

APPLICATION FOR CERTIFICATION

On Behalf of

LG Electronics Inc.

MIB RADIO ENTRY PLUS

Models No. : LAC9313SE

FCC ID : BEJ9QK-LAC9313SE

Brand : LG

Prepared for : LG Electronics Inc.
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File Number : C1M1209225
Report Number : EM-F1010782
Date of Test : Sep. 25 ~ Oct. 26, 2012
Date of Report : Oct. 26, 2012

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TEST REPORT CERTIFICATION

Applicant : LG Electronics Inc.
EUT Description : MIB RADIO ENTRY PLUS
FCC ID : **BEJ9QK-LAC9313SE**
(A) Model No. : LAC9313SE
(B) Serial No. : N/A
(C) Power Supply : DC 12V
(D) Test Voltage : DC 12V (Via DC Power Supply)

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C, Oct 2011
ANSI C63.4/2003
FCC Public Notice DA 00-705, Mar. 2000

(FCC CFR 47 Part 15C, §15.205, §15.207, §15.209 and §15.247)

The device described above was tested by AUDIX Technology Corporation to determine the maximum emission levels emanating from the device. The maximum emission levels were compared to the FCC Part 15 subpart C limits.

The measurement results are contained in this test report and AUDIX Technology Corporation is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliant with the FCC official limits.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of AUDIX Technology Corporation.

Date of Test : Sep. 25 ~ Oct. 26, 2012 Date of Report : Oct. 26, 2012

Producer : Tina Huang
(Tina Huang/Administrator)

Signatory : Leon Liu
(Leon Liu/Deputy General Manager)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

Description	:	MIB RADIO ENTRY PLUS
Model Number	:	LAC9313SE
Serial Number	:	N/A
FCC ID	:	BEJ9QK-LAC9313SE
Brand	:	LG
Applicant	:	LG Electronics Inc. 19-1, Cheongho-ri, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do, 451-713 Korea
Fundamental Range	:	2402MHz - 2480MHz
Channel Number	:	79
Radio Technology	:	GFSK, π /4DQPSK, 8-DPSK
Antenna	:	Chip Antenna, Gain: 3.5dBi (Peak)
Date of Receipt of Sample	:	Sep. 25, 2012
Date of Test	:	Sep. 25 ~ Oct. 26, 2012

1.2. Tested Supporting System Details

1.2.1. DC POWER SUPPLY

Model Number : 3303A
 Serial Number : 721773
 Manufacturer : TOP WARD
 DC Power Cable : Non-Shielded, Detachable, 0.8m
 AC Power Cord : Non-Shielded, Detachable, 1.8m

1.3. Description of Test Facility

Name of Firm : **AUDIX Technology Corporation**
EMC Department
 No. 67-4, Dingfu, Linkou Dist.,
 New Taipei City 244, Taiwan, R.O.C.

Test Site (AC) : **Semi-Anechoic Chamber**
 No. 67-4, Dingfu, Linkou Dist.,
 New Taipei City 244, Taiwan, R.O.C.
 May 11, 2012 File on
 Federal Communication Commission
 Registration Number: 90993

NVLAP Lab. Code : 200077-0

TAF Accreditation No : 1724

1.4. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty (dB)
Radiation Test (Distance: 3m)	30MHz~300MHz	±2.91dB
	300MHz~1000MHz	±2.94dB
	Above 1GHz	± 5.02dB

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	± 0.52dBm
Band Edges	± 0.13dB

2. CONDUCTED EMISSION MEASUREMENT

【The EUT only employs DC power for operation, no conductive emission limits are required according to FCC Part 15 Section §15.207】

3. RADIATED EMISSION MEASUREMENT

3.1. Test Equipment

The following test equipment was used during the radiated emission measurement:

3.1.1. For Frequency Range 30MHz~1000MHz (at Semi-Anechoic Chamber)

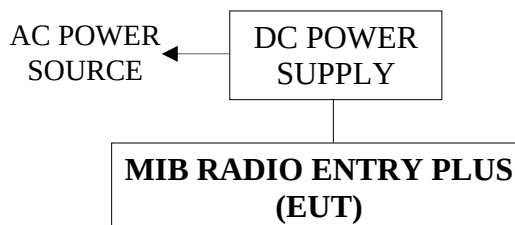
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	E4446A	US44300366	Aug. 07, 12'	Aug. 06, 13'
2.	Test Receiver	R & S	ESCS30	100338	Jul. 04, 12'	Jul. 03, 13'
3.	Amplifier	HP	8447D	2944A06305	Feb. 13, 12'	Feb. 12, 13'
4.	Log Periodic Antenna	Schwarzbeck	UHALP 9108-A	0810	Mar. 03, 12'	Mar. 02, 13'
5.	Biconical Antenna	CHASE	VBA6106A	1264	Mar. 03, 12'	Mar. 02, 13'
6.	Bluetooth Test Set	Anritsu	MT8852B	6K00005697	Mar. 21, 12'	Mar. 20, 13'

3.1.2. For Frequency Above 1GHz (at Semi-Anechoic Chamber)

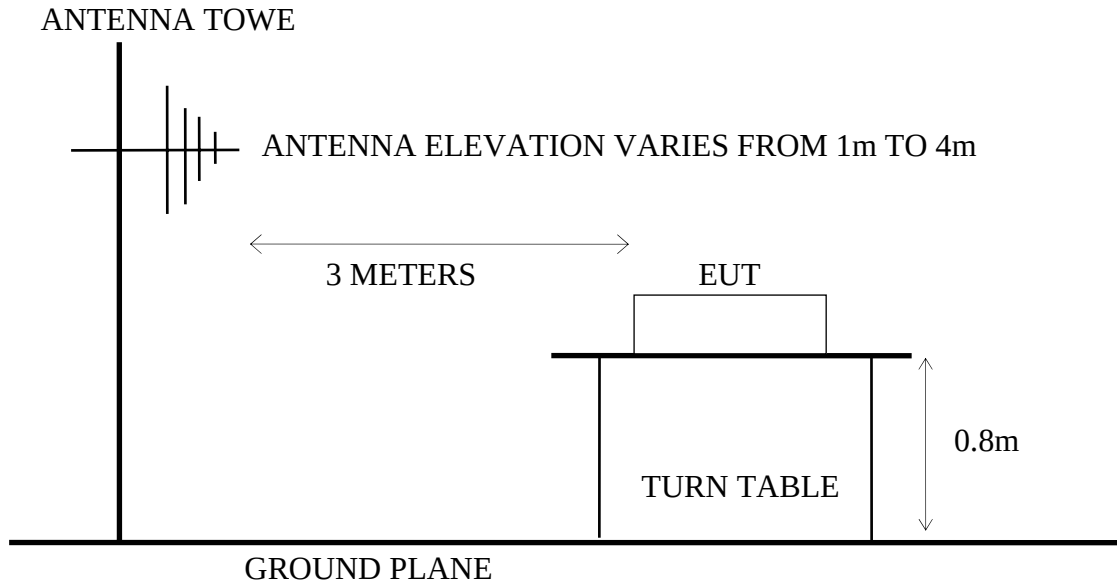
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	E4446A	US44300366	Aug. 07, 12'	Aug. 06, 13'
2.	Test Receiver	R & S	ESCS30	100338	Jul. 04, 12'	Jul. 03, 13'
3.	Pre-Amplifier	HP	8449B	3008A00529	Dec. 09, 11'	Dec. 08, 12'
4.	2.4GHz Notch Filter	EWT	EWT-14-0 070-R1	G2	Feb. 14, 12'	Feb. 13, 13'
5.	3.5G High Pass Filter	HP	84300-800 38	005	Dec. 15, 11'	Dec. 14, 12'
6.	Horn Antenna	EMCO	3115	9112-3775	May 09, 12'	May 08, 13'
7.	Horn Antenna	EMCO	3116	2653	Oct. 07, 11'	Oct. 06, 12'
8.	Bluetooth Test Set	Anritsu	MT8852B	6K00005697	Mar. 21, 12'	Mar. 20, 13'

3.2. Block Diagram of Test Setup

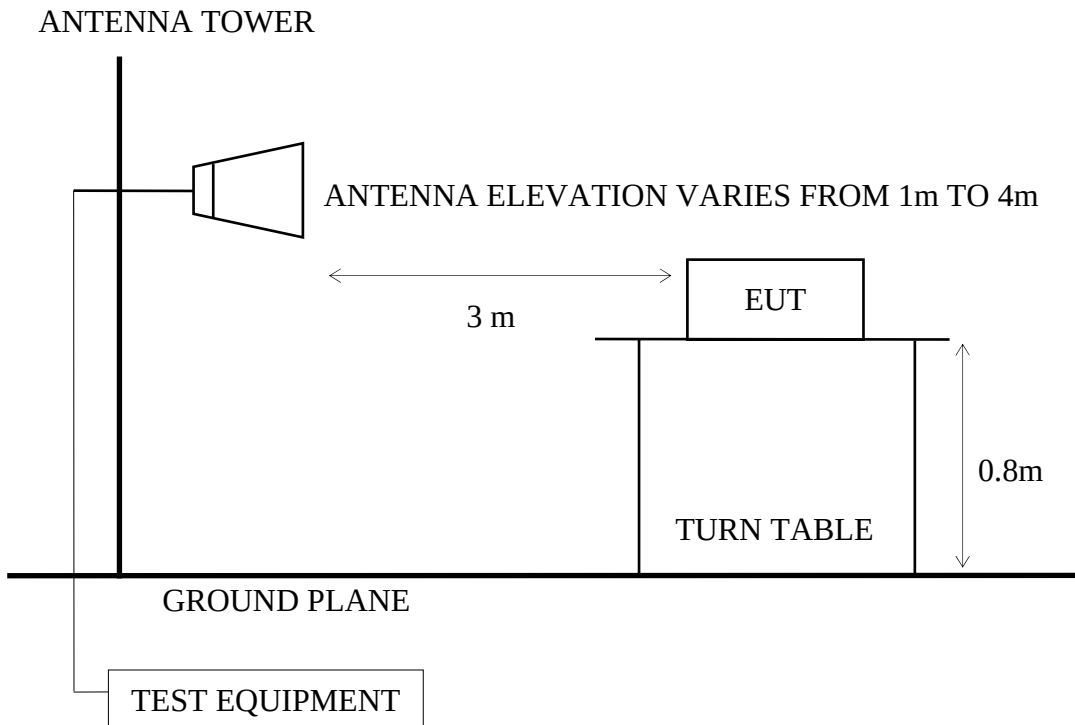
3.2.1. Block Diagram of connection between EUT and simulators



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



3.2.3. Semi-Anechoic Chamber (3m) Setup Diagram for above 1GHz



3.3. Radiated Emission Limits (§15.209)

Frequency MHz	Distance Meters	Field Strengths Limits	
		$\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
Above 960	3	500	54.0
Above 1000	3	74.0 $\text{dB}\mu\text{V/m}$ (Peak) 54.0 $\text{dB}\mu\text{V/m}$ (Average)	

- Remark :
- (1) Emission level ($\text{dB}\mu\text{V/m}$) = 20 log Emission level ($\mu\text{V/m}$)
 - (2) The tighter limit applies at 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) The limits in this table are based on CFR 47 Part 15.205(a)(b) and Part 15.209 (a).
 - (5) The over 1GHz limit, FCC limit is used based on CFR 47 Part 15.35 (b) and Part 15.205(b) & Part 15.209(e) and Part 15.207(c).

3.4. Operating Condition of EUT

- 3.4.1. Set up the EUT (MIB RADIO ENTRY PLUS) and simulator as shown on 3.2.1.
- 3.4.2. To turn on the power of all equipments.
- 3.4.3. The EUT was set to continuously transmit signals at 2402MHz, 2441MHz and 2480MHz via Bluetooth test set during testing.

3.5. Test Procedure

The EUT and its simulators were placed on a turn table which was 0.8 meter above the ground. The turn table rotated 360 degrees to determine the position of the maximum emission level. EUT was set 3 meters away from the receiving antenna which was mounted on an antenna tower. The antenna moved up and down between 1 to 4 meters to find out the maximum emission level. Broadband antenna such as calibrated biconical and log-periodical antenna or horn antenna were used as a receiving antenna. Both horizontal and vertical polarization of the antenna were set on measurement. In order to find the maximum emission, all of the interface cables were manipulated according to FCC ANSI C63.4-2003 regulation, and the measurement guideline was according to FCC Public Notice DA 00-705.

The bandwidth of the R&S Test Receiver ESCS30 was set at 120kHz. (For 30MHz to 1000MHz)

The resolution bandwidth and video bandwidth of test spectrum analyzer is 1MHz for peak detection (PK) at frequency above 1GHz.

The resolution bandwidth of test spectrum analyzer is 1MHz and the video bandwidth is 10Hz for average detection (AV) at frequency above 1GHz.

The frequency range from 30MHz to 25GHz (Up to 10th harmonics from fundamental frequency) was checked. Pursuant to ANSI 4.2.2, peak detector is an alternate option for frequency from 30MHz to 1000MHz.

Above 1GHz was measured with peak and average detector. For frequency from 1GHz to 25GHz, we checked it in 1 meter distance and with a shorter cable 2 meter instead of original's. There is no signal exist.

3.6. Radiated Emission Measurement Results

PASSED. (All the emissions not reported below are too low against the prescribed limits.)

EUT : MIB RADIO ENTRY PLUS

M/N : LAC9313SE

Test Date : Sep. 26, 2012 Temperature : 24°C Humidity : 60%

For Frequency Range 30MHz-1000MHz:

[Note: Three types of modulation (8-DPSK, π /4DQPSK, GFSK) were evaluated but only the worst case (8-DPSK) was reported in this report.]

The EUT with the following test modes were tested during the testing and all the test results are listed in section 3.6.1.

No.	Test Mode and Frequency		Reference Test Data No.	
			Horizontal	Vertical
1.	Transmitting	2402MHz (CH0)	# 2	# 1
2.		2441MHz (CH39)	# 1	# 2
3.		2480MHz (CH78)	# 2	# 1

* Type of modulation: 8-DPSK.

* All above final readings were measured with Quasi-Peak detector.

For Frequency Range above 1GHz:

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

For Restricted Bands:

[Note: Three types of modulation (8-DPSK, π /4DQPSK, GFSK) were evaluated but only the worst case (8-DPSK) was reported in this report.]

The EUT was tested in restricted bands and all the test results are listed in section 3.6.2. (The restricted bands defined in part 15.205(a))

No.	Test Mode and Frequency		Reference Test Data No.	
			Horizontal	Vertical
1.	Transmitting	2402MHz (CH0)	# 3, 4	# 1 , 2
2.		2480MHz (CH78)	# 5, 6	# 7, 8

* Type of modulation: 8-DPSK.

3.6.1. Frequency Range 30MHz-1000MHz Measurement Result

Transmit, Frequency: 2402MHz (8DPSK)

Site no. : A/C Chamber site Data no. : 2
 Dis. / Ant. : 3m VBA6106A/UHALP9108A Ant. pol. : HORIZONTAL
 Limit : FCC PART-15C
 Env. / Ins. : E4446A 24°C/60% Vic Fong
 EUT : LAC9313SE
 Power Rating : DC 12V
 Test Mode : TX2402 (8DPSK)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	61.040	12.55	1.60	17.48	31.63	40.00	8.37	Peak
2	474.260	18.48	5.85	8.85	33.17	46.00	12.83	Peak
3	667.290	22.80	6.40	12.49	41.69	46.00	4.31	Peak
4	800.180	24.14	6.90	11.39	42.42	46.00	3.58	Peak
5	963.140	26.63	7.60	9.83	44.06	54.00	9.94	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

Site no. : A/C Chamber site Data no. : 1
 Dis. / Ant. : 3m VBA6106A/UHALP9108A Ant. pol. : VERTICAL
 Limit : FCC PART-15C
 Env. / Ins. : E4446A 24°C/60% Vic Fong
 EUT : LAC9313SE
 Power Rating : DC 12V
 Test Mode : TX2402 (8DPSK)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	64.920	11.81	1.70	24.93	38.44	40.00	1.56	Peak
2	532.460	19.64	7.00	7.50	34.14	46.00	11.86	Peak
3	667.290	22.80	6.40	9.33	38.53	46.00	7.47	Peak
4	800.180	24.14	6.90	7.92	38.96	46.00	7.04	Peak
5	963.140	26.63	7.60	3.75	37.98	54.00	16.02	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

Transmit, Frequency: 2441MHz (8DPSK)

Site no. : A/C Chamber site Data no. : 1
 Dis. / Ant. : 3m VBA6106A/UHALP9108A Ant. pol. : HORIZONTAL
 Limit : FCC PART-15C
 Env. / Ins. : E4446A 24°C/60% Vic Fong
 EUT : LAC9313SE
 Power Rating : DC 12V
 Test Mode : TX2441 (8DPSK)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	59.100	13.16	1.60	15.84	30.60	40.00	9.40	Peak
2	428.670	17.23	5.20	10.94	33.37	46.00	12.63	Peak
3	667.290	22.80	6.40	13.72	42.92	46.00	3.08	Peak
4	800.180	24.14	6.90	13.20	44.23	46.00	1.77	Peak
5	963.140	26.63	7.60	8.60	42.83	54.00	11.17	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official
 limit are not reported.

Site no. : A/C Chamber site Data no. : 2
 Dis. / Ant. : 3m VBA6106A/UHALP9108A Ant. pol. : VERTICAL
 Limit : FCC PART-15C
 Env. / Ins. : E4446A 24°C/60% Vic Fong
 EUT : LAC9313SE
 Power Rating : DC 12V
 Test Mode : TX2441 (8DPSK)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	56.190	14.11	1.60	17.99	33.71	40.00	6.29	Peak
2	532.460	19.64	7.00	6.91	33.55	46.00	12.45	Peak
3	667.290	22.80	6.40	10.91	40.11	46.00	5.89	Peak
4	800.180	24.14	6.90	9.06	40.10	46.00	5.90	Peak
5	963.140	26.63	7.60	4.54	38.77	54.00	15.23	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official
 limit are not reported.

Transmit, Frequency: 2480MHz (8DPSK)

Site no. : A/C Chamber site Data no. : 2
 Dis. / Ant. : 3m VBA6106A/UHALP9108A Ant. pol. : HORIZONTAL
 Limit : FCC PART-15C
 Env. / Ins. : E4446A 24°C/60% Vic Fong
 EUT : LAC9313SE
 Power Rating : DC 12V
 Test Mode : TX2480 (8DPSK)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	61.040	12.55	1.60	22.41	36.56	40.00	3.44	Peak
2	667.290	22.80	6.40	12.91	42.11	46.00	3.89	Peak
3	800.180	24.14	6.90	11.03	42.06	46.00	3.94	Peak
4	963.140	26.63	7.60	9.37	43.60	54.00	10.40	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

Site no. : A/C Chamber site Data no. : 1
 Dis. / Ant. : 3m VBA6106A/UHALP9108A Ant. pol. : VERTICAL
 Limit : FCC PART-15C
 Env. / Ins. : E4446A 24°C/60% Vic Fong
 EUT : LAC9313SE
 Power Rating : DC 12V
 Test Mode : TX2480 (8DPSK)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	53.280	15.09	1.50	19.22	35.81	40.00	4.19	Peak
2	532.460	19.64	7.00	12.25	38.89	46.00	7.11	Peak
3	667.290	22.80	6.40	10.01	39.21	46.00	6.79	Peak
4	800.180	24.14	6.90	8.95	39.99	46.00	6.01	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

3.6.2. Restricted Bands Measurement Results

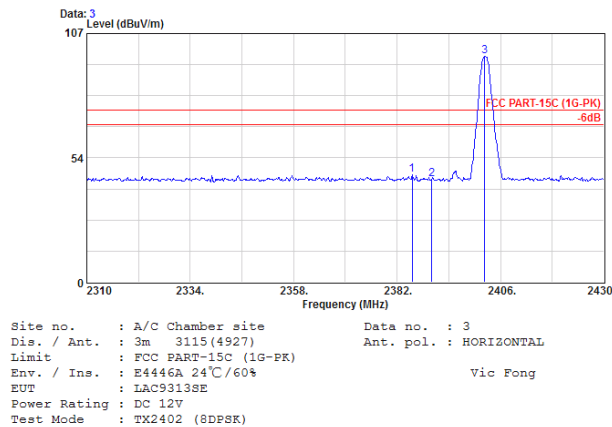
Date of Test : Sep. 26, 2012 Temperature : 24°C

EUT : MIB RADIO ENTRY PLUS Humidity : 60%

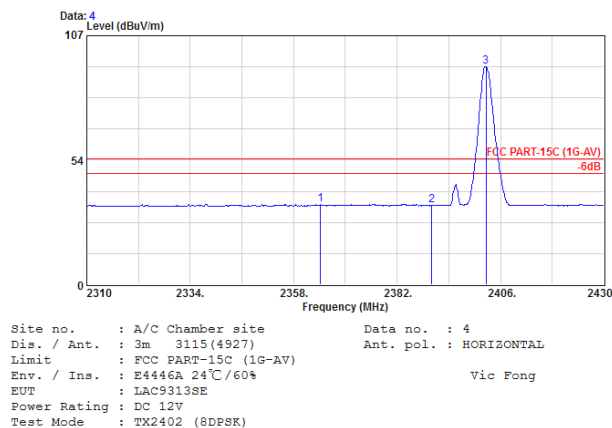
Test Mode : Transmitting Mode, Frequency: 2402MHz (CH0), 8-DPSK



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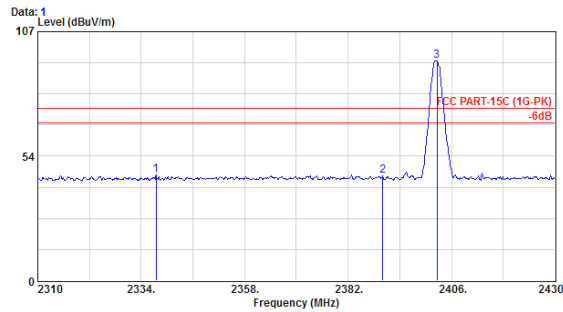
Date of Test : Sep. 26, 2012 Temperature : 24°C

EUT : MIB RADIO ENTRY PLUS Humidity : 60%

Test Mode : Transmitting Mode, Frequency: 2402MHz (CH0), 8-DPSK



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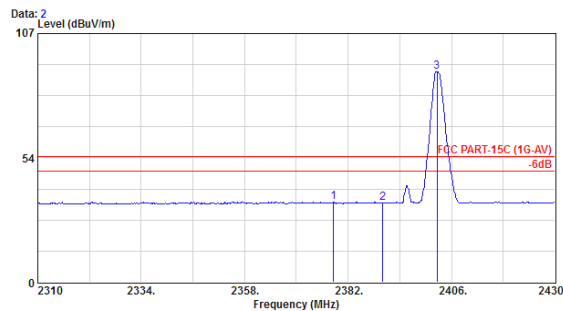
Site no. : A/C Chamber site Data no. : 1
Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
Limit : FCC PART-15C (1G-PK)
Env. / Ins. : E4446A 24°C/60% Vic Fong
EUT : LAC9313SE
Power Rating : DC 12V
Test Mode : TX2402 (8DPSK)

		Ant.	Cable		Emission			
	Freq.	Factor	Loss	Reading	Level	Limits	Margin	Remark
	(MHz)	(dB/m)	(dB)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)	
1	2337.480	28.36	6.27	10.84	45.47	74.00	28.53	Peak
2	2390.040	28.47	6.34	10.07	44.89	74.00	29.11	Peak
3	2402.640	28.51	6.36	59.66	94.53	74.00	-20.53	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.



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Site no. : A/C Chamber site Data no. : 2
Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
Limit : FCC PART-15C (1G-AV)
Env. / Ins. : E4446A 24°C/60% Vic Fong
EUT : LAC9313SE
Power Rating : DC 12V
Test Mode : TX2402 (8DPSK)

		Ant.	Cable		Emission			
	Freq.	Factor	Loss	Reading	Level	Limits	Margin	Remark
	(MHz)	(dB/m)	(dB)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)	
1	2378.640	28.43	6.32	-0.21	34.55	54.00	19.45	Average
2	2390.040	28.47	6.34	-0.84	33.98	54.00	20.02	Average
3	2402.640	28.51	6.36	55.58	90.45	54.00	-36.45	Average

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

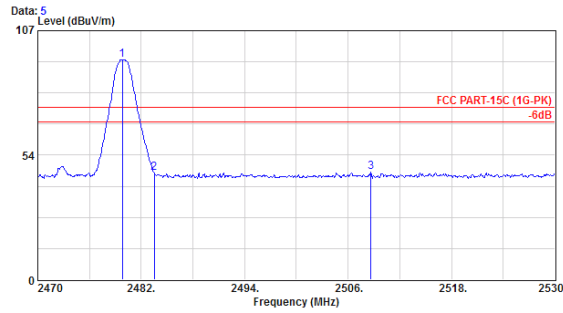
Date of Test : Sep. 26, 2012 Temperature : 24°C

EUT : MIB RADIO ENTRY PLUS Humidity : 60%

Test Mode : Transmitting Mode, Frequency: 2480MHz (CH78), 8-DPSK



AUDIX Corp. EMC Laboratory
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Email:ttenc@ttenc.com.tw



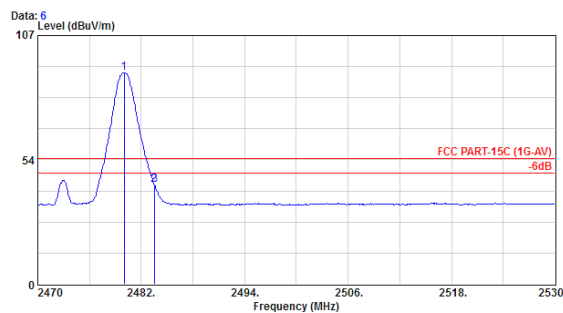
Site no. : A/C Chamber site Data no. : 5
Dis. / Ant. : 3m 3115 (4927) Ant. pol. : HORIZONTAL
Limit : FCC PART-15C (1G-PK)
Env. / Ins. : E4446A 24°C/60% Vic Fong
EUT : LAC9313SE
Power Rating : DC 12V
Test Mode : TX2480 (8DPSK)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.840	28.66	6.44	59.37	94.48	74.00	-20.48	Peak
2	2483.500	28.66	6.45	10.67	45.79	74.00	28.21	Peak
3	2508.640	28.76	6.48	11.11	46.35	74.00	27.65	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.



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Site no. : A/C Chamber site Data no. : 6
Dis. / Ant. : 3m 3115 (4927) Ant. pol. : HORIZONTAL
Limit : FCC PART-15C (1G-AV)
Env. / Ins. : E4446A 24°C/60% Vic Fong
EUT : LAC9313SE
Power Rating : DC 12V
Test Mode : TX2480 (8DPSK)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.020	28.66	6.44	55.94	91.05	54.00	-37.05	Average
2	2483.500	28.66	6.45	7.80	42.92	54.00	11.08	Average
3	2483.560	28.66	6.45	7.42	42.54	54.00	11.46	Average

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

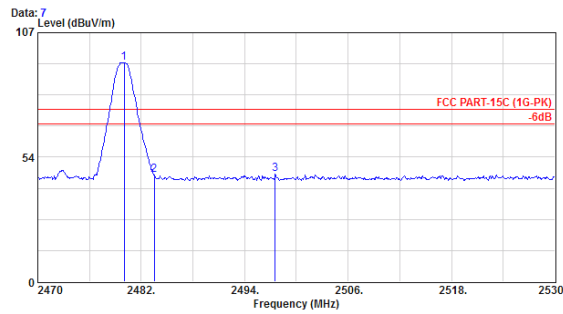
Date of Test : Sep. 26, 2012 Temperature : 24°C

EUT : MIB RADIO ENTRY PLUS Humidity : 60%

Test Mode : Transmitting Mode, Frequency: 2480MHz (CH78), 8-DPSK



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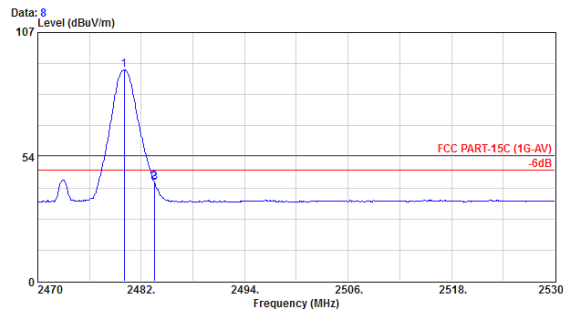
Site no. : A/C Chamber site Data no. : 7
Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
Limit : FCC PART-15C (1G-PK)
Env. / Ins. : E4446A 24°C/60% Vic Fong
EUT : LAC9313SE
Power Rating : DC 12V
Test Mode : TX2480 (8DPSK)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.020	28.66	6.44	59.11	94.22	74.00	-20.22	Peak
2	2483.500	28.66	6.45	10.55	45.66	74.00	28.34	Peak
3	2497.540	28.70	6.47	11.17	46.34	74.00	27.66	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.



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Site no. : A/C Chamber site Data no. : 8
Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
Limit : FCC PART-15C (1G-AV)
Env. / Ins. : E4446A 24°C/60% Vic Fong
EUT : LAC9313SE
Power Rating : DC 12V
Test Mode : TX2480 (8DPSK)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.020	28.66	6.44	55.84	90.95	54.00	-36.95	Average
2	2483.500	28.66	6.45	7.69	42.80	54.00	11.20	Average
3	2483.560	28.66	6.45	7.25	42.36	54.00	11.64	Average

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

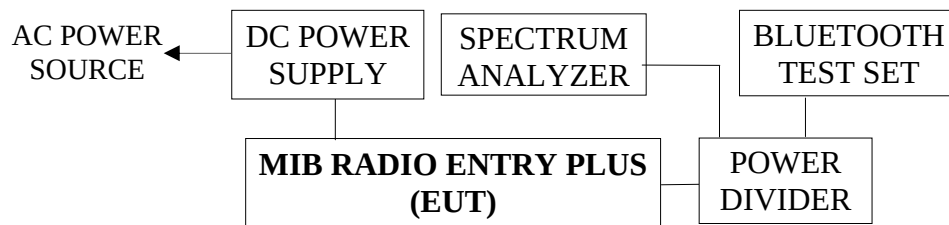
4. 20dB BANDWIDTH MEASUREMENT

4.1. Test Equipment

The following test equipment was used during the 20dB bandwidth measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9030A-544	US51350140	Oct. 14, 11'	Oct. 13, 12'
2.	Bluetooth Test Set	Anritsu	MT8852B	6K00005697	Mar. 21, 12'	Mar. 20, 13'
3.	Power Divider	Anritsu	K240C	19728	Jan. 05, 12'	Jan. 04, 13'

4.2. Block Diagram of Test Setup



4.3. Specification Limits (§15.247(a)(1))

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.

4.4. Operating Condition of EUT

- 4.4.1. Set up the EUT and simulator as shown on 4.2.
- 4.4.2. To turn on the power of all equipment.
- 4.4.3. The EUT (MIB RADIO ENTRY PLUS) was controlled and set as continuous transmitting via Bluetooth test set during testing.

4.5. Test Procedure

The transmitter output was connected to the spectrum analyzer. The RBW of the fundamental frequency was measure by spectrum analyzer 1% of the 20dB bandwidth and the setting equal to RBW and VBW is equal to RBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

The measurement guideline was according to FCC Public Notice DA 00-705.

4.6. Test Results

PASSED. All the test results are attached in next pages.

[Note: Three types of modulation (8-DPSK, π /4DQPSK, GFSK) were evaluated but only two types of modulation (8-DPSK and GFSK) were reported in this report.]

EUT : MIB RADIO ENTRY PLUS

M/N : LAC9313SE

Test Date : Sep. 25, 2012 Temperature : 25 °C Humidity : 59 %

4.6.1. Type of Modulation: 8-DPSK

No.	Channel	Test Frequency	20dB Bandwidth	2/3 (20dB Bandwidth)
1.	0	2402MHz	1.185MHz	0.790MHz
2.	39	2441MHz	1.182MHz	0.788MHz
3.	78	2480MHz	1.182MHz	0.788MHz

The maximum two-thirds of the 20dB bandwidth shall be at maximum 0.788MHz.

4.6.2. Type of Modulation: GFSK

No.	Channel	Test Frequency	20dB Bandwidth	2/3 (20dB Bandwidth)
1.	0	2402MHz	792kHz	528kHz
2.	39	2441MHz	789kHz	526kHz
3.	78	2480MHz	789kHz	526kHz

The maximum two-thirds of the 20dB bandwidth shall be at maximum 528kHz.

Figure 1: 8-DPSK, Channel 0, Frequency: 2402MHz

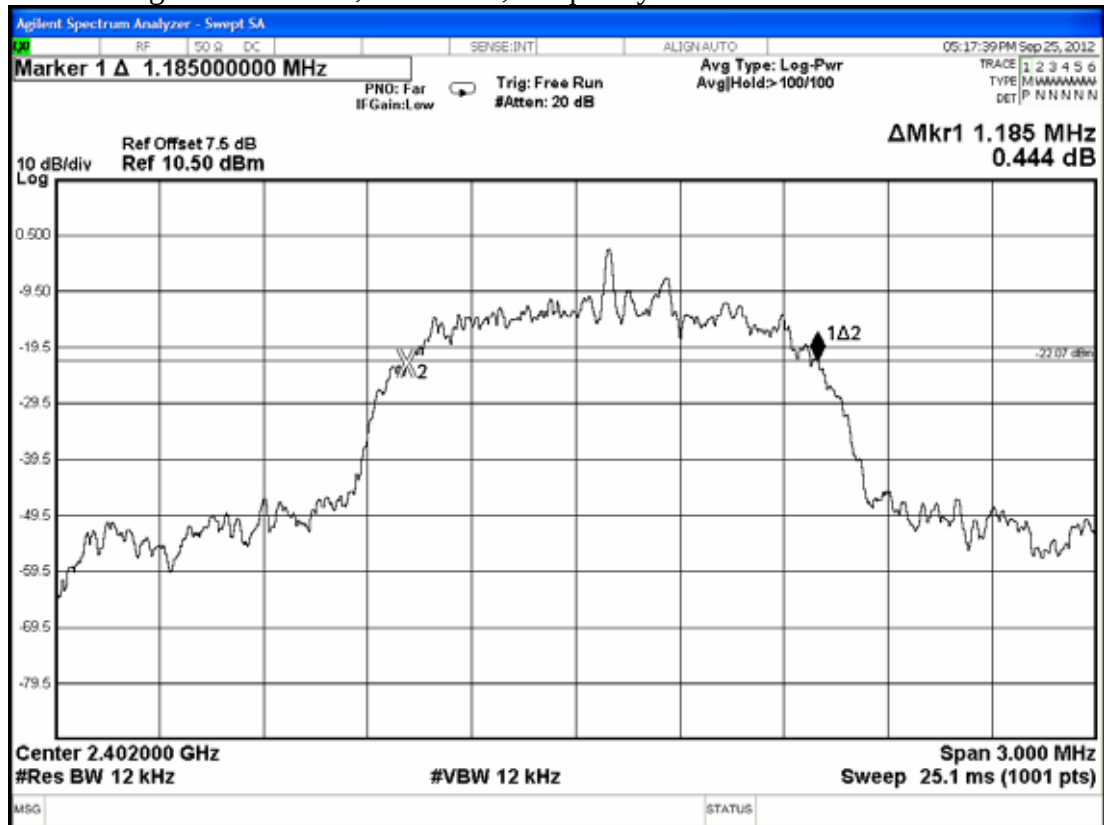


Figure 2: 8-DPSK, Channel 39, Frequency: 2441MHz

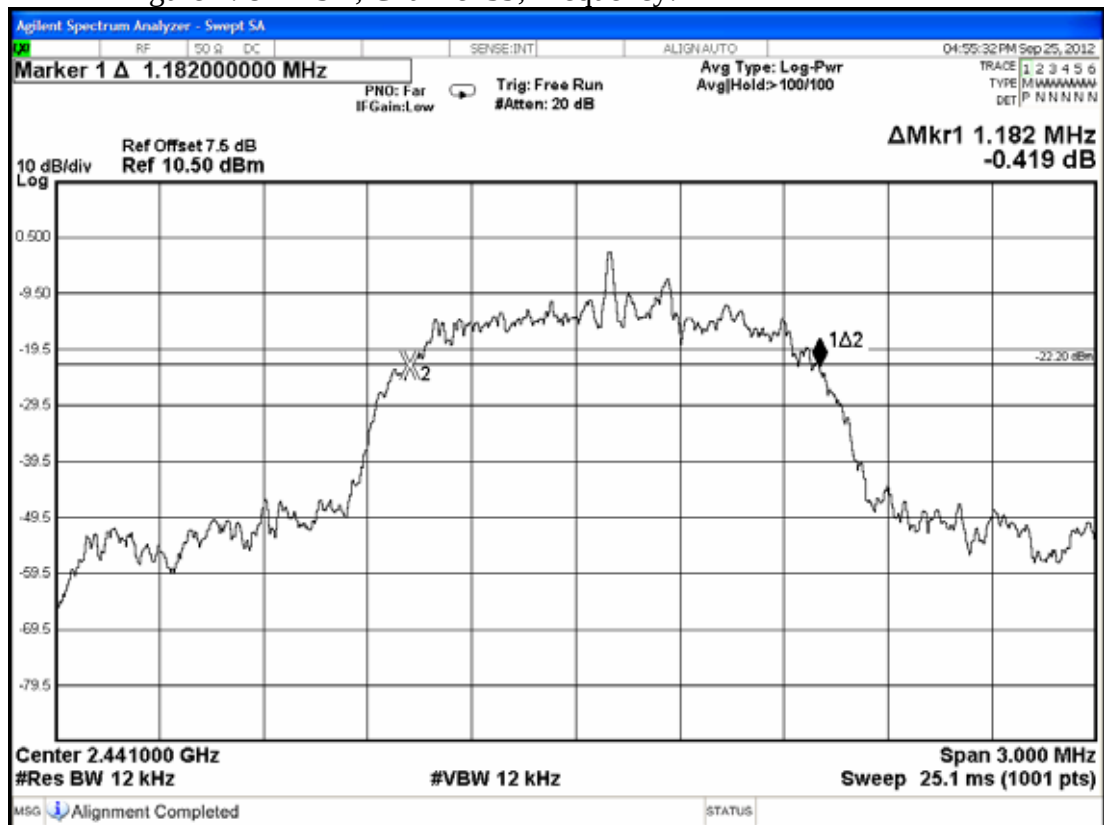


Figure 3: 8-DPSK, Channel 78, Frequency: 2480MHz

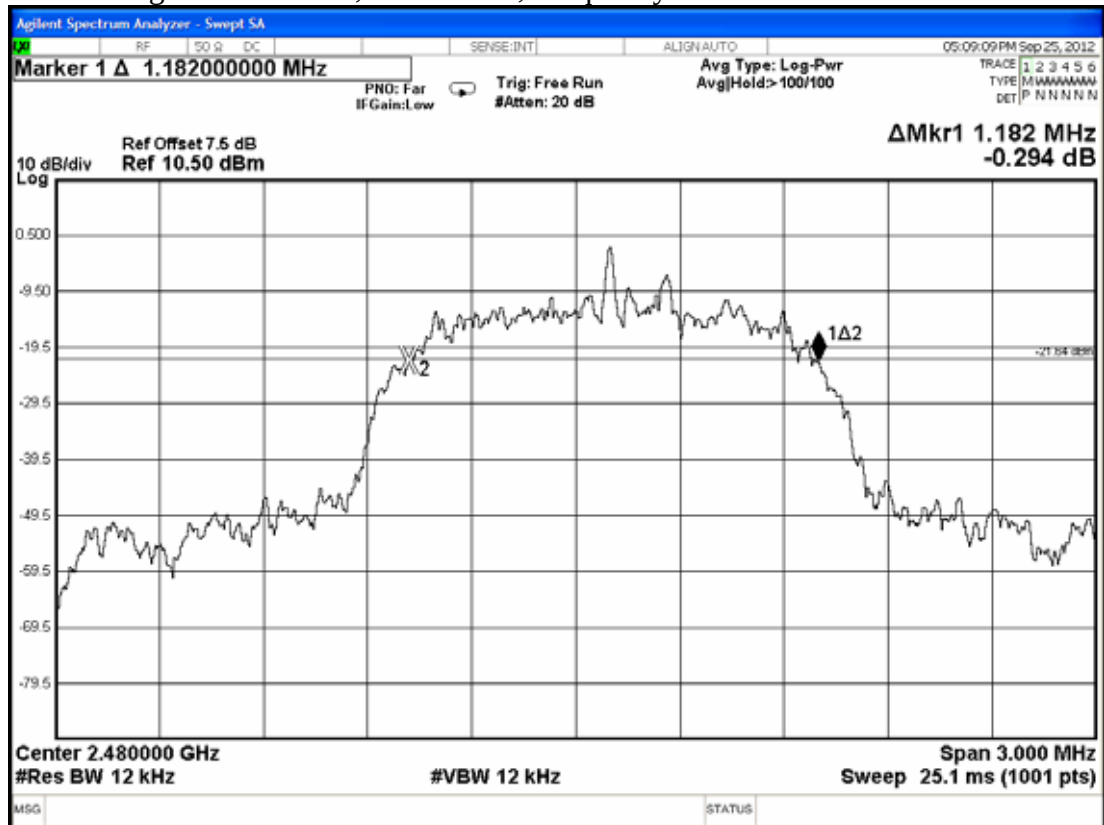


Figure 4: GFSK, Channel 0, Frequency: 2402MHz

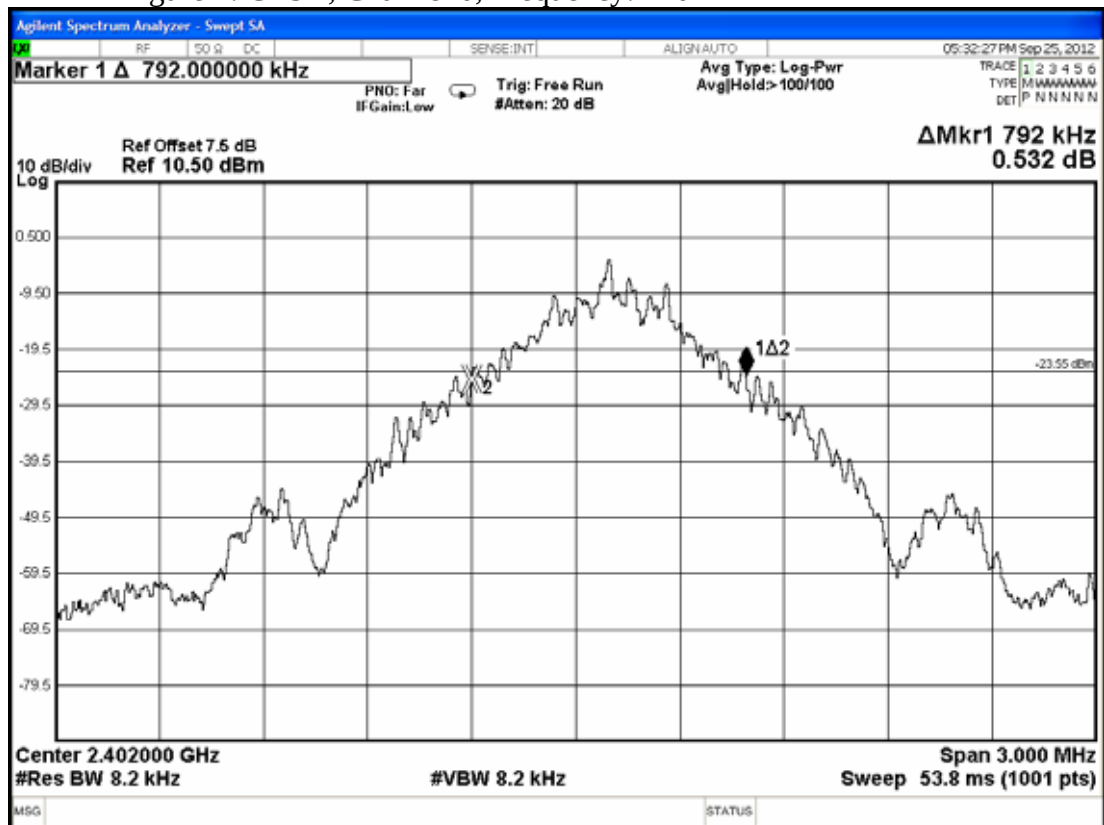


Figure 5: GFSK, Channel 39, Frequency: 2441MHz



Figure 6: GFSK, Channel 78, Frequency: 2480MHz



5. CARRIER FREQUENCY SEPARATION MEASUREMENT

5.1. Test Equipment

The following test equipment was used during the carrier frequency separation measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9030A-544	US51350140	Oct. 14, 11'	Oct. 13, 12'
2.	Bluetooth Test Set	Anritsu	MT8852B	6K00005697	Mar. 21, 12'	Mar. 20, 13'
3.	Power Divider	Anritsu	K240C	19728	Jan. 05, 12'	Jan. 04, 13'

5.2. Block Diagram of Test Setup

The same as section.4.2.

5.3. Specification Limits (§15.247(a)(1))

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.

5.4. Operating Condition of EUT

Same as carrier frequency separation measurement which was listed in section 4.4.

5.5. Test Procedure

The transmitter output was connected to the spectrum analyzer. The channel separation was measure by spectrum analyzer with RBW equal to 1% of the span. The video bandwidth not to be smaller than resolution bandwidth, the peak was mark on adjacent bandwidth, the between of peak is carrier frequency separation. The measurement guideline was according to FCC Public Notice DA 00-705.

5.6. Test Results

PASSED. All the test results are attached in next pages.

[Note: Three types of modulation (8-DPSK, π /4DQPSK, GFSK) were evaluated but only two types of modulation (8-DPSK and GFSK) were reported in this report.]

EUT : MIB RADIO ENTRY PLUS M/N : LAC9313SE

Test Date : Sep. 25, 2012 Temperature : 25 °C Humidity : 59 %

5.6.1. Type of Modulation: 8-DPSK

1. 2402MHz adjacent channel of carrier frequency separation: 1.002MHz.
2. 2441MHz adjacent channel of right carrier frequency separation: 1.002MHz.
3. 2441MHz adjacent channel of left carrier frequency separation: 1.002MHz.
4. 2480MHz adjacent channel of carrier frequency separation: 1.002MHz.

[Above values have met the requirement as specified in section 4.3: frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.]

5.6.2. Type of Modulation: GFSK

1. 2402MHz adjacent channel of carrier frequency separation: 1.002MHz.
2. 2441MHz adjacent channel of right carrier frequency separation: 1.002MHz.
3. 2441MHz adjacent channel of left carrier frequency separation: 1.002MHz.
4. 2480MHz adjacent channel of carrier frequency separation: 1.002MHz.

[Above values have met the requirement as specified in section 4.3: frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.]

Figure 1: 8-DPSK, 2402MHz adjacent channel of carrier frequency separation

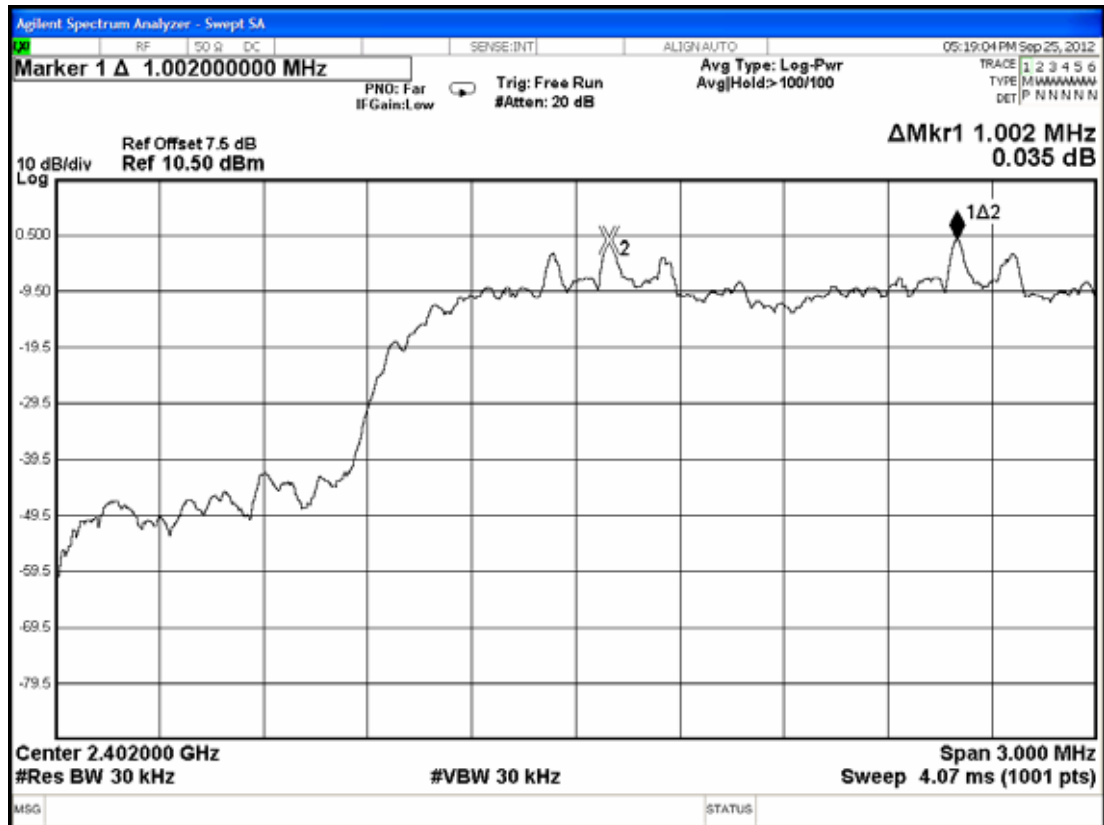


Figure 2: 8-DPSK, 2441MHz adjacent channel of right carrier frequency separation

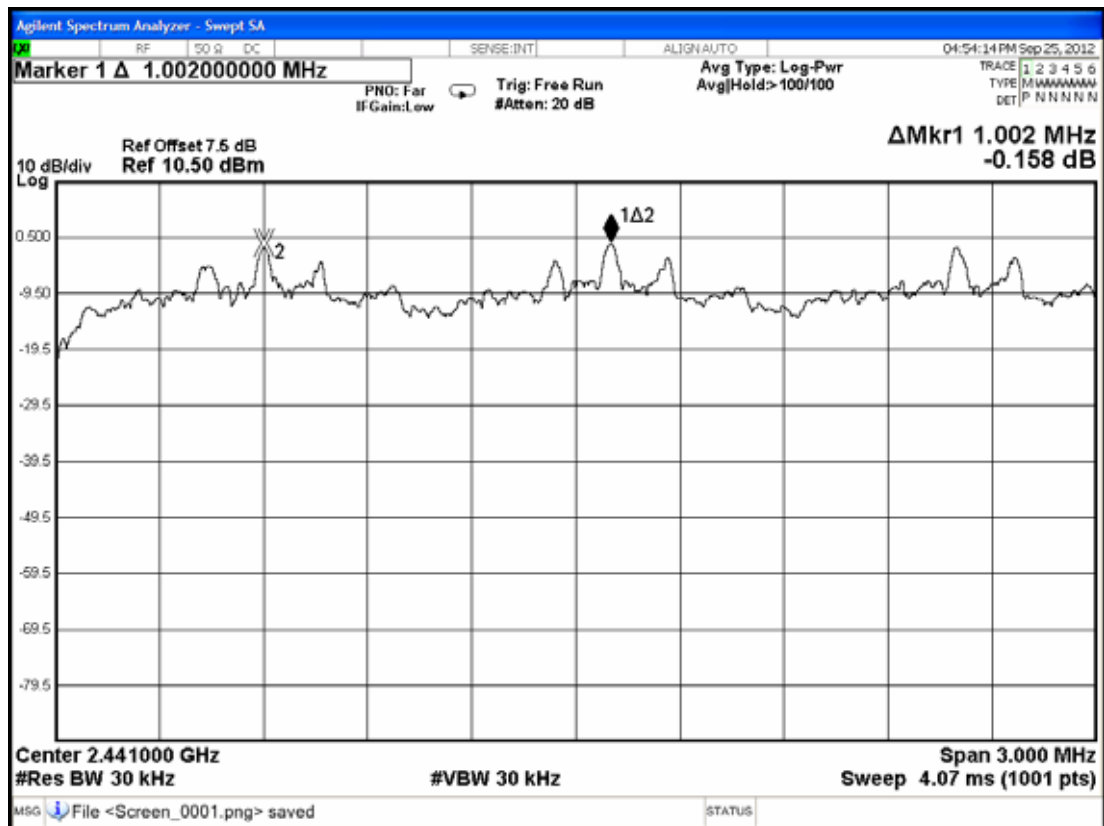


Figure 3: 8-DPSK, 2441MHz adjacent channel of left carrier frequency separation

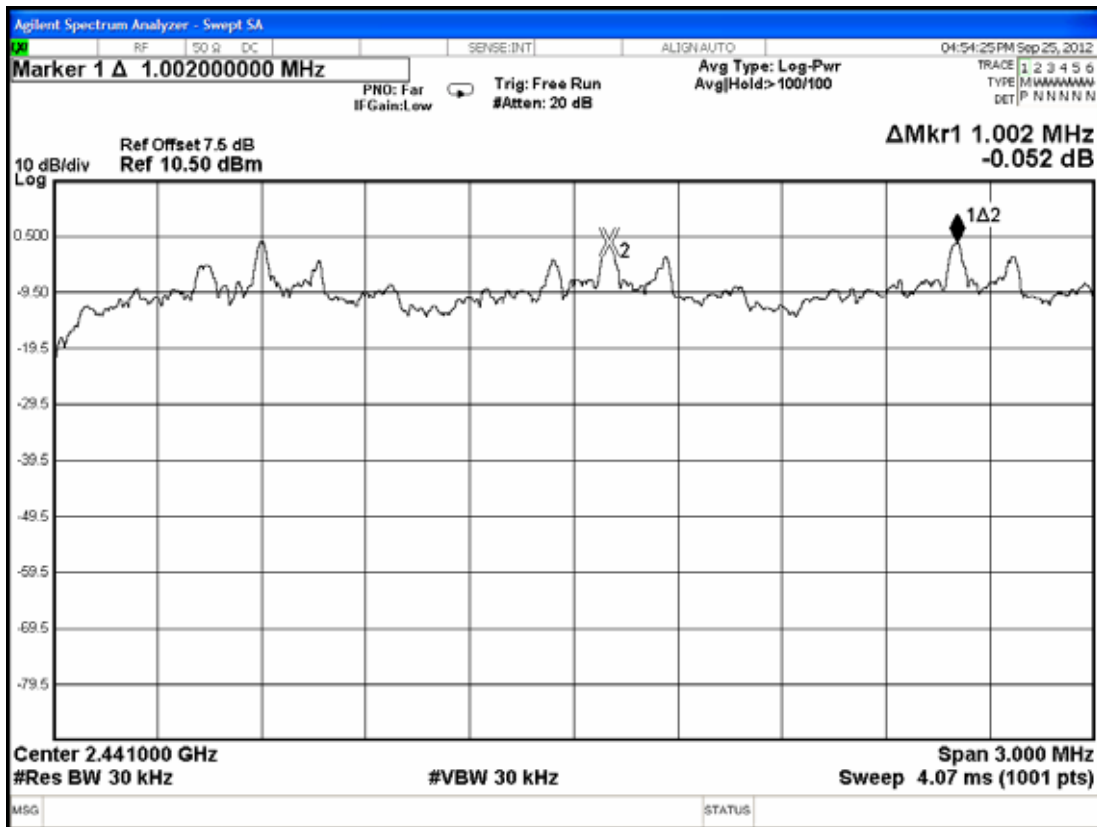


Figure 4: 8-DPSK, 2480MHz adjacent channel of carrier frequency separation

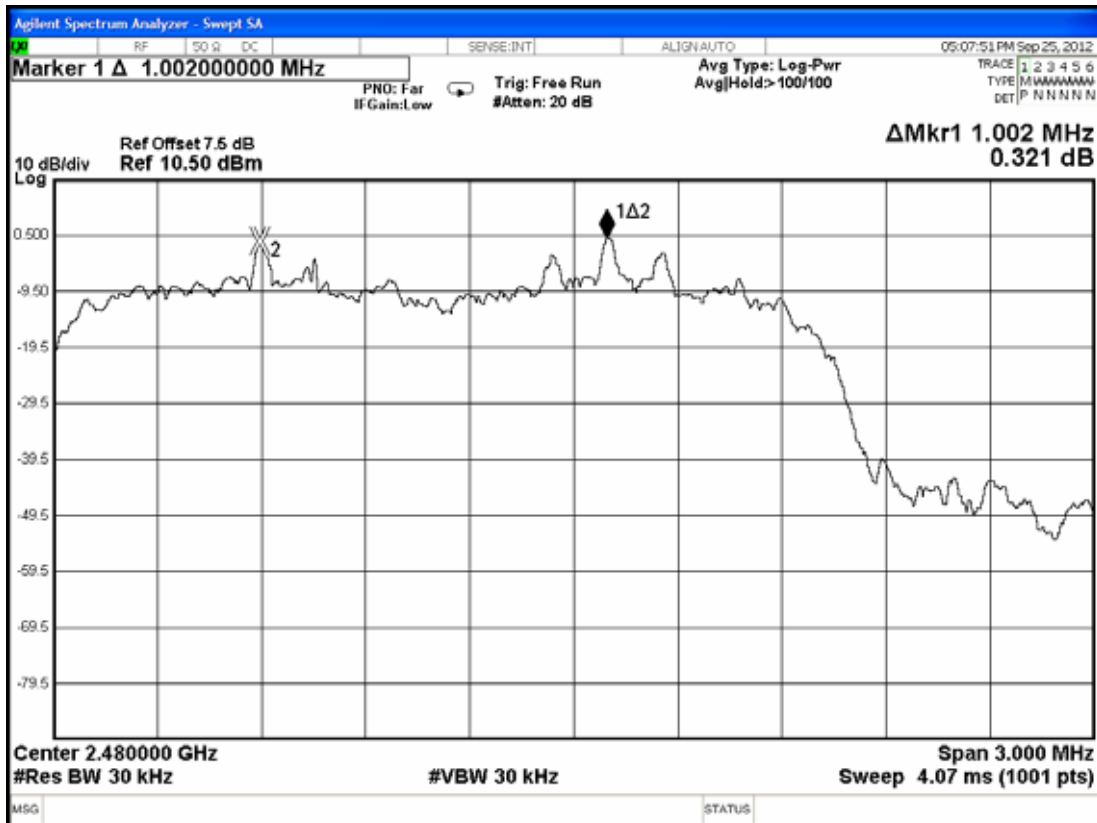


Figure 5: GFSK, 2402MHz adjacent channel of carrier frequency separation

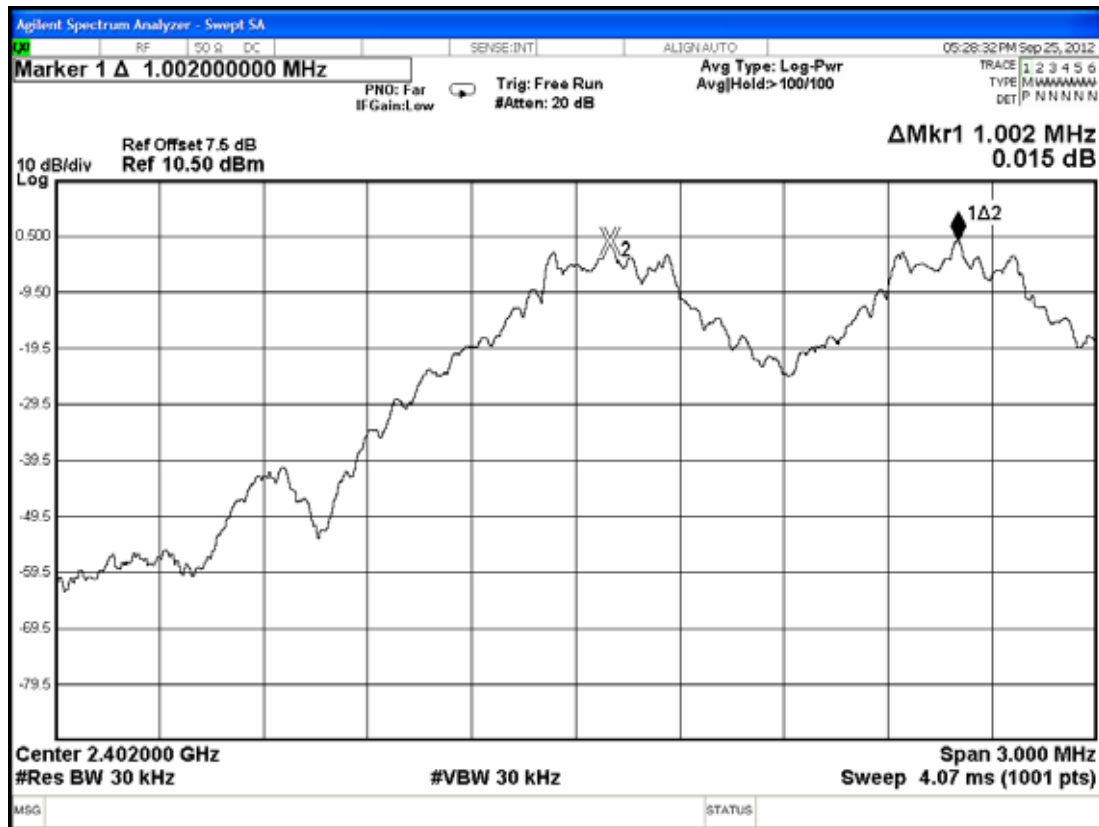


Figure 6: GFSK, 2441MHz adjacent channel of right carrier frequency separation

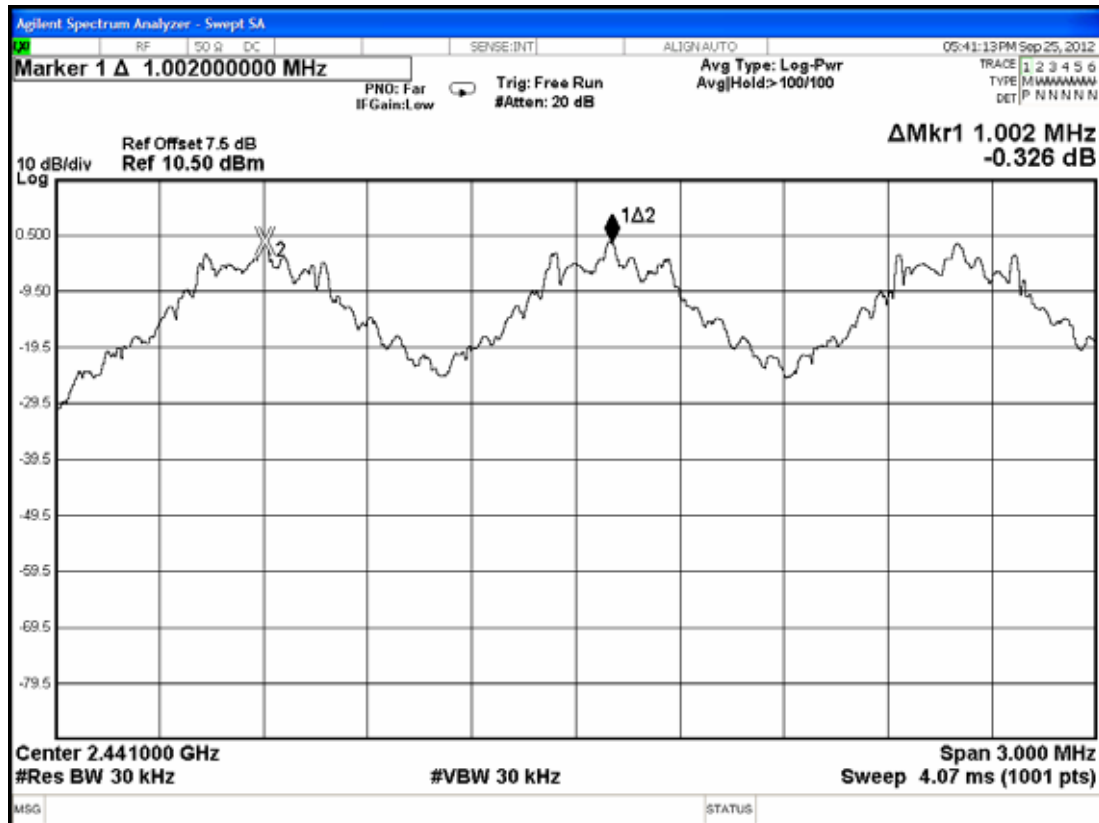


Figure 7: GFSK, 2441MHz adjacent channel of left carrier frequency separation

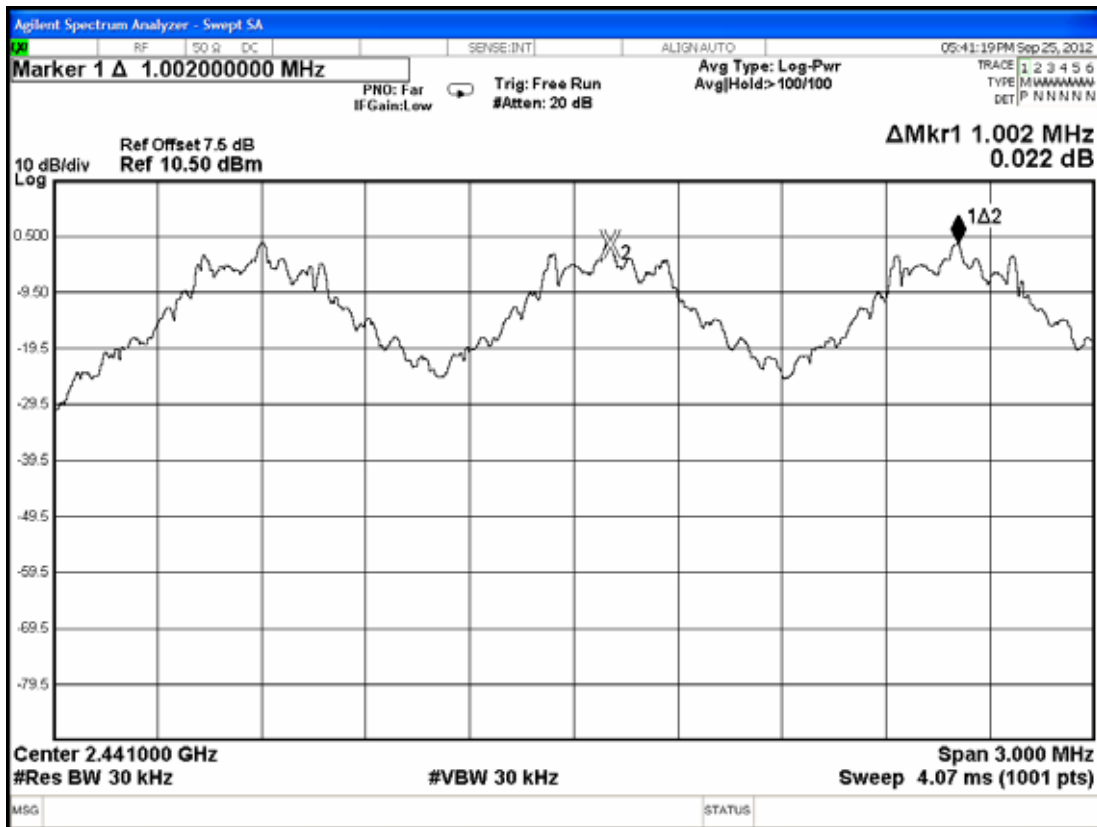
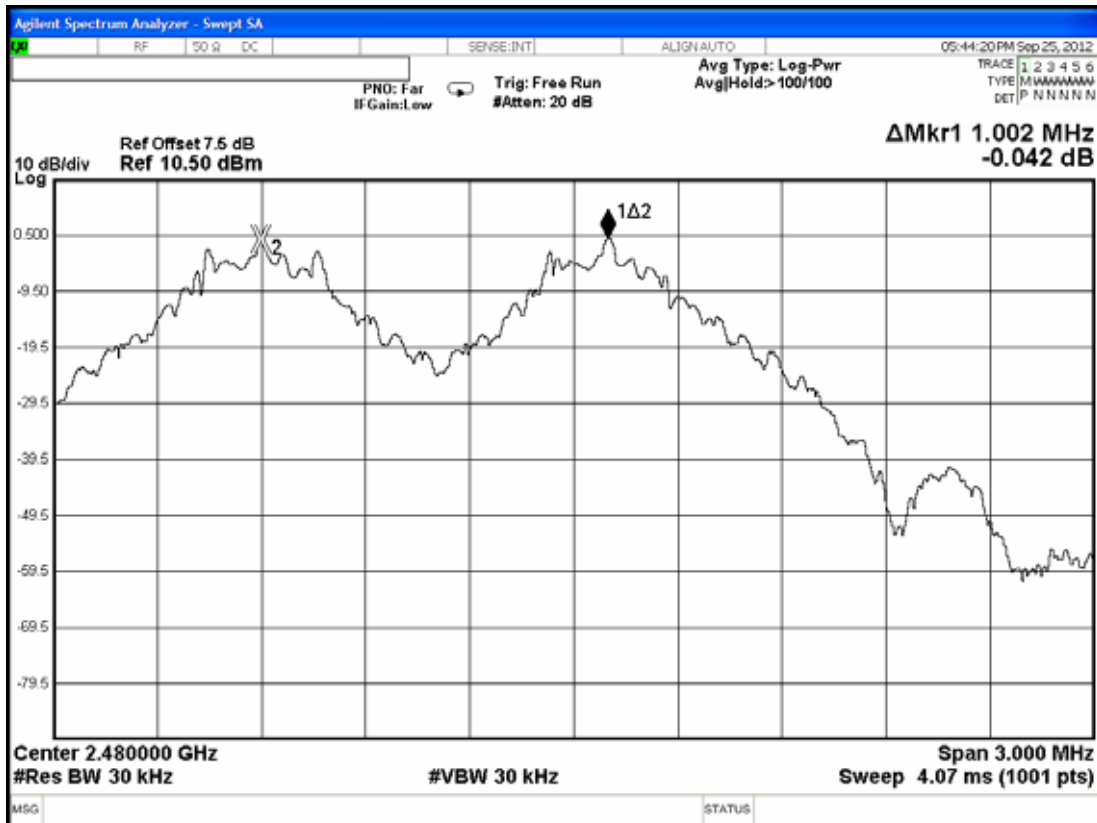


Figure 8: GFSK, 2480MHz adjacent channel of carrier frequency separation



6. TIME OF OCCUPANCY MEASUREMENT

6.1. Test Equipment

The following test equipment was used during the time of occupancy measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9030A-544	US51350140	Oct. 14, 11'	Oct. 13, 12'
2.	Bluetooth Test Set	Anritsu	MT8852B	6K00005697	Mar. 21, 12'	Mar. 20, 13'
3.	Power Divider	Anritsu	K240C	19728	Jan. 05, 12'	Jan. 04, 13'

6.2. Block Diagram of Test Setup

The same as section.4.2.

6.3. Specification Limits (§15.247(a)(1)(iii))

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.

6.4. Operating Condition of EUT

Same as carrier frequency separation measurement which was listed in section 4.4.

6.5. Test Procedure

The EUT was connected to the notebook. The bandwidth of the fundamental frequency was measure by spectrum analyzer with 1MHz RBW and 1MHz VBW. VBW≥RBW ; Span=zero span.

Centred on a hopping channel sweep=as necessary to capture the entire dwell time per hopping channel ; Detector function=peak ; Trace=Max hold

The measurement guideline was according to FCC Public Notice DA 00-705.

6.6. Test Results

PASSED. All the test results are attached in next pages.

[Note: Three types of modulation (8-DPSK, π /4DQPSK, GFSK) were evaluated but only two types of modulation (8-DPSK and GFSK) were reported in this report.]

EUT : MIB RADIO ENTRY PLUS

M/N : LAC9313SE

Test Date : Sep. 25, 2011 Temperature : 25 °C Humidity : 59 %

6.6.1. Type of Modulation : 8-DPSK, Test Frequency : 2441MHz

Duty cycle: 79channels*0.4 seconds = 31.6 seconds

3DH1 : For each 5 seconds of 50 channels appearance, the longest time of occupancy for each of 31.6 seconds is:

$$50 \text{ channels} * 31.6 \text{ seconds} / 5 * 0.495\text{ms} = 156.42\text{ms} (<400\text{ms})$$

3DH3 : For each 5 seconds of 25 channels appearance, the longest time of occupancy for each of 31.6 seconds is:

$$25 \text{ channels} * 31.6 \text{ seconds} / 5 * 1.745\text{ms} = 275.71\text{ms} (<400\text{ms})$$

3DH5 : For each 5 seconds of 17 channels appearance, the longest time of occupancy for each of 31.6 seconds is:

$$17 \text{ channels} * 31.6 \text{ seconds} / 5 * 3\text{ms} = 322.32\text{ms} (<400\text{ms})$$

Figure 1: 8-DPSK, 2441MHz, 3DH1

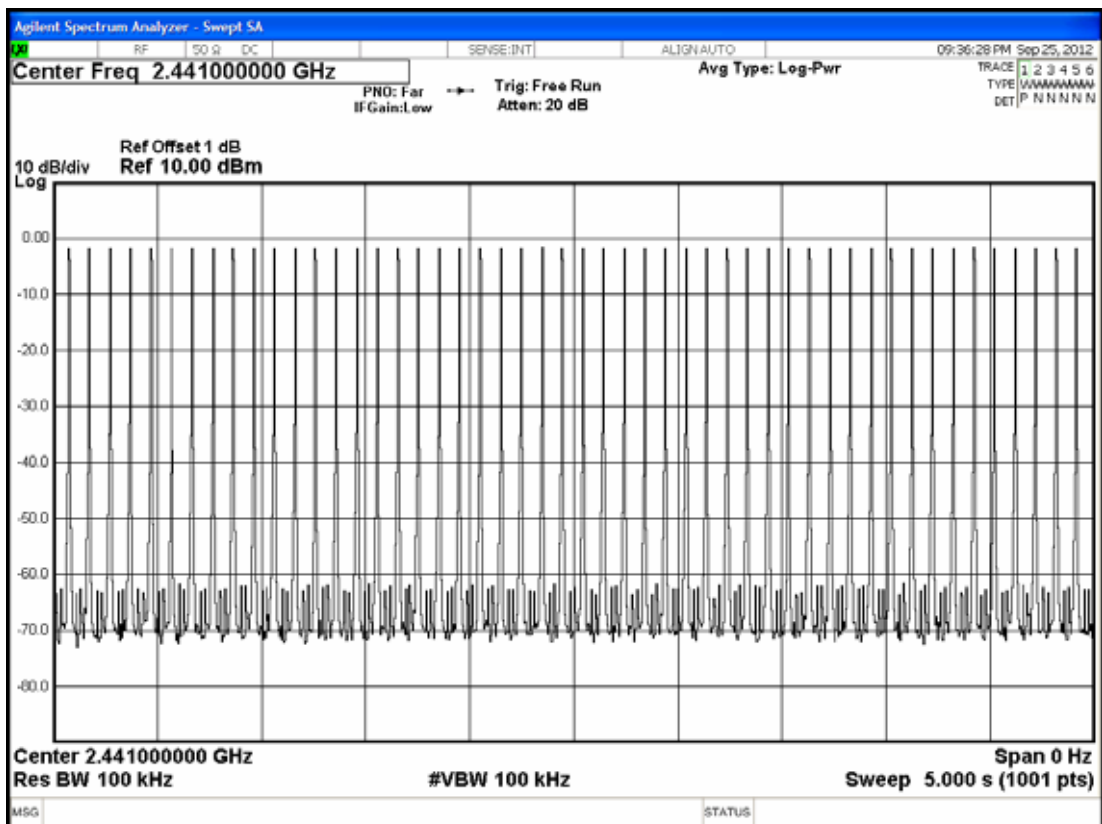
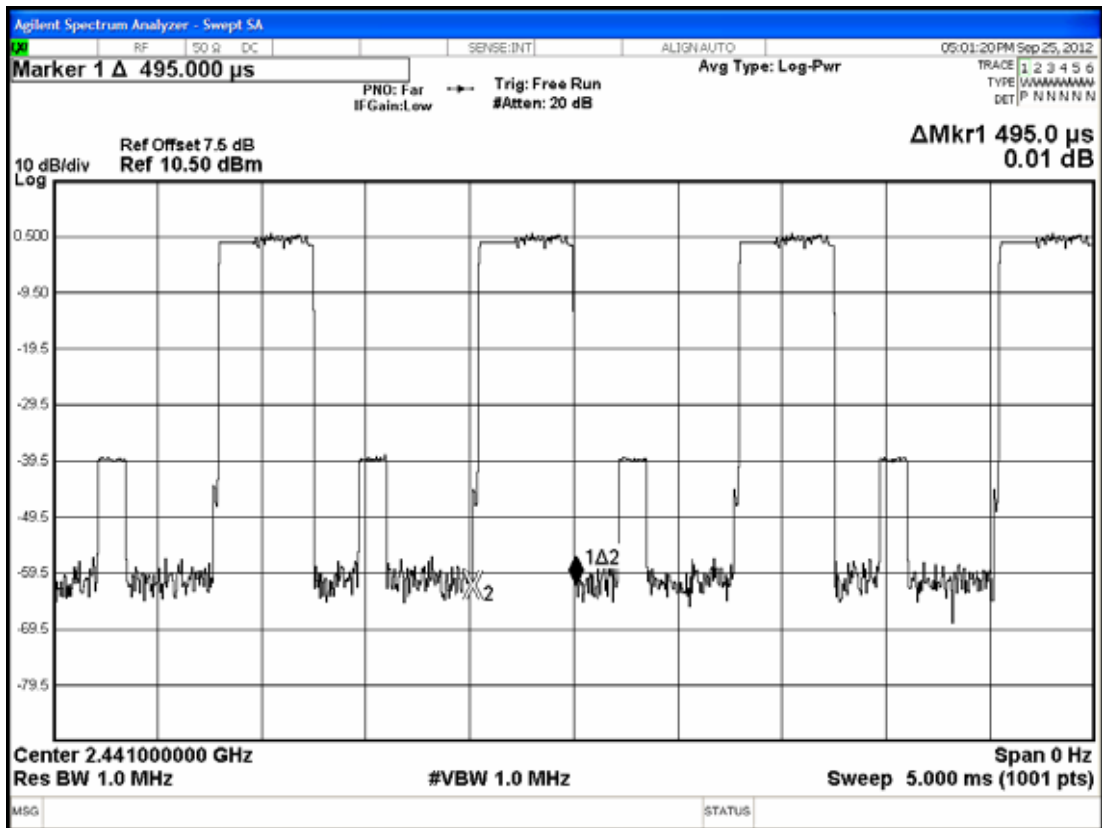


Figure 2: 8-DPSK, 2441MHz, 3DH3

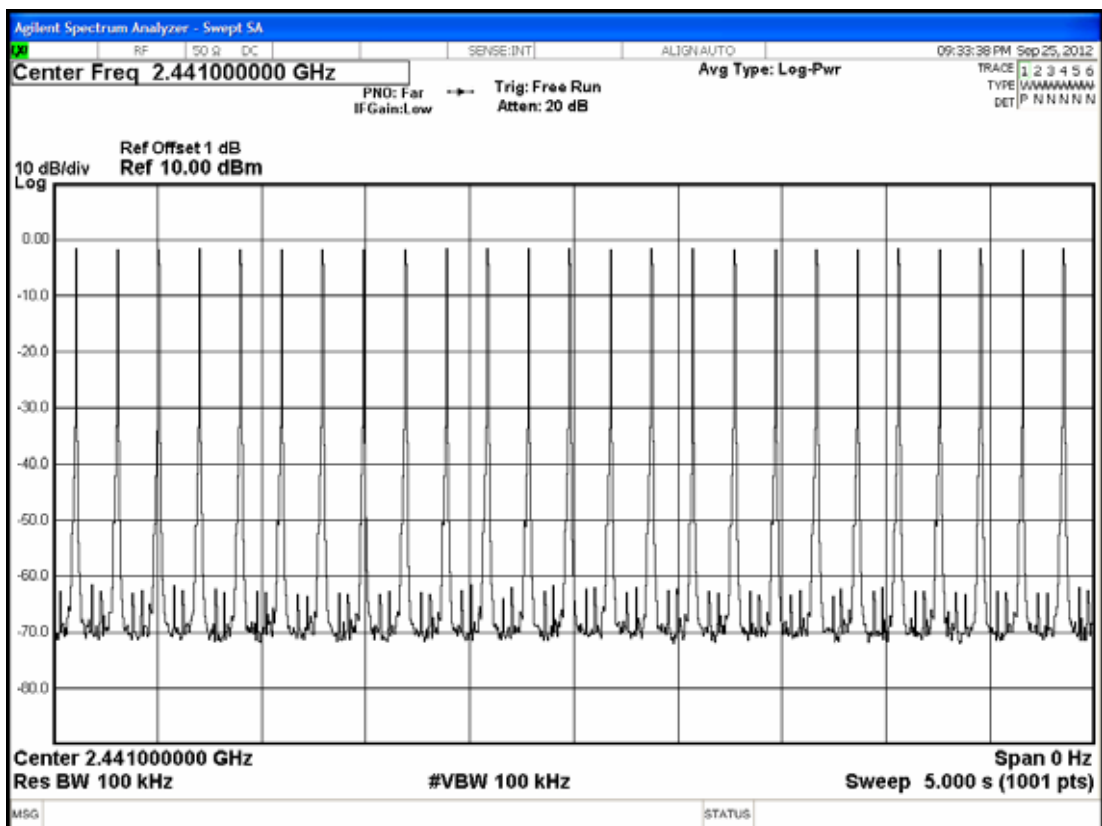
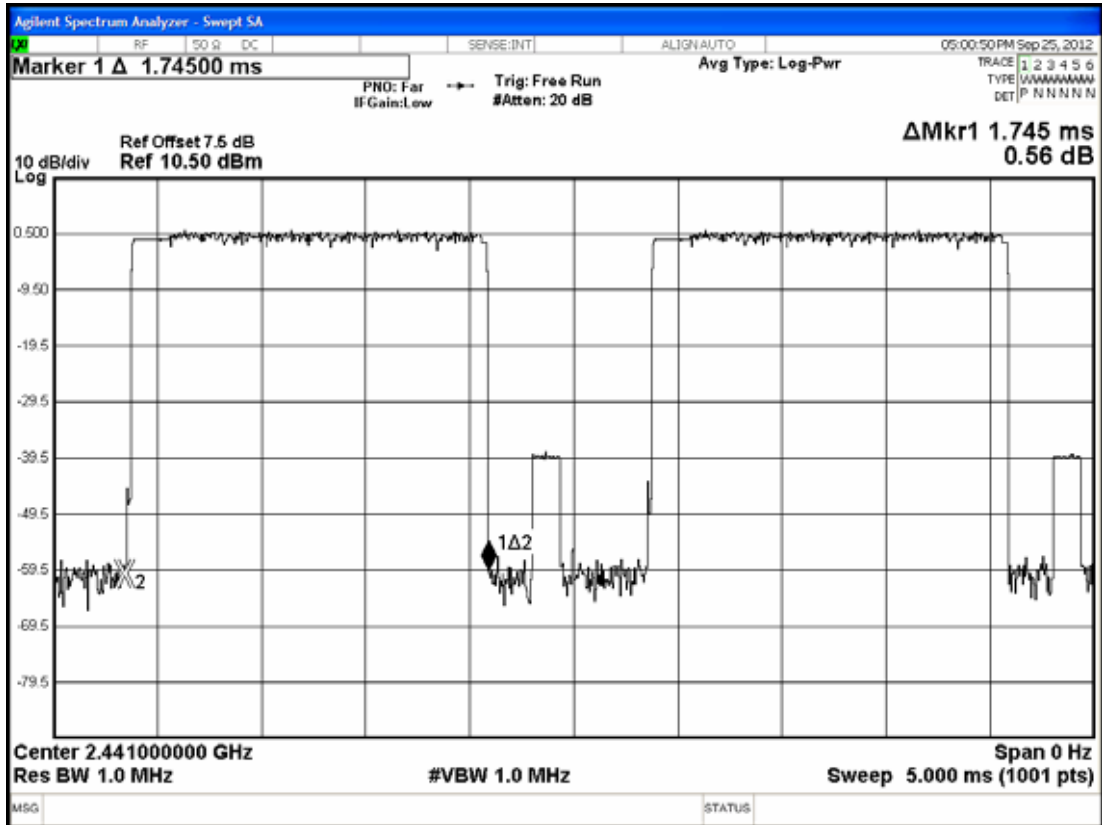
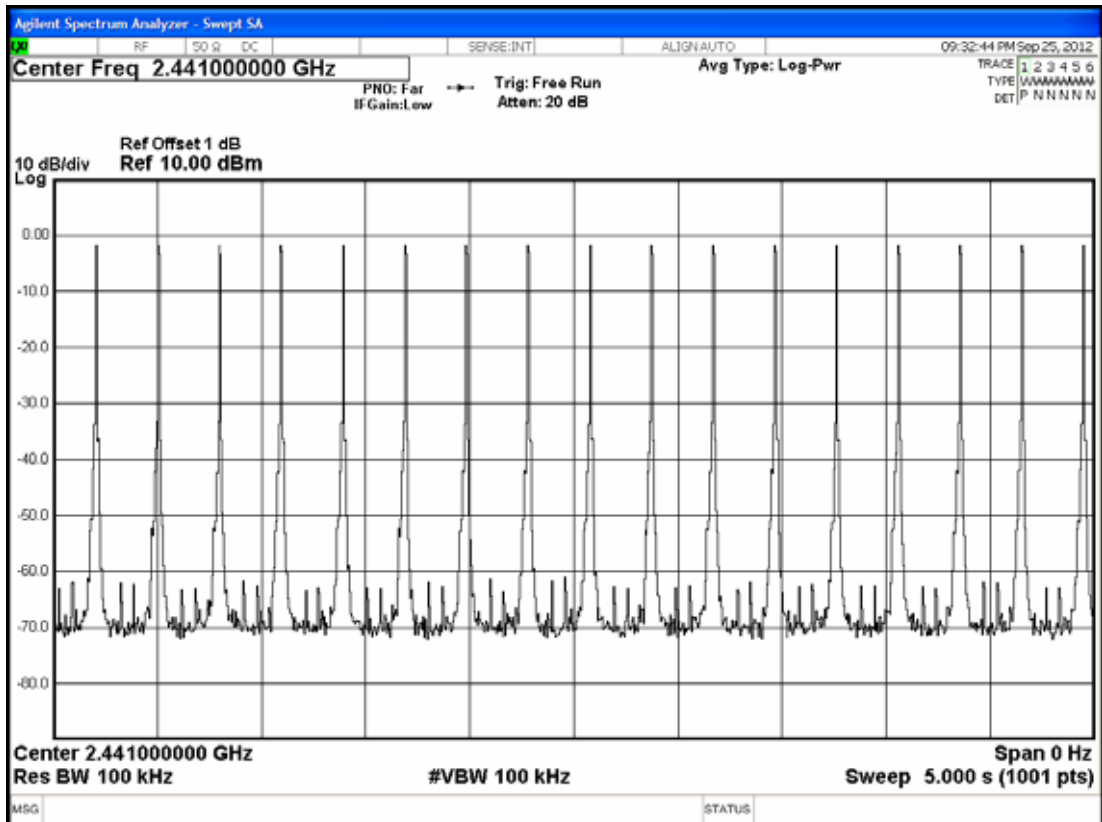
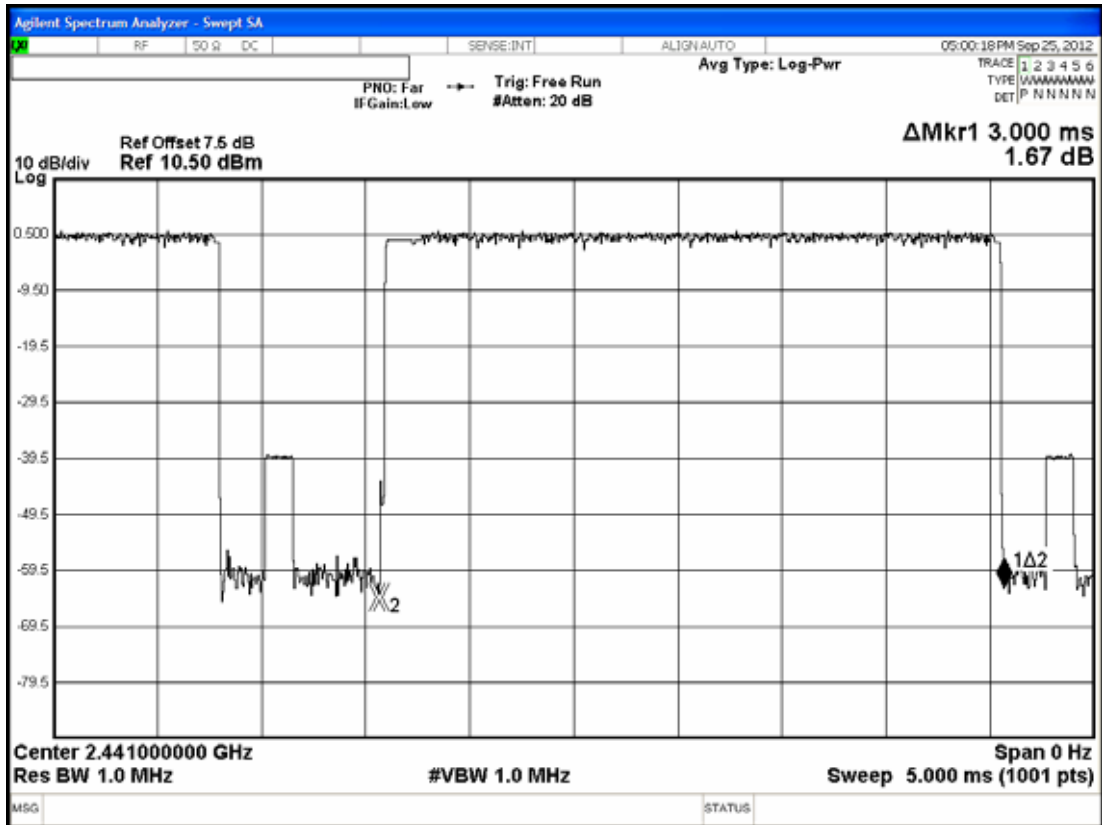


Figure 3: 8-DPSK, 2402MHz, 3DH5



6.6.2. Type of Modulation : GFSK, Test Frequency : 2441MHz

Duty cycle: 79channels*0.4 seconds = 31.6 seconds

DH1 : For each 5 seconds of 50 channels appearance, the longest time of occupancy for each of 31.6 seconds is:

$$50 \text{ channels} * 31.6 \text{ seconds} / 5 * 0.495 \text{ ms} = 156.42 \text{ ms} (< 400 \text{ ms})$$

DH3 : For each 5 seconds of 25 channels appearance, the longest time of occupancy for each of 31.6 seconds is:

$$25 \text{ channels} * 31.6 \text{ seconds} / 5 * 1.755 \text{ ms} = 277.29 \text{ ms} (< 400 \text{ ms})$$

DH5 : For each 5 seconds of 17 channels appearance, the longest time of occupancy for each of 31.6 seconds is:

$$17 \text{ channels} * 31.6 \text{ seconds} / 5 * 3 \text{ ms} = 322.32 \text{ ms} (< 400 \text{ ms})$$

Figure 4: GFSK, 2441MHz, DH1

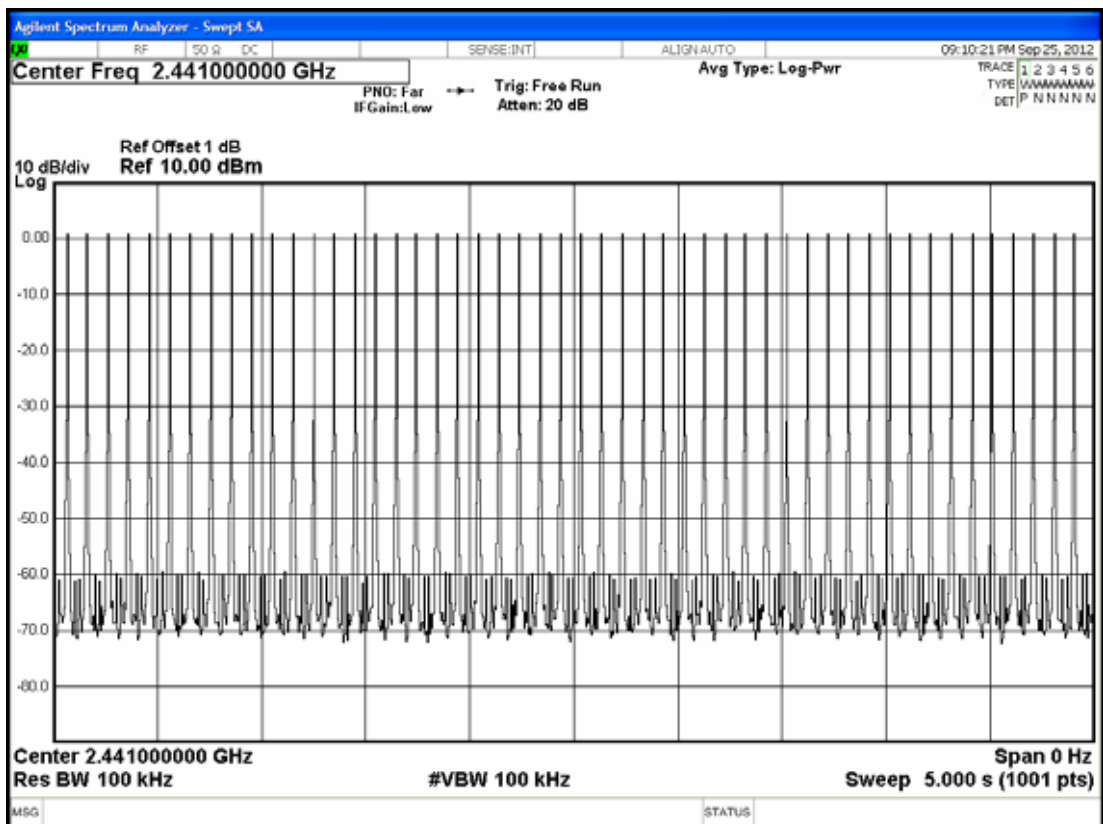
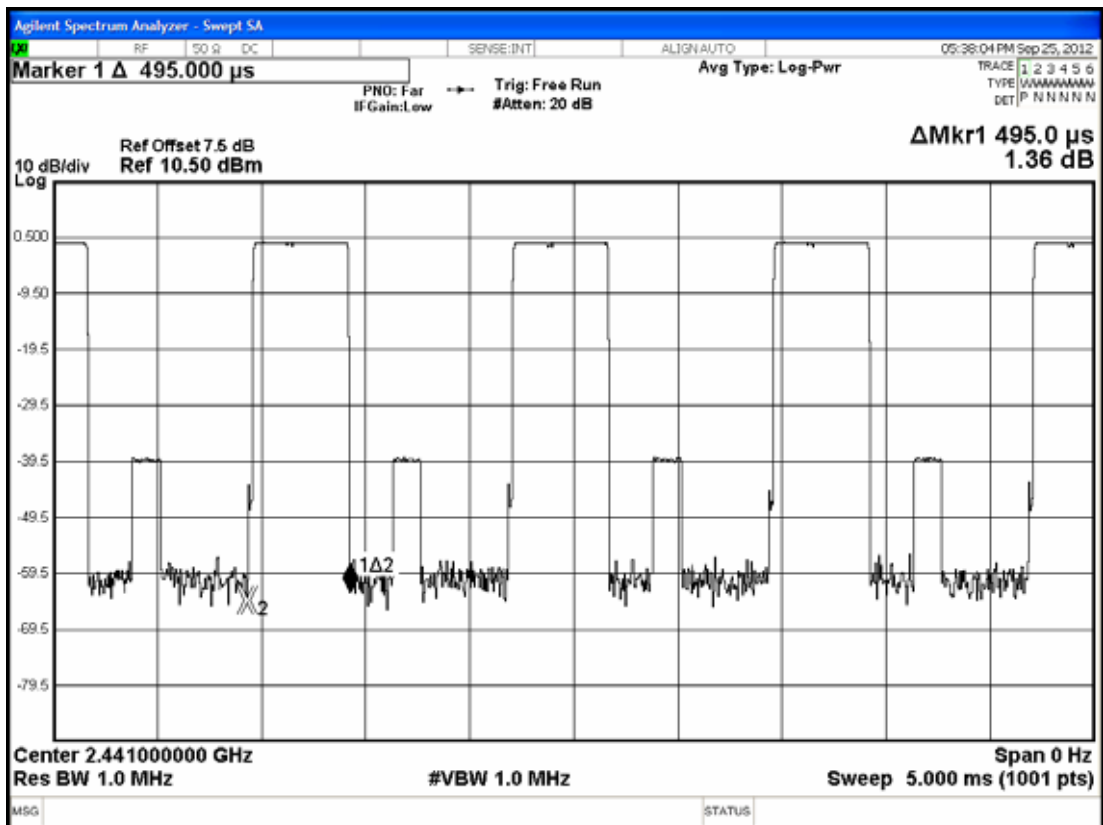


Figure 5: GFSK, 2441MHz, DH3

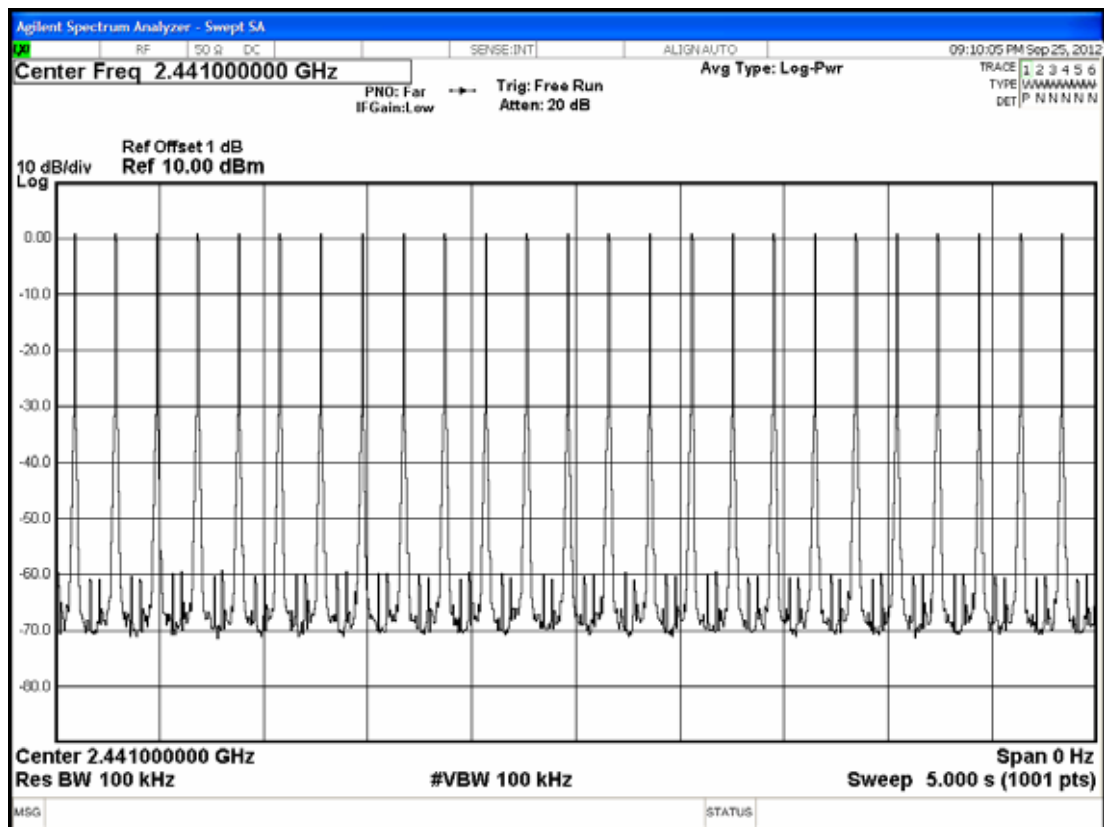
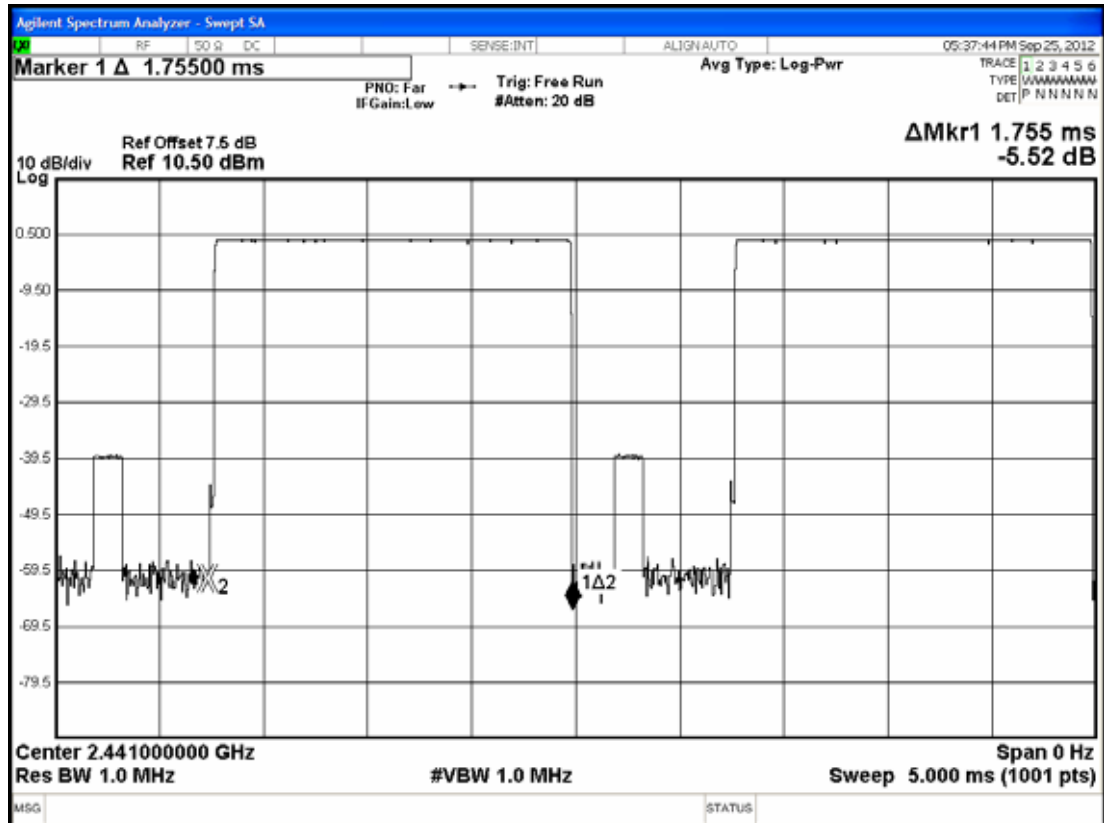
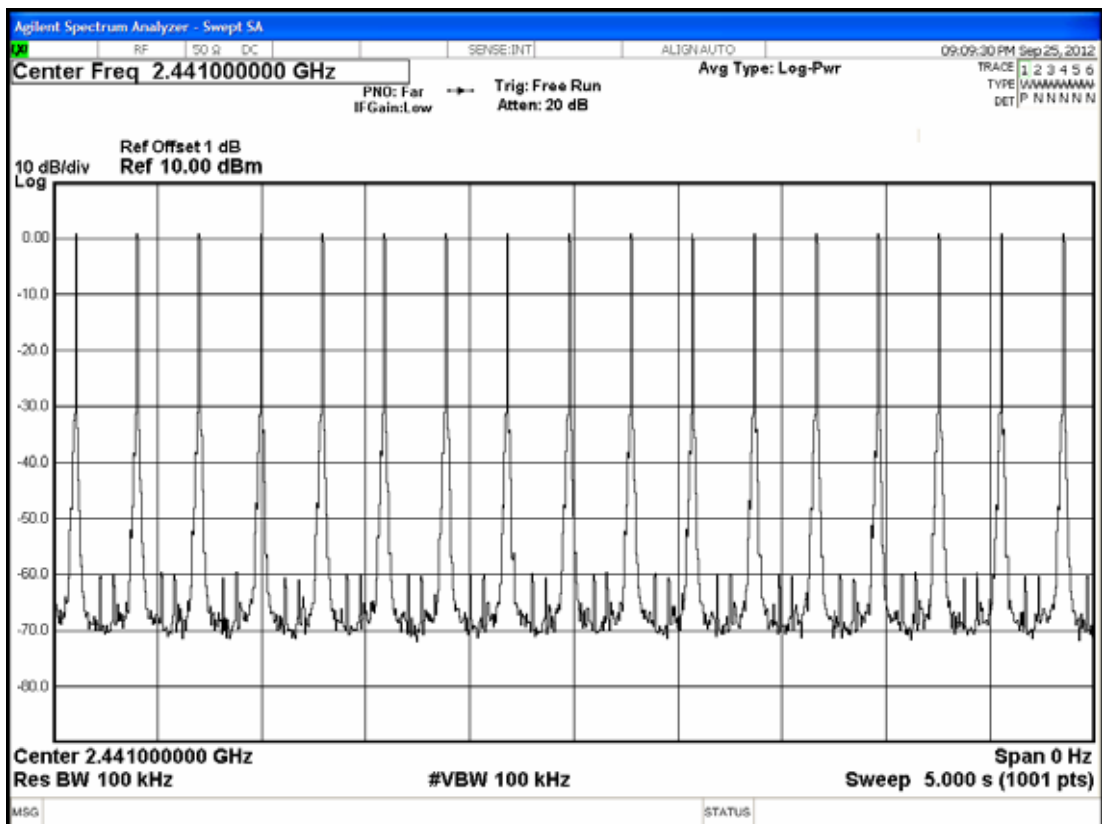
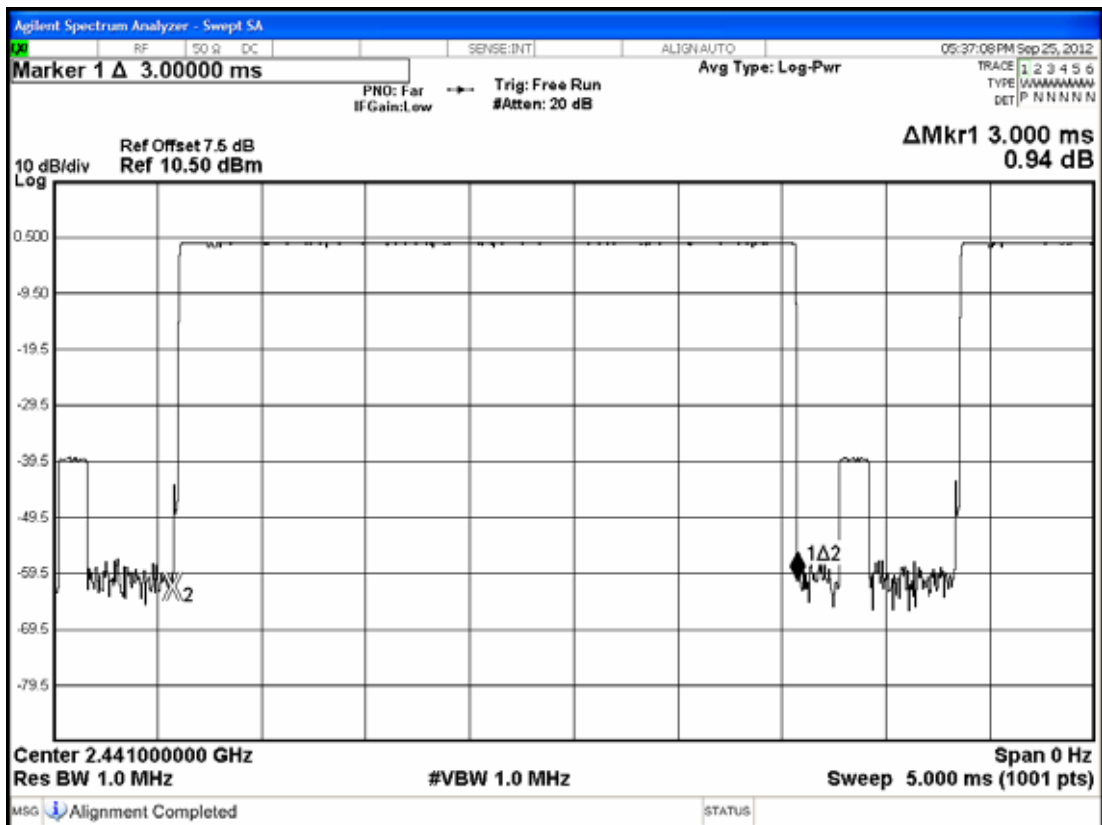


Figure 6: GFSK, 2441MHz, DH5



7. NUMBER OF HOPPING CHANNELS MEASUREMENT

7.1. Test Equipment

The following test equipment was used during the number of hopping channels measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9030A-544	US51350140	Oct. 14, 11'	Oct. 13, 12'
2.	Bluetooth Test Set	Anritsu	MT8852B	6K00005697	Mar. 21, 12'	Mar. 20, 13'
3.	Power Divider	Anritsu	K240C	19728	Jan. 05, 12'	Jan. 04, 13'

7.2. Block Diagram of Test Setup

The same as section.4.2.

7.3. Specification Limits (§15.247(a)(1)(iii))

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.

7.4. Operating Condition of EUT

Same as carrier frequency separation measurement which was listed in section 4.4.

7.5. Test Procedure

The transmitter output was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measure by spectrum analyzer with 100kHz RBW and 100kHz VBW. Sweep=Auto ; Detector function=peak ; Trace=Max hold
The measurement guideline was according to FCC Public Notice DA 00-705.

7.6. Test Results

PASSED. All the test results are attached in next page.

[Note: Three types of modulation (8-DPSK, π /4DQPSK, GFSK) were evaluated but only two types of modulation (8-DPSK and GFSK) were reported in this report.]

EUT : MIB RADIO ENTRY PLUS

M/N : LAC9313SE

Test Date : Sep. 25, 2012 Temperature : 25 °C Humidity : 59 %

7.6.1.Type of Modulation: 8-DPSK

The number hopping channel is 79.

7.6.2.Type of Modulation: GFSK

The number hopping channel is 79.

Figure 1: 8-DPSK

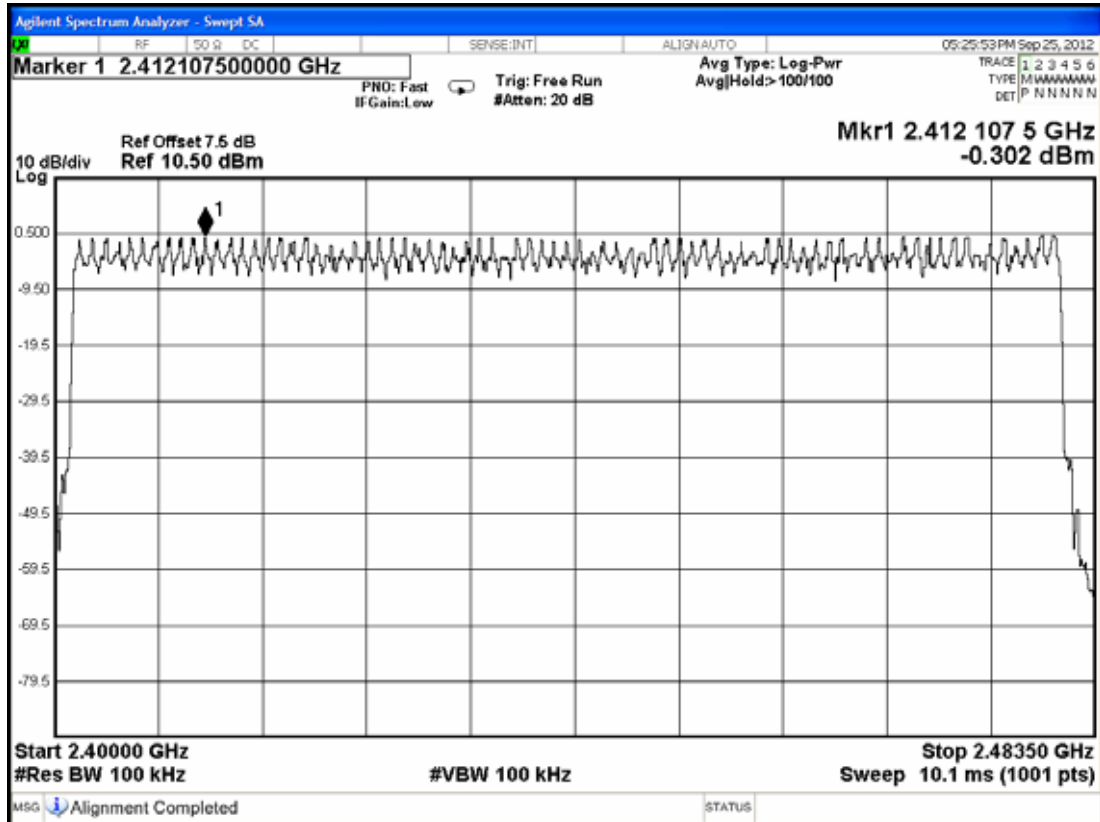
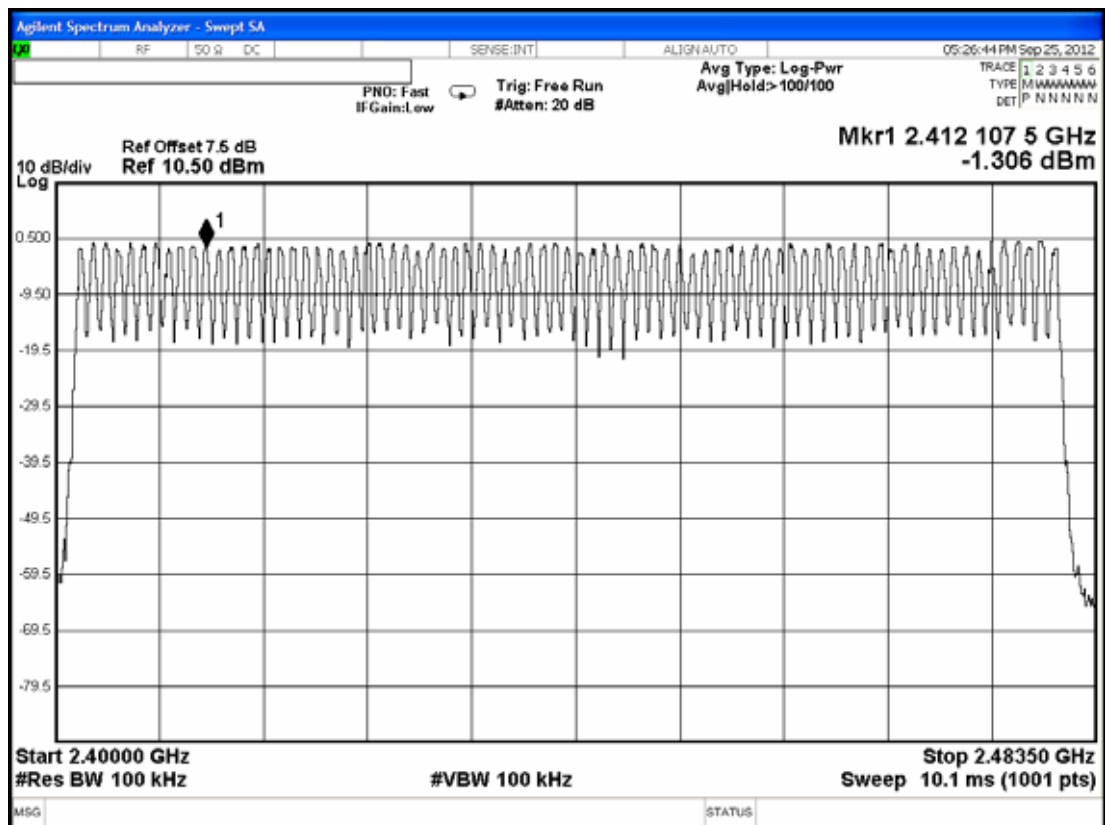


Figure 2: GFSK



8. MAXIMUM PEAK OUTPUT POWER MEASUREMENT

8.1. Test Equipment

The following test equipment was used during the maximum peak output power measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9030A-544	US51350140	Oct. 14, 11'	Oct. 13, 12'
2.	Bluetooth Test Set	Anritsu	MT8852B	6K00005697	Mar. 21, 12'	Mar. 20, 13'
3.	Power Divider	Anritsu	K240C	19728	Jan. 05, 12'	Jan. 04, 13'

8.2. Block Diagram of Test Setup

The same as section.4.2.

8.3. Specification Limits (§15.247(b)-(1))

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

8.4. Operating Condition of EUT

Same as carrier frequency separation measurement which was listed in 4.4 except the test set up replaced by section 8.2.

8.5. Test Procedure

The transmitter output was connected to the spectrum analyzer.

Span can encompass the waveform

$RBW > EBW$

$VBW \geq RBW$

Sweep=5MHz

The measurement guideline was according to FCC Public Notice DA 00-705.

8.6. Test Results

PASSED. All the test results are listed below.

[Note: Three types of modulation (8-DPSK, π /4DQPSK, GFSK) were evaluated but only two types of modulation (8-DPSK and GFSK) were reported in this report.]

EUT : MIB RADIO ENTRY PLUS

M/N : LAC9313SE

Test Date : Sep. 25, 2012 Temperature : 25°C Humidity : 59 %

8.6.1.Type of Modulation: 8-DPSK

No.	Channel	Test Frequency	Peak Output Power	Limit
1.	0	2402MHz	1.828dBm	21dBm
2.	39	2441MHz	1.647dBm	21dBm
3.	78	2480MHz	2.182dBm	21dBm

8.6.2.Type of Modulation: GFSK

No.	Channel	Test Frequency	Peak Output Power	Limit
1.	0	2402MHz	-0.239dBm	21dBm
2.	39	2441MHz	-0.473dBm	21dBm
3.	78	2480MHz	0.023dBm	21dBm

Figure 1: 8-DPSK, Channel 0, Frequency: 2402MHz

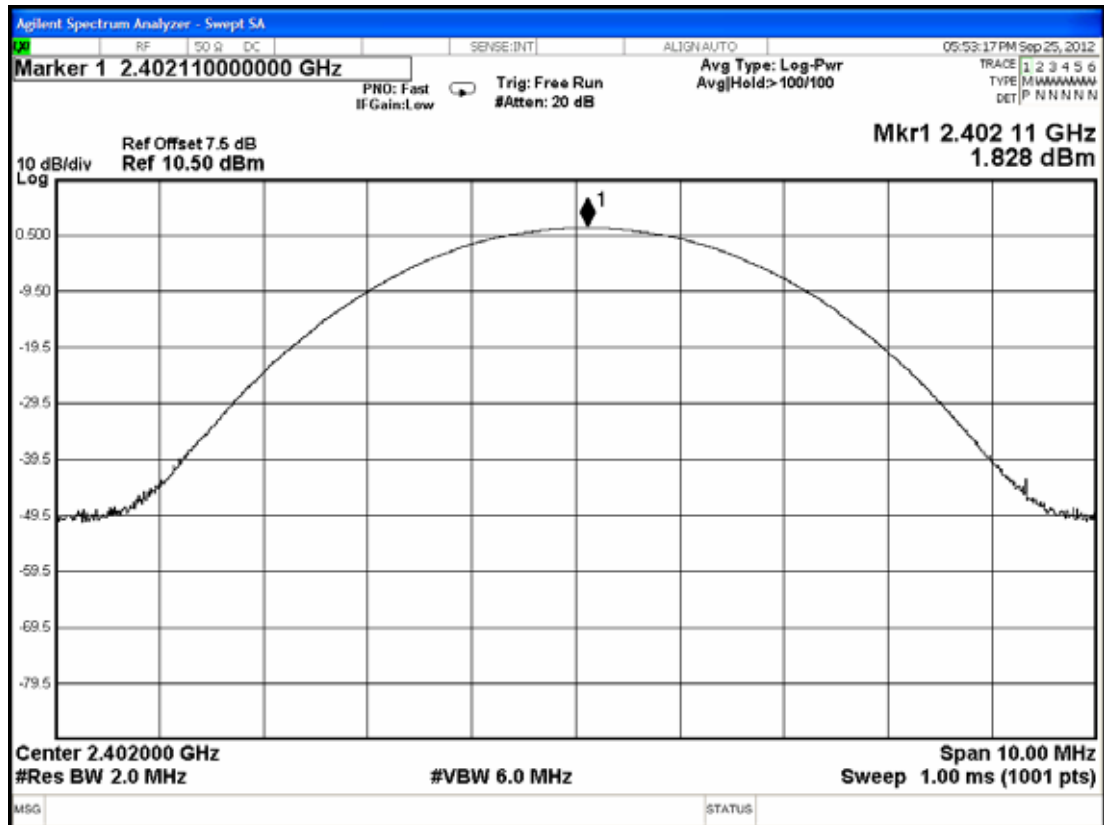


Figure 2: 8-DPSK, Channel 39, Frequency: 2441MHz

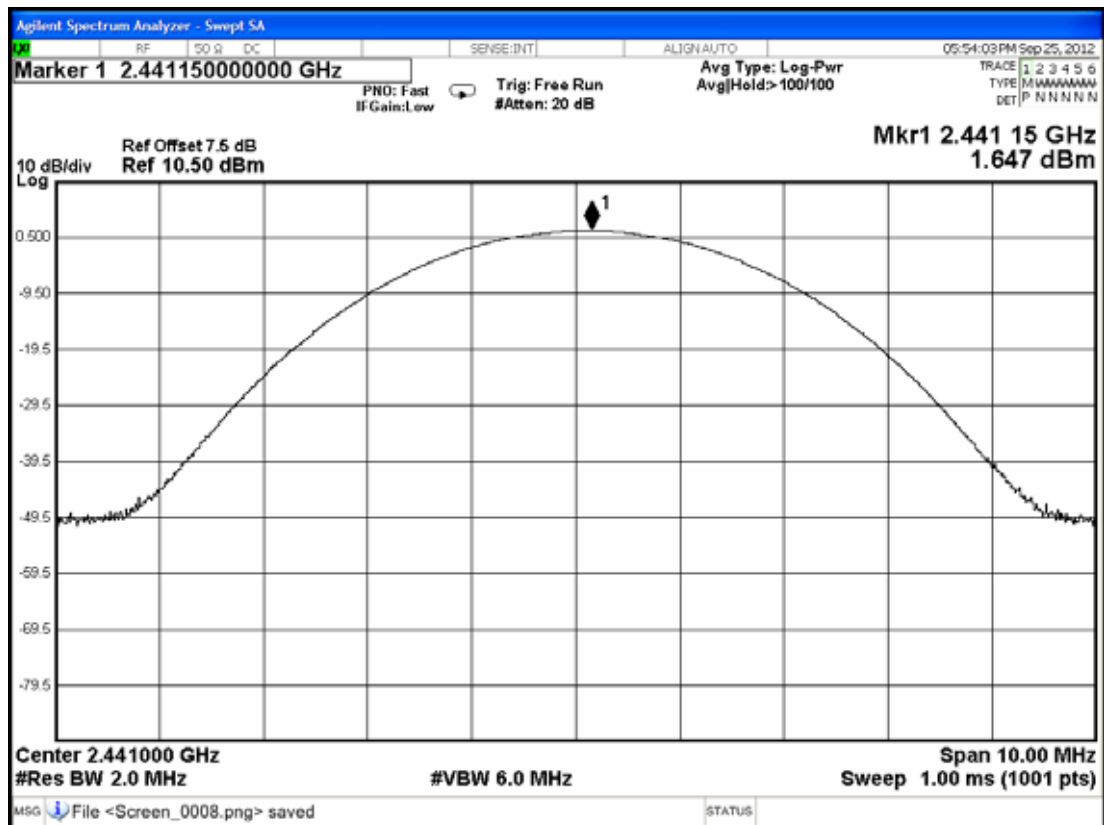


Figure 3: 8-DPSK, Channel 78, Frequency: 2480MHz

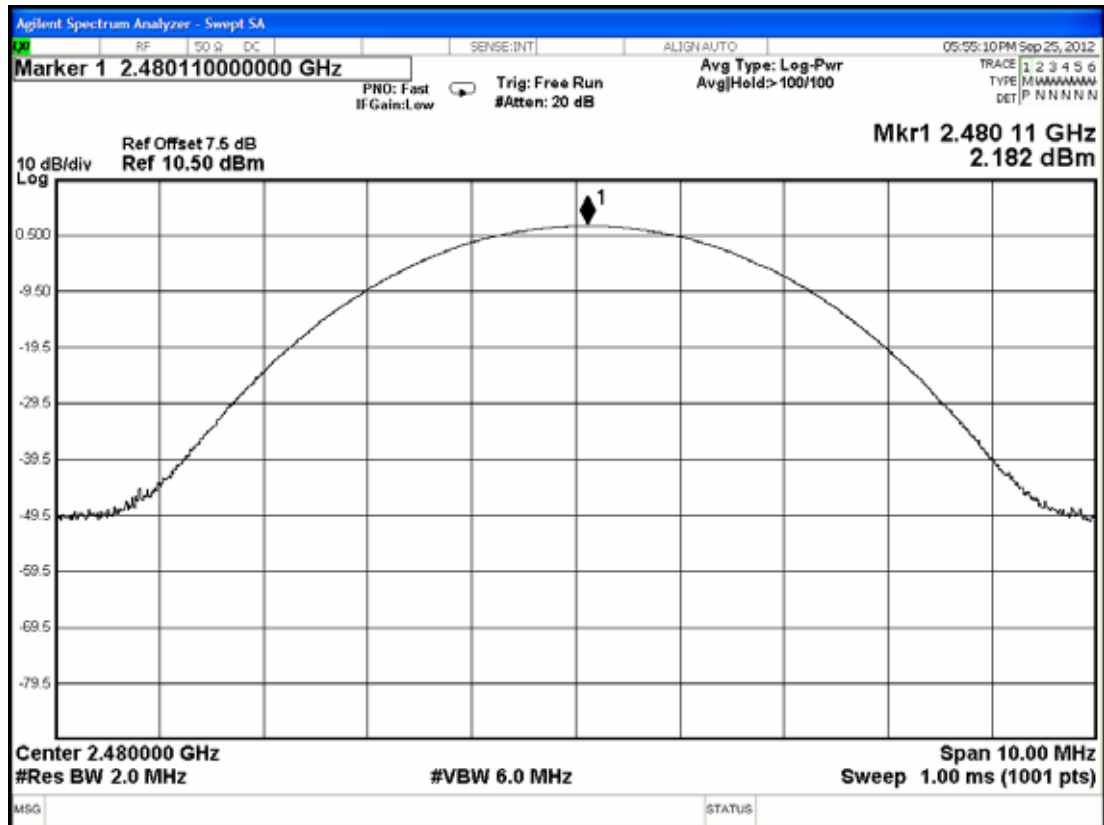


Figure 4: GFSK, Channel 0, Frequency: 2402MHz

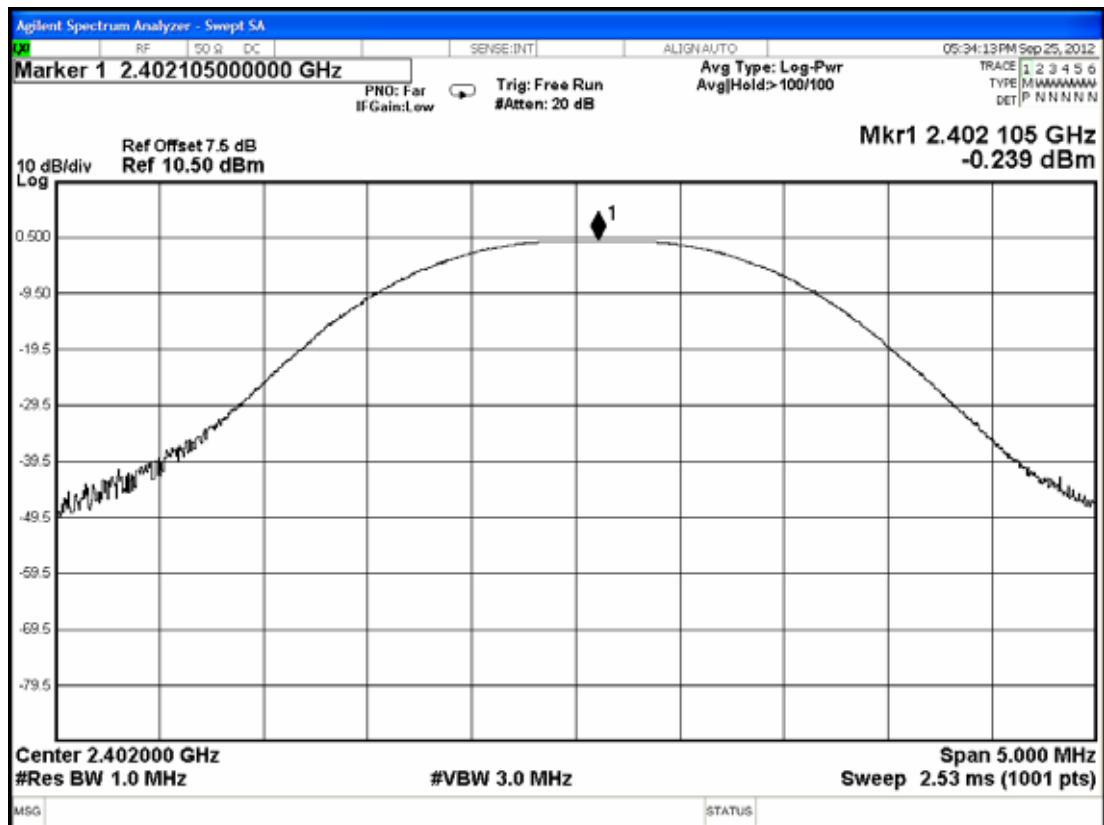


Figure 5: GFSK, Channel 39, Frequency: 2441MHz

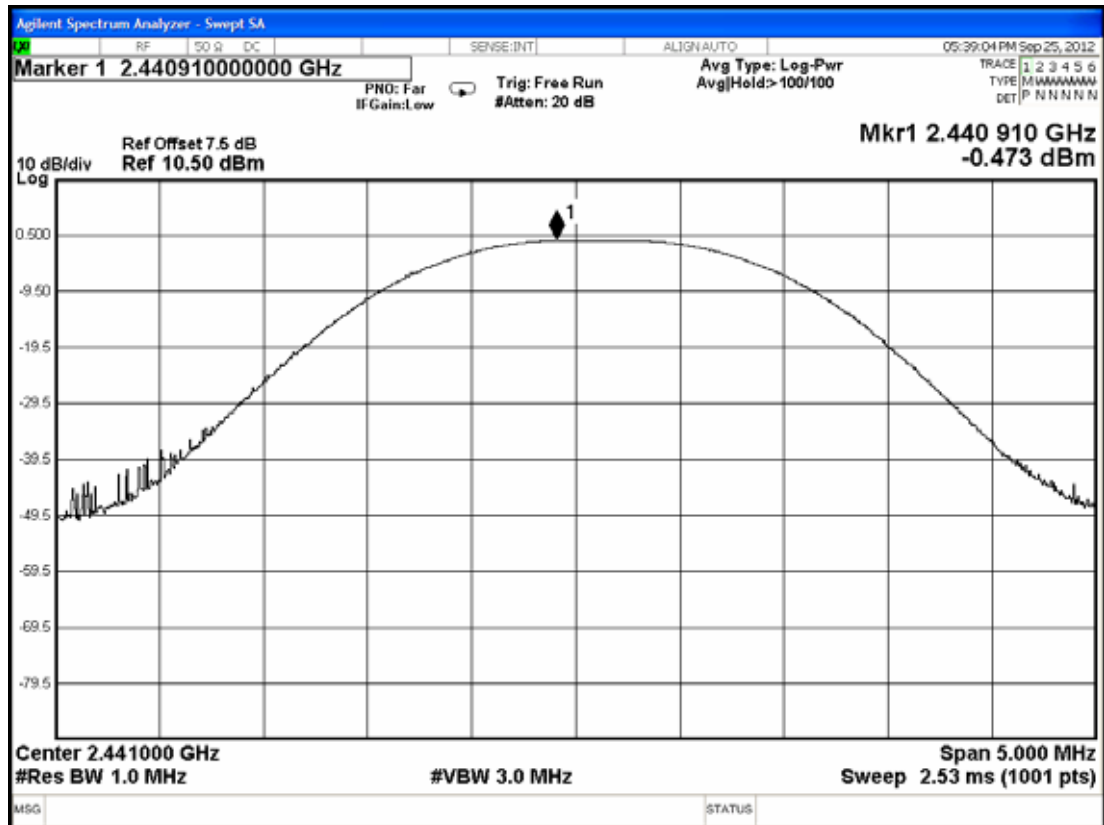
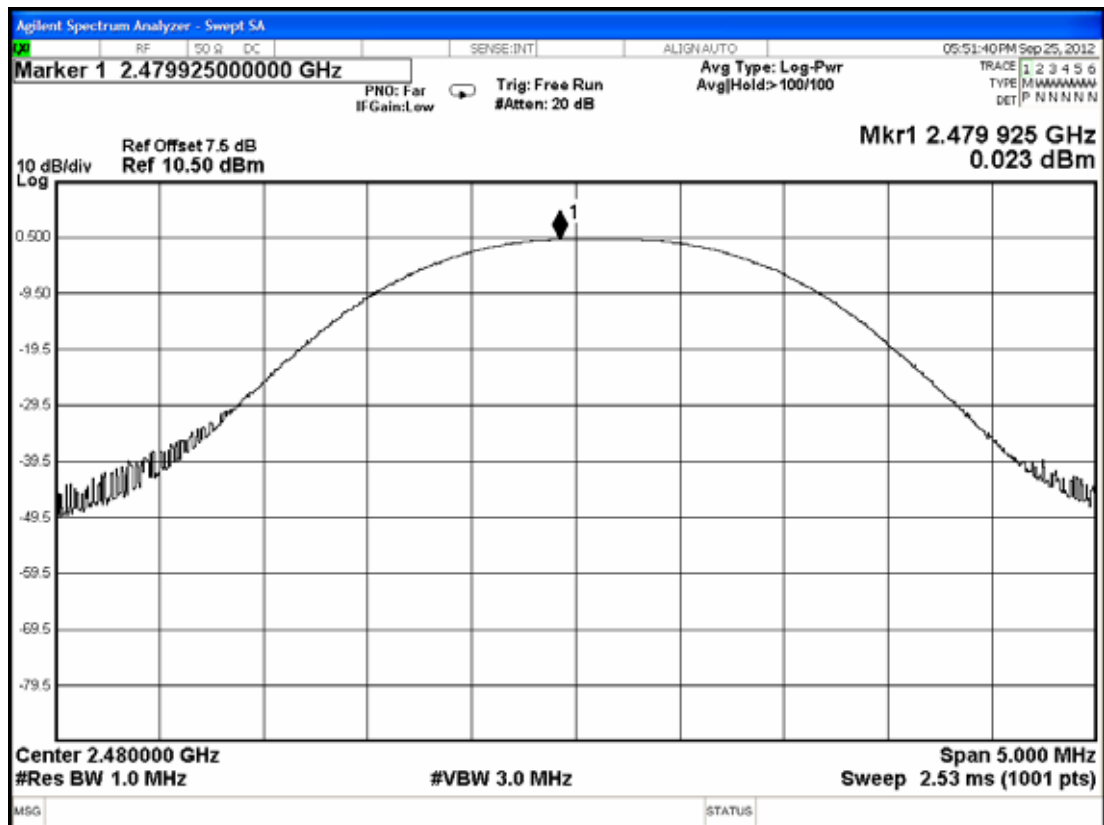


Figure 6: GFSK, Channel 78, Frequency: 2480MHz



9. EMISSION LIMITATIONS MEASUREMENT

9.1. Test Equipment

The following test equipment was used during the emission limitations test :

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9030A-544	US51350140	Oct. 17, 12'	Oct. 16, 13'

9.2. Block Diagram of Test Setup

The same as section.4.2.

9.3. Specification Limits (§15.247(c))

9.3.1. 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)).(※This test result attaching to §3.6.3)

9.3.2. The reference level for determining limit of emission limitations is according to the value measured indicated in plots at section 8.6.

9.4. Operating Condition of EUT

Same as carrier frequency separation measurement which was listed in section 4.4.

9.5. Test Procedure

The transmitter output was connected to the spectrum analyzer. Set both RBW and VBW of spectrum analyzer to 100kHz with suitable frequency span including 100kHz bandwidth from band edge.

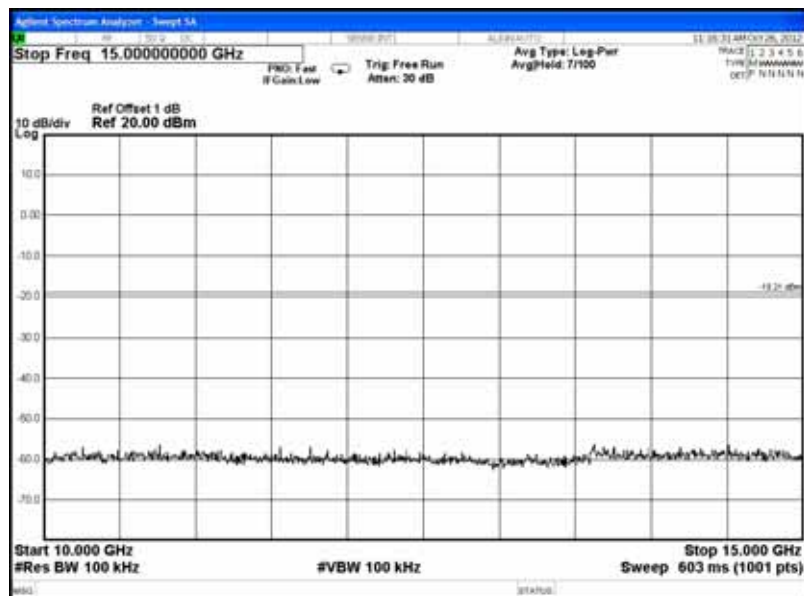
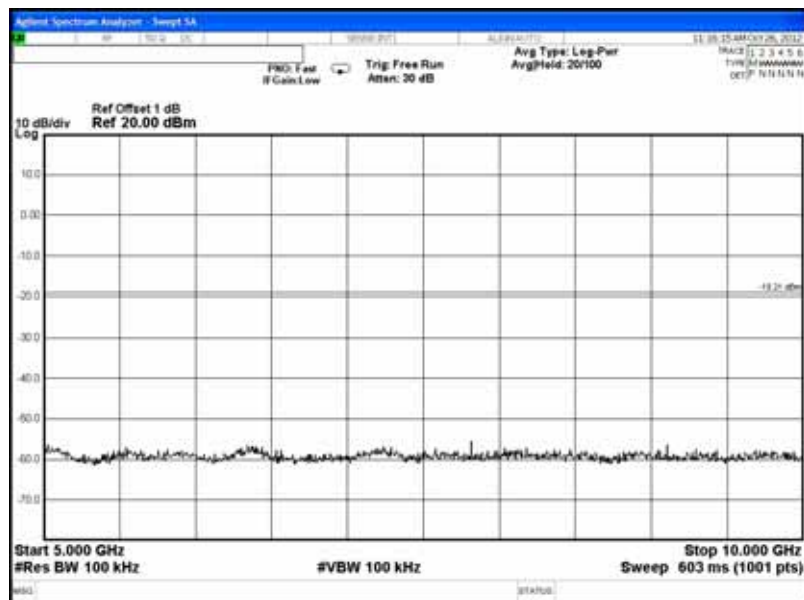
The measurement guideline was according to FCC Public Notice DA 00-705.

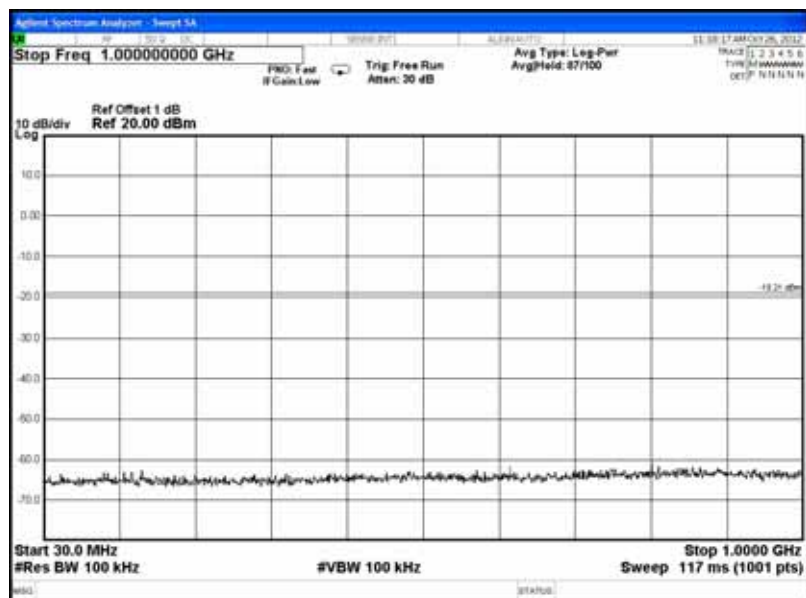
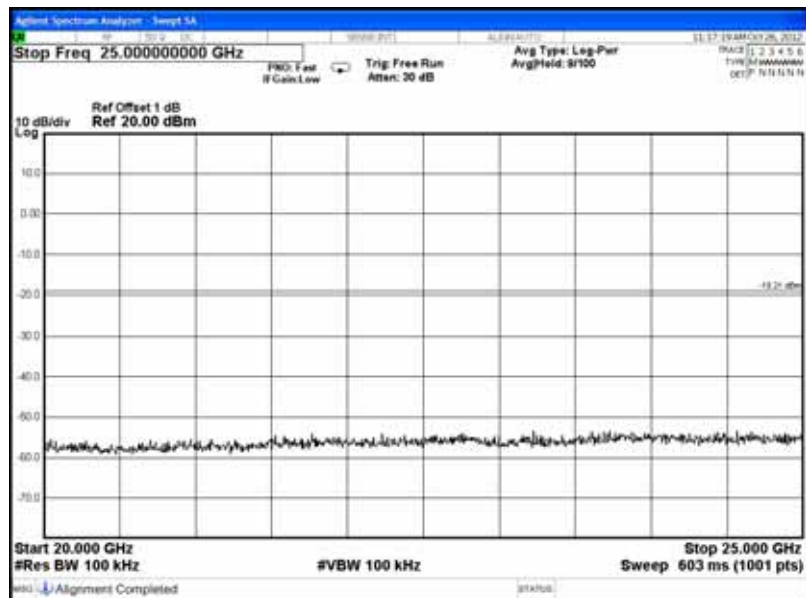
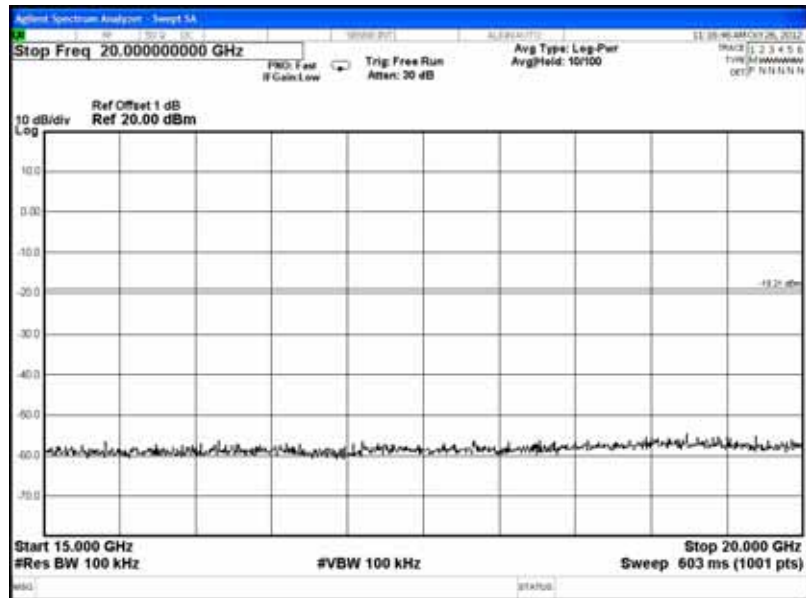
9.6. Test Results

PASSED. The testing data was attached in the next pages.

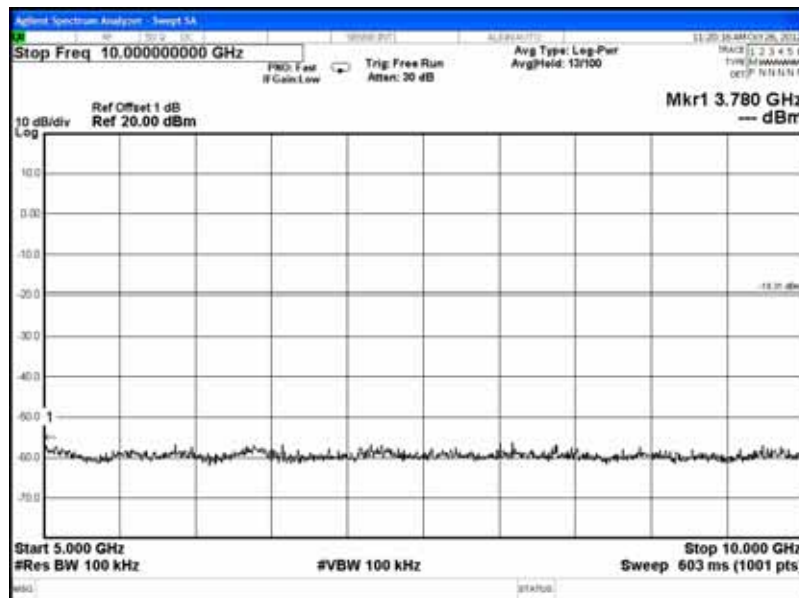
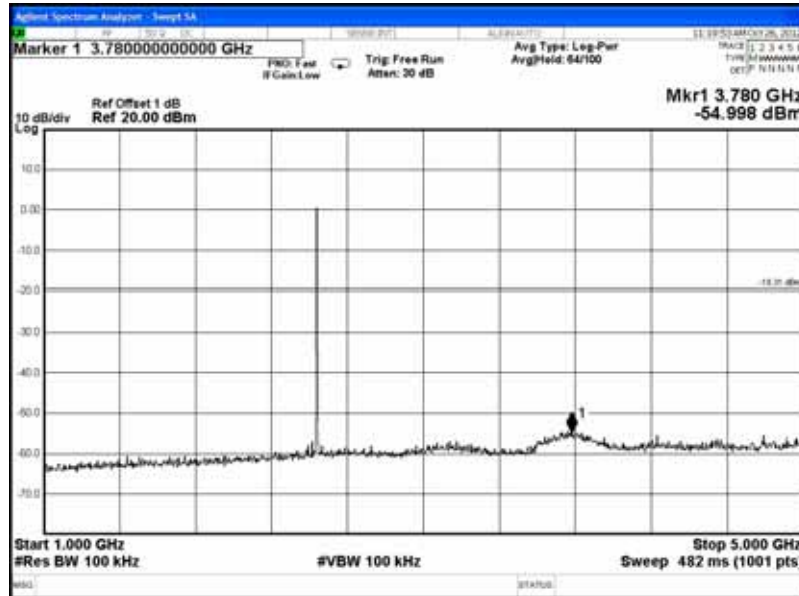
Test Date: Oct. 26, 2012 Temperature : 24°C Humidity : 62%

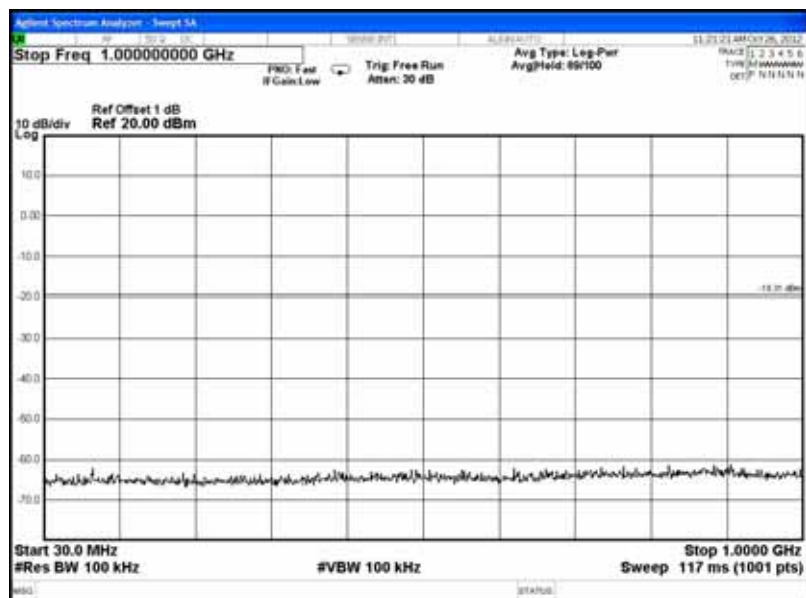
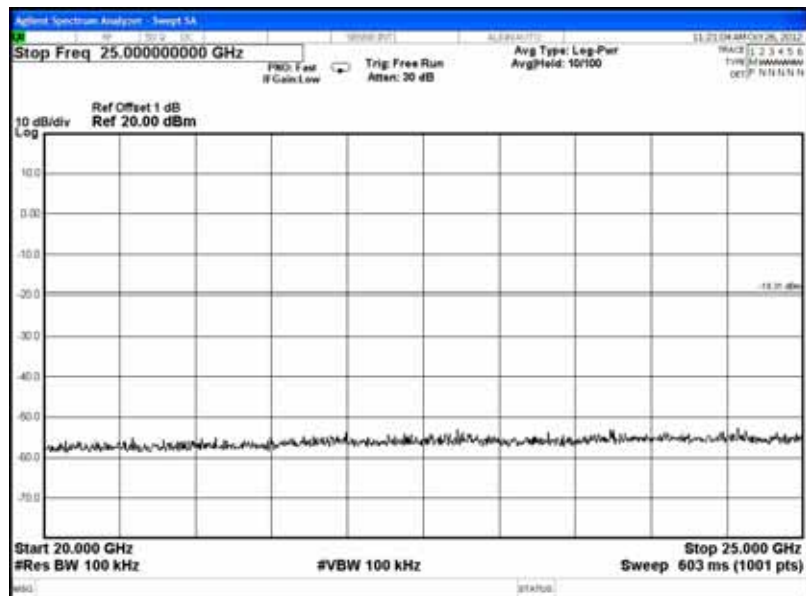
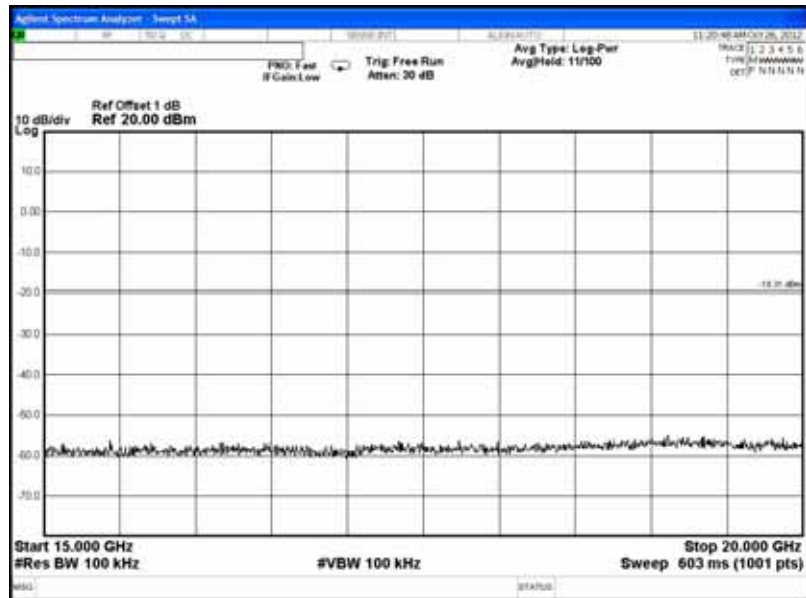
8-DPSK, Channel 0, Frequency: 2402MHz



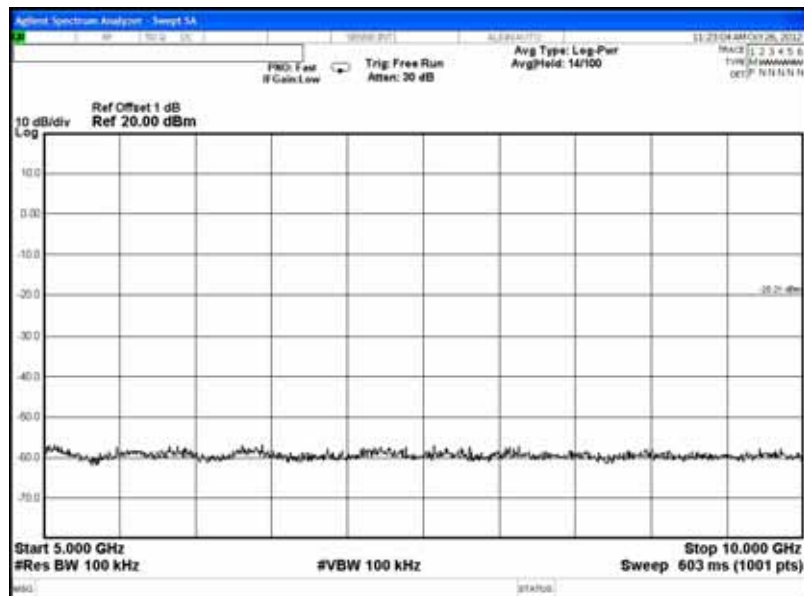
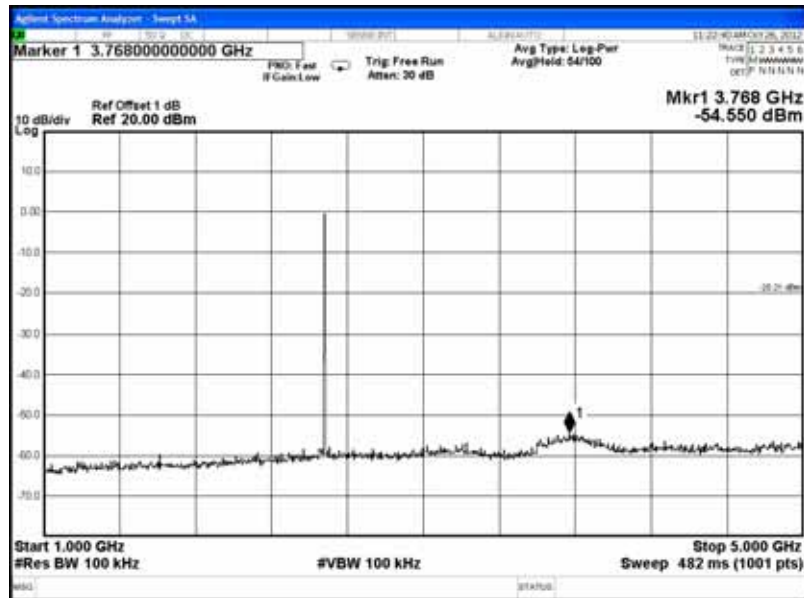


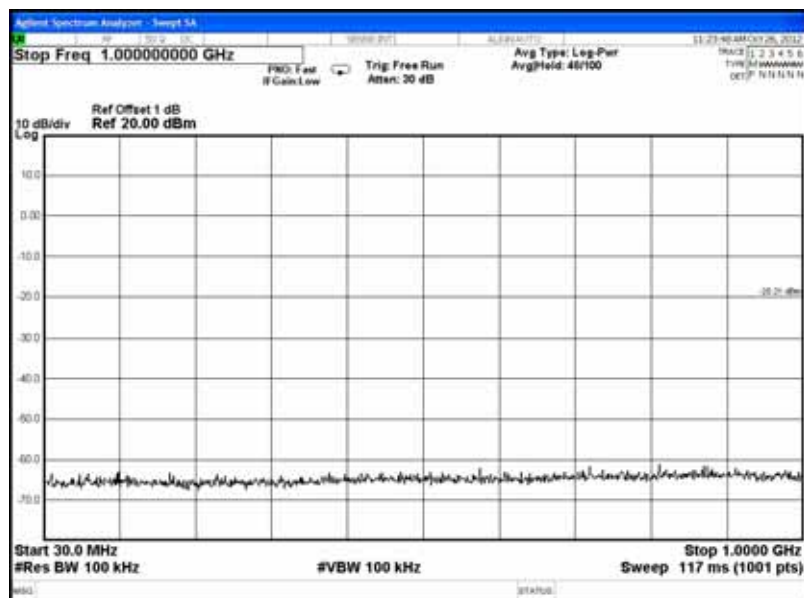
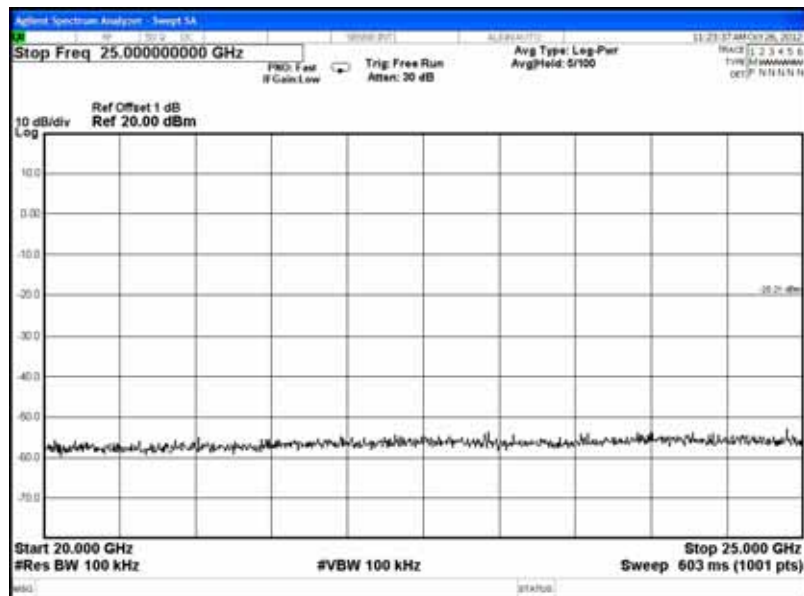
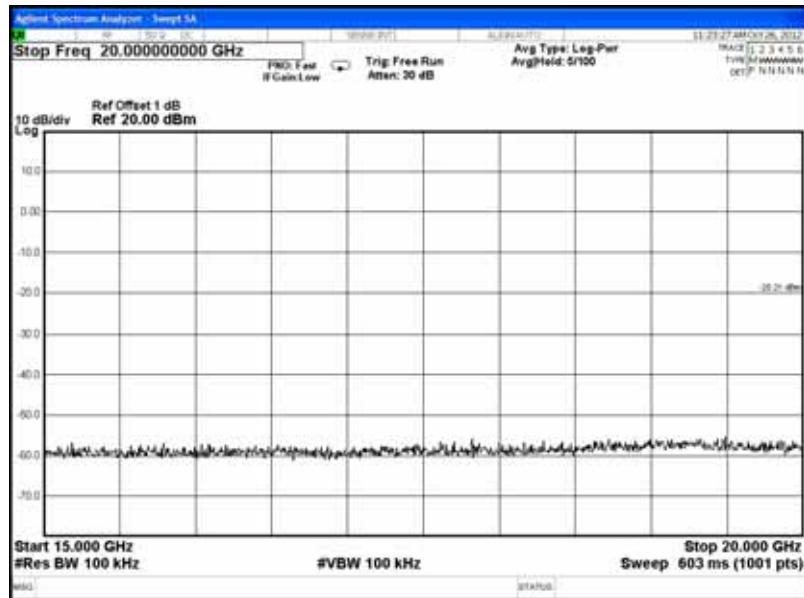
8-DPSK, Channel 39, Frequency: 2441MHz



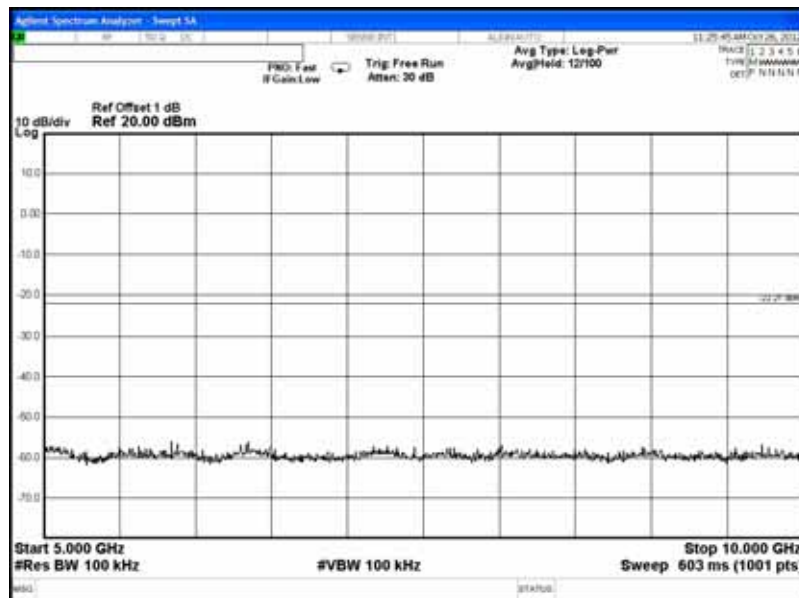
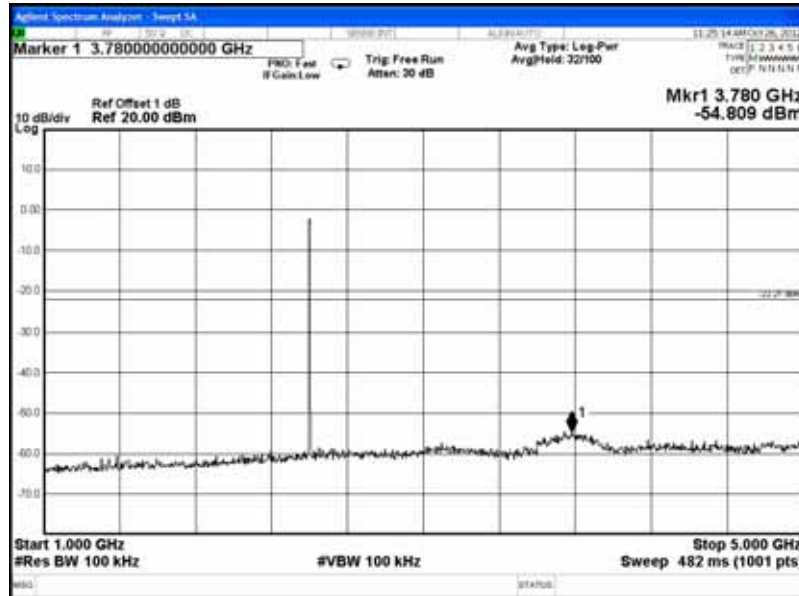


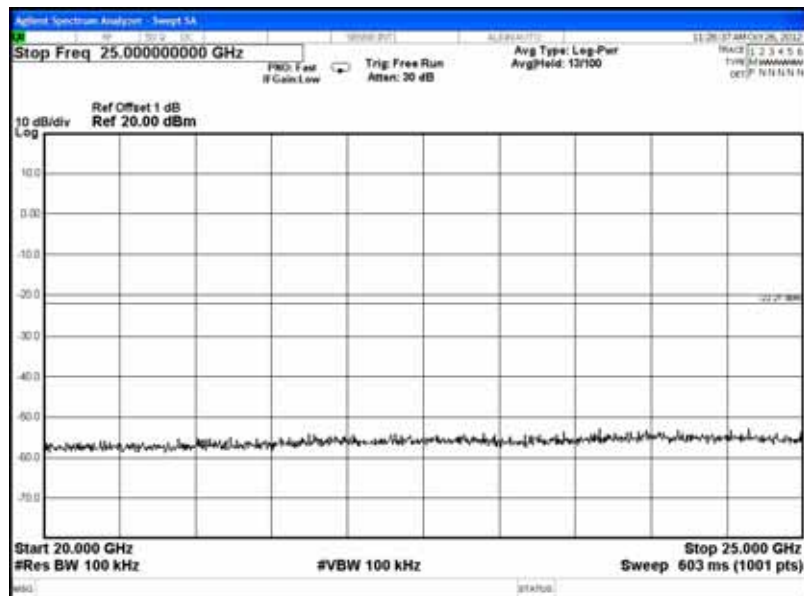
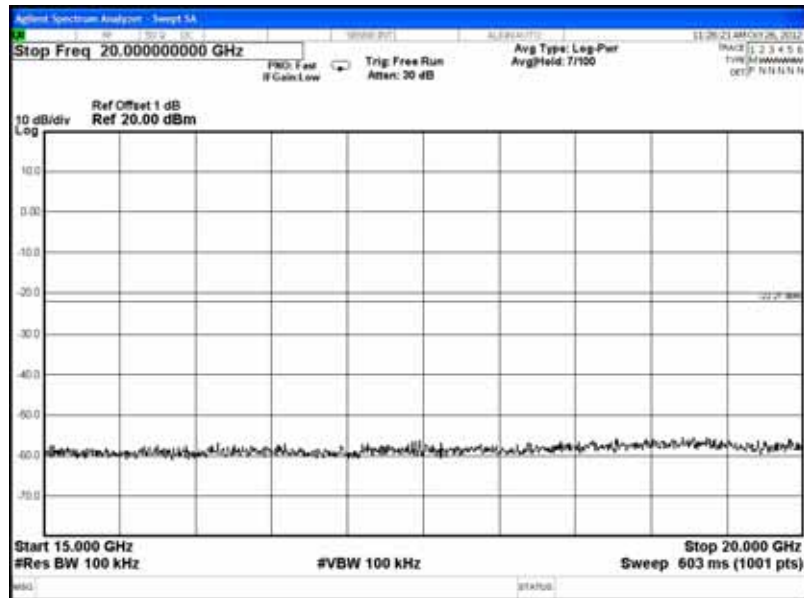
8-DPSK, Channel 78, Frequency: 2480MHz



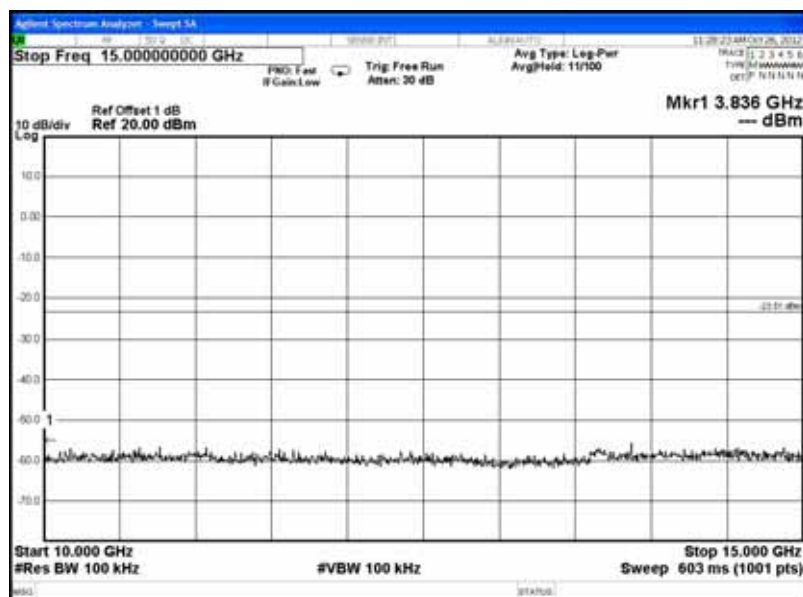
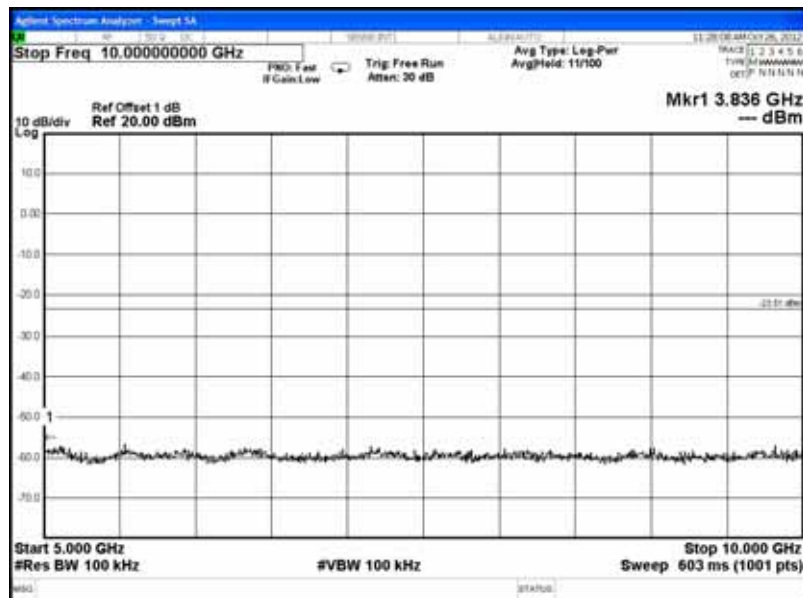
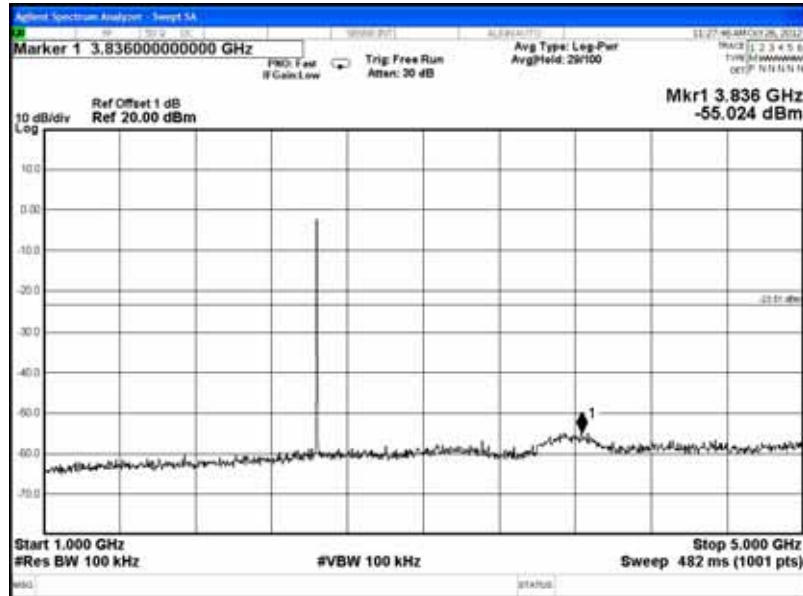


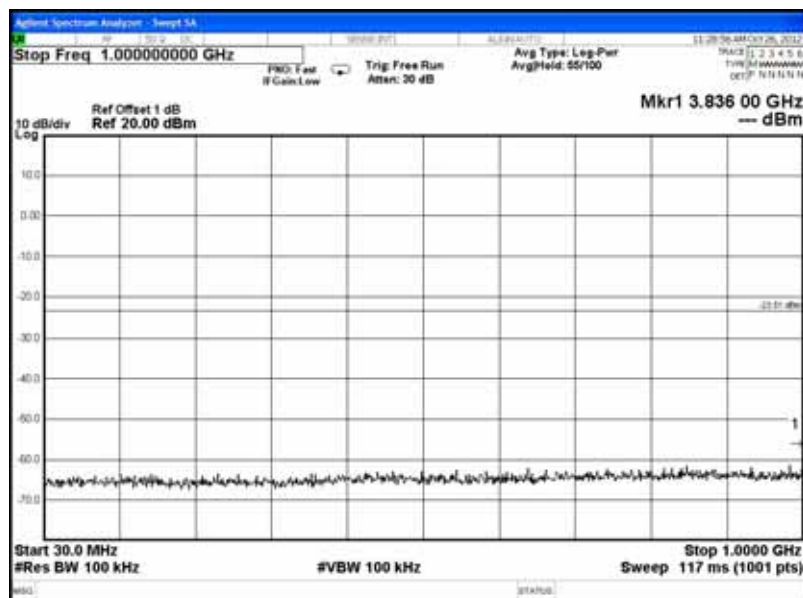
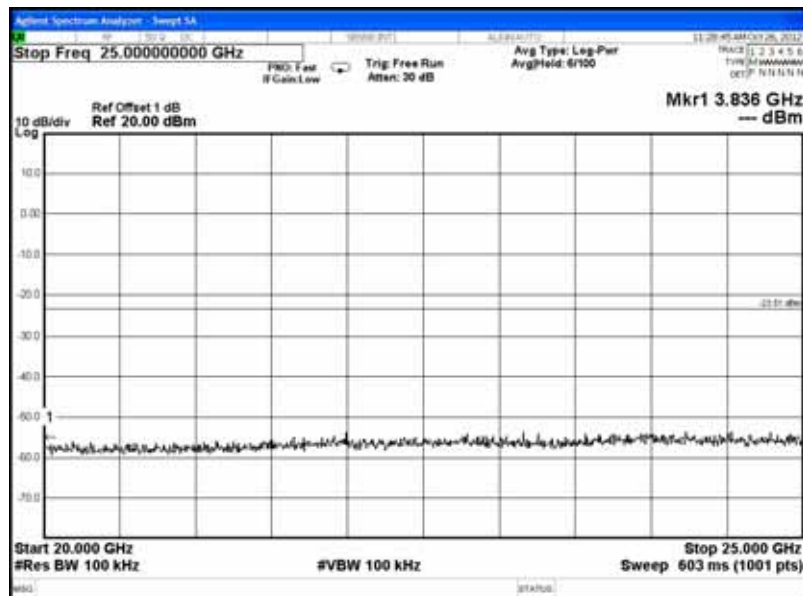
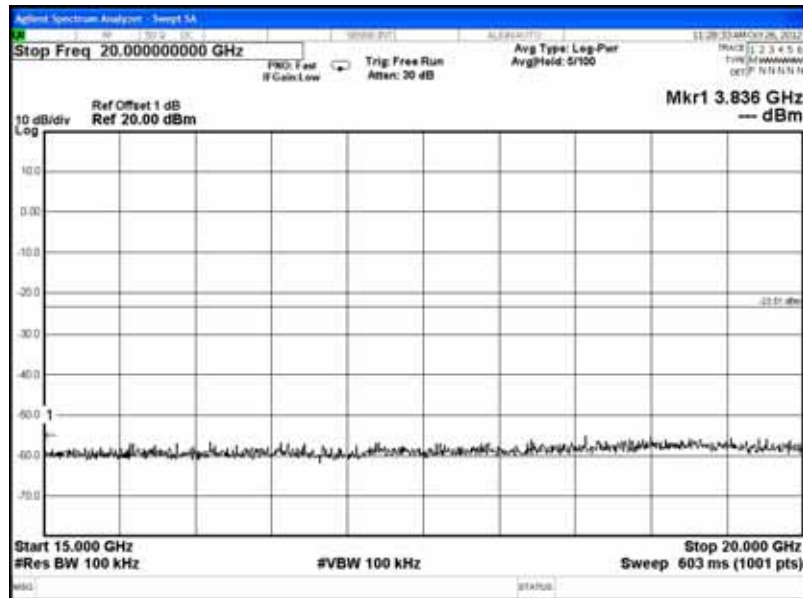
GFSK, Channel 0, Frequency: 2402MHz



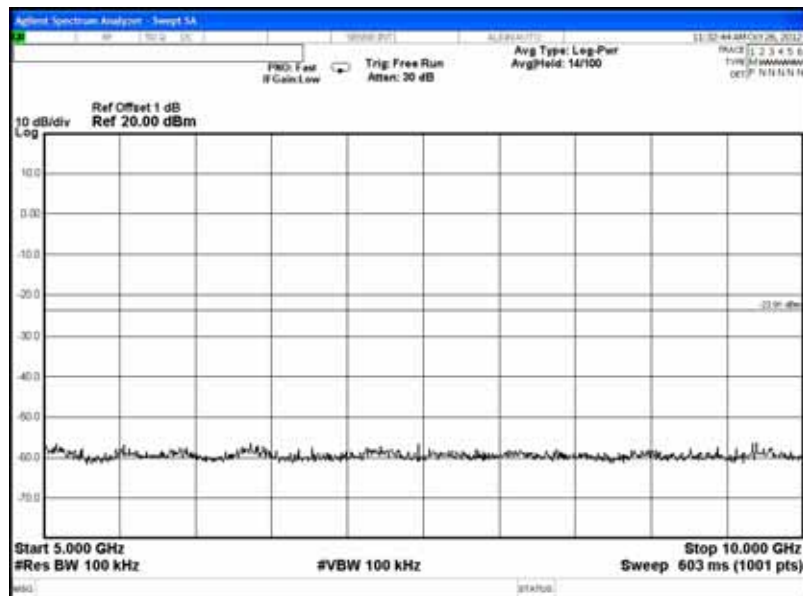


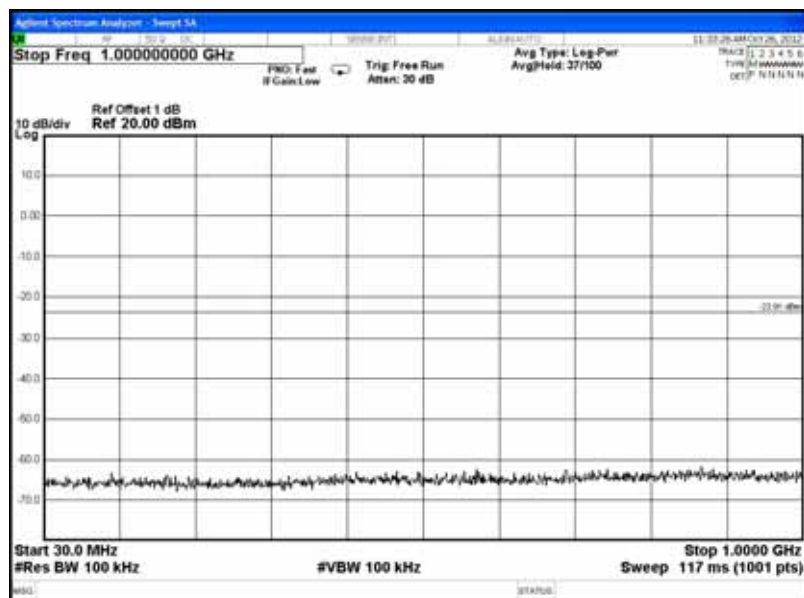
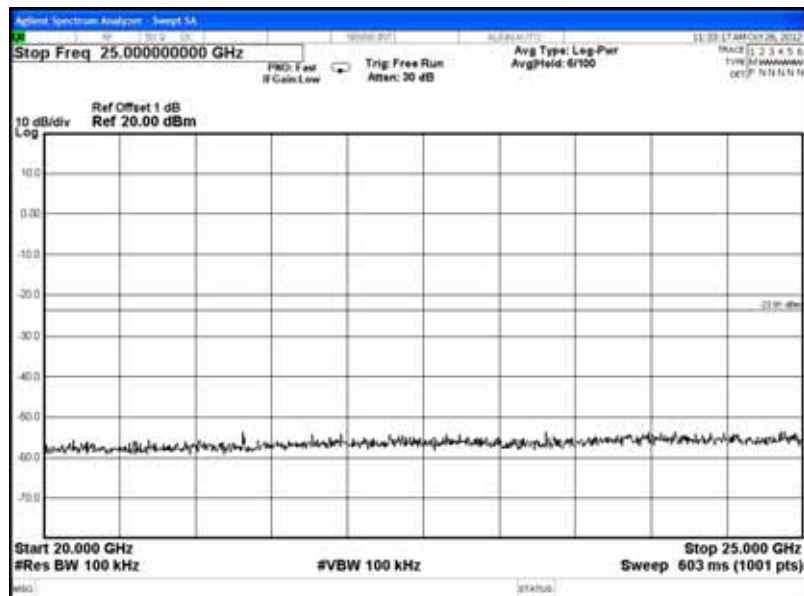
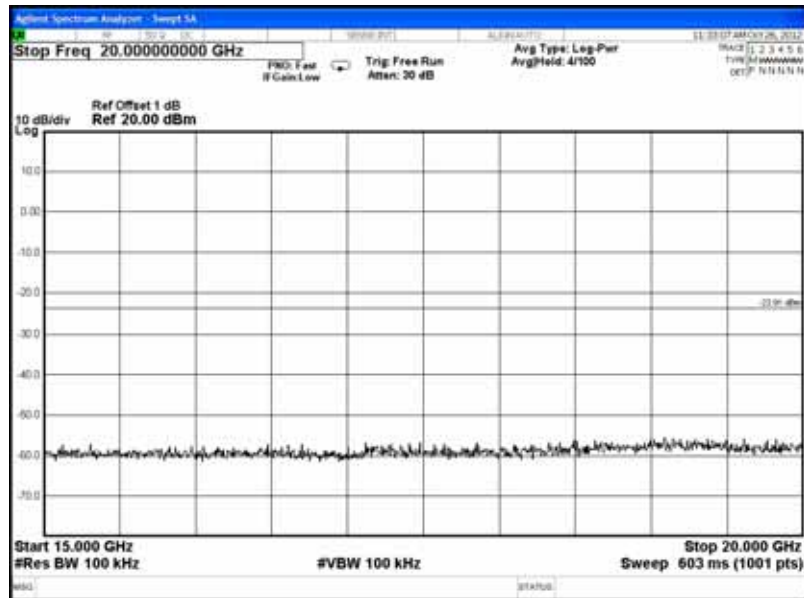
GFSK, Channel 39, Frequency: 2441MHz





GFSK, Channel 78, Frequency: 2480MHz





10.BAND EDGES MEASUREMENT

10.1.Test Equipment

The following test equipment was used during the band edges measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9030A-544	US51350140	Oct. 14, 11'	Oct. 13, 12'
2.	Bluetooth Test Set	Anritsu	MT8852B	6K00005697	Mar. 21, 12'	Mar. 20, 13'
3.	Power Divider	Anritsu	K240C	19728	Jan. 05, 12'	Jan. 04, 13'

10.2.Block Diagram of Test Setup

The same as section.4.2.

10.3.Specification Limits (§15.247(c))

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)). (※ This test result attaching to §3.6.3)

10.4.Operating Condition of EUT

Same as carrier frequency separation measurement which was listed in section 4.4.

10.5.Test Procedure

The transmitter output was connected to the spectrum analyzer. Set both RBW and VBW of spectrum analyzer to 100kHz with suitable frequency span including 100kHz bandwidth from band edge.

The measurement guideline was according to FCC Public Notice DA 00-705.

10.6. Test Results

PASSED. The testing data was attached in the next pages.

[Note: Three types of modulation (8-DPSK, π /4DQPSK, GFSK) were evaluated but only two types of modulation (8-DPSK and GFSK) were reported in this report.]

EUT : MIB RADIO ENTRY PLUS

M/N : LAC9313SE

Test Date : Sep. 25, 2012 Temperature : 25°C Humidity : 59 %

10.6.1. Type of Modulation: 8-DPSK

1. Below Band edge : The highest emission level is -55.740dBm on 2.39990GHz.
2. Upper Band edge: The highest emission level is -62.709dBm on 2.48360GHz.

10.6.2. Type of Modulation: GFSK

1. Below Band edge : The highest emission level is -56.760dBm on 2.39990GHz.
2. Upper Band edge: The highest emission level is -62.969dBm on 2.48360GHz.

Figure 1: 8-DPSK, Below Band edge

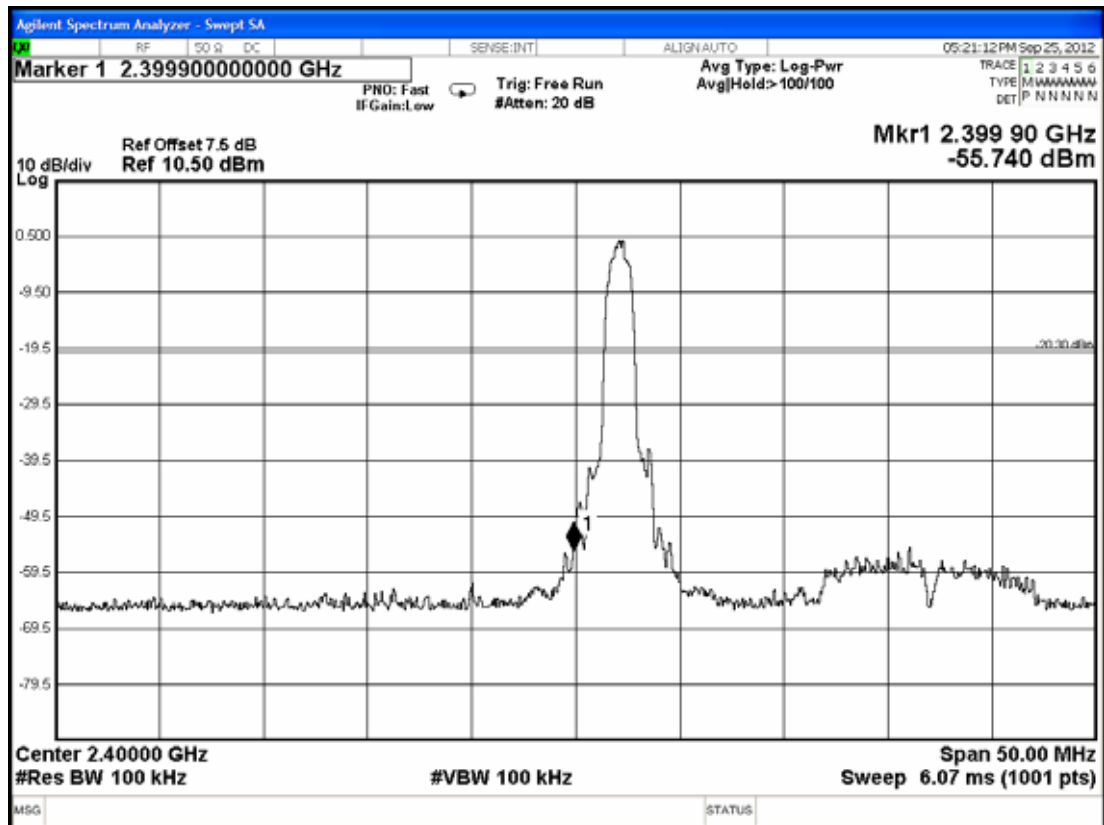


Figure 2: 8-DPSK, Upper Band edge



Figure 3: GFSK, Below Band edge

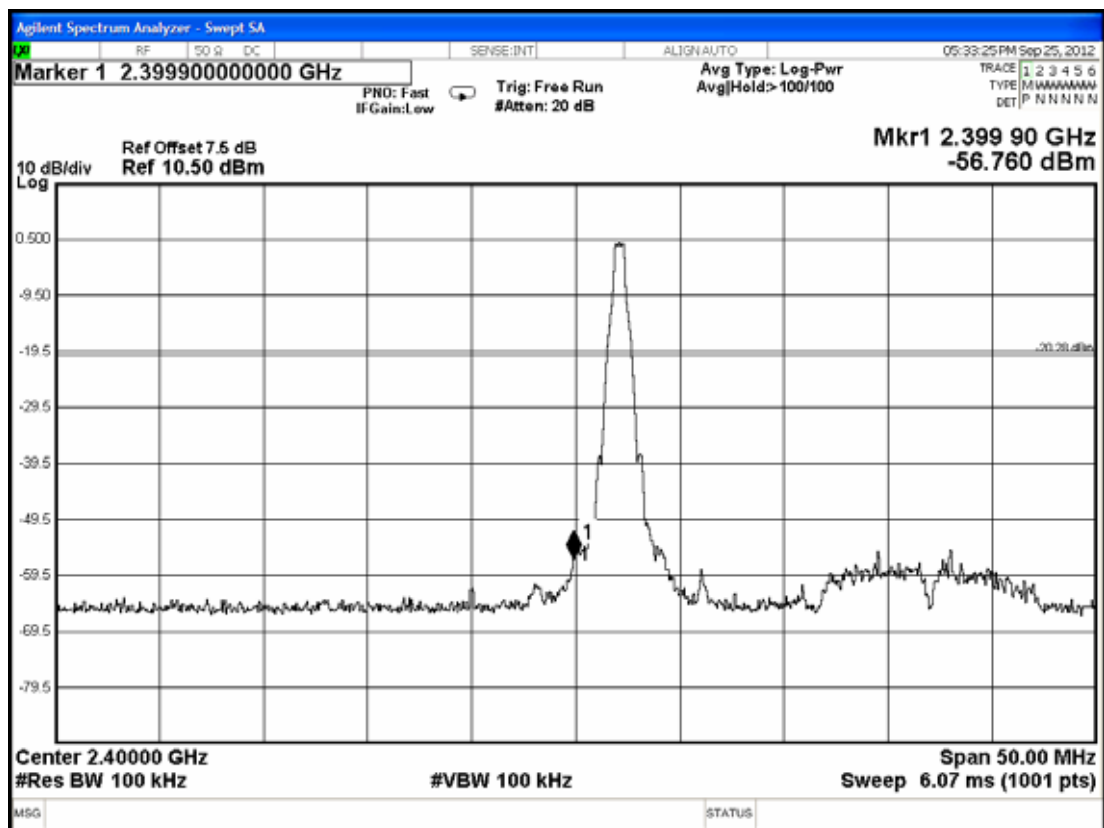
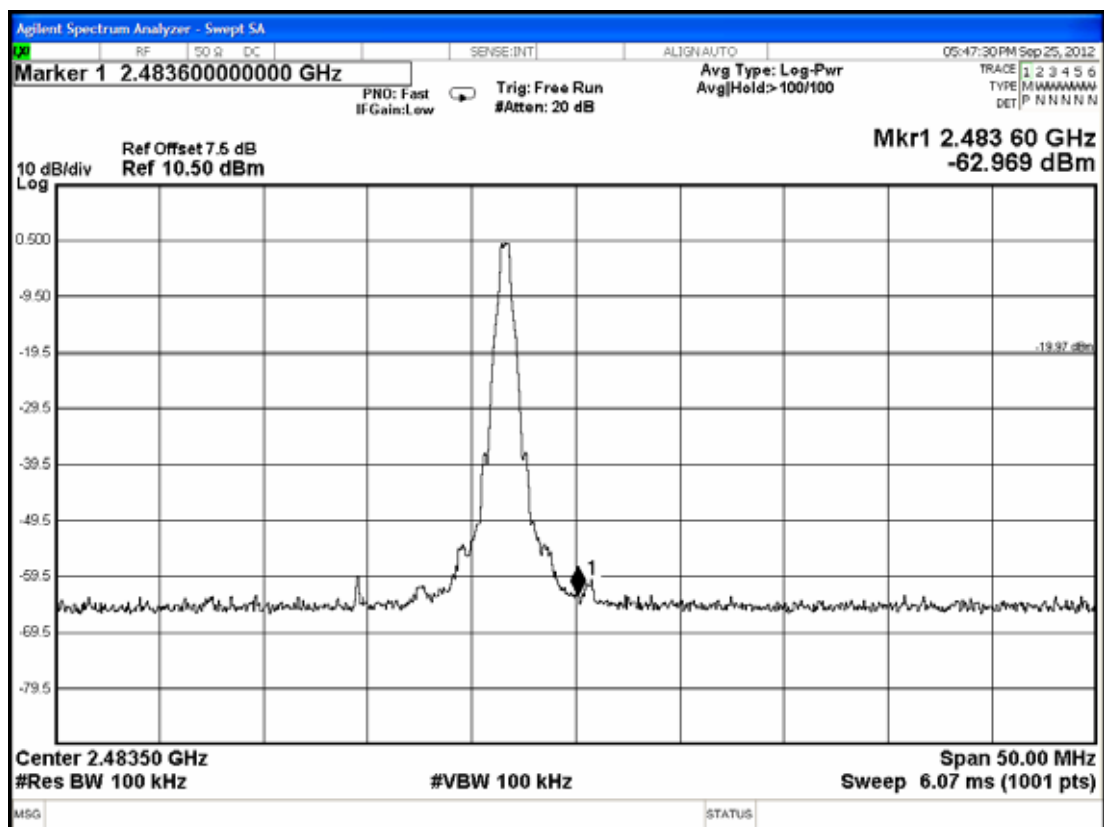


Figure 4: GFSK, Upper Band edge



11.DEVIATION TO TEST SPECIFICATIONS

【NONE】