

APPLICATION FOR CERTIFICATION

On Behalf of

LG Electronics Inc.

Wi-Fi/Bluetooth Dongle

Models No. : AN-WF500

FCC ID : BEJWF500

IC : 2703H-WF500

Brand : LG

Prepared for : LG Electronics Inc.
19-1, Cheongho-Ri, Jinwuy-Myeon,
Pyeongtaek-City, Gyeonggi-Do, 451-713,
Korea

Prepared By : AUDIX Technology Corporation
EMC Department
No. 53-11, Dingfu, Linkou Dist., New Taipei
City 244, Taiwan

Tel : (02) 2609-9301, 2609-2133
Fax: (02) 2609-9303

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TEST REPORT CERTIFICATION

Applicant : LG Electronics Inc.
 Manufacturer : LG Electronics Inc.
 Factory : Compal Networking (Kunshan) Co., Ltd.
 EUT Description : Wi-Fi/Bluetooth Dongle
FCC ID : **BEJWF500**
IC : **2703H-WF500**
 (A) Model No. : AN-WF500
 (B) Serial No. : N/A
 (C) Brand : LG
 (D) Power Supply : DC 5V (Powered by Notebook PC)

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C, Oct 2012
 (FCC CFR 47 Part 15C, §15.205, §15.207, §15.209 and §15.247)
 ANSI C63.4/2003
 FCC Public Notice DA 00-705, Mar. 2000

Industry Canada Rules and Regulations RSS-Gen (Issue 3), December 2010 and
 RSS-210 (Issue 8), December 2010

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 and Canada RSS-Gen, RSS-210 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 Part 15 and Industry Canada RSS-Gen, RSS-210 standards.

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. 13 ~ Oct. 11, 2013 Date of Report : Oct. 15, 2013

Producer : Tina Huang
 (Tina Huang/Administrator)

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

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

Product	Wi-Fi/Bluetooth Dongle
Model Number	AN-WF500
Serial Number	N/A
Brand Name	LG
Applicant	LG Electronics Inc. 19-1, Cheongho-Ri, Jinwuy-Myeon, Pyeongtaek-City, Gyeonggi-Do, 451-713, Korea
Manufacturer	LG Electronics Inc. 19-1, Cheongho-Ri, Jinwuy-Myeon, Pyeongtaek-City, Gyeonggi-Do, 451-713, Korea
Factory	Compal Networking (Kunshan) Co., Ltd. No.520, Nanbang Rd., Economic & Technical Development Zone, Kunshan, Jiangsu Province, China.
FCC ID	BEJWF500
IC	2703H-WF500
USB Cable	Shielded, Detachable, 0.5m
Fundamental Range	802.11b/g: 2412MHz ~ 2462MHz 802.11a: 5180MHz ~ 5240MHz (UNII Band I) and 5745MHz ~ 5825MHz (UNII Band IV) 802.11n-HT20: 2412MHz ~ 2462MHz and 5180MHz ~ 5240MHz (UNII Band I) and 5745MHz ~ 5825MHz (UNII Band IV) 802.11n-HT40: 2422MHz ~ 2452MHz and 5190MHz ~ 5230MHz (UNII Band I) and 5755MHz ~ 5795MHz (UNII Band IV) BT and BLE: 2402MHz ~ 2480MHz
Frequency Channel	802.11b/g: 11 channels 802.11a: UNII Band I: 4channels UNII Band IV: 4 channels 802.11n-HT20: 2.4GHz: 11 channels UNI Band I: 4channels UNII Band IV: 4 channels 802.11n-HT40: 2.4GHz: 7 channels UNII Band I: 2channels UNII Band IV: 3 channels BT: 79 channels (GFSK, $\pi/4$ DQPSK, 8-DPSK) 40 channels (BLE)

Radio Technology	802.11b: DSSS Modulation (DBPSK/DQPSK/CCK) 802.11g: OFDM Modulation (BPSK/QPSK/16QAM/64QAM) 802.11a: OFDM Modulation (BPSK/QPSK/16QAM/64QAM) 802.11n: OFDM Modulation (MIMO) (BPSK/QPSK/16QAM/64QAM) BT: FHSS (GFSK, π /4DQPSK, 8-DPSK) GFSK (BLE)
Data Transfer Rate	802.11b: 1/2/5.5/11Mbps 802.11a/g: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 300Mbps BT: 1/2/3Mbps BLE: Mbps
Date of Receipt of Sample	Sep. 09, 2013
Date of Test	Sep. 13 ~ Oct. 11, 2013
<p>Note: This EUT has 802.11a/b/g/n-HT20/HT40 and BT and BLE function. See below for related test reports based on radio functionality.</p> <ol style="list-style-type: none"> 1. The BT function has been test in other report of EM-F1020699. 2. The 802.11a/b/g/n-HT20/HT40 (2.4GHz and UNII Band IV) and BLE function has been test in other report of EM-F1020700. 3. The 802.11a/b/g/n-HT20/HT40 (UNII Band I) function has been test in other report of EM-F1020701. 	

1.2. Antenna Information

Antenna Part Number	Manufacture	Antenna Type	Peak Gain W/ Cable loss (dBi)	
			Frequency (MHz)	Max Gain (dBi)
Wi-Fi Antenna				
120800011700J (ANT#0)	arcadyan	PIFA Antenna	2.400 GHz	-0.60 dBi (peak)
			2.450 GHz	-1.85 dBi (peak)
			2.500 GHz	-2.20 dBi (peak)
			5.150 GHz	0.42 dBi (peak)
			5.250 GHz	-0.43 dBi (peak)
			5.350 GHz	-0.97 dBi (peak)
			5.470 GHz	0.23 dBi (peak)
			5.600 GHz	0.27 dBi (peak)
			5.725 GHz	-0.69 dBi (peak)
			5.785 GHz	-0.77 dBi (peak)
			5.850 GHz	-0.37 dBi (peak)
120800011800J (ANT#1)	arcadyan	PIFA Antenna	2.400 GHz	1.44 dBi (peak)
			2.450 GHz	0.83 dBi (peak)
			2.500 GHz	0.80 dBi (peak)
			5.150 GHz	0.61 dBi (peak)
			5.250 GHz	0.12 dBi (peak)
			5.350 GHz	0.37 dBi (peak)
			5.470 GHz	1.56 dBi (peak)
			5.600 GHz	0.73 dBi (peak)
			5.725 GHz	-0.87 dBi (peak)
			5.785 GHz	-0.98 dBi (peak)
5.850 GHz	-0.69 dBi (peak)			
Bluetooth Antenna				
---	arcadyan	PCB Antenna	2.400 GHz	-5.64 dBi (peak)
			2.450 GHz	-5.03 dBi (peak)
			2.500 GHz	-3.28 dBi (peak)

1.3. Tested Supporting System Details

1.3.1. NOTEBOOK PC

Model Number	:	N20A
Serial Number	:	8BN0AS413979471
FCC ID	:	By DoC
BSMI ID	:	R31018
Brand	:	ASUS
AC Adapter	:	Delta, M/N SADP-65KB B, DC Cord: Non-Shielded, Undetachable, 1.8m Bonded a ferrite core
Power Cord	:	Non-Shielded, Detachable, 1.8m

1.4. Description of Test Facility

Name of Firm : **AUDIX Technology Corporation**
EMC Department
No. 53-11, Dingfu, Linkou Dist.,
New Taipei City 244, Taiwan

Test Location & Facility (C8/AC) : **No. 8 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
May 11, 2012 File on
Federal Communication Commission
Registration Number: 90993

NVLAP Lab. Code : 200077-0

TAF Accreditation No : 1724

1.5. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty (dB)
Conduction Test	150kHz~30MHz	±1.73dB
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
Emission Limitations	± 0.13dB
Band Edges	± 0.13dB

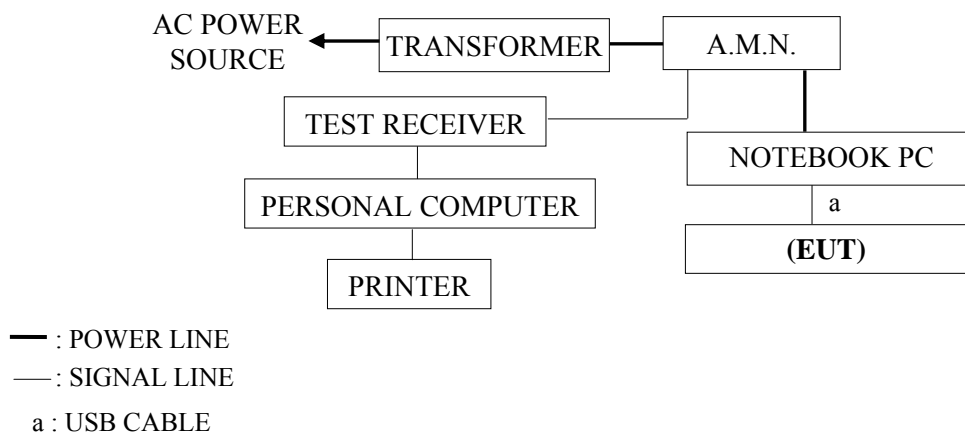
2. POWERLINE CONDUCTED EMISSION MEASUREMENT

2.1. Test Equipment

The following test equipment was used during the conducted emission measurement :
(No. 8 Shielded Room)

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Test Receiver	R&S	ESCS30	100265	Aug. 22, 13'	Aug. 21, 14'
2.	A.M.N.	R&S	ESH2-Z5	100366	Mar. 19, 13'	Mar. 18, 14'
3.	L.I.S.N.	Kyoritsu	KNW-407	8-881-13	Jan. 21, 13'	Jan. 30, 14'

2.2. Block Diagram of Test Setup



EUT: Wi-Fi/Bluetooth Dongle

2.3. Powerline Conducted Emission Limit (§15.207, RSS-Gen §7.2.2/Table 2)

Frequency	Maximum RF Line Voltage	
	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

Remark1.: If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary.

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

2.4. Operating Condition of EUT

- 2.4.1. Setup the EUT (Wi-Fi/Bluetooth Dongle) as shown on 2.2.
- 2.4.2. Turn on the power of all equipment.
- 2.4.3. The Notebook PC was running test software “Blue Tool” to set EUT (Wi-Fi/Bluetooth Dongle) on transmitting and receiving during all testing.

2.5. Test Procedure

The EUT link AC adapter was put on table which was above the ground by 80cm and power cord was connected to power mains through an Artificial Mains Network (A.M.N.). This provided a 50 ohm coupling impedance for the measuring equipment. (Please refer to the block diagram of the test setup and photographs.) Both sides of A.C. line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions simulators of the interface cables should be manipulated according to FCC ANSI C63.4-2003 , RSS-Gen and RSS-210 during conducted measurement.

The bandwidth of the R & S Test Receiver ESCS30 was set at 9kHz.

The frequency range from 150kHz to 30MHz was checked.

All the final readings from Test Receiver were measured with the Quasi-Peak detector and Average detector. (Remark: If the Average limit is met when using a Quasi-Peak detector, the Average detector is unnecessary)

2.6. Powerline Conducted Emission Measurement Results

PASSED.

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

EUT was performed during this section testing and all the test results are attached in next pages.

EUT : Wi-Fi/Bluetooth Dongle M/N : AN-WF500

Test Date : Sep. 13, 2013 Temperature : 25 Humidity : 56%

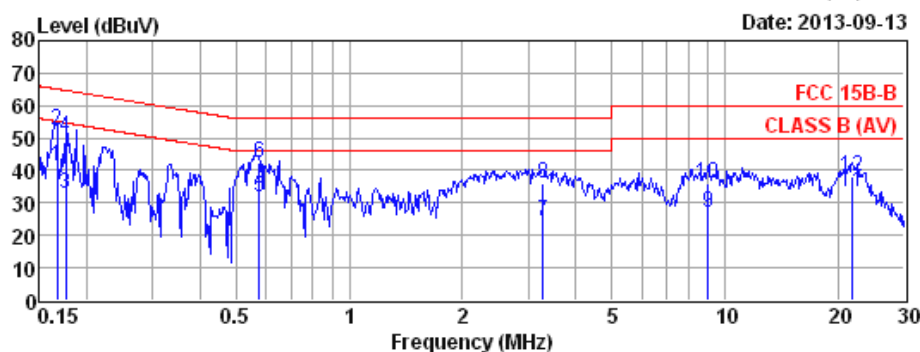
The details are as follows :

Mode	Reference Test Data	
	Neutral	Line
1.	# 10	# 9



AUDIX TECHNOLOGY Corp. EMC Department
 No.53-11, Dingfu, Linkou Dist., New Taipei City
 24442, Taiwan R.O.C.
 Tel: +886-2-26092133 Fax: +886-2-26099303
 Email: emc@audixtech.com

Data: 10 File: D:\test data\REPORT\2013\C1M1309XXX\C1M1309091-C-D.EM6 (12)



Site no. : No.8 Shielded Room Data no. : 10
 Dis. / Ant. : ESH2-Z5 366 Ant. pol. : NEUTRAL
 Limit : FCC 15B-B
 Env. / Ins. : 25°C / 56% ESCS (265) Engineer : Jack_Wu
 EUT : AII-WF500
 Power Rating : 120Vac/60Hz
 Test Mode : Operation

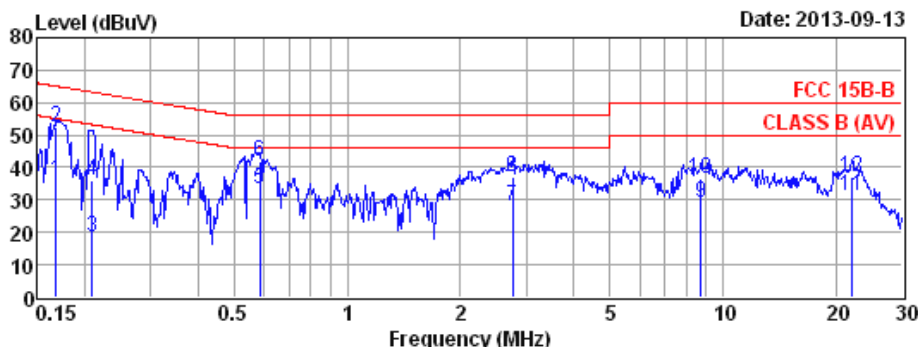
	Freq. (MHz)	AMI. Factor (dB)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.167	0.21	0.04	41.12	41.37	55.12	13.75	Average
2	0.167	0.21	0.04	52.32	52.57	65.12	12.55	QP
3	0.176	0.21	0.04	32.75	33.00	54.68	21.68	Average
4	0.176	0.21	0.04	49.82	50.07	64.68	14.61	QP
5	0.576	0.23	0.04	31.55	31.82	46.00	14.18	Average
6	0.576	0.23	0.04	41.86	42.13	56.00	13.87	QP
7	3.276	0.30	0.11	24.19	24.60	46.00	21.40	Average
8	3.276	0.30	0.11	35.59	36.00	56.00	20.00	QP
9	9.011	0.37	0.18	26.54	27.09	50.00	22.91	Average
10	9.011	0.37	0.18	35.41	35.96	60.00	24.04	QP
11	21.830	0.65	0.26	32.53	33.44	50.00	16.56	Average
12	21.830	0.65	0.26	37.10	38.01	60.00	21.99	QP

Remarks: 1. Emission Level= AMI Factor + Cable Loss + Reading.
 2. If the average limit is met when using a quasi-peak detector,
 the EUT shall be deemed to meet both limits and measurement
 with average detector is unnecessary.



AUDIX TECHNOLOGY Corp. EMC Department
 No.53-11, Dingfu, Linkou Dist., New Taipei City
 24442, Taiwan R.O.C.
 Tel: +886-2-26092133 Fax: +886-2-26099303
 Email: emc@audixtech.com

Data: 9 File: D:\test data\REPORT\2013\C1M1309XXX\C1M1309091-C-D.EM6 (12)



Site no. : Ilo.8 Shielded Room Data no. : 9
 Dis. / Ant. : ESH2-Z5 366 Ant. pol. : LINE
 Limit : FCC 15B-B
 Env. / Ins. : 25°C / 56% ESCS (265) Engineer : Jack_Wu
 EUT : AII-WF500
 Power Rating : 120Vac/60Hz
 Test Mode : Operation

	Freq. (MHz)	AMI. Factor (dB)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.168	0.11	0.04	36.14	36.29	55.08	18.79	Average
2	0.168	0.11	0.04	52.04	52.19	65.08	12.89	QP
3	0.209	0.11	0.04	18.64	18.79	53.23	34.44	Average
4	0.209	0.11	0.04	36.07	36.22	63.23	27.01	QP
5	0.585	0.13	0.04	33.40	33.57	46.00	12.43	Average
6	0.585	0.13	0.04	41.67	41.84	56.00	14.16	QP
7	2.750	0.18	0.09	27.61	27.88	46.00	18.12	Average
8	2.750	0.18	0.09	36.98	37.25	56.00	18.75	QP
9	8.729	0.24	0.18	28.81	29.23	50.00	20.77	Average
10	8.729	0.24	0.18	36.37	36.79	60.00	23.21	QP
11	21.946	0.60	0.26	30.22	31.08	50.00	18.92	Average
12	21.946	0.60	0.26	36.33	37.19	60.00	22.81	QP

Remarks: 1. Emission Level= AMI Factor + Cable Loss + Reading.
 2. If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

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)

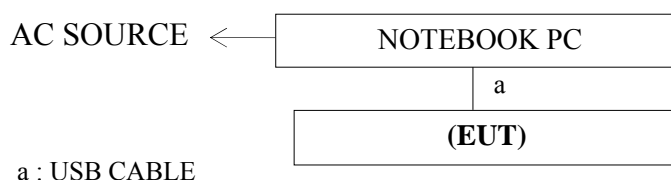
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1	Spectrum Analyzer	Agilent	E4446A	US44300366	Aug. 18, 13'	Aug. 17, 14'
2	Test Receiver	R & S	ESCS30	100338	Jul. 01, 13'	Jun. 30, 14'
3	Amplifier	HP	8447D	2944A06305	Feb. 19, 13'	Feb. 18, 14'
4	Log Periodic Antenna	Schwarzbeck	UHALP 9108-A	0810	Mar. 02, 13'	Mar. 01, 14'
5	Biconical Antenna	CHASE	VBA6106A	1264	Mar. 02, 13'	Mar. 01, 14'

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. 18, 13'	Aug. 17, 14'
2	Test Receiver	R & S	ESCS30	100338	Jul. 01, 13'	Jun. 30, 14'
3	Pre-Amplifier	HP	8449B	3008A02676	Mar. 01, 13'	Feb. 28, 14'
4	2.4GHz Notch Filter	K&L	7NSL10-244 1.5E130.5-0 0	1	Jun. 13, 13'	Jun. 12, 14'
5	3GHz High Pass Filter	Microwave Circuits	H3G018G1	484796	Jun. 13, 13'	Jun. 12, 14'
7	Horn Antenna	EMCO	3115	9112-3775	May 07, 13'	May 06, 14'
8	Horn Antenna	EMCO	3116	2653	Oct. 15, 12'	Oct. 14, 13'

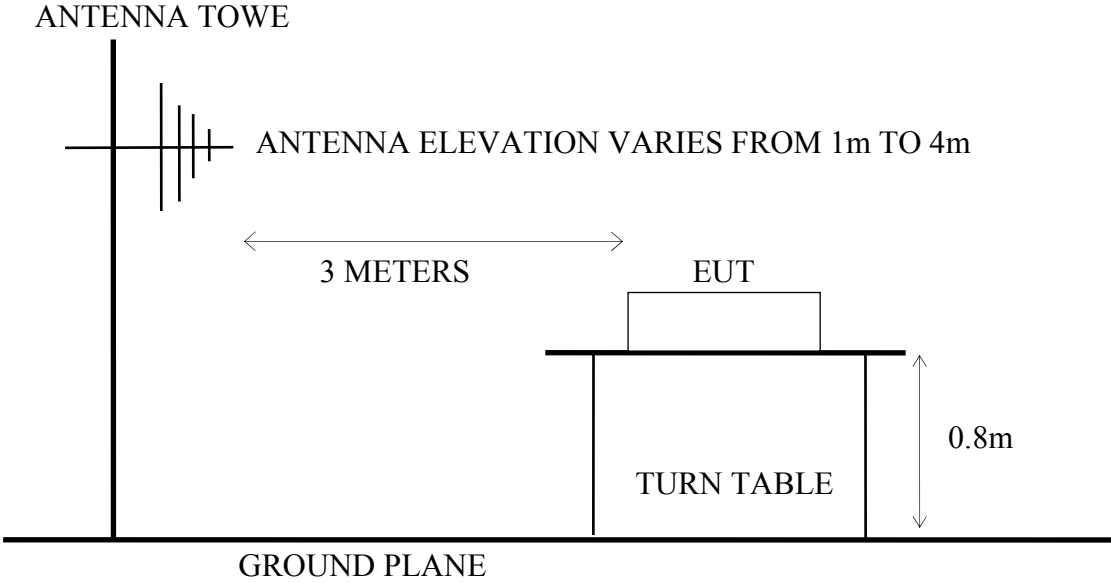
3.2. Block Diagram of Test Setup

3.2.1. Block Diagram of connection between EUT and simulators

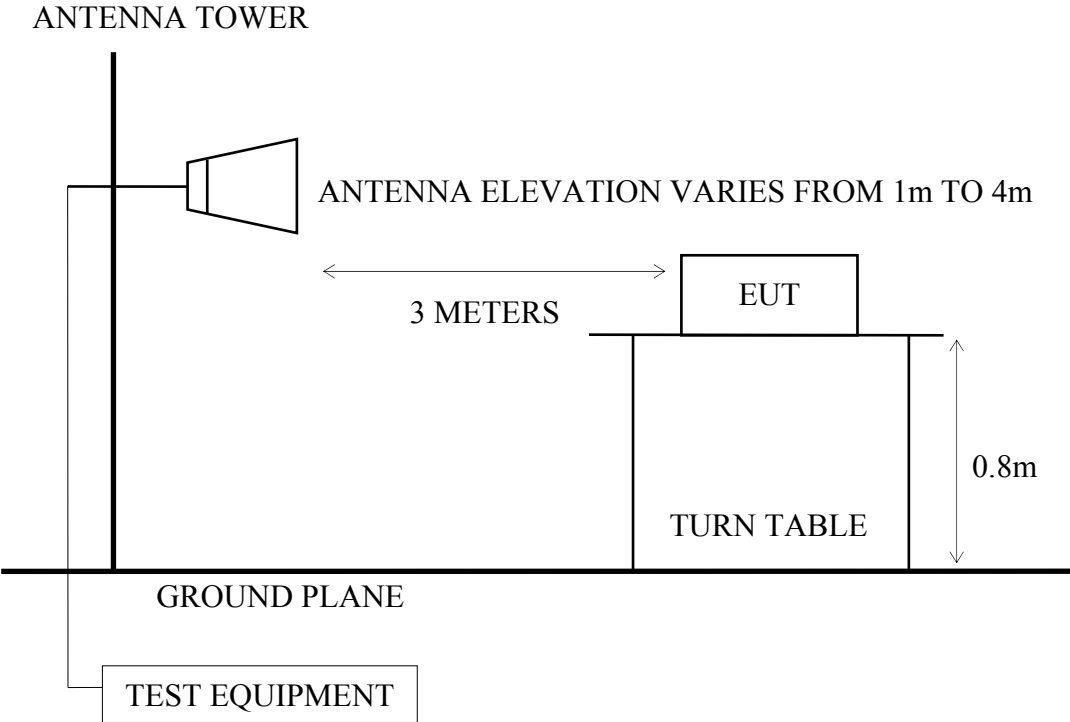


EUT: Wi-Fi/Bluetooth Dongle

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, RSS-210 §2.7/Table 2)

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 (Wi-Fi/Bluetooth Dongle) as shown on 3.2.1.
- 3.4.2. To turn on the power of all equipments.
- 3.4.3. The EUT set to continuously transmit signals at 2402MHz, 2441MHz and 2480MHz during all test time. (The test program is Blue Tool)

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, RSS-Gen and RSS-210 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. 30MHz to 1000MHz was measured with Quasi-Peak detector. 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.

Pursuant to ANSI C63.4 8.3.1.2, when peak value complies with the average limit, we didn't perform measurement in average detector.

3.6. Radiated Emission Measurement Results

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

EUT : Wi-Fi/Bluetooth Dongle M/N : AN-WF500

Test Date : Oct. 09, 2013 Temperature : 24 Humidity : 40%

For Frequency Range 30MHz-1000MHz:

[Note: We performed testing of the highest data rate (8-DPSK).]

The EUT emitted the fundamental frequency with data code at the stand, side and lying conditions.

The EUT select **worst position “lying”** and with following test modes was performed during this section testing and all the test results are listed in section 3.6.1.

No.	Channel	Frequency	Test Mode	Operating	Reference Test Data No.	
					Horizontal	Vertical
1	CH 0	2402MHz	Bluetooth (8-DPSK)	Transmit	# 13	# 14
2	CH 39	2441MHz			# 13	# 14
3	CH 78	2480MHz			# 13	# 14
4	CH 39	2441MHz	Bluetooth (8-DPSK)+ WLAN (802.11b 2437MHz)	Transmit	# 11	# 12
5	CH 39	2441MHz	Bluetooth (8-DPSK)+ WLAN (802.11a 5785MHz)	Transmit	# 11	# 12

* Type of modulation: 8-DPSK.

* All above final readings were measured with Peak detector.

For Frequency above 1GHz:

[Note: We performed testing of the highest data rate (8-DPSK).]

The EUT select **worst position “lying”** and with following test modes was performed during this section testing and all the test results are listed in section 3.6.2.

No.	Channel	Frequency	Test Mode	Operating	Reference Test Data No.	
					Horizontal	Vertical
1	CH 39	2441MHz	Bluetooth (8-DPSK)+ WLAN (802.11b 2437MHz)	Transmit	# 5	# 6
2	CH 39	2441MHz	Bluetooth (8-DPSK)+ WLAN (802.11a 5785MHz)	Transmit	# 5	# 6

Note: 1. Above all final readings were measured with Peak and Average detector.

2. For measurements above 4GHz to 5.5GHz, the peak measured value complies with the average limit, it is unnecessary to perform an average measurement. (According to ANSI C63.4-2003 section 8.3.1.2)

2. The emissions (up to 25GHz) not reported are too low to be measured.

For Restricted Bands:**[Note: We performed testing of the highest data rate (8-DPSK).]**

The EUT select **worst position “lying”** and with following test modes was performed during this section testing and all the test results are listed in section 3.6.3. (The restricted bands defined in part 15.205(a))

No.	Channel	Frequency	Test Mode	Reference Test Data No.	
				Horizontal	Vertical
1	CH 0	2402MHz	Transmitting	# 1 , 2	# 3, 4
2	CH 78	2480MHz		# 5, 6	# 7, 8

3.6.1. Frequency Range 30MHz-1000MHz Measurement Result

Transmit, Frequency: 2402MHz (8-DPSK)

Site no. : Audix NO.1 Chamber
 Dis. / Ant. : 3m CBL8112D 33821
 Limit : FCC PART 15C
 Env. / Ins. : 24*C/40% N9030A(140)
 EUT : AN-WF500
 Power Rating : DC 5V
 Test Mode : Tx 2402 BT

Data no. : 13
 Ant. pol. : HORIZONTAL
 Engineer : Johnny_hsueh

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Remark
1	120.21	12.40	2.90	13.77	28.47	43.50	15.03	Peak
2	288.99	13.59	3.80	14.94	31.73	46.00	14.27	Peak
3	396.66	16.43	4.79	8.59	29.81	46.00	16.19	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. : Audix NO.1 Chamber
 Dis. / Ant. : 3m CBL8112D 33821
 Limit : FCC PART 15C
 Env. / Ins. : 24*C/40% N9030A(140)
 EUT : AN-WF500
 Power Rating : DC 5V
 Test Mode : Tx 2402 BT

Data no. : 14
 Ant. pol. : VERTICAL
 Engineer : Johnny_hsueh

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Remark
1	30.00	19.80	1.10	18.11	39.01	40.00	0.99	Peak
2	117.90	12.95	2.90	18.57	39.22	43.50	10.28	Peak
3	265.71	13.74	3.70	21.67	39.11	46.00	6.89	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 (8-DPSK)

Site no. : Audix NO.1 Chamber
 Dis. / Ant. : 3m CBL6112D 33821
 Limit : FCC PART 15C
 Env. / Ins. : 24*C/40% N9030A(140)
 EUT : AN-WF500
 Power Rating : DC 5V
 Test Mode : Tx 2441 MHz BT

Data no. : 13
 Ant. pol. : HORIZONTAL
 Engineer : Johnny_hsueh

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Remark
1	117.90	12.95	2.90	19.67	29.92	49.50	15.18	Peak
2	288.99	13.59	3.80	13.85	31.24	46.00	14.76	Peak
3	400.54	16.51	4.80	8.51	29.82	46.00	16.18	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. : Audix NO.1 Chamber
 Dis. / Ant. : 3m CBL6112D 33821
 Limit : FCC PART 15C
 Env. / Ins. : 24*C/40% N9030A(140)
 EUT : AN-WF500
 Power Rating : DC 5V
 Test Mode : Tx 2441 MHz BT

Data no. : 14
 Ant. pol. : VERTICAL
 Engineer : Johnny_hsueh

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Remark
1	31.94	18.68	1.10	17.88	37.66	40.00	2.34	Peak
2	117.90	12.95	2.90	18.70	33.35	49.50	10.15	Peak
3	255.04	13.55	3.56	16.19	33.30	46.00	12.70	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 (8-DPSK)

Site no. : Audix NO.1 Chamber
 Dis. / Ant. : 3m CBL6112D 33821
 Limit : FCC PART 15C
 Env. / Ins. : 24*C/40% N9030A(140)
 EUT : AN-WF500
 Power Rating : DC 5V
 Test Mode : Tx 2480 MHz BT

Data no. : 13
 Ant. pol. : HORIZONTAL
 Engineer : Johnny_hsueh

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Remark
1	112.45	12.25	2.20	13.77	28.22	43.50	15.28	Peak
2	282.20	13.52	3.80	16.85	34.17	46.00	11.83	Peak
3	400.54	16.51	4.80	9.97	31.28	46.00	14.72	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. : Audix NO.1 Chamber
 Dis. / Ant. : 3m CBL6112D 33821
 Limit : FCC PART 15C
 Env. / Ins. : 24*C/40% N9030A(140)
 EUT : AN-WF500
 Power Rating : DC 5V
 Test Mode : Tx 2480 MHz BT

Data no. : 14
 Ant. pol. : VERTICAL
 Engineer : Johnny_hsueh

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Remark
1	30.00	19.80	1.10	18.04	38.94	40.00	1.06	Peak
2	93.05	9.97	2.00	18.45	30.42	43.50	13.08	Peak
3	117.30	12.35	2.30	18.50	33.15	43.50	10.35	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 (8-DPSK) + WLAN (802.11b 2437MHz)

Site no. : Audix NO.1 Chamber Data no. : 11
 Dis. / Ant. : 3m CBL6112D 33821 Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C
 Env. / Ins. : 24*C/40% N9030A(140) Engineer : Johnny_hsueh
 EUT : AN-WF500
 Power Rating : DC 5V
 Test Mode : WiFi 2.4G b Tx2437MHz +BT Tx2441MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dB μV)	Emission Level (dB μV/m)	Limits (dB μV/m)	Margin (dB)	Remark
1	288.99	13.59	3.80	14.70	32.09	46.00	13.91	Peak
2	335.55	14.90	4.20	12.79	31.89	46.00	14.11	Peak
3	400.54	16.51	4.80	11.37	32.68	46.00	13.32	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. : Audix NO.1 Chamber Data no. : 12
 Dis. / Ant. : 3m CBL6112D 33821 Ant. pol. : VERTICAL
 Limit : FCC PART 15C
 Env. / Ins. : 24*C/40% N9030A(140) Engineer : Johnny_hsueh
 EUT : AN-WF500
 Power Rating : DC 5V
 Test Mode : WiFi 2.4G b Tx2437MHz +BT Tx2441MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dB μV)	Emission Level (dB μV/m)	Limits (dB μV/m)	Margin (dB)	Remark
1	31.94	18.68	1.10	19.30	39.08	40.00	0.92	Peak
2	49.40	9.63	1.50	22.20	33.33	40.00	6.67	Peak
3	93.05	9.97	2.00	20.31	32.28	43.50	11.22	Peak
4	155.13	10.85	2.63	19.03	32.51	43.50	10.99	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 (8-DPSK) + WLAN (802.11a 5785MHz)

Site no. : Audix NO.1 Chamber Data no. : 11
 Dis. / Ant. : 3m CBL6112D 33821 Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C
 Env. / Ins. : 24*C/40% N9030A(140) Engineer : Johnny_hsueh
 EUT : AN-WF500
 Power Rating : DC 5V
 Test Mode : WiFi 5G B4 Tx5785MHz +BT Tx2441MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dB μV)	Emission Level (dB μV/m)	Limits (dB μV/m)	Margin (dB)	Remark
1	110.51	12.22	2.20	12.72	27.14	49.50	16.96	Peak
2	288.99	13.59	3.80	14.93	32.32	46.00	13.68	Peak
3	395.55	14.90	4.20	12.70	31.80	46.00	14.20	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. : Audix NO.1 Chamber Data no. : 12
 Dis. / Ant. : 3m CBL6112D 33821 Ant. pol. : VERTICAL
 Limit : FCC PART 15C
 Env. / Ins. : 24*C/40% N9030A(140) Engineer : Johnny_hsueh
 EUT : AN-WF500
 Power Rating : DC 5V
 Test Mode : WiFi 5G B4 Tx5785MHz +BT Tx2441MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dB μV)	Emission Level (dB μV/m)	Limits (dB μV/m)	Margin (dB)	Remark
1	31.94	18.68	1.10	19.46	39.24	40.00	0.76	Peak
2	158.04	10.64	2.70	22.46	35.80	49.50	7.70	Peak
3	398.60	16.48	4.80	10.60	31.88	46.00	14.12	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. Frequency Range 4000MHz-5500MHz Measurement Result

Transmit, Frequency: 2441MHz (8-DPSK) + WLAN (802.11b 2437MHz)

Site no. : Audix NO.1 Chamber Data no. : 5
 Dis. / Ant. : 3m 3115(4927) Ant. pol. : HORIZONTAL
 Limit : FCC PART15C(1G-AV)
 Env. / Ins. : 24*C/40% N9030A(140) Engineer : Johnny_hsueh
 EUT : AN-WF500
 Power Rating : DC 5V
 Test Mode : WiFi 2.4G b Tx2437MHz +BT Tx2441MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dB μV)	Emission Level (dB μV/m)	Limits (dB μV/m)	Margin (dB)	Remark
1	4874.50	33.18	9.15	10.87	53.20	54.00	0.80	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. : Audix NO.1 Chamber Data no. : 6
 Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
 Limit : FCC PART 15C(1G-PK)
 Env. / Ins. : 24*C/40% N9030A(140) Engineer : Johnny_hsueh
 EUT : AN-WF500
 Power Rating : DC 5V
 Test Mode : WiFi 2.4G b Tx2437MHz +BT Tx2441MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dB μV)	Emission Level (dB μV/m)	Limits (dB μV/m)	Margin (dB)	Remark
1	4874.50	33.18	9.15	45.05	52.81	54.00	1.19	Average
2	4874.50	33.18	9.15	47.97	55.73	74.00	18.27	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 (8-DPSK) + WLAN (802.11a 5785MHz)

Site no. : Audix NO.1 Chamber Data no. : 5
 Dis. / Ant. : 3m 3115(4927) Ant. pol. : HORIZONTAL
 Limit : FCC PART15C(1G-AV)
 Env. / Ins. : 24*C/40% N9030A(140) Engineer : Johnny_hsueh
 EUT : AN-WF500
 Power Rating : DC 5V
 Test Mode : WiFi 5G B4 Tx5785MHz +BT Tx2441MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dB μV)	Emission Level (dB μV/m)	Limits (dB μV/m)	Margin (dB)	Remark
1	4882.00	33.18	9.15	11.08	53.41	54.00	0.59	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. : Audix NO.1 Chamber Data no. : 6
 Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
 Limit : FCC PART 15C(1G-PK)
 Env. / Ins. : 24*C/40% N9030A(140) Engineer : Johnny_hsueh
 EUT : AN-WF500
 Power Rating : DC 5V
 Test Mode : WiFi 5G B4 Tx5785MHz +BT Tx2441MHz

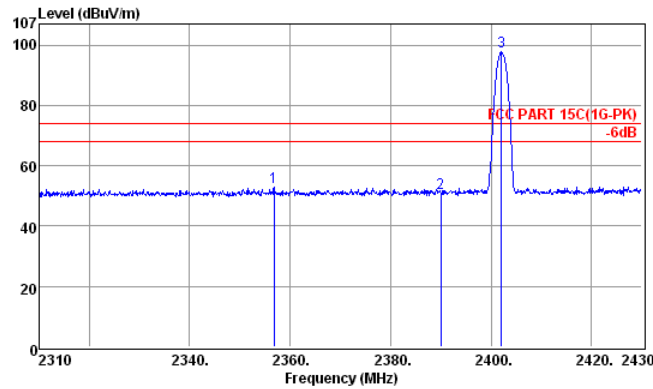
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dB μV)	Emission Level (dB μV/m)	Limits (dB μV/m)	Margin (dB)	Remark
1	4882.00	33.18	9.15	8.98	51.31	54.00	2.69	Average
2	4882.00	33.18	9.15	14.95	57.28	74.00	16.72	Peak

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

3.6.3. Restricted Bands Measurement Results

Date of Test : Oct. 09, 2013 Temperature : 24
 EUT : Wi-Fi/Bluetooth Dongle Humidity : 40%
 Test Mode : Transmitting Mode, Frequency: 2402MHz (CH0), 8-DPSK

Data: 1 File: C:\Documents and Settings\rf_room\桌面\C1M1309091\Test data\0914test\BT\out

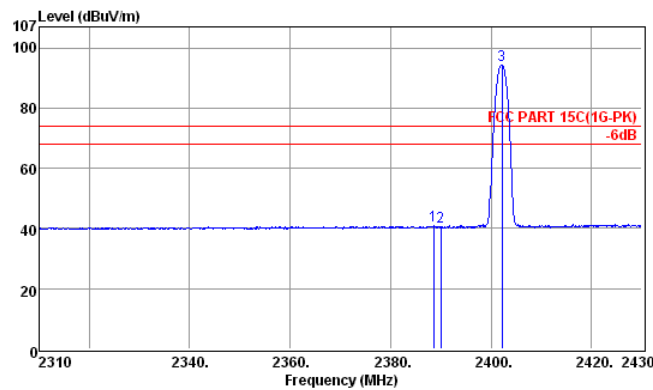


Site no. : Audix NO.1 Chamber Data no. : 1
 Dis. / Ant. : 3m 3115(4927) Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C(1G-PK)
 Env. / Ins. : 24*C/40% N9030A(140) Engineer : Johnny_hsueh
 EUT : AN-WF500
 Power Rating : DC 5V
 Test Mode : Tx2402MHz (8DPSK)

Peak	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dB μV)	Emission Level (dB μV/m)	Limits (dB μV/m)	Margin (dB)	Remark
1	2356.80	28.40	6.29	18.21	52.90	74.00	21.10	Peak
2	2390.04	28.47	6.34	18.10	50.91	74.00	23.09	Peak
3	2402.04	28.47	6.36	62.94	97.77	74.00	-23.77	Peak

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

Data: 2 File: C:\Documents and Settings\rf_room\桌面\C1M1309091\Test data\0914test\BT\out



Site no. : Audix NO.1 Chamber Data no. : 2
 Dis. / Ant. : 3m 3115(4927) Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C(1G-PK)
 Env. / Ins. : 24*C/40% N9030A(140) Engineer : Johnny_hsueh
 EUT : AN-WF500
 Power Rating : DC 5V
 Test Mode : Tx2402MHz (8DPSK)

Peak	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dB μV)	Emission Level (dB μV/m)	Limits (dB μV/m)	Margin (dB)	Remark
1	2388.60	28.47	6.34	6.08	40.89	74.00	33.11	Average
2	2390.04	28.47	6.34	5.65	40.46	74.00	33.54	Average
3	2402.16	28.47	6.36	59.61	94.44	74.00	-20.44	Average

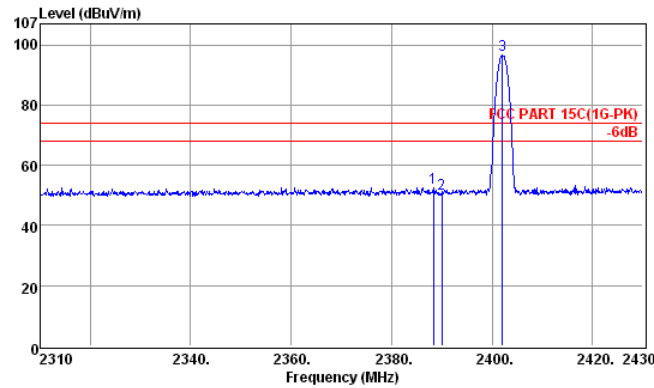
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

Date of Test : Oct. 09, 2013 Temperature : 24

EUT : Wi-Fi/Bluetooth Dongle Humidity : 40%

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

Data: 3 File: C:\Documents and Settings\rf_room\桌面\C1M1309091\Test data\0914test\BT\out

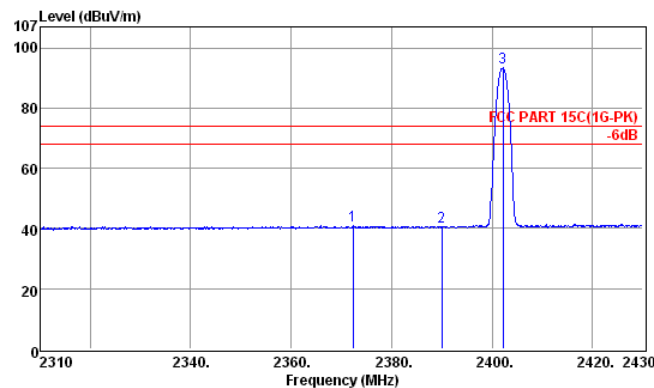


Site no. : Audix NO.1 Chamber Data no. : 3
 Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
 Limit : FCC PART 15C(1G-PK)
 Env. / Ins. : 24°C/40% N9030A(140) Engineer : Johnny_hsueh
 EUT : AN-WF500
 Power Rating : DC 5V
 Test Mode : Tx2402MHz (8DPSK)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dB μV)	Emission Level (dB μV/m)	Limits (dB μV/m)	Margin (dB)	Remark
1	2388.96	28.47	6.34	17.86	52.67	74.00	21.33	Peak
2	2390.04	28.47	6.34	15.89	50.50	74.00	23.50	Peak
3	2402.04	28.47	6.36	61.98	98.81	74.00	-22.81	Peak

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

Data: 4 File: C:\Documents and Settings\rf_room\桌面\C1M1309091\Test data\0914test\BT\out



Site no. : Audix NO.1 Chamber Data no. : 4
 Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
 Limit : FCC PART 15C(1G-PK)
 Env. / Ins. : 24°C/40% N9030A(140) Engineer : Johnny_hsueh
 EUT : AN-WF500
 Power Rating : DC 5V
 Test Mode : Tx2402MHz (8DPSK)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dB μV)	Emission Level (dB μV/m)	Limits (dB μV/m)	Margin (dB)	Remark
1	2372.28	28.48	6.31	6.05	40.79	74.00	33.21	Average
2	2390.04	28.47	6.34	5.58	40.89	74.00	33.61	Average
3	2402.16	28.47	6.36	58.47	93.30	74.00	-19.30	Average

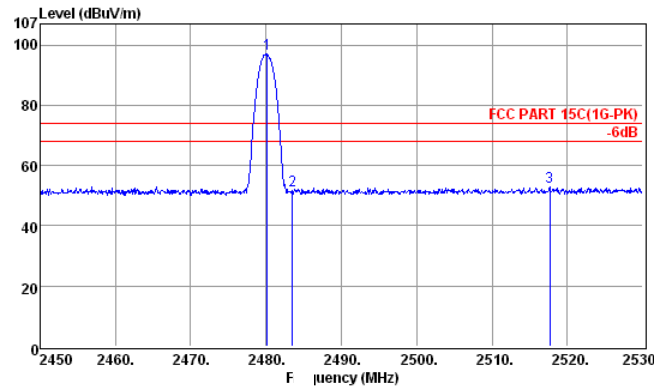
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

Date of Test : Oct. 09, 2013 Temperature : 24

EUT : Wi-Fi/Bluetooth Dongle Humidity : 40%

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

Data: 5 File: C:\Documents and Settings\rf_room\桌面\C1M1309091\Test data\0914test\BT\out

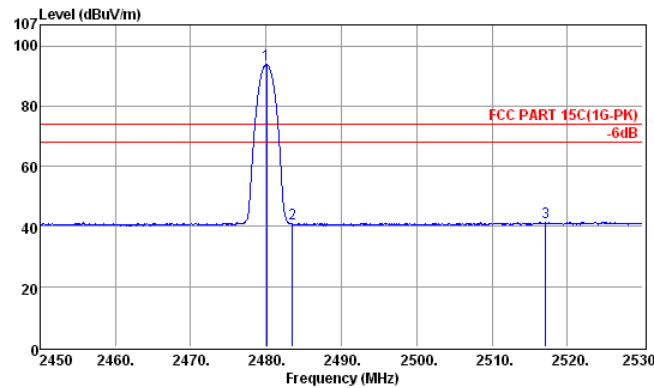


Site no. : Audix NO.1 Chamber Data no. : 5
 Dis. / Ant. : 3m 3115(4927) Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C(1G-PK)
 Env. / Ins. : 24°C/40% N9030A(140) Engineer : Johnny_hsueh
 EUT : AN-WF500
 Power Rating : DC 5V
 Test Mode : Tx2480MHz (8DPSK)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2480.16	28.66	6.44	61.87	96.97	74.00	-22.97	Peak
2	2483.52	28.66	6.45	18.63	51.74	74.00	22.26	Peak
3	2517.68	28.76	6.49	17.87	52.92	74.00	21.08	Peak

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

Data: 6 File: C:\Documents and Settings\rf_room\桌面\C1M1309091\Test data\0914test\BT\out



Site no. : Audix NO.1 Chamber Data no. : 6
 Dis. / Ant. : 3m 3115(4927) Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C(1G-PK)
 Env. / Ins. : 24°C/40% N9030A(140) Engineer : Johnny_hsueh
 EUT : AN-WF500
 Power Rating : DC 5V
 Test Mode : Tx2480MHz (8DPSK)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2480.08	28.66	6.44	58.60	93.70	74.00	-19.70	Average
2	2483.52	28.66	6.45	5.94	41.05	74.00	32.95	Average
3	2517.12	28.76	6.49	6.13	41.33	74.00	32.62	Average

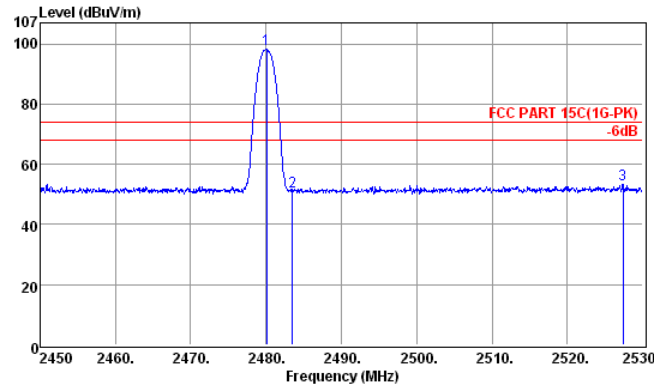
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

Date of Test : Oct. 09, 2013 Temperature : 24

EUT : Wi-Fi/Bluetooth Dongle Humidity : 40%

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

Data: 7 File: C:\Documents and Settings\rf_room\桌面\C1M1309091\Test data\0914test\BT\out

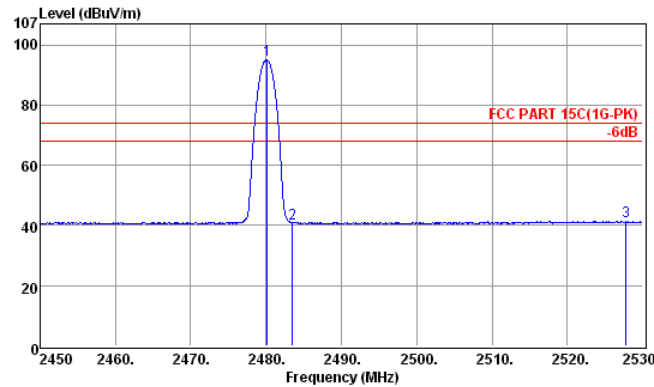


Site no. : Audix NO.1 Chamber Data no. : 7
 Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
 Limit : FCC PART 15C(1G-PK)
 Env. / Ins. : 24°C/40% N9030A(140) Engineer : Johnny_hsueh
 EUT : AN-WF500
 Power Rating : DC 5V
 Test Mode : Tx2480MHz (8DPSK)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2480.08	28.66	6.44	63.11	98.21	74.00	-24.21	Peak
2	2483.52	28.66	6.45	15.80	50.91	74.00	23.09	Peak
3	2527.44	28.81	6.52	18.08	53.41	74.00	20.59	Peak

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

Data: 8 File: C:\Documents and Settings\rf_room\桌面\C1M1309091\Test data\0914test\BT\out



Site no. : Audix NO.1 Chamber Data no. : 8
 Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
 Limit : FCC PART 15C(1G-PK)
 Env. / Ins. : 24°C/40% N9030A(140) Engineer : Johnny_hsueh
 EUT : AN-WF500
 Power Rating : DC 5V
 Test Mode : Tx2480MHz (8DPSK)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2480.16	28.66	6.44	59.79	94.89	74.00	-20.89	Average
2	2483.52	28.66	6.45	6.63	40.74	74.00	33.26	Average
3	2527.84	28.81	6.52	6.08	41.41	74.00	32.59	Average

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

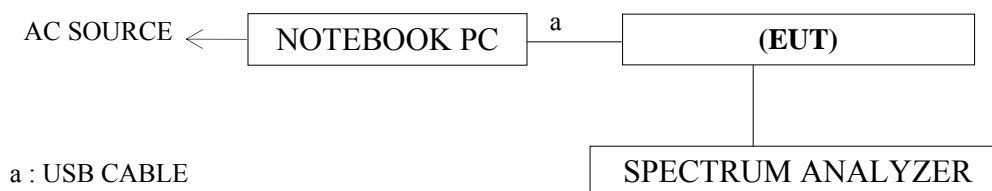
4. 20dB BANDWIDTH MEASUREMENT

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	Jul. 30, 13'	Jul. 29, 14'

4.2. Block Diagram of Test Setup



EUT: Wi-Fi/Bluetooth Dongle

4.3. Specification Limits [§15.247(a)(1), RSS-210 §A8.2 (a)]

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 (Wi-Fi/Bluetooth Dongle) linked Notebook PC, the test program “Blue Tool” was used to enable the EUT to transmit data at different channel frequency individually.

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.]

Test Date : Sep. 13, 2013 Temperature : 24 Humidity : 52%

4.6.1. Type of Modulation: 8-DPSK

No.	Channel	Test Frequency	20dB Bandwidth	2/3 (20dB Bandwidth)
1.	0	2402MHz	1.265MHz	0.843MHz
2.	39	2441MHz	1.265MHz	0.843MHz
3.	78	2480MHz	1.260MHz	0.840MHz

The maximum two-thirds of the 20dB bandwidth shall be at maximum 0.843MHz.

4.6.2. Type of Modulation: GFSK

Test Date : Sep. 13, 2013 Temperature : 24 Humidity : 52%

No.	Channel	Test Frequency	20dB Bandwidth	2/3 (20dB Bandwidth)
1.	0	2402MHz	0.925MHz	0.617MHz
2.	39	2441MHz	0.925MHz	0.617MHz
3.	78	2480MHz	0.920MHz	0.613MHz

The maximum two-thirds of the 20dB bandwidth shall be at maximum 0.617MHz.

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

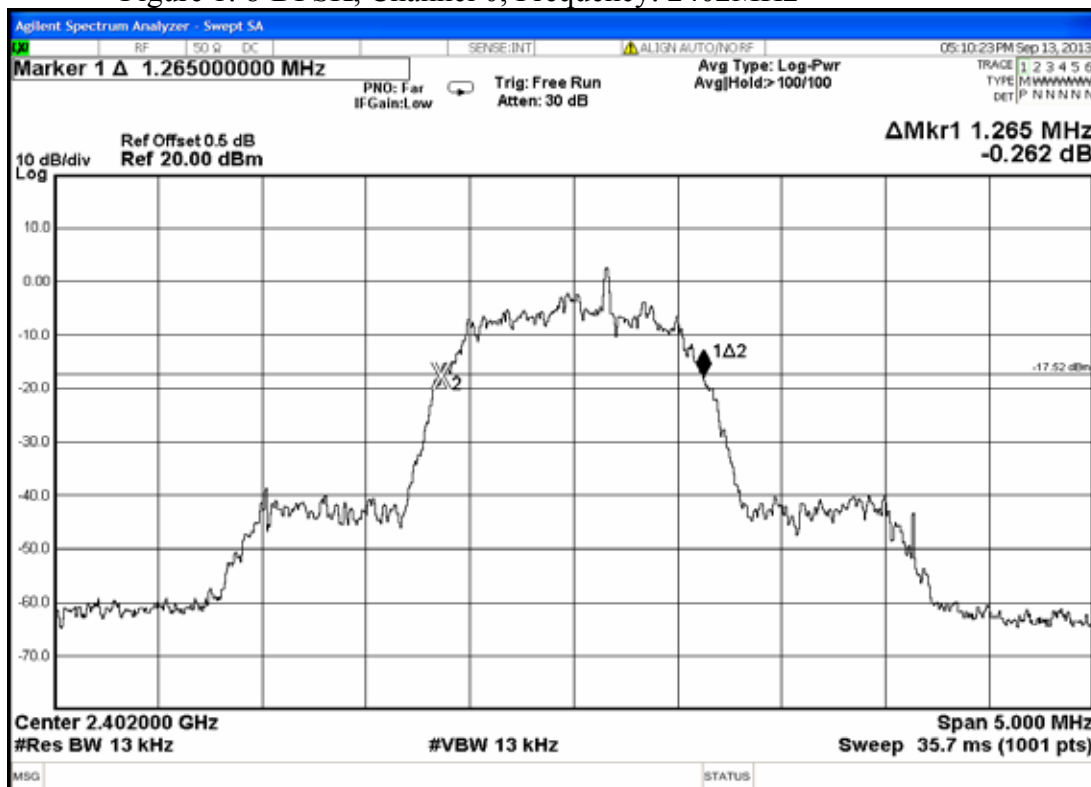


Figure 2: 8-DPSK, Channel 39, Frequency: 2441MHz

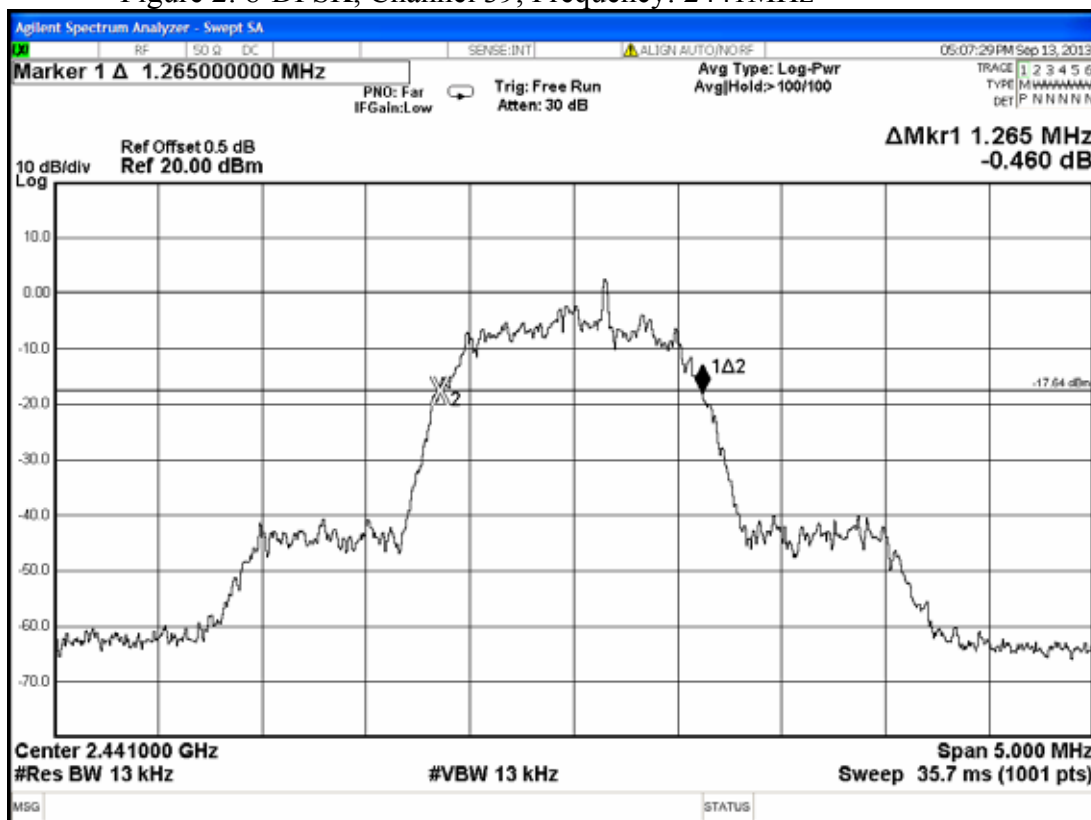


Figure 3: 8-DPSK, Channel 78, Frequency: 2480MHz

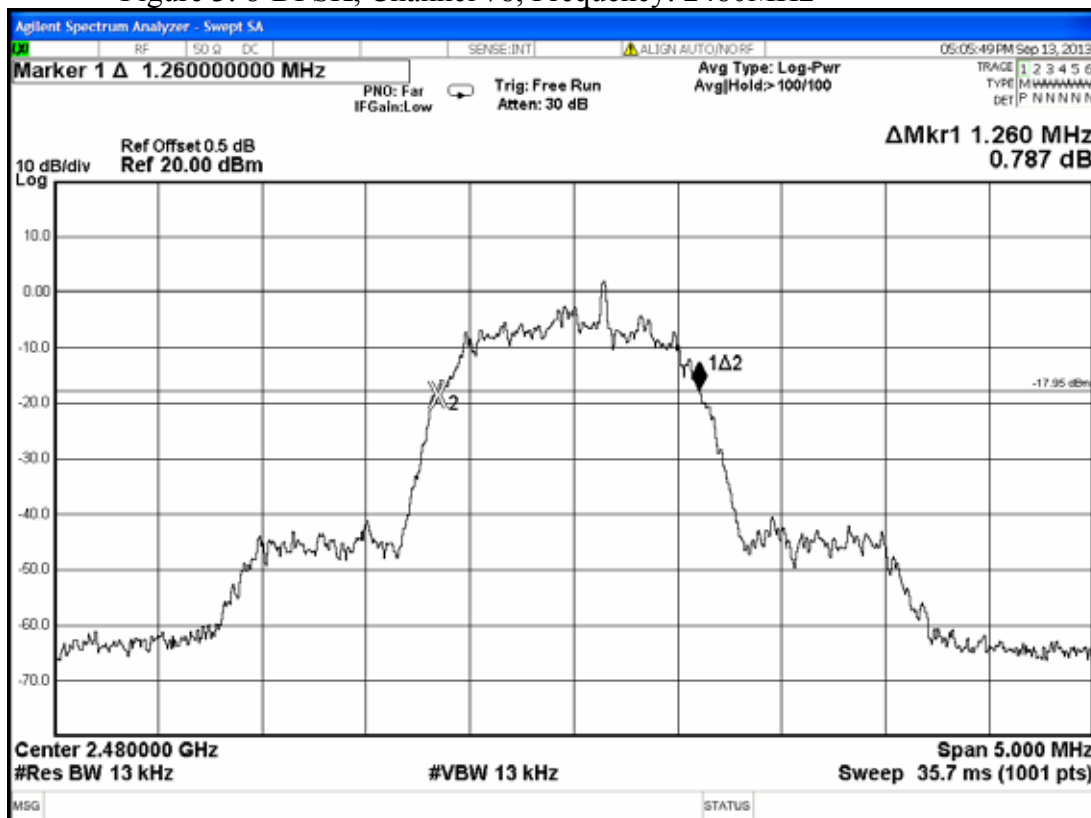


Figure 4: GFSK, Channel 0, Frequency: 2402MHz

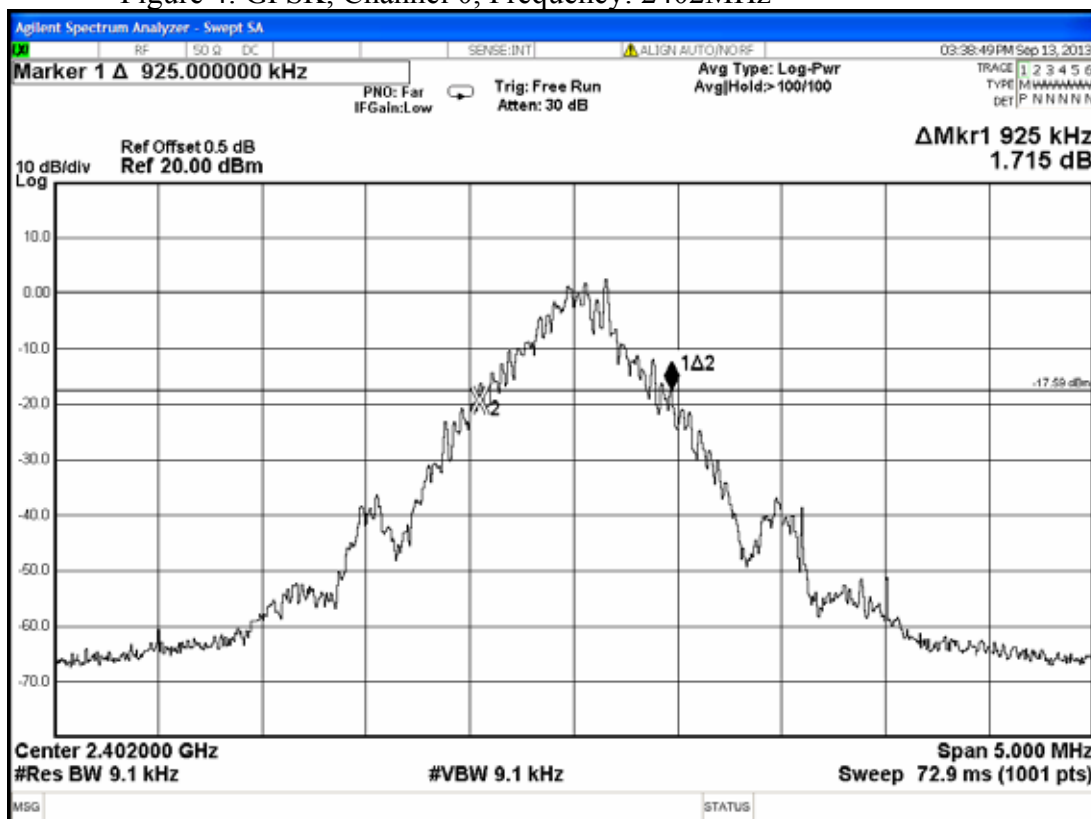
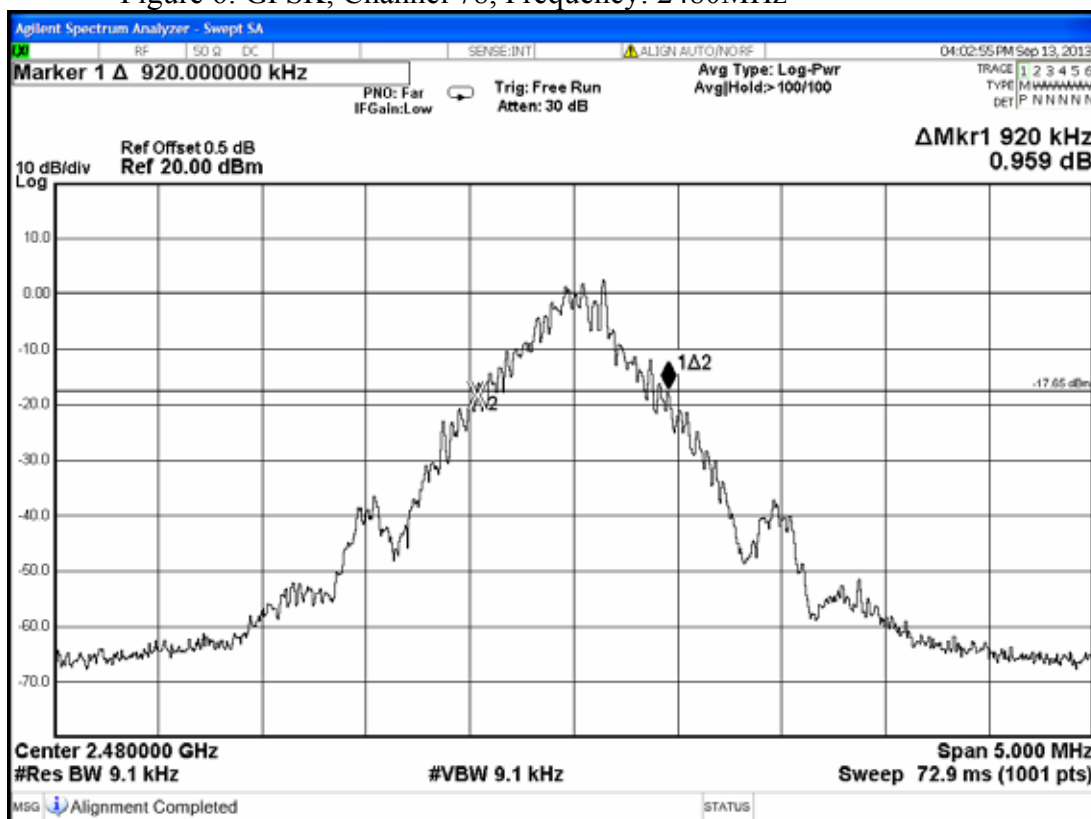


Figure 5: GFSK, Channel 39, Frequency: 2441MHz



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	Jul. 30, 13'	Jul. 29, 14'

5.2. Block Diagram of Test Setup

The same as section.4.2.

5.3. Specification Limits [§15.247(a)(1), RSS-210 §A8.2 (b)]

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.]

Test Date : Sep. 13, 2013 Temperature : 24 Humidity : 52%

5.6.1. Type of Modulation: 8-DPSK

1. 2402MHz adjacent channel of carrier frequency separation: 1.000MHz.
2. 2441MHz adjacent channel of right carrier frequency separation: 1.000MHz.
3. 2441MHz adjacent channel of left carrier frequency separation: 1.000MHz.
4. 2480MHz adjacent channel of carrier frequency separation: 1.000MHz.

[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: 1.000MHz.
2. 2441MHz adjacent channel of right carrier frequency separation: 1.000MHz.
3. 2441MHz adjacent channel of left carrier frequency separation: 1.000MHz.
4. 2480MHz adjacent channel of carrier frequency separation: 1.000MHz.

[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

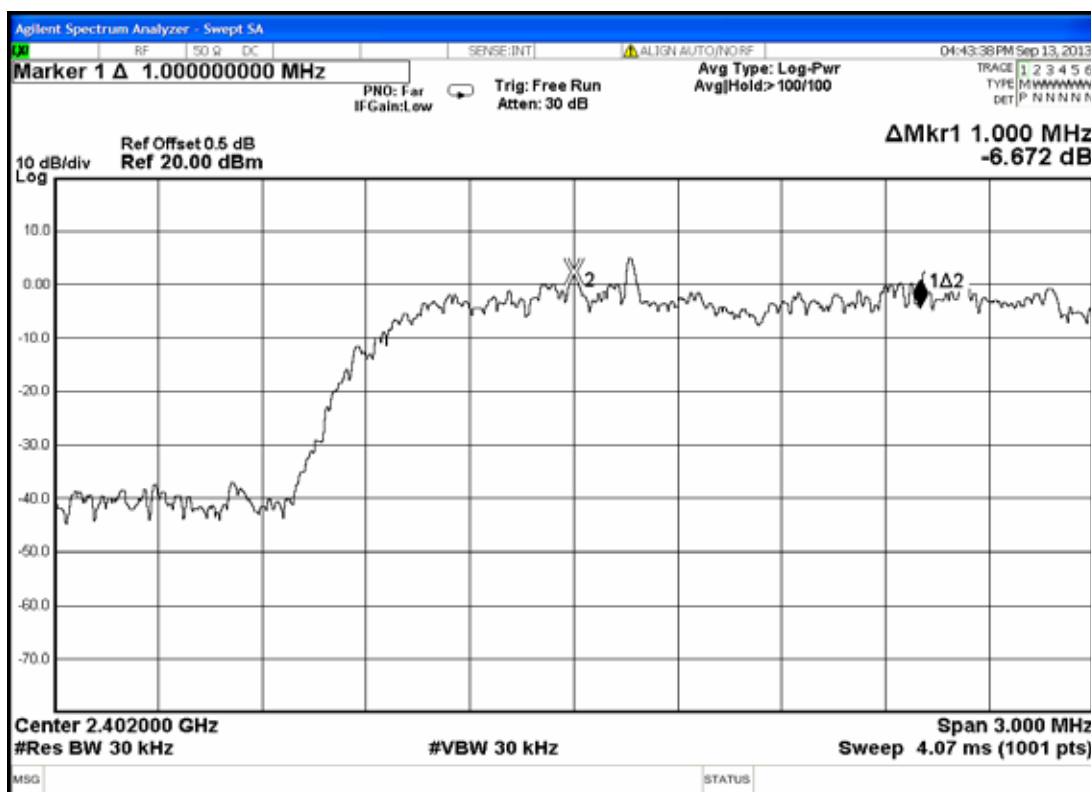


Figure 2: 8-DPSK, 2441MHz adjacent channel of left carrier frequency separation

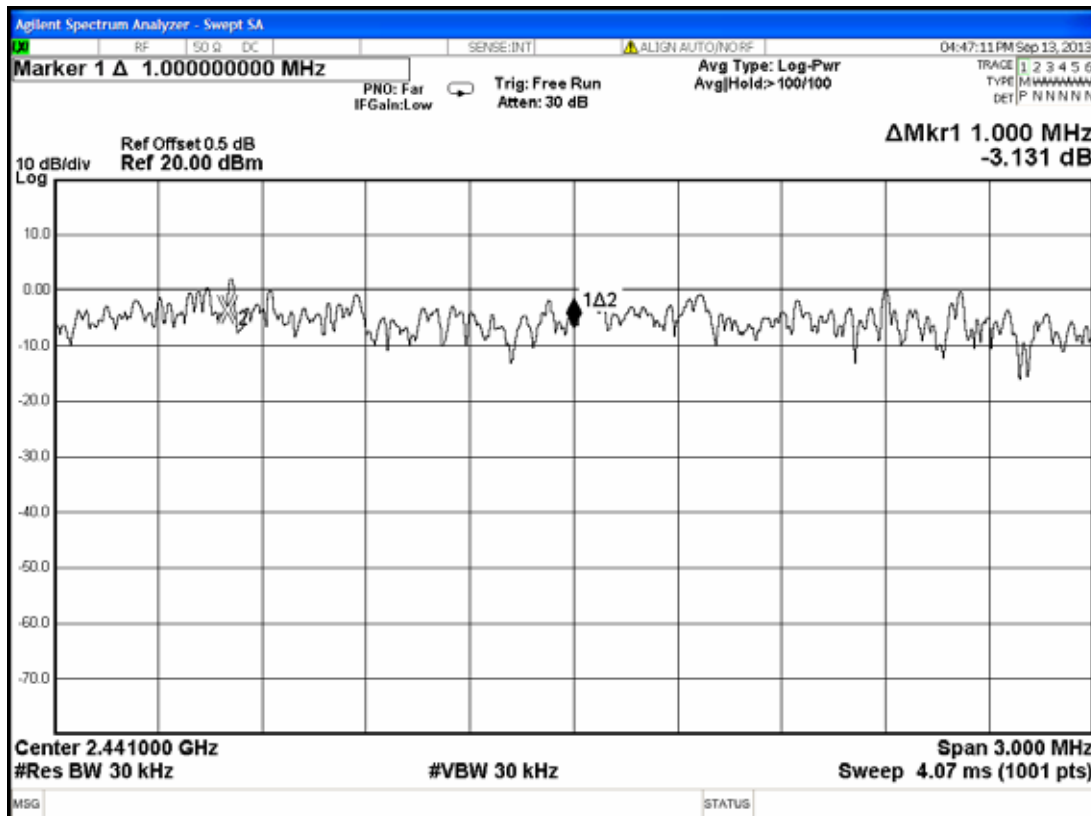


Figure 3: 8-DPSK, 2441MHz adjacent channel of right carrier frequency separation

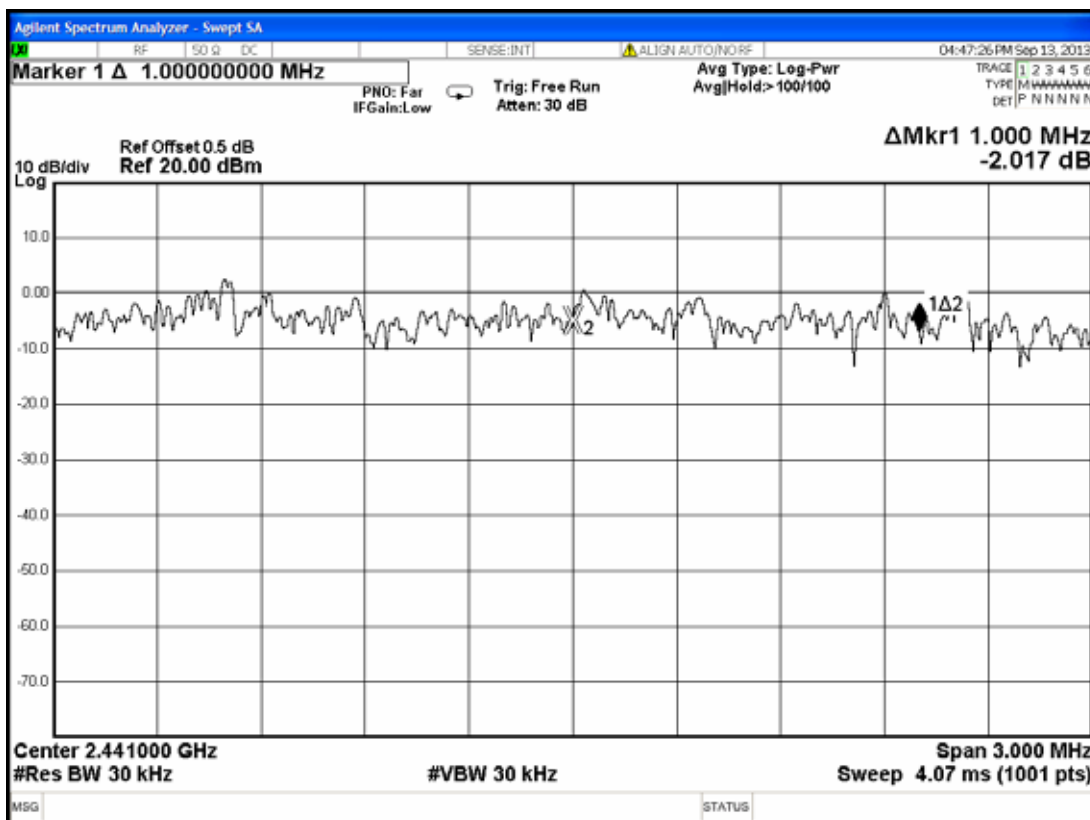


Figure 4: 8-DPSK, 2480MHz adjacent channel of carrier frequency separation

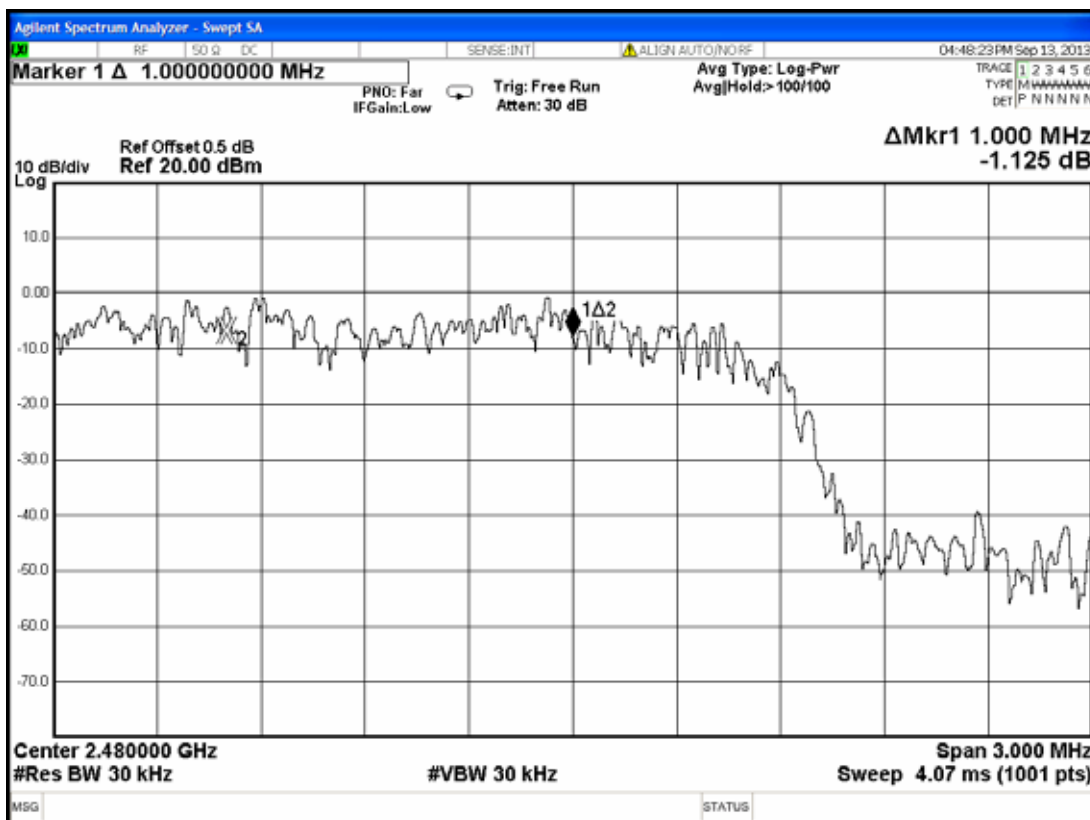


Figure 5: GFSK, 2402MHz adjacent channel of carrier frequency separation

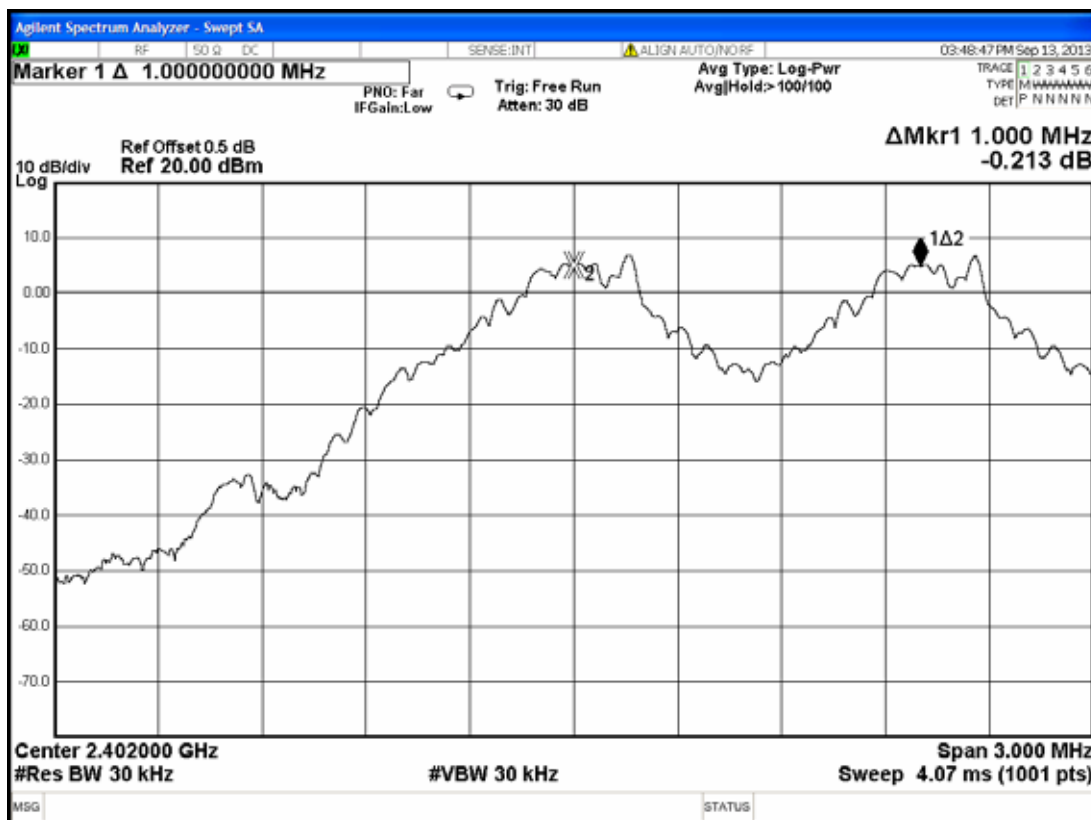


Figure 6: GFSK, 2441MHz adjacent channel of left carrier frequency separation

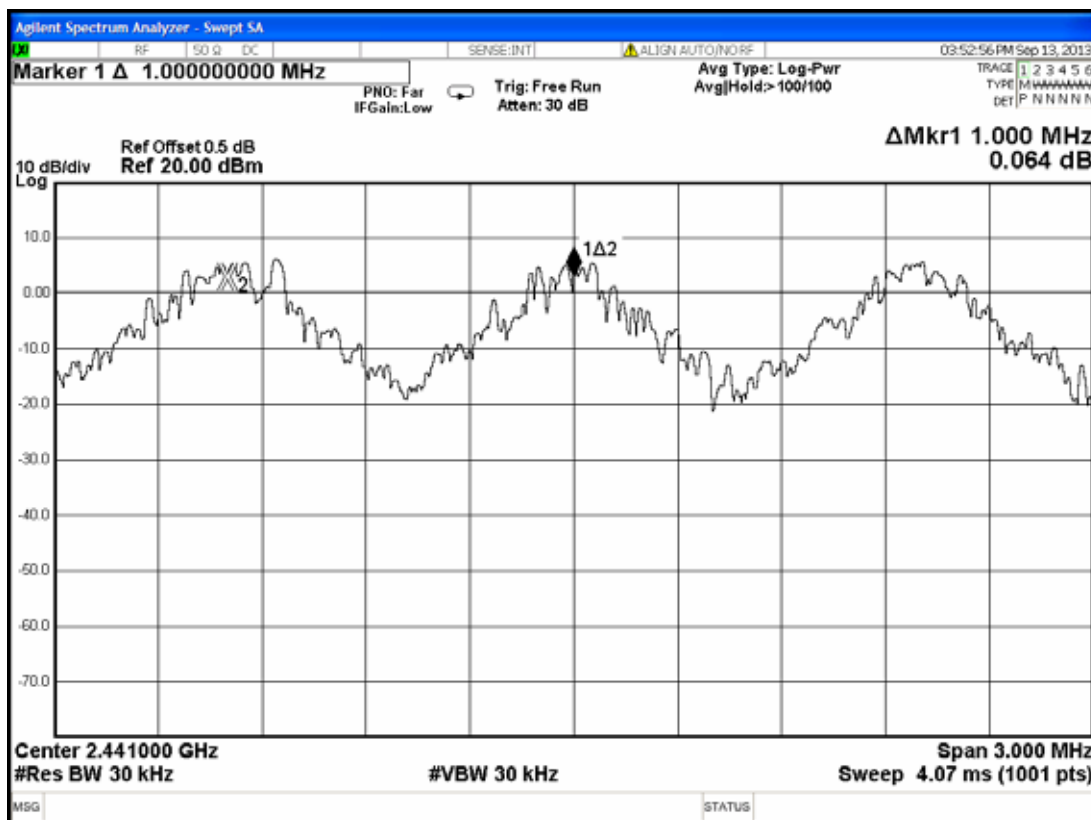


Figure 7: GFSK, 2441MHz adjacent channel of right carrier frequency separation

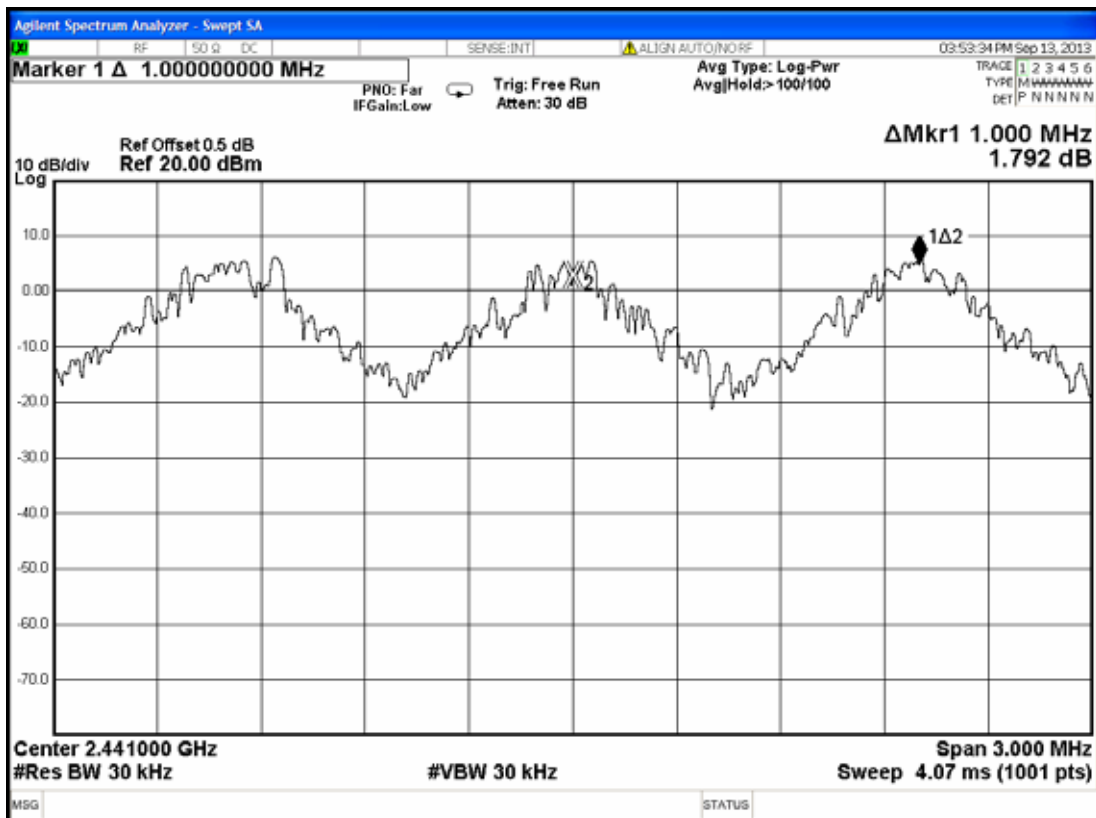
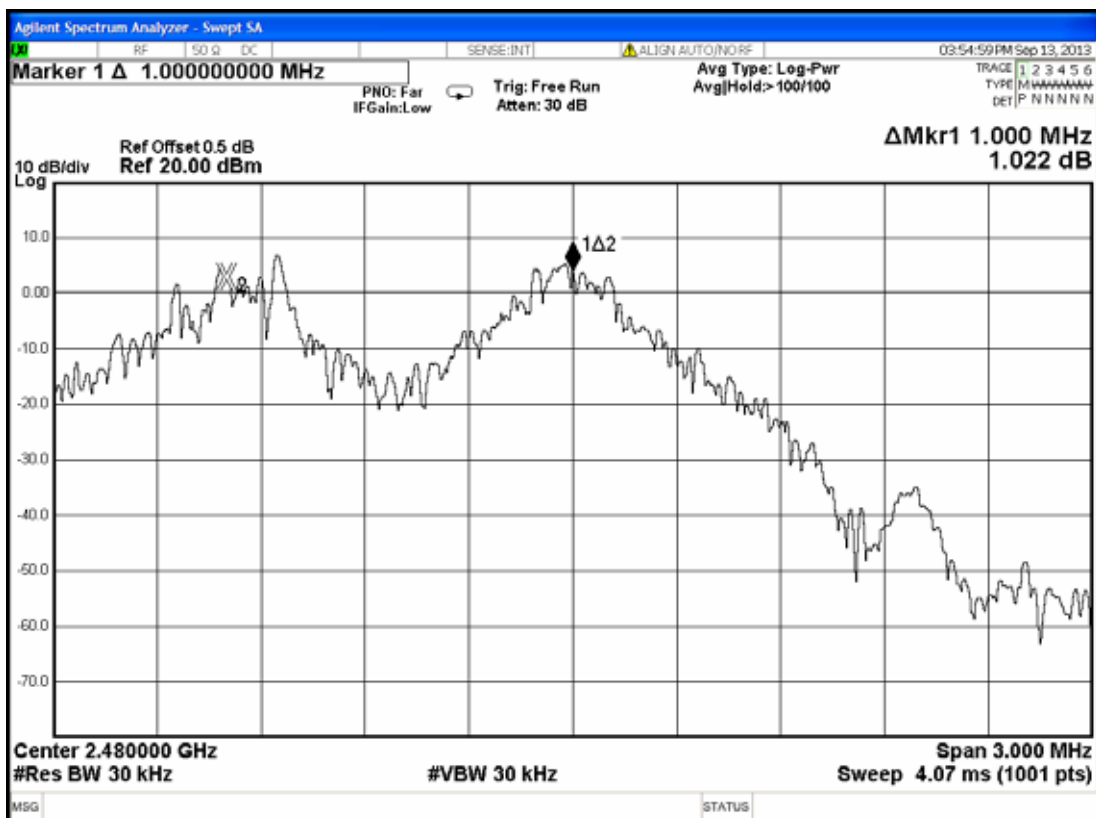


Figure 8: GFSK, 2480MHz adjacent channel of carrier frequency separation



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	Jul. 30, 13'	Jul. 29, 14'

6.2. Block Diagram of Test Setup

The same as section.4.2.

6.3. Specification Limits [§15.247(a)(1)(iii), RSS-210 §A8.2 (d)]

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. $VBW \geq RBW$; 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.]

Test Date : Sep. 13, 2013 Temperature : 24 Humidity : 52%

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:

$50\text{channels} * 31.6 \text{ seconds} / 5 * 0.385\text{ms} = 121.66\text{ms} (<400\text{ms})$

3DH3 : For each 5 seconds of 23 channels appearance, the longest time of occupancy for each of 31.6 seconds is:

$23 \text{ channels} * 31.6 \text{ seconds} / 5 * 1.635\text{ms} = 237.66\text{ms} (<400\text{ms})$

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

$17 \text{ channels} * 31.6 \text{ seconds} / 5 * 2.885\text{ms} = 309.96\text{ms} (<400\text{ms})$

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

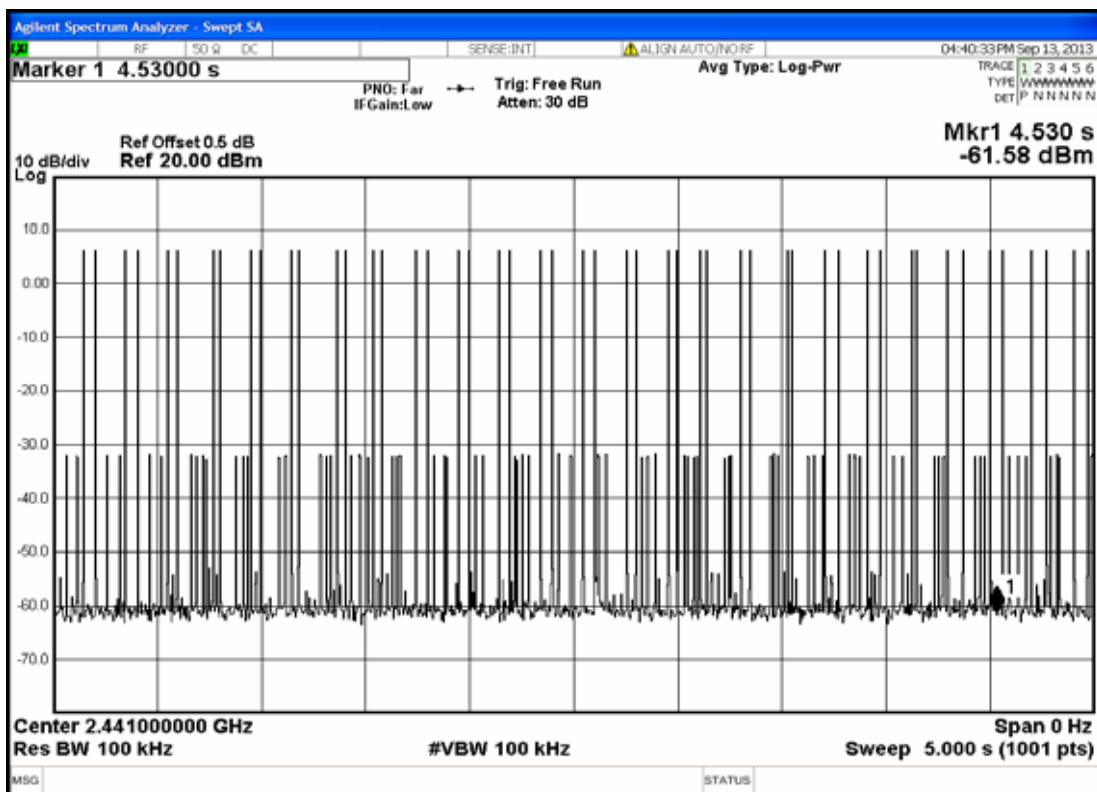
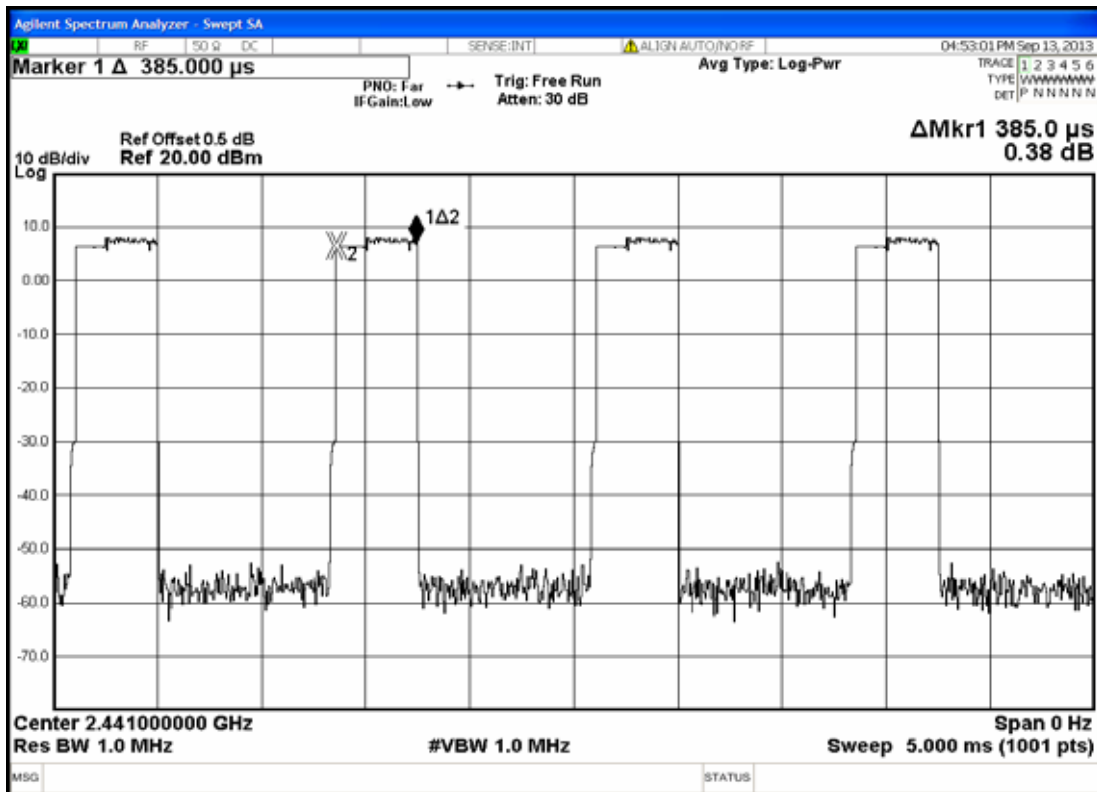


Figure 2: 8-DPSK, 2441MHz, 3DH3

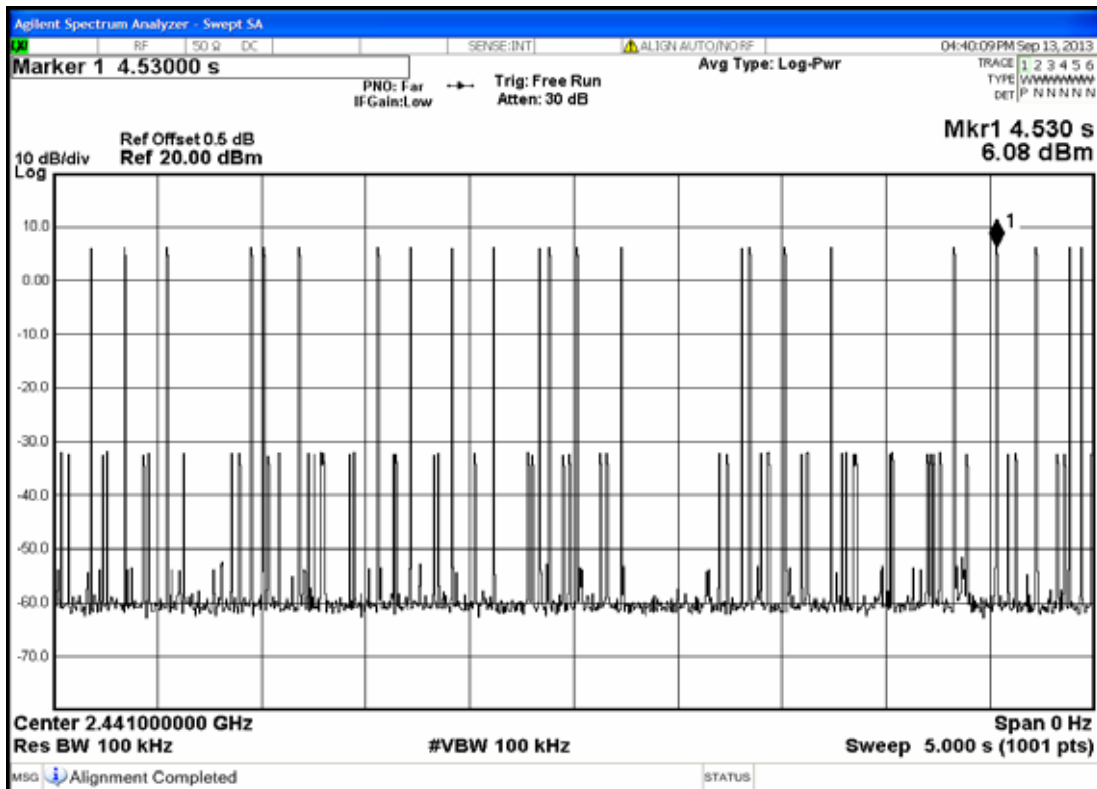
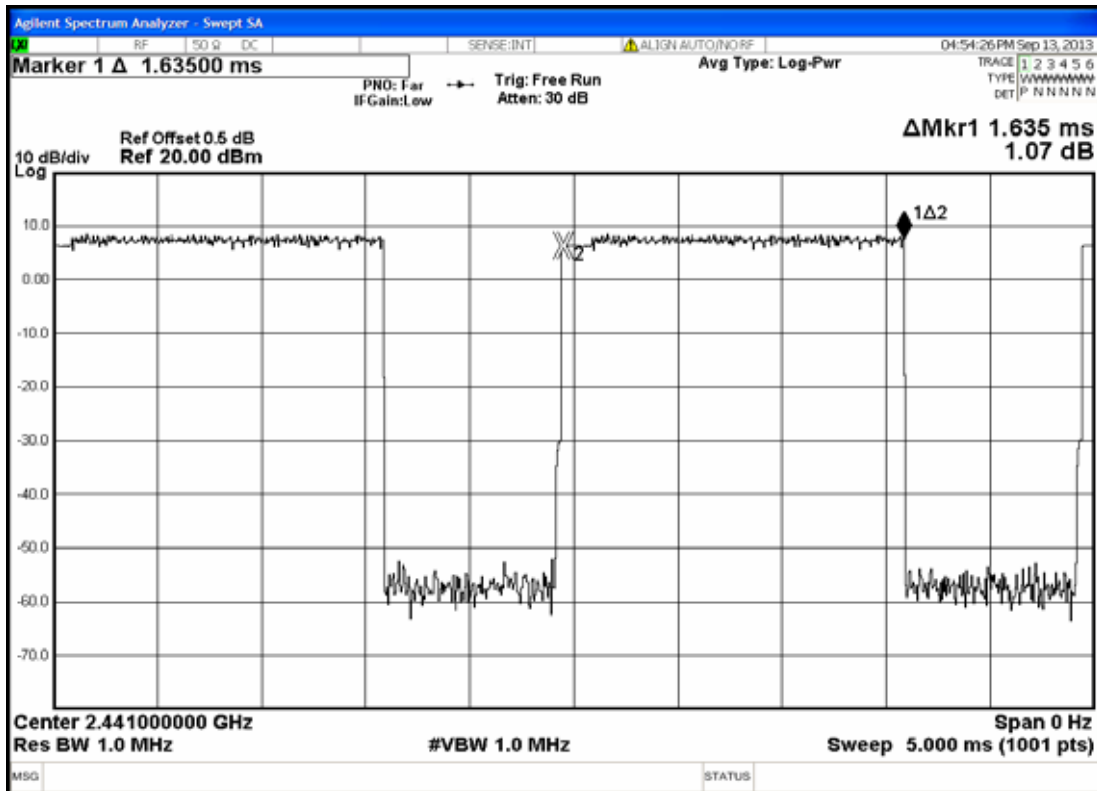
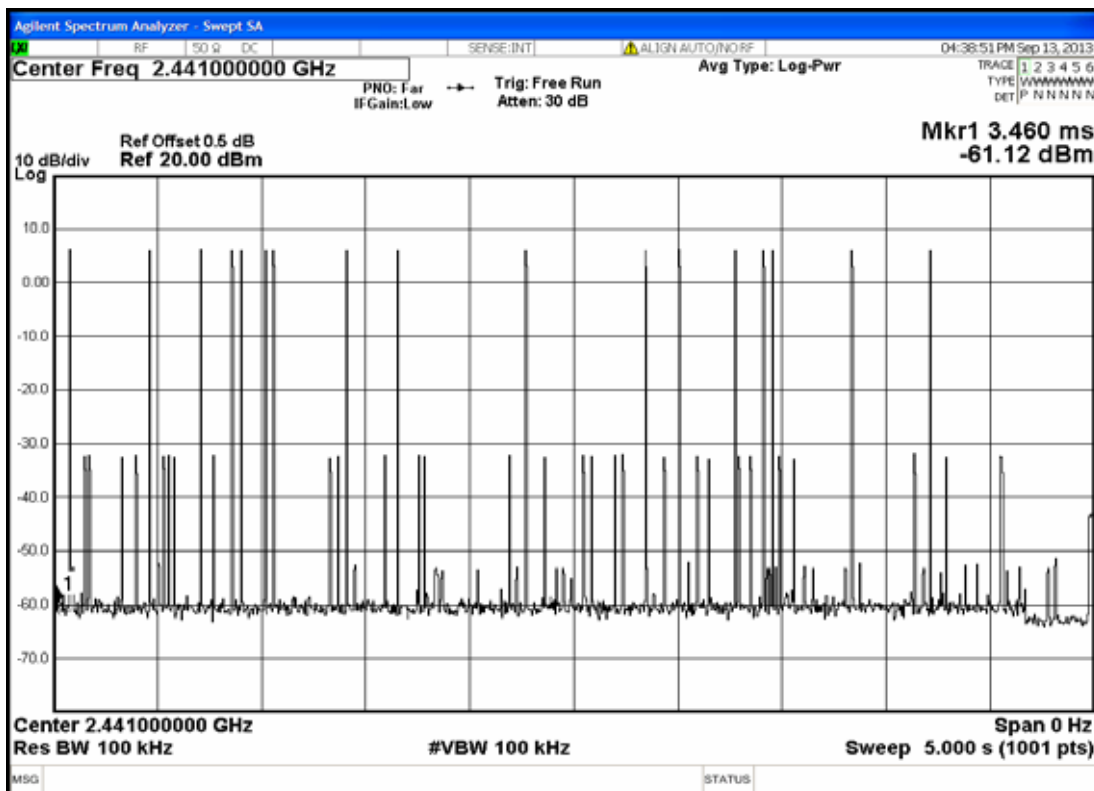
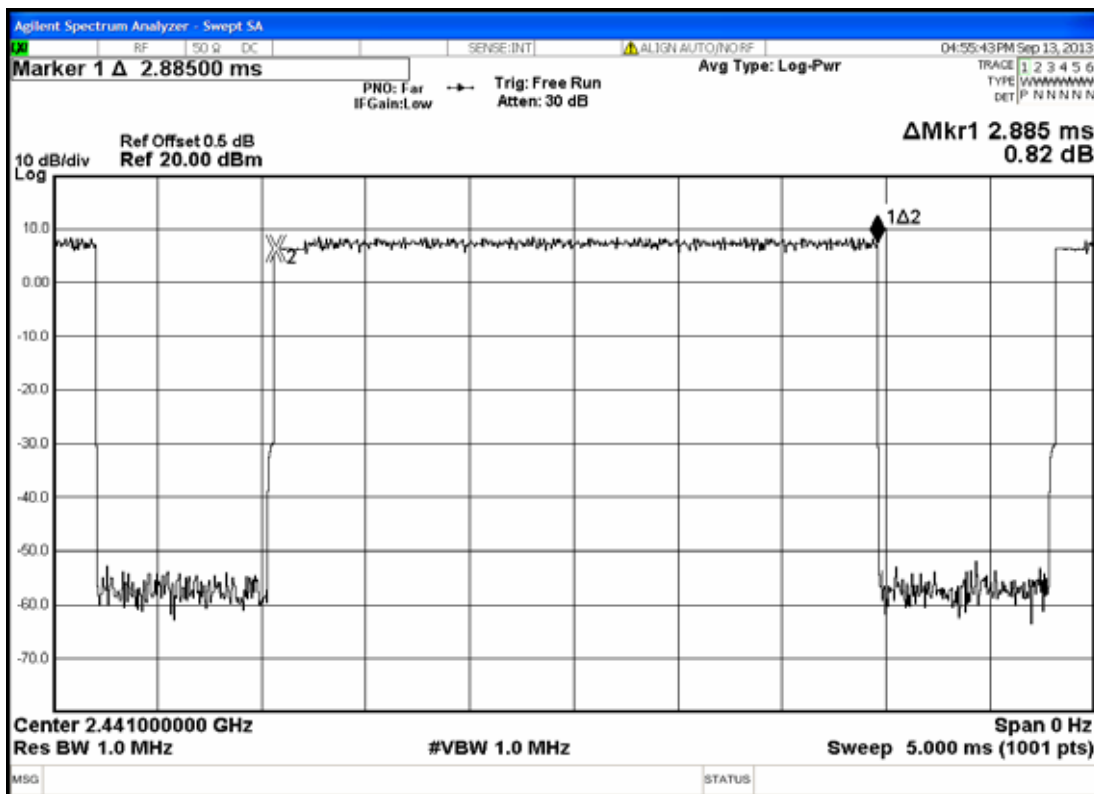


Figure 3: 8-DPSK, 2441MHz, 3DH5



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

Duty cycle: $79\text{channels} \times 0.4 \text{ seconds} = 31.6 \text{ seconds}$

DH1 : For each 5 seconds of 49 channels appearance, the longest time of occupancy for each of 31.6 seconds is:

$49 \text{ channels} \times 31.6 \text{ seconds} / 5 = 119.23\text{ms} (<400\text{ms})$

DH3 : For each 5 seconds of 26 channels appearance, the longest time of occupancy for each of 31.6 seconds is:

$26 \text{ channels} \times 31.6 \text{ seconds} / 5 = 267.66\text{ms} (<400\text{ms})$

DH5 : For each 5 seconds of 15 channels appearance, the longest time of occupancy for each of 31.6 seconds is:

$15 \text{ channels} \times 31.6 \text{ seconds} / 5 = 273.50\text{ms} (<400\text{ms})$

Figure 4: GFSK, 2441MHz, DH1

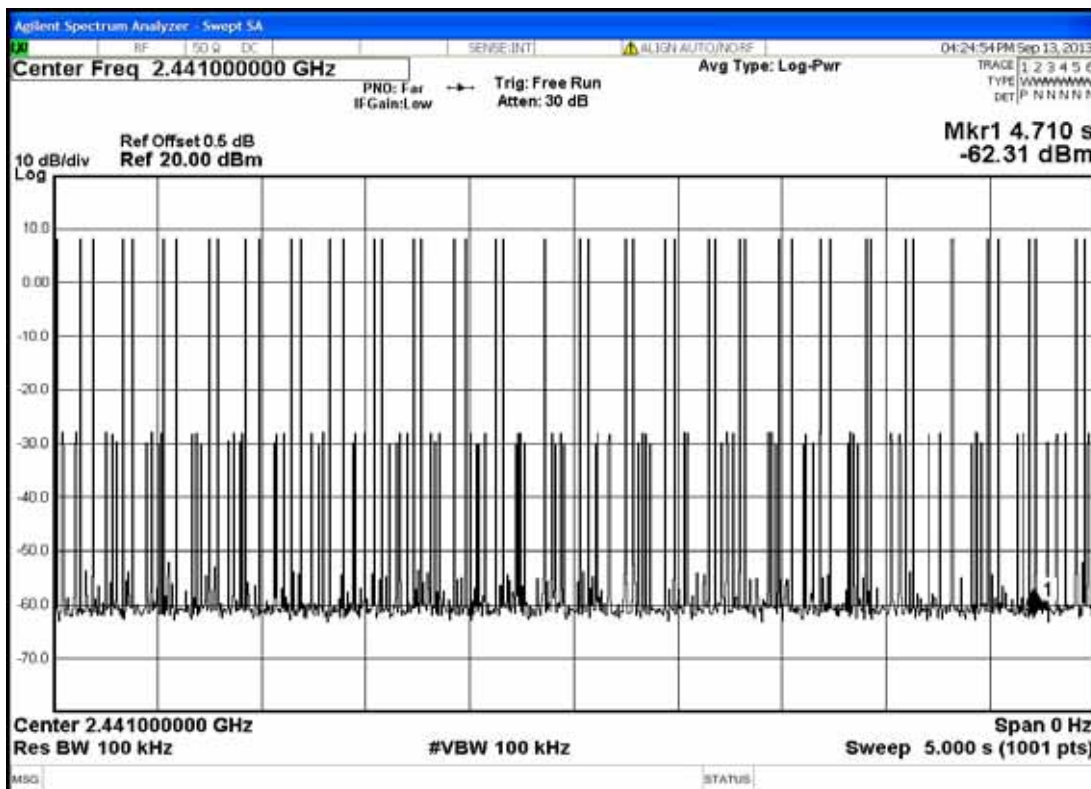
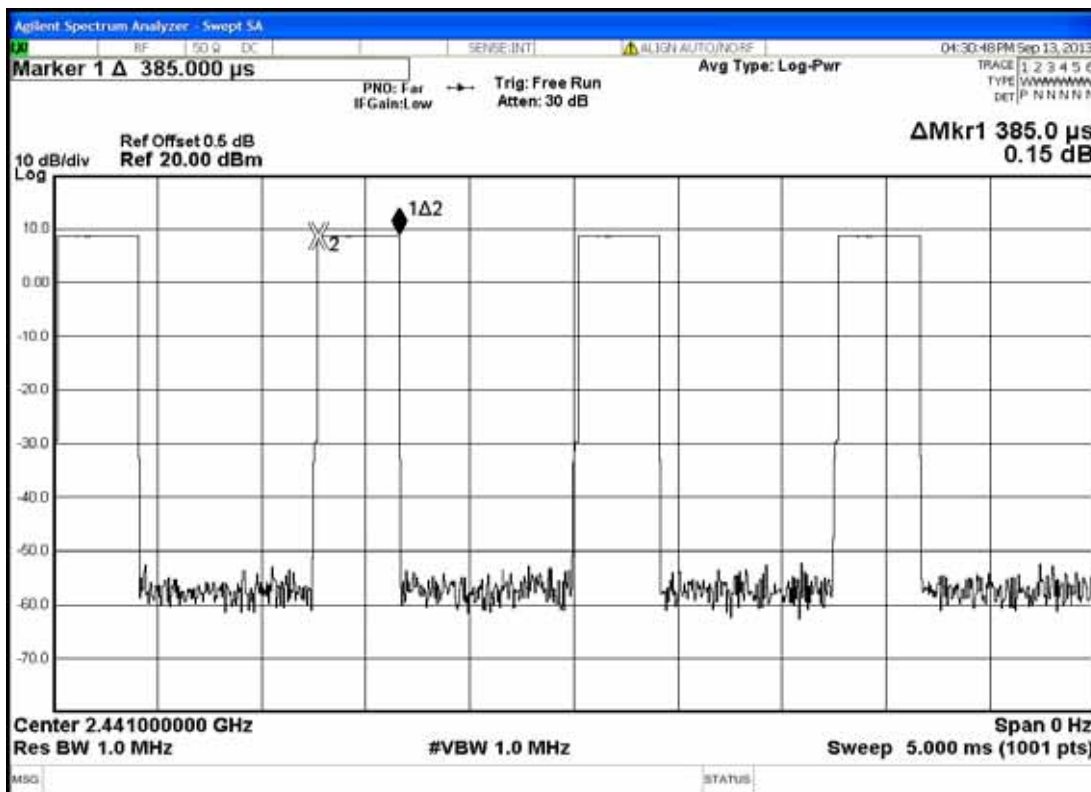


Figure 5: GFSK, 2441MHz, DH3

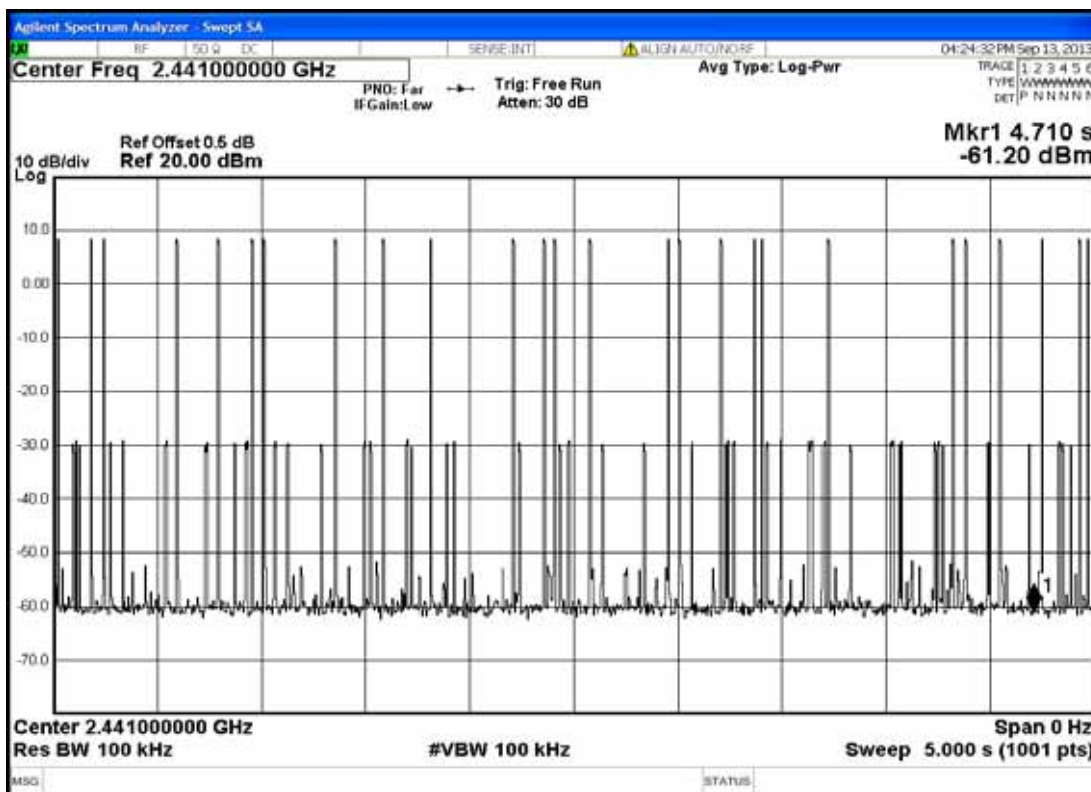
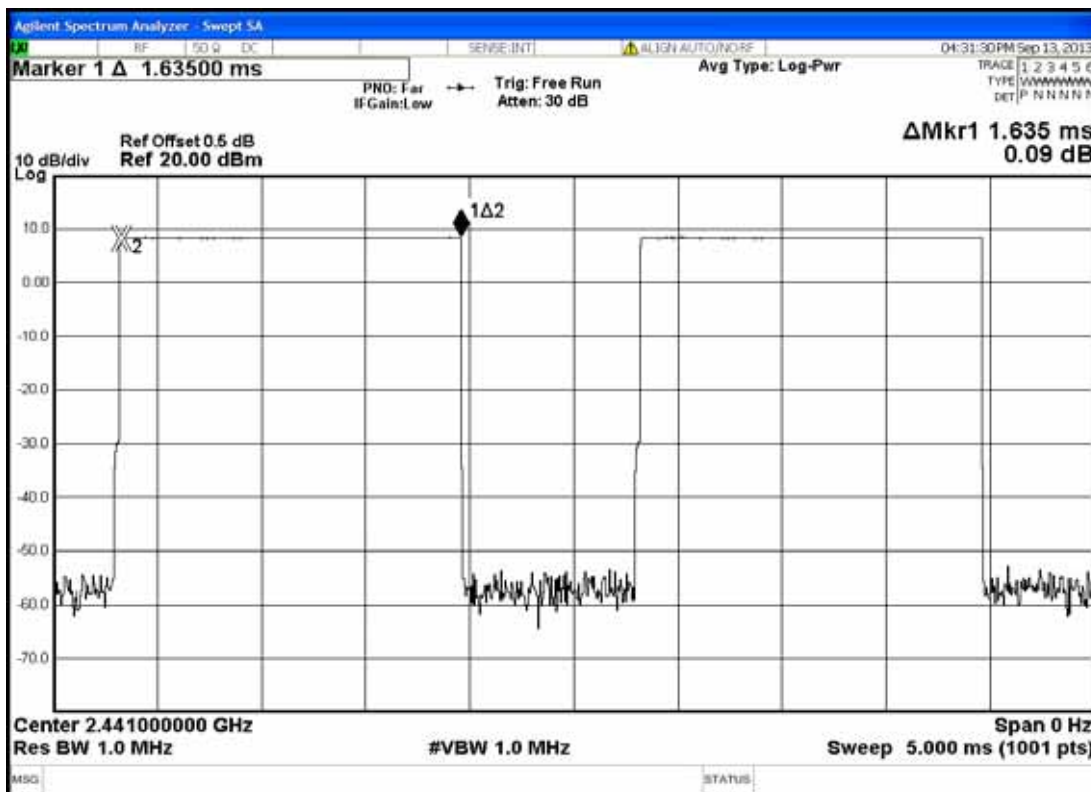
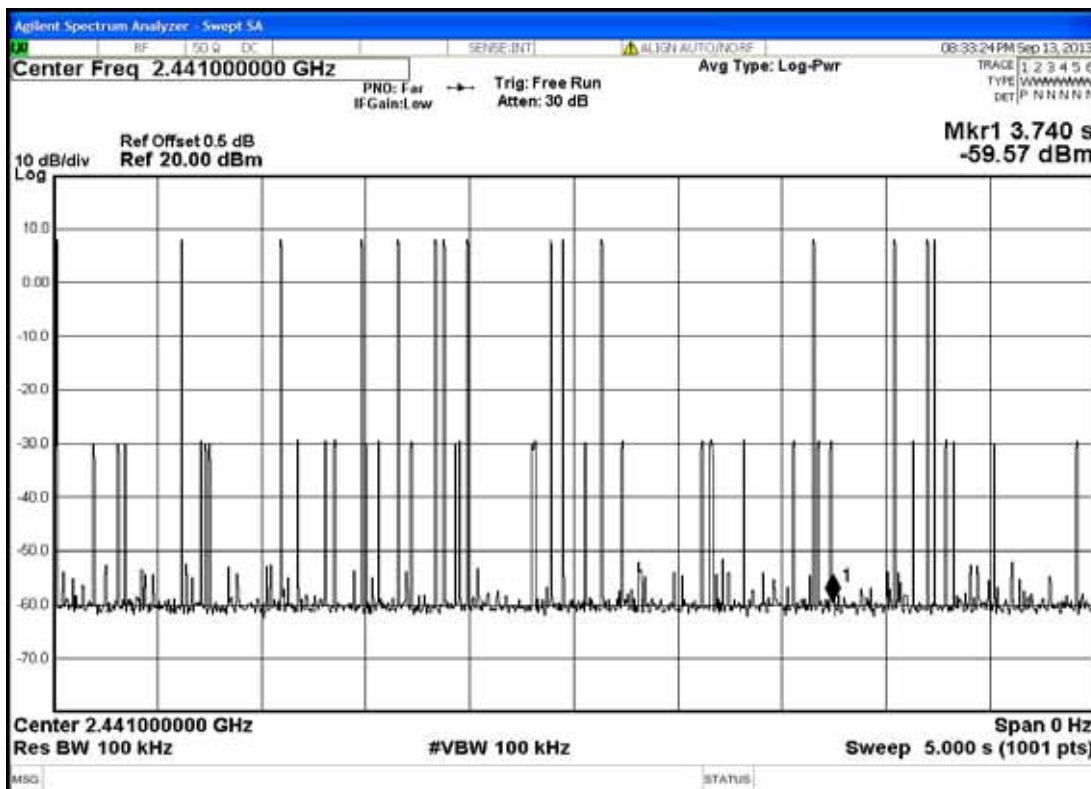
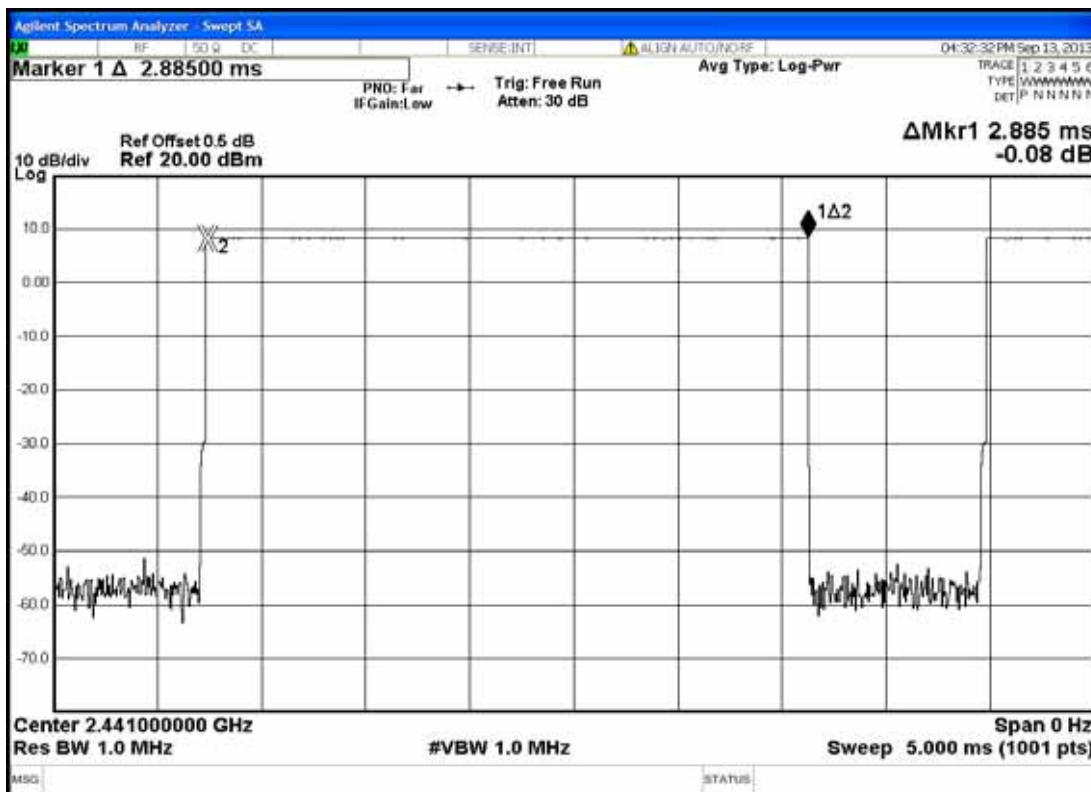


Figure 6: GFSK, 2441MHz, DH5



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	Jul. 30, 13'	Jul. 29, 14'

7.2. Block Diagram of Test Setup

The same as section.4.2.

7.3. Specification Limits [§15.247(a)(1)(iii), RSS-210 §A8.2 (d)]

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.]

Test Date : Oct. 11, 2013 Temperature : 25 Humidity : 51%

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

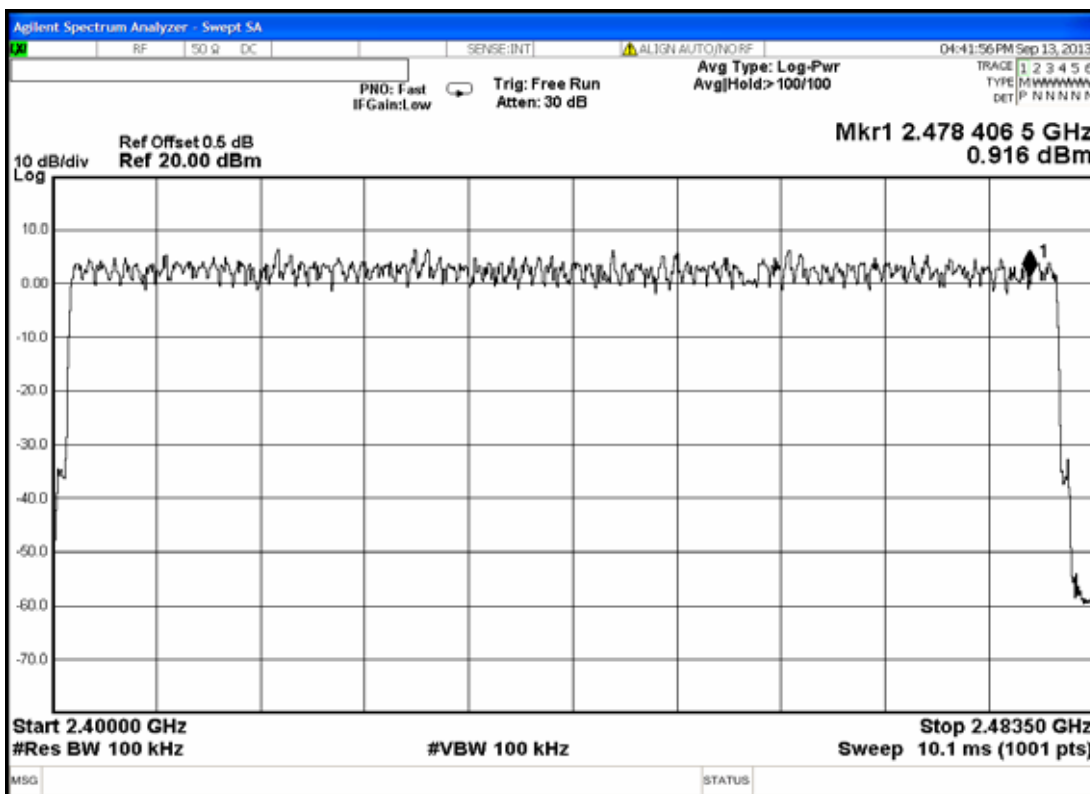
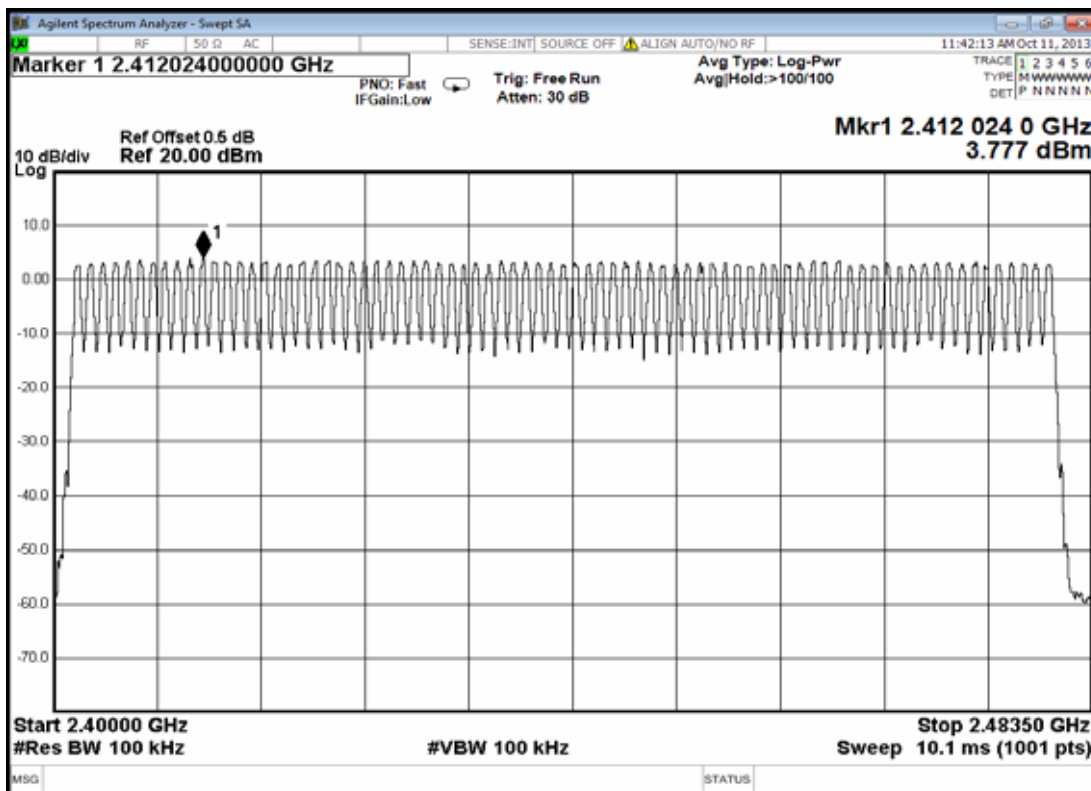


Figure 2: GFSK



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	Jul. 30, 13'	Jul. 29, 14'

8.2. Block Diagram of Test Setup

The same as section.4.2.

8.3. Specification Limits [§15.247(b)-(1), RSS-210 §A8.4 (2)]

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 .

8.5. Test Procedure

The transmitter output was connected to the spectrum analyzer.

Span can encompass the waveform

RBW>EBW

VBW 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.]

Test Date : Sep. 13, 2013 Temperature : 25 Humidity : 56%

8.6.1.Type of Modulation: 8-DPSK

No.	Channel	Test Frequency	Peak Output Power	Limit
1.	0	2402MHz	5.113 dBm	21dBm
2.	39	2441MHz	5.317 dBm	21dBm
3.	78	2480MHz	5.423 dBm	21dBm

8.6.2.Type of Modulation: GFSK

No.	Channel	Test Frequency	Peak Output Power	Limit
1.	0	2402MHz	3.558 dBm	21dBm
2.	39	2441MHz	3.649 dBm	21dBm
3.	78	2480MHz	3.523 dBm	21dBm

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

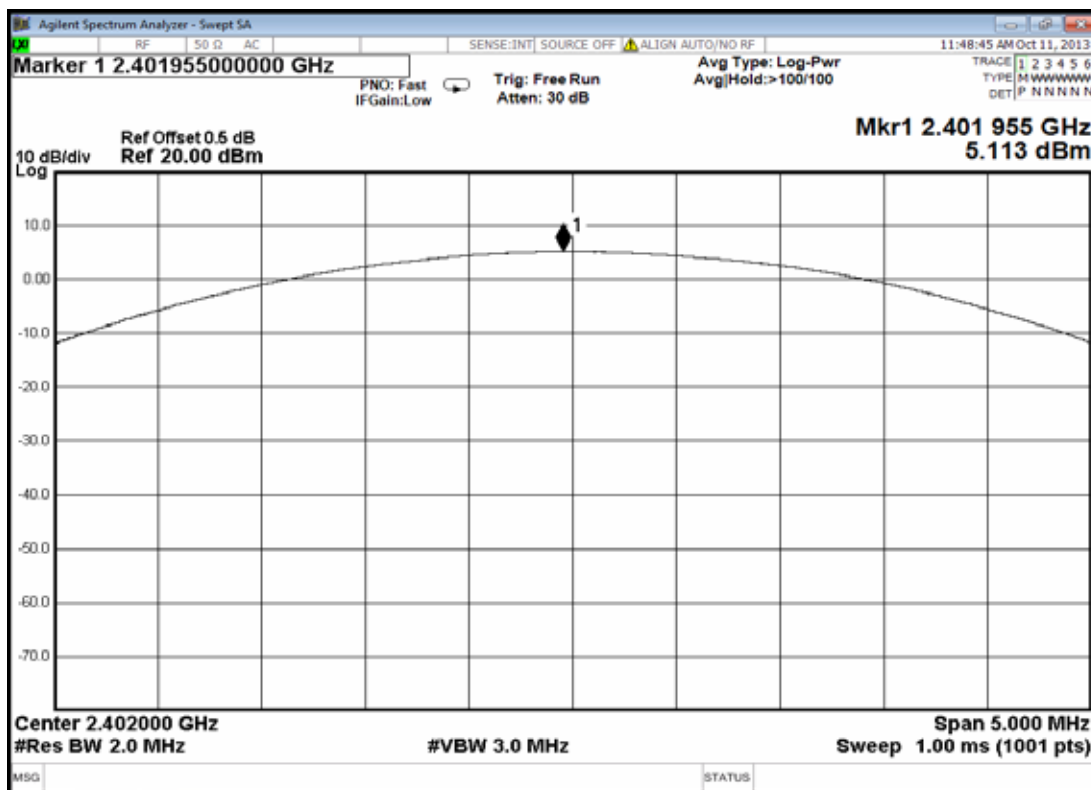


Figure 2: 8-DPSK, Channel 39, Frequency: 2441MHz

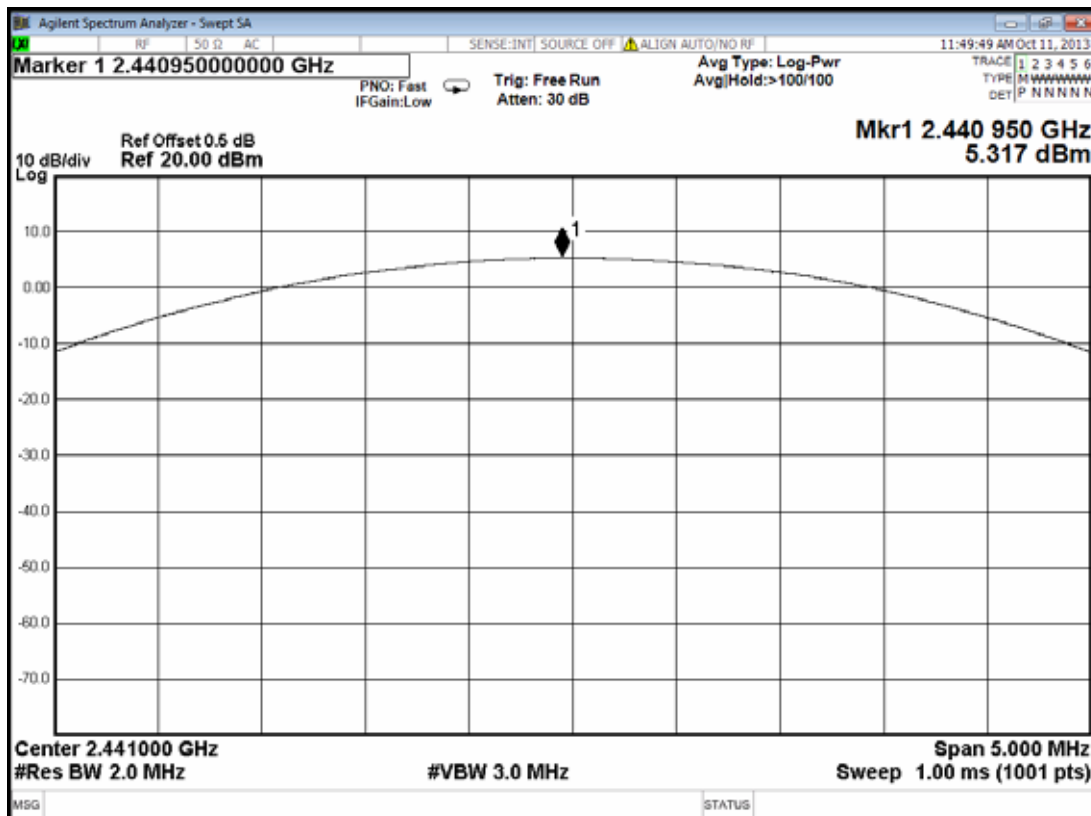


Figure 3: 8-DPSK, Channel 78, Frequency: 2480MHz

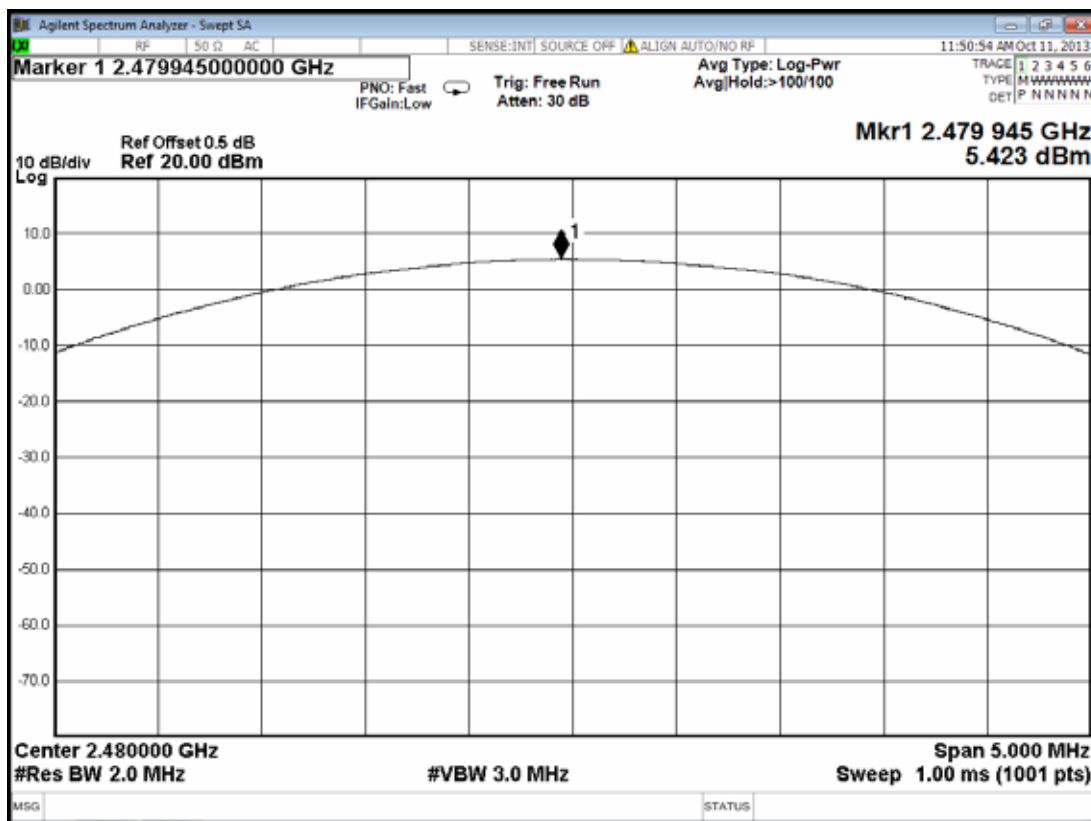


Figure 4: GFSK, Channel 0, Frequency: 2402MHz

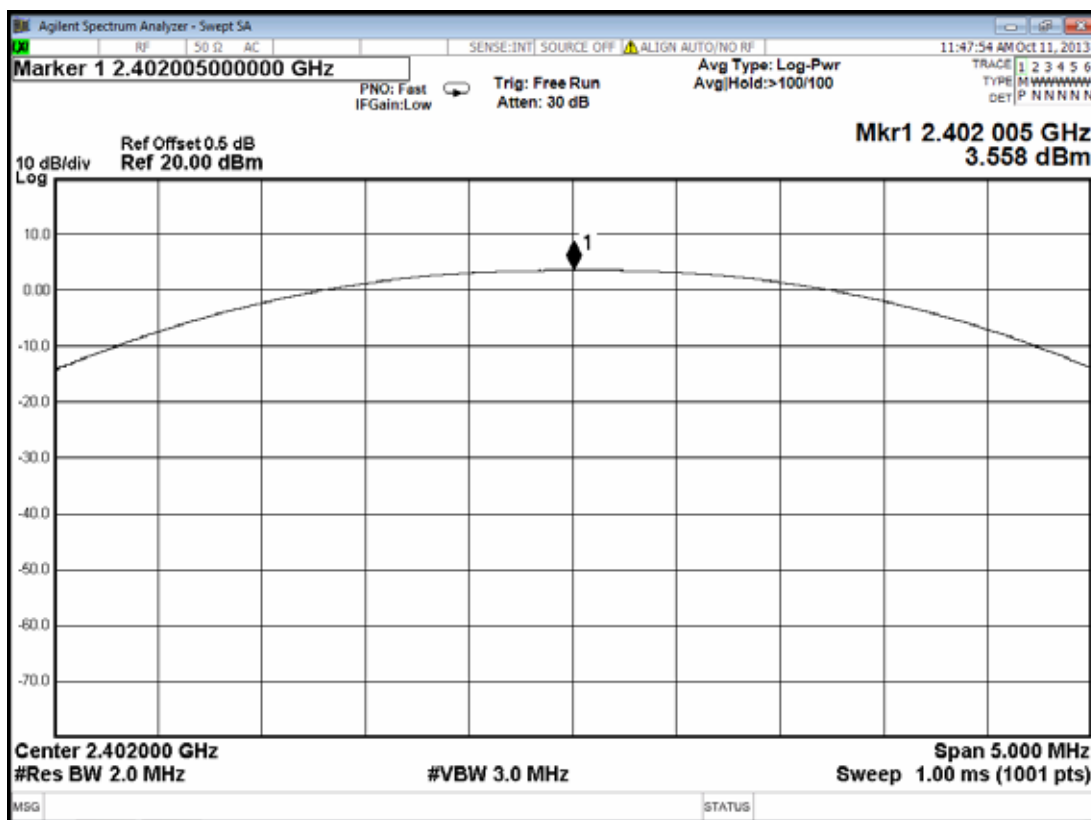


Figure 5: GFSK, Channel 39, Frequency: 2441MHz

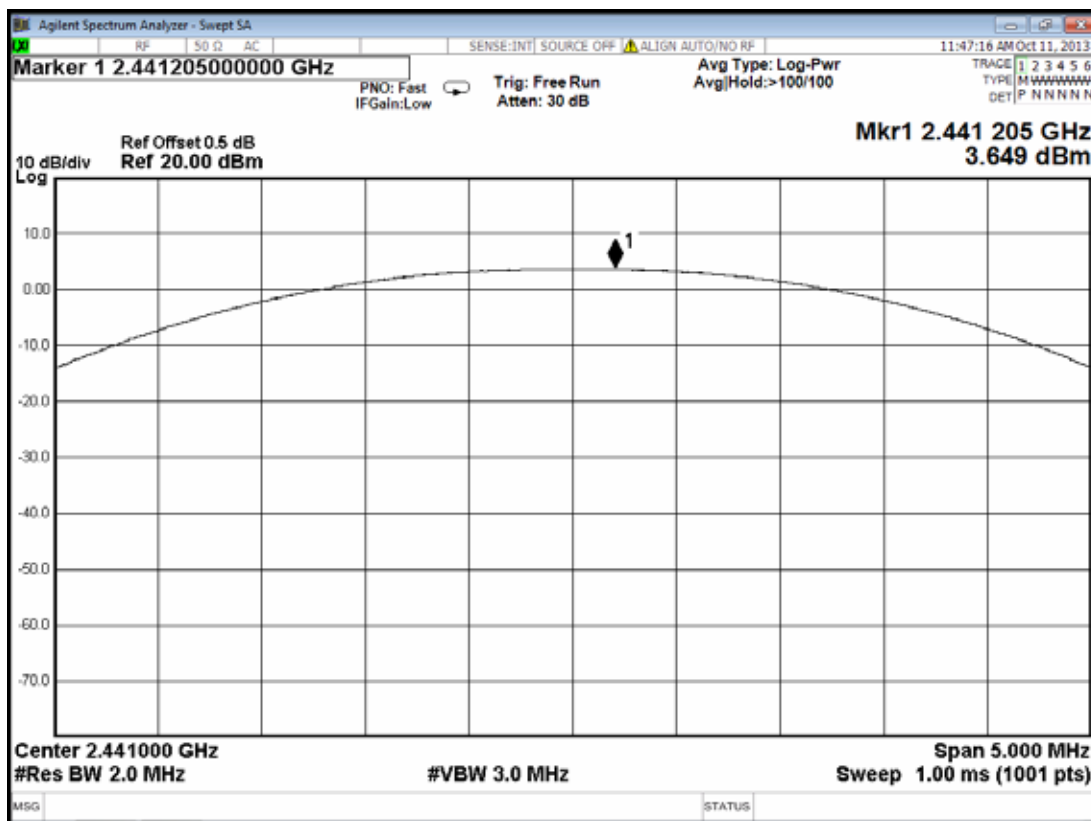
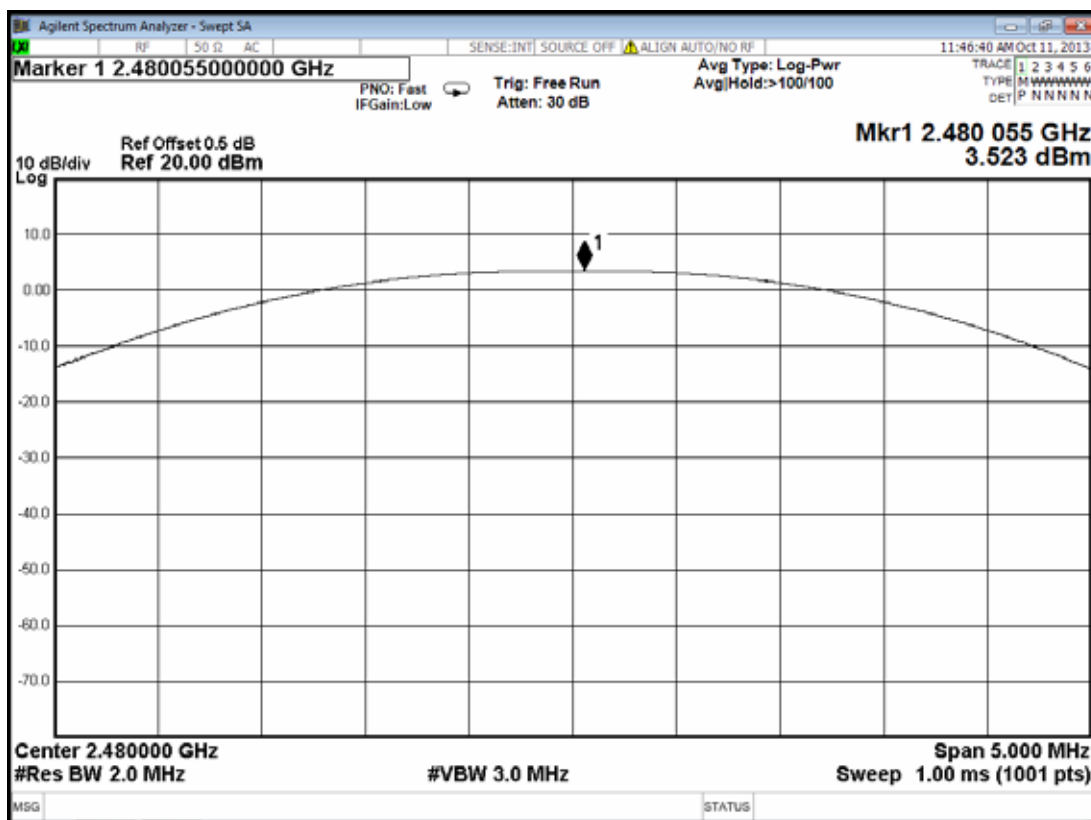


Figure 6: GFSK, Channel 78, Frequency: 2480MHz



9. EMISSION LIMITATIONS MEASUREMENT

All emission levels have been compliance with the limit specified in 15.209, thus conducted limitation is not required and presented.

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	Jul. 30, 13'	Jul. 29, 14'

10.2.Block Diagram of Test Setup

The same as section.4.2.

10.3.Specification Limits [§15.247(c), RSS-210 §A8.5]

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

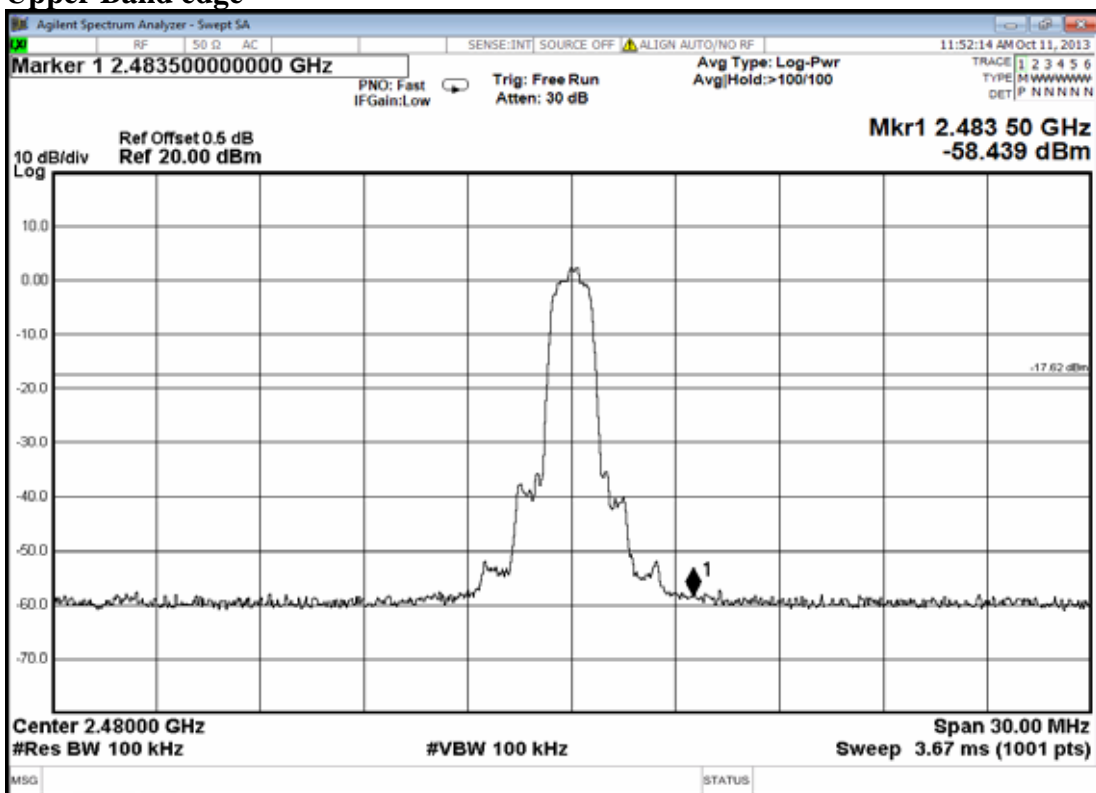
PASSED. The testing data was attached in the next pages.

[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.]

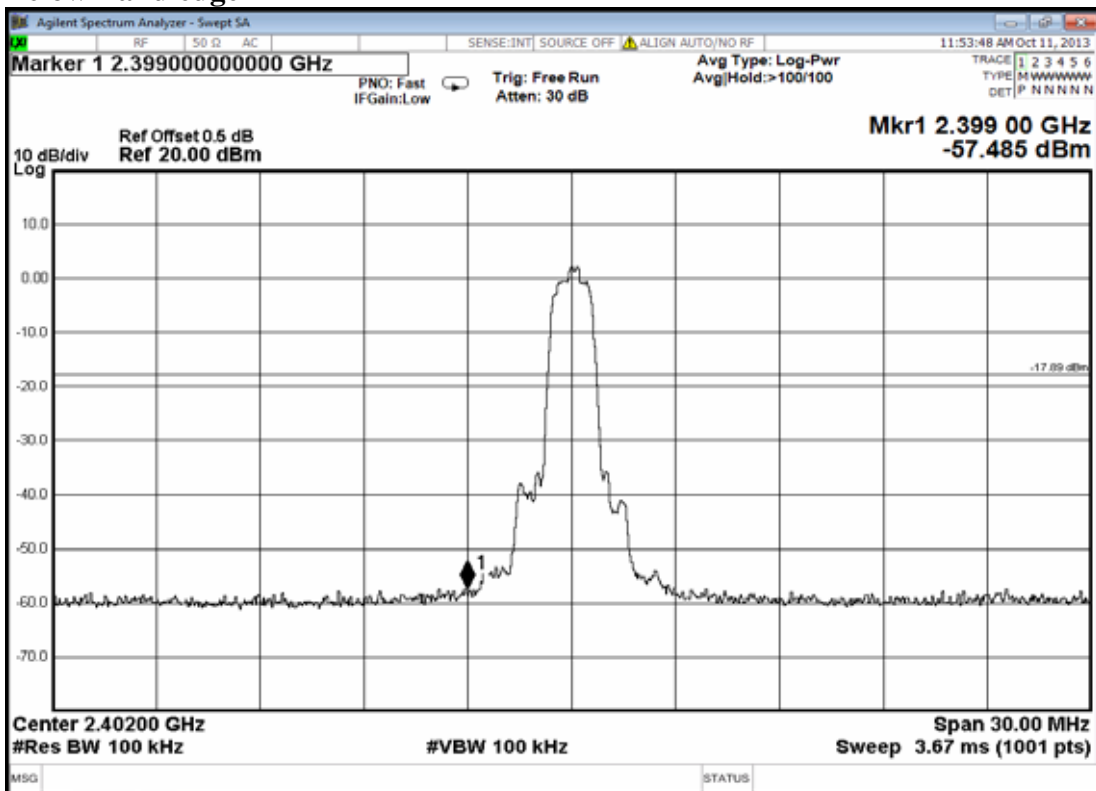
Test Date : Oct. 11, 2013 Temperature : 25 Humidity : 51%

10.6.1. Type of Modulation: 8-DPSK

Upper Band edge

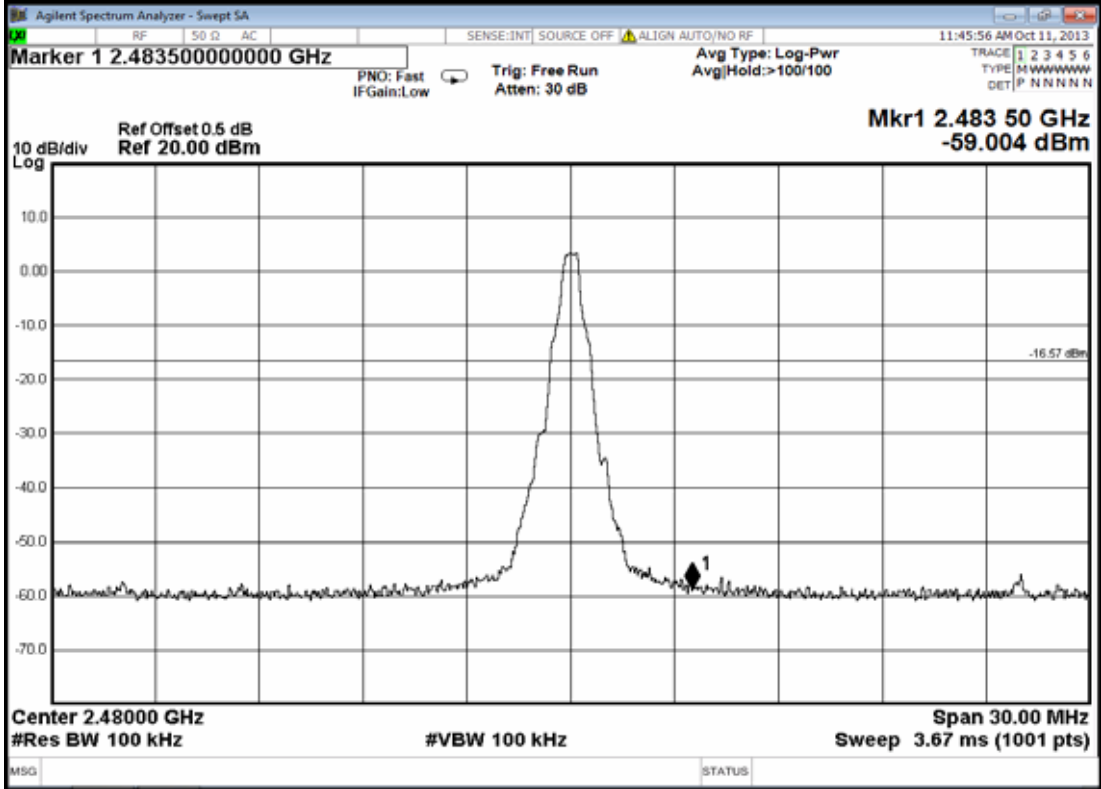


Below Band edge

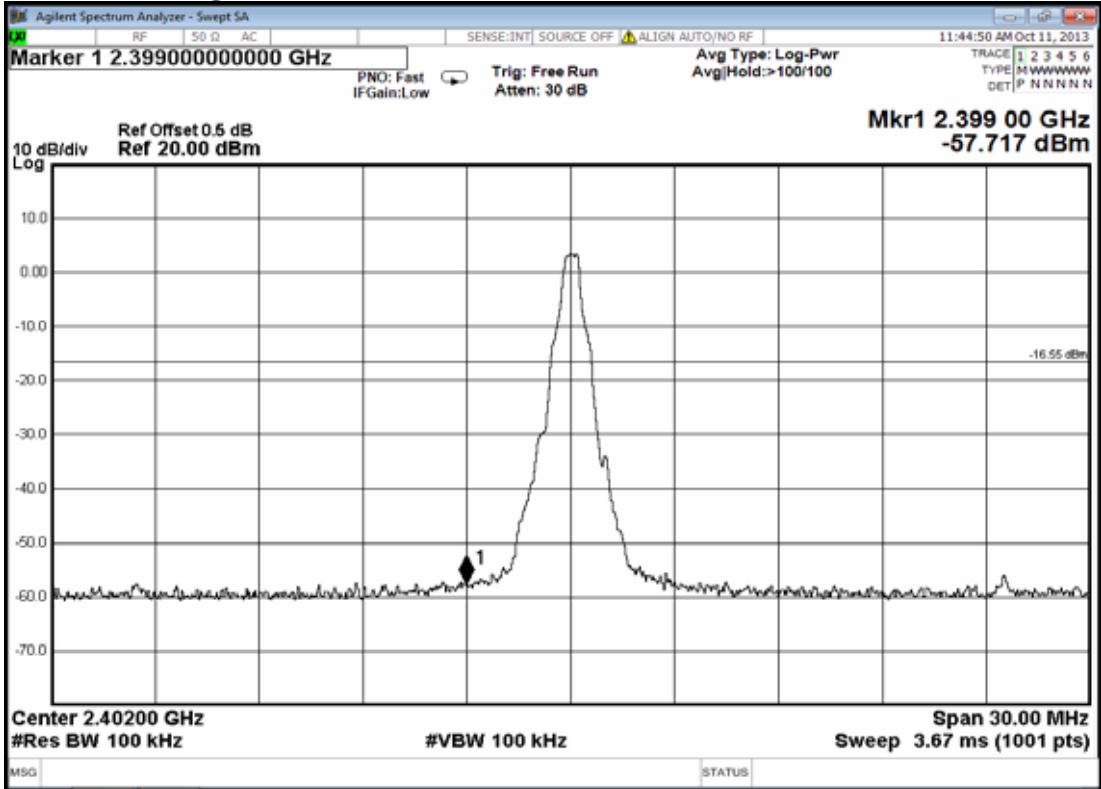


10.6.2. Type of Modulation: GFSK

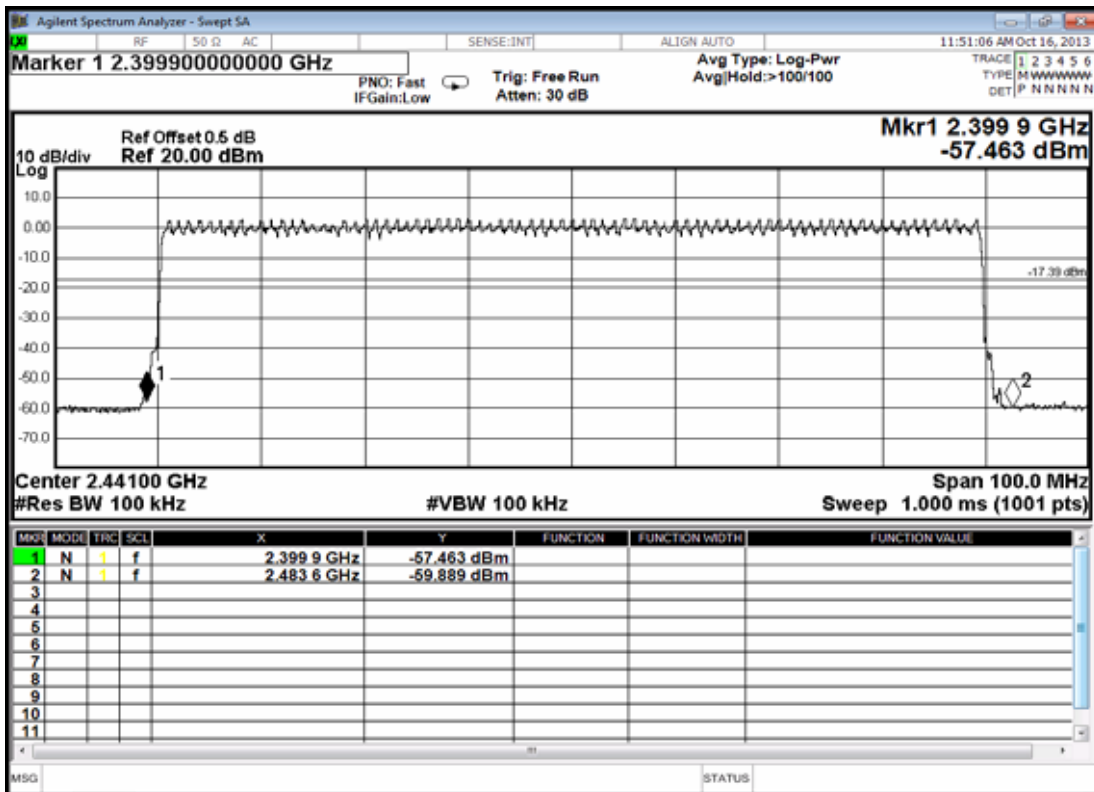
Upper Band edge



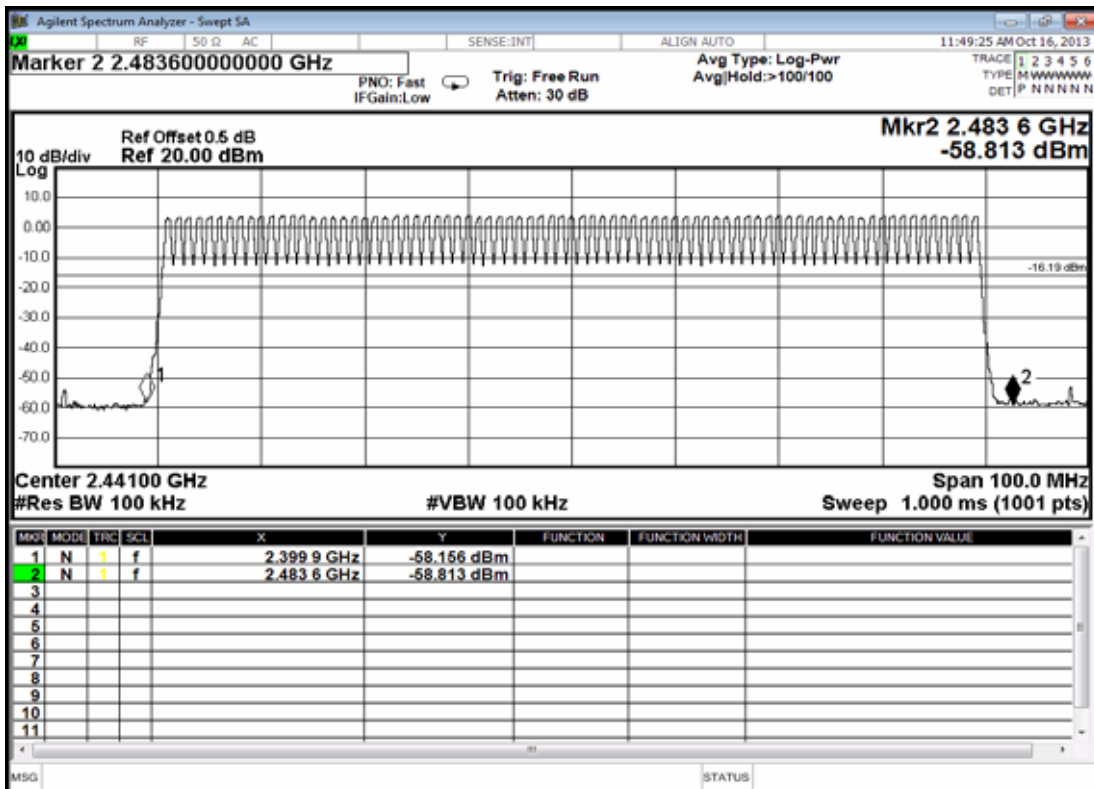
Below Band edge



10.6.3. Hopping Mode(Type of Modulation: 8-DPSK)



10.6.4. Hopping Mode(Type of Modulation: GFSK)



11.DEVIATION TO TEST SPECIFICATIONS

【NONE】

12. PHOTOGRAPHS

12.1. Photos of Conducted Disturbance Measurement



FRONT VIEW OF CONDUCTED MEASUREMENT

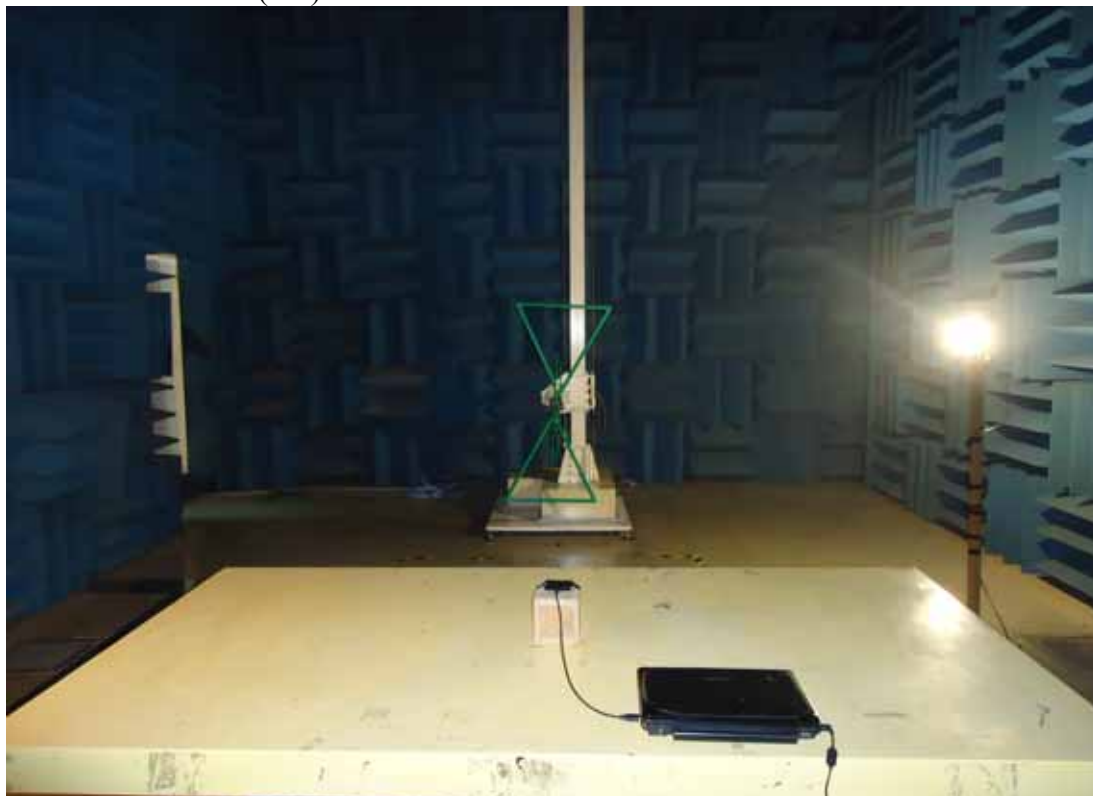


BACK VIEW OF CONDUCTED MEASUREMENT

12.2.Photos of Radiated Emission Measurement at Semi-Anechoic Chamber

12.2.1. Frequency Range 30MHz-1GHz

(Lie)



(Side)



(Stand)



12.2.2. Frequency Range Above 1GHz
(Lie)



(Side)



(Stand)



12.3.Photo of Section RF Conducted Measurement

