



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

Date : 2005-07-12
No. : HM154655

TEST REPORT

Page 1 of 21

Applicant:

Ewig Industries Macao Commercial Offshore Ltd.
Rua de Pequim Macau Finance Centre 10E,
Macao

Description of Samples:

Model name: Wireless Food Thermometer
Model no.: #693500
Brand name: Maverick
FCC ID: N9Z693500

Date Samples Received:

2005-07-04

Date Tested:

2005-07-12

Investigation Requested:

FCC Part 15 Subpart C

Conclusions:

The submitted product was deemed to have 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, EMD
for Chief Executive

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

Date : 2005-07-12

No. : HM154655

TEST REPORT

Page 2 of 21

CONTENT:

| | |
|---|------------------|
| Cover | Page 1 of 21 |
| Content | Page 2-3 of 21 |
| <u>1.0 General Details</u> | |
| 1.1 Test Laboratory | Page 4 of 21 |
| 1.2 Applicant Details Applicant HKSTC Code Number for Applicant Manufacturer | Page 4 of 21 |
| 1.3 Equipment Under Test [EUT] Description of EUT operation | Page 5 of 21 |
| 1.4 Date of Order | Page 5 of 21 |
| 1.5 Submitted Samples | Page 5 of 21 |
| 1.6 Test Duration | Page 5 of 21 |
| 1.7 Country of Origin | Page 5 of 21 |
| 1.8 Additional Information of EUT | Page 6 of 21 |
| <u>2.0 Technical Details</u> | |
| 2.1 Investigations Requested | Page 7 of 21 |
| 2.2 Test Standards and Results Summary | Page 7 of 21 |
| <u>3.0 Test Results</u> | |
| 3.1 Emission | Page 8-12 of 21 |
| 3.2 Bandwidth Measurement | Page 13-14 of 21 |

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

Date : 2005-07-12

No. : HM154655

TEST REPORT

Page 3 of 21

Appendix A

List of Measurement Equipment

Page 15 of 21

Appendix B

Duty Cycle Correction During 100 msec

Page 16-17 of 21

Appendix C

Periodic Operation

Page 18-19 of 21

Appendix D

Photographs

Page 20-21 of 21

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

Date : 2005-07-12

TEST REPORT

Page 4 of 21

No. : HM154655

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

Ewig Industries Macao Commercial Offshore Ltd.
Rua de Pequim Macau Finance Centre 10E, Macau

HKSTC Code Number for Applicant

EWI001

Manufacturer

Q & S MANUFACTURING CO., LTD.
Yin Shan District, Fu Gang Village,
Xiang Mang West Road, Qing Xi Town, Dong Guan City,
China

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Hong Kong Standards and Testing Centre

Date : 2005-07-12

TEST REPORT

Page 5 of 21

No. : HM154655

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

| | |
|----------------|--------------------------------|
| Product: | Wireless Food Thermometer |
| Manufacturer: | Q & S Manufacturing Co., Ltd. |
| Brand Name: | Maverick |
| Model Number: | #693500 |
| Input Voltage: | 3Vd.c ("AAA" size battery x 2) |

1.3.1 Description of EUT Operation

The Equipment Under Test (EUT) is a Ewig Industries Co., Ltd., Wireless Food Thermometer. The transmitter is an automatic transmitter. The EUT is to transmit RF signal while temperature measurement is changed. The EUT is for data transmission, Modulation by Data Code. Type is pulse modulation.

1.4 Date of Order

2005-07-04

1.5 Submitted Sample(s):

2 Samples per model

1.6 Test Duration

2005-07-12

1.7 Country of Origin

China

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

Date : 2005-07-12

TEST REPORT

Page 6 of 21

No. : HM154655

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

Date : 2005-07-12

TEST REPORT

Page 7 of 21

No. : HM154655

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 15.231e | 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 type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Note: N/A - Not Applicable

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

Date : 2005-07-12

TEST REPORT

Page 8 of 21

No. : HM154655

3.0 Test Results

3.1 Emission

3.1.1 Radiated Emissions

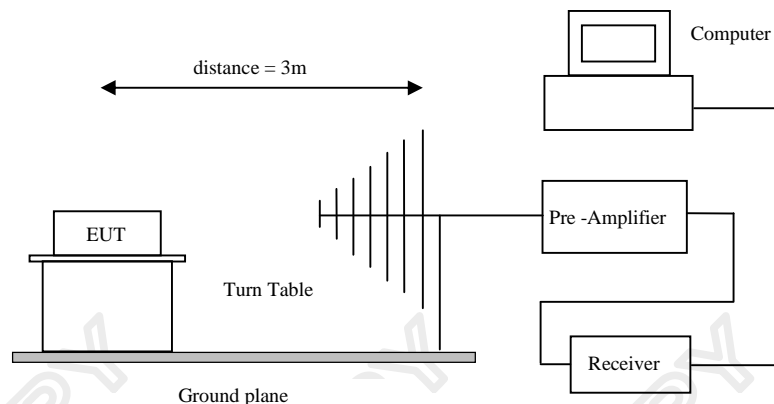
| | |
|--------------------|-------------------|
| Test Requirement: | FCC 47CFR 15.231e |
| Test Method: | ANSI C63.4:2003 |
| Test Date: | 2005-07-12 |
| Mode of Operation: | Tx mode |

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, 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 polarization. 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: 607756.

Test Setup:



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Hong Kong Standards and Testing Centre

Date : 2005-07-12

TEST REPORT

Page 9 of 21

No. : HM154655

Limits for Field Strength of Fundamental Emissions [FCC 47CFR 15.231e]:

| Frequency Range of Fundamental [MHz] | Field Strength of Fundamental Emission [Average] [μV/m] | Field Strength of Spurious Emission [Average] [μV/m] |
|---|---|--|
| 40.66-40.70 | 1,000 | 100 |
| 70-130 | 500 | 50 |
| 130-174 | 500 to 1,500 * | 50 to 150 * |
| 174-260 | 1,500 | 150 |
| 260-470 | 1,500 to 5,000 * | 150 to 500 * |
| Above 470 | 5,000 | 500 |

Where F is the frequency in MHz, the formula for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, mV/m at meters=22.72727(F)-2454.545; for the band 260-470 MHz, mV/m at 3 meters =16.6667(F)-2833.3333. The maximum permissible unwanted emission level is 20dB below the maximum fundamental level.

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 |
| 433.38 | 63.6 | 18.7 | 82.3 | 13031.7 | 43,896.8 | Horizontal |

| Field Strength of Spurious 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 |
| 866.76 | < 1.0 | 25.9 | < 26.9 | < 22.1 | 4389.7 | Vertical |
| + 1300.14 | < 1.0 | 30.2 | < 31.2 | < 36.3 | 5,000.0 | Vertical |
| 1733.52 | < 1.0 | 32.2 | < 33.2 | < 45.7 | 4,389.7 | Vertical |
| 2166.90 | < 1.0 | 15.9 | < 16.9 | < 7.0 | 4,389.7 | Vertical |
| 2600.28 | < 1.0 | 17.4 | < 18.4 | < 8.3 | 4,389.7 | Vertical |
| 3033.66 | < 1.0 | 17.2 | < 18.2 | < 8.1 | 4,389.7 | Vertical |
| 3467.04 | < 1.0 | 18.8 | < 19.8 | < 9.8 | 4,389.7 | Vertical |
| + 3900.42 | < 1.0 | 19.7 | < 20.7 | < 10.8 | 5,000.0 | Vertical |
| + 4333.80 | < 1.0 | 20.6 | < 21.6 | < 12.0 | 5,000.0 | Vertical |

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Hong Kong Standards and Testing Centre

Date : 2005-07-12

TEST REPORT

Page 10 of 21

No. : HM154655

Results:

| Field Strength of Fundamental Emissions | | | | | | |
|---|---------------------------------------|--------------------------------------|-----------------------------------|--------------------------------|------------------------------|---------------------|
| Average Value | | | | | | |
| Frequency MHz | Measured Level @3m dB μ V/m | Correction Factor dB μ V/m | Field Strength dB μ V/m | Field Strength μ V/m | Limit ** @3m μ V/m | Antenna Polarity |
| * 433.38 | 49.9 | 18.7 | 68.6 | 2691.5 | 4,389.7 | Horizontal |

| Field Strength of Spurious Emissions | | | | | | |
|--------------------------------------|---------------------------------------|--------------------------------------|-----------------------------------|--------------------------------|------------------------|---------------------|
| Average Value | | | | | | |
| Frequency MHz | Measured Level @3m dB μ V/m | Correction Factor dB μ V/m | Field Strength dB μ V/m | Field Strength μ V/m | Limit @3m μ V/m | Antenna Polarity |
| 866.76 | < 1.0 | 25.9 | < 26.9 | < 22.1 | 439.0 | Vertical |
| + 1300.14 | < 1.0 | 30.2 | < 31.2 | < 36.3 | 500.0 | Vertical |
| 1733.52 | < 1.0 | 32.2 | < 33.2 | < 45.7 | 439.0 | Vertical |
| 2166.90 | < 1.0 | 15.9 | < 16.9 | < 7.0 | 439.0 | Vertical |
| 2600.28 | < 1.0 | 17.4 | < 18.4 | < 8.3 | 439.0 | Vertical |
| 3033.66 | < 1.0 | 17.2 | < 18.2 | < 8.1 | 439.0 | Vertical |
| 3467.04 | < 1.0 | 18.8 | < 19.8 | < 9.8 | 439.0 | Vertical |
| + 3900.42 | < 1.0 | 19.7 | < 20.7 | < 10.8 | 500.0 | Vertical |
| + 4333.80 | < 1.0 | 20.6 | < 21.6 | < 12.0 | 500.0 | Vertical |

Remarks:

*: Adjusted by Duty Cycle = -13.7dB

**: According to FCC C47CFR 15.231e,
FCC Limit for Average Measurement = $16.667(433.38\text{MHz}) - 2833.3333 = 4,389.681146\mu\text{V/m}$

+: Denotes restricted band of operation.
Measurements were made using a peak detector. For emissions falling within the restricted bands of FCC Rules Part 15 Section 15.205, the limits of FCC Rules Part 15 Section 15.209 were applied.

Correction Factor included Antenna Factor and Cable Attenuation.

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

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

Date : 2005-07-12

TEST REPORT

Page 11 of 21

No. : HM154655

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

| Frequency Range [MHz] | Quasi-Peak Limits [μV/m] |
|--------------------------|-----------------------------|
| 30-88 | 100 |
| 88-216 | 150 |
| 216-960 | 200 |
| Above 960 | 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 |
| NO EMISSION DETECTED WITHIN 20dB OF THE FCC LIMITS | | | | | | |

Remarks:

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty = 30MHz to 1GHz ±4.1dB

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

Date : 2005-07-12

TEST REPORT

Page 12 of 21

No. : HM154655

3.1.1 Conducted Emissions (0.15MHz to 30MHz)

| | |
|--------------------|------------------|
| Test Requirement: | FCC 47CFR 15.107 |
| Test Method: | ANSI C63.4:2003 |
| Test Date: | N/A |
| Mode of Operation: | N/A |

Results: N/A

The EUT is operated by a single source of internal battery power [located in the battery compartment], therefore power line conducted emission was deemed unnecessary.

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Hong Kong Standards and Testing Centre

Date : 2005-07-12

TEST REPORT

Page 13 of 21

No. : HM154655

3.2 20dB Bandwidth of Fundamental Emission

| | |
|--------------------|----------------------------------|
| Test Requirement: | FCC 47 CFR 15.231e |
| Test Method: | ANSI C63.4:2003 (Section 13.1.7) |
| Test Date: | 2005-07-12 |
| 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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Hong Kong Standards and Testing Centre

Date : 2005-07-12

TEST REPORT

Page 14 of 21

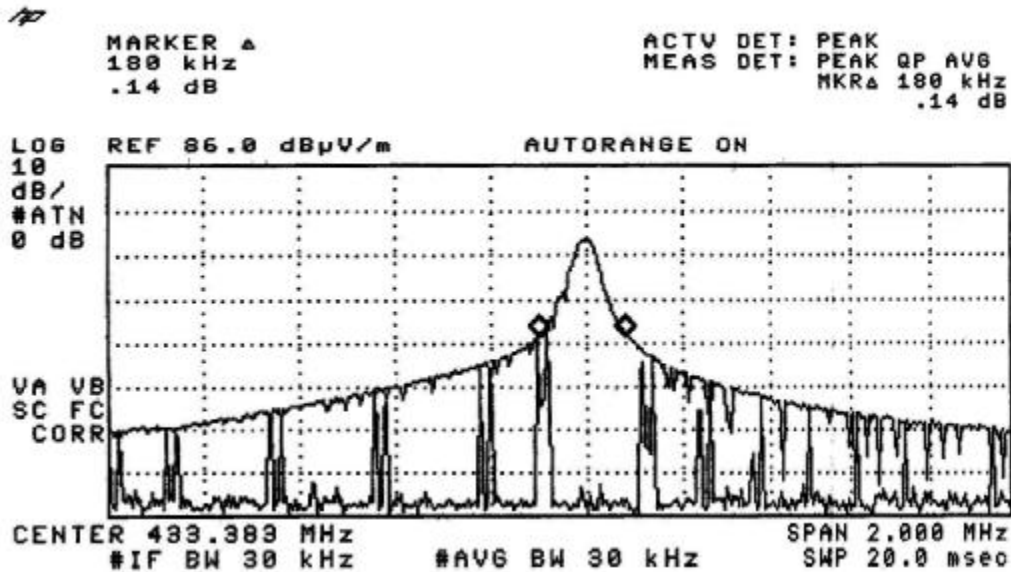
No. : HM154655

Limits for 20dB Bandwidth of Fundamental Emission:

| Frequency Range [MHz] | 20dB Bandwidth [kHz] | FCC Limits * [KHz] |
|--------------------------|-------------------------|-----------------------|
| 433.38 | 180 | 1083 |

*: FCC Limit for Bandwidth measurement = (0.25%)(Center Frequency)
=(0.0025)(433.38)
=1083KHz

20dB Bandwidth of Fundamental Emission



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Hong Kong Standards and Testing Centre

Date : 2005-07-12

TEST REPORT

Page 15 of 21

No. : HM154655

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 | 30/07/03 |
| EM022 | LOOP ANTENNA | EMCO | 6502 | 1189-2424 | 30/07/03 |
| EM072 | SIGNAL GENERATOR | HEWLETT PACKARD | 8640B | 1948A11892 | N/A |
| EM083 | HKSTC OPEN AREA TEST SITE | HKSTC | N/A | N/A | 08/02/03 |
| EM131 | PORTABLE SPECTRUM ANALYSER | HEWLETT PACKARD | 8595EM | 3710A00155 | 13/01/04 |
| EM145 | EMI TEST RECEIVER | R & S | ESCS 30 | 830245/021 | 04/10/04 |
| EM219 | BICONILOG ANTENNA | EMCO | 3142C | 00029071 | 28/10/03 |
| EM195 | ANTENNA POSITIONING MAST | EMCO | 2075 | 2368 | N/A |
| EM196 | MULTI-DEVICE CONTROLLER | EMCO | 2090 | 1662 | N/A |

Line Conducted

| 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 | 14/10/04 |
| EM127 | ISOLATION TRANSFORMER 220 TO 300 | WING SUN | N/A | N/A | CM |
| EM142 | PULSES LIMITER | R & S | ESH3Z2 | 357.8810.52 | 04/08/04 |
| 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 | 05/06/04 |

Remarks:-

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

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Date : 2005-07-12

TEST REPORT

Page 16 of 21

No. : HM154655

Appendix B

Duty Cycle Correction During 100msec

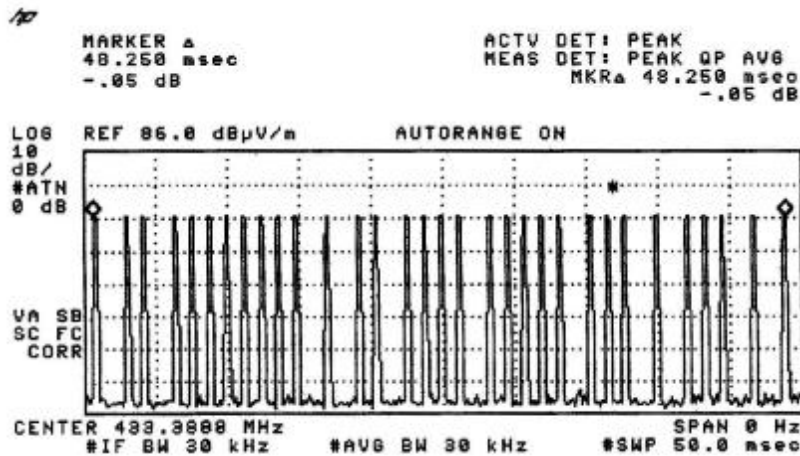
Each function key sends a different series of characters, but each packet period (48.25msec) never exceeds a series of 31 long (322μsec) or short (258μsec) pulses. Assuming any combination of short and long pulses may be obtained due to encoding the worse case transmit duty cycle would be considered $31 \times 322 \mu\text{sec}$ per 48.25msec = 20.6% duty cycle. Figure A through C show the characteristics of the pulse train for one of these functions.

Remarks:

Duty Cycle Correction = $20\text{Log}(0.206) = -13.7\text{dB}$

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

Figure A [Pulse Train]



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Hong Kong Standards and Testing Centre

Date : 2005-07-12

TEST REPORT

Page 17 of 21

No. : HM154655

Figure B [Long Pulse]

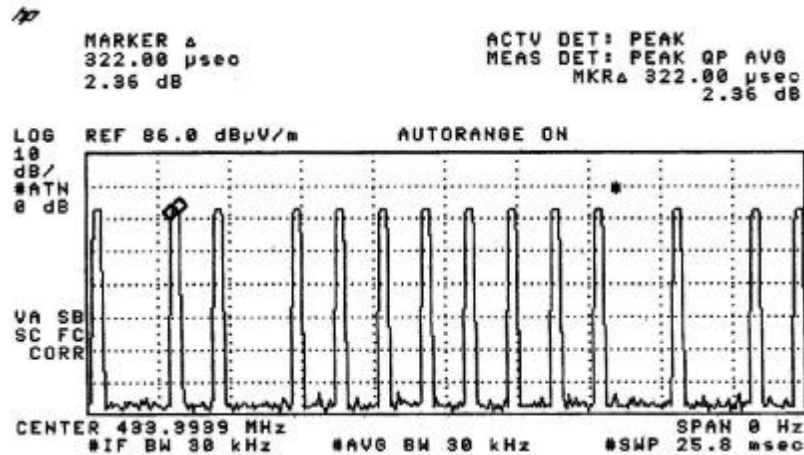
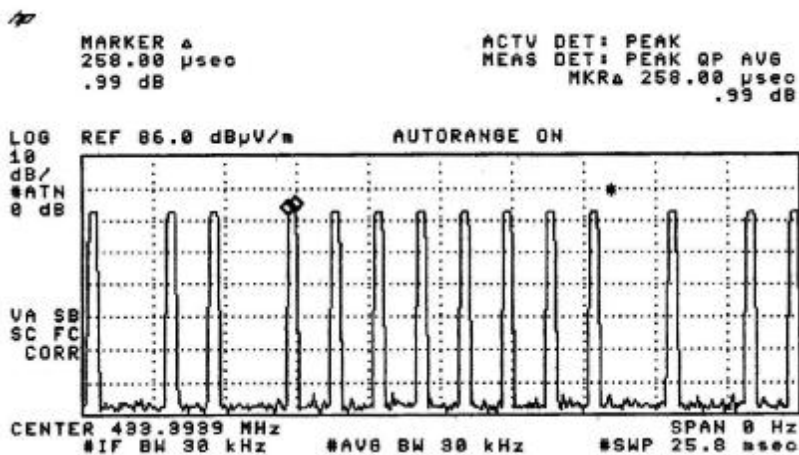


Figure C [Short Pulse]



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Hong Kong Standards and Testing Centre

Date : 2005-07-12

TEST REPORT

Page 18 of 21

No. : HM154655

Appendix C

Periodic Operation [FCC 47CFR 15.231e]

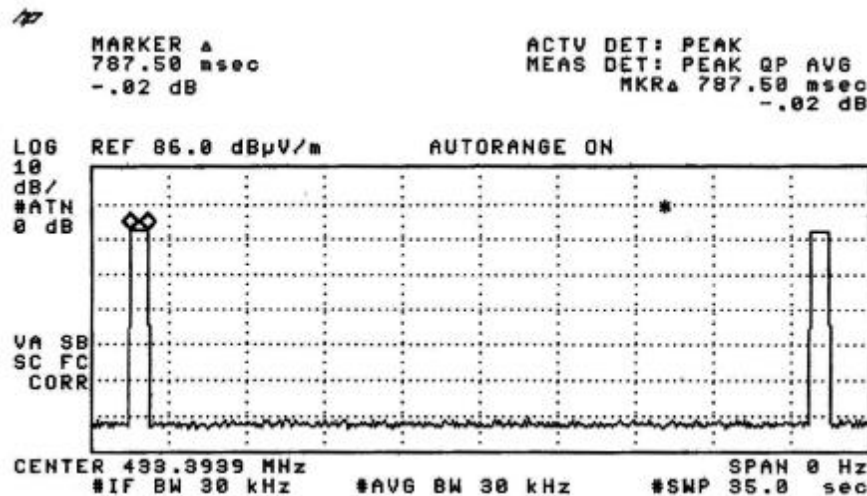
According to FCC 47CFR15.231e. The EUT shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

Results:

Since the EUT of each transmission is 787.5msec, so the silent period must not less than 23.6 seconds. (787.5msec x 30)

The following figures [Figure D to Figure E] showed the duration of each transmission and silent period.

Figure D [Each transmission]



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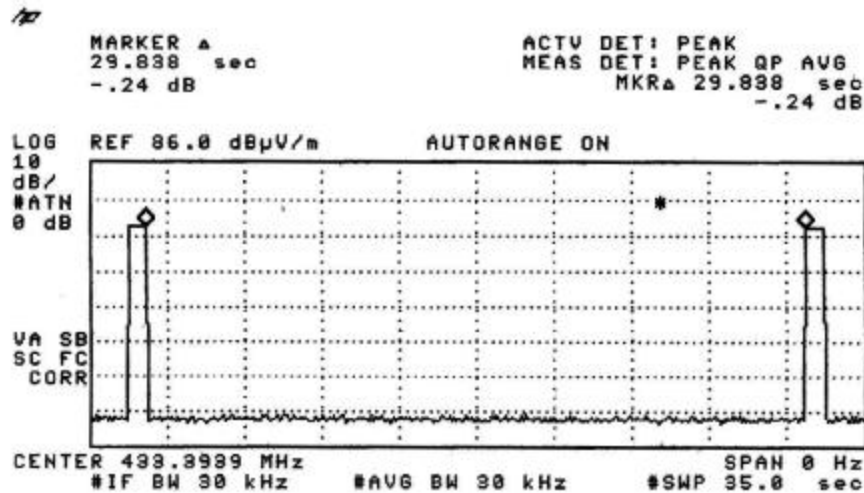
Date : 2005-07-12

TEST REPORT

Page 19 of 21

No. : HM154655

Periodic operation [FCC 47CFR15.231e]
Figure E [Silent Period]



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Hong Kong Standards and Testing Centre

Date : 2005-07-12

TEST REPORT

Page 20 of 21

No. : HM154655

Appendix D

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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Date : 2005-07-12

TEST REPORT

Page 21 of 21

No. : HM154655

Photographs of EUT,

Measurement of Radiated Emission Test Set Up



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

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