



FCC ID: QZE200
Issued on Mar. 7th, 2005

Report No.: FR530403

FCC TEST REPORT

CATEGORY : Portable

PRODUCT NAME : Dual mode 2.4GHz / 5GHz Access Point

FCC ID. : QZE200

FILING TYPE : Certification

BRAND NAME : Trapeze

MODEL NAME : MP-372

APPLICANT : **Trapeze Networks, Inc.**

5753 W. Las Positas Blvd. Pleasanton, CA 94588, US

MANUFACTURER : **Alpha Networks Inc.**

No.8, Li-shing Road VII, Science-based Industrial Park, Hsinchu, Taiwan

ISSUED BY : **SPORTON INTERNATIONAL INC.**

6F, No. 106, Sec. 1, Hsin Tai Wu Rd., His Chih, Taipei Hsien, Taiwan, R.O.C.

Statements:

Only the test result of 802.11b/g part is shown in this test report.

The test result in this report refers exclusively to the presented test model / sample.

Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.

Certificate or Test Report could not be used by the applicant to claim the product endorsement by CNLA and any agency of U.S. government.

The test equipment used to perform the test is calibrated and traceable to NML/ROC or NIST/USA.



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SPORTON International Inc.

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FAX : 886-2-2696-2255



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FCC ID: QZE200
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HISTORY OF THIS TEST REPORT

Received Date: Mar. 4th, 2005

Test Date: Jan. 17th, 2005

Original Report Issue Date: Mar. 7th, 2005

Report No.: FR530403

■ No additional attachment.

Additional attachment were issued as following record:



CERTIFICATE OF COMPLIANCE

with

47 CFR FCC Part 15 Subpart C

PRODUCT NAME : Dual mode 2.4GHz / 5GHz Access Point

BRAND NAME : Trapeze

MODEL NAME : MP-372

APPLICANT : **Trapeze Networks, Inc.**

5753 W. Las Positas Blvd. Pleasanton, CA 94588, US

MANUFACTURER : **Alpha Networks Inc.**

No.8, Li-shing Road VII, Science-based Industrial Park, Hsinchu, Taiwan

I HEREBY CERTIFY THAT:

The measurements shown in this test report were made in accordance with the procedures given in ANSI C63.4-2003 and all test are performed according to 47 CFR FCC Part 15 Subpart C. Testing was carried out on Jan. 17th, 2005 at SPORTON International Inc. LAB.

A handwritten signature in blue ink, appearing to read 'Dr. Alan Lane'.

Dr. Alan Lane

Vice General Manager
Sporton International Inc.



1. General Description of Equipment under Test

1.1. Applicant

Trapeze Networks, Inc.
5753 W. Las Positas Blvd. Pleasanton, CA 94588, US

1.2. Manufacturer

Alpha Networks Inc.
No.8, Li-shing Road VII, Science-based Industrial Park, Hsinchu, Taiwan

1.3. Basic Description of Equipment under Test

This product is a Wireless Access Point / Ethernet Bridge with 802.11a/b/g wireless solution. The technical data has been listed on section " Features of Equipment under Test ". RJ45 is available. 4 types of antenna are filed in this project for both 2.4GHz and 5GHz operating frequency band. There are 2 antenna ports in this product for external antenna connection, one is for 2.4GHz band, the other is for 5GHz band. This product will use 5GHz and 2.4GHz band antenna with the same beam width together.

1.4. Features of Equipment under Test

EUT

Items	Description
Type of Modulation	DSSS (CCK / DQPSK / DBPSK) OFDM (16QAM / 64QAM / DQPSK / DBPSK)
Number of Channels	11
Frequency Band	2400 MHz ~ 2483.5 MHz
Carrier Frequency Range	2412 MHz ~ 2462 MHz
Carrier Frequency	See section 1.6 for details
Data Rate	1, 2, 5.5, 11 Mbps 6, 12, 18, 24, 36, 48, 54 Mbps
Channel Bandwidth	16 MHz
Max. Conducted Output Power	21.10 dBm
Antenna Type	See section 1.5 for details
Communication Type	Half-Duplex
Testing Duty Cycle	100.00%
Test Power Source	4.5VDC from LAN System
Temperature Range (Operating)	0 ~ 50 °C



1.5. Antenna Description

No.	Brand Name	Model Name	Antenna Type	Gain (dBi)
1	CENTURION	CAF94400	Surface Mount Ant.	3.00
2	SuperPass	ANT-1180 (SPDG12H)	180° Panel Ant.	6.00
3	SuperPass	ANT-1120 (SPDG11T)	120° Panel Ant.	7.00
4	SuperPass	ANT-1060 (SPLG11)	60° Panel Ant.	10.00

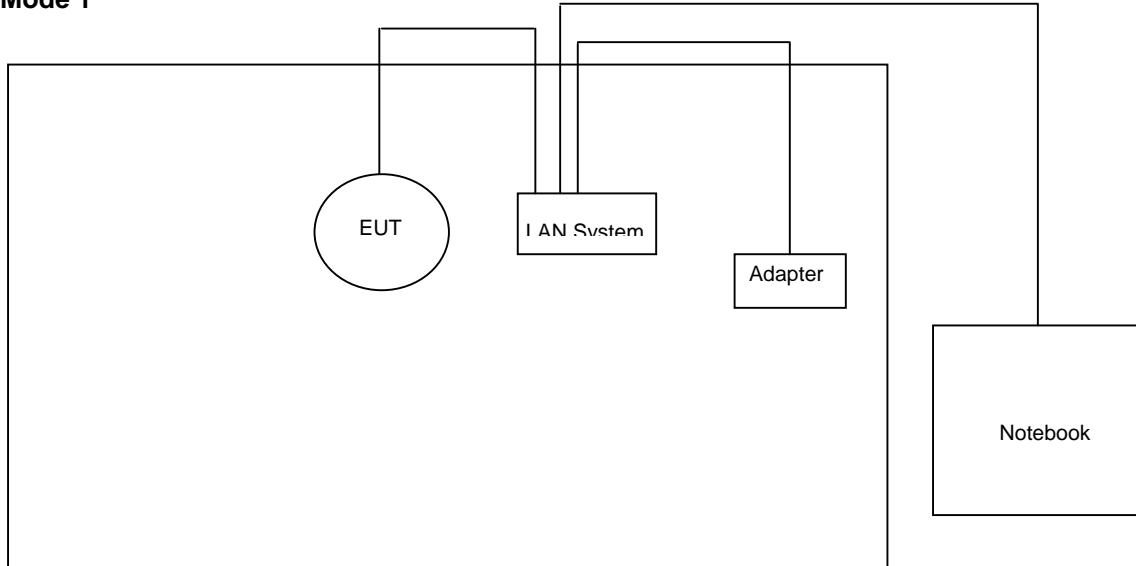
1.6. Table for Carrier Frequencies

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
01	2412 MHz	05	2432 MHz	09	2452 MHz	-	-
02	2417 MHz	06	2437 MHz	10	2457 MHz	-	-
03	2422 MHz	07	2442 MHz	11	2462 MHz	-	-
04	2427 MHz	08	2447 MHz	-	-	-	-

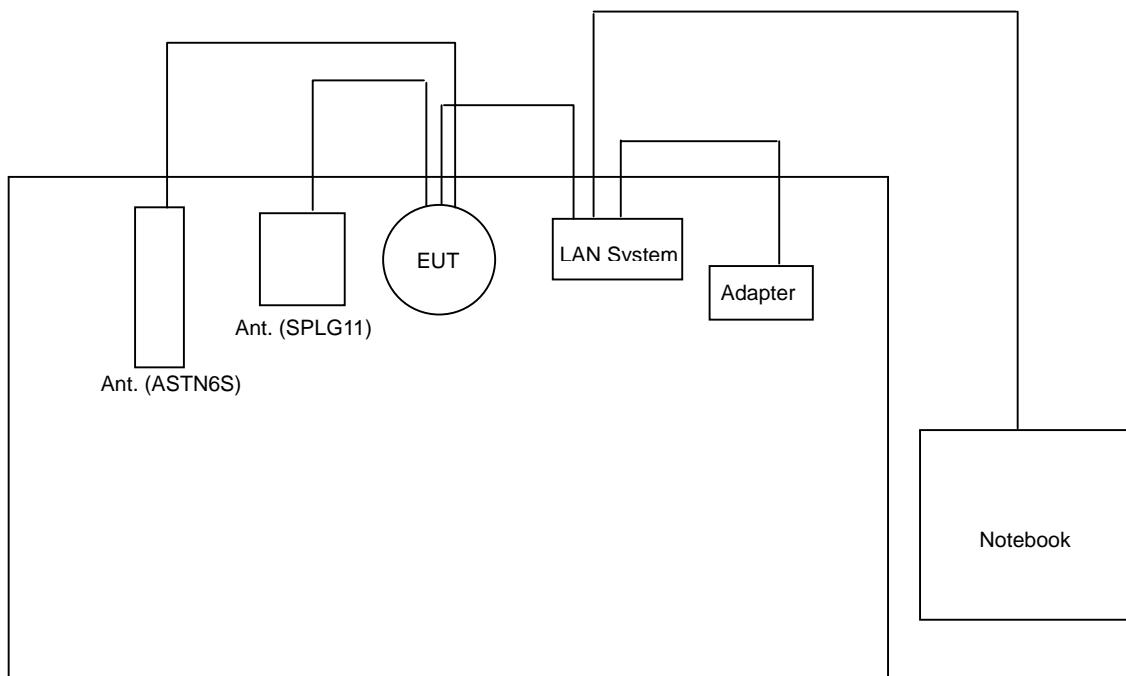
2. Test Configuration of the Equipment under Test

2.1. Connection Diagram of Test System

Mode 1



Mode 2





2.2. The Test Mode Description

1. For DSSS modulation, CCK (11 Mbps) is the worst case on all test items.
2. For OFDM modulation, BPSK (6 Mbps) is the worst case on all test items.
3. According to ANSI C63.4-2003: If frequency range of EUT is more than 10 MHz, we have to test the lowest, middle and highest channels of EUT.
4. Spurious emission below 1GHz is independent of channel selection and modulation types. So only channel 11 with OFDM modulation was tested.
5. AC conduction emission is independent of channel selection, modulation types and types of antenna. So only channel 11 with OFDM modulation was tested.
6. There are 4 types of antennas, 3 of them are in the same type. So only 2 antennas was tested.

Mode 1 : Ant. 1 (CAF94400) – Internal Antenna

Mode 2 : Ant. 4 (SPLG11) – External Antenna

2.3. Description of Test Supporting Units

Support unit	Brand	Model No.	Serial No.	FCC ID	Data cable (m)
Notebook	DELL	C600	10004	DoC	-
POE	-	-	-	-	-
Adapter	LB	SA06L48	-	-	1.5



3. General Information of Test

3.1. Test Facility

Test Site Location : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiag, Tao Yuan Hsien, Taiwan, R.O.C.
: TEL 886-3-327-3456
: FAX 886-3-318-0055
Test Site No : 03CH03-HY / TH01-HY / CO04-HY

3.2. Standards for Methods of Measurement

Here is the list of the standards followed in this test report.

ANSI C63.4-2003

47 CFR FCC Part 15 Subpart C

3.3. DoC Statement

This EUT is also classified as a device of computer peripheral Class B which DoC has to be followed. It has been verified according to the rule of 47 CFR part 15 Subpart B, and found that all the requirements has been fulfilled.

3.4. Frequency Range Investigated

Radiated emission test: from 30 MHz to 10th carrier harmonic

3.5. Test Distance

The test distance of radiated emission (30MHz~1GHz) test from antenna to EUT is 3 M.

The test distance of radiated emission (1GHz~10th carrier harmonic) test from antenna to EUT is 3 M.

3.6. Test Software

During testing, Channel & Power Controlling Software: This was provided by the manufacturer and is able to let the test engineer select the operating channel as well as the RF output power. The parameters for channel selection is trying to offer the test engineer the ability to fix the operating channel for testing, both normal data and continuously transmitting modes are allowed, and that for RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.



Power Parameter Table

Mode 1

Software Version	:	ART	
Power Set Ch01 / DSSS	:	19/TX Power	FRAME,ob=4,db=3,b_ob=2,d-db=1 (INT ANT.1)
Power Set Ch06 / DSSS	:	20/TX Power	FRAME,ob=4,db=3,b_ob=2,d-db=1 (INT ANT.1)
Power Set Ch11 / DSSS	:	20/TX Power	FRAME,ob=4,db=3,b_ob=2,d-db=1 (INT ANT.1)
Power Set Ch01 / OFDM	:	14/TX Power	FRAME,ob=4,db=3,b_ob=2,d-db=1 (INT ANT.1)
Power Set Ch06 / OFDM	:	19/TX Power	FRAME,ob=4,db=3,b_ob=2,d-db=1 (INT ANT.1)
Power Set Ch11 / OFDM	:	15/TX Power	FRAME,ob=4,db=3,b_ob=2,d-db=1 (INT ANT.1)
IP Address of EUT	:	Art \remote=192.168.1.20 \id=a034	

Mode 2

Software Version	:	ART	
Power Set Ch01 / DSSS	:	18/TX Power	FRAME,ob=4,db=3,b_ob=2,d-db=1 (EXT ANT.4)
Power Set Ch06 / DSSS	:	20/TX Power	FRAME,ob=4,db=3,b_ob=2,d-db=1 (EXT ANT.4)
Power Set Ch11 / DSSS	:	19/TX Power	FRAME,ob=4,db=3,b_ob=2,d-db=1 (EXT ANT.4)
Power Set Ch01 / OFDM	:	14/TX Power	FRAME,ob=4,db=3,b_ob=2,d-db=1 (EXT ANT.4)
Power Set Ch06 / OFDM	:	18/TX Power	FRAME,ob=4,db=3,b_ob=2,d-db=1 (EXT ANT.4)
Power Set Ch11 / OFDM	:	14/TX Power	FRAME,ob=4,db=3,b_ob=2,d-db=1 (EXT ANT.4)
IP Address of EUT	:	Art \remote=192.168.1.20 \id=a034	



4. List of Measurements

4.1. Summary of the Test Results

Applied Standard: 47 CFR FCC Part 15 Subpart C			
Paragraph	FCC Section	Description of Test	Result
5.1	15.247(a)(2)	6dB Spectrum Bandwidth	Pass
5.2	15.247(b)(3)	Maximum Peak Conducted Output Power	Pass
5.3	15.247(e)	Peak Power Spectral Density	Pass
5.4	15.247(d)	Band Edges Emission	Pass
5	15.207	AC Power Line Conducted Emission	Pass
5.6	15.247(d)	Spurious Radiated Emission	Pass
5.7	15.203/15.247(b)/(c)	Antenna Requirement	Pass
5.8	2.1091	Maximum Permissible Exposure	Pass

5. Test Result

5.1. Test of 6dB Spectrum Bandwidth

5.1.1. Applicable Standard

Section 15.247(a)(2): For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

5.1.2. Measuring Instruments

Item 18 of the table is on section 6.

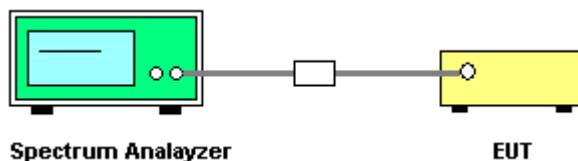
5.1.3. Description of Major Test Instruments Setting

- Spectrum Analyzer : R&S FSP30
- Attenuation : Auto
- Center Frequency : 2412 MHz / 2437 MHz / 2462 MHz
- Span Frequency : > 6dB Bandwidth
- RB : 100 kHz
- VB : 100 kHz
- Detector : Peak
- Trace : Max Hold
- Sweep Time : Auto

5.1.4. Test Procedures

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. Set RBW of spectrum analyzer to 100KHz and VBW to 100KHz. Trace to Max hold and Detector PK.
3. The spectrum width with level higher than 6dB below the peak level.
4. Repeat above 1~3 points for the middle and highest channel of the EUT.

5.1.5. Test Setup Layout



5.1.6. Test Criteria

All test results complied with the requirements of 15.247(a)(2). Measurement Uncertainty is 1×10^{-5} .



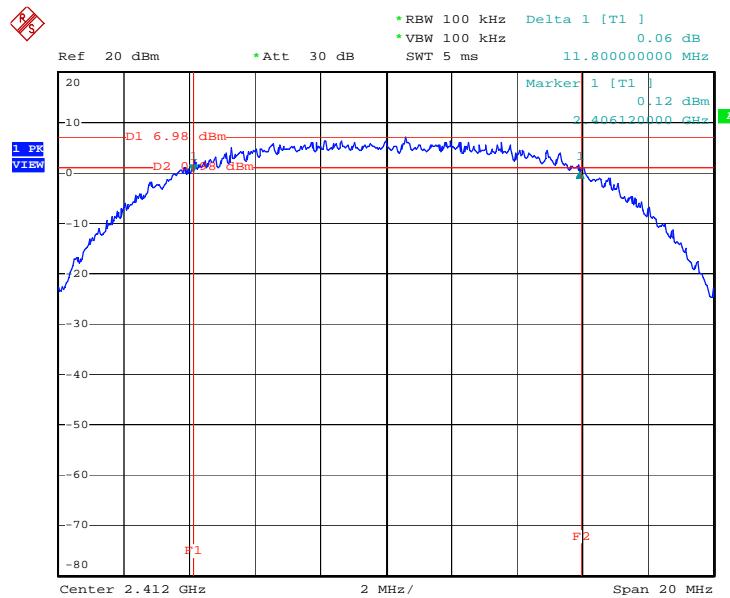
5.1.7. Test Result

- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Leo Hung

Modulation Type	Channel No.	Frequency (MHz)	6dB Bandwidth	Min. Limit
DSSS	01	2412 MHz	11.80	0.5
DSSS	06	2437 MHz	12.20	0.5
DSSS	11	2462 MHz	11.24	0.5
OFDM	01	2412 MHz	16.40	0.5
OFDM	06	2437 MHz	16.40	0.5
OFDM	11	2462 MHz	16.40	0.5

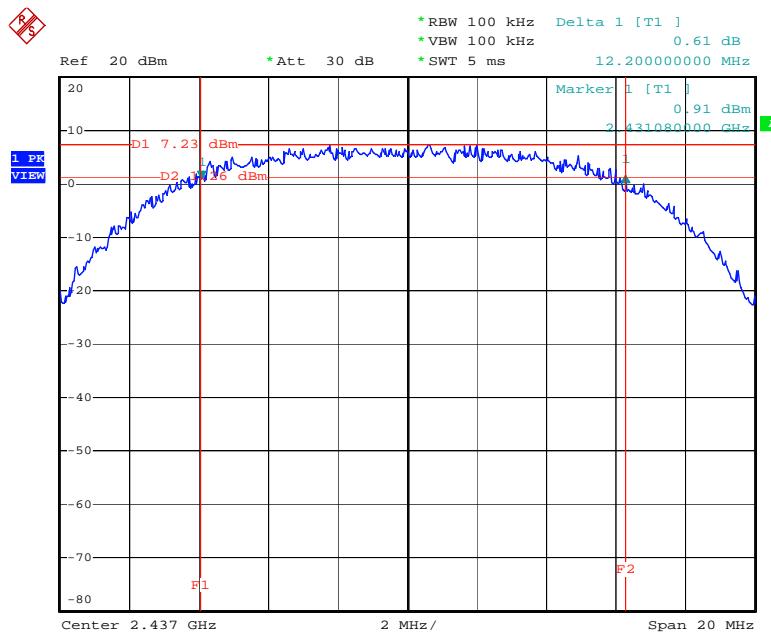


Modulation Type: DSSS (Channel 01) :



Date: 6.MAR.2005 07:18:16

Modulation Type: DSSS (Channel 06) :



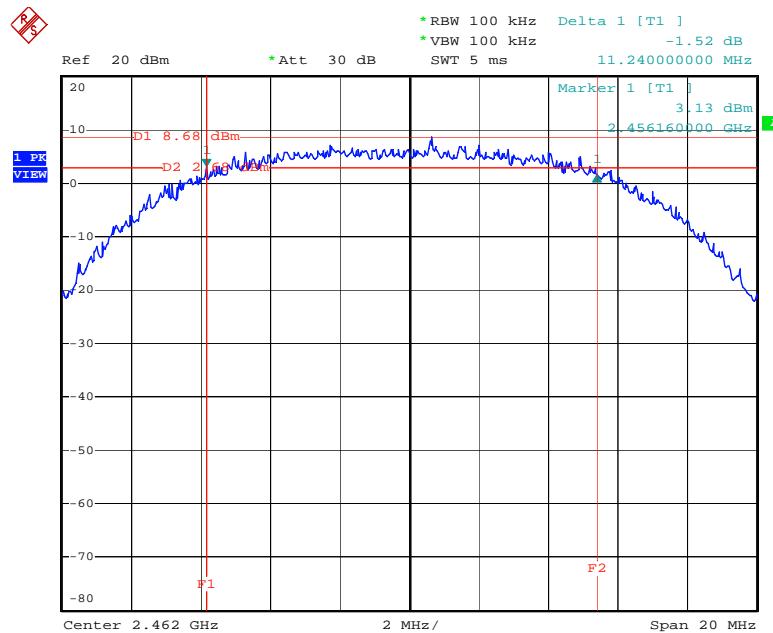
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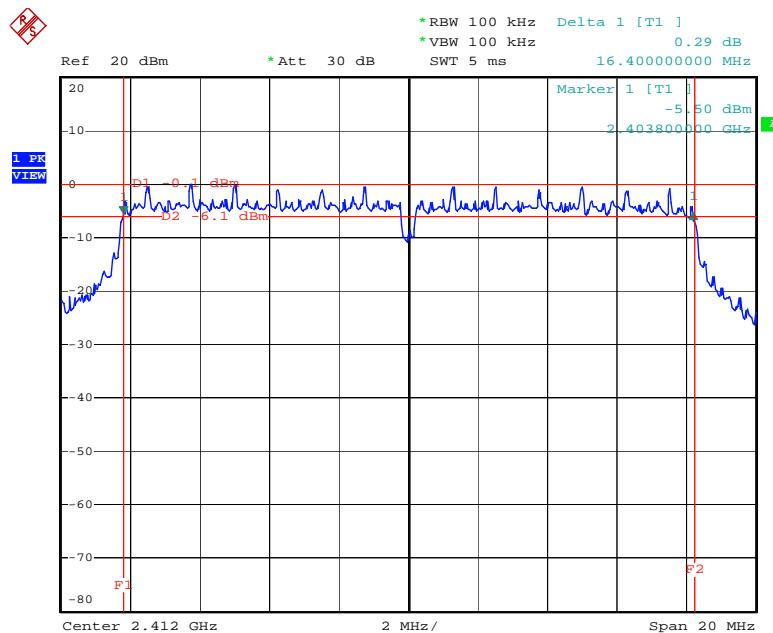
Report No.: FR530403

Modulation Type: DSSS (Channel 11) :



Date: 6.MAR.2005 07:27:03

Modulation Type: OFDM (Channel 01) :



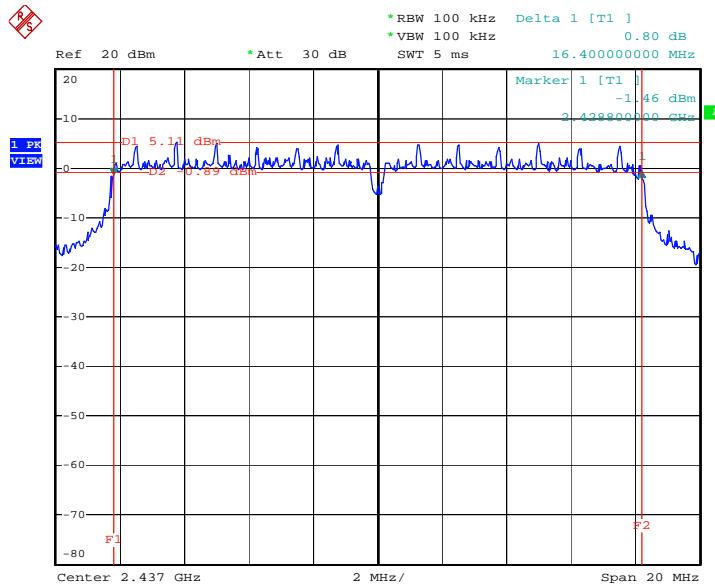
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FCC ID: QZE200
Issued on Mar. 7th, 2005

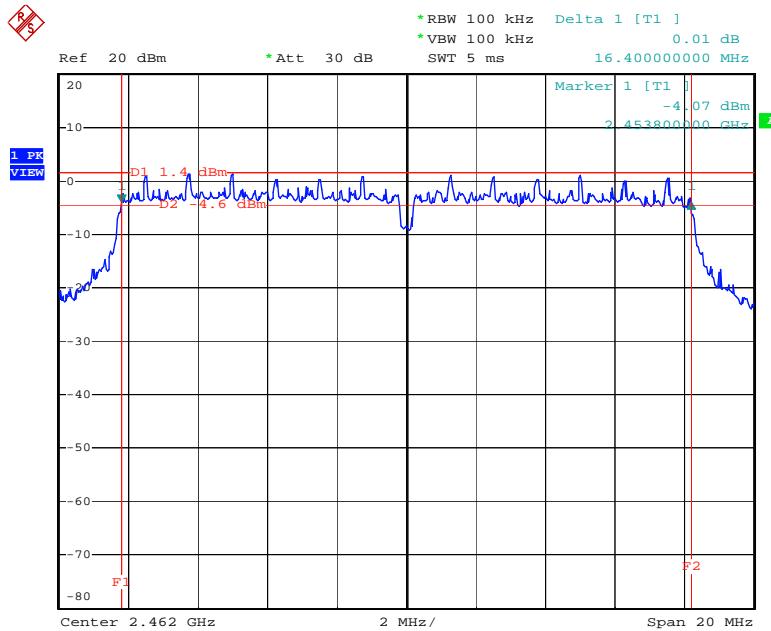
Report No.: FR530403

Modulation Type: OFDM (Channel 06) :



Date: 6.MAR.2005 06:48:50

Modulation Type: OFDM (Channel 11) :



Date: 6.MAR.2005 06:45:50



5.2. Test of Maximum Peak Conducted Output Power

5.2.1. Applicable Standard

Section 15.247(b)(3): The maximum peak output power shall not exceed 1 watt (30dBm). Except as shown below, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the above stated values by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

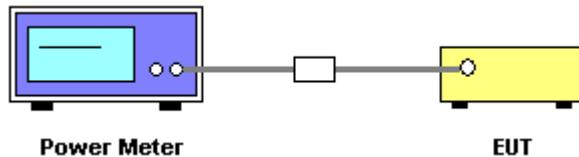
5.2.2. Measuring Instruments

Item 19, 21 of the table are on section 6.

5.2.3. Test Procedures and Test Instruments Setting

1. The transmitter output was connected to the peak power meter through an attenuator.
2. The filter and attenuator have the same peak value instrument parameters.
5. Repeated the 1 for the middle and highest channel of the EUT.

5.2.4. Test Setup Layout



5.2.5. Test Criteria

All test results complied with the requirements of 15.247(b)(3). Measurement Uncertainty is 1.5dB.



5.2.6. Test Result of Conducted Power

- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Leo Hung

For Mode 1 / Gain 3.00 dBi Power Setup

Modulation Type	Channel No.	Frequency (MHz)	Output Power (dBm)	Limits (dBm)
DSSS	01	2412 MHz	17.27	30
DSSS	06	2437 MHz	18.43	30
DSSS	11	2462 MHz	17.33	30
OFDM	01	2412 MHz	18.30	30
OFDM	06	2437 MHz	20.73	30
OFDM	11	2462 MHz	16.72	30

For Mode 2 / Gain 10.00 dBi Power Setup

Modulation Type	Channel No.	Frequency (MHz)	Output Power (dBm)	Limits (dBm)
DSSS	01	2412 MHz	18.40	26
DSSS	06	2437 MHz	18.10	26
DSSS	11	2462 MHz	18.70	26
OFDM	01	2412 MHz	17.80	26
OFDM	06	2437 MHz	21.10	26
OFDM	11	2462 MHz	17.80	26



5.2.7. Test Result of EIRP Power

- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Leo Hung

Antenna No.	Gain (dBi)	Modulation Type	Channel No.	Frequency (MHz)	Power (dBm)	Limits (dBm)
1	3.00	DSSS	01	2412 MHz	20.27	36
1	3.00	DSSS	06	2437 MHz	21.43	36
1	3.00	DSSS	11	2462 MHz	20.33	36
1	3.00	OFDM	01	2412 MHz	21.30	36
1	3.00	OFDM	06	2437 MHz	23.73	36
1	3.00	OFDM	11	2462 MHz	19.72	36
4	10.00	DSSS	01	2412 MHz	28.40	36
4	10.00	DSSS	06	2437 MHz	28.10	36
4	10.00	DSSS	11	2462 MHz	28.70	36
4	10.00	OFDM	01	2412 MHz	27.80	36
4	10.00	OFDM	06	2437 MHz	31.10	36
4	10.00	OFDM	11	2462 MHz	27.80	36



5.3. Test of Peak Power Spectral Density

5.3.1. Applicable Standard

Section 15.247(e): For digital modulation 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.

5.3.2. Measuring Instruments

Item 18 of the table is on section 6.

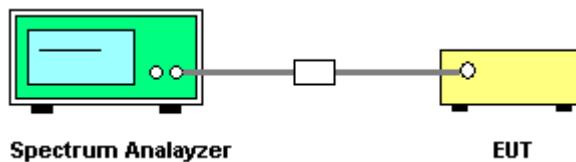
5.3.3. Description of Major Test Instruments Setting

- Spectrum Analyzer : R&S FSP30
- Attenuation : Auto
- Center Frequency : 2412 MHz / 2437 MHz / 2462 MHz
- Span Frequency : 1.5MHz
- RB : 3 kHz
- VB : 30 kHz
- Detector : Peak
- Trace : Max Hold
- Sweep Time : 500s

5.3.4. Test Procedures

1. The transmitter output is connected to the spectrum analyzer through an attenuator.
2. Set RBW of spectrum analyzer to 3kHz and VBW to 30kHz. Set Detector to Peak, Trace to Max Hold.
3. Mark the frequency with maximum peak power as the center of the display of the spectrum.
4. Set the span to 1.5MHz and the sweep time to 500s and record the maximum peak value.
5. Repeated the 1~4 for the middle and highest channel of the EUT.

5.3.5. Test Setup Layout



5.3.6. Test Criteria

All test results complied with the requirements of 15.247(e). Measurement Uncertainty is 1.5dB.



5.3.7. Test Result

- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Leo Hung

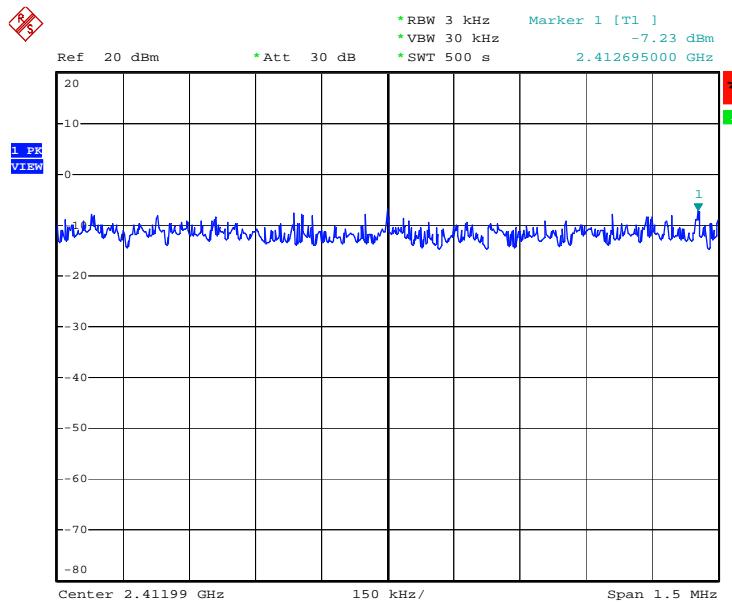
Modulation Type	Channel No.	Frequency (MHz)	Power Density (dBm)	Limits (dBm)
DSSS	01	2412 MHz	-7.22	8
DSSS	06	2437 MHz	-6.65	8
DSSS	11	2462 MHz	-6.22	8
OFDM	01	2412 MHz	-13.58	8
OFDM	06	2437 MHz	-9.91	8
OFDM	11	2462 MHz	-12.62	8



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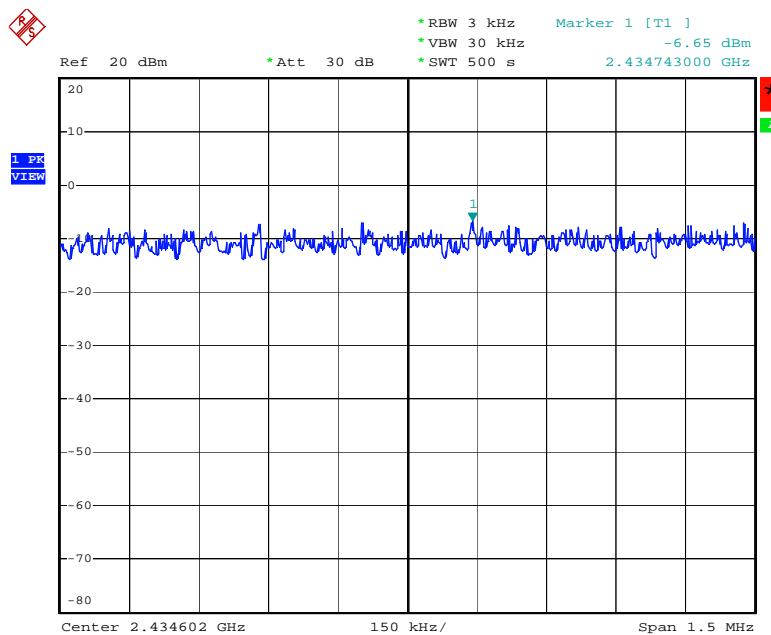
Report No.: FR530403

Modulation Type: DSSS (Channel 01) :



Date: 6.MAR.2005 07:20:21

Modulation Type: DSSS (Channel 06) :



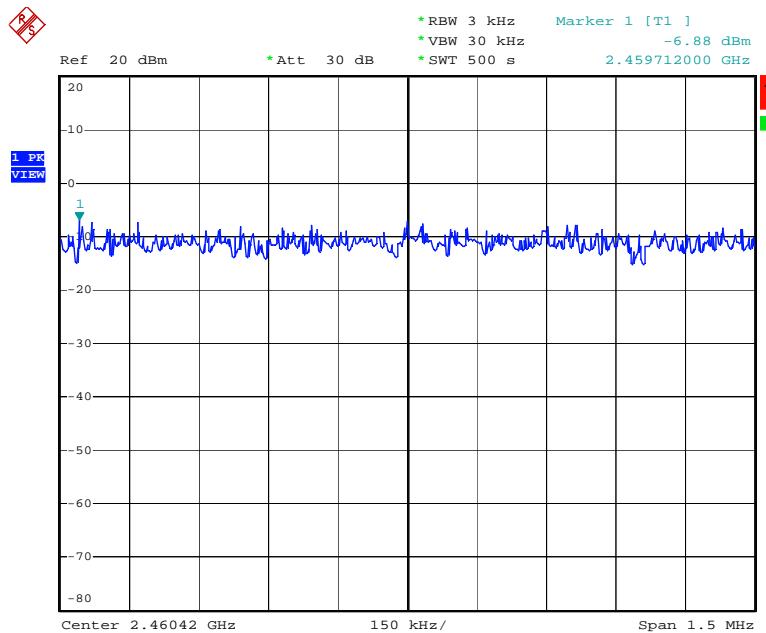
Date: 6.MAR.2005 07:30:24



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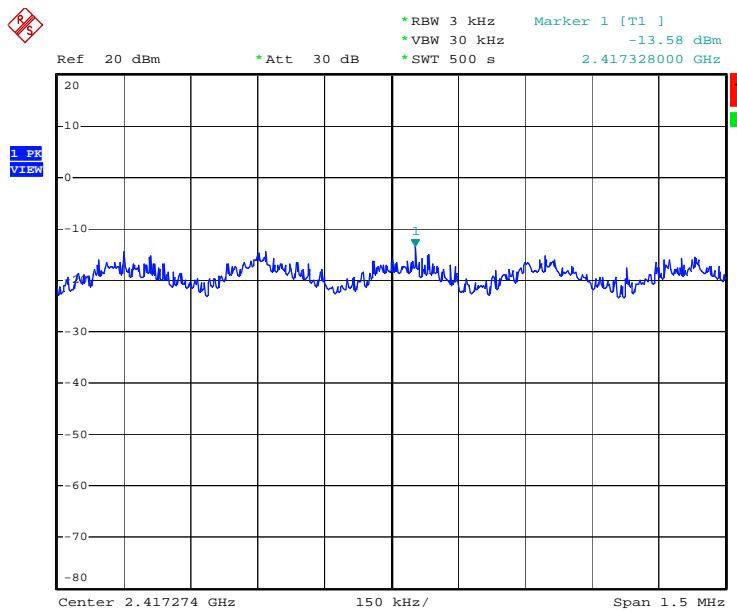
Report No.: FR530403

Modulation Type: DSSS (Channel 11) :



Date: 6.MAR.2005 07:28:47

Modulation Type: OFDM (Channel 01) :



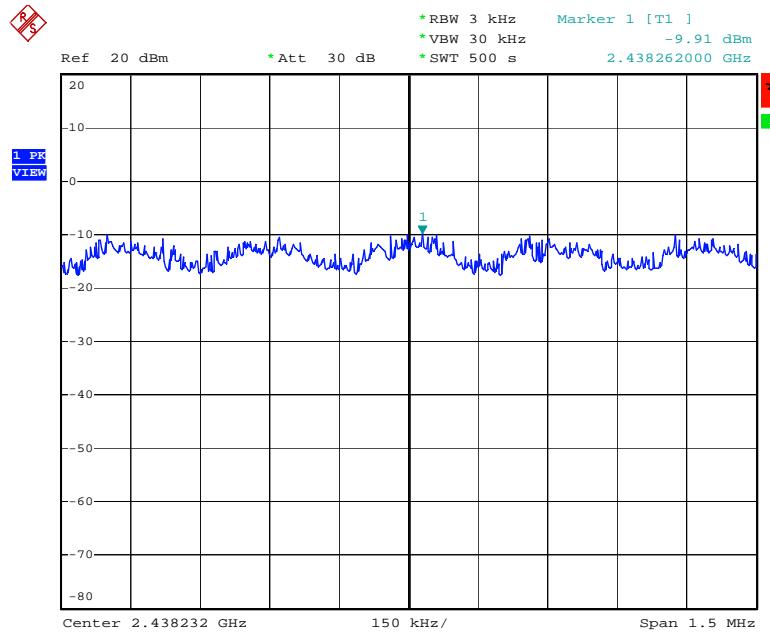
Date: 6.MAR.2005 06:36:06



FCC ID: QZE200
Issued on Mar. 7th, 2005

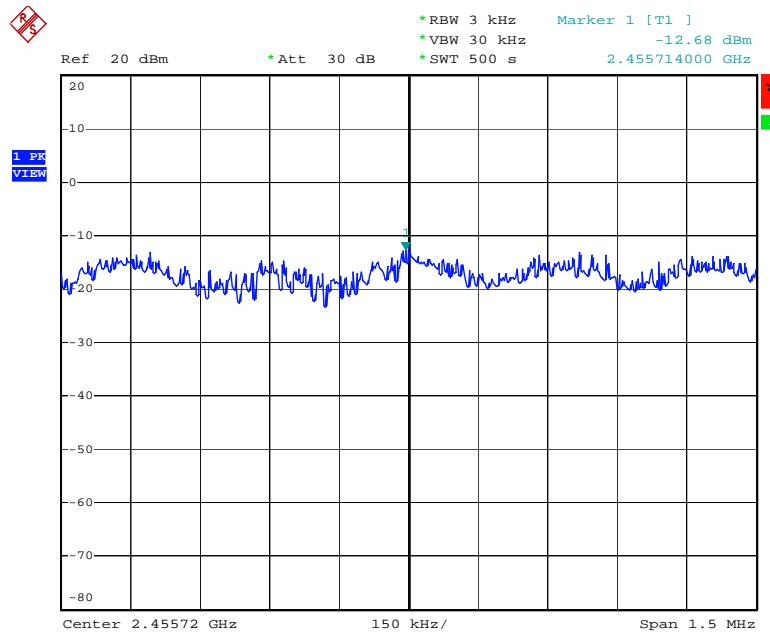
Report No.: FR530403

Modulation Type: OFDM (Channel 06) :



Date: 6.MAR.2005 06:47:57

Modulation Type: OFDM (Channel 11) :



Date: 6.MAR.2005 06:46:45



5.4. Test of Band Edges Emission

5.4.1. Applicable Standard

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 a radiated measurement. In addition, radiated emissions that fall in the restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified in Section 15.209.

5.4.2. Measuring Instruments

Item 6~17 of the table is on section 6 for radiated measurement.

Item 18 of the table is on section 6 for conducted measurement.

5.4.3. Description of Major Test Instruments Setting

- Spectrum Analyzer : R&S FSP30 (Conducted Measurement)
Attenuation : Auto
Center Frequency : 2412 MHz / 2462 MHz
Span Frequency : 100MHz
RB : 100 kHz
VB : 100 kHz
Detector : Peak
Trace : Max Hold
Sweep Time : Auto

- Spectrum Analyzer : R&S FSP40 (Radiated Measurement)
Attenuation : Auto
Center Frequency : 2412 MHz / 2462 MHz
Span Frequency : 100MHz
RB : 1 MHz for PK value / 1 MHz for AV value
VB : 1 MHz for PK value / 10 Hz for AV value
Detector : Peak
Trace : Max Hold
Sweep Time : Auto

5.4.4. Test Procedures and Test Instruments Setting

Conducted Measurement

1. The transmitter is set to the lowest channel.
2. The transmitter output was connected to the spectrum analyzer via a cable and cable loss is used as the offset of the spectrum analyzer.
3. Set both RBW and VBW of spectrum analyzer to 100KHz with convenient frequency span including

100MHz bandwidth from lower band edge. Then detector set to peak and max hold this trace.

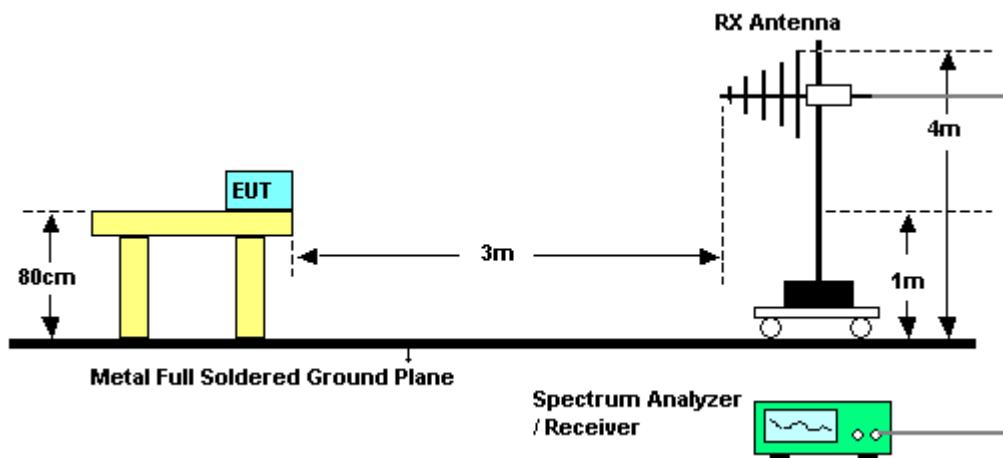
4. The lowest band edges emission was measured and recorded.
5. The transmitter set to the highest channel and repeated 2~4.

Radiated Measurement

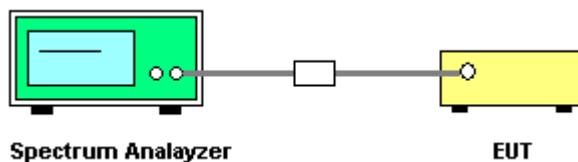
1. Configure the EUT according to ANSI C63.4.
2. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of both horizontal and vertical polarization.
4. For band edge emission, the antenna tower was scan (from 1 M to 4 M) and then the turn table was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. For band edge emission in restriction bands, use 10Hz VBW and 1MHz RBW for reading under AV and use 1MHz VBW and 1 MHz RBW for reading under PK.

5.4.5. Test Setup

Radiated Method



Conducted Method



5.4.6. Test Criteria

All test results complied with the requirements of 15.247(d). Measurement Uncertainty is 1×10^{-5} .



5.4.7. Test Result of Radiated Emission

- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Leo Hung

Mode 1

Modulation Type	Test Channel	Freq. (MHz)	Level* (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Trace (PK/AV)
DSSS	01	2386.68	61.86	-12.14	74	PK
DSSS	01	2386.68	52.74	-1.26	54	AV
DSSS	11	2483.50	70.08	-3.92	74	PK
DSSS	11	2483.50	52.84	-1.16	54	AV
OFDM	01	2390.00	65.46	-8.54	74	PK
OFDM	01	2390.00	50.43	-3.57	54	AV
OFDM	11	2483.50	64.40	-9.60	74	PK
OFDM	11	2483.50	51.31	-2.69	54	AV

Level*: The max field strength in the restricted bands.

Mode 2

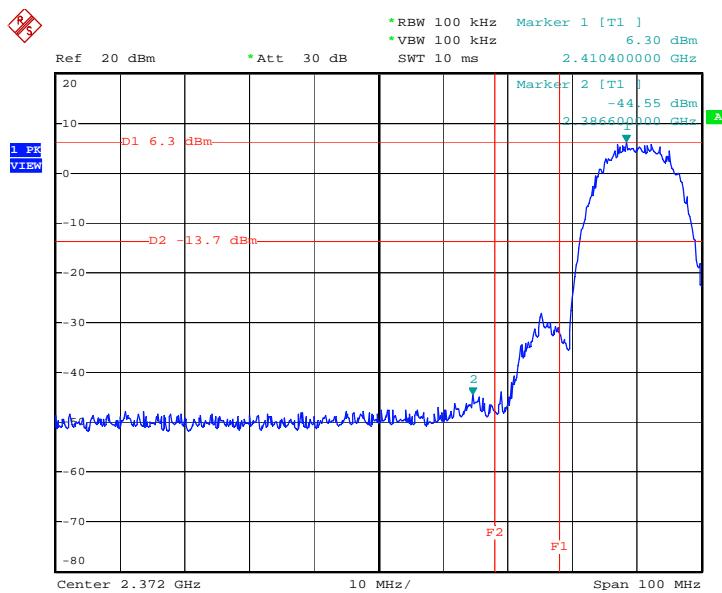
Modulation Type	Test Channel	Freq. (MHz)	Level* (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Trace (PK/AV)
DSSS	01	2390.00	62.03	-11.97	74	PK
DSSS	01	2390.00	52.88	-1.12	54	AV
DSSS	11	2483.50	70.55	-3.45	74	PK
DSSS	11	2483.50	52.87	-1.13	54	AV
OFDM	01	2390.00	67.22	-6.78	74	PK
OFDM	01	2390.00	52.11	-1.89	54	AV
OFDM	11	2483.50	66.54	-7.46	74	PK
OFDM	11	2483.50	52.74	-1.26	54	AV

Level*: The max field strength in the restricted bands.



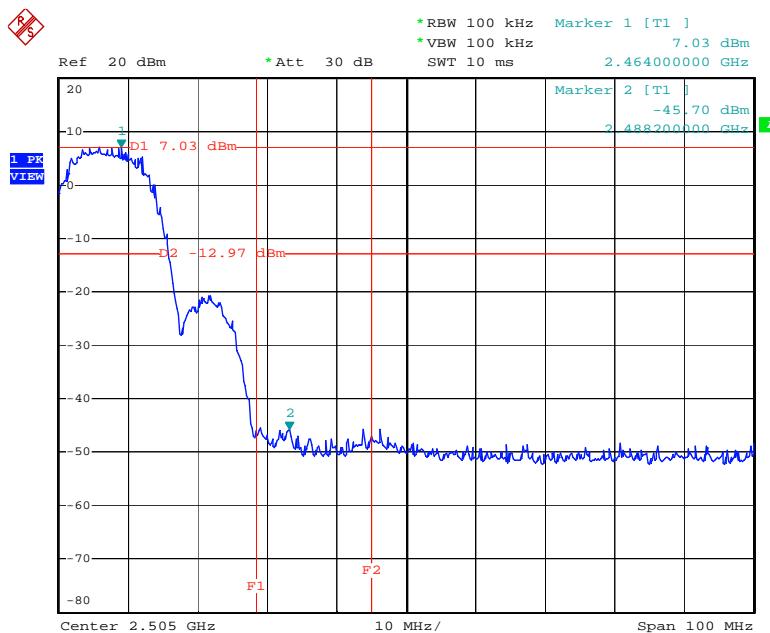
Test Result of Conducted Emission

Modulation Type: DSSS (Channel 01) :



Date: 6.MAR.2005 07:22:11

Modulation Type: DSSS (Channel 11) :



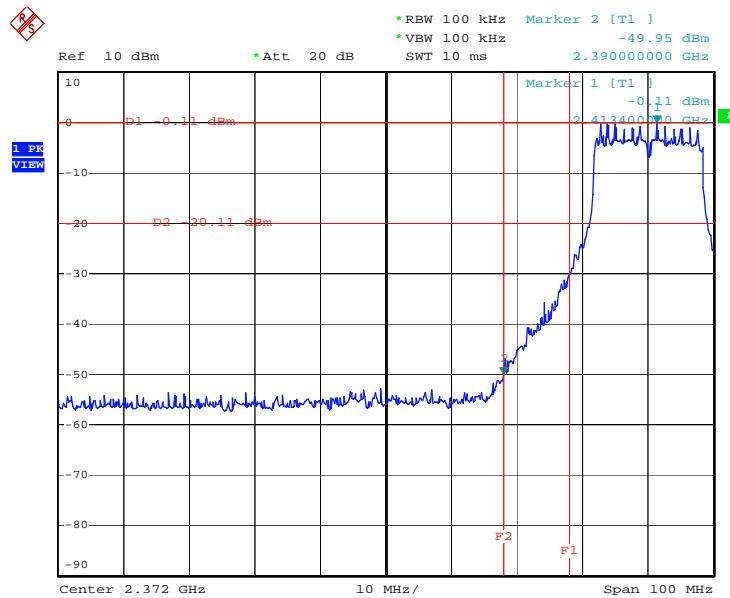
Date: 6.MAR.2005 07:26:00



FCC ID: QZE200
Issued on Mar. 7th, 2005

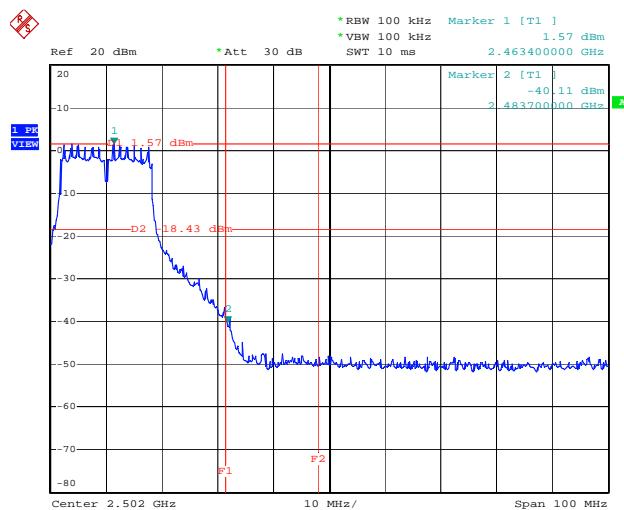
Report No.: FR530403

Modulation Type: OFDM (Channel 01) :



Date: 6.MAR.2005 06:41:08

Modulation Type: OFDM (Channel 11) :



Date: 6.MAR.2005 06:43:52



5.5. Test of AC Power Line Conducted Emission

5.5.1. Applicable Standard

Section 15.207: For a Low-power Radio-frequency Device is designed to be connected to the AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

Frequency (MHz)	QP Limit (dBuV)	AV Limit (dBuV)
0.15~0.5	66~56	56~46
0.5~5	56	46
5~30	60	50

5.5.2. Measuring Instruments

Please reference item 1~5 in chapter 6 for the instruments used for testing.

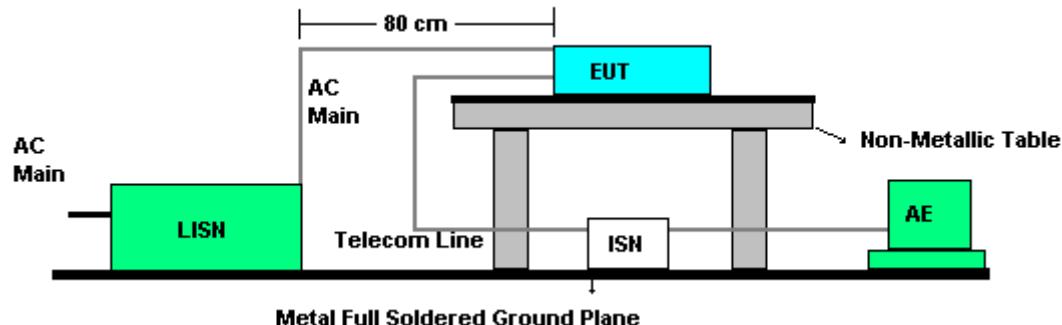
5.5.3. Description of Major Test Instruments Setting

- Test Receiver : R&S ESCS 30
- Attenuation : 10 dB
- Start Frequency : 0.15 MHz
- Stop Frequency : 30 MHz
- IF Bandwidth : 9 KHz

5.5.4. Test Procedures

1. Configure the EUT according to ANSI C63.4.
2. The EUT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN)
4. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
5. The frequency range from 150 KHz to 30 MHz was searched.
6. Use the Channel & Power Controlling software to make the EUT working on selected channel and expected output power, then use the "H" Patter Generator software to make the supporting equipments stay on working condition.
7. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
8. The measurement has to be done between each power line and ground at the power terminal for each RF channel. Only one RF channel has to be investigated since this test is independent with the RF channel selection.

5.5.5. Test Setup Layout



5.5.6. Test Criteria

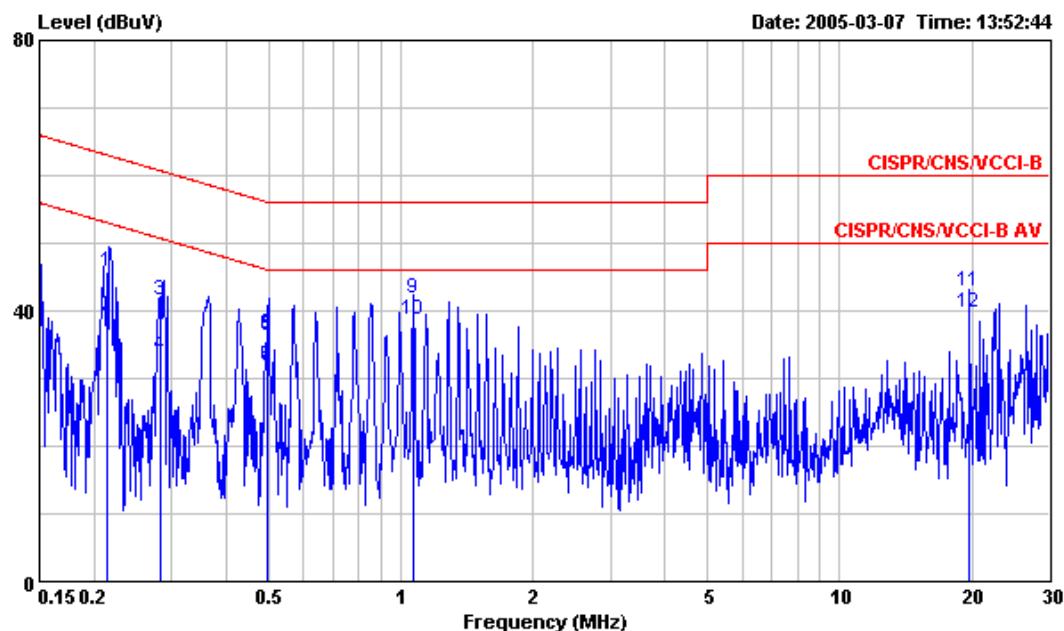
All test results complied with the requirements of 15.207. Measurement Uncertainty is 2.54dB.



5.5.7. Test Result of Conducted Emission for CH 11 / 2462 MHz

- Mode 1
- Temperature: 26°C
- Relative Humidity: 64%
- Test Engineer: Sky Wu

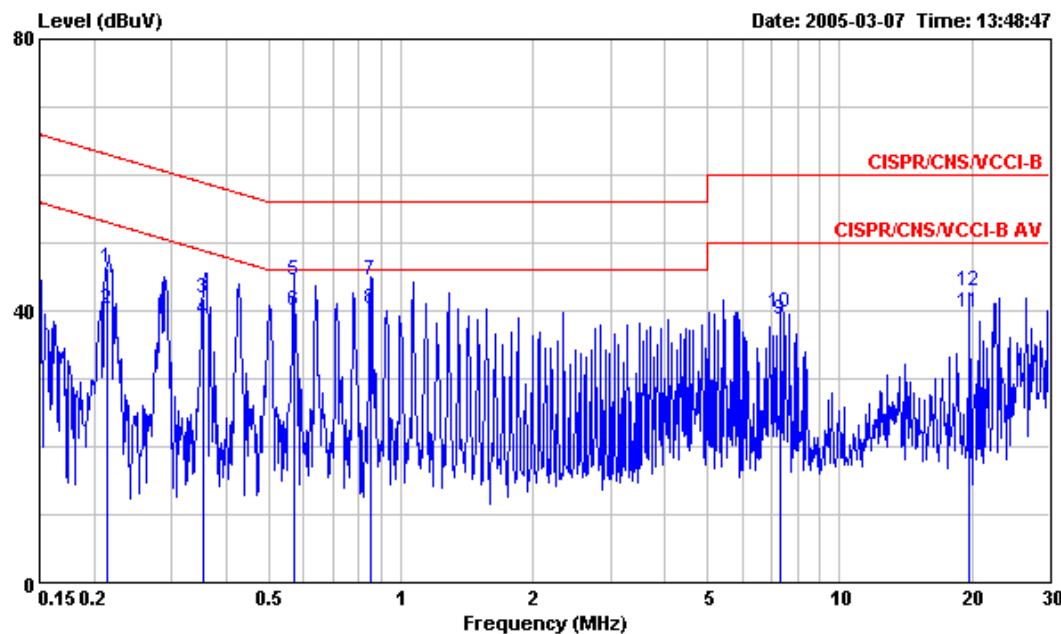
Line to Ground



Freq	Level	Over	Limit	Read	LISN	Cable	Remark
		Limit	Line	Level	Factor	Loss	
MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.2149230	45.77	-17.24	63.01	45.49	0.06	0.22 QP
2	0.2149230	39.25	-13.76	53.01	38.97	0.06	0.22 Average
3	0.2843170	41.54	-19.15	60.69	41.18	0.06	0.30 QP
4	0.2843170	33.32	-17.37	50.69	32.96	0.06	0.30 Average
5	0.4968230	36.43	-19.62	56.05	36.17	0.06	0.20 QP
6	0.4968230	31.96	-14.09	46.05	31.70	0.06	0.20 Average
7	0.4980930	31.96	-14.07	46.03	31.70	0.06	0.20 Average
8	0.4980930	36.45	-19.58	56.03	36.19	0.06	0.20 QP
9	1.067	41.85	-14.15	56.00	41.14	0.11	0.60 QP
10	1.067	38.74	-7.26	46.00	38.03	0.11	0.60 Average
11	19.708	42.94	-17.06	60.00	42.22	0.31	0.41 QP
12	19.708	39.73	-10.27	50.00	39.01	0.31	0.41 Average



Neutral to Ground

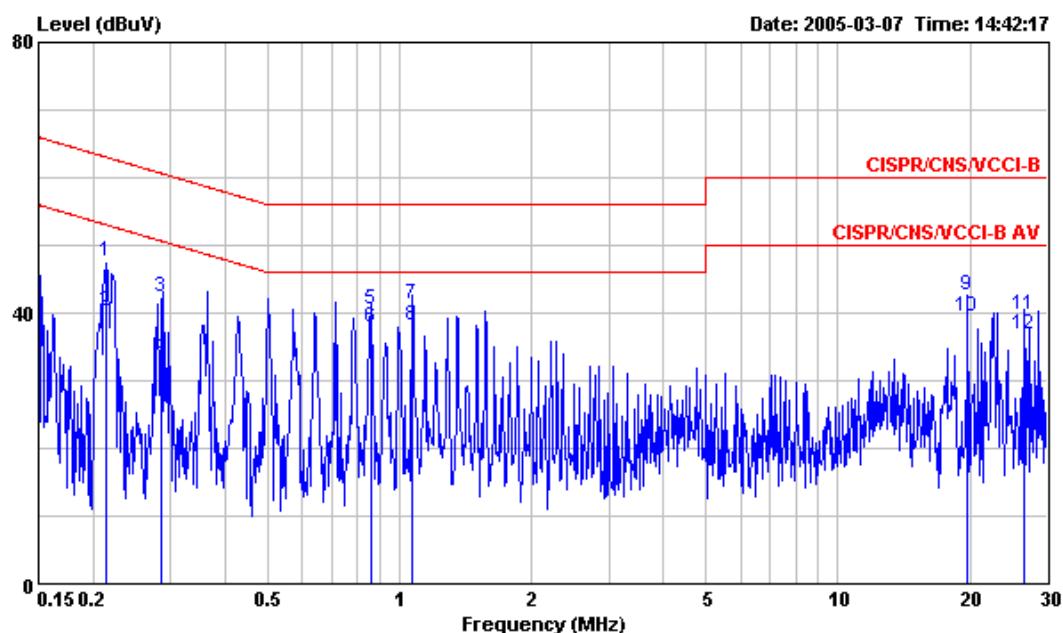


Freq	Level	Over	Limit	Read	LISN	Cable	Remark
		Limit	Line	Level	Factor	Loss	
MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 0.2136430	46.30	-16.76	63.06	45.97	0.11	0.22	QP
2 0.2136430	40.32	-12.74	53.06	39.99	0.11	0.22	Average
3 0.3558420	41.93	-16.89	58.82	41.52	0.11	0.30	QP
4 0.3558420	38.79	-10.03	48.82	38.38	0.11	0.30	Average
5 0.5688200	44.42	-11.58	56.00	43.78	0.23	0.41	QP
6 @0.5688200	39.97	-6.03	46.00	39.33	0.23	0.41	Average
7 0.8527650	44.57	-11.43	56.00	43.66	0.23	0.68	QP
8 @0.8527650	40.18	-5.82	46.00	39.27	0.23	0.68	Average
9 7.327	38.67	-11.33	50.00	38.12	0.30	0.25	Average
10 7.327	39.68	-20.32	60.00	39.13	0.30	0.25	QP
11 19.709	39.75	-10.25	50.00	38.91	0.43	0.41	Average
12 19.709	42.90	-17.10	60.00	42.06	0.43	0.41	QP



- Mode 2
- Temperature: 26°C
- Relative Humidity: 64%
- Test Engineer: Sky Wu

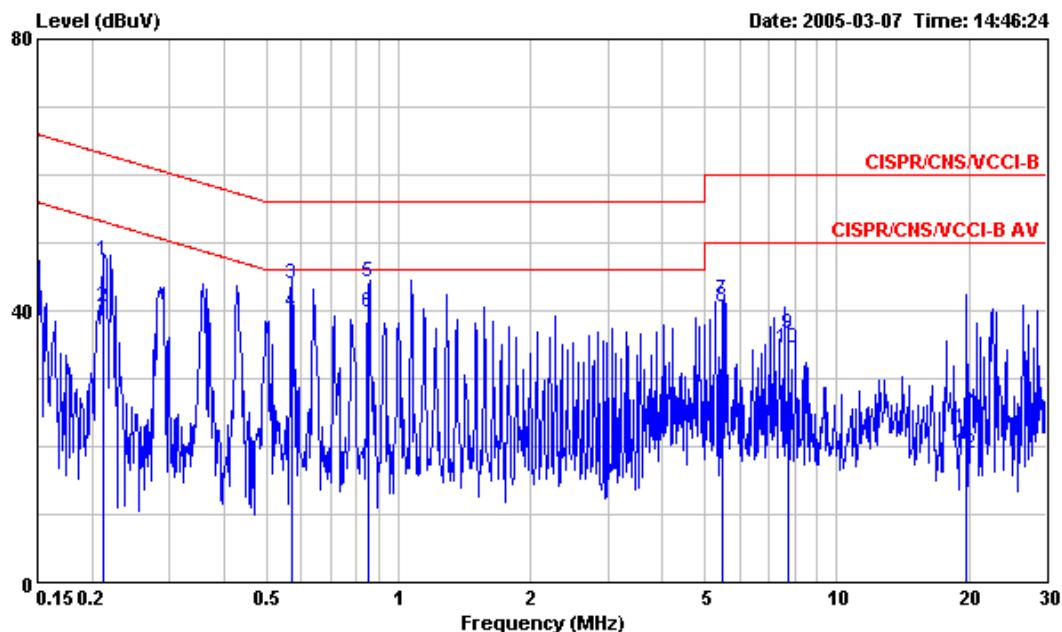
Line to Ground



Freq MHz	Level dBuV	Over Limit dB	Limit Line dBuV	Read Level dBuV	LISN Factor	Cable Loss dB		Remark
						dB	dB	
1 0.2139240	47.56	-15.49	63.05	47.28	0.06	0.22	QP	
2 0.2139240	40.16	-12.89	53.05	39.88	0.06	0.22	Average	
3 0.2855170	42.44	-18.21	60.65	42.08	0.06	0.30	QP	
4 0.2855170	33.47	-17.18	50.65	33.11	0.06	0.30	Average	
5 0.8572950	40.60	-15.40	56.00	39.81	0.11	0.68	QP	
6 0.8572950	37.91	-8.09	46.00	37.12	0.11	0.68	Average	
7 1.070	41.43	-14.57	56.00	40.72	0.11	0.60	QP	
8 1.070	38.29	-7.71	46.00	37.58	0.11	0.60	Average	
9 19.708	42.54	-17.46	60.00	41.82	0.31	0.41	QP	
10 19.708	39.42	-10.58	50.00	38.70	0.31	0.41	Average	
11 26.548	39.76	-20.24	60.00	38.94	0.38	0.44	QP	
12 26.548	36.87	-13.13	50.00	36.05	0.38	0.44	Average	



Neutral to Ground

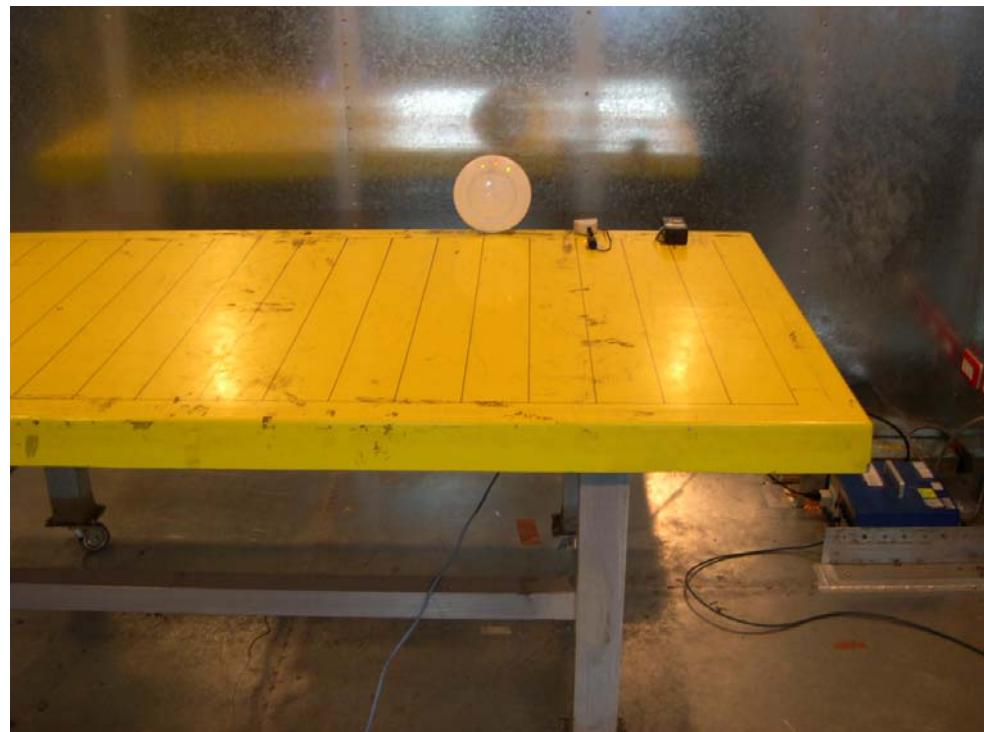


Freq MHz	Level dBuV	Over Limit dB	Over	Limit	Read	LISN	Cable	Remark
			Line	dBuV	Level	Factor	dB	
1 0.2127940	47.34	-15.76	63.10	47.01	0.11	0.22	QP	
2 0.2127940	40.46	-12.64	53.10	40.13	0.11	0.22	Average	
3 0.5701000	44.07	-11.93	56.00	43.43	0.23	0.41	QP	
4 0.5701000	39.63	-6.37	46.00	38.99	0.23	0.41	Average	
5 0.8560150	44.12	-11.88	56.00	43.21	0.23	0.68	QP	
6 0.8560150	39.83	-6.17	46.00	38.92	0.23	0.68	Average	
7 5.491	41.71	-18.29	60.00	41.20	0.26	0.25	QP	
8 5.491	40.48	-9.52	50.00	39.97	0.26	0.25	Average	
9 7.774	36.46	-23.54	60.00	35.90	0.30	0.26	QP	
10 7.774	34.53	-15.47	50.00	33.97	0.30	0.26	Average	
11 19.752	22.70	-37.30	60.00	21.86	0.43	0.41	QP	
12 19.752	18.84	-31.16	50.00	18.00	0.43	0.41	Average	

5.5.8. Photographs of Conducted Emission Test Configuration

Mode 1

FRONT VIEW



REAR VIEW





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Mode 2

FRONT VIEW



REAR VIEW





5.6. Test of Spurious Radiated Emission

5.6.1. Applicable Standard

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 a radiated measurement. In addition, radiated emissions that fall in the restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified in Section 15.209.

5.6.2. Measuring Instruments

Please reference item 1~17 in chapter 6 for the instruments used for testing.

5.6.3. Description of Major Test Instruments Setting

- Spectrum Analyzer : R&S FSP40
Attenuation : Auto
Start Frequency : 1000 MHz
Stop Frequency : 10th carrier harmonic
RB / VB : 1 MHz / 1MHz for Peak
RB / VB : 1 MHz / 10Hz for Average

- Test Receiver : R&S ESCS 30
Attenuation : Auto
Start Frequency : 30 MHz
Stop Frequency : 1000 MHz
RB : 120 KHz for QP or PK

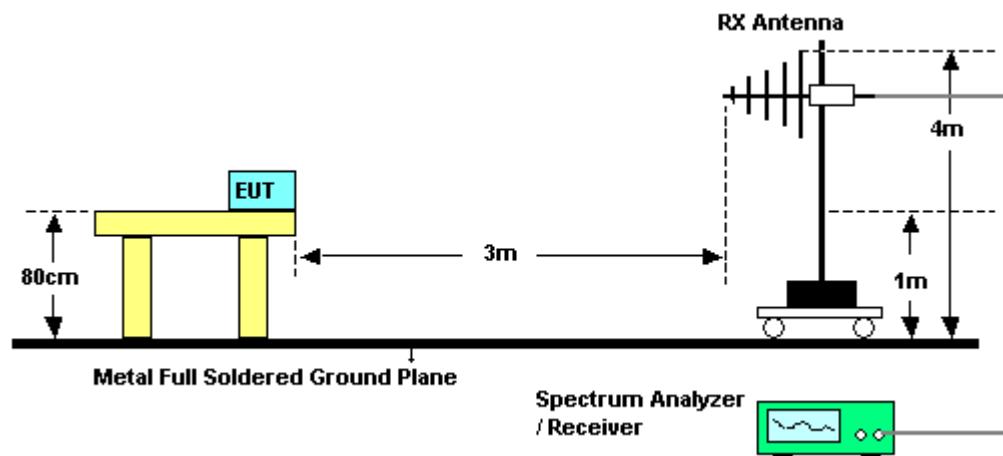
5.6.4. Test Procedures

1. Configure the EUT according to ANSI C63.4.
2. The EUT was placed on the top of the turntable 0.8 meter above ground.
3. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
4. Power on the EUT and all the supporting units.
5. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
6. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of both horizontal and vertical polarization.
7. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
8. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
9. For emission above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.

10. If the emission level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz and average method for above the 1GHz. the reported.

11. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB higher than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

5.6.5. Test Setup Layout



5.6.6. Test Criteria

All test results complied with the requirements of 15.247(d). Measurement Uncertainty is 2.26dB.

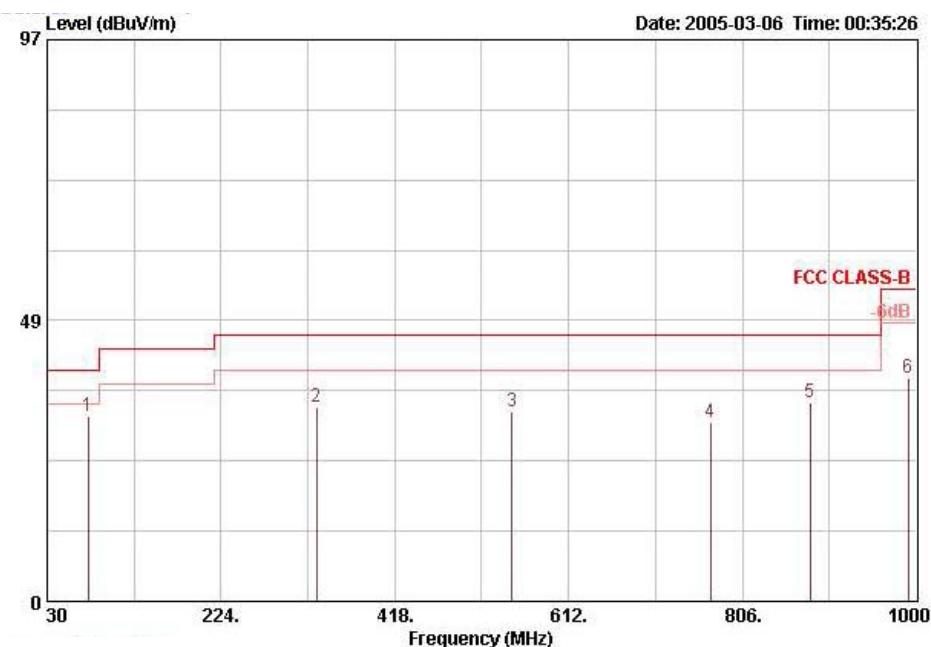


5.6.7. Test Results for CH 11 / 2462 MHz (for emission below 1GHz)

- Modulation Type: OFDM
- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Ming Da, Kao

Mode 1

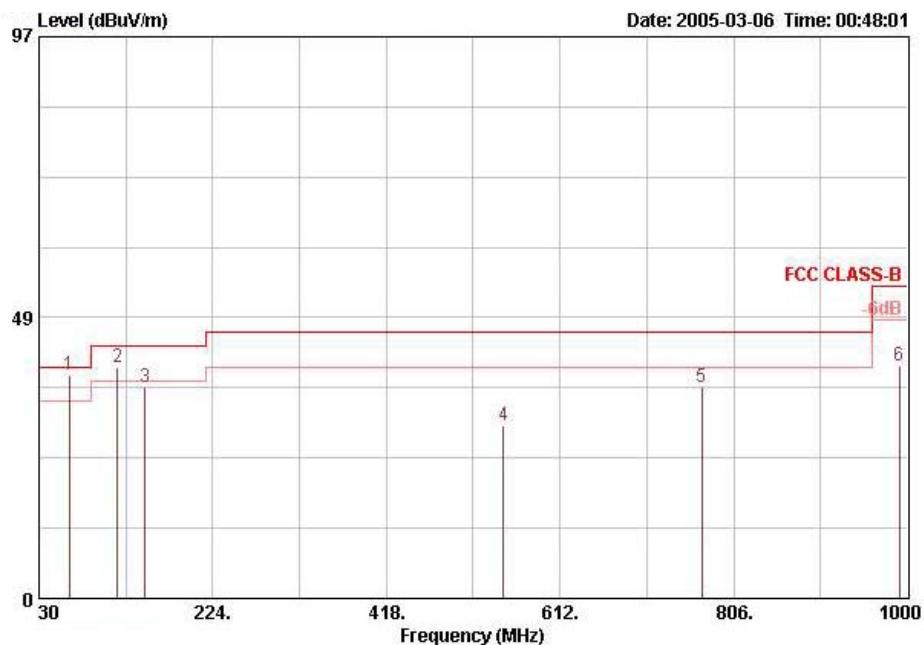
(A) Polarization: Horizontal



Freq MHz	Level dBuV/m	Over Limit dB	Antenna Line Factor	Cable Loss dB	Preamp Factor	Read Level dBuV	Read Pol/Phase		Remark
							Antenna Line Factor	Cable Loss dB	
1 75.590	32.03	-7.97	40.00	6.20	0.70	29.97	55.09	VERTICAL	Peak
2 330.700	33.69	-12.31	46.00	13.87	1.43	30.50	48.89	VERTICAL	Peak
3 548.950	32.68	-13.32	46.00	18.28	1.87	30.63	43.16	VERTICAL	Peak
4 770.110	31.05	-14.95	46.00	19.92	2.19	30.09	39.02	VERTICAL	Peak
5 881.660	34.31	-11.69	46.00	20.32	2.39	29.18	40.78	VERTICAL	Peak
6 991.270	38.58	-15.42	54.00	20.90	2.52	28.65	43.80	VERTICAL	Peak



(B) Polarization: Vertical



Freq	Level	Over Limit	Antenna Line Factor	Cable Loss Factor		Preamp	Read Level	Pol/Phase	Remark
				dB	dBuV/m				
MHz	dBuV/m			dB	dBuV/m	dB	dB	dBuV	
1 0	63.950	38.69	-1.31	40.00	5.10	0.67	29.89	62.81	VERTICAL Peak
2 0	117.300	39.96	-3.54	43.50	11.58	0.88	30.04	57.54	VERTICAL Peak
3	148.340	36.39	-7.11	43.50	10.28	0.96	30.09	55.24	VERTICAL Peak
4	548.950	29.90	-16.10	46.00	18.28	1.87	30.63	40.38	VERTICAL Peak
5	770.110	36.53	-9.47	46.00	19.92	2.19	30.09	44.51	VERTICAL Peak
6	991.270	40.05	-13.95	54.00	20.90	2.52	28.65	45.28	VERTICAL Peak

Note:

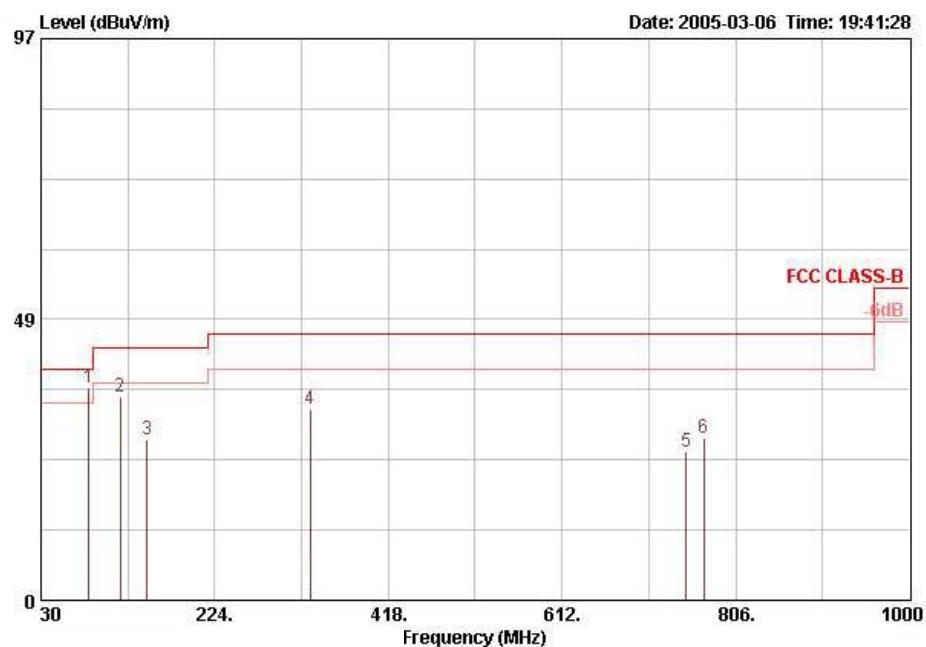
Emission level (dBuV/m) = 20 log Emission level (uV/m)

Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level



Mode 2

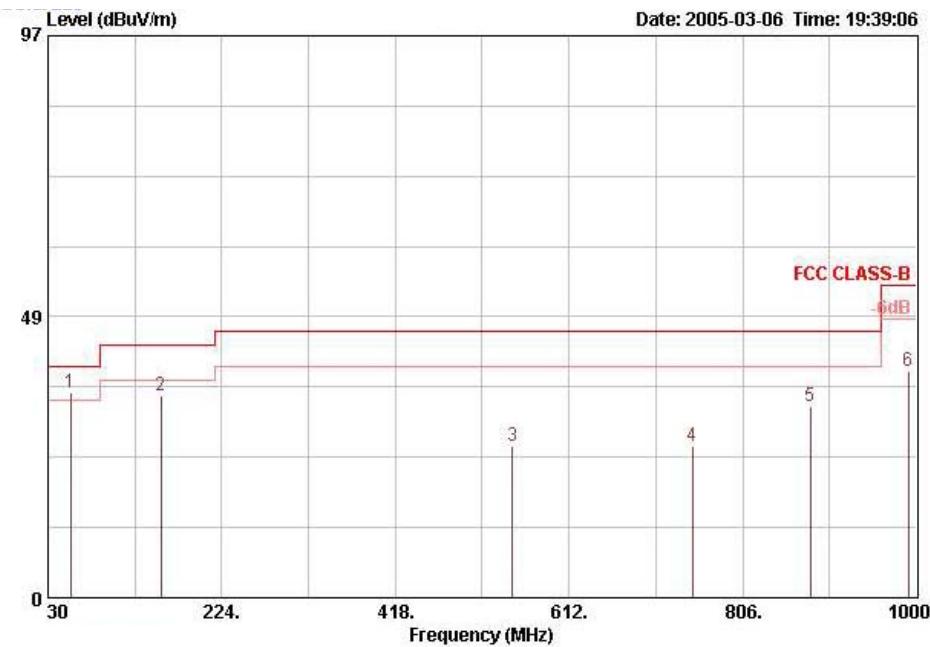
(A) Polarization: Horizontal



Freq	Level	Over	Limit	Antenna	Cable	Preamp	Read	Pol/Phase	Remark
		Limit	Line Factor	Loss	Factor	Level	Pol/Phase		
MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1 @	83.350	36.67	-3.33	40.00	7.40	0.73	29.97	58.50	HORIZONTAL Peak
2	118.270	35.27	-8.23	43.50	11.62	0.88	30.04	52.81	HORIZONTAL Peak
3	148.340	27.67	-15.83	43.50	10.28	0.96	30.09	46.52	HORIZONTAL Peak
4	330.700	33.02	-12.98	46.00	13.87	1.43	30.50	48.21	HORIZONTAL Peak
5	750.710	25.60	-20.40	46.00	19.92	2.15	30.06	33.60	HORIZONTAL Peak
6	770.110	27.97	-18.03	46.00	19.92	2.19	30.09	35.94	HORIZONTAL Peak



(B) Polarization: Vertical



Freq	Level	Over Limit	Antenna Line Factor	Cable Loss Factor		Read Level	Pol/Phase	Remark
				dB	dBuV/m			
1	55.220	35.49	-4.51	40.00	6.25	0.63	29.81	58.42 VERTICAL Peak
2	156.100	34.99	-8.51	43.50	9.68	0.99	30.14	54.45 VERTICAL Peak
3	548.950	26.11	-19.89	46.00	18.28	1.87	30.63	36.58 VERTICAL Peak
4	749.740	26.14	-19.86	46.00	19.92	2.15	30.06	34.13 VERTICAL Peak
5	881.660	33.11	-12.89	46.00	20.32	2.39	29.18	39.58 VERTICAL Peak
6	991.270	39.03	-14.97	54.00	20.90	2.52	28.65	44.26 VERTICAL Peak

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m)

Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

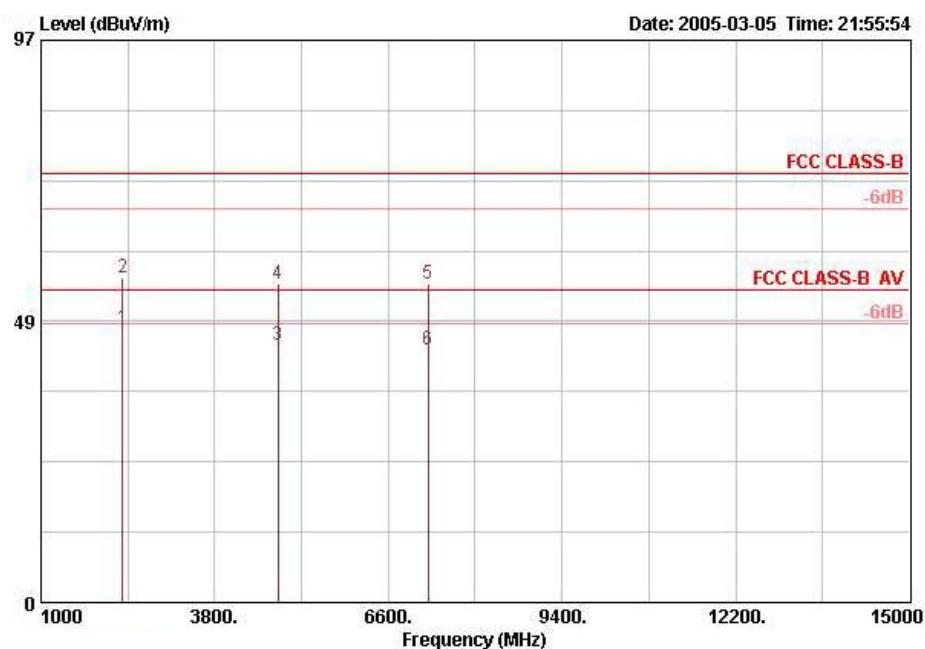


5.6.8. Test Results for CH 01 / 2412 MHz (for emission above 1GHz)

- Modulation Type: DSSS
- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Ming Da, Kao

Mode 1

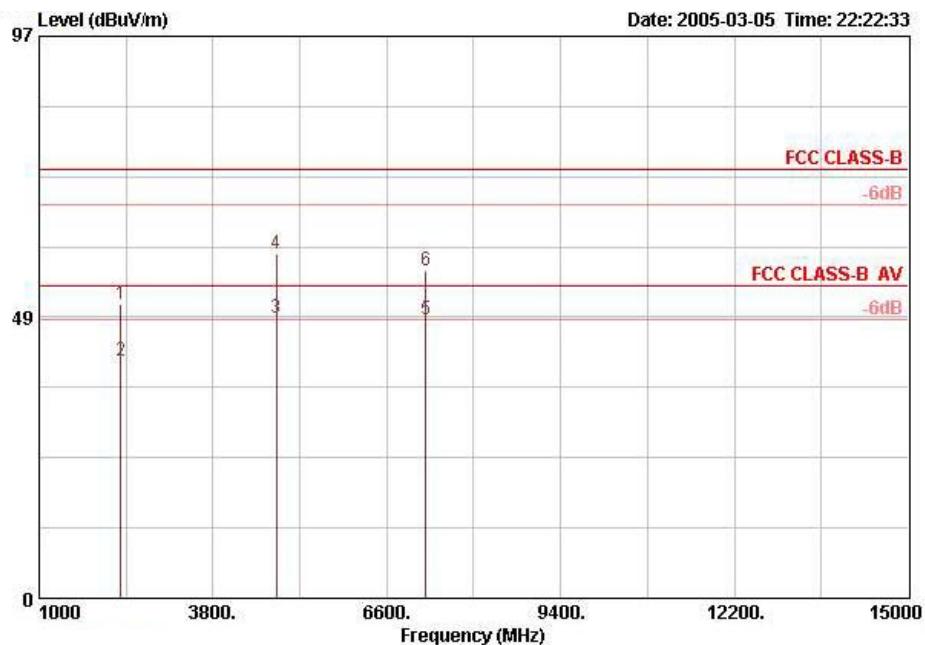
(A) Polarization: Horizontal



Freq	Level	Over	Limit	Antenna	Cable	Preamp	Read	Remark
		Line	Factor	Loss	Factor	Level	Pol/Phase	
MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV	
1	2320.040	47.18	-6.82	54.00	27.95	1.96	35.95	53.21 HORIZONTAL AVERAGE
2	2320.040	56.10	-17.90	74.00	27.95	1.96	35.95	62.13 HORIZONTAL PEAK
3	4823.920	44.31	-9.69	54.00	33.22	3.20	37.61	45.49 HORIZONTAL AVERAGE
4	4823.920	54.87	-19.13	74.00	33.22	3.20	37.61	56.05 HORIZONTAL PEAK
5	7238.000	55.04	-18.96	74.00	36.08	4.41	39.19	53.74 HORIZONTAL PEAK
6	7238.960	43.64	-10.36	54.00	36.08	4.41	39.19	42.34 HORIZONTAL AVERAGE



(B) Polarization: Vertical



Freq	Level	Over Limit	Antenna Line Factor	Cable Preamp		Read Level	Pol/Phase	Remark
				MHz	dBuV/m	dB	dBuV/m	dB
1	2319.640	50.87	-23.13	74.00	27.95	1.96	35.95	56.91 VERTICAL PEAK
2	2320.000	40.88	-13.12	54.00	27.95	1.96	35.95	46.92 VERTICAL AVERAGE
3 !	4823.680	48.44	-5.56	54.00	33.22	3.20	37.61	49.62 VERTICAL AVERAGE
4	4823.820	59.54	-14.46	74.00	33.22	3.20	37.61	60.72 VERTICAL PEAK
5 !	7233.200	48.15	-5.85	54.00	36.08	4.41	39.15	46.81 VERTICAL AVERAGE
6	7233.200	56.63	-17.37	74.00	36.08	4.41	39.15	55.30 VERTICAL PEAK

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m)

Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

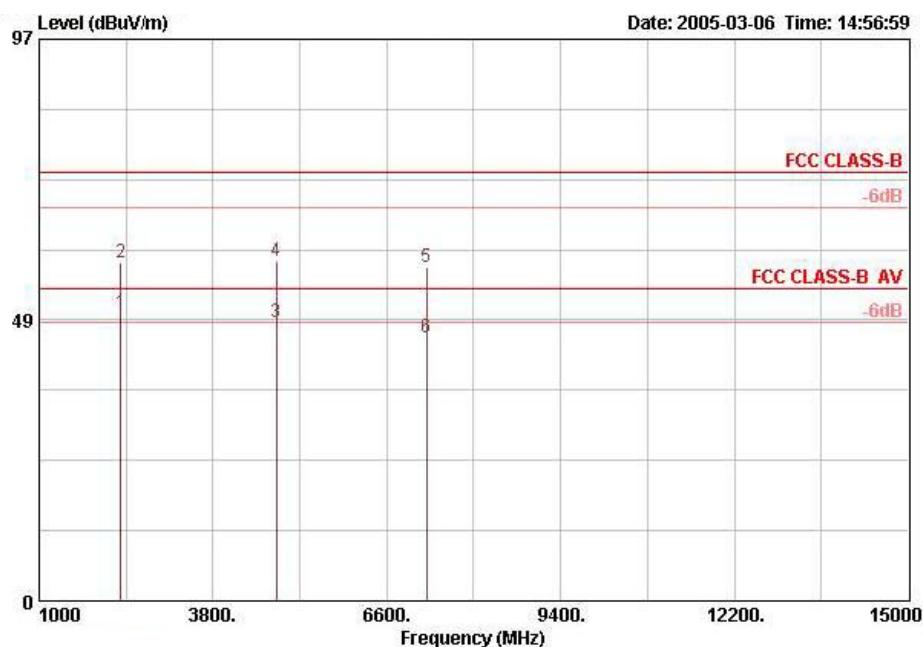


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Mode 2

(A) Polarization: Horizontal



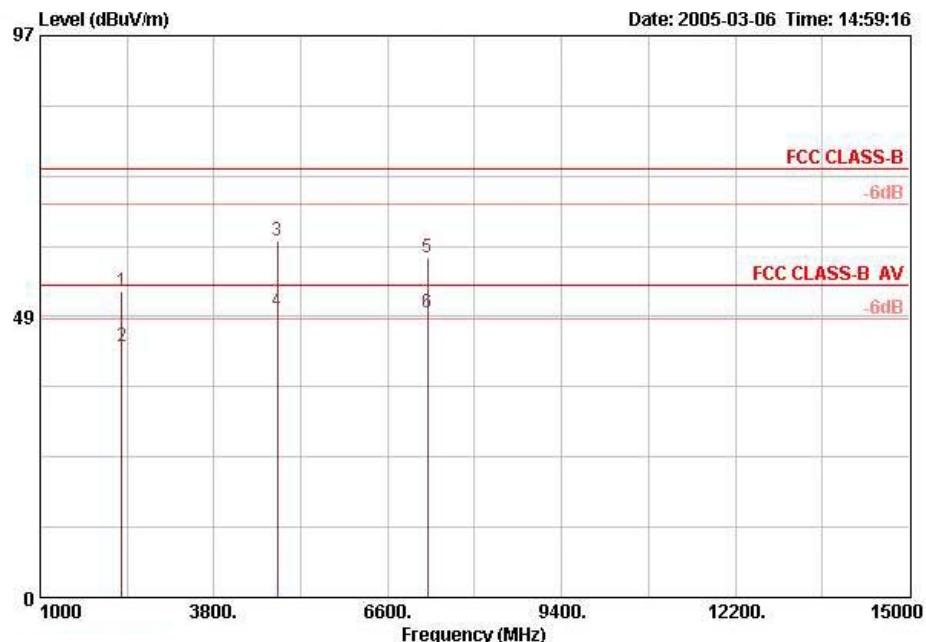
Freq	Level	Over	Limit	Antenna	Cable	Preamp	Read	Pol/Phase	Remark
		MHz	dBuV/m	dB	dBuV/m	dB/m	dB		
1	2320.000	49.64	-4.36	54.00	27.95	1.96	35.95	55.67	HORIZONTAL Average
2	2320.000	58.36	-15.64	74.00	27.95	1.96	35.95	64.39	HORIZONTAL Peak
3	4824.000	48.22	-5.78	54.00	33.22	3.20	37.61	49.40	HORIZONTAL Average
4	4824.000	58.74	-15.26	74.00	33.22	3.20	37.61	59.92	HORIZONTAL Peak
5	7236.000	57.51	-16.49	74.00	36.08	4.41	39.19	56.21	HORIZONTAL Peak
6	7236.000	45.51	-8.49	54.00	36.08	4.41	39.19	44.21	HORIZONTAL Average



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(B) Polarization: Vertical



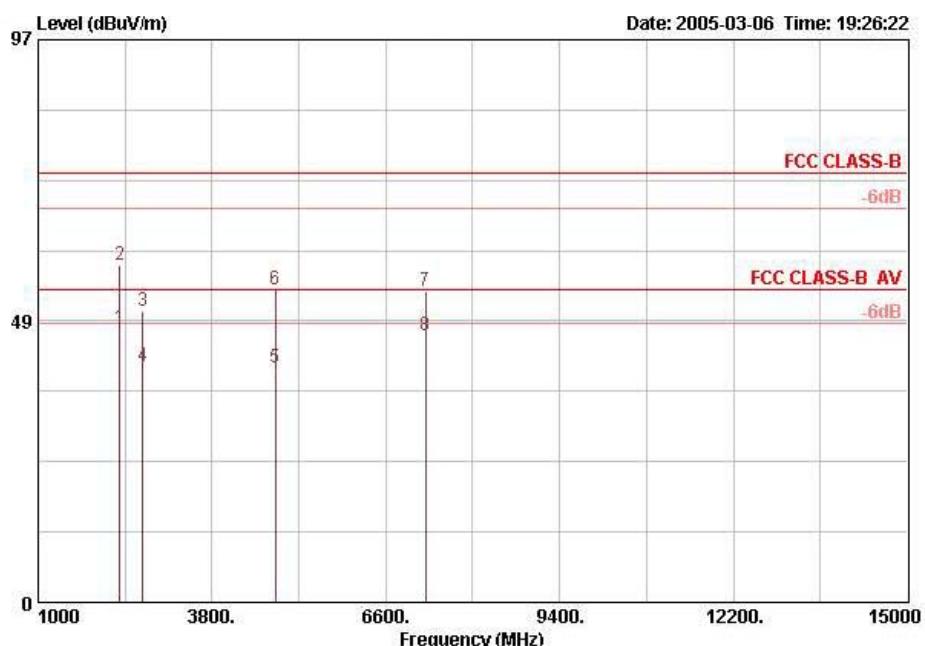
Freq	Level	Over	Limit	Antenna	Cable	Preamp	Read	Pol/Phase	Remark
		MHz	dBuV/m	dB	dBuV/m	dB/m	dB		
1	2320.000	52.88	-21.12	74.00	27.95	1.96	35.95	58.91	VERTICAL Peak
2	2320.000	43.25	-10.75	54.00	27.95	1.96	35.95	49.28	VERTICAL Average
3	4824.000	61.55	-12.45	74.00	33.22	3.20	37.61	62.73	VERTICAL Peak
4 !	4824.000	49.54	-4.46	54.00	33.22	3.20	37.61	50.72	VERTICAL Average
5	7236.000	58.66	-15.34	74.00	36.08	4.41	39.19	57.36	VERTICAL Peak
6 !	7236.000	49.25	-4.75	54.00	36.08	4.41	39.19	47.95	VERTICAL Average



- Modulation Type: OFDM
- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Ming Da, Kao

Mode 1

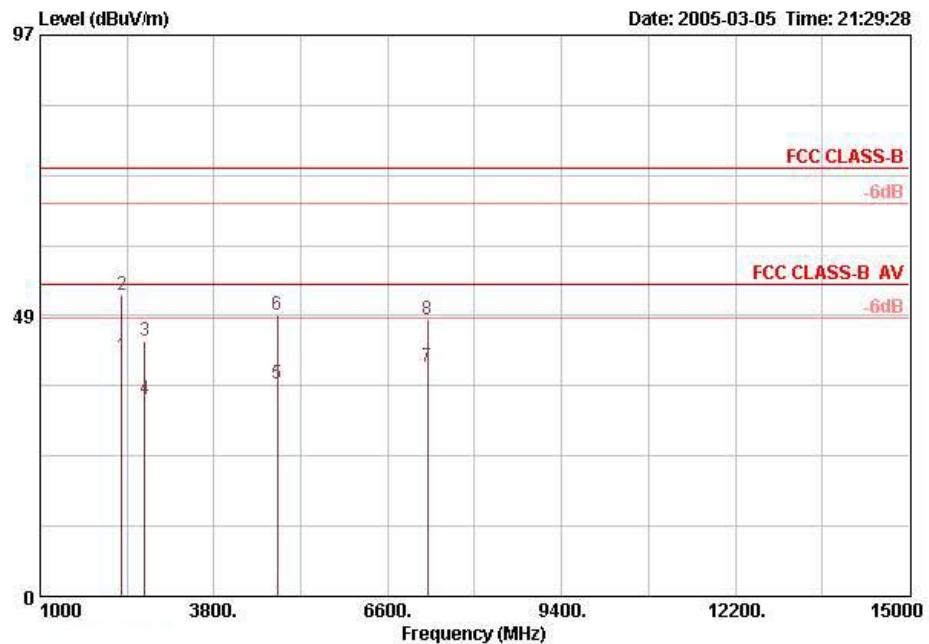
(A) Polarization: Horizontal



Freq	Level	Over	Limit	Antenna	Cable	Preamp	Read	Pol/Phase	Remark
		MHz	dBuV/m	dB	dBuV/m	dB/m	dB		
1	2320.000	47.32	-6.68	54.00	34.32	1.96	35.95	46.98	HORIZONTAL Average
2	2320.000	58.02	-15.98	74.00	34.32	1.96	35.95	57.68	HORIZONTAL Peak
3	2688.000	50.21	-23.79	74.00	33.26	1.86	36.20	51.30	HORIZONTAL Peak
4	2688.000	40.65	-13.35	54.00	33.26	1.86	36.20	41.74	HORIZONTAL Average
5	4824.000	40.36	-13.64	54.00	33.94	3.20	37.61	40.83	HORIZONTAL Average
6	4824.000	53.87	-20.13	74.00	33.94	3.20	37.61	54.34	HORIZONTAL Peak
7	7236.000	53.54	-20.46	74.00	38.84	4.41	39.19	49.48	HORIZONTAL Peak
8	7236.000	45.87	-8.13	54.00	38.84	4.41	39.19	41.81	HORIZONTAL Average



(B) Polarization: Vertical



Freq MHz	Level dBuV/m	Over Limit dB	Antenna Line Factor	Cable Loss dB/m	Preamp Factor	Read Level dB	Pol/Phase	Read	
								Remark	Level dBuV
1 2320.900	41.54	-12.46	54.00	27.95	1.96	35.95	47.57	VERTICAL	AVERAGE
2 2320.900	52.07	-21.93	74.00	27.95	1.96	35.95	58.10	VERTICAL	PEAK
3 2687.880	44.26	-29.74	74.00	29.06	1.86	36.20	49.54	VERTICAL	PEAK
4 2688.080	34.15	-19.85	54.00	29.06	1.86	36.20	39.44	VERTICAL	AVERAGE
5 4824.880	36.84	-17.16	54.00	33.22	3.20	37.61	38.02	VERTICAL	AVERAGE
6 4824.880	48.64	-25.36	74.00	33.22	3.20	37.61	49.82	VERTICAL	PEAK
7 7237.120	39.53	-14.47	54.00	36.08	4.41	39.19	38.23	VERTICAL	AVERAGE
8 7237.120	47.81	-26.19	74.00	36.08	4.41	39.19	46.51	VERTICAL	PEAK

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m)

Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

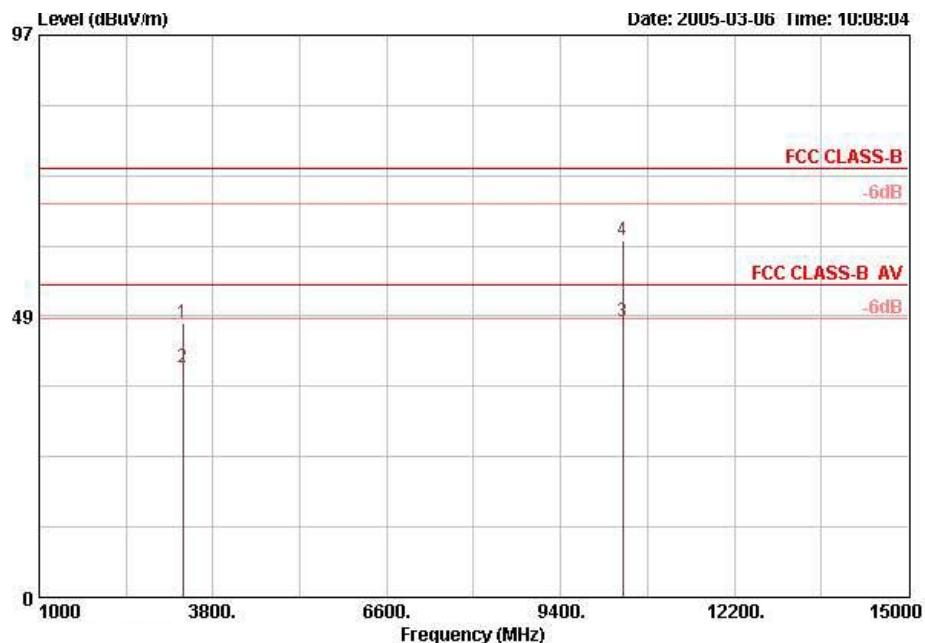


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Mode 2

(A) Polarization: Horizontal

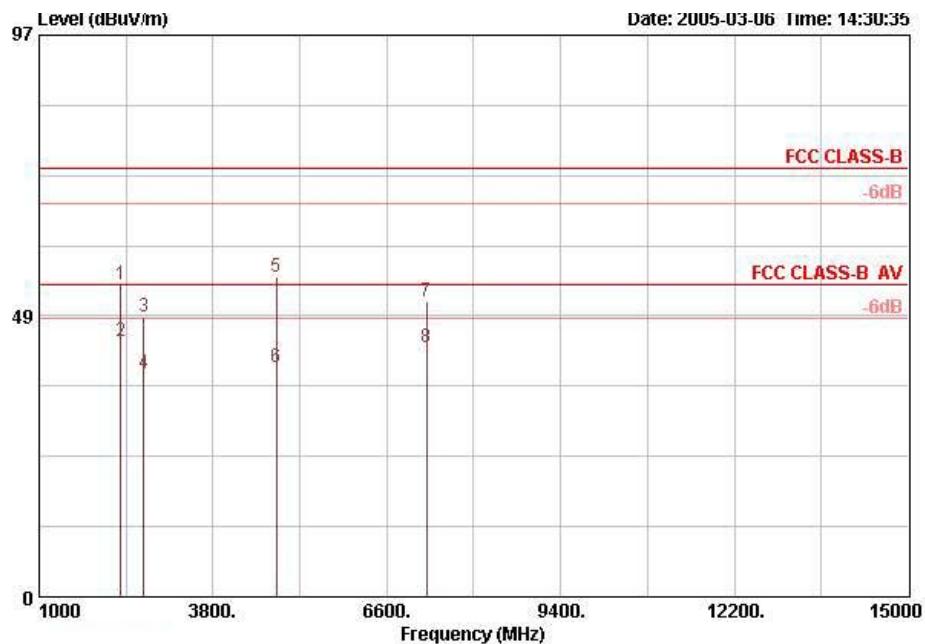


Freq	Level	Over	Antenna	Cable	Preamp	Read	Remark	
		Limit	Line Factor	Loss	Factor	Level		
MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV	
1	3313.000	47.24	-26.76	74.00	30.88	2.10	36.60	50.86 HORIZONTAL Peak
2	3313.000	39.66	-14.34	54.00	30.88	2.10	36.60	43.28 HORIZONTAL Average
3	10400.000	47.61	-6.39	54.00	39.38	5.23	36.13	39.13 HORIZONTAL Average
4	10400.000	61.57	-12.43	74.00	39.38	5.23	36.13	53.09 HORIZONTAL Peak



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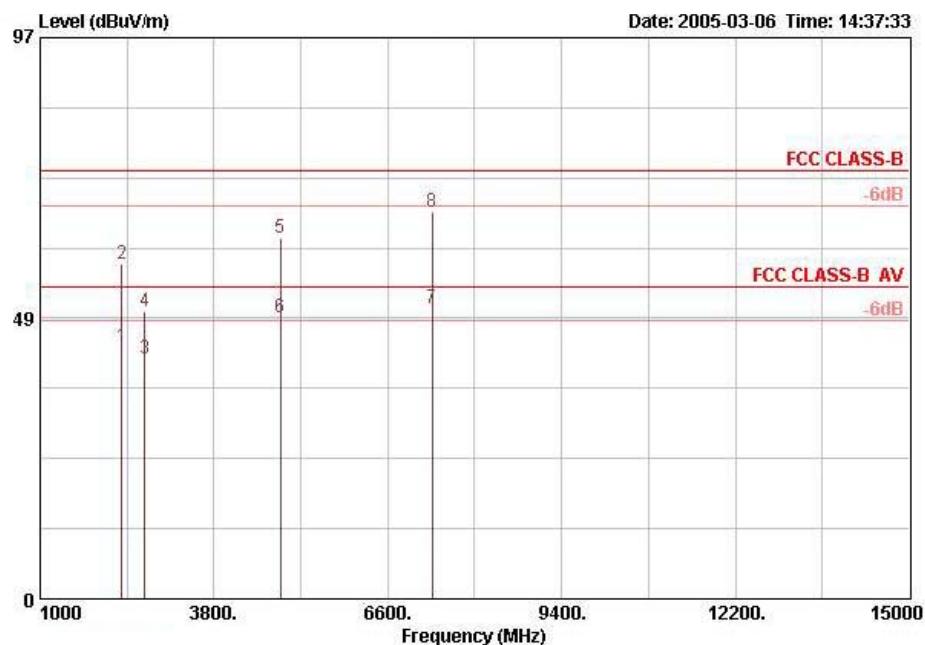
Freq	Level	Over Limit	Antenna Line Factor	Cable Preamplifier		Read Level		Remark
				dB	dBuV/m	dB	dBuV	
1	2320.000	54.05	-19.95	74.00	27.95	1.96	35.95	60.08 HORIZONTAL Peak
2	2320.000	44.25	-9.75	54.00	27.95	1.96	35.95	50.28 HORIZONTAL Average
3	2687.000	48.36	-25.64	74.00	29.06	1.86	36.20	53.65 HORIZONTAL Peak
4	2687.000	38.55	-15.45	54.00	29.06	1.86	36.20	43.84 HORIZONTAL Average
5	4824.000	55.27	-18.73	74.00	33.22	3.20	37.61	56.45 HORIZONTAL Peak
6	4824.000	39.68	-14.32	54.00	33.22	3.20	37.61	40.86 HORIZONTAL Average
7	7236.000	50.95	-23.05	74.00	36.08	4.41	39.19	49.65 HORIZONTAL Peak
8	7236.000	43.21	-10.79	54.00	36.08	4.41	39.19	41.91 HORIZONTAL Average



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(B) Polarization: Vertical



Freq	Level	Over Limit	Antenna Line Factor	Cable Loss Factor	Preamp Factor	Read Level		Pol/Phase	Remark	
						MHz	dBuV/m	dB	dBuV/m	dB/m
1	2320.000	43.55	-10.45	54.00	27.95	1.96	35.95	49.58	VERTICAL	Average
2	2320.000	57.88	-16.12	74.00	27.95	1.96	35.95	63.91	VERTICAL	Peak
3	2688.000	41.54	-12.46	54.00	29.06	1.86	36.20	46.83	VERTICAL	Average
4	2688.000	49.61	-24.39	74.00	29.06	1.86	36.20	54.90	VERTICAL	Peak
5	4872.000	62.38	-11.62	74.00	33.33	3.22	37.65	63.47	VERTICAL	Peak
6	4872.000	48.74	-5.26	54.00	33.33	3.22	37.65	49.83	VERTICAL	Average
7	7313.000	50.33	-3.67	54.00	36.24	4.44	39.28	48.92	VERTICAL	Average
8	7313.000	66.87	-7.13	74.00	36.24	4.44	39.28	65.46	VERTICAL	Peak

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m)

Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

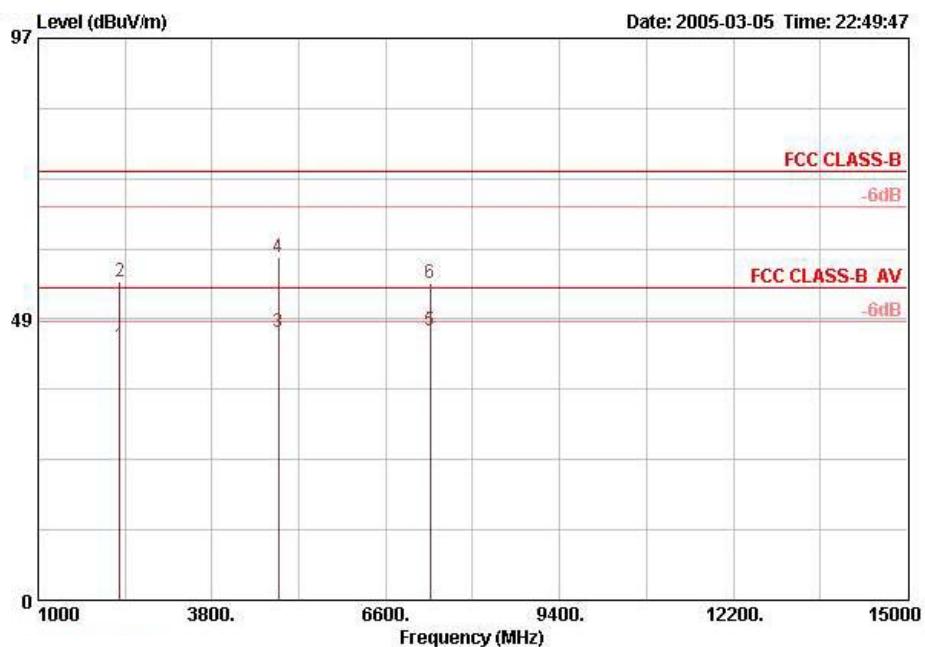


5.6.9. Test Results for CH 06 / 2437 MHz (for emission above 1GHz)

- Modulation Type: DSSS
- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Ming Da, Kao

Mode 1

(A) Polarization: Horizontal



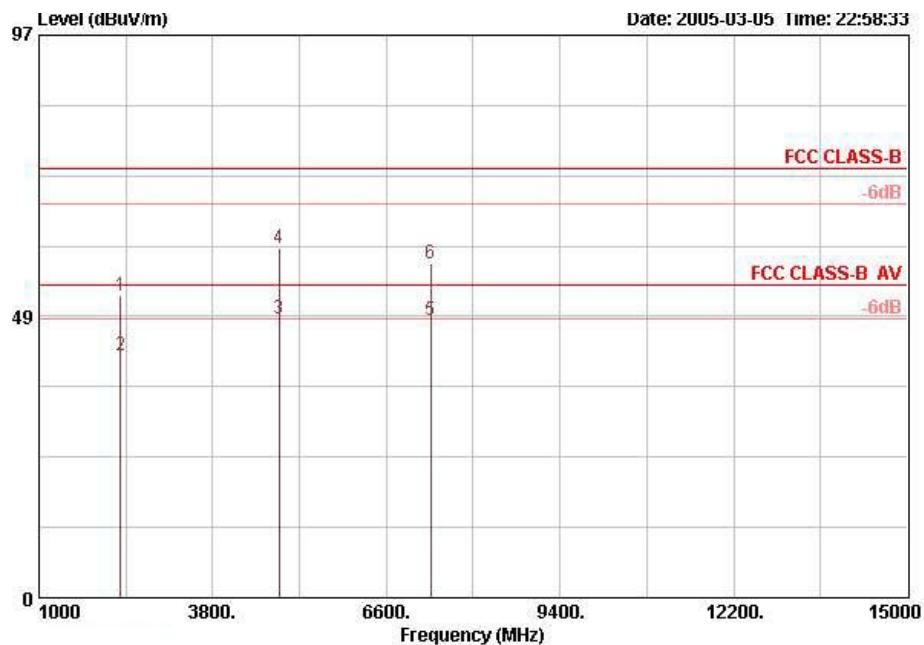
Freq	Level	Over Limit	Antenna Line Factor	Cable Loss	Preamp Factor	Read Level		Pol/Phase	Remark
						dB	dBuV/m		
1	2320.000	43.93	-10.07	54.00	27.95	1.96	35.95	49.96	HORIZONTAL AVERAGE
2	2320.260	54.91	-19.09	74.00	27.95	1.96	35.95	60.95	HORIZONTAL PEAK
3	4873.690	46.34	-7.66	54.00	33.33	3.22	37.65	47.43	HORIZONTAL AVERAGE
4	4874.030	59.15	-14.85	74.00	33.33	3.22	37.65	60.24	HORIZONTAL PEAK
5	7313.020	46.58	-7.42	54.00	36.24	4.44	39.28	45.17	HORIZONTAL AVERAGE
6	7313.020	54.69	-19.31	74.00	36.24	4.44	39.28	53.28	HORIZONTAL PEAK



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(B) Polarization: Vertical



Freq	Level	Over Limit	Antenna Line Factor	Cable Loss		Read Level	Pol/Phase	Remark		
				MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB
1	2319.680	51.95	-22.05	74.00	27.95	1.96	35.95	57.98	VERTICAL	PEAK
2	2320.060	41.85	-12.15	54.00	27.95	1.96	35.95	47.88	VERTICAL	AVERAGE
3	4873.720	48.20	-5.80	54.00	33.33	3.22	37.65	49.29	VERTICAL	AVERAGE
4	4874.040	60.18	-13.82	74.00	33.33	3.22	37.65	61.27	VERTICAL	PEAK
5	7310.120	47.86	-6.14	54.00	36.24	4.44	39.25	46.42	VERTICAL	AVERAGE
6	7312.880	57.57	-16.43	74.00	36.24	4.44	39.28	56.17	VERTICAL	PEAK

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m)

Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

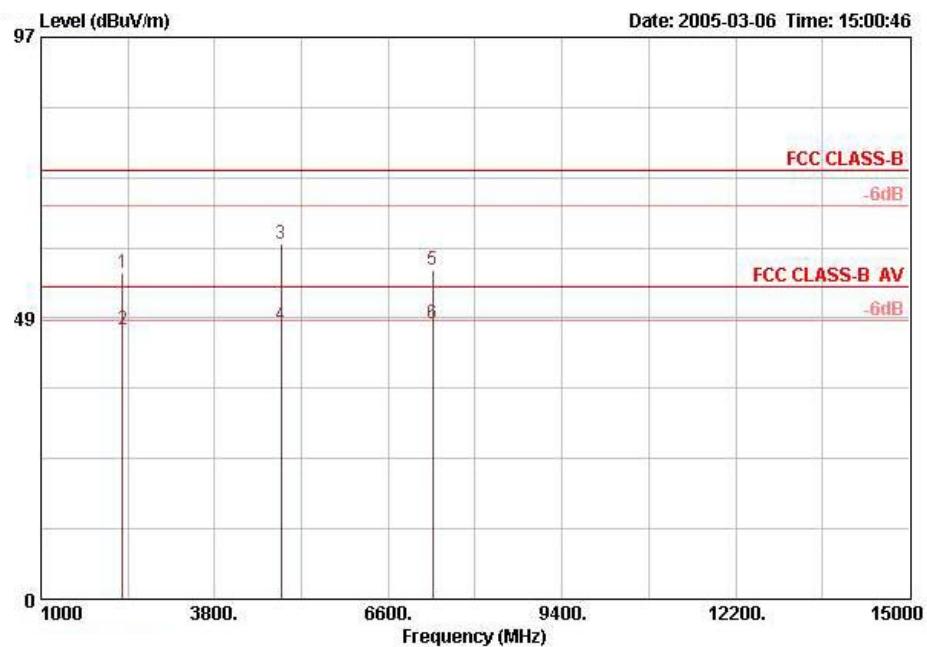


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Mode 2

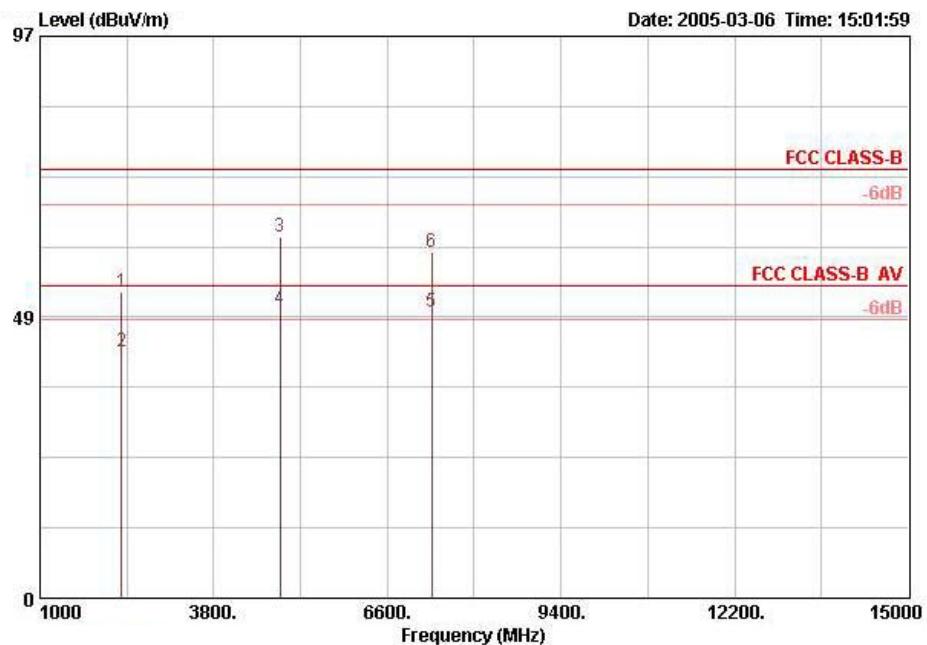
(A) Polarization: Horizontal



Freq	Level	Over	Limit	Antenna	Cable	Preamp	Read	Level	Pol/Phase	Remark
		Limit	Line Factor	dB/m	dB	dB	dBuV			
1	2320.000	56.37	-17.63	74.00	27.95	1.96	35.95	62.40	HORIZONTAL	Peak
2	2320.000	46.51	-7.49	54.00	27.95	1.96	35.95	52.54	HORIZONTAL	Average
3	4874.000	61.25	-12.75	74.00	33.33	3.22	37.65	62.34	HORIZONTAL	Peak
4	4874.000	47.44	-6.56	54.00	33.33	3.22	37.65	48.53	HORIZONTAL	Average
5	7311.000	56.95	-17.05	74.00	36.24	4.44	39.25	55.51	HORIZONTAL	Peak
6	7311.000	47.52	-6.48	54.00	36.24	4.44	39.25	46.08	HORIZONTAL	Average



(B) Polarization: Vertical



Freq	Level	Over	Limit	Antenna	Cable	Preamp	Read	Pol/Phase	Remark
		MHz	dBuV/m	dB	dBuV/m	dB/m	dB		
1	2320.000	52.96	-21.04	74.00	27.95	1.96	35.95	58.99	VERTICAL Peak
2	2320.000	42.54	-11.46	54.00	27.95	1.96	35.95	48.57	VERTICAL Average
3	4874.000	62.36	-11.64	74.00	33.33	3.22	37.65	63.45	VERTICAL Peak
4 !	4874.000	49.85	-4.15	54.00	33.33	3.22	37.65	50.94	VERTICAL Average
5 !	7311.000	49.54	-4.46	54.00	36.24	4.44	39.25	48.10	VERTICAL Average
6	7311.000	59.66	-14.34	74.00	36.24	4.44	39.25	58.22	VERTICAL Peak

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m)

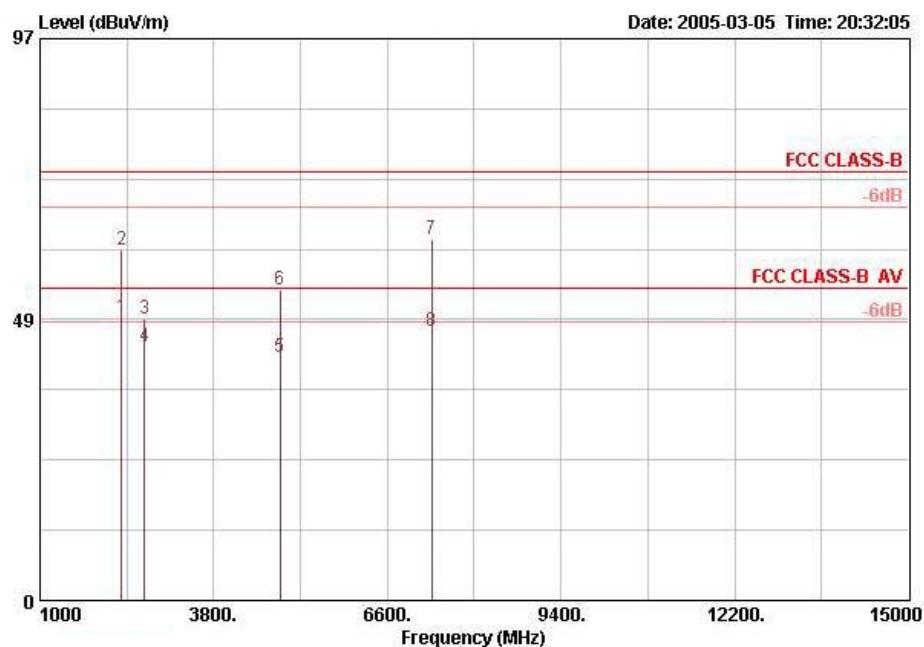
Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level



- Modulation Type: OFDM
- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Ming Da, Kao

Mode 1

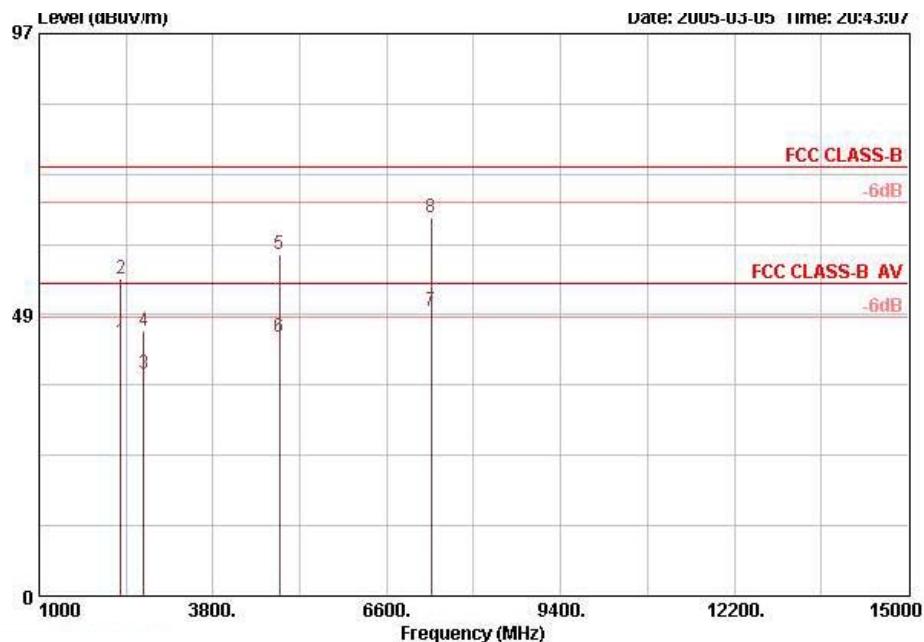
(A) Polarization: Horizontal



Freq	Level	Over Limit	Antenna Line Factor	Cable Loss	Preamp Factor	Read Level		Pol/Phase	Remark
						MHz	dBuV/m	dB	dBuV/m
1	2319.960	49.00	-5.00	54.00	27.95	1.96	35.95	55.03	HORIZONTAL AVERAGE
2	2319.960	60.46	-13.54	74.00	27.95	1.96	35.95	66.49	HORIZONTAL PEAK
3	2687.840	48.52	-25.48	74.00	29.06	1.86	36.20	53.80	HORIZONTAL PEAK
4	2688.020	43.78	-10.22	54.00	29.06	1.86	36.20	49.06	HORIZONTAL AVERAGE
5	4874.480	42.05	-11.95	54.00	33.33	3.22	37.65	43.14	HORIZONTAL AVERAGE
6	4874.480	53.55	-20.45	74.00	33.33	3.22	37.65	54.65	HORIZONTAL PEAK
7	7312.400	62.40	-11.60	74.00	36.24	4.44	39.28	60.99	HORIZONTAL PEAK
8	7312.800	46.59	-7.41	54.00	36.24	4.44	39.28	45.19	HORIZONTAL AVERAGE



(B) Polarization: Vertical



Freq	Level	Over Limit		Antenna Line Factor	Cable Loss		Preamp Factor	Read Level		Pol/Phase	Remark
		MHz	dBuV/m		dB	dBuV/m	dB/m	dB	dB		
1	2320.040	43.99	-10.01	54.00	27.95	1.96	35.95	50.03	VERTICAL	AVERAGE	
2	2320.120	54.67	-19.33	74.00	27.95	1.96	35.95	60.70	VERTICAL	PEAK	
3	2688.040	38.33	-15.67	54.00	29.06	1.86	36.20	43.62	VERTICAL	AVERAGE	
4	2688.040	45.83	-28.17	74.00	29.06	1.86	36.20	51.12	VERTICAL	PEAK	
5	4872.680	59.03	-14.97	74.00	33.33	3.22	37.65	60.13	VERTICAL	PEAK	
6	4873.120	44.57	-9.43	54.00	33.33	3.22	37.65	45.67	VERTICAL	AVERAGE	
7	7313.040	49.21	-4.79	54.00	36.24	4.44	39.28	47.80	VERTICAL	AVERAGE	
8	7318.640	65.29	-8.71	74.00	36.29	4.44	39.28	63.84	VERTICAL	PEAK	

Note:

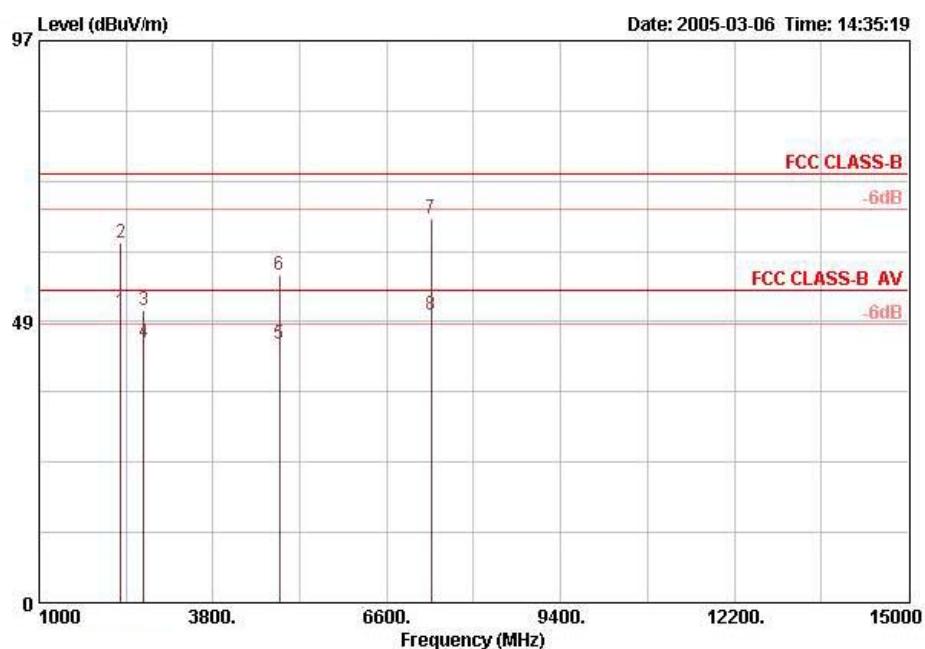
Emission level (dBuV/m) = 20 log Emission level (uV/m)

Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level



Mode 2

(A) Polarization: Horizontal



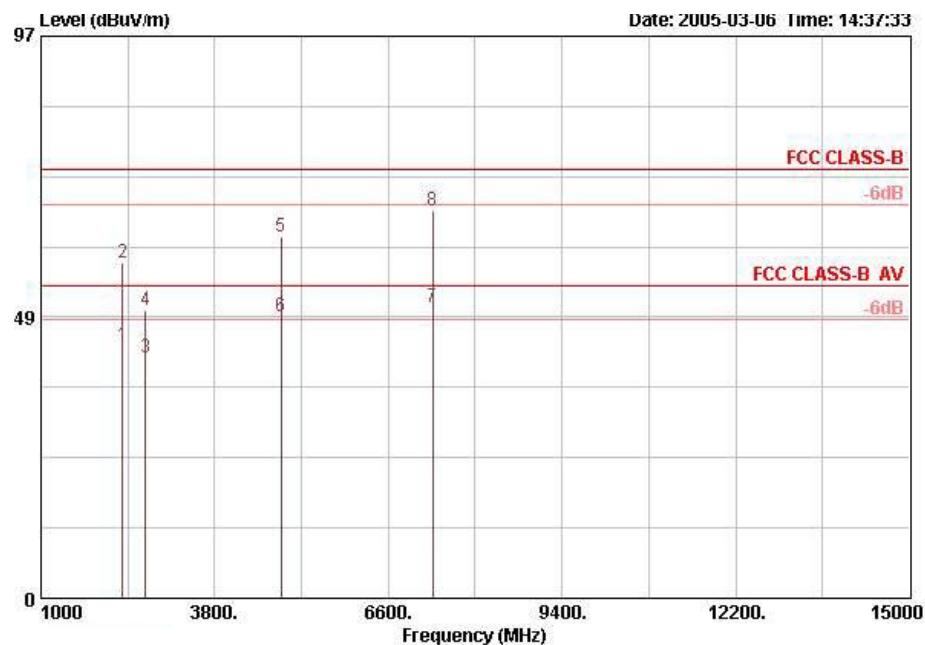
Freq MHz	Level dBuV/m	Over Limit		Antenna Line Factor	Cable Loss Factor		Read Level dBuV	Pol/Phase	Remark
		dB	dBuV/m		dB	dB/m			
1 ⑧	2319.000 50.25	-3.75	54.00	27.95	1.96	35.95	56.28	HORIZONTAL	Average
2	2319.000 62.22	-11.78	74.00	27.95	1.96	35.95	68.25	HORIZONTAL	Peak
3	2687.000 50.55	-23.45	74.00	29.06	1.86	36.20	55.84	HORIZONTAL	Peak
4	2687.000 44.88	-9.12	54.00	29.06	1.86	36.20	50.17	HORIZONTAL	Average
5	4874.000 44.55	-9.45	54.00	33.33	3.22	37.65	45.64	HORIZONTAL	Average
6	4874.000 56.57	-17.43	74.00	33.33	3.22	37.65	57.66	HORIZONTAL	Peak
7	7312.000 66.45	-7.55	74.00	36.24	4.44	39.28	65.04	HORIZONTAL	Peak
8 !	7312.000 49.69	-4.31	54.00	36.24	4.44	39.28	48.28	HORIZONTAL	Average



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(B) Polarization: Vertical



Freq	Level	Over Limit	Antenna Line Factor	Cable Loss	Preamp Factor	Read Level		Pol/Phase	Remark	
						MHz	dBuV/m	dB	dBuV/m	dB/m
1	2320.000	43.55	-10.45	54.00	27.95	1.96	35.95	49.58	VERTICAL	Average
2	2320.000	57.88	-16.12	74.00	27.95	1.96	35.95	63.91	VERTICAL	Peak
3	2688.000	41.54	-12.46	54.00	29.06	1.86	36.20	46.83	VERTICAL	Average
4	2688.000	49.61	-24.39	74.00	29.06	1.86	36.20	54.90	VERTICAL	Peak
5	4872.000	62.38	-11.62	74.00	33.33	3.22	37.65	63.47	VERTICAL	Peak
6	4872.000	48.74	-5.26	54.00	33.33	3.22	37.65	49.83	VERTICAL	Average
7	7313.000	50.33	-3.67	54.00	36.24	4.44	39.28	48.92	VERTICAL	Average
8	7313.000	66.87	-7.13	74.00	36.24	4.44	39.28	65.46	VERTICAL	Peak

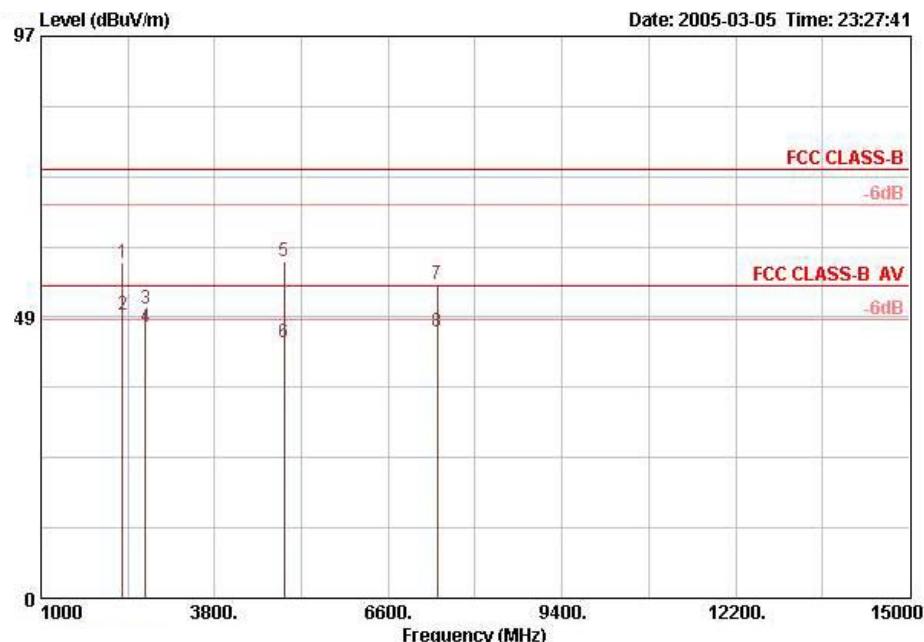


5.6.10. Test Results for CH 11 / 2462 MHz (for emission above 1GHz)

- Modulation Type: DSSS
- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Ming Da, Kao

Mode 1

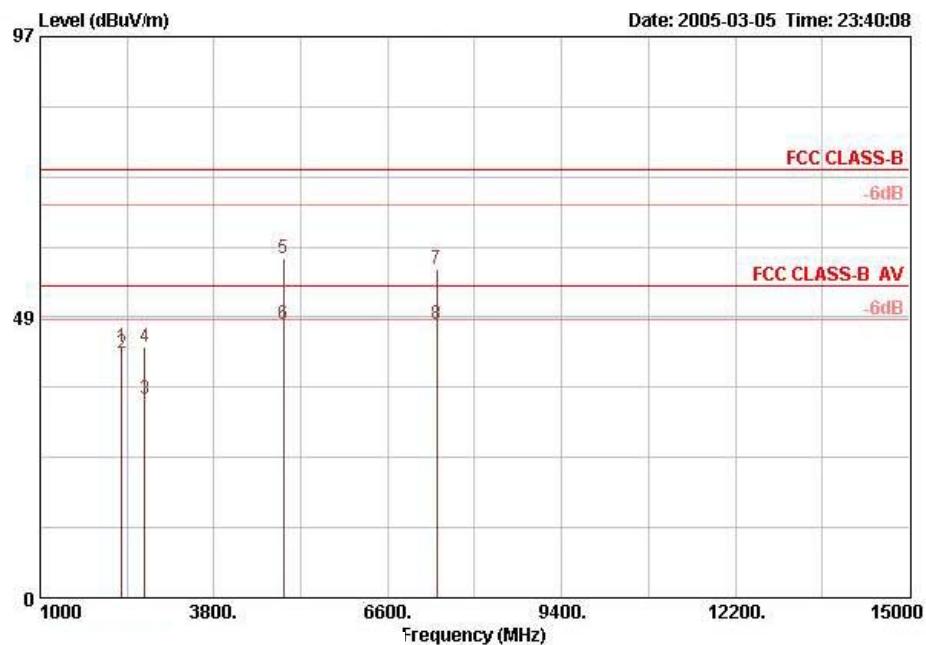
(A) Polarization: Horizontal



Freq	Level	Over Limit	Antenna Line Factor	Cable Loss	Preamp Factor	Read		
						dB	dB	dBuV
MHz	dBuV/m							
1	2320.140	57.94	-16.06	74.00	27.95	1.96	35.95	63.98 HORIZONTAL PEAK
2	2320.140	48.88	-5.12	54.00	27.95	1.96	35.95	54.92 HORIZONTAL AVERAGE
3	2687.980	50.06	-23.94	74.00	29.06	1.86	36.20	55.34 HORIZONTAL PEAK
4	2687.980	46.76	-7.24	54.00	29.06	1.86	36.20	52.05 HORIZONTAL AVERAGE
5	4924.010	58.12	-15.88	74.00	33.45	3.25	37.69	59.11 HORIZONTAL PEAK
6	4924.020	44.18	-9.82	54.00	33.45	3.25	37.69	45.17 HORIZONTAL AVERAGE
7	7386.200	54.27	-19.73	74.00	36.45	4.48	39.35	52.68 HORIZONTAL PEAK
8	7386.200	46.07	-7.93	54.00	36.45	4.48	39.35	44.48 HORIZONTAL AVERAGE



(B) Polarization: Vertical



Freq	Level	Over Limit	Antenna Line Factor	Cable Loss	Preamp Factor	Read Level		Pol/Phase	Remark
						MHz	dBuV/m	dB	dBuV
1	2320.400	43.27	-30.73	74.00	27.95	1.96	35.95	49.30	VERTICAL PEAK
2	2320.400	42.28	-11.72	54.00	27.95	1.96	35.95	48.31	VERTICAL AVERAGE
3	2688.740	34.28	-19.72	54.00	29.06	1.86	36.20	39.57	VERTICAL AVERAGE
4	2688.740	43.47	-30.53	74.00	29.06	1.86	36.20	48.76	VERTICAL PEAK
5	4923.860	58.61	-15.39	74.00	33.45	3.25	37.69	59.60	VERTICAL PEAK
6	4923.860	47.32	-6.68	54.00	33.45	3.25	37.69	48.31	VERTICAL AVERAGE
7	7386.600	56.83	-17.17	74.00	36.45	4.48	39.35	55.24	VERTICAL PEAK
8	7386.600	47.34	-6.66	54.00	36.45	4.48	39.35	45.75	VERTICAL AVERAGE

Note:

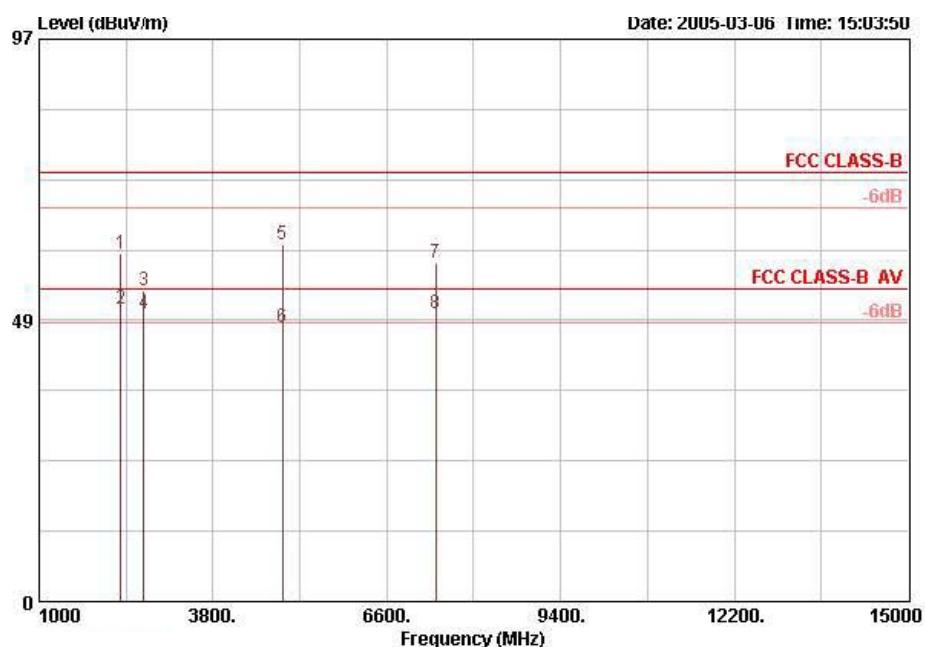
Emission level (dBuV/m) = 20 log Emission level (uV/m)

Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level



Mode 2

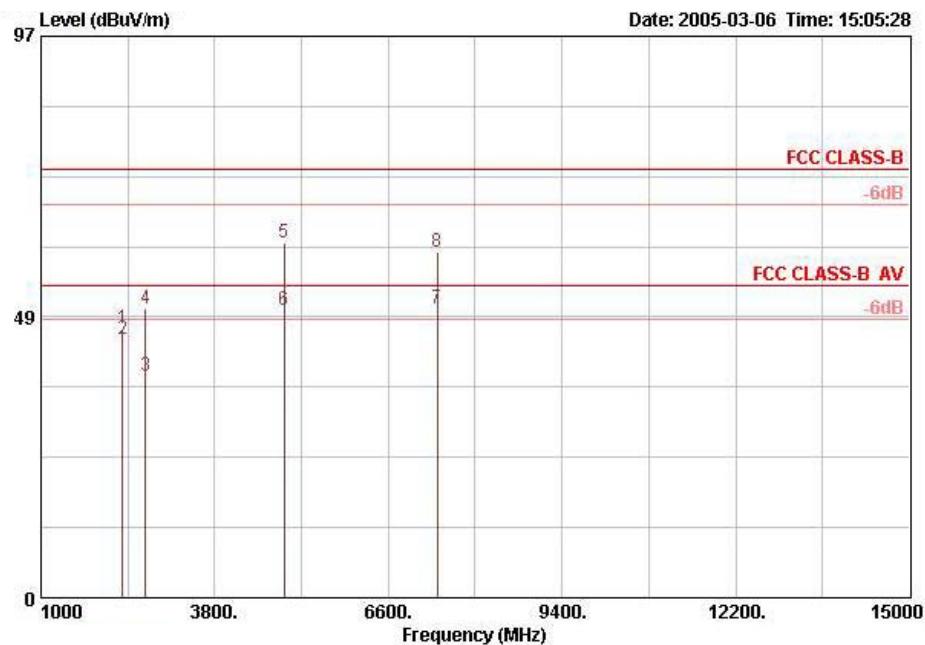
(A) Polarization: Horizontal



Freq MHz	Level dBuV/m	Over Limit	Antenna Line Factor	Cable Loss	Preamp Factor	Read			Remark
						dB	dB/m	dB	
1 2320.000	59.99	-14.01	74.00	27.95	1.96	35.95	66.02	HORIZONTAL Peak	
2 2320.000	50.36	-3.64	54.00	27.95	1.96	35.95	56.39	HORIZONTAL Average	
3 2688.000	53.68	-20.32	74.00	29.06	1.86	36.20	58.97	HORIZONTAL Peak	
4 2688.000	49.74	-4.26	54.00	29.06	1.86	36.20	55.03	HORIZONTAL Average	
5 4924.000	61.58	-12.42	74.00	33.45	3.25	37.69	62.57	HORIZONTAL Peak	
6 4924.000	47.25	-6.75	54.00	33.45	3.25	37.69	48.24	HORIZONTAL Average	
7 7386.000	58.36	-15.64	74.00	36.45	4.48	39.35	56.77	HORIZONTAL Peak	
8 7386.000	49.68	-4.32	54.00	36.45	4.48	39.35	48.09	HORIZONTAL Average	



(B) Polarization: Vertical



Freq	Level	Over	Limit	Antenna	Cable	Preamp	Read	Pol/Phase	Remark
		Limit	Line	Factor	Loss	Factor	Level		
MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1	2320.000	46.57	-27.43	74.00	27.95	1.96	35.95	52.60	VERTICAL Peak
2	2320.000	44.75	-9.25	54.00	27.95	1.96	35.95	50.78	VERTICAL Average
3	2688.000	38.21	-15.79	54.00	29.06	1.86	36.20	43.50	VERTICAL Average
4	2688.000	49.95	-24.05	74.00	29.06	1.86	36.20	55.24	VERTICAL Peak
5	4924.000	61.26	-12.74	74.00	33.45	3.25	37.69	62.25	VERTICAL Peak
6	4924.000	49.62	-4.38	54.00	33.45	3.25	37.69	50.61	VERTICAL Average
7	7386.000	49.99	-4.01	54.00	36.45	4.48	39.35	48.40	VERTICAL Average
8	7386.000	59.68	-14.32	74.00	36.45	4.48	39.35	58.09	VERTICAL Peak

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m)

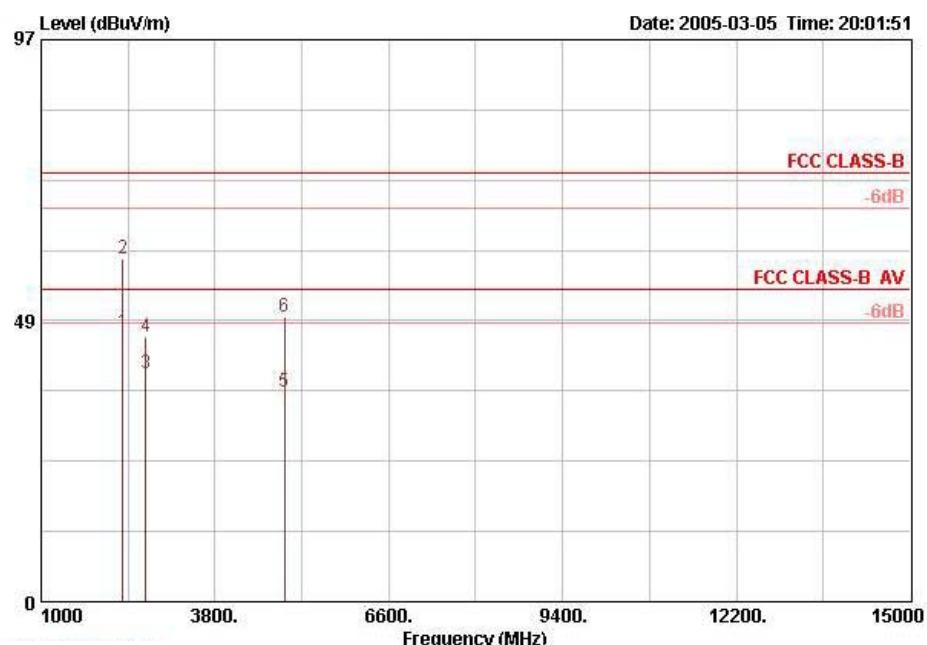
Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level



- Modulation Type: OFDM
- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Ming Da, Kao

Mode 1

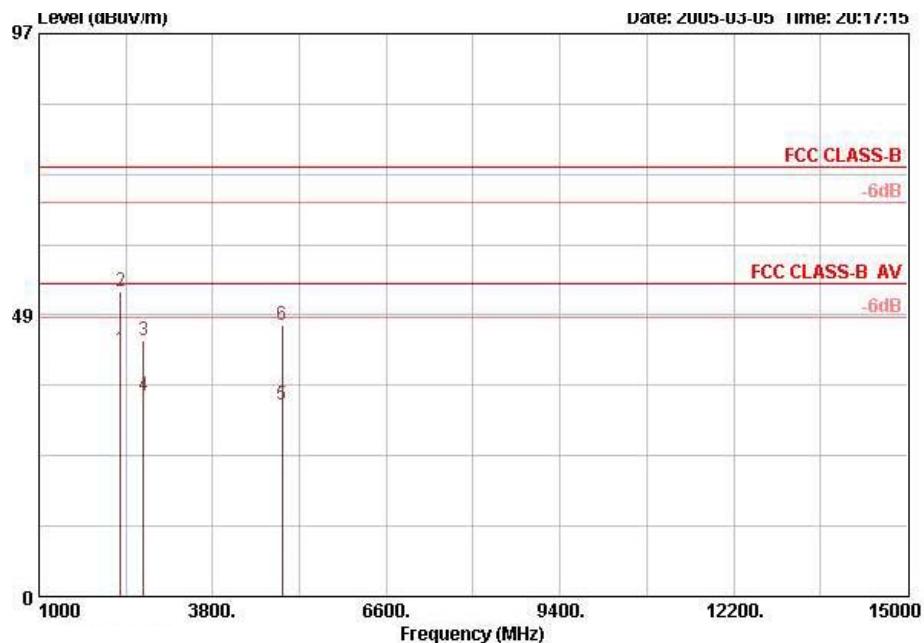
(A) Polarization: Horizontal



Freq	Level	Over Limit	Antenna Line Factor	Cable Loss	Preamp Factor	Read		
						dB	dB	dBuV
MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dB	
1	2320.140	46.50	-7.50	54.00	27.95	1.96	35.95	52.53 HORIZONTAL AVERAGE
2	2320.140	59.17	-14.83	74.00	27.95	1.96	35.95	65.20 HORIZONTAL PEAK
3	2687.960	39.31	-14.69	54.00	29.06	1.86	36.20	44.60 HORIZONTAL AVERAGE
4	2687.960	45.80	-28.20	74.00	29.06	1.86	36.20	51.09 HORIZONTAL PEAK
5	4922.240	36.32	-17.68	54.00	33.45	3.25	37.69	37.31 HORIZONTAL AVERAGE
6	4925.080	49.19	-24.81	74.00	33.45	3.25	37.69	50.18 HORIZONTAL PEAK



(B) Polarization: Vertical



Freq	Level	Over	Limit	Antenna	Cable	Preamp	Read	Remark
		Limit	Line	Factor	Loss	Factor	Level	
MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV	
1	2319.980	42.58	-11.42	54.00	27.95	1.96	35.95	48.62 VERTICAL AVERAGE
2	2320.020	52.57	-21.43	74.00	27.95	1.96	35.95	58.61 VERTICAL PEAK
3	2687.840	44.12	-29.88	74.00	29.06	1.86	36.20	49.40 VERTICAL PEAK
4	2688.020	34.56	-19.44	54.00	29.06	1.86	36.20	39.85 VERTICAL AVERAGE
5	4923.500	33.15	-20.85	54.00	33.22	3.20	37.61	34.33 VERTICAL AVERAGE
6	4923.500	46.85	-27.15	74.00	33.22	3.20	37.61	48.03 VERTICAL PEAK

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m)

Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

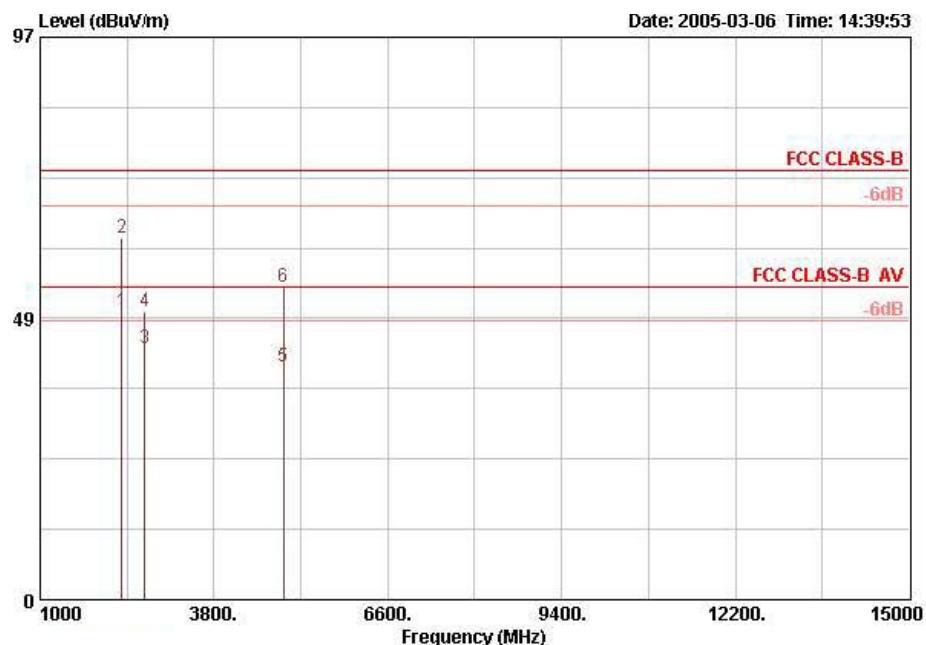


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Mode 2

(A) Polarization: Horizontal



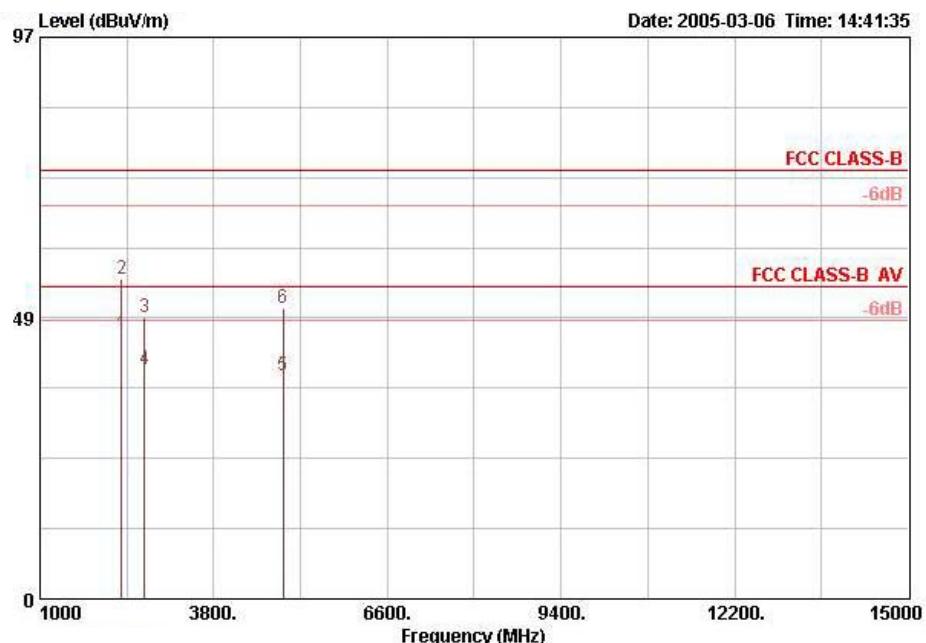
Freq	Level	Over	Limit	Antenna	Cable	Preamp	Read	Pol/Phase	Remark
		MHz	dBuV/m	dB	dBuV/m	dB/m	dB		
1	2320.000	49.65	-4.35	54.00	27.95	1.96	35.95	55.68	HORIZONTAL Average
2	2320.000	62.33	-11.67	74.00	27.95	1.96	35.95	68.36	HORIZONTAL Peak
3	2688.000	43.25	-10.75	54.00	29.06	1.86	36.20	48.54	HORIZONTAL Average
4	2688.000	49.66	-24.34	74.00	29.06	1.86	36.20	54.95	HORIZONTAL Peak
5	4922.000	40.28	-13.72	54.00	33.45	3.25	37.69	41.27	HORIZONTAL Average
6	4922.000	53.85	-20.15	74.00	33.45	3.25	37.69	54.84	HORIZONTAL Peak



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(B) Polarization: Vertical



Freq	Level	Over	Limit	Antenna	Cable	Preamp	Read	Pol/Phase	Remark
		MHz	dBuV/m	dB	dBuV/m	dB/m	dB		
1	2320.000	45.64	-8.36	54.00	27.95	1.96	35.95	51.67	VERTICAL Average
2	2320.000	55.35	-18.65	74.00	27.95	1.96	35.95	61.38	VERTICAL Peak
3	2688.000	48.55	-25.45	74.00	29.06	1.86	36.20	53.84	VERTICAL Peak
4	2688.000	39.68	-14.32	54.00	29.06	1.86	36.20	44.97	VERTICAL Average
5	4924.000	38.65	-15.35	54.00	33.45	3.25	37.69	39.64	VERTICAL Average
6	4924.000	50.13	-23.87	74.00	33.45	3.25	37.69	51.12	VERTICAL Peak

Note:

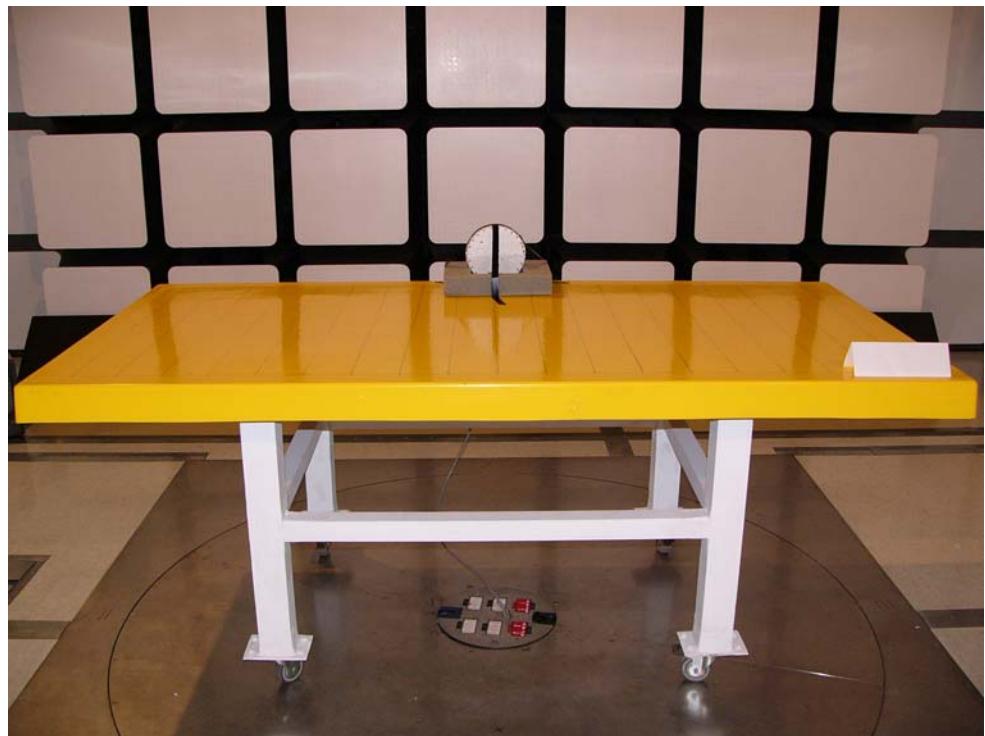
Emission level (dBuV/m) = 20 log Emission level (uV/m)

Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

5.6.11. Photographs of Radiated Emission Test Configuration

Mode 1

FRONT VIEW



REAR VIEW

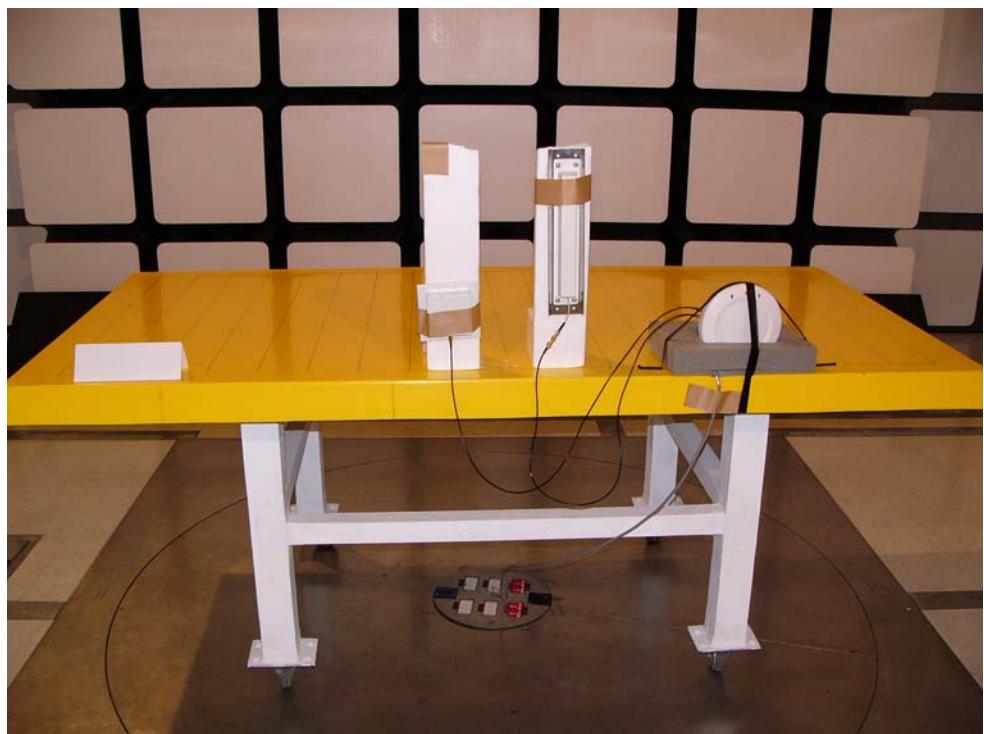


Mode 2

FRONT VIEW



REAR VIEW





5.7. Antenna Requirements

5.7.1. Standard Applicable

Section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Section 15.247(b)/(c):

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

If the intentional radiator is used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

5.7.2. Antenna Connected Construction

In 2.4GHz band, SMA connector is used for 3 sets of external antennas. There is no antenna connector for internal antenna. Since this product is classified as professional use, so standard connector should be allowed.

5.7.3. Antenna Gain

Gain of antenna 1 is less than 6dBi. That of Antenna 2 to 4 is more than 6dBi. Therefore peak conducted power limit shall be degraded. Antenna report of manufacturer will have more detail antenna gain or antenna pattern.

5.7.4. Test Criteria

All test results complied with the requirements of 15.203/15.247(b)/(c).



5.8. RF Exposure

5.8.1. Limit For Maximum Permissible Exposure (MPE)

This product can be classified as mobile device, so the 20cm separation distance warning is required. In this section, the power density at 20cm location is calculated to examine if it is lower than the limit.

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

F = frequency in MHz

*Plane-wave equivalent power density

5.8.2. MPE Calculation Method

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \quad \text{Power Density: } Pd \text{ (mW/cm}^2\text{)} = \frac{E^2}{377}$$

E = Electric field (V/m)

P = Peak RF output power (mW)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

From the peak EUT RF output power, the minimum mobile separation distance, d=20cm, as well as the gain of the used antenna, the RF power density can be obtained.



5.8.3. Calculated Result and Limit

- Modulation Type: DSSS
- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Ming Da, Kao

Mode 1

Channel No.	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)
01	3.00	2.00	17.27	53.33	0.0212	1
06	3.00	2.00	18.43	69.66	0.0277	1
11	3.00	2.00	17.33	54.08	0.0215	1

Mode 2

Channel No.	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)
01	10.00	10.00	18.40	69.18	0.1377	1
06	10.00	10.00	18.10	64.57	0.1285	1
11	10.00	10.00	18.70	74.13	0.1476	1



- Modulation Type: OFDM
- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Ming Da, Kao

Mode 1

Channel No.	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)
01	3.00	2.00	18.30	67.61	0.0269	1
06	3.00	2.00	20.73	118.30	0.0471	1
11	3.00	2.00	16.72	46.99	0.0187	1

Mode 2

Channel No.	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)
01	10.00	10.00	17.80	60.26	0.1199	1
06	10.00	10.00	21.10	128.82	0.2564	1
11	10.00	10.00	17.80	60.26	0.1199	1



6. List of Measuring Equipments Used

Items	Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
1	EMC Receiver	R&S	ESCS 30	100174	9 KHz – 2.75 GHz	Feb. 15, 2005	Conduction (CO04-HY)
2	LISN	MessTec	NNB-2/16Z	2001/004	9 KHz – 30 MHz	Jun. 09, 2004	Conduction (CO04-HY)
3	LISN (Support Unit)	MessTec	NNB-2/16Z	99041	9 KHz – 30 MHz	Apr. 27, 2004	Conduction (CO04-HY)
4	EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	N/A	Conduction (CO04-HY)
5	RF Cable-CON	UTIFLEX	3102-26886-4	CB044	9KHz~30MHz	Apr. 21, 2004	Conduction (CO04-HY)
6	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz~1GHz 3m	Jun. 21, 2004	Radiation (03CH03-HY)
7	Spectrum analyzer	R&S	FSP40	100004	9KHZ~40GHz	Aug. 31, 2004	Radiation (03CH03-HY)
8	Amplifier	SCHAFFNER	CPA9231A	18667	9KHz – 2GHz	Jan. 10, 2005	Radiation (03CH03-HY)
9	Biconical Antenna	SCHWARZBECK	VHBB 9124	301	30MHz –200MHz	Jul. 28, 2004	Radiation (03CH03-HY)
10	Log Antenna	SCHWARZBECK	VUSLP 9111	221	200MHz -1GHz	Jul. 28, 2004	Radiation (03CH03-HY)
11	RF Cable-R03m	Jye Bao	RG142	CB021	30MHz~1GHz	Feb. 22, 2005	Radiation (03CH03-HY)
12	Amplifier	MITEQ	AFS44	849984	100MHz~26.5GHz	Mar. 26, 2004	Radiation (03CH03-HY)
13	Horn Antenna	EMCO	3115	6741	1GHz – 18GHz	Apr. 07, 2004	Radiation (03CH03-HY)
14	Turn Table	HD	DS 420	420/650/00	0 ~ 360 degree	N/A	Radiation (03CH03-HY)
15	Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	N/A	Radiation (03CH03-HY)
16	Horn Antenna	Schwarzbeck	BBHA9170	154	18GHz~40GHz	Jun. 09, 2004	Radiation (03CH03-HY)
17	RF Cable-HIGH	Jye Bao	RG142	CB030-HIGH	1GHz~29.5GHz	Dec.01, 2004	Radiation (03CH03-HY)

※ Calibration Interval of instruments listed above is one year.



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Items	Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
18	Spectrum analyzer	R&S	FSP30	100023	9KHZ~30GHZ	Aug. 02, 2004	Conducted (TH01-HY)
19	Power meter	R&S	NRVS	100444	DC~40GHz	Jun. 15, 2004	Conducted (TH01-HY)
20	Power sensor	R&S	NRV-Z55	100049	DC~40GHz	Jun. 15, 2004	Conducted (TH01-HY)
21	Power Sensor	R&S	NRV-Z32	100057	30MHz-6GHz	Jun. 15, 2004	Conducted (TH01-HY)
22	AC power source	HPC	HPA-500W	HPA-9100024	AC 0~300V	Jun. 16, 2004	Conducted (TH01-HY)
23	AC power source	G.W.	GPC-6030D	C671845	DC 1V~60V	Nov. 06, 2003	Conducted (TH01-HY)
24	Temp. and Humidity Chamber	KSON	THS-C3L	612	N/A	Oct. 01, 2003	Conducted (TH01-HY)
25	RF CABLE-1m	Jye Bao	RG142	CB034-1m	20MHz~7GHz	Jan. 01, 2004	Conducted (TH01-HY)
26	RF CABLE-2m	Jye Bao	RG142	CB035-2m	20MHz~1GHz	Jan. 01, 2004	Conducted (TH01-HY)

※ Calibration Interval of instruments listed above is one year.



7. Company Profile

SPORTON Lab. was established in 1986 with one shielded room: the first private EMI test facility, offering local manufacturers an alternative EMI test familial apart from ERSO. In 1988, one 3M and 10M/3M open area test site were setup and also obtained official accreditation from FCC, VCCI and NEMKO. In 1993, a Safety laboratory was founded and obtained accreditation from UL of USA, CSA of Canada and TUV (Rhineland & PS) of Germany. In 1995, one EMC lab, including EMI and EMS test facilities was setup. In 1997, SPORTON Group has provided financial expense to relocate the headquarter to Orient Scientific Park in Taipei Hsien to offer more comprehensive, more qualified and better service to local suppliers and manufactures. In 1999, Safety Group and Component Group were setup. In 2001, SPORTON has established 3M/10M chamber in Hwa Ya Technology Park.

7.1. Certificate of Accreditation

Taiwan	BSMI, CNLA, DGT
USA	FCC, NVLAP, UL
EU	Nemko, TUV
Japan	VCCI
Canada	Industry Canada

7.2. Test Location

SHIJR	ADD : 6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei, Taiwan 221, R.O.C. TEL : 02-2696-2468 FAX : 02-2696-2255
HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 03-327-3456 FAX : 03-318-0055
LINKOU	ADD : No. 30-2, Dingfu Tsuen, Linkou Shiang, Taipei, Taiwan 244, R.O.C TEL : 02-2601-1640 FAX : 02-2601-1695
DUNGHU	ADD : No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei, Taiwan 114, R.O.C. TEL : 02-2631-4739 FAX : 02-2631-9740
JUNGHE	ADD : 7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei, Taiwan 235, R.O.C. TEL : 02-8227-2020 FAX : 02-8227-2626
NEIHU	ADD : 4Fl., No. 339, Hsin Hu 2 nd Rd., Taipei 114, Taiwan, R.O.C. TEL : 02-2794-8886 FAX : 02-2794-9777



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8. CNLA Certificate of Accreditation

Test Lab. : Sporton International Inc.
Accreditation Number : 1190
Originally Accredited : 2003/12/15
Effective Period : 2003/12/15~2006/12/14
Accredited Scope : 47 CFR FCC Part 15 Subpart C (9kHz~40GHz)



Taiwan Accreditation Foundation
Chinese National Laboratory Accreditation
Certificate of Accreditation

Accreditation Criteria: ISO 17025
Accreditation Number: 1190
Organization/Laboratory: EMC & Wireless Communications Laboratory, Sporton International Inc.
Originally Accredited: December 15, 2003
Effective Period: December 15, 2003 To December 14, 2006
Accredited Scope: Electrical Testing Field, 7 items, details shown in the following pages.
Specific Accreditation Program: Recognition and Approval of Designated Laboratory for Commodities Inspection


President, Taiwan Accreditation Foundation
Date: July 19, 2004

(This document is invalid unless accompanied by all 4 pages)

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