GLOBAL TESTING & CERTIFICATION CENTRE LTD.

FCC
TEST REPORT

Application No.: 06021626 (49MHz, Tx)

Rm09, 5/F Wah Wai Ind Ctr, 38-40 Au Pui Wan Street, Fotan Shatin, N.T., Hong Kong
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APPLICANT:	Hobby Master Limited
ADDRESS:	Room 11, 7th Floor, Good Harvest Building, Tsun Wen Road, Tuen Mun, N.T., Hong Kong
DATE OF RECEIVED:	24 February,2006
DATE OF TESTING:	24 February,2006 to 13 March,2006
DESCRIPTION OF SAMPLE:	
Product:	1/56 Tiger 1 R/C Tank
Brand Name:	HOBBYMASTER
Model No.:	HT0101
Additional Product Name:	1/56 Tiger 1 R/C Tank, M1A1, King Tiger, M4 Sherman, Panzer III, KV-1, Leopard M2, M-28 Pershing
Additional Model No.:	HT0102, HT0103, HT0104, HT0105, HT0106, HT0107, HT0108, HT0109, HT0110, HT0111, HT0112, HT0113, HT0114, HT0115, HT0116, HT0117, HT0118, HT0119, HT0120, HT0121, HT0122, HT0123, HT0124, HT0125, HT0126, HT0127, HT0128, HT0129
FCC ID:	T43HB-HT010149
Input Voltage:	DC9V (6F22)
Description of EUT Operation	The Equipment Under Test (EUT) is a Hobby Master Limited, 1/56 Tiger 1 R/C Tank. The transmitter is a 4 button transmitter. The EUT continues to Transmit while button is being pressed, Modulation by IC. And type is pulse modulation.
INVESTIGATION REQUESTED:	FCC PART 15 SUBPART C
TEST RESULTS:	See attached sheets
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 page 5 in Test report.

GTC

CS Lin, EMC
for Chief Executive

General Details

Test Laboratory

GLOBAL TESTING & CERTIFICATION CENTRE LTD
EMC Laboratory
Rm09,5/F Wah Wai Ind Ctr, 38-40 Au Pui Wan Street,
Fotan Shatin, N.T., Hong Kong

Telephone: 852 2320 0326
Fax: 852 2320 6287

Applicant Details
Applicant

Hobby Master Limited
Room 11, 7th Floor,
Good Harvest Building,
Tsun Wen Road, Tuen Mun,
N.T., Hong Kong

Manufacturer

Multitech International (HK) Limited
Room 30, 5/F, BLK A,
Cambridge Plaza, 188 Sun Wan Road,
Sheung Shui, Hong Kong

Technical Details

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.

Test Standards and Results Summary Tables

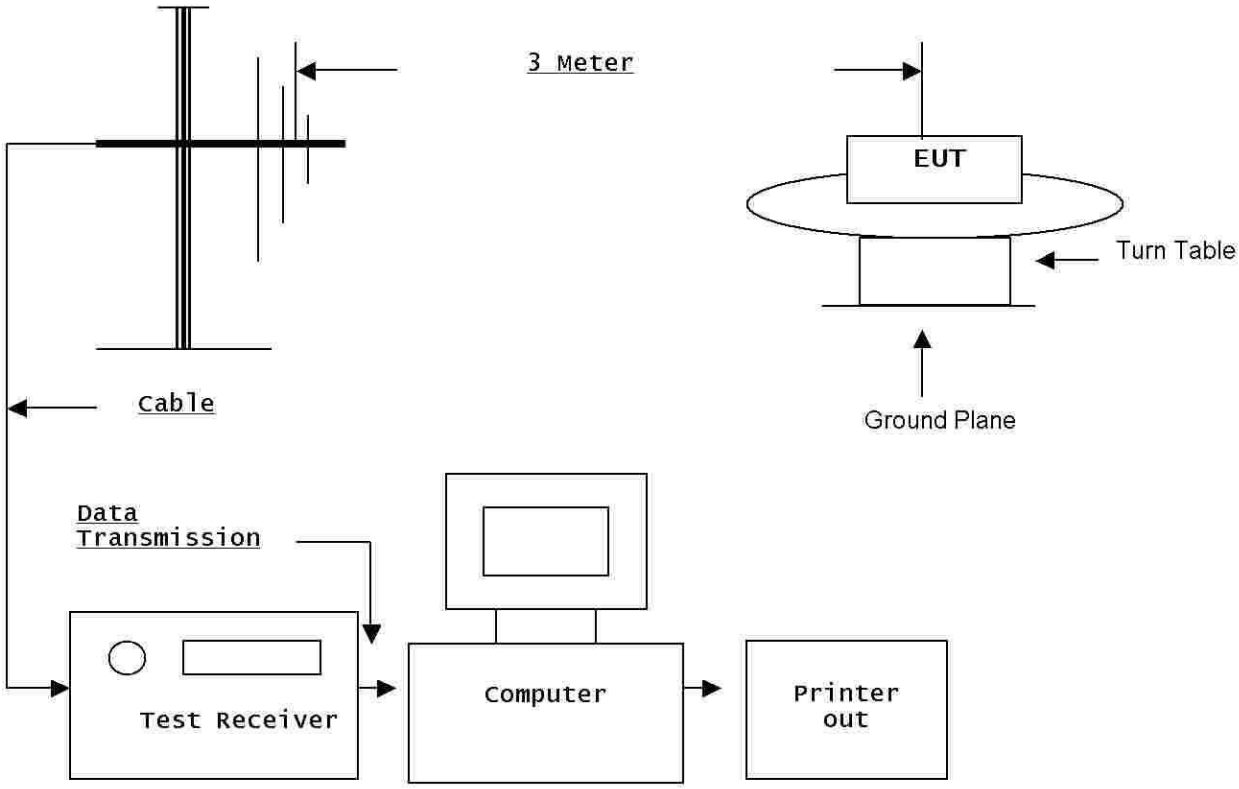
EMISSION Results Summary					
Test Condition	Test Requirement	Test Method	Test Result		
			Pass	Failed	N/A
Field Strength of Fundamental Emissions & Spurious Emissions	FCC 47CFR 15.235	ANSI C63.4:2003	☒	☐	☐
Radiated Emissions, 30MHz to 1GHz	FCC 47CFR 15.209	ANSI C63.4:2003	☒	☐	☐
Conducted Emissions on AC, 0.15MHz to 30MHz	FCC 47CFR 15.207	ANSI C63.4:2003	☐	☐	☒

Note: N/A – Not Applicable

Test Results

Emission

Radiation Emission Measurement (30MHz to 1GHz)
Setup diagram:



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 GTC with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules. With Registration Number:493655

Radiation Emissions Measurement

Appl. : Hobby Master Limited
Model: HT0101
Operation: TX mode

Test Requirement: FCC 47CFR 15.235
Test Method: ANSI C63.4:2003
Test Date: 2006-03-07

Limits for Field Strength of Fundamental Emissions :

Frequency Range of Fundamental [MHz]	Field Strength of Fundamental Emission [Peak] [µV/m]	Field Strength of Fundamental Emission [Average] [µV/m]
49.82-49.90	100,000	10,000

Results:

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
49.86	44.0	11.8	55.8	616.6	100,000	Horizontal

Field Strength of Fundamental Emissions Average							
Frequency MHz	Measured Level @3m dBµV	Adjusted by Duty Cycle dB	Correction Factor dB/m	Field Strength dBµV/m	Field Strength µV/m	Limit @3m µV/m	E-Field Polarity
49.86	37.8	-6.2	11.8	49.6	302.0	10,000	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:
Correction Factor included Antenna Factor and Cable Attenuation.
Calculated measurement uncertainty : 30MHz to 1GHz ±4.1dB

Radiation Emissions Measurement

Appl. : Hobby Master Limited
Model: HT0101
Operation: TX mode

Test Requirement: FCC 47CFR 15.209
Test Method: ANSI C63.4:2003
Test Date: 2006-03-07

Results:

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.

Radiated Emissions Quasi-Peak						
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
99.72	23.0	10.3	33.3	46.2	150	Horizontal
149.58	< 18.0	15.1	< 33.1	< 45.9	150	Horizontal
199.44	< 18.0	16.5	< 34.5	< 53.1	150	Horizontal
249.30	< 18.0	17.7	< 35.7	< 61.0	200	Horizontal
299.16	< 18.0	19.5	< 37.5	< 75.0	200	Horizontal
349.02	< 18.0	17.1	< 35.1	< 56.9	200	Horizontal
398.88	< 18.0	17.7	< 35.7	< 60.9	200	Horizontal
448.74	< 18.0	18.4	< 36.4	< 66.1	200	Horizontal
498.60	< 18.0	19.0	< 37.0	< 70.8	200	Horizontal

Remarks:
Correction Factor included Antenna Factor and Cable Attenuation.
Calculated measurement uncertainty : 30MHz to 1GHz ±4.1dB

Conducted Emission on AC (0.15MHz to 30MHz)

Appl. : Hobby Master Limited
Model: HT0101
Operation: N/A

Test Requirement: FCC 47CFR 15.207
Test Method: ANSI C63.4:2003
Test Date: 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.

26dB Bandwidth of Fundamental Emission

Appl. : Hobby Master Limited
Model: HT0101
Operation: On mode

Test Requirement: FCC 47CFR 15.235
Test Method: ANSI C63.4:2003 (section 13.1.7)
Test Date: 2006-03-08

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.

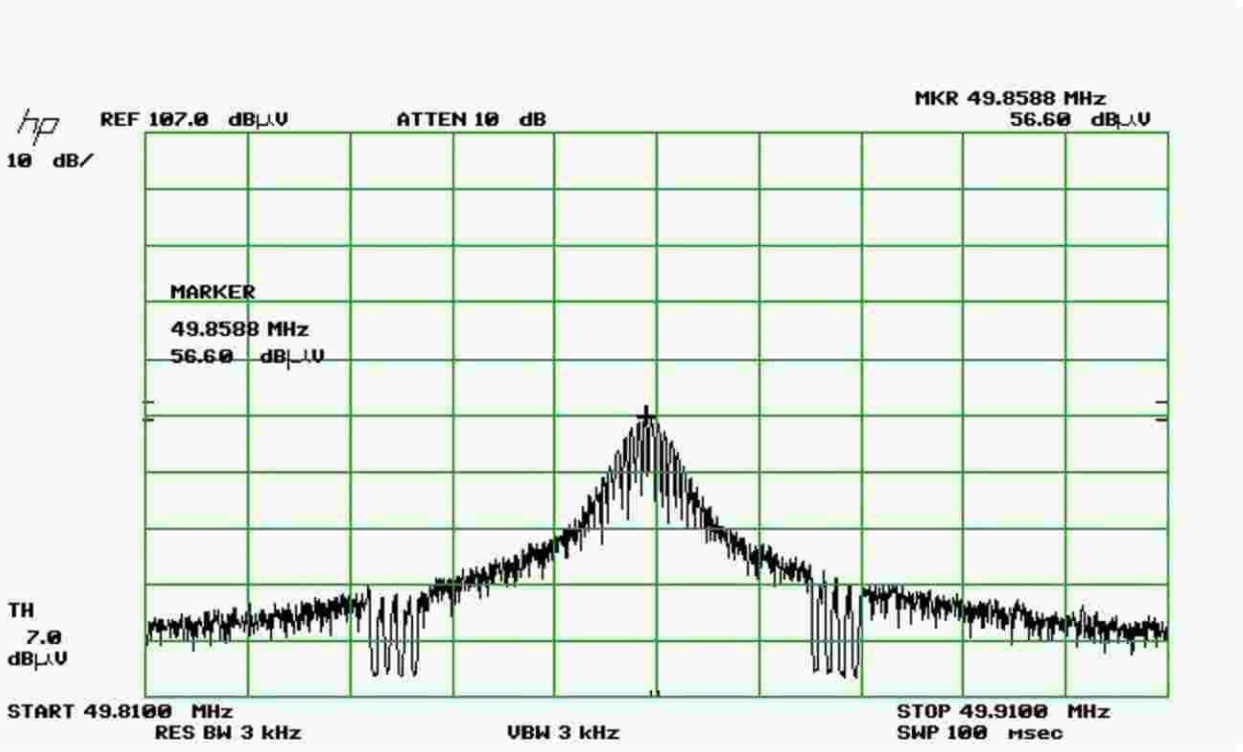
Setup diagram:

As Test Setup of page 6 in this report

Limits for 26dB bandwidth of Fundamental Emission:

Frequency Range [MHz]	26dB Bandwidth [KHz]	FCC Limits [MHz]
49.86	20.0	Within 49.82-49.90

26dB Bandwidth of Fundamental Emission



APPENDIX A

LIST OF MEASUREMENT EQUIPMENT

Equi. No.	Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Due Date
E005	EMI Test Receiver	Rohde & Schwarz	ESVP	89347/019	21 Sep 2005	20 Sep 2006
E003	Spectrum Analyzer With Q/P	Tektronic	2712	S034039	21 Sep 2005	20 Sep 2006
E004	RF Preselector	Tektronic	2706	B010649	21 Sep 2005	20 Sep 2006
E057	EMI Test Receiver	Rohde & Schwarz	ESVP	863112/007	18 Dec 2004	17 Sep 2006
E084	Spectrum Analyzer	Hewlett Packard	HP 8568B	3001A04930	07 Sep 2005	06 Sep 2006
E085	Displayer of Spectrum Analyzer	Hewlett Packard	HP 85662A	2033A01841	07 Sep 2005	06 Sep 2006
E086	Quasi-Peak Adaptor	Hewlett Packard	HP 85650A	2527A00785	07 Sep 2005	06 Sep 2006
E090	RF Signal Generator	Rohde & Schwarz	SMX	832566/005	13 June 2005	12 June 2006
E001	Antenna System	Schwarzbeck	D6917	UHALP9107	14 May 2005	13 May 2006
E002	Antenna System	Schwarzbeck	VHA9013	VHA90131253	14 May 2005	13 May 2006
E008	LISN	EMCO	3825/2	1115	24 Feb 2006	25 Feb 2007
E009	Impulse Limiter	Schwarzbeck	ECH-3-Z2	------	18 Jan 2004	17 June 2006
E098	Turntable	Chioce Way	TB1200	051112	--------	---------
E006	RF Signal Generator	Fluke	6060A	3880007	19 May 2005	18 May 2006
E092	Antenna Tripole	IT&T	UH800100	A05011	13 June 2005	12 June 2006
E098	Pre-Amplifier	Hewlett Packard	8447D	2944A09089	04 Mar 2006	03 Mar 2007
E099	Antenna Mast	Schwarzbeck	AM9014	------	---------	--------

APPENDIX B

Duty Cycle Correction During 100msec

Each function key sends a different series of characters, but each packet period (42.55msec) never exceeds a series of 4 long (850usec) and 58 short (300usec) pulses. Assuming any combination of short and long pulses may be obtained due to encoding the worst case transmit duty cycle would be considered4 x850usec+58 x300usec per 42.55msec=48.9% duty cycle. Figure A through C show the characteristics of the pulse train for one of these functions.

Remarks:

Duty Cycle Correction =20Log(0.489) =-6.2dB

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

Figure A [Pulse Train]

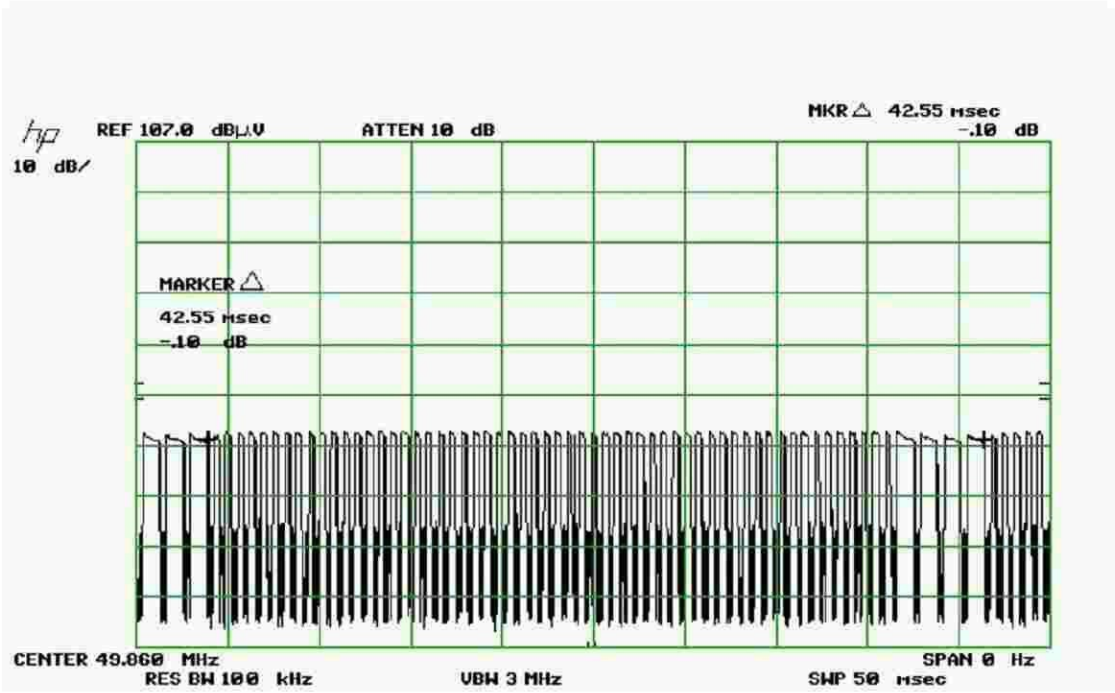


Figure B [Long Pulse]

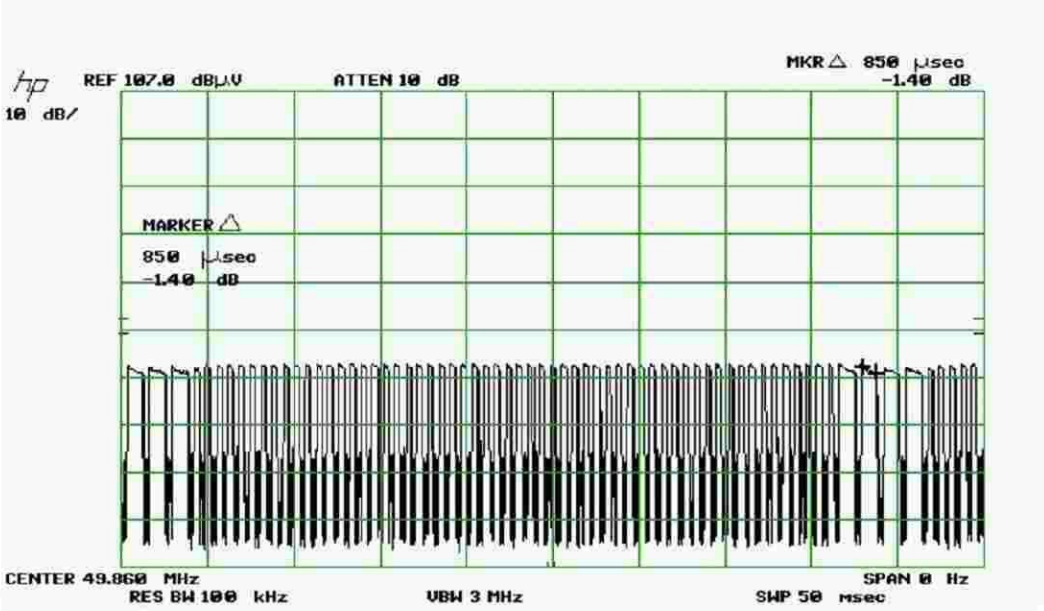
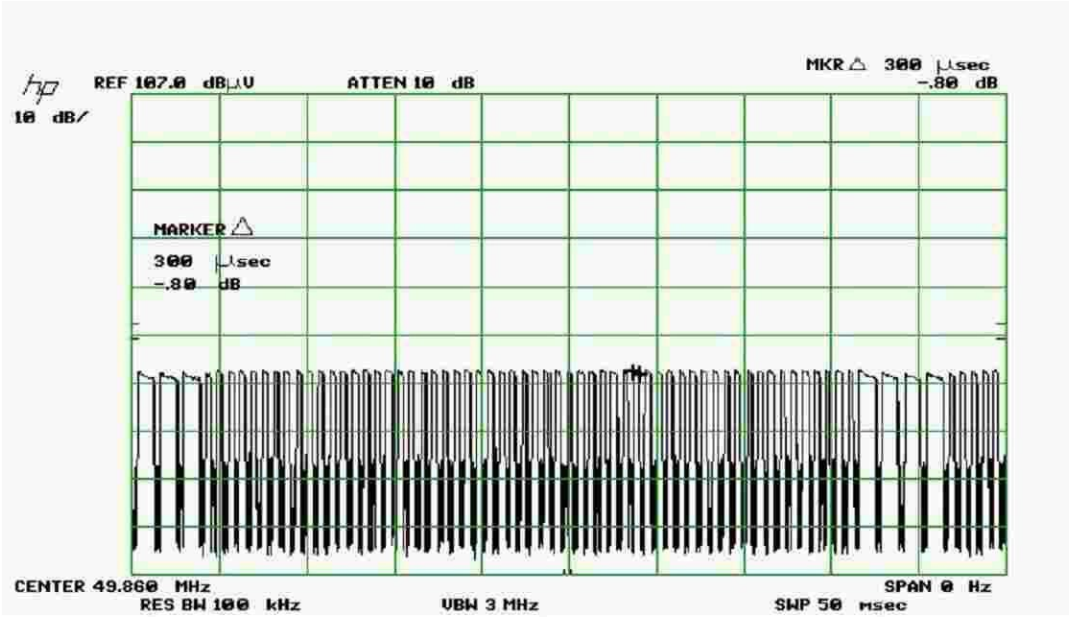


Figure C [Short Pulse]



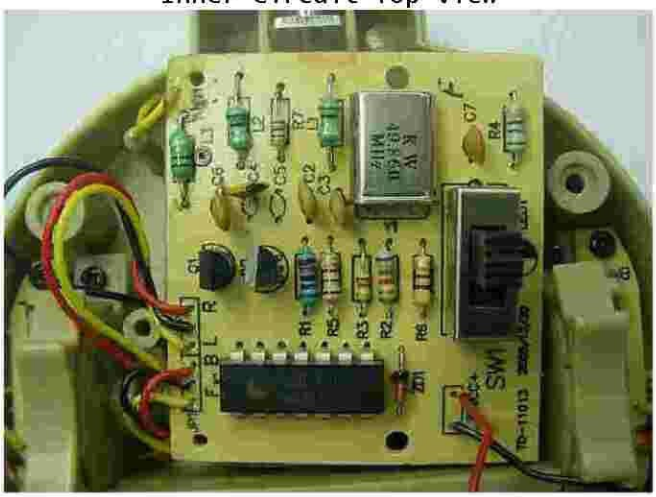
APPENDIX C

Photos of EUT

Front View of the product

Rear View of the product

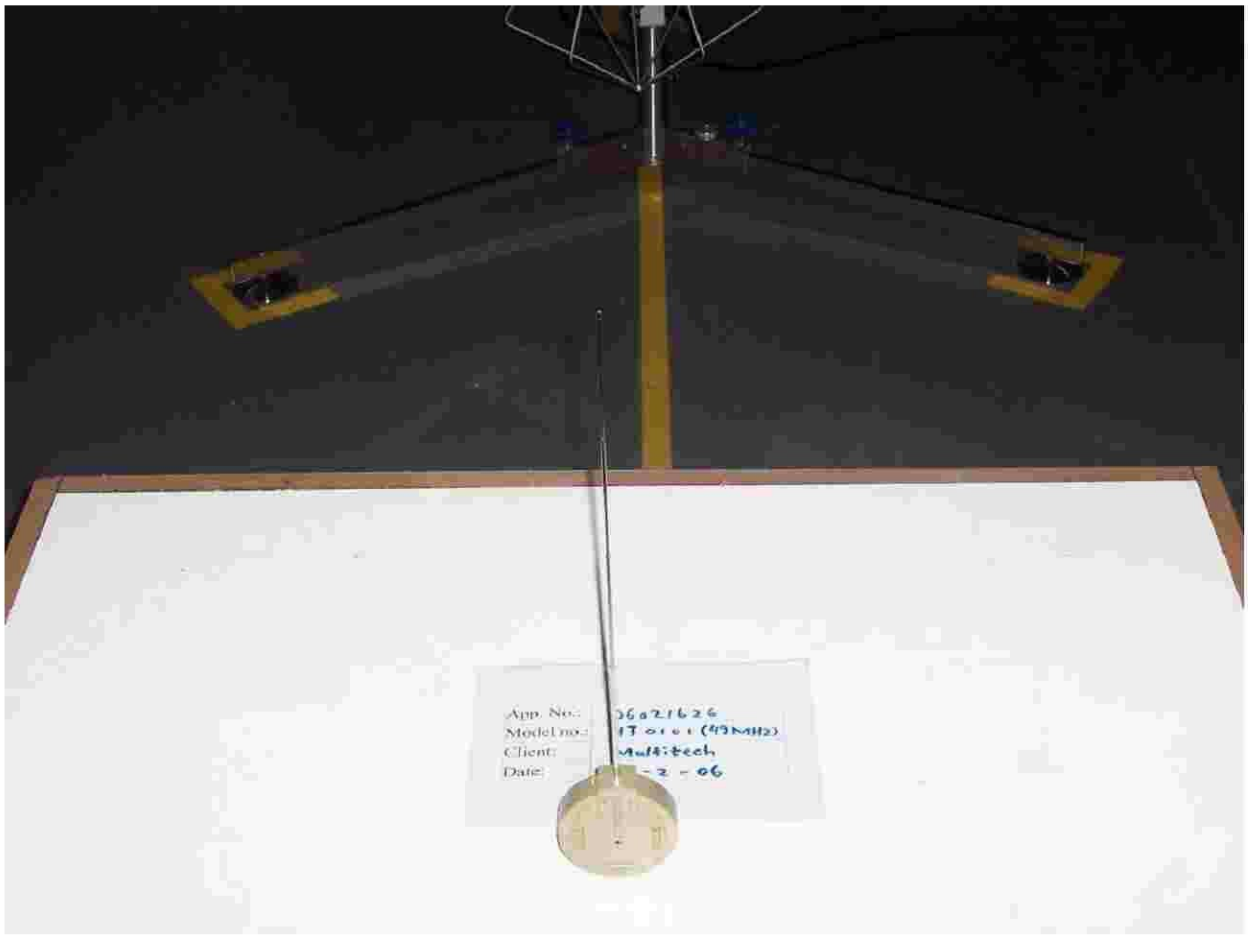
Inner Circuit Top View



Inner Circuit Bottom View

Photos of EUT

Measurement of Radiated Emission Test Set up



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