TEST REPORT

Reference No.	:	WTD21D06062214W001
FCC ID	:	2AG32EG8013LM11EUD
Applicant	:	Baicells Technologies Co., Ltd.
Address	:	9-10F, 1st Bldg., No.81 Beiqing Road, Haidian District, Beijing, China
Manufacturer	:	Baicells Technologies Co., Ltd.
Address	:	9-10F, 1st Bldg., No.81 Beiqing Road, Haidian District, Beijing, China
Product	:	LTE Outdoor CPE
Model(s)	:	EG8013L-M11-EUD
Brand Name	:	Baicells
Standards	:	FCC CFR Title 47 Part 2 FCC CFR Title 47 Part 96
Date of Receipt sample	:	2021-06-28
Date of Test	:	2021-06-29 to 2021-07-15
Date of Issue	:	2021-07-15
Test Result	:	**Pass**

Remarks:
The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Prepared By:
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Compiled by:

Levi Xiao / Project Engineer

Approved by:

Daniel Liu / Designated Reviewer

2 Contents

3 Revision History

Test report No.	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTD21D06062214W001	2021-06-25	2021-06-25 to 2021-07-15	2021-07-15	original	-	Valid

4 General Information

4.1 General Description of E.U.T.

Product:	LTE Outdoor CPE
Model(s):	EG8013L-M11-EUD
Model Description:	N/A
Storage Location:	Internal Storage
Device type:	End User Device

4.2 Details of E.U.T.

Operation Frequency:	LTE Band 48:3550MHz-3700MHz
Type of Modulation:	LTE: Uplink: QPSK, 16QAM, 64QAM;Downlink: QPSK, 16QAM, 64QAM
Antenna installation:	LTE: Internal antenna
Antenna Gain:	14dBi
Ratings:	DC 24V 0.5A

4.3 Channel List

Normal

10MHz		15MHz	
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
Low	3555	Low	3557.5
Middle	3625	Middle	3625
High	3695	High	3692.5
20MHz			
Channel	**Frequency (MHz)**		
Low	3560		
Middle	3625		
High	3690		

4.4 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Test Mode	Description
Data Mode (QPSK)	Keep the EUT in data communicating mode (QPSK). (10MHz, 15MHz, 20MHz)
Data Mode (64QAM)	Keep the EUT in data communicating mode (64QAM). (10MHz, 15MHz, 20MHz)

4.5 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:
47 CFR FCC Part 96
KDB 971168 D01 Power Meas License Digital Systems v03r01
KDB 662911 D01 Multiple Transmitter Output v02r01
KDB 940660 D01 Part 96 CBRS Eqpt v03
ANSI/TIA/EIA-603-E 2016
ANSI C63.26-2015

4.6 Test Facility

The test facility has a test site registered with the following organizations:

ISED CAB identifier: CN0013. Test Firm Registration No.: 7760A.

Waltek Testing Group Co., Ltd. Has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration number 7760A, October 15, 2016.

FCC Designation No.: CN1201. Test Firm Registration No.: 523476.

Waltek Testing Group Co., Ltd. EMC Laboratory `has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration number 523476, September 10, 2019.

5 Test Summary

Test Items	Available Channel (MHz)	Tested Channel (MHz)	Channel Bandwidth	Modulation
EIRP	3555 to 3695	3555 to 3695	10MHz	QPSK, 64QAM
	3557.5 to 3692.5	3557.5 to 3692.5	15MHz	QPSK, 64QAM
	3560 to 3690	3560 to 3690	20MHz	QPSK, 64QAM
Frequency stability	3555 to 3695	3625	10MHz	QPSK
	3557.5 to 3692.5	3625	15MHz	QPSK
	3560 to 3690	3625	20MHz	QPSK
Occupied Bandwidth	3555 to 3695	3555, 3625, 3695	10MHz	QPSK, 64QAM
	3557.5 to 3692.5	3557.5, 3625, 3692.5	15MHz	QPSK, 64QAM
	3560 to 3690	3560, 3625, 3690	20MHz	QPSK, 64QAM
Peak to Average Radio	3555 to 3695	3555, 3625, 3695	10MHz	QPSK
	3557.5 to 3692.5	3557.5, 3625, 3692.5	15MHz	QPSK
	3560 to 3690	3560, 3625, 3690	20MHz	QPSK
Emission outside the fundamental	3555 to 3695	3555, 3625, 3695	10MHz	QPSK
	3557.5 to 3692.5	3557.5, 3625, 3692.5	15MHz	QPSK
	3560 to 3690	3560, 3625, 3690	20MHz	QPSK
Out of band emission at antenna terminals	3555 to 3695	3555, 3625, 3695	10MHz	QPSK
	3557.5 to 3692.5	3557.5, 3625, 3692.5	15MHz	QPSK
	3560 to 3690	3560, 3625, 3690	20MHz	QPSK
Field Strength of Spurious Radiation	3555 to 3695	3555, 3625, 3695	10MHz	QPSK
	3557.5 to 3692.5	3557.5, 3625, 3692.5	15MHz	QPSK
	3560 to 3690	3560, 3625, 3690	20MHz	QPSK

NOTE 1: All supported modulation types were evaluated. The Worst case of QPSK was selected. Therefore, the Frequency Stability, Peak to Average Radio, Emission outside the fundamental, Out of band emission at antenna terminals and Field Strength of Spurious Radiation were presented under QPSK mode only.

NOTE 2: The duty cycle correction=10 log(1/duty cycle)=10 log(1/(1.98/4.98)) =4.02(dB)

Offset factory=ATT loss+Cable loss+Duty cycle correction=3.0+0.98+4.02=8 (dB)

6 Equipment Used during Test

6.1 Equipments List

3m Semi-anechoic Chamber for Radiation Emissions Test site 1#						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1	Spectrum Analyzer	R&S	FSP30	100091	2021-04-20	2022-04-19
2	Amplifier	Agilent	8447D	2944A10178	2021-04-20	2022-04-19
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	2020-08-22	2021-08-21
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	2021-04-20	2022-04-19
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	2021-04-25	2022-04-24
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	2021-04-20	2022-04-19
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	2021-04-20	2022-04-19
8	Coaxial Cable (above 1GHz)	ZT26-NJ-NJ-8M/FA	1GHz-18GHz	NA	2021-04-20	2022-04-19
3m Semi-anechoic Chamber for Radiation Emissions Test site 2#						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No**	**Last Calibration Date**	**Calibration Due Date**
1	Test Receiver	R&S	ESCI	101296	2021-04-20	2022-04-19
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2021-04-25	2022-04-24
3	Active Loop Antenna	Com-Power Corp.	AL-130R	10160007	2021-05-06	2022-05-05
4	Amplifier	ANRITSU	MH648A	M43381	2021-04-20	2022-04-19
5	Cable	HUBER+SUHNER	CBL2	525178	2021-04-20	2022-04-19
RF Conducted Testing						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1.	EMC Analyzer (9k~26.5GHz)	Agilent	E7405A	MY45114943	2021-04-20	2022-04-19
2.	Spectrum Analyzer	R&S	FSP30	100091	2021-04-20	2022-04-19
3.	EXA Signal Analyzer	Malaysia Keysight	N9010A	MY50520207	2021-04-20	2022-04-19

6.2 Measurement Uncertainty

Parameter	Uncertainty
Conducted Emission	± 3.64 dB(AC mains 150KHz~30MHz)
Radiated Spurious Emissions	± 5.08 dB (Bilog antenna 30M~1000MHz)
	± 5.47 dB (Horn antenna 1000M~25000MHz)
Radio Frequency	± 1 x 10^{-7}Hz
RF Power	± 0.42 dB
RF Power Density	± 0.7dB
Conducted Spurious Emissions	± 2.76 dB (9kHz~26500MHz)
Confidence interval：95%. Confidence factor:k=2	

6.3 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

7 Max EIRP and maximum spectral density

Test Requirement: FCC part96.41(b)

Test Method: ANSI/TIA-603-E:2016, ANSI C63.26:2015

Test Mode: Data communicating mode

Limit:

Device	Maximum EIRP(dBm/10MHz)	Maximum PSD(dBm/MHz)
End User Device	23	n/a
Category A CBSD	30	20
Category B CBSD	47	37

7.1 EUT Operation

Operating Environment :

Temperature: 22.4 °C

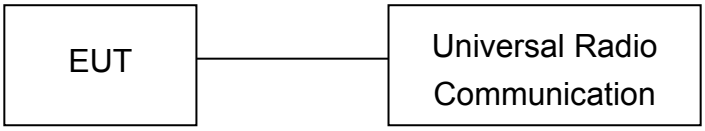
Humidity: 52.2 % RH

Atmospheric Pressure: 101.3kPa

7.2 Test Procedure

Conducted method for 10M&15M&20M bandwidth:

The RF output of the transmitter was connected to the wireless test set and the spectrum analyzer through sufficient attenuation.



For Maximum EIRP
1. Connect the transmitter to the spectrum analyzer via coaxial cable while ensuring proper impedance matching.
2. Set span to 2 × to 3 × the OBW.
3. Set RBW = 1% to 5% of the OBW.
4. Set VBW ≥ 3 × RBW.
5. Set number of measurement points in sweep ≥ 2 × span / RBW.
6. Sweep time:
   1) Set = auto-couple, or
   2) Set ≥ [10 × (number of points in sweep) × (transmission symbol period)] for single sweep (automation-compatible) measurement.
7. Detector = power averaging (rms).
8. Set sweep trigger to “free run.”
9. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over the on and off time of the transmitter, it can be necessary to increase the number of traces to be averaged above 100, or if using a manually configured sweep time, increase the sweep time.
10. Compute power by integrating the spectrum across the OBW(10MHz) of the signal using the instrument’s band or channel power measurement function with band/channel limits set equal to the OBW(10MHz) band edges.
11. Add 10 log (1/duty cycle) to the measured power level to compute the average power during continuous transmission.
12. EIRP = PMeas + GT.

PMeas measured transmitter output power
GT gain of the transmitting antenna.

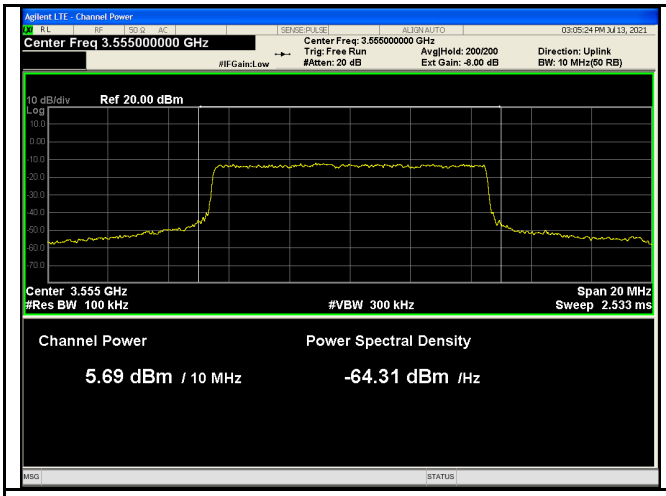
7.3 Test Result

Transmit Output Power								
Bandwidth (MHz)	Modulation	Test Channel	Chain 0 Output Power (dBm/10MHz)	Chain 1 Output Power (dBm/10MHz)	Total Power (dBm/10MHz)	Antenna Gain (dBi)	EIRP (dBm/10MHz)	EIRP Limit (dBm/10MHz)
10	QPSK	Low	5.69	5.68	8.70	14	22.70	23
		Middle	5.76	5.85	8.82	14	**22.82**	
		High	5.45	5.71	8.59	14	22.59	
	64QAM	Low	4.84	4.50	7.68	14	21.68	
		Middle	4.67	4.72	7.71	14	21.71	
		High	4.92	4.91	7.93	14	**21.93**	

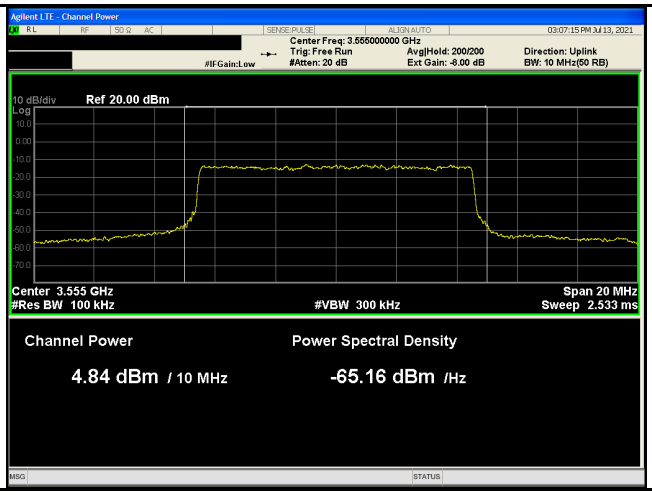
Transmit Output Power								
Bandwidth (MHz)	Modulation	Test Channel	Chain 0 Output Power (dBm/10MHz)	Chain 1 Output Power (dBm/10MHz)	Total Power (dBm/10MHz)	Antenna Gain (dBi)	EIRP (dBm/10MHz)	EIRP Limit (dBm/10MHz)
15	QPSK	Low	4.64	4.85	7.76	14	21.76	23
		Middle	4.43	4.16	7.31	14	21.31	
		High	4.51	4.89	7.71	14	21.71	
	64QAM	Low	3.50	3.68	6.60	14	20.60	
		Middle	3.43	3.89	6.68	14	20.68	
		High	3.69	3.53	6.62	14	20.62	
Full Transmit Output Power								
Bandwidth (MHz)	Modulation	Test Channel	Chain 0 Output Power (dBm/15MHz)	Chain 1 Output Power (dBm/15MHz)	Total Power (dBm/15MHz)	Antenna Gain (dBi)	EIRP (dBm/15MHz)	EIRP Limit (dBm/15MHz)
15	QPSK	Low	5.38	5.51	8.46	14	22.46	-
		Middle	5.12	5.14	8.14	14	22.14	
		High	5.82	5.43	8.64	14	**22.64**	
	64QAM	Low	4.32	4.14	7.24	14	21.24	
		Middle	4.27	4.38	7.34	14	**21.34**	
		High	4.08	4.12	7.11	14	21.11	

Transmit Output Power								
Bandwidth (MHz)	**Modulation**	**Test Channel**	**Chain 0 Output Power (dBm/10MHz)**	**Chain 1 Output Power (dBm/10MHz)**	**Total Power (dBm/10MHz)**	**Antenna Gain (dBi)**	**EIRP (dBm/10MHz)**	**EIRP Limit (dBm/10MHz)**
20	QPSK	Low	3.87	4.04	6.97	14	20.97	23
		Middle	3.97	3.76	6.88	14	20.88	
		High	3.91	4.03	6.98	14	20.98	
	64QAM	Low	3.36	3.14	6.26	14	20.26	
		Middle	2.89	3.03	5.97	14	19.97	
		High	2.85	3.14	6.01	14	20.01	
Full Transmit Output Power								
Bandwidth (MHz)	**Modulation**	**Test Channel**	**Chain 0 Output Power (dBm/20MHz)**	**Chain 1 Output Power (dBm/20MHz)**	**Total Power (dBm/20MHz)**	**Antenna Gain (dBi)**	**EIRP (dBm/20MHz)**	**EIRP Limit (dBm/20MHz)**
20	QPSK	Low	5.78	5.68	8.74	14	**22.74**	-
		Middle	5.33	5.47	8.41	14	22.41	
		High	5.55	5.78	8.68	14	22.68	
	64QAM	Low	4.87	5.16	8.03	14	**22.03**	
		Middle	4.48	4.54	7.52	14	21.52	
		High	4.59	4.22	7.42	14	21.42	

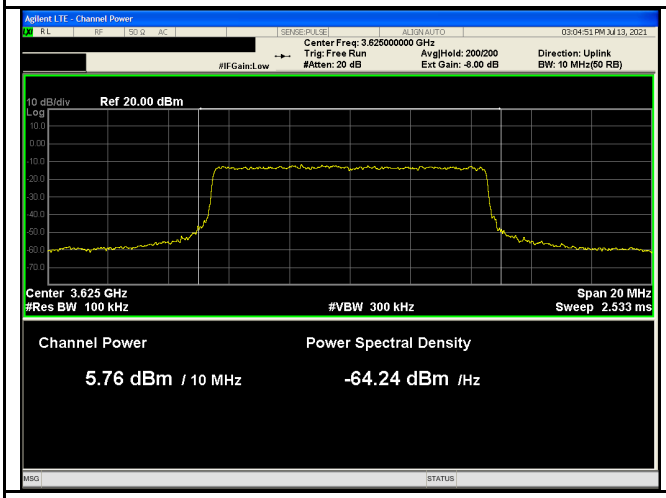
Transmit Output Power Test Plots
Chain 0



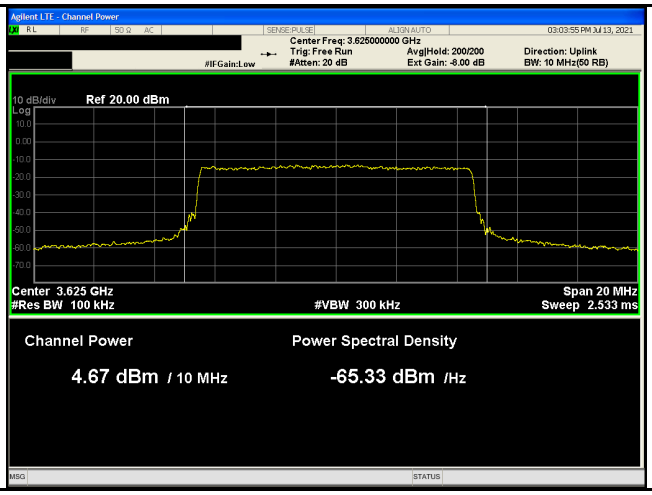
10MHz - Low CH QPSK



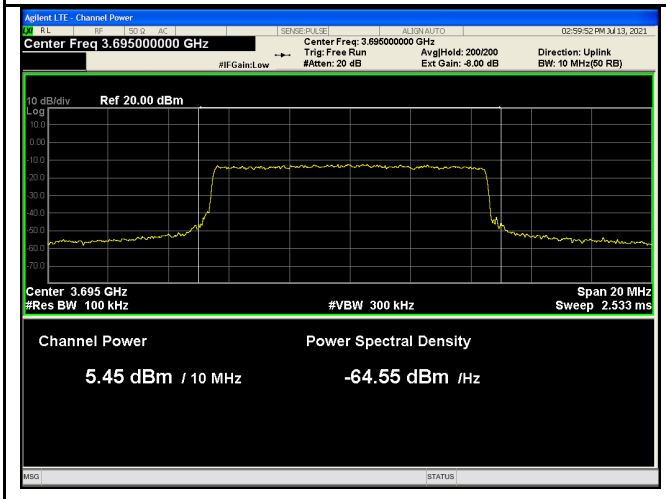
10MHz - Low CH 64QAM



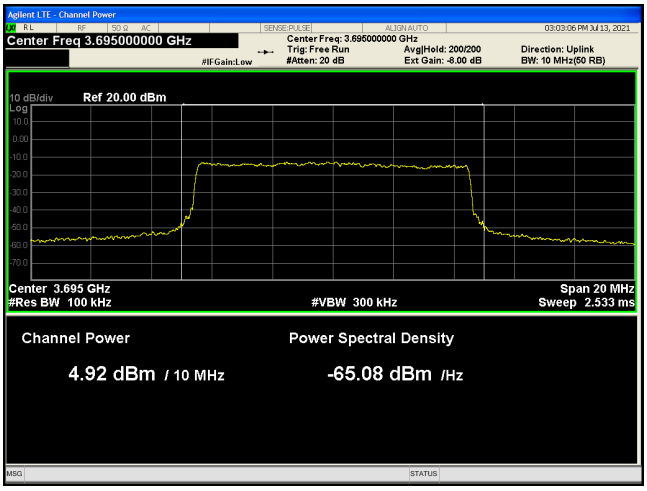
10MHz - Middle CH QPSK



10MHz - Middle CH 64QAM

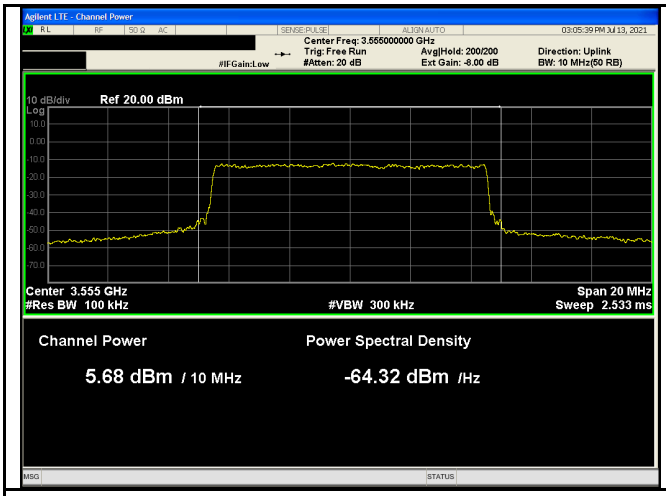


10MHz - High CH QPSK

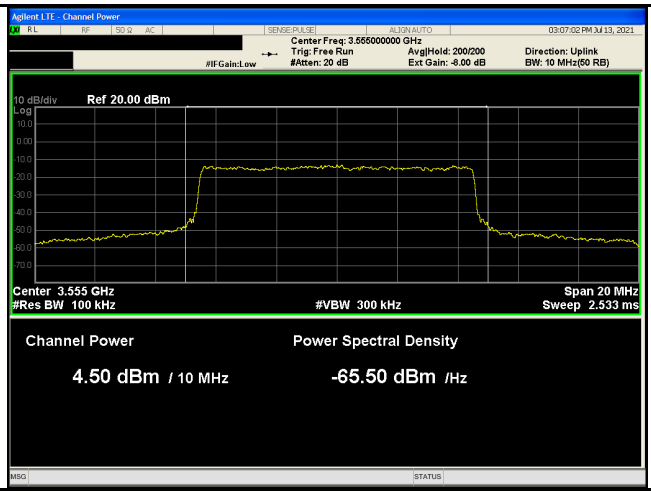


10MHz - High CH 64QAM

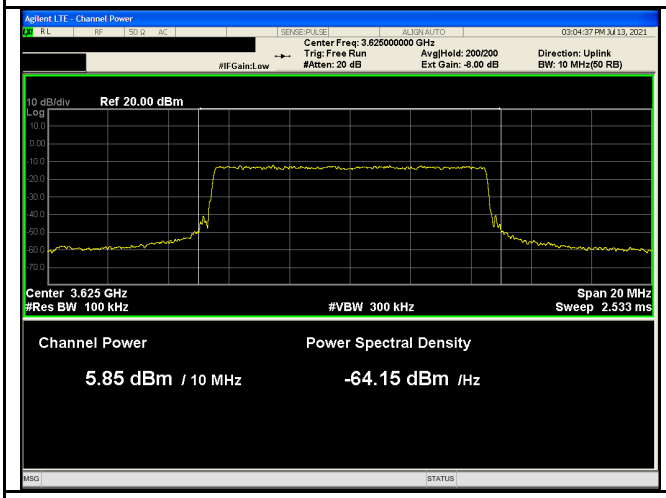
Chain 1



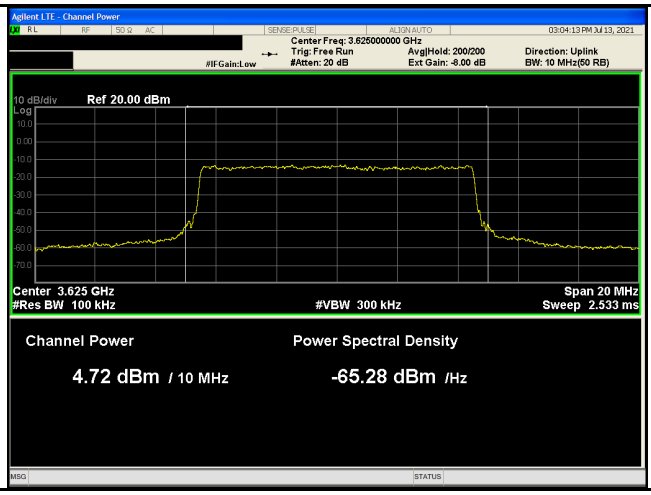
10MHz - Low CH QPSK



10MHz - Low CH 64QAM



10MHz - Middle CH QPSK



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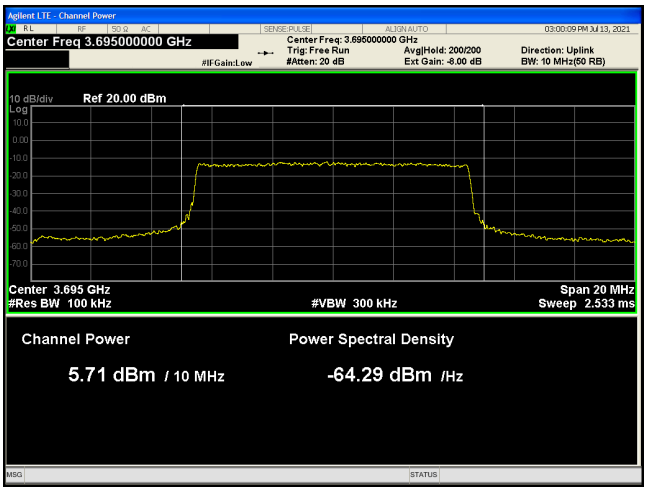
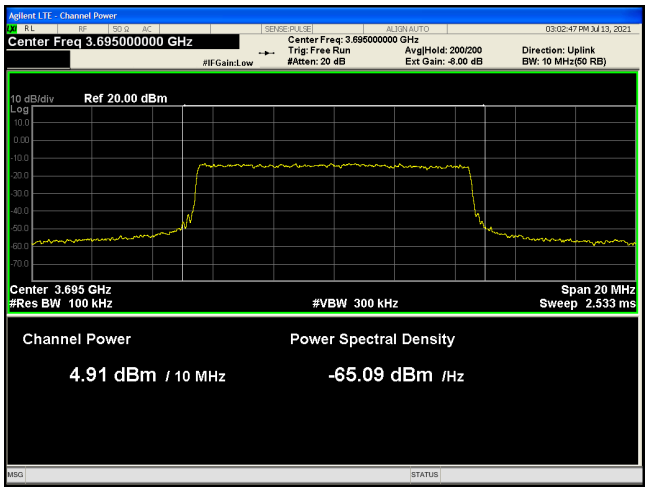
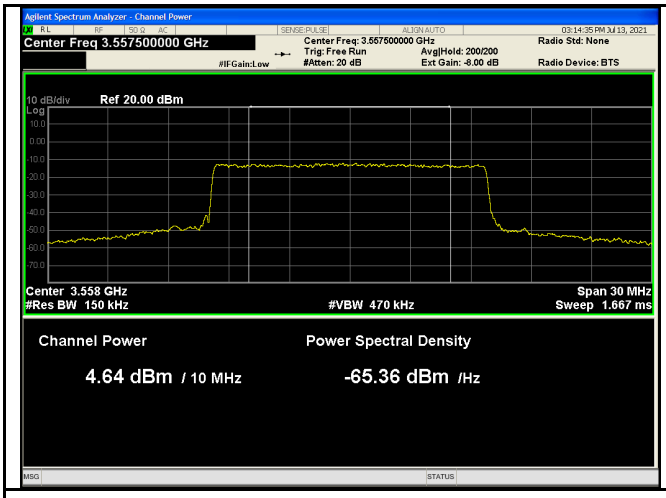


10MHz - High CH QPSK

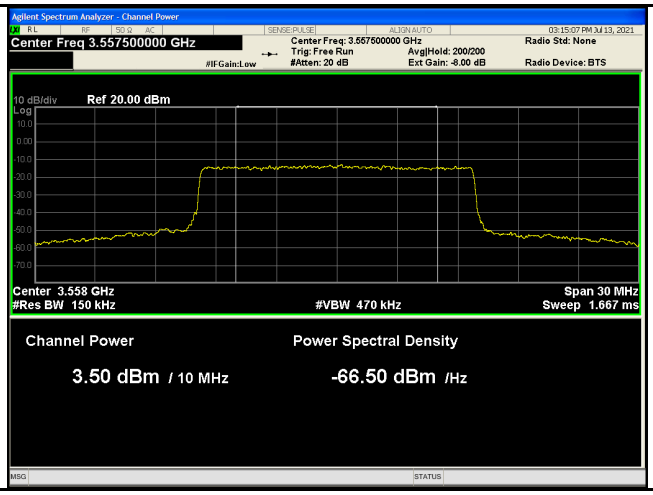


10MHz - High CH 64QAM

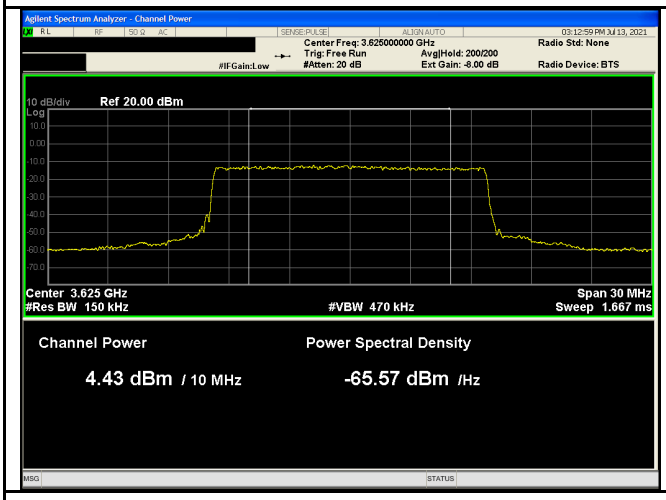
Chain 0



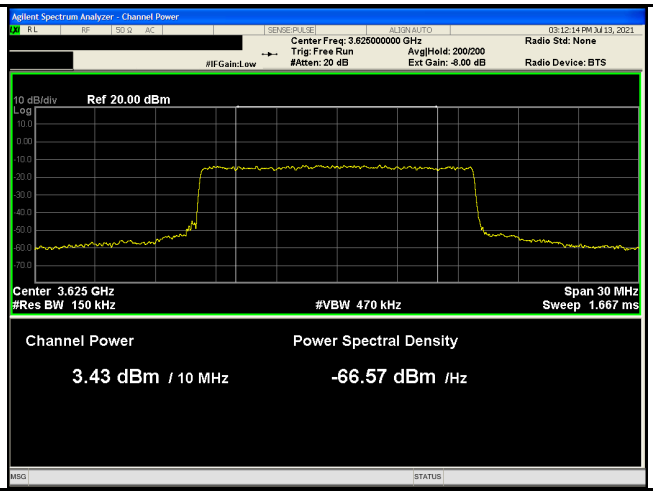
15MHz - Low CH QPSK



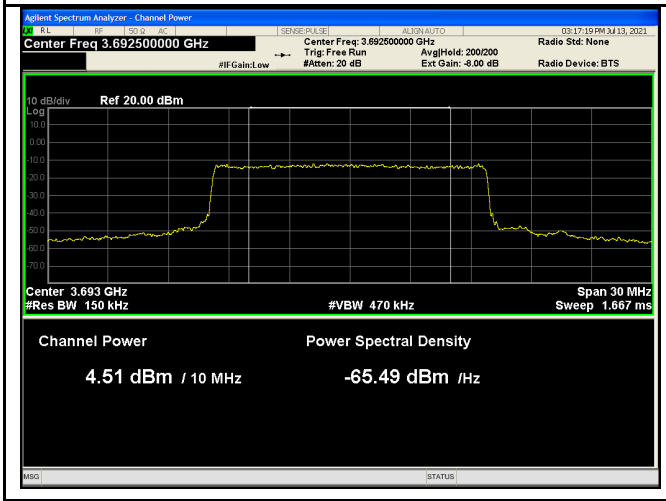
15MHz - Low CH 64QAM



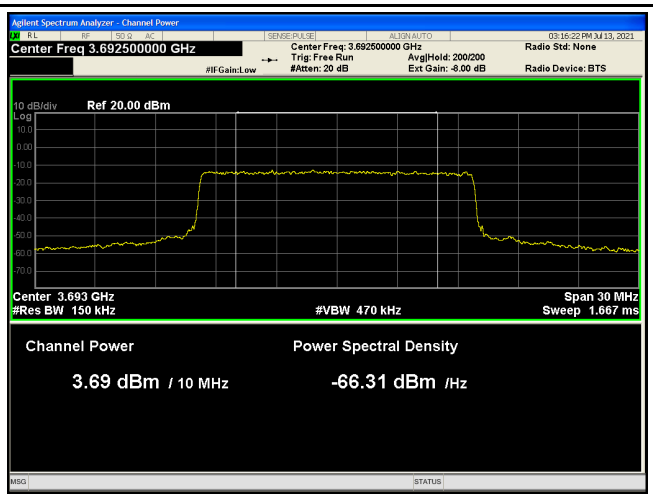
15MHz - Middle CH QPSK



15MHz - Middle CH 64QAM

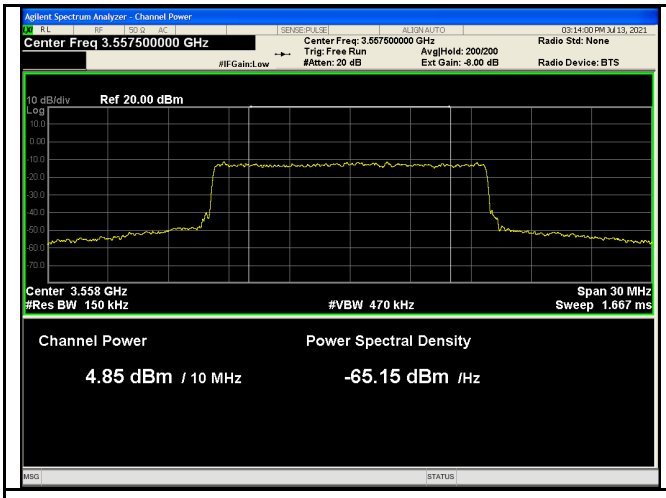


15MHz - High CH QPSK

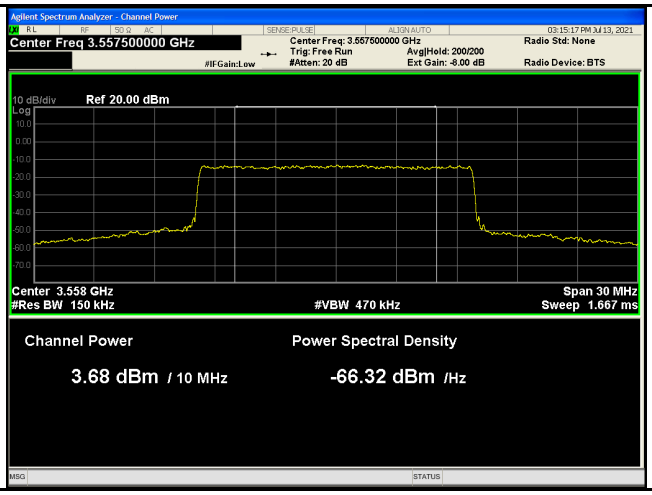


15MHz - High CH 64QAM

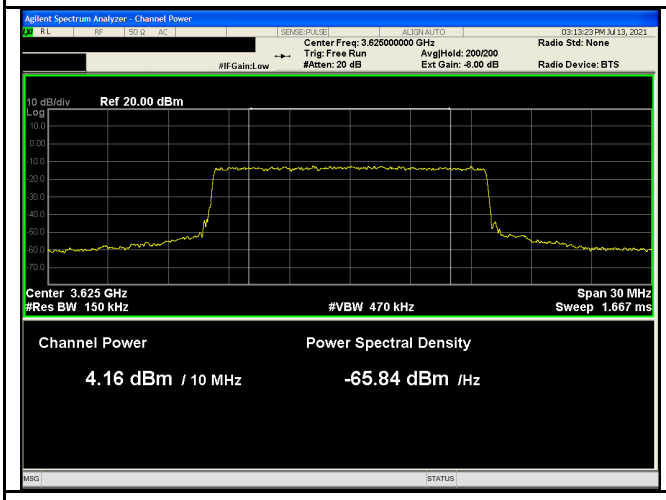
Chain 1



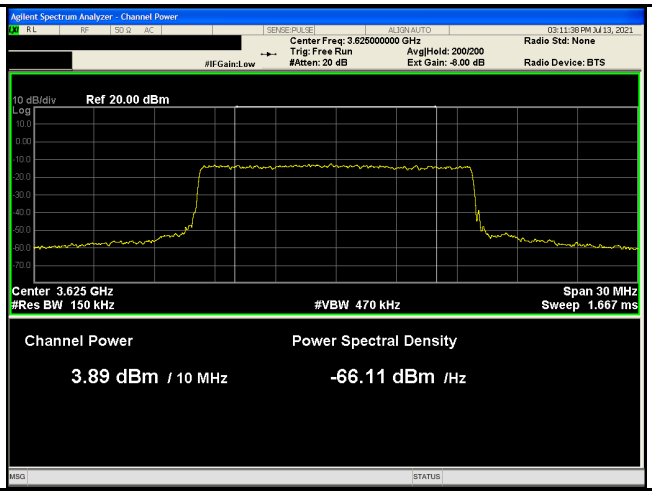
15MHz - Low CH QPSK



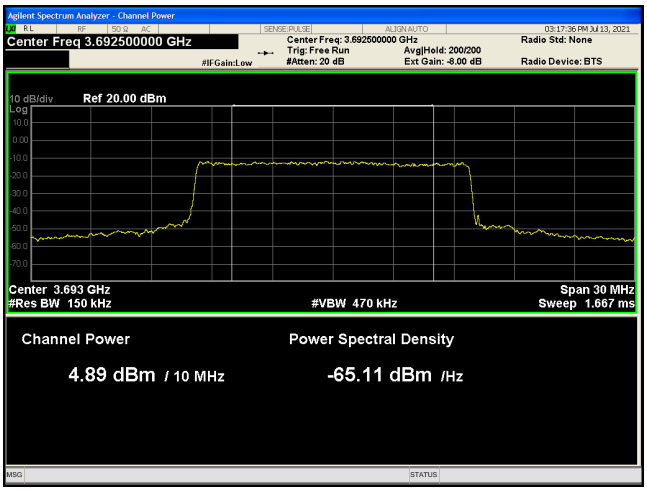
15MHz - Low CH 64QAM



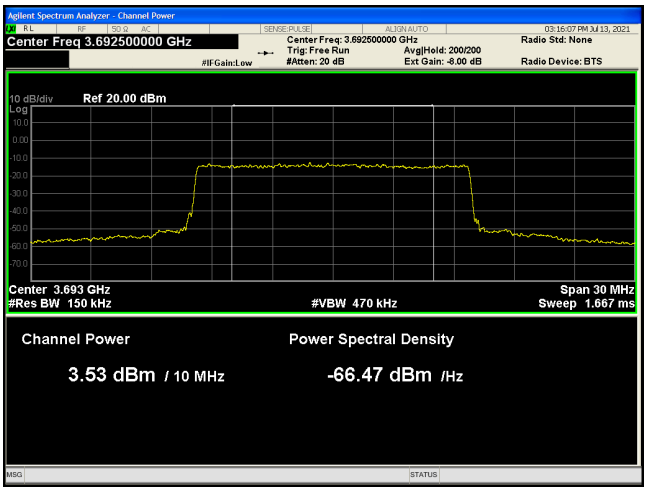
15MHz - Middle CH QPSK



15MHz - Middle CH 64QAM

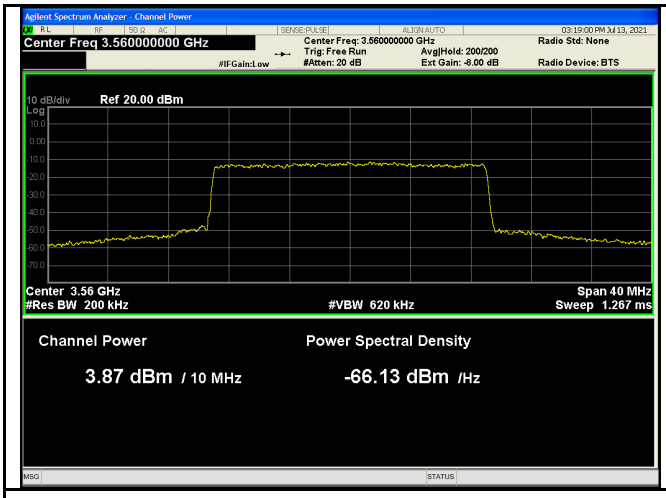


15MHz - High CH QPSK

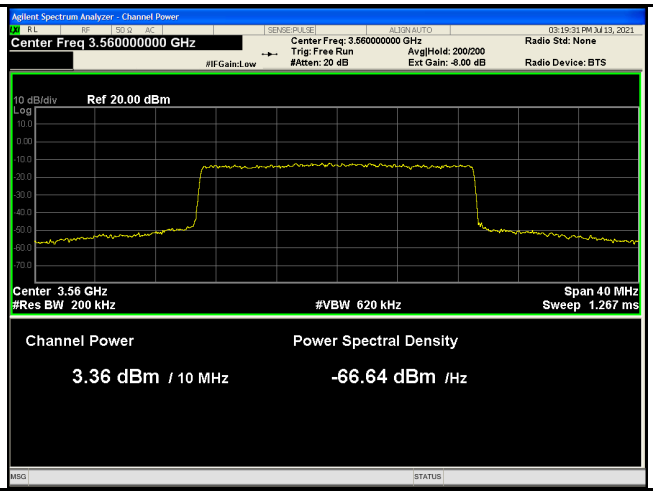


15MHz - High CH 64QAM

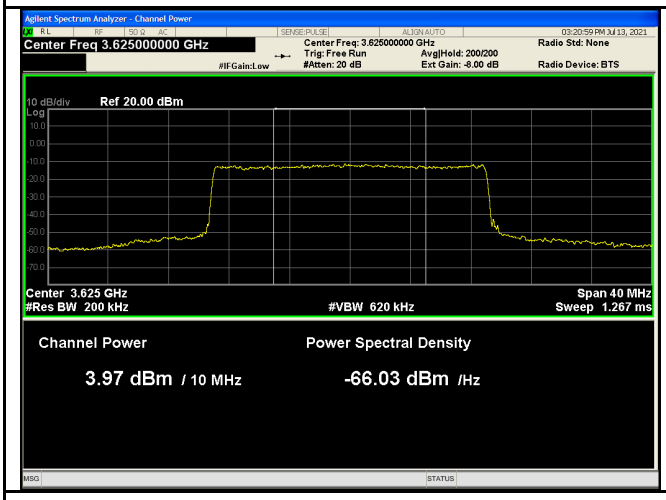
Chain 0



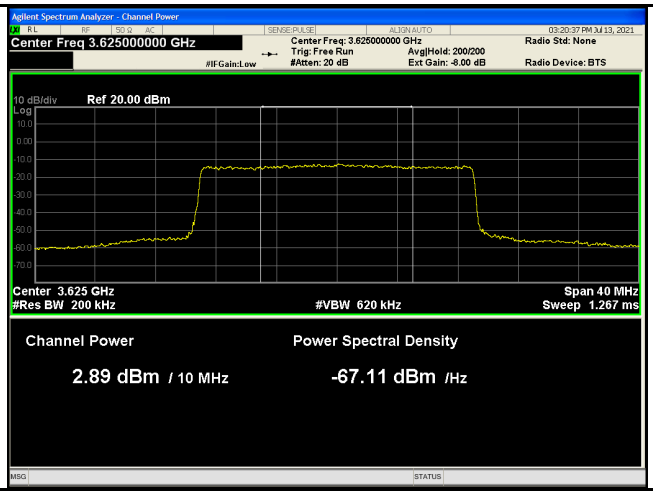
20MHz - Low CH QPSK



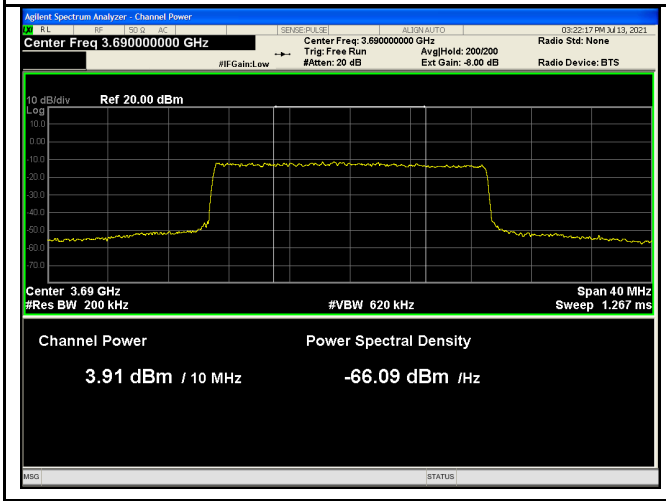
20MHz - Low CH 64QAM



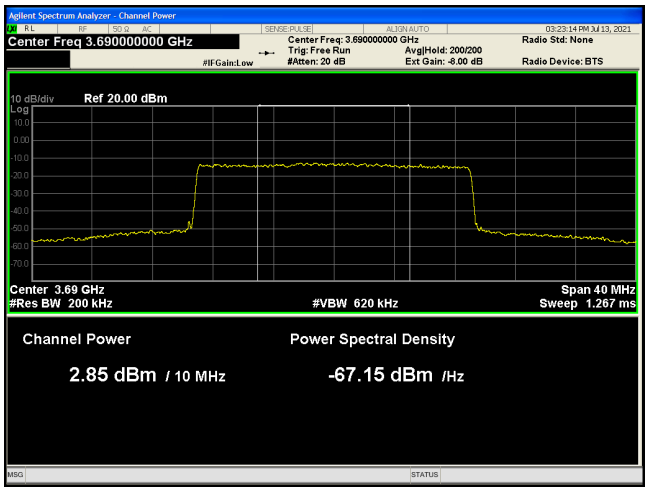
20MHz - Middle CH QPSK



20MHz - Middle CH 64QAM

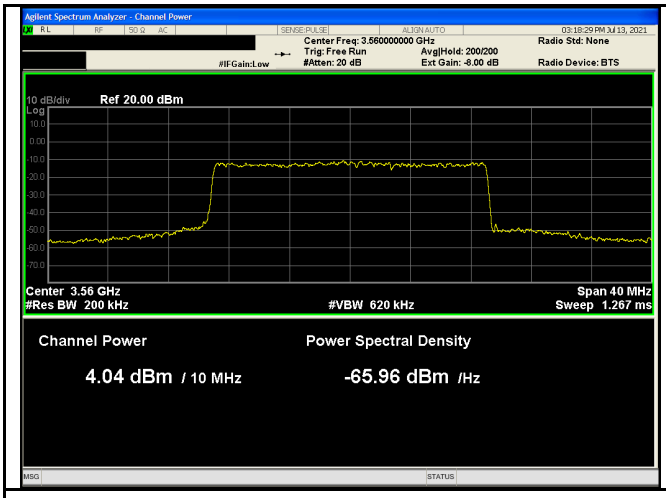


20MHz - High CH QPSK

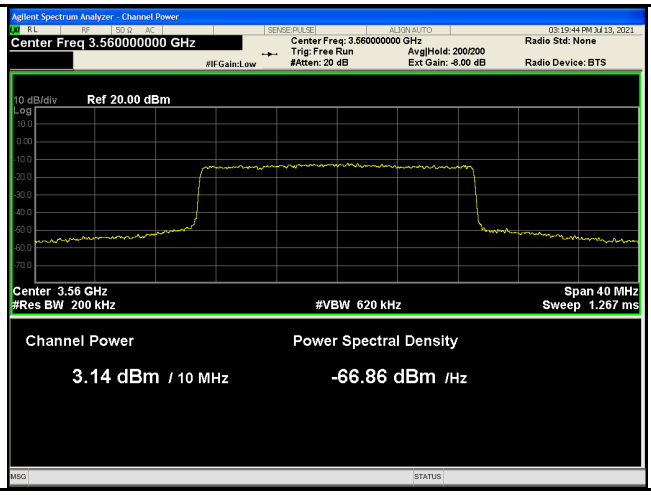


20MHz - High CH 64QAM

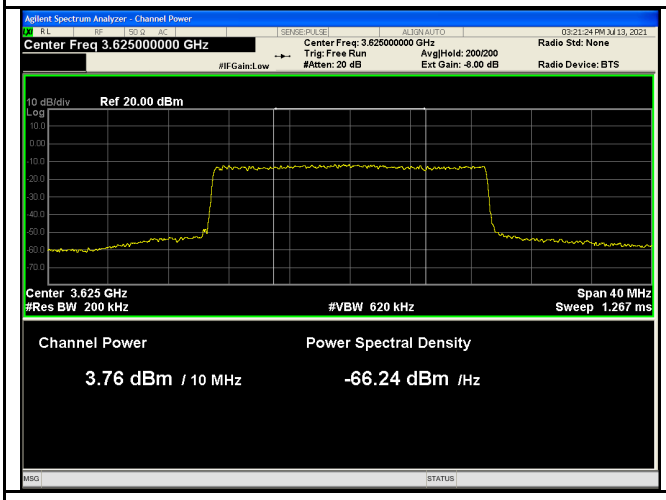
Chain 1



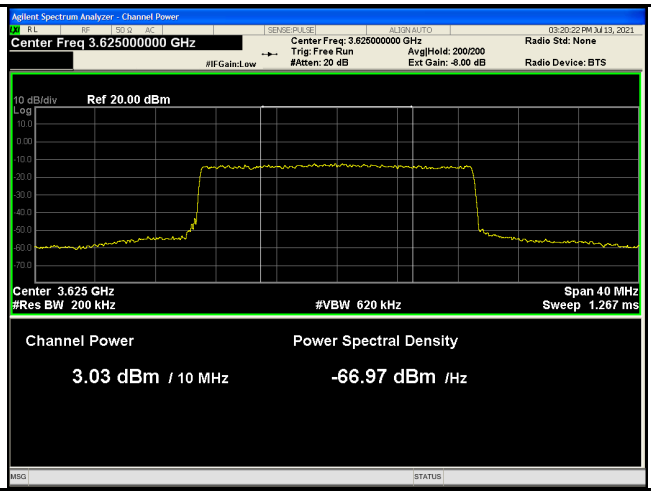
20MHz - Low CH QPSK



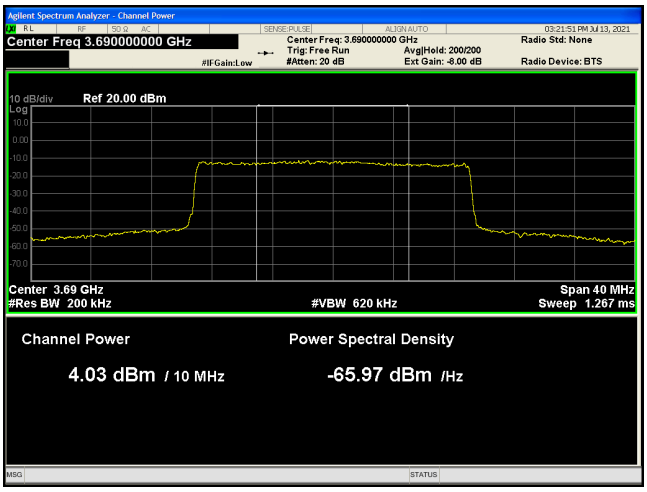
20MHz - Low CH 64QAM



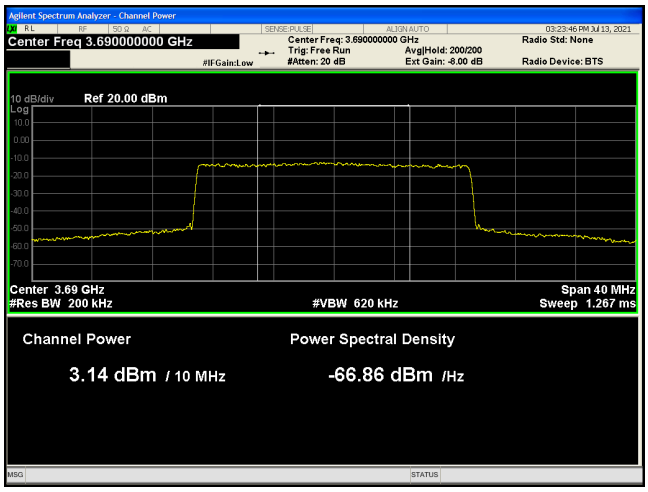
20MHz - Middle CH QPSK



20MHz - Middle CH 64QAM

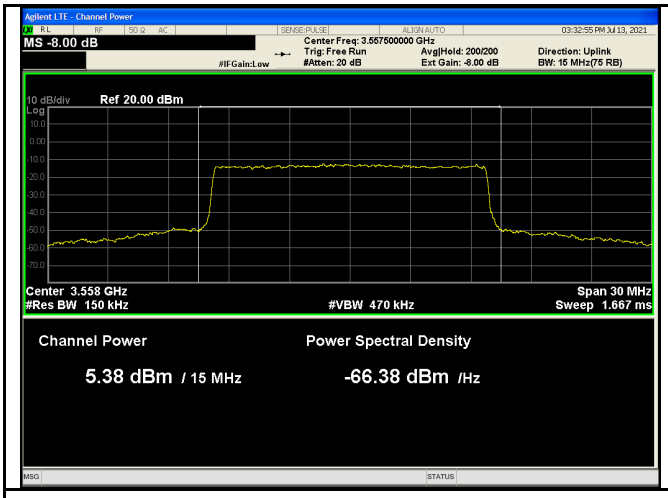


20MHz - High CH QPSK

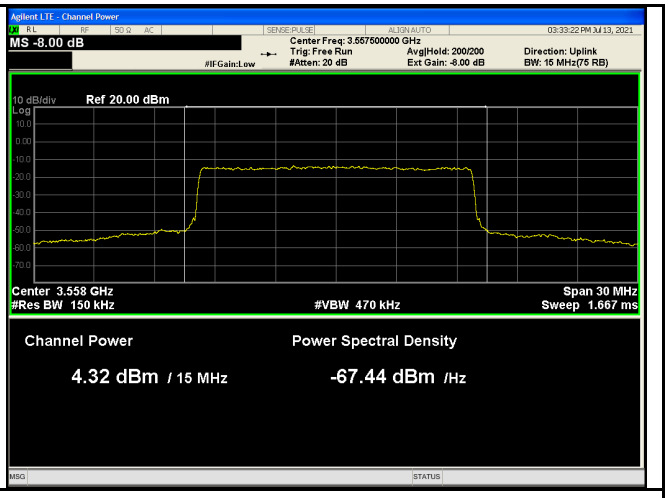


20MHz - High CH 64QAM

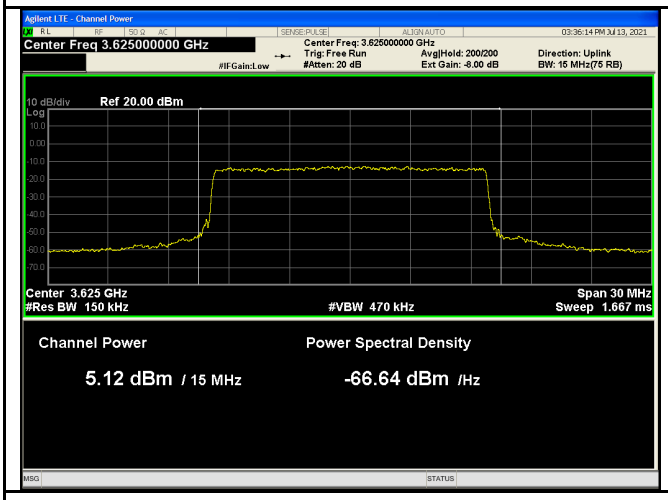
Full Transmit Output Power Test Plots
Chain 0



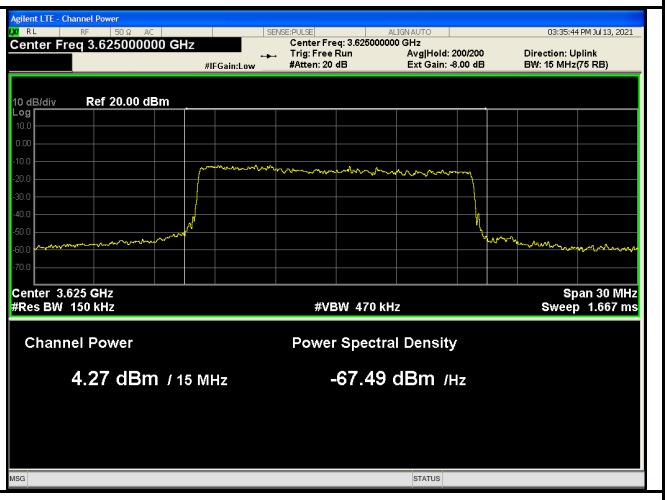
15MHz - Low CH QPSK



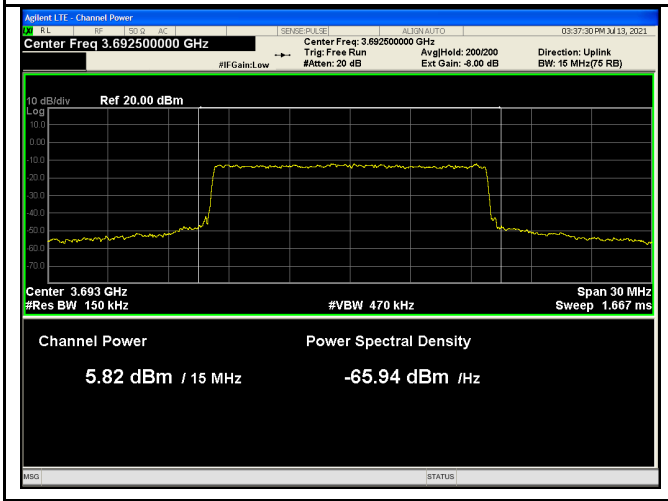
15MHz - Low CH 64QAM



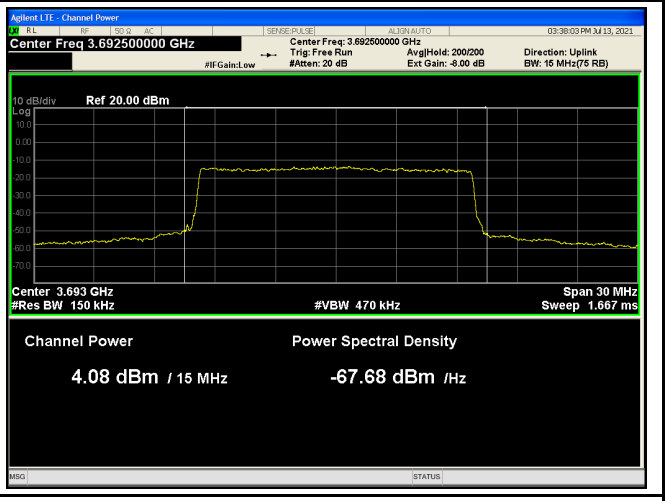
15MHz - Middle CH QPSK



15MHz - Middle CH 64QAM

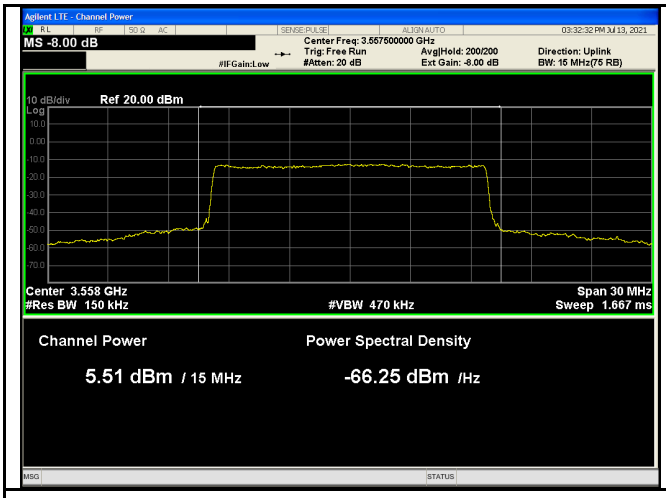


15MHz - High CH QPSK

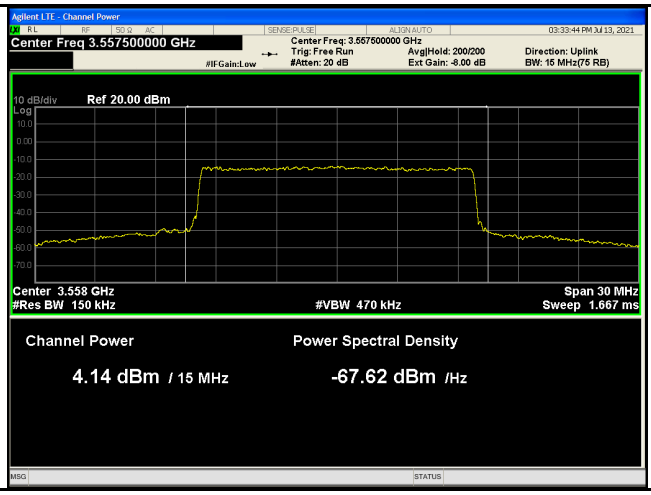


15MHz - High CH 64QAM

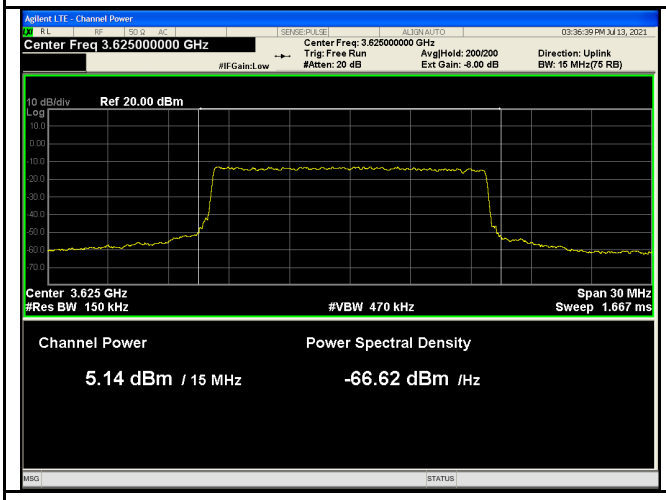
Chain 1



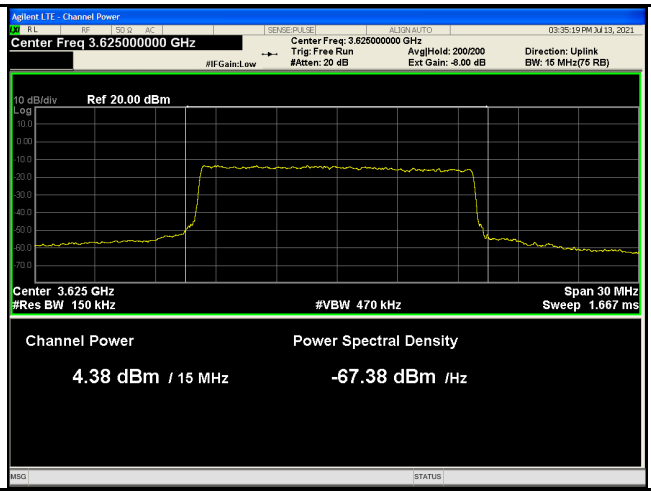
15MHz - Low CH QPSK



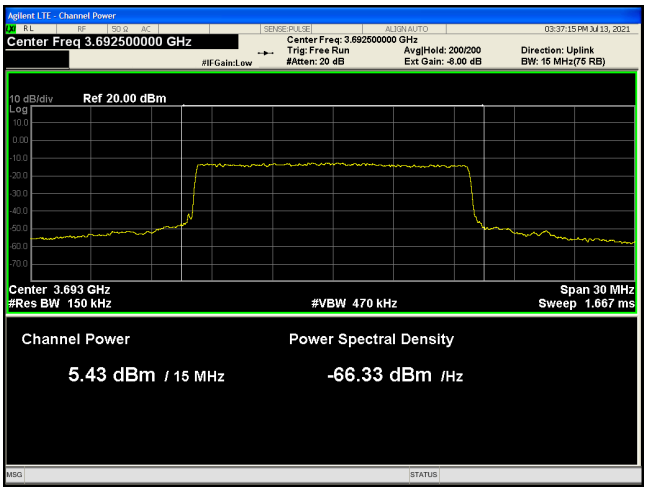
15MHz - Low CH 64QAM



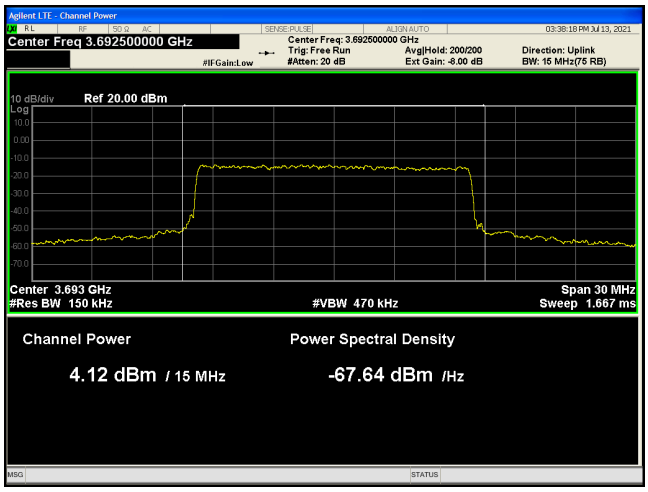
15MHz - Middle CH QPSK



15MHz - Middle CH 64QAM

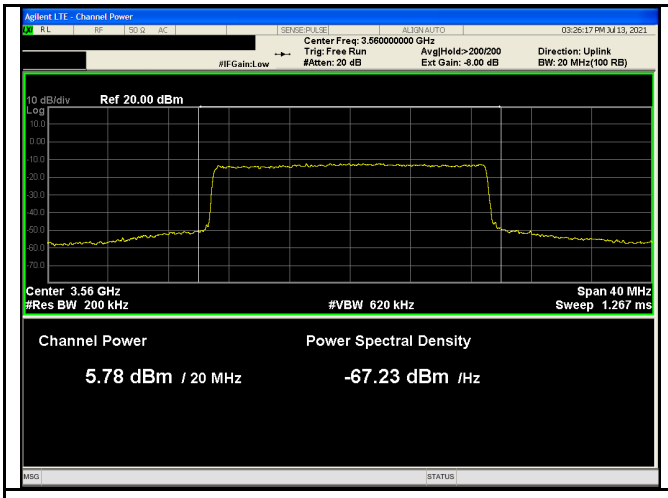


15MHz - High CH QPSK

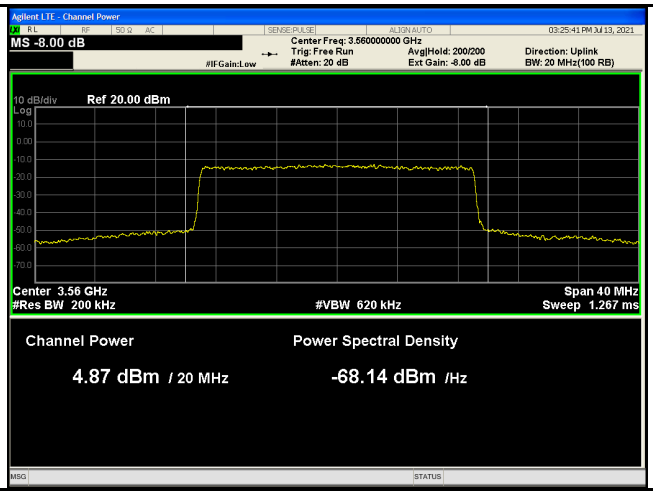


15MHz - High CH 64QAM

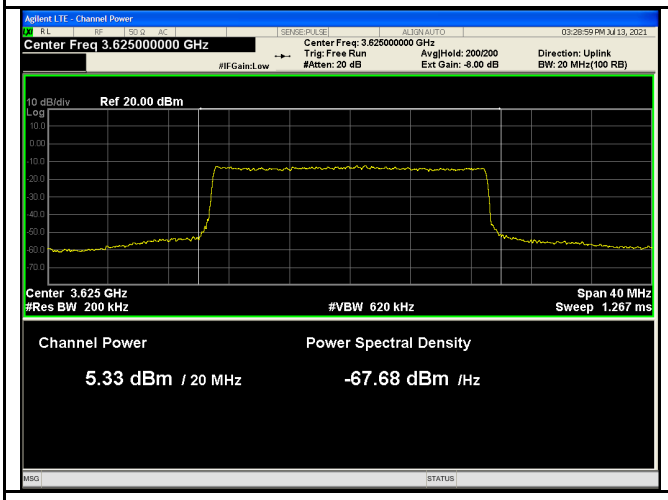
Chain 0



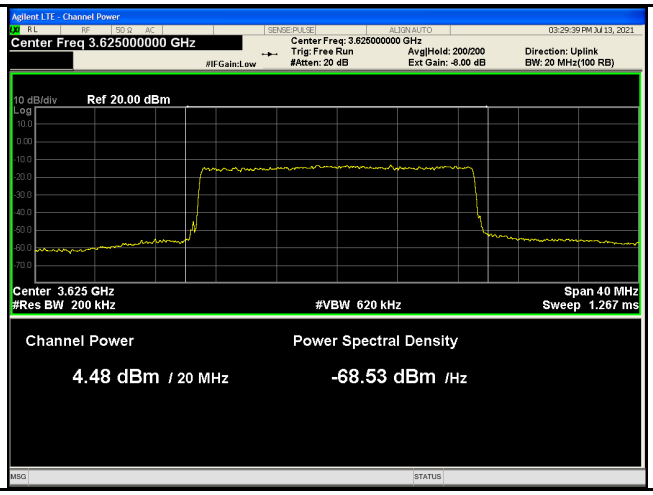
20MHz - Low CH QPSK



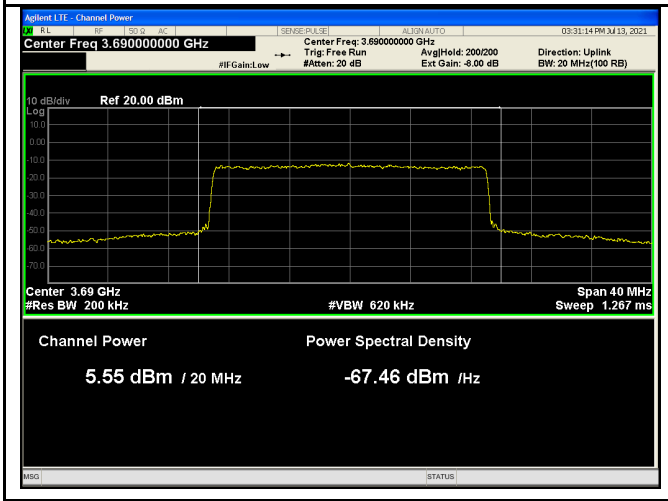
20MHz - Low CH 64QAM



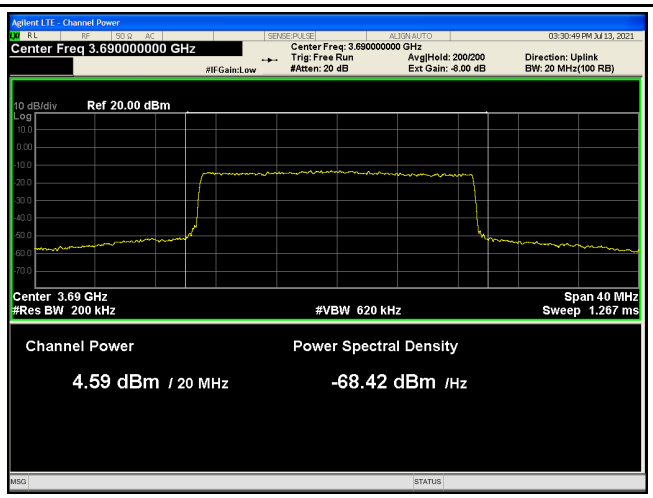
20MHz - Middle CH QPSK



20MHz - Middle CH 64QAM

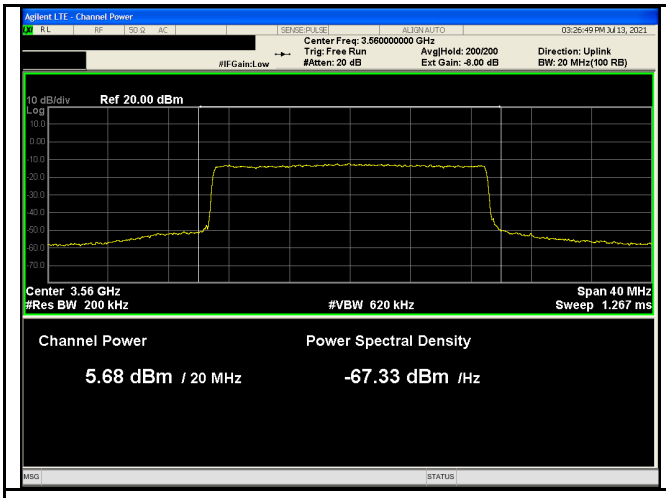


20MHz - High CH QPSK

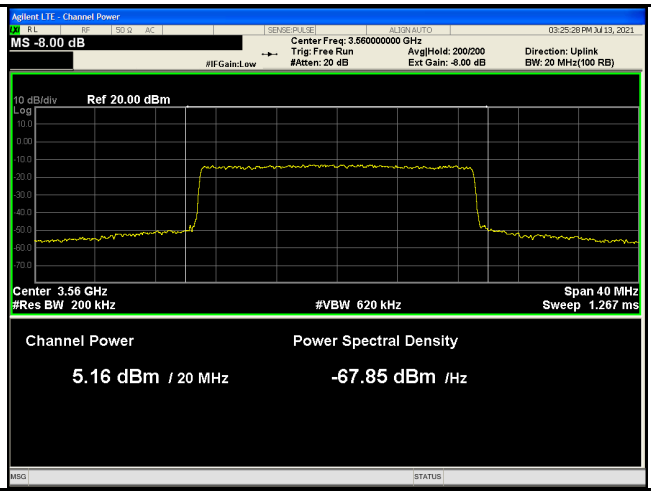


20MHz - High CH 64QAM

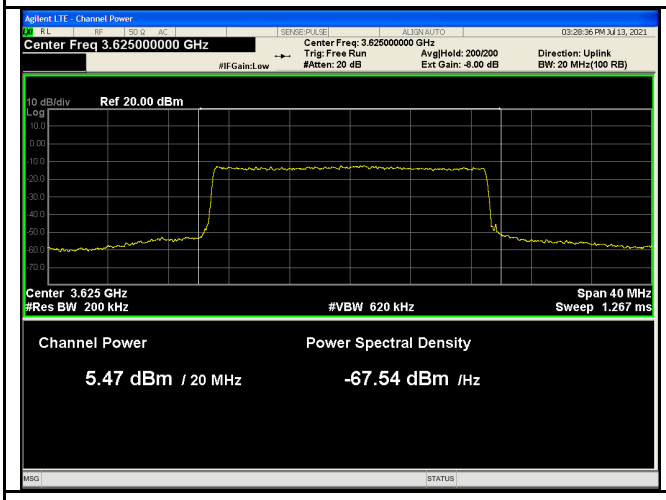
Chain 1



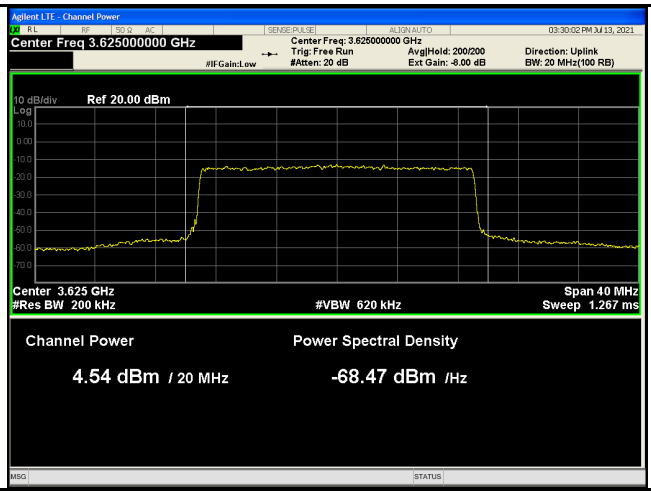
20MHz - Low CH QPSK



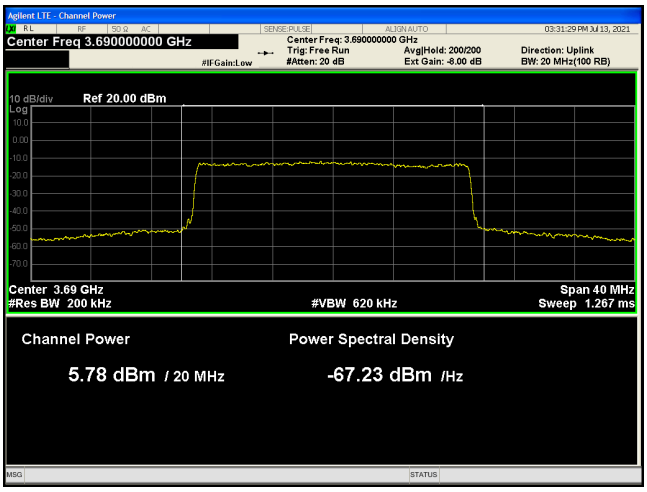
20MHz - Low CH 64QAM



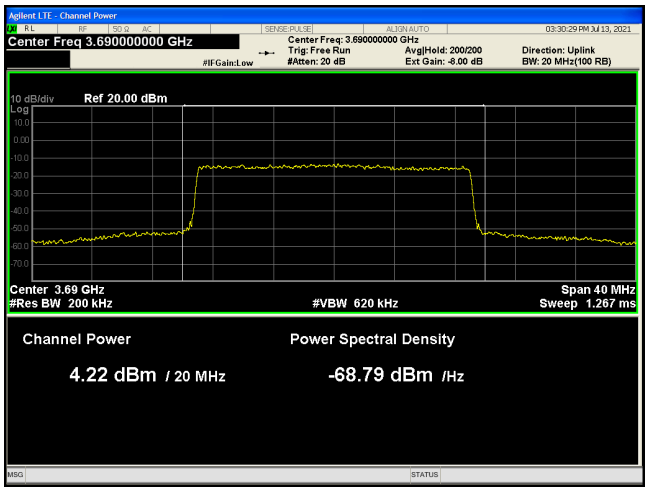
20MHz - Middle CH QPSK



20MHz - Middle CH 64QAM



20MHz - High CH QPSK



20MHz - High CH 64QAM

8 Peak-to-average power radio

Test Requirement: FCC part96.41(g)

Test Method: ANSI/TIA-603-E:2016, ANSI C63.26:2015

Test Mode: Data communicating mode

Limit:

Probability,%	dB
0.1	13

8.1 EUT Operation

Operating Environment :

Temperature: 22.5 °C

Humidity: 52.1 % RH

Atmospheric Pressure: 102.3kPa

Note: Data that only reflects the worst mode is reported

8.2 Test Procedure

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. Set EUT to transmit at maximum output power.
3. When the duty cycle is less than 98%, then signal gating will be implemented on the spectrum analyzer by triggering from the system simulator.
4. Set the CCDF (Complementary Cumulative Distribution Function) option of the spectrum analyzer. Record the maximum PAPR level associated with a probability of 0.1%.

8.3 Test Result

10MHz bandwidth

Mode	Chain 0			Chain 1			Limit
Channel	Low	Middle	High	Low	Middle	High	(dB)
Peak-to-Average Ratio (dB)	9.30	9.60	10.29	9.51	11.12	10.39	13

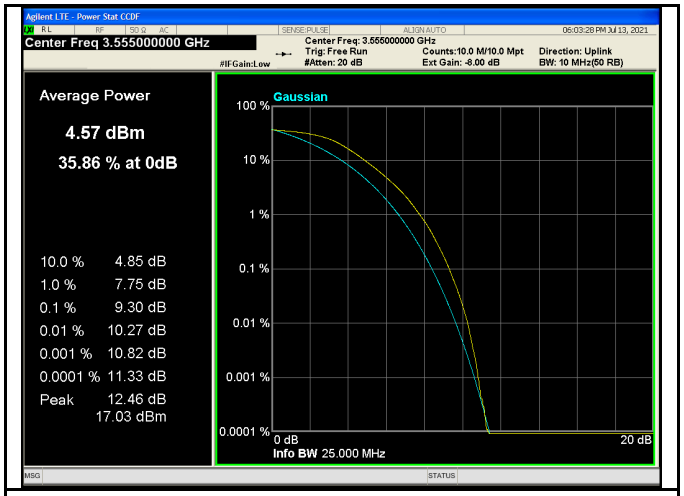
15MHz bandwidth

Mode	Chain 0			Chain 1			Limit
Channel	Low	Middle	High	Low	Middle	High	(dB)
Peak-to-Average Ratio (dB)	10.00	11.47	11.90	10.07	11.64	11.99	13

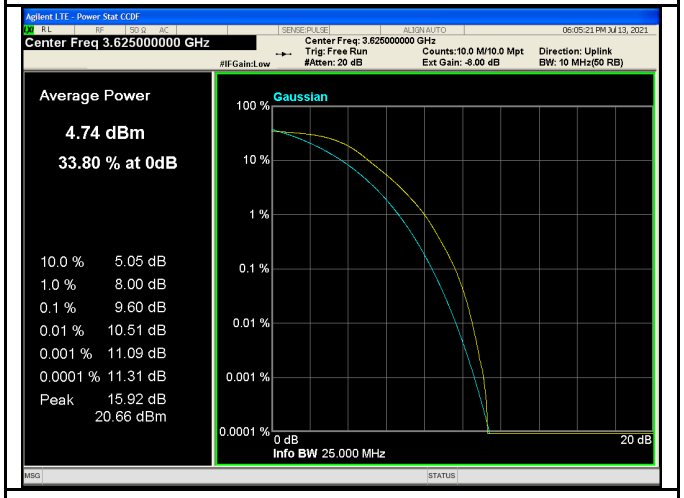
20MHz bandwidth

Mode	Chain 0			Chain 1			Limit
Channel	Low	Middle	High	Low	Middle	High	(dB)
Peak-to-Average Ratio (dB)	9.33	9.96	9.35	9.11	9.37	10.08	13

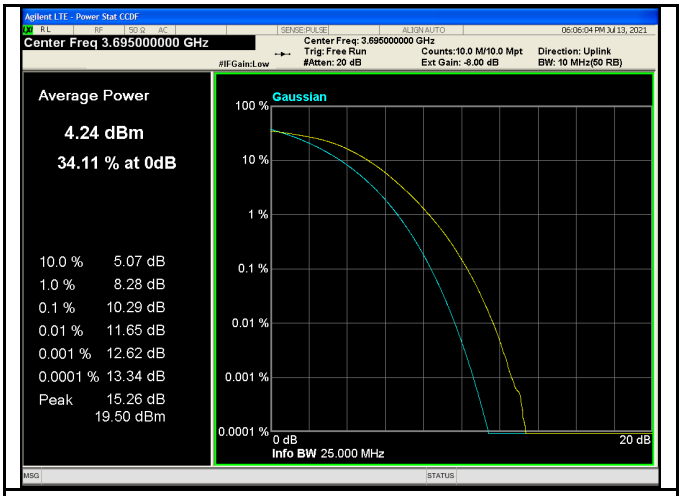
Test Plots
10M Chain 0



10MHz - Low CH QPSK

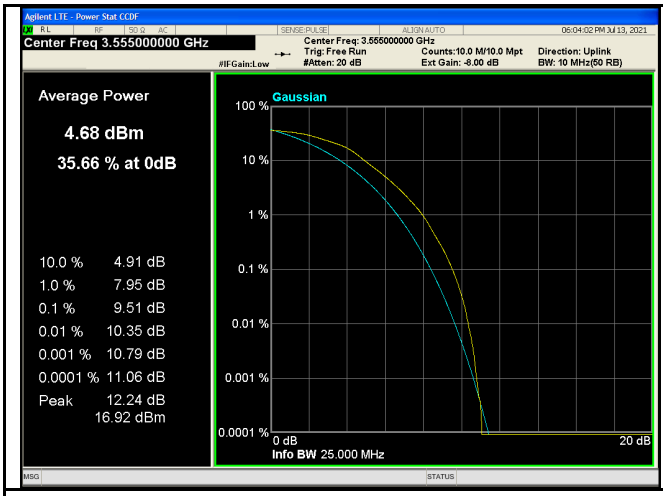


10MHz - Middle CH QPSK

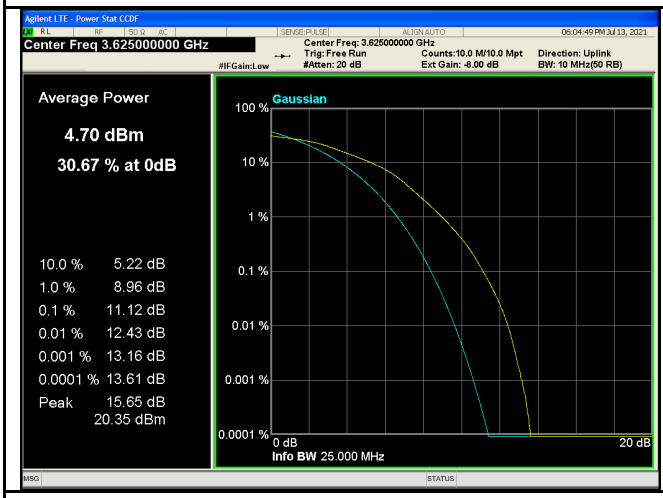


10MHz - High CH QPSK

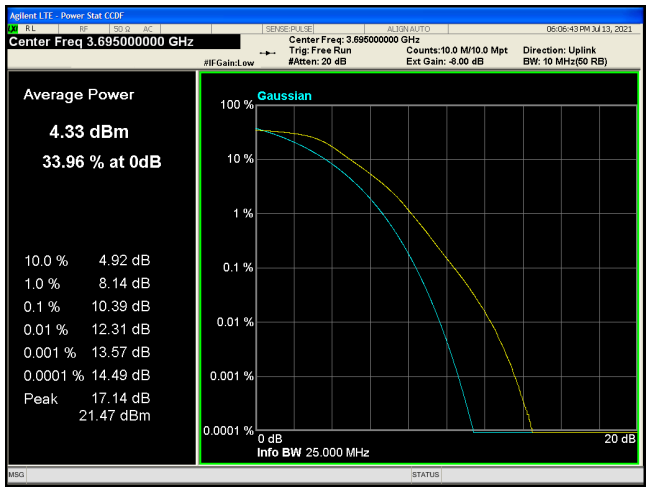
10M Chain 1



10MHz - Low CH QPSK

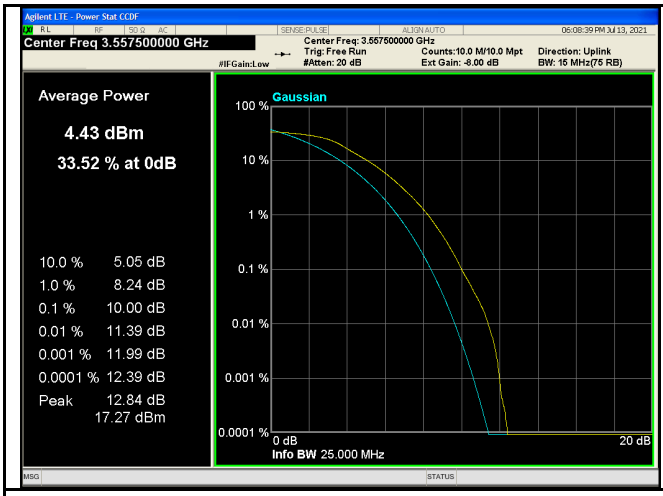


10MHz - Middle CH QPSK

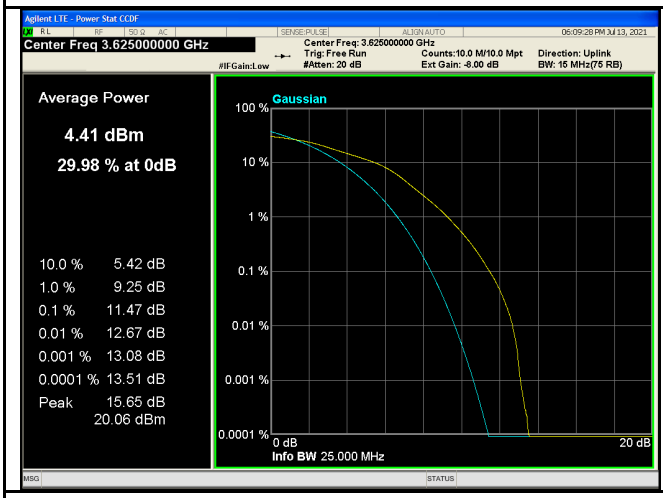


10MHz - High CH QPSK

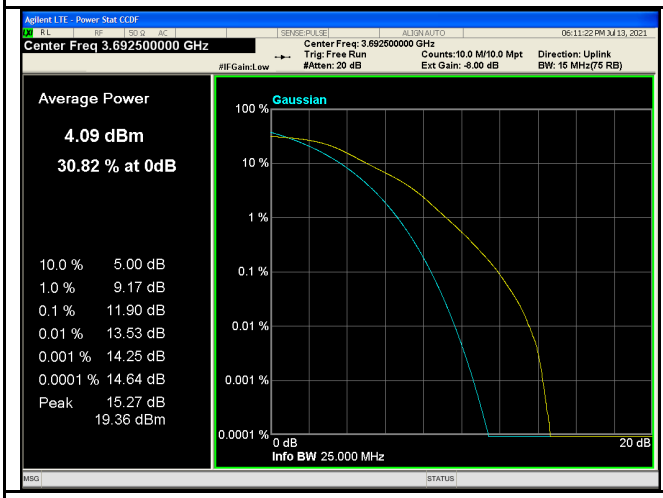
15M Chain 0



15MHz - Low CH QPSK

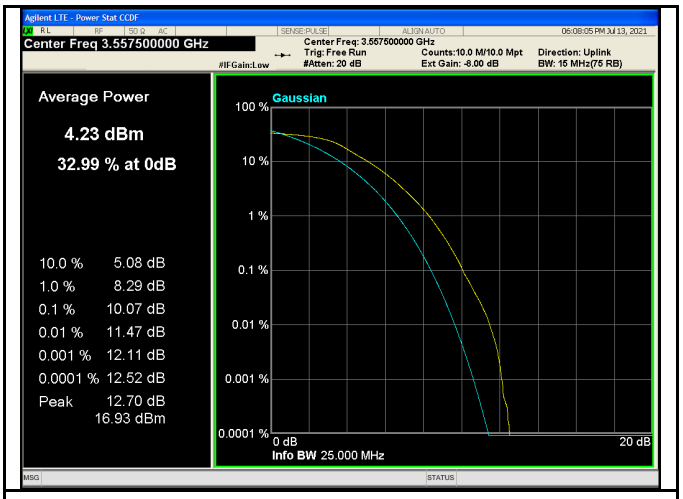


15MHz - Middle CH QPSK

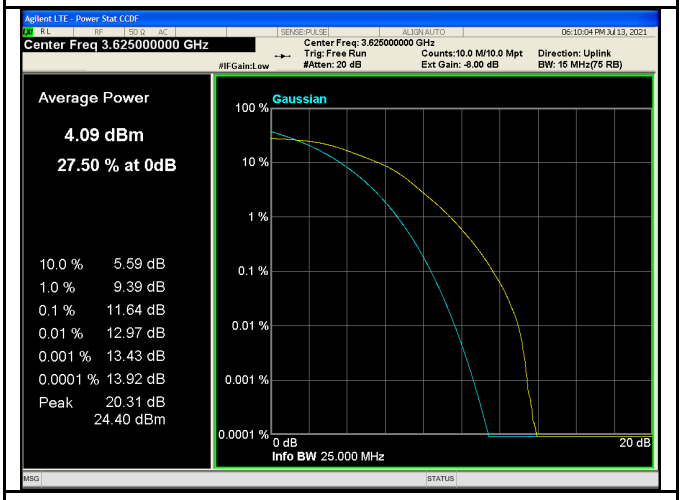


15MHz - High CH QPSK

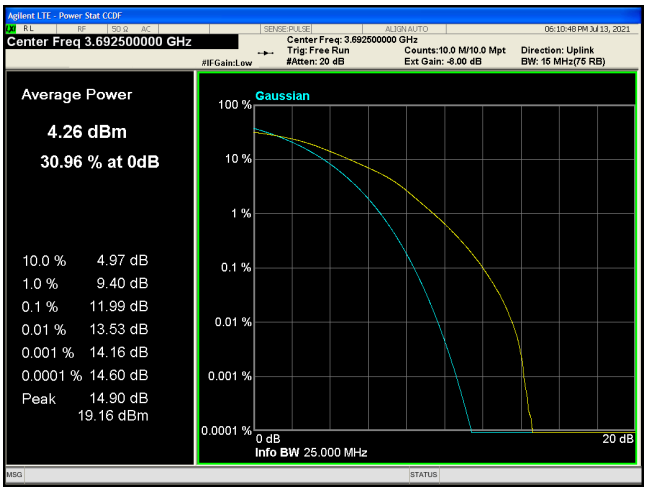
15M Chain 1



15MHz - Low CH QPSK

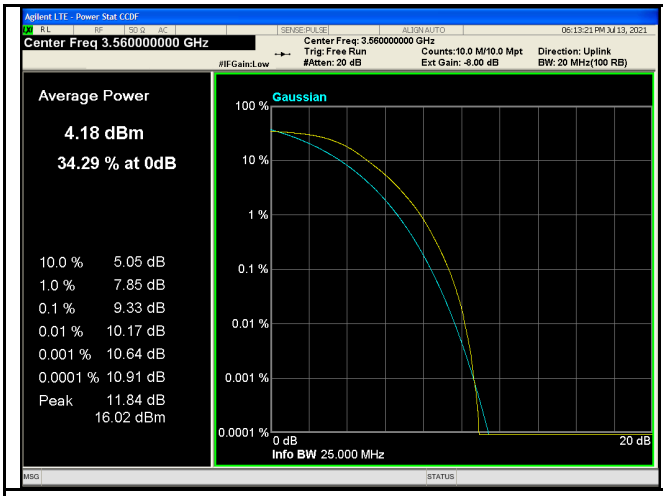


15MHz - Middle CH QPSK

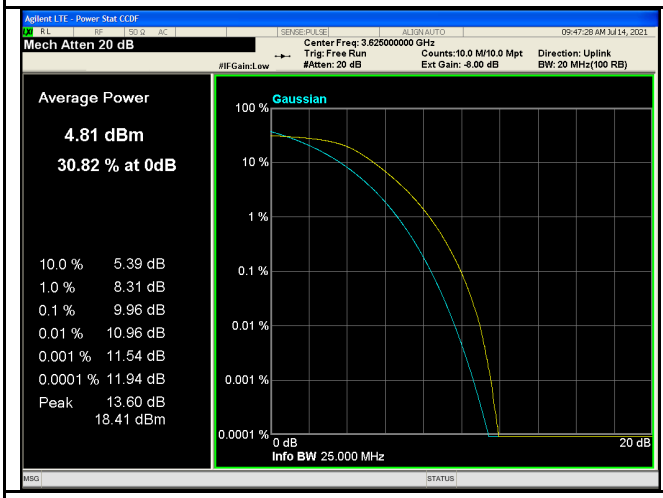


15MHz - High CH QPSK

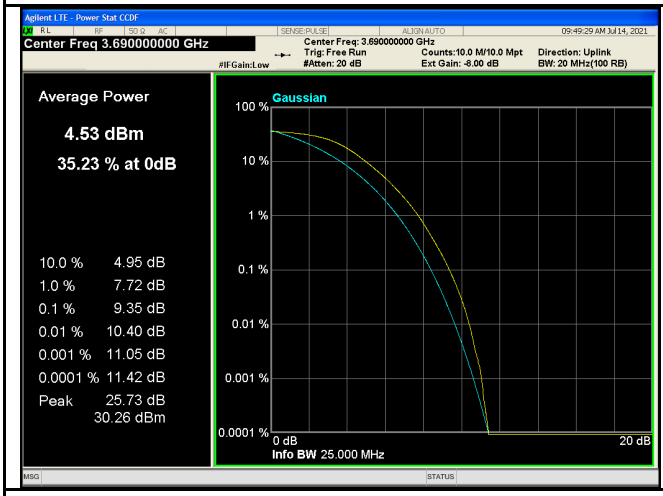
20M Chain 0



20MHz - Low CH QPSK

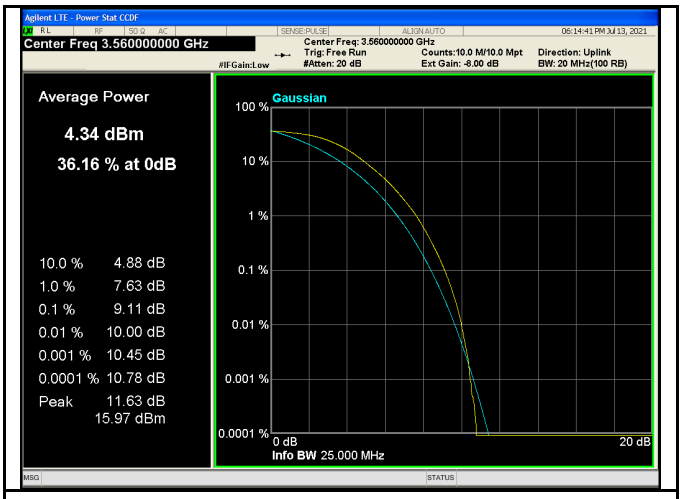


20MHz - Middle CH QPSK

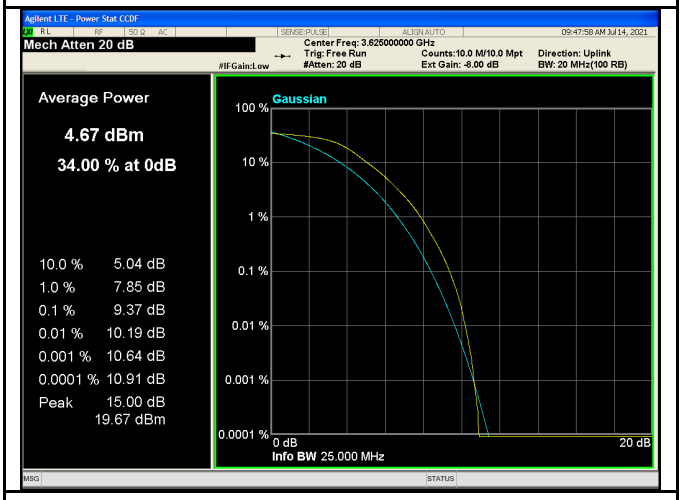


20MHz - High CH QPSK

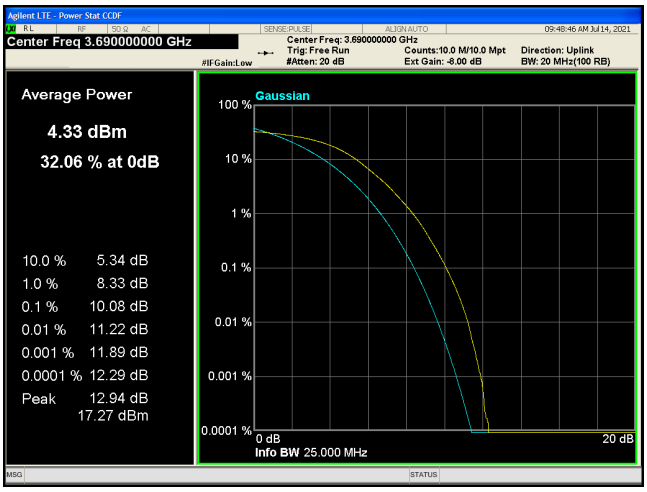
20M Chain 1



20MHz - Low CH QPSK



20MHz - Middle CH QPSK



20MHz - High CH QPSK

9 Occupy Bandwidth

Test Requirement:	FCC part 2.1049
Test Method:	ANSI/TIA-603-E:2016, ANSI C63.26:2015
Test Mode:	Data communicating mode

9.1 EUT Operation

Operating Environment :

Temperature:	22.6 °C
Humidity:	52.4 % RH
Atmospheric Pressure:	103.3kPa

9.2 Test Procedure

1. The EUT's output RF connector was connected with a short cable to the spectrum analyzer.

2. The transmitter shall be operated at its maximum carrier powermeasured under normal test conditions.

3. The span of the analyzer shall be set to capture all products of themodulation process, including the emission skirts.

4. The resolution bandwidth (RBW) shall be in the range of 1% to 5% ofthe occupied bandwidth (OBW) and video bandwidth (VBW) shall beapproximately 3x RBW.

9.3 Test Result

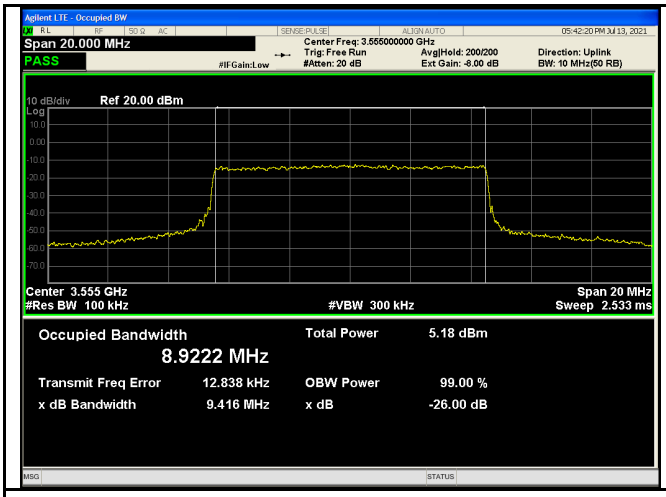
Chain 0

Bandwidth (MHz)	Modulation	Test Channel	26dB Down Bandwidth	99% Occupy bandwidth (MHz)
10	QPSK	Low	9.416	8.9222
		Middle	9.323	8.9066
		High	9.368	8.9205
	64QAM	Low	9.279	8.9094
		Middle	9.328	8.9105
		High	9.307	8.9229
Bandwidth (MHz)	**Modulation**	**Test Channel**	**26dB Down Bandwidth**	**99% Occupy bandwidth (MHz)**
15	QPSK	Low	13.88	13.392
		Middle	13.89	13.393
		High	13.87	13.352
	64QAM	Low	13.92	13.393
		Middle	13.90	13.413
		High	13.96	13.388
Bandwidth (MHz)	**Modulation**	**Test Channel**	**26dB Down Bandwidth**	**99% Occupy bandwidth (MHz)**
20	QPSK	Low	18.51	17.855
		Middle	18.60	17.871
		High	18.52	17.838
	64QAM	Low	18.51	17.860
		Middle	18.54	17.870
		High	18.51	17.842

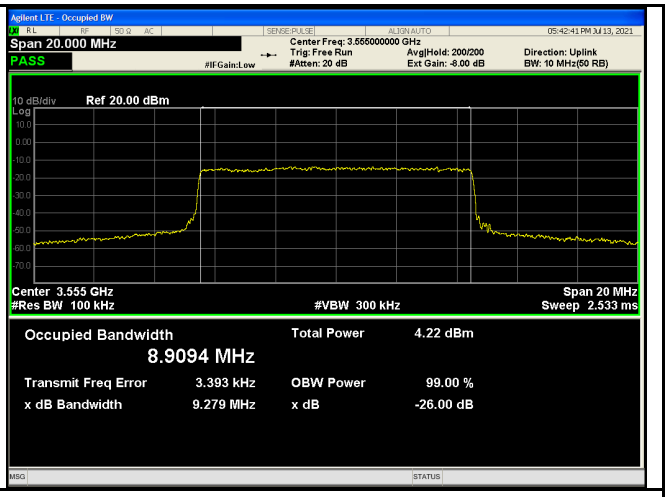
Chain 1

Bandwidth (MHz)	Modulation	Test Channel	26dB Down Bandwidth	99% Occupy bandwidth (MHz)
10	QPSK	Low	9.342	8.9127
		Middle	9.270	8.9146
		High	9.284	8.9286
	64QAM	Low	9.354	8.9139
		Middle	9.326	8.9096
		High	9.288	8.9210
Bandwidth (MHz)	**Modulation**	**Test Channel**	**26dB Down Bandwidth**	**99% Occupy bandwidth (MHz)**
15	QPSK	Low	13.93	13.393
		Middle	13.91	13.393
		High	14.01	13.379
	64QAM	Low	13.93	13.394
		Middle	13.93	13.382
		High	13.93	13.380
Bandwidth (MHz)	**Modulation**	**Test Channel**	**26dB Down Bandwidh**	**99% Occupy bandwidth (MHz)**
20	QPSK	Low	18.51	17.818
		Middle	18.53	17.831
		High	18.52	17.864
	164QAM	Low	18.53	17.869
		Middle	18.63	17.874
		High	18.55	17.843

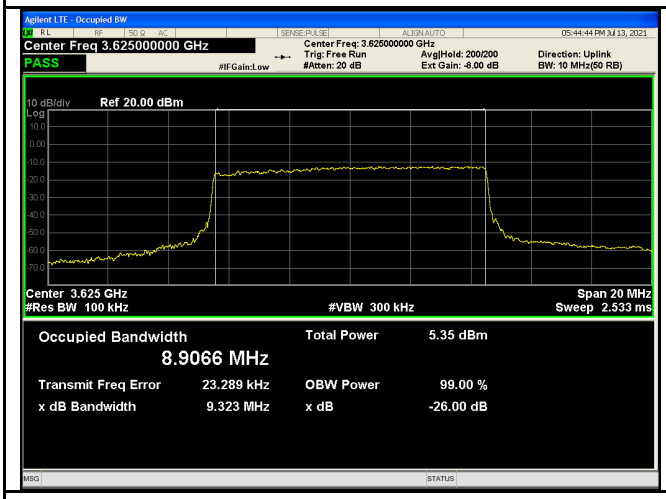
Test Plots
Chain 0



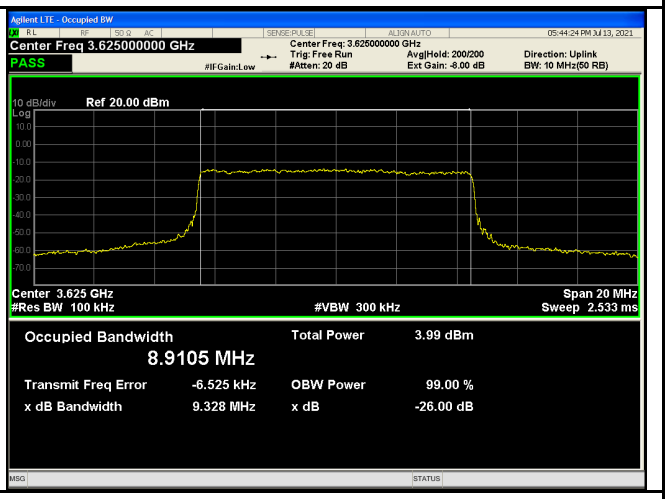
10MHz - Low CH QPSK



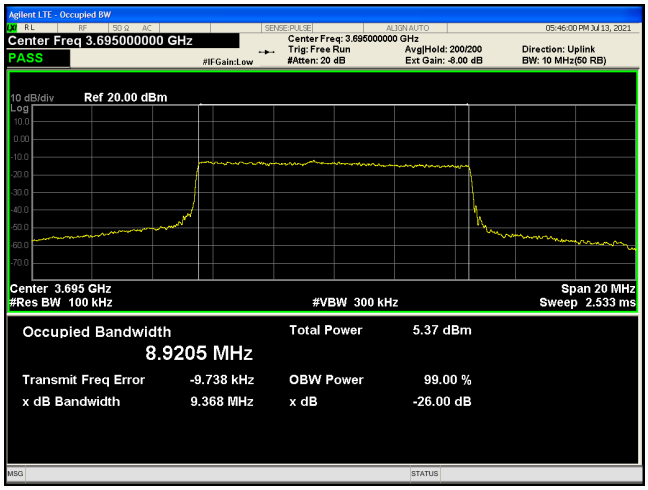
10MHz - Low CH 64QAM



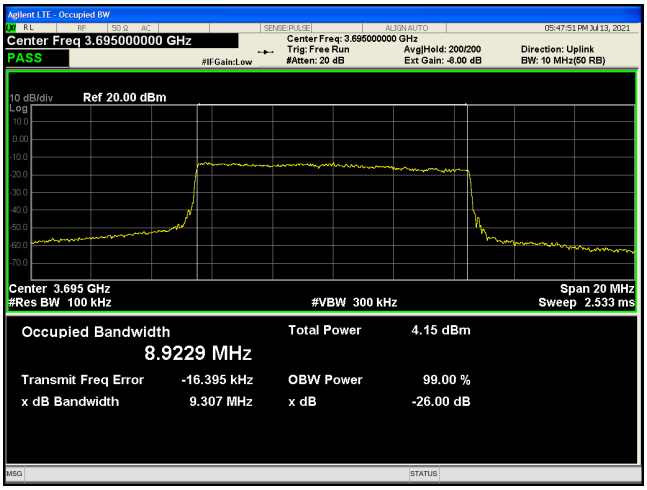
10MHz - Middle CH QPSK



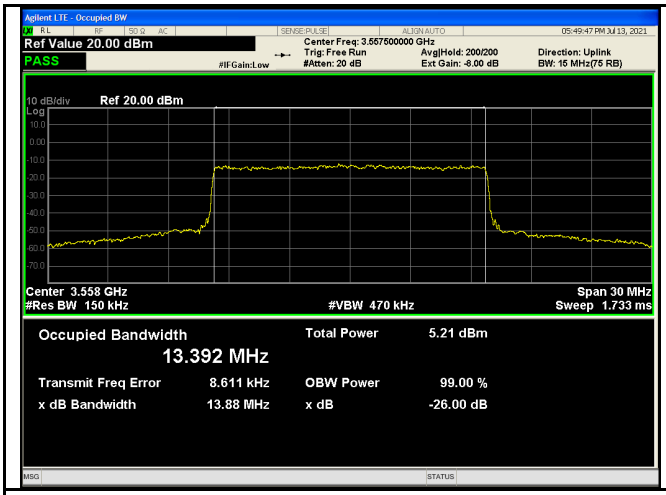
10MHz - Middle CH 64QAM



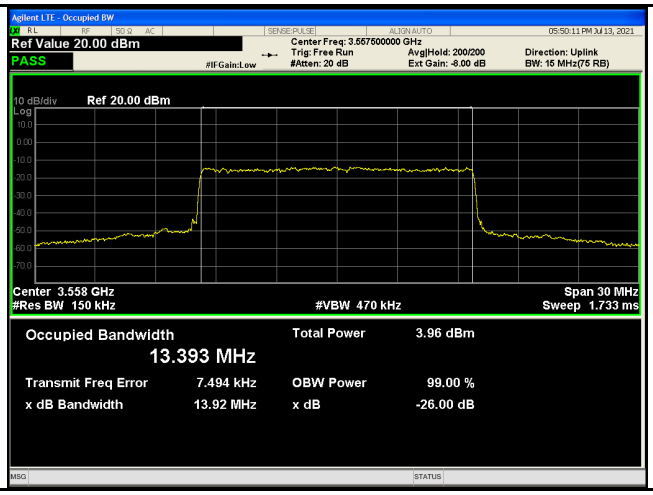
10MHz - High CH QPSK



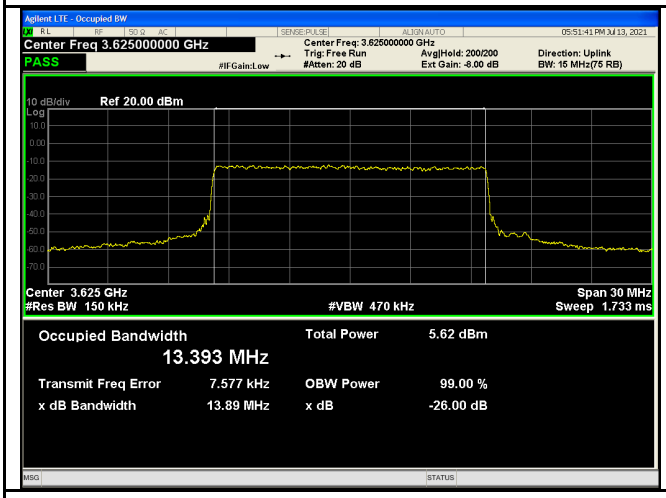
10MHz - High CH 64QAM



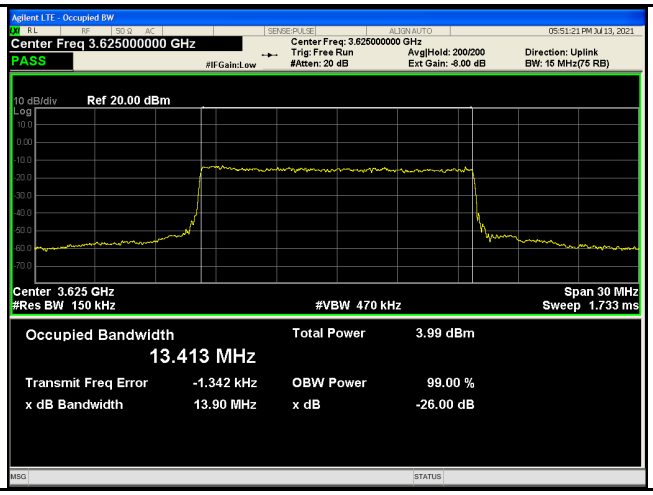
15MHz - Low CH QPSK



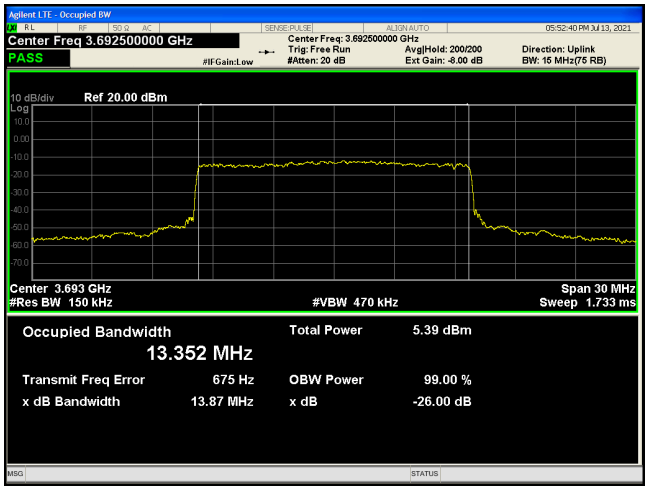
15MHz - Low CH 64QAM



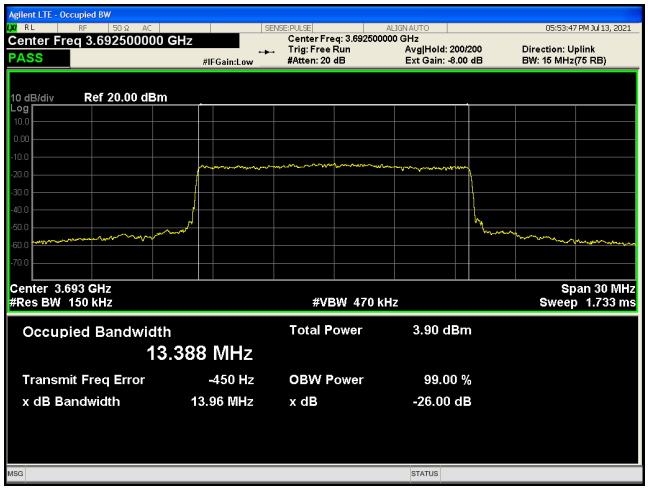
15MHz - Middle CH QPSK



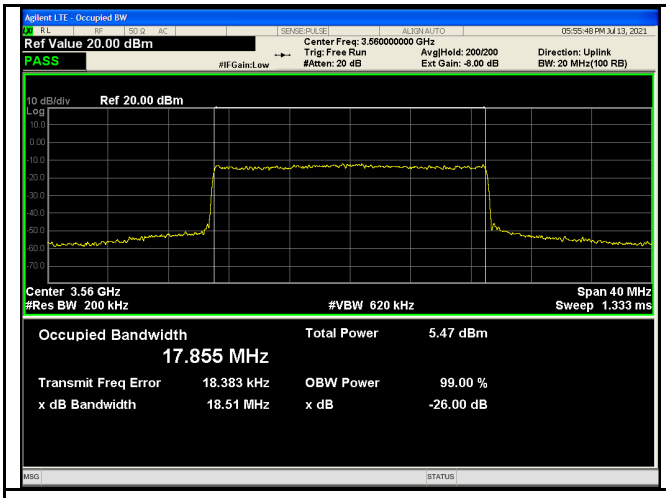
15MHz - Middle CH 64QAM



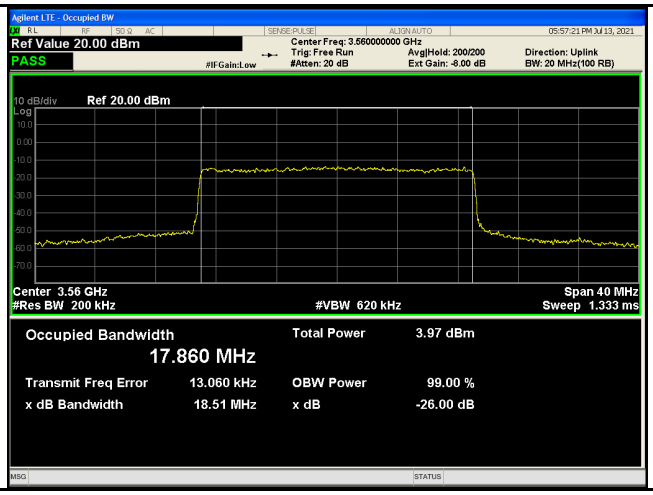
15MHz - High CH QPSK



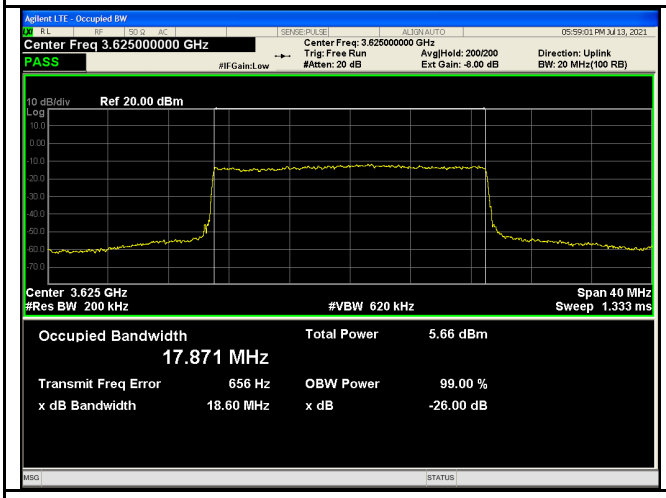
15MHz - High CH 64QAM



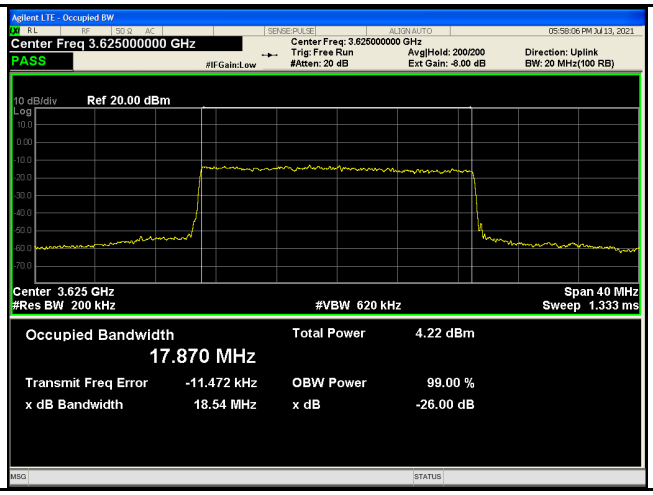
20MHz - Low CH QPSK



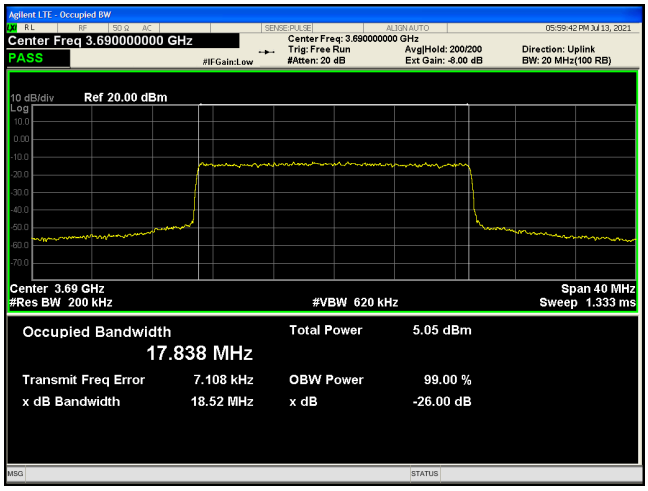
20MHz - Low CH 64QAM



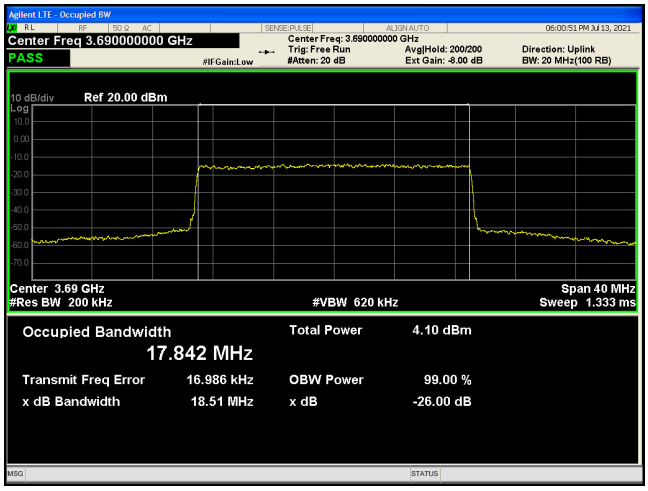
20MHz - Middle CH QPSK



20MHz - Middle CH 64QAM

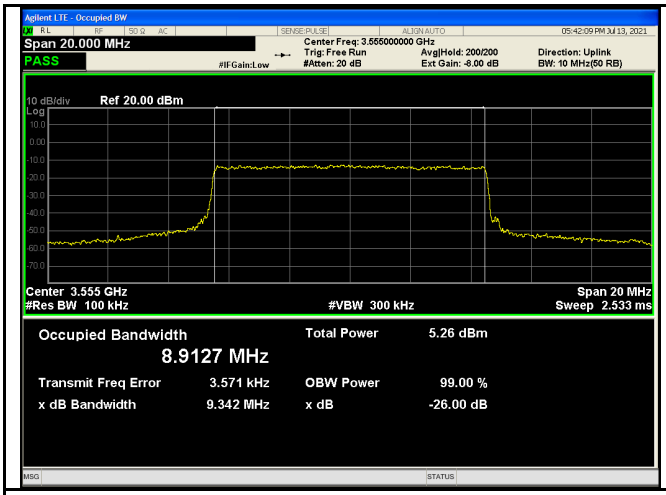


20MHz - High CH QPSK

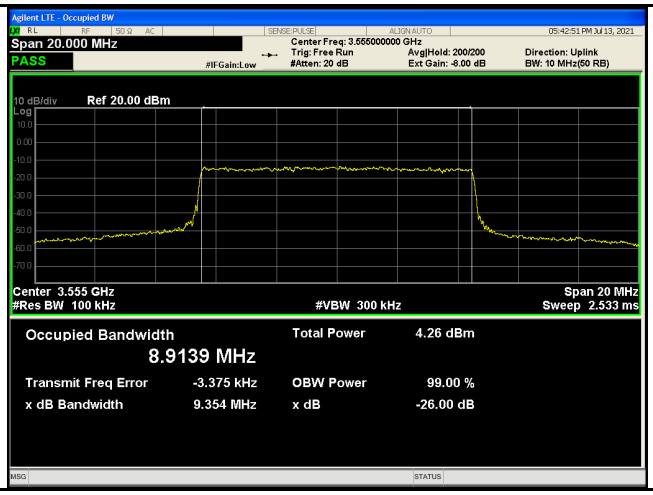


20MHz - High CH 64QAM

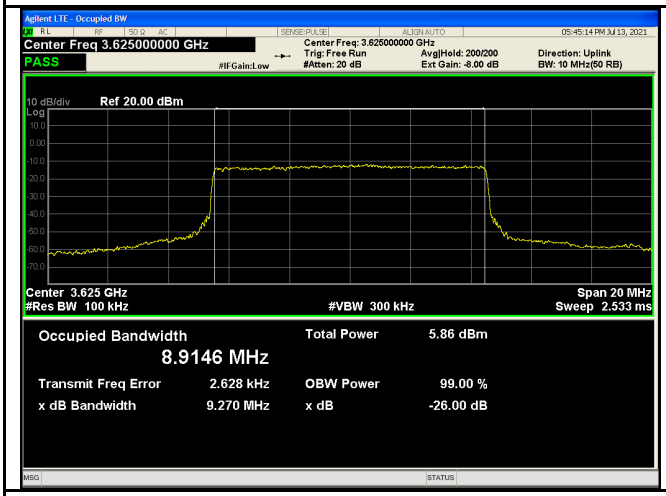
Chain 1



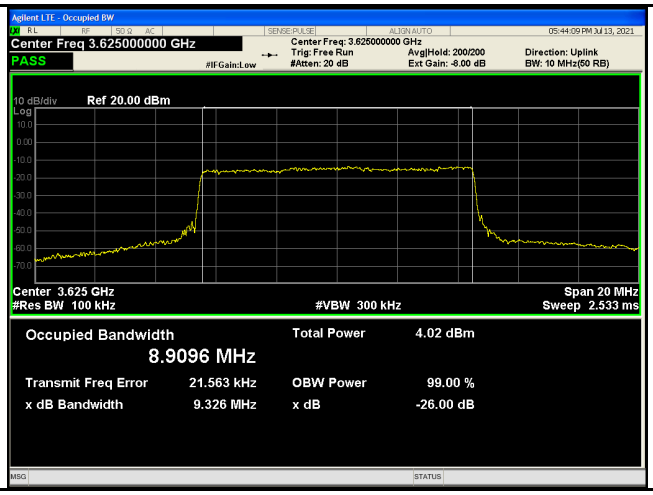
10MHz - Low CH QPSK



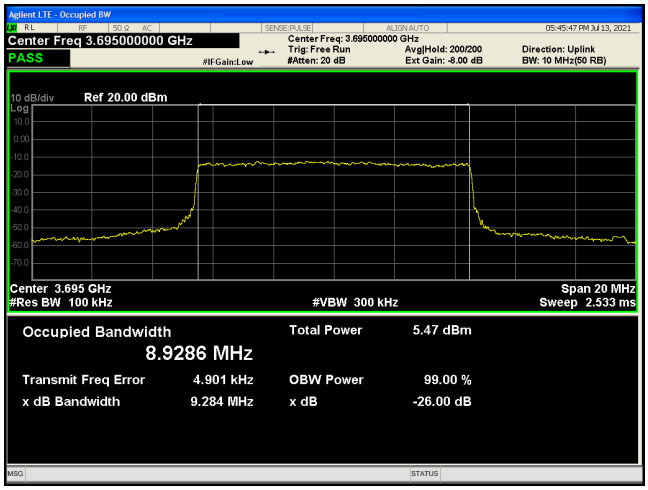
10MHz - Low CH 64QAM



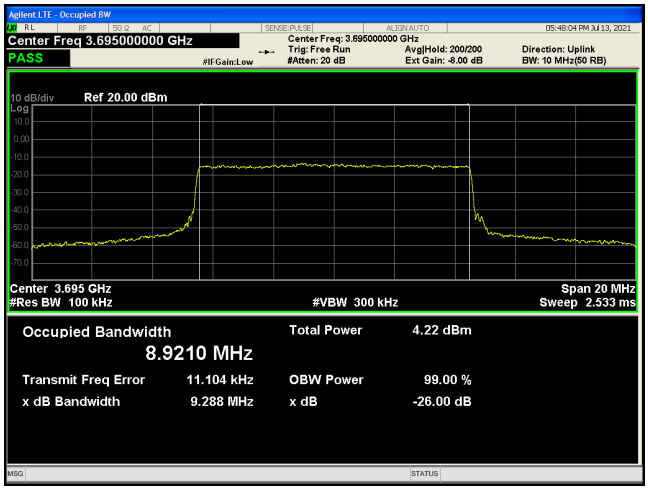
10MHz - Middle CH QPSK



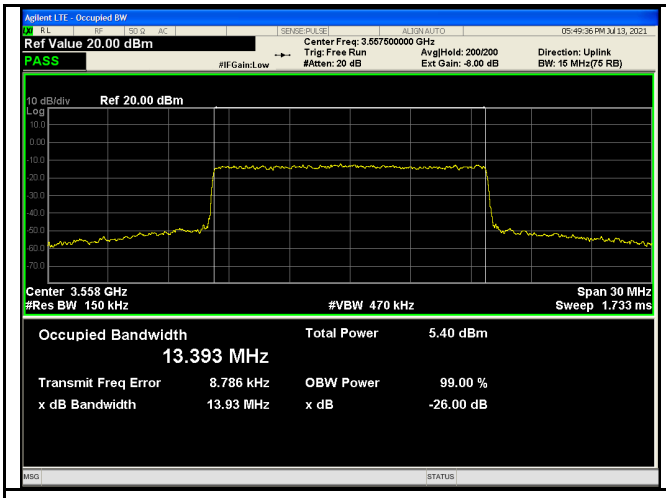
10MHz - Middle CH 64QAM



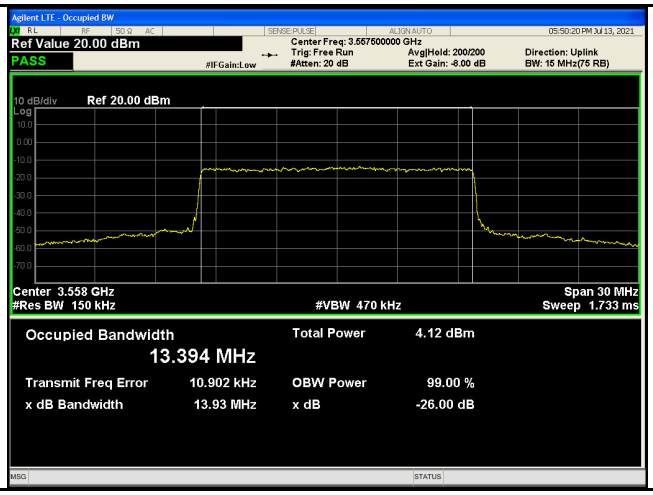
10MHz - High CH QPSK



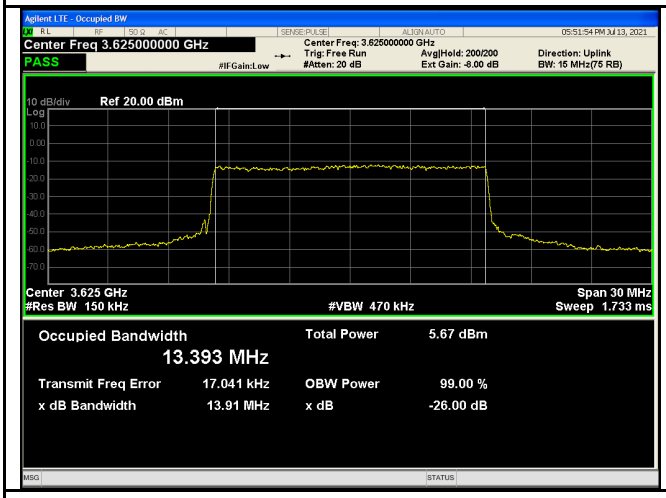
10MHz - High CH 64QAM



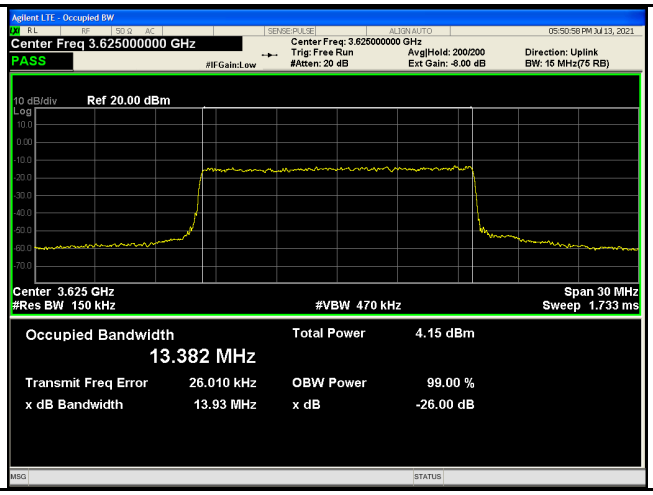
15MHz - Low CH QPSK



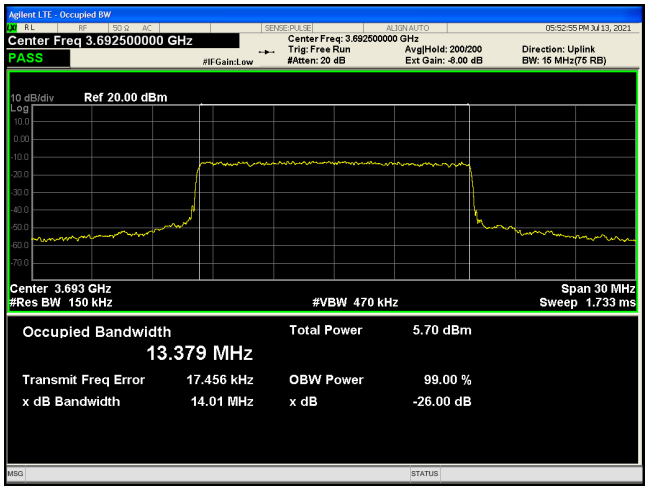
15MHz - Low CH 64QAM



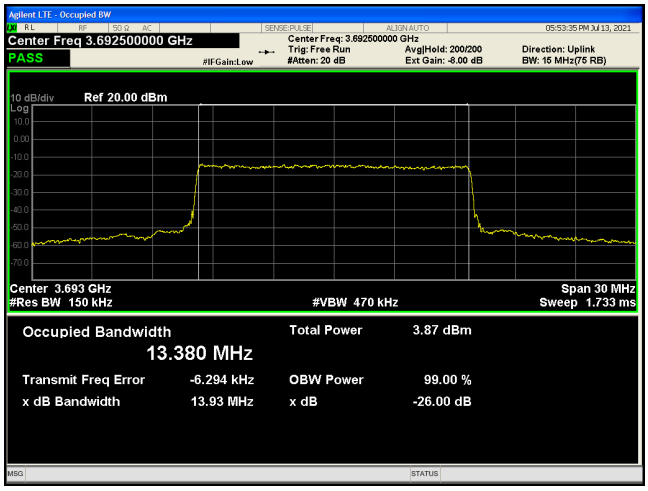
15MHz - Middle CH QPSK



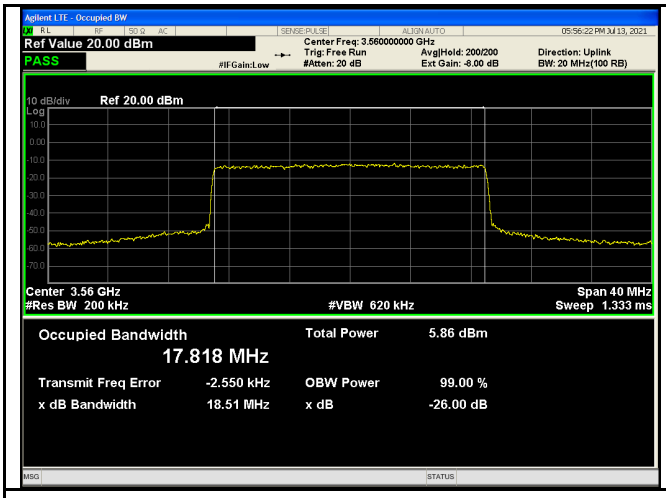
15MHz - Middle CH 64QAM



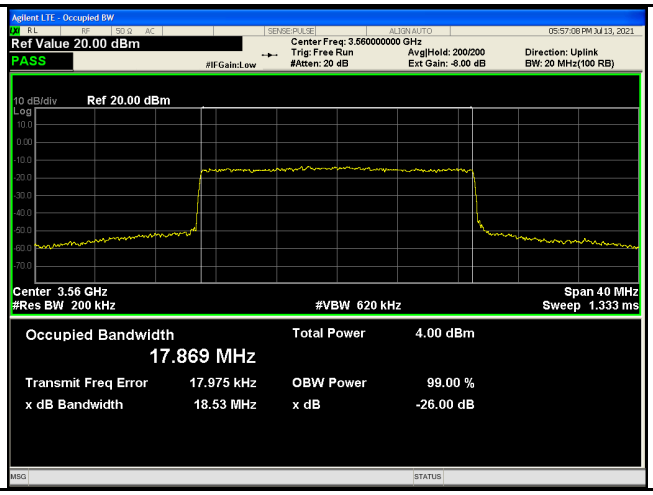
15MHz - High CH QPSK



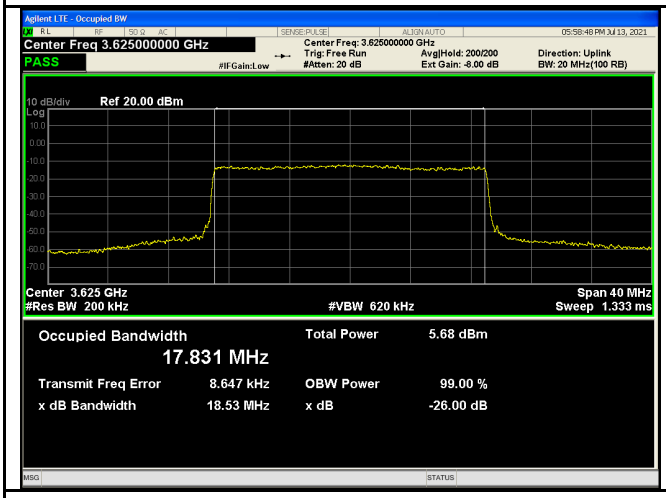
15MHz - High CH 64QAM



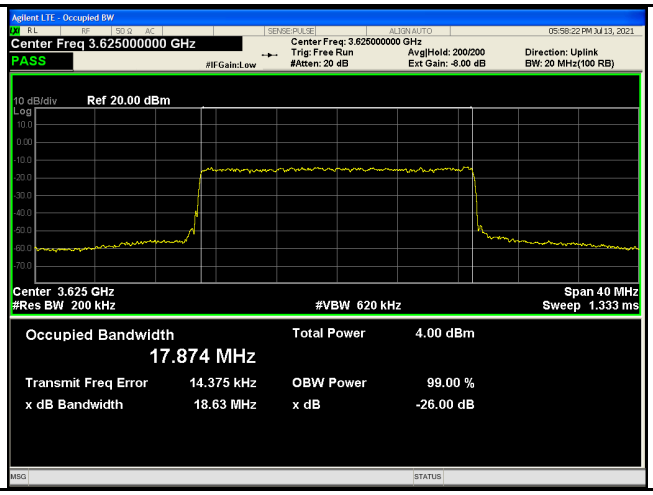
20MHz - Low CH QPSK



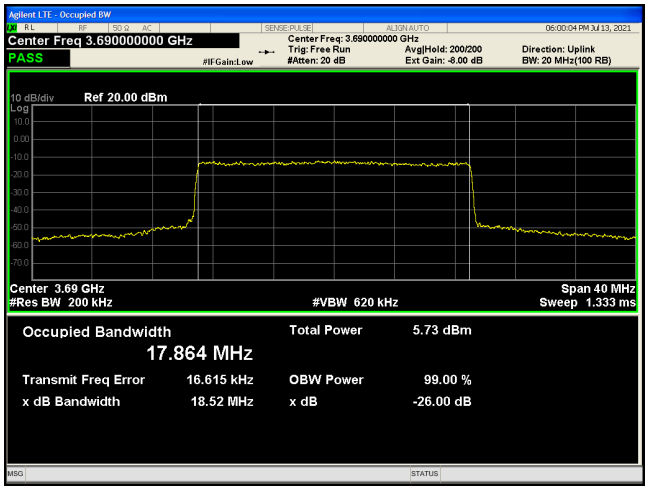
20MHz - Low CH 64QAM



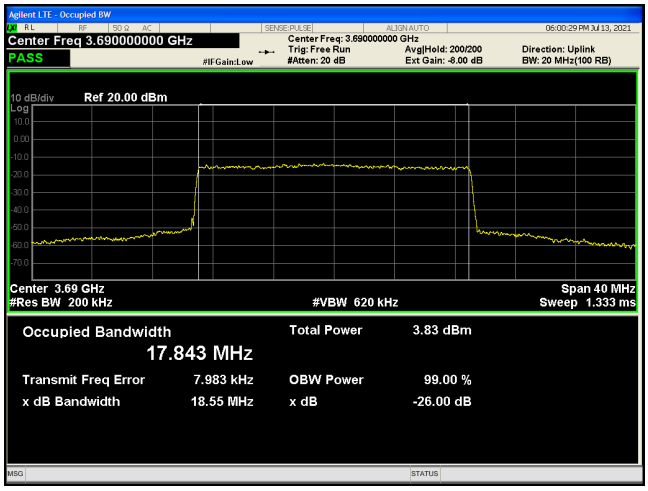
20MHz - Middle CH QPSK



20MHz - Middle CH 64QAM



20MHz - High CH QPSK



20MHz - High CH 64QAM

10 Emission outside the fundamental

Test Requirement:	FCC part 96.41(e)
Test Method:	ANSI/TIA-603-E:2016, ANSI C63.26:2015
Test Mode:	Data communicating mode
Limit:	•within 0 MHz to 10 MHz above and below the assigned channel ≤ −13 dBm/MHz • greater than 10 MHz above and below the assigned channel ≤ −25 dBm/MHz • any emission below 3530 MHz and above 3720 MHz ≤ −40 dBm/MHz

10.1 EUT Operation

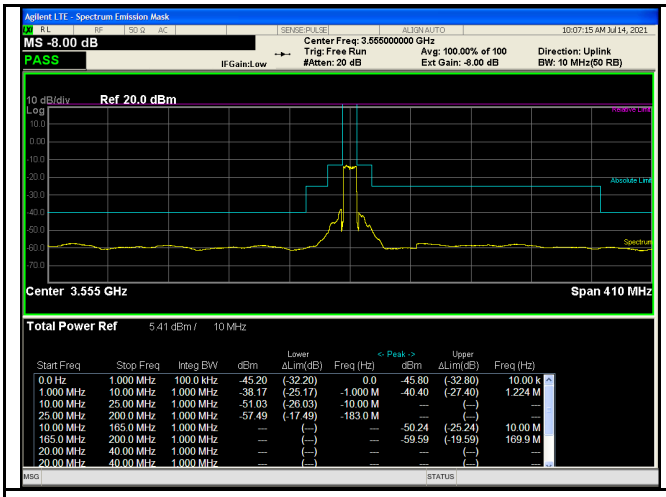
Operating Environment :	
Temperature:	22.7 °C
Humidity:	52.1 % RH
Atmospheric Pressure:	102.3kPa

10.2 Test Procedure

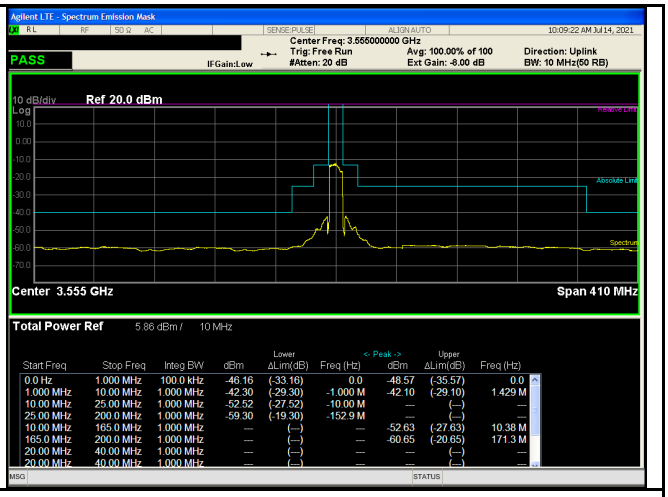
1. The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.
2. Measurements must be performed for low, mid, and high channels.
3. RBW=1% of fundamental for measurements within 1 MHz immediately outside the authorized channel; and 1 MHz for beyond 1 MHz outside the authorized channel. (eg. For 5MHz, RBW=51KHz within 1 MHz immediately outside the authorized channel)
4. Trace average at least 100 traces

10.3 Test Result

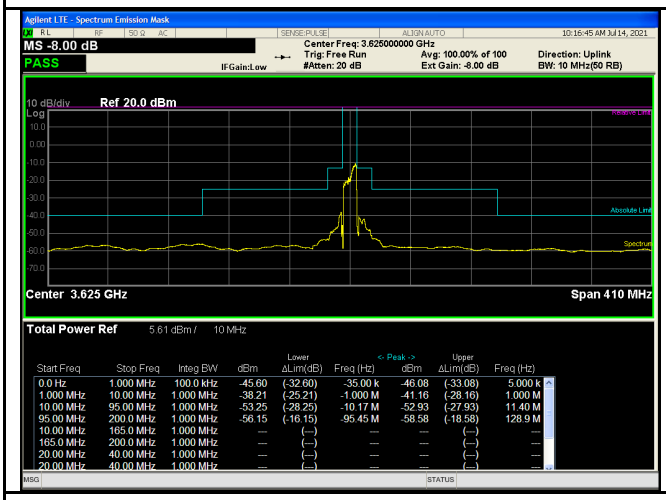
Test Plots



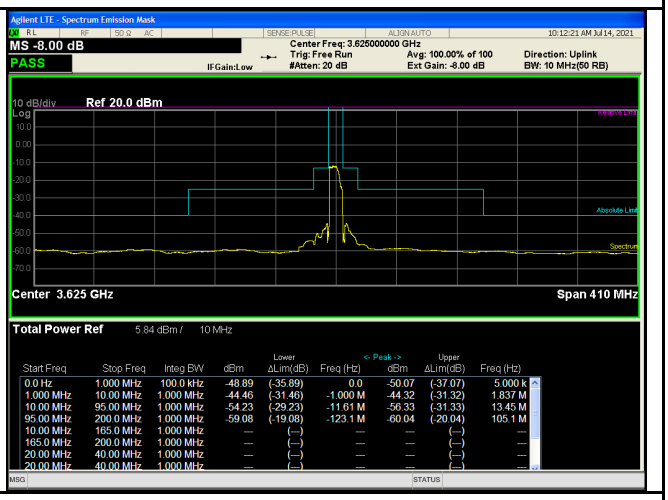
10MHz - Low CH QPSK- Chain 0



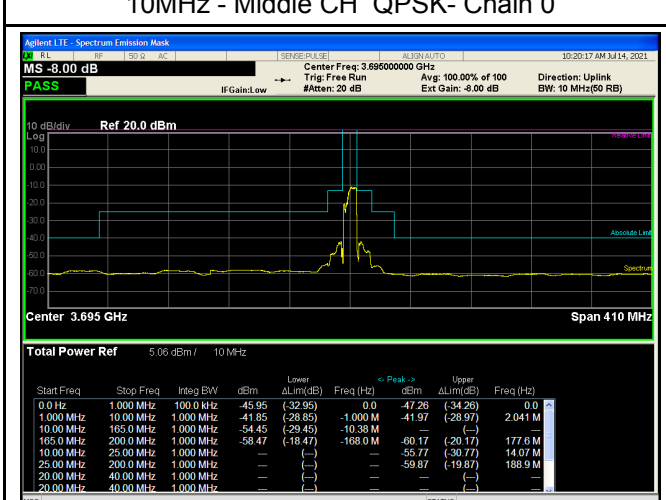
10MHz - Low CH QPSK - Chain 1



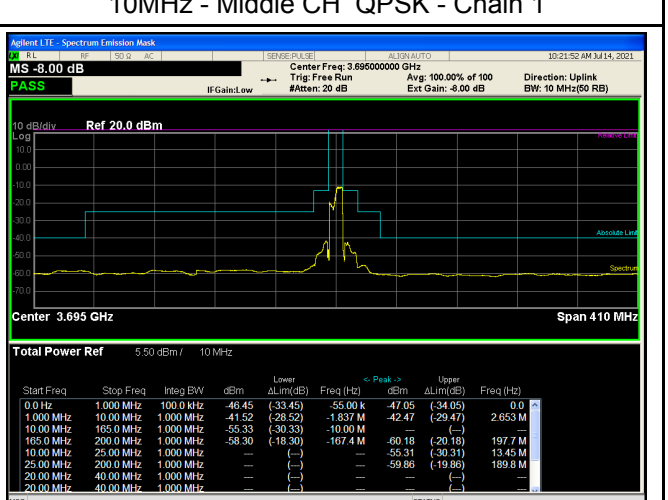
10MHz - Middle CH QPSK- Chain 0



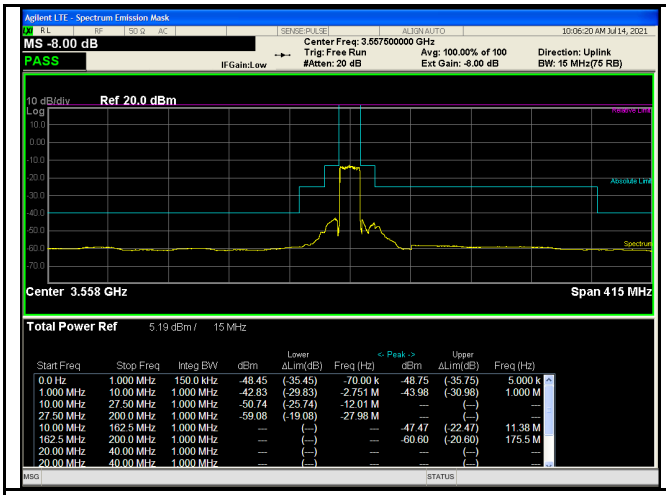
10MHz - Middle CH QPSK - Chain 1



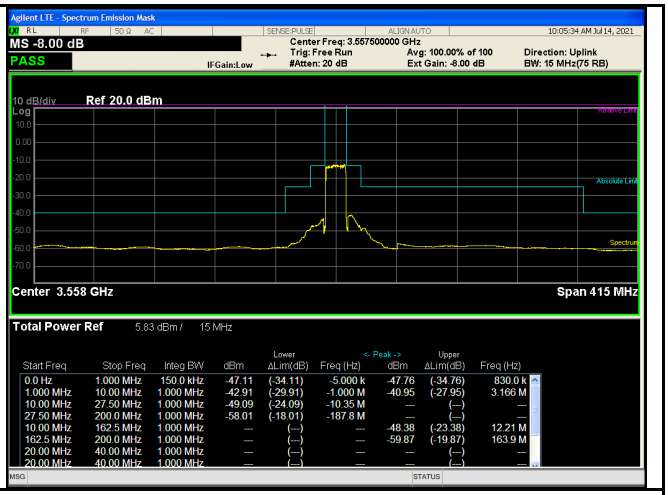
10MHz - High CH QPSK- Chain 0



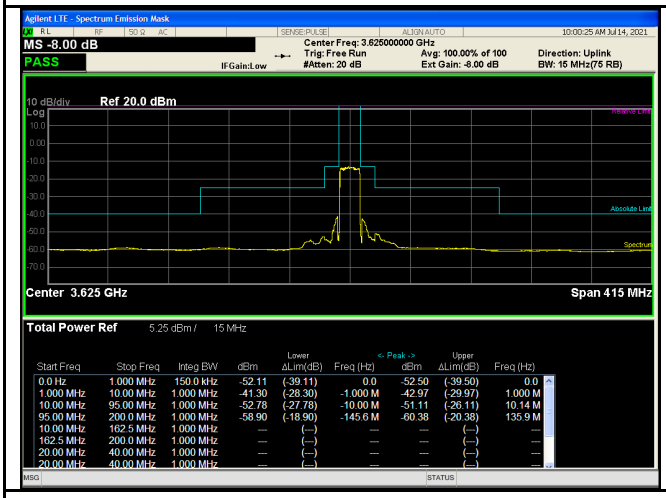
10MHz - High CH QPSK - Chain 1



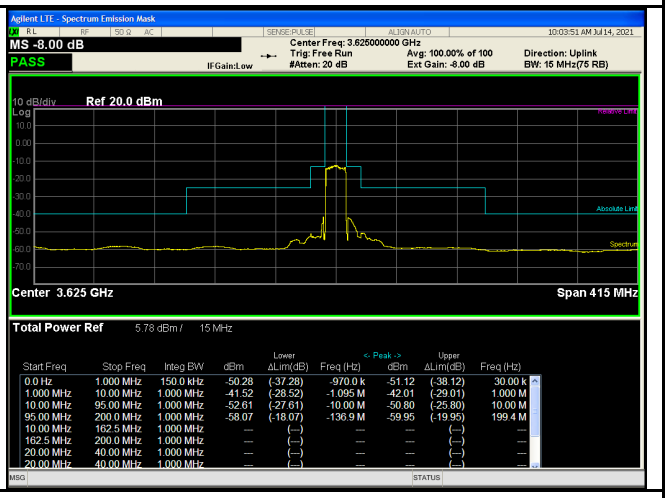
15MHz - Low CH QPSK- Chain 0



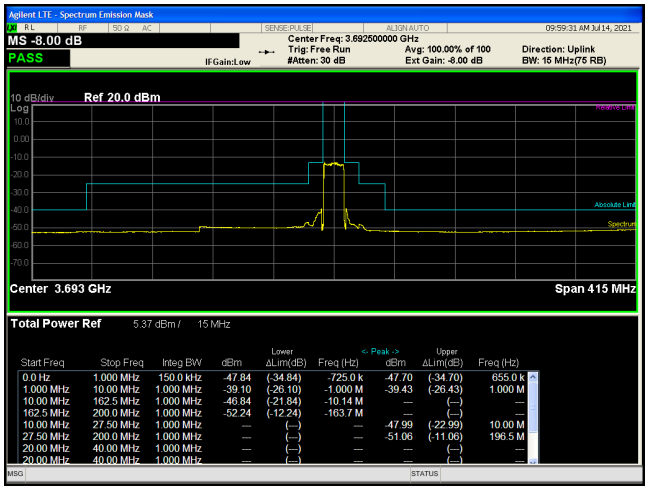
15MHz - Low CH QPSK - Chain 1



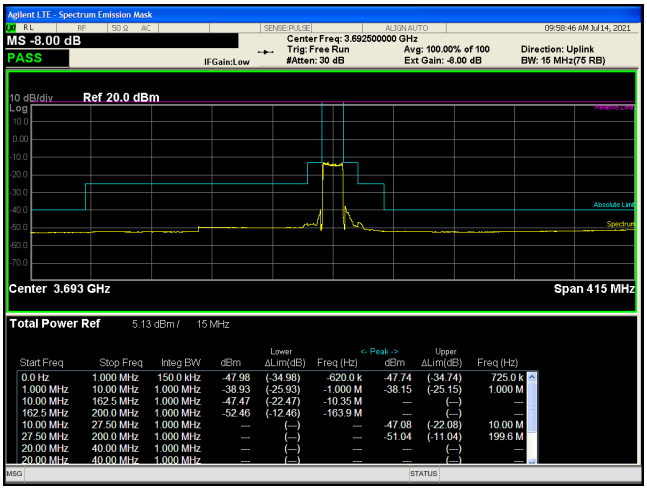
15MHz - Middle CH QPSK- Chain 0



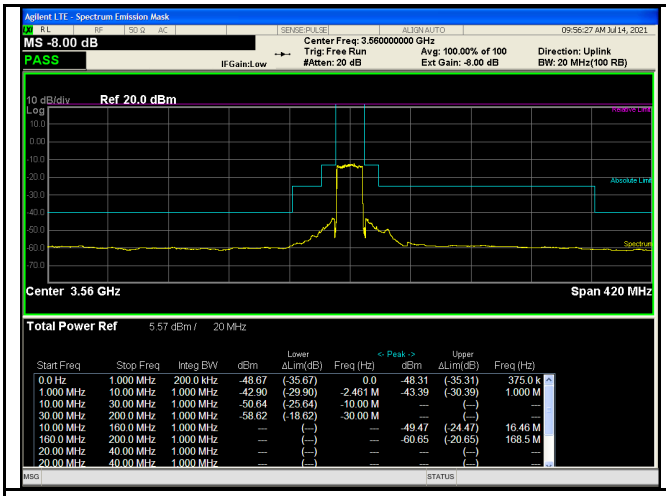
15MHz - Middle CH QPSK - Chain 1



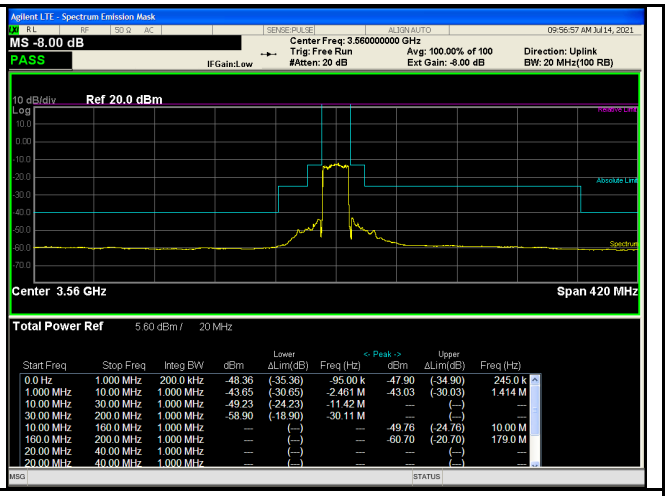
15MHz - High CH QPSK- Chain 0



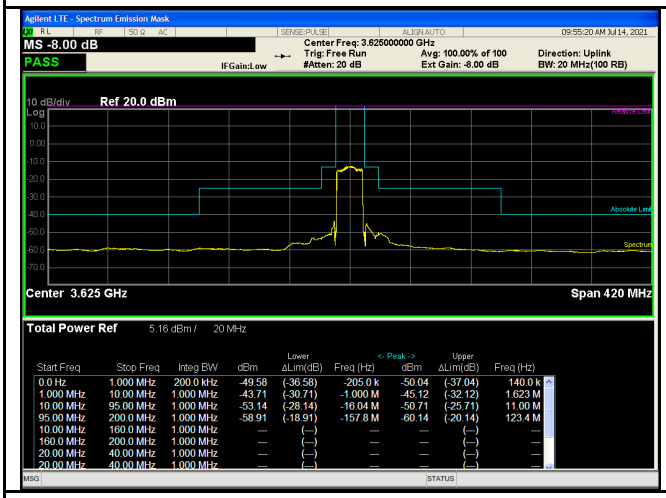
15MHz - High CH QPSK - Chain 1



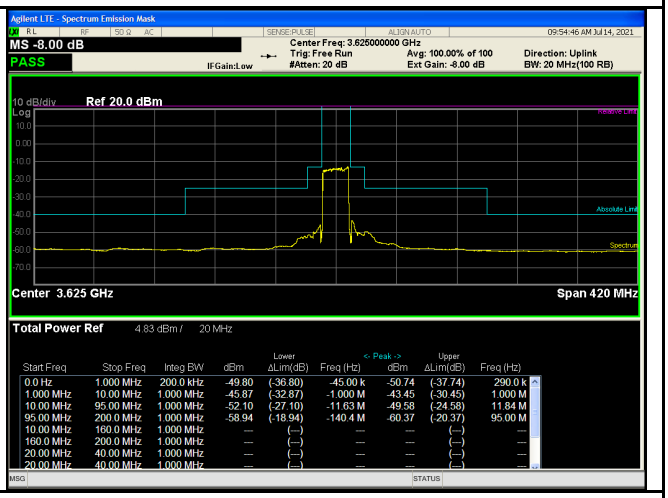
20MHz - Low CH QPSK- Chain 0



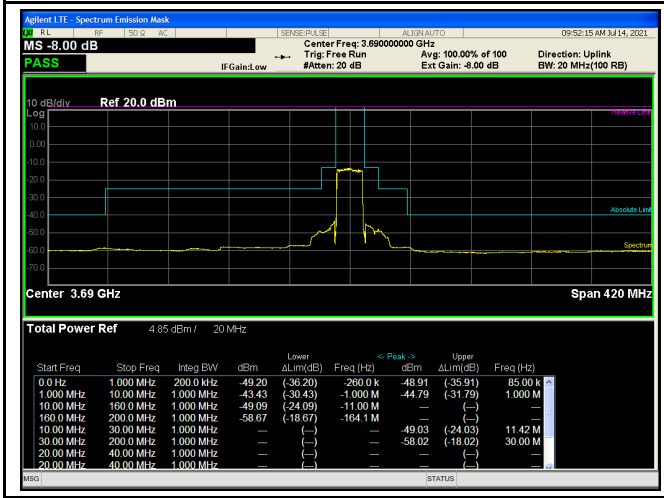
20MHz - Low CH QPSK - Chain 1



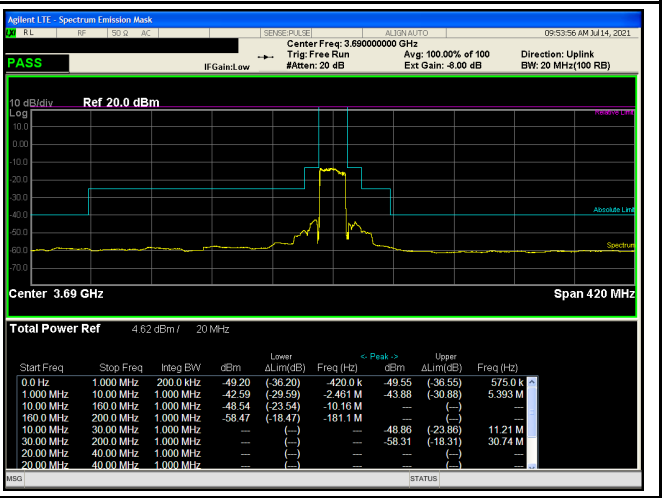
20MHz - Middle CH QPSK- Chain 0



20MHz - Middle CH QPSK - Chain 1



20MHz - High CH QPSK- Chain 0



20MHz - High CH QPSK - Chain 1

11 Out of band emission at antenna terminals

Test Requirement:	FCC part 96.41(e)
Test Method:	ANSI/TIA-603-E:2016, ANSI C63.26:2015
Test Mode:	Data communicating mode
Limit:	below 3530 MHz and above 3720 MHz ≤ -40dBm

11.1 EUT Operation

Operating Environment :

Temperature:	23.5 °C
Humidity:	52.1 % RH
Atmospheric Pressure:	101.3kPa

11.2 Test Procedure

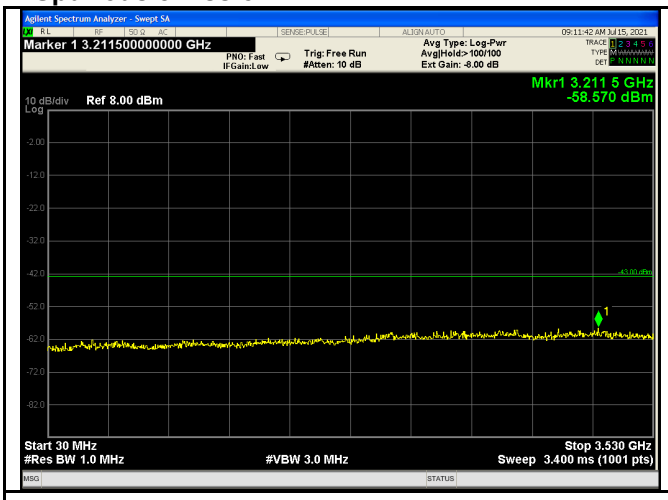
1. The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.
2. The resolution bandwidth of the spectrum analyzer was 1MHz; sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

11.3 Test Result

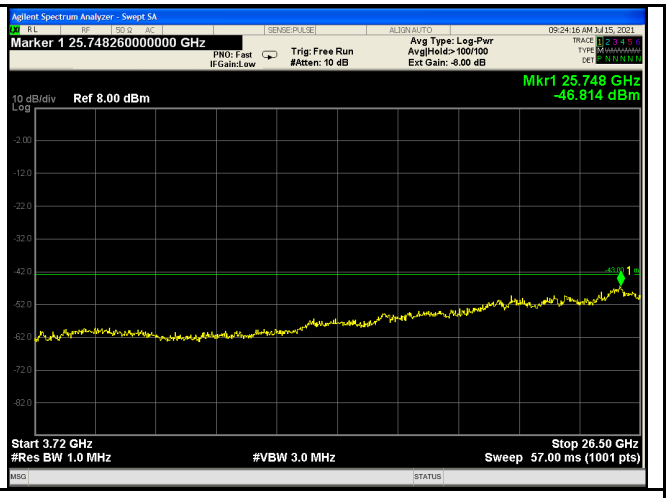
Remark: During the test, pre-scan the QPSK, 64QAM modulation, and found the QPSK modulation(10MHz/15MHz/20MHz) is the worst case.
The permit frequency range of Part 96 is from 3550-3700MHz.Notes as below:

Note 1: This device can be implement MIMO function,so the limit of spurious emissions needs to be reduced by 10log($Numbers_{ANT}$) according to KDB 662911
The general limit = -40dBm
For 2x2 MIMO, the limit=-40dBm -10log2=-43dBm.

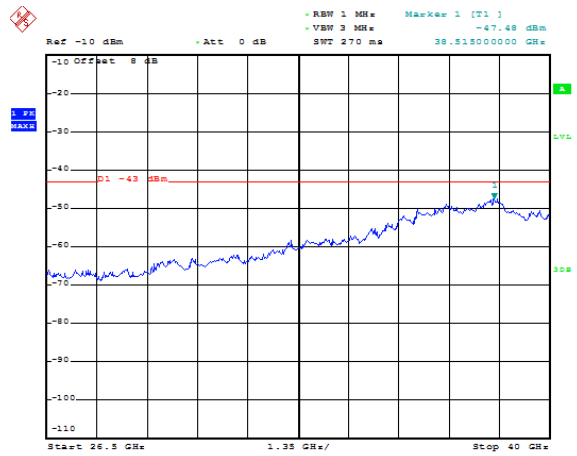
Test Plots (Worst case Chain 0)
Spurious emission



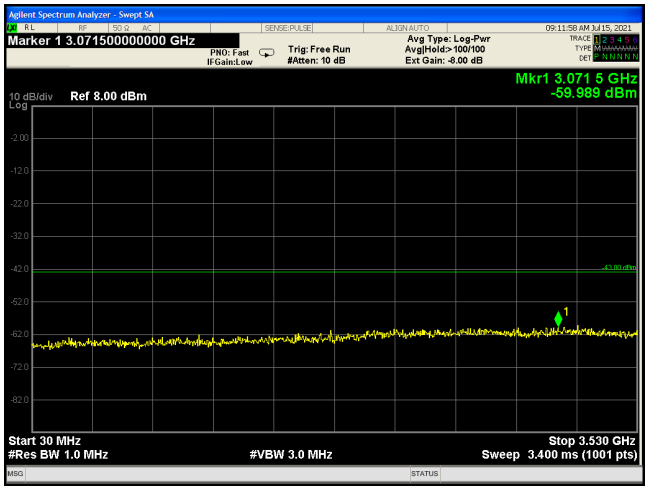
10MHz - Low CH 30MHz~3.53GHz



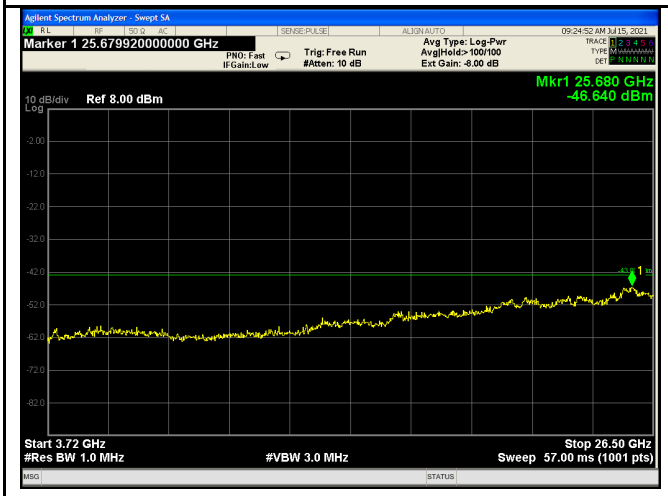
10MHz - Low CH 3.72GHz~26.5GHz



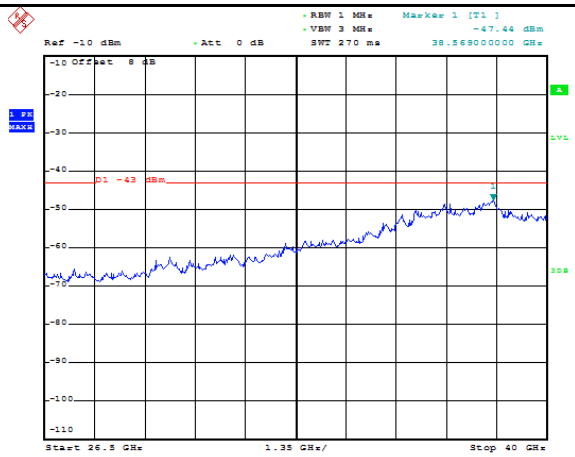
10MHz - Low CH 26.5GHz~40GHz



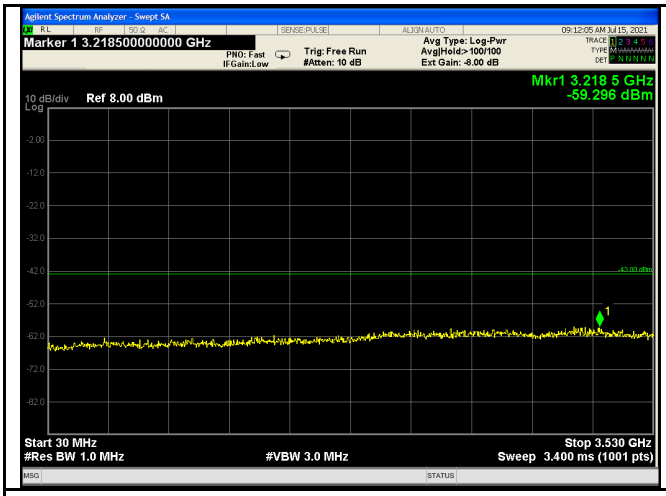
10MHz - Middle CH 30MHz~3.53GHz



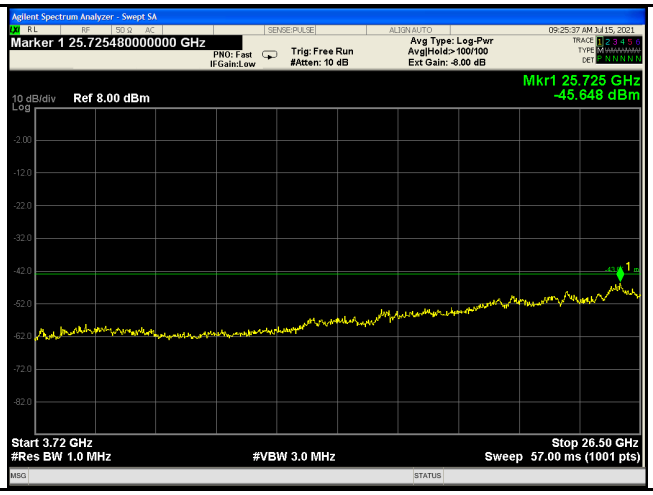
10MHz - Middle CH 3.72GHz~26.5GHz



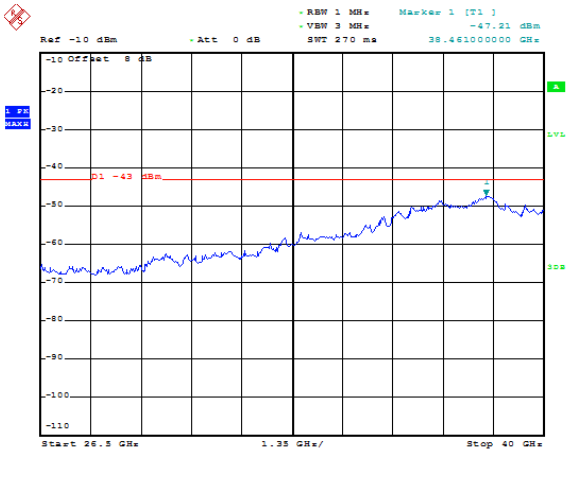
10MHz - Middle CH 26.5GHz~40GHz



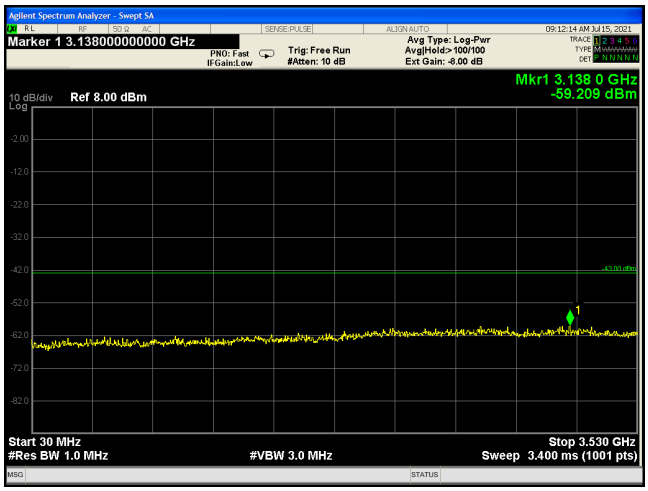
10MHz - High CH 30MHz~3.53GHz



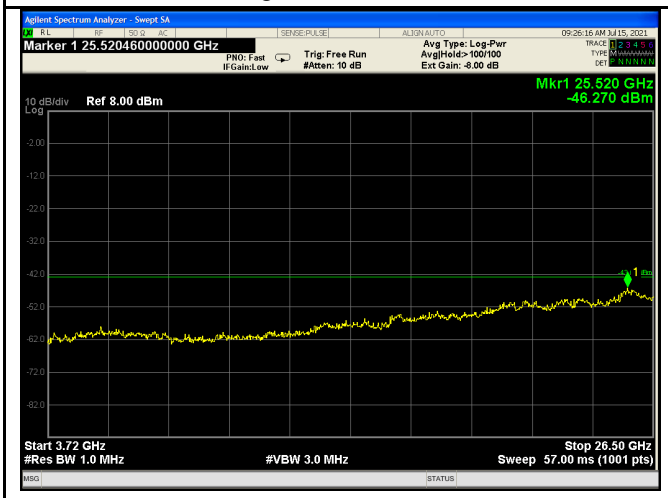
10MHz - High CH 3.72GHz~26.5GHz



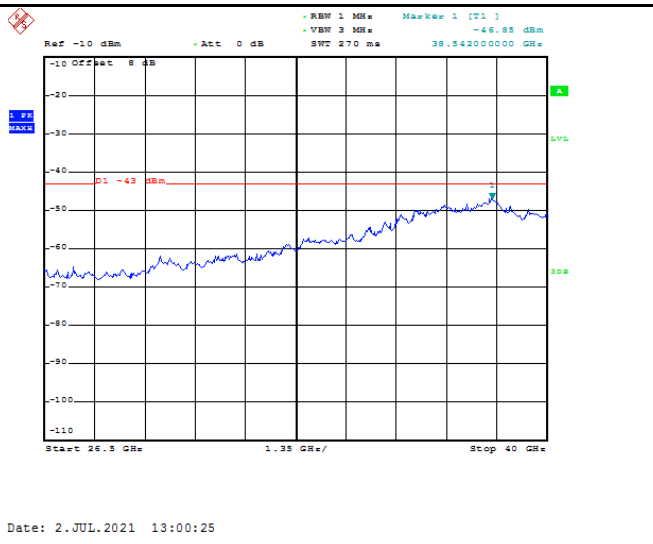
10MHz - High CH 26.5GHz~40GHz



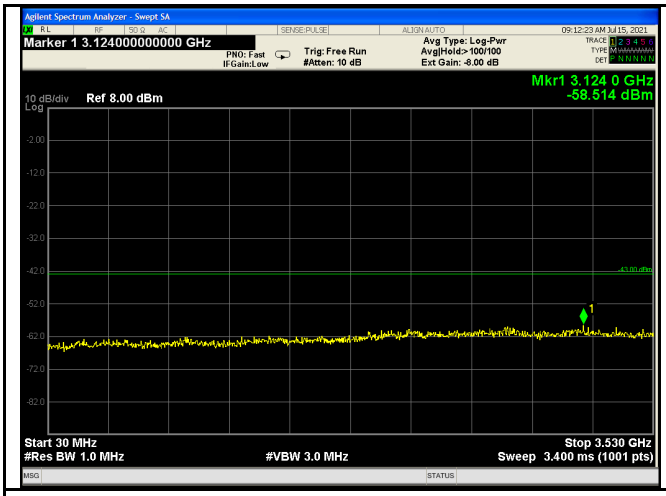
15MHz - Low CH 30MHz~3.53GHz



15MHz - Low CH 3.72GHz~26.5GHz

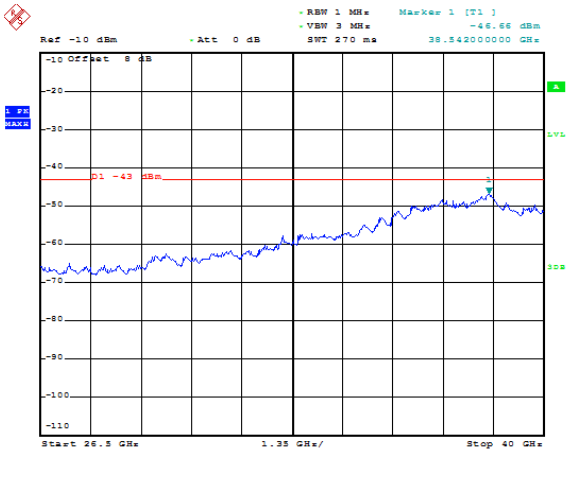


15MHz - Low CH 26.5GHz~40GHz

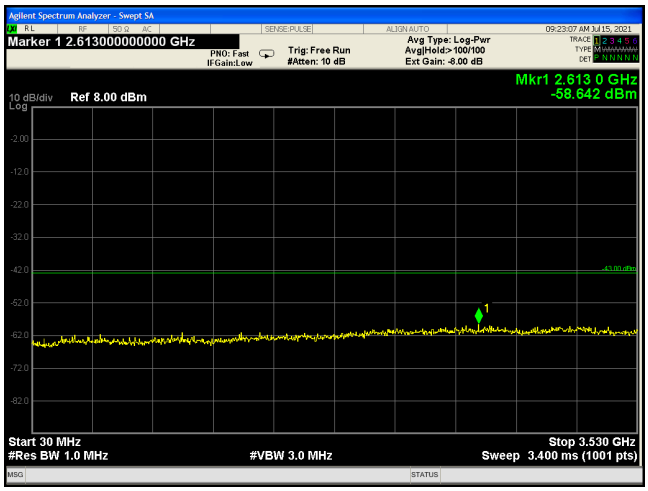


15MHz - Middle CH 30MHz~3.53GHz

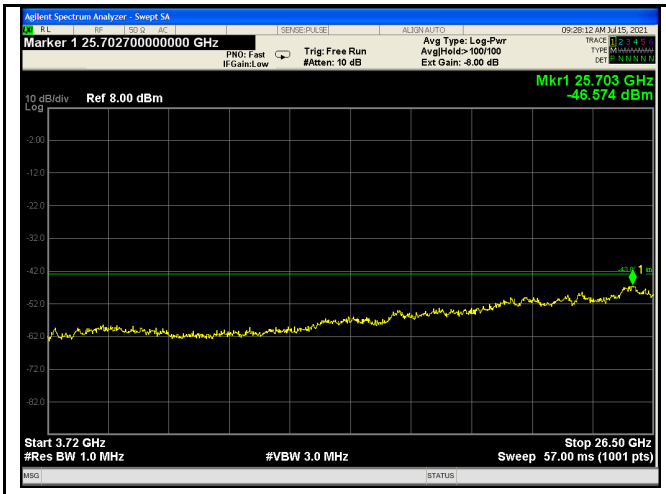
15MHz - Middle CH 3.72GHz~26.5GHz



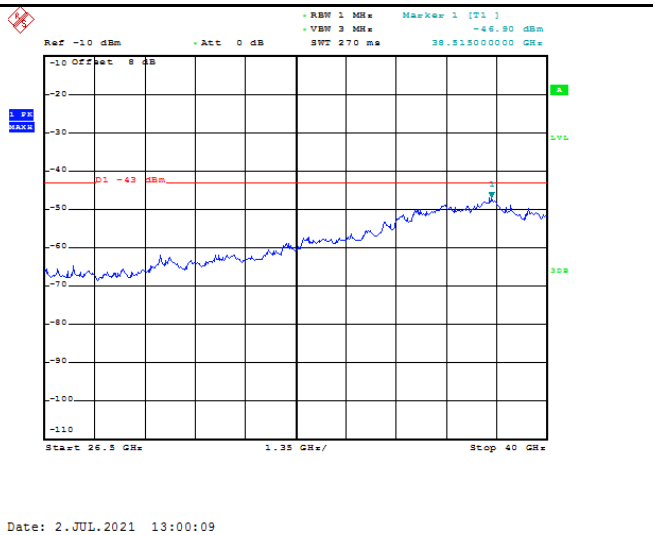
15MHz - Middle CH 26.5GHz~40GHz



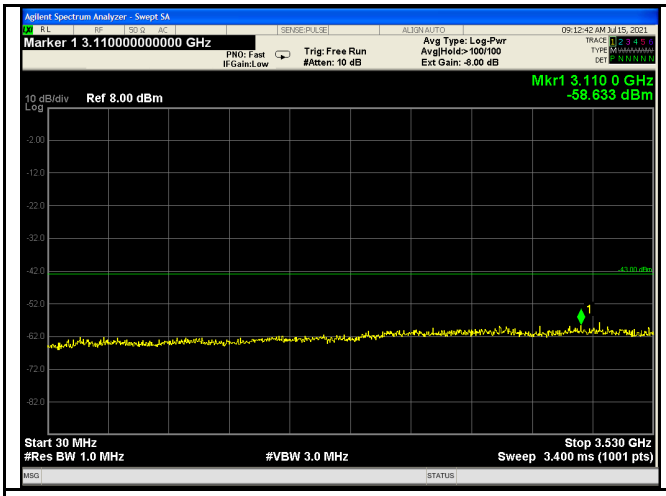
15MHz - High CH 30MHz~3.53GHz



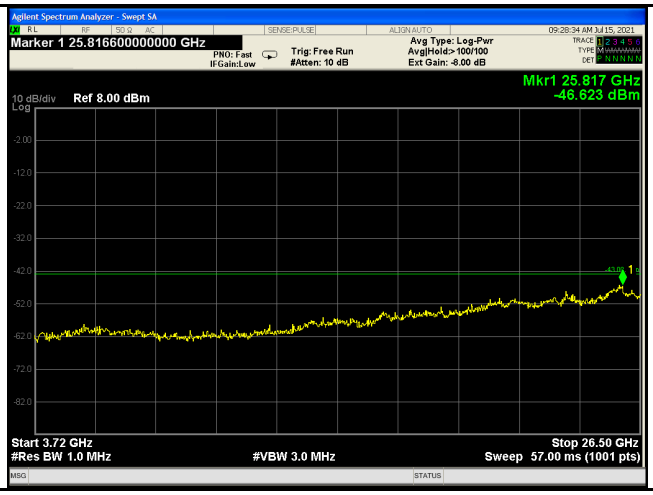
15MHz - High CH 3.72GHz~26.5GHz



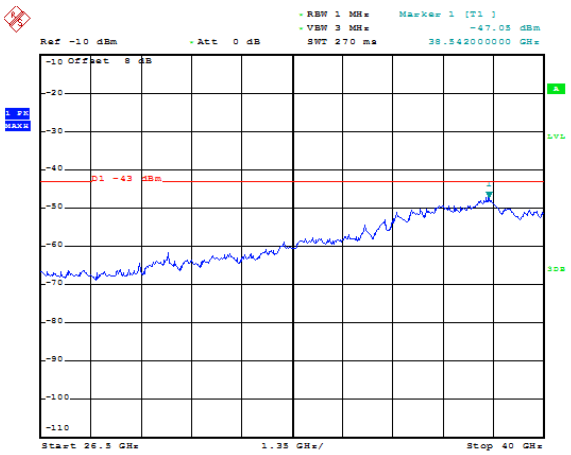
15MHz - High CH 26.5GHz~40GHz



20MHz - Low CH 30MHz~3.53GHz

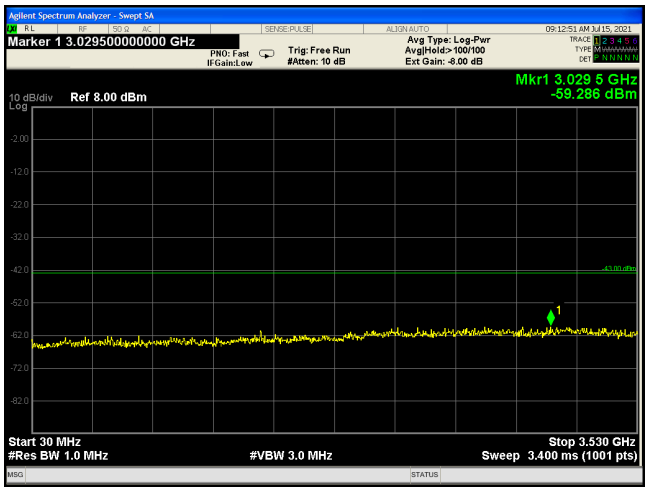


20MHz - Low CH 3.72GHz~26.5GHz



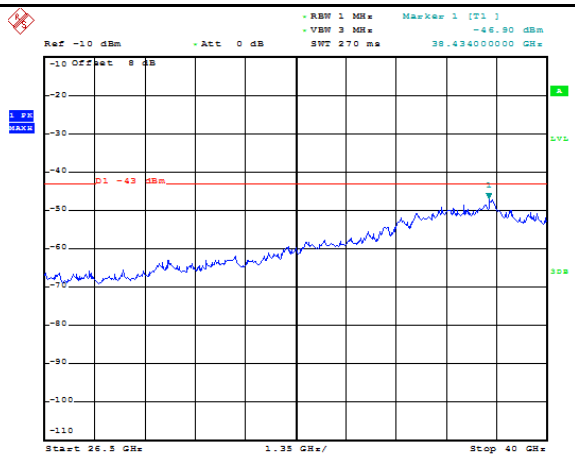
Date: 2.JUL.2021 13:01:23

20MHz - Low CH 26.5GHz~40GHz



20MHz - Middle CH 30MHz~3.53GHz

20MHz – Middle CH 3.72GHz~26.5GHz



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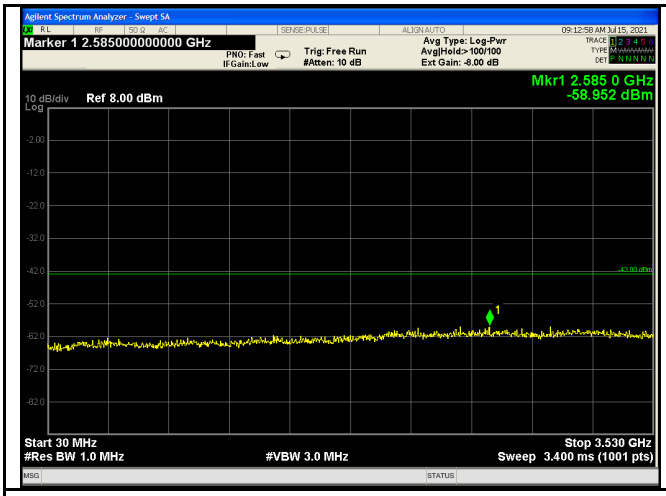
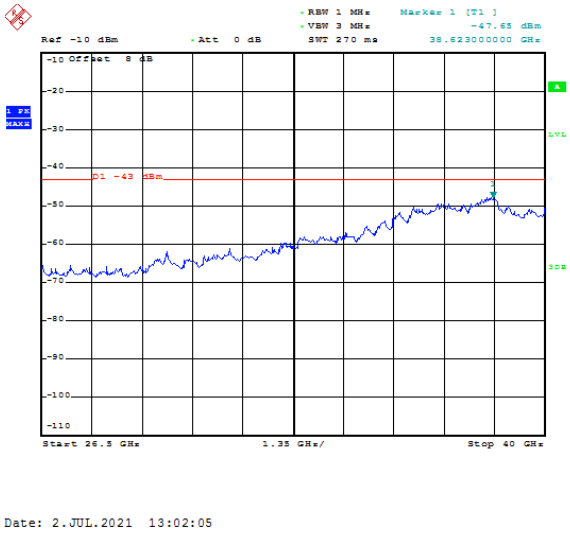
20MHz - Middle CH 26.5GHz~40GHz



20MHz - High CH 30MHz~3.53GHz

20MHz - High CH 3.72GHz~26.5GHz



20MHz - High CH 26.5GHz~40GHz

12 Field strength of spurious radiation measurement

Test Requirement:	FCC part 96.41(e)
Test Method:	ANSI/TIA-603-E:2016, ANSI C63.26:2015
Test Mode:	Data communicating mode
Limit:	-40dBm

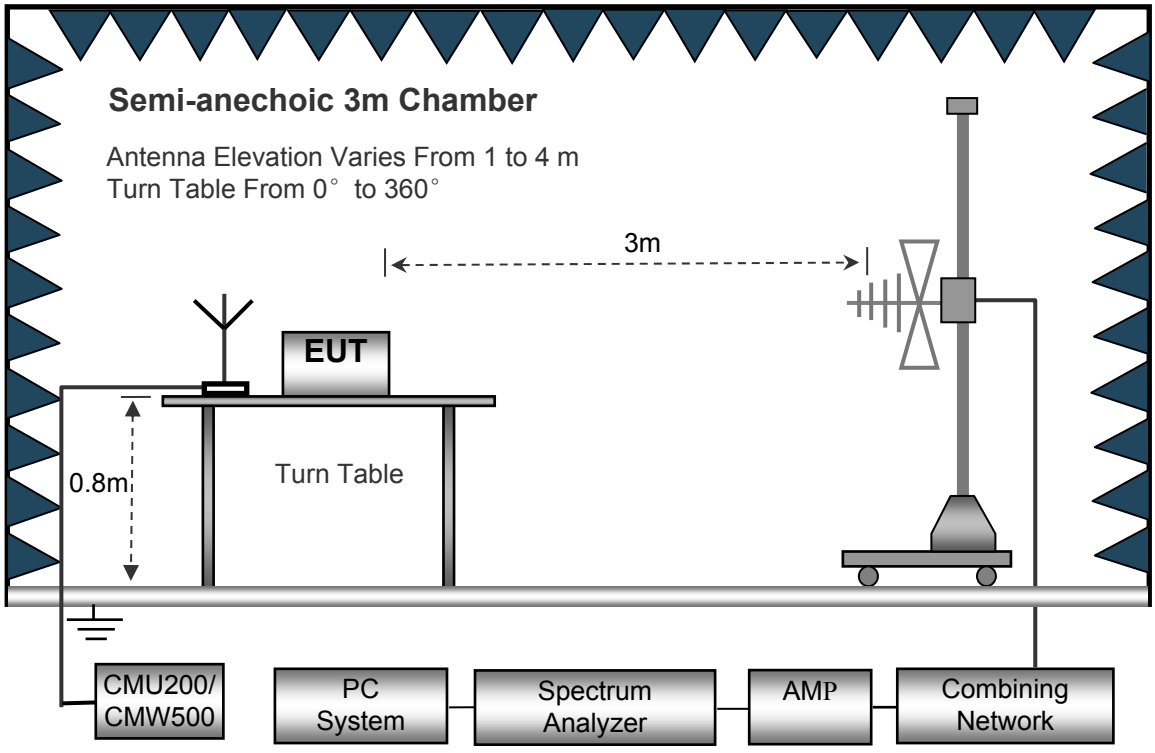
12.1 EUT Operation

Operating Environment :

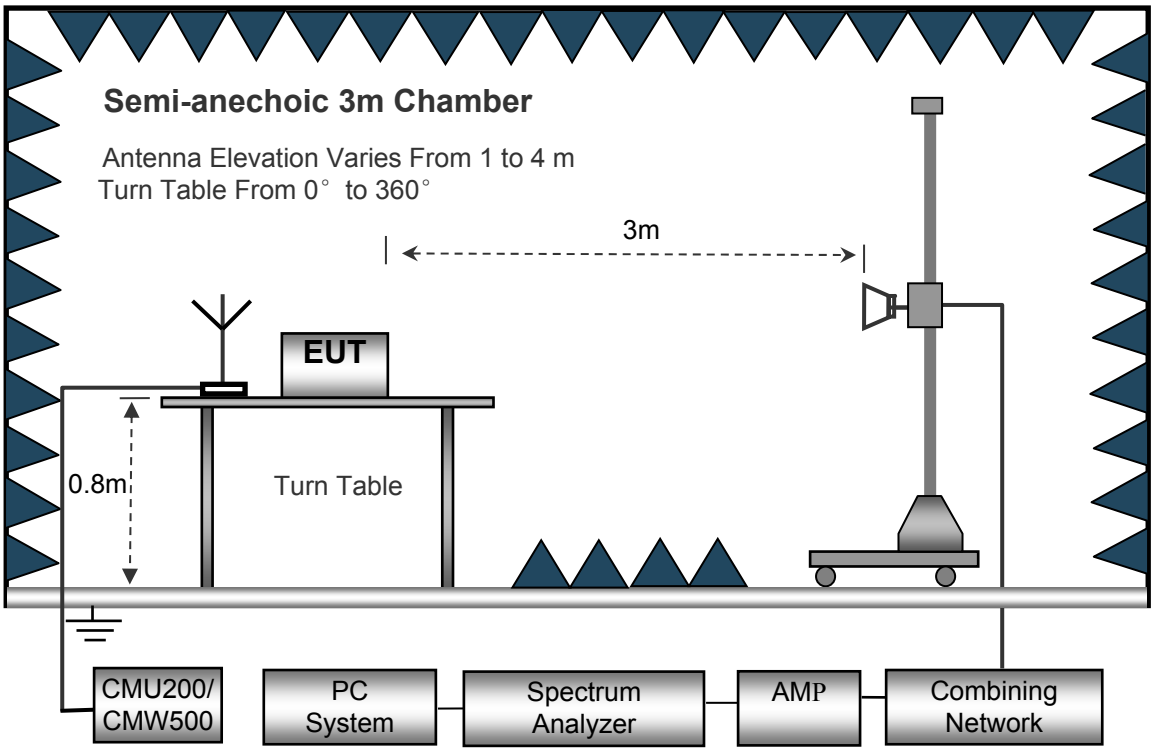
Temperature:	23.5 °C
Humidity:	52.1 % RH
Atmospheric Pressure:	101.2kPa

12.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site.
The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



12.3 Spectrum Analyzer Setup

30MHz ~ 1GHz

Sweep Speed ..... Auto
Detector ..... PK
Resolution Bandwidth 1MHz
Video Bandwidth 3MHz

Above 1GHz

Sweep Speed ..... Auto
Detector ..... PK
Resolution Bandwidth 1MHz
Video Bandwidth 3MHz

12.4 Test Procedure

1. The EUT was placed on an non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer.
2. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.
3. The frequency range up to tenth harmonic was investigated for each of three fundamental frequency (low, middle and high channels). Once spurious emission was identified, the power of the emission was determined using the substitution method.
4. The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency.
   ERP / EIRP = S.G. output (dBm) + Antenna Gain(dB/dBi) – Cable Loss (dB)

12.5 Test Result

30MHz-18GHz

Remark: During the test, pre-scan the QPSK, 64QAM modulation, and found the QPSK modulation and 20MHz bandwidth is the worst case.

Frequency	Receiver Reading	Turn table Angle	RX Antenna		Substituted			Absolute Level	Result	
			Height	Polar	SG Level	Cable	Antenna Gain		Limit	Margin
(MHz)	(dBμV)	Degree	(m)	(H/V)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
Low channel										
223.12	41.64	70	1.4	H	-68.87	0.15	0.00	-69.02	-40.00	-29.02
223.12	44.54	179	2.0	V	-63.05	0.15	0.00	-63.20	-40.00	-23.20
1648.40	43.43	16	2.2	H	-70.54	0.30	9.40	-61.44	-40.00	-21.44
1648.40	58.23	271	1.2	V	-55.30	0.30	9.40	-46.20	-40.00	-6.20
2472.60	58.83	53	1.9	H	-55.17	0.43	10.60	-45.00	-40.00	-5.00
2472.60	48.45	191	1.7	V	-61.83	0.43	10.60	-51.66	-40.00	-11.66
Middle channel										
199.38	41.46	101	1.8	H	-69.05	0.15	0.00	-69.20	-40.00	-29.20
199.38	45.65	348	1.9	V	-61.94	0.15	0.00	-62.09	-40.00	-22.09
1673.20	37.84	144	2.0	H	-76.13	0.30	9.40	-67.03	-40.00	-27.03
1673.20	58.32	295	1.0	V	-55.21	0.30	9.40	-46.11	-40.00	-6.11
2509.80	57.83	57	1.0	H	-56.17	0.43	10.60	-46.00	-40.00	-6.00
2509.80	48.14	31	1.7	V	-62.14	0.43	10.60	-51.97	-40.00	-11.97
High channel										
199.38	44.43	183	1.5	H	-66.08	0.15	0.00	-66.23	-40.00	-26.23
199.38	45.65	271	1.1	V	-61.94	0.15	0.00	-62.09	-40.00	-22.09
1697.60	35.84	59	2.0	H	-78.13	0.30	9.40	-69.03	-40.00	-29.03
1697.60	58.32	59	1.4	V	-55.21	0.30	9.40	-46.11	-40.00	-6.11
2546.40	57.83	143	1.1	H	-56.17	0.43	10.60	-46.00	-40.00	-6.00
2546.40	48.14	305	1.9	V	-62.14	0.43	10.60	-51.97	-40.00	-11.97

Remark:

Test Frequency: 18GHz~40GHz

The measurements were more than 20 dB below the limit and not recorded.

13 Frequency stability V.S. Temperature measurement

Test Requirement: FCC Part2.1055

Test Method: FCC Part2.1055

Test Mode: Data communicating mode

Limit: :

Frequency range (MHz)	Fixed and base stations (±ppm)	Mobile stations (±ppm)	
		Over 2 watts output power	2 watts or less output power
Below 25	100	100	200
25–50	20	20	50
72–76	5		50
150–174	5	5	50
216–220	1.0		1.0
220–222	0.1	1.5	1.5
421–512	2.5	5	5
806–809	1.0	1.5	1.5
809–824	1.5	2.5	2.5
851–854	1.0	1.5	1.5
854–869	1.5	2.5	2.5
896–901	0.1	1.5	1.5
902–928	2.5	2.5	2.5
902–928	2.5	2.5	2.5
929–930	1.5		
935–940	0.1	1.5	1.5
1427–1435	300	300	300
Above 2450			

13.1 EUT Operation

Operating Environment :

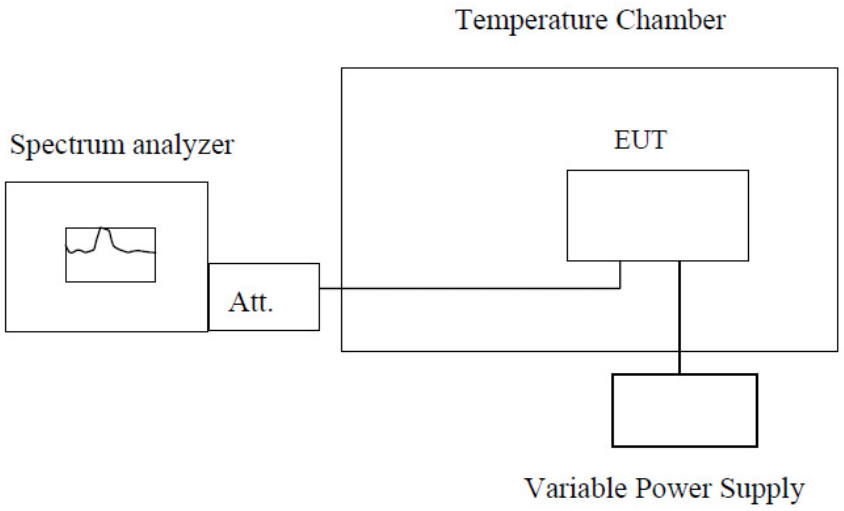
Temperature: 23.6 °C

Humidity: 52.2 % RH

Atmospheric Pressure: 101.3kPa

13.2 Test Procedure

1. The equipment under test was connected to an external DC power supply and input rated voltage.
2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators.
3. The EUT was placed inside the temperature chamber.
4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25℃ operating frequency as reference frequency.
5. Turn EUT off and set the chamber temperature to –30℃. After the temperature stabilized for approximately 30 minutes recorded the frequency.
6. Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃ reached.



Note : Measurement setup for testing on Antenna connector

13.3 Test Result

Remark: All three channels of all modulations have been tested, but only the worst channel and the worst modulation show in this test item.

Chain 0

Test Frequency: 3555MHz QPSK 10MHz			
Temperature (℃)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
-30	120	105	0.0287
-20		98	0.0268
-10		103	0.0282
0		106	0.0290
10		108	0.0296
20		100	0.0274
30		100	0.0274
40		112	0.0307
50		114	0.0312

Test Frequency: 3557.5MHz QPSK 15MHz			
Temperature (℃)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
-30	120	110	0.0301
-20		102	0.0279
-10		99	0.0271
0		108	0.0295
10		112	0.0306
20		106	0.0290
30		106	0.0290
40		103	0.0282
50		109	0.0298

Test Frequency: 3560MHz QPSK 20MHz			
Temperature (℃)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
-30	120	111	0.0304
-20		114	0.0312
-10		108	0.0296
0		107	0.0293
10		103	0.0282
20		108	0.0296
30		113	0.0309
40		107	0.0293
50		99	0.0271

Chain 1

Test Frequency: 3555MHz QPSK 10MHz			
Temperature (℃)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
-30	120	107	0.0293
-20		100	0.0273
-10		95	0.0260
0		100	0.0273
10		102	0.0279
20		98	0.0268
30		94	0.0257
40		103	0.0282
50		94	0.0257

Test Frequency: 3557.5MHz QPSK 15MHz			
Temperature (℃)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
-30	120	104	0.0284
-20		101	0.0276
-10		108	0.0295
0		102	0.0279
10		108	0.0295
20		101	0.0276
30		107	0.0293
40		102	0.0279
50		103	0.0282

Test Frequency: 3560MHz QPSK 20MHz			
Temperature (℃)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
-30	120	106	0.0290
-20		108	0.0295
-10		108	0.0295
0		110	0.0301
10		113	0.0309
20		113	0.0309
30		104	0.0284
40		104	0.0284
50		105	0.0287

14 Frequency stability V.S. Voltage measurement

Test Requirement: FCC Part2.1055

Test Method: FCC Part2.1055

Test Mode: Data communicating mode

Limit: FCC:

Frequency range (MHz)	Fixed and base stations (±ppm)	Mobile stations (±ppm)	
		Over 2 watts output power	2 watts or less output power
Below 25	100	100	200
25–50	20	20	50
72–76	5		50
150–174	5	5	50
216–220	1.0		1.0
220–222	0.1	1.5	1.5
421–512	2.5	5	5
806–809	1.0	1.5	1.5
809–824	1.5	2.5	2.5
851–854	1.0	1.5	1.5
854–869	1.5	2.5	2.5
896–901	0.1	1.5	1.5
902–928	2.5	2.5	2.5
902–928	2.5	2.5	2.5
929–930	1.5		
935–940	0.1	1.5	1.5
1427–1435	300	300	300
Above 2450			

14.1 EUT Operation

Operating Environment :

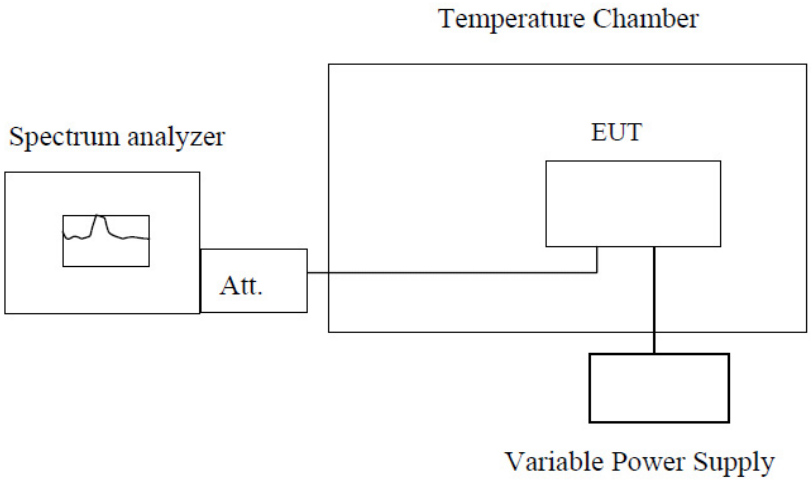
Temperature: 23.7 °C

Humidity: 52.9 % RH

Atmospheric Pressure: 101.4kPa

14.2 Test Procedure

1. Set chamber temperature to 25℃. Use a variable DC power source to power the EUT and set the voltage to rated voltage.
2. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.
3. Reduce the input voltage to specify extreme voltage variation (+/- 15%) and endpoint, record the maximum frequency change.



Note : Measurement setup for testing on Antenna connector

14.3 Test Result

Remark: All three channels of all modulations have been tested, but only the worst channel and the worst modulation show in this test item.

Chain 0

Test Frequency: 3555MHz QPSK 10MHz			
Temperature (℃)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
25	102	110	0.0301
	120	111	0.0304
	138	104	0.0285

Test Frequency: 3557.5MHz QPSK 15MHz			
Temperature (℃)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
25	102	110	0.0301
	120	108	0.0295
	138	108	0.0295

Test Frequency: 3560MHz QPSK 20MHz			
Temperature (℃)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
25	102	103	0.0281
	120	115	0.0314
	138	110	0.0301

Chain 1

Test Frequency: 3555MHz QPSK 10MHz			
Temperature (℃)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
25	102	113	0.0309
	120	106	0.0290
	138	105	0.0287

Test Frequency: 3557.5MHz QPSK 15MHz			
Temperature (℃)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
25	102	100	0.0274
	120	105	0.0287
	138	106	0.0290

Test Frequency: 3560MHz QPSK 20MHz			
Temperature (℃)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
25	102	107	0.0293
	120	108	0.0295
	138	107	0.0293

15 Photographs of test setup and EUT.

Note: Please refer to appendix: EG8013L-M11-EUD _Photos.

====== End of Report ======