



TEST REPORT OF PART15B FOR FCC

On Behalf of

Shenzhen DIST Technology limited

FCC ID: 2AL5I-ML-DT-RT-01GR

Product Description: Dog Training Collar

Test Model: ML-DT-RT-01G

Supplement Model: ML-DT-RT-01Y, ML-DT-RT-01H, ML-DT-RT-01X,
ML-DT-RT-02G, ML-DT-RT-02Y, ML-DT-RT-02H,
ML-DT-RT-02X, ML-DT-RT-01Z

Applicant: **Shenzhen DIST Technology limited**
A2-6F, 3 Building, B-118 Xijing Rd., Gushu,Baoan, Shenzhen,
China

Manufacturer: **Shenzhen DIST Technology limited**
A2-6F, 3 Building, B-118 Xijing Rd., Gushu,Baoan, Shenzhen,
China

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Test Date: April 25~May 19, 2017

Test by: **Reviewed By:**

Owen Li

Edmund Zou



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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: **Shenzhen DIST Technology limited**
Address of applicant: A2-6F, 3 Building, B-118 Xijing Rd., Gushu,Baoan, Shenzhen, China
Manufacturer: **Shenzhen DIST Technology limited**
Address of manufacturer: A2-6F, 3 Building, B-118 Xijing Rd., Gushu,Baoan, Shenzhen, China

General Description of E.U.T

Items	Description
EUT Description:	Dog Training Collar (RX Part)
Test Model:	ML-DT-RT-01G
Supplement Model:	ML-DT-RT-01Y, ML-DT-RT-01H, ML-DT-RT-01X, ML-DT-RT-02G, ML-DT-RT-02Y, ML-DT-RT-02H, ML-DT-RT-02X, ML-DT-RT-01Z
Trade mark:	N/A
Type of Modulation:	ASK
Frequency Band:	433.92MHz
Model Difference	N/A
Number of Channels	1
Antenna Type:	Internal antenna, fixed on PCB
Antenna Gain:	2.5dBi
Rated Voltage:	5DCV from USB port and battery

Note:

* The test data gathered are from the production sample provided by the manufacturer,
All above models in the table are the same just different with the feature and colour.



1.2 Test Facility

All measurement required was performed at laboratory of Centre Testing International (ShenZhen) Corporation ,Location at Building C, Sienific Innovation Park,Tiegang Reservoir, Xixiang, Baoan District, Shenzhen, Guangdong, The site and apparatus are constructed in conformance with the requirements of ANSI C63.10, CISPR 16-1-1 and other equivalent standards.

The test facility is recognized, certified, or accredited by the following organizations:

FCC – Registration No.: 565659

Centre Testing International (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 565659, expiration date is 01/27/2017.

IC Registration No.: 7408B

The 3m alternate test site of CENTRE TESTING INTERNATIONAL (SHENZHEN) CORPORATION. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 7408B on December 29, 2009.

CNAS - Registration No.: L1910

CENTRE TESTING INTERNATIONAL (SHENZHEN) CORPORATION,. to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories(CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.The acceptance letter from the CNAS is maintained in our files: Registration:L1910,January 12,2010.

1.3 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Test item	Value (dB)
Conducted Emission Expanded Uncertainty	2.23
Radiated emission expanded uncertainty(9kHz-30MHz)	3.08
Radiated emission expanded uncertainty(30MHz-1000MHz)	4.42
Radiated emission expanded uncertainty(Above 1GHz)	4.06



2. SYSTEM TEST CONFIGURATION

The tests documented in this report were performed in accordance with ANSI C63.10-2013 and FCC CFR 47 Part 15 Subpart B.

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The calibrated antennas used to sample the radiated field strength are mounted on a non-conductive, motorized antenna mast 3 or 10 meters from the leading edge of the turntable.

2.3 General Test Procedures

Conducted Emissions The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in ANSI C63.10-2013 and FCC CFR 47 Part 15 Subpart B Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak detector mode.

Radiated Emissions The EUT is placed on a turntable, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m/10m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in ANSI C63.10-2013 and FCC CFR 47 Part 15 Subpart B.



2.4 List of Measuring Equipments

Test equipments list of CENTRE TESTING INTERNATIONAL (SHENZHEN) CORPORATION.

Shielding Room No. 1 - Conducted disturbance Test				
Equipment	Manufacturer	Model	Serial No.	Due Date
Receiver	R&S	ESCI	100009	08/19/2017
LISN	ETS-LINDGREN	3850/2	00051952	08/19/2017
LISN	R&S	ENV216	100098	08/19/2017
Voltage Probe	R&S	ESH2-Z3	100042	08/19/2017
Current Probe	R&S	EZ17	100106	08/19/2017
ISN	TESEQ GmbH	ISN T800	30297	09/04/2017

Control Room - Conducted disturbance Test (10m part)				
Equipment	Manufacturer	Model	Serial No.	Due Date
Receiver	R&S	ESCI	100435	08/19/2017
LISN	schwarzbeck	NNLK8121	8121-529	08/19/2017
Transient Limiter	ELECTRO-METRICS	EM-7600	806	08/19/2017
Voltage Probe	R&S	ESH2-Z3	100042	08/19/2017
Current Probe	R&S	EZ17	100106	08/19/2017
ISN	TESEQ GmbH	ISN T800	30297	09/04/2017
Horn Antenna	ETS-LINGREN	3117	00057407	08/19/2017

3M Semi-anechoic Chamber - Radiated disturbance Test				
Equipment	Manufacturer	Model	Serial No.	Due Date
3M Chamber & Accessory Equipment	ETS-LINDGREN	FACT-3	3510	09/09/2017
Spectrum Analyzer	Agilent	E4440A	MY46185649	09/07/2017
TRILOG Broadband Antenna	schwarzbeck	VULB 9163	401	08/21/2017
Multi device Controller	ETS-LINGREN	2090	00057230	N/A
Horn Antenna	ETS-LINGREN	3117	00057407	08/19/2017
Microwave Preamplifier	Agilent	8449B	3008A02425	08/29/2017

10M Semi-anechoic Chamber - Radiated disturbance Test				
Equipment	Manufacturer	Model	Serial No.	Due Date
10M Chamber & Accessory Equipment	Rainford	--	--	09/06/2017
Receiver	R&S	ESCI	100435	08/19/2017
Spectrum Analyzer	R&S	FSP40	100416	09/06/2017
EMI test receiver	R&S	ESIB40	2023282915	08/24/2017



TRILOG Broadband Antenna	schwarzbeck	VULB 9163	484	08/21/2017
Horn Antenna	ETS-LINGREN	3117	00044562	09/07/2017
Microwave Preamplifier	Agilent	11909A	186871	09/06/2017
Microwave Preamplifier	HP	HP 8447F	2805A03379	09/06/2017
Microwave Preamplifier	CD	PAP-1G18G	2001	08/29/2017

Shielding Room No. 2 - Harmonic / Flicker Test (EN 61000-3-2) / (EN 61000-3-3)

Equipment	Manufacturer	Model	Serial No.	Due Date
5KVA AC POWER SOURCE	California instruments	5001iX-400-413	57344	08/29/2017
Flicker & Harmonic Tester	California instruments	PACS-1	72492	08/29/2017

Shielding Room No. 3 - ESD Test (IEC 61000-4-2)

Equipment	Manufacturer	Model	Serial No.	Due Date
ESD Simulator	EM TEST	ESD30C	V0603101091	08/30/2017
ESD Simulator	TESEQ	NSG437	478	08/22/2017

3M Full-anechoic Chamber - Radio-frequency electromagnetic field Immunity Test (IEC 61000-4-3)

Equipment	Manufacturer	Model	Serial No.	Due Date
3M Chamber & Accessory Equipment	ETS-LINDGREN	FACT-3	3510	09/09/2017
ESG Vector signal generators	Agilent	E4438C	MY45095744	09/07/2017
Power Amplifier	AR	150W1000	0322288	08/29/2017
TRILOG Broadband Antenna	schwarzbeck	VULB 9163	401	08/29/2017
Temperature & Humidity Chamber	ESPEC	DSW0540	ER-009	08/29/2017

Shielding Room No. 3 - EFT / Surges Test (IEC 61000-4-4) (IEC 61000-4-5)

Equipment	Manufacturer	Model	Serial No.	Due Date
Compact Generator	EM-Test	UCS500M/6B	V0603101093	09/19/2017
Capacitive Clamp	EM-Test	C Clamp HFK	0306-43	08/29/2017
CDN for Telecom Port	EM-Test	CNV504S1	V0603101094	08/29/2017
EFT Generator	SCHAFFNER	NSG 2025	19878	08/19/2017
SURGE Generator	SCHAFFNER	NSG 2050	200313-135AR	08/19/2017
CDN	SCHAFFNER	CDN-131/133	34397	08/29/2017

Shielding Room No. 2 - Radio-frequency continuous conducted Immunity Test (IEC 61000-4-6)

Equipment	Manufacturer	Model	Serial No.	Due Date
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Signal Generator	IFR	2023B	202307/883	09/07/2017
Power Amplifier	AR	75A 250A	320297	08/19/2017
Attenuator	EM-Test	ATT6/75	0320837	08/19/2017
CDN	EM-Test	CDN M2/M3	0204-01	08/19/2017
EM-Clamp	EM-Test	EM101	35770	08/19/2017

Shielding Room No. 2 - Power-frequency magnetic fields Immunity Test (IEC 61000-4-8)

Compact Generator	EM-Test	UCS500M/6B	V0603101093	08/19/2017
Induction Coil	EM-Test	MS100	0106-47	08/19/2017
Current Transformer	EM-Test	MC2630	0106-02	08/19/2017

Shielding Room No. 2 -Voltage dips and interruptions Test (IEC 61000-4-11)

Equipment	Manufacturer	Model	Serial No.	Due Date
5KVA AC POWER SOURCE	California instruments	5001iX-400-413	57344	08/19/2017
Electronic output switch	California instruments	EOS-1	72616	08/19/2017



3. SUMMARY OF TEST RESULTS

Test Rules	Description of Test	Result
FCC Part 15.107	Conducted Emission	Pass
FCC Part 15.109	Radiation Emission	Pass



4. Conducted Emission

4.1 Applicable Standard

for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

4.2 Limits

Limits for Class A digital devices

Frequency range (MHz)	Limits dB(μ V)	
	Quasi-peak	Average
0.15 to 0.50	79	66
0.50 to 30	73	60

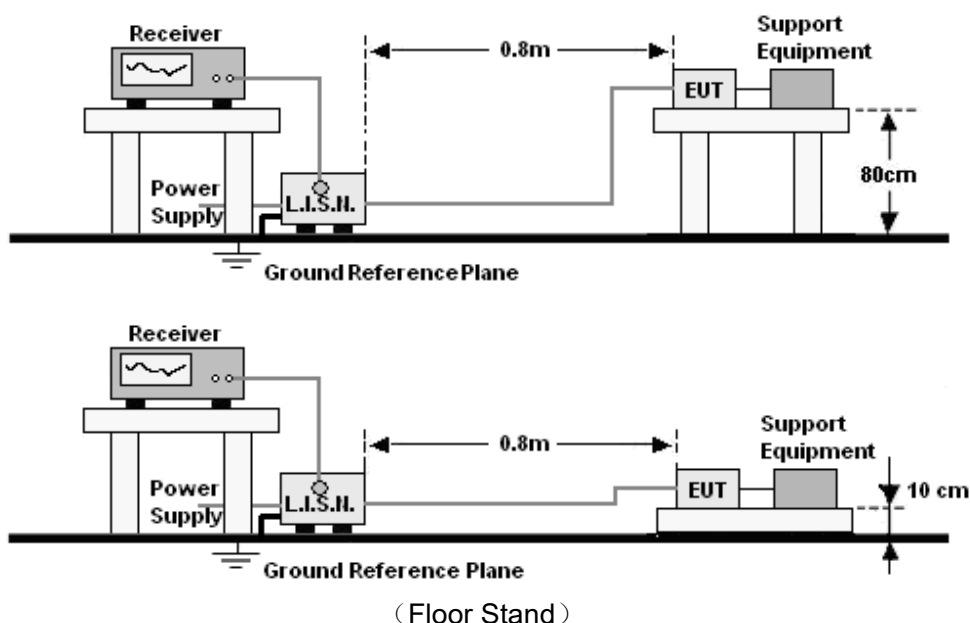
NOTE: The lower limit shall apply at the transition frequency.

Limits for Class B digital devices

Frequency range (MHz)	Limits dB(μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

NOTE: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50 MHz.

4.3 EUT Test Setup



4.4 Procedure Of Conducted Emission Test

- a. The Product was placed on a nonconductive table above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stability Network (L.I.S.N).
- b. The RBW of the receiver was set at 9 kHz in 150 kHz ~ 30MHz with Peak and AVG detector in Max Hold mode. Run the receiver's pre-scan to record the maximum disturbance generated from Product in all power lines in the full band.
- c. For each frequency whose maximum record was higher or close to limit, measure its QP and AVG values and record.

4.5 Test Result

Temperature (°C) : 22~23	EUT: Dog Training Collar
Humidity (%RH) : 50~54	M/N: ML-DT-RT-01G
Barometric Pressure (mbar) : 950~1000	Operation Condition: Charging

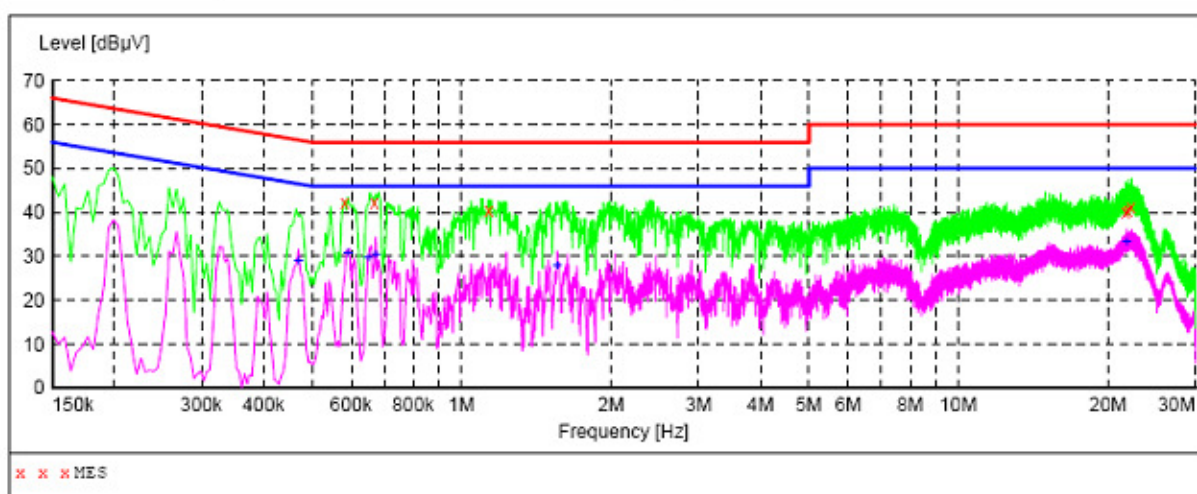




The Test Data Of Conducted Emission

EUT: Dog Training Collar
M/N: ML-DT-RT-01G
Operating Condition: Charging
Test Site: CHAMBER
Operator: Owen Li
Comment: Line:L
Tem:23°C Hum:50%

SCAN TABLE: "Voltage (150K-30M) FIN"
Short Description: 150K-30M Voltage



MEASUREMENT RESULT:

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	FE
0.582000	42.20	9.9	56	13.8	QP	L1	GND
0.667500	42.30	9.9	56	13.7	QP	L1	GND
1.135500	40.30	9.9	56	15.7	QP	L1	GND
21.700500	40.10	9.7	60	19.9	QP	L1	GND
21.979500	40.50	9.7	60	19.5	QP	L1	GND
22.245000	41.00	9.7	60	19.0	QP	L1	GND

MEASUREMENT RESULT:

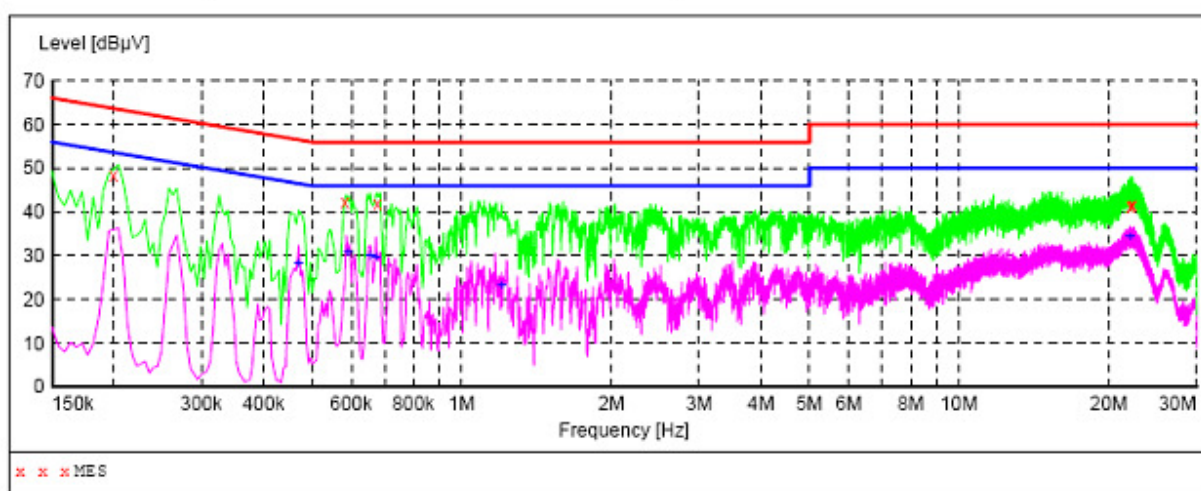
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	FE
0.469500	28.80	9.9	47	17.7	AV	L1	GND
0.591000	30.80	9.9	46	15.2	AV	L1	GND
0.649500	29.80	9.9	46	16.2	AV	L1	GND
0.672000	30.20	9.9	46	15.8	AV	L1	GND
1.558500	27.80	9.9	46	18.2	AV	L1	GND
21.835500	33.30	9.7	50	16.7	AV	L1	GND



The Test Data Of Conducted Emission

EUT: Dog Training Collar
M/N: ML-DT-RT-01G
Operating Condition: Charging
Test Site: CHAMBER
Operator: Owen Li
Comment: Line:N

SCAN TABLE: "Voltage (150K-30M) FIN"
Short Description: 150K-30M Voltage



MEASUREMENT RESULT:

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.199500	48.30	9.9	64	15.3	QP	N	GND
0.582000	42.30	9.9	56	13.7	QP	N	GND
0.676500	41.90	9.9	56	14.1	QP	N	GND
22.119000	41.30	9.7	60	18.7	QP	N	GND
22.222500	41.50	9.7	60	18.5	QP	N	GND
22.276500	41.40	9.7	60	18.6	QP	N	GND

MEASUREMENT RESULT:

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.469500	28.10	9.9	47	18.4	AV	N	GND
0.591000	30.80	9.9	46	15.2	AV	N	GND
0.654000	30.10	9.9	46	15.9	AV	N	GND
0.672000	29.60	9.9	46	16.4	AV	N	GND
1.203000	23.20	9.9	46	22.8	AV	N	GND
22.087500	34.40	9.7	50	15.6	AV	N	GND

5. Spurious Radiated Emission

5.1 Applicable Standard

For intentional device, according to 15.109(a), the general requirement of field strength of radiated emission from intentional radiators shall not exceed the following tables.

Limits for Class B digital devices

Frequency (MHz)	limits at 3m dB(μ V/m)
30-88	40.0
88-216	43.5
216-960	46.0
Above 960	54.0

- NOTE:**
1. The lower limit shall apply at the transition frequency.
 2. The limits shown above are based on measuring equipment employing a CISPR quasi-peak detector function for frequencies below or equal to 1000MHz.
 3. The limits shown above are based on measuring equipment employing an average detector function for frequencies above 1000MHz.

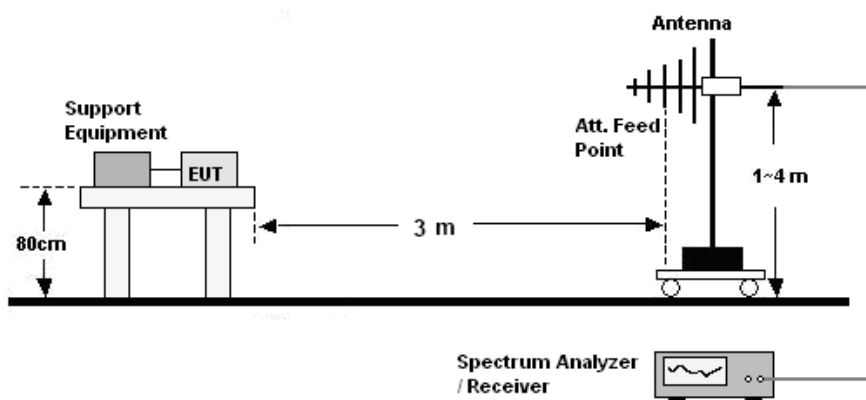
Limits for Class B digital devices

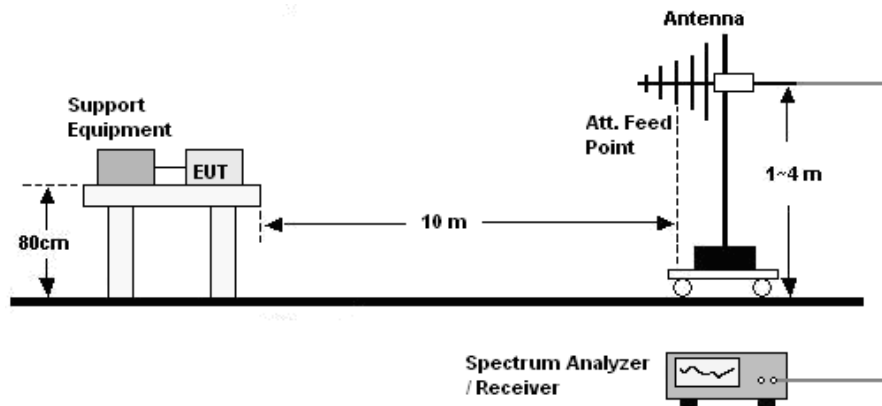
Frequency (MHz)	limits at 10m dB(μ V/m)
30-88	30.0
88-216	33.5
216-960	56.0
Above 960	64.0

- NOTE:**
1. The lower limit shall apply at the transition frequency.
 2. The limits shown above are based on measuring equipment employing a CISPR quasi-peak detector function for frequencies below or equal to 1000MHz.
 3. The limits shown above are based on measuring equipment employing an average detector function for frequencies above 1000MHz.

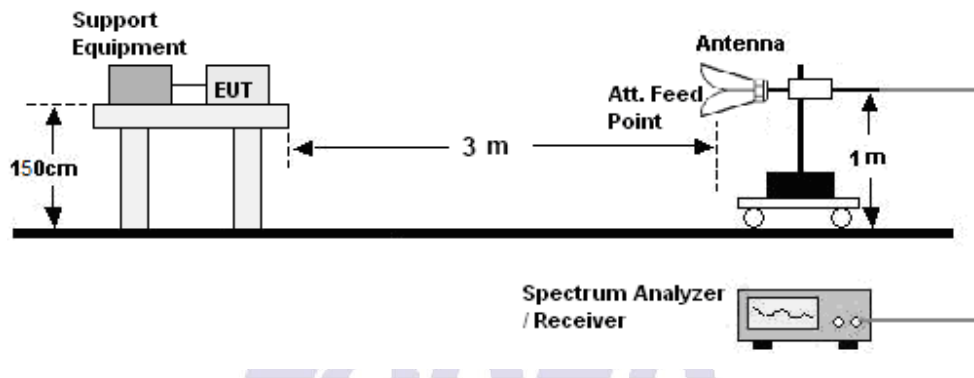
5.2 Radiated Measurement Setup

30MHz ~ 1GHz:





Above 1GHz:



5.3 Test Equipment List and Details

See section 2.4.

5.4 Radiated Measurement Test Procedure

30MHz ~ 1GHz:

- The Product was placed on the non-conductive turntable 0.8/0.1 m above the ground at a chamber.
- Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.

- c. For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.

Above 1GHz:

- a. The Product was placed on the non-conductive turntable 1.5/0.1 m above the ground at a chamber.
- b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
- c. For each frequency whose maximum record was higher or close to limit, measure its AV value: rotate the turntable from 0 to 360 degrees to find the degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to AV value and specified bandwidth with Maximum Hold Mode, and record the maximum value.

5.5 Test Result

Temperature (°C) : 22~23	EUT: Dog Training Collar
Humidity (%RH) : 50~54	M/N: ML-DT-RT-01G
Barometric Pressure (mbar) : 950~1000	Operation Condition: Normal working
Test Site: 3m Chamber	

Note:

The test data(above 1GHz) is lower than limit much,so not record in the report,just provided the worst test data as below.

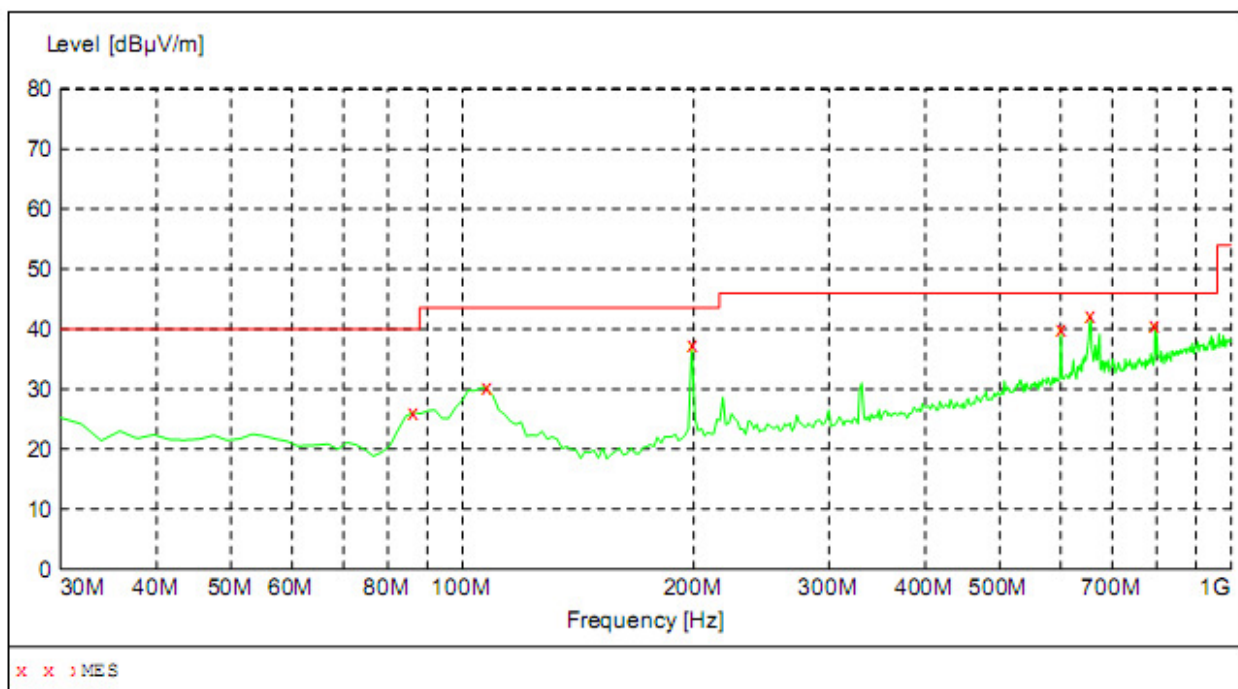


Radiated Emission Test Data:

EUT: Dog Training Collar
M/N: ML-DT-RT-01G
Operating Condition: Normal working
Test Site: 3m CHAMBER
Operator: Owen Li
Comment: Polarization: Horizontal

SWEEP TABLE: "test (30M-1G)"

Short Description:		Field Strength			
Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	VULB9163 NEW



MEASUREMENT RESULT:

Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
86.260000	26.10	14.8	40.0	13.9	---	300.0	0.00	HORIZONTAL
107.600000	30.20	16.9	43.5	13.3	---	300.0	0.00	HORIZONTAL
198.780000	37.40	16.1	43.5	6.1	---	300.0	0.00	HORIZONTAL
600.360000	40.10	26.4	46.0	5.9	---	100.0	0.00	HORIZONTAL
656.620000	42.10	27.0	46.0	3.9	---	100.0	0.00	HORIZONTAL
796.300000	40.50	29.4	46.0	5.5	---	100.0	0.00	HORIZONTAL

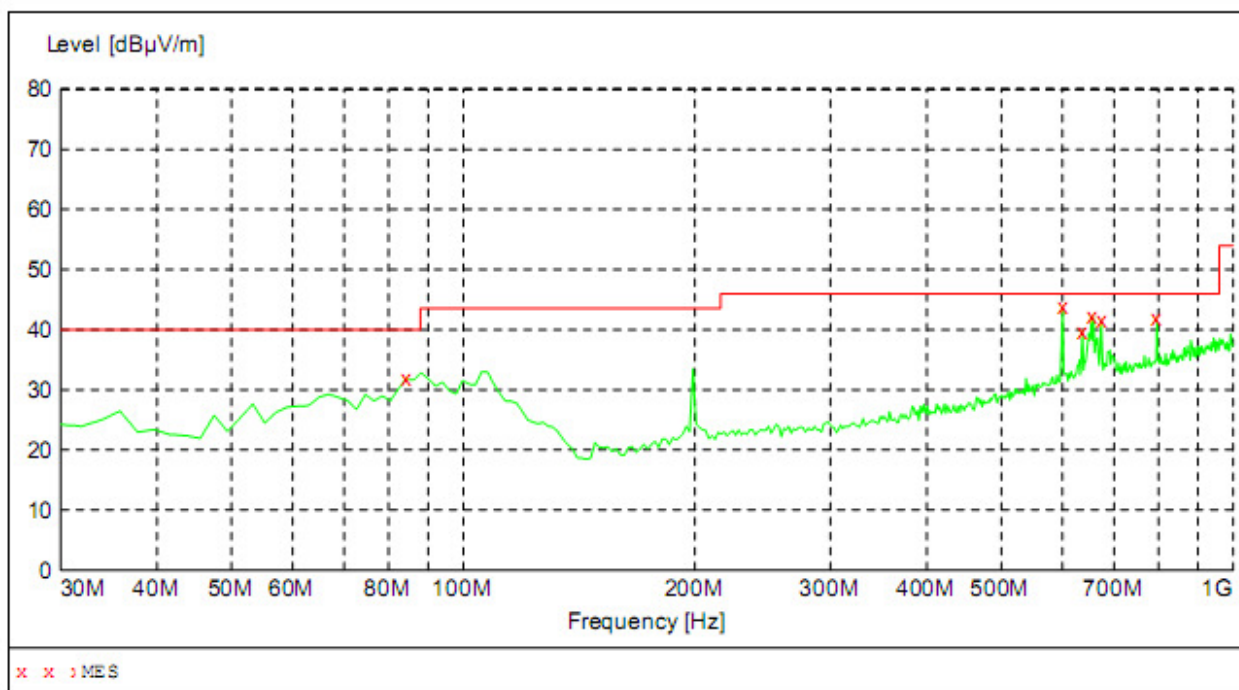


Radiated Emission Test Data:

EUT: Dog Training Collar
M/N: ML-DT-RT-01G
Operating Condition: Normal working
Test Site: 3m CHAMBER
Operator: Owen Li
Comment: Polarization: Vertical

SWEEP TABLE: "test (30M-1G)"

Short Description:		Field Strength			
Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	VULB9163 NEW



MEASUREMENT RESULT:

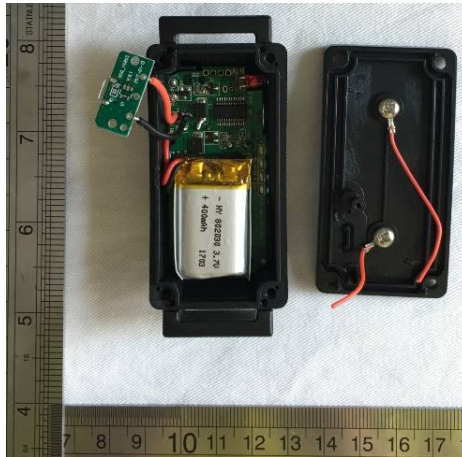
Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
84.320000	31.80	14.1	40.0	8.2	---	100.0	0.00	VERTICAL
600.360000	43.70	26.4	46.0	2.3	---	100.0	0.00	VERTICAL
637.220000	39.80	26.8	46.0	6.2	---	100.0	0.00	VERTICAL
654.680000	42.10	27.0	46.0	3.9	---	100.0	0.00	VERTICAL
674.080000	41.50	27.3	46.0	4.5	---	100.0	0.00	VERTICAL
796.300000	41.80	29.4	46.0	4.2	---	100.0	0.00	VERTICAL

APPENDIX A - External Photographs

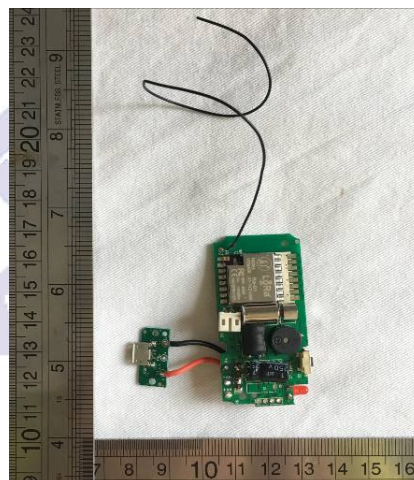
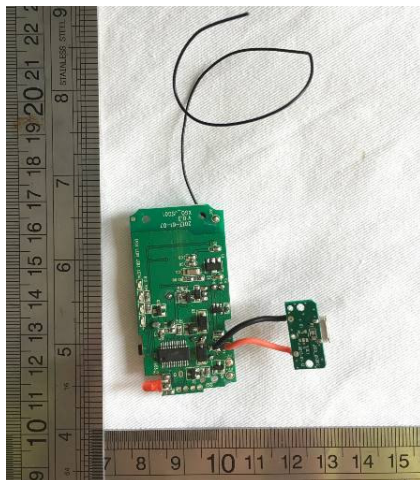


APPENDIX B - Internal Photographs

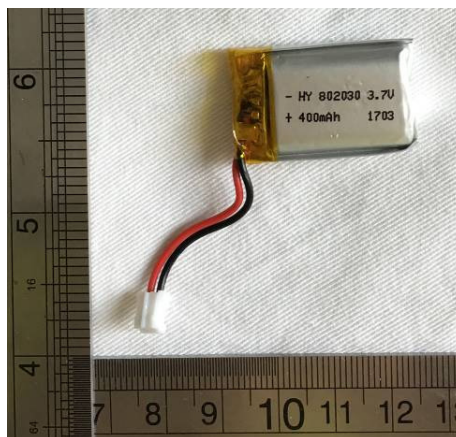
EUT –Uncovered View



EUT –PCB View



EUT –Battery View



APPENDIX C - Test Setup Photographs

Conducted Emission Test



Radiated Emission Test

