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*APPENDIX A*

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# APPENDIX A

## TEST PLOTS

(Model: mPAD-12.....)

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## A.1 20dB BANDWIDTH MEASUREMENT

Test Date	2016/05/20	Temp./Hum.	25°C/58%
Cable Loss	---	Test Voltage	AC 120V, 60Hz

### A.1.1 20dB Bandwidth Result

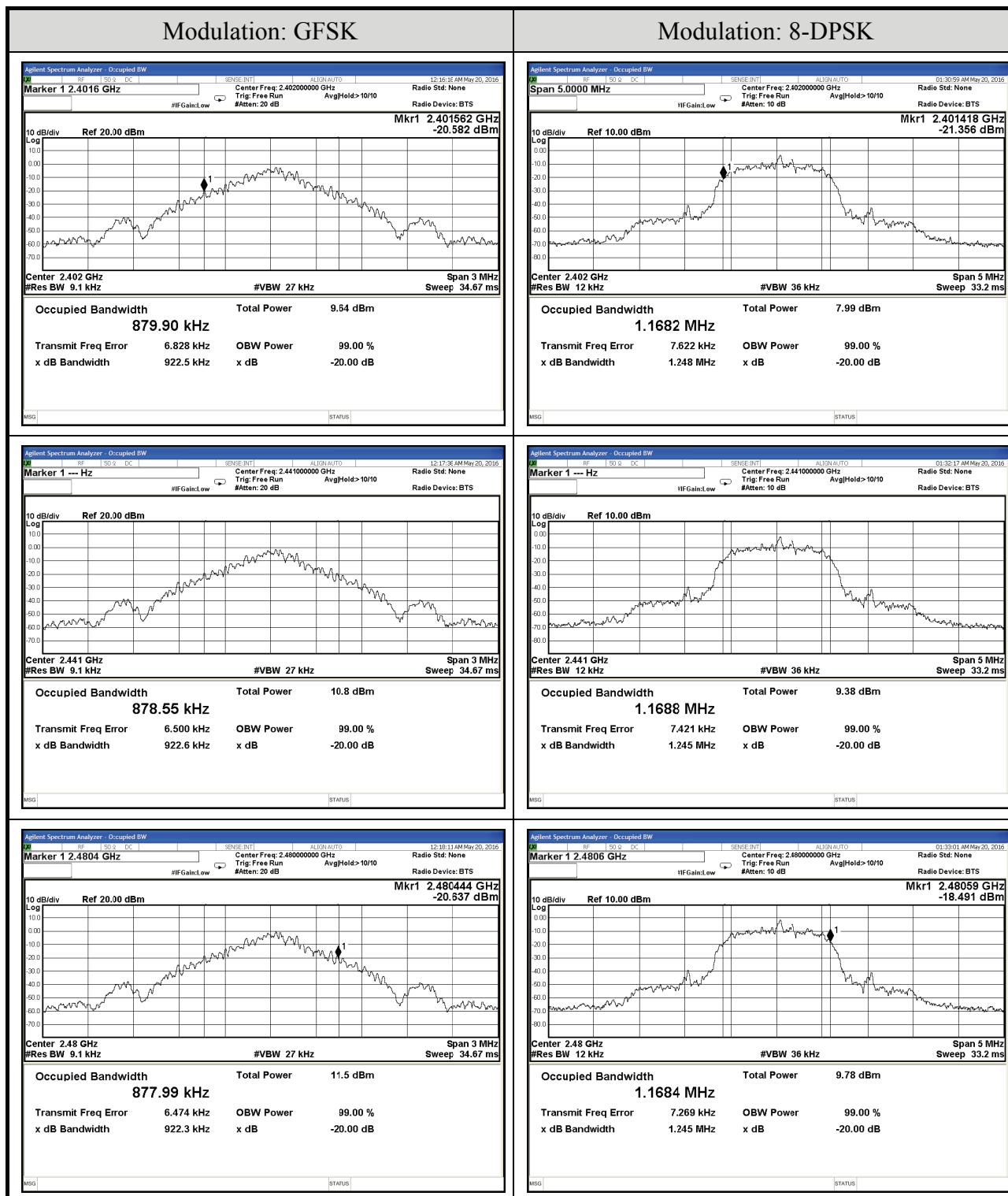
Modulation	Centre Frequency (MHz)	20 dB Bandwidth (MHz)	2/3 (20dB Bandwidth)
GFSK	2402	0.9225	0.615
	2441	0.9226	0.615
	2480	0.9223	0.615

Remark: The maximum two-thirds of the 20dB bandwidth is the limit for carrier frequency separation presented.

Modulation	Centre Frequency (MHz)	20 dB Bandwidth (MHz)	2/3 (20dB Bandwidth)
8-DPSK	2402	1.248	0.832
	2441	1.245	0.830
	2480	1.245	0.830

Remark: The maximum two-thirds of the 20dB bandwidth is the limit for carrier frequency separation presented.

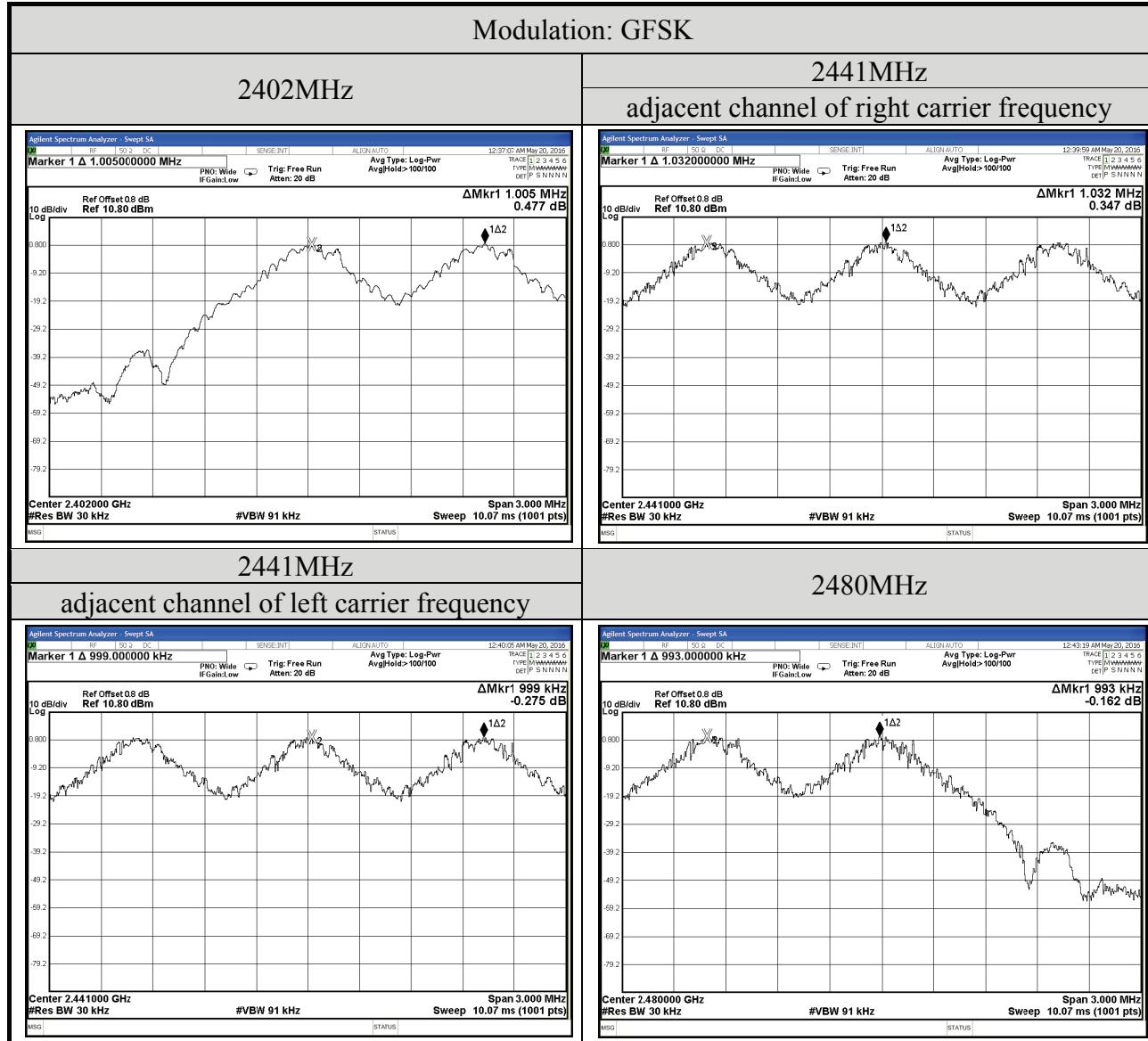
### A.1.2 Measurement Plots

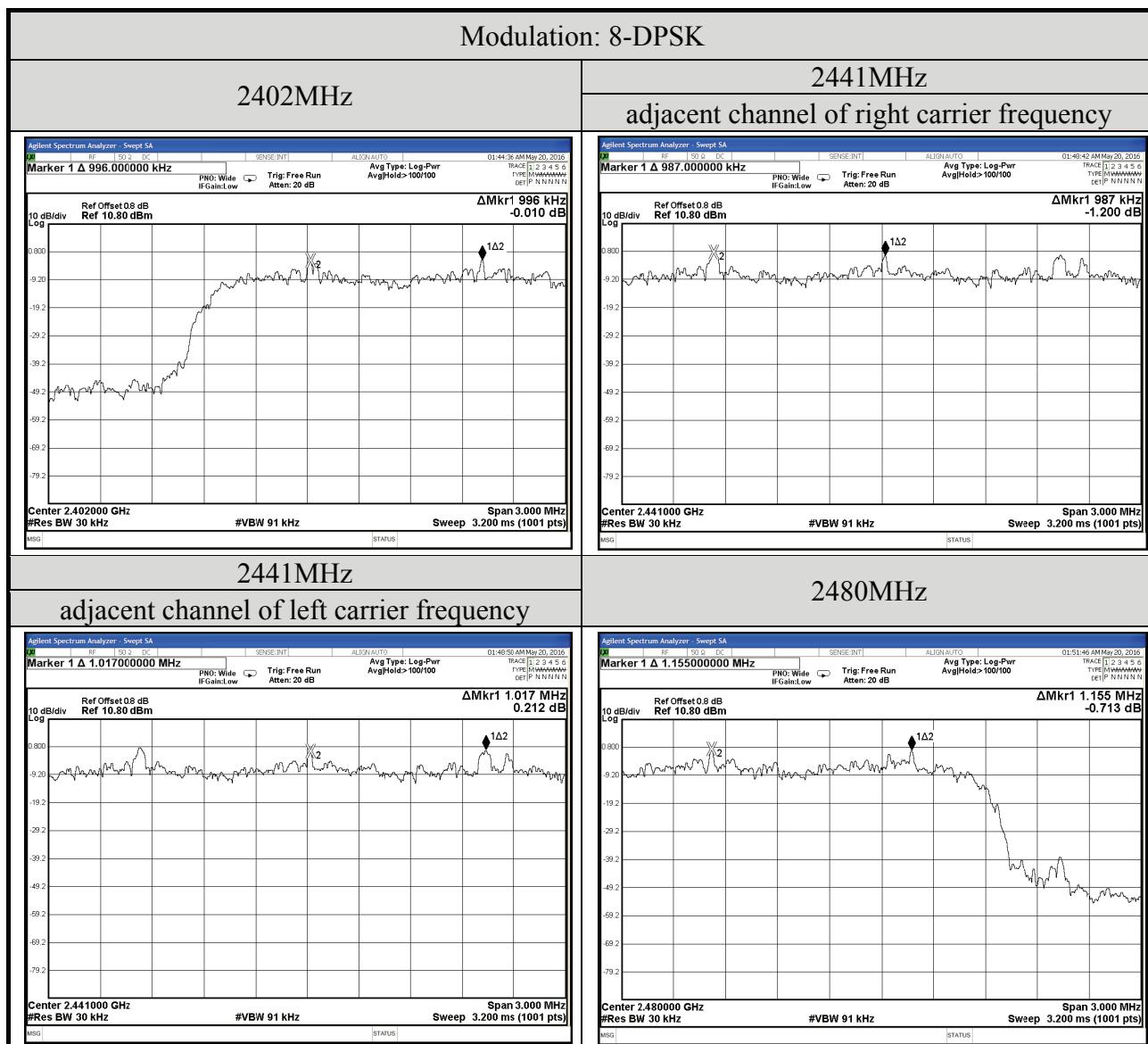


## A.2 CARRIER FREQUENCY SEPARATION MEASUREMENT

Test Date	2016/05/20	Temp./Hum.	25°C /58%
Cable Loss	0.8dB	Test Voltage	AC 120V, 60Hz

### A.2.1 Measurement Plots





## A.3 TIME OF OCCUPANCY MEASUREMENT

Test Date	2016/05/20	Temp./Hum.	25°C/58%
Cable Loss	0.8dB	Test Voltage	AC 120V, 60Hz

### A.3.1 Time of Occupancy

Modulation	Centre Frequency (MHz)	Mode	Time of Occupancy (ms)	Maximum accumulated Time of Occupancy (ms)	Limit (ms)
GFSK	2402	DH1	0.375	118.500	<400
		DH3	1.625	308.100	<400
		DH5	2.870	362.768	<400
	2441	DH1	0.381	120.396	<400
		DH3	1.635	206.664	<400
		DH5	2.885	364.664	<400
	2480	DH1	0.378	119.448	<400
		DH3	1.635	309.996	<400
		DH5	2.885	273.498	<400

Observation Period: 79 channels\*0.4 seconds = 31.6 seconds

#### Centre Frequency: 2402MHz

DH1: For each second of 10 channel appearance, the longest time of occupancy for each of 31.6 seconds is:

$$10 \text{ channels} * 31.6 \text{ seconds} * 0.375 \text{ ms} = 118.500 \text{ ms}$$

DH3: For each second of 6 channel appearance, the longest time of occupancy for each of 31.6 seconds is:

$$6 \text{ channels} * 31.6 \text{ seconds} * 1.625 \text{ ms} = 308.100 \text{ ms}$$

DH5: For each second of 4 channel appearance, the longest time of occupancy for each of 31.6 seconds is:

$$4 \text{ channels} * 31.6 \text{ seconds} * 2.870 \text{ ms} = 362.768 \text{ ms}$$

**Centre Frequency: 2441MHz**

DH1: For each second of 10 channel appearance, the longest time of occupancy for each of 31.6 seconds is:

$$10 \text{ channels} * 31.6 \text{ seconds} * 0.381 \text{ ms} = 120.396 \text{ ms}$$

DH3: For each second of 4 channel appearance, the longest time of occupancy for each of 31.6 seconds is:

$$4 \text{ channels} * 31.6 \text{ seconds} * 1.635 \text{ ms} = 206.664 \text{ ms}$$

DH5: For each second of 4 channel appearance, the longest time of occupancy for each of 31.6 seconds is:

$$4 \text{ channels} * 31.6 \text{ seconds} * 2.885 \text{ ms} = 364.664 \text{ ms}$$

**Centre Frequency: 2480MHz**

DH1: For each second of 10 channel appearance, the longest time of occupancy for each of 31.6 seconds is:

$$10 \text{ channels} * 31.6 \text{ seconds} * 0.378 \text{ ms} = 119.448 \text{ ms}$$

DH3: For each second of 6 channel appearance, the longest time of occupancy for each of 31.6 seconds is:

$$6 \text{ channels} * 31.6 \text{ seconds} * 1.635 \text{ ms} = 309.996 \text{ ms}$$

DH5: For each second of 3 channel appearance, the longest time of occupancy for each of 31.6 seconds is:

$$3 \text{ channels} * 31.6 \text{ seconds} * 2.885 \text{ ms} = 273.498 \text{ ms}$$

Modulation	Centre Frequency (MHz)	Mode	Time of Occupancy (ms)	Maximum accumulated Time of Occupancy (ms)	Limit (ms)
8-DPSK	2402	3DH1	0.384	121.344	<400
		3DH3	1.625	205.400	<400
		3DH5	2.878	363.779	<400
	2441	3DH1	0.381	120.396	<400
		3DH3	1.630	309.048	<400
		3DH5	2.863	361.883	<400
	2480	3DH1	0.384	121.344	<400
		3DH3	1.625	256.750	<400
		3DH5	2.878	363.779	<400

Observation Period: 79 channels\*0.4 seconds = 31.6 seconds

### **Centre Frequency: 2402MHz**

3DH1: For each second of 10 channel appearance, the longest time of occupancy for each of 31.6 seconds is:

$$10 \text{ channels} * 31.6 \text{ seconds} * 0.384 \text{ ms} = 121.344 \text{ ms}$$

3DH3: For each second of 4 channel appearance, the longest time of occupancy for each of 31.6 seconds is:

$$4 \text{ channels} * 31.6 \text{ seconds} * 1.625 \text{ ms} = 205.400 \text{ ms}$$

3DH5: For each second of 4 channel appearance, the longest time of occupancy for each of 31.6 seconds is:

$$4 \text{ channels} * 31.6 \text{ seconds} * 2.878 \text{ ms} = 363.779 \text{ ms}$$

**Centre Frequency: 2441MHz**

3DH1: For each second of 10 channel appearance, the longest time of occupancy for each of 31.6 seconds is:

**10** channels\*31.6 seconds\*      **0.381** ms= **120.396** ms

3DH3: For each second of 6 channel appearance, the longest time of occupancy for each of 31.6 seconds is:

**6** channels\*31.6 seconds\*      **1.630** ms= **309.048** ms

3DH5: For each second of 4 channel appearance, the longest time of occupancy for each of 31.6 seconds is:

**4** channels\*31.6 seconds\*      **2.863** ms= **361.883** ms

**Centre Frequency: 2480MHz**

3DH1: For each second of 10 channel appearance, the longest time of occupancy for each of 31.6 seconds is:

**10** channels\*31.6 seconds\*      **0.384** ms= **121.344** ms

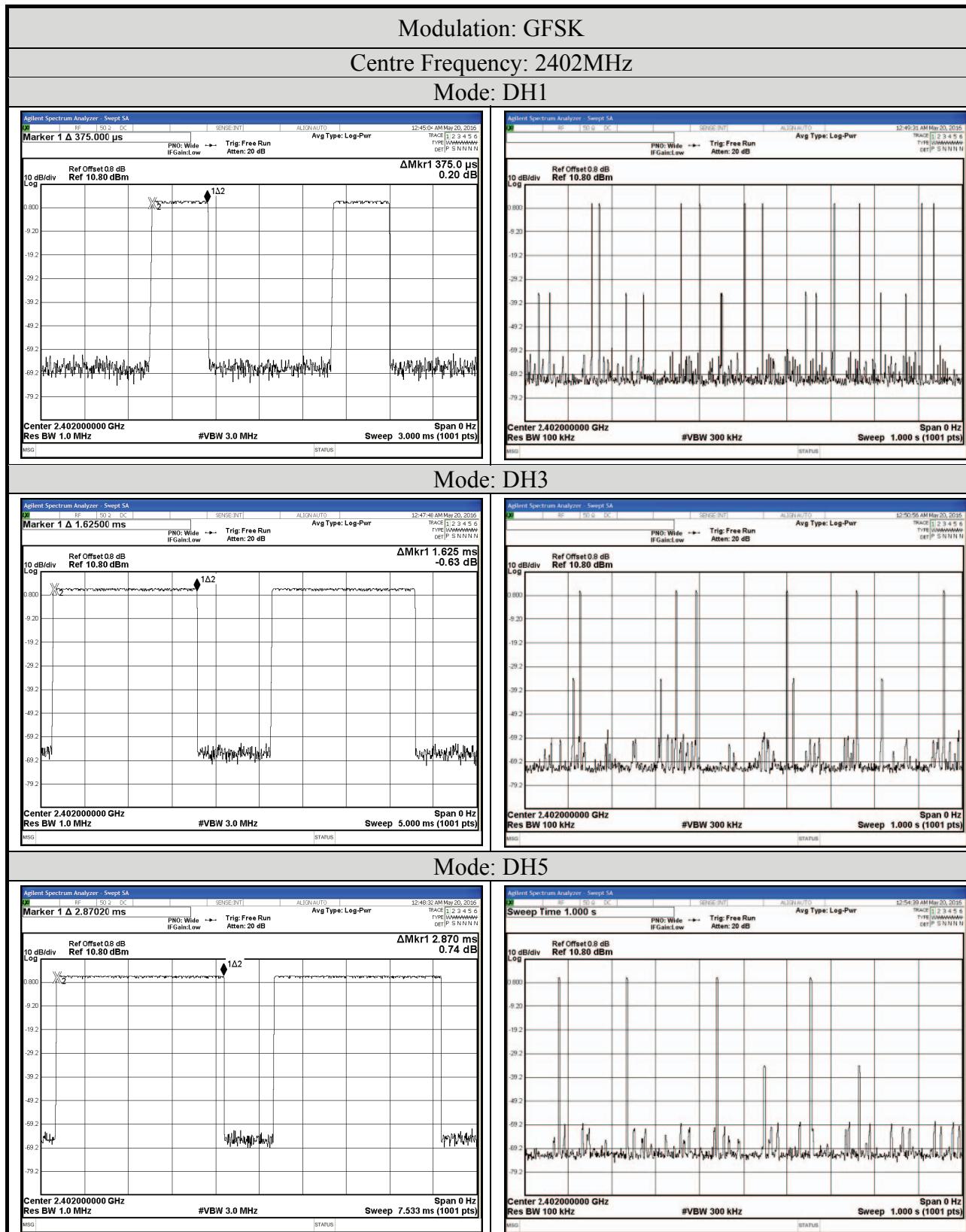
3DH3: For each second of 5 channel appearance, the longest time of occupancy for each of 31.6 seconds is:

**5** channels\*31.6 seconds\*      **1.625** ms= **256.750** ms

3DH5: For each second of 4 channel appearance, the longest time of occupancy for each of 31.6 seconds is:

**4** channels\*31.6 seconds\*      **2.878** ms= **363.779** ms

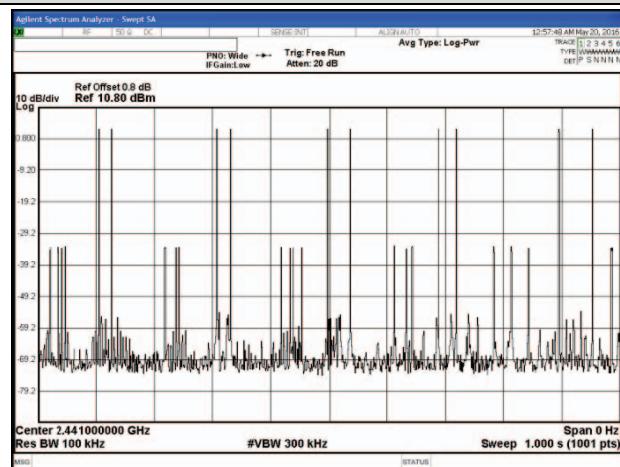
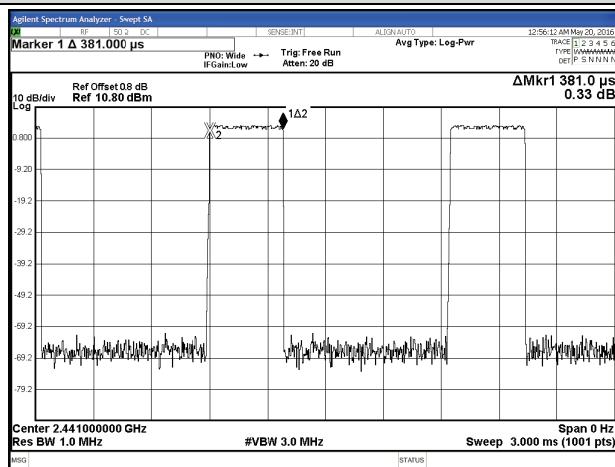
### A.3.2 Measurement Plots



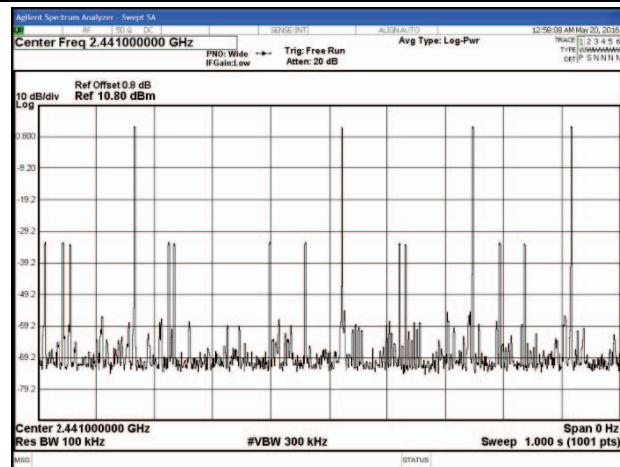
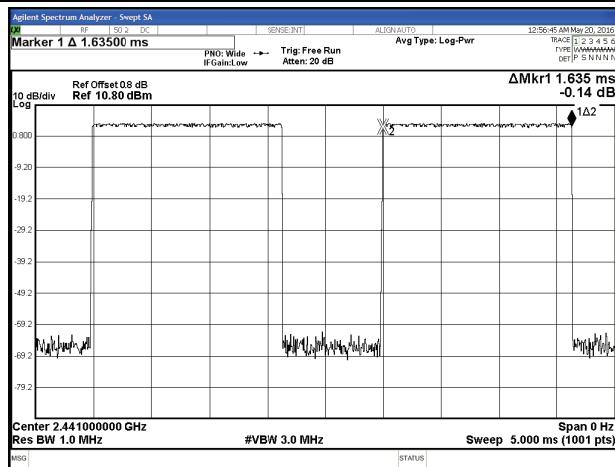
### Modulation: GFSK

Centre Frequency: 2441MHz

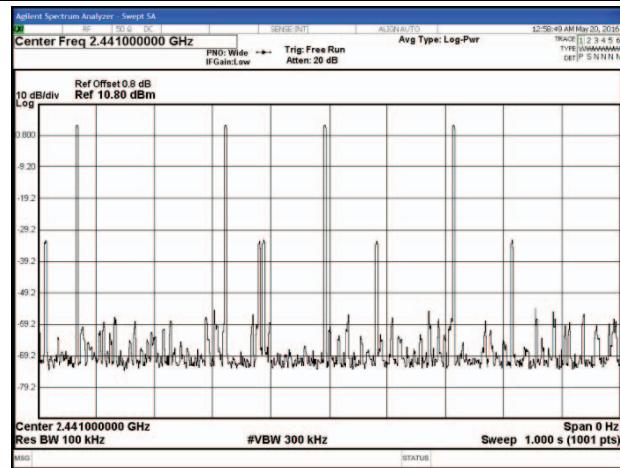
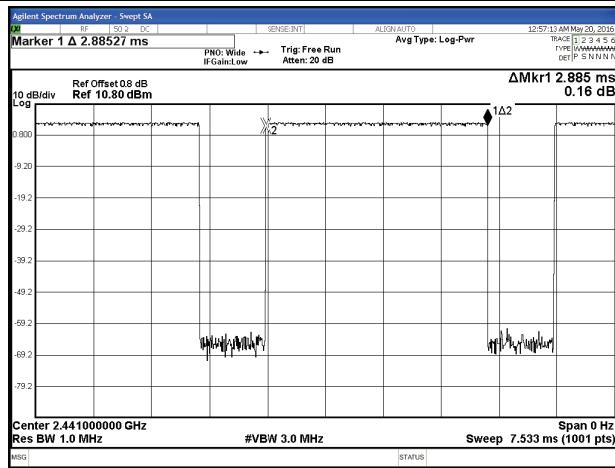
Mode: DH1



Mode: DH3



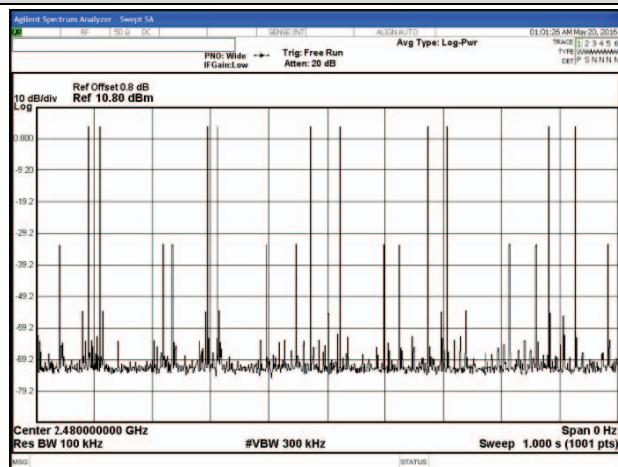
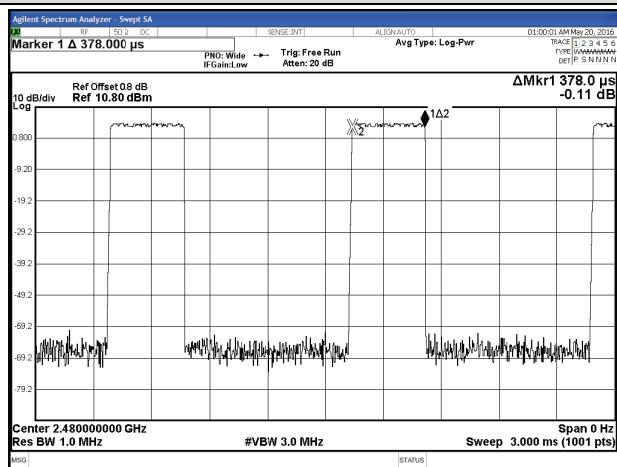
Mode: DH5



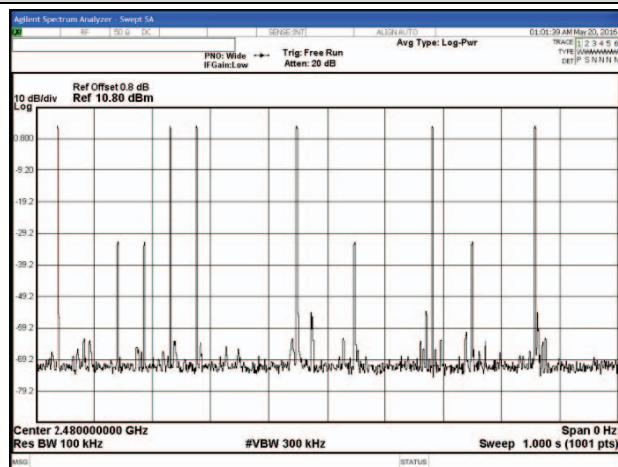
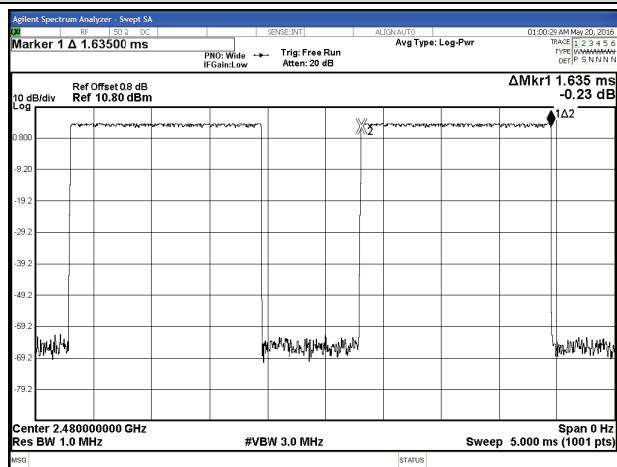
### Modulation: GFSK

Centre Frequency: 2480MHz

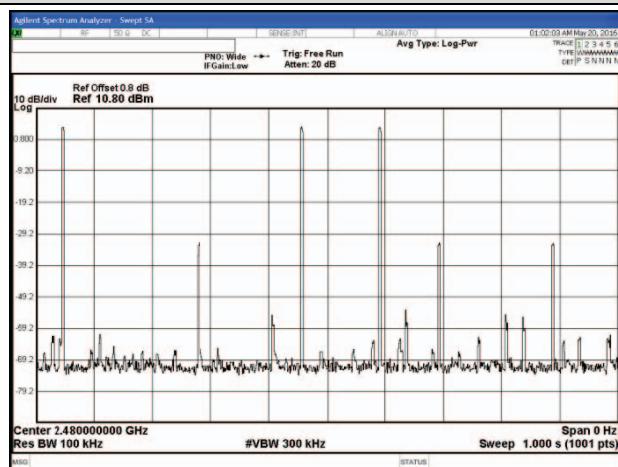
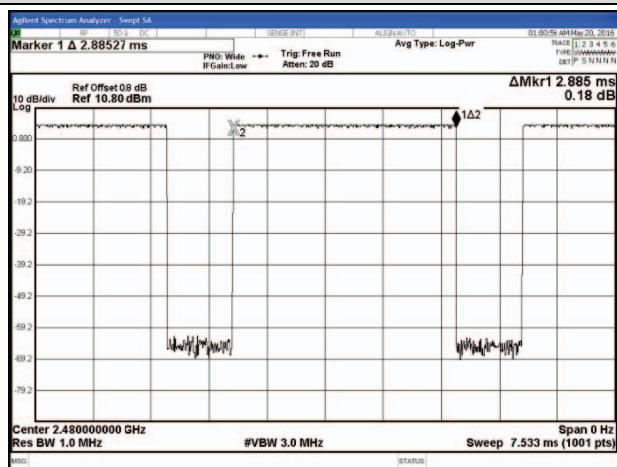
Mode: DH1



Mode: DH3



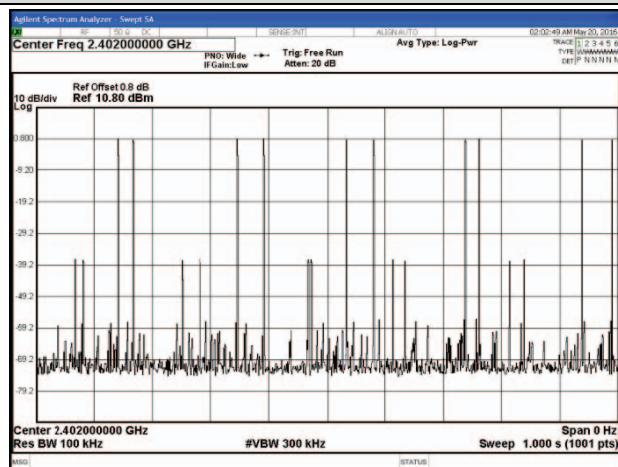
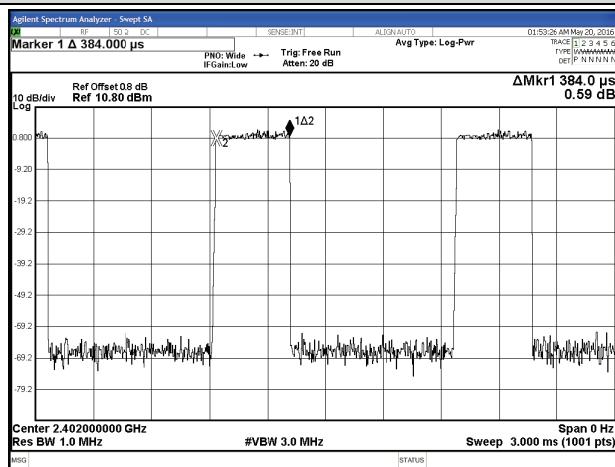
Mode: DH5



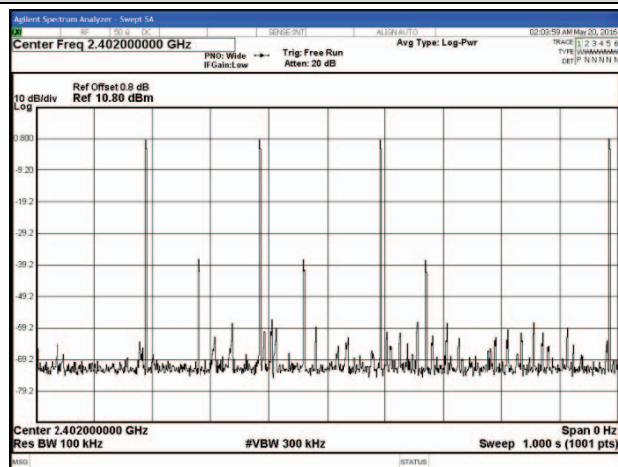
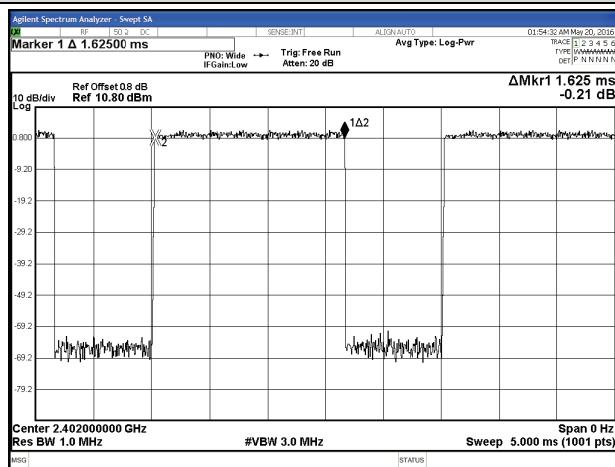
Modulation: 8-DPSK

Centre Frequency: 2402MHz

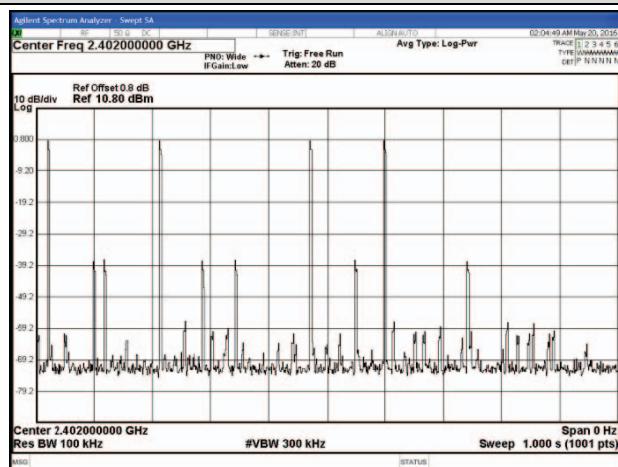
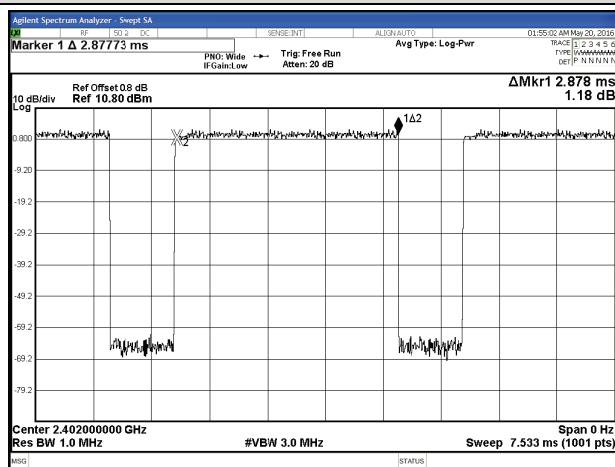
Mode: 3DH1



Mode: 3DH3



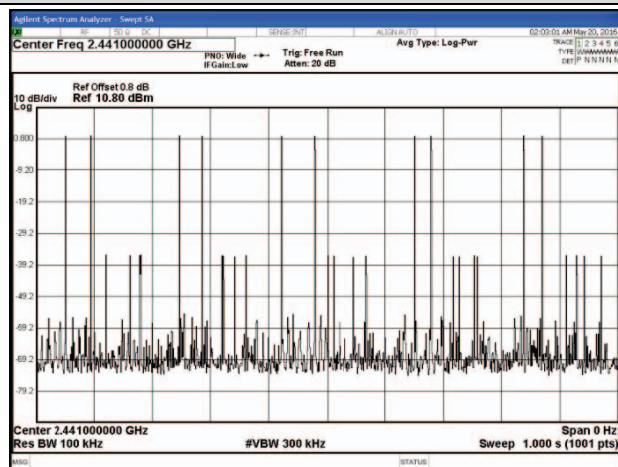
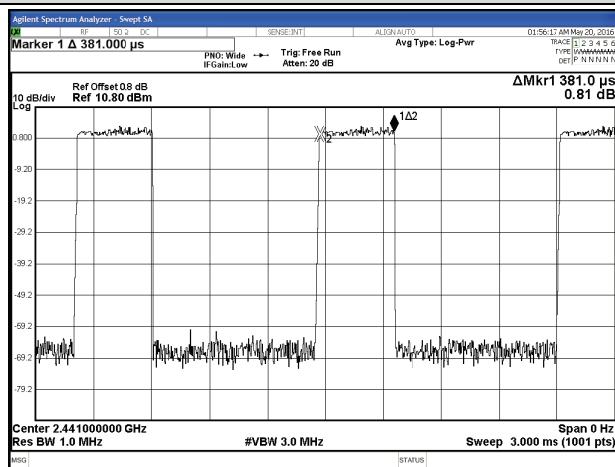
Mode: 3DH5



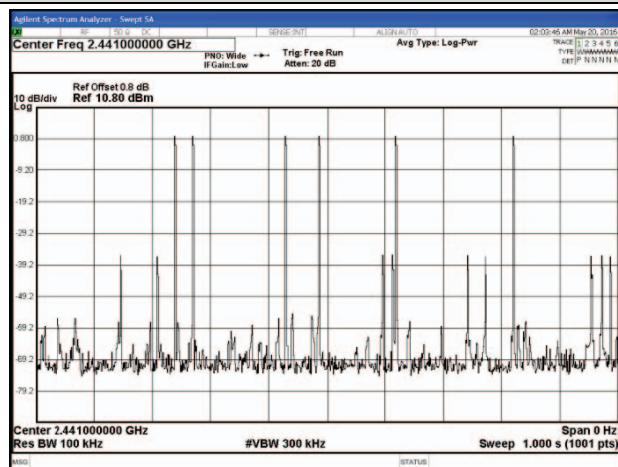
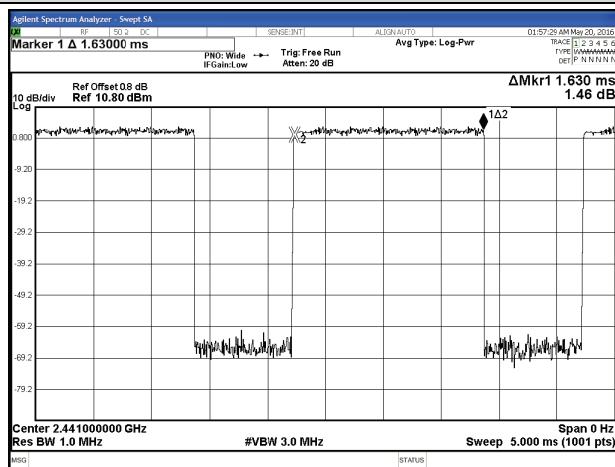
Modulation: 8-DPSK

Centre Frequency: 2441MHz

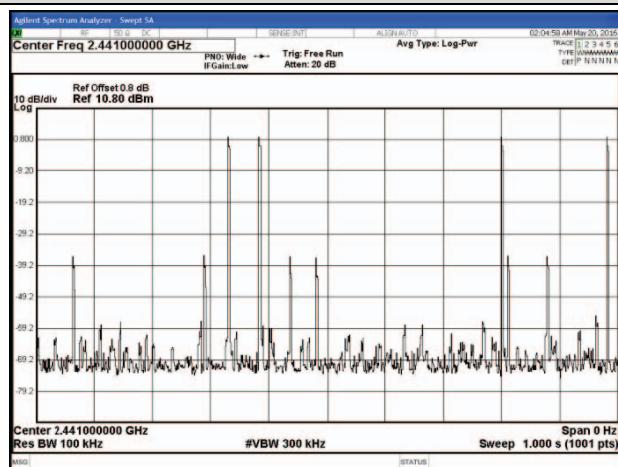
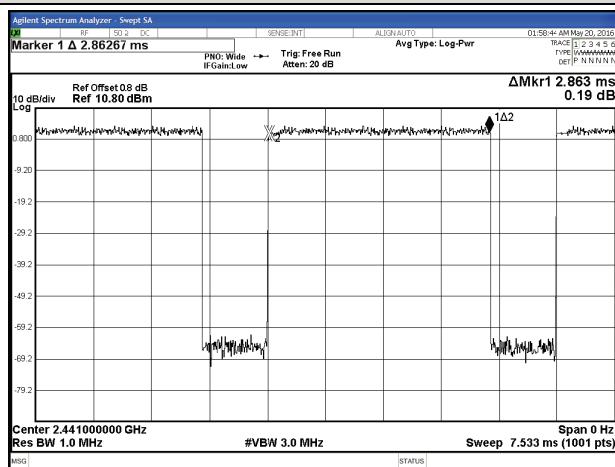
Mode: 3DH1



Mode: 3DH3



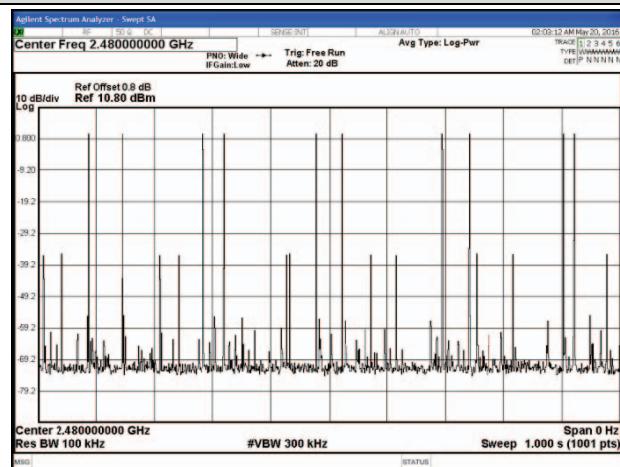
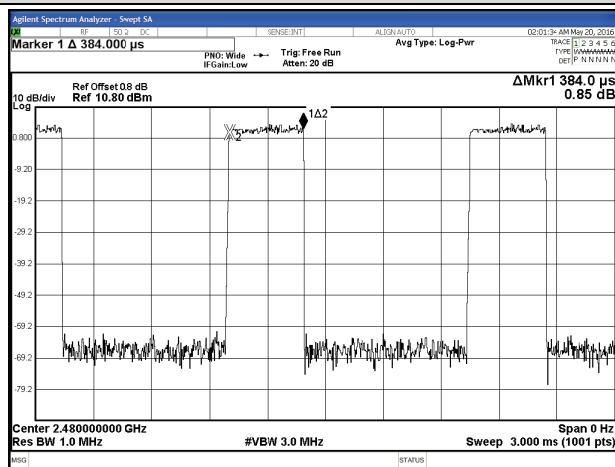
Mode: 3DH5



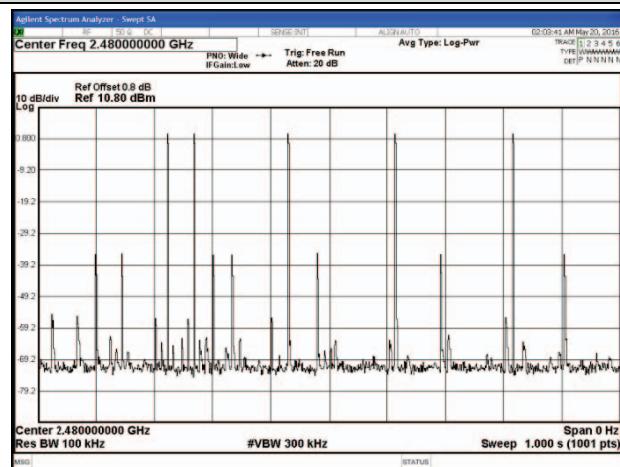
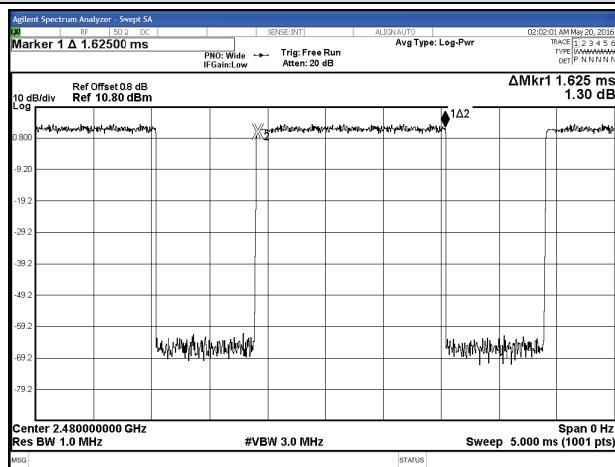
**Modulation: 8-DPSK**

**Centre Frequency: 2480MHz**

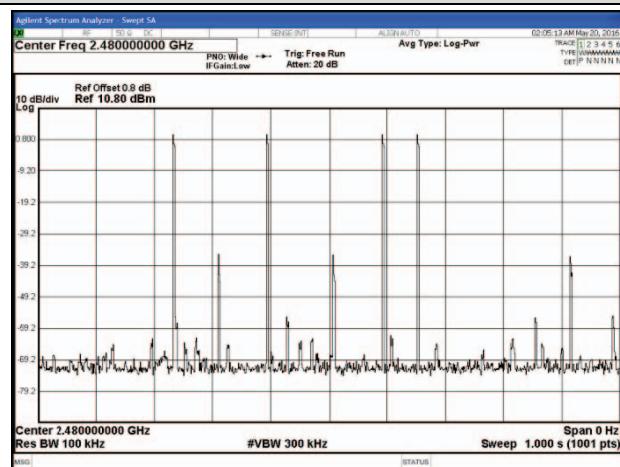
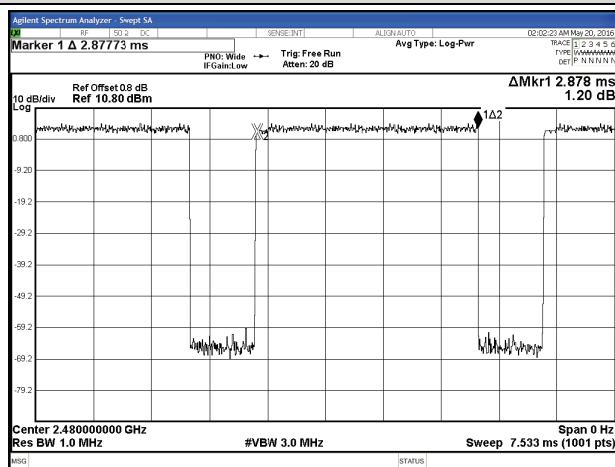
**Mode: 3DH1**



**Mode: 3DH3**



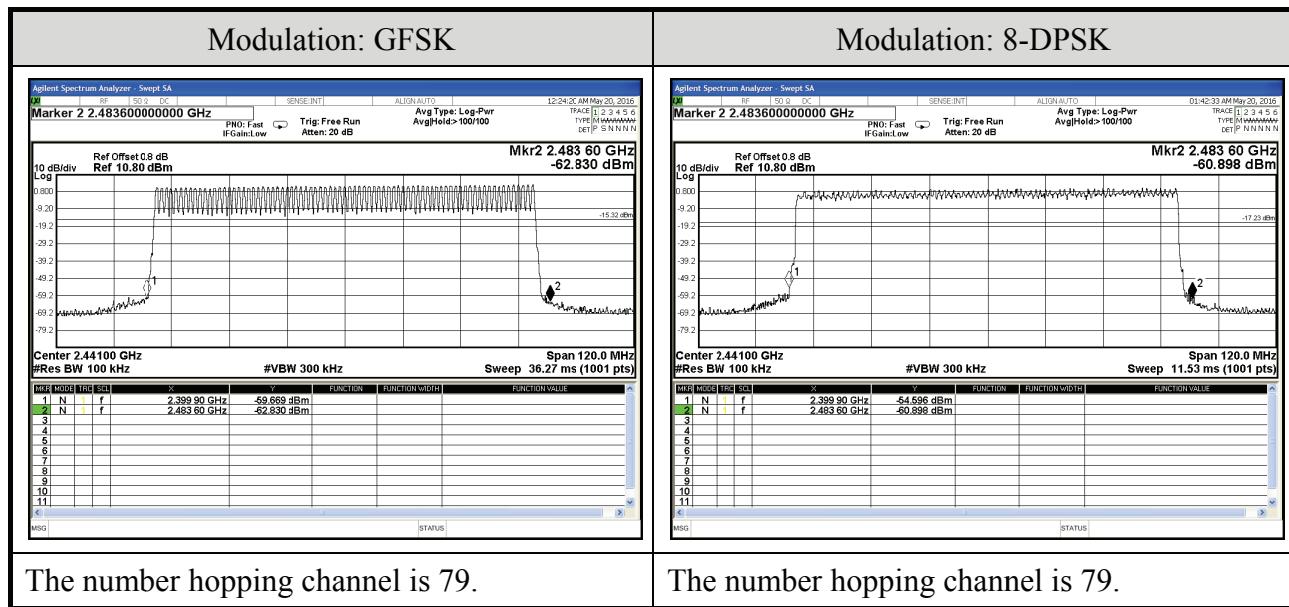
**Mode: 3DH5**



## A.4 NUMBER OF HOPPING CHANNELS MEASUREMENT

Test Date	2016/05/20	Temp./Hum.	25°C/58%
Cable Loss	0.8dB	Test Voltage	AC 120V, 60Hz

### A.4.1 Measurement Plots



## A.5 MAXIMUM PEAK OUTPUT POWER MEASUREMENT

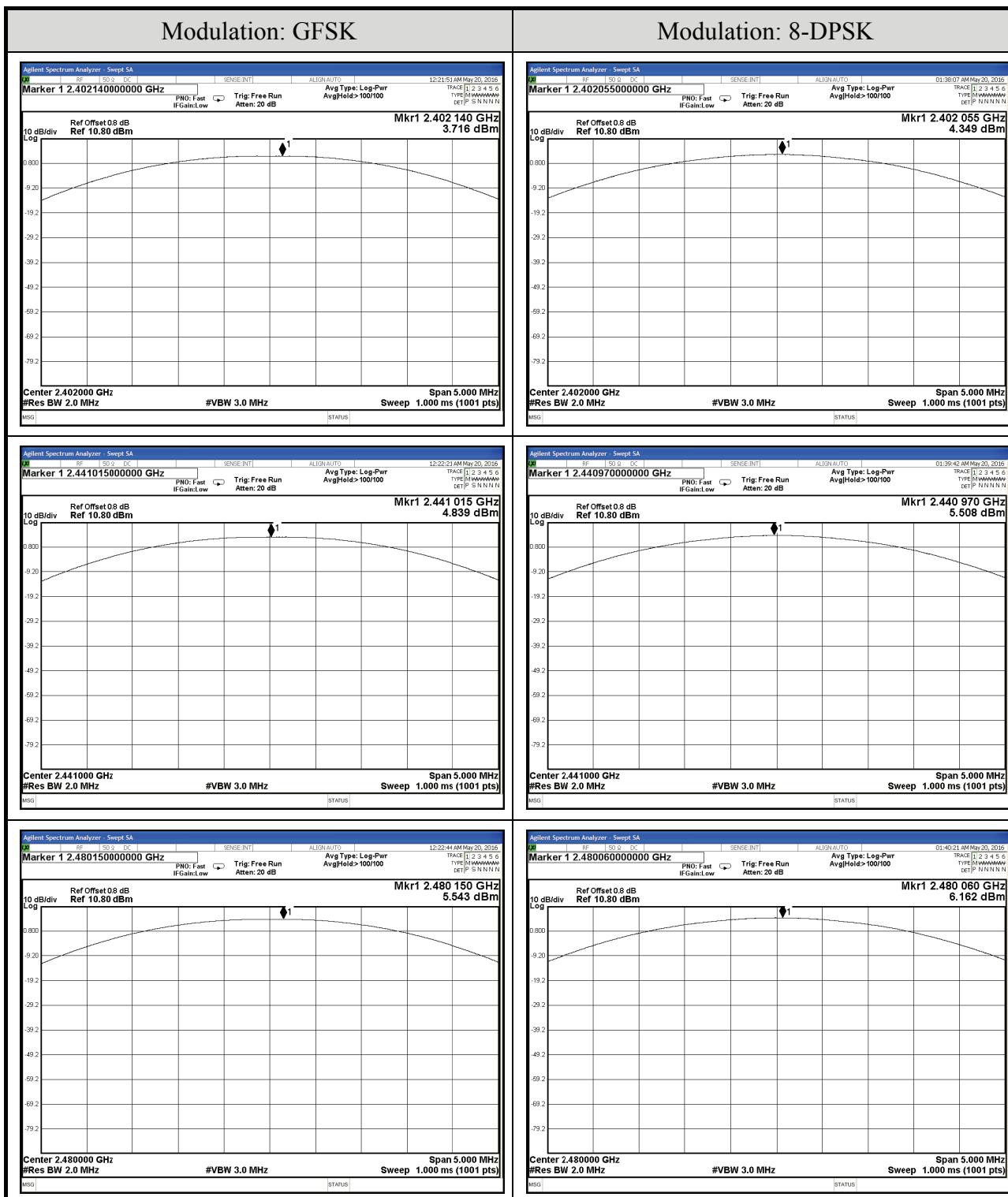
Test Date	2016/05/20	Temp./Hum.	25°C/58%
Cable Loss	0.7dB	Test Voltage	AC 120V, 60Hz

### A.5.1 Output Power

Modulation	Centre Frequency (MHz)	Peak Output Power		Limit
		dBm	W	
GFSK	2402	3.716	0.002353	21dBm (0.125W)
	2441	4.839	0.003047	
	2480	5.543	0.003583	

Modulation	Centre Frequency (MHz)	Peak Output Power		Limit
		dBm	W	
8-DPSK	2402	4.349	0.002722	21dBm (0.125W)
	2441	5.508	0.003555	
	2480	6.162	0.004132	

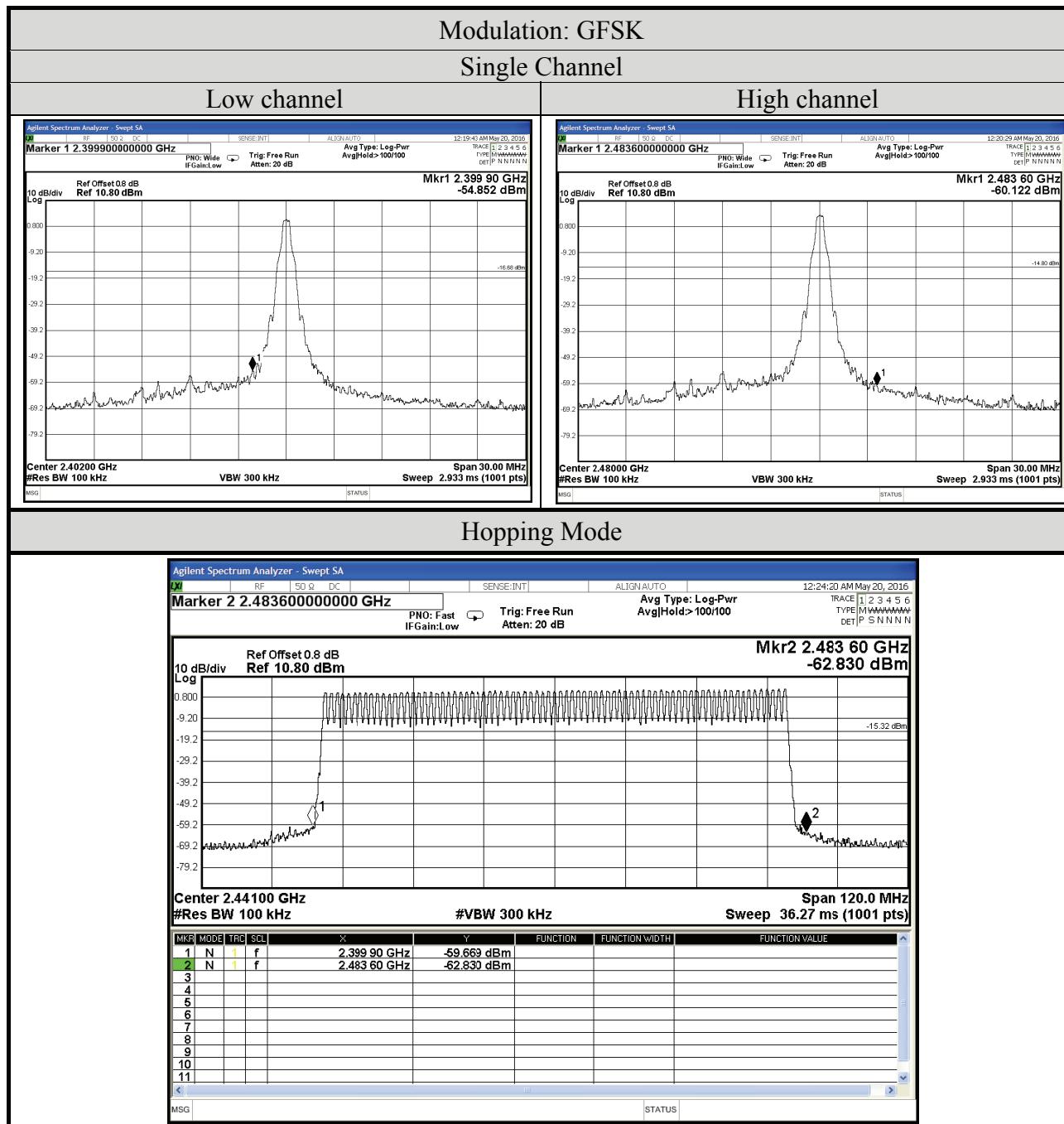
### A.5.2 Measurement Plots

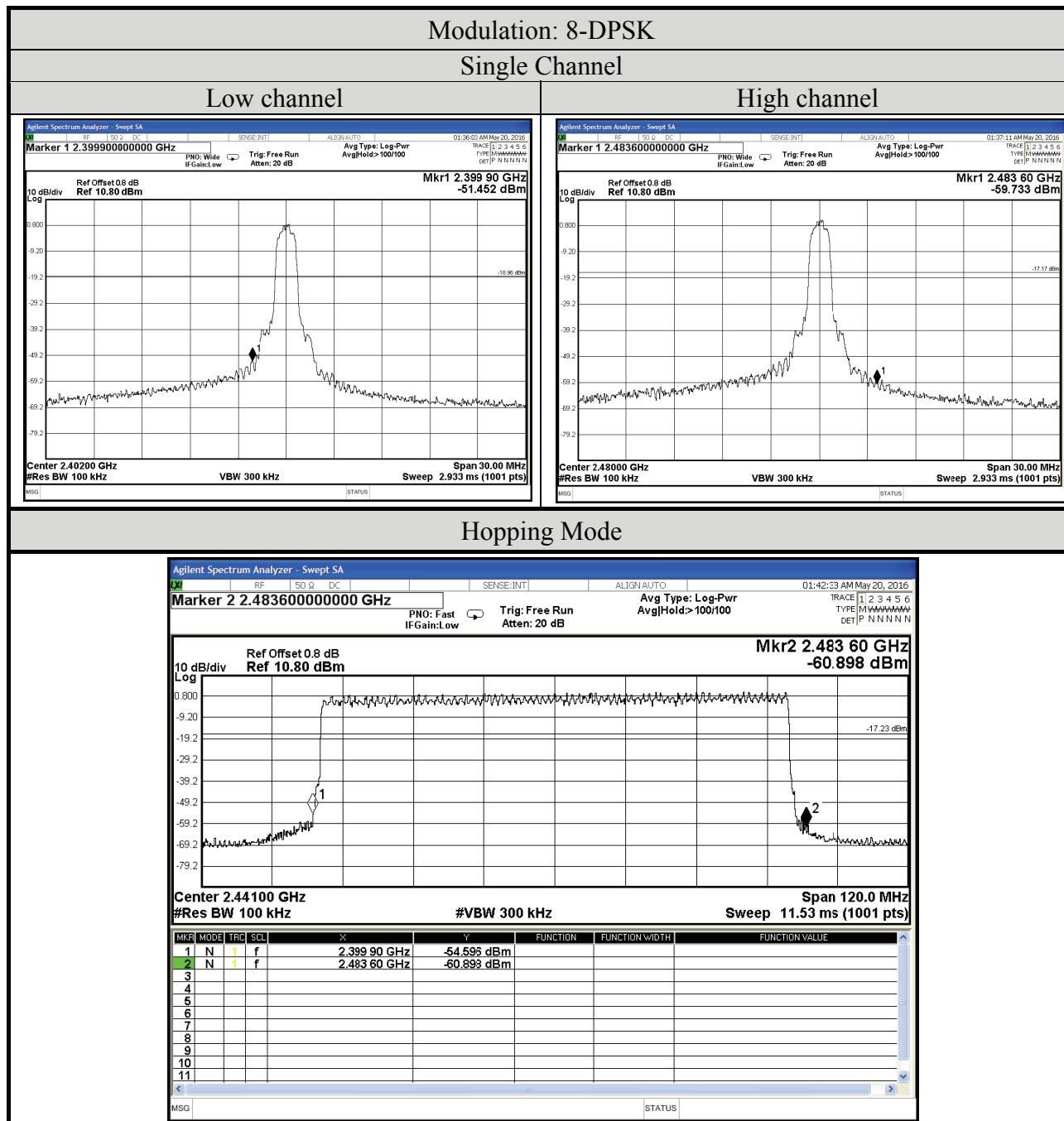


## A.6 EMISSION LIMITATIONS MEASUREMENT

### A.6.1 Band Edge

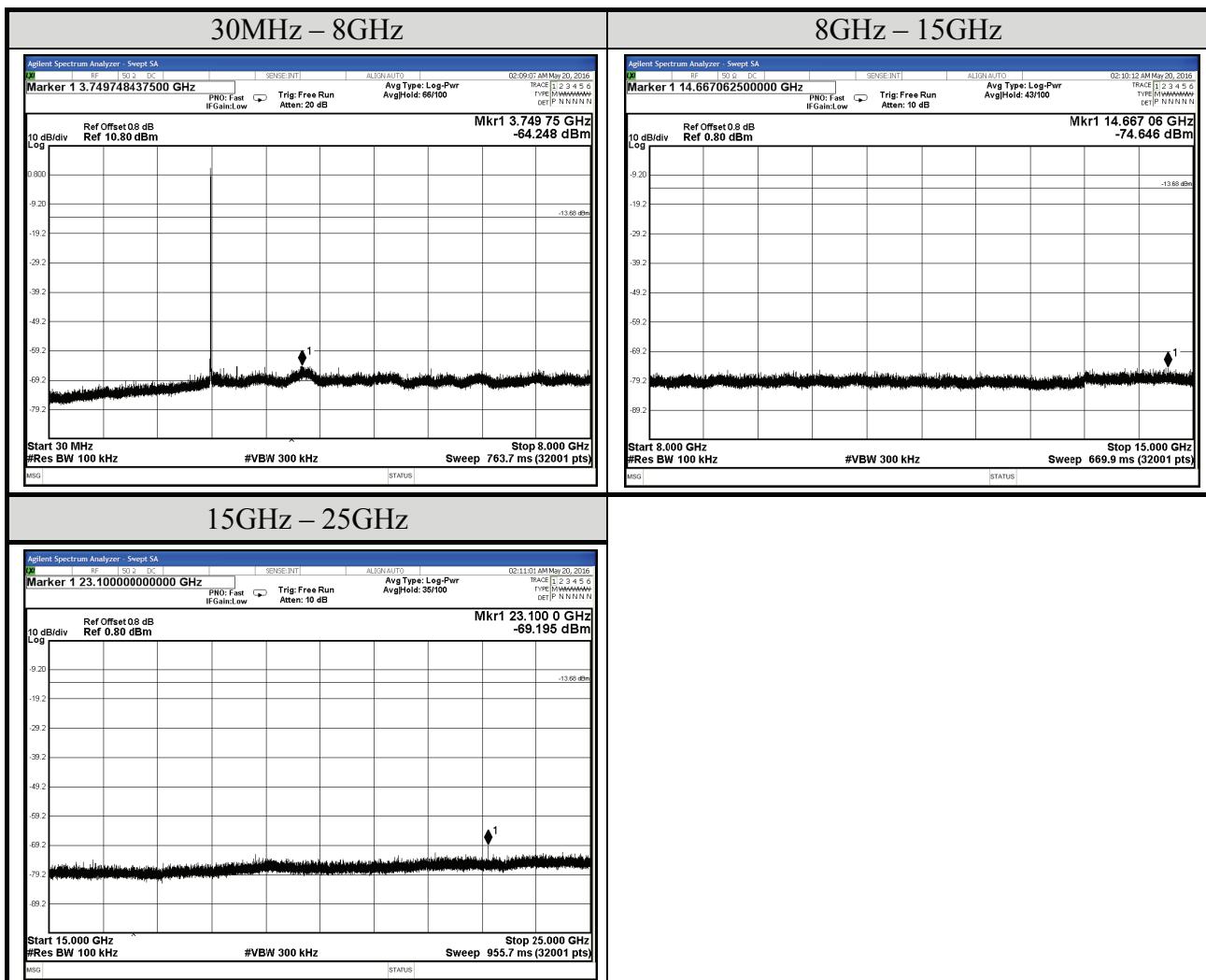
Test Date	2016/05/20	Temp./Hum.	25°C/58%
Cable Loss	0.8dB	Test Voltage	AC 120V, 60Hz





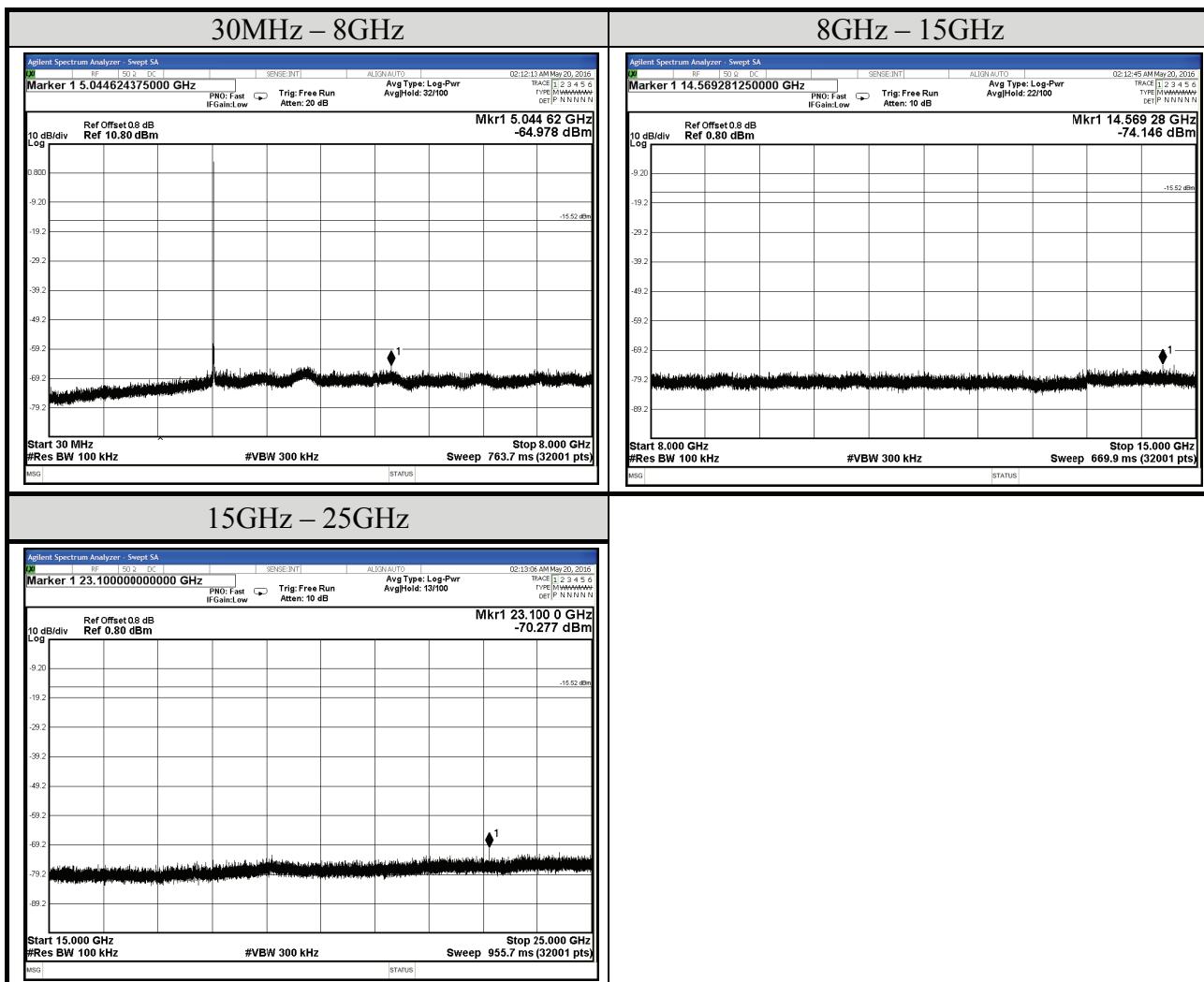
### A.6.2 Spurious Emission

Test Date	2016/05/20	Temp./Hum.	25°C /58%
Modulation	GFSK	Frequency	2402MHz
Cable Loss	0.8dB	Test Voltage	AC 120V, 60Hz



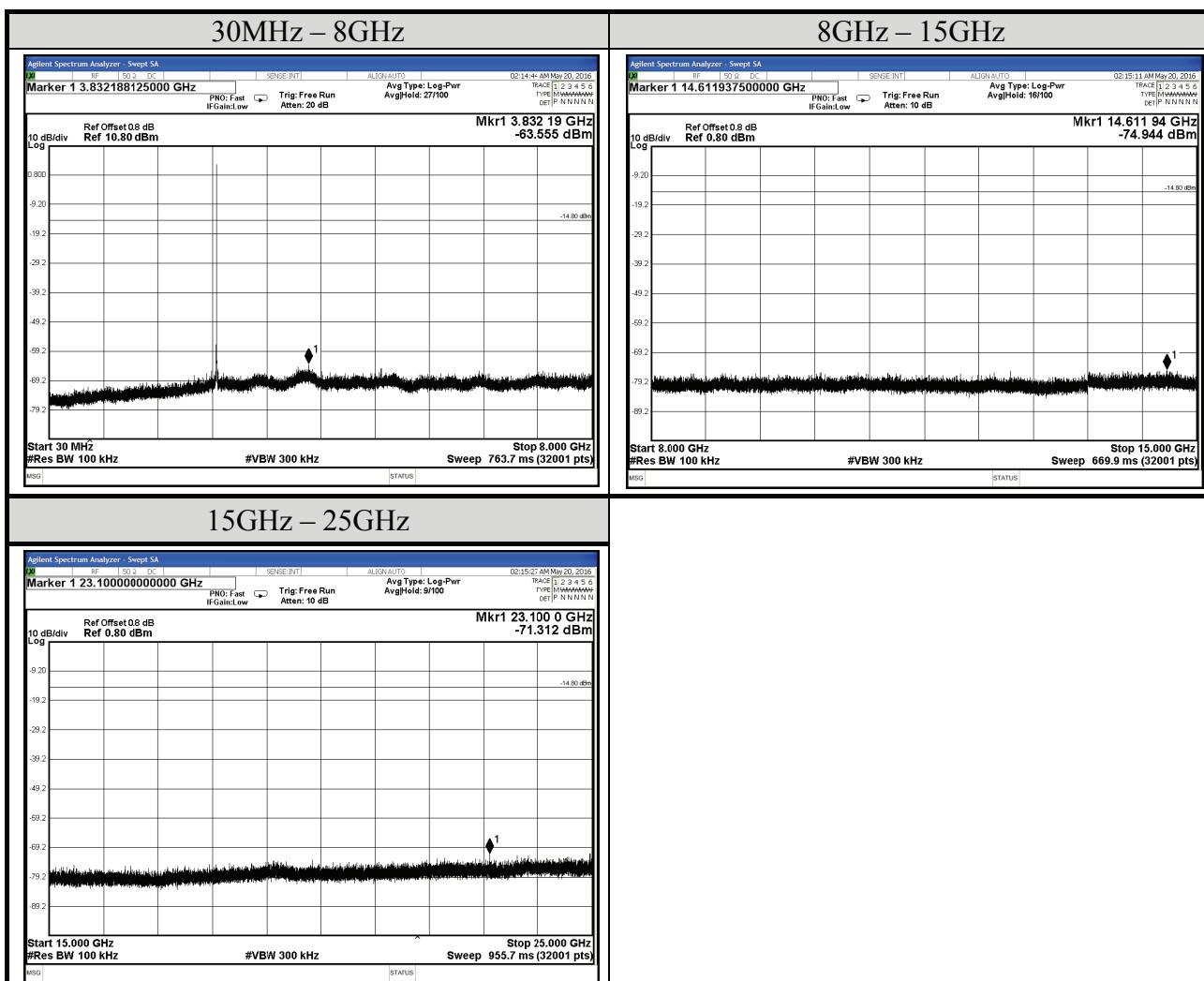
Note: All results have been included cable loss.

Test Date	2016/05/20	Temp./Hum.	25°C /58%
Modulation	GFSK	Frequency	2441MHz
Cable Loss	0.8dB	Test Voltage	AC 120V, 60Hz



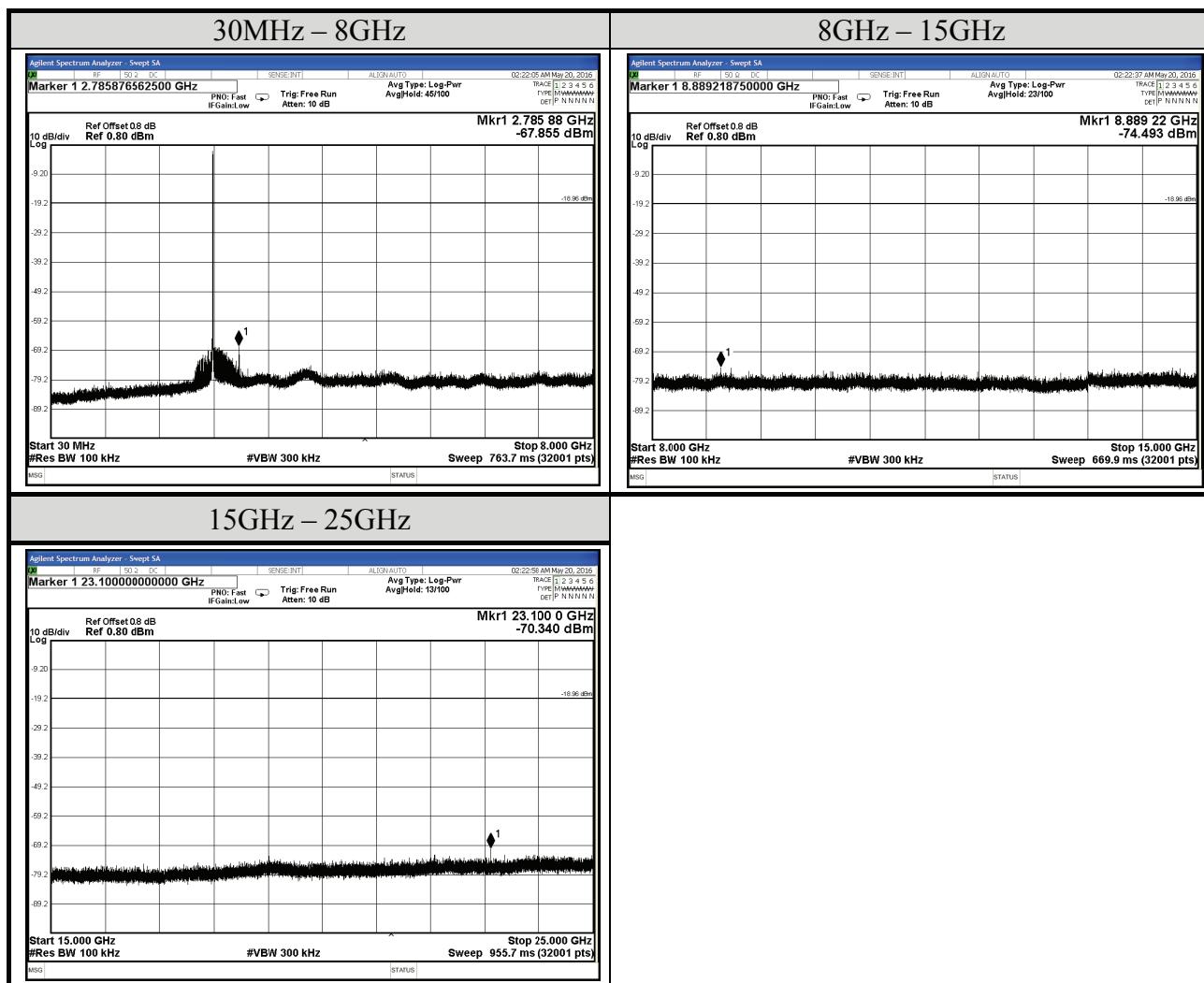
Note: All results have been included cable loss.

Test Date	2016/05/20	Temp./Hum.	25°C /58%
Modulation	GFSK	Frequency	2480MHz
Cable Loss	0.8dB	Test Voltage	AC 120V, 60Hz



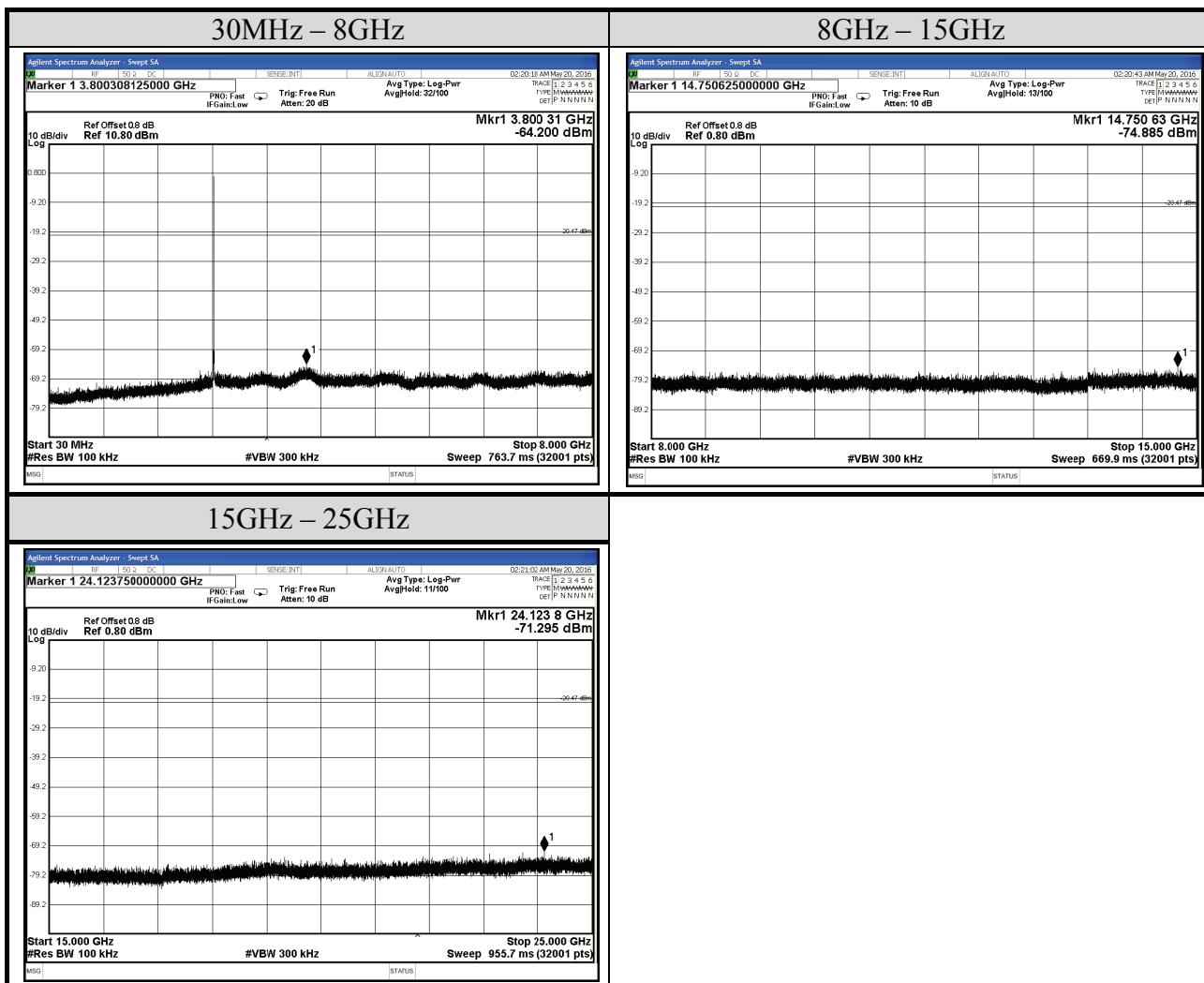
Note: All results have been included cable loss.

Test Date	2016/05/20	Temp./Hum.	25°C/58%
Modulation	8-DPSK	Frequency	2402MHz
Cable Loss	0.8dB	Test Voltage	AC 120V, 60Hz



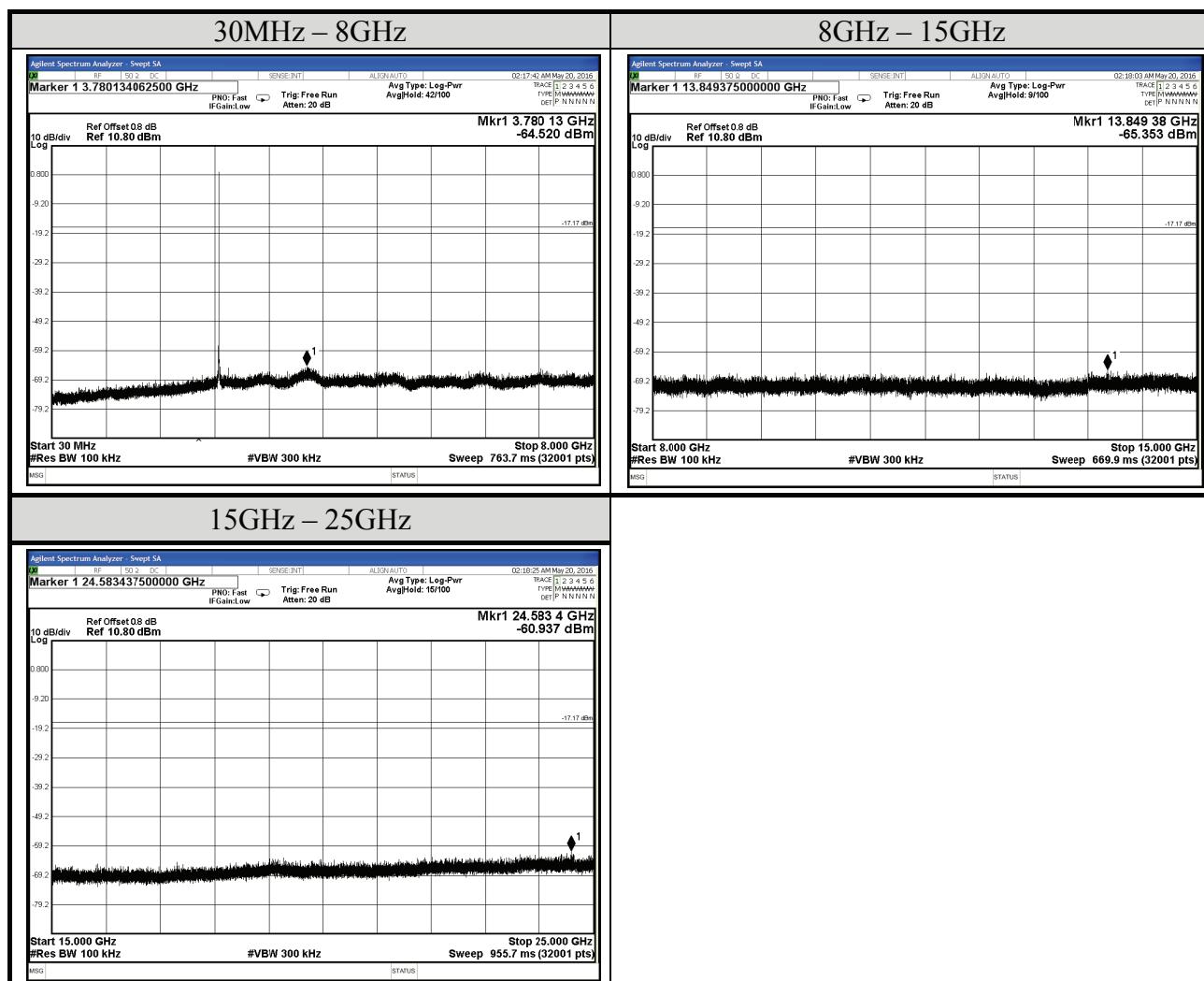
Note: All results have been included cable loss.

Test Date	2016/05/20	Temp./Hum.	25°C /58%
Modulation	8-DPSK	Frequency	2441MHz
Cable Loss	0.8dB	Test Voltage	AC 120V, 60Hz



Note: All results have been included cable loss.

Test Date	2016/05/20	Temp./Hum.	25°C /58%
Modulation	8-DPSK	Frequency	2480MHz
Cable Loss	0.8dB	Test Voltage	AC 120V, 60Hz



Note: All results have been included cable loss.