EMC TEST REPORT

The device described below is tested by Shenzhen NTC Co., Ltd. to determine the maximum emission levels emanating from the device, the severe levels which the device can endure and E.U.T.'s performance criterion. The test results are contained in this test report. Shenzhen NTC Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

Applicant	:	Shenzhen Samkoon Technology Corporation Ltd.
Address	:	3B/C, Building 1, Shenzhen software park, Gaoxin middle zone, Yuehai Street, Nanshan District, Shenzhen City
Manufacturer/Factory	:	Shenzhen Samkoon Technology Corporation Ltd.
Address	:	3B/C, Building 1, Shenzhen software park, Gaoxin middle zone, Yuehai Street, Nanshan District, Shenzhen City
E.U.T.	:	HMI
Brand Name	:	Samkoon®
Model No.	:	SK-070FE, SA-035F, SA-043F, SA-050H, SA-057F, SA-070F, SA-070H, SA-102H, SA-104F, SA-121F, HM-035F, HM-043F, HM-050H, HM-057F, HM-070F, HM-070H, HM-102H,HM-104F, HM-121F, SK-035FE, SK-043FE, SK-043HS, SK-043HE, SK-050HS, SK-050HE, SK-057FE, SK-070FS, SK-070FE, SK-070HS, SK-070HE, SK-102HS, SK-102HE, SK-104FS, SK-104FE, SK-121FS, SK-121FE, SK-035UE, SK-043UE, SK-070GE, SK-070GS, SK-070ME, SK-070MS, SK-102CE, SK-102CS, HM-035AE, HM-043AE, HM-043BS, HM-043BE, HM-050BS, HM-050BE, HM-057AE, HM-070AS, HM-070AE, HM-070BS, HM-070BE, HM-102BS, HM-102BE, HM-104AS, HM-104AE, HM-121AS, HM-121AE, HM-035UE, HM-043UE, HM-070GE, HM-070GS, HM-070ME, HM-070MS, HM-102CE, HM-102CS
Measurement Standard	:	EN 55032: 2015+AC: 2016 , EN 55035: 2017 (EN 61000-4-2: 2009, EN 61000-4-3: 2006+A2: 2010, EN 61000-4-4: 2012, EN 61000-4-5: 2014+A1: 2017, EN 61000-4-6: 2014+AC:2015)
Date of Receiver	:	October 28, 2018
Date of Test	:	October 29, 2018 to November 01, 2018
Date of Report	:	November 02, 2018

This Test Report is Issued Under the Authority of :

Prepared by	Approved & Authorized Signer
Bowen Zhu / Engineer	Iori Fan / Authorized Signatory

This report shows that the E.U.T. is technically compliant with the EN 55032 and EN 55035. This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen NTC Co., Ltd.

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Revision History of This Test Report

Report Number	Description	Issued Date
NTC1709707EV02	Initial Issue	2018-11-02

1. SUMMARY OF TEST RESULTS

The E.U.T. has been tested according to the following specifications:

EMISSION			
Standard	**Test Type**	**Result**	**Remarks**
EN 55032: 2015+ AC: 2016	Mains Terminal Disturbance Voltage Test	PASS	Uncertainty: 2.7dB
	Radiated Emission Test	PASS	Uncertainty: 3.4dB

IMMUNITY(EN 55035: 2017)			
Standard	**Test Type**	**Result**	**Remarks**
EN 61000-4-2: 2009	Electrostatic discharge immunity test	PASS	Meets the requirements of Performance Criterion B
EN 61000-4-3: 2006+A2: 2010	Radio-frequency, electromagnetic field immunity test	PASS	Meets the requirements of Performance Criterion A
EN 61000-4-4: 2012	Electrical fast transient/ burst immunity test	PASS	Meets the requirements of Performance Criterion B
EN 61000-4-5:2014 +A1:2017	Surge immunity test	PASS	Meets the requirements of Performance Criterion B
EN 61000-4-6:2014 +AC:2015	Injected Currents immunity test	PASS	Meets the requirements of Performance Criterion A

2. GENERAL INFORMATION

2.1 Details of E.U.T.

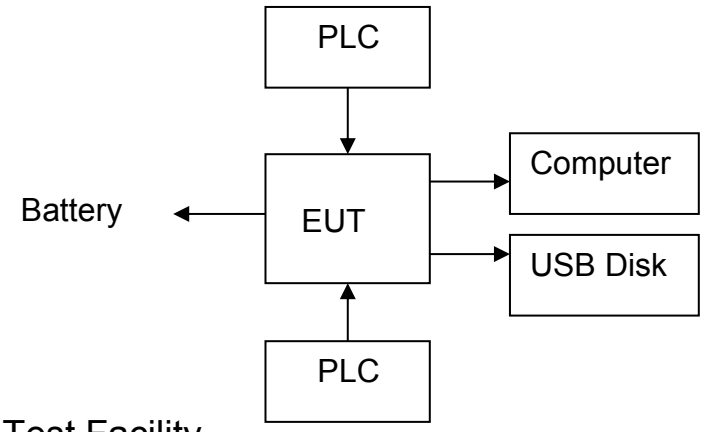
E.U.T.	:	HMI
Model No.	:	SK-070FE, SA-035F, SA-043F, SA-050H, SA-057F, SA-070F, SA-070H, SA-102H, SA-104F, SA-121F, HM-035F, HM-043F, HM-050H, HM-057F, HM-070F, HM-070H, HM-102H, HM-104F, HM-121F, SK-035FE, SK-043FE, SK-043HS, SK-043HE, SK-050HS, SK-050HE, SK-057FE, SK-070FS, SK-070FE, SK-070HS, SK-070HE, SK-102HS, SK-102HE, SK-104FS, SK-104FE, SK-121FS, SK-121FE, SK-035UE, SK-043UE, SK-070GE, SK-070GS, SK-070ME, SK-070MS, SK-102CE, SK-102CS, HM-035AE, HM-043AE, HM-043BS, HM-043BE, HM-050BS, HM-050BE, HM-057AE, HM-070AS, HM-070AE, HM-070BS, HM-070BE, HM-102BS, HM-102BE, HM-104AS, HM-104AE, HM-121AS, HM-121AE, HM-035UE, HM-043UE, HM-070GE, HM-070GS, HM-070ME, HM-070MS, HM-102CE, HM-102CS
Brand name	:	Samkoon®
Rating	:	DC 24V/ 0.3A
E.U.T. Type	:	Class A
Operation Frequency	:	Below 600MHz (Declaration by applicant)
Test Voltage	:	DC 24V
Cable	:	None
Description of model difference	:	All the same except the model name
Remark	:	None

2.2 Description of Support Device

ancillary equipment	model
computer	lenovo
24vlead-acid battery	---
USB Disk	kingston
PLC	FX2n-64MR-001
PLC with shielding	---

2.3 Block Diagram of Test Setup

Block diagram of connection between the E.U.T. and simulators



2.4 Test Facility

Site Description

EMC Lab : Listed by CNAS, November 02, 2016
The certificate is valid until August 13, 2024
The Laboratory has been assessed and proved to be in compliance with CNAS/CL01
The Certificate Registration Number is L5795.

Listed by FCC, July 03, 2014
The Certificate Number is 665078.

Listed by Industry Canada, June 08, 2017
The Certificate Registration Number. Is 46405-9743

Name of Firm : Dongguan Nore Testing Center Co.,Ltd.
(Dongguan NTC Co.,Ltd.)

Site Location : Building D,Gaosheng Science&Technology Park,Zhouxi Longxi Road,Nancheng District,Dongguan City,Guangdong Province,China

2.5 Abnormalities from Standard Conditions

None

3. MEASURING DEVICES AND TEST EQUIPMENT

3.1For Mains terminals Disturbance voltage Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI	101152	Mar. 07, 2018	1 Year
2.	L.I.S.N	Rohde & Schwarz	ENV 216	101317	Mar. 07, 2018	1 Year
3.	L.I.S.N	Schwarzbeck	NNLK8129	8129-212	Mar. 07, 2018	1 Year
4.	RF Switching Unit	Compliance Direction Systems Inc.	RSU-M2	38311	Mar. 07, 2018	1 Year

3.2 For Radiated Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI7	100837	Mar. 07, 2018	1 Year
2.	Antenna	Schwarzbeck	VULB9162	9162-010	Apr. 25, 2018	1 Year
3.	Positioning Controller	UC	UC 3000	N/A	N/A	N/A
4.	Color Monitor	SUNSPO	SP-140A	N/A	N/A	N/A
5.	Single Phase Power Line Filter	SAEMC	PF201A-32	110210	N/A	N/A
6.	3 Phase Power Line Filter	SAEMC	PF301A-200	110245	N/A	N/A
7.	DC Power Filter	SAEMC	PF301A-200	110245	N/A	N/A
8.	Cable	Huber+Suhner	CBL3-NN-9M	21490001	Mar. 07, 2018	1 Year
9.	Cable	Huber+Suhner	RG223U	N/A	Mar. 07, 2018	1 Year
10.	Power Amplifier	HP	HP 8447D	1145A00203	Mar. 07, 2018	1 Year

3.3 For Electrostatic Discharge Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ESD Tester	TESEQ	NSG 437	432	Apr. 26, 2018	1 Year

3.4 For RF Electromagnetic Field Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Signal Generator	Agilent	N5181A	MY50142530	Aug.31, 2018	1 Year
2.	Antenna	Schwarzbeck	VULB9162	9162-010	Apr.25, 2018	1 Year
3.	RF Power Meter	ESE	4242	13984	Aug.31, 2018	1 Year
4.	Power Amplifier	TESEQ	CBA 1G-150	T44029	N/A	N/A
5.	Power Sensor	ESE	51011EMC	35716	Aug.31, 2018	1 Year

3.5 For Electrical Fast Transient /Burst Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Burst Tester	EM TEST	UCS 500N	V1104108683	Mar. 07, 2018	1 Year
2.	Coupling Clamp	EM TEST	HFK	0311-94	Mar. 07, 2018	1 Year
3.	Test Soft	EM TEST	lec. control	N/A	N/A	

3.6 For Surge Immunity Test

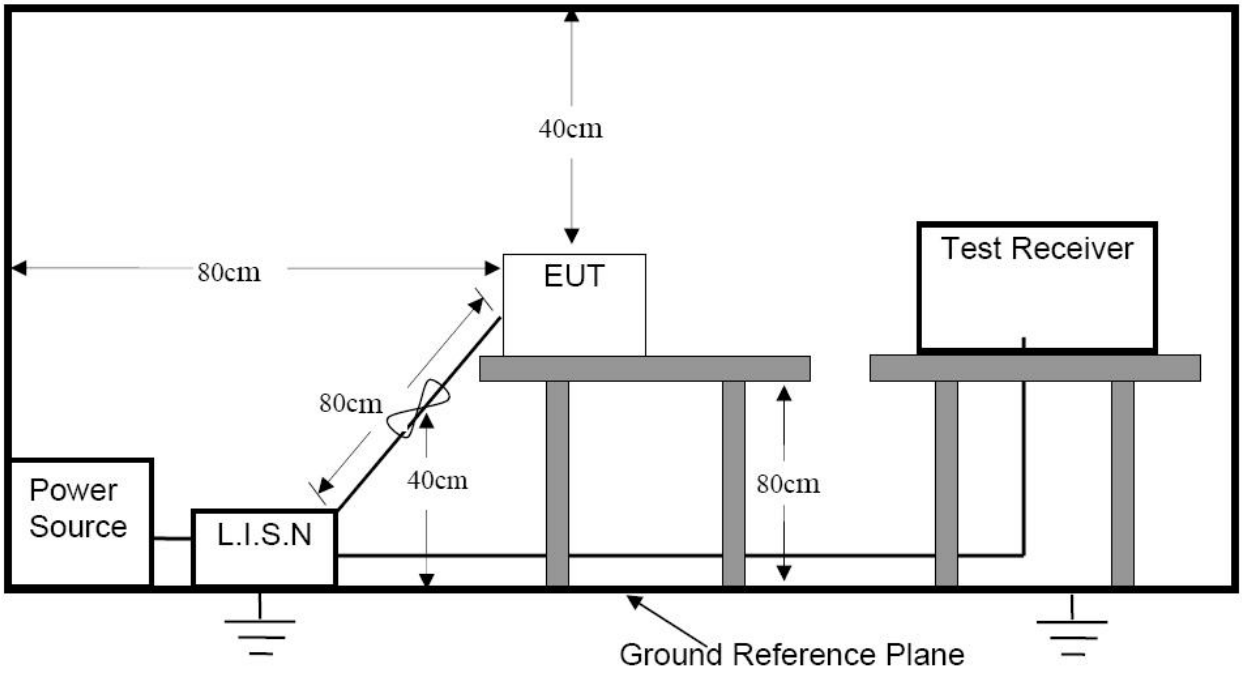
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Surge Tester	EM TEST	UCS 500N	V1104108683	Mar. 07, 2018	1 Year
2.	Test Soft	EM TEST	lec. control	N/A	N/A	N/A

3.7 For Injected Currents Immunity Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	CDN	Luthi	L-801M2/M3	2015	Oct.19, 2018	1 Year
2.	C/S Test System	HAEFELY	WinPAMP	NSEMC002	N/A	N/A

4. MAINS TERMINAL DISTURBANCE VOLTAGE MEASUREMENT

4.1 Block Diagram of Test Setup



4.2 Limit of Mains Terminal Disturbance voltage measurement

Test Standard: EN 55032

Limits for conducted disturbance at the mains ports.

Frequency range	Limits (Db(Uv))	
(MHz)	Quasi-peak	Average
0.15 to 0.5	79	66
0.5 to 30	73	60

Note: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

4.3 Test Procedure

The E.U.T. is put on the 0.8 m high table and connected to the AC mains through a Artificial Mains Network (AMN). This provided a 50ohm coupling impedance for the tested equipments. Both sides of AC line are checked to find out the maximum conducted emission levels according to the EN 55032 regulations during conducted emission test.

The bandwidth of the test receiver (R&S Test Receiver ESCI) is set at 9 KHz.

4.4 Operating Condition of E.U.T.

4.4.1 Setup the E.U.T. and simulators as shown in Section 2.3.

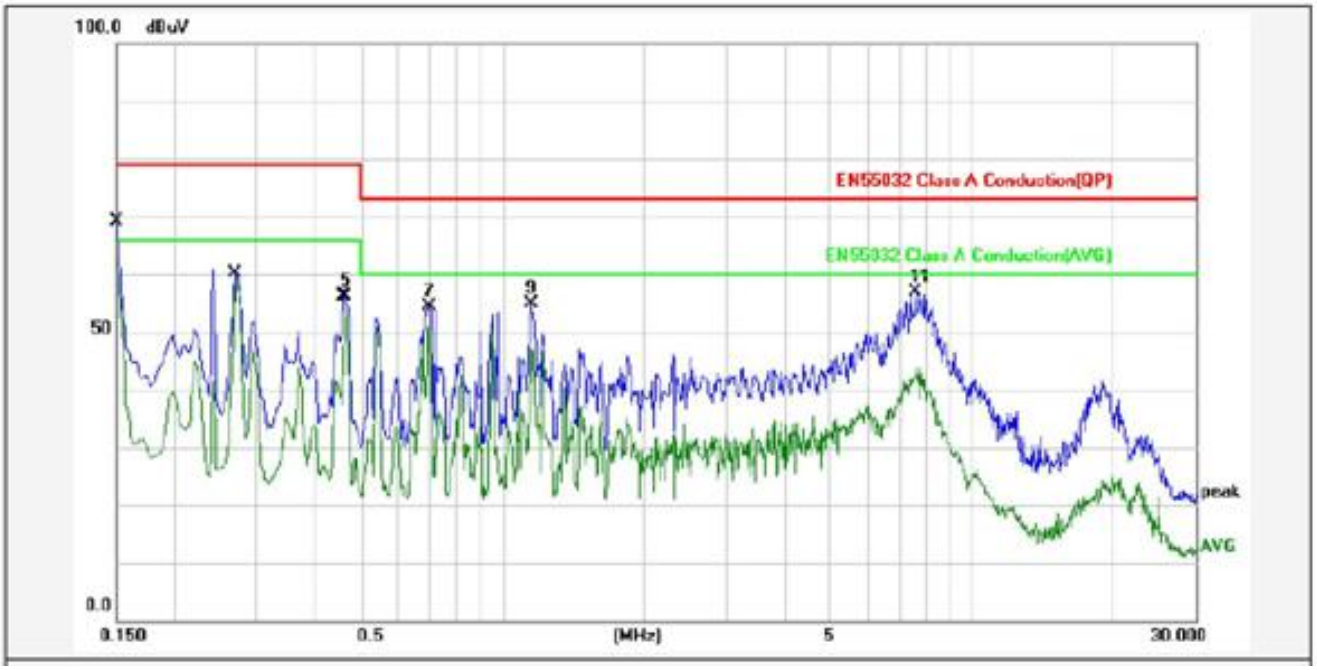
4.4.2 Turn on the power of all equipments.

4.4.3 Let the E.U.T. work in test modes (On) and test it.

4.5 Mains Terminal Disturbance Voltage Test Results

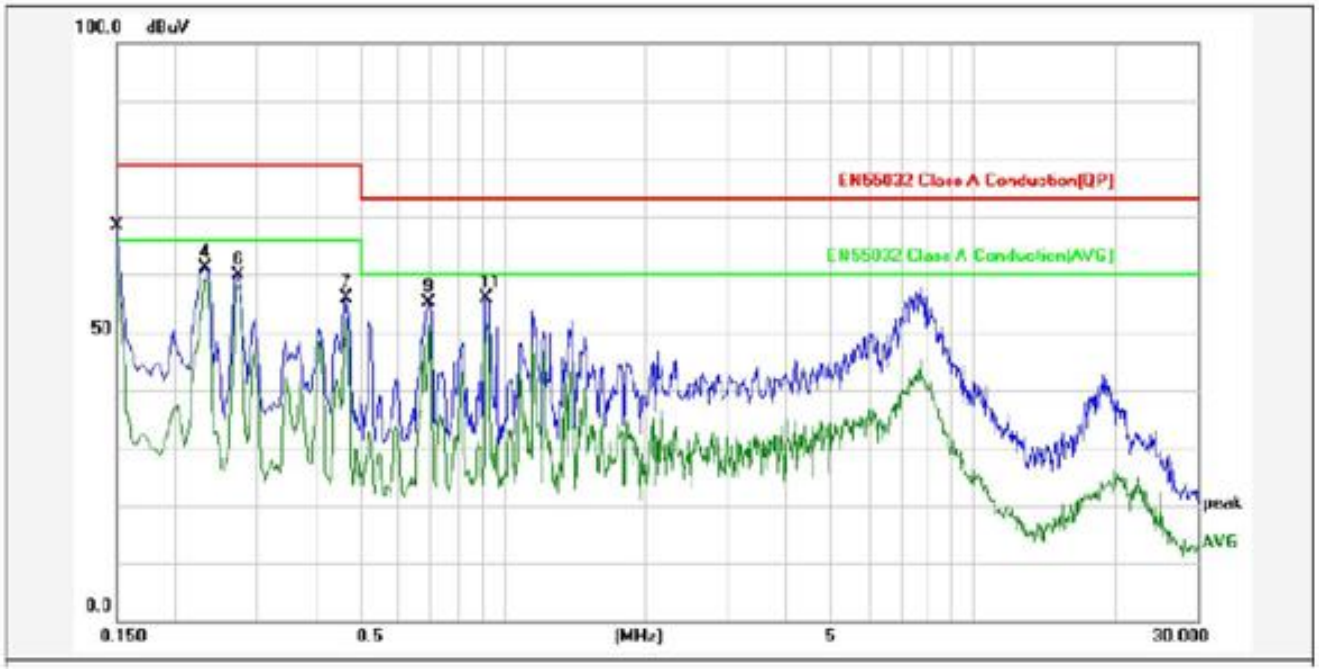
PASS.

E.U.T :	HMI	Model Name :	SK-070FE
Temperature :	25°C	Relative Humidity :	60 %
Pressure :	1006 hPa	Test Voltage :	DC 24V
Test Mode :	On	Polarization:	Positive electrode



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1500	10.64	57.46	68.10	79.00	-10.90	QP	P	
2	0.1500	10.64	52.56	63.20	66.00	-2.80	AVG	P	
3	0.2700	10.48	48.02	58.50	79.00	-20.50	QP	P	
4	0.2700	10.48	48.32	58.80	66.00	-7.20	AVG	P	
5	0.4620	10.53	45.49	56.02	79.00	-22.98	QP	P	
6	0.4620	10.53	43.38	53.91	66.00	-12.09	AVG	P	
7	0.6940	10.49	43.81	54.30	73.00	-18.70	QP	P	
8	0.6940	10.49	40.36	50.85	60.00	-9.15	AVG	P	
9	1.1580	10.48	44.40	54.88	73.00	-18.12	QP	P	
10	1.1580	10.48	36.62	47.10	60.00	-12.90	AVG	P	
11	7.6059	10.50	46.49	56.99	73.00	-16.01	QP	P	
12	7.6059	10.50	33.03	43.53	60.00	-16.47	AVG	P	

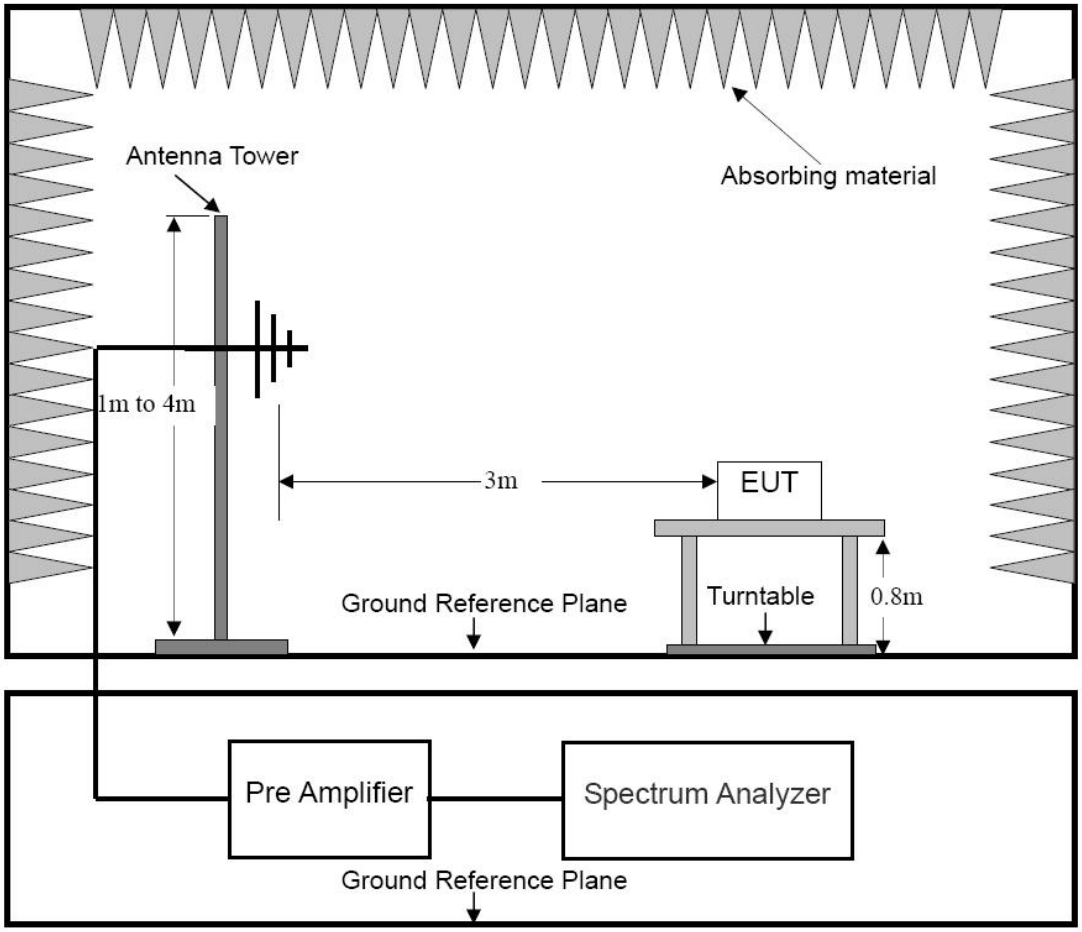
E.U.T :	HMI	Model Name :	SK-070FE
Temperature :	25°C	Relative Humidity :	60 %
Pressure :	1006 hPa	Test Voltage :	DC 24V
Test Mode :	On	Polarization:	Negative pole



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1500	10.54	57.76	68.30	79.00	-10.70	QP	P	
2	0.1500	10.54	52.96	63.50	66.00	-2.50	AVG	P	
3	0.2303	10.50	50.75	61.25	79.00	-17.75	QP	P	
4	0.2303	10.50	48.49	58.99	66.00	-7.01	AVG	P	
5	0.2700	10.48	49.40	59.88	79.00	-19.12	QP	P	
6	0.2700	10.48	47.62	58.10	66.00	-7.90	AVG	P	
7	0.4620	10.49	45.31	55.80	79.00	-23.20	QP	P	
8	0.4620	10.49	43.84	54.33	66.00	-11.67	AVG	P	
9	0.6940	10.67	44.36	55.03	73.00	-17.97	QP	P	
10	0.6940	10.67	40.44	51.11	60.00	-8.89	AVG	P	
11	0.9260	10.64	45.28	55.92	73.00	-17.08	QP	P	
12	0.9260	10.64	40.78	51.42	60.00	-8.58	AVG	P	

5. RADIATED EMISSION MEASUREMENT

5.1 Block Diagram of Test



5.2 Limit of Radiated Emission Measurement

Test Standard: EN 55032

Limits for radiated disturbance of class A at a measuring distance of 3m

Frequency range MHz	Quasi-peak limits dB(uV/m)
30 to 230	50
230 to 1000	57
Note 1 The lower limit shall apply at the transition frequency. Note 2 Additional provisions may be required for cases where interference occurs.	

Limits above 1GHz

Frequency (GHz)	Average Limit dB(uV/m)	Peak Limit dB(uV/m)
1 ~ 3	50	70
3 ~ 6	54	74

Note**:** The highest internal source of an EUT is defined as the highest frequency generated or used within the EUT or on which the EUT operates or tunes.

(1) If the highest frequency of the internal sources of the EUT is less than 108MHz, the measurement shall only be made up to 1GHz.

(2) If the highest frequency of the internal sources of the EUT is between 108MHz and 500MHz, the measurement shall only be made up to 2GHz.

(3) If the highest frequency of the internal sources of the EUT is between 500MHz and 1GHz, the measurement shall only be made up to 5GHz.

(4) If the highest frequency of the internal sources of the EUT is above 1GHz, the measurement shall be made up to 5 times the highest frequency or 6GHz, whichever is less.

5.3 Test Procedure

E.U.T. and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. E.U.T. 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 bilog antenna) is used as receiving antenna. Both horizontal and vertical polarization of the antenna is set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to EN 55032 on radiated emission measurement.

Below 1GHz,the bandwidth of the EMI test is set at 120 KHz.

The frequency range from 30 MHz to 1 GHz is checked.

5.4 Operating Condition of E.U.T.

5.4.1 Setup the E.U.T. and simulators as shown in Section 2.3.

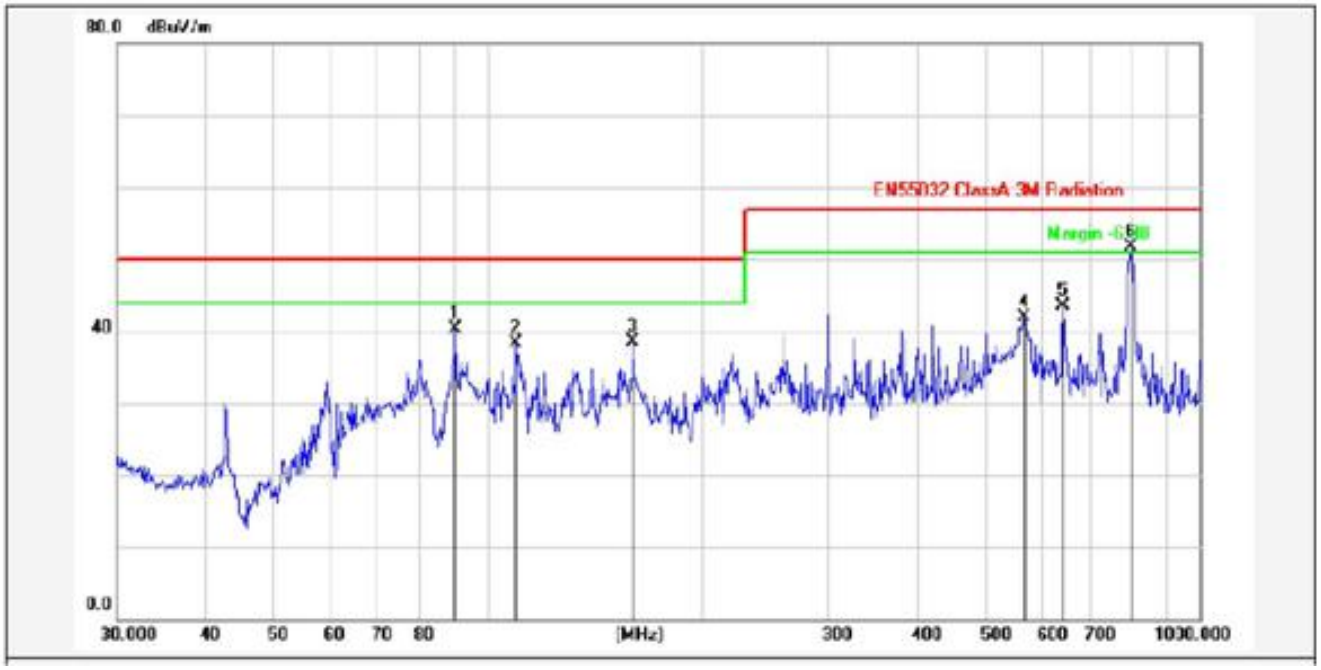
5.4.2 Turn on the power of all equipments.

5.4.3 Let the E.U.T. work in test modes(On) and test it.

5.5 Radiated Emission Measurement Result

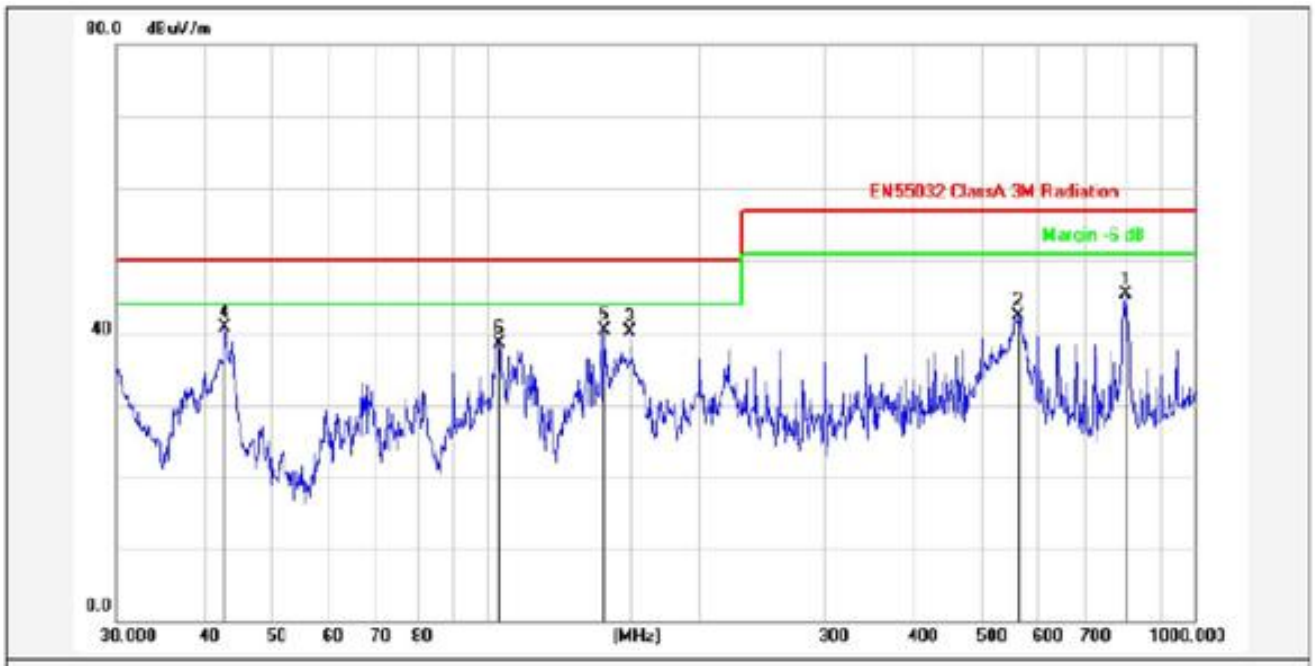
PASS.

E.U.T :	HMI	Model Name :	SK-070FE
Temperature :	25°C	Relative Humidity :	60 %
Pressure :	1006 hPa	Test Voltage :	DC 24V
Test Mode :	On	Polarization:	Horizontal



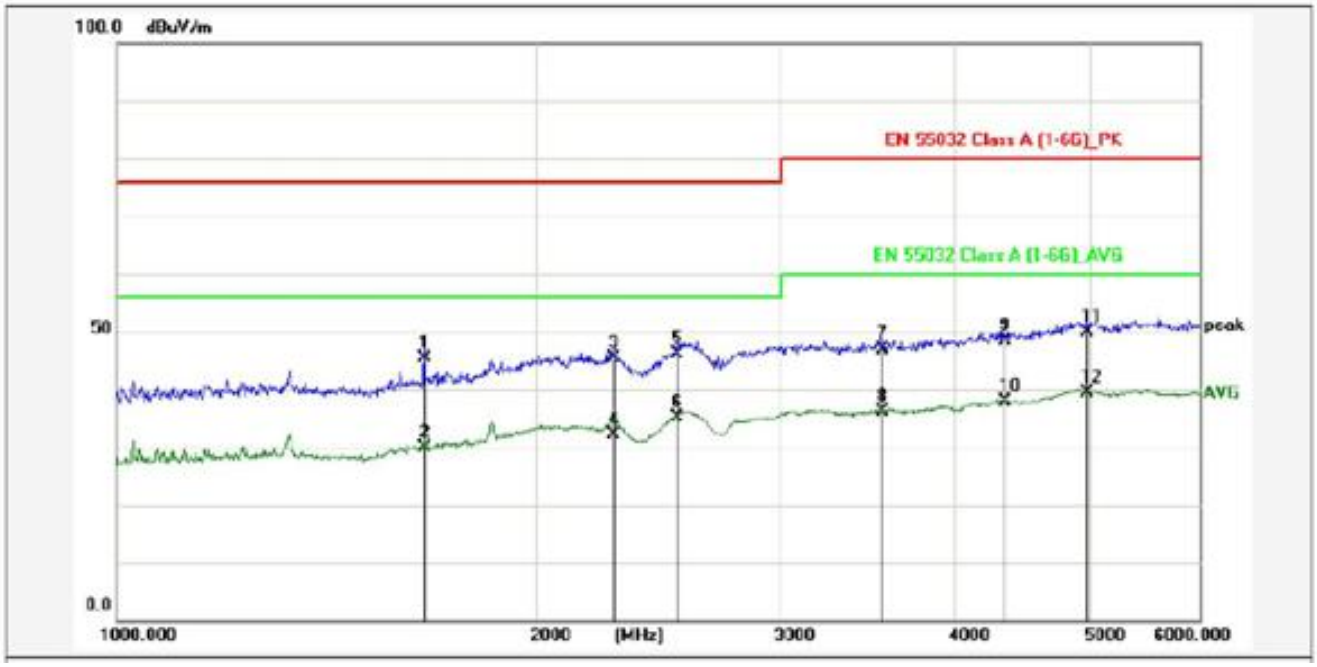
No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	89.9046	-7.95	48.29	40.34	50.00	-9.66	QP			P	
2	109.4116	-6.07	44.33	38.26	50.00	-11.74	QP			P	
3	159.7844	-6.74	45.26	38.52	50.00	-11.48	QP			P	
4	566.6221	0.64	41.23	41.87	57.00	-15.13	QP			P	
5	642.8612	1.51	41.97	43.48	57.00	-13.52	QP			P	
6	801.7863	3.81	47.99	51.80	57.00	-5.20	QP			P	

E.U.T :	HMI	Model Name :	SK-070FE
Temperature :	25°C	Relative Humidity :	60 %
Pressure :	1006 hPa	Test Voltage :	DC 24V
Test Mode :	On	Polarization:	Vertical



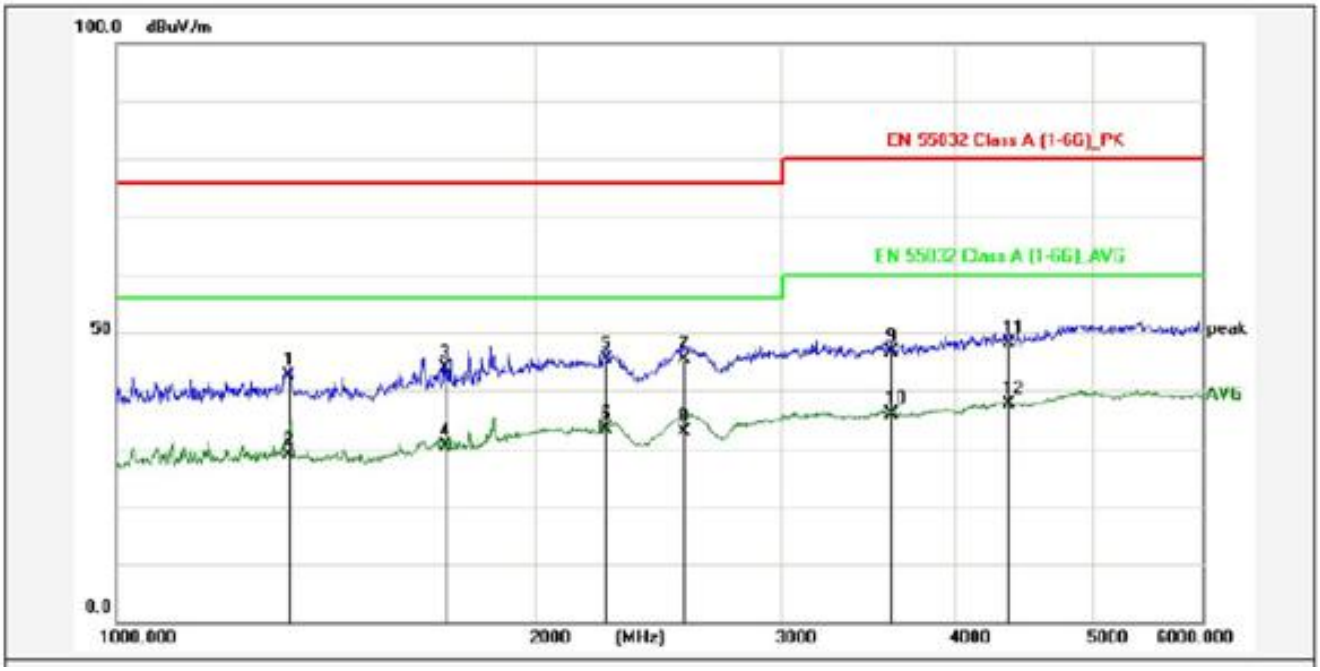
No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	801.7863	3.81	41.49	45.30	57.00	-11.70	QP			P	
2	564.6388	0.61	41.79	42.40	57.00	-14.60	QP			P	
3	159.7844	-6.74	46.90	40.16	50.00	-9.84	QP			P	
4	42.7495	-7.83	48.53	40.70	50.00	-9.30	QP			P	
5	146.8876	-6.19	46.56	40.37	50.00	-9.63	QP			P	
6	104.1701	-6.25	44.76	38.51	50.00	-11.49	QP			P	

E.U.T :	HMI	Model Name :	SK-070FE
Temperature :	25°C	Relative Humidity :	60 %
Pressure :	1006 hPa	Test Voltage :	DC 24V
Test Mode :	On	Polarization:	Horizontal



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	1663.393	-5.25	50.75	45.50	76.00	-30.50	QP			P	
2	1663.393	-5.25	35.20	29.95	56.00	-26.05	AVG			P	
3	2275.996	-0.22	45.72	45.50	76.00	-30.50	QP			P	
4	2275.996	-0.22	32.42	32.20	56.00	-23.80	AVG			P	
5	2529.778	0.51	45.69	46.20	76.00	-29.80	QP			P	
6	2529.778	0.51	34.74	35.25	56.00	-20.75	AVG			P	
7	3549.384	2.85	43.95	46.80	80.00	-33.20	QP			P	
8	3549.384	2.85	33.16	36.01	60.00	-23.99	AVG			P	
9	4345.943	4.76	43.74	48.50	80.00	-31.50	QP			P	
10	4345.943	4.76	33.05	37.81	60.00	-22.19	AVG			P	
11	4979.933	6.97	42.83	49.80	80.00	-30.20	QP			P	
12	4979.933	6.97	32.40	39.37	60.00	-20.63	AVG			P	

E.U.T :	HMI	Model Name :	SK-070FE
Temperature :	25°C	Relative Humidity :	60 %
Pressure :	1006 hPa	Test Voltage :	DC 24V
Test Mode :	On	Polarization:	Vertical



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	1329.615	-7.02	49.72	42.70	76.00	-33.30	QP			P	
2	1329.615	-7.02	36.01	28.99	56.00	-27.01	AVG			P	
3	1720.996	-4.51	48.31	43.80	76.00	-32.20	QP			P	
4	1720.996	-4.51	34.81	30.30	56.00	-25.70	AVG			P	
5	2243.604	-0.30	45.70	45.40	76.00	-30.60	QP			P	
6	2243.604	-0.30	33.80	33.50	56.00	-22.50	AVG			P	
7	2552.543	0.58	44.92	45.50	76.00	-30.50	QP			P	
8	2552.543	0.58	32.32	32.90	56.00	-23.10	AVG			P	
9	3594.181	2.94	43.75	46.69	80.00	-33.31	QP			P	
10	3594.181	2.94	32.89	35.83	60.00	-24.17	AVG			P	
11	4361.545	4.79	43.31	48.10	80.00	-31.90	QP			P	
12	4361.545	4.79	32.93	37.72	60.00	-22.28	AVG			P	

6. PERFORMANCE CRITERIA FOR IMMUNITY

The performance criteria are referred to the test standard: EN 55035

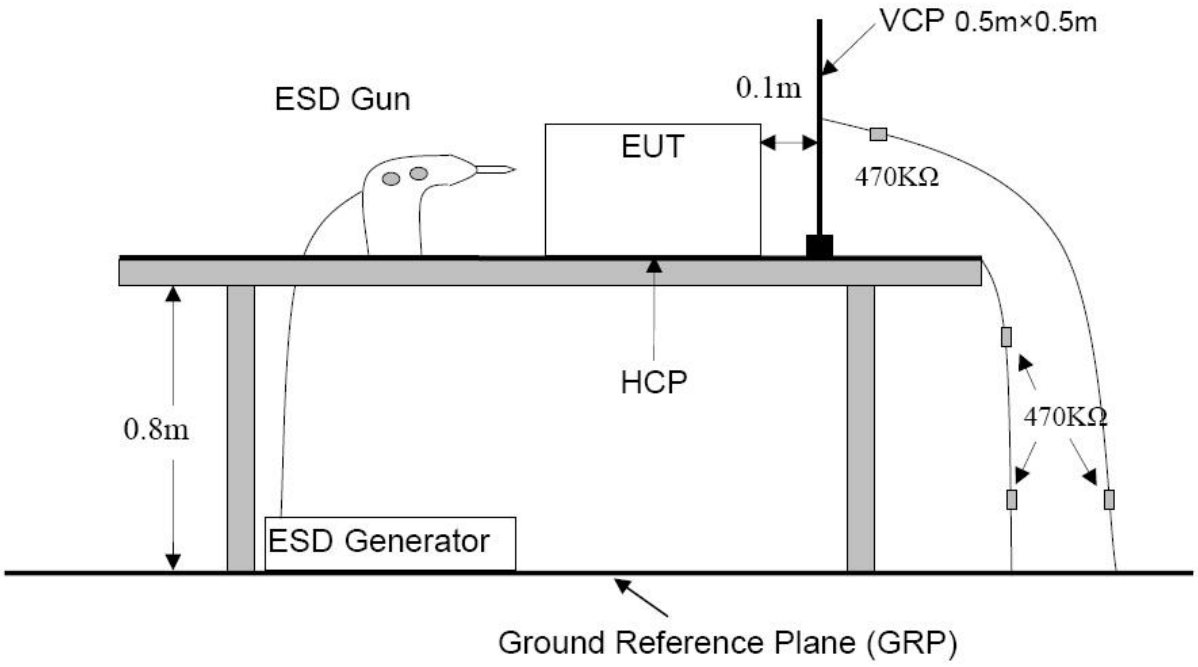
Performance Criteria A
The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced 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 derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance Criteria B
After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance of 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. 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 test.
If the minimum performance lever (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonable expect from the equipment if used as intended.

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

7. ELECTROSTATIC DISCHARGE TEST

7.1Block Diagram of Test Setup



7.2Test Standard and Severity Levels

7.2.1 Test Standard:

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

7.2.2 Severity Levels:

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

7.3 Test Procedure

7.3.1 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 E.U.T.. After each discharge, the discharge electrode shall be removed from the E.U.T.. The generator is then re-triggered for a new single discharge and repeated 25 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed

7.3.2 Contact Discharge**:**

All the procedure shall be same as Section 7.3.1. except that the tip of the discharge electrode shall touch the E.U.T..

7.3.3 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 E.U.T. and 0.1m from the front of the E.U.T.. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

7.3.4 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 E.U.T.. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the E.U.T. are completely illuminated.

7.4 Test Results

PASS.

Please refer to the following page.

Electrostatic Discharge Test Results

Ambient Condition:	Temp.: 26 ℃	R.H.: 50 %	Air Pressure : 103 kPa
Power Supply:	DC 24V	Required Performance Criterion :	B
Test Specifications:	±2, 4 KV Contact Discharge; ±2, 4, 8 KV Air Discharge For each point positive 25 times and negative 25 times		
Tested mode:	On		

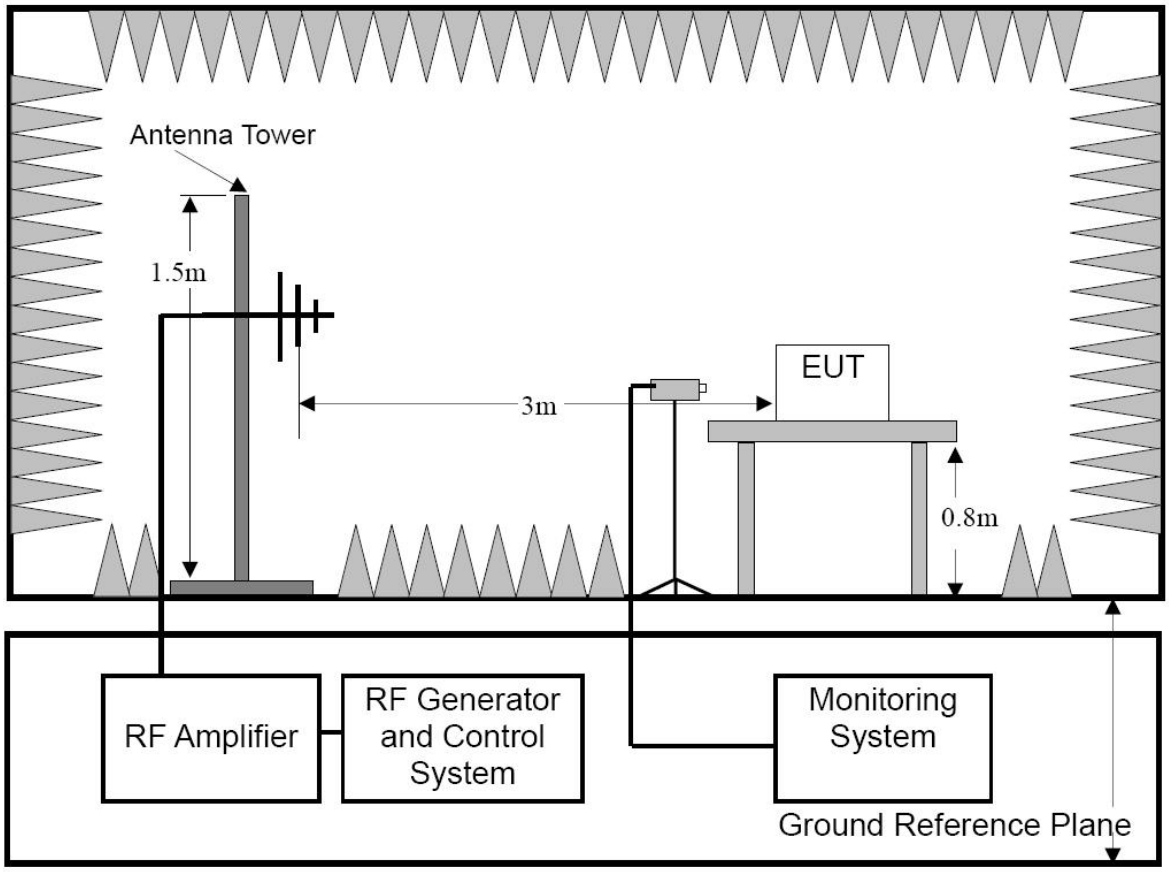
Test Point	**Kind** A-Air Discharge C-Contact Discharge	**Result** (Performance Criterion)
Screw	C	A
Port	A	A
Screen	A	A
LED	A	A
Indirect Discharge(HCP)	C	A
Indirect Discharge(VCP)	C	A

Note:

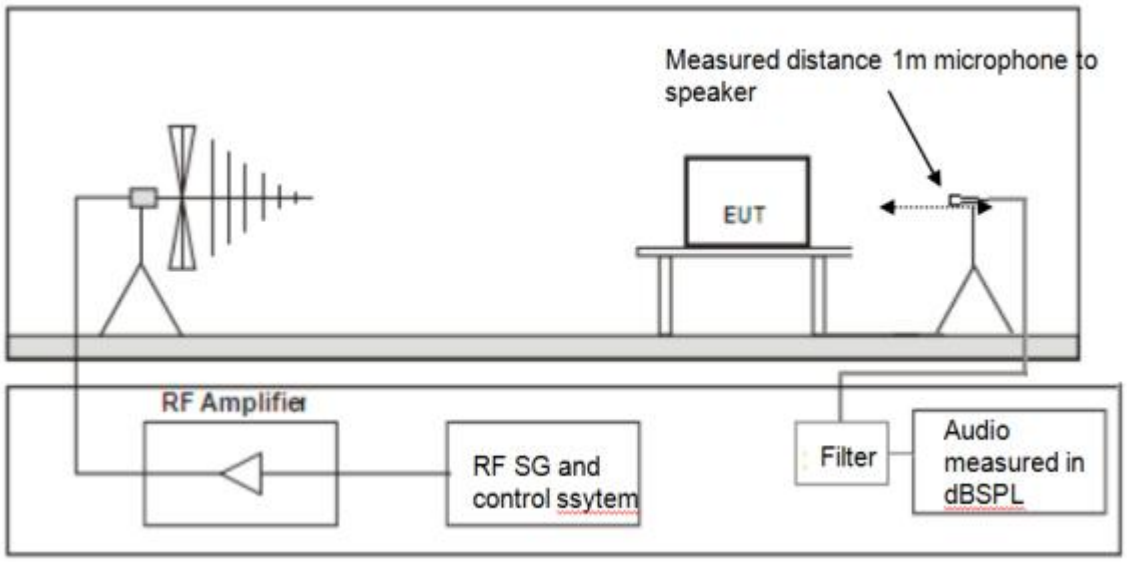
Test Equipment : ESD Tester (TESEQ, NSG 437) Test Engineer : Jerry

8. RF FIELD STRENGTH SUSCEPTIBILITY TEST

8.1 Block Diagram of Test Setup



For Acoustic mode:



8.2 Test Standard and Severity Levels

8.2.1 Test Standard

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

8.2.2 Severity Levels

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

8.3 Test Procedure

The E.U.T.and its simulators are placed on a turn table which is 0.8 meter above ground.E.U.T.is set 3 meter away from the transmitting antenna which is mounted on an antenna tower.Both horizontal and vertical polarization of the antenna are set on test.Each of the four sides of E.U.T.must be faced this transmitting antenna and measured individually.
All the scanning conditions are as follows:

Condition of Test	Remarks
1. Fielded Strength	3V/m(Severity Level 2)
2. Radiated Signal	Modulated
3. Scanning Frequency	895-905 MHz/80-1000MHz
4. Dwell time of radiated	0.0015 decade/s
5. Waiting Time	1 Sec.

8.4 Test Results

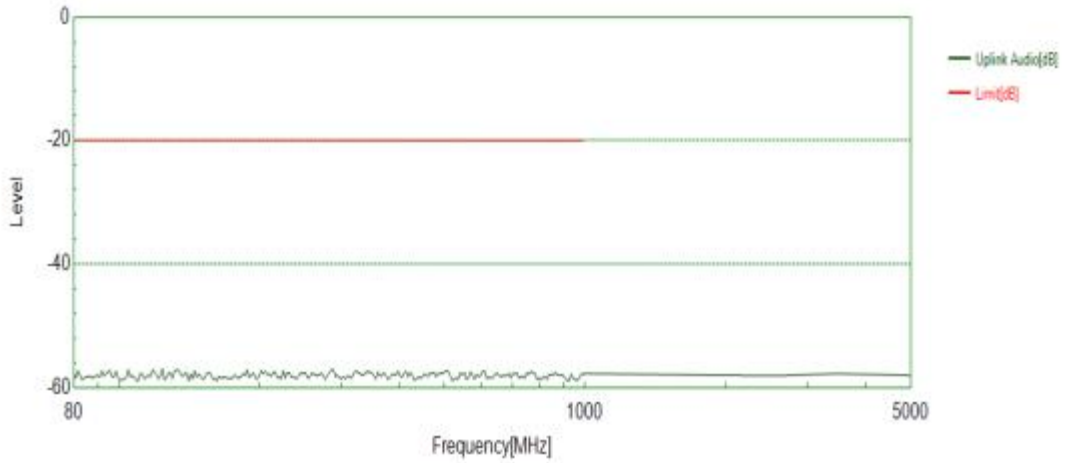
PASS.

Please refer to the following pages.

RF Field Strength Susceptibility Test Results

Ambient Condition:	Temp.:26℃	R.H.:53%	Air Pressure:101 kPa	
Power Supply:	DC 24V	Required Performance Criterion:A		
Test Specifications:	Modulation:1kHz,80%AM;Step Size:1%;Dwell Time:3s			
Tested mode:	On			
Frequency(MHz)	Level (V/m)	Antenna polarity	Side	Result(Performance Criterion)
80-1000MHz	3	Horizontal	Front	A
			Left	A
			Right	A
			Back	A
		Vertical	Front	A
			Left	A
			Right	A
			Back	A

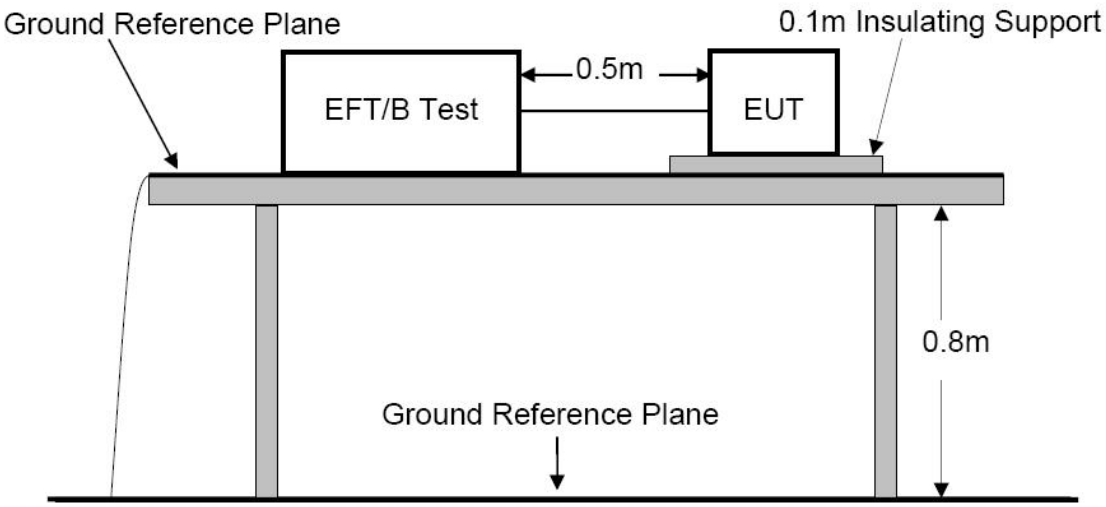
Note: The value of the reference level was reduce 20dB as the limit.



TEST RESUT	Pass
Note:	

9. ELECTRICAL FAST TRANSIENT/BURST TEST

9.1 Block Diagram of Test Setup



9.2 Test Standard and Severity Levels

9.2.1 Test Standard

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

9.2.2 Severity level

Open circuit output test voltage and repetition rate of the impulses				
Level	On power port, PE		On I/O (Input/Output) Signal data and control ports	
	Voltage peak KV	Repetition rate KHz	Voltage peak KV	Repetition rate KHz
1.	0.5	5 or 100	0.25	5 or 100
2.	1.0	5 or 100	0.5	5 or 100
3.	2.0	5 or 100	1.0	5 or 100
4.	4.0	5 or 100	2.0	5 or 100
X	Special	Special	Special	Special

Note 1 Use of 5 KHz repetition rates is traditional; however, 100 KHz is closer to reality. Product committees should determine which frequencies are relevant for specific products or product types.

Note 2 With some products, there may be no clear distinction, between power ports and I/O ports, in which case it is up to product committees to make this determination for test purposes.

Note 3 “X” is an open level. The level has to be specified in the dedicated equipment specification.

9.3 Test Procedure

The E.U.T. is put on the table which is 0.8 meter high above the ground. This reference ground plane shall project beyond the E.U.T. by at least 0.1m on all sides and the minimum distance between E.U.T. and all other conductive structure, except the ground plane beneath the E.U.T., shall be more than 0.5m.

9.3.1 For input and output AC power ports**:**

The E.U.T. 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 2 minutes.

9.3.2 For signal lines ports**:**

It's unnecessary to test.

9.3.3 For DC ports**:**

It's unnecessary to test.

9.4 Test Result

PASS.

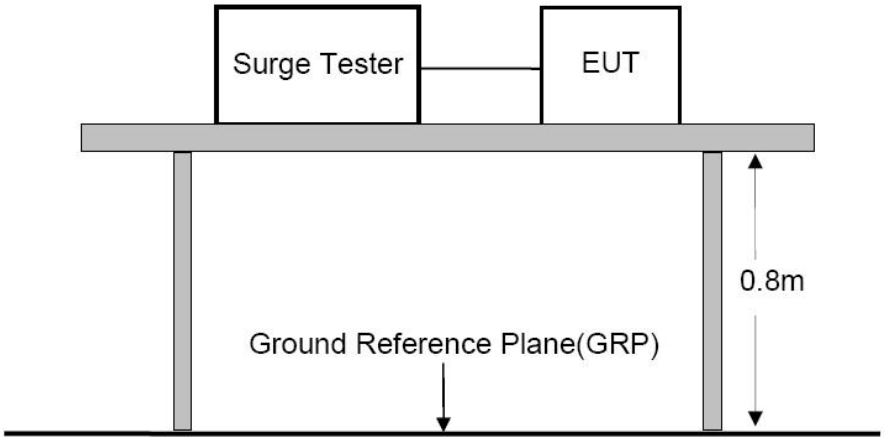
Please refer to the following page.

Electrical Fast Transient/Burst Test Results

Ambient Condition:	Temp.: 26 ℃	R.H.: 53 %	Air Pressure: 101 kPa
Power Supply:	DC 24V	Required Performance Criterion: B	
Test Specifications:	Repetition Frequency: 5kHz; Duration: 15ms; Period: 300ms		
Test mode:	On		
Line : ☐ AC Mains ☒ Signal line ☒ DC line Coupling : ☐ Direct ☒ Capacitive			
Line	**Test Voltage**	**Result** (Performance Criterion)	
L			
N			
PE			
L、N			
L、PE			
N、PE			
L、N、PE			
Signal line	±0.5KV	A	
DC line	±0.5KV	A	
Note :			
Test Equipment : Burst Tester(EM TEST,UCS500N) Test Engineer:Chilam			

10. SURGE IMMUNITY TEST

10.1 Block Diagram of Test Setup



10.2 Test Standard and Severity Levels

10.2.1 Test Standard

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

10.2.2 Severity level

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

10.3 Test Procedure

1. Set up the E.U.T. and test generator as shown on Section 10.1.
2. For line to line coupling mode, provide a 1.0KV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to E.U.T. selected points.
3. At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
4. Different phase angles are done individually.
5. Record the E.U.T. operating situation during compliance test and decide the E.U.T. immunity criterion for above each test.

10.4 Test Result

PASS.

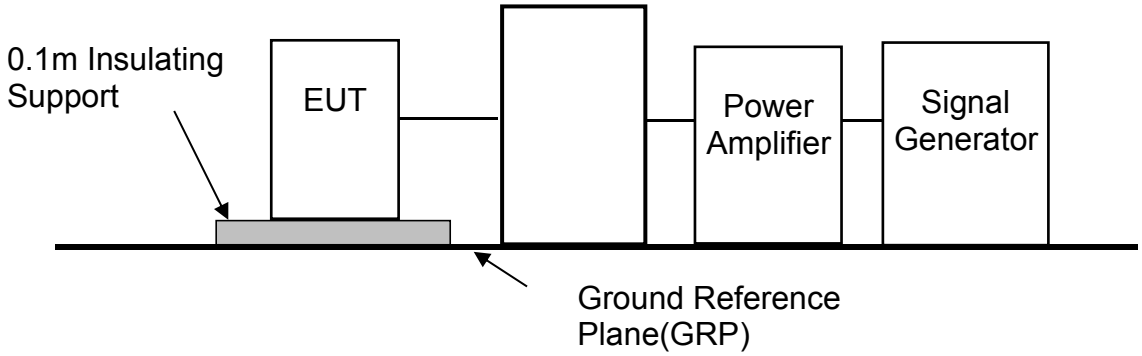
Please refer to the following page.

Surge Immunity Test Results

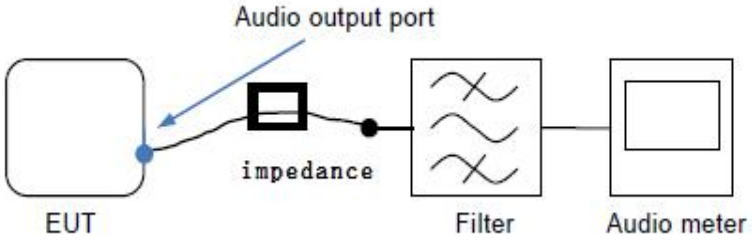
Ambient Condition:	Temp.: 26 ℃	R.H.: 53 %	Air Pressure: 101 kPa
Power Supply:	DC 24V	Required Performance Criterion: B	
Test Specifications:	Voltage surge 1.2/50 us;Current surge 8/20 us		
Test mode:	On		
Line	**Phase Angle**	**Test Voltage**	**Result** (Performance Criterion)
L-N			
L-PE			
N-PE			
Serial port line	---	+/-1KV	A
DC line	---	+/-1KV	A
Note :			
Test Equipment : Burst Tester(EM TEST,UCS500N)		Test Engineer:Chilam	

11. INJECTED CURRENTS SUSCEPTIBILITY TEST

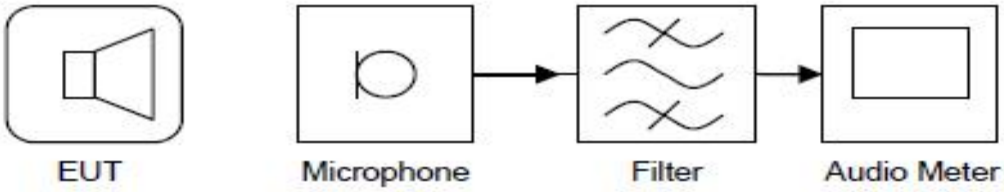
11.1 Block Diagram of Test Setup



For Electrical measurements setup:



For Acoustic measurements setup:



11.2 Test Standard and Severity Levels

11.2.1 Test Standard

EN 55035

(EN 61000-4-6: 2014+AC:2015, Severity Level2:3V(rms),0.15MHz~80MHz)

11.2.2 Severity level

Level	Field Strength V
0.15-10MHz	3
10-30MHz	3 to 1 *
30-80MHz	1

Note*: Where the amplitude of a test level varies over a given frequency range, it changes linearly with respect to the logarithm of the frequency.

11.3 Test Procedure

1. Set up the E.U.T.,CDN and test generators as shown on Section 11.1.
2. Let the E.U.T.work in test mode and measure it.
3. The E.U.T.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 E.U.T..Cables between CDN and E.U.T.are as short as possible,and their height above the ground reference plane shall be between 30 and 50 mm(where possible).
4. The disturbance signal described below is injected to E.U.T.through CDN.
5. The E.U.T.operates within its operational mode(s)under intended climatic conditions after power on.
6. The frequency range is swept from 150 KHz to 10 MHz using 3V signal level, from 10 MHz to 30 MHz using 3V to 1V changes linearly, from 30 MHz to 80 MHz using 1V signal level, and with the disturbance signal 80% amplitude modulated with a 1KHz sine wave.
7. The rate of sweep shall not exceed $1.5*10^{-3}$decades/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.
8. Recording the E.U.T.operating situation during compliance testing and decide the E.U.T.immunity criterion.

11.4 Test Result

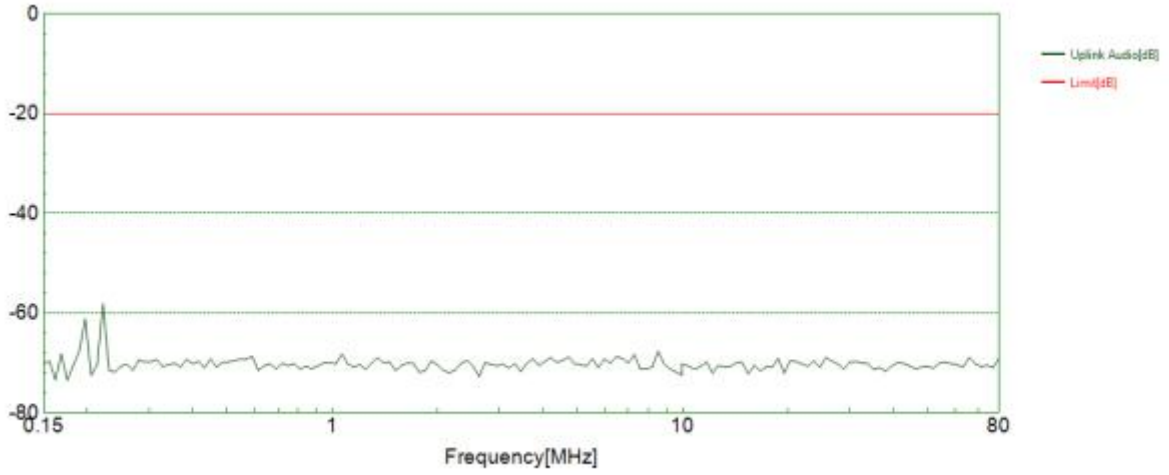
PASS.

Please refer to the following page.

Injected Currents Susceptibility Test Results

Ambient Condition:	Temp.:26℃	R.H.:53%	Air Pressure:101 kPa
Power Supply:	DC 24V	Required Performance Criterion:A	
Test Specifications:	Modulation:1KHz,80%AM,Step Size:1%,Dwell Time:3s		
Test mode:	On		
Test Port	Frequency(MHz)	Level(V)	Result (Performance Criterion)
AC Mains	0.15~80	3	A
Serial port Mains	0.15~80	3	A
USB Mains	0.15~80	3	A

Note: The value of the reference level was reduce 20dB as the limit.

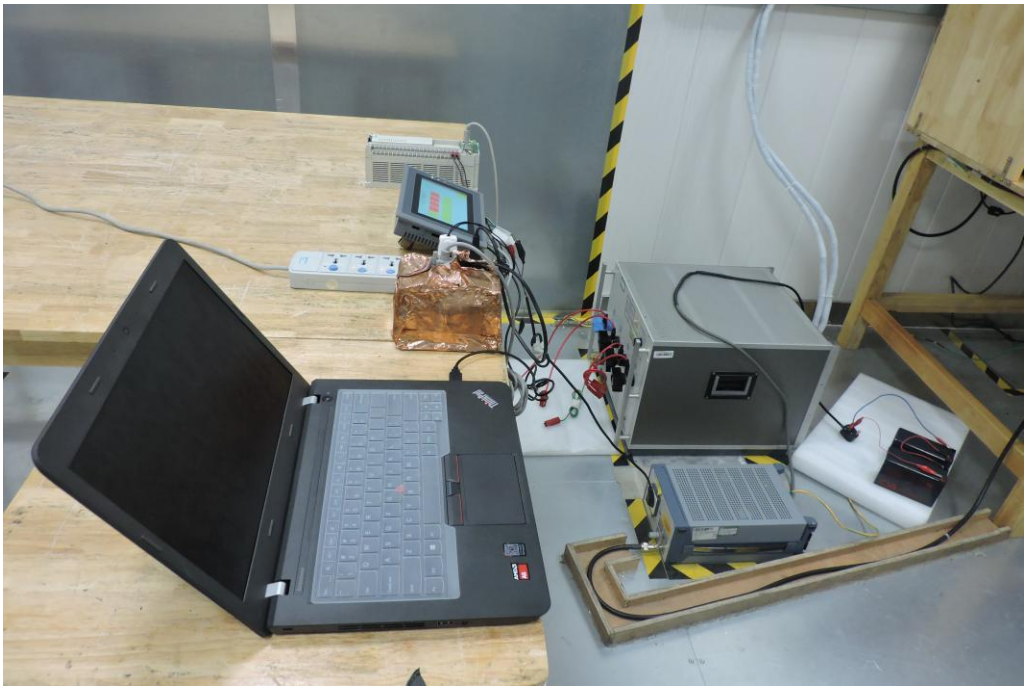


TEST RESUT	Pass

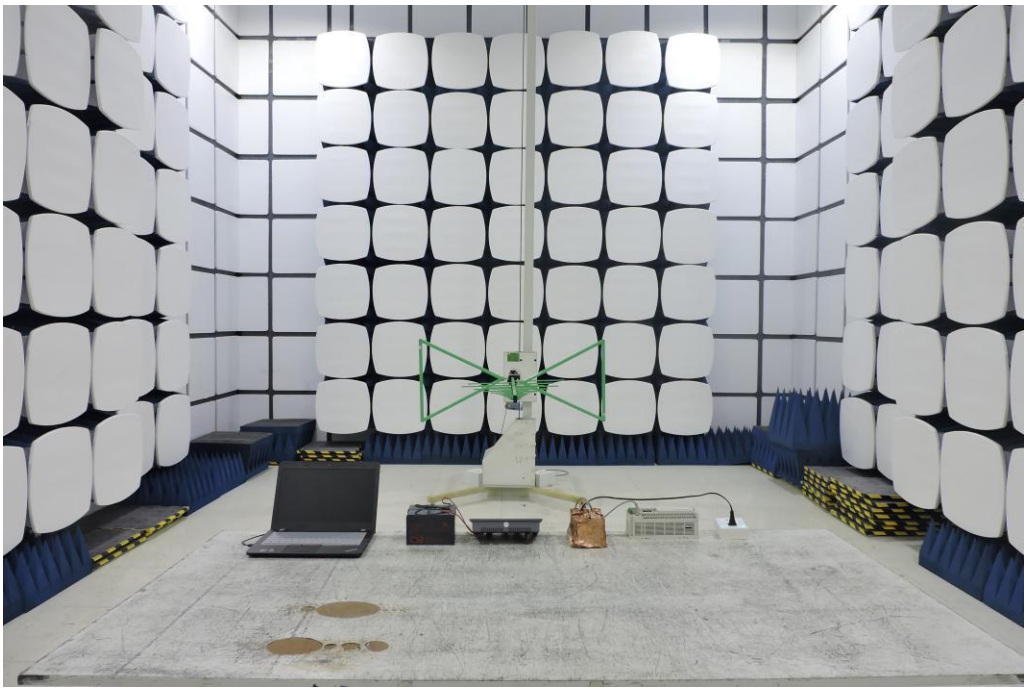
Note:

12. PHOTOGRAPHS

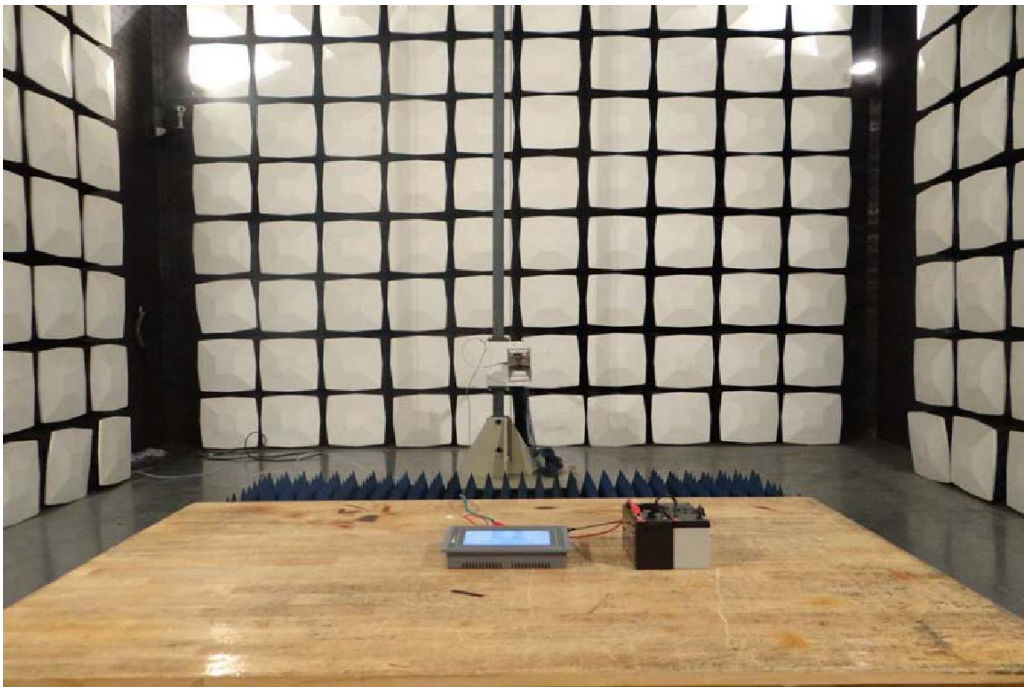
12.1 Photo of Power Line Conducted Emission Measurement



12.2 Photo of Radiated Emission Measurement(Below 1G)

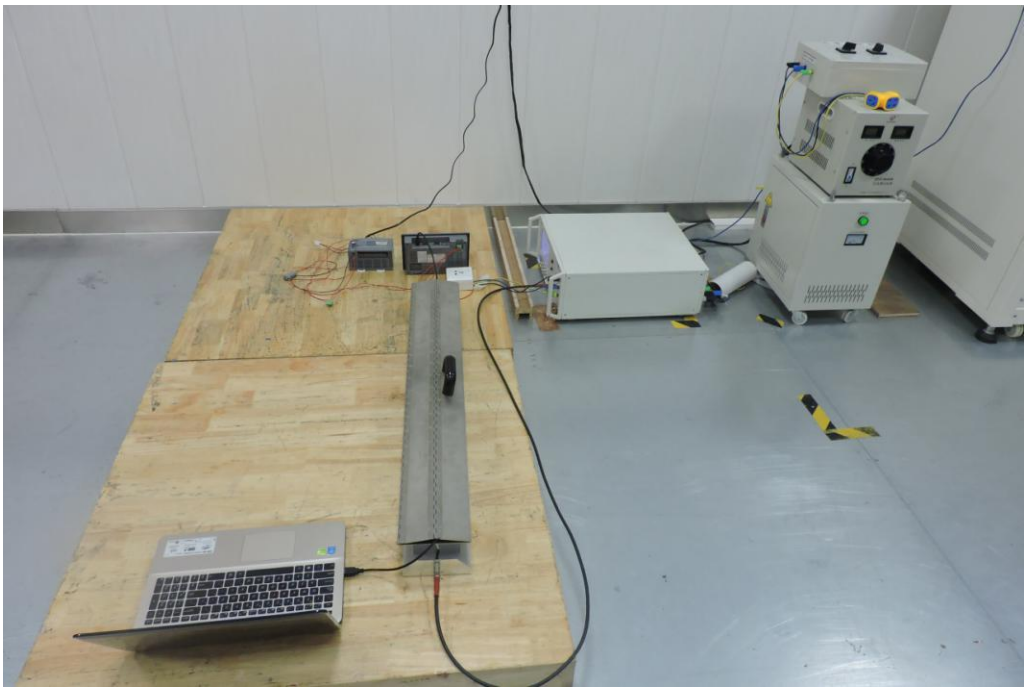


12.3 Photo of Radiation Emission Measurement(Above 1G)

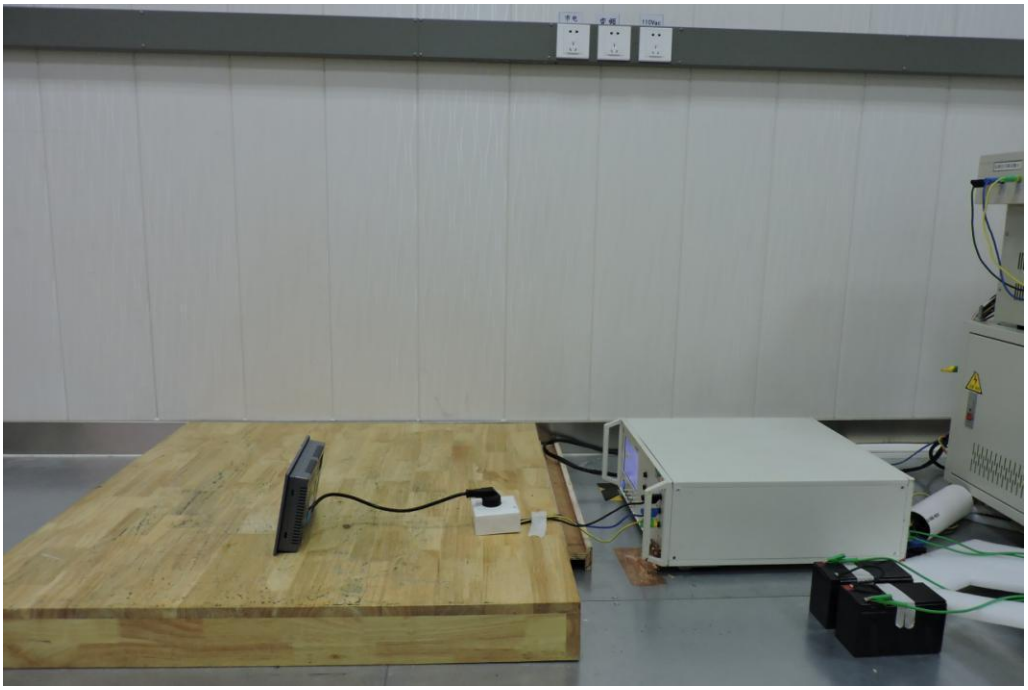


12.4 Photo of Electrostatic Discharge Immunity Measurement

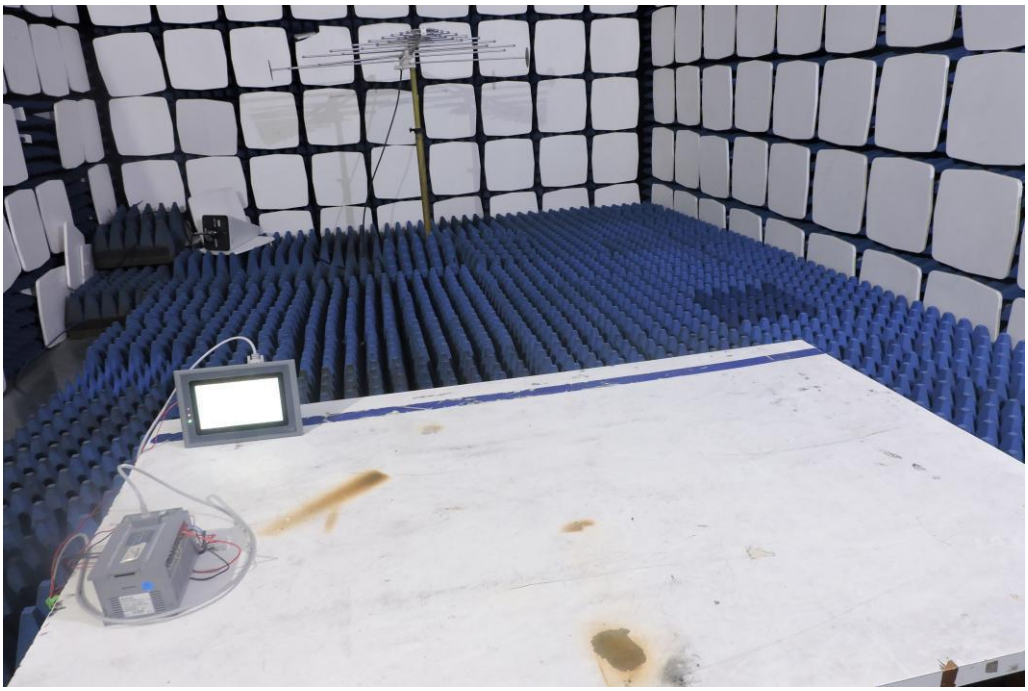
12.5 Photo of Electrical Fast Transient/Burst



12.6 Photo of surge immunity



12.7 Photo of RF Field Strength Susceptibility Test



APPENDIX I
(Photos of E.U.T.)

Figure 1
General Appearance of the E.U.T.

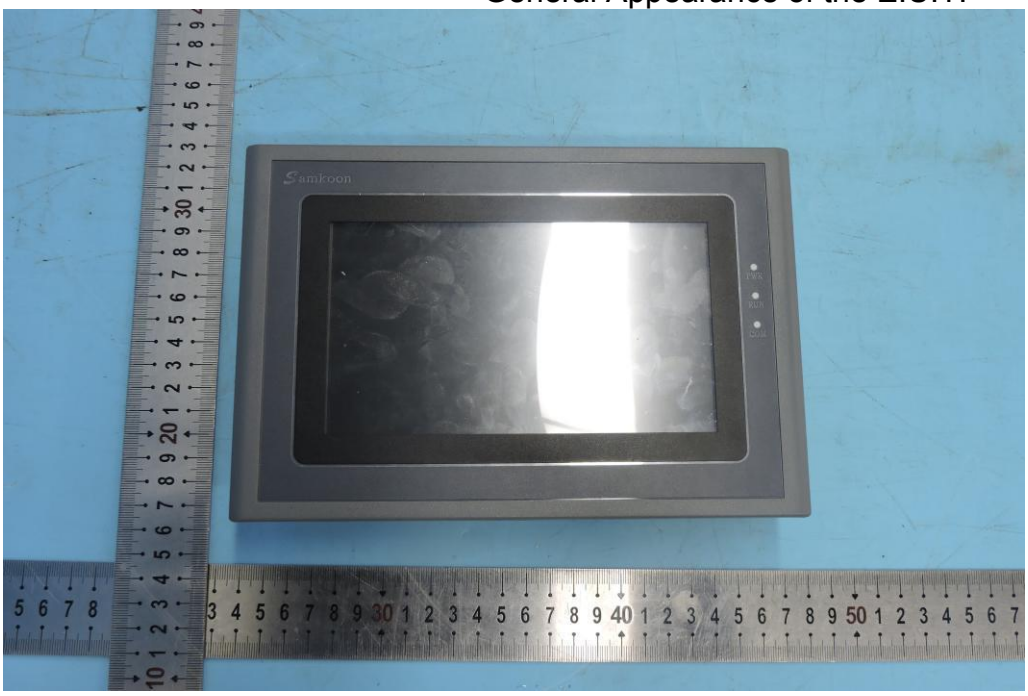


Figure 2
General Appearance of the E.U.T.

Figure 3
General Appearance of the E.U.T.

Figure 4
General Internal of the E.U.T.

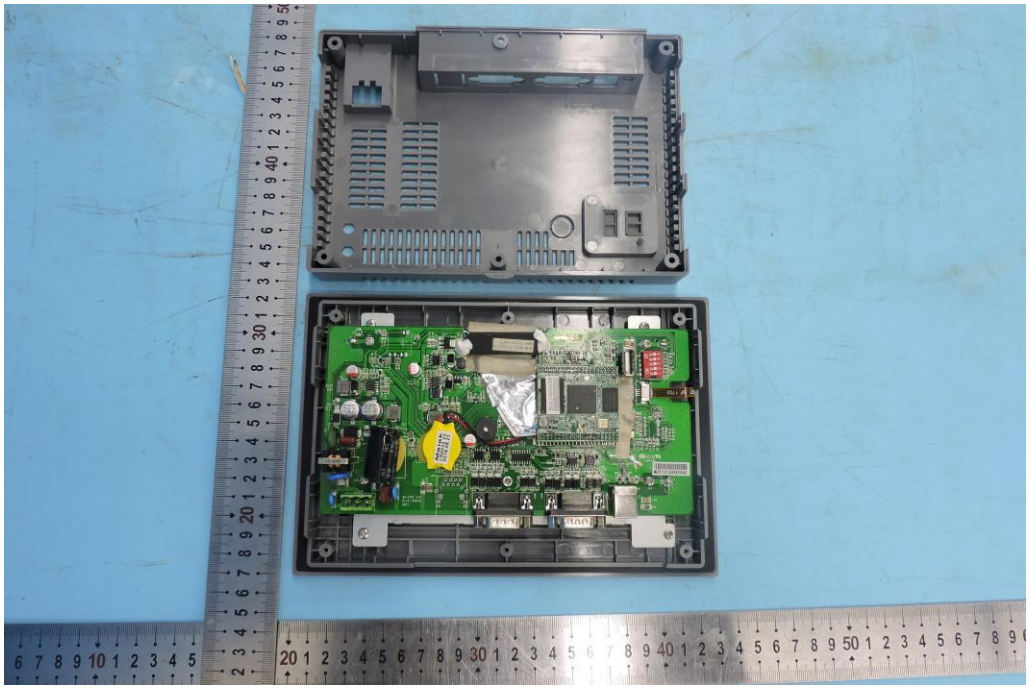


Figure 5
General Appearance of the PCB

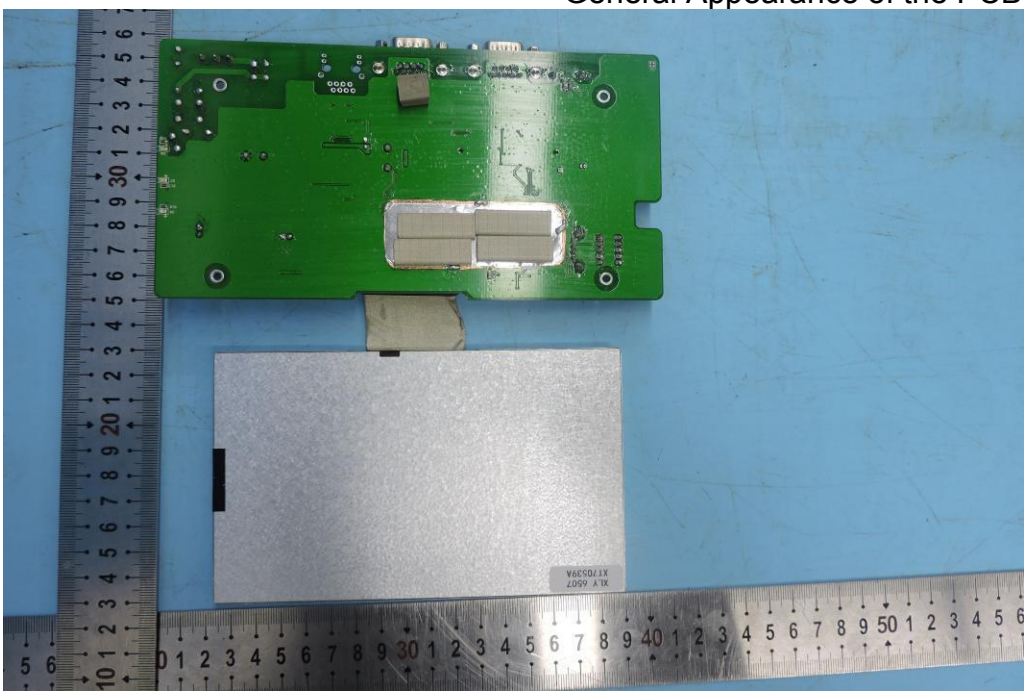


Figure 6
General Appearance of the PCB

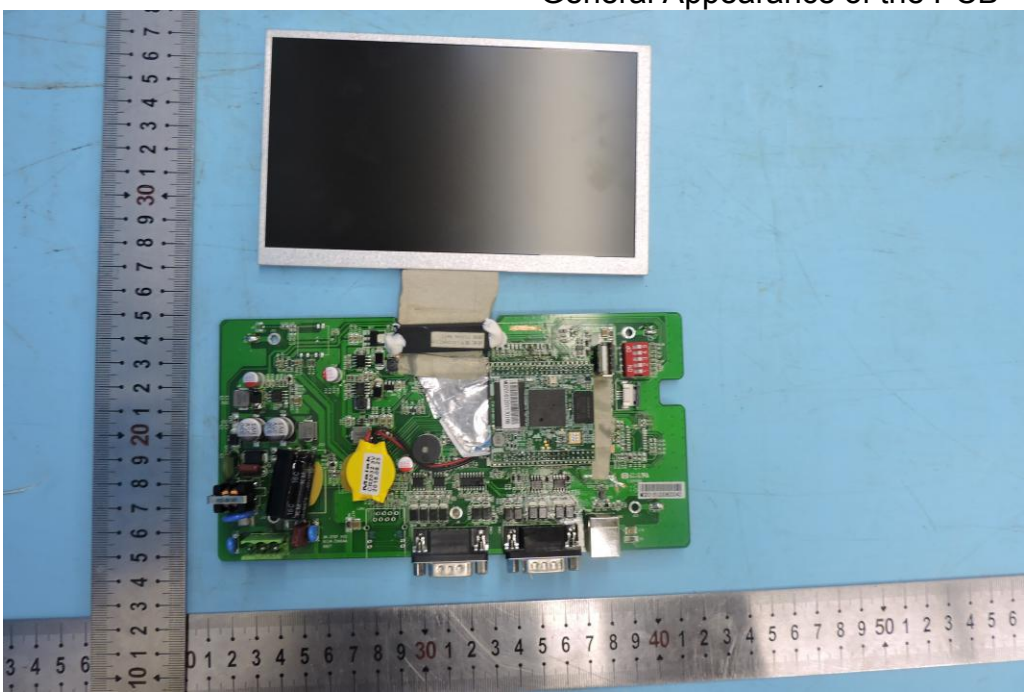


Figure 7
General Appearance of the PCB

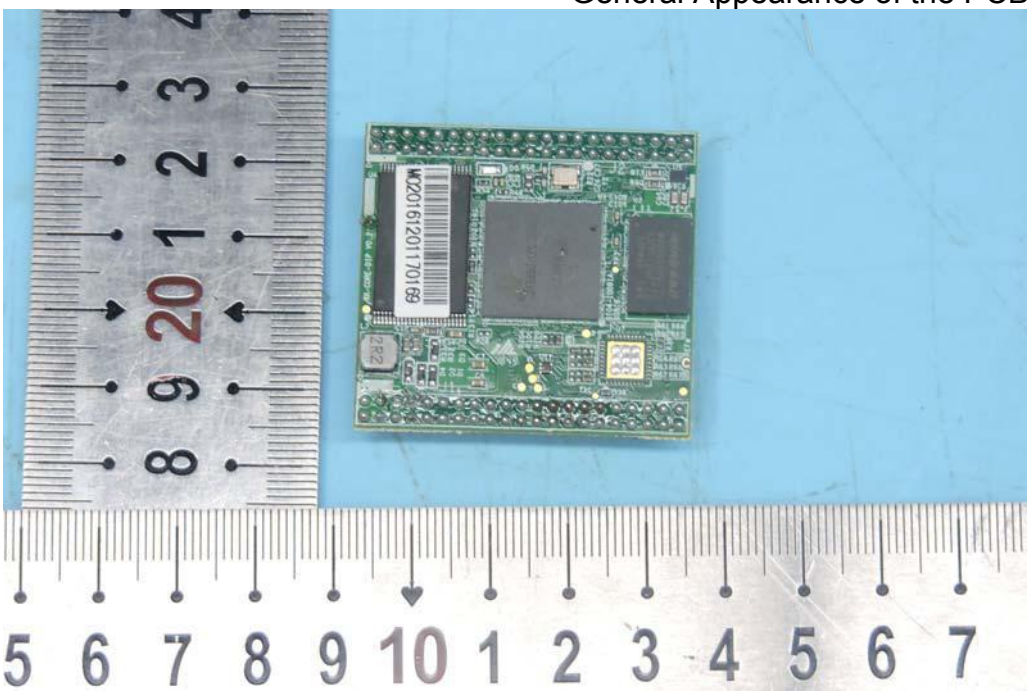
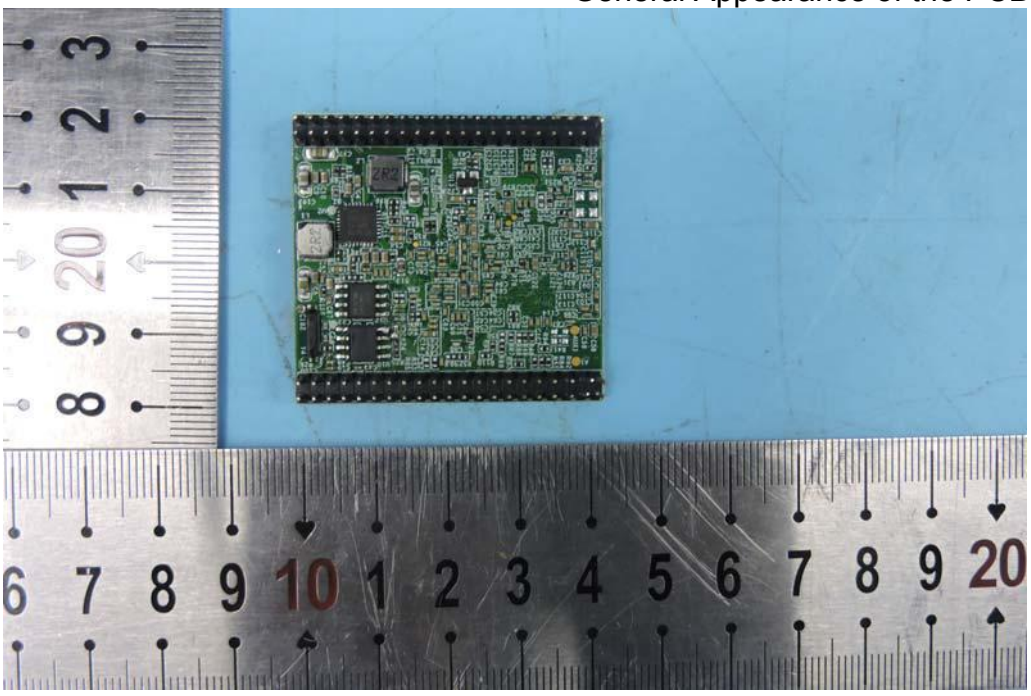


Figure 8
General Appearance of the PCB



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