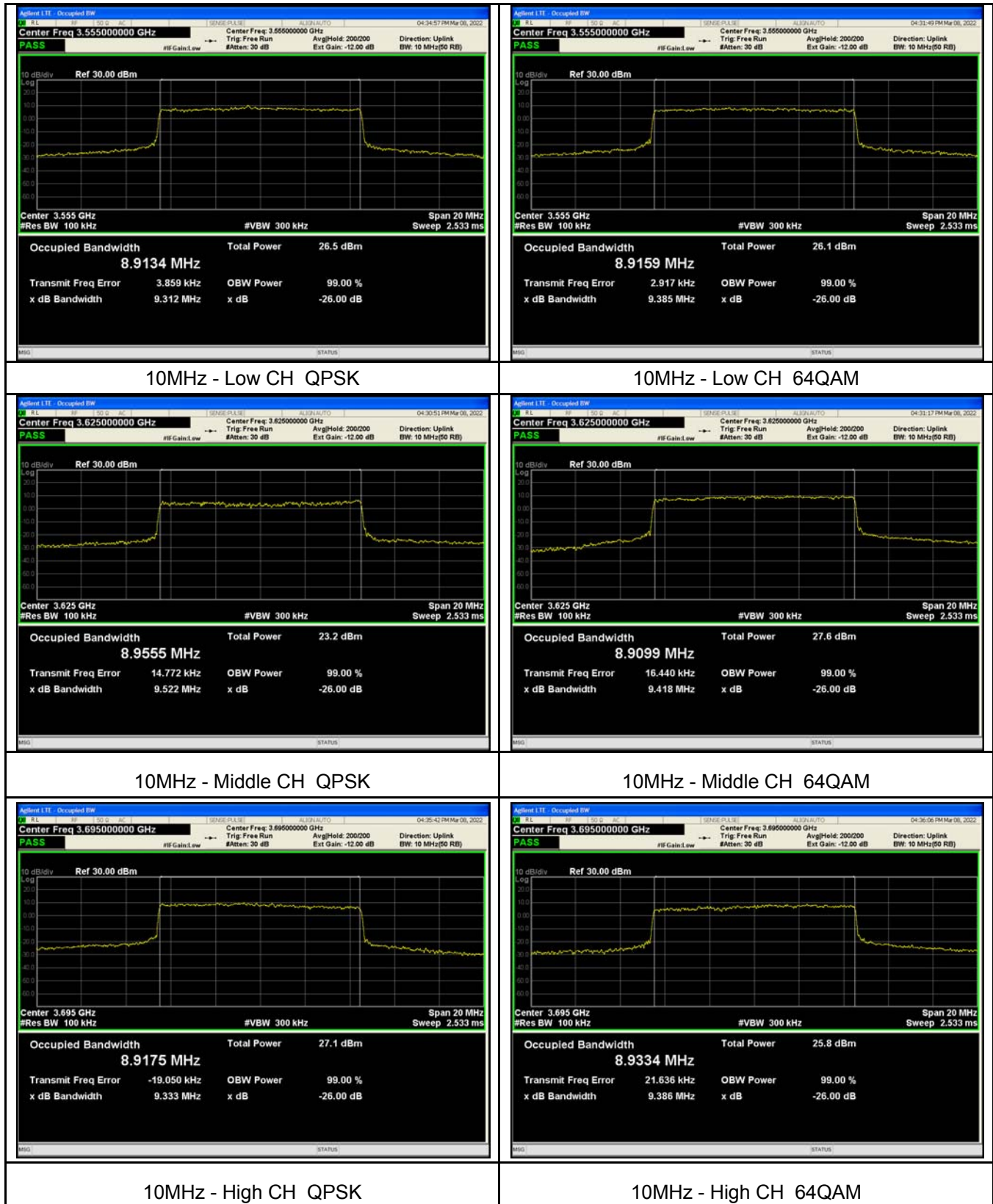
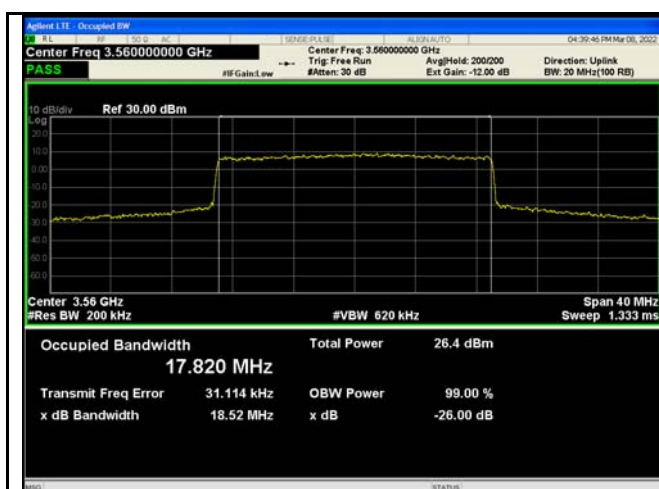
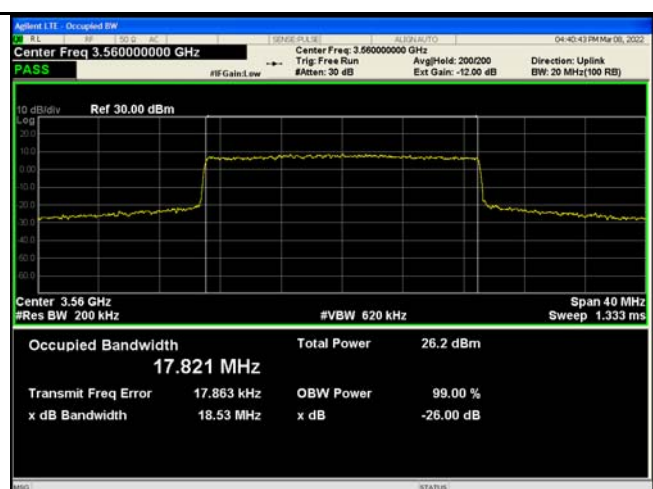


Test Plots Chain 0

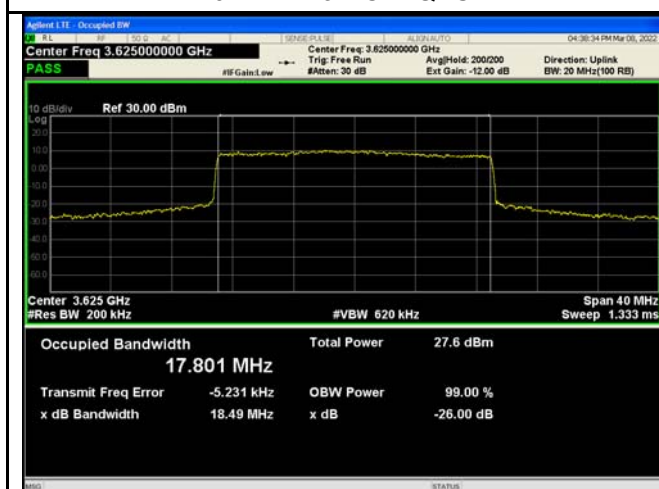




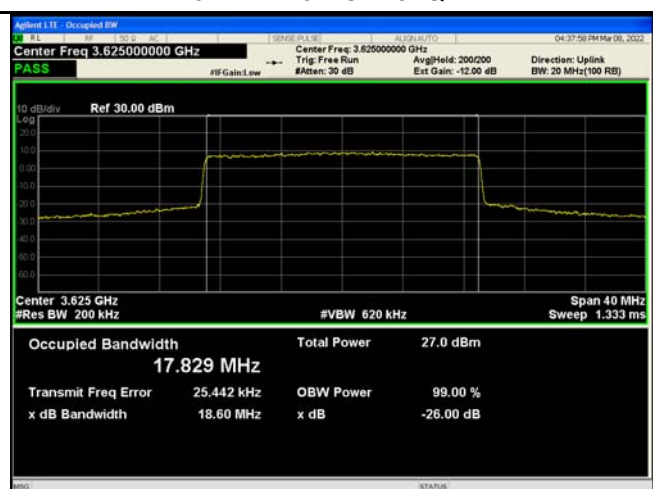
20MHz - Low CH QPSK



20MHz - Low CH 64QAM



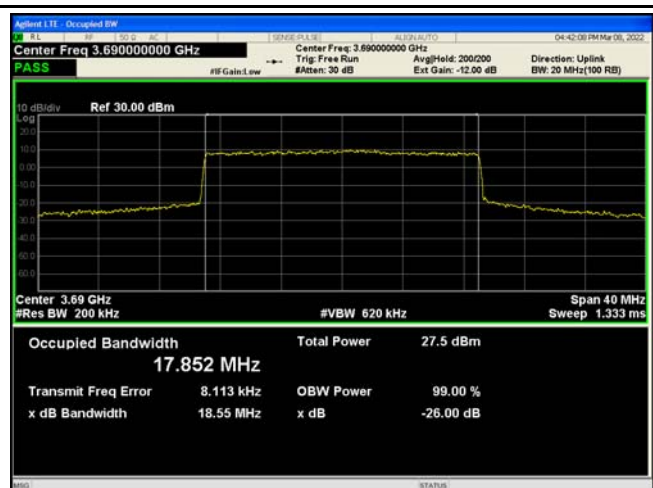
20MHz - Middle CH QPSK



20MHz - Middle CH 64QAM

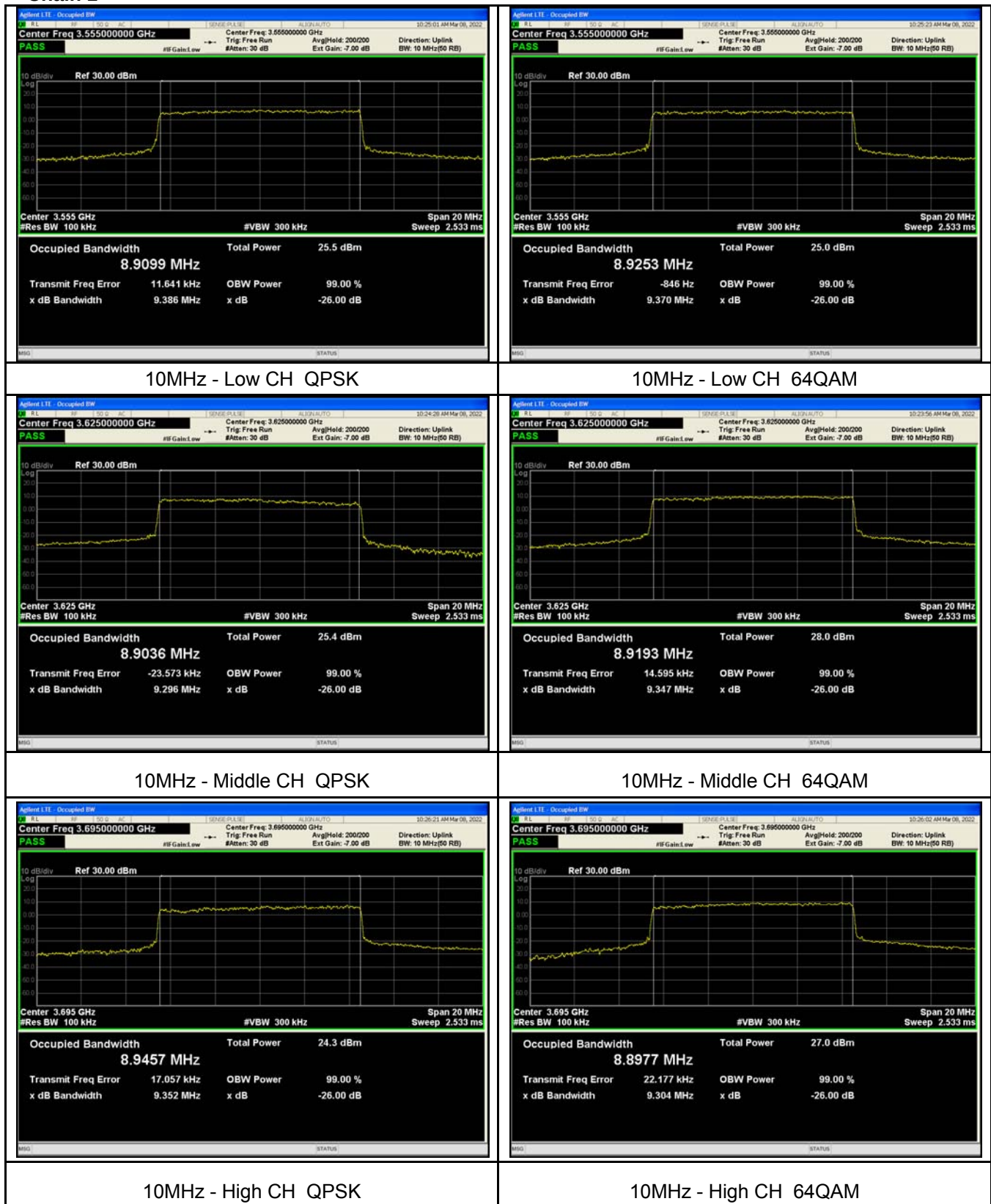


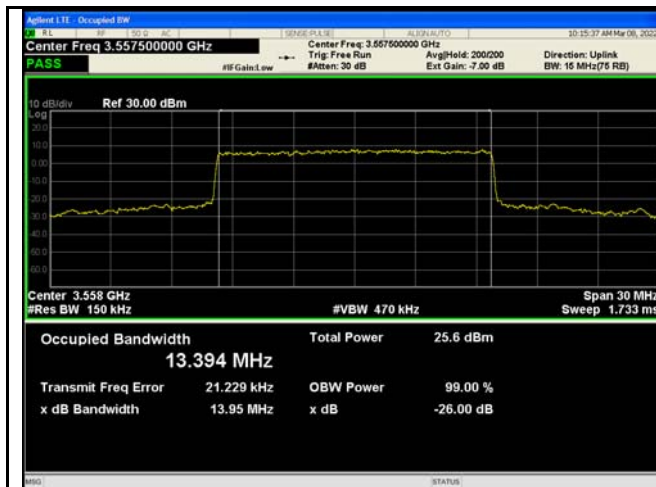
20MHz - High CH QPSK



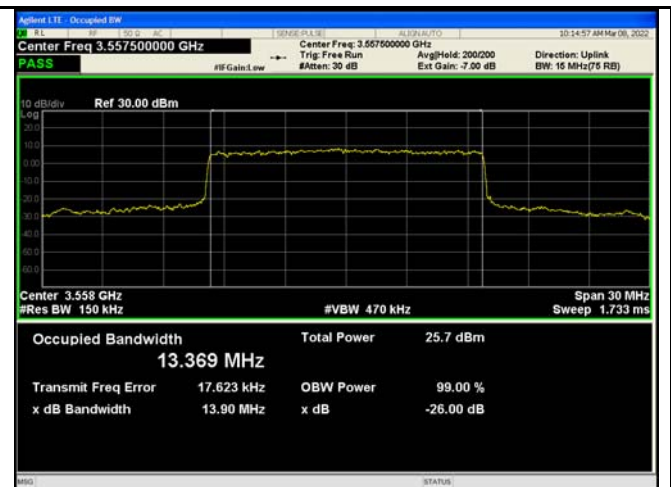
20MHz - High CH 64QAM

Chain 1

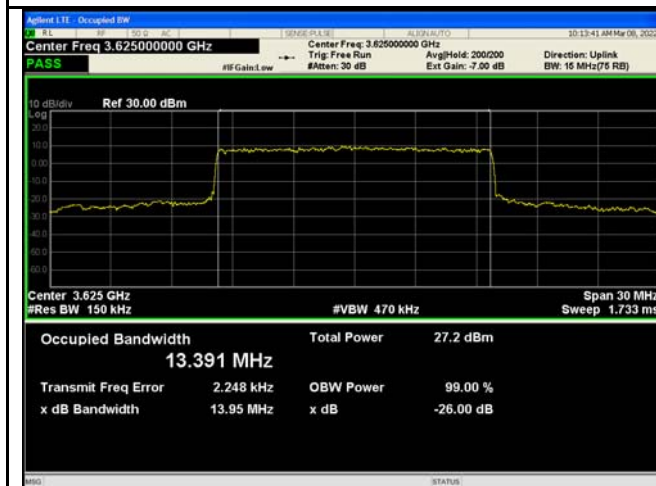




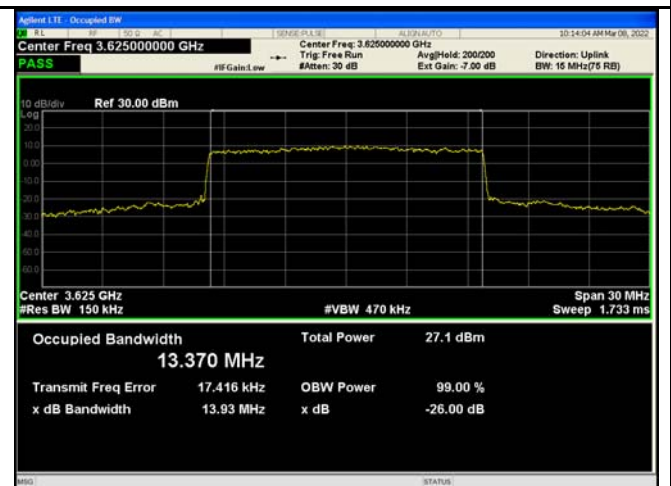
15MHz - Low CH QPSK



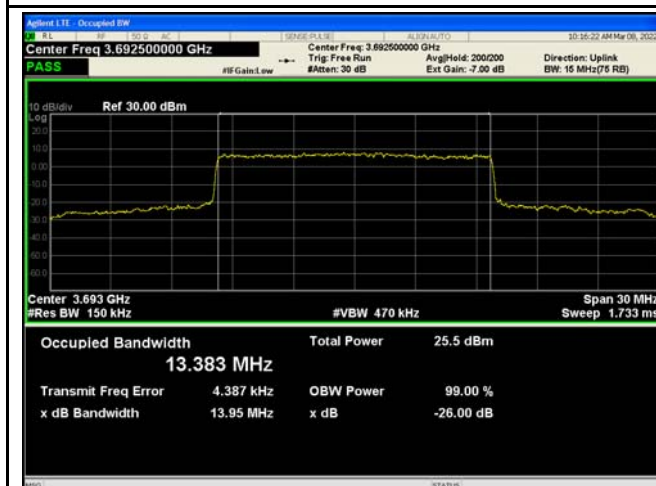
15MHz - Low CH 64QAM



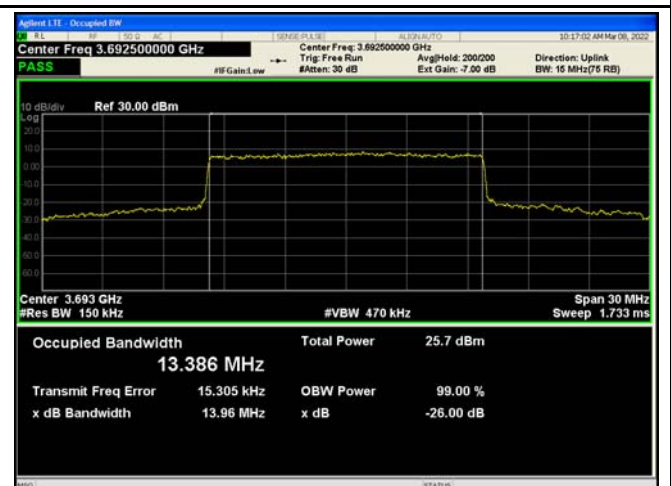
15MHz - Middle CH QPSK



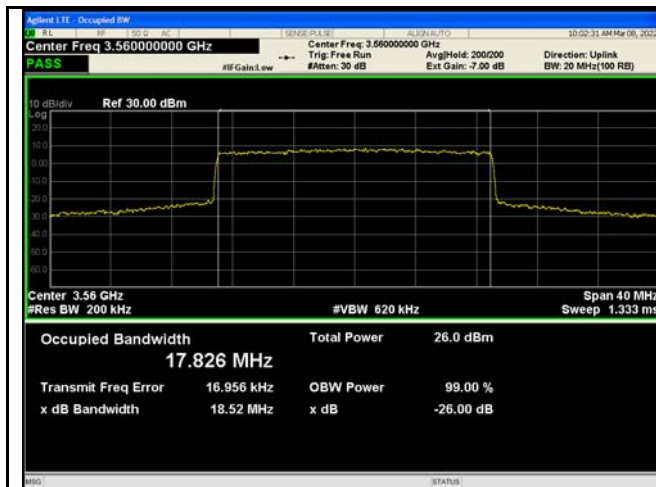
15MHz - Middle CH 64QAM



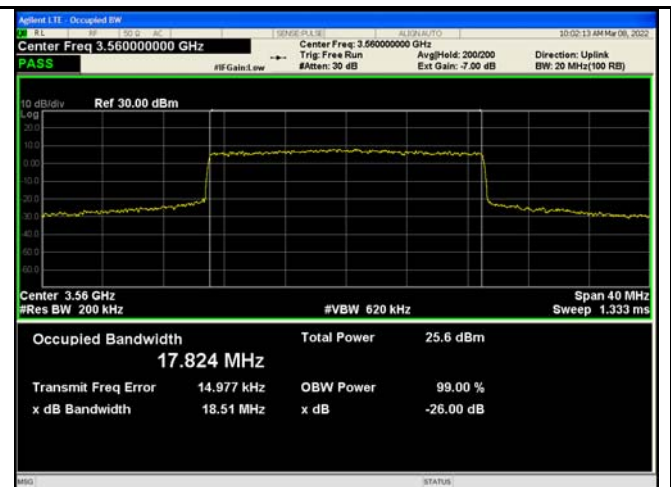
15MHz - High CH QPSK



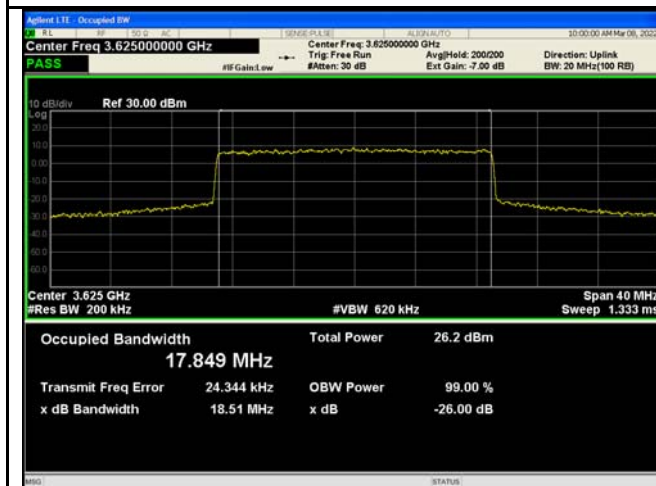
15MHz - High CH 64QAM



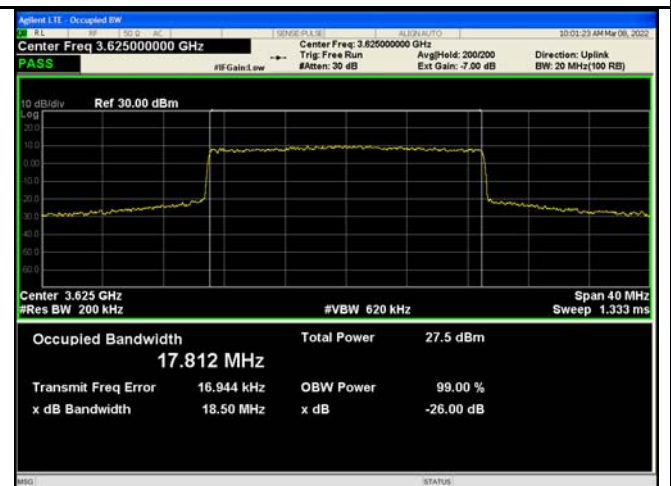
20MHz - Low CH QPSK



20MHz - Low CH 64QAM



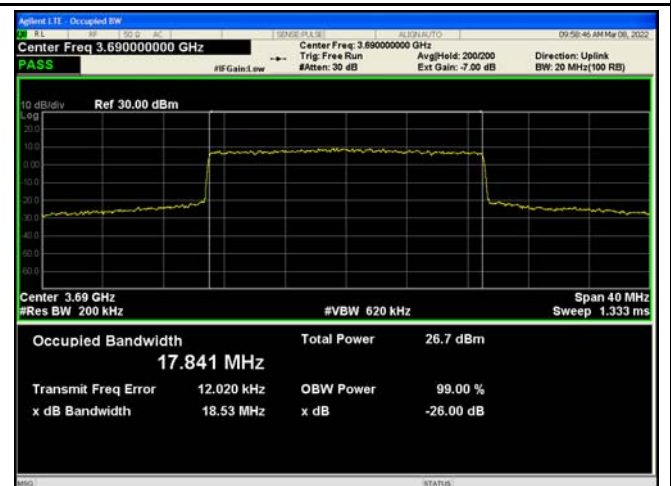
20MHz - Middle CH QPSK



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

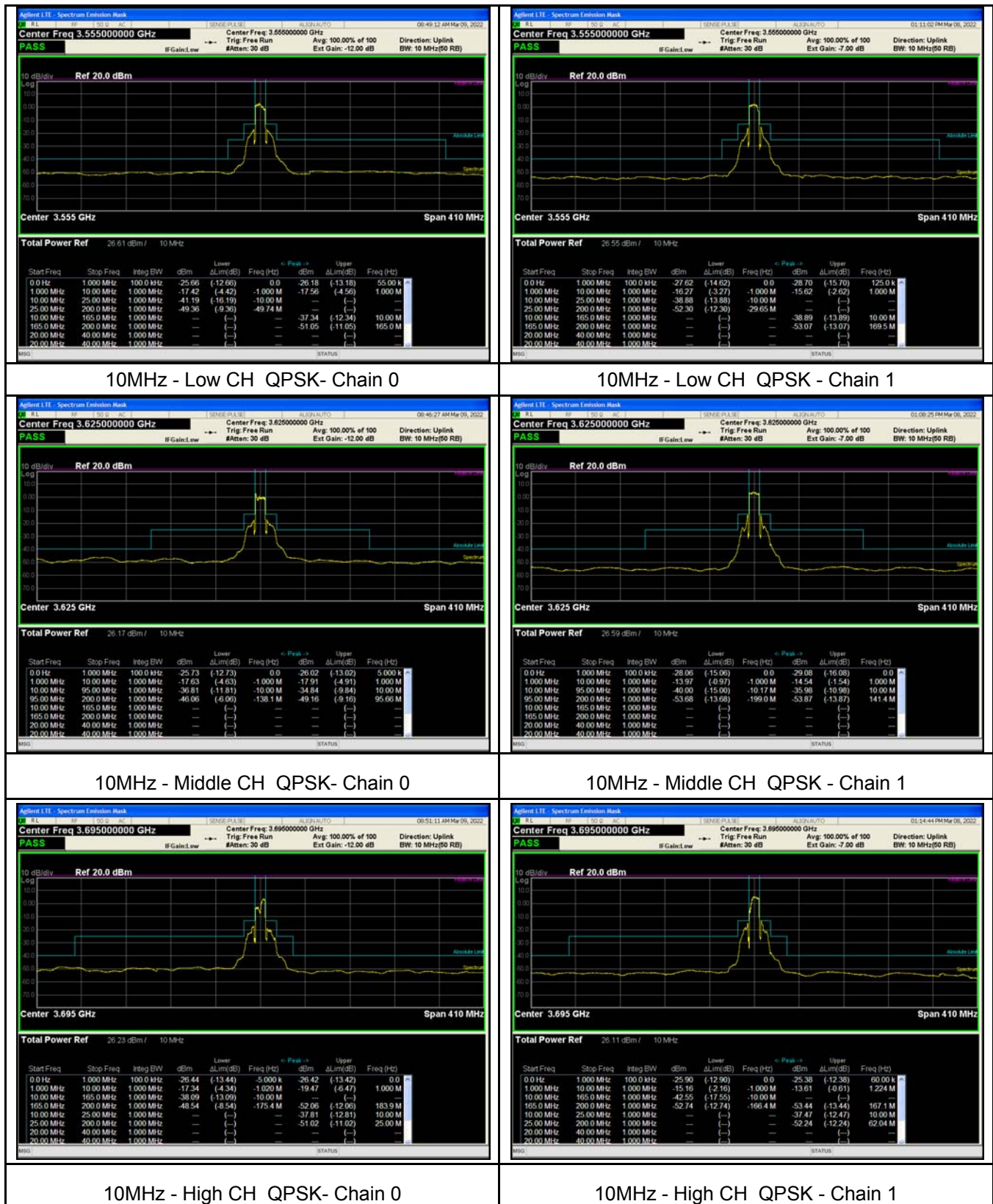
10.1 EUT Operation

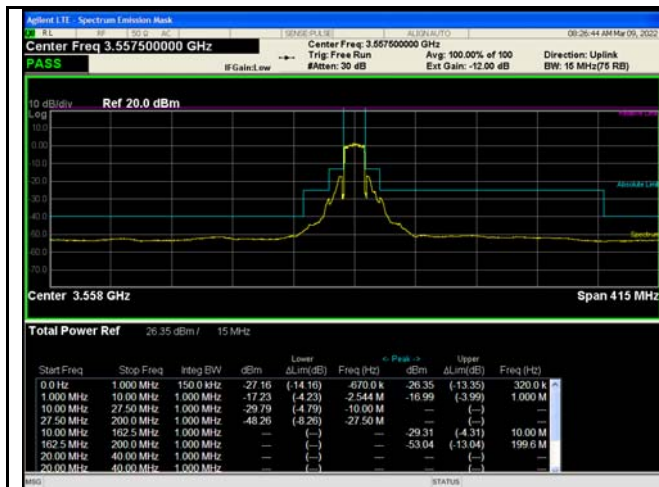
Operating Environment :	
Temperature:	22.7 °C
Humidity:	52.1 % RH
Atmospheric Pressure:	102.3kPa

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





15MHz - Low CH QPSK- Chain 0



15MHz - Low CH QPSK - Chain 1



15MHz - Middle CH QPSK- Chain 0



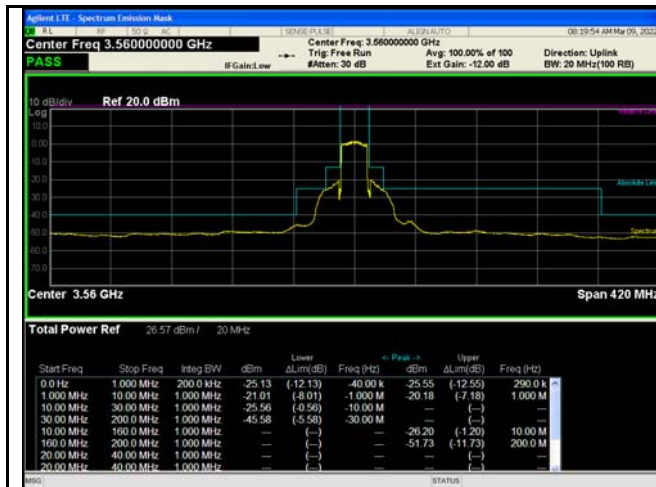
15MHz - Middle CH QPSK - Chain 1



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 $\leq$ -40dBm

11.1 EUT Operation

Operating Environment :

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

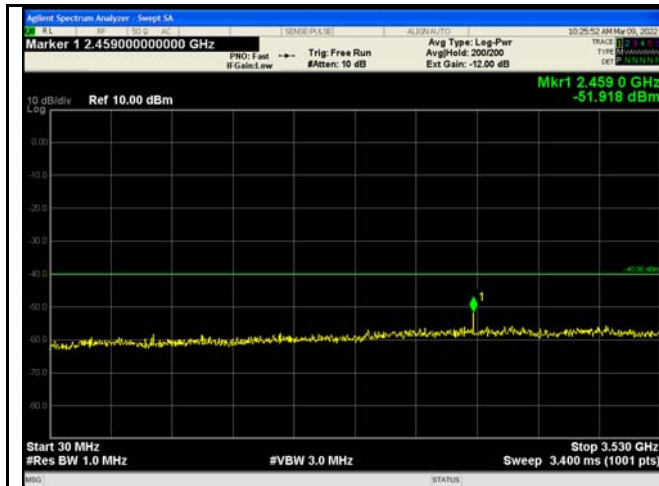
11.2 Test Procedure

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.

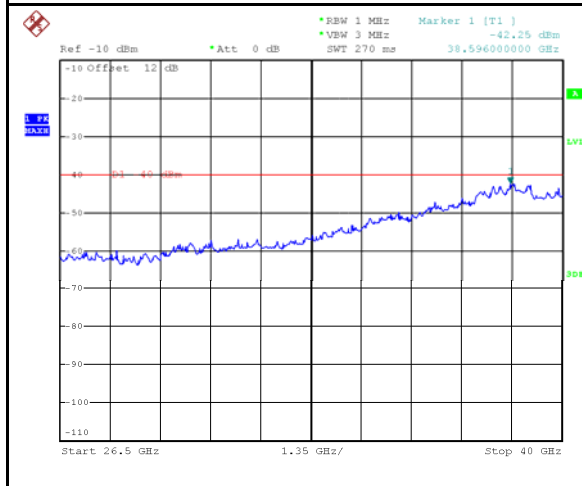
Test Plots (Worst case Chain 0)



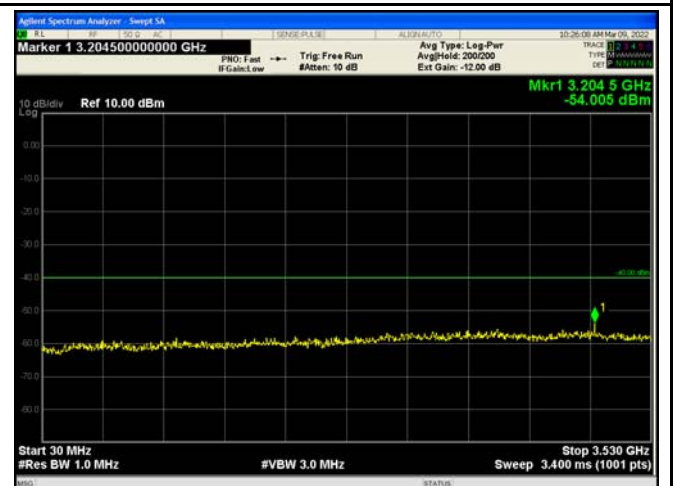
10MHz - Low CH 30MHz~3.53GHz



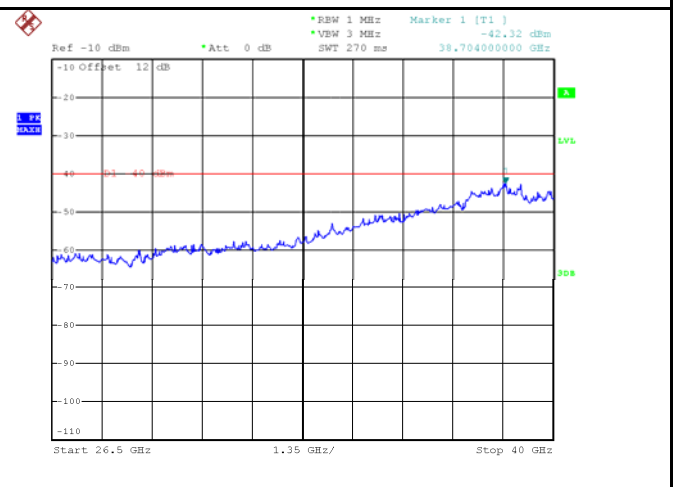
10MHz - Low CH 3.72GHz~26.5GHz

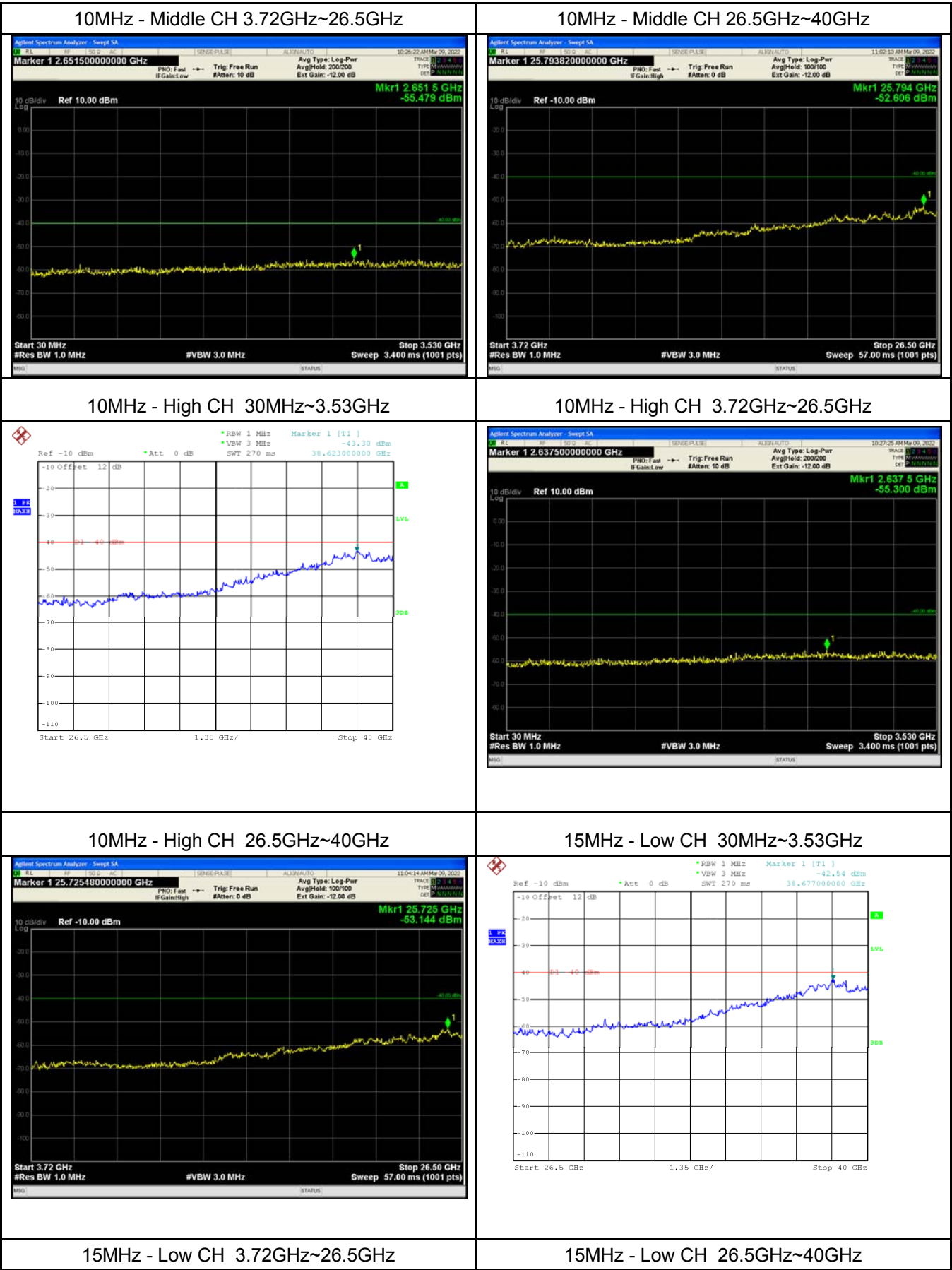


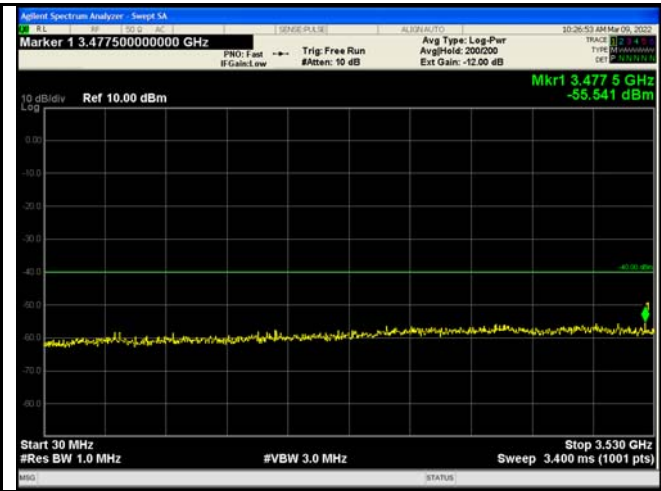
10MHz - Low CH 26.5GHz~40GHz



10MHz - Middle CH 30MHz~3.53GHz



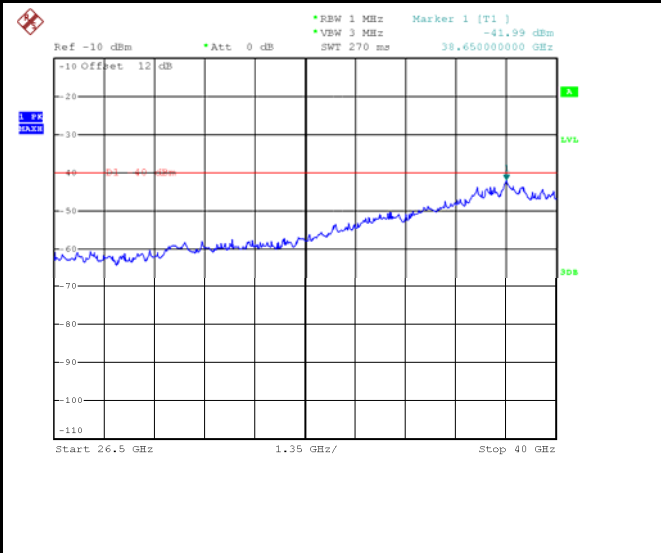




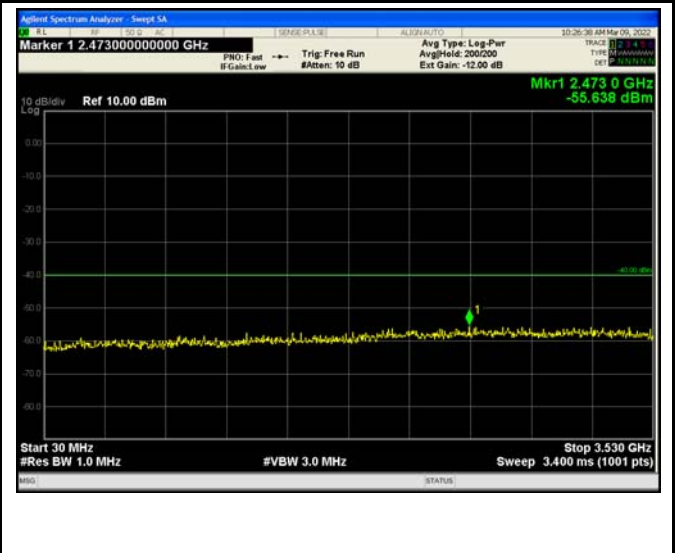
15MHz - Middle CH 30MHz~3.53GHz



15MHz - Middle CH 3.72GHz~26.5GHz



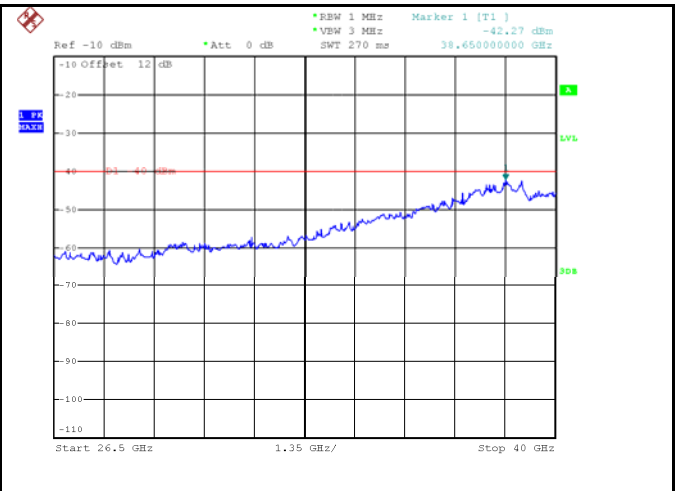
15MHz - Middle CH 26.5GHz~40GHz



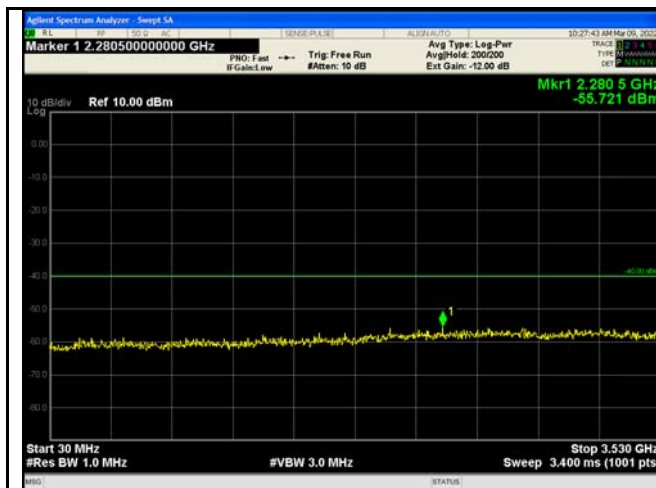
15MHz - High CH 30MHz~3.53GHz



15MHz - High CH 3.72GHz~26.5GHz



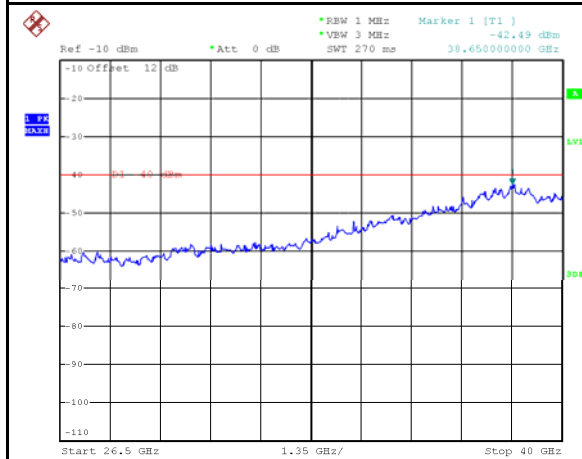
15MHz - High CH 26.5GHz~40GHz



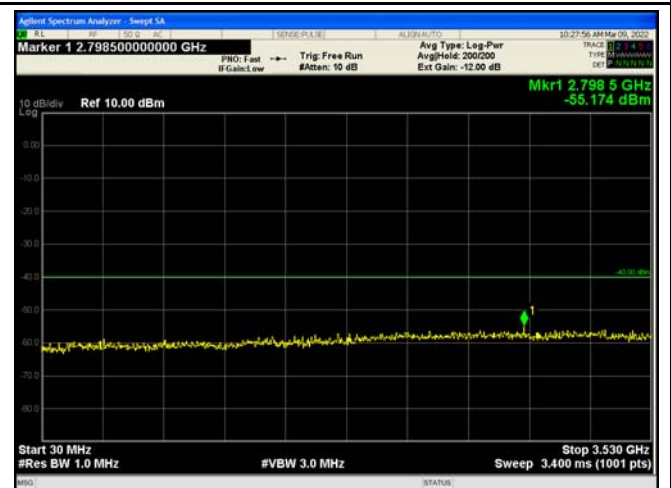
20MHz - Low CH 30MHz~3.53GHz



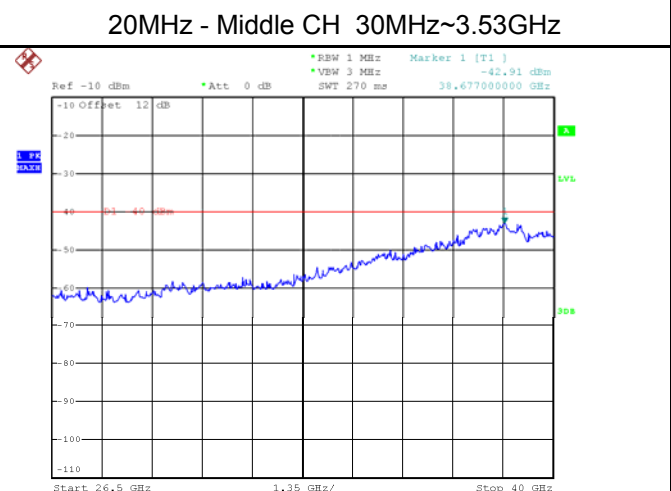
20MHz - Low CH 3.72GHz~26.5GHz



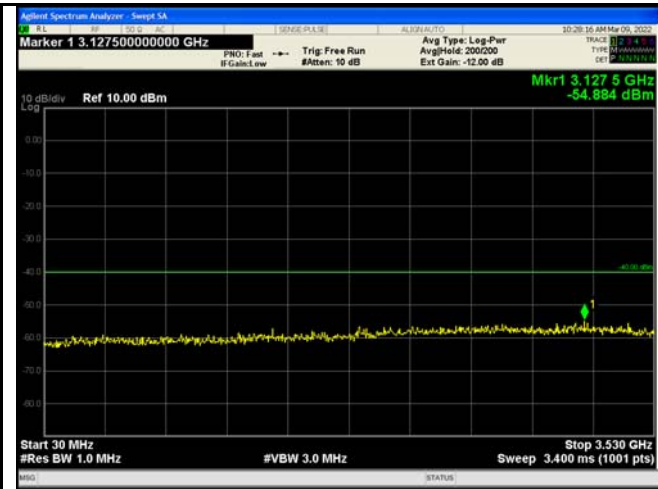
20MHz - Low CH 26.5GHz~40GHz



20MHz - Middle CH 3.72GHz~26.5GHz



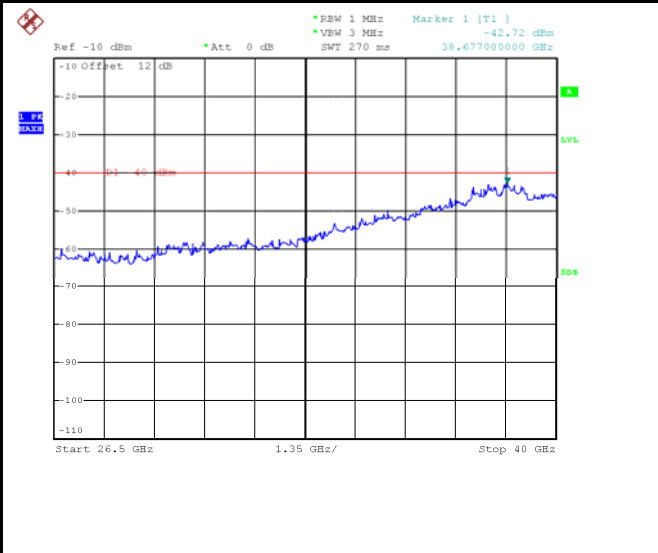
20MHz - Middle CH 26.5GHz~40GHz



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

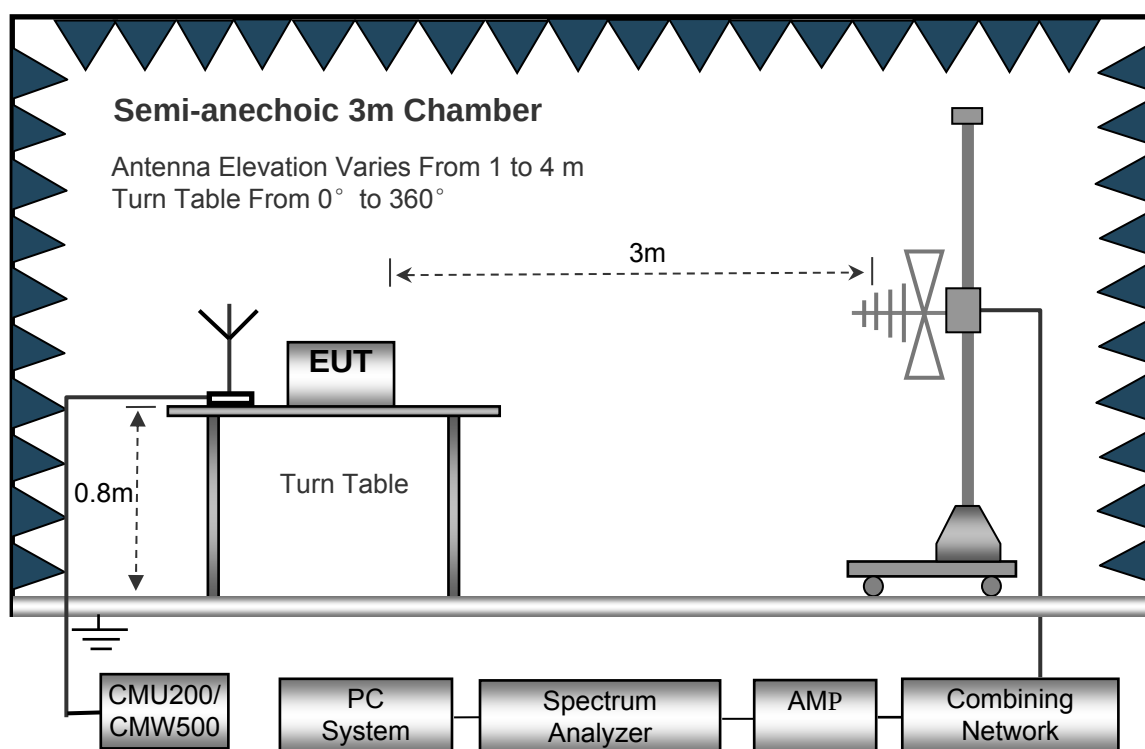
12.1 EUT Operation

Operating Environment :

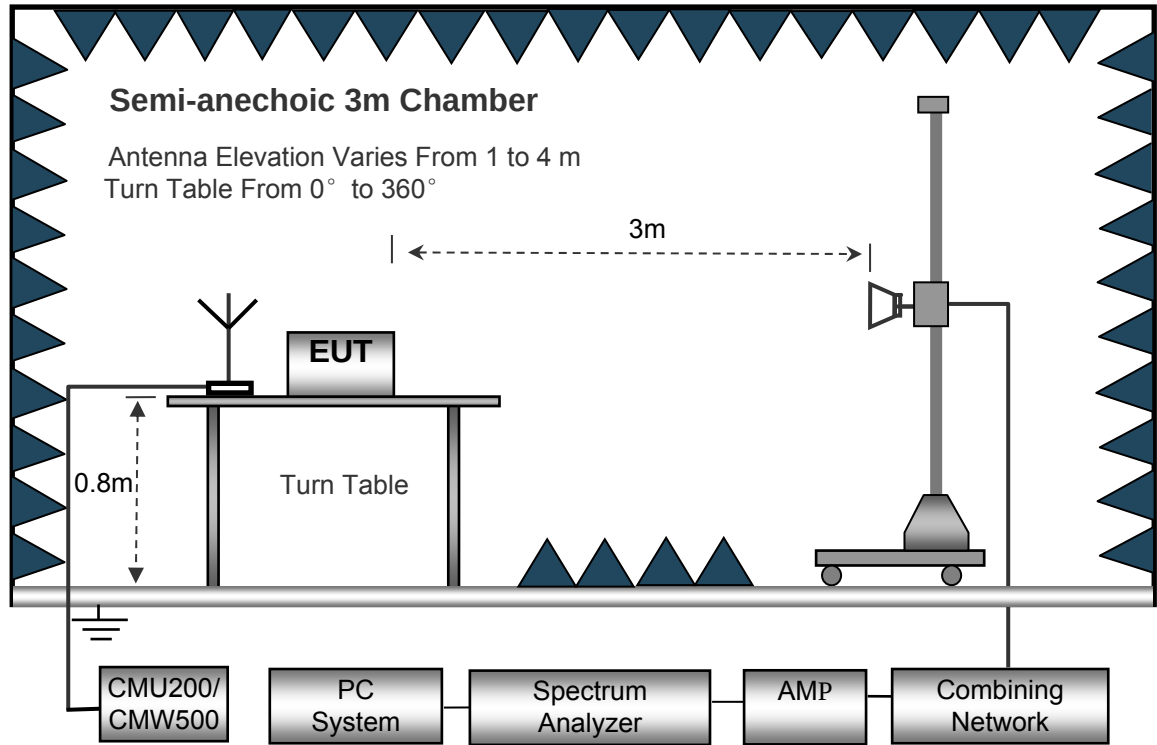
Temperature:	23.5 °C
Humidity:	52.1 % RH
Atmospheric Pressure:	101.2kPa

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 a 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.

$$\text{ERP / EIRP} = \text{S.G. output (dBm)} + \text{Antenna Gain(dB/dBi)} - \text{Cable Loss (dB)}$$

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										
211.36	38.85	326	1.2	H	-71.26	0.15	0.00	-71.41	-40	-31.41
211.36	41.18	289	1.2	V	-66.28	0.15	0.00	-66.43	-40	-26.43
7110.00	56.88	43	1.2	H	-52.36	2.40	7.50	-47.26	-40	-27.26
7110.00	58.45	106	1.8	V	-50.32	2.40	7.50	-45.22	-40	-5.22
10665.00	53.67	253	1.1	H	-51.57	2.88	10.40	-44.05	-40	-4.05
10665.00	44.73	231	1.7	V	-64.04	2.88	10.40	-56.52	-40	-16.52
Middle channel										
211.36	39.63	354	1.7	H	-70.48	0.15	0.00	-70.63	-40	-30.63
211.36	40.30	165	1.4	V	-67.16	0.15	0.00	-67.31	-40	-27.31
7250.00	57.21	190	1.2	H	-52.20	2.42	7.50	-47.12	-40	-7.12
7250.00	59.27	44	1.7	V	-49.50	2.42	7.50	-44.42	-40	-4.42
10875.00	53.58	345	2.1	H	-55.83	2.90	12.70	-46.03	-40	-6.03
10875.00	44.73	222	2.1	V	-64.04	2.90	12.70	-54.24	-40	-14.24
High channel										
211.36	39.48	193	1.3	H	-70.63	0.15	0.00	-70.78	-40	-30.78
211.36	41.19	143	1.5	V	-66.27	0.15	0.00	-66.42	-40	-26.42
7390.00	57.22	10	1.9	H	-54.27	2.47	7.50	-49.24	-40	-9.24
7390.00	58.98	352	1.6	V	-51.15	2.47	7.50	-46.12	-40	-6.12
11085.00	51.26	268	2.1	H	-58.15	2.92	12.70	-48.37	-40	-8.37
11085.00	54.93	164	1.1	V	-48.54	2.92	12.90	-38.56	-40	-8.56

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			

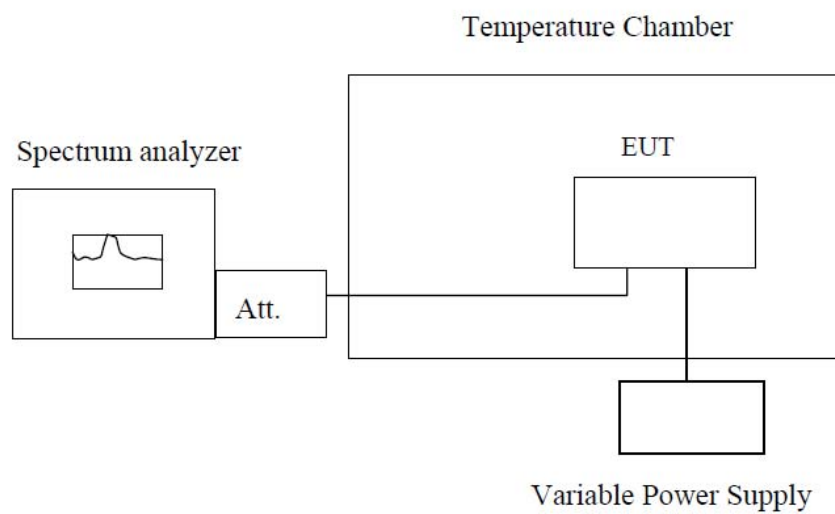
13.1 EUT Operation

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°C operating frequency as reference frequency.
5. Turn EUT off and set the chamber temperature to -30°C. After the temperature stabilized for approximately 30 minutes recorded the frequency.
6. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C 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 (°C)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
-30	120	77	0.0217
-20		56	0.0158
-10		19	0.0053
0		78	0.0219
10		75	0.0211
20		71	0.0200
30		15	0.0042
40		72	0.0203
50		73	0.0205
Test Frequency: 3555MHz 64QAM 10MHz			
Temperature (°C)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
-30	120	70	0.0197
-20		51	0.0143
-10		10	0.0028
0		71	0.0200
10		73	0.0205
20		72	0.0203
30		10	0.0028
40		70	0.0197
50		71	0.0200

Test Frequency: 3557.5MHz QPSK 15MHz			
Temperature (°C)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
-30	120	77	0.0216
-20		56	0.0157
-10		19	0.0053
0		69	0.0194
10		67	0.0188
20		78	0.0219
30		15	0.0042
40		64	0.0180
50		73	0.0205
Test Frequency: 3557.5MHz 64QAM 15MHz			
Temperature (°C)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
-30	120	71	0.0200
-20		54	0.0152
-10		18	0.0051
0		64	0.0180
10		62	0.0174
20		71	0.0200
30		10	0.0028
40		62	0.0174
50		71	0.0200

Test Frequency: 3560MHz QPSK 20MHz			
Temperature (°C)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
-30	120	82	0.0230
-20		65	0.0183
-10		66	0.0185
0		73	0.0205
10		73	0.0205
20		67	0.0188
30		76	0.0213
40		77	0.0216
50		71	0.0200
Test Frequency: 3560MHz 64QAM 20MHz			
Temperature (°C)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
-30	120	80	0.0225
-20		64	0.0180
-10		62	0.0174
0		71	0.0200
10		72	0.0200
20		61	0.0171
30		70	0.0197
40		72	0.0202
50		70	0.0197

Chain 1

Test Frequency: 3555MHz QPSK 10MHz			
Temperature (°C)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
-30	120	78	0.0219
-20		74	0.0208
-10		77	0.0217
0		71	0.0200
10		79	0.0222
20		63	0.0177
30		78	0.0219
40		77	0.0217
50		65	0.0183
Test Frequency: 3555MHz 64QAM 10MHz			
Temperature (°C)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
-30	120	70	0.0197
-20		72	0.0203
-10		71	0.0200
0		72	0.0203
10		72	0.0203
20		61	0.0172
30		72	0.0203
40		76	0.0214
50		61	0.0172

Test Frequency: 3557.5MHz QPSK 15MHz			
Temperature (°C)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
-30	120	66	0.0186
-20		79	0.0222
-10		76	0.0214
0		70	0.0197
10		61	0.0171
20		68	0.0191
30		77	0.0216
40		77	0.0216
50		78	0.0219
Test Frequency: 3557.5MHz 64QAM 15MHz			
Temperature (°C)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
-30	120	61	0.0171
-20		72	0.0202
-10		71	0.0200
0		72	0.0202
10		60	0.0169
20		62	0.0174
30		71	0.0200
40		72	0.0202
50		74	0.0208

Test Frequency: 3560MHz QPSK 20MHz			
Temperature (°C)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
-30	120	71	0.0199
-20		64	0.0180
-10		71	0.0199
0		69	0.0194
10		69	0.0194
20		66	0.0185
30		67	0.0188
40		75	0.0211
50		65	0.0183
Test Frequency: 3560MHz 64QAM 20MHz			
Temperature (°C)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
-30	120	72	0.0202
-20		63	0.0177
-10		70	0.0197
0		64	0.0180
10		65	0.0183
20		68	0.0191
30		66	0.0185
40		71	0.0199
50		62	0.0174

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			

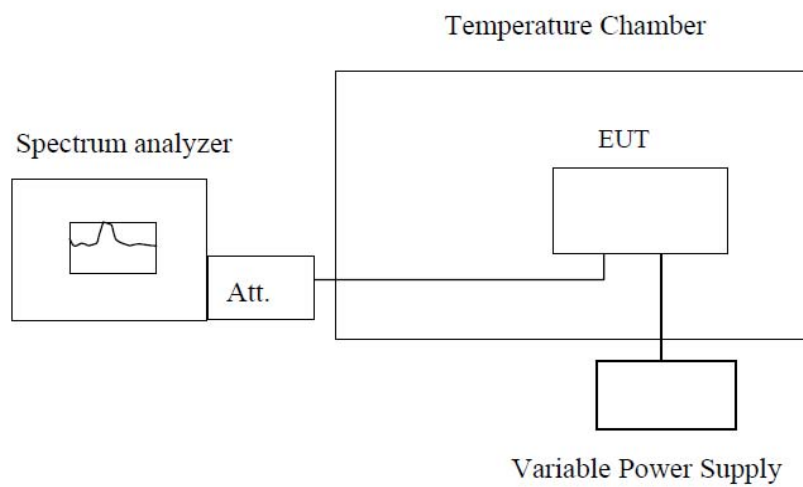
14.1 EUT Operation

Operating Environment :

Temperature: 23.7 °C
 Humidity: 52.9 % RH
 Atmospheric Pressure: 101.4kPa

14.2 Test Procedure

1. Set chamber temperature to 25°C. 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 (°C)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
25	102	107	0.0301
	120	114	0.0321
	138	119	0.0335
Test Frequency: 3555MHz 64QAM 10MHz			
Temperature (°C)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
25	102	105	0.0295
	120	112	0.0315
	138	111	0.0312

Test Frequency: 3557.5MHz QPSK 15MHz			
Temperature (°C)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
25	102	113	0.0318
	120	113	0.0318
	138	121	0.0340
Test Frequency: 3557.5MHz 64QAM 15MHz			
Temperature (°C)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
25	102	111	0.0312
	120	112	0.0315
	138	115	0.0323

Test Frequency: 3560MHz QPSK 20MHz			
Temperature (°C)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
25	102	118	0.0331
	120	118	0.0331
	138	113	0.0317
Test Frequency: 3560MHz 64QAM 20MHz			
Temperature (°C)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
25	102	112	0.0315
	120	111	0.0312
	138	112	0.0315

Chain 1

Test Frequency: 3555MHz QPSK 10MHz			
Temperature (°C)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
25	102	96	0.0270
	120	111	0.0312
	138	109	0.0307
Test Frequency: 3555MHz 64QAM 10MHz			
Temperature (°C)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
25	102	91	0.0256
	120	116	0.0326
	138	101	0.0284

Test Frequency: 3557.5MHz QPSK 15MHz			
Temperature (°C)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
25	102	102	0.0292
	120	95	0.0267
	138	100	0.0281
Test Frequency: 3557.5MHz 64QAM 15MHz			
Temperature (°C)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
25	102	104	0.0292
	120	92	0.0259
	138	105	0.0295

Test Frequency: 3560MHz QPSK 20MHz			
Temperature (°C)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
25	102	100	0.0281
	120	109	0.0306
	138	93	0.0261
Test Frequency: 3560MHz 64QAM 20MHz			
Temperature (°C)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)
25	102	104	0.0292
	120	101	0.0284
	138	91	0.0256

15 Photographs of test setup and EUT.

Note: Please refer to appendix: Appendix- EG8015G-M11-HP-Photos.

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