EMC TEST REPORT

For

Shanghai Panelmate Electronics Co.,Ltd.

Industrial Operation Panel

Test Model: IDD5915

Additional Model No.: Please Refer To Page 9

Prepared for	:	Shanghai Panelmate Electronics Co.,Ltd.
Address	:	Building 18th, No.177 FuLian 2nd Rd, BaoShan District, Shanghai, 201906
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
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Date of receipt of test sample	:	May 28, 2020
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	May 28, 2020 ~ August 05, 2020
Date of Report	:	August 07, 2020

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EMC TEST REPORT

EN 55032: 2015+A1: 2016

Information technology equipment-Radio disturbance characteristics – Limits of measurement

EN 55035: 2017

Electromagnetic compatibility of multimedia equipment – Immunity requirements

Report Reference No.	:	**LCS200526038AE**
Date of Issue.....	:	August 07, 2020
Testing Laboratory Name.....	:	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address.....	:	Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao' an District, Shenzhen, Guangdong, China
Testing Location/ Procedure ...	:	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name.....	:	**Shanghai Panelmate Electronics Co.,Ltd.**
Address.....	:	Building 18th, No.177 FuLian 2nd Rd, BaoShan District, Shanghai, 201906
Test Specification		
Standard	:	EN 55032: 2015+A1: 2016 EN 55035: 2017 EN 61000-3-2: 2014 EN 61000-3-3: 2013
Test Report Form No.	:	LCSEMC-1.0
TRF Originator	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF	:	Dated 2011-03

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Test Item Description.....	:	**Industrial Operation Panel**
Trade Mark.....	:	PANELMATE
Test Model	:	IDD5915
Ratings.....	:	Input: 220-240V~, 50/60Hz, 2A, 48W
Result	:	**Positive**

Compiled by:	Supervised by:	Approved by:
Mia Huang	Jason Deng	Gavin Liang
Mia Huang/ File administrators	Jason Deng / Technique principal	Gavin Liang/ Manager

LCS TESTING LABORATORY APPROVED

EMC -- TEST REPORT

Test Report No. : LCS200526038AE	August 07, 2020 Date of issue

Test Model.....	**: IDD5915**
EUT.....	: Industrial Operation Panel
Applicant.....	**: Shanghai Panelmate Electronics Co.,Ltd.**
Address.....	: Building 18th, No.177 FuLian 2nd Rd, BaoShan District, Shanghai, 201906
Telephone.....	: /
Fax.....	: /
Manufacturer.....	**: Shanghai Panelmate Electronics Co.,Ltd.**
Address.....	: Building 18th, No.177 FuLian 2nd Rd, BaoShan District, Shanghai, 201906
Telephone.....	: /
Fax.....	: /
Factory.....	**: Shanghai Panelmate Electronics Co.,Ltd.**
Address.....	: Building 18th, No.177 FuLian 2nd Rd, BaoShan District, Shanghai, 201906
Telephone.....	: /
Fax.....	: /

Test Result	**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	August 07, 2020	Initial Issue	Gavin Liang

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TABLE OF CONTENTS

Test Report Description Page

1. TEST STANDARDS **6**

2.SUMMARY OF STANDARDS AND RESULTS **7**

2.1. DESCRIPTION OF STANDARDS AND RESULTS 7
2.2. DESCRIPTION OF PERFORMANCE CRITERIA 8

3. GENERAL INFORMATION **9**

3.1. DESCRIPTION OF DEVICE (EUT) 9
3.2. DESCRIPTION OF SUPPORT DEVICE 9
3.3. DESCRIPTION OF TEST FACILITY 9
3.4. STATEMENT OF THE MEASUREMENT UNCERTAINTY 10
3.5. MEASUREMENT UNCERTAINTY 10

4. MEASURING DEVICES AND TEST EQUIPMENT **11**

5. TEST RESULTS **11**

5.1. POWER LINE CONDUCTED EMISSION MEASUREMENT 13
5.2. RADIATED EMISSION MEASUREMENT 15
5.3. HARMONIC CURRENT EMISSION MEASUREMENT 17
5.4. VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT 18
5.5. ELECTROSTATIC DISCHARGE IMMUNITY TEST 19
5.6. RF FIELD STRENGTH SUSCEPTIBILITY TEST 21
5.7. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST 23
5.8. SURGE IMMUNITY TEST 25
5.9. INJECTED CURRENTS SUSCEPTIBILITY TEST 27
5.10. MAGNETIC FIELD SUSCEPTIBILITY TEST 29
5.11. VOLTAGE DIPS AND INTERRUPTIONS TEST 30

ANNEXE A **31**

ANNEXE B **35**

ANNEXE C **48**

1. TEST STANDARDS

The tests were performed according to following standards:

EN 55032: 2015+A1: 2016 Electromagnetic compatibility of multimedia equipment - Emission Requirements
EN 55035:2017 Information technology equipment – Immunity characteristics
EN 61000-3-2:2014 Electromagnetic compatibility (EMC) -- Part 3-2: Limits - Limits for harmonic current emissions (equipment input current up to and including 16 A per phase)
EN 61000-3-3:2013 Electromagnetic compatibility (EMC) -- Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection

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2.SUMMARY OF STANDARDS AND RESULTS

2.1. Description of Standards and Results

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

Emission (EN 55032: 2015+A1: 2016)			
Description of Test Item	**Standard**	**Limits**	**Results**
Conducted disturbance at mains terminals	EN 55032: 2015+A1: 2016	Class A	PASS
Conducted disturbance at telecommunication port	EN 55032: 2015+A1: 2016	Class A	N/A
Radiated disturbance	EN 55032: 2015+A1: 2016	Class A	PASS
Harmonic current emissions	EN 61000-3-2: 2014	Class A	N/A
Voltage fluctuations & flicker	EN 61000-3-3: 2013	---------	PASS
Immunity (EN 55035: 2017)			
Description of Test Item	**Basic Standard**	**Performance Criteria**	**Results**
Electrostatic discharge (ESD)	EN 61000-4-2: 2009	B	PASS
Radio-frequency, Continuous radiated disturbance	EN 61000-4-3: 2006+A2: 2010	A	PASS
Electrical fast transient (EFT)	EN 61000-4-4: 2012	B	PASS
Surge (Input a.c. power ports)	EN 61000-4-5: 2014+A1: 2017	B	PASS
Surge (Telecommunication ports)		B	N/A
Radio-frequency, Continuous conducted disturbance	EN 61000-4-6: 2014	A	PASS
Power frequency magnetic field	EN 61000-4-8: 2010	A	PASS
Voltage dips, >95% reduction	EN 61000-4-11: 2004+A1: 2017	B	PASS
Voltage dips, 30% reduction		C	PASS
Voltage interruptions		C	PASS
***Note: N/A is an abbreviation for Not Applicable.			

Test mode:		
Mode 1	DVI mode	Record
Mode 2	USB mode	Pre-scan
Mode 3	VGA mode	Pre-scan
***Note: All test modes were tested, but we only recorded the worst case in this report.		

2.2. 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;

2.2.1. 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 deriver from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

2.2.2. 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 deriver from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

2.2.3. 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.

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3. GENERAL INFORMATION

3.1. Description of Device (EUT)

EUT	:	Industrial Operation Panel
Trade Mark	:	PANELMATE
Test Model	:	IDD5915
Model Lists	:	IDD5915-XXXX, IDD5915P-XXXX, IDD5916-XXXX, IDD5916P-XXXX, IDD5917-XXXX, IDD5917P-XXXX, IDD5918-XXXX, IDD5918P-XXXX, IDD5919-XXXX, IDD5919P-XXXX, IDD5921-XXXX, IDD5921P-XXXX
Model Declaration	:	PCB board, structure and internal of these model(s) are the same, So no additional models were tested
Power Supply	:	Input: 220-240V~, 50/60Hz, 2A, 48W

Highest internal frequency (Fx)	Highest measured frequency
Fx ≤ 108 MHz 108 MHz < Fx ≤ 500 MHz 500 MHz < Fx ≤ 1 GHz Fx > 1 GHz	1 GHz 2 GHz 5 GHz 5 × Fx up to a maximum of 6 GHz
NOTE 1 For FM and TV broadcast receivers, Fx is determined from the highest frequency generated or used excluding the local oscillator and tuned frequencies. Where Fx is unknown, the radiated emission measurements shall be performed up to 6 GHz	

3.2. Description of Support Device

Manufacturer	Description	Model	Serial Number
PC	Lenovo	WB0202140H	WB05067151

3.3. Description of Test Facility

NVLAP Accreditation Code is 600167-0.
FCC Designation Number is CN5024.
CAB identifier is CN0071.
CNAS Registration Number is L4595.

3.4. 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.

3.5. Measurement Uncertainty

Test	Parameters	Expanded uncertainty (U_{lab})	Expanded uncertainty (U_{cispr})
Conducted Emission	Level accuracy (9kHz to 150kHz) (150kHz to 30MHz)	± 2.63 dB ± 2.35 dB	± 3.8 dB ± 3.4 dB
Power Disturbance	Level accuracy (30MHz to 300MHz)	± 2.90dB	± 4.5 dB
Electromagnetic Radiated Emission (3-loop)	Level accuracy (9kHz to 30MHz)	± 3.60 dB	± 3.3 dB
Radiated Emission	Level accuracy (9kHz to 30MHz)	± 3.68 dB	N/A
Radiated Emission	Level accuracy (30MHz to 1000MHz)	± 3.48 dB	± 5.3 dB
Radiated Emission	Level accuracy (above 1000MHz)	± 3.90 dB	± 5.2 dB
Mains Harmonic	Voltage	± 0.510%	N/A
Voltage Fluctuations & Flicker	Voltage	± 0.510%	N/A
EMF	/	± 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%.

4. MEASURING DEVICES AND TEST EQUIPMENT

LINE CONDUCTED EMISSION

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	EMI Test Software	AUDIX	E3	/	N/A	N/A
2	EMI Test Receiver	R&S	ESPI	101840	2020-06-22	2021-06-21
3	Artificial Mains	R&S	ENV216	101288	2020-06-22	2021-06-21
4	10dB Attenuator	SCHWARZBECK	MTS-IMP-136	261115-001-0032	2020-06-22	2021-06-21
5	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW 500	103818	2019-10-21	2020-10-20

RADIATED DISTURBANCE

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	EMI Test Software	EZ	EZ-EMC	/	N/A	N/A
2	3m Fully Anechoic Chamber	MRDIANZI	FAC-3M	MR009	2020-06-22	2021-06-21
3	Positioning Controller	MF	MF-7082	/	2020-06-22	2021-06-21
4	By-log Antenna	SCHWARZBE	VULB9163	9163-470	2018-07-26	2021-07-25
5	Horn Antenna	SCHWARZBE	BBHA 9120D	9120D-1925	2018-07-02	2021-07-01
6	EMI Test Receiver	R&S	ESR 7	101181	2020-06-22	2021-06-21
7	RS SPECTRUM ANALYZER	R&S	FSP40	100503	2019-11-22	2020-11-21
8	Broadband Preamplifier	/	BP-01M18G	P150501	2020-06-22	2021-06-21
9	RF Cable-R03m	Jye Bao	RG142	CB021	2020-06-22	2021-06-21
10	RF Cable-HIGH	SUHNER	SUCOFLEX	03CH03-HY	2020-06-22	2021-06-21

VOLTAGE FLUCTUATION AND FLICKER/HARMONIC CURRENT EMISSIONS

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Power Analyzer Test System	Voltech	PM6000	200006700523	2020-06-22	2021-06-21

RF ELECTROMAGNETIC FIELD

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	RS Test Software	Tonscend	/	/	N/A	N/A
2	ESG Vector Signal Generator	Agilent	E4438C	MY4208139	2019-11-22	2020-11-21
3	3m Semi Anechoic Chamber	SIDT	SAC-3M	03CH03-HY	2020-06-22	2021-06-21
4	RF POWER AMPLIFIER	OPHIR	5225R	1052	NCR	NCR
5	RF POWER AMPLIFIER	OPHIR	5273F	1019	NCR	NCR
6	Stacked Broadband Log Periodic	SCHWARZBE	STLP 9128	9128ES-145	NCR	NCR
7	Stacked Mikrowellen Log.-Per	SCHWARZBE	STLP 9149	9149-484	NCR	NCR
8	Electric field probe	Narda	EP601	611WX8020	2020-03-26	2021-03-25

ELECTROSTATIC DISCHARGE

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	ESD Simulator	SCHLODER	SESD 230	604035	2020-06-22	2021-06-21

ELECTRICAL FAST TRANSIENT IMMUNITY

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Immunity Simulative Generator	EM TEST	UCS500 M4	0101-34	2020-06-22	2021-06-21

RF COMMON MODE

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Simulator	FRANKONIA	CIT-10/75	A126A1195	2020-06-22	2021-06-21
2	CDN	FRANKONIA	CDN-M2+M3	A2210177	2020-06-22	2021-06-21
3	6dB Attenuator	FRANKONIA	DAM25W	1172040	2020-06-22	2021-06-21
4	EM-Clamp	ZHINAN	ZN23203	14017	2020-06-22	2021-06-21

SURGES, LINE TO LINE AND LINE TO GROUND

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Immunity Simulative Generator	EM TEST	UCS500 M4	0101-34	2020-06-22	2021-06-21

MAGNETIC FIELD SUSCEPTIBILITY TEST

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Power frequency mag-field generator System	EVERFINE	EMS61000-8K	906003	2020-06-22	2021-06-21

VOLTAGE DIPS/INTERRUPTIONS IMMUNITY TEST

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Voltage dips and up generator	3CTEST	VDG-1105G	EC0171014	2020-06-22	2021-06-21

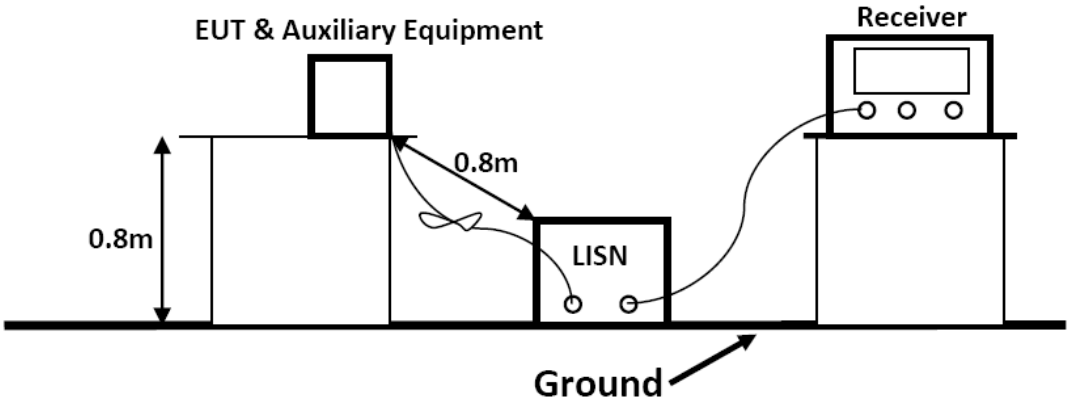
Note: All equipment is calibrated through CHINA CEPREI LABORATORY and GUANGZHOU LISAI CALIBRATION AND TEST CO., LTD.

NCR --- No calibration requirement.

5. TEST RESULTS

5.1. POWER LINE CONDUCTED EMISSION MEASUREMENT

5.1.1. Block Diagram of Test Setup



5.1.2. Test Standard

EN 55032: 2015+A1: 2016 Class A

Power Line Conducted Emission Limits (Class A)		
Frequency (MHz)	Limit (dBμV)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66.0 ~ 56.0 *	56.0 ~ 46.0 *
0.50 ~ 5.00	56.0	46.0
5.00 ~ 30.00	60.0	50.0
NOTE1-The lower limit shall apply at the transition frequencies. NOTE2-The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.		

5.1.3. EUT Configuration on Test

The following equipments are installed on Power Line Conducted Emission Measurement to meet the EN 55032 requirement and operating regulations in a manner, which tends to maximize its emission characteristics in a normal application.

5.1.4. Operating Condition of EUT

5.1.4.1.Setup the EUT as shown on Section 5.1.1
5.1.4.2.Turn on the power of all equipments.
5.1.4.3.Let the EUT work in measuring mode(1) and measure it.

5.1.5. Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and connected to the AC mains through Line Impedance Stability Network (L.I.S.N). This provided 50-ohm coupling impedance for the tested equipments. Both sides of AC line are investigated to find out the maximum conducted emission according to the EN 55032 regulations during conducted emission measurement.
The bandwidth of the field strength meter is set at 9kHz in 150kHz~30MHz.
The frequency range from 150kHz to 30MHz is investigated.

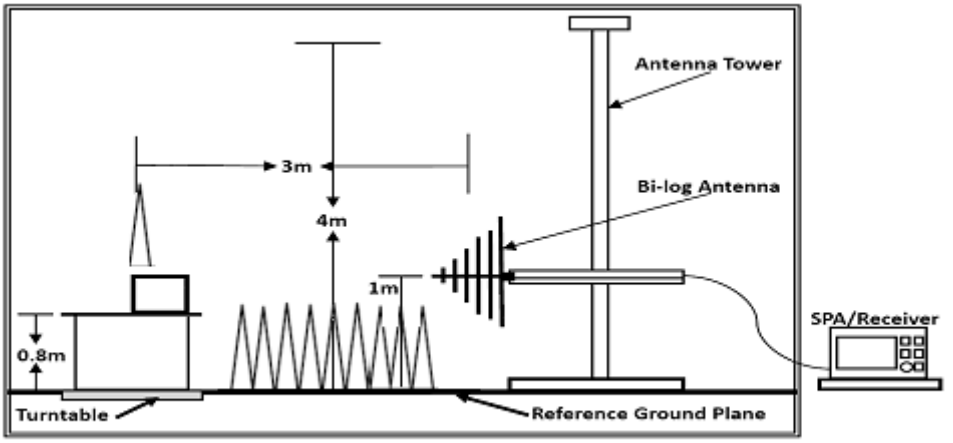
5.1.6. Test Results

PASS.

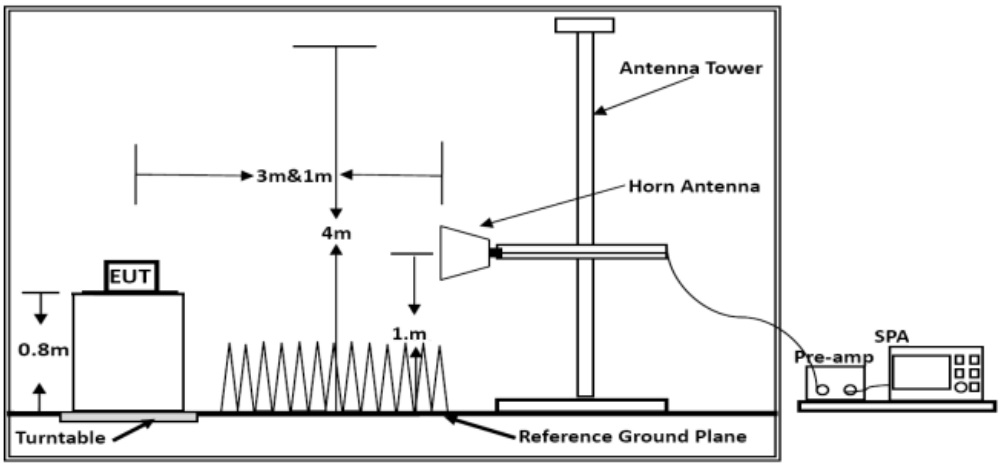
Refer to attached Annexe B.1

5.2. RADIATED EMISSION MEASUREMENT

5.2.1. Block Diagram of Test Setup



Below 1GHz



Above 1GHz

5.2.2. Test Standard

EN 55032: 2015+A1: 2016 Class A
All emanations from a class B device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified below:

Limits for Radiated Emission Below 1GHz		
Frequency (MHz)	Distance (Meters)	Field Strengths Limit (dBμV/m)
30 ~ 230	3	50
230 ~ 1000	3	57
***Note: (1) The smaller limit shall apply at the combination point between two frequency bands. (2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT.		

Limits for Radiated Emission Above 1GHz			
Frequency (MHz)	Distance (Meters)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)
1000 ~ 3000	3	80	60
3000 ~ 6000	3	74	64
***Note: The lower limit applies at the transition frequency.			

5.2.3. EUT Configuration on Test

The EN 55032 regulations test method must be used to find the maximum emission during radiated emission measurement.

5.2.4. Operating Condition of EUT

5.2.4.1.Turn on the power.
5.2.4.2.Let the EUT work in the test mode(1) and measure it.

5.2.5. Test Procedure

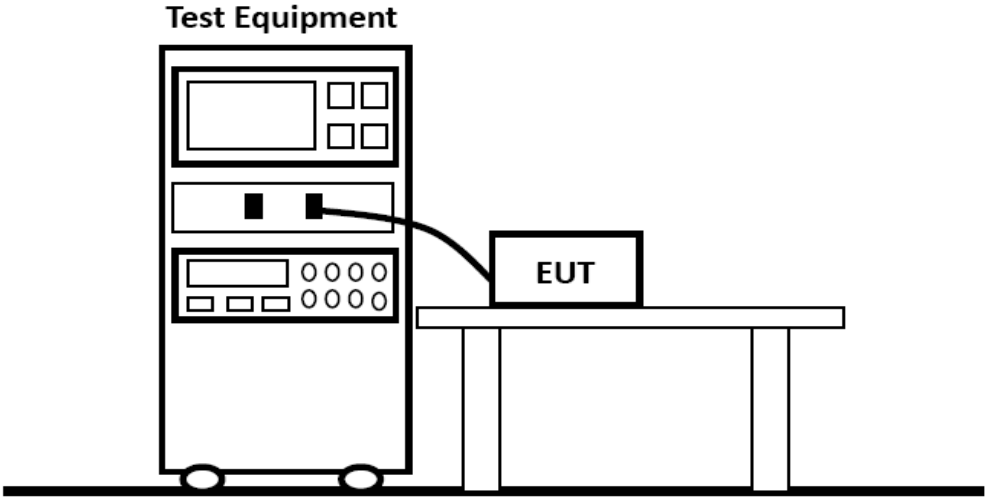
The EUT is placed on a turntable, which is 0.8 meter high above the ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. By-log antenna is used as a receiving antenna. Both horizontal and vertical polarization of the antenna is set on test.
The bandwidth of the EMI test receiver is set at RBW/VBW=120kHz/300kHz.
The frequency range from 30MHz to 1000MHz is checked.
The bandwidth of the Spectrum analyzer is set at RBW/VBW=1MHz/3MHz.
The frequency range from 1GHz to the frequency which about 5th carrier harmonic or 6GHz is checked.

5.2.6. Test Results

PASS.
Refer to attached Annexe B.2

5.3. HARMONIC CURRENT EMISSION MEASUREMENT

5.3.1. Block Diagram of Test Setup



5.3.2. Test Standard

EN 61000-3-2: 2014

5.3.3. Operating Condition of EUT

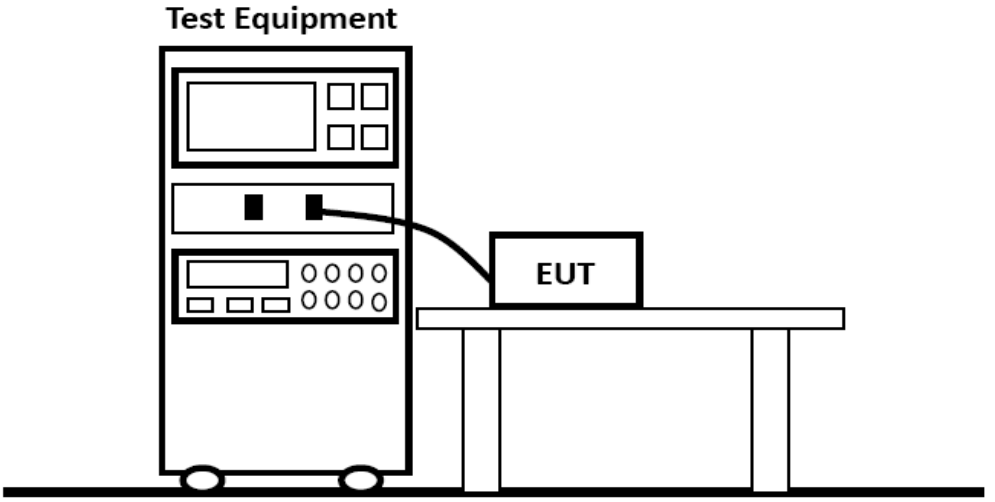
Same as Section 5.2.4, except the test setup replaced as Section 5.3.1.

5.3.4. Test Results

Refer to attached Annexe B.3

5.4. VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

5.4.1. Block Diagram of Test Setup



5.4.2. Test Standard

EN 61000-3-3: 2013

5.4.3. Operating Condition of EUT

Same as Section 5.2.4, except the test setup replaced as Section 5.4.1.

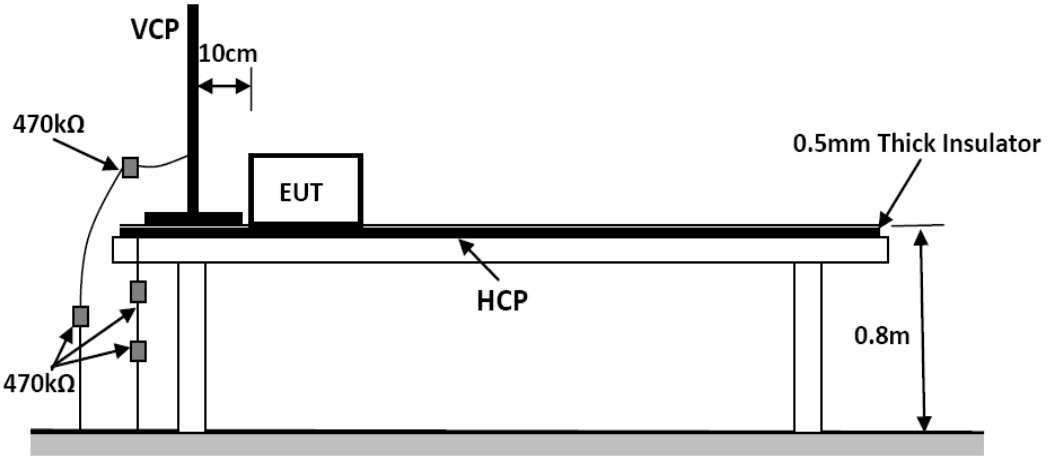
5.4.4. Test Results

PASS.

Refer to attached Annexe B.4

5.5. ELECTROSTATIC DISCHARGE IMMUNITY TEST

5.5.1. Block Diagram of Test Setup



5.5.2. Test Standard

EN 55035: 2017 (EN 61000-4-2: 2009, Severity Level: 3 / Air Discharge: ±8KV, Level: 2 / Contact Discharge: ±4KV)

5.5.3. Severity Levels and Performance Criterion

5.5.3.1. 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

5.5.3.2. Performance Criterion
Performance Criterion: B

5.5.4. EUT Configuration on Test

The configuration of EUT is listed in Section 5.5.1.

5.5.5. Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section 5.1.4. Except the test set up replaced by Section 5.5.1.

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5.5.6. Test Procedure

5.2.6.1. Air Discharge
This test is done on a non-conductive surfaces. The round discharge tip of the Electrostatic Discharge simulator shall be approached as fast as possible then to touch the EUT. After each discharge, the simulator shall be removed from the EUT. The simulator 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

5.2.6.2. Contact Discharge
All the procedure shall be same as air discharge, except using the acute discharge tip. The top end of the Electrostatic Discharge simulator is touch the EUT all the time when the simulator is re-triggered for a new single discharge and repeated 10 times for each pre-selected test point.

5.2.6.3. Indirect Discharge For Horizontal Coupling Plane
The vertical coupling plane(VCP) is placed 0.1m away from EUT. The top end of Electrostatic Discharge simulator should aim at the center of one border of the VCP for at least 25 times discharge.

5.2.6.4. Indirect Discharge For Vertical Coupling Plane
The top end of Electrostatic Discharge simulator should place at the point 0.1m away from EUT on the horizontal coupling plane(HCP). At least 25 times discharge should be done for every pre-selected point around EUT.

Record any performance degradation of the EUT during the test and judge the test result according to ce criterion.

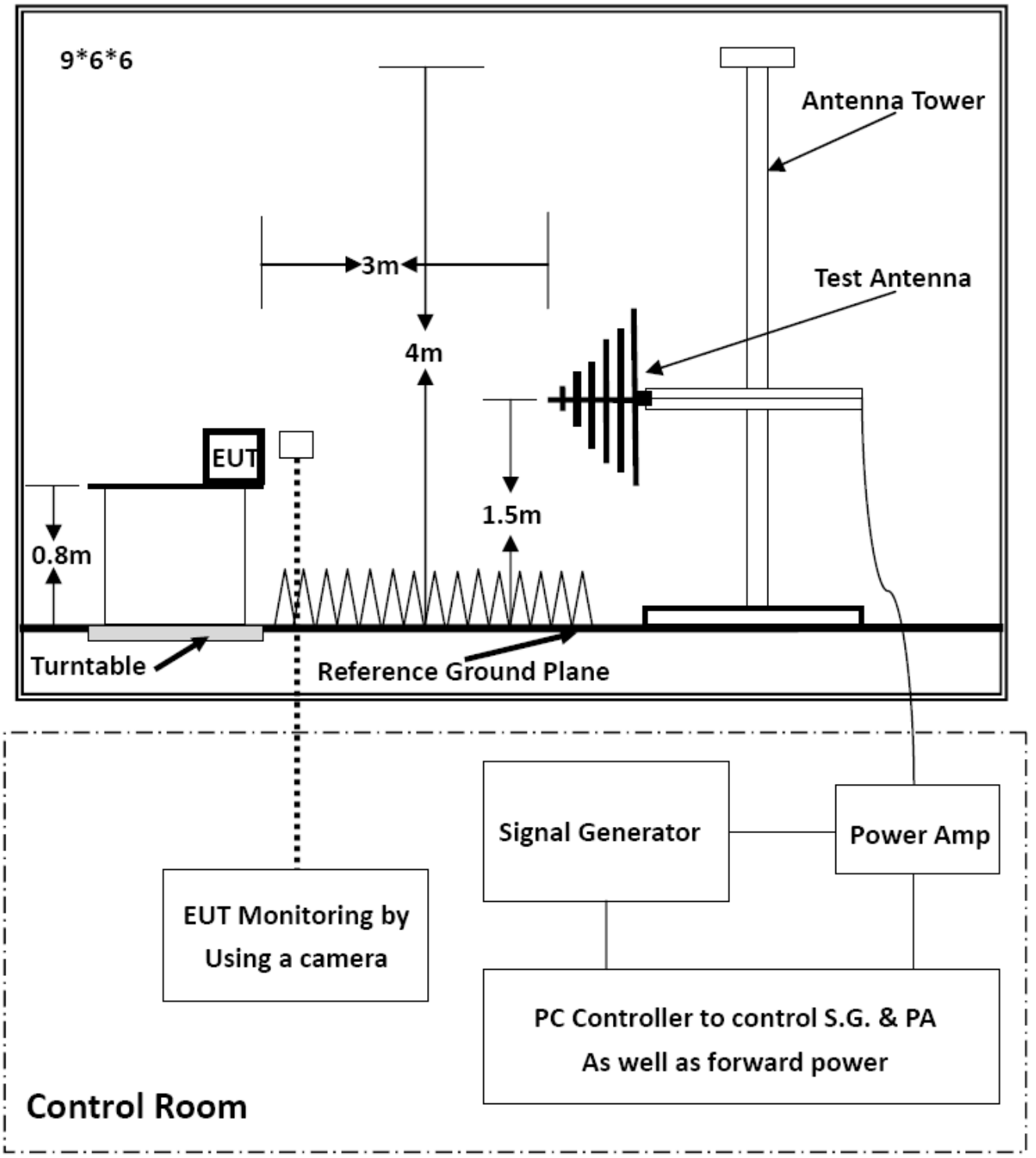
5.5.7. Test Results

PASS.

Refer to attached Annexe B.5

5.6. RF FIELD STRENGTH SUSCEPTIBILITY TEST

5.6.1. Block Diagram of Test Setup



5.6.2. Test Standard

EN 55035: 2017 (EN 61000-4-3: 2006+A2: 2010 Severity Level: 2, 3V/m)

5.6.3. Severity Levels and Performance Criterion

5.6.3.1. Severity level

Level	Field Strength (V/m)
1	1
2	3
3	10
X	1

5.6.3.2. Performance Criterion
Performance Criterion: A

5.6.4. EUT Configuration on Test

The configuration of EUT is listed in Section 5.6.1.

5.6.5. Operating Condition of EUT

Same as radiated emission measurement, which is listed in Section 5.2..4, except the test setup replaced as Section 5.6.1.

5.6.6. 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 CCD Recording is used to monitor its screen.
All the scanning conditions are as following:

Condition of Test	Remark
Fielded Strength	3 V/m (Severity Level 2)
Radiated Signal	Unmodulated
Test Frequency Range (swept test)	80-1000MHz
Test Frequency (spot test)	1800MHz, 2600MHz, 3500MHz, 5000MHz
Dwell time of radiated	0.0015 decade/s
Waiting Time	3 Sec.

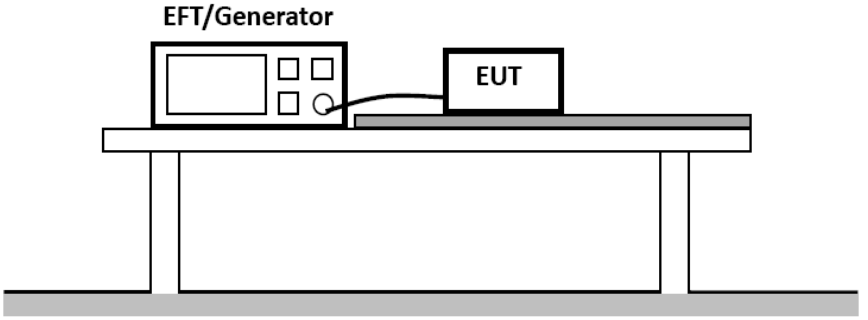
5.6.7. Test Results

PASS.

Refer to attached Annexe B.6

5.7. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

5.7.1. Block Diagram of Test Setup



5.7.2. Test Standard

EN 55035: 2017 (EN 61000-4-4: 2012, Severity Level, Level 2: 1KV)

5.7.3. Severity Levels and Performance Criterion

5.7.3.1. Severity level

Open Circuit Output Test Voltage ±10%		
Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1	0.5 KV	0.25 KV
2	1 KV	0.5 KV
3	2 KV	1 KV
4	4 KV	2 KV
X	Special	Special

5.7.3.2. Performance Criterion
Performance Criterion: B

5.7.4. EUT Configuration on Test

The configuration of EUT is listed in Section 5.7.1.

5.7.5. Operating Condition of EUT

5.7.5.1. Setup the EUT as shown in Section 5.7.1.
5.7.5.2. Turn on the power of all equipments.
5.7.5.3. Let the EUT work in test mode(1) and measure it.

5.7.6. Test Procedure

The EUT is put on the table, which is 0.8 meter high above the ground. This reference ground plane shall 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 beneath the EUT, shall be more than 0.5m.

5.7.6.1. For input and output AC power ports:
The EUT is connected to the power mains by using a coupling device, which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 1 mins.

5.7.6.2. For signal lines and control lines ports:
It’s unnecessary to test.

5.7.6.3. For DC output line ports:
It’s unnecessary to test.

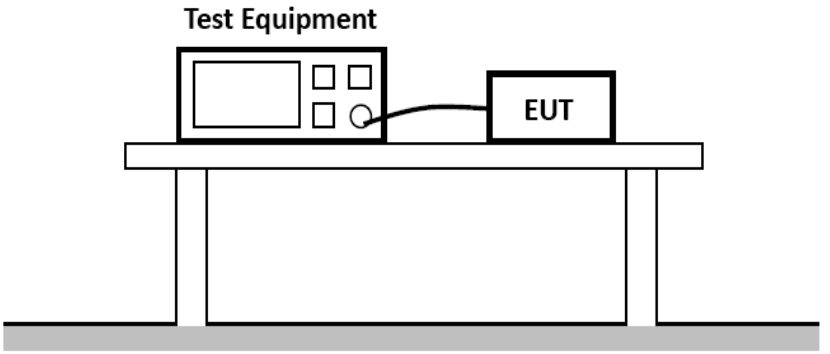
5.7.7. Test Results

PASS.

Refer to attached Annexe B.7

5.8. SURGE IMMUNITY TEST

5.8.1. Block Diagram of Test Setup



5.8.2. Test Standard

EN 55035: 2017 (EN 61000-4-5: 2014+A1: 2017, Severity Level: Line to Line: Level 2, 1.0KV, Line to Earth: Level 3, 2.0KV)

5.8.3. Severity Levels and Performance Criterion

5.8.3.1. Severity level

Severity Level	Open-Circuit Test Voltage (KV)
1	0.5
2	1.0
3	2.0
4	4.0
*	Special

5.8.3.2. Performance Criterion
Performance Criterion: B

5.8.4. EUT Configuration on Test

The configuration of EUT is listed in Section 5.8.1.

5.8.5. Operating Condition of EUT

5.8.5.1.Setup the EUT as shown in Section 5.8.1.
5.8.5.1.Turn on the power of all equipments.
5.8.5.1.Let the EUT work in test mode (1) and measure it.

5.8.6. Test Procedure

5.8.6.1. Set up the EUT and test generator as shown on Section 5.8.1.

5.8.6.2. For line to line coupling mode, provide a 1.0 KV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points.

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

5.8.6.4. Different phase angles are done individually.

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

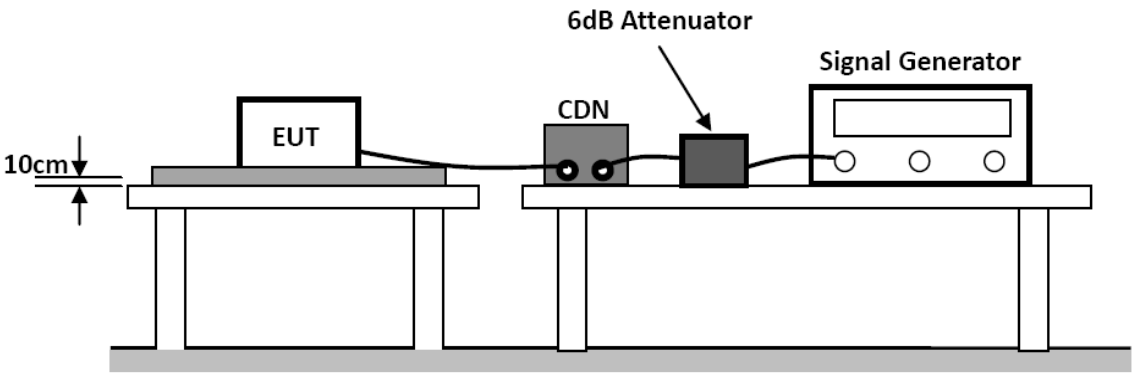
5.8.7. Test Results

PASS.

Refer to attached Annexe B.8

5.9. INJECTED CURRENTS SUSCEPTIBILITY TEST

5.9.1. Block Diagram of Test Setup



5.9.2. Test Standard

EN 55035: 2017(EN 61000-4-6: 2014, Severity Level: Level 2, (0.15MHz ~ 80MHz))

5.9.3. Severity Levels and Performance Criterion

5.9.3.1. Severity level

Level	Field Strength (V)
1	1
2	3
3	10
X	Special

5.9.3.2. Performance Criterion
Performance Criterion: A

5.9.4. EUT Configuration on Test

The configuration of EUT is listed in Section 5.9.1.

5.9.5. Operating Condition of EUT

5.9.5.1.Setup the EUT as shown in Section 5.9.1.
5.9.5.2.Turn on the power of all equipments.
5.9.5.3.Let the EUT work in test mode(1) and measure it.

5.9.6. Test Procedure

5.9.6.1. Set up the EUT, CDN and test generators as shown on Section 5.9.1.
5.9.6.2. Let the EUT work in test mode and measure it.
5.9.6.3. 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 30 and 50 mm (where possible).
5.9.6.4. The disturbance signal described below is injected to EUT through CDN.
5.9.6.5. The EUT operates within its operational mode(s) under intended climatic conditions after power on.
5.9.6.6. The frequency range is swept from 150kHz to 10MHz using 3V signal level,10MHz to 30MHz using 3V to 1V signal level,30MHz to 80MHz using 1V signal level, and with the disturbance signal 80% amplitude modulated with a 1kHz sine wave.
5.9.6.7. 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.
5.9.6.8. Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

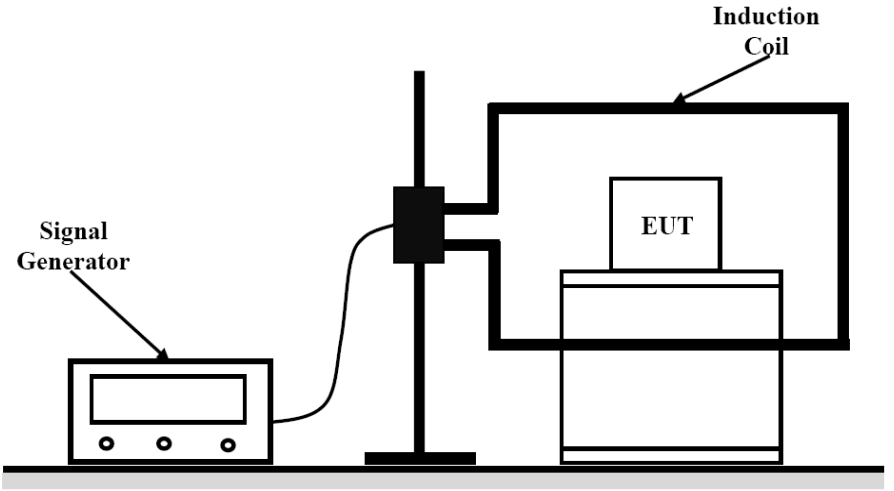
5.9.7. Test Results

PASS.

Refer to attached Annexe B.9

5.10. MAGNETIC FIELD SUSCEPTIBILITY TEST

5.10.1. Block Diagram of Test Setup



5.10.2. Test Standard

EN 55035: 2017 (EN 61000-4-8: 2010, Severity Level: Level 1, 1A/m)

5.10.3. Severity Levels and Performance Criterion

5.10.3.1. Severity level

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

5.10.3.2. Performance Criterion

Performance Criterion: A

5.10.4. EUT Configuration on Test

The configuration of EUT is listed in Section 5.10.1.

5.10.5. Test Procedure

EUT is placed on an insulating support of 0.1m high above a table of 0.8m high. There is a minimum 1m*1m ground metallic plane put on this table. EUT is put in the center of the magnetic coil then two orientations of the magnetic coil, horizontal and vertical, shall be rotated in order to expose the EUT to the difference polarization magnetic field.

Record any performance degradation of the EUT during the test and judge the test result according to performance criterion.

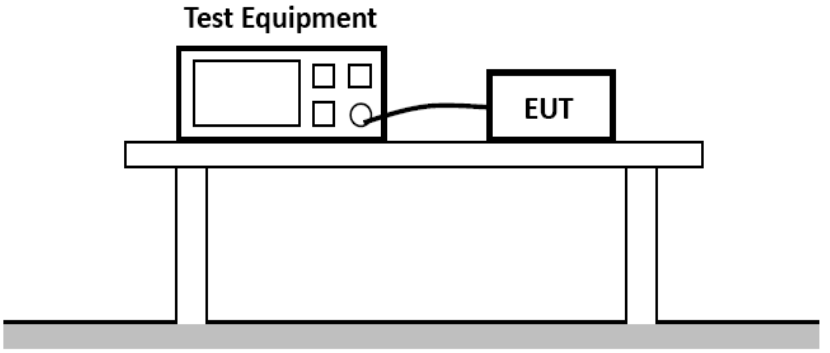
5.10.6. Test Results

PASS.

Refer to attached Annexe B.10

5.11. VOLTAGE DIPS AND INTERRUPTIONS TEST

5.11.1. Block Diagram of Test Setup



5.11.2. Test Standard

EN 55035: 2017 (EN 61000-4-11: 2004+A1: 2017)

5.11.3. Severity Levels and Performance Criterion

5.11.3.1. Severity level

Test Level		
Voltage Reduction $\%U_T$	Voltage Dips $\%U_T$	Duration (in Period)
100	0	0.5
100	0	1
30	70	5
Voltage Reduction $\%U_T$	Voltage Dips $\%U_T$	Duration (in Period)
100	0	250

5.11.3.2. Performance Criterion

Performance Criterion: B&C

5.11.4. EUT Configuration on Test

The configuration of EUT is listed in Section 5.11.1.

5.11.5. Operating Condition of EUT

5.11.5.1. Setup the EUT as shown in Section 5.11.1.
5.11.5.2. Turn on the power of all equipments.
5.11.5.3. Let the EUT work in test mode (1) and measure it.

5.11.6. Test Procedure

5.11.6.1. Set up the EUT and test generator as shown on Section 5.11.1.
5.11.6.2. The interruptions are introduced at selected phase angles with specified duration.
5.11.6.3. Record any degradation of performance.

5.11.7. Test Results

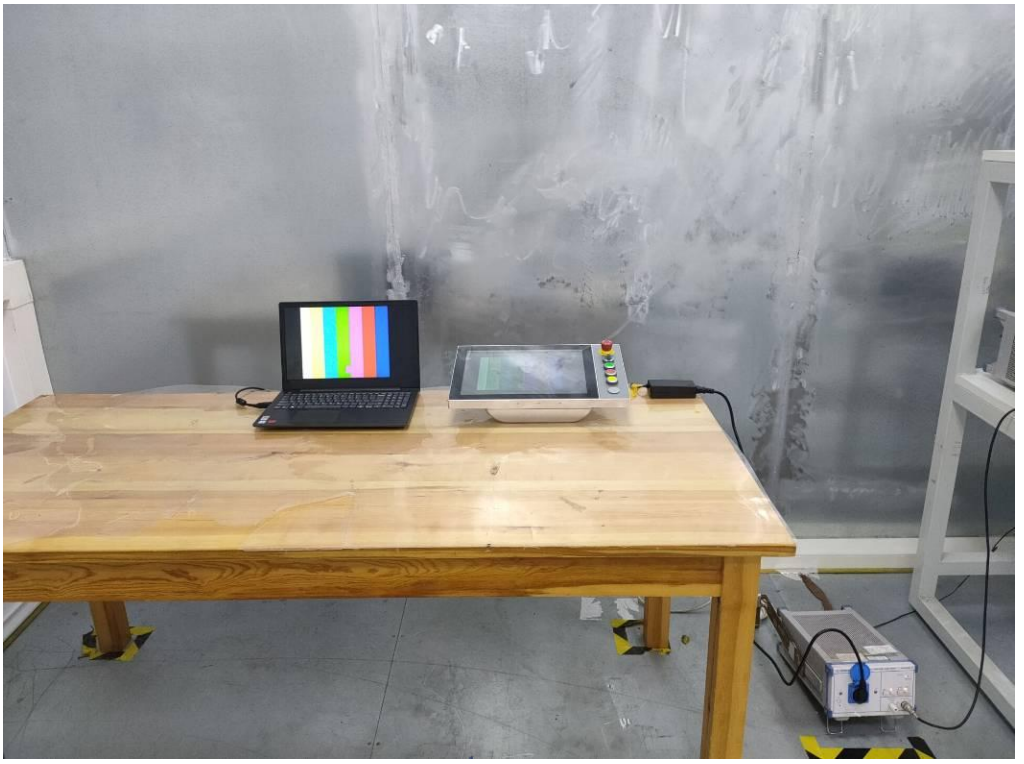
PASS.

Refer to attached Annexe B.11

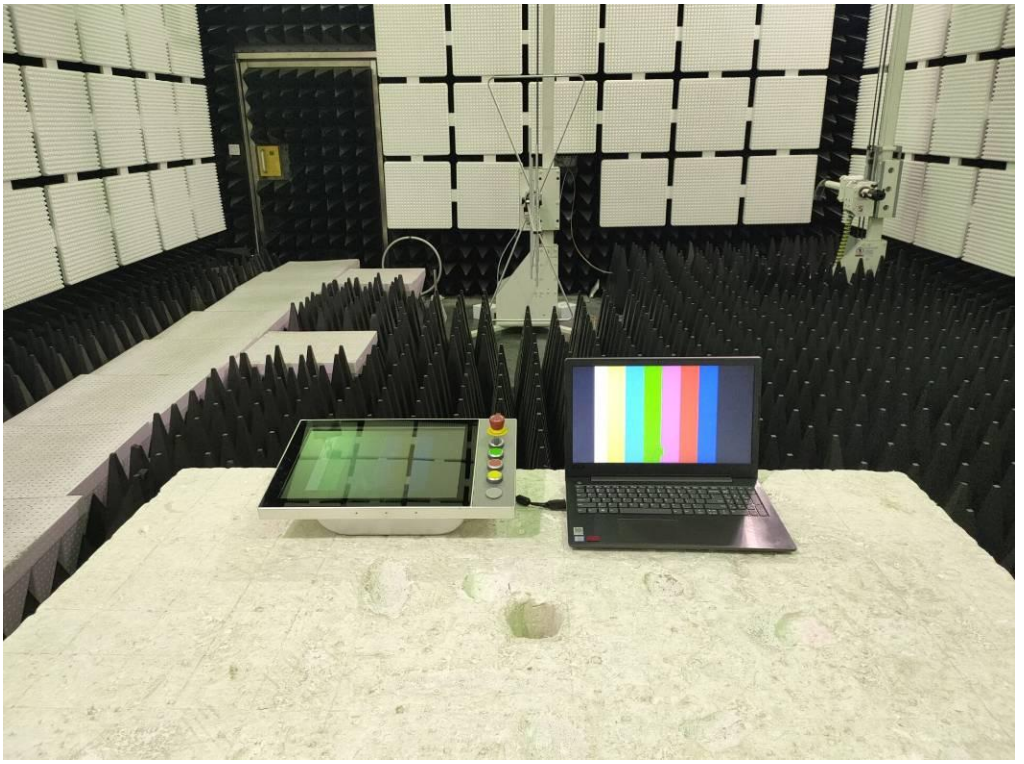
Annexe A

（Test photograph）

A.1 Test Setup Photo of Power Line Conducted Measurement

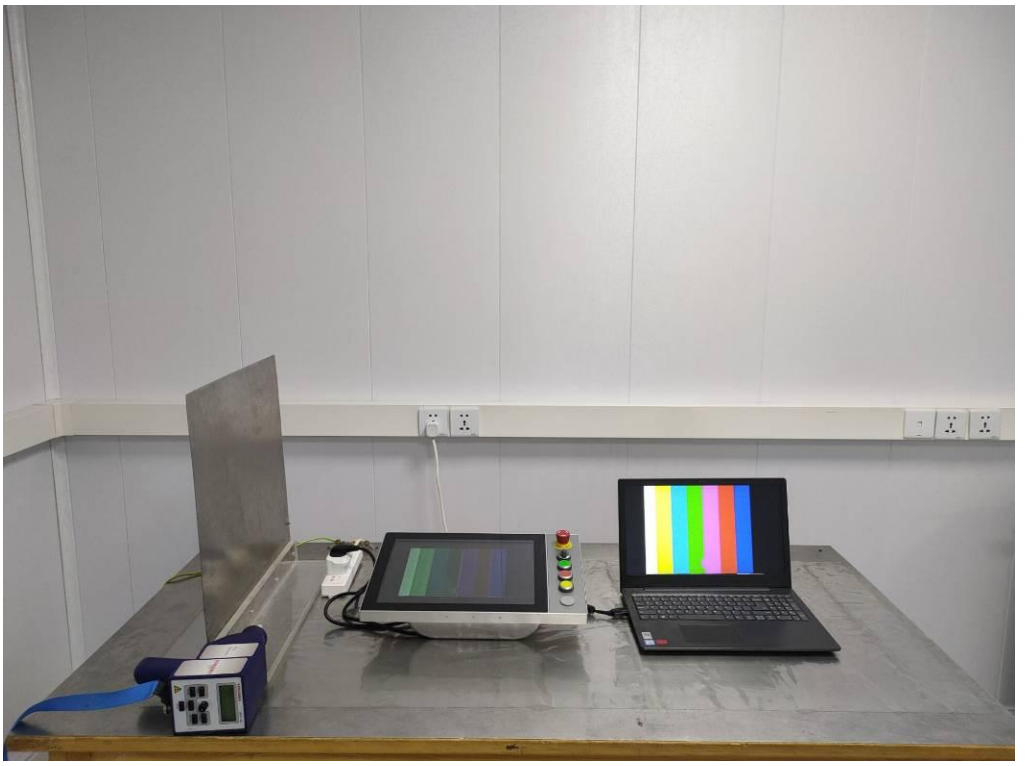


A.2 Test Setup Photo of Radiated Measurement (Below 1GHz)



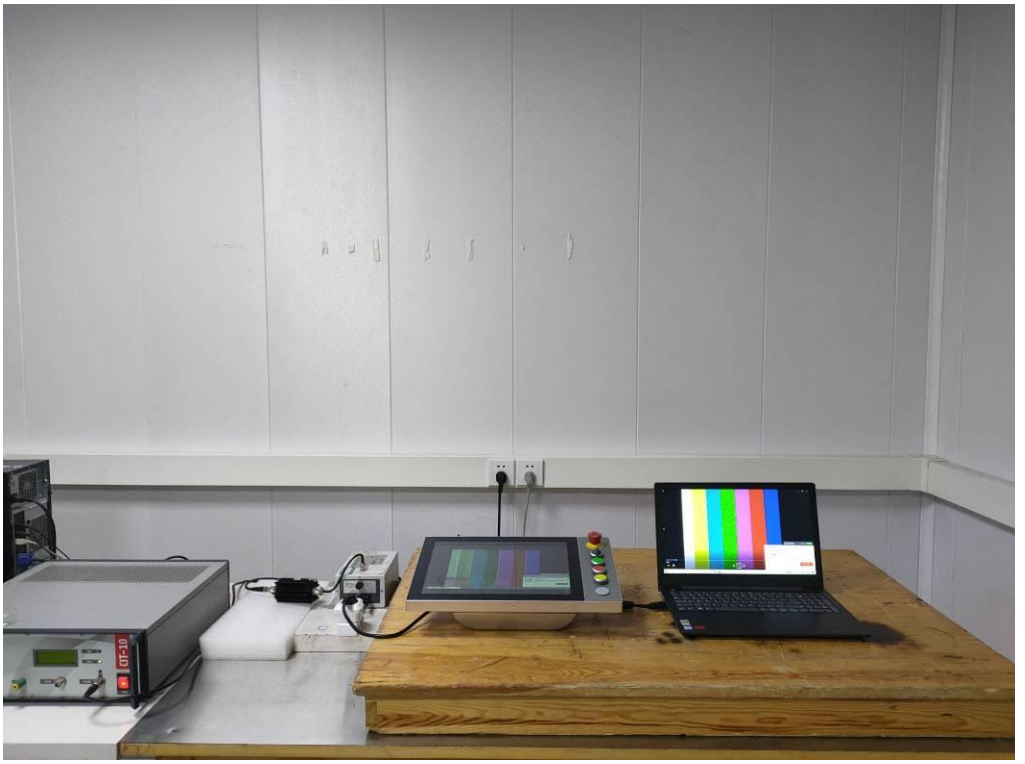
A.3 Test Setup Photo of Harmonic & Flicker Measurement

A.4 Test Setup Photo of Electrostatic Discharge Test



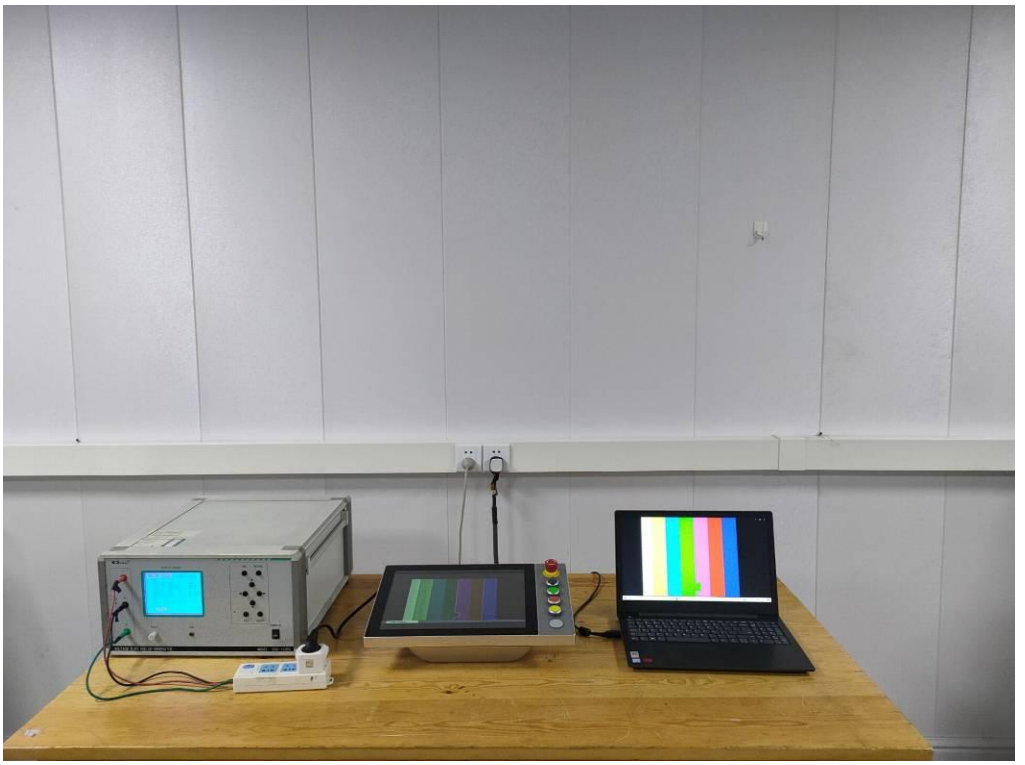
A.5 Photo of Electrical Fast Transient/Burst Test & Surge Immunity Test

A.6 Test Setup Photo of Injected Currents Susceptibility Test



A.7 Test Setup Photo of Magnetic Field Immunity Test

A.8 Test Setup Photo of Voltage Dips and Interruptions Test

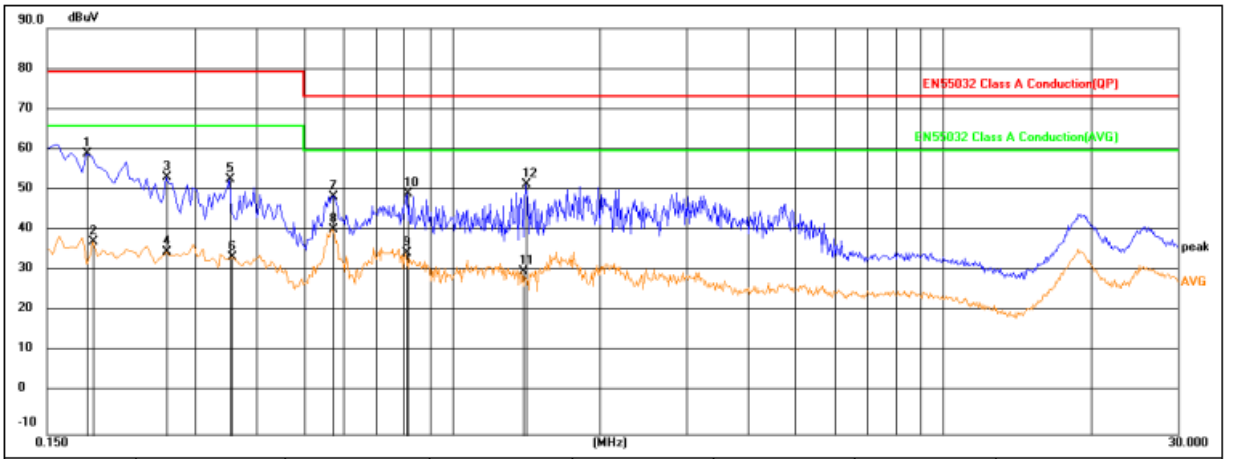


ANNEXE B

（Emission and Immunity test results）

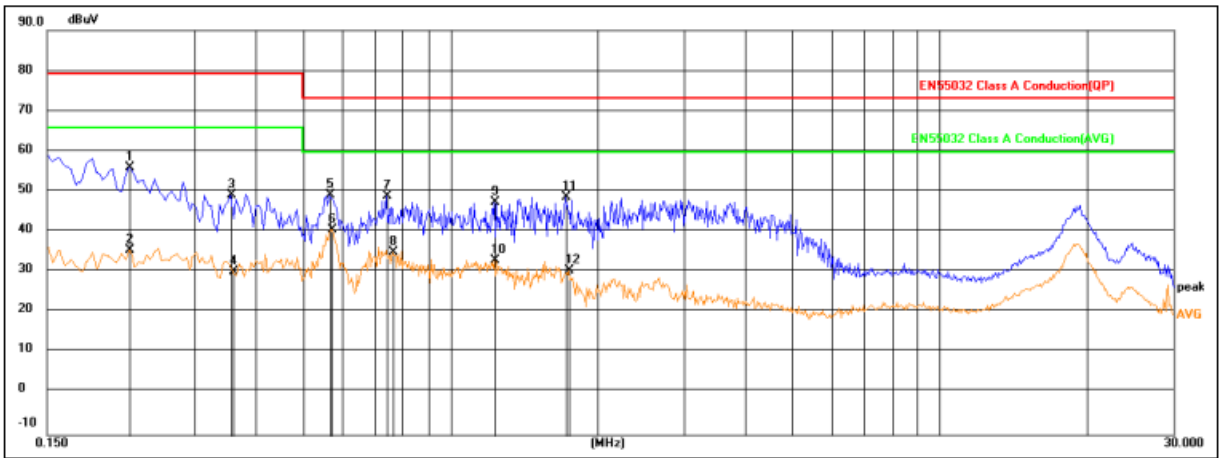
B.1 POWER LINE CONDUCTED EMISSION MEASUREMENT

Environmental Conditions:	23.3℃, 53.7% RH
Test Voltage:	AC 230V,50Hz
Test Model:	IDD5915
Test Mode:	Mode 1
Test Engineer:	XP Rao
Pol:	Line
Detailed results are shown below	



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1815	43.93	15.17	59.10	79.00	-19.90	QP
2	0.1860	22.42	15.17	37.59	66.00	-28.41	AVG
3	0.2625	38.01	15.24	53.25	79.00	-25.75	QP
4	0.2625	19.73	15.24	34.97	66.00	-31.03	AVG
5	0.3525	37.43	15.31	52.74	79.00	-26.26	QP
6	0.3570	18.29	15.31	33.60	66.00	-32.40	AVG
7	0.5730	33.34	15.30	48.64	73.00	-24.36	QP
8	0.5730	25.11	15.30	40.41	60.00	-19.59	AVG
9	0.8070	19.41	15.31	34.72	60.00	-25.28	AVG
10	0.8115	33.90	15.31	49.21	73.00	-23.79	QP
11	1.3920	14.74	15.32	30.06	60.00	-29.94	AVG
12	1.4144	36.38	15.33	51.71	73.00	-21.29	QP

Environmental Conditions:	23.3℃, 53.7% RH
Test Voltage:	AC 230V,50Hz
Test Model:	IDD5915
Test Mode:	Mode 1
Test Engineer:	XP Rao
Pol:	Neutral
Detailed results are shown below	



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.2220	41.02	15.20	56.22	79.00	-22.78	QP
2	0.2220	20.56	15.20	35.76	66.00	-30.24	AVG
3	0.3570	34.08	15.31	49.39	79.00	-29.61	QP
4	0.3596	15.23	15.31	30.54	66.00	-35.46	AVG
5	0.5685	34.06	15.30	49.36	73.00	-23.64	QP
6	0.5730	25.54	15.30	40.84	60.00	-19.16	AVG
7	0.7395	33.70	15.30	49.00	73.00	-24.00	QP
8	0.7665	19.95	15.31	35.26	60.00	-24.74	AVG
9	1.2300	32.37	15.28	47.65	73.00	-25.35	QP
10	1.2300	17.86	15.28	33.14	60.00	-26.86	AVG
11	1.7205	33.37	15.36	48.73	73.00	-24.27	QP
12	1.7475	15.33	15.36	30.69	60.00	-29.31	AVG

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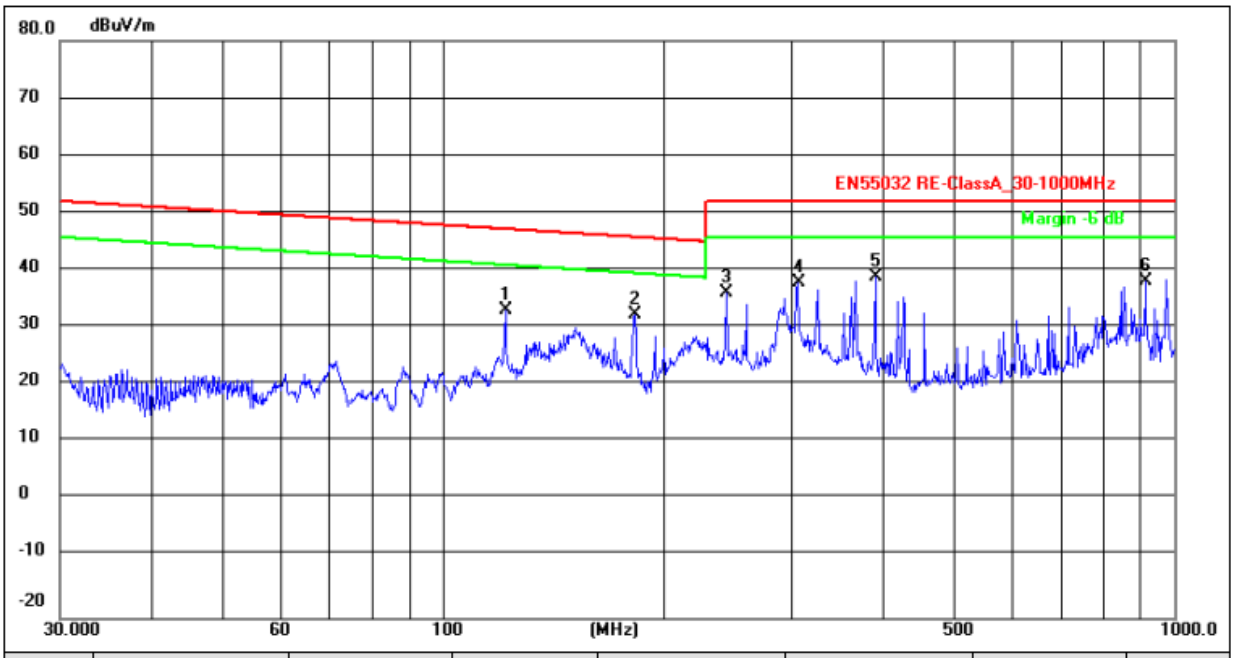
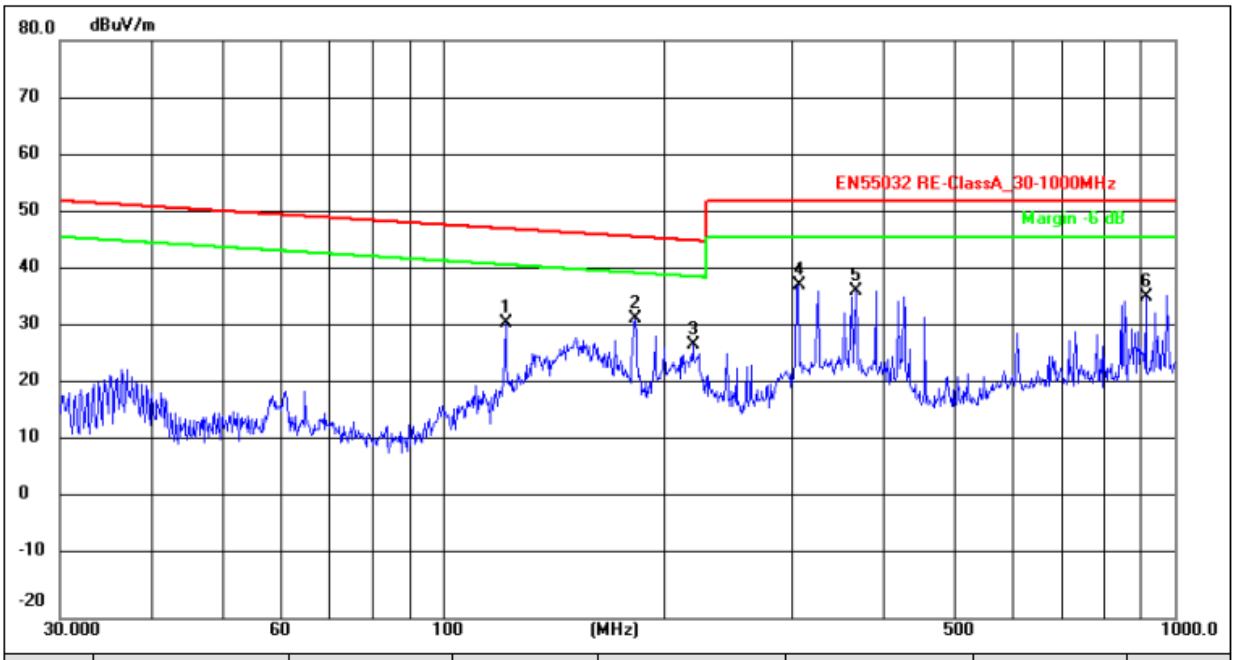
B.2 Radiated Disturbance Test Results（30MHz to 1000MHz）

Environmental Conditions:	24.6℃, 54.1% RH
Test Voltage:	AC 230V,50Hz
Test Model:	IDD5915
Test Mode:	Mode 1
Test Engineer:	XP Rao
Pol:	Vertical
Detailed results are shown below	



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	121.9755	53.43	-19.92	33.51	47.18	-13.67	QP
2	183.2005	51.82	-19.20	32.62	45.78	-13.16	QP
3	244.2321	52.30	-15.78	36.52	52.00	-15.48	QP
4	305.6800	52.52	-14.47	38.05	52.00	-13.95	QP
5 *	390.7225	51.49	-12.42	39.07	52.00	-12.93	QP
6	912.8620	44.14	-5.70	38.44	52.00	-13.56	QP

Environmental Conditions:	24.6℃, 54.1% RH
Test Voltage:	AC 230V,50Hz
Test Model:	IDD5915
Test Mode:	Mode 1
Test Engineer:	XP Rao
Pol:	Horizontal
Detailed results are shown below	



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	121.9755	51.04	-19.92	31.12	47.18	-16.06	QP
2 *	183.2005	50.95	-19.19	31.76	45.78	-14.02	QP
3	219.8449	43.95	-16.56	27.39	45.16	-17.77	QP
4	305.6800	52.07	-14.47	37.60	52.00	-14.40	QP
5	366.8231	49.75	-13.00	36.75	52.00	-15.25	QP
6	912.8620	41.40	-5.70	35.70	52.00	-16.30	QP

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B.3 HARMONIC CURRENT EMISSION MEASUREMENT

Pass

Because the power of EUT is less than 75W, according to standard EN 61000-3-2, harmonic current unnecessary to test.

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B.4 VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

Test Model	IDD5915	**Test Engineer**	XP Rao
Test Voltage	AC 230V/50Hz		

Overall Result:	Notes:
PASS	Measurement method - Voltage

	Pst	dc (%)	dmax (%)	Tmax(> 3.3%)(ms)
Limit	1.000	3.300	4.000	500
Reading 1	0.090	0.006	0.233	0

B.5 ELECTROSTATIC DISCHARGE IMMUNITY TEST

Electrostatic Discharge Test Results

Standard	☐ IEC 61000-4-2 ☑ EN 61000-4-2		
Applicant	Shanghai Panelmate Electronics Co.,Ltd.		
EUT	Industrial Operation Panel	**Temperature**	24.8℃
M/N	IDD5915	**Humidity**	53.8％
Criterion	B	**Pressure**	1021mbar
Test Mode	Mode 1	**Test Engineer**	XP Rao

Air Discharge						
Test Points	**Test Levels**			**Results**		
	± 2kV	**± 4kV**	**± 8kV**	**Passed**	**Fail**	**Performance Criterion**
Front	☒	☒	☒	☒	☐	☐A ☒B
Back	☒	☒	☒	☒	☐	☐A ☒B
Left	☒	☒	☒	☒	☐	☐A ☒B
Right	☒	☒	☒	☒	☐	☐A ☒B
Top	☒	☒	☒	☒	☐	☐A ☒B
Bottom	☒	☒	☒	☒	☐	☐A ☒B

Contact Discharge					
Test Points	**Test Levels**		**Results**		
	± 2 kV	**±4 kV**	**Passed**	**Fail**	**Performance Criterion**
Front	☒	☒	☒	☐	☐A ☒B
Back	☒	☒	☒	☐	☐A ☒B
Left	☒	☒	☒	☐	☐A ☒B
Right	☒	☒	☒	☐	☐A ☒B
Top	☒	☒	☒	☐	☐A ☒B
Bottom	☒	☒	☒	☐	☐A ☒B

Discharge To Horizontal Coupling Plane					
Side of EUT	**Test Levels**		**Results**		
	± 2 kV	**± 4 kV**	**Passed**	**Fail**	**Performance Criterion**
Front	☒	☒	☒	☐	☐A ☒B
Back	☒	☒	☒	☐	☐A ☒B
Left	☒	☒	☒	☐	☐A ☒B
Right	☒	☒	☒	☐	☐A ☒B

Discharge To Vertical Coupling Plane					
Side of EUT	**Test Levels**		**Results**		
	± 2 kV	**± 4 kV**	**Passed**	**Fail**	**Performance Criterion**
Front	☒	☒	☒	☐	☐A ☒B
Back	☒	☒	☒	☐	☐A ☒B
Left	☒	☒	☒	☐	☐A ☒B
Right	☒	☒	☒	☐	☐A ☒B

B.6 RF FIELD STRENGTH SUSCEPTIBILITY TEST

RF Field Strength Susceptibility Test Results			
Standard	☐ IEC 61000-4-3 ☑ EN 61000-4-3		
Applicant	Shanghai Panelmate Electronics Co.,Ltd.		
EUT	Industrial Operation Panel	**Temperature**	22.8℃
M/N	IDD5915	**Humidity**	53.0％
Field Strength	3 V/m	**Criterion**	A
Test Mode	Mode 1	**Test Engineer**	XP Rao
Test Frequency	80MHz to 1000MHz (swept test) 1800MHz, 2600MHz, 3500MHz, 5000MHz (spot test)		
Modulation	☐None ☐ Pulse ☑AM 1KHz 80%		
Steps	1%		

	Horizontal	Vertical
Front	PASS	PASS
Right	PASS	PASS
Rear	PASS	PASS
Left	PASS	PASS

Test Equipment:

1. Signal Generator: 2031 (MARCONI)
2. Power Amplifier: 500A100 & 100W/1000M1 (A&R)
3. Power Antenna: 3108 (EMCO) & AT1080 (A&R)
4. Field Monitor: FM2000 (A&R)

Note:

B.7 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

Electrical Fast Transient/Burst Test Results			
Standard	☐ IEC 61000-4-4 ☑ EN 61000-4-4		
Applicant	Shanghai Panelmate Electronics Co.,Ltd.		
EUT	Industrial Operation Panel	**Temperature**	22.9℃
M/N	IDD5915	**Humidity**	53.4%
Test Mode	Mode 1	**Criterion**	B
Test Engineer	XP Rao		

Line	Test Voltage	Result (+)	Result (-)
L	1KV	PASS	PASS
N	1KV	PASS	PASS
L-N	1KV	PASS	PASS
L-PE			
N-PE			
L-N-PE			
Signal Line			
I/O Cable			

Note:

B.8 SURGE IMMUNITY TEST

Surge Immunity Test Result			
Standard	☐ IEC 61000-4-5 ☑ EN 61000-4-5		
Applicant	Shanghai Panelmate Electronics Co.,Ltd.		
EUT	Industrial Operation Panel	**Temperature**	22.9℃
M/N	IDD5915	**Humidity**	53.4％
Test Mode	Mode 1	**Criterion**	B
Test Engineer	XP Rao		

Location	Polarity	Phase Angle	Number of Pulse	Pulse Voltage (KV)	Result
L-N	+	90°	5	1.0	PASS
	-	270°	5	1.0	PASS
L-PE					
N-PE					
Signal Line					
Note					

B.9 INJECTED CURRENTS SUSCEPTIBILITY TEST

Injected Currents Susceptibility Test Results			
Standard	☐ IEC 61000-4-6 ☑ EN 61000-4-6		
Applicant	Shanghai Panelmate Electronics Co.,Ltd.		
EUT	Industrial Operation Panel	**Temperature**	23.5℃
M/N	IDD5915	**Humidity**	53.2％
Test Mode	Mode 1	**Criterion**	A
Test Engineer	XP Rao		

Frequency Range (MHz)	Injected Position	Strength (Unmodulated)	Criterion	Result
0.15 ~ 10	AC Mains	3V	A	PASS
10 ~ 30		3V ~ 1V		
30 ~ 80		1V		

Remark:
1. Modulation Signal:1kHz 80% AM
2. Measurement Equipment :
   Simulator: CIT-10 (FRANKONIA)
   CDN : ☑CDN-M2 (FRANKONIA)
   ☐CDN-M3 (FRANKONIA)

Note:

B.10 MAGNETIC FIELD SUSCEPTIBILITY TEST

Magnetic Field Immunity Test Result			
Standard	☐ IEC 61000-4-8 ☑ EN 61000-4-8		
Applicant	Shanghai Panelmate Electronics Co.,Ltd.		
EUT	Industrial Operation Panel	**Temperature**	24.4℃
M/N	IDD5915	**Humidity**	54.1％
Test Mode	Mode 1	**Criterion**	A
Test Engineer	XP Rao		

Test Level (A/M)	Testing Duration	Coil Orientation	Criterion	Result
1	5 mins	X	A	PASS
1	5 mins	Y	A	PASS
1	5 mins	Z	A	PASS

Note:

B.11 VOLTAGE DIPS AND INTERRUPTIONS TEST

Voltage Dips And Interruptions Test Results			
Standard	☐ IEC 61000-4-11 ☑ EN 61000-4-11		
Applicant	Shanghai Panelmate Electronics Co.,Ltd.		
EUT	Industrial Operation Panel	**Temperature**	22.3℃
M/N	IDD5915	**Humidity**	54.4％
Test Mode	Mode 1	**Criterion**	B&C
Test Engineer	XP Rao		

Test Level % U_T	Voltage Dips & Short Interruptions % U_T	Duration (in periods)	Criterion	Result
0	100	0.5P	B	PASS
70	30	25P	C	PASS
0	100	250P	C	PASS

Note:

ANNEXE C

（External and internal photos of the EUT）

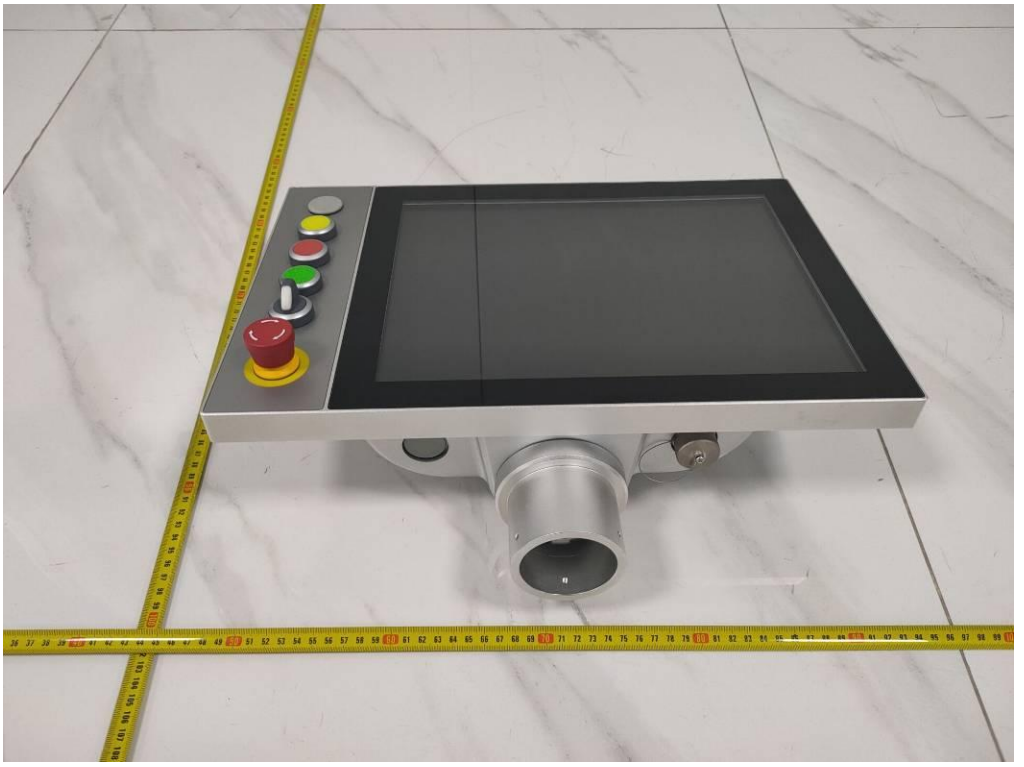

Fig.1

Fig.2

Fig.3

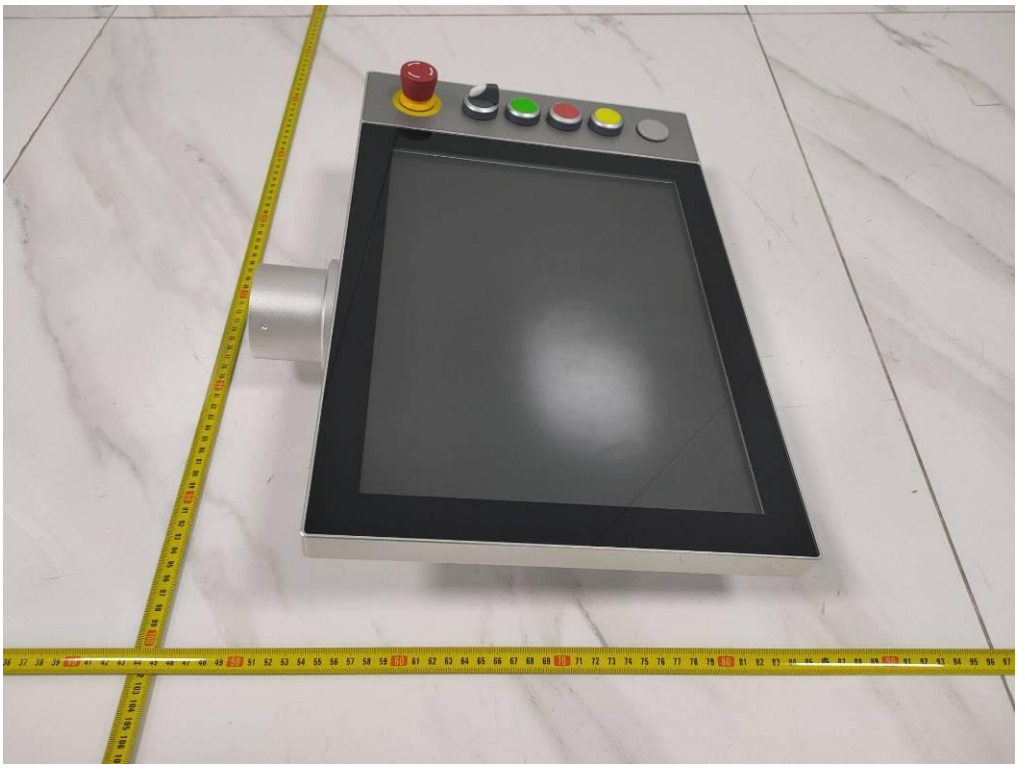

Fig.4

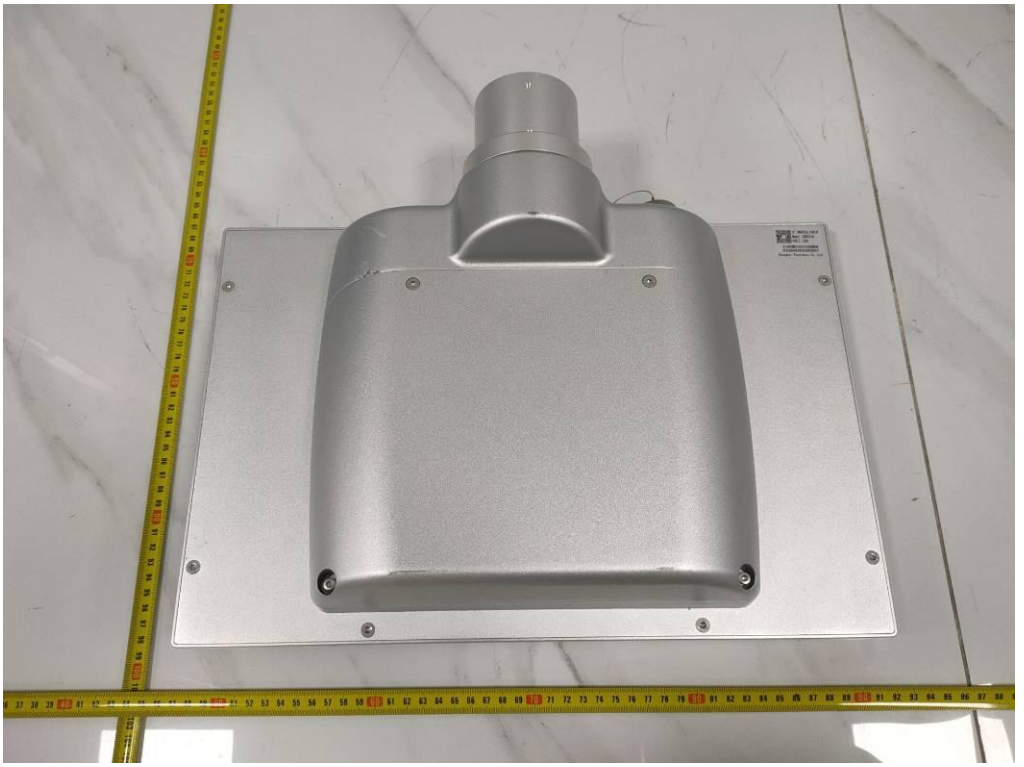

Fig.5

Fig.6

Fig.7

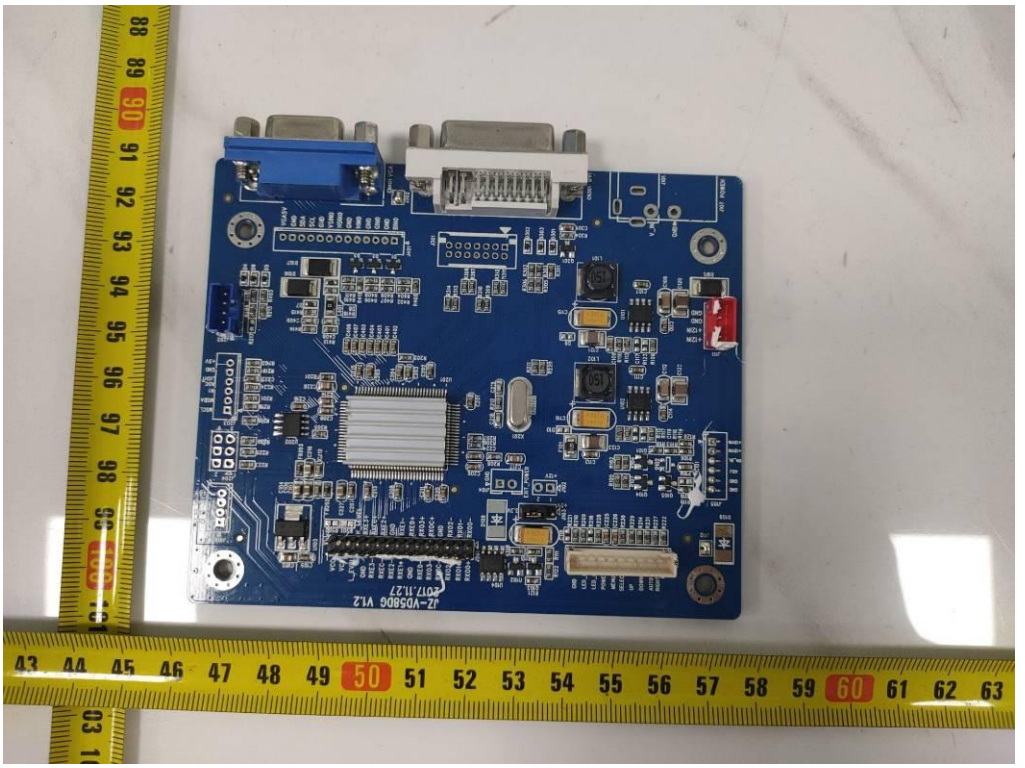

Fig.8

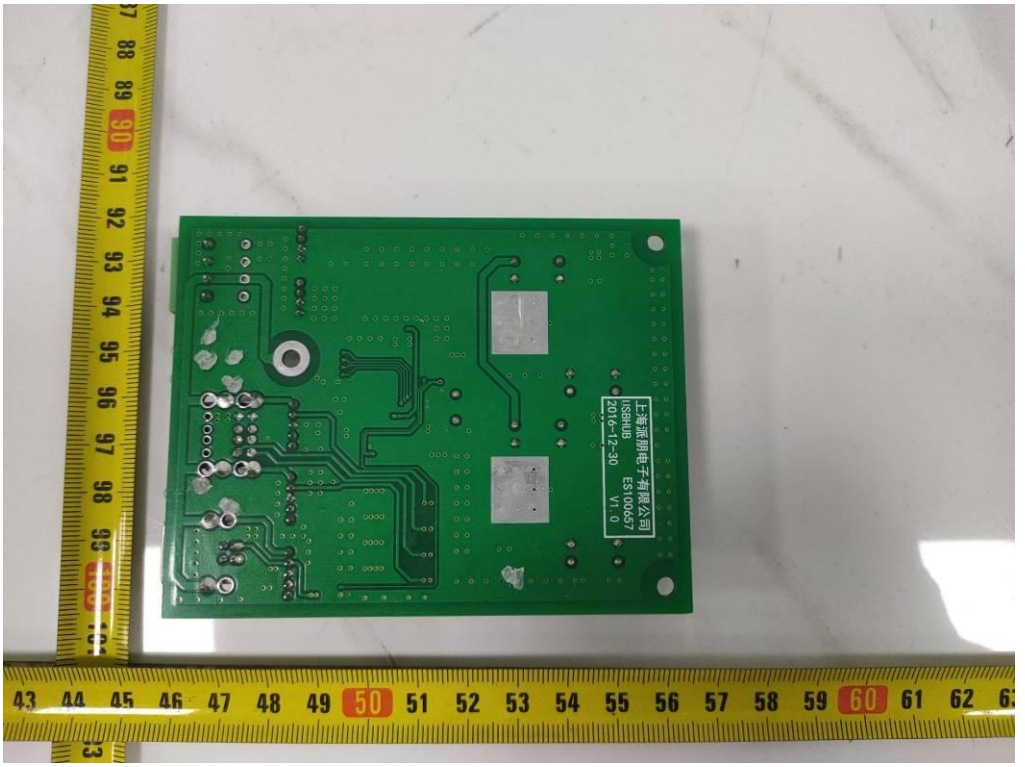

Fig.7

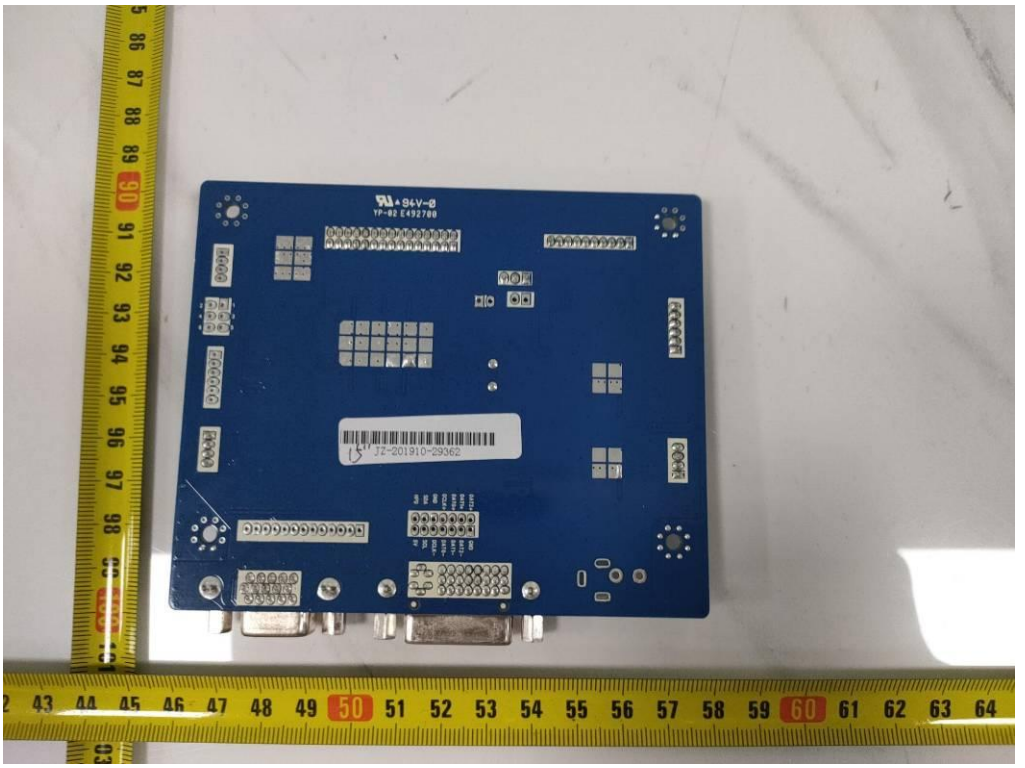

Fig.8

---------- THE END OF TEST REPORT ----------