

FCC TEST REPORT

CATEGORY : Portable End Product
PRODUCT NAME : Wireless Lan Product USB Dongle
FCC ID. : QS3WGSZB1
FILING TYPE : Certification
MODEL NAME : G245
APPLICANT : **TwinMOS Technologies Inc.**
303 No. 3, Tzu Chiang Rd., Hu Kou Xiang, Hsin Chu, 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.

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, 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.



Dr. Alan Lane
Vice General Manager
Sporton International Inc.



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

TwinMOS Technologies Inc.

303 No. 3, Tzu Chiang Rd., Hu Kou Xiang, Hsin Chu, Taiwan, R.O.C.

1.2. Manufacturer

Same as 1.1

1.3. Basic Description of Equipment under Test

This product is a wireless LAN USB Dongle with IEEE 802.11b/g wireless module. The radio technical data has been listed on section " Features of Equipment under Test ". This product is intended to be plugged in the USB port of the computer.

1.4. Features of Equipment under Test

ITEMS	DESCRIPTION
Type of Modulation	DSSS (CCK / DQPSK / DBPSK), OFDM (16QAM, 64QAM)
Number of Channels	11
Frequency Band	2400MHz ~ 2483.5MHz
Carrier Frequency	Please reference table below.
Channel Bandwidth	22 MHz
Output Power	DSSS:16.75dBm (peak) OFDM:16.00dBm (peak)
Antenna Type / Gain	Printed Antenna / 1dBi
Function Type	Transceiver
Power Rating (DC/AC, Voltage)	3.3 VDC from USB port
Temperature Range (Operating)	0 ~ 55°C



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		



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 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. – Notebook (DELL)

FCC ID	: N/A
Model No.	: PP01L
Serial No.	: SP0004
Remark	: This support device was tested to comply with FCC standards and authorized under Declaration of Conformity.

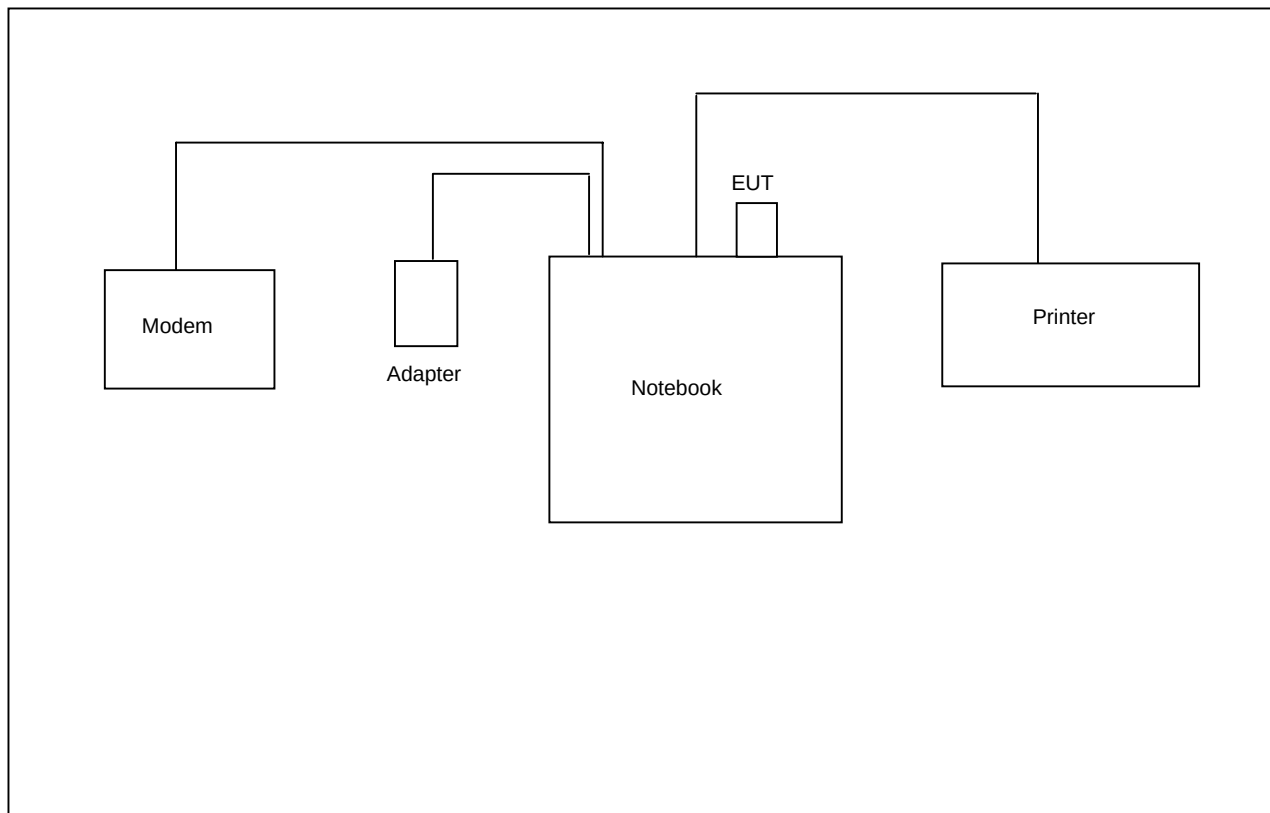
Support Unit 2. – Printer (EPSON)

FCC ID	: N/A
Model No.	: Stylus Color 680
Serial No.	: SP0016
Remark	: This support device was tested to comply with FCC standards and authorized under Declaration of Conformity and data cable is 1.35m of the shielded.

Support Unit 3. – Modem (ACEEX)

FCC ID	: IFAXDM141
Model No.	: DM141
Serial No.	: SP0019
Remark	: This support device was tested to comply with FCC standards and authorized under Declaration of Conformity and data cable is 1.15m of the shielded.

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.



3. Test Location and Standards

3.1. Test Location

Test Location : Sporton Hwa Ya Testing Building

Address : No. 52, Hwa Ya 1st 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. : CO04-HY, 03CH03-HY

3.2. Test Conditions

Normal Voltage : 110V/60Hz (host equipment)

Extreme Voltage : 138V and 102V (host equipment)

Normal Temperature : 20 °C

Extreme Temperature : 0 °C and 55 °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)

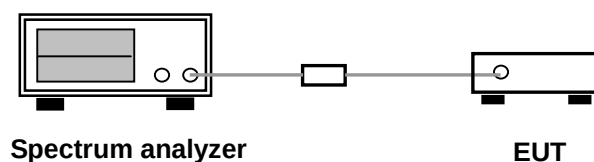
5.1.1 Measuring Instruments

Item 18 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



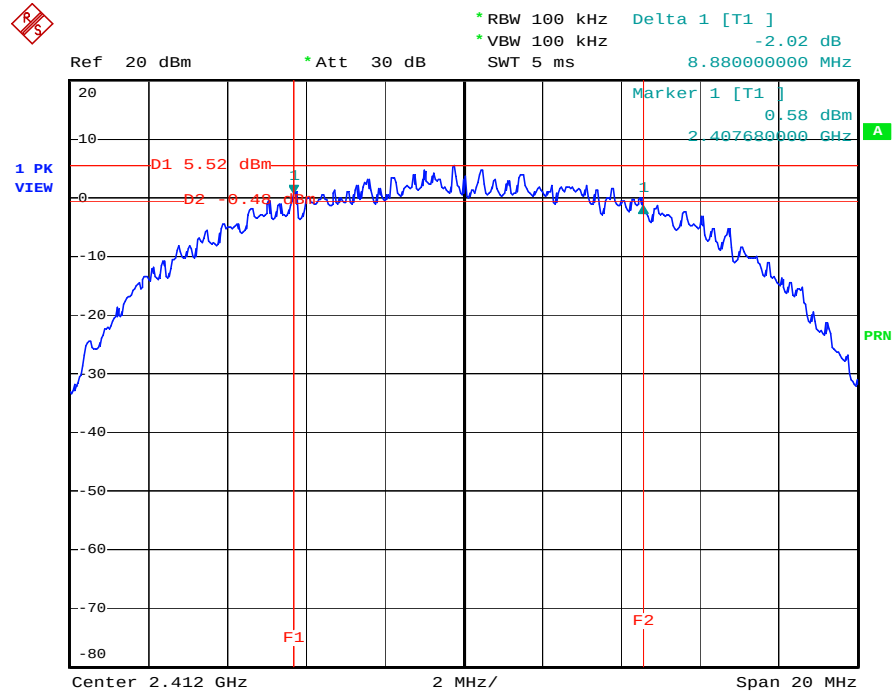
5.1.4 Test Result : See spectrum analyzer plots below

- Modulation Type: CCK
- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 70%
- Test Engineer: Sam Lee

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Min. Limit (MHz)
01	2412	8.88	0.5
06	2437	8.84	0.5
11	2462	8.84	0.5

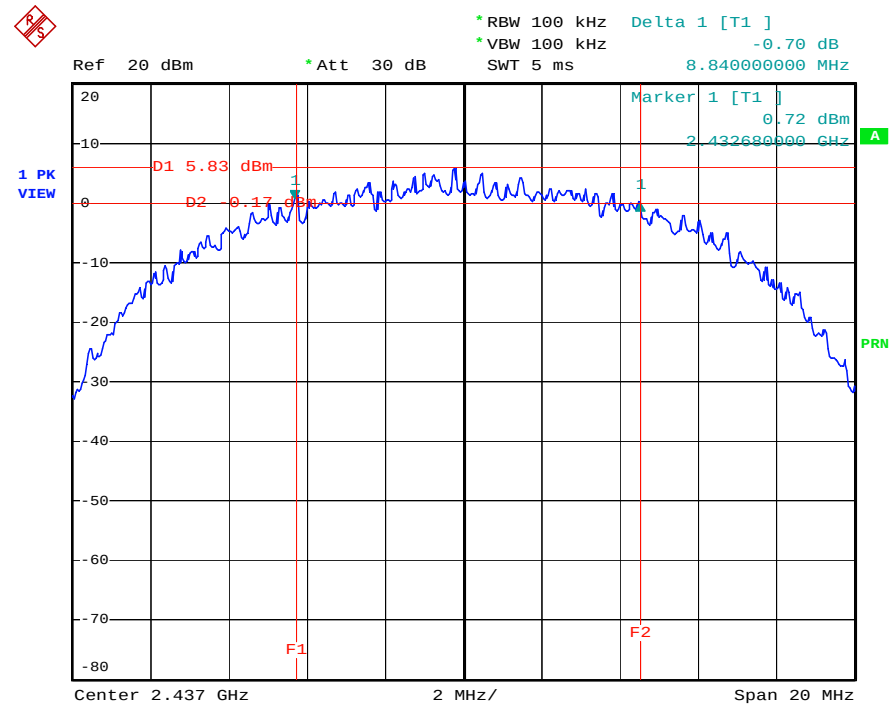


Modulation Type: CCK (Channel 01) :



Date: 14.SEP.2004 12:30:33

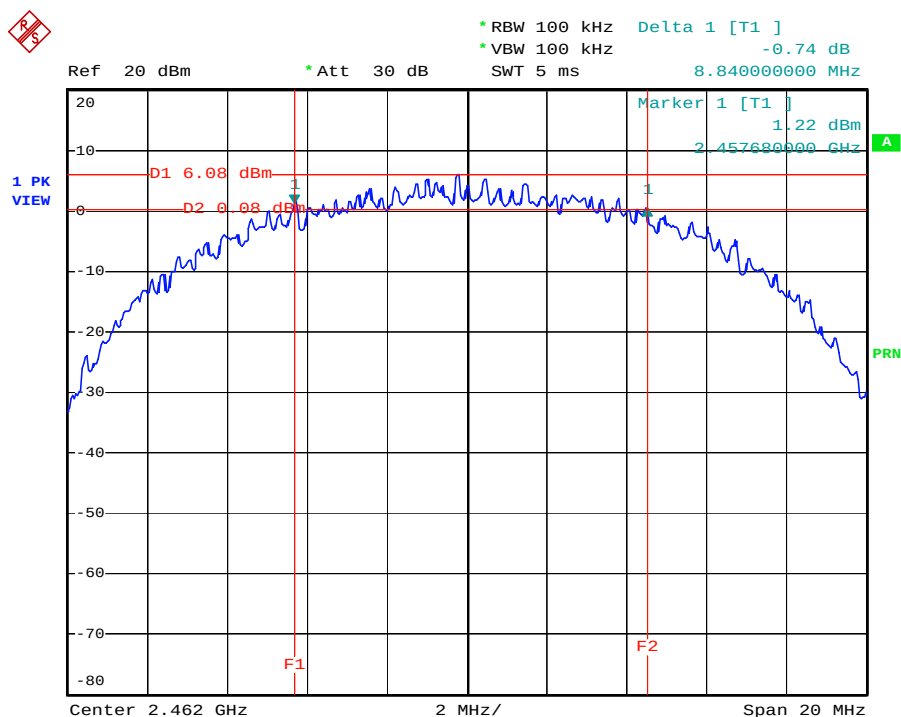
Modulation Type: CCK (Channel 06) :



Date: 14.SEP.2004 12:32:53



Modulation Type: CCK (Channel 11) :



Date: 14.SEP.2004 12:34:31

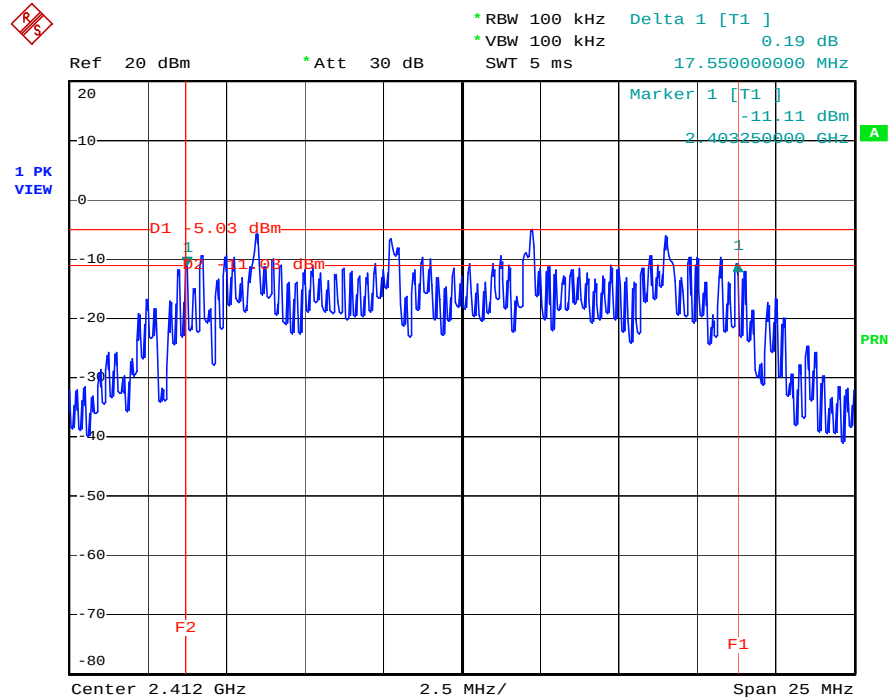
5.1.5 Test Result : See spectrum analyzer plots below

- Modulation Type: OFDM
- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 70%
- Test Engineer: Sam Lee

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Min. Limit (MHz)
01	2412	17.55	0.5
06	2437	17.55	0.5
11	2462	17.55	0.5

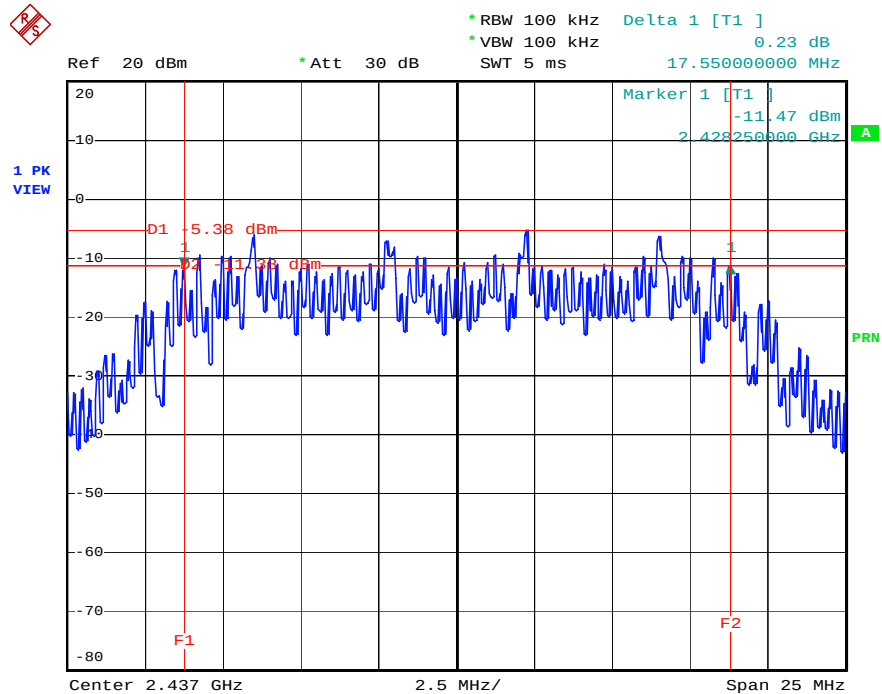


Modulation Type: OFDM (Channel 01) :



Date: 14.SEP.2004 13:15:11

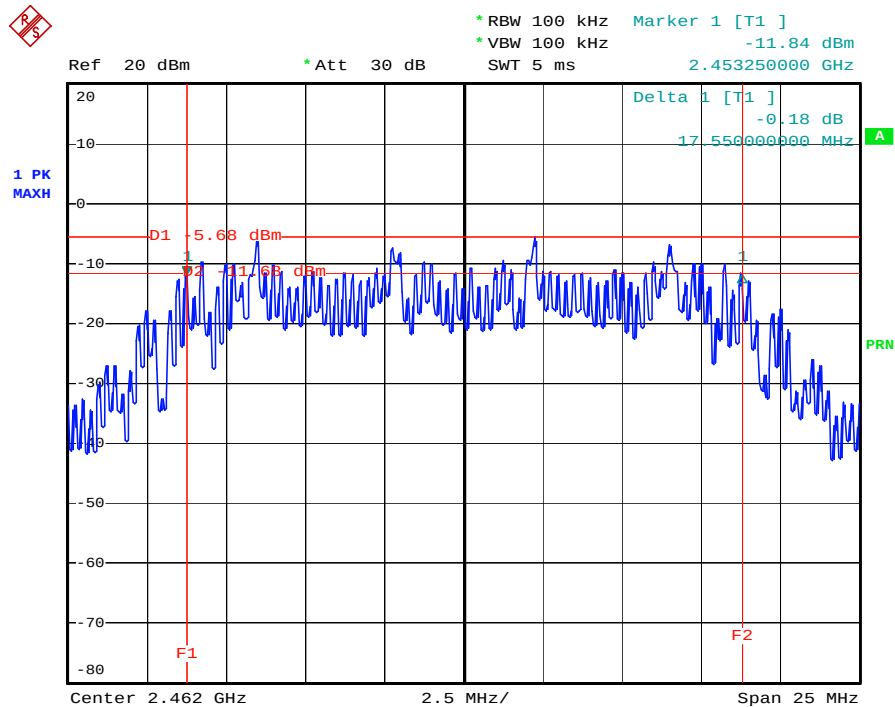
Modulation Type: OFDM (Channel 06) :



Date: 14.SEP.2004 13:19:47



Modulation Type: OFDM (Channel 11) :



Date: 14.SEP.2004 14:46:32

5.2. Test of Maximum Peak Output Power

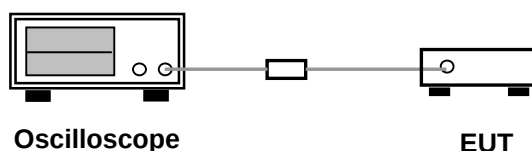
5.2.1 Measuring Instruments

Item 19 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. Replace the EUT by signal generator and adjust the power to have the same reading on oscilloscope.
3. Record the output power from the meter.
4. Repeated the 1~3 for the middle and highest channel of the EUT.

5.2.3 Test Setup Layout



5.2.4 Test Result

- Modulation Type: CCK
- Temperature: 26°C
- Relative Humidity: 64 %
- Duty Cycle of the Equipment During the Test: 70%
- Test Engineer: Sam Lee

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (mWatt)	Limits (dBm)
01	2412	16.55	45.19	30 dBm
06	2437	16.50	44.67	30 dBm
11	2462	16.75	47.32	30 dBm



5.2.5 Test Result

- Modulation Type: OFDM
- Temperature: 26°C
- Relative Humidity: 64 %
- Duty Cycle of the Equipment During the Test: 70%
- Test Engineer: Sam Lee

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (mWatt)	Limits (dBm)
01	2412	15.90	38.90	30 dBm
06	2437	15.82	38.19	30 dBm
11	2462	16.00	39.81	30 dBm

5.3. Test of Peak Power Spectral Density

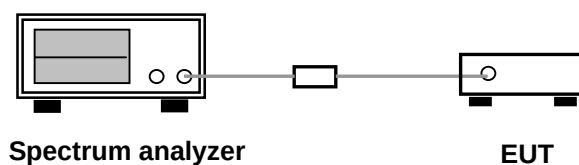
5.3.1 Measuring Instruments

Item 18 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



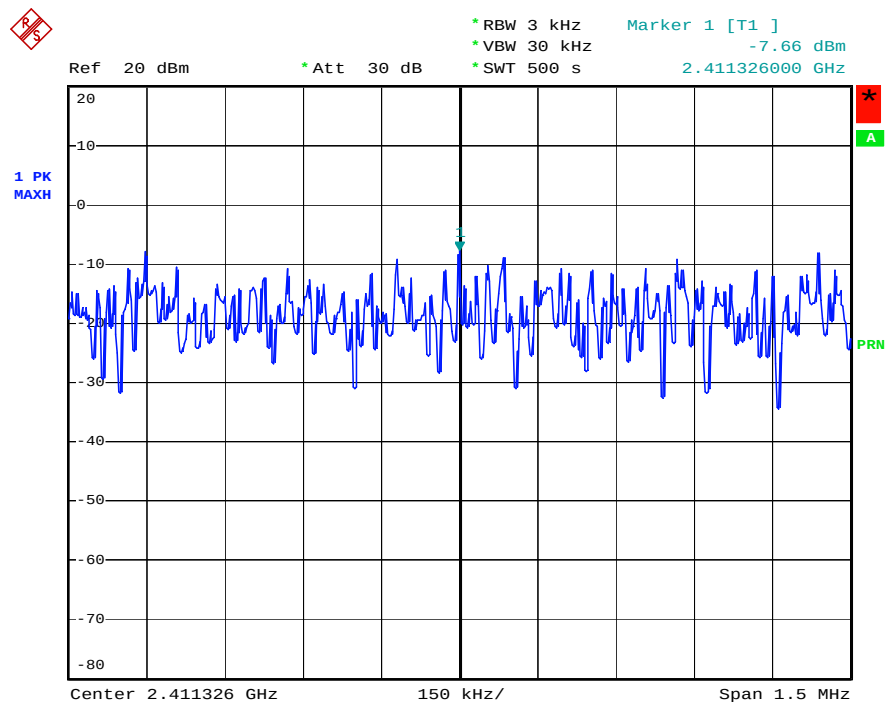
5.3.4 Test Result : See spectrum analyzer plots below

- Modulation Type: CCK
- Temperature: 26°C
- Relative Humidity: 64 %
- Duty Cycle of the Equipment During the Test: 70%
- Test Engineer: Sam Lee

Channel	Frequency (MHz)	Power Density (dBm)	Limits (dBm)
01	2412	-7.66	8
06	2437	-8.10	8
11	2462	-8.03	8

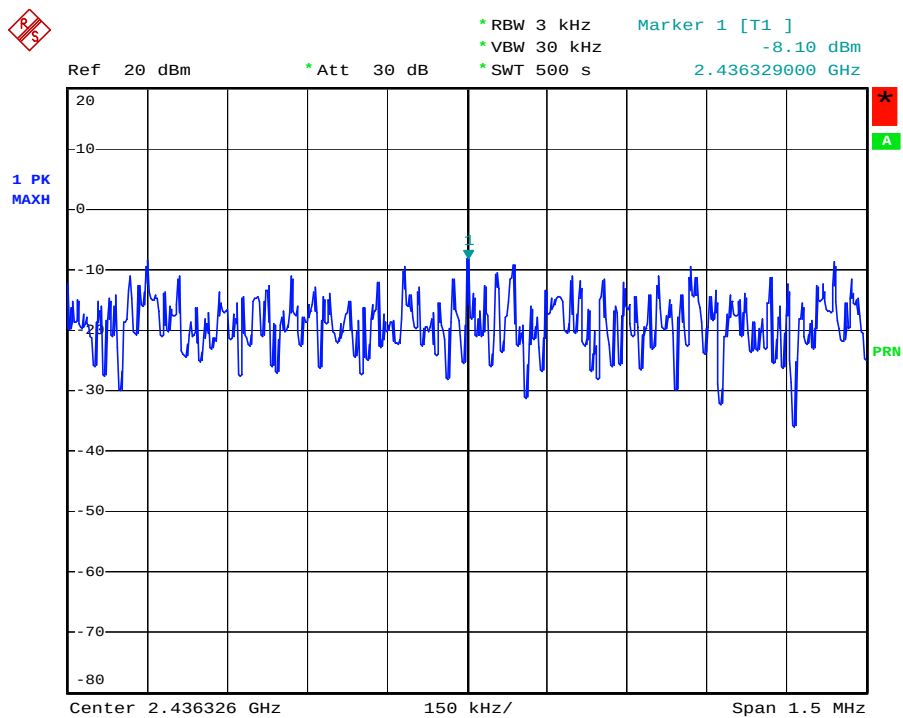


Modulation Type: CCK (Channel 01) :



Date: 14.SEP.2004 12:42:48

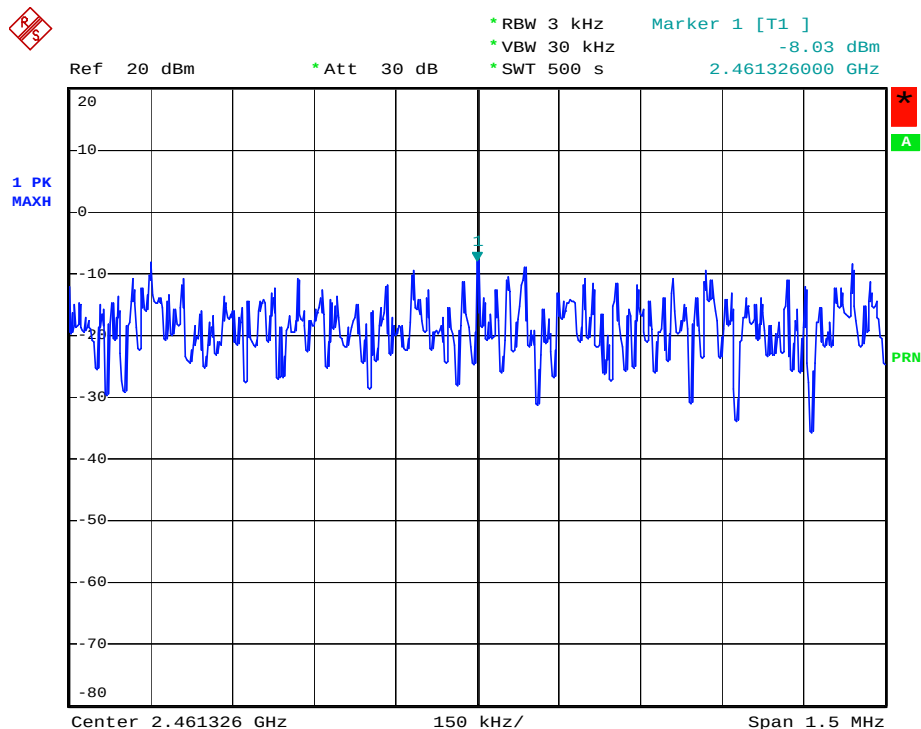
Modulation Type: CCK (Channel 06) :



Date: 14.SEP.2004 12:45:21



Modulation Type: CCK (Channel 11) :



Date: 14.SEP.2004 12:46:54

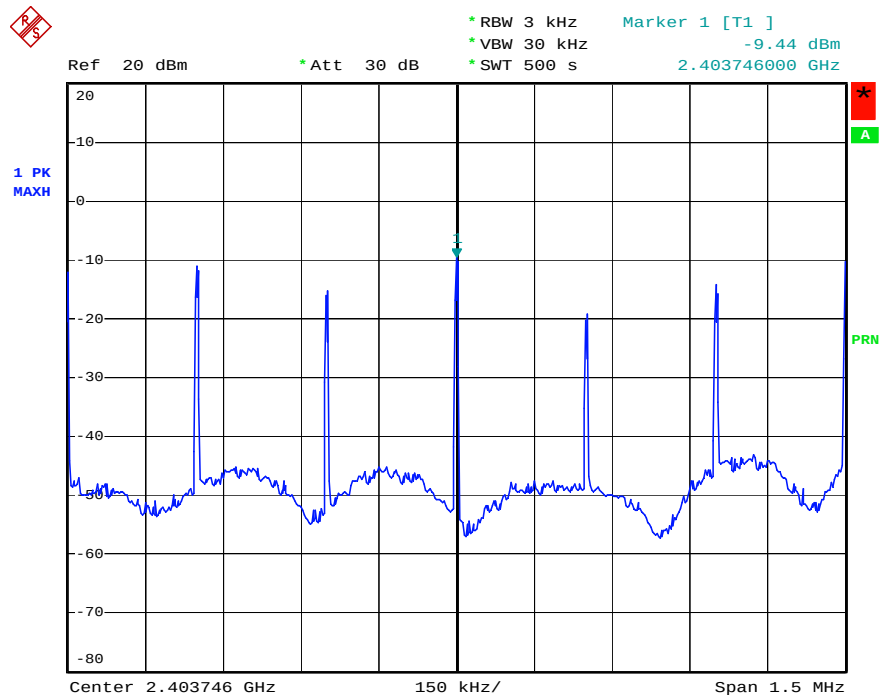
5.3.5 Test Result : See spectrum analyzer plots below

- Modulation Type: OFDM
- Temperature: 26°C
- Relative Humidity: 64 %
- Duty Cycle of the Equipment During the Test: 70%
- Test Engineer: Sam Lee

Channel	Frequency (MHz)	Power Density (dBm)	Limits (dBm)
01	2412	-9.44	8
06	2437	-10.00	8
11	2462	-10.18	8

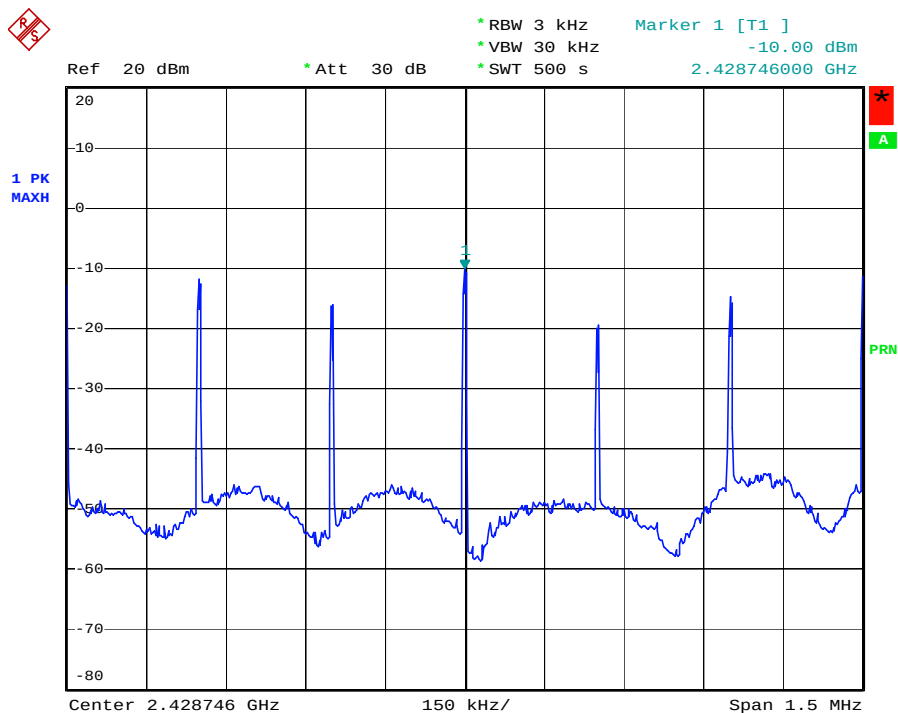


Modulation Type: OFDM (Channel 01) :



Date: 14.SEP.2004 15:09:50

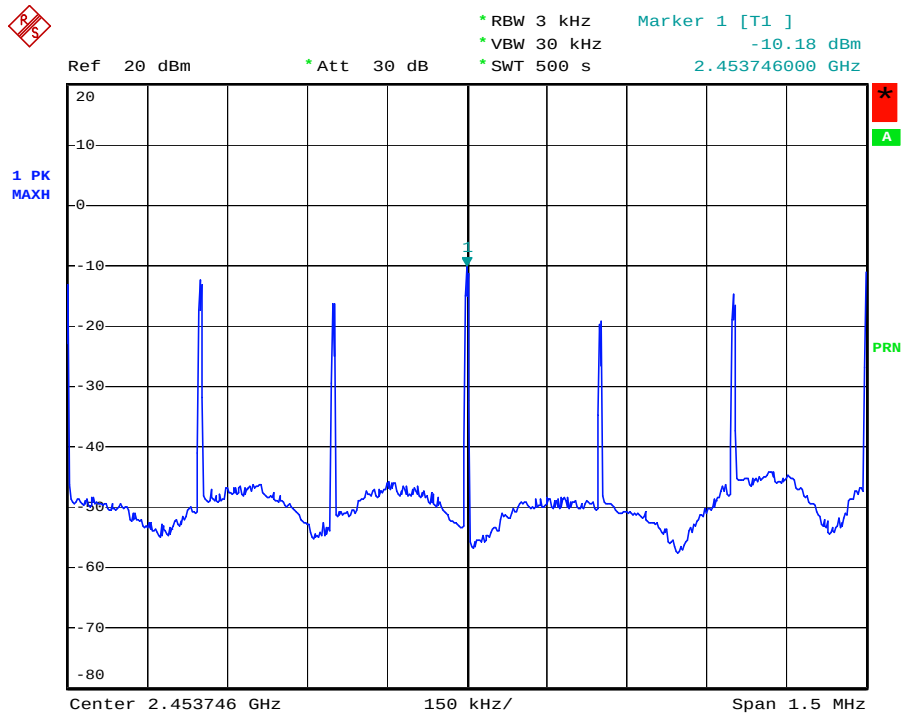
Modulation Type: OFDM (Channel 06) :



Date: 14.SEP.2004 15:07:37



Modulation Type: OFDM (Channel 11) :



Date: 14.SEP.2004 15:06:05

5.4. Test of Band Edges Emission

5.4.1 Measuring Instruments

Item 18 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: Sam Lee

(A) Left Edge

The band edge emission plot shows 58.73 dB for PK and 60.77dB for AV 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)
108.74	58.73	50.01	74.00	-23.99
100.84	60.77	40.07	54.00	-13.93

(B) Right Edge

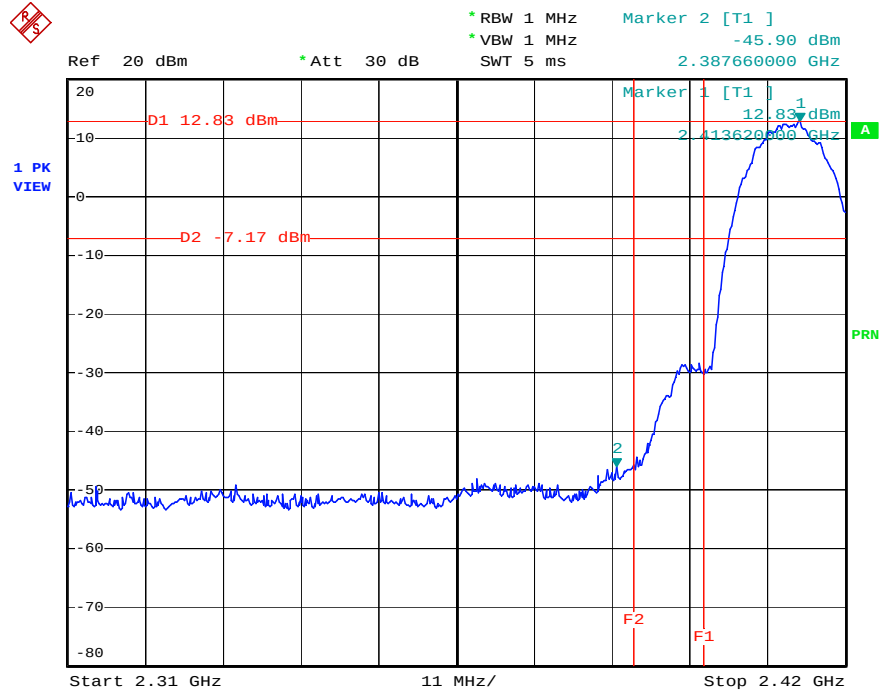
The band edge emission plot shows 57.88dB for PK and 60.68dB for AV delta between carrier maximum power and local maximum emission in the restricted band.

CH11 Carrier power strength (dBuV/m)	Delta (dB)	The maximum field strength in restrict band (dBuV/m)	Limit (dBuV/m)	Margin (dB)
107.74	57.88	49.59	74.00	-24.41
99.72	60.68	30.04	54.00	-14.96

* 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.

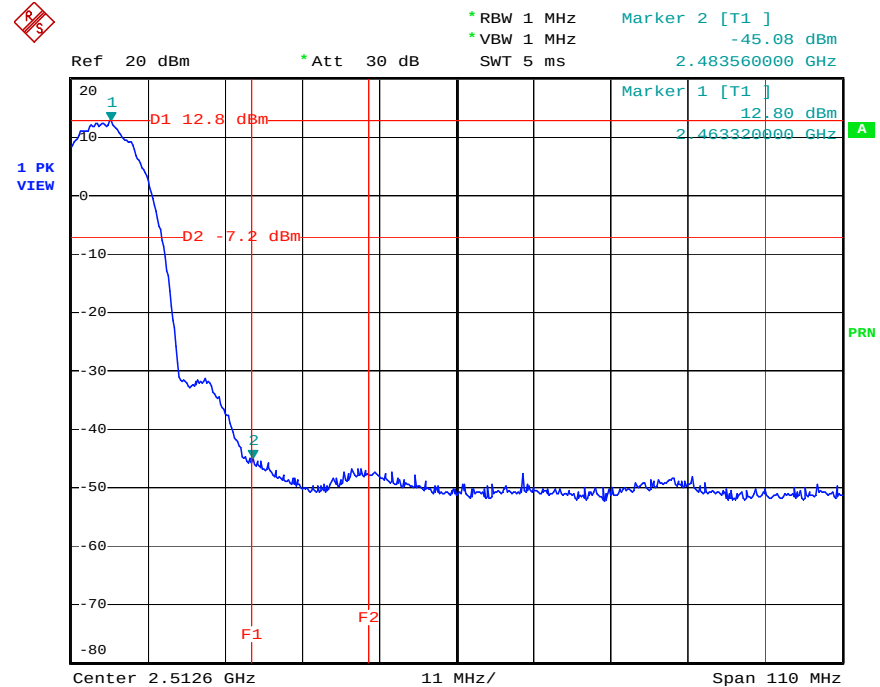


Modulation Type: CCK (Channel 01) :



Date: 14.SEP.2004 12:53:38

Modulation Type: CCK (Channel 11) :



Date: 14.SEP.2004 12:57:20

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

5.4.3 Test Result :

- Modulation Type: OFDM
- Test Engineer: Sam Lee

(A) Left Edge

The band edge emission plot shows 38.79dB for PK and 47.05dB for AV 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)
104.04	38.79	65.25	74.00	-5.75
84.22	47.05	37.17	54.00	-16.83

(B) Right Edge

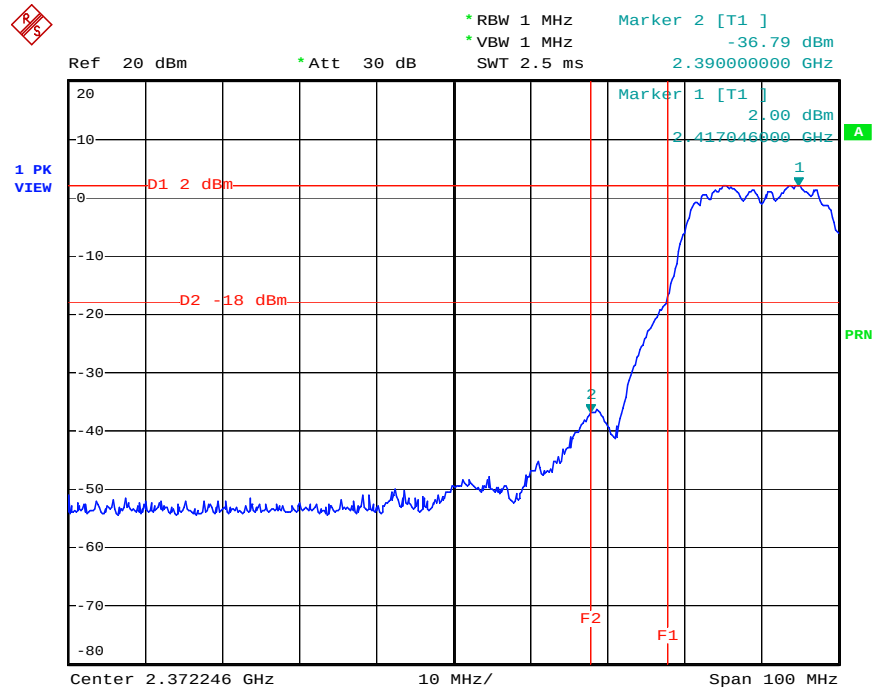
The band edge emission plot shows 42.20dB for PK and 48.45dB for AV delta between carrier maximum power and local maximum emission in the restricted band.

CH11 Carrier power strength (dBuV/m)	Delta (dB)	The maximum field strength in restrict band (dBuV/m)	Limit (dBuV/m)	Margin (dB)
101.72	42.20	59.52	74.00	-14.48
92.72	48.45	44.27	54.00	-9.73

*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.

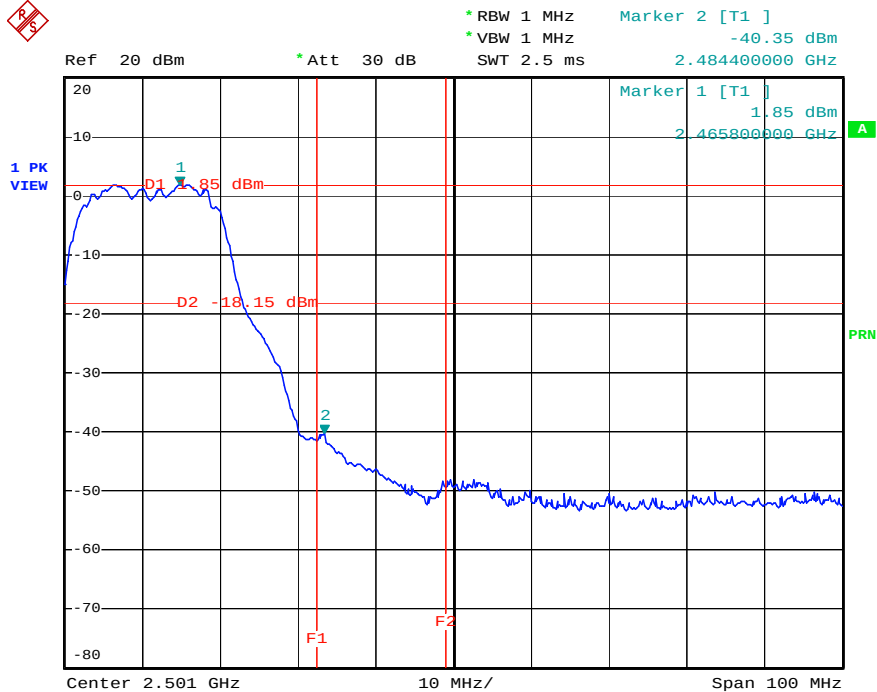


Modulation Type: OFDM (Channel 01) :



Date: 14.SEP.2004 15:12:15

Modulation Type: OFDM (Channel 11) :



Date: 14.SEP.2004 15:16:39

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 1~6 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	27deg. C / 44%		

Line to Ground

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.1944650	43.18	-20.66	63.84	43.07	0.10	0.01	QP
2	0.1944650	37.50	-16.34	53.84	37.39	0.10	0.01	Average
3	0.2900840	40.39	-20.13	60.52	40.27	0.10	0.02	QP
4	0.2900840	40.39	-10.13	50.52	40.27	0.10	0.02	Average
5	0.3391950	40.12	-19.10	59.22	40.00	0.10	0.02	QP
6	0.3391950	40.54	-8.68	49.22	40.42	0.10	0.02	Average
7	5.996	37.44	-22.56	60.00	37.15	0.20	0.09	QP
8	5.996	31.73	-18.27	50.00	31.44	0.20	0.09	Average
9	8.660	30.74	-19.26	50.00	30.44	0.20	0.10	Average
10	8.660	35.51	-24.49	60.00	35.21	0.20	0.10	QP
11	11.318	43.22	-16.78	60.00	42.90	0.20	0.12	QP
12	11.318	35.83	-14.17	50.00	35.51	0.20	0.12	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	0.1965370	46.12	-17.64	63.76	46.01	0.10	0.01	QP
2	0.1965370	43.32	-10.44	53.76	43.21	0.10	0.01	Average
3	0.2893470	40.61	-19.93	60.54	40.49	0.10	0.02	QP
4	0.2893470	40.47	-10.07	50.54	40.35	0.10	0.02	Average
5	0.3391950	37.96	-21.26	59.22	37.84	0.10	0.02	QP
6	0.3391950	38.84	-10.38	49.22	38.72	0.10	0.02	Average
7	0.6291890	30.56	-25.44	56.00	30.43	0.10	0.03	QP
8	0.6291890	30.95	-15.05	46.00	30.82	0.10	0.03	Average
9	2.563	27.17	-18.83	46.00	27.03	0.10	0.04	Average
10	2.563	29.39	-26.61	56.00	29.25	0.10	0.04	QP
11	11.269	39.23	-20.77	60.00	38.91	0.20	0.12	QP
12	11.269	35.28	-14.72	50.00	34.96	0.20	0.12	Average

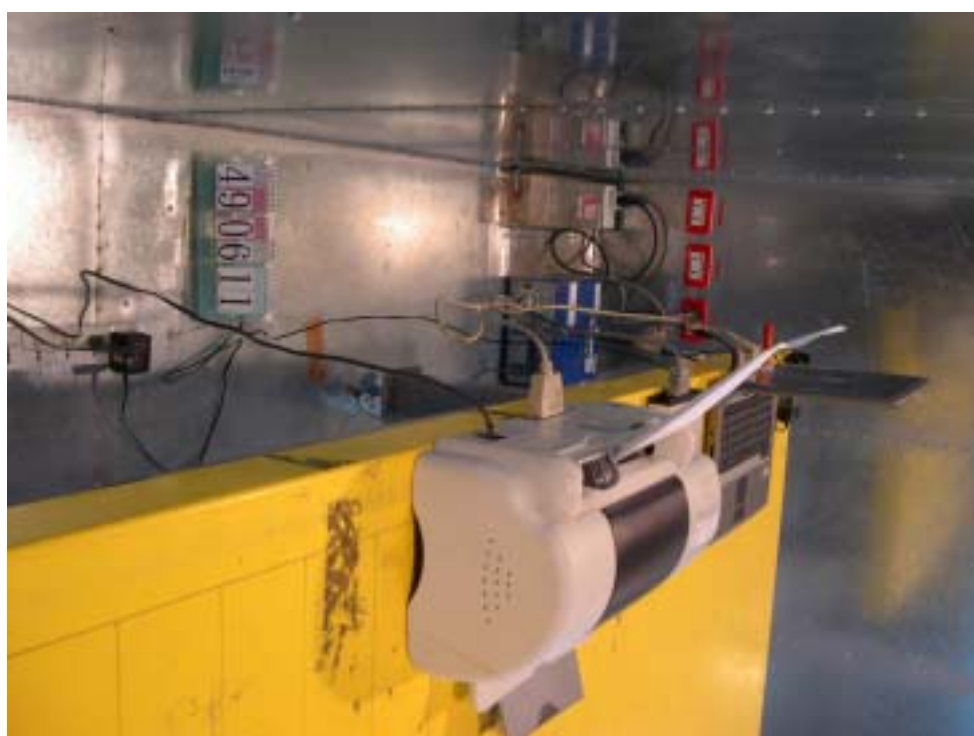
5.5.4 Photographs of Conducted Emission Test Configuration

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

FRONT VIEW



REAR VIEW



SIDE VIEW





5.6. Test of Spurious Radiated Emission

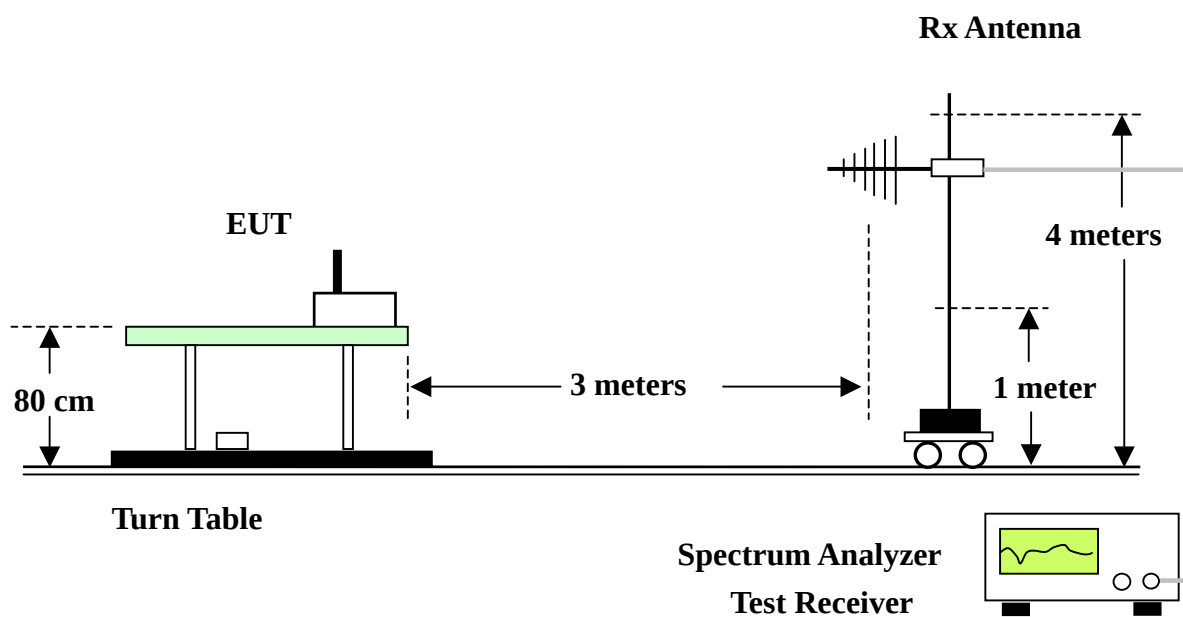
5.6.1 Measuring Instruments

Please reference items 7~17 in chapter 6 for the instruments used for testing.

5.6.2 Test Procedures

1. Configure the EUT according to ANSI C63.4.
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.

5.6.3 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

Test Mode	CH11 OFDM	Temperature	25 deg. C	Tested By	Steve Chen
Freq. Range	30MHz~1GHz	Humidity	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	103.780	24.12	-19.38	43.50	40.66	9.53	1.82	27.89	Peak	---	---
2	108.710	23.40	-20.10	43.50	39.17	10.25	1.86	27.88	Peak	---	---
3	120.100	21.44	-22.06	43.50	35.44	11.90	1.96	27.86	Peak	---	---
1	215.200	36.98	-6.52	43.50	47.00	14.99	2.63	27.64	Peak	128	216
2	265.600	35.79	-10.21	46.00	47.53	12.77	2.93	27.44	Peak	---	---
3	278.400	35.77	-10.23	46.00	46.99	13.16	3.01	27.39	Peak	---	---

(B) Polarization: Vertical

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	46.660	22.13	-17.87	40.00	36.92	12.06	1.16	28.01	Peak	---	---
2	112.620	23.78	-19.72	43.50	38.93	10.83	1.89	27.87	Peak	---	---
3	129.790	22.63	-20.87	43.50	36.03	12.33	2.11	27.84	Peak	---	---
1	439.200	32.92	-13.08	46.00	40.94	16.49	3.64	28.15	Peak	---	---
2	666.400	37.35	-8.65	46.00	40.83	20.60	4.65	28.73	Peak	---	---
3	832.800	35.71	-10.29	46.00	37.28	21.83	5.23	28.63	Peak	---	---



Modulation Type	CCK				
Test Mode	Mode 1 (2412MHz)	Temperature	25 deg. C	Tested By	Steve Chen
Freq. Range	1GHz~25GHz	Humidity	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	1000.000	47.15	-6.85	74.00	64.34	24.10	1.11	42.40	Peak	---	---
2	1668.000	39.65	-34.35	74.00	54.69	26.05	1.55	42.64	Peak	---	---
3	2252.000	48.51	-25.49	74.00	61.52	27.92	1.72	42.65	Peak	---	---
1	3596.000	39.70	-34.30	74.00	49.42	31.50	2.11	43.33	Peak	---	---
2	3870.000	39.18	-34.82	74.00	48.46	32.27	2.10	43.65	Peak	---	---
3	4822.000	45.38	-28.62	74.00	54.22	33.06	2.47	44.37	Peak	---	---

(B) Polarization: Vertical

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1000.000	45.52	-8.48	74.00	62.71	24.10	1.11	42.40	Peak	---	---
2	1998.000	41.91	-32.09	74.00	55.69	27.40	1.52	42.70	Peak	---	---
3	2294.000	44.02	-29.98	74.00	56.90	28.01	1.75	42.64	Peak	---	---
1	3334.000	39.65	-34.35	74.00	49.78	30.82	2.16	43.11	Peak	---	---
2	3604.000	39.93	-34.07	74.00	49.67	31.52	2.08	43.34	Peak	---	---
3	4822.000	42.15	-31.85	74.00	50.99	33.06	2.47	44.37	Peak	---	---



Modulation Type	CCK				
Test Mode	Mode 2 (2437MHz)	Temperature	25 deg. C	Tested By	Steve Chen
Freq. Range	1GHz~25GHz	Humidity	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	1662.000	39.38	-34.62	74.00	54.44	26.03	1.54	42.63	Peak	---	---
2	2220.000	46.52	-27.48	74.00	59.61	27.86	1.70	42.65	Peak	---	---
3	2596.000	43.73	-30.27	74.00	55.74	28.74	1.91	42.66	Peak	---	---
1	3588.000	40.26	-33.74	74.00	49.99	31.47	2.12	43.32	Peak	---	---
2	4876.000	41.82	-32.18	74.00	50.54	33.17	2.52	44.41	Peak	---	---
3	4942.000	40.33	-33.67	74.00	49.03	33.31	2.45	44.46	Peak	---	---

(B) Polarization: Vertical

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1000.000	44.30	-9.70	74.00	61.49	24.10	1.11	42.40	Peak	---	---
2	1998.000	42.15	-31.85	74.00	55.93	27.40	1.52	42.70	Peak	---	---
3	2222.000	41.70	-32.30	74.00	54.79	27.86	1.70	42.65	Peak	---	---
1	3438.000	39.17	-34.83	74.00	49.47	31.07	1.80	43.17	Peak	---	---
2	3588.000	40.55	-33.45	74.00	50.28	31.47	2.12	43.32	Peak	---	---
3	4876.000	41.25	-32.75	74.00	49.97	33.17	2.52	44.41	Peak	---	---



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

(A) Polarization: Horizontal

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamplifier Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1000.000	40.32	-13.68	74.00	57.51	24.10	1.11	42.40	Peak	---	---
2	1662.000	39.91	-34.09	74.00	54.97	26.03	1.54	42.63	Peak	---	---
3	2220.000	47.40	-26.60	74.00	60.49	27.86	1.70	42.65	Peak	---	---
1	3596.000	40.23	-33.77	74.00	49.95	31.50	2.11	43.33	Peak	---	---
2	3844.000	39.49	-34.51	74.00	48.79	32.20	2.12	43.62	Peak	---	---
3	4924.000	44.03	-29.97	74.00	52.74	33.27	2.47	44.45	Peak	---	---

(B) Polarization: Vertical

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamplifier Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1000.000	42.92	-11.08	74.00	60.11	24.10	1.11	42.40	Peak	---	---
2	1668.000	40.87	-33.13	74.00	55.91	26.05	1.55	42.64	Peak	---	---
3	1996.000	42.54	-31.46	74.00	56.33	27.40	1.51	42.70	Peak	---	---
4	2222.000	43.84	-30.16	74.00	56.93	27.86	1.70	42.65	Peak	---	---
1	3332.000	40.25	-33.75	74.00	50.39	30.81	2.16	43.11	Peak	---	---
2	3590.000	39.84	-34.16	74.00	49.56	31.48	2.12	43.32	Peak	---	---
3	4924.000	41.98	-32.02	74.00	50.69	33.27	2.47	44.45	Peak	---	---

Remark: The emission except listed above is too low to be measured.



Modulation Type	OFDM				
Test Mode	Mode 1 (2412MHz)	Temperature	25 deg. C	Tested By	Steve Chen
Freq. Range	1GHz~25GHz	Humidity	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	1000.000	39.88	-14.12	74.00	57.07	24.10	1.11	42.40	Peak	---	---
2	1660.000	39.66	-34.34	74.00	54.73	26.02	1.54	42.63	Peak	---	---
3	2254.000	42.62	-31.38	74.00	55.63	27.92	1.72	42.65	Peak	---	---
1	3590.000	40.27	-33.73	74.00	49.99	31.48	2.12	43.32	Peak	---	---
2	4822.000	41.82	-32.18	74.00	50.66	33.06	2.47	44.37	Peak	---	---

(B) Polarization: Vertical

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1000.000	45.13	-8.87	74.00	62.32	24.10	1.11	42.40	Peak	---	---
2	1668.000	41.66	-32.34	74.00	56.70	26.05	1.55	42.64	Peak	---	---
3	1996.000	43.11	-30.89	74.00	56.90	27.40	1.51	42.70	Peak	---	---
1	3596.000	40.31	-33.69	74.00	50.03	31.50	2.11	43.33	Peak	---	---
2	3844.000	39.89	-34.11	74.00	49.19	32.20	2.12	43.62	Peak	---	---
3	4822.000	40.59	-33.41	74.00	49.43	33.06	2.47	44.37	Peak	---	---



Modulation Type	OFDM				
Test Mode	Mode 2 (2437MHz)	Temperature	25 deg. C	Tested By	Steve Chen
Freq. Range	1GHz~25GHz	Humidity	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	1000.000	41.80	-12.20	74.00	58.99	24.10	1.11	42.40	Peak	---	---
2	1662.000	39.92	-34.08	74.00	54.98	26.03	1.54	42.63	Peak	---	---
3	2214.000	42.89	-31.11	74.00	56.00	27.84	1.70	42.65	Peak	---	---
1	3596.000	39.32	-34.68	74.00	49.04	31.50	2.11	43.33	Peak	---	---
2	4876.000	41.55	-32.45	74.00	50.27	33.17	2.52	44.41	Peak	---	---

(B) Polarization: Vertical

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1668.000	40.91	-33.09	74.00	55.95	26.05	1.55	42.64	Peak	---	---
2	1996.000	41.66	-32.34	74.00	55.45	27.40	1.51	42.70	Peak	---	---
3	2326.000	40.87	-33.13	74.00	53.71	28.07	1.72	42.63	Peak	---	---
1	3326.000	40.04	-33.96	74.00	50.19	30.80	2.16	43.11	Peak	---	---
2	3596.000	41.01	-32.99	74.00	50.73	31.50	2.11	43.33	Peak	---	---
3	4876.000	40.42	-33.58	74.00	49.14	33.17	2.52	44.41	Peak	---	---



Modulation Type	OFDM				
Test Mode	Mode 3 (2462MHz)	Temperature	25 deg. C	Tested By	Steve Chen
Freq. Range	1GHz~25GHz	Humidity	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	1598.000	39.81	-34.19	74.00	55.16	25.76	1.51	42.62	Peak	---	---
2	1662.000	39.25	-34.75	74.00	54.31	26.03	1.54	42.63	Peak	---	---
3	2238.000	45.40	-28.60	74.00	58.45	27.89	1.71	42.65	Peak	---	---
1	3590.000	41.44	-32.56	74.00	51.16	31.48	2.12	43.32	Peak	---	---
2	4924.000	42.21	-31.79	74.00	50.92	33.27	2.47	44.45	Peak	---	---

(B) Polarization: Vertical

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1662.000	40.39	-33.61	74.00	55.45	26.03	1.54	42.63	Peak	---	---
2	1998.000	41.87	-32.13	74.00	55.65	27.40	1.52	42.70	Peak	---	---
3	2220.000	42.83	-31.17	74.00	55.92	27.86	1.70	42.65	Peak	---	---
1	3596.000	38.74	-35.26	74.00	48.46	31.50	2.11	43.33	Peak	---	---
2	4926.000	40.61	-33.39	74.00	49.31	33.28	2.47	44.45	Peak	---	---

5.6.5 Photographs of Radiated Emission Test Configuration

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

FRONT VIEW



REAR VIEW





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 printed antenna without antenna connector.

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. 16, 2004	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	HP	8447D	2944A09072	100KHz – 1.3GHz	Nov. 05, 2003	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	Dec. 03, 2003	Radiation (03CH03-HY)
12	Amplifier	MITEQ	AFS44	849984	100MHz~26.5GHz	Mar. 26, 2004	Radiation (03CH03-HY)
13	Horn Antenna	EMCO	3115	6821	1GHz – 18GHz	Sep. 11, 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. 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
18	Spectrum analyzer	R&S	FSP7	838858/014	9KHZ~7GHZ	Sep. 03, 2003	Conducted (TH01-HY)
19	Power meter	R&S	NRVS	100444	DC~40GHz	Jun. 15, 2004	Conducted (TH01-HY)
20	Power sensor	R&S	NRV-Z55	100049	DC~40GHz	Jun. 15, 2004	Conducted (TH01-HY)
21	Power Sensor	R&S	NRV-Z32	100057	30MHz-6GHz	Jun. 15, 2004	Conducted (TH01-HY)
22	AC power source	HPC	HPA-500W	HPA-9100024	AC 0~300V	Jun. 16, 2004	Conducted (TH01-HY)
23	AC power source	G.W.	GPC-6030D	C671845	DC 1V~60V	Nov. 06, 2003	Conducted (TH01-HY)
24	Temp. and Humidity Chamber	KSON	THS-C3L	612	N/A	Oct. 01, 2003	Conducted (TH01-HY)
25	RF CABLE-1m	Jye Bao	RG142	CB034-1m	20MHz~7GHz	Jan. 01, 2004	Conducted (TH01-HY)
26	RF CABLE-2m	Jye Bao	RG142	CB035-2m	20MHz~1GHz	Jan. 01, 2004	Conducted (TH01-HY)

※ Calibration Interval of instruments listed above is one year.