FCC TEST REPORT

CATEGORY	:	Fixed
PRODUCT NAME	:	Wireless LAN Outdoor Bridge
FCC ID.	:	S7X5801A01
FILING TYPE	:	Certification
BRAND NAME	:	ALCON,PLANET,OvisLink,JAHT,GOLDENLINK
MODEL NAME	:	ALink-5801a, WAP-7000, WHB-5854A, JWP-9006BM, ANK-5800
APPLICANT	:	**ALCON Telecommunications Co., Ltd.** 2F,No.480-5,Sec. 6,Yen-Ping N. Rd.,Shih-Lin 111,Taipei,Taiwan,R.O.C.
MANUFACTURER	:	Same as the applicant
ISSUED BY	:	**SPORTON INTERNATIONAL INC.** 6F, No. 106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

Statements:

Only the test result of 802.11a part is shown in this test report. (5250MHz ~ 5350MHz)

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 NVLAP and any agency of U.S. government.

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

Lab Code: 200079-0

Table of Contents

History of this test report

Received Date: Jun. 02, 2005
Test Date: Sep. 13, 2005
Original Report Issue Date: Sep. 15, 2005
Report No.: FR560207

■ 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 E (Section 15.407)

PRODUCT NAME	:	Wireless LAN Outdoor Bridge
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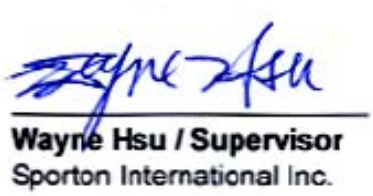
MANUFACTURER	:	Same as the applicant

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. Testing was carried out on Sep. 13, 2005 at SPORTON International Inc. LAB.



Wayne Hsu / Supervisor
Sporton International Inc.

1. General Description of Equipment under Test

1.1. Applicant

ALCON Telecommunications Co., Ltd.
2F,No.480-5,Sec. 6,Yen-Ping N. Rd.,Shih-Lin 111,Taipei,Taiwan,R.O.C.

1.2. Manufacturer

Same as the applicant

1.3. Basic Description of Equipment under Test

This product is a WLAN outdoor bridge with 802.11a wireless solution. The technical data has been listed on section " Features of Equipment under Test ".

1.4. Features of Equipment under Test

Items	Description
Type of Modulation	OFDM (16QAM / 64QAM / DQPSK / DBPSK)
Number of Channels	4
Frequency Band	5250MHz ~ 5350MHz
Carrier Frequency	See section 1.6 for details
Data Rate	6, 12, 18, 24, 36, 48, 54Mbps
Max. Conducted Output Power	See section 1.7 for details
Antenna Type	See section 1.5 for details
Communication Type	Half-Duplex
Testing Duty Cycle	100.00%
Power Rating (DC/AC, Voltage)	48 VDC from POE
Test Power Source	120.00V AC (Adapter of POE)
Temperature Range (Operating)	-30 ~ 70 °C

1.5. Antenna Description

No.	Antenna Type	Gain (dBi)
1	GP ANTENNA	9.00dBi @5.0GHz

1.6. Table for Carrier Frequencies

5250MHz ~ 5350MHz	
Channel	**Frequency**
52	5260 MHz
56	5280 MHz
60	5300 MHz
64	5320 MHz

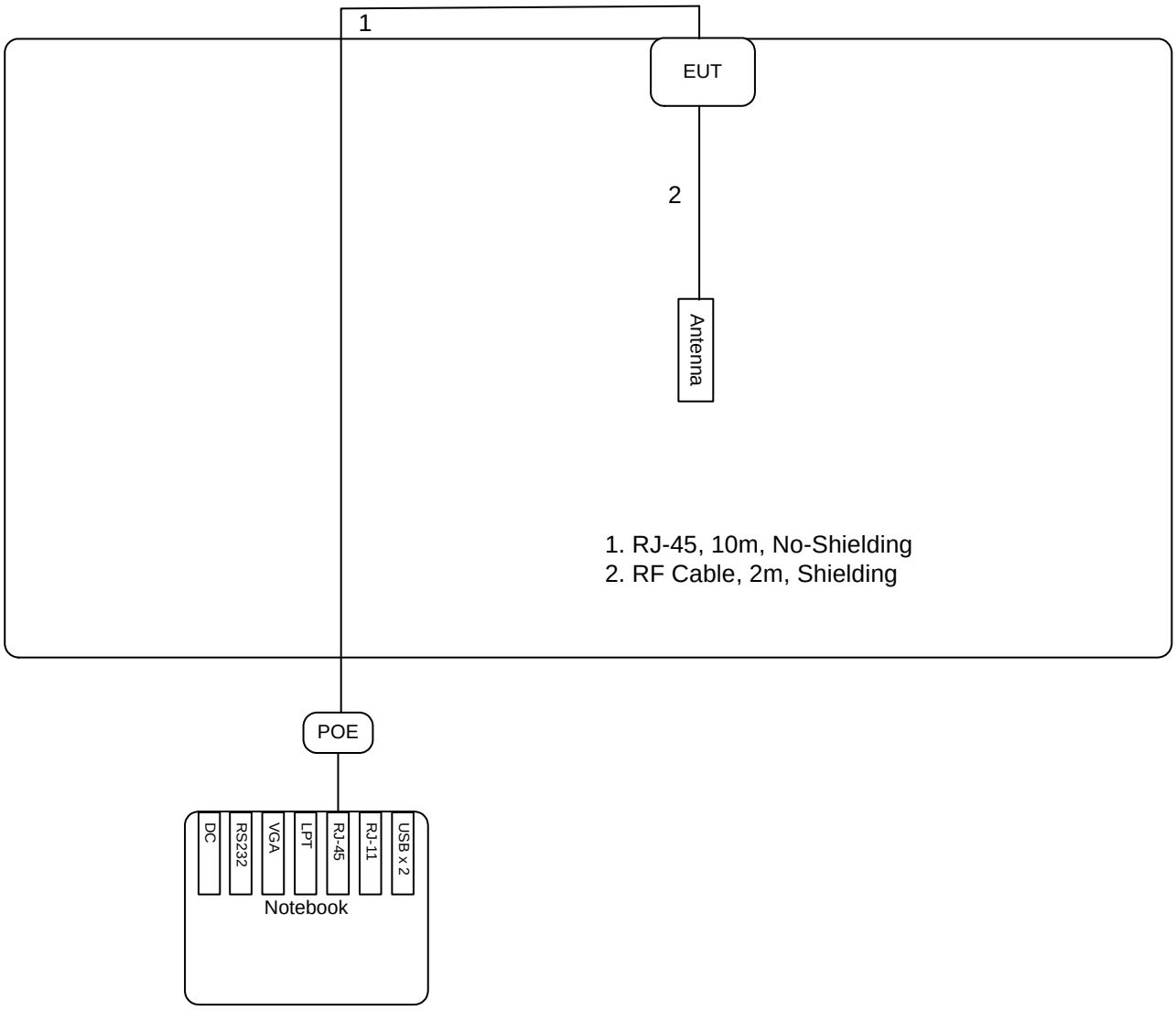
1.7. Table for Maximum Conducted Output Power

Frequency Bands 5250MHz ~ 5350MHz
20.44 dBm

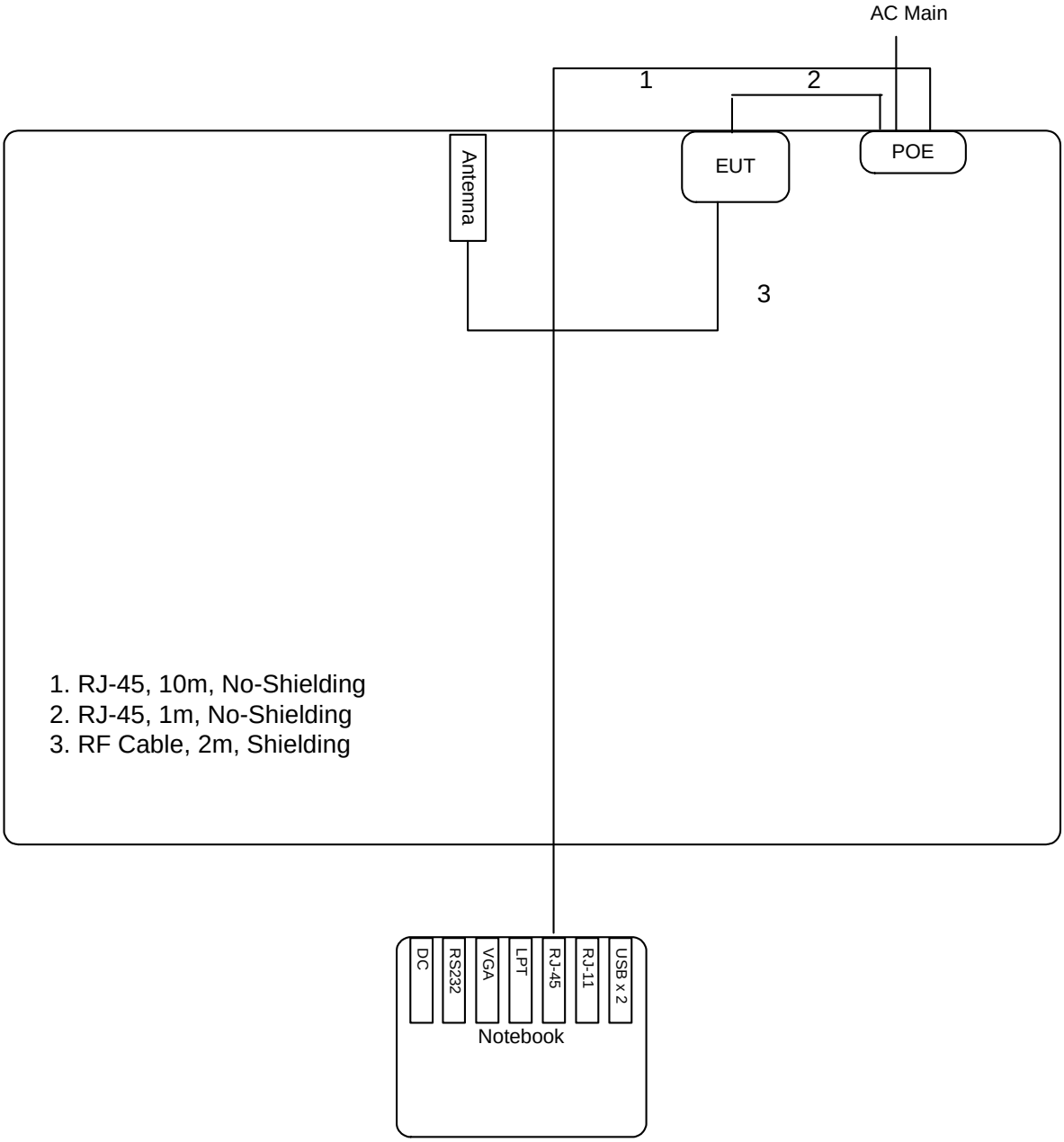
2. Test Configuration of the Equipment under Test

2.1. Connection Diagram of Test System

Radiation



Conduction


AC Main
1
2
Antenna
EUT
POE
3
1. RJ-45, 10m, No-Shielding
2. RJ-45, 1m, No-Shielding
3. RF Cable, 2m, Shielding
DC
RS232
VGA
LPT
RJ-45
RJ-11
USB x 2
Notebook

2.2. The Test Mode Description

1. For OFDM modulation, BPSK (64QAM) is the worst case on all test items.
2. Spurious emission below 1GHz is independent of channel selection, modulation and antenna type, so only channel 64 was tested.
3. AC conduction emission is independent of channel selection, modulation and antenna type, so only channel 64 was tested.

2.3. Description of Test Supporting Units

Support unit	Brand	Model No.	FCC ID
Notebook	DELL	PP01L (D505)	DoC
Notebook	COMPAQ	PP2150 (1500)	DoC

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. Test Conditions

Normal Voltage : 120.00VAC (For Adapter of POE)

Normal Temperature : 20°C

Extreme Temperature : -30 °C and 70 °C

3.3. 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 E (Section 15.407)

3.4. Frequency Range Investigated

Radiated emission test: from 30 MHz to 10th carrier harmonic or 40GHz at most.

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 or 40GHz at most) 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 Parameters of IEEE 802.11a

Test Software Version	ART	
Frequency	5260 MHz	5320 MHz
IEEE 802.11a OFDM	12.5	15

4. List of Measurements

4.1. Summary of the Test Results

Applied Standard: 47 CFR FCC Part 15 Subpart E

Paragraph	FCC Rule	Description of Test	Result
5.1	15.203/15.247(b)/(c)	26dB Spectrum Bandwidth	Pass
5.2	15.407	Maximum Conducted Output Power	Pass
5.3	15.407	Peak Power Spectral Density	Pass
5.4	15.407	Ratio of the Peak Excursion	Pass
5.5	15.407	Band Edges Emission	Pass
5.6	15.407(g)	Frequency Stability	Pass
5.7	15.407	AC Power Line Conducted Emission	Pass
5.8	15.209/15.407	Spurious Radiated Emission	Pass
5.9	15.203/15.247(b)/(c)	Antenna Requirement	Pass
5.10	2.1091	Maximum Permissible Exposure	Pass

5. Test Result

5.1. Test of 26dB Spectrum Bandwidth

5.1.1. Measuring Instruments

Item 20 of the table on section 6.

5.1.2. Test Procedures

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. Set RBW of spectrum analyzer to 300KHz and VBW to 1000KHz.
3. The 26dB bandwidth is the spectrum width with level higher than 26dB below the peak level.

5.1.3. Test Setup Layout

Spectrum Analyzer **EUT**

5.1.4. Test Criteria

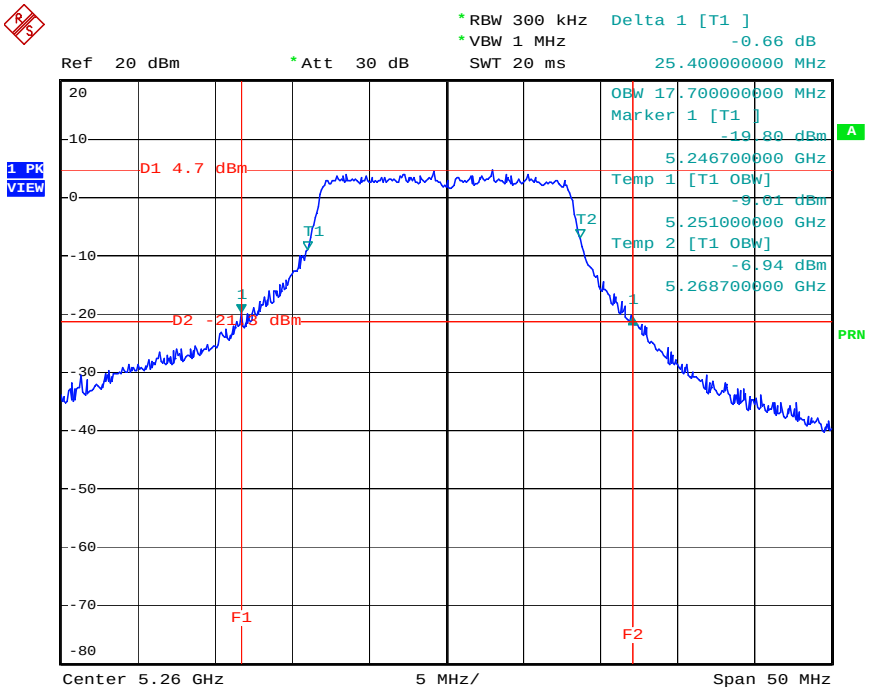
All test results complied with the requirements of 4.7.2 (1)(3). Measurement Uncertainty is $1x10^{-5}$.

5.1.5. Test Result: See spectrum analyzer plots below

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

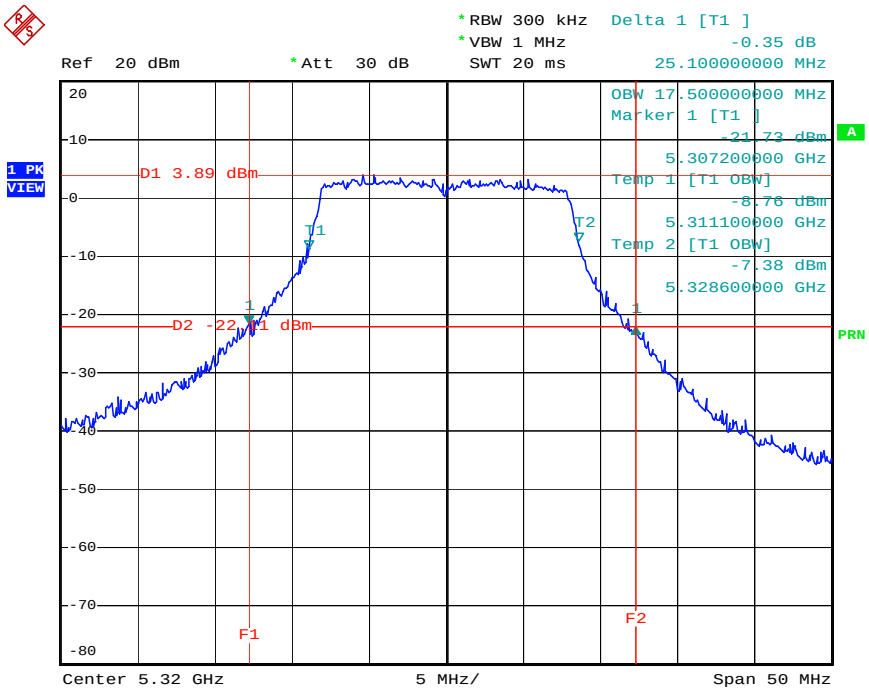
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
52	5260 MHz	25.40	17.70
64	5320 MHz	25.10	17.50

Channel: 52 / 5260 MHz



Date: 18.AUG.2005 15:10:24

Channel: 64 / 5320 MHz



Date: 18.AUG.2005 15:14:19

5.2. Test of Maximum Conducted Output Power

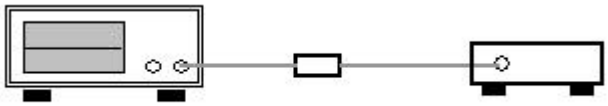
5.2.1. Measuring Instruments

Item 20 of the table on section 6.

5.2.2. Test Procedures

1. According to FCC DA 02-2138 test procedure, EUT connected to spectrum analyzer, then used the channel power function of spectrum analyzer and calculated total average power with spectrum range more than 26dB bandwidth.
2. Repeat point 1 for the lowest, middle and highest channel of the EUT.

5.2.3. Test Setup Layout



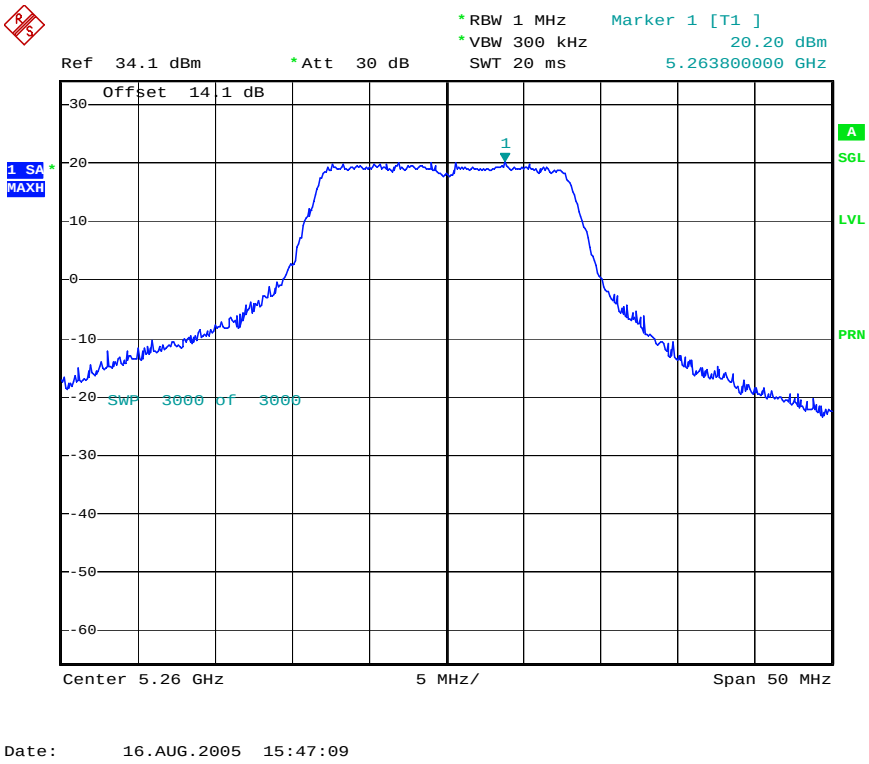
Spectrum Analyzer **EUT**

5.2.4. Test Result of Conducted Power

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

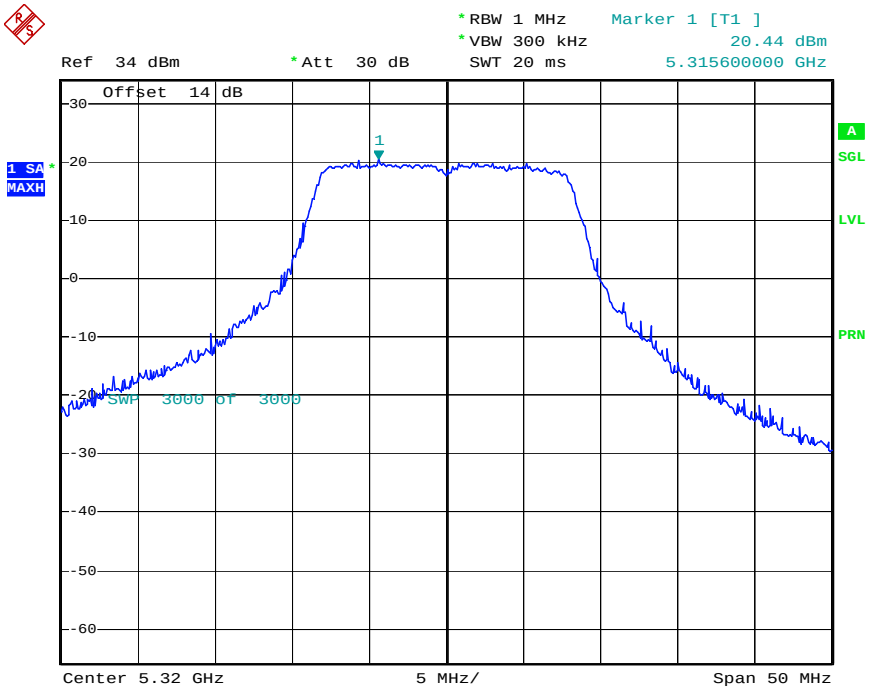
Channel	Frequency (MHz)	Output Power (dBm)	Limits (dBm)
52	5260 MHz	20.20	21
64	5320 MHz	20.44	21

Channel: 52 / 5260 MHz



Date: 16.AUG.2005 15:47:09

Channel: 64 / 5320 MHz



Date: 16.AUG.2005 15:54:50

5.3. Test of Peak Power Spectral Density

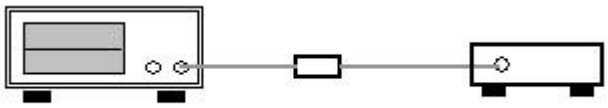
5.3.1. Measuring Instruments

Item 20 of the table on section 6.

5.3.2. Test Procedures

1. According to FCC DA 02-2138 test procedure, EUT connected to spectrum analyzer, then used the same setup as that used for power measurement of spectrum analyzer.
2. Repeat point 1 for the lowest, middle and highest channel of the EUT.

5.3.3. Test Setup Layout



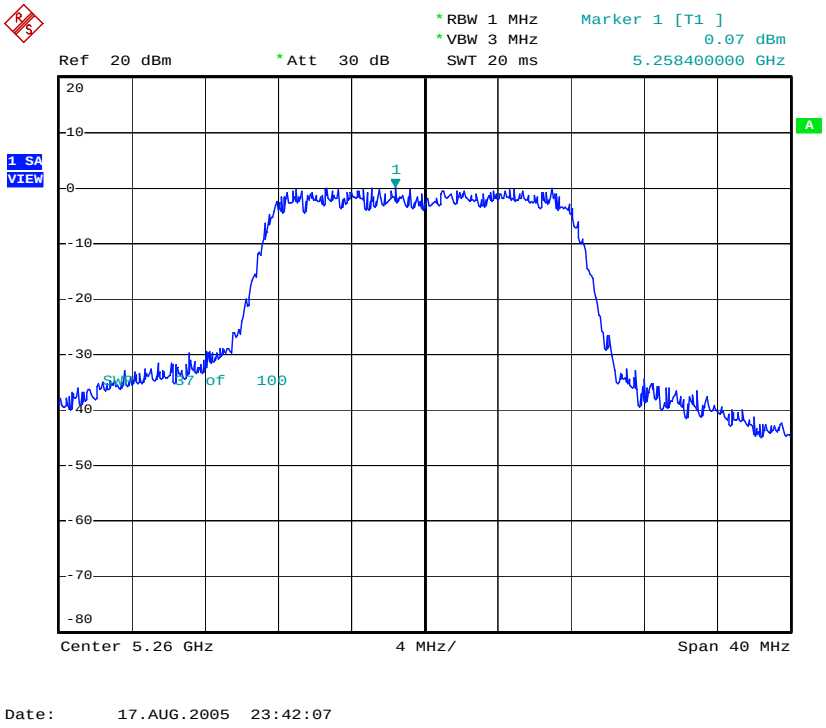
Spectrum Analyzer **EUT**

5.3.4. Test Result of conducted peak power spectral density

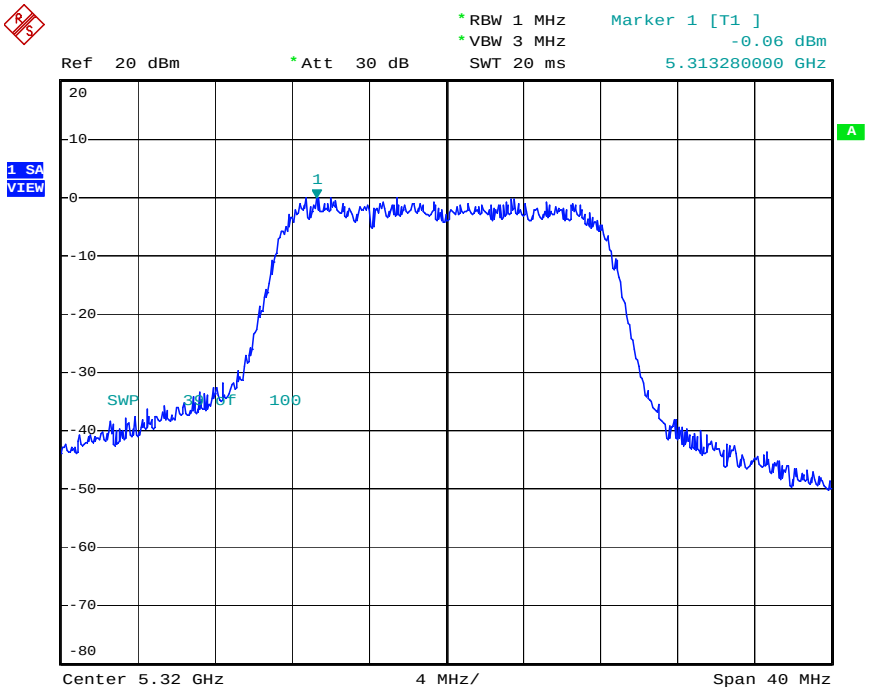
- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Eason Lu

Channel	Frequency (MHz)	Power Density (dBm)	Limits (dBm/MHz)
52	5260 MHz	0.07	8
64	5320 MHz	-0.06	8

Channel: 52 / 5260 MHz



Channel: 64 / 5320 MHz



5.4. Ratio of the Peak Excursion

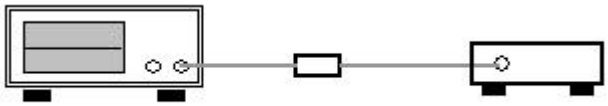
5.4.1. Measuring Instruments

Item 20 of the table on section 6.

5.4.2. Test Procedures

1. The transmitter output is connected to the spectrum analyzer through an attenuator.
2. Trace 1:Set RBW of spectrum analyzer to 1000kHz and VBW to 3000kHz.
3. Use peak detector mode, Max-hold and search the peak of trace 1.
4. Trace 2:Set RBW of spectrum analyzer to 1000kHz and VBW to 300kHz.
5. Use sample detector mode, trace max-hold and search the peak of trace 2
6. The delta limits is 13dB between trace 1 and trace 2 of the peak value.

5.4.3. Test Setup Layout



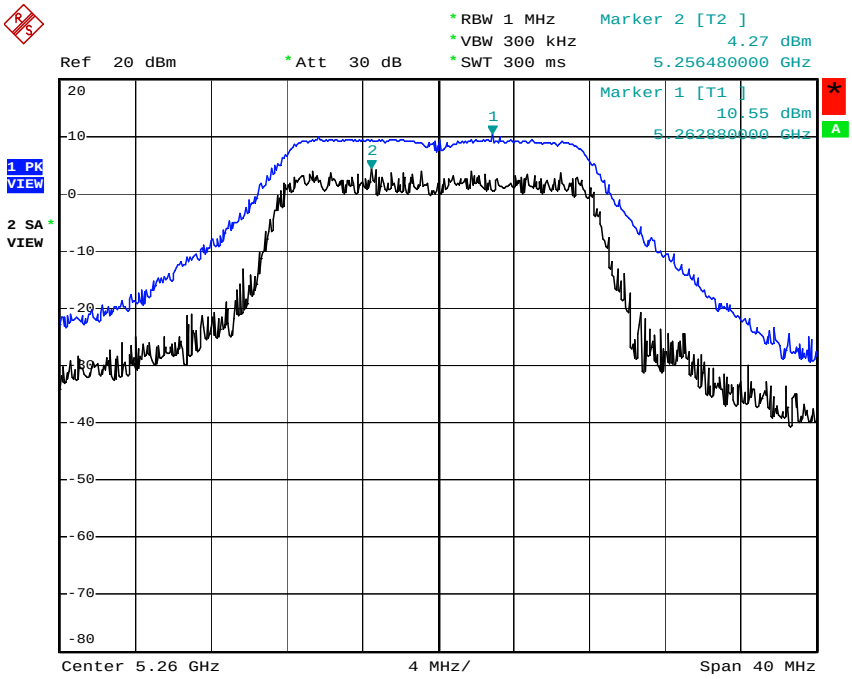
Spectrum Analyzer **EUT**

5.4.4. Test Result of conducted peak power spectral density

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

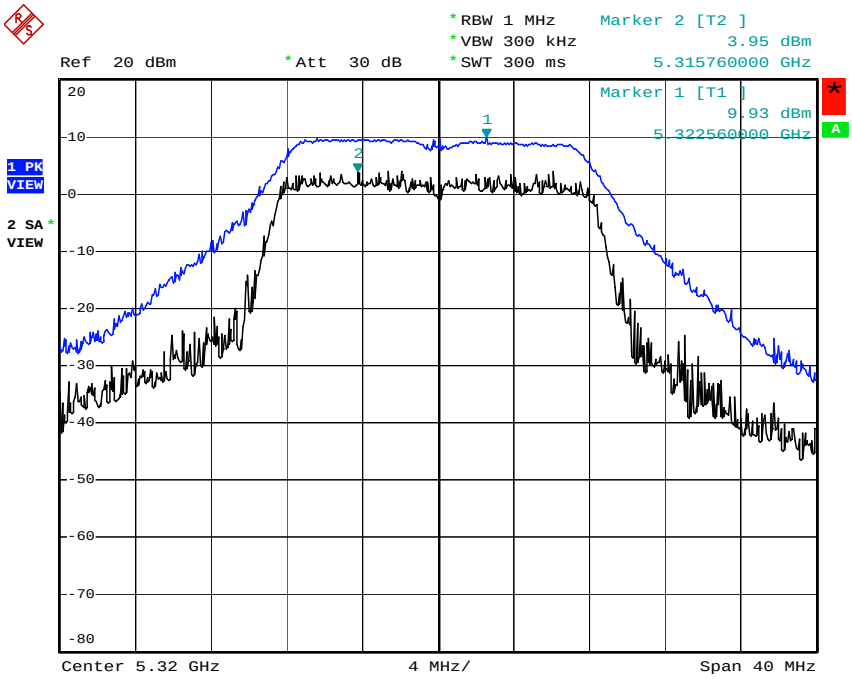
Channel	Frequency (MHz)	Peak Excursion (dB)	Max. Limits (dB)
52	5260 MHz	6.28	13
64	5320 MHz	5.98	13

Channel: 52 / 5260 MHz



Date: 17.AUG.2005 23:42:55

Channel: 64 / 5320 MHz



Date: 17.AUG.2005 23:45:06

5.5. Test of Band Edges Emission

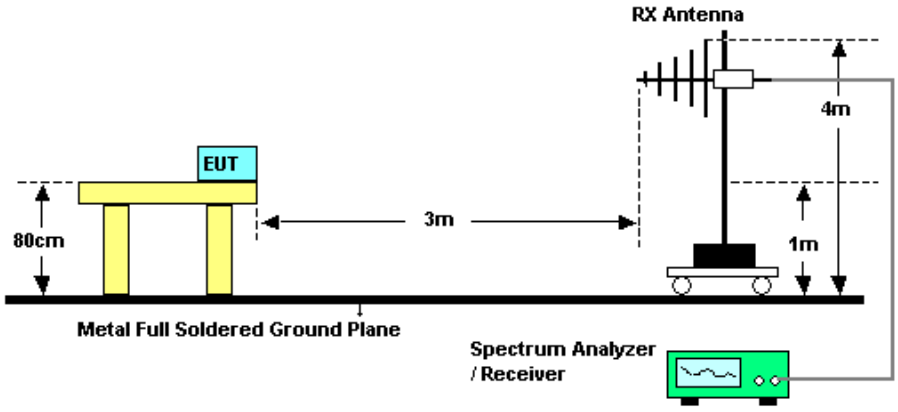
5.5.1. Measuring Instruments

Please reference item 6~19 in chapter 6 for the instruments used for testing.

5.5.2. Test Procedures

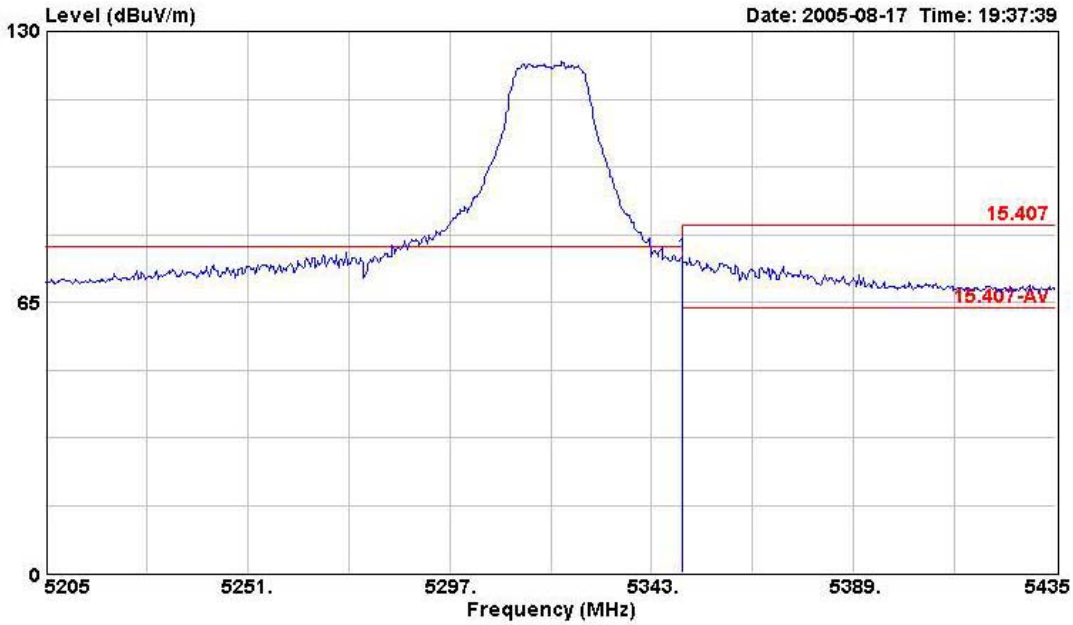
1. Configure the EUT according to ANSI C63.4-2003.
2. The EUT was placed on the top of the turntable 0.8 meter above ground.
3. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
4. The transmitter is set to the lowest channel of each band.
5. The turntable was rotated 360 degrees to determine the position of the highest radiation.
6. Set both RBW and VBW of spectrum analyzer to 1MHz with convenient frequency span including 1MHz bandwidth from lower band edge.
7. 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. Record the maximum value of band-edge.
8. Remove the transmitter and replace it with a broadband substitution antenna.
9. With the substitution antennas at maximum polarized and with the signal generator tuned to a particular fundamental frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading (item 6). This should be done carefully repeating the adjustment of the test antenna and generator output.
10. Pd(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBi). Pd is the dipole equivalent power and Pg is the generator output power into the substitution antenna.
11. The lowest and highest channels of band edges of each band emission was measured and recorded.
12. If any spurious emissions are in non-restriction bands, these emissions comply with EIRP -27dBm (The 68.3 dBμV/m limit at 3 metres (EIRP -27 dBm/MHz) of has been converted to 78.3 dBμV/m at 1 metre)

5.5.3. Test Setup Layout

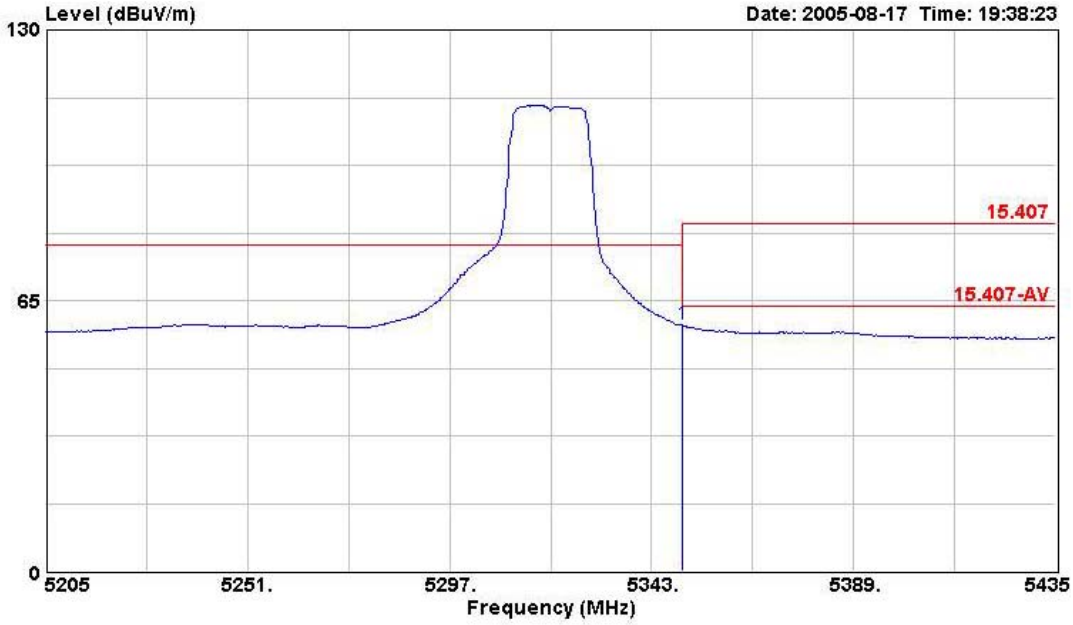


5.5.4. Test Result of Field Strength bandedge in restriction bands

- Test Results for CH 64 / 5320 MHz
- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Eason Lu



	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1 @	5350.000	76.10	-2.20	39.10	78.30	3.04	33.96	0.00	Peak	---	---



	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1 @	5350.000	59.04	-4.46	22.04	63.50	3.04	33.96	0.00	Average	---	---

5.6. Frequency Stability Measurement

5.6.1. Limit

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emissions is maintained within the band of operation under all conditions of normal operation as specified in the user's manual or ±20ppm (IEEE 802.11a specification).

5.6.2. Measuring Instruments and Setting

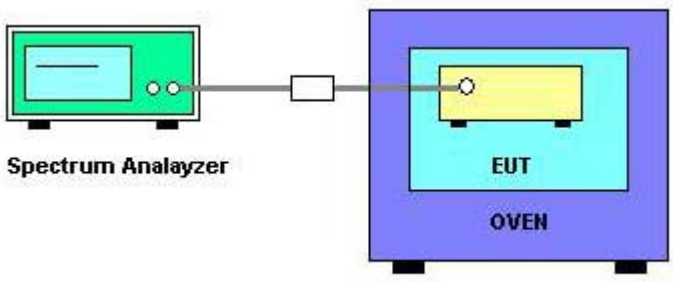
Please refer to section 6 in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Entire absence of modulation emissions bandwidth
RB	10 kHz
VB	10 kHz
Sweep Time	Auto

5.6.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyser.
1. EUT have transmitted absence of modulation signal and fixed channelize.
2. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
3. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
4. fc is declaring of channel frequency. Then the frequency error formula is (fc-f)/fc × 10^6 ppm and the limit is less than ±20ppm (IEEE 802.11a specification).
5. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
6. Extreme temperature rule is -30°C~50°C.

5.6.4. Test Setup Layout



5.6.5. Test Deviation

There is no deviation with the original standard.

5.6.6. EUT Operation during Test

The EUT was programmed to be in continuously un-modulation transmitting mode.

5.6.7. Test Result of Frequency Stability

Voltage vs. Frequency Stability

Voltage (V)	Measurement Frequency (MHz) 5320
126.50	5319.9655
110.00	5319.9645
93.50	5319.9639
Max. Deviation (MHz)	0.0361
Max. Deviation (ppm)	6.7857

Temperature vs. Frequency Stability

Temperature (℃)	Measurement Frequency (MHz) 5320
-30	5319.9531
-20	5319.9542
-10	5319.9625
0	5319.9787
10	5319.9748
20	5319.9645
30	5319.9651
40	5319.9618
50	5319.9686
Max. Deviation (MHz)	0.0469
Max. Deviation (ppm)	8.8158

5.7. Test of AC Power Line Conducted Emission

5.7.1. Applicable Standard

Section 2.3: 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

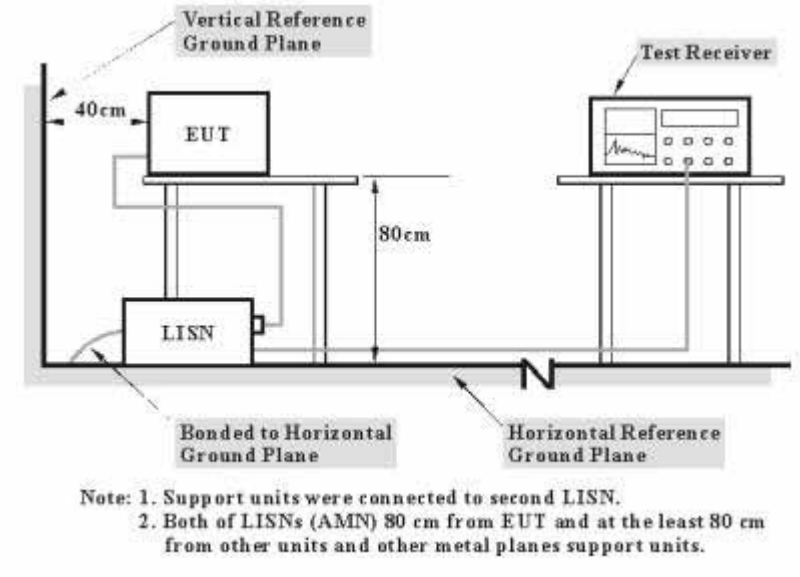
5.7.2. Measuring Instruments

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

5.7.3. Test Procedures

1. Configure the EUT according to ANSI C63.4-2003.
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 provides 50uH/50ohms coupling impedance.
5. The frequency range from 150 KHz to 30 MHz was searched.
6. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
7. 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.

5.7.4. Test Setup Layout



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

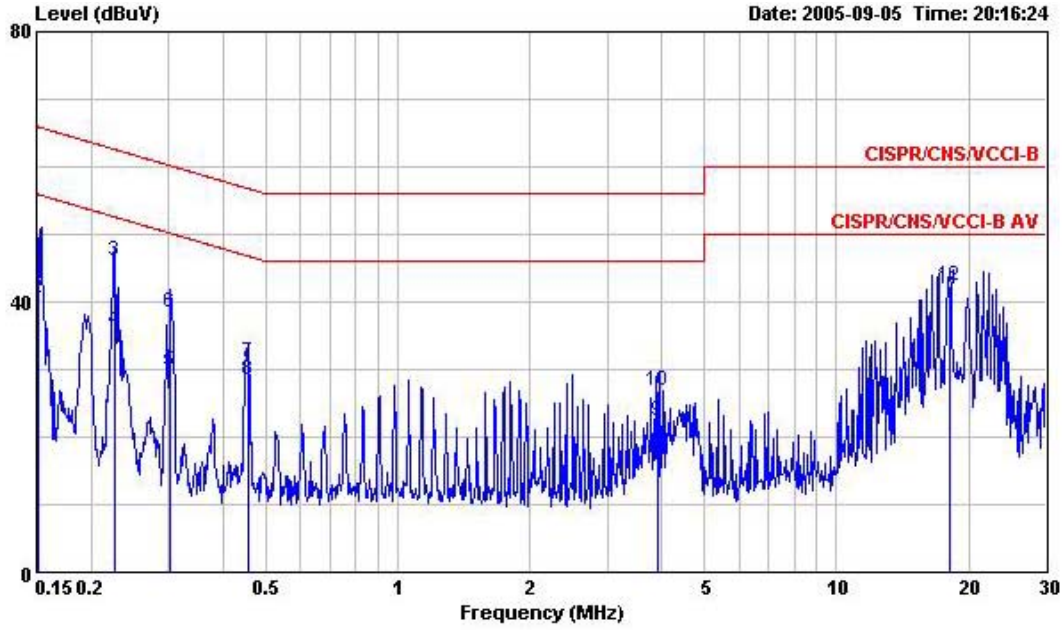
5.7.5. Test Criteria

All test results complied with the requirements of 2.3. Measurement Uncertainty is 2.54dB.

5.7.6. Test Result of Conducted Emission

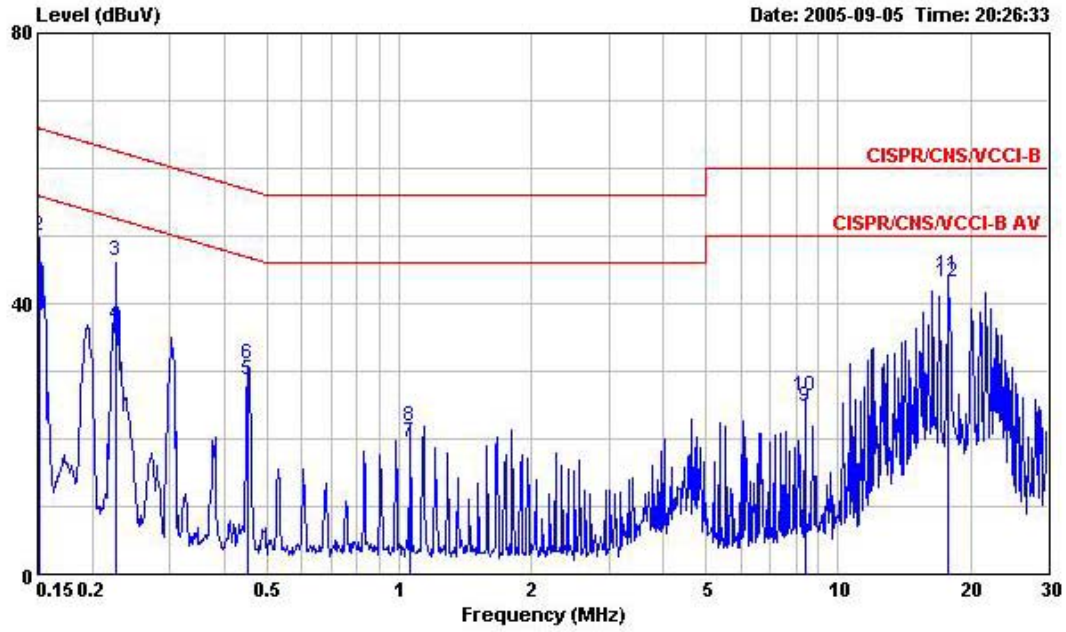
- Temperature: 26°C
- Relative Humidity: 64%
- Test Engineer: Sky Wu

Line to Ground



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.1514670	49.77	-16.15	65.92	49.18	0.06	0.53	QP
2	0.1514670	40.42	-15.50	55.92	39.83	0.06	0.53	Average
3	0.2267630	45.99	-16.58	62.57	45.69	0.06	0.24	QP
4	0.2267630	35.75	-16.82	52.57	35.45	0.06	0.24	Average
5	0.3034790	29.77	-20.38	50.15	29.39	0.06	0.32	Average
6	0.3034790	38.49	-21.66	60.15	38.11	0.06	0.32	QP
7	0.4563500	31.17	-25.59	56.76	30.88	0.06	0.23	QP
8	0.4563500	28.34	-18.42	46.76	28.05	0.06	0.23	Average
9	3.931	22.34	-23.66	46.00	21.83	0.21	0.30	Average
10	3.931	26.72	-29.28	56.00	26.21	0.21	0.30	QP
11	18.138	41.73	-8.27	50.00	41.12	0.28	0.33	Average
12	18.138	42.29	-17.71	60.00	41.68	0.28	0.33	QP

Neutral to Ground

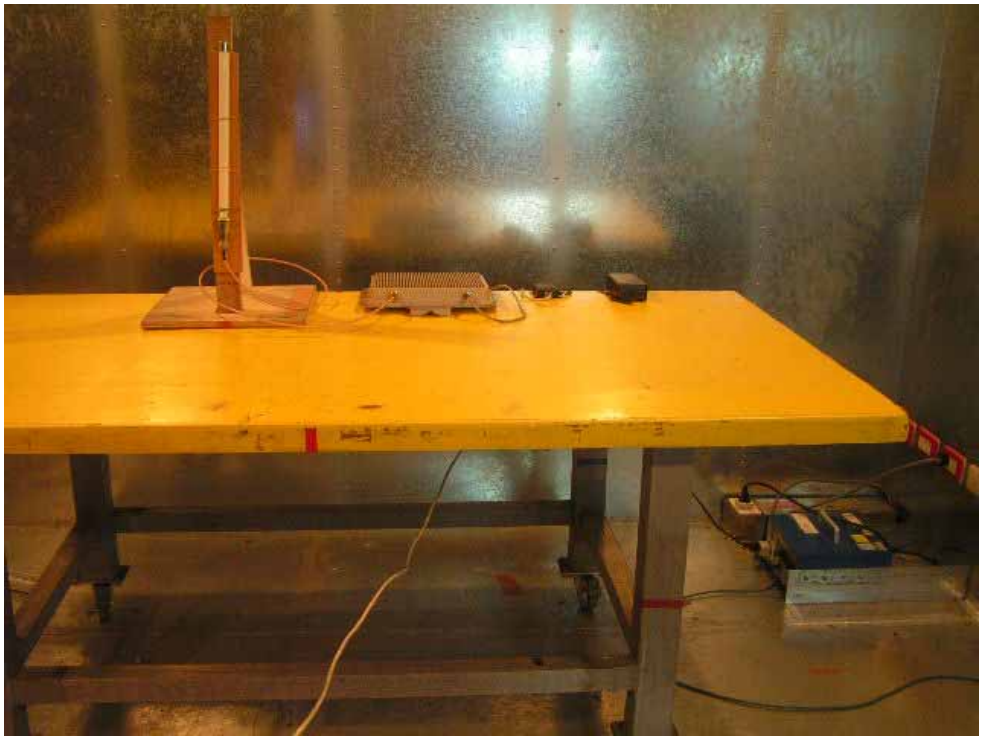


	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.1515980	41.61	-14.30	55.91	40.97	0.11	0.53	Average
2	0.1515980	50.11	-15.80	65.91	49.47	0.11	0.53	QP
3	0.2257630	46.32	-16.28	62.60	45.97	0.11	0.24	QP
4	0.2257630	36.75	-15.85	52.60	36.40	0.11	0.24	Average
5	0.4526690	28.58	-18.25	46.83	28.23	0.11	0.24	Average
6	0.4526690	31.16	-25.67	56.83	30.81	0.11	0.24	QP
7	1.060	19.56	-26.44	46.00	18.73	0.23	0.60	Average
8	1.060	21.74	-34.26	56.00	20.91	0.23	0.60	QP
9	8.395	24.84	-25.16	50.00	24.21	0.31	0.32	Average
10	8.395	26.41	-33.59	60.00	25.78	0.31	0.32	QP
11	17.845	44.14	-15.86	60.00	43.40	0.39	0.35	QP
12	17.845	43.15	-6.85	50.00	42.41	0.39	0.35	Average

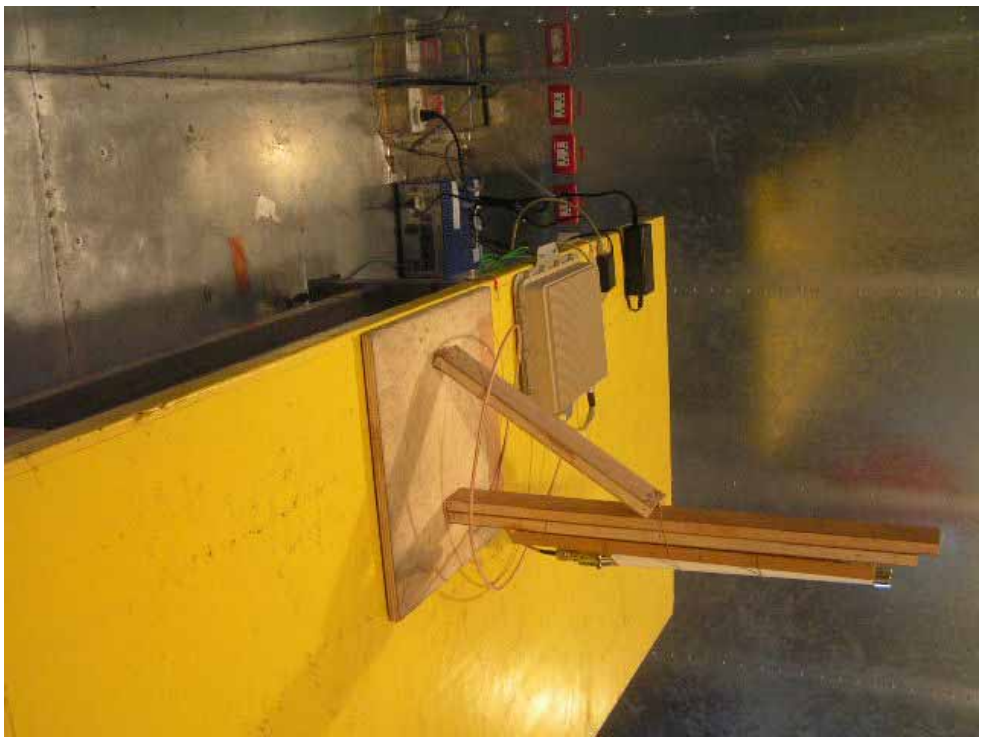
Note:
Corrected Reading: Probe (LISN / ISN) Factor + Cable Loss + Read Level = Level.

5.7.7. Photographs of Conducted Emission Test Configuration

FRONT VIEW



REAR VIEW



5.8. Test of Spurious Radiated Emission

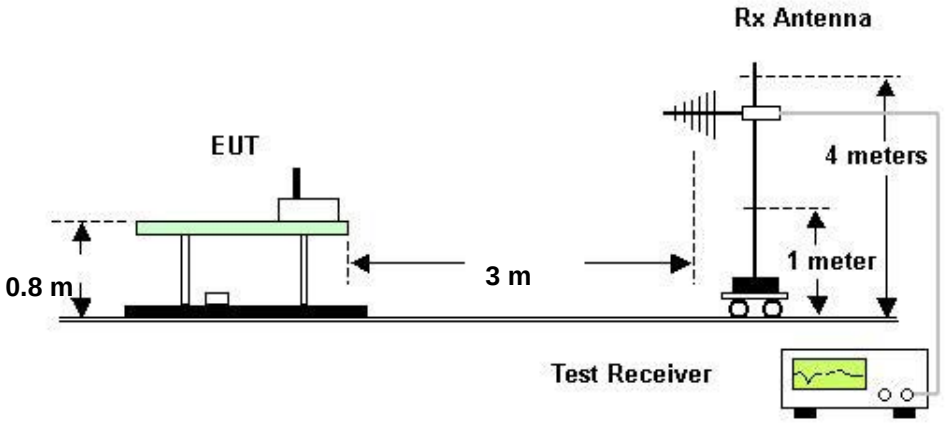
5.8.1. Measuring Instruments

Please refer to item 6~19 in chapter 6 for the instruments used for testing.

5.8.2. Test Procedures

1. Configure the EUT according to ANSI C63.4-2003.
2. The EUT was placed on the top of the turn table 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 turn table.
4. Power on the EUT and all the supporting units.
5. The turn table 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 turn table 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.

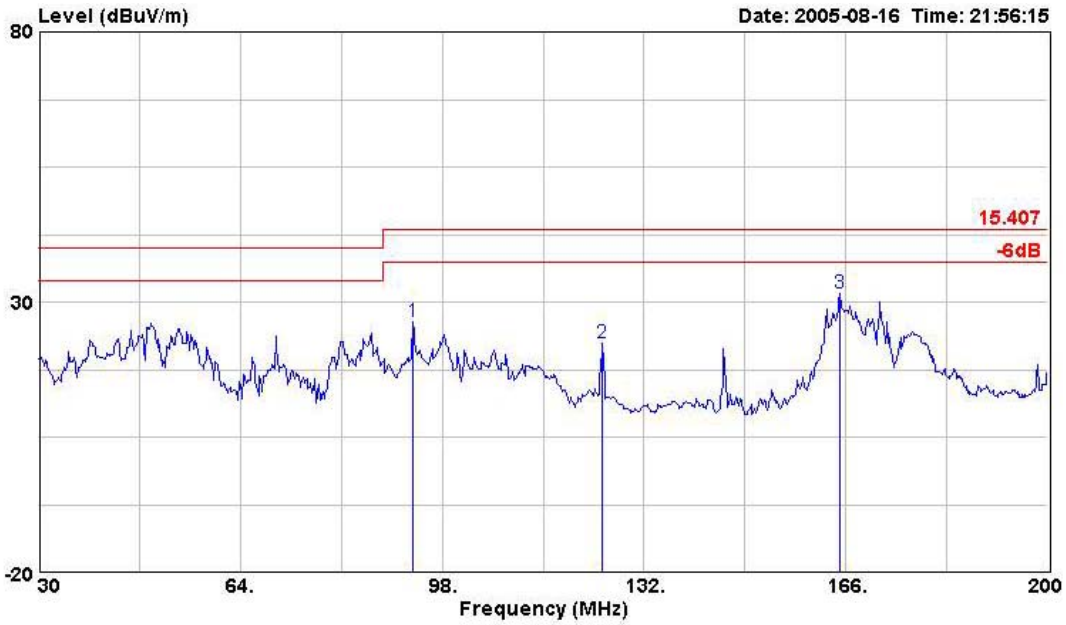
5.8.3. Test Setup Layout



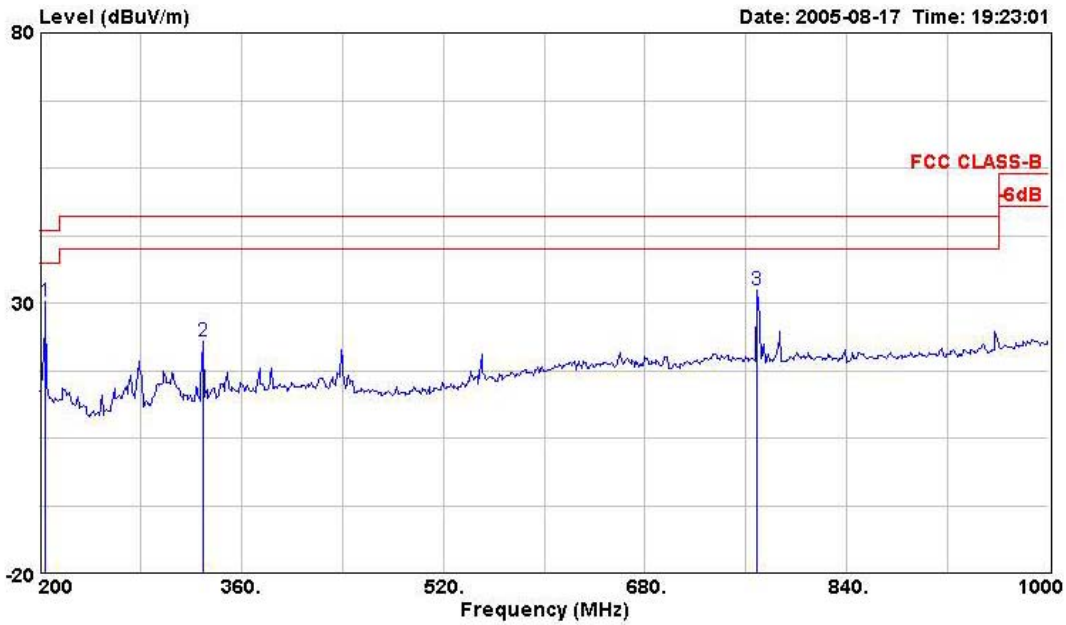
5.8.4. Test Results for CH 64 / 5320 MHz (for emission below 1GHz)

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

(A) Polarization: Horizontal

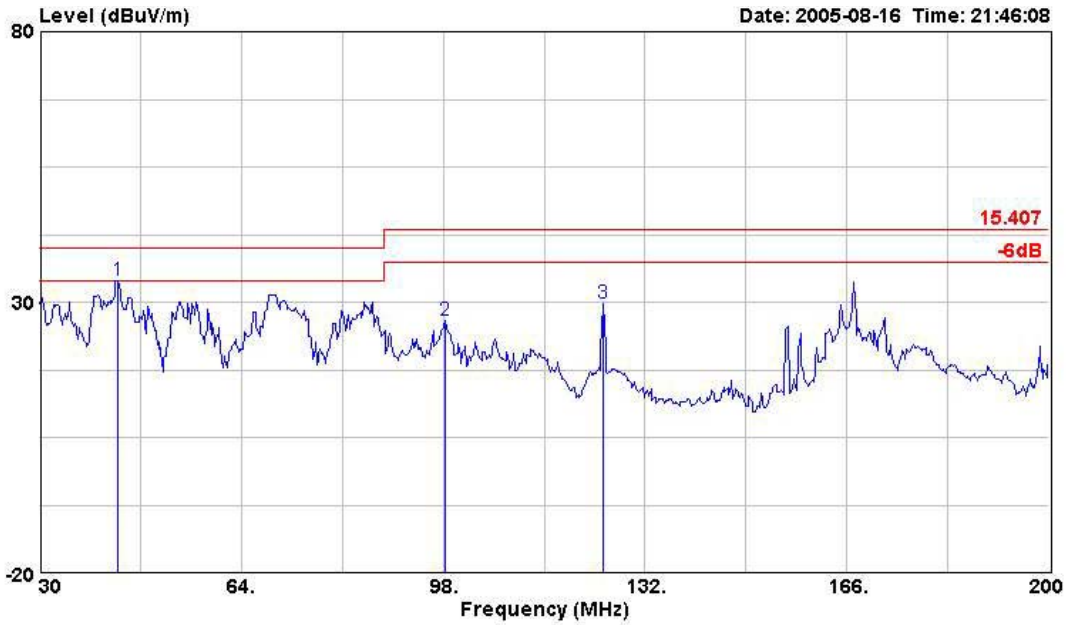


	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1 @	93.070	26.25	-17.25	46.25	43.50	0.92	8.66	29.58	Peak	---	---
2 @	125.030	22.36	-21.14	39.55	43.50	1.11	12.20	30.50	Peak	---	---
3 @	164.980	31.67	-11.83	47.41	43.50	1.28	13.14	30.16	Peak	---	---

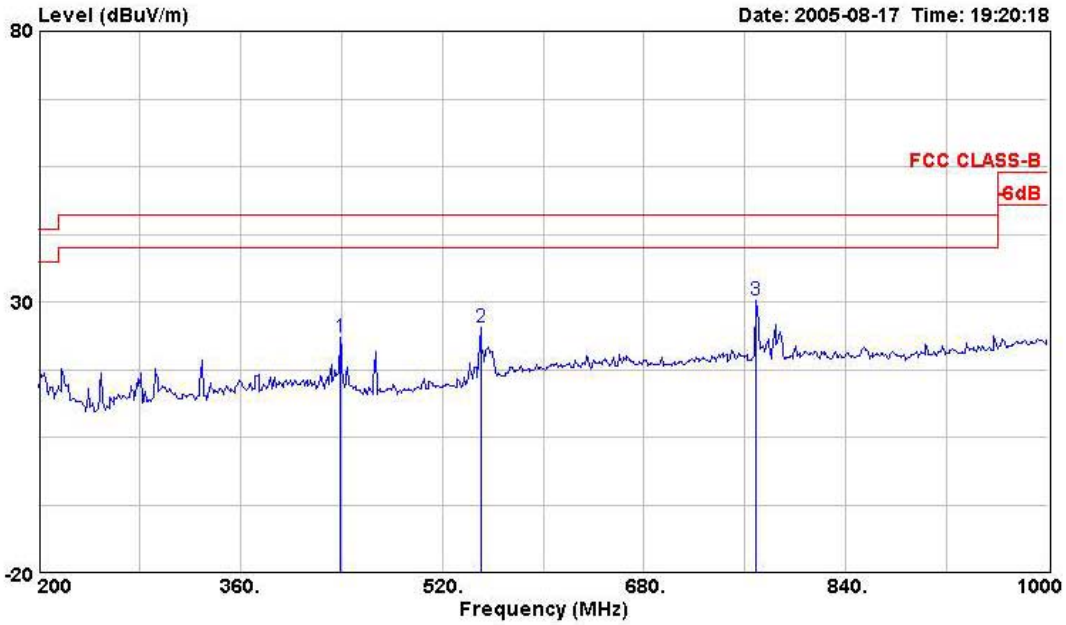


	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1 @	204.800	30.24	-13.26	43.98	43.50	1.24	15.82	30.80	Peak	---	---
2 @	329.600	22.80	-23.20	37.11	46.00	1.76	14.69	30.76	Peak	---	---
3 @	768.800	32.29	-13.71	38.50	46.00	2.79	21.53	30.53	Peak	---	---

(B) Polarization: Vertical



	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1 @	43.260	34.01	-5.99	51.23	40.00	0.65	12.47	30.34	Peak	---	---
2 @	98.340	26.48	-17.02	46.88	43.50	0.94	8.91	30.26	Peak	---	---
3 @	125.030	29.86	-13.64	47.05	43.50	1.11	12.20	30.50	Peak	---	---



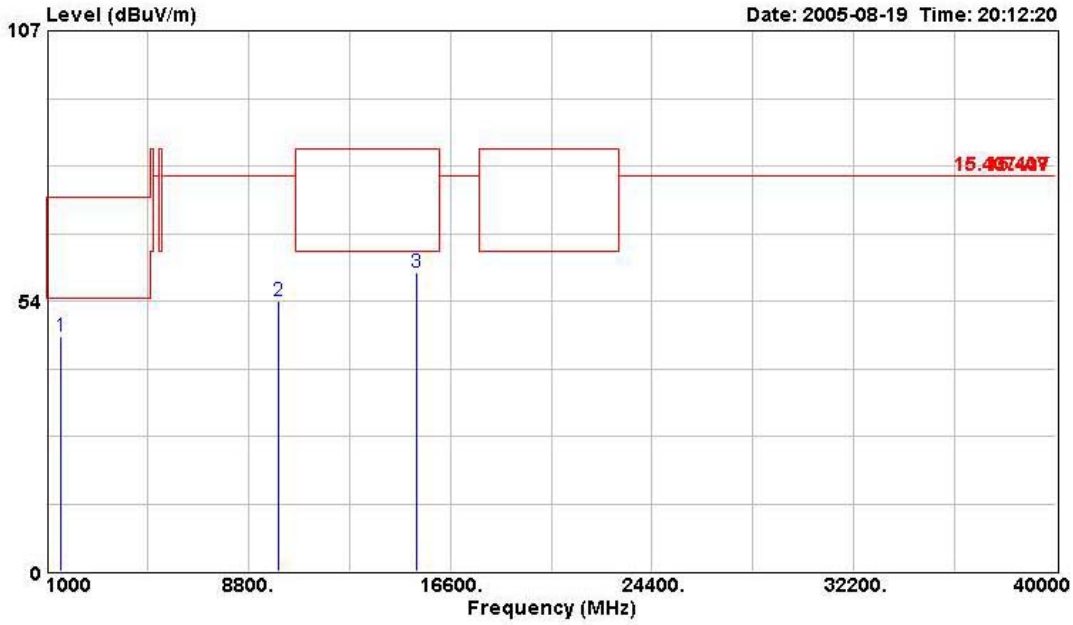
	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1 @	439.200	23.46	-22.54	35.60	46.00	2.11	16.49	30.74	Peak	---	---
2 @	550.400	25.34	-20.66	36.03	46.00	2.24	18.24	31.17	Peak	---	---
3 @	768.800	30.17	-15.83	36.38	46.00	2.79	21.53	30.53	Peak	---	---

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

5.8.5. Test Results for CH 52 / 5260 MHz (for emission above 1GHz)

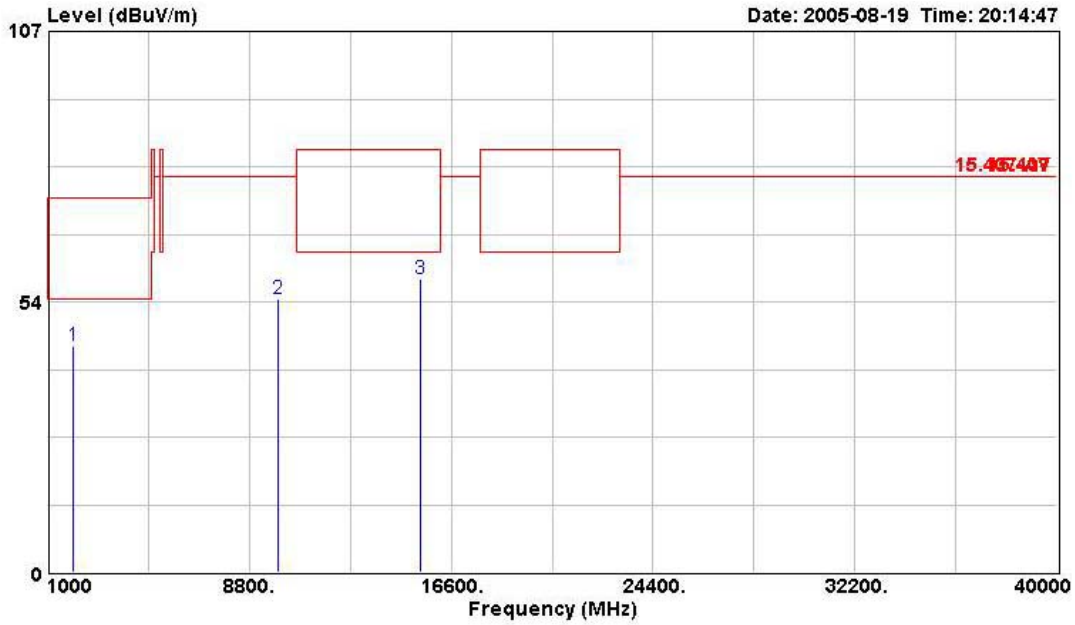
- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Ted Chiu

(A) Polarization: Horizontal



	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	1550.000	46.55	-27.45	52.55	74.00	1.49	25.52	33.00	Peak	---	---
2	9952.000	53.50	-24.80	44.04	78.30	3.98	38.94	33.46	PEAK	---	---
3 @	15300.000	59.22	-24.28	47.55	83.50	5.19	38.98	32.50	PEAK	---	---

(B) Polarization: Vertical

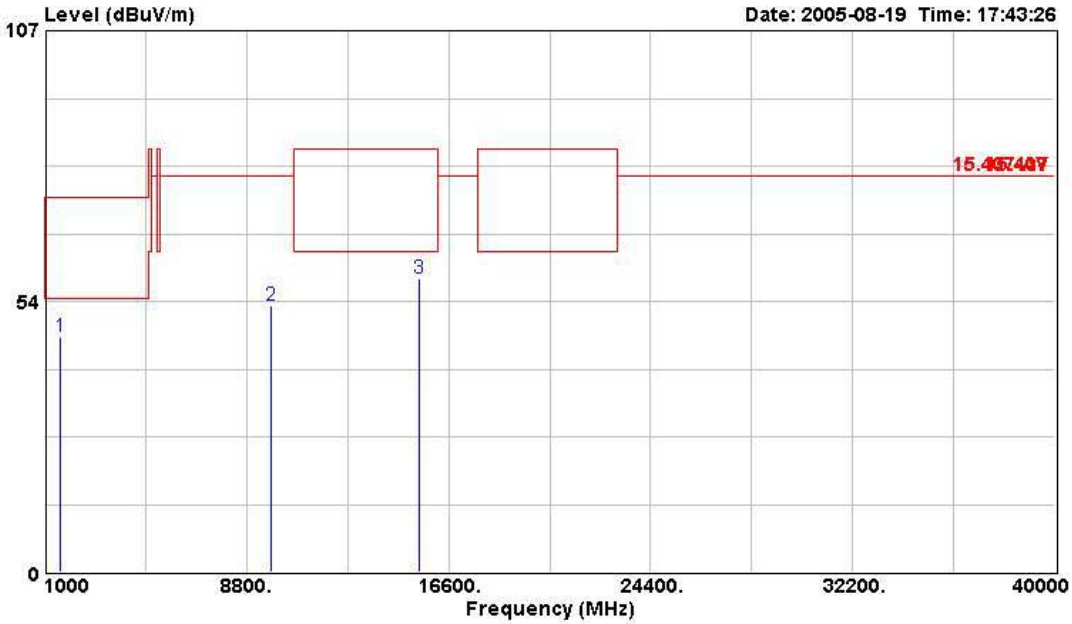


	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	1988.000	44.71	-29.29	48.25	74.00	1.72	27.43	32.68	Peak	---	---
2 @	9928.000	53.95	-24.35	44.55	78.30	3.98	38.88	33.46	PEAK	---	---
3	15428.000	57.96	-25.54	47.19	83.50	5.19	38.26	32.68	PEAK	---	---

5.8.6. Test Results for CH 64 / 5320 MHz (for emission above 1GHz)

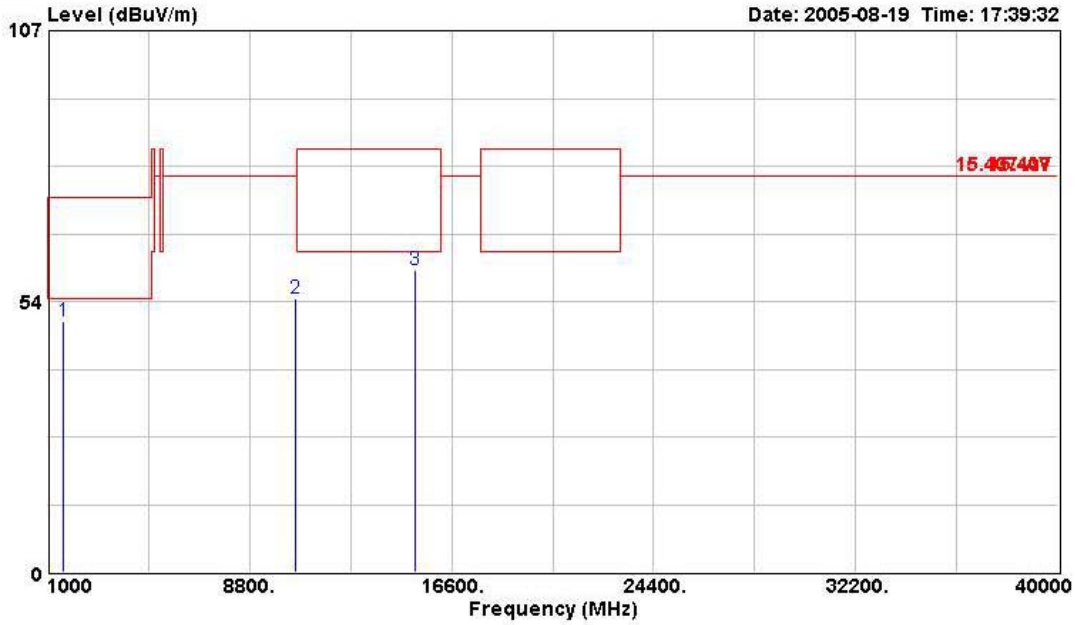
- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Ted Chiu

(A) Polarization: Horizontal



	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	1590.000	46.55	-27.45	52.29	74.00	1.51	25.74	32.98	Peak	---	---
2	9744.000	52.78	-25.52	43.68	78.30	4.00	38.53	33.44	PEAK	---	---
3	15488.000	57.95	-25.55	47.52	83.50	5.19	37.99	32.75	PEAK	---	---

(B) Polarization: Vertical

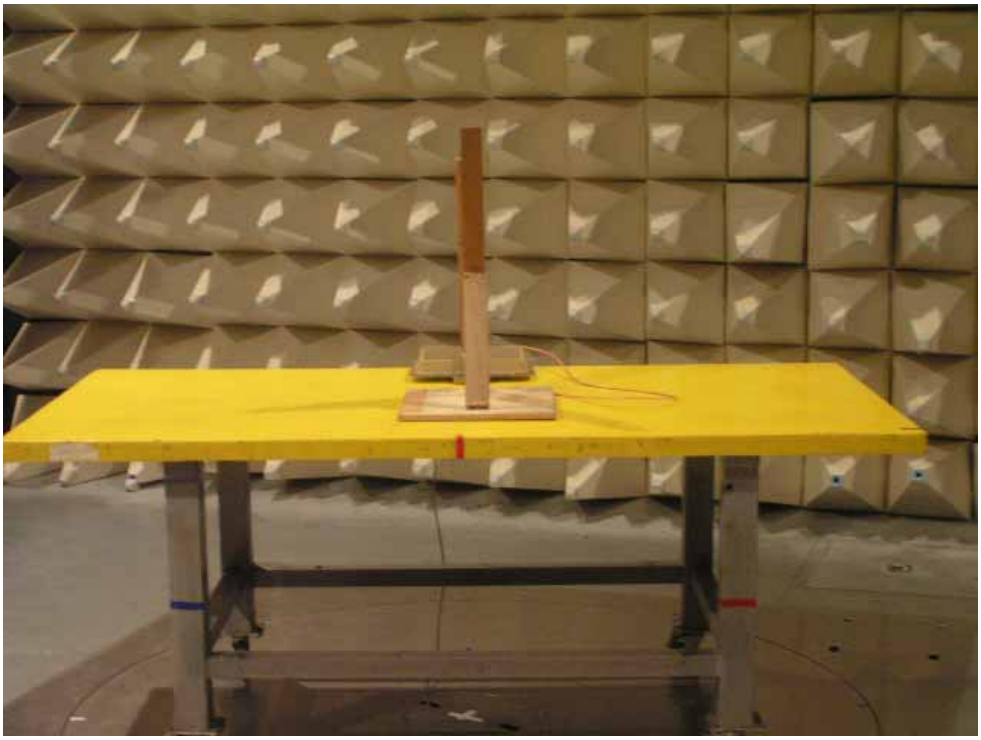


	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1 @	1596.000	49.69	-24.31	55.43	74.00	1.51	25.74	32.98	Peak	---	---
2 @	10548.000	54.20	-24.10	43.87	78.30	4.44	38.87	32.97	PEAK	---	---
3 @	15164.000	59.67	-23.83	47.07	83.50	5.20	39.69	32.29	PEAK	---	---

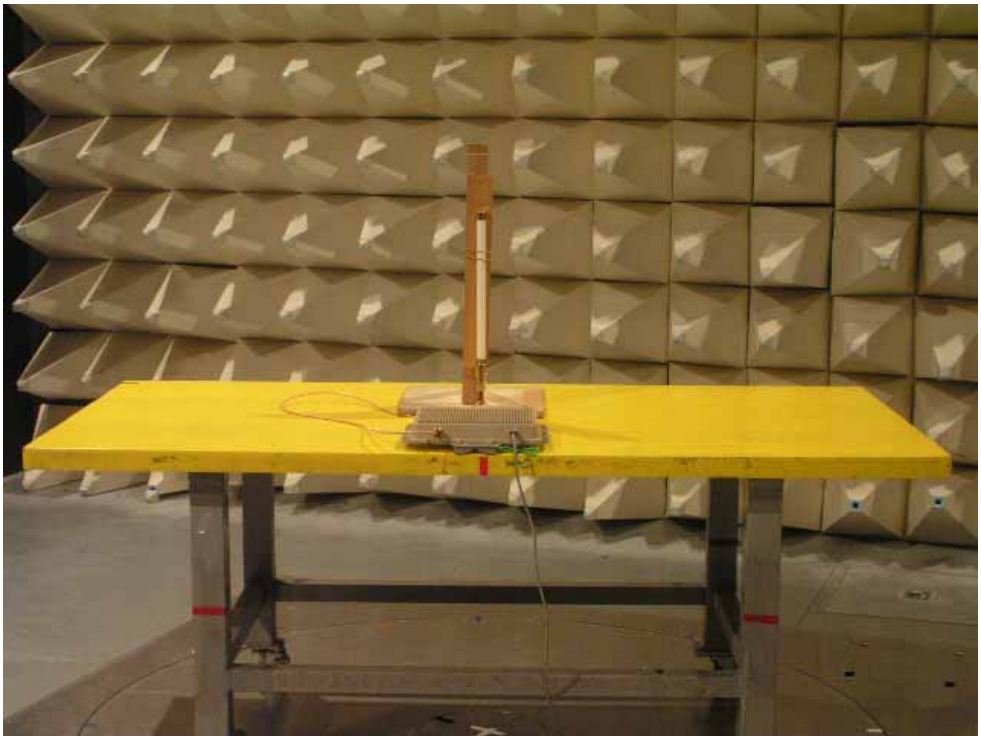
Note:
Emission level (dBuV/m) = 20 log Emission level (uV/m)
Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

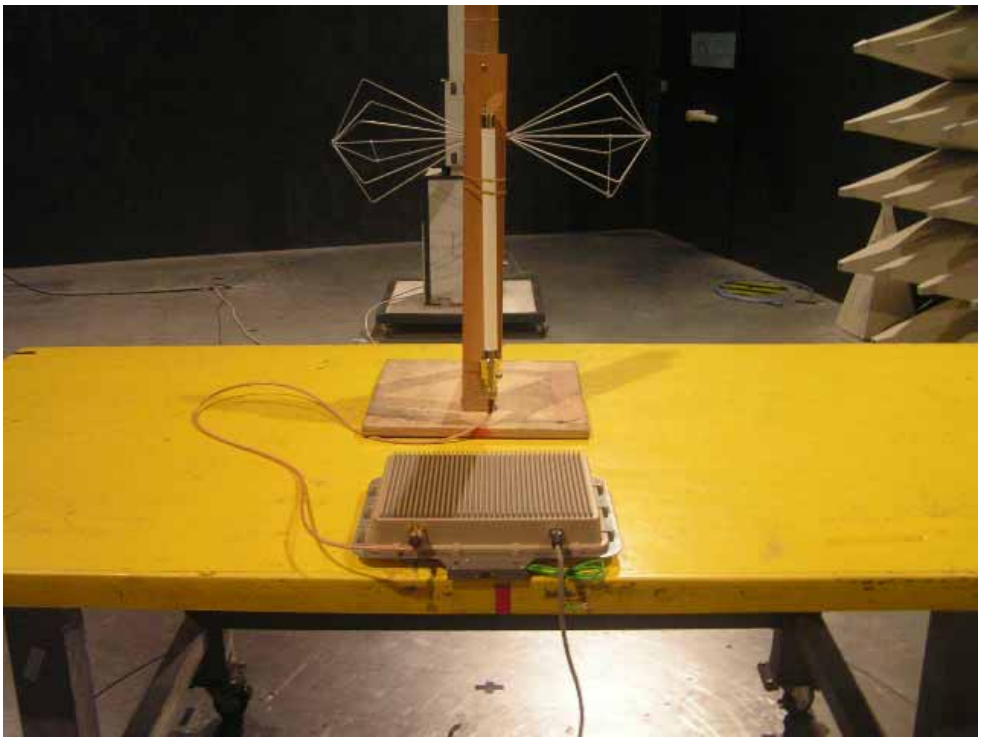
5.8.7. Photographs of Radiated Emission Test Configuration

FRONT VIEW



REAR VIEW





5.9. Antenna Requirements

5.9.1. Standard Applicable

47 CFR Part15 Section 15.203:
The limitation on type of antenna specified the requirements of 2.2 is not required.

47 CFR Part15 Section 15.407:
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.

5.9.2. Antenna Connected Construction

N-RP (Female) connector is used for the GP antenna.

The peak conducted power and power density limit shall be degraded accordingly.

5.9.3. Test Criteria

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

5.10. RF Exposure

5.10.1. 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

5.10.2. MPE Calculation Method

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

E = Electric field (V/m)

P = Peak RF output power (W)

G = EUT Antenna numeric gain (numeric)

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

The formula can be changed to

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

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained.

5.10.3. Calculated Result and Limit

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

Frequency	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)
5260 MHz	9.00	15.85	20.20	104.71	0.3303	1
5320 MHz	9.00	15.85	20.44	110.66	0.3491	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	9kHz – 2.75GHz	Feb. 19, 2005	Conduction (CO04-HY)
2	LISN	EMCO	3810/2NM	9703-1839	9kHz – 30MHz	Mar. 15, 2005	Conduction (CO04-HY)
3	LISN (Support Unit)	PIC	NNB-2/16Z	2001/008	9kHz – 30MHz	May 06, 2005	Conduction (CO04-HY)
4	EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	N/A	Conduction (CO04-HY)
5	RF Cable-CON	Suhner Switzerland	RG223/U	CB029	9kHz – 30MHz	Dec. 23, 2004	Conduction (CO04-HY)
6	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz ~ 1GHz 3m	Jun. 16, 2005	Radiation (03CH03-HY)
7	Spectrum Analyzer	R&S	FSP40	100019	9KHZ~40GHz	Jul. 21, 2005	Radiation (03CH03-HY)
8	Amplifier	SCHAFFNER	CPA9231A	18667	9KHz ~ 2GHz	Jan. 10, 2005	Radiation (03CH03-HY)
9	Amplifier	Agilent	8449B	3008A02120	1GHz ~ 26.5GHz	May 31, 2005	Radiation (03CH03-HY)
10	Amplifier	MITEQ	AMF-6F-260400	923364	26.5GHz ~ 40GHz	Jan. 05, 2004*	Radiation (03CH03-HY)
11	Loop Antenna	R&S	HFH2-Z2	860004/001	9kHz ~ 30MHz	May 24, 2004*	Radiation (03CH03-HY)
12	Biconical Antenna	SCHWARZBECK	VHBB 9124	301	30MHz ~ 200MHz	Jul. 22, 2005	Radiation (03CH03-HY)
13	Log Antenna	SCHWARZBECK	VUSLP 9111	221	200MHz ~ 1GHz	Jul. 22, 2005	Radiation (03CH03-HY)
14	Horn Antenna	EMCO	3115	6741	1GHz ~ 18GHz	Apr. 22, 2005	Radiation (03CH03-HY)
15	Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15GHz ~ 40GHz	Jun. 09, 2004*	Radiation (03CH03-HY)
16	RF Cable-R03m	Jye Bao	RG142	CB021	30MHz ~ 1GHz	Feb. 22, 2005	Radiation (03CH03-HY)
17	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	1GHz ~ 40GHz	Dec.01, 2004	Radiation (03CH03-HY)
18	Turn Table	HD	DS 420	420/650/00	0 ~ 360 degree	N/A	Radiation (03CH03-HY)
19	Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	N/A	Radiation (03CH03-HY)

※ Calibration Interval of instruments listed above is one year.
* Calibration Interval of instruments listed above is two year.

Items	Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
20	Spectrum Analyzer	R&S	FSP40	100019	9KHZ~40GHz	Jul. 21, 2005	Conducted (TH01-HY)
21	Power Meter	R&S	NRVS	100444	DC ~ 40GHz	Jul. 06, 2005	Conducted (TH01-HY)
22	Power Sensor	R&S	NRV-Z55	100049	DC ~ 40GHz	Jul. 06, 2005	Conducted (TH01-HY)
23	Power Sensor	R&S	NRV-Z32	100057	30MHz ~ 6GHz	Apr. 28, 2005	Conducted (TH01-HY)
24	AC Power Source	HPC	HPA-500W	HPA-9100024	AC 0 – 300V	Apr. 21, 2005	Conducted (TH01-HY)
25	DC Power Source	G.W.	GPC-6030D	C671845	DC 1V – 60V	Dec. 28, 2004	Conducted (TH01-HY)
26	Temp. and Humidity Chamber	KSON	THS-C3L	612	N/A	Oct. 01, 2004	Conducted (TH01-HY)
27	RF CABLE-1m	Jye Bao	RG142	CB034-1m	20MHz – 7GHz	Jan. 01, 2005	Conducted (TH01-HY)
28	RF CABLE-2m	Jye Bao	RG142	CB035-2m	20MHz – 1GHz	Jan. 01, 2005	Conducted (TH01-HY)
29	Data Generator	Tektronix	J310345	J310345	400Mbps	Dec. 21, 2004	Conducted (TH01-HY)
30	OscilloScope	Tektronix	TDS1012	C038520	100MHz-1Gs/s	Jan. 02, 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
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8. Certificate of NVLAP Accreditation

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ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

December 31, 2005
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