STC Test Report

Date : 2010-01-25
No. : HM164723

Applicant (LUF011): Lung Fat Industries (HK) Co., Ltd.
Flat 7, 8/F., New City Center, 2 Lei Yue Mun Road, Kwun Tong, Kowloon, Hong Kong.

Manufacturer: Lung Fat Industries (HK) Co., Ltd.
Flat 7, 8/F., New City Center, 2 Lei Yue Mun Road, Kwun Tong, Kowloon, Hong Kong.

Description of Sample(s): Submitted sample(s) said to be

Product:	TUTCO Heat Pack
Brand Name:	Tutco
Model Number:	81-0468-00
FCC ID:	UZAHP81046800

Date Sample(s) Received: 2009-12-24, 2010-01-12

Date Tested: 2010-01-05 to 2010-01-15

Investigation Requested: Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2008 and ANSI C63.4:2003 for FCC Certification.

Conclusion(s): 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.

Remark(s): ---

Dr. LEE Kam Chuen
Authorized Signatory
ElectroMagnetic Compatibility Department
For and on behalf of
The Hong Kong Standards and Testing Centre Ltd.

The Hong Kong Standards and Testing Centre Ltd.
10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong
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CONTENT:

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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

Lung Fat Industries (HK) Co., Ltd.
Flat 7, 8/F., New City Center, 2 Lei Yue Mun Road, Kwun Tong, Kowloon, Hong Kong.

Manufacturer

Lung Fat Industries (HK) Co., Ltd.
Flat 7, 8/F., New City Center, 2 Lei Yue Mun Road, Kwun Tong, Kowloon, Hong Kong.

1.3 Equipment Under Test [EUT]
Description of Sample

Submitted sample(s) said to be

Product:	TUTCO Heat Pack
Manufacturer:	Lung Fat Industries (HK) Co., Ltd.
Brand Name:	Tutco
Model Number:	81-0468-00
Rating:	3Vd.c. (“AA” size battery x 2)

1.3.1 Description of EUT Operation

The Equipment Under Test (EUT) is a Lung Fat Industries (HK) Co., Ltd. TUTCO Heat Pack. The EUT is an automatically activated transmitter, When the sensed temperature falls below the set point of the thermostat, the transmitter will send a signal to the receiver unit automatically. The transmission signal modulated by IC; and the type is pulse modulation.

1.4 Date of Order

2009-12-24, 2010-01-12

1.5 Submitted Sample(s):

2 Sample(s)

1.6 Test Duration

2010-01-05 to 2010-01-15

1.7 Country of Origin

USA

2.0 Technical Details

2.1 Investigations Requested

Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15 2008 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 15.231a	ANSI C63.4:2003	N/A	☒	☐	☐
Radiated Emissions, 30MHz to 1GHz	FCC 47CFR 15.209	ANSI C63.4:2003	N/A	☒	☐	☐

Note: N/A - Not Applicable

3.0 Test Results

3.1 Emission

3.1.1 Radiated Emissions (30 – 1000MHz)

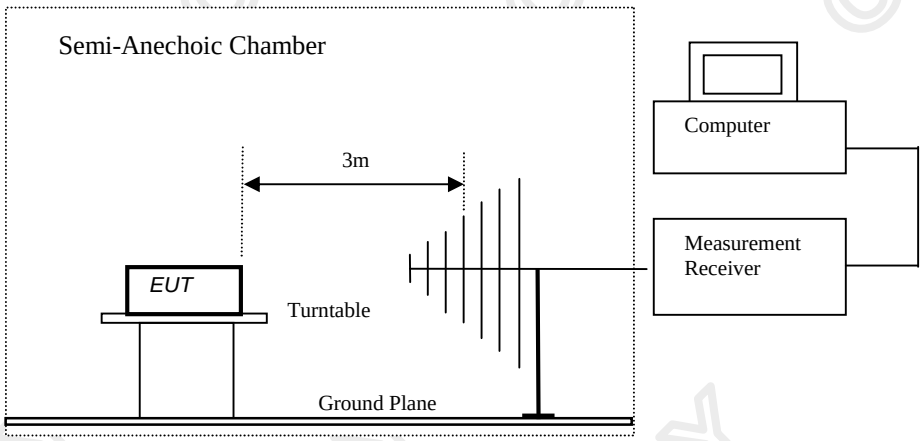
Test Requirement:	FCC 47CFR 15.231a
Test Method:	ANSI C63.4:2003
Test Date:	2010-01-15
Mode of Operation:	Tx on mode

Test Method:

The sample was placed 0.8m above the ground plane of semi-anechoic Chamber*. 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.

*: Semi-anechoic chamber located on the G/F of The Hong Kong Standards and Testing Centre Ltd. with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 607756.

Test Setup:



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

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	2,250	225
70-130	1,250	125
130-174	1,250 to 3,750 *	125 to 375 *
174-260	3,750	375
260-470	3,750 to 12,500 *	375 to 1,250 *
Above 470	12,500	1,250

Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, μV/m at 3 meters=56.81818(F)-6136.3636; for the band 260-470 MHz, μV/m at 3 meters =41.6667(F)-7083.3333. The maximum permissible unwanted emission level is 20dB below the maximum permitted fundamental level.

Results of Tx on mode: PASS

	Field Strength of Fundamental Emissions Peak Value						
	Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
	433.9	73.3	18.4	91.7	38,459.2	109,958.5	Vertical
	867.8	< 1.0	25.7	< 26.7	< 21.6	10,995.8	Vertical
+	1301.9	46.8	5.2	52.0	398.1	5,000.0	Vertical
	1735.6	50.5	-2.3	48.2	257.0	10,995.8	Horizontal
	2169.9	51.7	-0.6	51.1	358.9	10,995.8	Vertical
	2603.4	< 1.0	31.2	< 32.2	< 40.7	10,995.8	Vertical
	3037.8	49.6	5.8	55.4	588.8	10,995.8	Vertical
	3471.8	65.2	3.3	68.5	< 2,660.7	10,995.8	Vertical
+	3905.8	64.2	5.4	69.6	3,020.0	5,000.0	Vertical
+	4339.80	56.4	6.0	62.4	1,318.3	5,000.0	Vertical

Remarks:

FCC Limit for Fundamental Average Measurement = 41.6667(433.9)-7083.3333=10,995.8μV/m

+: Denotes restricted band of operation.
Measurements were made using a peak detector. Any emission less than 1000 MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 were not adjusted for averaging and the limits of FCC Rules Part 15 Section 15.209 were applied.

*: Adjusted by Duty Cycle = -22.74dB
Duty Cycle Correction =-20dB, if the calculation duty cycle correction >-20dB

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz 5.1dB

Results of Tx on mode: PASS3

Field Strength of Fundamental Emissions Average Value							
	Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
*	433.9	53.3	18.4	71.7	3,845.9	10,995.8	Vertical
*	867.8	< 1.0	25.7	< 26.7	< 21.6	1,099.6	Vertical
*+	1301.9	26.8	5.2	32.0	39.8	5,000.0	Vertical
*	1735.6	30.5	-2.3	28.2	25.7	1,099.6	Horizontal
*	2169.9	31.7	-0.6	31.1	35.9	1,099.6	Vertical
*	2603.4	< 1.0	31.2	< 32.2	< 40.7	1,099.6	Vertical
*	3037.8	29.6	5.8	35.4	58.9	1,099.6	Vertical
*	3471.8	45.2	3.3	48.5	< 266.1	1,099.6	Vertical
*+	3905.8	44.2	5.4	49.6	302.0	5,000.0	Vertical
*+	4339.80	36.4	6.0	42.4	131.8	5,000.0	Vertical

Remarks:

FCC Limit for Fundamental Average Measurement = 41.6667(433.9)-7083.3333=10,995.8μV/m

+: Denotes restricted band of operation.
Measurements were made using a peak detector. Any emission less than 1000 MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 were not adjusted for averaging and the limits of FCC Rules Part 15 Section 15.209 were applied.

*: Adjusted by Duty Cycle = -22.74dB
Duty Cycle Correction =-20dB, if the calculation duty cycle correction >-20dB

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz 5.1dB

Limits for Radiated Emissions [FCC 47 CFR 15.209]:

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 of Tx on mode: PASS

Field Strength of Fundamental Emissions Quasi-Peak Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Remarks:
No additional spurious emissions found between lowest internal used/generated frequency and 30MHz

Correction Factor includes Antenna Factor and Cable Attenuation.
Calculated measurement uncertainty : 30MHz to 1GHz 5.1dB

3.2 20dB Bandwidth of Fundamental Emission

Test Requirement:	FCC 47 CFR 15.231a
Test Method:	ANSI C63.4:2003 (Section 13.1.7)
Test Date:	2010-01-15
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:

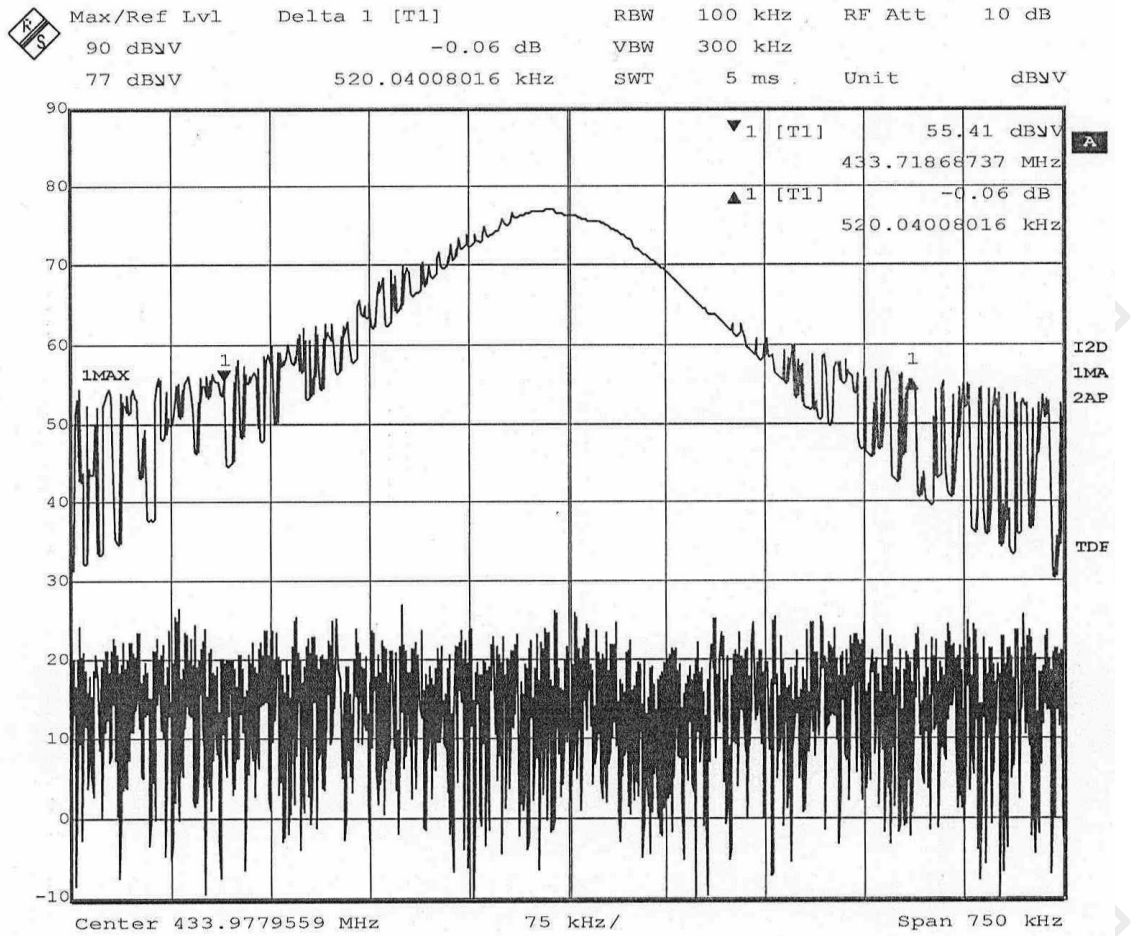
As Test Setup of clause 3.1.1 in this test report.

Limits for 20 dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [kHz]	FCC Limits * [kHz]
433.9	520.04	1084.7

*: FCC Limit for Bandwidth measurement = (0.25%)(Center Frequency)
=(0.0025)(433.9)
= 1084.7kHz

20dB Bandwidth of Fundamental Emission



Appendix A

List of Measurement Equipment

Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EMD062	HORN ANTENNA	EMCO	3117	0075933	2008/11/06	2010/11/06
EM215	MULTIDEVICE CONTROLER	EMCO	2090	00024676	N/A	N/A
EM216	MINI MAST SYSTEM	EMCO	2075	00026842	N/A	N/A
EM217	ELECTRIC POWERED TURNTABLE	EMCO	2088	00029144	N/A	N/A
EM218	ANECHOIC CHAMBER	ETS-Linggren	FACT-3	--	2008/12/01	2011/12/01
EM174	BICONILOG ANTENNA	EMCO	3142B	1671	2008/01/24	2010/01/24
EM181	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB7	100072	2009/06/29	2010/06/29
EM022	LOOP ANTENNA	EMCO	6502	1189-2424	2009/07/26	2011/07/26

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

Appendix B

Duty Cycle Correction During 100msec

The transmitter periodically sends a different series of characters, but each packet period (100msec) never exceeds a series of 1 long (1.56msec) and 1 medium (440.88µsec) 22 short (240.48µsec) pulses. Assuming any combination of short and long pulses may be obtained due to encoding the worst case transmit duty cycle would be considered (1x1.56msec)+(1x440.88µsec)+(22x240.48µsec) per 100msec=7.29% duty cycle. Figure A through F show the characteristics of the pulses train for one of these functions.

Remarks:

Duty Cycle Correction = 20log (0.0729)=-22.74dB
Duty Cycle Correction =-20dB, if the calculation duty cycle correction >-20dB

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

Figure A [Pulses Train]

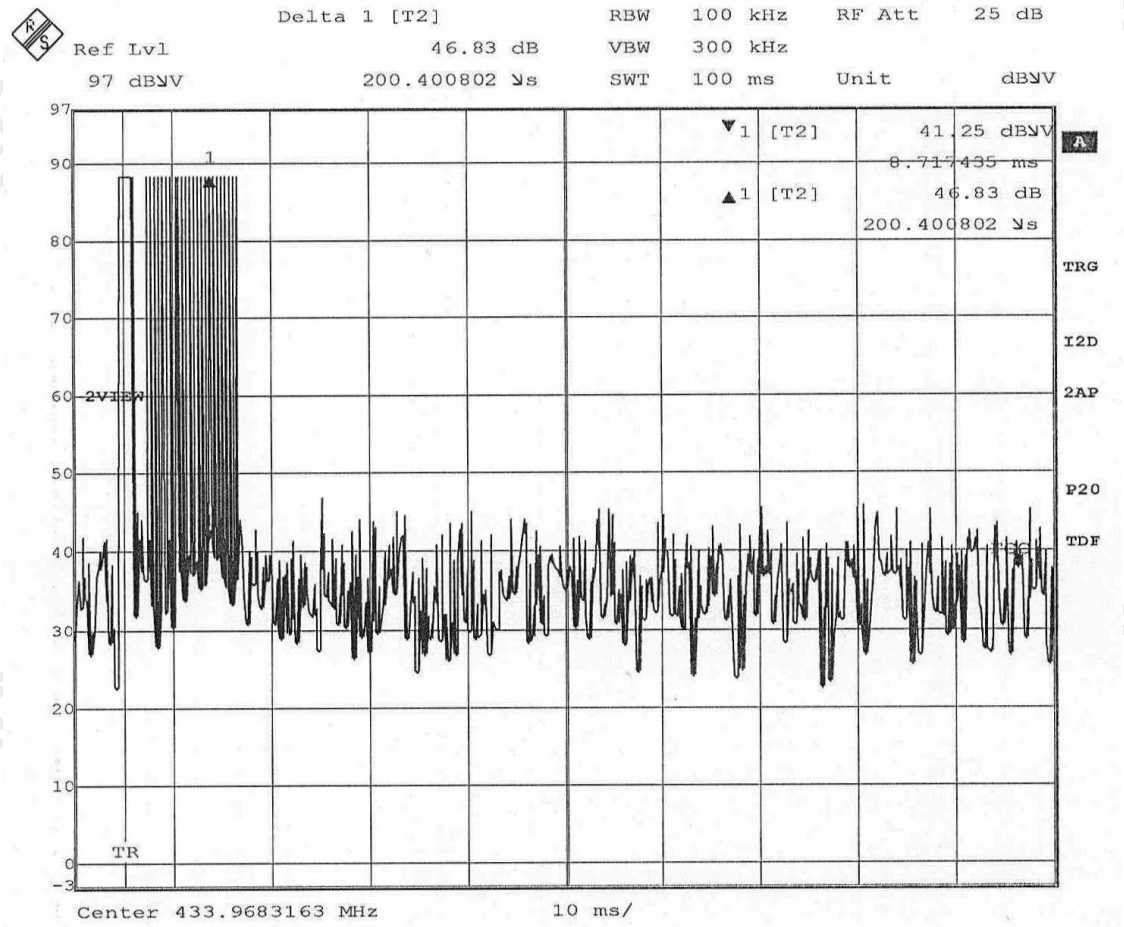


Figure B [Closer Look on the pulse train]

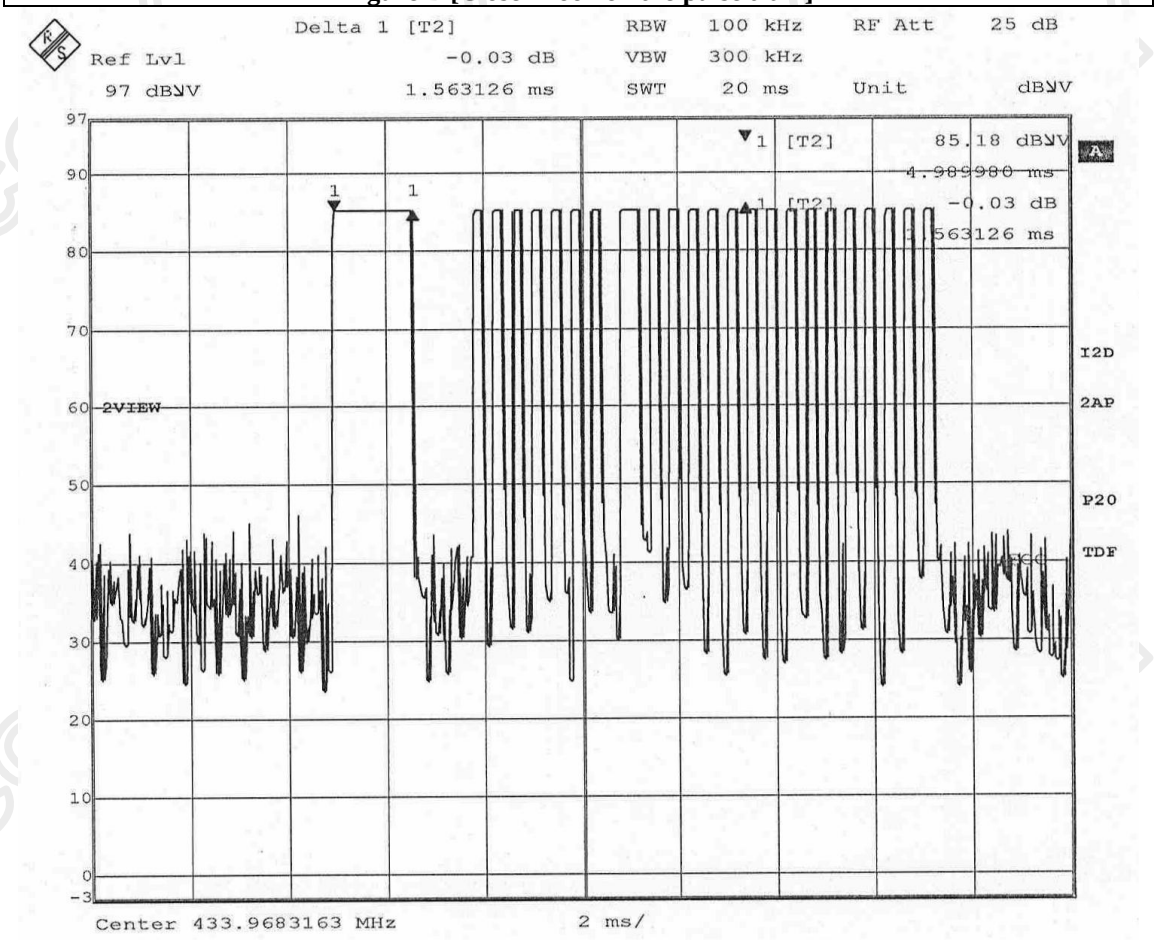


Figure C [Long pulse]

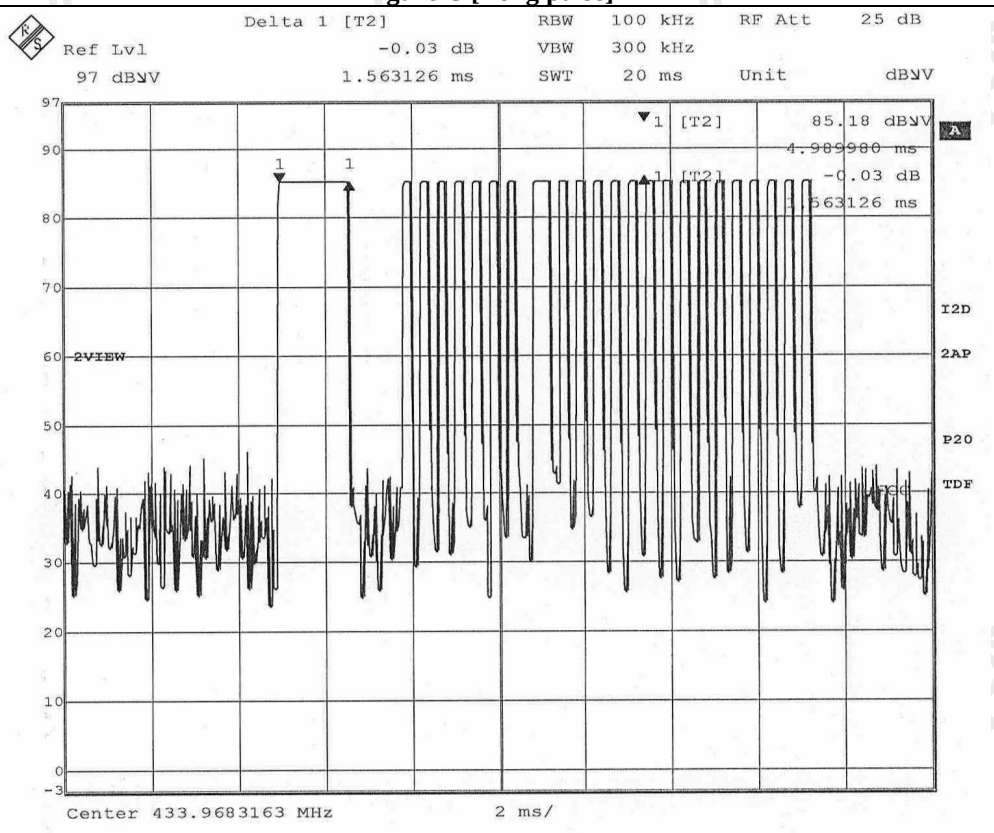


Figure D [Medium pulse]

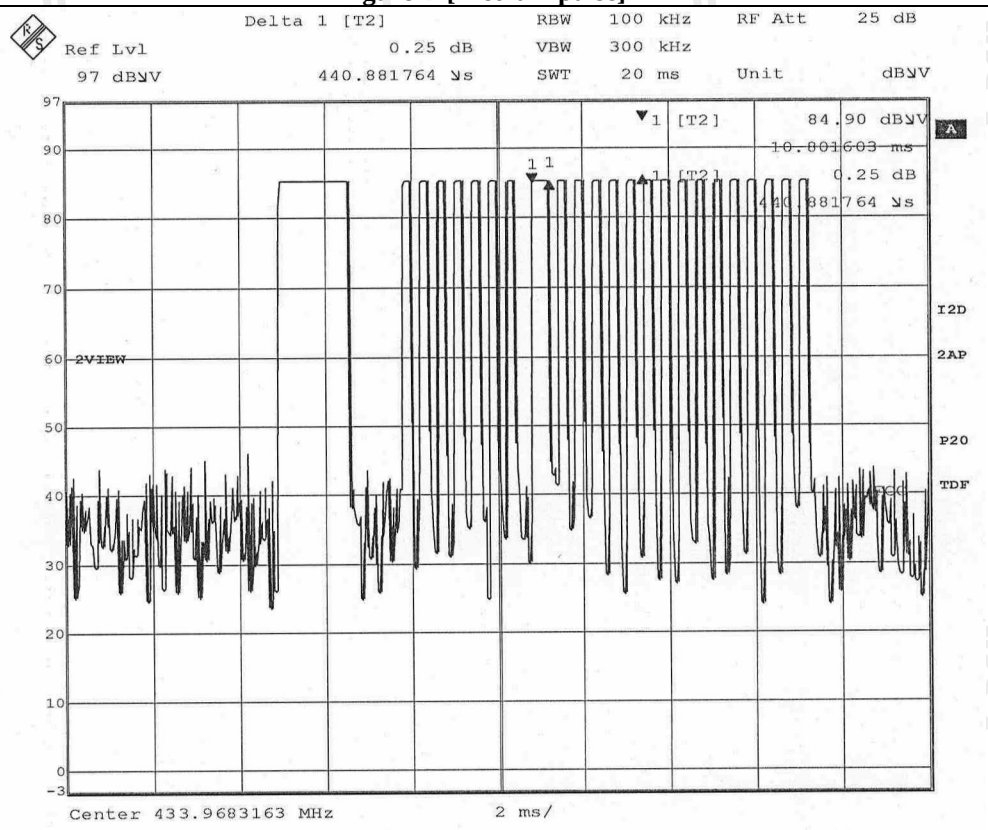


Figure E [Short pulse]

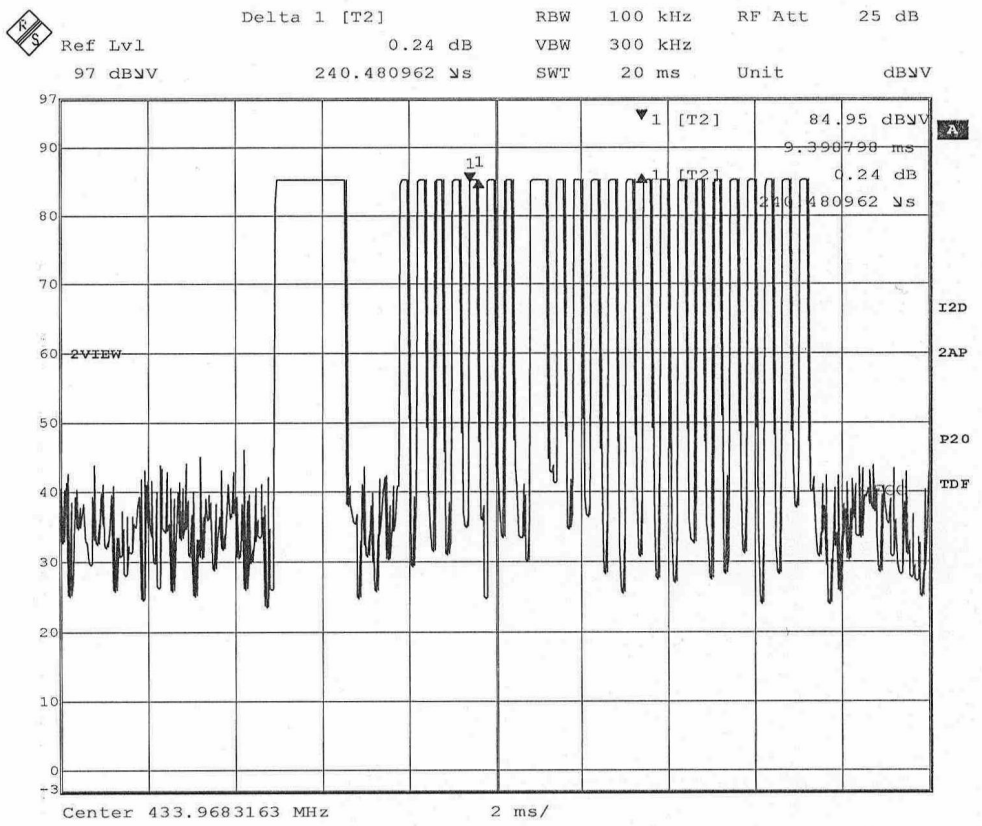
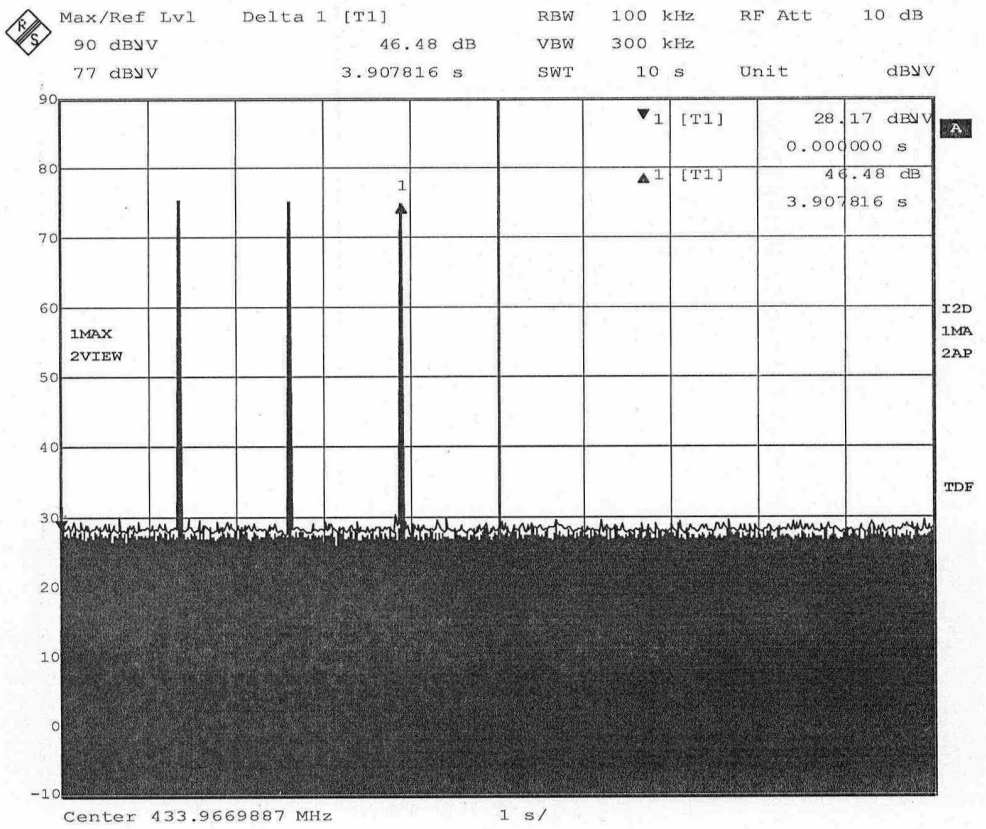


Figure F [EUT deactivate within not more than 5 seconds. Each Transmission period]



Appendix C

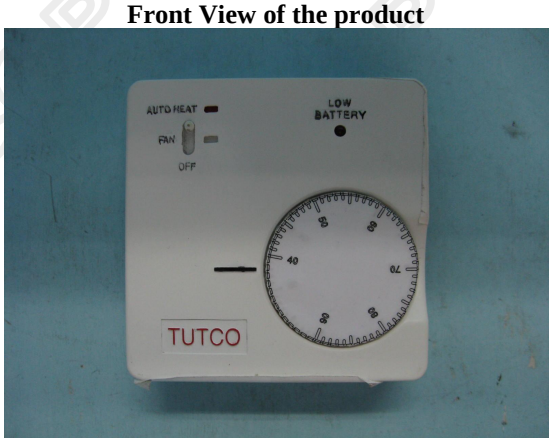
Periodic Operation [FCC 47CFR 15.231(a)]

The device appears to be an automatically activated transmitter. When a selected temperature is measured, the device will be activated and transmits appropriate control signals to the heater. The are three transmissions shown on plot. The transmission stop with 3 seconds after activation and fulfils hereby the requirement 15.231(a) the transmitter within not more than 5 seconds of being released.

Appendix D

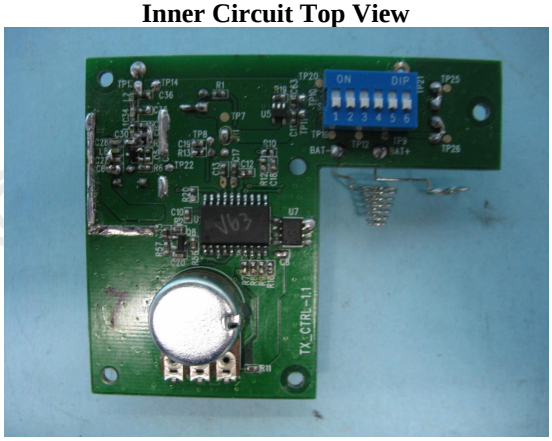
Photographs of EUT

Front View of the product

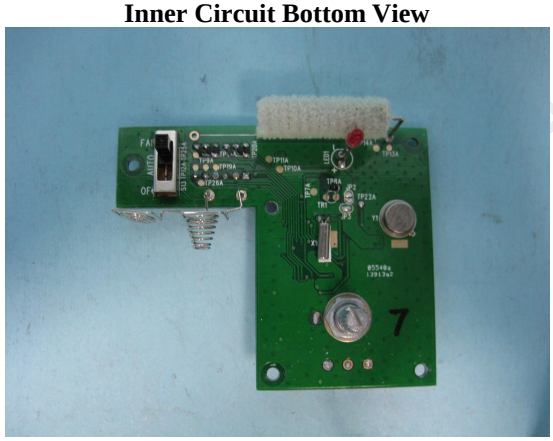


Rear View of the product

Inner Circuit Top View

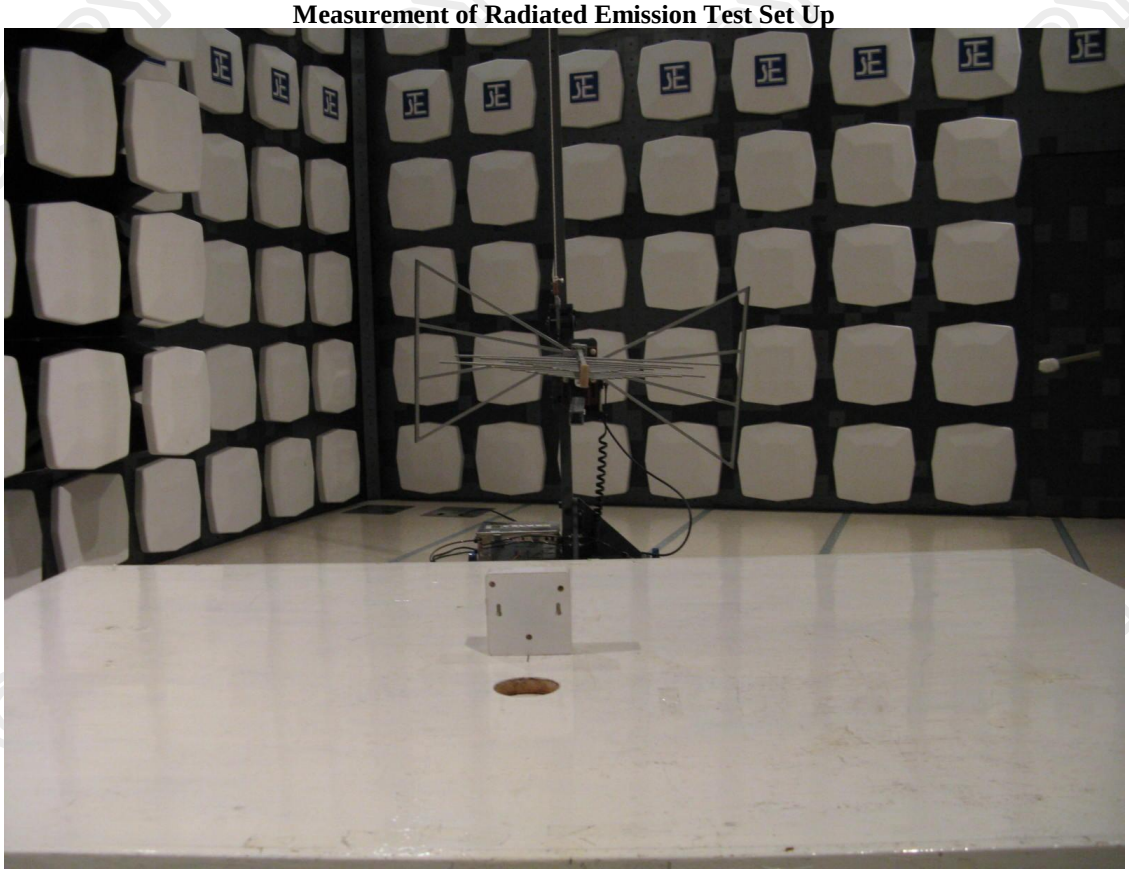


Inner Circuit Bottom View



Photographs of EUT

Measurement of Radiated Emission Test Set Up



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