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

Date : 2004-09-30
No. : HM152676

TEST REPORT

Applicant: Smart Hero Enterprises Limited.
Flat D, 22/Fl. Block 1, Goldfield Industrial Building,
144-150 Tai Lin Pai Rd., Kwai Chung, Kln.,
Hong Kong.

Description of Samples:

Model name:	Door Chime Transmitter
Model no.:	SH307T
Brand name:	SH
FCC ID:	SA2-307T

Date Samples Received: 2004-06-18

Date Tested: 2004-08-03

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: For additional models details, see page 5.

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 STC: www.hkstc.org (the section “Application and Quotation”).

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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

Smart Hero Enterprises Limited.
Flat D, 22/Fl. Block 1, Goldfield Industrial Building, 144-150
Tai Lin Pai Rd., Kwai Chung, Kln.,
Hong Kong.

HKSTC Code Number for Applicant **SMH002**

Manufacturer

Smart Hero Enterprises Limited.
Shui Ping Industrial Zone, Da Lang, Dongguang,
Guangdong Province, PRC

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1.3 Equipment Under Test [EUT]

Description of Sample

Product:	Door Chime Transmitter
Manufacturer:	Smart Hero Enterprises Limited.
Brand Name:	SH
Model Number:	SH307T
Additional Model Number:	AT307T, SH306T, SH308T, SH309T, SH310T
Input Voltage:	12Vd.c (“A23” size battery x 1)

1.3.1 Description of EUT Operation

The Equipment Under Test (EUT) is an Smart Hero Enterprises Limited., Door Chime Transmitter. The EUT is to transmit RF signal while each button is being pressed, Modulation by Data Code type is pulse modulation.

1.4 Date of Order

2004-06-18

1.5 Submitted Sample(s):

2 Samples per model

1.6 Test Duration

2004-08-03

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 C63.4:2003 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	Class B	☒	☐	☐
Conducted Emissions on AC, 0.15MHz to 30MHz	FCC 47CFR 15.207	ANSI C63.4:2003	Class B	☐	☐	☒

Note: N/A - Not Applicable

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3.0 Test Results

3.1 Emission

3.1.1 Radiated Emissions (30 – 1000MHz)

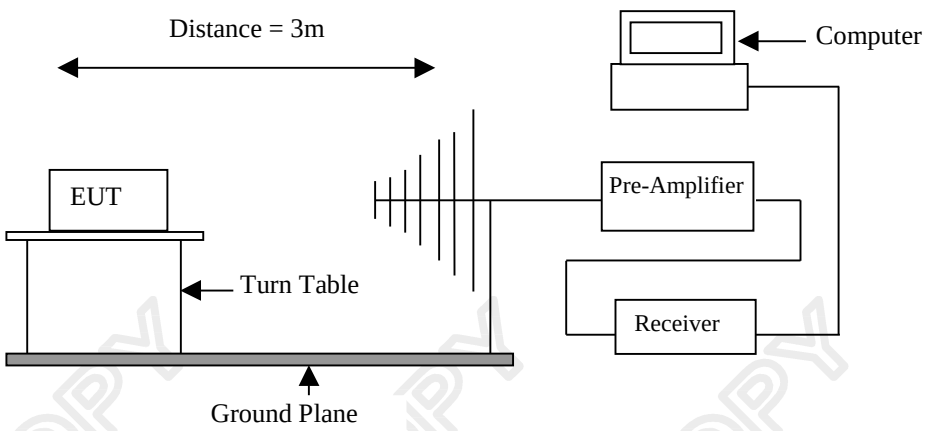
Test Requirement:	FCC 47CFR 15.231a
Test Method:	ANSI C63.4:2003
Test Date:	2004-08-03
Mode of Operation:	Tx mode

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, 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 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 15.231a]:

Frequency Range of Fundamental [MHz]	Field Strength of Fundamental Emission [Peak] [µV/m]	Field Strength of Fundamental 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 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 permissitted unwanted emission level is 20dB below the maximum permitted 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	E-Field Polarity
315.20	66.0	15.3	81.3	11614.5	60,500.1	Horizontal
630.40	29.6	22.4	52.0	398.107	6,050.0	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	E-Field Polarity
945.60	< 1.0	34.3	< 35.3	< 58.2	6,050.0	Vertical
1260.80	< 1.0	32.2	< 33.2	< 45.7	6,050.0	Vertical
+ 1576.00	< 1.0	38.8	< 39.8	< 97.7	5,000.0	Vertical
1891.20	< 1.0	17.4	< 18.4	< 8.3	6,050.0	Vertical
+ 2206.40	< 1.0	17.2	< 18.2	< 8.1	5,000.0	Vertical
2521.60	< 1.0	18.8	< 19.8	< 9.8	6,050.0	Vertical
+ 2836.80	< 1.0	19.7	< 20.7	< 10.8	5,000.0	Vertical
3152.00	< 1.0	20.6	< 21.6	< 12.0	6,050.0	Vertical

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Results:

Field Strength of Fundamental Emissions Average Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
315.20	55.5	15.3	70.8	3467.4	60,500.1	Horizontal
630.40	19.1	22.4	41.5	118.85	6,050.0	Horizontal

Field Strength of Spurious Emissions Average Vaule						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
945.60	< 1.0	34.3	< 35.3	< 58.2	6,050.0	Vertical
1260.80	< 1.0	32.2	< 33.2	< 45.7	6,050.0	Vertical
+ 1576.00	< 1.0	38.8	< 39.8	< 97.7	5,000.0	Vertical
1891.20	< 1.0	17.4	< 18.4	< 8.3	6,050.0	Vertical
+ 2206.40	< 1.0	17.2	< 18.2	< 8.1	5,000.0	Vertical
2521.60	< 1.0	18.8	< 19.8	< 9.8	6,050.0	Vertical
+ 2836.80	< 1.0	19.7	< 20.7	< 10.8	5,000.0	Vertical
3152.00	< 1.0	20.6	< 21.6	< 12.0	6,050.0	Vertical

Remarks:

*: Adjusted by Duty Cycle = -10.5dB

FCC Limit for Average Measurement = 41.6667(315.2MHz)-7083.3333=6,050.0μV/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 ave raging and the limit of FCC Rules Part 15 Section 15.209 were applied

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz ±5.7dB

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Limits 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	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field 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 ±5.7dB

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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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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:	2004-08-03
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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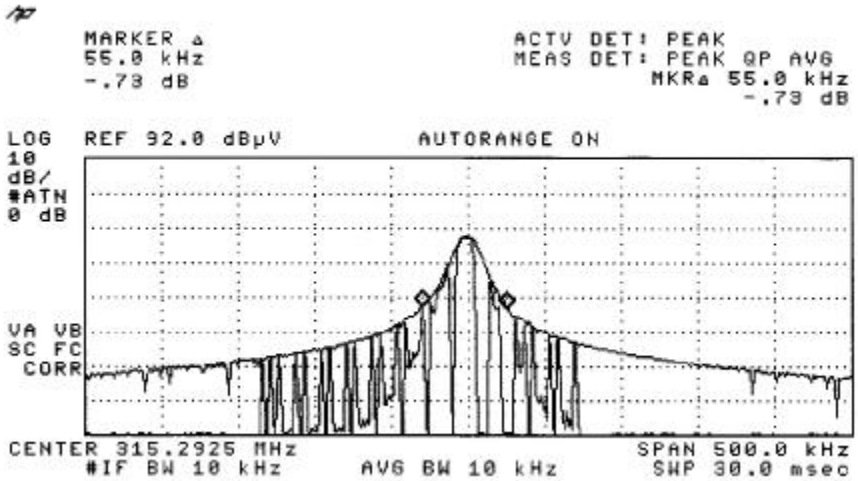
Limits for 20 dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [KHz]	FCC Limits * [KHz]
315.2	55.0	788

*: FCC Limit for Bandwidth measurement = (0.25%)(Center Frequency)
=(0.0025)(315.2)
=788KHz

20dB Bandwidth of Fundamental Emission



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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	ATTENNUATOR/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
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

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	PULES 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 (23.75msec) never exceeds a series of 10 long (600µsec) and 3 short (350µsec) pules. Assuming any combination of short and long pules may be obtained due to encoding the worst case transmit duty cycle would be considered 10x600µsec+3x350µsec per 23.75msec=29.6% duty cycle. Figure A through C show the characteristics of the pulses train for one of these functions.

Remarks:

Duty Cycle Correction = 20Log(0.296) =-10.5dB

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

Figure A [Pulse Train]

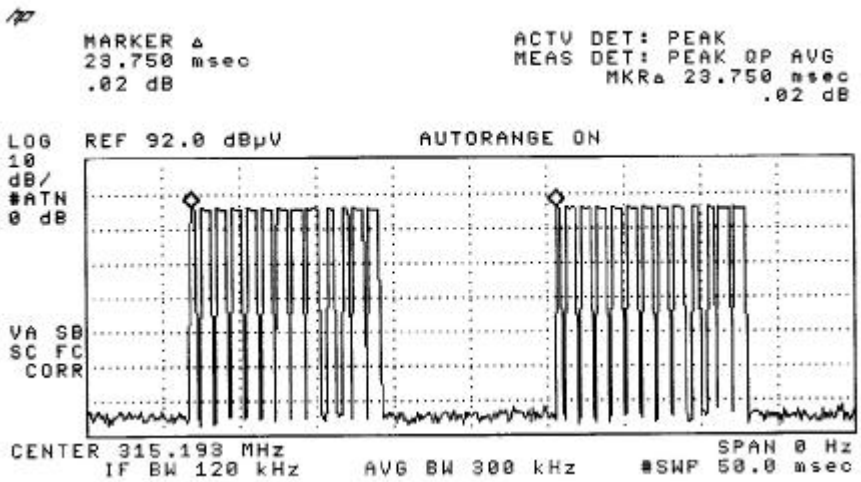


Figure B [Long Pulse]

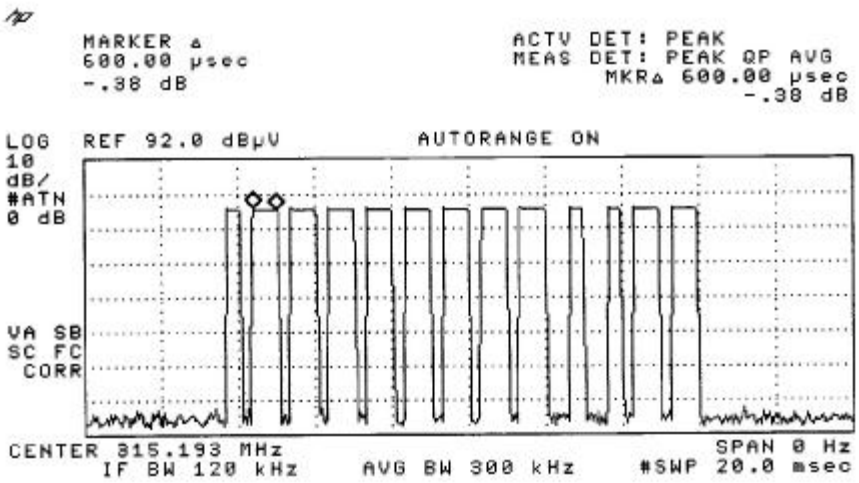
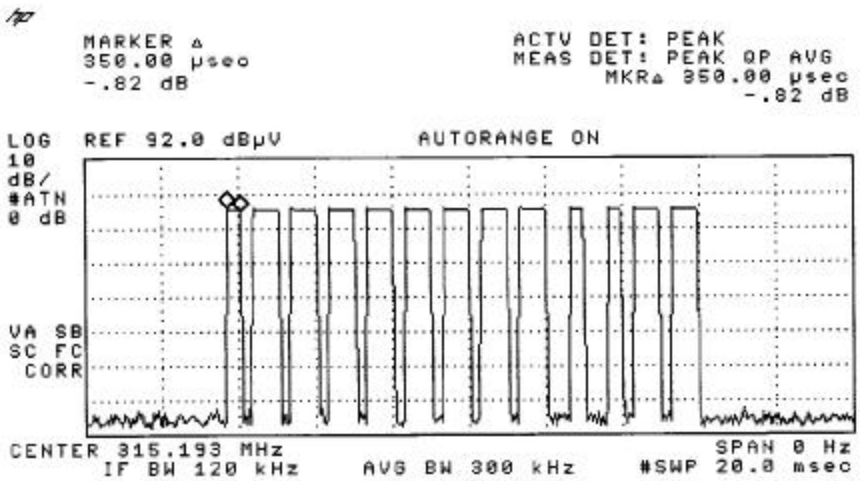


Figure C [Short Pulse]



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Appendix C

Periodic Operation [FCC 47CFR 15.231a]

According to FCC 47CFR15.231a. A transmitter manually activated must automatically deactivate within not more than 5 seconds of being released. The transmitter is a 1 button transmitter. The EUT continues to transmit while the button is being pressed. The EUT ceases transmission almost immediately upon being released and appears to finish the current packet being transmitted. Therefore the longest period of time the transmitter should take to deactivate is a packet length.

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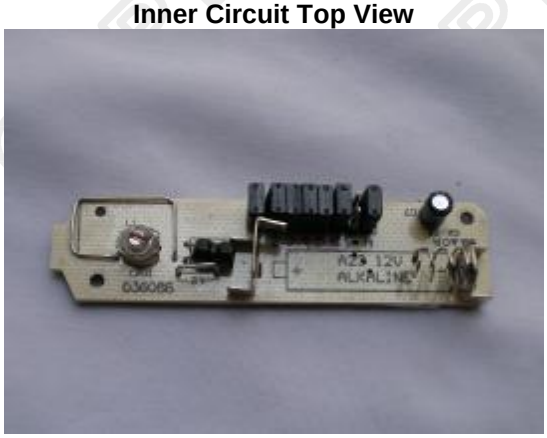
Appendix D

Photographs of EUT

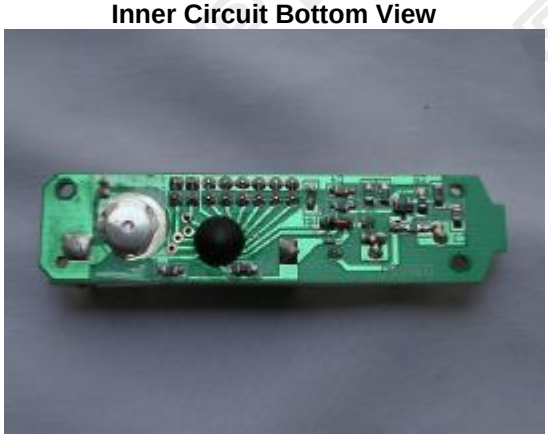
Front View of the product

Rear View of the product

Inner Circuit Top View



Inner Circuit Bottom View



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Photographs of EUT

Measurement of Radiated Emission Test Set Up

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

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