

FCC Test Report

Product Name	FIELDBOOK
Model No.	I1
FCC ID.	XGIFBI1

Applicant	LOGIC INSTRUMENT S.A.
Address	43 Avenue de l'Europe, BP60012, 95331 DOMONT cedex, France.

Date of Receipt	Oct. 08, 2014
Issued Date	Nov. 28, 2014
Report No.	14A0216R-RFUSP74V00
Report Version	V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

This report must not be used to claim product endorsement by TAF or any agency of the government. The test report shall not be reproduced without the written approval of QuieTek Corporation.

Test Report

Issued Date: Nov. 28, 2014

Report No.: 14A0216R-RFUSP74V00



Product Name	FIELDBOOK
Applicant	LOGIC INSTRUMENT S.A.
Address	43 Avenue de l'Europe, BP60012, 95331 DOMONT cedex, France.
Manufacturer	Ubiquconn Technology, Inc.
Model No.	I1
FCC ID.	XGIFB11
EUT Rated Voltage	AC 100-240V, 50-60Hz
EUT Test Voltage	AC 120V/ 60Hz
Trade Name	LOGIC INSTRUMENT
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2013 ANSI C63.10: 2009, KDB 558074 D01 DTS Meas Guidance v03r02
Test Result	Complied

Documented By

:

Genie Chang

(Senior Adm. Specialist / Genie Chang)

Tested By

:

Alan Chen

(Engineer / Alan Chen)

Approved By

:

Vincent Lin

(Director/ Vincent Lin)

TABLE OF CONTENTS

Description	Page
1. GENERAL INFORMATION	5
1.1. EUT Description.....	5
1.2. Operational Description.....	7
1.3. Tested System Details.....	8
1.4. Configuration of Tested System	8
1.5. EUT Exercise Software	9
1.6. Test Facility	10
2. CONDUCTED EMISSION	11
2.1. Test Equipment.....	11
2.2. Test Setup	11
2.3. Limits.....	12
2.4. Test Procedure	12
2.5. Uncertainty	12
2.6. Test Result of Conducted Emission.....	13
3. PEAK POWER OUTPUT	15
3.1. Test Equipment.....	15
3.2. Test Setup	15
3.3. Limit	15
3.4. Test Procedure	15
3.5. Uncertainty	15
3.6. Test Result of Peak Power Output.....	16
4. RADIATED EMISSION	18
4.1. Test Equipment.....	18
4.2. Test Setup	18
4.3. Limits.....	19
4.4. Test Procedure	20
4.5. Uncertainty	20
4.6. Test Result of Radiated Emission.....	21
5. RF ANTENNA CONDUCTED TEST	29
5.1. Test Equipment.....	29
5.2. Test Setup	29
5.3. Limits.....	29
5.4. Test Procedure	29
5.5. Uncertainty	29
5.6. Test Result of RF Antenna Conducted Test.....	30
6. BAND EDGE	32
6.1. Test Equipment.....	32
6.2. Test Setup	33
6.3. Limit	34
6.4. Test Procedure	34
6.5. Uncertainty	34

6.6.	Test Result of Band Edge	35
7.	CHANNEL NUMBER.....	43
7.1.	Test Equipment	43
7.2.	Test Setup	43
7.3.	Limit	43
7.4.	Test Procedure	43
7.5.	Uncertainty	43
7.6.	Test Result of Channel Number.....	44
8.	CHANNEL SEPARATION.....	46
8.1.	Test Equipment	46
8.2.	Test Setup	46
8.3.	Limit	46
8.4.	Test Procedure	46
8.5.	Uncertainty	46
8.6.	Test Result of Channel Separation.....	47
9.	DWELL TIME.....	51
9.1.	Test Equipment	51
9.2.	Test Setup	51
9.3.	Limit	51
9.4.	Test Procedure	51
9.5.	Uncertainty	51
9.6.	Test Result of Dwell Time	52
10.	OCCUPIED BANDWIDTH	56
10.1.	Test Equipment	56
10.2.	Test Setup	56
10.3.	Limits.....	56
10.4.	Test Procedure	56
10.5.	Uncertainty	56
10.6.	Test Result of Occupied Bandwidth	57
11.	EMI REDUCTION METHOD DURING COMPLIANCE TESTING	63
Attachment 1: EUT Test Photographs		
Attachment 2: EUT Detailed Photographs		

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	FIELDBOOK
Trade Name	LOGIC INSTRUMENT
Model No.	I1
FCC ID.	XGIFB11
Frequency Range	2402 – 2480MHz
Channel Number	79
Type of Modulation	FHSS: GFSK(1Mbps) / π /4DQPSK(2Mbps) / 8DPSK(3Mbps)
Antenna Type	PIFA Antenna
Channel Control	Auto
Antenna Gain	Refer to the table “Antenna List”
Power Adapter	MFR: FSP, M/N: FSP065-REB Input: AC 100-240V ~1.5A, 50-60 Hz Output: 19V, 3.42A Cable Out: Non-Shielded, 1.5m, with one ferrite core bonded.
Contain Module	Intel / 7260HMW

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	ethertronics	5001791 (Main) 5001799 (Aux)	PIFA Antenna	3.8dBi for 2.4GHz

Note:

1. The antenna of EUT is conform to FCC 15.203.
2. Only the higher gain antenna was tested and recorded in this report.

Center Frequency of Each Channel:

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

Note:

1. The EUT is a FIELDBOOK with a built-in WLAN 、Bluetooth and GPS transceiver, this report for Bluetooth.
2. These tests were conducted on a sample for the purpose of demonstrating compliance of Bluetooth transmitter with Part 15 Subpart C Paragraph 15.247 for spread spectrum devices.
3. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
4. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.
5. Bluetooth operation was evaluated at both 1Mb/s and 3Mb/s data rates. 2Mb/s data rate was found, through pre-testing, to produce emissions similar to those for 3Mb/s.

Test Mode	Mode 1: Transmit - 1Mbps (GFSK) Mode 2: Transmit - 3Mbps (8DPSK)
-----------	---

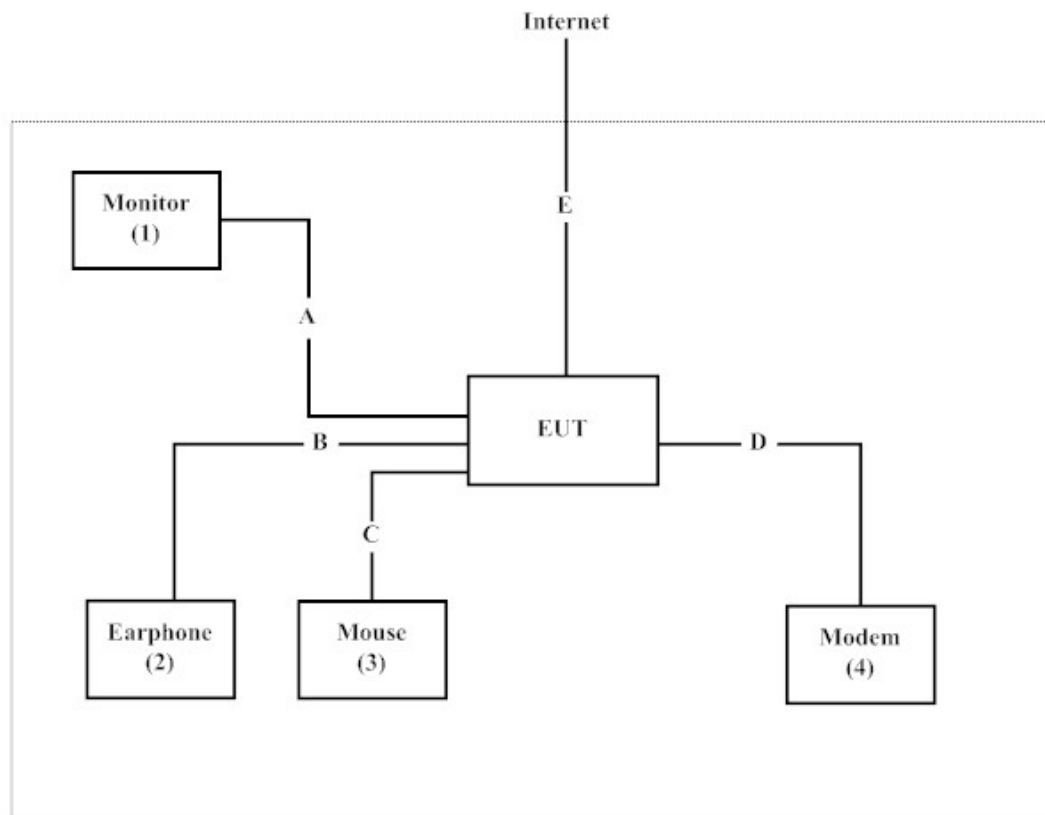
1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

	Product	Manufacturer	Model No.	Serial No.	Power Cord
(1)	Monitor	DELL	ST2320L		Non-Shielded, 1.8m
(2)	Earphone	AIWA	N/A	N/A	N/A
(3)	USB Mouse	Logitech	M-BE58	HCA30103211	N/A
(4)	Modem	ACEEX	DM-1414	0102027553	Non-Shielded, 1.8m

Signal Cable Type	Signal cable Description
A HDMI Cable	Shielded, 1.8m
B Earphone Cable	Shielded, 1.8m
C Mouse Cable	Shielded, 1.8m
D RS-232 Cable	Shielded, 1.8m
E RJ45 Cable	Shielded, 2.0m

1.4. Configuration of Tested System



1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.4.
- (2) Execute software “DRTU-v1.7.3.859” on the EUT
- (3) Configure the test mode, the test channel, and the data rate.
- (4) Press “OK” to start the continuous Transmit.
- (5) Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	30-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from QuieTek Corporation's Web Site: <http://www.quietek.com/tw/ctg/cts/accreditations.htm>
The address and introduction of QuieTek Corporation's laboratories can be founded in our Web site: <http://www.quietek.com/>

Site Description: File on
Federal Communications Commission
FCC Engineering Laboratory
7435 Oakland Mills Road
Columbia, MD 21046
Registration Number: 92195

Site Name: Quietek Corporation
Site Address: No.5-22, Ruishukeng,
Linkou Dist. New Taipei City 24451,
Taiwan, R.O.C.
TEL: 886-2-8601-3788 / FAX : 886-2-8601-3789
E-Mail : service@quietek.com

FCC Accreditation Number: TW1014

2. Conducted Emission

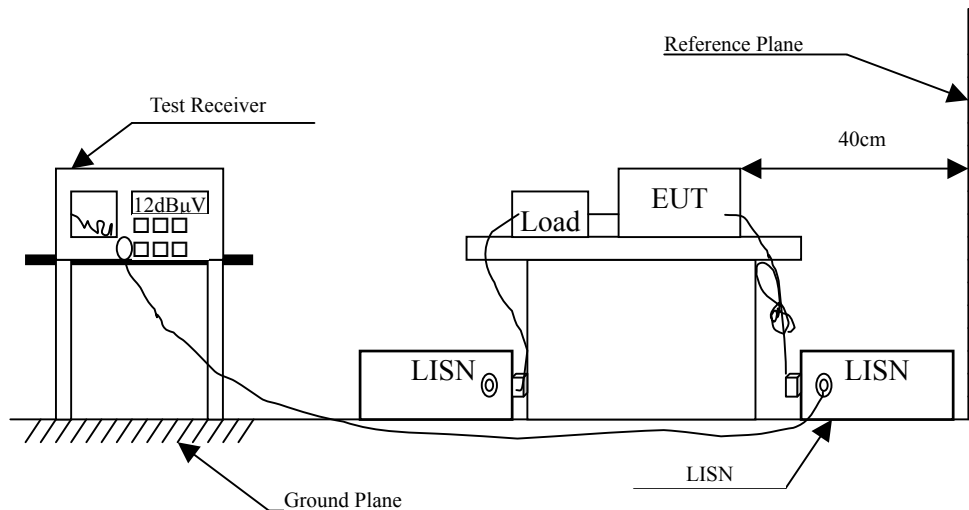
2.1. Test Equipment

	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
X	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2014	
X	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2014	Peripherals
X	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2014	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar, 2014	EUT
X	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2014	
	No.1 Shielded Room				

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked by “X” are used to measure the final test results.

2.2. Test Setup



2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBμV) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks: In the above table, the tighter limit applies at the band edges.

2.4. Test Procedure

The EUT and Peripherals are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all the interface cables must be changed according to ANSI C63.10: 2009 on conducted measurement.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

The EUT was setup to ANSI C63.10, 2009; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

2.5. Uncertainty

± 2.26 dB

2.6. Test Result of Conducted Emission

Product : FIELDBOOK
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 2: Transmit - 3Mbps (8DPSK) (2441MHz)

Frequency MHz	Correct Factor dB	Reading Level dBμV	Measurement Level dBμV	Margin dB	Limit dBμV
LINE 1					
Quasi-Peak					
0.193	9.650	38.270	47.920	-16.851	64.771
0.275	9.655	24.110	33.765	-28.664	62.429
0.474	9.665	24.110	33.775	-22.968	56.743
0.654	9.675	33.340	43.015	-12.985	56.000
1.029	9.696	26.320	36.016	-19.984	56.000
2.947	9.797	21.290	31.087	-24.913	56.000
Average					
0.193	9.650	28.350	38.000	-16.771	54.771
0.275	9.655	8.720	18.375	-34.054	52.429
0.474	9.665	14.330	23.995	-22.748	46.743
0.654	9.675	25.630	35.305	-10.695	46.000
1.029	9.696	16.490	26.186	-19.814	46.000
2.947	9.797	10.530	20.327	-25.673	46.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. "■" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : FIELDBOOK
Test Item : Conducted Emission Test
Power Line : Line 2
Test Mode : Mode 2: Transmit - 3Mbps (8DPSK) (2441MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBμV	dBμV	dB	dBμV
LINE 2					
Quasi-Peak					
0.205	9.661	35.220	44.881	-19.548	64.429
0.283	9.664	24.490	34.154	-28.046	62.200
0.396	9.661	22.260	31.921	-27.050	58.971
0.611	9.673	32.840	42.513	-13.487	56.000
0.826	9.695	29.430	39.125	-16.875	56.000
1.416	9.727	26.320	36.047	-19.953	56.000
Average					
0.205	9.661	26.850	36.511	-17.918	54.429
0.283	9.664	15.540	25.204	-26.996	52.200
0.396	9.661	14.480	24.141	-24.830	48.971
0.611	9.673	24.310	33.983	-12.017	46.000
0.826	9.695	19.390	29.085	-16.915	46.000
1.416	9.727	14.770	24.497	-21.503	46.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. "■" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

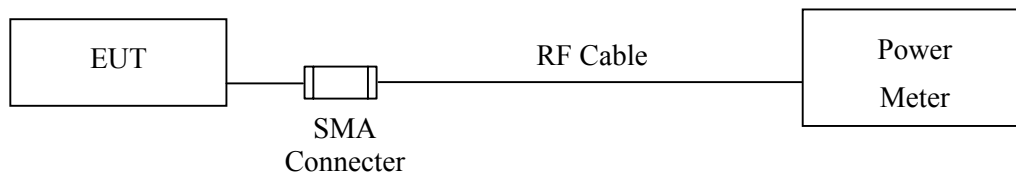
3. Peak Power Output

3.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Power Meter	Anritsu	ML2495A/6K00003357	May, 2014
X	Power Sensor	Anritsu	MA2411B/0738448	Jun, 2014

Note: 1. All equipments are calibrated every one year.
2. The test instruments marked by “X” are used to measure the final test results.

3.2. Test Setup



3.3. Limit

The maximum peak power shall be less 1Watt.

3.4. Test Procedure

The EUT was setup to ANSI C63.10, 2009; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

3.5. Uncertainty

± 1.27 dB

3.6. Test Result of Peak Power Output

Product : FIELDBOOK
 Test Item : Peak Power Output
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit - 1Mbps (GFSK)

Channel No.	Frequency (MHz)	Measurement (dBm)	Required Limit	Result
Channel 00	2402.00	3.04	1 Watt= 30 dBm	Pass
Channel 39	2441.00	3.22	1 Watt= 30 dBm	Pass
Channel 78	2480.00	3.12	1 Watt= 30 dBm	Pass

Product : FIELDBOOK
 Test Item : Peak Power Output
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit - 3Mbps (8DPSK)

Channel No.	Frequency (MHz)	Measurement (dBm)	Required Limit	Result
Channel 00	2402.00	2.21	1 Watt= 30 dBm	Pass
Channel 39	2441.00	2.39	1 Watt= 30 dBm	Pass
Channel 78	2480.00	2.32	1 Watt= 30 dBm	Pass

4. Radiated Emission

4.1. Test Equipment

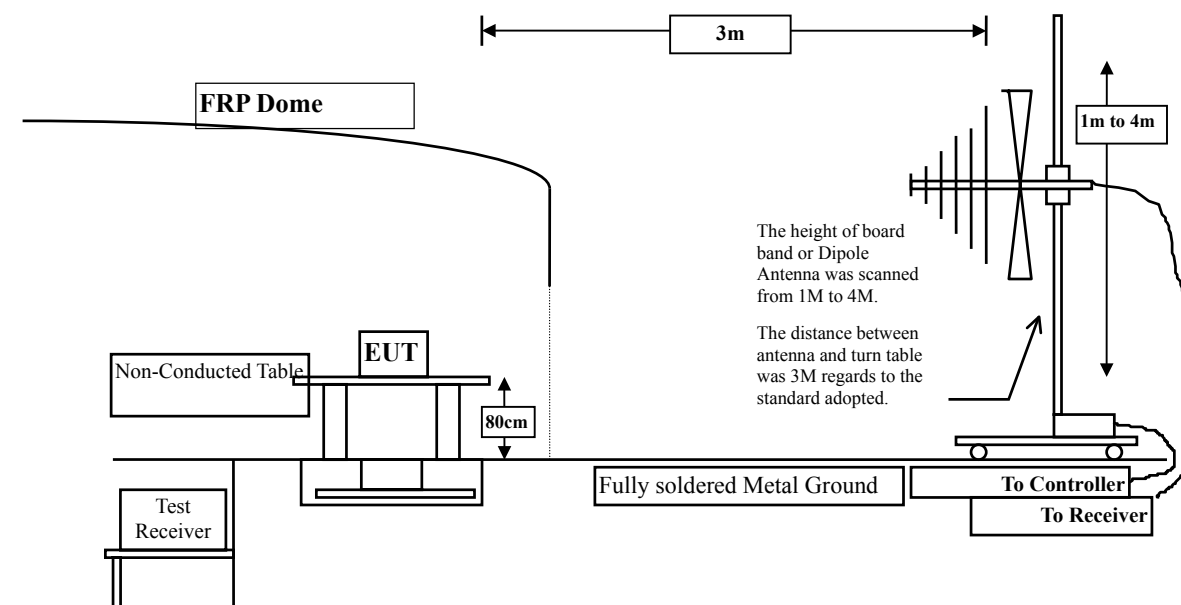
The following test equipments are used during the radiated emission test:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ Site # 3	X	Loop Antenna	Teseq	HLA6120 / 26739	Jul., 2014
	X	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2014
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2014
	X	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2014
	X	Pre-Amplifier	Agilent	8447D/2944A09549	Sep., 2014
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2014
	X	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2014
	X	Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2014
	X	Controller	QuieTek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

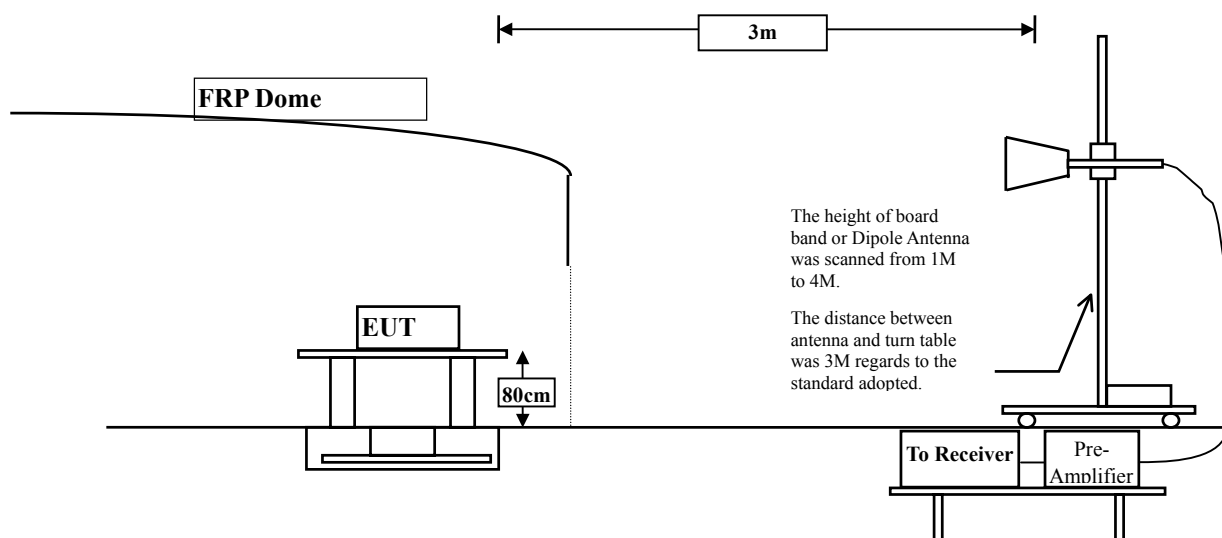
- Note:
1. All equipments are calibrated every one year.
 2. The test instruments marked by “X” are used to measure the final test results.

4.2. Test Setup

Below 1GHz



Above 1GHz



4.3. Limits

➤ General Radiated Emission Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	uV/m @3m	dBμV/m@3m
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

- Remarks:
1. RF Voltage (dBμV) = 20 log RF Voltage (uV)
 2. In the Above Table, the tighter limit applies at the band edges.
 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.

4.4. Test Procedure

The EUT was setup according to ANSI C63.10, 2009 and tested according to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10, 2009 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The worst radiated emission is measured on the Final Measurement.

The measurement frequency range from 9kHz - 10th Harmonic of fundamental was investigated.

4.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

4.6. Test Result of Radiated Emission

Product : FIELDBOOK
 Test Item : Harmonic Radiated Emission
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit - 1Mbps (GFSK)(2402MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level	dB	dBμV/m
	dB	dBμV	dBμV/m		
Horizontal					
Peak Detector:					
4804.000	2.511	44.233	46.743	-27.257	74.000
7206.000	9.511	37.873	47.384	-26.616	74.000
9608.000	10.394	37.454	47.848	-26.152	74.000
Average					
Detector:					
--					
Vertical					
Peak Detector:					
4804.000	2.923	45.912	48.834	-25.166	74.000
7206.000	9.988	37.810	47.799	-26.201	74.000
9608.000	10.847	37.756	48.603	-25.397	74.000
Average					
Detector:					
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : FIELDBOOK
Test Item : Harmonic Radiated Emission
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit - 1Mbps (GFSK)(2441MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dB μ V	dB μ V/m	dB	dB μ V/m
Horizontal					
Peak Detector:					
4882.000	2.038	44.647	46.685	-27.315	74.000
7323.000	9.699	38.247	47.946	-26.054	74.000
9764.000	9.665	37.881	47.546	-26.454	74.000
Average					
Detector:					
--					
Vertical					
Peak Detector:					
4882.000	2.499	46.166	48.665	-25.335	74.000
7323.000	10.303	38.262	48.565	-25.435	74.000
9764.000	10.299	37.971	48.271	-25.729	74.000
Average					
Detector:					
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : FIELDBOOK
Test Item : Harmonic Radiated Emission
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit - 1Mbps (GFSK)(2480MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dB μ V	dB μ V/m	dB	dB μ V/m
Horizontal					
Peak Detector:					
4960.000	2.582	44.975	47.557	-26.443	74.000
7440.000	10.555	37.995	48.550	-25.450	74.000
9920.000	10.206	37.868	48.074	-25.926	74.000
Average					
Detector:					
--					
Vertical					
Peak Detector:					
4960.000	3.398	46.364	49.763	-24.237	74.000
7440.000	11.214	38.284	49.498	-24.502	74.000
9920.000	11.245	37.549	48.794	-25.206	74.000
Average					
Detector:					
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : FIELDBOOK
Test Item : Harmonic Radiated Emission
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit - 3Mbps (8DPSK)(2402MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level	dB	dBμV/m
	dB	dBμV	dBμV/m		
Horizontal					
Peak Detector:					
4804.000	2.511	42.425	44.935	-29.065	74.000
7206.000	9.511	37.711	47.222	-26.778	74.000
9608.000	10.394	37.814	48.208	-25.792	74.000
Average					
Detector:					
--					
Vertical					
Peak Detector:					
4804.000	2.923	42.294	45.216	-28.784	74.000
7206.000	9.988	38.332	48.321	-25.679	74.000
9608.000	10.847	37.974	48.821	-25.179	74.000
Average					
Detector:					
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : FIELDBOOK
Test Item : Harmonic Radiated Emission
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit - 3Mbps (8DPSK) (2441MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4882.000	2.038	42.754	44.792	-29.208	74.000
7323.000	9.699	37.718	47.417	-26.583	74.000
9764.000	9.665	38.151	47.816	-26.184	74.000
Average					
Detector:					
--					
Vertical					
Peak Detector:					
4882.000	2.499	42.679	45.178	-28.822	74.000
7323.000	10.303	37.943	48.246	-25.754	74.000
9764.000	10.299	37.482	47.782	-26.218	74.000
Average					
Detector:					
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : FIELDBOOK
Test Item : Harmonic Radiated Emission
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit - 3Mbps (8DPSK) (2480MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dB μ V	dB μ V/m	dB	dB μ V/m
Horizontal					
Peak Detector:					
4960.000	2.582	43.028	45.610	-28.390	74.000
7440.000	10.555	38.361	48.916	-25.084	74.000
9920.000	10.206	38.098	48.304	-25.696	74.000
Average					
Detector:					
--					
Vertical					
Peak Detector:					
4960.000	3.398	42.586	45.985	-28.015	74.000
7440.000	11.214	37.539	48.753	-25.247	74.000
9920.000	11.245	37.611	48.856	-25.144	74.000
Average					
Detector:					
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : FIELDBOOK
 Test Item : General Radiated Emission
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit - 1Mbps (GFSK) (2441MHz)

Frequency MHz	Correct Factor dB	Reading Level dBμV	Measurement Level dBμV/m	Margin dB	Limit dBμV/m
Horizontal					
130.880	-7.407	45.607	38.199	-5.301	43.500
261.830	-5.466	44.428	38.962	-7.038	46.000
556.710	2.695	29.987	32.682	-13.318	46.000
740.040	3.710	32.881	36.591	-9.409	46.000
797.270	6.393	27.459	33.853	-12.147	46.000
997.090	8.467	28.732	37.199	-16.801	54.000
Vertical					
147.370	-5.431	41.799	36.368	-7.132	43.500
260.860	-4.870	41.923	37.053	-8.947	46.000
391.810	-0.963	35.160	34.197	-11.803	46.000
497.540	-0.713	36.881	36.168	-9.832	46.000
740.040	-0.890	31.653	30.763	-15.237	46.000
889.420	1.224	27.142	28.366	-17.634	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.
8. No emission found between lowest internal used/generated frequency to 30MHz.

Product : FIELDBOOK
 Test Item : General Radiated Emission
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit - 3Mbps (8DPSK) (2441MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dB μ V	dB μ V/m	dB	dB μ V/m
Horizontal					
130.880	-7.407	44.554	37.146	-6.354	43.500
260.860	-5.460	43.556	38.096	-7.904	46.000
439.340	0.749	33.014	33.763	-12.237	46.000
716.760	3.809	30.866	34.675	-11.325	46.000
800.180	6.417	27.211	33.628	-12.372	46.000
997.090	8.467	29.279	37.746	-16.254	54.000
Vertical					
148.340	-5.406	40.538	35.132	-8.368	43.500
261.830	-4.906	41.415	36.509	-9.491	46.000
442.250	-6.724	33.996	27.272	-18.728	46.000
522.760	1.116	31.828	32.944	-13.056	46.000
734.220	-0.855	31.403	30.549	-15.451	46.000
924.340	3.149	24.986	28.135	-17.865	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.
8. No emission found between lowest internal used/generated frequency to 30MHz.

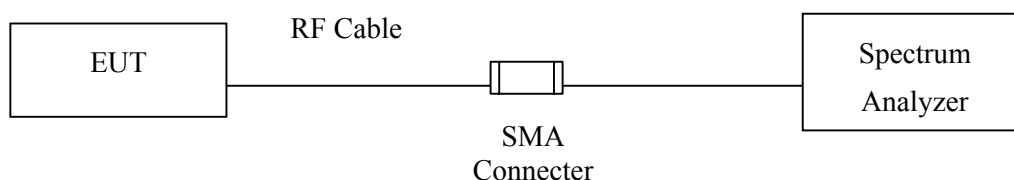
5. RF Antenna Conducted Test

5.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2014
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2014
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2014

Note: 1. All equipments are calibrated every one year.
2. The test instruments Marked “X” are used to measure the final test results.

5.2. Test Setup



5.3. Limits

According to FCC Section 15.247(d). In any 100 kHz 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 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

5.4. Test Procedure

The EUT was setup to ANSI C63.10, 2009; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

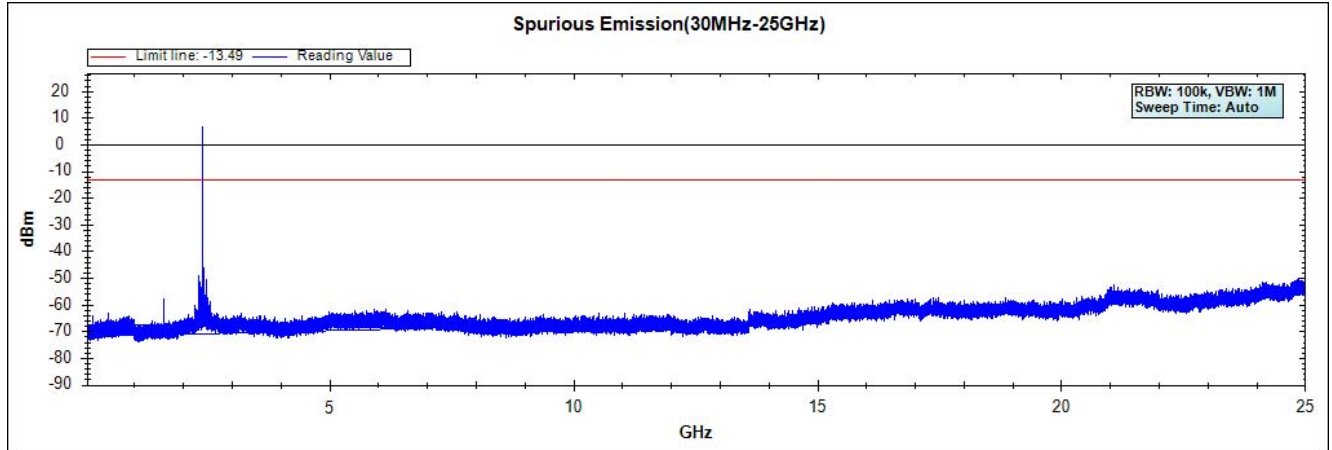
5.5. Uncertainty

± 150Hz

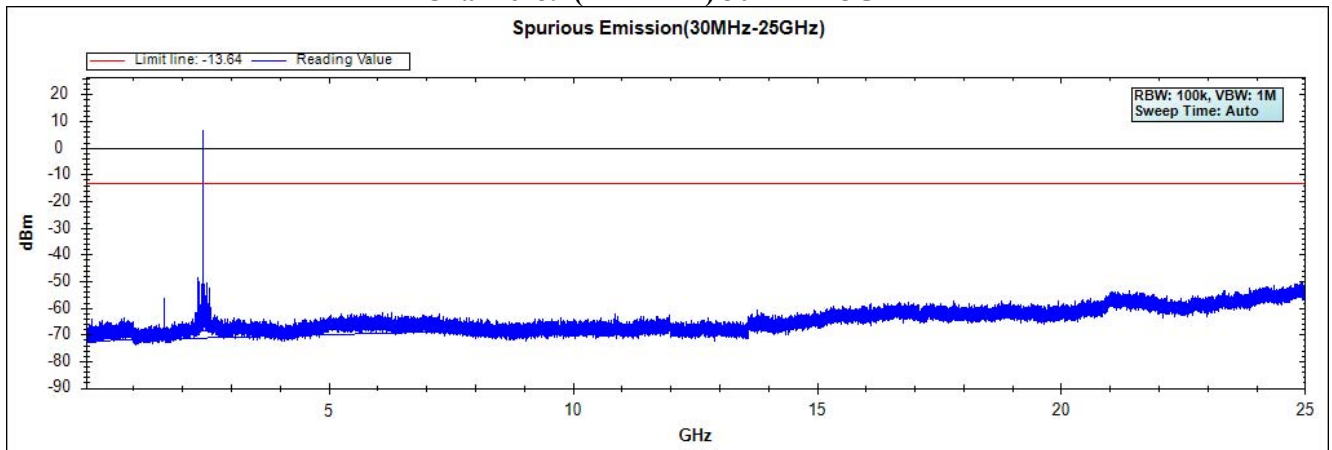
5.6. Test Result of RF Antenna Conducted Test

Product : FIELDBOOK
 Test Item : RF Antenna Conducted Test
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit - 1Mbps (GFSK)

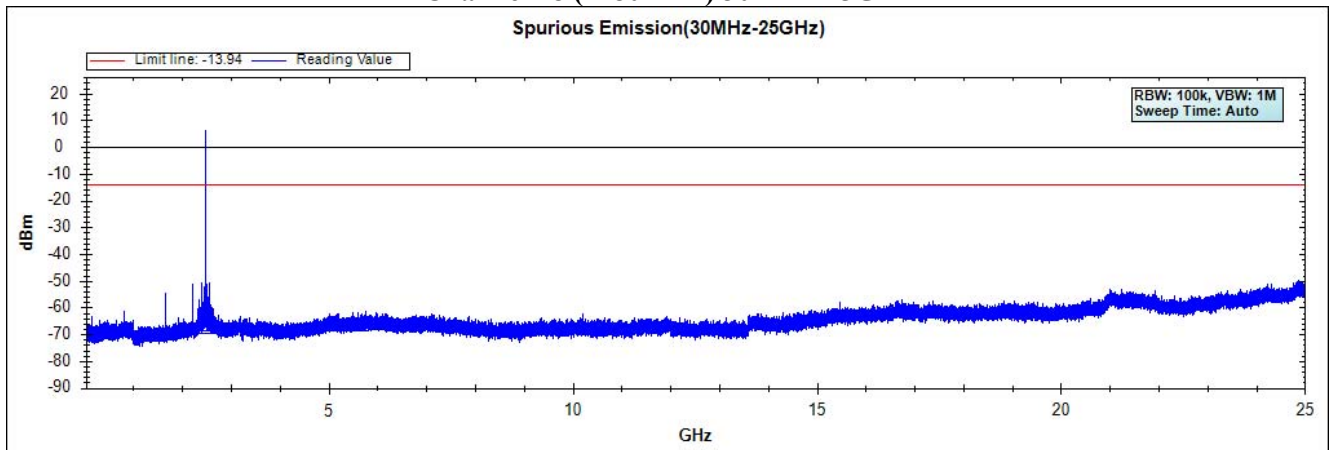
Channel 00 (2402MHz) 30MHz-25GHz



Channel 39 (2441MHz) 30MHz-25GHz



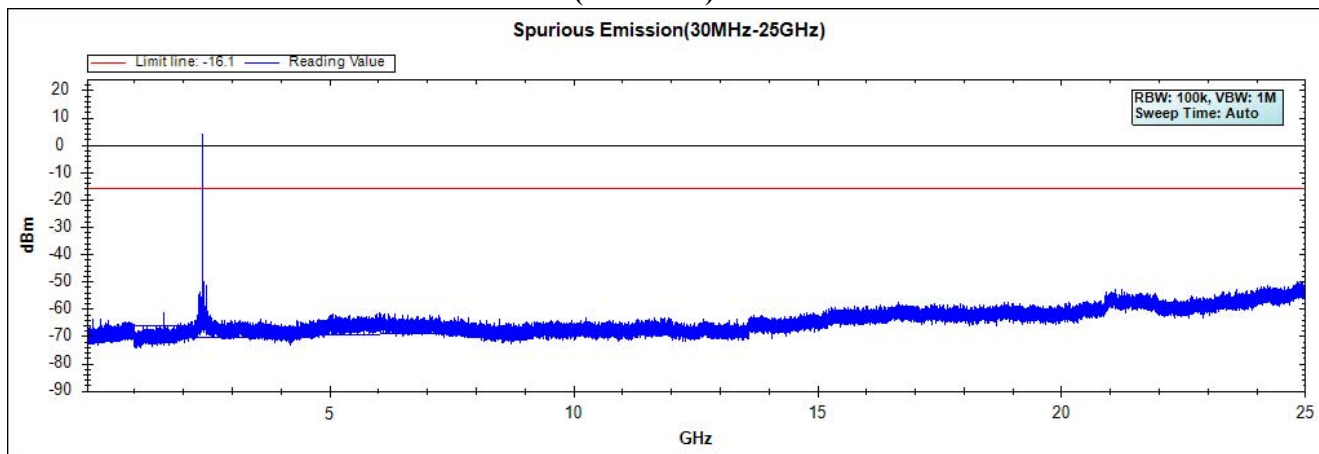
Channel 78 (2480MHz) 30MHz-25GHz



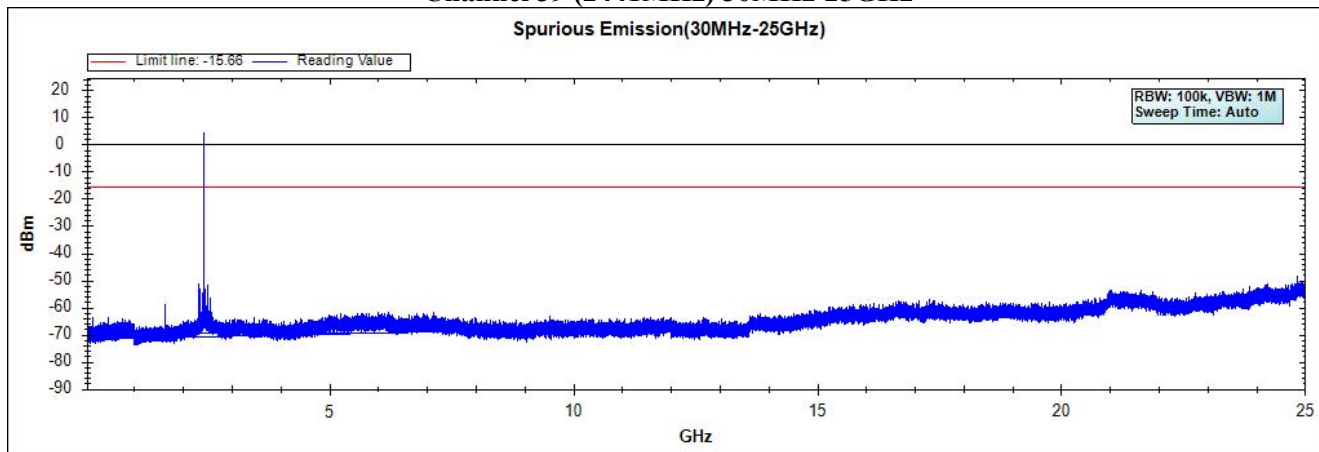
Note: The above test pattern is synthesized by multiple of the frequency range.

Product : FIELDBOOK
 Test Item : RF Antenna Conducted Test
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit - 3Mbps (8DPSK)

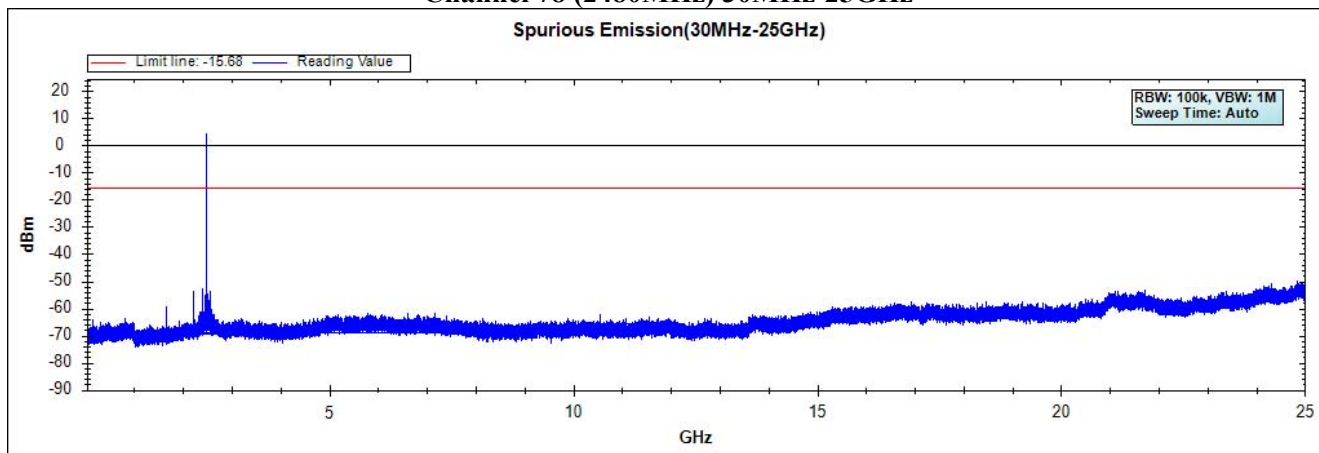
Channel 00 (2402MHz) 30MHz-25GHz



Channel 39 (2441MHz) 30MHz-25GHz



Channel 78 (2480MHz) 30MHz-25GHz



Note: The above test pattern is synthesized by multiple of the frequency range.

6. Band Edge

6.1. Test Equipment

RF Conducted Measurement

The following test equipments are used during the band edge tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2014
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2014
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2014

RF Radiated Measurement:

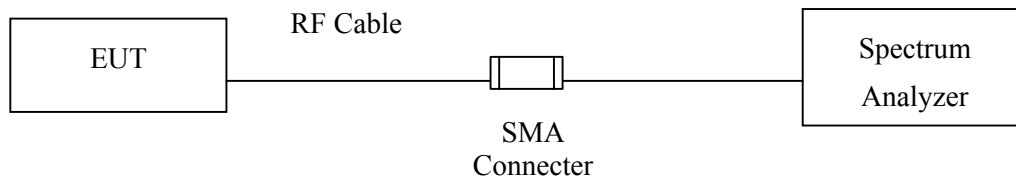
The following test equipments are used during the band edge tests:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ Site # 3		Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2014
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2014
		Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2014
	X	Pre-Amplifier	Agilent	8447D/2944A09549	Sep., 2014
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2014
		Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2014
	X	Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2014
	X	Controller	QuieTek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

- Note:
1. All equipments are calibrated every one year.
 2. The test instruments marked by "X" are used to measure the final test results.

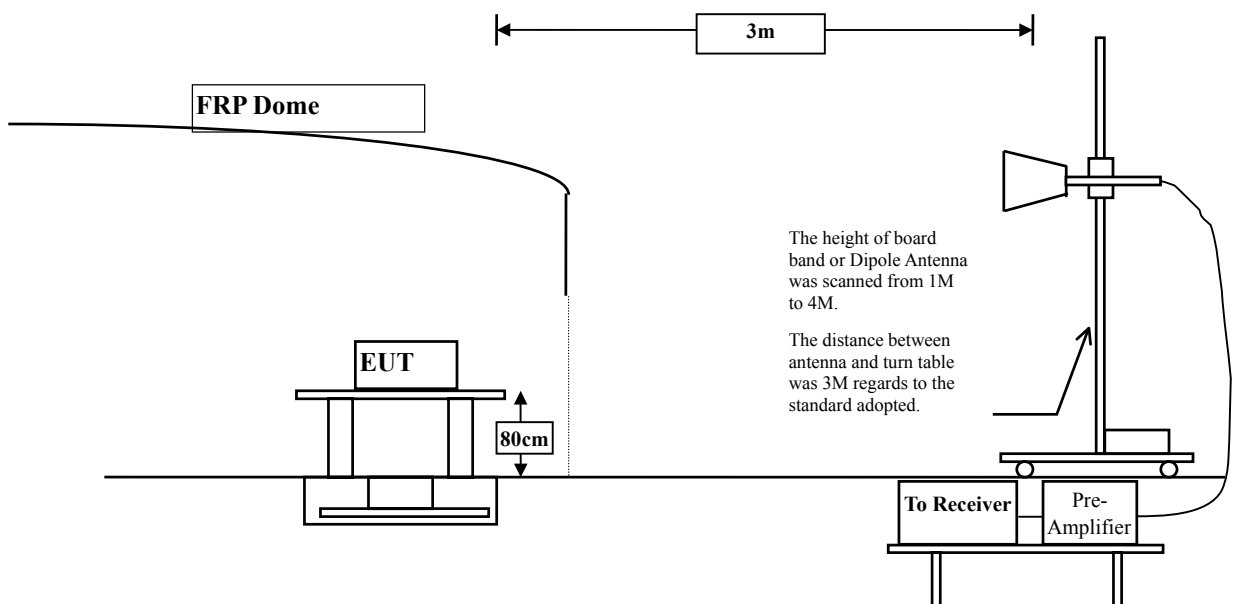
6.2. Test Setup

RF Conducted Measurement



RF Radiated Measurement:

Above 1GHz



6.3. Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz 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 the 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)).

6.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10:2009 on radiated measurement.

The bandwidth below 1GHz setting on the field strength meter is 120 kHz, above 1GHz are 1 MHz. The EUT was setup to ANSI C63.10, 2009; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

6.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

6.6. Test Result of Band Edge

Product : FIELDBOOK
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit - 1Mbps (GFSK)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
00 (Peak)	2387.700	33.737	29.584	63.321	74.00	54.00	Pass
00 (Peak)	2390.000	33.739	27.694	61.433	74.00	54.00	Pass
00 (Peak)	2400.000	33.752	29.151	62.902	--	--	--
00 (Peak)	2402.100	33.755	63.604	97.359	--	--	--
00 (Average)	2390.000	33.739	15.976	49.715	74.00	54.00	Pass
00 (Average)	2400.000	33.752	18.949	52.700	--	--	--
00 (Average)	2402.000	33.755	53.447	87.201	--	--	--

Figure Channel 00:

Horizontal (Peak)

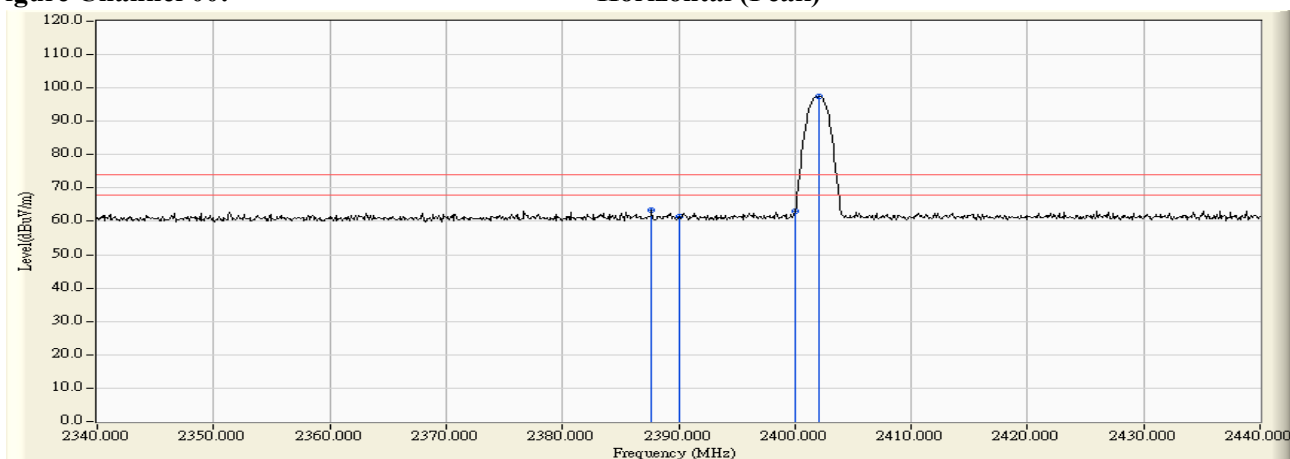
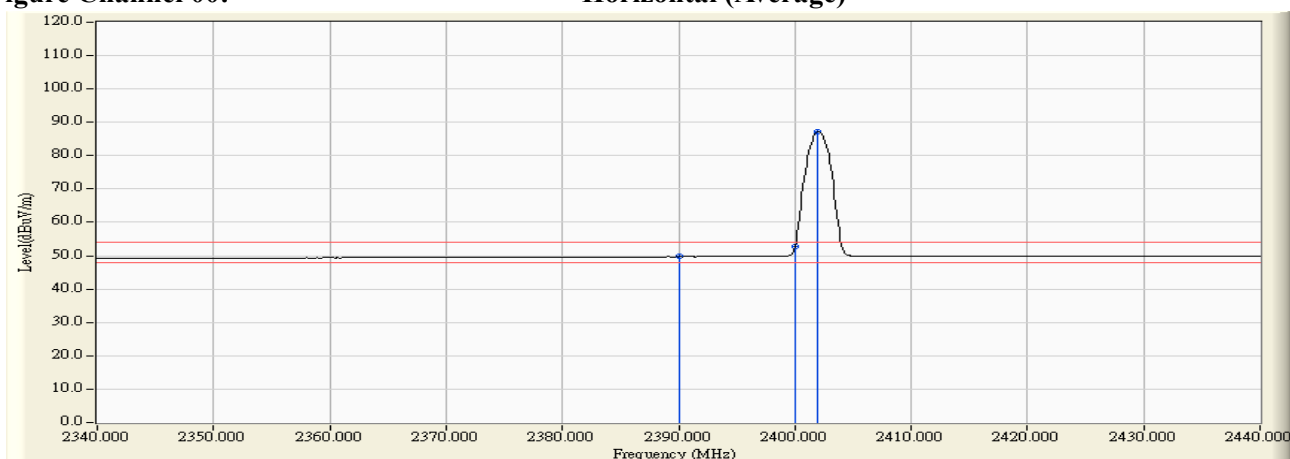


Figure Channel 00:

Horizontal (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : FIELDBOOK
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit - 1Mbps (GFSK)

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
00 (Peak)	2381.700	32.324	29.505	61.830	74.00	54.00	Pass
00 (Peak)	2390.000	32.267	27.699	59.966	74.00	54.00	Pass
00 (Peak)	2400.000	32.241	29.699	61.940	--	--	--
00 (Peak)	2402.100	32.241	63.150	95.391	--	--	--
00 (Average)	2390.000	32.267	15.932	48.199	74.00	54.00	Pass
00 (Average)	2400.000	32.241	18.696	50.937	--	--	--
00 (Average)	2402.000	32.241	53.077	85.318	--	--	--

Figure Channel 00: Vertical (Peak)

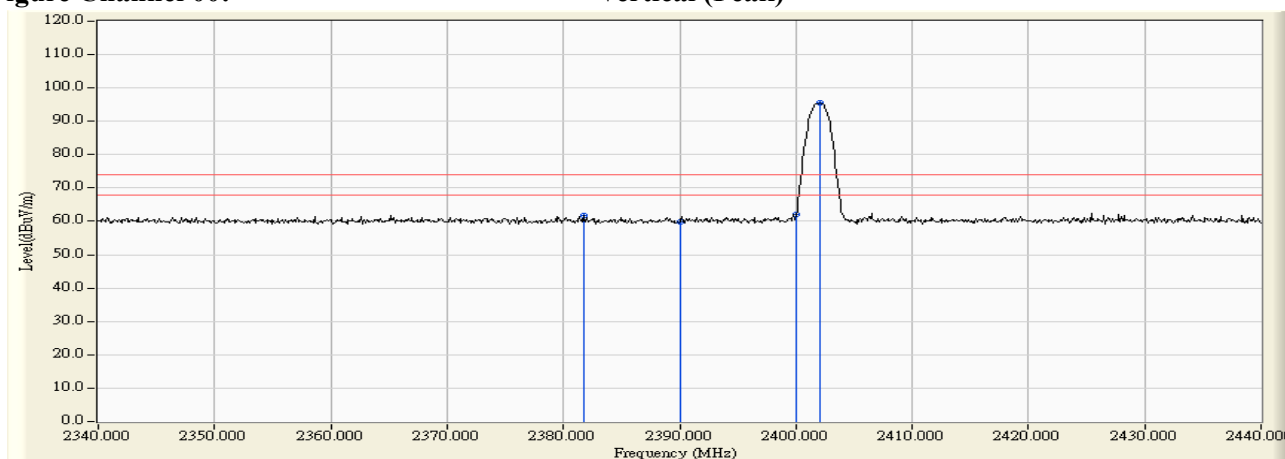
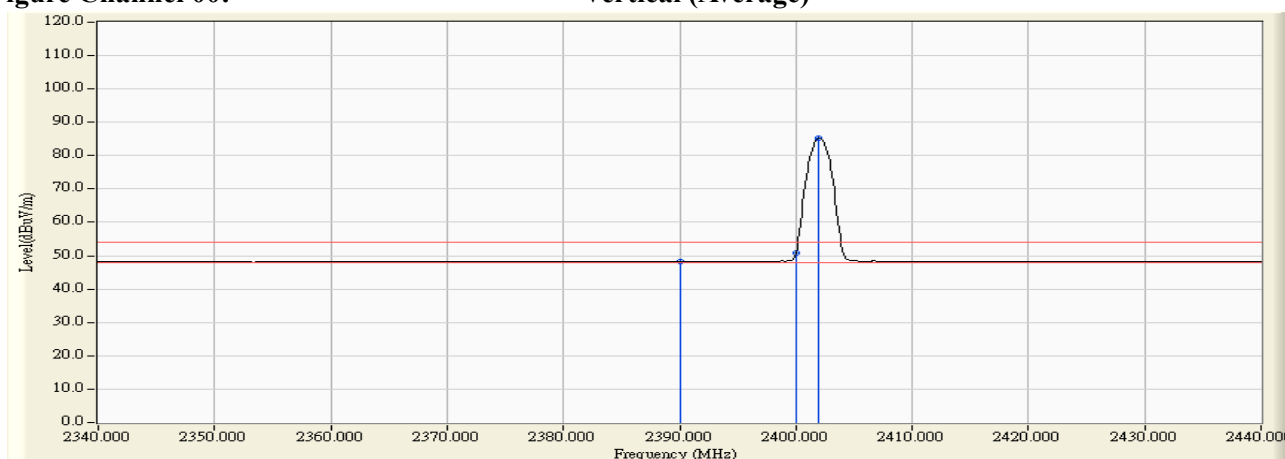


Figure Channel 00: Vertical (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : FIELDBOOK
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit - 1Mbps (GFSK)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
78 (Peak)	2480.100	33.941	62.595	96.536	--	--	--
78 (Peak)	2483.500	33.951	27.431	61.381	74.00	54.00	Pass
78 (Peak)	2495.300	33.980	29.947	63.928	74.00	54.00	Pass
78 (Average)	2480.000	33.941	52.530	86.471	--	--	--
78 (Average)	2483.500	33.951	16.076	50.026	74.00	54.00	Pass

Figure Channel 78: Horizontal (Peak)

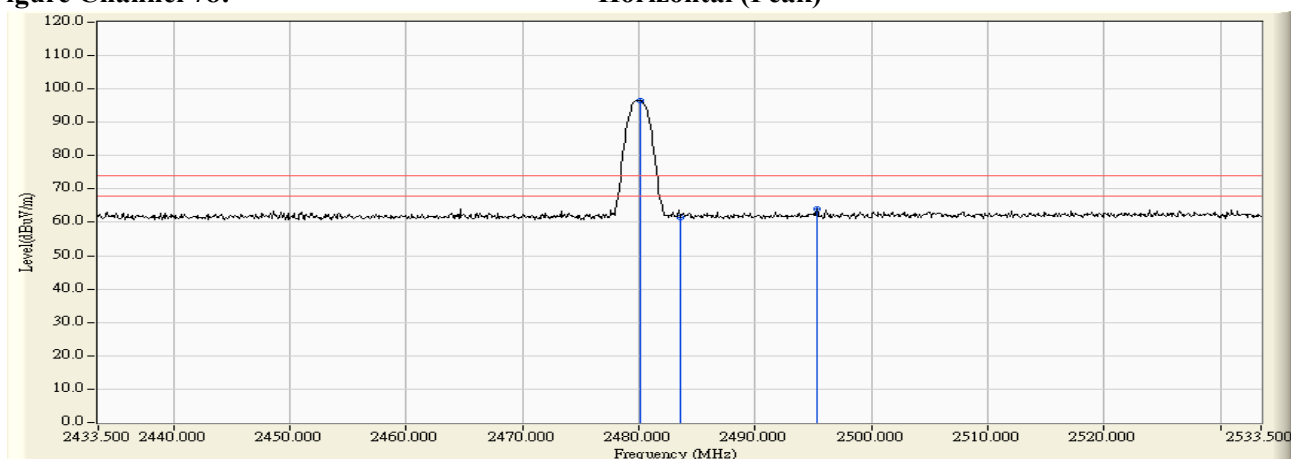
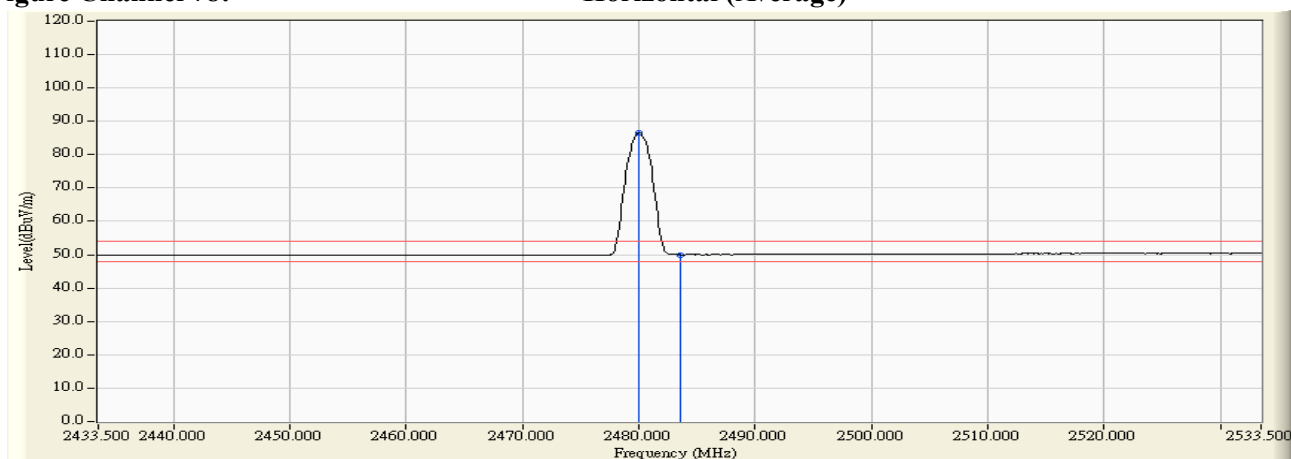


Figure Channel 78: Horizontal (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : FIELDBOOK
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit - 1Mbps (GFSK)

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
78 (Peak)	2479.800	32.568	62.451	95.018	--	--	--
78 (Peak)	2483.500	32.586	27.867	60.452	74.00	54.00	Pass
78 (Peak)	2493.500	32.634	28.926	61.559	74.00	54.00	Pass
78 (Average)	2480.000	32.568	52.550	85.118	--	--	--
78 (Average)	2483.500	32.586	16.048	48.633	74.00	54.00	Pass

Figure Channel 78:

Vertical (Peak)

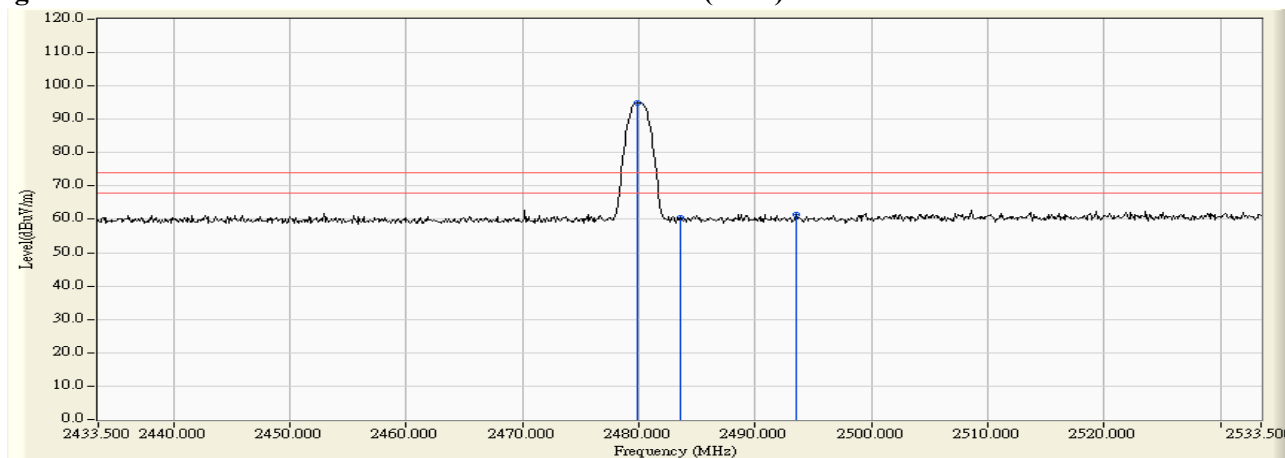
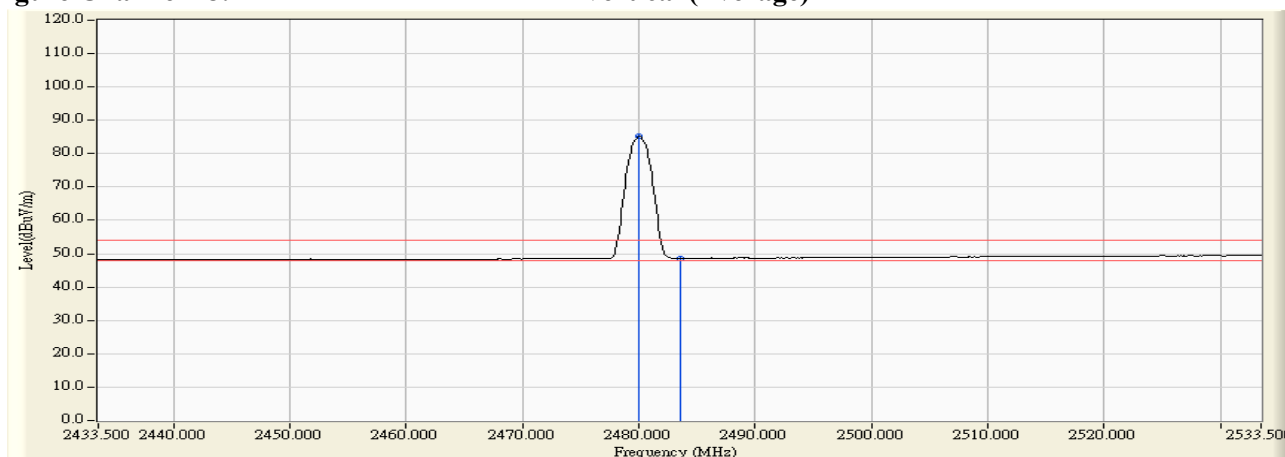


Figure Channel 78:

Vertical (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : FIELDBOOK
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit - 3Mbps (8DPSK)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
00 (Peak)	2382.500	33.733	29.212	62.945	74.00	54.00	Pass
00 (Peak)	2390.000	33.739	27.267	61.006	74.00	54.00	Pass
00 (Peak)	2400.000	33.752	32.385	66.136	--	--	--
00 (Peak)	2402.000	33.755	61.068	94.822	--	--	--
00 (Average)	2390.000	33.739	16.029	49.768	74.00	54.00	Pass
00 (Average)	2400.000	33.752	22.311	56.062	--	--	--
00 (Average)	2402.000	33.755	49.641	83.395	--	--	--

Figure Channel 00:

Horizontal (Peak)

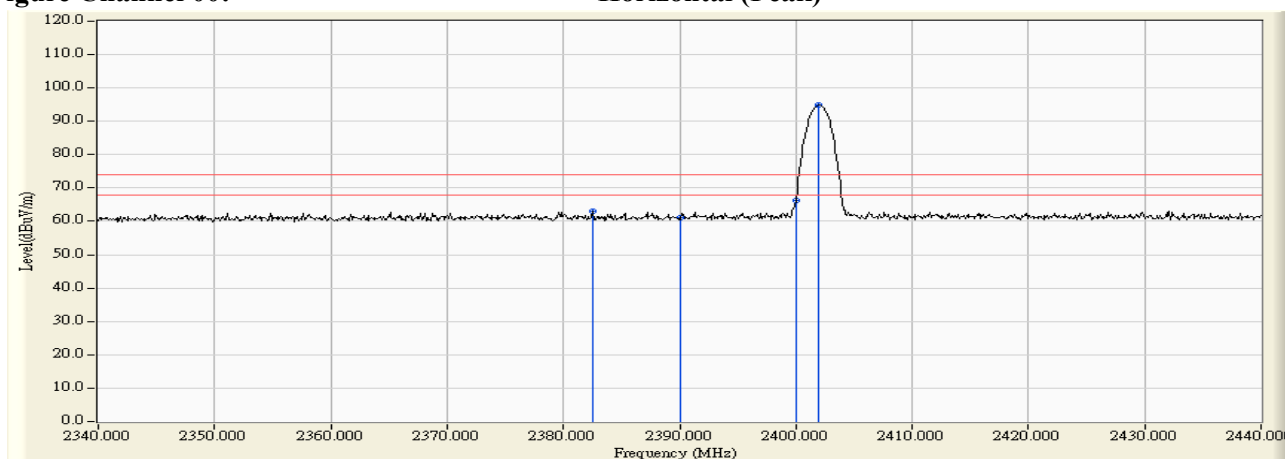
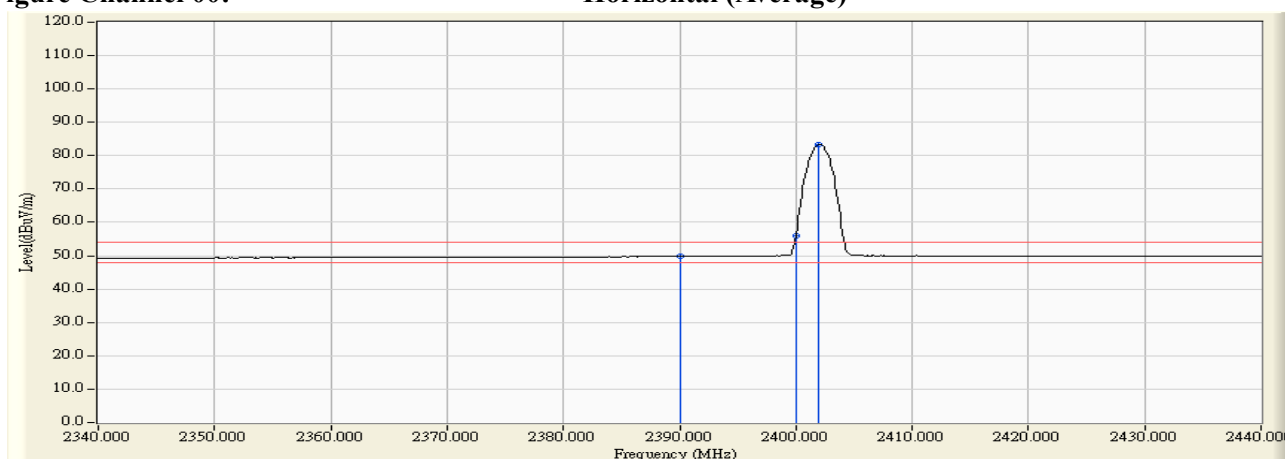


Figure Channel 00:

Horizontal (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : FIELDBOOK
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit - 3Mbps (8DPSK)

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
00 (Peak)	2350.700	32.559	29.966	62.525	74.00	54.00	Pass
00 (Peak)	2390.000	32.267	28.209	60.476	74.00	54.00	Pass
00 (Peak)	2400.000	32.241	31.253	63.494	--	--	--
00 (Peak)	2402.000	32.241	59.272	91.513	--	--	--
00 (Average)	2390.000	32.267	16.024	48.291	74.00	54.00	Pass
00 (Average)	2400.000	32.241	21.593	53.834	--	--	--
00 (Average)	2402.000	32.241	48.147	80.388	--	--	--

Figure Channel 00: Vertical (Peak)

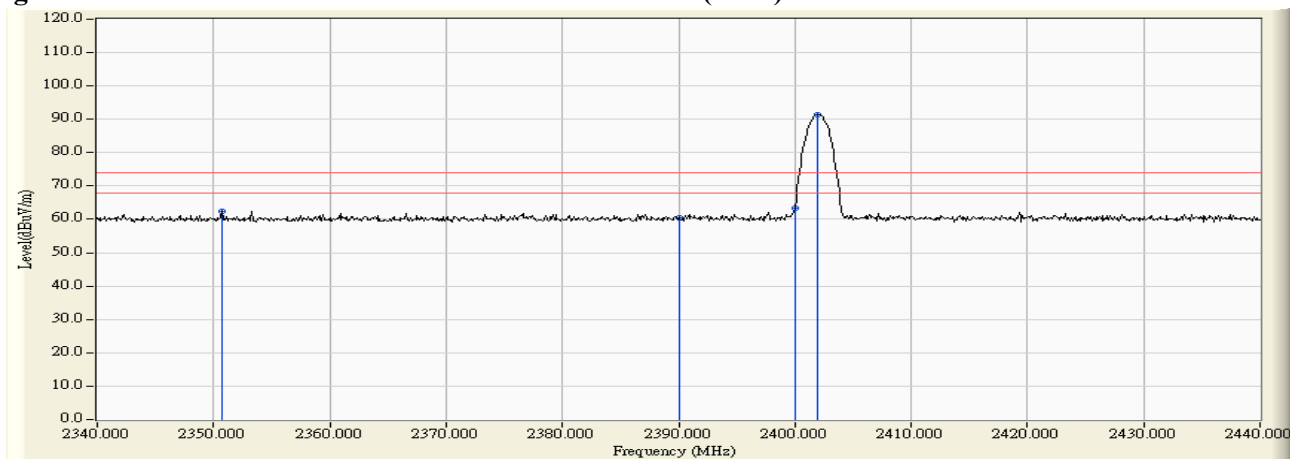
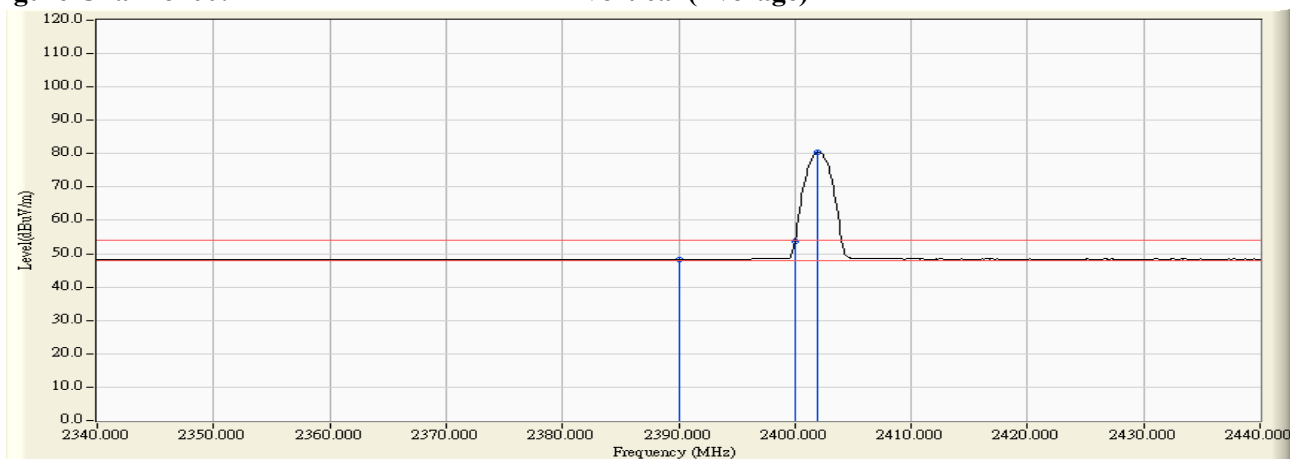


Figure Channel 00: Vertical (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : FIELDBOOK
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit - 3Mbps (8DPSK)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
78 (Peak)	2480.000	33.941	59.703	93.644	--	--	--
78 (Peak)	2483.500	33.951	27.442	61.392	--	--	--
78 (Peak)	2485.200	33.954	29.565	63.519	74.00	54.00	Pass
78 (Average)	2480.000	33.941	48.512	82.453	--	--	--
78 (Average)	2483.500	33.951	16.166	50.116	74.00	54.00	Pass

Figure Channel 78: Horizontal (Peak)

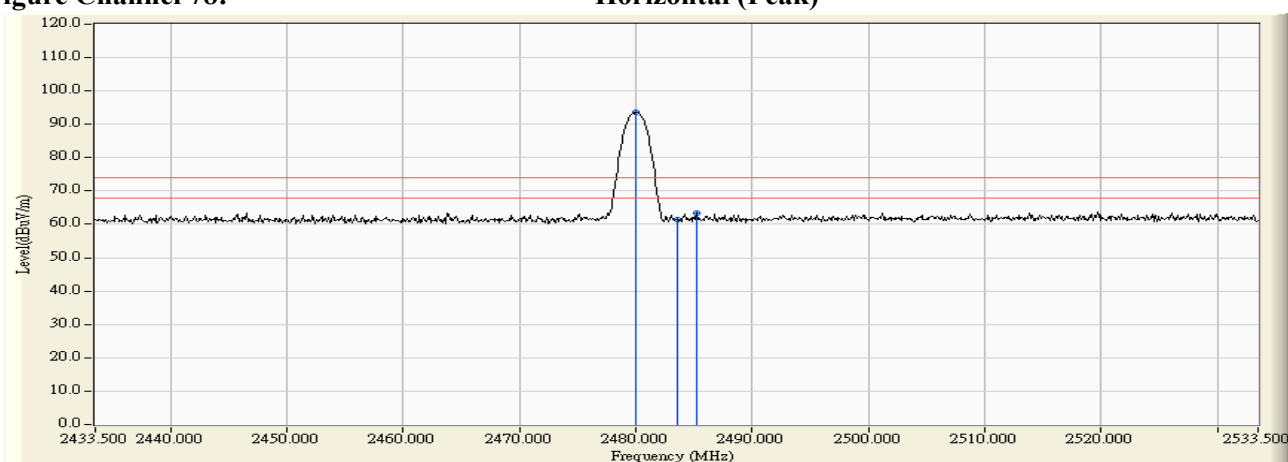
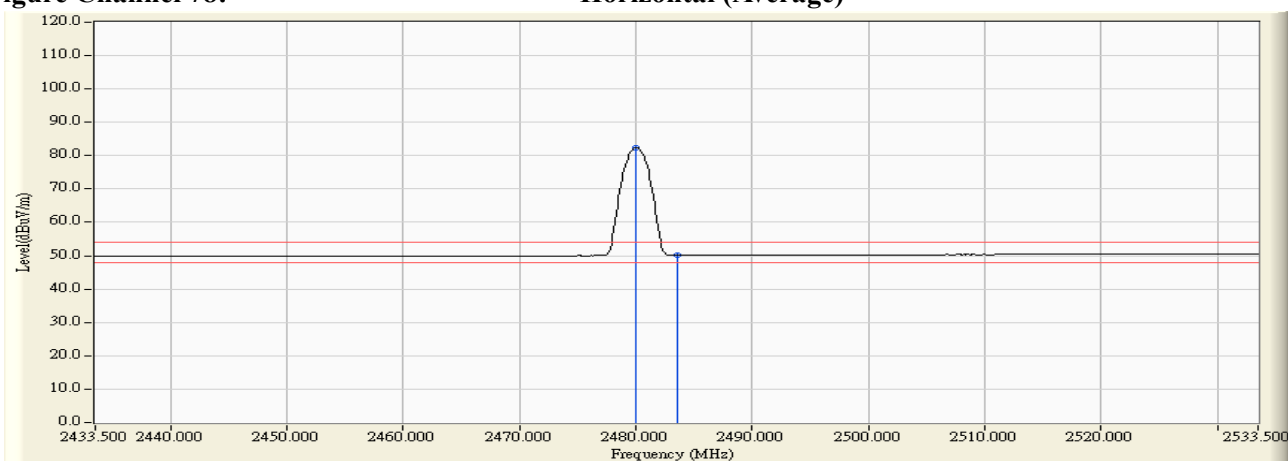


Figure Channel 78: Horizontal (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : FIELDBOOK
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit - 3Mbps (8DPSK)

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
78 (Peak)	2480.000	32.568	59.335	91.903	--	--	--
78 (Peak)	2483.500	32.586	27.581	60.166	74.00	54.00	Pass
78 (Peak)	2494.500	32.639	28.781	61.419	74.00	54.00	Pass
78 (Average)	2480.100	32.569	48.214	80.782	--	--	--
78 (Average)	2483.500	32.586	16.122	48.707	74.00	54.00	Pass

Figure Channel 78:

Vertical (Peak)

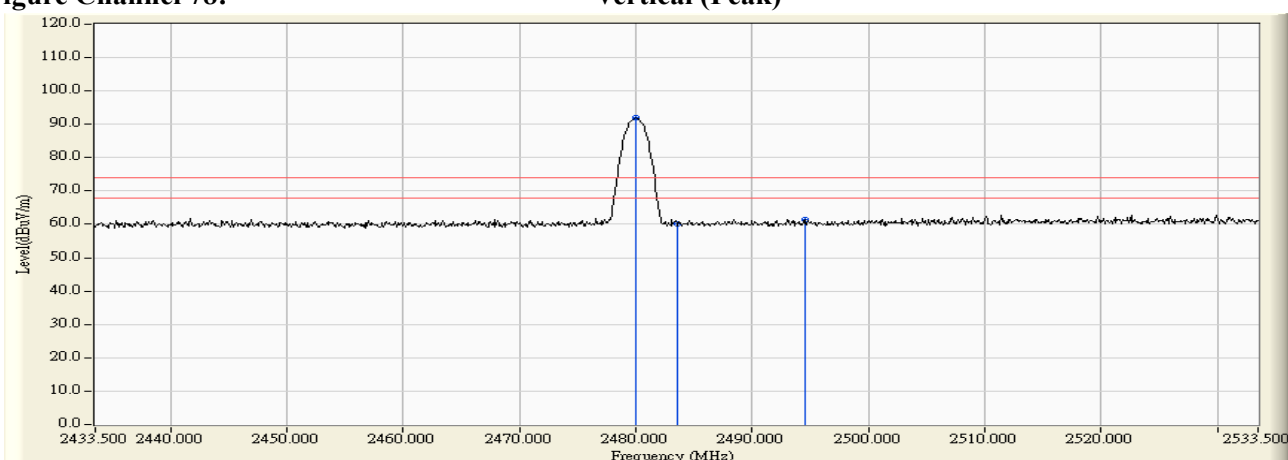
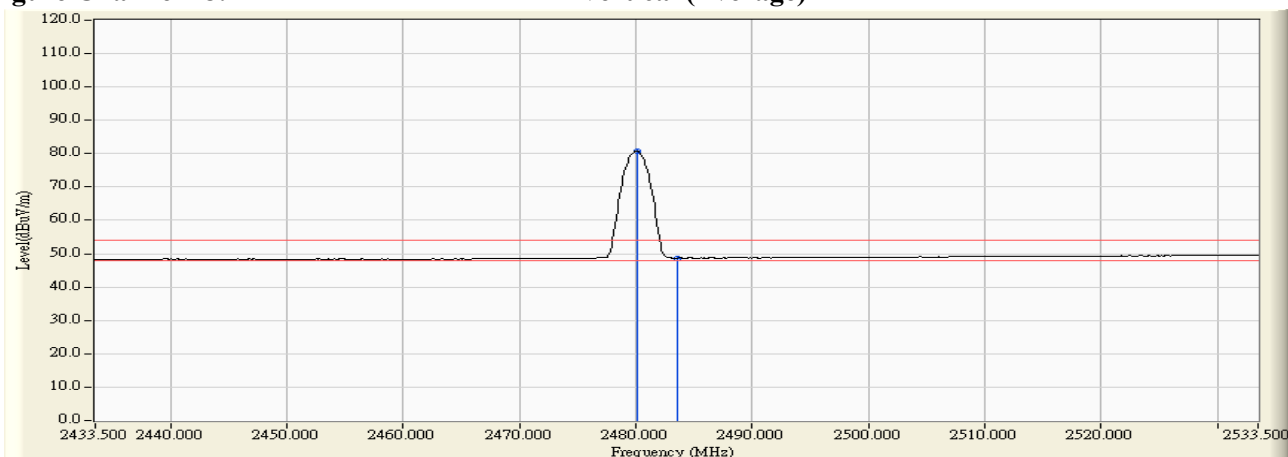


Figure Channel 78:

Vertical (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

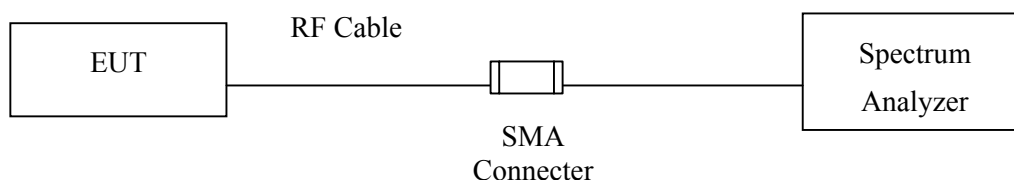
7. Channel Number

7.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2014
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2014
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2014

Note: 1. All equipments are calibrated every one year.
2. The test instruments marked by "X" are used to measure the final test results.

7.2. Test Setup



7.3. Limit

Frequency hopping systems operating in the 2400-2483.5 MHz bands shall use at least 75 hopping frequencies.

7.4. Test Procedure

The EUT was setup to ANSI C63.10, 2009; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

7.5. Uncertainty

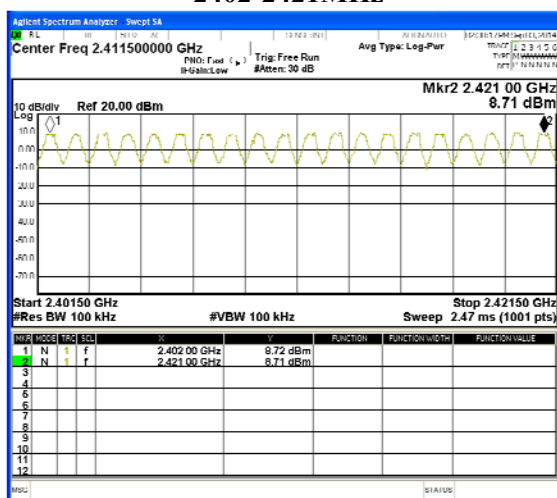
N/A

7.6. Test Result of Channel Number

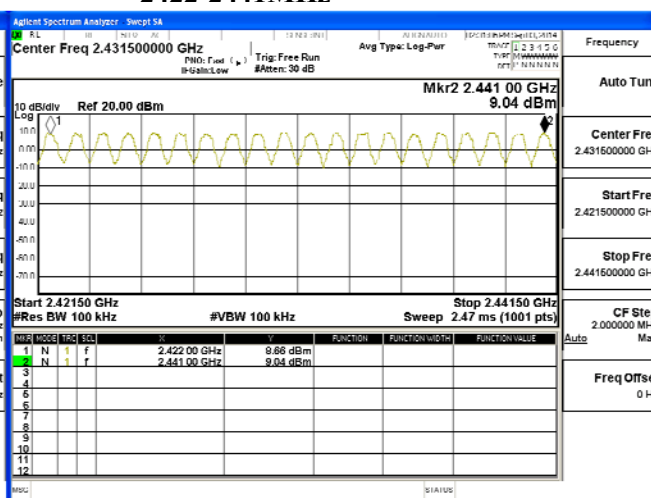
Product : FIELDBOOK
 Test Item : Channel Number
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit - 1Mbps (GFSK)

Frequency Range (MHz)	Measurement (Hopping Channel)	Required Limit (Hopping Channel)	Result
2402 ~ 2480	79	>75	Pass

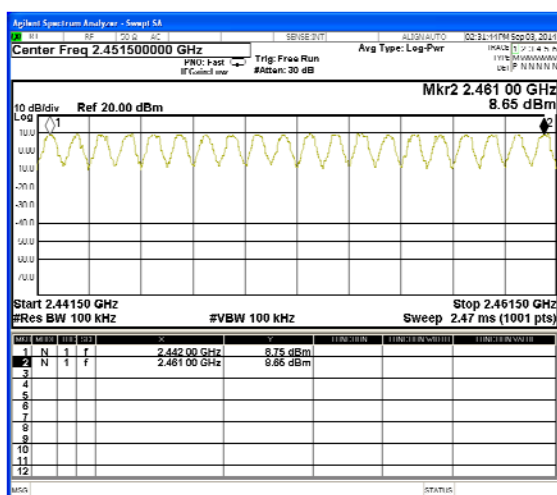
2402-2421MHz



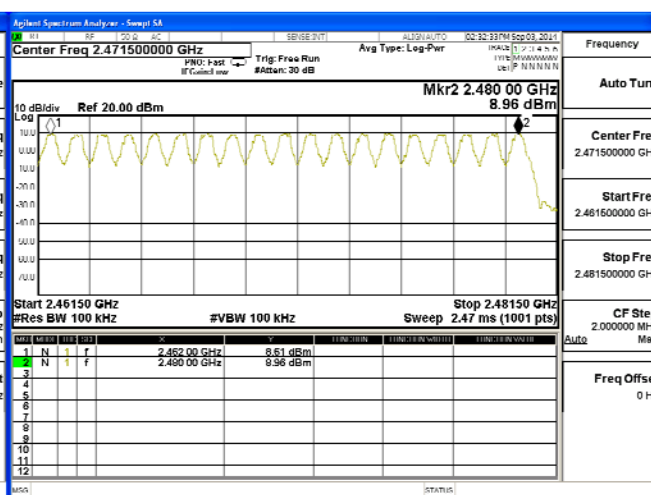
2422-2441MHz



2442-2461MHz



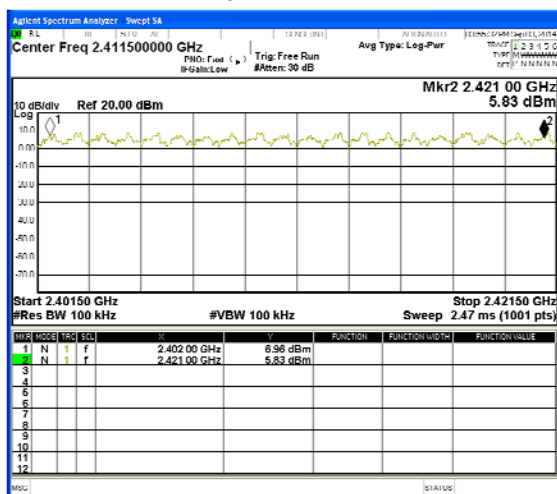
2462-2480MHz



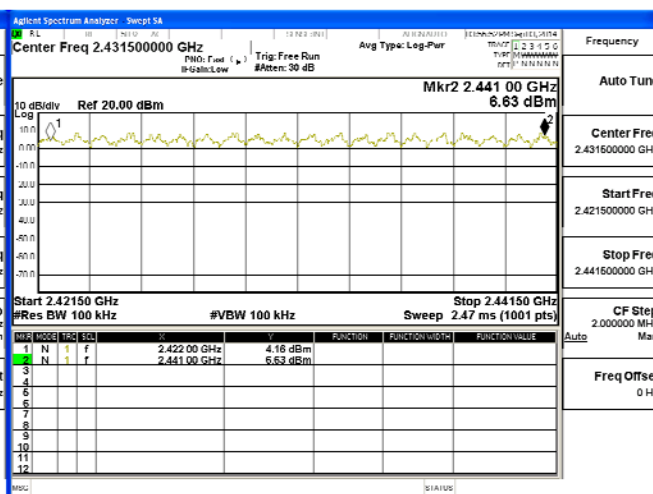
Product : FIELDBOOK
 Test Item : Channel Number
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit - 3Mbps (8DPSK)

Frequency Range (MHz)	Measurement (Hopping Channel)	Required Limit (Hopping Channel)	Result
2402 ~ 2480	79	>75	Pass

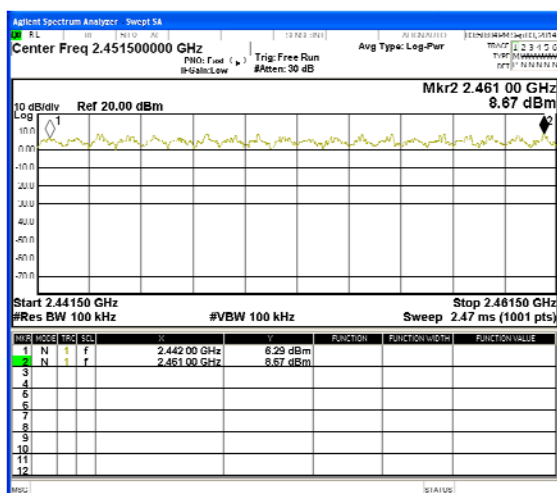
2402-2421MHz



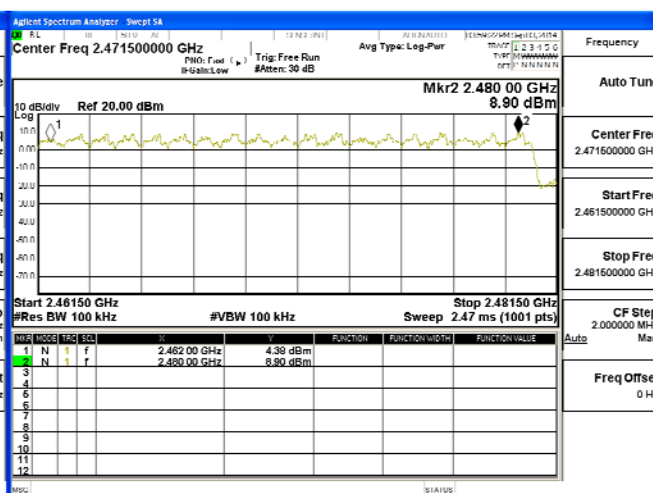
2422-2441MHz



2442-2461MHz



2462-2480MHz



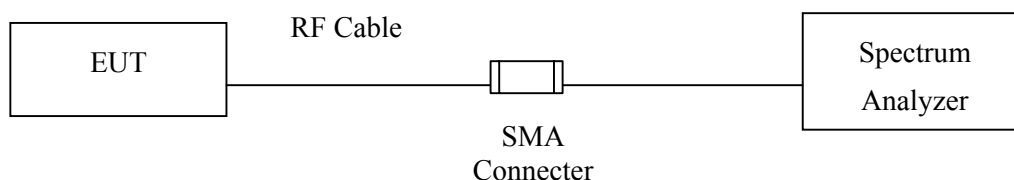
8. Channel Separation

8.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2014
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2014
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2014

Note: 1. All equipments are calibrated every one year.
2. The test instruments mark by "X" are used to measure the final test results.

8.2. Test Setup



8.3. Limit

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

8.4. Test Procedure

The EUT was setup to ANSI C63.10, 2009; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

8.5. Uncertainty

$\pm 150\text{Hz}$

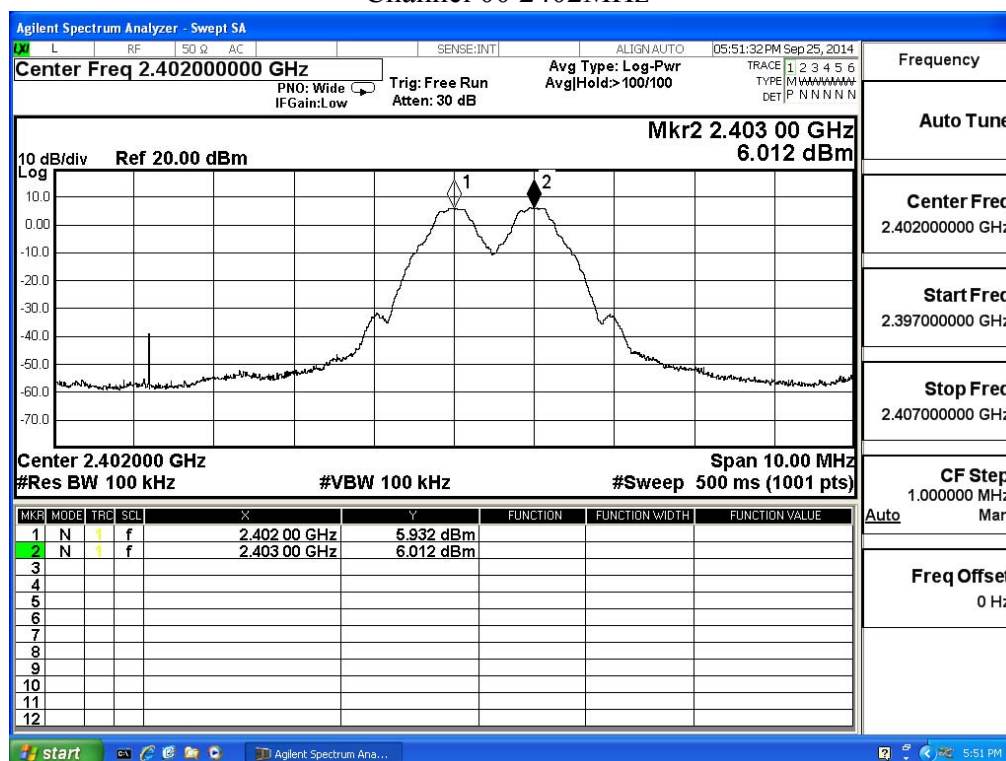
8.6. Test Result of Channel Separation

Product : FIELDBOOK
 Test Item : Channel Separation
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit - 1Mbps (GFSK)

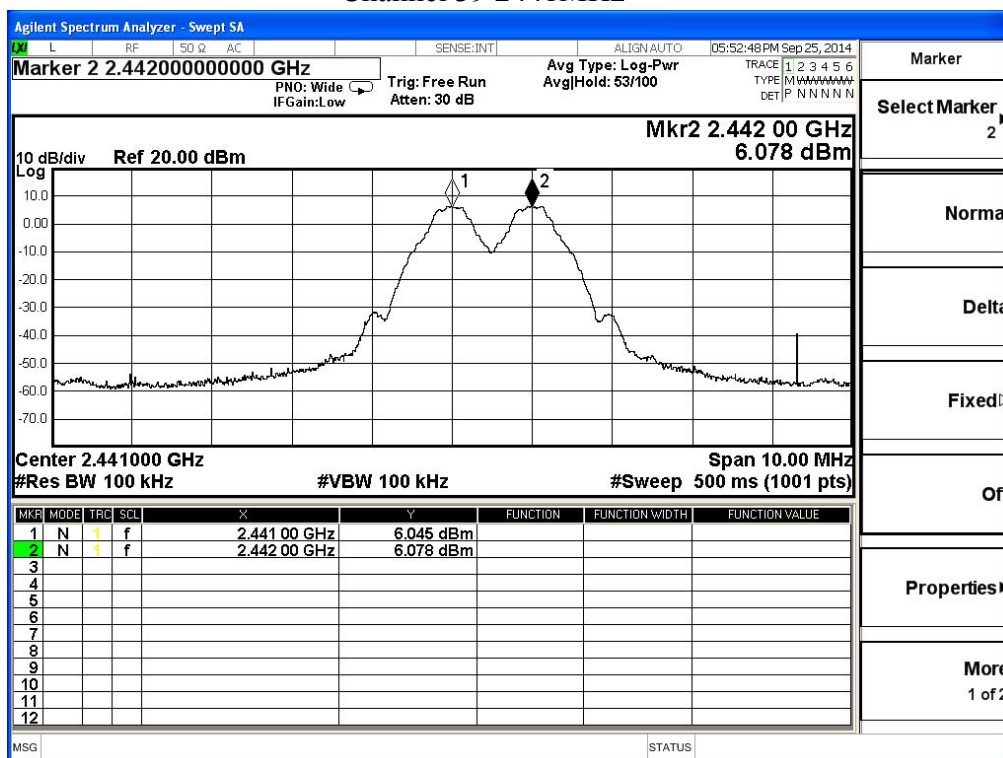
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Limit (kHz)	Limit of (2/3)*20dB Bandwidth (kHz)	Result
00	2402	1000	>25 kHz	746.7	Pass
39	2441	1000	>25 kHz	746.7	Pass
78	2480	1000	>25 kHz	746.7	Pass

NOTE: The 20dB Bandwidth is refer to section 10.

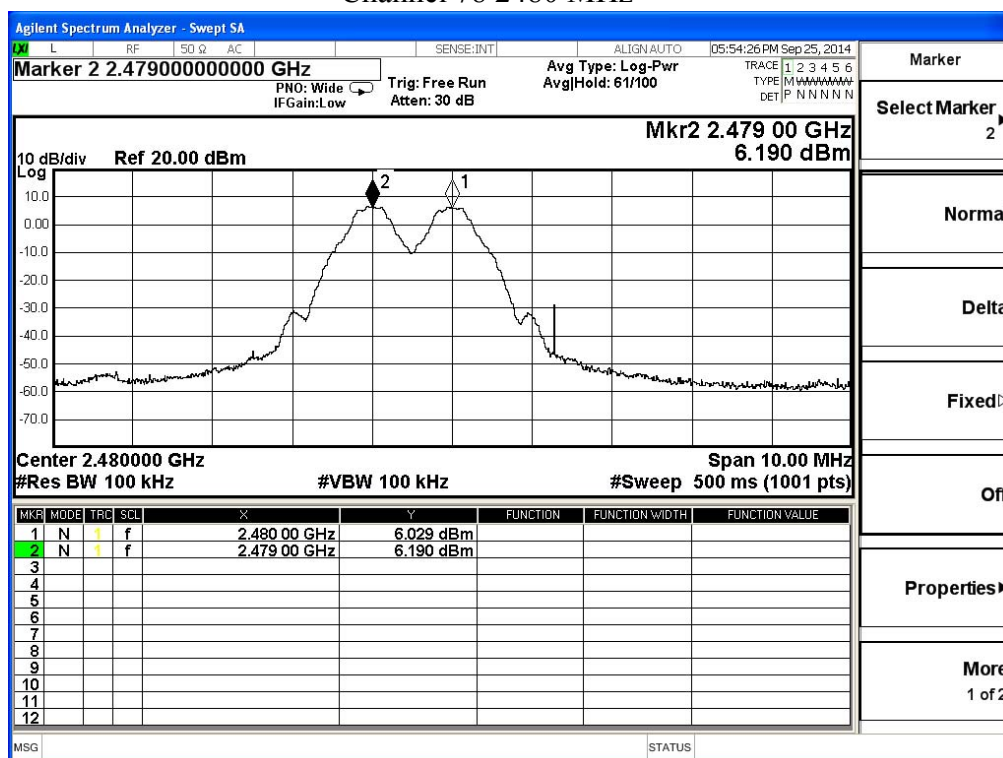
Channel 00 2402MHz



Channel 39 2441MHz



Channel 78 2480 MHz

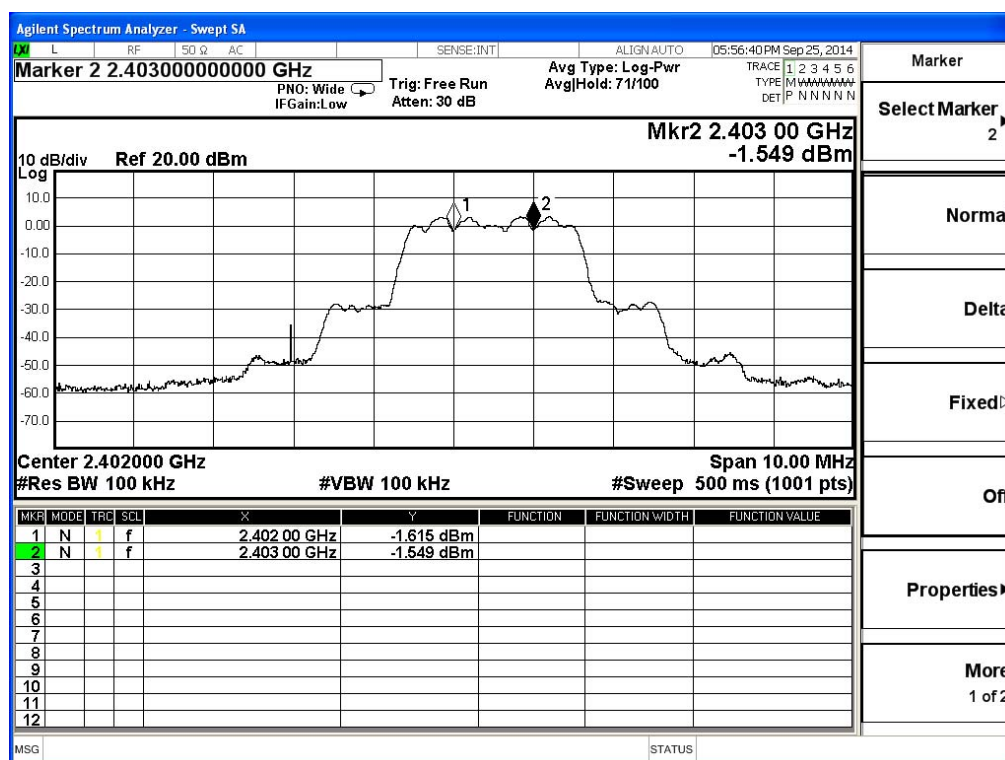


Product : FIELDBOOK
 Test Item : Channel Separation
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit - 3Mbps (8DPSK)

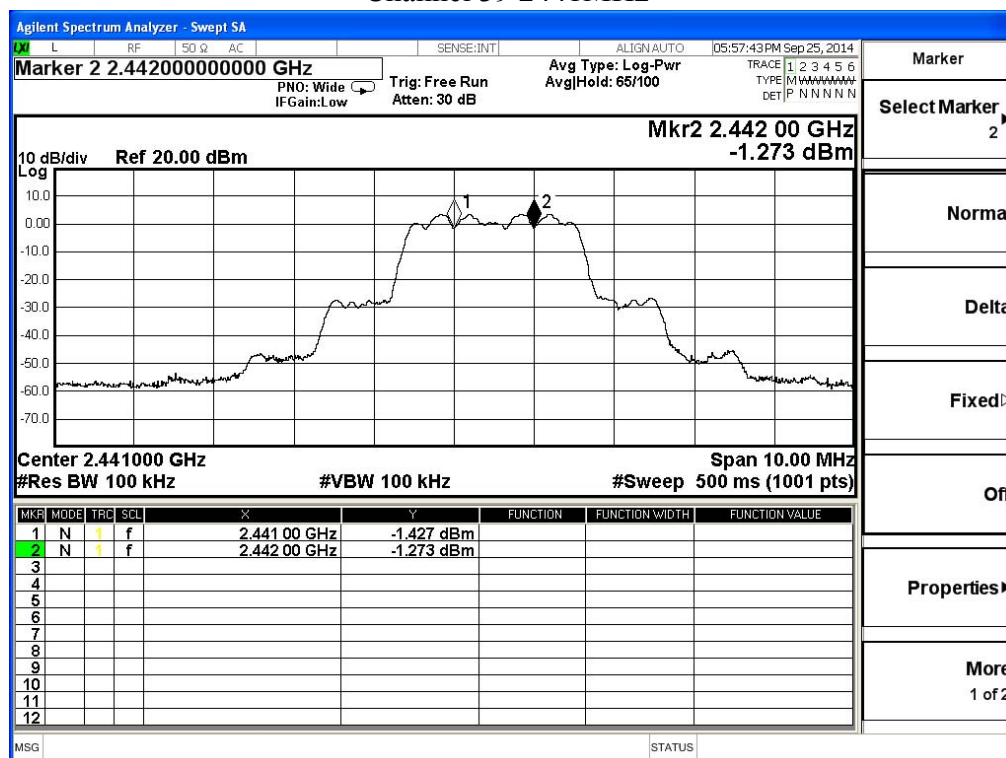
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Limit (kHz)	Limit of (2/3)*20dB Bandwidth (kHz)	Result
00	2402	1000	>25 kHz	940.0	Pass
39	2441	1000	>25 kHz	946.7	Pass
78	2480	1000	>25 kHz	940.0	Pass

NOTE: The 20dB Bandwidth is refer to section 10.

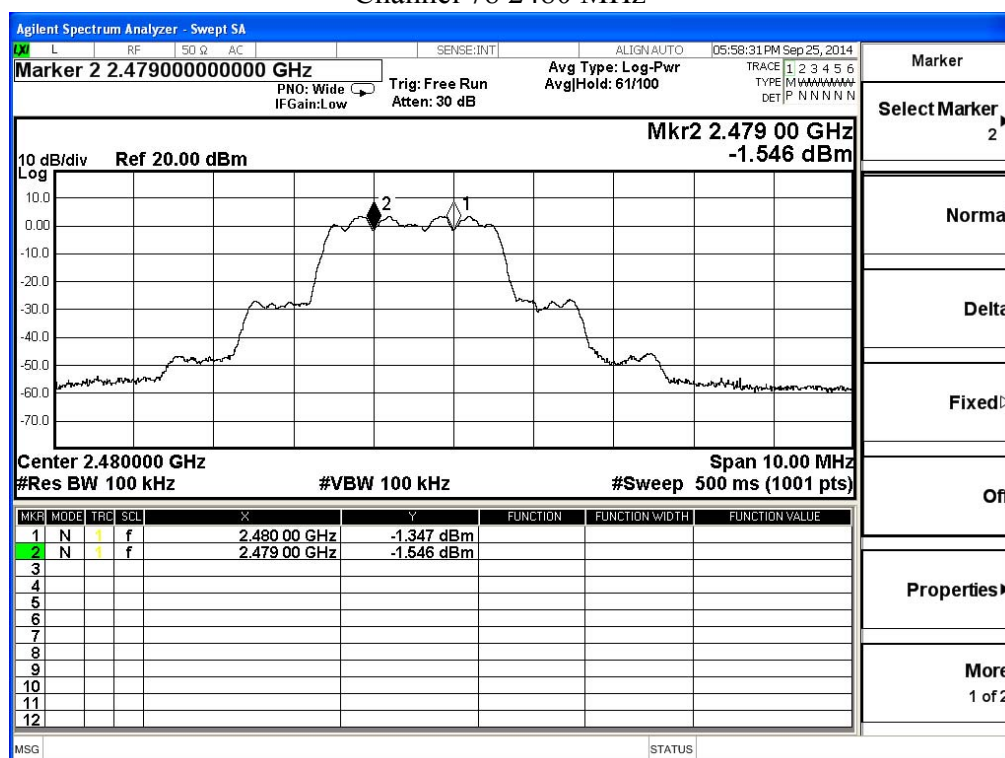
Channel 00 2402MHz



Channel 39 2441MHz



Channel 78 2480 MHz



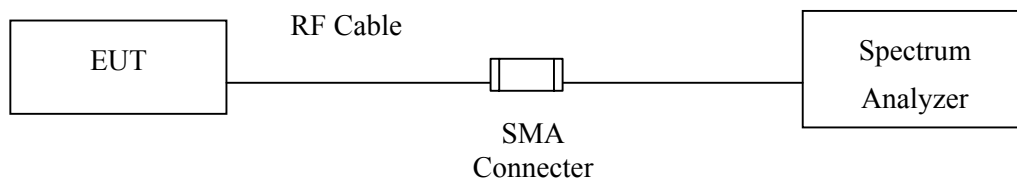
9. Dwell Time

9.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2014
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2014
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2014

Note: 1. All equipments are calibrated every one year.
2. The test instruments marked by "X" are used to measure the final test results.

9.2. Test Setup



9.3. Limit

The dwell time shall be the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

9.4. Test Procedure

The EUT was setup to ANSI C63.10, 2009; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

9.5. Uncertainty

$\pm 25\text{msec}$

9.6. Test Result of Dwell Time

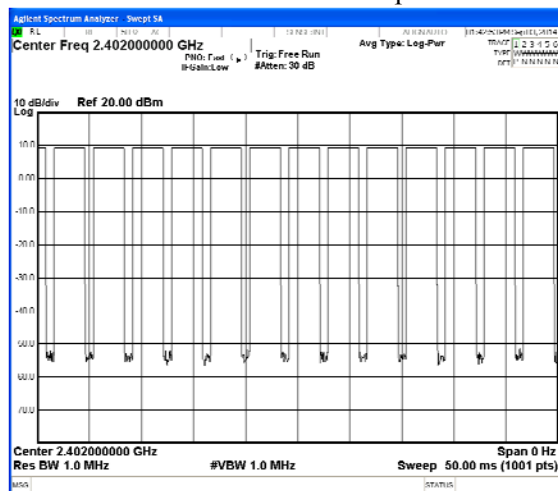
Product : FIELDBOOK
 Test Item : Dwell Time
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit - 1Mbps (GFSK) (Channel 00,39,78 –DH5)

Frequency (MHz)	Time slot length (ms)	Hopping of Number	Sweep time (ms)	Duty cycle	Dwell Time (Sec)	Limit (Sec)	Result
2402	2.890	14	50	0.81	0.324	0.4	Pass
2441	2.900	14	50	0.81	0.325	0.4	Pass
2480	2.890	14	50	0.81	0.324	0.4	Pass

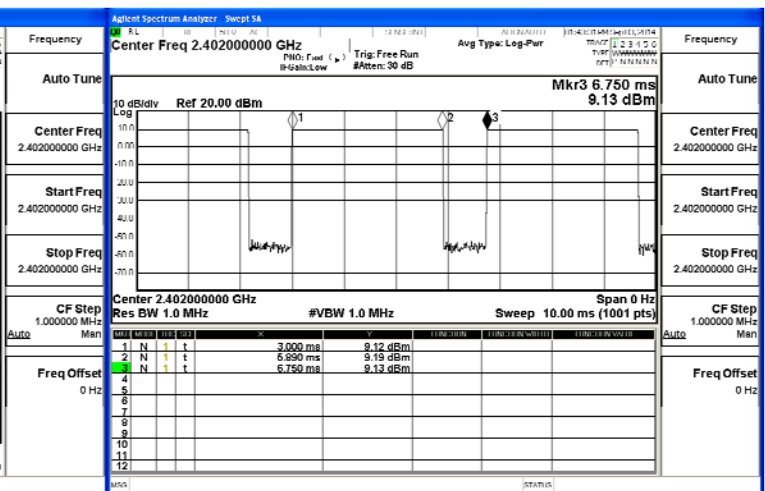
Duty cycle = ((Time slot length(ms)*Hopping of Number) / Sweep time (ms))

Dwell time = (Duty cycle / 79) * (79*0.4)

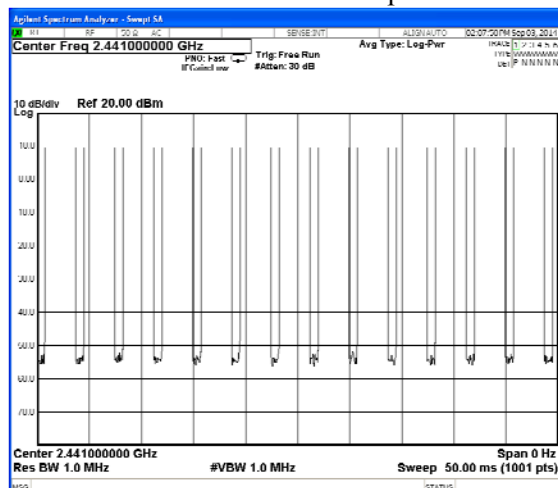
CH 00 Time Interval between hops



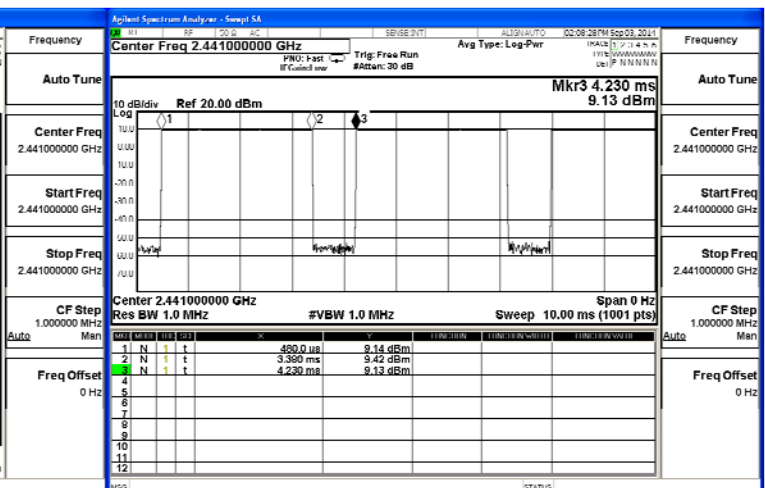
CH 00 Transmission Time



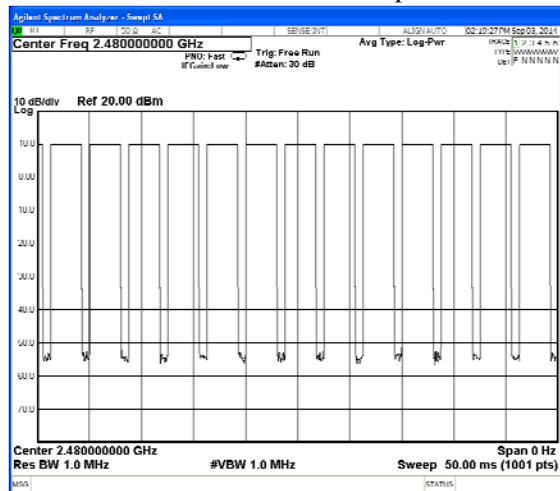
CH39 Time Interval between hops



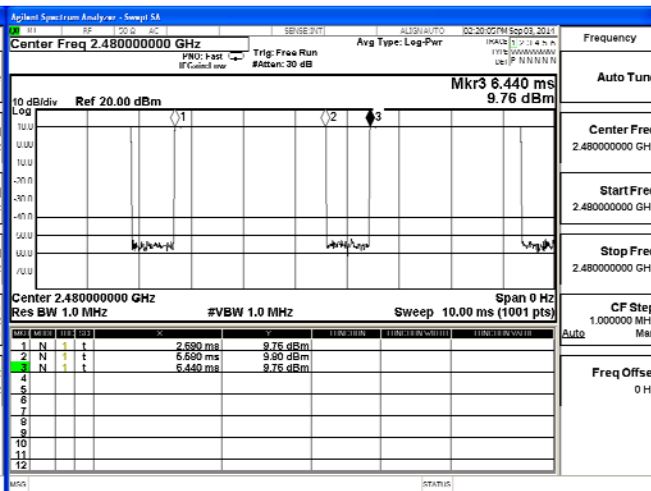
CH 39Transmission Time



CH 78 Time Interval between hops



CH 78 Transmission Time



Note:

The dwell times of the packet type of DH1, DH3, and DH5 are tested. Only the worst case is shown on the report.

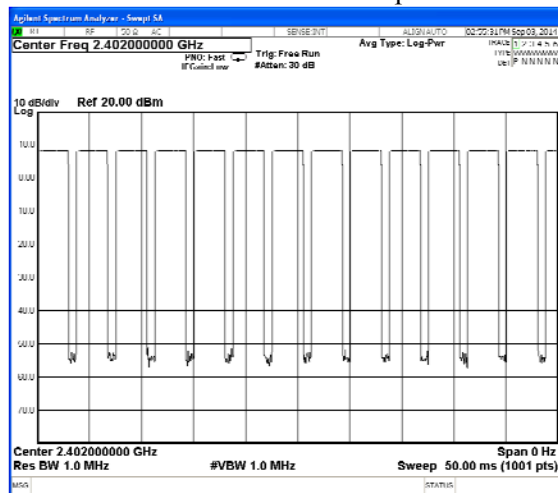
Product : FIELDBOOK
 Test Item : Dwell Time
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit - 3Mbps (8DPSK) (Channel 00,39,78 –DH5)

Frequency (MHz)	Time slot length (ms)	Hopping of Number	Sweep time (ms)	Duty cycle	Dwell Time (Sec)	Limit (Sec)	Result
2402	2.900	14	50	0.81	0.325	0.4	Pass
2441	2.900	14	50	0.81	0.325	0.4	Pass
2480	2.910	14	50	0.81	0.326	0.4	Pass

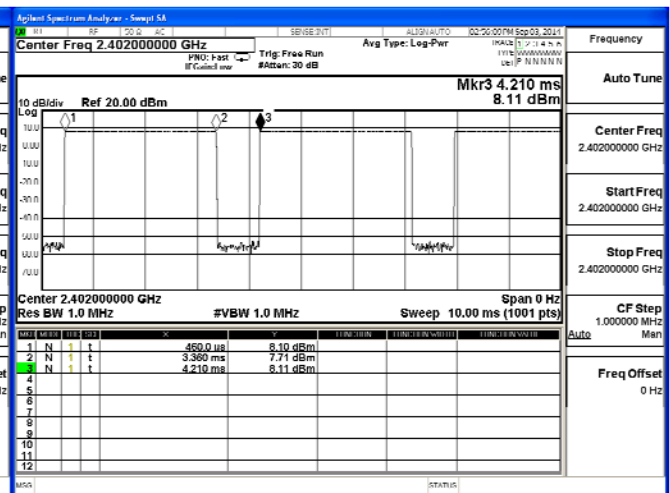
Duty cycle = ((Time slot length(ms)*Hopping of Number) / Sweep time (ms))

Dwell time = (Duty cycle /79) * (79*0.4)

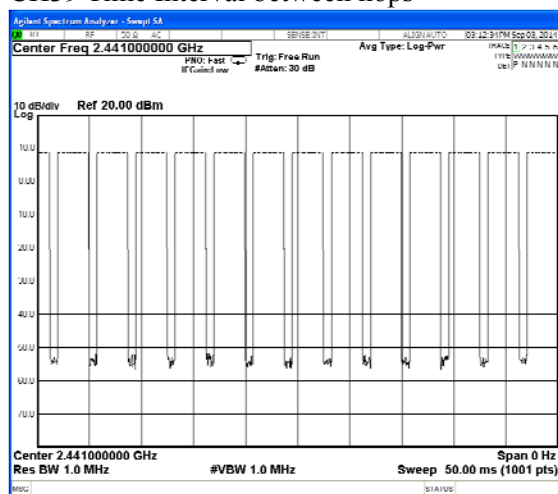
CH 00 Time Interval between hops



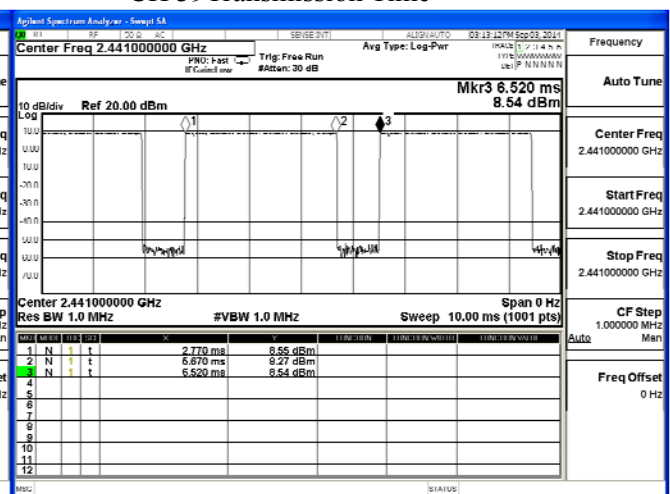
CH 00 Transmission Time



CH39 Time Interval between hops



CH 39Transmission Time



CH 78 Transmission Time

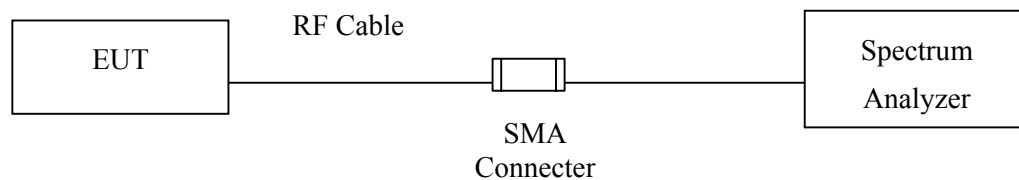
10. Occupied Bandwidth

10.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2014
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2014
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2014

Note: 1. All equipments are calibrated every one year.
2. The test instruments marked by “X” are used to measure the final test results.

10.2. Test Setup



10.3. Limits

N/A

10.4. Test Procedure

The EUT was setup to ANSI C63.10, 2009; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

10.5. Uncertainty

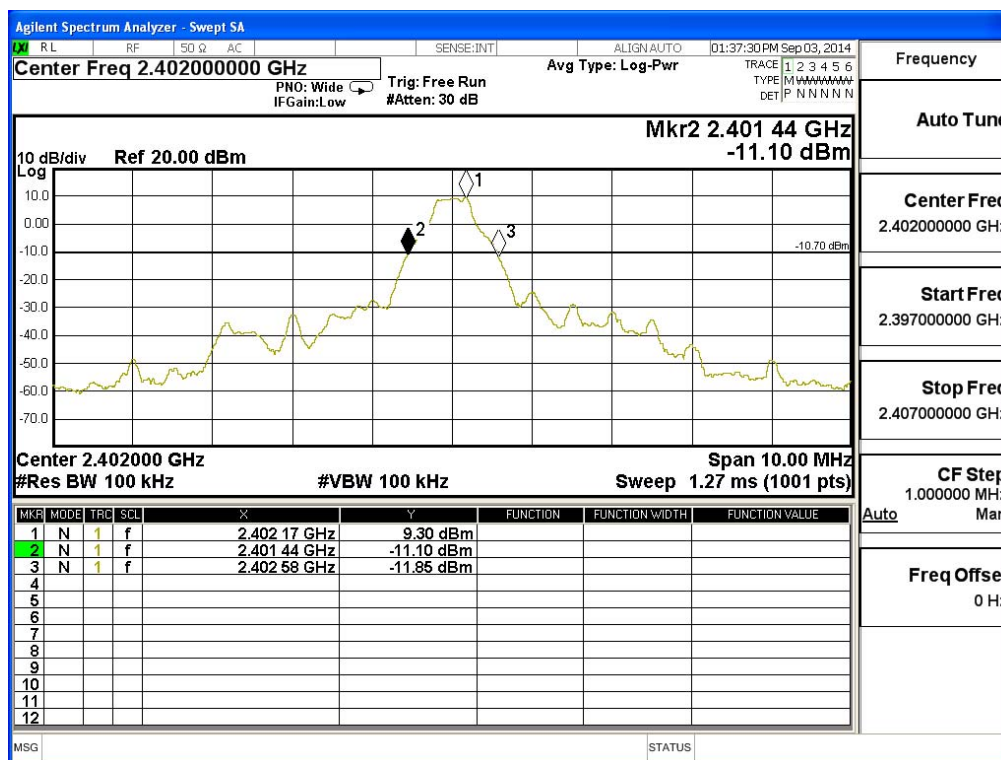
$\pm 150\text{Hz}$

10.6. Test Result of Occupied Bandwidth

Product : FIELDBOOK
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit - 1Mbps (GFSK)(2402MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
00	2402	1140	--	NA

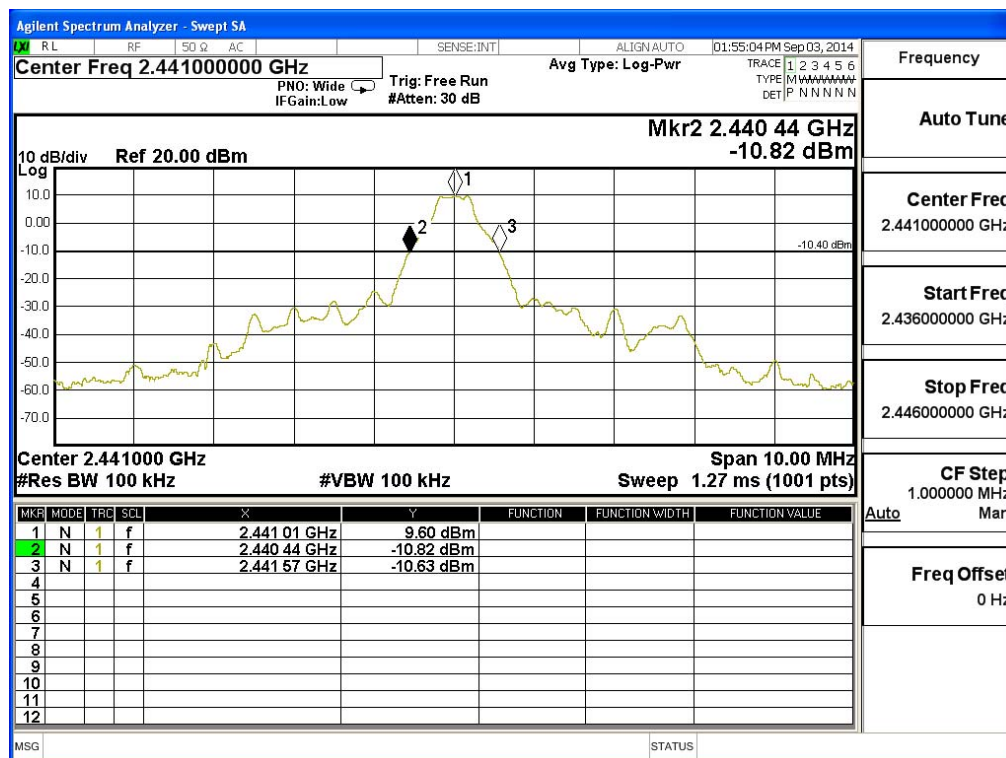
Figure Channel 00:



Product : FIELDBOOK
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit - 1Mbps (GFSK)(2441MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
39	2441	1130	--	NA

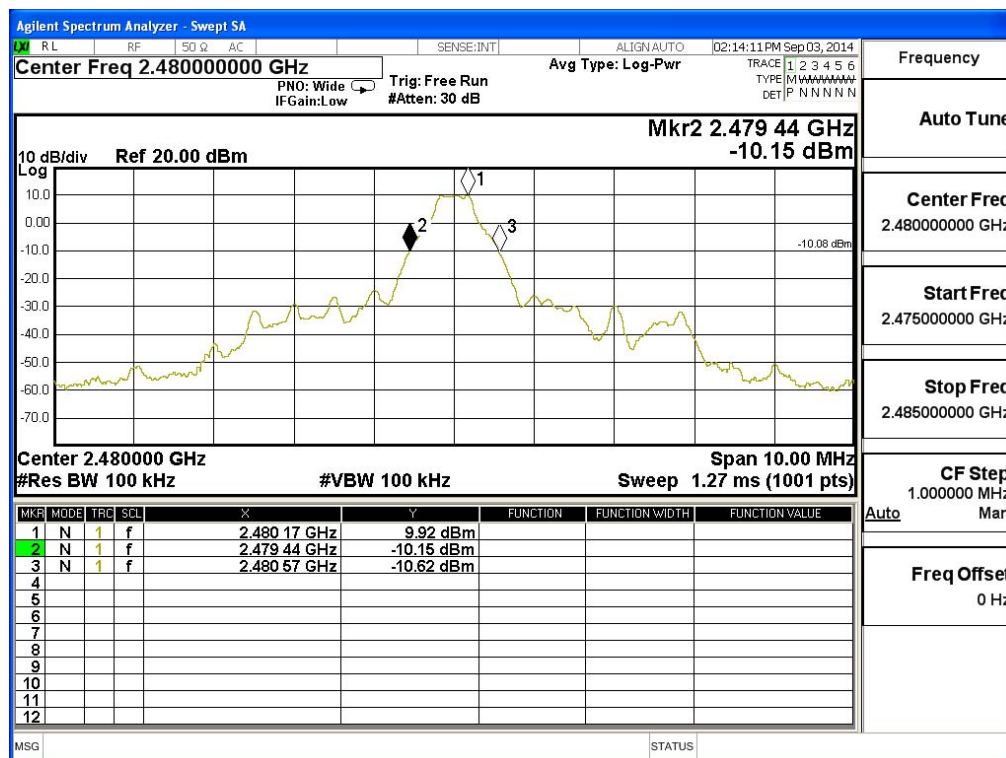
Figure Channel 39:



Product : FIELDBOOK
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit - 1Mbps (GFSK)(2480MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
78	2480	1130	--	NA

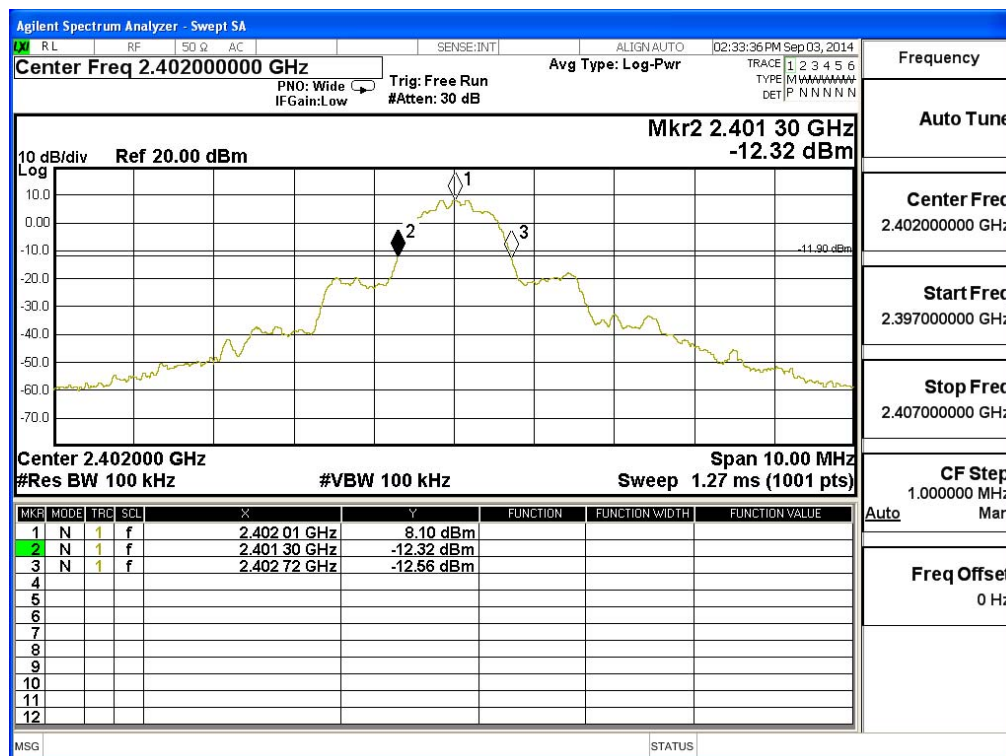
Figure Channel 78:



Product : FIELDBOOK
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit - 3Mbps (8DPSK) (2402MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
00	2402	1420	--	NA

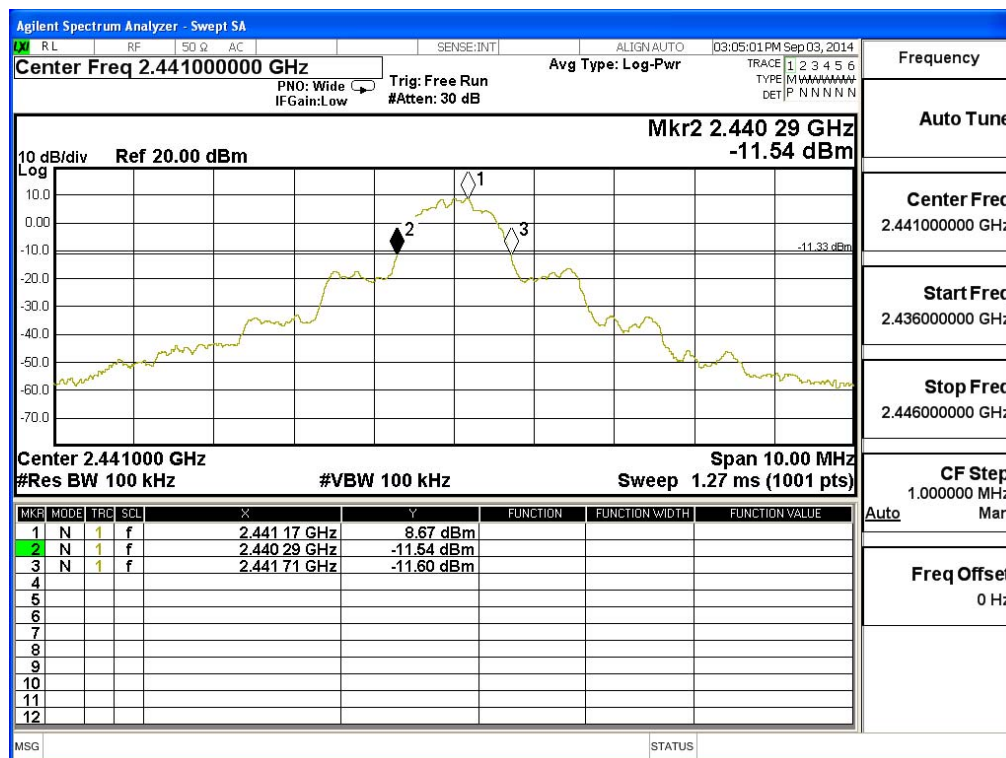
Figure Channel 00:



Product : FIELDBOOK
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit - 3Mbps (8DPSK) (2441MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
39	2441	1420	--	NA

Figure Channel 39:



Product : FIELDBOOK
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit - 3Mbps (8DPSK)(2480MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
78	2480	1420	--	NA

Figure Channel 78:



11. EMI Reduction Method During Compliance Testing

No modification was made during testing.