FCC Radio Test Report

FCC ID: 2AWG9-OSPREY

This report concerns: Original Grant

Project No.	:	2107C014
Equipment	:	4G LTE WiFi Router
Brand Name	:	WiFiRanger
Test Model	:	OSPREY
Series Model	:	N/A
Applicant	:	WiFiRanger, A LinOra Company
Address	:	943 W Overland Road, , Meridian,Idaho United States 83642
Manufacturer	:	Shenzhen Comnect Technology Co.,Ltd
Address	:	G Zone, 3/F, Building 1, Baisha High-Tech Park, Xili Street, Shenzhen
Factory	:	Shenzhen Comnect Technology Co.,Ltd
Address	:	Second Standard Factory, Zhongcai Road, Yingbin Avenue, Luxi Industrial Park,Jiangxi
Date of Receipt	:	Jul. 08, 2021
Date of Test	:	Jul. 09, 2021 ~ Aug. 03, 2021
Issued Date	:	Aug. 25, 2021
Report Version	:	R01
Test Sample	:	Engineering Sample No.: DG2021070560 for conducted, DG2021070562 for radiated.
Standard(s)	:	47 CFR FCC Part 27 Subpart L 47 CFR FCC Part 27 Subpart M 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.

Gabriel Zhu

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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.

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

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

Limitation

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

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REPORT ISSUED HISTORY

Report Version	Description	Issued Date
R00	Original Issue.	Aug. 23, 2021
R01	Removed test photos.	Aug. 25, 2021

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC Part 27 Subpart L, M & Part 2			
Standard(s) Section	**Test Item**	**Judgment**	**Remark**
2.1046 27.50(d)(4) 27.50(h)(2)	Equivalent Isotropic Radiated Power	PASS	------
2.1049	Occupied Bandwidth	PASS	------
2.1051 27.53(h) 27.53(m)(4)	Conducted Spurious Emissions	PASS	------
2.1053 27.53(h) 27.53(m)(4)	Radiated Spurious Emissions	PASS	------
2.1051 27.53(h) 27.53(m)(4)	Band Edge Measurements	PASS	------
-	Peak To Average Ratio	PASS	Record Only
2.1055 27.54	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

The measurement uncertainty figures shall be calculated according the methods described in the ETSI TR 100 028 and shall correspond to an expansion factor (coverage factor) k=1.96 or k=2(which provide confidence levels of respectively 90% and 95.45% in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).
Measurement Uncertainty for a Level of Confidence of 95 %, U=2xUc(y).

The BTL measurement uncertainty as below table:

A. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	Ant. H / V	U,(dB)
DG-CB03 (3m)	CISPR	9KHz ~ 30MHz	-	3.02
		30MHz ~ 200MHz	V	4.26
		30MHz ~ 200MHz	H	3.38
		200MHz ~ 1,000MHz	V	3.98
		200MHz ~ 1,000MHz	H	3.94

Test Site	Method	Measurement Frequency Range	U,(dB)
DG-CB03 (3m)	CISPR	1GHz ~ 6GHz	3.96
		6GHz ~ 18GHz	5.24

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	21.8°C	46%	AC 120V/60Hz	Tate Liu
Occupied Bandwidth	21.8°C	46%	AC 120V/60Hz	Tate Liu
Conducted Spurious Emissions	21.8°C	46%	AC 120V/60Hz	Tate Liu
Radiated Spurious Emissions	25°C	60%	AC 120V/60Hz	Kwok Guo
Band Edge	21.8°C	46%	AC 120V/60Hz	Tate Liu
Peak to Average Ratio	21.8°C	46%	AC 120V/60Hz	Tate Liu
Frequency Stability	Normal & **Extreme**	46%	Normal & **Extreme**	Tate Liu

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	4G LTE WiFi Router				
Brand Name	WiFiRanger				
Test Model	OSPREY				
Series Model	N/A				
Model Difference(s)	N/A				
Power Source	DC voltage supplied from AC adapter. (Support Units)				
Power Rating	I/P: 100-240V~ 50/60Hz 0.3A max O/P: 12.0V ⎓ 1A				
IEMI No.	Radiated	866834043420244			
	Conducted	866834044831423			
Modulation Type	WCDMA/HSDPA/HSUPA		QPSK		
	LTE		QPSK,16QAM		
Max. EIRP	WCDMA Band IV		QPSK	26.20	dBm
	HSDPA Band IV		QPSK	25.22	dBm
	HSUPA Band IV		QPSK	25.30	dBm
	LTE	Channel Bandwidth (MHz)	QPSK (dBm)	16QAM (dBm)	
	Band 4	1.4	25.27	24.26	
		3	25.40	24.58	
		5	25.09	24.14	
		10	25.24	24.16	
		15	25.03	24.56	
		20	25.20	24.27	
Max. ERP	Band 12	1.4	25.41	24.70	
		3	25.45	24.05	
		5	25.07	23.91	
		10	25.26	24.24	
	Band 13	5	25.12	24.02	
		10	25.14	23.91	

Note:

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

2. Channel List:

WCDMA Band IV				
Test Frequency ID	UARFCN	Frequency of Uplink (MHz)	UARFCN	Frequency of Downlink (MHz)
Low Range	1312	1712.4	1537	2112.4
Mid Range	1413	1732.6	1638	2132.6
High Range	1513	1752.6	1738	2152.6

LTE Band 4					
Test Frequency ID	Bandwidth (MHz)	N_{UL}	Frequency of Uplink (MHz)	N_{DL}	Frequency of Downlink (MHz)
Low Range	1.4	19957	1710.7	1957	2110.7
	3	19965	1711.5	1965	2111.5
	5	19975	1712.5	1975	2112.5
	10	20000	1715	2000	2115
	15	20025	1717.5	2025	2117.5
	20	20050	1720	2050	2120
Mid Range	1.4/3/5/10/15/20	20175	1732.5	2175	2132.5
High Range	1.4	20393	1754.3	2393	2154.3
	3	20385	1753.5	2385	2153.5
	5	20375	1752.5	2375	2152.5
	10	20350	1750	2350	2150
	15	20325	1747.5	2325	2147.5
	20	20300	1740	2300	2145

LTE Band 12			
Test Frequency ID	Bandwidth (MHz)	EARFCN	Frequency (UL and DL) (MHz)
Low Range	1.4	23017	699.7
	3	23025	700.5
	5	23035	701.5
	10	23060	704.0
Mid Range	1.4/3/5/10	23095	707.5
High Range	1.4	23173	715.3
	3	23165	714.5
	5	23155	713.5
	10	23130	711.0

LTE Band 13			
Test Frequency ID	Bandwidth (MHz)	EARFCN	Frequency (UL and DL) (MHz)
Low Range	5	23205	779.5
Mid Range	5/10	23230	782.0
High Range	5	23255	784.5

3. Table for Filed Antenna:

Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Note
N/A	N/A	Dipole	N/A	1.9	WCDMA Band IV
N/A	N/A	Dipole	N/A	1.9	LTE Band 4
N/A	N/A	Dipole	N/A	3.2	LTE Band 12
N/A	N/A	Dipole	N/A	3.2	LTE Band 13

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.

WCDMA BAND IV MODE			
Test Item	Available Channel	Tested Channel	Mode
Output Power & EIRP	1312 to 1513	1312, 1413, 1513	WCDMA, HSDPA, HSUPA
Occupied Bandwidth	1312 to 1513	1312, 1413, 1513	WCDMA
Conducted Spurious Emissions	1312 to 1513	1413	WCDMA
Radiated Spurious Emissions	1312 to 1513	1413	WCDMA
Band Edge	1312 to 1513	1312, 1513	WCDMA
Peak to Average Ratio	1312 to 1513	1312, 1413, 1513	WCDMA
Frequency Stability	1312 to 1513	1413	WCDMA

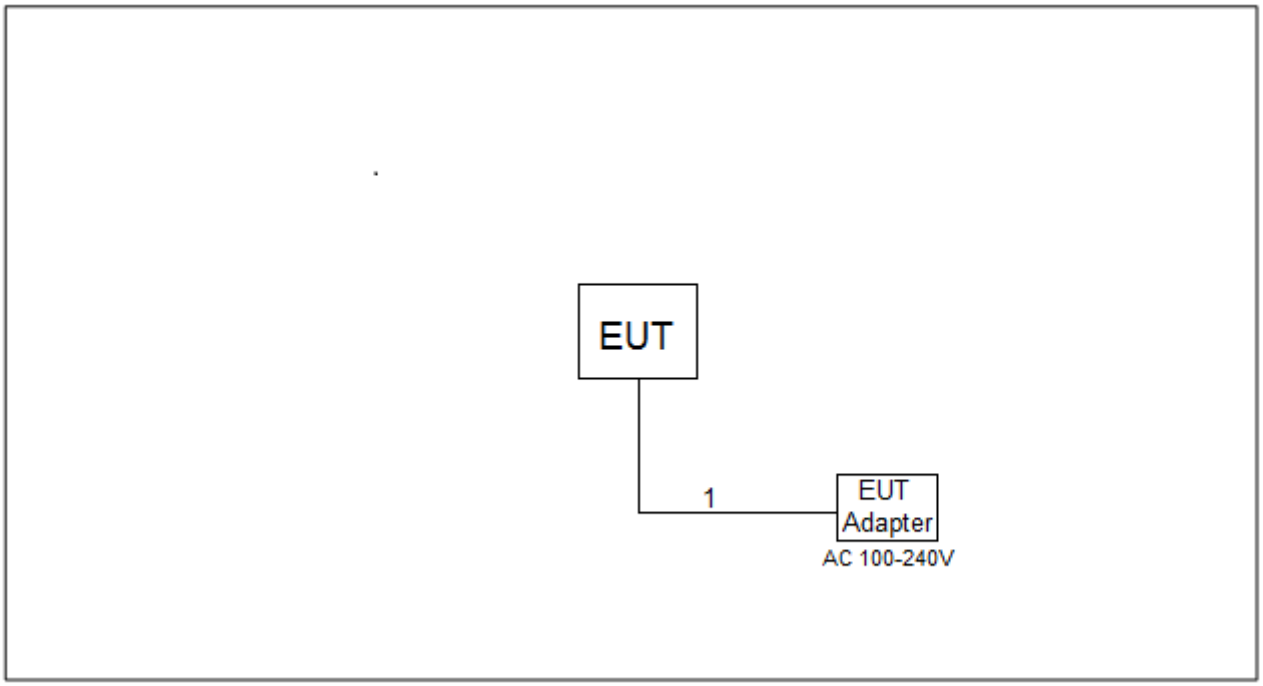
LTE BAND 4 MODE					
Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
Output Power & EIRP	19957 to 20393	19957, 20175, 20393	1.4MHz	QPSK, 16QAM	1RB/3RB/6RB
	19965 to 20385	19965, 20175, 20385	3MHz	QPSK, 16QAM	1RB/8RB/15RB
	19975 to 20375	19975, 20175, 20375	5MHz	QPSK, 16QAM	1RB/12RB/25RB
	20000 to 20350	20000, 20175, 20350	10MHz	QPSK, 16QAM	1RB/25RB/50RB
	20025 to 20325	20025, 20175, 20325	15MHz	QPSK, 16QAM	1RB/36RB/75RB
	20050 to 20300	20050, 20175, 20300	20MHz	QPSK, 16QAM	1RB/50RB/100RB
Occupied Bandwidth	19957 to 20393	19957, 20175, 20393	1.4MHz	QPSK, 16QAM	6RB
	19965 to 20385	19965, 20175, 20385	3MHz	QPSK, 16QAM	15RB
	19975 to 20375	19975, 20175, 20375	5MHz	QPSK, 16QAM	25RB
	20000 to 20350	20000, 20175, 20350	10MHz	QPSK, 16QAM	50RB
	20025 to 20325	20025, 20175, 20325	15MHz	QPSK, 16QAM	75RB
	20050 to 20300	20050, 20175, 20300	20MHz	QPSK, 16QAM	100RB

LTE BAND 4 MODE					
Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
Conducted Spurious Emissions	19957 to 20393	20175	1.4MHz	QPSK	1RB
	19975 to 20375	20175	5MHz	QPSK	1RB
	20050 to 20300	20175	20MHz	QPSK	1RB
Radiated Spurious Emissions	19957 to 20393	20175	1.4MHz	QPSK	1RB
	19975 to 20375	20175	5MHz	QPSK	1RB
	20050 to 20300	20175	20MHz	QPSK	1RB
Band Edge	19957 to 20393	19957, 20393	1.4MHz	QPSK	1RB/6RB
	19965 to 20385	19965, 20385	3MHz	QPSK	1RB/15RB
	19975 to 20375	19975, 20375	5MHz	QPSK	1RB/25RB
	20000 to 20350	20000, 20350	10MHz	QPSK	1RB/50RB
	20025 to 20325	20025, 20325	15MHz	QPSK	1RB/75RB
	20050 to 20300	20050, 20300	20MHz	QPSK	1RB/100RB
Peak To Average Ratio	19957 to 20393	19957, 20175, 20393	1.4MHz	QPSK, 16QAM	1RB
	19965 to 20385	19965, 20175, 20385	3MHz	QPSK, 16QAM	1RB
	19975 to 20375	19975, 20175, 20375	5MHz	QPSK, 16QAM	1RB
	20000 to 20350	20000, 20175, 20350	10MHz	QPSK, 16QAM	1RB
	20025 to 20325	20025, 20175, 20325	15MHz	QPSK, 16QAM	1RB
	20050 to 20300	20050, 20175, 20300	20MHz	QPSK, 16QAM	1RB
Frequency Stability	19957 to 20393	20175	1.4MHz	QPSK	1RB
	19965 to 20385	20175	3MHz	QPSK	1RB
	19975 to 20375	20175	5MHz	QPSK	1RB
	20000 to 20350	20175	10MHz	QPSK	1RB
	20025 to 20325	20175	15MHz	QPSK	1RB
	20050 to 20300	20175	20MHz	QPSK	1RB

LTE BAND 12					
Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
Output Power & ERP	23017 to 23173	23017, 23095, 23173	1.4MHz	QPSK, 16QAM	1RB/3RB/6RB
	23025 to 23165	23025, 23095, 23165	3MHz	QPSK, 16QAM	1RB/8RB/15RB
	23035 to 23155	23035, 23095, 23155	5MHz	QPSK, 16QAM	1RB/12RB/25RB
	23060 to 23130	23060, 23095, 23130	10MHz	QPSK, 16QAM	1RB/25RB/50RB
Frequency Stability	23017 to 23173	23095	1.4MHz	QPSK	1 RB
	23025 to 23165	23095	3MHz	QPSK	1 RB
	23035 to 23155	23095	5MHz	QPSK	1 RB
	23060 to 23130	23095	10MHz	QPSK	1 RB
Occupied Bandwidth	23017 to 23173	23017, 23095, 23173	1.4MHz	QPSK, 16QAM	6RB
	23025 to 23165	23025, 23095, 23165	3MHz	QPSK, 16QAM	15RB
	23035 to 23155	23035, 23095, 23155	5MHz	QPSK, 16QAM	25RB
	23060 to 23130	23060, 23095, 23130	10MHz	QPSK, 16QAM	50RB
Peak to Average Ratio	23017 to 23173	23017, 23095, 23173	1.4MHz	QPSK, 16QAM	1 RB
	23025 to 23165	23025, 23095, 23165	3MHz	QPSK, 16QAM	1 RB
	23035 to 23155	23035, 23095, 23155	5MHz	QPSK, 16QAM	1 RB
	23060 to 23130	23060, 23095, 23130	10MHz	QPSK, 16QAM	1 RB
Band Edge	23017 to 23173	23017,23173	1.4MHz	QPSK	1RB/6RB
	23025 to 23165	23025,23165	3MHz	QPSK	1RB/15RB
	23035 to 23155	23035,23155	5MHz	QPSK	1RB/25RB
	23060 to 23130	23060,23130	10MHz	QPSK	1RB/50RB
Conducted Emission	23017 to 23173	23095	1.4MHz	QPSK	1 RB
	23035 to 23155	23095	5MHz	QPSK	1 RB
	23060 to 23130	23095	10MHz	QPSK	1 RB
Radiated Emission	23017 to 23173	23095	1.4MHz	QPSK	1 RB
	23017 to 23173	23095	5MHz	QPSK	1 RB
	23060 to 23130	23095	10MHz	QPSK	1 RB

LTE BAND 13					
Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
Output Power & ERP	23205 to 23255	23205, 23230, 23255	5MHz	QPSK, 16QAM	1RB/12RB/25RB
	23230	23230	10MHz	QPSK, 16QAM	1RB/25RB/50RB
Frequency Stability	23205 to 23255	23230	5MHz	QPSK	1 RB
	23230	23230	10MHz	QPSK	1 RB
Occupied Bandwidth	23205 to 23255	23205, 23230, 23255	5MHz	QPSK, 16QAM	25RB
	23230	23230	10MHz	QPSK, 16QAM	50RB
Peak to Average Ratio	23205 to 23255	23205, 23230, 23255	5MHz	QPSK, 16QAM	1 RB
	23230	23230	10MHz	QPSK, 16QAM	1 RB
Band Edge	23205 to 23255	23205, 23255	5MHz	QPSK	1RB/25RB
	23230	23230	10MHz	QPSK	1RB/50RB
Conducted Emission	23205 to 23255	23230	5MHz	QPSK	1 RB
	23230	23230	10MHz	QPSK	1 RB
Radiated Emission	23205 to 23255	23230	5MHz	QPSK	1 RB
	23230	23230	10MHz	QPSK	1 RB

2.3 BLOCK DIGRAM SHOWING THECONFIGURATIONOFSYSTEMTESTED



2.4 DESCRIPTION OF SUPPORT UNITS

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

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.
-	-	-	-	-

Item	Cable Type	Shielded Type	Ferrite Core	Length
1	DC Cable	NO	NO	1.5m

3. TEST RESULT

3.1 OUTPUT POWER MEASUREMENT

3.1.1 LIMIT

Mobile / Portable station are limited to 1 watts e.i.r.p. (Part 27 Subpart L)
Mobile / Portable station are limited to 2 watts e.i.r.p. (Part 27 Subpart M)

3.1.2 TEST PROCEDURE

The testing follows FCC KDB 971168 v03r01 Section 5.

EIRP:

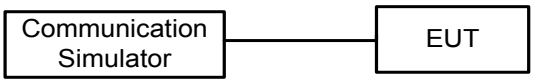
EIRP = Output Power + Antenan gain

Output Power:

The EUT was set up for the maximum power with 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.

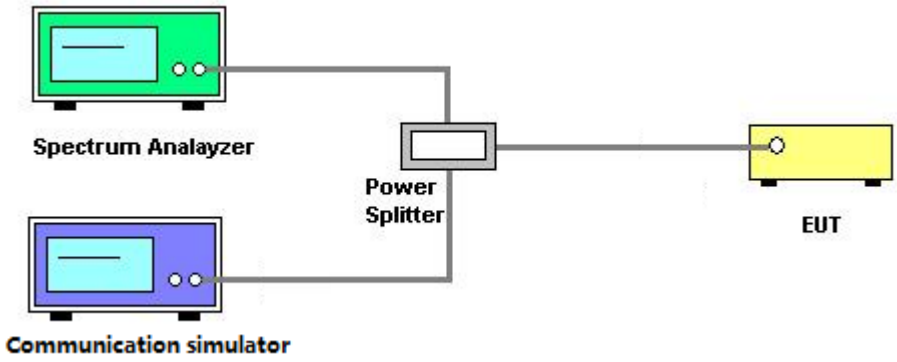
3.2 OCCUPIED BANDWIDTH MEASUREMENT

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. (Part 27 Subpart L)

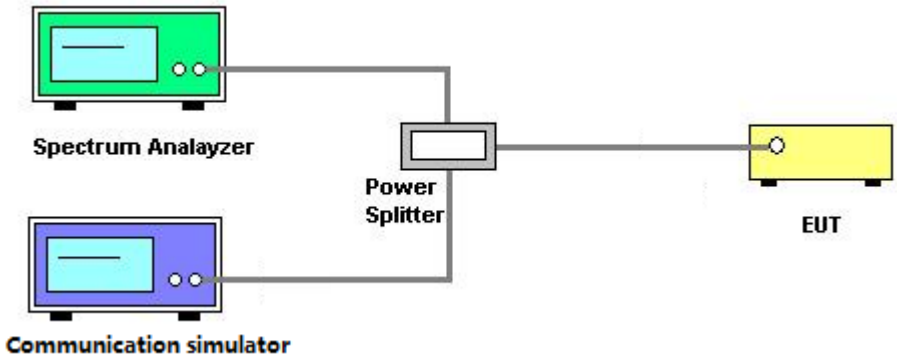
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 55 + 10 log(P) dB. The emission limit equal to -25dBm. (Part 27 Subpart M)

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. (Part 27 Subpart L)

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 55 + 10 log(P) dB. The emission limit equal to -25dBm. (Part 27 Subpart M)

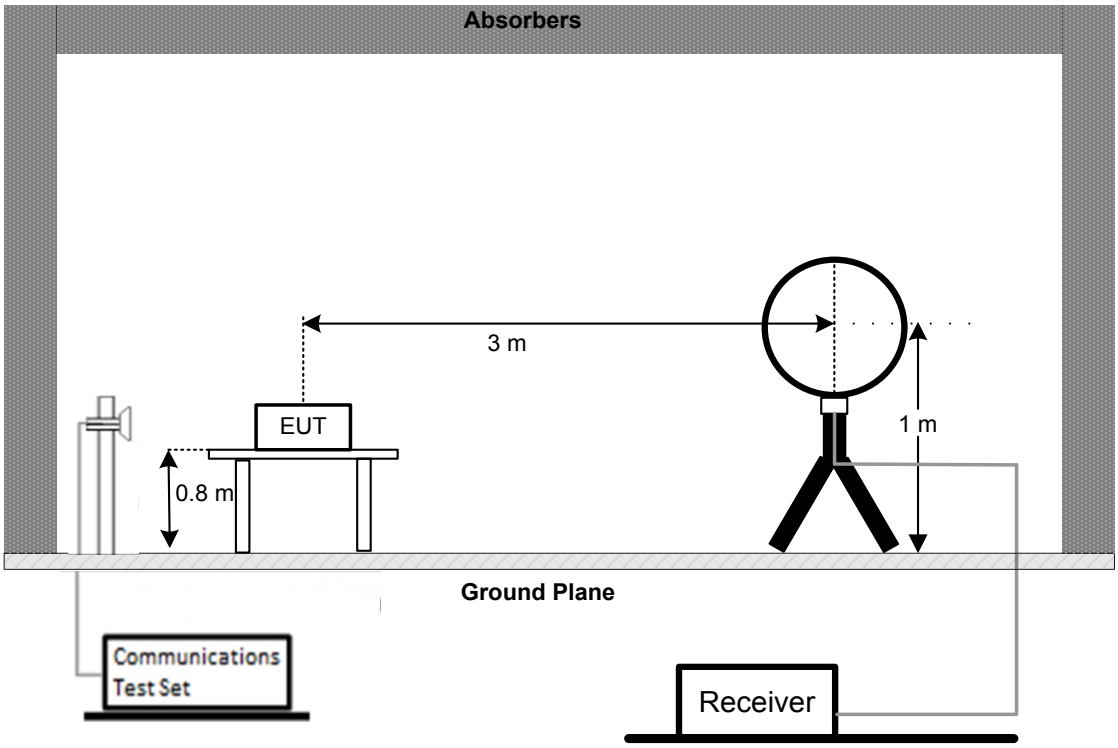
3.4.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 6.2.

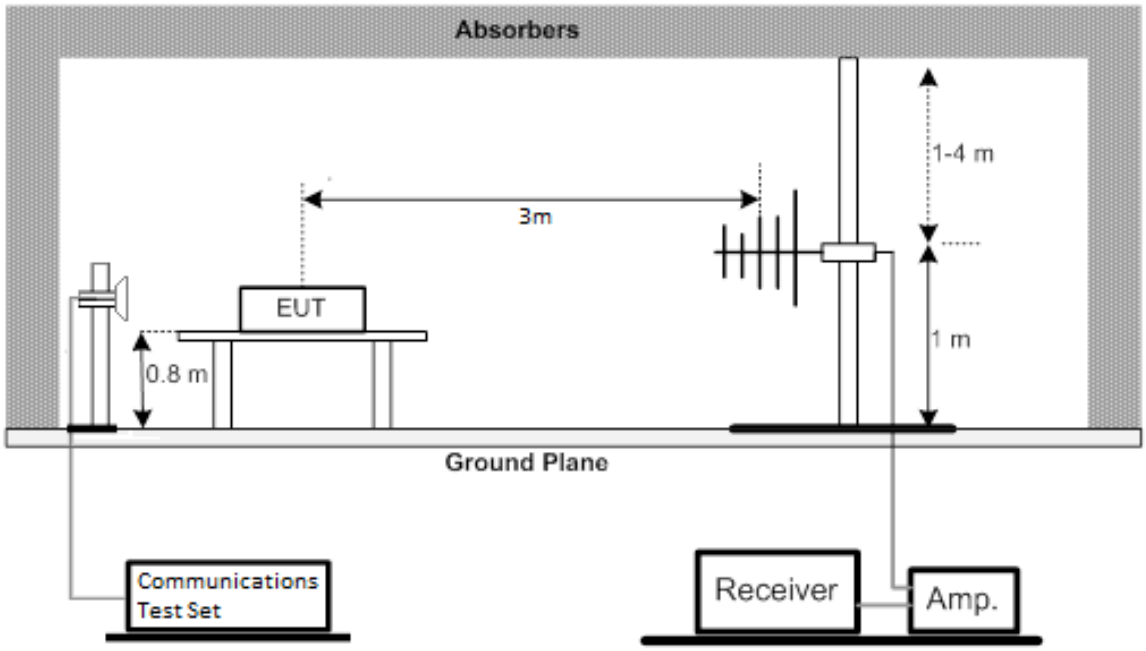
1. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power.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

3.4.3 TEST SETUP LAYOUT

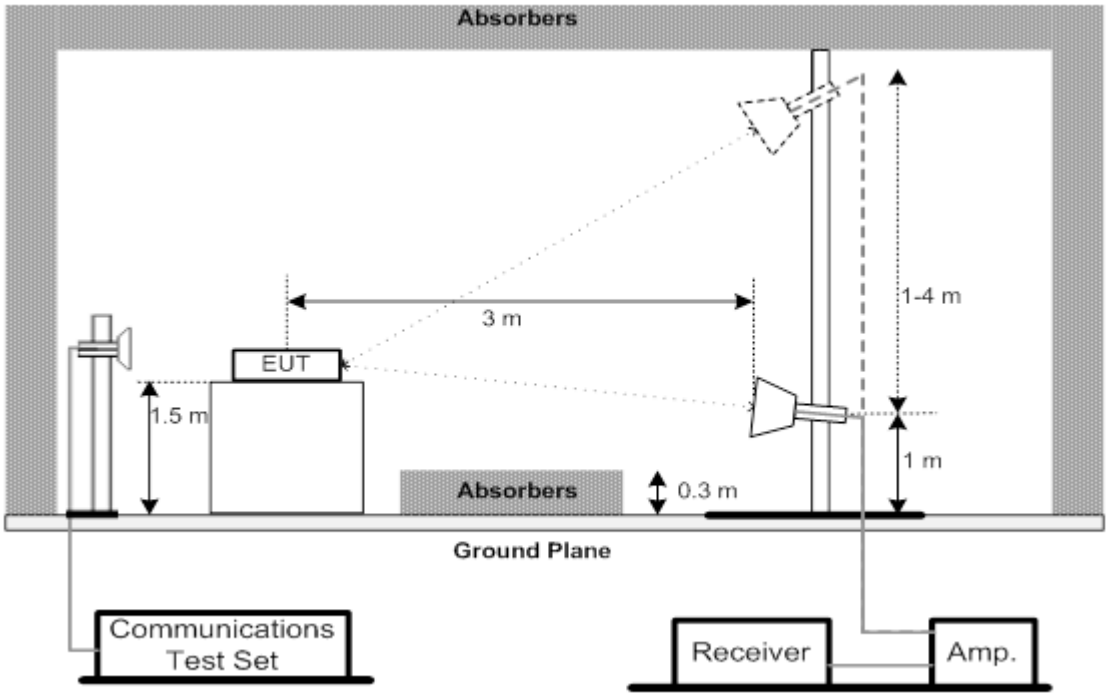
Below 30MHz



30MHz to 1GHz



Above 1GHz



3.4.4 TEST RESULTS (9KHZ TO 30MHZ)

Please refer to the APPENDIX D.

3.4.5 TEST RESULTS (30MHZ TO 1000MHZ)

Please refer to the APPENDIX E.

3.4.6 TEST RESULTS (ABOVE 1000MHZ)

Please refer to the APPENDIX F.

3.5 BAND EDGE MEASUREMENT

3.5.1 LIMIT

The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed. (Part 27 Subpart L)

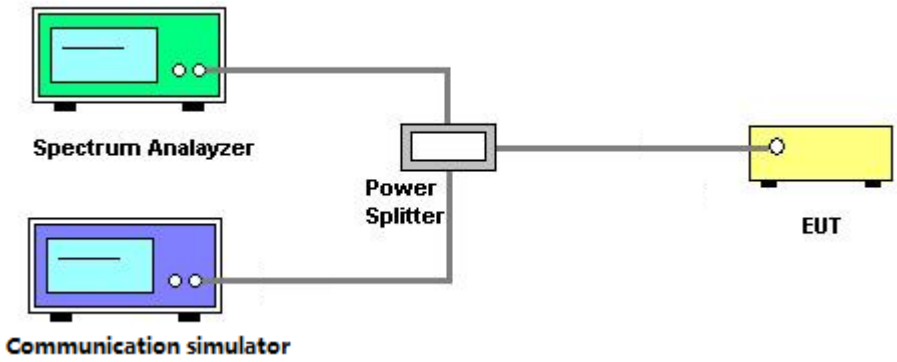
For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees. (Part 27 Subpart M)

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

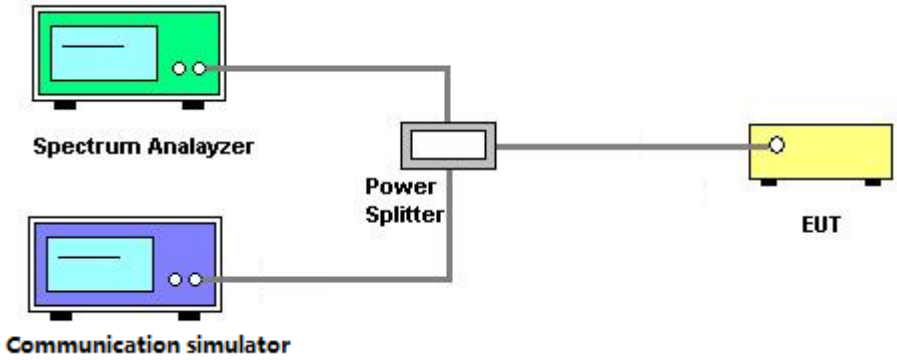
In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB.

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

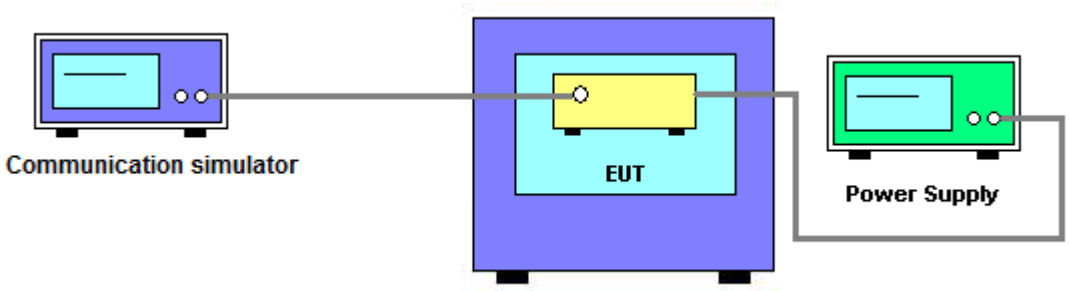
±1.5 ppm is for base and fixed station. ±2.5 ppm is for mobile station.

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	9160-3231	Apr. 14, 2022
2	Amplifier	Agilent	8449B	3008A02334	Feb. 27, 2022
3	HighPass 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	HighPass 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	B10-01-01-12M	18072744	Oct. 16, 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	Oct. 16, 2021
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):

Modulation	Band	WCDMA Band IV		
	Tx Channel	1312CH	1413CH	1513CH
	Frequency	1712.4MHz	1732.6MHz	1752.6MHz
QPSK	RMC 12.2K	24.27	24.01	23.99
	RMC 64K	24.3	24.04	24.01
	RMC 144K	24.3	24.04	24.02
	RMC 384K	24.3	24.04	24
	HSDPA Subtest-1	23.26	23.02	23
	HSDPA Subtest-2	23.32	23.07	23.06
	HSDPA Subtest-3	22.75	22.58	22.64
	HSDPA Subtest-4	22.82	22.61	22.64
	HSUPA Subtest-1	22.72	22.96	23.18
	HSUPA Subtest-2	22.31	21.79	22.01
	HSUPA Subtest-3	21.78	21.42	22.15
	HSUPA Subtest-4	22.45	22.65	22.24
	HSUPA Subtest-5	23.4	23.04	23.12

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				19957CH	20175CH	20393CH
				1710.7MHz	1732.5MHz	1754.3MHz
4 / 1.4M	QPSK	1	0	23.23	23.00	23.04
		1	2	23.37	23.14	23.05
		1	5	23.26	23.13	22.97
		3	0	23.31	23.17	23.04
		3	1	23.27	23.21	23.08
		3	2	23.19	23.12	23.04
		6	0	22.20	22.04	22.03
	16QAM	1	0	22.08	22.10	22.03
		1	2	22.22	22.22	22.33
		1	5	22.22	22.20	22.15
		3	0	22.36	21.79	21.98
		3	1	22.24	21.82	22.02
		3	2	22.23	21.68	21.93
		6	0	21.11	20.90	21.21

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				19965CH	20175CH	20385CH
				1711.5MHz	1732.5MHz	1753.5MHz
4 / 3M	QPSK	1	0	23.25	23.27	23.03
		1	7	23.19	23.19	23.05
		1	14	23.50	23.13	23.11
		8	0	22.04	21.95	21.97
		8	4	21.99	21.99	22.05
		8	7	21.98	22.19	22.07
		15	0	22.16	22.04	22.03
	16QAM	1	0	22.68	22.01	21.91
		1	7	22.42	22.05	21.75
		1	14	22.31	22.08	21.63
		8	0	21.17	21.08	20.89
		8	4	21.07	21.11	20.88
		8	7	21.06	21.11	20.88
		15	0	21.15	21.20	20.96

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				19975CH	20175CH	20375CH
				1712.5MHz	1732.5MHz	1752.5MHz
4 / 5M	QPSK	1	0	23.17	23.07	22.96
		1	13	23.15	23.03	22.92
		1	24	23.19	22.99	23.02
		12	0	22.13	22.06	22.07
		12	6	22.22	22.10	22.13
		12	11	22.24	22.21	22.06
		25	0	22.22	22.10	22.11
	16QAM	1	0	22.04	22.18	22.06
		1	13	21.73	22.24	21.80
		1	24	21.65	22.13	21.83
		12	0	21.21	21.00	21.11
		12	6	21.20	21.02	21.16
		12	11	21.19	21.12	21.19
		25	0	21.32	21.27	21.04

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20000CH	20175CH	20350CH
				1715MHz	1732.5MHz	1750MHz
4 / 10M	QPSK	1	0	23.19	23.08	22.94
		1	25	23.34	23.32	23.14
		1	49	23.21	23.02	23.10
		25	0	22.16	22.01	22.11
		25	13	22.17	22.03	22.07
		25	25	22.20	22.07	21.94
		50	0	22.19	21.94	22.07
	16QAM	1	0	22.26	21.77	22.07
		1	25	22.18	21.79	22.04
		1	49	22.04	21.77	22.04
		25	0	21.23	21.13	21.38
		25	13	21.12	21.13	21.16
		25	25	21.12	21.18	21.01
		50	0	21.18	21.02	21.09

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20025CH	20175CH	20325CH
				1717.5MHz	1732.5MHz	1747.5MHz
4 / 15M	QPSK	1	0	23.13	23.09	23.11
		1	38	23.07	23.05	22.94
		1	74	23.04	23.00	22.91
		36	0	22.14	22.08	22.01
		36	18	22.17	22.09	21.93
		36	39	22.10	22.10	21.97
		75	0	22.16	22.08	22.03
	16QAM	1	0	22.19	21.77	22.66
		1	38	22.15	21.88	22.50
		1	74	22.11	21.78	22.65
		36	0	21.10	21.06	21.02
		36	18	21.08	21.16	20.91
		36	39	21.15	21.07	21.04
		75	0	21.22	20.93	21.03

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20050CH	20175CH	20300CH
				1720MHz	1732.5MHz	1740MHz
4 / 20M	QPSK	1	0	22.63	23.04	23.11
		1	50	22.92	23.30	23.05
		1	99	22.77	23.12	22.86
		50	0	22.08	21.99	22.30
		50	25	22.05	22.12	22.19
		50	50	21.98	22.06	22.20
		100	0	22.06	21.93	22.19
	16QAM	1	0	22.09	22.10	21.74
		1	50	22.37	22.33	22.13
		1	99	22.17	22.01	21.89
		50	0	20.99	21.12	21.32
		50	25	20.98	21.28	21.13
		50	50	21.04	21.18	20.99
		100	0	21.06	21.13	21.19

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				23017CH	23095CH	23173CH
				699.7MHz	707.5MHz	715.3MHz
12 / 1.4M	QPSK	1	0	24.11	23.81	24.04
		1	2	24.17	24.01	24.14
		1	5	24.20	23.88	24.36
		3	0	24.30	24.00	23.94
		3	1	24.18	24.20	24.12
		3	2	24.10	24.10	23.99
		6	0	23.10	23.07	23.14
	16QAM	1	0	22.77	22.76	22.81
		1	2	22.53	22.84	23.21
		1	5	22.41	22.78	22.81
		3	0	22.62	23.43	22.46
		3	1	22.60	23.65	22.65
		3	2	22.58	23.47	22.92
		6	0	21.71	21.89	21.90

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				23025CH	23095CH	23165CH
				700.5MHz	707.5MHz	714.5MHz
12 / 3M	QPSK	1	0	24.40	24.00	24.06
		1	7	24.25	24.01	23.89
		1	14	24.22	23.96	24.06
		8	0	22.91	22.96	23.00
		8	4	22.93	22.98	22.99
		8	7	22.92	22.98	23.07
		15	0	22.98	23.00	22.93
	16QAM	1	0	22.98	22.63	22.92
		1	7	22.83	22.47	23.00
		1	14	22.80	22.52	22.80
		8	0	21.93	21.80	21.96
		8	4	22.04	21.85	21.93
		8	7	21.98	21.75	22.10
		15	0	21.84	21.93	21.80

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				23035CH	23095CH	23155CH
				701.5MHz	707.5MHz	713.5MHz
12 / 5M	QPSK	1	0	24.02	23.68	23.82
		1	13	23.81	23.71	23.84
		1	24	23.77	23.68	23.97
		12	0	22.83	22.91	22.75
		12	6	22.70	22.89	22.78
		12	11	22.73	22.92	22.87
		25	0	22.87	22.97	22.85
	16QAM	1	0	22.75	22.81	22.60
		1	13	22.51	22.86	22.49
		1	24	22.12	22.81	22.55
		12	0	22.03	21.69	21.69
		12	6	21.89	21.75	21.63
		12	11	21.93	21.71	21.72
		25	0	21.92	21.90	21.70

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				23060CH	23095CH	23130CH
				704MHz	707.5MHz	711MHz
12 / 10M	QPSK	1	0	23.98	23.51	23.99
		1	25	24.15	24.06	24.01
		1	49	24.21	23.71	23.74
		25	0	22.64	22.88	22.80
		25	13	22.64	22.87	22.73
		25	25	22.89	22.82	22.85
		50	0	22.81	22.80	22.92
	16QAM	1	0	23.19	22.37	22.93
		1	25	23.04	22.57	22.95
		1	49	22.79	22.17	22.82
		25	0	21.78	21.87	22.01
		25	13	21.77	21.86	21.89
		25	25	21.91	21.88	21.98
		50	0	21.82	21.79	21.95

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				CH23205	CH23230	CH23255
				779.5MHz	782MHz	784.5MHz
13 / 5M	QPSK	1	0	23.81	24.07	23.67
		1	13	23.77	23.86	23.58
		1	24	23.94	24.02	23.76
		12	0	22.85	22.88	22.90
		12	6	22.95	22.91	22.95
		12	11	22.92	22.93	22.97
		25	0	22.97	23.00	22.97
	16QAM	1	0	22.23	22.43	22.87
		1	13	22.14	22.35	22.97
		1	24	22.35	22.31	22.81
		12	0	21.85	21.77	21.84
		12	6	21.77	21.74	21.81
		12	11	21.79	21.89	21.90
		25	0	21.98	22.00	22.10

LTE Band / BW	Modulation	RB Size	RB Offset	Mid CH
				CH23230
				782MHz
13 / 10M	QPSK	1	0	23.90
		1	25	24.02
		1	49	24.09
		25	0	23.04
		25	13	22.87
		25	25	22.99
		50	0	22.96
	16QAM	1	0	22.86
		1	25	22.83
		1	49	22.81
		25	0	22.07
		25	13	21.81
		25	25	21.82
		50	0	21.83

EIRP (dBm):

Modulation	Band	WCDMA Band IV		
	Tx Channel	1312CH	1413CH	1513CH
	Frequency	1712.4MHz	1732.6MHz	1752.6MHz
QPSK	RMC 12.2K	26.17	25.91	25.89
	RMC 64K	26.20	25.94	25.91
	RMC 144K	26.20	25.94	25.92
	RMC 384K	26.20	25.94	25.90
	HSDPA Subtest-1	25.16	24.92	24.90
	HSDPA Subtest-2	25.22	24.97	24.96
	HSDPA Subtest-3	24.65	24.48	24.54
	HSDPA Subtest-4	24.72	24.51	24.54
	HSUPA Subtest-1	24.62	24.86	25.08
	HSUPA Subtest-2	24.21	23.69	23.91
	HSUPA Subtest-3	23.68	23.32	24.05
	HSUPA Subtest-4	24.35	24.55	24.14
	HSUPA Subtest-5	25.30	24.94	25.02

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				19957CH	20175CH	20393CH
				1710.7MHz	1732.5MHz	1754.3MHz
4 / 1.4M	QPSK	1	0	25.13	24.90	24.94
		1	2	25.27	25.04	24.95
		1	5	25.16	25.03	24.87
		3	0	25.21	25.07	24.94
		3	1	25.17	25.11	24.98
		3	2	25.09	25.02	24.94
		6	0	24.10	23.94	23.93
	16QAM	1	0	23.98	24.00	23.93
		1	2	24.12	24.12	24.23
		1	5	24.12	24.10	24.05
		3	0	24.26	23.69	23.88
		3	1	24.14	23.72	23.92
		3	2	24.13	23.58	23.83
		6	0	23.01	22.80	23.11

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				19965CH	20175CH	20385CH
				1711.5MHz	1732.5MHz	1753.5MHz
4 / 3M	QPSK	1	0	25.15	25.17	24.93
		1	7	25.09	25.09	24.95
		1	14	25.40	25.03	25.01
		8	0	23.94	23.85	23.87
		8	4	23.89	23.89	23.95
		8	7	23.88	24.09	23.97
		15	0	24.06	23.94	23.93
	16QAM	1	0	24.58	23.91	23.81
		1	7	24.32	23.95	23.65
		1	14	24.21	23.98	23.53
		8	0	23.07	22.98	22.79
		8	4	22.97	23.01	22.78
		8	7	22.96	23.01	22.78
		15	0	23.05	23.10	22.86

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				19975CH	20175CH	20375CH
				1712.5MHz	1732.5MHz	1752.5MHz
4 / 5M	QPSK	1	0	25.07	24.97	24.86
		1	13	25.05	24.93	24.82
		1	24	25.09	24.89	24.92
		12	0	24.03	23.96	23.97
		12	6	24.12	24.00	24.03
		12	11	24.14	24.11	23.96
		25	0	24.12	24.00	24.01
	16QAM	1	0	23.94	24.08	23.96
		1	13	23.63	24.14	23.70
		1	24	23.55	24.03	23.73
		12	0	23.11	22.90	23.01
		12	6	23.10	22.92	23.06
		12	11	23.09	23.02	23.09
		25	0	23.22	23.17	22.94

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20000CH	20175CH	20350CH
				1715MHz	1732.5MHz	1750MHz
4 / 10M	QPSK	1	0	25.09	24.98	24.84
		1	25	25.24	25.22	25.04
		1	49	25.11	24.92	25.00
		25	0	24.06	23.91	24.01
		25	13	24.07	23.93	23.97
		25	25	24.10	23.97	23.84
		50	0	24.09	23.84	23.97
	16QAM	1	0	24.16	23.67	23.97
		1	25	24.08	23.69	23.94
		1	49	23.94	23.67	23.94
		25	0	23.13	23.03	23.28
		25	13	23.02	23.03	23.06
		25	25	23.02	23.08	22.91
		50	0	23.08	22.92	22.99

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20025CH	20175CH	20325CH
				1717.5MHz	1732.5MHz	1747.5MHz
4 / 15M	QPSK	1	0	25.03	24.99	25.01
		1	38	24.97	24.95	24.84
		1	74	24.94	24.90	24.81
		36	0	24.04	23.98	23.91
		36	18	24.07	23.99	23.83
		36	39	24.00	24.00	23.87
		75	0	24.06	23.98	23.93
	16QAM	1	0	24.09	23.67	24.56
		1	38	24.05	23.78	24.40
		1	74	24.01	23.68	24.55
		36	0	23.00	22.96	22.92
		36	18	22.98	23.06	22.81
		36	39	23.05	22.97	22.94
		75	0	23.12	22.83	22.93

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20050CH	20175CH	20300CH
				1720MHz	1732.5MHz	1740MHz
4 / 20M	QPSK	1	0	24.53	24.94	25.01
		1	50	24.82	25.20	24.95
		1	99	24.67	25.02	24.76
		50	0	23.98	23.89	24.20
		50	25	23.95	24.02	24.09
		50	50	23.88	23.96	24.10
		100	0	23.96	23.83	24.09
	16QAM	1	0	23.99	24.00	23.64
		1	50	24.27	24.23	24.03
		1	99	24.07	23.91	23.79
		50	0	22.89	23.02	23.22
		50	25	22.88	23.18	23.03
		50	50	22.94	23.08	22.89
		100	0	22.96	23.03	23.09

ERP (dBm):

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				23017CH	23095CH	23173CH
				699.7MHz	707.5MHz	715.3MHz
12 / 1.4M	QPSK	1	0	25.16	24.86	25.09
		1	2	25.22	25.06	25.19
		1	5	25.25	24.93	25.41
		3	0	25.35	25.05	24.99
		3	1	25.23	25.25	25.17
		3	2	25.15	25.15	25.04
		6	0	24.15	24.12	24.19
	16QAM	1	0	23.82	23.81	23.86
		1	2	23.58	23.89	24.26
		1	5	23.46	23.83	23.86
		3	0	23.67	24.48	23.51
		3	1	23.65	24.70	23.70
		3	2	23.63	24.52	23.97
		6	0	22.76	22.94	22.95

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				23025CH	23095CH	23165CH
				700.5MHz	707.5MHz	714.5MHz
12 / 3M	QPSK	1	0	25.45	25.05	25.11
		1	7	25.30	25.06	24.94
		1	14	25.27	25.01	25.11
		8	0	23.96	24.01	24.05
		8	4	23.98	24.03	24.04
		8	7	23.97	24.03	24.12
		15	0	24.03	24.05	23.98
	16QAM	1	0	24.03	23.68	23.97
		1	7	23.88	23.52	24.05
		1	14	23.85	23.57	23.85
		8	0	22.98	22.85	23.01
		8	4	23.09	22.90	22.98
		8	7	23.03	22.80	23.15
		15	0	22.89	22.98	22.85

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				23035CH	23095CH	23155CH
				701.5MHz	707.5MHz	713.5MHz
12 / 5M	QPSK	1	0	25.07	24.73	24.87
		1	13	24.86	24.76	24.89
		1	24	24.82	24.73	25.02
		12	0	23.88	23.96	23.80
		12	6	23.75	23.94	23.83
		12	11	23.78	23.97	23.92
		25	0	23.92	24.02	23.90
	16QAM	1	0	23.80	23.86	23.65
		1	13	23.56	23.91	23.54
		1	24	23.17	23.86	23.60
		12	0	23.08	22.74	22.74
		12	6	22.94	22.80	22.68
		12	11	22.98	22.76	22.77
		25	0	22.97	22.95	22.75

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				23060CH	23095CH	23130CH
				704MHz	707.5MHz	711MHz
12 / 10M	QPSK	1	0	25.03	24.56	25.04
		1	25	25.20	25.11	25.06
		1	49	25.26	24.76	24.79
		25	0	23.69	23.93	23.85
		25	13	23.69	23.92	23.78
		25	25	23.94	23.87	23.90
		50	0	23.86	23.85	23.97
	16QAM	1	0	24.24	23.42	23.98
		1	25	24.09	23.62	24.00
		1	49	23.84	23.22	23.87
		25	0	22.83	22.92	23.06
		25	13	22.82	22.91	22.94
		25	25	22.96	22.93	23.03
		50	0	22.87	22.84	23.00

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				CH23205	CH23230	CH23255
				779.5MHz	782MHz	784.5MHz
13 / 5M	QPSK	1	0	24.86	25.12	24.72
		1	13	24.82	24.91	24.63
		1	24	24.99	25.07	24.81
		12	0	23.90	23.93	23.95
		12	6	24.00	23.96	24.00
		12	11	23.97	23.98	24.02
		25	0	24.02	24.05	24.02
	16QAM	1	0	23.28	23.48	23.92
		1	13	23.19	23.40	24.02
		1	24	23.40	23.36	23.86
		12	0	22.90	22.82	22.89
		12	6	22.82	22.79	22.86
		12	11	22.84	22.94	22.95
		25	0	23.03	23.05	23.15

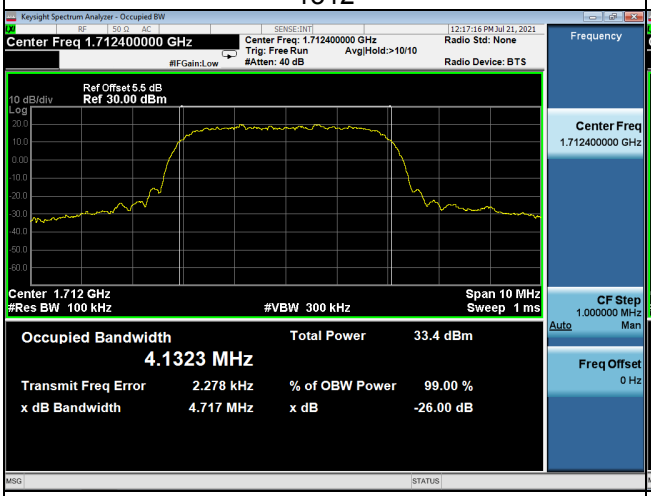
LTE Band / BW	Modulation	RB Size	RB Offset	Mid CH
				CH23230
				782MHz
13 / 10M	QPSK	1	0	24.95
		1	25	25.07
		1	49	25.14
		25	0	24.09
		25	13	23.92
		25	25	24.04
		50	0	24.01
	16QAM	1	0	23.91
		1	25	23.88
		1	49	23.86
		25	0	23.12
		25	13	22.86
		25	25	22.87
		50	0	22.88

APPENDIX B - OCCUPIED BANDWIDTH

WCDMA Band IV_WCDMA					
QPSK					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
1312	1712.4	4.1323	1312	1712.4	4.717
1413	1732.6	4.1267	1413	1732.6	4.721
1513	1752.6	4.1315	1513	1752.6	4.716

Spectrum Plot

1312



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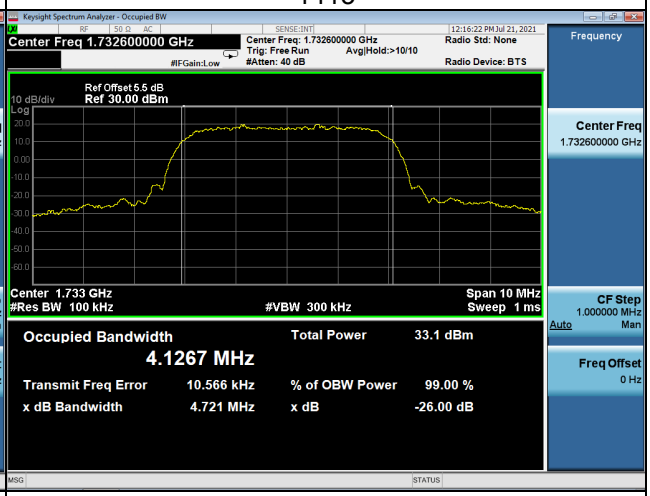

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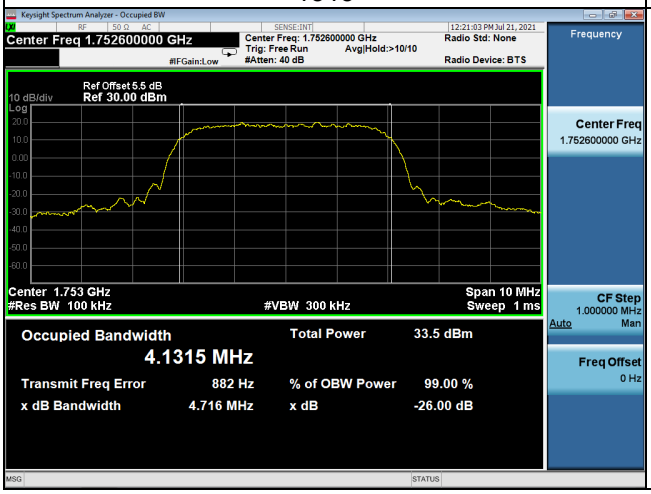

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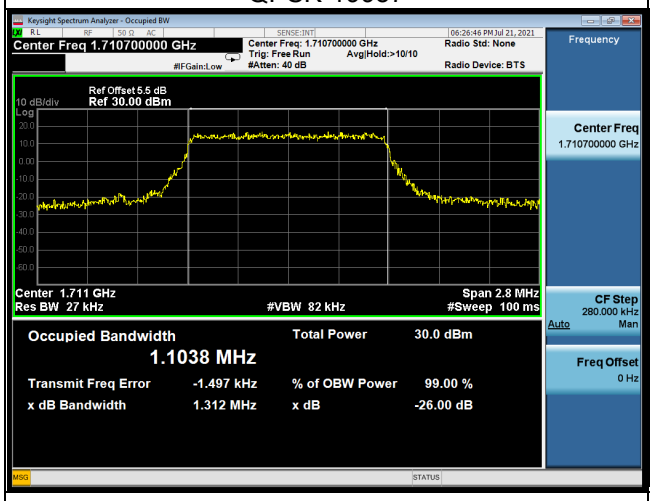
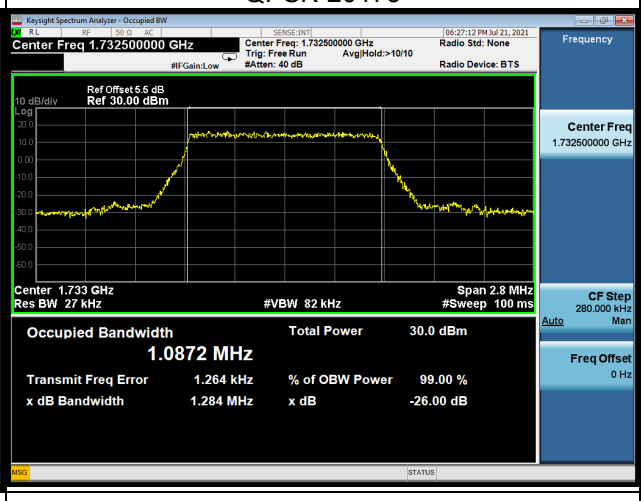
LTE Band 4_1.4M					
QPSK					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
19957	1710.7	1.1038	19957	1710.7	1.312
20175	1732.5	1.0872	20175	1732.5	1.284
20393	1754.3	1.0965	20393	1754.3	1.288
16QAM					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
19957	1710.7	1.0889	19957	1710.7	1.300
20175	1732.5	1.0971	20175	1732.5	1.296
20393	1754.3	1.0883	20393	1754.3	1.281

Spectrum Plot

QPSK-19957



QPSK-20175



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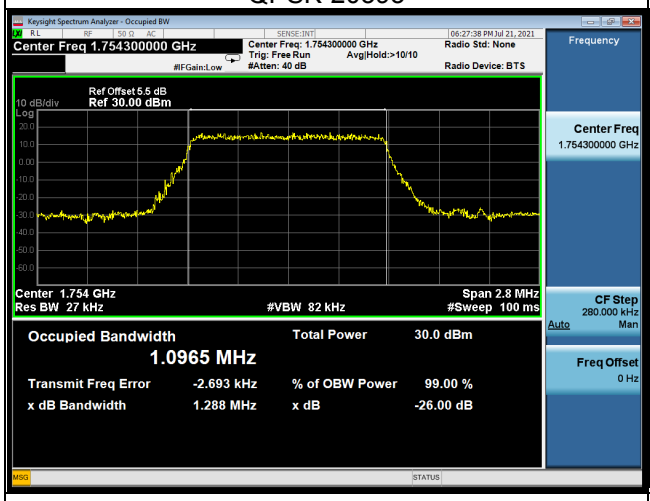
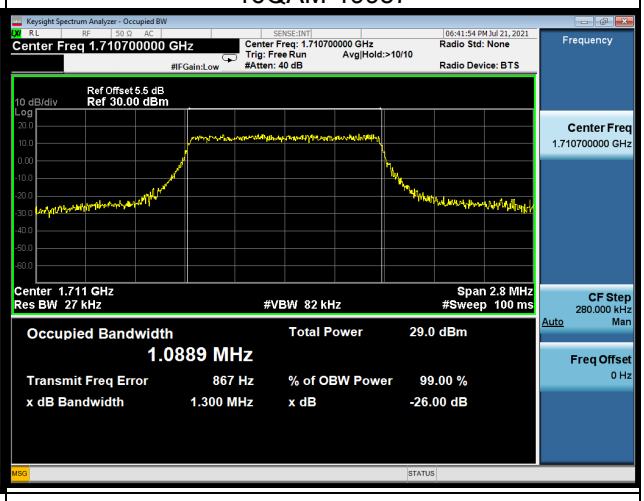


16QAM-19957



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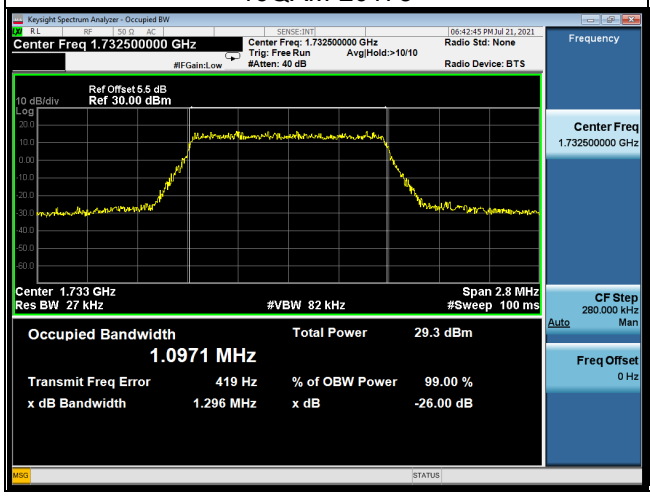

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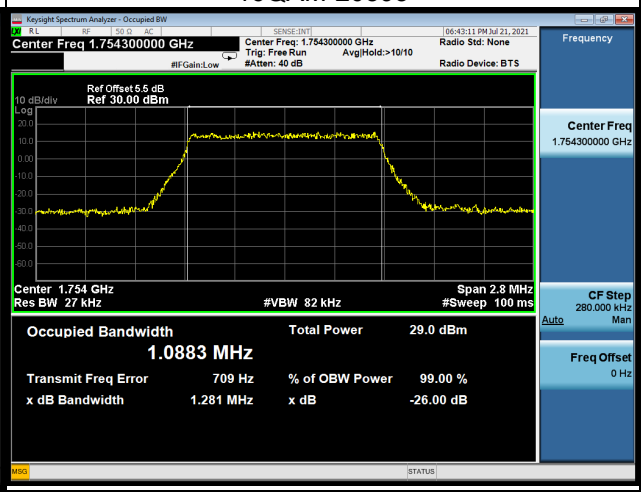
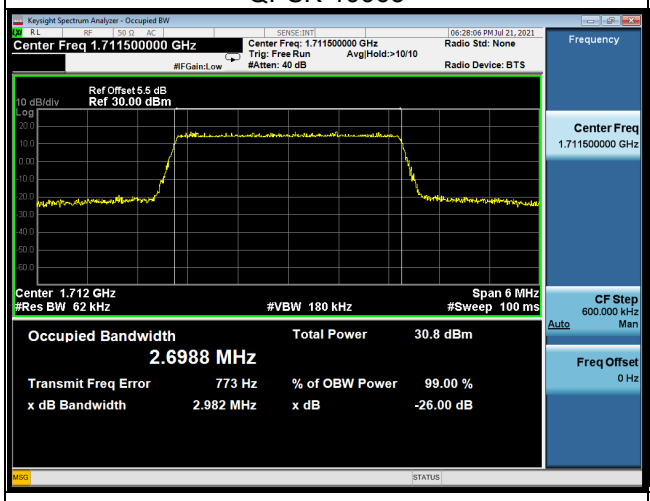


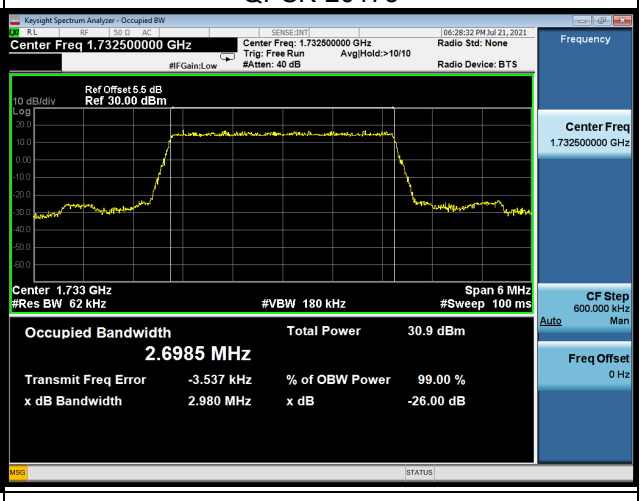
LTE Band 4_3M					
QPSK					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
19965	1711.5	2.6988	19965	1711.5	2.982
20175	1732.5	2.6985	20175	1732.5	2.980
20385	1753.5	2.6991	20385	1753.5	2.983
16QAM					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
19965	1711.5	2.7046	19965	1711.5	2.971
20175	1732.5	2.7020	20175	1732.5	2.962
20385	1753.5	2.6977	20385	1753.5	2.997

Spectrum Plot

QPSK-19965



QPSK-20175



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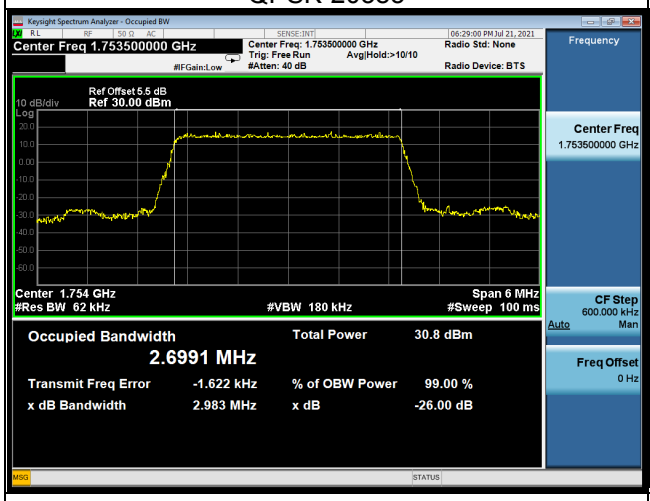

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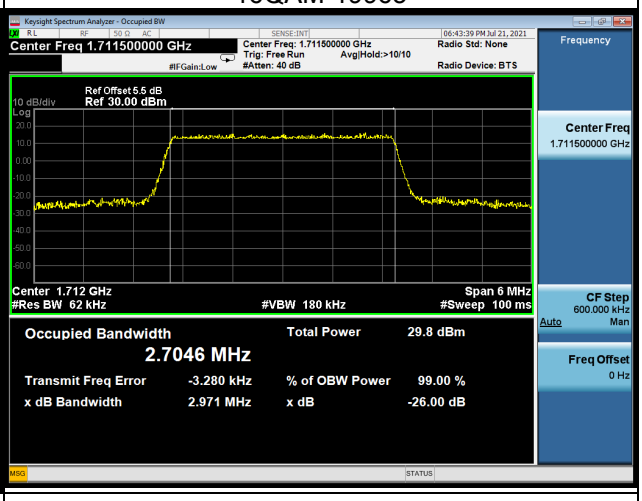

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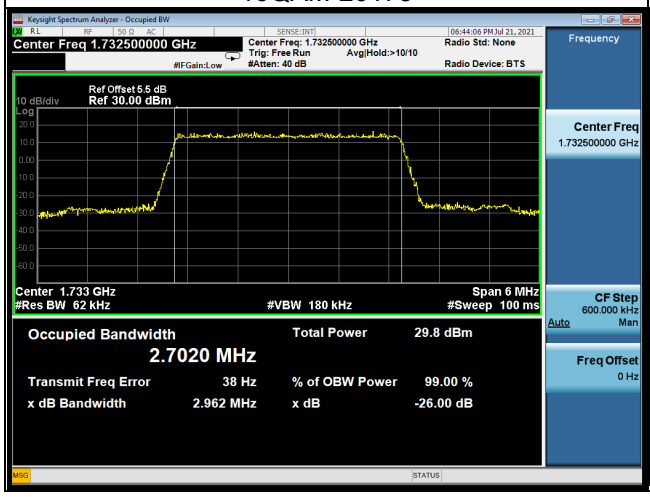

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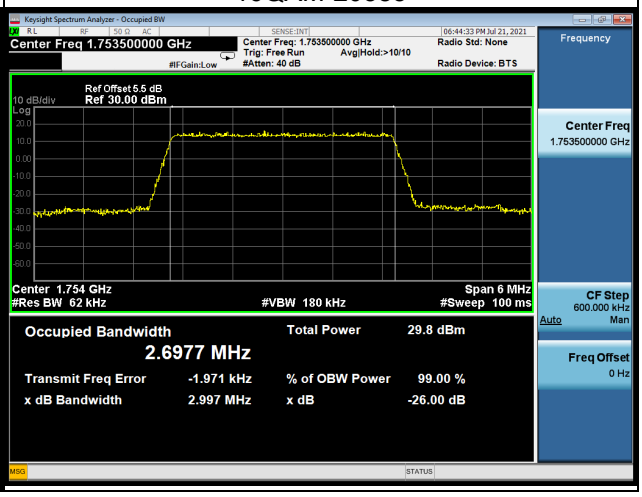
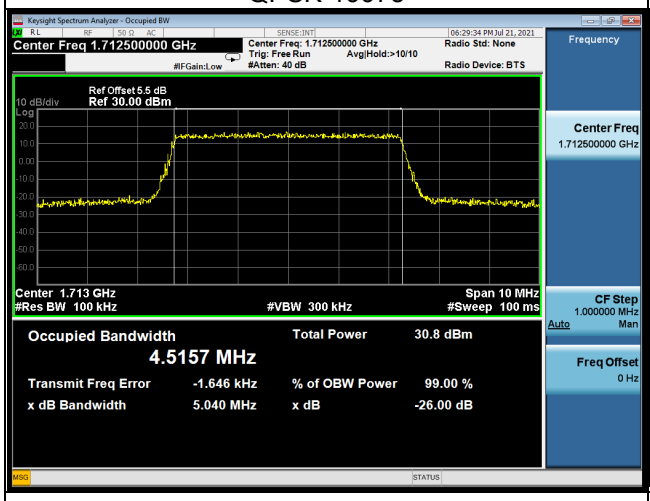


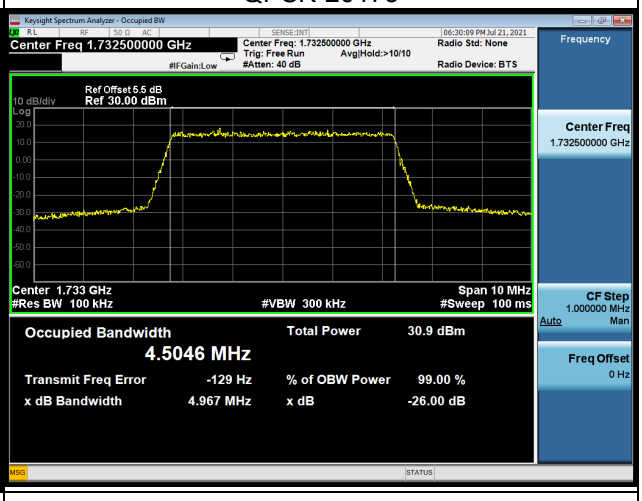
LTE Band 4_5M					
QPSK					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
19975	1712.5	4.5157	19975	1712.5	5.040
20175	1732.5	4.5046	20175	1732.5	4.967
20375	1752.5	4.5050	20375	1752.5	4.984
16QAM					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
19975	1712.5	4.5037	19975	1712.5	5.022
20175	1732.5	4.5026	20175	1732.5	4.979
20375	1752.5	4.5010	20375	1752.5	4.920

Spectrum Plot

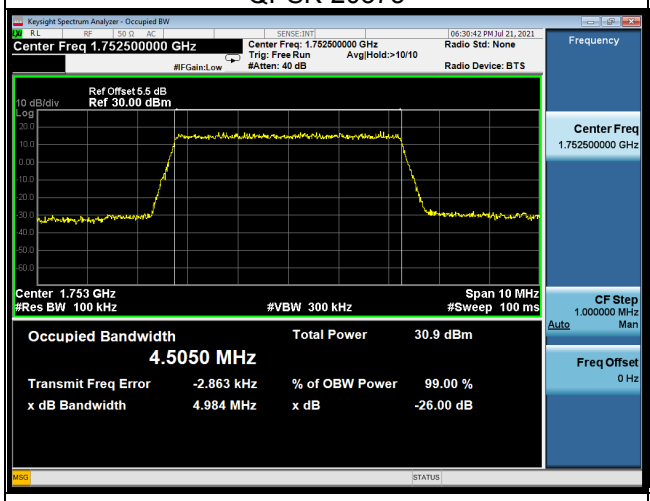
QPSK-19975



QPSK-20175



QPSK-20375



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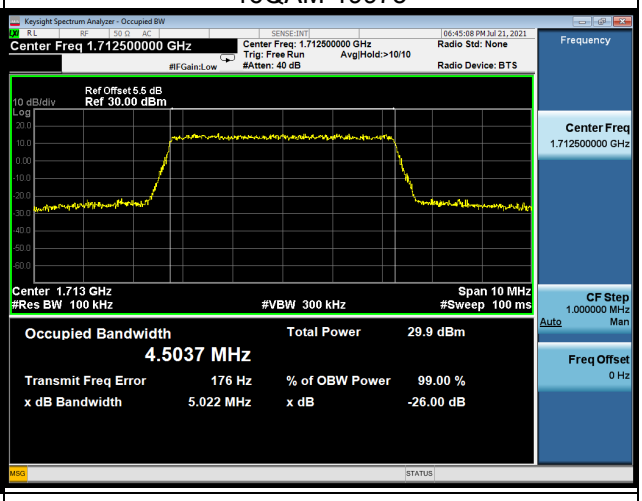

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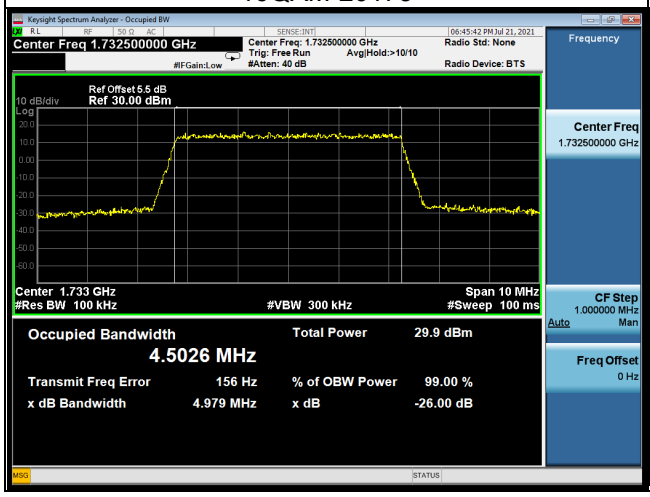

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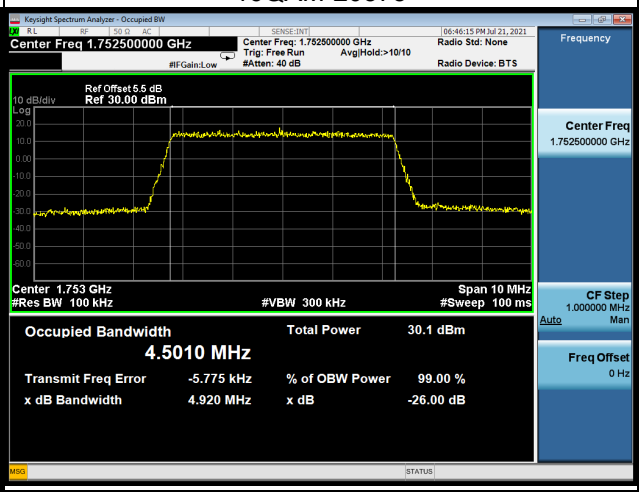
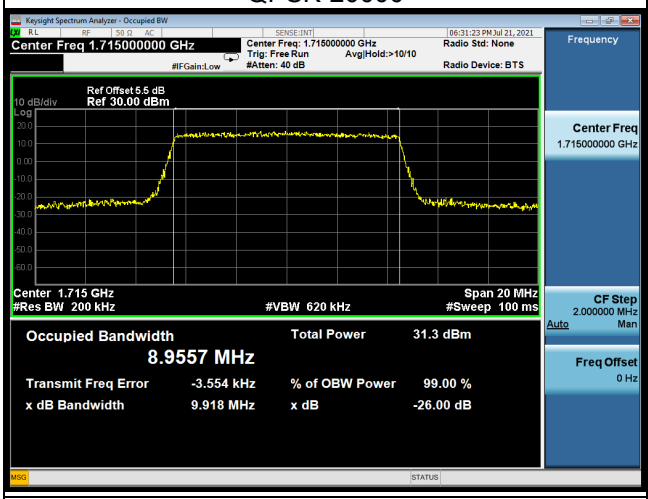


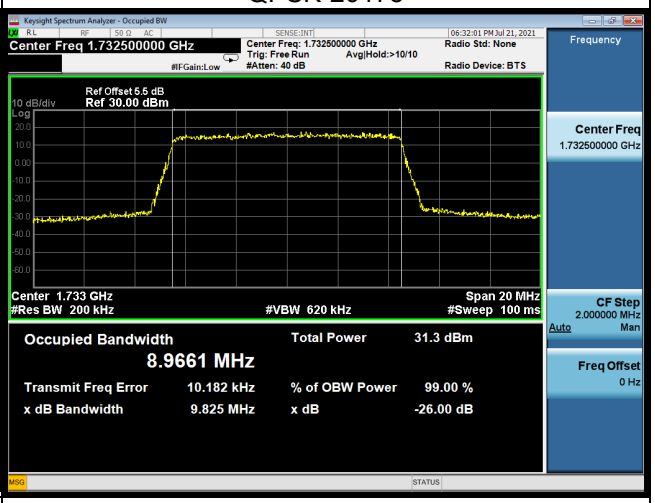
LTE Band 4_10M					
QPSK					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
20000	1715	8.9557	20000	1715	9.918
20175	1732.5	8.9661	20175	1732.5	9.825
20350	1750	8.9786	20350	1750	9.924
16QAM					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
20000	1715	8.9468	20000	1715	9.884
20175	1732.5	8.9582	20175	1732.5	9.814
20350	1750	8.9513	20350	1750	9.842

Spectrum Plot

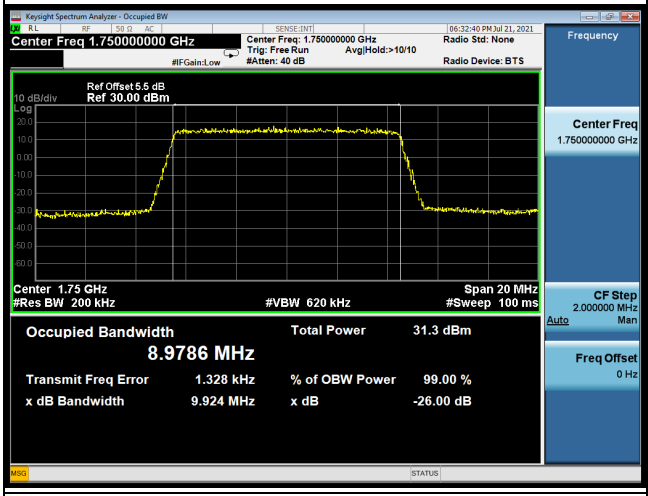
QPSK-20000



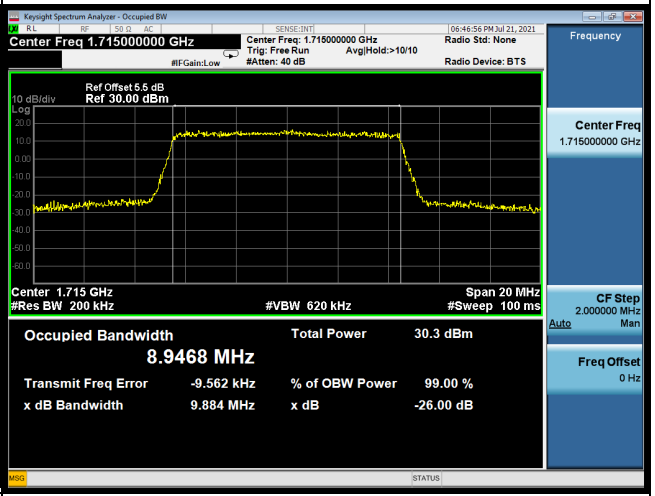
QPSK-20175



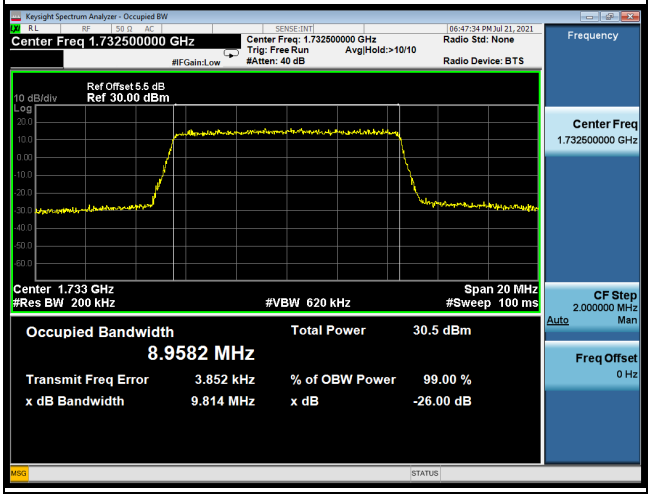
QPSK-20350



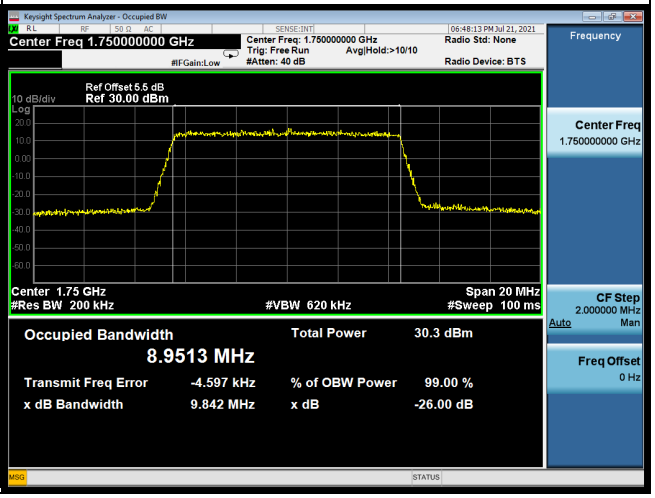
16QAM-20000



16QAM-20175



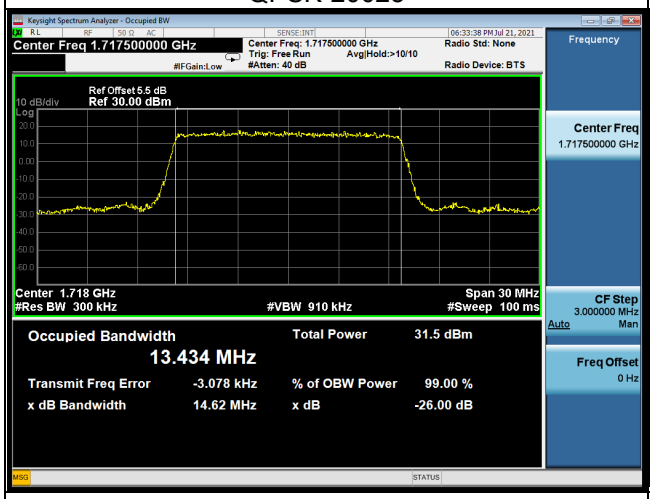
16QAM-20350



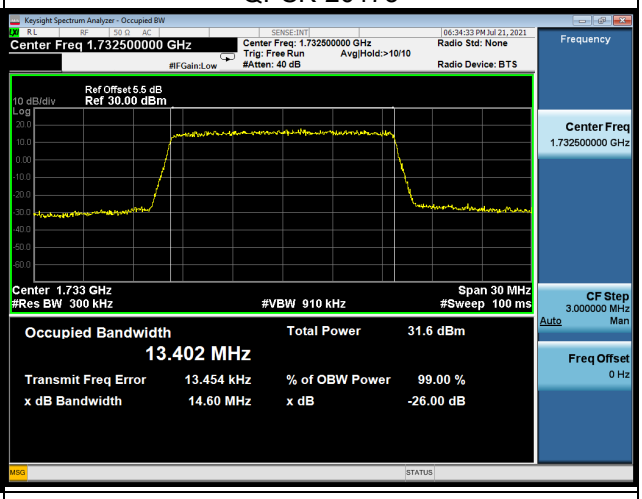
LTE Band 4_15M					
QPSK					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
20025	1717.5	13.434	20025	1717.5	14.62
20175	1732.5	13.402	20175	1732.5	14.60
20325	1747.5	13.412	20325	1747.5	14.63
16QAM					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
20025	1717.5	13.430	20025	1717.5	14.76
20175	1732.5	13.434	20175	1732.5	14.62
20325	1747.5	13.412	20325	1747.5	14.68

Spectrum Plot

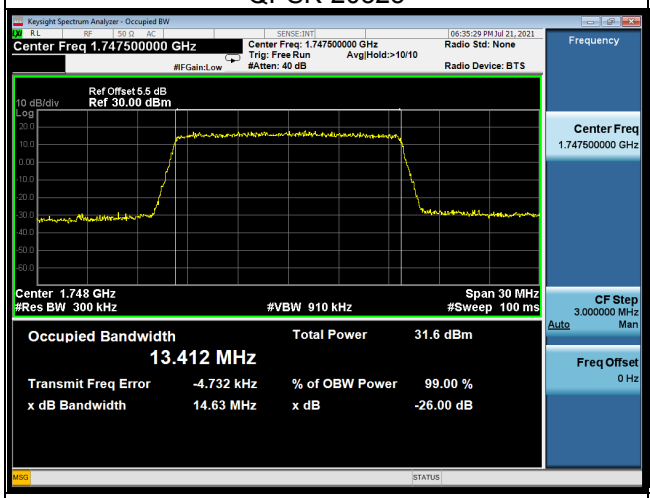
QPSK-20025



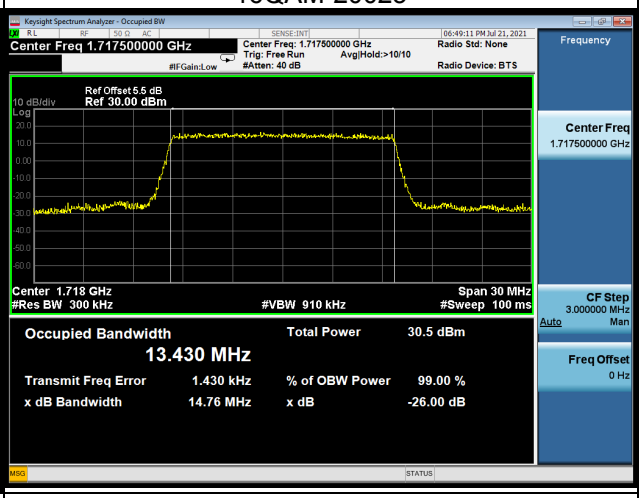
QPSK-20175



QPSK-20325



16QAM-20025



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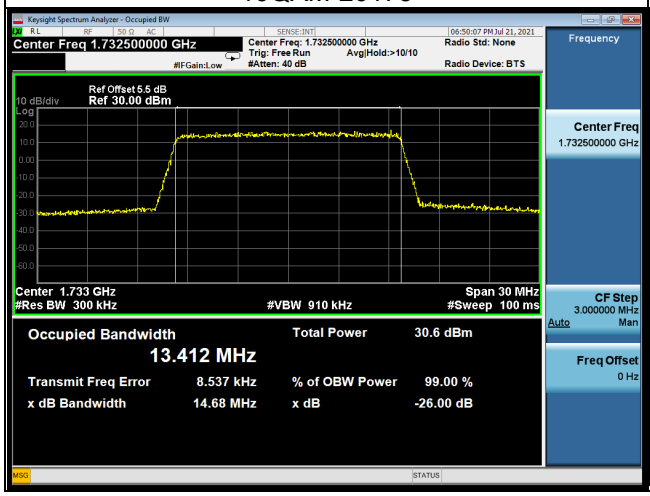
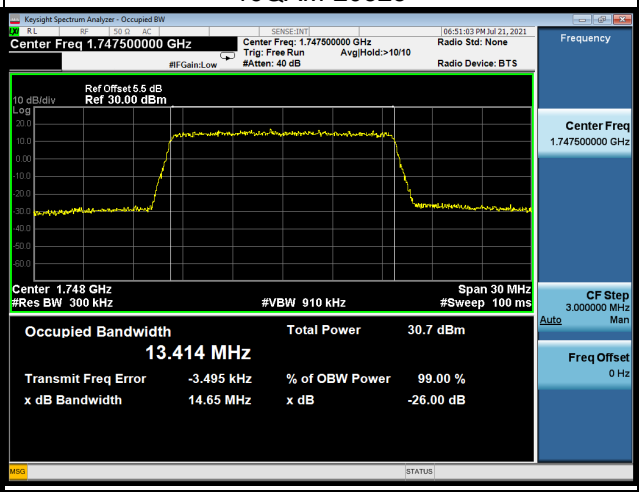


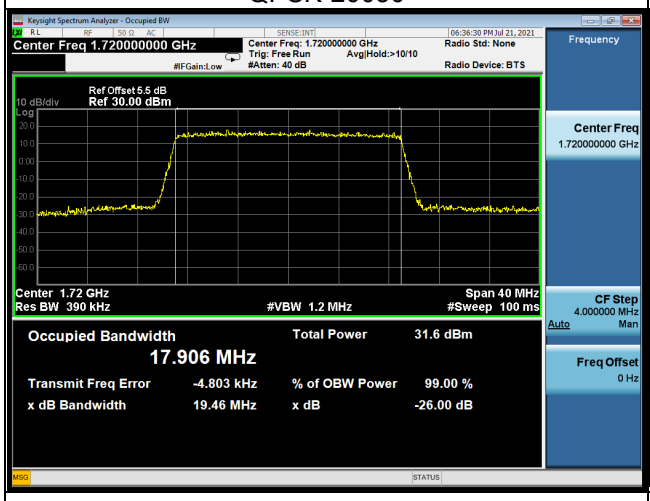
16QAM-20325



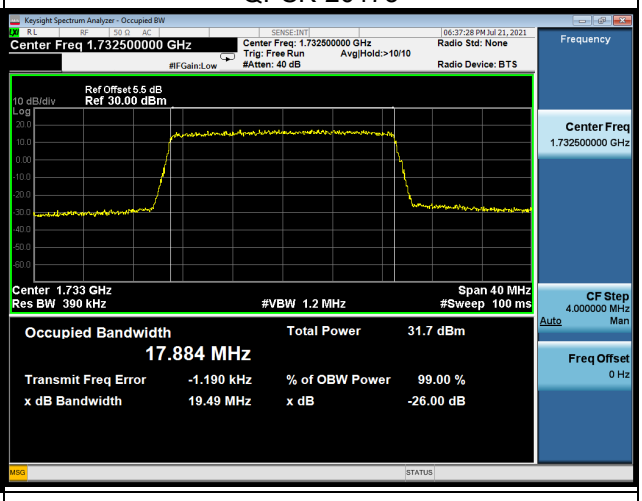
LTE Band 4_20M					
QPSK					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
20050	1720	17.906	20050	1720	19.46
20175	1732.5	17.884	20175	1732.5	19.49
20300	1740	17.883	20300	1740	19.24
16QAM					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
20050	1720	17.859	20050	1720	19.36
20175	1732.5	17.870	20175	1732.5	19.37
20300	1740	17.877	20300	1740	19.38

Spectrum Plot

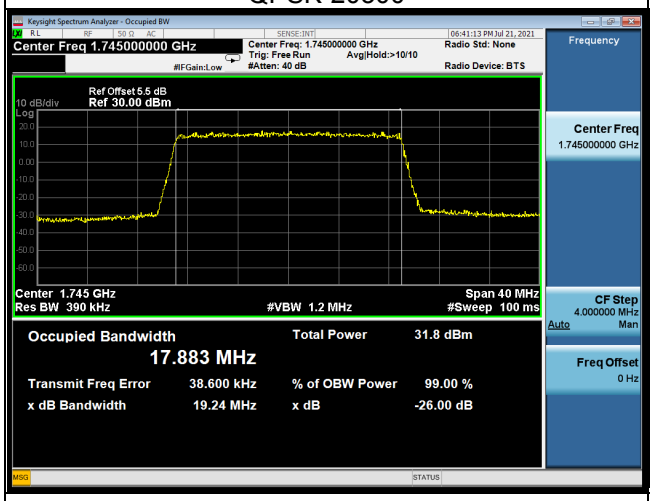
QPSK-20050



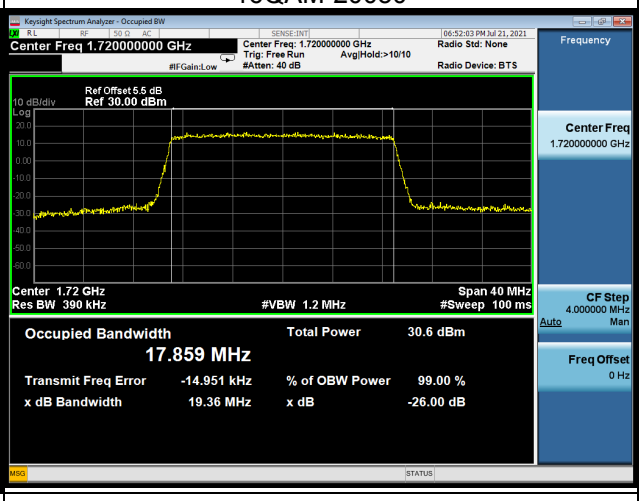
QPSK-20175



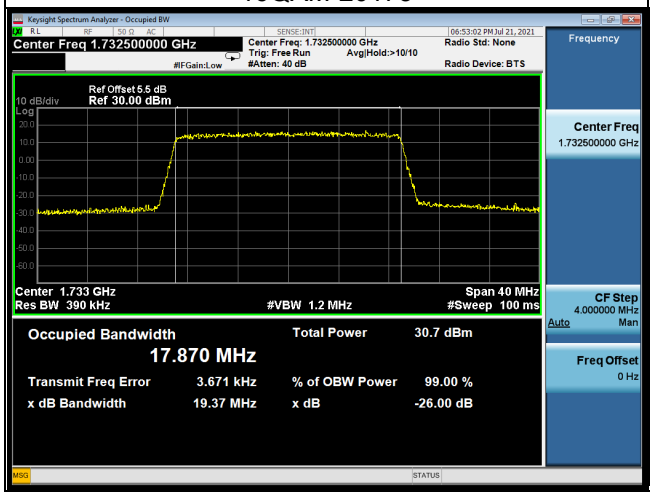
QPSK-20300



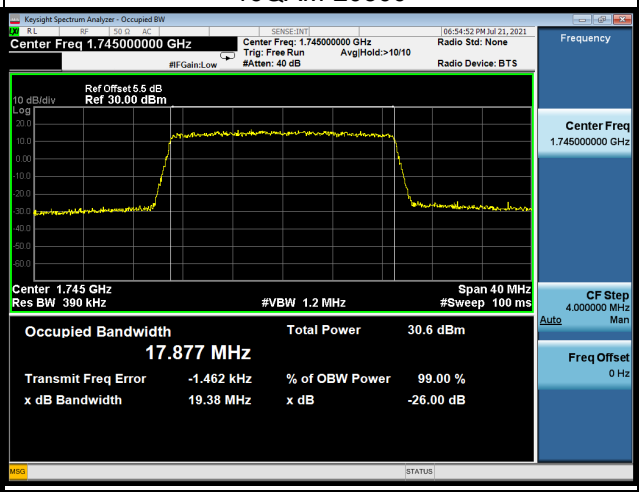
16QAM-20050



16QAM-20175



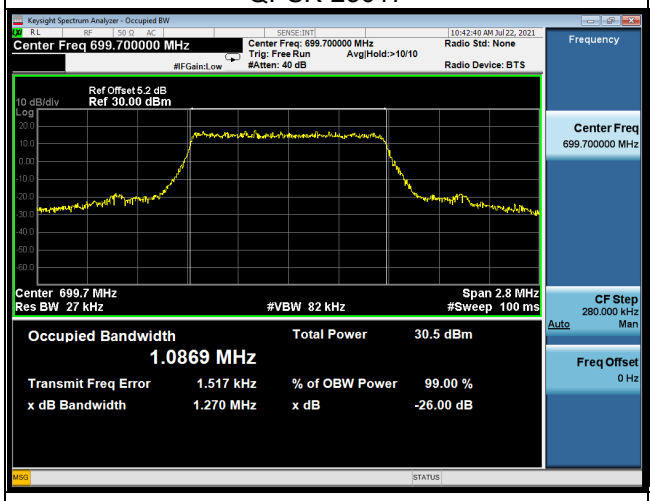
16QAM-20300



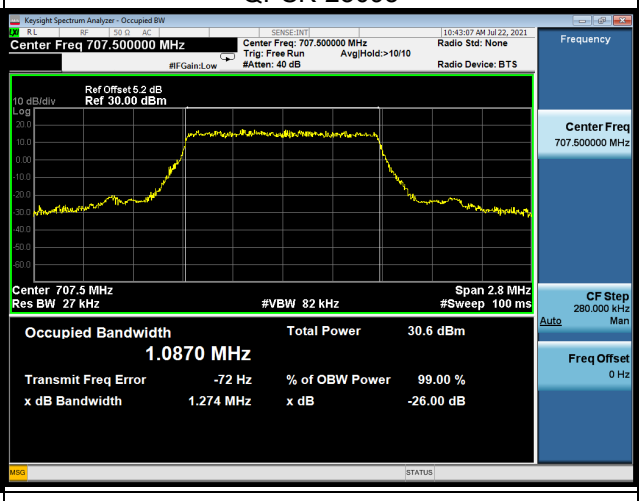
LTE Band 12_1.4M					
QPSK					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
23017	699.7	1.0869	23017	699.7	1.270
23095	707.5	1.0870	23095	707.5	1.274
23173	715.3	1.1012	23173	715.3	1.306
16QAM					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
23017	699.7	1.0889	23017	699.7	1.289
23095	707.5	1.0918	23095	707.5	1.284
23173	715.3	1.0978	23173	715.3	1.307

Spectrum Plot

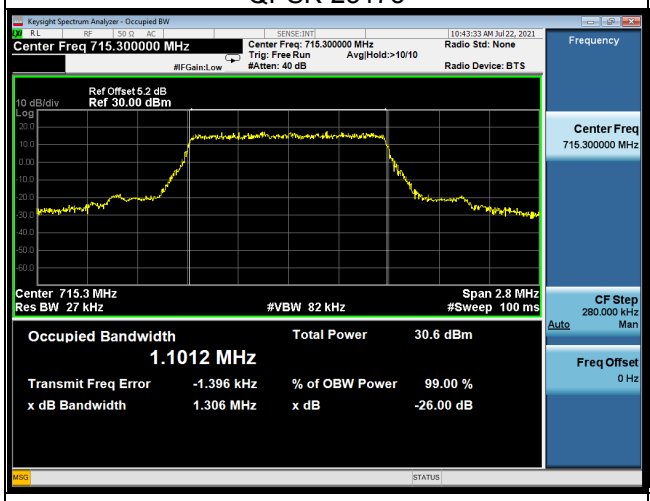
QPSK-23017



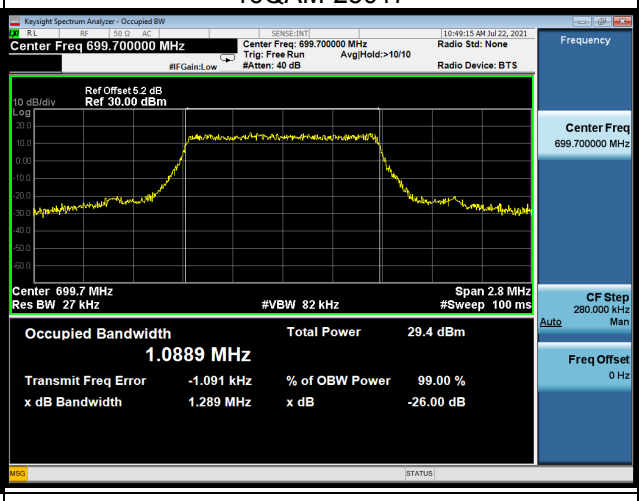
QPSK-23095



QPSK-23173



16QAM-23017



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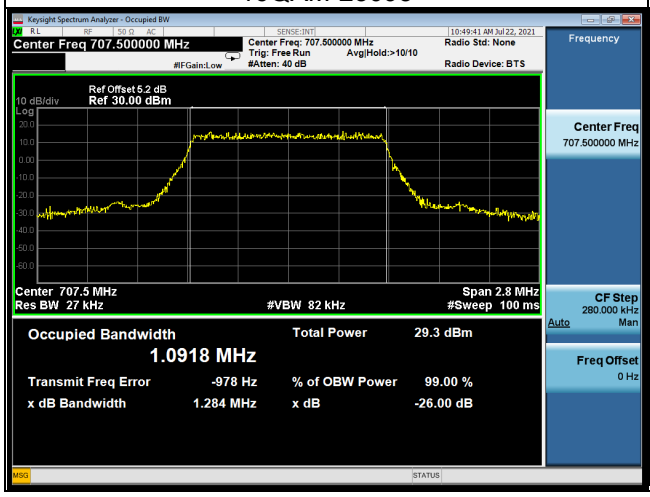

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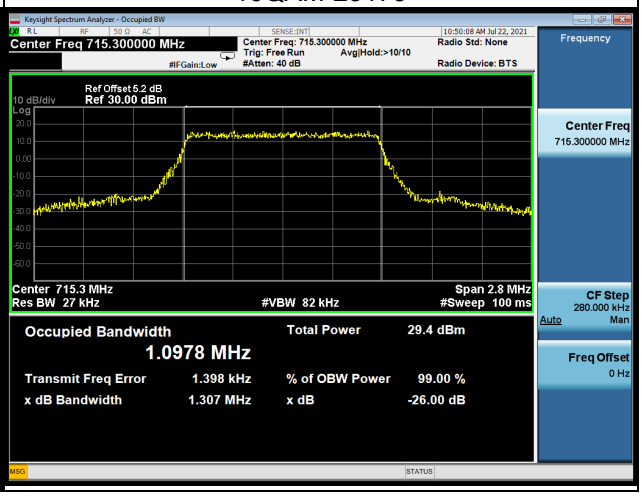
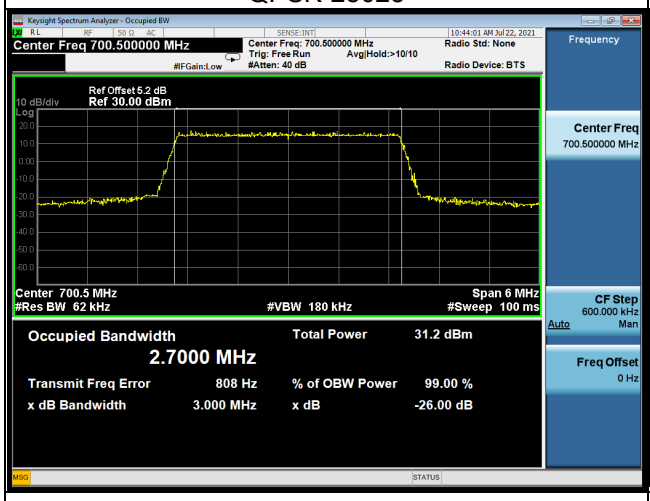


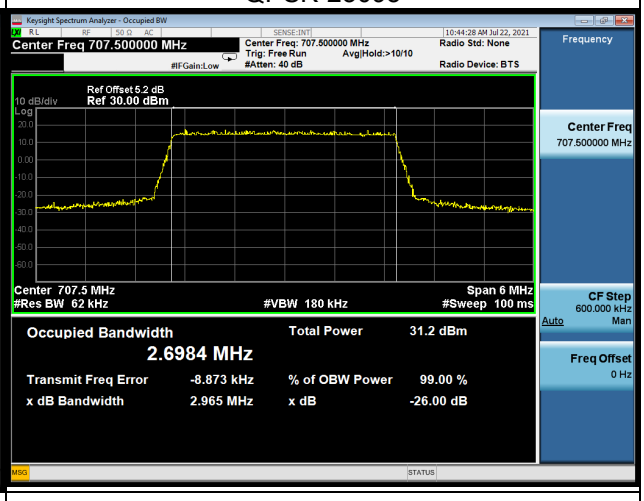
LTE Band 12_3M					
QPSK					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
23025	700.5	2.7000	23025	700.5	3.000
23095	707.5	2.6984	23095	707.5	2.965
23165	714.5	2.7007	23165	714.5	2.987
16QAM					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
23025	700.5	2.7045	23025	700.5	2.984
23095	707.5	2.6928	23095	707.5	3.003
23165	714.5	2.6991	23165	714.5	2.985

Spectrum Plot

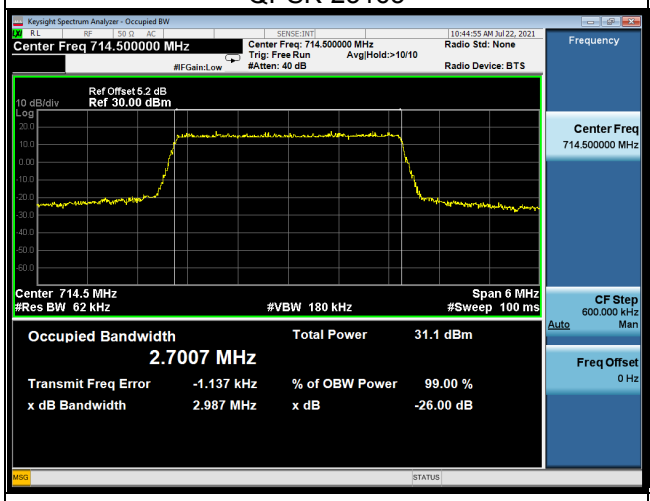
QPSK-23025



QPSK-23095

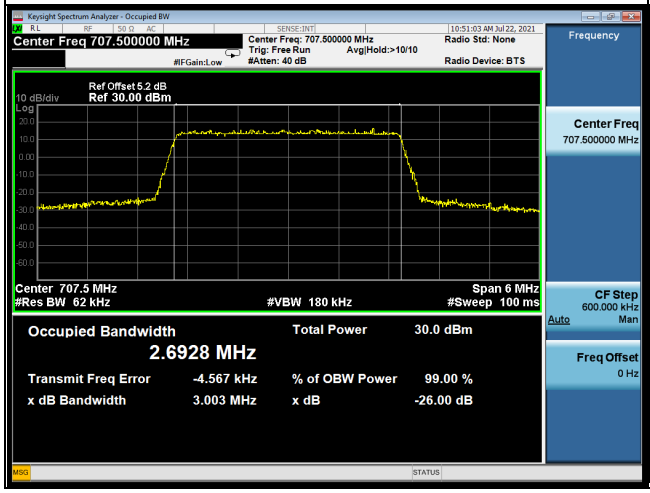


QPSK-23165

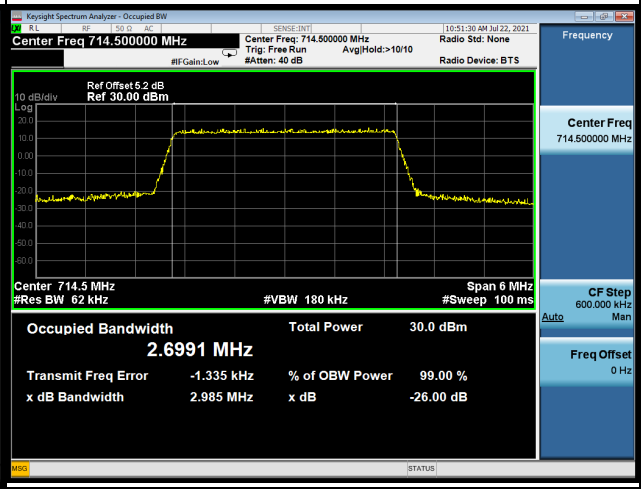


16QAM-23525

16QAM-23095



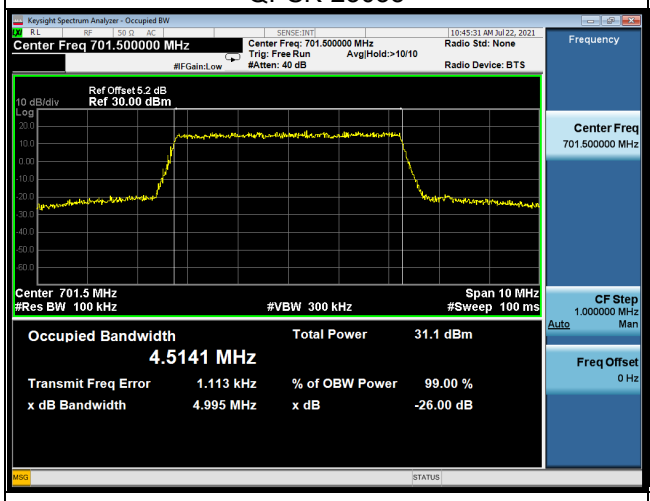
16QAM-23165



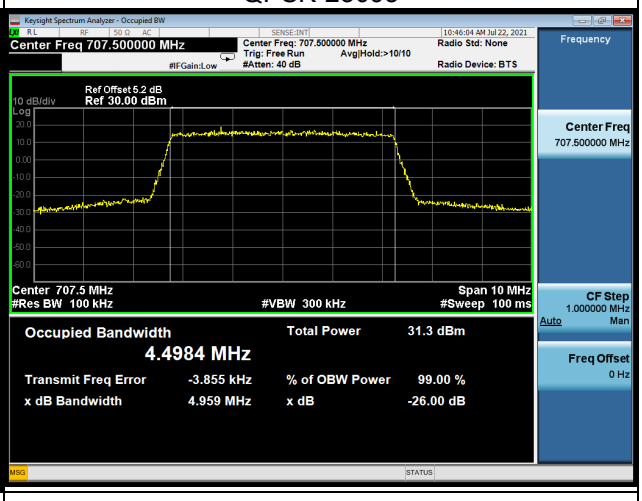
LTE Band 12_5M					
QPSK					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
23035	701.5	4.5141	23035	701.5	4.995
23095	707.5	4.4984	23095	707.5	4.959
23155	713.5	4.5111	23155	713.5	4.960
16QAM					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
23035	701.5	4.5070	23035	701.5	4.975
23095	707.5	4.4897	23095	707.5	4.965
23155	713.5	4.5085	23155	713.5	4.973

Spectrum Plot

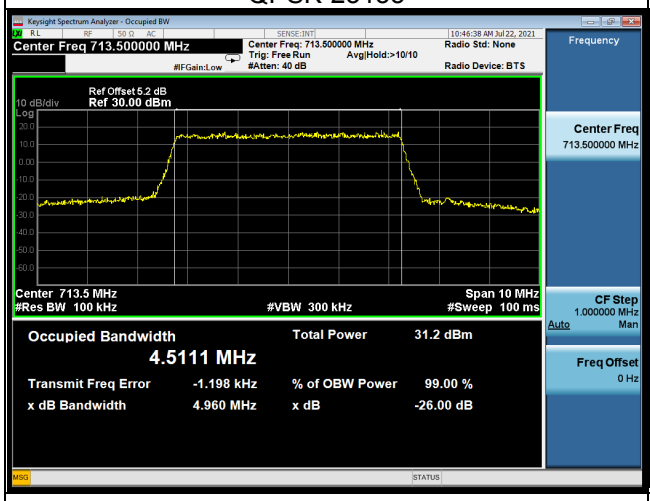
QPSK-23035



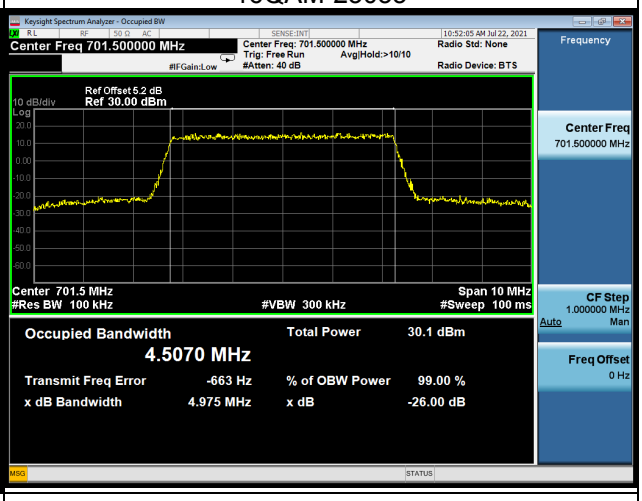
QPSK-23095



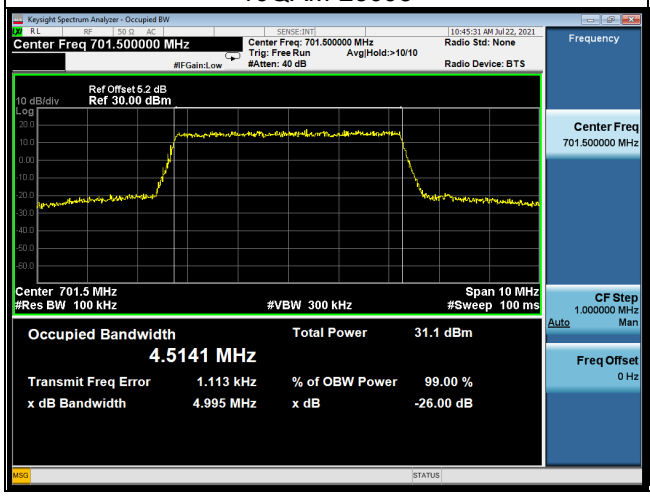
QPSK-23155



16QAM-23035



16QAM-23095



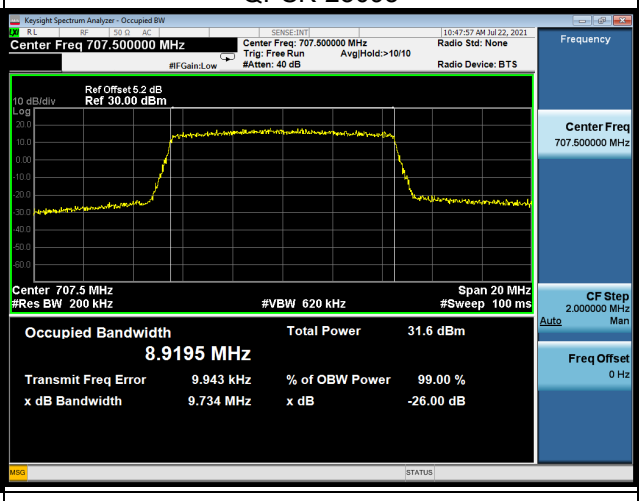
16QAM-23155

LTE Band 12_10M					
QPSK					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
23060	704.0	8.9480	23060	704.0	9.918
23095	707.5	8.9195	23095	707.5	9.734
23130	711.0	9.0036	23130	711.0	9.868
16QAM					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
23060	704.0	8.9618	23060	704.0	9.949
23095	707.5	8.9204	23095	707.5	9.769
23130	711.0	8.9780	23130	711.0	9.927

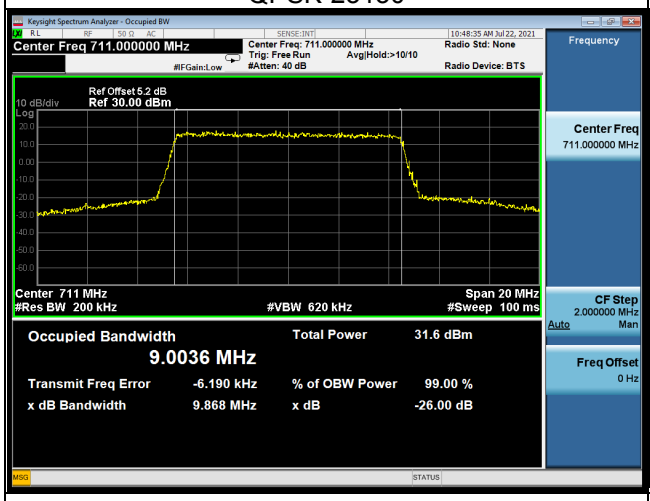
Spectrum Plot

QPSK-23060

QPSK-23095

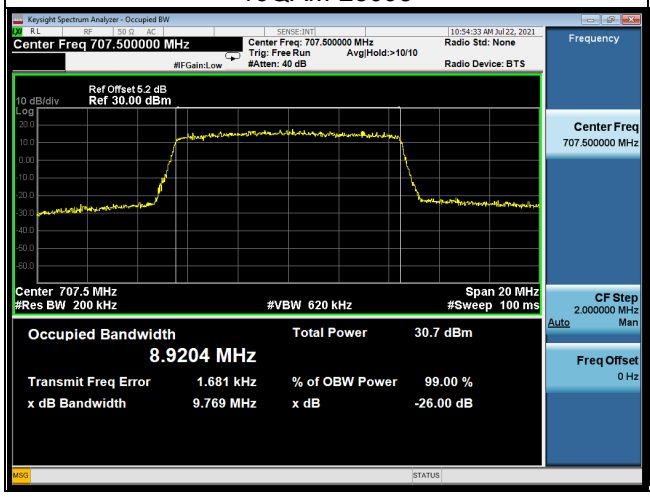


QPSK-23130

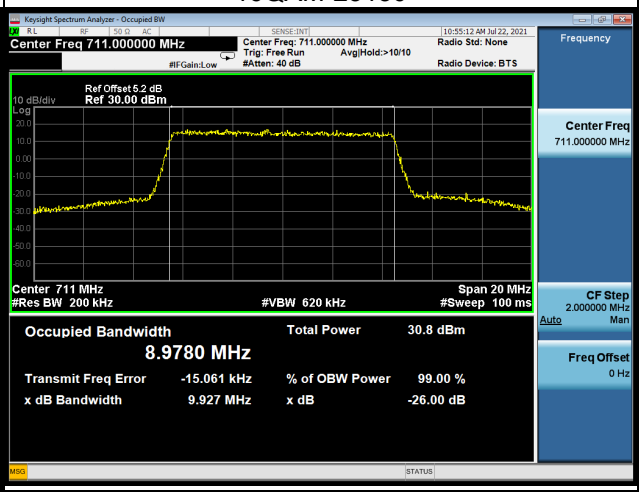


16QAM-23060

16QAM-23095



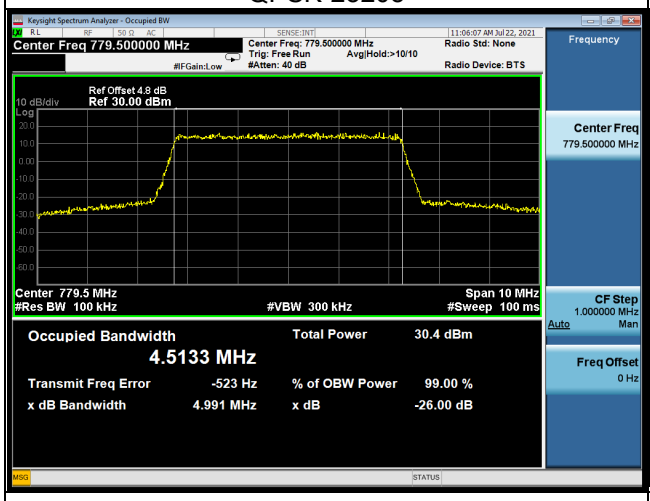
16QAM-23130



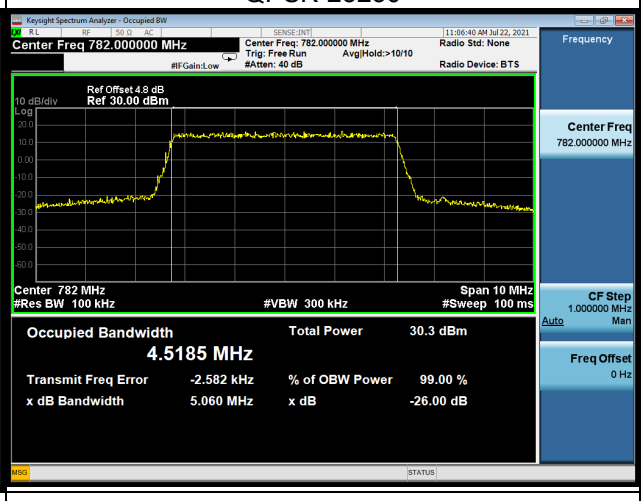
LTE Band 13_5M					
QPSK					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
23205	779.5	4.5133	23205	779.5	4.991
23230	782.0	4.5185	23230	782.0	5.060
23255	784.5	4.5066	23255	784.5	5.002
16QAM					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
23205	779.5	4.5034	23205	779.5	4.959
23230	782.0	4.5004	23230	782.0	4.984
23255	784.5	4.4929	23255	784.5	4.989

Spectrum Plot

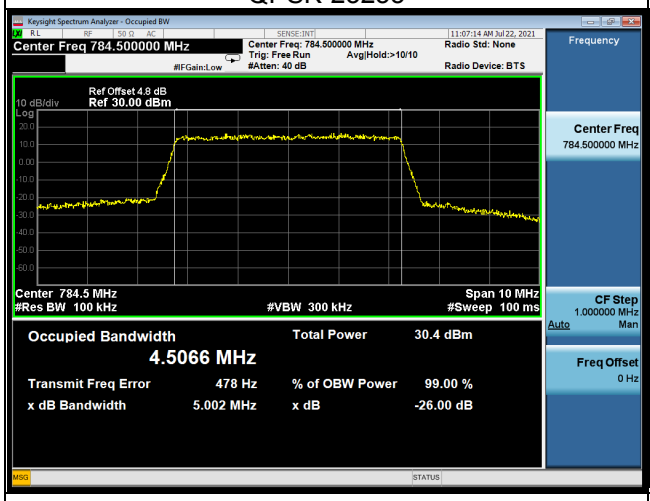
QPSK-23205



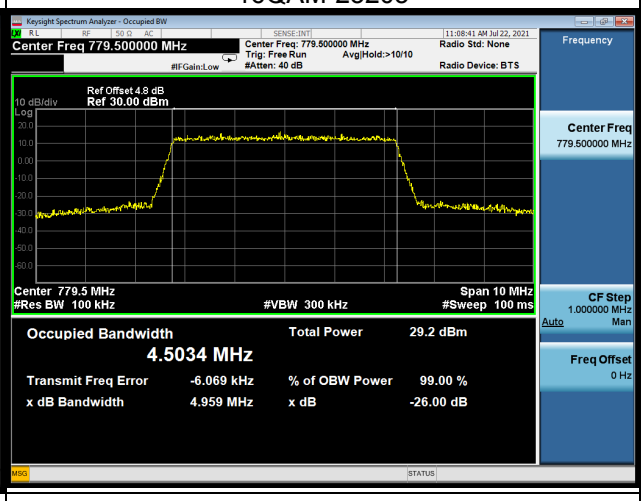
QPSK-23230



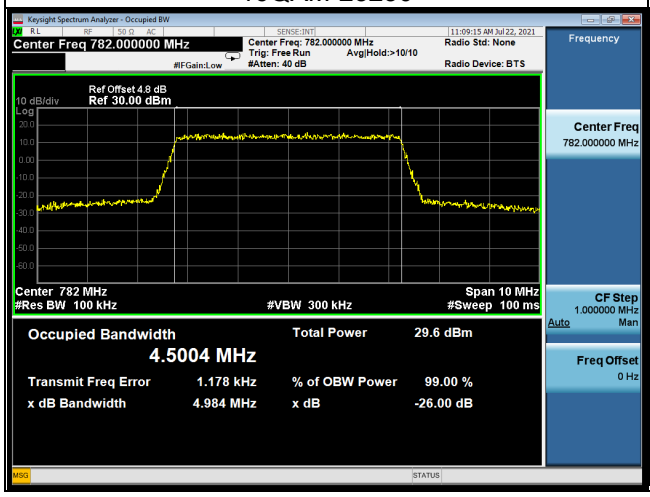
QPSK-23255



16QAM-23205



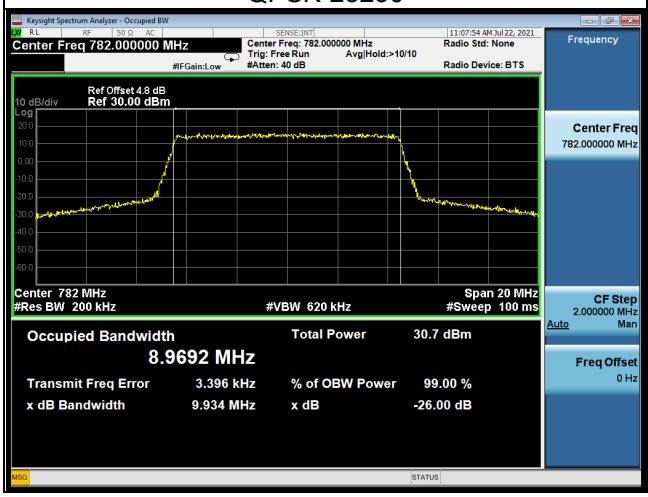
16QAM-23230

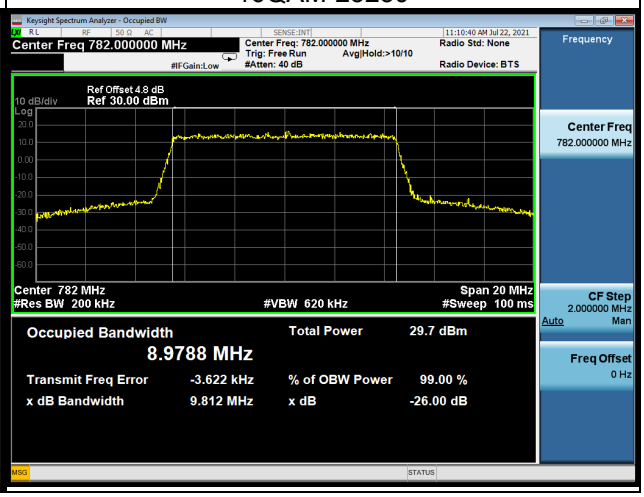


16QAM-23255

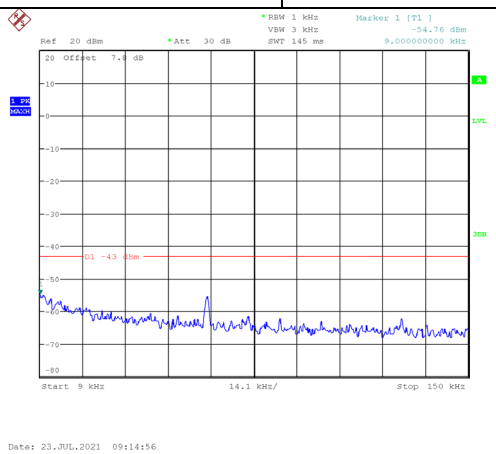
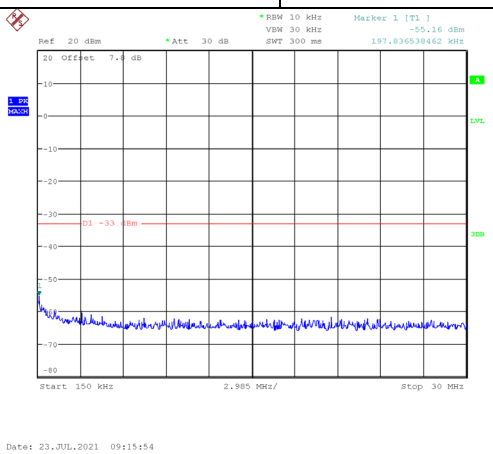
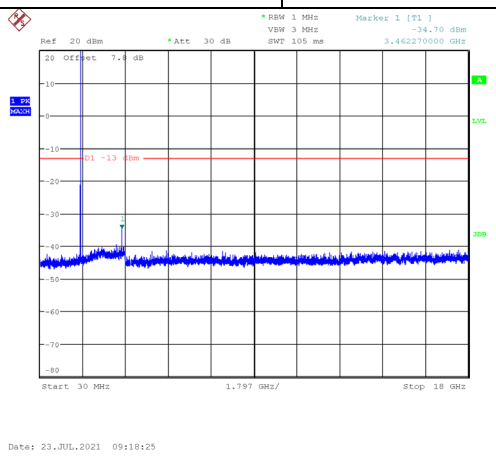
LTE Band 13_10M					
QPSK					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
23230	782.0	8.9692	23230	782.0	9.934
16QAM					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
23230	782.0	8.9788	23230	782.0	9.812

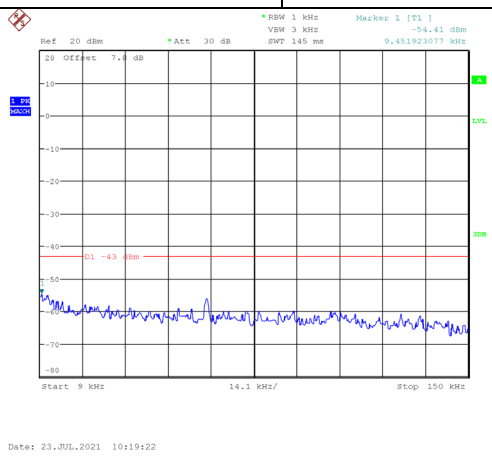
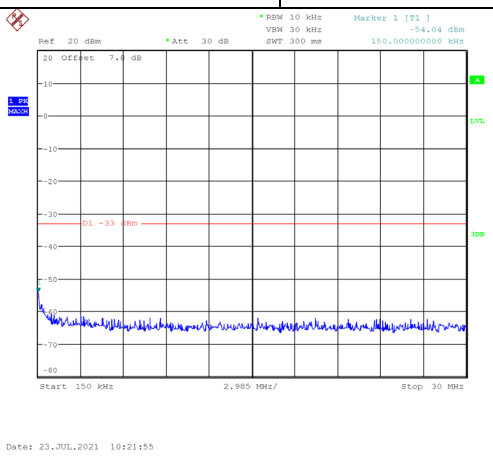
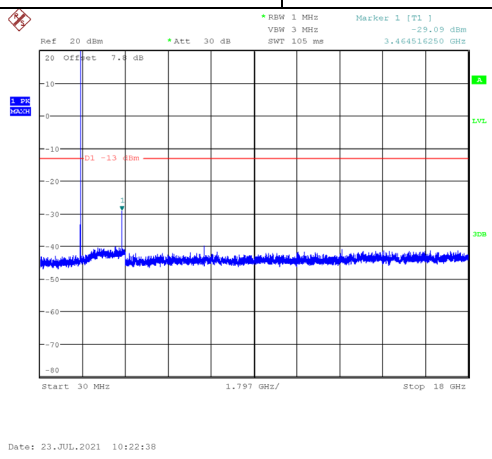
Spectrum Plot	
QPSK-23230	16QAM-23230

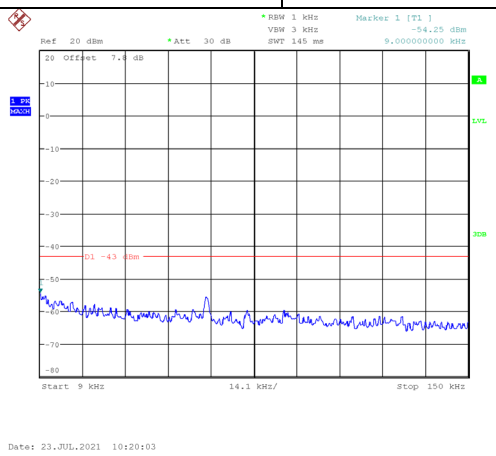
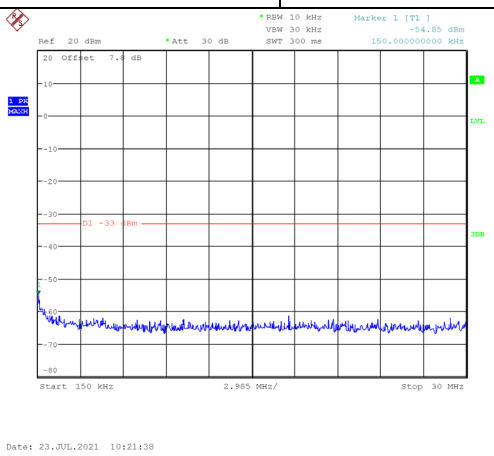
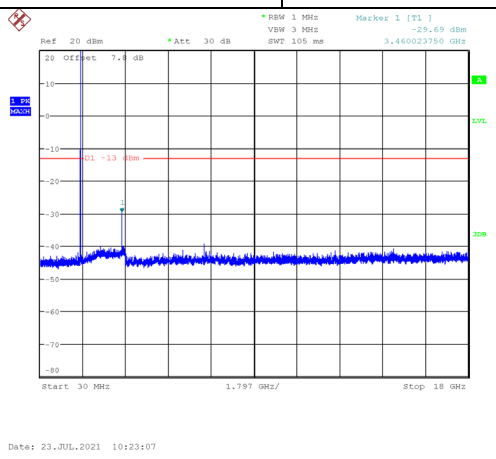


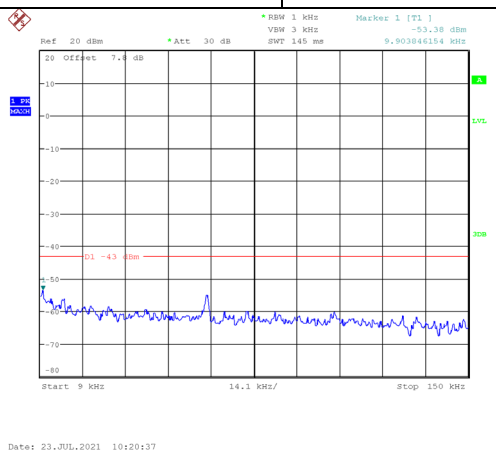
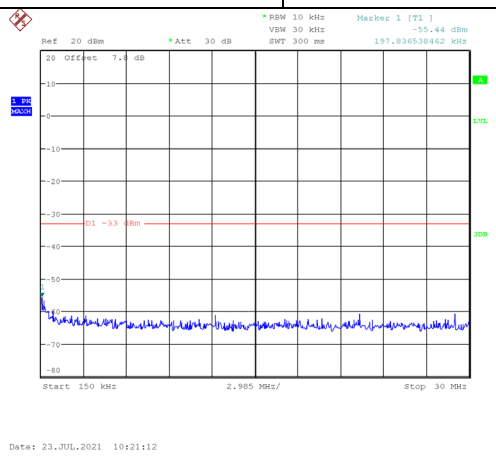
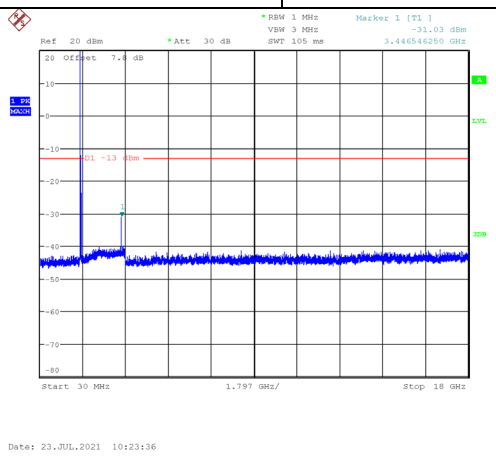


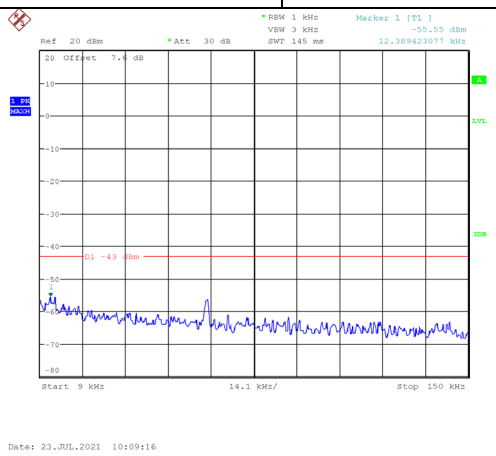
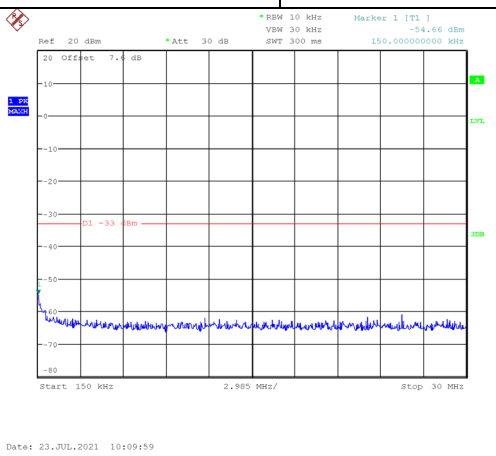
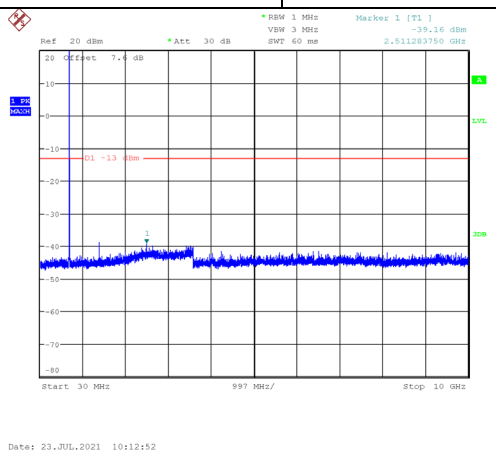
APPENDIX C - CONDUCTED SPURIOUS EMISSIONS

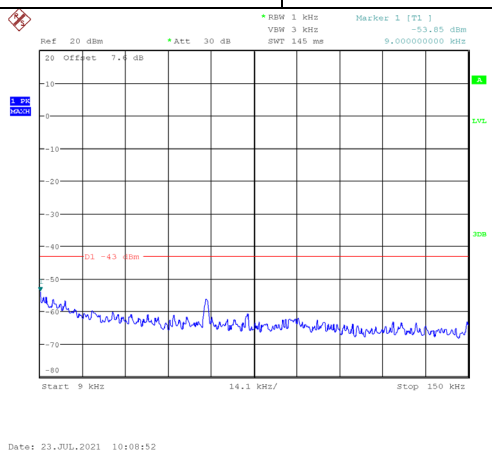
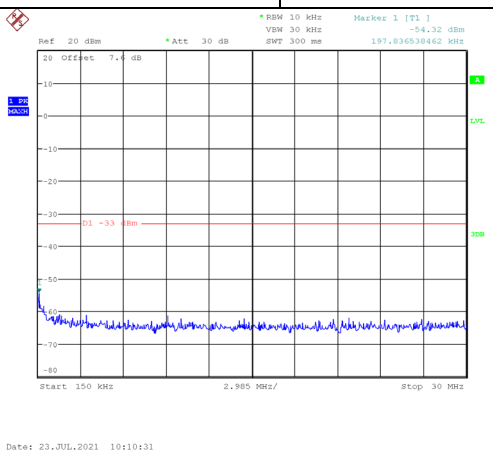
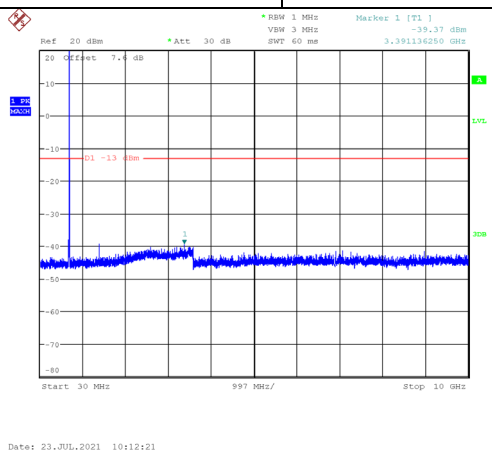
WCDMA Band IV_WCDMA			
Channel	Frequency(MHz)	Channel	Frequency(MHz)
1413	1732.6	1413	1732.6
			
Channel	Frequency(MHz)	-	-
1413	1732.6	-	-
		-	

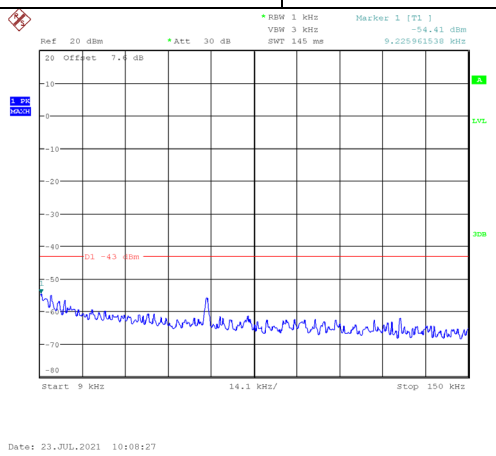
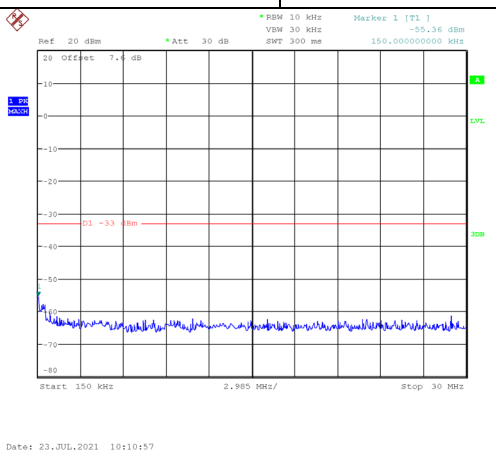
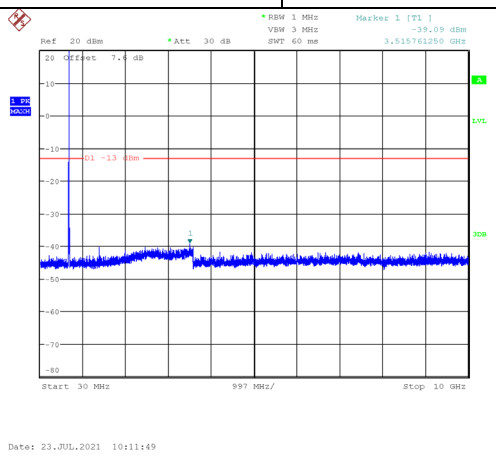
LTE Band 4_1.4M Spectrum Plot			
Channel	Frequency(MHz)	Channel	Frequency(MHz)
20175	1732.5	20175	1732.5
			
Channel	Frequency(MHz)	-	-
20175	1732.5	-	-
		-	

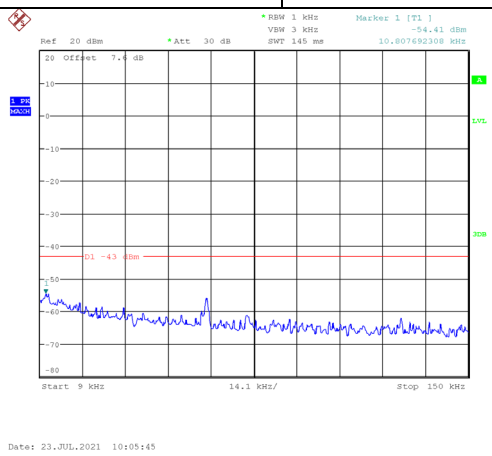
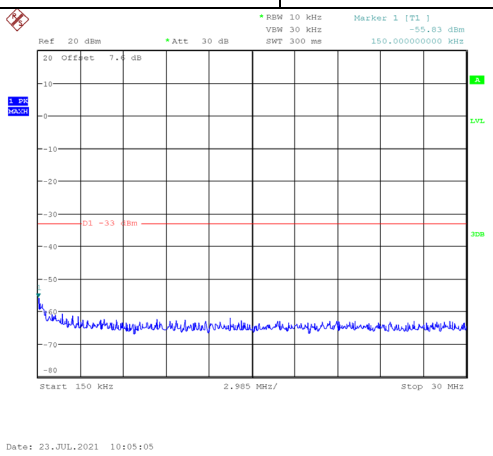
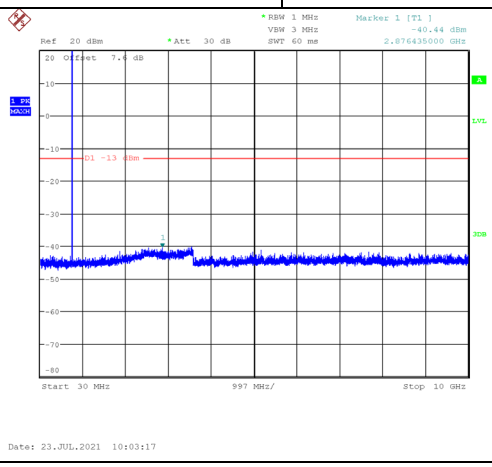
LTE Band 4_5M Spectrum Plot			
Channel	Frequency(MHz)	Channel	Frequency(MHz)
20175	1732.5	20175	1732.5
			
Channel	Frequency(MHz)	-	-
20175	1732.5	-	-
		-	

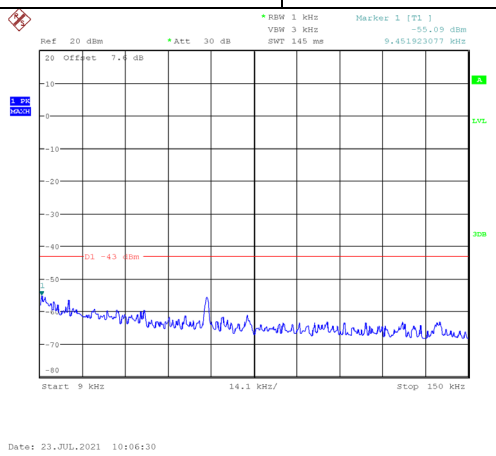
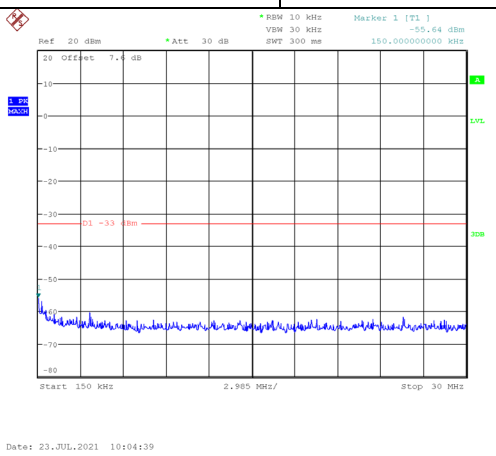
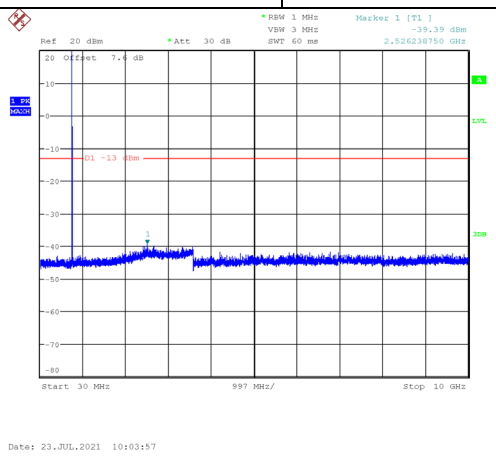
LTE Band 4_20M Spectrum Plot			
Channel	Frequency(MHz)	Channel	Frequency(MHz)
20175	1732.5	20175	1732.5
			
Channel	Frequency(MHz)	-	-
20175	1732.5	-	-
		-	

LTE Band 12_1.4M Spectrum Plot			
Channel	Frequency(MHz)	Channel	Frequency(MHz)
23095	707.5	23095	707.5
			
Channel	Frequency(MHz)	-	-
23095	707.5	-	-
		-	

LTE Band 12_5M Spectrum Plot			
Channel	Frequency(MHz)	Channel	Frequency(MHz)
23095	707.5	23095	707.5
			
Channel	Frequency(MHz)	-	-
23095	707.5	-	-
		-	

LTE Band 12_10M Spectrum Plot			
Channel	Frequency(MHz)	Channel	Frequency(MHz)
23095	707.5	23095	707.5
			
Channel	Frequency(MHz)	-	-
23095	707.5	-	-
		-	

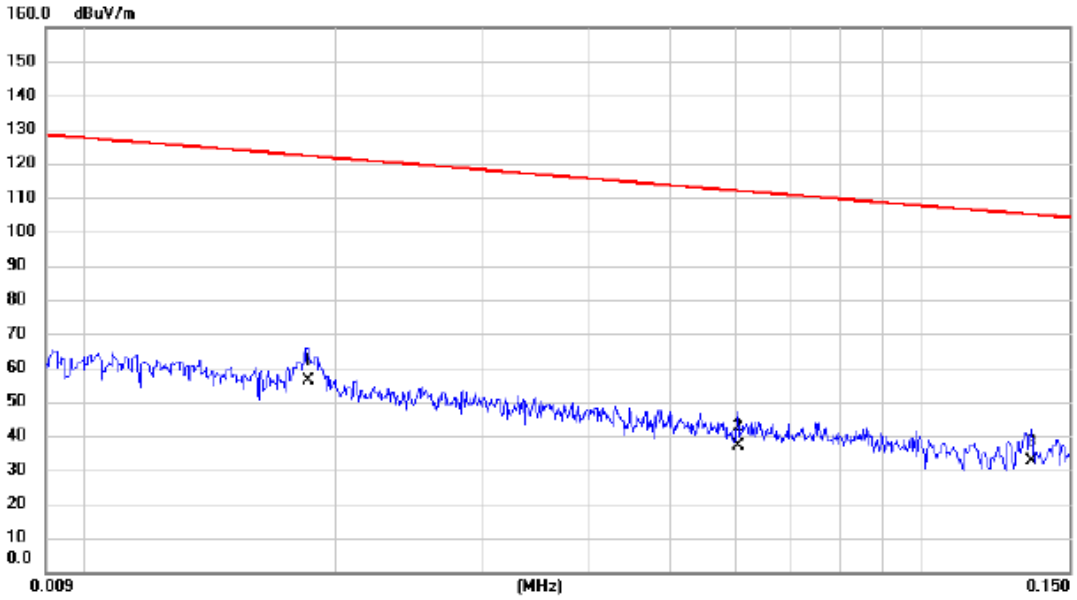
LTE Band 13_5M Spectrum Plot			
Channel	Frequency(MHz)	Channel	Frequency(MHz)
23230	782.0	23230	782.0
			
Channel	Frequency(MHz)	-	-
23230	782.0	-	-
		-	

LTE Band 13_10M Spectrum Plot			
Channel	Frequency(MHz)	Channel	Frequency(MHz)
23230	782.0	23230	782.0
			
Channel	Frequency(MHz)	-	-
23230	782.0	-	-
		-	

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

Test Mode	TX Mode

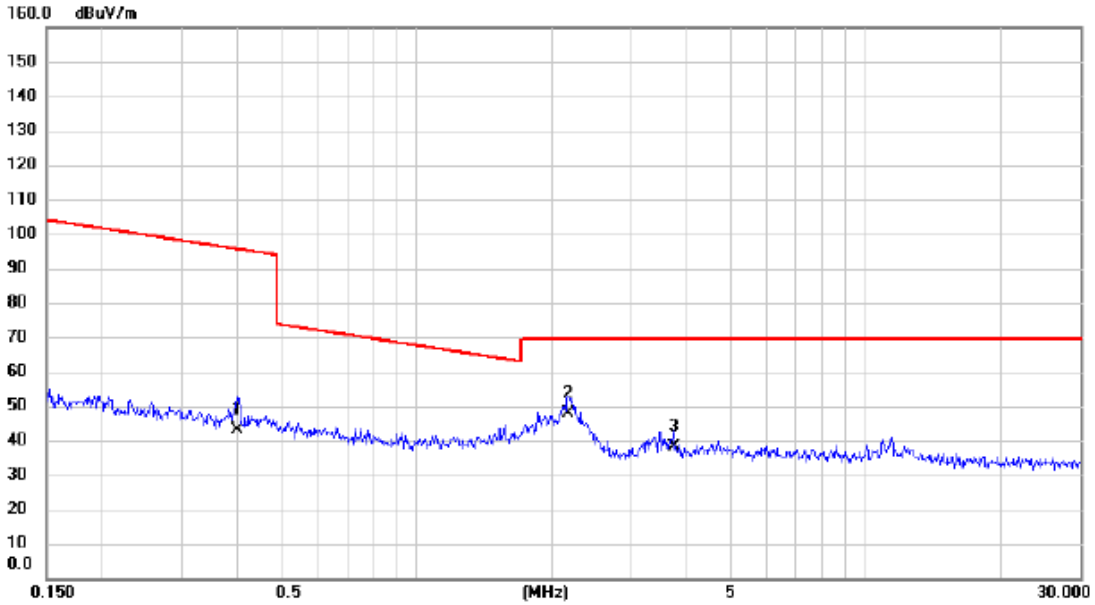
Ant 0°



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	*	0.0185	42.58	13.68	56.26	122.26	-66.00	AVG			
2		0.0603	24.67	12.48	37.15	112.00	-74.85	AVG			
3		0.1352	19.95	12.73	32.68	104.99	-72.31	AVG			

Test Mode	TX Mode

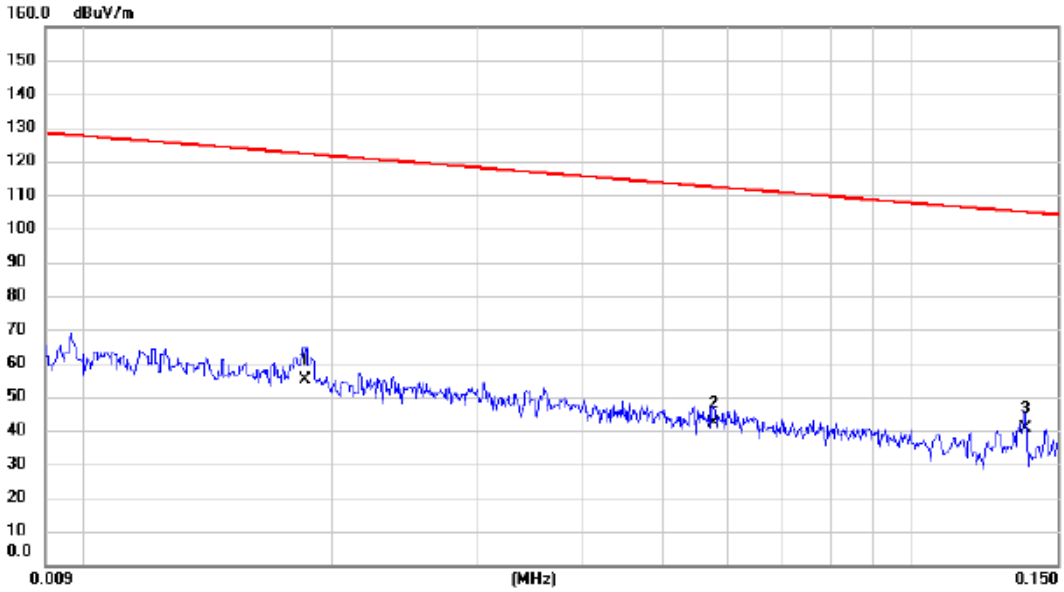
Ant 0°



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		0.3997	30.75	12.26	43.01	95.57	-52.56	AVG			
2	*	2.1668	36.52	11.22	47.74	69.54	-21.80	QP			
3		3.7395	27.49	10.91	38.40	69.54	-31.14	QP			

Test Mode	TX Mode

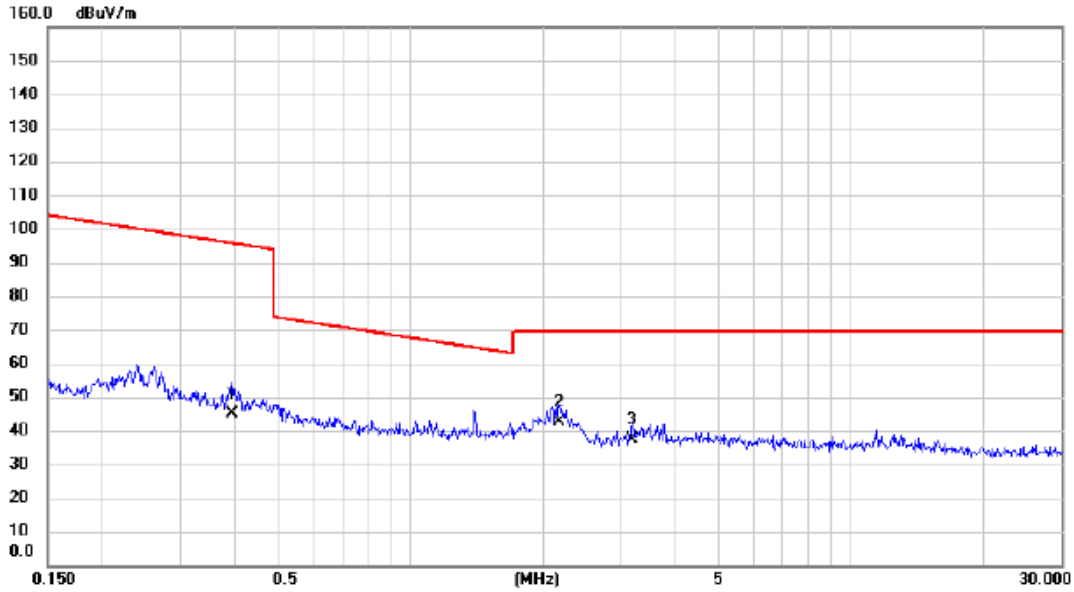
Ant 90°



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		0.0185	41.28	13.68	54.96	122.26	-67.30	AVG			
2		0.0578	29.56	12.47	42.03	112.37	-70.34	AVG			
3	*	0.1371	27.84	12.73	40.57	104.87	-64.30	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		0.3933	32.59	12.28	44.87	95.71	-50.84	AVG			
2	*	2.1783	31.48	11.21	42.69	69.54	-26.85	QP			
3		3.1900	26.54	10.83	37.37	69.54	-32.17	QP			

APPENDIX E - RADIATED SPURIOUS EMISSIONS (30MHZ TO 1GHZ)

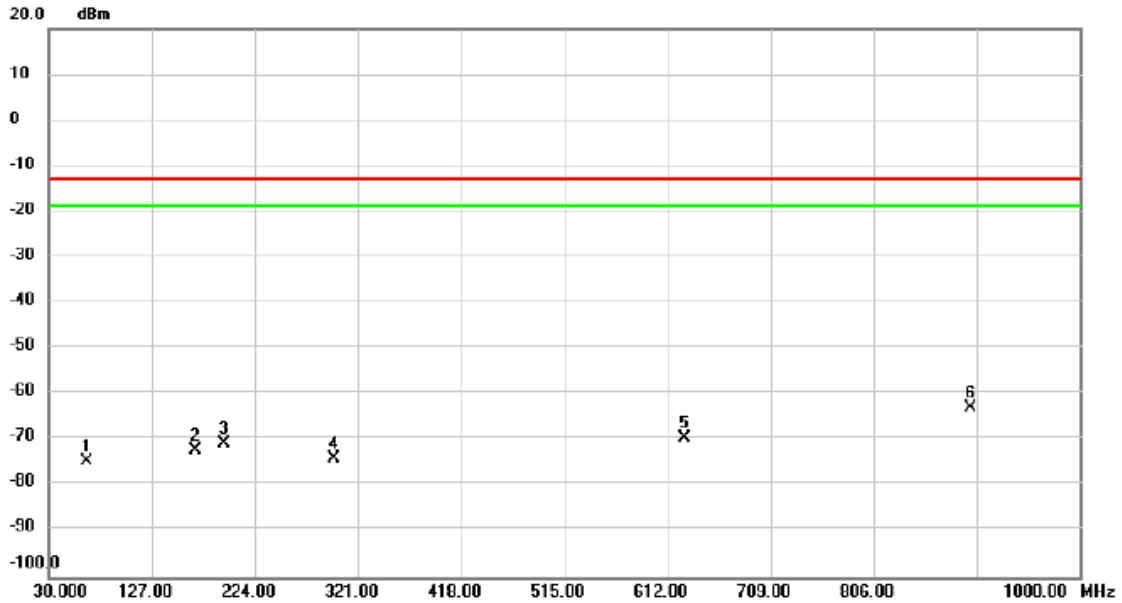
Test Mode	WCDMA Band IV_TX CH1413

Vertical

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		64.435	-59.43	-5.23	-64.66	-13.00	-51.66	peak	
2		105.175	-66.15	-4.97	-71.12	-13.00	-58.12	peak	
3		193.930	-65.65	-4.78	-70.43	-13.00	-57.43	peak	
4		415.575	-74.97	1.01	-73.96	-13.00	-60.96	peak	
5		685.235	-74.41	5.81	-68.60	-13.00	-55.60	peak	
6	*	896.695	-71.74	8.40	-63.34	-13.00	-50.34	peak	

Test Mode	WCDMA Band IV_TX CH1413

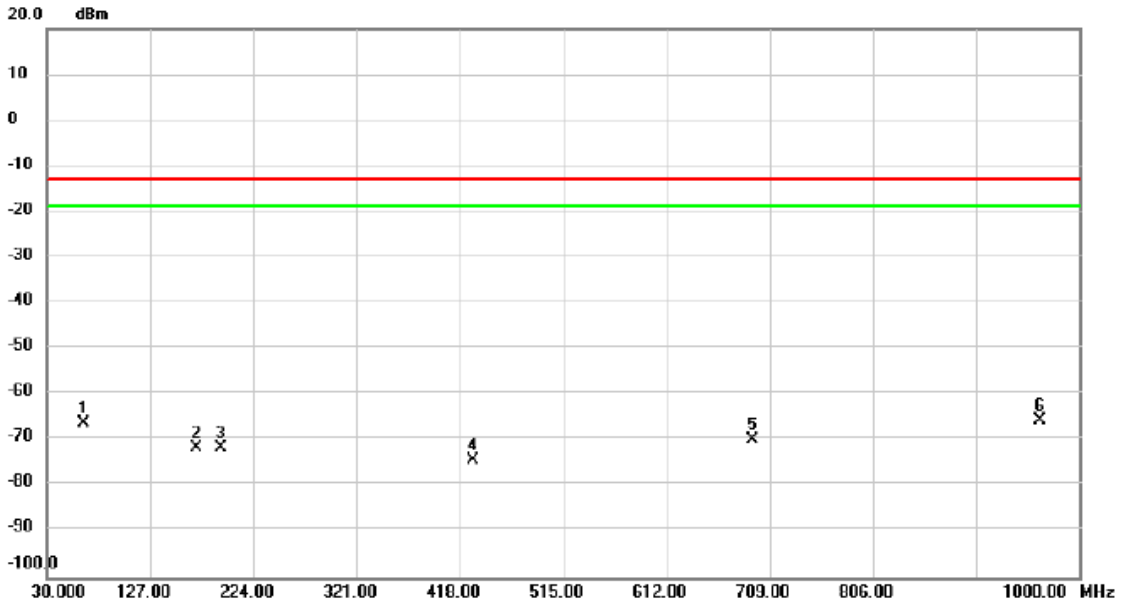
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		65.405	-69.22	-5.36	-74.58	-13.00	-61.58	peak	
2		167.740	-70.06	-2.17	-72.23	-13.00	-59.23	peak	
3		194.900	-65.96	-4.85	-70.81	-13.00	-57.81	peak	
4		298.690	-72.49	-1.47	-73.96	-13.00	-60.96	peak	
5		627.520	-74.37	4.84	-69.53	-13.00	-56.53	peak	
6	*	897.665	-71.35	8.41	-62.94	-13.00	-49.94	peak	

Test Mode	LTE Band 4_TX CH20175_1.4M

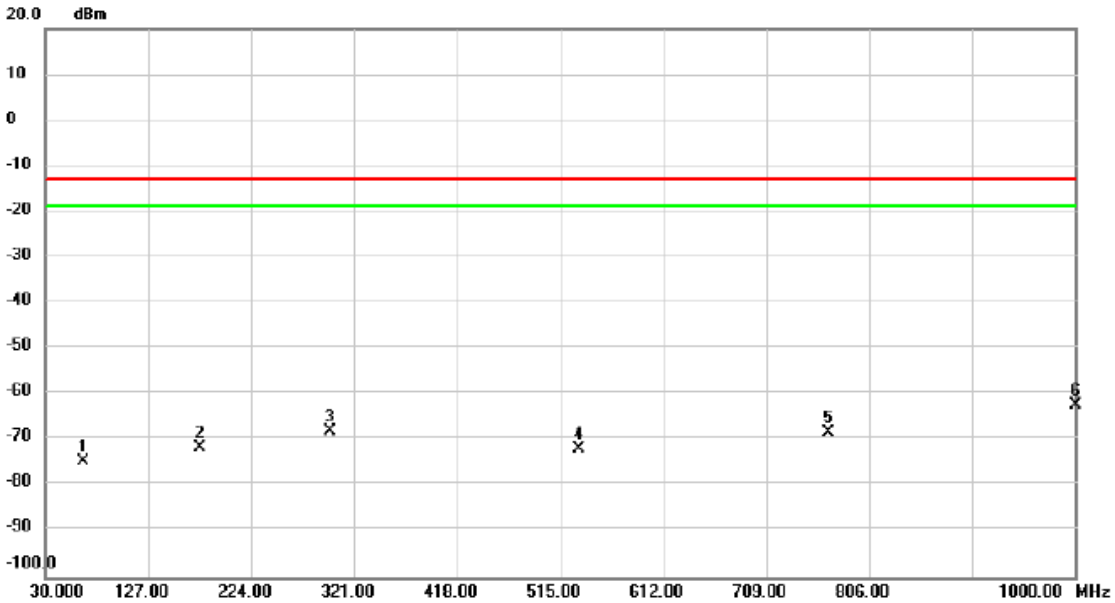
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		64.435	-60.92	-5.23	-66.15	-13.00	-53.15	peak	
2		170.165	-69.06	-2.50	-71.56	-13.00	-58.56	peak	
3		193.930	-66.77	-4.78	-71.55	-13.00	-58.55	peak	
4		430.125	-75.84	1.41	-74.43	-13.00	-61.43	peak	
5		692.995	-75.65	5.91	-69.74	-13.00	-56.74	peak	
6	*	963.625	-75.58	9.99	-65.59	-13.00	-52.59	peak	

Test Mode	LTE Band 4_TX CH20175_1.4M

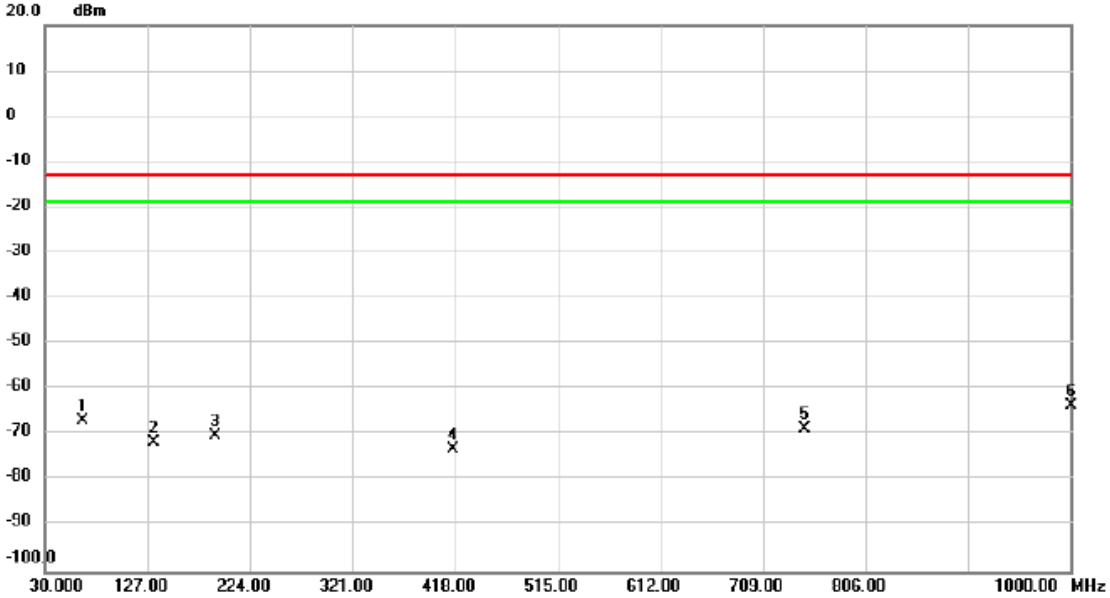
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		65.405	-69.21	-5.36	-74.57	-13.00	-61.57	peak	
2		175.985	-68.70	-2.92	-71.62	-13.00	-58.62	peak	
3		298.690	-66.56	-1.47	-68.03	-13.00	-55.03	peak	
4		532.460	-74.46	2.62	-71.84	-13.00	-58.84	peak	
5		767.200	-75.00	6.62	-68.38	-13.00	-55.38	peak	
6	*	1000.000	-72.99	10.71	-62.28	-13.00	-49.28	peak	

Test Mode	LTE Band 4_TX CH20175_5M

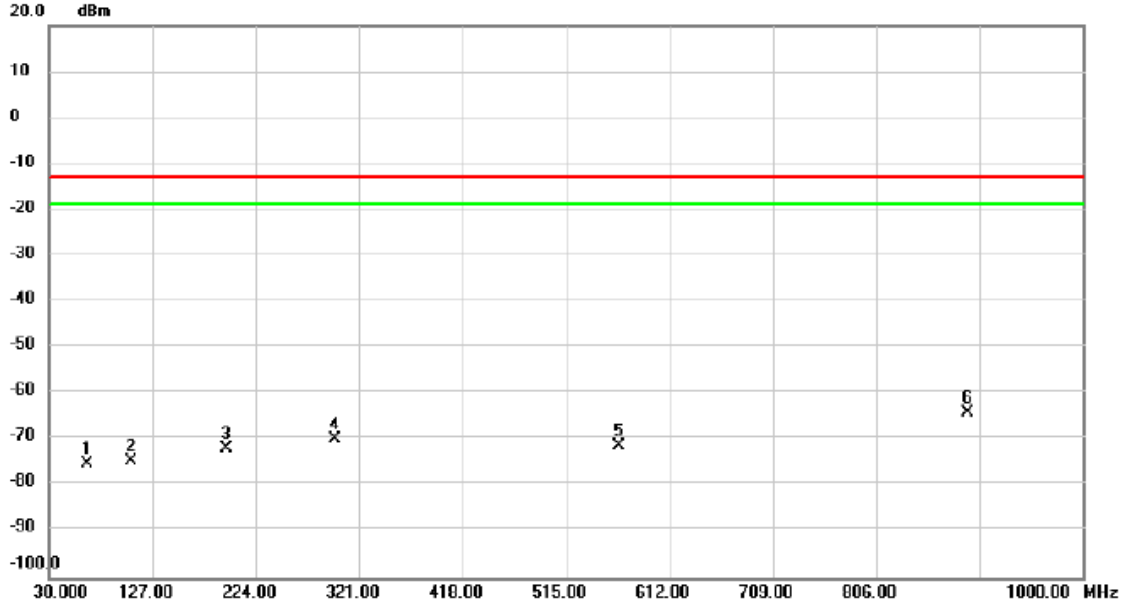
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		65.405	-61.51	-5.36	-66.87	-13.00	-53.87	peak	
2		132.335	-68.53	-3.11	-71.64	-13.00	-58.64	peak	
3		191.505	-65.52	-4.61	-70.13	-13.00	-57.13	peak	
4		415.575	-74.24	1.01	-73.23	-13.00	-60.23	peak	
5		747.800	-74.97	6.36	-68.61	-13.00	-55.61	peak	
6	*	1000.000	-74.30	10.71	-63.59	-13.00	-50.59	peak	

Test Mode	LTE Band 4_TX CH20175_5M

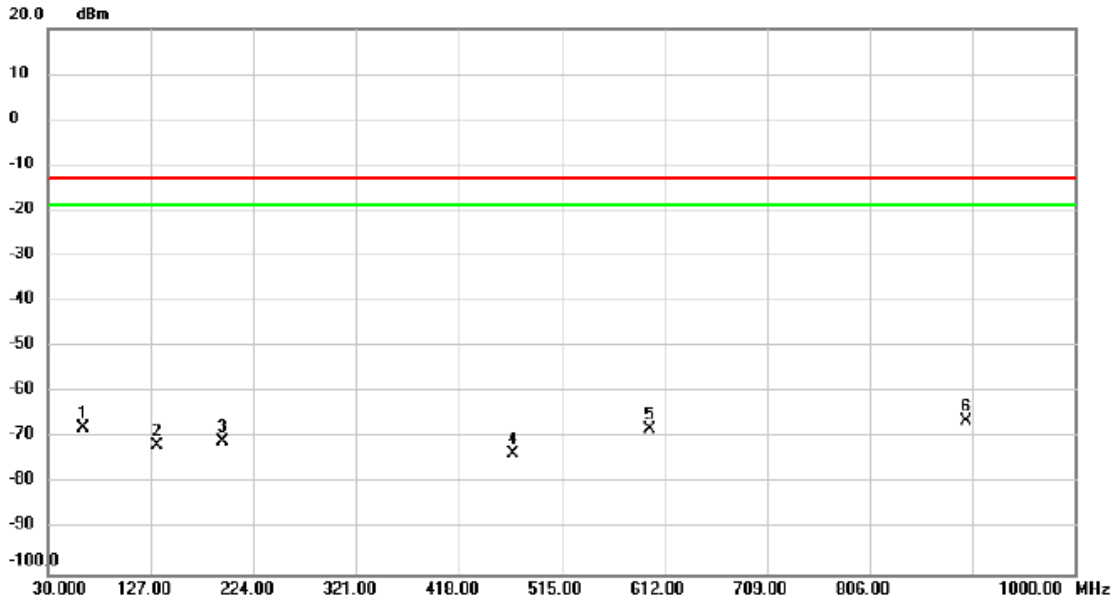
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		65.405	-70.01	-5.36	-75.37	-13.00	-62.37	peak	
2		106.630	-69.70	-4.87	-74.57	-13.00	-61.57	peak	
3		196.355	-67.08	-4.96	-72.04	-13.00	-59.04	peak	
4		298.690	-68.23	-1.47	-69.70	-13.00	-56.70	peak	
5		564.955	-74.65	3.22	-71.43	-13.00	-58.43	peak	
6	*	892.330	-72.52	8.34	-64.18	-13.00	-51.18	peak	

Test Mode	LTE Band 4_TX CH20175_20M

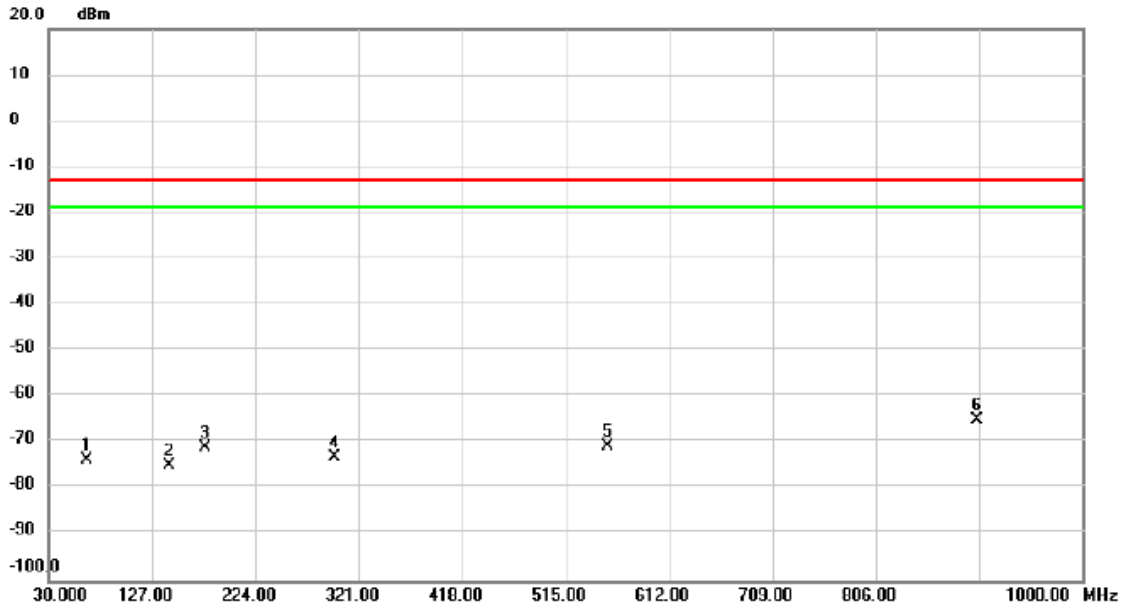
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		63.465	-62.50	-5.17	-67.67	-13.00	-54.67	peak	
2		132.820	-68.55	-3.10	-71.65	-13.00	-58.65	peak	
3		195.385	-65.99	-4.89	-70.88	-13.00	-57.88	peak	
4		468.925	-75.41	2.10	-73.31	-13.00	-60.31	peak	
5		597.935	-72.31	4.18	-68.13	-13.00	-55.13	peak	
6	*	896.695	-74.53	8.40	-66.13	-13.00	-53.13	peak	

Test Mode	LTE Band 4_TX CH20175_20M

Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		65.405	-68.25	-5.36	-73.61	-13.00	-60.61	peak	
2		142.520	-72.04	-2.81	-74.85	-13.00	-61.85	peak	
3		176.955	-67.91	-2.99	-70.90	-13.00	-57.90	peak	
4		298.690	-71.64	-1.47	-73.11	-13.00	-60.11	peak	
5		554.285	-73.74	2.91	-70.83	-13.00	-57.83	peak	
6	*	901.060	-73.38	8.46	-64.92	-13.00	-51.92	peak	