

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT
INTENTIONAL RADIATOR CERTIFICATION TO
FCC PART 95 SUBPART C (R/C) and E REQUIREMENT
OF**

Radio transmitter for consumer toy

MODEL No.: EJT-4F

BRAND NAME: ENJOY TOY & HOBBY CORP.

FCC ID: PA8EJT-4FETHC

REPORT NO: C30619407-RP

ISSUE DATE: Jul. 22, 2003

Prepared for

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Prepared by

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C&C Laboratory, Co., Ltd.**

VERIFICATION OF COMPLIANCE

Applicant: ENJOY TOY & HOBBY CORP.
7F-1, No. 29, Lane 169, Kang Ning St.,
His-Chih, Taipei Hsian, Taiwan.

Equipment Under Test: Radio transmitter for consumer toy

BRAND NAME: ENJOY TOY & HOBBY CORP.

MODEL No.: EJT-4F

Model Difference: N/A

Serial Number: N/A

File Number: C30619407-RP

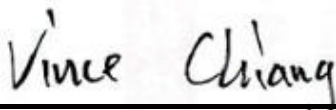
Date of test: Jun 20 ~ Jul. 14, 2003

We hereby certify that:

The above equipment was tested by C&C Laboratory Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in TIA/EIA-603-1-1998 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 Rule Part 95 subpart C and E.

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

Approved By



Vince Chiang / Supervisor

C&C Laboratory Co., Ltd.

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1. GENERAL INFORMATION

1.1 Product Description

Product	Radio transmitter for consumer toy	
Model Name	EJT-4F	
Model Difference:	N/A	
Trade Name	ENJOY TOY & HOBBY CORP.	
Frequency Range and Power	TX: 72.79 MHz	5mW (Peak)
Type of Emission	6K00F1D	
Rated Power	12Vdc by AA size Battery	

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: PA8EJT-4FETHC filing to comply with Section Part 95 subpart C and E of the FCC CFR 47 Rules.

1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures document on chapter 13 of ANSI C63.4 (1992) and FCC CFR 47.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055 and 2.1057.

1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the address of C&C Laboratory, Co., Ltd. No. 165, Chung Sheng Road, Hsin Tien City, Taipei, Taiwan, R. O. C. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 1992 and CISPR 22/EN 55022 requirements. The test facility are listed with Federal Communications Commission (reference number 250366 (Site No. E, H, I, J, K)

1.5 Special Accessories

Not available for this EUT intended for grant.

1.6 Equipment Modifications

Not available for this EUT intended for grant.

2. SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

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

2.2 EUT Exercise

The EUT (Transmitter) was operated in the engineering mode to fix the Tx frequency which was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4-1992. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and Average detector mode.

2.3.2 Radiated Emissions

The EUT is placed on a turn table which is 1.0 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 max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4-1992.

2.4 Configuration of Tested System

Fig. 2-1 Configuration of Tested System

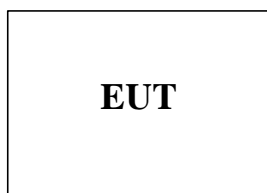


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note

Table 2-2 Information of Interface Cable

Item	I/O Cable	Device Connected	Shielded Type	Ferrite Core	Detachable/ Permanently	Length	Note

Note:

- (1) Unless otherwise marked as in 'Remark' column, C&C Laboratory consigns the support equipment to the tested system.
- (2) For detachable type I/O cable should be specified the length in cm in 'Length' column.

3. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§ 2.1046 § 95.639	RF Conducted Output Power	Compliant
§ 2.1046 § 95.639	ERP	Compliant
§ 2.1049 § 95.633	99% Occupied Bandwidth	Compliant
§ 2.1053 § 95.635(1)(3)(7)(10) (11)(12)	Unwanted Emission	Compliant
§ 2.1055, § 95.623(C)	Frequency Stability vs. Temperature	Compliant
§ 2.1055, § 95.623(C)	Frequency Stability vs. Voltage	Compliant
§ 15.107; § 15.207	AC Power Line Conducted Emission	N/A

4. DESCRIPTION OF TEST MODES

The EUT (Radio transmitter for consumer toy) has been tested under normal operating condition.

EUT is staying in continuous transmitting mode. Channel 72.79MHz with rated data rate is chosen for full testing.

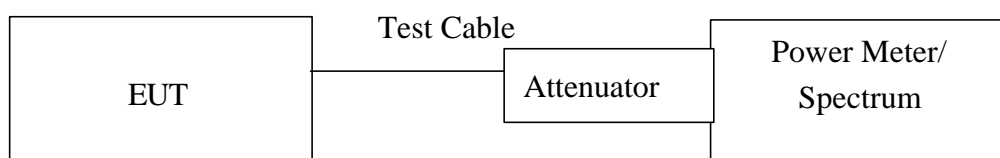
The ERP power and unwanted emission were measured as EUT stand-up position (X mode) and lie down position (Y and Z modes) with antenna extend to maximum length. The worst modes X and Y were reported.

5. RF POWER OUTPUT MEASUREMENT

5.1 Standard Applicable

According to FCC § 2.1046.

5.2 Test Set-up:



Note: Measurement setup for testing on Antenna connector

5.3 Measurement Procedure

The test point (Before T4) of transmitter was connected to a Power meter/ Spectrum Analyzer. Transmitter output was read off the power meter in dBm. The power output at the transmitter test point (Before T4) was determined by adding the value of the attenuator to the power meter reading.

5.4 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	Model No.	Serial No.	LAST CAL.	Cal. Due.
Spectrum Analyzer	Agilent	E4446A	US42510252	04/28/2003	04/27/2004
Spectrum Analyzer	R&S	FSP30	100112	6/29/2003	6/28/2004
Attenuator	Mini circle	20dB	N/A	05/15/2003	05/14/2004

5.5 Measurement Result

Frequency (MHz)	Power Meter Reading (dBm)	Attenuator (dB)	Cable Loss (dB)	Peak Power (dBm)	Output Power W	Limit W
72.79	-15.60	20	2	6.70	0.00468	0.75

6. ERP MEASUREMENT

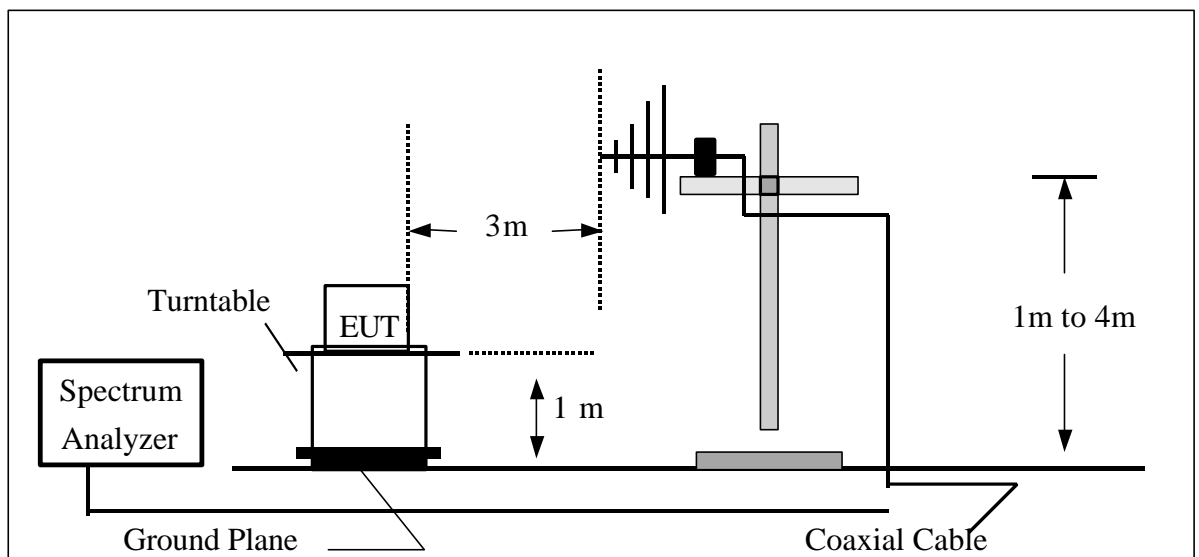
6.1 Standard Applicable

According to FCC § 2.1046

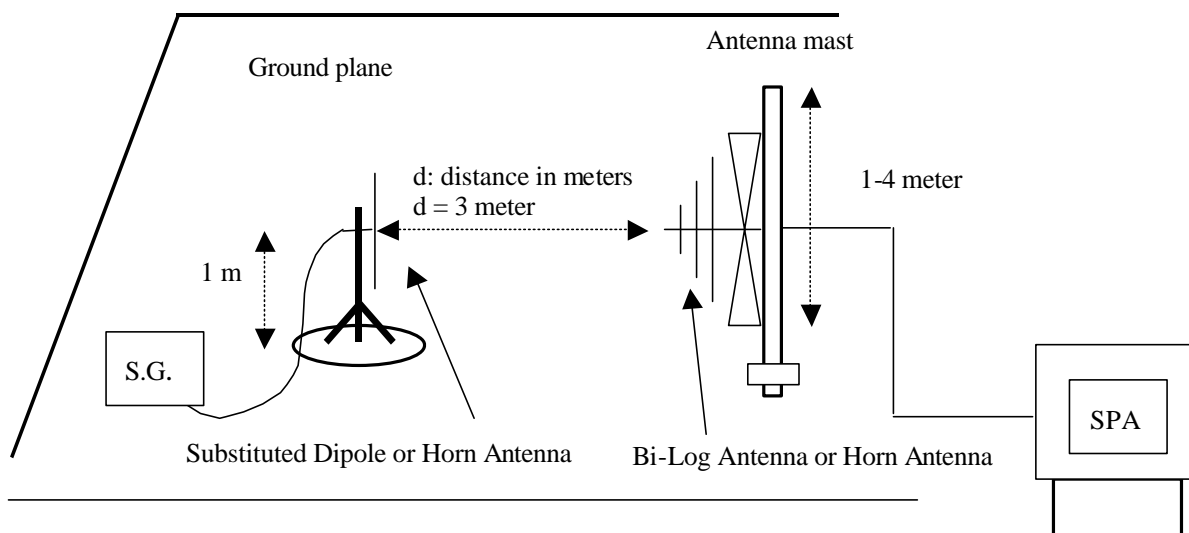
FCC § 95.639, limited to 0.75W ERP.

6.2 Test SET-UP (Block Diagram of Configuration)

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Substituted Method Test Set-Up



6.3 Measurement Procedure

The EUT was placed on an non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer.

During the measurement of the EUT, the resolution bandwidth was set to 100kHz and the average bandwidth was set to 100kHz. The highest emission was recorded with the rotation of the turntable and the lowering of the test antenna. The reading was recorded and the field strength (E in dBuV/m) was calculated.

ERP were measured using a substitution method. The EUT was replaced by Bi-log antenna and connected to the S.G. output was recorded and ERP was calculated as follows:

$$\text{ERP} = \text{S.G. output (dBm)} + \text{Antenna Gain (dBd)} - \text{Cable (dB)}$$

6.4 Measurement Equipment Used:

Open Area Test Site # I					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	ADVANTEST	R3132	120900008	09/16/02	09/17/03
Pre-Amplifier	SCHAFFNER	CPA9231A	3626	10/29/02	10/30/03
CABLE	BELDEN	9913	#I1	10/12/02	10/13/03
ANTENNA	SCHAFFNER	CBL 6112B	2800	10/01/02	10/02/03
Turn Table	EMCO	2081-1.21	9709-1885	N.C.R	N.C.R
Antenna Tower	EMCO	2075-2	9707-2060	N.C.R	N.C.R
Controller	EMCO	2090	9709-1256	N.C.R	N.C.R
Site NSA	C&C	N/A	N/A	09/07/2002	09/06/2003
S.G.	HP	83630B	3844A01022	1/15/2003	1/14/2004
Low Loss Cable#38	HUBER+SUHNER	SUCOFLEX 104EPA-6M	19443	4/9/2003	4/8/2004
Substituted Antenna	SCHAFFNER	CBL 6112B	2802	10/01/02	10/02/03

6.5 Measurement Result

Operation Mode :TX X and Y Modes
 Fundamental Frequency :72.79MHz
 Temperature :29°C
 Humidity :66%

Test Date :Jun. 05, 2003
 Test By :Spring
 Pol. :Ver./Hor.

EUT Pol.	Frequency (MHz)	Antenna Pol.	SPA Reading (dBuV)	S.G. Output (dBm)	Antenna Gain (dBd)	Cable Loss (dB)	ERP (dBm)
X	72.79	V	80.63	-1.30	1.76	1.10	-0.64
Y	72.79	H	76.00	-4.70	1.76	1.10	-4.04

Remark :

(1) Spectrum Setting :

RBW= 100KHz, VBW= 100kHz, Sweep time= 200 ms.

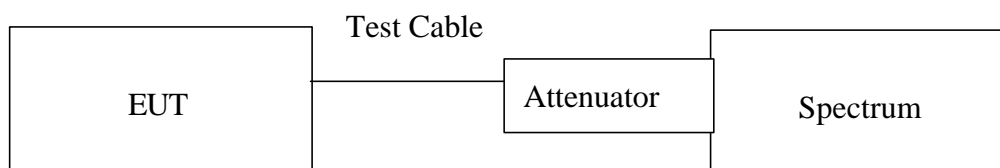
(2) X Mode means the EUT in stand-up position; Y, Z Mode means the EUT in lie-on position

7. 99% OCCUPIED BANDWIDTH MEASUREMENT

7.1 Standard Applicable

According to § FCC 2.1049. and § 95.633, Limit 8kHz.

7.2 Test Set-up:



Note: Measurement setup for testing on Antenna connector

7.3 Measurement Procedure

The RF antenna port of EUT was connected to a spectrum analyzer through appropriate attenuation. The Resolution Bandwidth and Video Bandwidth of the spectrum analyzer were set at 300Hz, Sweep Time = auto, Max. Hold.

7.4 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	Model No.	Serial No.	LAST CAL.	Cal. Due.
Spectrum Analyzer	Agilent	E4446A	US42510252	04/28/2003	04/27/2004
Spectrum Analyzer	R&S	FSP30	100112	6/29/2003	06/28/2004
Attenuator	Mini circle	20dB	N/A	05/15/2003	05/14/2004

7.5 Measurement Result:

Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
72.79	3.1223	8	Pass

Figure 7-1:



8. Unwanted Emission Measurement

8.1 Standard Applicable

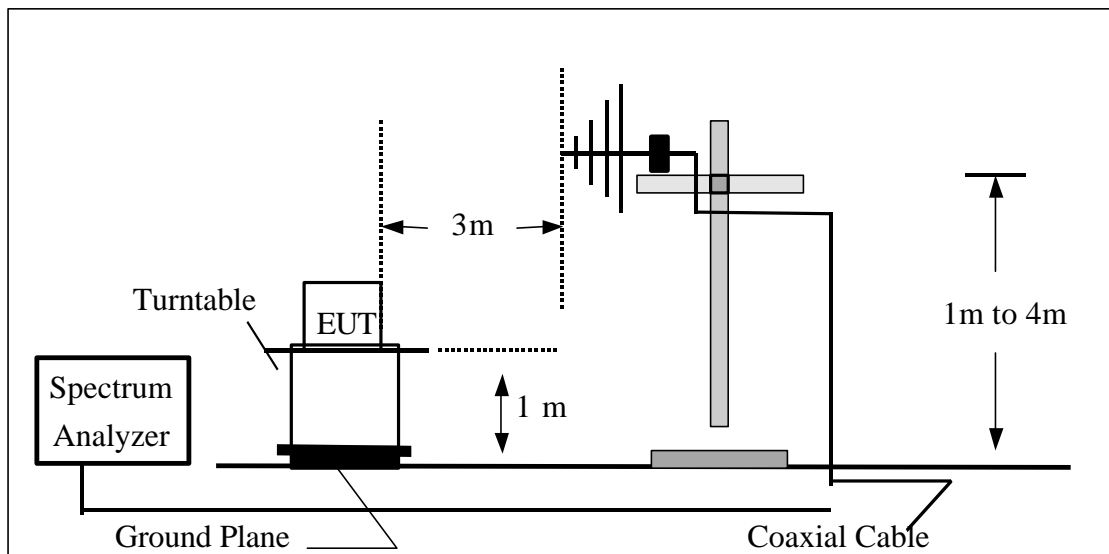
According to FCC § 2.1053.

FCC § 95.635 (1)(3) (11)

- (1) At least 25 dB (decibels) on any frequency removed from the center of the authorized bandwidth by more than 50% up to and including 100% of the authorized bandwidth.
- (10) At least 45 dB on any frequency removed from the center of the authorized bandwidth by more than 100% up to and including 125% of the authorized bandwidth.
- (11) At least 55 dB on any frequency removed from the center of the authorized bandwidth by more than 125% up to and including 250% of the authorized bandwidth.

8.2 Test SET-UP

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



8.3 Measurement Procedure

The EUT was placed on an non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer.

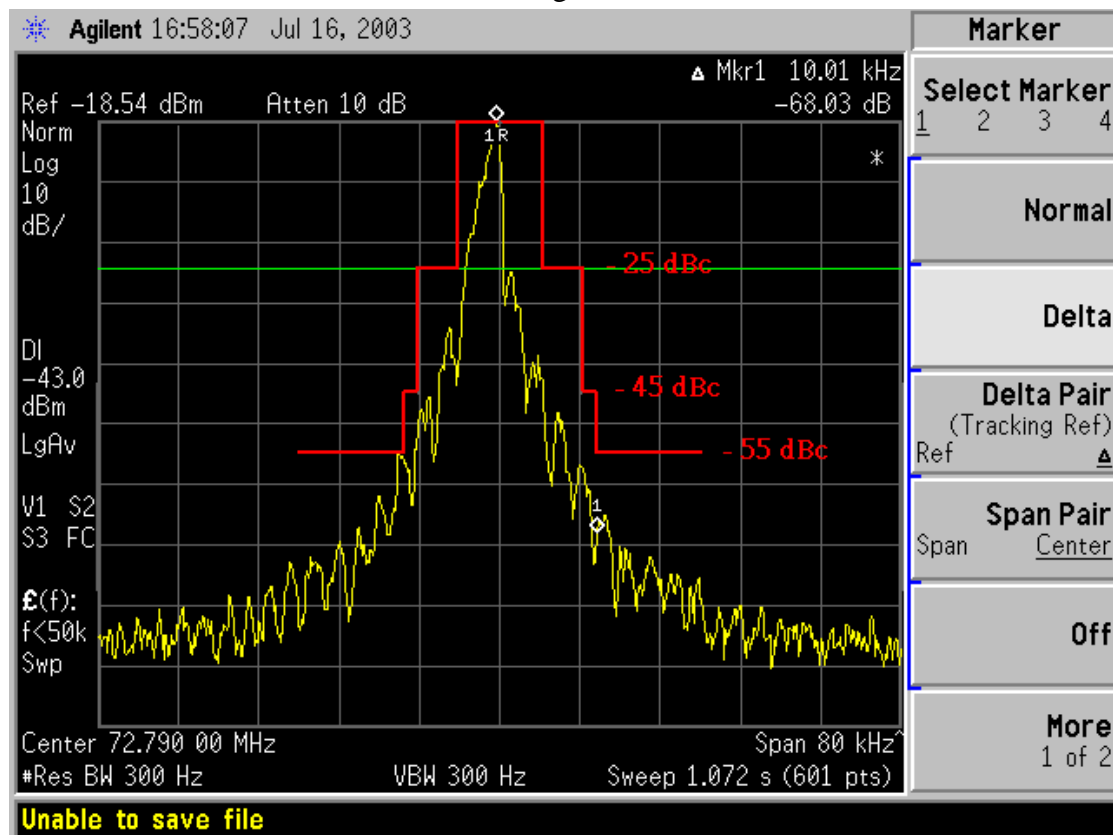
During the measurement of the EUT, the resolution bandwidth was set to 300Hz and the Video bandwidth was set to 300Hz. Max. Hold. View.

8.4 Measurement Equipment Used:

Open Area Test Site # I					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	ADVANTEST	R3132	120900008	09/16/02	09/17/03
Pre-Amplifier	SCHAFFNER	CPA9231A	3626	10/29/02	10/30/03
CABLE	BELDEN	9913	#I1	10/12/02	10/13/03
ANTENNA	SCHAFFNER	CBL 6112B	2800	10/01/02	10/02/03
Turn Table	EMCO	2081-1.21	9709-1885	N.C.R	N.C.R
Antenna Tower	EMCO	2075-2	9707-2060	N.C.R	N.C.R
Controller	EMCO	2090	9709-1256	N.C.R	N.C.R
Site NSA	C&C	N/A	N/A	09/07/2002	09/06/2003

8.5 Measurement Result

Figure 8-1:



9. Unwanted Emission Measurement

9.1 Standard Applicable

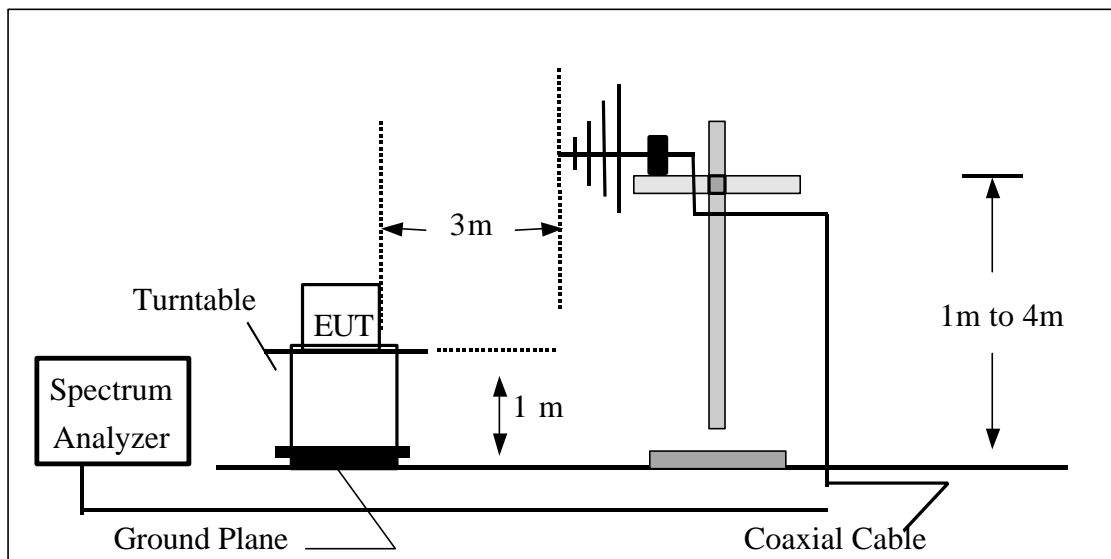
According to FCC § 2.1053,

FCC § 95.635 (12)

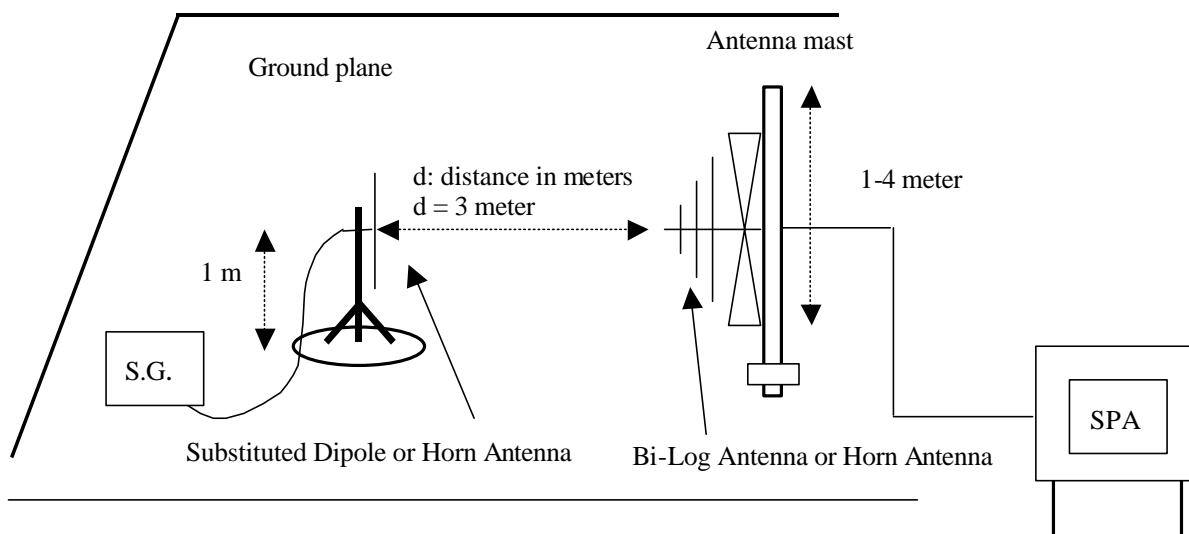
(12) At least $56+10\log(P)$ dB on any frequency removed from the center of the authorized by more than 250%.

9.2 EUT Setup (Block Diagram of Configuration)

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Substituted Method Test Set-Up



9.3 Measurement Procedure

The EUT was placed on an non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer.

During the measurement of the EUT, the resolution bandwidth was set to 100kHz and the average bandwidth was set to 100kHz. The highest emission was recorded with the rotation of the turntable and the lowering of the test antenna. The reading was recorded and the field strength (E in dBuV/m) was calculated.

ERP were measured using a substitution method. The EUT was replaced by Bi-log antenna and connected to the S.G. output was recorded and ERP was calculated as follows:

$$\text{ERP} = \text{S.G. output (dBm)} + \text{Antenna Gain (dBd)} - \text{Cable (dB)}$$

9.4 Measurement Equipment Used:

Open Area Test Site # I					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	ADVANTEST	R3132	120900008	09/16/02	09/17/03
Pre-Amplifier	SCHAFFNER	CPA9231A	3626	10/29/02	10/30/03
CABLE	BELDEN	9913	#I1	10/12/02	10/13/03
ANTENNA	SCHAFFNER	CBL 6112B	2800	10/01/02	10/02/03
Turn Table	EMCO	2081-1.21	9709-1885	N.C.R	N.C.R
Antenna Tower	EMCO	2075-2	9707-2060	N.C.R	N.C.R
Controller	EMCO	2090	9709-1256	N.C.R	N.C.R
Site NSA	C&C	N/A	N/A	09/07/2002	09/06/2003
S.G.	HP	83630B	3844A01022	1/15/2003	1/14/2004
Low Loss Cable#38	HUBER+SUHNER	SUCOFLEX 104EPA-6M	19443	4/9/2003	4/8/2004
Substituted Antenna	SCHAFFNER	CBL 6112B	2802	10/01/02	10/02/03

9.5 Measurement Result

Refer to attach tabular data sheets.

Radiated Spurious Emission Measurement Result

Operation Mode :TX X Mode
 Fundamental Frequency :72.79MHz
 Temperature :29°C
 Humidity :66%

Test Date :Jun. 05, 2003
 Test By :Spring
 Pol. :Ver.

	dBm	W
Maximum carrier Power (Radiated)	-0.64	0.0009
Calculated limit(refer to TP)	-26	

Freq. (MHz)	Ant. Pol.	EUT Pol.	SPA Reading (dBuV)	S.G Output (dBm)	Antenna (dBd)	Cable (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
43.68	V	X	30.82	-43.40	-6.99	0.70	-51.09	-26.00	-25.09
58.23	V	X	53.94	-28.80	-2.22	0.90	-31.92	-26.00	-5.92
87.35	V	X	51.99	-28.80	1.14	1.20	-28.86	-26.00	-2.86
101.91	V	X	44.17	-33.40	0.00	2.10	-35.50	-26.00	-9.50
116.46	V	X	48.22	-27.70	-0.46	1.50	-29.66	-26.00	-3.66
120.92	V	X	46.98	-28.40	0.00	1.50	-29.90	-26.00	-3.90
145.58	V	X	53.33	-29.50	3.01	1.60	-28.09	-26.00	-2.09
218.37	V	X	35.81	-43.50	8.13	1.80	-37.17	-26.00	-11.17
291.16	V	X	--					-26.00	
363.95	V	X	30.84	-43.50	6.81	2.70	-39.39	-26.00	-13.39
436.74	V	X	27.34	-48.30	6.63	3.50	-45.17	-26.00	-19.17
509.53	V	X	--					-26.00	
582.32	V	X	--					-26.00	
655.11	V	X	--					-26.00	
727.90	V	X	--					-26.00	

Remark :

- (1) Measuring frequencies from 30 MHz to the 10th harmonic of highest fundamental frequency.
- (2) Datas 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.
- (3) Spectrum Setting :
30MHz- 1GHz, RBW= 100KHz, VBW= 100kHz, Sweep time= 200 ms.
- (4) X Mode means the EUT in stand-up position; Y,Z Mode means the EUT in lie-on position

Radiated Spurious Emission Measurement Result

Operation Mode :TX Y Mode
 Fundamental Frequency :72.79MHz
 Temperature :29°C
 Humidity :66%

Test Date :Jun,5 2003
 Test By :Spring
 Pol. :Hor.

	dBm	W
Maximum carrier Power (Radiated)	-4.04	0.0004
Calculated limit(refer to TP)	-26	

Freq. (MHz)	Ant. Pol.	EUT Pol.	SPA Reading (dBuV)	S.G Output (dBm)	Antenna (dBd)	Cable (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
43.68	H	Y	49.50	-33.10	-6.99	0.70	-40.79	-26.00	-14.79
58.23	H	Y	52.52	-28.40	-2.22	0.90	-31.52	-26.00	-5.52
87.35	H	Y	49.83	-27.70	1.14	1.20	-27.76	-26.00	-1.76
101.91	H	Y	43.87	-32.50	0.00	2.10	-34.60	-26.00	-8.60
116.46	H	Y	48.84	-26.90	-0.46	1.50	-28.86	-26.00	-2.86
120.92	H	Y	48.30	-26.60	0.00	1.50	-28.10	-26.00	-2.10
145.58	H	Y	50.26	-30.00	3.01	1.60	-28.59	-26.00	-2.59
218.37	H	Y	37.53	-49.00	8.13	1.80	-42.67	-26.00	-16.67
291.16	H	Y	--					-26.00	
363.95	H	Y	25.90	-52.60	6.81	2.70	-48.49	-26.00	-22.49
436.74	H	Y	31.58	-45.80	6.63	3.50	-42.67	-26.00	-16.67
509.53	H	Y	--					-26.00	
582.32	H	Y	--					-26.00	
655.11	H	Y	--					-26.00	
727.90	H	Y	--					-26	

Remark :

- (1) Measuring frequencies from 30 MHz to the 10th harmonic of highest fundamental frequency.
- (2) Datas 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.
- (3) Spectrum Setting :
30MHz- 1GHz, RBW= 100KHz, VBW= 100kHz, Sweep time= 200 ms.
- (4) X Mode means the EUT in stand-up position; Y,Z Mode means the EUT in lie-on position

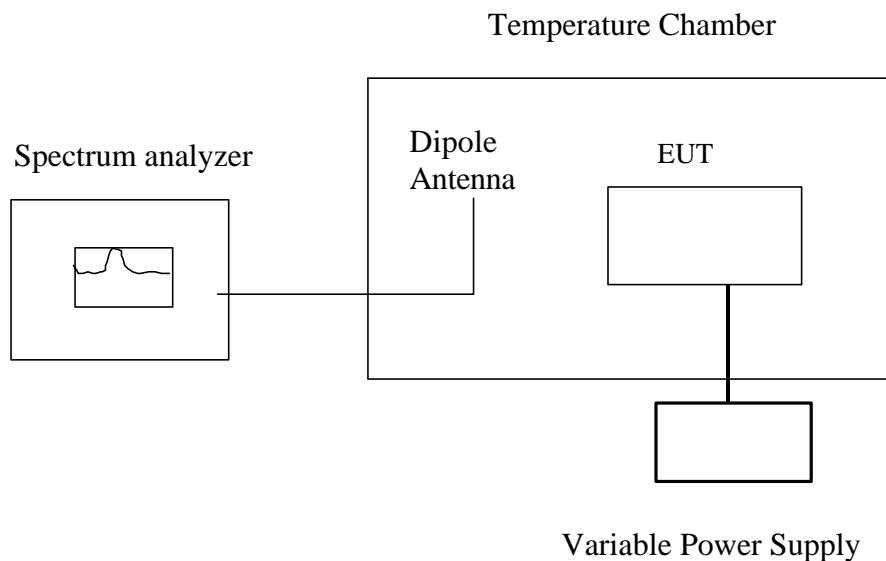
10. FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT

10.1 Standard Applicable:

According to FCC § 2.1055, FCC § 95.623(C)

Frequency Tolerance: 0.002%

10.2 Test Set-up:



10.3 Measurement Procedure:

The equipment under test was connected to an external AC or DC power supply and input rated voltage. Receiver Antenna was connected to a frequency counter or spectrum analyzer. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

10.4 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	Model No.	Serial No.	LAST CAL.	Cal. Due.
DC Power Source	Agilent	E3640A	MY40001774	1/13/2003	1/12/2004
Temperature Chamber	K.son	THS-M1	242	3/21/2003	3/20/2004
Spectrum Analyzer	Agilent	E4446A	US42510252	04/28/2003	04/27/2004
Spectrum Analyzer	R&S	FSP30	100112	6/29/2003	6/28/2004
Attenuator	Mini circle	20dB	N/A	05/15/2003	05/14/2004
low loss cable#32	Huber + Suhner	SUCOFLEX 104EPA-6M	19428	4/9/2003	4/8/2004

10.5 Measurement Result:

Reference Frequency: 72.790962 MHz @ 25				
Limit: +/- 0.002% = 1455.819 Hz				
Power Supply	Environment	Frequency	Delta (Hz)	Limit (Hz)
Vdc	Temperature ()	(MHz)		
12	50	72.790900	62.00	1455.8
12	40	72.790802	160.00	1455.8
12	30	72.790946	16.00	1455.8
12	25	72.790962	0.00	1455.8
12	20	72.791043	-81.00	1455.8
12	10	72.791116	-153.50	1455.8
12	0	72.791155	-193.00	1455.8
12	-10	72.791091	-129.00	1455.8
12	-20	72.790850	112.00	1455.8
12	-30	72.790642	320.00	1455.8

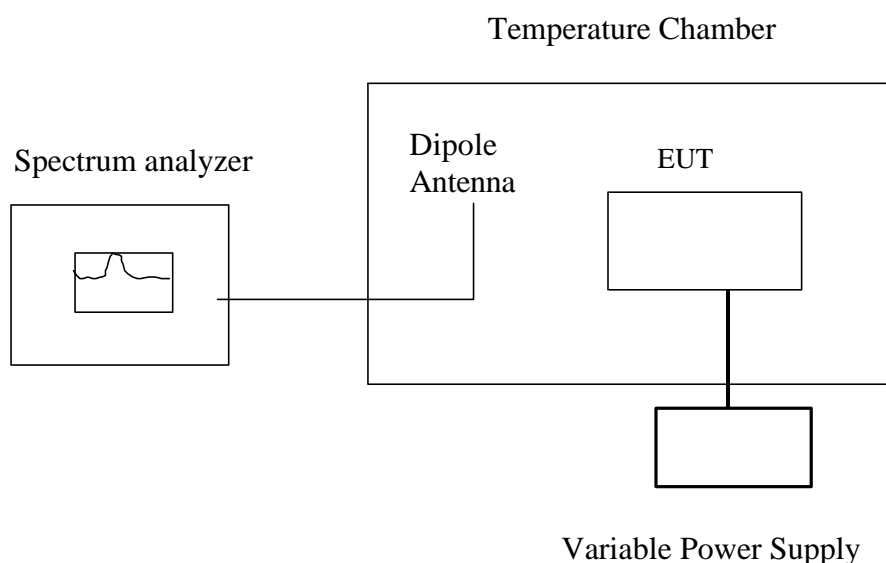
11. FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT

11.1 Standard Applicable:

According to FCC § 2.1055, FCC § 95.623(C)

Frequency Tolerance: 0.002%

11.2 Test Set-up:



11.3 Measurement Procedure:

Set chamber temperature to 25 °C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specified extreme voltage variation (+/- 15%) and endpoint, record the maximum frequency change.

11.4 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	Model No.	Serial No.	LAST CAL.	Cal. Due.
DC Power Source	Agilent	E3640A	MY40001774	01/13/2003	01/12/2004
Temperature Chamber	K.son	THS-M1	242	03/21/2003	03/20/2004
Spectrum Analyzer	Agilent	E4446A	US42510252	04/28/2003	04/27/2004
Spectrum Analyzer	R&S	FSP30	100112	06/29/2003	06/28/2004
Attenuator	Mini circle	20dB	N/A	05/15/2003	05/14/2004
Low loss cable#32	Huber + Suhner	SUCOFLEX 104EPA-6M	19428	04/09/2003	04/08/2004

11.5 Measurement Result:

Reference Frequency: 72.790962 MHz @ 25				
Limit: +/- 0.002% = 1455.819 Hz				
Power Supply	Environment	Frequency	Delta (Hz)	Limit (Hz)
Vdc	Temperature ()	(MHz)		
12	25	72.790962	0.00	1455.8
10.2	25	72.790914	48.00	1455.8
13.8	25	72.790994	-32.00	1455.8
5.5 (End Point)	25	72.790049	913.00	1455.8

APPENDIX 1

PHOTOGRPHS OF SET UP