

FCC TEST REPORT

for

47 CFR, Part 15, Subpart C

Equipment : Wireless 802.11b Residential Gateway

Model No. : MS-6811, RG11B

FCC ID. : I4L-MS6811

Filing Type : Certification

Applicant : Micro-Star Int'l Co., Ltd.
No. 69, Li-De St., Jung-He City, Taipei Hsien, Taiwan

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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: Aug. 20, 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 Residential Gateway

Model No. : MS-6811, RG11B

FCC ID. : I4L-MS6811

Filing Type : Certification

Applicant : **Micro-Star Int'l Co., Ltd.**

No. 69, Li-De St., Jung-He City, Taipei Hsien, Taiwan

I **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 Aug. 18, 2003 at **SPORTON International Inc.** LAB.



Alex Chen
Manager

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

Micro-Star Int'l Co., Ltd.
No. 69, Li-De St., Jung-He City, Taipei Hsien, Taiwan

1.2. Manufacturer

1. Micro-Star Int'l Co., Ltd.
No. 488, Ban-Nan Rd., Jung-He City, Taipei Hsien, Taiwan
2. MSI COMPUTER (SHENZHEN) Co., Ltd.
Longma Information Technology Industrial Park, Shiyan, Tangtou Village, Shenzhen

1.3. Basic Description of Equipment under Test

Equipment	: Wireless 802.11b Residential Gateway
Model No.	: MS-6811, RG11B
FCC ID.	: I4L-MS6811
Trade Name	: MSI
TP Cable x 6	: Non-Shielded, 1m
USB Cable	: Shielded, 1.2m
Power Supply Type	: Linear
AC Power Input	: Wall-Mount, 2pin
DC Power Cable	: Non-Shielded, 1.8m

1.4. Feature of Equipment under Test

Product Feature & Specification	
1. Host/Radio Interface	PCMCIA PC card PRISM2.5
2. Type of Modulation	DSSS (BDPSK, QDPSK, CCK)
3. Number of Channels	11
4. Frequency Band	2.4 ~ 2.4835GHz ISM bandwidth
5. Carrier Frequency of each channel	2412, 2417,....., 2472, 2484
6. Bandwidth of each channel	22MHz
7. Maximum Output Power to Antenna	15.17dBm
8. IF & L.O. frequency	2038MHz
9. Type of Antenna Connector (Ex: SMA,TNC, MCX, MMCX, UFC.....etc)	MMCX
10. Antenna Type / Class and Gain	Dipole, Omni, 1.74dBi Maximum
11. Function Type	Transceiver
12. Power Rating (DC/AC, Voltage)	3.3VDC +/- 5%
13. Basic function of product	WLAN
14. Adapter	DVE / DV-1280-3 Input: 120VAC, 60Hz, 16W Output: 12VDC, 1A

2. Test Configuration of Equipment under Test

2.1. Test Manner

- a. The EUT has been associated with personal computer 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 COMPAQ Notebook, VIEWSONIC Monitor, COMPAQ PS/2 Keyboard, LOGITECH USB Mouse, EPSON Printer and EUT for EMI test.
- c. The following modes were pretested:
 - Mode 1. CH01 (2412MHz)
 - Mode 2. CH06 (2437MHz)
 - Mode 3. CH11 (2462MHz)
- b. Frequency range investigated: conduction 150 KHz to 30 MHz, radiation 30 MHz to 25000MHz.

2.2. Description of Test System

Support Unit 1. -- 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 2. -- PS/2 Keyboard (COMPAQ)

FCC ID	: N/A
Model No.	: 6511-VA
Serial No.	: SP0054
Data Cable	: Shielded, 1.5m
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.

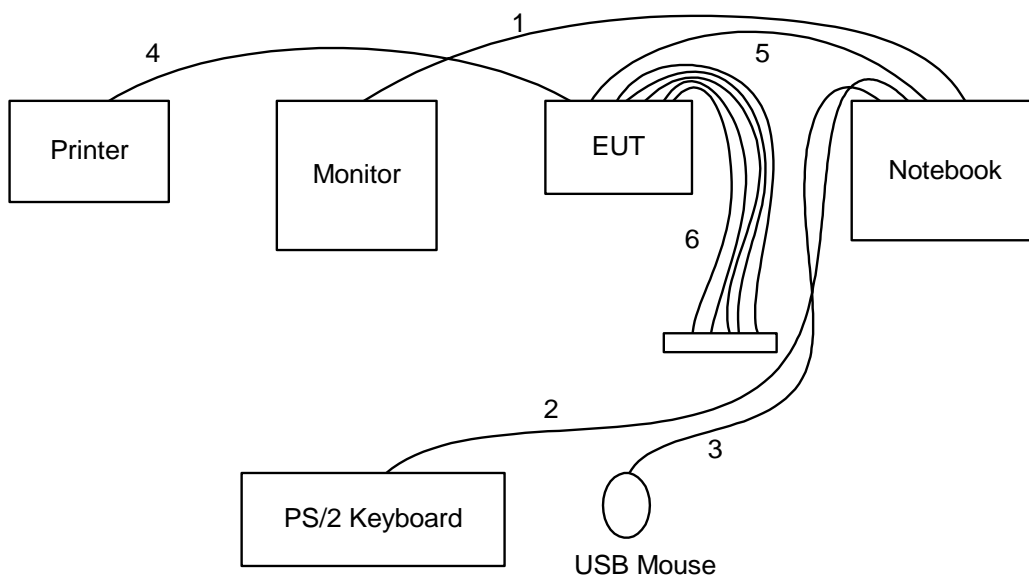
Support Unit 4. -- Printer (EPSON)

FCC ID : N/A
Model No. : STYLUS COLOR S680
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. – Notebook (COMPAQ)

FCC ID : N/A
Model No. : PRESARIO 1500
Power Supply Type : Switching
Power Cord : Non-Shielded
Serial No. : SP0036
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 1.
2. The I/O cable is connected from Notebook to the support unit 2.
3. The I/O cable is connected from Notebook to the support unit 3.
4. The USB cable is connected from EUT to the support unit 4.
5. The TP cable is connected from Notebook to the EUT.
6. These are loop-back TP Cables.

3. Test Software

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, "Explorer.exe" was executed to keep transmitting signals at fixed frequency.

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,
FCC 97-114 for test of 6dB Bandwidth
FCC 97-114 for test of Maximum Peak Output Power
FCC 97-114 for test of 100kHz Bandwidth of Frequency Band Edges
FCC 97-114 for test of Power Spectral Density

4.3. Test in Compliance with

FCC Part 15, Subpart C 15.247

4.4. Frequency Range Investigated

- a. Conduction: from 150 KHz to 30 MHz
- b. Radiation: from 30 MHz to 25000MHz

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

5.2. 6dB Bandwidth

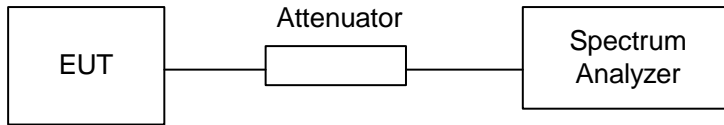
5.2.1. Measuring Instruments :

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 :

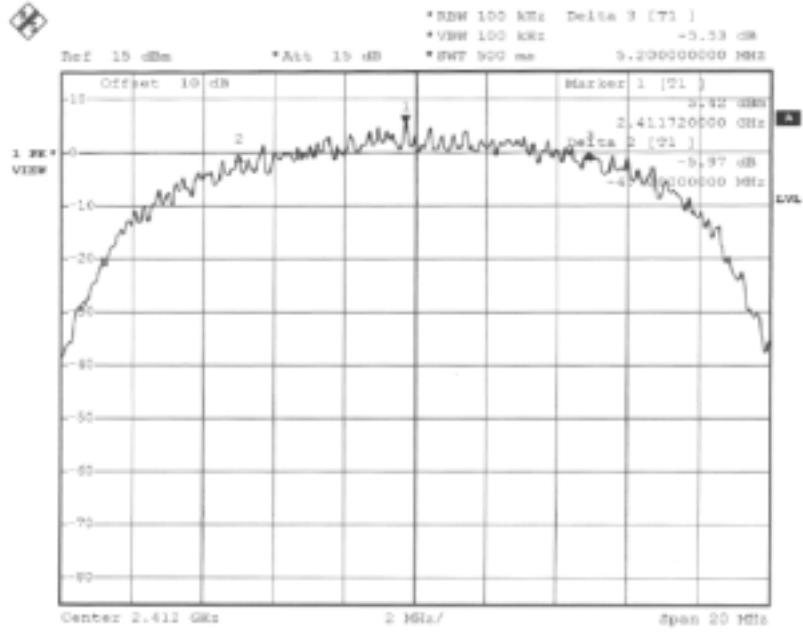


5.2.4. Test Result : The spectrum analyzer plots are attached as below

- Temperature : 26°C
- Relative Humidity : 65 %

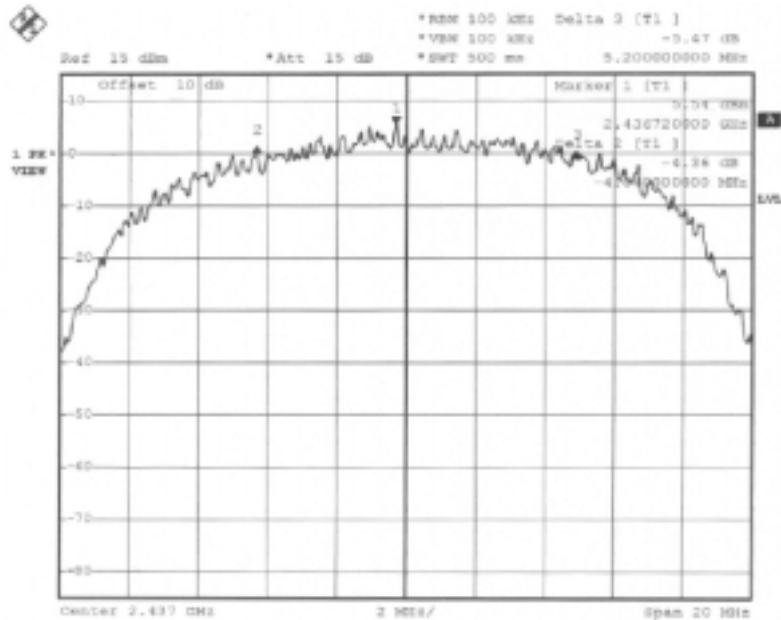
Channel	Frequency (MHz)	6dB Emission bandwidth (MHz)	Limits (MHz)	Plot Ref. No.
1	2412	9.92	0.5	1
6	2437	9.24	0.5	2
11	2462	9.24	0.5	3

Plot1(Channel 1) :



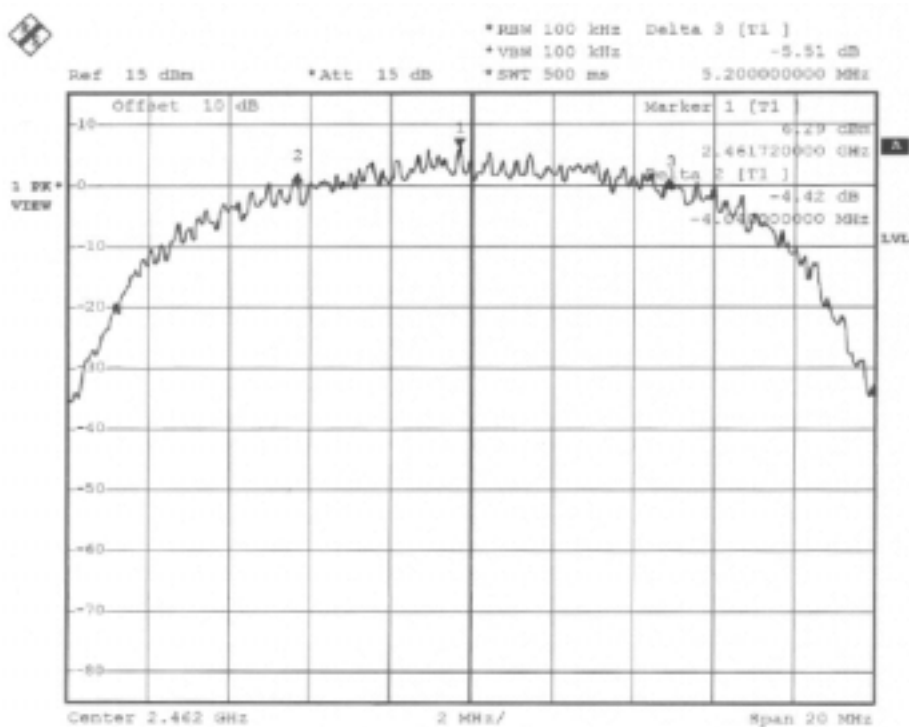
Date: 19.JUL.2003 11:04:24

Plot2(Channel 6) :



Date: 19.JUL.2003 11:15:54

Plot3(Channel 11) :



Date: 19.JUL.2003 11:13:48

Comments : 6dB Emission bandwidth>500kHz

5.3. Peak Output Power

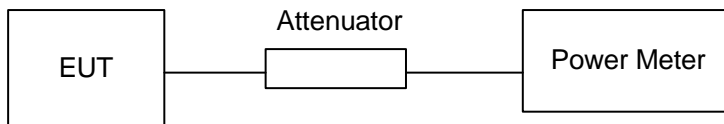
5.3.1. Measuring Instruments :

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: 26°C
- Relative Humidity: 65 %
- Antenna Gain: 1.74 dBi

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (mW)	Limits (Watt/dBm)
1	2412	14.24	26.54605562	1W/30 dBm
6	2437	14.42	27.66941645	1W/30 dBm
11	2462	15.17	32.88516309	1W/30 dBm

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

5.4. Power Spectral Density

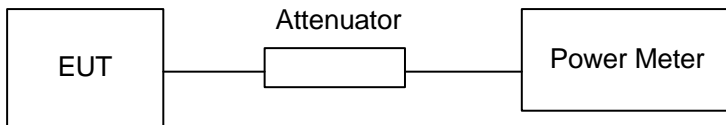
5.4.1. Measuring Instruments :

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 :

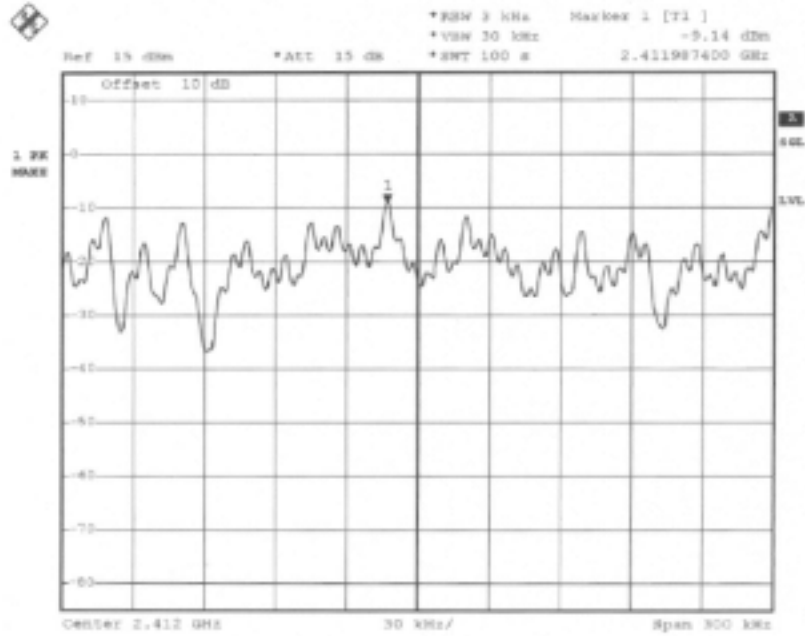


5.4.4. Test Result : See spectrum analyzer plots below

- Temperature: 26°C
- Relative Humidity: 65 %

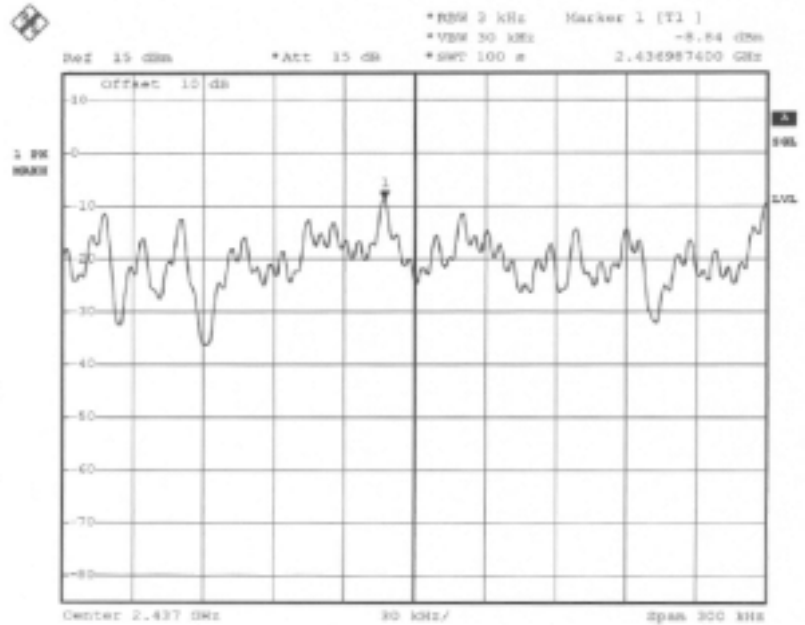
Channel	Frequency (MHz)	Power Spectral Density (dBm)	Limits (dBm)	Plot Ref. No.
1	2412	-9.14	8	1
6	2437	-8.84	8	2
11	2462	-8.07	8	3

Plot1(Channel 1):



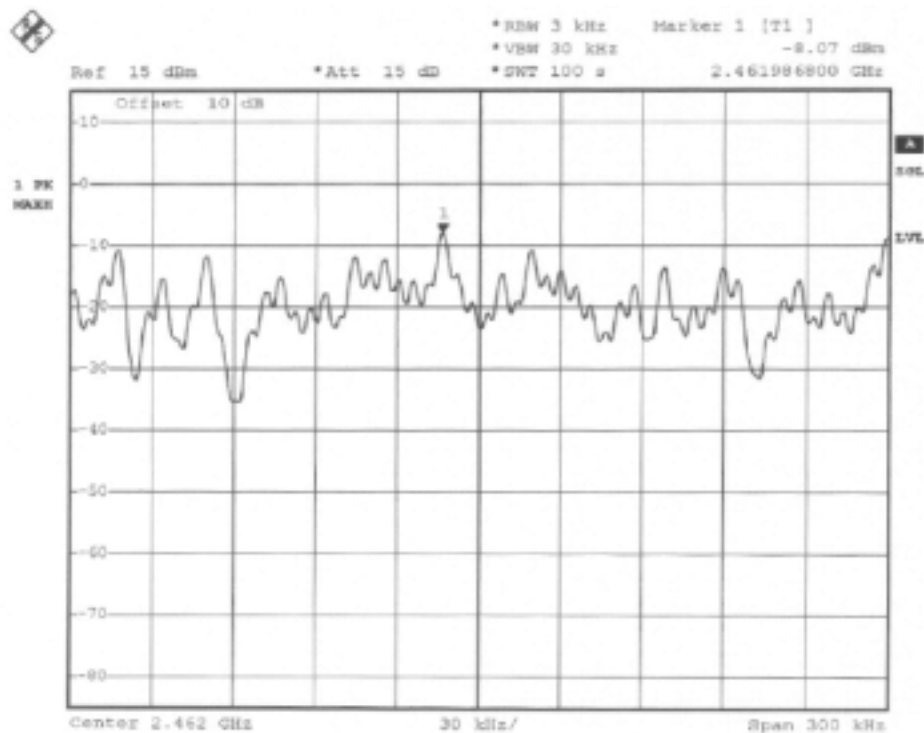
Date: 19.JUL.2003 11:07:39

Plot2(Channel 6):



Date: 19.JUL.2003 11:10:11

Plot3(Channel 11):



Date: 19-JUL-2003 11:12:30

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 :

- Test Mode: Mode 1
- Frequency Range of Test: from 150KHz to 30 MHz
- 6dB Bandwidth: 9KHz
- Temperature: 27°C
- Relative Humidity: 55 %


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

Site : C001-HY
 Condition : CNS/VCCI/CISPR-B 2003 2001/008 LINE
 EUT : Gateway
 Power : 110V/60Hz
 Model : MS-6811
 Memo : TX CH01

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.161	21.33	-34.07	55.40	21.19	0.10	0.04	Average
2	0.161	46.94	-18.46	65.40	46.80	0.10	0.04	QP
3	0.217	44.99	-17.94	62.93	44.84	0.10	0.05	QP
4	0.217	16.92	-36.01	52.93	16.77	0.10	0.05	Average
5	0.252	43.34	-18.35	61.69	43.17	0.10	0.07	QP
6	0.252	15.47	-36.22	51.69	15.30	0.10	0.07	Average
7	0.358	41.54	-17.23	58.77	41.33	0.10	0.11	QP
8	0.358	14.85	-33.92	48.77	14.64	0.10	0.11	Average
9	0.442	15.51	-31.51	47.02	15.30	0.10	0.11	Average
10	0.442	40.63	-16.39	57.02	40.42	0.10	0.11	QP
11	0.601	38.82	-17.18	56.00	38.63	0.10	0.09	QP
12	0.601	11.97	-34.03	46.00	11.78	0.10	0.09	Average

Site : C001-HY
 Condition : CNS/VCCI/CISPR-B 2003 2001/008 NEUTRAL
 EUT : Gateway
 Power : 110V/60Hz
 Model : MS-6811
 Memo : TX CH01

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.169	47.29	-17.72	65.01	47.15	0.10	0.04	QP
2	0.169	19.03	-35.98	55.01	18.89	0.10	0.04	Average
3	0.260	43.26	-18.17	61.43	43.09	0.10	0.07	QP
4	0.260	15.32	-36.11	51.43	15.15	0.10	0.07	Average
5	0.408	41.22	-16.47	57.69	41.00	0.10	0.12	QP
6	0.408	15.51	-32.18	47.69	15.29	0.10	0.12	Average
7	0.464	40.61	-16.01	56.62	40.40	0.10	0.11	QP
8	0.464	15.26	-31.36	46.62	15.05	0.10	0.11	Average
9	0.579	39.37	-16.63	56.00	39.17	0.10	0.10	QP
10	0.579	12.54	-33.46	46.00	12.34	0.10	0.10	Average
11	0.644	37.96	-18.04	56.00	37.77	0.10	0.09	QP
12	0.644	12.11	-33.89	46.00	11.92	0.10	0.09	Average

Test Engineer: 
 John Huang

- Test Mode: Mode 2
- Frequency Range of Test: from 150KHz to 30 MHz
- 6dB Bandwidth: 9KHz
- Temperature: 27°C
- Relative Humidity: 55 %


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

Site : C001-HY
 Condition : CNS/VCCI/CISPR-B 2003 2001/008 LINE
 EUT : Gateway
 Power : 110V/60Hz
 Model : MS-6811
 Memo : TX CH06

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.164	47.17	-18.09	65.26	47.03	0.10	0.04	QP
2	0.164	21.03	-34.23	55.26	20.09	0.10	0.04	Average
3	0.181	18.95	-35.49	54.44	18.81	0.10	0.04	Average
4	0.181	47.17	-17.27	64.44	47.03	0.10	0.04	QP
5	0.435	14.67	-32.49	47.16	14.46	0.10	0.11	Average
6	0.435	40.74	-16.42	57.16	40.53	0.10	0.11	QP
7	0.549	39.56	-16.44	56.00	39.36	0.10	0.10	QP
8	0.549	12.60	-33.40	46.00	12.40	0.10	0.10	Average
9	0.661	37.18	-18.82	56.00	36.99	0.10	0.09	QP
10	0.661	10.82	-35.18	46.00	10.63	0.10	0.09	Average

Site : C001-HY
 Condition : CNS/VCCI/CISPR-B 2003 2001/008 NEUTRAL
 EUT : Gateway
 Power : 110V/60Hz
 Model : MS-6811
 Memo : TX CH06

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.157	46.99	-18.63	65.62	46.85	0.10	0.04	QP
2	0.157	21.24	-34.38	55.62	21.10	0.10	0.04	Average
3	0.203	46.07	-17.42	63.49	45.93	0.10	0.04	QP
4	0.203	17.92	-35.57	53.49	17.78	0.10	0.04	Average
5	0.408	41.22	-16.47	57.69	41.00	0.10	0.12	QP
6	0.408	15.56	-32.13	47.69	15.34	0.10	0.12	Average
7	0.464	40.61	-16.01	56.62	40.40	0.10	0.11	QP
8	0.464	15.26	-31.36	46.62	15.05	0.10	0.11	Average
9	0.579	12.48	-33.52	46.00	12.28	0.10	0.10	Average
10	0.579	39.33	-16.67	56.00	39.13	0.10	0.10	QP
11	0.679	36.83	-19.17	56.00	36.64	0.10	0.09	QP
12	0.679	10.75	-35.25	46.00	10.56	0.10	0.09	Average

Test Engineer: 
 John Huang

FCC TEST REPORT

Report No. : F371710

- Test Mode: Mode 3
- Frequency Range of Test: from 150KHz to 30 MHz
- 6dB Bandwidth: 9KHz
- Temperature: 27°C
- Relative Humidity: 55 %


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

Site : C001-HY
 Condition : CNS/VCCI/CISPR-B 2003 2001/008 LINE
 EUT : Gateway
 Power : 110V/60Hz
 Model : MS-6811
 Memo : TX CH11

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.158	46.97	-18.62	65.59	46.83	0.10	0.04	QP
2	0.158	21.14	-34.45	55.59	21.00	0.10	0.04	Average
3	0.188	46.92	-17.20	64.12	46.78	0.10	0.04	QP
4	0.188	18.73	-35.39	54.12	18.59	0.10	0.04	Average
5	0.435	40.74	-16.42	57.16	40.53	0.10	0.11	QP
6	0.435	14.67	-32.49	47.16	14.46	0.10	0.11	Average
7	0.502	13.09	-32.91	46.00	12.88	0.10	0.11	Average
8	0.502	40.10	-15.90	56.00	39.09	0.10	0.11	QP
9	0.549	39.56	-16.44	56.00	39.36	0.10	0.10	QP
10	0.549	12.73	-33.27	46.00	12.53	0.10	0.10	Average
11	0.627	38.08	-17.92	56.00	37.09	0.10	0.09	QP
12	0.627	11.56	-34.44	46.00	11.37	0.10	0.09	Average

Site : C001-HY
 Condition : CNS/VCCI/CISPR-B 2003 2001/008 NEUTRAL
 EUT : Gateway
 Power : 110V/60Hz
 Model : MS-6811
 Memo : TX CH11

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.161	47.24	-18.19	65.43	47.10	0.10	0.04	QP
2	0.161	21.34	-34.09	55.43	21.20	0.10	0.04	Average
3	0.179	47.42	-17.11	64.53	47.28	0.10	0.04	QP
4	0.179	19.72	-34.81	54.53	19.58	0.10	0.04	Average
5	0.417	41.17	-16.34	57.51	40.95	0.10	0.12	QP
6	0.417	15.73	-31.78	47.51	15.51	0.10	0.12	Average
7	0.486	13.78	-32.46	46.24	13.57	0.10	0.11	Average
8	0.486	40.43	-15.81	56.24	40.22	0.10	0.11	QP
9	0.585	39.17	-16.83	56.00	38.97	0.10	0.10	QP
10	0.585	12.28	-33.72	46.00	12.08	0.10	0.10	Average
11	0.686	36.38	-19.62	56.00	36.20	0.10	0.08	QP
12	0.686	10.59	-35.41	46.00	10.41	0.10	0.08	Average

Test Engineer: 
 John Huang

5.6. Test of Radiated Emission

Radiated emissions from 30 MHz to 25 GHz were measured according to the methods defines in ANSI C63.4-2001. The EUT was placed on a nonmetallic stand, 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 (HP 8447D)
 - RF Gain 30 dB
 - Signal Input 100 KHz to 1.3 GHz

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

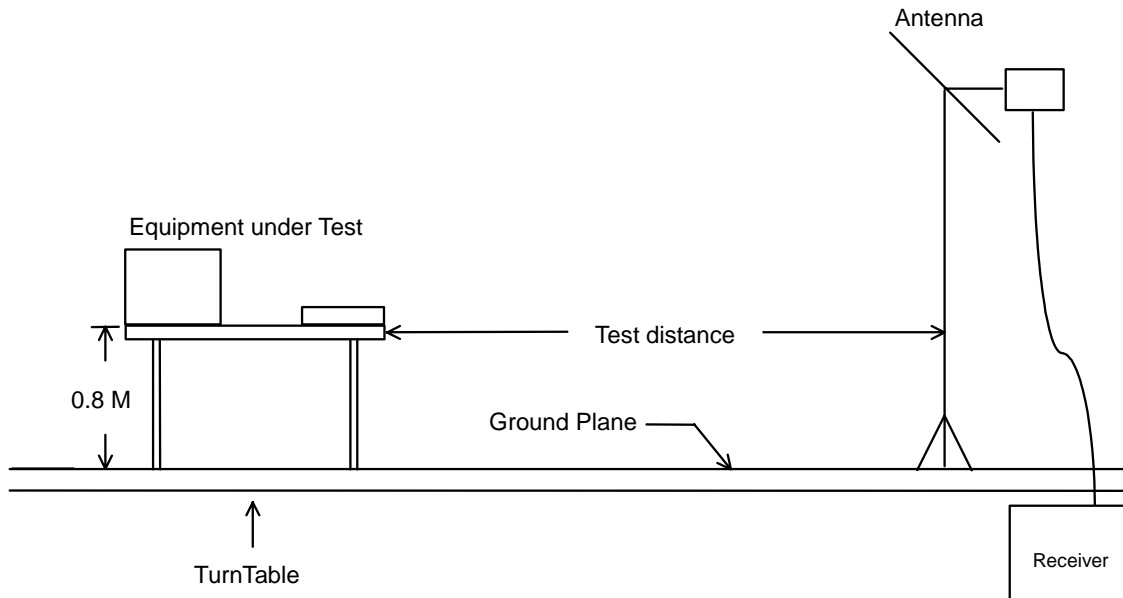
- Spectrum analyzer (R&S FSEK30)
 - Attenuation 10 dB
 - Start Frequency 1 GHz
 - Stop Frequency 25 GHz
 - Resolution Bandwidth 1 MHz
 - Video Bandwidth 1 MHz
 - Signal Input 20 Hz to 40 GHz

- Test Receiver (SCHAFFNER SCR3501)
 - Resolution Bandwidth 120 KHz
 - Frequency Band 9 K – 1 GHz
 - Quasi-Peak Detector ON for Quasi-Peak Mode
OFF for Peak Mode

5.6.2. Test Procedures

1. The EUT was placed on a rotatable table top 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. 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.
5. 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.
6. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
7. 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.
8. 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
- Test Distance: 3 M
- Temperature: 26 °C
- Relative Humidity: 65 %
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading: Antenna (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 test record

■ Spurious Emission

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT HORIZONTAL
 EUT : Gateway
 Power : 110V/60Hz
 MODEL : MS-6811
 MEMO : TX CH01 2412MHz
 : F371710

	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	200.100	39.99	-3.51	43.50	57.02	7.28	2.29	26.60	QP	---	---
2	274.890	44.76	-1.24	46.00	57.03	11.60	2.73	26.60	QP	100	105
3	291.900	42.66	-3.34	46.00	55.02	11.43	2.81	26.60	Peak	---	---

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT HORIZONTAL
 EUT : Gateway
 Power : 110V/60Hz
 MODEL : MS-6811
 MEMO : TX CH01 2412MHz
 : F371710

	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	424.600	43.69	-2.31	46.00	52.50	14.98	3.53	27.32	QP	---	---
2	598.900	44.14	-1.86	46.00	50.64	17.28	4.22	28.00	QP	---	---
3	900.600	44.16	-1.84	46.00	47.13	19.42	5.41	27.80	QP	---	---

Site : 03CH03-NY
 Condition : 3m 03CH03-MAT VERTICAL
 EUT : Gateway
 Power : 110V/60Hz
 MODEL : MS-6811
 MEMO : TX CH01 2412MHz
 : F371710

	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 !	31.890	36.26	-3.74	40.00	48.05	14.29	1.02	27.10	QP	---	---
2 !	200.100	39.91	-3.59	43.50	56.94	7.28	2.29	26.60	Peak	---	---
3 !	274.890	43.83	-2.17	46.00	56.10	11.60	2.73	26.60	QP	---	---

Site : 03CH03-NY
 Condition : 3m 03CH03-MAT VERTICAL
 EUT : Gateway
 Power : 110V/60Hz
 MODEL : MS-6811
 MEMO : TX CH01 2412MHz
 : F371710

	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	466.600	39.16	-6.84	46.00	47.49	15.56	3.64	27.53	Peak	---	---
2 !	598.900	43.62	-2.38	46.00	50.12	17.28	4.22	28.00	QP	---	---
3 !	900.600	43.45	-2.55	46.00	46.42	19.42	5.41	27.80	QP	---	---

FCC TEST REPORT

Report No. : F371710

Site : 03CH03-HY
 Condition : 3m HORN-ANT-6741 HORIZONTAL
 EUT : Gateway
 Power : 110V/60Hz
 MODEL : MS-6811
 MEMO : TX CH01 2412MHz
 : F371710

	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	1100.000	43.49	-30.51	74.00	42.02	24.36	4.09	26.98	Peak	---	---
2	1100.000	36.01	-17.99	54.00	34.54	24.36	4.09	26.98	Average	---	---
3	1158.000	47.42	-26.58	74.00	45.73	24.50	4.18	26.99	Peak	---	---
4	1158.000	42.05	-11.95	54.00	40.36	24.50	4.18	26.99	Average	---	---
5	1198.000	43.68	-30.32	74.00	41.03	24.60	4.24	26.99	Peak	---	---
6	1198.000	37.67	-16.33	54.00	35.82	24.60	4.24	26.99	Average	---	---
7	2038.000	51.13	-22.87	74.00	45.02	27.49	5.73	27.11	Peak	---	---
8	2038.000	44.55	-9.45	54.00	38.44	27.49	5.73	27.11	Average	---	---
11	2788.000	51.93	-22.07	74.00	42.95	29.34	6.86	27.22	Peak	---	---
12	2788.000	43.77	-10.23	54.00	34.79	29.34	6.86	27.22	Average	---	---
1	3982.000	56.75	-17.25	74.00	42.24	32.59	9.32	27.40	Peak	---	---
2	3982.000	50.16	-3.84	54.00	35.65	32.59	9.32	27.40	Average	---	---

Site : 03CH03-HY
 Condition : 3m HORN-ANT-6741 VERTICAL
 EUT : Gateway
 Power : 110V/60Hz
 MODEL : MS-6811
 MEMO : TX CH01 2412MHz
 : F371710

	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
2	1000.000	40.04	-13.96	54.00	38.99	24.10	3.92	26.97	Average	---	---
3	1492.000	50.58	-23.42	74.00	47.59	25.33	4.69	27.03	Peak	---	---
4	1492.000	45.28	-8.72	54.00	42.29	25.33	4.69	27.03	Average	---	---
5	1788.000	48.52	-25.48	74.00	43.77	26.54	5.28	27.07	Peak	---	---
6	1788.000	38.46	-15.54	54.00	33.71	26.54	5.28	27.07	Average	---	---
7	2036.000	53.45	-20.55	74.00	47.35	27.48	5.73	27.11	Peak	---	---
8	2036.000	48.13	-5.87	54.00	42.03	27.48	5.73	27.11	Average	---	---
11	2788.000	53.03	-20.97	74.00	44.05	29.34	6.86	27.22	Peak	---	---
12	2788.000	48.02	-5.98	54.00	39.04	29.34	6.86	27.22	Average	---	---
1	3982.000	57.07	-16.93	74.00	42.56	32.59	9.32	27.40	Peak	---	---
2	3982.000	50.62	-3.38	54.00	36.11	32.59	9.32	27.40	Average	---	---

➤ For 5GHz ~ 25GHz

Remark: Frequency from 5000MHz to 25000MHz, 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)	Reading Loss (dB)	Reading (dBuV)	Limits (dBuV/m)	Emission (uV/m)	Level (dBuV/m)	Margin (uV/m)	Detect (dB)	Mode
2414.000	H	28.25	6.23	67.39	-	-	101.87	124022.36		Peak
2414.000	H	28.25	6.23	58.95	-	-	93.43	46935.34		A.V.
2414.000	V	28.25	6.23	73.33	-	-	107.81	245753.66		Peak
2414.000	V	28.25	6.23	64.59	-	-	99.07	89846.26		A.V.
4824.000	V/H						-			Peak, A.V.
7236.000	V/H						-			Peak, A.V.
9648.000	V/H						-			Peak, A.V.
12060.000	V/H						-			Peak, A.V.
14472.000	V/H						-			Peak, A.V.
16884.000	V/H						-			Peak, A.V.
19296.000	V/H						-			Peak, A.V.
21708.000	V/H						-			Peak, A.V.
24120.000	V/H						-			Peak, A.V.

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

Test Engineer : Steve
Steve Chen

- Test Mode: Mode 2
- Test Distance: 3 M
- Temperature: 26 °C
- Relative Humidity: 65 %
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading: Antenna (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 test record

■ Spurious Emission

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT HORIZONTAL
 EUT : Gateway
 Power : 110V/60Hz
 MODEL : MS-6811
 MEMO : TX CH06 2437MHz
 : F371710

	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 !	200.100	41.03	-2.47	43.50	58.06	7.28	2.29	26.60	QP	---	---
2 !	274.890	41.88	-4.12	46.00	54.15	11.60	2.73	26.60	QP	---	---
3 !	286.500	43.17	-2.83	46.00	55.50	11.48	2.79	26.60	QP	---	---

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT HORIZONTAL
 EUT : Gateway
 Power : 110V/60Hz
 MODEL : MS-6811
 MEMO : TX CH06 2437MHz
 : F371710

	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 !	466.600	41.44	-4.56	46.00	49.77	15.56	3.64	27.53	QP	---	---
2 !	598.900	43.48	-2.52	46.00	49.98	17.28	4.22	28.00	QP	---	---
3 !	799.800	44.20	-1.80	46.00	48.35	18.79	5.06	28.00	QP	100	100
4 !	900.600	44.13	-1.87	46.00	47.10	19.42	5.41	27.80	QP	---	---

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT VERTICAL
 EUT : Gateway
 Power : 110V/60Hz
 MODEL : MS-6811
 MEMO : TX CH06 2437MHz
 : F371710

	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	30.540	35.78	-4.22	40.00	46.93	14.93	1.02	27.10	Peak	---	---
2	101.820	39.35	-4.15	43.50	55.24	9.41	1.69	26.99	Peak	---	---
3	200.100	41.43	-2.07	43.50	58.46	7.28	2.29	26.60	QP	---	---

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT VERTICAL
 EUT : Gateway
 Power : 110V/60Hz
 MODEL : MS-6811
 MEMO : TX CH06 2437MHz
 : F371710

	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	598.900	43.36	-2.64	46.00	49.86	17.28	4.22	28.00	QP	---	---
2	800.500	42.69	-3.31	46.00	46.04	18.79	5.06	28.00	Peak	---	---
3	900.600	42.39	-3.61	46.00	45.36	19.42	5.41	27.80	QP	---	---

Site : 03CH03-HY
 Condition : 3m HORN-ANT-6741 HORIZONTAL
 EUT : Gateway
 Power : 110V/60Hz
 MODEL : MS-6811
 MEMO : TX CH06 2437MHz
 : F371710

	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	1158.000	47.81	-26.19	74.00	46.12	24.50	4.18	26.99	Peak	---	---
2	1158.000	39.94	-20.06	54.00	32.25	24.50	4.18	26.99	Average	---	---
3	1388.000	46.58	-27.42	74.00	44.01	25.06	4.53	27.02	Peak	---	---
4	1388.000	35.84	-18.16	54.00	33.27	25.06	4.53	27.02	Average	---	---
5	1492.000	47.20	-26.80	74.00	44.21	25.33	4.69	27.03	Peak	---	---
6	1492.000	35.63	-18.37	54.00	32.64	25.33	4.69	27.03	Average	---	---
7	1598.000	46.88	-27.12	74.00	43.27	25.76	4.90	27.05	Peak	---	---
8	1598.000	38.13	-15.87	54.00	34.52	25.76	4.90	27.05	Average	---	---
9	2062.000	51.39	-22.61	74.00	45.21	27.53	5.76	27.11	Peak	---	---
10	2062.000	40.17	-13.83	54.00	33.99	27.53	5.76	27.11	Average	---	---
1	3980.000	56.05	-17.15	74.00	42.34	32.59	9.32	27.40	Peak	---	---
2	3980.000	50.42	-3.58	54.00	35.91	32.59	9.32	27.40	Average	---	---

Site : 03CH03-HY
 Condition : 3m HORN-ANT-6741 VERTICAL
 EUT : Gateway
 Power : 110V/60Hz
 MODEL : MS-6811
 MEMO : TX CH06 2437MHz
 : F371710

	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	45.79	-28.21	74.00	44.74	24.10	3.92	26.97	Peak	---	---
4	1198.000	34.50	-19.50	54.00	32.65	24.60	4.24	26.99	Average	---	---
5	1500.000	50.62	-23.38	74.00	47.59	25.36	4.70	27.03	Peak	---	---
6	1500.000	37.24	-16.76	54.00	34.21	25.36	4.70	27.03	Average	---	---
7	2062.000	54.58	-19.42	74.00	48.40	27.53	5.76	27.11	Peak	---	---
8	2062.000	40.73	-13.27	54.00	34.55	27.53	5.76	27.11	Average	---	---
11	2812.000	51.59	-22.41	74.00	42.50	29.41	6.90	27.22	Peak	---	---
12	2812.000	46.06	-7.94	54.00	36.97	29.41	6.90	27.22	Average	---	---
1	3974.000	56.72	-17.28	74.00	42.25	32.57	9.30	27.40	Peak	---	---
2	3974.000	50.45	-3.55	54.00	35.98	32.57	9.30	27.40	Average	---	---

- For 5GHz ~ 25GHz
 Remark: Frequency from 5000MHz to 25000MHz, 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	6.26	66.80	-	-	101.36	116949.94		Peak
2438.000	H	28.30	6.26	58.62	-	-	93.18	45603.69		A.V.
2438.000	V	28.30	6.26	73.21	-	-	107.77	244624.53		Peak
2438.000	V	28.30	6.26	64.06	-	-	98.62	85310.01		A.V.
4874.000	V/H						-			Peak, A.V.
7311.000	V/H						-			Peak, A.V.
9748.000	V/H						-			Peak, A.V.
12185.000	V/H						-			Peak, A.V.
14622.000	V/H						-			Peak, A.V.
17059.000	V/H						-			Peak, A.V.
19496.000	V/H						-			Peak, A.V.
21933.000	V/H						-			Peak, A.V.
24370.000	V/H						-			Peak, A.V.

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

Test Engineer : Steve
Steve Chen

- Test Mode: Mode 3
- Test Distance: 3 M
- Temperature: 26 °C
- Relative Humidity: 65 %
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading: Antenna (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 test record

■ Spurious Emission

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT HORIZONTAL
 EUT : Gateway
 Power : 110V/60Hz
 MODEL : MS-6811
 MEMO : TX CH11 2462MHz
 : F371710

	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	200.100	42.05	-1.45	43.50	59.08	7.28	2.29	26.60	QP	---	---
2	264.090	42.91	-3.09	46.00	55.13	11.70	2.68	26.60	QP	---	---
3	274.890	43.01	-2.99	46.00	55.28	11.60	2.73	26.60	QP	---	---
4	286.500	42.84	-3.16	46.00	55.17	11.48	2.79	26.60	QP	---	---

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT HORIZONTAL
 EUT : Gateway
 Power : 110V/60Hz
 MODEL : MS-6811
 MEMO : TX CH11 2462MHz
 : F371710

	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	300.000	43.68	-2.32	46.00	56.07	11.36	2.85	26.60	QP	---	---
2	424.600	44.19	-1.81	46.00	53.00	14.98	3.53	27.32	QP	---	---
3	599.600	43.66	-2.34	46.00	50.15	17.28	4.23	28.00	QP	---	---
4	800.500	44.87	-1.13	46.00	49.02	18.79	5.06	28.00	QP	100	105
5	900.600	43.90	-2.10	46.00	46.87	19.42	5.41	27.80	QP	---	---

Site : 03CH03-HY
 Condition : 3a 03CH03-MAT VERTICAL
 EUT : Gateway
 Power : 110V/60Hz
 MODEL : MS-6811
 MEMO : TX CH11 2462MHz
 : F371710

	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	31.890	35.38	-4.62	40.00	47.17	14.29	1.02	27.10	Peak	---	---
2	101.820	39.78	-3.72	43.50	55.67	9.41	1.69	26.99	Peak	---	---
3	200.100	41.22	-2.28	43.50	58.25	7.28	2.29	26.60	QP	---	---

Site : 03CH03-HY
 Condition : 3a 03CH03-MAT VERTICAL
 EUT : Gateway
 Power : 110V/60Hz
 MODEL : MS-6811
 MEMO : TX CH11 2462MHz
 : F371710

	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	598.900	42.61	-3.39	46.00	49.11	17.28	4.22	28.00	QP	---	---
2	799.800	43.84	-2.16	46.00	47.99	18.79	5.06	28.00	QP	---	---
3	900.600	42.65	-3.35	46.00	45.62	19.42	5.41	27.00	QP	---	---

Site : 03CH03-HY
 Condition : 3m HORN-ANT-6741 HORIZONTAL
 EUT : Gateway
 Power : 110V/60Hz
 MODEL : MS-6811
 MEMO : TX CH11 2462MHz
 : F371710

	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	1158.000	47.12	-26.88	74.00	45.43	24.50	4.18	26.99	Peak	---	---
2	1158.000	32.77	-21.23	54.00	31.08	24.50	4.18	26.99	Average	---	---
3	1198.000	43.48	-30.52	74.00	41.63	24.60	4.24	26.99	Peak	---	---
4	1198.000	34.03	-19.97	54.00	32.18	24.60	4.24	26.99	Average	---	---
5	1598.000	46.68	-27.32	74.00	43.07	25.76	4.90	27.05	Peak	---	---
6	1598.000	36.17	-17.83	54.00	32.56	25.76	4.90	27.05	Average	---	---
7	2086.000	55.81	-18.19	74.00	49.54	27.58	5.80	27.11	Peak	---	---
8	2086.000	39.95	-14.05	54.00	33.68	27.58	5.80	27.11	Average	---	---
11	2838.000	49.43	-24.57	74.00	40.21	29.50	6.95	27.23	Peak	---	---
12	2838.000	44.63	-9.37	54.00	35.41	29.50	6.95	27.23	Average	---	---
1	3956.000	57.02	-16.98	74.00	42.63	32.52	9.26	27.39	Peak	---	---
2	3956.000	50.33	-3.67	54.00	35.94	32.52	9.26	27.39	Average	---	---

Site : 03CH03-HY
 Condition : 3m HORN-ANT-6741 VERTICAL
 EUT : Gateway
 Power : 110V/60Hz
 MODEL : MS-6811
 MEMO : TX CH11 2462MHz
 : F371710

	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	1300.000	49.84	-24.16	74.00	47.60	24.85	4.40	27.01	Peak	---	---
2	1300.000	37.25	-16.75	54.00	35.01	24.85	4.40	27.01	Average	---	---
3	1398.000	50.15	-23.85	74.00	47.53	25.09	4.55	27.02	Peak	---	---
4	1398.000	41.35	-12.65	54.00	38.73	25.09	4.55	27.02	Average	---	---
5	1492.000	49.57	-24.43	74.00	46.58	25.33	4.69	27.03	Peak	---	---
6	1492.000	40.52	-13.48	54.00	37.53	25.33	4.69	27.03	Average	---	---
7	1748.000	46.81	-27.19	74.00	42.31	26.38	5.19	27.07	Peak	---	---
8	1748.000	39.15	-14.85	54.00	34.65	26.38	5.19	27.07	Average	---	---
9	2086.000	52.07	-1.93	54.00	45.80	27.58	5.80	27.11	Average	---	---
10	2086.000	53.81	-20.19	74.00	47.54	27.58	5.80	27.11	Peak	---	---
1	4014.000	57.42	-16.58	74.00	42.90	32.59	9.34	27.41	Peak	---	---
2	4014.000	50.26	-3.74	54.00	35.74	32.59	9.34	27.41	Average	---	---

➤ For 5GHz ~ 25GHz

Remark: Frequency from 5000MHz to 25000MHz, the emission emitted by the EUT is too low to be measured

■ Field strength of fundamental and harmonics

Frequency (MHz)	Antenna Polarity	Cable Factor	Reading Loss	Limits (dBuV)	Emission (dBuV/m)	Level (uV/m)	Margin (dB)	Detect Mode	
2462.000	H	28.35	6.29	66.19	-	-	100.83	110027.18	Peak
2462.000	H	28.35	6.29	58.14	-	-	92.78	43551.19	A.V.
2462.000	V	28.35	6.29	74.07	-	-	108.71	272583.77	Peak
2462.000	V	28.35	6.29	65.80	-	-	100.44	105196.19	A.V.
4924.000	V/H						-		Peak, A.V.
7386.000	V/H						-		Peak, A.V.
9848.000	V/H						-		Peak, A.V.
12310.000	V/H						-		Peak, A.V.
14772.000	V/H						-		Peak, A.V.
17234.000	V/H						-		Peak, A.V.
19696.000	V/H						-		Peak, A.V.
22158.000	V/H						-		Peak, A.V.
24620.000	V/H						-		Peak, A.V.

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

Test Engineer : Steve
Steve Chen

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

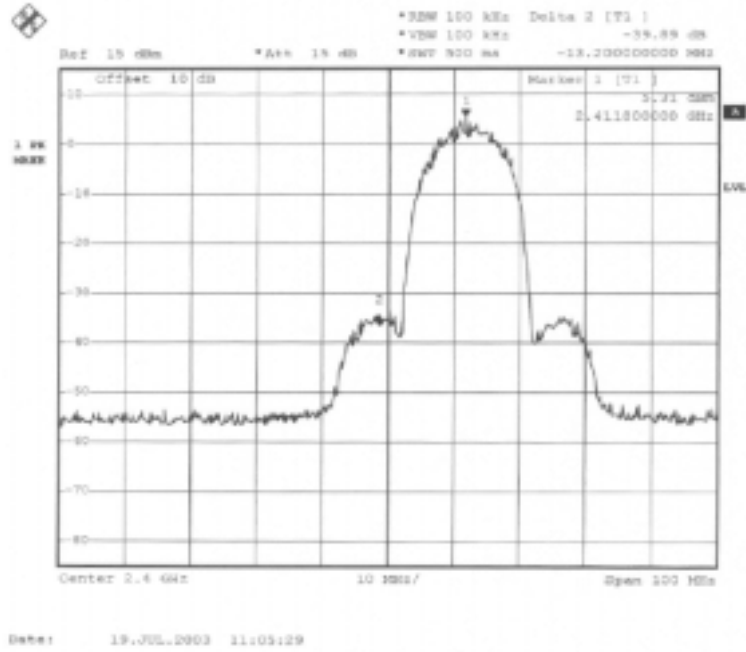
The band edge emission plot on page 39. shows 56.35dB delta between carrier maximum power and local maximum emission in the restricted band (2.4835GHz).

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	100.83	44.48	74.00	-29.52	Peak
H	92.78	36.43	54.00	-17.57	Average
V	108.71	52.36	74.00	-21.64	Peak
V	100.44	44.09	54.00	-9.91	Average

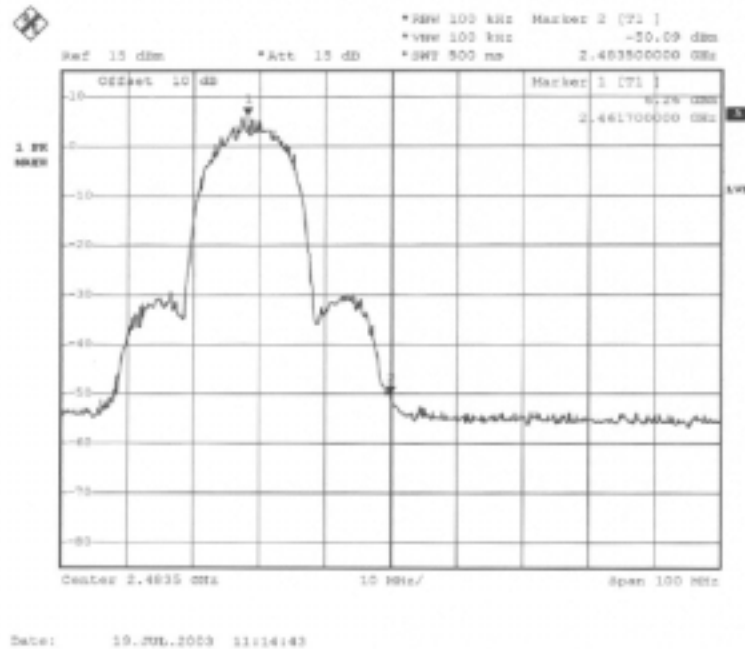
* The maximum field strength in restricted band is the emission of carrier power strength subtract to the delta between carrier maximum power and local maximum emission in the restricted band.

The spectrum analyzer plots are attached as below :

Plot1 (Channel 1) :



Plot2 (Channel 11) :



Comments : All emissions in any 100kHz bandwidth outside the band edge are attenuated more then 20dB from the carrier.

5.8. Antenna Requirements

The EUT use a undetachable antenna via MMCX-reversed external connector. It is considered 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 maximum Gain antenna used in this product is dipole antenna. The antenna connector type is MMCX. The coaxial cable of the antenna is fixed to the antenna.

5.9. RF Exposure

FCC Rules and Regulations Part 1.1307,1.1310,2.1091,2.1093:

RF Exposure Compliance

5.9.1. Limit For Maximum Permissible Exposure (MPE)

(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 ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

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

F=frequency in MHz

*Plane-wave equivalent power density

5.9.2. MPE Calculations

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \quad \text{Power Density: } Pd \text{ (mW/cm}^2\text{)} = \frac{E^2}{3770}$$

- E = Electric field (V/m)
- P = Peak output power (mW)
- G = Antenna numeric gain (numeric)
- d = Separation distance (m)

Because the EUT is belong to General Population/ Uncontrolled Exposure. So the Limit of Power Density is 1.0 mW/cm². We can change the formula to:

$$d = \sqrt{\frac{30 \times P \times G}{3770}}$$

Channel NO.	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (W)	Calculated RF Exposure Separation Distance (m)	Minimum RF Exposure Separation Distance (m)
Channel 1	1.74	1.49	14.24	0.0265	0.0178	0.20
Channel 6	1.74	1.49	14.42	0.0277	0.0181	0.20
Channel 11	1.74	1.49	15.17	0.0329	0.0198	0.20

5.9.3. FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna shall not be less than 20cm (8 inches) during normal operation. Proposed RF exposure safety information to include in User's Manual.

6. EMI Suppression Component List

No EMI suppression components.

7. Antenna Factor & Cable Loss

Frequency (MHz)	Antenna Factor (dB)	Cable Loss (dB)	Frequency (MHz)	Antenna Factor (dB)	Cable Loss (dB)
30	15.35	1.01	1000	24.10	3.92
35	13.63	1.04	2000	27.40	5.66
40	11.11	1.09	3000	30.00	7.20
45	10.59	1.24	4000	32.60	9.36
50	6.47	1.43	5000	33.40	9.16
55	5.83	1.39	6000	34.20	10.70
60	5.18	1.59	7000	35.30	12.16
65	4.81	1.41	8000	36.90	13.12
70	4.43	1.43	9000	38.10	13.81
75	5.10	1.55	10000	39.00	14.83
80	5.91	1.56	11000	38.60	15.83
85	7.33	1.62	12000	39.50	17.11
90	8.74	1.41	13000	39.30	17.62
95	9.05	1.81	14000	41.60	18.37
100	9.36	1.68	15000	40.60	19.10
110	9.65	1.73	16000	37.20	19.72
120	9.97	1.79	17000	40.20	21.98
130	10.51	1.93	18000	48.90	21.22
140	10.32	2.06	19000	37.60	23.90
150	9.42	2.09	20000	37.30	24.07
160	8.09	2.12	21000	37.00	25.49
170	7.43	2.12	22000	38.00	24.92
180	7.60	2.12	23000	38.70	25.60
190	7.43	2.21	24000	38.60	25.70
200	7.26	2.29	25000	38.90	26.54
220	9.11	2.42			
240	10.88	2.54			
260	11.75	2.66			
280	11.55	2.76			
300	11.36	2.85			
320	12.03	3.10			
340	12.69	3.36			
360	13.33	3.49			
380	14.00	3.50			
400	14.63	3.51			
450	15.33	3.55			
500	16.03	3.81			
550	16.65	4.05			
600	17.29	4.23			
650	17.64	4.63			
700	18.00	4.74			
750	18.39	4.95			
800	18.79	5.06			
850	19.10	5.18			
900	19.42	5.40			
950	19.58	5.91			
1000	19.75	5.58			

8. List of Measuring Equipments Used

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver	R&S	ESCS 30	100174	9 KHz – 2.75 GHz	Dec. 12, 2002	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	TM013	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	FSEK30	100189	20Hz~40GHz	Aug. 04, 2003	Radiation (03CH03-HY)
Receiver	SCHAFFNER	SCR 3501	417	9 KHz – 1GHz	Feb. 20, 2003	Radiation (03CH03-HY)
Amplifier	HP	8447D	2944A09072	100KHz – 1.3GHz	Oct. 21, 2002	Radiation (03CH03-HY)
Bilog Antenna	SCHAFFNER	CBL6112B	2687	30MHz – 2GHz	Dec. 21, 2002	Radiation (03CH03-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30MHz~1GHz	Jan. 02, 2003	Radiation (03CH03-HY)
Amplifier	MITEQ	NSP2650-NF	805858	100MHz~26.5GHz	Jul. 10, 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)
Horn Antenna	Schwarzbeck	BBHA9170	BBHA9170154	15GHz~40GHz	Jun. 02, 2003	Radiation (03CH03-HY)
RF Cable-HIGH	Jye Bao	RG142	CB030-HIGH	1GHz~29.5GHz	Mar. 14, 2003	Radiation (03CH03-HY)
Power meter	R&S	NRVS	100444	DC~40GHz	May 28, 2003	Conducted
Power sensor	R&S	NRV-Z55	100049	DC~40GHz	May 28, 2003	Conducted
Power Sensor	R&S	NRV-Z32	100057	30MHz-6GHz	May 28, 2003	Conducted
AC power source	HPC	HPA-500W	HPA-9100024	AC 0~300V	May 27, 2003	Conducted
Temp. and Humidity Chamber	KSON	THS-C3L	612	N/A	Oct. 02, 2002	Conducted

Calibration Interval of instruments listed above is one year.

9. Uncertainty of Test Site

Uncertainty of Radiated Emission Measurement

Contribution	Probability Distribution	3m	10m
Antenna factor calibration	normal(k=2)	±1	±1
cable loss calibration	normal(k=2)	±0.3	±0.3
RCV/SPA specification	rectangular	±2	±2
Antenna Directivity	rectangular	±3	±0.5
Antenna Factor V.S. Height	rectangular	±2	±2
Antenna Factor Interpolation for Frequency	rectangular	±0.25	±0.25
site imperfection	rectangular	±2	±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	±0.54
combined standard uncertainty $U_e(y)$	normal	±2.7	±2.2
Measuring uncertainty for a level of confidence of 95% $U=2U_e(y)$	normal (k=2)	±5.4	±4.4

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

$U = \{((1/2)^2+(0.3/2)^2+(2^2+3^2+2^2+0.25^2+2^2)/3+(0.54)^2/2)\}^{1/2}=2.7$ 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 $U_e(y)$	normal	±1.66
Measuring uncertainty for a level of confidence of 95% $U=2U_e(y)$	normal (k=2)	±3.32

$U = \{(0.3/2)^2+(2^2+1.5^2+0.2^2)/3+(0.2)^2/2\}^{1/2}=1.66$