FCC TEST REPORT

CATEGORY	:	Mobile
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 802.11a part is shown in this test report. (5745MHz ~ 5825MHz)

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.

CNLA

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ILAC MRA

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APPENDIX A. PHOTOGRAPHS OF EUT ..... A1 ~ A37

HISTORY OF THIS TEST REPORT

Test Date: Mar. 07, 2005
Original Report Issue Date: Mar. 07, 2005
Report No.: FR530403

■ No additional attachment.
☐ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

CERTIFICATE OF COMPLIANCE

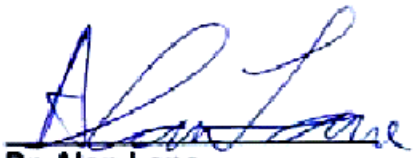
with

47 CFR FCC Part 15 Subpart C

PRODUCT NAME	:	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 Mar. 07, 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

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 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

Items	Description
Type of Modulation	OFDM (16QAM / 64QAM / DQPSK / DBPSK)
Number of Channels	5
Frequency Band	5725 MHz ~ 5850 MHz
Carrier Frequency Range	5745MHz~5825MHz
Carrier Frequency	See section 1.6 for details
Data Rate	54 Mbps
Channel Bandwidth	18 MHz
Max. Conducted Output Power	20 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.	Antenna Type	Gain (dBi)
1	Internal PIFA Antenna (CAF94400)	4.00dBi @5.0GHz
2	External Panel Antenna ANT-5180 (ASTN6H) 180°	10.80dBi @5.0GHz
3	External Panel Antenna ANT-5120 (ASTN6T) 120°	12.50dBi @5.0GHz
4	External Panel Antenna ANT-5060 (ASTN6S) 60°	14.50dBi @5.0GHz

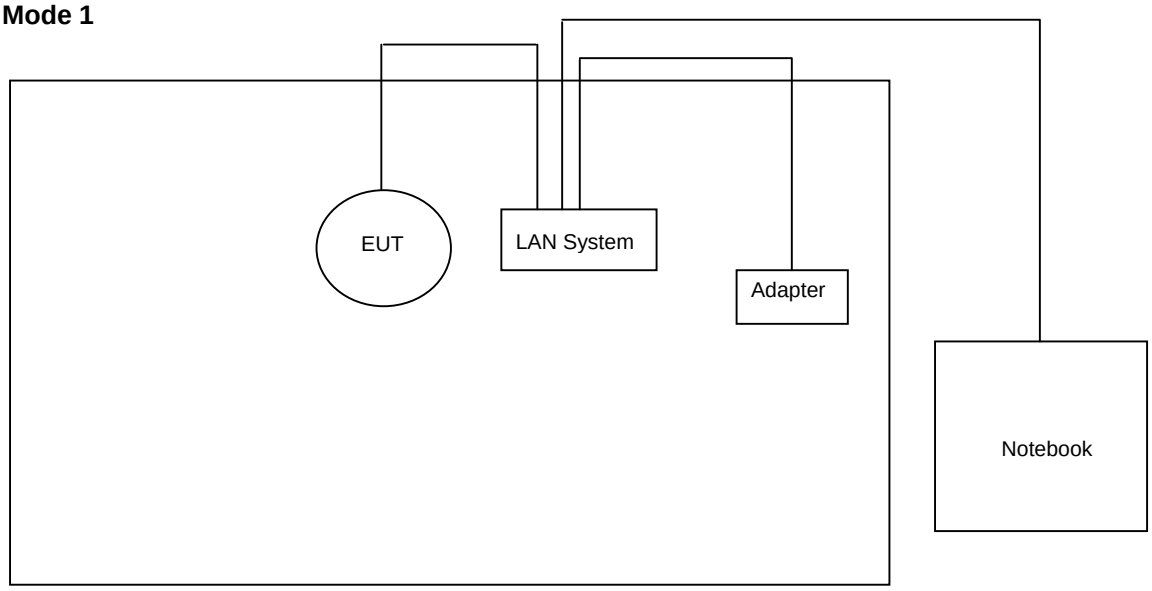
1.6. Table for Carrier Frequencies

Channel	Frequency
100	5745 MHz
104	5765 MHz
108	5785 MHz
112	5805 MHz
116	5825 MHz

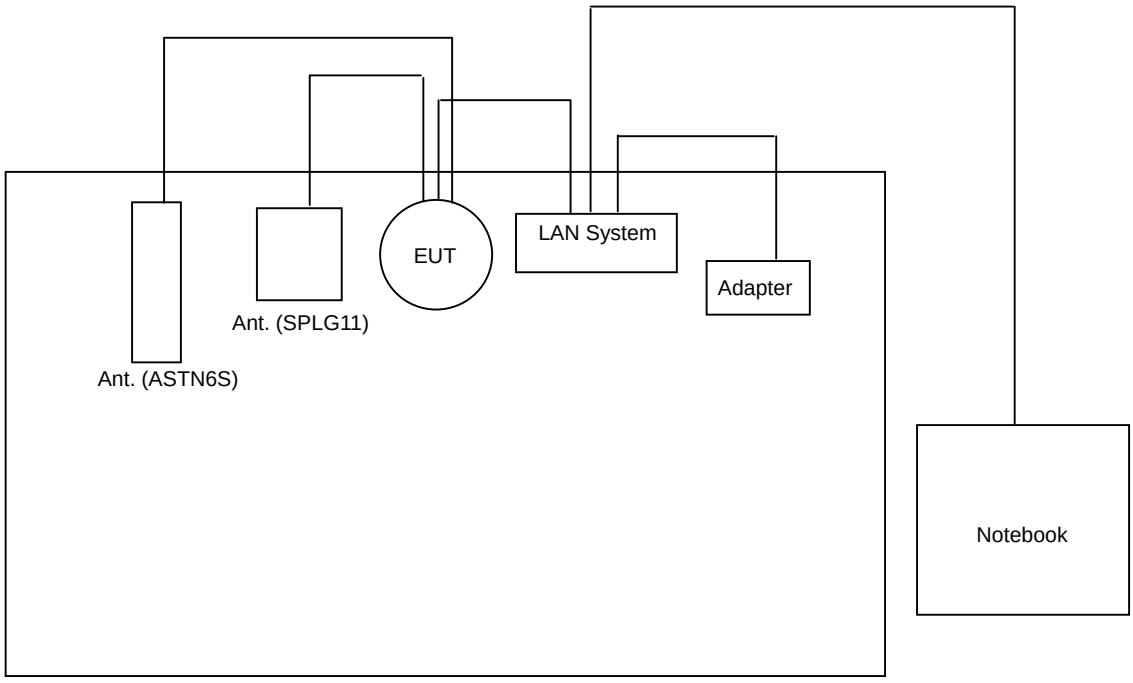
2. Test Configuration of the Equipment under Test

2.1. Connection Diagram of Test System

Mode 1



Mode 2



2.2. The Test Mode Description

1. For OFDM modulation, OFDM (64Mbps) is the worst case on all test items.
2. 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.
3. Spurious emission below 1GHz is independent of channel selection and modulation types. So only channel 5825MHz with OFDM modulation was tested.
4. AC conduction emission is independent of channel selection, modulation types and types of antenna. So only channel 5825MHz with OFDM modulation was tested.
5. There are 4 types of antennas, 3 of them are in the same type. So only 2 antennas was tested.
   Mode 1 : Internal Antenna (PIFA CAF94400 – antenna 1)
   Mode 2 : External Antenna (Panel ASTN6S – antenna 2)

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 : 03CH01-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. Frequency Range Investigated

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

3.4. 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.

3.5. 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

Test Software	**ART**		
Test Channel	CH 100	CH 104	CH 116
Test Frequency	5745MHz	5765MHz	5825MHz
TX Power of OFDM	18.00	18.00	18.00

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.

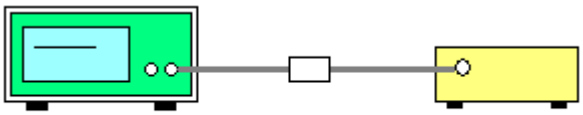
5.1.3. Description of Major Test Instruments Setting

- Spectrum Analyzer : R&S FSP30
  Attenuation : Auto
  Center Frequency : 5745MHz / 5785MHz / 5825MHz
  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

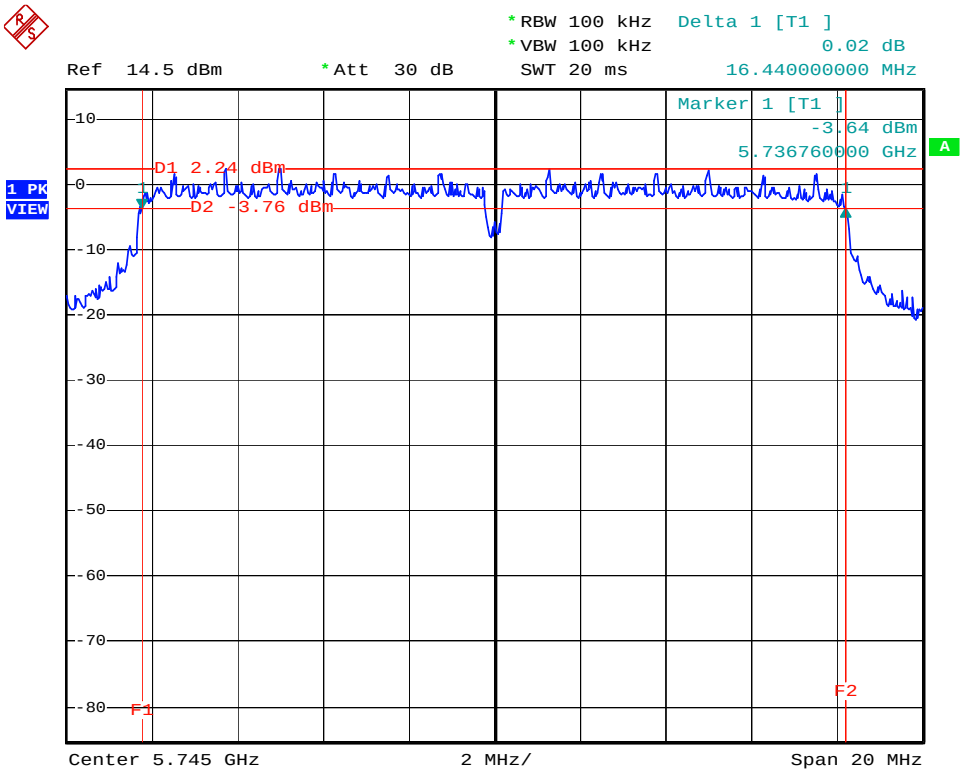
All test results complied with the requirements of 15.247(a)(2). Measurement Uncertainty is $1x10^{-5}$.

5.1.7. Test Result

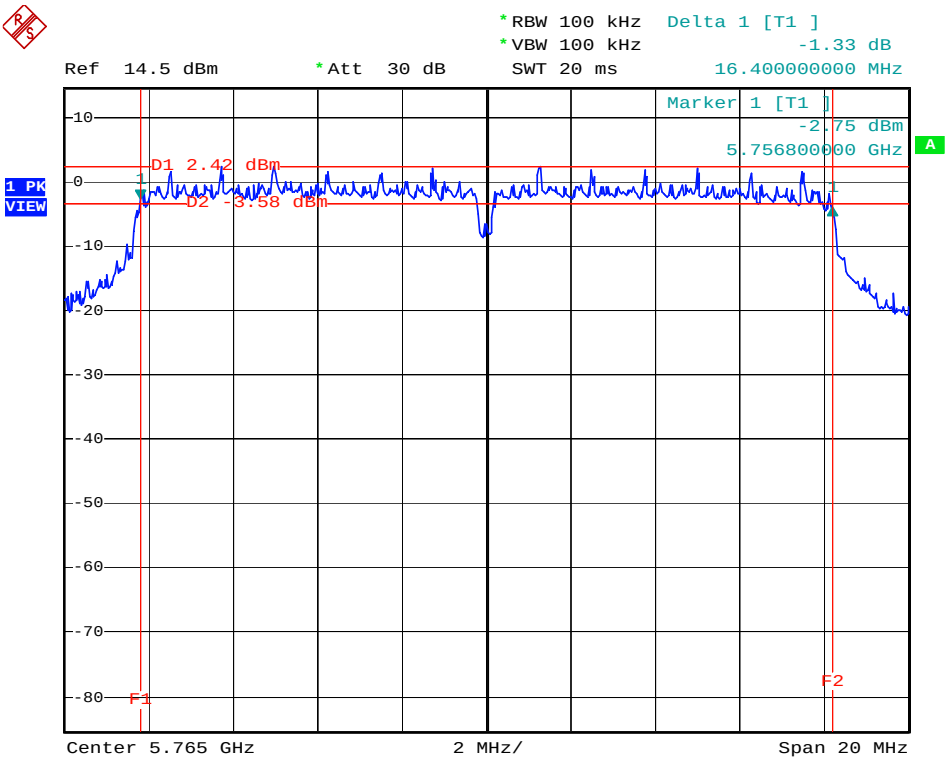
- Temperature: 15°C
- Relative Humidity: 62%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Steven Lu

Modulation Type	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Min. Limit (MHz)
OFDM	100	5745MHz	16.44	0.5
OFDM	104	5785MHz	16.40	0.5
OFDM	116	5825MHz	16.48	0.5

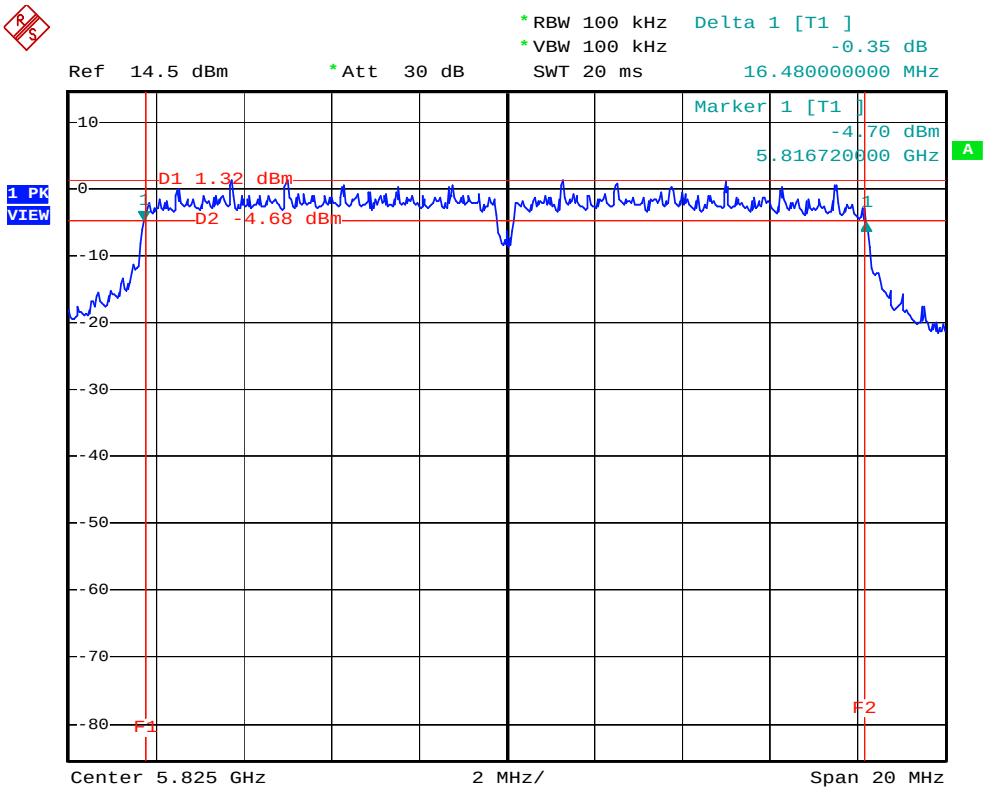
Modulation Type: OFDM (Channel 100)：



Modulation Type: OFDM (Channel 104)：



Modulation Type: OFDM (Channel 116)：



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.

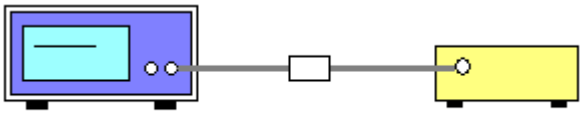
5.2.2. Measuring Instruments

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.
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

- Temperature: 15°C
- Relative Humidity: 62%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Steven Lu

Modulation Type	Channel No.	Frequency (MHz)	Output Power (dBm)	Limits (dBm)
OFDM	100	5745MHz	20.00	30
OFDM	104	5785MHz	20.00	30
OFDM	116	5825MHz	20.00	30

5.2.7. Test Result of EIRP Power

- Temperature: 15°C
- Relative Humidity: 62%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Steven Lu

Antenna No.	Gain (dBi)	Modulation Type	Channel No.	Frequency (MHz)	Power (dBm)	Limits (dBm)
1	4.00	OFDM	100	5745MHz	24.00	36
1	4.00	OFDM	104	5785MHz	24.00	36
1	4.00	OFDM	116	5825MHz	24.00	36
4	14.50	OFDM	100	5745MHz	34.50	36
4	14.50	OFDM	104	5785MHz	34.50	36
4	14.50	OFDM	116	5825MHz	34.50	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.

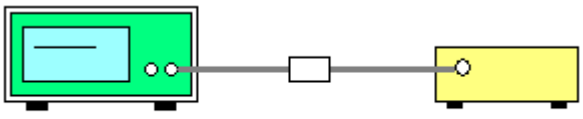
5.3.3. Description of Major Test Instruments Setting

- Spectrum Analyzer : R&S FSP30
  Attenuation : Auto
  Center Frequency : 5745MHz / 5785MHz / 5825MHz
  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

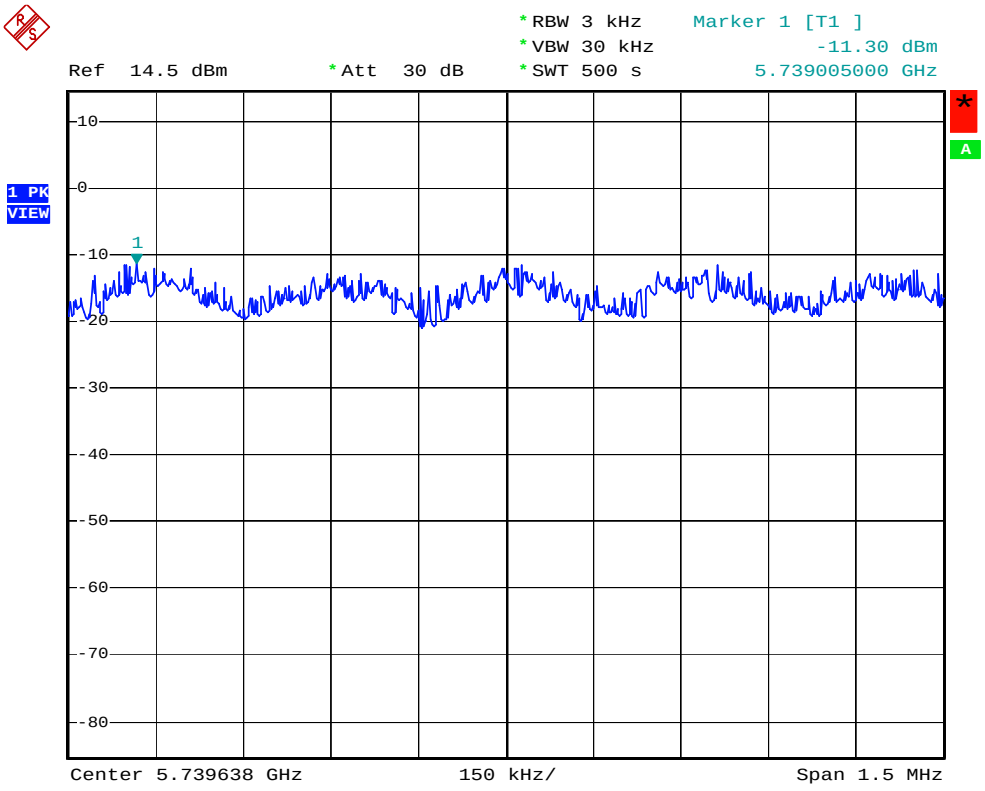
All test results complied with the requirements of 15.247(e). Measurement Uncertainty is 1.5dB.

5.3.7. Test Result

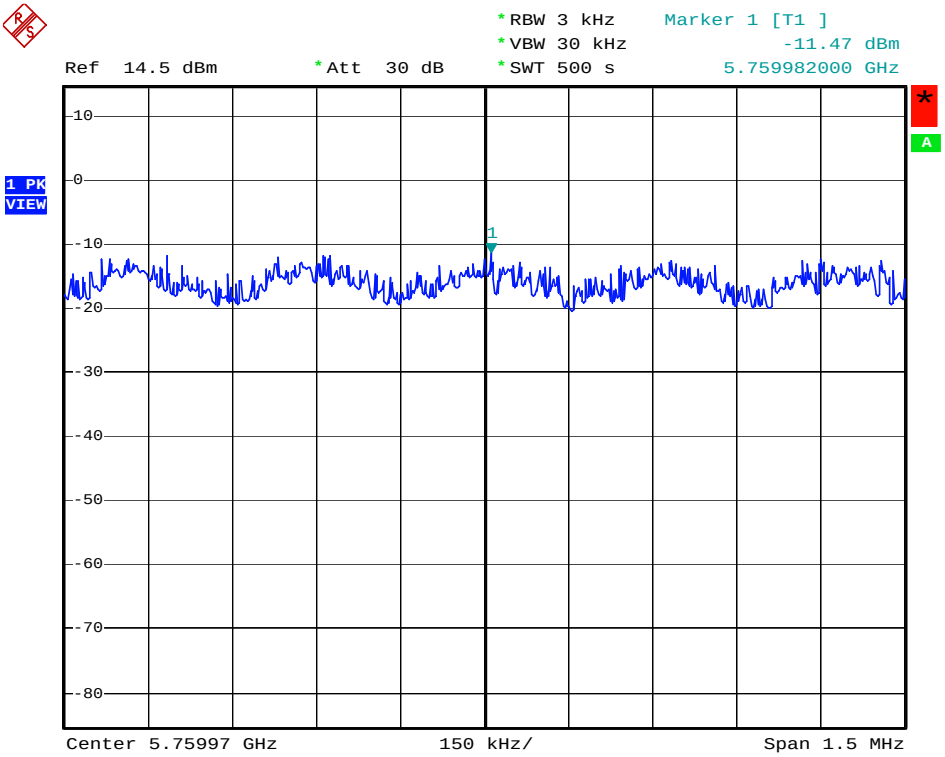
- Temperature: 15°C
- Relative Humidity: 62%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Steven Lu

Modulation Type	Channel No.	Frequency (MHz)	Power Density (dBm)	Limits (dBm)
OFDM	100	5745MHz	-11.30	8
OFDM	104	5785MHz	-11.47	8
OFDM	116	5825MHz	-12.23	8

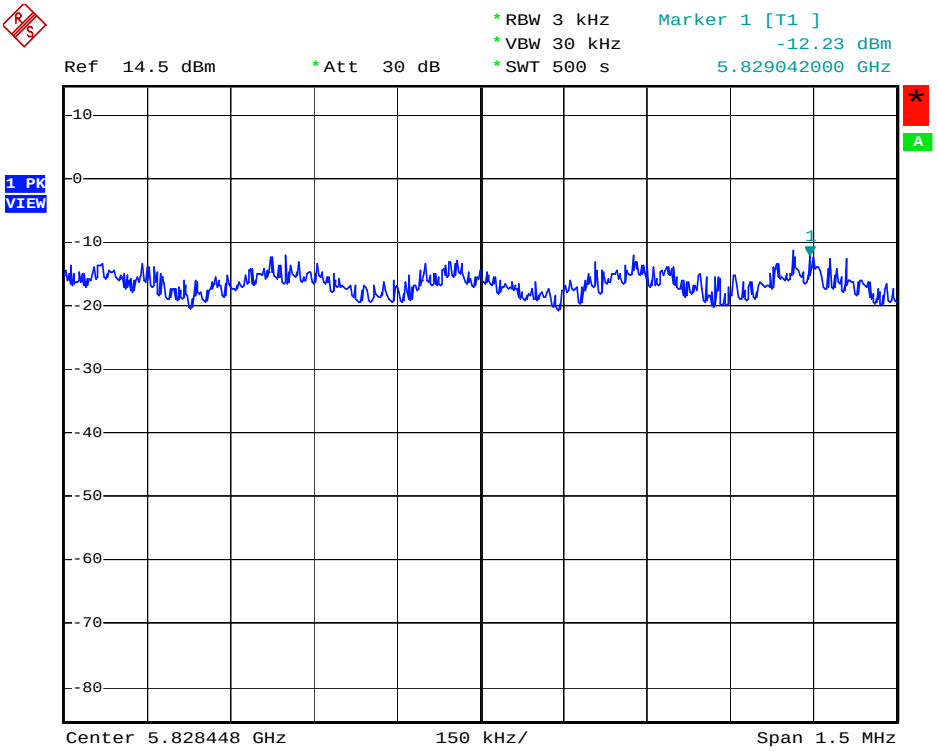
Modulation Type: OFDM (Channel 100)：



Modulation Type: OFDM (Channel 104)：



Modulation Type: OFDM (Channel 116)：



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 : 5745MHz / 5785MHz / 5825MHz
  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 : 5745MHz / 5785MHz / 5825MHz
  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

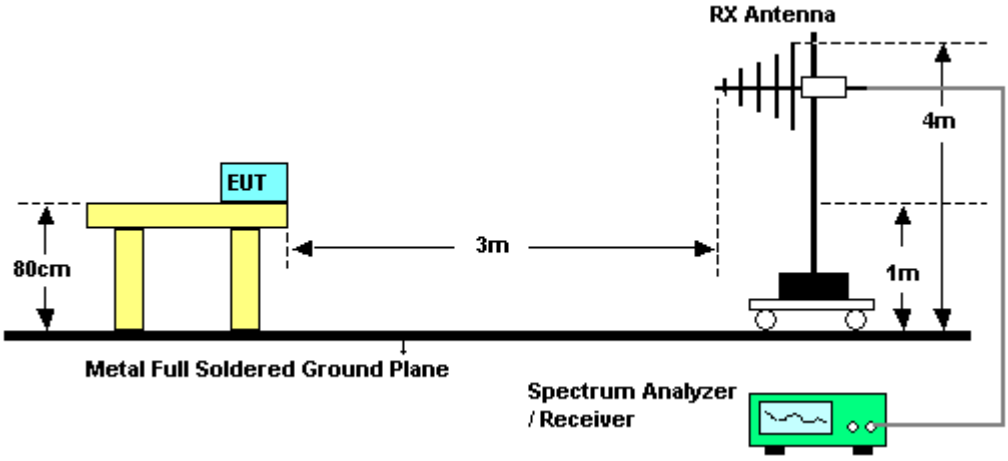
1. The transmitter is set to the lowest channel.
2. The transmitter output was connected to the spectrum analyzer via a cable and cable loss is used as the offset of the spectrum analyzer.
3. Set both RBW and VBW of spectrum analyzer to 100KHz with convenient frequency span including 100MHz bandwidth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

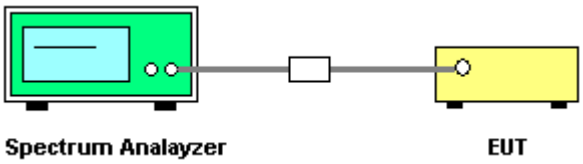
1. Configure the EUT according to ANSI C63.4.
2. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of both horizontal and vertical polarization.
4. For band edge emission, the antenna tower was scan (from 1 M to 4 M) and then the turntable 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

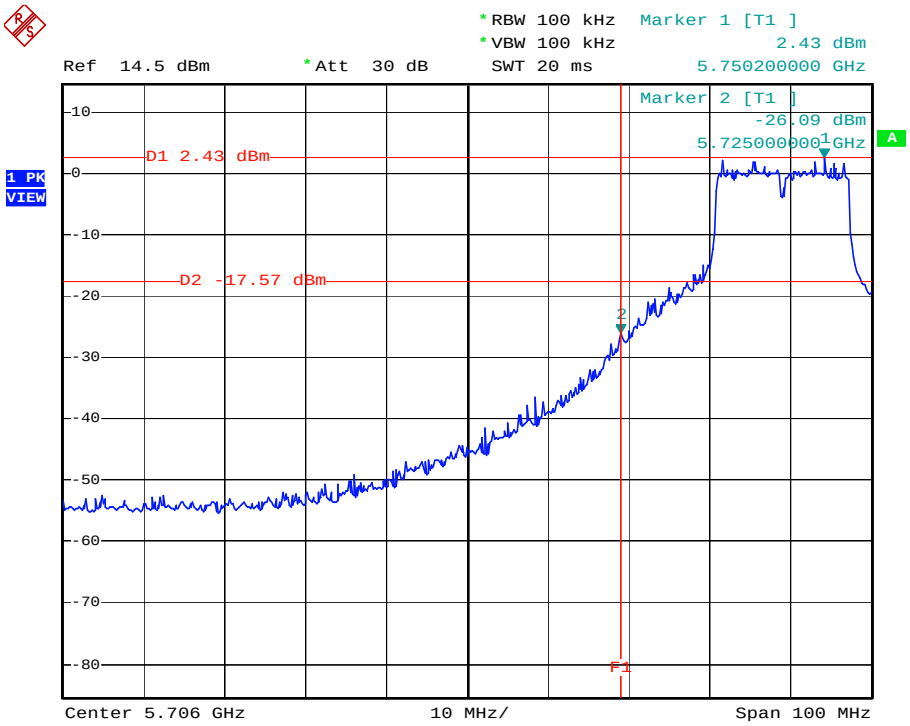


5.4.6. Test Criteria

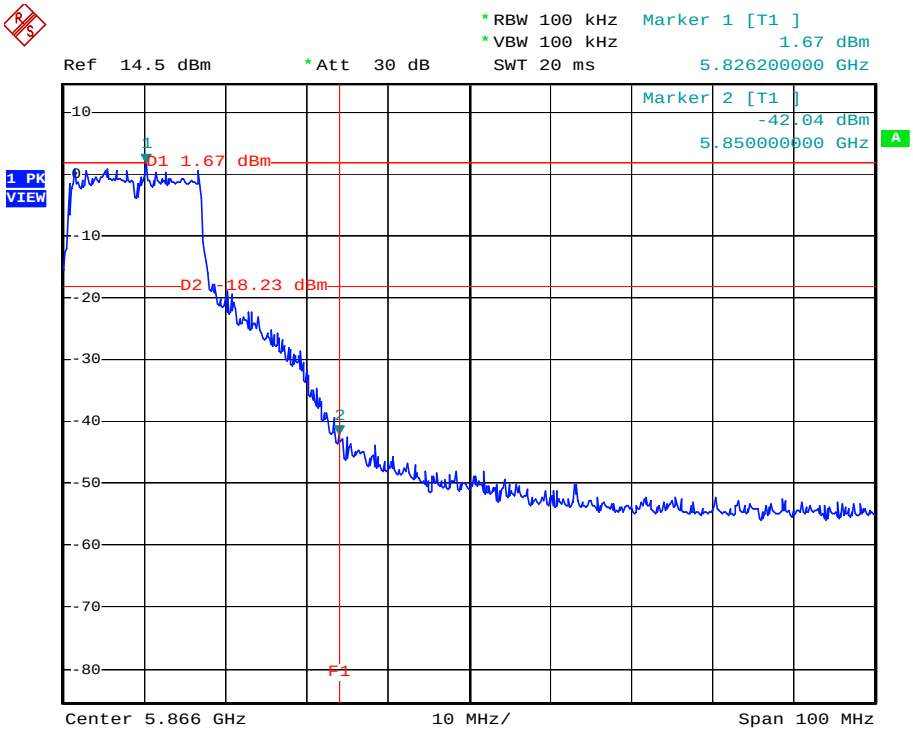
All test results complied with the requirements of 15.247(d). Measurement Uncertainty is 2.26dB.

Plots Showing the band edge emission lower than –20dBc

Modulation Type: OFDM (Channel 100)：



Modulation Type: OFDM (Channel 116)：



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.

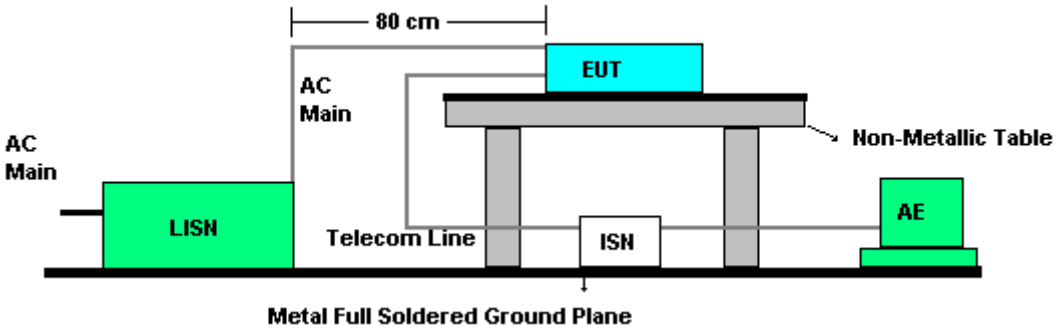
5.5.3. Description of Major Test Instruments Setting

- 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



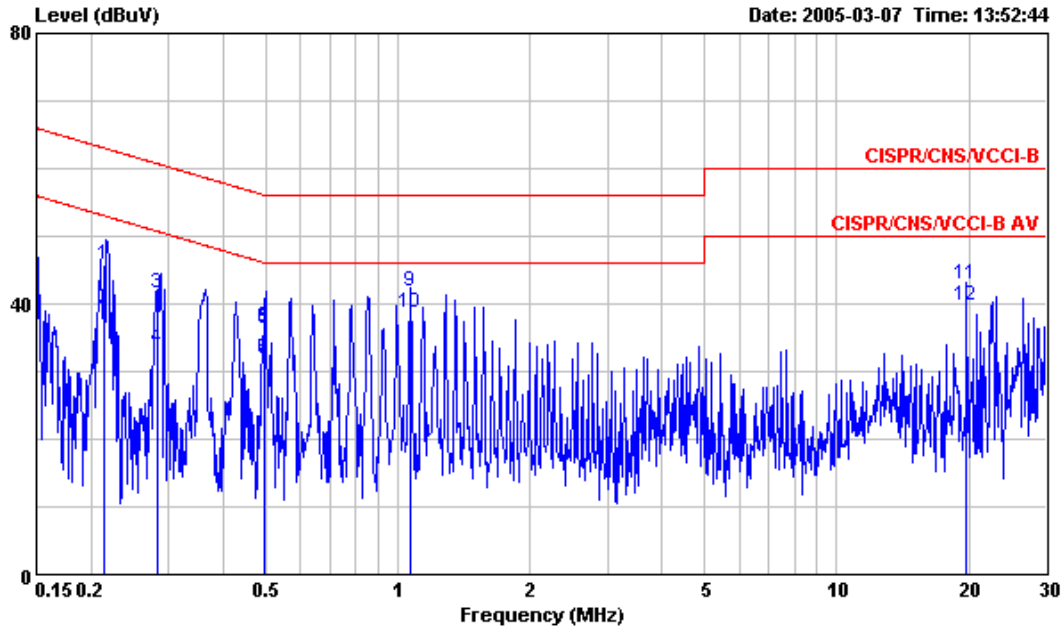
5.5.6. Test Criteria

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

5.5.7. Test Result of Conducted Emission

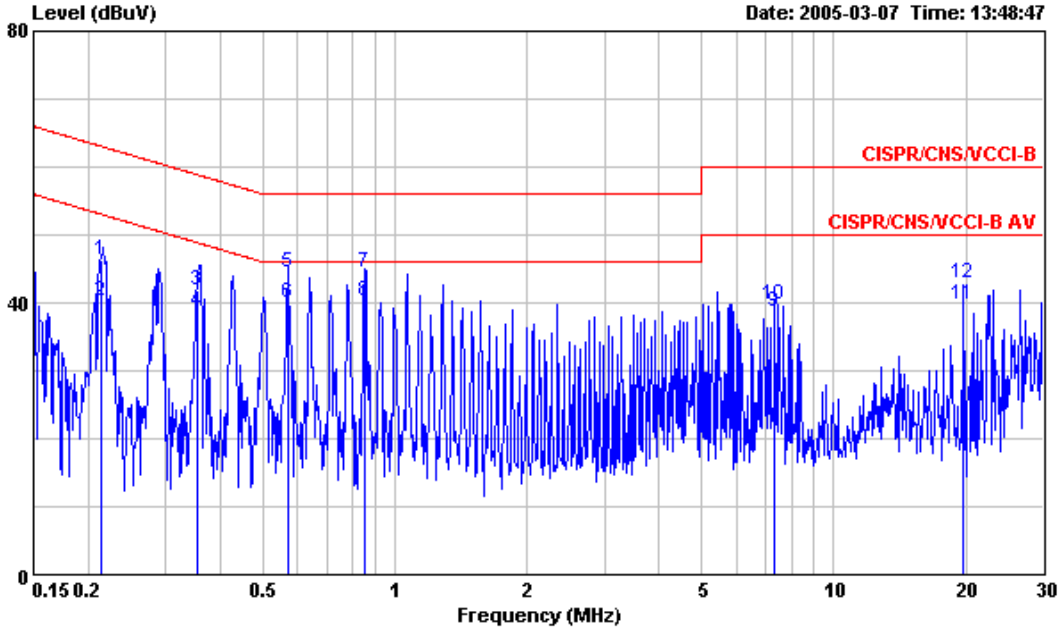
- Mode 1
- Temperature: 15°C
- Relative Humidity: 62%
- Test Engineer: Sky Wu

Line to Ground



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.2149230	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

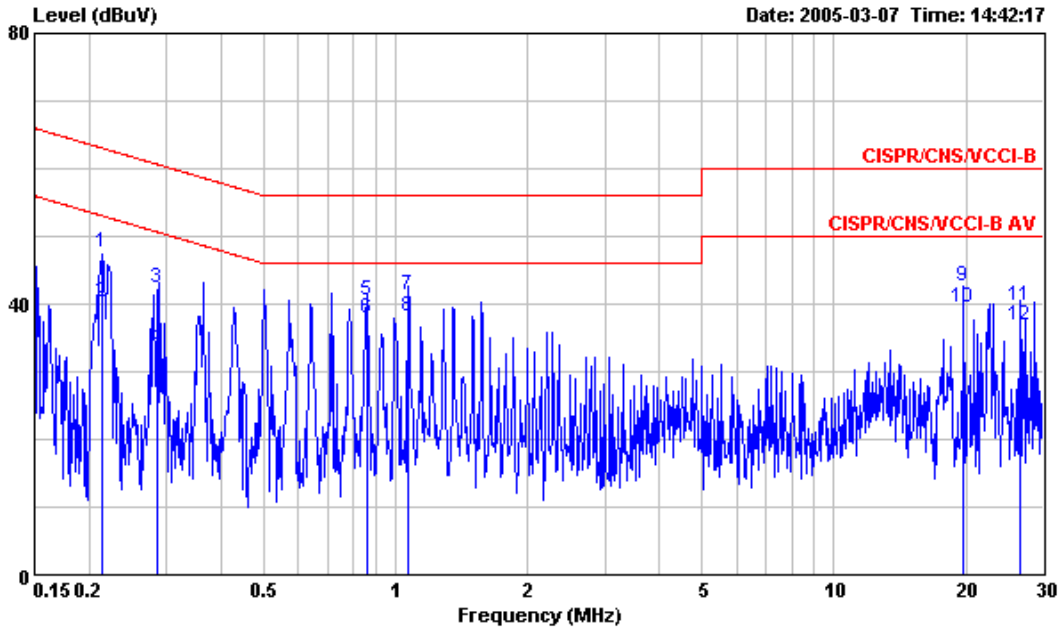
Neutral to Ground



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	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

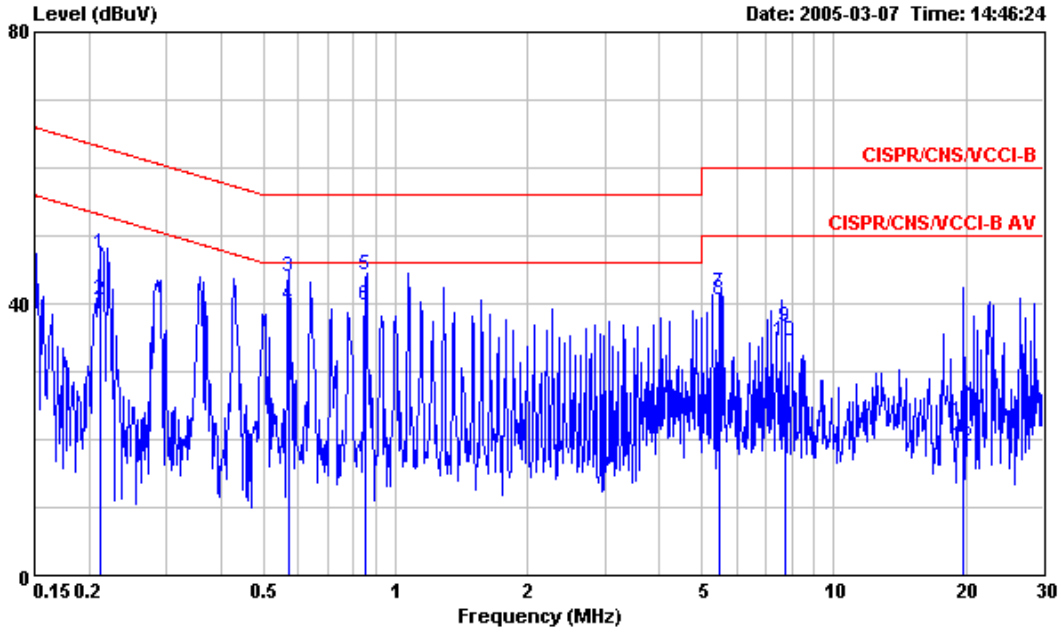
- Mode 2
- Temperature: 15°C
- Relative Humidity: 62%
- Test Engineer: Sky Wu

Line to Ground



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.2139240	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

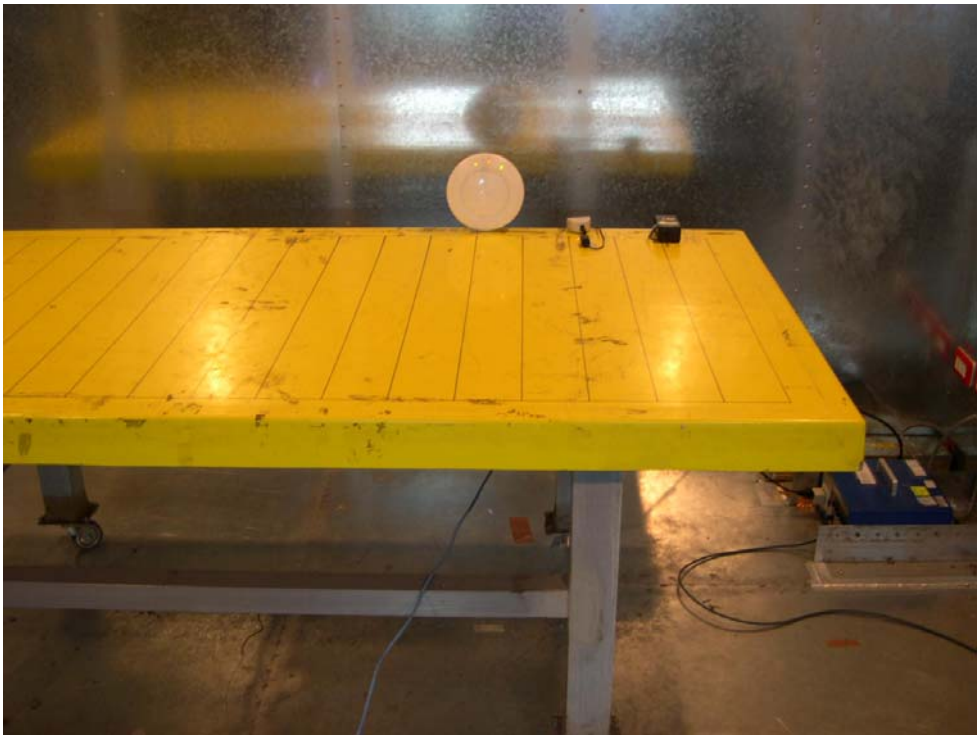


	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.2127940	47.34	-15.76	63.10	47.01	0.11	0.22	QP
2	0.2127940	40.46	-12.64	53.10	40.13	0.11	0.22	Average
3	0.5701000	44.07	-11.93	56.00	43.43	0.23	0.41	QP
4	0.5701000	39.63	-6.37	46.00	38.99	0.23	0.41	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

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

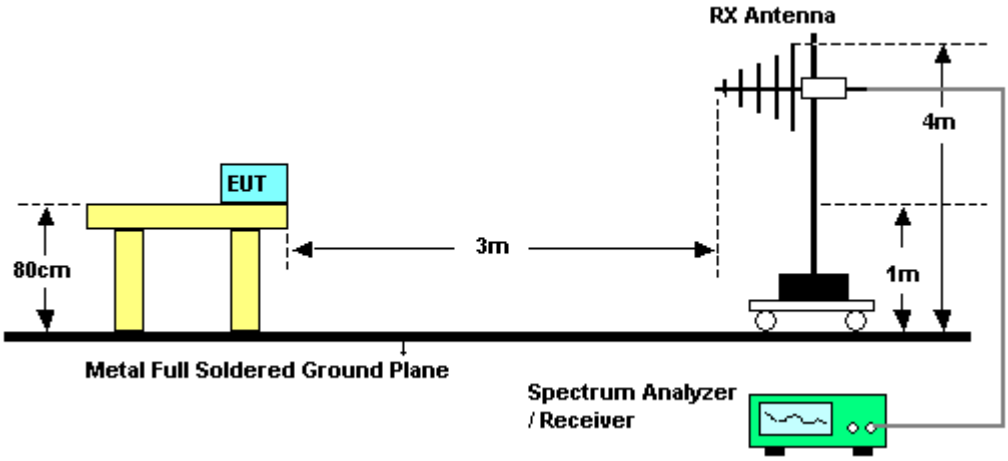
- Test Receiver : R&S ESCS 30
  Attenuation : Auto
  Start Frequency : 30 MHz
  Stop Frequency : 1000 MHz
  RB : 120 KHz for QP or PK

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

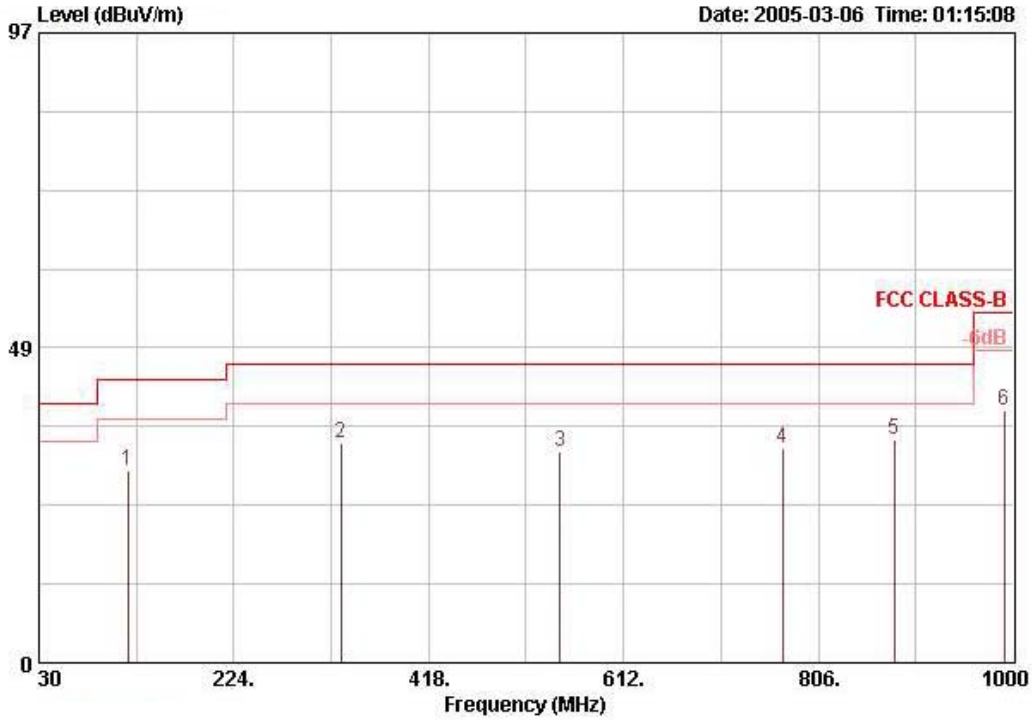
All test results complied with the requirements of 15.247(d). Measurement Uncertainty is 2.26dB.

5.6.7. Test Results for CH 116 / 5825MHz (for emission below 1GHz)

- Modulation Type: OFDM
- Temperature: 15°C
- Relative Humidity: 62%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Ted Chiu

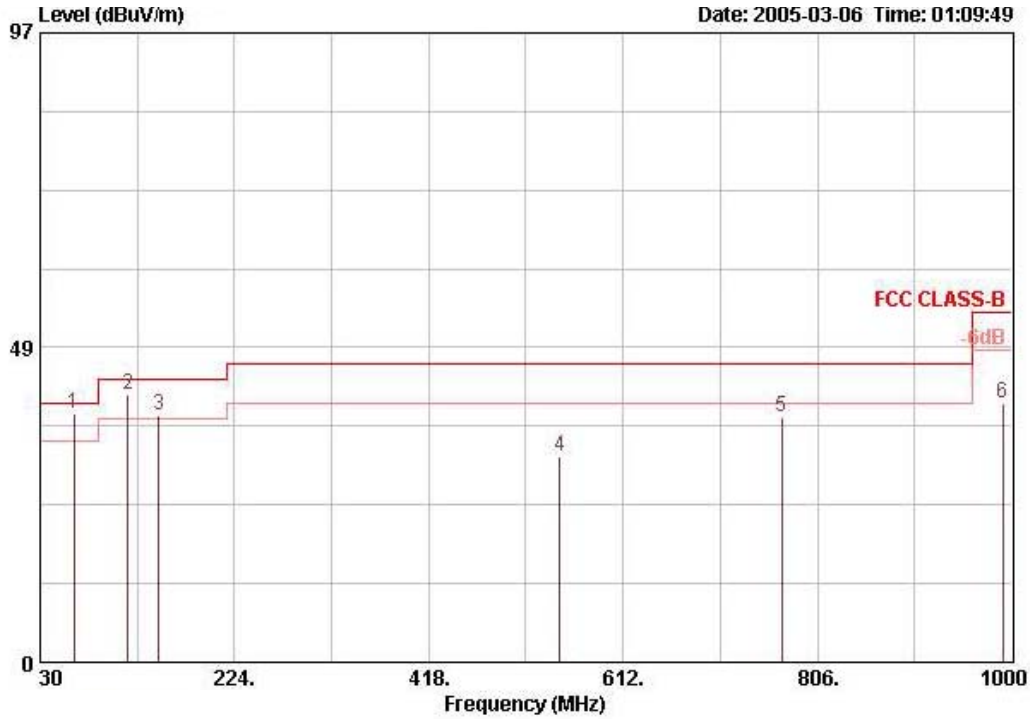
Mode 1

(A) Polarization: Horizontal



	Freq	Level	Over Limit	Limit Line	Antenna Factor	Cable Loss	Preamp Factor	Read Level	Pol/Phase	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1	118.270	29.53	-13.97	43.50	11.62	0.88	30.04	47.06	Peak	
2	330.700	33.95	-12.05	46.00	13.87	1.43	30.50	49.14	Peak	
3	548.950	32.61	-13.39	46.00	18.28	1.87	30.63	43.08	Peak	
4	770.110	33.03	-12.97	46.00	19.92	2.19	30.09	41.00	Peak	
5	881.660	34.43	-11.57	46.00	20.32	2.39	29.18	40.89	Peak	
6	991.270	38.76	-15.24	54.00	20.90	2.52	28.65	43.98	Peak	

(B) Polarization: Vertical

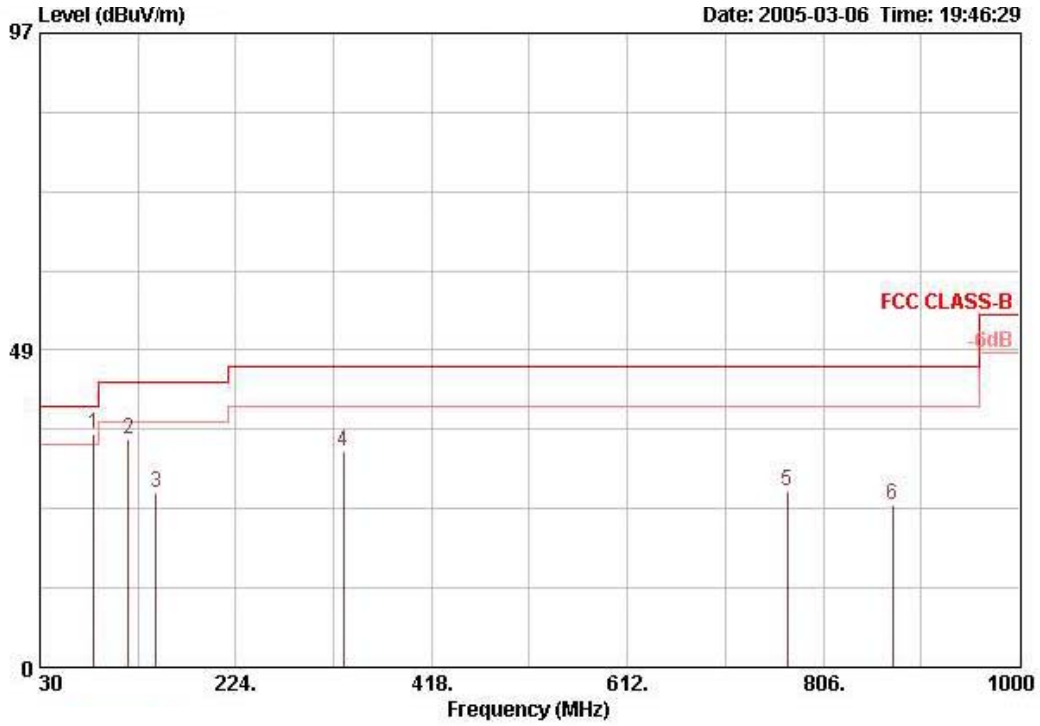


	Freq	Level	Over Limit	Limit Line	Antenna Factor	Cable Loss	Preamp Factor	Read Level	Pol/Phase	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1 @	63.950	38.26	-1.74	40.00	5.10	0.67	29.89	62.37	Peak	
2 @	117.300	41.19	-2.31	43.50	11.58	0.88	30.04	58.78	Peak	
3 !	148.340	38.14	-5.36	43.50	10.28	0.96	30.09	56.98	Peak	
4	548.950	31.67	-14.33	46.00	18.28	1.87	30.63	42.14	Peak	
5	770.110	37.90	-8.10	46.00	19.92	2.19	30.09	45.87	Peak	
6	991.270	39.99	-14.01	54.00	20.90	2.52	28.65	45.22	Peak	

Note:
Emission level (dBuV/m) = 20 log Emission level (uV/m)
Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

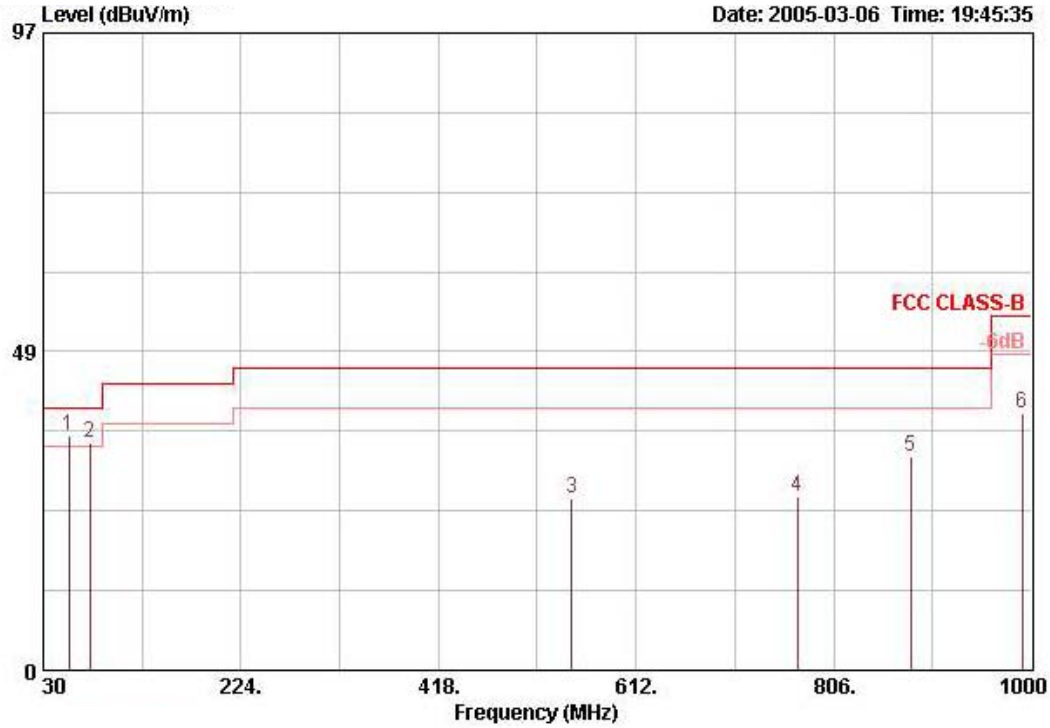
Mode 2

(A) Polarization: Horizontal



	Freq	Level	Over Limit	Limit Line	Antenna Factor	Cable Loss	Preamp Factor	Read Level	Pol/Phase	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1 !	83.350	35.79	-4.21	40.00	7.40	0.73	29.97	57.62	Peak	
2	117.300	34.91	-8.59	43.50	11.58	0.88	30.04	52.50	Peak	
3	145.430	26.69	-16.81	43.50	10.55	0.95	30.07	45.25	Peak	
4	330.700	33.00	-13.00	46.00	13.87	1.43	30.50	48.20	Peak	
5	770.110	26.96	-19.04	46.00	19.92	2.19	30.09	34.93	Peak	
6	874.870	24.94	-21.06	46.00	20.30	2.39	29.34	31.60	Peak	

(B) Polarization: Vertical



	Freq	Level	Over Limit	Limit Line	Antenna Factor	Cable Loss	Preamp Factor	Read Level	Pol/Phase	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1 !	55.220	35.76	-4.24	40.00	6.25	0.63	29.81	58.69	Peak	
2 !	75.590	34.61	-5.39	40.00	6.20	0.70	29.97	57.67	Peak	
3	548.950	26.22	-19.78	46.00	18.28	1.87	30.63	36.70	Peak	
4	770.110	26.33	-19.67	46.00	19.92	2.19	30.09	34.30	Peak	
5	881.660	32.60	-13.40	46.00	20.32	2.39	29.18	39.07	Peak	
6	991.270	39.20	-14.80	54.00	20.90	2.52	28.65	44.42	Peak	

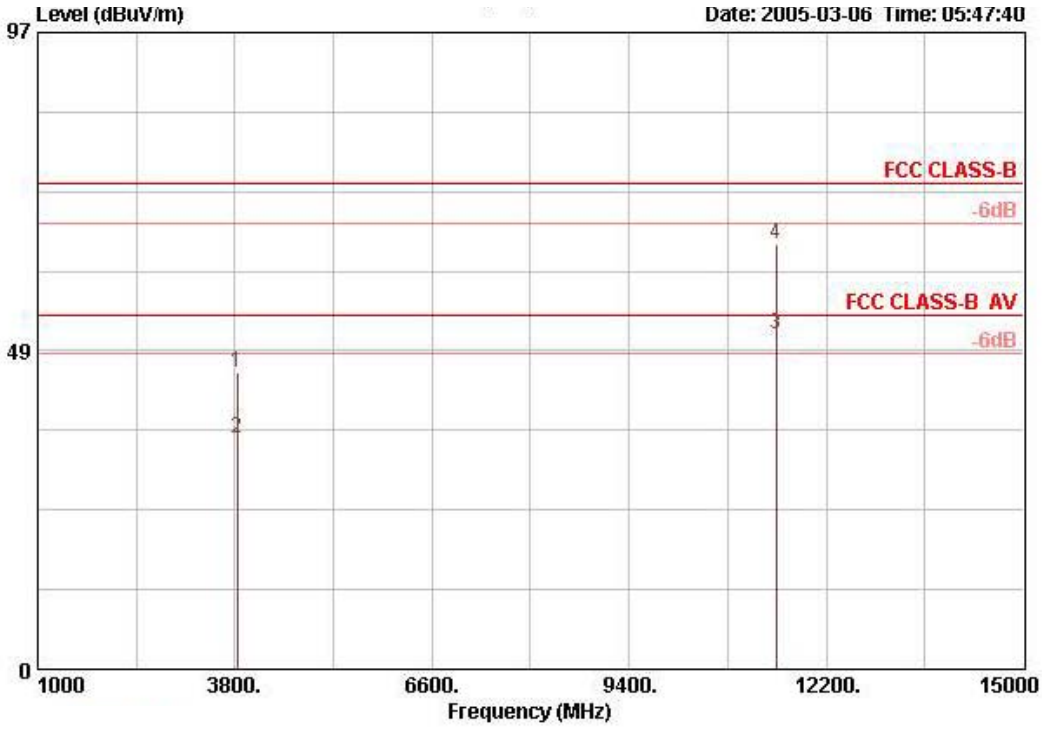
Note:
Emission level (dBuV/m) = 20 log Emission level (uV/m)
Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

5.6.8. Test Results for CH 100 / 5745MHz (for emission above 1GHz)

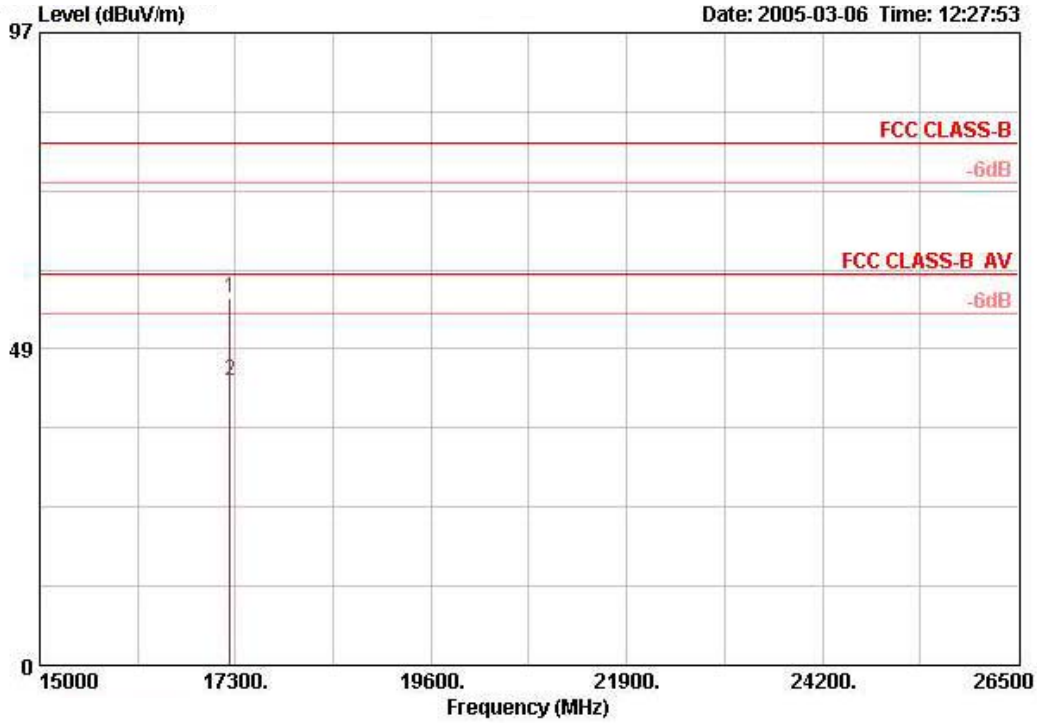
- Modulation Type: OFDM
- Temperature: 15°C
- Relative Humidity: 62%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Ted Chiu

Mode 1

(A) Polarization: Horizontal

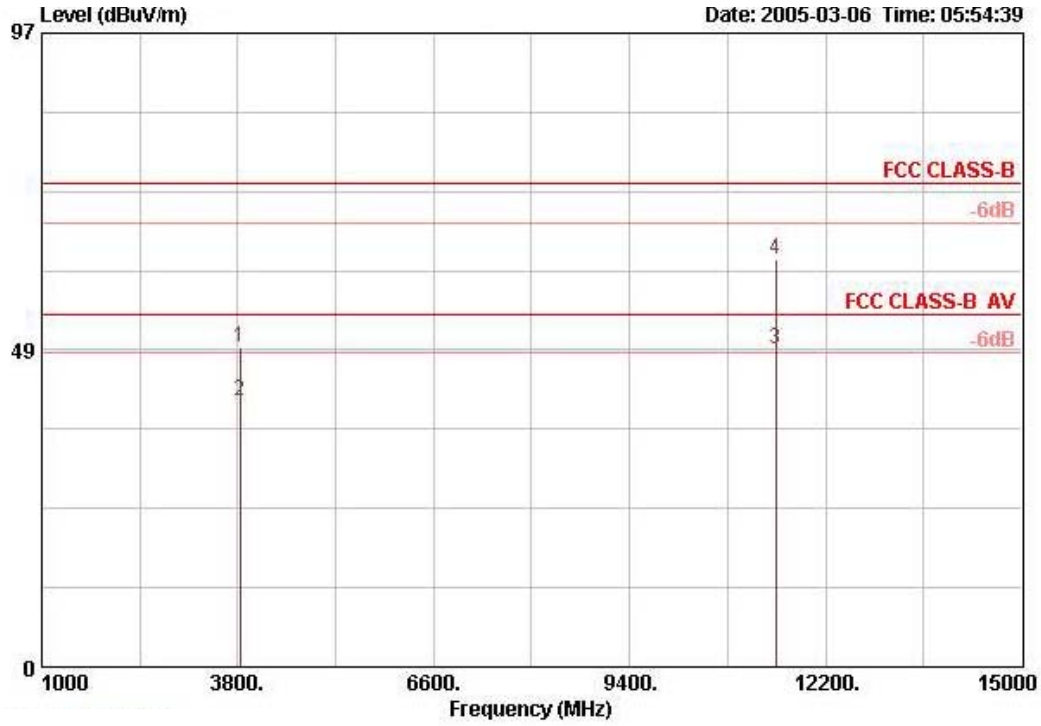


	Freq	Level	Over Limit	Limit Line	Antenna Factor	Cable Loss	Preamp Factor	Read Level	Pol/Phase	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1	3829.370	45.12	-28.88	74.00	32.22	2.82	36.78	46.86	VERTICAL	PEAK
2	3829.370	35.16	-18.84	54.00	32.22	2.82	36.78	36.90	VERTICAL	AVERAGE
3 @	11490.280	50.91	-3.09	54.00	39.20	5.57	37.80	43.94	VERTICAL	AVERAGE
4	11491.040	64.86	-9.14	74.00	39.20	5.57	37.80	57.88	VERTICAL	PEAK

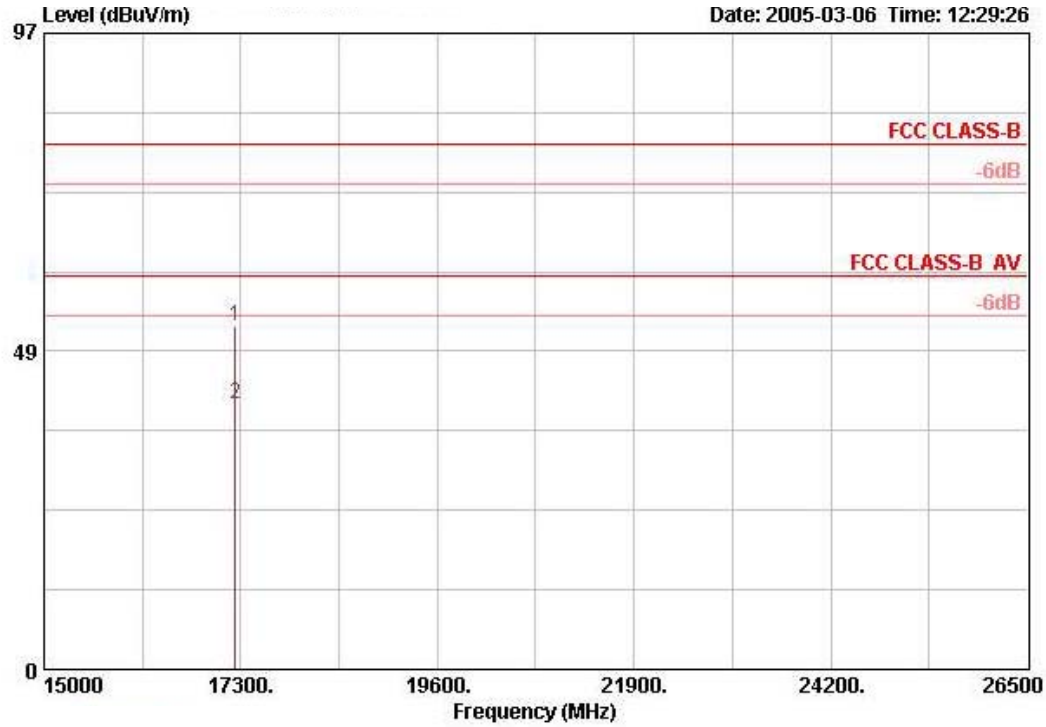


	Freq	Level	Over Limit	Limit Line	Antenna Factor	Cable Loss	Preamp Factor	Read Level	Pol/Phase	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1	17235.000	56.36	-23.64	80.00	37.17	12.64	36.93	43.48	HORIZONTAL	Peak
2	17235.000	43.66	-16.34	60.00	37.17	12.64	36.93	30.78	HORIZONTAL	Average

(B) Polarization: Vertical



	Freq	Level	Over Limit	Limit Line	Antenna Factor	Cable Loss	Preamp Factor	Read Level	Pol/Phase	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1	3830.640	48.95	-25.05	74.00	32.27	2.82	36.78	50.65	HORIZONTAL	PEAK
2	3830.640	40.60	-13.40	54.00	32.27	2.82	36.78	42.30	HORIZONTAL	AVERAGE
3 !	11489.380	48.67	-5.33	54.00	39.20	5.57	37.80	41.70	HORIZONTAL	AVERAGE
4	11489.380	62.27	-11.73	74.00	39.20	5.57	37.80	55.30	HORIZONTAL	PEAK

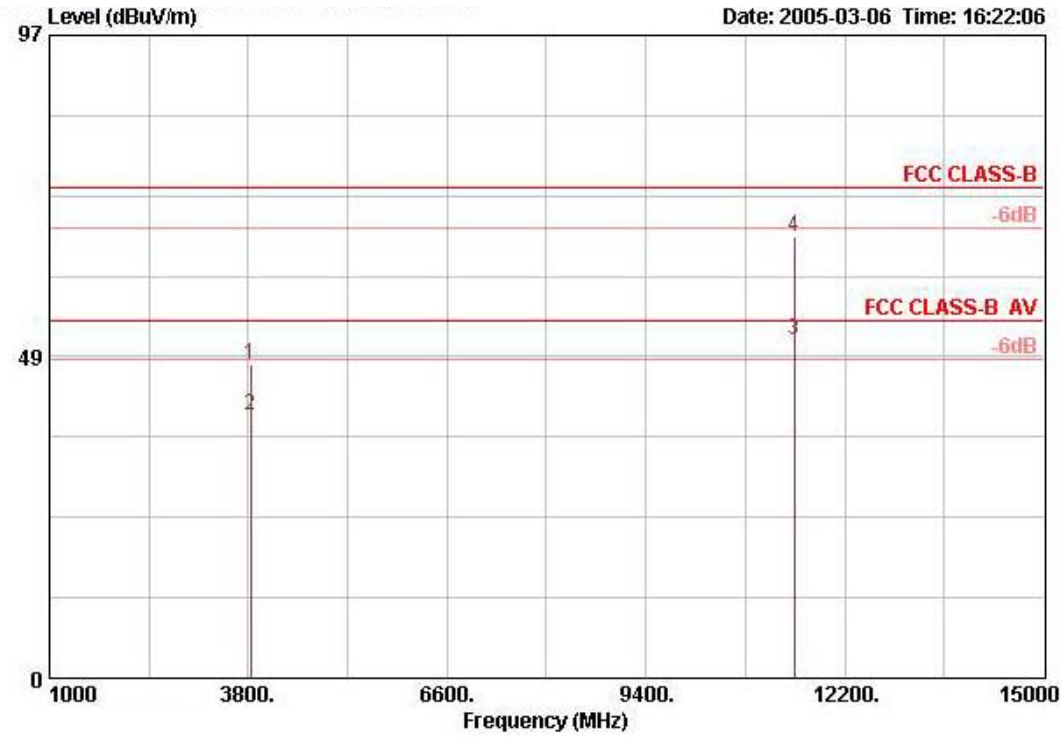


	Freq	Level	Over Limit	Limit Line	Antenna Factor	Cable Loss	Preamp Factor	Read Level	Pol/Phase	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1	17235.000	52.24	-27.76	80.00	37.17	12.64	36.93	39.36	VERTICAL	Peak
2	17235.000	40.35	-19.65	60.00	37.17	12.64	36.93	27.47	VERTICAL	Average

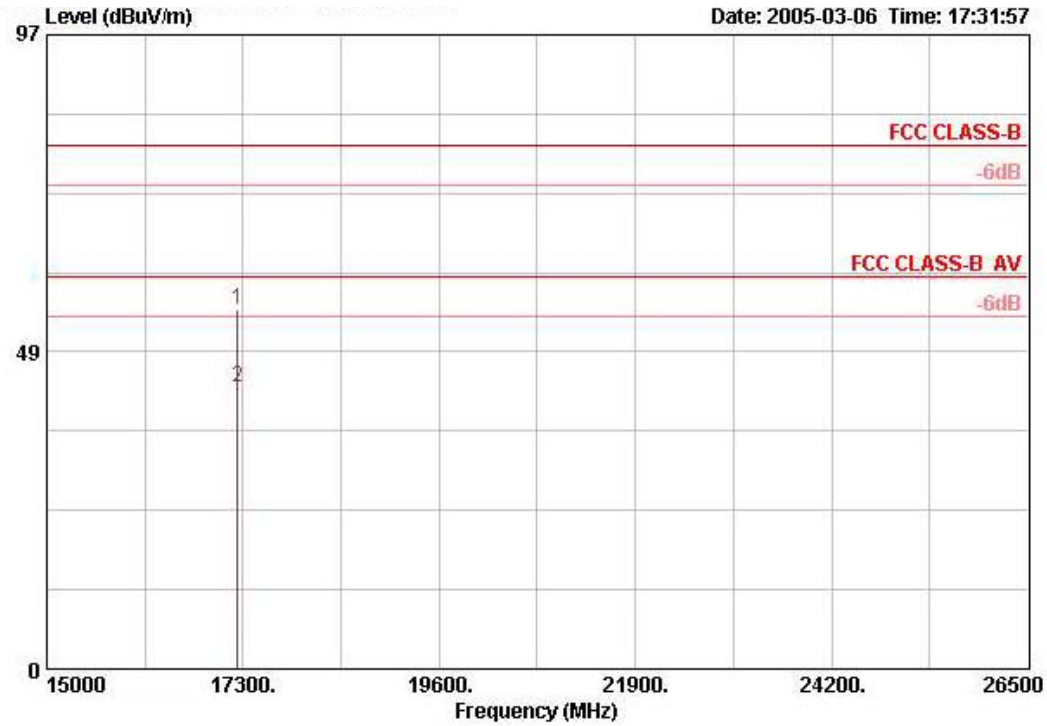
Note:
Emission level (dBuV/m) = 20 log Emission level (uV/m)
Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

Mode 2

(A) Polarization: Horizontal

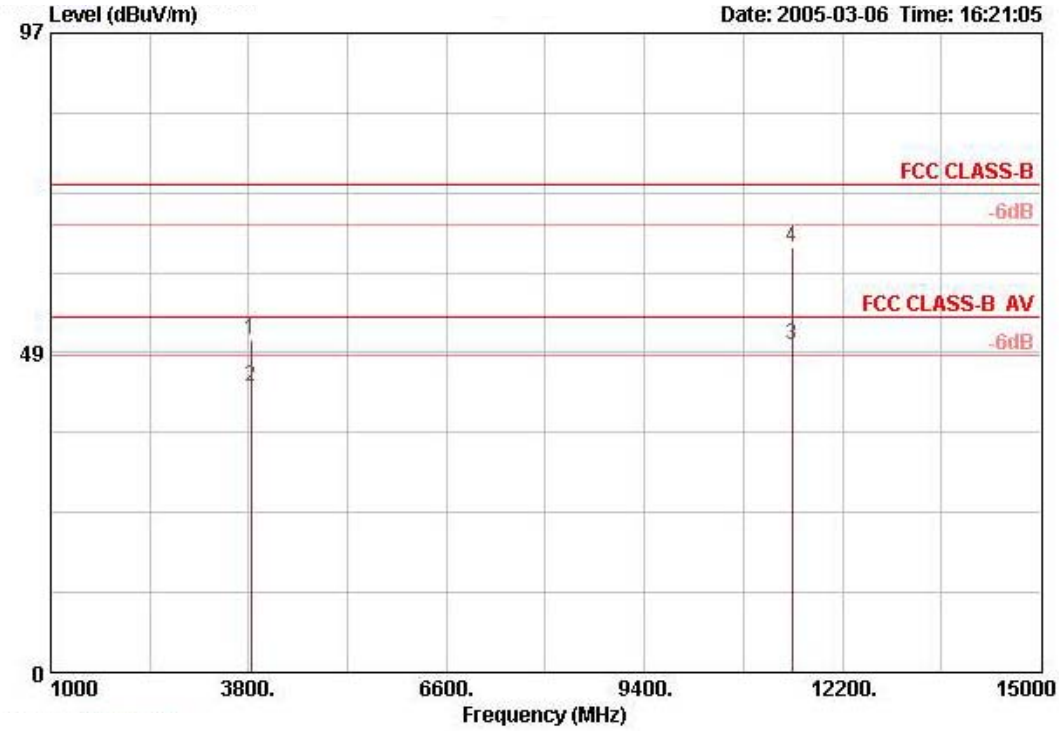


	Freq	Level	Over Limit	Limit Line	Antenna Factor	Cable Loss	Preamp Factor	Read Level	Pol/Phase	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1	3829.000	47.36	-26.64	74.00	32.22	2.82	36.78	49.10	HORIZONTAL	Peak
2	3829.000	39.54	-14.46	54.00	32.22	2.82	36.78	41.28	HORIZONTAL	Average
3 @	11490.000	50.88	-3.12	54.00	39.20	5.57	37.80	43.91	HORIZONTAL	Average
4	11490.000	66.69	-7.31	74.00	39.20	5.57	37.80	59.72	HORIZONTAL	Peak

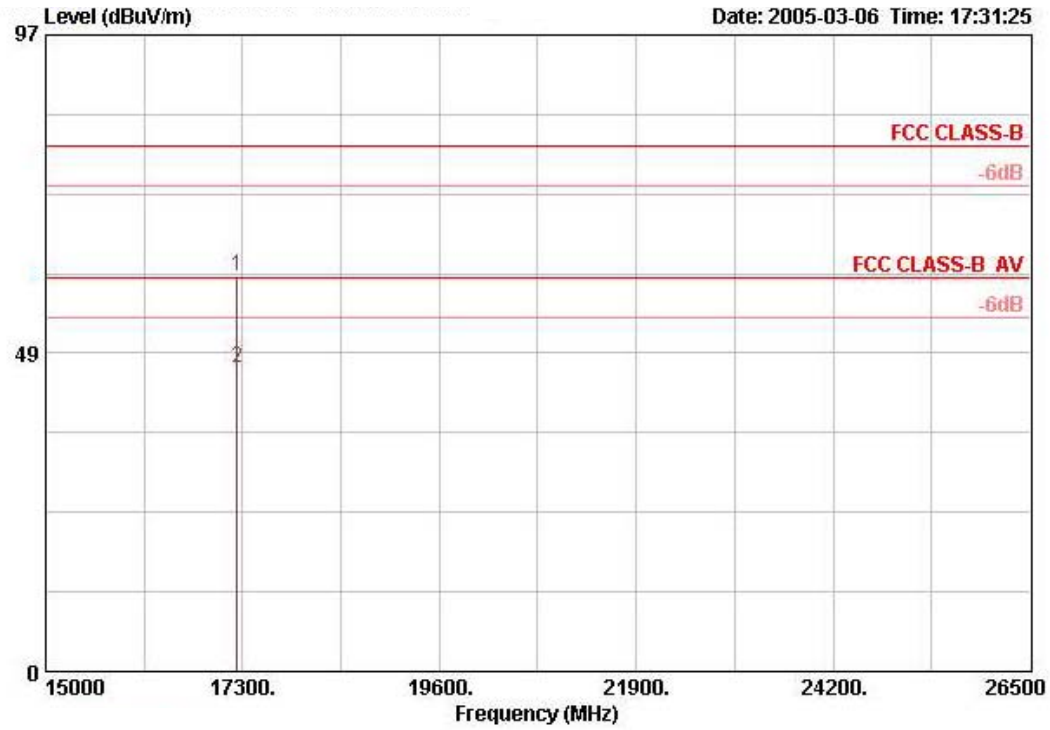


	Freq	Level	Over Limit	Limit Line	Antenna Factor	Cable Loss	Preamp Factor	Read Level	Pol/Phase	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1	17235.000	54.87	-25.13	80.00	37.17	12.64	36.93	41.99	HORIZONTAL	Peak
2	17235.000	43.21	-16.79	60.00	37.17	12.64	36.93	30.33	HORIZONTAL	Average

(B) Polarization: Vertical



	Freq	Level	Over Limit	Limit Line	Antenna Factor	Cable Loss	Preamp Factor	Read Level	Pol/Phase	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1	3830.000	50.36	-23.64	74.00	32.22	2.82	36.78	52.10	VERTICAL	Peak
2	3830.000	43.25	-10.75	54.00	32.22	2.82	36.78	44.99	VERTICAL	Average
3 !	11490.000	49.65	-4.35	54.00	39.20	5.57	37.80	42.68	VERTICAL	Average
4	11490.000	64.50	-9.50	74.00	39.20	5.57	37.80	57.53	VERTICAL	Peak



	Freq	Level	Over Limit	Limit Line	Antenna Factor	Cable Loss	Preamp Factor	Read Level	Pol/Phase	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1	17235.000	60.22	-19.78	80.00	37.17	12.64	36.93	47.34	VERTICAL	Peak
2	17235.000	46.25	-13.75	60.00	37.17	12.64	36.93	33.37	VERTICAL	Average

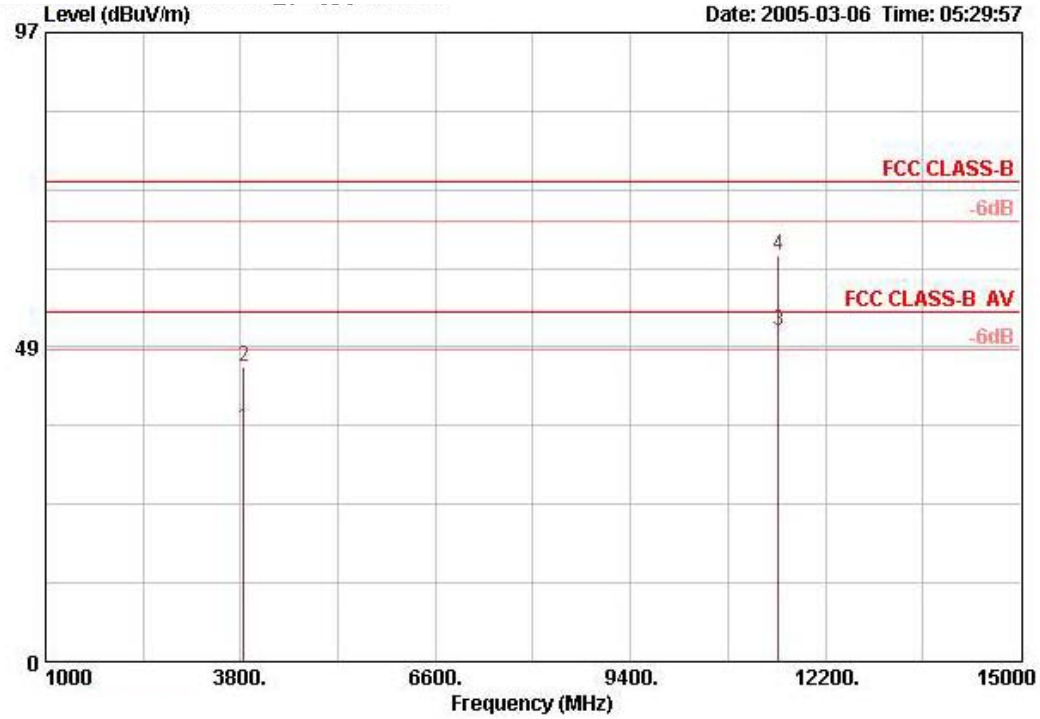
Note:
Emission level (dBuV/m) = 20 log Emission level (uV/m)
Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

5.6.9. Test Results for CH 104 / 5765MHz (for emission above 1GHz)

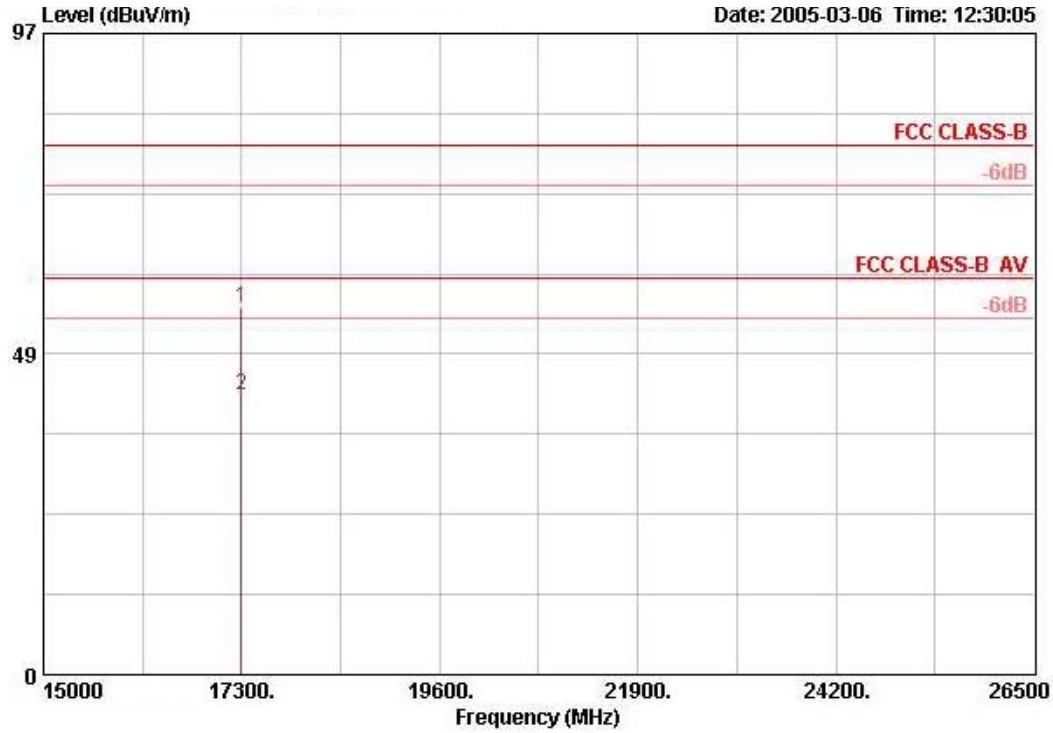
- Modulation Type: OFDM
- Temperature: 15°C
- Relative Humidity: 62%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Ted Chiu

Mode 1

(A) Polarization: Horizontal

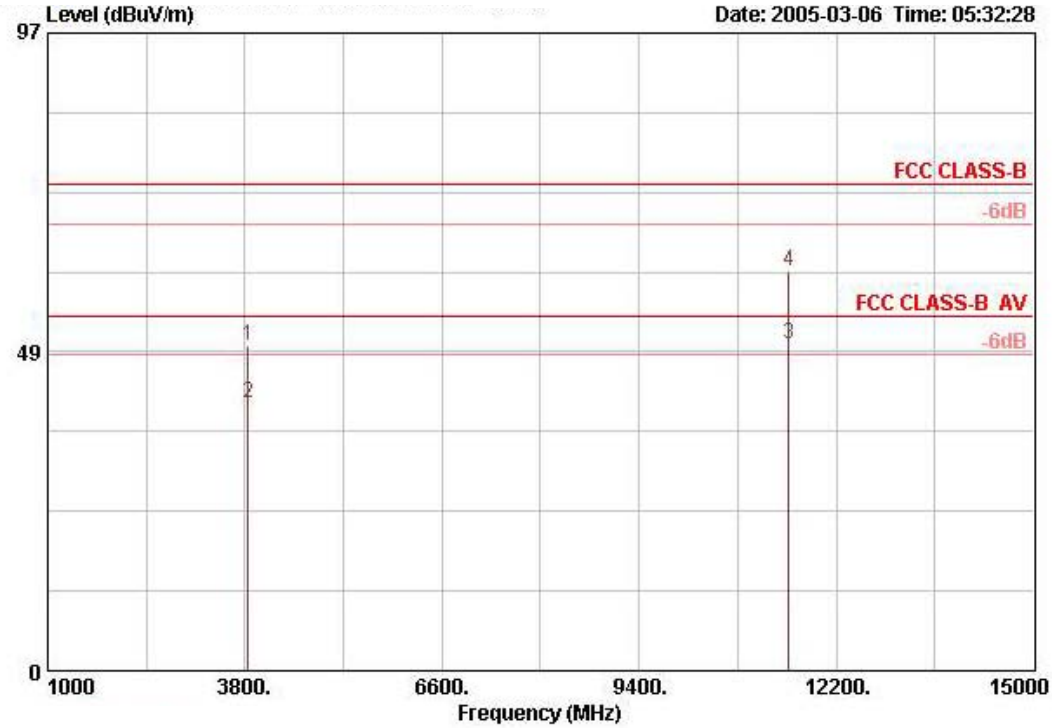


	Freq	Level	Over Limit	Limit Line	Antenna Factor	Cable Loss	Preamp Factor	Read Level	Pol/Phase	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1	3842.800	36.01	-17.99	54.00	32.27	2.82	36.78	37.71	VERTICAL	AVERAGE
2	3842.800	45.38	-28.62	74.00	32.27	2.82	36.78	47.08	VERTICAL	PEAK
3 @	11529.960	50.95	-3.05	54.00	39.20	5.58	37.85	44.02	VERTICAL	AVERAGE
4	11529.960	62.71	-11.29	74.00	39.20	5.58	37.85	55.78	VERTICAL	PEAK

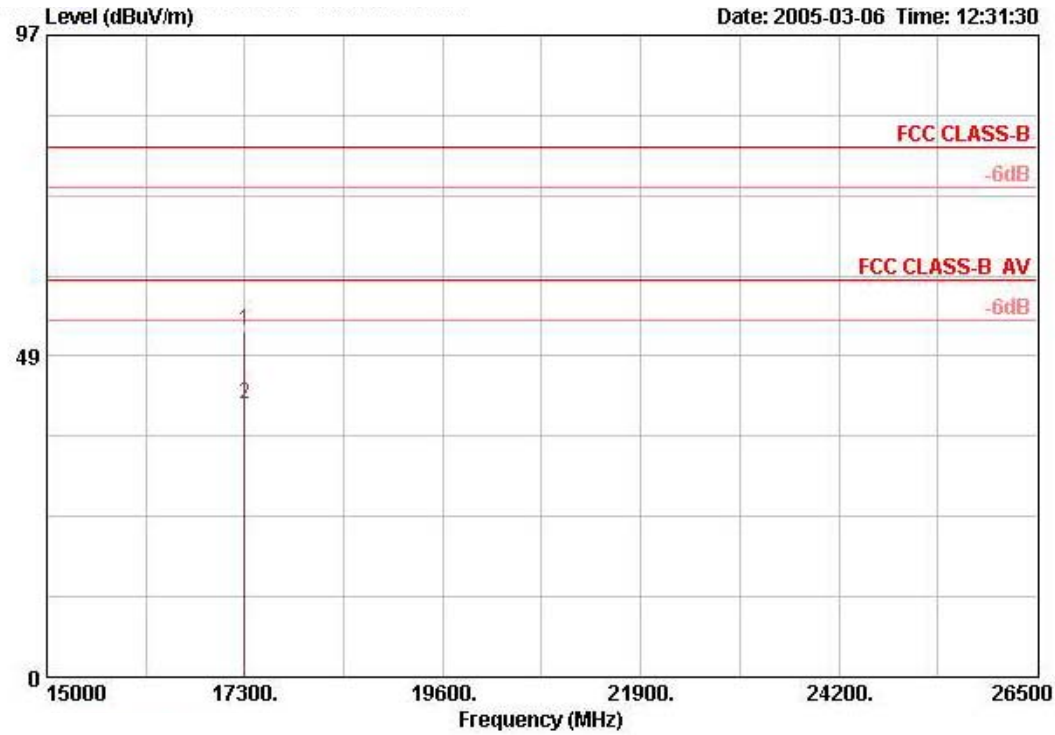


	Freq	Level	Over Limit	Limit Line	Antenna Factor	Cable Loss	Preamp Factor	Read Level	Pol/Phase	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1	17295.000	55.38	-24.62	80.00	37.22	10.97	37.15	44.34	HORIZONTAL	Peak
2	17295.000	42.38	-17.62	60.00	37.22	10.97	37.15	31.34	HORIZONTAL	Average

(B) Polarization: Vertical



	Freq	Level	Over Limit	Limit Line	Antenna Factor	Cable Loss	Preamp Factor	Read Level	Pol/Phase	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1	3843.900	49.34	-24.66	74.00	32.27	2.82	36.80	51.05	HORIZONTAL	PEAK
2	3843.900	40.64	-13.36	54.00	32.27	2.82	36.80	42.35	HORIZONTAL	AVERAGE
3 !	11529.270	49.67	-4.33	54.00	39.20	5.58	37.85	42.74	HORIZONTAL	AVERAGE
4	11529.270	60.71	-13.29	74.00	39.20	5.58	37.85	53.78	HORIZONTAL	PEAK

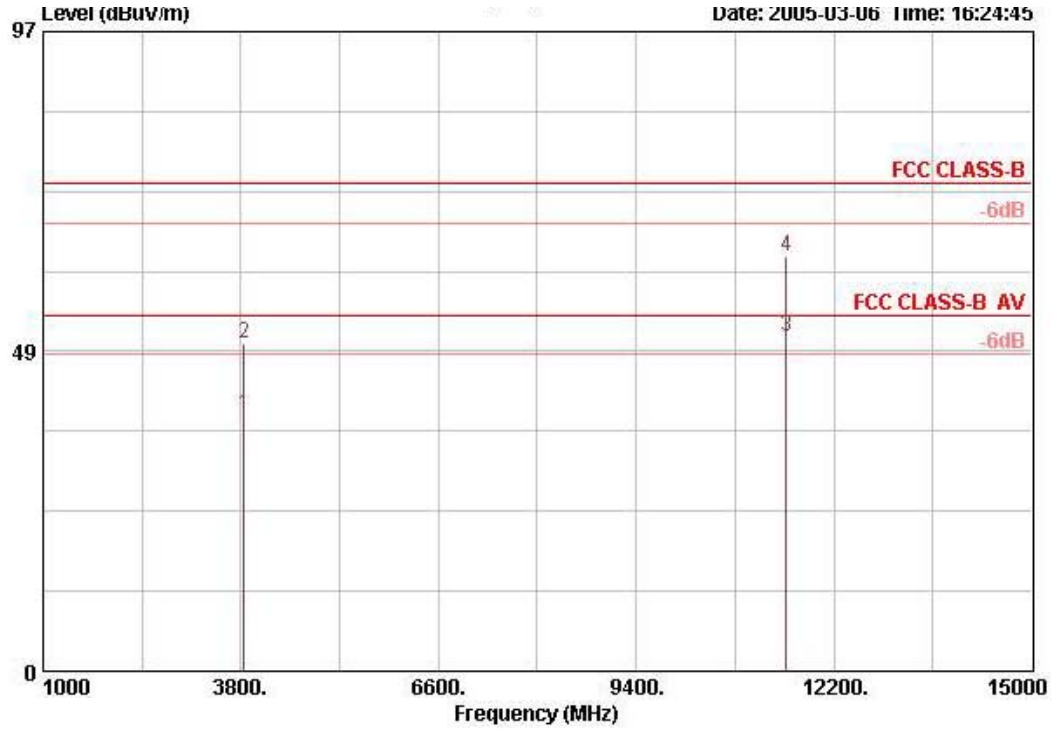


	Freq	Level	Over Limit	Limit Line	Antenna Factor	Cable Loss	Preamp Factor	Read Level	Pol/Phase	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1	17295.000	52.35	-27.65	80.00	37.22	10.97	37.15	41.31	VERTICAL	Peak
2	17295.000	41.11	-18.89	60.00	37.22	10.97	37.15	30.07	VERTICAL	Average

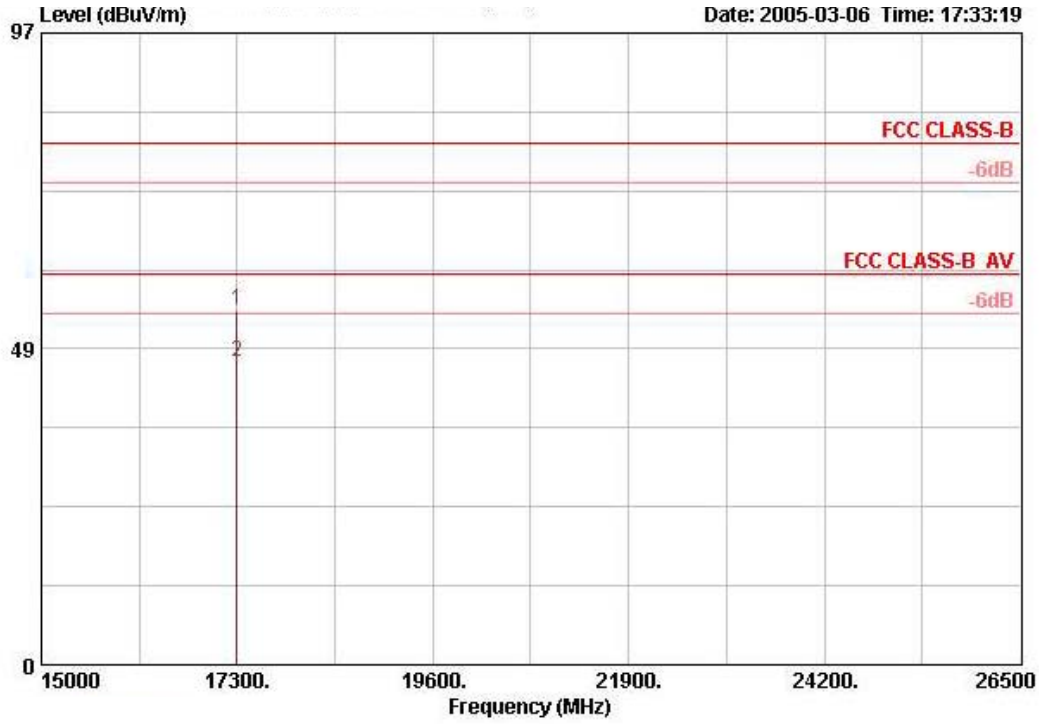
Note:
Emission level (dBuV/m) = 20 log Emission level (uV/m)
Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

Mode 2

(A) Polarization: Horizontal

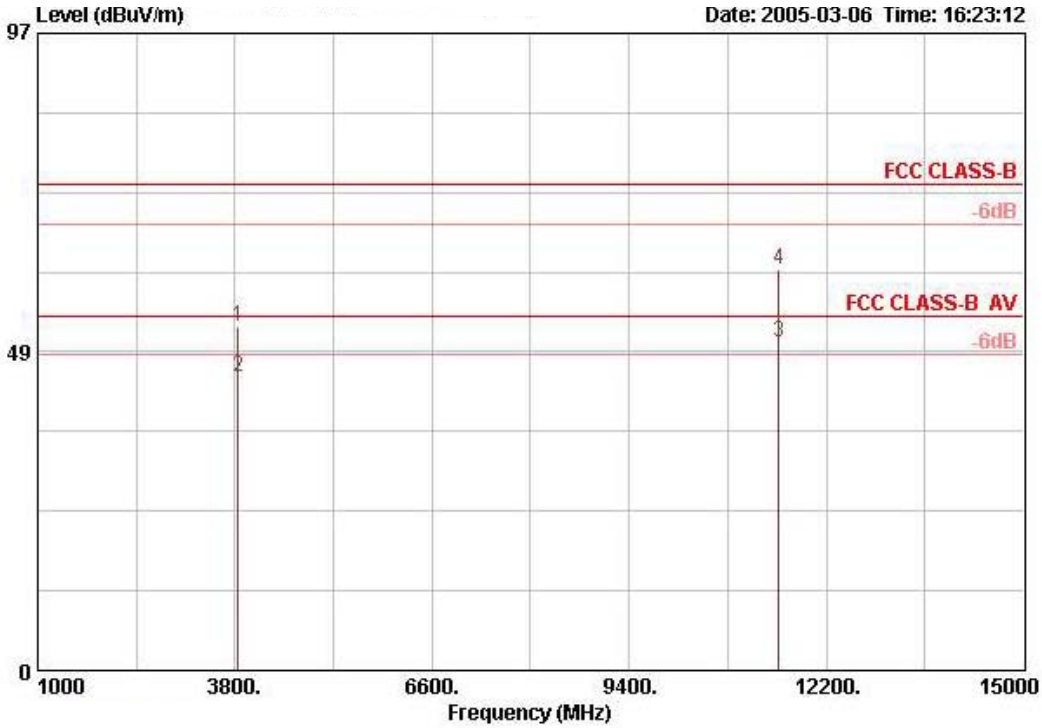


	Freq	Level	Over Limit	Limit Line	Antenna Factor	Cable Loss	Preamp Factor	Read Level	Pol/Phase	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1	3843.000	38.88	-15.12	54.00	32.27	2.82	36.78	40.58	HORIZONTAL	Average
2	3843.000	49.58	-24.42	74.00	32.27	2.82	36.78	51.28	HORIZONTAL	Peak
3 @	11530.000	50.86	-3.14	54.00	39.20	5.58	37.85	43.93	HORIZONTAL	Average
4	11530.000	62.98	-11.02	74.00	39.20	5.58	37.85	56.05	HORIZONTAL	Peak

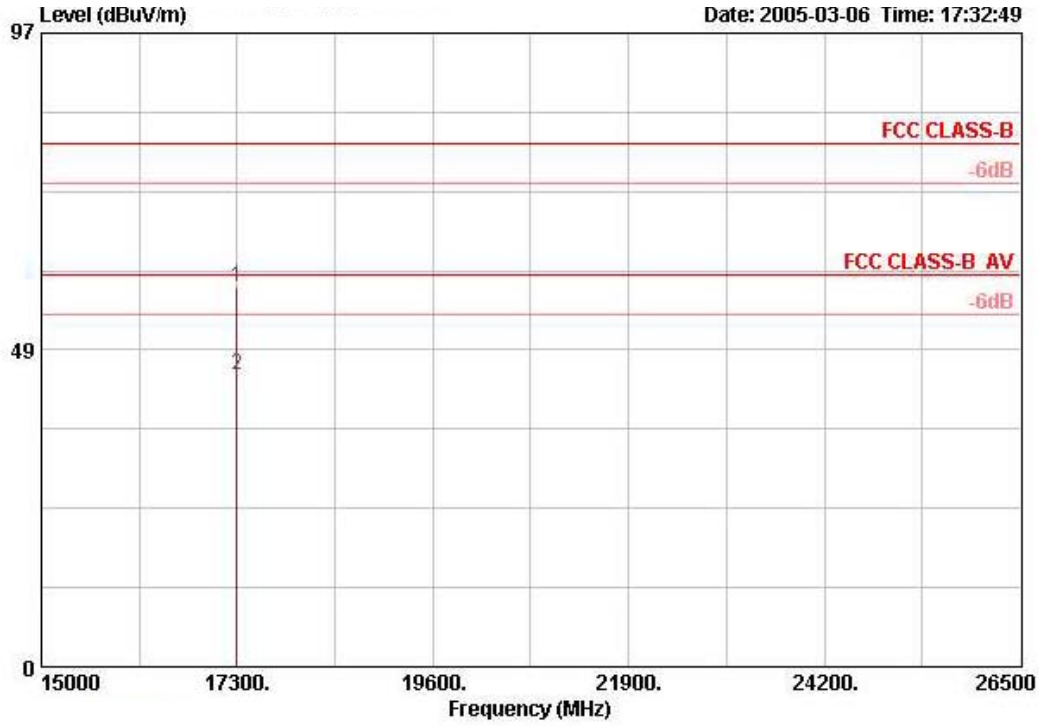


	Freq	Level	Over Limit	Limit Line	Antenna Factor	Cable Loss	Preamp Factor	Read Level	Pol/Phase	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1	17295.000	54.36	-25.64	80.00	37.22	10.97	37.15	43.32	HORIZONTAL	Peak
2	17295.000	46.58	-13.42	60.00	37.22	10.97	37.15	35.54	HORIZONTAL	Average

(B) Polarization: Vertical



	Freq	Level	Over Limit	Limit Line	Antenna Factor	Cable Loss	Preamp Factor	Read Level	Pol/Phase	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1	3843.000	52.28	-21.72	74.00	32.27	2.82	36.78	53.98	VERTICAL	Peak
2	3843.000	44.69	-9.31	54.00	32.27	2.82	36.78	46.39	VERTICAL	Average
3 @	11530.000	49.98	-4.02	54.00	39.20	5.58	37.85	43.05	VERTICAL	Average
4	11530.000	61.02	-12.98	74.00	39.20	5.58	37.85	54.09	VERTICAL	Peak



	Freq	Level	Over Limit	Limit Line	Antenna Factor	Cable Loss	Preamp Factor	Read Level	Pol/Phase	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1	17295.000	58.24	-21.76	80.00	37.22	10.97	37.15	47.20	VERTICAL	Peak
2	17295.000	44.58	-15.42	60.00	37.22	10.97	37.15	33.54	VERTICAL	Average

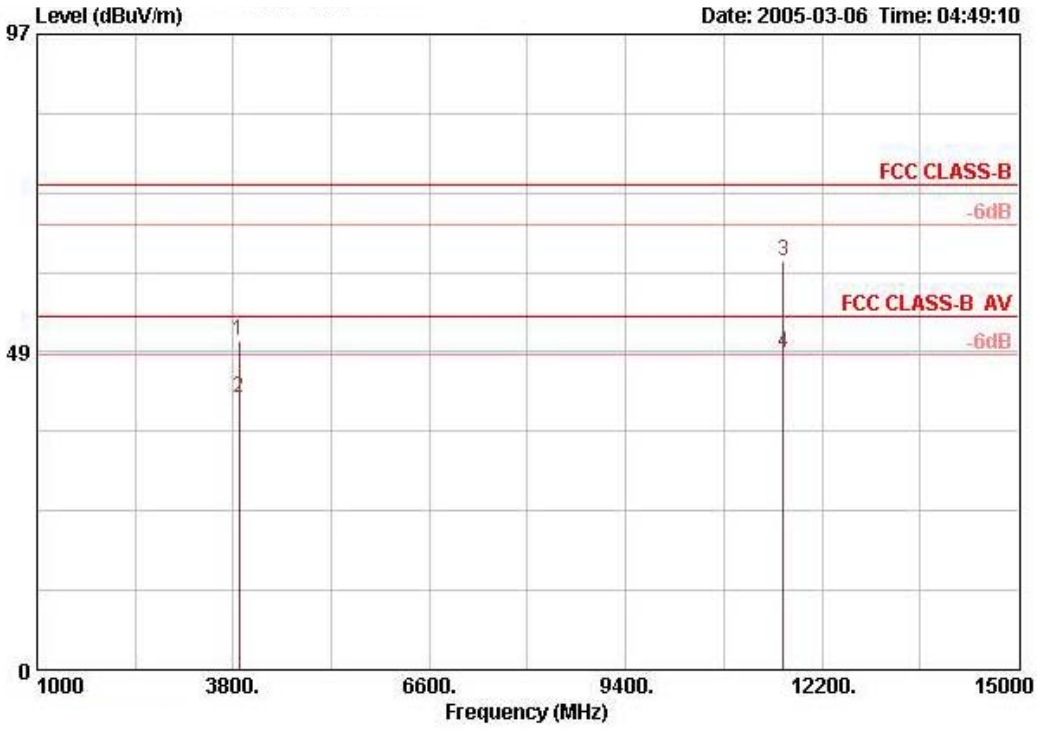
Note:
Emission level (dBuV/m) = 20 log Emission level (uV/m)
Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

5.6.10. Test Results for CH 116 / 5825MHz (for emission above 1GHz)

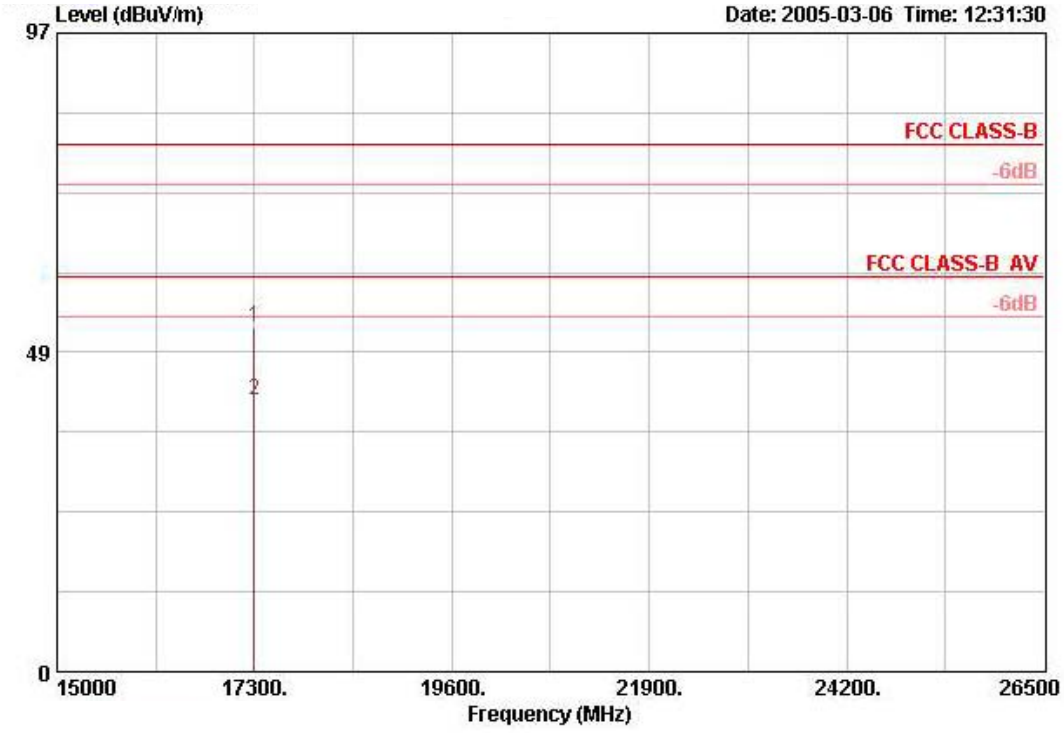
- Modulation Type: OFDM
- Temperature: 15°C
- Relative Humidity: 62%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Ted Chiu

Mode 1

(A) Polarization: Horizontal

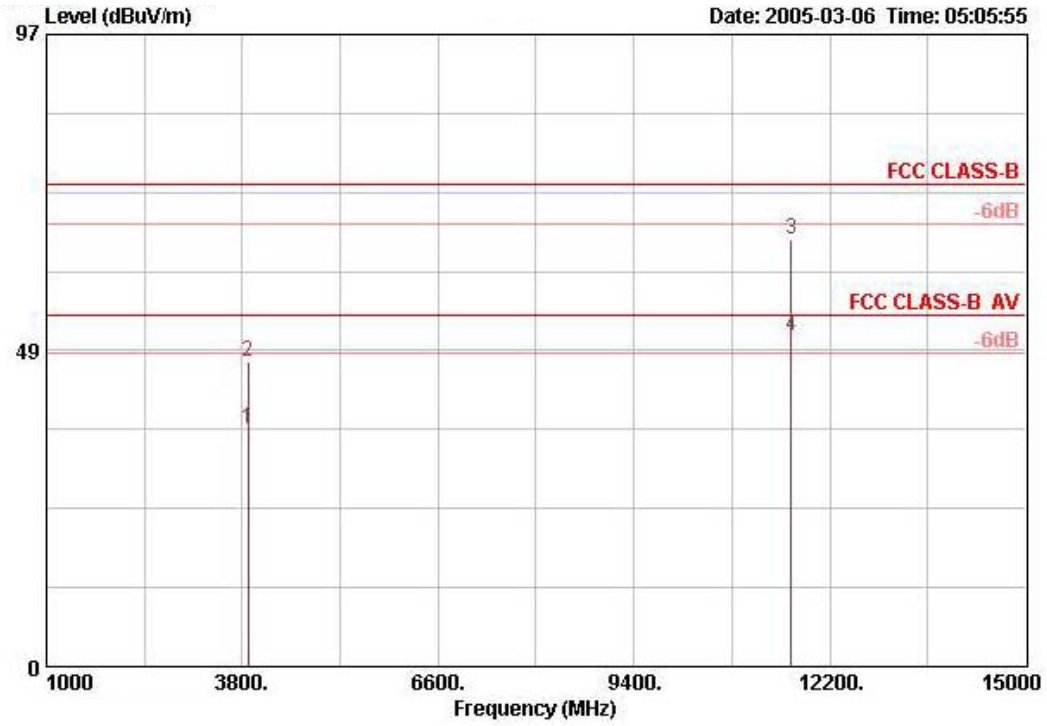


	Freq	Level	Over Limit	Limit Line	Antenna Factor	Cable Loss	Preamp Factor	Read Level	Pol/Phase	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1	3883.200	50.14	-23.86	74.00	32.41	2.86	36.81	51.68	HORIZONTAL	PEAK
2	3883.300	41.59	-12.41	54.00	32.41	2.86	36.81	43.13	HORIZONTAL	AVERAGE
3	11645.680	62.50	-11.50	74.00	39.23	5.63	37.71	55.35	HORIZONTAL	PEAK
4 !	11647.420	48.37	-5.63	54.00	39.23	5.63	37.67	41.19	HORIZONTAL	AVERAGE

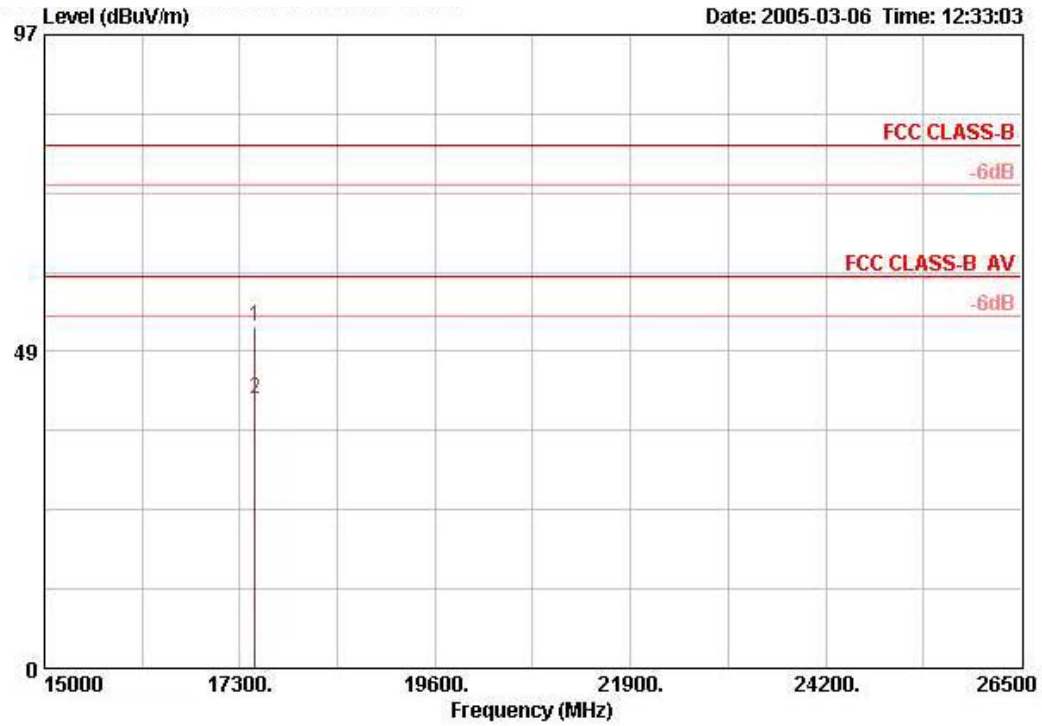


	Freq	Level	Over Limit	Limit Line	Antenna Factor	Cable Loss	Preamp Factor	Read Level	Pol/Phase	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1	17295.000	52.35	-27.65	80.00	37.22	10.97	37.15	41.31	VERTICAL	Peak
2	17295.000	41.11	-18.89	60.00	37.22	10.97	37.15	30.07	VERTICAL	Average

(B) Polarization: Vertical



	Freq	Level	Over Limit	Limit Line	Antenna Factor	Cable Loss	Preamp Factor	Read Level	Pol/Phase	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1	3883.400	36.53	-17.47	54.00	32.41	2.86	36.81	38.07	VERTICAL	AVERAGE
2	3883.400	46.88	-27.12	74.00	32.41	2.86	36.81	48.42	VERTICAL	PEAK
3	11645.760	65.47	-8.53	74.00	39.23	5.63	37.71	58.33	VERTICAL	PEAK
4 @	11649.980	50.65	-3.35	54.00	39.23	5.63	37.67	43.47	VERTICAL	AVERAGE

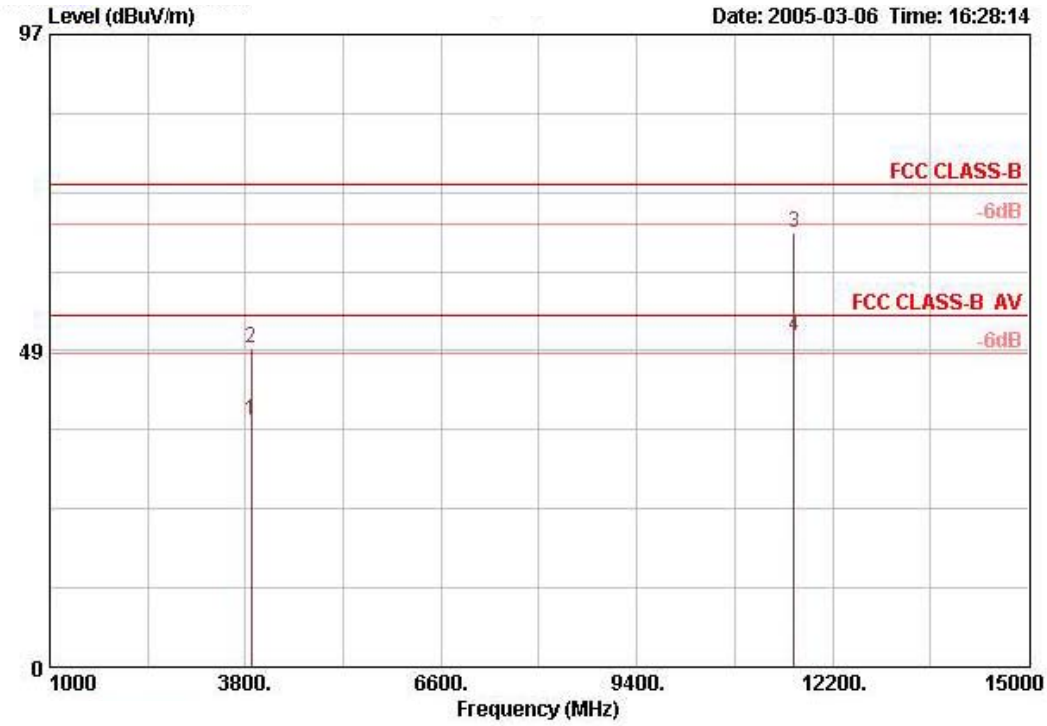


	Freq	Level	Over Limit	Limit Line	Antenna Factor	Cable Loss	Preamp Factor	Read Level	Pol/Phase	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1	17475.000	52.33	-27.67	80.00	37.21	7.64	37.91	45.39	VERTICAL	Peak
2	17475.000	41.36	-18.64	60.00	37.21	7.64	37.91	34.42	VERTICAL	Average

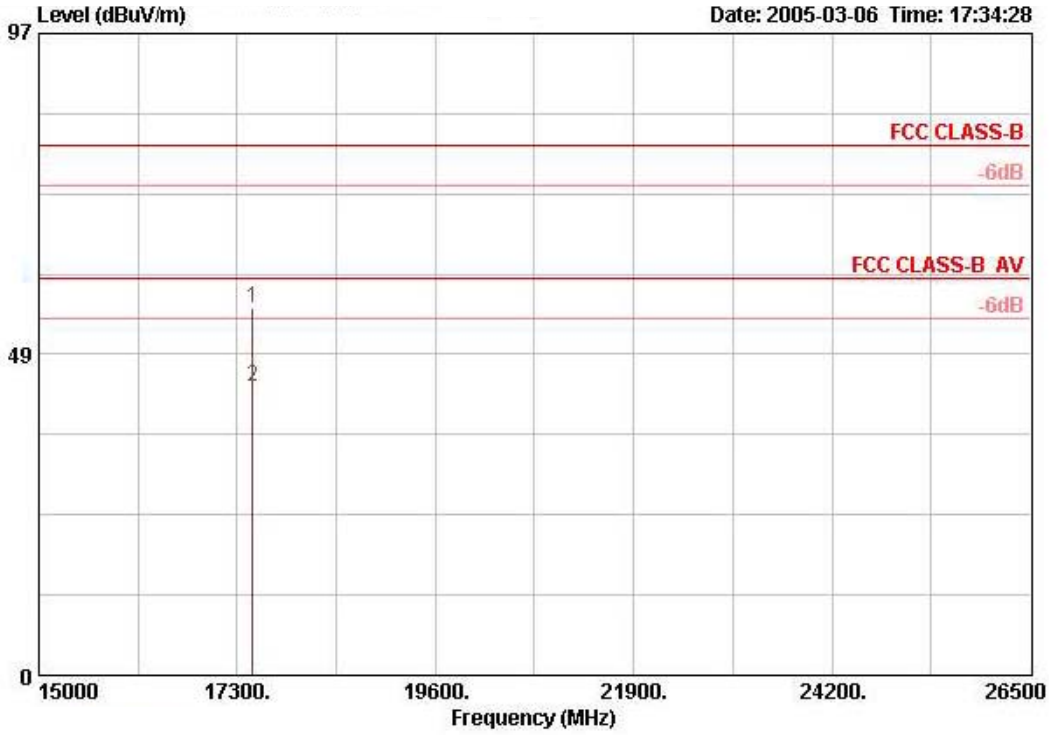
Note:
Emission level (dBuV/m) = 20 log Emission level (uV/m)
Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

Mode 2

(A) Polarization: Horizontal

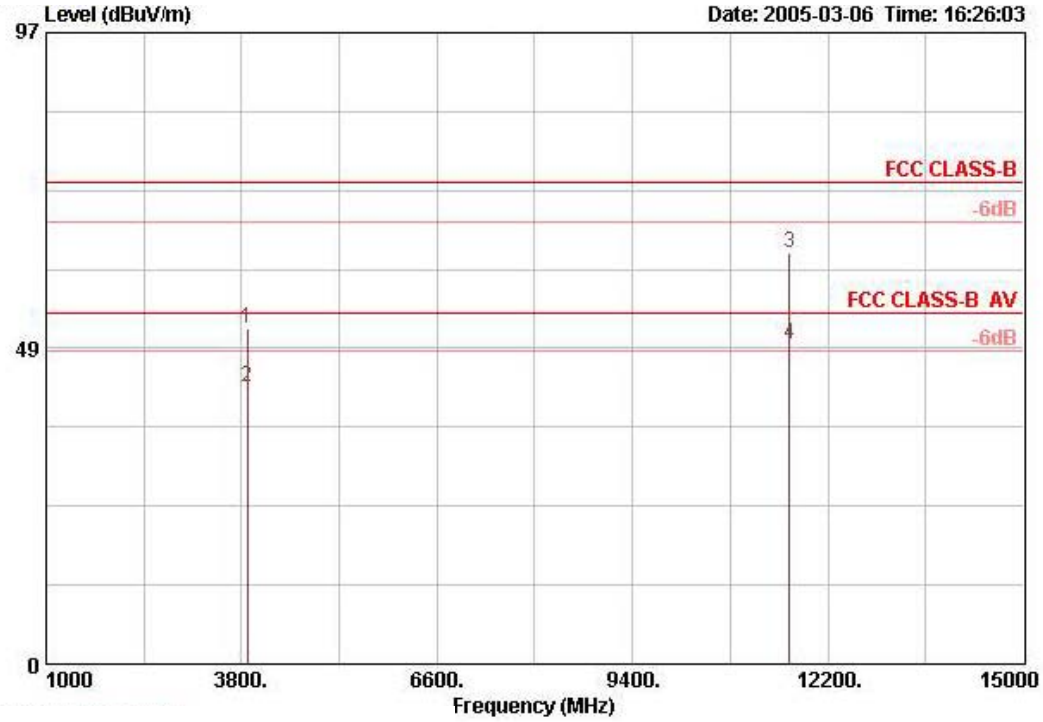


	Freq	Level	Over Limit	Limit Line	Antenna Factor	Cable Loss	Preamp Factor	Read Level	Pol/Phase	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1	3883.000	37.89	-16.11	54.00	32.41	2.86	36.81	39.43	HORIZONTAL	Average
2	3883.000	48.89	-25.11	74.00	32.41	2.86	36.81	50.43	HORIZONTAL	Peak
3	11645.000	66.57	-7.43	74.00	39.23	5.63	37.71	59.42	HORIZONTAL	Peak
4 @	11645.000	50.87	-3.13	54.00	39.23	5.63	37.71	43.72	HORIZONTAL	Average

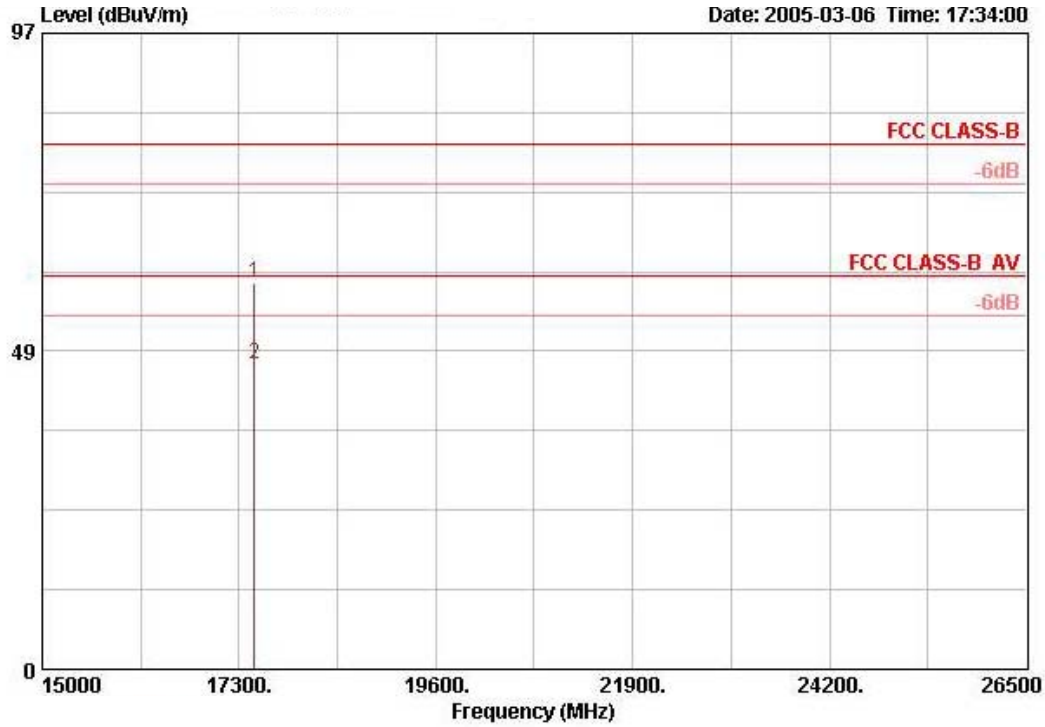


	Freq	Level	Over Limit	Limit Line	Antenna Factor	Cable Loss	Preamp Factor	Read Level	Pol/Phase	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1	17475.000	55.61	-24.39	80.00	37.21	7.64	37.91	48.67	HORIZONTAL	Peak
2	17475.000	43.69	-16.31	60.00	37.21	7.64	37.91	36.75	HORIZONTAL	Average

(B) Polarization: Vertical



	Freq	Level	Over Limit	Limit Line	Antenna Factor	Cable Loss	Preamp Factor	Read Level	Pol/Phase	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1	3883.000	51.66	-22.34	74.00	32.41	2.86	36.81	53.20	VERTICAL	Peak
2	3883.000	42.52	-11.48	54.00	32.41	2.86	36.81	44.06	VERTICAL	Average
3	11645.000	63.25	-10.75	74.00	39.23	5.63	37.71	56.10	VERTICAL	Peak
4 !	11645.000	49.05	-4.95	54.00	39.23	5.63	37.71	41.90	VERTICAL	Average



	Freq	Level	Over Limit	Limit Line	Antenna Factor	Cable Loss	Preamp Factor	Read Level	Pol/Phase	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1	17475.000	58.96	-21.04	80.00	37.21	7.64	37.91	52.02	VERTICAL	Peak
2	17475.000	46.60	-13.40	60.00	37.21	7.64	37.91	39.66	VERTICAL	Average

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

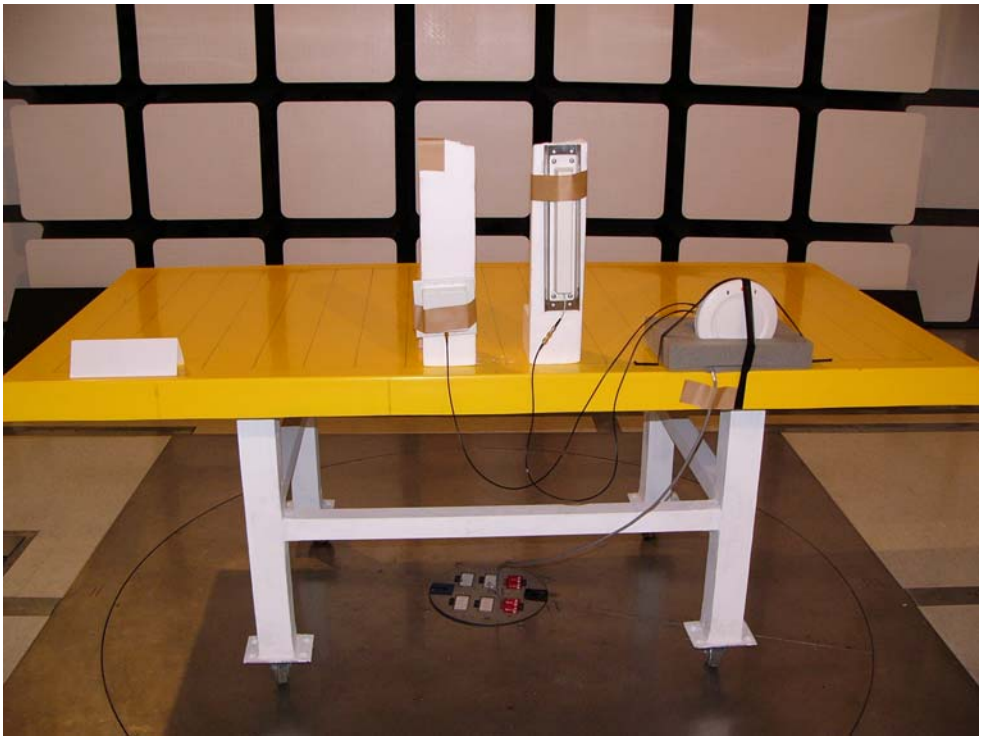
FRONT VIEW

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

Internal Antenna 5745MHz ~ 5825MHz, there are 4 kinds of antenna. External antenna uses SMA connector. Internal antenna has no connector.

5.7.3. Antenna Gain

All antennas gain of EUT are less than 6dBi. Therefore peak conducted power limit shall not be degraded any more. 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/ cm²)	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/cm²)	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 (V/m) $= \frac{\sqrt{30 \times P \times G}}{d}$ Power Density: *Pd* (mW/cm²) $= \frac{E^2}{377}$

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: OFDM
- Temperature: 15°C
- Relative Humidity: 62%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Ted Chiu

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)
100	4.00	2.51	20.00	100.00	0.0500	1
104	4.00	2.51	20.00	100.00	0.0500	1
116	4.00	2.51	20.00	100.00	0.0500	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)
100	14.50	28.18	20.00	100.00	0.5610	1
104	14.50	28.18	20.00	100.00	0.5610	1
116	14.50	28.18	20.00	100.00	0.5610	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.

Items	Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
18	Spectrum analyzer	R&S	FSP40	838858/014	9KHZ~7GHZ	Sep. 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. 05, 2004	Conducted (TH01-HY)
24	Temp. and Humidity Chamber	KSON	THS-C3L	612	N/A	Oct. 01, 2004	Conducted (TH01-HY)
25	RF CABLE-1m	Jye Bao	RG142	CB034-1m	20MHz~7GHz	Jan. 01, 2005	Conducted (TH01-HY)
26	RF CABLE-2m	Jye Bao	RG142	CB035-2m	20MHz~1GHz	Jan. 01, 2005	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 2nd Rd., Taipei 114, Taiwan, R.O.C.
	TEL：	02-2794-8886
	FAX：	02-2794-9777

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

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