

# FCC TEST REPORT

**CATEGORY** : Mobile Device  
**PRODUCT NAME** : 802.11b/g PCI adapter card  
**FCC ID.** : MCLT60N865  
**FILING TYPE** : Certification  
**BRAND NAME** : FOXCONN  
**MODEL NAME** : T60N865

**APPLICANT** : **HON HAI PRECISION IND. CO., LTD.**

5F-1, 5 Hsin-An Road, Hsinchu Scienced-Based Industrial  
Park Taiwan, R.O.C.

**MANUFACTURER** : Same as Applicant

**ISSUED BY** : **SPORTON INTERNATIONAL INC.**

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

## Statements:

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

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

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



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1190  
ILAC MRA



Lab Code: 200079-0



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## History of this test report

No additional attachment.

Additional attachment were issued as following record:

Attachment No.	Issue Date	Description



## 1. General Description of Equipment under Test

### 1.1. Applicant

HON HAI PRECISION IND. CO., LTD.

5F-1, 5 Hsin-An Road, Hsinchu Scienced-Based Industrial Park Taiwan, R.O.C.

### 1.2. Manufacturer

Same as Applicant

### 1.3. Basic Description of Equipment under Test

This product is a PCI card with IEEE 802.11b/g wireless LAN solution. The technical data has been listed on section " Feature of Equipment under Test ". And it can be used for host equipment with PCI interface.

### 1.4. Features of Equipment under Test

ITEMS	DESCRIPTION
Type of Modulation	DSSS (CCK / DQPSK / DBPSK ), OFDM ( 10QAM, 64QAM )
Number of Channels	11
Frequency Band	2400MHz ~ 2483.5MHz
Carrier Frequency of Each Channel	Please reference table below.
Channel Bandwidth	CCK : 22MHz OFDM : 18MHz
Output Power	CCK : 20.60 dBm (peak) OFDM : 18.40 dBm (peak)
Antenna Type / Gain	Monopole Antenna / 2dBi
Function Type	Transceiver
Power Rating (DC/AC , Voltage)	3.3 VDC from host
Data Rate	DSSS ( 1, 2, 5.5, 11 Mbps ) OFDM ( 6, 9, 12, 18, 24, 36, 48, 54 Mbps )
Duty Cycle	NA
Humidity Range	10% ~ 90%
Temperature Range (Operating)	0 ~ 55°C



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## 1.5. Table for Carrier Frequencies

Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2412 MHz	5	2432 MHz	9	2452 MHz
2	2417 MHz	6	2437 MHz	10	2457 MHz
3	2422 MHz	7	2442 MHz	11	2462 MHz
4	2427 MHz	8	2447 MHz		



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## 2. Test Configuration of the Equipment under Test

### 2.1. Description of the Test

- a. During testing, the equipment was placed on a non-conducting support.
- b. The following test modes were performed:
  - Mode 1 : CH 01 2412MHz
  - Mode 2 : CH 06 2437MHz
  - Mode 3 : CH 11 2462MHz
- c. Spurious emission below 1GHz is independent of channel selection, so only Channel 11 with OFDM modulation was tested.
- d. For spurious emission above 1GHz, lowest, middle and highest channel with 11Mbps and 54Mbps data rate was tested.
- e. The EUT has been programmed to continuously transmit or receive mode during testing. The used peripherals as well as the configuration fulfill the requirements of ANSI C63.4:2001.
- f. The configuration is operated in a manner which tends to maximize its emission characteristics in a typical application.
- g. 3 meters measurement distance in semi-anechoic chamber was used in this test.

### 2.2. Frequency Range Investigated

- a. Conducted power line test: from 150 kHz to 30 MHz
- b. Radiated emission test: from 30 MHz to 25000 MHz



### 2.3. Description of Test Supporting Units

#### Support Unit 1. -- Personal Computer (COMPAQ)

FCC ID : N/A  
Model No. : D380mx  
Power Supply Type : Switching  
Power Cord : Non-Shielded  
Serial No. : SP0037  
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

#### Support Unit 2. -- Monitor (VIEWSONIC)

FCC ID : N/A  
Model No. : VCDTS21553-3P  
Power Supply Type : Switching  
Power Cord : Non-Shielded  
Serial No. : SP0051  
Data Cable : Shielded, 1.7m  
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

#### Support Unit 3. -- PS/2 Keyboard (LOGITECH)

FCC ID : N/A  
Model No. : Y-SJ17  
Serial No. : SP0054  
Data Cable : Shielded, 360 degree via metal backshells, 1.7m  
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

#### Support Unit 4. -- PS/2 Mouse (LOGITECH)

FCC ID : DZL211029  
Model No. : M-S34  
Serial No. : SP0041  
Data Cable : Shielded, 1.7m



Support Unit 5. -- Printer (EPSON)

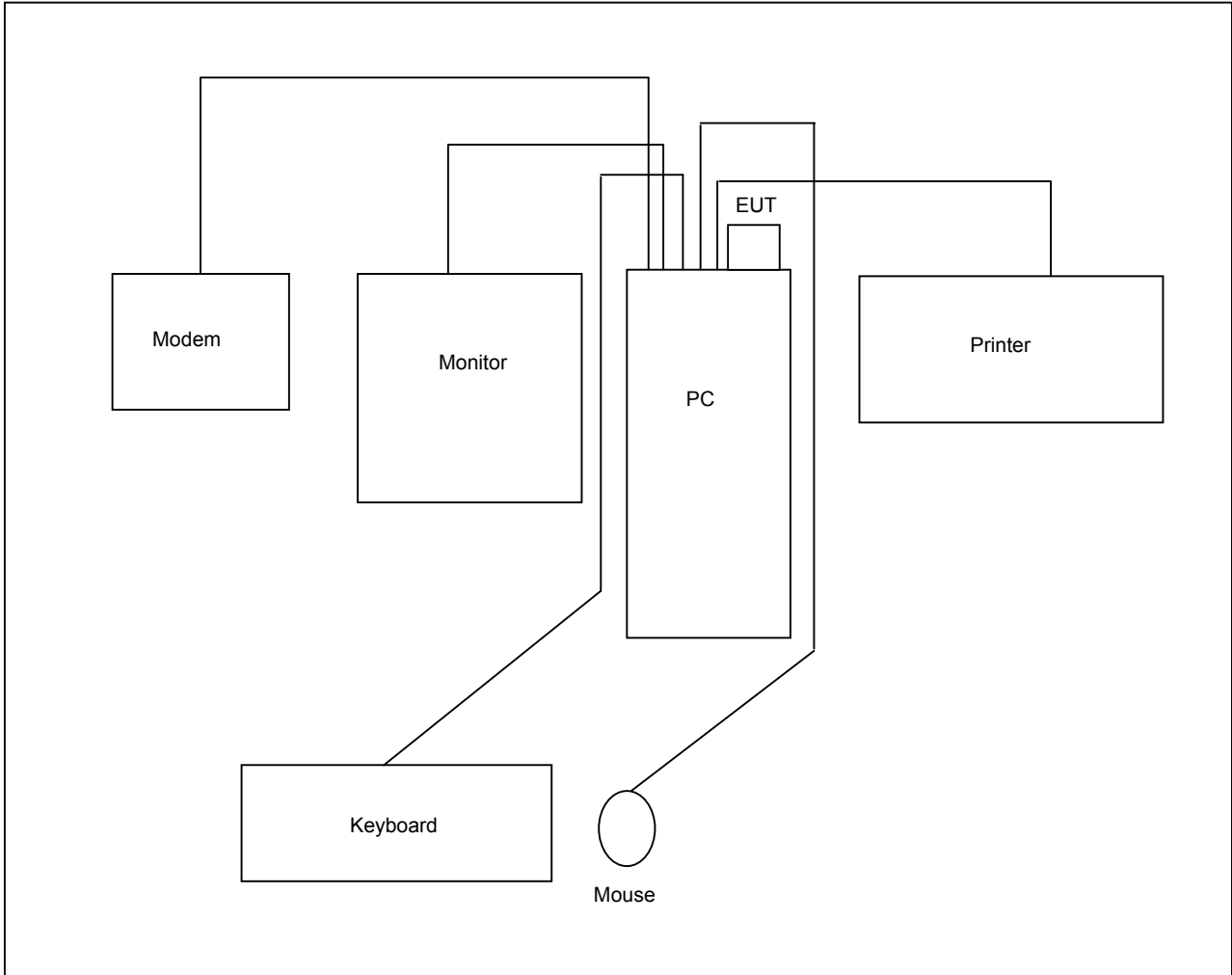
FCC ID : N/A  
Model No. : STYLUS COLOR 680  
Power Supply Type : Linear  
Power Cord : Non-Shielded  
Serial No. : SP0048  
Data Cable : Shielded, 1.35m  
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 6. -- Modem (ACEEX)

FCC ID : IFAXDM141  
Model No. : DM141  
Power Supply Type : Linear  
Power Cord : Non-Shielded  
Serial No. : SP0049  
Data Cable : Shielded, 1.15m  
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.



## 2.4. Connection Diagram of Test System





## 2.5. Test Software

There are 2 software may be used in the testing.

- a. 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.
- b. "H" Pattern Generator: Except Access Point, the supporting equipment such as monitor or printer is always available. Under testing, these supporting equipment has to also under working condition. "H" Pattern Generator is able to continuously transmitting "H" character to those supporting equipments.



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### 3. Test Location and Standards

#### 3.1. Test Location

**Test Location :** Sporton Hwa Ya Testing Building

**Address :** No. 52, Hwa Ya 1<sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

Tel: +886 3 327 3456 Fax: +886 3 318 0055

**Test Site No. :** CO01-HY, 03CH03-HY

#### 3.2. Test Conditions

Normal Voltage : 120V/60Hz

Extreme Voltages : 138V and 102V

Normal Temperature : 20 °C

Extreme Temperature : -20 °C and 50 °C

#### 3.3. Standards for Methods of Measurement

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

**ANSI C63.4-2001**

**47 CFR Part 15 Subpart C ( Section 15.247 )**

#### 3.4. DoC Statement

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



## 4. List of Measurements

### 4.1. Summary of the Test Results

Applied Standard: 47 CFR Part 15 and Part 2			
Paragraph	FCC Rule	Description of Test	Result
5.1	15.247(a)(2)	6dB Spectrum Bandwidth (DSSS System)	Pass
5.2	15.247(b)	Maximum Peak Output Power	Pass
5.3	15.247(d)	Peak Power Spectral Density	Pass
5.4	15.247(c)	Band Edges Emission	Pass
5.5	15.107/15.207	AC Power Line Conducted Emission	Pass
5.6	15.209/15.247(c)	Spurious Radiated Emission	Pass
5.7	15.203	Antenna Requirement	Pass

## 5. Test Result

### 5.1. Test of 6dB Spectrum Bandwidth ( DSSS System )

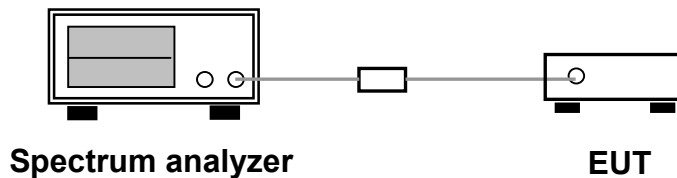
#### 5.1.1 Measuring Instruments

Item 9 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 100KHz and VBW to 100KHz.
3. The 6dB bandwidth is defined as 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.

#### 5.1.3 Test Setup Layout



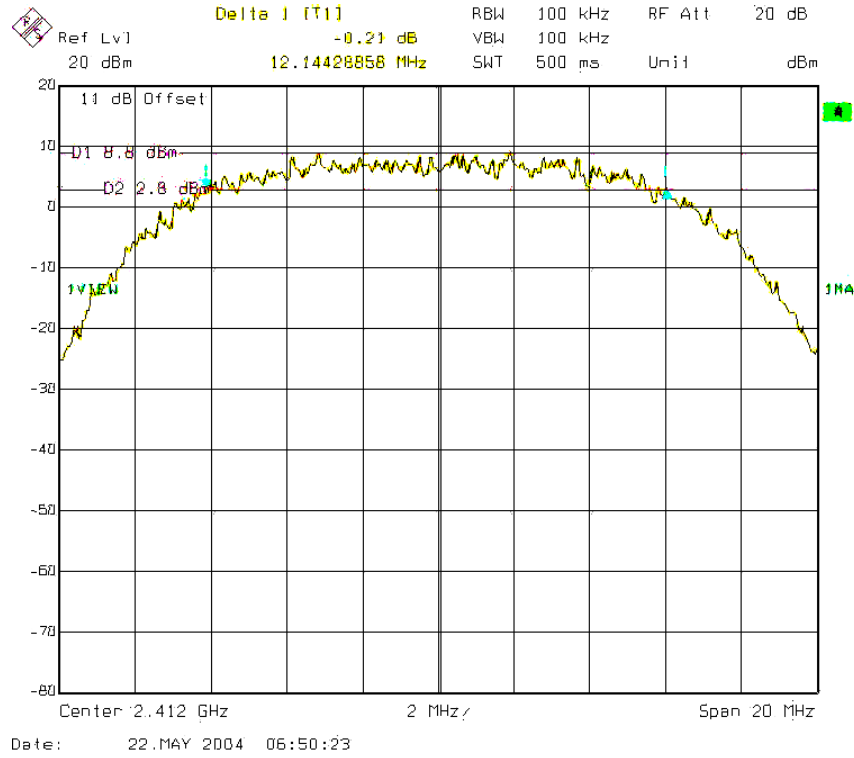
#### 5.1.4 Test Result : See spectrum analyzer plots below

- Modulation Type: CCK
- Temperature: 26°C
- Relative Humidity: 64%
- Test Engineer: Murray Lu

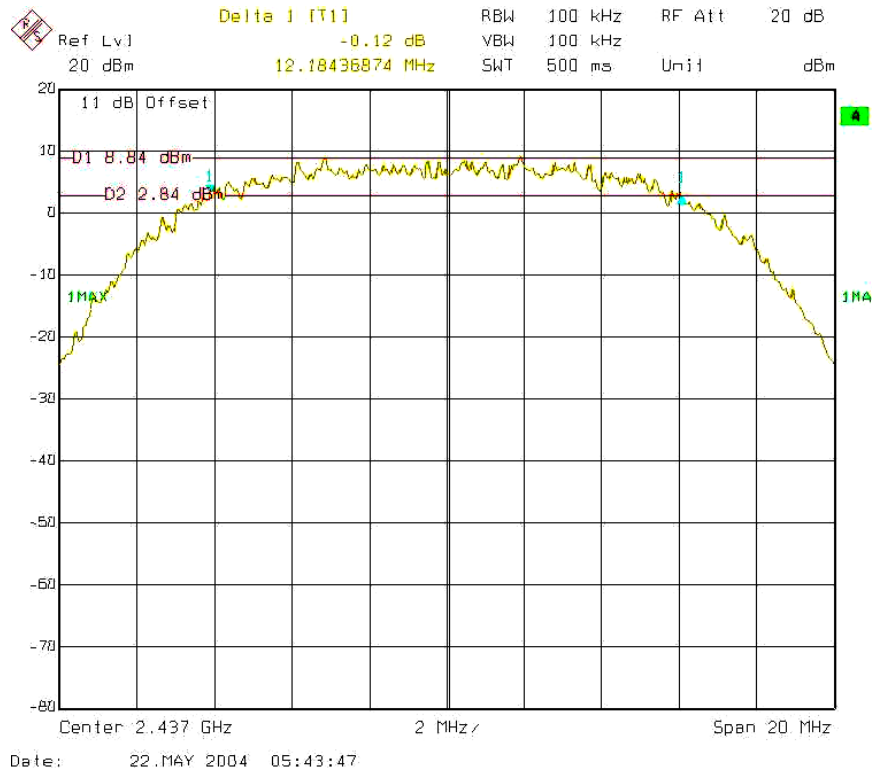
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Min. Limit (MHz)
01	2412	12.14	0.5
06	2437	12.18	0.5
11	2462	12.14	0.5



Modulation Type: CCK (Channel 01) :

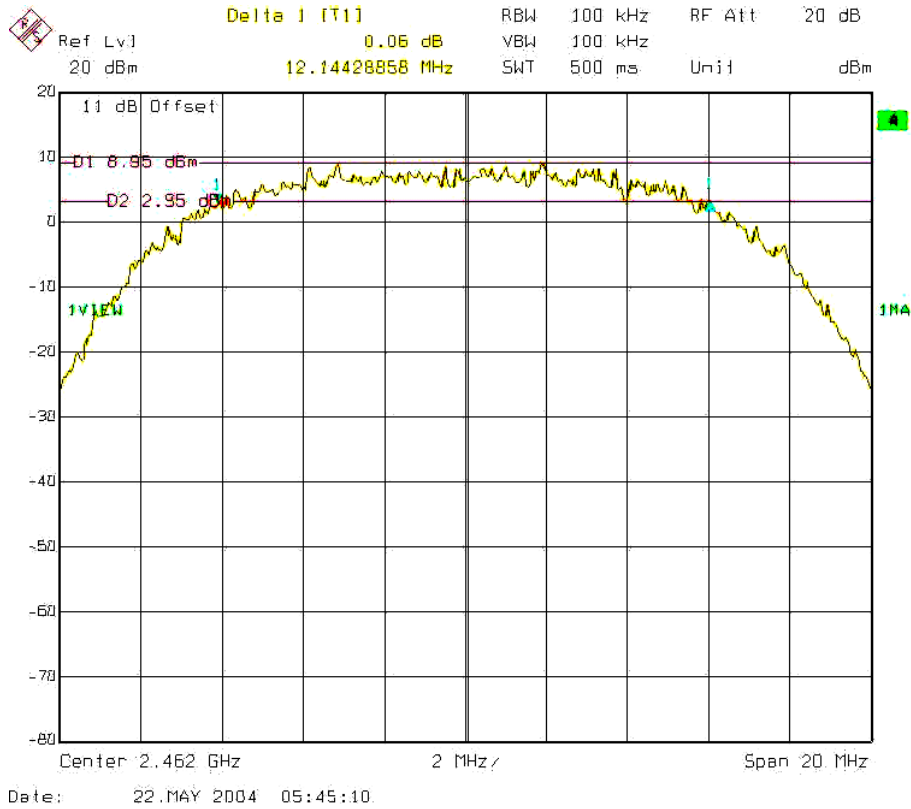


Modulation Type: CCK (Channel 06) :





Modulation Type: CCK (Channel 11) :



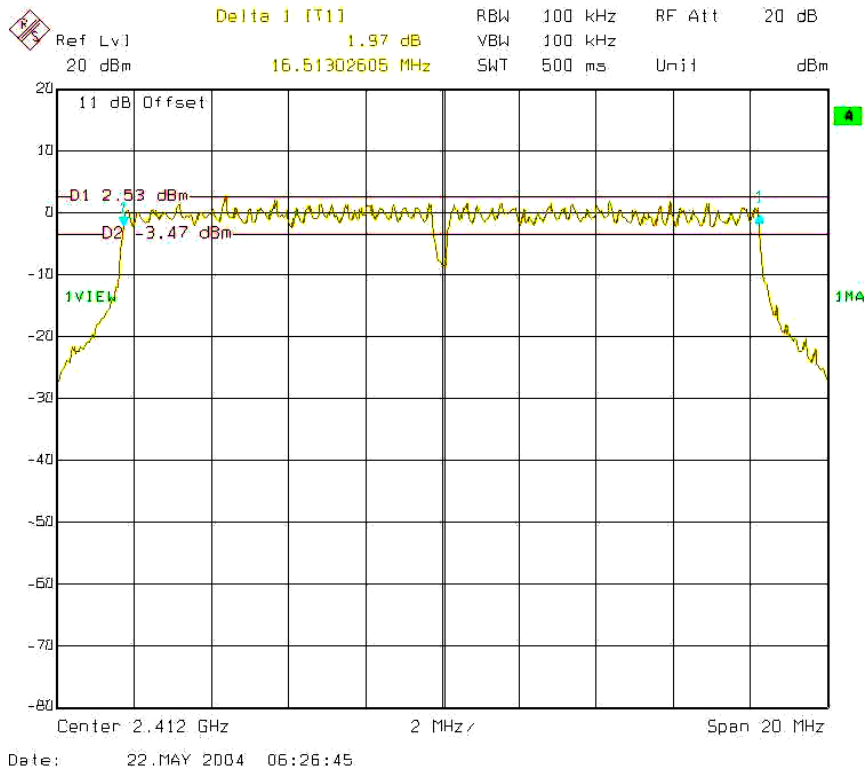
5.1.5 Test Result : See spectrum analyzer plots below

- Modulation Type: OFDM
- Temperature: 26°C
- Relative Humidity: 64 %
- Test Engineer: Murray Lu

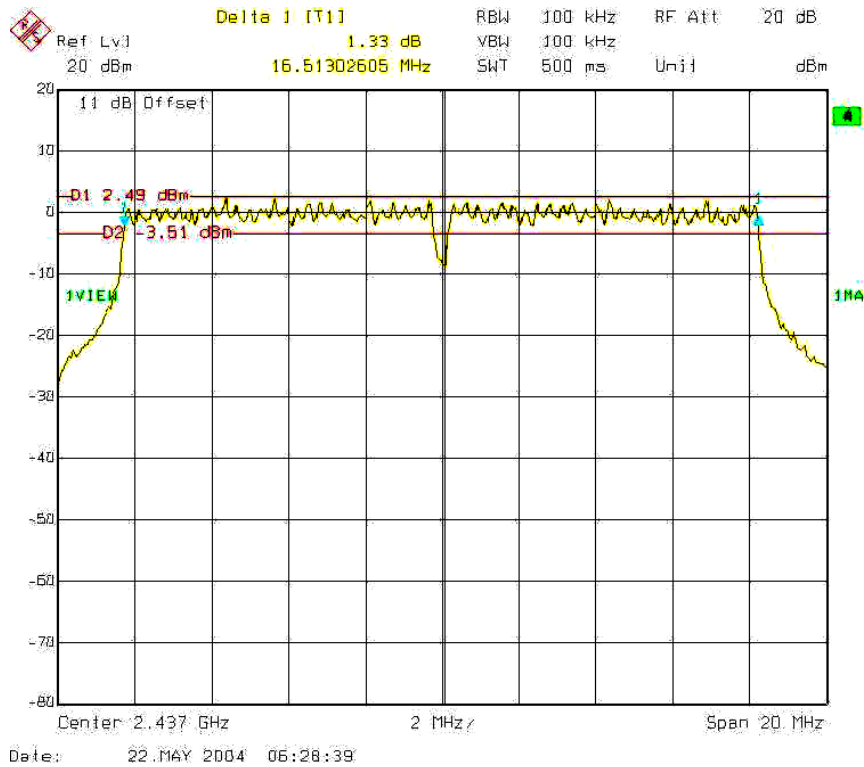
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Min. Limit (MHz)
01	2412	16.51	0.5
06	2437	16.51	0.5
11	2462	16.56	0.5



Modulation Type: OFDM (Channel 01) :



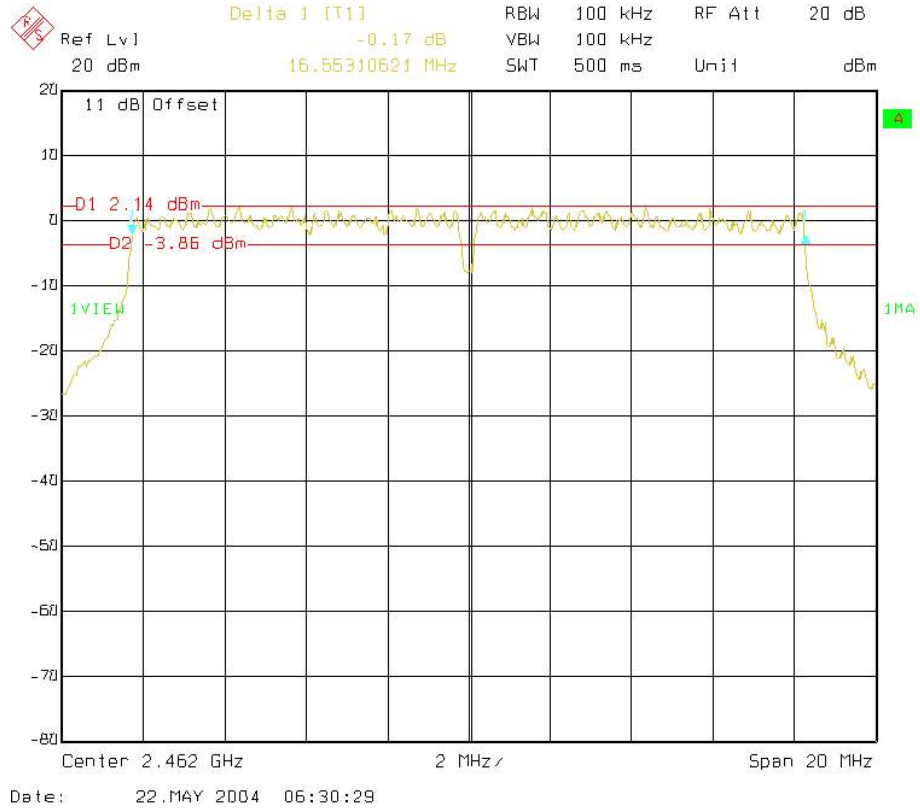
Modulation Type: OFDM (Channel 06) :







Modulation Type: OFDM (Channel 11) :



## 5.2. Test of Maximum Peak Output Power

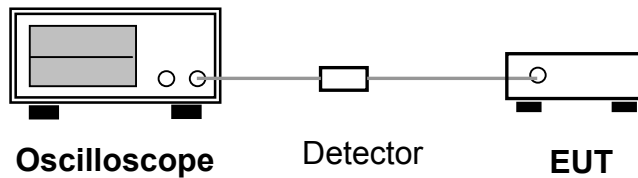
### 5.2.1 Measuring Instruments

Item 9 of the table on section 6.

### 5.2.2 Test Procedures

1. The transmitter output was connected to the vertical channel of the oscilloscope through a detector.
2. Observe the duty cycle X from the oscilloscope and the record the detected voltage level A.
3. Replace the EUT via the signal generator, calibrate the reading via the carrier frequency.
4. The duty cycle X has to be calibrated on the output power of the signal generator.
5. Repeated the 1~4 for the middle and highest channel of the EUT.

### 5.2.3 Test Setup Layout



### 5.2.4 Test Result : See spectrum analyzer plots below

- Modulation Type: CCK
- Temperature: 26°C
- Relative Humidity: 64 %
- Test Engineer: Murray Lu

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (mWatt)	Limits (dBm )
01	2412	20.6	114.815	30 dBm
06	2437	20.3	107.152	30 dBm
11	2462	20.5	112.202	30 dBm



5.2.5 Test Result : See spectrum analyzer plots below

- Modulation Type: OFDM
- Temperature: 26°C
- Relative Humidity: 64 %
- Test Engineer: Murray Lu

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (mWatt)	Limits (dBm )
01	2412	18.4	69.183	30 dBm
06	2437	18.1	64.565	30 dBm
11	2462	18.3	67.608	30 dBm

### 5.3. Test of Peak Power Spectral Density

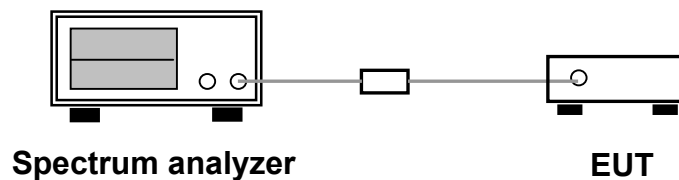
#### 5.3.1 Measuring Instruments

Item 9 of the table on section 6.

#### 5.3.2 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.
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.

#### 5.3.3 Test Setup Layout



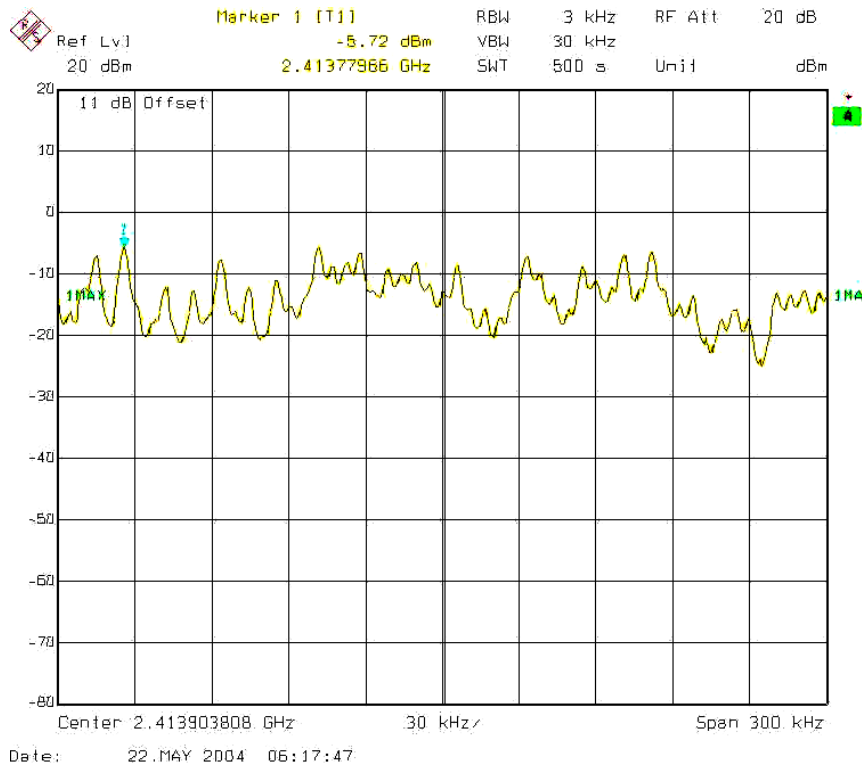
#### 5.3.4 Test Result : See spectrum analyzer plots below

- Modulation Type: CCK
- Temperature: 26°C
- Relative Humidity: 64 %
- Test Engineer: Murray Lu

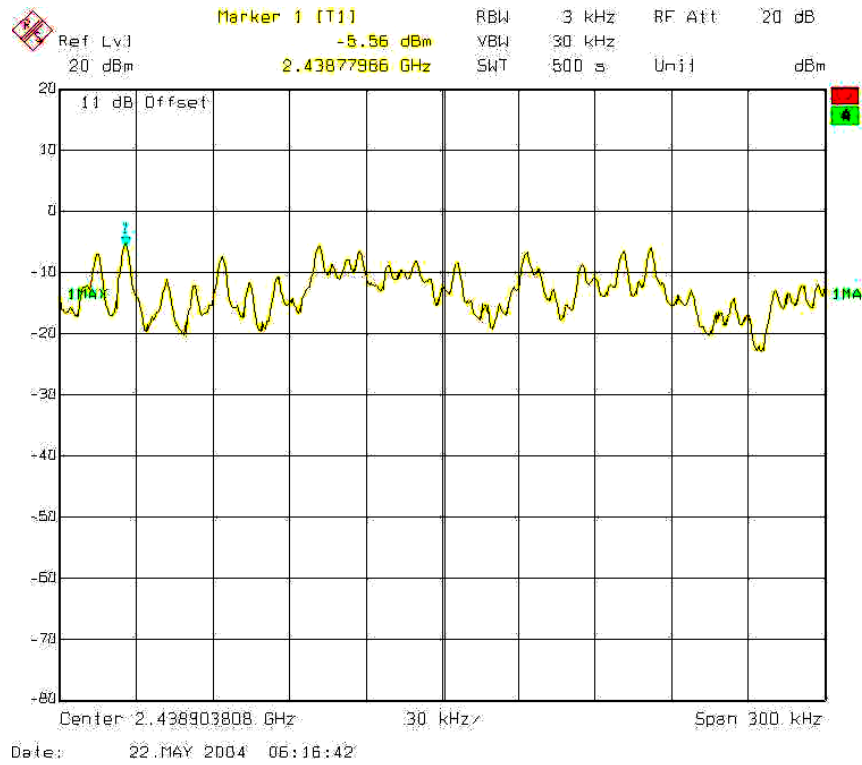
Channel	Frequency (MHz)	Power Density (dBm)	Limits (dBm)
01	2412	-5.72	8
06	2437	-5.56	8
11	2462	-5.07	8



Modulation Type: CCK (Channel 01) :

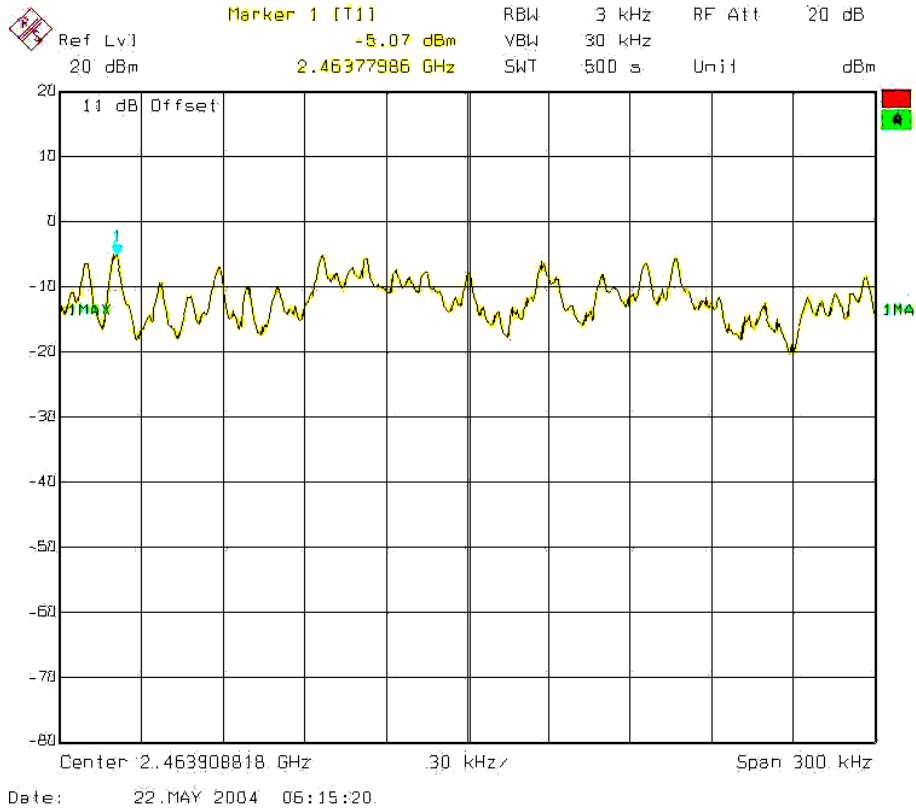


Modulation Type: CCK (Channel 06) :





Modulation Type: CCK (Channel 11) :



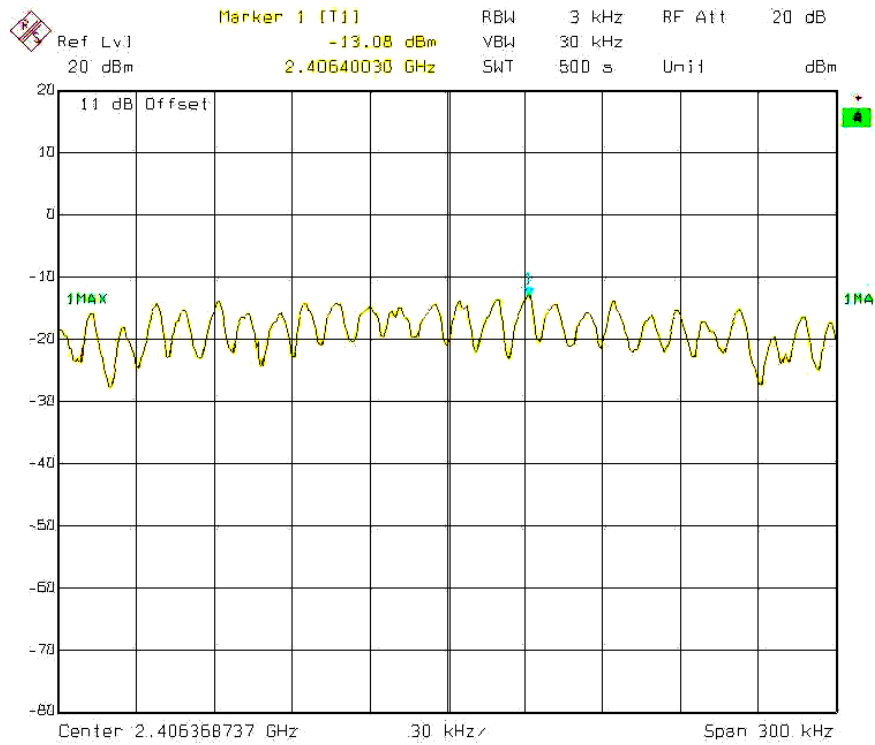
5.3.5 Test Result : See spectrum analyzer plots below

- Modulation Type: OFDM
- Temperature: 26°C
- Relative Humidity: 64 %
- Test Engineer: Murray Lu

Channel	Frequency (MHz)	Power Density (dBm)	Limits (dBm)
01	2412	-13.08	8
06	2437	-13.16	8
11	2462	-12.39	8

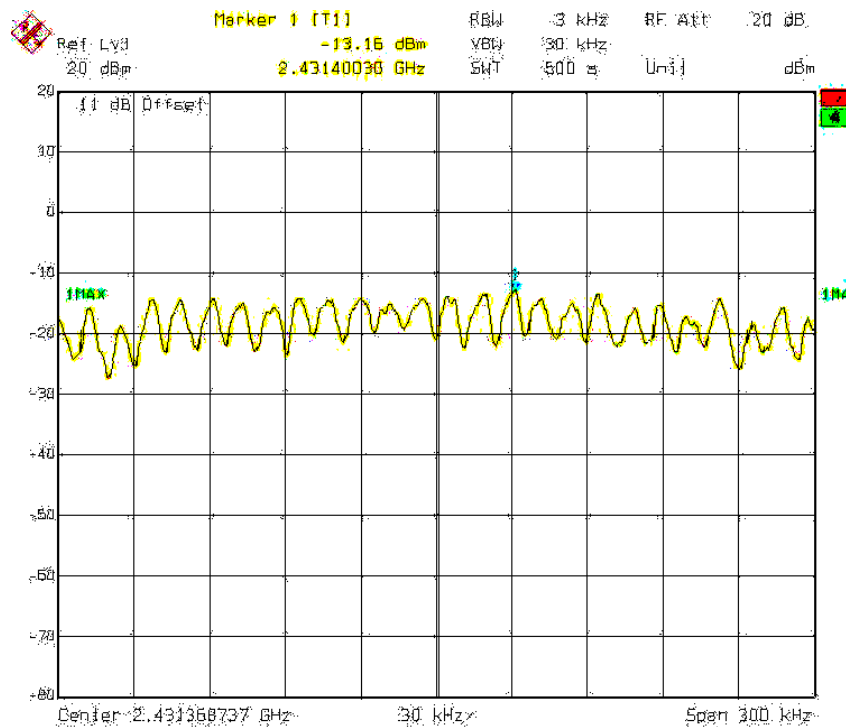


Modulation Type: OFDM (Channel 01) :



Date: 22.MAY 2004 06:48:12

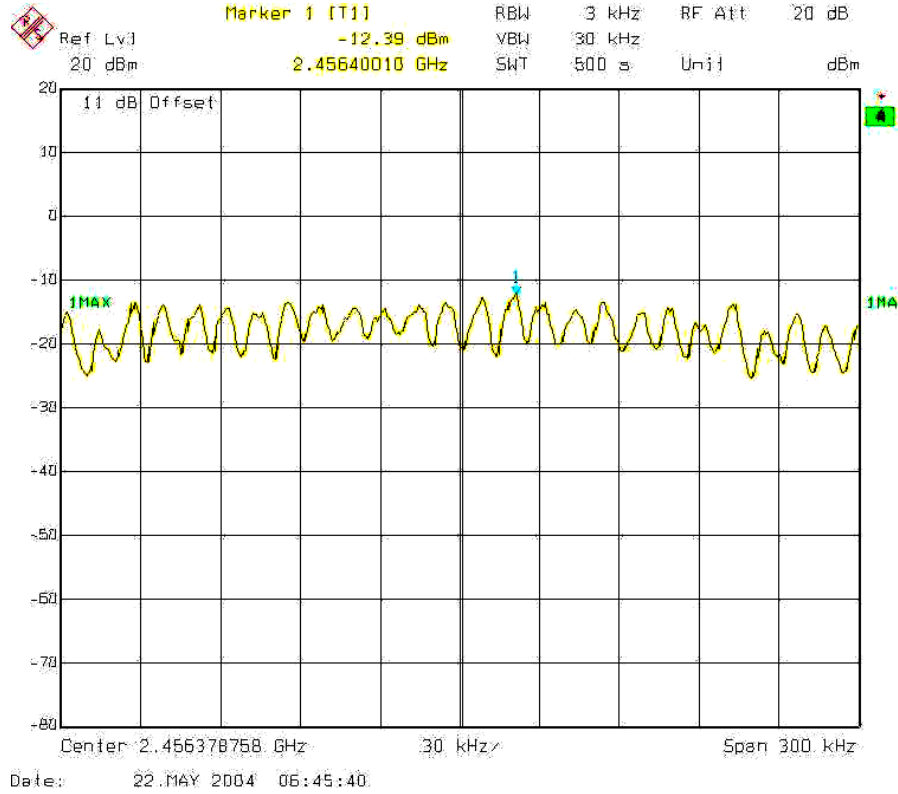
Modulation Type: OFDM (Channel 06) :



Date: 22.MAY 2004 06:48:36



Modulation Type: OFDM (Channel 11) :







## 5.4. Test of Band Edges Emission

### 5.4.1 Measuring Instruments

Item 9 of the table on section 6.

### 5.4.2 Test Procedures

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

### 5.4.3 Test Result :

- Modulation Type: CCK
- Test Engineer: Murray Lu

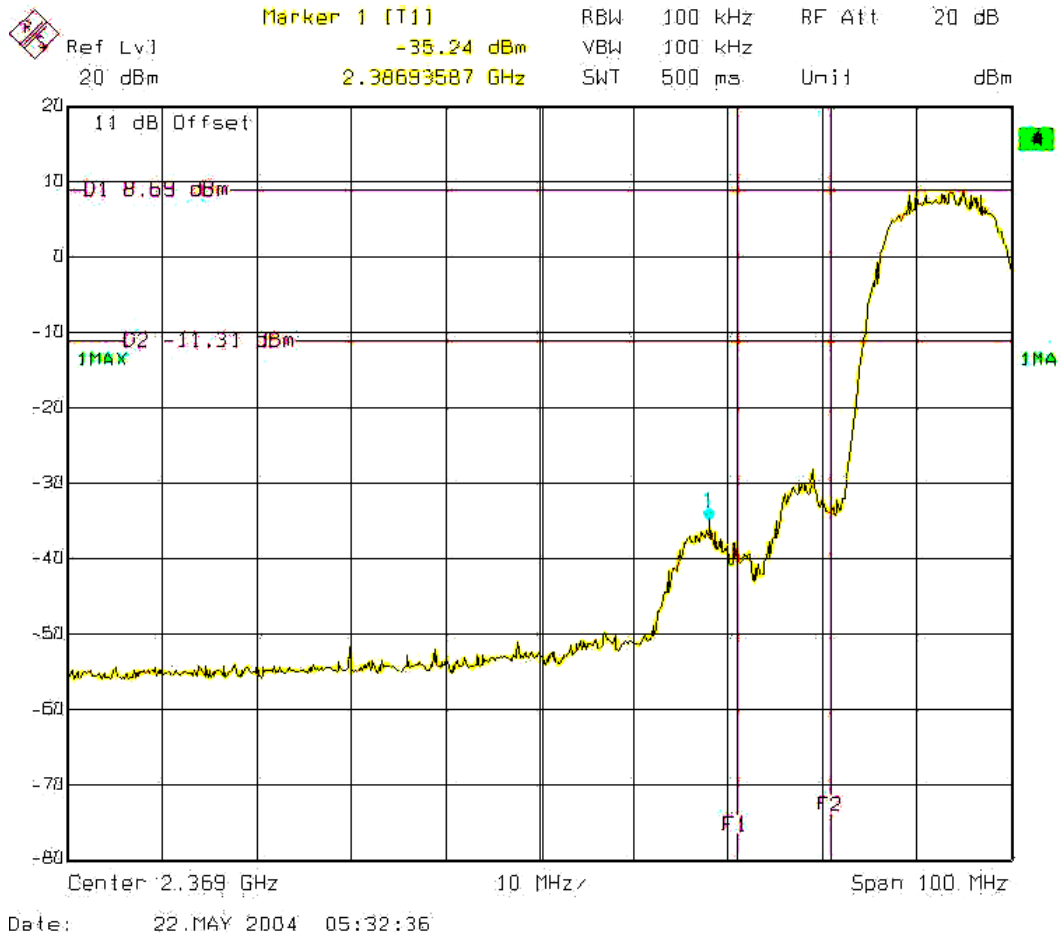
#### (A) Left Edge

The band edge emission plot shows 43.93dB delta between carrier maximum power and local maximum emission in the restricted band.

CH01 Carrier power strength (dBuV/m)	Delta (dB)	The maximum field strength in restrict band (dBuV/m)	Limit (dBuV/m)	Margin (dB)
93.94	43.93	50.01	54.00	-3.99



Modulation Type: CCK(Channel 01) :



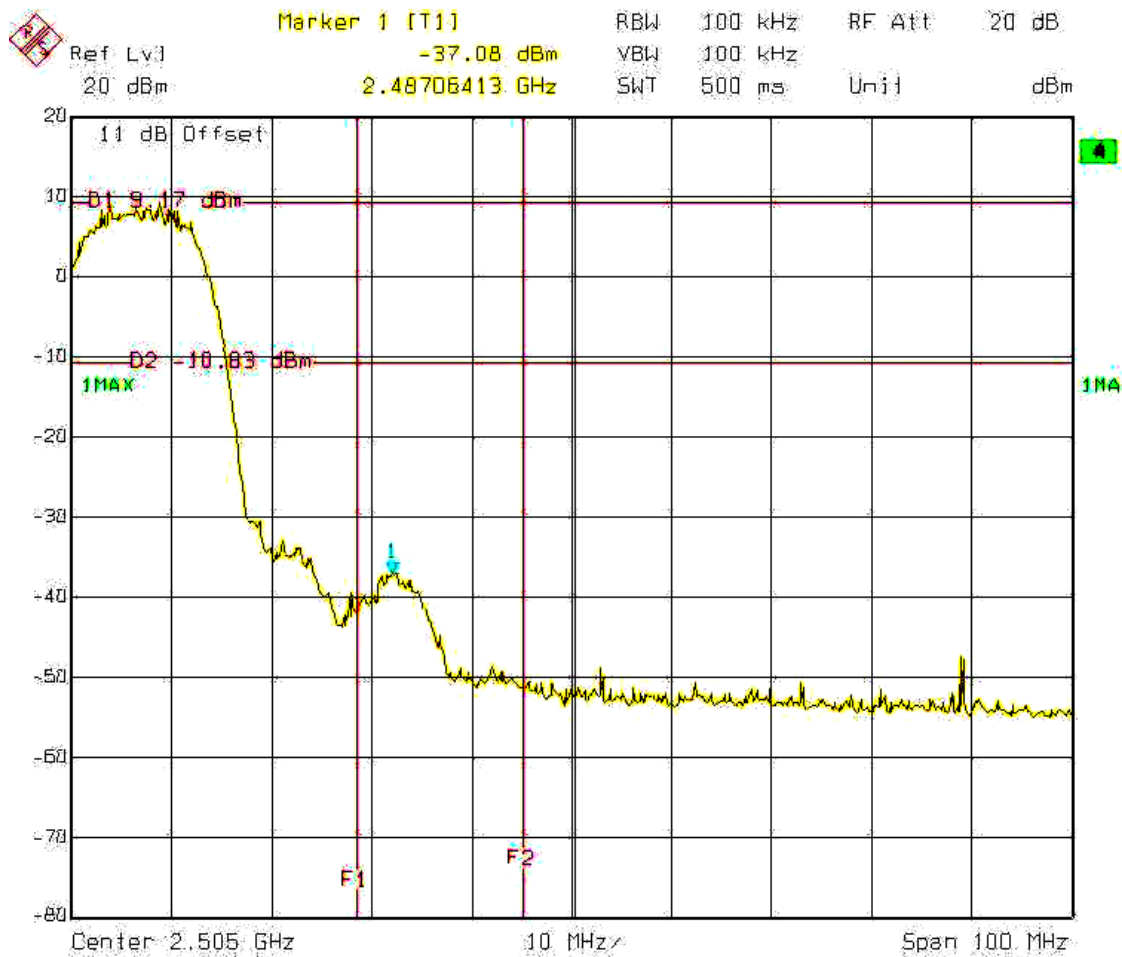
(B) Right Edge

The band edge emission plot shows 47.07dB delta between carrier maximum power and local maximum emission in the restricted band.

CH11 Carrier power strength (dBuV/m)	Delta (dB)	The maximum field strength in restrict band (dBuV/m)	Limit (dBuV/m)	Margin (dB)
94.65	46.25	48.40	54.00	-5.60

\* The maximum field strength in restricted band is the emission of carrier power strength subtract to the delta between carrier maximum power and local maximum emission in the restricted band.

Modulation Type: CCK (Channel 11) :



Date: 22.MAY.2004 05:48:05

Observation : All emissions in the 100kHz bandwidth are 20dB lower than the carrier strength.



5.4.4 Test Result :

- Modulation Type: OFDM
- Test Engineer: Murray Lu

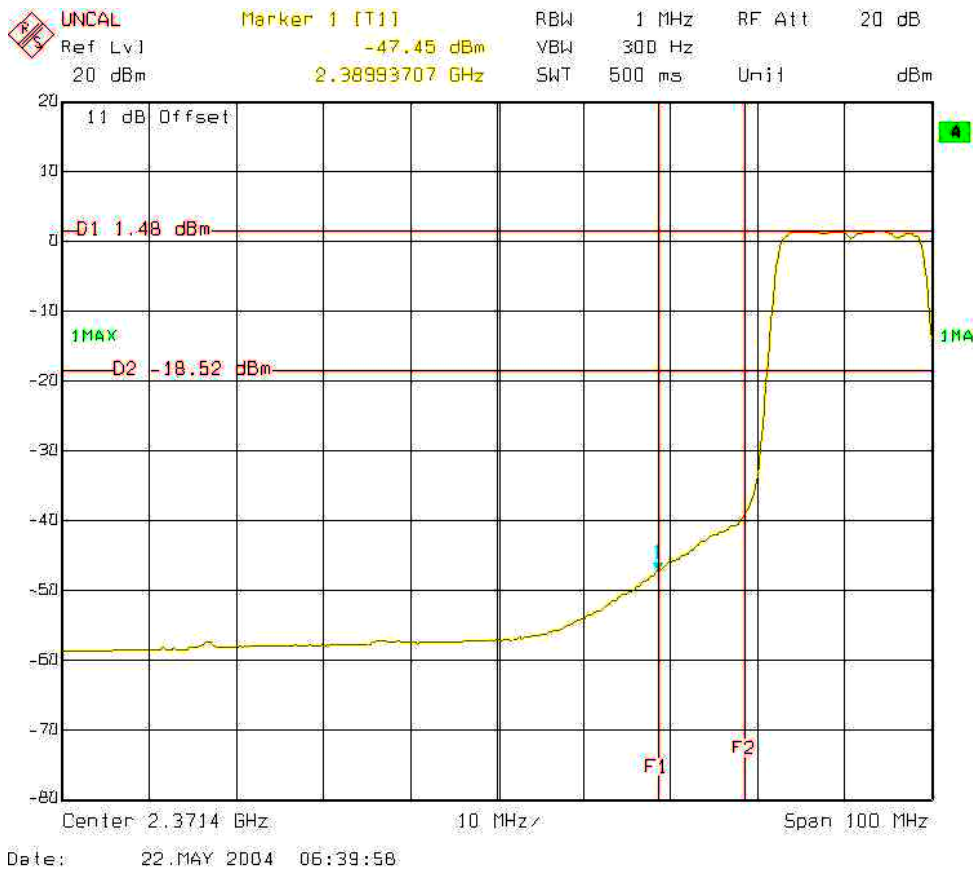
(A) Left Edge

The band edge emission plot shows 48.93dB delta between carrier maximum power and local maximum emission in the restricted band.

CH01 Carrier power strength (dBuV/m)	Delta (dB)	The maximum field strength in restrict band (dBuV/m)	Limit (dBuV/m)	Margin (dB)
59.74	48.93	10.81	54.00	-43.19

\* The maximum field strength in restricted band is the emission of carrier power strength subtract to the delta between carrier maximum power and local maximum emission in the restricted band

Modulation Type: OFDM (Channel 01) :





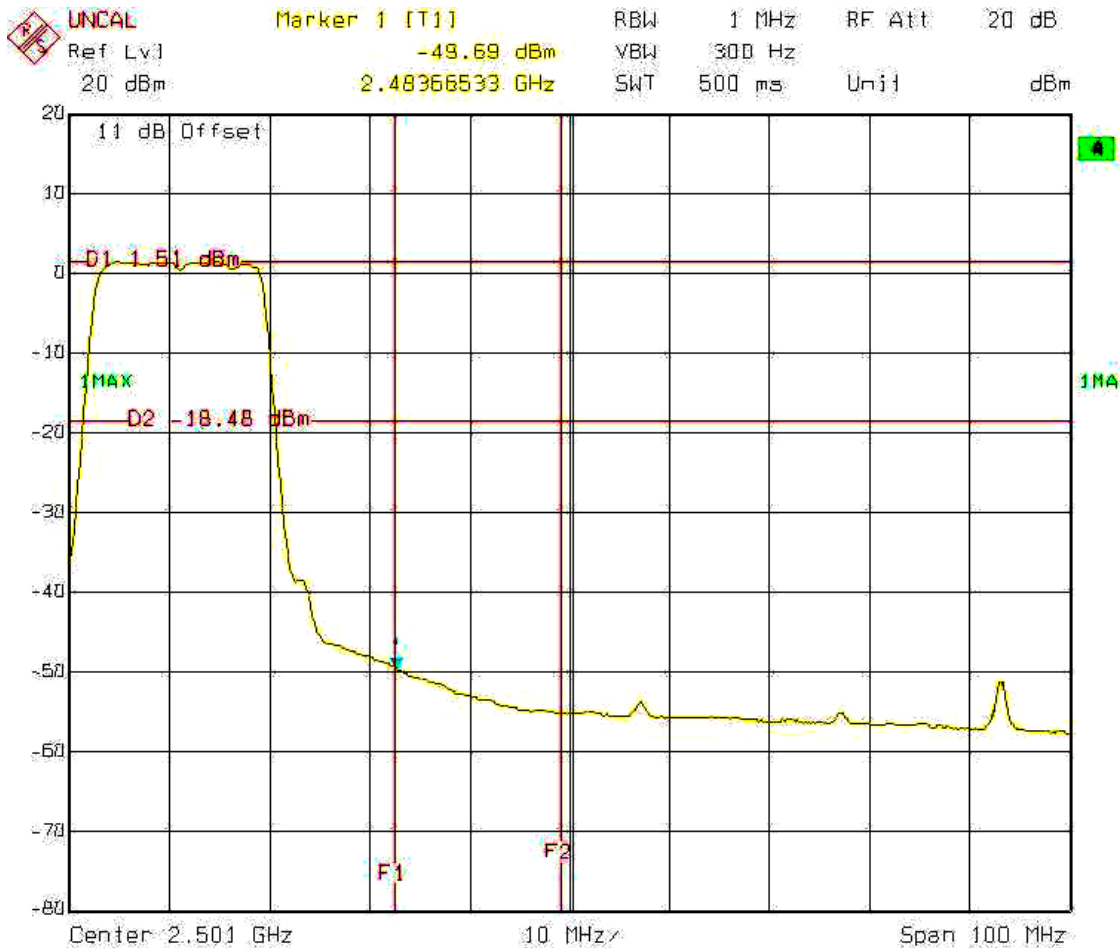
(B) Right Edge

The band edge emission plot shows 51.20dB delta between carrier maximum power and local maximum emission in the restricted band.

CH11 Carrier power strength (dBuV/m)	Delta (dB)	The maximum field strength in restrict band (dBuV/m)	Limit (dBuV/m)	Margin (dB)
59.51	51.20	8.31	54.00	-45.69

\* The maximum field strength in restricted band is the emission of carrier power strength subtract to the delta between carrier maximum power and local maximum emission in the restricted band

Modulation Type: OFDM (Channel 11) :



Date: 22 MAY 2004 06:34:02

Observation : All emissions in the 100kHz bandwidth are 20dB lower than the carrier strength.



## 5.5. Test of AC Power Line Conducted Emission

### 5.5.1 Measuring Instruments

Please reference item 1~7 in chapter 6 for the instruments used for testing.

### 5.5.2 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 provides 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.



5.5.3 Test Result of Conducted Emission

Test Mode	RF LINK	Tested By	Brian Lin
Temperature / Humidity	26deg. C / 64%		

*Line to Ground*

	Freq	Level	Over Limit	Limit Line	Read Level	Factor	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	dB	
1	0.1777150	38.61	-25.98	64.59	38.50	0.11	0.10	0.01	QP
2	0.1777150	29.23	-25.36	54.59	29.12	0.11	0.10	0.01	Average
3	0.2035970	39.36	-24.10	63.46	39.25	0.11	0.10	0.01	QP
4	@0.2035970	35.54	-17.92	53.46	35.43	0.11	0.10	0.01	Average
5	0.2938830	23.76	-26.65	50.41	23.64	0.12	0.10	0.02	Average
6	0.2938830	30.46	-29.95	60.41	30.34	0.12	0.10	0.02	QP
7	0.4374210	25.43	-31.68	57.11	25.31	0.12	0.10	0.02	QP
8	0.4374210	21.21	-25.90	47.11	21.09	0.12	0.10	0.02	Average
9	11.546	36.90	-23.10	60.00	36.63	0.27	0.14	0.13	QP
10	@ 11.546	33.41	-16.59	50.00	33.14	0.27	0.14	0.13	Average
11	20.700	10.74	-39.26	50.00	10.30	0.44	0.24	0.20	Average
12	20.700	17.33	-42.67	60.00	16.89	0.44	0.24	0.20	QP

*Neutral to Ground*

	Freq	Level	Over Limit	Limit Line	Read Level	Factor	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	dB	
1	0.1761040	40.75	-23.92	64.67	40.64	0.11	0.10	0.01	QP
2	0.1761040	31.85	-22.82	54.67	31.74	0.11	0.10	0.01	Average
3	0.2018130	38.62	-24.92	63.54	38.51	0.11	0.10	0.01	QP
4	0.2018130	33.53	-20.01	53.54	33.42	0.11	0.10	0.01	Average
5	0.2353310	32.09	-30.17	62.26	31.98	0.11	0.10	0.01	QP
6	0.2353310	25.99	-26.27	52.26	25.88	0.11	0.10	0.01	Average
7	0.2924290	30.58	-29.88	60.46	30.46	0.12	0.10	0.02	QP
8	0.2924290	23.17	-27.29	50.46	23.05	0.12	0.10	0.02	Average
9	11.546	37.21	-22.79	60.00	36.88	0.33	0.20	0.13	QP
10	@ 11.546	33.53	-16.47	50.00	33.20	0.33	0.20	0.13	Average
11	20.700	10.84	-39.16	50.00	10.30	0.54	0.34	0.20	Average
12	20.700	17.59	-42.41	60.00	17.05	0.54	0.34	0.20	QP

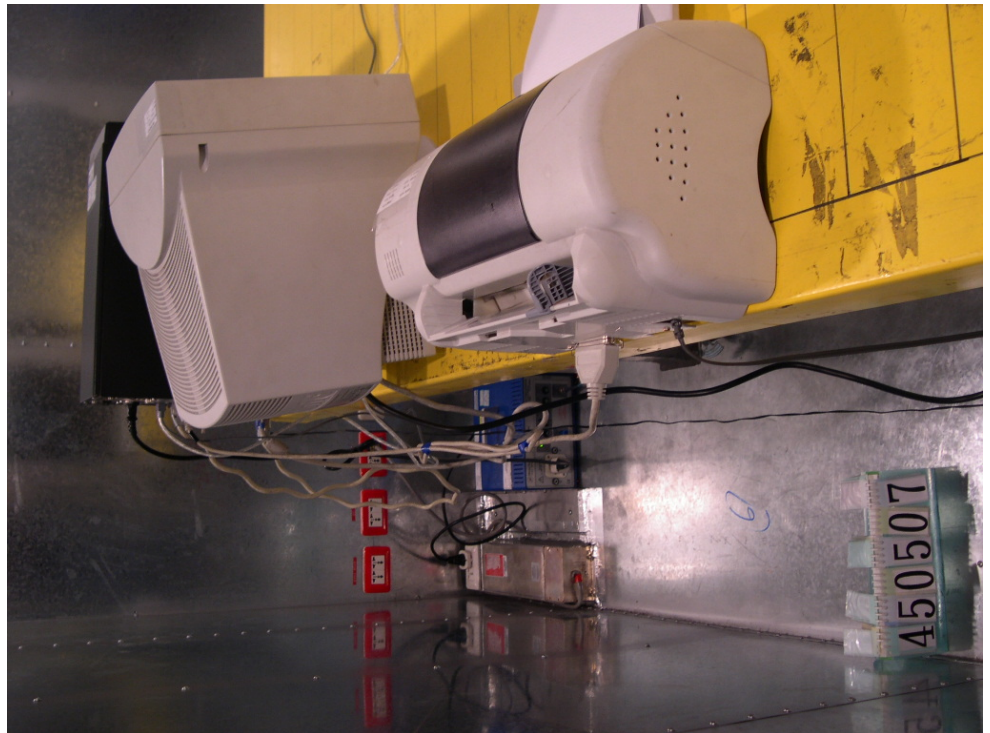
#### 5.5.4 Photographs of Conducted Emission Test Configuration

- The photographs show the configuration that generates the maximum emission.

FRONT VIEW

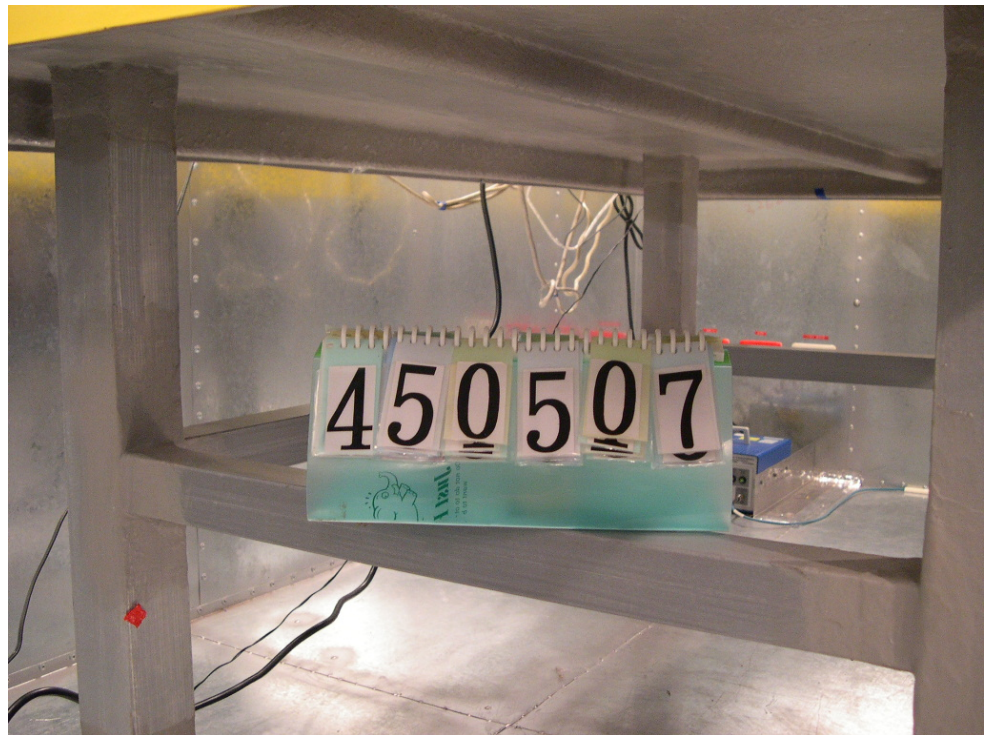


REAR VIEW





SIDE VIEW





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## 5.6. Test of Spurious Radiated Emission

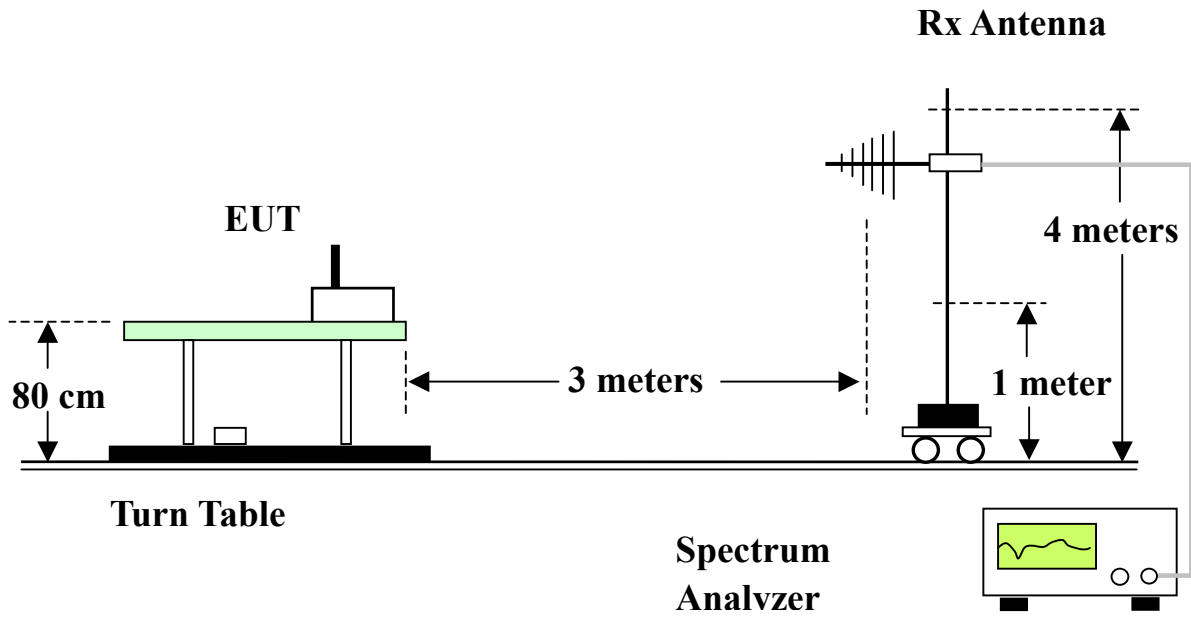
### 5.6.1 Measuring Instruments

Please reference item 8~19 in chapter 6 for the instruments used for testing.

### 5.6.2 Test Procedures

- a) Configure the EUT according to ANSI C63.4.
- b) The EUT was placed on the top of the turn table 0.8 meter above ground.
- c) 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.
- d) Power on the EUT and all the supporting units.
- e) The turn table was rotated by 360 degrees to determine the position of the highest radiation.
- f) 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.
- g) 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.
- h) Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
- i) For emission above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
- j) 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.
- k) 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.

5.6.3 Test Setup Layout





5.6.4 Test Results and Limit

**Note:**

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

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

<b>Test Mode</b>	<b>RF LINK</b>	<b>Temperature</b>	25 deg. C	<b>Tested By</b>	Steve Chen
<b>Freq. Range</b>	30MHz~1GHz	<b>Humidity</b>	65%		

**(A) Polarization: Horizontal**

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	144.070	31.81	-11.69	43.50	45.50	12.00	2.12	27.81	QP	---	---
2	177.900	31.21	-12.29	43.50	43.04	13.50	2.41	27.74	QP	---	---
3	195.070	32.00	-11.50	43.50	42.51	14.69	2.51	27.71	QP	---	---
1	228.000	30.86	-15.14	46.00	42.13	13.60	2.72	27.59	QP	---	---
2	236.800	29.73	-16.27	46.00	41.45	13.05	2.78	27.55	QP	---	---
3	400.800	28.62	-17.38	46.00	37.16	15.80	3.47	27.81	QP	---	---

**(B) Polarization: Vertical**

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	71.140	33.49	-6.51	40.00	51.08	8.95	1.42	27.96	QP	125	136
2	95.790	28.69	-14.81	43.50	45.49	9.43	1.68	27.91	QP	---	---
3	118.740	27.12	-16.38	43.50	42.47	10.56	1.95	27.86	QP	---	---
1	400.000	30.80	-15.20	46.00	39.34	15.79	3.47	27.80	QP	---	---
2	432.000	29.40	-16.60	46.00	37.63	16.24	3.62	28.09	QP	---	---
3	902.400	30.00	-16.00	46.00	31.83	21.12	5.35	28.30	QP	---	---



<b>Modulation Type</b>	CCK				
<b>Test Mode</b>	Mode 1 ( 2412MHz )	<b>Temperature</b>	26 deg. C	<b>Tested By</b>	Steve Chen
<b>Freq. Range</b>	1GHz~25GHz	<b>Humidity</b>	64%		

**(A) Polarization: Horizontal**

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	2038.330	52.45	-21.55	74.00	64.52	27.21	1.65	40.93	Peak	---	---
2	2038.330	49.85	-4.15	54.00	61.92	27.21	1.65	40.93	Average	---	---
3	2342.740	46.58	-7.42	54.00	57.98	28.02	1.69	41.11	Average	---	---
1	2517.590	51.09	-22.91	74.00	61.92	28.51	1.86	41.20	Peak	---	---
2	2517.590	39.99	-14.01	54.00	50.82	28.51	1.86	41.20	Average	---	---
3	2786.170	56.59	-17.41	74.00	66.39	29.45	1.95	41.20	Peak	---	---
4	2786.170	39.92	-14.08	54.00	49.72	29.45	1.95	41.20	Average	---	---
5	2817.680	45.14	-8.86	54.00	54.82	29.56	1.96	41.20	Average	---	---

**(B) Polarization: Vertical**

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1202.940	36.90	-17.10	54.00	51.60	24.40	1.22	40.32	Average	---	---
2	2038.330	50.12	-3.88	54.00	62.19	27.21	1.65	40.93	Average	102	215
3	2338.570	49.71	-4.29	54.00	61.13	28.00	1.69	41.11	Average	---	---
1	2517.590	51.73	-22.27	74.00	62.56	28.51	1.86	41.20	Peak	---	---
2	2517.590	41.03	-12.97	54.00	51.86	28.51	1.86	41.20	Average	---	---
3	2786.170	43.53	-10.47	54.00	53.33	29.45	1.95	41.20	Average	---	---
4	2786.170	60.87	-13.13	74.00	70.67	29.45	1.95	41.20	Peak	---	---
5	2817.160	48.52	-5.48	54.00	58.20	29.56	1.96	41.20	Average	---	---
1	4822.000	43.36	-10.64	54.00	50.03	33.23	2.47	42.37	Average	---	---



<b>Modulation Type</b>	CCK				
<b>Test Mode</b>	Mode 2 ( 2437MHz )	<b>Temperature</b>	25 deg. C	<b>Tested By</b>	Steve Chen
<b>Freq. Range</b>	1GHz~25GHz	<b>Humidity</b>	65%		

**(A) Polarization: Horizontal**

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1653.300	38.38	-35.62	74.00	51.71	25.83	1.54	40.70	Peak	---	---
2	2064.740	50.13	-3.87	54.00	62.14	27.28	1.66	40.95	Average	103	198
3	2064.740	53.19	-20.81	74.00	65.20	27.28	1.66	40.95	Peak	---	---
4	2338.570	47.26	-6.74	54.00	58.68	28.00	1.69	41.11	Average	---	---
1	2507.260	51.15	-22.85	74.00	62.02	28.47	1.86	41.20	Peak	---	---
2	2507.260	40.78	-13.22	54.00	51.65	28.47	1.86	41.20	Average	---	---
3	2810.960	54.44	-19.56	74.00	64.14	29.54	1.96	41.20	Peak	---	---
4	2810.960	37.67	-16.33	54.00	47.37	29.54	1.96	41.20	Average	---	---
5	2865.190	41.72	-12.28	54.00	51.24	29.73	1.95	41.20	Average	---	---

**(B) Polarization: Vertical**

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1504.570	36.59	-17.41	54.00	50.47	25.27	1.46	40.61	Average	---	---
2	2064.740	50.29	-23.71	74.00	62.30	27.28	1.66	40.95	Peak	---	---
3	2064.740	47.87	-6.13	54.00	59.88	27.28	1.66	40.95	Average	---	---
4	2321.890	50.07	-3.93	54.00	61.49	27.96	1.72	41.10	Average	---	---
1	2522.240	50.64	-23.36	74.00	61.45	28.52	1.87	41.20	Peak	---	---
2	2522.240	39.60	-14.40	54.00	50.41	28.52	1.87	41.20	Average	---	---
3	2810.960	58.26	-15.74	74.00	67.96	29.54	1.96	41.20	Peak	---	---
4	2810.960	40.71	-13.29	54.00	50.41	29.54	1.96	41.20	Average	---	---
5	2865.190	44.65	-9.35	54.00	54.17	29.73	1.95	41.20	Average	---	---



<b>Modulation Type</b>	CCK				
<b>Test Mode</b>	Mode 3 ( 2462MHz )	<b>Temperature</b>	27 deg. C	<b>Tested By</b>	Steve Chen
<b>Freq. Range</b>	1GHz~25GHz	<b>Humidity</b>	63%		

**(A) Polarization: Horizontal**

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	2088.370	54.46	-19.54	74.00	66.40	27.35	1.67	40.96	Peak	---	---
2	2088.370	50.84	-3.16	54.00	62.78	27.35	1.67	40.96	Average	100	213
3	2348.300	47.35	-6.65	54.00	58.76	28.03	1.68	41.12	Average	---	---
1	2542.900	52.08	-21.92	74.00	62.81	28.59	1.88	41.20	Peak	---	---
2	2542.900	41.21	-12.79	54.00	51.94	28.59	1.88	41.20	Average	---	---
3	2835.750	48.40	-5.60	54.00	58.02	29.63	1.95	41.20	Average	---	---

**(B) Polarization: Vertical**

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1732.530	45.43	-8.57	54.00	58.60	26.12	1.46	40.75	Average	---	---
2	2088.370	51.08	-22.92	74.00	63.02	27.35	1.67	40.96	Peak	---	---
3	2088.370	48.16	-5.84	54.00	60.10	27.35	1.67	40.96	Average	---	---
4	2348.300	49.13	-4.87	54.00	60.54	28.03	1.68	41.12	Average	---	---
1	2542.900	51.09	-22.91	74.00	61.82	28.59	1.88	41.20	Peak	---	---
2	2542.900	39.98	-14.02	54.00	50.71	28.59	1.88	41.20	Average	---	---
3	2835.750	52.08	-21.92	74.00	61.70	29.63	1.95	41.20	Peak	---	---
4	2835.750	49.10	-4.90	54.00	58.72	29.63	1.95	41.20	Average	---	---
5	2920.980	39.83	-14.17	54.00	49.16	29.93	1.94	41.20	Average	---	---



<b>Modulation Type</b>	OFDM				
<b>Test Mode</b>	Mode 1 ( 2412MHz )	<b>Temperature</b>	25 deg. C	<b>Tested By</b>	Steve Chen
<b>Freq. Range</b>	1GHz~25GHz	<b>Humidity</b>	65%		

**(A) Polarization: Horizontal**

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	2038.330	51.22	-22.78	74.00	63.29	27.21	1.65	40.93	Peak	---	---
2	2038.330	48.49	-5.51	54.00	60.56	27.21	1.65	40.93	Average	---	---
3	2320.500	47.04	-6.96	54.00	58.45	27.96	1.73	41.10	Average	---	---
1	2517.590	51.11	-22.89	74.00	61.94	28.51	1.86	41.20	Peak	---	---
2	2517.590	39.66	-14.34	54.00	50.49	28.51	1.86	41.20	Average	---	---
3	2780.490	51.05	-22.95	74.00	60.87	29.43	1.95	41.20	Peak	---	---
4	2780.490	33.77	-20.23	54.00	43.59	29.43	1.95	41.20	Average	---	---
5	2813.030	42.70	-11.30	54.00	52.39	29.55	1.96	41.20	Average	---	---

**(B) Polarization: Vertical**

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1504.570	36.35	-17.65	54.00	50.23	25.27	1.46	40.61	Average	---	---
2	2038.330	50.05	-23.95	74.00	62.12	27.21	1.65	40.93	Peak	---	---
3	2038.330	47.40	-6.60	54.00	59.47	27.21	1.65	40.93	Average	---	---
4	2359.420	49.97	-4.03	54.00	61.34	28.06	1.69	41.12	Average	105	216
1	2517.590	51.52	-22.48	74.00	62.35	28.51	1.86	41.20	Peak	---	---
2	2517.590	41.02	-12.98	54.00	51.85	28.51	1.86	41.20	Average	---	---
3	2784.620	32.39	-21.61	54.00	42.19	29.45	1.95	41.20	Average	---	---
4	2784.620	54.69	-19.31	74.00	64.49	29.45	1.95	41.20	Peak	---	---
5	2823.360	46.04	-7.96	54.00	55.70	29.58	1.96	41.20	Average	---	---





<b>Modulation Type</b>	OFDM				
<b>Test Mode</b>	Mode 2 ( 2437MHz )	<b>Temperature</b>	25 deg. C	<b>Tested By</b>	Steve Chen
<b>Freq. Range</b>	1GHz~25GHz	<b>Humidity</b>	65%		

**(A) Polarization: Horizontal**

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	2064.740	53.24	-20.76	74.00	65.25	27.28	1.66	40.95	Peak	---	---
2	2064.740	50.13	-3.87	54.00	62.14	27.28	1.66	40.95	Average	102	205
3	2316.330	46.54	-7.46	54.00	57.95	27.95	1.74	41.10	Average	---	---
1	2503.130	50.08	-23.92	74.00	60.98	28.45	1.85	41.20	Peak	---	---
2	2503.130	39.90	-14.10	54.00	50.80	28.45	1.85	41.20	Average	---	---
3	2804.760	48.50	-5.50	54.00	58.23	29.52	1.95	41.20	Average	---	---
4	2862.610	40.43	-13.57	54.00	49.96	29.72	1.95	41.20	Average	---	---

**(B) Polarization: Vertical**

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1504.570	35.05	-18.95	54.00	48.93	25.27	1.46	40.61	Average	---	---
2	2064.740	50.83	-23.17	74.00	62.84	27.28	1.66	40.95	Peak	---	---
3	2064.740	47.61	-6.39	54.00	59.62	27.28	1.66	40.95	Average	---	---
4	2320.500	49.37	-4.63	54.00	60.78	27.96	1.73	41.10	Average	---	---
1	2505.710	50.12	-23.88	74.00	61.01	28.46	1.85	41.20	Peak	---	---
2	2505.710	41.04	-12.96	54.00	51.93	28.46	1.85	41.20	Average	---	---
3	2804.760	52.02	-21.98	74.00	61.75	29.52	1.95	41.20	Peak	---	---
4	2804.760	34.85	-19.15	54.00	44.58	29.52	1.95	41.20	Average	---	---
5	2862.610	42.51	-11.49	54.00	52.04	29.72	1.95	41.20	Average	---	---



<b>Modulation Type</b>	OFDM				
<b>Test Mode</b>	Mode 3 ( 2462MHz )	<b>Temperature</b>	25 deg. C	<b>Tested By</b>	Steve Chen
<b>Freq. Range</b>	1GHz~25GHz	<b>Humidity</b>	65%		

**(A) Polarization: Horizontal**

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	2088.370	53.64	-20.36	74.00	65.58	27.35	1.67	40.96	Peak	---	---
2	2088.370	50.27	-3.73	54.00	62.21	27.35	1.67	40.96	Average	---	---
3	2327.450	47.02	-6.98	54.00	58.43	27.98	1.71	41.10	Average	---	---
1	2542.900	51.05	-22.95	74.00	61.78	28.59	1.88	41.20	Peak	---	---
2	2542.900	40.99	-13.01	54.00	51.72	28.59	1.88	41.20	Average	---	---
3	2827.490	42.17	-11.83	54.00	51.81	29.60	1.96	41.20	Average	---	---

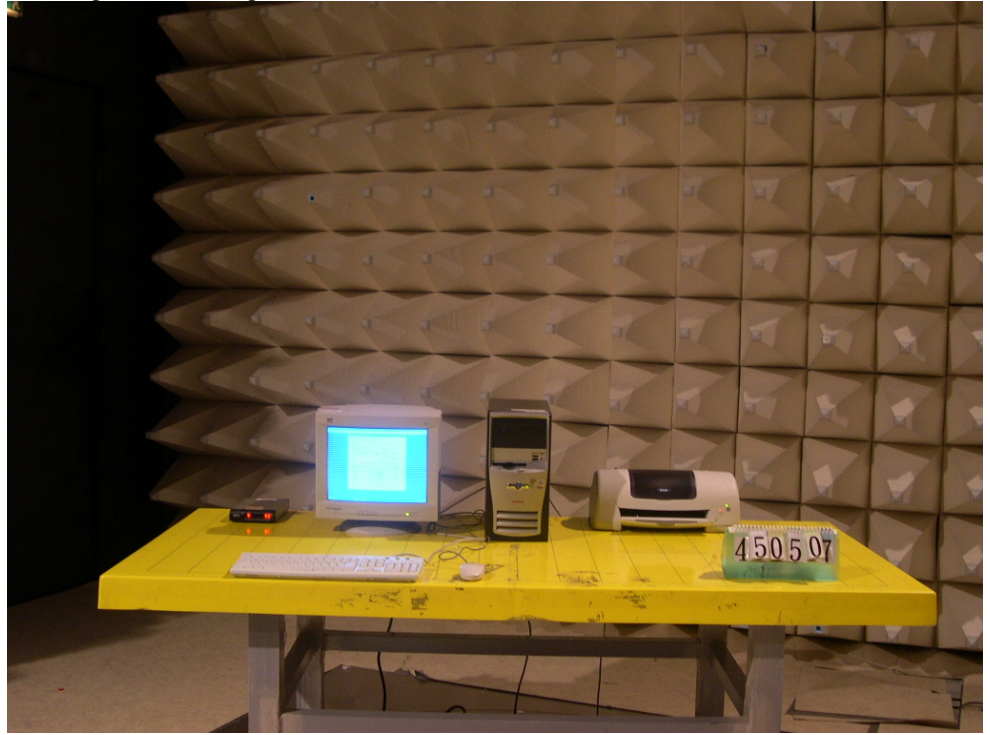
**(B) Polarization: Vertical**

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1504.570	36.22	-17.78	54.00	50.10	25.27	1.46	40.61	Average	---	---
2	2088.370	50.85	-23.15	74.00	62.79	27.35	1.67	40.96	Peak	---	---
3	2088.370	47.51	-6.49	54.00	59.45	27.35	1.67	40.96	Average	---	---
4	2327.450	50.42	-3.58	54.00	61.83	27.98	1.71	41.10	Average	106	213
1	2542.900	50.83	-23.17	74.00	61.56	28.59	1.88	41.20	Peak	---	---
2	2542.900	39.53	-14.47	54.00	50.26	28.59	1.88	41.20	Average	---	---
3	2837.820	45.72	-8.28	54.00	55.33	29.64	1.95	41.20	Average	---	---

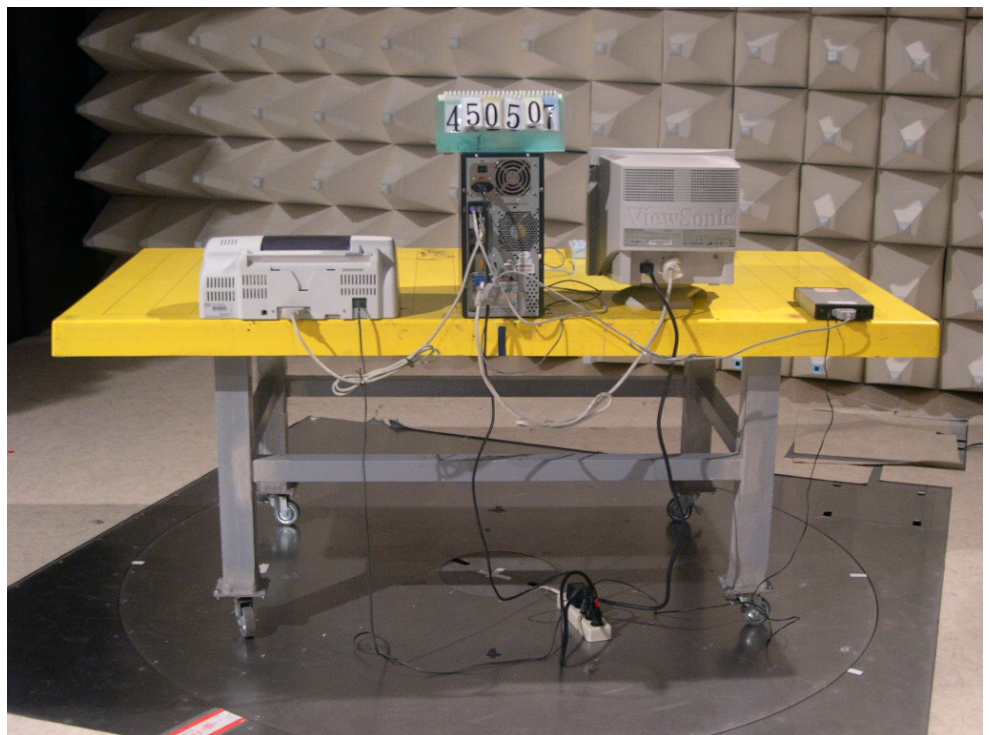
### 5.6.5 Photographs of Radiated Emission Test Configuration

- The photographs show the configuration that generates the maximum emission.

FRONT VIEW



REAR VIEW





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## 5.7. Antenna Requirements

### 5.7.1 Standard Applicable

47 CFR Part15 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.

47 CFR Part15 Section 15.247 (b):

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

The antenna used in this product is monopole antenna with reversed SMA connector.



## 5.8. RF Exposure

### 5.8.1. Limit For Maximum Permissible Exposure (MPE)

This product can be classified as mobile device, so the 20cm separation distance warning is required.

In this section, the power density at 20cm location is calculated to examine if it is lower than the limit.

#### (A) Limits for Occupational / Controlled Exposure

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

#### (B) Limits for General Population / Uncontrolled Exposure

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

F = frequency in MHz

\*Plane-wave equivalent power density

5.8.2. MPE Calculation Method

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d}$$

$$\text{Power Density: } Pd \text{ (mW/cm}^2\text{)} = \frac{E^2}{377}$$

**E** = Electric field (V/m)

**P** = Peak RF output power (mW)

**G** = EUT Antenna numeric gain (numeric)

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

The formula can be changed to

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

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

5.8.3. Calculated Result and Limit

· Modulation Type: CCK

Channel No.	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power ( mW )	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )
Channel 01	2	1.58	20.600	114.8154	0.0362	1
Channel 10	2	1.58	20.300	107.1519	0.0338	1
Channel 13	2	1.58	20.500	112.2018	0.0354	1

From the calculated result shown in above table, the power density is lower than limit at location 20cm far away.



· Modulation Type: OFDM

Channel No.	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power ( mW )	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )
Channel 01	2	1.58	18.400	69.1831	0.0218	1
Channel 10	2	1.58	18.100	64.5654	0.0204	1
Channel 13	2	1.58	18.300	67.6083	0.0213	1

From the calculated result shown in above table, the power density is lower than limit at location 20cm far away.



## 6. List of Measuring Equipments Used

Items	Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
1	EMC Receiver	R&S	ESCS 30	100132	9 KHz – 2.75 GHz	Jun. 12, 2003	Conduction (CO01-HY)
2	LISN	MessTec	NNB-2/16Z	2001/004	9 KHz – 30 MHz	Jun. 02, 2003	Conduction (CO01-HY)
3	LISN (Support Unit)	MessTec	NNB-2/16Z	99041	9 KHz – 30 MHz	Apr. 03, 2004	Conduction (CO01-HY)
4	EMI Filter	LINDGREN	LRE-2060	1004	< 450 Hz	N/A	Conduction (CO01-HY)
5	EMI Filter	LINDGREN	N6006	201052	0 ~ 60 Hz	N/A	Conduction (CO01-HY)
6	RF Cable-CON	Suhner Switzerland	RG223/U	CB029	9KHz~30MHz	Dec. 24, 2003	Conduction (CO01-HY)
7	50 ohm BNC type Terminal	NOBLE	50ohm	TM004	50 ohm	Apr. 07, 2004	Conduction (CO01-HY)
8	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz~1GHz 3m	Jun. 21, 2003	Radiation (03CH03-HY)
9	Spectrum analyzer	R&S	FSP40	100004	9KHz~40GHz	Aug. 23, 2003	Radiation (03CH03-HY)
10	Amplifier	HP	8447D	2944A09072	100KHz – 1.3GHz	Nov. 05, 2003	Radiation (03CH03-HY)
11	Biconical Antenna	SCHWARZBECK	VHBB 9124	301	30MHz –200MHz	Jul. 24, 2003	Radiation (03CH03-HY)
12	Log Antenna	SCHWARZBECK	VUSLP 9111	221	200MHz -1GHz	Jul. 24, 2003	Radiation (03CH03-HY)
13	RF Cable-R03m	Jye Bao	RG142	CB021	30MHz~1GHz	Dec. 03, 2003	Radiation (03CH03-HY)
14	Amplifier	MITEQ	AFS44	879981	100MHz~26.5GHz	Jul. 23, 2003	Radiation (03CH03-HY)
15	Horn Antenna	COM-POWER	3115	6821	1GHz – 18GHz	Sep. 12, 2003	Radiation (03CH03-HY)
16	Turn Table	HD	DS 420	420/650/00	0 ~ 360 degree	N/A	Radiation (03CH03-HY)
	Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	N/A	Radiation (03CH03-HY)
17	Horn Antenna	Schwarzbeck	BBHA9170	154	15GHz~40GHz	Jun. 02, 2003	Radiation (03CH03-HY)
18	RF Cable-HIGH	Jye Bao	RG142	CB030-HIGH	1GHz~29.5GHz	Dec. 05, 2003	Radiation (03CH03-HY)

※ Calibration Interval of instruments listed above is one year.





Items	Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
19	Spectrum analyzer	R&S	FSP7	838858/014	9KHZ~7GHZ	Sep. 03, 2003	Conducted
20	Power meter	R&S	NRVS	100444	DC~40GHz	May 28, 2003	Conducted
21	Power sensor	R&S	NRV-Z55	100049	DC~40GHz	May 28, 2003	Conducted
22	Power Sensor	R&S	NRV-Z32	100057	30MHz-6GHz	May 28, 2003	Conducted
23	AC power source	HPC	HPA-500W	HPA-9100024	AC 0~300V	May 27, 2003	Conducted
24	AC power source	G.W.	GPC-6030D	C671845	DC 1V~60V	Nov. 06, 2003	Conducted
25	Temp. and Humidity Chamber	KSON	THS-C3L	612	N/A	Oct. 01, 2003	Conducted
26	RF CABLE-1m	Jye Bao	RG142	CB034-1m	20MHz~7GHz	Jan. 01, 2004	Conducted
27	RF CABLE-2m	Jye Bao	RG142	CB035-2m	20MHz~1GHz	Jan. 01, 2004	Conducted

※ Calibration Interval of instruments listed above is one year.