Turbo Mode					
Test Mode	Mode 3 CH04	**Temperature**	26 deg. C	**Tested By**	Steve Chen
Freq. Range	1GHz~40GHz	**Humidity**	64%		

(A) Polarization: Horizontal

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1078.000	33.42	-20.58	54.00	50.61	24.04	1.21	42.44	Average	---	---
2	1438.000	33.56	-20.44	54.00	49.61	25.07	1.46	42.58	Average	---	---
3	2252.000	36.86	-17.14	54.00	50.01	27.78	1.72	42.65	Average	---	---

(B) Polarization: Vertical

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1078.000	33.64	-20.36	54.00	50.83	24.04	1.21	42.44	Average	---	---
2	1260.000	34.17	-19.83	54.00	50.74	24.56	1.38	42.51	Average	---	---
3	1438.000	35.29	-18.71	54.00	51.34	25.07	1.46	42.58	Average	102	216

Remark: Spurious on higher frequency band, the emission emitted by the EUT is too low to be measured.

Turbo Mode					
Test Mode	Mode 3 CH05	**Temperature**	26 deg. C	**Tested By**	Steve Chen
Freq. Range	1GHz~40GHz	**Humidity**	64%		

(A) Polarization: Horizontal

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1260.000	33.27	-20.73	54.00	49.84	24.56	1.38	42.51	Average	---	---
2	1886.000	36.20	-17.80	54.00	50.61	26.69	1.58	42.68	Average	102	212

(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	1078.000	33.37	-20.63	54.00	50.56	24.04	1.21	42.44	Average	---	---
2	1260.000	34.14	-19.86	54.00	50.71	24.56	1.38	42.51	Average	---	---
3	1438.000	35.41	-18.59	54.00	51.46	25.07	1.46	42.58	Average	---	---

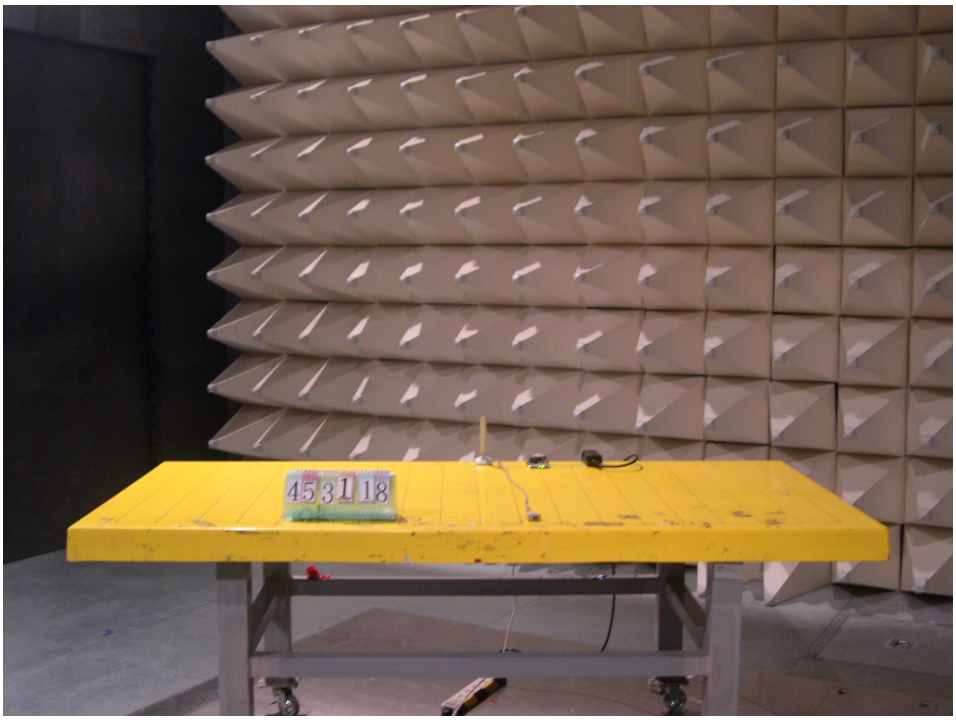
Remark: Spurious on higher frequency band, the emission emitted by the EUT is too low to be measured.

5.6.6. Photographs of Radiated Emission Test Configuration

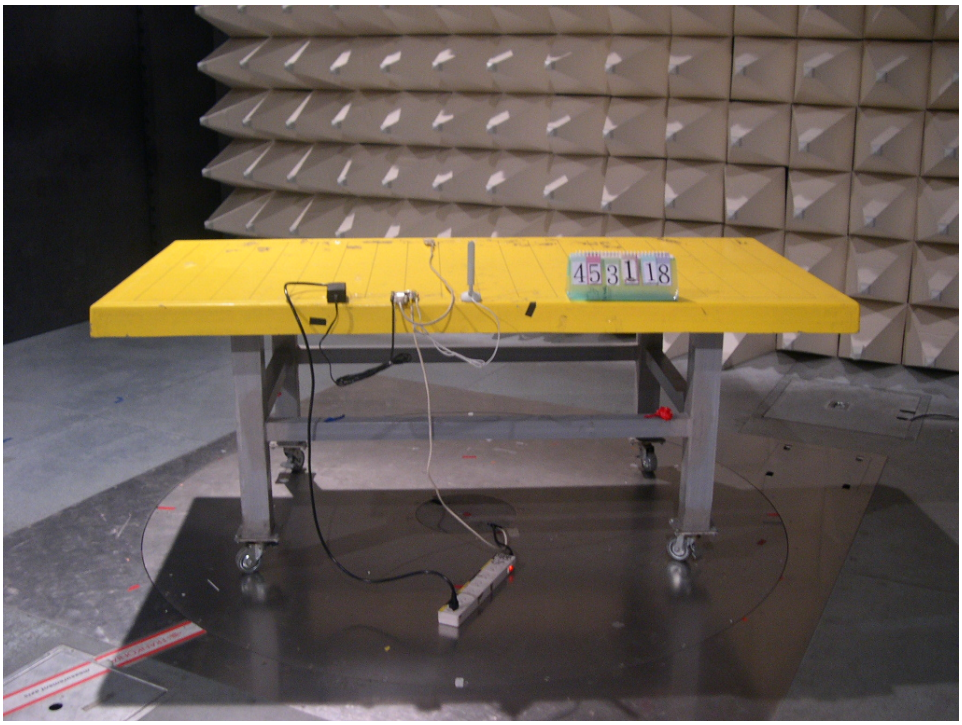
- The photographs show the configuration that generates the maximum emission.

Mode 1

FRONT VIEW

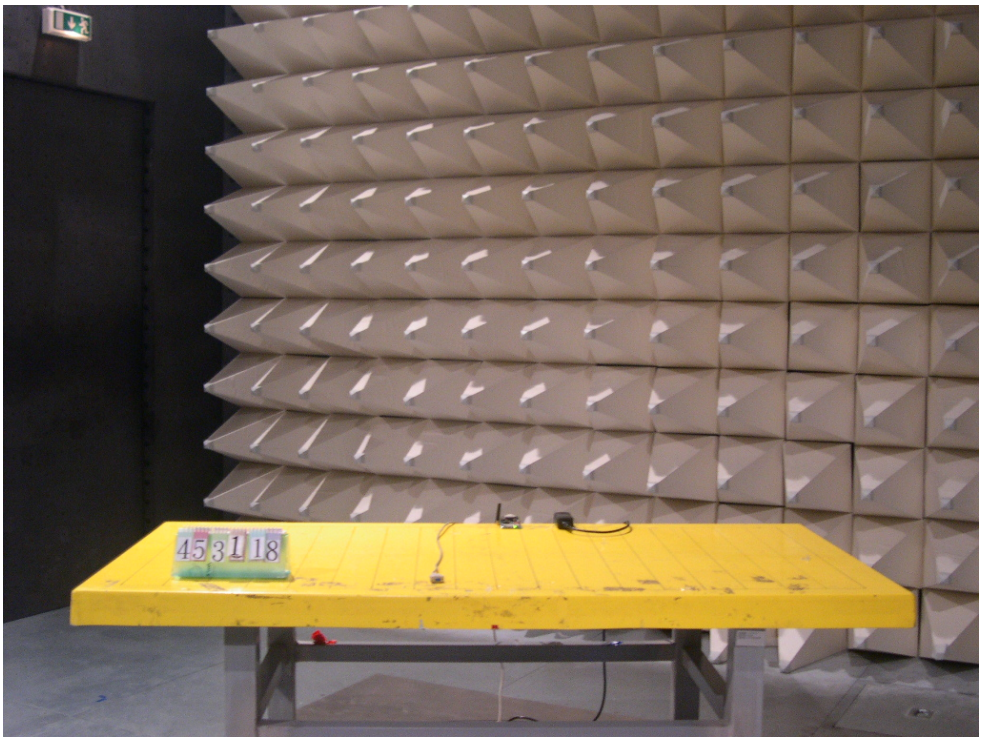


REAR VIEW

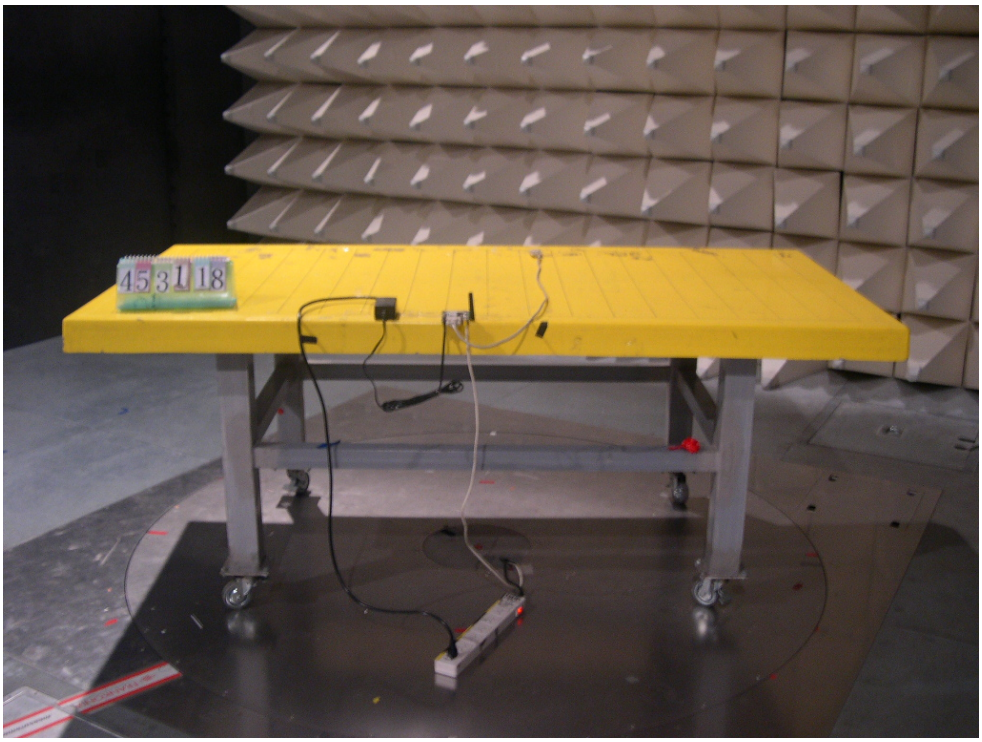


Mode 2

FRONT VIEW

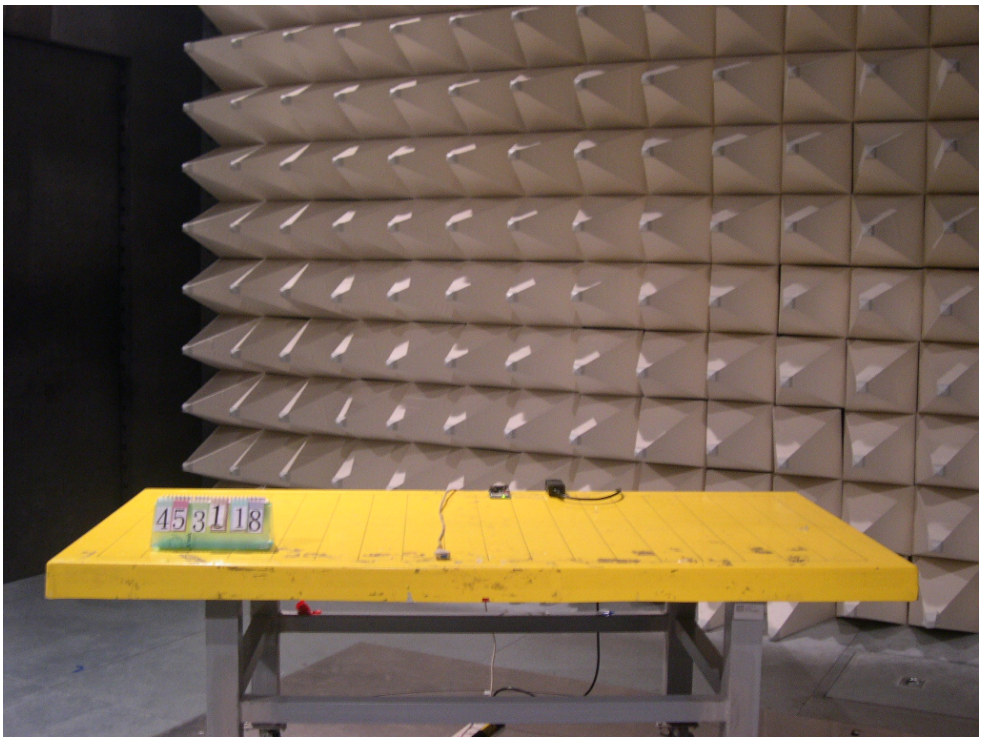


REAR VIEW

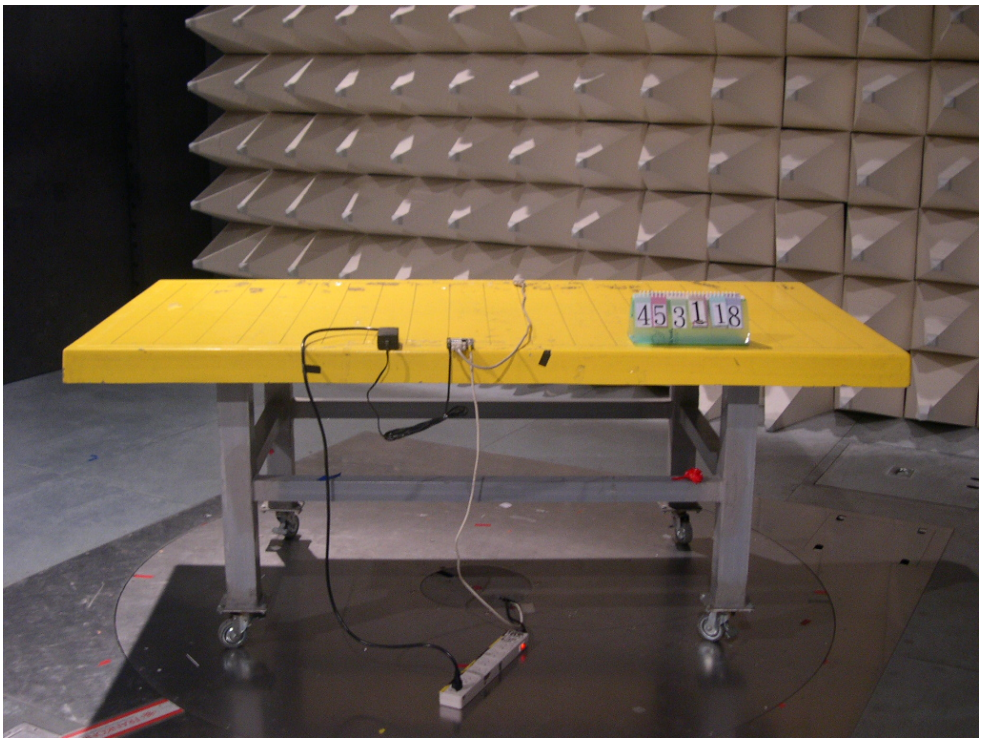


Mode 3

FRONT VIEW



REAR VIEW



5.7. Test of Frequency Stability

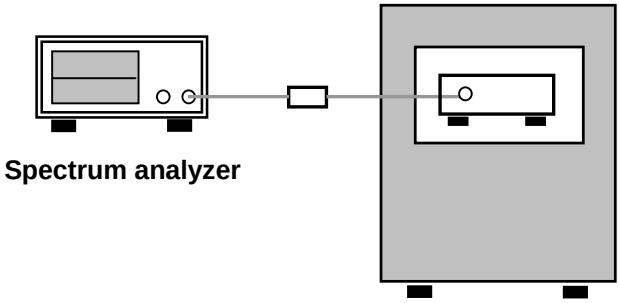
5.7.1. Measuring Instruments

Item 9 of the table on section 6.

5.7.2. Test Procedures

1. The transmitter output is connected to the spectrum analyzer through an attenuator.
2. Set RBW of spectrum analyzer to 10kHz and VBW to 10kHz.
3. Use peak detector mode, Max-hold and search the peak of trace 1.
4. The test extreme voltage is, according to 2.1055(d)(1), is to change the primary supply voltage from 85 to 115 percent of the nominal value
5. Extreme temperature rule is, according to 2.1055(a)(1), -30℃~50℃.

5.7.3. Test Setup Layout



5.7.4. Test Result : See spectrum analyzer plots below

- Modulation Type: Un-Modulated Carrier (CW)
- Temperature: 25°C
- Relative Humidity: 62 %
- Duty cycle of the equipment during the test: 100%

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)		
(℃)	5240.00	5320.00	5805
-30	5240.0160	5320.0056	5805.0015
-20	5240.0220	5320.0021	5805.0045
-10	5240.0010	5320.0044	5805.0044
0	5239.9960	5320.0024	5805.0023
10	5239.9520	5320.0027	5805.0047
20	5239.9260	5320.0014	5805.0064
30	5239.9450	5320.0012	5805.0021
40	5239.9400	5320.0022	5805.0014
50	5239.9460	5320.0047	5805.0002
Max. Deviation (MHz)	5240.0160	5320.0056	5805.0015
Max. Deviation (ppm)	3.05	1.05	0.26

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)		
(V)	5240.00	5320.00	5805
126.50	5240.0130	5320.0100	5805.0070
110.00	5240.0130	5320.0080	5805.0080
93.50	5240.0150	5320.0078	5805.0065
Max. Deviation (MHz)	5240.0150	5320.0100	5805.0070
Max. Deviation (ppm)	2.86	1.88	1.21

5.8. Test of AC Power Line Conducted Emission

5.8.1. Measuring Instruments

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

5.8.2. 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.

5.8.3. Test Result of Conducted Emission

Test Mode	Mode 1	Tested By	Jason Chang
Temperature / Humidity	25 deg. C / 60%		

Line to Ground

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.1886650	50.15	-13.95	64.10	50.04	0.10	0.01	QP
2	0.1886650	38.16	-15.94	54.10	38.05	0.10	0.01	Average
3	0.2847840	35.11	-25.57	60.68	34.99	0.10	0.02	QP
4	0.2847840	19.94	-30.74	50.68	19.82	0.10	0.02	Average
5	0.3791160	33.14	-25.16	58.30	33.02	0.10	0.02	QP
6	0.3791160	26.91	-21.39	48.30	26.79	0.10	0.02	Average
7	2.360	27.86	-28.14	56.00	27.71	0.12	0.03	QP
8	2.360	12.62	-33.38	46.00	12.47	0.12	0.03	Average
9	17.756	27.45	-32.55	60.00	27.01	0.26	0.18	QP
10	17.756	24.10	-25.90	50.00	23.66	0.26	0.18	Average
11	19.710	37.84	-22.16	60.00	37.35	0.29	0.20	QP
12	19.710	35.89	-14.11	50.00	35.40	0.29	0.20	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	0.1913990	48.46	-15.52	63.98	48.35	0.10	0.01	QP
2	0.1913990	37.77	-16.21	53.98	37.66	0.10	0.01	Average
3	0.2893170	35.47	-25.07	60.54	35.35	0.10	0.02	QP
4	0.2893170	21.65	-28.89	50.54	21.53	0.10	0.02	Average
5	0.4737650	24.60	-21.85	46.45	24.48	0.10	0.02	Average
6	0.4737650	30.47	-25.98	56.45	30.35	0.10	0.02	QP
7	2.070	11.60	-34.40	46.00	11.48	0.10	0.02	Average
8	2.070	28.17	-27.83	56.00	28.05	0.10	0.02	QP
9	17.756	27.23	-32.77	60.00	26.79	0.26	0.18	QP
10	17.756	24.03	-25.97	50.00	23.59	0.26	0.18	Average
11	19.711	37.07	-22.93	60.00	36.58	0.29	0.20	QP
12	19.711	35.11	-14.89	50.00	34.62	0.29	0.20	Average

Test Mode	Mode 2	Tested By	Jason Chang
Temperature / Humidity	25 deg. C / 60%		

Line to Ground

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.1913690	50.07	-13.91	63.98	49.96	0.10	0.01	QP
2	0.1913690	37.23	-16.75	53.98	37.12	0.10	0.01	Average
3	0.2878180	35.25	-25.34	60.59	35.13	0.10	0.02	QP
4	0.2878180	19.07	-31.52	50.59	18.95	0.10	0.02	Average
5	0.3811300	29.46	-18.79	48.25	29.34	0.10	0.02	Average
6	0.3811300	33.00	-25.25	58.25	32.88	0.10	0.02	QP
7	2.300	8.30	-37.70	46.00	8.15	0.12	0.03	Average
8	2.300	22.61	-33.39	56.00	22.46	0.12	0.03	QP
9	17.755	28.10	-31.90	60.00	27.66	0.26	0.18	QP
10	17.755	24.87	-25.13	50.00	24.43	0.26	0.18	Average
11	19.710	38.56	-21.44	60.00	38.07	0.29	0.20	QP
12	19.710	36.74	-13.26	50.00	36.25	0.29	0.20	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	0.1913990	48.70	-15.28	63.98	48.59	0.10	0.01	QP
2	0.1913990	36.98	-17.00	53.98	36.87	0.10	0.01	Average
3	0.2868490	24.31	-26.31	50.62	24.19	0.10	0.02	Average
4	0.2868490	35.99	-24.63	60.62	35.87	0.10	0.02	QP
5	0.4729550	30.61	-25.85	56.46	30.49	0.10	0.02	QP
6	0.4729550	24.73	-21.73	46.46	24.61	0.10	0.02	Average
7	2.350	33.95	-22.05	56.00	33.82	0.10	0.03	QP
8	2.350	12.65	-33.35	46.00	12.52	0.10	0.03	Average
9	17.755	27.86	-32.14	60.00	27.42	0.26	0.18	QP
10	17.755	24.87	-25.13	50.00	24.43	0.26	0.18	Average
11	19.710	38.50	-21.50	60.00	38.01	0.29	0.20	QP
12	19.710	36.61	-13.39	50.00	36.12	0.29	0.20	Average

Test Mode	Mode 3	Tested By	Jason Chang
Temperature / Humidity	25 deg. C / 60%		

Line to Ground

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.1917550	49.77	-14.19	63.96	49.66	0.10	0.01	QP
2	0.1917550	37.04	-16.92	53.96	36.93	0.10	0.01	Average
3	0.2862970	34.97	-25.66	60.63	34.85	0.10	0.02	QP
4	0.2862970	19.61	-31.02	50.63	19.49	0.10	0.02	Average
5	0.3779920	33.58	-24.74	58.32	33.46	0.10	0.02	QP
6	0.3779920	28.68	-19.64	48.32	28.56	0.10	0.02	Average
7	2.460	27.59	-28.41	56.00	27.42	0.13	0.04	QP
8	2.460	12.02	-33.98	46.00	11.85	0.13	0.04	Average
9	17.755	27.39	-32.61	60.00	26.95	0.26	0.18	QP
10	17.755	24.25	-25.75	50.00	23.81	0.26	0.18	Average
11	19.710	37.37	-22.63	60.00	36.88	0.29	0.20	QP
12	19.710	35.50	-14.50	50.00	35.01	0.29	0.20	Average

Neutral to Ground

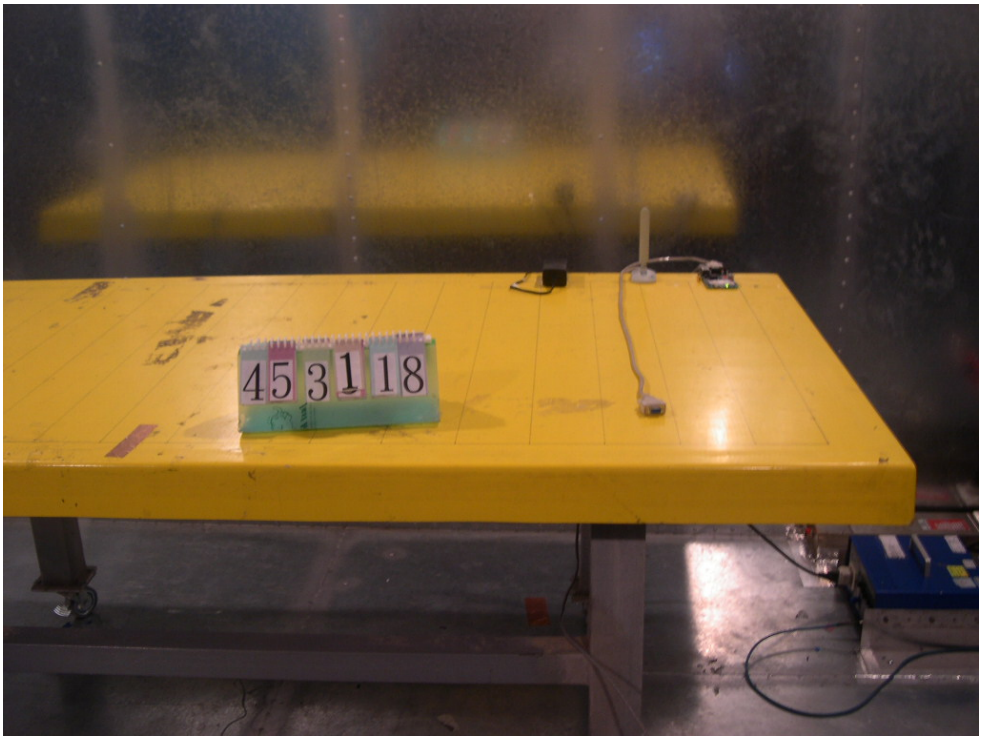
	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.1899060	48.68	-15.36	64.04	48.57	0.10	0.01	QP
2	0.1899060	37.41	-16.63	54.04	37.30	0.10	0.01	Average
3	0.2879170	35.93	-24.65	60.58	35.81	0.10	0.02	QP
4	0.2879170	23.31	-27.27	50.58	23.19	0.10	0.02	Average
5	0.4805980	29.70	-26.63	56.33	29.58	0.10	0.02	QP
6	0.4805980	20.65	-25.68	46.33	20.53	0.10	0.02	Average
7	2.260	31.62	-24.38	56.00	31.49	0.10	0.03	QP
8	2.260	12.07	-33.93	46.00	11.94	0.10	0.03	Average
9	17.756	26.95	-33.05	60.00	26.51	0.26	0.18	QP
10	17.756	23.88	-26.12	50.00	23.44	0.26	0.18	Average
11	19.709	37.60	-22.40	60.00	37.11	0.29	0.20	QP
12	19.709	35.66	-14.34	50.00	35.17	0.29	0.20	Average

5.8.4. Photographs of Radiated Emission Test Configuration

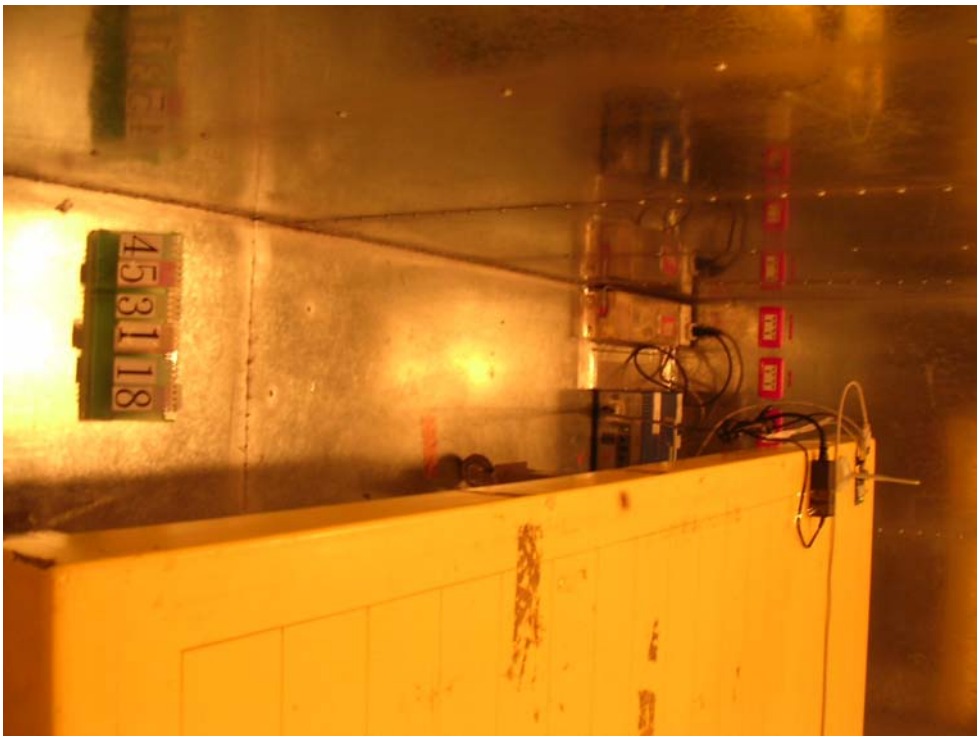
- The photographs show the configuration that generates the maximum emission.

Mode 1

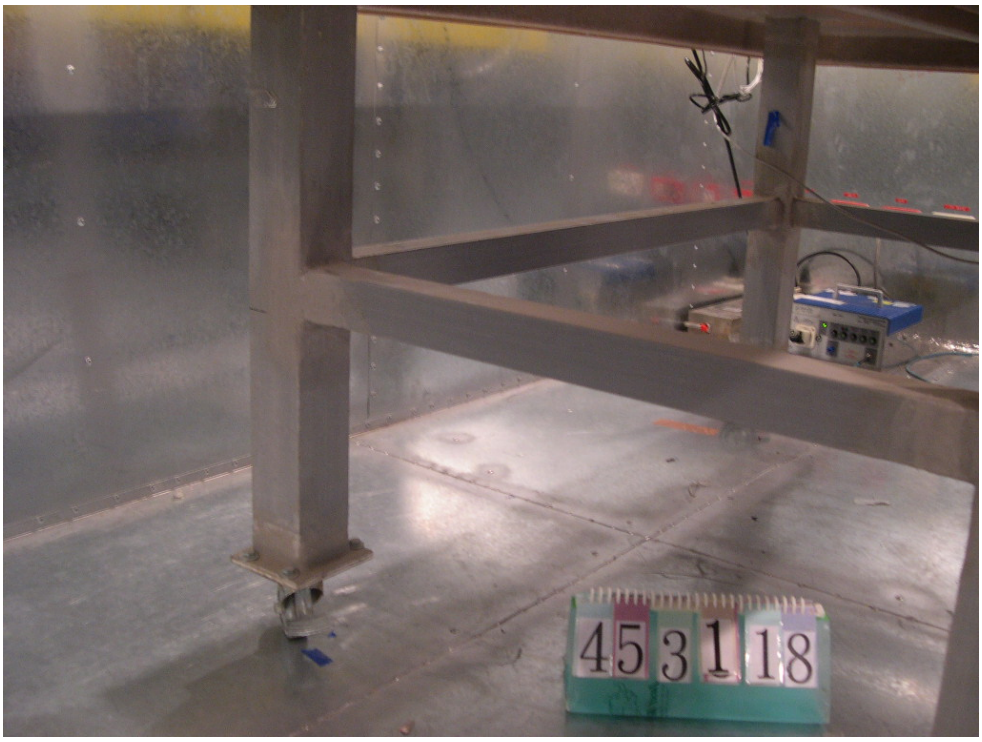
FRONT VIEW



REAR VIEW

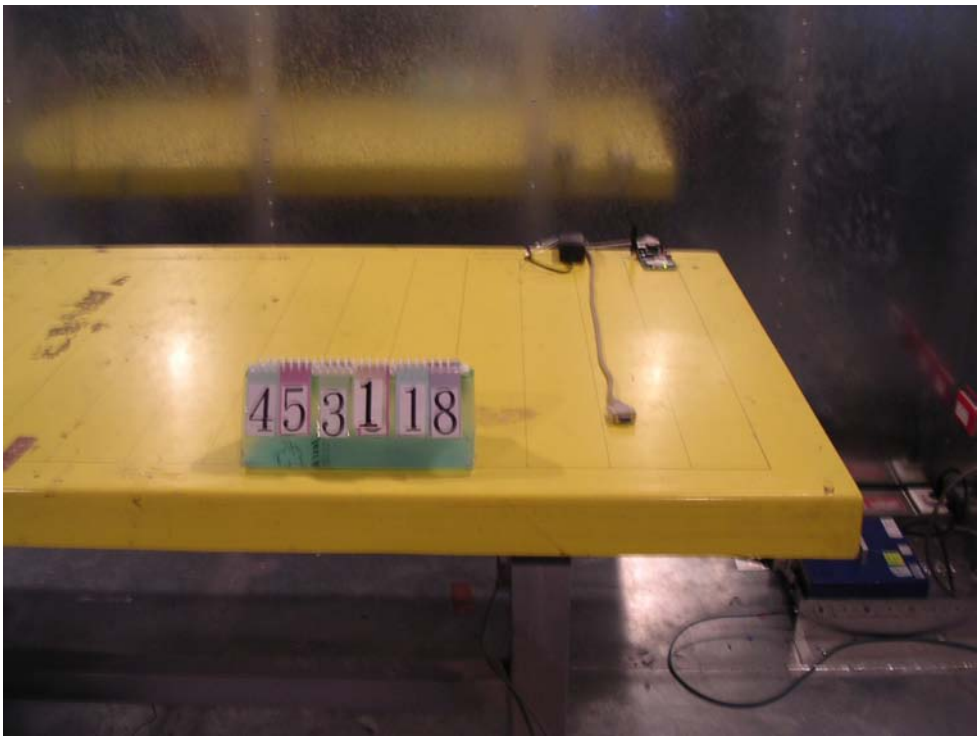


SIDE VIEW

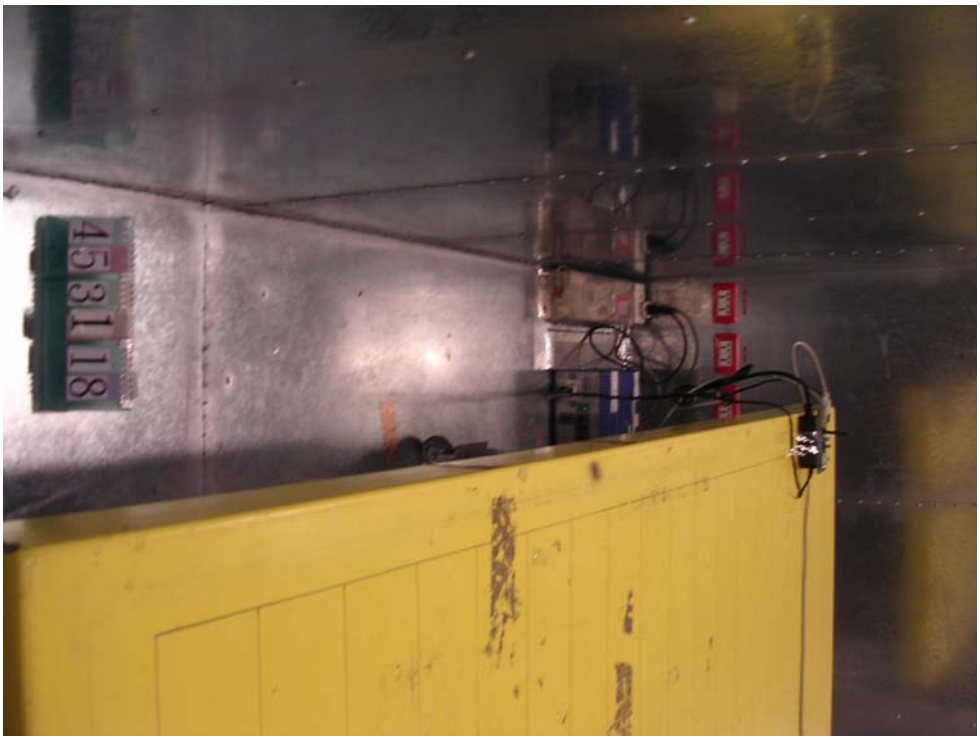


Mode 2

FRONT VIEW



REAR VIEW



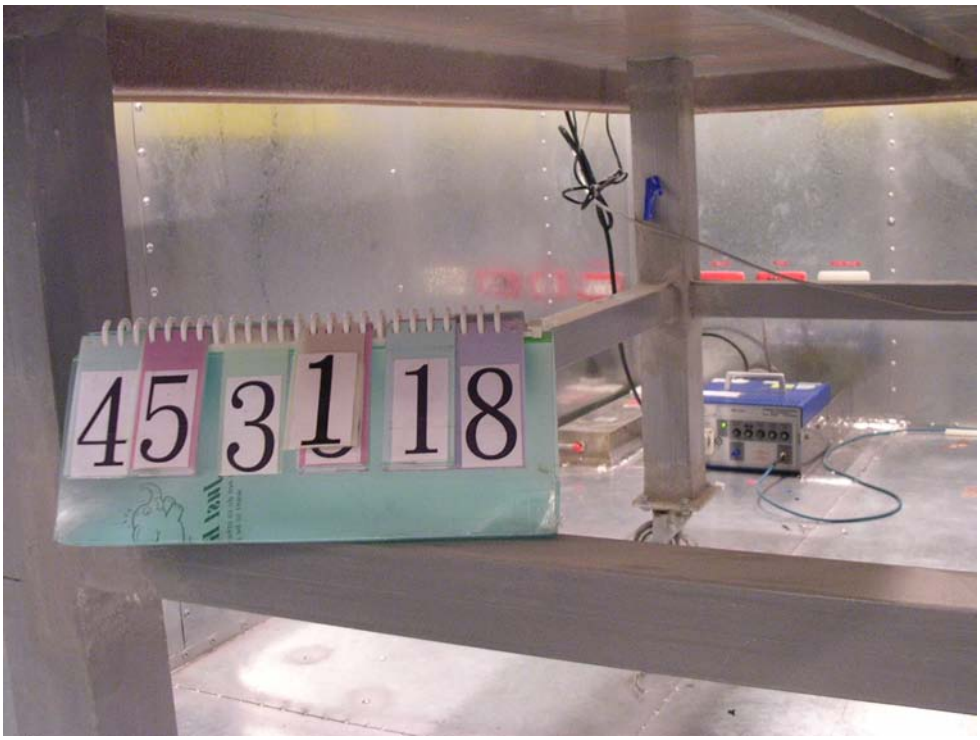
SIDE VIEW

Mode 3

FRONT VIEW

REAR VIEW

SIDE VIEW



5.9. Antenna Requirements

5.9.1. 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 15.407 (a):

For 5150MHz~5250MHz : If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Device shall use a transmitting antenna that is an integral part of the device.

For 5250MHz~5350MHz / 5470MHz~5725MHz : If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For 5725MHz~5825MHz : If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain up to 23 dBi without any corresponding reduction in the transmitter peak output power or peak power spectral density. For fixed, point-to-point U-NII transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in peak transmitter power and peak power spectral density for each 1 dB of antenna gain in excess of 23 dBi would be required. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing

high gain directional antennas are used exclusively for fixed, point-to-point operations.

5.9.2. Antenna Connected Construction

There is no antenna connector for integral chip antenna. The connector for monopole antenna is revsersed SMA and standard SMA. But this product is classified as professional use, so there is no need to fulfill the unique antenna connector requirement.

5.10. RF Exposure

5.10.1. Limit For Maximum Permissible Exposure (MPE)

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

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

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/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

5.10.2. MPE Calculation Method

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

E = Electric field (V/m)
P = Peak RF output power (mW)
G = EUT Antenna numeric gain (numeric)
d = Separation distance between radiator and human body (m)

The formula can be changed to

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

From the peak EUT RF output power, the minimum mobile separation distance, d=2.5cm, as well as the gain of the used antenna, the RF power density can be obtained.

5.10.3. Calculated Result and Limit

Only the mode with maximum Gain was calculated (Mode 1).

Normal Mode

Channel No.	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)
Channel 22	5	3.16	23.65	231.7395	0.1459	1

Turbo Mode

Channel No.	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)
Channel 03	5	3.16	18.5000	70.7946	0.0446	1

6. List of Measuring Equipments Used

Items	Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
1	EMC Receiver	R&S	ESCS 30	100174	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. 23, 2003	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. 12, 2003	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	15GHz~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.