Guangdong, People's Republic of China.
BTL's Test Firm Registration Number for FCC: 357015
BTL's Designation Number for FCC: CN1240

1.2 MEASUREMENT UNCERTAINTY

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

A. Radiated Measurement:

Test Site	Method	Measurement Frequency Range	Ant. H / V	U, (dB)
DG-CB03	CISPR	9kHz ~ 30MHz	-	2.36
		30MHz ~ 200MHz	V	4.36
		30MHz ~ 200MHz	H	3.32
		200MHz ~ 1,000MHz	V	4.08
		200MHz ~ 1,000MHz	H	3.96
		1GHz ~ 6GHz	-	3.80
		6GHz ~ 18GHz	-	4.82

B. Other Measurement:

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

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

1.3 TEST ENVIRONMENT CONDITIONS

Test Item	Temperature	Humidity	Test Voltage	Tested By
Output Power & ERP	23.5°C	43%	DC 3.6 V	Tate Liu
Occupied Bandwidth	23.5°C	43%	DC 3.6 V	Tate Liu
Conducted Spurious Emissions	23.5°C	43%	DC 3.6 V	Tim Yang
Radiated Spurious Emissions	26°C	52%	DC 3.6 V	Kwok Guo
Band Edge	23.5°C	43%	DC 3.6 V	Tate Liu
Peak to Average Ratio	23.5°C	43%	DC 3.6 V	Tate Liu
Frequency Stability	Normal & Extreme	43%	Normal & Extreme	Tate Liu

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	LTE Cat-M1 Tracker			
Brand Name	Mobilogix			
Test Model	ATD600S			
Series Model	N/A			
Model Difference(s)	N/A			
Hardware Version	1.1			
Software Version	1.1.45			
Power Source	Supplied from battery.			
Power Rating	DC 3.6V			
IEMI No.	Conducted	867730051961021		
	Radiated	867730051961708		
Category	NB2			
Sub-carrier Spacing	3.75KHz, 15KHz			
Modulation Type	UL: BPSK, QPSK DL: BPSK, QPSK			
Max. ERP	LTE	Sub-carrier Spacing (KHz)	BPSK (dBm)	QPSK (dBm)
	Band 5	3.75	19.59	19.61
		15	19.93	20.04

Note:

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

2. Table for Filed Antenna:

Brand	P/N	Antenna Type	Connector	Gain (dBi)	Note
Ethertronics	1004795	Chip	N/A	1.6	LTE Band 5

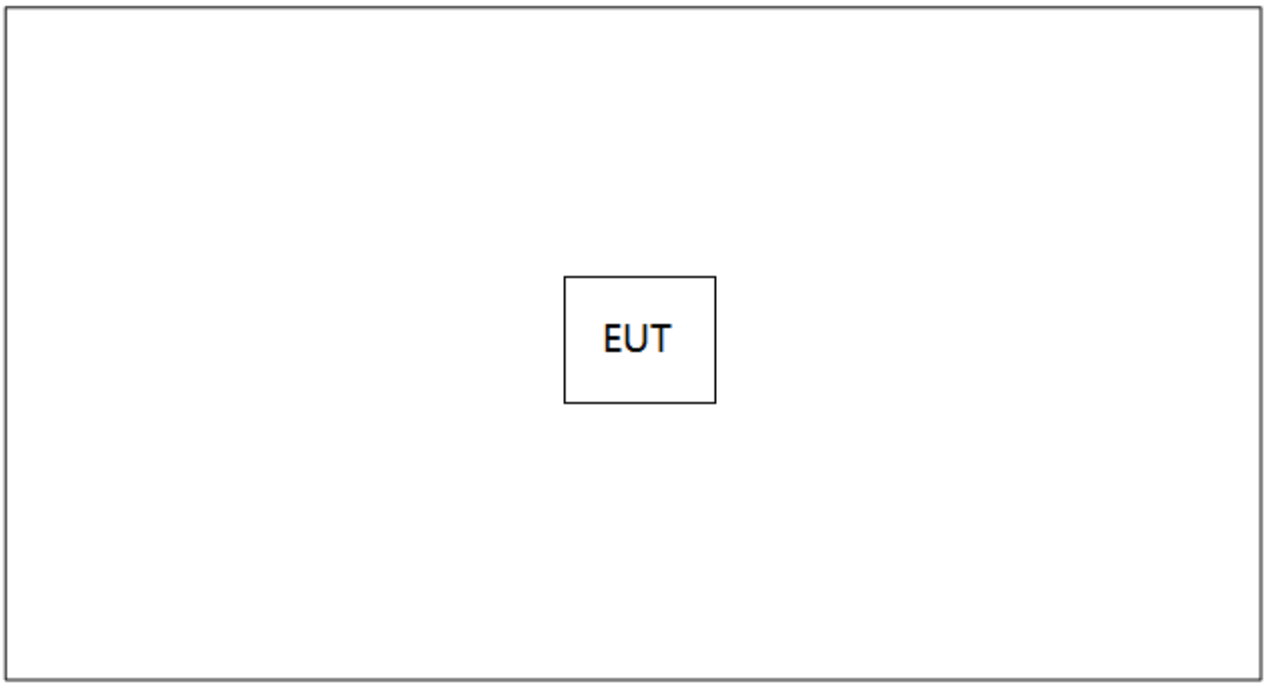
Note: The antenna gain is provided by the manufacturer.

2.2 DESCRIPTION OF TEST MODES

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

LTE BAND 5 MODE				
Test Item	Tested Channel	Sub-carrier Spacing(kHz)	Modulation	Mode
Output Power & ERP	20401, 20525, 20649	3.75	BPSK, QPSK	1RB
		15		
Occupied Bandwidth	20401, 20525, 20649	3.75	BPSK, QPSK	1RB
		15		1RB/12RB
Conducted Spurious Emissions	20525	3.75	BPSK, QPSK	1RB
		15		
Radiated Spurious Emissions	20525	3.75	BPSK, QPSK	1RB
		15		
Band Edge	20402, 20648	3.75	BPSK, QPSK	1RB
		15		1RB/12RB
Peak To Average Ratio	20401, 20525, 20649	3.75	BPSK, QPSK	1RB
		15		
Frequency Stability	20525	3.75	BPSK, QPSK	1RB
		15		

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATIONOFSYSTEMTESTED



2.4 DESCRIPTION OF SUPPORT UNITS

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

Item	Equipment	Brand	Model No.	Series No.
-	-	-	-	-

Item	Cable Type	Shielded Type	Ferrite Core	Length
-	-	-	-	-

3. TEST RESULT

3.1 OUTPUT POWER MEASUREMENT

3.1.1 LIMIT

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

3.1.2 TEST PROCEDURE

The testing follows FCC KDB 971168 v03r01 Section 5.

EIRP / ERP:

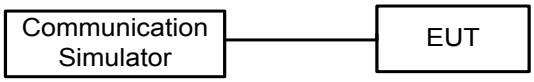
EIRP = Output Power + Antenan gain
ERP = EIPR - 2.15dBi

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.

3.1.3 TEST SETUP LAYOUT

Output Power Measurement



3.1.4 TEST DEVIATION

No deviation

3.1.5 TEST RESULTS

Please refer to the APPENDIX A.

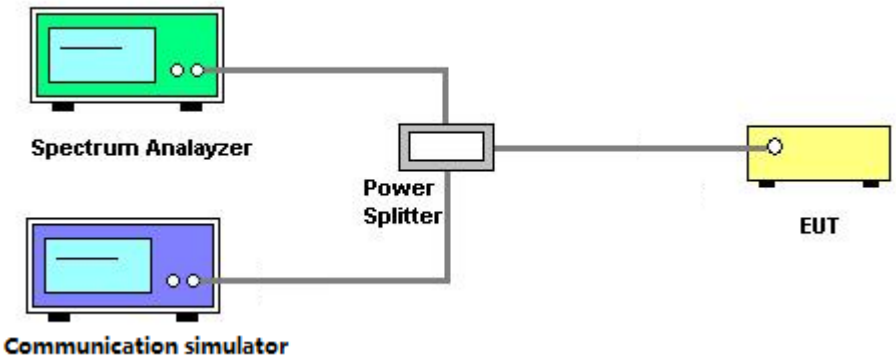
3.2 OCCUPIED BANDWIDTH MEASUREMENT

3.2.1 TEST PROCEDURE

The testing follows FCC KDB 971168 v03r01 Section 4.

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.

3.2.2 TEST SETUP LAYOUT



3.2.3 TEST DEVIATION

No deviation

3.2.4 TEST RESULTS

Please refer to the APPENDIX B.

3.3 CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

3.3.1 LIMIT

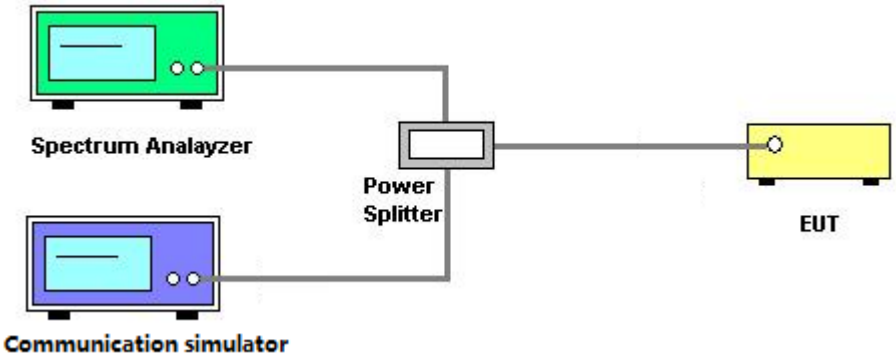
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit equal to -13dBm.

3.3.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 6.

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

3.3.3 TEST SETUP LAYOUT



3.3.4 TEST DEVIATION

No deviation

3.3.5 TEST RESULTS

Please refer to the APPENDIX C.

3.4 RADIATED SPURIOUS EMISSIONS MEASUREMENT

3.4.1 LIMIT

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

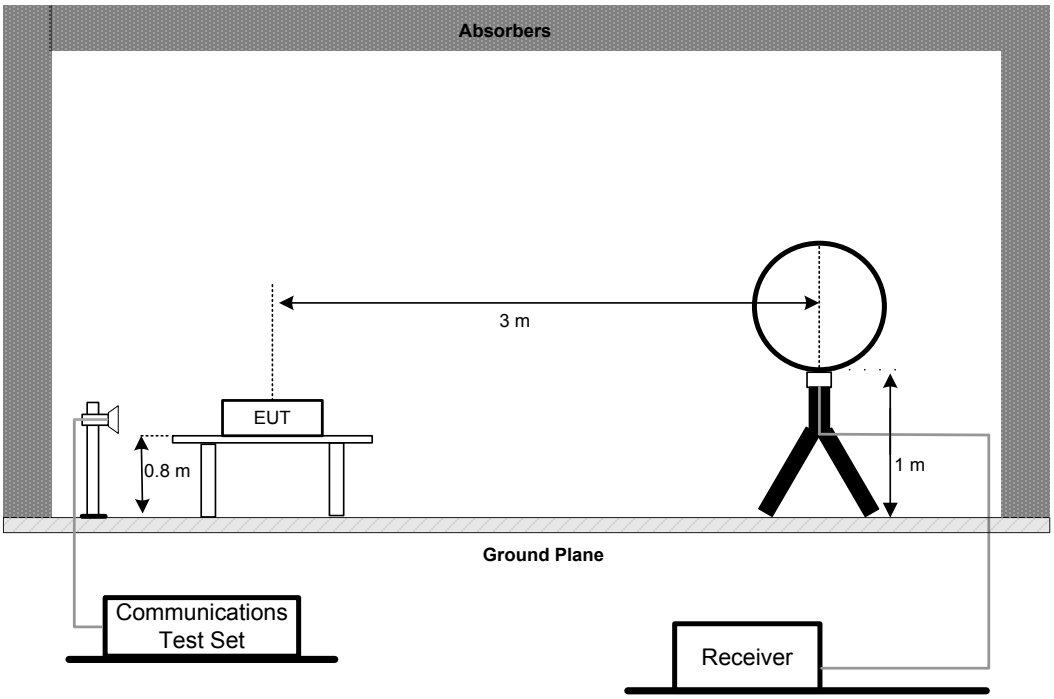
3.4.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 6.2.

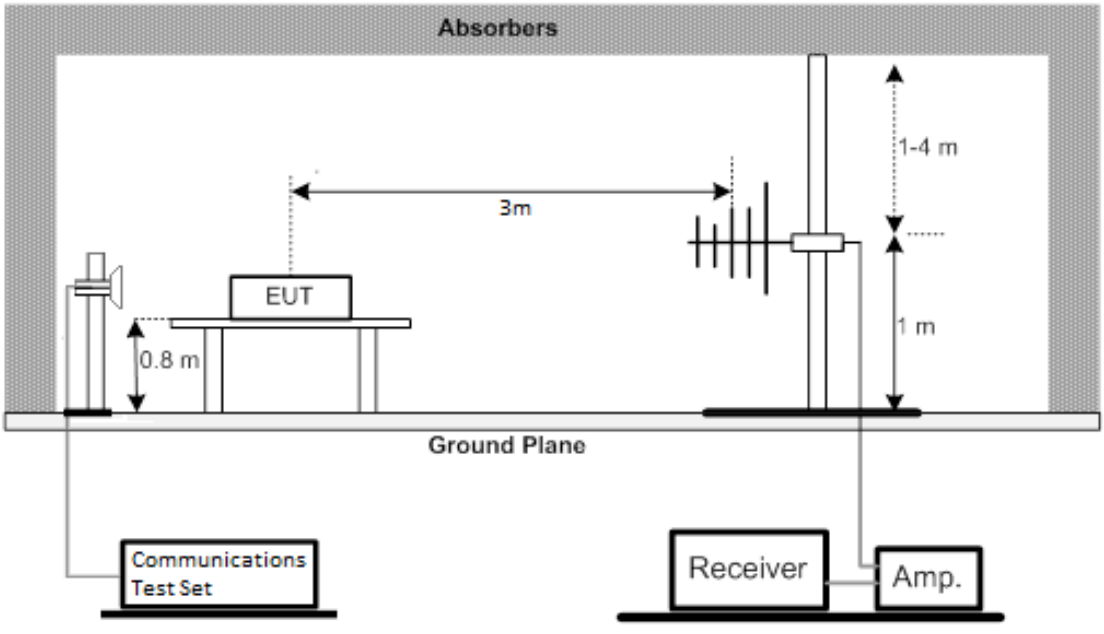
1. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from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

3.4.3 TEST SETUP LAYOUT

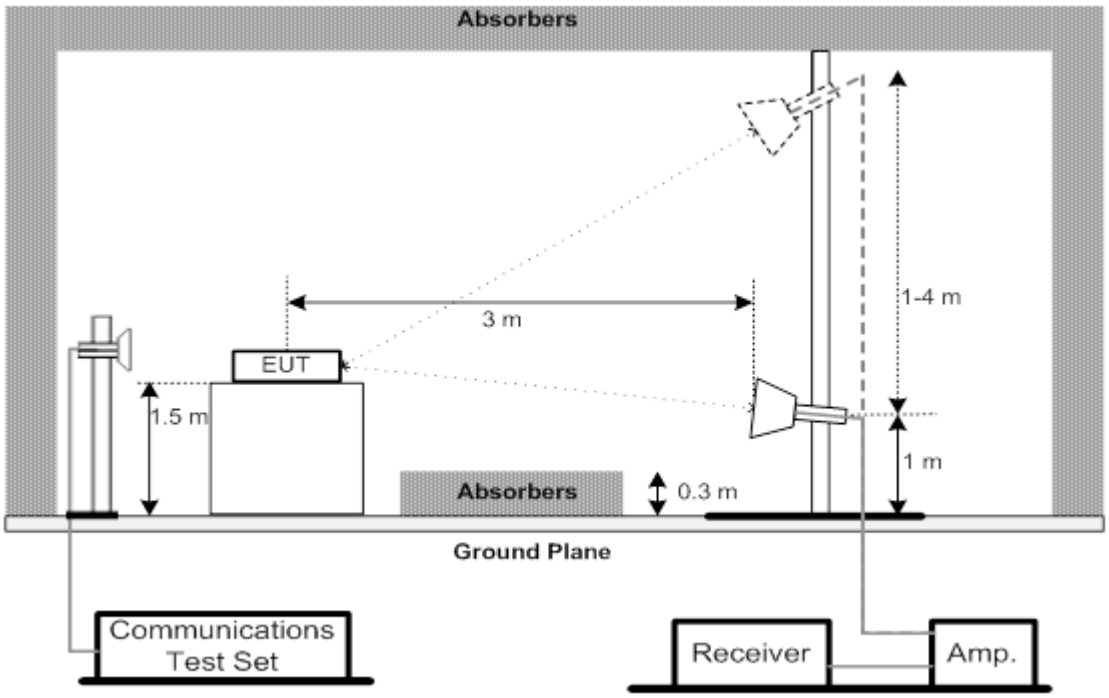
Below 30MHz



30MHz to 1000MHz



Above 1GHz



3.4.4 TEST DEVIATION

No deviation

3.4.5 TEST RESULTS (9KHZ TO 30MHZ)

Please refer to the APPENDIX D.

3.4.6 TEST RESULTS (30MHZ TO 1000MHZ)

Please refer to the APPENDIX E.

3.4.7 TEST RESULTS (ABOVE 1000MHZ)

Please refer to the APPENDIX F.

3.5 BAND EDGE MEASUREMENT

3.5.1 LIMIT

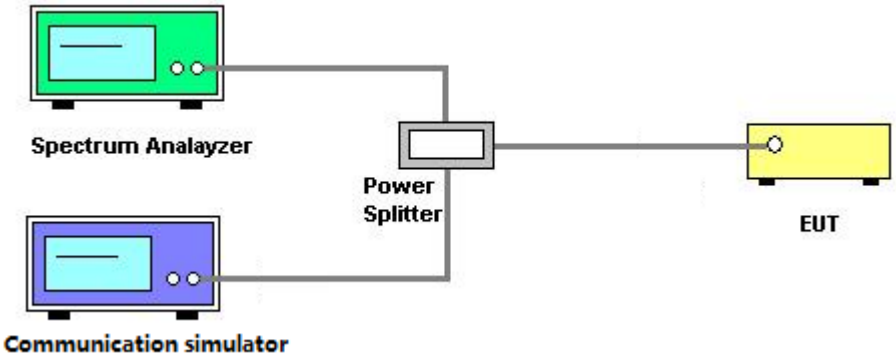
A Power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the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

3.5.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 6.

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

3.5.3 TEST SETUP LAYOUT



3.5.4 TEST DEVIATION

No deviation

3.5.5 TEST RESULTS

Please refer to the APPENDIX G.

3.6 PEAK TO AVERAGE RATIO MEASUREMENT

3.6.1 LIMIT

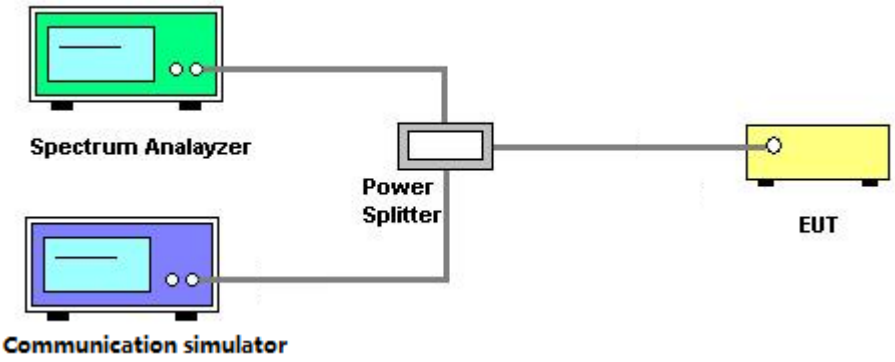
In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB.

3.6.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 5.7.

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

3.6.3 TEST SETUP LAYOUT



3.6.4 TEST DEVIATION

No deviation

3.6.5 TEST RESULTS

Please refer to the APPENDIX H.

3.7 FREQUENCY STABILITY MEASUREMENT

3.7.1 LIMIT

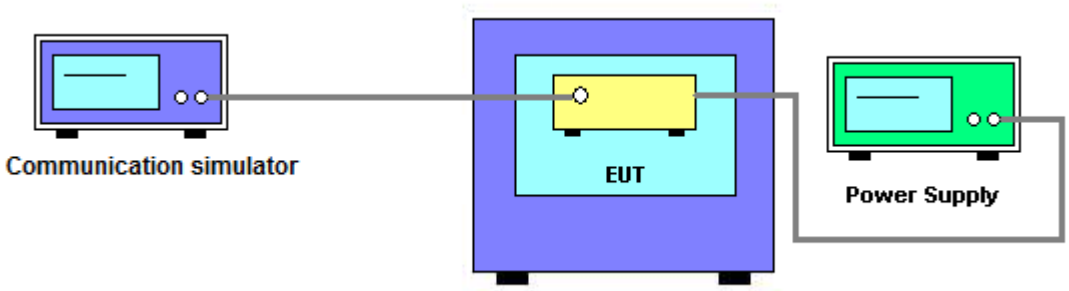
±1.5 ppm is for base and fixed station. ±2.5 ppm is for mobile station.

3.7.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 9.

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

3.7.3 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 Spurious Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	Schwarzbeck	VULB9160	9160-3232	Mar. 15, 2022
2	Amplifier	Agilent	8449B	3008A02334	Feb. 27, 2022
3	High Pass Filter	Wairrwright Instruments Gmbh	WHK 1.5/15G-10ST	11	Feb. 27, 2022
4	Band Reject Filter	Wairrwright Instruments Gmbh	WRCG 1710/1785-1690/1805-60/12SS	38	Feb. 27, 2022
5	Band Reject Filter	Wairrwright Instruments Gmbh	WRCG 824/849-810/863-60/9SS	7	Feb. 27, 2022
6	Band Reject Filter	Wairrwright Instruments Gmbh	WRCG 880/915-860/935-60/9SS	14	Feb. 27, 2022
7	Band Reject Filter	Wairrwright Instruments Gmbh	WRCG 1850/1910-1830/1930-60/10SS	17	Feb. 27, 2022
8	High Pass Filter	Wairrwright Instruments Gmbh	WHK3.1/18G-10SS	24	Feb. 27, 2022
9	Wireless Communication Test SET	Agilent	E5515C	MY48364183	Feb. 28, 2022
10	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Feb. 28, 2022
11	Receiver	Agilent	N9038A	MY52130039	Mar. 19, 2022
12	wideband radio communication tester	R&S	CMW500	152372	Feb. 27, 2022
13	High pass filter	KANGMAIWEI	ZHPF-M3-12.75G-3869	B2015073763	Feb. 07, 2022
14	High pass filter	KANGMAIWEI	ZHPF-M1000-4000-1	B2015073762	Feb. 07, 2022
15	High pass filter	KANGMAIWEI	ZHPF-M6-186-1727	B2015073764	Feb. 07, 2022
16	Cable	emci	LMR-400(30MHz-1GHz) (8m+5m)	N/A	May 20, 2022
17	Cable	mitron	RWLP50-4.0A-KJ-SMSM-12M	N/A	Nov. 23, 2021
18	Controller	ETS-Lindgren	2090	N/A	N/A
19	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
20	Loop Antenna	EM	EM-6876-1	230	Apr. 28, 2022
21	Double Ridged Guide Antenna	ETS	3115	75846	Mar. 17, 2022
22	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Jun. 30, 2022

Conducted Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Wireless Communication Test SET	Agilent	E5515C	MY48364183	Feb. 28, 2022
2	EXA Spectrum Analyzer	Agilent	N9010A	MY50520044	Feb. 28, 2022
3	POWER SPLITTER	Mini-Circuits	ZFRSC-123-S+	331000910-1	Feb. 27, 2022
4	wideband radio communication tester	R&S	CMW500	152372	Feb. 27, 2022

Frequency Stability Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Wireless Communication Test SET	Agilent	E5515C	MY48364183	Feb. 28, 2022
2*	Multi-output DC Power Supply	GW Instek	GPC-3030DN	EK880675	Jul. 25, 2023
3	POWER SPLITTER	Mini-Circuits	ZFRSC-123-S+	331000910-1	Feb. 27, 2022
4	wideband radio communication tester	R&S	CMW500	152372	Feb. 27, 2022
5	Const Temp,& Humidity Chamber	Bell	BTH-50C	20170306001	Feb. 27, 2022

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

APPENDIX A - OUTPUT POWER

Output Power (dBm):

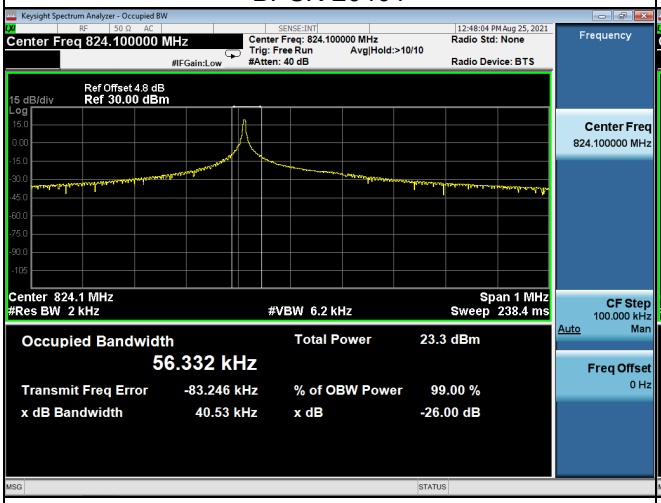
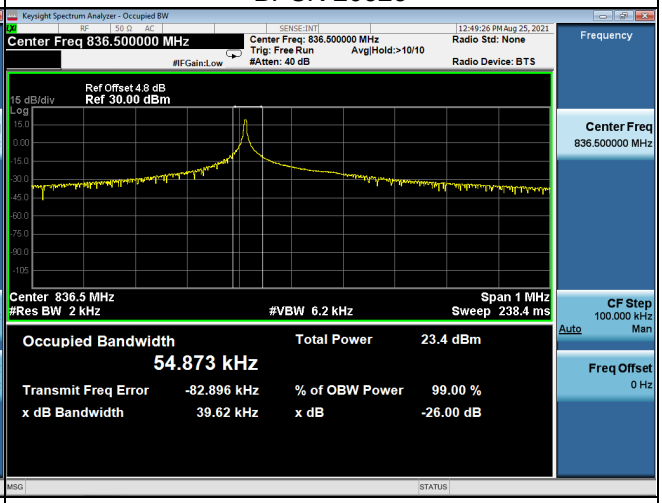
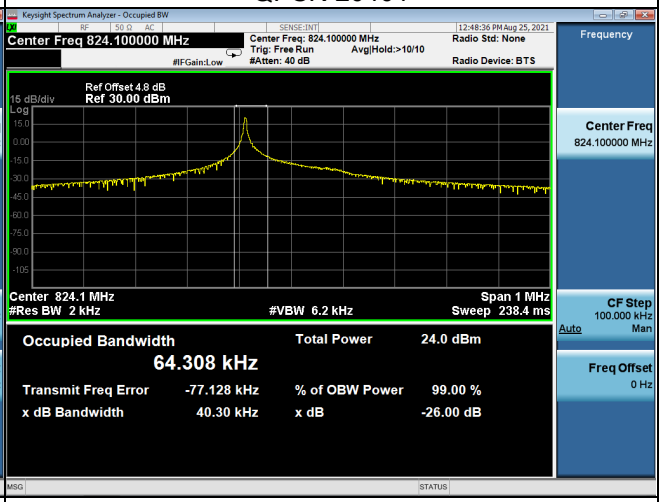
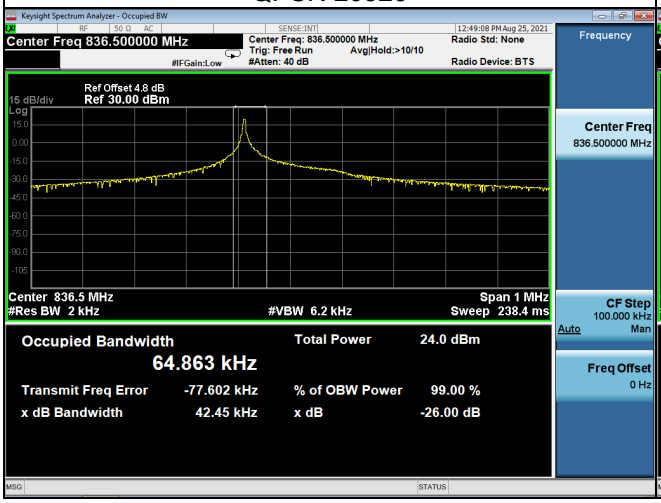
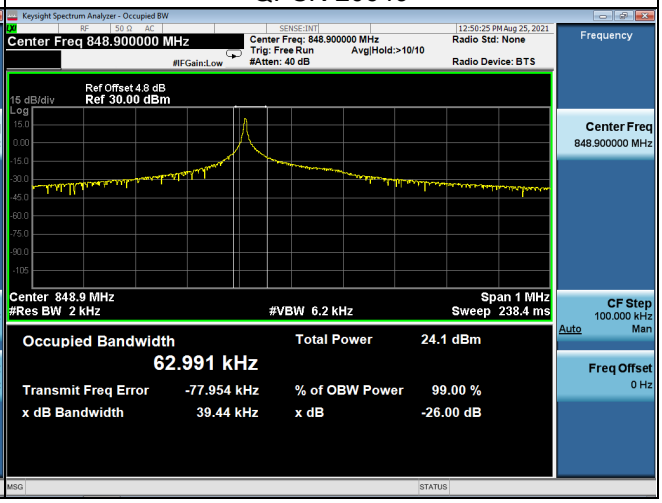
LTE Band	Sub-carrier Spacing (kHz)	Modulation	N_{tones}	Tone offset	Low CH	Mid CH	High CH
					CH20401	CH20525	CH20649
					824.1MHz	836.5MHz	848.9MHz
5	3.75	BPSK	1	0	19.99	20.14	20.04
			1	47	20.02	20.06	19.96
		QPSK	1	0	20.07	20.16	20.04
			1	47	20.05	20.08	19.97
	15	BPSK	1	0	20.29	20.48	20.29
			1	11	20.16	20.35	20.23
		QPSK	1	0	20.43	20.59	20.43
			1	11	20.32	20.49	20.34

ERP (dBm):

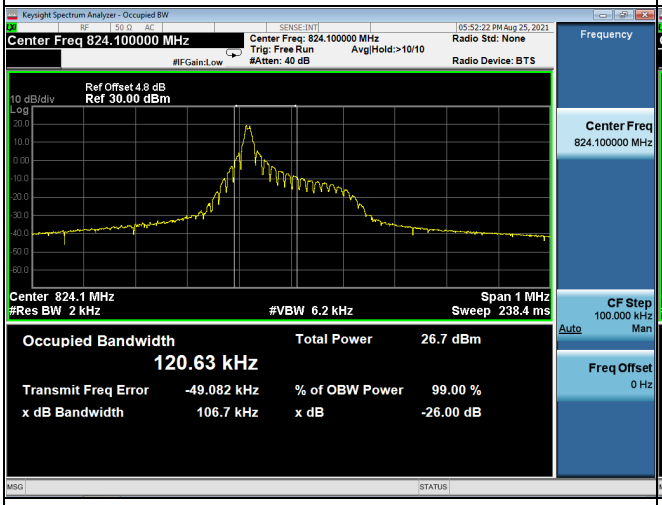
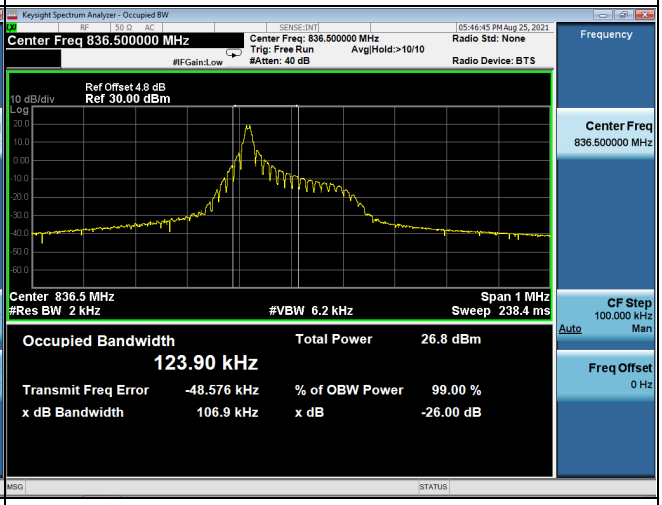
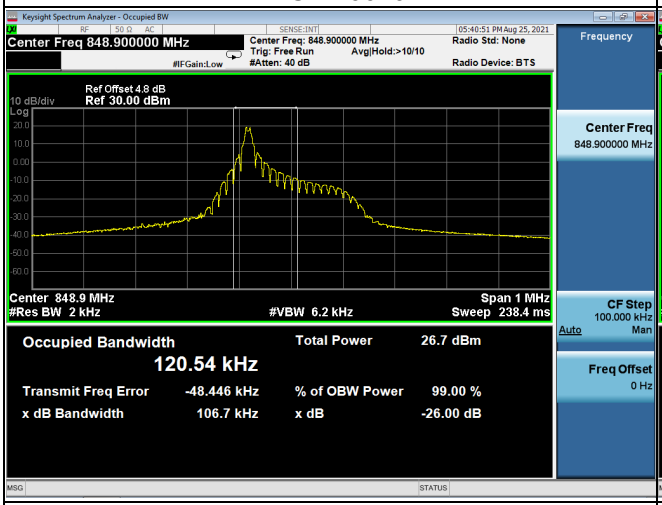
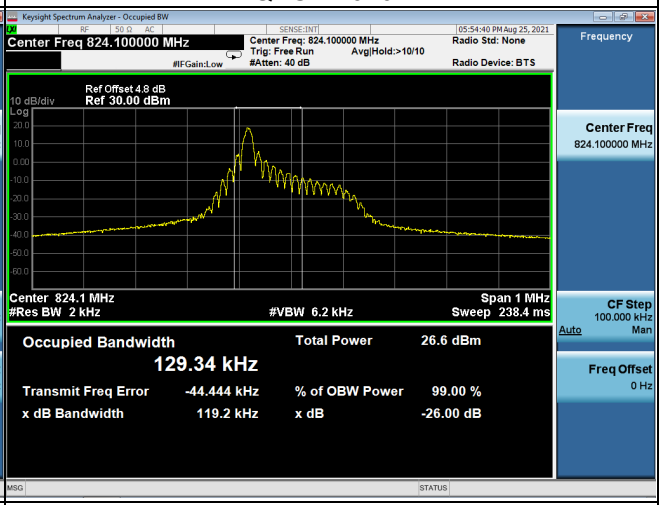
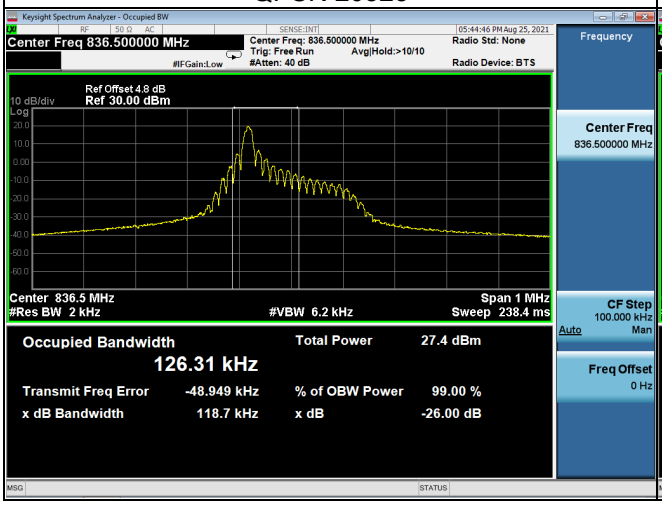
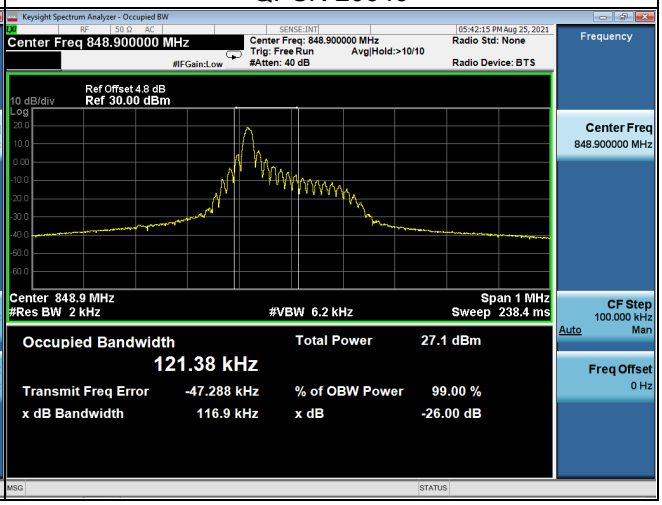
LTE Band	Sub-carrier Spacing (kHz)	Modulation	N_{tones}	Tone offset	Low CH	Mid CH	High CH
					CH20401	CH20525	CH20649
					824.1MHz	836.5MHz	848.9MHz
5	3.75	BPSK	1	0	19.44	19.59	19.49
			1	47	19.47	19.51	19.41
		QPSK	1	0	19.52	19.61	19.49
			1	47	19.50	19.53	19.42
	15	BPSK	1	0	19.74	19.93	19.74
			1	11	19.61	19.80	19.68
		QPSK	1	0	19.88	20.04	19.88
			1	11	19.77	19.94	19.79

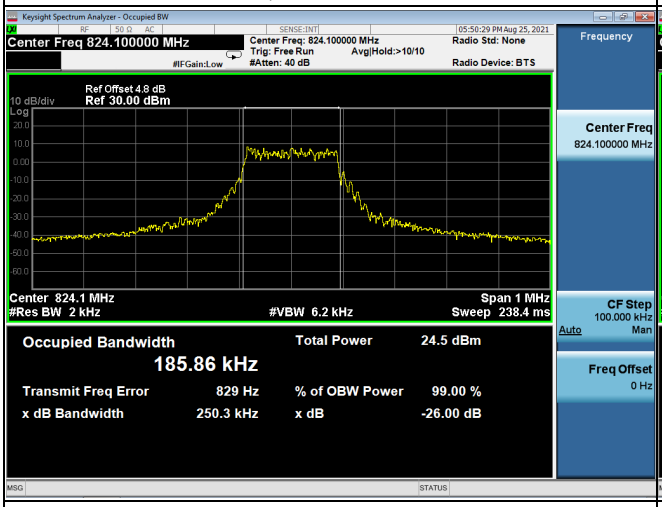
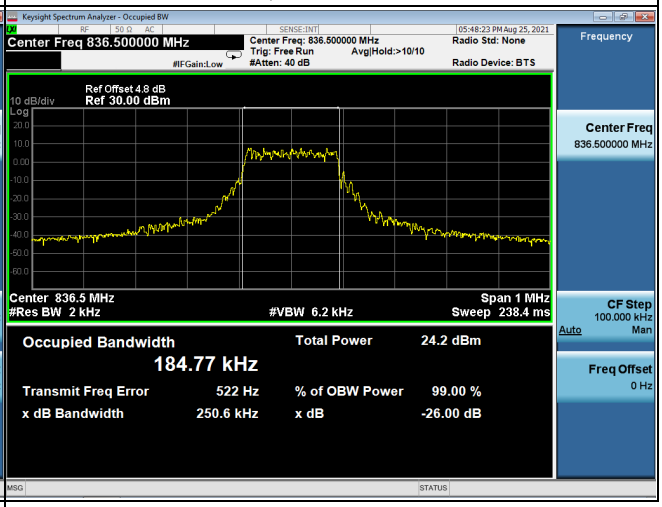
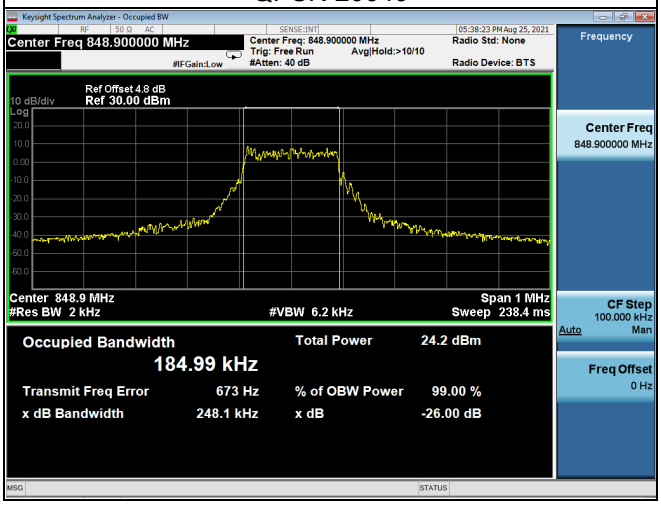
APPENDIX B - OCCUPIED BANDWIDTH

LTE Band 5_3.75KHz					
BPSK			1RB#0		
Channel	Frequency (MHz)	99% Occupied Bandwidth (KHz)	Channel	Frequency (MHz)	26dB Bandwidth (KHz)
20401	824.1	56.332	20401	824.1	40.53
20525	836.5	54.873	20525	836.5	39.62
20649	848.9	56.322	20649	848.9	40.89
QPSK			1RB#0		
Channel	Frequency (MHz)	99% Occupied Bandwidth (KHz)	Channel	Frequency (MHz)	26dB Bandwidth (KHz)
20401	824.1	64.308	20401	824.1	40.30
20525	836.5	64.863	20525	836.5	42.45
20649	848.9	62.991	20649	848.9	39.44

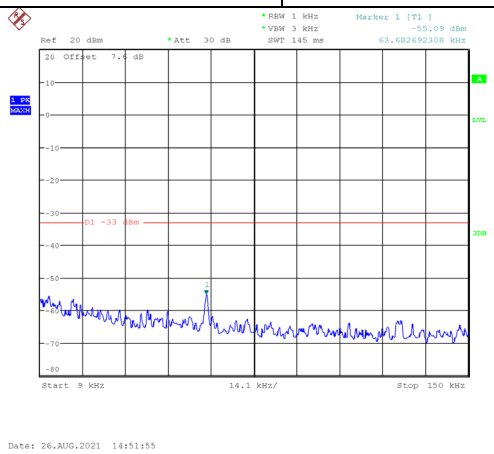
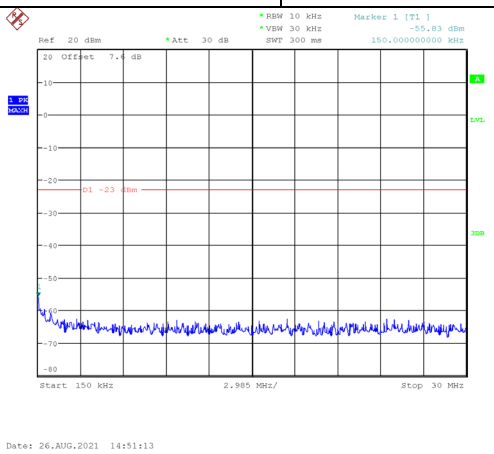
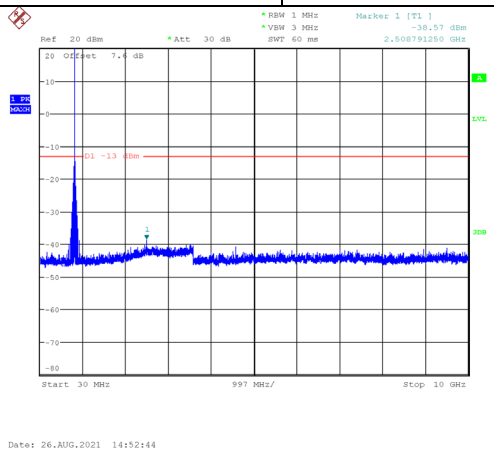
Spectrum Plot	
1RB#0	
BPSK-20401	BPSK-20525
	
BPSK-20649	QPSK-20401
	
QPSK-20525	QPSK-20649
	

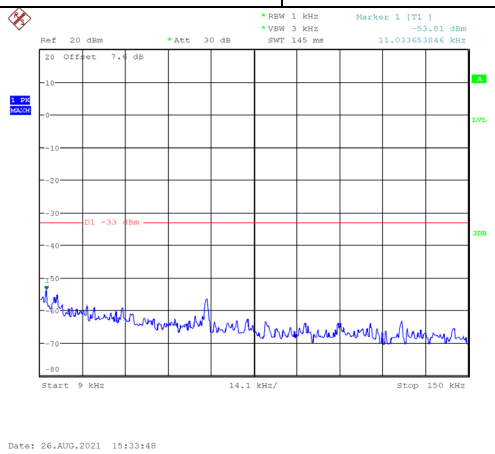
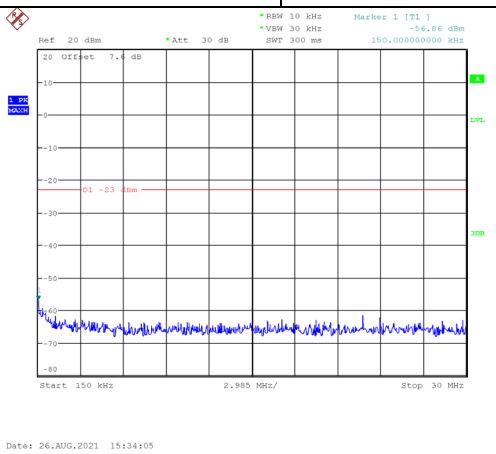
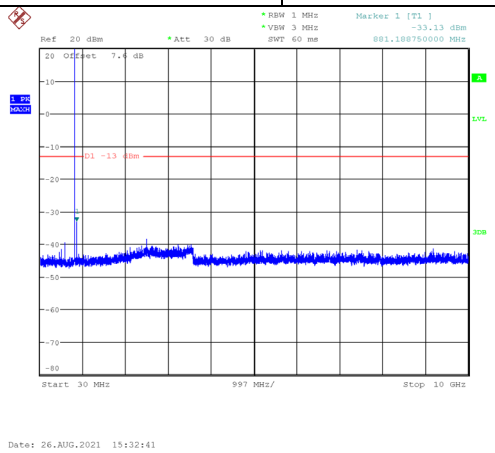
LTE Band 5_15KHz					
BPSK			1RB#0		
Channel	Frequency (MHz)	99% Occupied Bandwidth (KHz)	Channel	Frequency (MHz)	26dB Bandwidth (KHz)
20401	824.1	120.63	20401	824.1	106.7
20525	836.5	123.90	20525	836.5	106.9
20649	848.9	120.54	20649	848.9	106.7
QPSK			1RB#0		
Channel	Frequency (MHz)	99% Occupied Bandwidth (KHz)	Channel	Frequency (MHz)	26dB Bandwidth (KHz)
20401	824.1	129.34	20401	824.1	119.2
20525	836.5	126.31	20525	836.5	118.7
20649	848.9	121.38	20649	848.9	116.9
QPSK			12RB#0		
Channel	Frequency (MHz)	99% Occupied Bandwidth (KHz)	Channel	Frequency (MHz)	26dB Bandwidth (KHz)
20401	824.1	185.86	20401	824.1	250.3
20525	836.5	184.77	20525	836.5	250.6
20649	848.9	184.99	20649	848.9	248.1

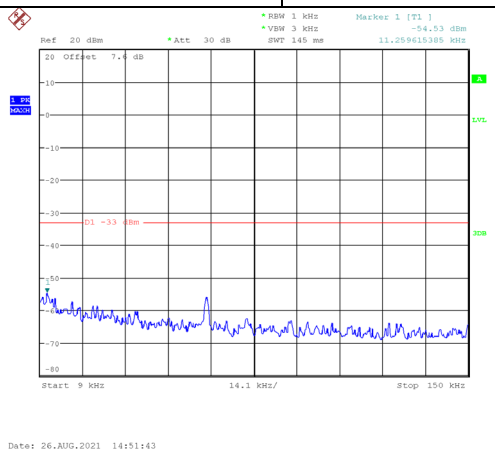
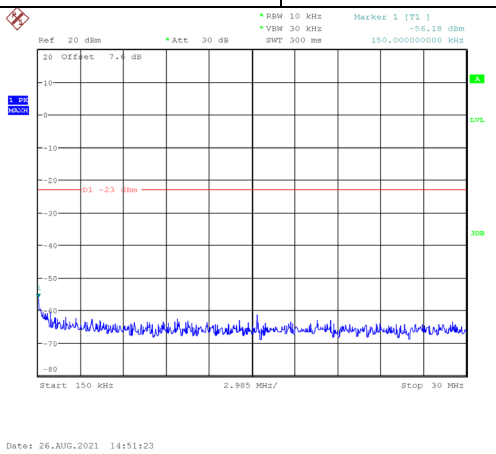
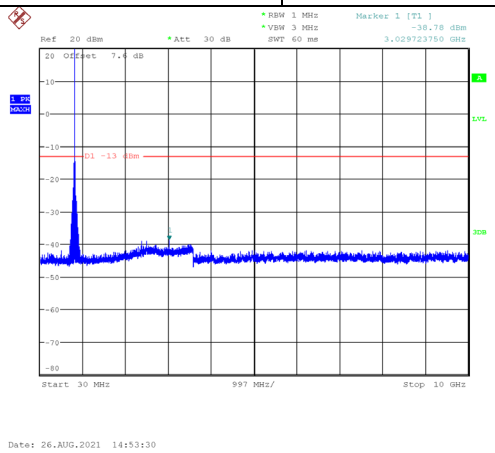
Spectrum Plot	
1RB#0	
BPSK-20401	BPSK-20525
	
BPSK-20649	QPSK-20401
	
QPSK-20525	QPSK-20649
	

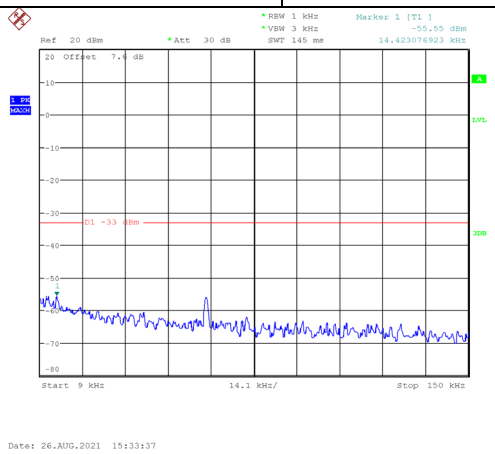
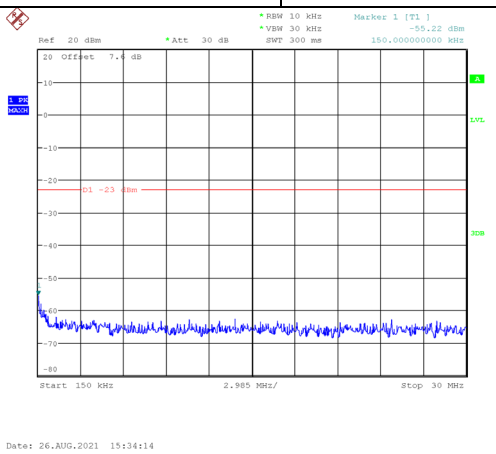
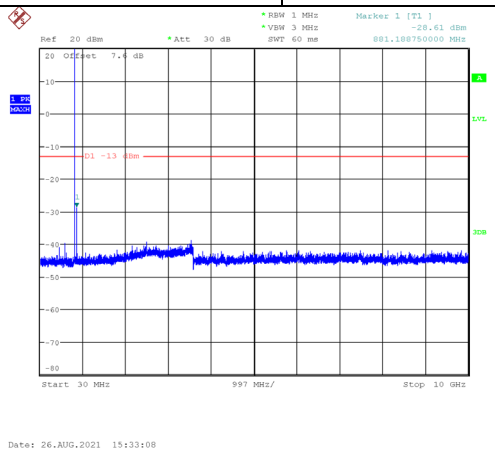
Spectrum Plot	
12RB#0	
QPSK-20401	QPSK-20525
	
QPSK-20649	
	

APPENDIX C - CONDUCTED SPURIOUS EMISSIONS

LTE Band 5_BPSK_3.75KHz Spectrum Plot			
Channel	Frequency(MHz)	Channel	Frequency(MHz)
20525	836.5	20525	836.5
			
Channel	Frequency(MHz)	-	-
20525	836.5	-	-
		-	

LTE Band 5_BPSK_15KHz Spectrum Plot			
Channel	Frequency(MHz)	Channel	Frequency(MHz)
20525	836.5	20525	836.5
			
Channel	Frequency(MHz)	-	-
20525	836.5	-	-
		-	

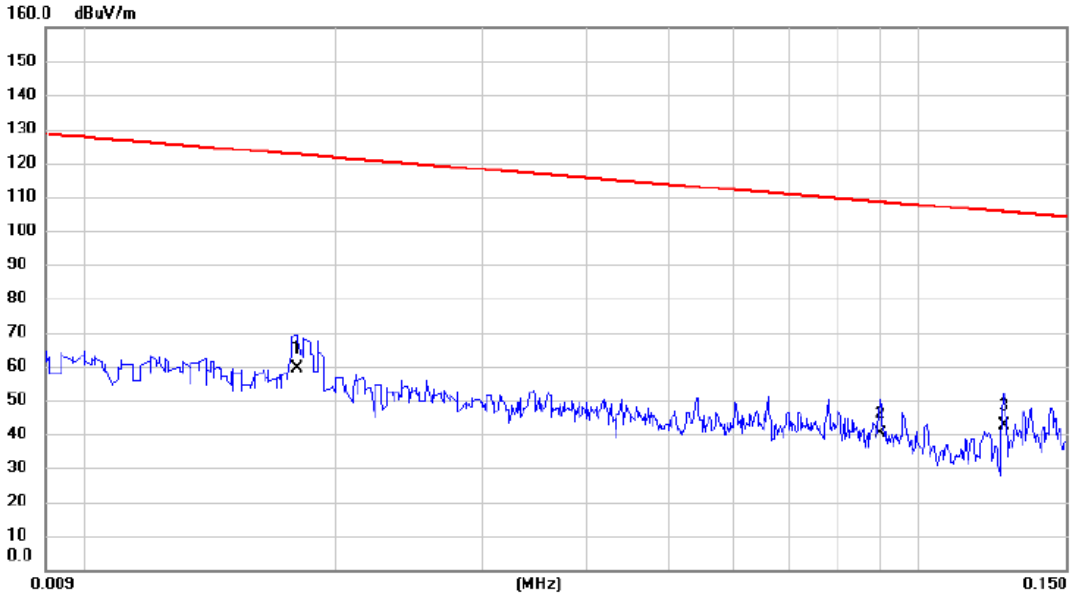
LTE Band 5_QPSK_3.75KHz Spectrum Plot			
Channel	Frequency(MHz)	Channel	Frequency(MHz)
20525	836.5	20525	836.5
			
Channel	Frequency(MHz)	-	-
20525	836.5	-	-
		-	

LTE Band 5_QPSK_15KHz Spectrum Plot			
Channel	Frequency(MHz)	Channel	Frequency(MHz)
20525	836.5	20525	836.5
			
Channel	Frequency(MHz)	-	-
20525	836.5	-	-
		-	

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

Test Mode	TX Mode

Ant 0°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	0.0180	45.65	13.84	59.49	122.50	-63.01	AVG			
2		0.0900	27.48	12.66	40.14	108.52	-68.38	AVG			
3		0.1263	29.68	12.73	42.41	105.58	-63.17	AVG			

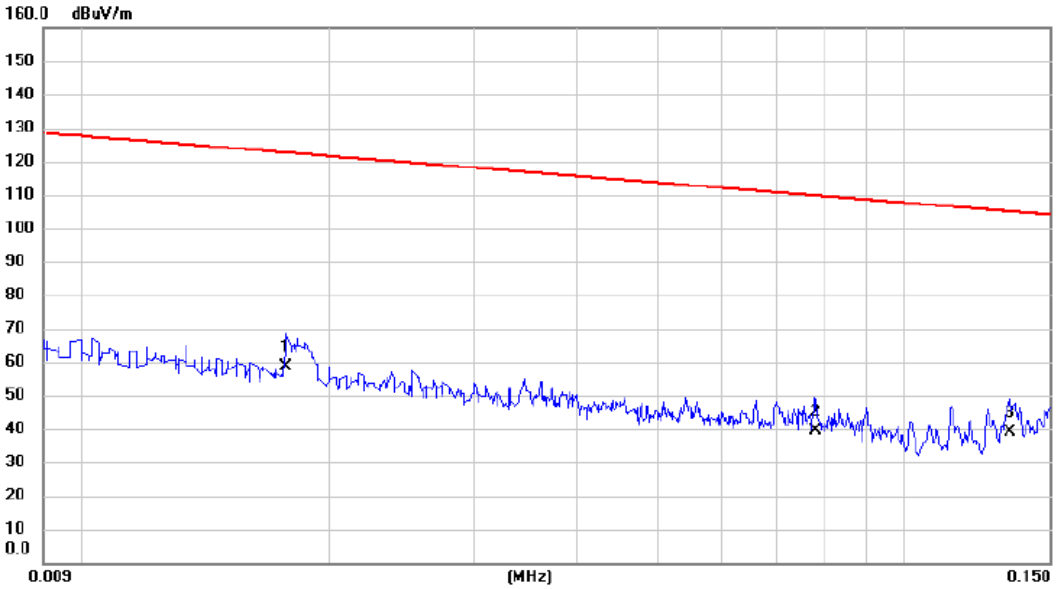
Test Mode	TX Mode

Ant 0°

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		0.4374	48.25	12.17	60.42	94.79	-34.37	AVG			
2	*	2.2367	36.79	11.19	47.98	69.54	-21.56	QP			
3		4.3606	34.85	11.00	45.85	69.54	-23.69	QP			

Test Mode	TX Mode

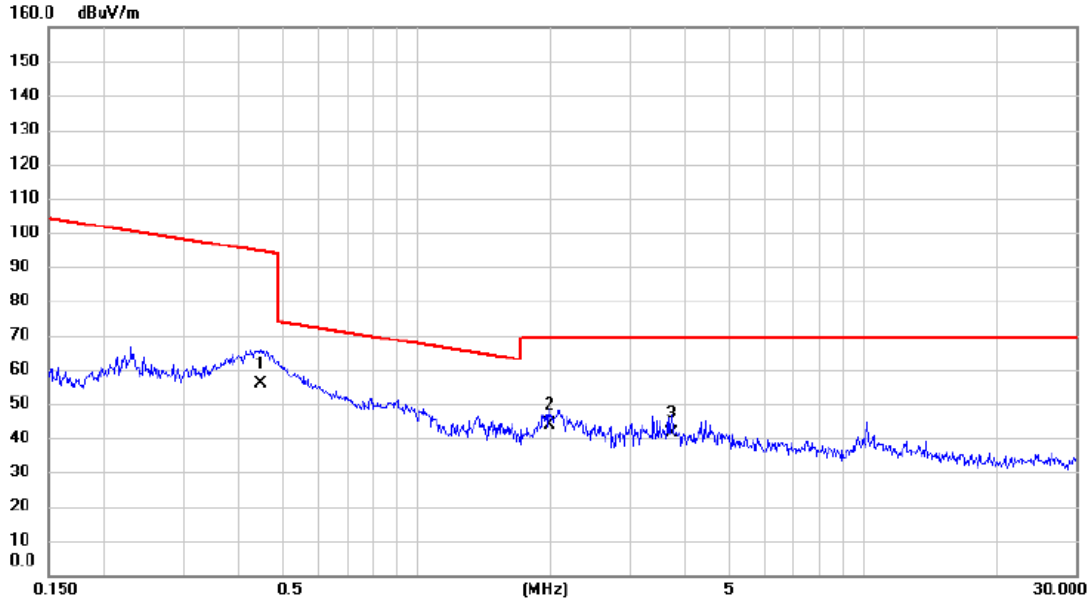
Ant 90°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	0.0177	44.51	13.93	58.44	122.65	-64.21	AVG			
2		0.0780	26.89	12.59	39.48	109.76	-70.28	AVG			
3		0.1344	26.43	12.73	39.16	105.04	-65.88	AVG			

Test Mode	TX Mode

Ant 90°

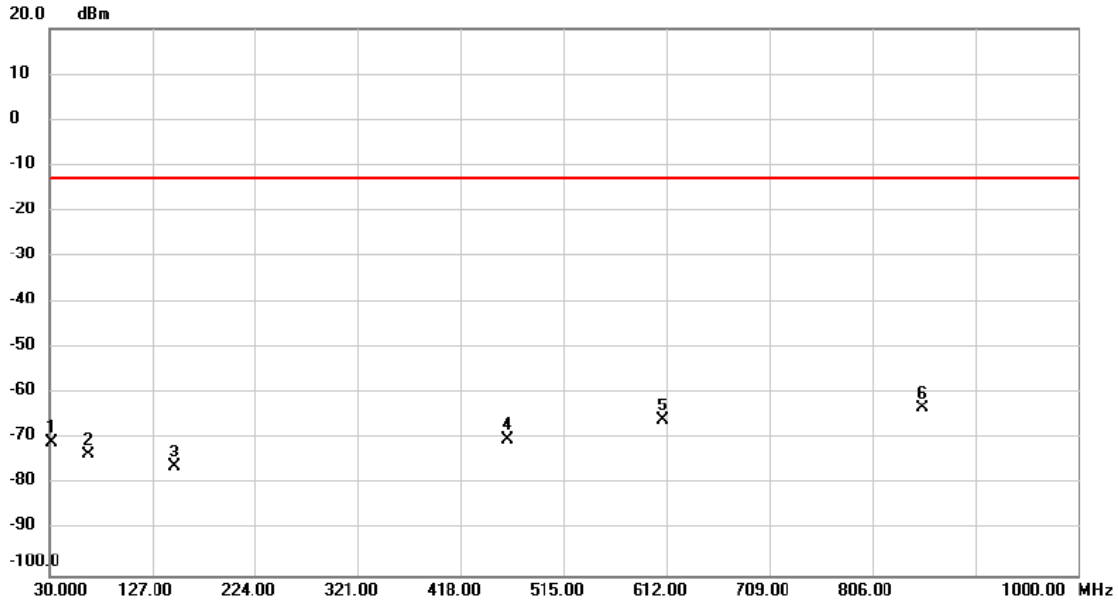


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		0.4468	43.83	12.14	55.97	94.60	-38.63	AVG			
2	*	1.9906	32.57	11.31	43.88	69.54	-25.66	QP			
3		3.7198	30.49	10.91	41.40	69.54	-28.14	QP			

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

Test Mode	LTE Band 5_BPSK_TX CH20525_3.75KHz

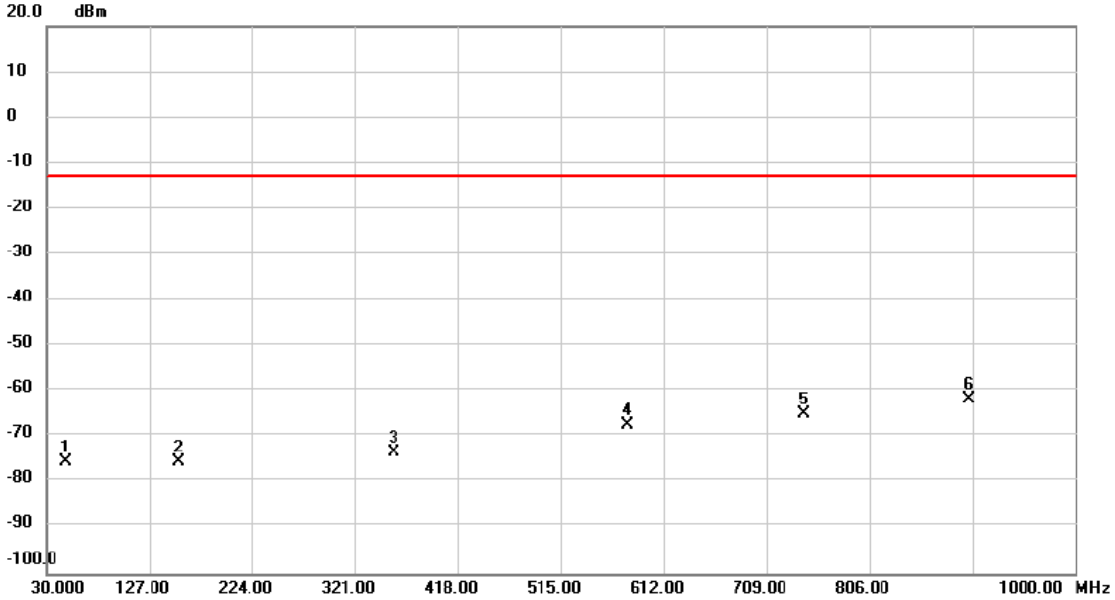
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		32.264	-65.07	-5.72	-70.79	-13.00	-57.79	peak	
2		66.872	-67.54	-6.00	-73.54	-13.00	-60.54	peak	
3		148.380	-72.93	-3.14	-76.07	-13.00	-63.07	peak	
4		462.441	-72.48	2.19	-70.29	-13.00	-57.29	peak	
5		608.960	-70.90	4.89	-66.01	-13.00	-53.01	peak	
6	*	852.834	-72.09	8.87	-63.22	-13.00	-50.22	peak	

Test Mode	LTE Band 5_BPSK _TX CH20525_3.75KHz

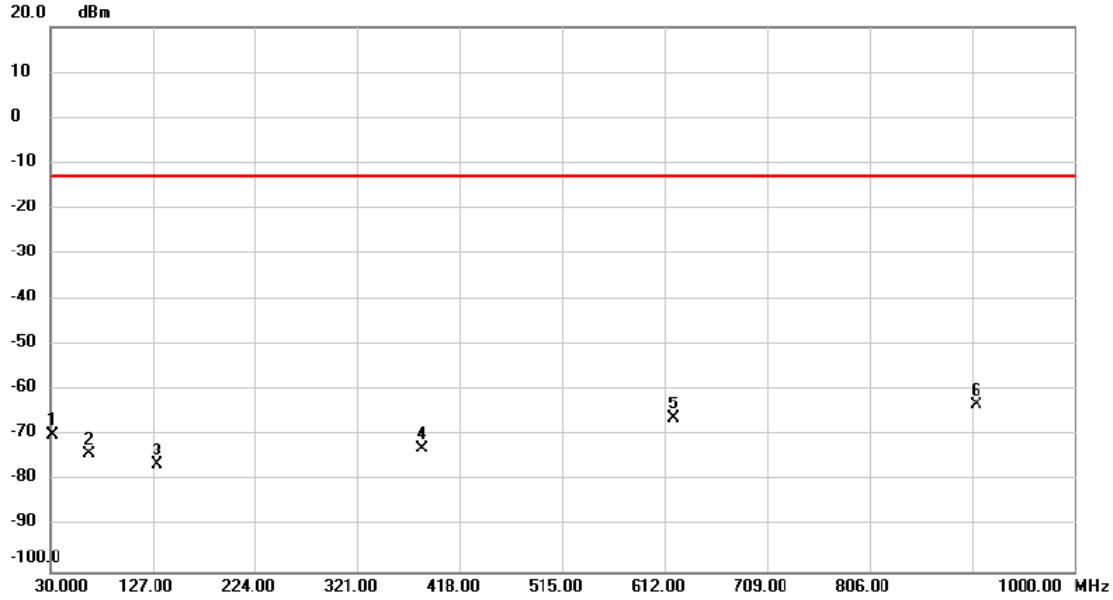
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		48.436	-71.39	-4.18	-75.57	-13.00	-62.57	peak	
2		154.848	-72.64	-2.98	-75.62	-13.00	-62.62	peak	
3		357.322	-73.13	-0.35	-73.48	-13.00	-60.48	peak	
4		577.586	-71.60	4.16	-67.44	-13.00	-54.44	peak	
5		744.805	-72.48	7.33	-65.15	-13.00	-52.15	peak	
6	*	900.380	-71.64	9.76	-61.88	-13.00	-48.88	peak	

Test Mode	LTE Band 5_BPSK_TX CH20525_15KHz

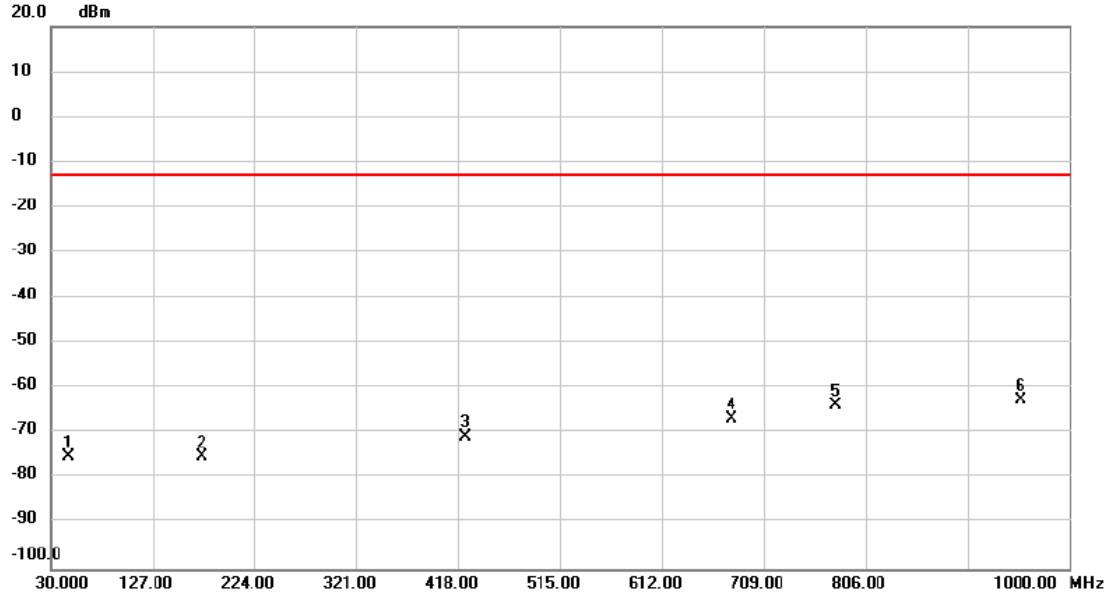
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		32.264	-64.14	-5.72	-69.86	-13.00	-56.86	peak	
2		66.225	-68.06	-5.88	-73.94	-13.00	-60.94	peak	
3		131.560	-72.79	-3.78	-76.57	-13.00	-63.57	peak	
4		382.874	-73.12	0.24	-72.88	-13.00	-59.88	peak	
5		619.957	-71.26	5.08	-66.18	-13.00	-53.18	peak	
6	*	908.143	-73.39	10.00	-63.39	-13.00	-50.39	peak	

Test Mode	LTE Band 5_BPSK_TX CH20525_15KHz

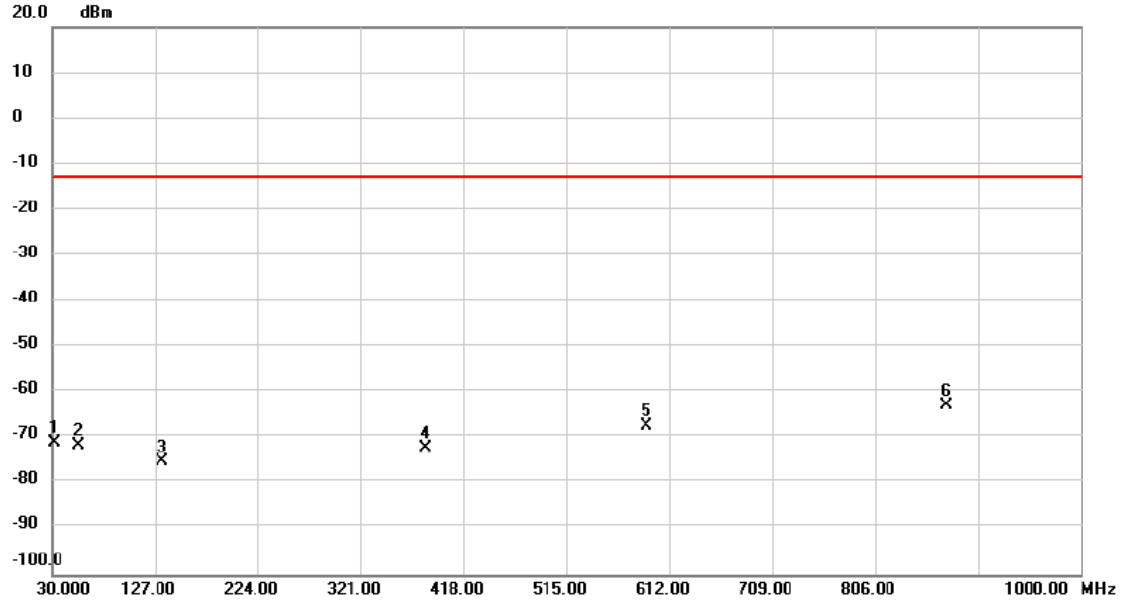
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		47.142	-71.01	-4.26	-75.27	-13.00	-62.27	peak	
2		173.608	-71.74	-3.44	-75.18	-13.00	-62.18	peak	
3		424.598	-72.07	1.30	-70.77	-13.00	-57.77	peak	
4		678.500	-72.82	5.99	-66.83	-13.00	-53.83	peak	
5		778.119	-72.01	8.19	-63.82	-13.00	-50.82	peak	
6	*	954.718	-74.10	11.30	-62.80	-13.00	-49.80	peak	

Test Mode	LTE Band 5_QPSK_TX CH20525_3.75KHz

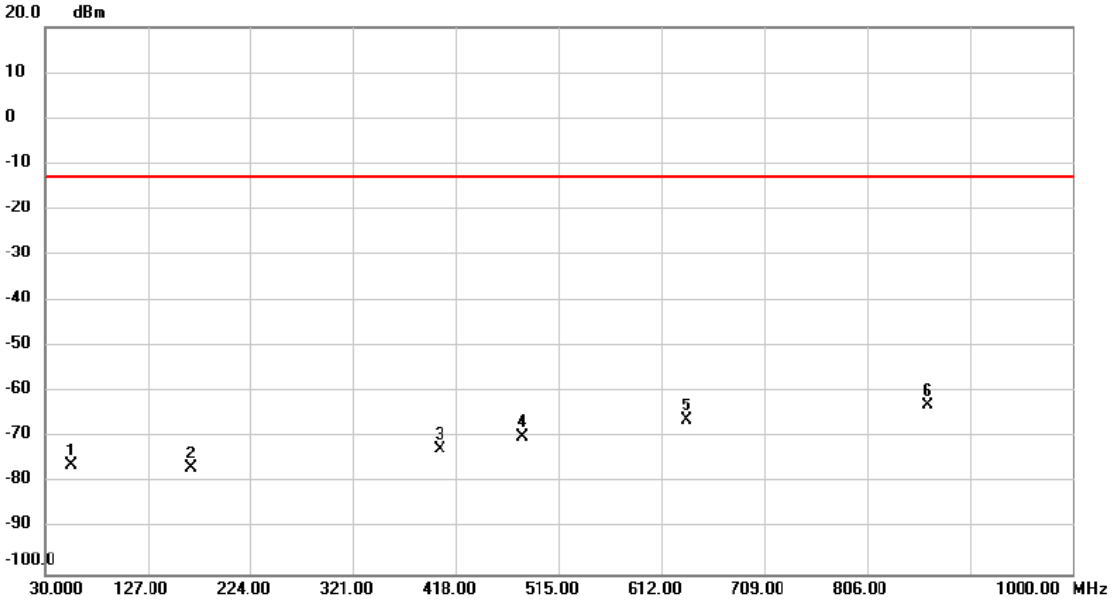
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		31.617	-65.34	-5.77	-71.11	-13.00	-58.11	peak	
2		55.228	-67.08	-4.54	-71.62	-13.00	-58.62	peak	
3		133.501	-71.61	-3.69	-75.30	-13.00	-62.30	peak	
4		382.874	-72.61	0.24	-72.37	-13.00	-59.37	peak	
5		591.170	-71.98	4.51	-67.47	-13.00	-54.47	peak	
6	*	873.858	-72.14	9.26	-62.88	-13.00	-49.88	peak	

Test Mode	LTE Band 5_QPSK_TX CH20525_3.75KHz

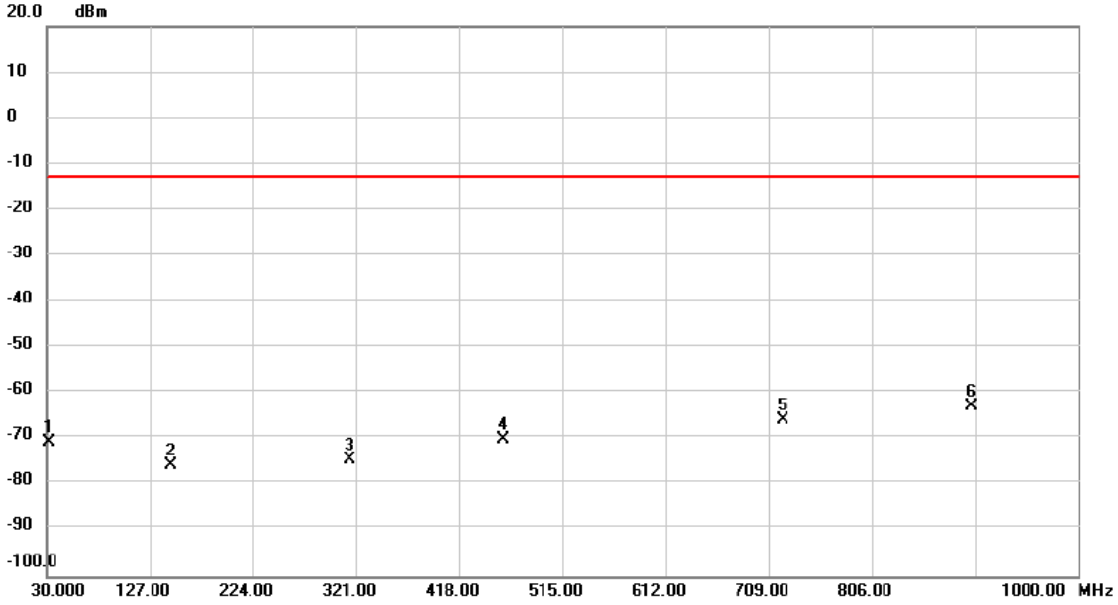
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		55.228	-71.69	-4.54	-76.23	-13.00	-63.23	peak	
2		167.786	-73.61	-3.01	-76.62	-13.00	-63.62	peak	
3		403.251	-73.23	0.72	-72.51	-13.00	-59.51	peak	
4		480.877	-72.19	2.49	-69.70	-13.00	-56.70	peak	
5		635.805	-71.73	5.35	-66.38	-13.00	-53.38	peak	
6	*	863.184	-71.89	9.07	-62.82	-13.00	-49.82	peak	

Test Mode	LTE Band 5_QPSK_TX CH20525_15KHz

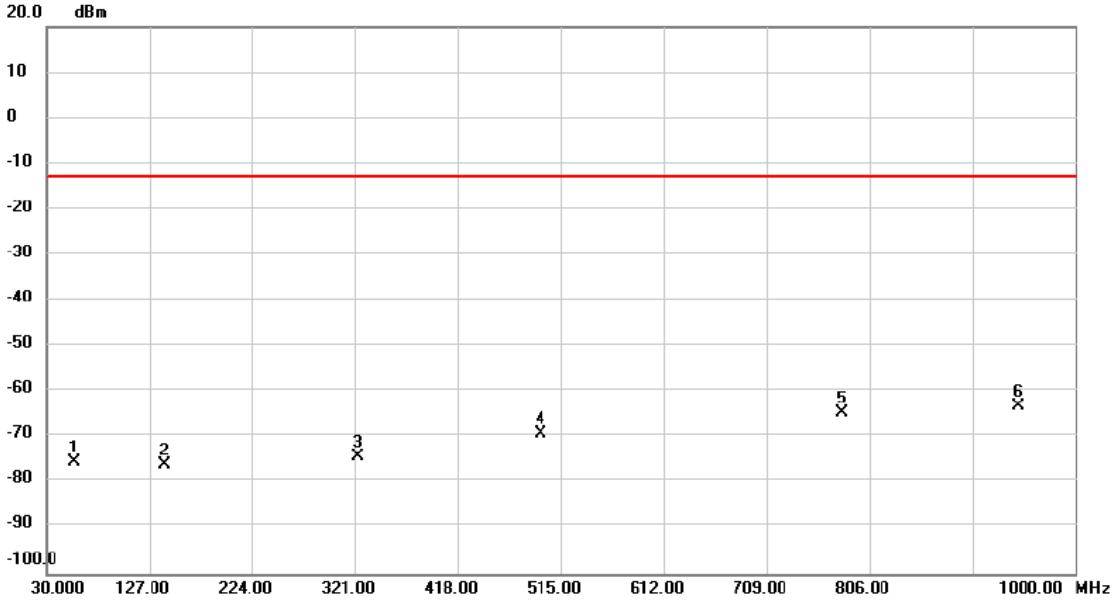
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		32.264	-65.11	-5.72	-70.83	-13.00	-57.83	peak	
2		147.086	-72.53	-3.17	-75.70	-13.00	-62.70	peak	
3		315.275	-73.56	-1.14	-74.70	-13.00	-61.70	peak	
4		459.530	-72.37	2.14	-70.23	-13.00	-57.23	peak	
5		722.164	-72.73	6.81	-65.92	-13.00	-52.92	peak	
6	*	899.410	-72.67	9.74	-62.93	-13.00	-49.93	peak	

Test Mode	LTE Band 5_QPSK_TX CH20525_15KHz

Horizontal

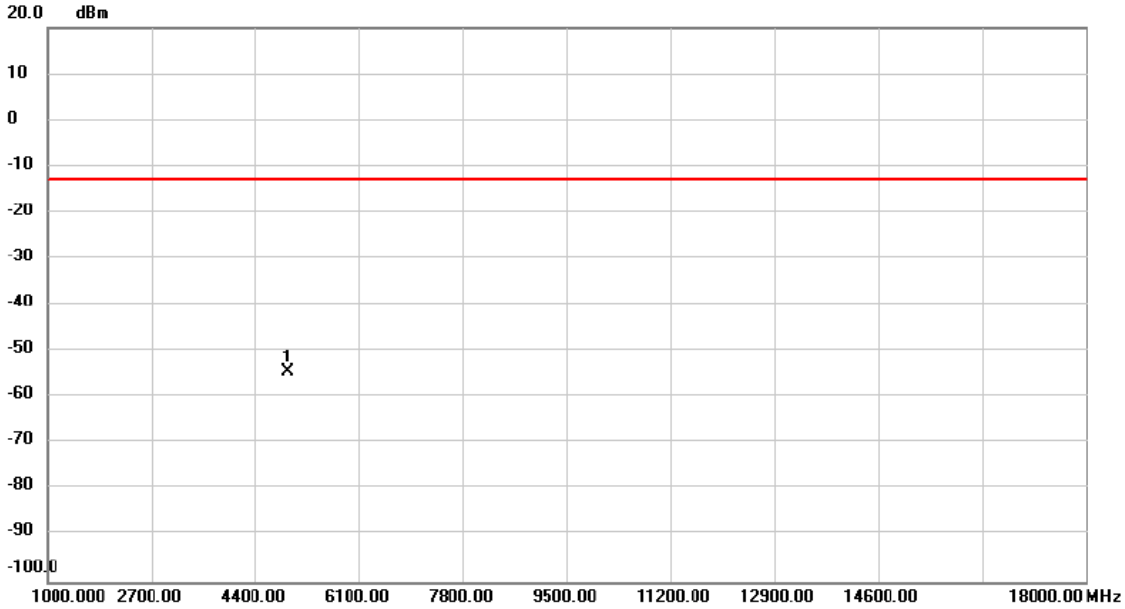


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		56.522	-70.97	-4.59	-75.56	-13.00	-62.56	peak	
2		141.911	-72.83	-3.30	-76.13	-13.00	-63.13	peak	
3		323.685	-73.28	-0.98	-74.26	-13.00	-61.26	peak	
4		496.402	-71.90	2.76	-69.14	-13.00	-56.14	peak	
5		780.707	-72.92	8.25	-64.67	-13.00	-51.67	peak	
6	*	946.309	-74.30	11.18	-63.12	-13.00	-50.12	peak	

APPENDIX F - RADIATED SPURIOUS EMISSIONS (ABOVE 1000MHZ)

Test Mode	LTE Band 5_BPSK_TX CH20525_3.75KHz

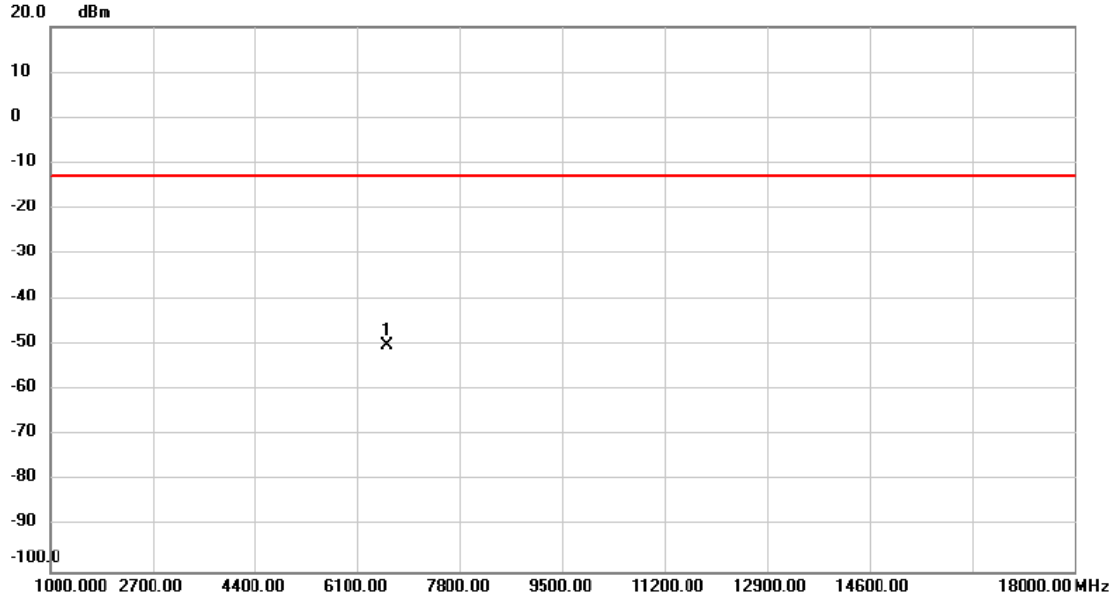
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	4935.500	-71.93	17.53	-54.40	-13.00	-41.40	peak	

Test Mode	LTE Band 5_BPSK _TX CH20525_3.75KHz

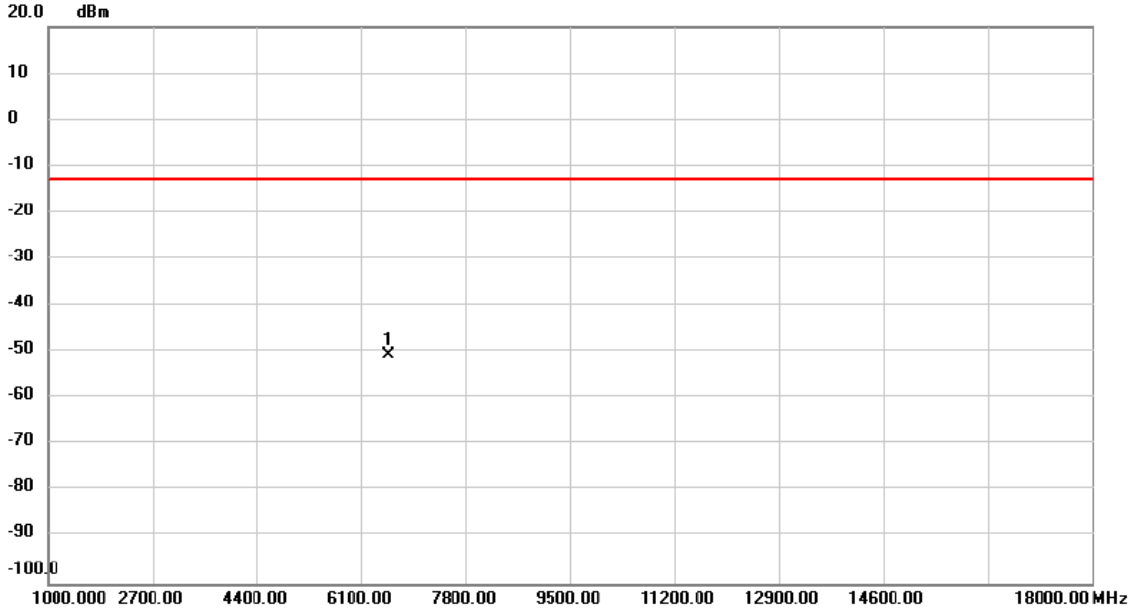
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	6584.500	-69.96	20.04	-49.92	-13.00	-36.92	peak	

Test Mode	LTE Band 5_BPSK_TX CH20525_15KHz

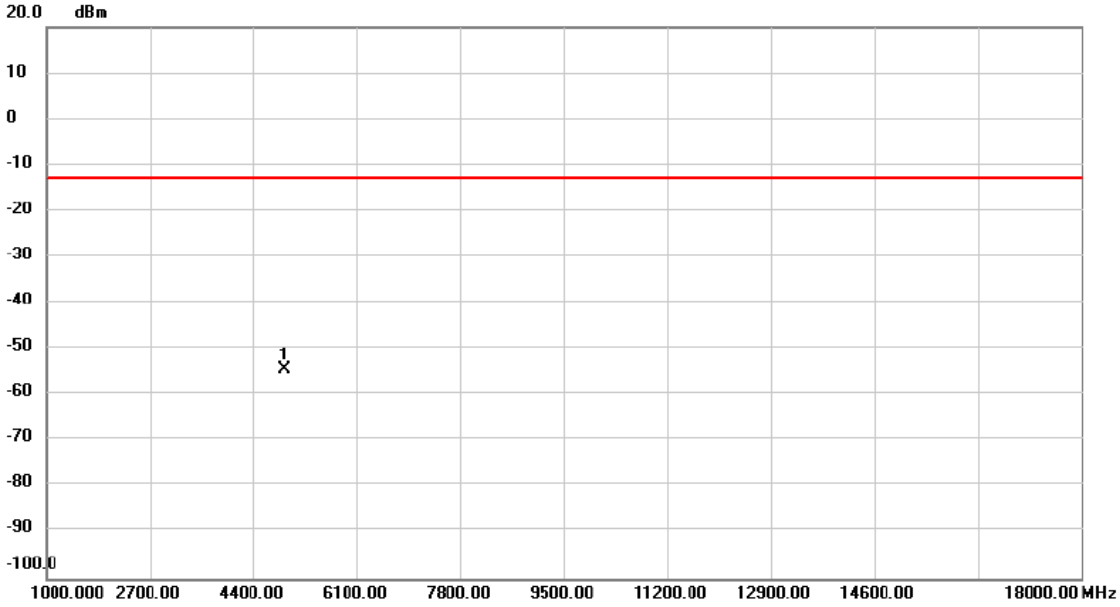
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	6533.500	-70.51	19.80	-50.71	-13.00	-37.71	peak	

Test Mode	LTE Band 5_BPSK_TX CH20525_15KHz

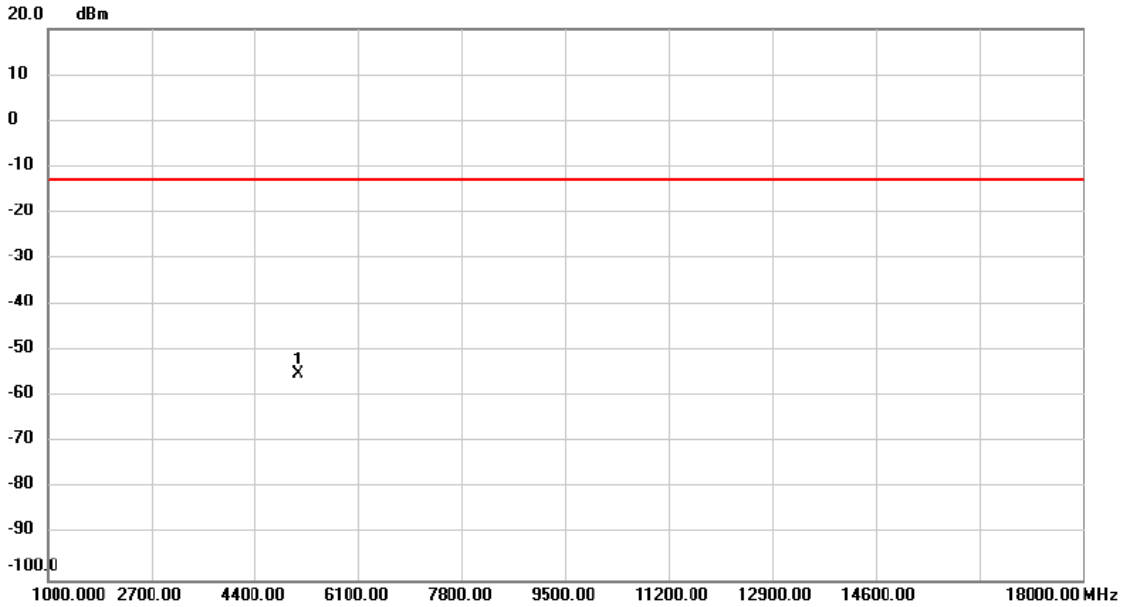
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	4918.500	-72.05	17.45	-54.60	-13.00	-41.60	peak	

Test Mode	LTE Band 5_QPSK_TX CH20525_3.75KHz

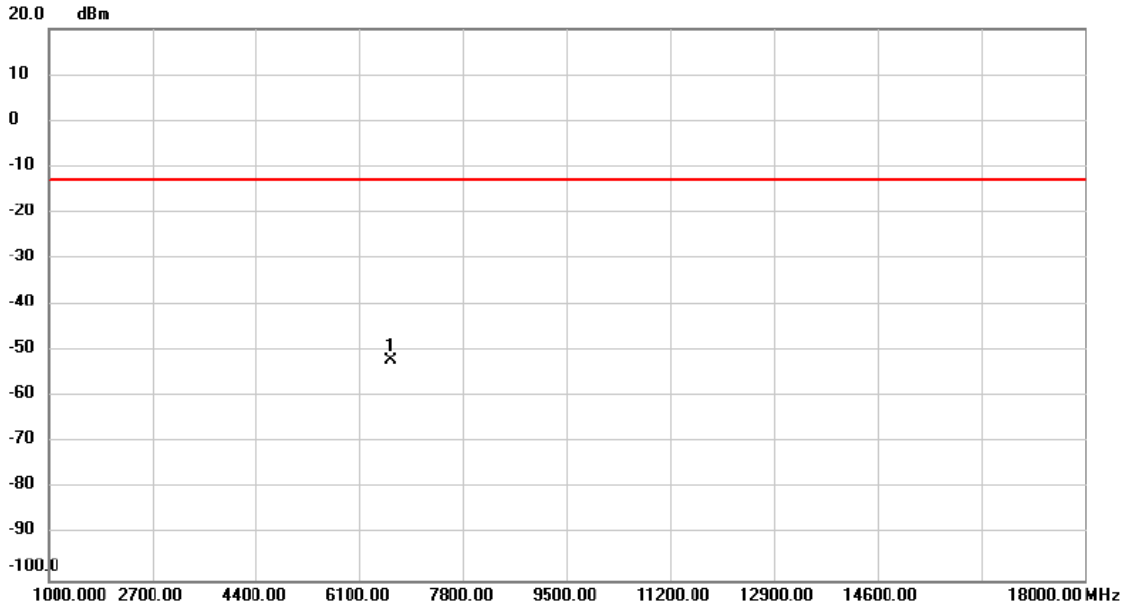
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	5122.500	-73.04	17.99	-55.05	-13.00	-42.05	peak	

Test Mode	LTE Band 5_QPSK_TX CH20525_3.75KHz

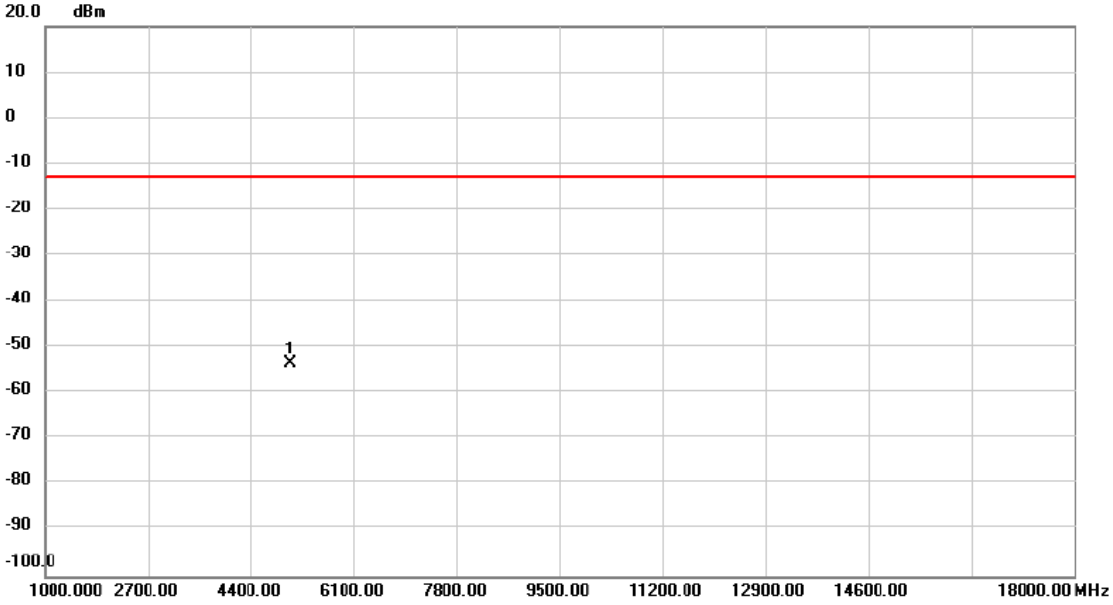
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	6610.000	-72.41	20.17	-52.24	-13.00	-39.24	peak	

Test Mode	LTE Band 5_QPSK_TX CH20525_15KHz

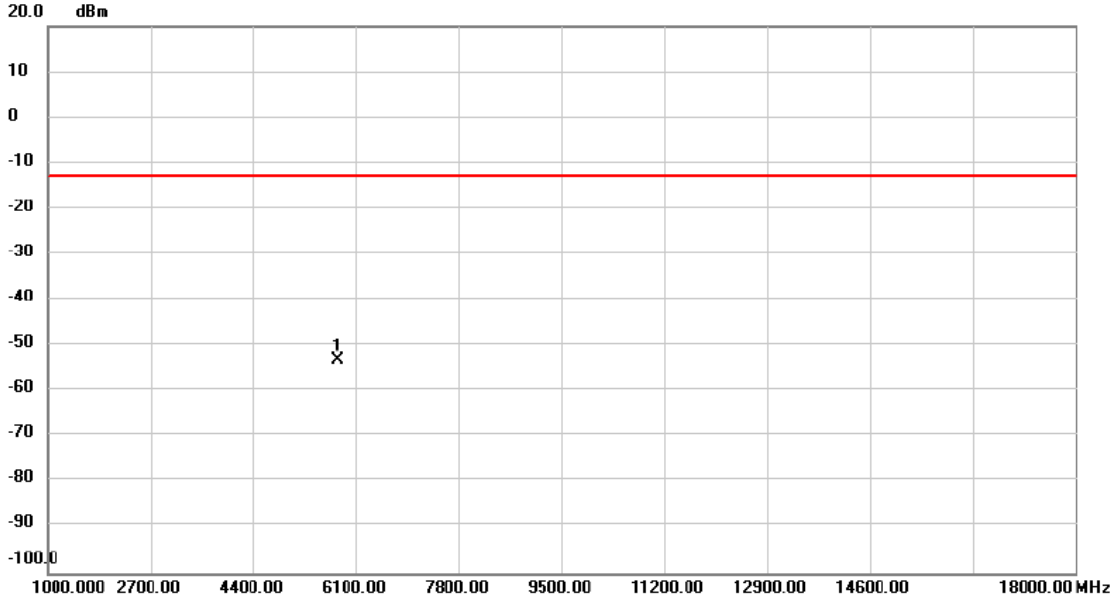
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	5037.500	-71.61	17.90	-53.71	-13.00	-40.71	peak	

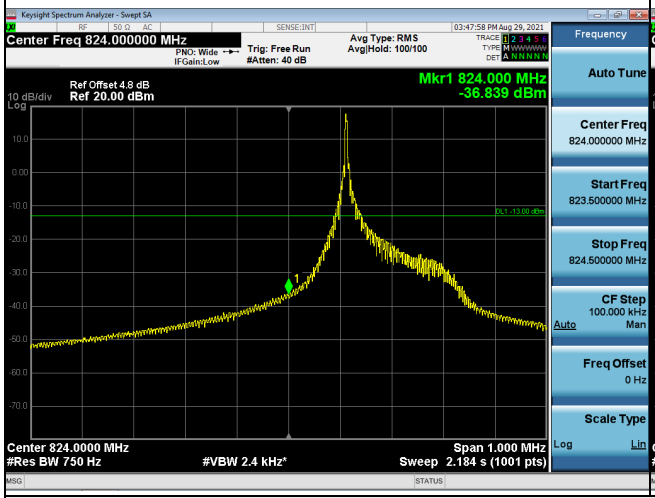
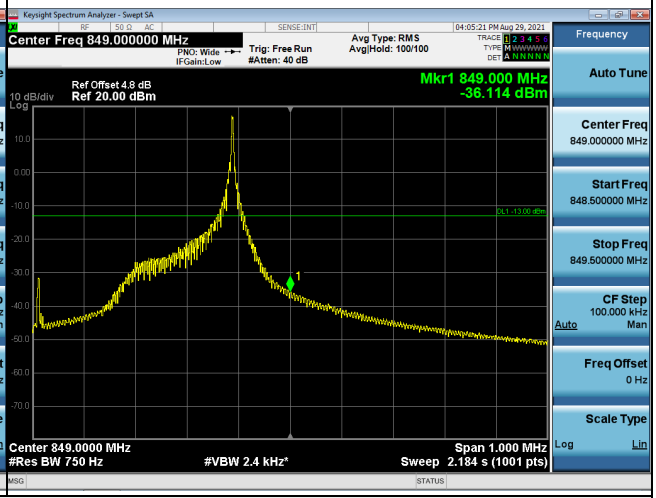
Test Mode	LTE Band 5_QPSK_TX CH20525_15KHz

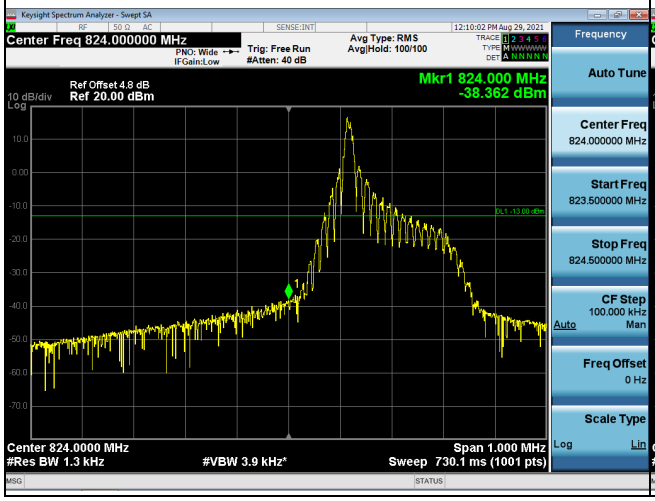
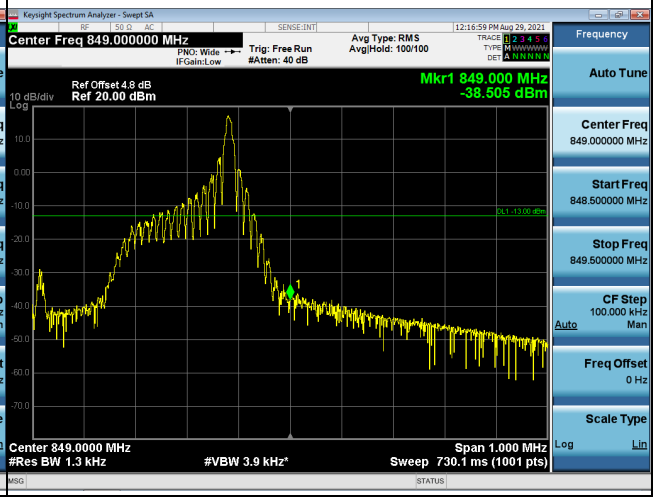
Horizontal

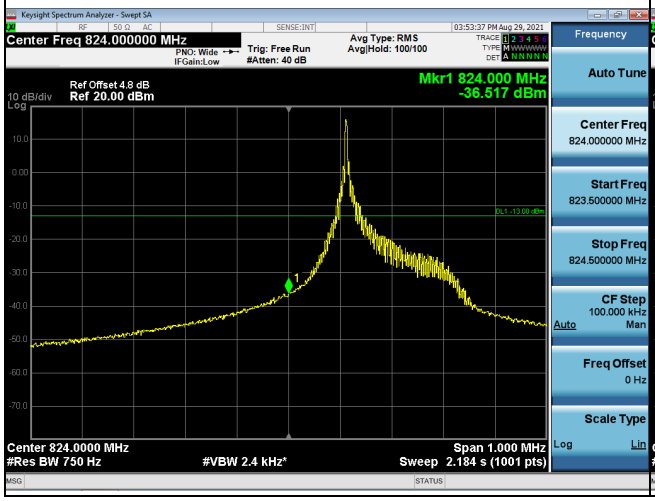
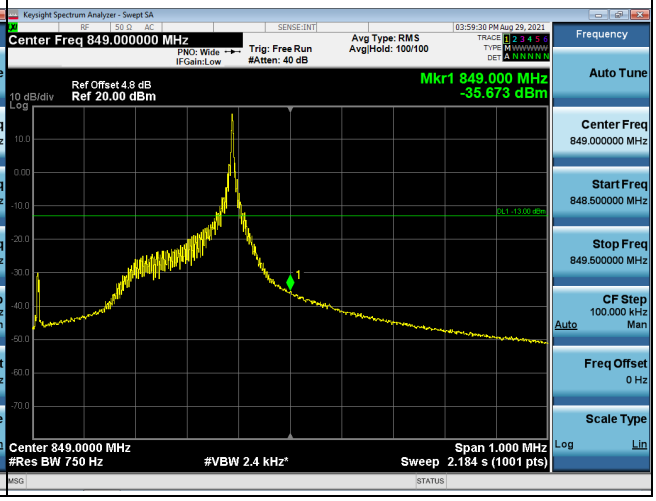


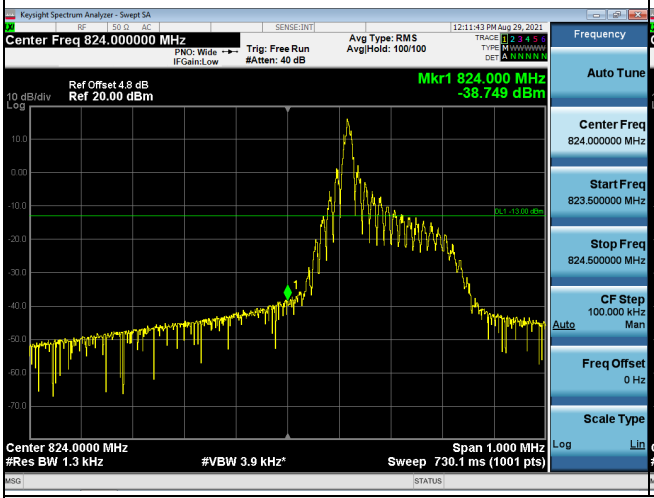
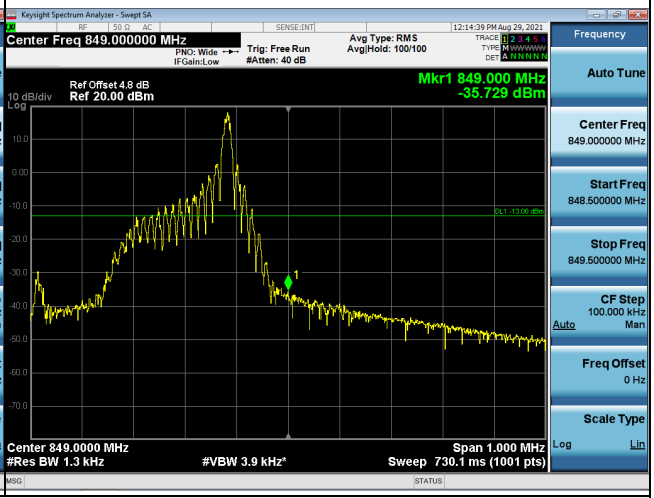
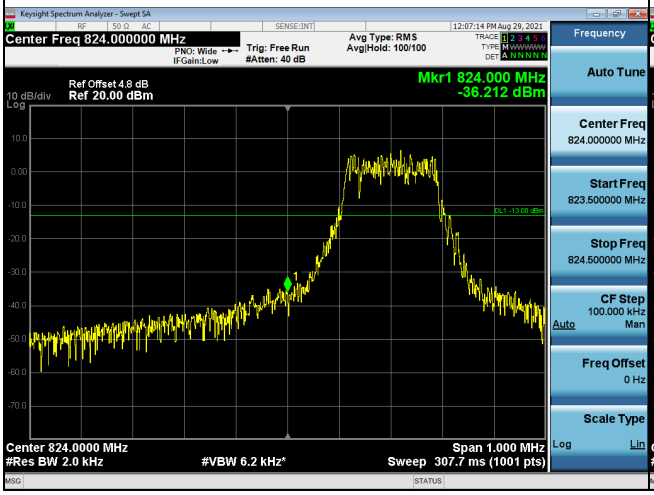
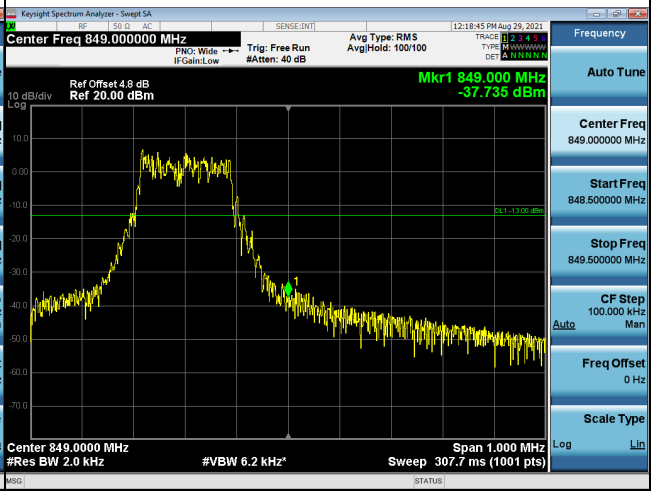
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	5785.500	-71.94	18.57	-53.37	-13.00	-40.37	peak	

APPENDIX G - BAND EDGE

LTE Band 5_BPSK _3.75KHz Spectrum Plot			
1RB#0		1RB#47	
Channel	20402	Channel	20648
			

LTE Band 5_BPSK _15KHz Spectrum Plot			
1RB#0		1RB#11	
Channel	20402	Channel	20648
			

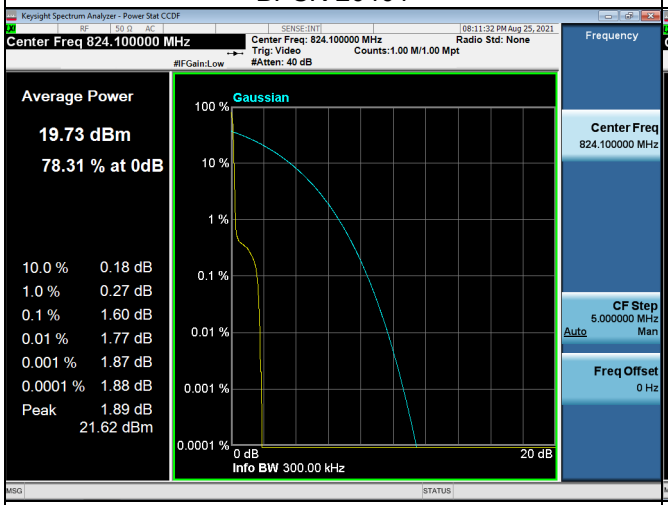
LTE Band 5_QPSK _3.75KHz Spectrum Plot			
1RB#0		1RB#47	
Channel	20402	Channel	20648
			

LTE Band 5_QPSK _15KHz Spectrum Plot			
1RB#0		1RB#11	
Channel	20402	Channel	20648
			
12RB#0			
Channel	20402	Channel	20648
			

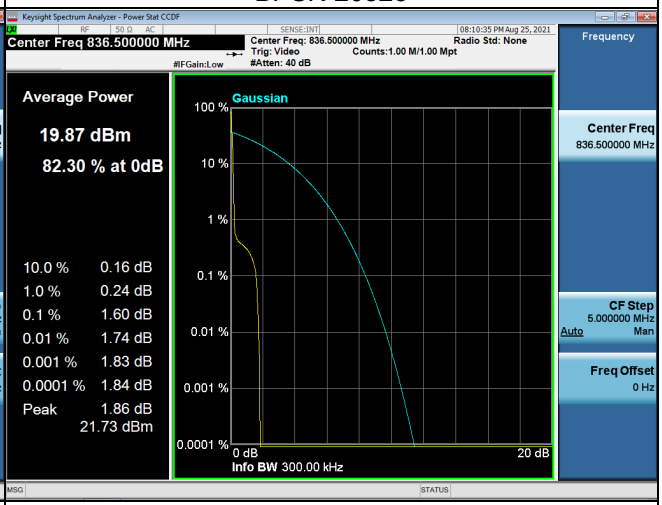
APPENDIX H - PEAK TO AVERAGE RATIO

LTE Band 5_3.75KHz Spectrum Plot

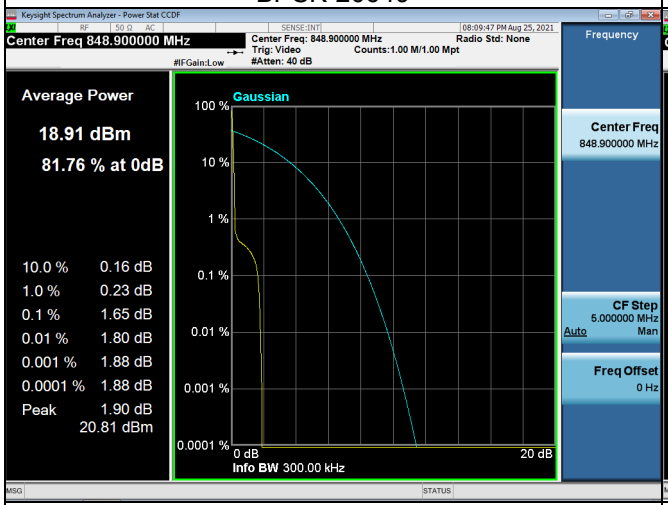
BPSK-20401



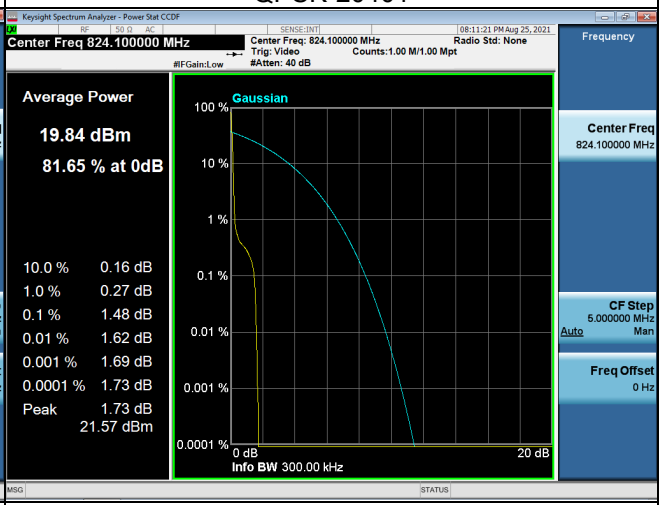
BPSK-20525



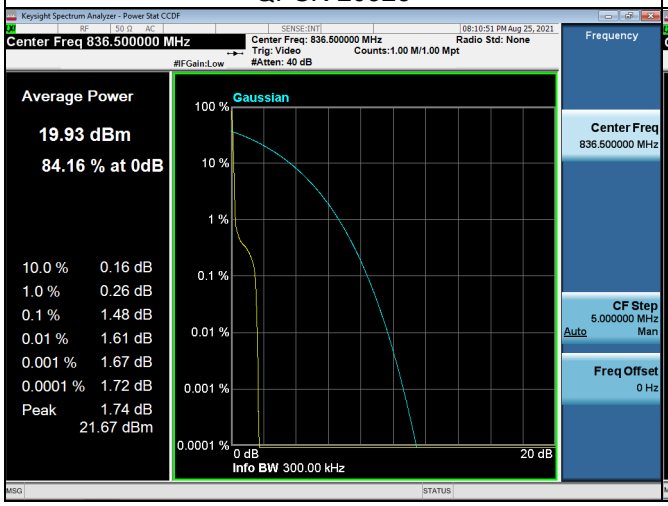
BPSK-20649



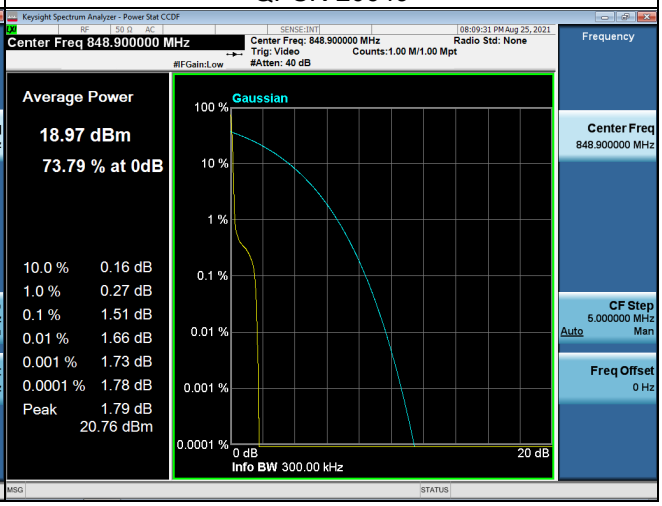
QPSK-20401



QPSK-20525

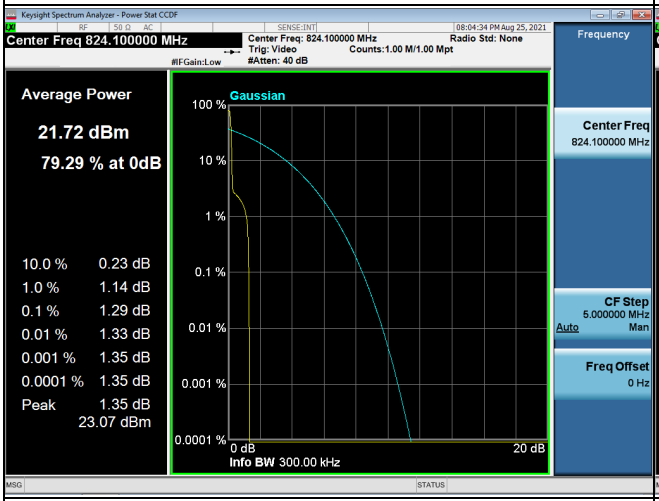


QPSK-20649

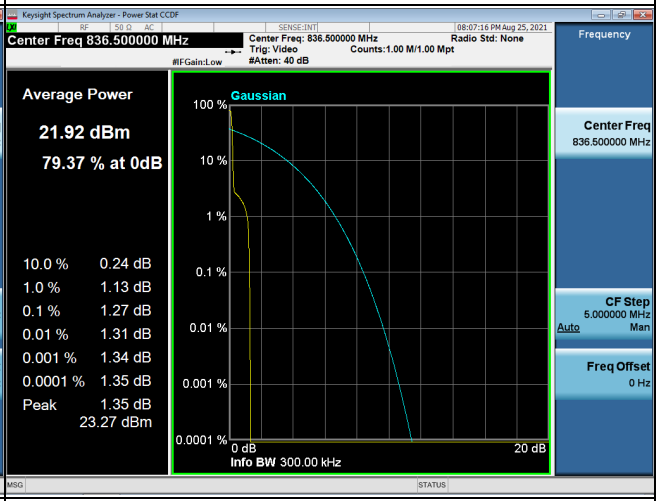


LTE Band 5_15KHz Spectrum Plot

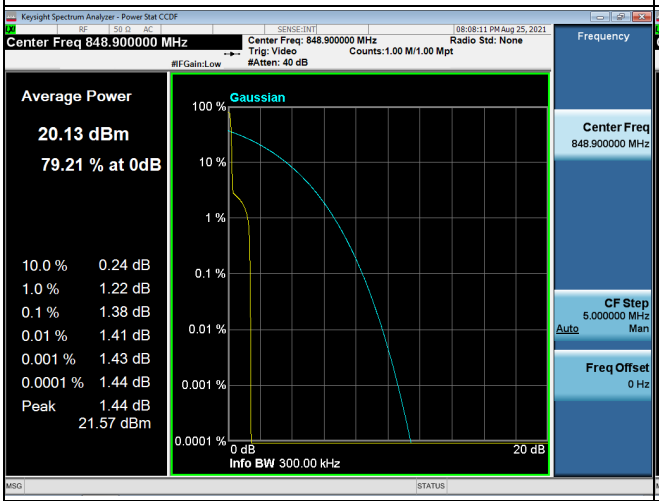
BPSK-20401



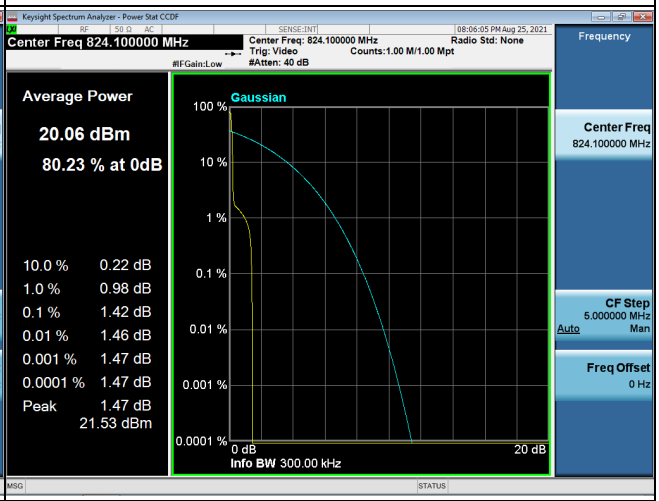
BPSK-20525



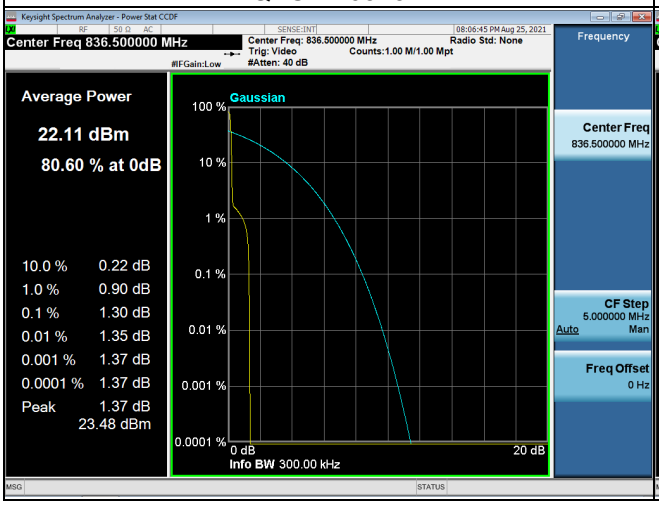
BPSK-20649



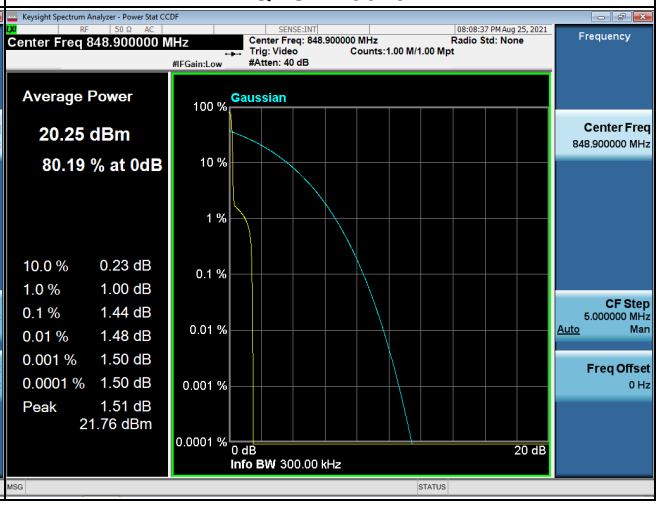
QPSK-20401



QPSK-20525



QPSK-20649



APPENDIX I - FREQUENCY STABILITY

Test Mode	LTE Band 5_BPSK_CH20525_3.75KHz

Temperature vs. Frequency Stabiility

Temperature(°C)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
-30	4.95	0.005917513	±2.5
-20	-4.24	-0.005068739	
-10	14.38	0.017190675	
0	1.70	0.002032277	
10	-14.29	-0.017083084	
20	-6.57	-0.007854154	
30	1.79	0.002139868	
40	-11.82	-0.014130305	
50	-10.83	-0.012946802	
Max. Deviation (ppm)	14.38	0.017190675	

Voltage vs. Frequency Stability

Voltage(Volts)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
3.8	4.48	0.005355649	±2.5
3.6	7.21	0.008619247	
2.0	8.02	0.009587567	
Max. Deviation (ppm)	8.02	0.009587567	

Test Mode	LTE Band 5_BPSK_CH20525_15KHz

Temperature vs. Frequency Stabiility

Temperature(°C)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
-30	-11.67	-0.013950986	±2.5
-20	13.46	0.016090855	
-10	-8.56	-0.010233114	
0	-14.05	-0.016796175	
10	-7.97	-0.009527794	
20	9.45	0.011297071	
30	9.99	0.011942618	
40	-8.98	-0.010735206	
50	-3.26	-0.003897191	
Max. Deviation (ppm)	-14.05	-0.016796175	

Voltage vs. Frequency Stability

Voltage(Volts)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
3.8	7.42	0.008870293	±2.5
3.6	12.15	0.014524806	
2.0	6.98	0.008344292	
Max. Deviation (ppm)	12.15	0.014524806	

Test Mode	LTE Band 5_QPSK_CH20525_3.75KHz

Temperature vs. Frequency Stabiility

Temperature(°C)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
-30	-5.46	-0.006527197	±2.5
-20	11.77	0.014070532	
-10	2.72	0.003251644	
0	-4.76	-0.005690377	
10	-2.43	-0.002904961	
20	13.72	0.016401674	
30	10.88	0.013006575	
40	1.77	0.002115959	
50	9.01	0.01077107	
Max. Deviation (ppm)	13.72	0.016401674	

Voltage vs. Frequency Stability

Voltage(Volts)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
3.8	-5.14	-0.00614465	±2.5
3.6	9.75	0.011655708	
2.0	12.69	0.015170353	
Max. Deviation (ppm)	12.69	0.015170353	

Test Mode	LTE Band 5_QPSK_CH20525_15KHz

Temperature vs. Frequency Stabiility

Temperature(°C)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
-30	6.56	0.0078422	±2.5
-20	13.87	0.016580992	
-10	-1.91	-0.002283323	
0	-4.51	-0.005391512	
10	0.97	0.001159594	
20	12.86	0.01537358	
30	2.32	0.002773461	
40	9.39	0.011225344	
50	-2.60	-0.003108189	
Max. Deviation (ppm)	13.87	0.016580992	

Voltage vs. Frequency Stability

Voltage(Volts)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
3.8	5.48	0.006551106	±2.5
3.6	-4.86	-0.005809922	
2.0	3.86	0.004614465	
Max. Deviation (ppm)	5.48	0.006551106	

End of Test Report