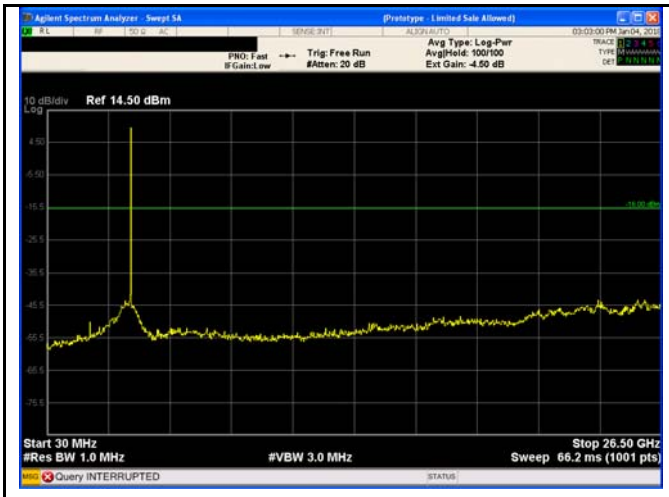
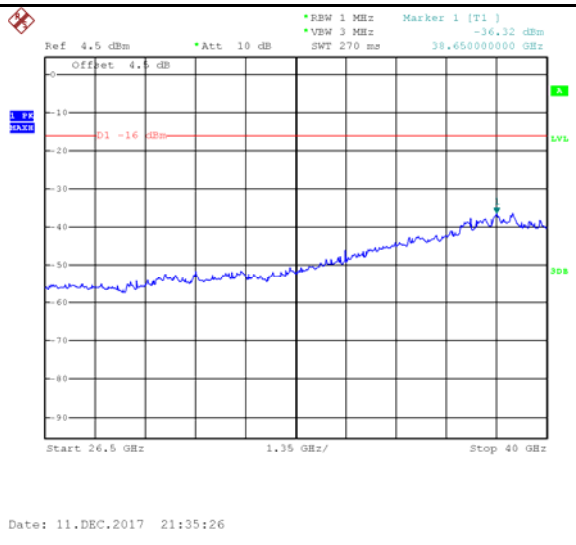
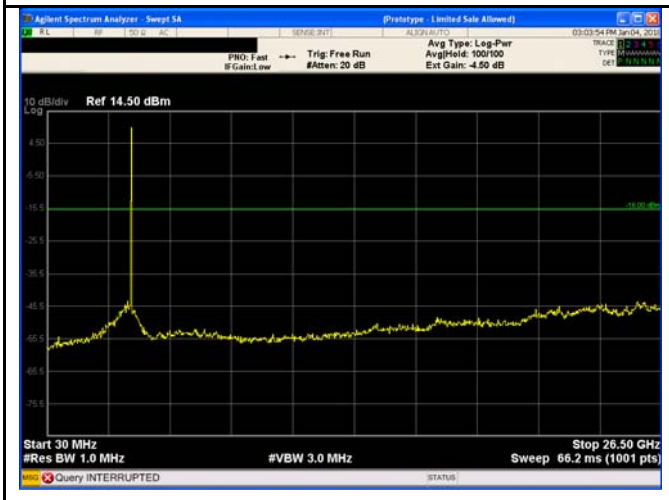
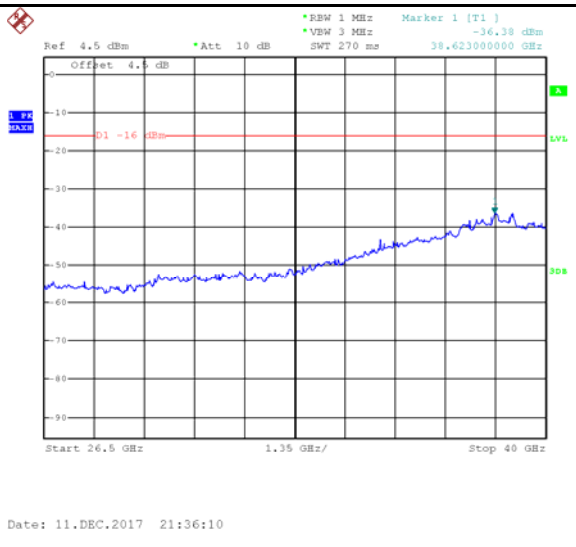




10MHz - Low CH 30MHz~26.5GHz

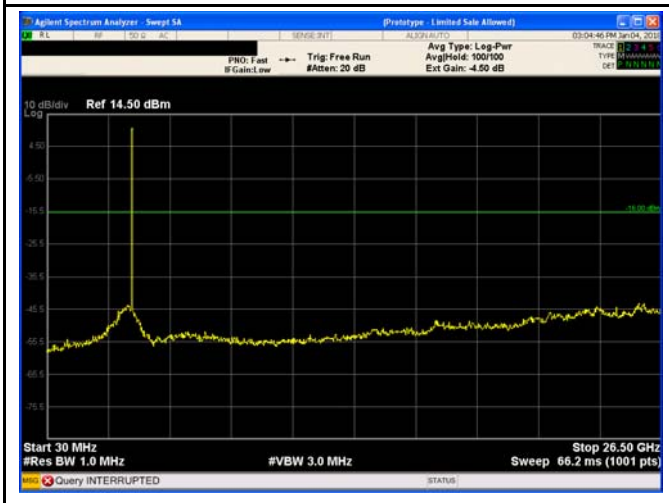
10MHz - Low CH 26.5GHz~40GHz

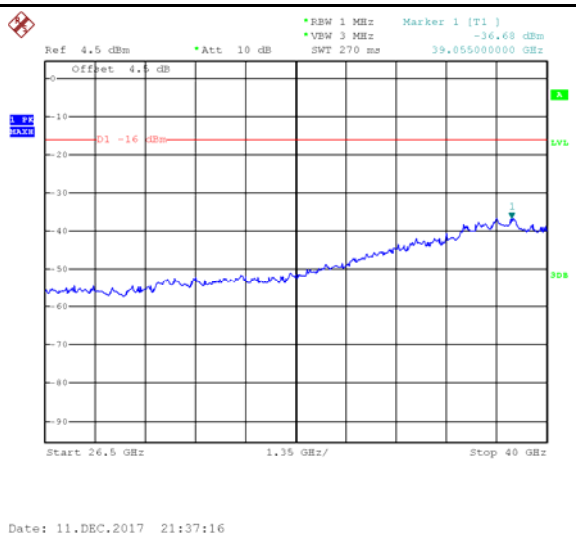




10MHz - Middle CH 30MHz~26.5GHz

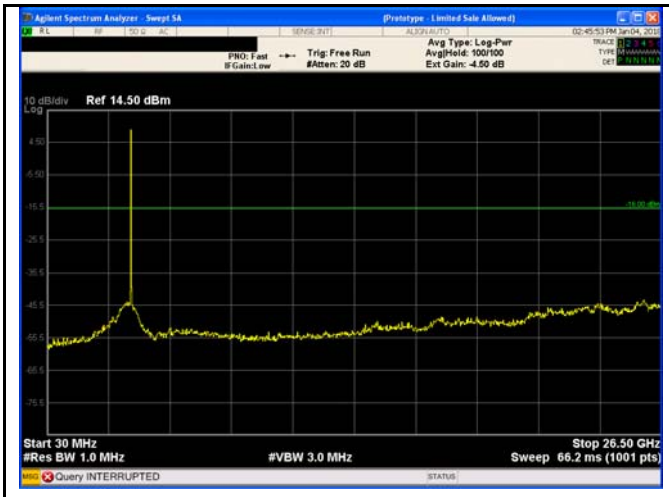
10MHz - Middle CH 26.5GHz~40GHz



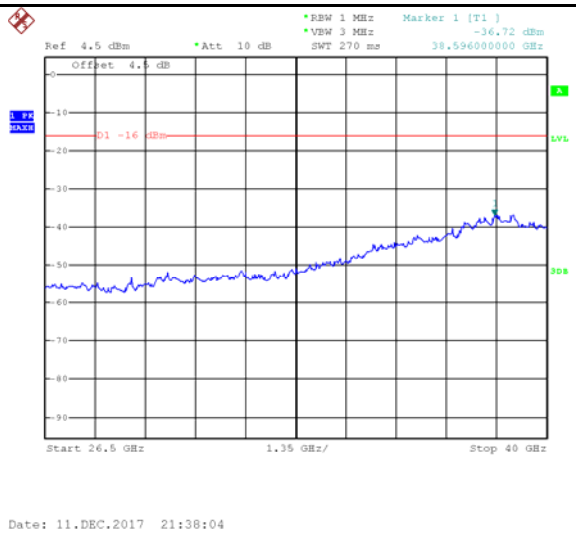


10MHz - High CH 30MHz~26.5GHz

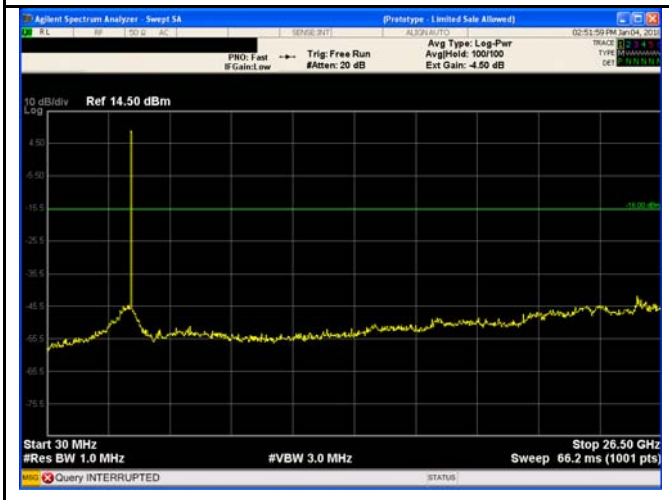
10MHz - High CH 26.5GHz~40GHz



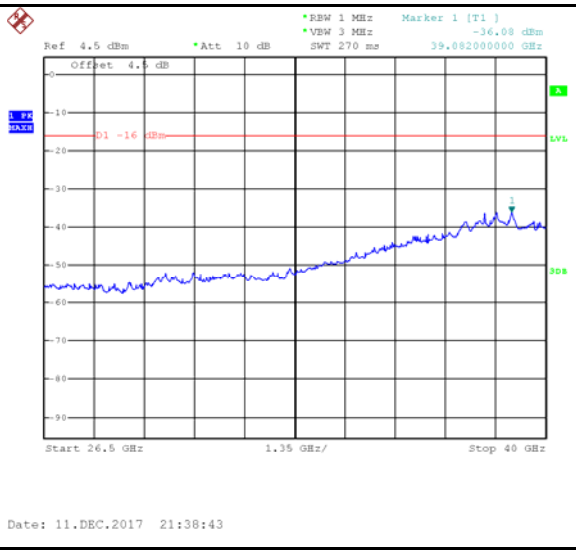
15MHz - Low CH 30MHz~26.5GHz



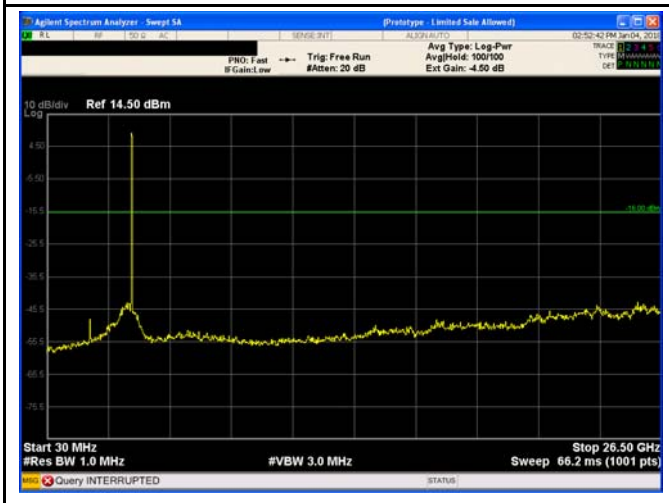
15MHz - Low CH 26.5GHz~40GHz



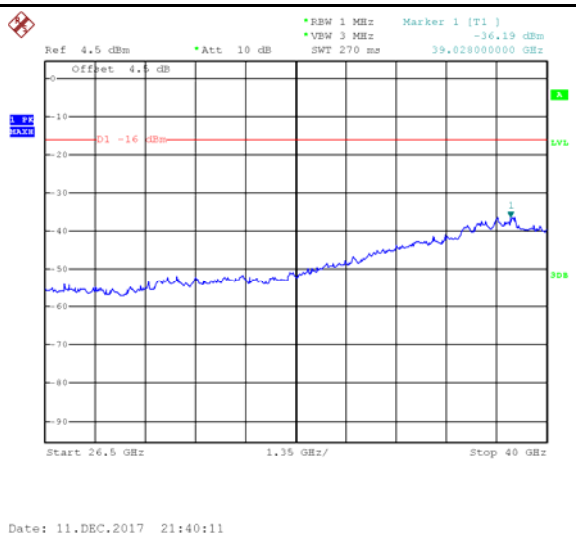
15MHz - Middle CH 30MHz~26.5GHz



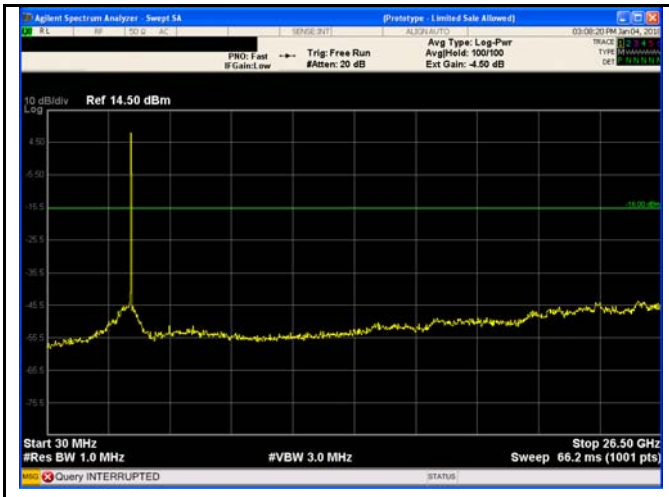
15MHz - Middle CH 26.5GHz~40GHz



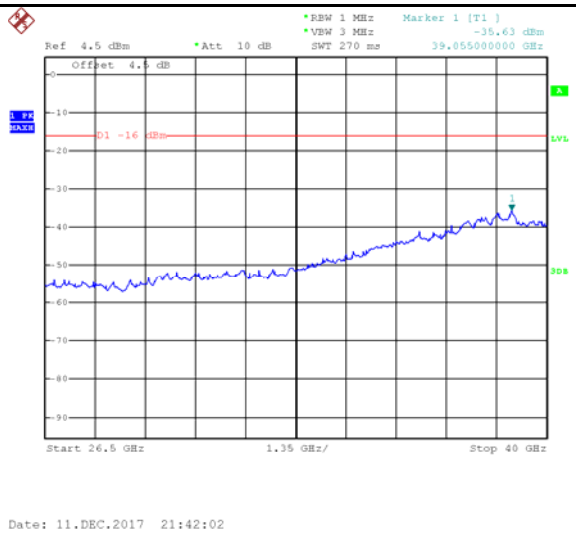
15MHz - High CH 30MHz~26.5GHz



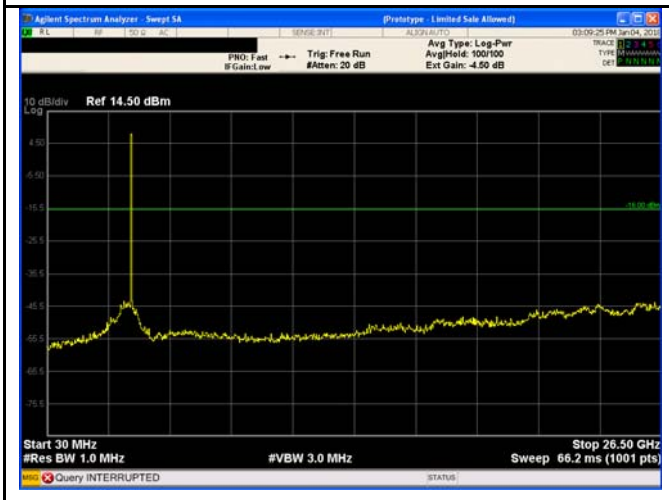
15MHz - High CH 26.5GHz~40GHz



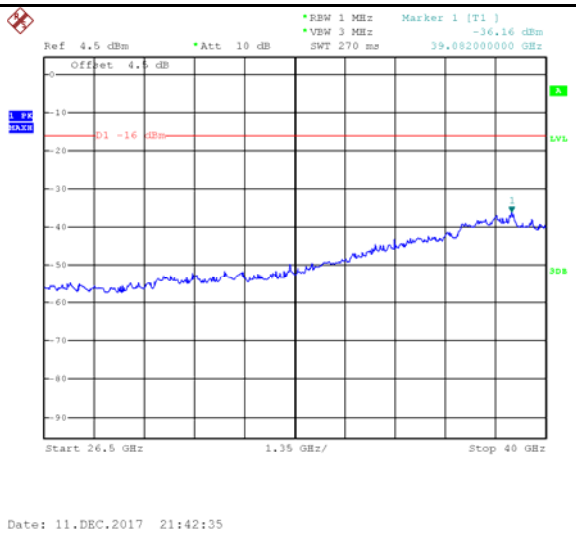
20MHz - Low CH 30MHz~26.5GHz



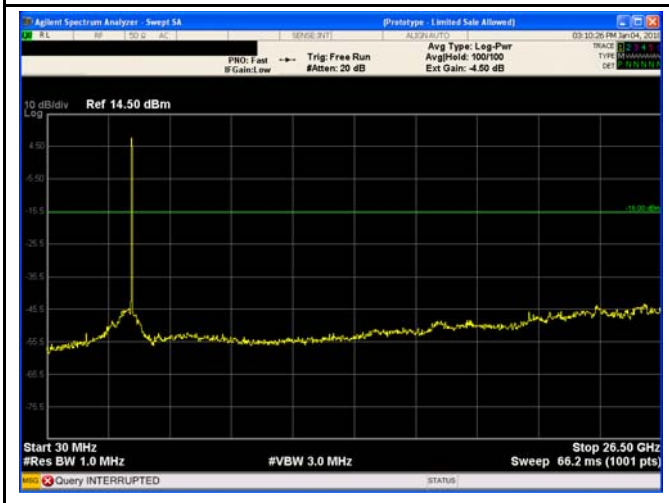
20MHz - Low CH 26.5GHz~40GHz



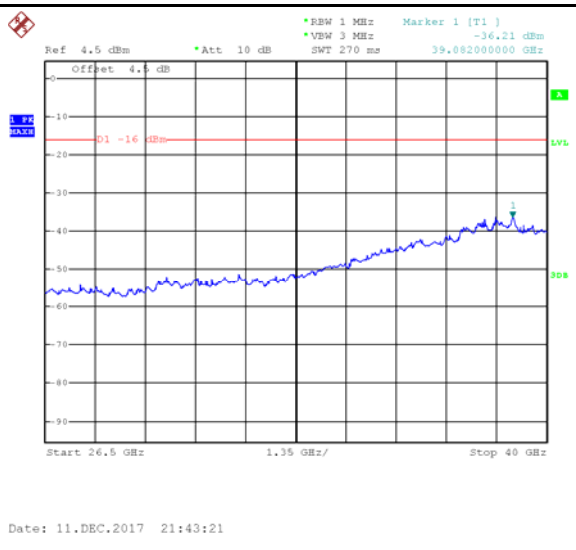
20MHz - Middle CH 30MHz~26.5GHz



20MHz - Middle CH 26.5GHz~40GHz

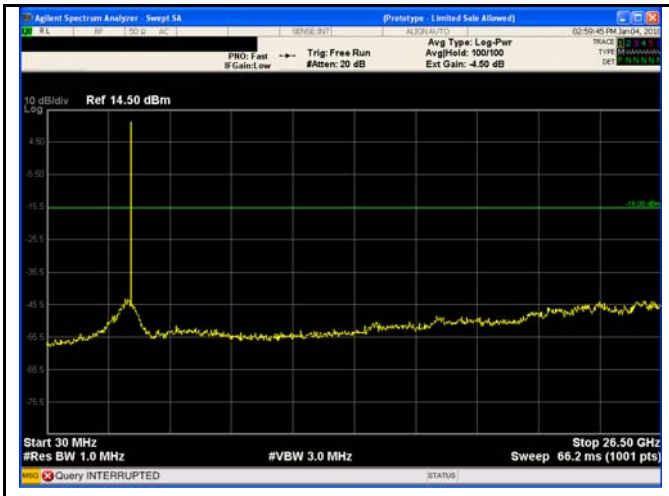
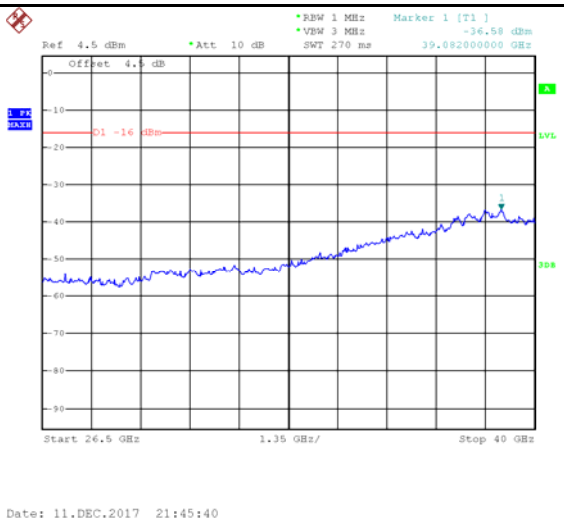
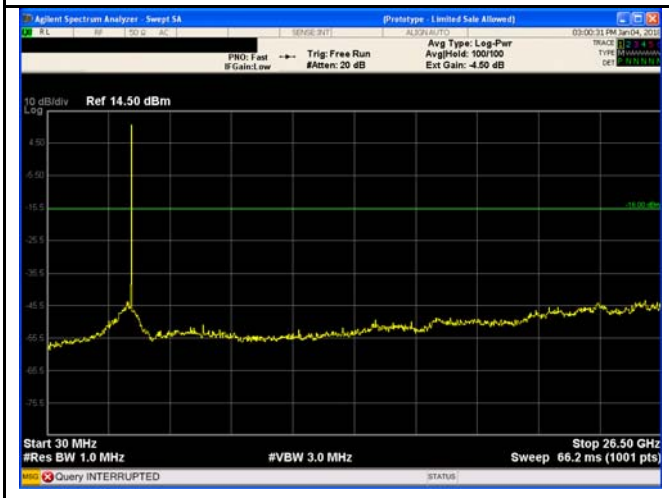
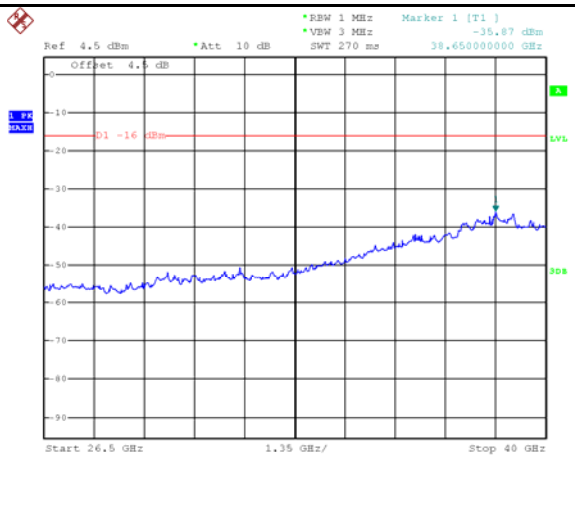
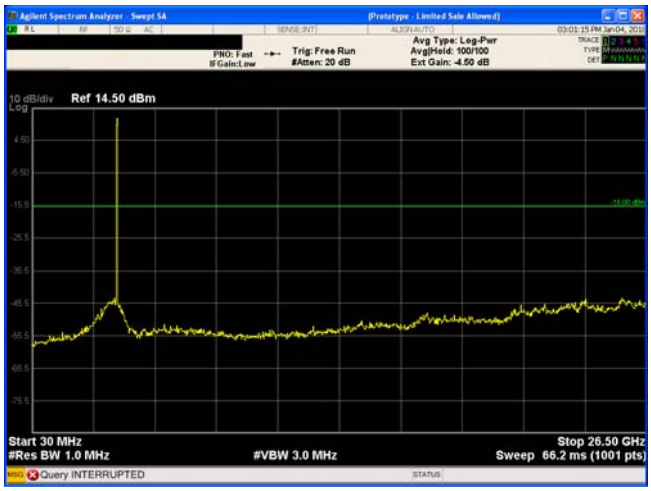
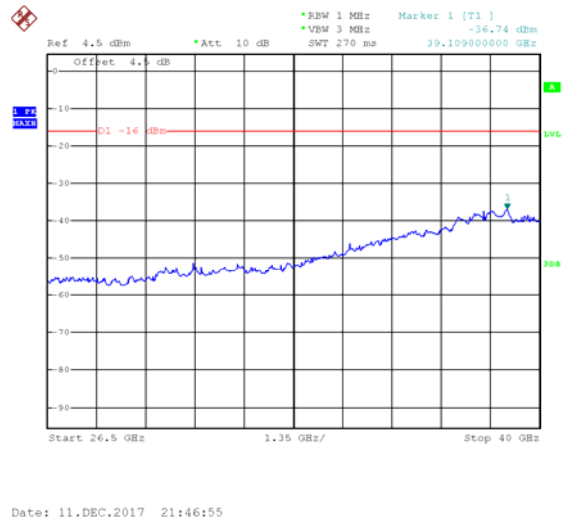


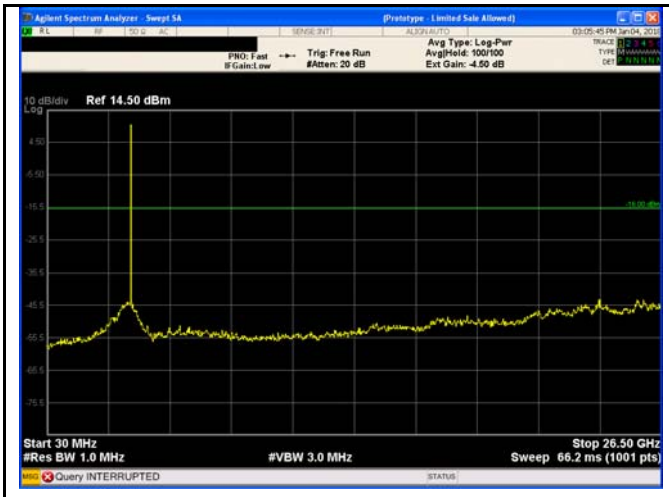
20MHz - High CH 30MHz~26.5GHz



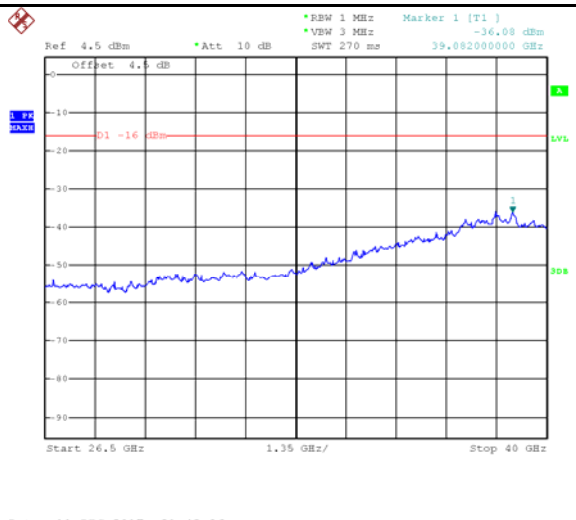
20MHz - High CH 26.5GHz~40GHz

Chain 1

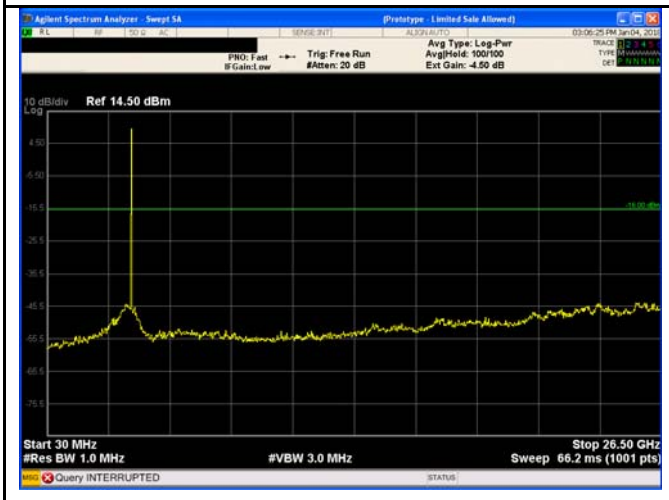
	
5MHz - Low CH 30MHz~26.5GHz	5MHz - Low CH 26.5GHz~40GHz
	
5MHz - Middle CH 30MHz~26.5GHz	5MHz - Middle CH 26.5GHz~40GHz
	
5MHz - High CH 30MHz~26.5GHz	5MHz - High CH 26.5GHz~40GHz



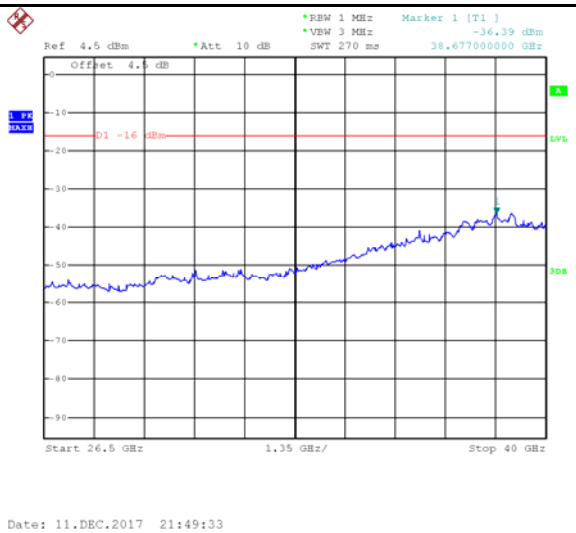
10MHz - Low CH 30MHz~26.5GHz



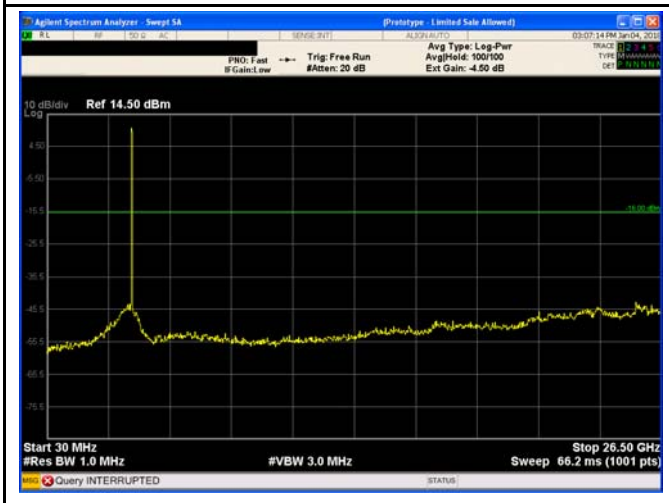
10MHz - Low CH 26.5GHz~40GHz



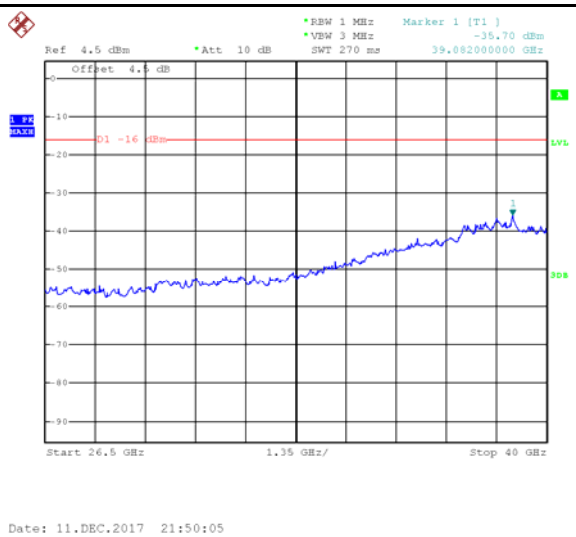
10MHz - Middle CH 30MHz~26.5GHz



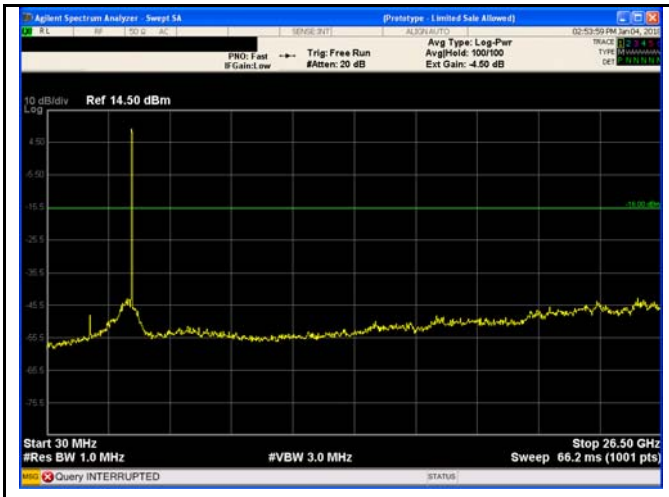
10MHz - Middle CH 26.5GHz~40GHz



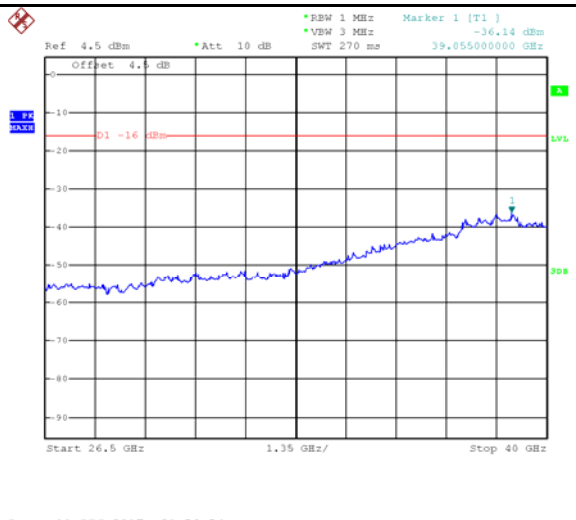
10MHz - High CH 30MHz~26.5GHz



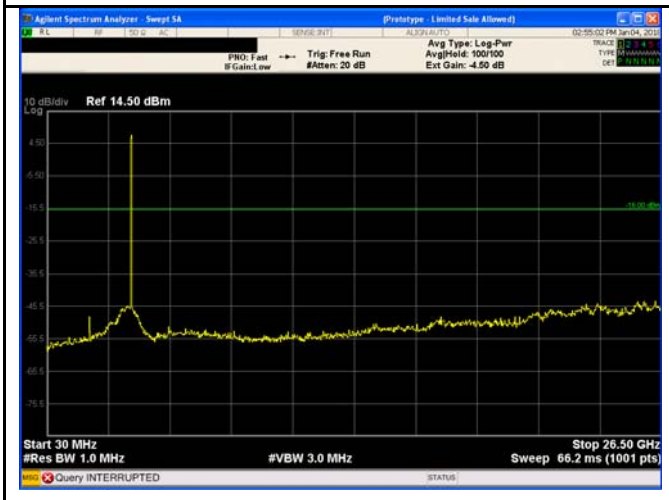
10MHz - High CH 26.5GHz~40GHz



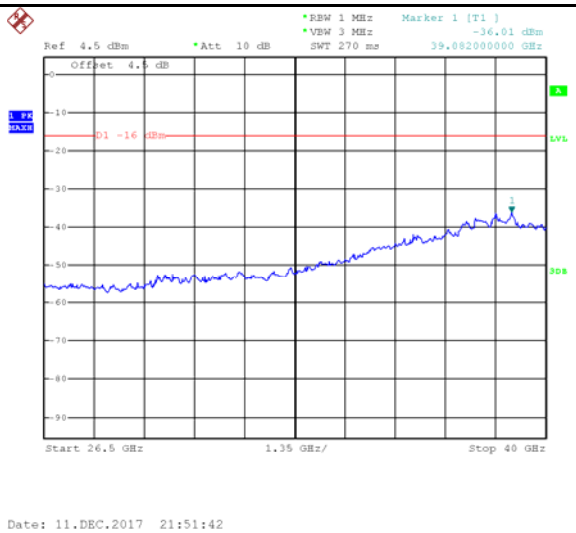
15MHz - Low CH 30MHz~26.5GHz



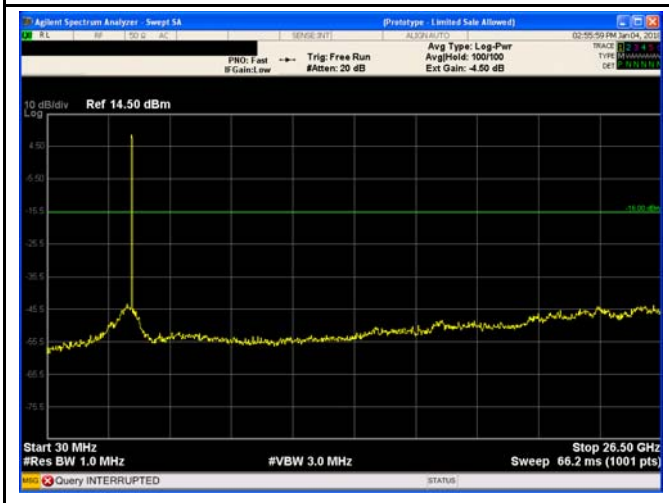
15MHz - Low CH 26.5GHz~40GHz



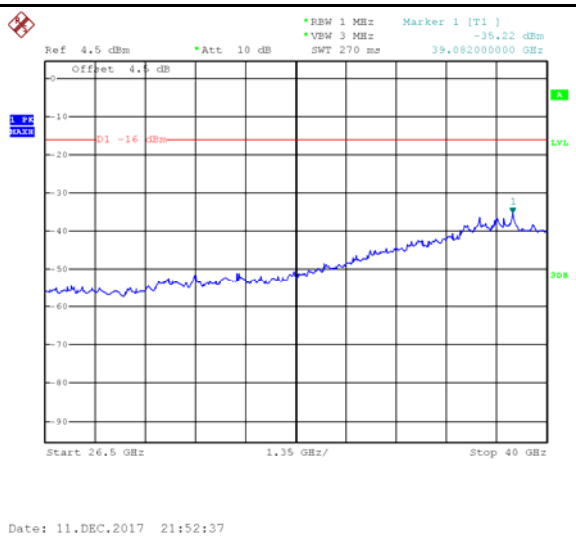
15MHz - Middle CH 30MHz~26.5GHz



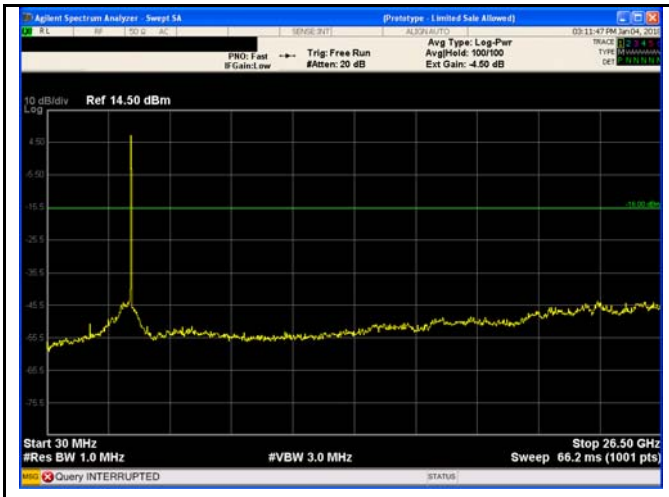
15MHz - Middle CH 26.5GHz~40GHz



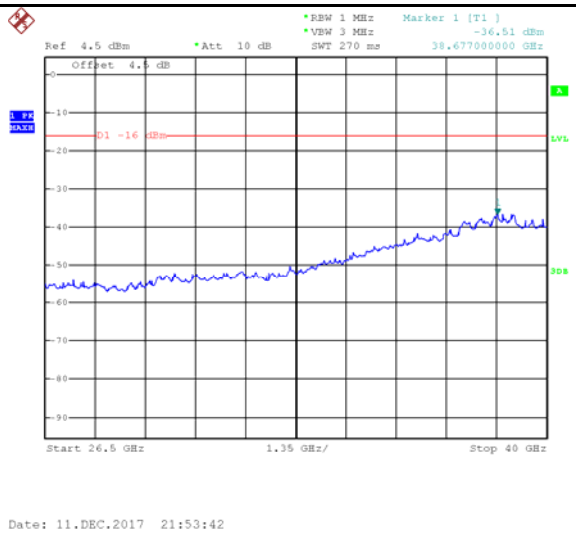
15MHz - High CH 30MHz~26.5GHz



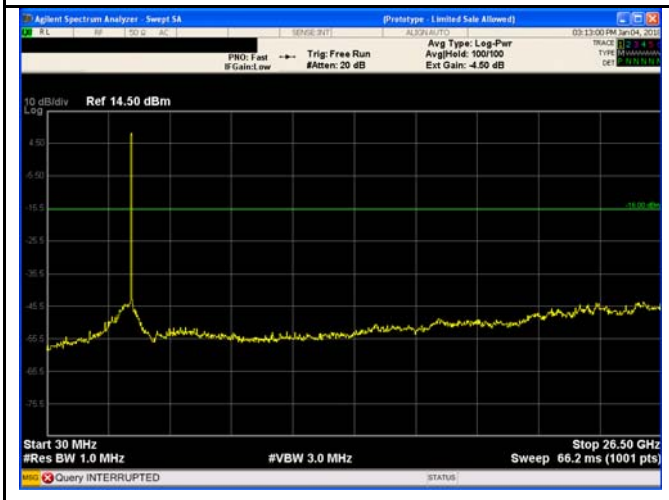
15MHz - High CH 26.5GHz~40GHz



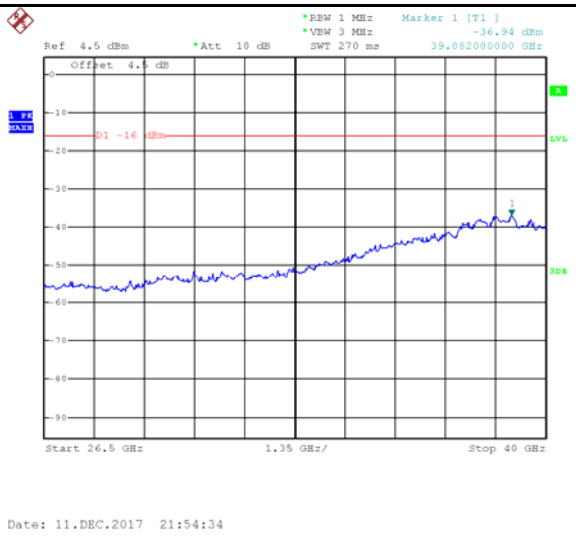
20MHz - Low CH 30MHz~26.5GHz



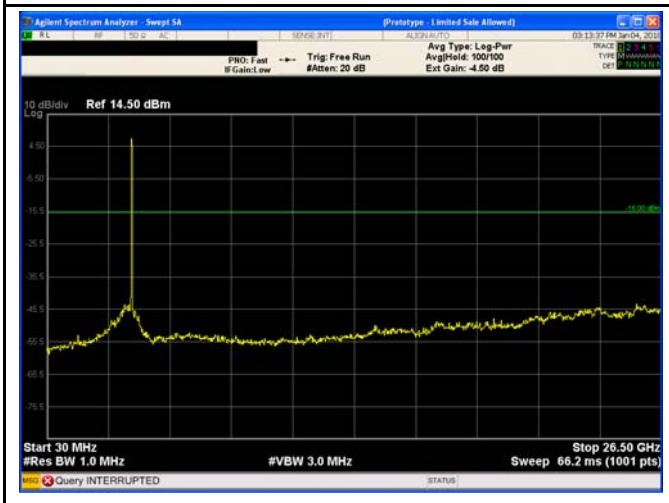
20MHz - Low CH 26.5GHz~40GHz



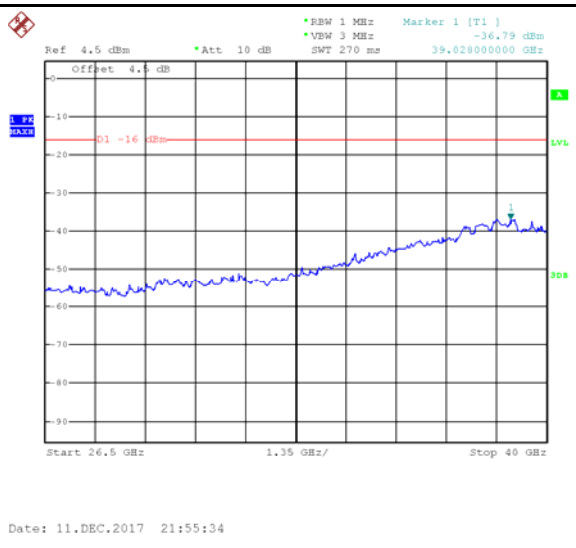
20MHz - Middle CH 30MHz~26.5GHz



20MHz - Middle CH 26.5GHz~40GHz

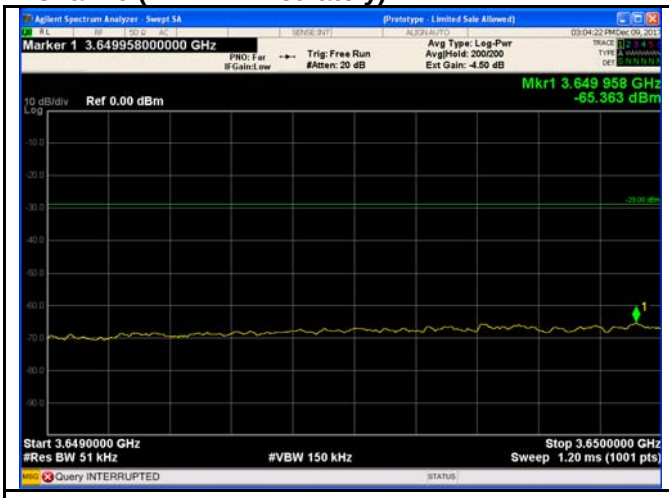


20MHz - High CH 30MHz~26.5GHz

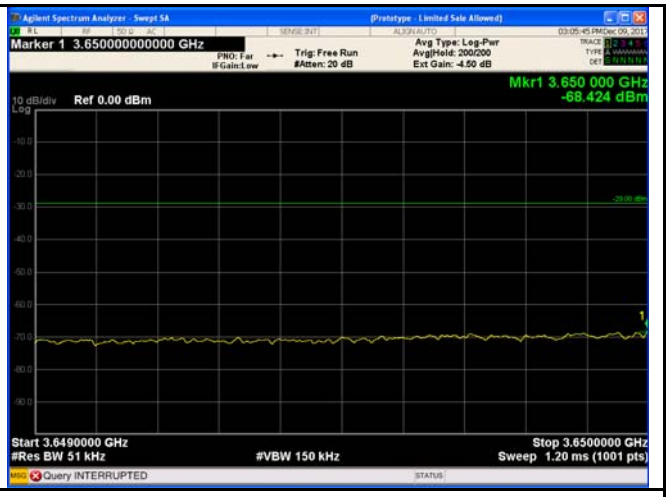


20MHz - High CH 26.5GHz~40GHz

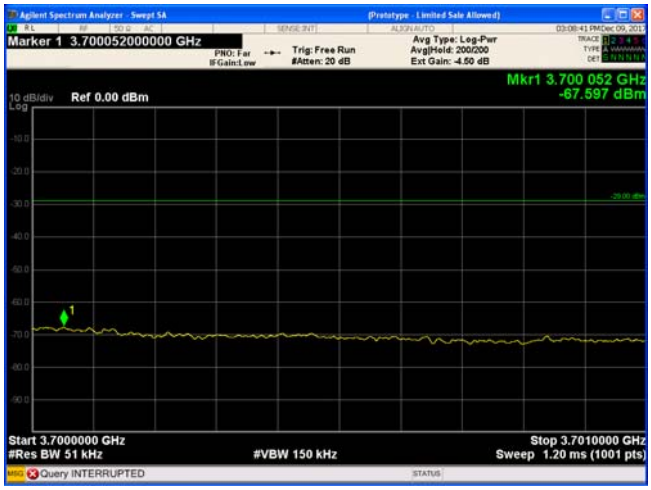
Band edge emission
Chain 0 (1MHz immediately)



5MHz – 3649MHz-3650MHz Low CH QPSK

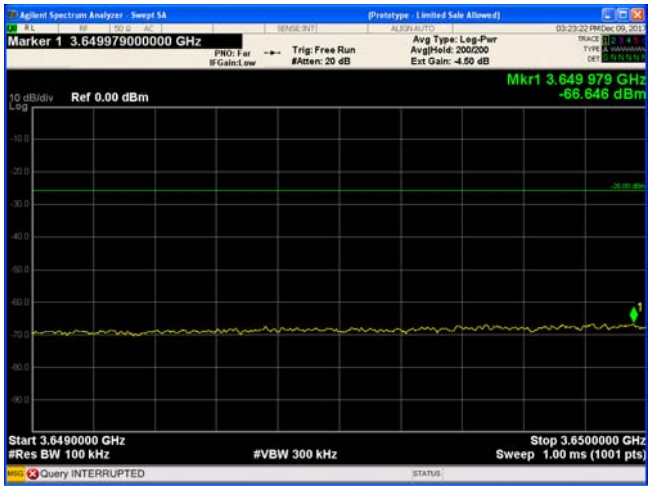


5MHz –3649MHz-3650MHz Low CH 16QAM

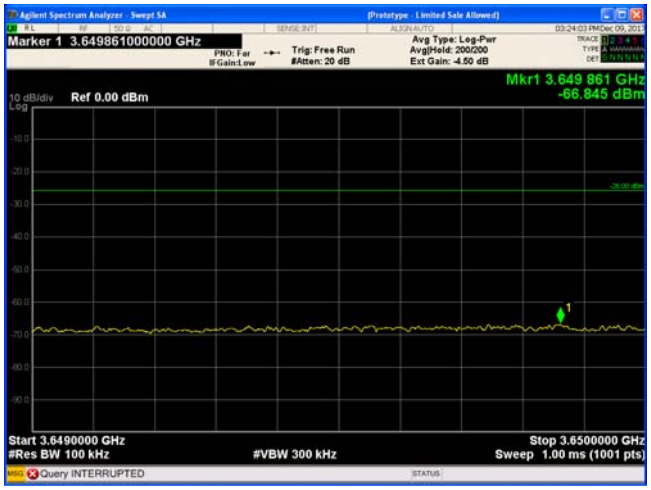


5MHz - 3700MHz -3701MHz High CH QPSK

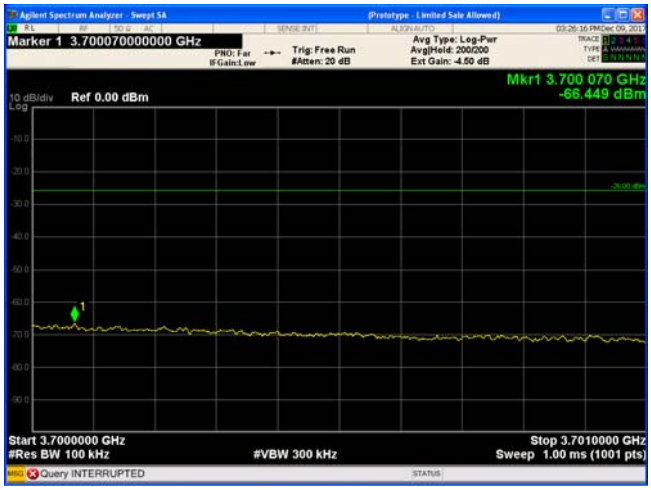
5MHz - 3700MHz -3701MHz High CH 16QAM



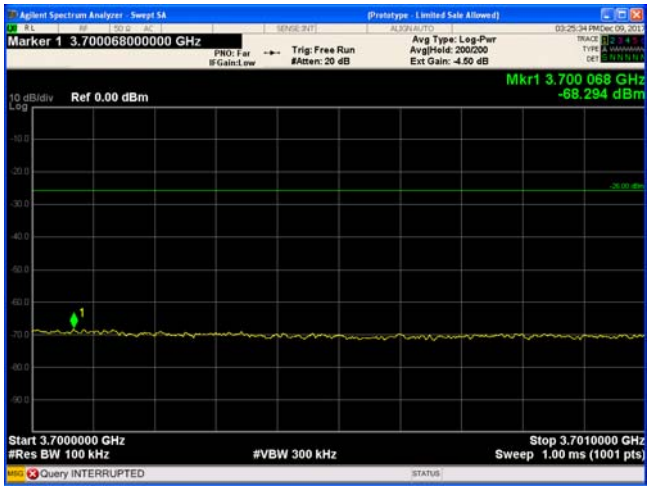
10MHz – 3649MHz-3650MHz Low CH QPSK



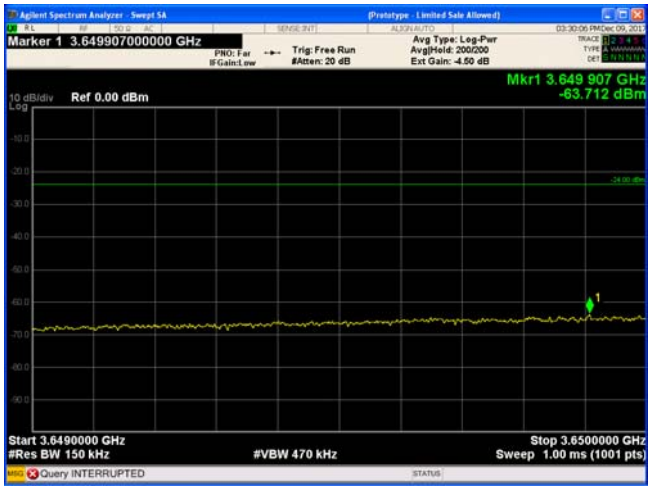
10MHz –3649MHz-3650MHz Low CH 16QAM



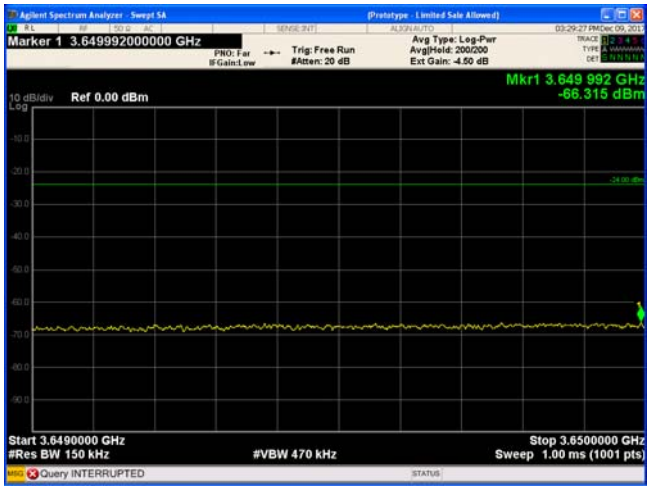
10MHz - 3700MHz -3701MHz High CH QPSK



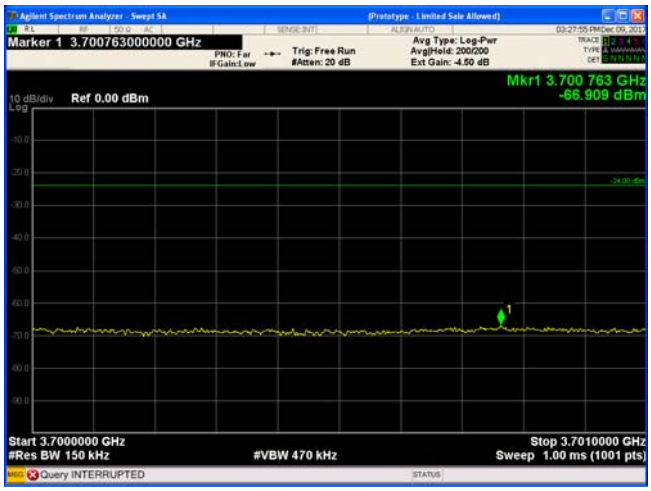
10MHz - 3700MHz -3701MHz High CH 16QAM



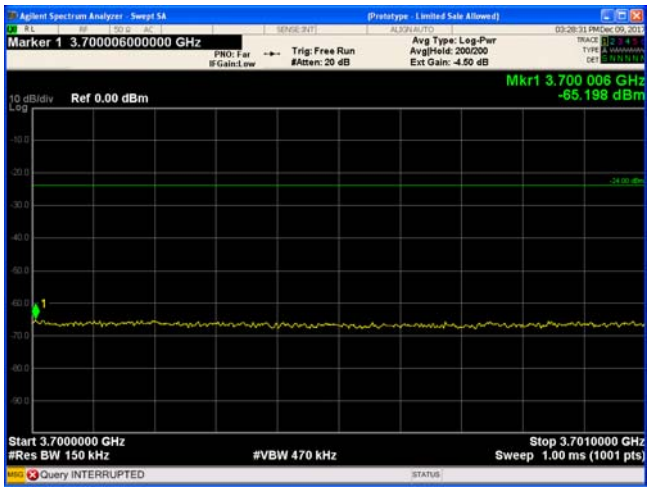
15MHz – 3649MHz-3650MHz Low CH QPSK



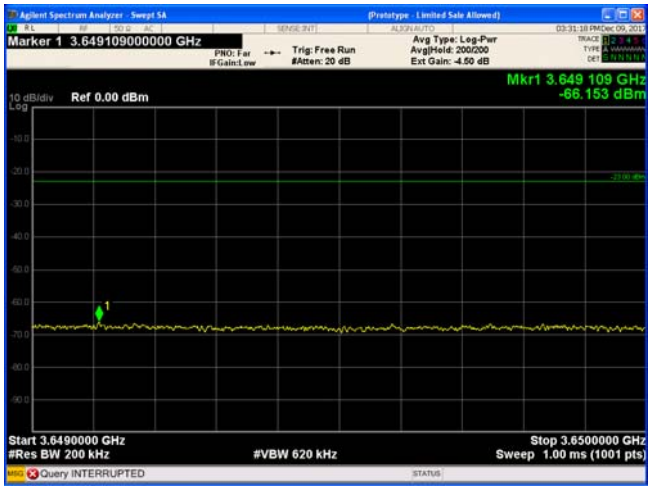
15MHz –3649MHz-3650MHz Low CH 16QAM



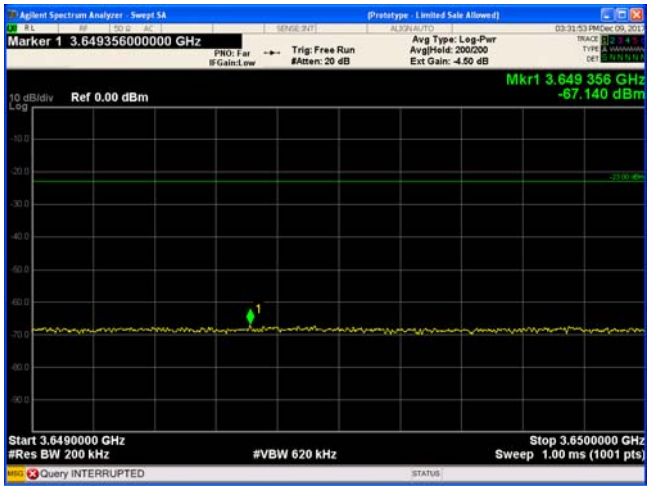
15MHz - 3700MHz -3701MHz High CH QPSK



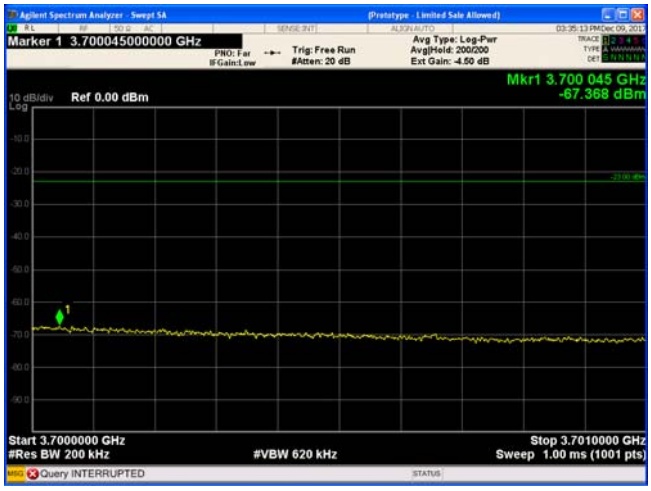
15MHz - 3700MHz -3701MHz High CH 16QAM



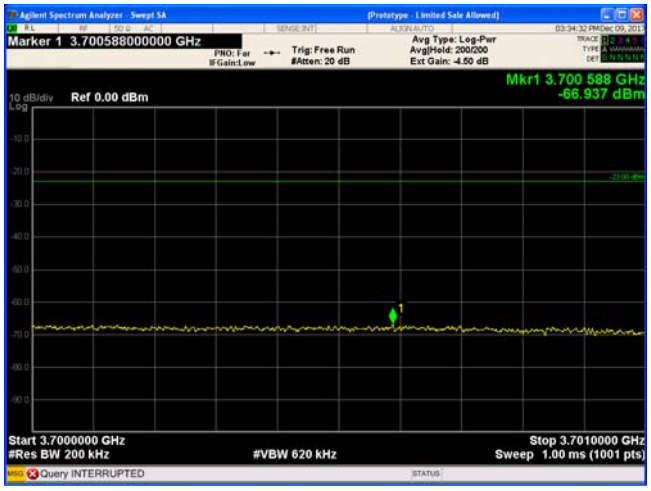
20MHz – 3649MHz-3650MHz Low CH QPSK



20MHz –3649MHz-3650MHz Low CH 16QAM

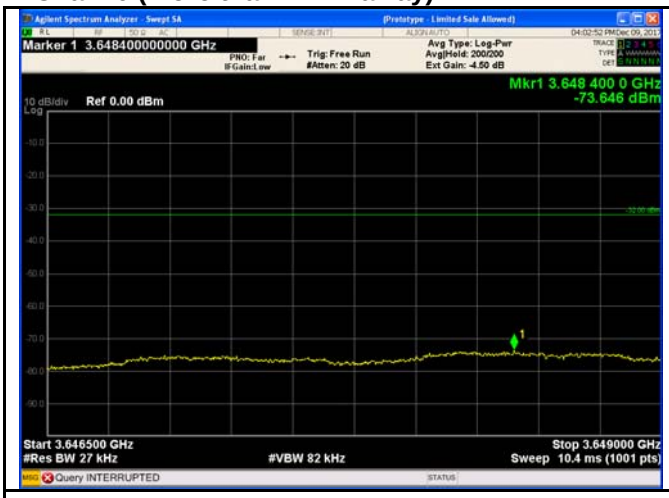


20MHz - 3700MHz -3701MHz High CH QPSK

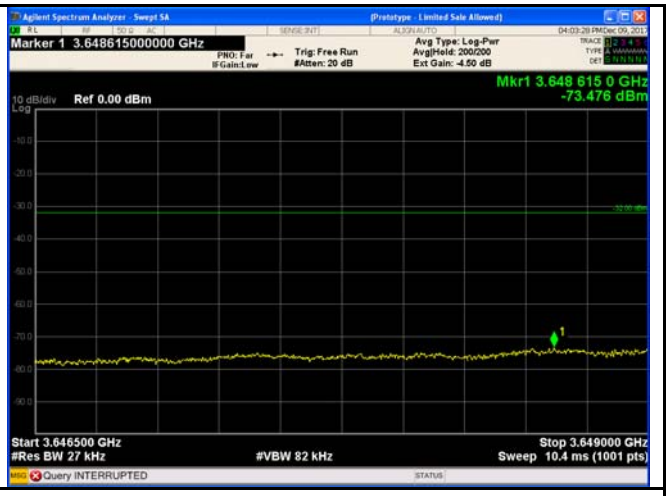


20MHz - 3700MHz -3701MHz High CH 16QAM

Chain 0 (more than 1MHz away)

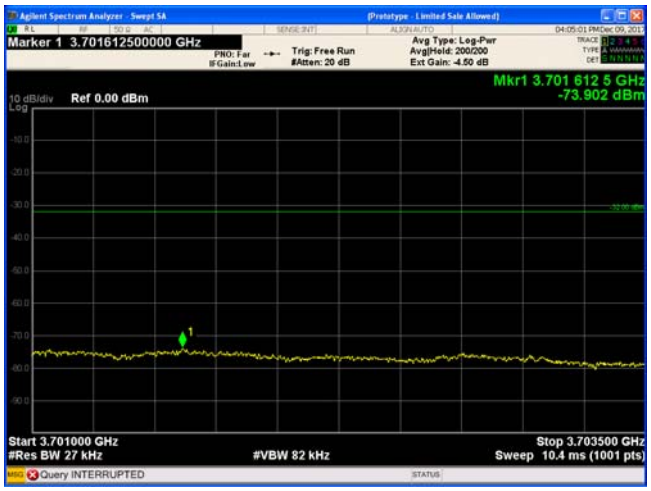


5MHz – 3646.5MHz-3649MHz Low CH QPSK

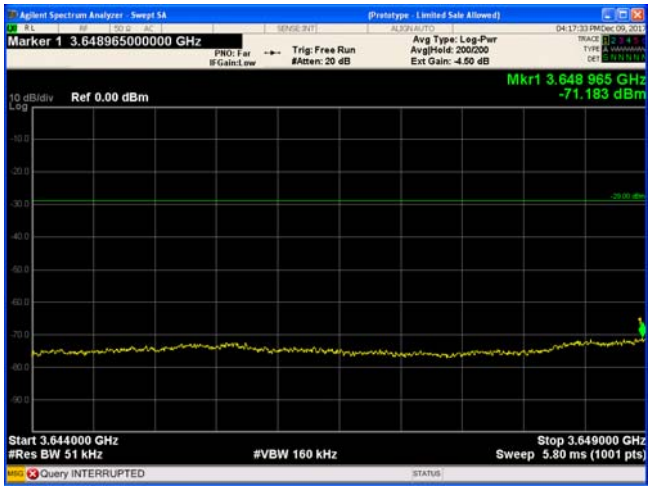


5MHz –3646.5MHz-3649MHz Low CH 16QAM

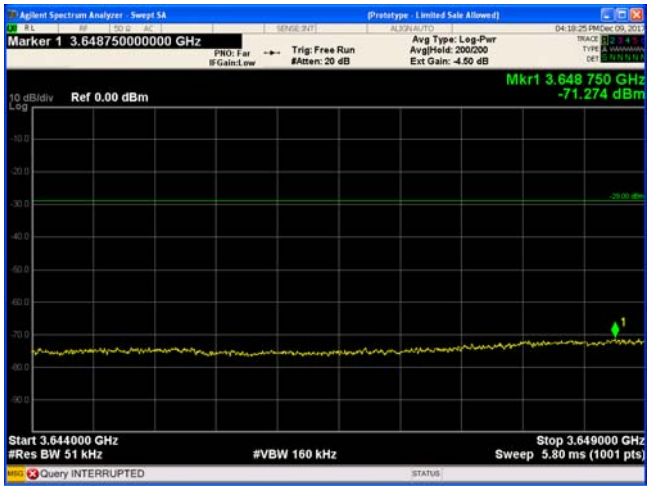
5MHz - 3701MHz -3703.5MHz High CH QPSK



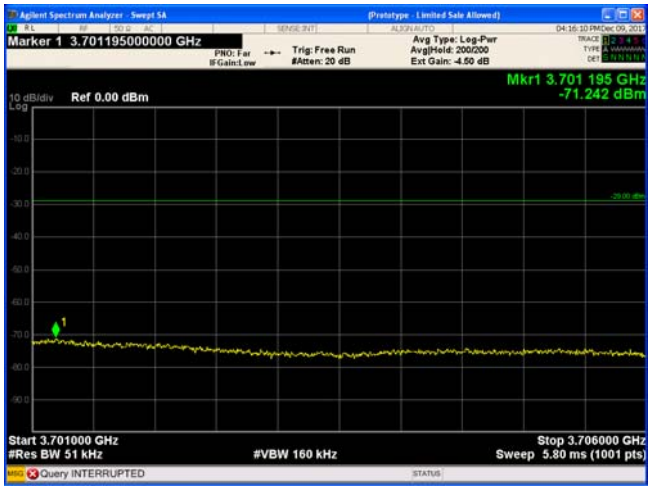
5MHz - 3701MHz -3703.5MHz High CH 16QAM



10MHz – 3644MHz-3649MHz Low CH QPSK



10MHz –3644MHz-3649MHz Low CH 16QAM



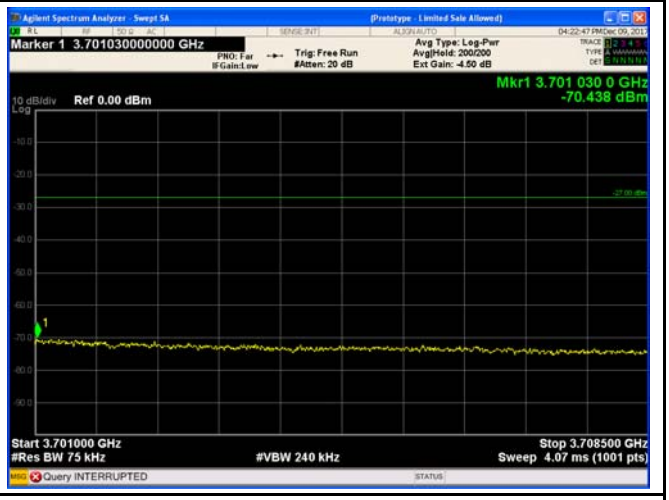
10MHz - 3701MHz -3706MHz High CH QPSK

10MHz - 3701MHz -3706MHz High CH 16QAM

15MHz – 3641.5MHz-3649MHz Low CH QPSK

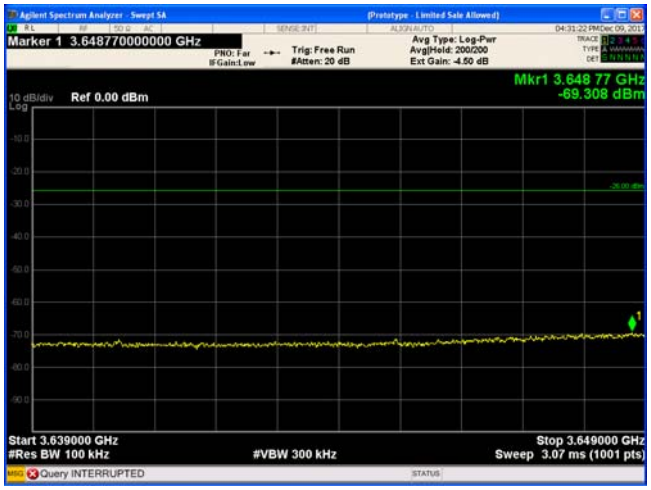
15MHz –3641.5MHz-3649MHz Low CH 16QAM

15MHz - 3701MHz -3708.5MHz High CH QPSK



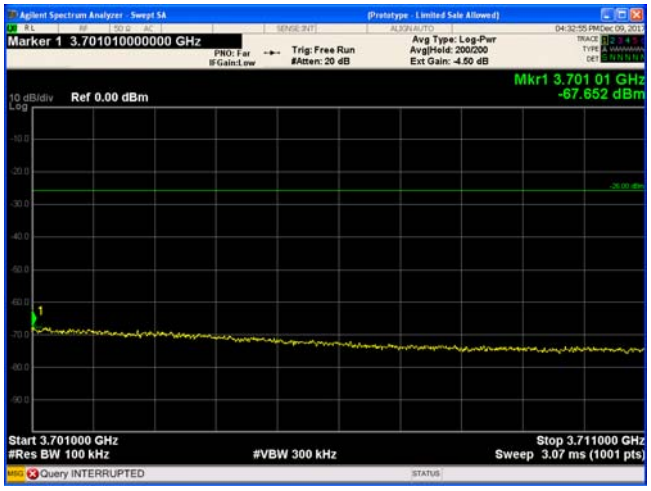
15MHz - 3701MHz -3708.5MHz High CH 16QAM

20MHz – 3639MHz-3649MHz Low CH QPSK



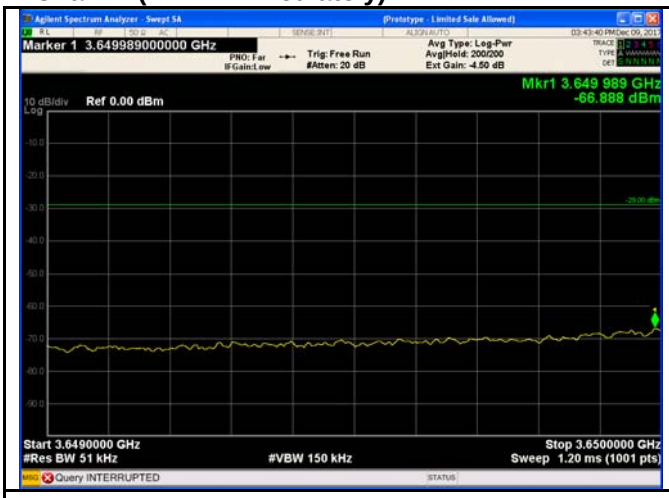
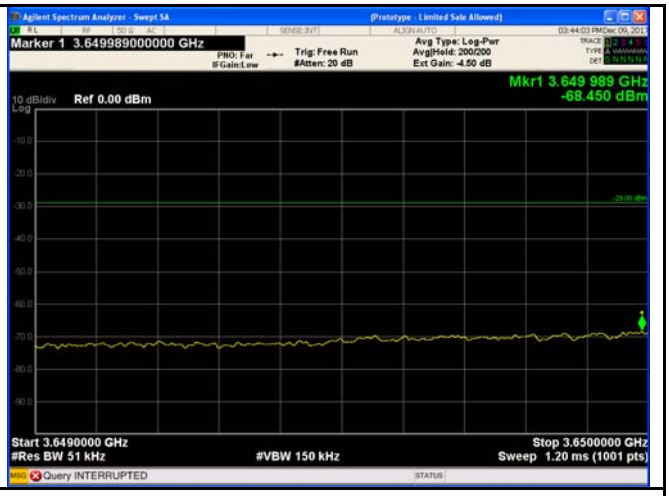
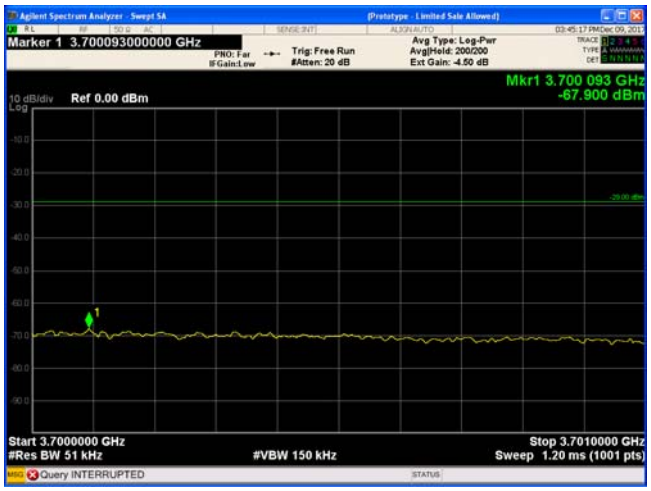
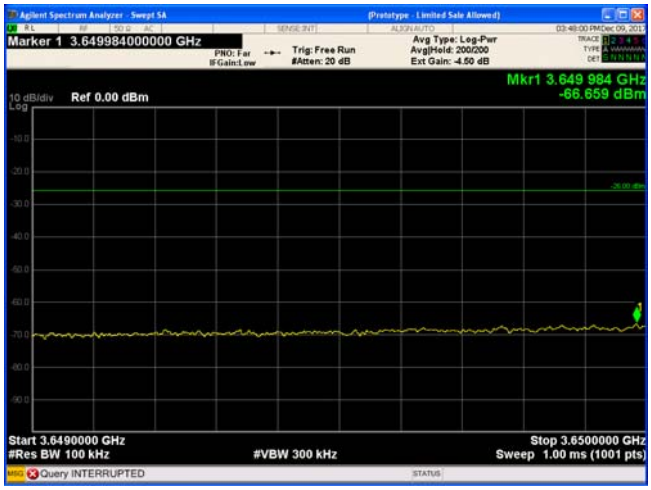
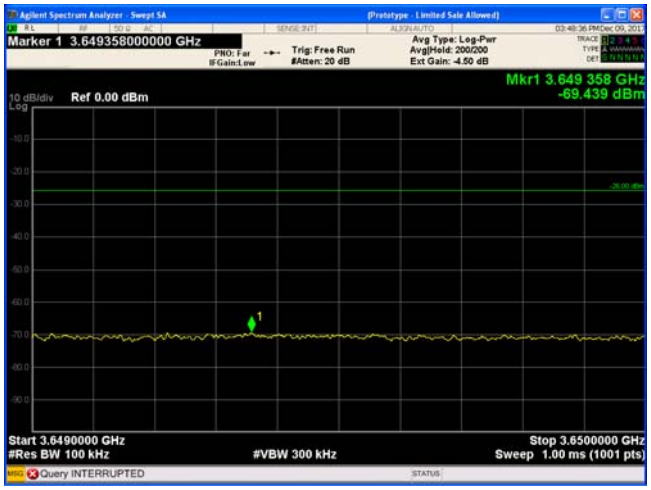
20MHz –3639MHz-3649MHz Low CH 16QAM

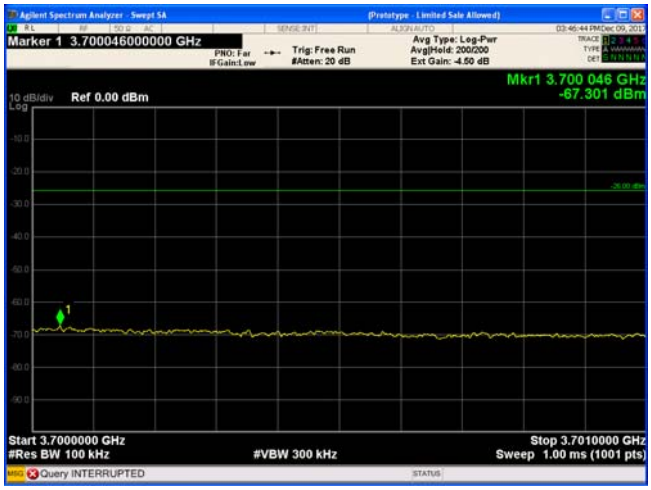
20MHz - 3701MHz -3711MHz High CH QPSK



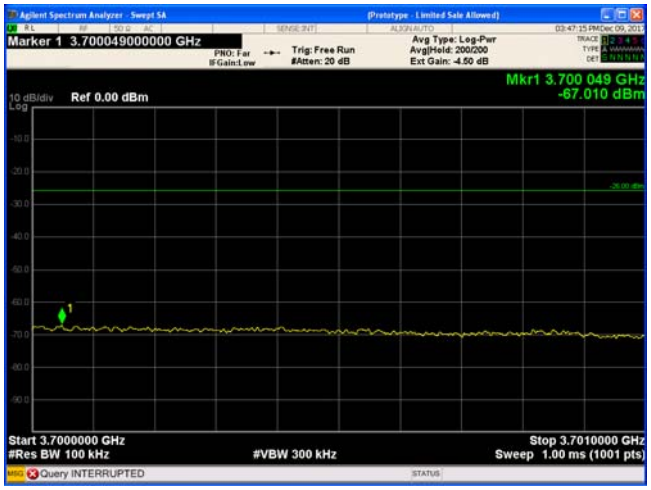
20MHz - 3701MHz -3711MHz High CH 16QAM

Chain 1 (1MHz immediately)

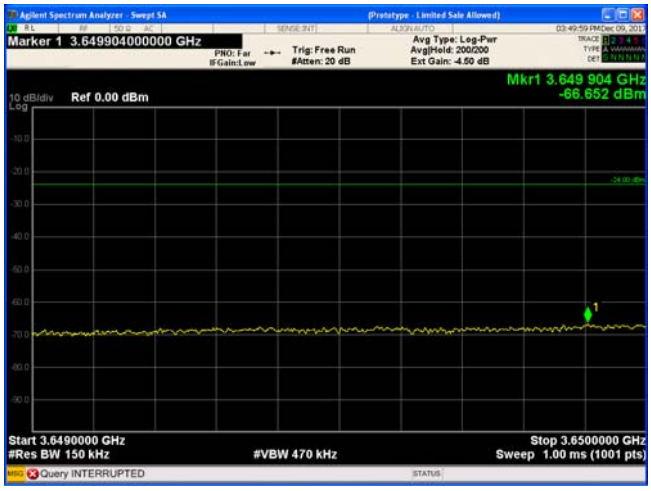
	
5MHz – 3649MHz-3650MHz Low CH QPSK	5MHz –3649MHz-3650MHz Low CH 16QAM
	
5MHz - 3700MHz -3701MHz High CH QPSK	5MHz - 3700MHz -3701MHz High CH 16QAM
	
10MHz – 3649MHz-3650MHz Low CH QPSK	10MHz –3649MHz-3650MHz Low CH 16QAM



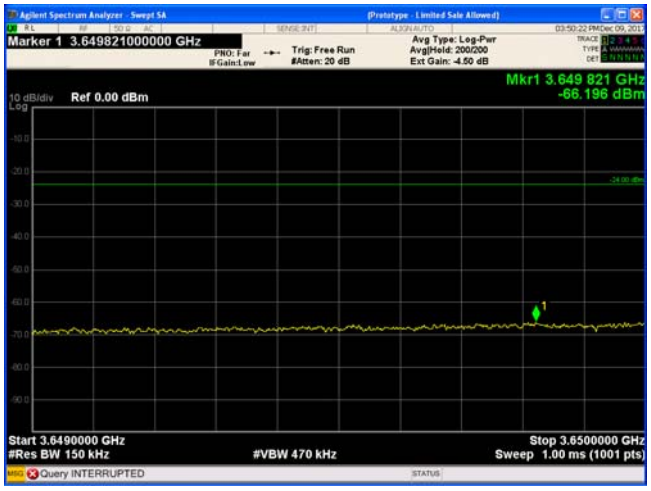
10MHz - 3700MHz -3701MHz High CH QPSK



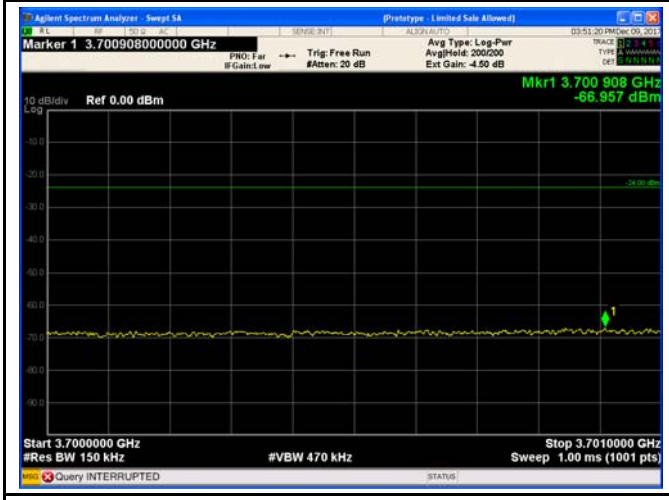
10MHz - 3700MHz -3701MHz High CH 16QAM



15MHz – 3649MHz-3650MHz Low CH QPSK

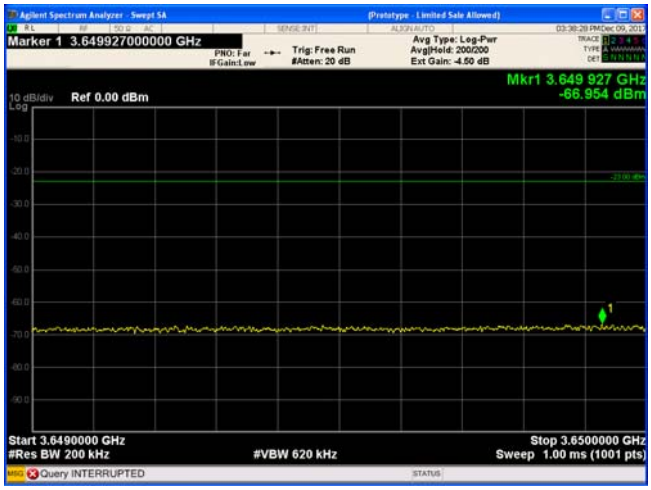
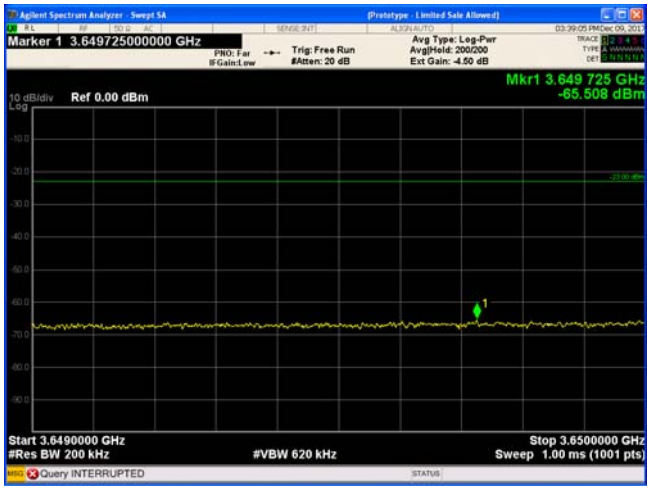
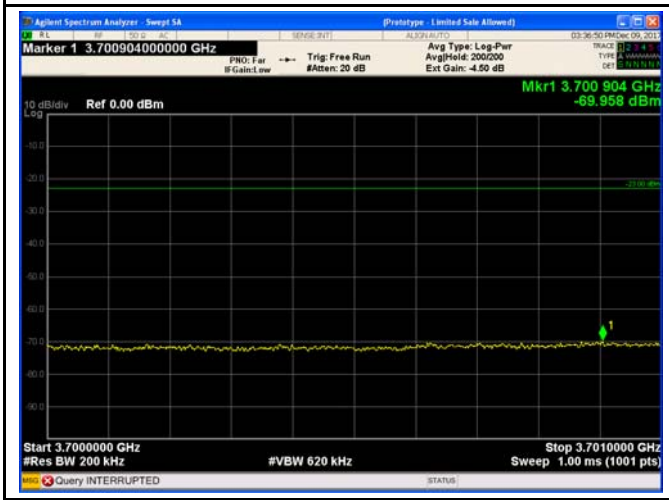
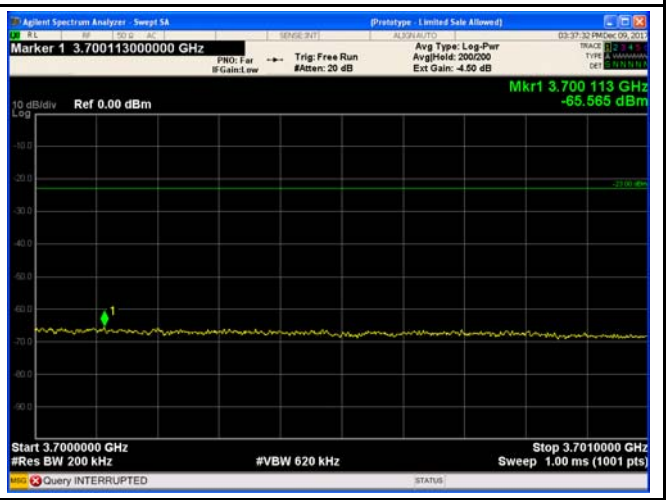


15MHz –3649MHz-3650MHz Low CH 16QAM

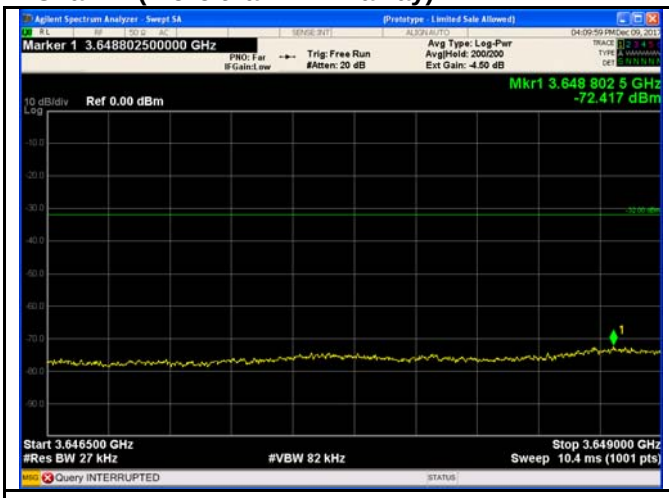


15MHz - 3700MHz -3701MHz High CH QPSK

15MHz - 3700MHz -3701MHz High CH 16QAM

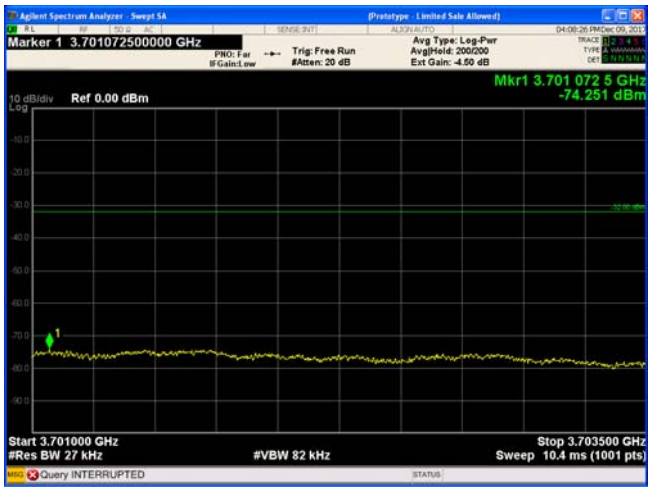
	
20MHz – 3649MHz-3650MHz Low CH QPSK	20MHz –3649MHz-3650MHz Low CH 16QAM
	
20MHz - 3700MHz -3701MHz High CH QPSK	20MHz - 3700MHz -3701MHz High CH 16QAM

Chain 1 (more than 1MHz away)

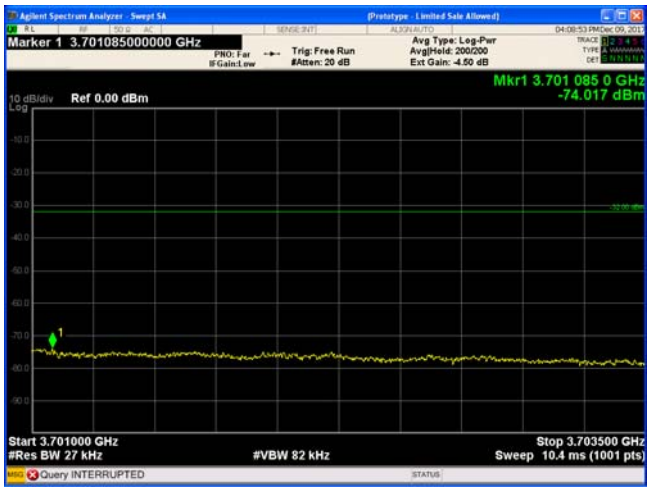


5MHz – 3646.5MHz-3649MHz Low CH QPSK

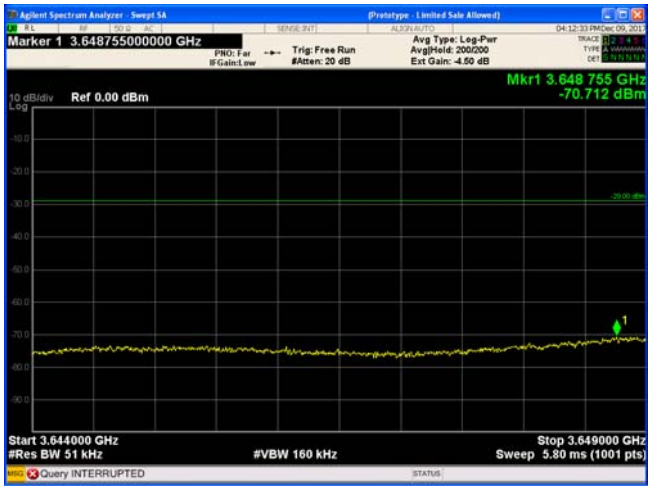
5MHz –3646.5MHz-3649MHz Low CH 16QAM



5MHz - 3701MHz -3703.5MHz High CH QPSK



5MHz - 3701MHz -3703.5MHz High CH 16QAM



10MHz – 3644MHz-3649MHz Low CH QPSK

10MHz –3644MHz-3649MHz Low CH 16QAM

10MHz - 3701MHz -3706MHz High CH QPSK

10MHz - 3701MHz -3706MHz High CH 16QAM

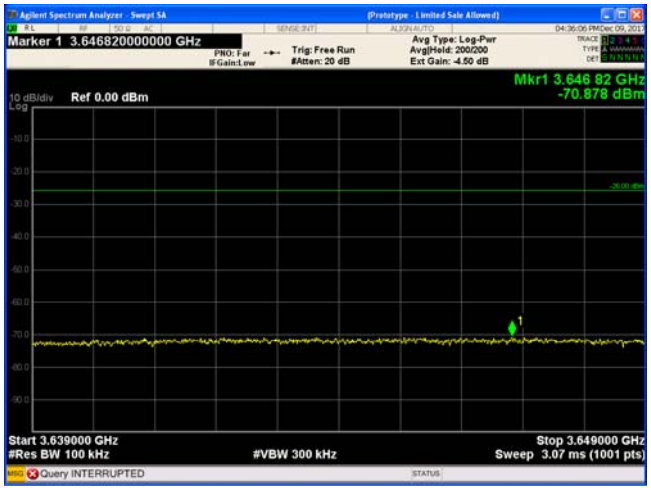
15MHz – 3641.5MHz-3619MHz Low CH QPSK

15MHz –3641.5MHz-3649MHz Low CH 16QAM

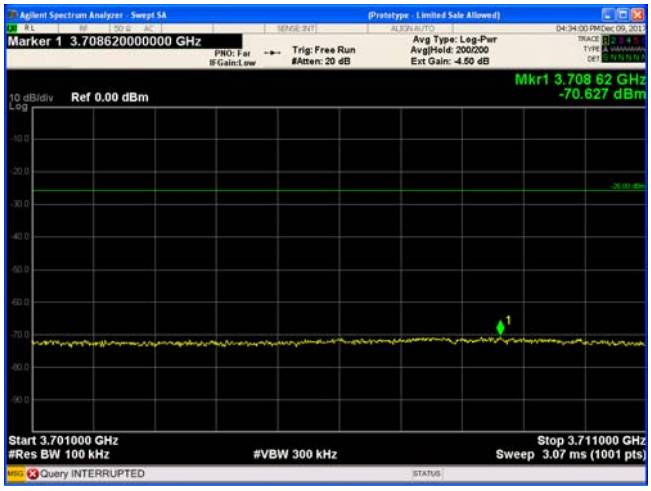
15MHz - 3701MHz -3708.5MHz High CH QPSK

15MHz - 3701MHz -3708.5MHz High CH 16QAM

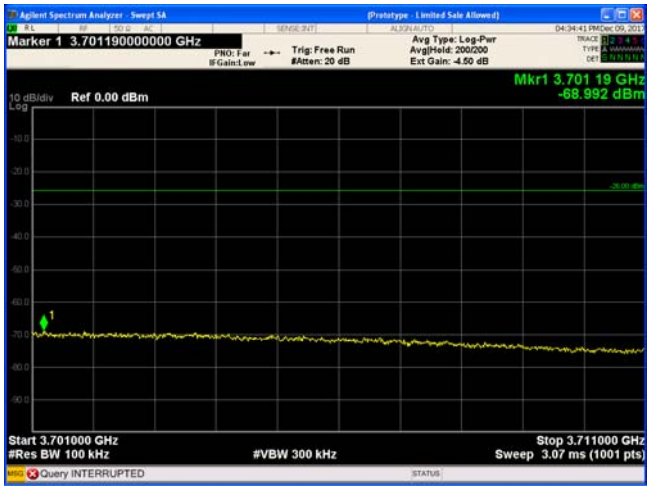
20MHz – 3639MHz-3649MHz Low CH QPSK



20MHz –3639MHz-3649MHz Low CH 16QAM



20MHz - 3701MHz -3711MHz High CH QPSK



20MHz - 3701MHz -3711MHz High CH 16QAM

12 Field strength of spurious radiation measurement

Test Requirement:	FCC part90.1323
Test Method:	FCC part2.1051
	ANSI/TIA-603-E-2016
Test Mode:	Data communicating mode
Limit:	-13dBm

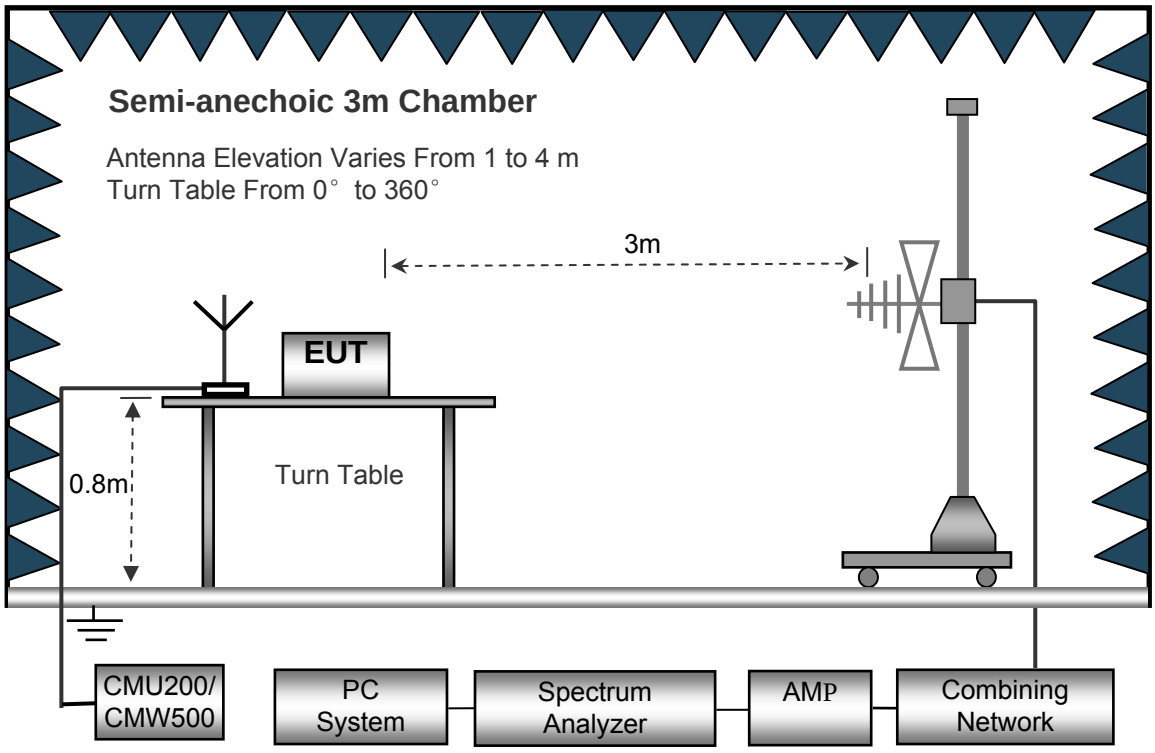
12.1 EUT Operation

Operating Environment :

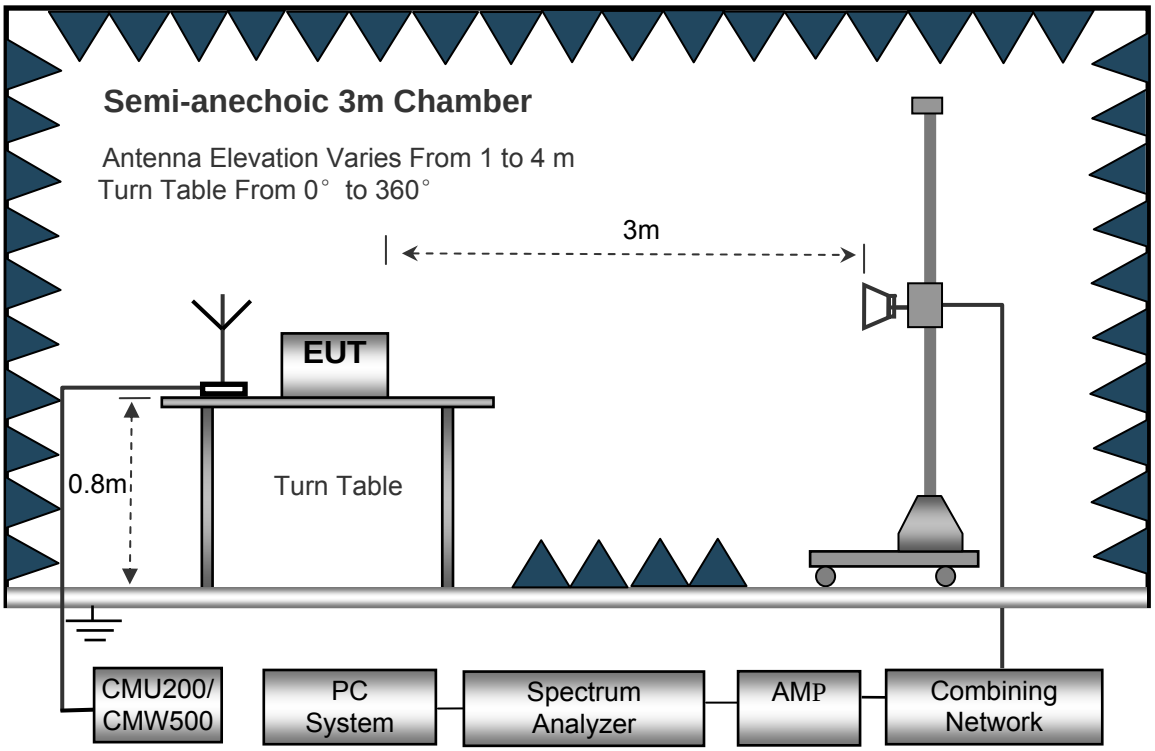
Temperature:	23.5 °C
Humidity:	52.1 % RH
Atmospheric Pressure:	101.2kPa

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 100kHz
Video Bandwidth 300kHz

Above 1GHz

Sweep Speed ..... Auto
Detector ..... PK
Resolution Bandwidth 1MHz
Video Bandwidth 3MHz
Detector ..... Ave.
Resolution Bandwidth 1MHz
Video Bandwidth 10Hz

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, 16QAM modulation, and found the QPSK modulation and 10MHz bandwitch 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										
198.63	38.58	11	2.1	H	-71.93	0.15	0.00	-72.08	-13.00	-59.08
198.63	29.67	108	1.5	V	-77.92	0.15	0.00	-78.07	-13.00	-65.07
7310.00	65.95	250	1.9	H	-47.10	2.79	12.70	-37.19	-13.00	-24.19
7310.00	59.98	191	1.7	V	-51.17	2.79	12.70	-41.26	-13.00	-28.26
10965.00	53.58	63	1.5	H	-55.83	3.25	13.13	-45.95	-13.00	-32.95
10965.00	44.73	129	1.2	V	-64.04	3.25	13.13	-54.16	-13.00	-41.16
Middle channel										
198.63	38.32	54	1.1	H	-72.19	0.15	0.00	-72.34	-13.00	-59.34
198.63	29.86	102	2.2	V	-77.73	0.15	0.00	-77.88	-13.00	-64.88
7350.00	58.40	341	1.9	H	-54.65	2.37	12.50	-44.52	-13.00	-31.52
7350.00	52.44	275	1.0	V	-58.71	2.37	12.50	-48.58	-13.00	-35.58
11025.00	47.04	11	1.6	H	-62.37	2.79	12.70	-52.46	-13.00	-39.46
11025.00	38.09	150	2.1	V	-70.68	2.79	12.70	-60.77	-13.00	-47.77
High channel										
198.63	38.29	283	2.1	H	-72.22	0.15	0.00	-72.37	-13.00	-59.37
198.63	30.07	73	2.0	V	-77.52	0.15	0.00	-77.67	-13.00	-64.67
7390.00	50.56	164	1.5	H	-62.08	2.37	12.50	-51.95	-13.00	-38.95
7390.00	44.70	340	2.1	V	-66.03	2.37	12.50	-55.90	-13.00	-42.90
11085.00	40.31	16	1.6	H	-69.27	2.81	12.80	-59.28	-13.00	-46.28
11085.00	30.24	278	1.2	V	-78.56	2.81	12.80	-68.57	-13.00	-55.57

Remark:

Test Frequency: 18GHz~25GHz

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

13 Frequency stability V.S. Temperature measurement

Test Requirement: FCC Part90.213(a)

Test Method: FCC Part2.1055(a)(1)(b)

ANSI/TIA-603-E-2016

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			

13.1 EUT Operation

Operating Environment :

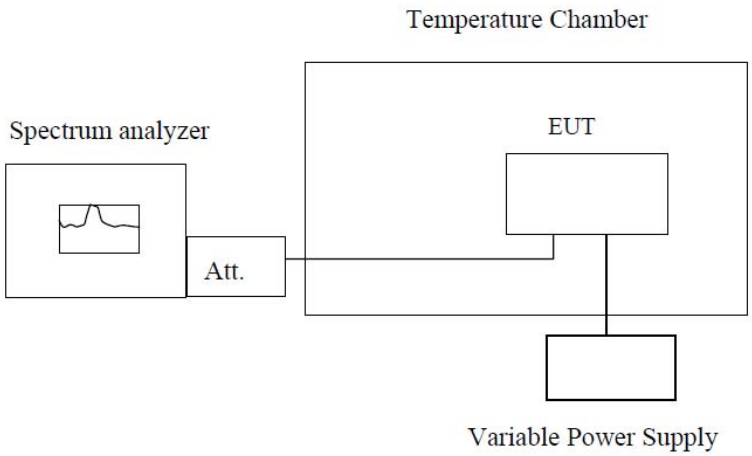
Temperature: 23.5 °C

Humidity: 52.3 % 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: 3652.5MHz QPSK 5MHz			
Temperature (℃)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
-40	120	118	0.0323
-25		106	0.0290
-10		112	0.0307
0		106	0.0290
10		111	0.0304
20		111	0.0304
30		100	0.0274
40		93	0.0255
55		101	0.0277

Test Frequency: 3655MHz QPSK 10MHz			
Temperature (℃)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
-40	120	114	0.0312
-25		101	0.0276
-10		110	0.0301
0		111	0.0304
10		103	0.0282
20		113	0.0309
30		107	0.0293
40		106	0.0290
55		103	0.0282

Test Frequency: 3657.5MHz QPSK 15MHz			
Temperature (℃)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
-40	120	105	0.0287
-25		105	0.0287
-10		108	0.0295
0		114	0.0312
10		105	0.0287
20		103	0.0282
30		110	0.0301
40		119	0.0325
55		120	0.0328

Test Frequency: 3660MHz QPSK 20MHz			
Temperature (℃)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
-40	120	111	0.0303
-25		113	0.0309
-10		115	0.0314
0		116	0.0317
10		112	0.0306
20		118	0.0322
30		107	0.0292
40		103	0.0281
55		110	0.0301

Chain 1

Test Frequency: 3652.5MHz QPSK 5MHz			
Temperature (℃)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
-40	120	109	0.0298
-25		116	0.0318
-10		113	0.0309
0		123	0.0337
10		123	0.0337
20		114	0.0312
30		123	0.0337
40		127	0.0348
55		127	0.0348

Test Frequency: 3655MHz QPSK 10MHz			
Temperature (℃)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
-40	120	101	0.0276
-25		97	0.0265
-10		102	0.0279
0		96	0.0263
10		107	0.0293
20		112	0.0306
30		92	0.0252
40		91	0.0249
55		91	0.0249

Test Frequency: 3657.5MHz QPSK 15MHz			
Temperature (℃)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
-40	120	105	0.0287
-25		112	0.0306
-10		111	0.0303
0		121	0.0331
10		111	0.0303
20		115	0.0314
30		133	0.0364
40		126	0.0344
55		142	0.0388

Test Frequency: 3660MHz QPSK 20MHz			
Temperature (℃)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
-40	120	104	0.0284
-25		99	0.0270
-10		109	0.0298
0		116	0.0317
10		105	0.0287
20		101	0.0276
30		129	0.0352
40		134	0.0366
55		128	0.0350

14 Frequency stability V.S. Voltage measurement

Test Requirement: FCC Part90.213(a)

Test Method: FCC Part2.1055(a)(1)(b)

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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 :

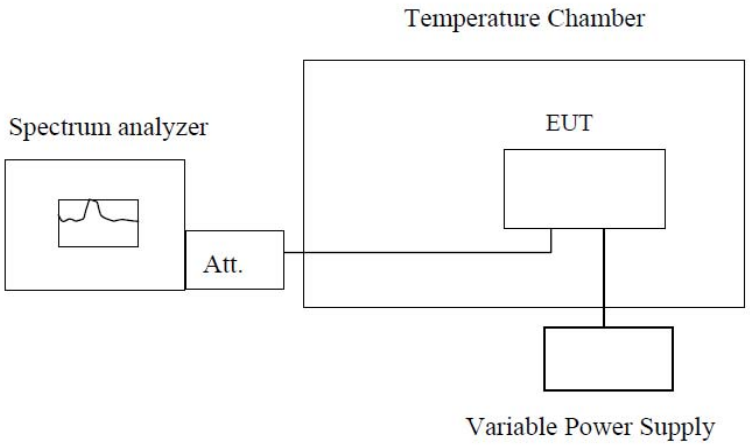
Temperature: 22.9 °C

Humidity: 52.0 % RH

Atmospheric Pressure: 101.3kPa

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: 3652.5MHz QPSK 5MHz			
Temperature (℃)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
25	105	105	0.0287
	120	104	0.0285
	144	98	0.0268

Test Frequency: 3655MHz QPSK 10MHz			
Temperature (℃)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
25	105	103	0.0282
	120	92	0.0252
	144	95	0.0260

Test Frequency: 3657.5MHz QPSK 15MHz			
Temperature (℃)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
25	105	103	0.0282
	120	107	0.0293
	144	96	0.0262

Test Frequency: 3660MHz QPSK 20MHz			
Temperature (℃)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
25	105	103	0.0281
	120	101	0.0276
	144	101	0.0276

Chain 1

Test Frequency: 3652.5MHz QPSK 5MHz			
Temperature (℃)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
25	105	103	0.0282
	120	105	0.0287
	144	102	0.0279

Test Frequency: 3655MHz QPSK 10MHz			
Temperature (℃)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
25	105	103	0.0282
	120	108	0.0295
	144	95	0.0260

Test Frequency: 3657.5MHz QPSK 15MHz			
Temperature (℃)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
25	105	103	0.0282
	120	97	0.0265
	144	99	0.0271

Test Frequency: 3660MHz QPSK 20MHz			
Temperature (℃)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
25	105	103	0.0281
	120	118	0.0322
	144	106	0.0290

15 Photographs of Test Setup and EUT.

Note: Please refer to appendix: WTS17S1194932E_Photo.

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