

EMC TEST REPORT

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Date of Report : October 23, 2018



EMC TEST REPORT

EN 55032: 2015

Limits and methods of measurement of radio disturbance characteristics of broadcast receivers and associated equipment

EN 55020: 2007+A11: 2011+A12: 2016

Electromagnetic immunity of broadcast receivers and associated equipment

Report Reference No.: LCS180717007DE

Date Of Issue.....: October 23, 2018

Testing Laboratory Name Zhongshan LCS Compliance Testing Laboratory Ltd.

Address.....: 23F, Building A, Zhongshan Harbor of iDEAS, No. 25 Gangyi Road, Torch Development Zone, Zhongshan, Guangdong, China

Testing Location/ Procedure Full application of Harmonised standards ☒
Partial application of Harmonised standards ☐
Other standard testing method ☐

Test Specification:

Standard EN 55032: 2015

EN 55020: 2007+A11: 2011+A12: 2016

Test Report Form No.....: LCSEMC-1.0

TRF Originator.....: Zhongshan LCS Compliance Testing Laboratory Ltd.

Master TRF Dated 2011-03

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Test Item Description.....: USB shields

Trade Mark.....: OEM

Test Model.....: USB shield

Ratings Input: DC 5V

Result Positive

Compiled by:

Lylian Li

Lylian Li/ File administrators

Supervised by:

Davey Xu

Davey Xu / Technique principal

Approved by:

Leo Lee

Leo Lee / Manager



EMC -- TEST REPORT**Test Report No. : LCS180717007DE**October 23, 2018
Date of issue

Test Model..... : USB shield

EUT..... : USB shields

Test Result according to the standards on page 6: **Positive**

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

Revision	Issue Date	Revisions	Revised By
000	October 23, 2018	Initial Issue	Leo Lee

TABLE OF CONTENT

Test Report Description	Page
1. SUMMARY OF STANDARDS AND RESULTS	6
1.1. Description of Standards and Results	6
1.2. Description of Performance Criteria	7
2. GENERAL INFORMATION	8
2.1. Description of Device (EUT)	8
2.2. Support equipment List	8
2.3. Statement of the measurement uncertainty	8
2.4. Measurement Uncertainty	9
3. TEST INSTRUMENT USED.....	10
3.1. Radiated Disturbance (Electric Field)	10
3.2. Electrostatic Discharge	10
4. RADIATED EMISSION MEASUREMENT	11
4.1. Block Diagram of Test	11
4.2. Radiated Emission Limit	12
4.3. EUT Configuration on Test	12
4.4. Operating Condition of EUT	12
4.5. Test Procedure	12
4.6. Radiated Emission Noise Measurement Results	12
5. ELECTROSTATIC DISCHARGE IMMUNITY TEST.....	14
5.1. Block Diagram of Test Setup	14
5.2. Test Standard	14
5.3. Severity Levels and Performance Criterion	14
5.4. EUT Configuration on Test	15
5.5. Operating Condition of EUT	15
5.6. Test Procedure	15
5.7. Test Results	15
6. PHOTOGRAPH.....	17
6.1. Photo of Radiated Measurement	17
6.2. Photo of Electrostatic Discharge Immunity Measurement	17
7. EXTERNAL AND INTERNAL PHOTOGRAPH OF THE EUT.....	18

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 (EN 55032: 2015)			
Description of Test Item	Standard	Limits	Results
Conducted disturbance at mains terminals	EN 55032: 2015	-----	N/A
Conducted disturbance at Antenna terminals	EN 55032: 2015	-----	N/A
Disturbance Power	EN 55032: 2015	-----	N/A
Radiated disturbance	EN 55032: 2015	-----	PASS
Harmonic current emissions	EN 61000-3-2: 2014	Class A	N/A
Voltage fluctuations & flicker	EN 61000-3-3: 2013	-----	N/A
IMMUNITY (EN 55020: 2007+A11: 2011+A12: 2016)			
Description of Test Item	Basic Standard	Performance Criteria	Results
Electrostatic discharge (ESD)	EN 61000-4-2: 2009	B	PASS
Electrical fast transient (EFT)	EN 61000-4-4: 2012	B	N/A
Immunity against Input interference (S1) test	EN 55020: 2007+A11: 2011+A12: 2016	A	N/A
immunity Against RFI Voltages/current(S2) test	EN 55020: 2007+A11: 2011+A12: 2016	A	N/A
Ambient Electromagnetic Fields Immunity (S3) Test	EN 55020: 2007+A11: 2011+A12: 2016	A	N/A
Screening Effectiveness Test	EN 55020: 2007+A11: 2011+A12: 2016	A	N/A
keyed Carrier Test	EN 55020: 2007+A11: 2011+A12: 2016	A	N/A
N/A is an abbreviation for Not Applicable.			

1.2. Description of Performance Criteria

General Performance Criteria

Examples of functions defined by the manufacturer to be evaluated during testing include, but are not limited to, the following:

- essential operational modes and states;
- tests of all peripheral access (hard disks, floppy disks, printers, keyboard, mouse, etc.);
- quality of software execution;
- quality of data display and transmission;
- quality of speech transmission.

1.2.1. Performance criterion A

The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacture when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deliver from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

1.2.2. Performance 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 manufacture, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.

During the test, degradation of performance is allowed. However, no change of operation state or stored data is allowed to persist after the test.

If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be deliver from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

1.2.3. Performance 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 manufacture's instructions.

Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be loss.

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

EUT : USB shields

Trade Mark : OEM

Test Model : USB shield

Power Supply : Input: DC 5V

EUT Clock Frequency : \leq 108MHz

2.2. Support equipment List

Name	Manufacturers	M/N	S/N
PC	dell	Optiplex 380 MT	2YK643X

2.3. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

2.4.Measurement Uncertainty

Test	Parameters	Expanded uncertainty (U_{lab})	Expanded uncertainty (U_{cispr})
Power disturbance	Level accuracy (30MHz to 300MHz)	$\pm 2.90\text{dB}$	$\pm 4.5\text{ dB}$
Electromagnetic Radiated Emission (3-loop)	Level accuracy (9kHz to 30MHz)	$\pm 3.60\text{ dB}$	$\pm 2.63\text{ dB}$
Radiated Emission	Level accuracy (9kHz to 30MHz)	$\pm 3.68\text{ dB}$	$\pm 2.63\text{ dB}$
Radiated Emission	Level accuracy (30MHz to 1000MHz)	$\pm 3.48\text{ dB}$	$\pm 2.63\text{ dB}$
Radiated Emission	Level accuracy (above 1000MHz)	$\pm 3.90\text{ dB}$	N/A
Mains Harmonic	Voltage	$\pm 0.510\%$	N/A
Voltage Fluctuations & Flicker	Voltage	$\pm 0.510\%$	N/A
EMF		$\pm 21.59\%$	N/A

- (1) Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus.
- (2) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

3. TEST INSTRUMENT USED

3.1. Radiated Disturbance (Electric Field)

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2018-06-16
2	EMI Test Receiver	ROHDE & SCHWARZ	ESR 7	101181	2018-06-16
3	By-Log Antenna	SCHWARZBECK	VULB9163	9163-470	2018-05-01
4	EMI Test Software	AUDIX	E3	N/A	2018-06-16
5	Positioning Controller	MF	MF-7082	/	2018-06-16

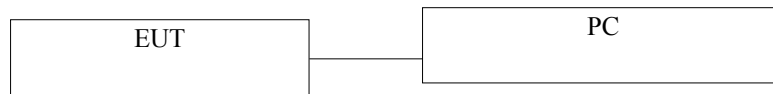
3.2. Electrostatic Discharge

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	ESD Simulator	SCHLODER	SESD 230	604035	2018-06-16

4. RADIATED EMISSION MEASUREMENT

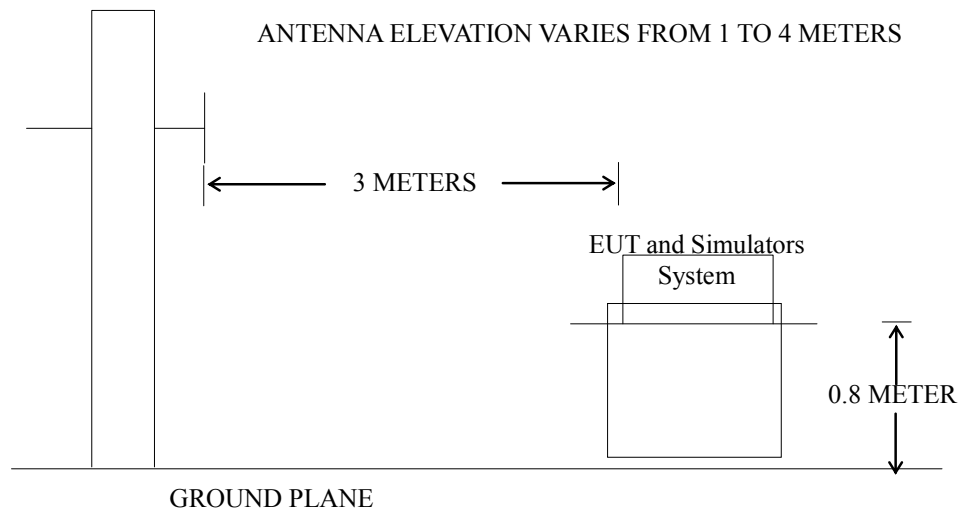
4.1. Block Diagram of Test

4.1.1 Block diagram of connection between the EUT and simulators



(EUT: USB shields)

4.1.2. Block diagram of test setup in chamber



(EUT: USB shields)

4.2. Radiated Emission Limit

For EN 55032

Limits for radiated disturbance Blow 1GHz			
FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		dB(μV)/m	
30 ~ 300	3	Harmonics	40
300 ~ 1000	3	Harmonics	47
Other	3	Harmonics	Same as EN 55022B
Remark: (1) Emission level (dB)μV = 20 log Emission level μV/m (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.			

4.3. EUT Configuration on Test

The following equipment are installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

4.4. Operating Condition of EUT

4.4.1. Setup the EUT as shown in Section 4.1.

4.4.2. Let the EUT work in test mode USB and measure it.

4.5. Test Procedure

EUT and its simulators are placed on a turn table, which is 0.8 meter high above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated by-log antenna) is used as receiving antenna. Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4-2009 on radiated emission measurement.

The bandwidth of the EMI test receiver is set at 120kHz.

The frequency range from 30MHz to 1000MHz is checked.

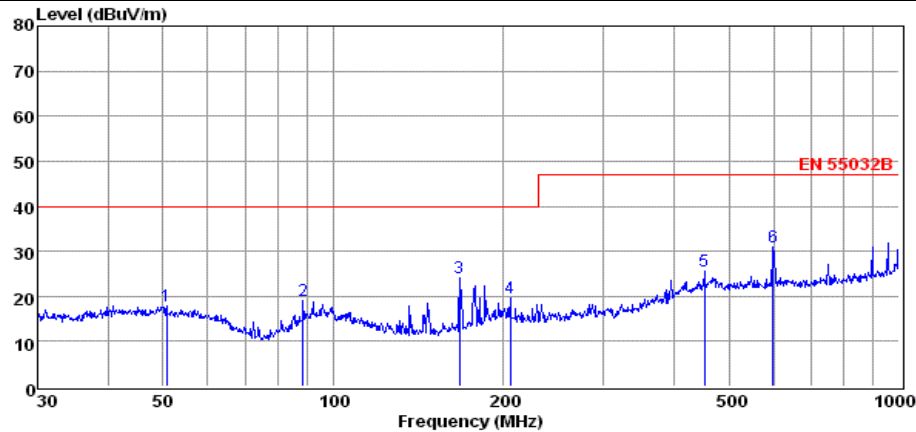
4.6. Radiated Emission Noise Measurement Results

PASS.

The frequency range from 30MHz to 1000MHz is investigated.

The scanning waveforms is in the next page.

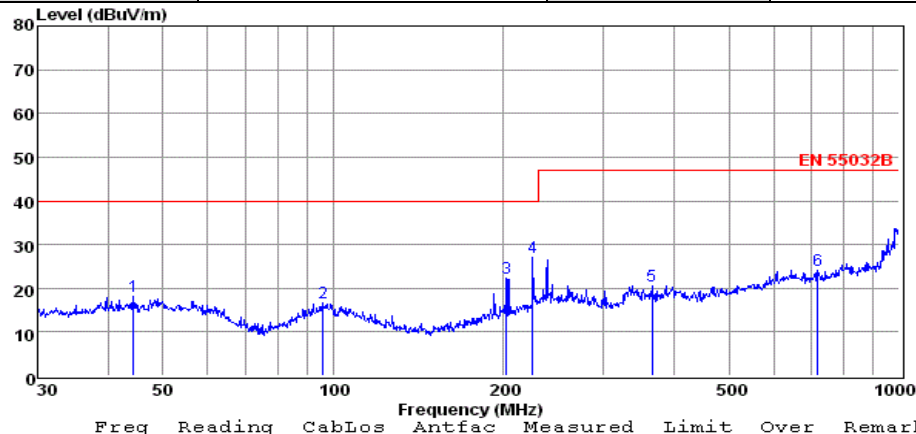
Test Model	USB shield	Test Mode	USB
Environmental Conditions	24.1°C, 53.5% RH	Test Engineer	Sunny Chen
Pol	Vertical		



	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	50.76	4.09	0.54	13.21	17.84	40.00	-22.16	QP
2	88.34	7.02	0.68	11.37	19.07	40.00	-20.93	QP
3	167.24	14.42	0.77	8.89	24.08	40.00	-15.92	QP
4	205.68	7.97	0.99	10.75	19.71	40.00	-20.29	QP
5	452.72	8.64	1.35	15.58	25.57	47.00	-21.43	QP
6	599.32	10.94	1.43	18.44	30.81	47.00	-16.19	QP

Note: 1. All readings are Quasi-peak values.
 2. Measured= Reading + Antenna Factor + Cable Loss
 3. The emission that at 20db below the official limit are not reported

Test Model	USB shield	Test Mode	USB
Environmental Conditions	24.1°C, 53.5% RH	Test Engineer	Sunny Chen
Pol	Horizontal		



	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	44.28	4.14	0.41	13.55	18.10	40.00	-21.90	QP
2	95.76	3.04	0.58	12.89	16.51	40.00	-23.49	QP
3	202.10	10.83	0.82	10.64	22.29	40.00	-17.71	QP
4	225.31	14.58	0.89	11.44	26.91	40.00	-13.09	QP
5	365.54	4.78	1.14	14.47	20.39	47.00	-26.61	QP
6	719.20	3.39	1.75	19.05	24.19	47.00	-22.81	QP

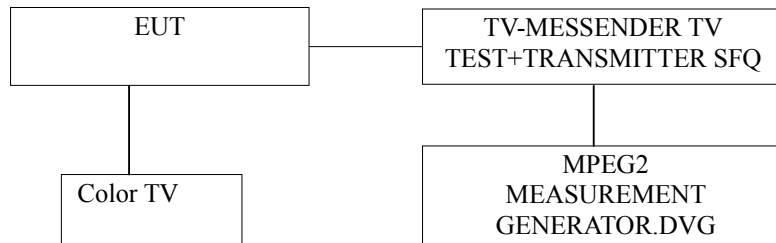
Note: 1. All readings are Quasi-peak values.
 2. Measured= Reading + Antenna Factor + Cable Loss
 3. The emission that at 20db below the official limit are not reported

Note: Pre-Scan all mode, Thus record worse case mode result in this report.

5. ELECTROSTATIC DISCHARGE IMMUNITY TEST

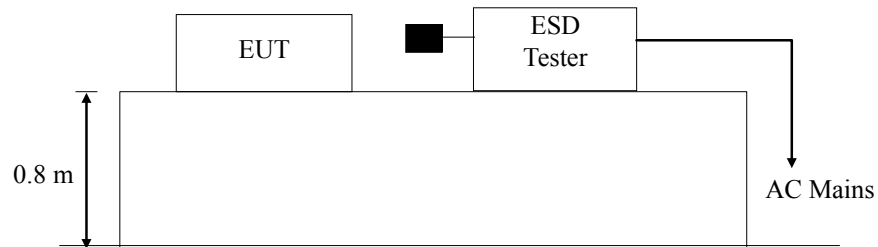
5.1. Block Diagram of Test Setup

5.1.1. Block Diagram of the EUT and the simulators



(EUT: USB shields)

5.1.2. Test Setup



(EUT: USB shields)

5.2. Test Standard

EN 55020: 2007+A11: 2011+A12: 2016 (EN61000-4-2: 2009 Severity Level: 3 / Air Discharge: ± 8 KV Level: 2 / Contact Discharge: ± 4 KV)

5.3. Severity Levels and Performance Criterion

5.3.1 Severity 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

5.3.2 Performance criterion: **B**

5.4.EUT Configuration on Test

The configuration of EUT are listed in Section 2.1

5.5.Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section 4.5, except the test set up replaced by Section 9.1.

5.6.Test Procedure

5.6.1 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

5.6.2 Contact Discharge

All the procedure shall be same as Section 9.6.1. except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

5.6.3 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.

5.6.4 Indirect Discharge For Vertical Coupling Plane

At least 10 single discharge (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.

5.7.Test Results

PASS.

Please refer to the following pages.

Electrostatic Discharger Test Results

Standard	<input type="checkbox"/> IEC 61000-4-2 <input checked="" type="checkbox"/> EN 61000-4-2		
Applicant			
EUT	USB shields	Temperature	23.6°C
M/N	USB shield	Humidity	53.1%
Criterion	B	Pressure	1021mbar
Test Mode	USB	Test Engineer	Sunny Chen

Air Discharge						
Test Points	Test Levels			Results		
	± 2KV	± 4KV	± 8KV	Pass	Fail	Performance Criterion
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B
Back	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B
Left	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B
Right	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B
Top	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B
Bottom	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B
Contact Discharge						
Test Points	Test Levels		Results			
	± 2 KV	±4 KV	Pass	Fail	Performance Criterion	
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Back	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Left	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Right	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Top	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Bottom	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Discharge To Horizontal Coupling Plane						
Side of EUT	Test Levels		Results			
	± 2 KV	± 4 KV	Pass	Fail	Performance Criterion	
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Back	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Left	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Right	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Discharge To Vertical Coupling Plane						
Side of EUT	Test Levels		Results			
	± 2 KV	± 4 KV	Pass	Fail	Performance Criterion	
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Back	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Left	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Right	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B

6. PHOTOGRAPH

6.1.Photo of Radiated Measurement



6.2.Photo of Electrostatic Discharge Immunity Measurement



7. EXTERNAL AND INTERNAL PHOTOS OF THE EUT



Fig.1



Fig.2

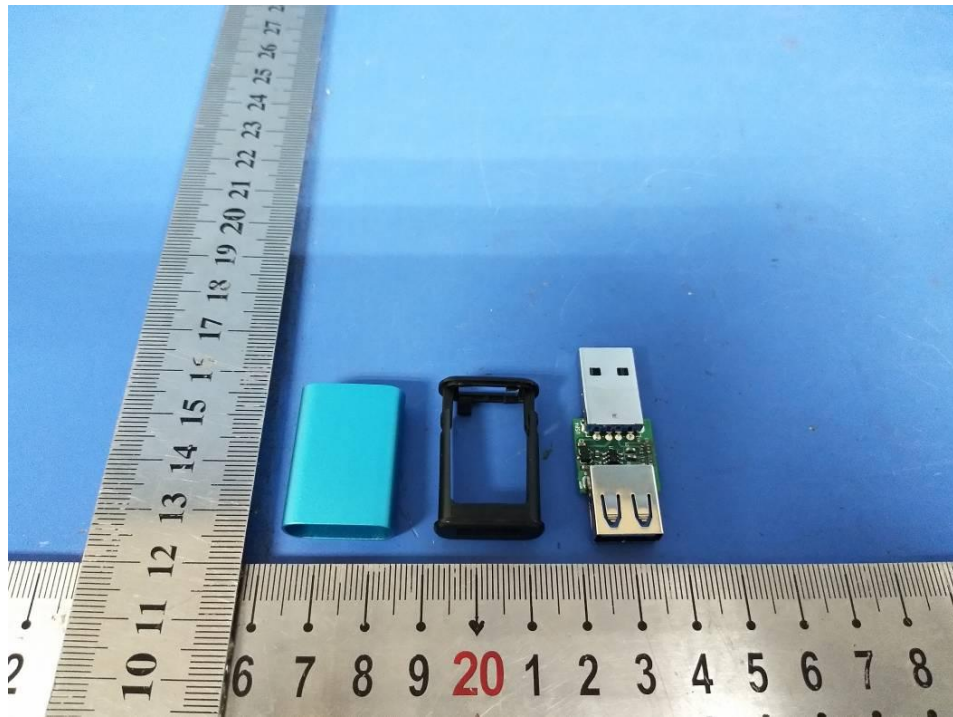


Fig.3

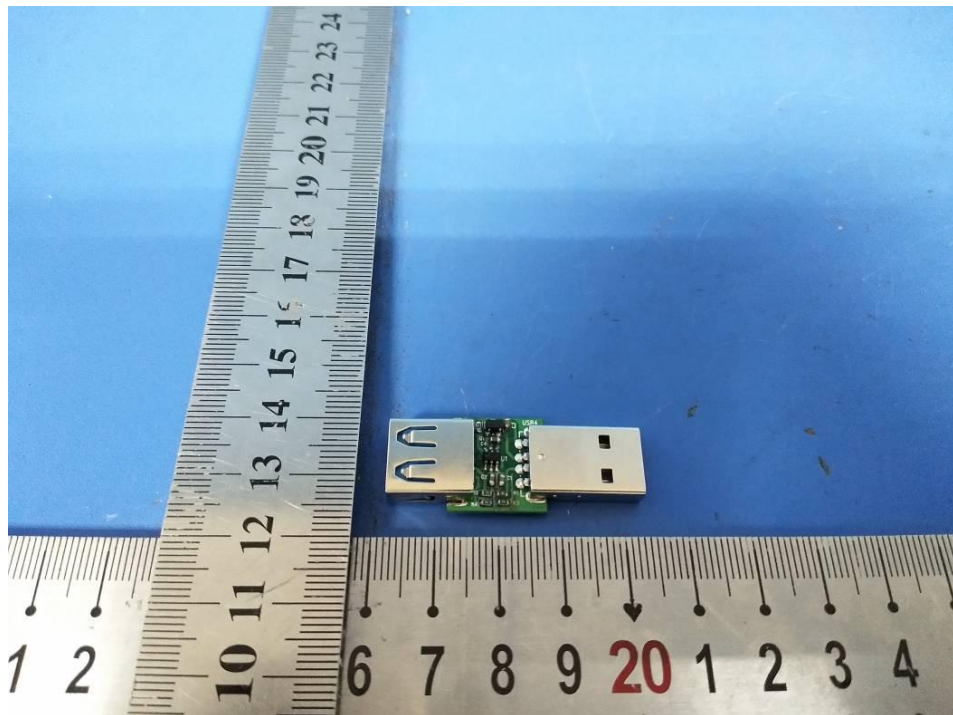


Fig.4

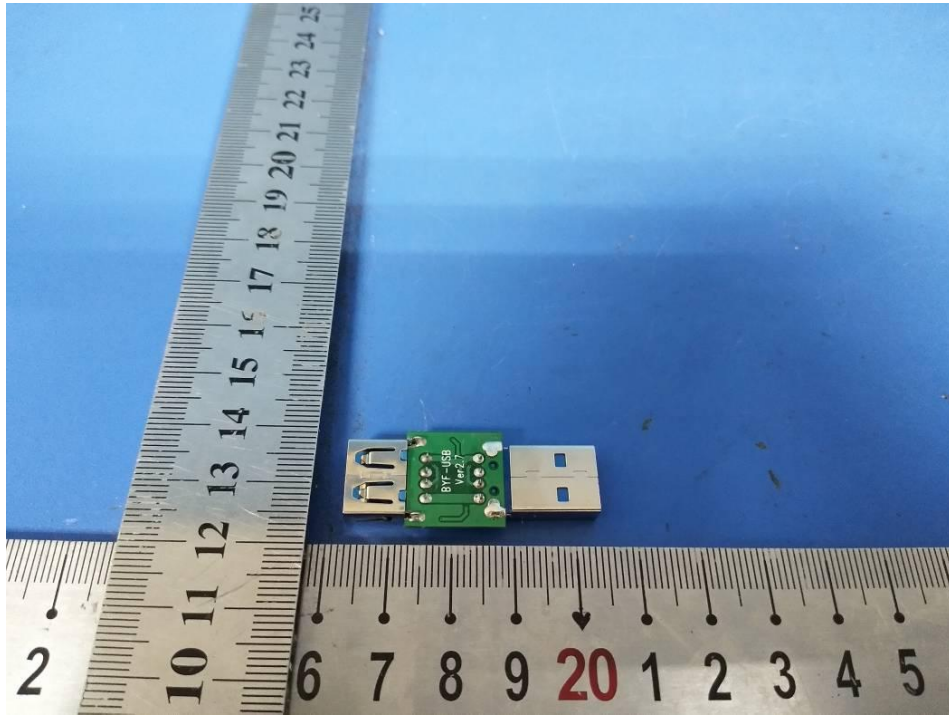


Fig.5

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