FCC PART 15 SUBPART C CERTIFICATION REPORT

FOR LOW POWER TRANSMITTER

TEST REPORT No.: HM104286

Equipment Under Test [EUT]:	Wireless Thermometer
Model Number:	690801
Applicant:	Ewig Industries Company Limited.
FCC ID :	N9Z690801A

CONTENT:

CONCLUSION

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.

Law Man Kit	Steven Tsang	Patrick Wong
Testing Engineer	Verify by	Patrick Wong for Managing Director

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 Company Limited.
13/F., Houtex Industrial Bldg.,
16 Hung To Road, Kwun Tong,
Kowloon, Hong Kong.

Telephone: 852 29516874
Fax: 852 23435799

HKSTC Code Number for Applicant **EWI001**

Manufacturer

Ewig Industries Company Limited.
13/F., Houtex Industrial Bldg.,
16 Hung To Road, Kwun Tong,
Kowloon, Hong Kong.

Telephone: 852 29516874
Fax: 852 23435799

1.3 Equipment Under Test [EUT]

Description of Sample

Product:	Wireless Thermometer
Manufacturer:	Ewig Industries Company Limited.
Brand Name:	N/A
Model Number:	690801
Input Voltage:	3Vd.c (“AAA” size battery x 2)

1.3.1 Description of EUT Operation

The Equipment Under Test (EUT) is an Ewig Industries Company Limited., 433.8MHz Wireless 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. Tape is pulses modulation.

1.4 Date of Order

2001-03-07

1.5 Submitted Sample(s):

1 Sample per model

1.6 Test Duration

2001-03-15

1.7 Country of Origin

China

1.8 Additional Information of EUT

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

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 C63.4:1992 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 C63.4:1992	N/A	☒	☐	☐
Radiated Emissions, 30MHz to 1GHz	FCC 47CFR 15.209	ANSI C63.4:1992	Class B	☒	☐	☐
Conducted Emissions on AC, 0.45MHz to 30MHz	FCC 47CFR 15.207	ANSI C63.4:1992	Class B	☐	☐	☒

Note: N/A - Not Applicable

3.0 Test Results

3.1 Emission

3.1.1 Radiated Emissions

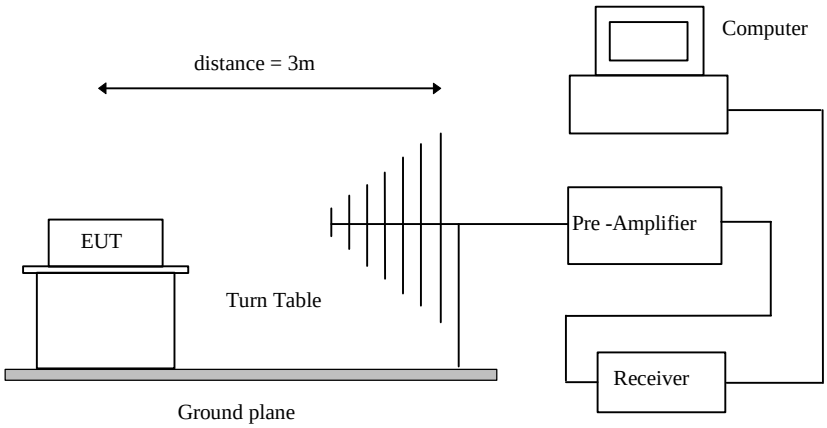
Test Requirement:	FCC 47CFR 15.231e
Test Method:	ANSI C63.4:1992
Test Date:	2001-03-15
Mode of Operation:	On mode

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. 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:



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

Frequency Range of Fundamental [MHz]	Field Strength of Fundamental Emissions [µV/m]	Field Strength of Spurious Emissions [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, ì V/m at meters=22.72727(F)-2454.545; for the band 260-470 MHz, ì V/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	Level @3m	Correction Factor	Field Strength	Field Strength	Limit ** @3m	Antenna Polarity
MHz	dBµV	dB/m	dBµV/m	µV/m	µV/m	
433.8	62.8	22.2	85.0	17782.8	43966.8	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:

*: 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

Results:

Field Strength of Fundamental Emissions Average Value *						
Frequency MHz	Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Field Strength µV/m	Limit ** @3m µV/m	Antenna Polarity
433.8	46.3	22.2	68.5	2260.7	4396.7	Vertical

Field Strength of Spurious Emissions Average Value *						
Frequency MHz	Level @3m dBµV	Correction Factor dB/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:

*: Adjusted by Duty Cycle = -17dB

**: According to FCC C47CFR 15.231e,
FCC Limit for Average Measurement = 16.6667(433.8MHz)-2833.3333=4396.68µV/m

Correction Factor included Antenna Factor and Cable Attenuation.

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

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
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	Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Field Strength µV/m	Limit @3m µV/m	Antenna Polarity
NO EMISSION DETECTED WITHIN 20dB OF THE FCC LIMITS						

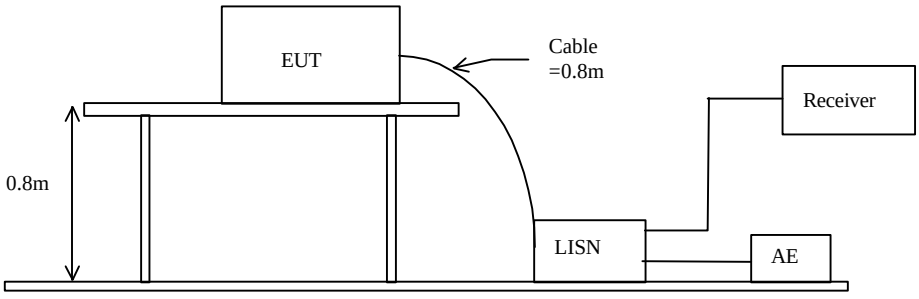
3.1.1 Conducted Emissions (0.45MHz to 30MHz)

Test Requirement:	FCC 47CFR 15.207
Test Method:	ANSI C63.4:1992
Test Date:	2001-03-15
Mode of Operation:	Not Applicable

Test Method:

The test was performed in accordance with ANSI C63.4:1992, 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:



Limit for Conducted Emissions (FCC 47 CFR 15.207):

Frequency Range [MHz]	Quasi-Peak Limits [µV/m]
0.45-30	250

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

Results:

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.

Remarks:

Calculated measurement uncertainty = ±2.3dB

3.2 20dB Bandwidth of Fundamental Emission

Test Requirement:	FCC 47 CFR 15.231
Test Method:	ANSI C63.4:1992 (Section 13.1.7)
Test Date:	2001-03-15
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.

Limits for 20 dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [KHz]	FCC Limits * [KHz]
433.8	350	1084

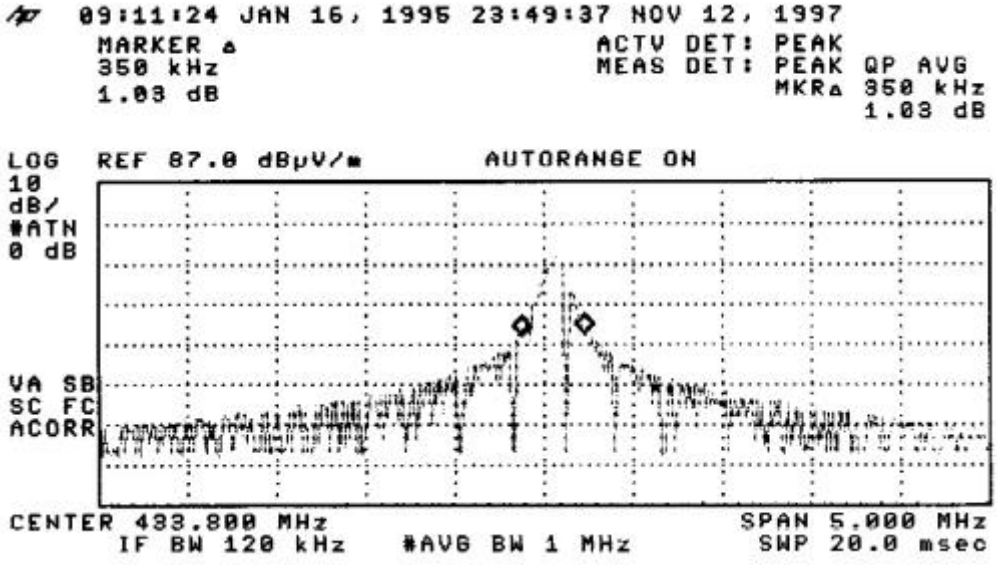
Remarks:

*: FCC Limit for Bandwidth measurement = (0.25%)(Center Frequency)
=(0.0025)(433.8)
=1084KHz

Results:

The following figure is the measured bandwidth of Fundamental Emission.

20dB Bandwidth of Fundamental Emission



Appendix A

Test Equipment Audit

Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL.
EM007	SPECTRUM ANALYZER	HEWLETT PACKARD	HP85660B	3144A21192	18/07/00
EM008	SPECTRUM ANALYZER DISPLAY	HEWLETT PACKARD	HP85662A	3144A20514	18/07/00
EM009	QUASI PEAK ADAPTOR	HEWLETT PACKARD	HP85650A	3303A01702	18/07/00
EM010	RF PRESELECTOR	HEWLETT PACKARD	HP85685A	3221A01410	18/07/00
EM011	ATTENNUATOR/SWITCH	HEWLETT PACKARD	HP11713A	2508A10595	18/07/00
EM012	PRE-AMPLIFIER	HEWLETT PACKARD	HP8449B	3008A00262	18/07/00
EM013	CONTROLLER (COMPUTER), COLOR MONITOR, KEYBOARD & MOUSE FLOPPY DRIVE	HEWLETT PACKARD HEWLETT PACKARD HEWLETT PACKARD	HP9000 HP A1097C HP9133L	6226A60314 3151J39517 2623A02468	CM
EM131	PORTABLE SPECTRUM ANALYSER	HEWLETT PACKARD	8595EM	3710A00155	10/07/00
EM017	ANTENNA	ARA INC.	LPB-2513/A	1069	17/02/00
EM020	HORN ANTENNA	EMCO	3115	4032	09/08/00
EM072	SIGNAL GENERATOR	HEWLETT PACKARD	8640B	1948A11892	30/03/98
EM083	HKSTC OPEN AREA TEST SITE	HKSTC	N/A	N/A	15/02/01
EM145	EMI TEST RECEIVER	R & S	ESCS 30	830245/021	31/05/00

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	10/09/00
EM002	LISN	EMCO	3825-2	9005-1657	27/07/99
EM119	LISN	R & S	ESH3-Z5	0831.5518.52	31/08/00
EM145	EMI TEST RECEIVER	R & S	ESCS 30	830245/021	31/05/00
EM120	EMI TEST RECEIVER	R&S	ESHS10	1004.0401.10	04/09/00
EM127	ISOLATION TRANSFORMER 220 TO 300	WING SUN	N/A	N/A	N/A
EM142	PLUSE LIMITER	R & S	ESH3Z2	357.8810.52	29/01/00

Remarks:

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

Appendix B

Duty Cycle Correction During 100msec

Each data sent a different series of characters, but each packet period (82msec) never exceed a series of 49 long (250µsec) and short (125µsec) pulses. Assumed any combination of short or long pulses may be obtained due to encoding the worse case transmit duty cycle would be considered 49x250µsec per 82 msec = 14.9% duty cycle.

Remarks:

Duty Cycle Correction = 20Log(0.149) =-16.5dB

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

Figure A [Pulse Train]

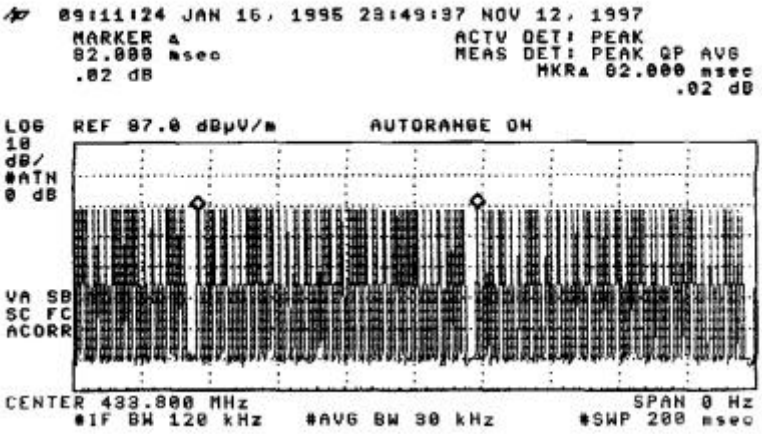


Figure B [Long Pulse]

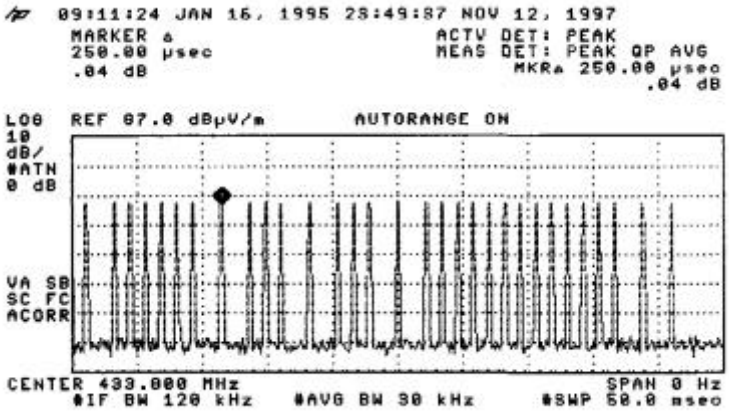
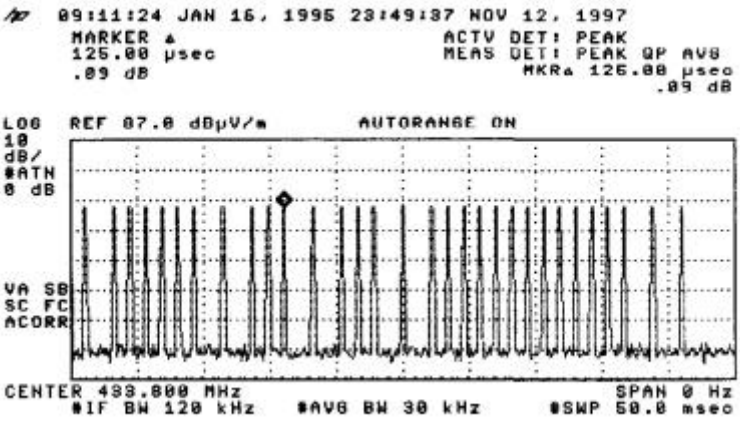


Figure C [Short Pulse]



Appendix C

Periodic Operation [FCC 47CFR 15.231e]

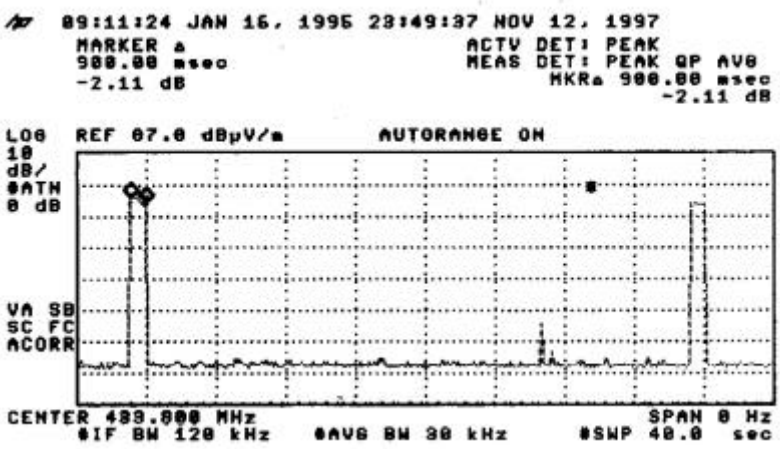
According to FCC 47CFR15.231e. The EUT shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case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

Results:

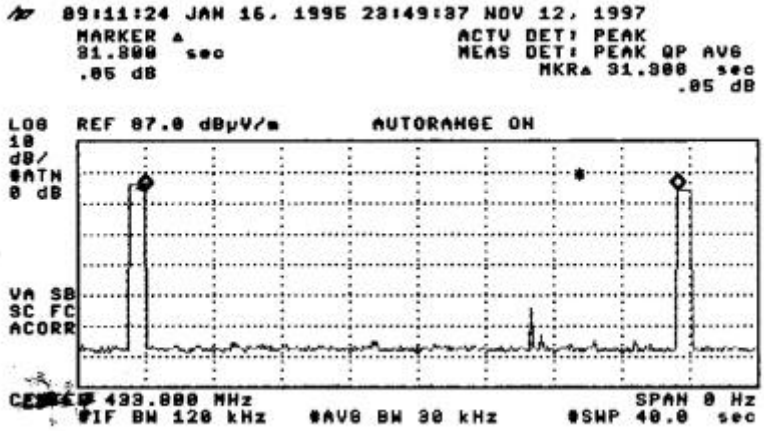
Since the EUT of each transmission is 900 msec, so the silent period must not less than 27 seconds (900msec x 30).

The following figures [Figure D to Figure E] showed the duration of each transmission (900msec) and silent period (31.3sec).

Figure D [Each transmission]



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



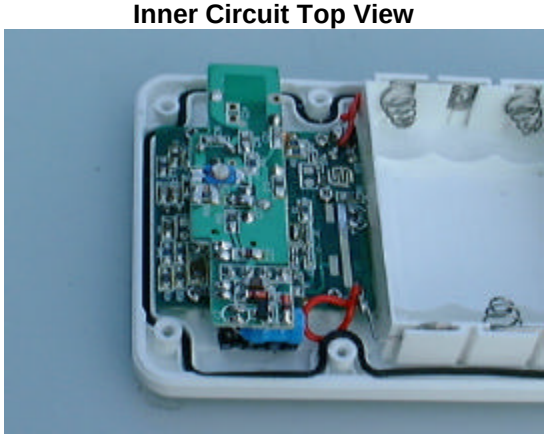
Appendix D

Photographs of EUT

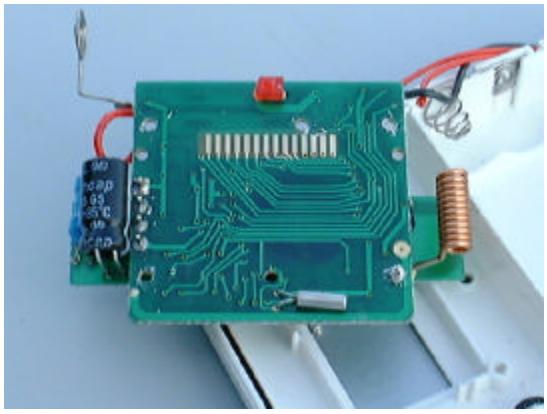
Front View of the product

Rear View of the product

Inner Circuit Top View



Inner Circuit Bottom View



Photographs of EUT

Measurement of Radiated Emission Test Set Up

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