

Chain 0:

10MHz

QPSK

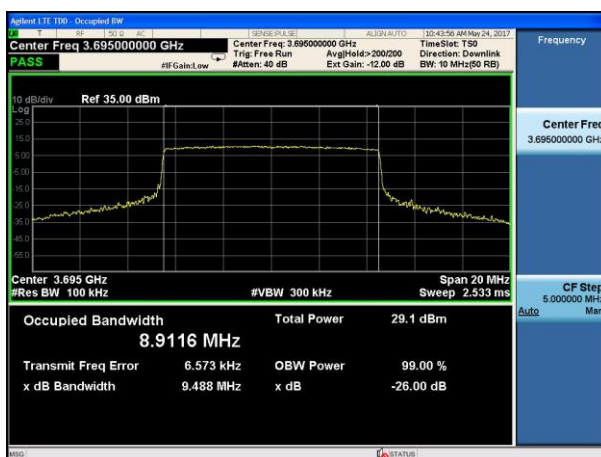
64QAM



Lowest channel



Middle channel



Highest channel

20MHz

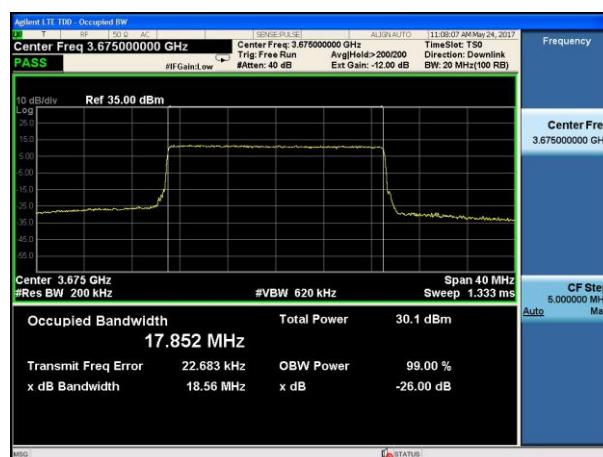
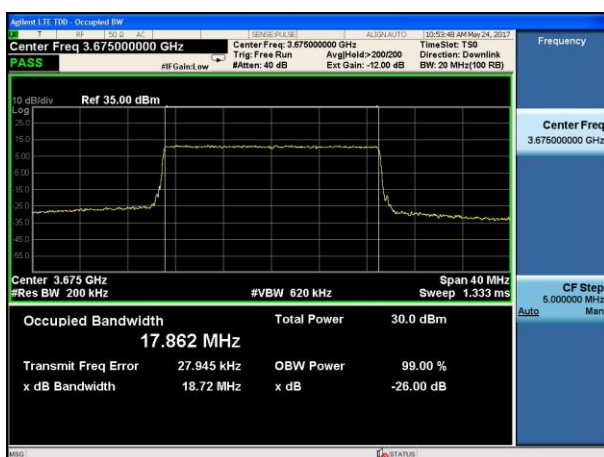
QPSK



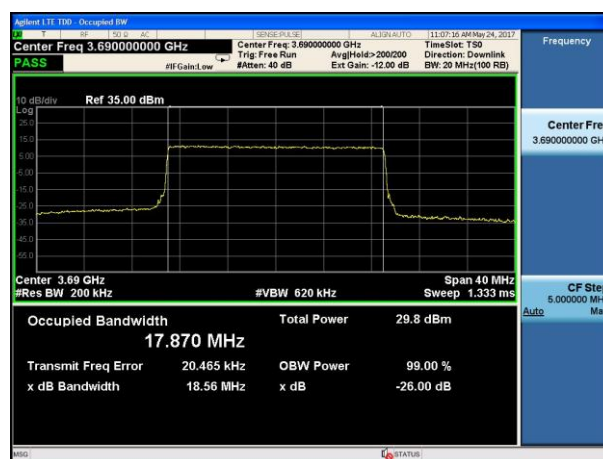
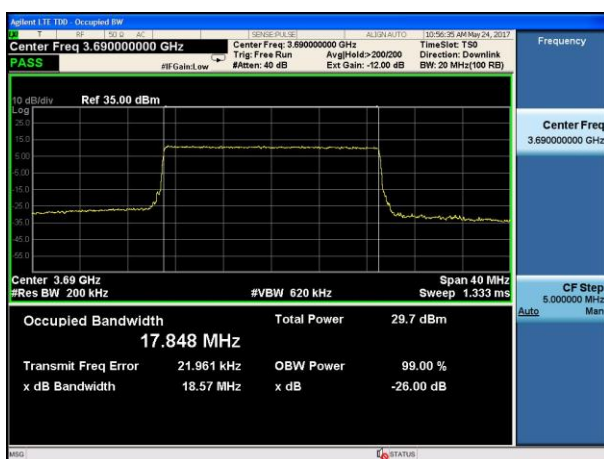
64QAM



Lowest channel



Middle channel



Highest channel

Chain 1:

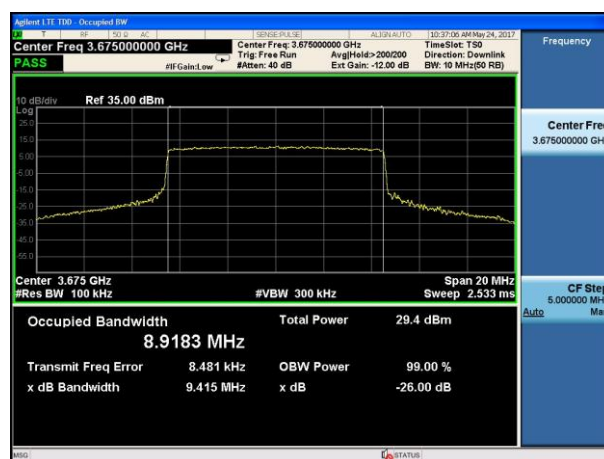
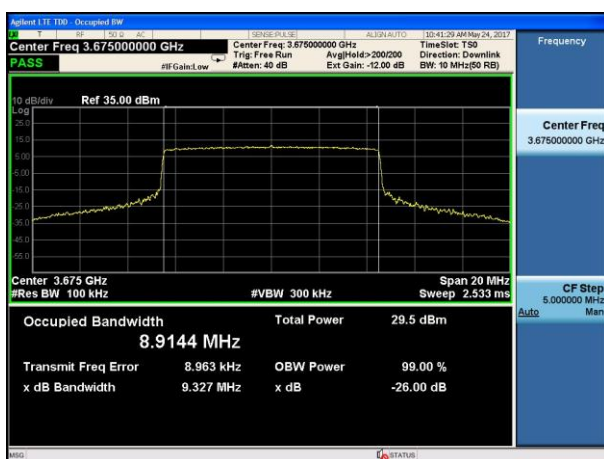
10MHz

QPSK

64QAM



Lowest channel



Middle channel

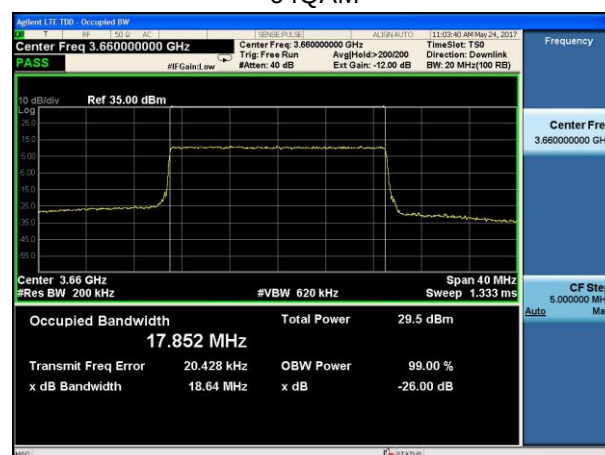
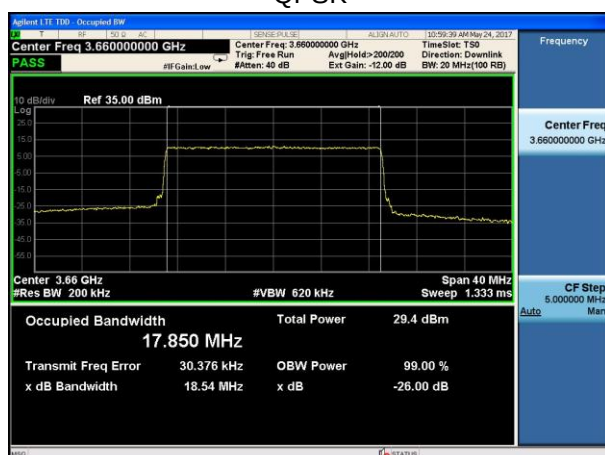


Highest channel

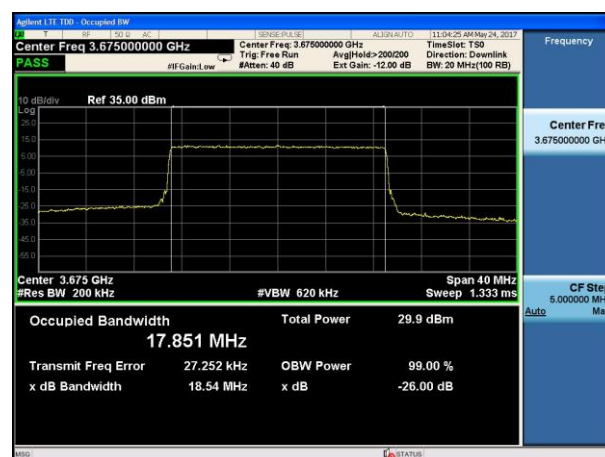
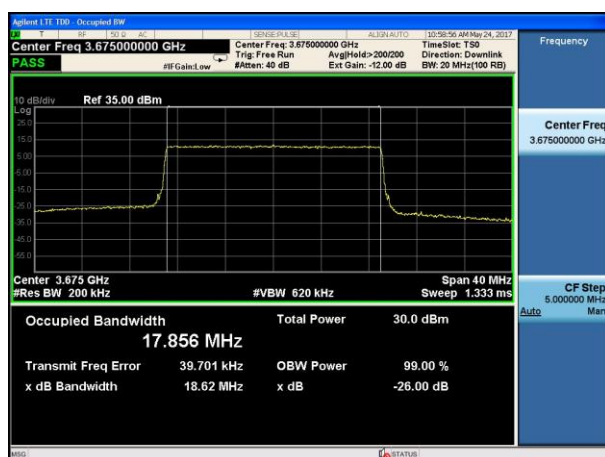
20MHz

QPSK

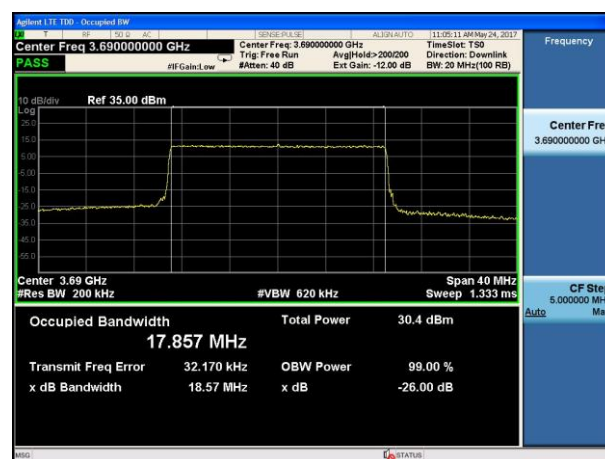
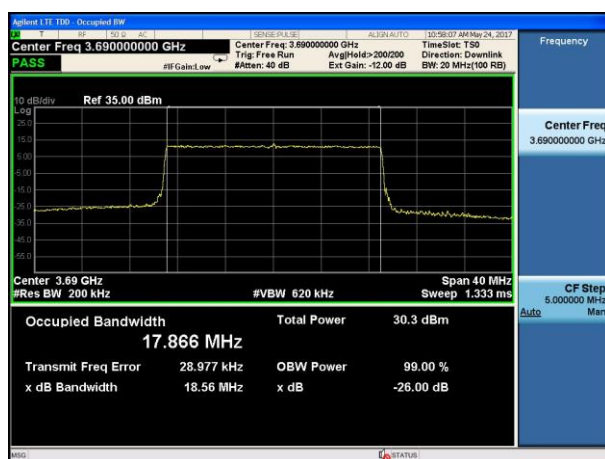
64QAM



Lowest channel



Middle channel



Highest channel

6.7 Emission Mask

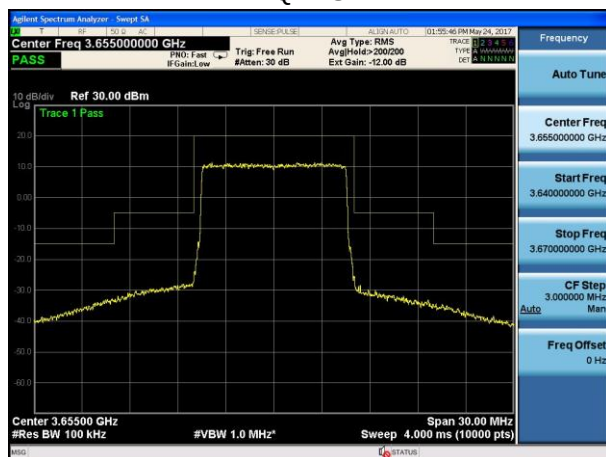
Test Requirement:	FCC part 90.210(b)
Limit:	Emission Mask B. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows: (1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB. (2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB. (3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least $43 + 10 \log (P)$ dB
Test Procedure:	1 The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. 2 RBW=100kHz, VBW=1MHz, Detector mode= RMS, Trace mode: Power averaging over 100 sweeps
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Data:

Test plots as below:
Chain 0:

10MHz

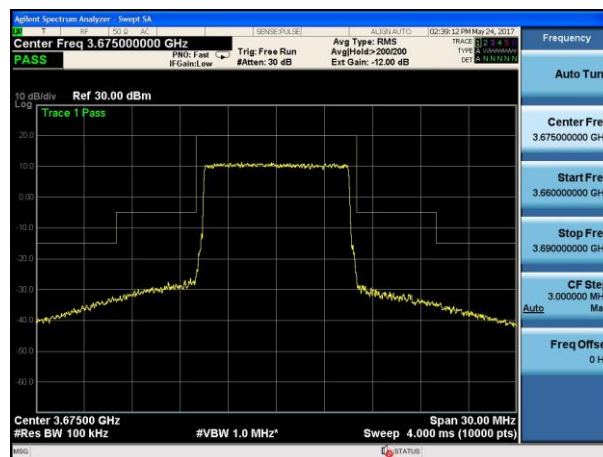
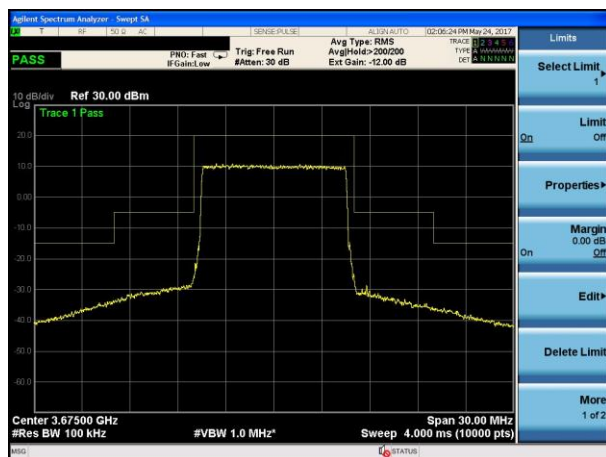
QPKS



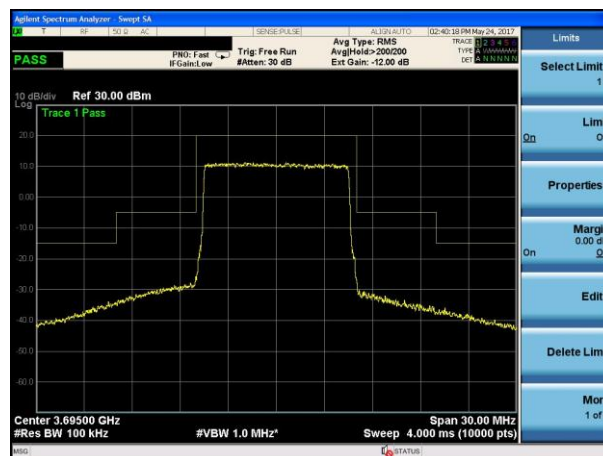
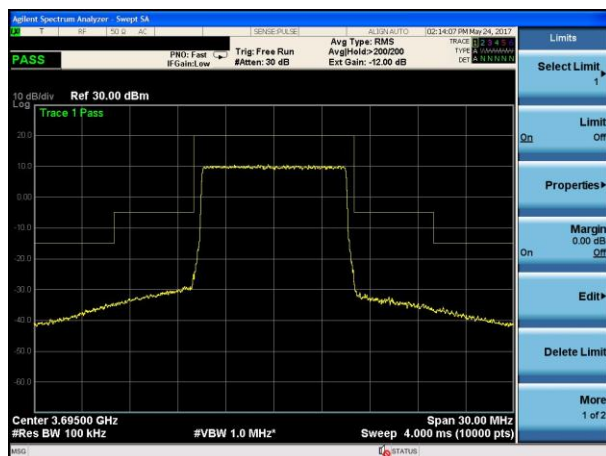
64QAM



Lowest channel



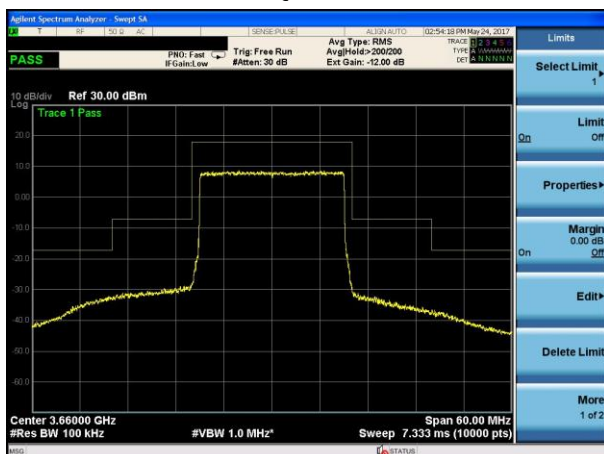
Middle channel



Highest channel

20MHz

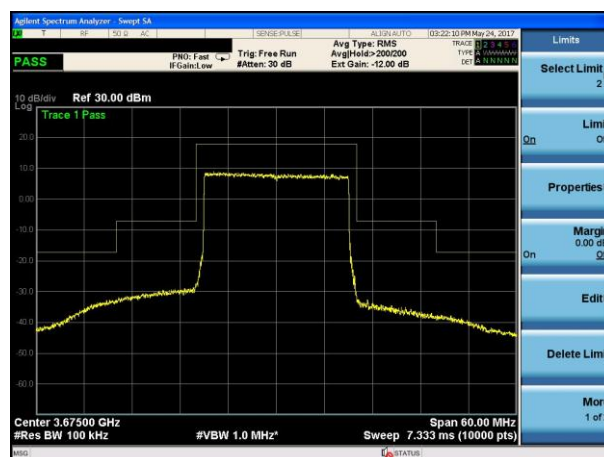
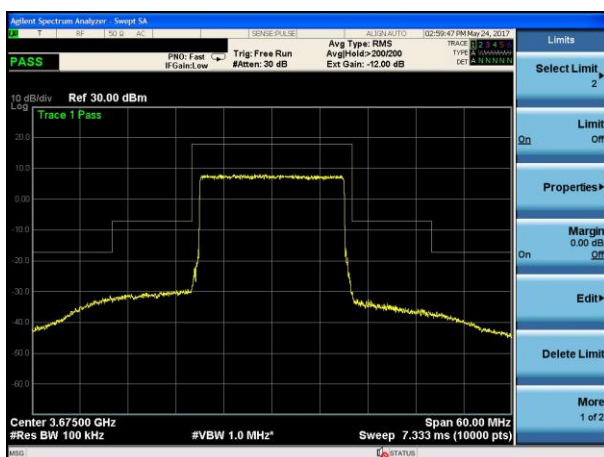
QPKS



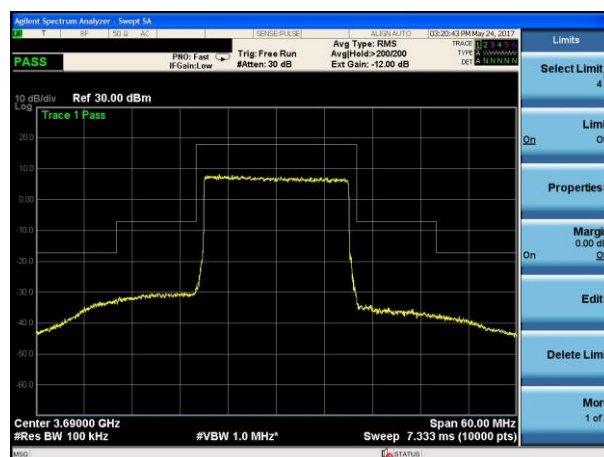
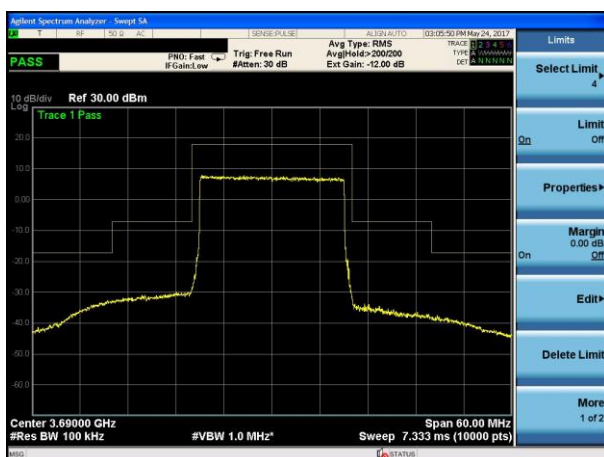
64QAM



Lowest channel



Middle channel



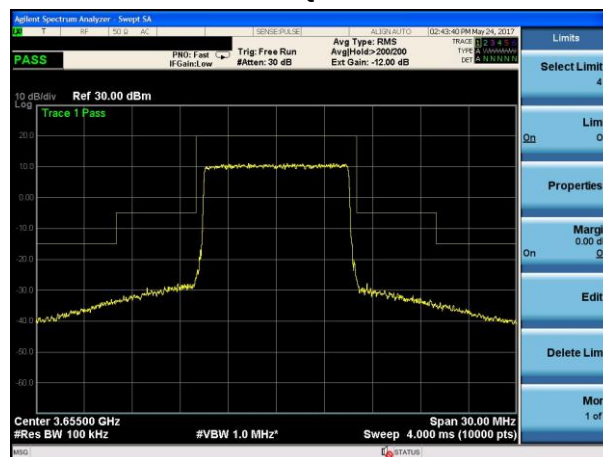
Highest channel

Chain 1:

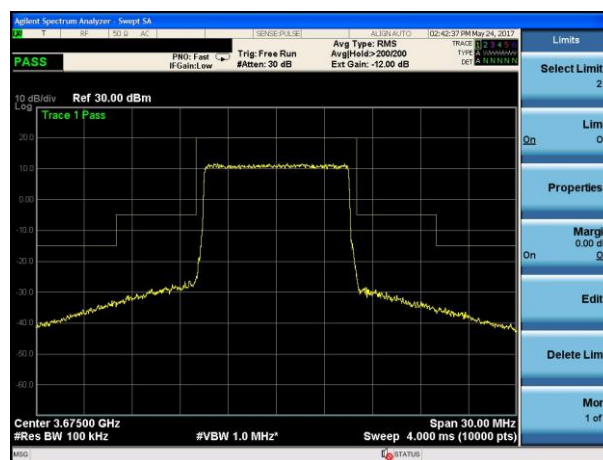
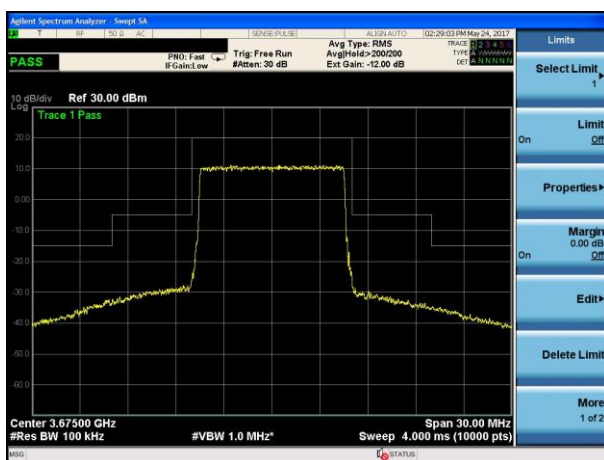
10MHz

QPKS

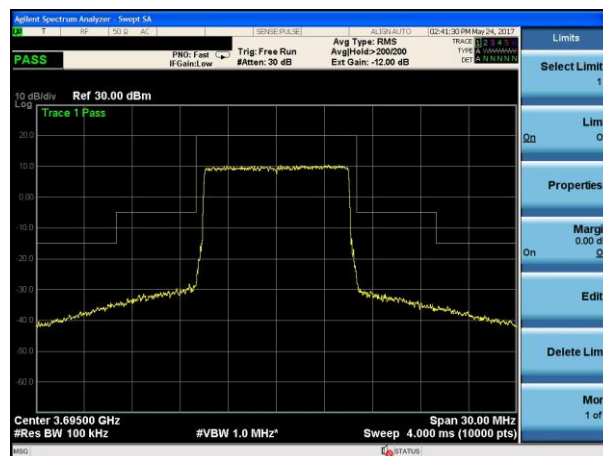
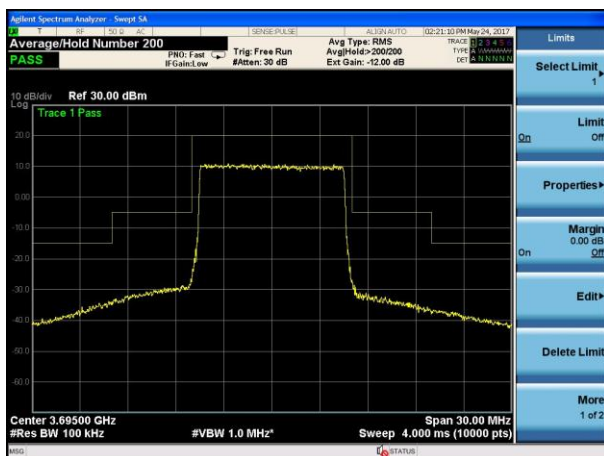
64QAM



Lowest channel



Middle channel



Highest channel

20MHz

QPKS



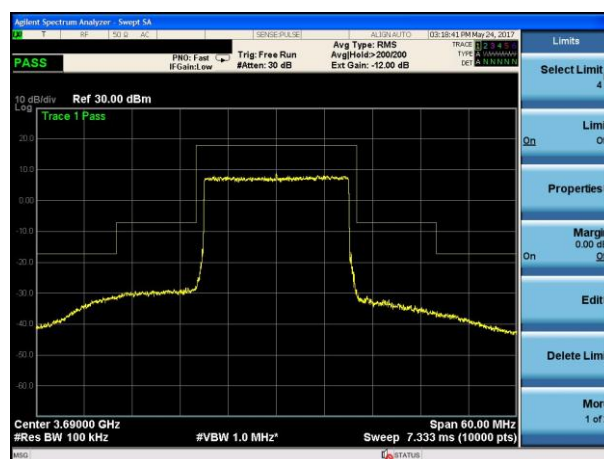
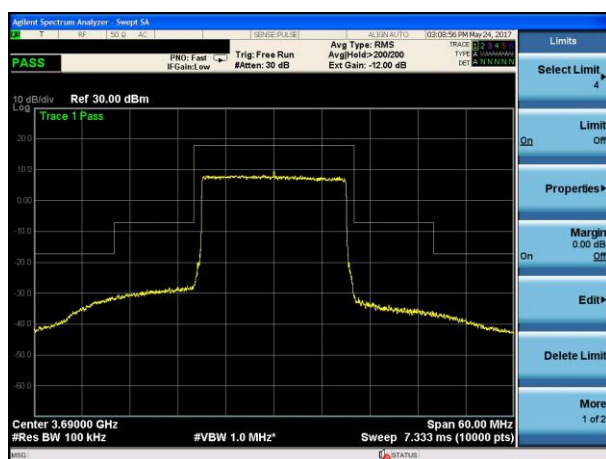
64QAM



Lowest channel



Middle channel



Highest channel

6.8 Out of band emission at antenna terminals

Test Requirement:	FCC part90.1323 and RSS-197 Clause 5.7
Test Method:	FCC part2.1051 and RSS Gen Section 6.13
Limit:	-13dBm
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 set at 100 kHz when below 1GHz, 1MHz when above 1 GHz; sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic. 3 For the out of band: Set the RBW=100 kHz, VBW=300 kHz when below 1 GHz, RBW =1 MHz, VBW=3 MHz when above 1 GHz, Start=30MHz, Stop= 10th harmonic. 4 Band Edge Requirements: In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions.
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed
Remark:	During the test, pre-scan the QPSK, 64QAM modulation, and found the QPSK modulation(10MHz/20MHz middle channel) is the worst case.

Test plots as follows (worst case):

Spurious emission

Chain 0:

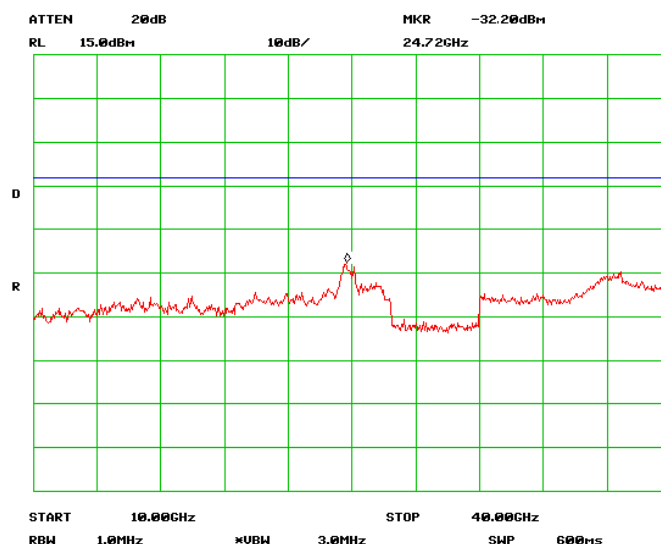
10MHz(Middle channel)



30MHz~1GHz

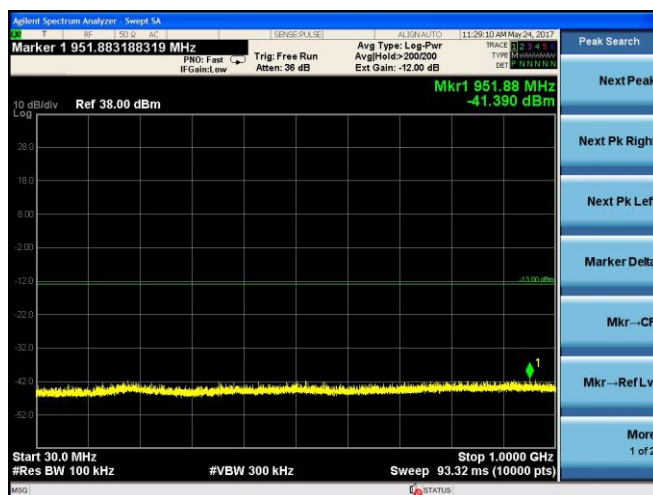


1GHz~10GHz

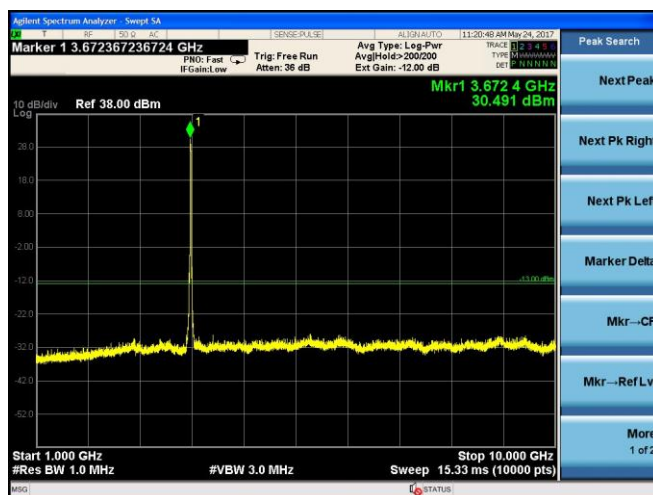


10GHz~40GHz

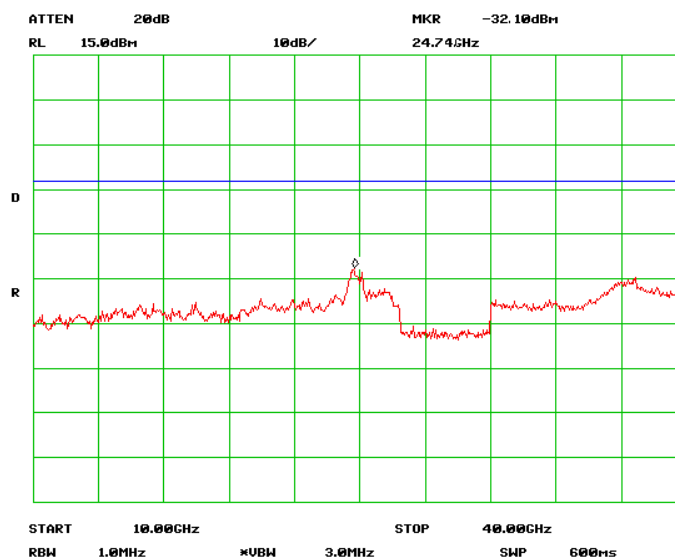
20MHz(Middle channel)



30MHz~1GHz



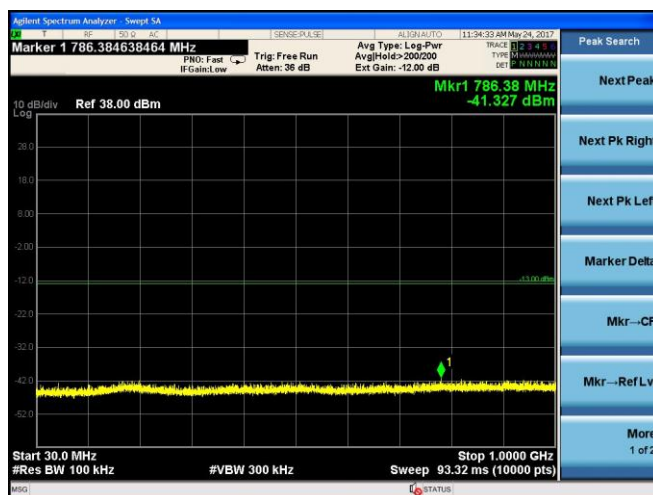
1GHz~10GHz



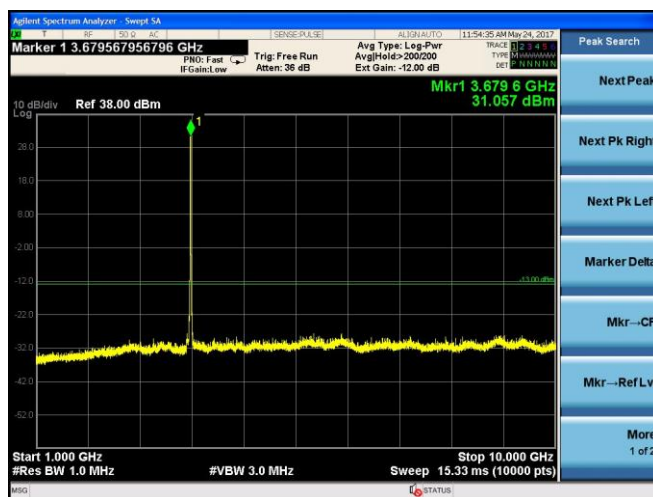
10GHz~40GHz

Chain 1:

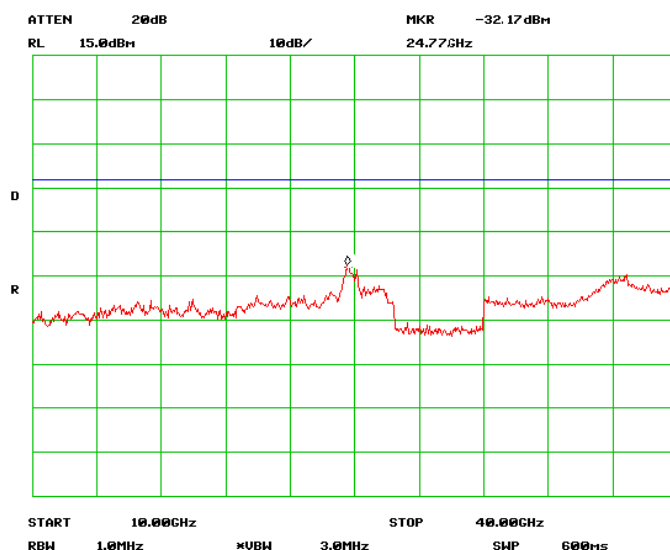
10MHz(Middle channel)



30MHz~1GHz

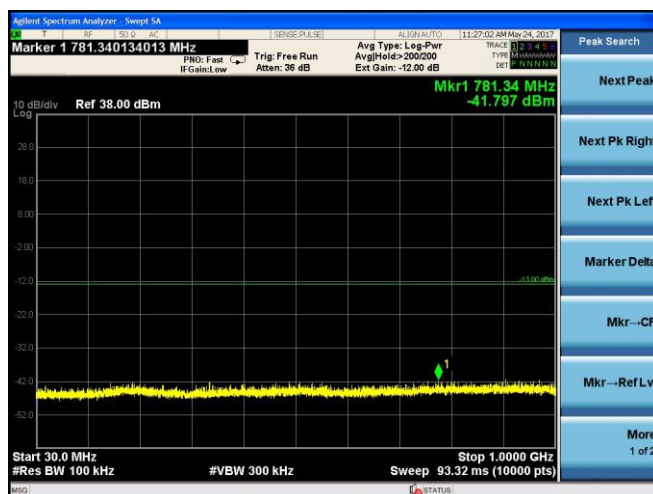


1GHz~10GHz

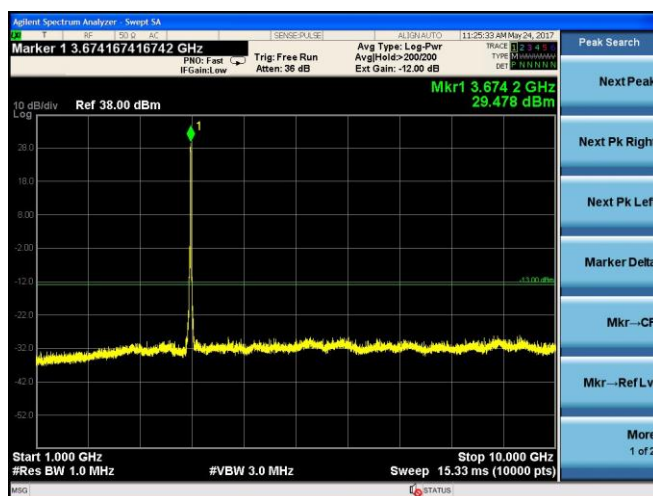


10GHz~40GHz

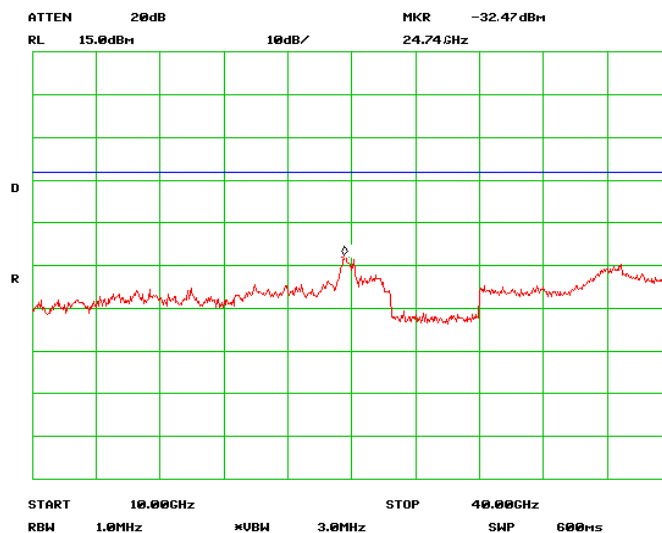
20MHz(Middle channel)



30MHz~1GHz



1GHz~10GHz



10GHz~40GHz

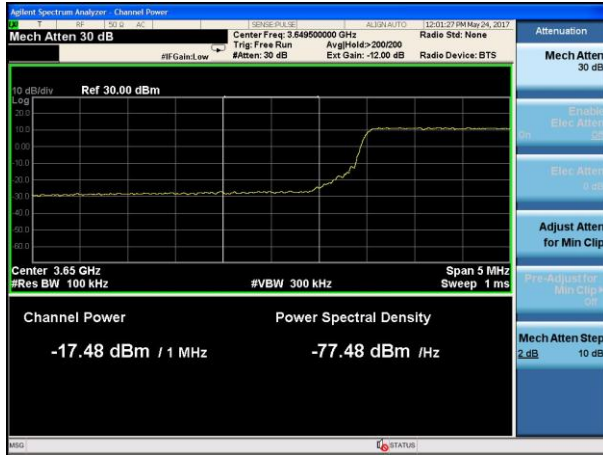
Band edge emission:

Chain 0:

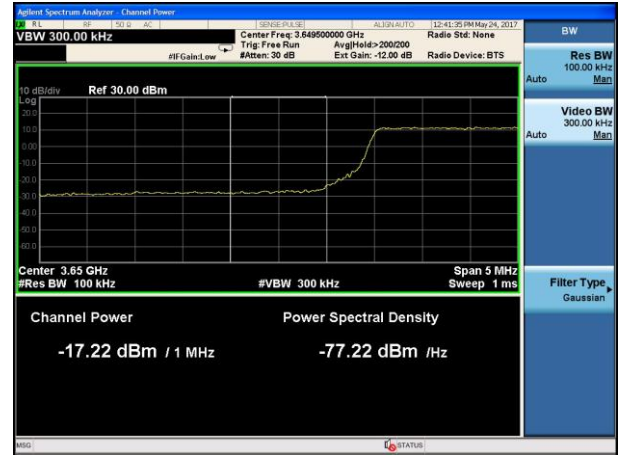
10MHz

QPSK

64QAM



Lowest channel



Lowest channel



Highest channel



Highest channel

20MHz

QPSK



Lowest channel

64QAM



Lowest channel



Highest channel

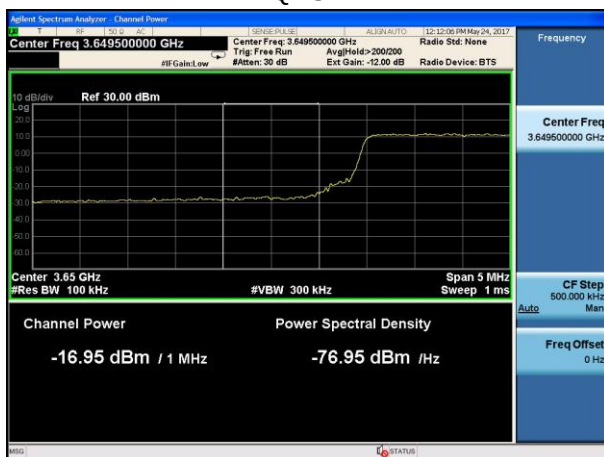


Highest channel

Chain 1:

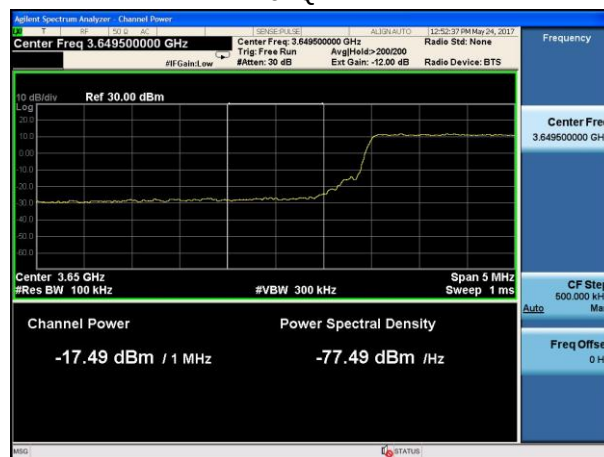
10MHz

QPSK



Lowest channel

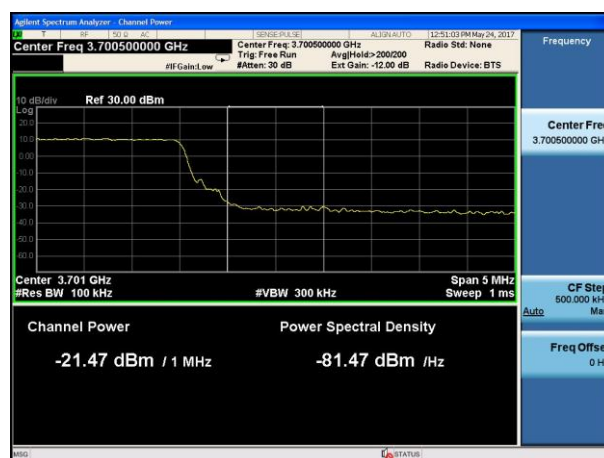
64QAM



Lowest channel



Highest channel



Highest channel

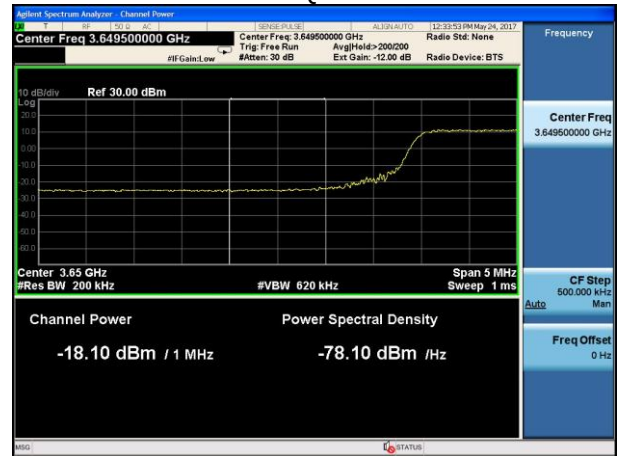
20MHz

QPSK



Lowest channel

64QAM



Lowest channel

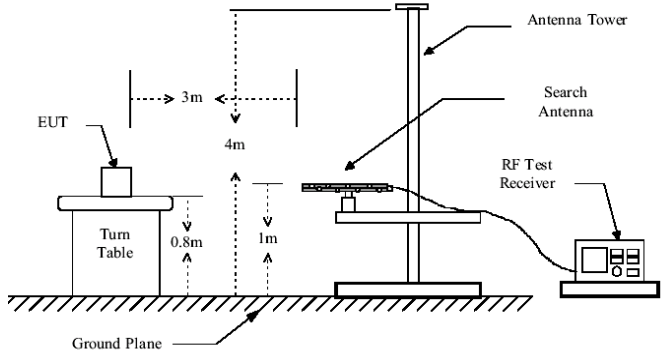
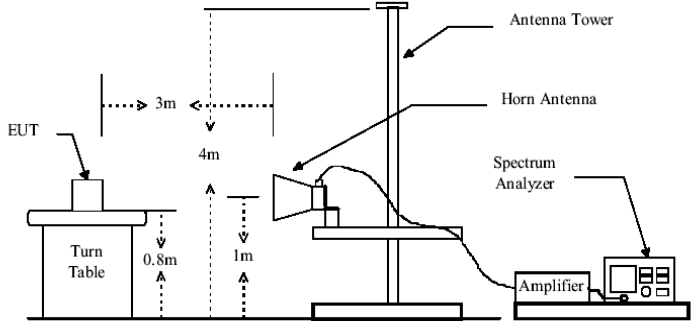
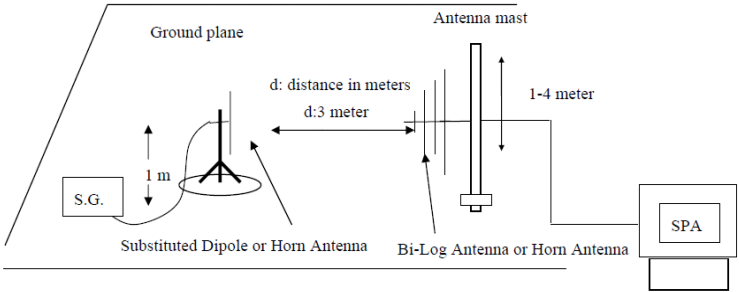


Highest channel



Highest channel

6.9 Field strength of spurious radiation measurement

Test Requirement:	Part 90.1323 and RSS 197 section 5.7
Test Method:	FCC part2.1053 and RSS Gen section 6.13
Limit:	-13dBm
Test setup:	Below 1GHz  Above 1GHz  Substituted method: 
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)
Test Uncertainty:	± 4.88 dB
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details.
Test results:	Passed
Remark:	During the test, pre-scan the QPSK, 64QAM modulation, and found the QPSK modulation is the worst case.

Measurement Data (worst case):

10MHz for QPSK				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
Lowest				
7310.00	Vertical	-41.17	-13	Pass
10965.00	V	-42.25		
7310.00	Horizontal	-41.44		
10965.00	H	-40.48		
Middle				
7350.00	Vertical	-42.08	-13	Pass
11025.00	V	-41.69		
7350.00	Horizontal	-42.39		
11025.00	H	-40.85		
Highest				
7390.00	Vertical	-42.04	-13	Pass
11085.00	V	-41.26		
7390.00	Horizontal	-42.12		
11085.00	H	-40.58		

Remark:

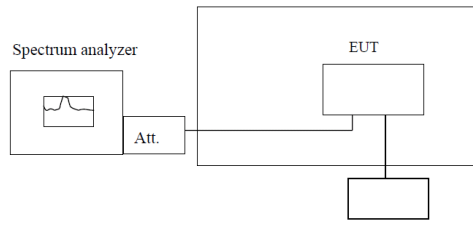
- The emission levels of below 1 GHz are very lower than the limit and not show in test report.

20MHz for QPSK				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
Lowest				
7320.00	Vertical	-40.84	-13	Pass
1098.00	V	-40.14		
7320.00	Horizontal	-40.95		
1098.00	H	-39.84		
Middle				
7350.00	Vertical	-41.41	-13	Pass
11025.00	V	-40.06		
7350.00	Horizontal	-41.32		
11025.00	H	-40.78		
Highest				
7380.00	Vertical	-42.02	-13	Pass
11070.00	V	-41.14		
7380.00	Horizontal	-40.36		
11070.00	H	-40.11		

Remark:

- The emission levels of below 1 GHz are very lower than the limit and not show in test report.

6.10 Frequency stability V.S. Temperature measurement

Test Requirement:	FCC Part90.213(a) and RSS 197 section 5.3																																																																														
Test Method:	FCC Part2.1055(a)(1)(b) and RSS Gen section 6.1.1																																																																														
Limit:	FCC: <table><thead><tr><th rowspan="2">Frequency range (MHz)</th><th rowspan="2">Fixed and base stations (±ppm)</th><th colspan="2">Mobile stations (±ppm)</th></tr><tr><th>Over 2 watts output power</th><th>2 watts or less output power</th></tr></thead><tbody><tr><td>Below 25</td><td>100</td><td>100</td><td>200</td></tr><tr><td>25-50</td><td>20</td><td>20</td><td>50</td></tr><tr><td>72-76</td><td>5</td><td></td><td>50</td></tr><tr><td>150-174</td><td>5</td><td>5</td><td>50</td></tr><tr><td>216-220</td><td>1.0</td><td></td><td>1.0</td></tr><tr><td>220-222</td><td>0.1</td><td>1.5</td><td>1.5</td></tr><tr><td>421-512</td><td>2.5</td><td>5</td><td>5</td></tr><tr><td>806-809</td><td>1.0</td><td>1.5</td><td>1.5</td></tr><tr><td>809-824</td><td>1.5</td><td>2.5</td><td>2.5</td></tr><tr><td>851-854</td><td>1.0</td><td>1.5</td><td>1.5</td></tr><tr><td>854-869</td><td>1.5</td><td>2.5</td><td>2.5</td></tr><tr><td>896-901</td><td>0.1</td><td>1.5</td><td>1.5</td></tr><tr><td>902-928</td><td>2.5</td><td>2.5</td><td>2.5</td></tr><tr><td>902-928</td><td>2.5</td><td>2.5</td><td>2.5</td></tr><tr><td>929-930</td><td>1.5</td><td></td><td></td></tr><tr><td>935-940</td><td>0.1</td><td>1.5</td><td>1.5</td></tr><tr><td>1427-1435</td><td>300</td><td>300</td><td>300</td></tr><tr><td>Above 2450</td><td></td><td></td><td></td></tr></tbody></table> IC: The transmitter frequency stability limit shall be determined as follows: (a) The frequency offset shall be measured according to the procedure described in RSS-Gen and recorded; (b) Using a resolution bandwidth of 1% of the occupied bandwidth, a reference point at the unwanted emission level specified in Section 5.7 on the emission mask of the lowest and highest channel shall be selected, and the frequency at these points shall be recorded as fL and fH respectively. The applicant shall ensure frequency stability by showing that fL minus the frequency offset and fH plus the frequency offset shall be within the 3650-3700 MHz band.	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			
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																																																																															
Test setup:	Temperature Chamber  Spectrum analyzer Att. EUT Variable Power Supply Note : Measurement setup for testing on Antenna connector																																																																														
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																																																																														
Test Instruments:	Refer to section 5.8 for details																																																																														
Test mode:	Refer to section 5.3 for details																																																																														
Test results:	Passed																																																																														
Remark:	All three channels of all modulations have been tested, but only the worst channel and the worst modulation show in this test item.																																																																														

Measurement Data (the worst channel):

Chain 0:

Reference Frequency: Lowest channel=3655MHz(10MHz for QPSK)			
Power supplied (Vdc)	Temperature (°C)	Frequency error	
		Hz	ppm
48.00	-40	199	0.054446
	-25	187	0.051163
	-10	155	0.042408
	0	163	0.044596
	10	132	0.036115
	20	144	0.039398
	30	171	0.046785
	40	108	0.029549
	55	128	0.035021
Reference Frequency: Lowest channel=3660MHz(20MHz for QPSK)			
Power supplied (Vdc)	Temperature (°C)	Frequency error	
		Hz	ppm
48.00	-40	196	0.053552
	-20	123	0.033607
	-10	166	0.045355
	0	188	0.051366
	10	172	0.046995
	20	144	0.039344
	30	150	0.040984
	40	108	0.029508
	55	116	0.031694

Chain 1:

Reference Frequency: Lowest channel=3655MHz(10MHz for QPSK)			
Power supplied (Vdc)	Temperature (°C)	Frequency error	
		Hz	ppm
48.00	-40	196	0.053625
	-20	123	0.033653
	-10	188	0.051436
	0	166	0.045417
	10	174	0.047606
	20	120	0.032832
	30	146	0.039945
	40	138	0.037756
	55	109	0.029822
Reference Frequency: Lowest channel=3660MHz(20MHz for QPSK)			
Power supplied (Vdc)	Temperature (°C)	Frequency error	
		Hz	ppm
48.00	-40	197	0.053825
	-20	181	0.049454
	-10	169	0.046175
	0	171	0.046721
	10	148	0.040437
	20	126	0.034426
	30	133	0.036339
	40	150	0.040984
	55	107	0.029235

6.11 Frequency stability V.S. Voltage measurement

Test Requirement:	FCC Part 90.213(a) and RSS 197 section 5.3																																																																														
Test Method:	FCC Part 2.1055(a)(1)(b) and RSS Gen section 6.1.1																																																																														
Limit:	FCC: <table><thead><tr><th rowspan="2">Frequency range (MHz)</th><th rowspan="2">Fixed and base stations (±ppm)</th><th colspan="2">Mobile stations (±ppm)</th></tr><tr><th>Over 2 watts output power</th><th>2 watts or less output power</th></tr></thead><tbody><tr><td>Below 25</td><td>100</td><td>100</td><td>200</td></tr><tr><td>25-50</td><td>20</td><td>20</td><td>50</td></tr><tr><td>72-76</td><td>5</td><td></td><td>50</td></tr><tr><td>150-174</td><td>5</td><td>5</td><td>50</td></tr><tr><td>216-220</td><td>1.0</td><td></td><td>1.0</td></tr><tr><td>220-222</td><td>0.1</td><td>1.5</td><td>1.5</td></tr><tr><td>421-512</td><td>2.5</td><td>5</td><td>5</td></tr><tr><td>806-809</td><td>1.0</td><td>1.5</td><td>1.5</td></tr><tr><td>809-824</td><td>1.5</td><td>2.5</td><td>2.5</td></tr><tr><td>851-854</td><td>1.0</td><td>1.5</td><td>1.5</td></tr><tr><td>854-869</td><td>1.5</td><td>2.5</td><td>2.5</td></tr><tr><td>896-901</td><td>0.1</td><td>1.5</td><td>1.5</td></tr><tr><td>902-928</td><td>2.5</td><td>2.5</td><td>2.5</td></tr><tr><td>902-928</td><td>2.5</td><td>2.5</td><td>2.5</td></tr><tr><td>929-930</td><td>1.5</td><td></td><td></td></tr><tr><td>935-940</td><td>0.1</td><td>1.5</td><td>1.5</td></tr><tr><td>1427-1435</td><td>300</td><td>300</td><td>300</td></tr><tr><td>Above 2450</td><td></td><td></td><td></td></tr></tbody></table> IC: The transmitter frequency stability limit shall be determined as follows: (a) The frequency offset shall be measured according to the procedure described in RSS-Gen and recorded; (b) Using a resolution bandwidth of 1% of the occupied bandwidth, a reference point at the unwanted emission level specified in Section 5.7 on the emission mask of the lowest and highest channel shall be selected, and the frequency at these points shall be recorded as f_L and f_H respectively. The applicant shall ensure frequency stability by showing that f_L minus the frequency offset and f_H plus the frequency offset shall be within the 3650-3700 MHz band.	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			
Frequency range (MHz)	Fixed and base stations (±ppm)			Mobile stations (±ppm)																																																																											
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Above 2450																																																																															
Test setup:	Spectrum analyzer Att. EUT Variable Power Supply Temperature Chamber Note : Measurement setup for testing on Antenna connector																																																																														
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.																																																																														
Test Instruments:	Refer to section 5.8 for details																																																																														
Test mode:	Refer to section 5.3 for details, and all channels have been tested, only shows the worst channel data in this report.																																																																														
Test results:	Passed																																																																														
Remark:	All three channels of all modulations have been tested, but only the worst channel and the worst modulation show in this test item.																																																																														

Measurement Data (the worst channel):

Chain 0:

Reference Frequency: Lowest channel=3655MHz(10MHz for QPSK)			
Temperature (°C)	Power supplied (Vdc)	Frequency error	
		Hz	ppm
25	42	98	0.026813
	48	76	0.020793
	58	90	0.024624
Reference Frequency: Lowest channel=3660MHz(20MHz for QPSK)			
Temperature (°C)	Power supplied (Vdc)	Frequency error	
		Hz	ppm
25	42	87	0.023770
	48	90	0.024590
	58	74	0.020219

Chain 1:

Reference Frequency: Lowest channel=3655MHz(10MHz for QPSK)			
Temperature (°C)	Power supplied (Vdc)	Frequency error	
		Hz	ppm
25	42	99	0.027086
	48	81	0.022161
	58	63	0.017237
Reference Frequency: Lowest channel=3660MHz(20MHz for QPSK)			
Temperature (°C)	Power supplied (Vdc)	Frequency error	
		Hz	ppm
25	42	80	0.021858
	48	72	0.019672
	58	57	0.015574