



FCC 47 CFR PART 15 SUBPART C

TEST REPORT

For

Industrial Radio Remote Controller

Model: F24-60

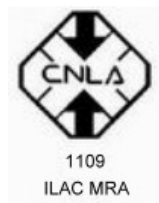
Trade Name: TELECRANE

Issued to

LEE'S HI-TECH ENTERPRISE CO., LTD
8F-1, NO.288-2, Hsin-Ya Rd, Chien-Chen Zone(806),
Kaohsiung, Taiwan, R.O.C.

Issued by

Compliance Certification Services Inc.
No. 8, Jiu Ceng Ling, Jiaokeng Village, Sinhua
Township, Tainan Hsien 712, Taiwan R.O.C.
TEL: 886-6-580-2201
FAX: 886-6-580-2202



***Note:** This report shall not be reproduced except in full, without the written approval of Compliance Certification Services Inc. This document may be altered or revised by Compliance Certification Services Inc. personnel only, and shall be noted in the revision section of the document.*



TABLE OF CONTENTS

1. TEST RESULT CERTIFICATION.....	3
2. EUT DESCRIPTION.....	4
3. TEST METHODOLOGY	5
3.1 EUT CONFIGURATION.....	5
3.2 EUT EXERCISE	5
3.3 GENERAL TEST PROCEDURES.....	5
3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS.....	6
3.5 DESCRIPTION OF TEST MODES	6
4. INSTRUMENT CALIBRATION.....	7
5. FACILITIES AND ACCREDITATIONS.....	8
5.1 FACILITIES	8
5.2 EQUIPMENT	8
5.3 LABORATORY ACCREDITATIONS AND LISTING	8
5.4 TABLE OF ACCREDITATIONS AND LISTINGS.....	9
6. SETUP OF EQUIPMENT UNDER TEST	10
6.1 SETUP CONFIGURATION OF EUT	10
6.2 SUPPORT EQUIPMENT	10
7. FCC PART 15.231 REQUIREMENTS	11
7.1 20 DB BANDWIDTH.....	11
7.2 LIMIT OF TRANSMISSION TIME.....	14
7.3 DUTY CYCLE.....	17
7.4 RADIATED EMISSIONS	20
7.5 POWERLINE CONDUCTED EMISSIONS	35



1. TEST RESULT CERTIFICATION

Applicant : LEE'S HI-TECH ENTERPRISE CO., LTD.
Address : 8F-1, NO.288-2, Hsin-Ya Rd, Chien-Chen Zone (806), Kaohsiung,
Taiwan, R.O.C.
Equipment Under Test : Industrial Radio Remote Controller
Model Number : F24-60
Trade Name : TELECRANE
Date of Test : July .05 ~ July. 08, 2005

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart C	No non-compliance noted

We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4: 2003 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.207, 15.209 and Part 15.231.

The test results of this report relate only to the tested sample identified in this report.

Approved by:

Reviewed by:

 July 18, 2005
Alex Chiu
Manager
Compliance Certification Services Inc.

 July 18, 2005
Jeter Wu
Section Manager
Compliance Certification Services Inc.





2. EUT DESCRIPTION

Product	Industrial Radio Remote Controller
Trade Name	TELECRANE
Model Number	F24-60
Model Difference	N/A
Power Supply	Powered by battery (Rating: 6Vdc)
Frequency Range	310MHz ~ 320MHz
Modulation Technique	Pulse Modulation
Antenna Designation	Dipole Antenna 1.5 dBi

Remark: This submittal(s) (test report) is intended for FCC ID: LWN9406F60 filing to comply with Section 15.207, 15.209 and 15.231 of the FCC Part 15, Subpart C Rules.



3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4 (2001) and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 15.207, 15.209 and 15.231.

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4.



3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

- (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	(²)
13.36 - 13.41	322 - 335.4		

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

- (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

3.5 DESCRIPTION OF TEST MODES

The EUT(Model: F24-60) had been tested under engineering test mode condition and the EUT staying in continuous transmitting mode.



4. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.



5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

☒ No. 8, Jiu Ceng Ling, Jiaokeng Village, Sinhua Township, Tainan Hsien 712, Taiwan R.O.C.

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.







Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

5.3 LABORATORY ACCREDITATIONS AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code: 200627-0 to perform Electromagnetic Interference tests according to FCC Part 15 And CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government. In addition, the test facilities are listed with Federal Communications Commission (registration no: 228014).

5.4 TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	NVLAP	EN 55014-1, CNS 13783-1, AS/NZS CISPR 14.1, IEC/CISPR 14-1, IEC/CISPR 22, CNS 13438, IEC 61000-3-2, IEC 61000-3-3, AS/NZS 61000.3.3, ANSI C63.4, AS/NZS CISPR 22, VCCI, IEC/CISPR 24, IEC 61000-4-2/4/5/6/8/11	 NVLAP LAB CODE 200627-0 200627-0
USA	FCC	3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements	 228014
Japan	VCCI	3/10 meter Open Area Test Sites and conducted test sites to perform radiated/conducted measurements	 R-1989 , C-2142
Taiwan	CNLA	CISPR 11 FCC METHOD-47 CFR Part 18 EN 55011 CNS 13803, CISPR 14 EN 55014 CNS 13783-1, CISPR 22 EN 55022 VCCI FCC Method-47 CFR Part 15 Subpart B CNS 13438	 1109 ILAC MRA
Taiwan	BSMI	CNS 13438, CNS 13783-1, CNS 13803	 SL2-IS-E-0039 SL2-IN-E-0039 SL2-A1-E-0039
Canada	Industry Canada	RSS212, Issue 1	 IC 4417-1

** No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government.*



6. SETUP OF EQUIPMENT UNDER TEST

6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

6.2 SUPPORT EQUIPMENT

No.	Product	Manufacturer	Model No.	FCC ID	Signal cable
1	N/A	N/A	N/A	N/A	N/A

Remark:

- 1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.*
- 2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*



7. FCC PART 15.231 REQUIREMENTS

7.1 20 DB BANDWIDTH

LIMIT

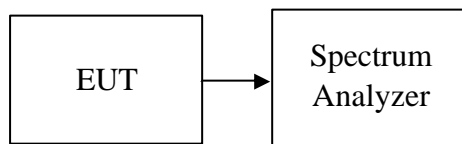
The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
SPECTRUM ANALYZER	R&S	FSEM	830270/015	March 18, 2006

Remark: Each piece of equipment is scheduled for calibration once a year.

Test Configuration



TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The spectrum analyzer center frequency is set to the transmitter frequency. The RBW is set to 10 kHz and VBW is set 30kHz.

TEST RESULTS

No non-compliance noted.



Test Data

For the fundamental frequency (310.25MHz)

Frequency (MHz)	20dB Bandwidth (KHz)	Limit (KHz)	Result
310.25	252.50	775.63	PASS

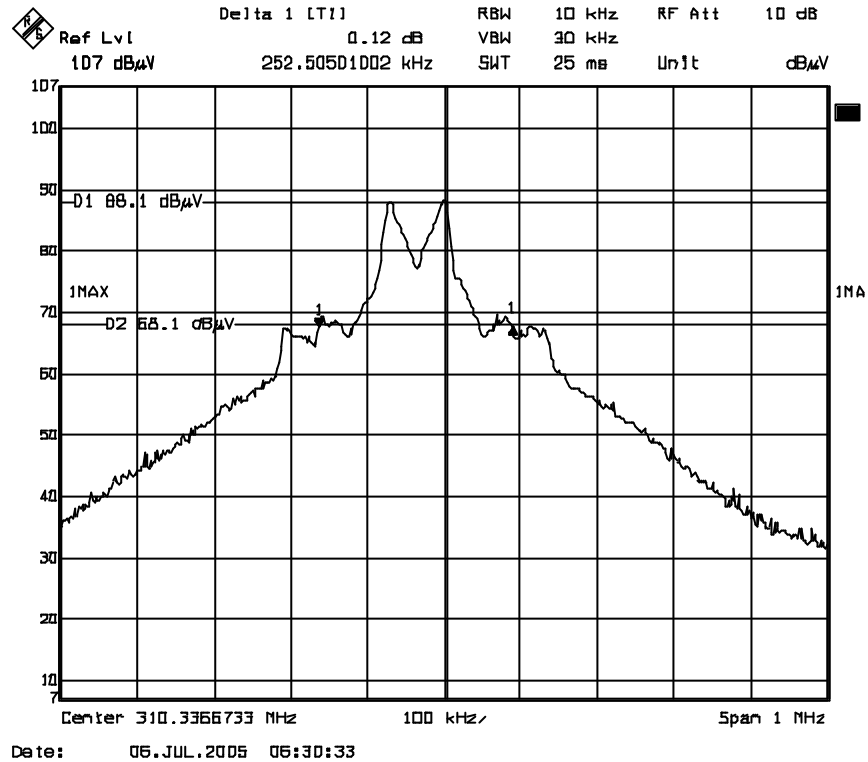
For the fundamental frequency (319.395MHz)

Frequency (MHz)	20dB Bandwidth (KHz)	Limit (KHz)	Result
319.395	224.44	789.49	PASS

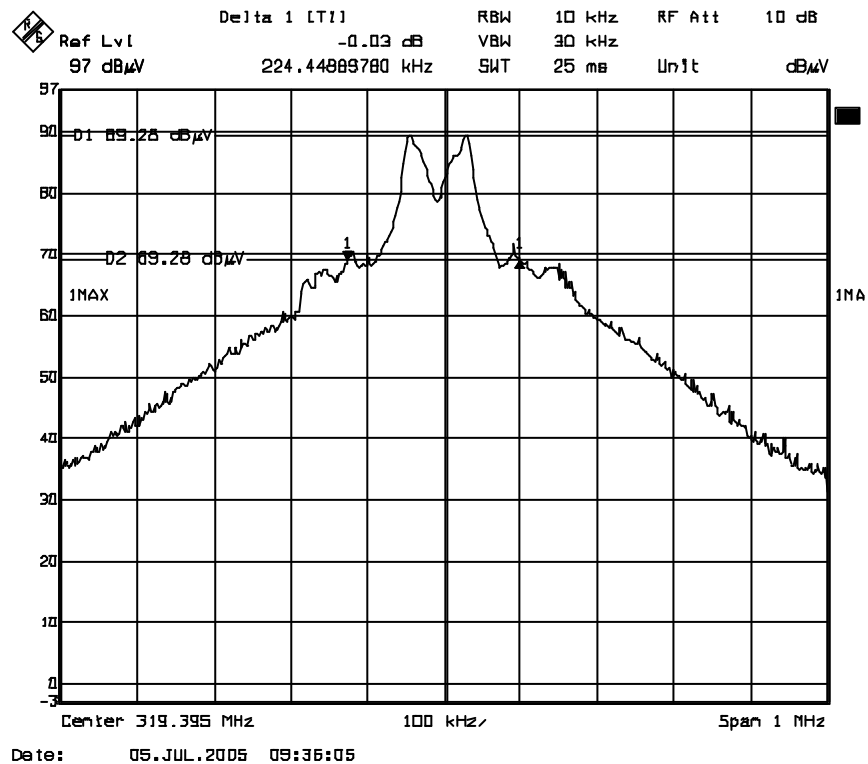


Test Plot

For the fundamental frequency (310.25MHz)



For the fundamental frequency (319.395MHz)





7.2 LIMIT OF TRANSMISSION TIME

LIMIT

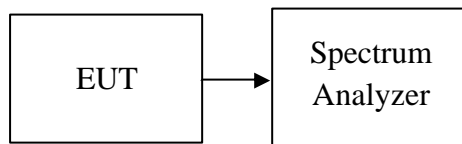
According to 15.231 (a)(1), a manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
SPECTRUM ANALYZER	R&S	FSEM	830270/015	March 18, 2006

Remark: Each piece of equipment is scheduled for calibration once a year.

Test Configuration



TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The spectrum analyzer center frequency is set to the transmitter frequency. The RBW and VBW are set to 1MHz.

TEST RESULTS

No non-compliance noted



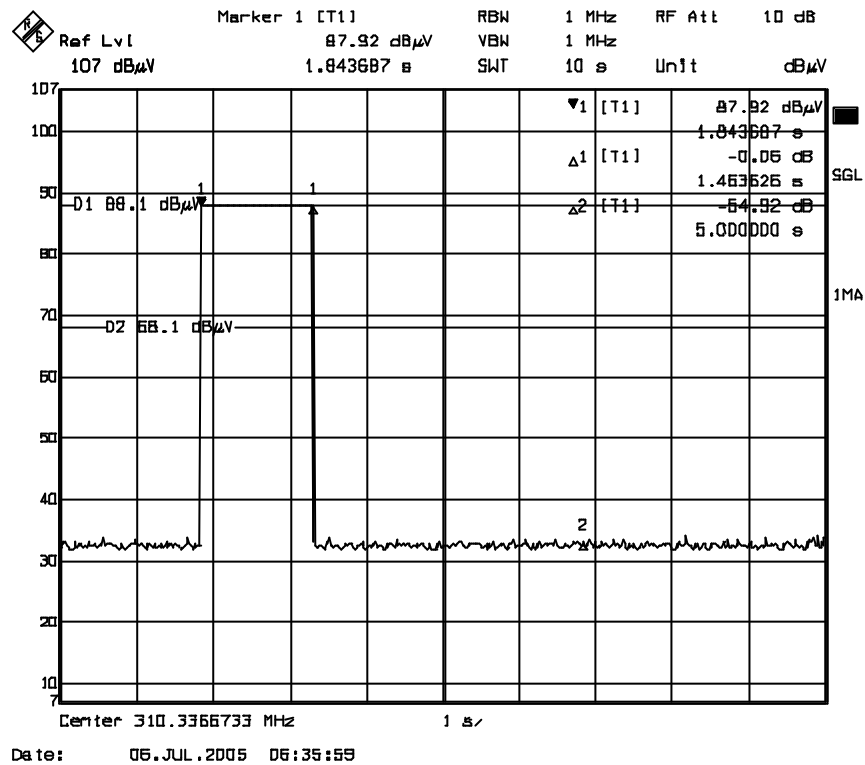
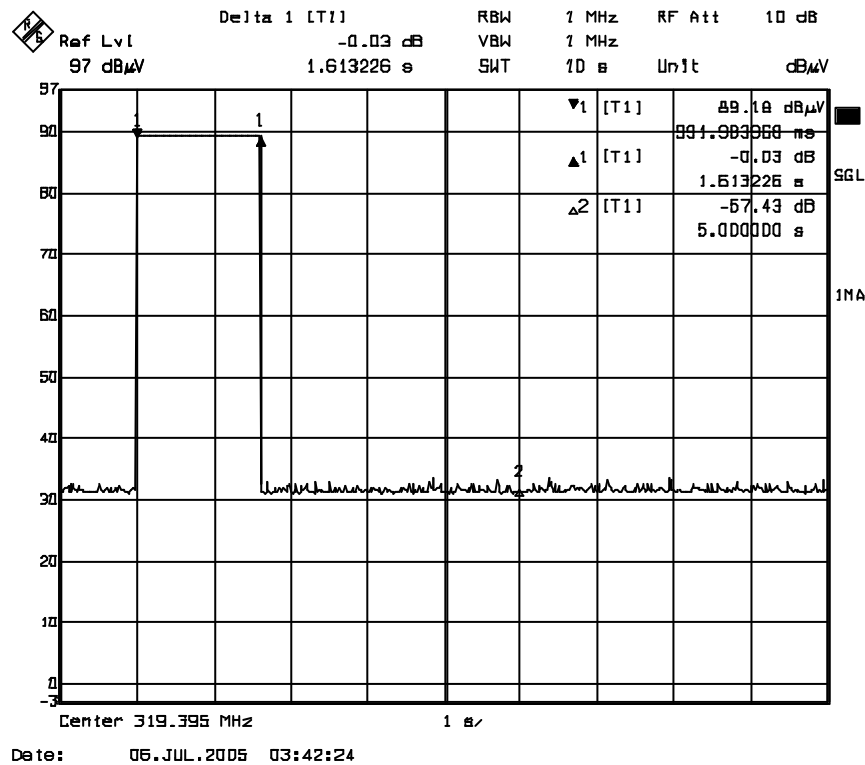
Test Data

For the fundamental frequency (310.25MHz)

Frequency (MHz)	Transmission Time (s)	Limit (Second)	Result
310.25	1.463	5.00	PASS

For the fundamental frequency (319.395MHz)

Frequency (MHz)	Transmission Time (s)	Limit (Second)	Result
319.395	1.613	5.00	PASS

**Test Plot****For the fundamental frequency (310.25MHz)****For the fundamental frequency (319.395MHz)**



7.3 DUTY CYCLE

LIMIT

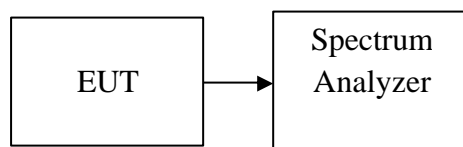
Nil (No dedicated limit specified in the Rules)

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
SPECTRUM ANALYZER	R&S	FSEM	830270/015	March 18, 2006

Remark: Each piece of equipment is scheduled for calibration once a year.

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW, VBW=100KHz, Span = 0Hz, Adjust Sweep = 5ms.
5. Repeat above procedures until all frequency measured were complete.

TEST RESULTS

No non-compliance noted

Test Data

For the fundamental frequency (310.25MHz)

$$T_p = 4.82\text{ms}$$

$$T_{on} = 0.196 * 8 + 0.096 * 8 = 2.342 \text{ (ms)}$$

$$\text{Factor} = 20 * \log(T_{on} / T_p) = 20 * \log(2.34/4.82) = -6.271\text{dB}$$

For the fundamental frequency (319.395MHz)

$$T_p = 4.81\text{ms}$$

$$T_{on} = 0.195 * 8 + 0.094 * 8 = 2.315 \text{ (ms)}$$

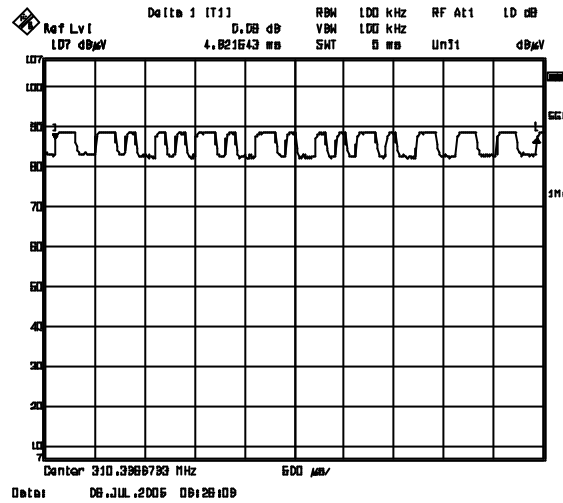
$$\text{Factor} = 20 * \log(T_{on} / T_p) = 20 * \log(2.34/4.82) = -6.365\text{dB}$$



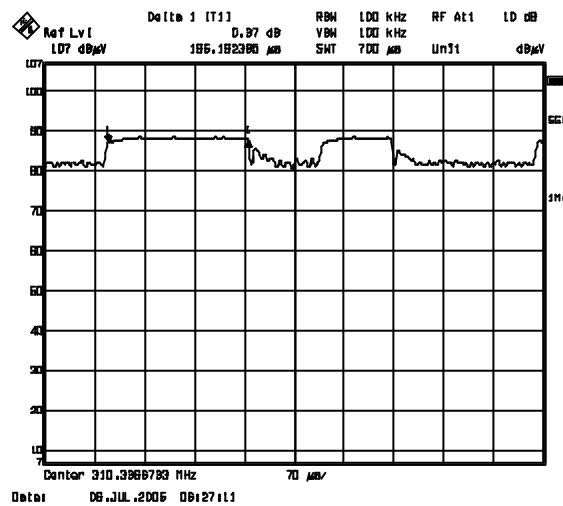
Test Plot

For the fundamental frequency (310.25MHz)

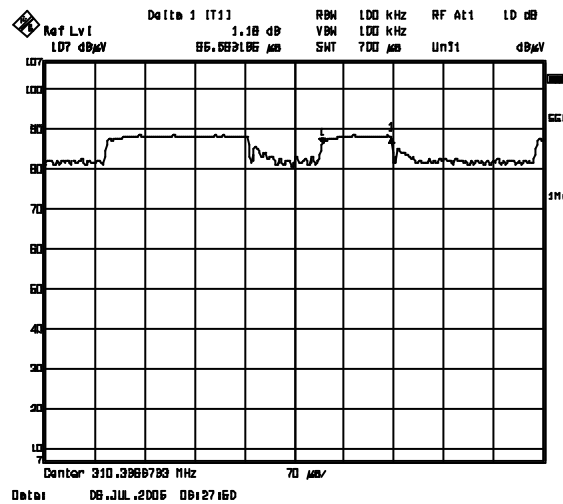
Tp



Ton1



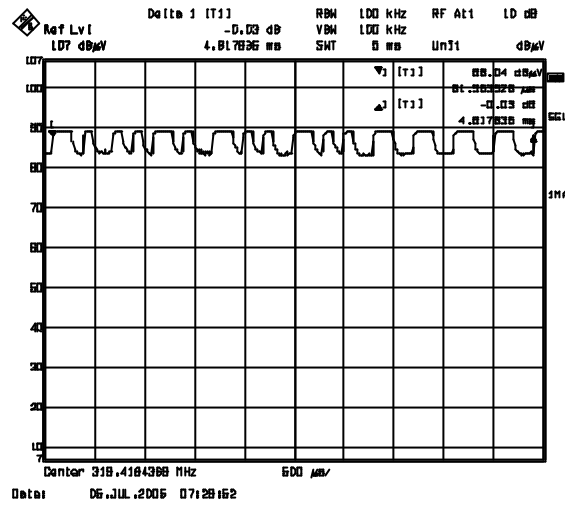
Ton2



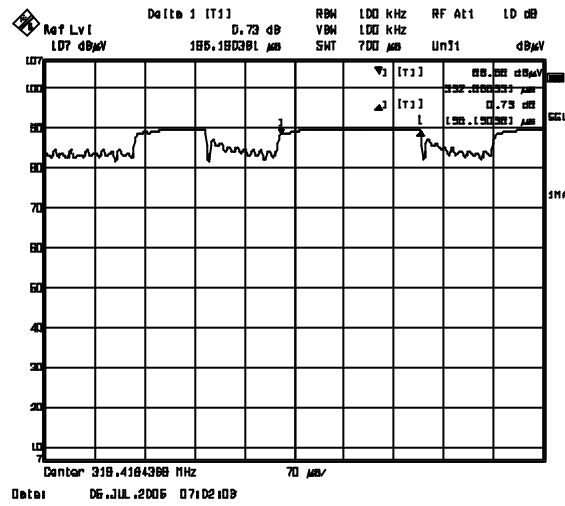


For the fundamental frequency (319.395MHz)

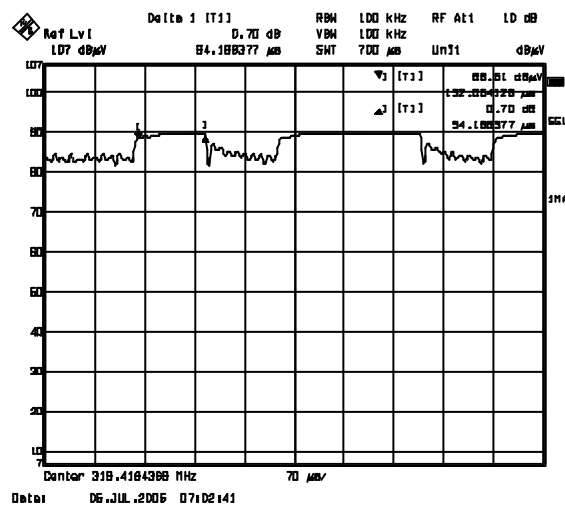
Tp



Ton1



Ton2





7.4 RADIATED EMISSIONS

LIMIT

1. Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (mV/m)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

Remark: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

2. In the above emission table, the tighter limit applies at the band edges.

Frequency (Hz)	Field Strength (μ V/m at 3-meter)	Field Strength (dB μ V/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

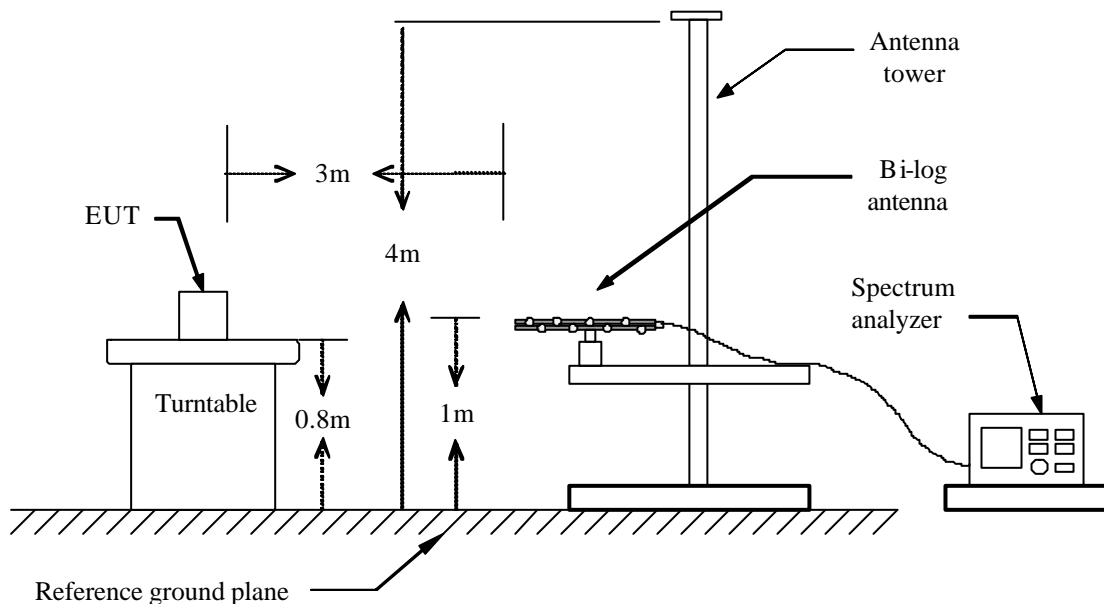
MEASUREMENT EQUIPMENT USED

Open Area Test Site # 6				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
O.A.T.S	-----	-----	No.6	SEP. 12, 2005
EMI RECEIVER	R&S	ESVS10	833206/012	FEB. 24, 2006
Spectrum Analyzer	R&S	FSEM	830270/015	MAR. 18, 2006
BI-LOG ANTENNA	CHASE	CBL6112B	2341	FEB. 18, 2006
Horn Antenna	Com-Power	AH-118	071032	AUG. 02, 2005
18G Cable	SMA	SUCOFLEX104(1M)	-----	MAR. 22, 2006
Pre-Amplifier	HP	8447F	2944A03817	MAR. 09, 2006
Signal Generator	HP	8673C	2938A00663	FEB. 02, 2006
RF SWITCH	-----	ERS-180A	-----	JAN. 31, 2006
POWER METER	IFR	8541C	1835448	APR. 17, 2006

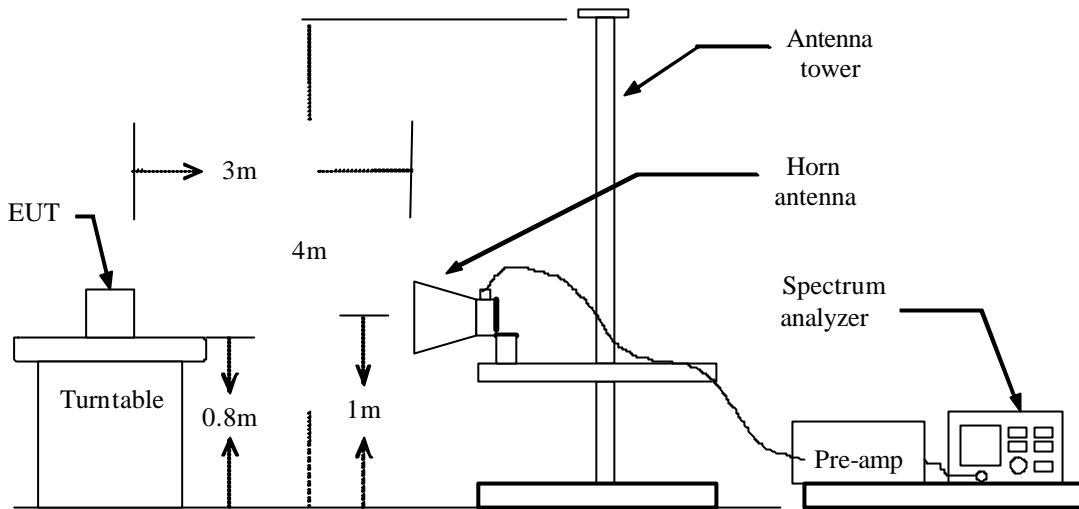
Remark: Each piece of equipment is scheduled for calibration once a year.

Test Configuration

Below 1 GHz



Above 1 GHz



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:

Below 1GHz:

RBW=100kHz / VBW=300kHz / Sweep=AUTO

Above 1GHz:

(a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO

7. Repeat above procedures until the measurements for all frequencies are complete.

**TEST RESULTS**

For the fundamental frequency (310.3MHz)

Below 1 GHz**Operation Mode:** TX / X Mode**Test Date:** July 07, 2005**Temperature:** 27.1°C**Tested by:** Jerry Chang**Humidity:** 65 % RH**Polarity:** Ver. / Hor.

Freq- Uency	Antenna Factor	Cable Loss	Meter Reading at 3 m(dB μ V/M)		Limits	Duty Cycle Factor	Emission Le vel at 3 m(dB μ V/M)		Margin		Mark
			Horizontal	Vertical			Horizontal	Vertical	Horizontal	Vertical	
(MHz)	(dB)	(dB)			(dB μ V/M)	(dB μ V)					(P/A)
310.32	13.80	1.67	59.78	46.47	95.34	-6.27	75.25	61.94	-20.09	-33.40	P
310.32	13.80	1.67	N/A	N/A	75.34	-6.27	68.98	55.67	-6.36	-19.67	A
620.47	18.95	3.06	20.57	20.46	75.34	-6.27	42.58	42.47	-32.76	-32.87	P
620.47	18.95	3.06	N/A	N/A	55.34	-6.27	36.31	36.20	-19.03	-19.14	A
930.98	22.38	3.89	21.71	20.96	75.34	-6.27	47.98	47.23	-27.36	-28.11	P
930.98	22.38	3.89	N/A	N/A	55.34	-6.27	41.71	40.96	-13.63	-14.38	A
N/A	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	P
N/A	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	A

Notes:

1. Measuring frequencies from 30 MHz to the 1GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.
3. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
4. The IF bandwidth of SPA between 30MHz to 1GHz was 100kHz.

**Operation Mode:** TX / Y Mode**Test Date:** July 07, 2005**Temperature:** 27.1°C**Tested by:** Jerry Chang**Humidity:** 65 % RH**Polarity:** Ver. / Hor.

Freq- Uency	Antenna Factor	Cable Loss	Meter Reading at 3 m(dB μ V/M)		Limits	Duty Cycle Factor	Emission Level at 3 m(dB μ V/M)		Margin		Mark
			Horizontal	Vertical			Horizontal	Vertical	Horizontal	Vertical	
(MHz)	(dB)	(dB)			(dB μ V/M)	(dB μ V)					(P/A)
310.33	13.80	1.67	41.25	56.87	95.34	-6.27	56.72	72.34	-38.62	-23.00	P
310.33	13.80	1.67	N/A	N/A	75.34	-6.27	50.45	66.07	-24.89	-9.27	A
620.64	18.95	3.06	20.98	21.35	75.34	-6.27	42.99	43.36	-32.35	-31.98	P
620.64	18.95	3.06	N/A	N/A	55.34	-6.27	36.72	37.09	-18.62	-18.25	A
930.78	22.37	3.89	20.26	20.37	75.34	-6.27	46.53	46.64	-28.81	-28.70	P
930.78	22.37	3.89	N/A	N/A	55.34	-6.27	40.26	40.37	-15.08	-14.97	A
N/A	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	P
N/A	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	A

Notes:

1. Measuring frequencies from 30 MHz to the 1GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.
3. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
4. The IF bandwidth of SPA between 30MHz to 1GHz was 100kHz.

**Operation Mode:** TX / Z Mode**Test Date:** July 07, 2005**Temperature:** 27.1°C**Tested by:** Jerry Chang**Humidity:** 65 % RH**Polarity:** Ver. / Hor.

Freq- Uency	Antenna Factor	Cable Loss	Meter Reading at 3 m(dB μ V/M)		Limits	Duty Cycle Factor	Emission Level at 3 m(dB μ V/M)		Margin		Mark
			Horizontal	Vertical			Horizontal	Vertical	Horizontal	Vertical	
(MHz)	(dB)	(dB)			(dB μ V/M)	(dB μ V)					(P/A)
310.32	13.80	1.67	59.67	45.30	95.34	-6.27	75.14	60.77	-20.20	-34.57	P
310.32	13.80	1.67	N/A	N/A	75.34	-6.27	68.87	54.50	-6.47	-20.84	A
620.67	18.95	3.06	20.83	19.36	75.34	-6.27	42.84	41.37	-32.49	-33.96	P
620.67	18.95	3.06	N/A	N/A	55.34	-6.27	36.57	35.10	-18.77	-20.24	A
930.83	22.37	3.89	20.27	20.52	75.34	-6.27	46.54	46.79	-28.80	-28.55	P
930.83	22.37	3.89	N/A	N/A	55.34	-6.27	40.27	40.52	-15.07	-14.82	A
N/A	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	P
N/A	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	A

Notes:

1. Measuring frequencies from 30 MHz to the 1GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.
3. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
4. The IF bandwidth of SPA between 30MHz to 1GHz was 100kHz.

**Above 1 GHz**

Operation Mode: TX / X Mode **Test Date:** July 07, 2005
Temperature: July 07, 2005 **Tested by:** Jerry Chang
Humidity: Jerry Chang **Polarity:** Ver. / Hor.

Freq- Uency	Antenna Factor	Cable Loss	Meter Reading at 3 m(dB μ V/M)		Limits	Emission Level at 3 m(dB μ V/M)		Margin		Mark
			Horizontal	Vertical		Horizontal	Vertical	Horizontal	Vertical	
(MHz)	(dB)	(dB)			(dB μ V/M)					(P/A)
1241.20	25.85	4.17	24.56	24.26	75.34	54.58	54.28	-20.76	-21.06	P
1241.20	25.85	4.17	16.52	16.23	55.34	46.54	46.25	-8.80	-9.09	A
N/A	-----	-----	-----	-----	-----	-----	-----	-----	-----	P
N/A	-----	-----	-----	-----	-----	-----	-----	-----	-----	A

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
 - a. Spectrum Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
 - b. Spectrum AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.



Operation Mode: TX / Y Mode

Test Date:

July 07, 2005

Temperature: July 07, 2005

Tested by:

Jerry Chang

Humidity: Jerry Chang

Polarity:

Ver. / Hor.

Freq- Uency	Antenna Factor	Cable Loss	Meter Reading at 3 m(dB μ V/M)		Limits	Emission Level at 3 m(dB μ V/M)		Margin		Mark
			Horizontal	Vertical		Horizontal	Vertical	Horizontal	Vertical	
(MHz)	(dB)	(dB)			(dB μ V/M)					(P/A)
1241.20	25.85	4.17	24.78	24.33	75.34	54.80	54.35	-20.54	-20.99	P
1241.20	25.85	4.17	16.28	15.73	55.34	46.30	45.75	-9.04	-9.59	A
N/A	-----	-----	-----	-----	-----	-----	-----	-----	-----	P
N/A	-----	-----	-----	-----	-----	-----	-----	-----	-----	A

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
 - a. Spectrum Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
 - b. Spectrum AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.



Operation Mode: TX / ZMode

Test Date:

July 07, 2005

Temperature: July 07, 2005

Tested by:

Jerry Chang

Humidity: Jerry Chang

Polarity:

Ver. / Hor.

Freq- Uency	Antenna Factor	Cable Loss	Meter Reading at 3 m(dB μ V/M)		Limits	Emission Level at 3 m(dB μ V/M)		Margin		Mark
			Horizontal	Vertical		Horizontal	Vertical	Horizontal	Vertical	
(MHz)	(dB)	(dB)			(dB μ V/M)					(P/A)
1241.20	25.85	4.17	24.74	24.25	75.34	54.76	54.27	-20.58	-21.07	P
1241.20	25.85	4.17	16.54	15.55	55.34	46.56	45.57	-8.78	-9.77	A
N/A	-----	-----	-----	-----	-----	-----	-----	-----	-----	P
N/A	-----	-----	-----	-----	-----	-----	-----	-----	-----	A

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
 - a. Spectrum Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
 - b. Spectrum AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.



For the fundamental frequency (319.395MHz)

Below 1 GHz

Operation Mode: TX / X Mode

Test Date: July 07, 2005

Temperature: 27.1°C

Tested by: Jerry Chang

Humidity: 65 % RH

Polarity: Ver. / Hor.

Freq- Uency	Antenna Factor	Cable Loss	Meter Reading at 3 m(dB μ V/M)		Limits	Duty Cycle Factor	Emission Level at 3 m(dB μ V/M)		Margin		Mark
			Horizontal	Vertical			Horizontal	Vertical	Horizontal	Vertical	
(MHz)	(dB)	(dB)			(dB μ V/M)	(dB μ V)					(P/A)
319.39	13.85	1.74	59.32	46.51	95.88	-6.37	74.91	62.10	-20.97	-33.78	P
319.39	13.85	1.74	N/A	N/A	75.88	-6.37	68.54	55.73	-7.34	-20.15	A
638.84	19.12	3.16	20.01	20.44	75.88	-6.37	42.30	42.73	-33.59	-33.16	P
638.84	19.12	3.16	N/A	N/A	55.88	-6.37	35.93	36.36	-19.95	-19.52	A
958.04	22.69	3.97	18.64	19.02	75.88	-6.37	45.30	45.68	-30.58	-30.20	P
958.04	22.69	3.97	N/A	N/A	55.88	-6.37	38.94	39.32	-16.95	-16.57	A
N/A	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	P
N/A	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	A

Notes:

1. Measuring frequencies from 30 MHz to the 1GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.
3. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
4. The IF bandwidth of SPA between 30MHz to 1GHz was 100kHz.

**Operation Mode:** TX / Y Mode**Test Date:** July 07, 2005**Temperature:** 27.1°C**Tested by:** Jerry Chang**Humidity:** 65 % RH**Polarity:** Ver. / Hor.

Freq- Uency	Antenna Factor	Cable Loss	Meter Reading at 3 m(dB μ V/M)		Limits	Duty Cycle Factor	Emission Level at 3 m(dB μ V/M)		Margin		Mark
			Horizontal	Vertical			Horizontal	Vertical	Horizontal	Vertical	
(MHz)	(dB)	(dB)			(dB μ V/M)	(dB μ V)					(P/A)
319.40	13.85	1.74	45.24	58.10	95.88	-6.37	60.83	73.69	-35.05	-22.19	P
319.40	13.85	1.74	N/A	N/A	75.88	-6.37	54.46	67.32	-21.42	-8.56	A
638.78	19.12	3.16	20.21	20.74	75.88	-6.37	42.50	43.03	-33.39	-32.86	P
638.78	19.12	3.16	N/A	N/A	55.88	-6.37	36.13	36.66	-19.75	-19.22	A
958.98	22.70	3.98	20.48	20.78	75.88	-6.37	47.16	47.46	-28.73	-28.43	P
958.98	22.70	3.98	N/A	N/A	55.88	-6.37	40.79	41.09	-15.09	-14.79	A
N/A	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	P
N/A	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	A

Notes:

1. Measuring frequencies from 30 MHz to the 1GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.
3. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
4. The IF bandwidth of SPA between 30MHz to 1GHz was 100kHz.

**Operation Mode:** TX / Z Mode**Test Date:** July 07, 2005**Temperature:** 27.1°C**Tested by:** Jerry Chang**Humidity:** 65 % RH**Polarity:** Ver. / Hor.

Freq- Uency	Antenna Factor	Cable Loss	Meter Reading at 3 m(dB μ V/M)		Limits	Duty Cycle Factor	Emission Level at 3 m(dB μ V/M)		Margin		Mark
			Horizontal	Vertical			Horizontal	Vertical	Horizontal	Vertical	
(MHz)	(dB)	(dB)			(dB μ V/M)	(dB μ V)					(P/A)
319.41	13.85	1.74	59.91	46.63	95.88	-6.37	75.50	62.22	-20.38	-33.66	P
319.41	13.85	1.74	N/A	N/A	75.88	-6.37	69.13	55.85	-6.75	-20.03	A
638.84	19.12	3.16	21.11	20.29	75.88	-6.37	43.40	42.58	-32.49	-33.31	P
638.84	19.12	3.16	N/A	N/A	55.88	-6.37	37.03	36.21	-18.85	-19.67	A
945.00	22.54	3.94	20.55	21.27	75.88	-6.37	47.02	47.74	-28.86	-28.14	P
945.00	22.54	3.94	N/A	N/A	55.88	-6.37	40.66	41.38	-15.23	-14.51	A
N/A	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	P
N/A	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	A

Notes:

1. Measuring frequencies from 30 MHz to the 1GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.
3. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
4. The IF bandwidth of SPA between 30MHz to 1GHz was 100kHz.

**Above 1 GHz**

Operation Mode: TX / X Mode **Test Date:** July 07, 2005
Temperature: July 07, 2005 **Tested by:** Jerry Chang
Humidity: Jerry Chang **Polarity:** Ver. / Hor.

Freq- Uency	Antenna Factor	Cable Loss	Meter Reading at 3 m(dB μ V/M)		Limits	Emission Level at 3 m(dB μ V/M)		Margin		Mark
			Horizontal	Vertical		Horizontal	Vertical	Horizontal	Vertical	
(MHz)	(dB)	(dB)			(dB μ V/M)					(P/A)
1277.58	26.07	4.26	24.99	24.55	75.88	55.32	54.88	-20.56	-21.00	P
1277.58	26.07	4.26	16.39	16.45	55.88	46.72	46.78	-9.16	-9.10	A
N/A	-----	-----	-----	-----	-----	-----	-----	-----	-----	P
N/A	-----	-----	-----	-----	-----	-----	-----	-----	-----	A

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
 - a. Spectrum Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
 - b. Spectrum AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.



Operation Mode: TX / Y Mode

Test Date:

July 07, 2005

Temperature: July 07, 2005

Tested by:

Jerry Chang

Humidity: Jerry Chang

Polarity:

Ver. / Hor.

Frequency (MHz)	Antenna Factor (dB)	Cable Loss (dB)	Meter Reading at 3 m (dB μ V/M)		Limits (dB μ V/M)	Emission Level at 3 m (dB μ V/M)		Margin		Mark (P/A)
			Horizontal	Vertical		Horizontal	Vertical	Horizontal	Vertical	
1277.58	26.07	4.26	24.56	24.33	75.88	54.89	54.66	-20.99	-21.22	P
1277.58	26.07	4.26	16.26	15.53	55.88	46.59	45.86	-9.29	-10.02	A
N/A	-----	-----	-----	-----	-----	-----	-----	-----	-----	P
N/A	-----	-----	-----	-----	-----	-----	-----	-----	-----	A

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
 - a. Spectrum Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
 - b. Spectrum AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.



Operation Mode: TX / ZMode

Test Date: July 07, 2005

Temperature: July 07, 2005

Tested by: Jerry Chang

Humidity: Jerry Chang

Polarity: Ver. / Hor.

Freq- Uency	Antenna Factor	Cable Loss	Meter Reading at 3 m(dB μ V/M)		Limits	Emission Level at 3 m(dB μ V/M)		Margin		Mark
			Horizontal	Vertical		Horizontal	Vertical	Horizontal	Vertical	
(MHz)	(dB)	(dB)			(dB μ V/M)					(P/A)
1277.58	26.07	4.26	24.86	24.16	75.88	55.19	54.49	-20.69	-21.39	P
1277.58	26.07	4.26	16.36	15.96	55.88	46.69	46.29	-9.19	-9.59	A
N/A	-----	-----	-----	-----	-----	-----	-----	-----	-----	P
N/A	-----	-----	-----	-----	-----	-----	-----	-----	-----	A

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
 - a. Spectrum Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
 - b. Spectrum AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.



7.5 POWERLINE CONDUCTED EMISSIONS

LIMIT

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

MEASUREMENT EQUIPMENT USED

Conducted Emission Test				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
L.I.S.N.	SCHWARZBECK	NNLK 8121	8121-446	SEP. 29, 2005 For Insertion loss
			8121-308	DEC. 09, 2005 For Insertion loss
Test Receiver	R&S	ESCS 30	100348	JUN. 16, 2005
Pulse Limit	R & S	ESH3-Z2	100110	DEC. 27, 2005
N Type coaxial cable	-----	-----	-----	DEC. 26, 2005

Remark: Each piece of equipment is scheduled for calibration once a year.

Test Configuration

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

Test Procedure

Since this EUT is battery powered, this test item is not applicable.

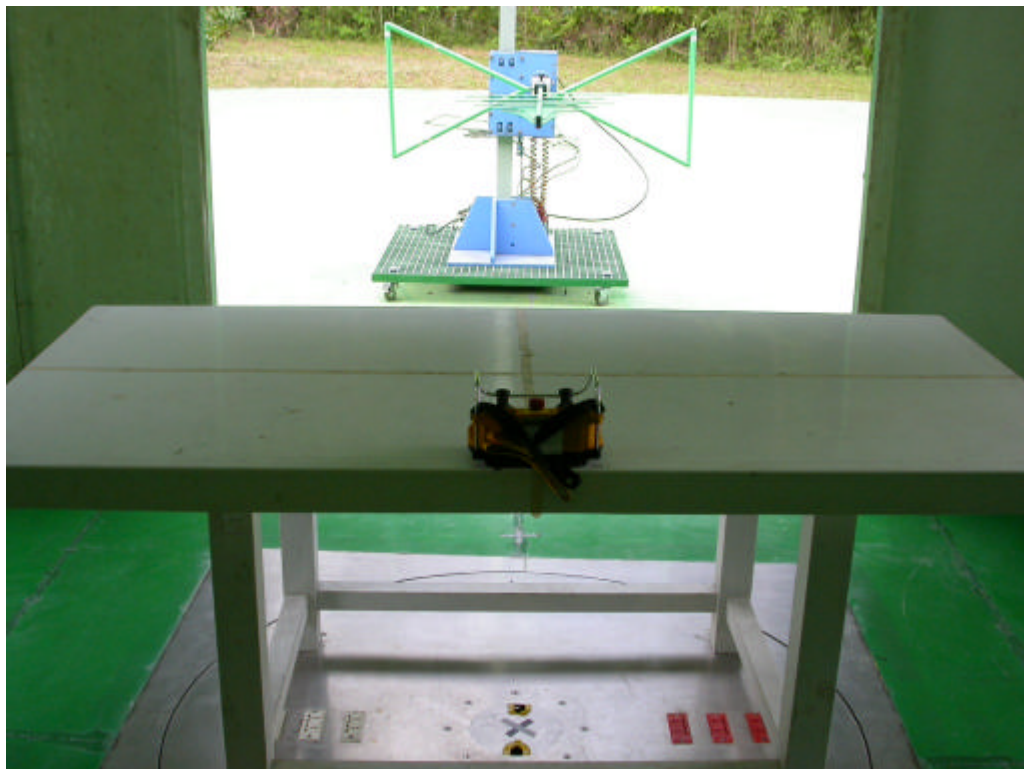
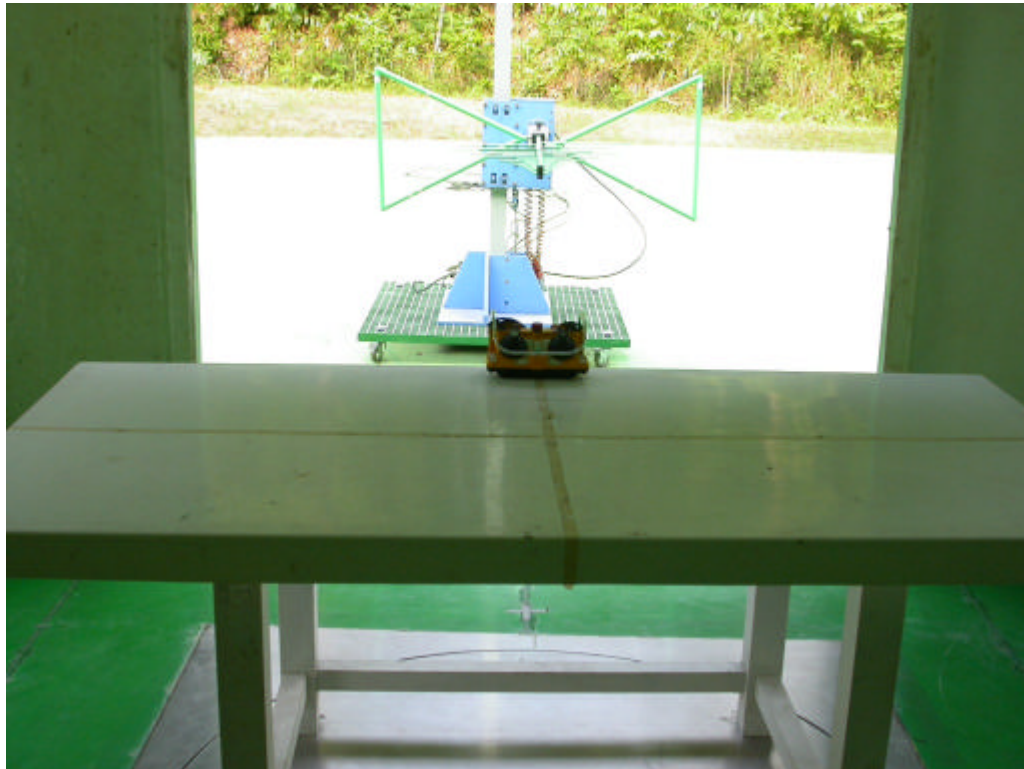
TEST RESULTS

Since this EUT is battery powered, this test item is not applicable.

APPENDIX 1 PHOTOGRAPHS OF TEST SETUP

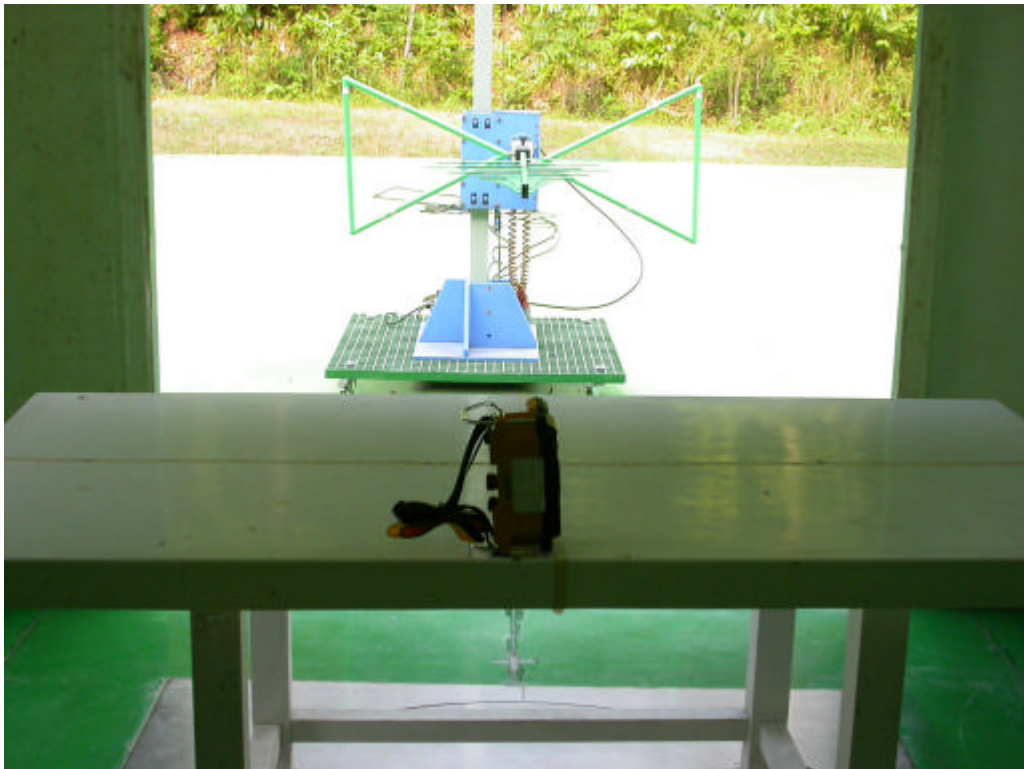
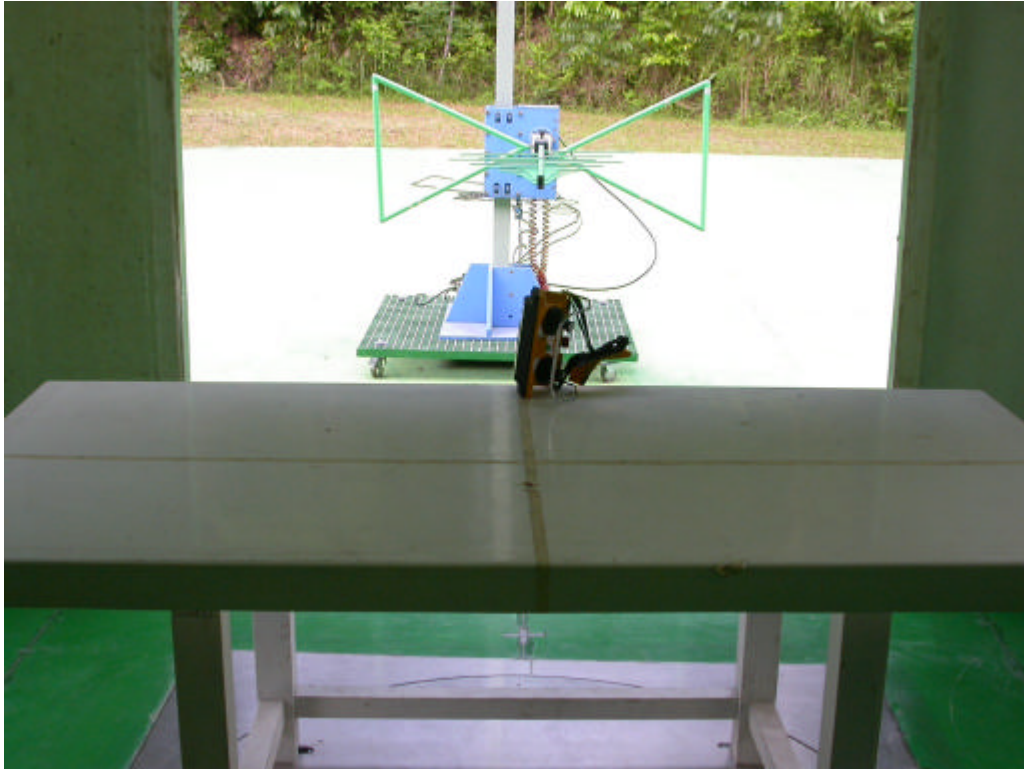
Radiated Emission Set up Photos

(1) X-axis





(2) Y-axis





(3) Z-axis

