

FCC TEST REPORT

for

47 CFR, Part 15, Subpart C

Equipment : Wireless 802.11b Mini PCI Card

Model No. : WM1170

FCC ID : RK9-WM1170

Filing Type : Certification

Applicant : CastleNet Technology Inc.
6F, No.957, Chung Cheng Rd., Chung-Ho City, Taipei Hsien, Taiwan,
R.O.C.

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SPORTON International Inc.

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

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History of this test report

Original Report Issue Date: Oct. 31, 2003

No additional attachment.

Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

CERTIFICATE OF COMPLIANCE

for

47 CFR, Part 15, Subpart C

Equipment : Wireless 802.11b Mini PCI Card

Model No. : WM1170

FCC ID : RK9-WM1170


Filing Type : Certification

Applicant : CastleNet Technology Inc.

6F, No.957, Chung Cheng Rd., Chung-Ho City, Taipei Hsien, Taiwan,
R.O.C.

HEREBY CERTIFY THAT :

The measurements shown in this test report were made in accordance with the procedures given in **ANSI C63.4 - 2001** and the equipment under test was **passed** all test items required in FCC Part 15 subpart C, relative to the equipment under test. Testing was carried out on Oct. 27, 2003 at **SPORTON International Inc. LAB.**



Joe Yang

Director

SPORTON International Inc.

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

1. General Description of Equipment under Test

1.1. Applicant

CastleNet Technology Inc.

6F, No.957, Chung Cheng Rd., Chung-Ho City, Taipei Hsien, Taiwan, R.O.C.

1.2 Manufacturer

Same as 1.1

1.3 Basic Description of Equipment under Test

Equipment	: Wireless 802.11b Mini PCI Card
Model No.	: WM1170
FCC ID.	: RK9-WM1170
Trade Name	: CastleNet
Power Supply Type	: From system
AC Power Input	: N/A

1.4 Feature of Equipment under Test

Product Feature & Specification			
1. Host/Radio Interface	MiniPCI 1.0		
2. Type of Modulation	BPSK/QPSK/CCK		
3. Number of Channels	USA/Canada: 11	V	European: 13
	Japan: 13, 14		Other:
4. Frequency Band	2400~2483.5MHz		
5. Carrier Frequency of each channel	2412,2417,2422,2427,2432,2437,2442,2447,2452,2457,2462,2467,2472		
6. Bandwidth of each channel	22MHz		
7. Maximum Output Power to Antenna	17.03 dBm		
8. IF & L.O. frequency	Each channel carrier frequency * 2		
9. Type of Antenna Connector (Ex: SMA,TNC, MCX, MMCX, UFC.....etc)	Hirose U.FL-R-SMT		
10. Antenna Type / Class and Gain	Embedded PIFA antenna / 1.3 dBi		
11. Function Type	Transmitter		Transceiver v
12. Power Rating (DC/AC , Voltage)	DC 3.3V, 400mA max		
13. Duty Cycle	100%		
14. Basic function of product	Wireless Local Area Network		
15. Temperature Range (Operating)	0~60C		
16. Humidity	0~95%		
17. Other Special	N/A		
18. Remark	N/A		

2 Test Configuration of Equipment under Test

2.1 Test Manner

- a. The EUT has been associated with notebook and peripherals pursuant to ANSI C63.4-2001 and configuration operated in a manner, which tended to maximize its emission characteristics in a typical application.
- b. The complete test system included DELL NOTEBOOK, VIEWSONIC Monitor, LOGITECH USB Mouse, EPSON Printer , ACEEX modem, Gateway USB keyboard and EUT for EMI test.
- c. The EUT can operate on eleven channels from 2412.0MHz to 2462.0MHz. (as listed in section 1.4). According to 15.31(m), three channels (one near top, one near middle and one near bottom) were performed as following:
- d. The following test modes were pretested for conduction test:
 - Mode 1: CH00 (2412MHz)
 - Mode 2: CH06 (2437MHz)
 - Mode 3: CH11 (2462MHz)
- f. The following test modes were pretested for radiation test:
 - Mode 1: CH00 (2412MHz)
 - Mode 2: CH06 (2437MHz)
 - Mode 3: CH11 (2462MHz)
- g. Frequency range investigated: conduction 150 KHz to 30 MHz, radiation 30 MHz to 24835MHz.

2.2 Description of Test System

Support Unit 1. – Notebook (Dell)

FCC ID	: QD5-BRCM1005-D
Model No.	: PP05L
Power Supply Type	: Switching
Power Cord	: Non-Shielded
Serial No.	: SP0037

Support Unit 2. -- Monitor (VIEWSONIC)

FCC ID : N/A
Model No. : VCDTS21553-3P
Power Supply Type : Switching
Power Cord : Non-Shielded
Serial No. : SP0052
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. -- USB Mouse (LOGITECH)

FCC ID : N/A
Model No. : M-BE58
Serial No. : SP0041
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 4. -- 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.

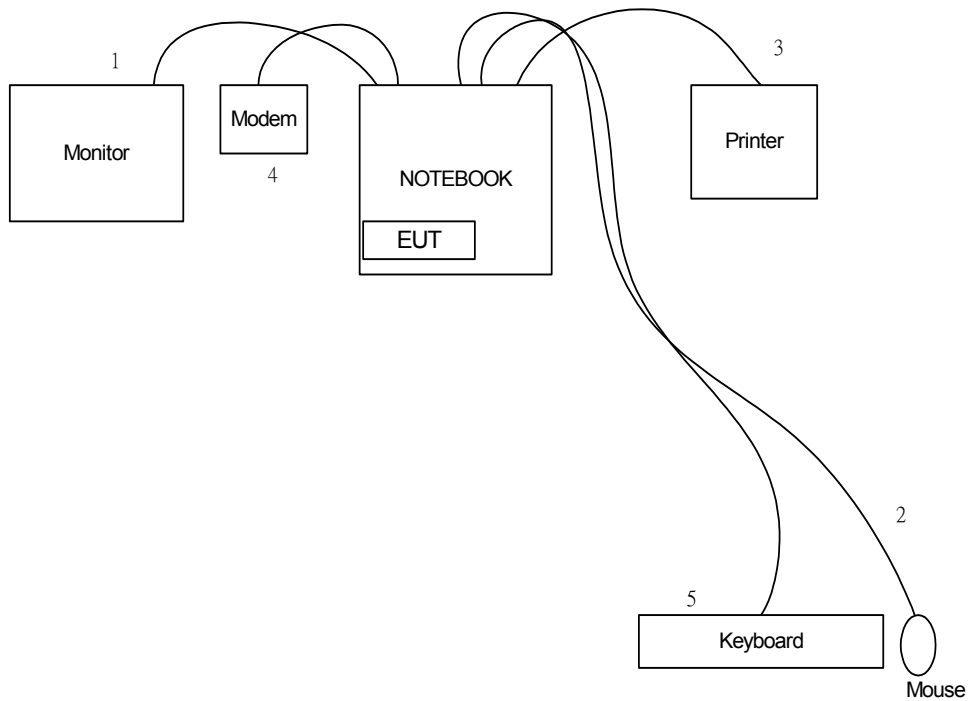
Support Unit 5. -- Modem (ACEXX)

FCC ID : IFAXDM141
Model No. : DM141
Serial No. : SP0041
Data Cable : Shielded, 1.15m

Support Unit 6. -- USB keyboard (Gateway)

FCC ID : N/A
Model No. : sk-9900U
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.

2.3 Connection Diagram of Test System



1. The I/O cable is connected from NOTEBOOK to the support unit 2.
2. The I/O cable is connected from NOTEBOOK to the support unit 3.
3. The I/O cable is connected from NOTEBOOK to the support unit 4
4. The I/O cable is connected from NOTEBOOK to the support unit 5.
5. The I/O cable is connected from NOTEBOOK to the support unit 6.

3 Operation of Equipment under Test

An executive program, EMCTEST.EXE under WIN XP, which generates a complete line of continuously repeating "H" pattern was used as the test software.

The program was executed as follows:

- a. Turn on the power of all equipment.
- b. The PC reads the test program from the hard disk drive and runs it.
- c. The PC sends "H" messages to the monitor, and the monitor displays "H" patterns on the screen.
- d. The PC sends "H" messages to the printer, then the printer prints them on the paper.
- e. The PC sends "H" messages to the internal Hard Disk, and the Hard Disk reads and writes the message.
- f. Repeat the steps from c to e.

At the same time, the following programs were executed:

RFtestUtil and one self test program to keep sending signals.

4 General Information of Test

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 : CO01-HY, 03CH03-HY

4.1 Test Voltage

110V/ 60Hz

4.2 Standard for Methods of Measurement

ANSI C63.4-2001 for conducted power line test and radiated emission test,
"Guidance on Measurements for Direct Sequence Spread Spectrum Systems" for test of 6dB Bandwidth
"Guidance on Measurements for Direct Sequence Spread Spectrum Systems" for test of Maximum Peak
Output Power
"Guidance on Measurements for Direct Sequence Spread Spectrum Systems" for test of 100kHz Bandwidth
of Frequency Band Edges
"Guidance on Measurements for Direct Sequence Spread Spectrum Systems" for test of Power Spectral
Density

4.3 Test in Compliance with

FCC Part 15, Subpart C

4.4 Frequency Range Investigated

- a. Conduction: from 150 kHz to 30 MHz
- b. Radiation: from 30 MHz to 24835MHz

4.5 Test Distance

The test distance of radiated emission from antenna to EUT is 3 M.

5 Report of Measurements and Examinations

5.1 List of Measurements and Examinations

FCC Rule	Description of Test	Result
15.207	Conducted Emission	Pass
<u>15.247(a)(2)</u>	6dB Bandwidth	Pass
<u>15.247(b)</u>	Maximum Peak Output Power	Pass
15.209	Radiated Emission	Pass
<u>15.247(c)</u>	100kHz Bandwidth of Frequency Band Edges	Pass
<u>15.247(d)</u>	Power Spectral Density	Pass
<u>15.203</u>	Antenna Requirement	Pass
1.1307 1.1310 2.1091 2.1093	RF Exposure Compliance	Pass

5.2 6dB Bandwidth

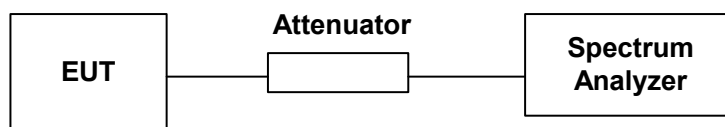
5.2.1 Measuring Instruments :

As described in chapter 7 of this test report.

5.2.2 Test Procedure :

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 6 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6 dB.

5.2.3 Test Setup Layout :



5.2.4 Test Result : The spectrum analyzer plots are attached as below

- Temperature : 24 °C
- Relative Humidity : 72%

Channel	Frequency (MHz)	6dB Emission bandwidth (MHz)	Limits (MHz)	Plot Ref. No.
01	2412	5.48	0.5	1
06	2437	5.48	0.5	2
11	2462	5.48	0.5	3

5.3 Peak Output Power

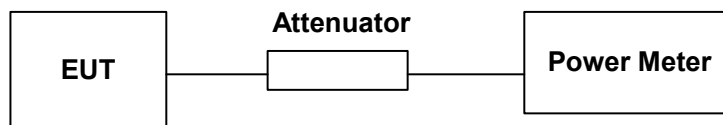
5.3.1 Measuring Instruments :

As described in chapter 7 of this test report.

5.3.2 Test Procedure :

The antenna port (RF output) of the EUT was connected to the input (RF input) of a power meter. Power was read directly from the meter and cable loss connection was added to the reading to obtain power at the EUT antenna terminal. The EUT Output Power was set to maximum to produce the worse case test result.

5.3.3 Test Setup Layout :



5.3.4 Test Result : See spectrum analyzer plots below

- Temperature : 24°C
- Relative Humidity : 72 %
- Antenna Gain: 1.3 dBi

Channel	Frequency (MHz)	Measured Output Power (mWatt)	Measured Output Power (dBm)	Limits (Watt/dBm)
01	2412	59.0	15.75	1W/30 dBm
06	2437	56.6	14.53	1W/30 dBm
11	2462	52.6	15.29	1W/30 dBm

- Comments : Maximum Peak Output Power < 30dBm (1Watt)

5.4 Power Spectral Density

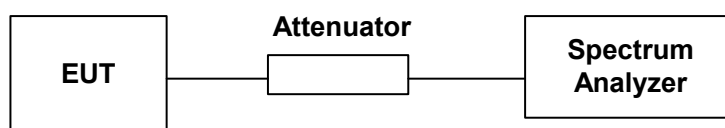
5.4.1 Measuring Instruments :

As described in chapter 7 of this test report.

5.4.2 Test Procedure :

1. The transmitter output was connected to spectrum analyzer through an attenuator.
2. The spectrum analyzer's resolution bandwidth were set at 3KHz RBW and 30KHz VBW as that of the fundamental frequency. Set the sweep time=span/3KHz.
3. The power spectral density was measured and recorded.
4. The sweep time is allowed to be longer than span/3KHz for a full response of the mixer in the spectrum analyzer.

5.4.3 Test Setup Layout :



5.4.4 Test Result : See spectrum analyzer plots below

- Temperature : 24°C
- Relative Humidity : 72%

Channel	Frequency (MHz)	Power Spectral Density (dBm)	Limits (dBm)	Plot Ref. No.
01	2412	-6.09	8	1
06	2437	-7.17	8	2
11	2462	-6.93	8	3

5.5 Test of Conducted Emission

Conducted Emissions were measured from 150 KHz to 30 MHz with a bandwidth of 9 KHz and return leads of the EUT according to the methods defined in ANSI C63.4-2001 Section 3.1. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

5.5.1 Major Measuring Instruments :

● Test Receiver	(R&S ESCS 30)
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 KHz

5.5.2 Test Procedures :

- a. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- b. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- c. All the support units are connect to the other LISN.
- d. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- e. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
- f. Both sides of AC line were checked for maximum conducted interference.
- g. The frequency range from 150 KHz to 30 MHz was searched.
- h. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

5.5.3 Test Result of Conducted Emission :

Frequency Range of Test : from 150KHz to 30 MHz. 6dB Bandwidth : 9KHz

- Test Mode : Mode 1
- Temperature : 24°C
- Relative Humidity : 71 %


■ The test was passed at the minimum margin that marked by the frame in the following table

Site : C001-HY
 Condition : CNS/VCCI/CISPR-B 2003 2001/008 NEUTRAL
 EUT : WM 1170
 Power : AC 110 / 60 Hz
 Model : TX CH 01 2412 MHz
 Memo :

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.172	51.13	-13.73	64.86	50.98	0.10	0.05	QP
2	0.172	34.33	-20.53	54.86	34.18	0.10	0.05	Average
3	0.216	42.15	-20.82	62.97	41.99	0.10	0.06	QP
4	0.216	22.71	-30.26	52.97	22.55	0.10	0.06	Average
5	0.249	38.49	-23.30	61.79	38.31	0.10	0.08	QP
6	0.249	22.08	-29.71	51.79	21.90	0.10	0.08	Average
7	0.348	32.20	-26.81	59.01	31.97	0.10	0.13	QP
8	0.348	22.96	-26.05	49.01	22.73	0.10	0.13	Average
9	1.710	26.99	-29.01	56.00	26.85	0.10	0.04	QP
10	1.710	19.16	-26.84	46.00	19.02	0.10	0.04	Average
11	8.370	25.34	-34.66	60.00	24.96	0.20	0.18	QP
12	8.370	19.25	-30.75	50.00	18.87	0.20	0.18	Average

Site : C001-HY
 Condition : CNS/VCCI/CISPR-B 2003 2001/008 LINE
 EUT : WM 1170
 Power : AC 110 / 60 Hz
 Model : TX CH 01 2412 MHz
 Memo :

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.167	51.51	-13.60	65.11	51.36	0.10	0.05	QP
2	0.167	32.39	-22.72	55.11	32.24	0.10	0.05	Average
3	0.178	50.78	-13.80	64.58	50.63	0.10	0.05	QP
4	0.178	35.34	-19.24	54.58	35.19	0.10	0.05	Average
5	0.228	39.88	-22.64	62.52	39.71	0.10	0.07	QP
6	0.228	20.45	-32.07	52.52	20.28	0.10	0.07	Average
7	0.332	33.03	-26.37	59.40	32.81	0.10	0.12	QP
8	0.332	15.62	-33.78	49.40	15.40	0.10	0.12	Average
9	1.510	25.63	-30.37	56.00	25.47	0.10	0.06	QP
10	1.510	17.59	-28.41	46.00	17.43	0.10	0.06	Average
11	9.160	20.55	-29.45	50.00	20.17	0.19	0.19	Average
12	9.160	26.69	-33.31	60.00	26.31	0.19	0.19	QP

Test Engineer : 
 Kevin Yang

- Test Mode : Mode 2
- Temperature : 24°C
- Relative Humidity : 71 %


■ The test was passed at the minimum margin that marked by the frame in the following table

Site : CO01-HY
 Condition : CNS/VCCI/CISPR-B 2003 2001/008 NEUTRAL
 EUT : WM 1170
 Power : AC 110 / 60 Hz
 Model : TX CH 06 2437 MHz
 Memo :

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.169	50.89	-14.12	65.01	50.74	0.10	0.05	QP
2	0.169	35.46	-19.55	55.01	35.31	0.10	0.05	Average
3	0.216	40.86	-22.11	62.97	40.70	0.10	0.06	QP
4	0.216	24.06	-28.91	52.97	23.90	0.10	0.06	Average
5	0.247	35.95	-25.91	61.86	35.77	0.10	0.08	QP
6	0.247	19.22	-32.64	51.86	19.04	0.10	0.08	Average
7	0.341	32.29	-26.89	59.18	32.06	0.10	0.13	QP
8	0.341	20.85	-28.33	49.18	20.62	0.10	0.13	Average
9	1.460	27.91	-28.09	56.00	27.74	0.10	0.07	QP
10	1.460	19.85	-26.15	46.00	19.68	0.10	0.07	Average
11	7.610	25.79	-34.21	60.00	25.43	0.20	0.16	QP
12	7.610	18.99	-31.01	50.00	18.63	0.20	0.16	Average

Site : CO01-HY
 Condition : CNS/VCCI/CISPR-B 2003 2001/008 LINE
 EUT : WM 1170
 Power : AC 110 / 60 Hz
 Model : TX CH 06 2437 MHz
 Memo :

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.178	49.40	-15.18	64.58	49.25	0.10	0.05	QP
2	0.178	29.42	-25.16	54.58	29.27	0.10	0.05	Average
3	0.203	41.00	-22.49	63.49	40.85	0.10	0.05	QP
4	0.203	19.49	-34.00	53.49	19.34	0.10	0.05	Average
5	0.235	33.01	-29.26	62.27	32.84	0.10	0.07	QP
6	0.235	19.73	-32.54	52.27	19.56	0.10	0.07	Average
7	0.320	27.12	-32.59	59.71	26.90	0.10	0.12	QP
8	0.320	14.28	-35.43	49.71	14.06	0.10	0.12	Average
9	1.640	27.30	-28.70	56.00	27.15	0.10	0.05	QP
10	1.640	19.66	-26.34	46.00	19.51	0.10	0.05	Average
11	8.920	26.90	-33.10	60.00	26.53	0.19	0.18	QP
12	8.920	20.91	-29.09	50.00	20.54	0.19	0.18	Average

Test Engineer : 
 Kevin Yang

- Test Mode : Mode 3
- Temperature : 24°C
- Relative Humidity : 71 %


The test was passed at the minimum margin that marked by the frame in the following table

Site : C001-HY
 Condition : CNS/VCCI/CISPR-B 2003 2001/008 NEUTRAL
 EUT : WM 1170
 Power : AC 110 / 60 Hz
 Model : TX CH 11 2462 MHz
 Memo :

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.167	50.06	-15.05	65.11	49.91	0.10	0.05	QP
2	0.167	34.64	-20.47	55.11	34.49	0.10	0.05	Average
3	0.202	40.46	-23.07	63.53	40.31	0.10	0.05	QP
4	0.202	18.77	-34.76	53.53	18.62	0.10	0.05	Average
5	0.267	36.46	-24.75	61.21	36.27	0.10	0.09	QP
6	0.267	25.11	-26.10	51.21	24.92	0.10	0.09	Average
7	0.315	26.81	-33.03	59.84	26.59	0.10	0.12	QP
8	0.315	10.89	-38.95	49.84	10.67	0.10	0.12	Average
9	1.790	25.96	-30.04	56.00	25.82	0.10	0.04	QP
10	1.790	17.43	-28.57	46.00	17.29	0.10	0.04	Average
11	9.910	27.04	-32.96	60.00	26.64	0.20	0.20	QP
12	9.910	21.28	-28.72	50.00	20.88	0.20	0.20	Average

Site : C001-HY
 Condition : CNS/VCCI/CISPR-B 2003 2001/008 LINE
 EUT : WM 1170
 Power : AC 110 / 60 Hz
 Model : TX CH 11 2462 MHz
 Memo :

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.151	46.09	-19.85	65.94	45.94	0.10	0.05	QP
2	0.151	27.03	-38.91	65.94	26.88	0.10	0.05	Average
3	0.180	49.14	-15.35	64.49	48.99	0.10	0.05	QP
4	0.180	34.33	-30.16	64.49	34.18	0.10	0.05	Average
5	0.221	38.66	-24.12	62.78	38.49	0.10	0.07	QP
6	0.221	18.77	-44.01	62.78	18.60	0.10	0.07	Average
7	0.336	31.79	-27.51	59.30	31.57	0.10	0.12	QP
8	0.336	19.01	-40.29	59.30	18.79	0.10	0.12	Average
9	1.590	27.24	-28.76	56.00	27.09	0.10	0.05	QP
10	1.590	18.79	-37.21	56.00	18.64	0.10	0.05	Average
11	10.070	27.78	-32.22	60.00	27.38	0.20	0.20	QP
12	10.070	21.28	-38.72	60.00	20.88	0.20	0.20	Average

Test Engineer : 
 Kevin Yang

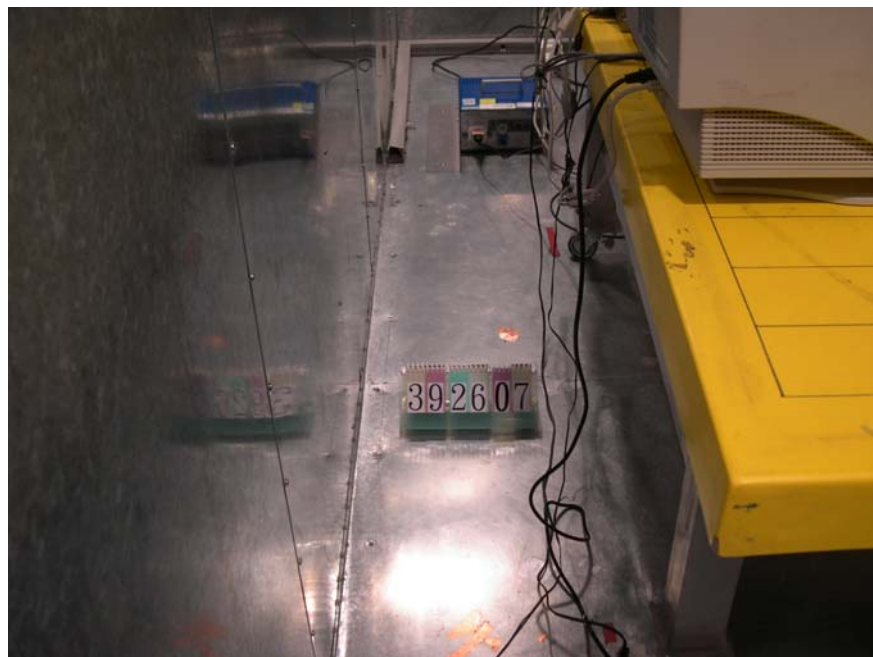
5.5.4 Photographs of Conducted Emission Test Configuration

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

FRONT VIEW



REAR VIEW



SIDE VIEW



5.6 Test of Radiated Emission

Radiated emissions from 30 MHz to 24.835 GHz were measured according to the methods defines in ANSI C63.4-2001. The EUT was placed, 0.8 meter above the ground plane, as shown in section 5.6.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions

5.6.1 Major Measuring Instruments

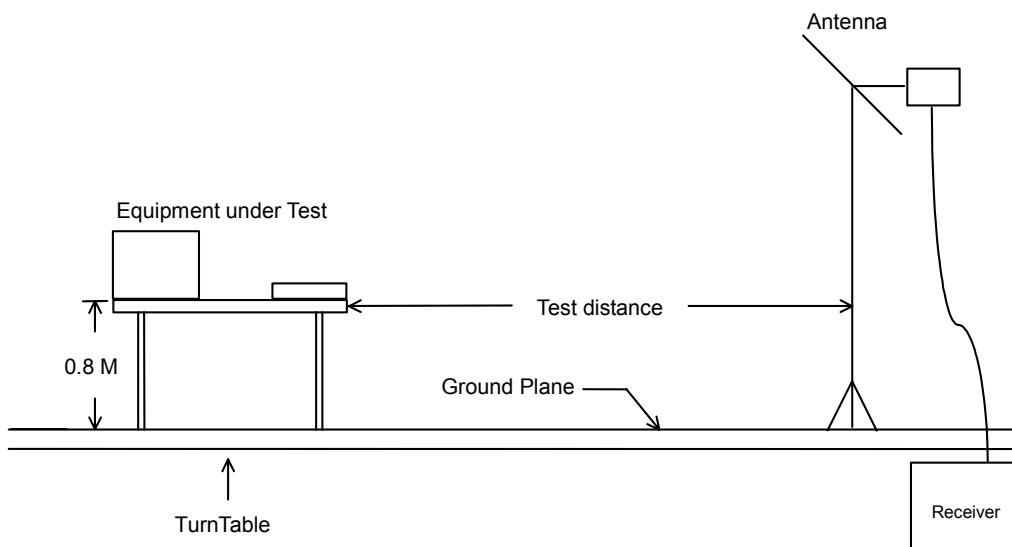
- Amplifier (MITEQ AFS44)
 - RF Gain 40 dB
 - Signal Input 100 MHz to 26.5 GHz

- Spectrum analyzer (R&S FSP40)
 - Attenuation 10 dB
 - Start Frequency 1 GHz
 - Stop Frequency 25 GHz
 - Resolution Bandwidth 1 MHz
 - Video Bandwidth 1 MHz
 - Signal Input 9 KHz to 40 GHz

5.6.2 Test Procedures

- A. The EUT was placed on a rotatable table top 0.8 meter above ground.
- B. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- C. The table was rotated 360 degrees to determine the position of the highest radiation.
- D. The antenna is a broadband antenna and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
- E. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
- F. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
- G. If the emission level of the EUT in peak mode was 3 dB lower than the 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 and reported.
- H. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower 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 Typical Test Setup Layout of Radiated Emission



5.6.4 Test Result of Radiated Emission

- Test Mode: Mode 1 (2412MHz)
- Test Distance : 3 M
- Temperature : 23 °C
- Relative Humidity : 68 %
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

■ The test was passed at the minimum margin that marked by the frame in the following table

■ Spurious Emission

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT HORIZONTAL
 EUT : WM 1170
 Power : AC 110 / 60 Hz
 MODEL : TX CH 01 2412 MHz
 MEMO :

	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	115.860	34.12	-9.38	43.50	49.35	9.85	1.86	26.94	Peak	---	---
2	220.620	35.69	-10.31	46.00	50.51	9.20	2.58	26.60	Peak	---	---

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT HORIZONTAL
 EUT : WM 1170
 Power : AC 110 / 60 Hz
 MODEL : TX CH 01 2412 MHz
 MEMO :

	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	363.700	32.25	-13.75	46.00	42.42	13.46	3.35	26.98	Peak	---	---
2	699.000	31.35	-14.65	46.00	36.99	17.99	4.37	28.00	Peak	---	---

FCC TEST REPORT

Report No. : F392607

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT VERTICAL
 EUT : WM 1170
 Power : AC 110 / 60 Hz
 MODEL : TX CH 01 2412 MHz
 MEMO :

	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	96.420	32.81	-10.69	43.50	48.98	9.15	1.69	27.01	Peak	104	181
2	250.050	32.95	-13.05	46.00	45.58	11.34	2.63	26.60	Peak	101	223

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT VERTICAL
 EUT : WM 1170
 Power : AC 110 / 60 Hz
 MODEL : TX CH 01 2412 MHz
 MEMO :

	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	365.800	31.73	-14.27	46.00	41.82	13.53	3.37	26.99	Peak	100	224
2	665.400	33.55	-12.45	46.00	38.75	17.75	5.05	28.00	Peak	---	---

FCC TEST REPORT

Report No. : F392607

Site : 03CH03-HY
 Condition : 3m HORN-ANT-6741 VERTICAL
 EUT : WM 1170
 Power : AC 110 / 60 Hz
 MODEL : TX CH 01 2412 MHz
 MEMO :

	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	1590.000	47.85	-26.15	74.00	57.98	25.73	4.80	40.66	Peak	---	---
2	2364.600	49.85	-24.15	74.00	56.91	28.15	5.91	41.12	Peak	---	---
3 !	2364.600	48.74	-5.26	54.00	55.80	28.15	5.91	41.12	Average	109	60

Site : 03CH03-HY
 Condition : 3m HORN-ANT-6741 HORIZONTAL
 EUT : WM 1170
 Power : AC 110 / 60 Hz
 MODEL : TX CH 01 2412 MHz
 MEMO :

	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	3213.000	46.40	-7.60	54.00	49.82	30.52	7.30	41.24	Average	100	9

FCC TEST REPORT

Report No. : F392607

Site : 03CH03-HY
 Condition : 3m HORN-ANT-6741 VERTICAL
 EUT : WM 1170
 Power : AC 110 / 60 Hz
 MODEL : TX CH 01 2412 MHz
 MEMO :

	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	1590.000	47.85	-26.15	74.00	57.98	25.73	4.80	40.66	Peak	---	---

Site : 03CH03-HY
 Condition : 3m HORN-ANT-6741 VERTICAL
 EUT : WM 1170
 Power : AC 110 / 60 Hz
 MODEL : TX CH 01 2412 MHz
 MEMO :

	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	3213.000	48.97	-5.03	54.00	52.39	30.52	7.30	41.24	Average	110	85


➤ For 3.214GHz ~ 24.835GHz

Remark: Frequency from 3214MHz to 24835MHz, the emission emitted by the EUT is too low to be measured

■ Field strength of fundamental and harmonics

Frequency (MHz)	Antenna Polarity	Cable Factor	Cable Loss	Reading (dBuV)	Limits (dBuV/m)	Emission (uV/m)	Level (dBuV/m)	Margin (uV/m)	Detect (dB)	Mode
2414.000	H	28.25	5.98	70.85	-	-	105.08	179473.36		Peak
2414.000	H	28.25	5.98	62.66	-	-	96.89	69903.67		AV
2414.000	V	28.25	5.98	76.17	-	-	110.40	331131.12		Peak
2414.000	V	28.25	5.98	66.84	-	-	101.07	113109.74		AV
4822.000	V/H									AV/Peak
7236.000	V/H						-			AV/Peak
9648.000	V/H						-			AV/Peak
12060.000	V/H						-			AV/Peak
14472.000	V/H						-			AV/Peak
16884.000	V/H						-			AV/Peak
19296.000	V/H						-			AV/Peak
21708.000	V/H						-			AV/Peak
24120.000	V/H						-			AV/Peak

Remark: The emission emitted by the EUT is too low to be measured except the emission listed above,

Test Engineer : 
 Kevin Yang

- Test Mode: Mode 2 (2437 MHz)
- Test Distance : 3 M
- Temperature : 23 °C
- Relative Humidity : 68 %
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

■ The test was passed at the minimum margin that marked by the frame in the following table

■ Spurious Emission

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT HORIZONTAL
 EUT : WM 1170
 Power : AC 110 / 60 Hz
 MODEL : TX CH 06 2437 MHz
 MEMO :

	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	116.940	34.00	-9.50	43.50	49.14	9.88	1.91	26.93	Peak	200	271
2	250.050	34.03	-11.97	46.00	46.66	11.34	2.63	26.60	Peak	---	---

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT HORIZONTAL
 EUT : WM 1170
 Power : AC 110 / 60 Hz
 MODEL : TX CH 06 2437 MHz
 MEMO :

	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	365.800	34.95	-11.05	46.00	45.04	13.53	3.37	26.99	Peak	---	---
2	699.000	31.83	-14.17	46.00	37.47	17.99	4.37	28.00	Peak	---	---

FCC TEST REPORT

Report No. : F392607

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT VERTICAL
 EUT : WM 1170
 Power : AC 110 / 60 Hz
 MODEL : TX CH 06 2437 MHz
 MEMO :

	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	98.580	32.35	-11.15	43.50	48.35	9.28	1.72	27.00	Peak	---	---
2	250.050	33.21	-12.79	46.00	45.84	11.34	2.63	26.60	Peak	---	---

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT VERTICAL
 EUT : WM 1170
 Power : AC 110 / 60 Hz
 MODEL : TX CH 06 2437 MHz
 MEMO :

	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	363.700	32.38	-13.62	46.00	42.55	13.46	3.35	26.98	Peak	---	---
2	699.000	32.34	-13.66	46.00	37.98	17.99	4.37	28.00	Peak	---	---

Site : 03CH03-HY
 Condition : 3m HORN-ANT-6741 HORIZONTAL
 EUT : WM 1170
 Power : AC 110 / 60 Hz
 MODEL : TX CH 06 2437 MHz
 MEMO :

	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	1590.000	46.17	-27.83	74.00	56.30	25.73	4.80	40.66	Peak	100	86

Site : 03CH03-HY
 Condition : 3m HORN-ANT-6741 HORIZONTAL
 EUT : WM 1170
 Power : AC 110 / 60 Hz
 MODEL : TX CH 06 2437 MHz
 MEMO :

	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	3246.000	49.04	-24.96	74.00	52.33	30.60	7.36	41.25	Peak	---	---
2	3246.000	44.37	-9.63	54.00	47.66	30.60	7.36	41.25	Average	100	343

Site : 03CH03-HY
 Condition : 3m HORN-ANT-6741 VERTICAL
 EUT : WM 1170
 Power : AC 110 / 60 Hz
 MODEL : TX CH 06 2437 MHz
 MEMO :

	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	3246.000	50.54	-23.46	74.00	53.83	30.60	7.36	41.25	Peak	---	---
2	3246.000	47.28	-6.72	54.00	50.57	30.60	7.36	41.25	Average	100	223


➤ For 3.247GHz ~ 24.850GHz

Remark: Frequency from 3247MHz to 24850MHz, the emission emitted by the EUT is too low to be measured

■ Field strength of fundamental and harmonics

Frequency (MHz)	Antenna Polarity	Cable Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Limits (dBuV/m)	Emission (uV/m)	Level (dBuV/m)	Margin (uV/m)	Detect (dB)	Mode
2438.000	H	28.30	6.01	71.61	-	-	105.92	197696.96	-	Peak
2438.000	H	28.30	6.01	63.83	-	-	98.14	80723.50	-	AV
2438.000	V	28.30	6.01	71.61	-	-	105.92	197696.96	-	Peak
2438.000	V	28.30	6.01	63.83	-	-	98.14	80723.50	-	AV
4876.000	V/H									AV/Peak
7311.000	V/H						-			AV/Peak
9748.000	V/H						-			AV/Peak
12185.000	V/H						-			AV/Peak
14622.000	V/H						-			AV/Peak
17059.000	V/H						-			AV/Peak
19496.000	V/H						-			AV/Peak
21933.000	V/H						-			AV/Peak
24370.000	V/H						-			AV/Peak

Remark: The emission emitted by the EUT is too low to be measured except the emission listed above,

Test Engineer : 
 Kevin Yang

- Test Mode: Mode 3 (2462 MHz)
- Test Distance : 3 M
- Temperature : 23 °C
- Relative Humidity : 68 %
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

■ **The test was passed at the minimum margin that marked by the frame in the following table**

■ Spurious Emission

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT HORIZONTAL
 EUT : WM 1170
 Power : AC 110 / 60 Hz
 MODEL : TX CH 11 2462 MHz
 MEMO :

	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	116.940	34.06	-9.44	43.50	49.20	9.88	1.91	26.93	Peak	198	268
2	175.260	34.26	-9.24	43.50	51.54	7.53	1.89	26.70	Peak	---	---
3	250.050	34.16	-11.84	46.00	46.79	11.34	2.63	26.60	Peak	---	---

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT HORIZONTAL
 EUT : WM 1170
 Power : AC 110 / 60 Hz
 MODEL : TX CH 11 2462 MHz
 MEMO :

	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	363.700	35.13	-10.87	46.00	45.30	13.46	3.35	26.98	Peak	102	226
2	696.200	31.80	-14.20	46.00	37.07	17.97	4.76	28.00	Peak	101	201

FCC TEST REPORT

Report No. : F392607

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT VERTICAL
 EUT : WM 1170
 Power : AC 110 / 60 Hz
 MODEL : TX CH 11 2462 MHz
 MEMO :

	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	95.610	33.48	-10.02	43.50	49.70	9.11	1.68	27.01	Peak	---	---
2	250.050	33.38	-12.62	46.00	46.01	11.34	2.63	26.60	Peak	---	---

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT VERTICAL
 EUT : WM 1170
 Power : AC 110 / 60 Hz
 MODEL : TX CH 11 2462 MHz
 MEMO :

	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	365.800	32.07	-13.93	46.00	42.16	13.53	3.37	26.99	Peak	104	224
2	794.200	31.82	-14.18	46.00	36.04	18.74	5.04	28.00	Peak	---	---

FCC TEST REPORT

Report No. : F392607

Site : 03CH03-HY
 Condition : 3m HORN-ANT-6741 VERTICAL
 EUT : WM 1170
 Power : AC 110 / 60 Hz
 MODEL : TX CH 11 2462 MHz
 MEMO :

	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	1590.000	46.77	-27.23	74.00	56.90	25.73	4.80	40.66	Peak	100	219
4	2487.500	48.93	-25.07	74.00	55.65	28.40	6.08	41.20	Peak	---	---
5	2487.500	48.48	-5.52	54.00	55.20	28.40	6.08	41.20	Average	108	55

Site : 03CH03-HY
 Condition : 3m HORN-ANT-6741 HORIZONTAL
 EUT : WM 1170
 Power : AC 110 / 60 Hz
 MODEL : TX CH 11 2462 MHz
 MEMO :

	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	3282.000	47.89	-26.11	74.00	51.04	30.69	7.42	41.26	Peak	---	---
2	3282.000	45.43	-8.57	54.00	48.58	30.69	7.42	41.26	Average	113	135

Site : 03CH03-HY
 Condition : 3m HORN-ANT-6741 VERTICAL
 EUT : WM 1170
 Power : AC 110 / 60 Hz
 MODEL : TX CH 11 2462 MHz
 MEMO :

	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	3282.000	48.73	-25.27	74.00	51.88	30.69	7.42	41.26	Peak	---	---
2	3282.000	46.87	-7.13	54.00	50.02	30.69	7.42	41.26	Average	100	225


➤ For 3.283GHz ~ 24.850GHz

Remark: Frequency from 3283MHz to 24850MHz, the emission emitted by the EUT is too low to be measured

■ Field strength of fundamental and harmonics

Frequency (MHz)	Antenna Polarity	Cable Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Limits (dBuV/m)	Emission (uV/m)	Level (dBuV/m)	Margin (uV/m)	Detect (dB)	Mode
2462.000	H	28.35	6.29	73.65	-	-	108.29	259716.77		Peak
2462.000	H	28.35	6.29	69.74	-	-	104.38	165577.00		AV
2462.000	V	28.35	6.29	69.25	-	-	103.89	156494.83		Peak
2462.000	V	28.35	6.29	66.78	-	-	101.42	117760.60		AV
4926.000	V/H						-			AV/ Peak
7386.000	V/H						-			AV/ Peak
9848.000	V/H						-			AV/ Peak
12310.000	V/H						-			AV/ Peak
14772.000	V/H						-			AV/ Peak
17234.000	V/H						-			AV/ Peak
19696.000	V/H						-			AV/ Peak
22158.000	V/H						-			AV/ Peak
24620.000	V/H						-			AV/ Peak

Remark: The emission emitted by the EUT is too low to be measured except the emission listed above,

Test Engineer : 
 Kevin Yang

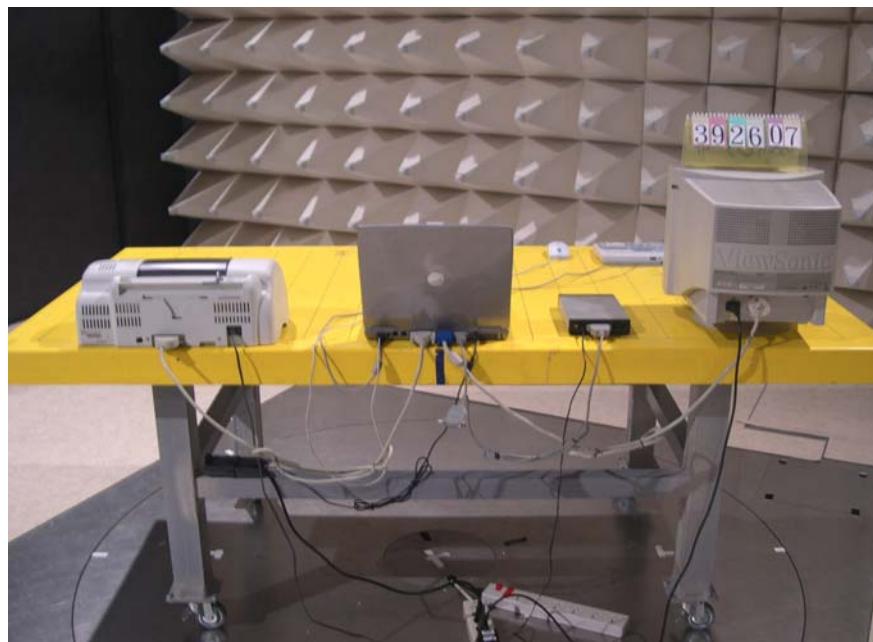
5.6.5 Photographs of Radiated Emission Test Configuration

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

FRONT VIEW



REAR VIEW



5.7 Band Edges Measurement

5.7.1 Measuring Instruments :

As described in chapter 7 of this test report.

5.7.2 Test Procedure :

1. The transmitter output was connected to the spectrum analyzer via a low lose cable.
2. Set both RBW and VBW of spectrum analyzer to 100KHz with convenient frequency span including 100 KHz bandwidth from band edge.
3. The band edges was measured and recorded.

5.7.3 Test Result :

- Test Result in lower band (Channel 1) : PASS
- Test Result in higher band(Channel 11) : PASS

5.7.4 Note on Band edge Emission

The band edge emission plot on appendix B page B8. shows 56.93dB delta between carrier maximum power and local maximum emission in the restricted band (2.390GHz).

The band edge emission plot on appendix B page B9. shows 57.49dB delta between carrier maximum power and local maximum emission in the restricted band (2.4835GHz).

Polarity	The emission of carrier power strength (dB μ V/m)	The maximum field strength in restrict band (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
H	105.08	48.15	74.00	-25.85	Peak
H	106.00	48.51	74.00	-25.49	Peak
H	96.89	39.96	54.00	-14.04	Average
H	98.08	40.59	54.00	-13.41	Average
V	110.40	49.40	74.00	-20.53	Peak
V	103.89	51.75	74.00	-27.6	Peak
V	101.07	47.31	54.00	-9.86	Average
V	101.42	49.28	54.00	-10.07	Average

* 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.

5.8 Antenna Requirements

The EUT use an embedded PIFA antenna with Hirose U.FL-R-SMT connector. It is considered to meet antenna requirement of FCC.

5.8.1 Standard Applicable

For intentional device, according to FCC 47 CFR 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.

And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

5.8.2 Antenna Connected Construction

The antenna of this device is embedded PCB antenna on top corner of the keyboard via Hirose U.FL-R connector.

6 Antenna Factor & Cable Loss

Frequency (MHz)	Antenna Factor (dB)	Cable Loss (dB)	Frequency (MHz)	Antenna Factor (dB)	Cable Loss (dB)
30	15.35	0.92	1000	24.10	3.92
35	13.63	1.05	2000	27.40	5.66
40	11.11	1.08	3000	30.00	7.20
45	10.59	1.15	4000	32.60	9.36
50	6.47	1.29	5000	33.40	9.16
55	5.83	1.63	6000	34.20	10.70
60	5.18	1.30	7000	35.30	12.16
65	4.81	1.36	8000	36.90	13.12
70	4.43	1.43	9000	38.10	13.81
75	5.10	1.48	10000	39.00	14.83
80	5.91	1.53	11000	38.60	15.83
85	7.33	1.61	12000	39.50	17.11
90	8.74	1.69	13000	39.30	17.62
95	9.05	1.67	14000	41.60	18.37
100	9.36	1.76	15000	40.60	19.10
110	9.65	1.80	16000	37.20	19.72
120	9.97	1.90	17000	40.20	21.98
130	10.51	1.61	18000	48.90	21.22
140	10.32	2.14	19000	37.60	23.90
150	9.42	2.16	20000	37.30	24.07
160	8.09	2.16	21000	37.00	25.49
170	7.43	1.99	22000	38.00	24.92
180	7.60	2.39	23000	38.70	25.60
190	7.43	2.38	24000	38.60	25.70
200	7.26	2.46	25000	24.10	3.92
220	9.11	2.59	14000	27.40	5.66
240	10.88	2.68	15000	30.00	7.20
260	11.75	2.91	16000	32.60	9.36
280	11.55	2.92	17000	33.40	9.16
300	11.36	2.99	18000	34.20	10.70
320	12.03	3.03	19000	35.30	12.16
340	12.69	3.22	20000	36.90	13.12
360	13.33	3.28	21000	38.10	13.81
380	14.00	3.80	22000	39.00	14.83
400	14.63	3.80	23000	38.60	15.83
450	15.33	3.69	24000	39.50	17.11
500	16.03	3.93	25000	39.30	17.62
550	16.65	3.56			
600	17.29	4.15			
650	17.64	4.58			
700	18.00	4.73			
750	18.39	4.71			
800	18.79	4.99			
850	19.10	5.24			
900	19.42	5.38			
950	19.58	5.57			
1000	19.75	5.62			

7 List of Measuring Equipments Used

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver	R&S	ESCS 30	100132	9 KHz – 2.75 GHz	Jun. 12, 2003	Conduction (CO01-HY)
LISN	MessTec	NNB-2/16Z	2001-008	9 KHz – 30 MHz	Apr. 29, 2003	Conduction (CO01-HY)
LISN (Support Unit)	MessTec	NNB-2/16Z	2001-009	9 KHz – 30 MHz	Apr. 29, 2003	Conduction (CO01-HY)
EMI Filter	LINDGREN	LRE-2060	1004	< 450 Hz	N/A	Conduction (CO01-HY)
EMI Filter	LINDGREN	N6006	201052	0 ~ 60 Hz	N/A	Conduction (CO01-HY)
RF Cable-CON	Suhner Switzerland	RG223/U	CB029	9KHz~30MHz	Jan. 07, 2003	Conduction (CO01-HY)
50 ohm BNC type Terminal	NOBLE	50ohm	TM009	50 ohm	Apr. 24, 2003	Conduction (CO01-HY)
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz~1GHz 3m	Jun. 21, 2003	Radiation (03CH03-HY)
Spectrum analyzer	R&S	FSP40	100004	9KHz~40GHz	Aug. 07, 2003	Radiation (03CH03-HY)
Amplifier	MITEQ	AFS44	879981	100MHz~26.5GHz	Jul. 23, 2003	Radiation (03CH03-HY)
Horn Antenna	COM-POWER	AH-118	10094	1GHz – 18GHz	Apr. 10, 2003	Radiation (03CH03-HY)
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)
RF Cable-HIGH	Jye Bao	RG142	CB030-HIGH	1GHz~29.5GHz	Mar. 14, 2003	Radiation (03CH03-HY)

※ Calibration Interval of instruments listed above is one year, except for Horn Antenna, BBHA9170.

8 Uncertainty of Test Site

Uncertainty of Radiated Emission Measurement

Contribution	Probability Distribution	3m
Antenna factor calibration	normal(k=2)	±1
cable loss calibration	normal(k=2)	±0.3
RCV/SPA specification	rectangular	±2
Antenna Directivity	rectangular	±3
Antenna Factor V.S. Height	rectangular	±2
Antenna Factor Interpolation for Frequency	rectangular	±0.25
site imperfection	rectangular	±2
Mismatch Receiver VSWR $\Gamma_1=0.09$ Antenna VSWR $\Gamma_2=0.67$ Uncertainty= $20\log(1-\Gamma_1\Gamma_2)$	U-shaped	±0.54
combined standard uncertainty Ue(y)	normal	±2.7
Measuring uncertainty for a level of confidence of 95% U=2Ue(y)	normal (k=2)	±5.4

$U = \sqrt{\{(1/2)^2 + (0.3/2)^2 + (2^2 + 0.5^2 + 2^2 + 0.25^2 + 2^2)/3 + (0.54)^2/2\}} = 2.2$ for 10m test distance

$U = \sqrt{\{(1/2)^2 + (0.3/2)^2 + (2^2 + 3^2 + 2^2 + 0.25^2 + 2^2)/3 + (0.54)^2/2\}} = 2.7$ for 3m test distance

Uncertainty of Conducted Emission Measurement

Contribution	Probability Distribution	150KHz – 30MHz
Cable and I/P attenuator calibration	normal(k=2)	±0.3
RCV/SPA specification	rectangular	±2
LISN coupling specification	rectangular	±1.5
Transducer factor frequency interpolation	rectangular	±0.2
Mismatch Receiver VSWR $\Gamma_1=0.09$ LISN VSWR $\Gamma_2=0.33$ Uncertainty= $20\log(1-\Gamma_1\Gamma_2)$	U-shaped	0.2
combined standard uncertainty Ue(y)	normal	±1.66
Measuring uncertainty for a level of confidence of 95% U=2Ue(y)	normal (k=2)	±3.32

$U = \sqrt{\{(0.3/2)^2 + (2^2 + 1.5^2 + 0.2^2)/3 + (0.2)^2/2\}} = 1.66$