

香港標準及檢定中心
Hong Kong Standards and Testing Centre

Date: 2003-04-14

TEST REPORT

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No.: HM109126

FCC PART 15 SUBPART C CERTIFICATION REPORT
FOR LOW POWER TRANSMITTER

TEST REPORT No.: HM109126

Equipment Under Test [EUT]:

Radiofrequency Electronic Anti-shoptheft
System

Model Number:

EG909

Applicant:

Shenzhen Ronghua Electronic Co., Ltd.

FCC ID :

QQ7EGUARDEAS02

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N. T., Hong Kong
Tel : (852) 2666 1888
Fax : (852) 2664 4353
Homepage: www.hkstdc.org
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Appendix A

List of Measurement Equipment

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Duty Cycle Correction During 100 msec

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CONCLUSION

The submitted product was deemed to have COMPLIED after modification by customer with the requirements of Federal Communications Commission [FCC] Rules and Regulations Part 15. The tests were performed in accordance with the standards described above and on Section 2.2 in this Test Report.

Verify by

Patrick Wong
for Chief Executive

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Homepage: www.hkstc.org
E-mail: hksta@hksta.com



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1.0 General Details

1.1 Test Laboratory

The Hong Kong Standards and Testing Centre Ltd.
EMC Laboratory
10 Dai Wang Street, Taipo Industrial Estate
New Territories, Hong Kong

Telephone: 852 2666 1888
Fax: 852 2664 4353

1.2 Applicant Details
Applicant

SHENZHEN RONGHUA ELECTRONIC CO., LTD.
3/F., Bldg. 524, Bagualing Shenzhen

Telephone: 86 755 8226 1223
Fax: 86 755 8226 2665

HKSTC Code Number for Applicant

SZR003

Manufacturer

SHENZHEN RONGHUA ELECTRONIC CO., LTD.
3/F., Bldg. 524, Bagualing Shenzhen

Telephone: 86 755 8226 1223
Fax: 86 755 8226 2665

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1.3 Equipment Under Test [EUT]
Description of Sample

Product: Radiofrequency Electronic Anti-shoptheft System
Manufacturer: Shenzhen Ronghua Electronic Co., Ltd.
Brand Name: eGUARD
Model Number: EG909
Input Voltage: 120Va.c 60Hz

1.3.1 Description of EUT Operation

The Equipment Under Test(EUT) is an Shenzhen Ronghua Electronic Co., Ltd., Radiofrequency Electronic Anti-shoptheft System. The transmitter is a 1 button transmitter. The EUT continues to transmit while button is being switch on, Modulation by IC. and tape is pulse modulation.

1.4 Date of Order

2002-10-25

1.5 Submitted Sample(s):

4 Samples per model

1.6 Test Duration

2003-03-31

1.7 Country of Origin

China

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1.8 Additional Information of EUT

	Submitted	Not Available
User Manual	☒	☐
Part List	☒	☐
Circuit Diagram	☒	☐
Printed Circuit Board [PCB] Layout	☒	☐
Block diagram	☒	☐
FCC ID Label	☒	☐

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2.0 Technical Details

2.1 Investigations Requested

Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15 and ANSI C63.4:2000 for FCC Certification.

2.2 Test Standards and Results Summary Tables

EMISSION Results Summary						
Test Condition	Test Requirement	Test Method	Class / Severity	Test Result		
				Pass	Failed	N/A
Field Strength of Fundamental Emissions	FCC 47CFR 15.223	ANSI C63.4:2000	N/A	☒	☐	☐
Radiated Emissions, 30MHz to 1GHz	FCC 47CFR 15.209	ANSI C63.4:2000	Class B	☒	☐	☐
Conducted Emissions on AC, 0.15MHz to 30MHz	FCC 47CFR 15.207	ANSI C63.4:2000	Class B	☒	☐	☐

Note: N/A - Not Applicable

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3.0 Test Results

3.1 Emission

3.1.1 Radiated Emissions

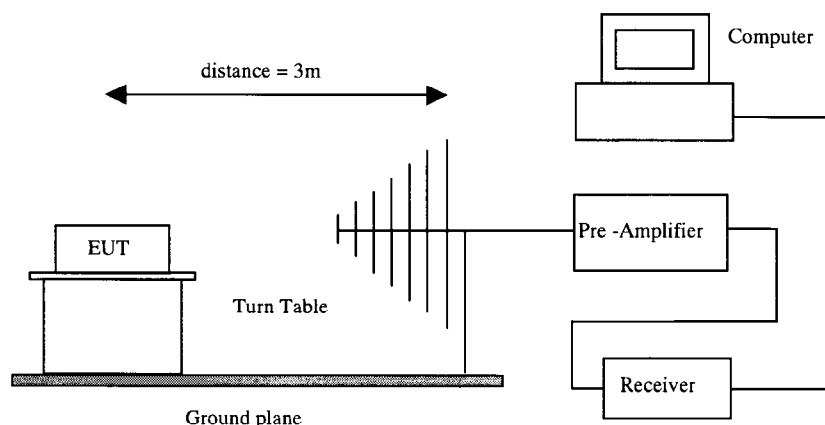
Test Requirement:	FCC 47CFR 15.223
Test Method:	ANSI C63.4:2000
Test Date:	2003-03-31
Mode of Operation:	On mode

Test Method:

The sample was placed 0.8m above the ground plane on the OATS *. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigate all operating modes, rotated about all 3 axis (X, Y & Z) to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. For the Loop antenna, it would be rotated per 45 degree. The emissions worst-case are shown in Test Results of the following pages.

*: OATS [Open Area Test Site] located at HKSTC with a metal ground plane on filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 90657.

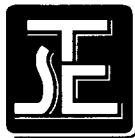
Test Setup:



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Limits for Field Strength of Fundamental Emissions [FCC 47CFR 15.223]:

Frequency Range of Fundamental [MHz]	Field Strength of Fundamental Emission [Peak] [μV/m]	Field Strength of Fundamental Emission [Average] [μV/m]
1.705-10.00	10,000	1,000

Results:

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	Antenna Polarity
9.50	46.7	11.2	57.9	785.2	10,000	Horizontal

Field Strength of Fundamental Emissions Average						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	Antenna Polarity
9.50	19.4	11.2	30.6	33.9	1,000	Horizontal

According to FCC 47CFR15.35, the limit on the radio frequency emissions as measured using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules.

Remarks:

*: Adjusted by Duty Cycle = -27.36dB

*: Linear interpolations

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty = 30MHz to 300MHz ±3.7dB
300MHz to 1GHz +3.0dB / -2.7dB

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Limited for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

Frequency Range [MHz]	Quasi-Peak Limits [μV/m]
1.705-30	300
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Results :

Radiated Emissions Quasi-Peak						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	Antenna Polarity
28.57	19.2	21.0	40.2	102.3	100	Horizontal
38.20	15.1	14.4	29.5	29.9	100	Horizontal
126.10	26.4	9.8	36.2	64.6	150	Horizontal
158.40	20.1	11.6	31.7	38.5	150	Horizontal
209.40	18.4	12.6	31.0	35.5	150	Horizontal
226.70	19.3	13.8	33.1	45.2	200	Horizontal
255.41	17.6	14.8	32.4	41.7	200	Horizontal

Remarks:

*: Linear interpolations

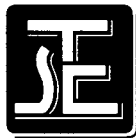
Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty = 30MHz to 300MHz ±3.7dB
300MHz to 1GHz +3.0dB / -2.7dB

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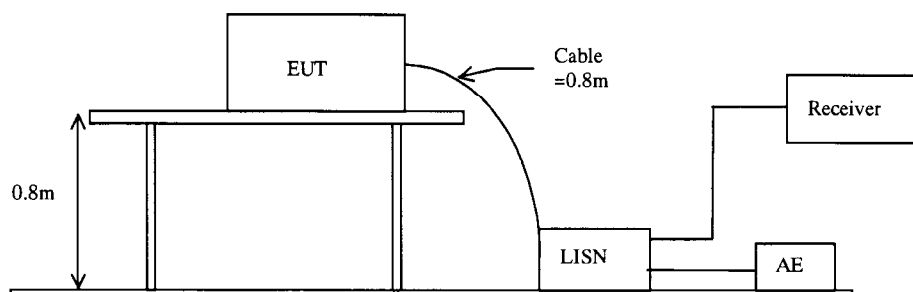
3.1.1 Conducted Emissions (0.15MHz to 30MHz)

Test Requirement:	FCC 47CFR 15.207
Test Method:	ANSI C63.4:2000
Test Date:	2003-03-31
Mode of Operation:	On mode

Test Method:

The test was performed in accordance with ANSI C63.4:2000, with the following: an initial measurement was performed in peak and average detection mode on the live line. Any emissions recorded within 30dB of the relevant limit line were re-measured using quasi-peak and average detection on the live and neutral lines with the worst case recorded in the table of results.

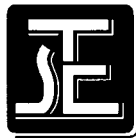
Test Setup:



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Fax : (852) 2664 4353
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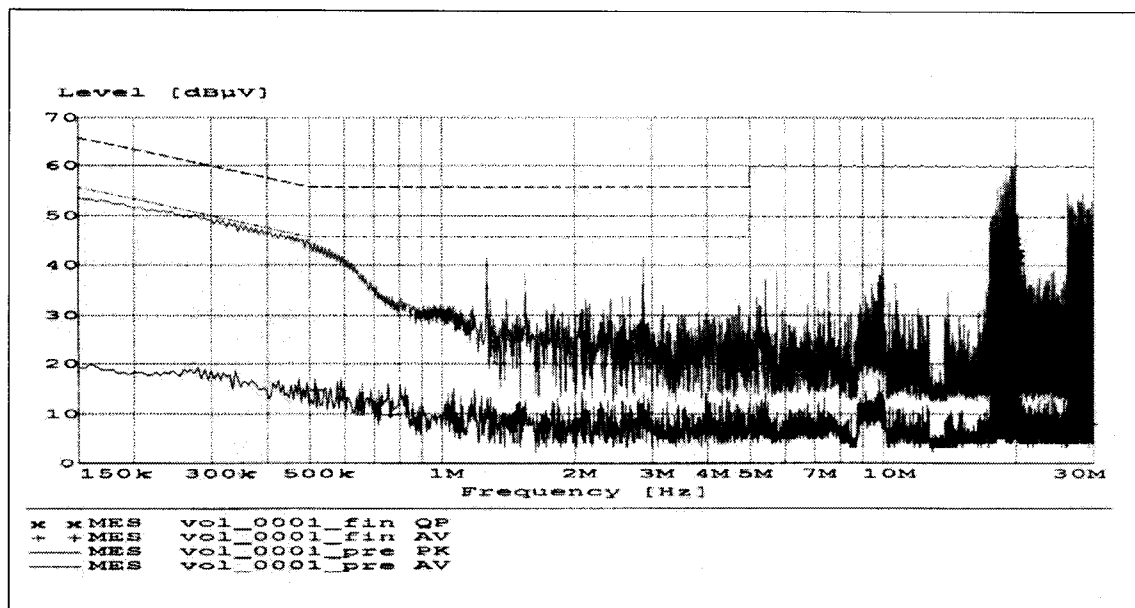
Limit for Conducted Emissions (FCC 47 CFR 15.207):

Frequency Range [MHz]	Quasi-Peak Limits [dB μ V]	
	Quasi Peak	Average
0.15-0.5	66-56*	56-46*
0.5-5	56	46
5-30	60	50

*Decreases with the Logarithm of the Frequency

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram labelled as (QP and AV).

Results:



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Result:

Conductor	Frequency	Quasi-Peak		Average	
		Level	Limit	Level	Limit
Live or Neutral	MHz	dB μ V/m	dB μ V/m	dB μ V/m	dB μ V/m
Live	18.270	36.2	60	.*	.*
Live	18.540	36.0	60	.*	.*
Live	18.870	38.3	60	.*	.*
Live	18.975	37.7	60	.*	.*
Live	19.140	39.3	60	.*	.*
Live	19.250	39.3	60	.*	.*
Live	19.305	41.9	60	.*	.*
Live	19.415	42.7	60	.*	.*
Live	19.470	43.6	60	.*	.*
Live	19.630	44.0	60	.*	.*
Live	19.685	45.2	60	.*	.*
Live	19.740	40.9	60	.*	.*
Live	19.850	42.7	60	.*	.*
Live	19.905	42.6	60	.*	.*
Live	19.630	.*	.*	11.5	50
Live	19.960	42.8	60	.*	.*
Live	20.015	41.3	60	.*	.*
Live	20.070	42.9	60	.*	.*

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Result:

Conductor	Frequency	Quasi-Peak		Average	
Live or Neutral	MHz	Level dB μ V/m	Limit dB μ V/m	Level dB μ V/m	Limit dB μ V/m
Neutral	0.515	-*-	-*-	14.8	46
Neutral	0.59	-*-	-*-	13.3	46
Neutral	0.755	-*-	-*-	9.9	46
Neutral	19.085	37.1	60	-*-	-*-
Neutral	26.350	34.6	60	-*-	-*-
Neutral	28.420	35.4	60	-*-	-*-
Neutral	29.295	-*-	-*-	8.1	50

Remarks:

Calculated measurement uncertainty = ± 2.3 dB

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3.2 6dB Bandwidth of Fundamental Emission

Test Requirement:	FCC 47 CFR 15.227
Test Method:	ANSI C63.4:2000 (Section 13.1.7)
Test Date:	2003-03-31
Mode of Operation:	On mode

Test Method:

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

Test Setup:

As Test Setup of clause 3.1.1 in this test report.

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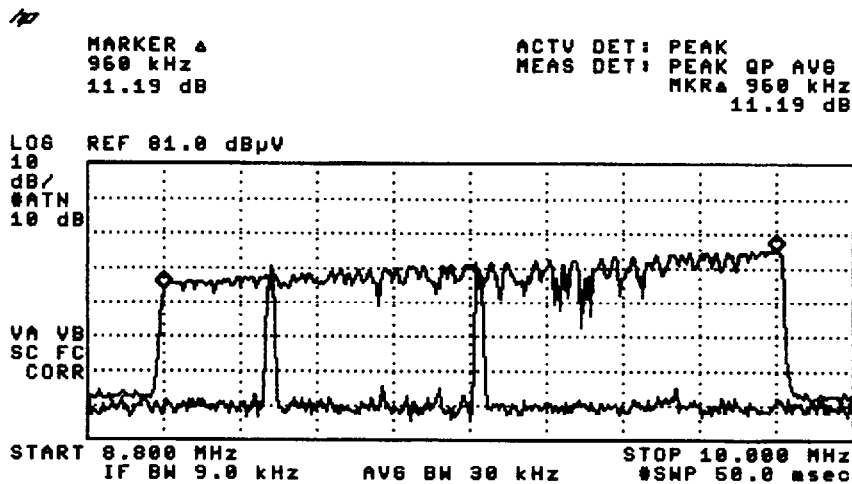
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Limits for 6 dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	26dB Bandwidth [KHz]	FCC Limits * [KHz]
9.5	960	within 1.705-10

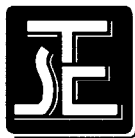
6dB Bandwidth of Fundamental Emission



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Appendix A

Test Equipment Audit

Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL
EM007	SPECTRUM ANALYZER	HEWLETT PACKARD	HP85660B	3144A21192	07/09/01
EM008	SPECTRUM ANALYZER DISPLAY	HEWLETT PACKARD	HP85662A	3144A20514	07/09/01
EM009	QUASI PEAK ADAPTOR	HEWLETT PACKARD	HP85650A	3303A01702	07/09/01
EM010	RF PRESELECTOR	HEWLETT PACKARD	HP85685A	3221A01410	07/09/01
EM011	ATTENUATOR/SWITCH	HEWLETT PACKARD	HP11713A	2508A10595	07/09/01
EM012	PRE-AMPLIFIER	HEWLETT PACKARD	HP8449B	3008A00262	07/09/01
EM013	CONTROLLER (COMPUTER), COLOR MONITOR, KEYBOARD & MOUSE FLOPPY DRIVE	HEWLETT PACKARD HEWLETT PACKARD HEWLETT PACKARD	HP9000 HP A1097C HP9133L	6226A60314 3151J39517 2623A02468	CM
EM020	HORN ANTENNA	EMCO	3115	4032	19/07/00
EM022	LOOP ANTENNA	EMCO	6502	1189-2424	04/08/00
EM072	SIGNAL GENERATOR	HEWLETT PACKARD	8640B	1948A11892	N/A
EM083	HKSTC OPEN AREA TEST SITE	HKSTC	N/A	N/A	14/02/02
EM131	PORTABLE SPECTRUM ANALYSER	HEWLETT PACKARD	8595EM	3710A00155	18/12/01
EM145	EMI TEST RECEIVER	R & S	ESCS 30	830245/021	22/07/02
EM194	BICONILOG ANTENNA	EMCO	3142B	1795	14/05/02
EM195	ANTENNA POSITIONING MAST	EMCO	2075	2368	N/A
EM196	MULTI-DEVICE CONTROLLER	EMCO	2090	1662	N/A

Conducted Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL
EM078	VARIAC	SHANGHAI VOLTAGE	TDGC-3/0.5	N/A	CM
EM081	SMALL SCREENED ROOM	MIKO INST HK	N/A	N/A	04/10/01
EM119	LISN	R & S	ESH3-Z5	0831.5518.52	31/08/00
EM127	ISOLATION TRANSFORMER 220 TO 300	WING SUN	N/A	N/A	CM
EM142	PULSES LIMITER	R & S	ESH3Z2	357.8810.52	04/07/01
EM181	EMI TEST RECEIVER	R & S	ESIB7	100072	28/11/01
EM154	SHIELDING ROOM	SIEMENA MATSUSHITA COMPONENTS	N/A	803-740-057- 99A	02/01/02
EM197	LISN	EMCO	4825/2	1193	28/03/02

Remarks:

CM Corrective Maintenance
N/A Not Applicable or Not Available
TBD To Be Determined

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Appendix B

Duty Cycle Correction During 100msec

Each function key sends a different series of characters, but each packet period (62.475msec) never exceeds a series of 9 long (300μsec) or short pulses. Assuming any combination of short and long pulses may be obtained due to encoding the worse case transmit duty cycle would be considered $9 \times 300\mu\text{sec} \text{ per } 62.475\text{msec} = 4.32\%$ duty cycle. Figure A through C show the characteristics of the pulse train for one of these function.

Remarks:

Duty Cycle Correction = $20\text{Log}(0.0432) = -27.3\text{dB}$

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The following figures [Figure A to Figure D] showed the characteristics of the pulse train for one of these functions.

Figure A [Pulse Train]

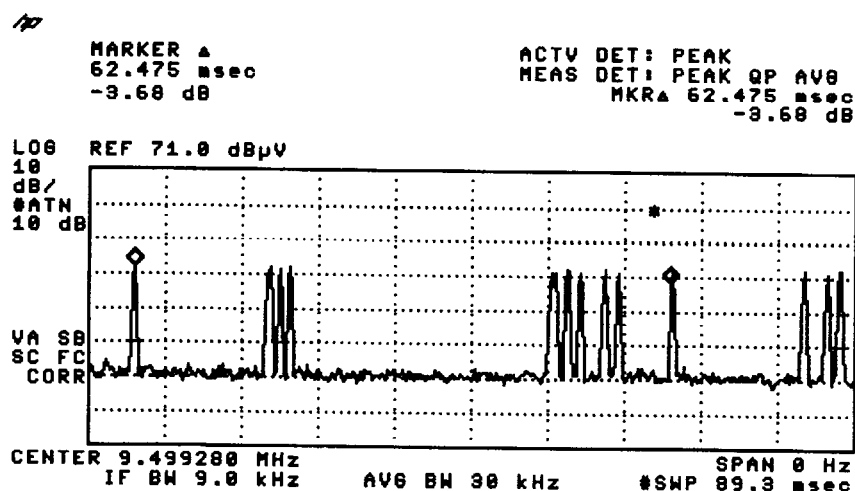
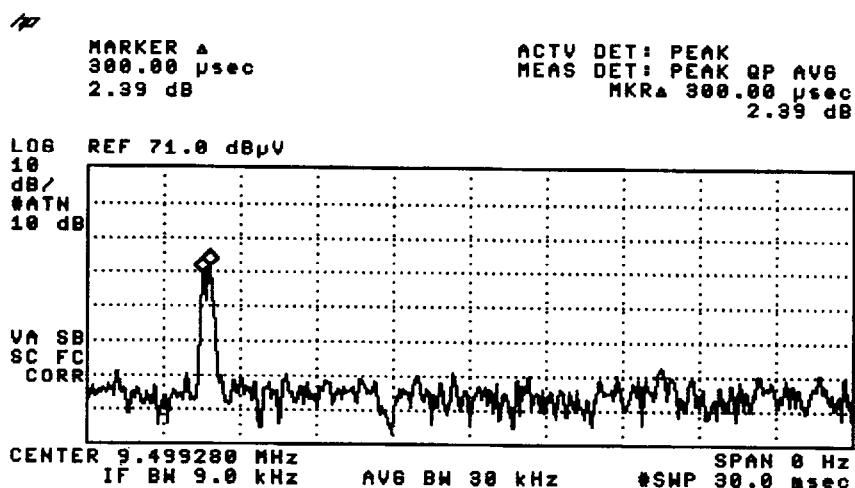


Figure B [Long & Short Pulse]



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Figure C [Stop Frequency 9.88MHz]

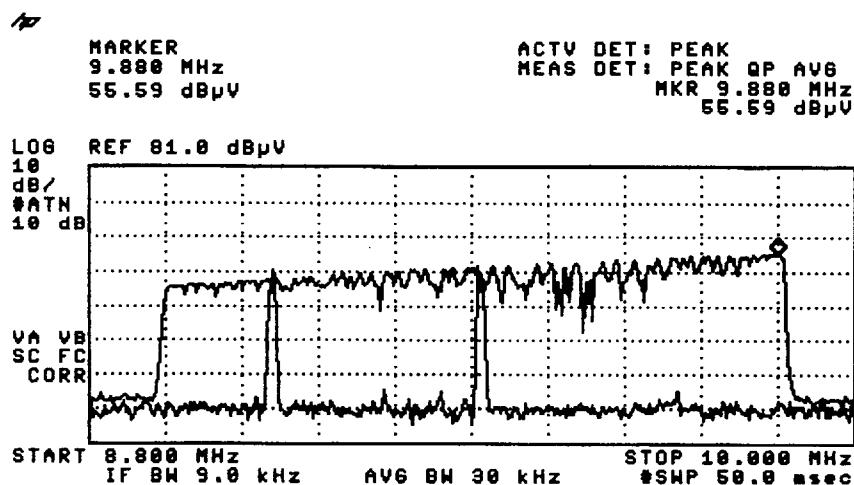
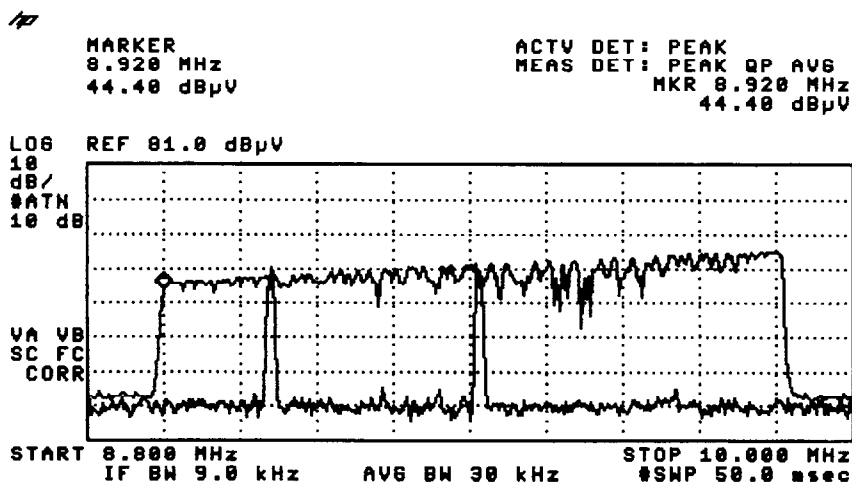


Figure D [Start Frequency 8.92MHz]



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Appendix C

Photographs of EUT

Front View of the product



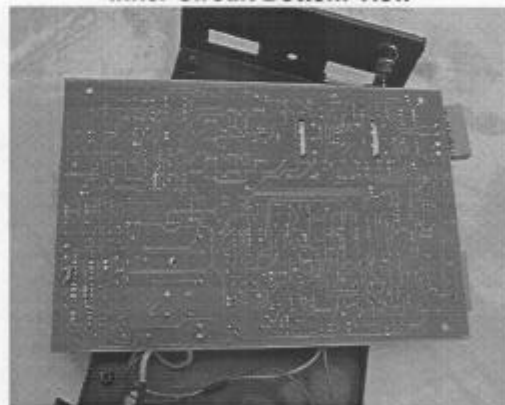
Rear View of the product



Inner Circuit Top View



Inner Circuit Bottom View



Conditions in Issuance of Test Report

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香港新界大埔工業邨大宏街10號
10 Dai Wang Street,
Taipo Industrial Estate,
N. T., Hong Kong
Tel : (852) 2666 1888
Fax : (852) 2664 4353
Homepage: www.hkstdc.org
E-mail: hkstdc@hkstdc.com



香港標準及檢定中心
Hong Kong Standards and Testing Centre

Date: 2003-04-14

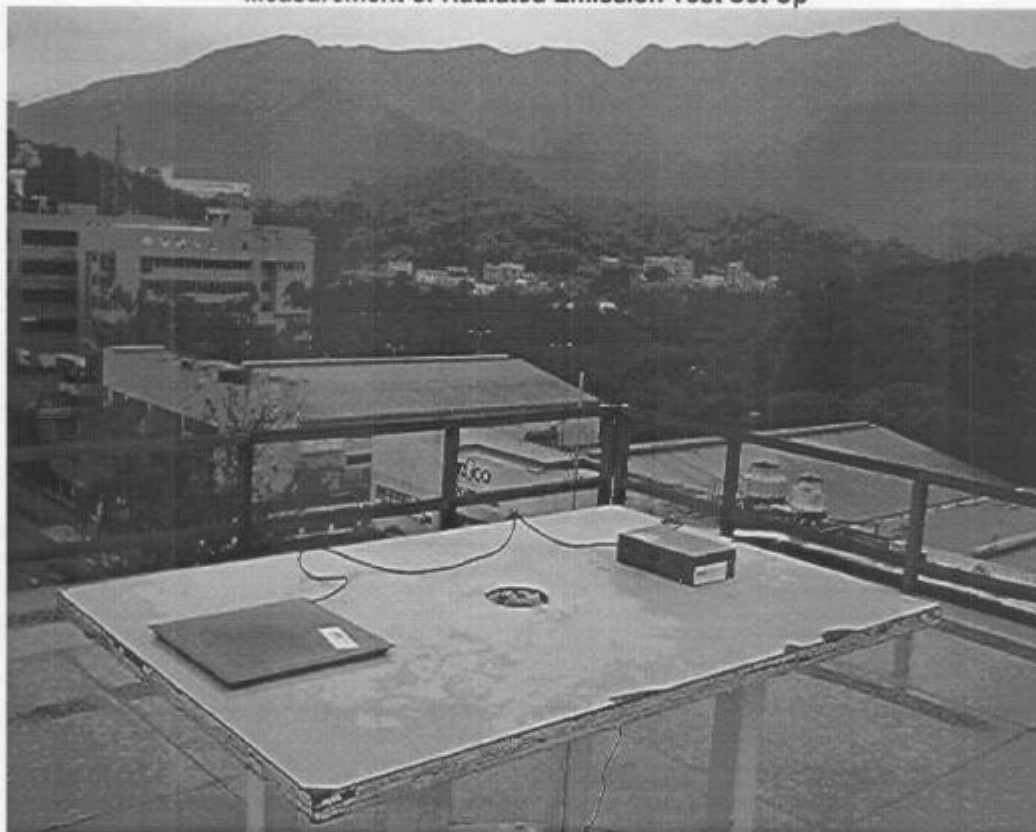
TEST REPORT

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Photographs of EUT

Measurement of Radiated Emission Test Set Up



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香港新界大埔工業邨大宏街10號
10 Dai Wang Street,
Taipo Industrial Estate,
N. T., Hong Kong
Tel : (852) 2666 1888
Fax : (852) 2664 4353
Homepage: www.hkstc.org
E-mail: hkstd@hkstc.com