

FCC TEST REPORT

CATEGORY : Fixed

PRODUCT NAME : Wireless LAN PCI 802.11a/b/g Adapter

FCC ID. : PPQWN5401A

FILING TYPE : Certification

BRAND NAME : LITE-ON, HP

MODEL NAME : WN5401A, WN5401A-H1

APPLICANT : **LITE-ON TECHNOLOGY CORP.**
2F, No. 6, Lane 359, Sec. 2, Chung-Shan Rd., Chung-Ho,
Taiwan, R.O.C.

MANUFACTURER : **DONGGUAN G-COM COMPUTER CO., LTD.**
1st Row Yin Shan Rd., Yin Hwu Industrial Area, Qingxi Town,
Dong Guan City, Guang Dong, China

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.

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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.



1190
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HISTORY OF THIS TEST REPORT

Received Date: Feb 25, 2005

Test Date: Mar 03, 2005

Original Report Issue Date: Mar. 09, 2005

Report No.: FR522506

☒ No additional attachment.

☐ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

CERTIFICATE OF COMPLIANCE

with

47 CFR FCC Part 15 Subpart C

PRODUCT NAME : Wireless LAN PCI 802.11a/b/g Adapter

BRAND NAME : LITE-ON, HP

MODEL NAME : WN5401A, WN5401A-H1

APPLICANT : **LITE-ON TECHNOLOGY CORP.**

2F, No. 6, Lane 359, Sec. 2, Chung-Shan Rd., Chung-Ho,
Taiwan, R.O.C.

MANUFACTURER : **DONGGUAN G-COM COMPUTER CO., LTD.**

1st Row Yin Shan Rd., Yin Hwu Industrial Area, Qingxi Town,
Dong Guan City, Guang Dong, China

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 Mar 03, 2005 at SPORTON International Inc. LAB.



Dr. Alan Lane

Vice General Manager
Sporton International Inc.

1. General Description of Equipment under Test

1.1. Applicant

LITE-ON TECHNOLOGY CORP.

2F, No. 6, Lane 359, Sec. 2, Chung-Shan Rd., Chung-Ho, Taiwan, R.O.C.

1.2. Manufacturer

DONGGUAN G-COM COMPUTER CO., LTD.

1st Row Yin Shan Rd., Yin Hwu Industrial Area, Qingxi Town, Dong Guan City, Guang Dong, China

1.3. Basic Description of Equipment under Test

This product is a Wireless LAN PCI Adapter with 802.11a/b/g wireless solution. The technical data has been listed on section "Features of Equipment under Test". 4 types of antenna were filed in this project.

1.4. Features of Equipment under Test

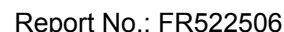
Items	Description
Type of Modulation	DSSS (CCK / DQPSK / DBPSK) OFDM (64QAM / 16QAM / DQPSK / DBPSK)
Number of Channels	11
Frequency Band	2412MHz ~ 2462 MHz
Carrier Frequency	See section 1.6 for details
Data Rate	1, 2, 5.5, 11 Mbps – DSSS 6, 12, 18, 24, 36, 48, 54, 108 Mbps - OFDM
Channel Bandwidth	11.7 MHz (DSSS), 32.1 MHz (OFDM)
Max. Conducted Output Power	DSSS : 20.5 dBm ; OFDM : 19.8 dBm
Antenna Type	See section 1.5 for details
Communication Type	Half-Duplex
Testing Duty Cycle	100.00%
Power Rating (DC/AC, Voltage)	5 VDC from host
Test Power Source	110.00V AC (host)
Temperature Range (Operating)	-10 ~ 55 °C

1.5. Antenna Description

No.	Brand Name	Model Name	Antenna Type	Antenna Connector	Gain (dBi)
1	JOYMAX	Embedded(Internal)	Patch Monopole	UFL	2.50
2	JOYMAX	Swivel(External)	Dipole Antenna	Revise-SMA	2.00
3	JOYMAX	Flying Lead(External)	Dipole Antenna	Revise-SMA	3.00
4	JOYMAX	Portable(External)	Dipole Antenna	Revise-SMA	3.00

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	-	-	-	-



2.3. Description of Test Supporting Units

Support unit	Brand	Model No.	Serial No.	FCC ID	Data cable (m)
PC	HP	DTPC-16	SP0002	DoC	-
Monitor	VIEWSONIC	VCDTS21553-3P	SP0007	DoC	1.7
(PS2) Keyboard	LOGITECH	Y-SJ17	SP0011	DoC	1.7
(PS2) Mouse	LOGITECH	M-BE58	SP0014	DoC	1.7
Printer	EPSON	STYLUS COLOR 680	SP0019	DoC	1.35
Modem	ACEEX	DM141	SP0019	IFAXDM141	1.15

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

Software Version	ART
Normal Function	
Power Set Ch01 / DSSS	21/ TX Power
Power Set Ch06 / DSSS	21 / TX Power
Power Set Ch11 / DSSS	19.5 / TX Power
Power Set Ch01 / OFDM	18/ TX Power
Power Set Ch06 / OFDM	19 / TX Power
Power Set Ch11 / OFDM	18 / TX Power
Turbo Function	
Power Set Ch06 / OFDM	19 / TX Power(
IP Address of EUT	ART \ID=2062

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
5.5	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.

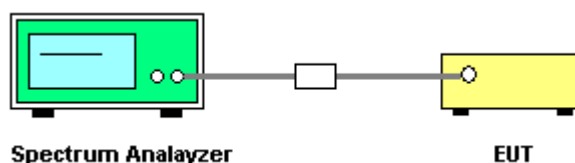
5.1.3. Description of Major Test Instruments Setting

- 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

- Normal Function
- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Bunny Yao

Normal Mode

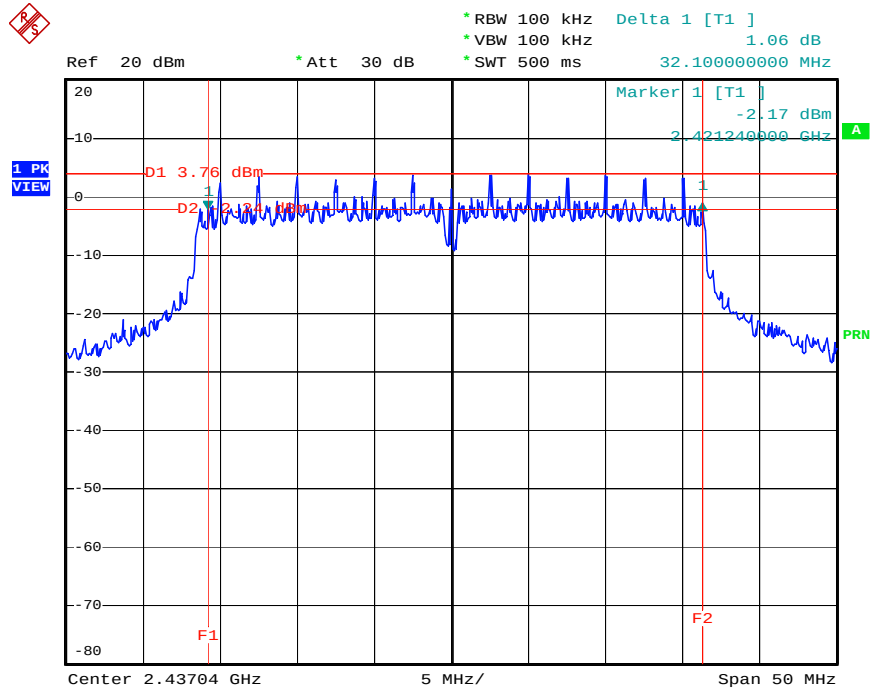
Modulation Type	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Min. Limit (MHz)
DSSS	01	2412 MHz	11.56	0.5
DSSS	06	2437 MHz	11.12	0.5
DSSS	11	2462 MHz	11.72	0.5
OFDM	01	2412 MHz	16.35	0.5
OFDM	06	2437 MHz	16.40	0.5
OFDM	11	2462 MHz	16.20	0.5

Turbo Mode

Modulation Type	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Min. Limit (MHz)
OFDM	06	2437 MHz	32.1	0.5

Turbo Mode

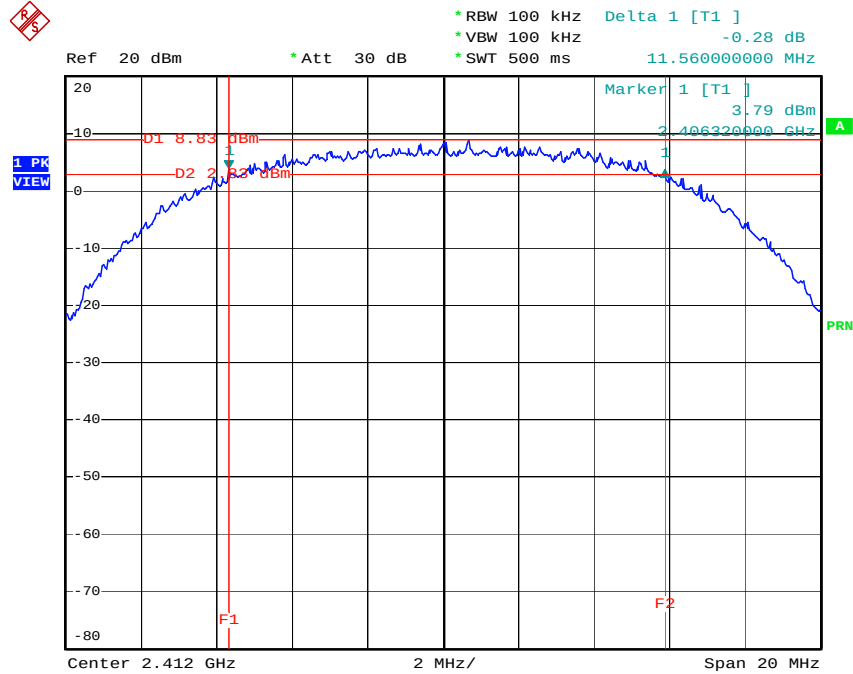
Modulation Type: OFDM (Channel 06) :



Date: 26.JAN.2005 19:00:24

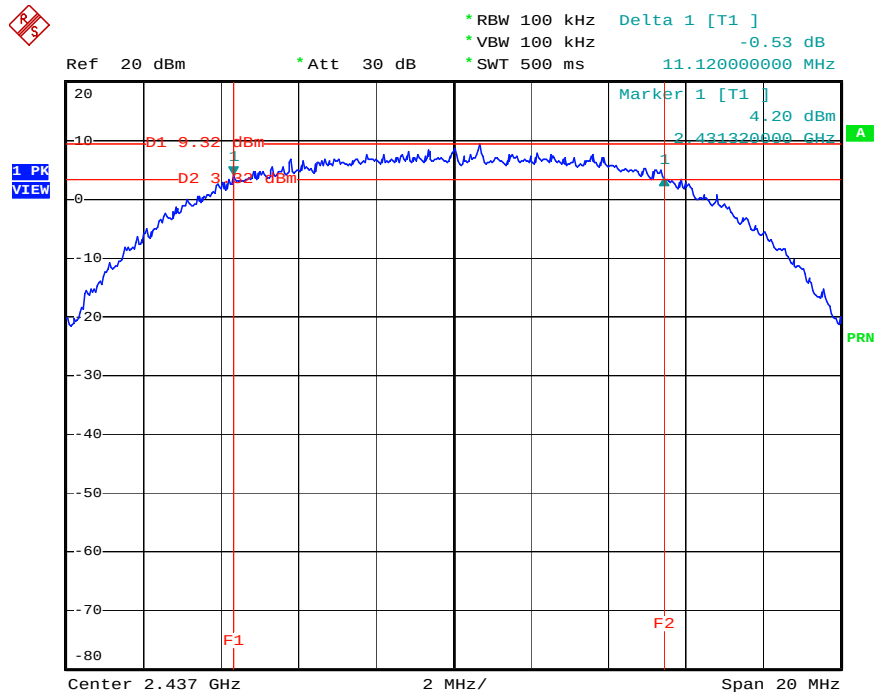
Normal Mode

Modulation Type: DSSS (Channel 01) :



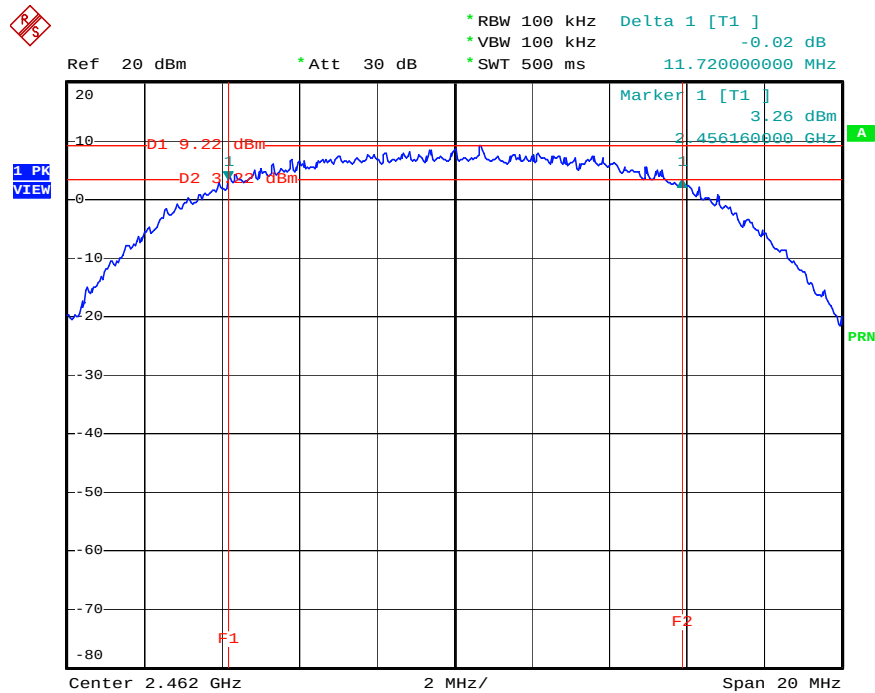
Date: 26. JAN. 2005 18:29:49

Modulation Type: DSSS (Channel 06) :



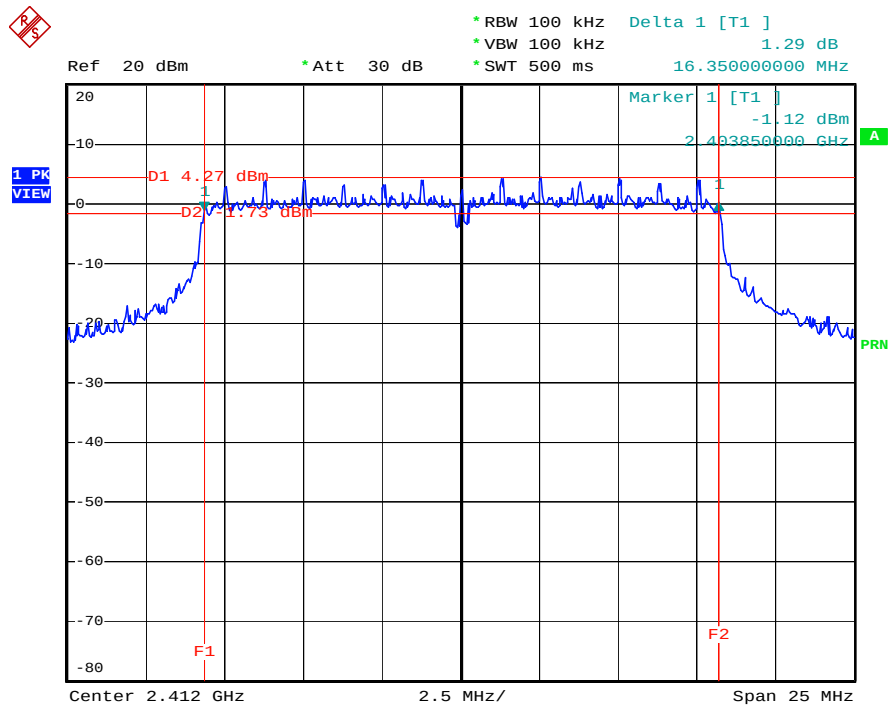
Date: 26. JAN. 2005 18:32:28

Modulation Type: DSSS (Channel 11) :



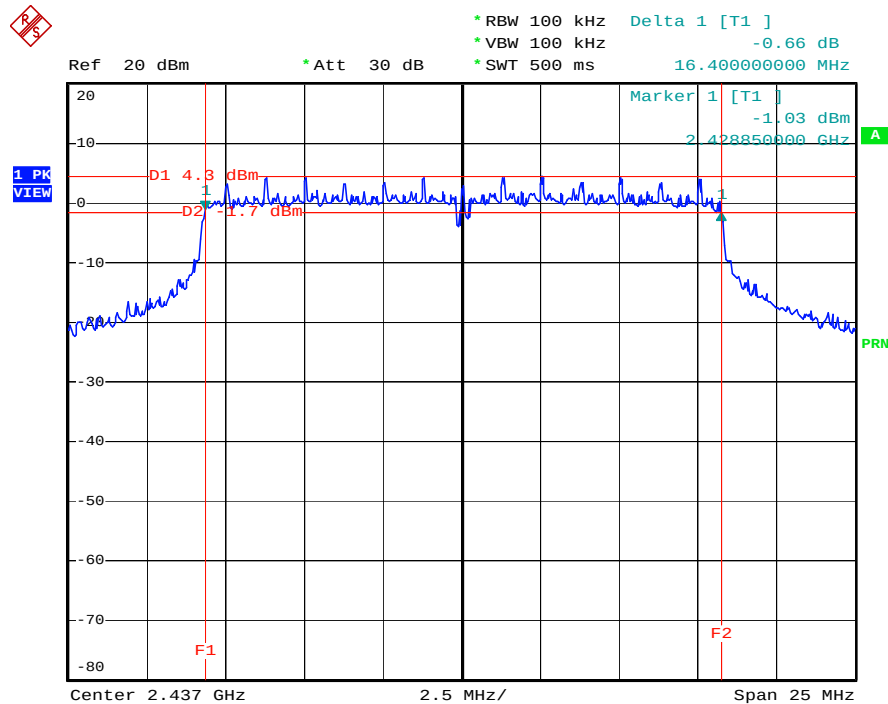
Date: 26.JAN.2005 18:34:30

Modulation Type: OFDM (Channel 01) :



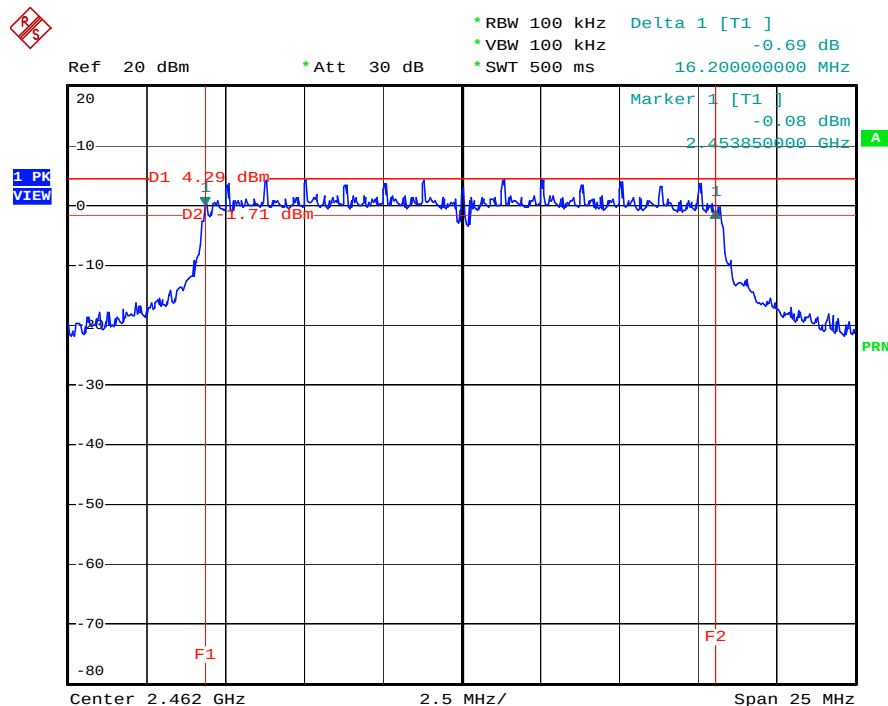
Date: 26.JAN.2005 18:39:53

Modulation Type: OFDM (Channel 06) :



Date: 26.JAN.2005 18:42:06

Modulation Type: OFDM (Channel 11) :



Date: 26.JAN.2005 18:44:03

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.

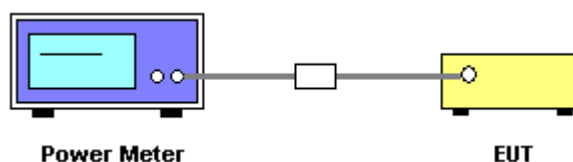
5.2.2. Measuring Instruments

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. Peak power meter parameter set to auto attenuator and filter is the same as.
3. 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

- Normal Function
- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Bunny Yao

Normal Mode

Modulation Type	Channel No.	Frequency (MHz)	Output Power (dBm)	Limits (dBm)
DSSS	01	2412 MHz	20.20	30
DSSS	06	2437 MHz	20.50	30
DSSS	11	2462 MHz	19.50	30
OFDM	01	2412 MHz	19.80	30
OFDM	06	2437 MHz	19.70	30
OFDM	11	2462 MHz	19.10	30

Turbo Mode

Modulation Type	Channel No.	Frequency (MHz)	Output Power (dBm)	Limits (dBm)
OFDM	06	2437 MHz	19.50	30

5.2.7. Test Result of EIRP Power

- Normal Function
- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Bunny Yao

Normal Mode

Antenna No.	Gain (dBi)	Modulation Type	Channel No.	Frequency (MHz)	Power (dBm)	Limits (dBm)
1	2.50	DSSS	01	2412 MHz	22.70	36
1	2.50	DSSS	06	2437 MHz	23.00	36
1	2.50	DSSS	11	2462 MHz	22.00	36
1	2.50	OFDM	01	2412 MHz	22.30	36
1	2.50	OFDM	06	2437 MHz	22.20	36
1	2.50	OFDM	11	2462 MHz	21.60	36
2	2.00	DSSS	01	2412 MHz	22.20	36
2	2.00	DSSS	06	2437 MHz	22.50	36
2	2.00	DSSS	11	2462 MHz	21.50	36
2	2.00	OFDM	01	2412 MHz	21.80	36
2	2.00	OFDM	06	2437 MHz	21.70	36
2	2.00	OFDM	11	2462 MHz	21.10	36
3	3.00	DSSS	01	2412 MHz	23.20	36
3	3.00	DSSS	06	2437 MHz	23.50	36
3	3.00	DSSS	11	2462 MHz	22.50	36
3	3.00	OFDM	01	2412 MHz	22.80	36
3	3.00	OFDM	06	2437 MHz	22.70	36

Antenna No.	Gain (dBi)	Modulation Type	Channel No.	Frequency (MHz)	Power (dBm)	Limits (dBm)
3	3.00	OFDM	11	2462 MHz	22.10	36
4	3.00	DSSS	01	2412 MHz	23.20	36
4	3.00	DSSS	06	2437 MHz	23.50	36
4	3.00	DSSS	11	2462 MHz	22.50	36
4	3.00	OFDM	01	2412 MHz	22.80	36
4	3.00	OFDM	06	2437 MHz	22.70	36
4	3.00	OFDM	11	2462 MHz	22.10	36

Turbo Mode

Antenna No.	Gain (dBi)	Modulation Type	Channel No.	Frequency (MHz)	Power (dBm)	Limits (dBm)
1	2.50	OFDM	01	2412 MHz	22.00	36
2	2.00	OFDM	01	2412 MHz	21.50	36
3	3.00	OFDM	01	2412 MHz	22.50	36
4	3.00	OFDM	01	2412 MHz	22.50	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.

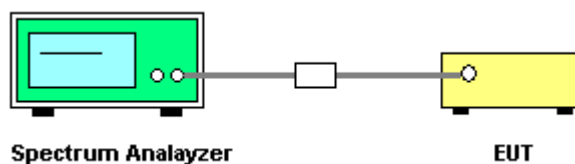
5.3.3. Description of Major Test Instruments Setting

- 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

- Normal Function
- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Bunny Yao

Normal Mode

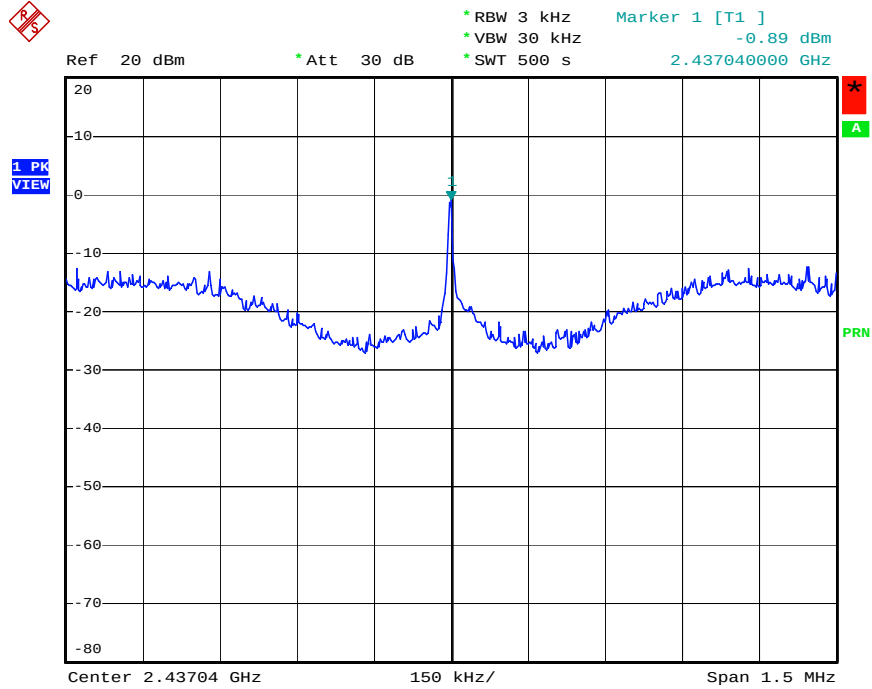
Modulation Type	Channel No.	Frequency (MHz)	Power Density (dBm)	Limits (dBm)
DSSS	01	2412 MHz	-2.96	8
DSSS	06	2437 MHz	-2.73	8
DSSS	11	2462 MHz	-3.96	8
OFDM	01	2412 MHz	-0.45	8
OFDM	06	2437 MHz	0.16	8
OFDM	11	2462 MHz	-0.05	8

Turbo Mode

Modulation Type	Channel No.	Frequency (MHz)	Power Density (dBm)	Limits (dBm)
OFDM	06	2437 MHz	-0.89	8

Turbo Mode

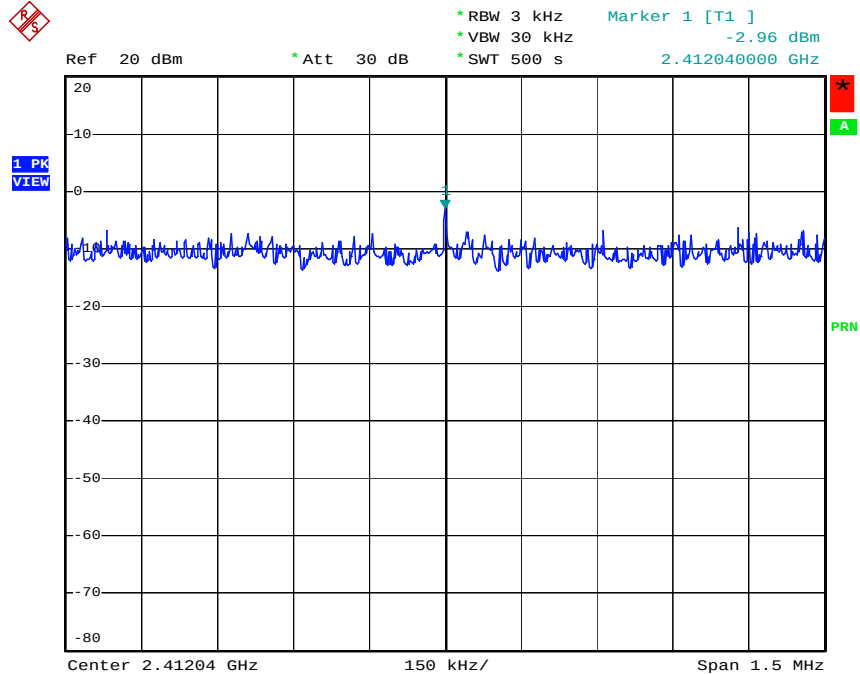
Modulation Type: OFDM (Channel 06) :



Date: 26.JAN.2005 18:57:19

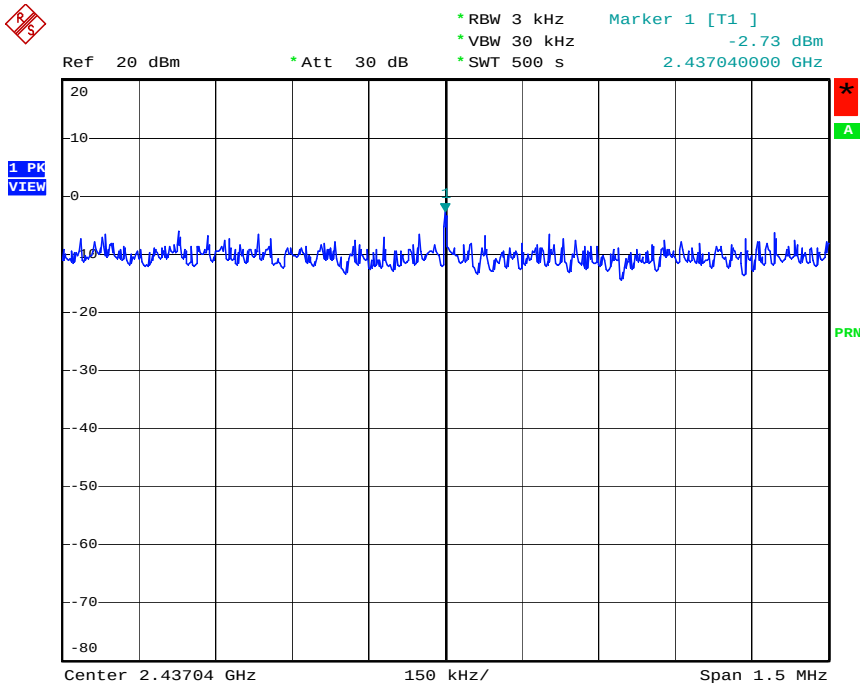
Normal Mode

Modulation Type: DSSS (Channel 01) :



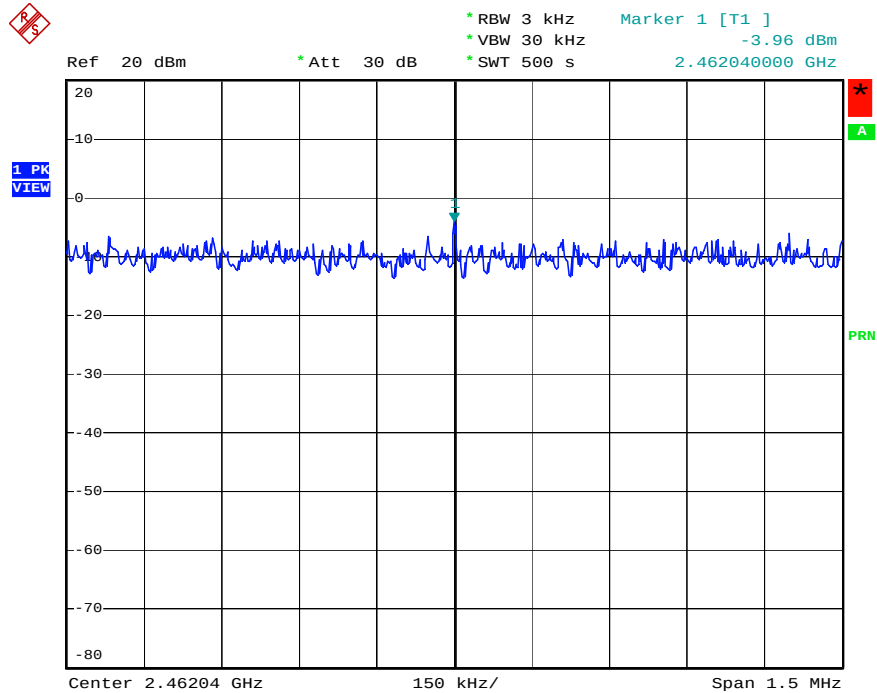
Date: 26.JAN.2005 18:19:56

Modulation Type: DSSS (Channel 06) :



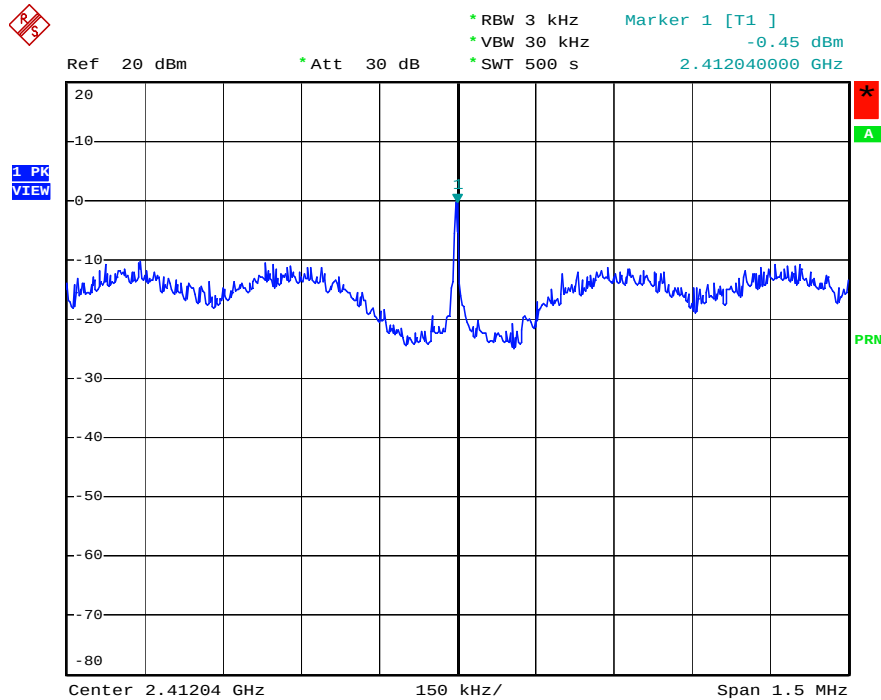
Date: 26.JAN.2005 18:22:09

Modulation Type: DSSS (Channel 11) :



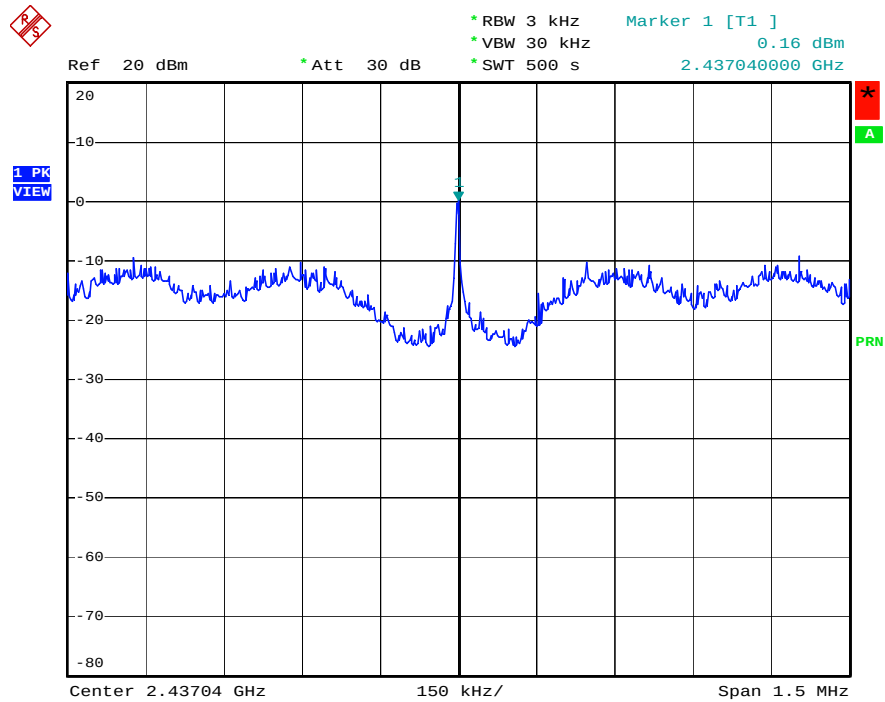
Date: 26.JAN.2005 18:23:26

Modulation Type: OFDM (Channel 01) :



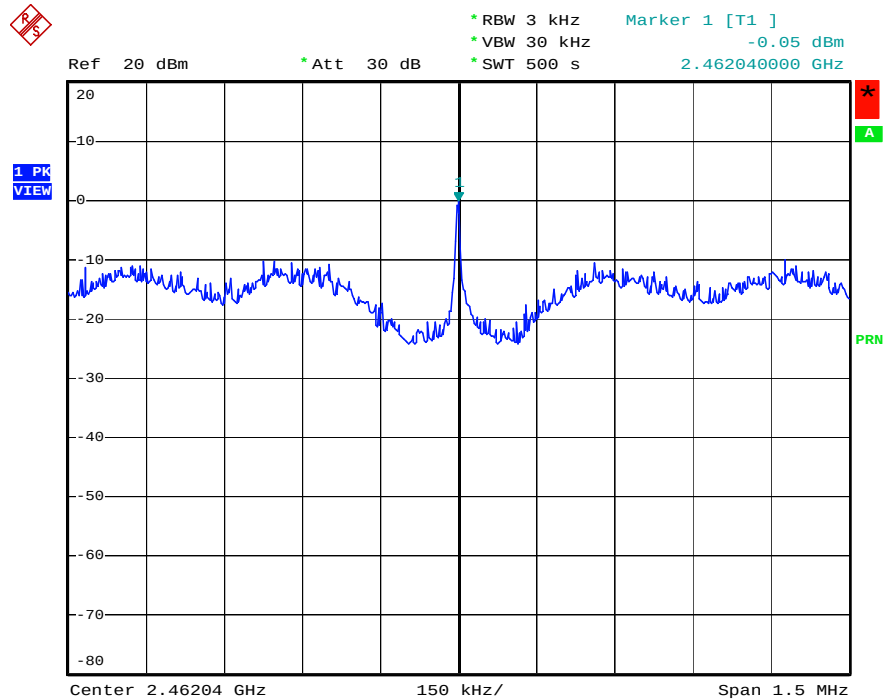
Date: 26.JAN.2005 18:50:17

Modulation Type: OFDM (Channel 06) :



Date: 26. JAN. 2005 18:51:39

Modulation Type: OFDM (Channel 11) :



Date: 26. JAN. 2005 18:53:06

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.

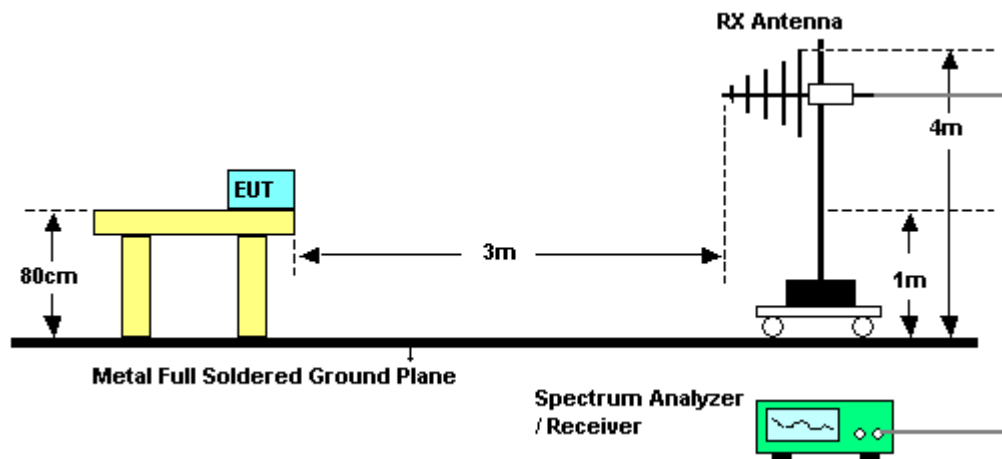
4. The lowest band edges emission was measured and recorded.
5. The transmitter set to the highest channel and repeated 2~4.

Radiated Measurement

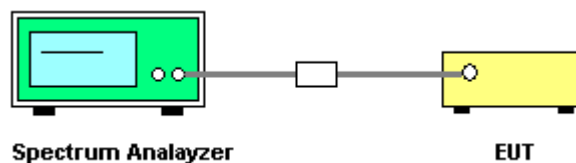
1. Configure the EUT according to ANSI C63.4.
2. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of both 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: Bunny Yao

Mode 1

Normal Mode

Modulation Type	Test Channel	Freq. (MHz)	Level* (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Trace (PK/AV)
DSSS	01	2384.29	63.26	-74.00	74	PK
DSSS	01	2384.29	47.39	-54.00	54	AV
DSSS	11	2488.22	56.65	-74.00	74	PK
DSSS	11	2488.22	46.91	-54.00	54	AV
OFDM	01	2389.99	70.54	-74.00	74	PK
OFDM	01	2389.99	50.11	-54.00	54	AV
OFDM	11	2483.66	69.96	-74.00	74	PK
OFDM	11	2483.66	49.69	-54.00	54	AV

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

Turbo Mode

Modulation Type	Test Channel	Freq. (MHz)	Level* (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Trace (PK/AV)
OFDM	06	2389.99	67.41	-74.00	74	PK
OFDM	06	2389.99	49.52	-54.00	54	AV
OFDM	06	2483.66	67.16	-74.00	74	PK
OFDM	06	2483.66	50.04	-54.00	54	AV

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

Mode 2

Normal Mode

Modulation Type	Test Channel	Freq. (MHz)	Level* (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Trace (PK/AV)
DSSS	01	2389.99	57.27	-74.00	74	PK
DSSS	01	2389.99	47.22	-54.00	54	AV
DSSS	11	2489.17	62.46	-74.00	74	PK
DSSS	11	2489.17	52.17	-54.00	54	AV
OFDM	01	2389.99	73.83	-74.00	74	PK
OFDM	01	2389.99	52.09	-54.00	54	AV
OFDM	11	2483.66	70.39	-74.00	74	PK
OFDM	11	2483.66	50.36	-54.00	54	AV

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

Turbo Mode

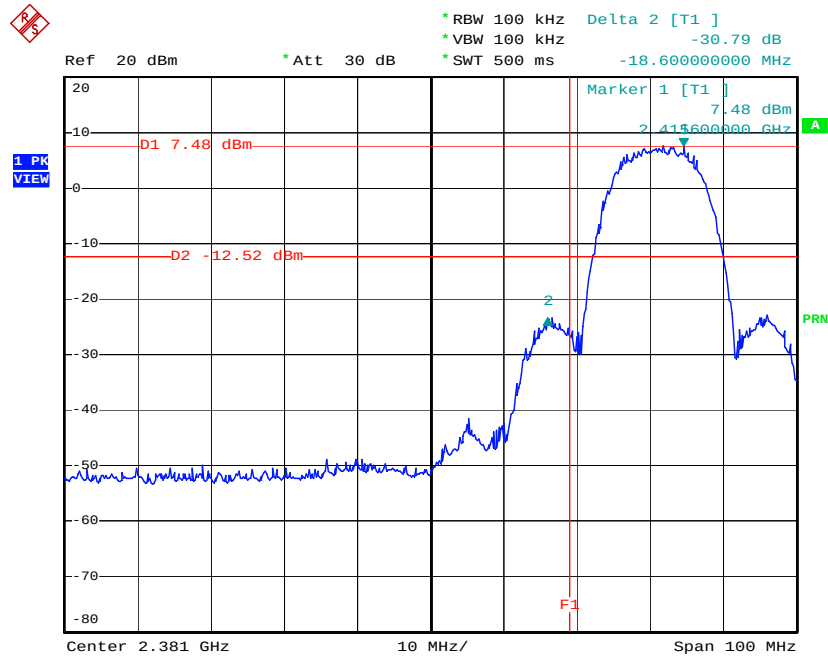
Modulation Type	Test Channel	Freq. (MHz)	Level* (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Trace (PK/AV)
OFDM	06	2389.99	62.76	-74.00	74	PK
OFDM	06	2389.99	48.15	-54.00	54	AV
OFDM	06	2483.66	70.52	-74.00	74	PK
OFDM	06	2483.66	50.97	-54.00	54	AV

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

5.4.8. Test Result of Conducted Emission

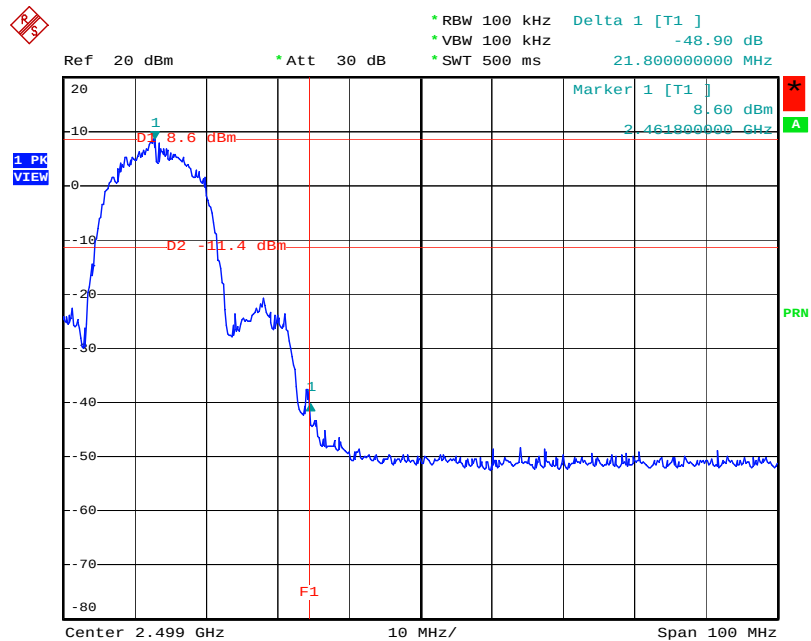
Normal Mode

Modulation Type: DSSS (Channel 01) :



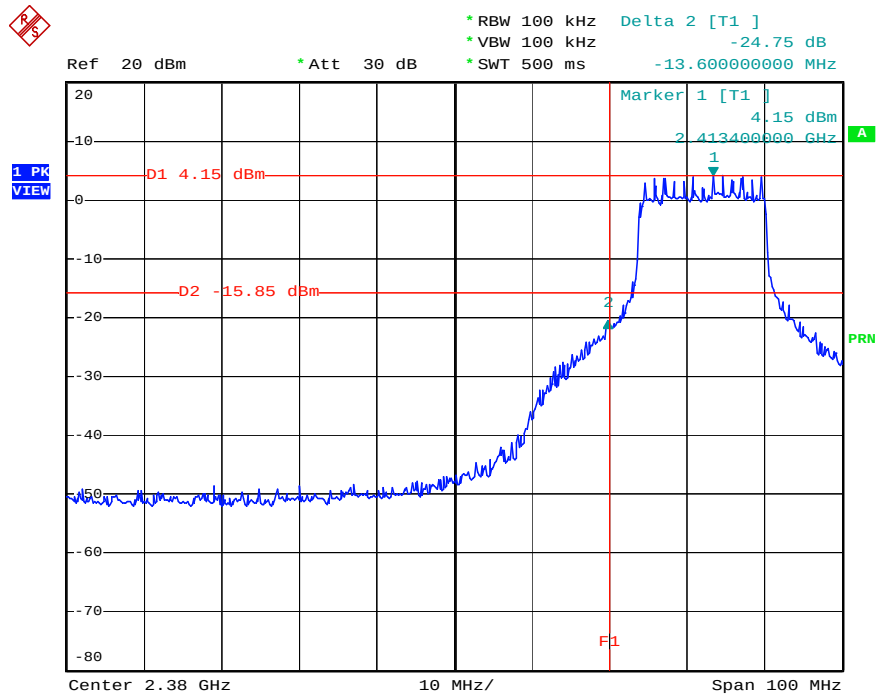
Date: 26.JAN.2005 18:14:46

Modulation Type: DSSS (Channel 11) :



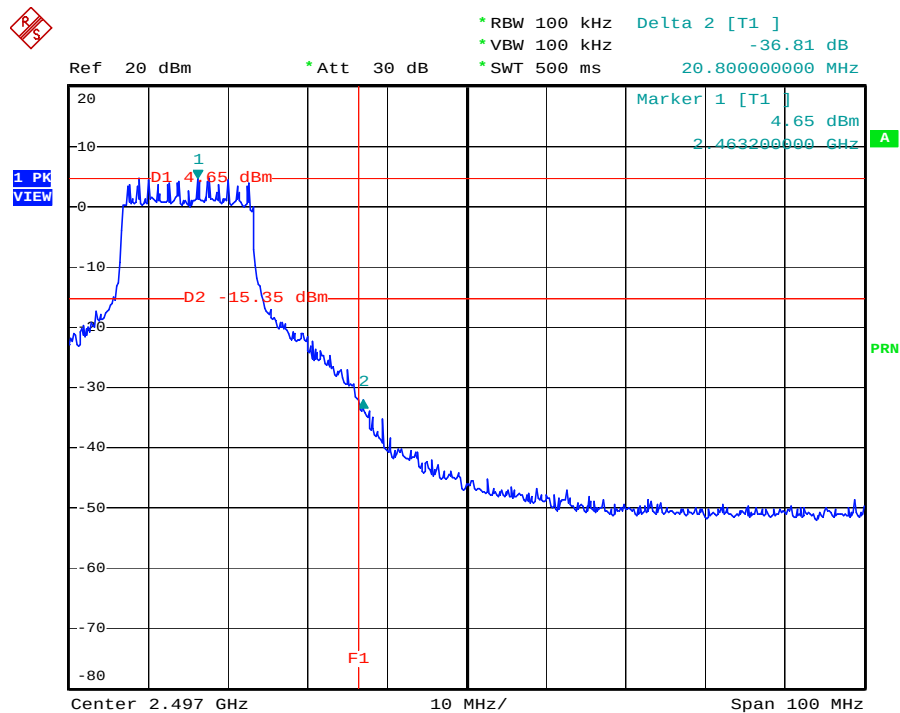
Date: 4.MAR.2005 17:48:59

Modulation Type: OFDM (Channel 01) :



Date: 26.JAN.2005 18:48:13

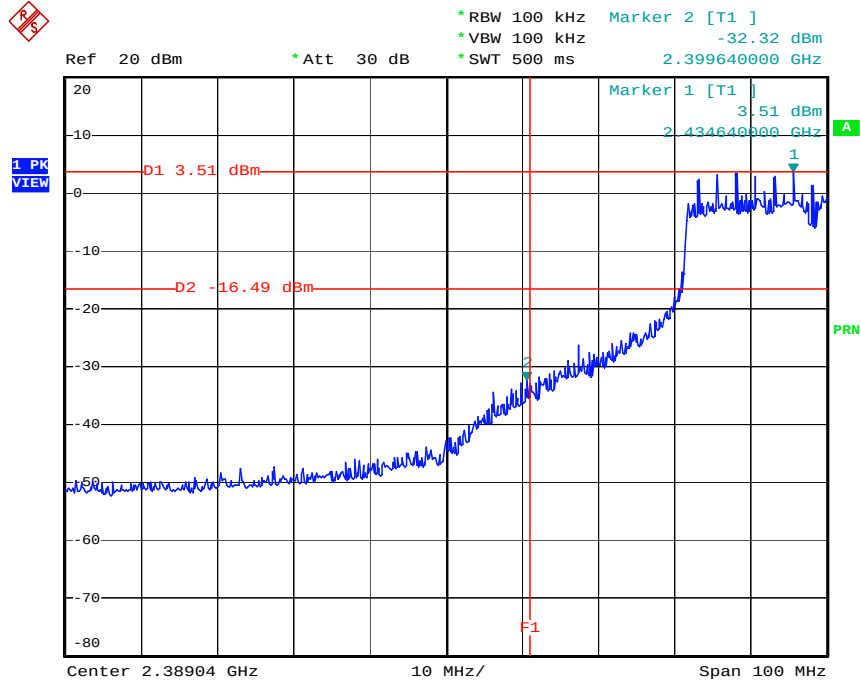
Modulation Type: OFDM (Channel 11) :



Date: 26.JAN.2005 18:46:12

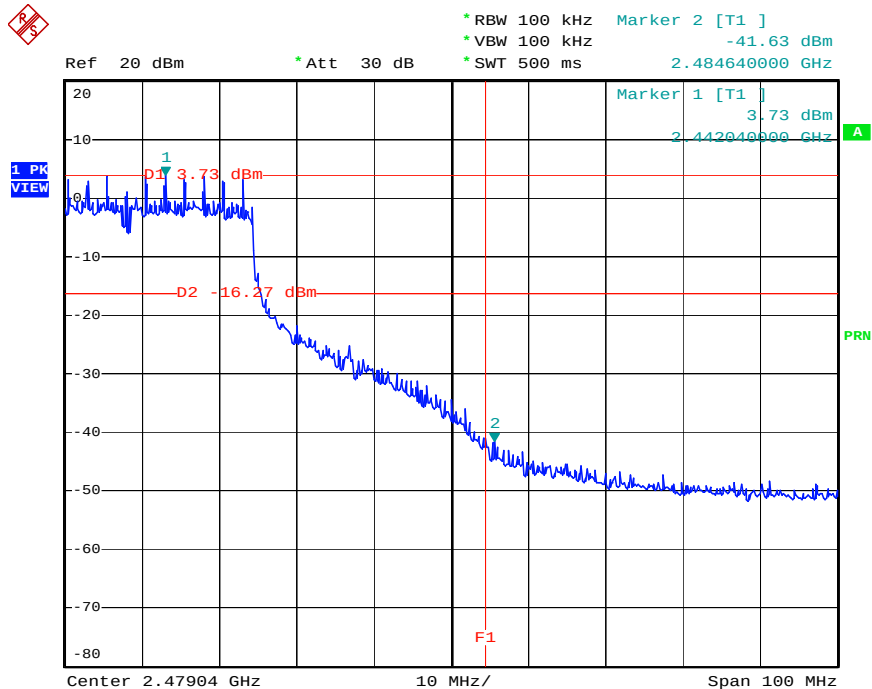
Turbo Mode

Modulation Type: OFDM (Channel 06) :



Date: 26.JAN.2005 19:09:25

Modulation Type: OFDM (Channel 06) :



Date: 26.JAN.2005 19:07:37

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.

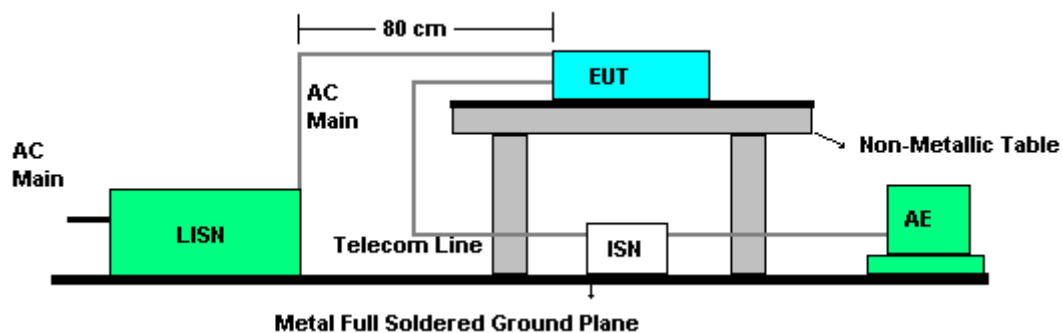
5.5.3. Description of Major Test Instruments Setting

- 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



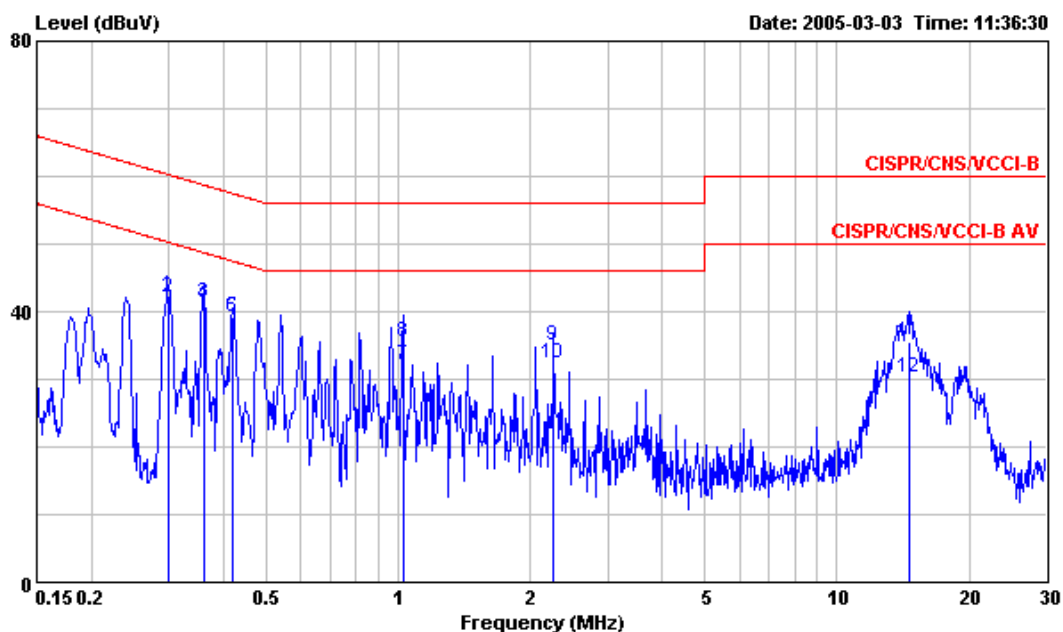
5.5.6. Test Criteria

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

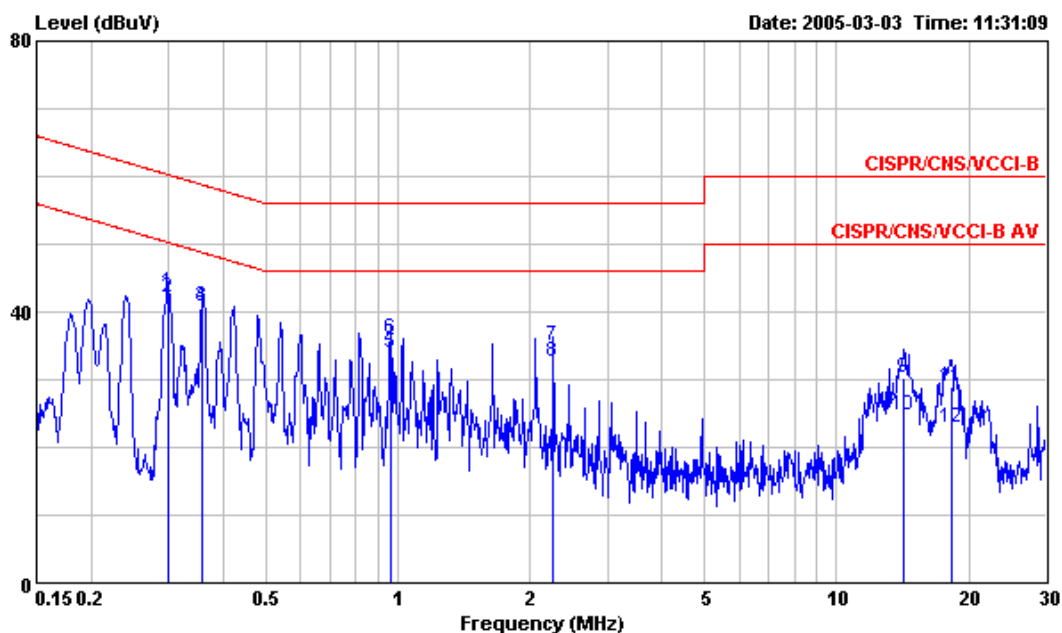
- Modulation Type: OFDM
- Temperature: 26°C
- Relative Humidity: 64%
- Test Engineer: Bunny Yao

Line to Ground



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.2988450	42.47	-17.80	60.27	42.09	0.06	0.32	QP
2	0.2988450	42.21	-8.06	50.27	41.83	0.06	0.32	Average
3	0.3602770	41.20	-17.52	58.72	40.85	0.06	0.29	QP
4	0.3602770	41.01	-7.71	48.72	40.66	0.06	0.29	Average
5	0.4202150	39.33	-18.11	57.44	39.01	0.06	0.26	QP
6	0.4202150	39.23	-8.21	47.44	38.91	0.06	0.26	Average
7	1.024	32.01	-13.99	46.00	31.28	0.11	0.62	Average
8	1.024	35.44	-20.56	56.00	34.71	0.11	0.62	QP
9	2.254	35.10	-20.90	56.00	34.74	0.13	0.23	QP
10	2.254	32.49	-13.51	46.00	32.13	0.13	0.23	Average
11	14.591	35.50	-24.50	60.00	34.28	0.21	1.01	QP
12	14.591	30.21	-19.79	50.00	28.99	0.21	1.01	Average

Neutral to Ground



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.2999730	42.77	-17.47	60.24	42.34	0.11	0.32	QP
2	0.2999730	41.97	-8.27	50.24	41.54	0.11	0.32	Average
3	0.3589320	40.74	-8.01	48.75	40.34	0.11	0.29	Average
4	0.3589320	40.78	-17.97	58.75	40.38	0.11	0.29	QP
5	0.9620010	33.85	-12.15	46.00	32.97	0.23	0.65	Average
6	0.9620010	36.09	-19.91	56.00	35.21	0.23	0.65	QP
7	2.254	34.94	-21.06	56.00	34.48	0.23	0.23	QP
8	2.254	32.64	-13.36	46.00	32.18	0.23	0.23	Average
9	14.211	30.34	-29.66	60.00	28.88	0.33	1.13	QP
10	14.211	24.81	-25.19	50.00	23.35	0.33	1.13	Average
11	18.330	28.87	-31.13	60.00	28.13	0.40	0.34	QP
12	18.330	23.00	-27.00	50.00	22.26	0.40	0.34	Average

5.5.8. Photographs of Conducted Emission Test Configuration

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

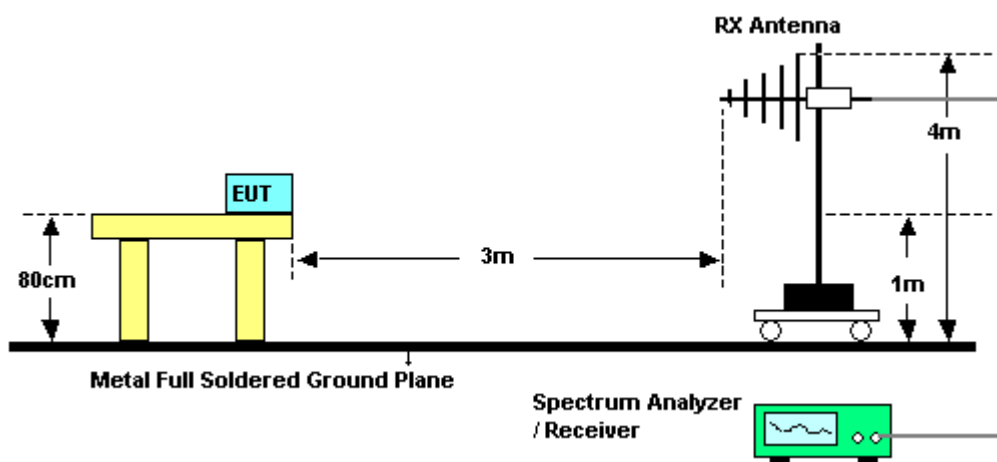
- Spectrum Analyzer : R&S FSP40
 - Attenuation : Auto
 - Start Frequency : 1000 MHz
 - Stop Frequency : 10th carrier harmonic
 - RB / VB : 1 MHz / 1MHz for Peak
 - RB / VB : 1 MHz / 10Hz for Average
- Test Receiver : R&S ESCS 30
 - Attenuation : Auto
 - Start Frequency : 30 MHz
 - Stop Frequency : 1000 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

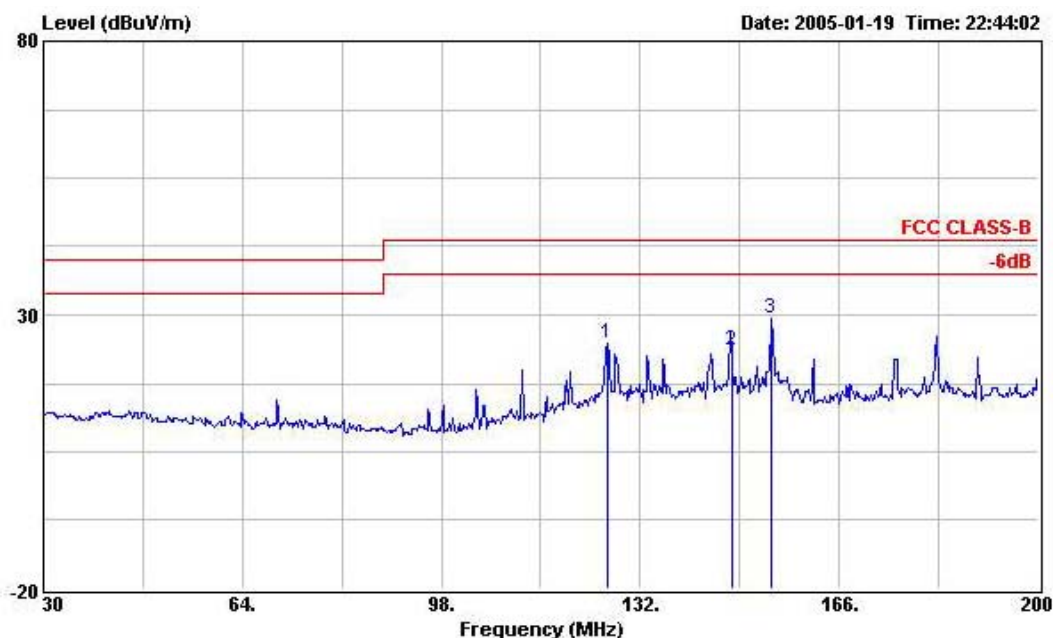
All test results complied with the requirements of 15.247(d). Measurement Uncertainty is 2.26dB.

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

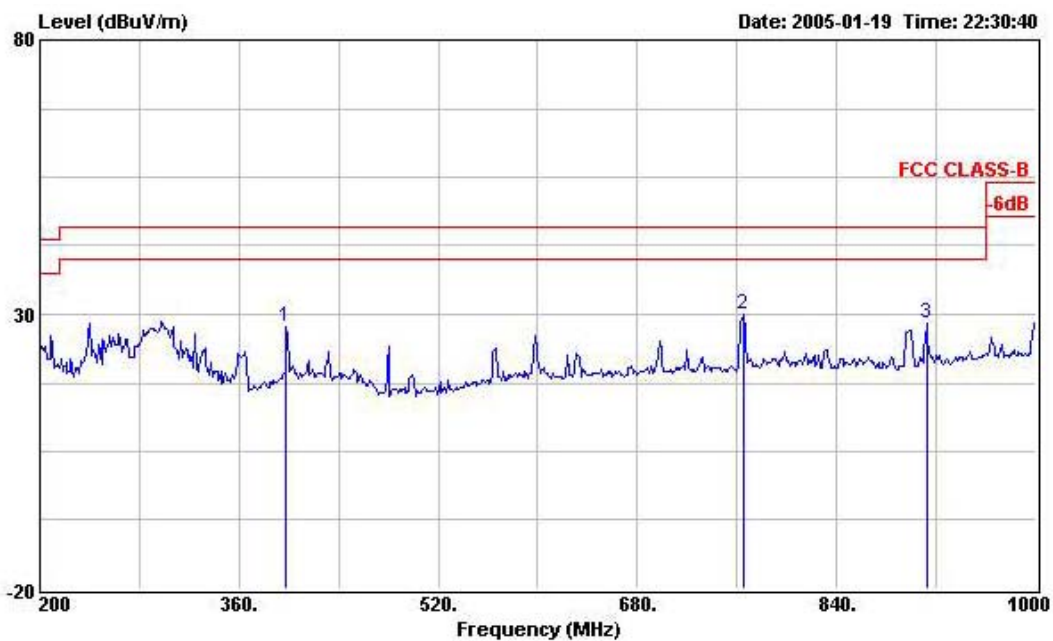
- Modulation Type: OFDM
- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Ted Chiu

Mode 1

(A) Polarization: Horizontal

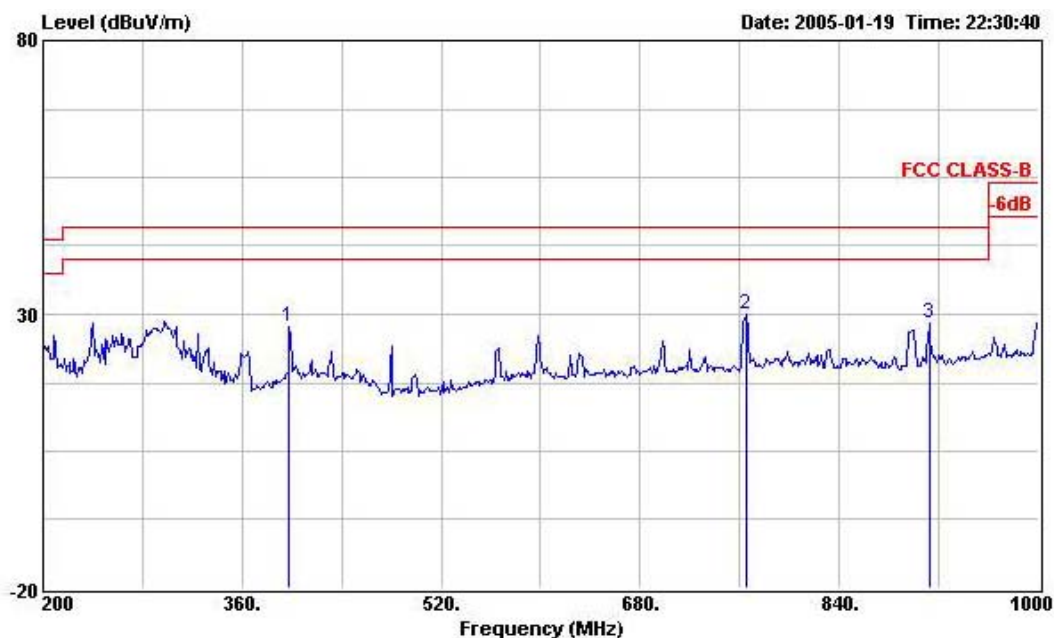


	Freq	Level	Over	Limit	Read	Probe	Cable	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor	Remark	Pos	Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	126.390	24.86	-18.64	43.50	39.77	12.24	0.00	27.15	Peak	---	---
2	147.640	23.48	-20.02	43.50	38.52	12.06	0.00	27.10	Peak	---	---
3	154.270	29.45	-14.05	43.50	44.33	12.21	0.00	27.09	Peak	---	---

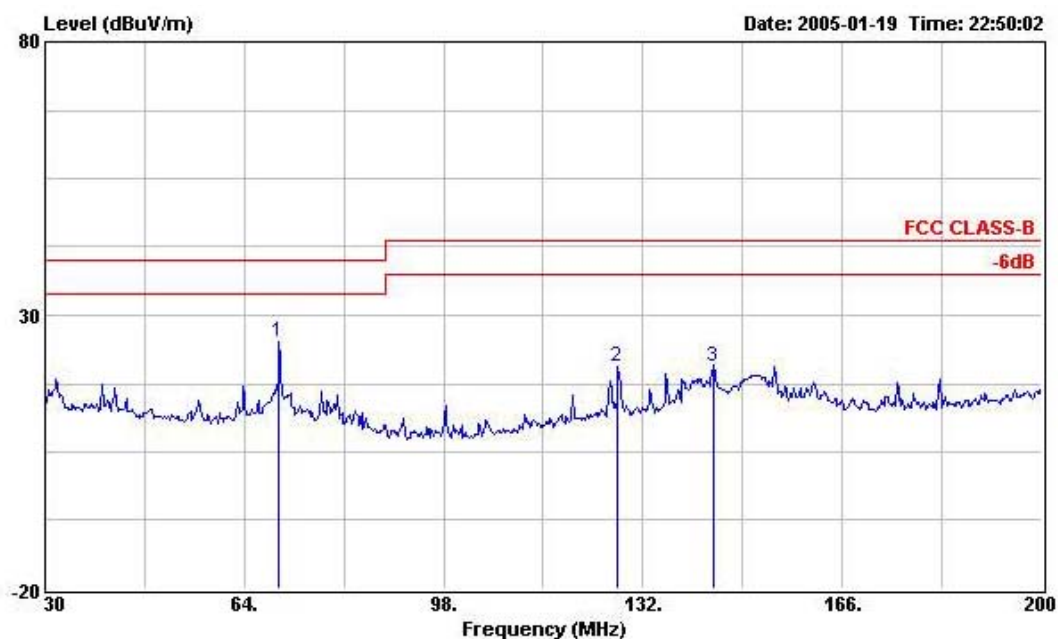


	Freq	Level	Over	Limit	Read	Probe	Cable	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor	Remark	Pos	Pos
			dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	397.600	27.85	-18.15	46.00	38.79	16.73	0.00	27.67	Peak	---	---
2	764.800	29.90	-16.10	46.00	36.26	21.48	0.00	27.84	Peak	---	---
3	912.000	28.33	-17.67	46.00	33.59	21.97	0.00	27.23	Peak	---	---

(B) Polarization: Vertical



	Freq	Level	Over	Limit	Read	Probe	Cable	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor	Remark	Pos	Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	397.600	27.85	-18.15	46.00	38.79	16.73	0.00	27.67	Peak	---	---
2	764.800	29.90	-16.10	46.00	36.26	21.48	0.00	27.84	Peak	---	---
3	912.000	28.33	-17.67	46.00	33.59	21.97	0.00	27.23	Peak	---	---



	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	69.950	25.22	-14.78	40.00	42.86	9.80	0.00	27.44	Peak	---	---
2	127.750	20.60	-22.90	43.50	35.47	12.27	0.00	27.14	Peak	---	---
3	144.070	20.70	-22.80	43.50	35.50	12.31	0.00	27.11	Peak	---	---

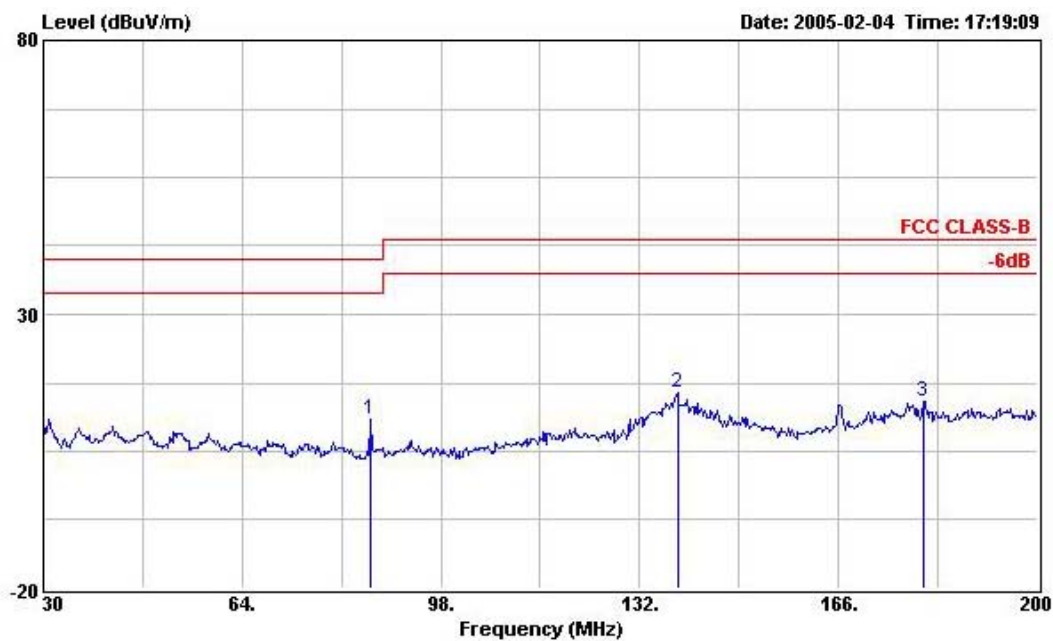
Note:

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

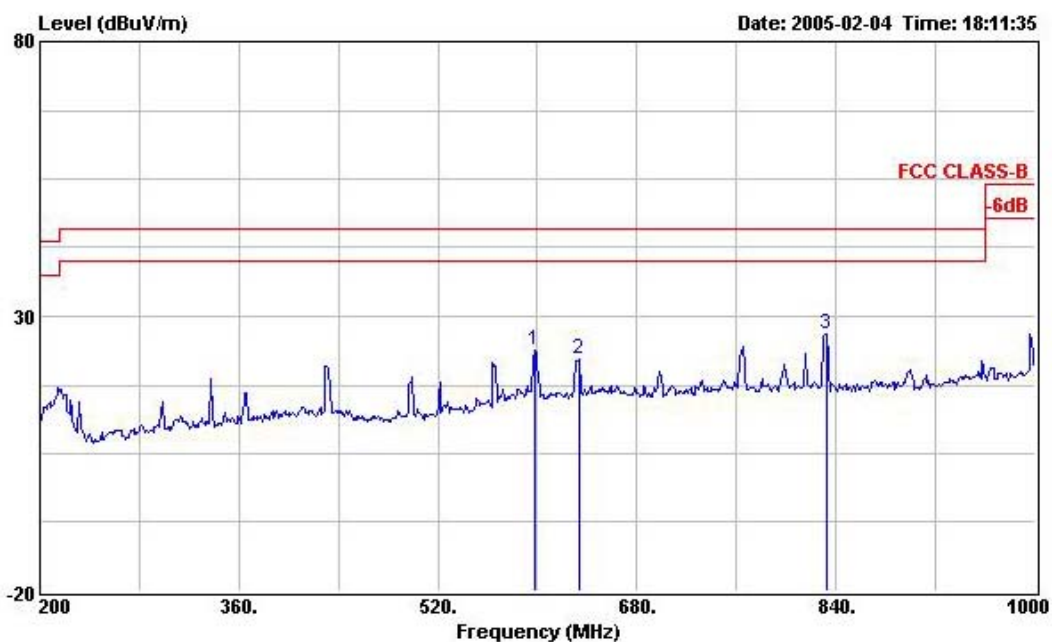
Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

Mode 2

(A) Polarization: Horizontal

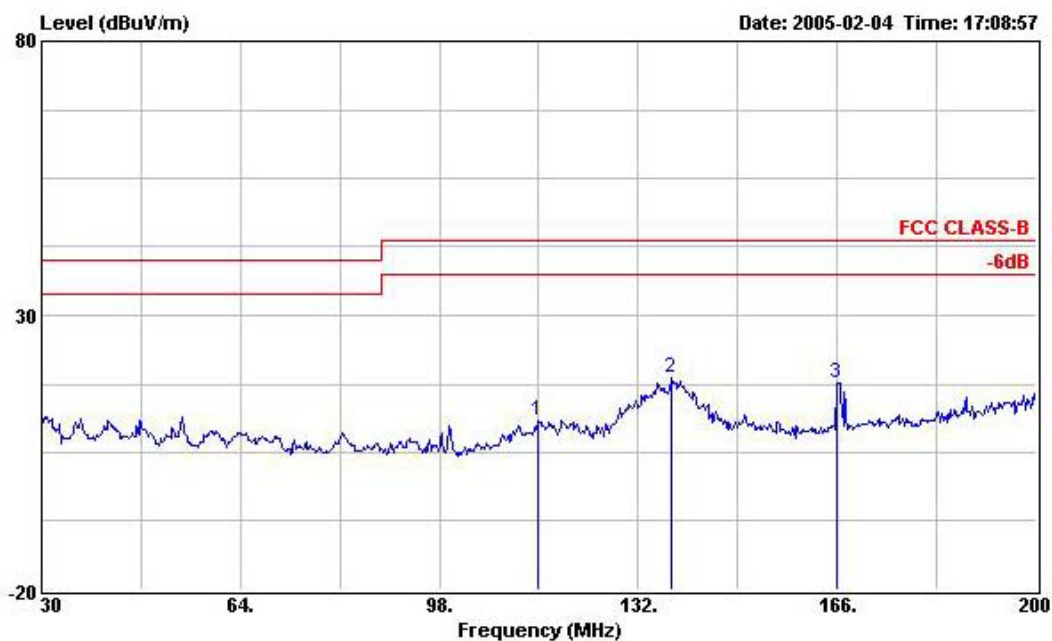


	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	86.100	10.77	-29.23	40.00	31.97	8.89	0.00	30.09	Peak	---	---
2	138.460	15.62	-27.88	43.50	33.83	12.56	0.00	30.77	Peak	---	---
3	180.620	13.98	-29.52	43.50	29.77	14.24	0.00	30.03	Peak	---	---

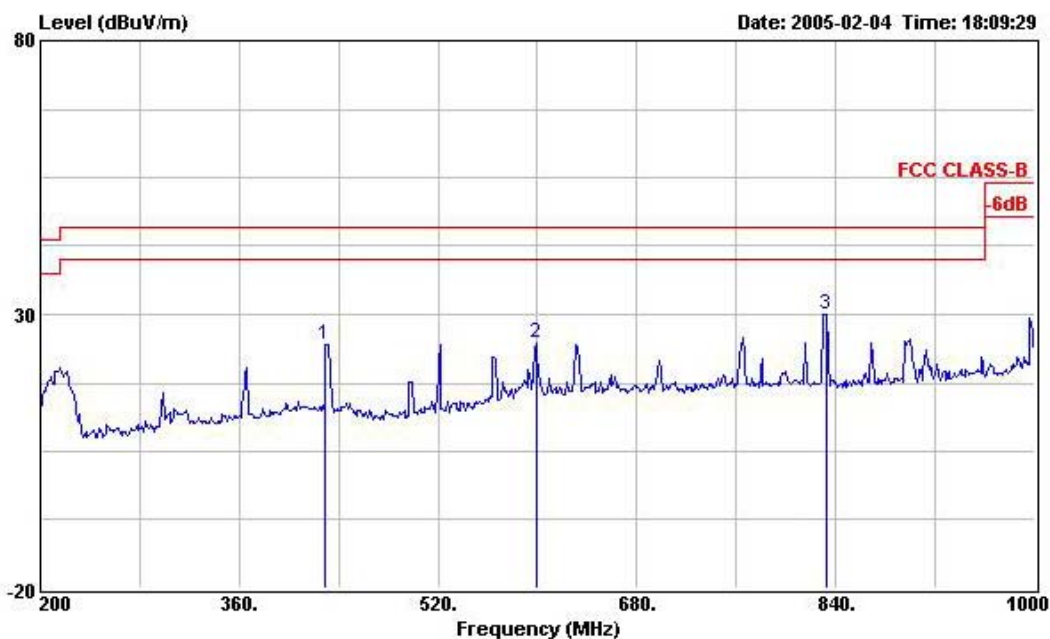


	Freq	Level	Over	Limit	Read	Probe	Cable	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor	Remark	Pos	Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	598.400	23.74	-22.26	46.00	34.50	20.33	0.00	31.09	Peak	---	---
2	633.600	22.16	-23.84	46.00	32.35	20.50	0.00	30.69	Peak	---	---
3	832.000	26.89	-19.11	46.00	35.47	21.84	0.00	30.42	Peak	---	---

(B) Polarization: Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamplifier	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	114.830	10.88	-32.62	43.50	30.03	11.13	0.00	30.28	Peak	---	---
2	137.780	18.48	-25.02	43.50	36.70	12.54	0.00	30.76	Peak	---	---
3	165.830	17.81	-25.69	43.50	34.70	13.23	0.00	30.12	Peak	---	---



	Freq	Level	Over	Limit	Read	Probe	Cable	Preamp		Ant	Table
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB	Remark	Pos	Pos
1	429.600	24.55	-21.45	46.00	38.64	16.56	0.00	30.65	Peak	---	---
2	599.200	24.93	-21.07	46.00	35.66	20.36	0.00	31.09	Peak	---	---
3	832.000	30.11	-15.89	46.00	38.69	21.84	0.00	30.42	Peak	---	---

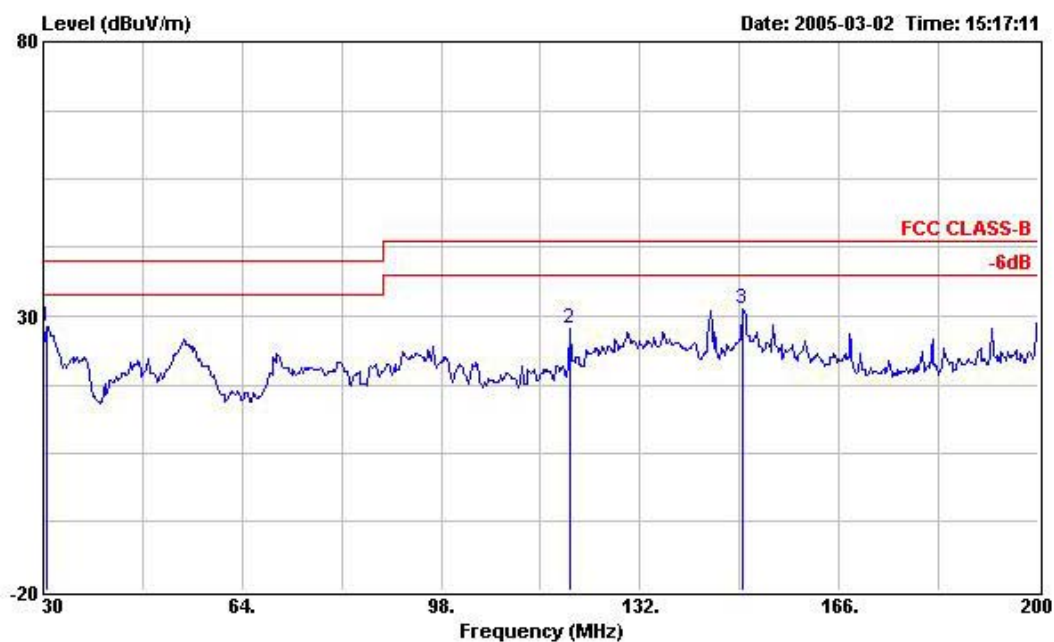
Note:

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

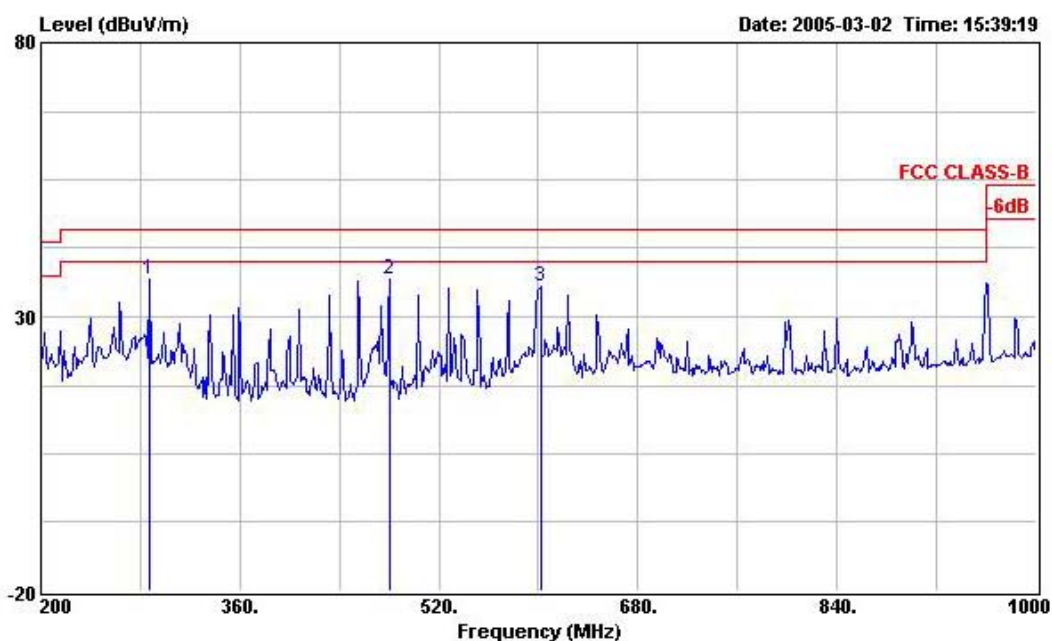
Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

Mode 3

(A) Polarization: Horizontal

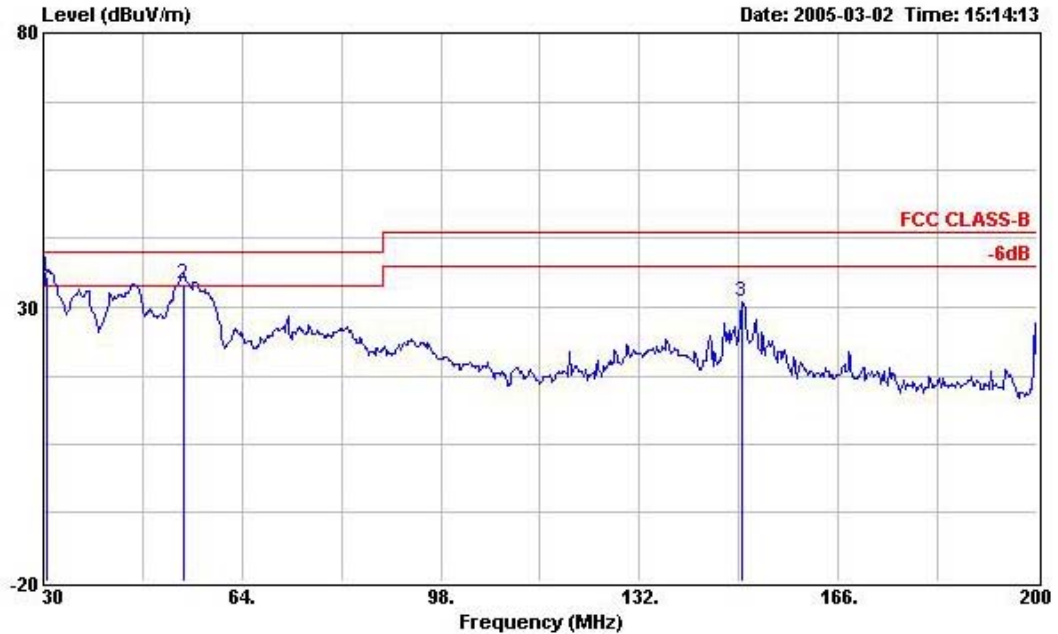


	Freq	Level	Over	Limit	Read	Probe	Cable	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor	Remark	Pos	Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	30.510	27.96	-12.04	40.00	44.77	12.90	0.57	30.28	Peak	---	---
2	120.100	27.61	-15.89	43.50	44.94	11.90	1.09	30.32	Peak	---	---
3	149.510	31.26	-12.24	43.50	48.57	11.93	1.19	30.43	Peak	---	---

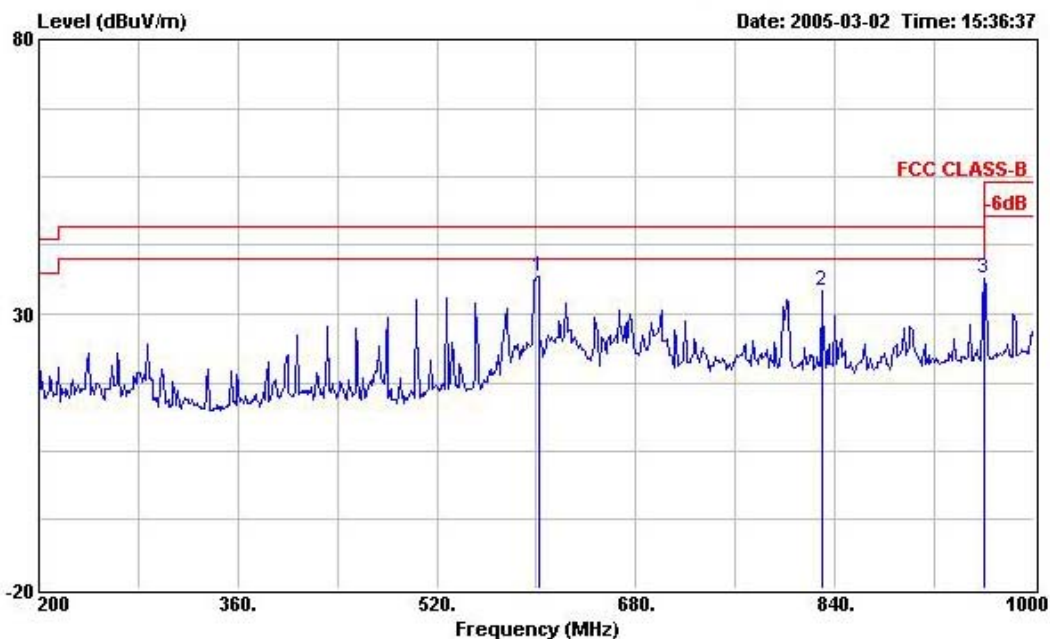


	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	288.000	36.72	-9.28	46.00	52.12	13.46	1.68	30.54	Peak	---	---
2	480.000	36.77	-9.23	46.00	49.81	16.16	2.12	31.32	Peak	---	---
3	601.600	35.36	-10.64	46.00	43.63	20.40	2.40	31.07	Peak	---	---

(B) Polarization: Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1 !	30.510	35.37	-4.63	40.00	52.18	12.90	0.57	30.28	QP	---	---
2 !	54.140	34.16	-5.84	40.00	52.69	11.02	0.72	30.27	QP	---	---
3	149.510	30.89	-12.61	43.50	48.20	11.93	1.19	30.43	Peak	---	---



	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	601.600	36.96	-9.04	46.00	45.23	20.40	2.40	31.07	Peak	---	---
2	829.600	34.38	-11.62	46.00	40.12	21.84	2.87	30.45	Peak	---	---
3	960.000	36.40	-9.60	46.00	39.65	23.02	3.02	29.29	Peak	---	---

Note:

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

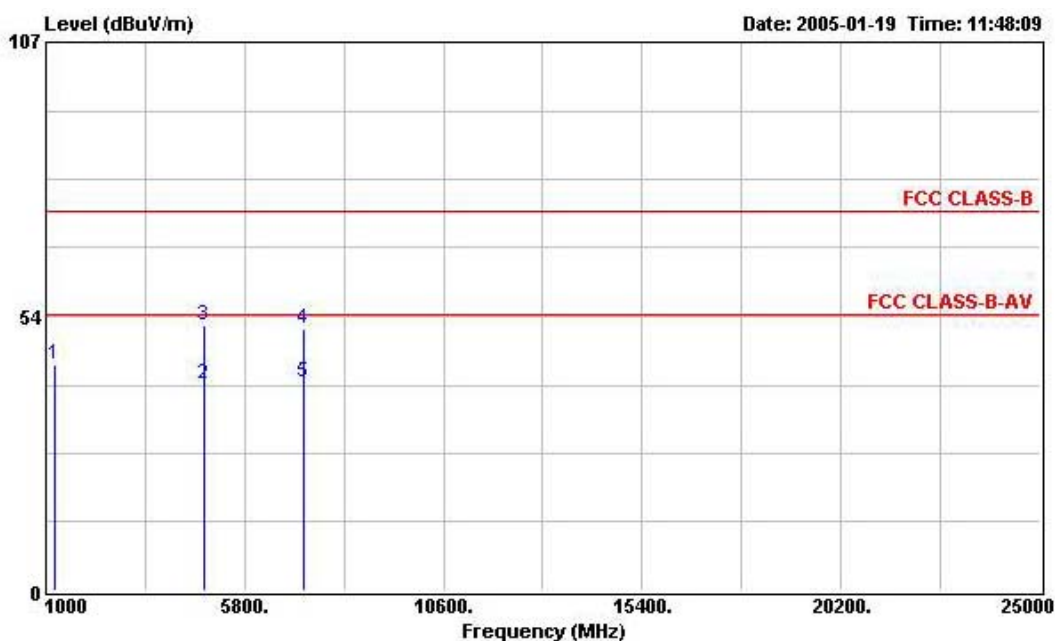
Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

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: Ted Chiu

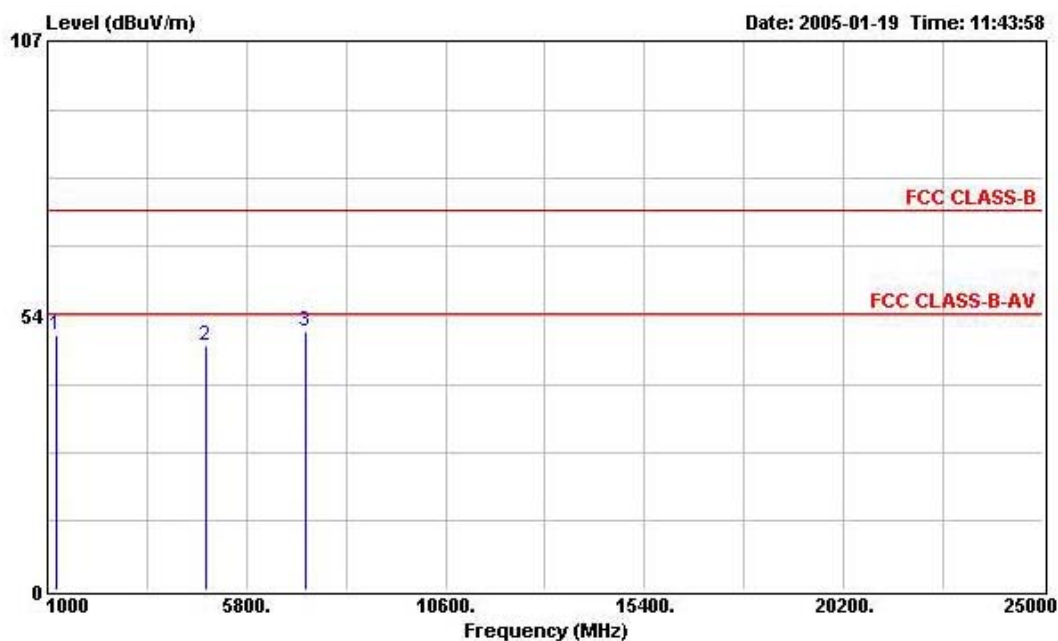
Mode 1

(A) Polarization: Horizontal



	Freq	Level	Over	Limit	Read	Probe	Cable	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor	Remark	Pos	Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1196.000	44.16	-29.84	74.00	57.52	24.54	1.32	39.22	Peak	---	---
2	4824.000	40.22	-13.78	54.00	44.56	32.96	2.84	40.14	Average	---	---
3	4824.000	51.80	-22.20	74.00	56.14	32.96	2.84	40.14	Peak	---	---
4	7228.000	51.11	-22.89	74.00	51.14	35.82	3.62	39.47	Peak	---	---
5	7228.000	40.78	-13.22	54.00	40.81	35.82	3.62	39.47	Average	---	---

(B) Polarization: Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1196.000	49.70	-24.30	74.00	63.06	24.54	1.32	39.22	Peak	---	---
2	4824.000	47.51	-26.49	74.00	51.85	32.96	2.84	40.14	Peak	---	---
3	7232.000	50.44	-23.56	74.00	50.47	35.82	3.62	39.47	Peak	---	---

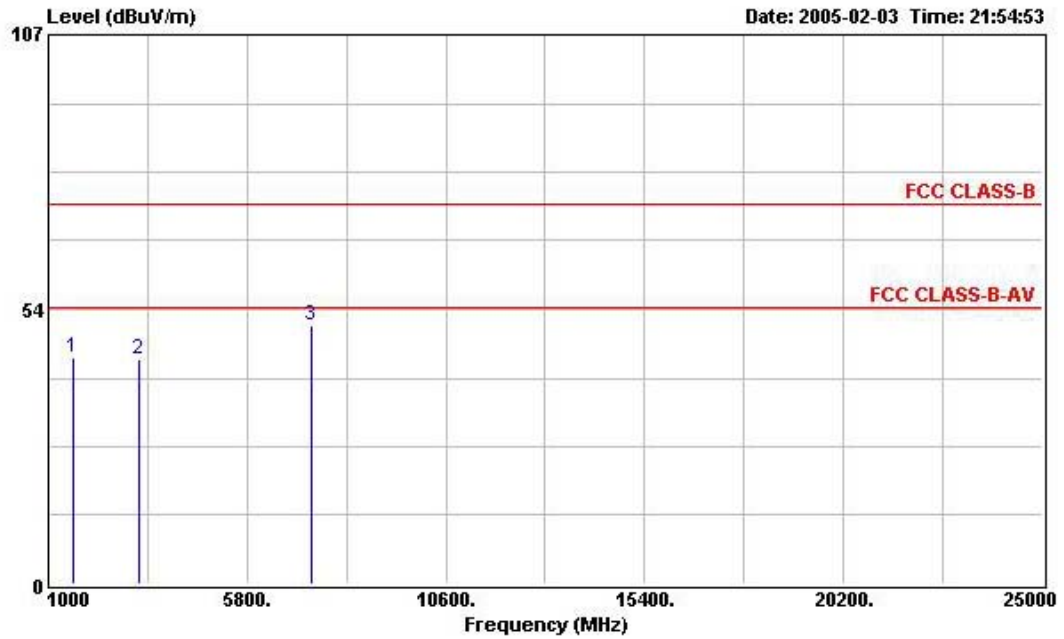
Note:

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

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

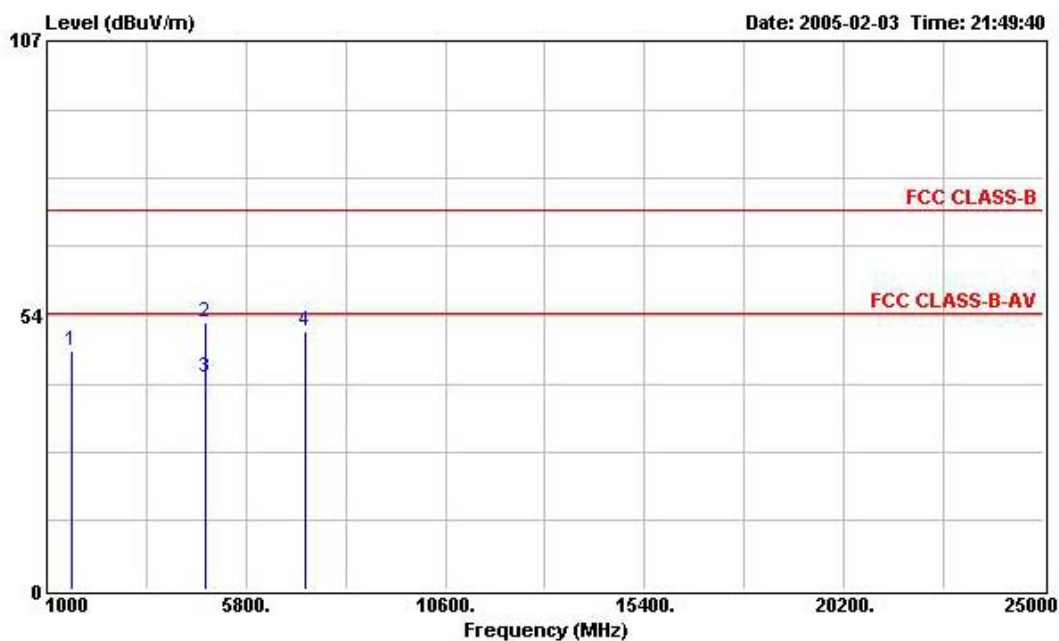
Mode 2

(A) Polarization: Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1596.000	44.19	-29.81	74.00	56.38	25.56	1.52	39.27	Peak	---	---
2	3192.000	43.89	-30.11	74.00	50.36	30.48	2.26	39.21	Peak	---	---
3	7340.000	50.50	-23.50	74.00	50.16	36.13	3.66	39.45	Peak	---	---

(B) Polarization: Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1600.000	46.42	-27.58	74.00	58.68	25.48	1.51	39.25	Peak	---	---
2	4824.000	52.20	-21.80	74.00	56.54	32.96	2.84	40.14	Peak	---	---
3	4824.000	41.50	-12.50	54.00	45.84	32.96	2.84	40.14	Average	---	---
4	7224.000	50.40	-23.60	74.00	50.49	35.77	3.62	39.48	Peak	---	---

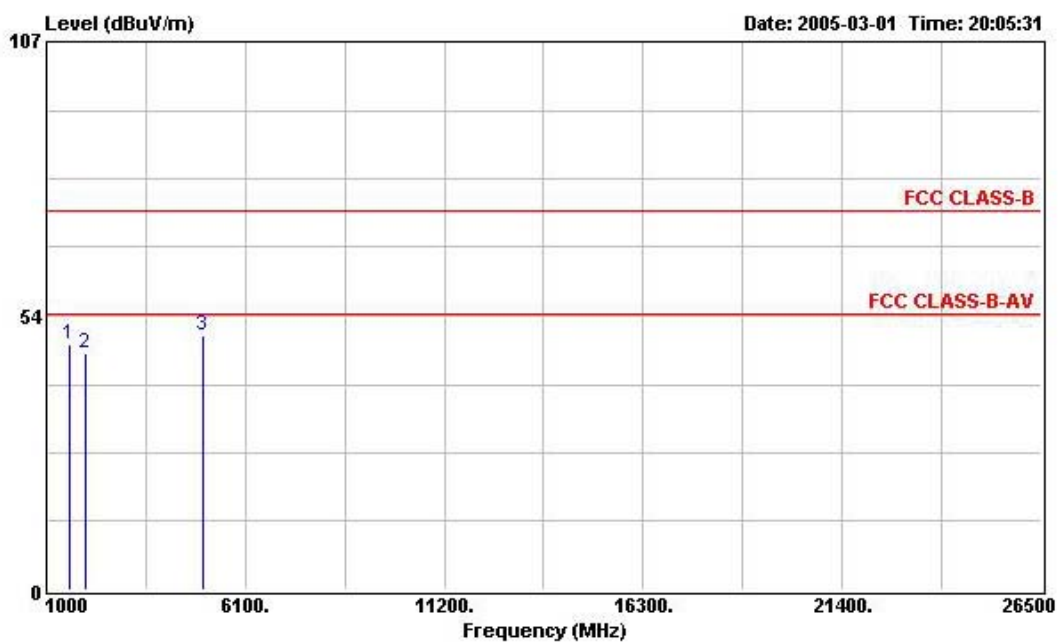
Note:

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

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

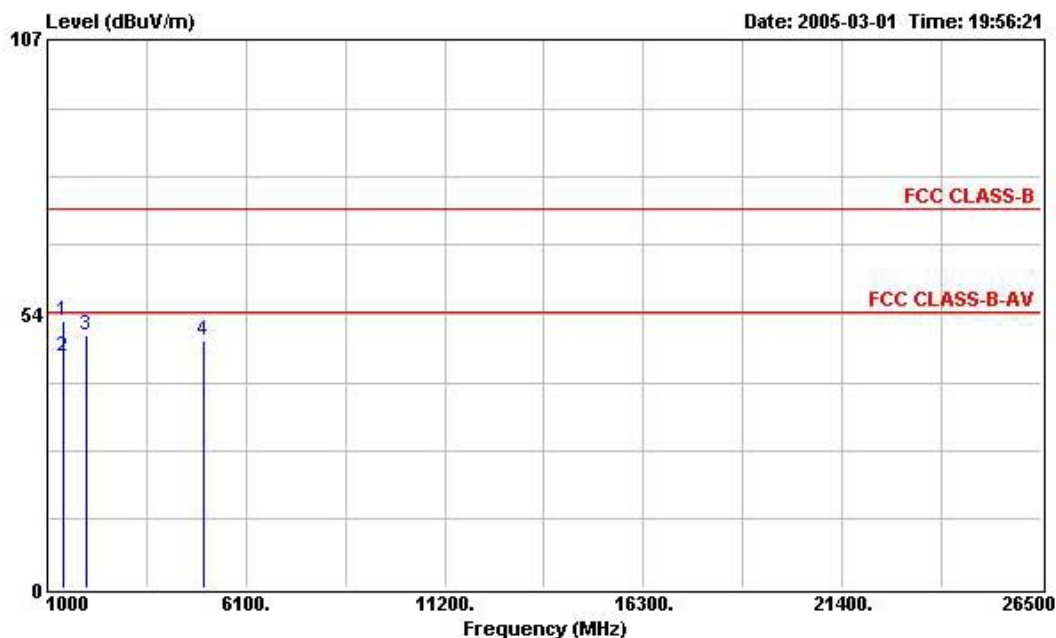
Mode 3

(A) Polarization: Horizontal



	Freq	Level	Over	Limit	Read	Probe	Cable	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor	Remark	Pos	Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1598.000	47.81	-26.19	74.00	59.96	25.61	1.52	39.28	Peak	---	---
2	1996.000	46.33	-27.67	74.00	56.86	27.40	1.72	39.65	Peak	---	---
3	4992.000	49.61	-24.39	74.00	53.52	33.32	2.92	40.15	Peak	100	360

(B) Polarization: Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1398.000	52.27	-21.73	74.00	65.09	24.94	1.43	39.19	Peak	---	---
2	1398.000	45.03	-8.97	54.00	57.85	24.94	1.43	39.19	Average	---	---
3	1998.000	49.46	-24.54	74.00	59.99	27.40	1.72	39.65	Peak	---	---
4	5000.000	48.22	-25.78	74.00	52.13	33.32	2.92	40.15	Peak	100	360

Note:

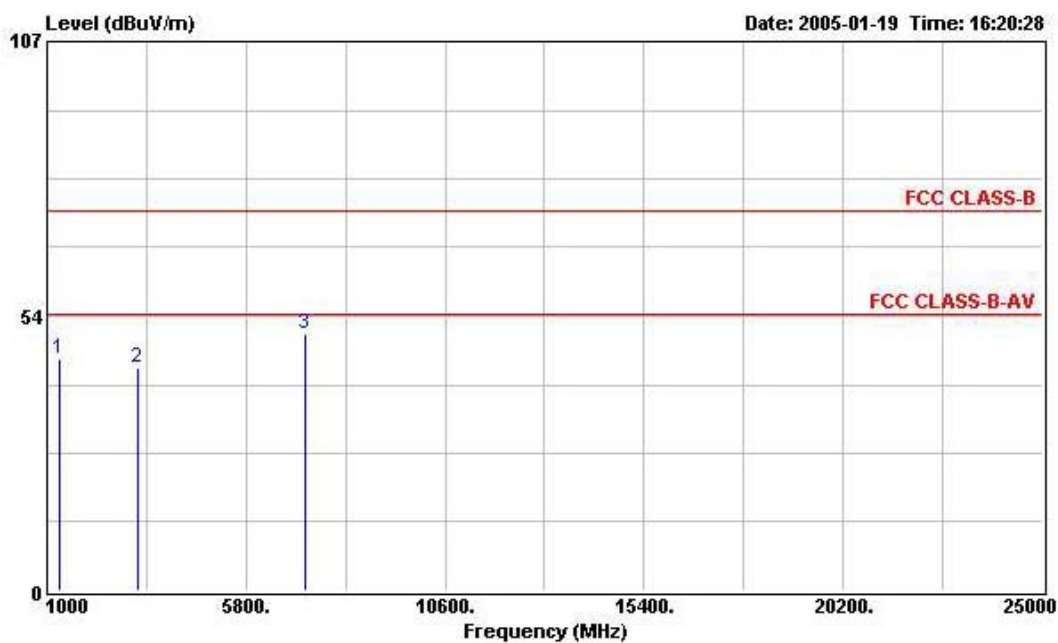
Emission level (dBuV/m) = 20 log Emission level (uV/m)

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: Ted Chiu

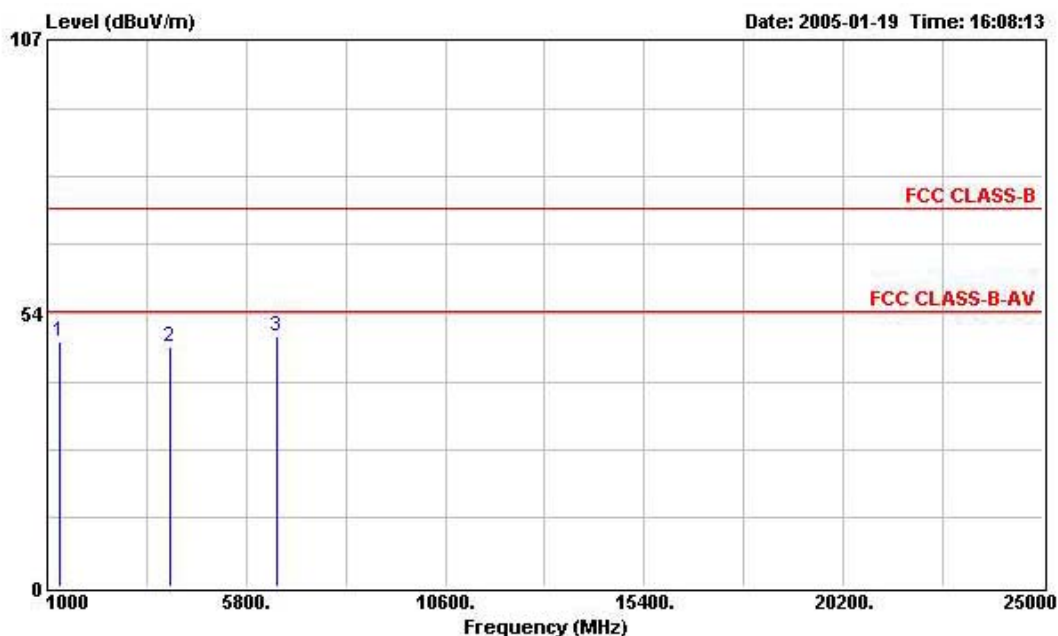
Mode 1

(A) Polarization: Horizontal



	Freq	Level	Over	Limit	Read	Probe	Cable	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor	Remark	Pos	Pos
			dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1296.000	45.17	-28.83	74.00	58.29	24.73	1.36	39.21	Peak	---	---
2	3192.000	43.41	-30.59	74.00	49.88	30.48	2.26	39.21	Peak	---	---
3	7224.000	50.11	-23.89	74.00	50.20	35.77	3.62	39.48	Peak	---	---

(B) Polarization: Vertical



	Freq	Level	Over	Limit	Read	Probe	Cable	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor	Remark	Pos	Pos
			dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1296.000	47.88	-26.12	74.00	61.00	24.73	1.36	39.21	Peak	---	---
2	3972.000	46.77	-27.23	74.00	51.23	32.46	2.49	39.41	Peak	---	---
3	6548.000	48.82	-25.18	74.00	50.74	34.36	3.41	39.69	Peak	---	---

Note:

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

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