FCC Part 15.247(WIFI)
TEST REPORT

for

Pocket PC Mobile Phone

Model Name:	V83
Trade Name:	Inventec / Velocity
Report No.:	SH08090014W02
FCC ID:	DGIV83

prepared for

Inventec Corporation
Inventec Building, 66 Hou-Kang St.,
Shih-Lin District, Taipei 11170, Taiwan, R.O.C

prepared by

Shenzhen Electronic Product Quality Testing Center
Morlab Laboratory
3/F, Electronic Testing Building, Shahe Road, Xili,
Nanshan District, Shenzhen, 518055 P. R. China
Tel: +86 755 86130398
Fax: +86 755 86130218

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1 Test Report Certification

Equipment under Test:	Pocket PC Mobile Phone
Model Name:	V83
Trade Name:	Inventec / Velocity
FCC ID:	DGIV83
Applicant:	Inventec Corporation Inventec Building, 66 Hou-Kang St., Shih-Lin District, Taipei 11170, Taiwan, R.O.C
Manufacturer:	Inventec Hi-tech Corporation 789 Puxing Road , Min Hang District Shanghai 201114 , China
Test Standards:	47 CFR Part 15,Subpart C
EUT Received Date:	Nov.08, 2008
Test Date(s):	Nov,09 2008 –Nov,13, 2008
Test Result:	PASS

*** We Hereby Certify That:**

The equipment under test was tested by Shenzhen Electronic Product Quality Testing Center Morlab Laboratory. The test data, data evaluation, test procedures and equipment configurations shown in this report were made in accordance with the requirement of related European Commission's standards.

The test results of this report only apply for the tested sample equipment identified above. The test report shall be invalid without all the signatures of the test engineer, the reviewer and the approver.

Tested by: Huang Quanbo Dated: 2008.11.13
Huang Quanbo

Reviewed by: Zhang Jun Dated: 2008.11.13
Zhang Jun

Approved by: Su Feng Dated: 2008.11.13
Su Feng

2 General Information

2.1 DESCRIPTION OF EUT

Product	Pocket PC Mobile Phone
Trade Name	Inventec / Velocity
Model Number	V83
WIFI module Model name	AW-GH320
WIFI module Brand name	AW-GH320
Frequency Range	2412 ~ 2472 MHz
Transmit Power	≤20dBm
Modulation Technique	DSSS /OFDM
Number of Channels	13 Channels
Antenna Specification	Permanent attached
Temperature Range	-10 ~ +70°C
Hardware Version	DVT2.2
Software Version	Ver8227

NOTE:

1. The EUT is a GSM mobile phone. It provides Wi-Fi (IEEE 802.11b and IEEE 802.11g) wireless interface, operating at 2.4GHz ISM band. The Wi-Fi modulations are Direct Sequence Spread Spectrum (DSSS) for IEEE 802.11b and Orthogonal Frequency Division Multiplexing (OFDM) for IEEE 802.11g. The Channels and transmitter center frequencies are:
   - Channel 1: 2412 MHz (lowest channel)
   - Channel 2: 2417 MHz
   - Channel 3: 2422 MHz
   - Channel 4: 2417 MHz
   - Channel 5: 2432 MHz
   - Channel 6: 2437 MHz (middle channel)
   - Channel 7: 2442 MHz
   - Channel 8: 2447 MHz
   - Channel 9: 2452 MHz
   - Channel 10: 2457 MHz
   - Channel 11: 2462 MHz (highest channel);
2. Please refer to Appendix I for the photographs of the EUT. For a more detailed features description about the EUT, please refer to User's Manual.

2.2 Objective

Perform EMC test according to FCC Part 15 Subpart C (Wi-Fi, 2.4GHz ISM band radiator).

2.3 Test Standards and Results

The EUT has been tested according to 47 CFR Part 15, Radio Frequency Devices.
Test items and the results are as bellow:

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№	FCC Rules	Test Type	Result	Test Date
1	§15.207	Conducted Emission	PASS	2008.11.12
2	§15.209 §15.247(c)	Radiated Emission	PASS	2008.11.12
3	§15.247(a)	6dB Bandwidth	PASS	2008.11.12
4	§15.247(b)	Maximum Peak Output Power	PASS	2008.11.12
5	§15.247(c)	Band Edge	PASS	2008.11.12
6	§15.247(c)	Conducted Spurious Emission	PASS	2008.11.12
7	§15.247(d)	Power Spectrum Density	PASS	2008.11.12

2.4 List of Equipments Used

Description	Manufacturer	Model No.	Cal. Due Date	Serial No.
Test Receiver	Rohde & Schwarz	ESIB26	2009.06.05	A0304218
Test Receiver	Schwarzbeck	FCKL1528	2009.06.05	A0304230
Spectrum Analyzer	Rohde & Schwarz	FSP13	2009.01.15	M-030176
LISN	Schwarzbeck	NSLK8127	2009.06.05	A0304233
Loop Antenna	Rohde & Schwarz	HFH2-Z2	2009.06.05	A0304220
Ultra Broadband Ant.	Rohde & Schwarz	HL562	2009.06.05	A0304224
Horn Ant.	Rohde & Schwarz	HF906	2009.06.05	100150
Bluetooth Tester	Rohde & Schwarz	CBT	2009.09.26	100261
Shield Room	Nanbo Tech	Site 1	2009.01.04	A0304188
Anechoic Chamber	Albatross	EMC12.8×6.8×6.4(m)	2009.04.10	A0304210

2.5 Test Facility

Shenzhen Electronic Product Quality Testing Center (SET) is a third party testing organization accredited by China National Accreditation Board for Laboratories (CNAL) according to ISO/IEC 17025. The accreditation certificate number is **L1659**.

The EMC chamber site No.1 (EMC12.8×6.8×6.4(m)), and the radiated and conducted Emission test equipments of SET are constructed and calibrated to meet the FCC requirements ANSI C63.4:2001 and CISPR 22/EN 55022. The FCC Registration Number is **261302**.

The EMC chamber site No.1 (EMC12.8×6.8×6.4(m)) also complies with Canada standard RSS 212, and acceptable to Industry Canada for the performance of radiated measurements. The Industry Canada Registration Number is **IC 5915**.

2.6 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:
- Temperature: 15-35ºC
- Humidity: 30-60 %
- Atmospheric pressure: 86-106 kPa

3 Conducted Emission Test

3.1 Limits of Conducted Emission

According to FCC §15.207, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dBμV)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
0.50 - 30	60	50

NOTE:

1. The lower limit shall apply at the band edges.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

3.2 Test Procedure

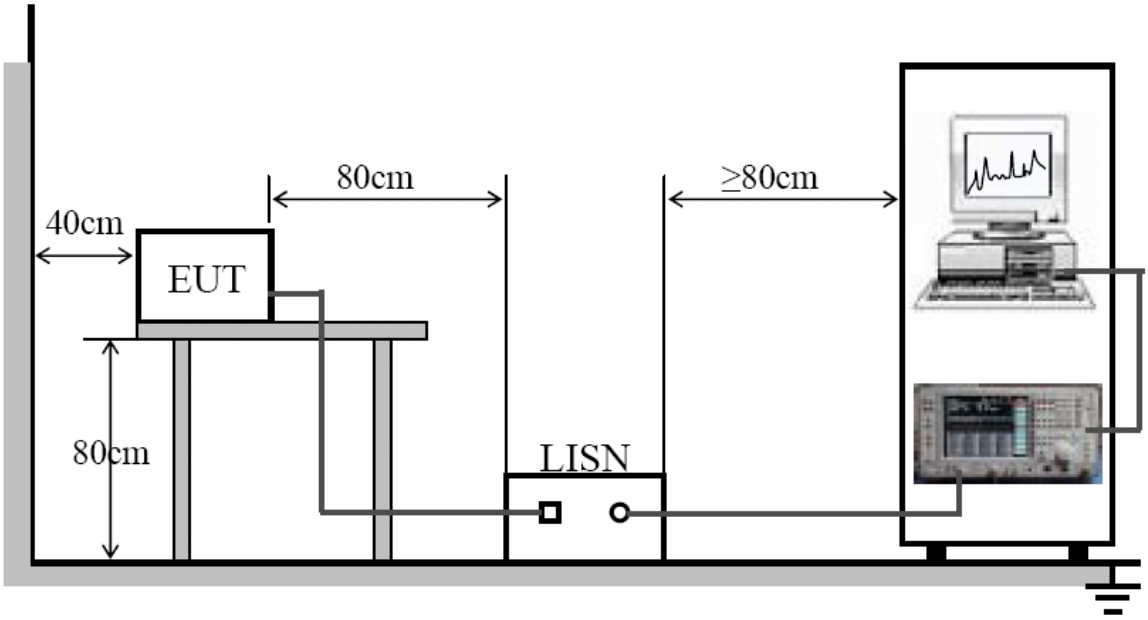
a. The EUT was placed on a 0.8m high insulating table and kept 0.4 meters from the conducting wall of shielded room.

b. The EUT was connected to the power mains through a line impedance stabilization network (LISN). The LISN provide 50Ω/50μH of coupling impedance for the measuring instrument.

c. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

d. The frequency range from 150 kHz to 30 MHz was searched using CISPR Quasi-Peak and Average detector.

3.3 Test Setup



For the actual test configuration, please refer to the related item - Photographs of the Test Configuration.

3.4 EUT Setup and Operating Conditions

The EUT configuration of the emission tests was MS + Battery + Charger.

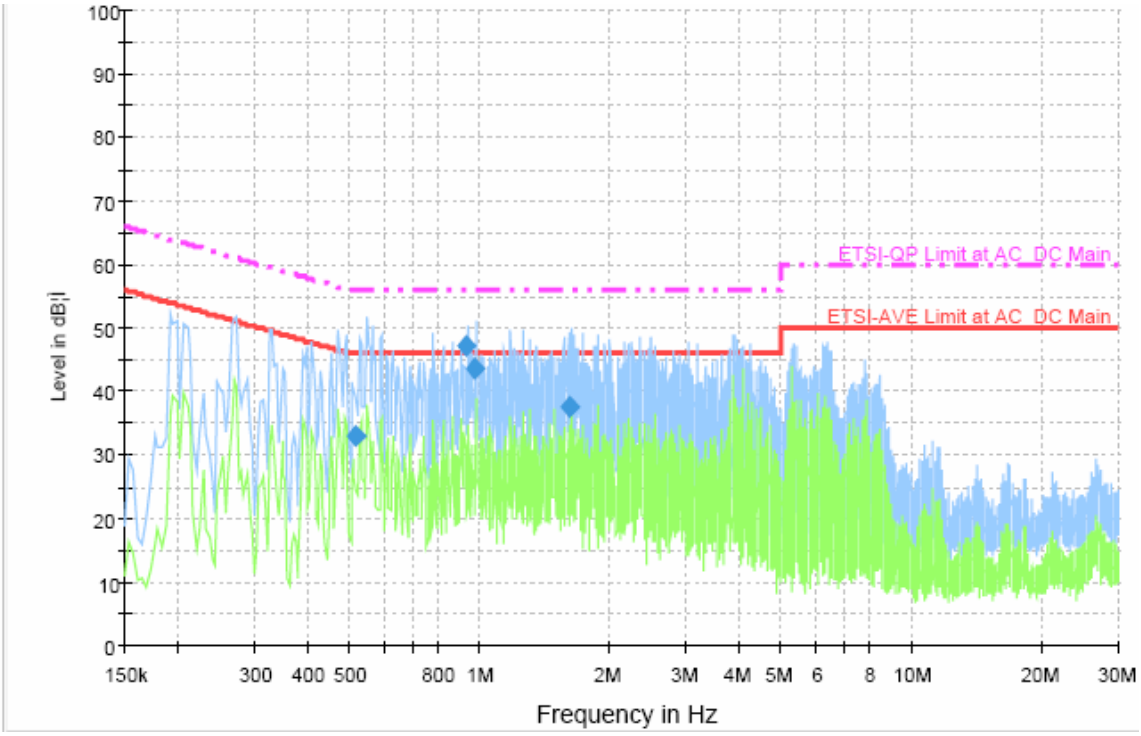
During the measurement, the EUT was charging empty battery. The charger was powered by 120V 60Hz AC mains supply.

The Wi-Fi function of the MS was activated. The EUT accessed to the internet through a Wi-Fi wireless router (D-LINK, DI-624+A), and kept transceiving data with a network termination.

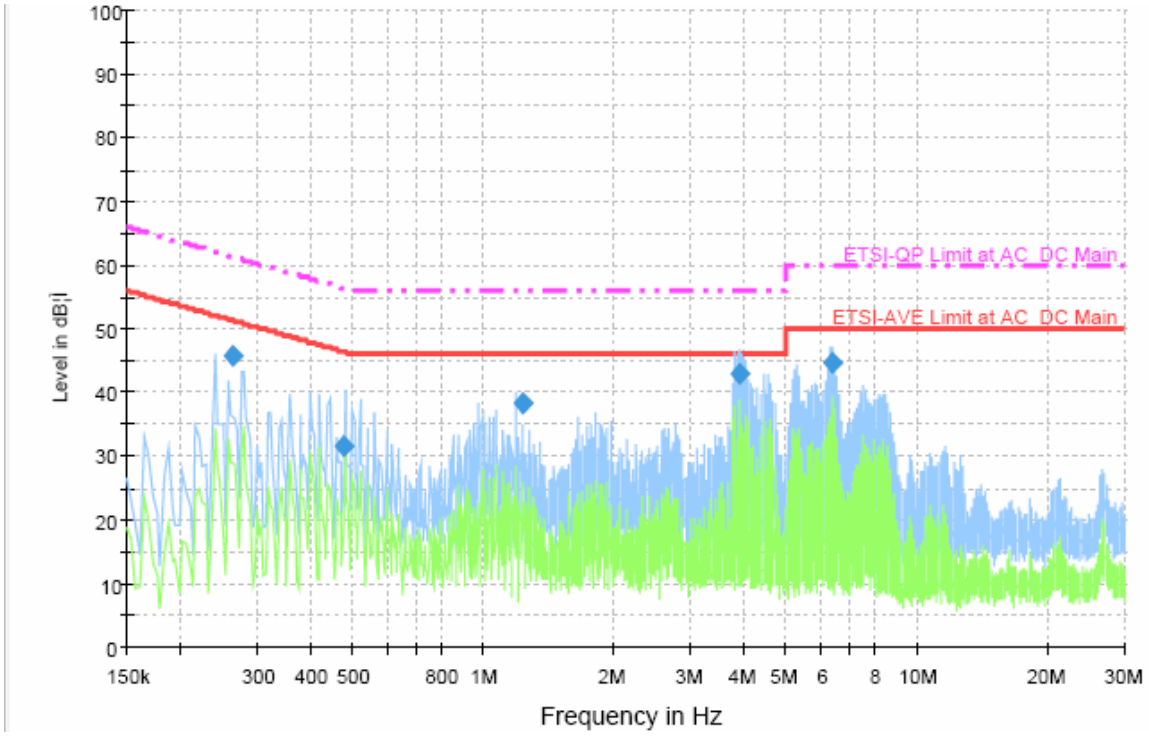
3.5 Test Results

No.	@Frequency (MHz)	Measured Emission Level (dBµV)				Limit (dBµV)		Verdict
		PK	QP	AV	Phase	QP	AV	
1	0.514099	49.0	33.0	32.0	L	56.0	46.0	PASS
2	0.921945	50.0	47.3	35.0	L	56.0	46.0	PASS
3	0.976043	51.0	43.5	35.5	L	56.0	46.0	PASS
4	1.601471	50.0	37.5	34.5	L	56.0	46.0	PASS
5	0.263096	46.0	45.9	28.0	N	63.6	53.6	PASS
6	0.476168	40.0	31.5	25.5	N	61.7	51.7	PASS
7	1.225583	40.0	38.4	23.5	N	56.0	46.0	PASS
8	3.889249	46.5	42.8	28.5	N	56.0	46.0	PASS
9	6.332568	46.5	44.7	27.0	N	60.0	50.0	PASS

Test Plot:



(Plot A: L Phase)



(Plot B: N Phase)

4 Radiated Emission Test

4.1 Limits of Radiated Emission

According to FCC §15.247(c), radiated emission outside the frequency band 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).

According to FCC §15.209 (a), Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency(MHz)	Field Strength(μ V/m)	Measurement Distance(m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector. When average radiated emission measurements are specified in this part, including emission measurements below 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules,

4.2 Test Procedure

a. The EUT was placed on the top of a ratable 0.8 meters above the ground at a semi-anechoic chamber.

b. In the frequency range of 9 kHz to 30 MHz, magnetic field was measured with loop antenna. The antenna was positioned with its plane vertical at 1 m distance from the EUT. The center of the loop was 1 m above the ground. During the measurement the loop antenna rotated about its vertical axis for maximum response at each azimuth about the EUT.

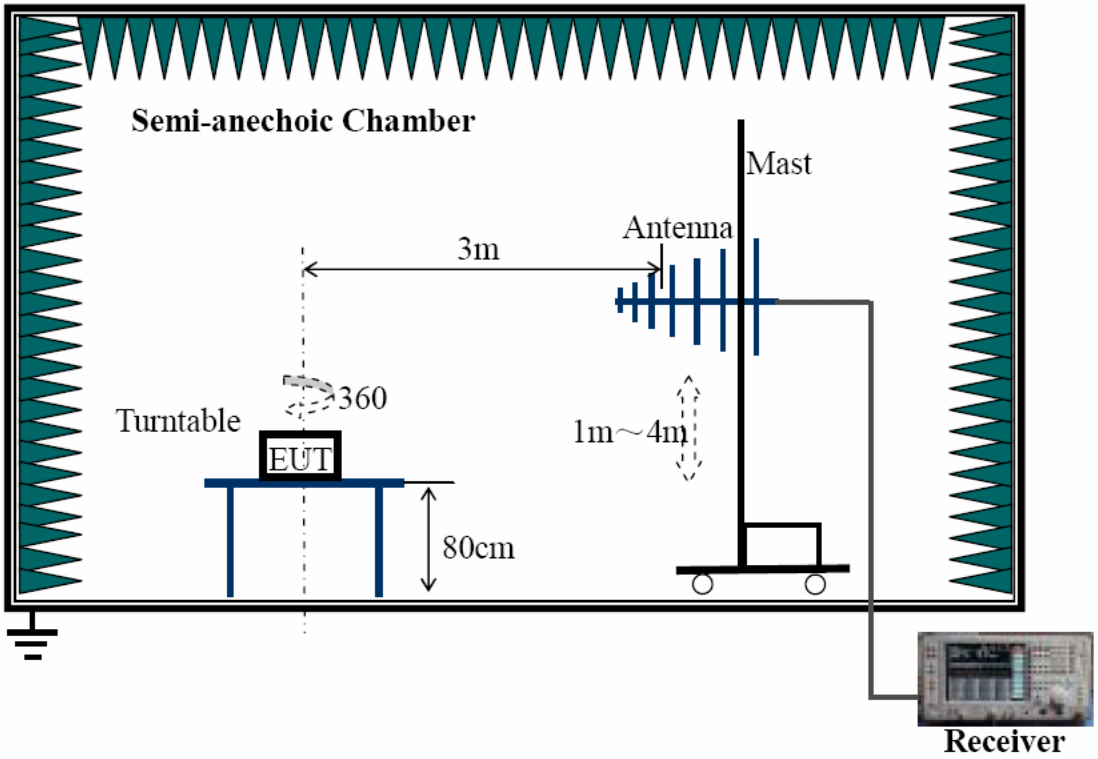
c. In the frequency range above 30MHz, ultra-broadband bi-log antenna (30 MHz to 1 GHz) and horn antenna (above 1GHz) were used. Antenna was 3 meters away from the EUT. Antenna height was varied from one meter to four meter above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to

make the measurement.

d. The test-receiver system was set to Peak Detector Function and Specified Bandwidth with Maximum Hold Mode.

e. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emission that did not have 10 dB margins would be retested one by one using the quasi-peak method.

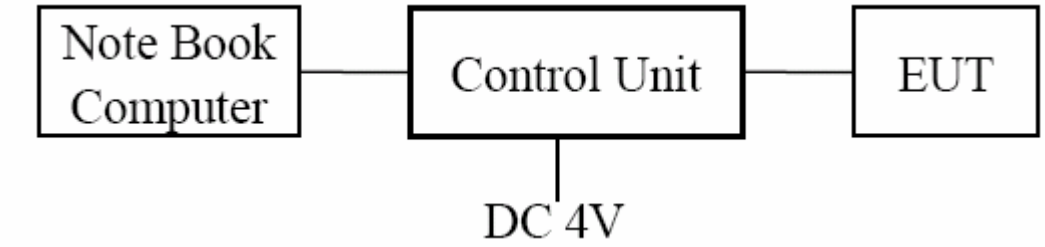
4.3 Test Setup



For the actual test configuration, please refer to the related item-Photographs of the Test Configuration.

4.4 EUT Setup and Operating Conditions

The EUT was connected to and controlled by a control unit provided by the applicant.



The EUT was set to continuous Wi-Fi transmitting at maximum power and maximum data rate, e.g., 11 Mbps for IEEE802.11b (DSSS) and 54 Mbps for IEEE802.11g (OFDM).

At each operating mode, lowest, middle and highest channels were measured respectively.

4.5 Test Results

I.FundamentalEmissions

EUT Modulation	EUT Operating Freq. (MHz)	Antenna Polarization	Emission Level (dBμV/m)	
			PK	AV
DSSS	2412.00	Vertical	102.12	93.63
		Horizontal	100.84	92.59
	2437.00	Vertical	101.94	93.25
		Horizontal	100.63	92.13
	2462.00	Vertical	102.31	93.57
		Horizontal	100.99	92.47
OFDM	2412.00	Vertical	100.42	87.37
		Horizontal	98.78	86.33
	2437.00	Vertical	100.45	87.53
		Horizontal	98.96	86.41
	2462.00	Vertical	100.26	87.09
		Horizontal	98.77	86.19

NOTE: Field strength of fundamental emissions were measured and record as a reference for calculation of the band edge emissions according to Marker-Delta Method DA 00-705. See chapter 11.5.

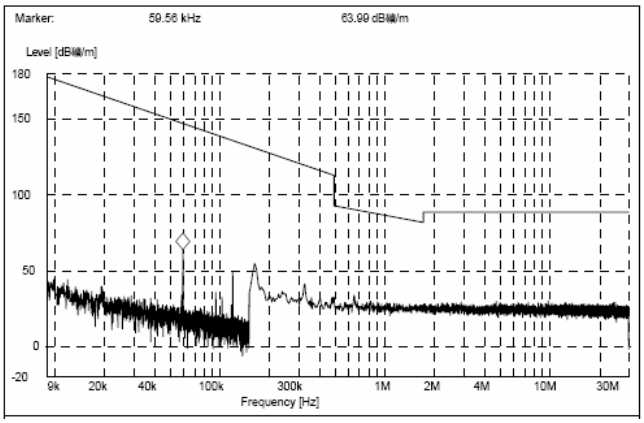
II. Spurious Emissions

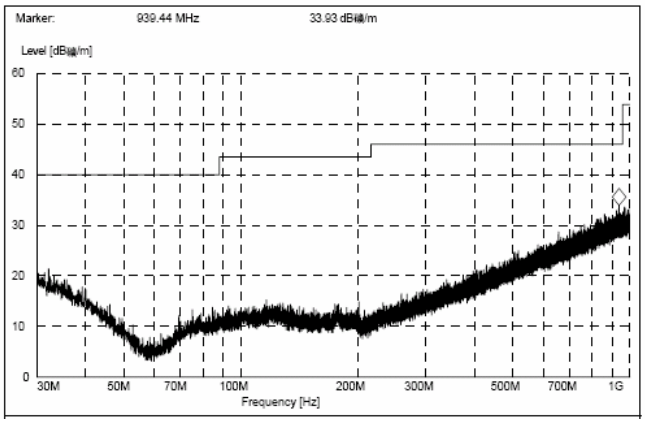
EUT Modulation	EUT Operating Freq. (MHz)	Emissions Falling in Restrict Bands (MHz)	Antenna Polarization	Emission Level (dBμV/m)		QP Limits (dBμV/m)	
				PK	AV	PK	AV
DSSS	2412.00	4824.00	Vertical	60.85	48.07	74	54
			Horizontal	58.20	44.91	74	54
	2437.00	4874.00	Vertical	61.04	47.45	74	54
			Horizontal	59.27	45.88	74	54
	2462.00	4924.00	Vertical	61.95	49.50	74	54
			Horizontal	59.68	45.99	74	54
OFDM	2412.00	4824.00	Vertical	62.17	47.93	74	54
			Horizontal	58.71	45.12	74	54
	2437.00	4874.00	Vertical	62.75	48.03	74	54
			Horizontal	59.38	45.91	74	54
	2462.00	4924.00	Vertical	63.35	49.14	74	54
			Horizontal	61.49	47.88	74	54

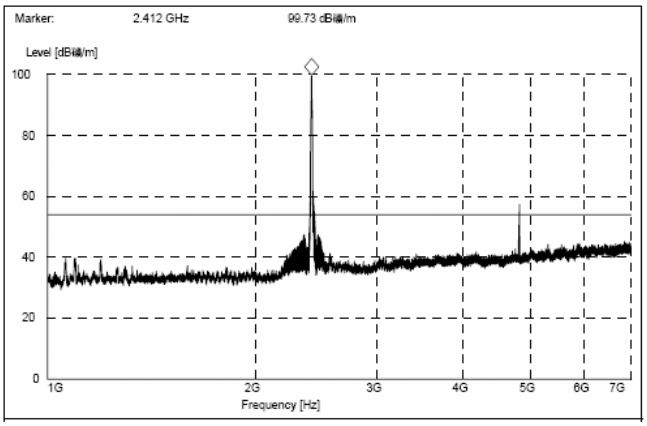
NOTE: The spurious Emissions from 9 kHz to 10th harmonic of the fundamental frequency were researched. Refer to following test plots.

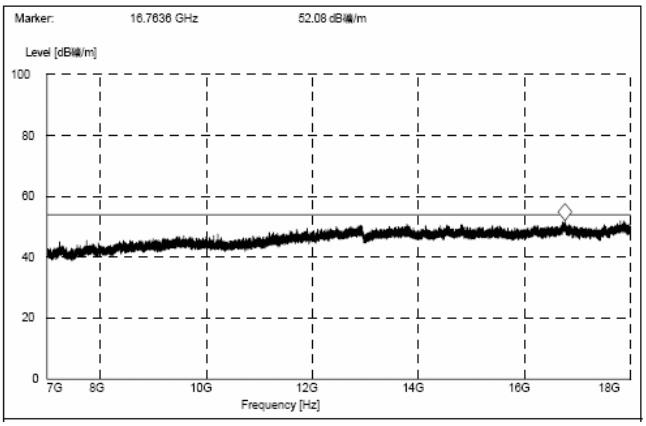
Test Plots

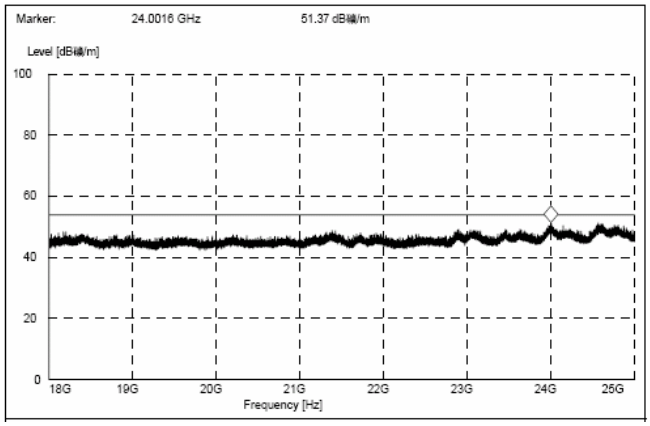
1. DSSS-2412MHz, Vertical



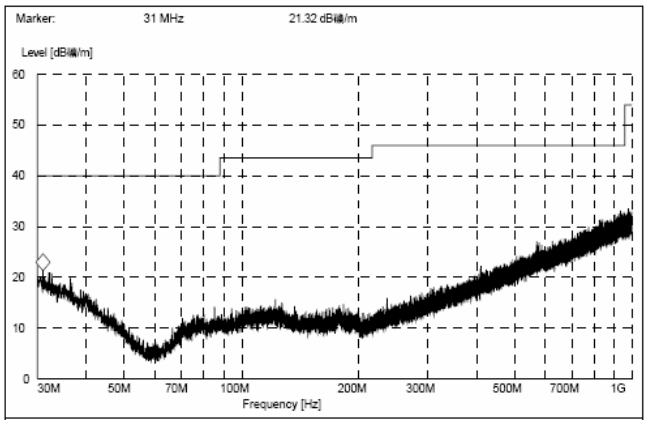


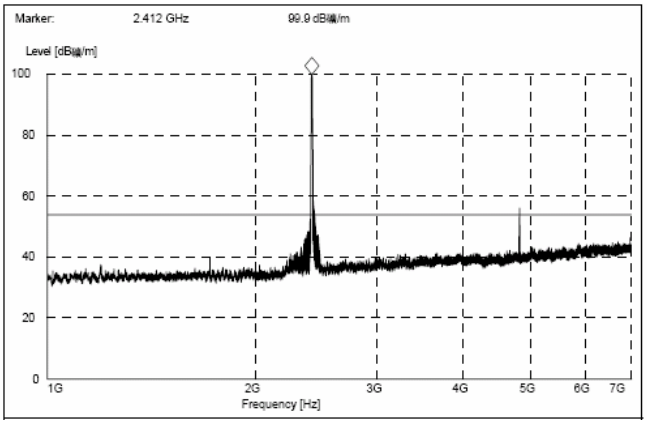


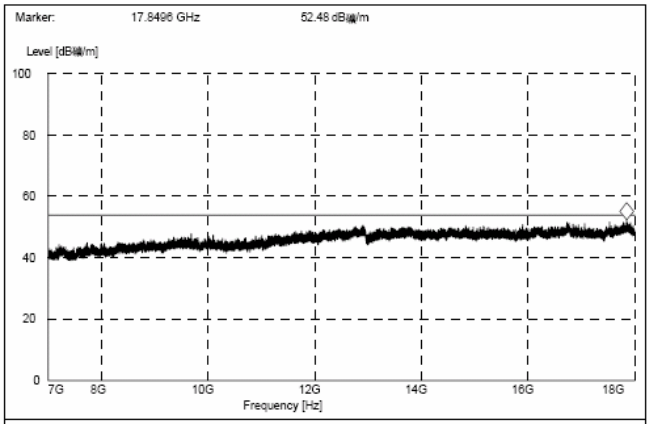


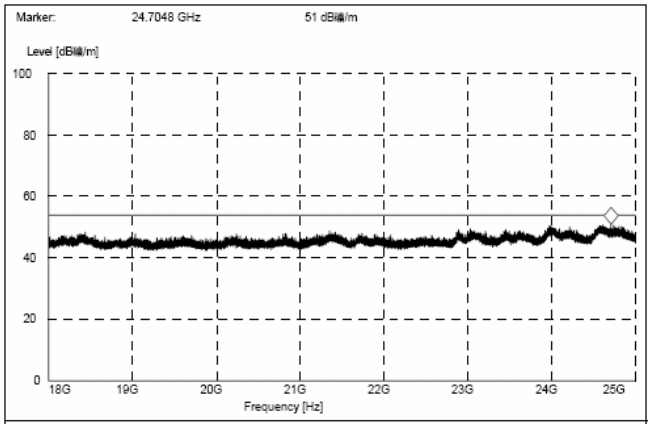


2. DSSS-2412MHz, Horizontal

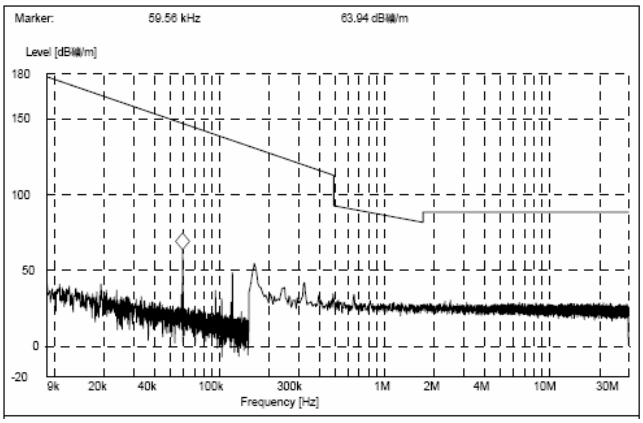


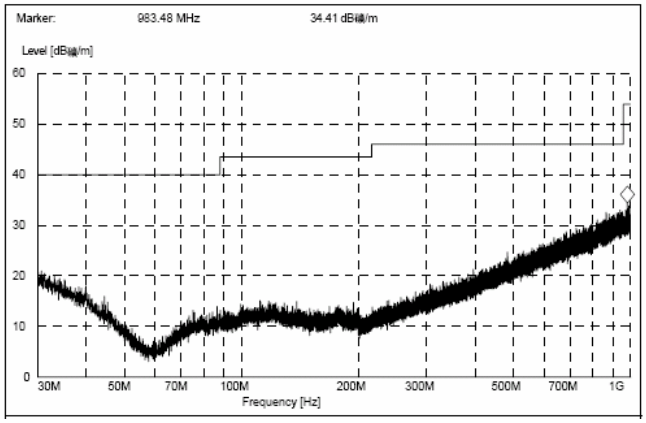


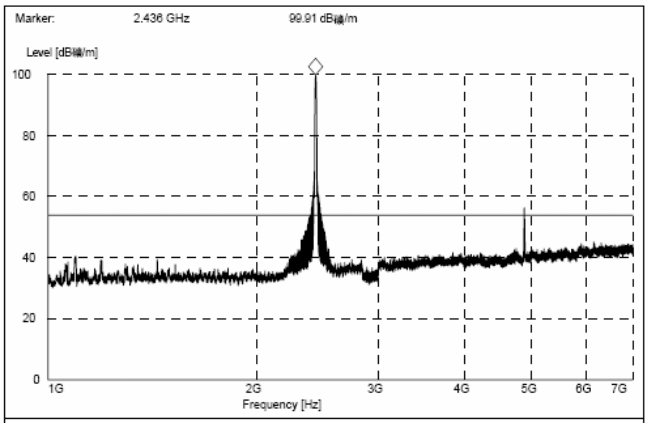


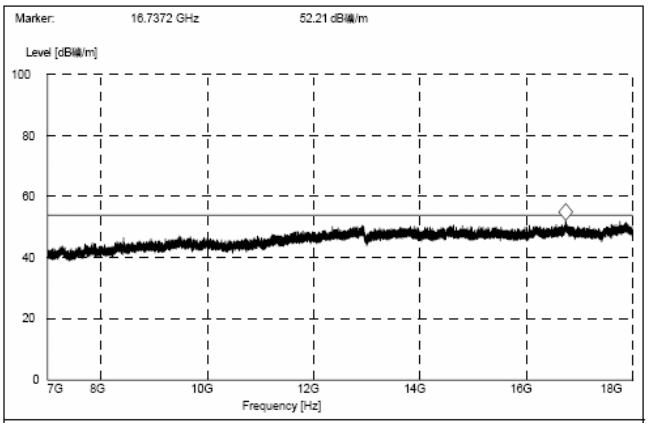


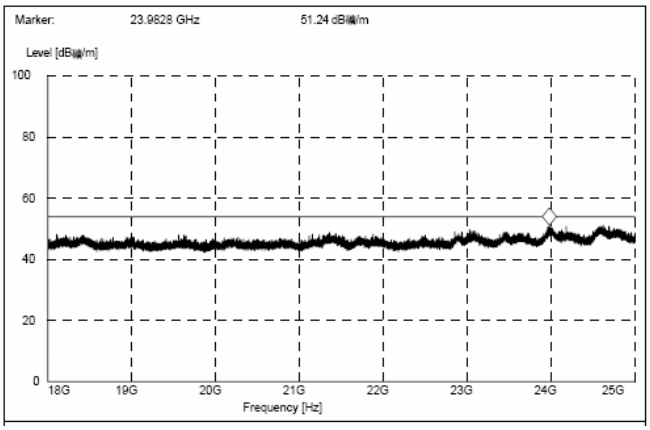
3. DSSS-2437MHz, Vertical



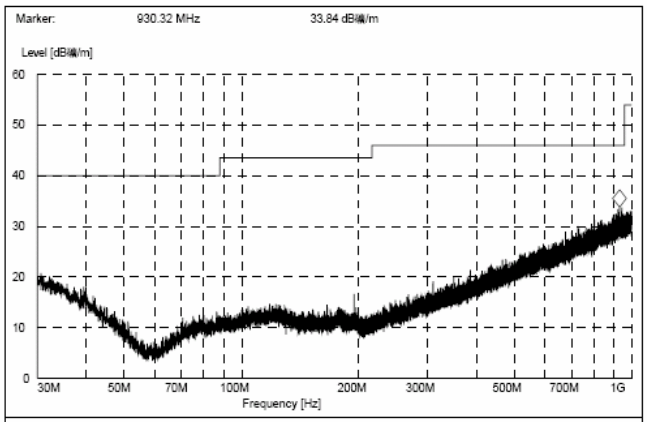


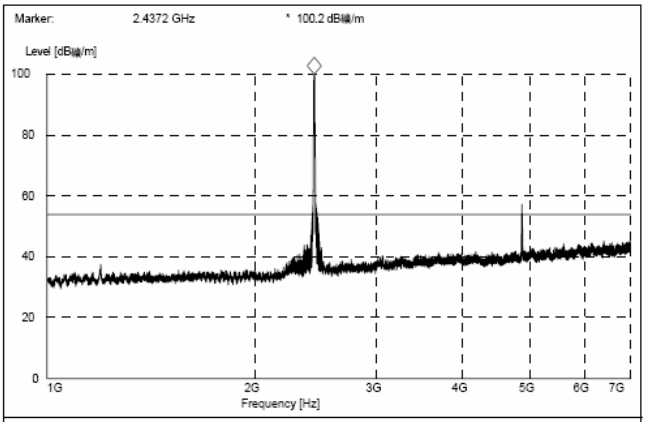


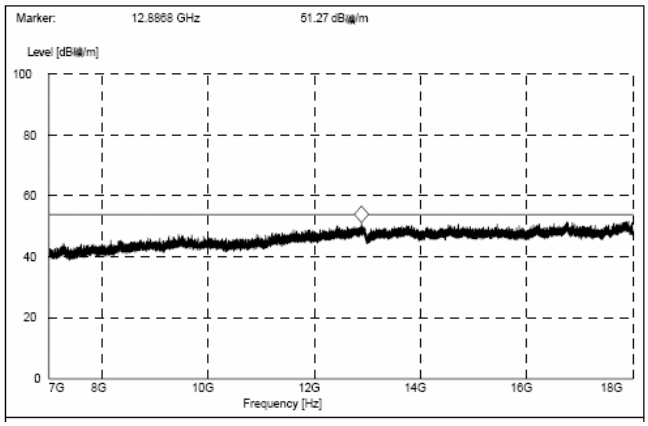


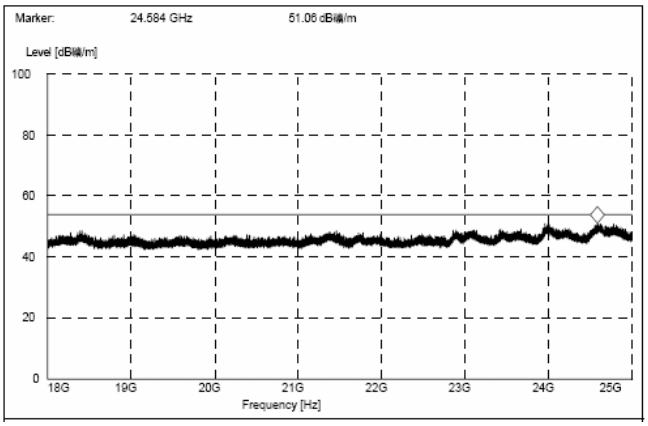


4. DSSS-2437MHz, Horizontal

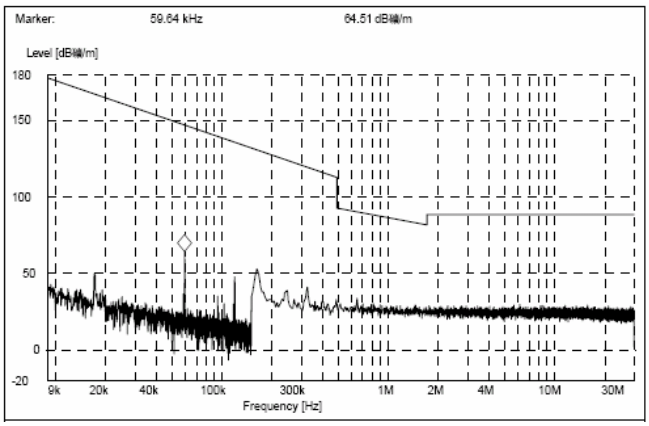


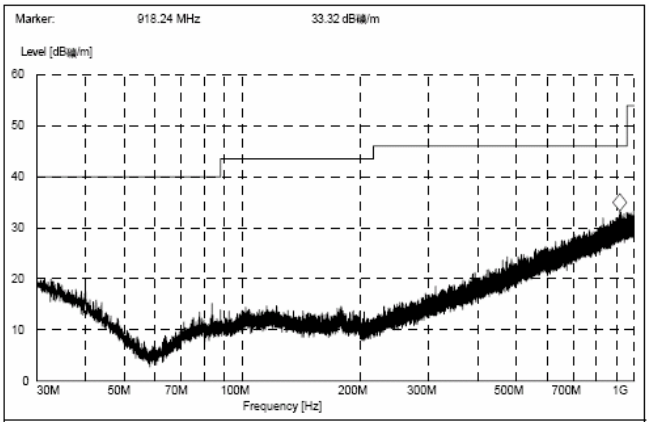


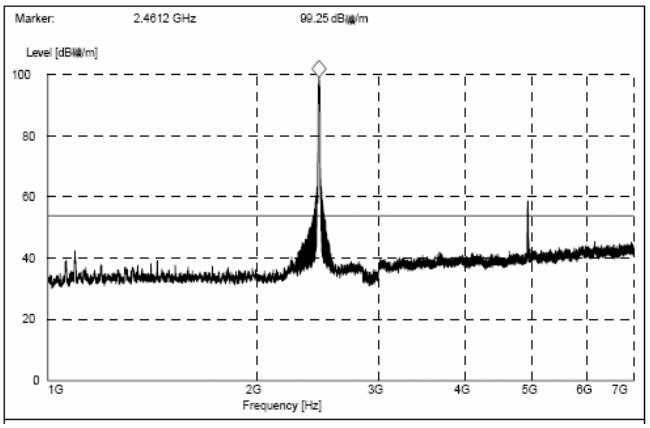


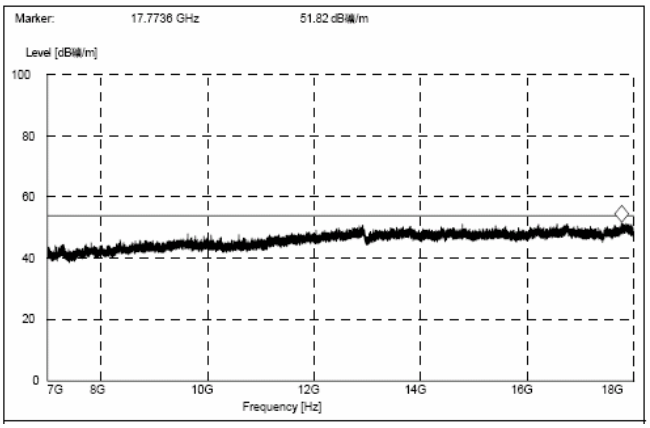


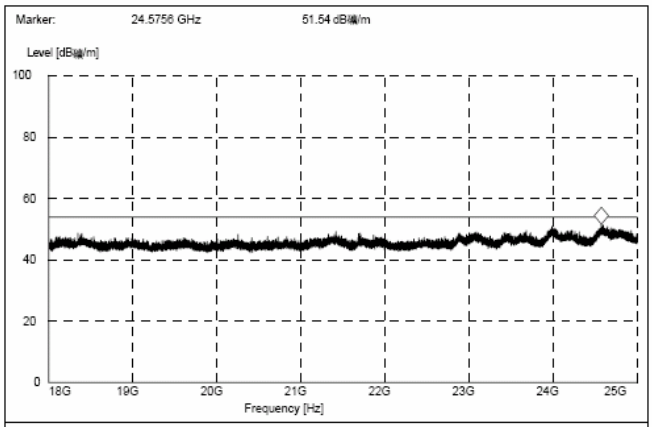
5. DSSS-2462MHz, Vertical



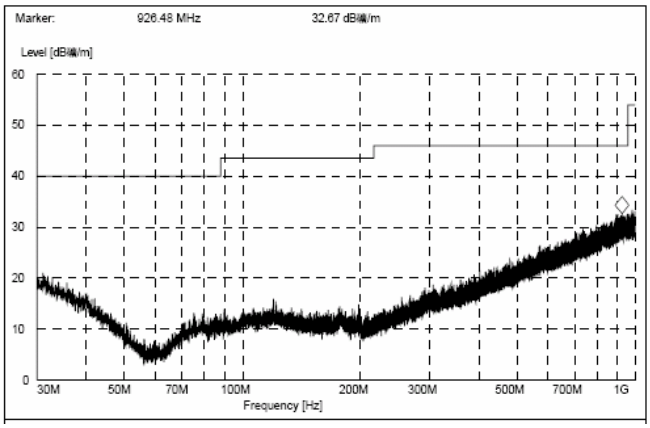


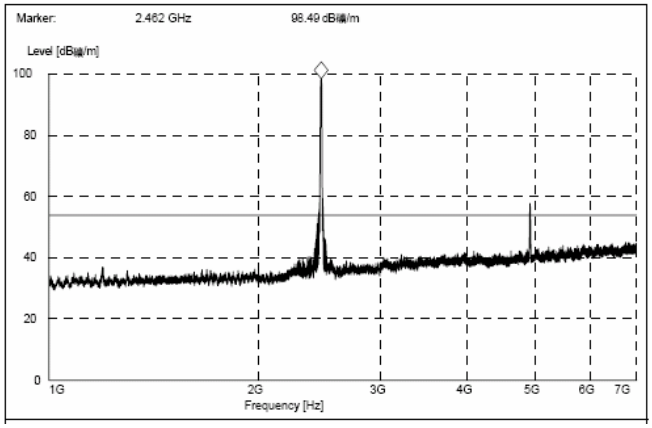


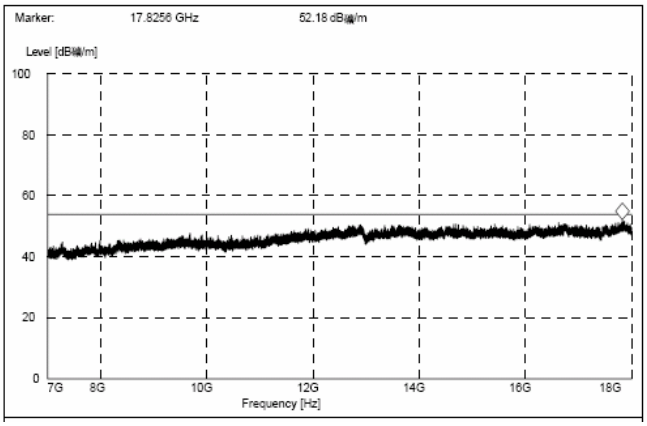


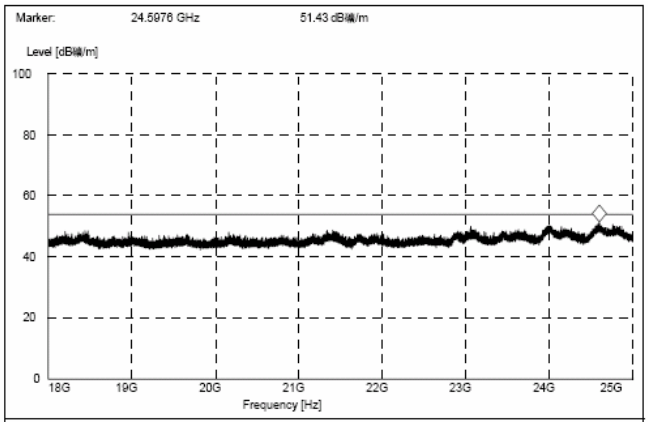


6. DSSS-2462MHz, Horizontal

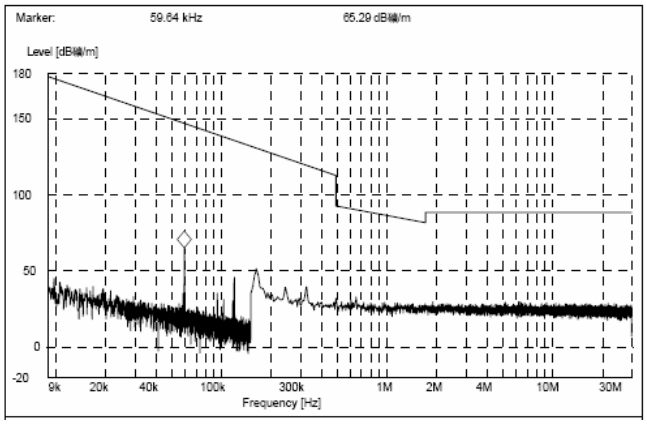


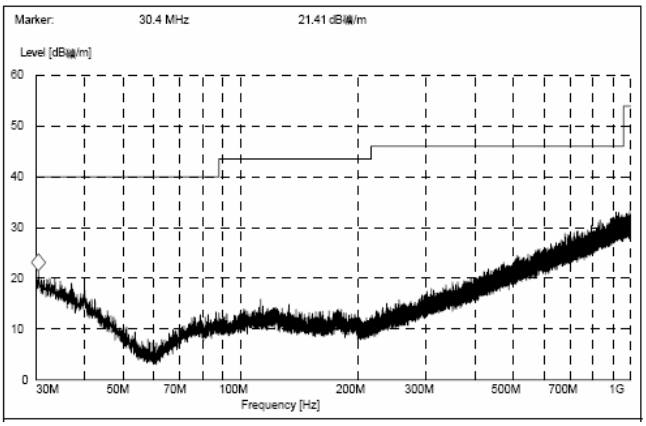


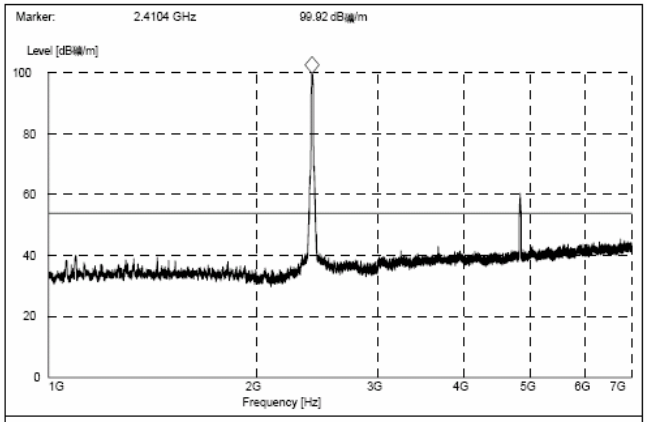


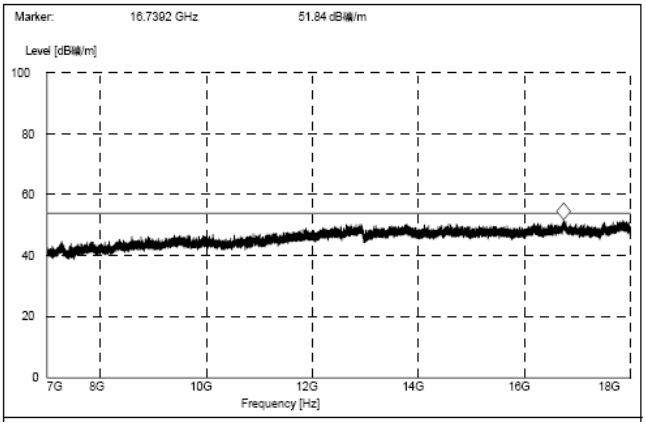


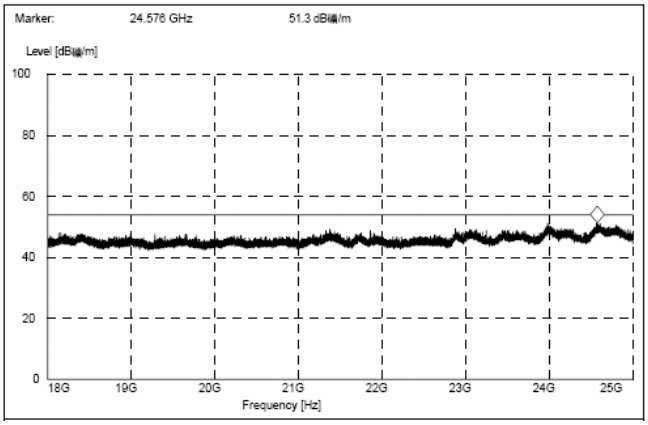
7. OFDM-2412MHz, Vertical



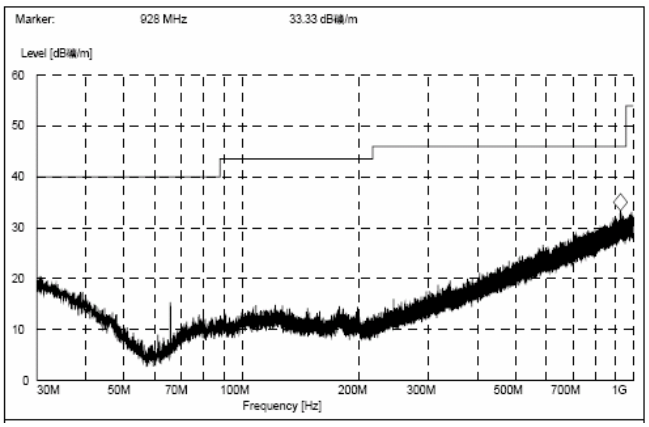


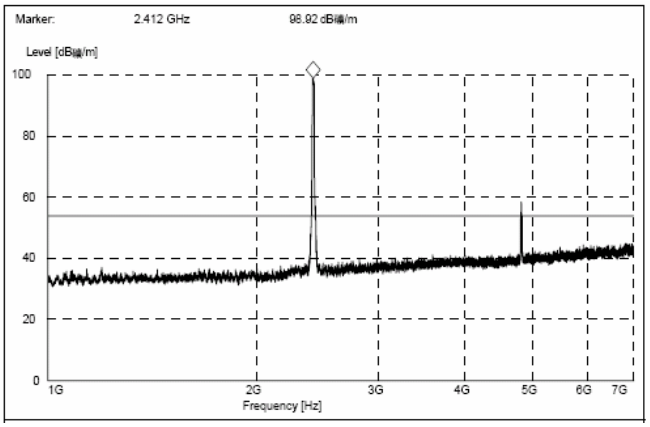


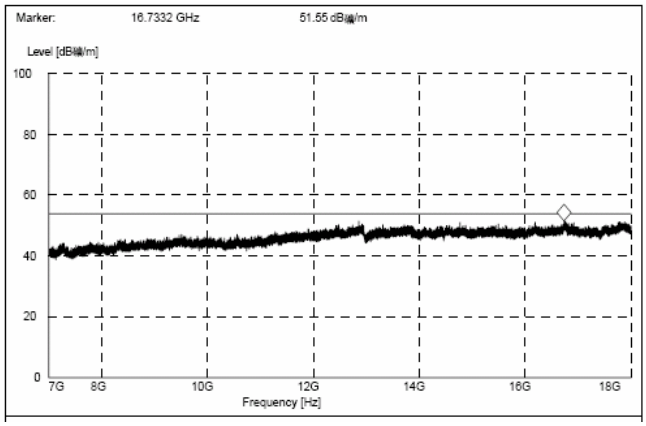


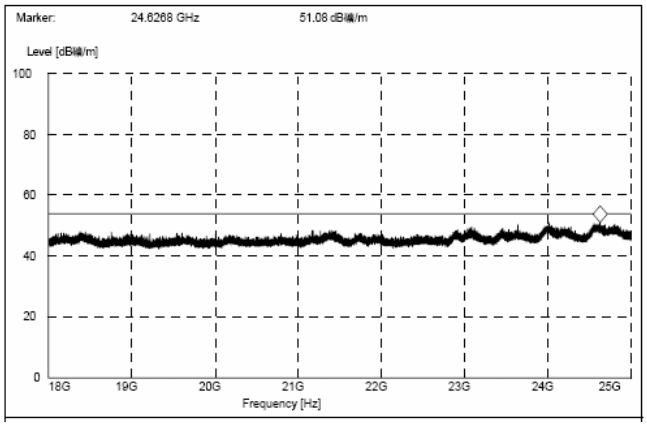


8. OFDM-2412MHz, Horizontal

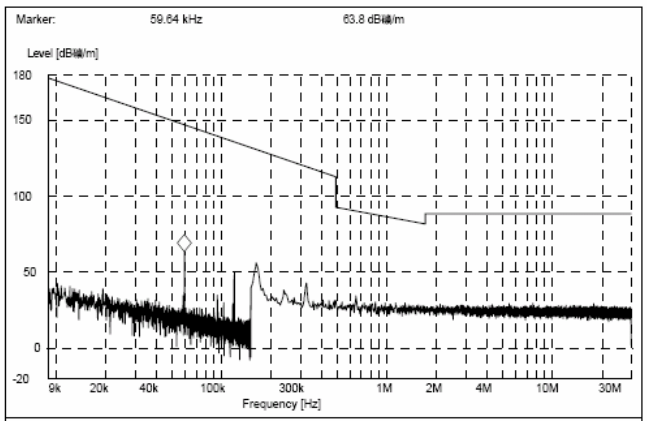


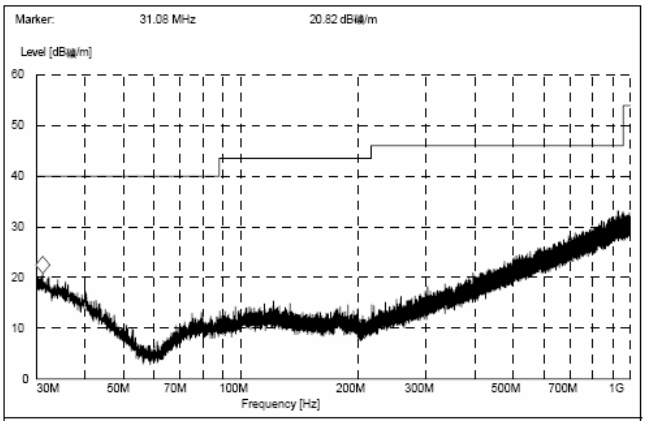


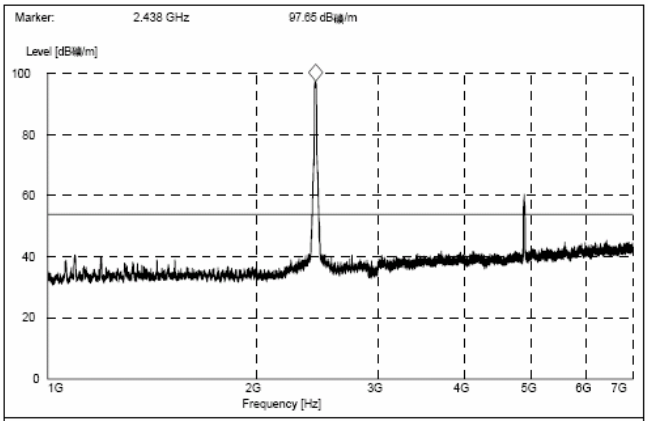


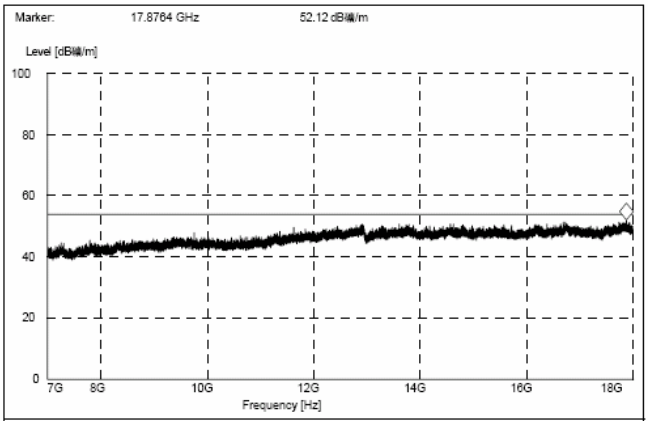


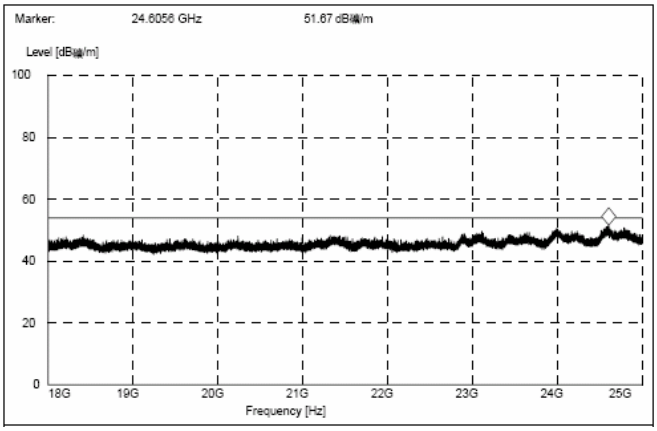
9. OFDM-2437MHz, Vertical



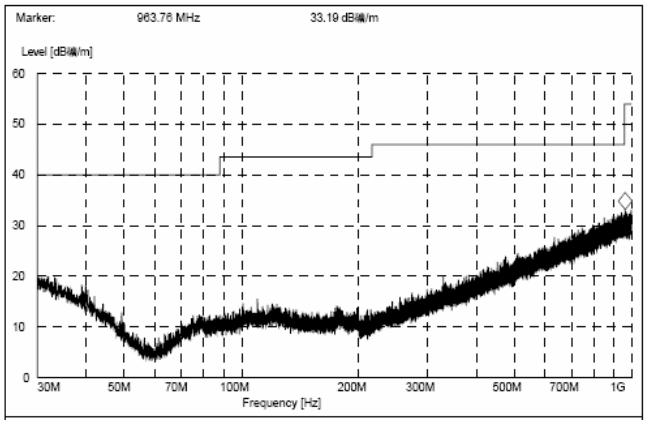


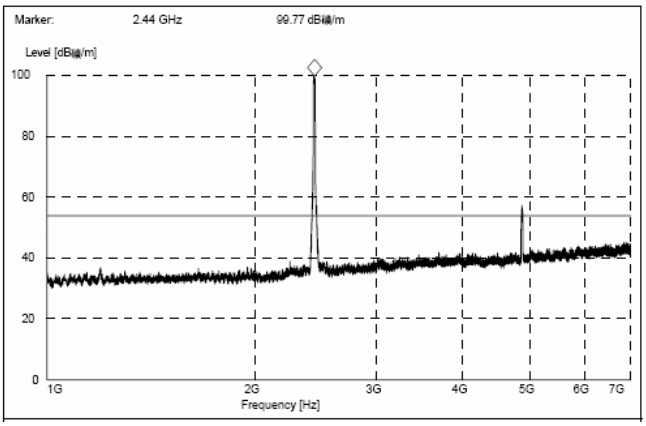


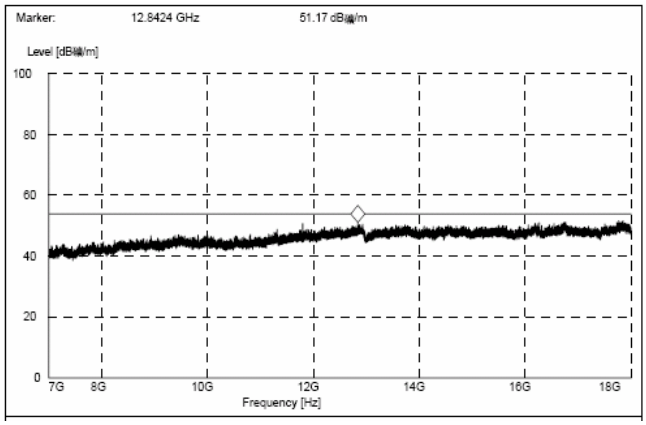


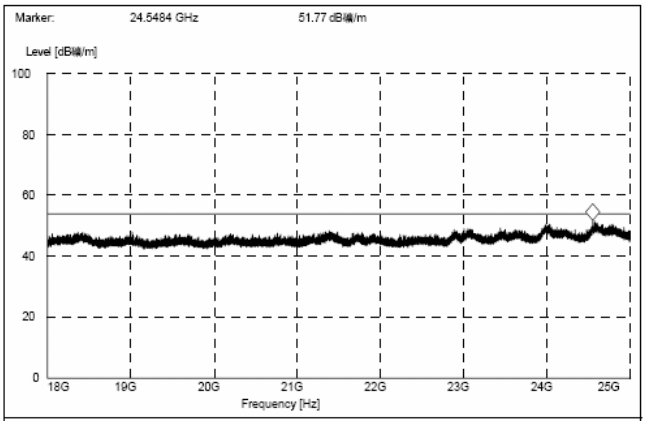


10. OFDM-2437MHz, Horizontal

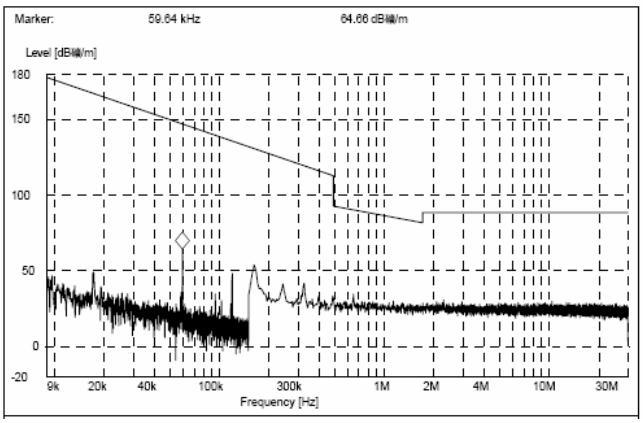


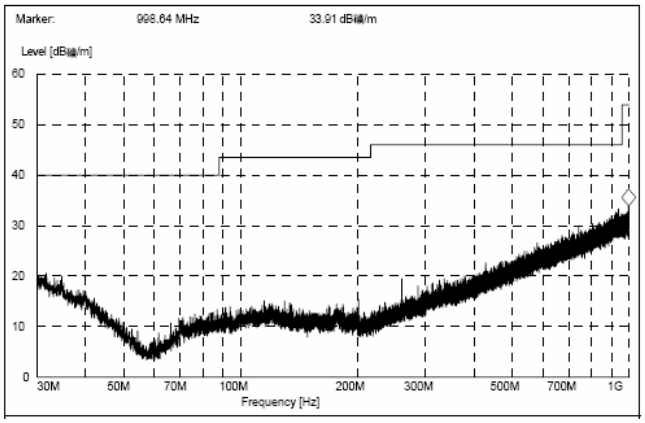


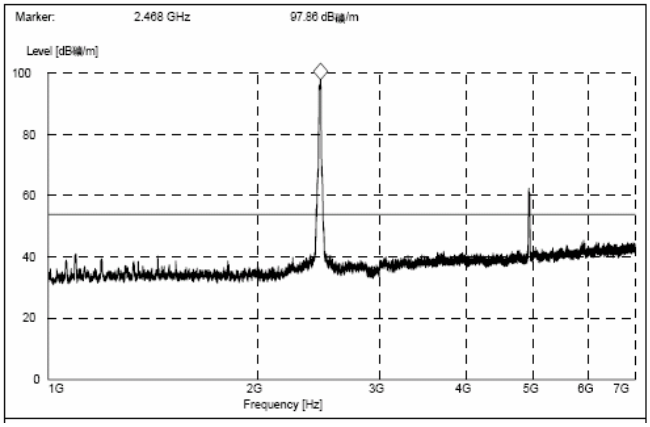


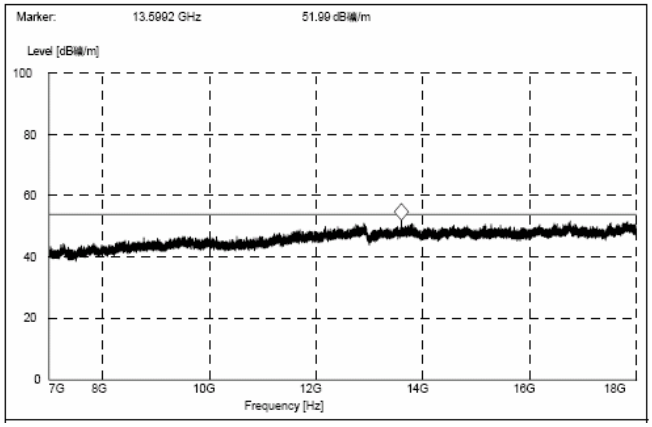


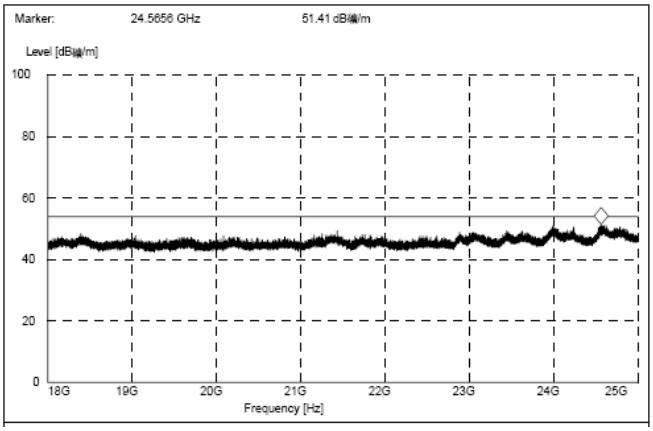
11. OFDM-2462MHz, Vertical



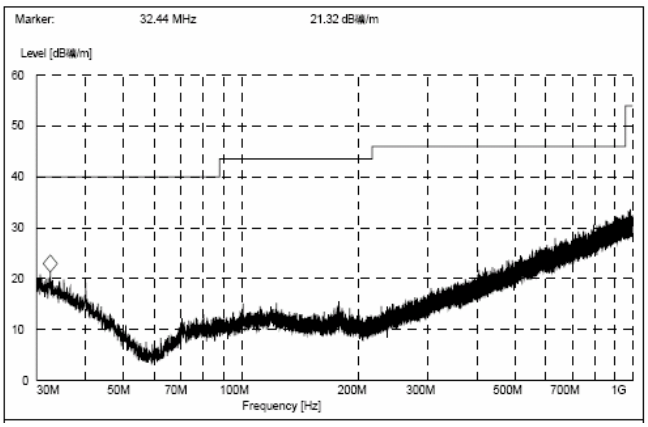


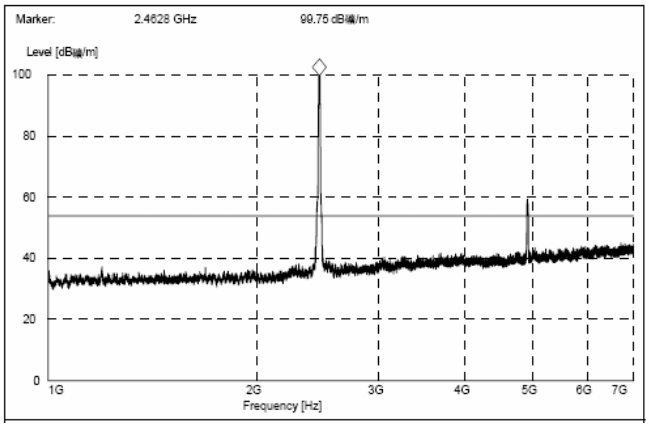


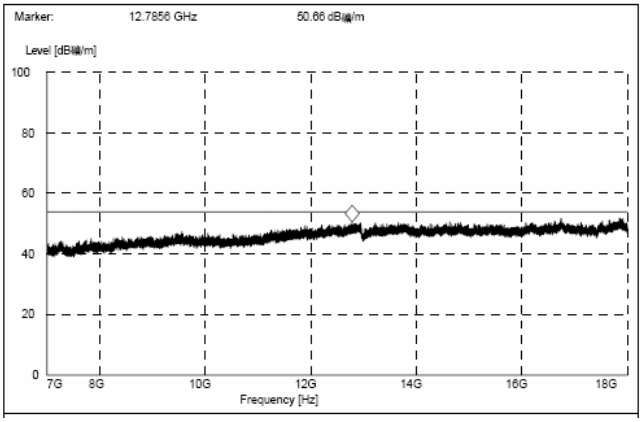


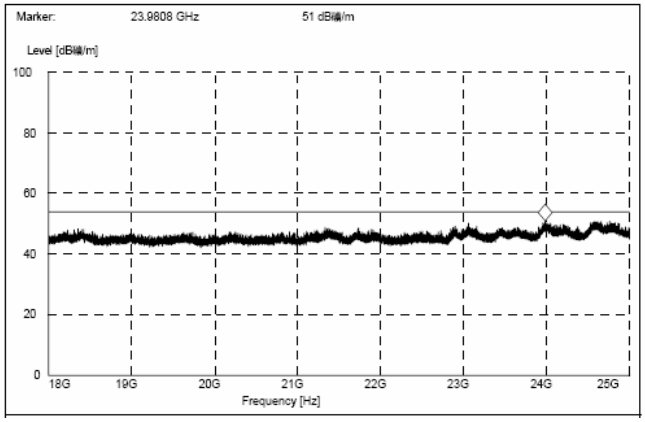


12. OFDM-2462MHz, Horizontal









5 6dB Bandwidth Measurement

5.1 Definition

According to FCC §15.247 (a) (2), Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

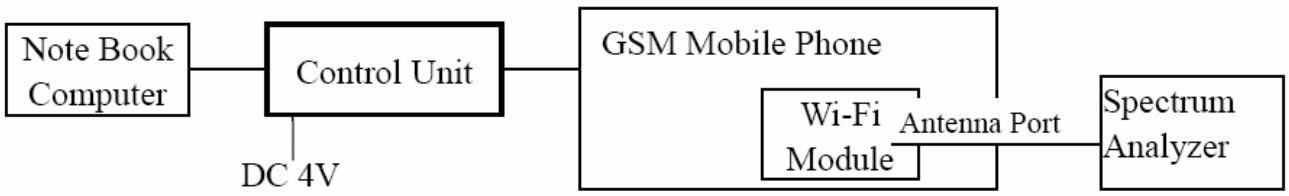
5.2 Test Procedure

a. The EUT temporary antenna port was coupled to the spectrum analyzer. The lost of the cables the test system is calibrated to correct the reading.

b. The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode.

c. The resolution bandwidth of the spectrum analyzer was set to at least 1% of the EUT emission bandwidth. RBW=100 kHz, VBW=300 kHz.

5.3 Test Setup



For the actual test configuration, please refer to the related item-Photographs of the Test Configuration.

5.4 EUT Setup and Operating Conditions

The EUT was connected to and controlled by a control unit provided by the applicant.

The EUT was set to continuous Wi-Fi transmitting at maximum power and maximum data rate, e.g., 11 Mbps for IEEE802.11b (DSSS) and 54 Mbps for IEEE802.11g (OFDM).

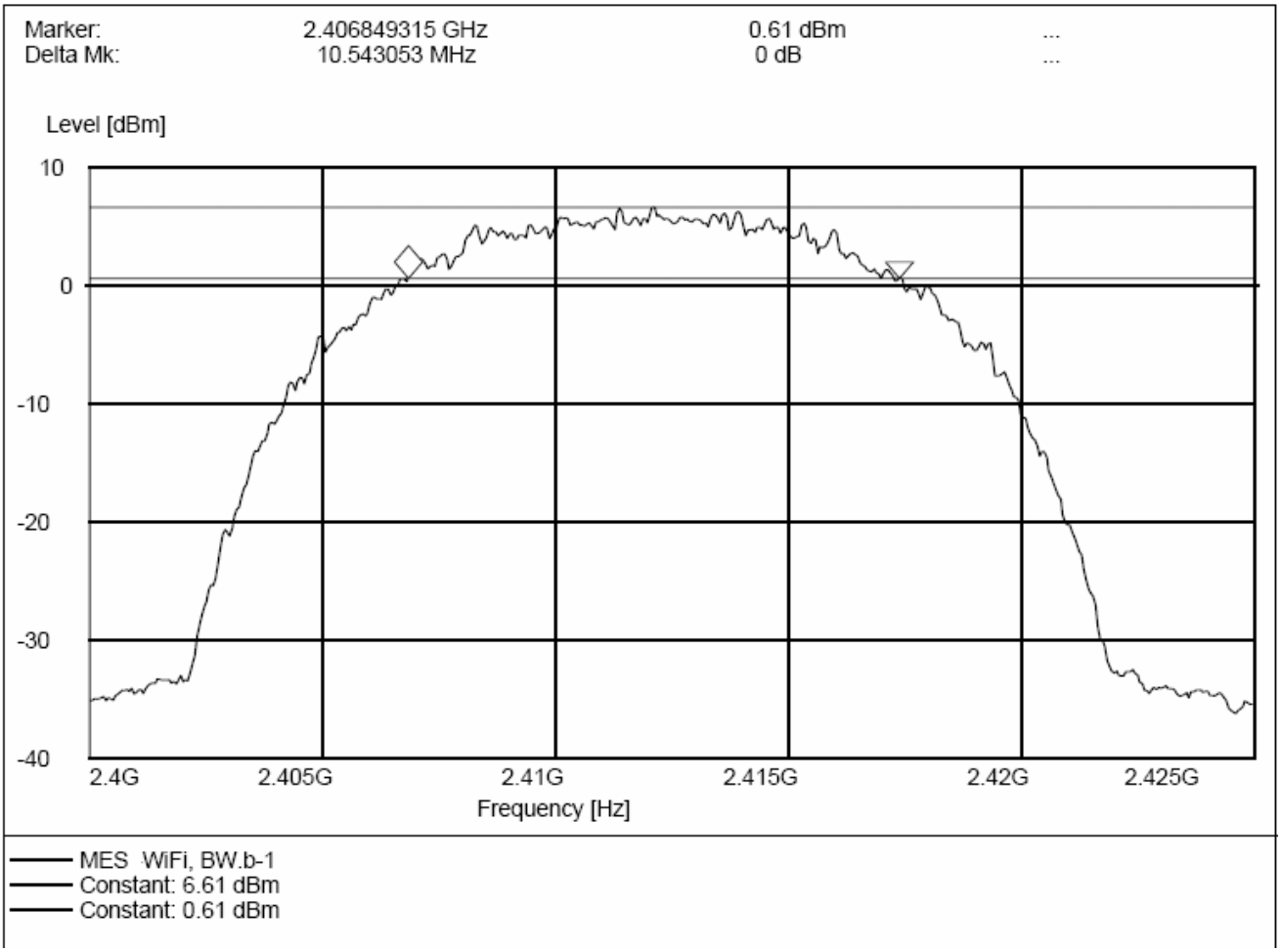
At each operating mode, lowest, middle and highest channels were measured respectively.

5.5 Test Results

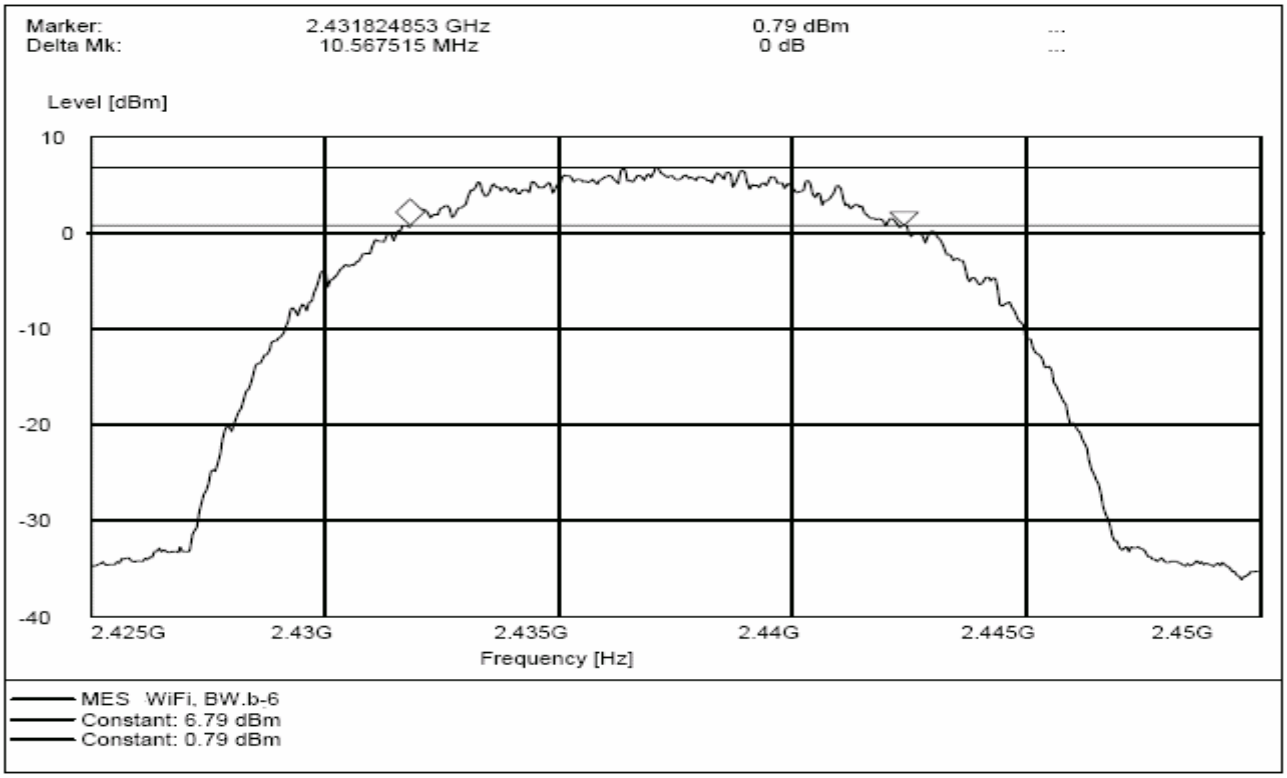
EUT Modulation	EUT Operating Frequency (MHz)	6dB Bandwidth (MHz)	FCC Requirement
DSSS	2412	10.5	>500 kHz
	2437	10.6	
	2462	10.6	
OFDM	2412	16.7	
	2437	16.5	
	2462	16.6	

6dB Bandwidth Test Plots

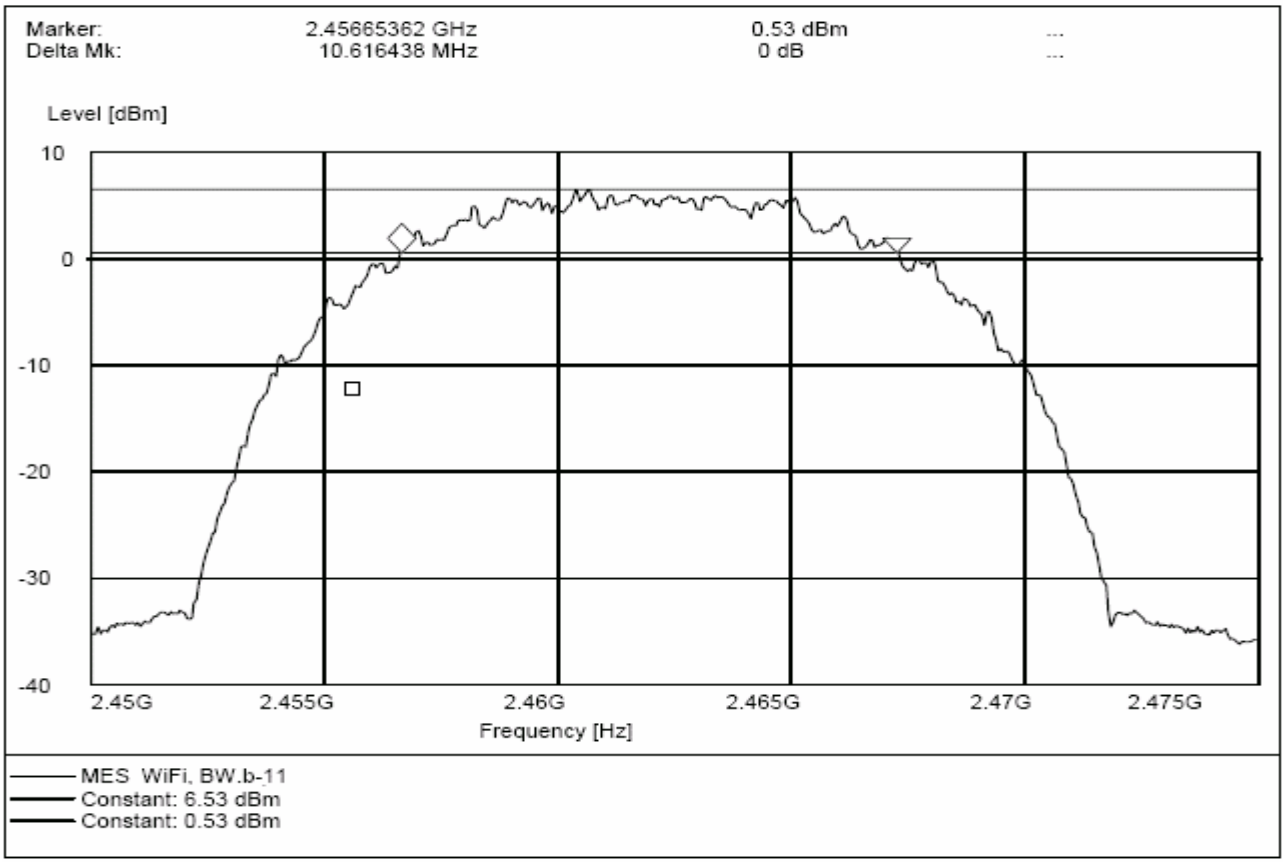
1. DSSS-2412MHz



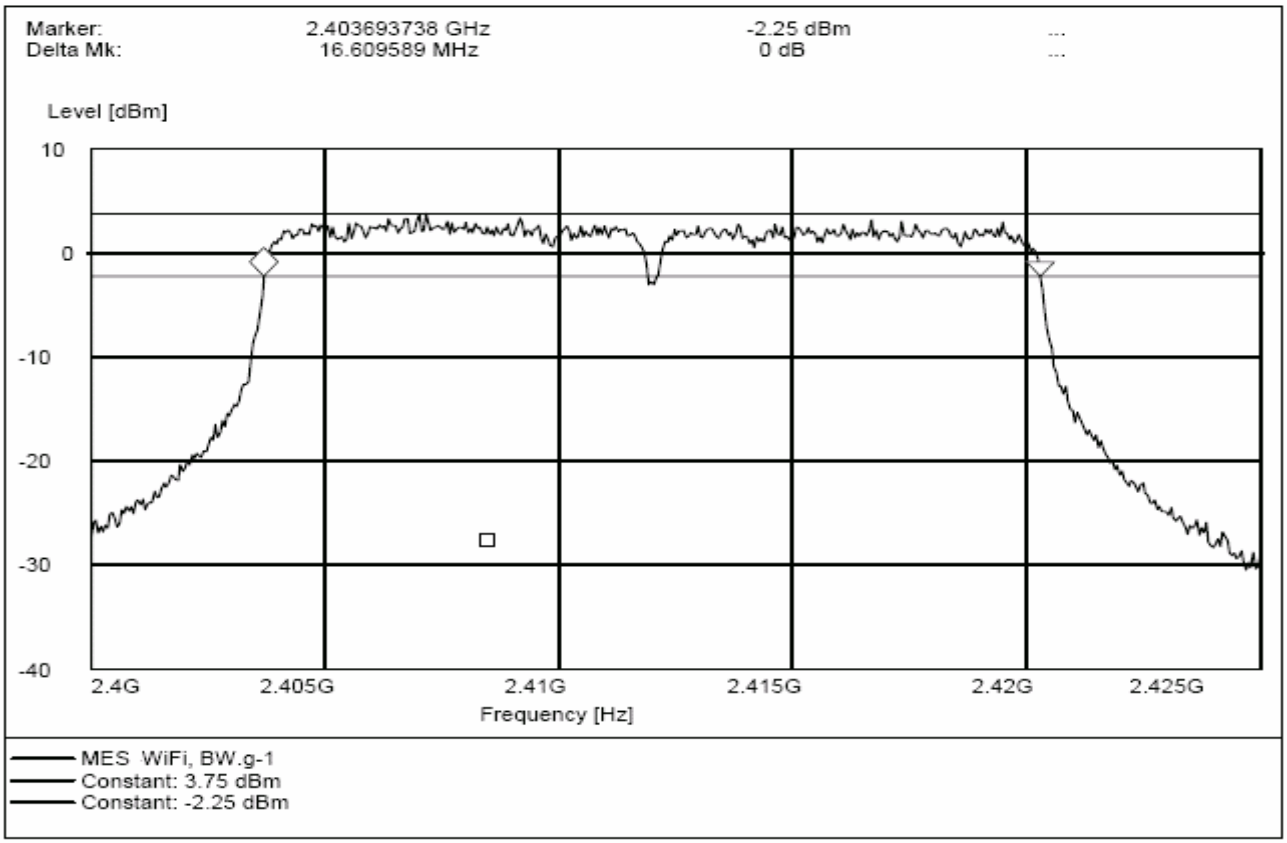
2. DSSS-2437MHz



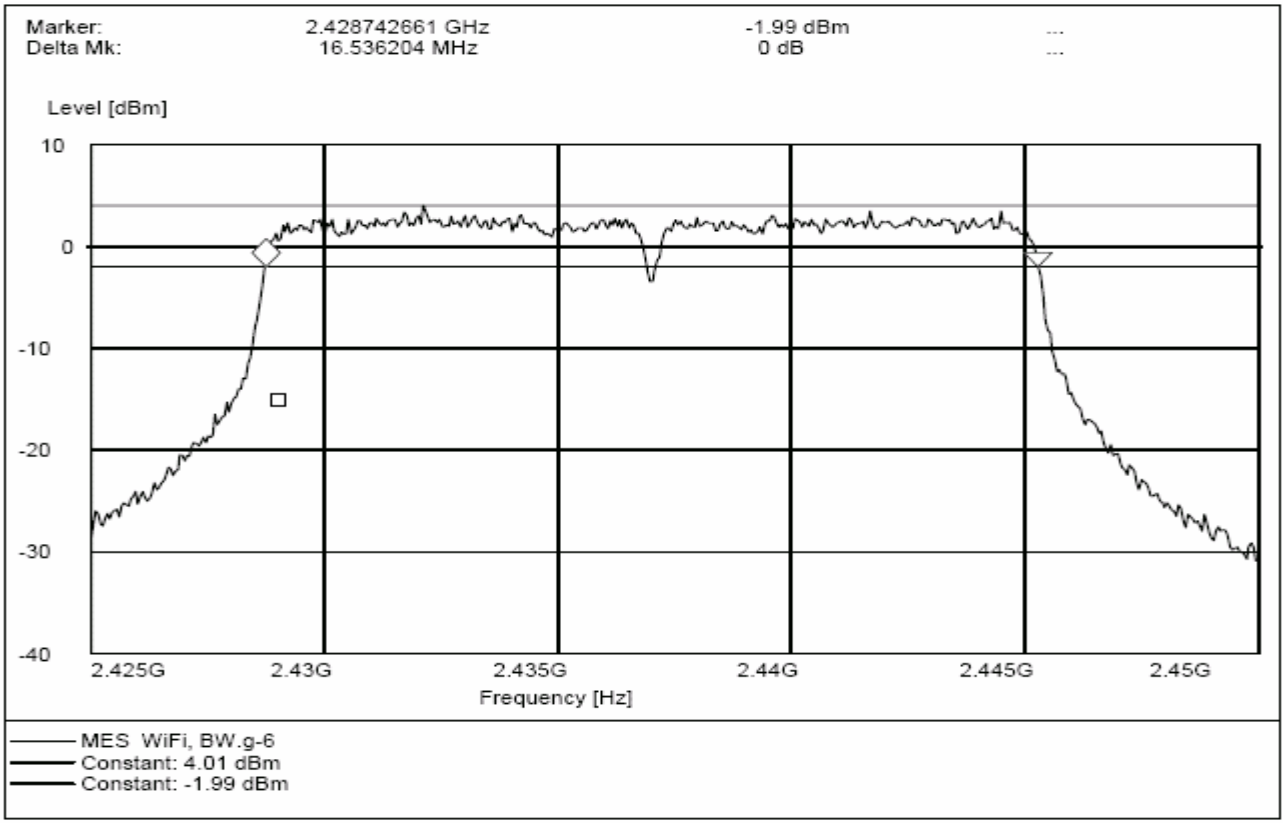
3. DSSS-2462MHz



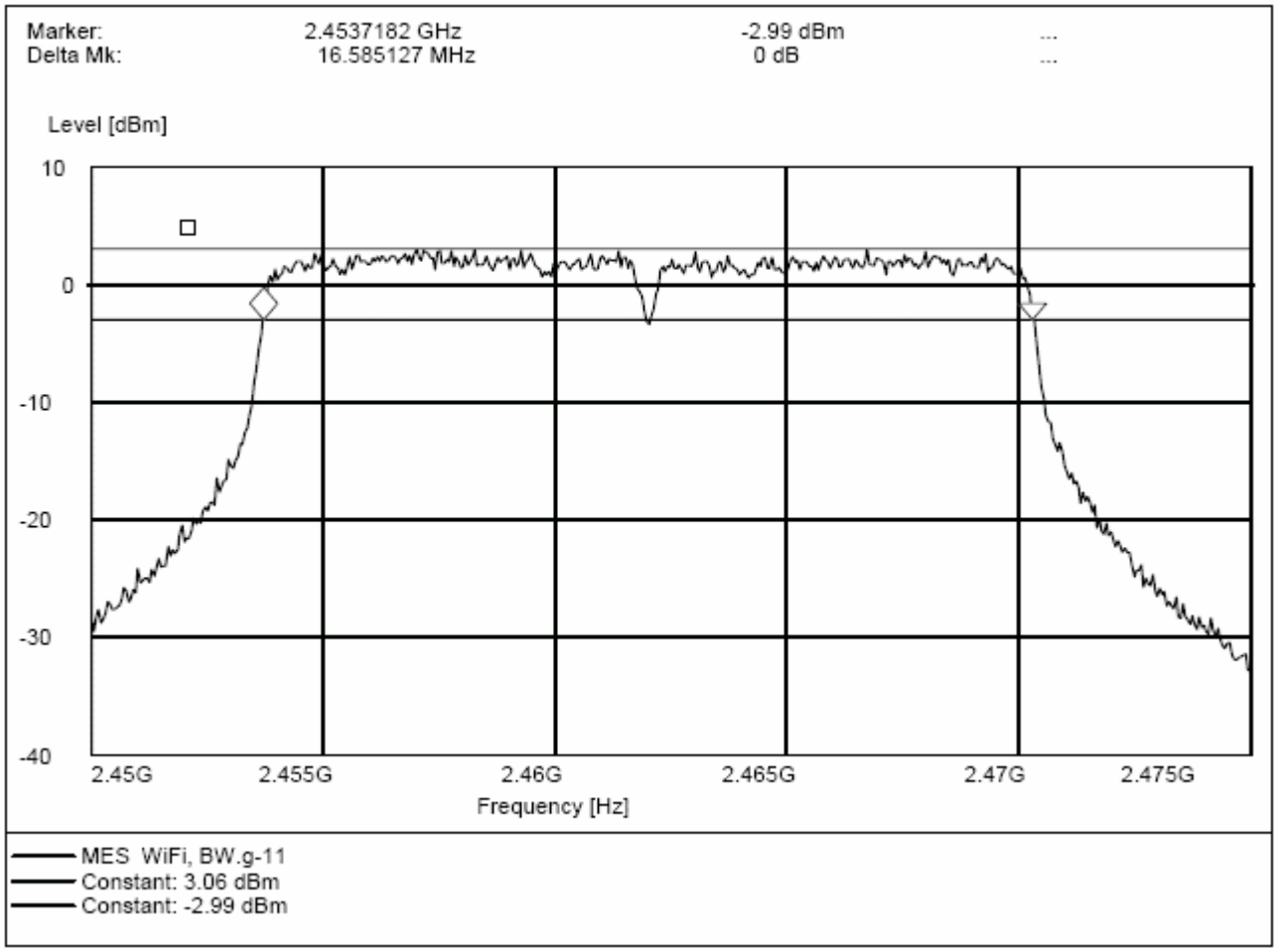
4. OFDM-2412MHz



5. OFDM-2437MHz



6. OFDM-2462MHz



6 Maximum Peak Output Power

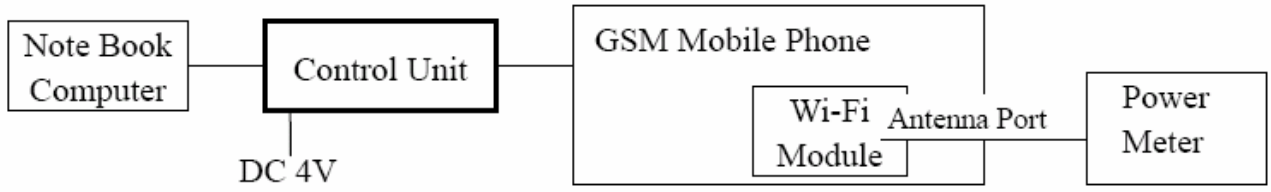
6.1 Requirement of the standard

According to FCC §15.247 (b) (3), the maximum peak output power of systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands is 1 Watt.

6.2 Test Procedure

The EUT temporary antenna port was coupled to the power meter. The radio frequency load attached to the EUT antenna terminal was 50 Ohm. The lost of the cables the test system is calibrated to correct the reading.

6.3 Test Setup



6.4 EUT Setup and Operating Conditions

Same as 5.4

6.5 Test Results

Modulation	Operating Frequency (MHz)	Peak Output Power		Limit (W)
		(dBm)	(W)	
DSSS	2412	16.34	0.043	1
	2437	16.30	0.043	1
	2462	16.41	0.044	1
OFDM	2412	20.32	0.108	1
	2437	20.61	0.115	1
	2462	20.50	0.112	1

7 Band Edge

7.1 Requirement of the standard

According to FCC §15.247(c), 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 a radiated measurement.

7.2 Test Procedure

a. The EUT was coupled to the spectrum analyzer and the base station simulator through a power divider. The radio frequency load attached to the EUT antenna terminal was 50 Ohm. The lost of the cables the test system is calibrated to correct the reading.

b. The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode.

c. According to the standard requirement, the resolution bandwidth of the spectrum analyzer was set to RBW=100 kHz, VBW=300 kHz.

7.3 Test Setup

Same as 5.3

7.4 EUT Setup and Operating Conditions

Same as 5.4

7.5 Test Results

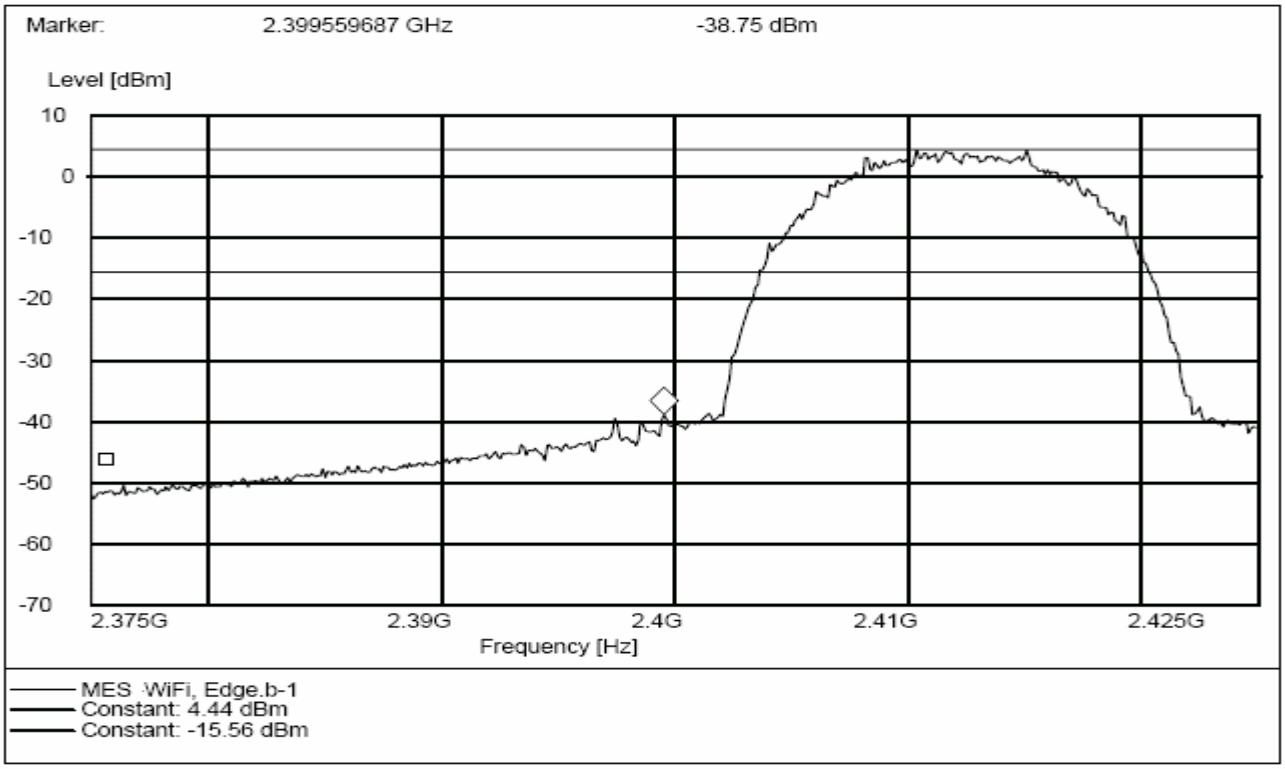
The radio frequency power beyond the band edges was 20dB below the peak output power, measured with 100 kHz resolution bandwidth. Refer to the following test plots.

Field strength of band edge emission falling in adjacent restricted bands (2483.5MHz - 2500MHz) per section 15.205(a) was calculated according to Marker-Delta Method DA 00-705. Refer to chapter 4.5 for step 1 in-band field strength measurement. Calculation results in the following table shows compliance with the radiated emission limits specified in Section 15.209(a).

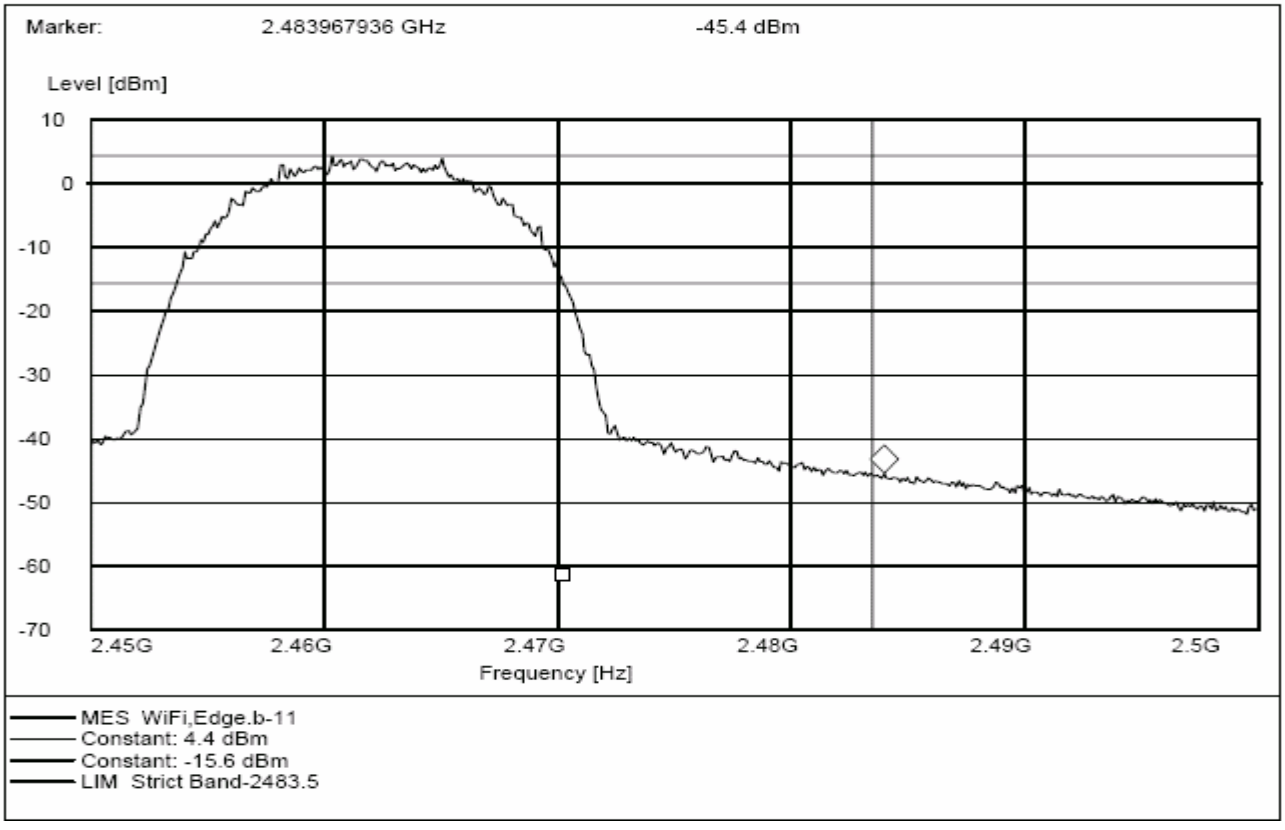
EUT Modulation	Fundamental Emission			Freq. of Max. Band Edges Emission (MHz)	Delta Marker (dB)	Calculated Max. Band Edges Emission Level (dBμV/m)	Limit (dBμV/m)
	Freq.	Field Strength (dBμV/m)	Detector				
DSSS	2462	102.31	PK	2483.97	49.8	52.51	74
DSSS	2462	93.57	AV	2483.97	49.8	43.77	54
OFDM	2462	100.26	PK	2483.57	47.02	53.24	74
OFDM	2462	87.09	AV	2483.57	47.02	40.07	54

Band Edge Test Plots

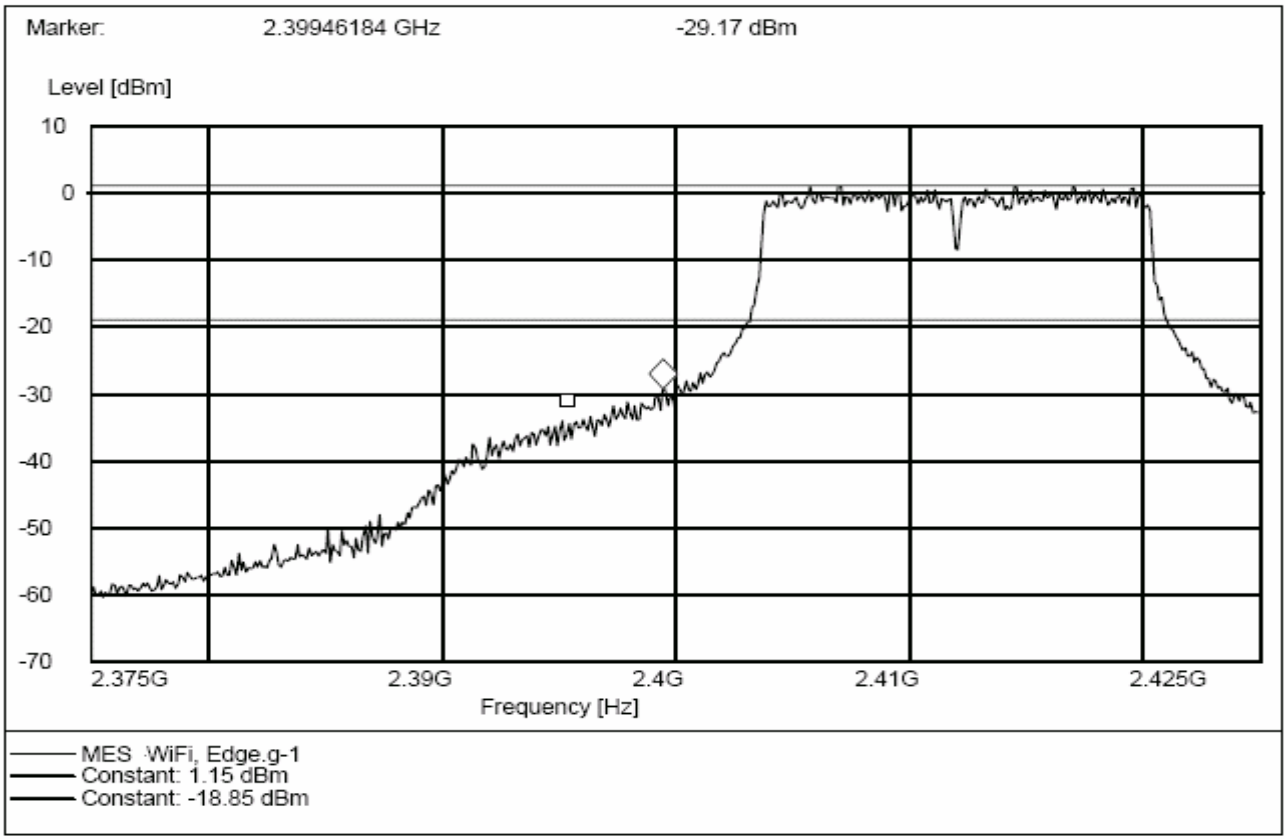
1. DSSS-2412MHz



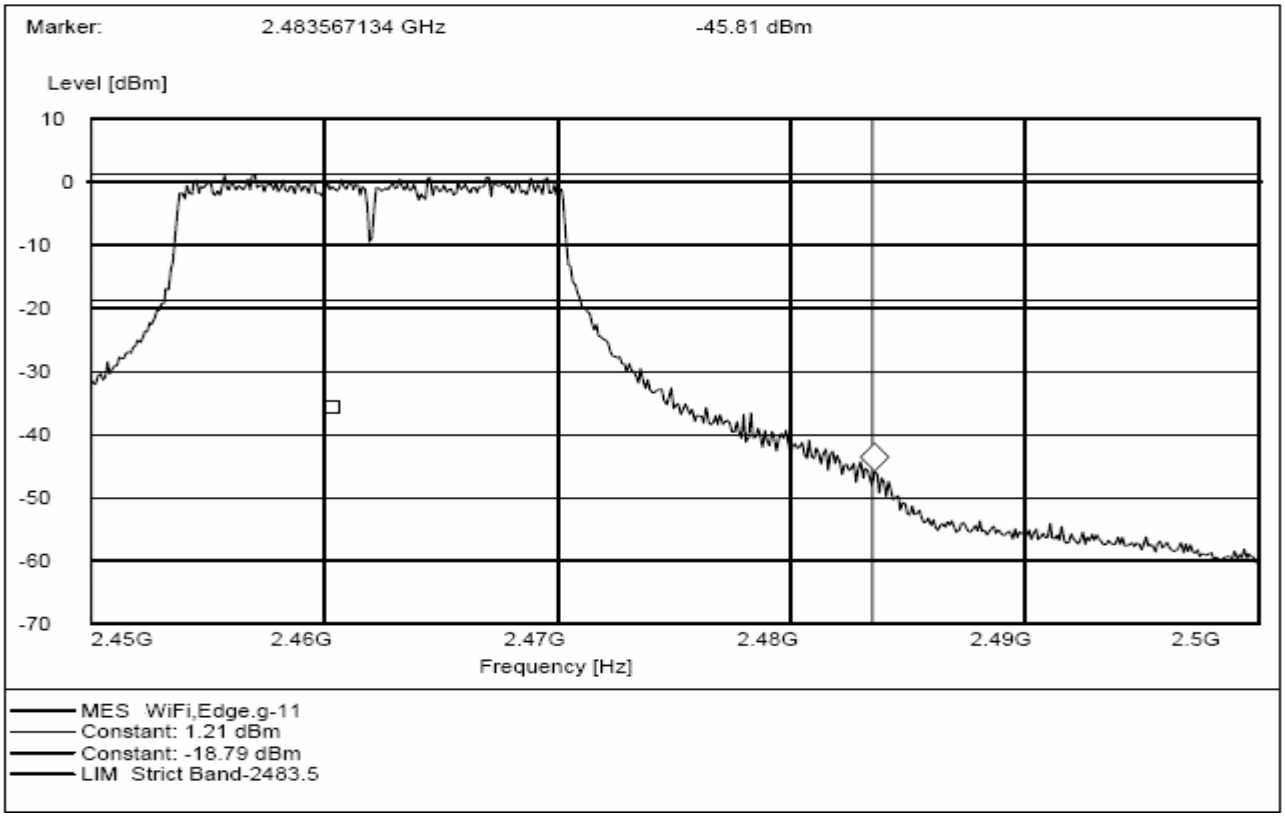
2. DSSS-2462MHz



3. OFDM-2412MHz



4. OFDM-2462MHz



8 Conducted Spurious Emission

8.1 Requirement of the standard

According to FCC §15.247(c), 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 a radiated measurement.

8.2 Test Procedure

a. The EUT was coupled to the spectrum analyzer and the base station simulator through a power divider. The radio frequency load attached to the EUT antenna terminal was 50 Ohm. The lost of the cables the test system is calibrated to correct the reading.

b. The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode.

c. The spurious Emissions from 9 KHz to 10th harmonic of the fundamental frequency were researched.

d. According to the standard requirement, the resolution bandwidth of the spectrum analyzer was set to RBW=100 kHz, VBW=300 kHz.

8.3 Test Setup

Same as 5.3

8.4 EUT Setup and Operating Conditions

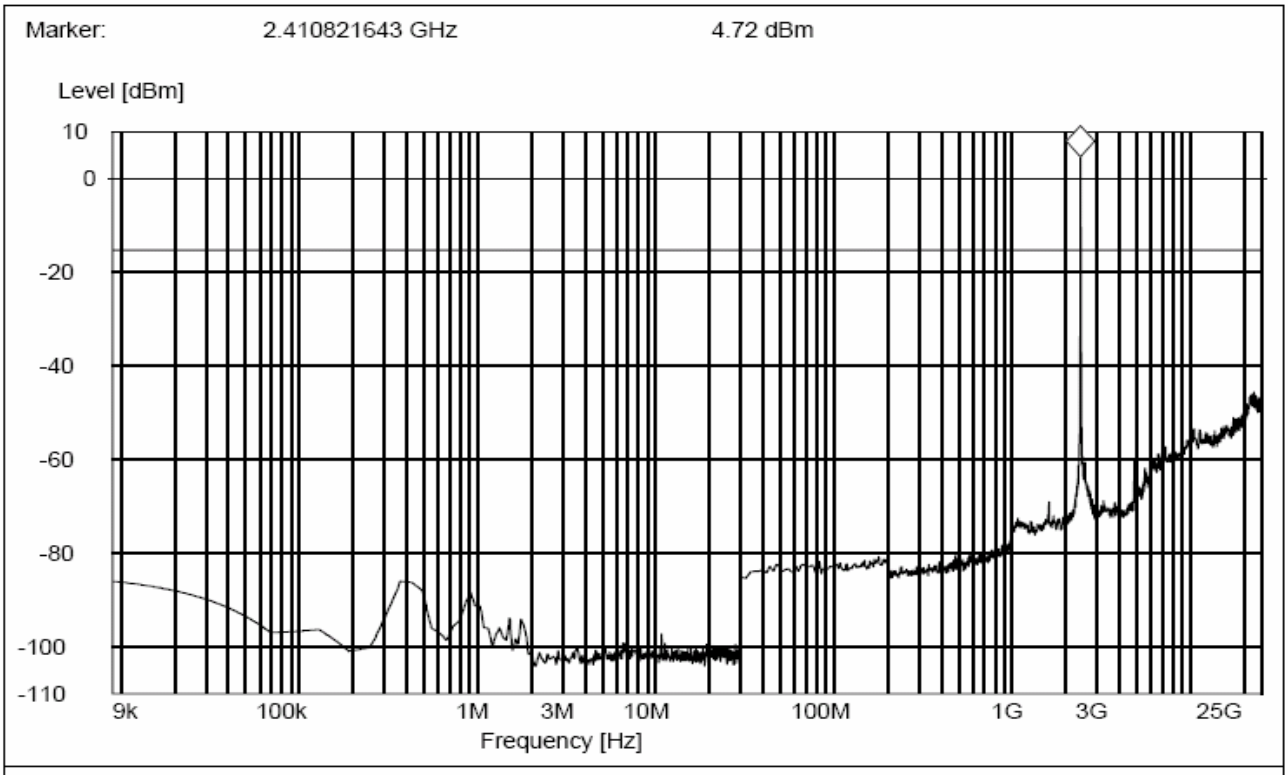
Same as 5.4

8.5 Test Results

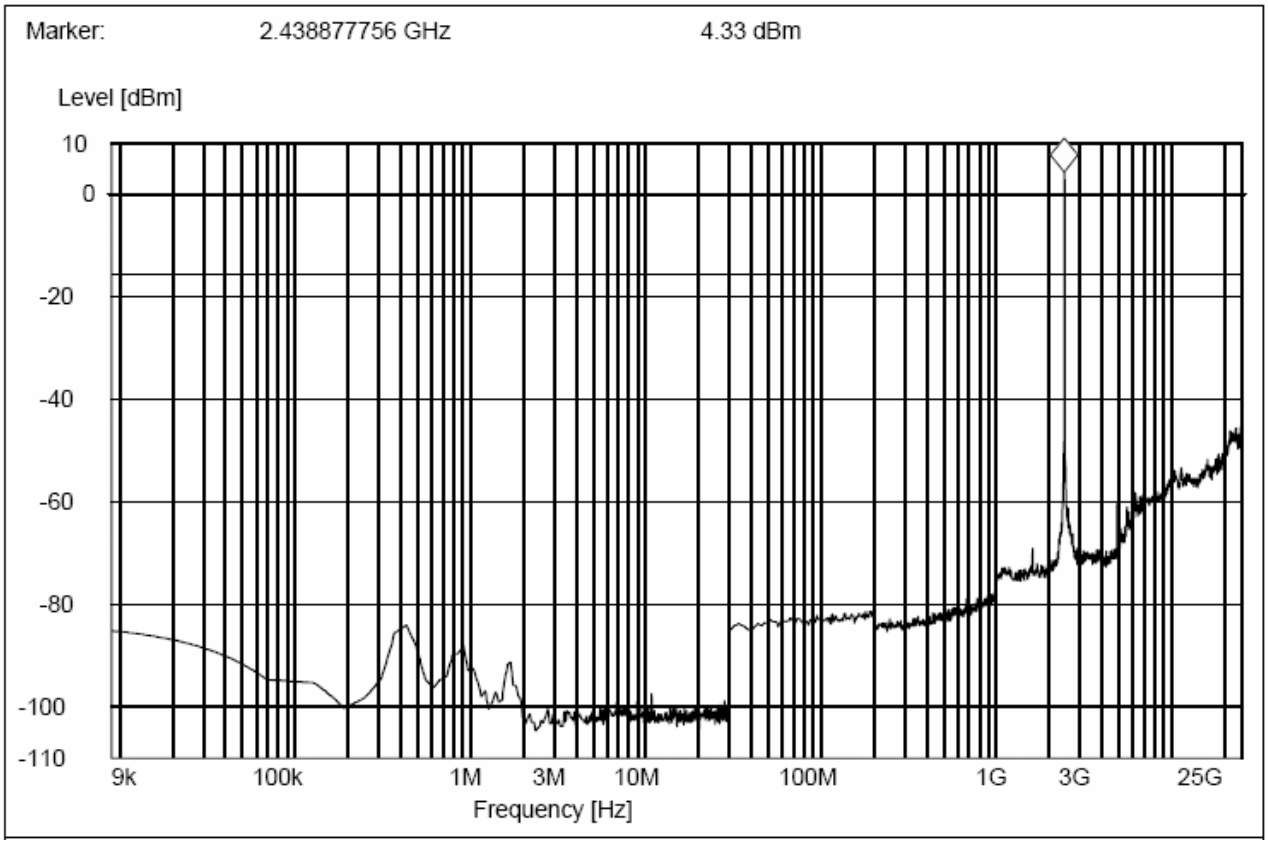
The following test plots shows that spurious emissions in the whole frequency range were bellow the 20dBc limit line.

Conducted Spurious Emission Test Plots

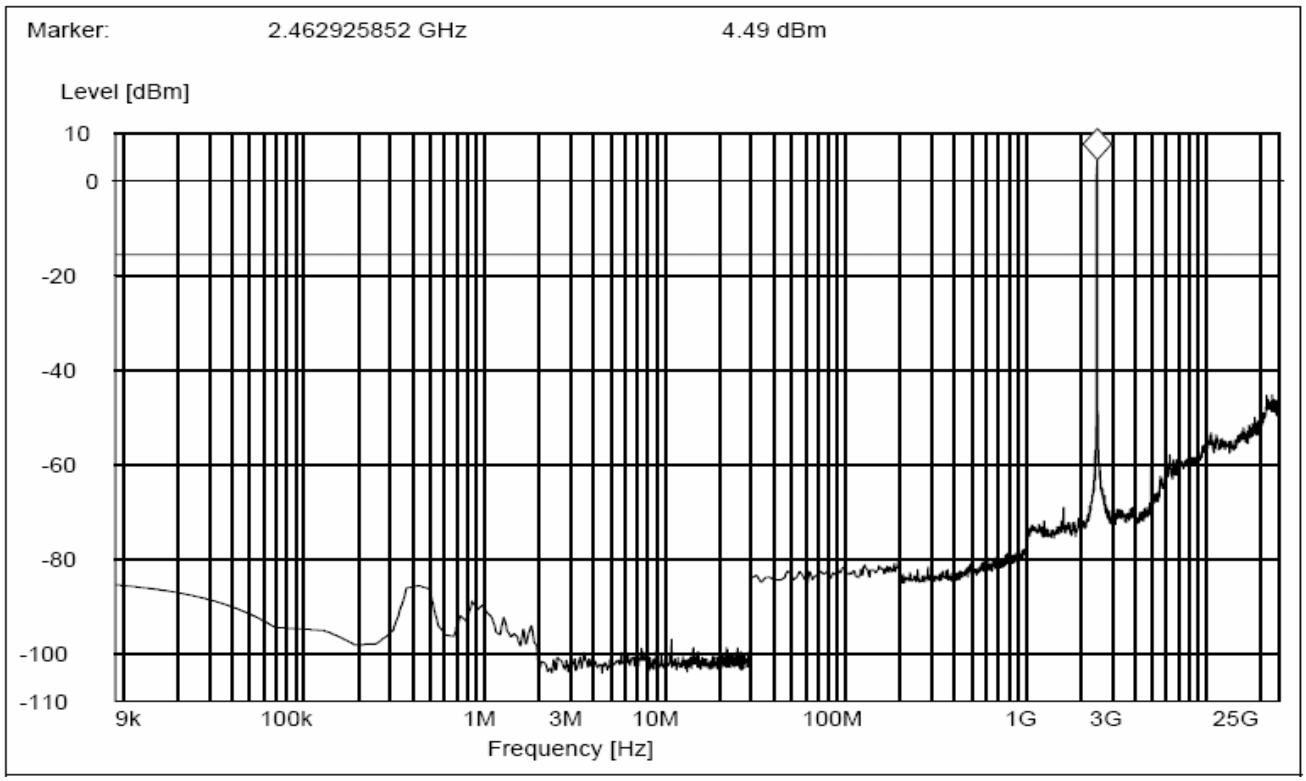
1. DSSS-2412MHz



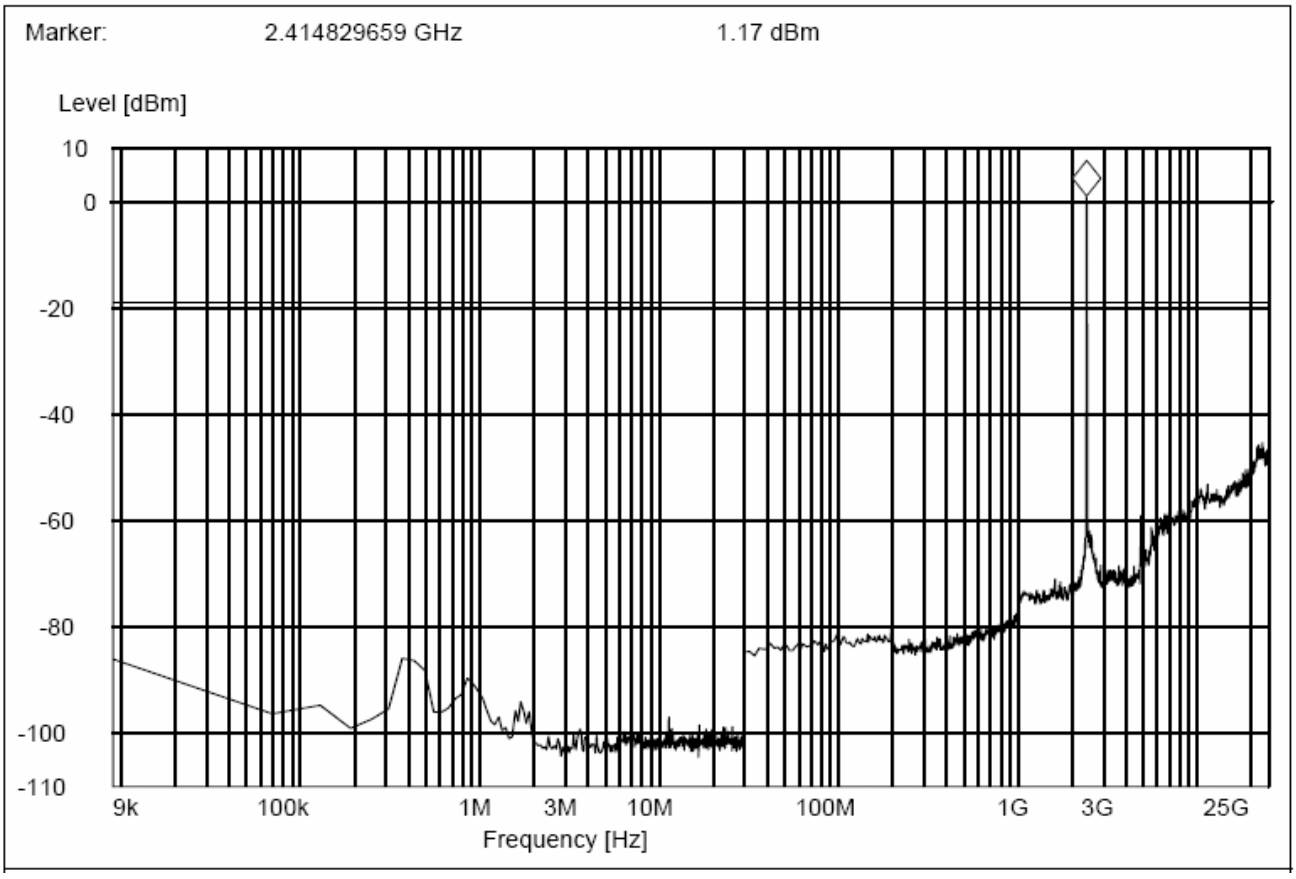
2. DSSS-2437MHz



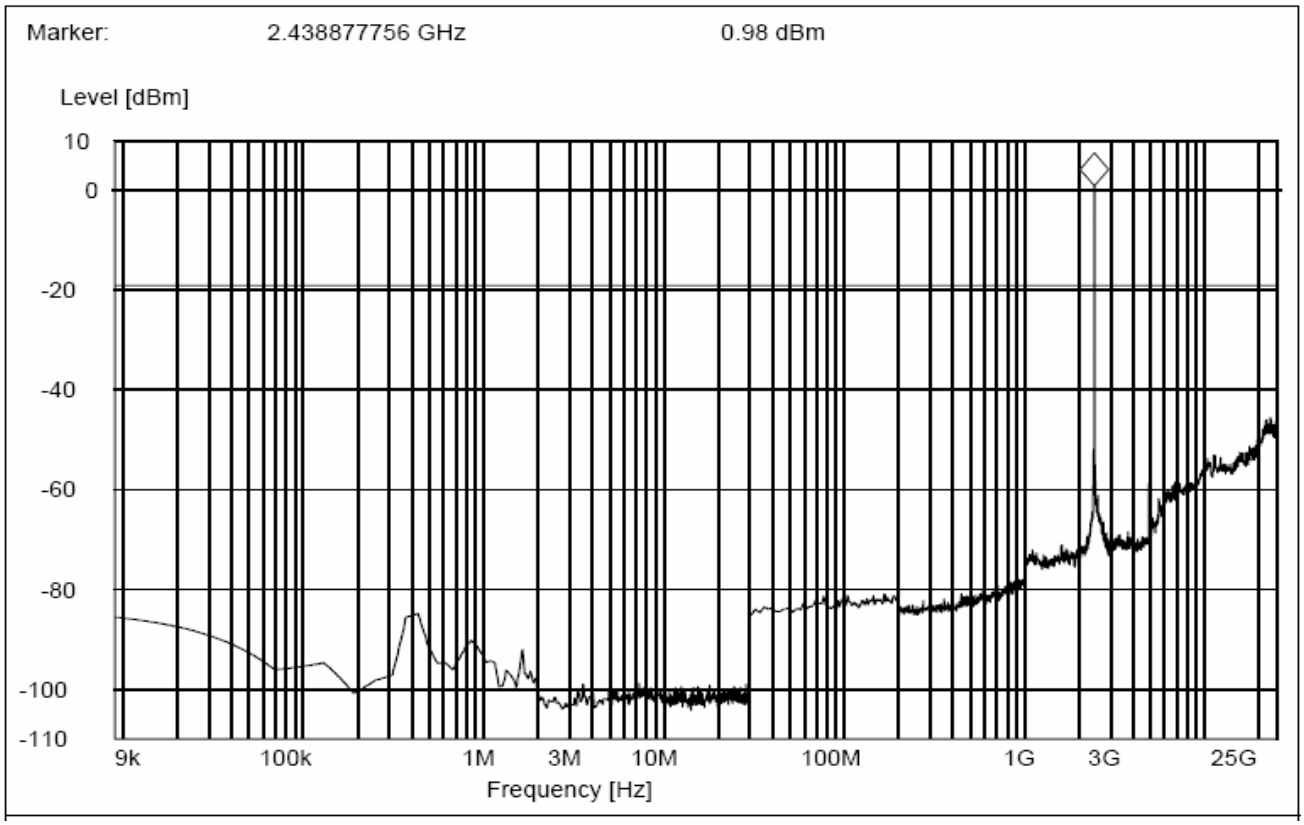
3. DSSS-2462MHz



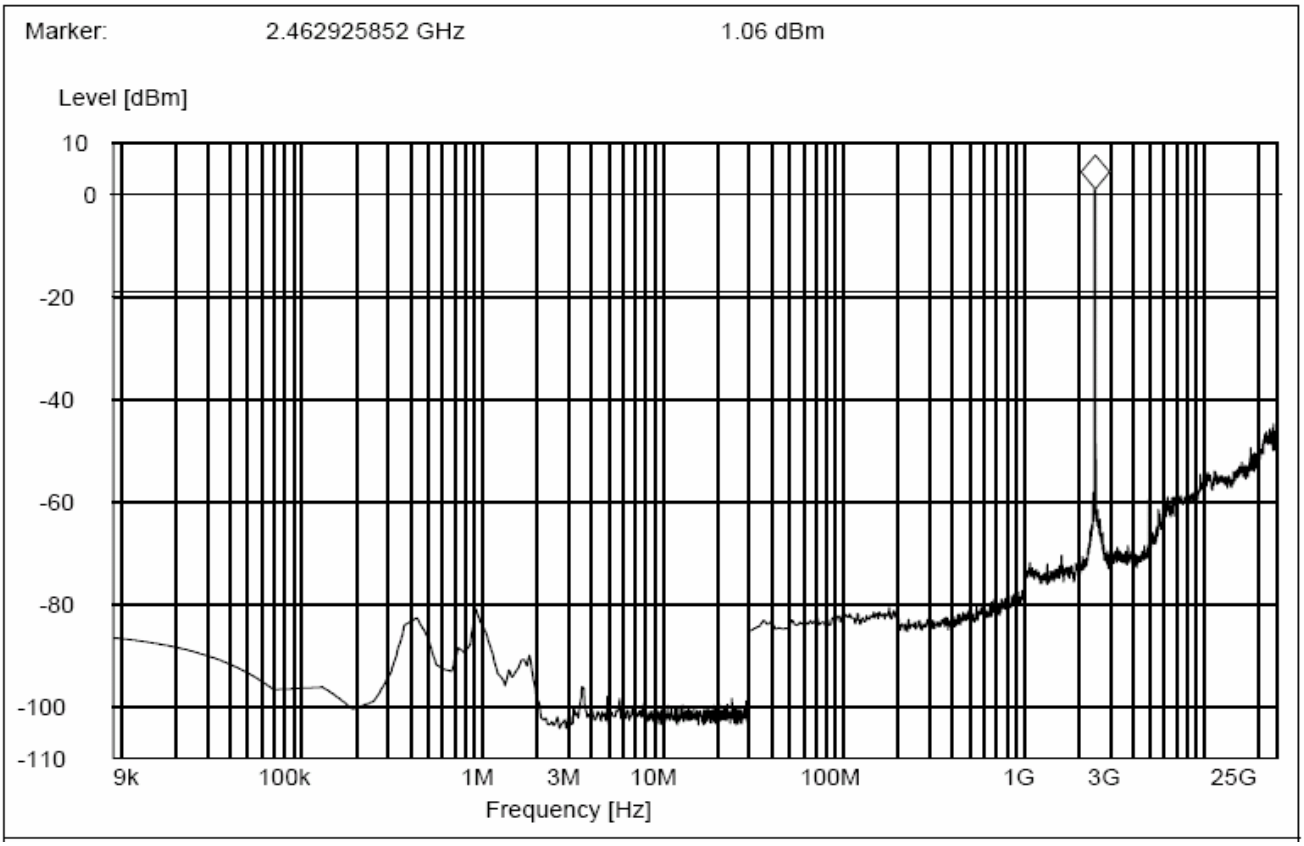
4. OFDM-2412MHz



5. OFDM-2437MHz



6. OFDM-2462MHz



9 Power Spectrum Density Measurement

9.1 Limits of Power Spectrum Density

According to FCC §15.247(d), for digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

9.2 Test Procedure

a. The EUT temporary antenna port was coupled to the spectrum analyzer. The lost of the cables the test system is calibrated to correct the reading.

b. The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode.

c. The resolution bandwidth of the spectrum analyzer was set to 3 kHz.

9.3 Test Setup

Same as 5.3

9.4 EUT Setup and Operating Conditions

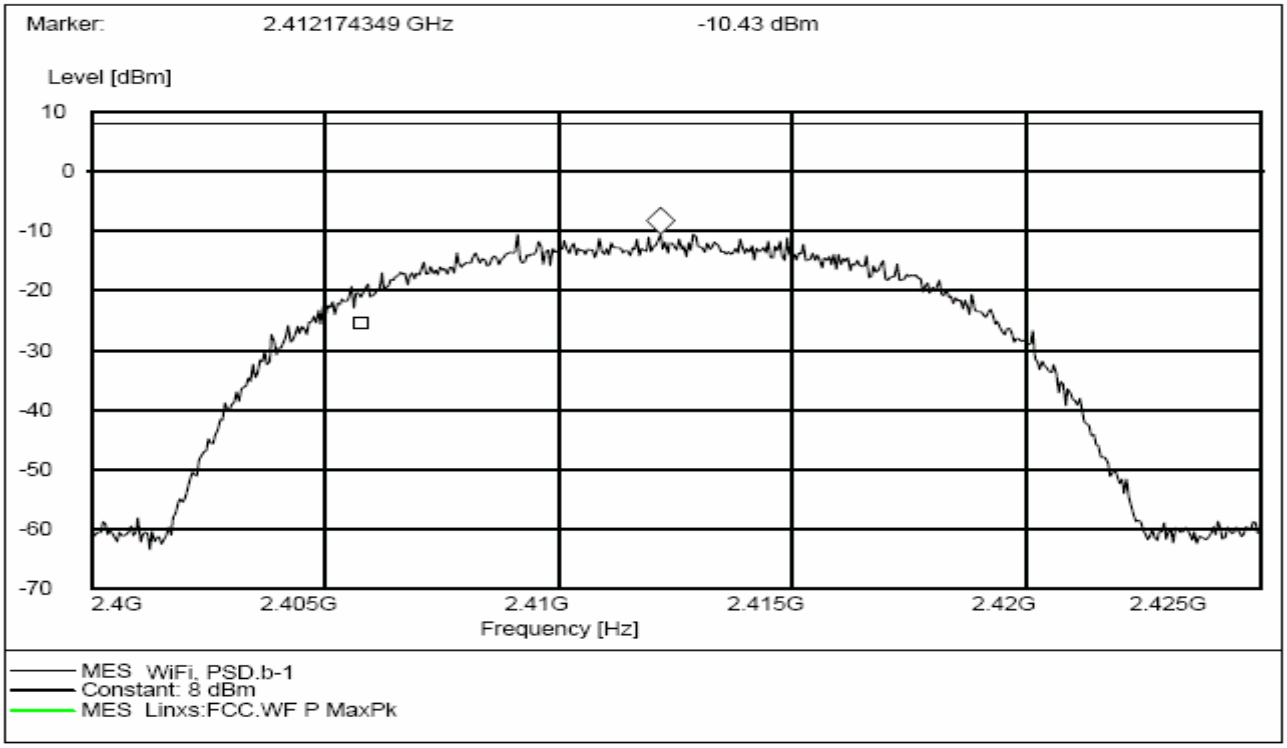
Refer to 5.4.

9.5 Test Results

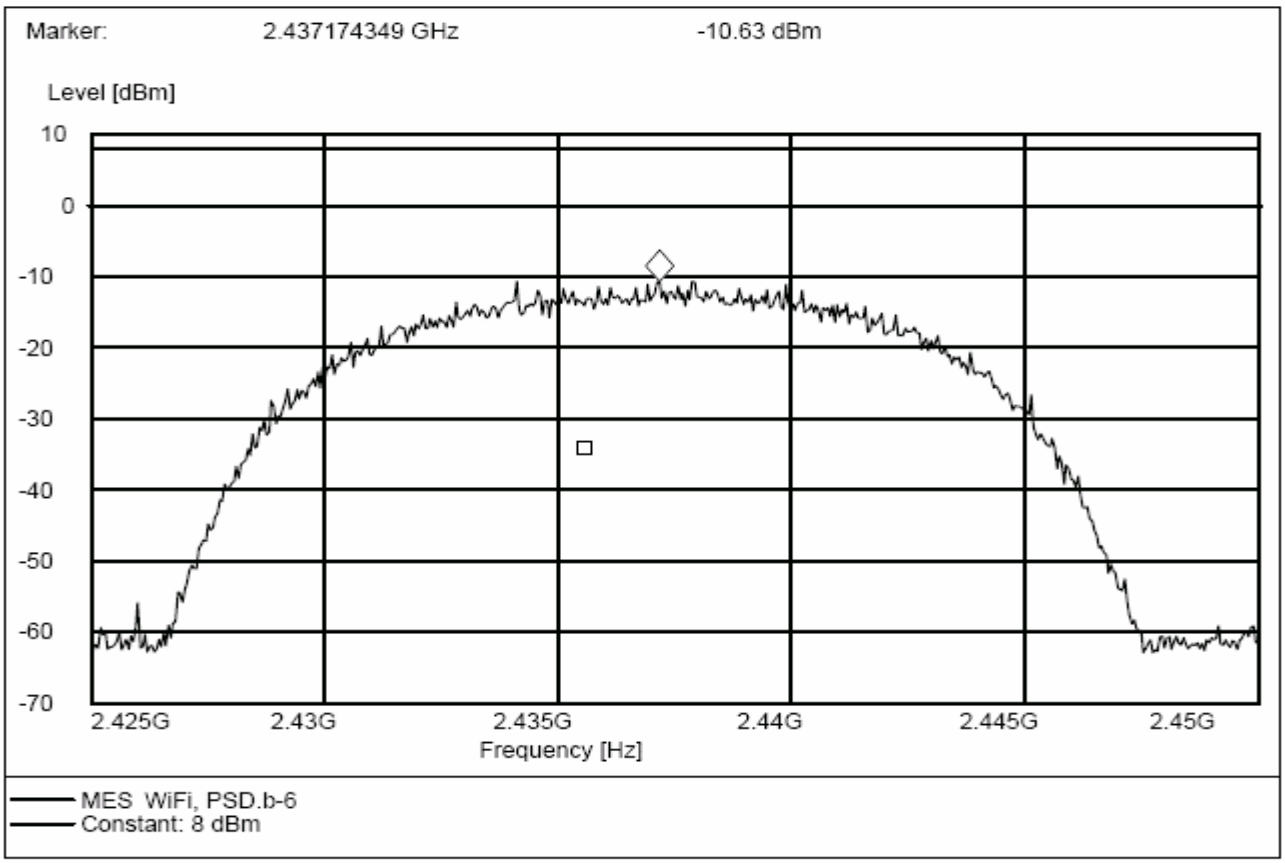
EUT Modulation	Operating Frequency (MHz)	Power spectrum density (dBm/3kHz)	Limit (dBm/3kHz)
DSSS	2412	-10.43	8
	2437	-10.63	
	2462	-10.53	
OFDM	2412	-10.43	
	2437	-12.37	
	2462	-10.52	

Plots of Power Spectrum Density

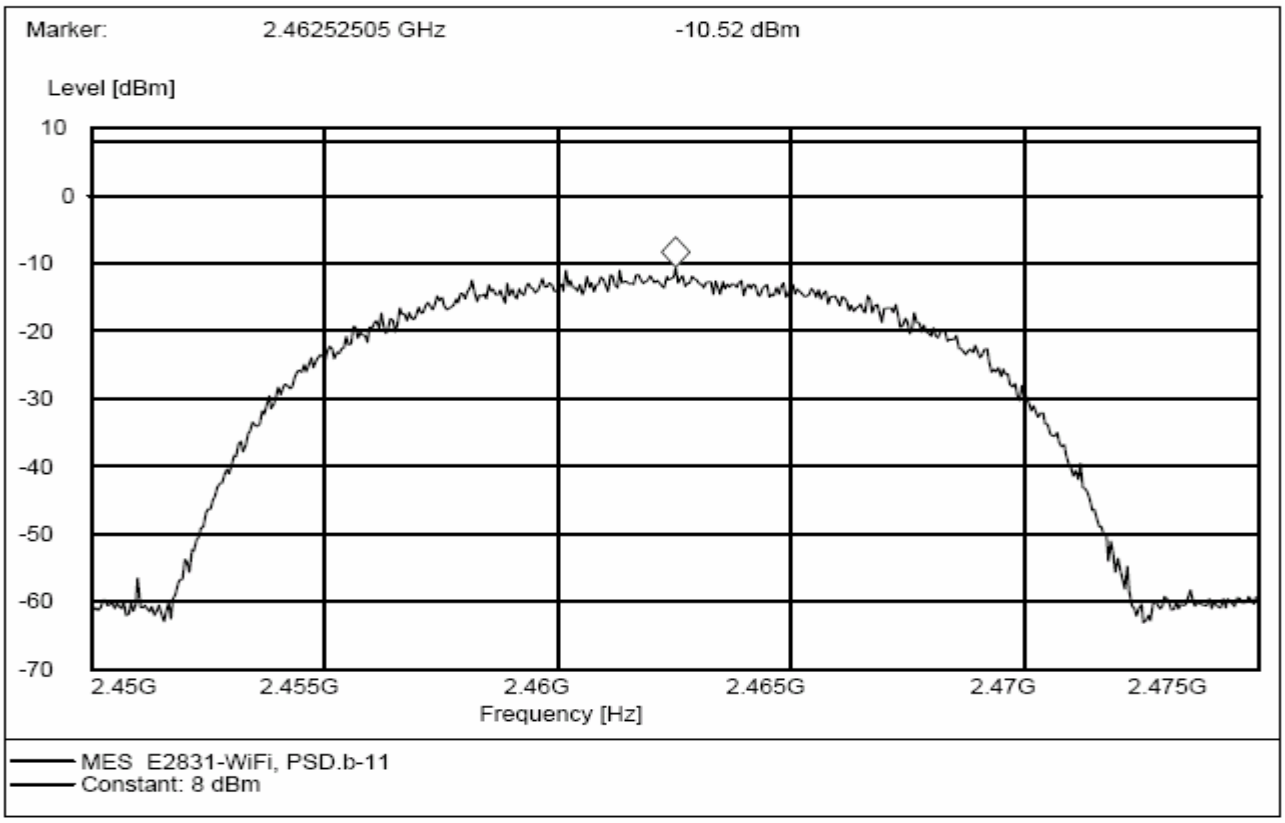
1. DSSS-2412MHz



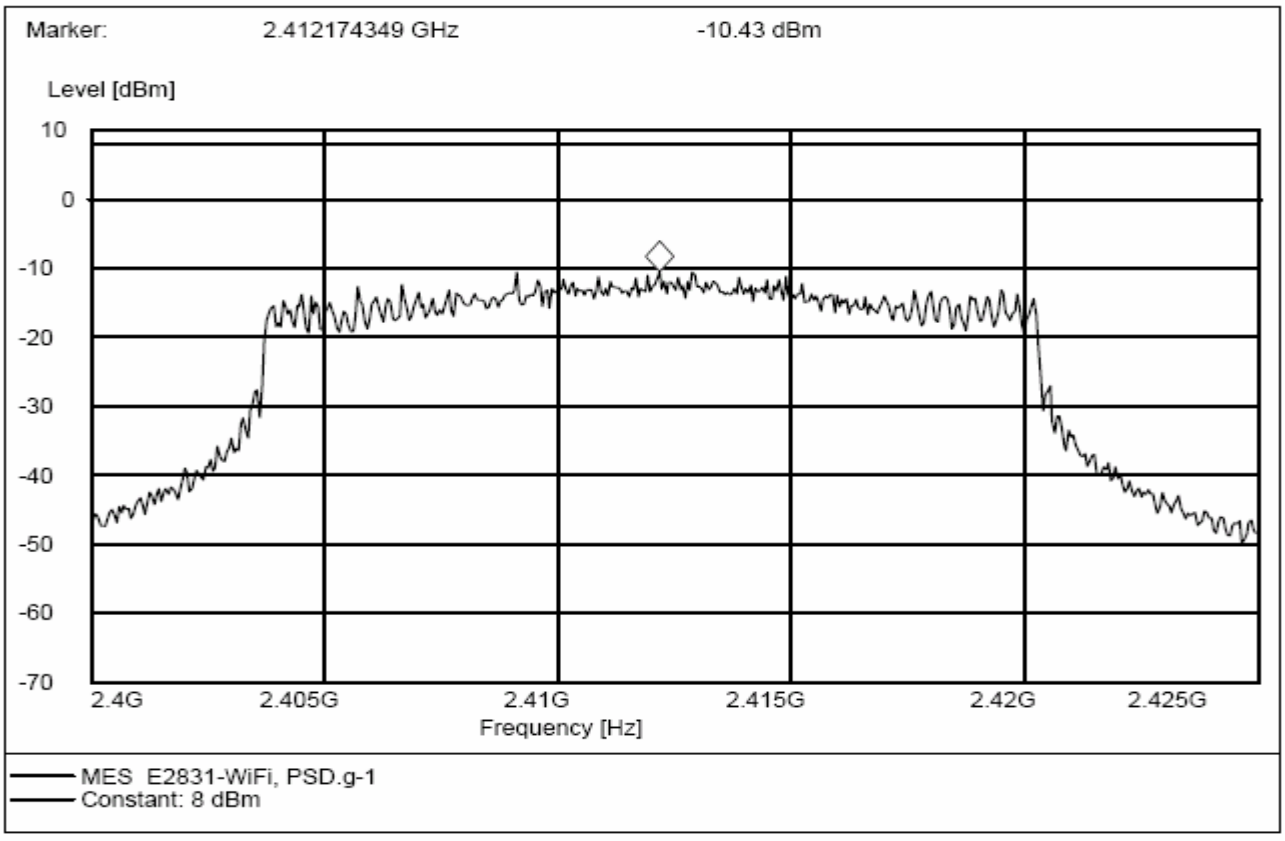
2. DSSS-2437MHz



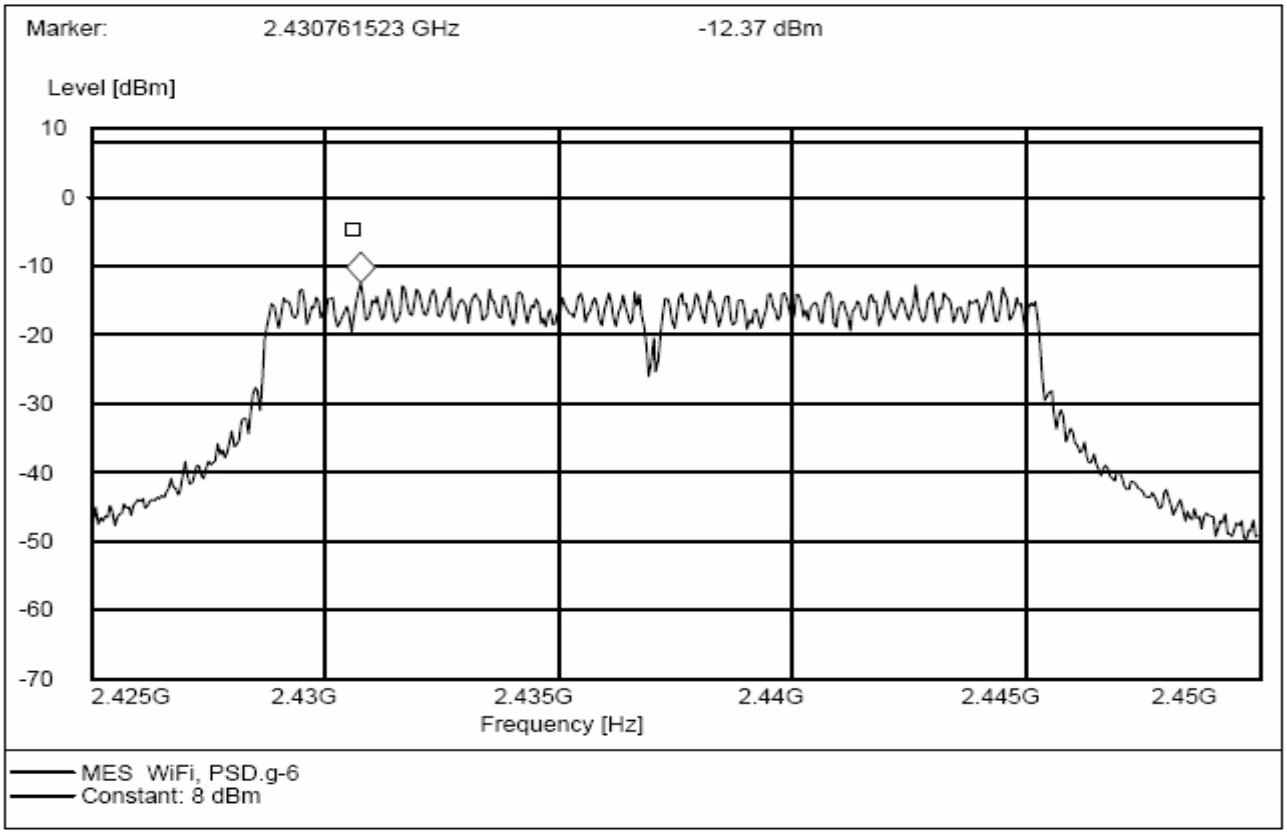
3. DSSS-2462MHz



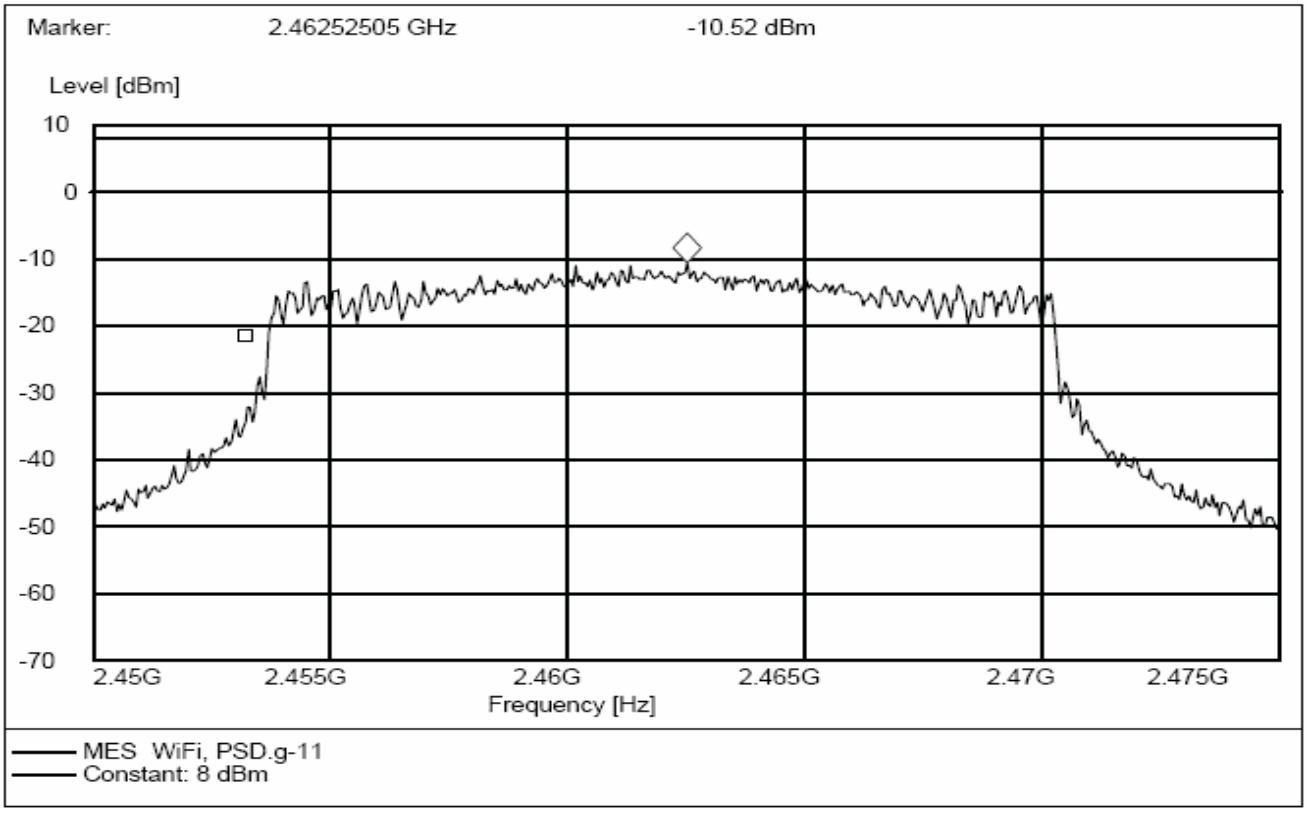
4. OFDM-2412MHz



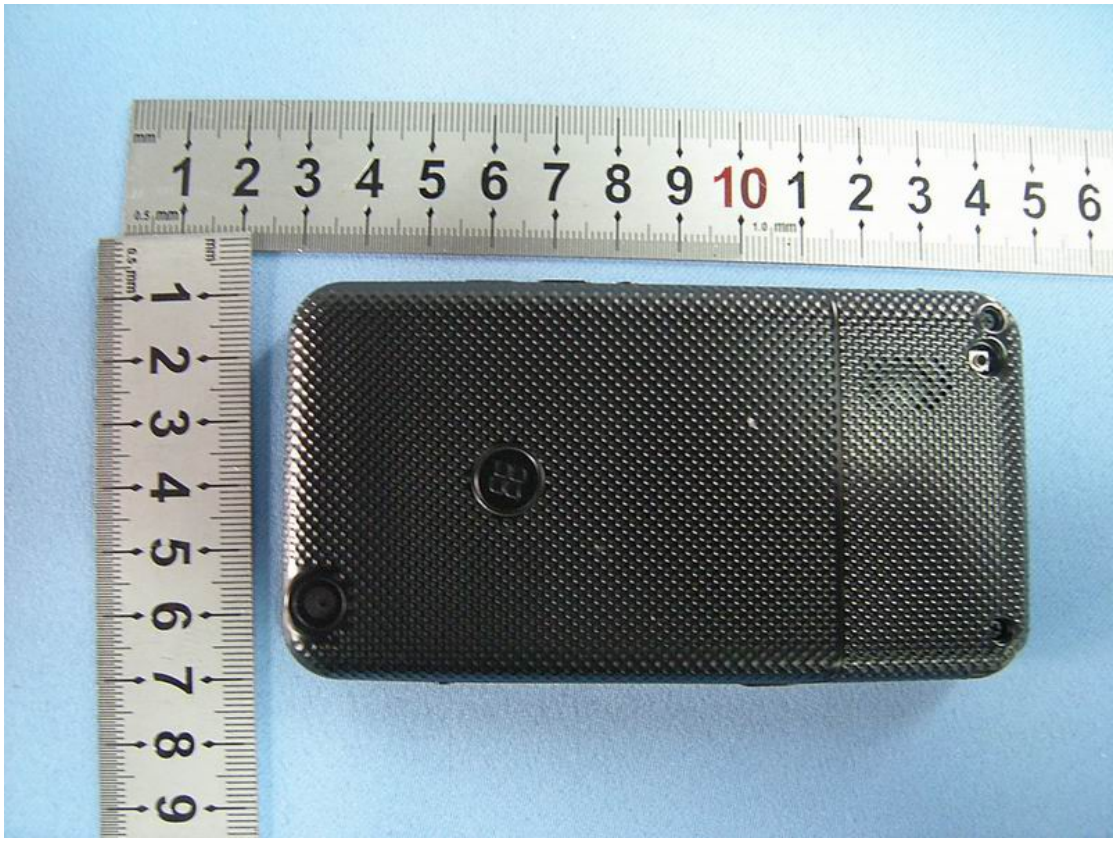
5. OFDM-2437MHz

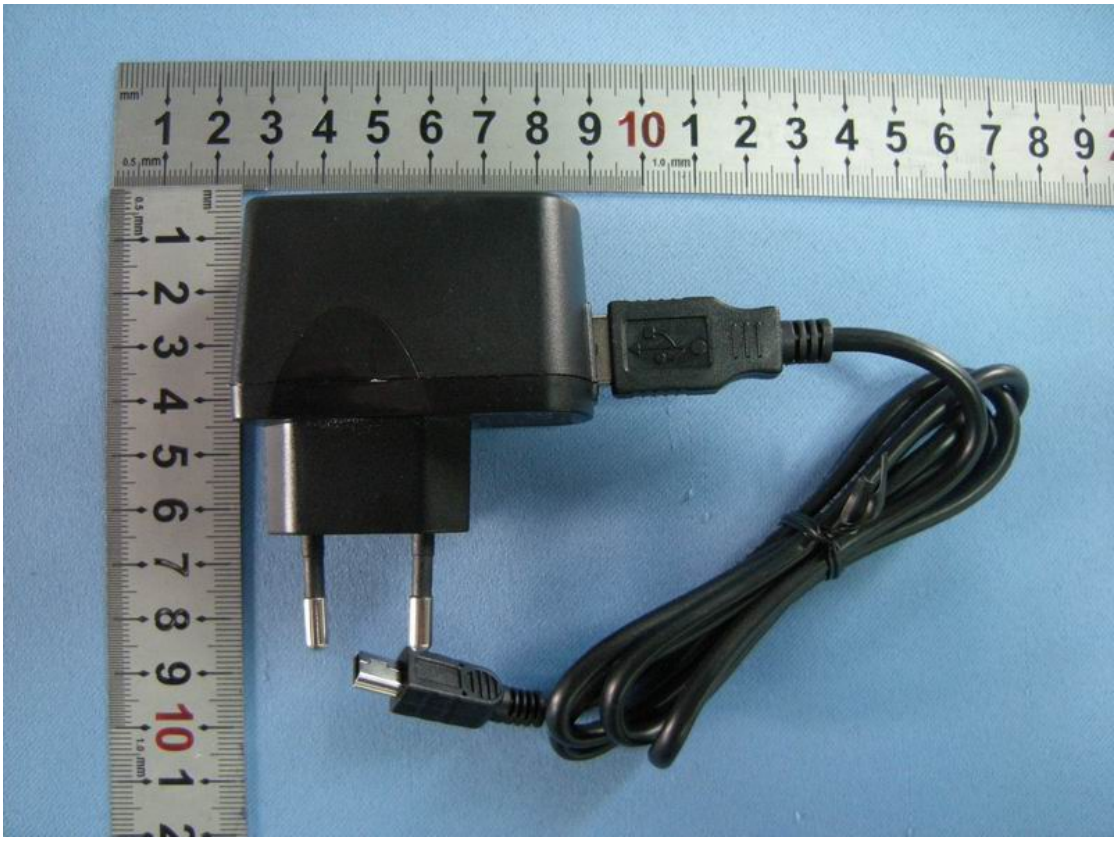


6. OFDM-2462MHz

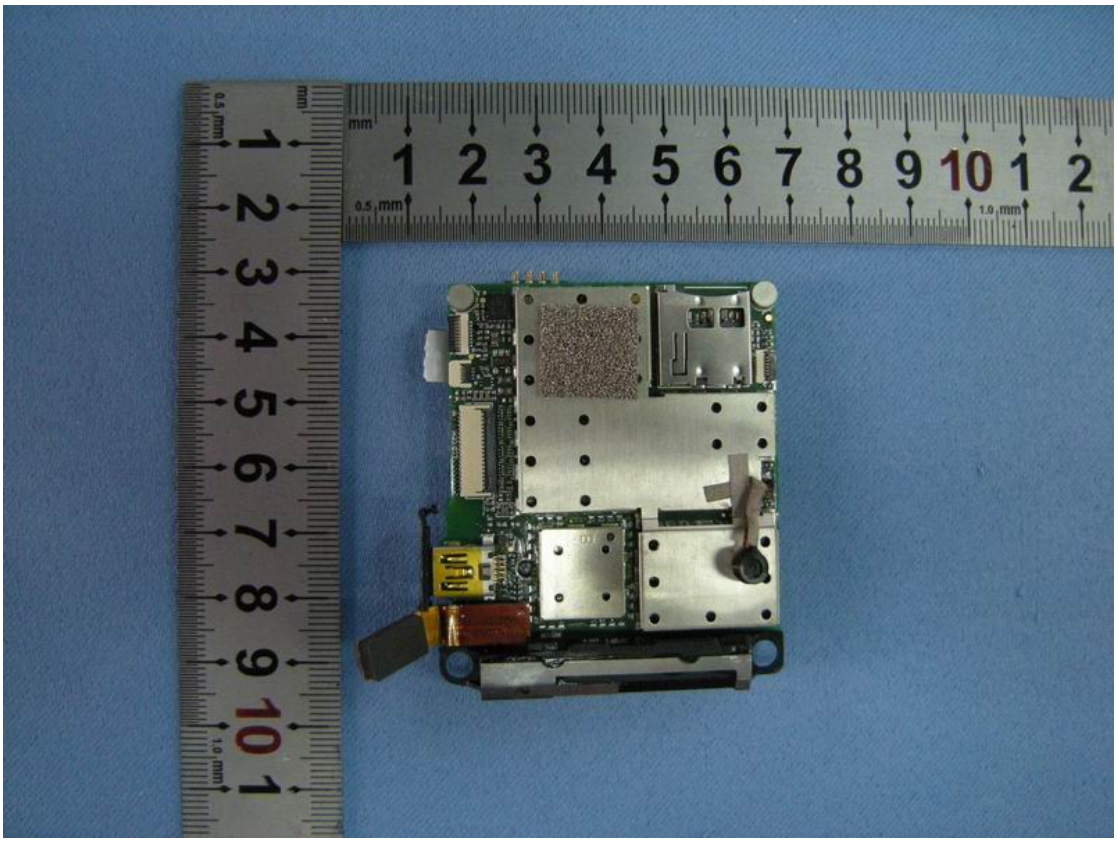


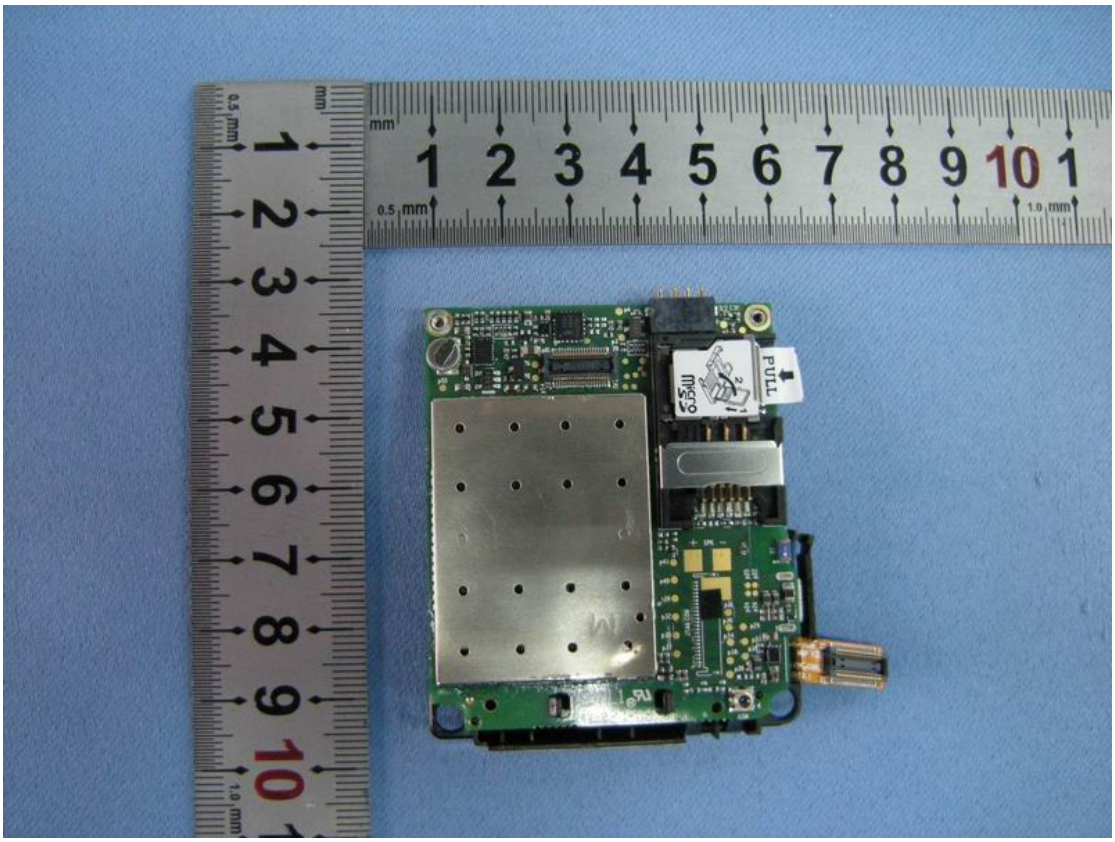
Appendix I: Photographs of the EUT






SUNGROM
PULL




PULL

Appendix II：Photographs of Test Configuration