



APPLICATION FOR ELECTROMAGNETIC COMPATIBILITY DIRECTIVE

On Behalf of

Shenzhen UniMAT Automation Technology Co., LTD

HMI

Model No.: UH404-2EU01-0AA0, UH404-2AU01-0AA0

Prepared for : Shenzhen UniMAT Automation Technology Co., LTD
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TEST REPORT DECLARATION

Applicant : Shenzhen UniMAT Automation Technology Co., LTD
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 ShenZhen City, GuangDong Province, China
 Manufacturer : Shenzhen UniMAT Automation Technology Co., LTD
 Address : 1201guoxin invest Plaza, Gaoxin 7th Road South, NanShan District,
 ShenZhen City, GuangDong Province, China
 EUT Description : HMI
 (A) Model No. : UH404-2EU01-0AA0, UH404-2AU01-0AA0
 (B) Trademark : **UniMAT**

Measurement Standard Used:

EN 61000-6-4:2007 + A1:2011

EN 61000-6-2:2005

The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The test results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed full responsibility for the accuracy and completeness of test. Also, this report shows that the EUT is technically compliant with the EN 61000-6-4, EN 61000-6-2 requirements.

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

Tested by (name + signature).....: John Han
 Project Engineer

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

Date of issue.....: December 15, 2020



Revision History

Revision	Issue Date	Revisions	Revised By
V0	December 15, 2020	Initial released Issue	John Han

1. Summary Of Standards And Results

1.1. Description of Standards and Results

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

EMISSION				
Description of Test Item	Standard	Limits	Results	
Conducted disturbance at mains terminals	EN 61000-6-4:2007 + A1:2011	Section 11 Table 2	N/A	
Conducted disturbance at telecommunication port	EN 61000-6-4:2007 + A1:2011	Section 11 Table 3	N/A	
Radiated disturbance	EN 61000-6-4:2007 + A1:2011	Section 11 Table 1	P	
Harmonic current emissions	EN IEC 61000-3-2:2019	Section 7	N/A	
Voltage fluctuations & flicker	EN 61000-3-3:2013/A1:2019	Section 5	N/A	
IMMUNITY (EN 61000-6-2:2005)				
Description of Test Item	Standard	Performan ce Criteria	Observation Criteria	Results
Electrostatic discharge (ESD)	IEC 61000-4-2:2008	B	A	P
Radio-frequency, Continuous radiated disturbance	IEC 61000-4-3:2006+ A1:2007 + A2:2010	A	A	N/A
Electrical fast transient (EFT)	IEC 61000-4-4:2012	B	A	N/A
Surge (Input a.c. power port)	IEC 61000-4-5:2014+A1: 2017	B	A	N/A
Surge(Telecommunication port)		N/A	N/A	N/A
Radio-frequency, Continuous conducted disturbance	IEC 61000-4-6:2013	A	N/A	P
Power frequency magnetic field	IEC 61000-4-8:2009	A	N/A	N/A
Voltage dips,100% reduction	IEC 61000-4-11:2020	B	B	N/A
Voltage dips, 40% reduction		C	C	N/A
Voltage dips, 30% reduction		C	C	N/A
Voltage interruptions		C	C	N/A
Note: 1. P is an abbreviation for Pass. 2. F is an abbreviation for Fail. 3. N/A is an abbreviation for Not Applicable.				

2. General Information

2.1. Description of Device (EUT)

Description : HMI

Model Number : UH404-2EU01-0AA0, UH404-2AU01-0AA0

Diff : Except for the differences in network ports and appearance, the circuits are identical. All tests are carried out using UH404-2EU01-0AA0 model.

Highest frequency : More than 108MHz

Test Voltage : DC 24V From DC Power

Trademark : ***UniMAT***

EUT information : N/A

Software version : N/A

Hardware version : N/A

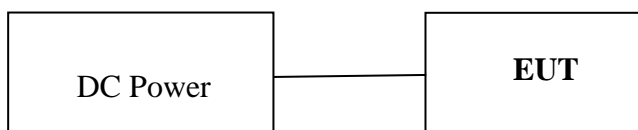
Accessories1 : N/A

2.2. Tested Supporting System Details

No.	Description	Manufacturer	Model	Serial Number
1.	DC Power	/	/	/

2.3. Block Diagram of connection between EUT and simulators

Playing 1KHz(U disk)



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

EUT: HMI

2.4.Test Mode Description

For EMI Tests		
No.	Test Mode	Test Voltage
※1.	Playing 1KHz(U disk)	DC 24V From DC Power
2.	Playing 1KHz(VGA)	DC 24V From DC Power
Note: ※1 is worst case mode tests, so this report only reflected the worst mode in this part.		

2.5. Test Facility

Shenzhen Alpha Product Testing Co., Ltd.

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

2.6. Measurement Uncertainty

Item	MU	Remark
Uncertainty for Conducted Emission Test	2.74dB	
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.77dB	Polarize: V
	3.80dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	4.16dB	Polarize: H
	4.13dB	Polarize: V

2.7.Test Equipment List

For Conducted Disturbance At Mains Terminals Test Equipment:						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI	101165	2020.09.02	1 Year
2.	L.I.S.N.#1	Schwarz beck	NSLK8126	8126466	2020.09.02	1 Year
3.	L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	101043	2020.09.02	1 Year
4.	Pulse Limiter	Schwarz beck	9516F	9618	2020.09.02	1 Year

For Frequency Range 30MHz~1GHz Radiated Emission Test Equipment:						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Test Receiver	Rohde&Schwarz	ESR	1316.3003K03-102082-Wa	2020.09.02	1 Year
3	Bilog Antenna	Schwarz beck	VULB 9168	9168-627	2020.04.12	2 Year

For Frequency Range above 1GHz Radiated Emission Test Equipment:						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Spectrum analyzer	Rohde&Schwarz	FSV40-N	102137	2020.09.02	1 Year
2	Horn Antenna	Schwarz beck	BBHA 9120 D	2106	2019.09.07	2 Year
3	Amplifier	Agilent	8449B	3008A02664	2020.09.02	1 Year

For Harmonic Current Test & Voltage Fluctuations & Flicker Test Equipment:						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Harmonics Flicker Analyser	Voltech	PM6000	200006700495	2020.09.02	1 Year

For Electrostatic Discharge Test Equipment:						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ESD Tester	HAEFELY	PESD1610	H310546	2020.09.23	1 Year

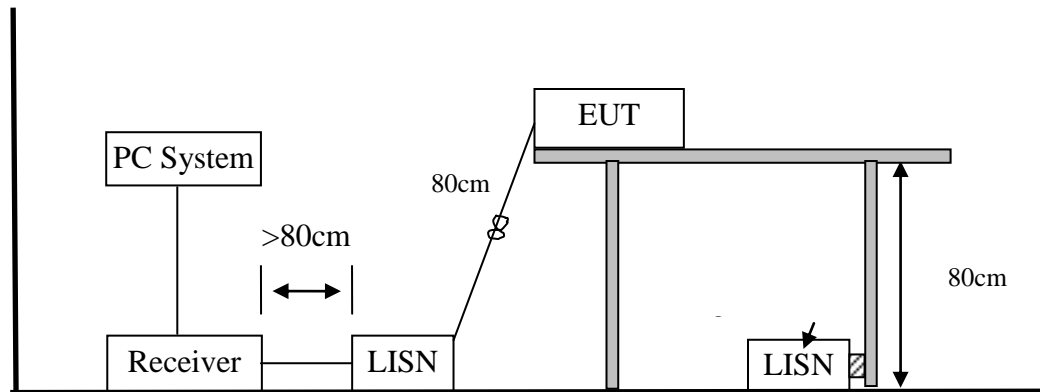
For RF Field Strength Susceptibility Test Equipment:						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	vector Signal Generator	Agilent	E4438C	US44271917	2020.09.02	1 Year
2.	Power meter	Agilent	E4419B	GB40202122	2020.09.02	1 Year
3.	Power Sensor	Agilent	E9300A	MY41496625s	2020.09.02	1 Year
4.	RF power Amplifier	OPHIR	5225R	1045	N/A	NCR
5.	RF power Amplifier	OPHIR	5273R	1018	N/A	NCR
6	RF power Amplifier	Micotop	MPA-3000-6000-100	MPA1811348	N/A	NCR
7.	Antenna	SCHWARZBECK	STLP9128E-special	STLP9128Es#139	N/A	NCR
8.	Antenna	SCHWARZBECK	STLP 9149	STLP 9149#456	N/A	NCR

For Electrical Fast Transient/Burst Immunity, Surge, Power Frequency Magnetic Field Immunity, Voltage dips and interruptions test Equipment:						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Multifunctional Compact Immunity Test system	3ctest	CCS 600	ES0801655	2020.09.02	1 Year
2.	Surge & EFT Coupling Decoupling Network	3ctest	SEPN 3832T	ES0951601	2020.09.02	1 Year
3.	Voltage variation and PF magnetic field regulating device	3ctest	VMT2216S	ES0441601	2020.09.02	1 Year
4.	Capacitive Coupling Clamp	3ctest	CCC 100	EC0441660	2020.09.02	1 Year

For Injected currents susceptibility test Equipment:						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Conducted Immunity test System	SKET	CITS_150K 230M	SK2019101 001_CITS	2020.09.02	1 Year
2.	Fixed Coaxial Attenuator (6dB Attenuation)	CD	ATT-0675	120540086	2020.09.02	1 Year
3.	coupling-decoupling network (CDN)	CD	CDN M2/M3	2302	2020.09.02	1 Year
4.	Electromagnetic Injection Clamp (EMC-Clamp)	CD	EM-Clamp	0513A0312 01	2020.09.02	1 Year

3. Conducted Disturbance At Mains Terminals Test

3.1. Block Diagram of Test Setup



3.2. Power Line Conducted Emission Test Limits

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μ V)	Average Level dB(μ V)
150kHz ~ 500kHz	79	66
500kHz ~ 30MHz	73	60

- Notes:
1. Emission level=Read level + LISN factor-Preamplifier factor + Cable loss
 2. * Decreasing linearly with logarithm of frequency.
 3. The lower limit shall apply at the transition frequencies.

3.3.Configuration of EUT on Test

The following equipment are installed on conducted disturbance at mains terminals to meet the EN 61000-6-4 requirement and operating regulations in a manner that tends to maximize its emission characteristics in a normal application.

3.4.Operating Condition of EUT

- (1) Setup the EUT as shown as Section 3.2.
- (2) Turn on the power of all equipment.
- (3) Let the EUT work in test mode and 15 minutes before taking the test.

3.5.Test Procedure

- (1) The EUT was placed on a non-metallic table, 80cm above the ground plane. The EUT Power connected to the power mains through a line impedance stabilization network (L.I.S.N. 1#). This provided a 50-ohm coupling impedance for the EUT (Please refer to the block diagram of the test setup and photographs). The other peripheral devices power cord connected to the power mains through a line impedance stabilization network (L.I.S.N.#2). Both sides of power line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to EN 61000-6-4 on Conducted Disturbance at Mains Terminals test.
- (2) The frequency range from 150kHz to 30MHz is checked, the bandwidth of test receiver (R&S TEST RECEIVER ESCI) is set at 9kHz.
- (3) The test results are reported on Section 3.7.

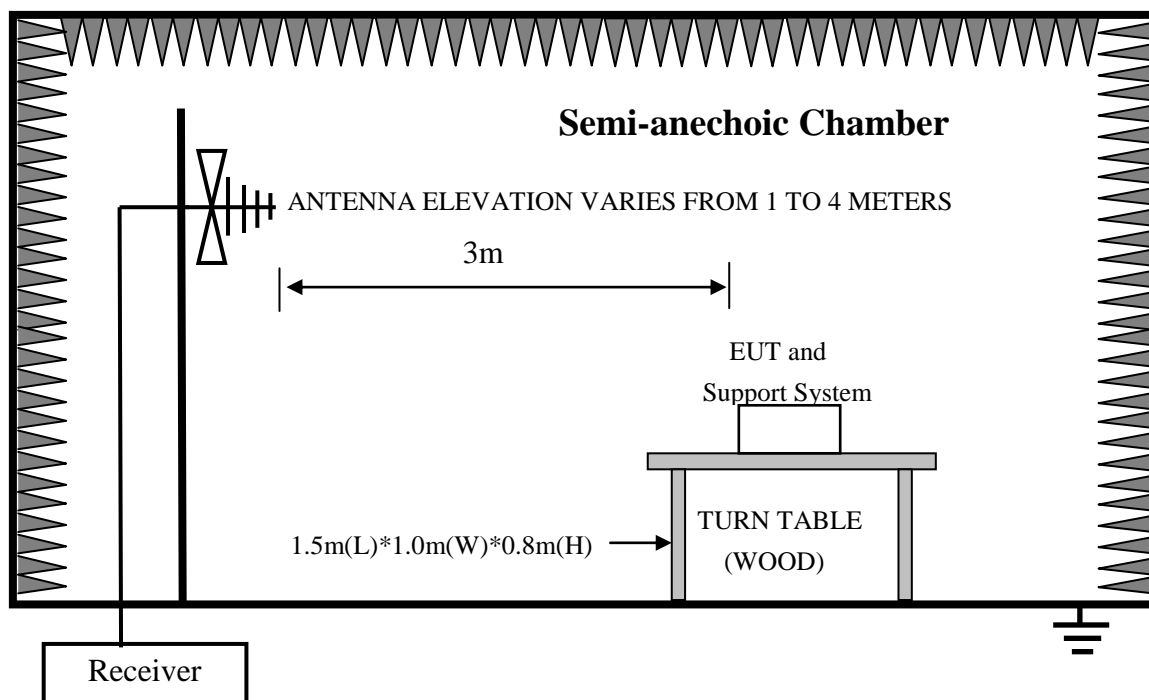
3.6.Conducted Disturbance at Mains Terminals Test Results

EUT	: HMI	Test Date	: N/A
M/N	: UH404-2EU01-0AA0	Temperature	: N/A
Test Engineer	: N/A	Humidity	: N/A
Test Voltage	: N/A	Pressure	: N/A
Test Mode	: N/A		
Test Results	: N/A		
Note Not applicable for equipment operated with PC, Battery, or Power Supply.			

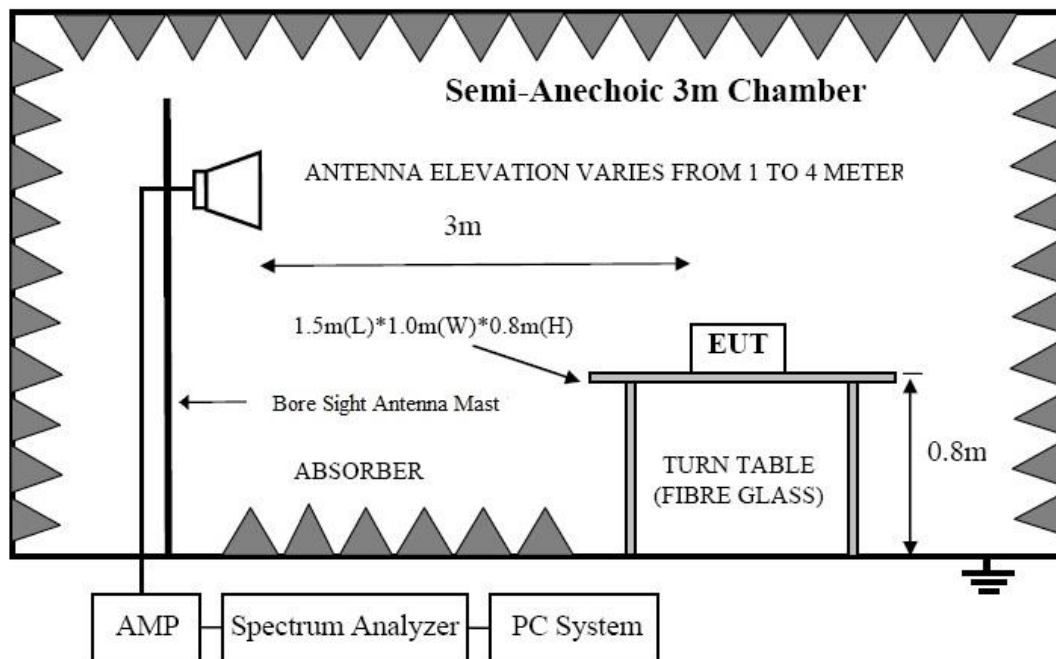
4. Radiated Disturbance Test

4.1. Block Diagram of Test Setup

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



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



4.2. Test Standard

EN 61000-6-4:2007 + A1:2011, Class B

4.3. Test Limit

Frequency MHz	Distance (Meters)	Field Strengths Limits dB(μ V)/m
30 ~ 230	3	50
230 ~ 1000	3	57
1000 ~ 3000	3	76(Peak) 56(Average)
3000 ~ 6000	3	80(Peak) 60(Average)

- Notes:
1. Emission level = Read level + Antenna Factor - Preamp Factor + Cable Loss
 2. The smaller limit shall apply at the cross point between two frequency bands.
 3. Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

4.4. Configuration of EUT on Test

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

4.5. Operating Condition of EUT

- (1) Setup the EUT as shown as Section 4.2.
- (2) Turn on the power of all equipment.
- (3) Let the EUT work in test mode and 15 minutes before taking the test.

4.6. Test Procedure

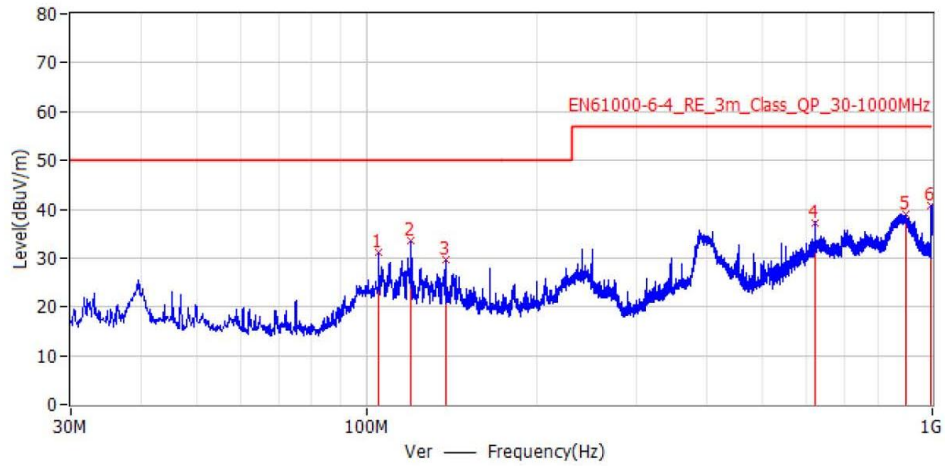
- (1) The EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber. An antenna was located 3m from the EUT on an adjustable mast. A pre-scan was first performed in order to find prominent radiated emissions. For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all the interface cables were changed according to EN 61000-6-4 on Radiated Disturbance test.
- (2) The frequency range from 30MHz to 1000MHz is checked, the bandwidth of test receiver (R&S TEST RECEIVER ESR) is set at 120kHz.
- (3) The resolution bandwidth of the R&S Spectrum Analyzer FSV40-N was set at 1MHz. (For above 1GHz)
- (4) The frequency range from 30MHz to 1000MHz was pre-scanned with a peak detector and all final readings of measurement from Test Receiver are Quasi-Peak values, all measurement distance is 3m in 3m semi anechoic chamber.

- (5) The frequency range from 1GHz to 6GHz was checked with peak and average detector, measurement distance is 3m in 3m chamber.
- (6) The test results are reported on Section 4.8.

4.7.Radiated Disturbance Test Results

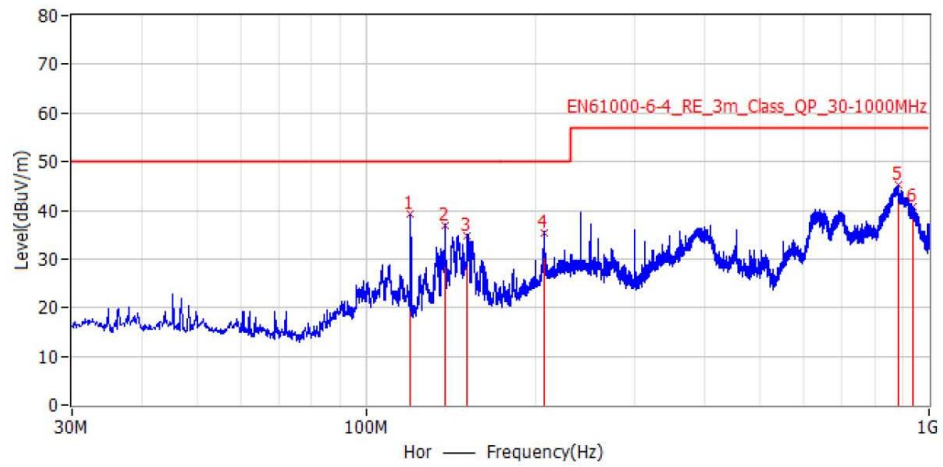
For below 1G radiated disturbance test result:	
EUT : HMI	Test Date : 2021.01.14
M/N : UH404-2EU01-0AA0	Temperature : 24℃
Test Engineer : John Han	Humidity : 56%
Test Voltage : DC 24V From DC Power	Pressure : 101.6Kpa
Test Mode : Playing 1KHz(U disk)	
Test Results : PASS	
Note: 1. The test results are listed in next pages.	

Antenna polarity: Vertical



No.	Frequency	Level dBuV/m	Factor dB/m	Limit dBuV/m	Margin dB	Detector	Polar	Height cm	Angle deg
1*	104.933 MHz	31.2	13.9	50.0	-18.8	PK	Ver	100.0	30.0
2*	119.968 MHz	33.7	15.3	50.0	-16.3	PK	Ver	100.0	354.0
3*	137.791 MHz	29.7	16.3	50.0	-20.3	PK	Ver	100.0	249.0
4*	621.215 MHz	37.3	23.0	57.0	-19.7	PK	Ver	100.0	30.0
5*	899.362 MHz	39.0	26.3	57.0	-18.0	PK	Ver	100.0	0.0
6*	995.878 MHz	40.7	27.4	57.0	-16.3	PK	Ver	100.0	217.0

Antenna polarity: Horizontal

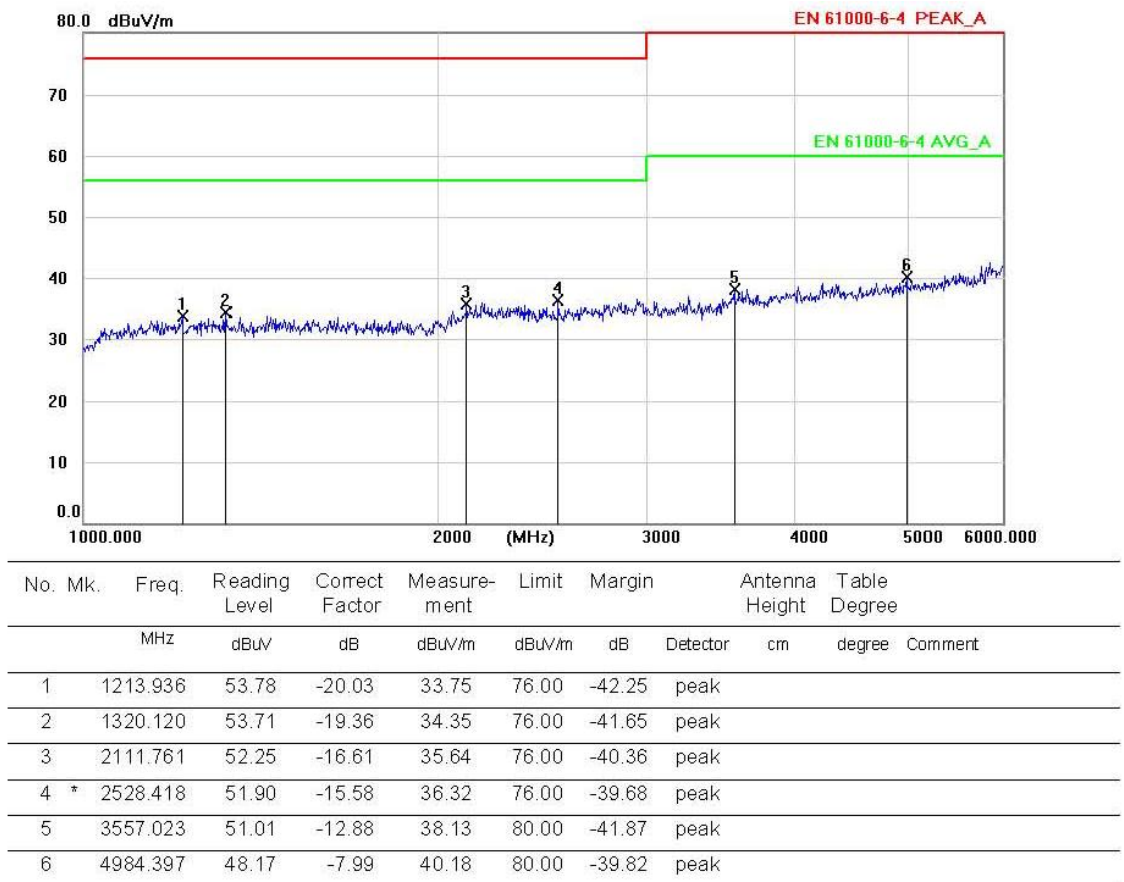


No.	Frequency	Level dBuV/m	Factor dB/m	Limit dBuV/m	Margin dB	Detector	Polar	Height cm	Angle deg
1*	119.968 MHz	39.2	15.3	50.0	-10.8	PK	Hor	199.0	184.0
2*	137.912 MHz	37.0	16.3	50.0	-13.0	PK	Hor	199.0	318.0
3*	151.371 MHz	34.9	17.1	50.0	-15.1	PK	Hor	199.0	318.0
4*	206.782 MHz	35.5	13.3	50.0	-14.5	PK	Hor	188.0	0.0
5*	882.994 MHz	45.2	26.2	57.0	-11.8	PK	Hor	100.0	300.0
6*	937.071 MHz	40.8	27.1	57.0	-16.2	PK	Hor	100.0	329.0

For above 1G radiated disturbance test result:

EUT	: HMI	Test Date	: 2021.01.14
M/N	: UH404-2EU01-0AA0	Temperature	: 24℃
Test Engineer	: John Han	Humidity	: 56%
Test Voltage	: DC 24V From DC Power	Pressure	: 101.6Kpa
Test Mode	: Playing 1KHz(U disk)		
Test Results	: PASS		
Note:	1. The test results are listed in next pages.		

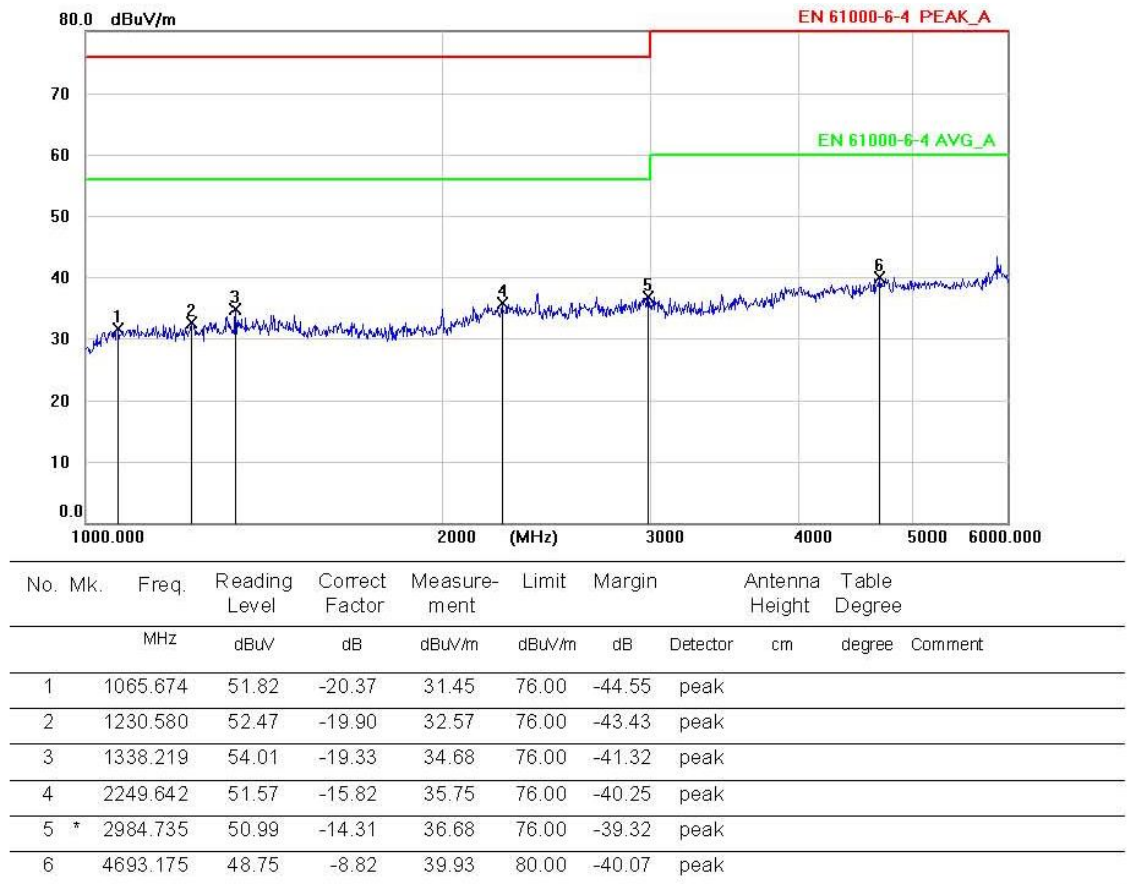
Antenna polarity: Vertical



Note:1. *:Maximum data; x:Over limit; !:over margin.

2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Antenna polarity: Horizontal

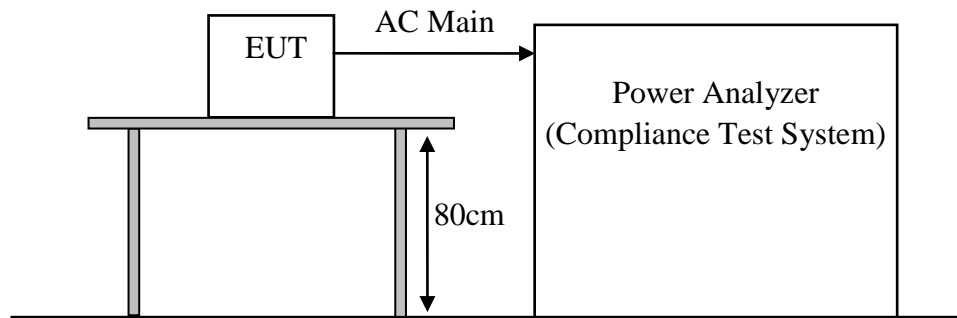


Note:1. *:Maximum data; x:Over limit; !:over margin.

2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

5. Harmonic Current Test

5.1. Block Diagram of Test Setup



5.2. Test Standard

EN IEC 61000-3-2:2019

5.3. Harmonic Current Test Limits

For Class A equipment:

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

for Class B equipment:

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

5.4.Configuration of EUT on Test

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

5.5.Operating Condition of EUT

- (1) Setup the EUT as shown as Section 5.2.
- (2) Turn on the power of all equipment.
- (3) Let the EUT work in test mode and 15 minutes before taking the test.

5.6.Test Procedure

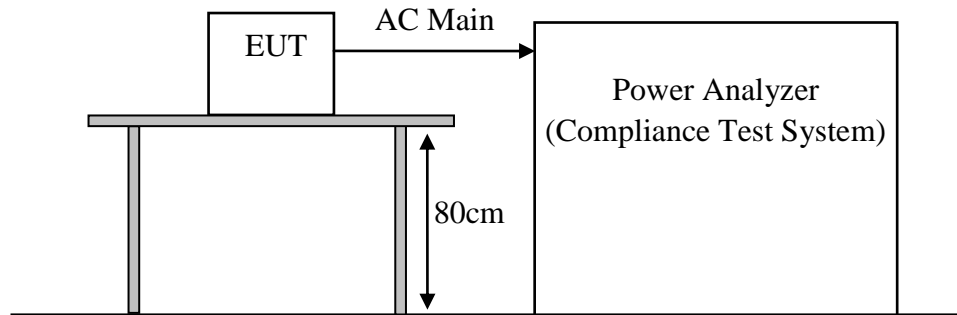
- (1) The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn. The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the necessary for the EUT to be exercised.
- (2) The test results are reported on Section 5.8.

5.7.Harmonic Current Test Results

EUT : HMI	Test Date : N/A
M/N : UH404-2EU01-0AA0	Temperature : N/A
Test Engineer : N/A	Humidity : N/A
Test Voltage : N/A	Pressure : N/A
Test Mode : N/A	
Test Results : N/A	
Note: Not applicable for equipment operated with Battery DC supply.	

6. Voltage Fluctuations & Flicker Test

6.1. Block Diagram of Test Setup



6.2. Voltage Fluctuation and Flicker Test Limits

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

6.3.Test Standard

EN 61000-3-3:2013/A1:2019

6.4.Configuration of EUT on Test

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

6.5.Operating Condition of EUT

- (1) Setup the EUT as shown as Section 6.2.
- (2) Turn on the power of all equipment.
- (3) Let the EUT work in test mode and 15 minutes before taking the test.

6.6.Test Procedure

- (1) The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under normal conditions During the flick measurement; the measure time shall include that part of whole operation changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.
- (2) The test results are reported on Section 6.8.

6.7.Voltage Fluctuation and Flicker Test Results

EUT	: HMI	Test Date	: N/A
M/N	: UH404-2EU01-0AA0	Temperature	: N/A
Test Engineer	: N/A	Humidity	: N/A
Test Voltage	: N/A	Pressure	: N/A
Test Mode	: N/A		
Test Results	: N/A		
Note: Not applicable for equipment operated with Battery DC supply.			

7. Immunity Performance Criteria

Performance Level

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

Definition related to the performance level:

1. Based on the used product standard
2. Based on the declaration of the manufacturer, requestor or purchaser

Performance criterion A

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

Power frequency magnetic field test

For CRT monitors, the following also applies:

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

The jitter (in mm) shall not exceed the value $\frac{(\text{character height in mm} + 0,3) \times 2,5}{33,3}$ when the CRT

monitor is immersed in a continuous magnetic field of 1A/m (r.m.s.) at one of the power frequencies of 50Hz.

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

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

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

Performance criterion B

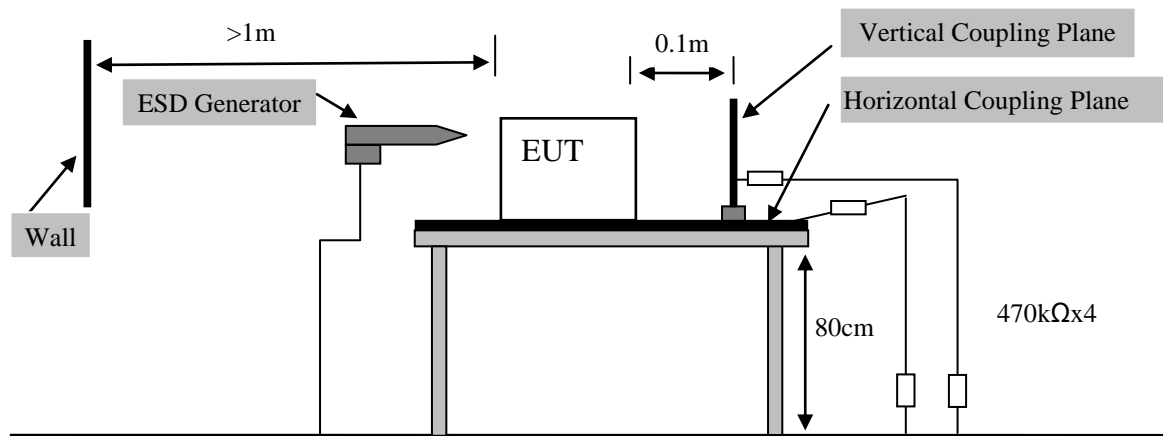
Screen disturbances during the application of the test are permissible.

Performance criterion C

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

8. Electrostatic Discharge Test

8.1. Block Diagram of Test Setup



8.2. Electrostatic Discharge Test Limits

Test Type	Test Level	Performance Criterion
Air Discharge	2, 4, 8KV	B
Contact Discharge	2, 4KV	B

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

8.3. Configuration of EUT on Test

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

8.4. Operating Condition of EUT

- (1) Setup the EUT as shown as Section 8.2.
- (2) Turn on the power of all equipment.
- (3) Let the EUT work in test mode and 15 minutes before taking the test.

8.5. Test Procedure

(1) Air Discharge:

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

(2) Contact Discharge:

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

(3) Indirect discharge for horizontal coupling plane:

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

(4) Indirect discharge for vertical coupling plane:

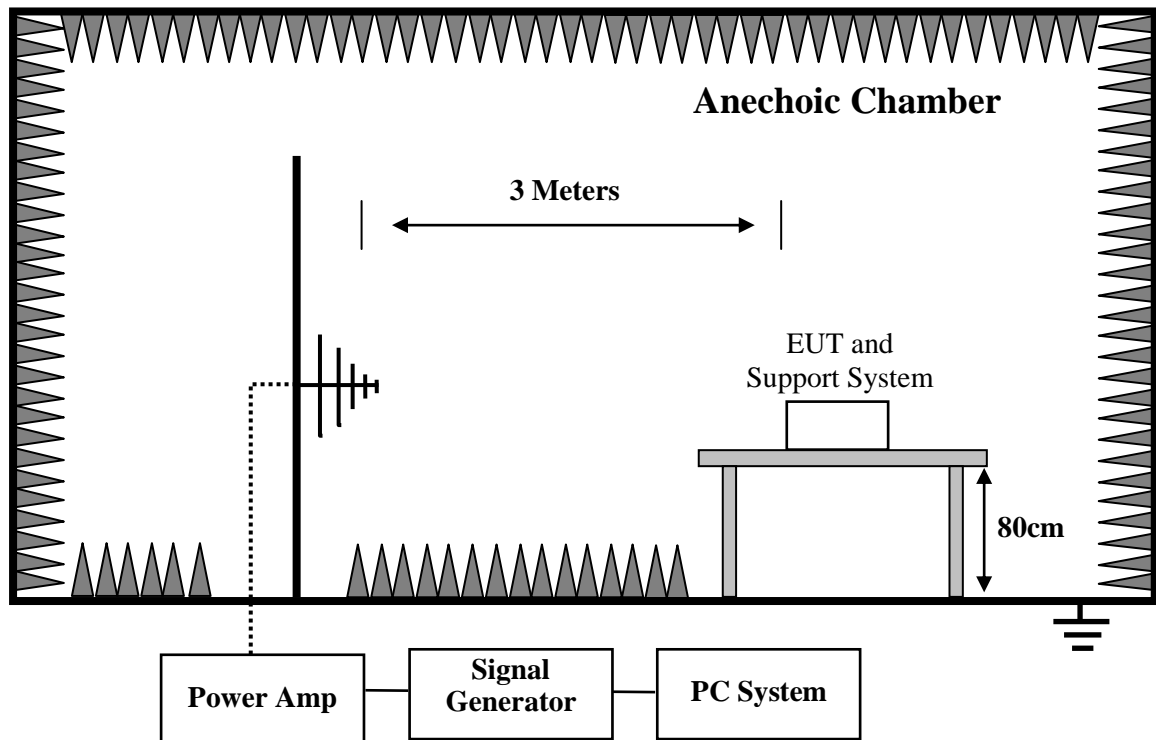
At least 20 single discharge (10 with positive and 10 negative with positive) were applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, was placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges were applied to the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

8.6.Electrostatic Discharge Test Results

EUT : HMI			Test Date : 2021.01.14		
M/N : UH404-2EU01-0AA0			Temperature : 24℃		
Test Engineer : John Han			Humidity : 56%		
Test Voltage		DC 24V From DC Power	Pressure : 101.6Kpa		
Test Mode : Playing 1KHz(U disk)					
Test Results : PASS					
Discharge Voltage (kV)		Type Of Discharge	Dischargeable Points	Performance	
				Required	Observation
±2		Contact	1	B	A
±4		Contact	1	B	A
±2		Air	2, 3, 4	B	A
±4		Air	2, 3, 4	B	A
±8		Air	2, 3, 4	B	A
±2		HCP-Bottom	Edge of the HCP	B	A
±4		HCP-Bottom	Edge of the HCP	B	A
±2		VCP-Front	Center of the VCP	B	A
±4		VCP-Front	Center of the VCP	B	A
±2		VCP-Left	Center of the VCP	B	A
±4		VCP-Left	Center of the VCP	B	A
±2		VCP-Back	Center of the VCP	B	A
±4		VCP-Back	Center of the VCP	B	A
±2		VCP-Right	Center of the VCP	B	A
±4		VCP-Right	Center of the VCP	B	A
Discharge Points Description					
<u>1</u>	Metal Shell		<u>4</u>	Button	
<u>2</u>	Screen		<u>5</u>		
<u>3</u>	Gap		<u>6</u>		
Note:		1. For the time interval between successive single discharges an initial value of one second. 2. For Air Discharge each Point Positive 10 times and negative 10 times discharge. 3. For Contact Discharge each point positive 10 times and negative 10 times discharge.			
Remark:		Class A is no function loss.			

9. RF Field Strength Susceptibility Test

9.1. Block Diagram of Test Setup



9.2.RF Field Strength susceptibility Test Limits

Test Specifications	Test Level	Performance Criterion
80MHz-1000MHz	10V/m (r.m.s.)	A
1.4GHz-2.0GHz	3V/m (r.m.s.)	A
2.0GHz-2.7GHz	1V/m (r.m.s.)	A

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

9.3.Configuration of EUT on Test

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

9.4.Operating Condition of EUT

- (1) Setup the EUT as shown as Section 9.2.
- (2) Turn on the power of all equipment.
- (3) Let the EUT work in test mode and 15 minutes before taking the test.

9.5.Test Procedure

- (1) Testing was performed in a Fully anechoic chamber as recommended by IEC 61000-4-3. The EUT was placed on an 80 cm high non-conductive table located in the area of field uniformity. The radiating antenna was placed 3m in front of the EUT and Support system, and dwell time of the radiated interference was controlled by an automated, computer-controlled system.
- (2) The signal source was stepped through the applicable frequency range at a rate no faster than 1% of the fundamental. The signal was amplitude modulated 80% over the frequency range 80 MHz to 1GHz at a level of 10 V/m, 1.4GHz to 2GHz at a level of 3 V/m. The signal was amplitude modulated 80% over the frequency range 2GHz to 2.7GHz at a level of 1 V/m The dwell time was set at 3 s. Field presence was monitored during testing via a field probe placed in close proximity to the EUT.
- (3) Throughout testing, the EUT was closely monitored for signs of susceptibility. The test was performed with the antennae oriented in both a horizontal and vertical polarization.
- (4) All the scanning conditions are as follows:

Condition of Test	Require of Test
Test Fielded Strength	10 V/m & 3 V/m & 1V/m
Radiated Signal	80% amplitude modulated with a 1kHz sine wave
Scanning Frequency	80 - 1000 MHz, 1.4GHz-2GHz, 2GHz-2.7GHz
Sweeping time of radiated	0.0015 decade/s
Dwell Time	3 Sec.

9.6.RF Field Strength Susceptibility Test Results

EUT	: HMI	Test Date	: 2021.01.14		
M/N	: UH404-2EU01-0AA0	Temperature	: 24°C		
Test Engineer	: John Han	Humidity	: 56 %		
Test Voltage	DC 24V From DC Power	Pressure	: 101.6Kpa		
Frequency Range	: 80 MHz -1000MHz	Field Strength	: 10V/m		
Test Mode	: Playing 1KHz(U disk)				
Test Results	: PASS				
Modulation:	<input checked="" type="checkbox"/> AM	<input type="checkbox"/> Pulse	<input type="checkbox"/> none 1 kHz 80%		
	Frequency Range :80 MHz -1000MHz				
Steps	1%				
	Horizontal		Vertical	Result	
	Required	Observation	Required	Observation	(Pass / Fail)
Front	A	A	A	A	Pass
Right	A	A	A	A	Pass
Rear	A	A	A	A	Pass
Left	A	A	A	A	Pass
Remark: Class A is no function loss					

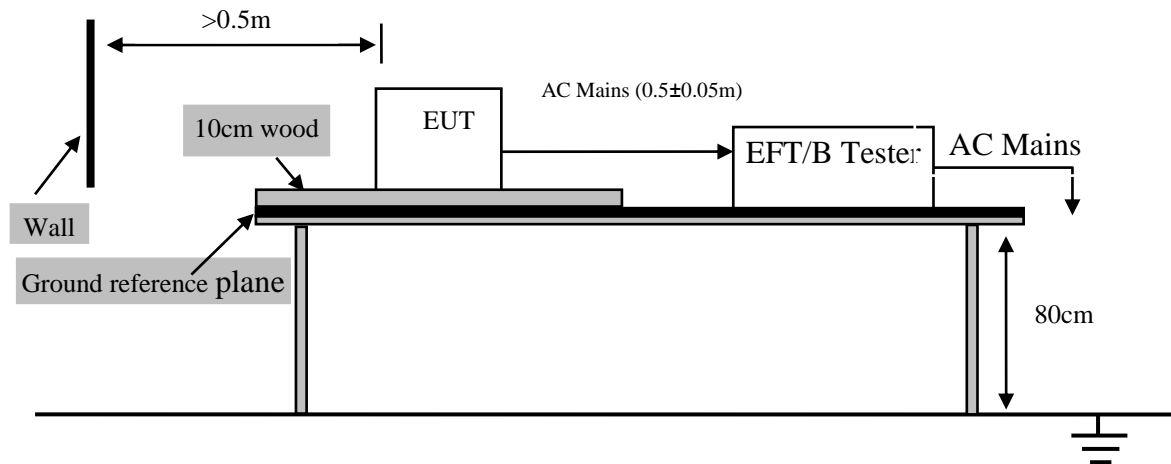
EUT	: HMI	Test Date	: 2021.01.14		
M/N	: UH404-2EU01-0AA0	Temperature	: 24°C		
Test Engineer	: John Han	Humidity	: 56 %		
Test Voltage	DC 24V From DC Power	Pressure	: 101.6Kpa		
Frequency Range	: 1.4GHz – 2GHz	Field Strength	: 3V/m		
Test Mode	: Playing 1KHz(U disk)				
Test Results	: PASS				
Modulation:	<input checked="" type="checkbox"/> AM <input type="checkbox"/> Pulse <input type="checkbox"/> none 1 kHz 80%				
	Frequency Range : 1.4GHz-2GHz				
Steps	1%				
	Horizontal		Vertical	Result	
	Required	Observation	Required	Observation	(Pass / Fail)
Front	A	A	A	A	Pass
Right	A	A	A	A	Pass
Rear	A	A	A	A	Pass
Left	A	A	A	A	Pass
Remark: Class A is no function loss					

9.7.RF Field Strength Susceptibility Test Results

EUT	: HMI	Test Date	: 2021.01.14		
M/N	: UH404-2EU01-0AA0	Temperature	: 24°C		
Test Engineer	: John Han	Humidity	: 56 %		
Test Voltage	DC 24V From DC Power	Pressure	: 101.6Kpa		
Frequency Range	: 2GHz-2.7GHz	Field Strength	: 1V/m		
Test Mode	: Playing 1KHz(U disk)				
Test Results	: PASS				
Modulation:	<input checked="" type="checkbox"/> AM <input type="checkbox"/> Pulse <input type="checkbox"/> none 1 kHz 80%				
	Frequency Range :2GHz -2.7GHz				
Steps	1%				
	Horizontal		Vertical	Result	
	Required	Observation	Required	Observation	(Pass / Fail)
Front	A	A	A	A	Pass
Right	A	A	A	A	Pass
Rear	A	A	A	A	Pass
Left	A	A	A	A	Pass
Remark: Class A is no function loss					

10. Electrical Fast Transient/Burst Immunity Test

10.1. Block Diagram of Test Setup



10.2. Electrical Fast Transient/Burst Test Limits

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

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

10.3. Configuration of EUT on Test

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

10.4. Operating Condition of EUT

- (1) Setup the EUT as shown as Section 10.2.
- (2) Turn on the power of all equipment.
- (3) Let the EUT work in test mode and 15 minutes before taking the test.

10.5. Test Procedure

The EUT and its simulators were placed on the ground reference plane and were insulated from it by a wood support 0.1m + 0.01m thick. The ground reference plane was 1m*1m metallic sheet with 0.65mm minimum thickness. This reference ground plane was project

- (1) beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane was more than 0.5m. All cables to the EUT was placed on the wood support, cables not subject to EFT/B was routed as far as possible from the cable under test to minimize the coupling between the cables.

10.6.1. For input and AC power ports:

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

10.6.2. For signal lines and control lines ports:

It's unnecessary to test.

10.6.3. For DC input and DC output power ports:

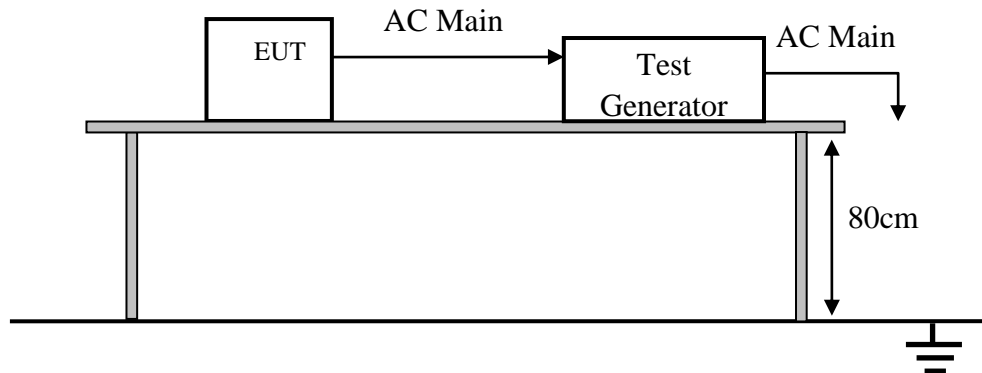
It's unnecessary to test.

10.6.Electrical Fast Transient/Burst immunity Test Results

EUT	: HMI	Test Date	: N/A
M/N	: UH404-2EU01-0AA0	Temperature	: N/A
Test Engineer	: N/A	Humidity	: N/A
Test Voltage	: N/A	Pressure	: N/A
Test Mode	: N/A		
Test Results	: N/A		
Note: Not applicable for equipment operated with PC, Battery, or Power Supply.			

11. Surge Test

11.1. Block Diagram of Test Setup



11.2. Surge Test Limits

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

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

11.3. Configuration of EUT on Test

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

11.4. Operating Condition of EUT

- (1) Setup the EUT as shown as Section 11.2.
- (2) Turn on the power of all equipment.
- (3) Let the EUT work in test mode and 15 minutes before taking the test.

11.5. Test Procedure

- (1) For line-to-line coupling mode, provide a 1kV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points, and for active line / neutral lines to ground are same except test level is 2kV.
- (2) At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are applied during test.

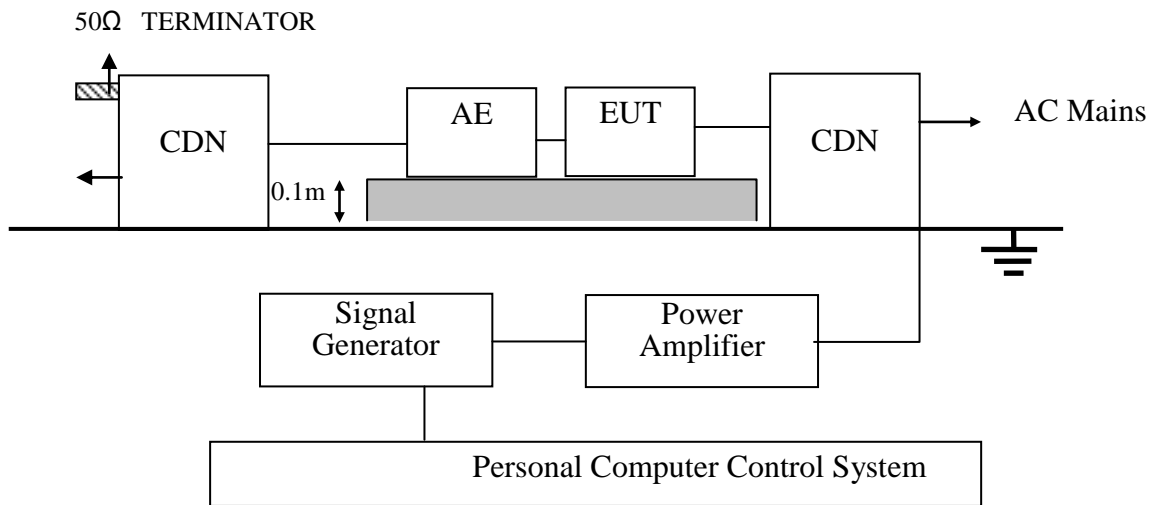
- (3) Different phase angles are done individually.
- (4) Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

11.6.Surge Test Results

EUT	: HMI	Test Date	: N/A
M/N	: UH404-2EU01-0AA0	Temperature	: N/A
Test Engineer	: N/A	Humidity	: N/A
Test Voltage	: N/A	Pressure	: N/A
Test Mode	: N/A		
Test Results	: N/A		
Note: Not applicable for equipment operated with PC, Battery, or Power Supply.			

12. Injected Currents Susceptibility Test

12.1. Block Diagram of Test Setup



12.2. Injected currents susceptibility Test Limits

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

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

12.3. Configuration of EUT on Test

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

12.4. Operating Condition of EUT

- (1) Setup the EUT as shown as Section 12.2.
- (2) Turn on the power of all equipment.
- (3) Let the EUT work in test mode and 15 minutes before taking the test.

12.5. Test Procedure

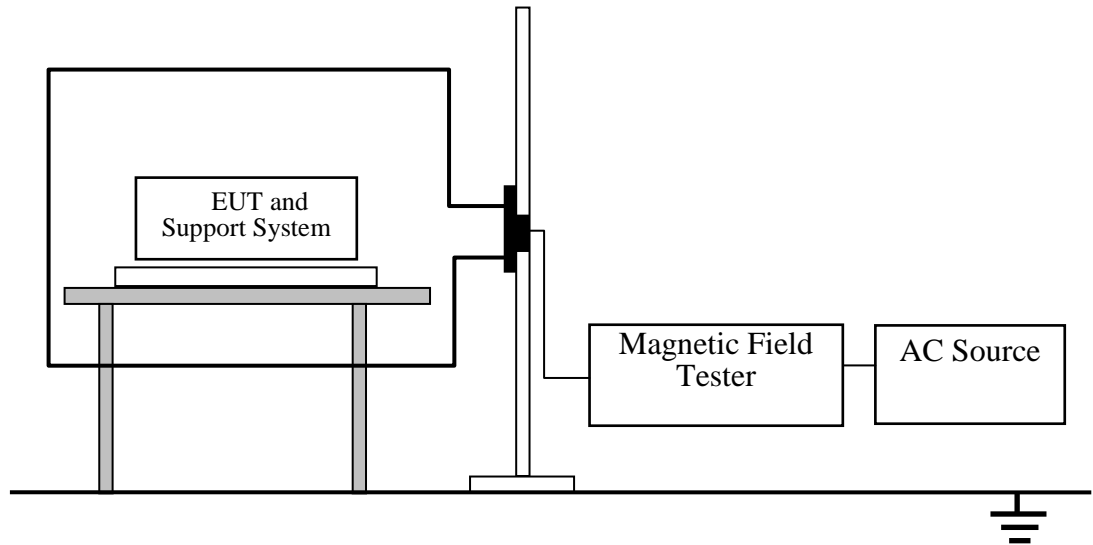
- (1) Let the EUT work in test mode and test it.
The EUT are placed on an insulating support 0.1m high above a ground reference plane.
- (2) CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT.
Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 10 and 30 mm (where possible).
- (3) The disturbance signal described below is injected to EUT through CDN.
- (4) The EUT operates within its operational mode(s) under intended climatic conditions after power on.
- (5) The frequency range is swept from 0.150MHz to 80MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1kHz sine wave.
The rate of sweep shall not exceed 1.5×10^{-3} decades/s. Where the frequency is swept
- (6) incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
- (7) Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

12.6. Injected currents susceptibility Test Results

EUT : HMI	Test Date : N/A
M/N : UH404-2EU01-0AA0	Temperature : N/A
Test Engineer : N/A	Humidity : N/A
Test Voltage : N/A	Pressure : N/A
Test Mode : N/A	
Test Results : N/A	
Note : Not applicable for equipment operated with PC, Battery, or Power Supply.	

13. Magnetic Field Immunity Test

13.1. Block Diagram of Test Setup



13.2. magnetic field Test Limits

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

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

13.3. Configuration of EUT on Test

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

13.4.Operating Condition of EUT

- (1) Setup the EUT as shown as Section 13.2.
- (2) Turn on the power of all equipment.
- (3) Let the EUT work in test mode and 15 minutes before taking the test.

13.5.Test Procedure

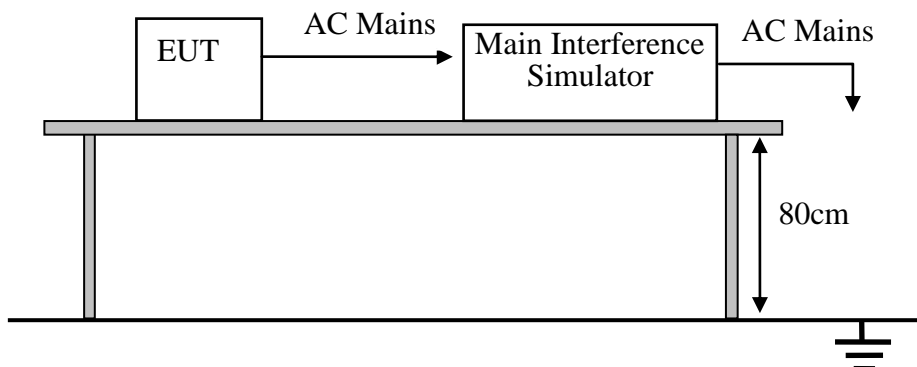
- The EUT was subjected to the test magnetic field by using the induction coil of standard dimensions (1m*1m) and shown in Section 13.2. The induction coil was then rotated by 90° in order to expose the EUT to the test field with different orientations.
- (1)

13.6.magnetic field immunity Test Results

EUT : HMI	Test Date : N/A
M/N : UH404-2EU01-0AA0	Temperature : N/A
Test Engineer : N/A	Humidity : N/A
Test Voltage : N/A	Pressure : N/A
Test Mode : N/A	
Test Results : N/A	
Note: The EUT not containing devices susceptible to magnetic fields, and Power-frequency magnetic field test applicable only to EUT containing devices susceptible to magnetic fields, so the test not applicable.	

14. Voltage Dips And Interruptions Test

14.1. Block Diagram of Test Setup



14.2. Voltage dips and interruptions Test Limits

Test Level %U _T	Voltage dip and short interruptions %U _T	Performance Criterion	Duration (in period)
0	100	B	1
40	60	C	10
70	30	C	25
0	100	C	250

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

14.3. Configuration of EUT on Test

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

14.4. Operating Condition of EUT

- (1) Setup the EUT as shown as Section 14.2.
- (2) Turn on the power of all equipment.
- (3) Let the EUT work in test mode and 15 minutes before taking the test.

14.5. Test Procedure

- (1) The interruption is introduced at selected phase angles with specified duration.
- (2) Record any degradation of performance.

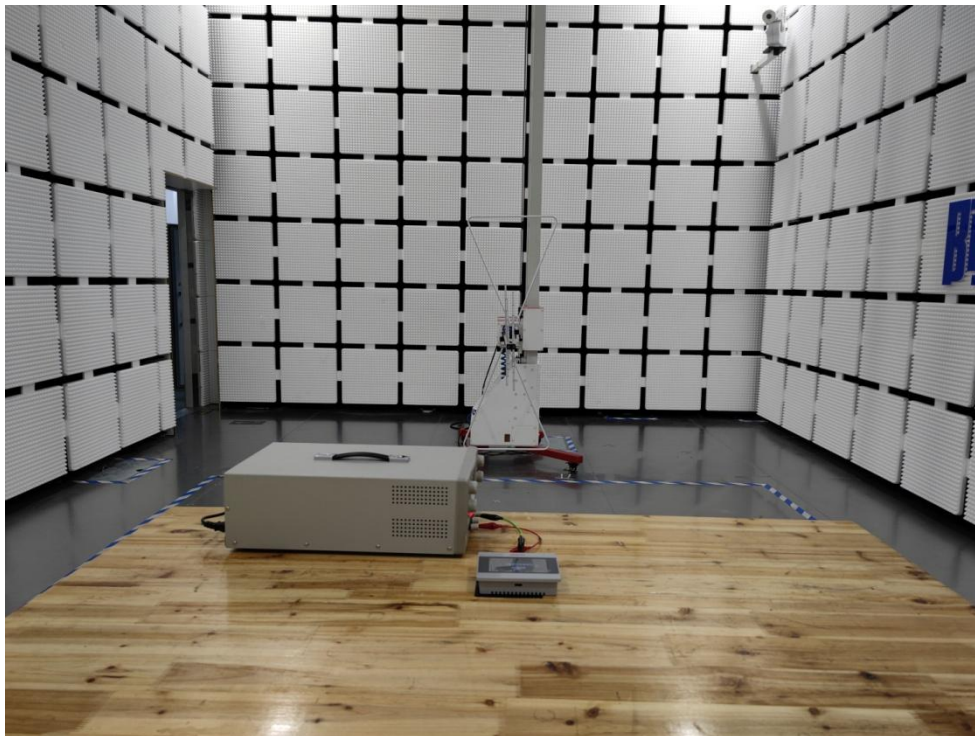
14.6.Voltage dips and interruptions Test Results

EUT	: HMI	Test Date	: N/A
M/N	: UH404-2EU01-0AA0	Temperature	: N/A
Test Engineer	: N/A	Humidity	: N/A
Test Voltage	: N/A	Pressure	: N/A
Test Mode	: N/A		
Test Results	: N/A		
Note:	Note: Not applicable for equipment operated with PC, Battery, or Power Supply.		

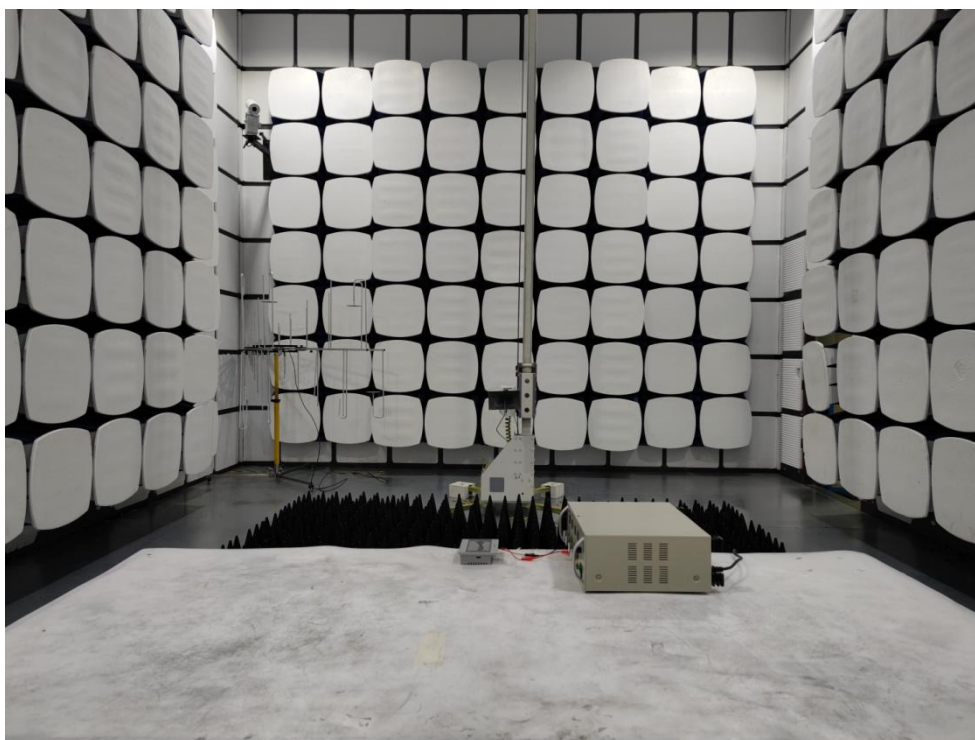
15. Photograph

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

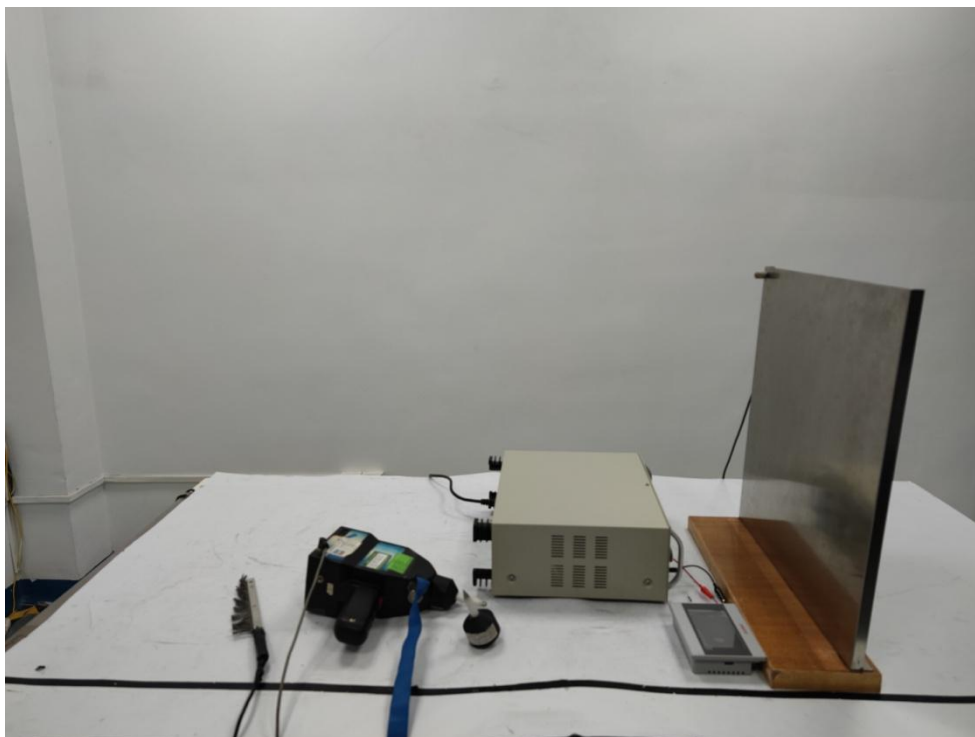
Below 1G



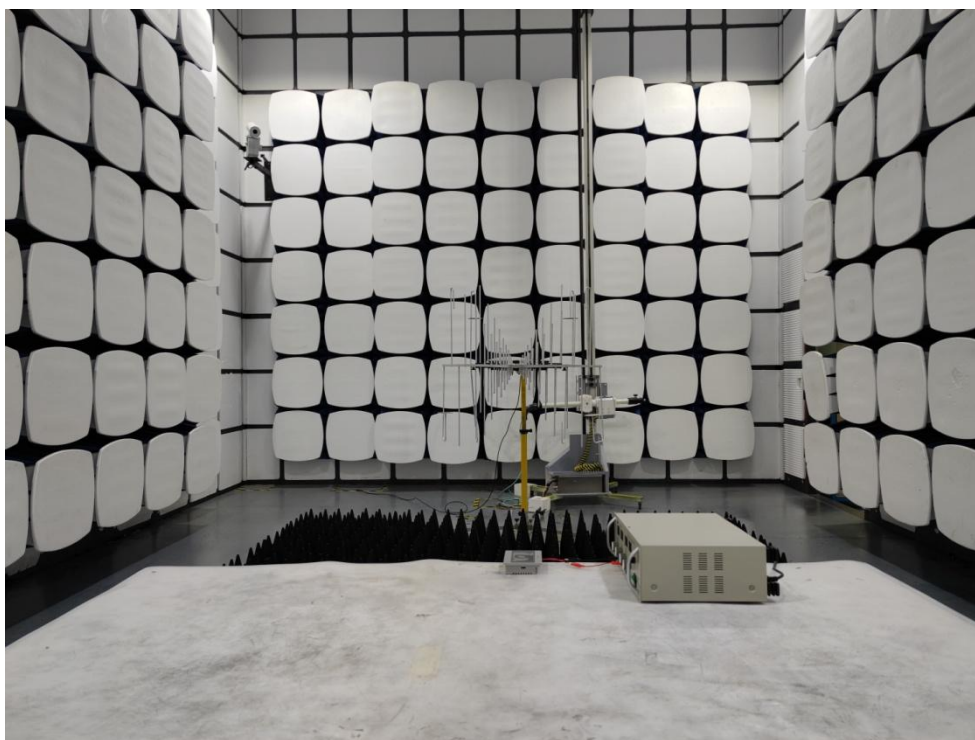
Above 1G



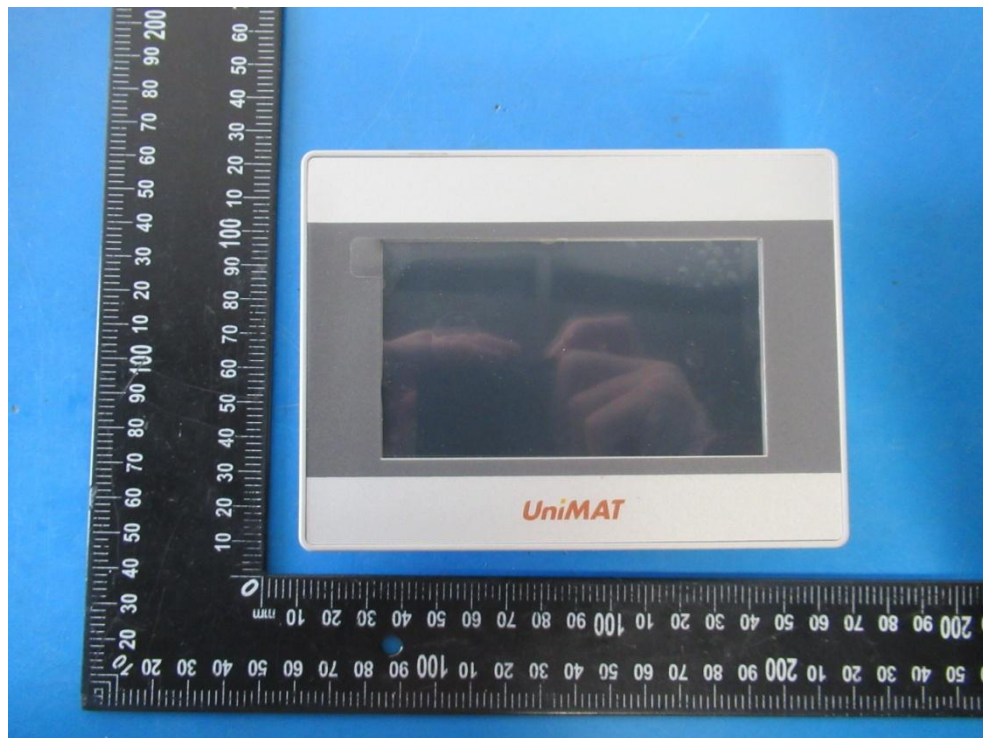
15.2.Photos of Electrostatic Discharge Test



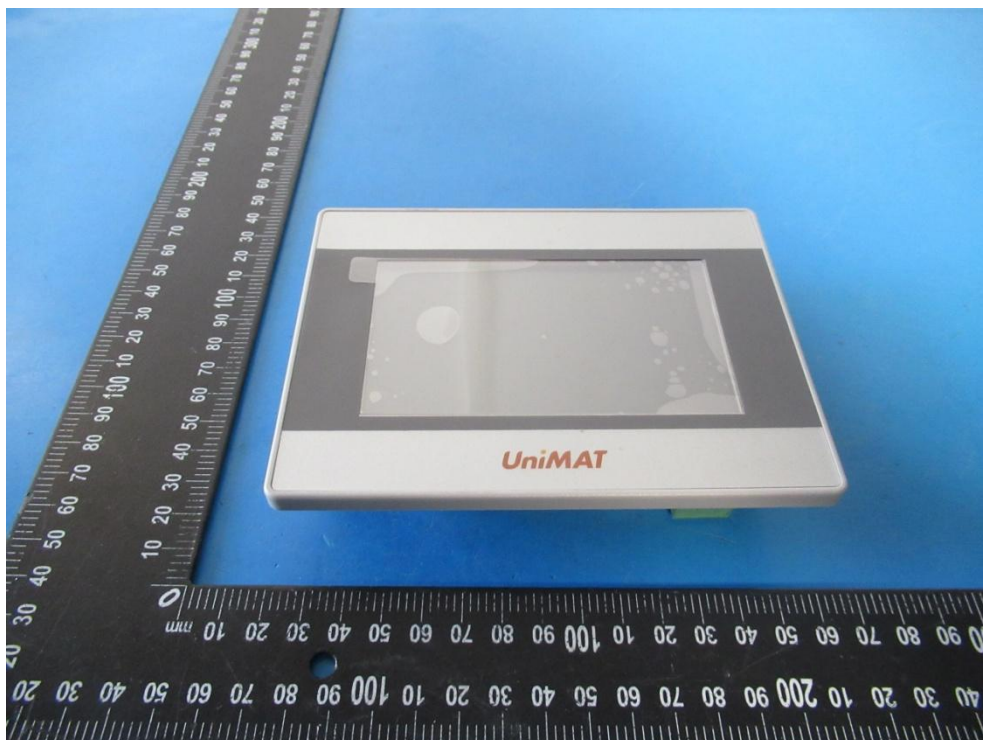
15.3.Photo of RF Field Strength Susceptibility test



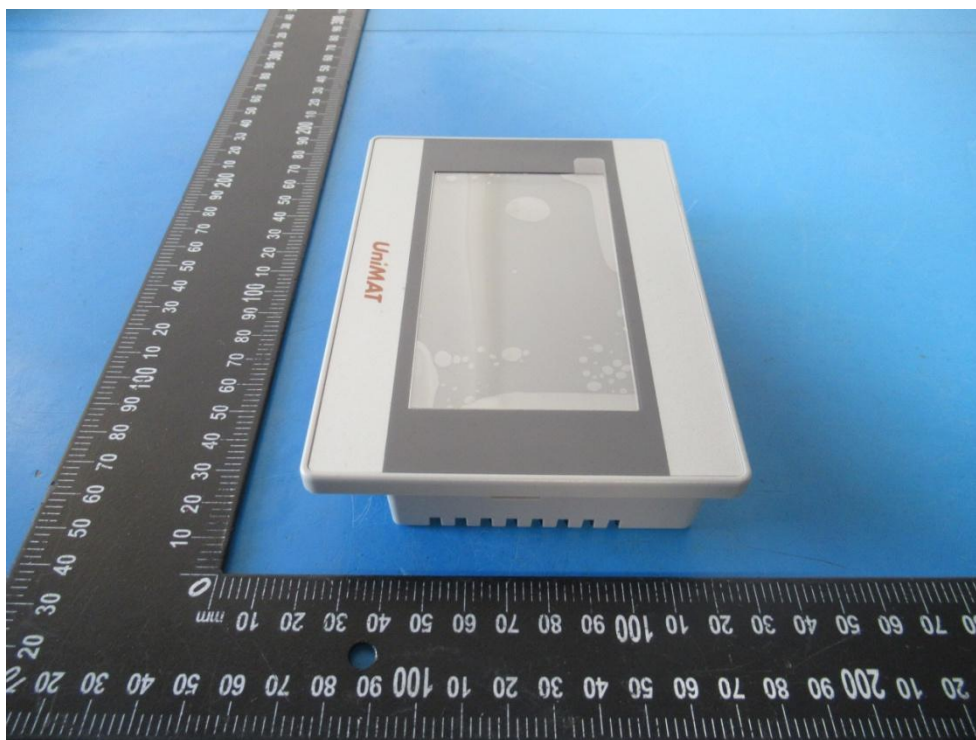
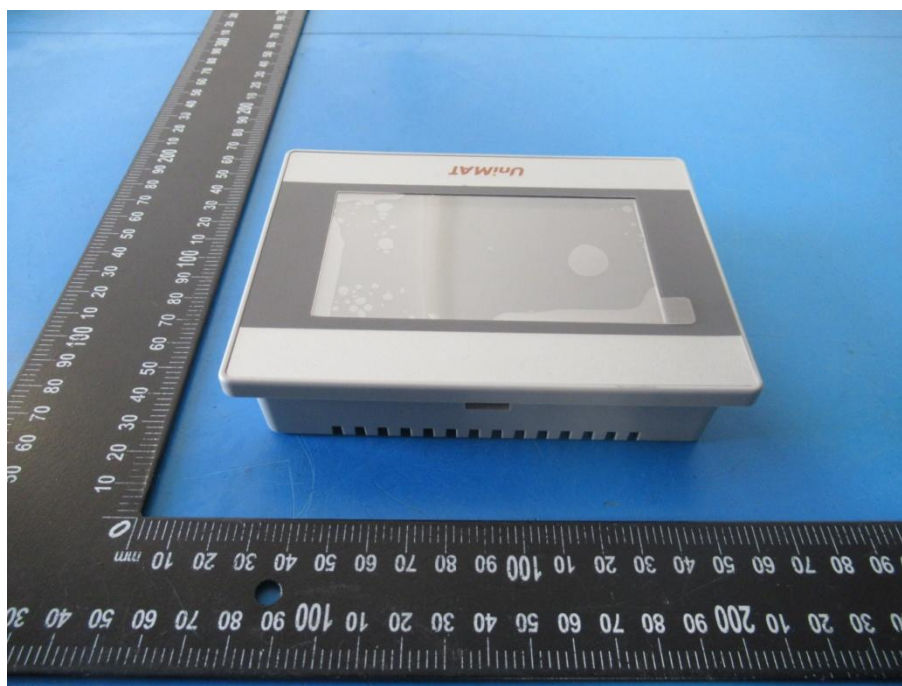
16.Photos Of The EUT

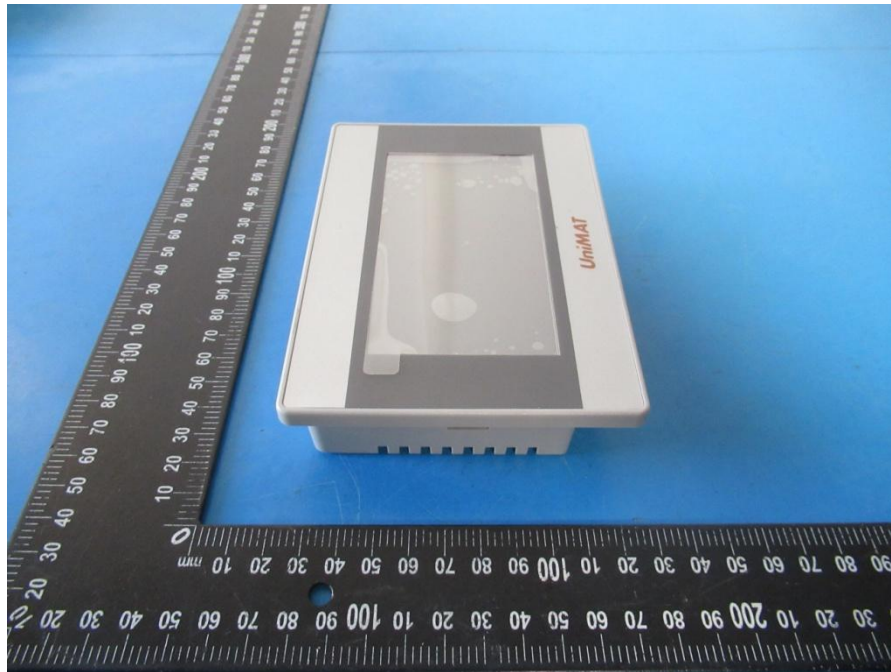


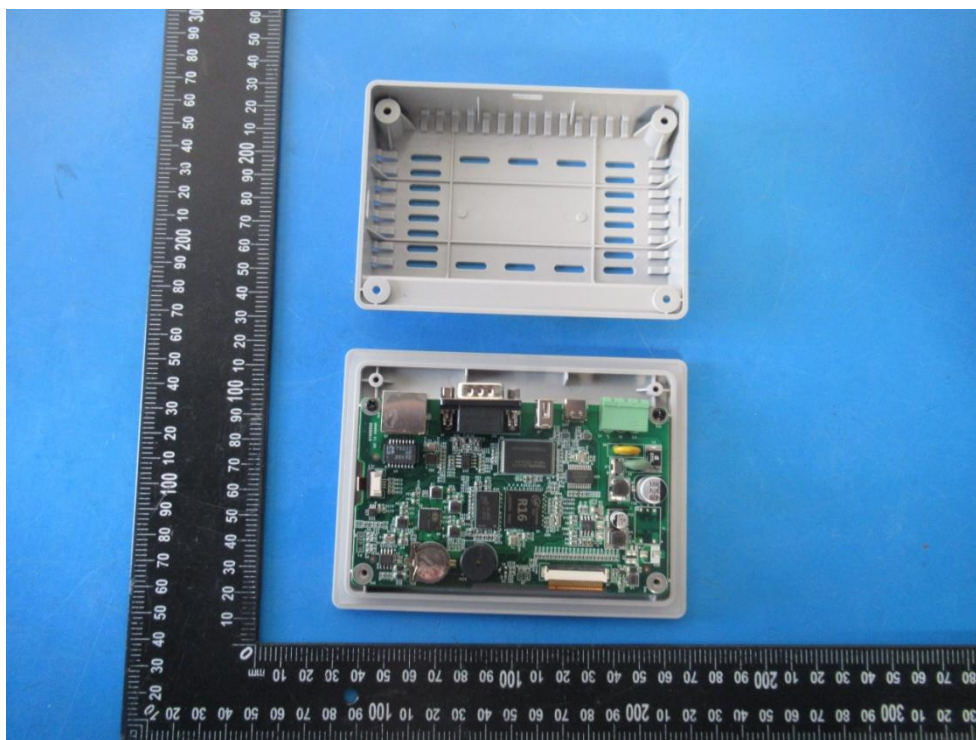
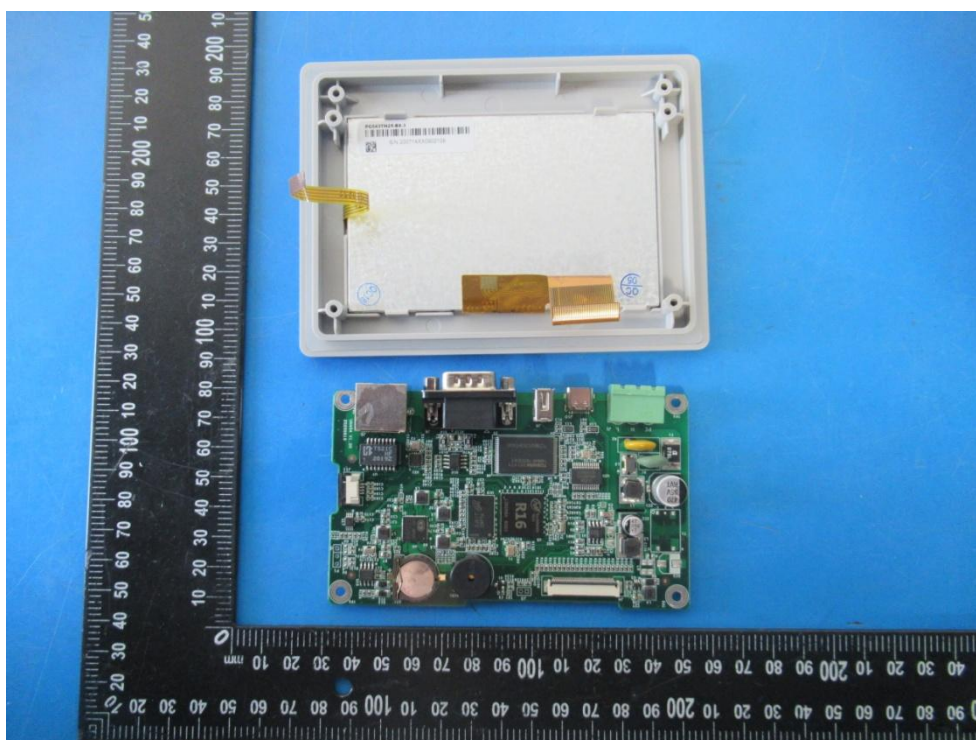
EUT View

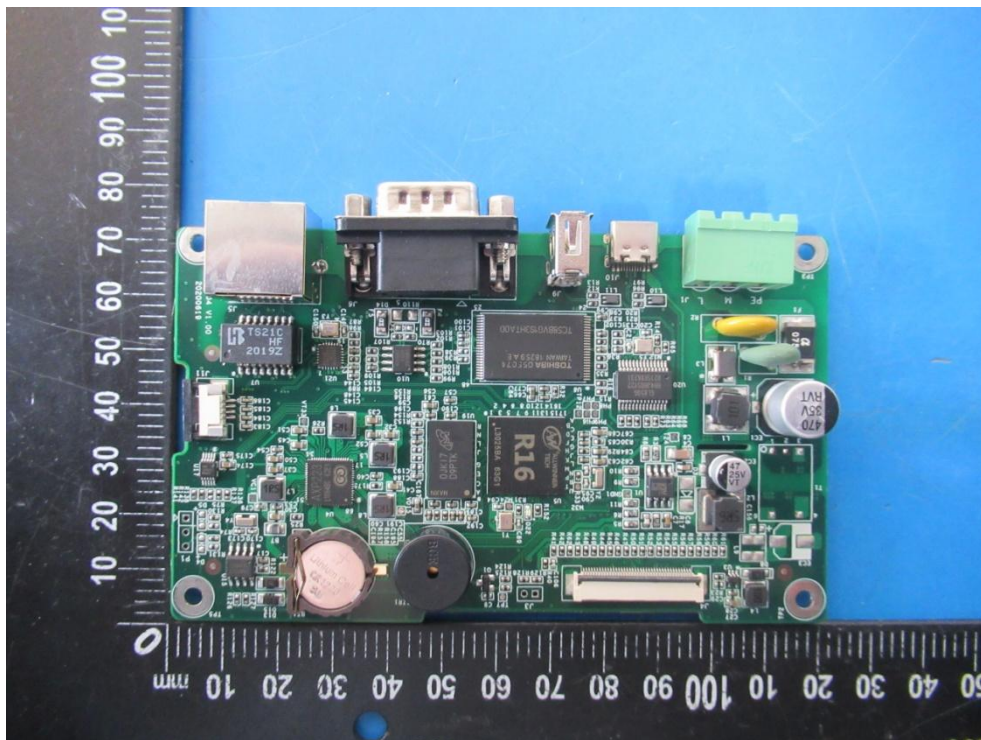


EUT View

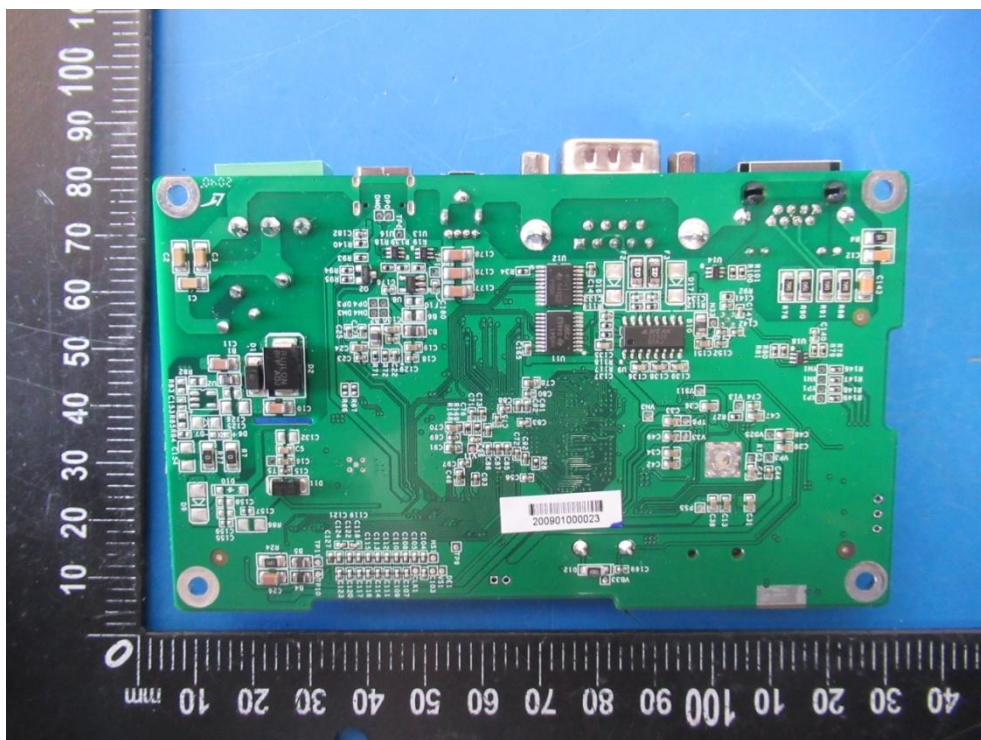
**EUT View****EUT View**

**EUT View****EUT View**

**EUT View****EUT View**



EUT View



EUT View

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