EMC Test Report

Certificate No.	:	TB181020082
Applicant	:	Shenzhen Ouran Technoogy Co., Ltd.
Equipment Under Test (EUT)		
EUT Name	:	Smoke leak detector
Model No.	:	SDT202
Serial Model No.	:	SDT106, SDT206, SDT208, SDT302, SDT306, SDT308.
Brand Name	:	AUTOOL
Receipt Date	:	2018-10-15
Test Date	:	2018-10-15 to 2018-11-07
Issue Date	:	2018-11-07
Standards	:	EN 55032:2015 EN 55024:2010+A1:2015
Conclusions	:	**PASS** In the configuration tested, the EUT complied with the standards specified above. The EUT technically complies with the 2014/30/EU directive requirements
Test/Witness Engineer	:	Rebeca
Engineer Supervisor	:	Ivan Su
Approved & Authorized	:	Ray Lai

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

1 A/F., Bldg.6, Yusheng Industrial Zone, The National Road No.107 Xixiang Section 467, Xixiang, Bao'an, Shenzhen, Guangdong, China
Tel: +86 75526509301 Fax: +86 75526509195

TABLE OF CONTENTS

1. GENERAL INFORMATION 4
1.1. Client Information 4
1.2. General Description of EUT (Equipment Under Test) 4
1.3. Description of Operating Mode 5
1.4. Block Diagram Showing The Configuration of System Tested 5
1.5. Description of Support Units 6
1.6. Performance Criterion 6
1.7. Measurement Uncertainty 7
1.8. Test Facility 7
2. TEST RESULTS SUMMARY 8
3. TEST EQUIPMENT USED 10
4. RADIATED EMISSION TEST 11
4.1 Test Standard and Limit 11
4.2. Test Setup 11
4.3. Test Procedure 13
4.4. Test Data 13
5. ELECTROSTATIC DISCHARGE IMMUNITY TEST 14
5.1 Test Requirements 14
5.2. Test Setup 14
5.3. Test Procedure 15
5.4. Test Data 15
6. RADIATED ELECTROMAGNETIC FIELD IMMUNITY TEST 16
6.1. Test Requirements 16
6.2. Test Setup 16
6.3. Test Procedure 16
6.4. Test Data 17
7. PHOTOGRAPHS - CONSTRUCTIONAL DETAILS 18
8. PHOTOGRAPHS - TEST SETUP 20
ATTACHMENT A--RADIATED EMISSION TEST DATA (BELOW 1G) 21
ATTACHMENT B--ELECTROSTATIC DISCHARGE TEST DATA 23
ATTACHMENT C--RF FIELD STRENGTH SUSCEPTIBILITY TEST DATA 25

Revision History

Report No.	Version	Description	Issued Date
TB-EMC162281	Rev.01	Initial issue of report	2018-11-07

1. General Information

1.1. Client Information

Applicant	:	Shenzhen Ouran Technoogy Co., Ltd.
Address	:	No. 306 Haiming Building, No.1, Entrepreneur 2nd Road, Baomin Community, Xin'an Street, Bao'an District, Shenzhen, China
Manufacturer	:	Shenzhen Ouran Technoogy Co., Ltd.
Address	:	No. 306 Haiming Building, No.1, Entrepreneur 2nd Road, Baomin Community, Xin'an Street, Bao'an District, Shenzhen, China

1.2. General Description of EUT (Equipment Under Test)

EUT Name	:	Smoke leak detector
Model(s)	:	SDT202, SDT106, SDT206, SDT208, SDT302, SDT306, SDT308.
Model Difference	:	All these models are identical in the same PCB layout and electrical circuit, the only difference is model name for commercial. therefore, EMI and EMS testing was performed with SDT202 only.
Brand Name	:	AUTOOL
Class of EUT	:	☐ Class A ☒ Class B
EUT Type	:	☒ Table top ☐ Floor standing ☐ combination
F_X	:	≤108 MHz
Power Supply	:	DC 12V 6A
***F_X*: Highest internal frequency.**		

1.3. Description of Operating Mode

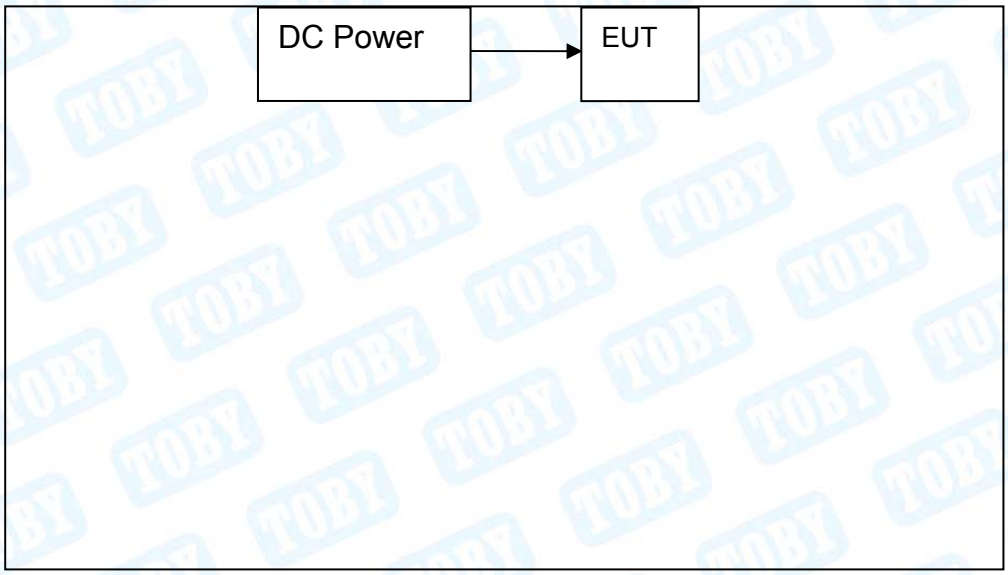
To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	Normal Mode

The EUT system operated these modes were found to be the worst case during the pre-scanning test as Following:

For EMI Test	
Final Test Mode	**Description**
Mode 1	Normal Mode
For EMS Test	
Final Test Mode	**Description**
Mode 1	Normal Mode

1.4. Block Diagram Showing The Configuration of System Tested



1.5. Description of Support Units

Equipment Information				
Name	**Model**	**S/N**	**Manufacturer**	**Used "√"**
LCD Monitor	E170Sc	----	DELL	
PC	OPTIPLEX380	----	DELL	
Keyboard	L100	U01C	DELL	
Mouse	M-UARDEL7	----	DELL	
TV	K600S	----	KONKA	
Notebook	161301-CN	15987/00203076	Xiaomi	
Cable Information				
Number	**Shielded Type**	**Ferrite Core**	**Length**	**Note**
Cable 1	YES	YES(2)	1.8M	
Cable 2	YES	YES(1)	2.0M	
Cable 3	YES	NO	1.5M	
Cable 4	NO	NO	0.5M	

1.6. Performance Criterion

Criterion A: The equipment shall continue to operate as intended without operator intervention. No degradation of performance of loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended.

Criterion B: After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the equipment is used as intended.

Criterion C: Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions.

1.7. Measurement Uncertainty

The reported uncertainty of measurement y ± U，where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2，providing a level of confidence of approximately 95 %.

Test	Parameters	Expanded Uncertainty (U_{Lab})	Expanded Uncertainty (U_{Cispr})
Conducted Emission	Level Accuracy: 9kHz~150kHz 150kHz to 30MHz	±3.42 dB ±3.42 dB	±4.0 dB ±3.6 dB
Radiated Emission	Level Accuracy: 9kHz to 30 MHz	±4.60 dB	N/A
Radiated Emission	Level Accuracy: 30MHz to 1000 MHz	±4.40 dB	±5.2 dB
Radiated Emission	Level Accuracy: Above 1000MHz	±4.20 dB	N/A
Mains Harmonic	Voltage	±3.11%	N/A
Voltage Fluctuations & Flicker	Voltage	±3.25%	N/A

1.8. Test Facility

The testing report were performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at 1A/F., Bldg.6, Yusheng Industrial Zone, The National Road No.107 Xixiang Section 467, Xixiang, Bao'an, Shenzhen, Guangdong, China. At the time of testing, the following bodies accredited the Laboratory:

A2LA Certificate No.: 4750.01

The laboratory has been accredited by American Association for Laboratory Accreditation (A2LA) to ISO/IEC 17025： 2005 General Requirements for the Competence of Testing and Calibration Laboratories for the technical competence in the field of Electrical Testing. And the A2LA Certificate No.: 4750.01.

IC Registration No.: (11950A-1)

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A-1.

2. TEST Results Summary

EMISSION (☒EN 55032:2015)			
Description of test items	**Standards**	**Class**	**Results**
Conducted disturbance at mains terminals	EN 55032: 2015	☐ Class A ☐ Class B	N/A (1)
Conducted disturbance for asymmetric mode	EN 55032: 2015	☐ Class A ☐ Class B	N/A(2)
Conducted differential voltage emission	EN 55032: 2015	Class B	N/A(2)
Radiated Disturbance	EN 55032: 2015	☐ Class A ☒ Class B	Pass
Harmonic current emissions	EN 61000-3-2: 2014	☐ Class A ☐ Class D	N/A (4)
Voltage fluctuation and flicker	EN 61000-3-3: 2013		N/A

Note:
(1) Class A/Class B: Applicable to AC mains power ports
(2) Class A: Applicable to wired network ports, optical fibre ports with metallic shield or tension members and antenna ports.
Class B: Applicable to wired network ports, optical fibre ports with metallic shield or tension members, broadcast receiver tuner ports and antenna ports.
Applicable to ports listed above and intended to connect to cables longer than 3 m.
(3) Class B: Applicable to TV broadcast receiver tuner ports with an accessible connector, RF modulator output ports and FM broadcast receiver tuner ports with an accessible connector.
(4) Class A: Balanced three-phase equipment, Household appliances excluding equipment as Class D, Tools excluding portable tools, Dimmers for incandescent lamps, audio equipment, equipment not specified in one of the three other classes.
Class D: Equipment having a specified power less than or equal to600 W of the following types: Personal computers and personal computer monitors and television receivers.

IMMUNITY (☒EN 55024:2010+A1:2015)		
Description of test items	**Standards**	**Results**
Electrostatic Discharge (ESD)	EN 61000-4-2: 2009	Pass
Radio-frequency, Continuous radiated disturbance	EN 61000-4-3: 2006+A2:2008+ A2: 2010	Pass
EFT/B Immunity	EN 61000-4-4: 2012	N/A
Surge Immunity	EN 61000-4-5: 2014	N/A
Conducted RF Immunity	EN 61000-4-6: 2014	N/A
Power frequency magnetic field	EN 61000-4-8: 2010	N/A(1)
Voltage dips, >95% reduction	EN 61000-4-11: 2004	N/A
Voltage dips, 30% reduction		
Voltage interruptions		
Note: N/A is an abbreviation for Not Applicable. (1) Not applicable, the EUT is not containing devices susceptible to magnetic fields.		

3. Test Equipment Used

Radiation Emission Test					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Cal.Due Date**
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 18, 2018	Jul. 17, 2019
EMI Test Receiver	Rohde & Schwarz	ESCI	101165	Jul. 18, 2018	Jul. 17, 2019
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar. 16, 2018	Mar. 15, 2019
Bilog Antenna	ETS-LINDGREN	3142E	00117542	Mar. 16, 2018	Mar. 15, 2019
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar. 16, 2018	Mar. 15, 2019
Horn Antenna	ETS-LINDGREN	3117	00143209	Mar. 16, 2018	Mar. 15, 2019
Pre-amplifier	HP	11909A	185903	Mar. 17, 2018	Mar. 16, 2019
Pre-amplifier	HP	8449B	3008A00849	Mar. 17, 2018	Mar. 16, 2019
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar. 17, 2018	Mar. 16, 2019
Signal Generator	Rohde & Schwarz	SML03	IKW682-054	Mar. 17, 2018	Mar. 16, 2019
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A
Discharge Immunity Test					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Cal.Due Date**
ESD Tester	TESEQ	NSG437	304	Aug. 08, 2018	Aug. 07, 2019
Radiated Immunity Test					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Cal.Due Date**
Signal Generator	Rohde & Schwarz	SMT03	200754	Mar. 22, 2018	Mar. 21, 2019
Power Meter	Rohde & Schwarz	NRVD	110562	Feb. 12, 2018	Feb. 11, 2019
Voltage Probe	Rohde & Schwarz	URV5-Z2	12056	Feb. 12, 2018	Feb. 11, 2019
Voltage Probe	Rohde & Schwarz	URV5-Z2	12074	Feb. 12, 2018	Feb. 11, 2019
RF Amplifier	AR	50S1G4A	326720	Feb. 12, 2018	Feb. 11, 2019
Bilog Antenna	ETS	3142C	00047662	Feb. 12, 2018	Feb. 11, 2019
Horn Antenna	ARA	DRG-118A	16554	Feb. 12, 2018	Feb. 11, 2019

4. Radiated Emission Test

4.1 Test Standard and Limit

4.1.1. Test Standard

EN 55032: 2015

4.1.2. Test Limit

Bellow 1GHz

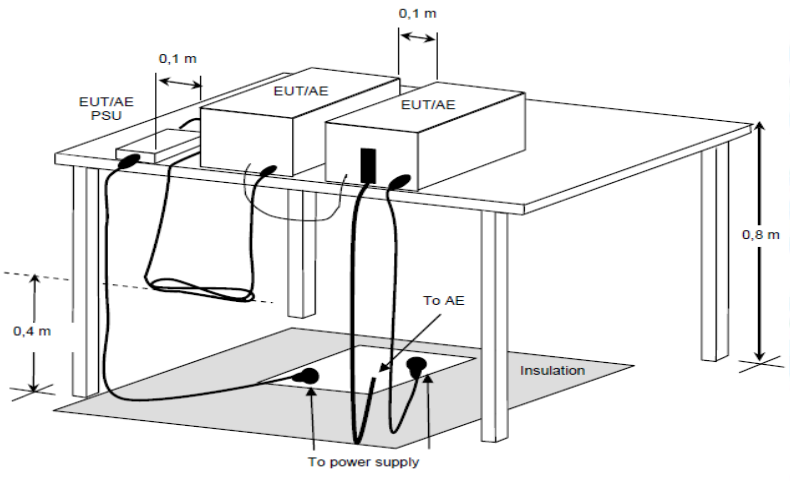
Frequency	Limit (dBμV/m) (3m)	
	Quasi-peak Level	
	Class A	Class B
30MHz~230MHz	50	40
230MHz~1000MHz	57	47
Remark: 1. The lower limit shall apply at the transition frequency. 2. The test distance is 3m.		

Above 1GHz

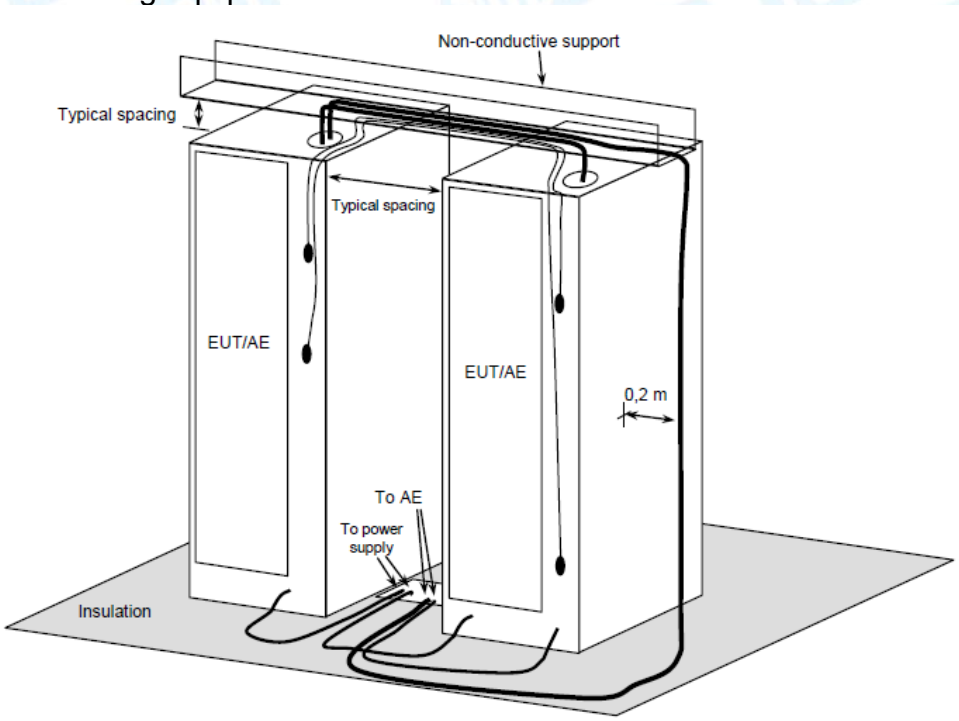
Frequency (GHz)	Limit (dBμV/m) (3m)			
	Class A		Class B	
	Peak	Average	Peak	Average
1~3	76	56	70	50
3~6	80	60	74	54
Remark: 1. The lower limit shall apply at the transition frequency. 2. The test distance is 3m.				

4.2. Test Setup

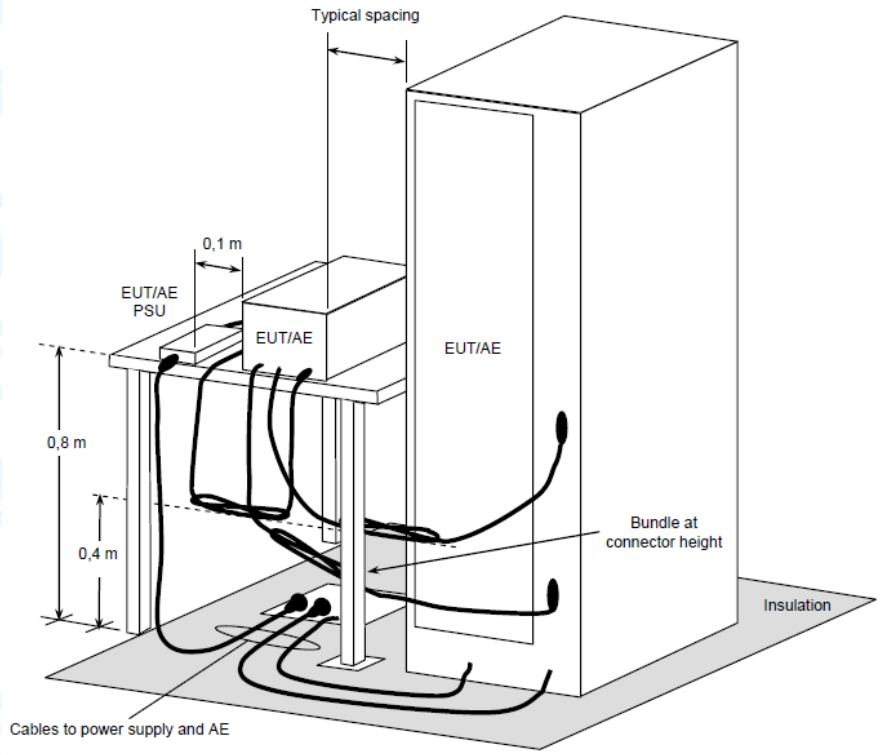
☒ For table top equipment



☐ For floor standing equipment



☐ For combination equipment



4.3. Test Procedure

Measurement was performed according to clause 7.3 of CISPR 16-2-3.

The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m. The table was rotated 360 degrees to determine the position of the highest radiation.
The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

The initial step in collecting radiated emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range.

If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.

Highest internal frequency (Fx)	Highest measured frequency for radiated measurement	Measured Bandwidth
Fx ≤ 108 MHz	1 GHz	120kHz
108 MHz < Fx ≤ 500 MHz	2 GHz	1MHz
500 MHz < Fx ≤ 1 GHz	5 GHz	1MHz
Fx > 1 GHz	5*Fx up to a maximum of 6 GHz	1MHz
NOTE 1: For FM and TV broadcast receivers, Fx is determined from the highest frequency generated orused excluding the local oscillator and tuned frequencies. **NOTE 2:** For outdoor units of home satellEquipment receiving systems highest measured frequency shall be 18GHz.		

4.4. Test Data

Please refer to the Attachment A.

5. Electrostatic Discharge Immunity Test

5.1 Test Requirements

5.1.1. Test Standard

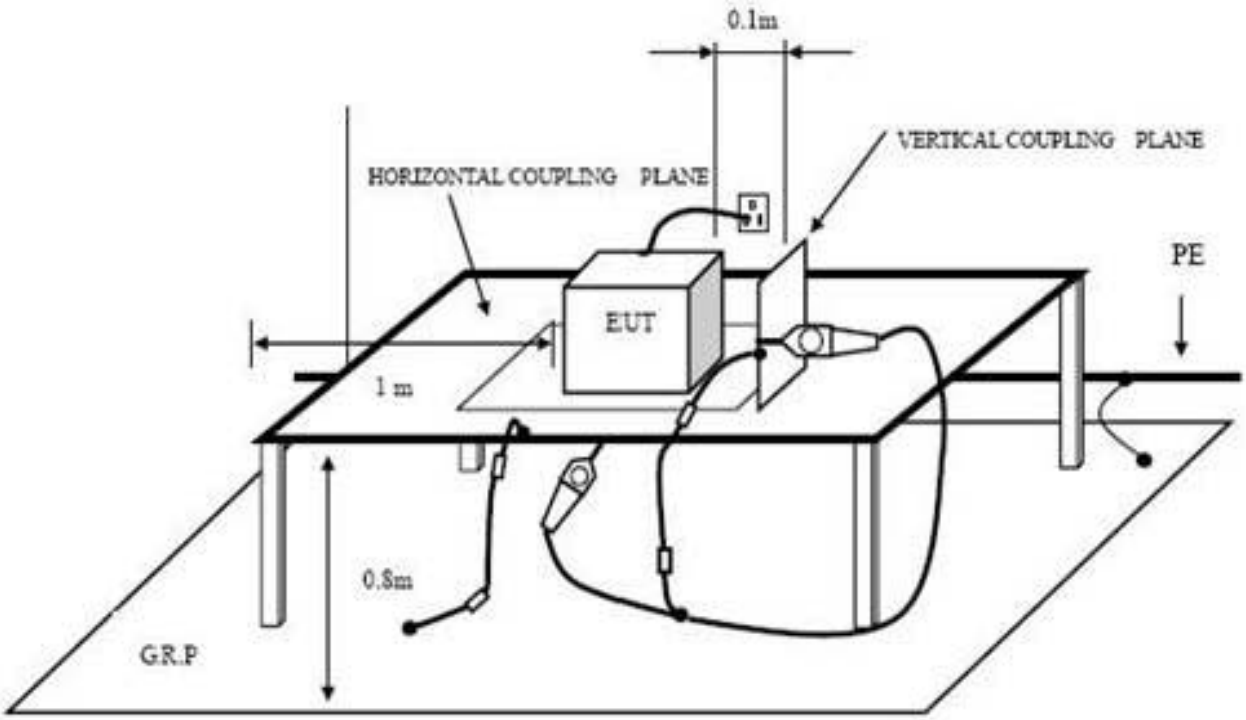
EN 55024:2010+A1:2015 (EN 61000-4-2:2009)

5.1.2. Test Level

Level	Test Voltage Contact Discharge (Kv)	Test Voltage Air Discharge (Kv)
1	±2	±2
2	±4	±4
3	±6	±8
4	±8	±15
X	Special	Special

5.1.3. Performance criterion: **B**

5.2. Test Setup



INDIRECT DISCHARGE SETUP

5.3. Test Procedure

10.3.1 Air Discharge:

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

10.3.2 Contact Discharge:

All the procedure shall be same as air discharge. Except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

10.3.3 Indirect discharge for horizontal coupling plane

At least 10 single discharges (in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the center point of each unit (if applicable) of the EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

10.3.4 Indirect discharge for vertical coupling plane

At least 10 single discharges (in the most sensitive polarity) shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

5.4. Test Data

Please refer to the Attachment B.

6. Radiated Electromagnetic Field Immunity Test

6.1. Test Requirements

6.1.1. Test Standard

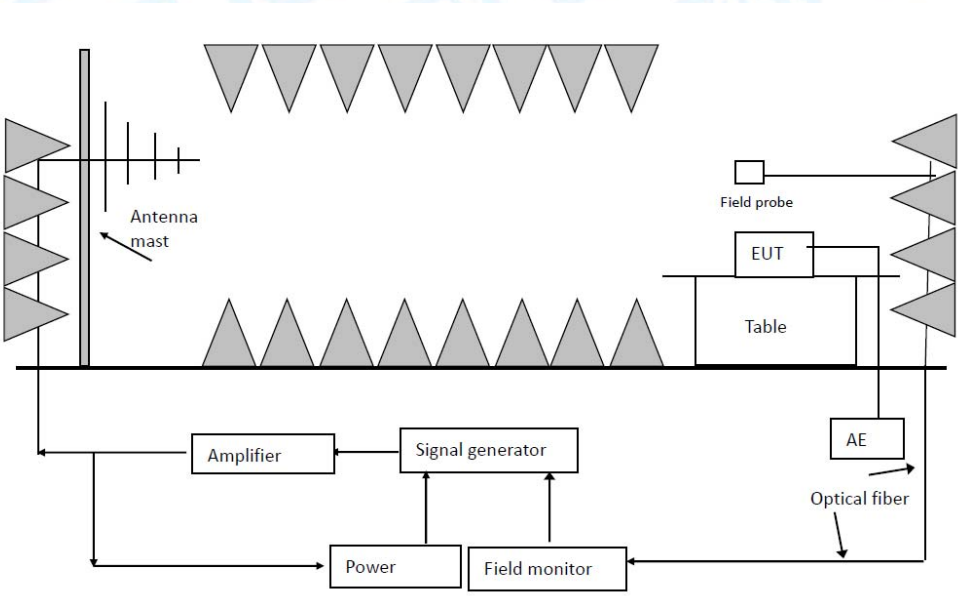
EN 55024:2010+A1:2015 (EN 61000-4-3:2006+A1:2008+A2:2010)

6.1.2. Test Level

Level	Field Strength V/m
1	1
2	3
3	10
X	Special

Performance criterion: **A**

6.2. Test Setup



6.3. Test Procedure

The EUT are placed on a table, which is 0.8 meter high above the ground. The EUT is set 3 meters away from the transmitting antenna, which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna is set on test. Each of the four sides of the EUT must be faced this transmitting antenna and measured individually.

In order to judge the EUT performance, a camera is used to monitor its screen.

All the scanning conditions are as following:

Condition of Test	Remark
Fielded strength	3V/m (Severity Level 2)
Radiated signal	Modulated
Scanning frequency	80-1000MHz
Sweep time of radiated	0.0015 Decade/s
Dwell time	1 Sec.

6.4. Test Data

Please refer to the Attachment C.

7. Photographs - Constructional Details

Photo 1 Appearance of EUT



Photo 2 Appearance of EUT



Photo 3 Appearance of EUT

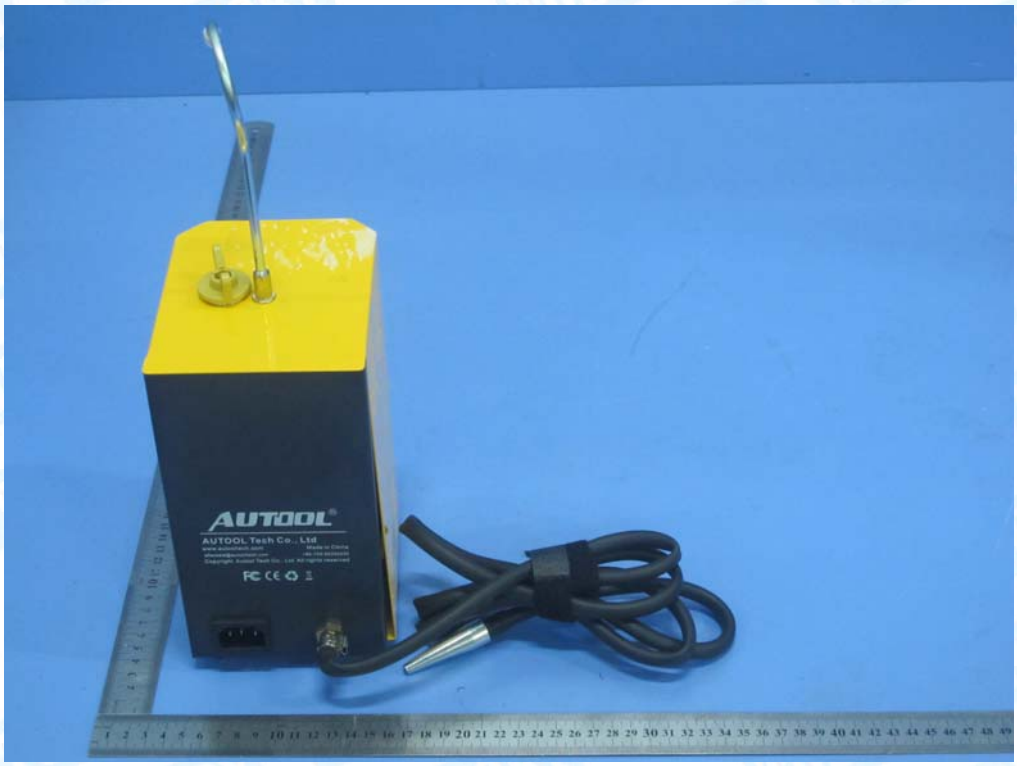
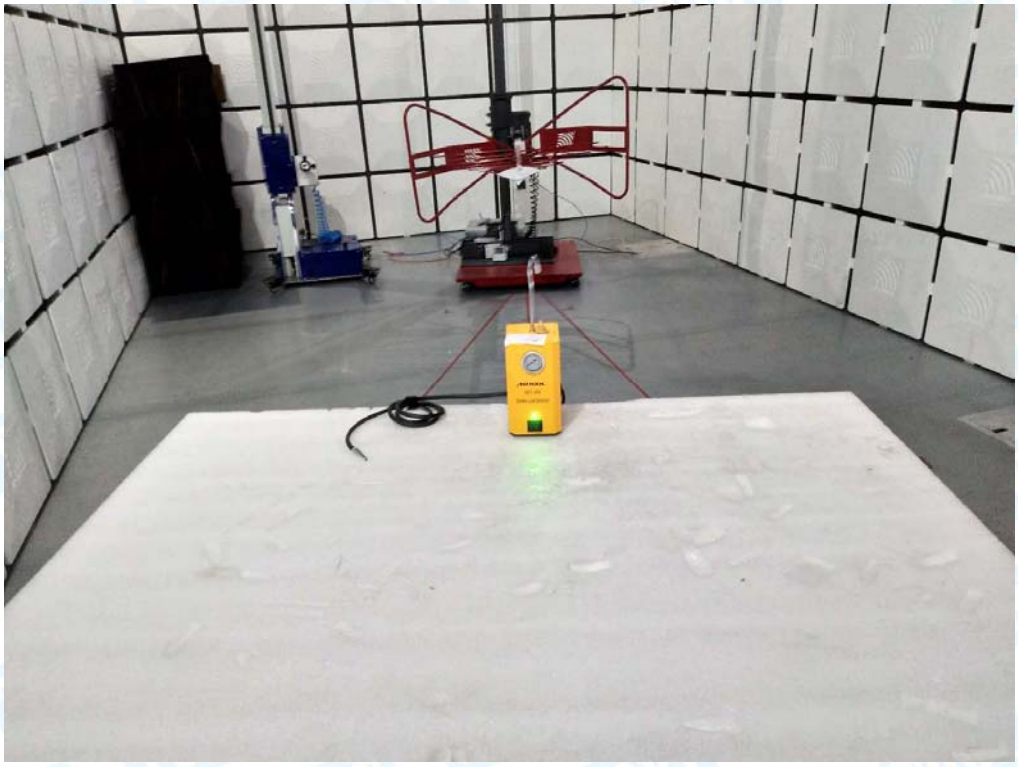


Photo 4 Internal of EUT



8. Photographs - Test Setup

Radiated Emission Test Setup—Below 1G

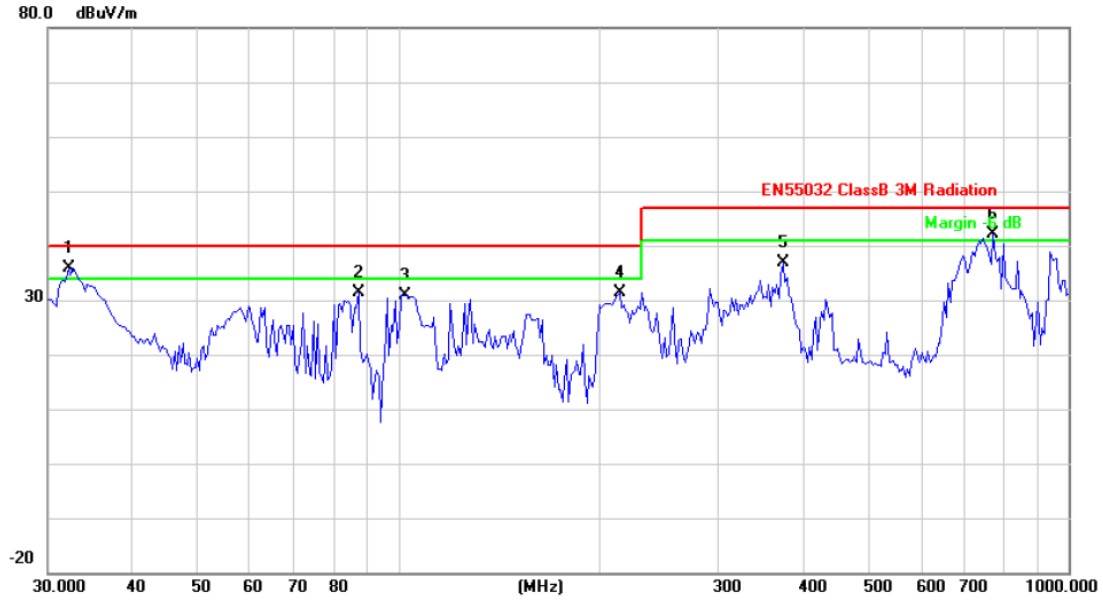


Electrostatic Discharge Test Setup



Attachment A--Radiated Emission Test Data (Below 1G)

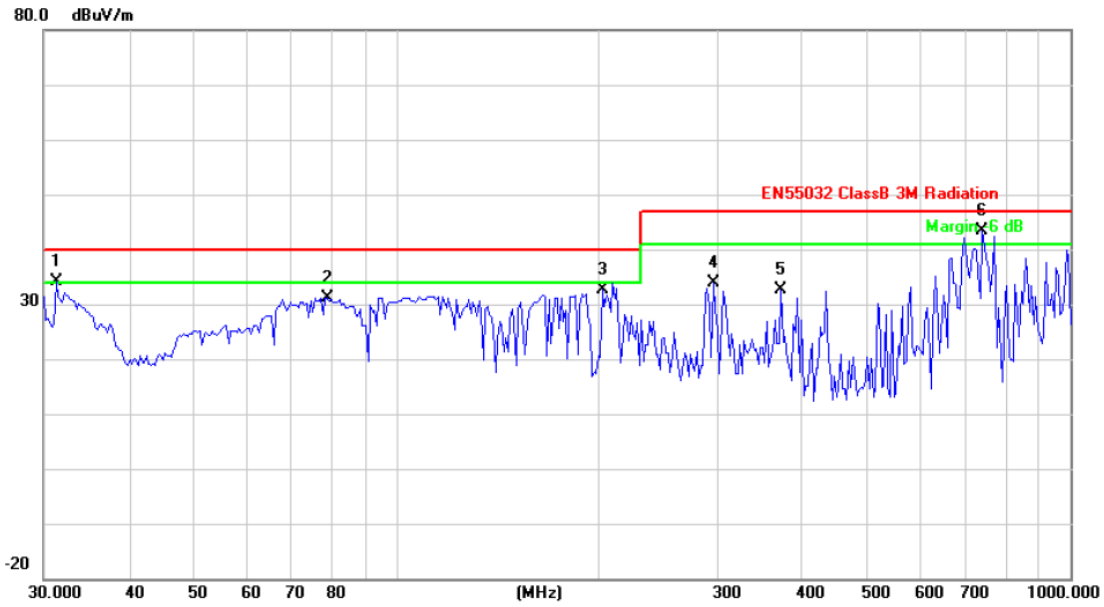
Temperature:	25 ℃	**Relative Humidity:**	55%
Pressure:	1010 hPa		
Test Voltage:	DC 12V		
Ant. Pol.	Horizontal		
Test Mode:	Mode 1		
Remark:			



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	32.1794	50.70	-14.89	35.81	40.00	-4.19	peak
2		87.1116	53.70	-22.26	31.44	40.00	-8.56	peak
3		102.3597	52.41	-21.47	30.94	40.00	-9.06	peak
4		213.7633	50.63	-19.21	31.42	40.00	-8.58	peak
5		374.6225	50.03	-13.25	36.78	47.00	-10.22	peak
6	!	771.4486	47.93	-5.87	42.06	47.00	-4.94	peak

Emission Level= Read Level+ Correct Factor

Temperature:	25 ℃	**Relative Humidity:**	55%
Pressure:	1010 hPa		
Test Voltage:	DC 12V		
Ant. Pol.	Vertical		
Test Mode:	Mode 1		
Remark:			



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	!	31.2893	48.59	-14.36	34.23	40.00	-5.77	peak
2		78.9651	53.97	-22.76	31.21	40.00	-8.79	peak
3		202.1005	52.42	-19.67	32.75	40.00	-7.25	peak
4		295.1469	50.60	-16.72	33.88	47.00	-13.12	peak
5		372.0045	46.11	-13.39	32.72	47.00	-14.28	peak
6	*	739.6604	49.71	-6.42	43.29	47.00	-3.71	peak

Emission Level= Read Level+ Correct Factor

Attachment B--Electrostatic Discharge Test Data

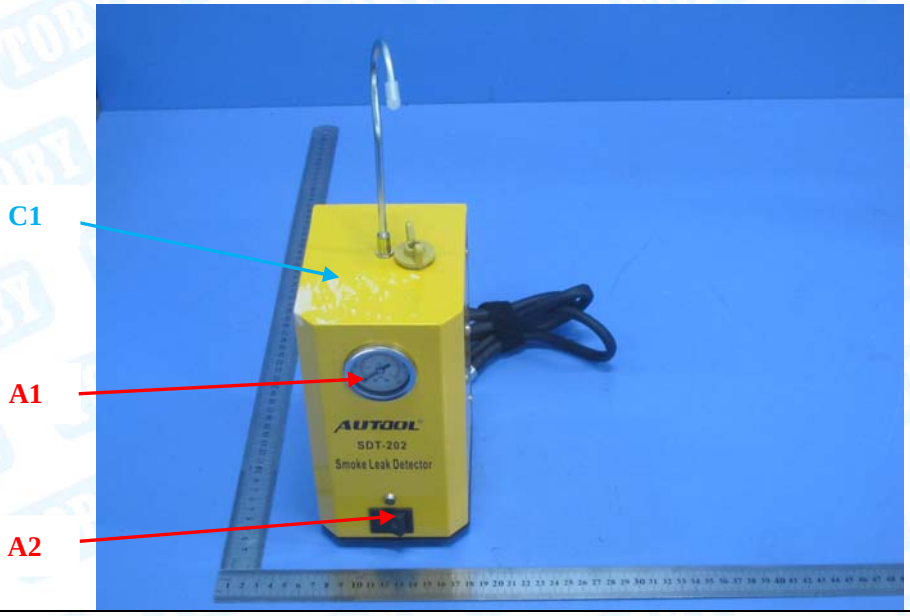
Temperature :	22℃	Humidity :	50%
Power supply :	DC 12V	Test Mode :	Mode 1

Required Performance Criteria: B

Air Discharge: ±2/±4/±8kV Contact Discharge: ±2/±4kV

Location	Test Level (kV)	No. of Discharge	Judgment	Result
A1	±2kV±4kV±8kV	20	A	PASS
A2		20	A	
C1	±2kV±4kV	20	A	
HCP	±4kV	40	A	
VCP	±4kV	40	A	

Test Location Photos



Note:

1) Criteria A: There was no change operated with initial operating during the test.
2) Criteria B: The EUT function loss during the test, but self-recoverable after the test.
3) Criteria C: The system shut down during the test.

Attachment C--RF Field Strength Susceptibility Test Data

Temperature	: 22℃	Humidity	: 50%
Power supply	: DC 12V	Test Mode	: Mode 1

Required Performance Criteria: A

Modulation: AM 80%

Pulse: 1 kHz

EUT Position	Actual Performance Criteria				Result
	Frequency Range 1: 80~1000MHz		Frequency Range 2: /		
	Horizontal	Vertical	Horizontal	Vertical	
Front	A	A	/	/	PASS
Right	A	A	/	/	PASS
Rear	A	A	/	/	PASS
Left	A	A	/	/	PASS

Remark:

1) Criteria A: There was no change operated with initial operating during the test.
2) Criteria B: The EUT function loss during the test, but self-recoverable after the test.
3) Criteria C: The system shut down during the test.

-----END OF REPORT-----