

**FCC 15.247& RSS-247
2.4 GHz Report**

for

LG Electronics Inc.

**222 LG-ro Jinwi-myeon 451-713
Pyeongtaek-si, Gyeonggi-do 451-713, Korea**

Brand : LG
Product Name : Notebook Computer
Model Name : 13Z970
FCC ID : BEJNT-13Z970
IC : 2703H-13Z970

**Prepared by: : AUDIX Technology Corporation,
EMC Department**



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APPENDIX A TEST PLOTS

APPENDIX B TEST PHOTOGRAPHS

TEST REPORT CERTIFICATION

Applicant : LG Electronics Inc.
Factory : LG Electronics Nanjing New Technology Co., Ltd.
Product Name : Notebook Computer
Model No. : 13Z970
Serial No. : N/A
Brand : LG
Power Supply : DC 19V

Applicable Standards:

47 CFR FCC Part 15 Subpart C:2016

RSS-Gen (Issue 4), November 2014

RSS-247 (Issue 1), May 2015

ANSI C63.10:2013

FCC Public Notice DA 00-705

AUDIX Technology Corp. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

AUDIX Technology Corp. does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens and samples.

Date of Test: 2016. 11. 07 ~ 24

Date of Report: 2016. 11. 24

Producer: Sabrina Wang
(Sabrina Wang/Administrator)

Signatory: Ben Cheng
(Ben Cheng/Manager)

1. REPORT HISTORY

Revision	Date	Revision Summary	Report Number
0	2016. 11. 24	Original Report.	EM-F160760

2. SUMMARY OF TEST RESULTS

Rule		Description	Results
FCC	IC		
15.207	RSS-Gen §8.8	Conducted Emission	PASS
15.247(d)/ 15.205	RSS-Gen §8.9 RSS-247 §5.5	Radiated Band Edge and Radiated Spurious Emission	PASS
15.247(a)(1)	RSS-247 §5.1(2)	20dB Bandwidth	PASS
15.247(a)(1)	RSS-247 §5.1(2)	Carrier Frequency Separation	PASS
15.247(a)(1)(iii)	RSS-247 §5.1(4)	Time of Occupancy	PASS
15.247(a)(1)(iii)	RSS-247 §5.1(4)	Number of Hopping Channels	PASS
15.247(b)(1)	RSS-247 §5.1(2)	Maximum Peak Output Power	PASS
15.247(d)	RSS-247 §5.5	Conducted Band Edges and Conducted Spurious Emission	PASS
15.203	---	Antenna Requirement	PASS

3. GENERAL INFORMATION

3.1. Description of EUT

Product	Notebook Computer													
Model Number	13Z970													
Serial Number	N/A													
Brand	LG													
Applicant	LG Electronics Inc. 222 LG-ro Jinwi-myeon 451-713 Pyeongtaek-si,Gyeonggi-do 451-713, Korea													
Factory	LG Electronics Nanjing New Technology Co., Ltd. No.346,Yaoxin Road, Economic & Technical Development Zone, Nanjing, China.													
RF Features	WLAN:802.11b/g/n Bluetooth: BT and BLE													
Transmit Type	<table><tr><th colspan="2">2.4 GHz</th></tr><tr><td>802.11b</td><td>1T1R</td></tr><tr><td>802.11g</td><td>1T1R</td></tr><tr><td>802.11n-HT20</td><td>2T2R</td></tr><tr><td>802.11n-HT40</td><td>2T2R</td></tr><tr><td>BT/BLE</td><td>1T1R</td></tr></table>		2.4 GHz		802.11b	1T1R	802.11g	1T1R	802.11n-HT20	2T2R	802.11n-HT40	2T2R	BT/BLE	1T1R
	2.4 GHz													
	802.11b	1T1R												
	802.11g	1T1R												
	802.11n-HT20	2T2R												
	802.11n-HT40	2T2R												
	BT/BLE	1T1R												
	<table><tr><th colspan="2">UNII Bands</th></tr><tr><td>802.11a</td><td>1T1R</td></tr><tr><td>802.11n-HT20/ 802.11ac-VHT20</td><td>2T2R</td></tr><tr><td>802.11n-HT40/ 802.11ac-VHT40</td><td>2T2R</td></tr><tr><td>802.11ac-VHT80</td><td>2T2R</td></tr></table>		UNII Bands		802.11a	1T1R	802.11n-HT20/ 802.11ac-VHT20	2T2R	802.11n-HT40/ 802.11ac-VHT40	2T2R	802.11ac-VHT80	2T2R		
	UNII Bands													
	802.11a	1T1R												
	802.11n-HT20/ 802.11ac-VHT20	2T2R												
	802.11n-HT40/ 802.11ac-VHT40	2T2R												
	802.11ac-VHT80	2T2R												
Date of Receipt of Sample	2016. 11. 07													

3.2. List of Key Components of EUT

Item	Vendor	Model name	Description
System	Microsoft	Windows 10	---
Main Board	LGIT	13/14/15Z970 Main	LGIT
	E&E	13/14/15Z970 Main	E&E
CPU (Socket: BGA1356)	Intel	i7-7500U	2.70GHz, up to 2.90GHz
	Intel	i5-7200U	2.50GHz, up to 2.71GHz
Memory	SAMSUNG	M471A1K43BB0-CPB	8GB DDR4 2133MHz
	SK hynix	HMA81GS6AFR8N-TF	8GB DDR4 2133MHz
LCD Panel	LG Display	LP133WF5-SPC1	Resolution: 1920 x 1080, 60Hz HDMI: 4K; (Including touch)
	LG Display	LP133WF4-SPC1	(Non touch)
Storage	SAMSUNG	MZ-NLN512A (P/N: MZNLN512HMJP)	512GB
	SK hynix	HFS512G39MND-3510A (P/N: HFS512G39MND)	512GB
Web Camera	Namuga	LC121 / LC119	1.00M/HD
WLAN Combo Card	Intel	8265D2W	802.11a/b/g/n/ac 2.4GHz/5GHz + BT 4.2 BLE FCC ID: PD98265D2 IC: 1000M-8265D2
Wireless LAN Antenna	LG (INPAQ)	WA-F-LBLB-04-047	FPCB Type Main: Black, Aux: Gray
Wireless LAN Board	HANNSTAR	13Z970 WLAN SUB	---
	E&E	13Z970 WLAN SUB	
HDMI Board	HANNSTAR	13Z970 HDMI SUB	---
	E&E	13Z970 HDMI SUB	
Keyboard	LG	13Z970 KR HMB8150ELB13	---
Touch Pad	LG	EBD62827901 FA167D-16H0	---
	LG	EBD61685203 SA167D-26H5	---
Type C to LAN	LG	10/100 Megabit Ethernet	---
	Type C to LAN: Shielded, Undetached, 0.12m		

Item	Vendor	Model name	Description
Battery Pack	LG	LBR1223E	60.06Wh, DC7.7V, 7800mAh
	LG	LBP7221E	34.61Wh, DC7.7V, 4495mAh
AC Adapter	LG (Lien Chang)	LCAP25B	I/P: AC 100-240V, 50-60Hz, 1.0A, O/P: DC 19V, 2.1A
	DC Power Cord: Non-Shielded, Undetached, 1.5m, Bonded a ferrite core AC Power Cord: Non-Shielded, Detached, 1.5m (2C)		

Remark: For a more detailed features description, please refer to the manufacturer's specifications or the user manual.

3.3. Antenna Information

2.4G Antenna					
No.	Antenna Part Number	Manufacture	Antenna Type	Frequency (MHz)	Max Gain (dBi)
1	WA-F-LBLB-04-047 (Main)	INPAQ	FPCB	2400	0.76
				2450	2.31
				2500	3.26
2	WA-F-LBLB-04-047 (AUX)			2400	2.64
				2450	2.22
				2500	2.37

5G Antenna					
No.	Antenna Part Number	Manufacture	Antenna Type	Frequency (MHz)	Max Gain (dBi)
1	WA-F-LBLB-04-047 (Main)	INPAQ	FPCB	5100	1.49
				5400	2.74
				5800	2.48
2	WA-F-LBLB-04-047 (AUX)			5100	2.98
				5400	1.98
				5800	4.76

3.4. EUT Specifications Assessed in Current Report

Mode	Fundamental Range (MHz)	Channel Number	Modulation	Data Rate (Mbps)
Bluetooth	2402-2480	79	FHSS (GFSK, $\pi/4$ DQPSK, 8-DPSK)	1/2/3

Channel List					
Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457
02	2404	29	2431	56	2458
03	2405	30	2432	57	2459
04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454		
26	2428	53	2455		

3.5. Test Configuration

Mode	Duty Cycle (x)	T (ms)	Duty Cycle Factor (dB)
Bluetooth	N/A	2.90	N/A

AC Conduction	
Test Case	Normal operation

Item		Modulation	Data Rate	Test Channel
Radiated Test Case	Radiated Band Edge ^{Note1}	GFSK	1Mbps	00/78
		8DPSK	3Mbps	00/78
	Radiated Spurious Emission ^{Note1}	GFSK	1Mbps	00/39/78
Conducted Test Case ^{Note2}	20dB Bandwidth	GFSK	1Mbps	00/39/78
		8-DPSK	3Mbps	00/39/78
	Carrier Frequency Separation	GFSK	1Mbps	00/39/78
		8-DPSK	3Mbps	00/39/78
	Time of Occupancy	GFSK	1Mbps	00/39/78
		8-DPSK	3Mbps	00/39/78
	Number of Hopping Channels	GFSK	1Mbps	39
		8-DPSK	3Mbps	39
	Maximum Peak Output Power	GFSK	1Mbps	00/39/78
		8-DPSK	3Mbps	00/39/78
	Band Edges	GFSK	1Mbps	00/78
		8-DPSK	3Mbps	00/78
	Spurious Emission	GFSK	1Mbps	00/39/78
		8-DPSK	3Mbps	00/39/78

Note 1:

☒ Mobile Device

☐ Portable Device, and 3 axis were assessed. The worst scenario for Radiated Spurious Emission as follow:

- ☐ Lie
- ☐ Side
- ☐ Stand

Note 2: We performed testing of the highest and lowest data rate.

3.6. Tested Supporting System List

3.6.1. Support Peripheral Unit

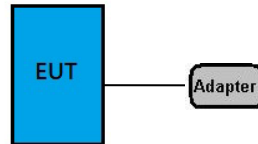
No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	SD Card	ADATA	N/A	N/A	N/A
2.	Earphone	APPLE	N/A	N/A	N/A
3.	LCD Monitor	VIEWSONIC	VP2780-4K	U8K153600277	N/A
4.	External HDD	SONY	HD-E1	3GDL0T155151 A12	N/A
5.	USB Mouse	DELL	MS111-T	CN-0KW2YH-7 1616-282-0XYP	N/A
6.	Earphone	HTC	Max300	N/A	N/A
7.	USB Mouse	ASUS	N6-mimi	N/A	N/A
8.	LCD TV	LG	22LK330-DB	N/A	N/A
9.	USB Storage	Transcend	N/A	N/A	N/A

3.6.2. Cable Lists

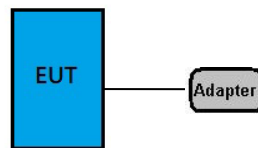
No.	Cable Description Of The Above Support Units
1.	N/A
2.	Earphone Cable: Unshielded, Detachable, 0.9m
3.	HDMI Cable: Shielded, Detachable, 1.8m
4.	USB Cable: Shielded, Detachable, 0.5m
5.	USB Cable: Shielded, Detachable, 1.8m
6.	Earphone Cable: Unshielded, Detachable, 1.5m
7.	USB Cable: Shielded, Detachable, 1.5m
8.	Power Cord: Shielded, Detachable, 1.5m HDMI Cable: Shielded, Detachable, 1.5m
9.	N/A

3.7. Setup Configuration

3.7.1. EUT Configuration for Power Line and Radiated Emission



3.7.2. EUT Configuration for Conducted Test Items



3.8. Operating Condition of EUT

Test program “DRTU” is used for enabling EUT RF function under continues transmitting and choosing data rate / channel.

3.9. Description of Test Facility

Test Firm Name	:	AUDIX Technology Corporation EMC Department No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan
Test Location & Facility	:	No. 7 Shielded Room No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan Semi-Anechoic Chamber No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan IC Test Site Registration No.: 5183B-1 Renewal on September 17, 2014 Fully Anechoic Chamber No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan IC Test Site Registration No.: 5183B-4 Renewal on August 31, 2015
NVLAP Lab. Code	:	200077-0
TAF Accreditation No	:	1724
FCC OET Designation	:	TW1004 & TW1090

3.10.Measurement Uncertainty

Test Item	Frequency Range	Uncertainty
Conduction Test	150kHz~30MHz	±3.5dB
Radiation Test (Distance: 3m)	30MHz~1000MHz	± 3.68dB
	Above 1GHz	± 5.82dB

Remark : Uncertainty = $k_{uc}(y)$

Test Item	Uncertainty
20dB Bandwidth	±0.2kHz
Carrier Frequency Separation	±0.2kHz
Time of Occupancy	±0.03sec
Maximum peak Output power	± 0.52dB
Conducted Emission Limitations	± 0.13dB

4. MEASUREMENT EQUIPMENT LIST

4.1. Conducted Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Test Receiver	R&S	ESCI	101276	2016. 03. 31	1 Year
2.	A.M.N.	R&S	ESH2-Z5	100366	2016. 07. 27	1 Year
3.	L.I.S.N.	Kyoritsu	KNW-407	8-1539-3	2016. 01. 21	1 Year
4.	Pulse Limiter	R&S	ESH3-Z2	101495	2016. 01. 17	1 Year
5.	Test Software	Audix	e3	V.120619C	N.C.R.	N.C.R.

4.2. Radiated Emission Measurement

4.2.1. Frequency Range 9kHz~1000MHz (Semi-Anechoic Chamber)

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2016. 09. 19	1 Year
2.	Test Receiver	R & S	ESCS30	100338	2016. 06. 22	1 Year
3.	Amplifier	HP	8447D	2944A06305	2016. 02. 23	1 Year
4.	Bilog Antenna	CHASE	CBL6112D	33821	2016. 01. 30	1 Year
5.	Loop Antenna	R&S	HFH2-Z2	891847/27	2015. 12. 24	1 Year
6.	Test Software	Audix	e3	V.120619C	N.C.R.	N.C.R.

4.2.2. Frequency Range Above 1GHz (Fully Anechoic Chamber)

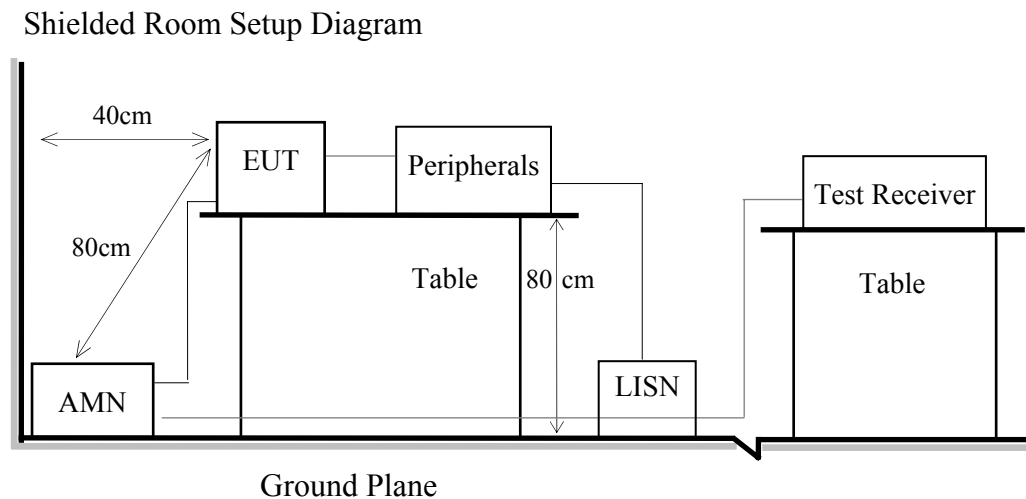
Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	E4446A	US44300366	2016. 08. 19	1 Year
2.	Amplifier	Sonoma	310N	187161	2016. 06. 14	1 Year
3.	2.4GHz Notch Filter	K&L	7NSL10-2441.5E130.5-00	1	2016. 07. 27	1 Year
4.	Horn Antenna	ETS-Lindgren	3117	00135902	2016. 03. 05	1 Year
5.	Horn Antenna	EMCO	3116	2653	2016. 10. 24	1 Year
6.	Test Software	Audix	e3	V.6.110601	N.C.R.	N.C.R.

4.3. RF Conducted Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9030A-526	MY53310269	2015. 11. 28	1 Year

5. CONDUCTED EMISSION MEASUREMENT

5.1. Block Diagram of Test Setup



5.2. Power Line Conducted Emission Limit

Frequency	Conducted Limit	
	Quasi-Peak Level	Average Level
150kHz ~ 500kHz	66 ~ 56 dB μ V	56 ~ 46 dB μ V
500kHz ~ 5MHz	56 dB μ V	46 dB μ V
5MHz ~ 30MHz	60 dB μ V	50 dB μ V

Remark 1.: If the average limit is met when using a Quasi-Peak detector, the measurement using the average detector is not required.

2.: The lower limit applies to the band edges.

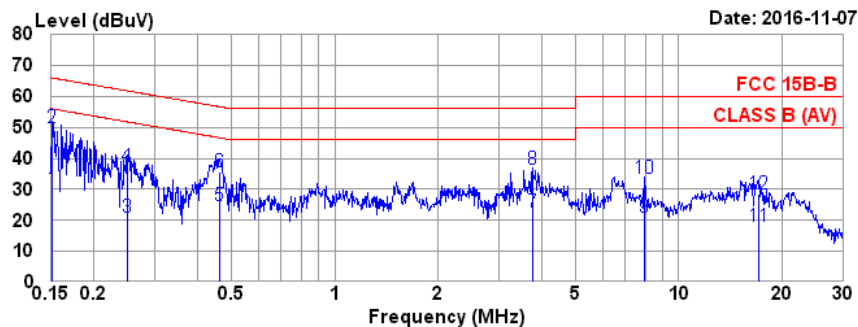
5.3. Test Procedure

- 5.3.1. To set up the EUT as indicated in ANSI C 63.10. The EUT was placed on the table which has 80 cm height to the ground and 40 cm distance to the conducting wall.
- 5.3.2. Power supplier of the EUT was connected to the AC mains through an Artificial Mains Network (A.M.N.).
- 5.3.3. The AC power supplies to all peripheral devices must be provided through line impedance stabilization network (L.I.S.N.)
- 5.3.4. Checking frequency range from 150 kHz to 30 MHz and record the emission which does not have 20 dB below limit.

5.4. Conducted Emission Measurement Results

PASSED.

Test Date	2016/11/07	Temp./Hum.	24°C/53%
Test Voltage	AC 120V, 60Hz (via AC Adapter)		



Site no. : No.7 Shielded Room Data no. : 2
Condition : ESH2-Z5 366(ADAPTER) Phase : NEUTRAL
Limit : FCC 15B-B
Env. / Ins. : 24°C / 53% ESCI (1276) Engineer : Nick Du
EUT : 13Z970
Power Rating : 120Vac/60Hz
Test Mode : Operating

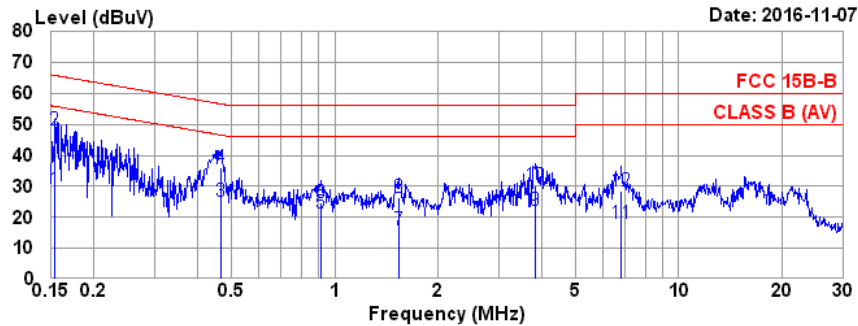
	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.151	0.19	0.03	9.85	20.16	30.23	55.96	25.73	Average
2	0.151	0.19	0.03	9.85	39.99	50.06	65.96	15.90	QP
3	0.251	0.18	0.04	9.85	10.95	21.02	51.73	30.71	Average
4	0.251	0.18	0.04	9.85	27.40	37.47	61.73	24.26	QP
5	0.464	0.19	0.04	9.85	14.83	24.91	46.63	21.72	Average
6	0.464	0.19	0.04	9.85	25.59	35.67	56.63	20.96	QP
7	3.759	0.31	0.11	9.89	12.23	22.54	46.00	23.46	Average
8	3.759	0.31	0.11	9.89	26.02	36.33	56.00	19.67	QP
9	7.977	0.48	0.16	9.87	10.36	20.87	50.00	29.13	Average
10	7.977	0.48	0.16	9.87	23.04	33.55	60.00	26.45	QP
11	17.018	0.88	0.23	9.91	7.12	18.14	50.00	31.86	Average
12	17.018	0.88	0.23	9.91	17.32	28.34	60.00	31.66	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.

AUDIX Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

Test Date	2016/11/07	Temp./Hum.	24°C/53%
Test Voltage	AC 120V, 60Hz (via AC Adapter)		



Site no. : No.7 Shielded Room Data no. : 1
Condition : ESH2-Z5 366(ADAPTER) Phase : LINE
Limit : FCC 15B-B
Env. / Ins. : 24°C / 53% ESCI (1276) Engineer : Nick Du
EUT : 13Z970
Power Rating : 120Vac/60Hz
Test Mode : Operating

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.154	0.18	0.03	9.85	18.88	28.94	55.78	26.84	Average
2	0.154	0.18	0.03	9.85	37.99	48.05	65.78	17.73	QP
3	0.466	0.19	0.04	9.85	15.09	25.17	46.58	21.41	Average
4	0.466	0.19	0.04	9.85	26.15	36.23	56.58	20.35	QP
5	0.909	0.21	0.06	9.90	11.01	21.18	46.00	24.82	Average
6	0.909	0.21	0.06	9.90	14.63	24.80	56.00	31.20	QP
7	1.535	0.23	0.07	9.94	5.51	15.75	46.00	30.25	Average
8	1.535	0.23	0.07	9.94	16.13	26.37	56.00	29.63	QP
9	3.840	0.33	0.11	9.89	12.09	22.42	46.00	23.58	Average
10	3.840	0.33	0.11	9.89	19.87	30.20	56.00	25.80	QP
11	6.805	0.47	0.14	9.87	7.49	17.97	50.00	32.03	Average
12	6.805	0.47	0.14	9.87	18.23	28.71	60.00	31.29	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.

6. RADIATED EMISSION MEASUREMENT

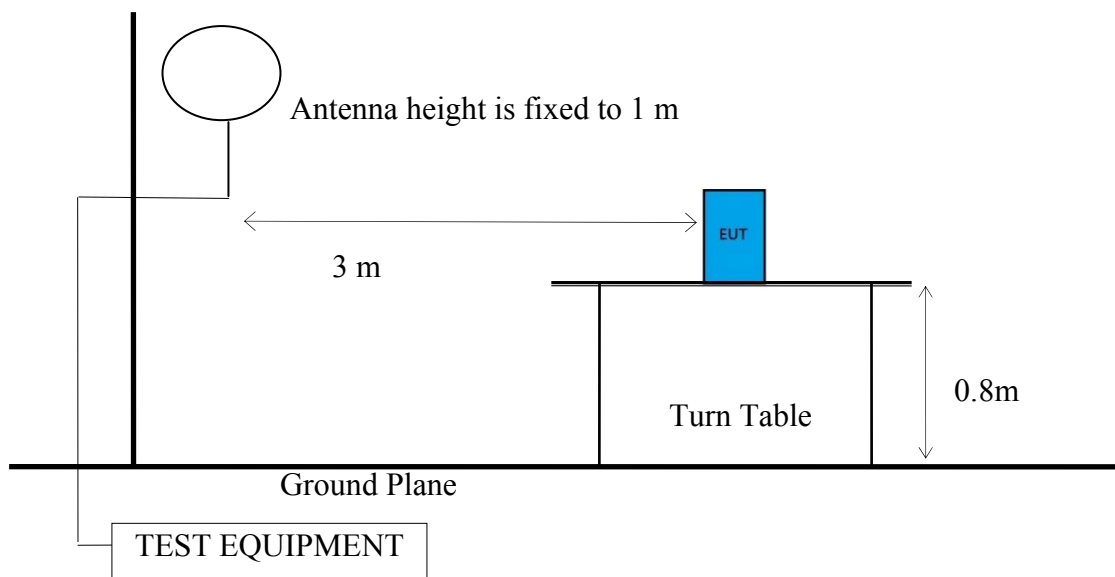
6.1. Block Diagram of Test Setup

6.1.1. Block Diagram of EUT

Indicated as section 3.6

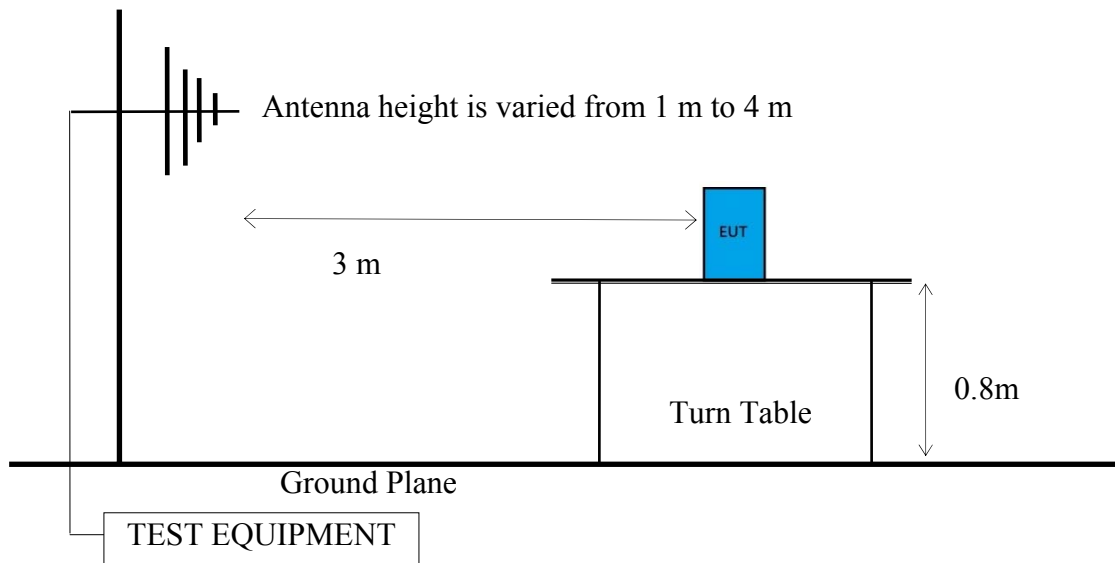
6.1.2. Semi Anechoic Chamber (3m) Setup Diagram for 9kHz-30MHz

Antenna Tower

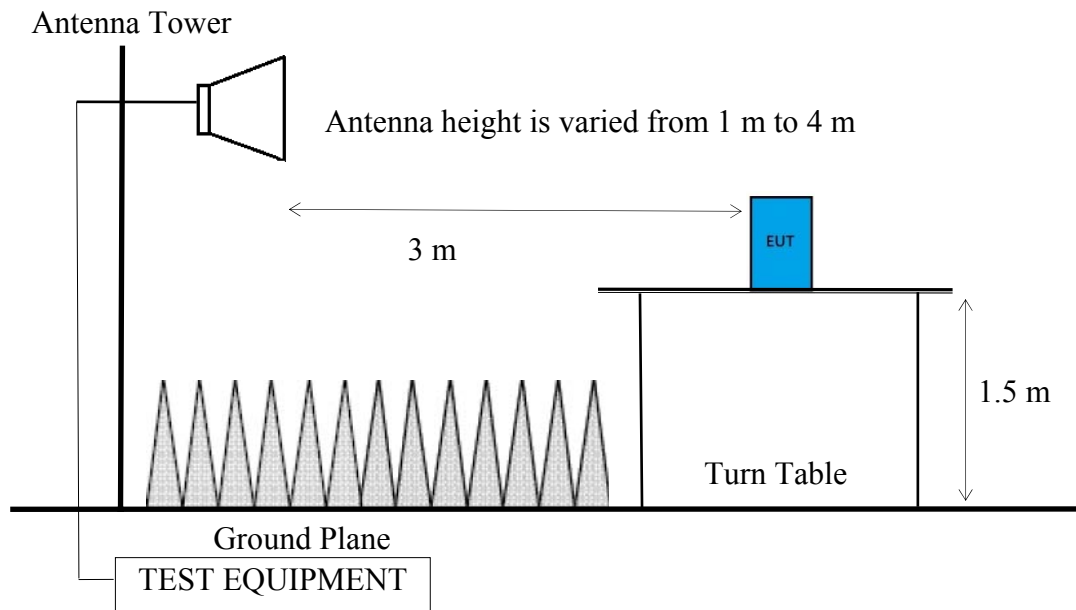


6.1.3. Semi-Anechoic Chamber (3m) Setup Diagram for 30-1000 MHz

Antenna Tower



6.1.4. Fully Anechoic Chamber (3m) Setup Diagram for above 1GHz



6.2. Radiated Emission Limits

In any 100kHz bandwidth outside the frequency band, the radio frequency power produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205 and RSS-Gen Section 8.10 table 6, must also comply with the radiated emission limits specified as below.

Frequency (MHz)	Distance (m)	Limits	
		dBμV/m	μV/m
0.009 - 0.490	300	67.6	2400/kHz
0.490 - 1.705	30	87.6	24000/kHz
1.705 - 30	30	29.5	30
30 - 88	3	40.0	100
88- 216	3	43.5	150
216- 960	3	46.0	200
Above 960	3	54.0	500
Above 1000	3	74.0 dBμV/m (Peak) 54.0 dBμV/m (Average)	

Remark : (1) $\text{dB}\mu\text{V/m} = 20 \log (\mu\text{V/m})$

- (2) The tighter limit applies to the edge between two frequency bands.
- (3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
- (4) Fundamental and emission fall within operation band are exempted from this section.
- (5) Pursuant to ANSI C63.10: 6.6.4.3, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.

6.3. Test Procedure

Frequency Range 9kHz~30MHz:

The EUT setup on the turn table which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

- (1) RBW = 9kHz with peak and average detector.
- (2) Detector: average and peak (9kHz-490kHz)
Q.P. (490kHz-30MHz)

Frequency Range 30MHz ~ 40GHz:

The EUT setup on the turn find table which has 80 cm (for 30-1000 MHz) and 1.5m (for above 1GHz) height to the ground. The turn table rotated 360 degrees and antenna varied from 1 m to 4 m to find the maximum emission level. Both horizontal and vertical polarization are required. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

Frequency below 1 GHz:

Spectrum Analyzer is used for pre-testing with following setting:

- (1) RBW = 120KHz
- (2) VBW $\geq 3 \times$ RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.
- (7) When peak-detected value is lower than limit that the measurement using the Q.P. detector is not required. Otherwise using Q.P. for finally measurement.

Frequency above 1GHz to 10th harmonic:**Peak Detector:**

- (1) RBW = 1MHz
- (2) VBW $\geq 3 \times$ RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.
- (7) When peak-detected value is lower than limit that the measurement using the average detector is not required. Otherwise using average for finally measurement.

Average Detector:**■ Option 1:**

- (1) RBW = 1 MHz
- (2) VBW = 1/T
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.

□ Option 2:

Average Emission Level = Peak Emission Level + D.C.C.F.

6.4. Measurement Result Explanation

■ Peak Emission Level = Antenna Factor + Cable Loss + Meter Reading

■ Average Emission Level = Antenna Factor + Cable Loss + Meter Reading

□ Average Emission Level = Peak Emission Level + DCCF

Duty Cycle Correction Factor (DCCF) = $20\log(TX_{on}/100ms)$ presented in section 3.4

□ ERP = Peak Emission Level - 95.2dB - 2.14dB

6.5. Test Results

PASSED.

Test Date	2016/11/24	Temp./Hum.	25°C/56%
Test Voltage	AC 120V, 60Hz (via AC Adapter)		

6.5.1. Emissions within Restricted Frequency Bands

6.5.1.1. Frequency 9kHz~30MHz

The emissions (9kHz~30MHz) not reported for there is no emission be found.

6.5.1.2. Frequency Below 1 GHz

Worse mode as representative.

Modulation	GFSK	Frequency	TX 2402MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
90.14	9.12	3.15	12.43	24.70	43.50	18.80	Peak
249.22	12.35	4.32	15.14	31.81	46.00	14.19	Peak
328.76	13.90	4.98	11.49	30.37	46.00	15.63	Peak
410.24	15.71	5.75	4.13	25.59	46.00	20.41	Peak
637.22	18.48	6.59	1.58	26.65	46.00	19.35	Peak
833.16	20.22	7.29	1.83	29.34	46.00	16.66	Peak

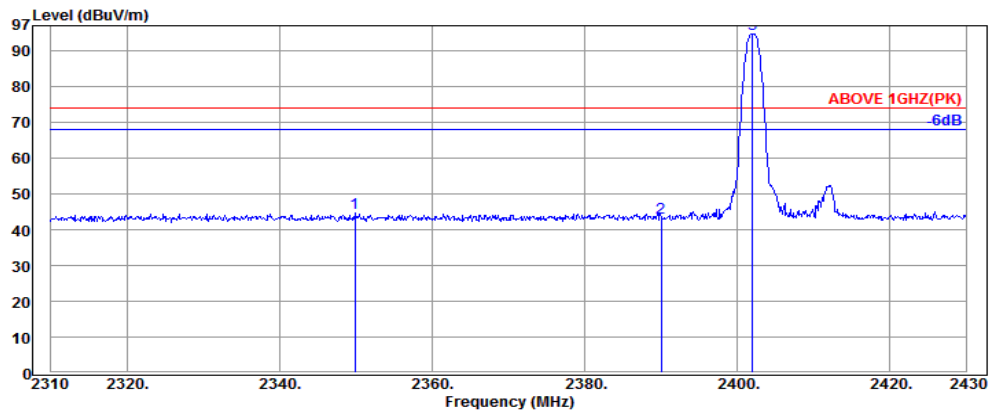
Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
30.97	18.07	2.34	16.99	37.40	40.00	2.60	Peak
246.31	12.16	4.30	12.84	29.30	46.00	16.70	Peak
334.58	14.05	5.04	10.37	29.46	46.00	16.54	Peak
529.55	17.40	6.46	3.04	26.90	46.00	19.10	Peak
691.54	18.70	6.70	2.24	27.64	46.00	18.36	Peak
865.17	20.40	7.42	2.33	30.15	46.00	15.85	Peak

6.5.1.3. Frequency Above 1 GHz to 10th harmonics

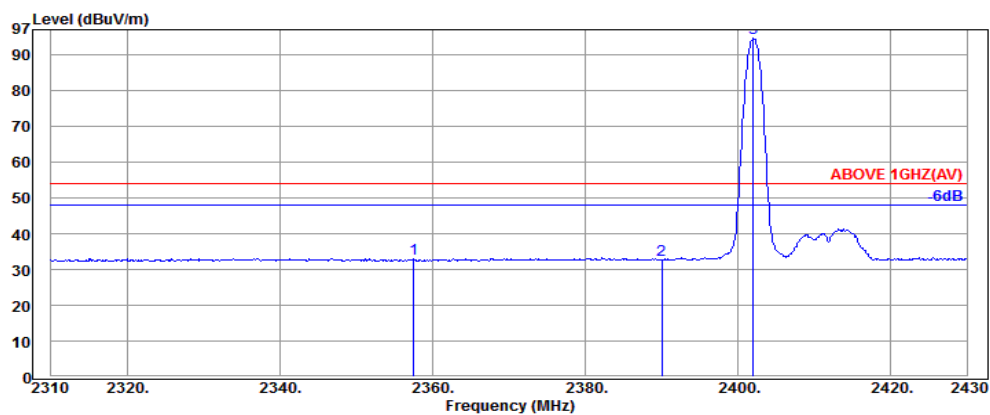
Band Edge:

Mode	GFSK	Frequency	TX 2402MHz
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Antenna at Horizontal Polarization

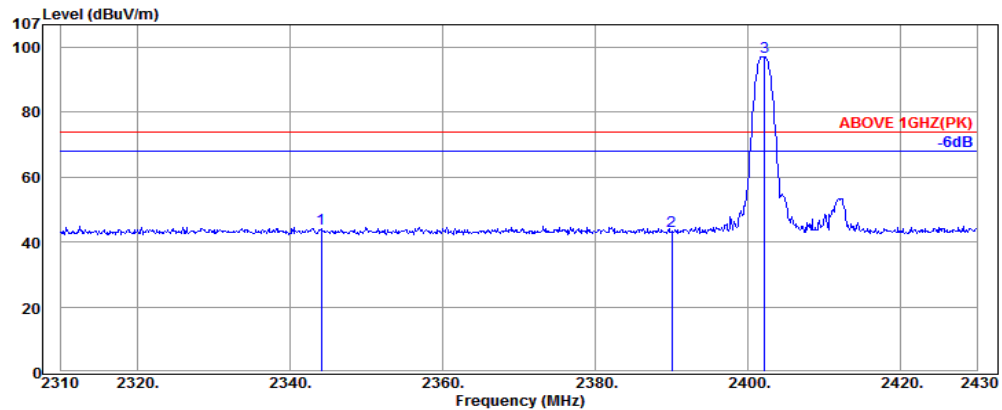
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2349.84	32.08	5.68	6.85	44.61	74.00	29.39	Peak
2390.04	32.16	5.72	5.61	43.49	74.00	30.51	Peak
2402.04	32.16	5.72	56.82	94.70	---	---	Peak



Antenna at Horizontal Polarization

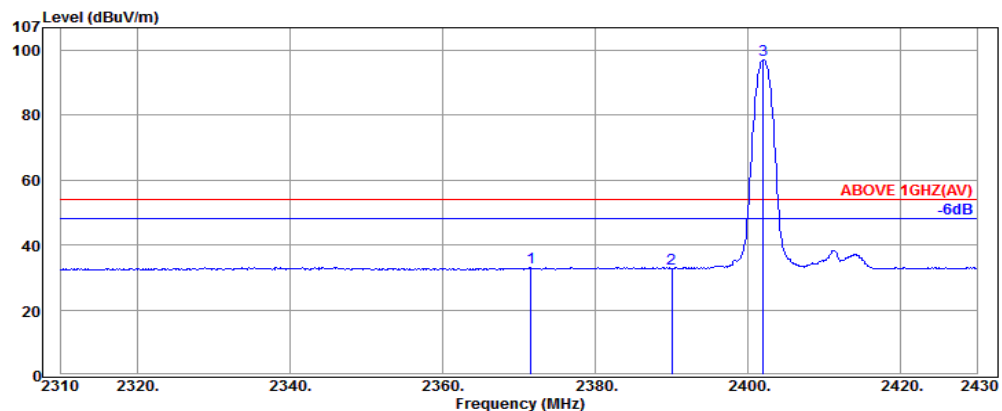
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2357.52	32.11	5.69	-4.85	32.95	54.00	21.05	Average
2390.04	32.16	5.72	-5.08	32.80	54.00	21.20	Average
2402.04	32.16	5.72	56.63	94.51	---	---	Average

Mode	GFSK	Frequency	TX 2402MHz
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Antenna at Vertical Polarization

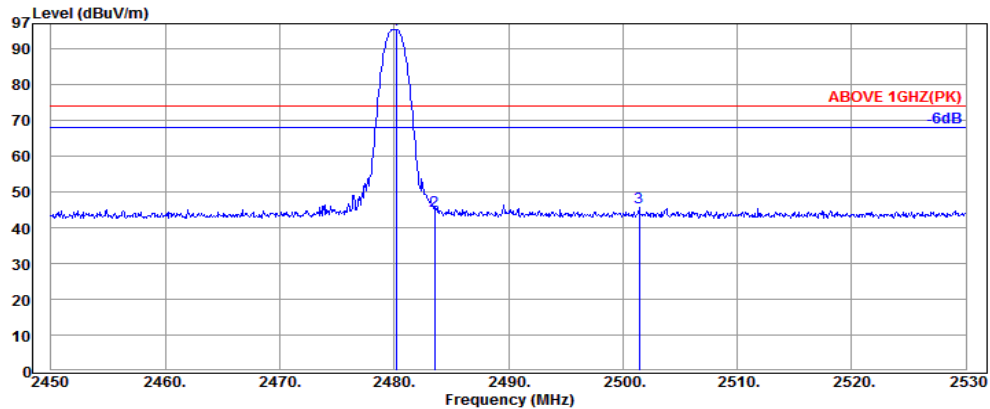
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2344.08	32.08	5.68	6.44	44.20	74.00	29.80	Peak
2390.04	32.16	5.72	5.67	43.55	74.00	30.45	Peak
2402.16	32.16	5.72	59.31	97.19	---	---	Peak



Antenna at Vertical Polarization

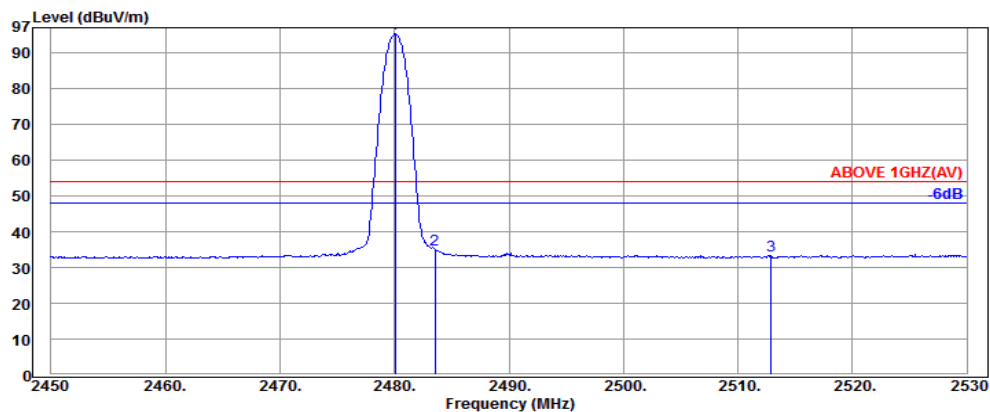
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2371.56	32.13	5.71	-4.91	32.93	54.00	21.07	Average
2390.04	32.16	5.72	-5.10	32.78	54.00	21.22	Average
2402.04	32.16	5.72	59.12	97.00	---	---	Average

Mode	GFSK	Frequency	TX 2480MHz
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Antenna at Horizontal Polarization

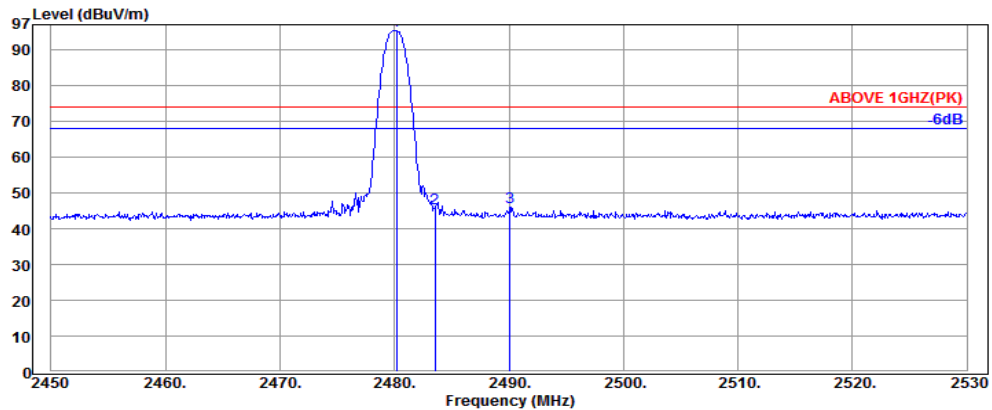
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2480.16	32.28	5.82	57.18	95.28	---	---	Peak
2483.52	32.28	5.82	6.67	44.77	74.00	29.23	Peak
2501.44	32.30	5.84	7.63	45.77	74.00	28.23	Peak



Antenna at Horizontal Polarization

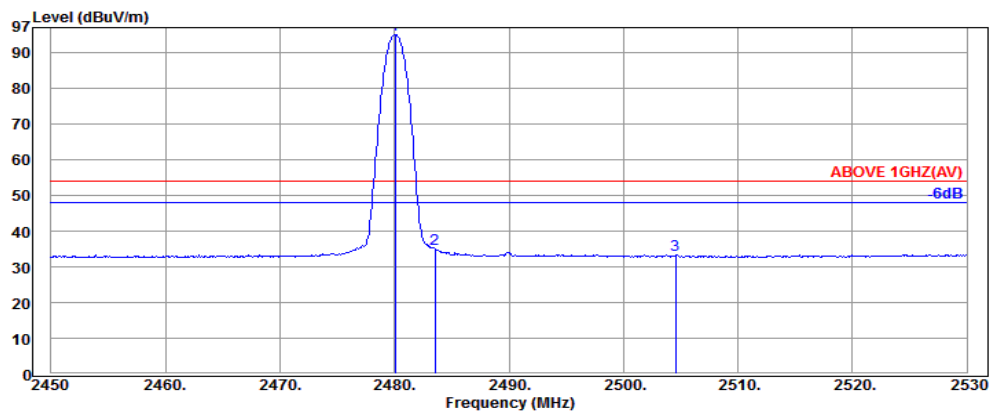
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2480.08	32.28	5.82	57.11	95.21	---	---	Average
2483.52	32.28	5.82	-3.13	34.97	54.00	19.03	Average
2512.88	32.32	5.87	-4.99	33.20	54.00	20.80	Average

Mode	GFSK	Frequency	TX 2480MHz
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Antenna at Vertical Polarization

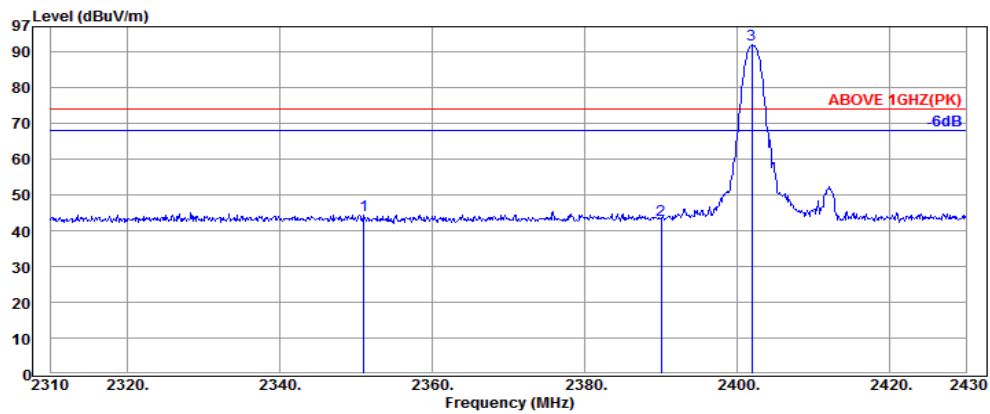
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2480.16	32.28	5.82	57.12	95.22	---	---	Peak
2483.52	32.28	5.82	7.71	45.81	74.00	28.19	Peak
2490.08	32.30	5.84	7.80	45.94	74.00	28.06	Peak



Antenna at Vertical Polarization

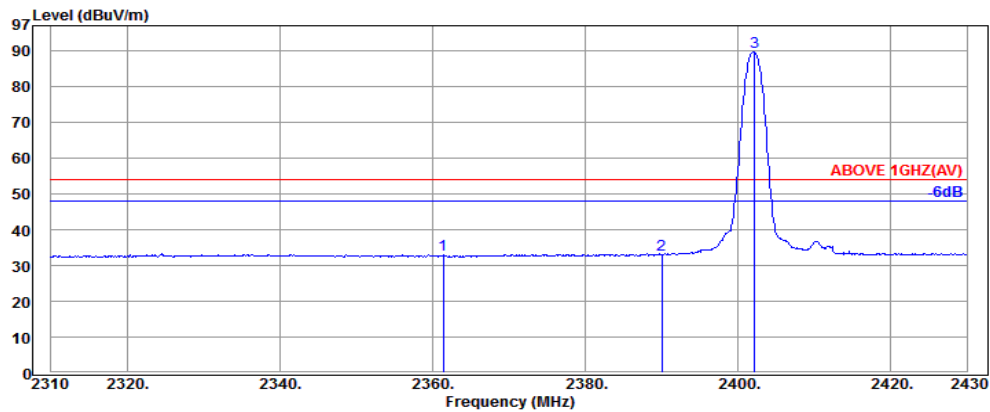
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2480.08	32.28	5.82	56.95	95.05	---	---	Average
2483.52	32.28	5.82	-2.98	35.12	54.00	18.88	Average
2504.56	32.32	5.87	-4.81	33.38	54.00	20.62	Average

Mode	8-DPSK	Frequency	TX 2402MHz
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Antenna at Horizontal Polarization

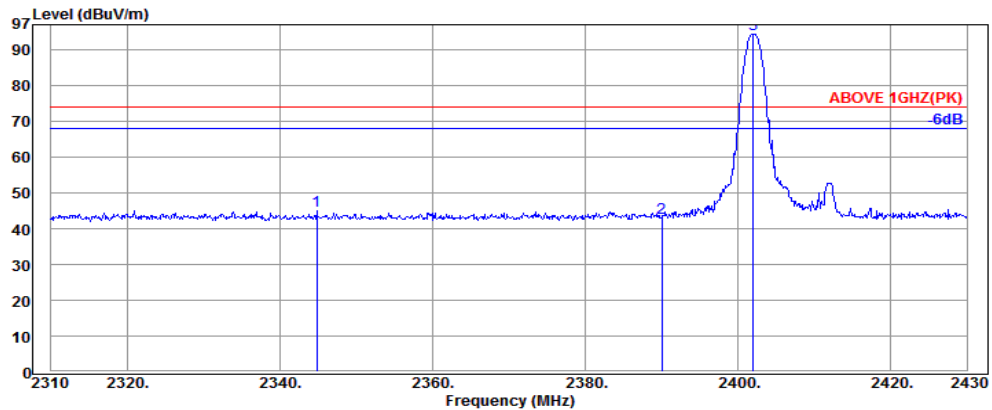
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2351.04	32.08	5.68	6.74	44.50	74.00	29.50	Peak
2390.04	32.16	5.72	5.28	43.16	74.00	30.84	Peak
2401.92	32.16	5.72	53.98	91.86	---	---	Peak



Antenna at Horizontal Polarization

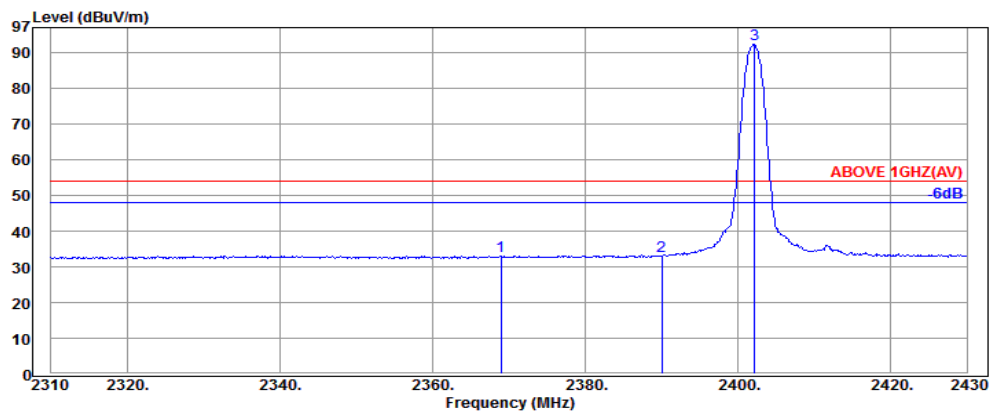
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2361.36	32.11	5.69	-4.93	32.87	54.00	21.13	Average
2390.04	32.16	5.72	-4.79	33.09	54.00	20.91	Average
2402.16	32.16	5.72	51.92	89.80	---	---	Average

Mode	8-DPSK	Frequency	TX 2402MHz
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Antenna at Vertical Polarization

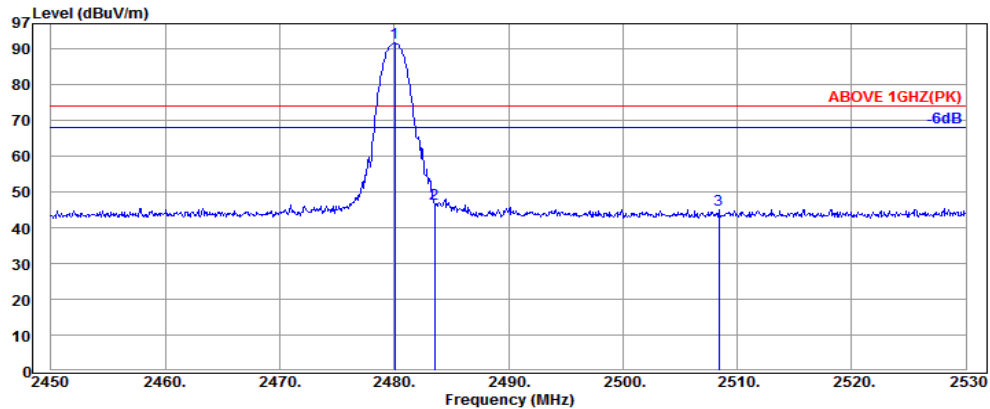
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2344.80	32.08	5.68	7.13	44.89	74.00	29.11	Peak
2390.04	32.16	5.72	5.10	42.98	74.00	31.02	Peak
2402.04	32.16	5.72	56.59	94.47	---	---	Peak



Antenna at Vertical Polarization

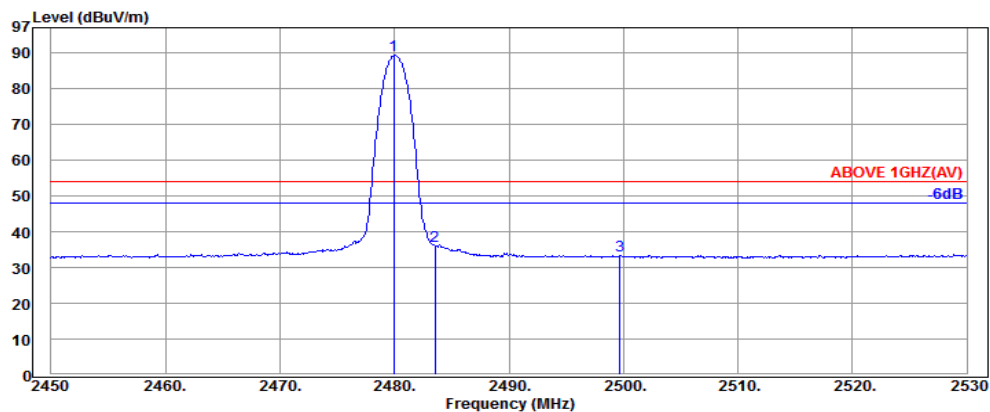
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2368.92	32.13	5.71	-4.81	33.03	54.00	20.97	Average
2390.04	32.16	5.72	-4.99	32.89	54.00	21.11	Average
2402.16	32.16	5.72	54.39	92.27	---	---	Average

Mode	8-DPSK	Frequency	TX 2480MHz
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Antenna at Horizontal Polarization

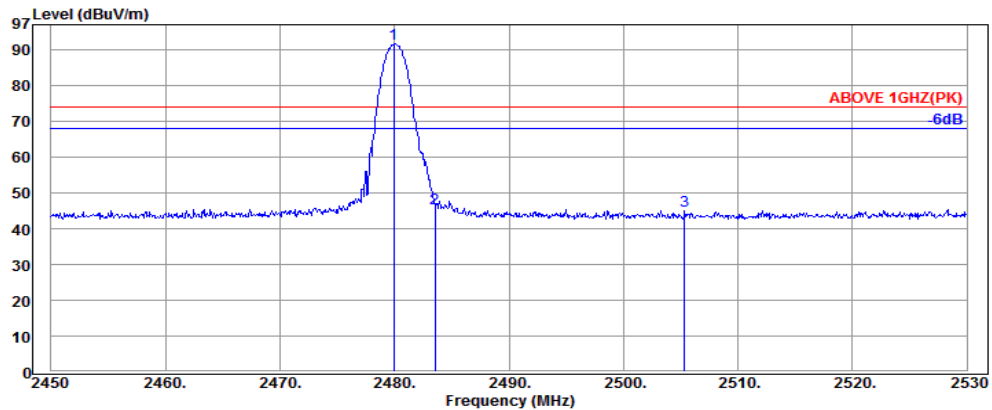
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2480.08	32.28	5.82	53.52	91.62	---	---	Peak
2483.52	32.28	5.82	8.52	46.62	74.00	27.38	Peak
2508.40	32.32	5.87	6.92	45.11	74.00	28.89	Peak



Antenna at Horizontal Polarization

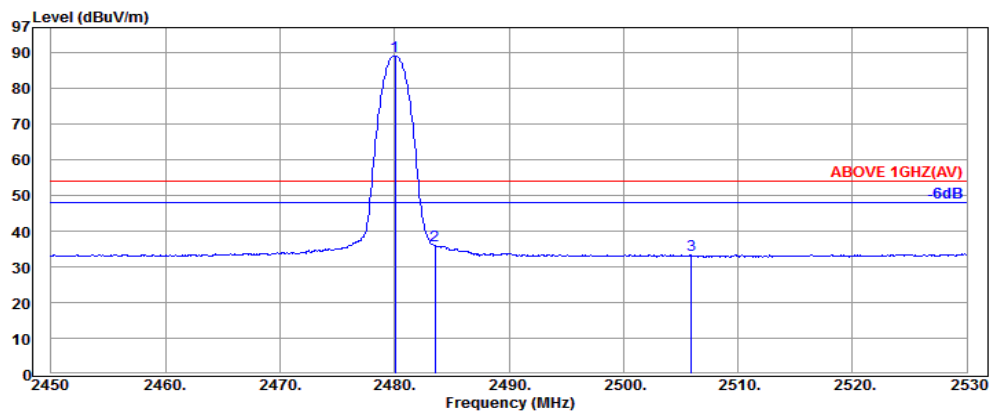
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2479.92	32.28	5.82	51.08	89.18	---	---	Average
2483.52	32.28	5.82	-2.02	36.08	54.00	17.92	Average
2499.68	32.30	5.84	-4.76	33.38	54.00	20.62	Average

Mode	8-DPSK	Frequency	TX 2480MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2479.92	32.28	5.82	53.51	91.61	---	---	Peak
2483.52	32.28	5.82	7.62	45.72	74.00	28.28	Peak
2505.36	32.32	5.87	6.82	45.01	74.00	28.99	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2480.08	32.28	5.82	51.06	89.16	---	---	Average
2483.52	32.28	5.82	-2.04	36.06	54.00	17.94	Average
2505.92	32.32	5.87	-4.90	33.29	54.00	20.71	Average

6.5.2. Emissions outside the frequency band:

The emissions (up to 25GHz) not reported for there is no emission be found.

Modulation	GFSK	Frequency	TX 2402MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1062.00	28.09	3.42	12.25	43.76	54.00	10.24	Peak
2124.00	31.77	5.43	7.60	44.80	54.00	9.20	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1064.00	28.09	3.42	17.79	49.30	54.00	4.70	Peak
2132.00	31.79	5.46	16.05	53.30	54.00	0.70	Peak

Modulation	GFSK	Frequency	TX 2441MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1066.00	28.09	3.42	11.69	43.20	54.00	10.80	Peak
2132.00	31.79	5.46	9.03	46.28	54.00	7.72	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1066.00	28.09	3.42	17.25	48.76	54.00	5.24	Peak
2132.00	31.79	5.46	16.59	53.84	54.00	0.16	Peak
3185.00	32.86	6.43	4.57	43.86	54.00	10.14	Peak
4255.00	33.70	8.00	6.42	48.12	54.00	5.88	Peak

Modulation	GFSK	Frequency	TX 2480MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
1064.00	28.09	3.42	12.80	44.31	54.00	9.69	Peak
2130.00	31.77	5.43	9.65	46.85	54.00	7.15	Peak

Antenna at Vertical Polarization

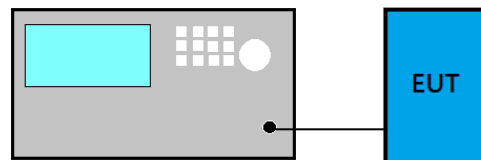
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
1064.00	28.09	3.42	17.89	49.40	54.00	4.60	Peak
2124.00	31.77	5.43	15.54	52.74	54.00	1.26	Peak
3195.00	32.86	6.43	9.10	48.39	54.00	5.61	Peak

6.5.3. Emissions in Non-restricted Frequency Bands

All emission levels below the 15.209 general radiated emissions limits is not required.

7. 20dB BANDWIDTH MEASUREMENT

7.1. Block Diagram of Test Setup



7.2. Specification Limits

Alternatively, frequency hopping systems operating in the 2400-2483.5MHz band may have hopping channel carrier frequencies that are separated by 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater.

7.3. Test Procedure

Following measurement procedure is reference to DA00-705:

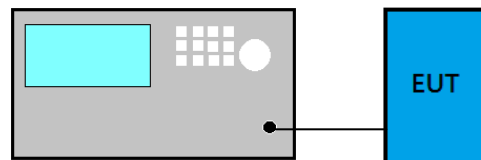
- (1) Set RBW close to 1% of OBW.
- (2) Set $VBW \geq RBW$.
- (3) Detector = Peak.
- (4) Trace mode = max hold.
- (5) Sweep = auto couple.
- (6) Allow the trace to stabilize.
- (7) Setting channel bandwidth function x dB to -20 dB to record the final bandwidth.

7.4. Test Results

Please refer to Appendix A

8. CARRIER FREQUENCY SEPARATION MEASUREMENT

8.1. Block Diagram of Test Setup



8.2. Specification Limits

Alternatively, frequency hopping systems operating in the 2400-2483.5MHz band may have hopping channel carrier frequencies that are separated by 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output no greater than 125mW.

8.3. Test Procedure

Following measurement procedure is reference to DA00-705:

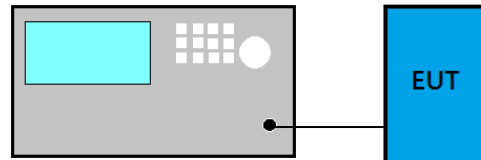
- (1) Span = wide enough to capture the peaks of two adjacent channels
- (2) RBW $\geq$ 1% of the span
- (3) VBW $\geq$ RBW
- (4) Sweep = auto
- (5) Detector function = peak
- (6) Trace = max hold

8.4. Test Results

Please refer to Appendix A

9. TIME OF OCCUPANCY MEASUREMENT

9.1. Block Diagram of Test Setup



9.2. Specification Limits

Frequency hopping systems in the 2400-2483.5MHz shall use at least 15 non-overlapping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by number of hopping channels employed.

9.3. Test Procedure

Following measurement procedure is reference to DA00-705:

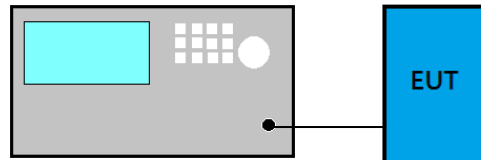
- (1) Span = zero span, centered on a hopping channel
- (2) RBW = 1 MHz
- (3) VBW $\geq$ RBW
- (4) Sweep = as necessary to capture the entire dwell time per hopping channel
- (5) Detector function = peak
- (6) Trace = max hold

9.4. Test Results

Please refer to Appendix A

10. NUMBER OF HOPPING CHANNELS MEASUREMENT

10.1. Block Diagram of Test Setup



10.2. Specification Limits

Frequency hopping systems which use fewer than 20 hopping frequencies may employ intelligent hopping techniques to avoid interference to other transmissions. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 non-overlapping channels.

10.3. Test Procedure

Following measurement procedure is reference to DA00-705:

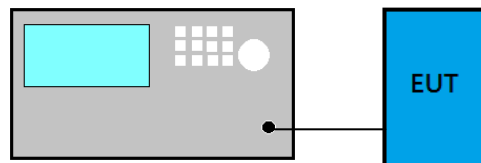
- (1) Span = the frequency band of operation
- (2) RBW $\geq$ 1% of the span
- (3) VBW $\geq$ RBW
- (4) Sweep = auto
- (5) Detector function = peak
- (6) Trace = max hold

10.4. Test Results

Please refer to Appendix A

11. MAXIMUM PEAK OUTPUT POWER MEASUREMENT

11.1. Block Diagram of Test Setup



11.2. Specification Limits

The Limits of maximum Peak Output Power for frequency hopping systems in 2400-2483.5MHz is: 0.125Watt. (21dBm)

11.3. Test Procedure

Following measurement procedure is reference to DA00-705:

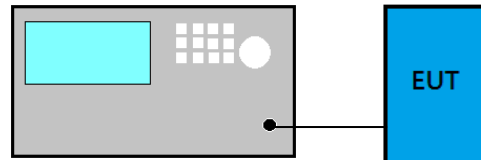
- (1) Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
- (2) RBW $\geq$ 1% of the span
- (3) VBW $\geq$ RBW
- (4) Sweep = auto
- (5) Detector function = peak
- (6) Trace = max hold

11.4. Test Results

Please refer to Appendix A

12. EMISSION LIMITATIONS MEASUREMENT

12.1. Block Diagram of Test Setup



12.2. Specification Limits

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (See Section 15.205(c)).

12.3. Test Procedure

Following measurement procedure is reference to DA00-705:

- (1) Set span wide enough to capture the peak level of the in-band emission and all spurious emissions; up to 10th harmonic.
- (2) RBW = 100 kHz
- (3) VBW $\geq$ RBW
- (4) Sweep = auto
- (5) Detector function = peak
- (6) Trace = max hold

12.4. Test Results

Please refer to Appendix A

13.DEVIATION TO TEST SPECIFICATIONS

【NONE】



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APPENDIX A

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APPENDIX A

TEST PLOTS

(Model: 13Z970)

File Number: C1M1611057

Report Number: EM-F160760

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A.1 20dB BANDWIDTH MEASUREMENT

Test Date	2016/11/17	Temp./Hum.	25°C/58%
Cable Loss	0.5dB	Test Voltage	AC 120V, 60Hz (via AC Adapter)

A.1.1 20dB Bandwidth Result

Modulation	Centre Frequency (MHz)	20 dB Bandwidth (MHz)	2/3 (20dB Bandwidth)
GFSK	2402	0.9203	0.614
	2441	0.9213	0.614
	2480	0.9216	0.614

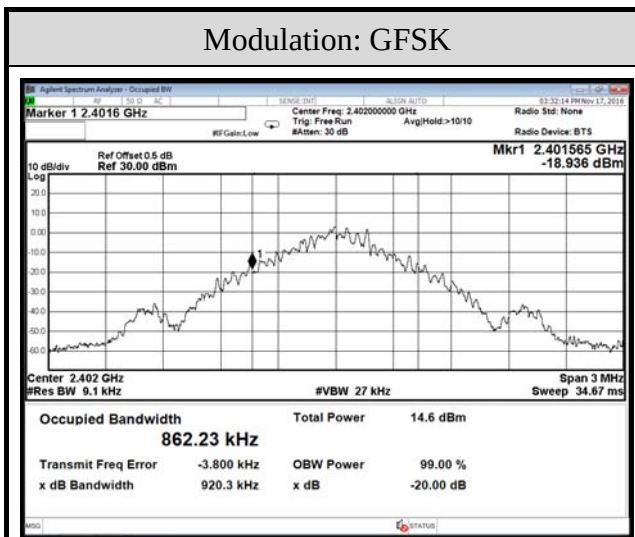
Remark: The maximum two-thirds of the 20dB bandwidth is the limit for carrier frequency separation presented.

Modulation	Centre Frequency (MHz)	20 dB Bandwidth (MHz)	2/3 (20dB Bandwidth)
8-DPSK	2402	1.385	0.923
	2441	1.385	0.923
	2480	1.385	0.923

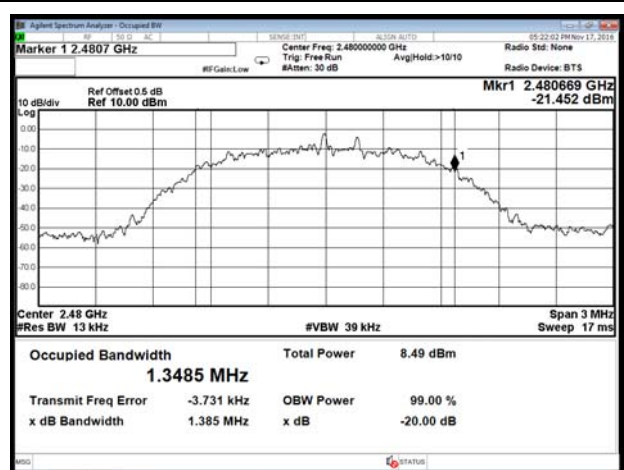
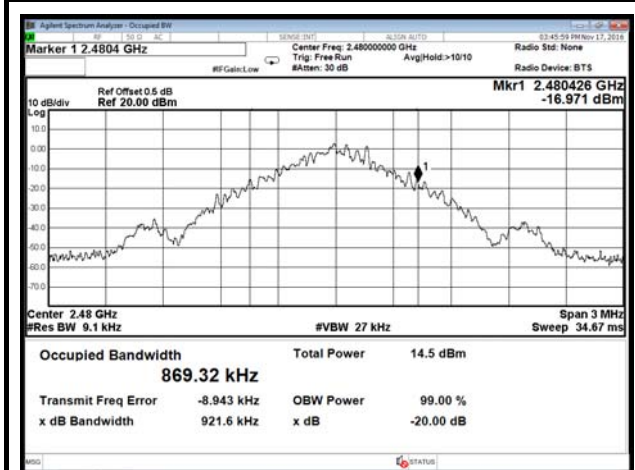
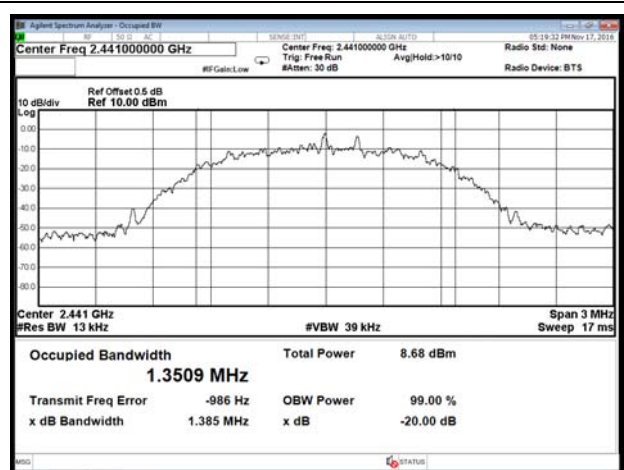
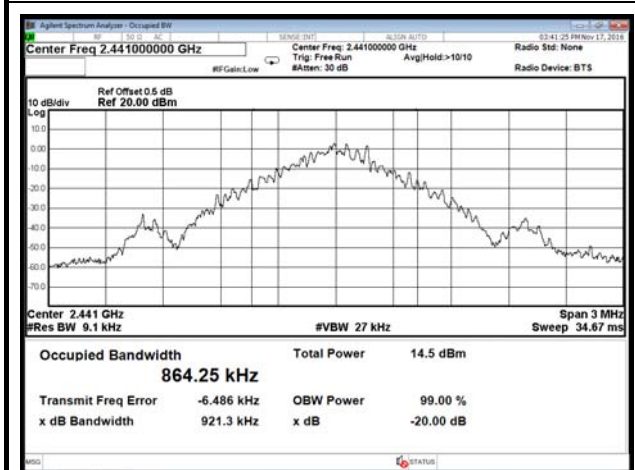
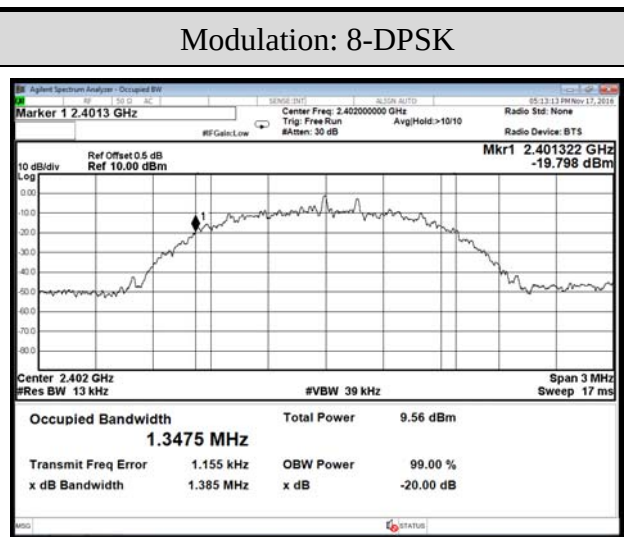
Remark: The maximum two-thirds of the 20dB bandwidth is the limit for carrier frequency separation presented.

A.1.2 Measurement Plots

Modulation: GFSK



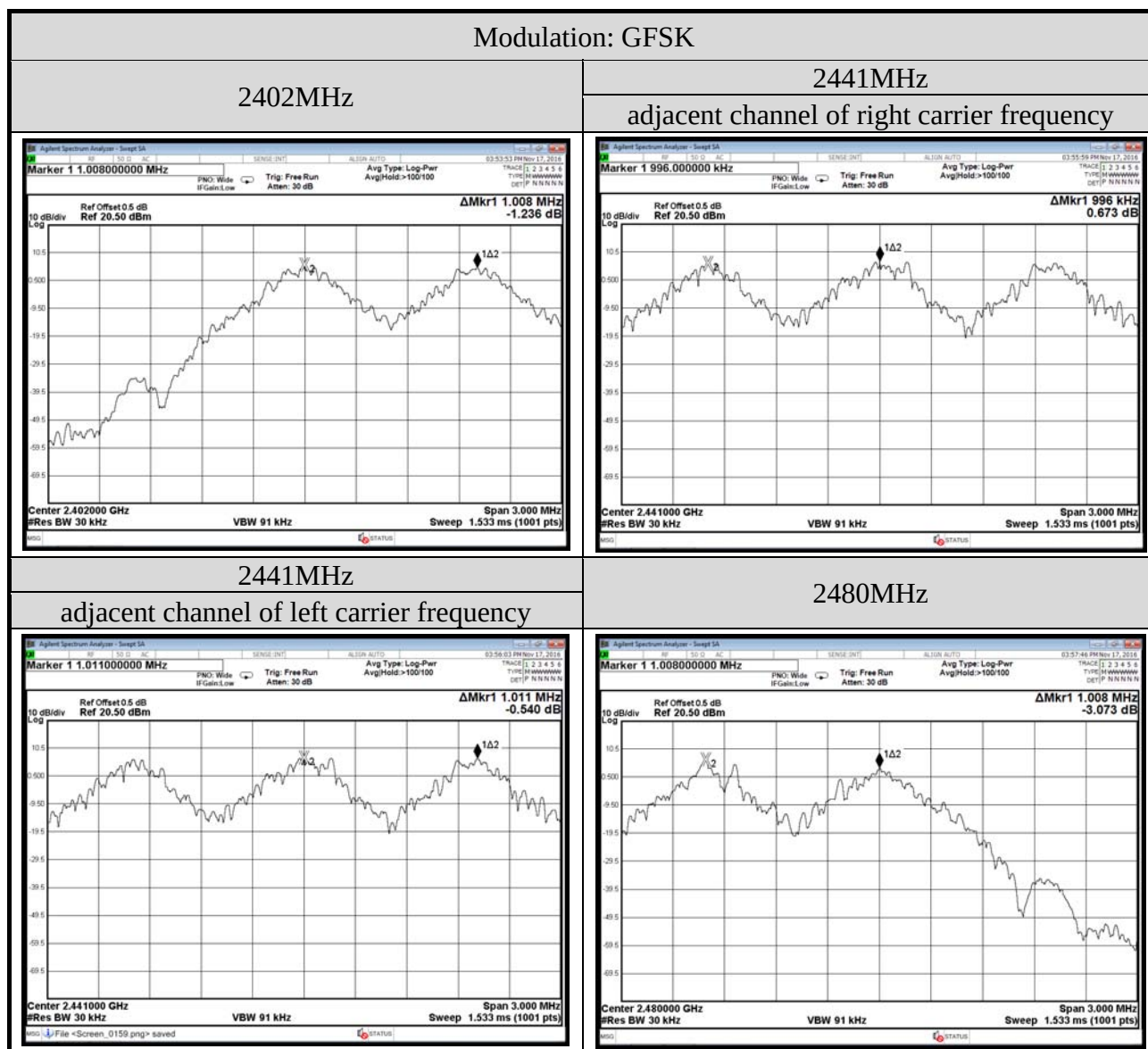
Modulation: 8-DPSK

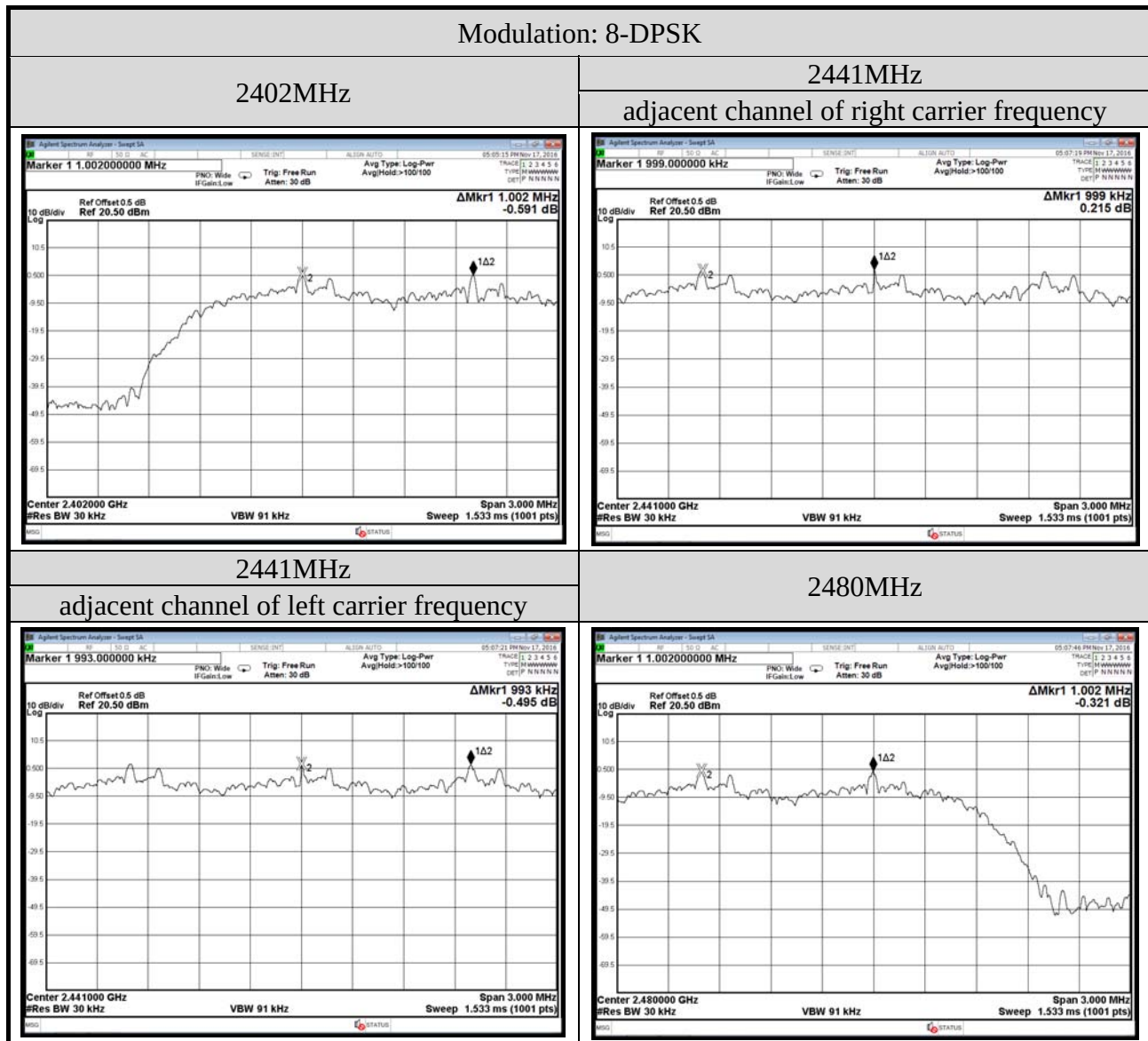


A.2 CARRIER FREQUENCY SEPARATION MEASUREMENT

Test Date	2016/11/17	Temp./Hum.	25°C/58%
Cable Loss	0.5dB	Test Voltage	AC 120V, 60Hz (via AC Adapter)

A.2.1 Measurement Plots





A.3 TIME OF OCCUPANCY MEASUREMENT

Test Date	2016/11/17	Temp./Hum.	25°C/58%
Cable Loss	0.5dB	Test Voltage	AC 120V, 60Hz (via AC Adapter)

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	0.38	72.048	<400
		DH3	1.64	259.120	<400
		DH5	2.88	273.024	<400
	2441	DH1	0.38	72.048	<400
		DH3	1.62	255.960	<400
		DH5	2.90	274.920	<400
	2480	DH1	0.38	72.048	<400
		DH3	1.64	259.120	<400
		DH5	2.88	273.024	<400

Observation Period: 79 channels*0.4 seconds = 31.6 seconds

Centre Frequency: 2402MHz

DH1: For each second of 6 channel appearance, the longest time of occupancy for each of 31.6 seconds is:

$$6 \text{ channels} * 31.6 \text{ seconds} * 0.38 \text{ ms} = 72.048 \text{ ms}$$

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

$$5 \text{ channels} * 31.6 \text{ seconds} * 1.64 \text{ ms} = 259.120 \text{ ms}$$

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

$$3 \text{ channels} * 31.6 \text{ seconds} * 2.88 \text{ ms} = 273.024 \text{ ms}$$

Centre Frequency: 2441MHz

DH1: For each second of 6 channel appearance, the longest time of occupancy for each of 31.6 seconds is:

6 channels*31.6 seconds* **0.38** ms= **72.048** ms

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

5 channels*31.6 seconds* **1.62** ms= **255.960** ms

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

3 channels*31.6 seconds* **2.90** ms= **274.920** ms

Centre Frequency: 2480MHz

DH1: For each second of 6 channel appearance, the longest time of occupancy for each of 31.6 seconds is:

6 channels*31.6 seconds* **0.38** ms= **72.048** m
s

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

5 channels*31.6 seconds* **1.64** ms= **259.120** ms

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

3 channels*31.6 seconds* **2.88** ms= **273.024** ms

Modulation	Centre Frequency (MHz)	Mode	Time of Occupancy (ms)	Maximum accumulated Time of Occupancy (ms)	Limit (ms)
8-DPSK	2402	3DH1	0.39	73.944	<400
		3DH3	1.64	207.296	<400
		3DH5	2.89	182.648	<400
	2441	3DH1	0.38	73.944	<400
		3DH3	1.64	207.296	<400
		3DH5	2.89	182.648	<400
	2480	3DH1	0.39	73.944	<400
		3DH3	1.64	207.296	<400
		3DH5	2.89	182.648	<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:

6 channels*31.6 seconds* **0.39** ms= **73.944** ms

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

4 channels*31.6 seconds* **1.64** ms= **207.296** ms

3DH5: For each second of 2 channel appearance, the longest time of occupancy for each of 31.6 seconds is:

2 channels*31.6 seconds* **2.89** ms= **182.648** ms

Centre Frequency: 2441MHz

3DH1: For each second of 6 channel appearance, the longest time of occupancy for each of 31.6 seconds is:

6 channels*31.6 seconds* **0.39** ms= **73.944** ms

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

4 channels*31.6 seconds* **1.64** ms= **207.296** ms

3DH5: For each second of 2 channel appearance, the longest time of occupancy for each of 31.6 seconds is:

2 channels*31.6 seconds* **2.89** ms= **182.648** ms

Centre Frequency: 2480MHz

3DH1: For each second of 6 channel appearance, the longest time of occupancy for each of 31.6 seconds is:

6 channels*31.6 seconds* **0.39** ms= **73.944** ms

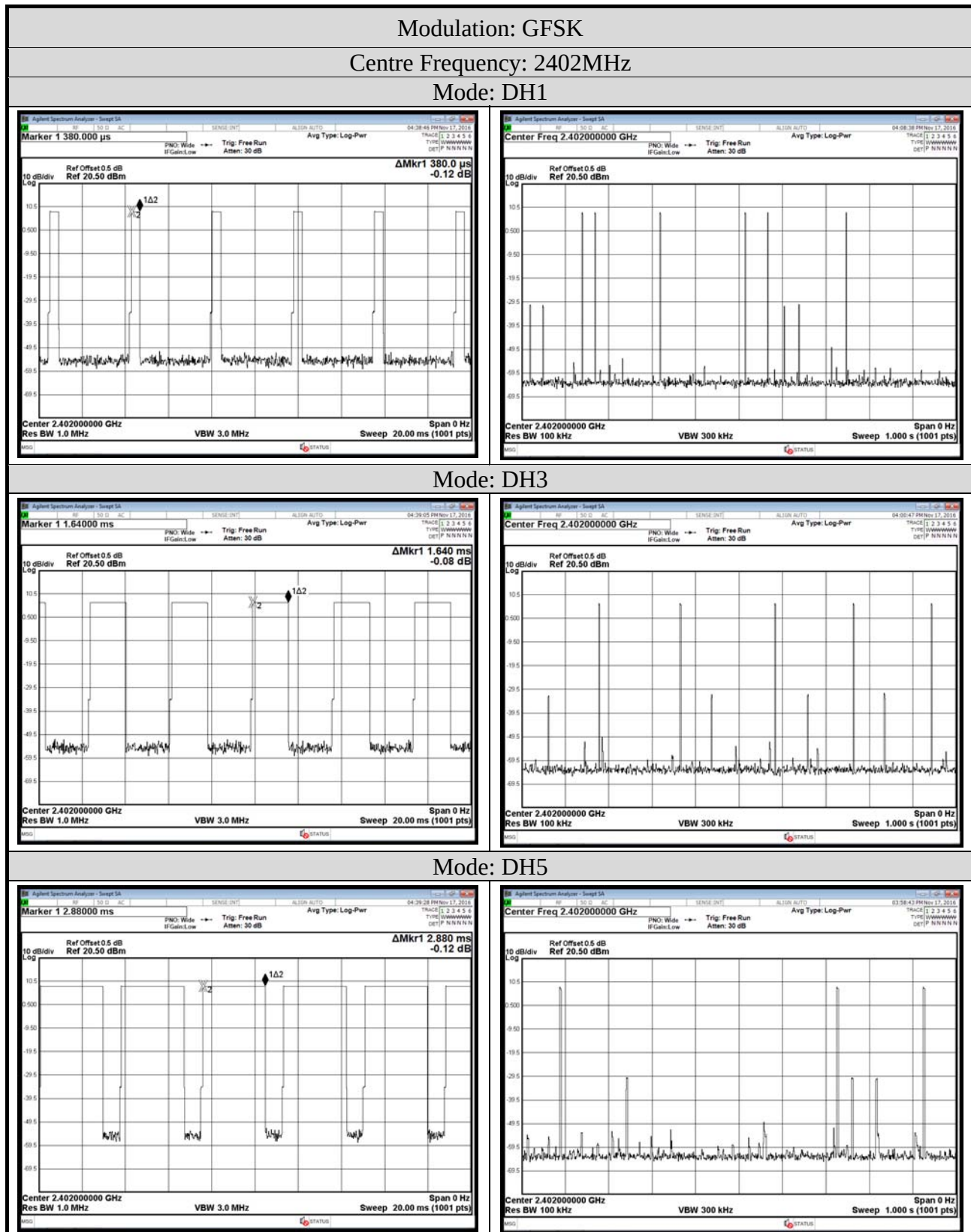
3DH3: For each second of 4 channel appearance, the longest time of occupancy for each of 31.6 seconds is:

4 channels*31.6 seconds* **1.64** ms= **207.296** ms

3DH5: For each second of 2 channel appearance, the longest time of occupancy for each of 31.6 seconds is:

2 channels*31.6 seconds* **2.89** ms= **182.648** ms

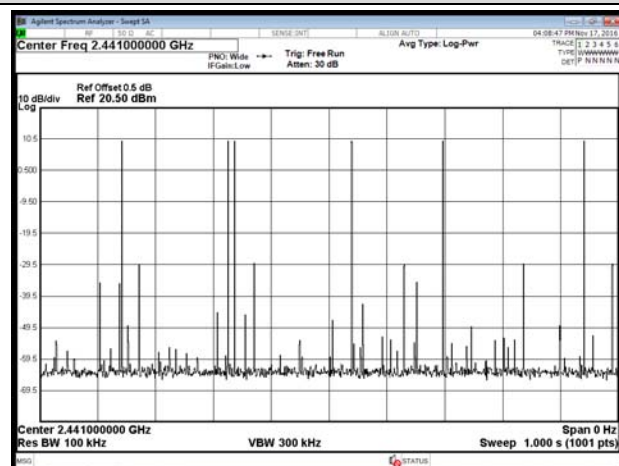
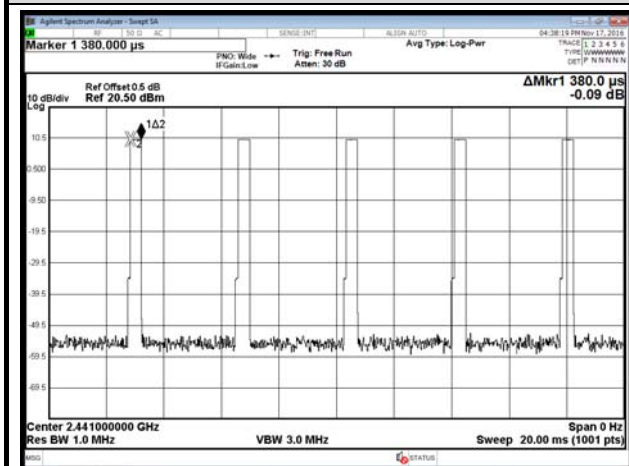
A.3.2 Measurement Plots



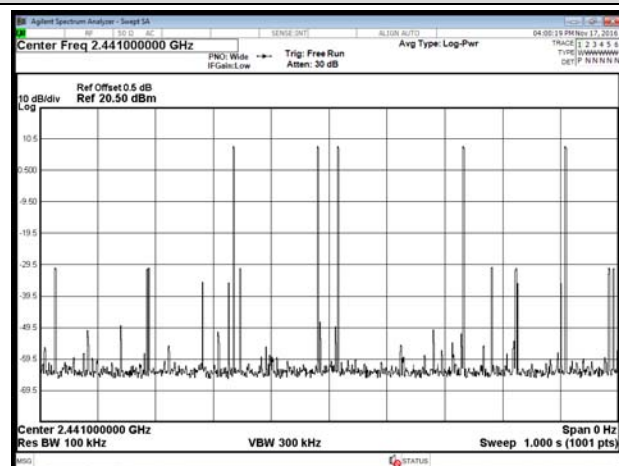
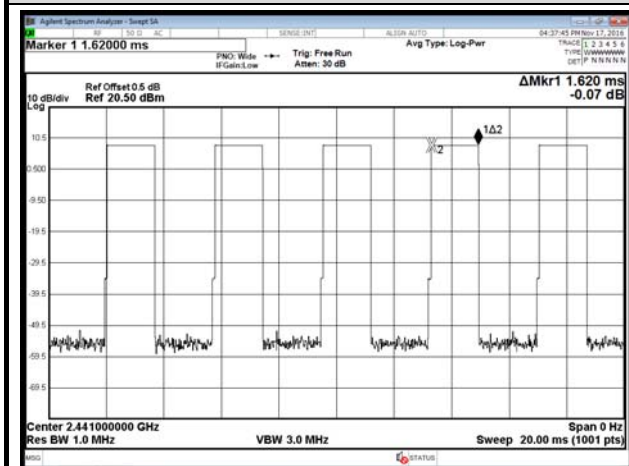
Modulation: GFSK

Centre Frequency: 2441MHz

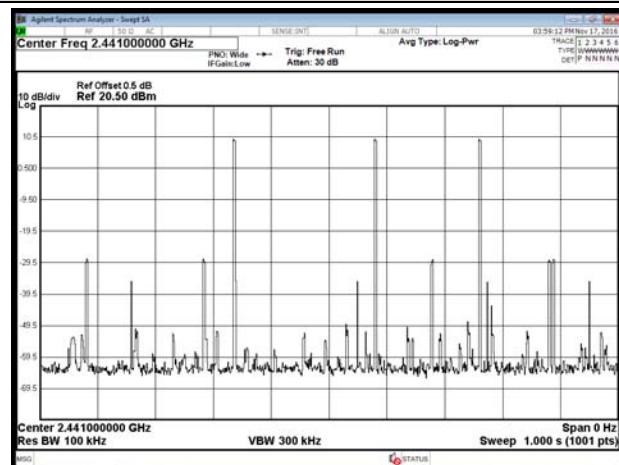
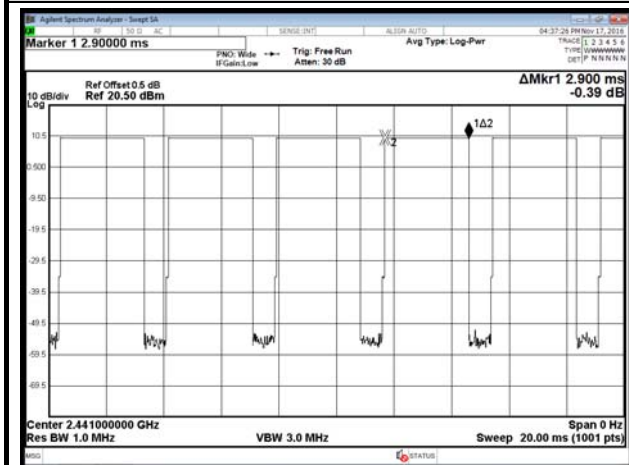
Mode: DH1



Mode: DH3



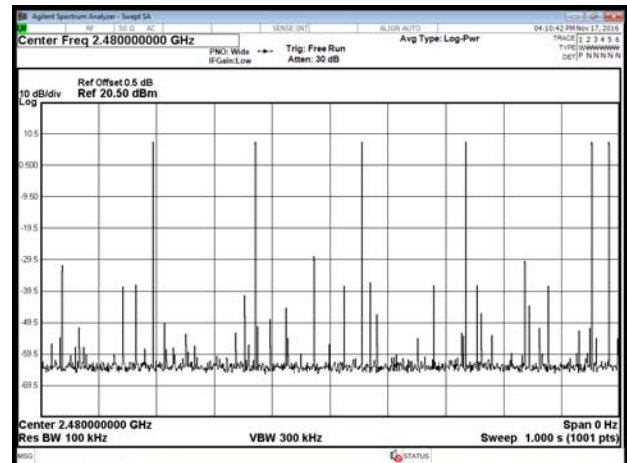
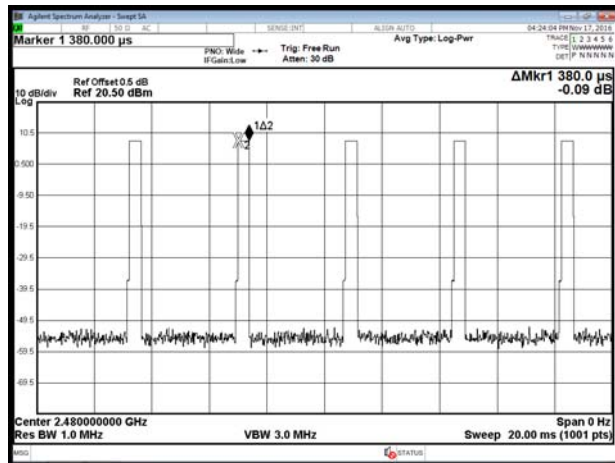
Mode: DH5



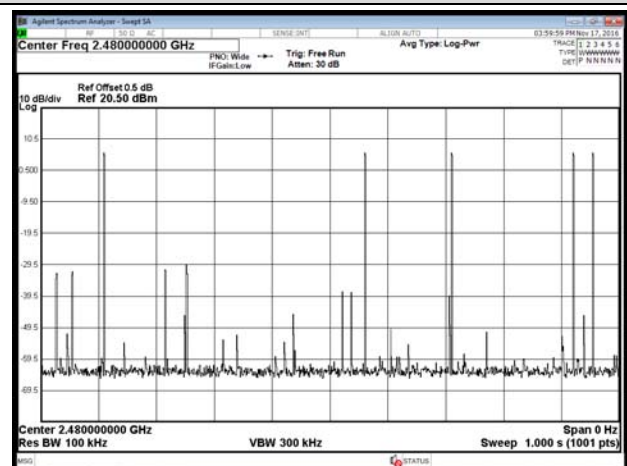
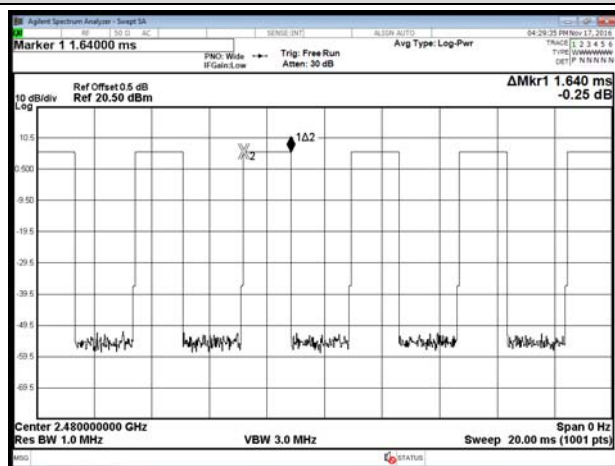
Modulation: GFSK

Centre Frequency: 2480MHz

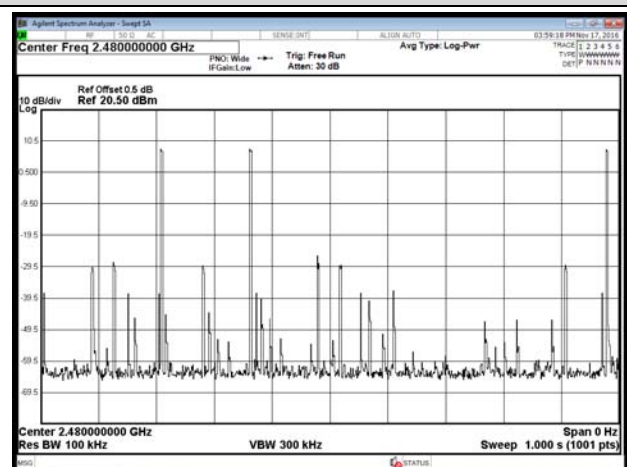
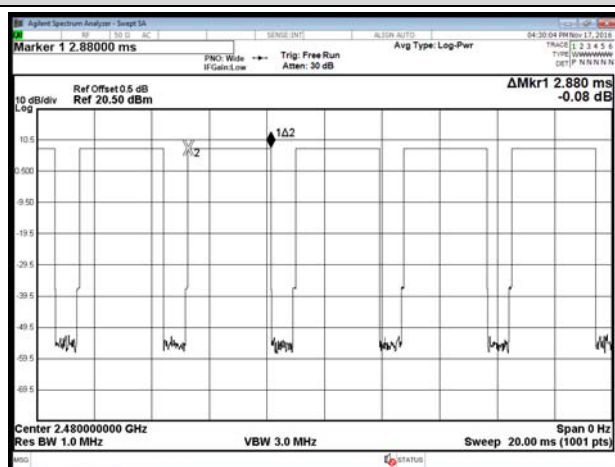
Mode: DH1



Mode: DH3



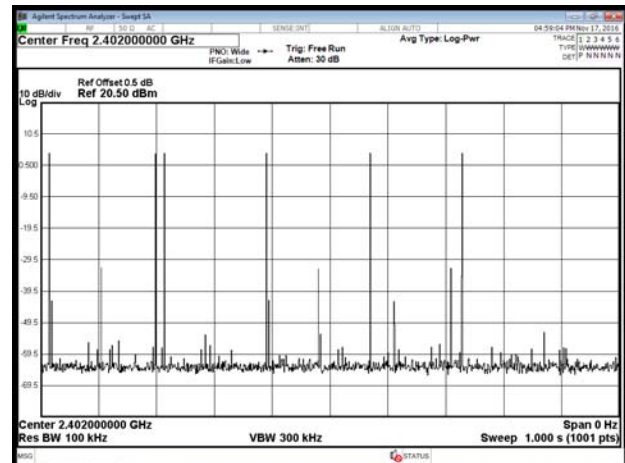
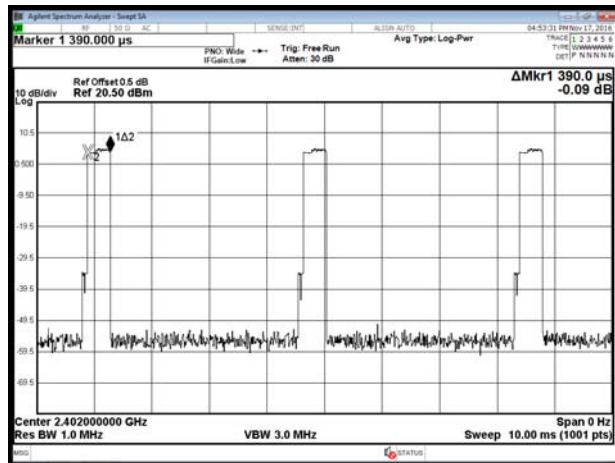
Mode: DH5



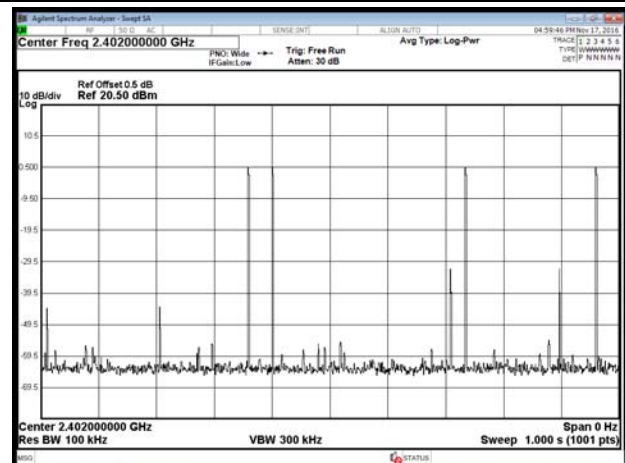
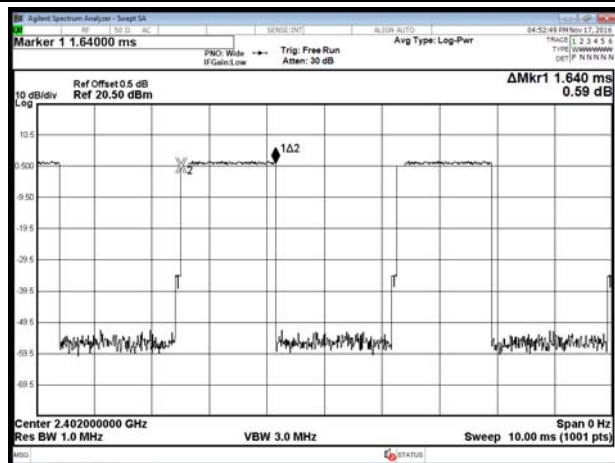
Modulation: 8-DPSK

Centre Frequency: 2402MHz

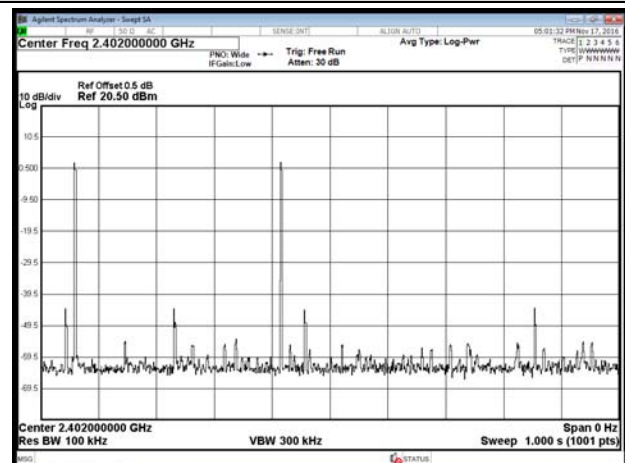
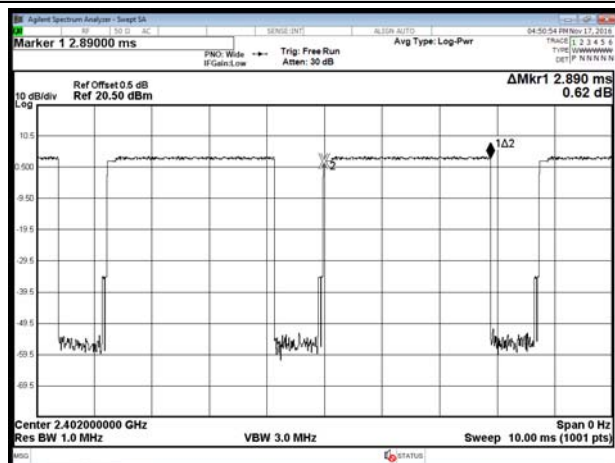
Mode: 3DH1



Mode: 3DH3



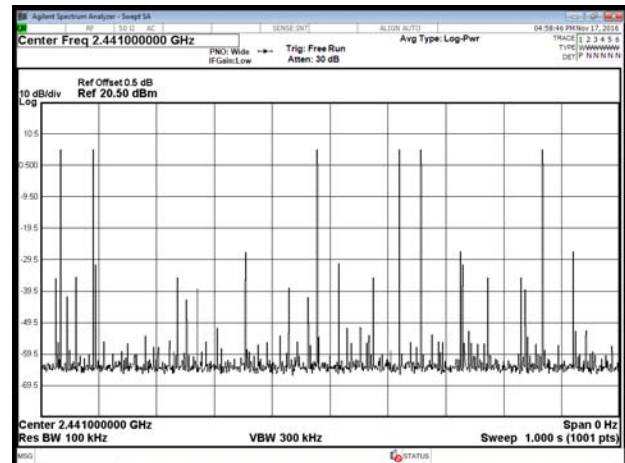
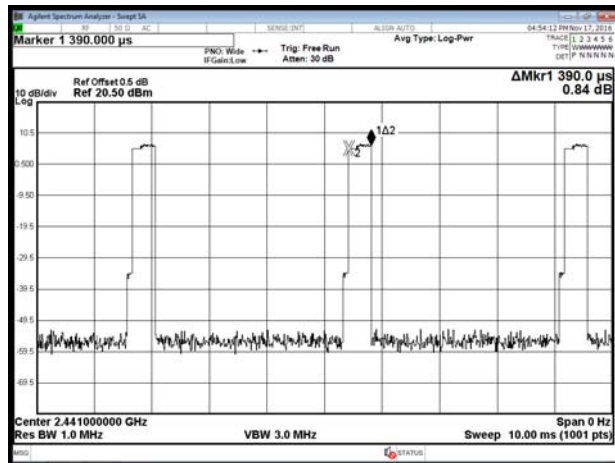
Mode: 3DH5



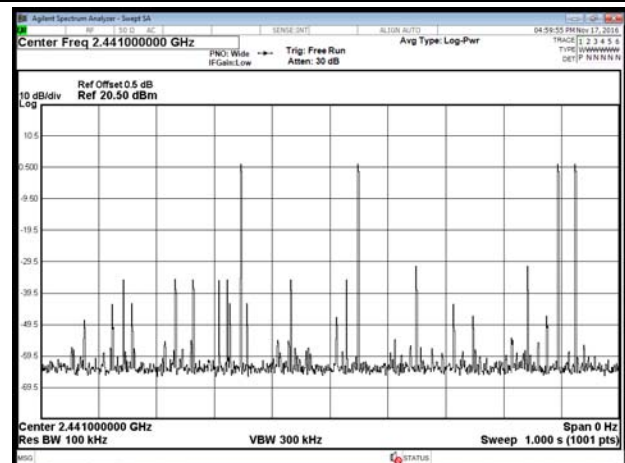
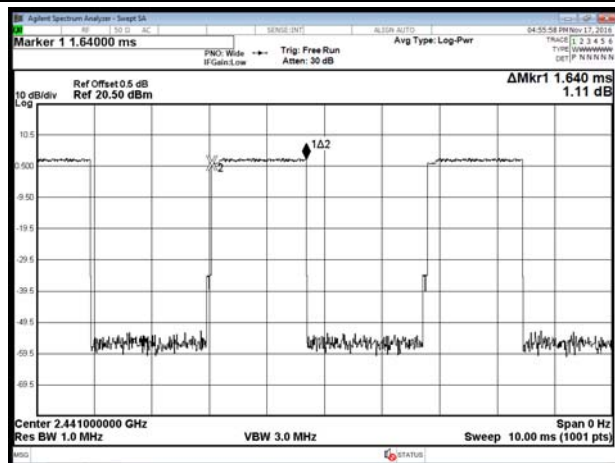
Modulation: 8-DPSK

Centre Frequency: 2441MHz

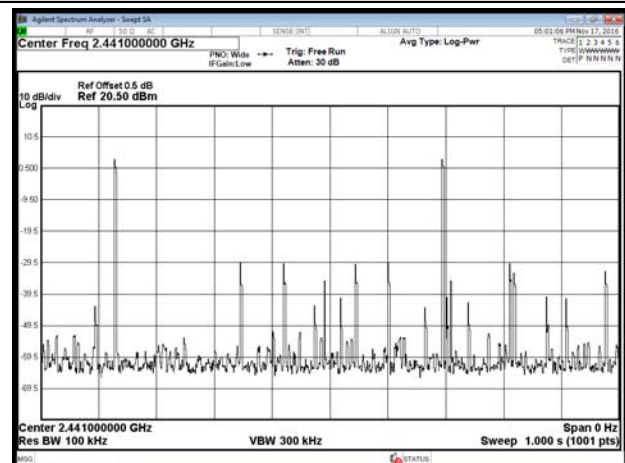
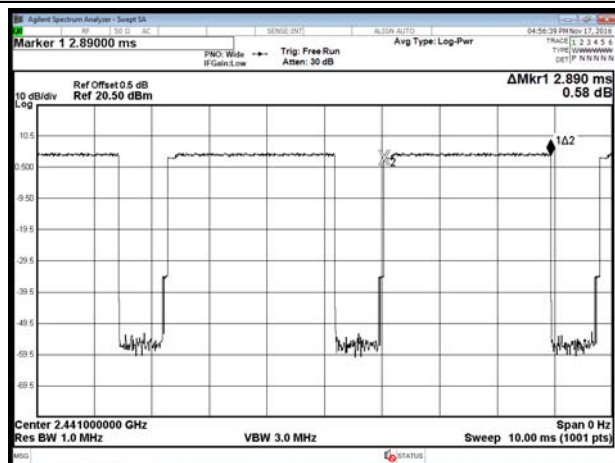
Mode: 3DH1



Mode: 3DH3



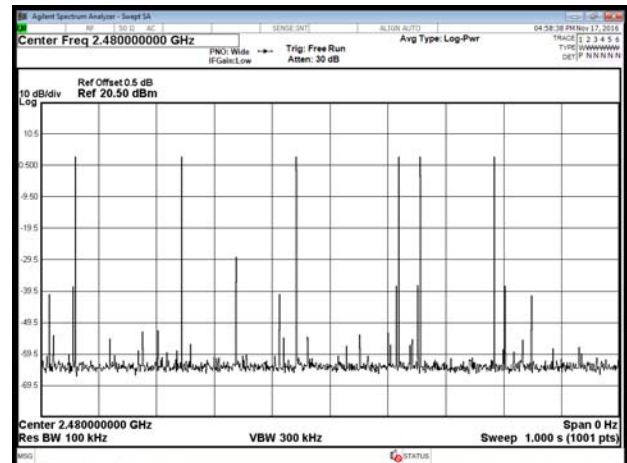
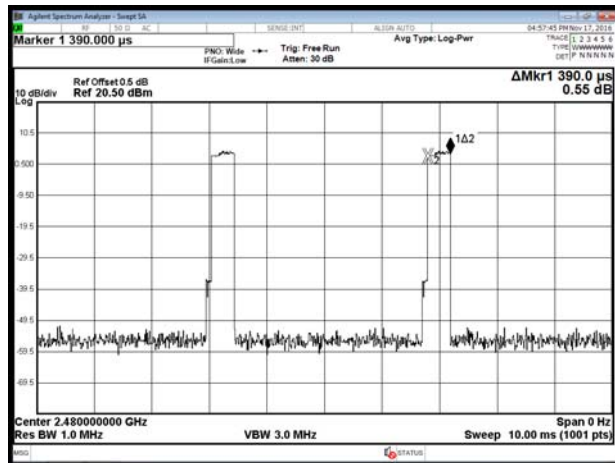
Mode: 3DH5



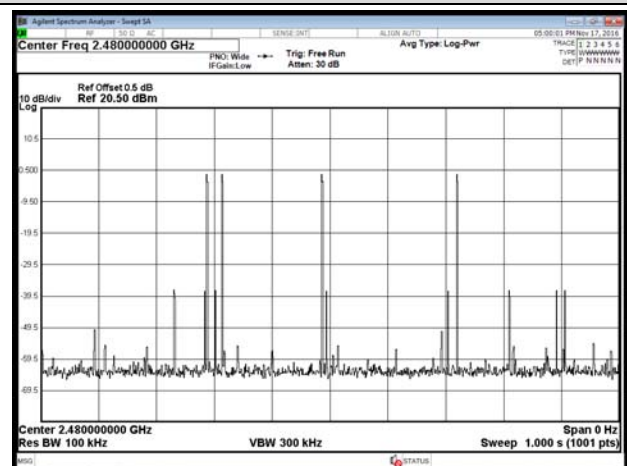
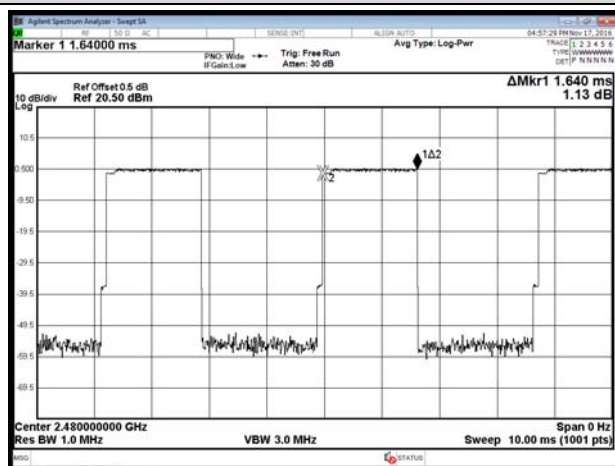
Modulation: 8-DPSK

Centre Frequency: 2480MHz

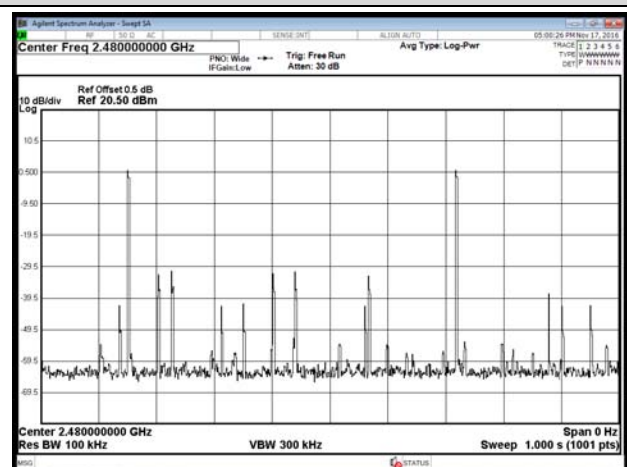
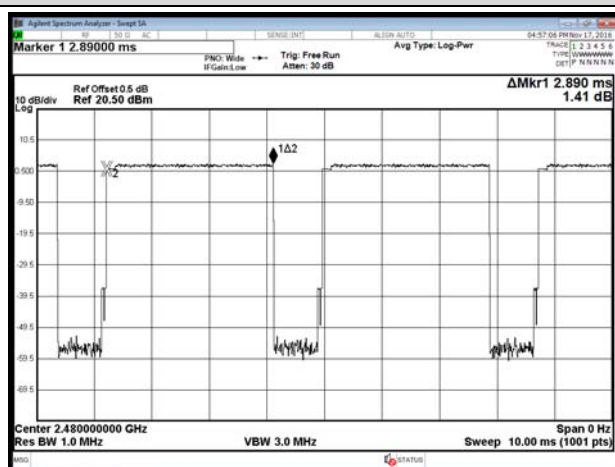
Mode: 3DH1



Mode: 3DH3



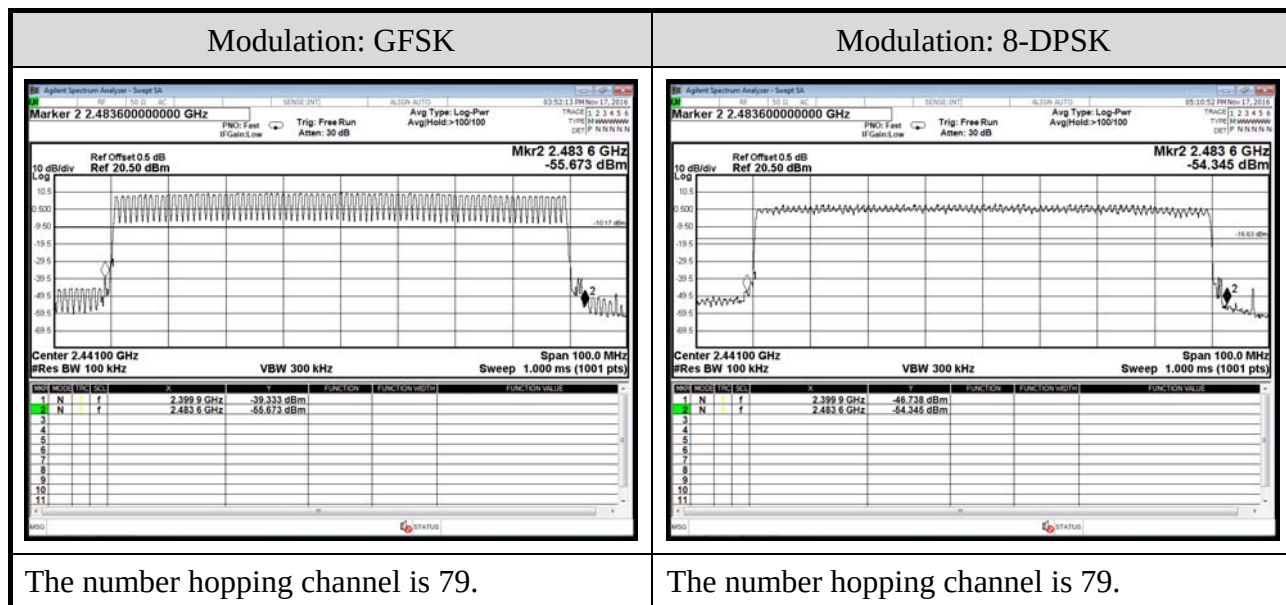
Mode: 3DH5



A.4 NUMBER OF HOPPING CHANNELS MEASUREMENT

Test Date	2016/11/17	Temp./Hum.	25°C/58%
Cable Loss	0.5dB	Test Voltage	AC 120V, 60Hz (via AC Adapter)

A.4.1 Measurement Plots



A.5 MAXIMUM PEAK OUTPUT POWER MEASUREMENT

Test Date	201611/17	Temp./Hum.	25°C/58%
Cable Loss	0.5dB	Test Voltage	AC 120V, 60Hz (via AC Adapter)

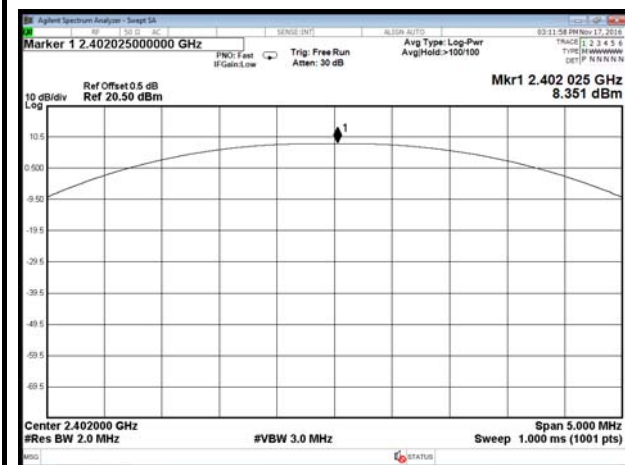
A.5.1 Output Power

Modulation	Centre Frequency (MHz)	Peak Output Power		Limit
		dBm	W	
GFSK	2402	8.351	0.006841	21dBm (0.125W)
	2441	8.241	0.006670	
	2480	7.902	0.006169	

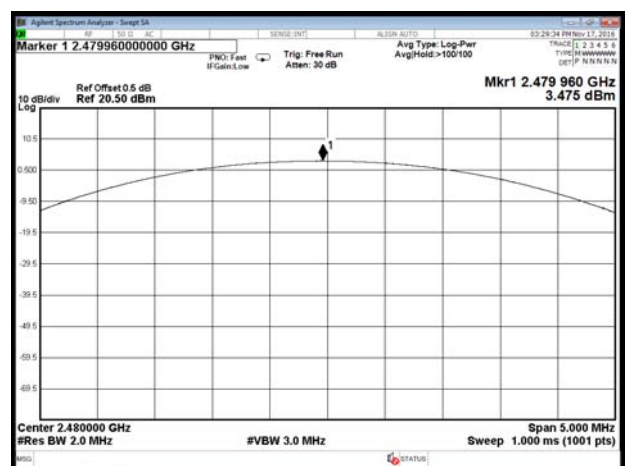
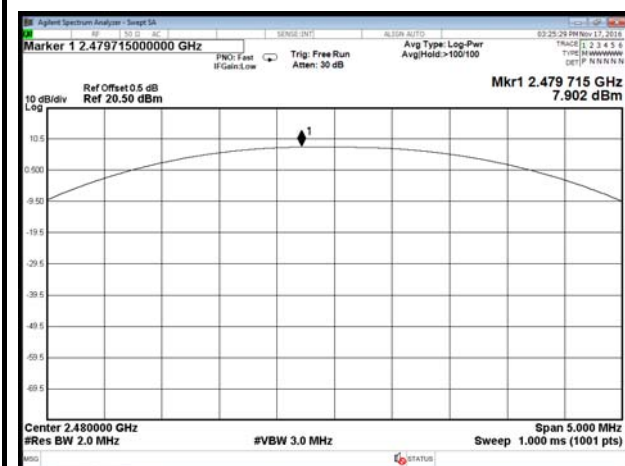
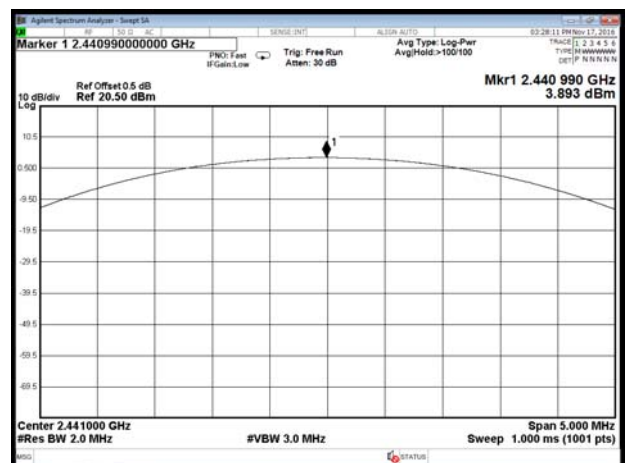
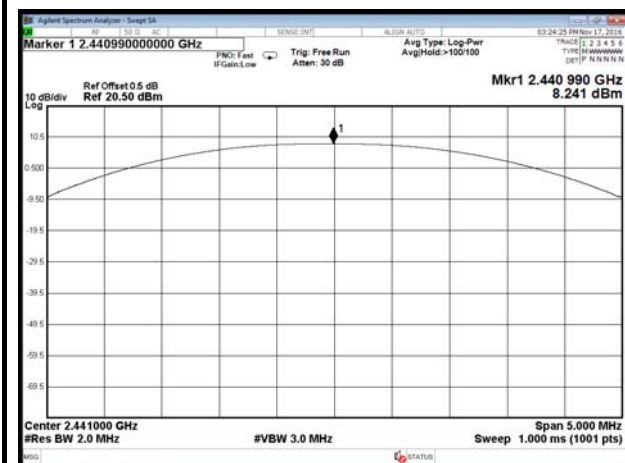
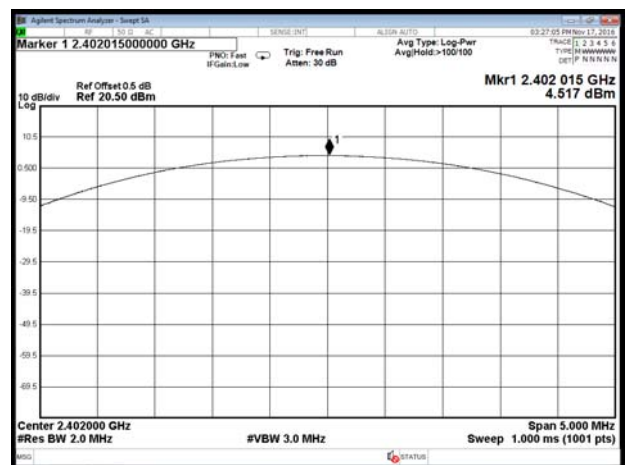
Modulation	Centre Frequency (MHz)	Peak Output Power		Limit
		dBm	W	
8-DPSK	2402	4.517	0.002829	21dBm (0.125W)
	2441	3.893	0.002451	
	2480	3.475	0.002226	

A.5.2 Measurement Plots

Modulation: GFSK



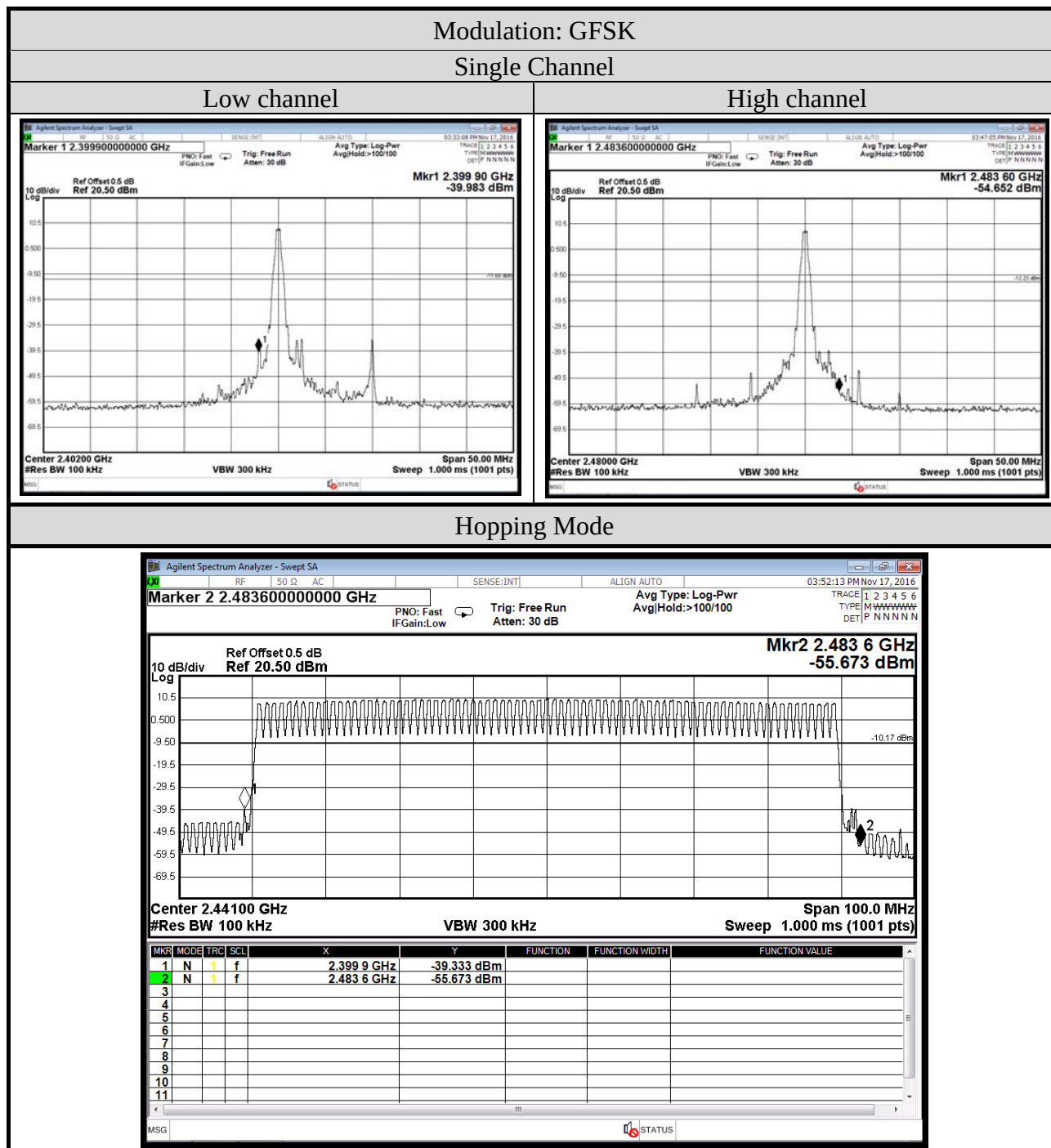
Modulation: 8-DPSK

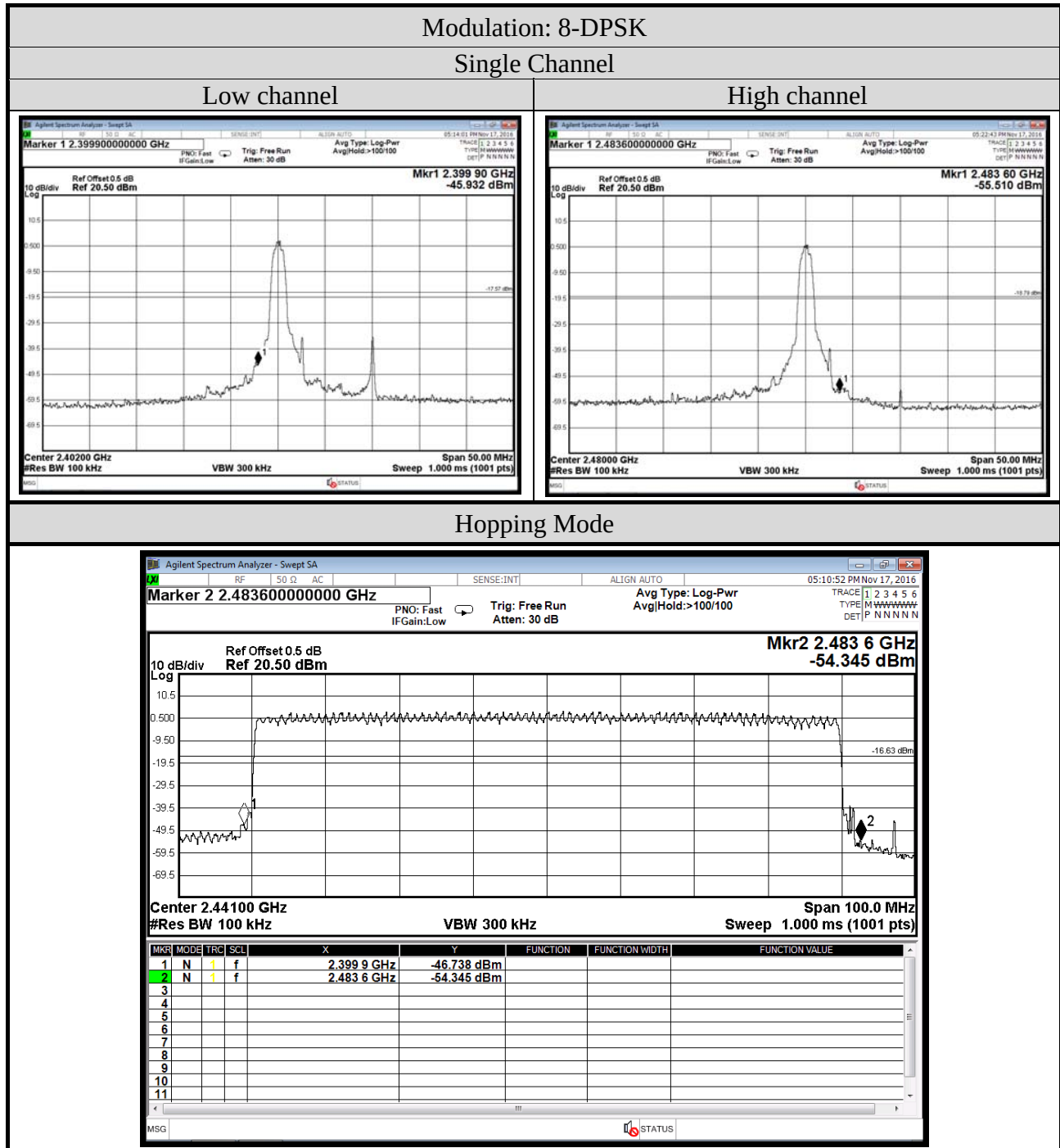


A.6 EMISSION LIMITATIONS MEASUREMENT

A.6.1 Band Edge

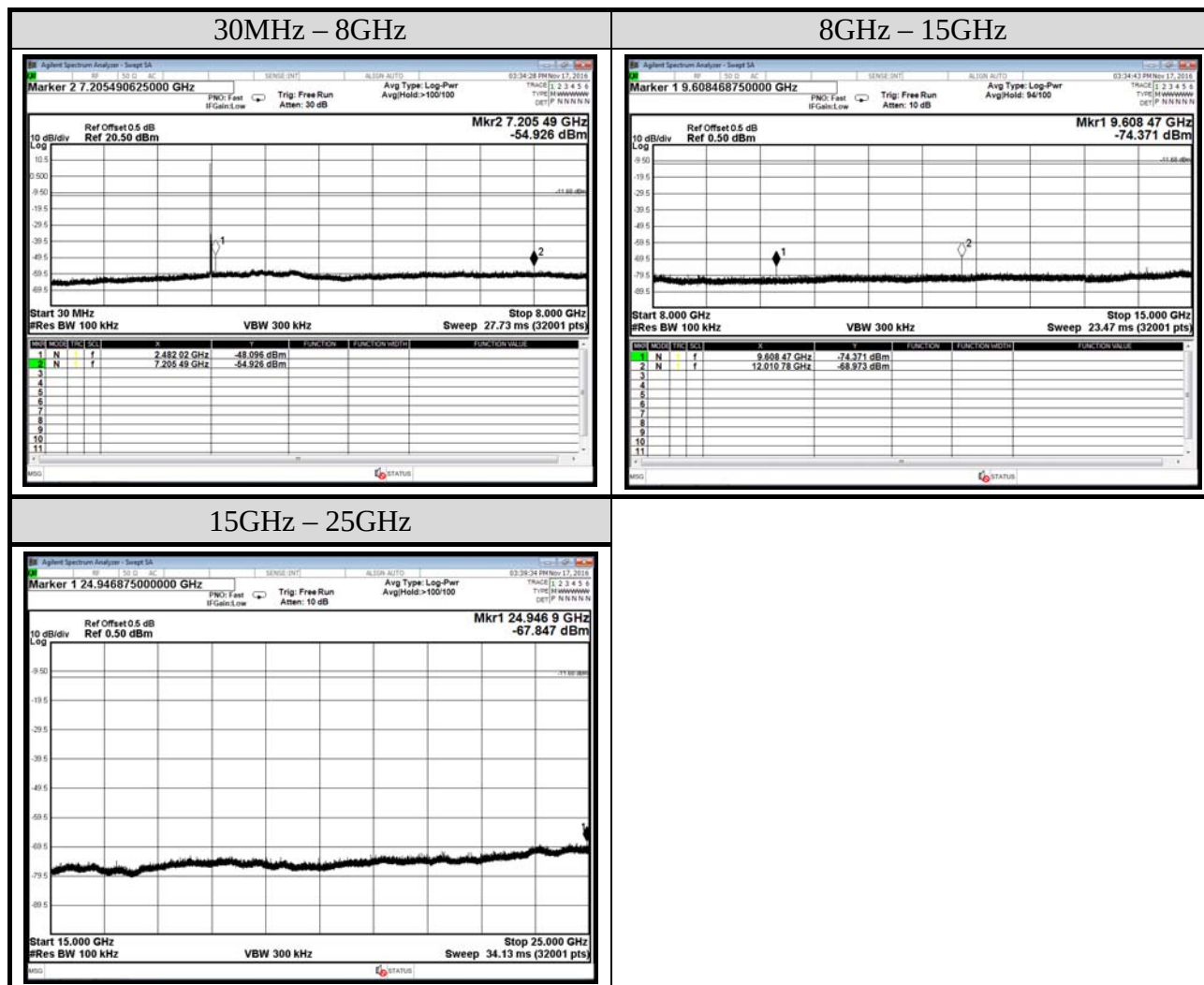
Test Date	2016/11/17	Temp./Hum.	25°C/58%
Cable Loss	0.5dB	Test Voltage	AC 120V, 60Hz (via AC Adapter)





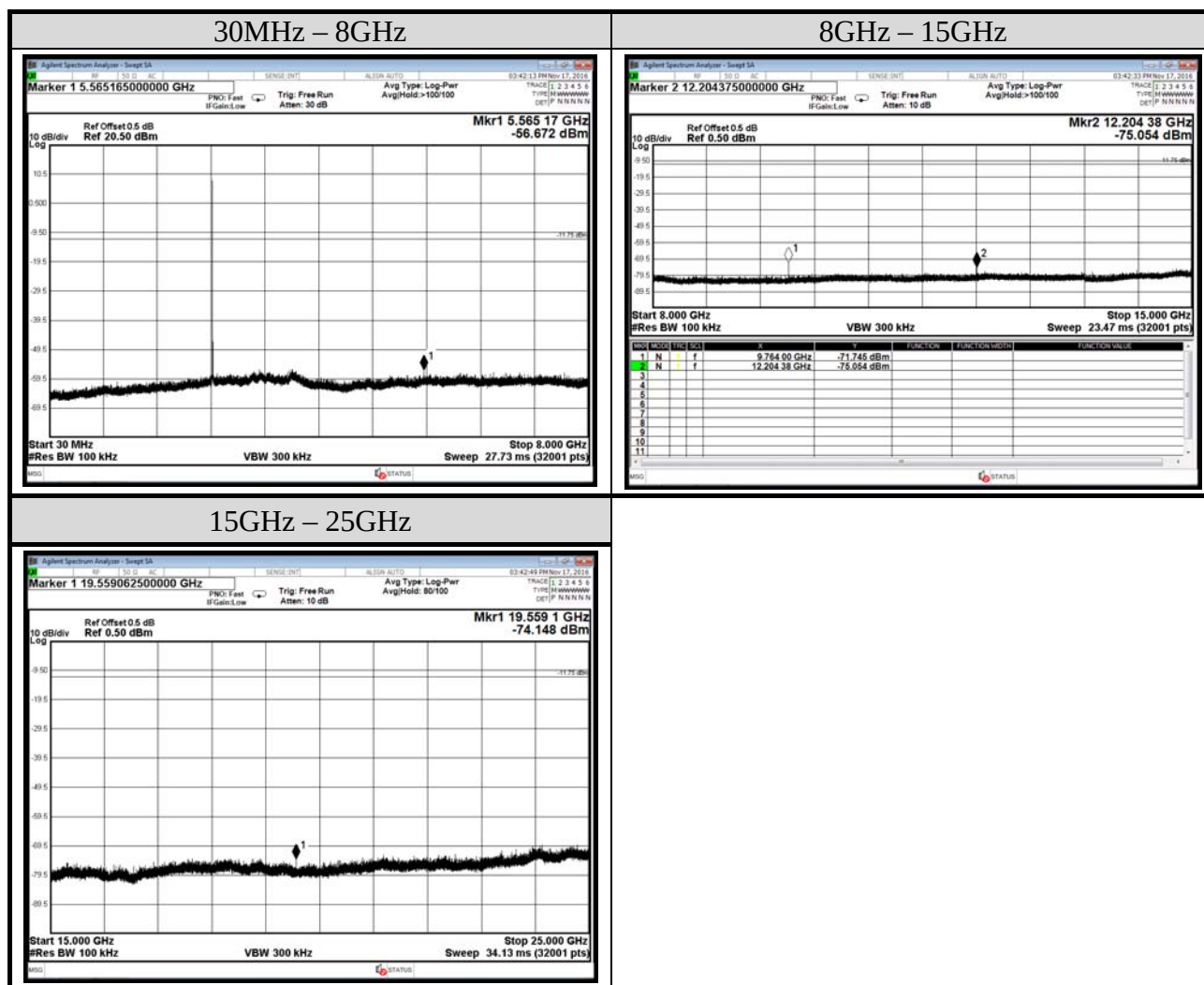
A.6.2 Spurious Emission

Test Date	2016/11/17	Temp./Hum.	25°C/58%
Modulation	GFSK	Frequency	2402MHz
Cable Loss	0.5dB	Test Voltage	AC 120V, 60Hz (via AC Adapter)



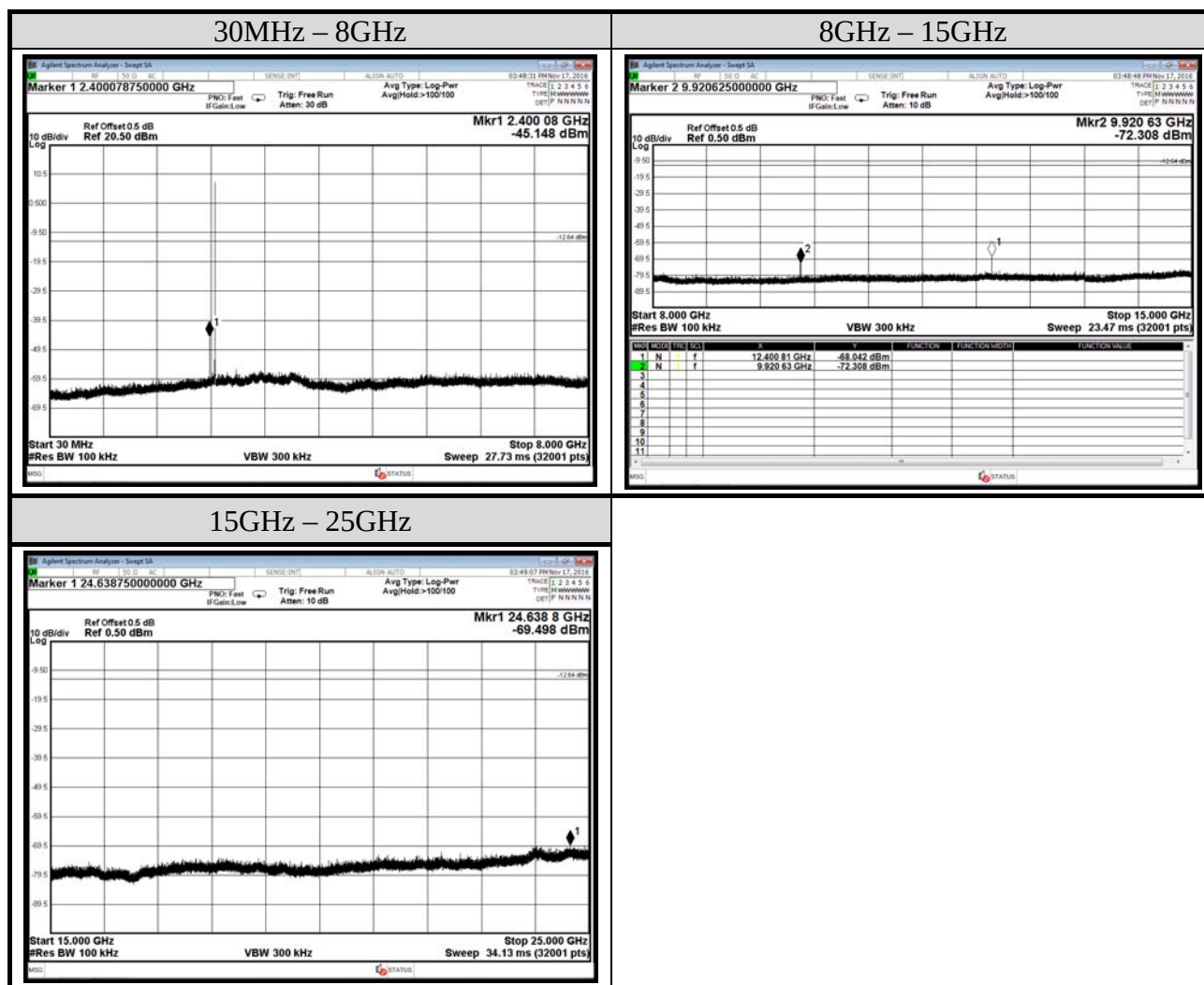
Note: All results have been included cable loss.

Test Date	2016/11/17	Temp./Hum.	25°C/58%
Modulation	GFSK	Frequency	2441MHz
Cable Loss	0.5dB	Test Voltage	AC 120V, 60Hz (via AC Adapter)



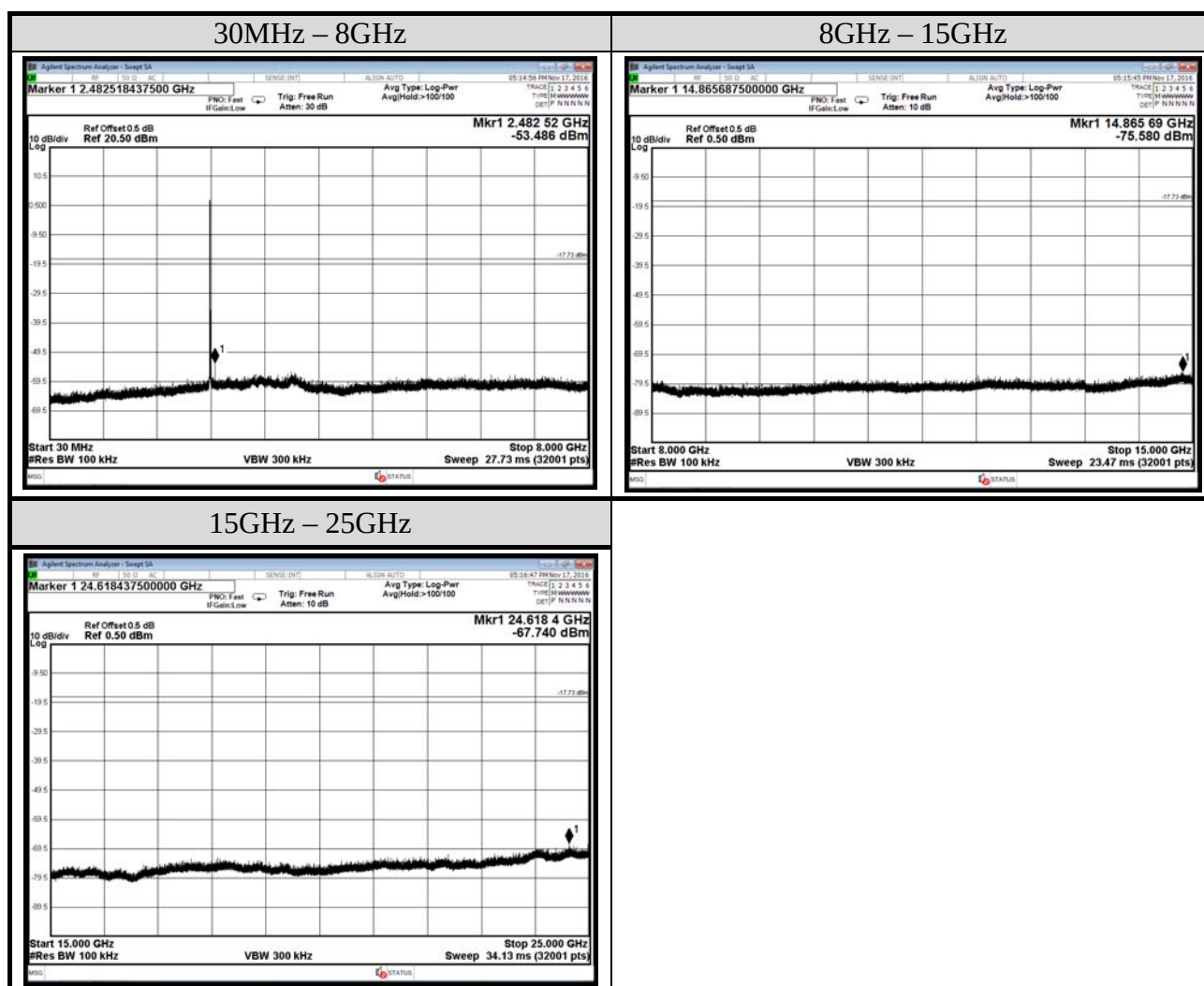
Note: All results have been included cable loss.

Test Date	2016/11/17	Temp./Hum.	25°C/58%
Modulation	GFSK	Frequency	2480MHz
Cable Loss	0.5dB	Test Voltage	AC 120V, 60Hz (via AC Adapter)



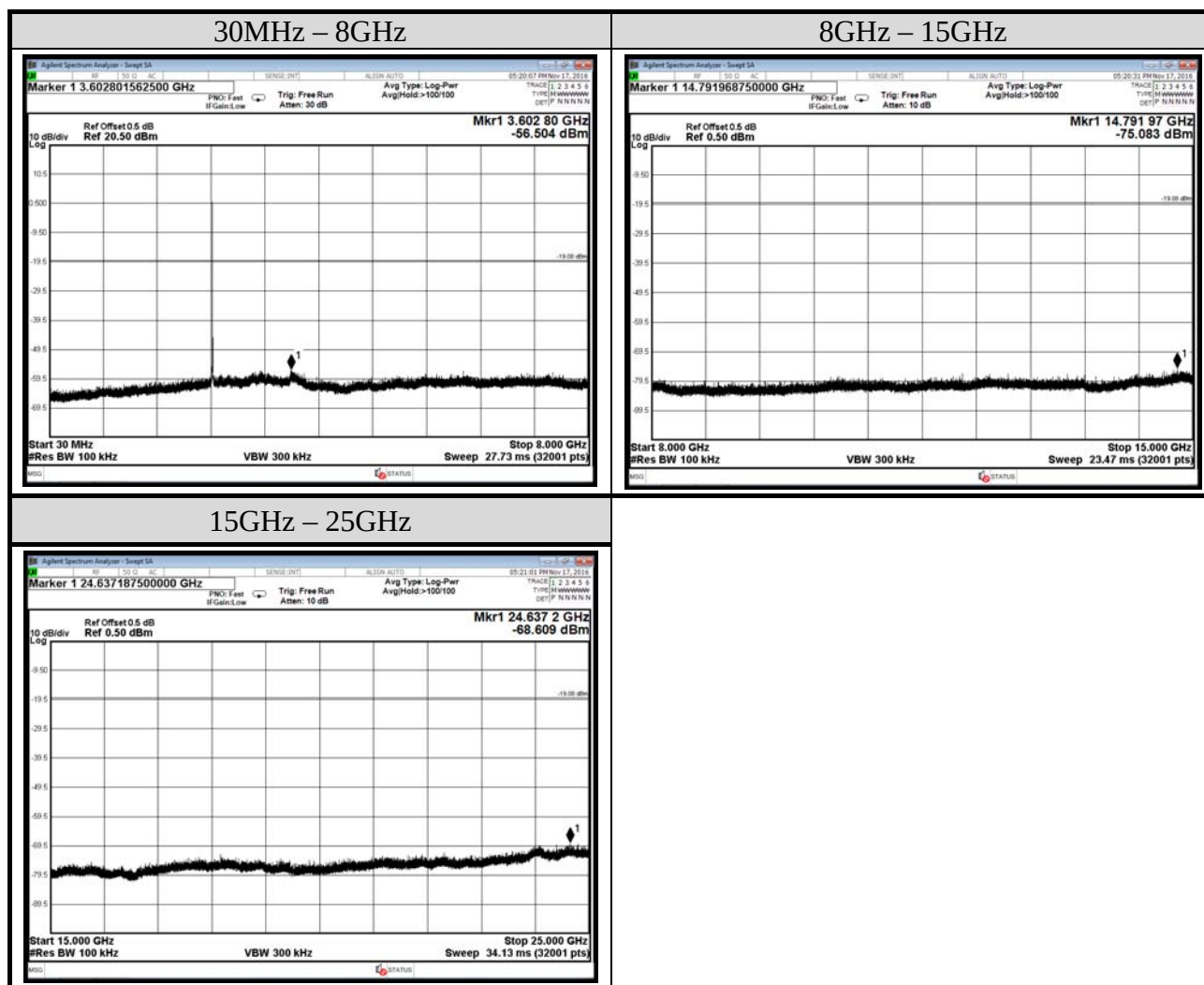
Note: All results have been included cable loss.

Test Date	2016/11/17	Temp./Hum.	25°C/58%
Modulation	8-DPSK	Frequency	2402MHz
Cable Loss	0.5dB	Test Voltage	AC 120V, 60Hz (via AC Adapter)



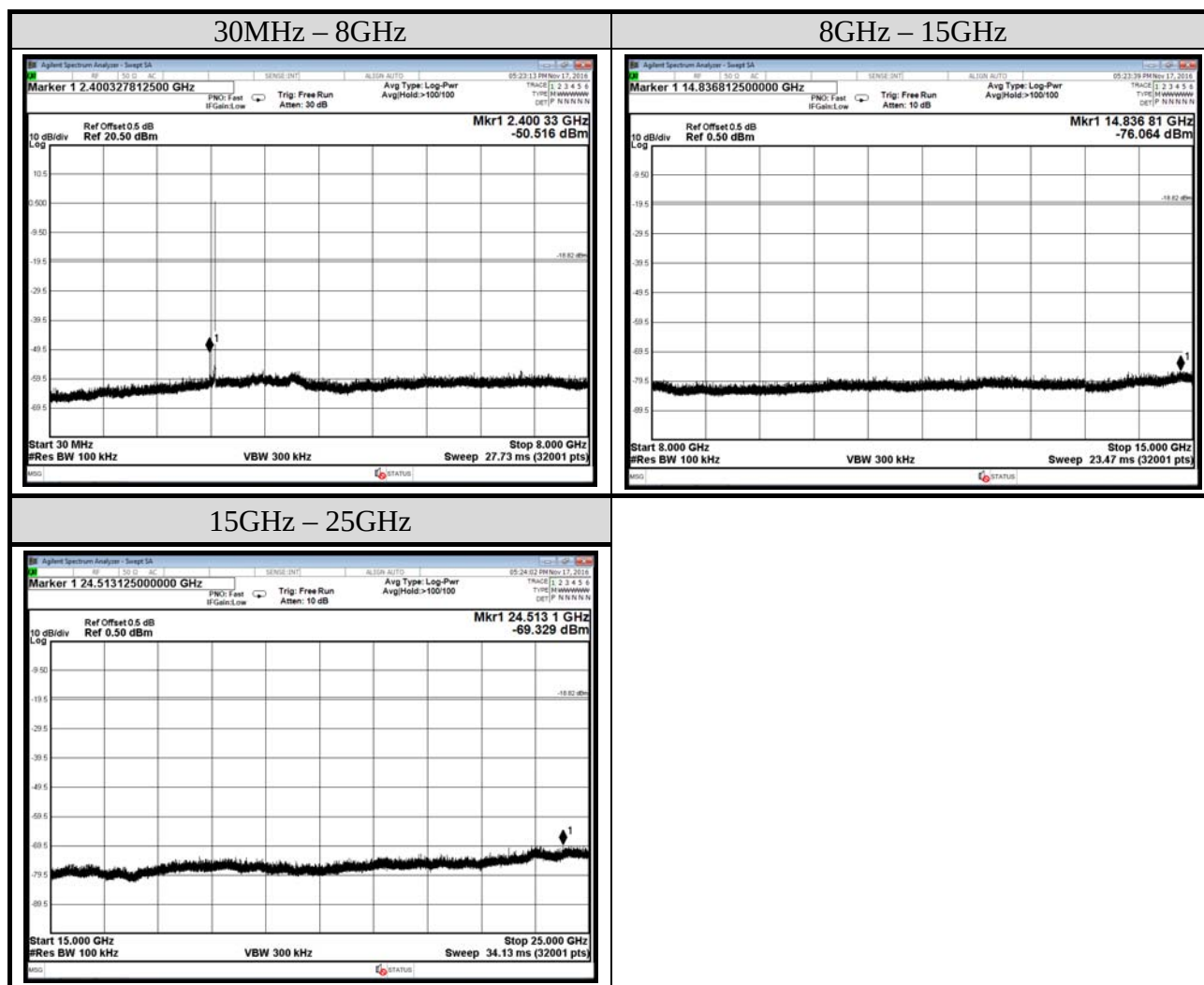
Note: All results have been included cable loss.

Test Date	2016/11/17	Temp./Hum.	25°C/58%
Modulation	8-DPSK	Frequency	2441MHz
Cable Loss	0.5dB	Test Voltage	AC 120V, 60Hz (via AC Adapter)



Note: All results have been included cable loss.

Test Date	2016/11/17	Temp./Hum.	25°C/58%
Modulation	8-DPSK	Frequency	2480MHz
Cable Loss	0.5dB	Test Voltage	AC 120V, 60Hz (via AC Adapter)



Note: All results have been included cable loss.