FCC Radio Test Report

FCC ID: M82-SCN100

Report No.	:	BTL-FCCP-8-2212T004
Equipment	:	Computer
Model Name	:	SCN-100-9, SCN-100-9xxxxxxxxxxxxxxxx (where “x” may be any alphanumeric character, “-” or blank for marketing purpose and no impact safety related critical components and constructions)
Brand Name	:	(1) ADVANTECH or ADVANTECH (2) SCANIA
Applicant	:	Advantech Co., Ltd.
Address	:	No.1, Alley 20, Lane 26, Rueiguang Road, Neihu District, Taipei 11491, Taiwan.
Radio Function	:	LTE Band 26
FCC Rule Part(s)	:	FCC CFR Title 47, Part 90, Subpart S
Date of Receipt	:	2022/12/9
Date of Test	:	2023/2/24 ~ 2023/10/27
Issued Date	:	2023/11/7

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

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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.

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 are not use in determining the Pass/Fail results.

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REVISION HISTORY

Report No.	Version	Description	Issued Date	Note
BTL-FCCP-8-2212T004	R00	Original Report.	2023/9/4	Invalid
BTL-FCCP-8-2212T004	R01	Added others conducted test items.	2023/11/7	Valid

1 SUMMARY OF TEST RESULTS

Test procedures according to the technical standards.

Standard(s) Section	Description	Test Result	Judgement	Remark
2.1046 90.635 (b)	Conducted Output Power Effective Radiated Power	APPENDIX A	Pass	------
2.1049 90.209	Occupied Bandwidth	APPENDIX B	Pass	------
2.1053 90.669	Conducted Spurious Emissions	APPENDIX C	Pass	------
2.1053 90.691	Radiated Spurious Emissions	APPENDIX D	Pass	------
2.1053 90.691	Mask Measurements	APPENDIX E	Pass	------
-	Peak To Average Ratio	APPENDIX F	Pass	------
2.1055 90.213	Frequency Stability	APPENDIX G	Pass	------

NOTE:
(1) ”N/A” denotes test is not applicable in this Test Report.
(2) The report format version is TP.1.1.1.

1.1 REFERENCE TEST GUIDANCE

ANSI C63.26-2015
ANSI/TIA-603-E-2016
FCC KDB 971168 D01 Power Meas License Digital Systems v03r01

1.2 TEST FACILITY

The test locations stated below are under the TAF Accreditation Number 0659.
The test location(s) used to collect the test data in this report are:
No. 68-1, Ln. 169, Sec. 2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan
(FCC DN: TW0659)
☐ C05 ☐ SR10 ☒ SR11
No. 72, Ln. 169, Sec. 2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan
(FCC DN: TW0659)
☐ C06 ☒ CB21 ☐ CB22

1.3 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y ± U**, where expanded uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k = 2**, providing a level of confidence of approximately **95 %**. The measurement instrumentation uncertainty considerations contained in CISPR 16-4-2. The BTL measurement uncertainty is less than the CISPR 16-4-2 U_{cispr} requirement.

A. Effective Radiated Power and Radiated emissions test :

Test Site	Measurement Frequency Range	U,(dB)
CB21	0.03 GHz ~ 0.2 GHz	4.17
	0.2 GHz ~ 1 GHz	4.72
	1 GHz ~ 6 GHz	5.21
	6 GHz ~ 18 GHz	5.51
	18 GHz ~ 26 GHz	3.69
	26 GHz ~ 40 GHz	4.23

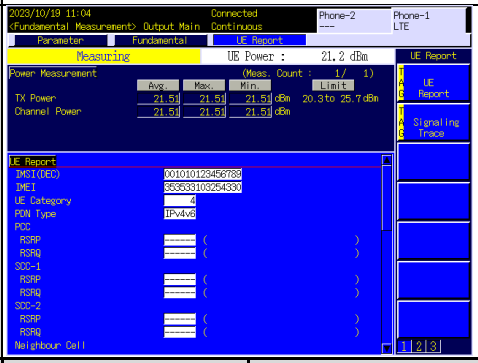
NOTE:
Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

1.4 TEST ENVIRONMENT CONDITIONS

Test Item	Environment Condition	Test Voltage	Tested by
Conducted Output Power	23.4 °C, 59 %	AC 120V	Cora Lin
Effective Radiated Power	Refer to data	AC 120V	Mark Wang
Occupied Bandwidth	25.4 °C, 54 %	AC 120V	Cora Lin
Conducted Spurious Emissions	25.4 °C, 54 %	AC 120V	Cora Lin
Radiated Spurious Emissions	Refer to data	AC 120V	Mark Wang
Mask Measurements	25.4 °C, 54 %	AC 120V	Cora Lin
Peak To Average Ratio	25.4 °C, 54 %	AC 120V	Cora Lin
Frequency Stability	Normal and Extreme		Cora Lin

2 GENERAL INFORMATION

2.1 DESCRIPTION OF EUT

Equipment	Computer
Model Name	SCN-100-9, SCN-100-9xxxxxxxxxxxxxxxx (where “x” may be any alphanumeric character, “-” or blank for marketing purpose and no impact safety related critical components and constructions)
Brand Name	(1) ADVANTECH or ADVANTECH (2) SCANIA
Model Difference	Different model distribute to different area.
Power Source	DC voltage supplied from AC/DC Adapter.
Power Rating	EUT: 12-32Vdc, 10-3.75A For Adapter: I/P: 100-240V~2.3A, 50-60Hz O/P: 24.0V⎓7.5A 180.0W
Products Covered	1 * Adapter: FSP / FSP180-AAAN3
WWAN Module	AirPrime / EM7565
IMEI No.	

Operation Frequency	Band	UL Frequency (MHz)	DL Frequency (MHz)
	LTE 26	814 ~ 824	859 ~ 869

Maximum ERP	Band	BW (MHz)	Mode	Power (W)
	LTE 26	1.4	QPSK	0.197
			16QAM	0.160
		3	QPSK	0.200
			16QAM	0.162
		5	QPSK	0.060
			16QAM	0.048
		10	QPSK	0.204
			16QAM	0.166

Test Model	SCN-100-9
Sample Status	Engineering Sample
EUT Modification(s)	N/A

NOTE:
(1) The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

(2) Channel List:

LTE Band 26					
Test Frequency ID	Bandwidth (MHz)	N_{UL}	Frequency of Uplink (MHz)	N_{DL}	Frequency of Downlink (MHz)
Low Range	1.4	26697	814.7	8697	859.7
	3	26705	815.5	8705	860.5
	5	26715	816.5	8715	861.5
Mid Range	1.4/3/5/10	26740	819	8740	864
High Range	1.4	26783	823.3	8783	868.3
	3	26775	822.5	8775	867.5
	5	26765	821.5	8765	866.5

(3) Table for Filed Antenna:

Antenna	Manufacture	Part Number	Type	Connector	Gain (dBi)	Note
Main	AWAN	DC33001WF00	PIFA	I-PEX	2.65	LTE Band 26
Aux	AWAN	DC33001WF10	PIFA	I-PEX	2.35	LTE Band 26

(4) The above Antenna information are derived from the antenna data sheet provided by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

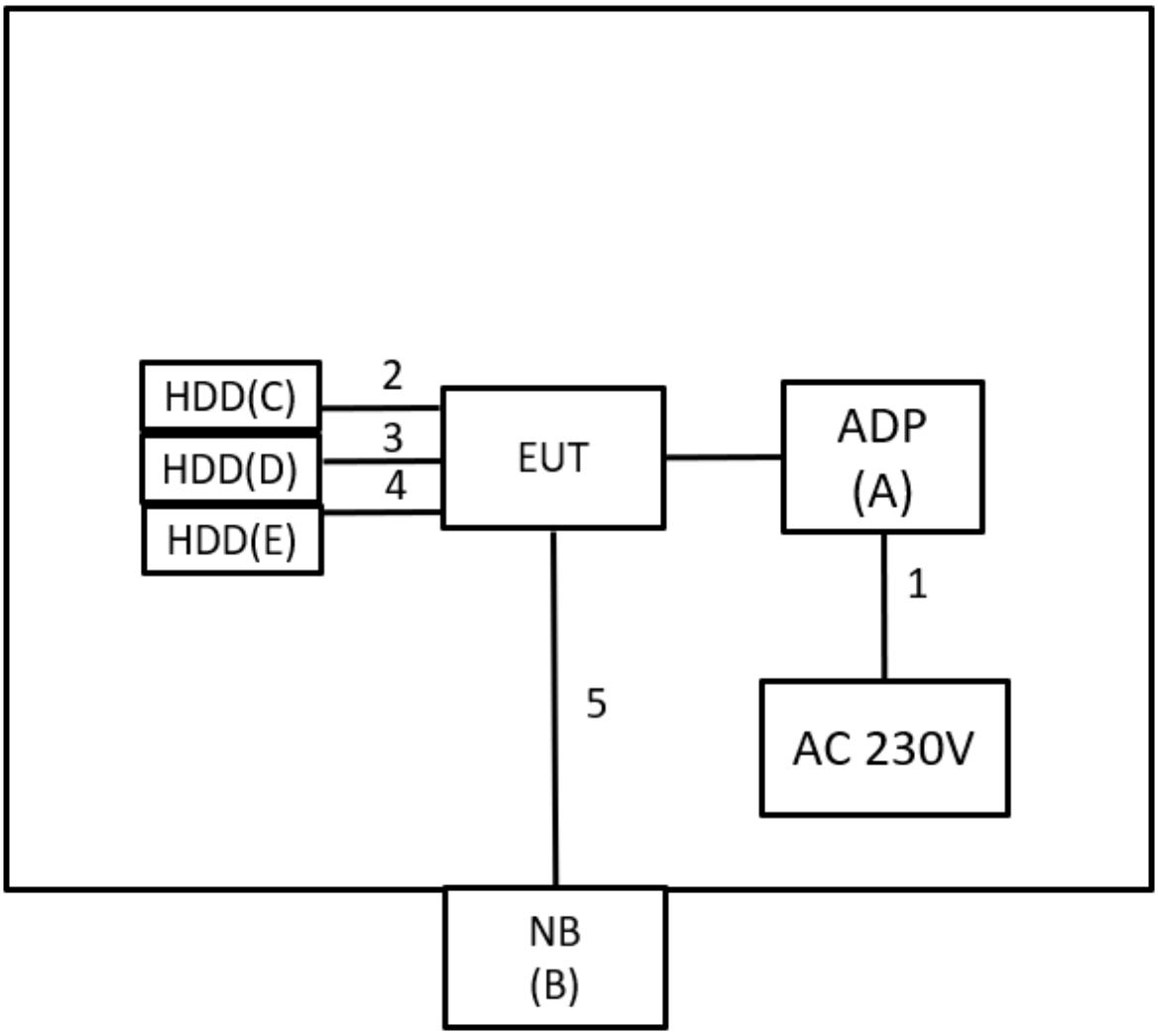
2.2 TEST MODES

LTE BAND 26 MODE					
Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
Conducted Output Power & Effective Radiated Power	26697 to 26783	26697, 26740, 26783	1.4MHz	QPSK, 16QAM, 64QAM	1RB/3RB/6RB
	26705 to 26775	26705, 26740, 26775	3MHz	QPSK, 16QAM, 64QAM	1RB/8RB/15RB
	26715 to 26765	26715, 26740, 26765	5MHz	QPSK, 16QAM, 64QAM	1RB/12RB/25RB
	26740	26740	10MHz	QPSK, 16QAM, 64QAM	1RB/25RB/50RB
Occupied Bandwidth	26697 to 26783	26697, 26740, 26783	1.4MHz	QPSK, 16QAM, 64QAM	6RB
	26705 to 26775	26705, 26740, 26775	3MHz	QPSK, 16QAM, 64QAM	15RB
	26715 to 26765	26715, 26740, 26765	5MHz	QPSK, 16QAM, 64QAM	25RB
	26740	26740	10MHz	QPSK, 16QAM, 64QAM	50RB
Conducted Spurious Emissions	26697 to 26783	26740	1.4MHz	QPSK	1RB
	26705 to 26775	26740	5MHz	QPSK	1RB
	26715 to 26765	26740	10MHz	QPSK	1RB
Radiated Spurious Emissions	26715 to 26765	26740	10MHz	QPSK	1RB
Mask	26697 to 26783	26697, 26783	1.4MHz	QPSK	1RB/6RB
	26705 to 26775	26705, 26775	3MHz	QPSK	1RB/15RB
	26715 to 26765	26715, 26765	5MHz	QPSK	1RB/25RB
	26740	26740	10MHz	QPSK	1RB/50RB
Peak To Average Ratio	26697 to 26783	26697, 26740, 26783	1.4MHz	QPSK, 16QAM, 64QAM	1RB
	26705 to 26775	26705, 26740, 26775	3MHz	QPSK, 16QAM, 64QAM	1RB
	26715 to 26765	26715, 26740, 26765	5MHz	QPSK, 16QAM, 64QAM	1RB
	26740	26740	10MHz	QPSK, 16QAM, 64QAM	1RB
Frequency Stability	26715 to 26765	26740	10MHz	QPSK	50RB

NOTE:
(1) For Radiated Spurious Emissions both QPSK and 16QAM are evaluated, but only the worst case (QPSK) is recorded.

2.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Equipment letters and Cable numbers refer to item numbers described in the tables of clause 2.4.



2.4 SUPPORT UNITS

Item	Equipment	Brand	Model No.	Series No.	Remarks
A	ADP	FSP GROUP	FSP180-AAAN3	N/A	Supplied by test requester.
B	NB	HP	TPN-C125	N/A	Furnished by test lab.
C	USB 2.5" HDD	AKITIO	Neutrino U3.1	SK21D1621D003F	Furnished by test lab.
D	USB 2.5" HDD	AKITIO	Neutrino U3.1	SK21D1621D003F	Furnished by test lab.
E	USB 3.0 HDD	WD	WDBC3C0010BSL-0B	WX81A88ALJUC	Furnished by test lab.

Item	Shielded	Ferrite Core	Length	Cable Type	Remarks
1	N/A	N/A	1m	Power Cable	Supplied by test requester.
2	N/A	N/A	0.6m	TypeC to TypeC Cable	Furnished by test lab.
3	N/A	N/A	1m	TypeC to TypeC Cable	Furnished by test lab.
4	N/A	N/A	0.3m	TypeC to TypeC Cable	Furnished by test lab.
5	N/A	N/A	12m	RJ45 Cable	Furnished by test lab.

3 CONDUCTED OUTPUT POWER AND EFFECTIVE RADIATED POWER MEASUREMENT

3.1 LIMIT

Mobile / Portable station are limited to 100 watts e.r.p.

NOTE:
(1) The test result calculated as following:
Measurement Value = Reading Level + Correct Factor
Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use)
Margin Level = Measurement Value - Limit Value
Calculation example:

Reading Level		Correct Factor		Measurement Value
-29.66	+	34.26	=	4.60

Measurement Value		Limit Value		Margin Level
4.60	-	38.45	=	-33.85

3.2 TEST PROCEDURE

The testing follows FCC KDB 971168 v03r01 Section 5.0.

EIRP / ERP Power Measurement:
EIRP = Conducted Power + Antenna gain.
ERP power = EIPR power - 2.15 dBi.

Conducted Measurement:

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.

Radiated Measurement:

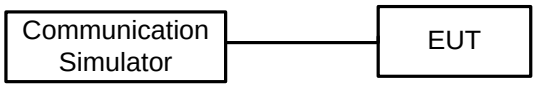
a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
b. 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
c. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.
d. ERP can be calculated form EIRP by subtracting the gain of dipole, ERP = EIPR - 2.15dBi..
e. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

3.3 DEVIATION FROM TEST STANDARD

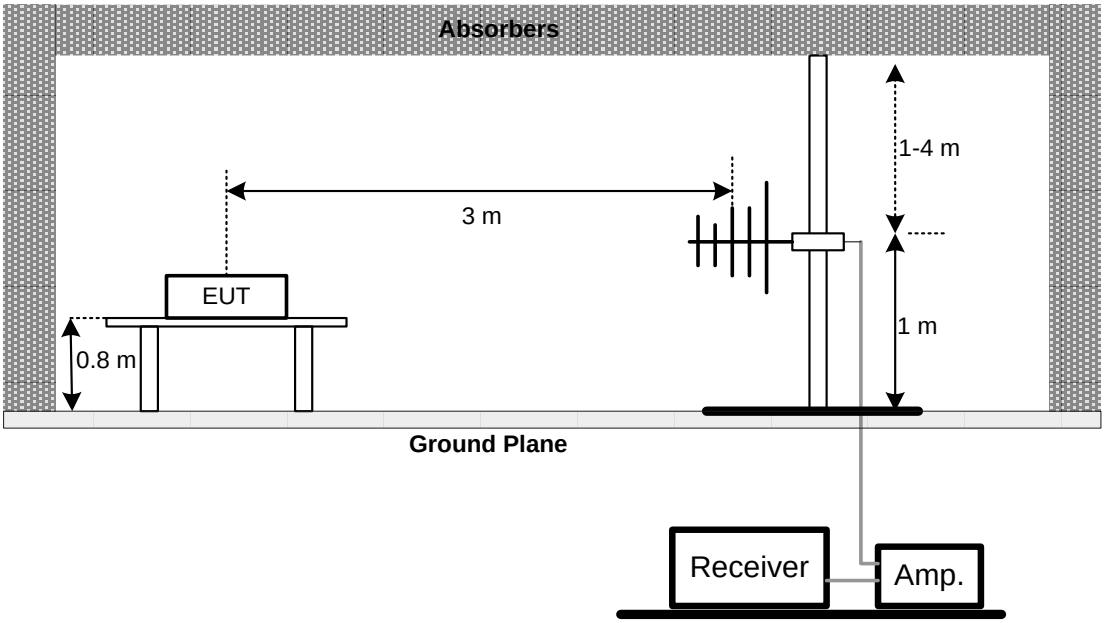
No deviation.

3.4 TEST SETUP

Conducted Measurement:



Radiated Measurement:



3.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

3.6 TEST RESULT

Please refer to the APPENDIX A.

4 OCCUPIED BANDWIDTH MEASUREMENT

4.1 TEST PROCEDURE

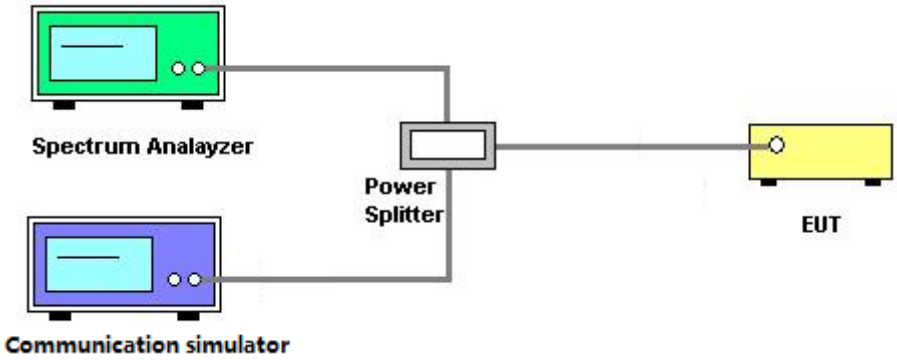
The testing follows FCC KDB 971168 v03r01 Section 4.

a. 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.
b. The EUT was connected to spectrum analyzer and system simulator via a power divider.
c. RBW=(1% ~ 5%)*EBW
   VBW⩾3* RBW.
d. Set spectrum analyzer with Peak detector.

4.2 DEVIATION FROM TEST STANDARD

No deviation.

4.3 TEST SETUP



4.4 TEST RESULT

Please refer to the APPENDIX B

5 CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

5.1 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.

5.2 TEST PROCEDURE

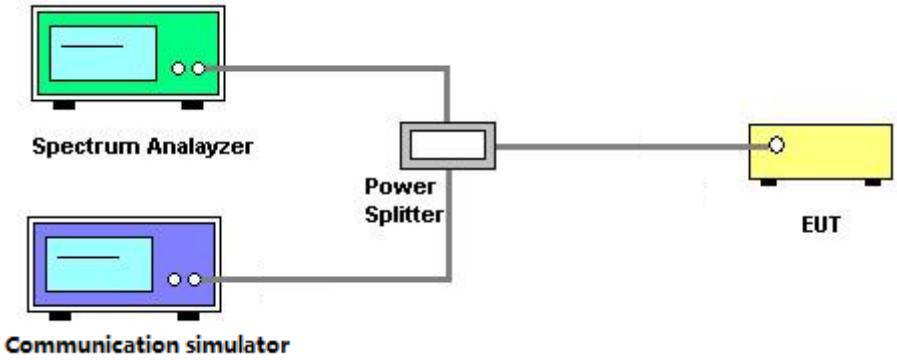
The testing follows FCC KDB 971168 v03r01 Section 6.

a. The EUT was connected to spectrum analyzer and system simulator via a power divider.
b. 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.
c. Set spectrum analyzer with Peak detector.
d. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

5.3 DEVIATION FROM TEST STANDARD

No deviation.

5.4 TEST SETUP



5.5 TEST RESULT

Please refer to the APPENDIX C.

6 RADIATED SPURIOUS EMISSIONS MEASUREMENT

6.1 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.

NOTE:
(1) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.
(2) The test result calculated as following:
Measurement Value = Reading Level + Correct Factor
Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use)
Margin Level = Measurement Value - Limit Value
Calculation example:

Reading Level (dBm)		Correct Factor (dB)		Measurement Value (dBm)
-50.43	+	-2.11	=	-52.54

Measurement Value (dBm)		Limit Value (dBm)		Margin Level (dB)
-52.54	-	-13	=	-39.54

6.2 TEST PROCEDURE

The testing follows FCC KDB 971168 v03r01 Section 6.2.

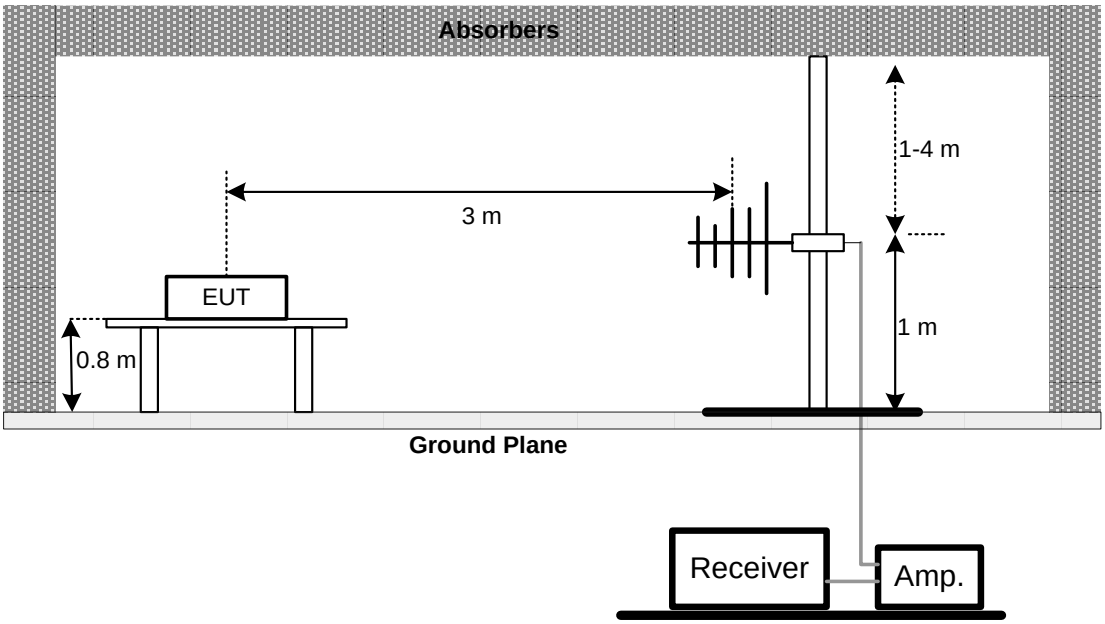
a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
b. 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
c. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.
d. ERP can be calculated form EIRP by subtracting the gain of dipole, ERP = EIPR - 2.15dBi..
e. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

6.3 DEVIATION FROM TEST STANDARD

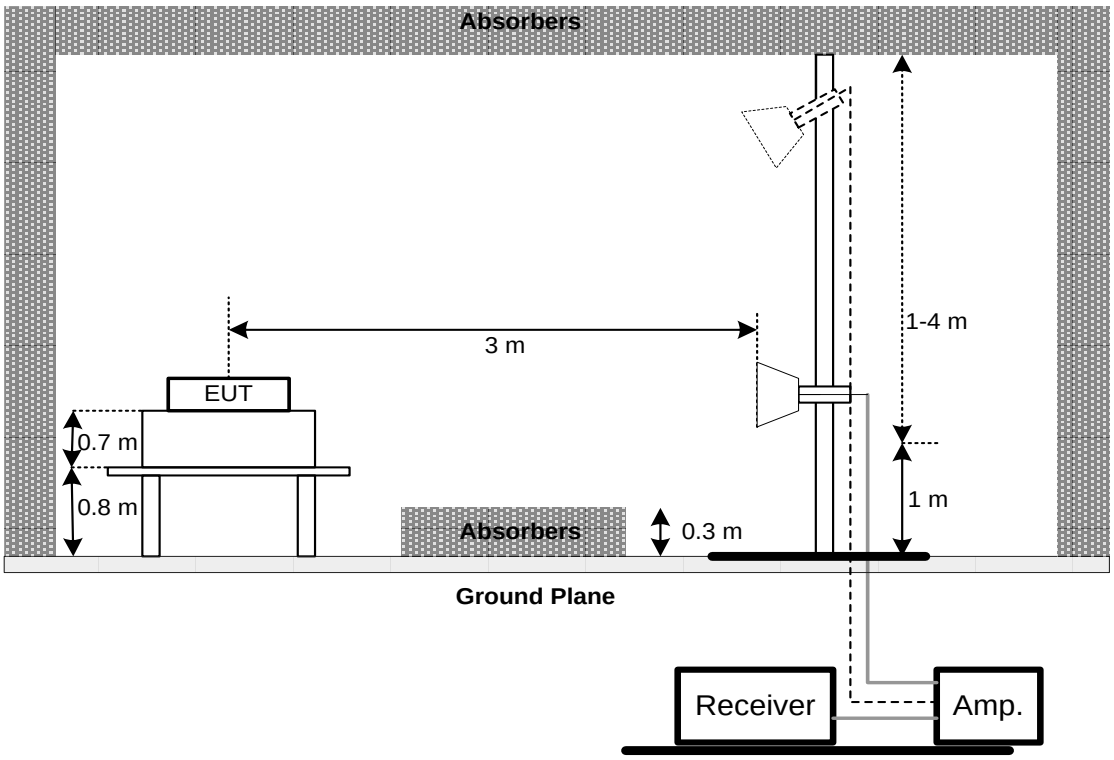
No deviation.

6.4 TEST SETUP

30 MHz to 1 GHz



Above 1 GHz



6.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

6.6 TEST RESULT

Please refer to the APPENDIX D.

7 MASK MEASUREMENTS

7.1 LIMIT

According to FCC part 90.691 shall be tested the emission mask. For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log10(f/6.1) decibels or 50+10Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz. For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

7.2 TEST PROCEDURE

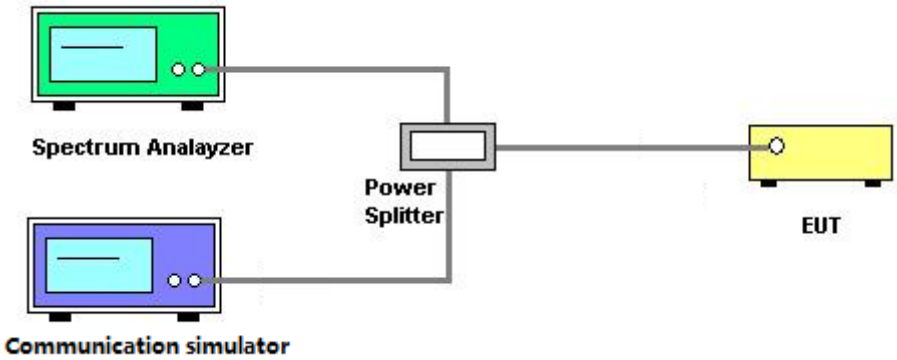
The testing follows FCC KDB 971168 v03r01 Section 6.

a. All measurements were done at low and high operational frequency range.
b. Set RBW=1% of 26dBc bandwidth, VBW=3 X RBW, detector=RMS, Sweep time = Auto.
   For Section 90.691(a) compliance testing, use RBW = 300 Hz for offsets less than 37.5 kHz from a chan nel edge; RBW = 100 kHz for offsets greater than 37.5 kHz is allowed.
c. Record the max trace plot into the test report.

7.3 DEVIATION FROM TEST STANDARD

No deviation.

7.4 TEST SETUP



7.5 TEST RESULT

Please refer to the APPENDIX E.

8 PEAK TO AVERAGE RATIO MEASUREMENT

8.1 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.

8.2 TEST PROCEDURE

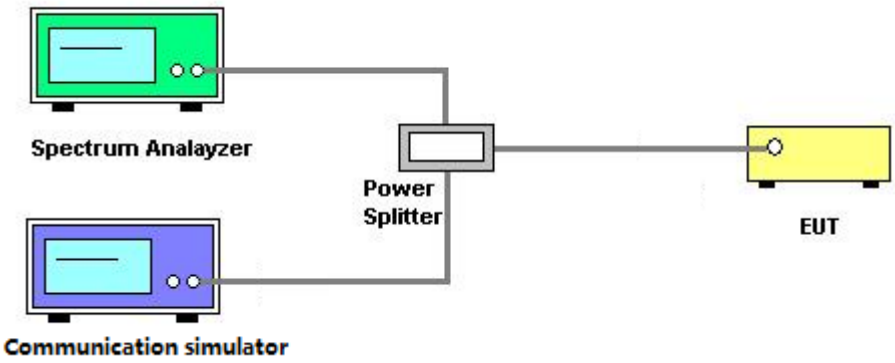
The testing follows FCC KDB 971168 v03r01 Section 5.7.

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

8.3 DEVIATION FROM TEST STANDARD

No deviation.

8.4 TEST SETUP



8.5 TEST RESULT

Please refer to the APPENDIX F.

9 FREQUENCY STABILITY MEASUREMENT

9.1 LIMIT

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

9.2 TEST PROCEDURE

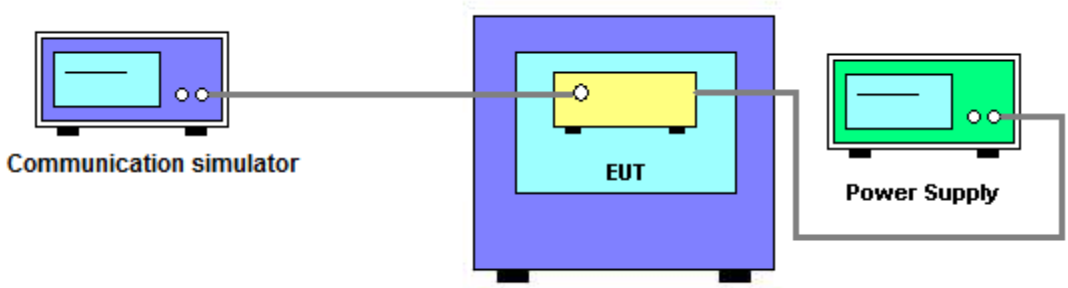
The testing follows FCC KDB 971168 v03r01 Section 9.

a. 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.
b. 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.
c. 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.
d. The frequency error was recorded frequency error from the communication simulator.

9.3 DEVIATION FROM TEST STANDARD

No deviation.

9.4 TEST SETUP



9.5 TEST RESULT

Please refer to the APPENDIX G

10 LIST OF MEASURING EQUIPMENTS

Conducted Output Power						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Spectrum Analyzer	Keysight	N9010A	MY56480489	2022/10/19	2023/10/18
2	WIRELESS COMMUNICATIO N TEST SET	Agilent	E5515C	GB47390193	2023/7/4	2024/7/3
3	Radio Communication Test Station	ANRITSU	MT8821C	6262044728	2022/11/25	2023/11/24

Effective Isotropic Radiated Power and Radiated Emissions						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Preamplifier	EMCI	EMC330N	980850	2022/9/19	2023/9/18
2	Preamplifier	EMCI	EMC118A45SE	980819	2023/3/7	2024/3/6
3	Pre-Amplifier	EMCI	EMC184045SE	980907	2022/9/28	2023/9/27
4	Test Cable	EMCI	EMC104-SM-SM-1000	220319	2023/3/14	2024/3/13
5	Test Cable	EMCI	EMC104-SM-SM-3000	220322	2023/3/14	2024/3/13
6	Test Cable	EMCI	EMC104-SM-SM-7000	220324	2023/3/14	2024/3/13
7	EXA Signal Analyzer	keysight	N9020B	MY57120120	2023/2/24	2024/2/23
8	Horn Antenna	RFSPIN	DRH18-E	211202A18EN	2022/5/18	2023/5/17
9	Horn Ant	Schwarzbeck	BBHA 9170D	1136	2022/5/18	2023/5/17
10	Log-bicon Antenna	Schwarzbeck	VULB9168	1369	2022/5/20	2023/5/19
11	6dB Attenuator	EMCI	EMCI-N-6-06	AT-06001	2022/5/20	2023/5/19
12	Test Cable	EMCI	EMC101G-KM-K M-3000	220329	2023/3/14	2024/3/13
13	Test Cable	EMCI	EMC102-KM-KM-1000	220327	2023/3/14	2024/3/13
14	WIRELESS COMMUNICATIO N TEST SET	Agilent	E5515C	GB47390193	2022/7/7	2023/7/6
15	Radio Communication Analyzer	ANRITSU	MT8820C	6201381608	2022/12/22	2023/12/21
16	Radio Communication Test Station	ANRITSU	MT8821C	6262044728	2022/11/25	2023/11/24
17	Radio Communication Analyzer	ANRITSU	MT8000A	6262036844	2022/11/24	2023/11/23
18	Wideband Radio Communication Tester	R&S	CMW500	154121	2023/1/12	2024/1/11
19	Radio Communication Analyzer	Keysight	E7515B	MY59020217	2022/7/8	2023/7/7
20	Measurement Software	EZ	EZ_EMC (Version NB-03A1-01)	N/A	N/A	N/A

Others Conducted Measurement						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Spectrum Analyzer	R&S	FSV7	103032	2023/8/10	2024/8/9
2	Spectrum Analyzer	Keysight	N9010A	MY54200240	2023/6/26	2024/6/25
3	Spectrum Analyzer	Keysight	N9010A	MY56480489	2022/10/19	2023/10/18
4	Thermal Chamber	HOLINK	H-TH-2SP-B	EK04101902	2023/7/3	2024/7/2
5	WIRELESS COMMUNICATIO N TEST SET	Agilent	E5515C	GB47390193	2023/7/4	2024/7/3
6	Radio Communication Analyzer	ANRITSU	MT8820C	6201381608	2022/12/22	2023/12/21
7	Radio Communication Test Station	ANRITSU	MT8821C	6262044728	2022/11/25	2023/11/24

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

11 EUT TEST PHOTO

Please refer to document Appendix No.: TP-2212T004-FCCP-1 (APPENDIX-TEST PHOTOS).

12 EUT PHOTOS

Please refer to document Appendix No.: EP-2212T004-1 (APPENDIX-EUT PHOTOS).

APPENDIX A CONDUCTED OUTPUT POWER AND EFFECTIVE RADIATED POWER

Conducted Output Power and Calculated ERP:

LTE Band 26 Power:

Band	BW (MHz)	Channel	Frequency (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Average power	ERP power (dBm)	ERP power (W)
26	1.4M	26697	814.7	QPSK	1	0	0	22.37	22.87	0.194
					1	2	0	22.44	22.94	0.197
					1	5	0	22.43	22.93	0.196
					3	0	0	22.37	22.87	0.194
					3	1	0	22.44	22.94	0.197
					3	2	0	22.43	22.93	0.196
					6	0	1	21.48	21.98	0.158
				16QAM	1	0	1	21.46	21.96	0.157
					1	2	1	21.54	22.04	0.160
					1	5	1	21.54	22.04	0.160
					3	0	1	21.46	21.96	0.157
					3	1	1	21.54	22.04	0.160
					3	2	1	21.54	22.04	0.160
					6	0	2	20.47	20.97	0.125
		26740	819.0	QPSK	1	0	0	22.38	22.88	0.194
					1	2	0	22.45	22.95	0.197
					1	5	0	22.44	22.94	0.197
					3	0	0	22.38	22.88	0.194
					3	1	0	22.45	22.95	0.197
					3	2	0	22.44	22.94	0.197
					6	0	1	21.49	21.99	0.158
				16QAM	1	0	1	21.47	21.97	0.157
					1	2	1	21.55	22.05	0.160
					1	5	1	21.55	22.05	0.160
					3	0	1	21.47	21.97	0.157
					3	1	1	21.55	22.05	0.160
					3	2	1	21.55	22.05	0.160
					6	0	2	20.49	20.99	0.126
		26783	823.3	QPSK	1	0	0	22.36	22.86	0.193
					1	2	0	22.43	22.93	0.196
					1	5	0	22.42	22.92	0.196
					3	0	0	22.36	22.86	0.193
					3	1	0	22.43	22.93	0.196
					3	2	0	22.42	22.92	0.196
					6	0	1	21.47	21.97	0.157
				16QAM	1	0	1	21.45	21.95	0.157
					1	2	1	21.53	22.03	0.160
					1	5	1	21.53	22.03	0.160
					3	0	1	21.45	21.95	0.157
					3	1	1	21.53	22.03	0.160
					3	2	1	21.53	22.03	0.160
					6	0	2	20.47	20.97	0.125

NOTE:
(1) EIRP = Average power + Antenna gain.
(2) ERP = EIRP - 2.15.
(3) $P(W) = 1\ W \cdot 10^{(P(dBm)/10)} / 1000$

Band	BW (MHz)	Channel	Frequency (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Average power	ERP power (dBm)	ERP power (W)
26	3M	26705	815.5	QPSK	1	0	0	22.42	22.92	0.196
					1	7	0	22.49	22.99	0.199
					1	14	0	22.48	22.98	0.199
					8	0	1	21.53	22.03	0.160
					8	4	1	21.65	22.15	0.164
					8	7	1	21.62	22.12	0.163
					15	0	1	21.53	22.03	0.160
				16QAM	1	0	1	21.51	22.01	0.159
					1	7	1	21.59	22.09	0.162
					1	14	1	21.59	22.09	0.162
					8	0	2	20.53	21.03	0.127
					8	4	2	20.60	21.10	0.129
					8	7	2	20.55	21.05	0.127
					15	0	2	20.52	21.02	0.126
		26740	819.0	QPSK	1	0	0	22.43	22.93	0.196
					1	7	0	22.50	23.00	0.200
					1	14	0	22.49	22.99	0.199
					8	0	1	21.54	22.04	0.160
					8	4	1	21.66	22.16	0.164
					8	7	1	21.63	22.13	0.163
					15	0	1	21.54	22.04	0.160
				16QAM	1	0	1	21.52	22.02	0.159
					1	7	1	21.60	22.10	0.162
					1	14	1	21.60	22.10	0.162
					8	0	2	20.54	21.04	0.127
					8	4	2	20.61	21.11	0.129
					8	7	2	20.56	21.06	0.128
					15	0	2	20.53	21.03	0.127
		26775	822.5	QPSK	1	0	0	22.41	22.91	0.195
					1	7	0	22.48	22.98	0.199
					1	14	0	22.47	22.97	0.198
					8	0	1	21.52	22.02	0.159
					8	4	1	21.64	22.14	0.164
					8	7	1	21.61	22.11	0.163
					15	0	1	21.52	22.02	0.159
				16QAM	1	0	1	21.50	22.00	0.158
					1	7	1	21.58	22.08	0.161
					1	14	1	21.58	22.08	0.161
					8	0	2	20.52	21.02	0.126
					8	4	2	20.59	21.09	0.129
					8	7	2	20.54	21.04	0.127
					15	0	2	20.51	21.01	0.126

NOTE:
(1) EIRP = Average power + Antenna gain.
(2) ERP = EIRP - 2.15.
(3) P(W) = 1 W · $10^{(P(dBm)/10)}$ / 1000

Band	BW (MHz)	Channel	Frequency (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Average power	ERP power (dBm)	ERP power (W)
26	5M	26715	816.5	QPSK	1	0	0	22.47	17.67	0.058
					1	12	0	22.54	17.74	0.059
					1	24	0	22.53	17.73	0.059
					12	0	1	21.58	16.78	0.048
					12	6	1	21.70	16.90	0.049
					12	11	1	21.67	16.87	0.049
					25	0	1	21.58	16.78	0.048
				16QAM	1	0	1	21.56	16.76	0.047
					1	12	1	21.64	16.84	0.048
					1	24	1	21.64	16.84	0.048
					12	0	2	20.58	15.78	0.038
					12	6	2	20.65	15.85	0.038
					12	11	2	20.60	15.80	0.038
					25	0	2	20.57	15.77	0.038
		26740	819.0	QPSK	1	0	0	22.48	17.68	0.059
					1	12	0	22.55	17.75	0.060
					1	24	0	22.54	17.74	0.059
					12	0	1	21.59	16.79	0.048
					12	6	1	21.71	16.91	0.049
					12	11	1	21.68	16.88	0.049
					25	0	1	21.59	16.79	0.048
				16QAM	1	0	1	21.57	16.77	0.048
					1	12	1	21.65	16.85	0.048
					1	24	1	21.65	16.85	0.048
					12	0	2	20.59	15.79	0.038
					12	6	2	20.66	15.86	0.039
					12	11	2	20.61	15.81	0.038
					25	0	2	20.58	15.78	0.038
		26765	821.5	QPSK	1	0	0	22.46	17.66	0.058
					1	12	0	22.53	17.73	0.059
					1	24	0	22.52	17.72	0.059
					12	0	1	21.57	16.77	0.048
					12	6	1	21.69	16.89	0.049
					12	11	1	21.66	16.86	0.049
					25	0	1	21.57	16.77	0.048
				16QAM	1	0	1	21.55	16.75	0.047
					1	12	1	21.63	16.83	0.048
					1	24	1	21.63	16.83	0.048
					12	0	2	20.57	15.77	0.038
					12	6	2	20.64	15.84	0.038
					12	11	2	20.59	15.79	0.038
					25	0	2	20.56	15.76	0.038

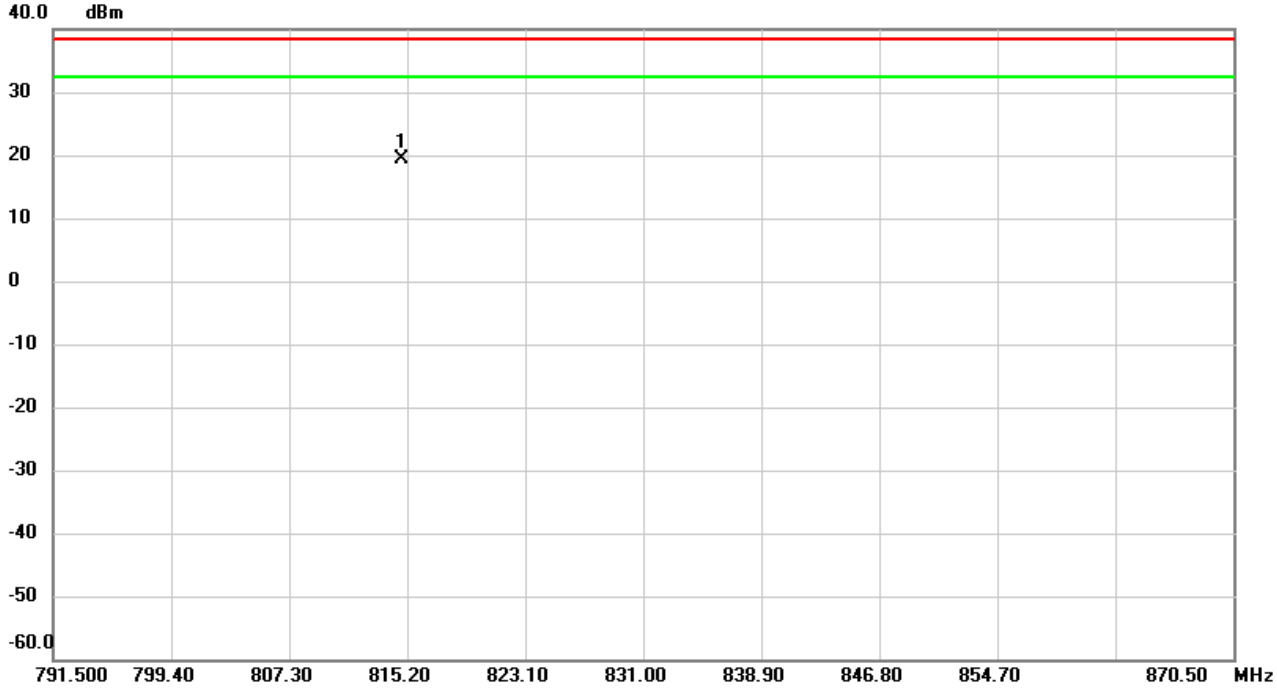
NOTE:
(1) EIRP = Average power + Antenna gain.
(2) ERP = EIRP - 2.15.
(3) P(W) = 1 W · $10^{(P(dBm)/10)}$ / 1000

Band	BW (MHz)	Channel	Frequency (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Average power	ERP power (dBm)	ERP power (W)
26	10M	26740	819.0	QPSK	1	0	0	**22.53**	23.03	0.201
					1	24	0	**22.60**	23.10	0.204
					1	49	0	**22.59**	23.09	0.204
					25	0	1	21.64	22.14	0.164
					25	12	1	21.76	22.26	0.168
					25	24	1	21.73	22.23	0.167
					50	0	1	21.64	22.14	0.164
				16QAM	1	0	1	21.62	22.12	0.163
					1	24	1	21.70	22.20	0.166
					1	49	1	21.70	22.20	0.166
					25	0	2	20.64	21.14	0.130
					25	12	2	20.71	21.21	0.132
					25	24	2	20.66	21.16	0.131
					50	0	2	20.63	21.13	0.130

NOTE:
(1) EIRP = Average power + Antenna gain.
(2) ERP = EIRP - 2.15.
(3) P(W) = 1 W · $10^{(P(dBm) / 10)}$ / 1000

Radiated ERP Power:

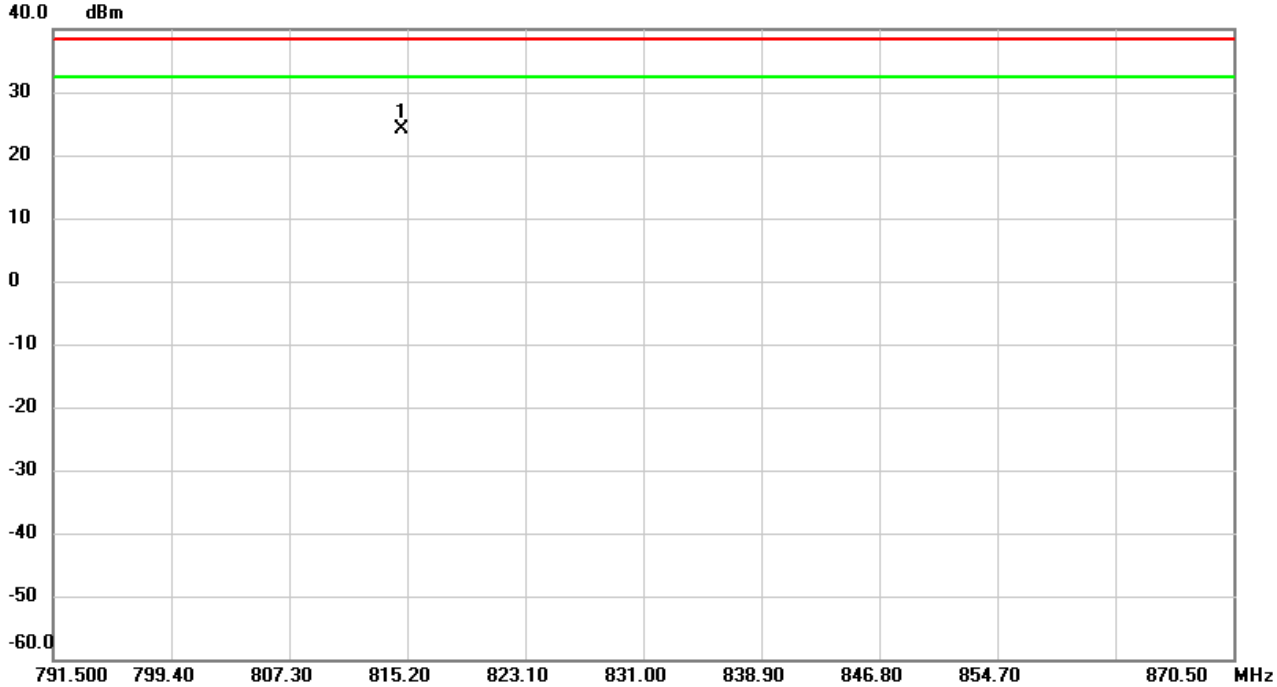
Test Mode	LTE Band 26	Test Date	2023/3/27
Test Channel	CH26765	Polarization	Vertical
Temp	22°C	Hum.	66%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	814.8656	9.70	9.74	19.44	38.45	-19.01	peak	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

Test Mode	LTE Band 26	Test Date	2023/3/27
Test Channel	CH26765	Polarization	Horizontal
Temp	22°C	Hum.	66%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	814.8050	13.85	10.20	24.05	38.45	-14.40	peak	

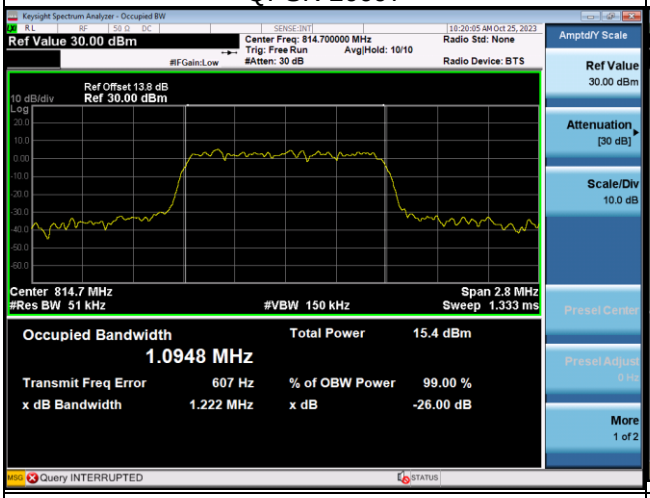
REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

APPENDIX B OCCUPIED BANDWIDTH

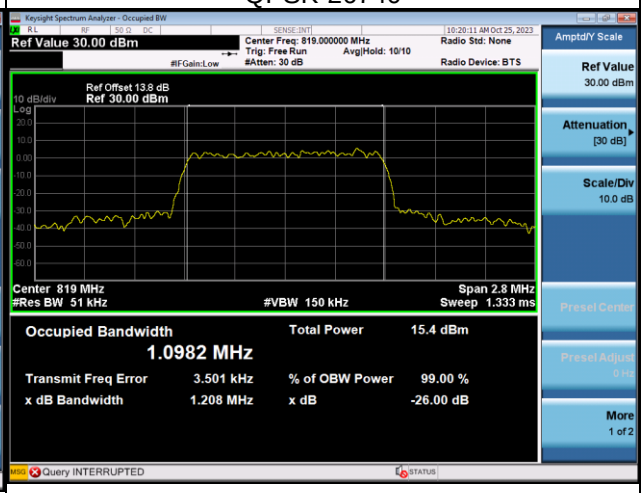
LTE Band 26_1.4M					
QPSK					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
26697	814.7	1.0948	26697	814.7	1.222
26740	819	1.0982	26740	819	1.208
26783	823.3	1.1030	26783	823.3	1.238
16QAM					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
26697	814.7	1.1109	26697	814.7	1.206
26740	819	1.1013	26740	819	1.227
26783	823.3	1.1088	26783	823.3	1.223
64QAM					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
26697	814.7	1.1005	26697	814.7	1.217
26740	819	1.1069	26740	819	1.225
26783	823.3	1.1157	26783	823.3	1.223

Spectrum Plot

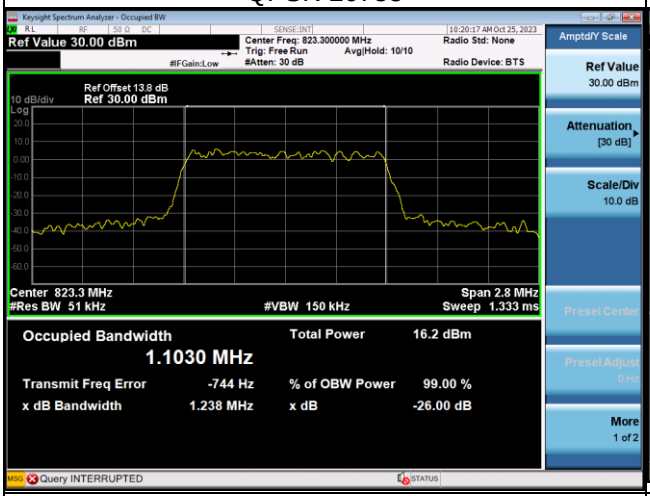
QPSK-26697



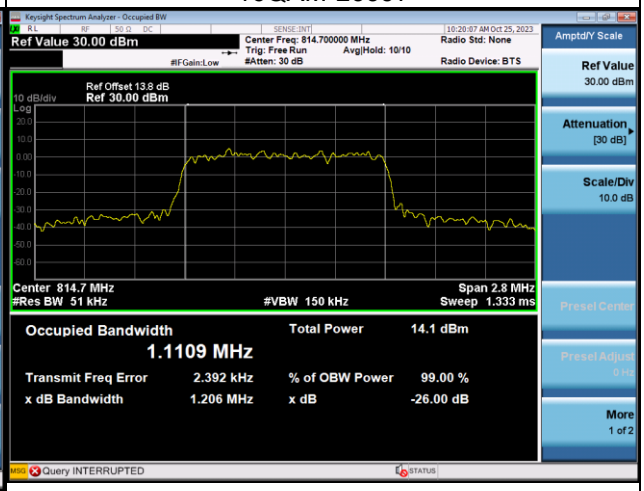
QPSK-26740



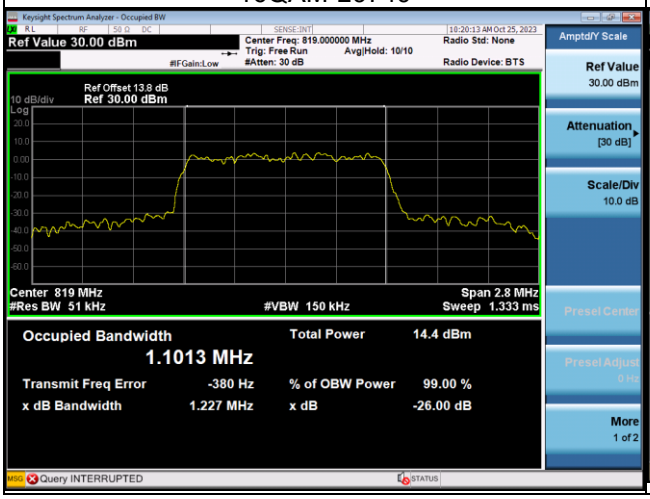
QPSK-26783



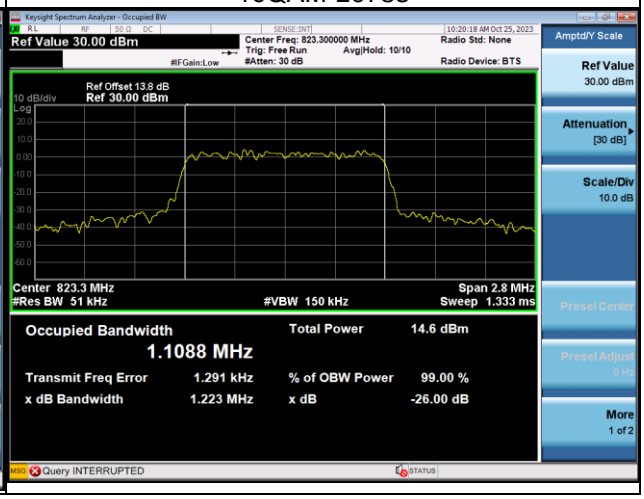
16QAM-26697

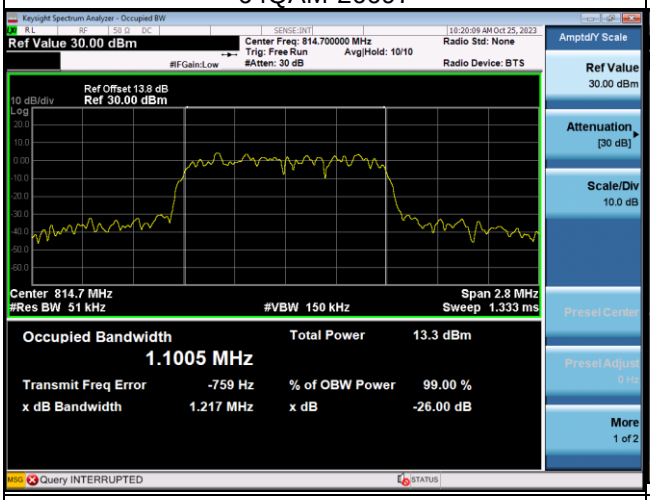
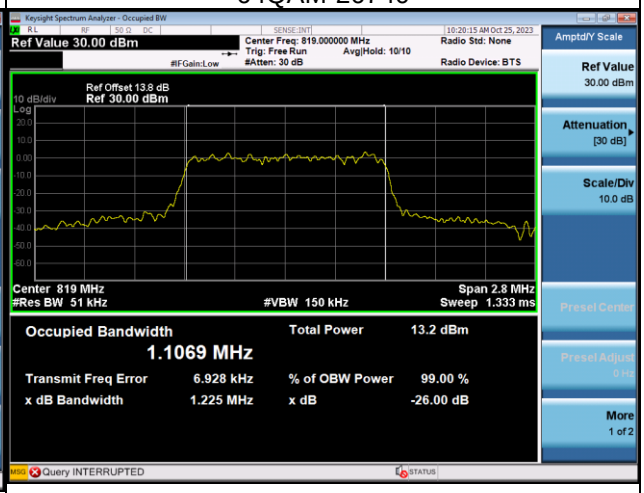
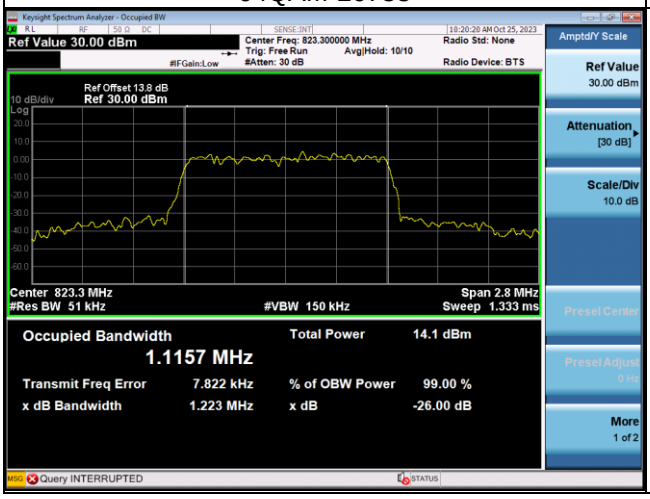


16QAM-26740



16QAM-26783

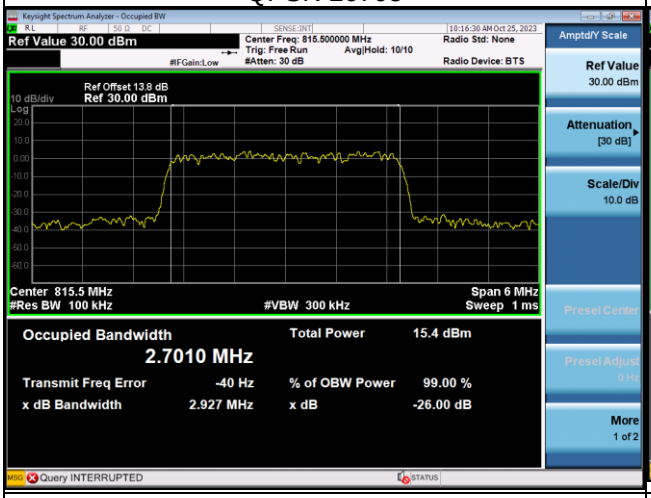


Spectrum Plot	
64QAM-26697	64QAM-26740
	
64QAM-26783	-
	-

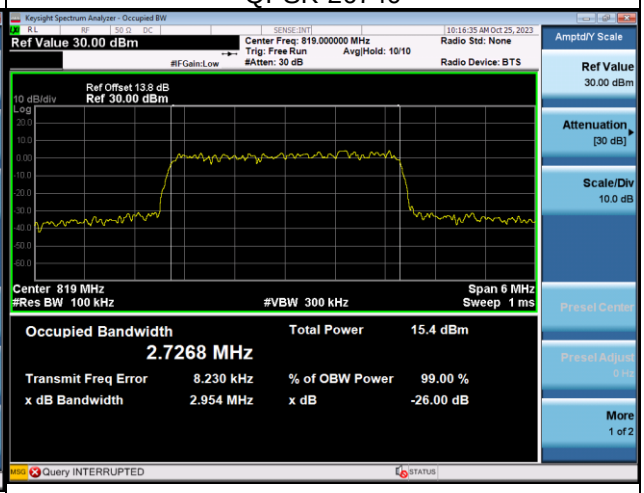
LTE Band 26_3M					
QPSK					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
26705	815.5	2.7010	26705	815.5	2.927
26740	819	2.7268	26740	819	2.954
26775	822.5	2.7005	26775	822.5	2.955
16QAM					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
26705	815.5	2.7157	26705	815.5	2.950
26740	819	2.7009	26740	819	2.940
26775	822.5	2.7293	26775	822.5	2.966
64QAM					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
26705	815.5	2.6902	26705	815.5	2.920
26740	819	2.7264	26740	819	2.921
26775	822.5	2.7243	26775	822.5	3.019

Spectrum Plot

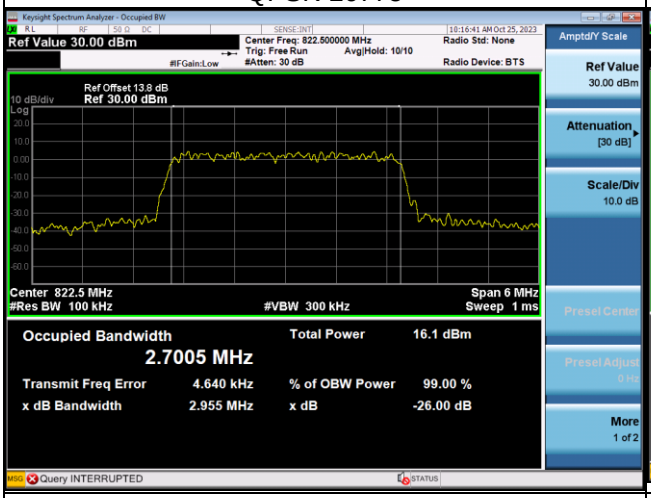
QPSK-26705



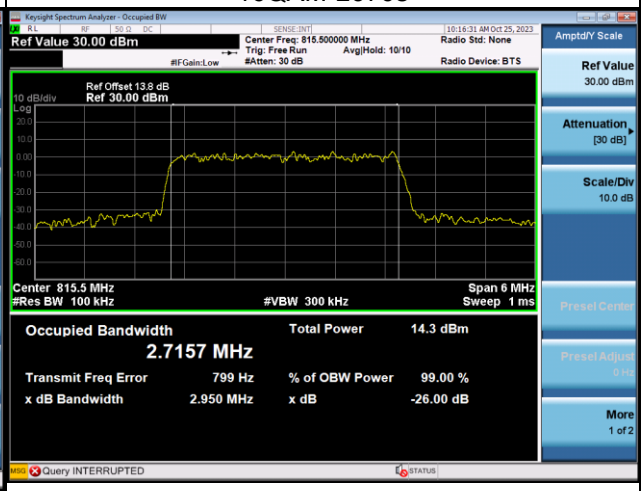
QPSK-26740



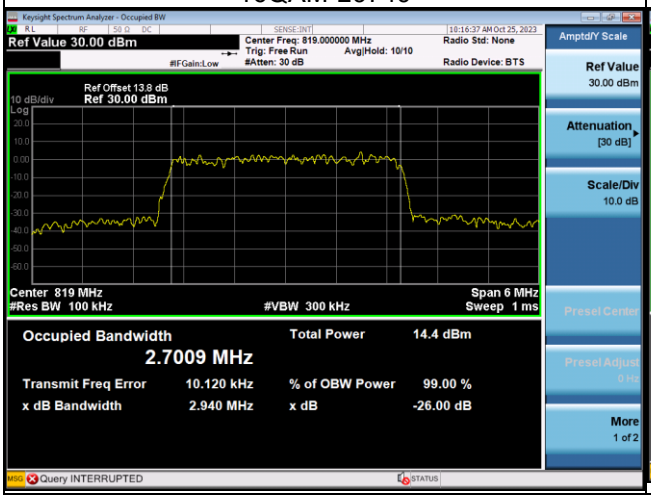
QPSK-26775



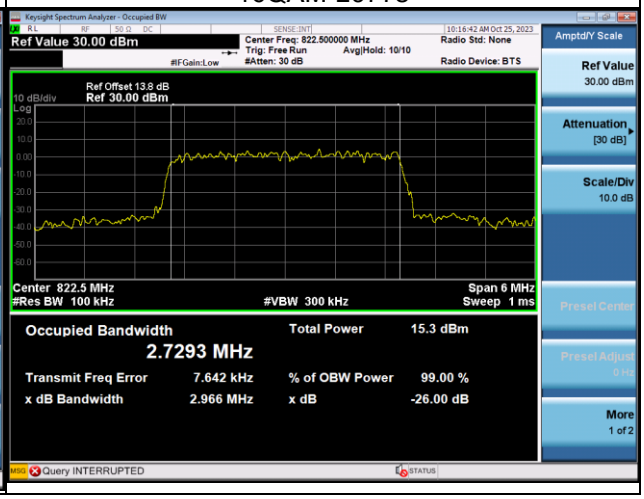
16QAM-26705

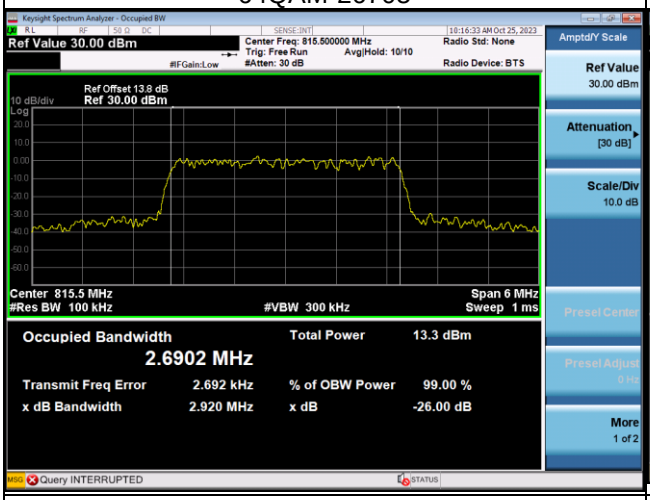
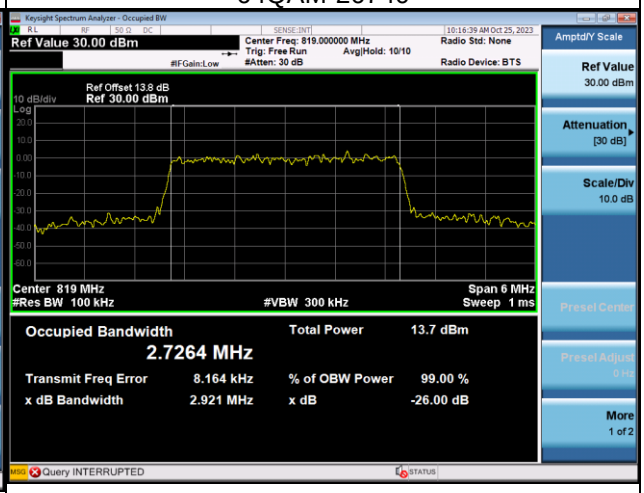
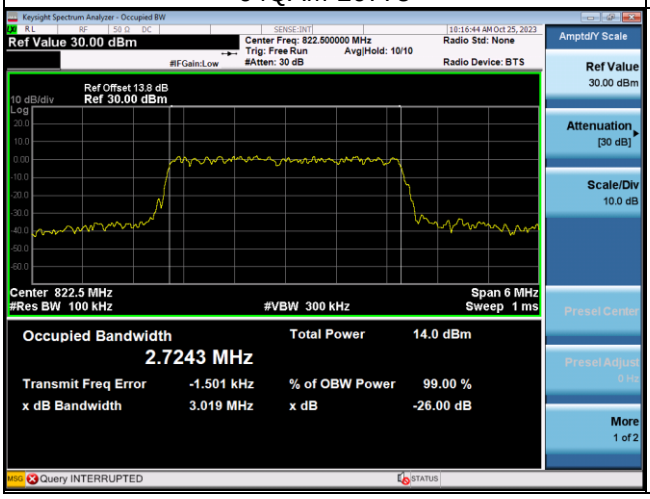


16QAM-26740



16QAM-26775

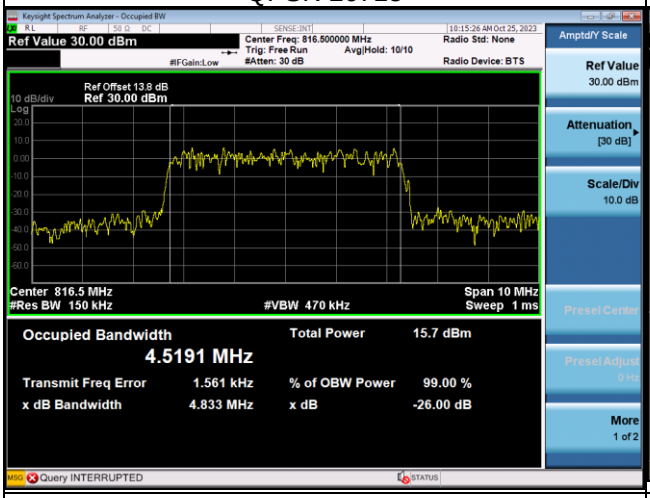


Spectrum Plot	
64QAM-26705	64QAM-26740
	
64QAM-26775	-
	-

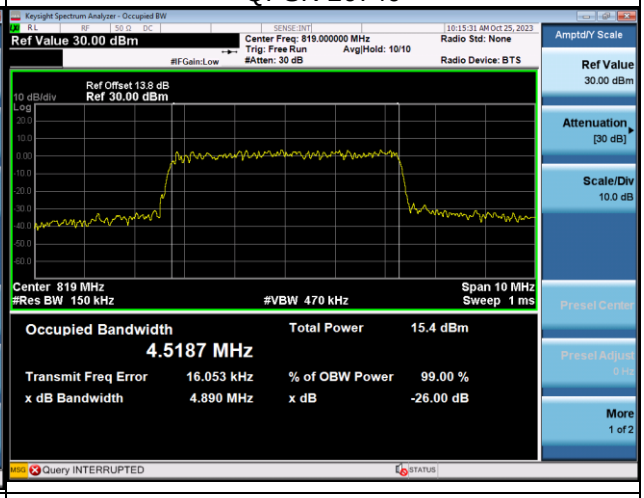
LTE Band 26_5M					
QPSK					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
26715	816.5	4.5191	26715	816.5	4.833
26740	819	4.5187	26740	819	4.890
26765	821.5	4.4809	26765	821.5	4.842
16QAM					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
26715	816.5	4.5286	26715	816.5	4.852
26740	819	4.5256	26740	819	4.847
26765	821.5	4.4982	26765	821.5	4.814
64QAM					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
26715	816.5	4.5120	26715	816.5	4.894
26740	819	4.5017	26740	819	4.844
26765	821.5	4.4790	26765	821.5	4.845

Spectrum Plot

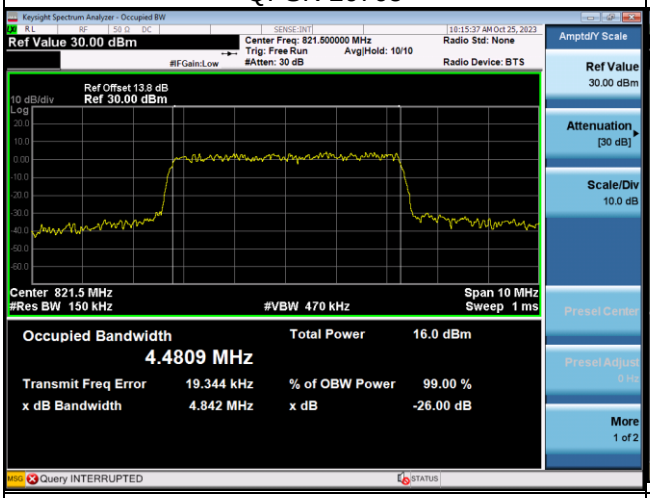
QPSK-26715



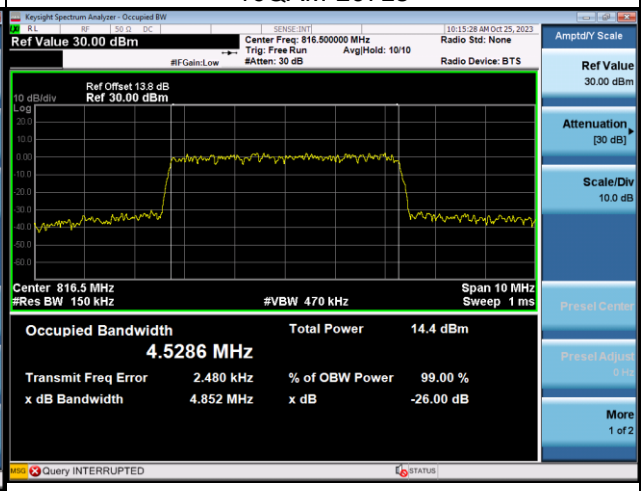
QPSK-26740



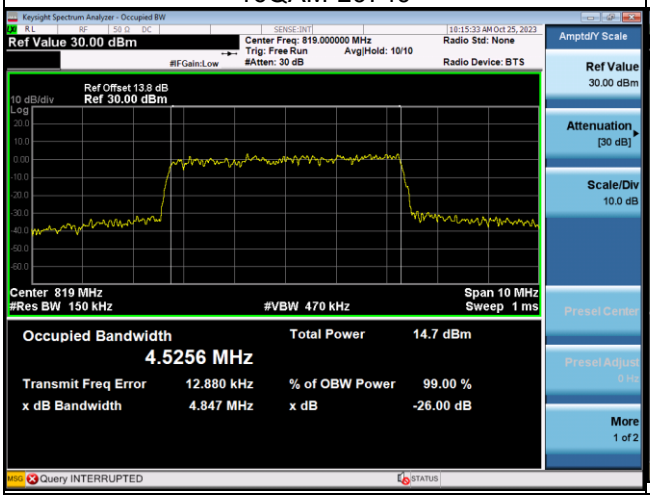
QPSK-26765



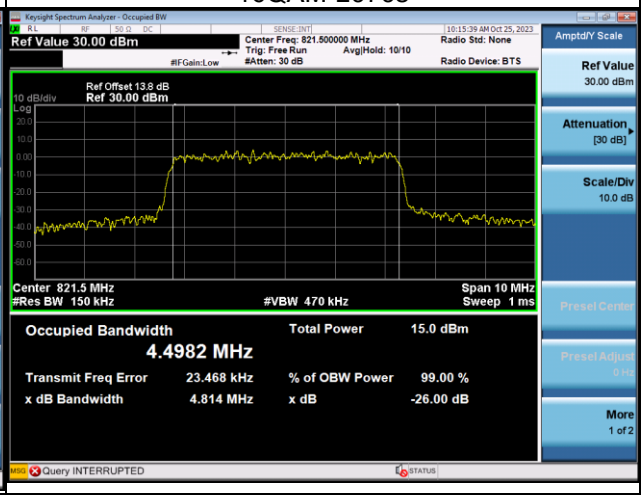
16QAM-26715

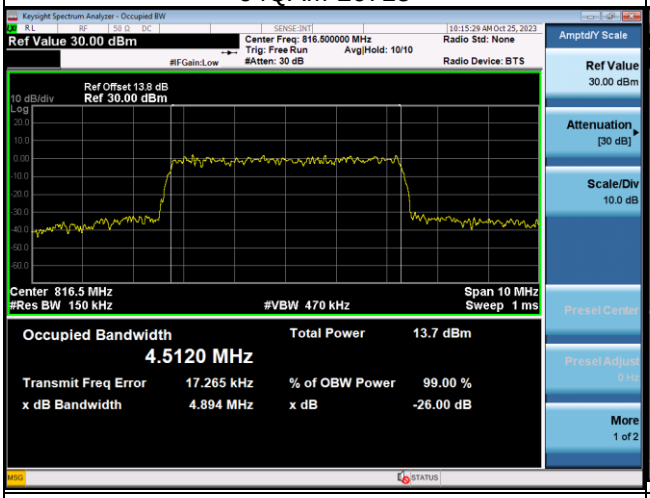
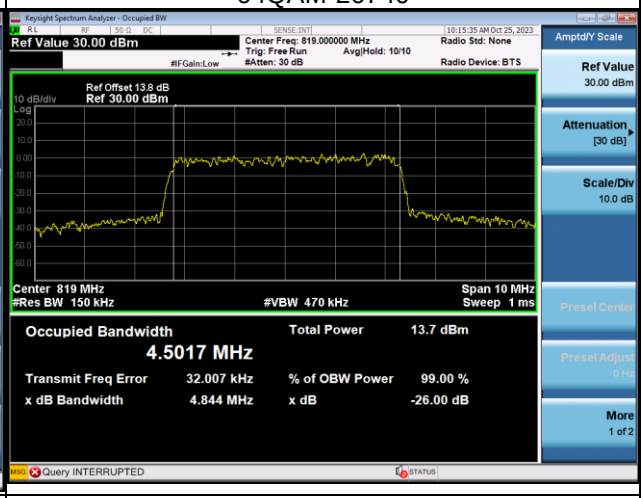
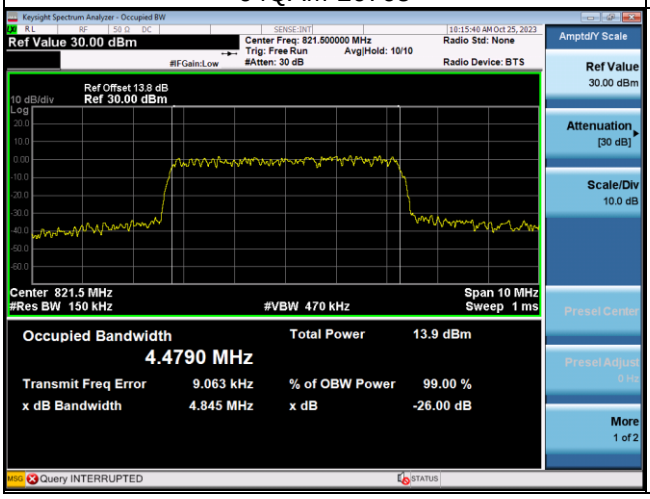


16QAM-26740



16QAM-26765

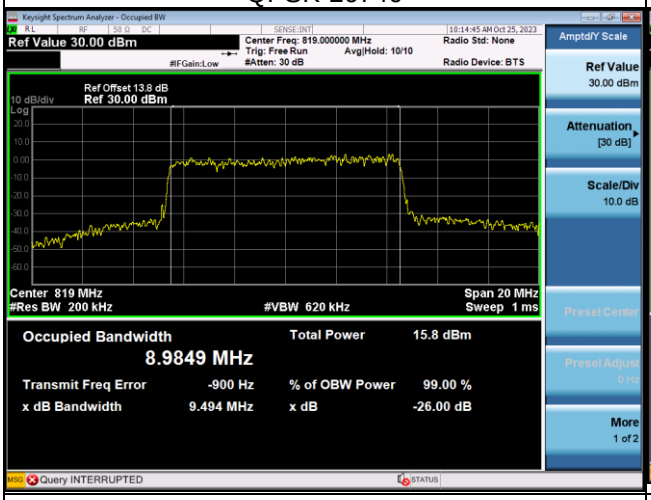


Spectrum Plot	
64QAM-26715	64QAM-26740
	
64QAM-26765	-
	-

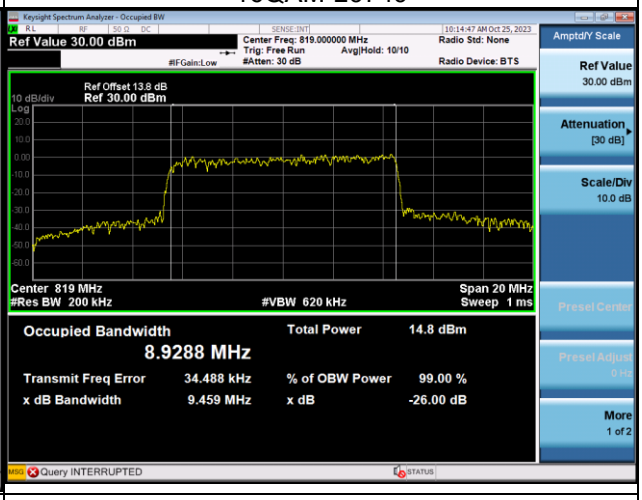
LTE Band 26_10M					
QPSK					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
26740	819	8.9849	26740	819	9.494
16QAM					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
26740	819	8.9288	26740	819	9.459
64QAM					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
26740	819	8.9849	26740	819	9.494

Spectrum Plot

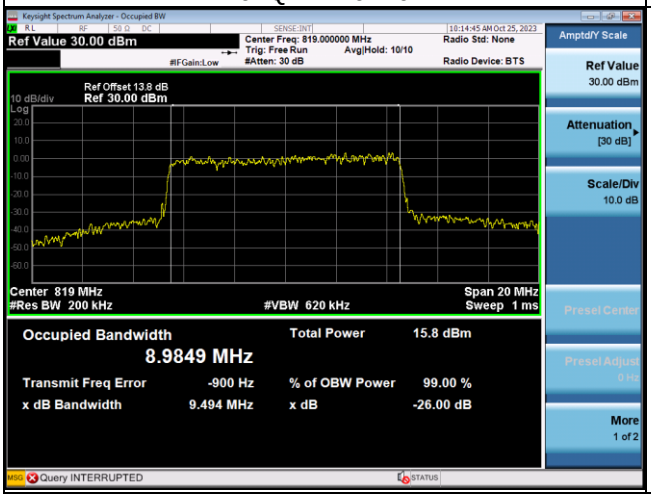
QPSK-26740



16QAM-26740



64QAM-26740



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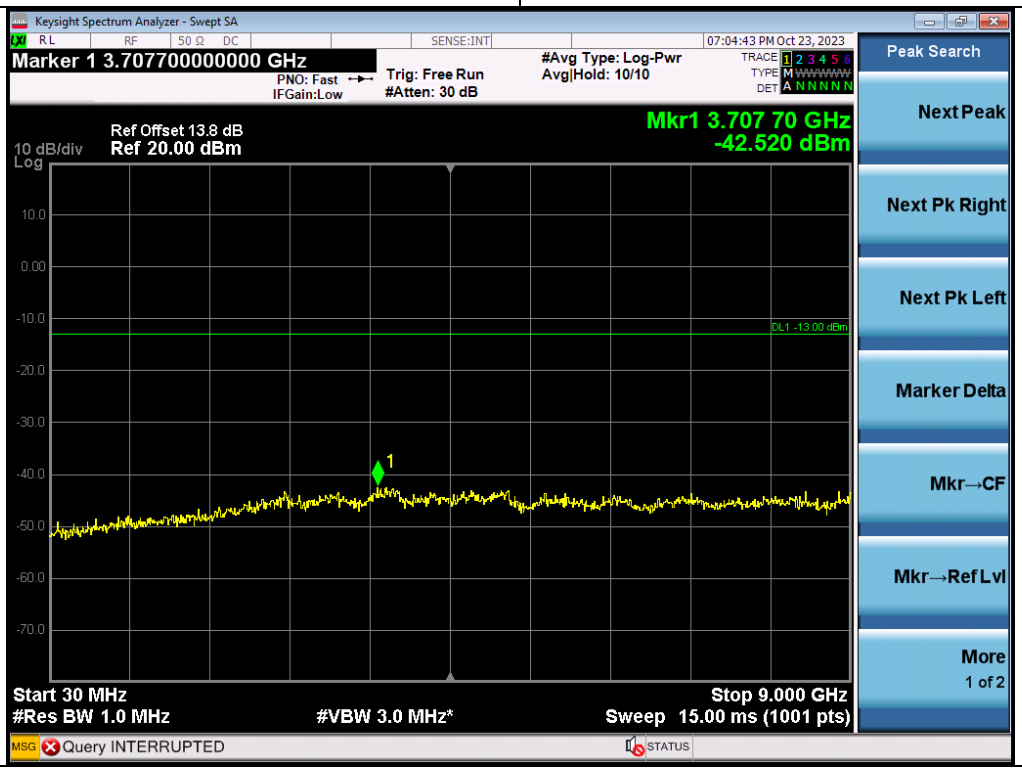
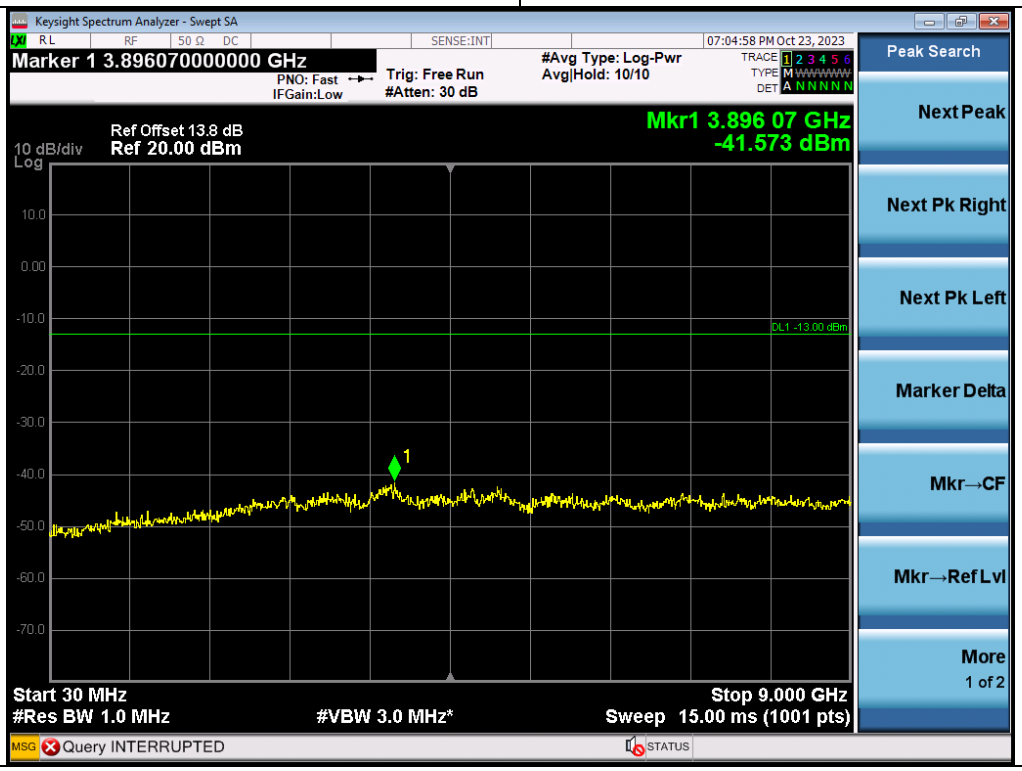
APPENDIX C CONDUCTED SPURIOUS EMISSION

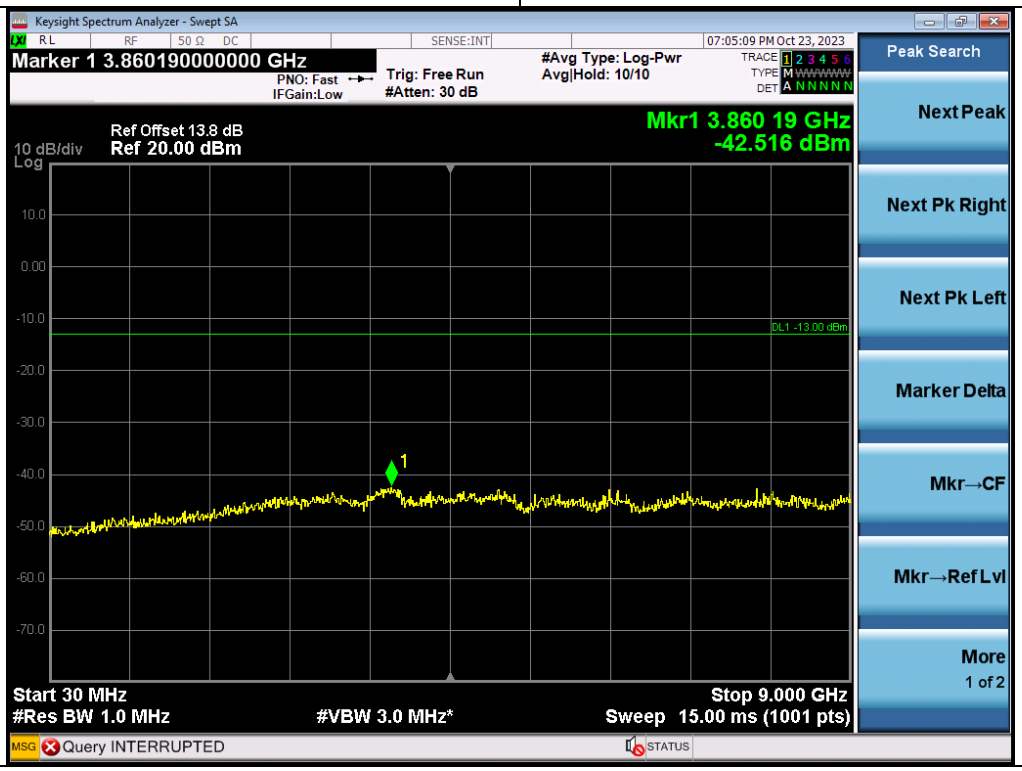
LTE Band 26_1.4M Spectrum Plot	
Channel	Frequency(MHz)
26740	819



LTE Band 26_5M Spectrum Plot	
Channel	Frequency(MHz)
26740	819

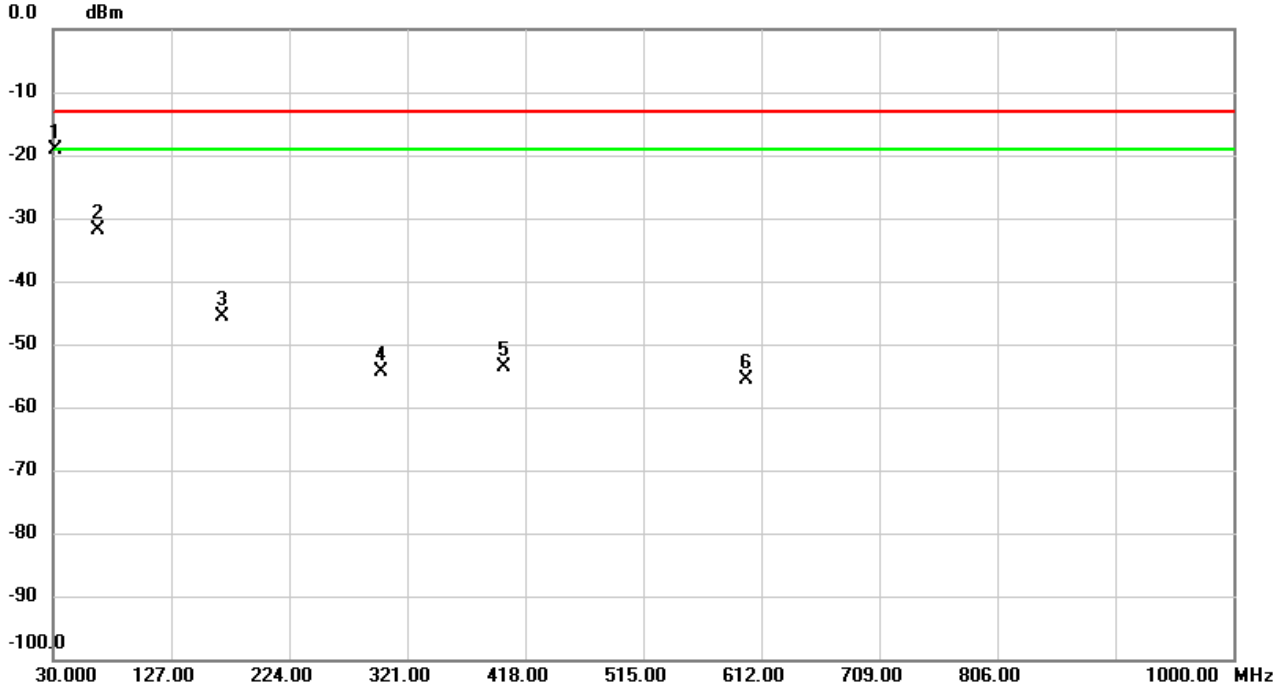


LTE Band 26_10M Spectrum Plot	
Channel	Frequency(MHz)
26740	819



APPENDIX D RADIATED SPURIOUS EMISSIONS

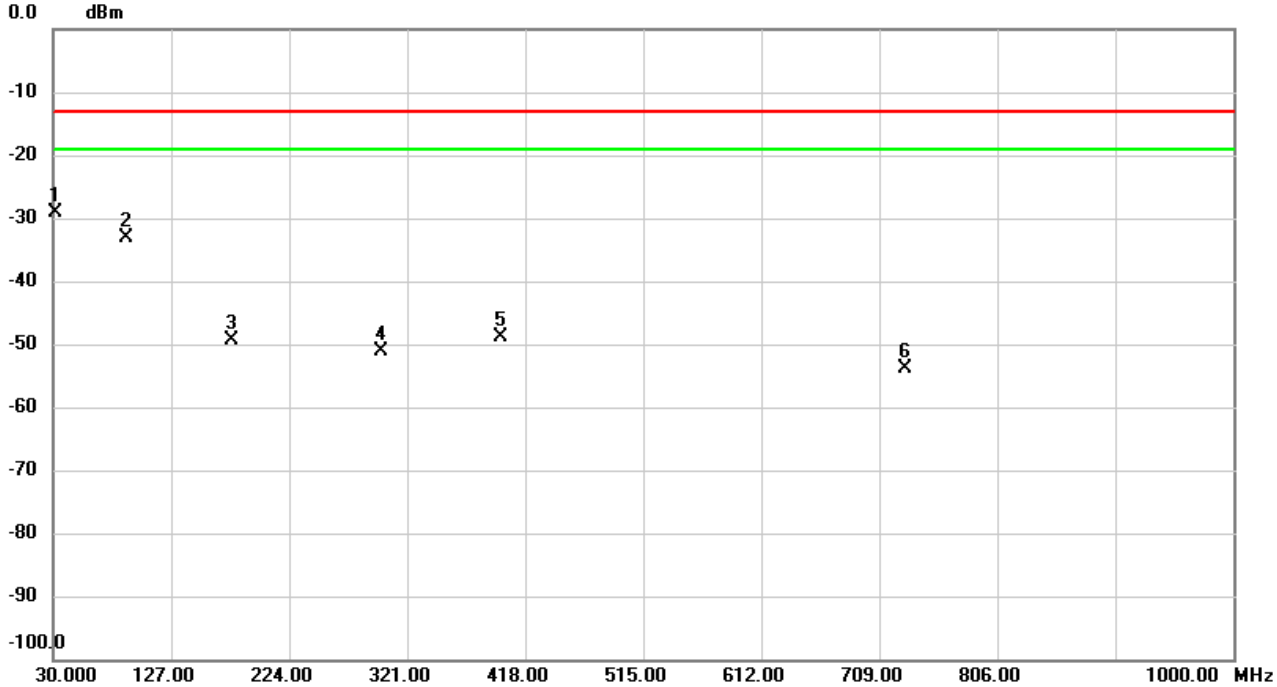
Test Mode	LTE Band 26	Test Date	2023/3/29
Test Channel	CH26865	Polarization	Vertical
Temp	24°C	Hum.	63%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	31.4227	-40.43	21.32	-19.11	-13.00	-6.11	peak	
2		66.2780	-48.87	17.12	-31.75	-13.00	-18.75	peak	
3		168.5160	-62.29	16.60	-45.69	-13.00	-32.69	peak	
4		299.9510	-63.58	9.30	-54.28	-13.00	-41.28	peak	
5		399.9257	-62.09	8.57	-53.52	-13.00	-40.52	peak	
6		600.0043	-66.32	10.68	-55.64	-13.00	-42.64	peak	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

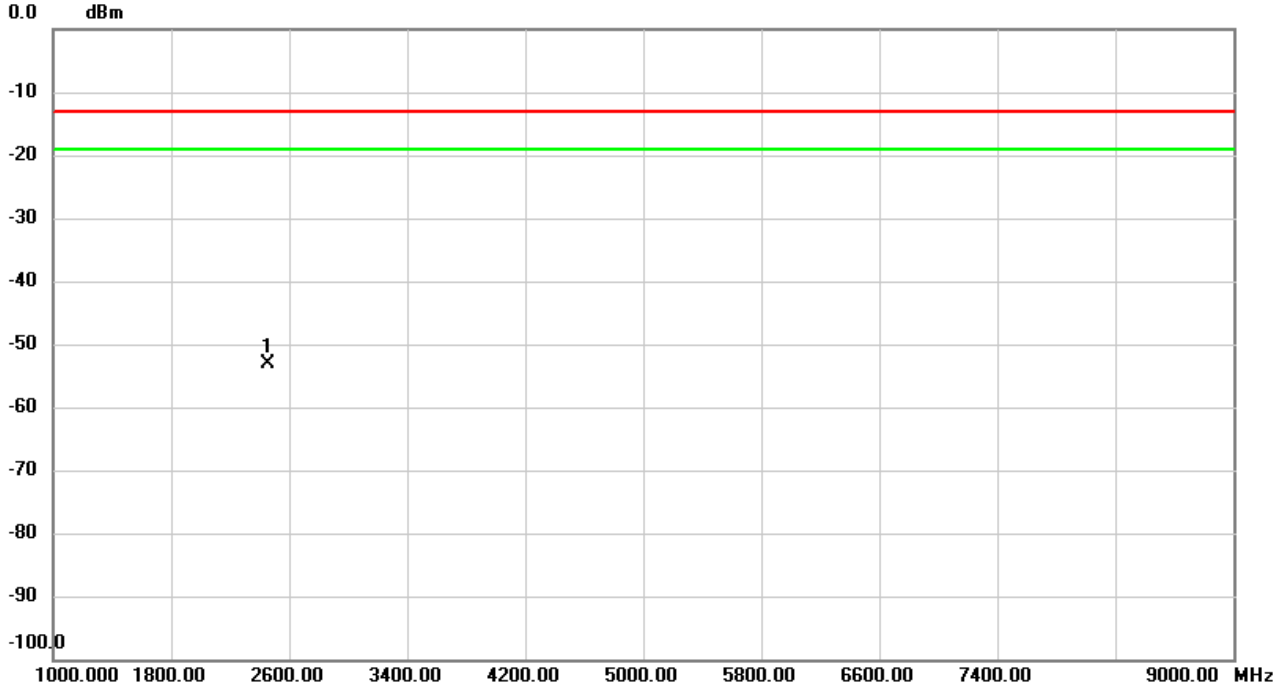
Test Mode	LTE Band 26	Test Date	2023/3/29
Test Channel	CH26865	Polarization	Horizontal
Temp	24°C	Hum.	63%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	31.4227	-52.88	23.86	-29.02	-13.00	-16.02	peak	
2		90.3340	-48.29	15.16	-33.13	-13.00	-20.13	peak	
3		177.4077	-60.79	11.31	-49.48	-13.00	-36.48	peak	
4		299.9510	-57.56	6.36	-51.20	-13.00	-38.20	peak	
5		398.3090	-57.24	8.39	-48.85	-13.00	-35.85	peak	
6		730.3400	-63.00	9.10	-53.90	-13.00	-40.90	peak	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

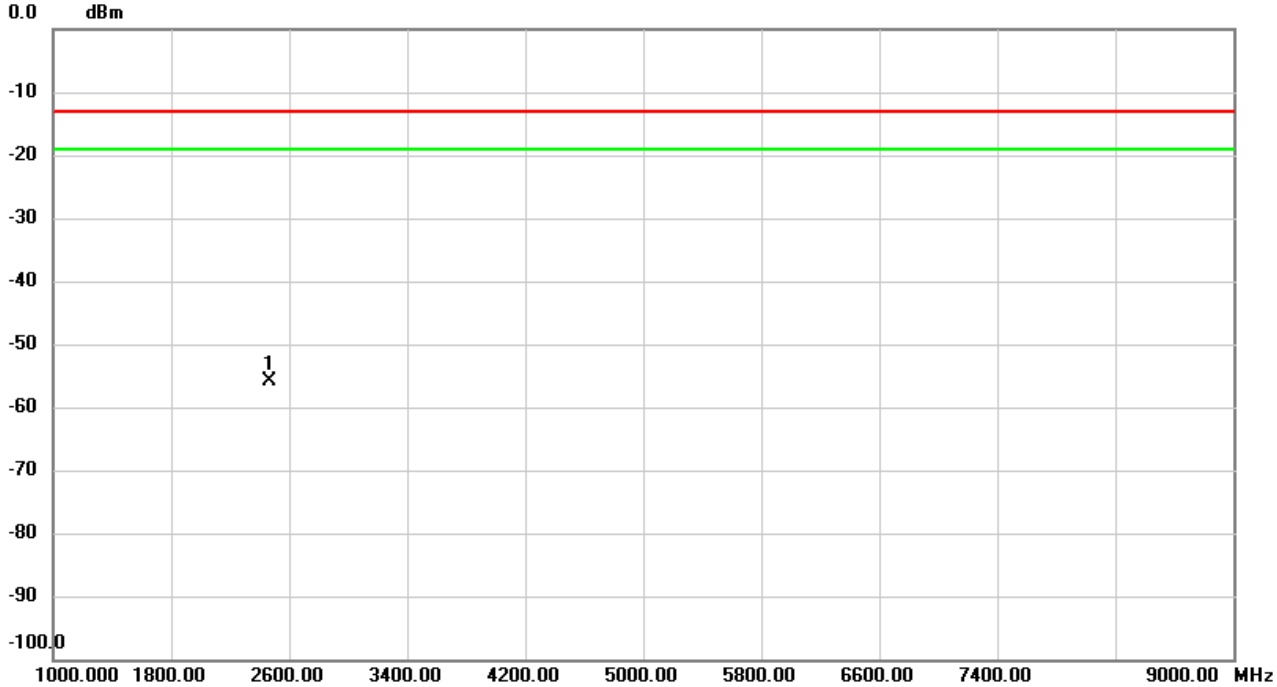
Test Mode	LTE Band 26	Test Date	2023/3/27
Test Channel	CH26765	Polarization	Vertical
Temp	22°C	Hum.	66%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	2461.333	-59.42	6.21	-53.21	-13.00	-40.21	peak	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

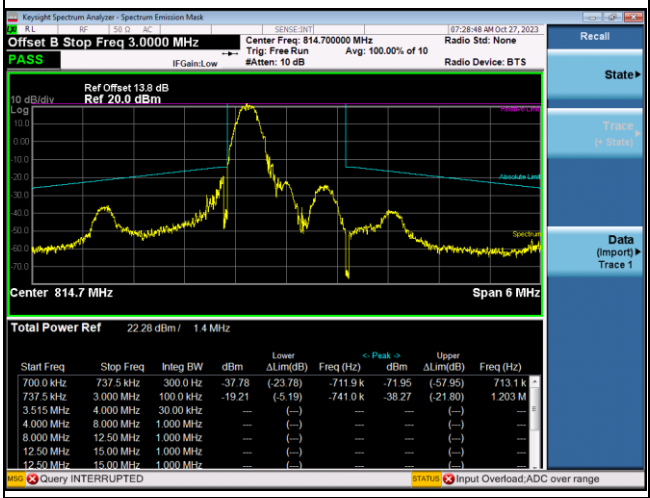
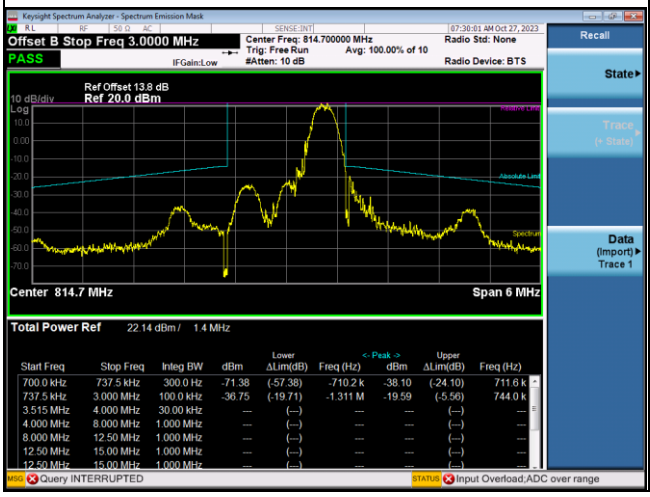
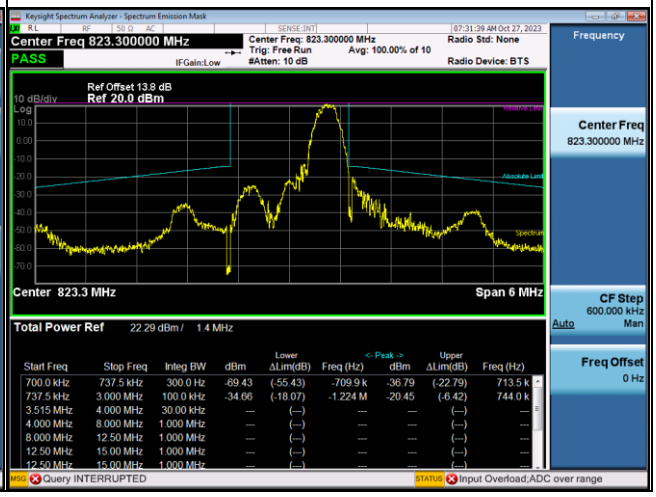
Test Mode	LTE Band 26	Test Date	2023/3/27
Test Channel	CH26765	Polarization	Horizontal
Temp	22°C	Hum.	66%

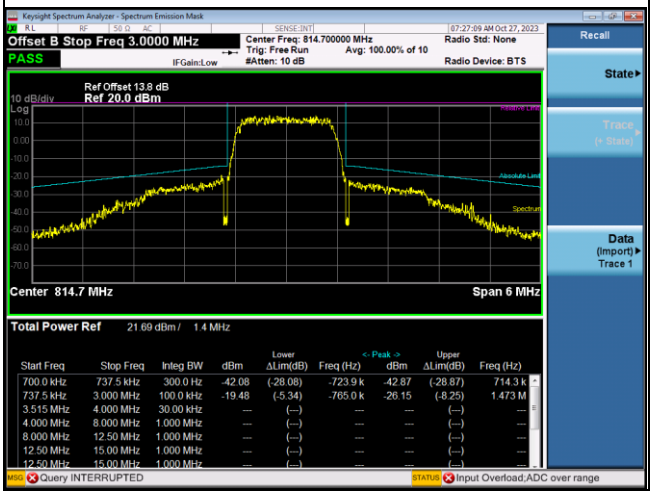
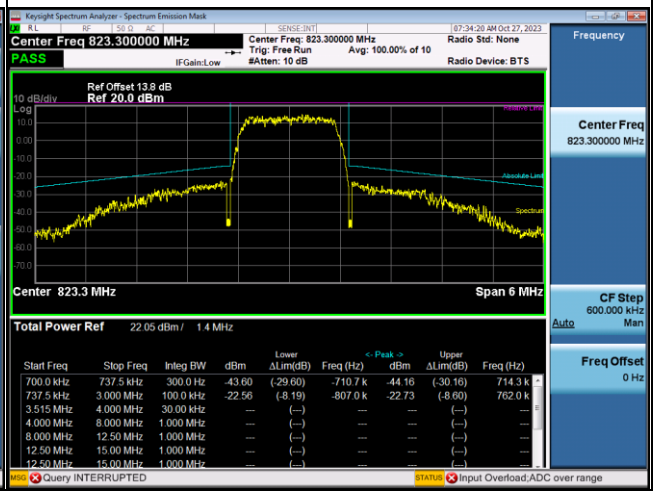


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	2465.000	-61.99	6.24	-55.75	-13.00	-42.75	peak	

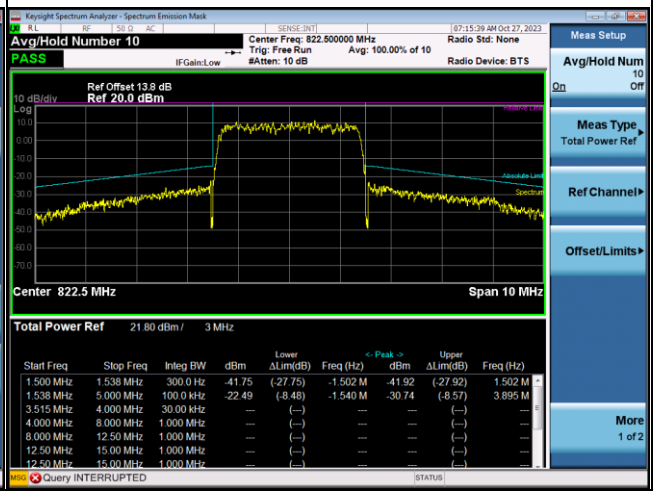
REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

APPENDIX E MASK

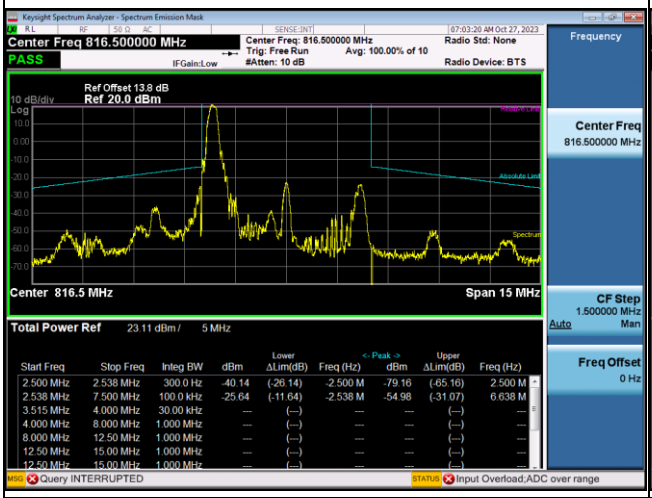
LTE Band 26_1.4M			
1RB#0			
Channel	26697	Channel	26783
			
1RB#5			
Channel	26697	Channel	26783
			

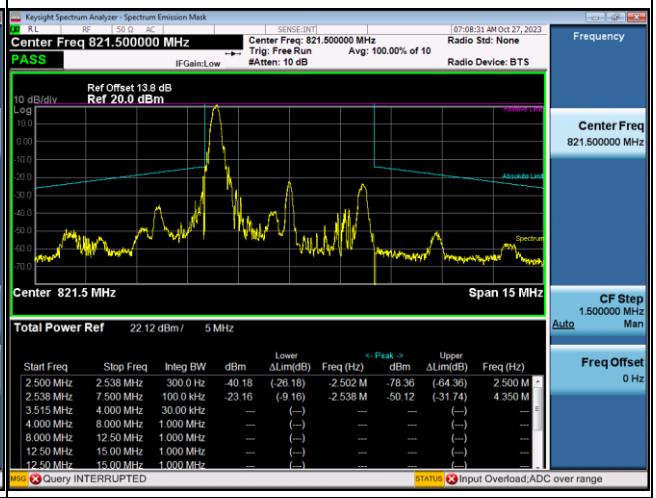
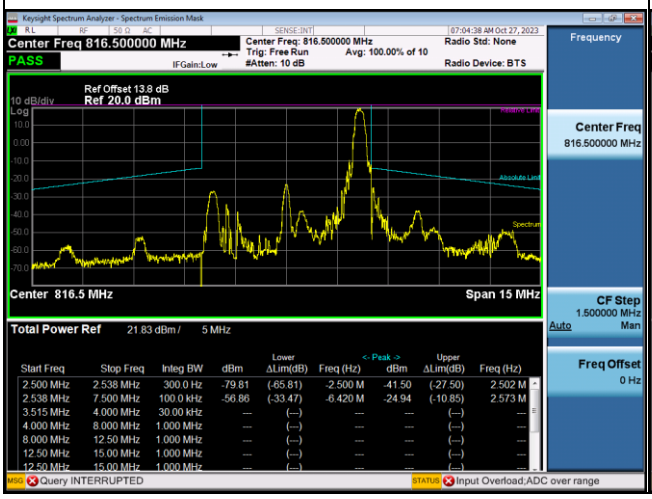
6RB#0			
Channel	26697	Channel	26783
			

LTE Band 26_3M			
1RB#0			
Channel	26705	Channel	26775
1RB#14			
Channel	26705	Channel	26775

15RB#0			
Channel	26705	Channel	26775
			

LTE Band 26_5M			
1RB#0			
Channel	26715	Channel	26765





1RB#24			
Channel	26715	Channel	26765