APPLICATION FOR ELECTROMAGNETIC COMPATIBILITY DIRECTIVE

On Behalf of

JOYO TECHNOLOGY CO., LTD

TUNER

Model No.: JT-06

Prepared for	:	JOYO TECHNOLOGY CO., LTD
Address	:	2/F, Lushi Industry Building, 28th District, Baoan, Shenzhen, 518101 China.

Prepared By	:	Shenzhen Alpha Product Testing Co., Ltd.
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Date of Report	:	November 15, 2017
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TEST REPORT DECLARATION

Applicant	:	JOYO TECHNOLOGY CO., LTD
Manufacturer	:	JOYO TECHNOLOGY CO., LTD
EUT Description	:	TUNER
	(A) Model No.	: JT-06
	(B) Ratings Supply	: DC 3V
	(C) Test Voltage	: DC 3V from battery

Measurement Standard Used:

EN 61000-6-3:2001 + A1:2011

EN 61000-6-1:2007

The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The test results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed full responsibility for the accuracy and completeness of test. Also, this report shows that the EUT is technically compliant with the EN 61000-6-3 and EN 61000-6-1 requirements.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen Alpha Product Testing Co., Ltd.

Tested by (name + signature).....: Star Yang, Project Engineer

Approved by (name + signature).....: Simple Guan, Project Manager

Date of issue..... .....: November 15, 2017

1. SUMMARY OF STANDARDS AND RESULTS

1.1.Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below:

EMISSION			
Description of Test Item	**Standard**	**Limits**	**Results**
Conducted disturbance at mains terminals	EN 61000-6-3:2001 + A1:2011	Class B	N/A
Conducted disturbance at telecommunication port	EN 61000-6-3:2001 + A1:2011	Class B	N/A
Radiated disturbance	EN 61000-6-3:2001 + A1:2011	Class B	P
Harmonic current emissions	EN 61000-3-2:2014	Class B	N/A
Voltage fluctuations & flicker	EN 61000-3-3:2013	Class B	N/A

IMMUNITY (EN 61000-6-1: 2007)				
Description of Test Item	**Standard**	**Performance Criteria**	**Observation Criteria**	**Results**
Electrostatic discharge (ESD)	IEC 61000-4-2:2008	B	A	P
Radio-frequency, Continuous radiated disturbance	IEC 61000-4-3:2006+ A1:2007 + A2:2010	A	A	P
Electrical fast transient (EFT)	IEC 61000-4-4:2012	B	N/A	N/A
Surge (Input a.c. power port)	IEC 61000-4-5:2014	B	N/A	N/A
Surge(Telecommunication port)		B	N/A	N/A
Radio-frequency, Continuous conducted disturbance	IEC 61000-4-6:2013	A	N/A	N/A
Power frequency magnetic field	IEC 61000-4-8:2009	A	N/A	N/A
Voltage dips, >95% reduction	IEC 61000-4-11:2004	B	N/A	N/A
Voltage dips, >95% reduction		B	N/A	N/A
Voltage dips, 30% reduction		C	N/A	N/A
Voltage interruptions		C	N/A	N/A

Note: 1. P is an abbreviation for Pass.

2. F is an abbreviation for Fail.

3. N/A is an abbreviation for Not Applicable.

2. GENERAL INFORMATION

2.1.Description of Device (EUT)

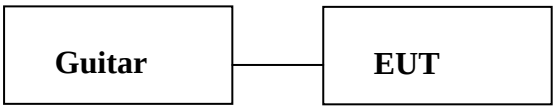
Description	:	TUNER
Model Number	:	JT-06
Diff	:	N/A
Test Voltage	:	DC 3V from battery
Classification	:	Class III
Highest frequency	:	Less than 108MHz
Applicant	:	JOYO TECHNOLOGY CO., LTD
Address	:	2/F, Lushi Industry Building, 28th District, Baoan, Shenzhen, 518101 China.
Manufacturer	:	JOYO TECHNOLOGY CO., LTD
Address	:	2/F, Lushi Industry Building, 28th District, Baoan, Shenzhen, 518101 China.
Sample Type	:	Prototype production

2.2.Tested Supporting System Details

No.	Description	Manufacturer	Model	Serial Number
1	Guitar	N/A	N/A	N/A

2.3.Block Diagram of connection between EUT and simulators

For EMI & EMS Tests



Signal Cable Description of the above Support Units					
No.	**Port Name**	**Cable**	**Length**	**Shielded (Yes or No)**	**Detachable (Yes or No)**
(a)	N/A	N/A	N/A	N/A	N/A

EUT: TUNER

2.4.Test Mode Description

For EMI and EMS Tests		
No.	Test Mode	Test Voltage
1.	Tuning	DC 3V from battery

2.5.Test Facility

Shenzhen Alpha Product Testing Co., Ltd.

Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103, Shenzhen, Guangdong, China

2.6.Measurement Uncertainty

(95% confidence levels, k=2)

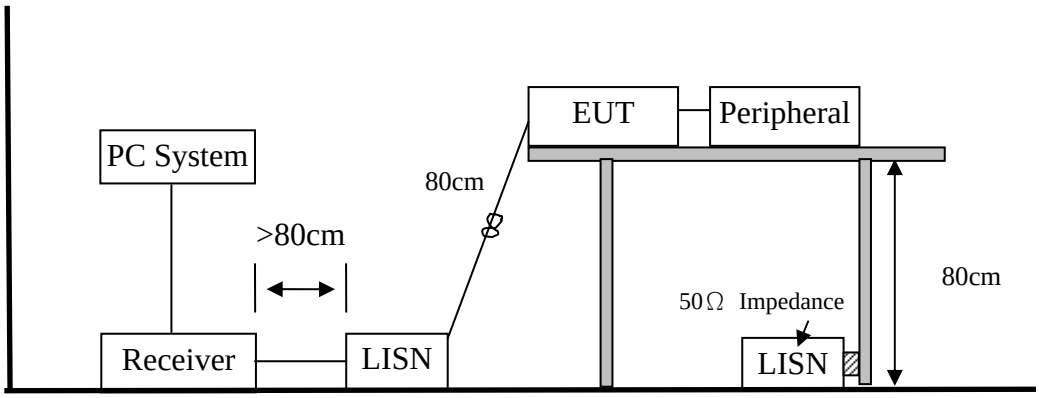
Item	MU	Remark
Uncertainty for Conducted Emission Test	2.74dB	
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.77dB	Polarize: V
	3.80dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	4.16dB	Polarize: H
	4.13dB	Polarize: V
Uncertainty for radio frequency	5.4×10^{-8}	
Uncertainty for conducted RF Power	0.37dB	

3. CONDUCTED DISTURBANCE AT MAINS TERMINALS TEST

3.1.Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI	101165	2017.09.22	1 Year
2.	L.I.S.N.#1	Schwarzbeck	NSLK8126	8126466	2017.09.22	1 Year
3.	L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	101043	2017.09.22	1 Year
4.	Pulse Limiter	Schwarzbeck	9516F	9618	2017.09.22	1 Year

3.2.Block Diagram of Test Setup



3.3.Power Line Conducted Emission Test Limits

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μV)	Average Level dB(μV)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Notes: 1. Emission level=Read level + LISN factor-Preamp factor + Cable loss

2. * Decreasing linearly with logarithm of frequency.

3. The lower limit shall apply at the transition frequencies.

3.4.Configuration of EUT on Test

The following equipment are installed on conducted disturbance at mains terminals to meet the EN 61000-6-3:2001 + A1:2011 requirement and operating regulations in a manner which tends to maximize its emission characteristics in a normal application.

3.5.Operating Condition of EUT

（1） Setup the EUT as shown as Section 3.2.

（2） Turn on the power of all equipment.

（3） Let the EUT work in test mode and 15 minutes before taking the test.

3.6.Test Procedure

（1） The EUT was placed on a non-metallic table, 80cm above the ground plane. The EUT Power connected to the power mains through a line impedance stabilization network (L.I.S.N. 1#). This provided a 50-ohm coupling impedance for the EUT (Please refer to the block diagram of the test setup and photographs). The other peripheral devices power cord connected to the power mains through a line impedance stabilization network (L.I.S.N.#2). Both sides of power line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to EN 61000-6-3 on Conducted Disturbance at Mains Terminals test.

（2） The frequency range from 150kHz to 30MHz is checked, the bandwidth of test receiver (R&S TEST RECEIVER ESCI) is set at 9kHz.

（3） The test results are reported on Section 3.7.

3.7.Conducted Disturbance at Mains Terminals Test Results

EUT	:	TUNER	Test Date	:	**N/A**
M/N	:	JT-06	Temperature	:	**N/A**
Test Engineer	:	**N/A**	Humidity	:	**N/A**
Test Voltage	:	**N/A**	Pressure	:	**N/A**
Test Mode	:	**N/A**			
Test Results	:	**N/A**			
Note: The EUT is supplied by Battery, so this item does not applicable.					

4. RADIATED DISTURBANCE TEST

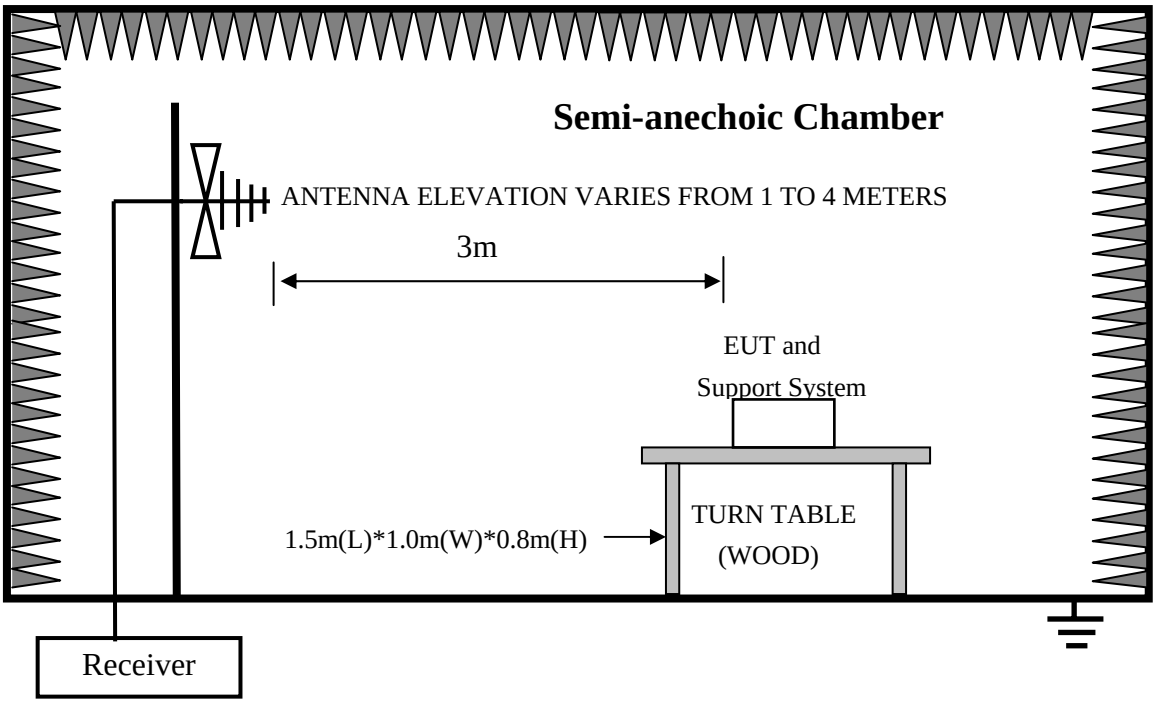
4.1.Test Equipment

For frequency range 30MHz~1GHz (At Semi Anechoic Chamber)						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Test Receiver	Rohde&Schwarz	ESR	1316.3003K03-102082-Wa	2017.09.23	1 Year
2	Bilog Antenna	Schwarzbeck	VULB 9168	9168-438	2016.09.30	2 Year

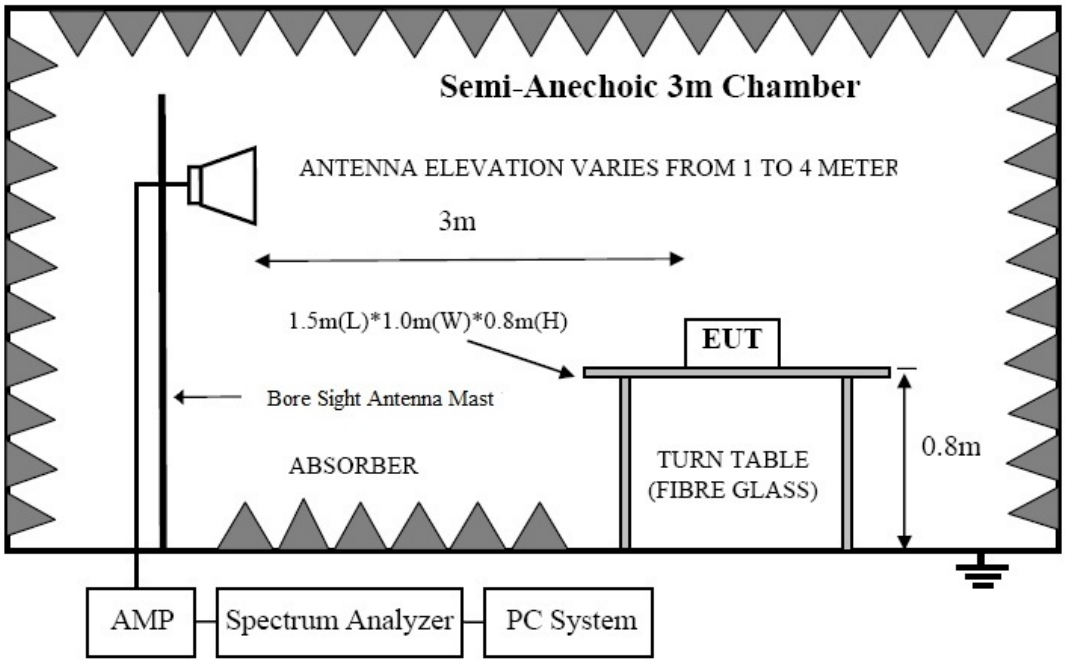
For frequency range above 1GHz (At Semi Anechoic Chamber)						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Spectrum Analyzer	Agilent	E4407B	MY49510055	2017.09.23	1 Year
2	Horn Antenna	Schwarzbeck	BBHA 9120 D	BBHA 9120 D(1201)	2016.09.30	2 Year
3	Amplifier	Agilent	8449B	3008A02664	2017.09.23	1 Year

4.2.Block Diagram of Test Setup

In Semi Anechoic Chamber (3m) Test Setup Diagram for 30MHz~1000MHz



In Semi Anechoic Chamber (3m) Test Setup Diagram for Above 1GHz



4.3.Test Standard

EN 61000-6-3:2001 + A1:2011, Class B

4.4.Test Limit

Frequency MHz	Distance (Meters)	Field Strengths Limits dB(μV)/m
30 ~ 230	3	40
230 ~ 1000	3	47
1000 ~ 3000	3	70(Peak) 50(Average)
3000 ~ 6000	3	74(Peak) 54(Average)

Notes: 1. Emission level = Read level + Antenna Factor - Preamp Factor + Cable Loss

2. The smaller limit shall apply at the cross point between two frequency bands.

3. Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

4.5.Configuration of EUT on Test

The following equipment are installed on Radiated Emission Test to meet the EN 61000-6-3 requirements and operating regulations in a manner that tends to maximize its emission characteristics in normal application.

4.6.Operating Condition of EUT

（1） Setup the EUT as shown as Section 4.2.

（2） Turn on the power of all equipment.

（3） Let the EUT work in test mode and 15 minutes before taking the test.

4.7.Test Procedure

（1） The EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber. An antenna was located 3m from the EUT on an adjustable mast. A pre-scan was first performed in order to find prominent radiated emissions. For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all the interface cables were changed according to EN 61000-6-3 on Radiated Disturbance test.

（2） The frequency range from 30MHz to 1000MHz is checked, the bandwidth of test receiver (R&S TEST RECEIVER ESCI) is set at 120kHz.

（3） The resolution bandwidth of the Agilent Spectrum Analyzer E4407B was set at 1MHz. (For above 1GHz)

（4） The frequency range from 30MHz to 1000MHz was pre-scanned with a peak detector and all final readings of measurement from Test Receiver are Quasi-Peak values, all measurement distance is 3m in 3m semi anechoic chamber.

（5） The frequency range from 1GHz to 6GHz was checked with peak and average detector, measurement distance is 3m in 3m chamber.

（6） The test results are reported on Section 4.8.

4.8.Radiated Disturbance Test Results

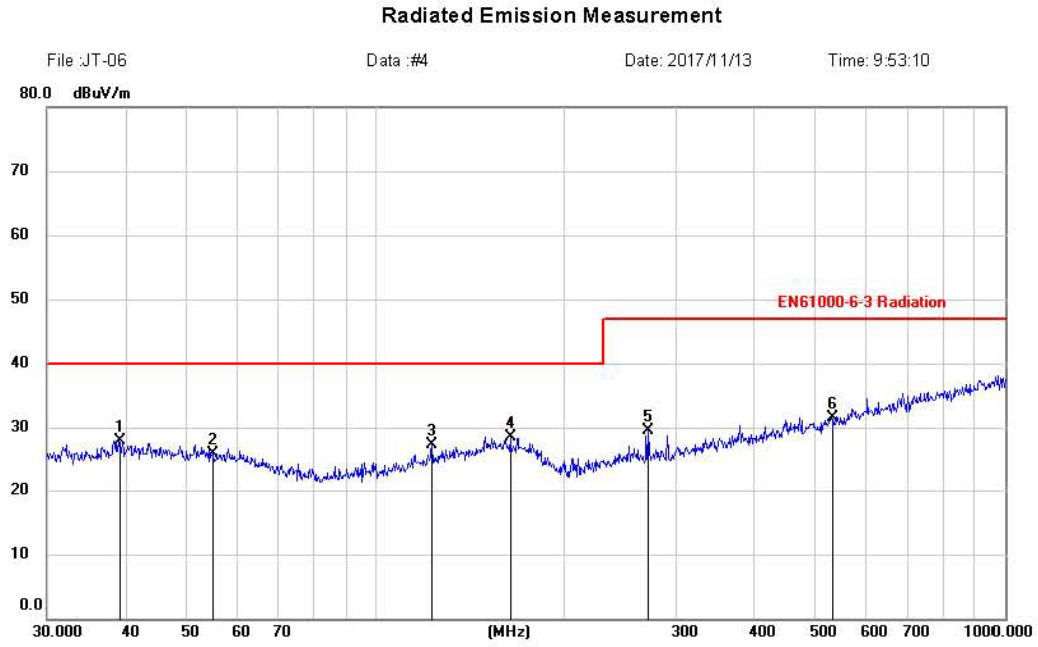
For below 1G radiated disturbance test result:					
EUT	:	TUNER	Test Date	:	2017-11-13
M/N	:	JT-06	Temperature	:	23.8℃
Test Engineer	:	Star Yang	Humidity	:	56%
Test Voltage	:	DC 3V from battery	Pressure	:	101.6Kpa
Test Mode	:	Tuning			
Test Results	:	**PASS**			

Note: 1. The test results are listed in next pages.

2. This mode is worst case mode, so this report only reflected the worst mode.

3. If the limits for the measurement with the quasi-peak detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the quasi-peak detector need not be carried out.

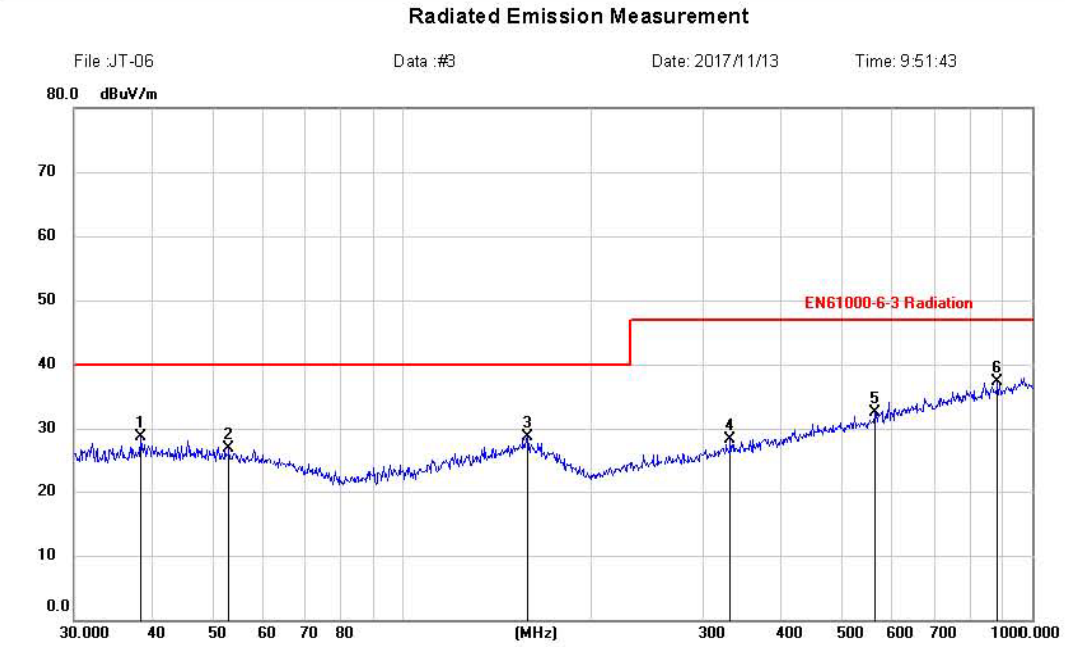
Antenna Polarity: H



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		39.1616	13.78	14.21	27.99	40.00	-12.01	peak			
2		54.6429	12.67	13.31	25.98	40.00	-14.02	peak			
3		123.2655	14.43	12.81	27.24	40.00	-12.76	peak			
4	*	163.7550	14.20	14.28	28.48	40.00	-11.52	peak			
5		270.3748	16.64	12.79	29.43	47.00	-17.57	peak			
6		531.9635	13.39	18.17	31.56	47.00	-15.44	peak			

Note:1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Antenna Polarity: V



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		38.3462	14.69	13.95	28.64	40.00	-11.36	peak			
2		52.7600	13.38	13.48	26.86	40.00	-13.14	peak			
3		158.1123	14.11	14.57	28.68	40.00	-11.32	peak			
4		331.3546	13.94	14.30	28.24	47.00	-18.76	peak			
5		566.6223	13.47	18.95	32.42	47.00	-14.58	peak			
6	*	887.6099	14.43	22.83	37.26	47.00	-9.74	peak			

Note:1. *:Maximum data; x:Over limit; l:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

For above 1G radiated disturbance test result:

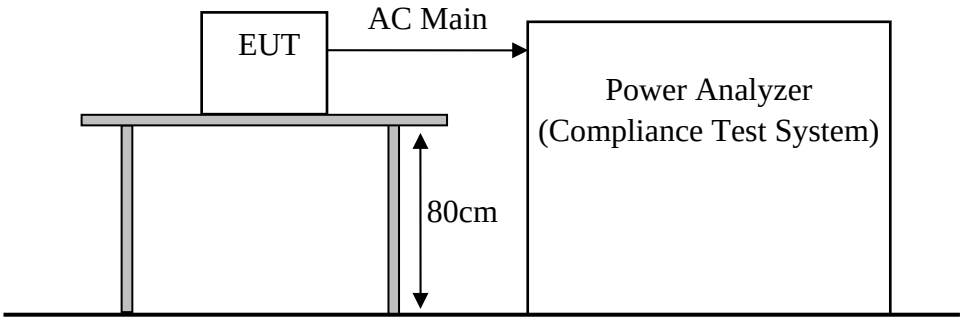
EUT	:	TUNER	Test Date	:	N/A
M/N	:	JT-06	Temperature	:	N/A
Test Engineer	:	N/A	Humidity	:	N/A
Test Voltage	:	N/A	Pressure	:	N/A
Test Mode	:	N/A			
Test Results	:	**N/A**			
Note:	The highest frequency of the internal sources of the EUT is less than 108 MHz, the measurement shall only be made up to 1 GHz. So the frequency rang above 1GHz radiation test not applicable.				

5. HARMONIC CURRENT TEST

5.1.Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Harmonics Flicker Analyser	Voltech	PM6000	200006700495	2017.09.28	1 Year

5.2.Block Diagram of Test Setup



5.3.Test Standard

EN 61000-3-2:2014; Class A

5.4.Harmonic Current Test Limits

For Class A equipment:

Harmonic order n	Maximum permissible harmonic current A
Odd harmonics	
3	2,30
5	1,14
7	0,77
9	0,40
11	0,33
13	0,21
$15 \le n \le 39$	$0{,}15\frac{15}{n}$
Even harmonics	
2	1,08
4	0,43
6	0,30
$8 \le n \le 40$	$0{,}23\frac{8}{n}$

for Class B equipment:
The harmonics of the input current shall not exceed the values given in Class A equipment limit multiplied by a factor of 5.4.

5.5.Configuration of EUT on Test

The following equipment are installed on Harmonic Current Test to meet the EN61000-3-2 requirements and operating regulations in a manner that tends to maximize its emission characteristics in normal application.

5.6.Operating Condition of EUT

（1） Setup the EUT as shown as Section 5.2.

（2） Turn on the power of all equipment.

（3） Let the EUT work in test mode and 15 minutes before taking the test.

5.7.Test Procedure

（1） The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn. The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the necessary for the EUT to be exercised.

（2） The test results are reported on Section 5.8.

5.8.Harmonic Current Test Results

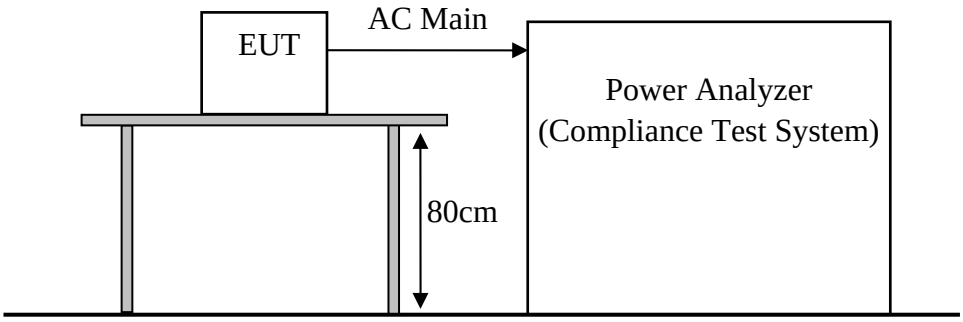
EUT	:	TUNER	Test Date	:	**N/A**
M/N	:	JT-06	Temperature	:	**N/A**
Test Engineer	:	**N/A**	Humidity	:	**N/A**
Test Voltage	:	**N/A**	Pressure	:	**N/A**
Test Mode	:	**N/A**			
Test Results	:	**N/A**			
Note: The EUT is supplied by Battery, so this item does not applicable.					

6. VOLTAGE FLUCTUATIONS & FLICKER TEST

6.1.Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Harmonics Flicker Analyser	Voltech	PM6000	200006700495	2017.09.28	1 Year

6.2.Block Diagram of Test Setup



6.3.Voltage Fluctuation and Flicker Test Limits

Test Item	Limit	Note
P_{st}	1.0	P_{st} means Short-term flicker indicator
P_{lt}	0.65	P_{lt} means long-term flicker indicator
T_{dt}	0.2	T_{dt} means maximum time that dt exceeds 3%
d_{max}(%)	4%	d_{max} means maximum relative voltage change.
d_c(%)	3.3%	d_c means relative steady-state voltage change.

6.4.Test Standard

EN 61000-3-3:2013

6.5.Configuration of EUT on Test

The following equipment are installed on Harmonic Current Test to meet the EN61000-3-3 requirements and operating regulations in a manner that tends to maximize its emission characteristics in normal application.

6.6.Operating Condition of EUT

（1） Setup the EUT as shown as Section 6.2.

（2） Turn on the power of all equipment.

（3） Let the EUT work in test mode and 15 minutes before taking the test.

6.7.Test Procedure

（1） The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under normal conditions During the flick measurement; the measure time shall include that part of whole operation changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

（2） The test results are reported on Section 6.8.

6.8. Voltage Fluctuation and Flicker Test Results

EUT	:	TUNER	Test Date	:	**N/A**
M/N	:	JT-06	Temperature	:	**N/A**
Test Engineer	:	**N/A**	Humidity	:	**N/A**
Test Voltage	:	**N/A**	Pressure	:	**N/A**
Test Mode	:	**N/A**			
Test Results	:	**N/A**			
Note: The EUT is supplied by Battery, so this item does not applicable.					

7. IMMUNITY PERFORMANCE CRITERIA

Performance Level

The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test, relative to a performance level by its manufacturer or the requestor of the test, or the agreed between the manufacturer and the purchaser of the product.

Definition related to the performance level:

1. Based on the used product standard

2.Based on the declaration of the manufacturer, requestor or purchaser

Performance criterion A

When seen from the normal viewing distance, the EUT shall operate with no change beyond the manufacturer's specification, in flicker, colour, focus and jitter (except for the power frequency magnetic field test).

Power frequency magnetic field test

For CRT monitors, the following also applies:

The jitter shall be measured using a measuring microscope as specified in 6.6.14 of ISO 9241-3.

The jitter (in mm) shall not exceed the value $\frac{(\text{character height in mm} + 0{,}3) \text{ x } 2{,}5}{33{,}3}$ when the CRT monitor is immersed in a continuous magnetic field of 1A/m (r.m.s.) at one of the power frequencies of 50Hz.

Alternatively, a field of 50A/m may be applied, and a transparent graduated mask used to assess the jitter. In that case, the jitter shall not exceed 50 times the value in the above formula.

NOTE-This test level is used to simplify the measurement of jitter. Lesser values of the test level may be used if non-linearity is experienced, due to, for example, saturation of screening material.

The EUT shall be tested in two positions, both perpendicular to the magnetic field.

Performance criterion B

Screen disturbances during the application of the test are permissible.

Performance criterion C

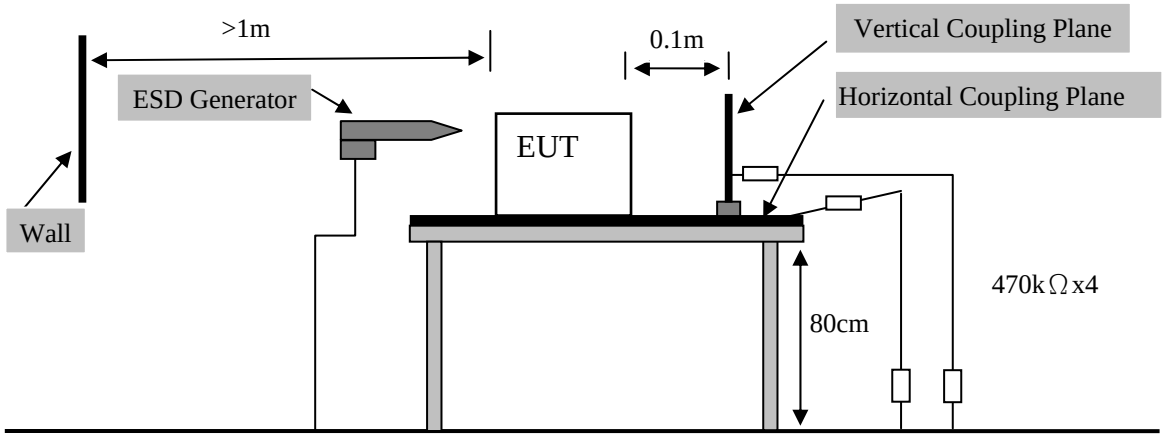
Failures which are not self-recovered after removal of the external disturbance, but which can be recovered to normal operation by reset or reboot are permissible.

8. ELECTROSTATIC DISCHARGE TEST

8.1.Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	ESD Tester	HAEFELY	PESD1610	H310546	2017.09.27	1 Year

8.2.Block Diagram of Test Setup



8.3.Electrostatic Discharge Test Limits

Test Type	Test Level	Performance Criterion
Air Discharge	8KV	B
Contact Discharge	4KV	B

Notes: 1. Test set-up reference IEC 61000-4-2:2008

8.4.Configuration of EUT on Test

The following equipment are installed on Electrostatic Discharge Test to meet the IEC 61000-4-2 requirements and operating regulations in a manner that tends to maximize its emission characteristics in normal application.

8.5.Operating Condition of EUT

（1） Setup the EUT as shown as Section 8.2.

（2） Turn on the power of all equipment.

（3） Let the EUT work in test mode and 15 minutes before taking the test.

8.6.Test Procedure

（1） Air Discharge**:**

The test was applied on non-conductive surfaces of EUT. The round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT. After each discharge, the discharge electrode was removed from the EUT. The generator was re-triggered for a new single discharge and repeated 20 times (10 with positive and 10 negative with positive) for each pre-selected test point. This procedure was repeated until all the air discharge completed.

（2） Contact Discharge:

All the procedure was same as Section 8.6.1. Except that the generator was re-triggered for a new single discharge and repeated 20 times for each pre-selected test point. The tip of the discharge electrode was touching the EUT before the discharge switch was operated.

（3） Indirect discharge for horizontal coupling plane:

At least 20 single discharges (10 with positive and 10 negative with positive) were applied to the horizontal coupling plane, at points on each side of the EUT. The discharge electrode positions vertically at a distance of 0.1m from the EUT and with the discharge electrode touching the coupling plane.

（4） Indirect discharge for vertical coupling plane:

At least 20 single discharge (10 with positive and 10 negative with positive) were applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, was placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges were applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

8.7.Electrostatic Discharge Test Results

EUT	:	TUNER	Test Date	:	2017-11-14
M/N	:	JT-06	Temperature	:	23.5℃
Test Engineer	:	Star Yang	Humidity	:	54 %
Test Voltage		DC 3V from battery	Pressure	:	101.6Kpa
Test Mode	:	Tuning			
Test Results	:	**PASS**			

Discharge Voltage (kV)	**Type Of Discharge**	**Dischargeable Points**	**Performance**	
			Required	**Observation**
±2	Contact	1	B	A
±4	Contact	1	B	A
±2	Air	2, 3	B	A
±4	Air	2, 3	B	A
±8	Air	2, 3	B	A
±2	HCP-Bottom	Edge of the HCP	B	A
±4	HCP-Bottom	Edge of the HCP	B	A
±2	VCP-Front	Center of the VCP	B	A
±4	VCP-Front	Center of the VCP	B	A
±2	VCP-Left	Center of the VCP	B	A
±4	VCP-Left	Center of the VCP	B	A
±2	VCP-Back	Center of the VCP	B	A
±4	VCP-Back	Center of the VCP	B	A
±2	VCP-Right	Center of the VCP	B	A
±4	VCP-Right	Center of the VCP	B	A

Discharge Points Description

1	Metal	4	
2	Slots	5	
3	Screen	6	

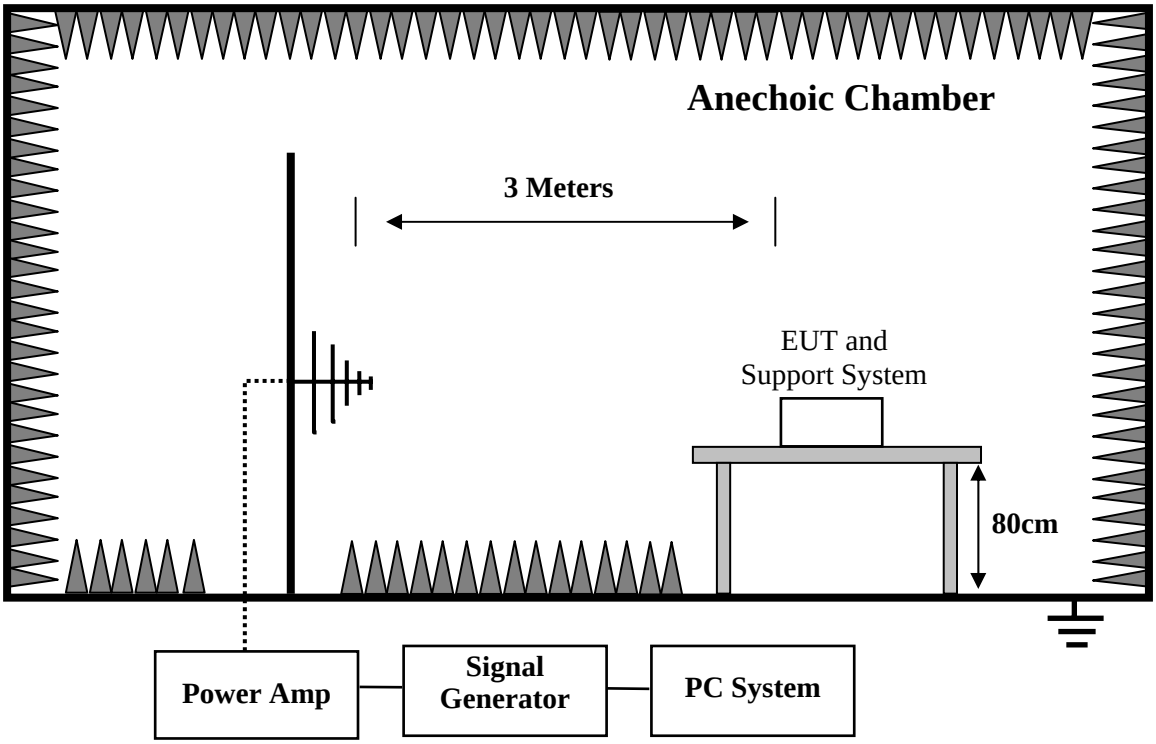
Note:	1. For the time interval between successive single discharges an initial value of one second. 2. EUT only contains the metal contact surface, do not need to measure air discharge
Remark:	Class A is no function loss.

9. RF FIELD STRENGTH SUSCEPTIBILITY TEST

9.1.Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	vector Signal Generator	Agilent	E4438C	US44271917	2017.09.29	1 Year
2.	Power meter	Agilent	E4419B	GB40202122	2017.09.22	1 Year
3.	Power Sensor	Agilent	E9300A	MY41496625	2017.09.22	1 Year
4.	RF power Amplifier	OPHIR	5225R	1045	N/A	NCR
5.	RF power Amplifier	OPHIR	5273R	1018	N/A	NCR
6.	Antenna	SCHWARZBECK	STLP9128E-special	STLP9128Es#139	N/A	NCR
7.	Antenna	SCHWARZBECK	STLP9128E-special	STLP 9149 #456	N/A	NCR

9.2.Block Diagram of Test Setup



9.3.RF Field Strength susceptibility Test Limits

Test Specifications	Test Level	Performance Criterion
80MHz-1000MHz	3V/m (r.m.s.)	A

Notes: 1. Test set-up reference IEC 61000-4-3:2006 + A1:2007 + A2:2010

9.4.Configuration of EUT on Test

The following equipment are installed on Electrostatic Discharge Test to meet the IEC 61000-4-3 requirements and operating regulations in a manner that tends to maximize its emission characteristics in normal application.

9.5.Operating Condition of EUT

（1） Setup the EUT as shown as Section 9.2.

（2） Turn on the power of all equipment.

（3） Let the EUT work in test mode and 15 minutes before taking the test.

9.6.Test Procedure

（1） Testing was performed in a Fully anechoic chamber as recommended by IEC 61000-4-3.

（2） The EUT was placed on an 80 cm high non-conductive table located in the area of field uniformity. The radiating antenna was placed 3m in front of the EUT and Support system, and dwell time of the radiated interference was controlled by an automated, computer-controlled system.

（3） The signal source was stepped through the applicable frequency range at a rate no faster than 1% of the fundamental. The signal was amplitude modulated 80% over the frequency range 80 MHz to 1GHz & 1.4GHz to 2GHz at a level of 3 V/m. The signal was amplitude modulated 80% over the frequency range 2GHz to 2.7GHz at a level of 1 V/m The dwell time was set at 3 s. Field presence was monitored during testing via a field probe placed in close proximity to the EUT.

（4） Throughout testing, the EUT was closely monitored for signs of susceptibility. The test was performed with the antennae oriented in both a horizontal and vertical polarization.

（5） All the scanning conditions are as follows:

Condition of Test	Require of Test
Test Fielded Strength	3 V/m & 1V/m
Radiated Signal	80% amplitude modulated with a 1kHz sine wave
Scanning Frequency	80 - 1000 MHz, 1.4GHz-2GHz, 2GHz-2.7GHz
Sweeping time of radiated	0.0015 decade/s
Dwell Time	3 Sec.

9.7.RF Field Strength Susceptibility Test Results

EUT	:	TUNER	Test Date	:	2017-11-14
M/N	:	JT-06	Temperature	:	23.5℃
Test Engineer	:	Star Yang	Humidity	:	54 %
Test Voltage		DC 3V from battery	Pressure	:	101.6Kpa
Frequency Range	:	80 MHz -1000MHz, 1.4GHz – 2GHz	Field Strength	:	3V/m
Test Mode	:	Tuning			
Test Results	:	**PASS**			
Modulation:		☑ AM ☐ Pulse ☐ none 1 kHz 80%			

Steps	1%				
	Horizontal		Vertical		Result
	Required	Observation	Required	Observation	(Pass / Fail)
Front	A	A	A	A	Pass
Right	A	A	A	A	Pass
Rear	A	A	A	A	Pass
Left	A	A	A	A	Pass
Remark: Class A is no function loss					

9.8.RF Field Strength Susceptibility Test Results

EUT	:	TUNER	Test Date	:	2017-11-14
M/N	:	JT-06	Temperature	:	23.5℃
Test Engineer	:	Star Yang	Humidity	:	54 %
Test Voltage		DC 3V from battery	Pressure	:	101.6Kpa
Frequency Range	:	2GHz-2.7GHz	Field Strength	:	1V/m
Test Mode	:	Tuning			
Test Results	:	**PASS**			
Modulation:		☑ AM ☐ Pulse ☐ none 1 kHz 80%			

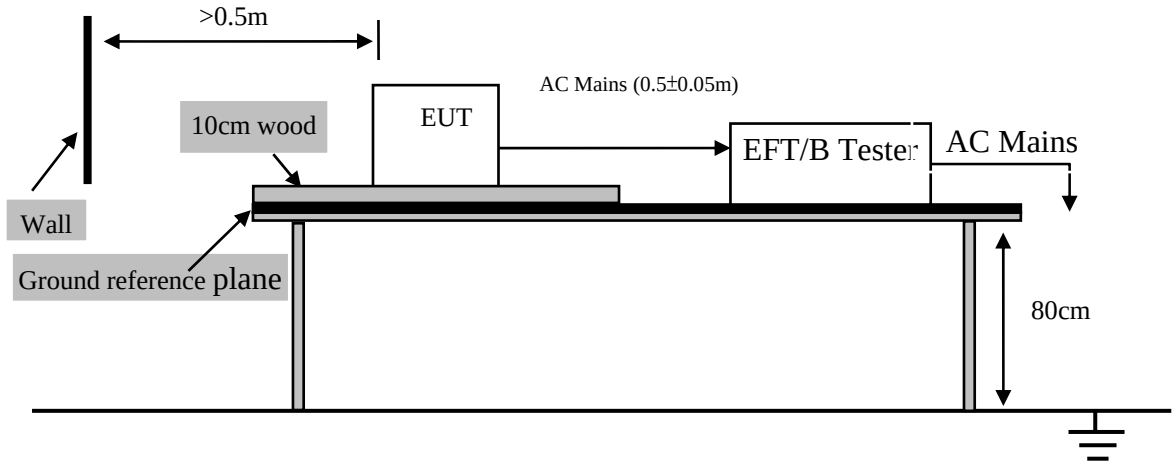
Steps	1%				
	Horizontal		Vertical		Result
	Required	Observation	Required	Observation	(Pass / Fail)
Front	A	A	A	A	Pass
Right	A	A	A	A	Pass
Rear	A	A	A	A	Pass
Left	A	A	A	A	Pass
Remark: Class A is no function loss					

10.ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

10.1.Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Multifunctional Compact Immunity Test system	3ctest	CCS 600	ES0801655	2017.09.22	1 Year
2.	Surge&EFT Coupling Decoupling Network	3ctest	SEPN 3832T	ES0951601	2017.09.22	1 Year
3.	Voltage variation and PF magnetic field regulating device	3ctest	VMT2216S	ES0441601	2017.09.22	1 Year
4.	Capacitive Coupling Clamp	3ctest	CCC 100	EC0441660	2017.09.22	1 Year

10.2.Block Diagram of Test Setup



10.3.Electrical Fast Transient/Burst Test Limits

Test Specifications	Test Level	Performance Criterion
1.	2	2
2.	4	4
3.	6	8
4.	8	15
X	Special	Special

Notes: 1. Test set-up reference IEC 61000-4-4:2012

10.4.Configuration of EUT on Test

The following equipment are installed on Electrostatic Discharge Test to meet the IEC 61000-4-4 requirements and operating regulations in a manner that tends to maximize its emission characteristics in normal application.

10.5.Operating Condition of EUT

(1) Setup the EUT as shown as Section 10.2.

(2) Turn on the power of all equipment.

(3) Let the EUT work in test mode and 15 minutes before taking the test.

10.6.Test Procedure

(1) The EUT and its simulators were placed on the ground reference plane and were insulated from it by a wood support 0.1m + 0.01m thick. The ground reference plane was 1m*1m metallic sheet with 0.65mm minimum thickness. This reference ground plane was project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane was more than 0.5m. All cables to the EUT was placed on the wood support, cables not subject to EFT/B was routed as far as possible from the cable under test to minimize the coupling between the cables.

10.6.1. For input and AC power ports:

The EUT was connected to the power mains by using a coupling device that couples the EFT interference signal to AC power lines. Both positive transients and negative transients of test voltage were applied during compliance test and the duration of the test can’t less than 1min.

10.6.2. For signal lines and control lines ports:

It’s unnecessary to test.

10.6.3. For DC input and DC output power ports:

It’s unnecessary to test.

10.7.Electrical Fast Transient/Burst immunity Test Results

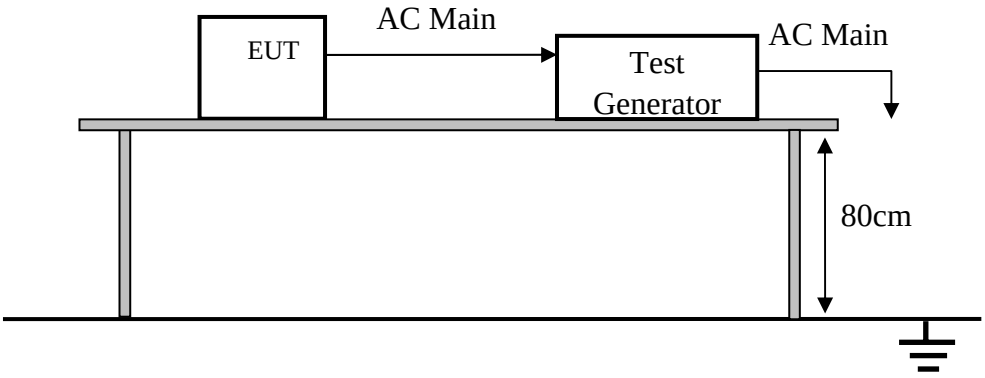
EUT	:	TUNER	Test Date	:	N/A
M/N	:	JT-06	Temperature	:	N/A
Test Engineer	:	N/A	Humidity	:	N/A
Test Voltage	:	N/A	Pressure	:	N/A
Test Mode	:	N/A			
Test Results	:	N/A			
Note: The EUT is supplied by Battery, so this item does not applicable.					

11.SURGE TEST

11.1.Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Multifunctional Compact Immunity Test system	3ctest	CCS 600	ES0801655	2017.09.22	1 Year
2.	Surge&EFT Coupling Decoupling Network	3ctest	SEPN 3832T	ES0951601	2017.09.22	1 Year
3.	Voltage variation and PF magnetic field regulating device	3ctest	VMT2216S	ES0441601	2017.09.22	1 Year
4.	Capacitive Coupling Clamp	3ctest	CCC 100	EC0441660	2017.09.22	1 Year

11.2.Block Diagram of Test Setup



11.3.Surge Test Limits

Severity Level	Open-Circuit Test Voltage (kV)
1	0.5
2	1
3	2
4	4
*	Special

Notes: 1. Test set-up reference IEC 61000-4-5:2014

11.4.Configuration of EUT on Test

The following equipment are installed on Electrostatic Discharge Test to meet the IEC 61000-4-5 requirements and operating regulations in a manner that tends to maximize its emission characteristics in normal application.

11.5.Operating Condition of EUT

(1) Setup the EUT as shown as Section 11.2.

(2) Turn on the power of all equipment.

(3) Let the EUT work in test mode and 15 minutes before taking the test.

11.6.Test Procedure

(1) For line-to-line coupling mode, provide a 1kV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points, and for active line / neutral lines to ground are same except test level is 2kV.

(2) At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are applied during test.

(3) Different phase angles are done individually.

(4) Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

11.7.Surge Test Results

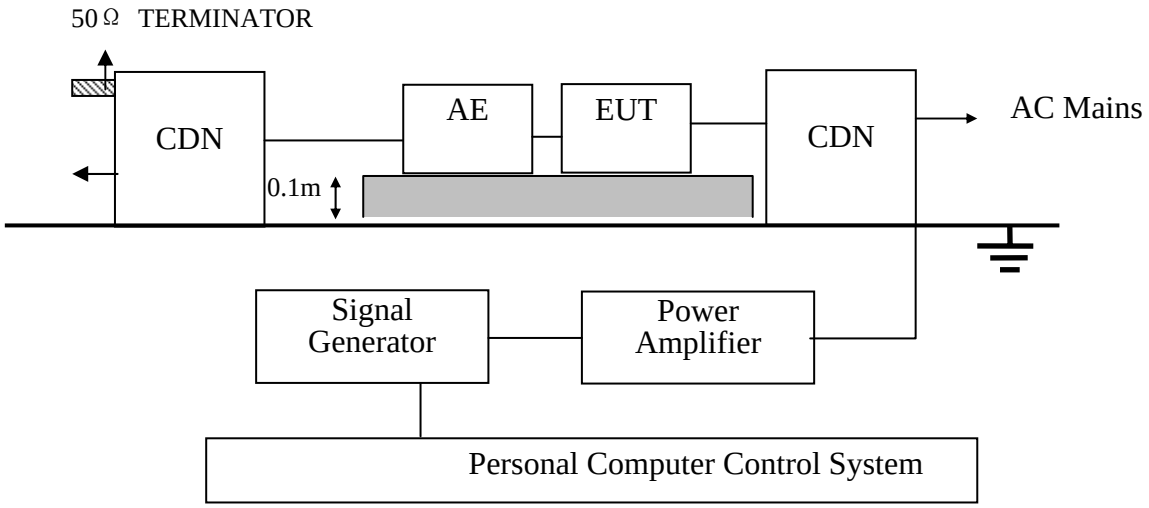
EUT	:	TUNER	Test Date	:	N/A
M/N	:	JT-06	Temperature	:	N/A
Test Engineer	:	N/A	Humidity	:	N/A
Test Voltage	:	N/A	Pressure	:	N/A
Test Mode	:	N/A			
Test Results	:	N/A			
Note: The EUT is supplied by Battery, so this item does not applicable.					

12. INJECTED CURRENTS SUSCEPTIBILITY TEST

12.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	CONDUCTED IMMUNITY TEST SYSTEM (RF-Generator)	Frankonia	CIT-10/75	12681247/2013	2017.09.22	1 Year
2.	Fixed Coaxial Attenuator (6dB Attenuation)	CD	ATT-0675	120540086	2017.09.22	1 Year
3.	coupling-decoupling network (CDN)	CD	CDN M2/M3	2302	2017.09.22	1 Year
4.	Electromagnetic Injection Clamp (EMC-Clamp)	CD	EM-Clamp	0513A031201	2017.09.22	1 Year

12.2. Block Diagram of Test Setup



12.3.Injected currents susceptibility Test Limits

Level	Voltage Level (e.m.f.) V
1	1
2	3
3	10
X	Special

Notes: 1. Test set-up reference IEC 61000-4-6:2013

12.4.Configuration of EUT on Test

The following equipment are installed on Electrostatic Discharge Test to meet the IEC 61000-4-6 requirements and operating regulations in a manner that tends to maximize its emission characteristics in normal application.

12.5.Operating Condition of EUT

(1) Setup the EUT as shown as Section 12.2.

(2) Turn on the power of all equipment.

(3) Let the EUT work in test mode and 15 minutes before taking the test.

12.6.Test Procedure

(1) Let the EUT work in test mode and test it.

(2) The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 10 and 30 mm (where possible).

(3) The disturbance signal described below is injected to EUT through CDN.

(4) The EUT operates within its operational mode(s) under intended climatic conditions after power on.

(5) The frequency range is swept from 0.150MHz to 80MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1kHz sine wave.

(6) The rate of sweep shall not exceed 1.5*10-3decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.

(7) Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

12.7.Injected currents susceptibility Test Results

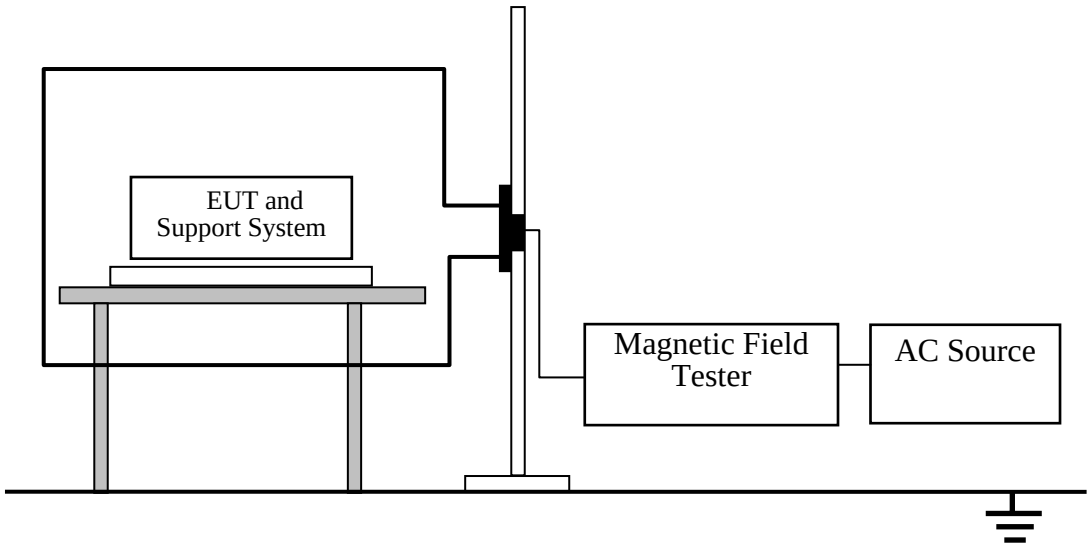
EUT	:	TUNER	Test Date	:	N/A
M/N	:	JT-06	Temperature	:	N/A
Test Engineer	:	N/A	Humidity	:	N/A
Test Voltage	:	N/A	Pressure	:	N/A
Test Mode	:	N/A			
Test Results	:	**N/A**			
Note: The EUT is supplied by Battery, so this item does not applicable.					

13.MAGNETIC FIELD IMMUNITY TEST

13.1.Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Multifunctional Compact Immunity Test system	3ctest	CCS 600	ES0801655	2017.09.22	1 Year
2.	Surge&EFT Coupling Decoupling Network	3ctest	SEPN 3832T	ES0951601	2017.09.22	1 Year
3.	Voltage variation and PF magnetic field regulating device	3ctest	VMT2216S	ES0441601	2017.09.22	1 Year
4.	Capacitive Coupli ng Clamp	3ctest	CCC 100	EC0441660	2017.09.22	1 Year

13.2.Block Diagram of Test Setup



13.3.magnetic field Test Limits

Level	Magnetic Field Strength A/m
1	1
2	3
3	10
4	30
5	100
X	Special

Notes: 1. Test set-up reference IEC 61000-4-8:2009

13.4.Configuration of EUT on Test

The following equipment are installed on Electrostatic Discharge Test to meet the IEC 61000-4-8 requirements and operating regulations in a manner that tends to maximize its emission characteristics in normal application.

13.5.Operating Condition of EUT

(1) Setup the EUT as shown as Section 13.2.

(2) Turn on the power of all equipment.

(3) Let the EUT work in test mode and 15 minutes before taking the test.

13.6.Test Procedure

(1) The EUT was subjected to the test magnetic field by using the induction coil of standard dimensions (1m*1m) and shown in Section 13.2. The induction coil was then rotated by 90°in order to expose the EUT to the test field with different orientations.

13.7.magnetic field immunity Test Results

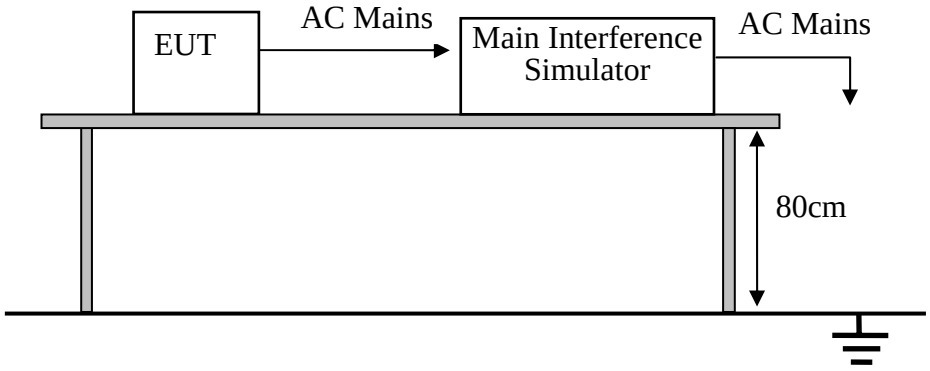
EUT	:	TUNER	Test Date	:	N/A
M/N	:	JT-06	Temperature	:	N/A
Test Engineer	:	N/A	Humidity	:	N/A
Test Voltage	:	N/A	Pressure	:	N/A
Test Mode	:	N/A			
Test Results	:	**N/A**			
Note:	The EUT not containing devices susceptible to magnetic fields, and Power-frequency magnetic field test applicable only to EUT containing devices susceptible to magnetic fields, so the test not applicable.				

14. VOLTAGE DIPS AND INTERRUPTIONS TEST

14.1.Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Multifunctional Compact Immunity Test system	3ctest	CCS 600	ES0801655	2017.09.22	1 Year
2.	Surge&EFT Coupling Decoupling Network	3ctest	SEPN 3832T	ES0951601	2017.09.22	1 Year
3.	Voltage variation and PF magnetic field regulating device	3ctest	VMT2216S	ES0441601	2017.09.22	1 Year
4.	Capacitive Coupl ing Clamp	3ctest	CCC 100	EC0441660	2017.09.22	1 Year

14.2.Block Diagram of Test Setup



14.3.Voltage dips and interruptions Test Limits

Test Level %U_T	Voltage dip and short interruptions %U_T	Performance Criterion	Duration (in period)
0	100	B	0.5
0	100	B	1
70	30	C	25
0	100	C	250

Notes: 1. Test set-up reference IEC 61000-4-11:2004

14.4.Configuration of EUT on Test

The following equipment are installed on Electrostatic Discharge Test to meet the IEC 61000-4-11 requirements and operating regulations in a manner that tends to maximize its emission characteristics in normal application.

14.5.Operating Condition of EUT

(1) Setup the EUT as shown as Section 14.2.

(2) Turn on the power of all equipment.

(3) Let the EUT work in test mode and 15 minutes before taking the test.

14.6.Test Procedure

(1) The interruption is introduced at selected phase angles with specified duration.

(2) Record any degradation of performance.

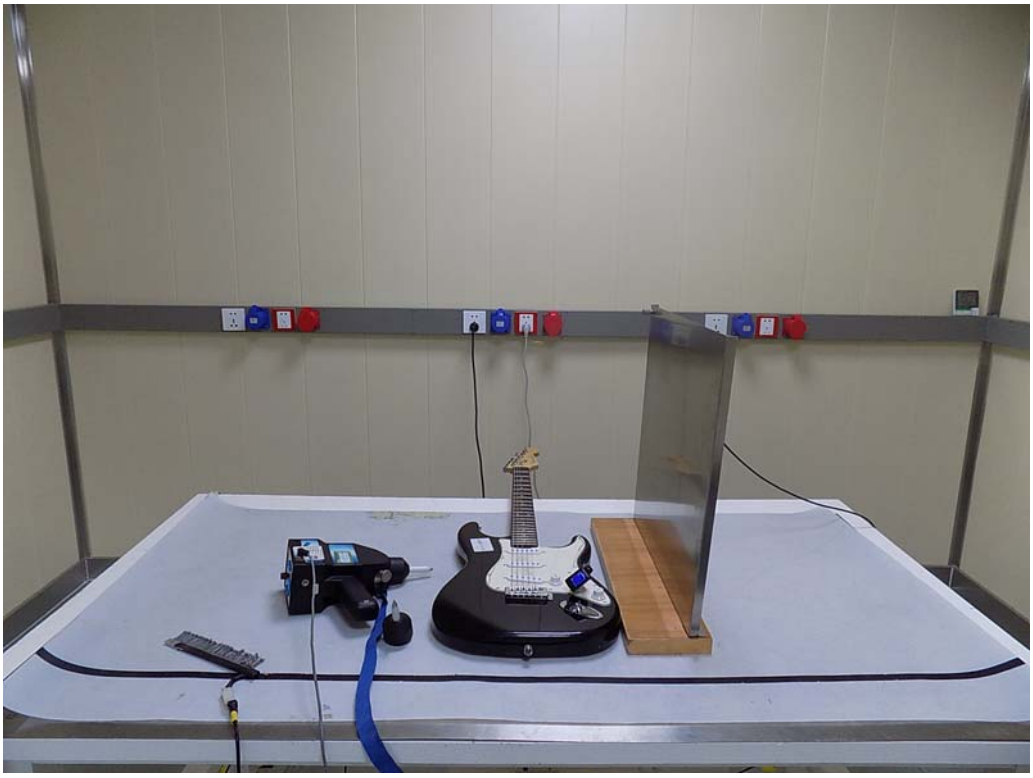
14.7.Voltage dips and interruptions Test Results

EUT	:	TUNER	Test Date	:	N/A
M/N	:	JT-06	Temperature	:	N/A
Test Engineer	:	N/A	Humidity	:	N/A
Test Voltage	:	N/A	Pressure	:	N/A
Test Mode	:	N/A			
Test Results	:	**N/A**			
Note:	The EUT is supplied by Battery, so this item does not applicable.				

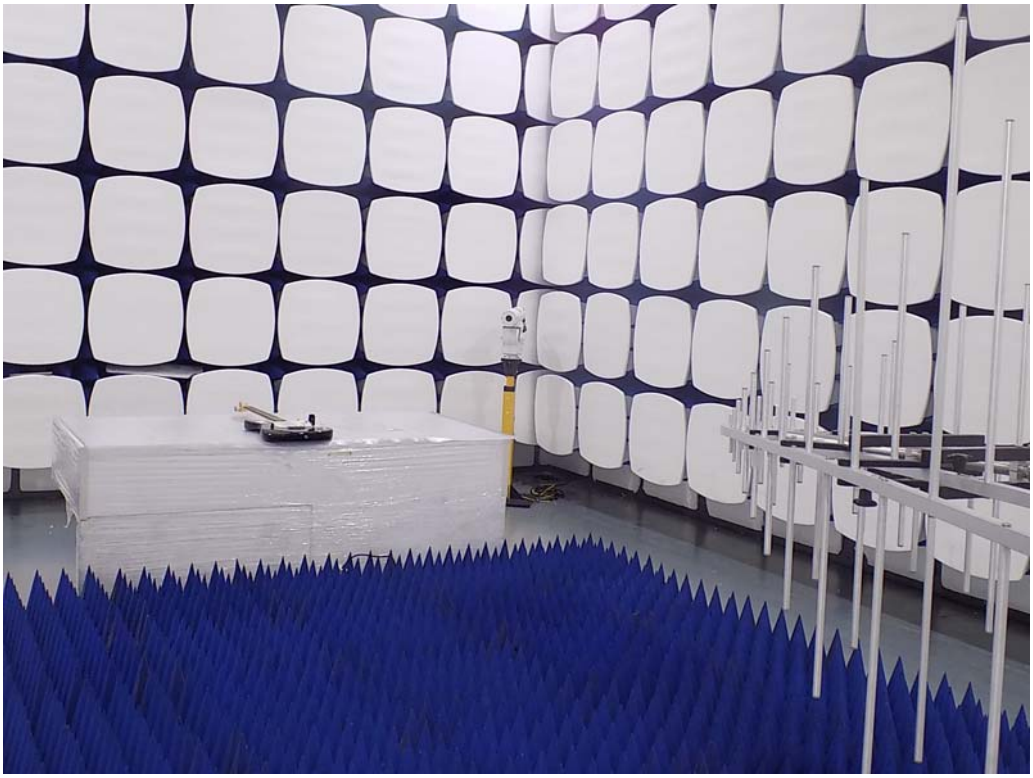
15. PHOTOGRAPH

15.1.Photos of Radiated Disturbance Test (In Semi Anechoic Chamber)

15.2.Photos of Electrostatic Discharge Test



15.3.Photos of RF Field Strength Susceptibility Test



16. PHOTOS OF THE EUT

EUT View

EUT View

EUT View

EUT View

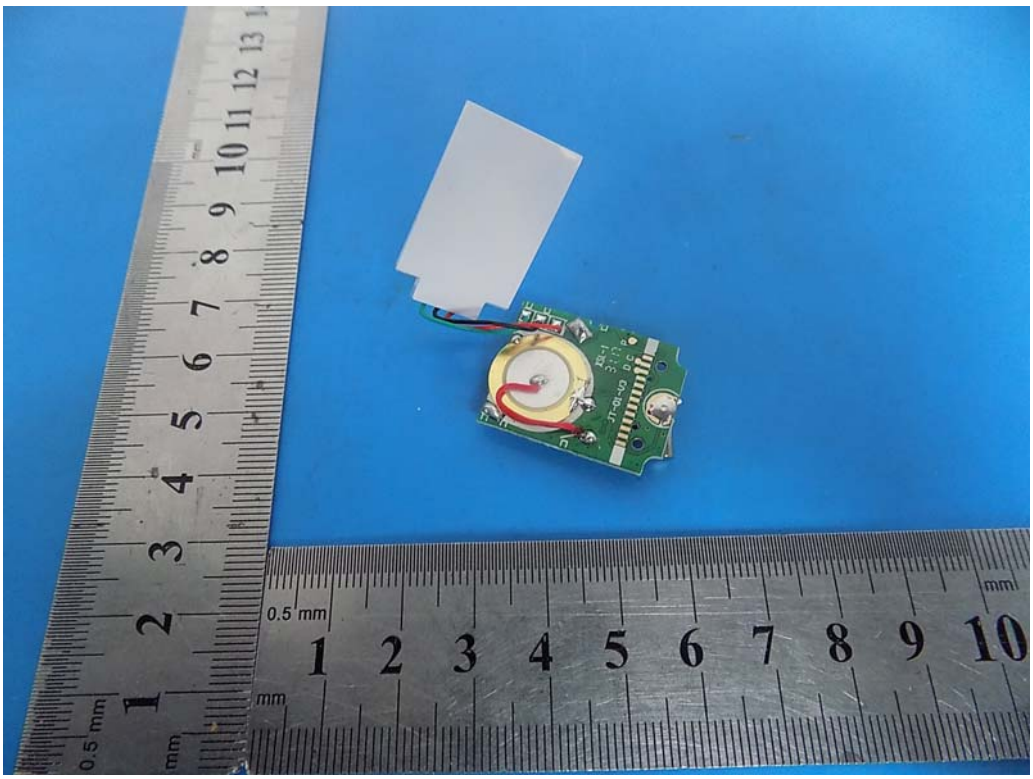
EUT View

EUT View

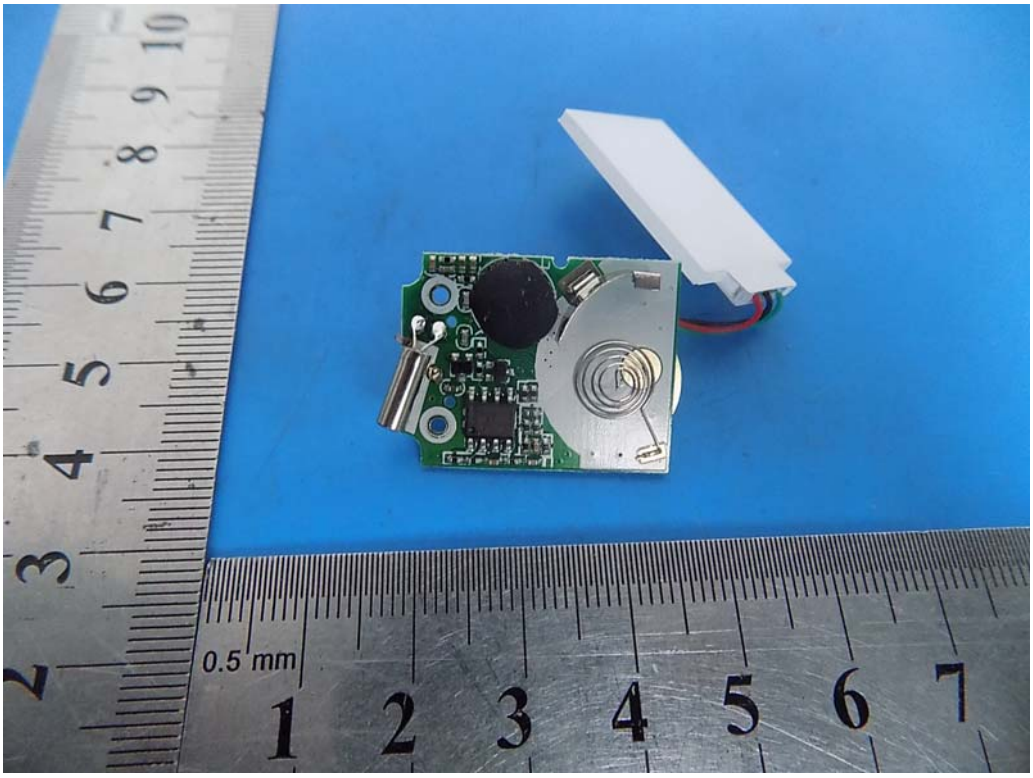
EUT View

EUT View

EUT View



EUT View



EUT View

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