



香 港 標 準 及 檢 定 中 心
Hong Kong Standards and Testing Centre

Date : 2004-07-06

No. : HM150647

TEST REPORT

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Applicant:

Sinar Electronics Ltd.
Room 608, Shui Hing Centre,
13 Sheung Yuet Road, Kowloon Bay,
Kowloon, Hong Kong.

Description of Samples:

Model name: 2.4G PS Wireless Controller
Model no.: SE-8007
Brand name: Titan
FCC ID: RKB-8007-1

Date Samples Received:

2004-02-06

Date Tested:

2004-03-01 to 2004-04-02

Investigation Requested:

FCC Part 15 Subpart C

Conclusions:

The submitted product COMPLIED 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.

Remarks:

K C Lee, EMC
for Chief Executive

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For full text of "Conditions of Issuance of Test Report", please refer to overleaf or refer to the website of
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Appendix A

List of Measurement Equipment

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Duty Cycle Correction During 100 msec

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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

1.2 Applicant Details
Applicant

Sinar Electronics Limited.
Room 608, Shui Hing Centre,
13 Sheung Yuet Road, Kowloon Bay,
Kowloon, Hong Kong.

HKSTC Code Number for Applicant

SIE007

Manufacturer

Sinar Electronics Limited.
Room 608, Shui Hing Centre,
13 Sheung Yuet Road, Kowloon Bay,
Kowloon, Hong Kong.

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**1.3 Equipment Under Test [EUT]
Description of Sample**

Model Name: 2.4G PS Wireless Controller
Manufacturer: Sinar Electronics Limited.
Brand Name: Titan
Model Number: SE-8007
Input Voltage: The product draws power from the signal port of the console.

1.3.1 Description of EUT Operation

The Equipment Under Test (EUT) is a Sinar Electronics Limited, 2.4GHz PS Wireless Controller. Modulation by IC, and type is pulse modulation.

1.4 Date of Order

2004-02-06

1.5 Submitted Sample(s):

1 Sample per model

1.6 Test Duration

2004-03-01 to 2004-04-02

1.7 Country of Origin

China

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1.8 Additional Information of EUT

User Manual
Part List
Circuit Diagram
Printed Circuit Board [PCB] Layout
Block diagram
FCC ID Label

Submitted

Not Available

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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 C63.4:2003 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 & Spurious Emissions	FCC 47CFR 15.249	ANSI C63.4:2003	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radiated Emissions, 30MHz to 1GHz	FCC 47CFR 15.209	ANSI C63.4:2003	Class B	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Conducted Emissions on AC, 0.15MHz to 30MHz	FCC 47CFR 15.207	ANSI C63.4:2003	Class B	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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 15.249
Test Method:	ANSI C63.4:2003
Test Date:	2004-04-02
Mode of Operation:	Base unit connected to PS2 (Tx 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, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. 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 filled 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 15.249]:

Frequency Range of Fundamental [MHz]	Field Strength of Fundamental Emission [Average] [$\mu\text{V/m}$]	Field Strength of Harmonics Emission [Average] [$\mu\text{V/m}$]
2400-2483.5	50,000	500,000

Results: Lower Frequency – Channel 1

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m dB $\mu\text{V/m}$	Correction Factor dB $\mu\text{V/m}$	Field Strength dB $\mu\text{V/m}$	Field Strength $\mu\text{V/m}$	Limit @3m $\mu\text{V/m}$	E-Field Polarity
2402.00	58.2	34.3	92.5	42,169.7	50,000	Horizontal
4804.00	27.1	39.8	66.9	2,213.1	500,000	Horizontal
7206.00	< 1.0	10.8	< 11.8	< 3.9	500,000	Horizontal
9608.00	< 1.0	9.8	< 10.8	< 3.5	500,000	Horizontal
12010.00	< 1.0	11.5	< 12.5	< 4.2	500,000	Horizontal
14412.00	< 1.0	15.9	< 16.9	< 7.0	500,000	Horizontal
16814.00	< 1.0	17.4	< 18.4	< 8.3	500,000	Horizontal
19216.00	< 1.0	17.2	< 18.2	< 8.1	500,000	Horizontal
21618.00	< 1.0	18.8	< 19.8	< 9.8	500,000	Horizontal
24020.00	< 1.0	19.7	< 20.7	< 10.8	500,000	Horizontal

Remarks:

Calculated measurement uncertainty : 30MHz to 1GHz $\pm 4.1\text{dB}$
1GHz to 18GHz $\pm 4.4\text{dB}$

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Limits for Field Strength of Fundamental Emissions [FCC 47CFR 15.249]:

Frequency Range of Fundamental [MHz]	Field Strength of Fundamental Emission [Average] [$\mu\text{V/m}$]	Field Strength of Harmonics Emission [Average] [$\mu\text{V/m}$]
2400-2483.5	50,000	500,000

Results: Lower Frequency – Channel 1

Field Strength of Fundamental Emissions Average						
Frequency MHz	Measured Level @3m dB $\mu\text{V/m}$	Correction Factor dB $\mu\text{V/m}$	Field Strength dB $\mu\text{V/m}$	Field Strength $\mu\text{V/m}$	Limit @3m $\mu\text{V/m}$	E-Field Polarity
2402.00	30.5	34.3	64.8	1,737.8	50,000	Horizontal
4804.00	-0.6	39.8	39.2	91.2	500,000	Horizontal
7206.00	< 1.0	10.8	< 11.8	< 3.9	500,000	Horizontal
9608.00	< 1.0	9.8	< 10.8	< 3.5	500,000	Horizontal
12010.00	< 1.0	11.5	< 12.5	< 4.2	500,000	Horizontal
14412.00	< 1.0	15.9	< 16.9	< 7.0	500,000	Horizontal
16814.00	< 1.0	17.4	< 18.4	< 8.3	500,000	Horizontal
19216.00	< 1.0	17.2	< 18.2	< 8.1	500,000	Horizontal
21618.00	< 1.0	18.8	< 19.8	< 9.8	500,000	Horizontal
24020.00	< 1.0	19.7	< 20.7	< 10.8	500,000	Horizontal

Remarks:

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz $\pm 4.1\text{dB}$
1GHz to 18GHz $\pm 4.4\text{dB}$

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Limits for Field Strength of Fundamental Emissions [FCC 47CFR 15.249]:

Frequency Range of Fundamental [MHz]	Field Strength of Fundamental Emission [Average] [$\mu\text{V/m}$]	Field Strength of Harmonics Emission [Average] [$\mu\text{V/m}$]
2400-2483.5	50,000	500,000

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: Highest Frequency

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m dB $\mu\text{V/m}$	Correction Factor dB $\mu\text{V/m}$	Field Strength dB $\mu\text{V/m}$	Field Strength $\mu\text{V/m}$	Limit @3m $\mu\text{V/m}$	E-Field Polarity
2402.00	56.5	34.4	90.9	35,075.2	50,000	Horizontal
4804.00	25.4	40.1	65.5	1,883.6	500,000	Horizontal
7206.00	< 1.0	10.8	< 11.8	< 3.9	500,000	Horizontal
9608.00	< 1.0	9.8	< 10.8	< 3.5	500,000	Horizontal
12010.00	< 1.0	11.5	< 12.5	< 4.2	500,000	Horizontal
14412.00	< 1.0	15.9	< 16.9	< 7.0	500,000	Horizontal
16814.00	< 1.0	17.4	< 18.4	< 8.3	500,000	Horizontal
19216.00	< 1.0	17.2	< 18.2	< 8.1	500,000	Horizontal
21618.00	< 1.0	18.8	< 19.8	< 9.8	500,000	Horizontal
24020.00	< 1.0	19.7	< 20.7	< 10.8	500,000	Horizontal

Remarks:

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz $\pm 4.1\text{dB}$
1GHz to 18GHz $\pm 4.4\text{dB}$

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Limits for Field Strength of Fundamental Emissions [FCC 47CFR 15.249]:

Frequency Range of Fundamental [MHz]	Field Strength of Fundamental Emission [Average] [$\mu\text{V/m}$]	Field Strength of Harmonics Emission [Average] [$\mu\text{V/m}$]
2400-2483.5	250,000	25,000

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: Highest Frequency

Field Strength of Fundamental Emissions Average						
Frequency MHz	Measured Level @3m dB $\mu\text{V/m}$	Correction Factor dB $\mu\text{V/m}$	Field Strength dB $\mu\text{V/m}$	Field Strength $\mu\text{V/m}$	Limit @3m $\mu\text{V/m}$	E-Field Polarity
2402.00	28.8	34.4	63.2	1,445.4	50,000	Horizontal
4804.00	-2.3	40.1	37.8	77.6	500,000	Horizontal
7206.00	< 1.0	10.8	< 11.8	< 3.9	500,000	Horizontal
9608.00	< 1.0	9.8	< 10.8	< 3.5	500,000	Horizontal
12010.00	< 1.0	11.5	< 12.5	< 4.2	500,000	Horizontal
14412.00	< 1.0	15.9	< 16.9	< 7.0	500,000	Horizontal
16814.00	< 1.0	17.4	< 18.4	< 8.3	500,000	Horizontal
19216.00	< 1.0	17.2	< 18.2	< 8.1	500,000	Horizontal
21618.00	< 1.0	18.8	< 19.8	< 9.8	500,000	Horizontal
24020.00	< 1.0	19.7	< 20.7	< 10.8	500,000	Horizontal

Remarks:

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz $\pm 4.1\text{dB}$
1GHz to 18GHz $\pm 4.4\text{dB}$

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3.1.2 Conducted Emissions (0.15MHz to 30MHz)

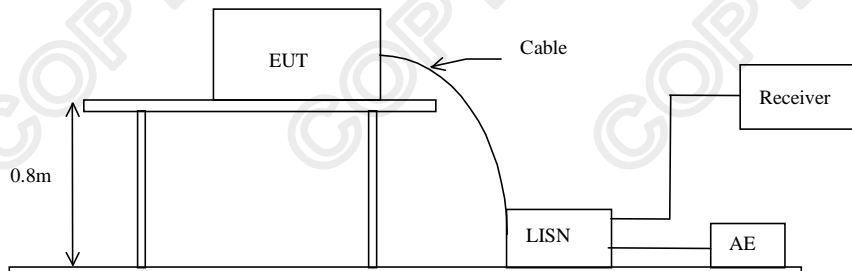
Test Requirement:
Test Method:
Test Date:
Mode of Operation:

FCC 47CFR 15.207
ANSI C63.4:2003
2004-05-03
On Mode

Test Method:

The test was performed in accordance with ANSI C63.4:2003, 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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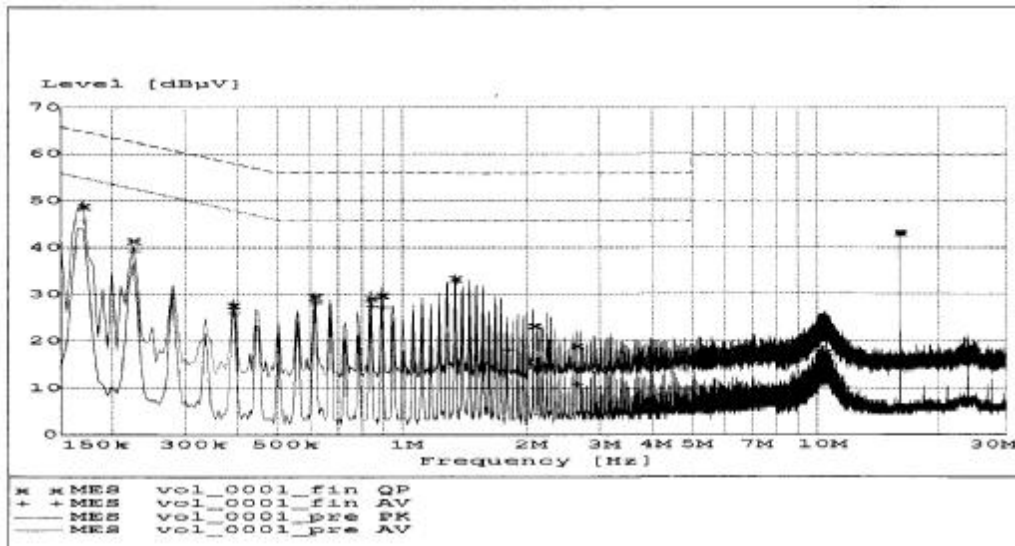
Limits for Conducted Emissions (FCC 47 CFR 15.107):

Frequency Range [MHz]	Quasi-Peak Limits [dB μ V]	Average [dB μ V]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	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: Pass



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Results: Pass

Conductor	Frequency	Quasi-Peak		Average	
Live or Neutral	MHz	Level dB μ V	Limit dB μ V	Level dB μ V	Limit dB μ V
Live	0.170000	48.80	65.00	45.70	55.00
Live	0.390000	27.70	58.00	26.00	48.00
Live	0.615000	29.60	56.00	28.20	46.00
Live	0.840000	29.20	56.00	27.60	46.00
Live	0.895000	29.90	56.00	27.20	46.00
Live	1.345000	33.50	56.00	32.80	46.00
Live	2.630000	19.10	56.00	10.90	46.00
Live	3.690000	-*-	-*-	5.00	46.00
Live	3.975000	17.10	56.00	-*-	-*-
Live	10.200000	-*-	-*-	16.10	50.00
Live	10.355000	20.40	60.00	-*-	-*-
Live	10.460000	17.70	60.00	-*-	-*-
Live	10.590000	-*-	-*-	15.90	50.00
Live	16.000000	43.20	60.00	43.10	50.00
Live	23.990000	-*-	-*-	15.30	50.00
Neutral	0.225000	41.50	63.00	39.20	53.00
Neutral	1.790000	-*-	-*-	18.20	46.00
Neutral	2.075000	23.40	56.00	-*-	-*-
Neutral	6.265000	-*-	-*-	5.60	50.00
Neutral	7.055000	16.50	60.00	-*-	-*-
Neutral	23.990000	18.10	60.00	-*-	-*-

Remarks:

Calculated measurement uncertainty: ± 2.8 dB

-*- Emission greater than 30dB below limit line

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3.2 20dB Bandwidth of Fundamental Emission

Test Requirement:	FCC 47 CFR 15.215(c)
Test Method:	ANSI C63.4:2003 (Section 13.1.7)
Test Date:	2004-04-02
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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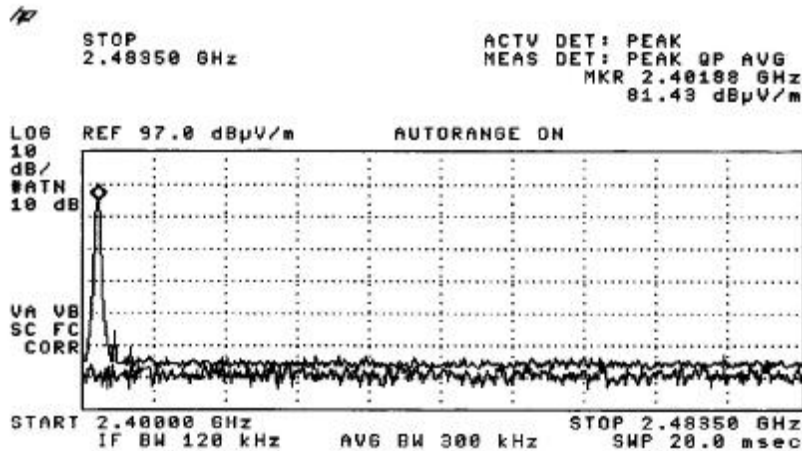
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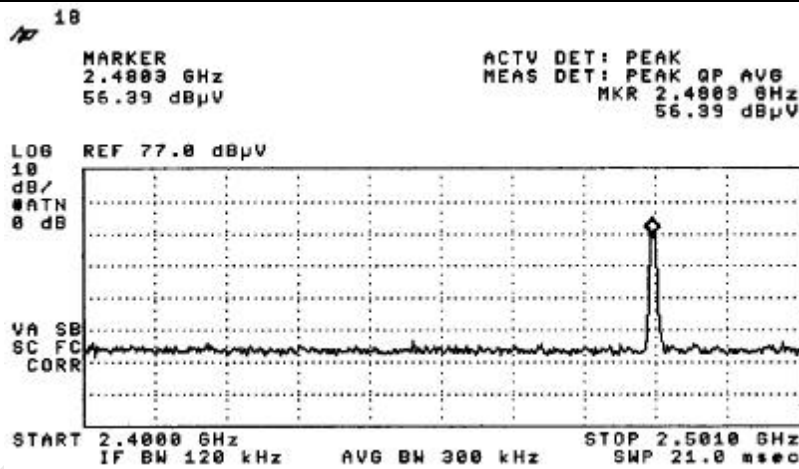
Channel 1

Lower Frequency



Channel 15

Highest Frequency



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Appendix A

List of Measurement Equipment

Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL
EM007	SPECTRUM ANALYZER	HEWLETT PACKARD	HP85660B	3144A21192	15/06/04
EM008	SPECTRUM ANALYZER DISPLAY	HEWLETT PACKARD	HP85662A	3144A20514	15/06/04
EM009	QUASI PEAK ADAPTOR	HEWLETT PACKARD	HP85650A	3303A01702	15/06/04
EM010	RF PRESELECTOR	HEWLETT PACKARD	HP85685A	3221A01410	15/06/04
EM011	ATTENUATOR/SWITCH	HEWLETT PACKARD	HP11713A	2508A10595	15/06/04
EM012	PRE-AMPLIFIER	HEWLETT PACKARD	HP8449B	3008A00262	15/06/04
EM013	CONTROLLER (COMPUTER), COLOR MONITOR, KEYBOARD & MOUSE FLOPPY DRIVE	HEWLETT PACKARD HEWLETT PACKARD HEWLETT PACKARD	HP9000 HP A1097C HP9133L	6226A60314 3151J39517 2623A02468	15/06/04
EM020	HORN ANTENNA	EMCO	3115	4032	15/06/04
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	08/11/02
EM131	PORTABLE SPECTRUM ANALYSER	HEWLETT PACKARD	8595EM	3710A00155	13/01/04
EM145	EMI TEST RECEIVER	R & S	ESCS 30	830245/021	02/08/03
EM194	BICONILOG ANTENNA	EMCO	3142B	1795	21/10/03
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	17/10/03
EM119	LISN	R & S	ESH3-Z5	0831.5518.52	01/10/02
EM127	ISOLATION TRANSFORMER 220 TO 300	WING SUN	N/A	N/A	CM
EM142	PULSES LIMITER	R & S	ESH3Z2	357.8810.52	07/07/03
EM181	EMI TEST RECEIVER	R & S	ESIB7	100072	06/01/04
EM154	SHIELDING ROOM	SIEMENA MATSUSHITA COMPONENTS	N/A	803-740-057- 99A	17/10/03
EM197	LISN	EMCO	4825/2	1193	08/04/03

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

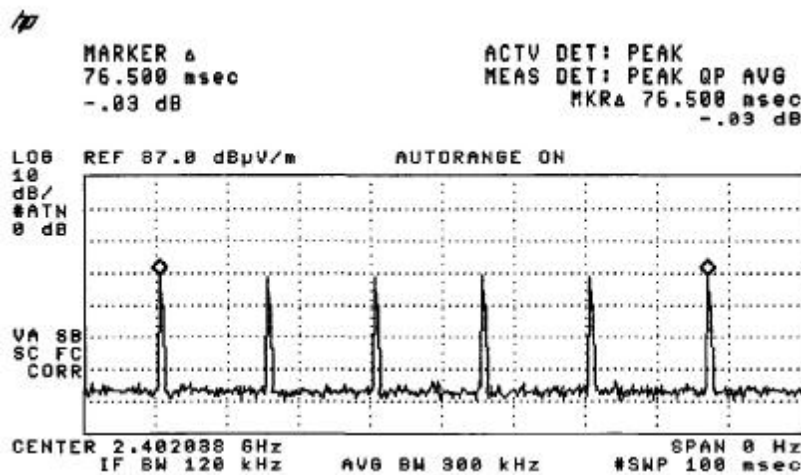
Each function key sends a different series of characters, but each packet period (76.5msec) never exceeds a series of 6 long (525µsec) or short (525µsec) pulses. Assuming any combination of short and long pulses may be obtained due to encoding the worst case transmit duty cycle would be considered $6 \times 525 \mu\text{sec}$ per 76.5msec = 4.1% duty cycle. Figure A through C show the characteristics of the pulse train for one of these functions.

Remarks:

Duty Cycle Correction = $20\text{Log}(0.041) = -27.7\text{dB}$

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

Figure A [Pulse Train]



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Figure B [Long Pulse]

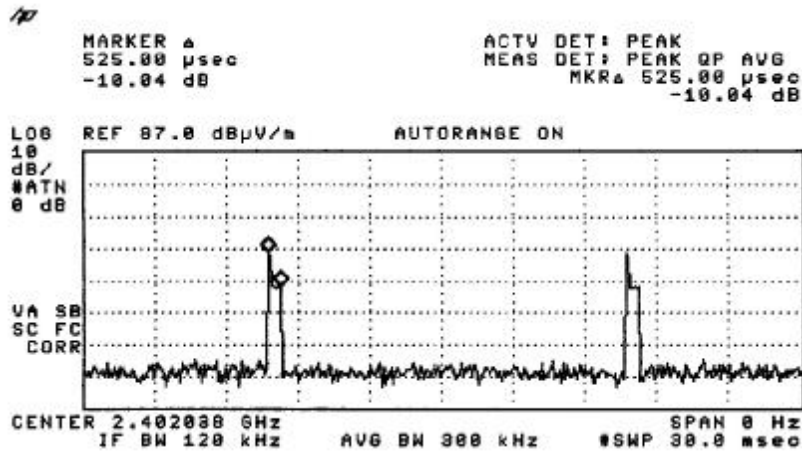
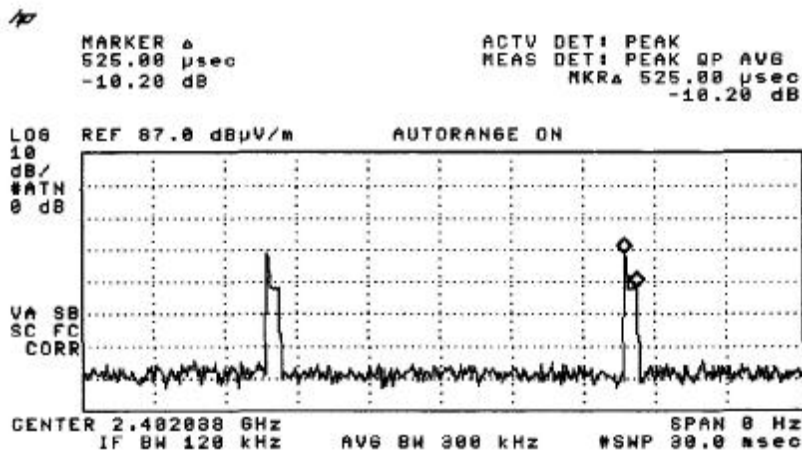


Figure C [Short Pulse]



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Appendix C

Photographs of EUT

Front View of the product



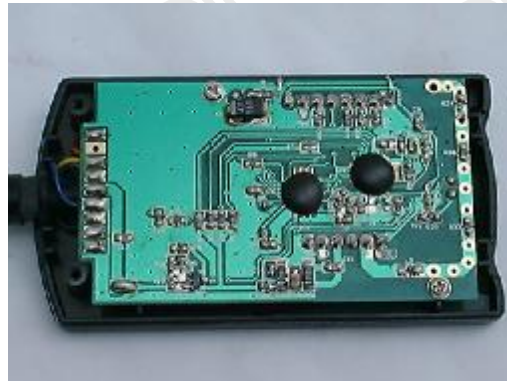
Rear View of the product



Inner Circuit Top View



Inner Circuit Bottom View



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Photographs of EUT

Measurement of Radiated Emission Test Set Up



Measurement of Conducted Emission Test Set Up



***** End of Test Report *****

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