

EMC TEST REPORT

Reference No. : WT10125148-E-E-E

Applicant : Cherub Technology Company Limited.

Address : 6F, Building A2, Xili Nangang No.2 Industrial Park, Songbai Rd., Nanshan District, Shenzhen

Equipment Under Test (EUT) :

Product Name : TUNER METRONOME

Model No. : MT-50

Standards : EN61000-6-1:2007
EN61000-6-3:2007

Date of Test : Dec. 11-14, 2010

Engineer : Sonic.Chen *Sonic chen*

Reviewed By : Philo.Zhong *Philo zhong*

Test Result :	PASS *
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Prepared By:

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* The sample detailed above has been tested to the requirements of Council Directives 2004/108/EC. The test results have been reviewed against the Directives above and found to meet their essential requirement

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1 Test Summary

Test	Test Requirement	Test Method	Class / Severity	Result
Mains Terminal Disturbance Voltage, 150kHz to 30MHz	EN61000-6-3:2007	EN55022:2006 +A1:2007	Class B	N/A
Radiation Emission, 30MHz to 1000MHz	EN61000-6-3:2007	EN55022:2006 +A1:2007	Class B	PASS
ESD	EN61000-6-1:2007	EN 61000-4-2 :2009	±4 kV Contact ±8 kV Air	PASS
Radiated Immunity (80MHz to 2.7GHz)	EN61000-6-1:2007	EN 61000-4-3 : 2006	1~3V/m, 80%, 1kHz, Amp. Mod.	PASS
Electrical Fast Transients (EFT) on AC	EN61000-6-1:2007	EN 61000-4-4 :2004	AC ±1.0kV DC ±0.5kV	N/A
Surge Immunity on AC	EN61000-6-1:2007	EN 61000-4-5 : 2006	±1kV D.M.† ±2kV C.M.‡	N/A
Injected Currents on AC, 150kHz to 80MHz	EN61000-6-1:2007	EN 61000-4-6 :2009	3Vrms(emf), 80%, 1kHz Amp. Mod.	N/A
Power-frequency magnetic field	EN61000-6-1:2007	EN 61000-4-8 :1993 +A1:2001	3A/m	N/A
Voltage Dips and Interruptions on AC	EN61000-6-1:2007	EN 61000-4-11:2004	>95 % U_T^* for 0.5per >95 % U_T^* for 250per 30 % U_T^* for 25per	N/A

Remark:

A.M. Amplitude Modulation.

P.M. Pulse Modulation.

† D.M. – Differential Mode

* U_T is the nominal supply voltage

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3 General Information

3.1 Client Information

Applicant: Cherub Technology Company Limited.
Address of Applicant: 6F, Building A2, Xili Nangang No.2 Industrial Park, Songbai Rd., Nanshan District, Shenzhen

Manufacturer : Cherub Technology Company Limited.
Address of Manufacturer: 6F, Building A2, Xili Nangang No.2 Industrial Park, Songbai Rd., Nanshan District, Shenzhen

3.2 General Description of E.U.T.

Product Name: TUNER METRONOME
Model No.: MT-50

3.3 Details of E.U.T.

Power supply Battery: DC1.5V*2, AAA

3.4 Description of Support Units

The EUT has been tested as an independent unit.

3.5 Standards Applicable for Testing

The customer requested EMC tests for a TUNER METRONOME. The standards used were EN61000-6-3 Class B for emissions & EN 61000-6-1 for immunity.

Table 1 : Tests Carried Out Under EN61000-6-3:2007

Standard	Status
EN61000-6-3:2007 Radiation Emission, 30MHz to 1000MHz	√
EN61000-6-3:2007 Mains Terminal Disturbance Voltage, 150KHz to 30MHz	×

Table 2 : Tests Carried Out Under EN 61000-6-1:2007

Standard	Status
EN 61000-4-2:2009 Electro-static discharge	√
EN 61000-4-3:2006 Radio frequency EM fields (80MHz to 2.7GHz)	√
EN 61000-4-4:2004 Fast transients	×
EN 61000-4-5:2006 Surges	×
EN 61000-4-6:2009 Radio frequency continuous conducted (150kHz to 80MHz)	×
EN 61000-4-8:1993+A1:2001 Power-frequency magnetic field (50Hz)	×
EN 61000-4-11:2004 Voltage dips & interruptions	×

√ Indicates that the test is applicable

× Indicates that the test is not applicable

3.6 Test Facility

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

- **FCC – Registration No.:880581**

Waltek Services(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 880581, June 24, 2008.

- **IC – Registration No.: 7760A**

Waltek Services(Shenzhen) Co., Ltd. has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration 7760A, Aug. 03, 2010

3.7 Test Location

All the tests were performed at:-

Waltek Services(Shenzhen) Co., Ltd. at 1/F, Fukangtai Building, West Baima Rd.,Songgang Street, Baoan District, Shenzhen, China.

4 Equipment Used during Test

Equipment Name	Manufacturer Model	Equipment No	Internal No	Specification	Cal. Date	Due Date	Cert. No	Uncertainty
EMC Analyzer	Agilent/ E7405A	MY451149 43	W2008001	9k-26.5GHz	Aug- 03-10	Aug- 02-11	Wws200 81596	±1dB
Trilog Broadband Antenne 30-3000 MHz	SCHWARZB ECK MESS- ELEKTROM/ VULB9163	336	W2008002	30-3000 MHz	Aug- 03-10	Aug- 02-11		±1dB
Broad-band Horn Antenna	SCHWARZB ECK MESS- ELEKTROM/ BBHA 9120D(1201)	667	W2008003	1-18GHz	Aug- 03-10	Aug- 02-11		f<10 GHz: ±1dB 10GHz<f< 18 GHz: ±1.5dB
Broadband Preamplifier	SCHWARZB ECK MESS- ELEKTROM/ BBV 9718	9718-148	W2008004	0.5-18GHz	Aug- 03-10	Aug- 02-11		±1.2dB
10m Coaxial Cable with N-male Connectors usable up to 25GHz,	SCHWARZB ECK MESS- ELEKTROM/ AK 9515 H	-	-	-	Aug- 03-10	Aug- 02-11		-
10m 50 Ohm Coaxial Cable with N-plug, individual length, usable up to 3(5)GHz, Connector	SCHWARZB ECK MESS- ELEKTROM/ AK 9513				Aug- 03-10	Aug- 02-11		
Positioning Controller	C&C LAB/ CC-C-IF				N/A	N/A		
Color Monitor	SUNSPO/ SP- 14C				N/A	N/A		
Test Receiver	ROHDE&SC HWAZ/ ESPI	101155	W2005001	9k-3GHz	Aug- 03-10	Aug- 02-11	Wws200 80942	±1dB
EMI Receiver	Beijingkehua n	KH3931		9k-1GHz	Aug- 03-10	Aug- 02-11		
Two-Line V-Network	ROHDE&SC HWAZ/ ENV216	100115	W2005002	50Ω/50μH	Aug- 03-10	Aug- 02-11	Wws200 80941	±10%

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Equipment Name	Manufacturer Model	Equipment No	Internal No	Specification	Cal. Date	Due Date	Cert. No	Uncertainty
Absorbing Clamp	ROHDE&SC HWAHZ/ MDS-21	100205	W2005003	impedance 50 Ω loss : 17 dB	Aug- 03-10	Aug- 02-11	Wws200 80943	± 1 dB
10m 50 Ohm Coaxial Cable with N-plug, individual length, usable up to 3(5)GHz, Connectors	SCHWARZB ECK MESS- ELEKTROM/ AK 9514				Aug- 03-10	Aug- 02-11		
Digital Power Analyzer	Em Test AG/Switzerla nd/ DPA 500	V07451 03095	W2008012	Power: 2000VA Vol-range: 0- 300V Freq_range: 10-80Hz	Aug- 03-10	Aug- 02-11	Wwd200 81185	Voltage distinguish:0 .025% Power_freq distinguish:0 .02Hz
Power Source	Em Test AG/Switzerla nd/ ACS 500	V07451 03096	W2008013	Vol-range: 0- 300V Power_freq: 10-80Hz				
Electrostatic Discharge Simulator	Em Test AG/Switzerla nd/DITO	V07451 03094	W2008005	Contact discharge: 500V-10KV Air diacharge: 500V-16.5KV	Aug- 03-10	Aug- 02-11	Wwc200 82400	7.5A current will be changed in $V_m=1.5V$
RF Generator	TESEQ GmbH/ NSG4070	25781	W2008008	Fraq-range: 9K-1GHz RF voltage: - 60 dBm- +10dBm	Aug- 03-10	Aug- 02-11	Wws200 81890	Power_freq distinguish0. 1Hz RFelectricity distinguish 0.1 B
CDN M- Type	TESEQ GmbH/ CDN M016	25112	W2008009	Voltage correct factor 9.5 dB	Aug- 03-10	Aug- 02-11	Wwc200 82396	150K- 80MHz: ± 1 dB 80- 230MHz:-2- +3dB
EM-Clamp	TESEQ GmbH/ KEMZ 801	25453	W2008010	Freq_range: 0.15-1000 MHz	Aug- 03-10	Aug- 02-11	Wwc200 82397	0.3-400 MHz: ± 4 dB Other freq: ± 5 dB
Attenuator 6dB	TESEQ GmbH/ ATN6050	25365			Aug- 03-10	Aug- 02-11	Wws200 81597	

Equipment Name	Manufacturer Model	Equipment No	Internal No	Specification	Cal. Date	Due Date	Cert. No	Uncertainty
All Modules Generator	SCHAFFNER /6150	34579	W2008006	voltage:200V-4.4KV Pulse current: 100A-2.2KA	Aug-03-10	Aug-02-11	Wwc200 82401	voltage: ±10% Pulse current: ±10%
Capacitive Coupling Clamp	SCHAFFNER / CDN 8014	25311			Aug-03-10	Aug-02-11	Wwc200 82398	-
Signal and Data Line Coupling Network	SCHAFFNER / CDN 117	25627	W2008011	1.2/50µS	Aug-03-10	Aug-02-11	Wwc200 82399	-
AC Power Supply	TONGYUN/ DTDGC-4				Aug-03-10	Aug-02-11	Wws200 80944	-
Exposure Level Tester ELT-400	Narda Safety TEST Solutions/230 4/03	M-0155	w2008022	Test freq range: 1 – 400kHz	Aug-03-10	Aug-02-11	Wwd200 81191	Test uncertainly: 1 – 120kHz:±1.83%, 120 kHz-400 kHz: ±4.06%
Magnetic Field Probe 100cm ²	Narda Safety TEST Solutions/230 0/90.10	M-1070	w2008021	Test freq range: 1 – 400kHz				Test uncertainly: 1Hz-10Hz: ±16.2%, 10Hz - 120kHz:±2.2%, 120 kHz-400 kHz: ±4.7%
Active Loop Antenna Charger 10kHz-30MHz	Beijing Dazhi / ZN30900A	-	-	10kHz-30MHz	Aug-03-10	Aug-02-11		±1dB

5 Emission Test Results

5.1 Radiation Emission Data

Test Requirement:	EN 61000-6-3
Test Method:	EN 55022
Test Result:	PASS
Frequency Range:	30MHz to 1000MHz
Class/Severity:	Class B
Detector:	Peak for pre-scan (120kHz Resolution Bandwidth) Quasi-Peak & Average if maximised peak within 6dB of Average Limit

5.1.1 E.U.T. Operation

Operating Environment:	
Temperature:	25.5 °C
Humidity:	51 % RH
Atmospheric Pressure:	1012 mbar

EUT Operation :

Compliance test was performed in tuner and metronome mode, tuner is the worst mode,below shows the mode data.

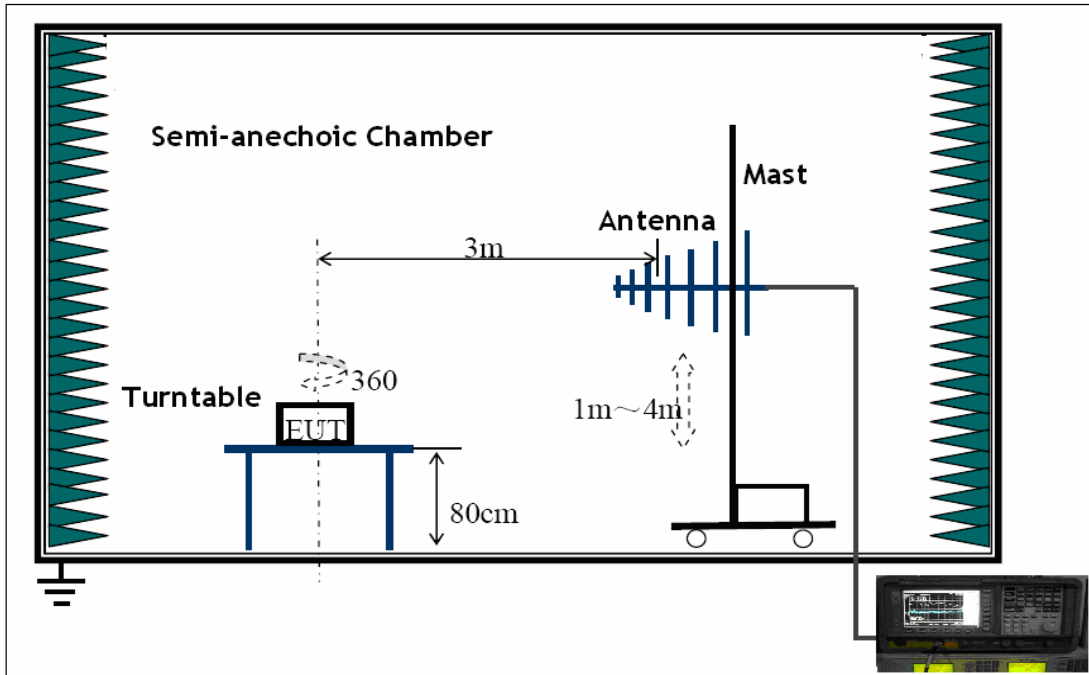
5.1.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR 16-4-2, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Waltek EMC Lab is ± 5.03 dB.

5.1.3 EUT Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the CISPR16-1, The specification used in this report was the EN55022 Class B limits.



5.1.4 Spectrum Analyzer Setup

According to EN55022 Class B Rules, the system was tested to 1000 MHz.

Start Frequency.....	30 MHz
Stop Frequency.....	1000 MHz
Sweep Speed	Auto
IF Bandwidth.....	120KHz
Video Bandwidth.....	100KHz
Quasi-Peak Adapter Bandwidth.....	120 KHz
Quasi-Peak Adapter Mode.....	Normal
Resolution Bandwidth.....	100KHz

5.1.5 Test procedure

The radiated emissions test.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combinations.

All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB μ V of specification limits), and are distinguished with a "**Qp**" in the data table.

The EUT was under normal mode during the final qualification test and the configuration was used to represent the worst case results.

5.1.6 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB μ V means the emission is 7dB μ V below the maximum limit for Class B. The equation for margin calculation is as follows:

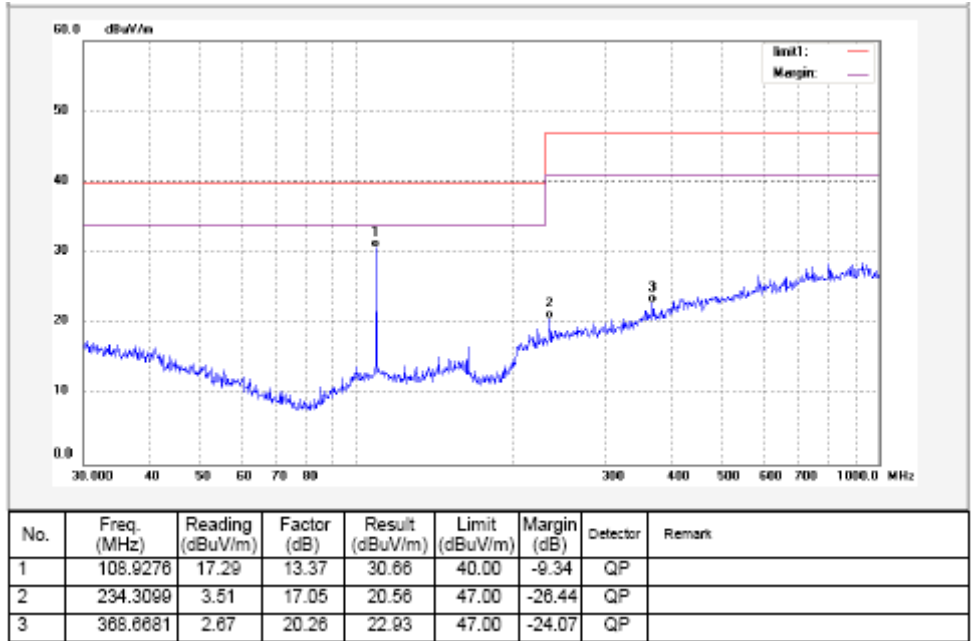
$$\text{Margin} = \text{Corr. Ampl.} - \text{Class B Limit}$$

5.1.7 Summary of Test Results

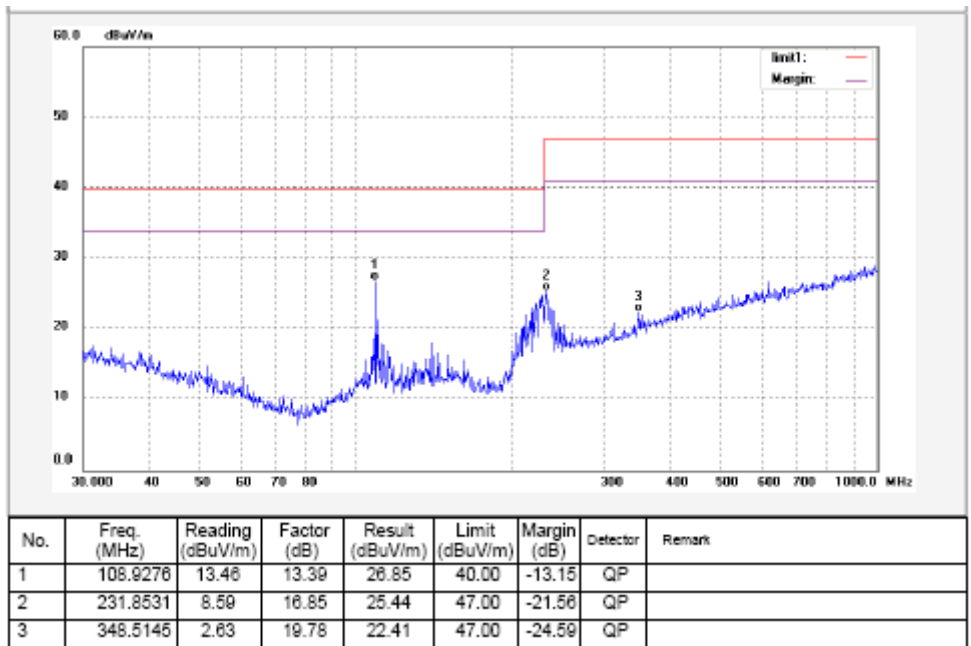
According to the data in section 5.1.8, the EUT complied with the EN55022 Class B standards.

5.1.8 Radiated Emissions Test Data

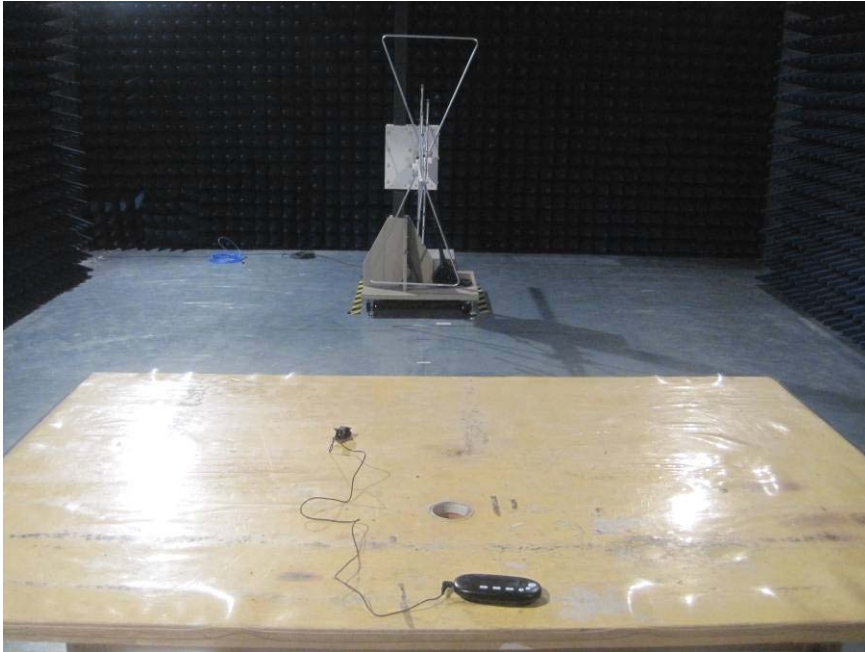
Antenna polarization:Vertical



Antenna polarization:Horizontal



5.1.9 Photograph – Radiation Emission Test Setup



6 Immunity Test Results

6.1 Performance Criteria Description

Criterion A: The apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.

Criterion B: The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.

Criterion C: Temporary loss of function is allowed, provided the function is self recoverable or can be restored by the operation of the controls.

For further details, please refer to EN 61000-6-1.

6.2 ESD

Test Requirement:	EN 61000-6-1
Test Method:	EN 61000-4-2
Test Result:	PASS
Discharge Impedance:	330 Ω / 150 pF
Discharge Voltage:	Air Discharge: +/-8 kV Contact Discharge: +/-4 kV, HCP & VCP: +/-4 kV
Polarity:	Positive & Negative
Number of Discharge:	Minimum 10 times at each test point
Discharge Mode:	Single Discharge
Discharge Period:	1 second minimum

6.2.1 E.U.T. Operation

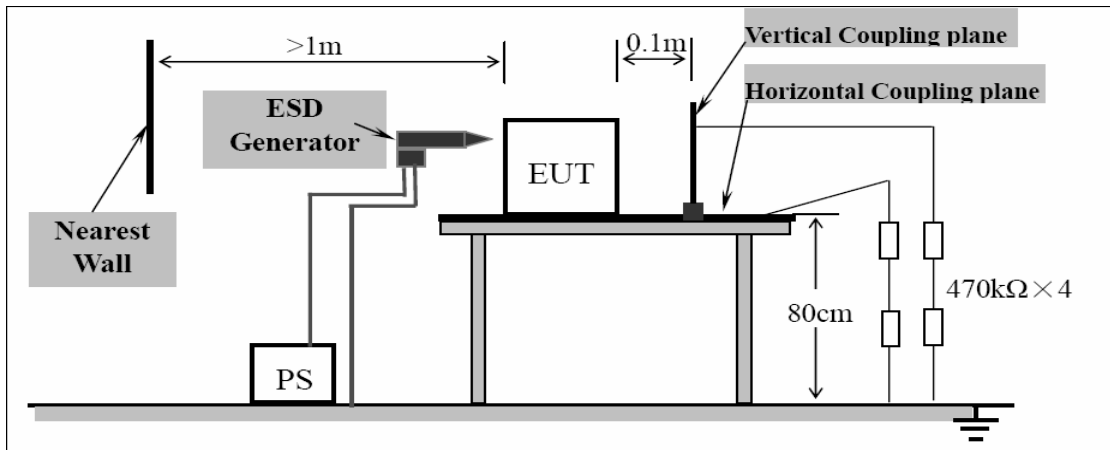
Operating Environment:	
Temperature :	25.5 °C
Humidity :	51 % RH
Barometric Pressure :	1012 mbar

EUT Operation:

Compliance test was performed in tuner and metronome mode.

6.2.2 ESD Test Setup

The ESD Test setup accordance with the EN 61000-4-2, The Specification used in this report was the EN 55024 Paragraph 4.2 requirements.



6.2.3 Direct Application Test Results

Observations : Test points : 1. All Exposed Surface & Seams;
2. All metallic part

Direct Application			Test Results	
Discharge Level (kV)	Polarity (+/-)	Test Point	Contact Discharge	Air Discharge
8	+/-	2	N/A	B
4	+/-	1	B	N/A

Results

B: Criterion B, please refer to clause 6.1 for more details.

N/A: Not applicable.

6.2.4 Indirect Application Test Results

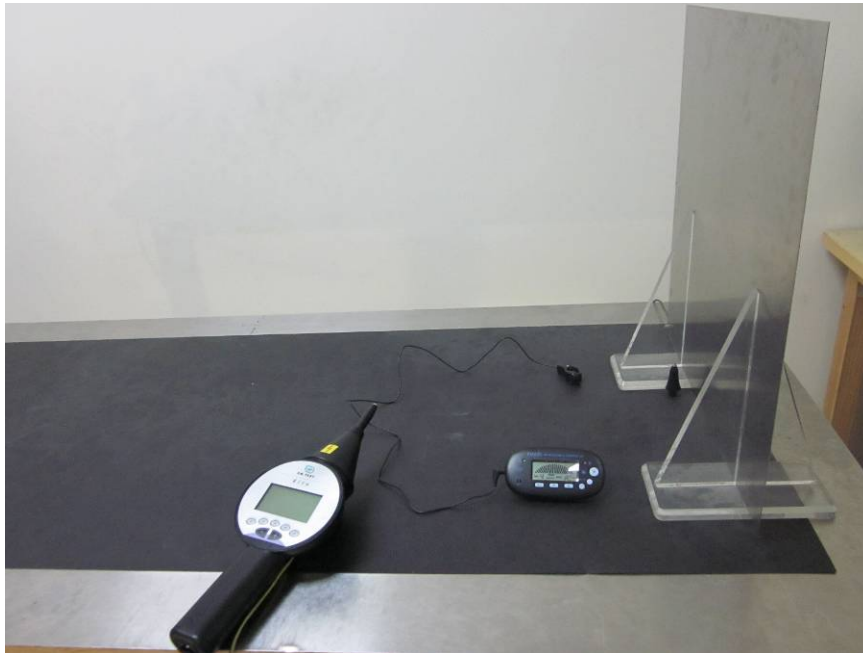
Observations : Test points : 1. All sides.

Indirect Application			Test Results	
Discharge Level (kV)	Polarity (+/-)	Test Point	Horizontal Coupling	Vertical Coupling
4	+/-	1	B	B

Results

B: Criterion B, please refer to clause 6.1 for more details.

6.2.5 Photograph - ESD Test Setup



6.3 Radiated Immunity

Test Requirement: EN 61000-6-1
Test Method: EN 61000-4-3
Test Result: PASS
Frequency Range: 80MHz-1GHz,1.4GHz-2 GHz,2 GHz-2.7 GHz
Face Under Test: Three Mutually Orthogonal Faces
Severity: 3V/m, 1kHz, 80% Amp. Mod. from 80MHz to 1GHz
3V/m, 1kHz, 80% Amp. Mod. from 1.4GHz to 2GHz
1V/m, 1kHz, 80% Amp. Mod. from 2GHz to 2.7GHz

6.3.1 E.U.T. Operation

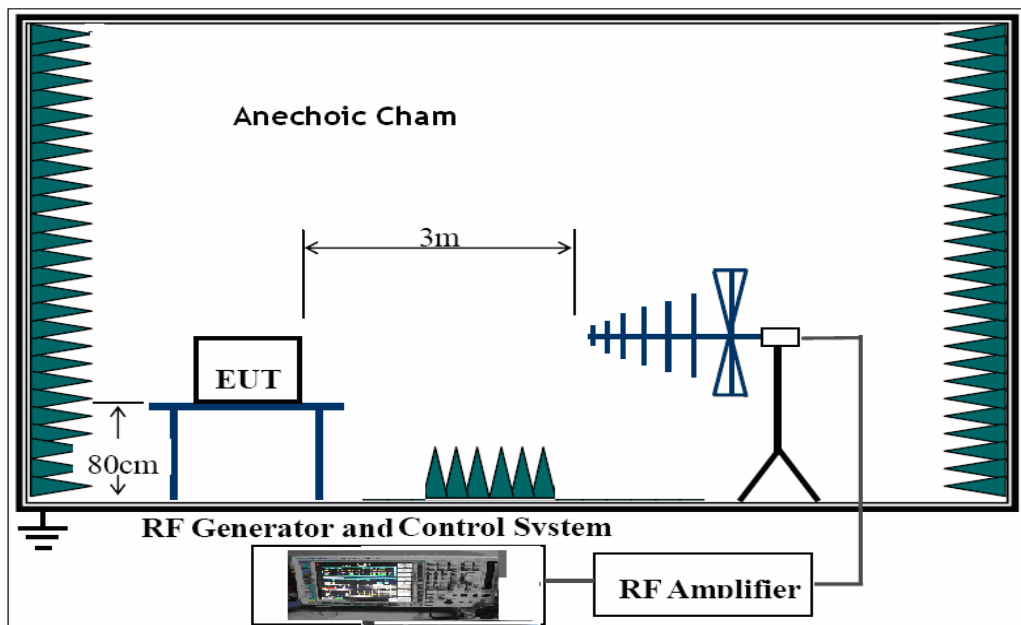
Operating Environment:
Temperature: 25.5 °C
Humidity: 51 % RH
Barometric Pressure: 1012 mbar

EUT Operation:

Compliance test was performed in tuner and metronome mode.

6.3.2 Radiated Immunity Test Setup

The Radiated Immunity test setup accordance with the EN 61000-4-3, The Specification used in this report was the EN 55024 Paragraph 4.2.3 requirements.



6.3.3 Test Results

Frequency	Level	Modulation	EUT Face	Result / Observations
80MHz-1GHz	3V/m	1kHz, 80%, Amp. Mod.	X Y Z	During test and after test, the EUT was normal (A).
1.4GHz-2GHz	3V/m	1kHz, 80%, Amp. Mod.	X Y Z	During test and after test, the EUT was normal (A).
2GHz-2.7GHz	1V/m	1kHz, 80%, Amp. Mod.	X Y Z	During test and after test, the EUT was normal (A).

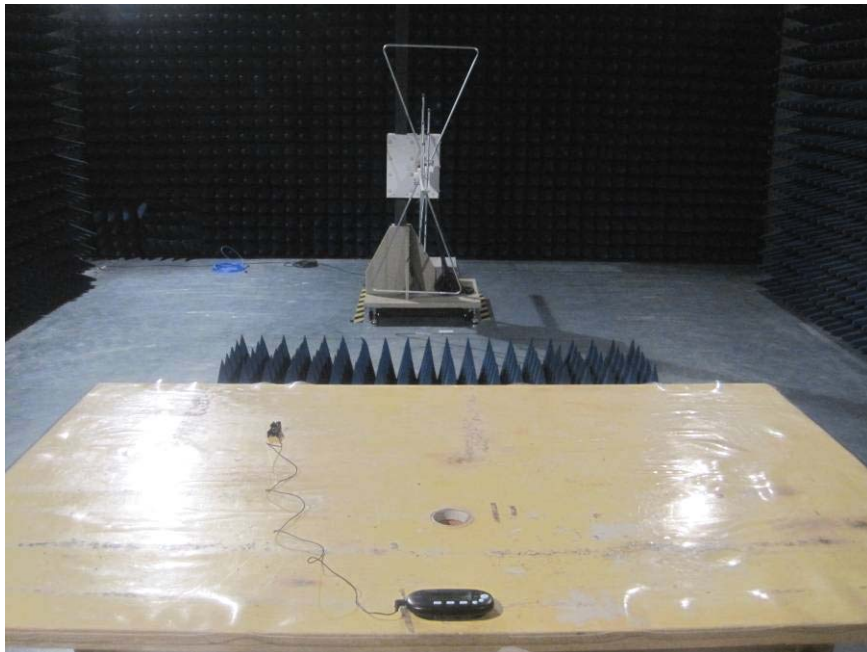
Remarks:

- AM : Amplitude Modulation.
- PM : Pulse Modulation.
- X : EUT as per photograph in section 6.3.4 of this report.
- Y : As X, but rotate EUT by 90° clockwise.
- Z : As Y, but rotate EUT by 90° vertically.

Results

A: Criterion A, please refer to clause 6.1 for more details.

6.3.4 Photograph - Radiated Immunity Test Setup For X-Direction



7 Photographs - Constructional Details

7.1 EUT - Front View



7.2 EUT - Back View



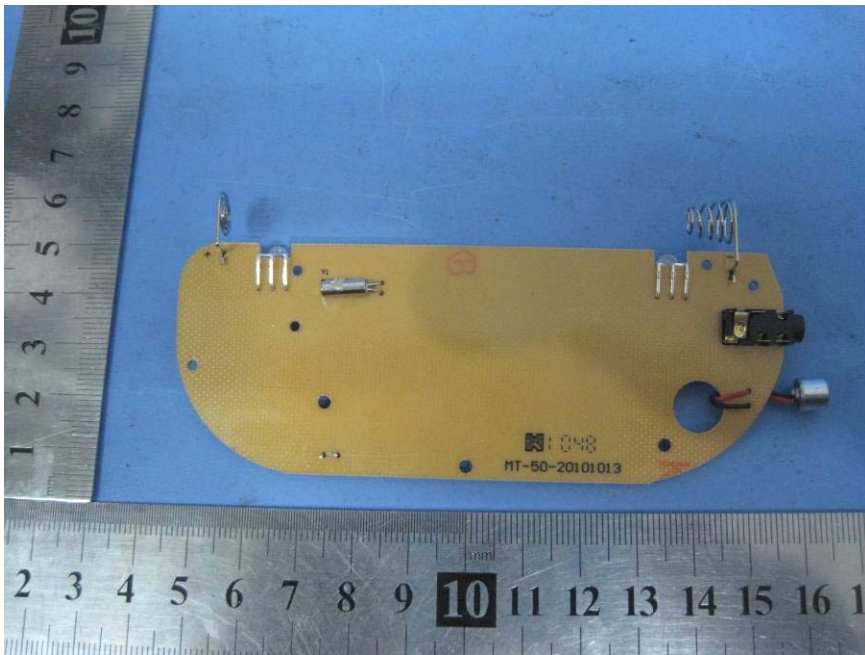
WALTEK SERVICES

Reference No.: WT10125148-E-E-E

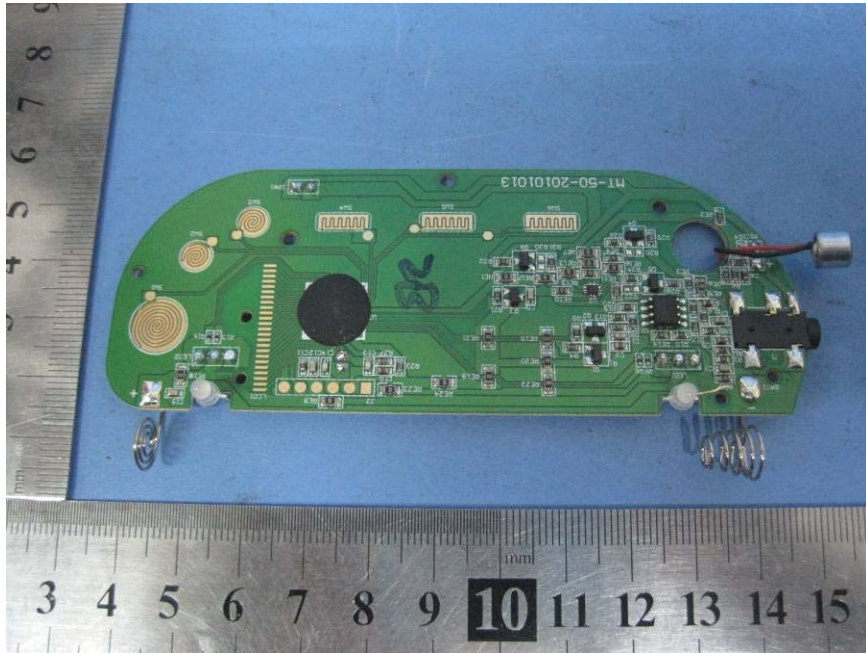
7.3 EUT –Open View



7.4 PCB –Front View



7.5 PCB –Back View



8 CE Label

1. The CE conformity marking must consist of the initials 'CE' taking the following form:
If the CE marking is reduced or enlarged, the proportions given in the above graduated drawing must be respected.
2. The CE marking must have a height of at least 5 mm except where this is not possible on account of the nature of the apparatus.
3. The CE marking must be affixed to the product or to its data plate. Additionally it must be affixed to the packaging, if any, and to the accompanying documents.
4. The CE marking must be affixed visibly, legibly and indelibly.
It must have the same height as the initials 'CE'

Proposed Label Location on EUT

