CE/EMC TEST REPORT

For

Shenzhen Libre Technology Limited Company

Product Name:	Libre Computer Board AML-S905X-CC
Trademark:	N/A
Model Number:	AML-S905X-CC
Prepared For: Address:	Shenzhen Libre Technology Limited Company 634.Block B,Tianhui Building,Yousong Road,Longhua New Area,Shenzhen CHINA.
Prepared By: Address:	Shenzhen BCTC Testing Co., Ltd. BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China
Report No.:	BCTC-FY170805897E

TABLE OF CONTENT

Test Report Declaration Page

1. GENERAL INFORMATION 5
1.1. Description of Device (EUT) 5
1.2. Tested System Details 5
1.3. Test Uncertainty 5
1.4. Test Facility 6

2. TEST INSTRUMENT USED 7

3. CONDUCTED EMISSION AT THE MAINS TERMINALS TEST 10
3.1. Block Diagram Of Test Setup 10
3.2. Test Standard 10
3.3. Power Line Conducted Emission Limit 10
3.4. EUT Configuration on Test 10
3.5. Operating Condition of EUT 10
3.6. Test Procedure 11
3.7. Test Result 11

4. RADIATION EMISSION TEST 14
4.1. Block Diagram of Test Setup 14
4.2. Test Standard 14
4.3. Radiation Limit 14
4.4. EUT Configuration on Test 15
4.5. Operating Condition of EUT 15
4.6. Test Procedure 15
4.7. Test Result 15

5. HARMONIC CURRENT EMISSION TEST 18
5.1. Block Diagram of Test Setup 18
5.2. Test Standard 18
5.3. Operating Condition of EUT 18
5.4. Test Procedure 18
5.5. Test Results 18

6. VOLTAGE FLUCTUATIONS & FLICKER TEST 19
6.1. Block Diagram of Test Setup 19
6.2. Test Standard 19
6.3. Operating Condition of EUT 19
6.4. Test Procedure 19
6.5. Test Results 19

7. ELECTROSTATIC DISCHARGE IMMUNITY TEST 20
7.1. Block Diagram of Test Setup 20
7.2. Test Standard 20
7.3. Severity Levels and Performance Criterion 20
7.4. EUT Configuration 21
7.5. Operating Condition of EUT 21
7.6. Test Procedure 21
7.7. Test Results 22

8. RF FIELD STRENGTH SUSCEPTIBILITY TEST 23
8.1. Block Diagram of Test Setup 23
8.2. Test Standard 23
8.3. Severity Levels and Performance Criterion 24
8.4. EUT Configuration on Test 24
8.5. Operating Condition of EUT 24

8.6. Test Procedure 25
8.7. Test Results 25
9. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST 26
9.1. Block Diagram of EUT Test Setup 26
9.2. Test Standard 26
9.3. Severity Levels and Performance Criterion 26
9.4. EUT Configuration on Test 27
9.5. Operating Condition of EUT 27
9.6. Test Procedure 27
9.7. Test Results 27
10. SURGE TEST 28
10.1. Block Diagram of EUT Test Setup 28
10.2. Test Standard 28
10.3. Severity Levels and Performance Criterion 28
10.4. EUT Configuration on Test 29
10.5. Operating Condition of EUT 29
10.6. Test Procedure 29
10.7. Test Result 29
11. INJECTED CURRENTS SUSCEPTIBILITY TEST 30
11.1. Block Diagram of EUT Test Setup 30
11.2. Test Standard 30
11.3. Severity Levels and Performance Criterion 30
11.4. EUT Configuration on Test 31
11.5. Operating Condition of EUT 31
11.6. Test Procedure 31
11.7. Test Result 32
12. MAGNETIC FIELD IMMUNITY TEST 33
12.1. Block Diagram of Test Setup 33
12.2. Test Standard 33
12.3. Severity Levels and Performance Criterion 33
12.4. EUT Configuration on Test 34
12.5. Operating Condition of EUT 34
12.6. Test Procedure 34
12.7. Test Results 34
13. VOLTAGE DIPS AND INTERRUPTIONS TEST 35
13.1. Block Diagram of EUT Test Setup 35
13.2. Test Standard 35
13.3. Severity Levels and Performance Criterion 35
13.4. EUT Configuration on Test 36
13.5. Operating Condition of EUT 36
13.6. Test Procedure 36
13.7. Test Result 36
14. EUT PHOTOGRAPHS 37
15. EUT TEST PHOTOGRAPHS 38

Shenzhen BCTC Testing Co., Ltd.

Applicant	:	Shenzhen Libre Technology Limited Company
Address	:	634.Block B,Tianhui Building,Yousong Road,Longhua New Area,Shenzhen CHINA.
Manufacturer	:	Shenzhen Libre Technology Limited Company
Address	:	634.Block B,Tianhui Building,Yousong Road,Longhua New Area,Shenzhen CHINA.
EUT	:	Libre Computer Board AML-S905X-CC
Model Number	:	AML-S905X-CC
Trademark:	:	N/A
Test Date	:	Aug. 31 – Sep. 06, 2018
Date of Report	:	Sep. 06, 2018
Test Result:	:	The equipment under test was found to be compliance with the requirements of the standards applied.

Test Procedure Used:

EMI : EN 55032:2015

EN 61000-3-2:2014, EN 61000-3-3:2013

EMS : EN 55024:2010+A1:2015

EN 61000-4-2:2009, EN 61000-4-3:2006+A1:2008+A2:2010,
EN 61000-4-4:2012, EN 61000-4-5:2014,
EN 61000-4-6:2014, EN 61000-4-8:2010, EN 61000-4-11:2004

Prepared by(Engineer): Jack Bu

Reviewer(Supervisor): Jade Yang

Approved(Manager): Carson Zhang

This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of Shenzhen BCTC Testing Co., Ltd.

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	Libre Computer Board AML-S905X-CC
Trademark	:	N/A
Model Number	:	AML-S905X-CC
Power Supply	:	DC5V 10W 2A

1.2. Tested System Details

None.

1.3. Test Uncertainty

Conducted Emission Uncertainty	:	±1.82dB
Radiated Emission Uncertainty	:	±2.51dB

1.4. Test Facility

Site Description

Name of Firm	:	Shenzhen BCTC Testing Co., Ltd.
Site Location	:	BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China
Lab Qualifications	:	Certificated by Industry Canada Registration No.: 12655A Date of registration: January 19, 2015 Certificated by FCC, USA Registration No.: 187086 Date of registration: November 28, 2014 Certificated by CNAS China Registration No.: CNAS L6046 Date of registration: February 3, 2013

2. TEST INSTRUMENT USED

For Conducted Emission at the mains terminals Test

Conducted Emission Test (A --- site)					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
843 Shielded Room	ChengYu	843 Room	843	Aug. 25, 2017	Aug. 24, 2018
EMI Receiver	R&S	ESCI	101421	Aug. 27, 2017	Aug. 26, 2018
LISN	Schwarzbeck	NSLK8127	8127739	Sep. 07, 2016	Sep. 06, 2017
Attenuator	R&S	ESH3-Z2	BCTC021E	Aug. 25, 2017	Aug. 24, 2018
843 Cable 1#	FUJIKURA	843C1#	001	Aug. 25, 2017	Aug. 24, 2018

For Conducted Emission at the telecom port Test

Conducted Emission Test (A --- site)					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
843 Shielded Room	ChengYu	843 Room	843	Aug. 25, 2017	Aug. 24, 2018
EMI Receiver	R&S	ESCI	101421	Aug. 27, 2017	Aug. 26, 2018
Coupling/ Decoupling Network	PH	ISN T800	S1509001	Aug. 25, 2017	Aug. 24, 2018
Attenuator	R&S	ESH3-Z2	BCTC021E	Aug. 25, 2017	Aug. 24, 2018
843 Cable 1#	FUJIKURA	843C1#	001	Aug. 25, 2017	Aug. 24, 2018

For Radiated Emission Test

Radiation Emission Test (966 chamber)					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
966 chamber	ChengYu	966 Room	966	Aug. 25, 2017	Aug. 24, 2018
Spectrum Analyzer	Agilent	E4407B	MY45109572	Aug. 27, 2017	Aug. 26, 2018
Amplifier	Schwarzbeck	BBV9743	9743-119	Aug. 25, 2017	Aug. 24, 2018
Amplifier	Schwarzbeck	BBV9718	9718-270	Aug. 25, 2017	Aug. 24, 2018
Log-periodic Antenna	Schwarzbeck	VULB9160	VULB9160-3 369	Sep. 07, 2016	Sep. 06, 2017
EMI Receiver	R&S	ESCI	101421	Aug. 27, 2017	Aug. 26, 2018
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1275	Aug. 25, 2017	Aug. 24, 2018
966 Cable 1#	CHENGYU	966	004	Aug. 25, 2017	Aug. 24, 2018
966 Cable 2#	CHENGYU	966	003	Aug. 25, 2017	Aug. 24, 2018

For Harmonic & Flicker Test

For Harmonic / Flicker Test (A --- site)					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
Harmonic / Flicker Analyzer	KIKUSUI	KHA1000	VA002445	Sep. 06, 2017	Sep. 06, 2018
AC Power Supply	KIKUSUI	PCR4000M	UK001879	Sep. 06, 2017	Sep. 06, 2018
Line Impedance network	KIKUSUI	LIN1020JF	UL001611	Sep. 06, 2017	Sep. 06, 2018

For Electrostatic Discharge Immunity Test

For Electrostatic Discharge Immunity Test (A --- site)					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
ESD Tester	KIKISUI	KES4201A	UH002321	Aug. 28, 2017	Aug. 27, 2018

For RF Field Strength Susceptibility Test(SMQ)

For RF Field Strength Susceptibility Test (SMQ --- site)					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
Signal Generator	HP	8648A	3625U00573	Sep. 26, 2016	Sep. 26, 2017
Amplifier	A&R	500A100	17034	Sep. 26, 2016	Sep. 26, 2017
Amplifier	A&R	100W/1000M1	17028	Sep. 26, 2016	Sep. 26, 2017
Audio Analyzer (20Hz~1GHz)	Panasonic	2023B	202301/428	Sep. 26, 2016	Sep. 26, 2017
Isotropic Field Probe	A&R	FP2000	16755	Sep. 26, 2016	Sep. 26, 2017
Antenna	EMCO	3108	9507-2534	Sep. 26, 2016	Sep. 26, 2017
Log-periodic Antenna	A&R	AT1080	16812	Sep. 26, 2016	Sep. 26, 2017

For Electrical Fast Transient /Burst Immunity Test

For Electrical Fast Transient/Burst Immunity Test (A --- site)					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
Burst Tester	Prima	EFT61004AG	PR14054467	Aug. 25, 2017	Aug. 24, 2018
Coupling Clamp	Prima	EFT61004AG	BCTC009E	Aug. 25, 2017	Aug. 24, 2018

For Surge Test

For Surge Test (A --- site)					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
Surge Tester	Prima	SUG61005BX	PR12045446	Aug. 27, 2017	Aug. 26, 2018

For Injected Currents Susceptibility Test

For Injected Currents Susceptibility Test (A --- site)					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
C/S Test System	SCHLODER	CDG600	126B1281	Aug. 27, 2017	Aug. 26, 2018
CDN	SCHLODER	CDN-M2+3	A2210320/2015	Aug. 27, 2017	Aug. 26, 2018
Injection Clamp	SCHLOBER	EMCL-20	132A1214/2015	Aug. 27, 2017	Aug. 26, 2018

For Magnetic Field Immunity Test

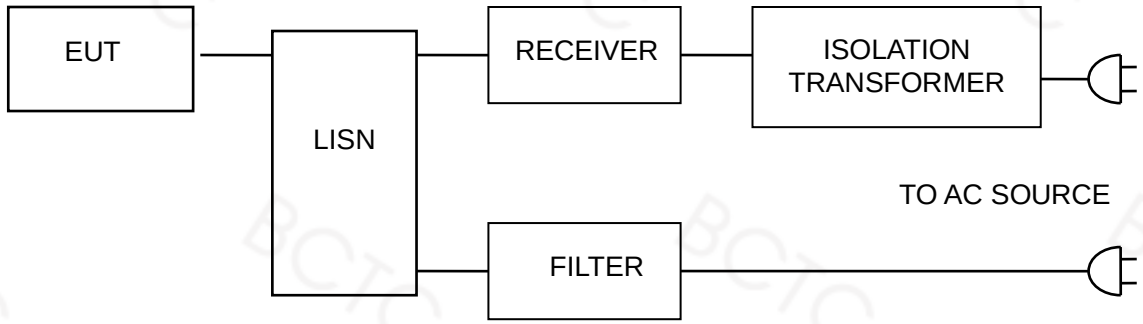
For Magnetic Field Immunity Test (A --- site)					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
Magnetic field generator	HTEC	HPFMF	15701	Aug. 27, 2017	Aug. 26, 2018

For Voltage Dips Interruptions Test

For Voltage Dips Interruptions Test (A --- site)					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
Dips Tester	Prima	DRP61011AG	PR14086284	Aug. 27, 2017	Aug. 26, 2018

3. CONDUCTED EMISSION AT THE MAINS TERMINALS TEST

3.1. Block Diagram Of Test Setup



3.2. Test Standard

EN 55032:2015

3.3. Power Line Conducted Emission Limit

Frequency MHz	Limits dB(μV)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66 ~ 56*	56 ~ 46*
0.50 ~ 5.00	56	46
5.00 ~ 30.00	60	50

Notes: 1. *Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

3.4. EUT Configuration on Test

The following equipments are installed on conducted emission test to meet EN 55032 requirement and operating in a manner which tends to maximize its emission characteristics in a normal application.

3.5. Operating Condition of EUT

3.5.1 Setup the EUT and simulators as shown in Section 3.1.
3.5.2 Turn on the power of all equipments.
3.5.3 Let the EUT work in test modes and test it.

3.6. Test Procedure

The EUT is put on the ground 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 10KHz.

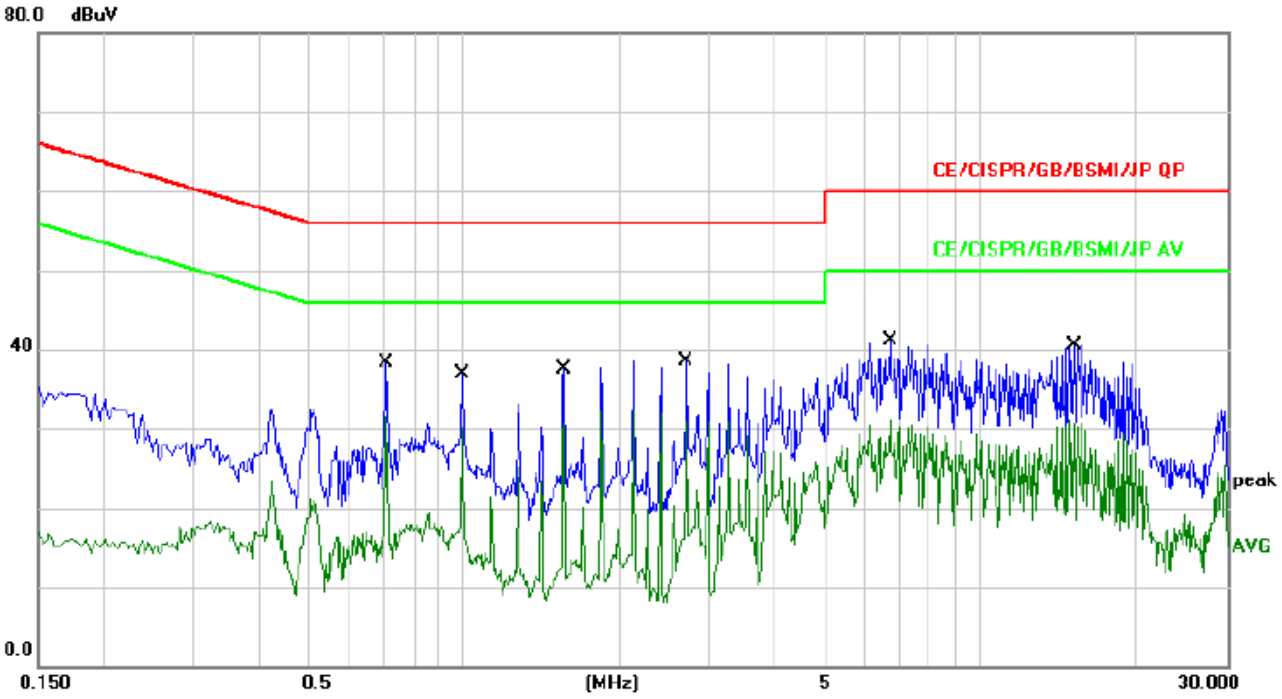
The frequency range from 150 KHz to 30 MHz is investigated.

3.7. Test Result

PASS

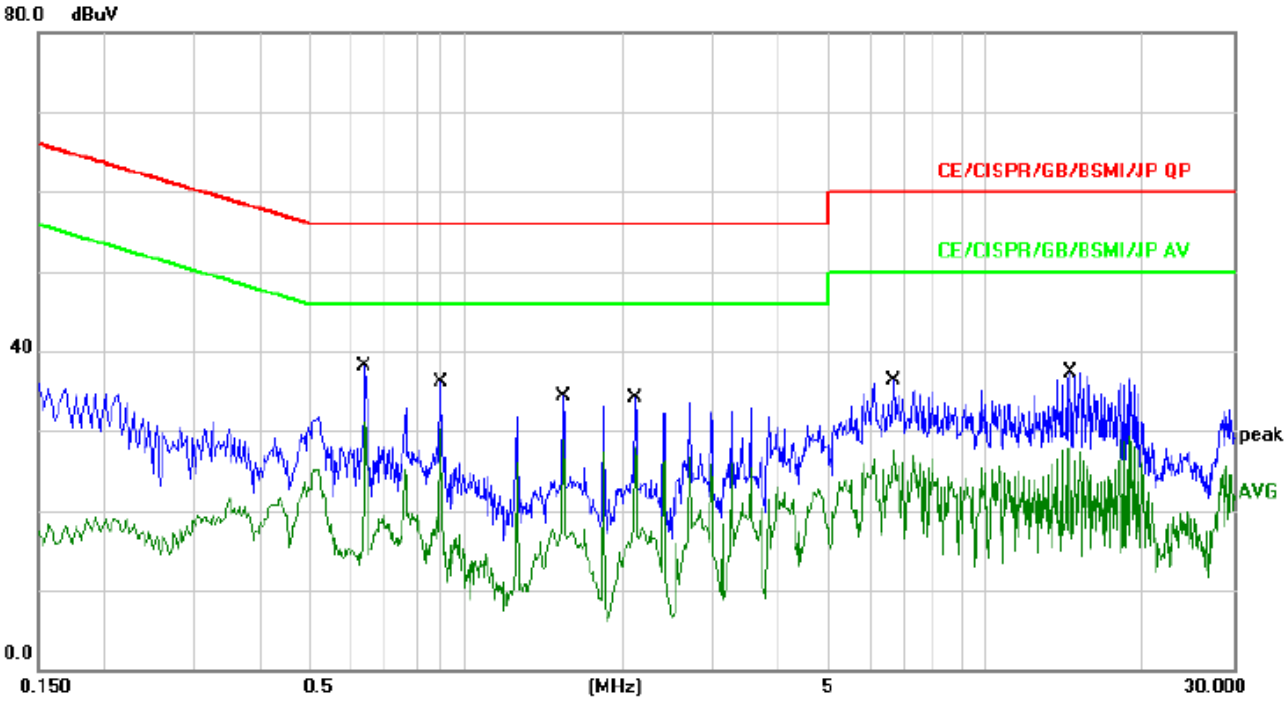
Please refer to the following page.

Conducted Emission At The Mains Terminals Test Data			
Temperature:	24.5 ℃	Relative Humidity:	54%
Pressure:	1009hPa	Phase :	Line
Test Voltage :	DC 5V from adapter input AC 230V/50Hz	Test Mode:	ON Mode



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.7100	28.73	9.67	38.40	56.00	-17.60	QP	
2	*	0.7100	21.91	9.67	31.58	46.00	-14.42	AVG	
3		0.9940	27.17	9.71	36.88	56.00	-19.12	QP	
4		0.9940	20.30	9.71	30.01	46.00	-15.99	AVG	
5		1.5620	27.89	9.71	37.60	56.00	-18.40	QP	
6		1.5620	20.98	9.71	30.69	46.00	-15.31	AVG	
7		2.6980	28.87	9.72	38.59	56.00	-17.41	QP	
8		2.6980	21.24	9.72	30.96	46.00	-15.04	AVG	
9		6.6700	31.39	9.79	41.18	60.00	-18.82	QP	
10		6.6700	21.39	9.79	31.18	50.00	-18.82	AVG	
11		15.1820	30.65	9.93	40.58	60.00	-19.42	QP	
12		15.1820	20.86	9.93	30.79	50.00	-19.21	AVG	

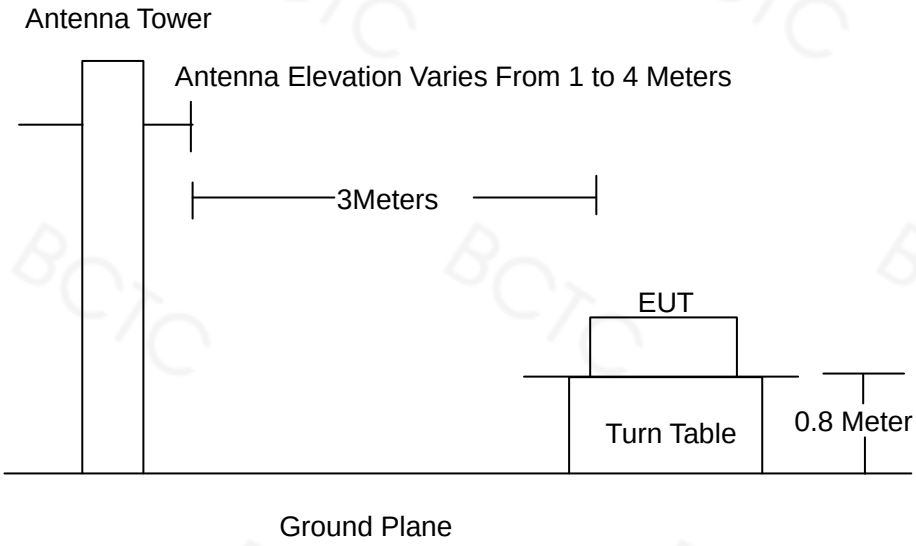
Conducted Emission At The Mains Terminals Test Data			
Temperature:	24.5 ℃	Relative Humidity:	54%
Pressure:	1009hPa	Phase :	Neutral
Test Voltage :	DC 5V from adapter input AC 230V/50Hz	Test Mode:	ON Mode



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.6380	28.51	9.67	38.18	56.00	-17.82	QP	
2	*	0.6380	21.35	9.67	31.02	46.00	-14.98	AVG	
3		0.8940	26.32	9.70	36.02	56.00	-19.98	QP	
4		0.8940	20.66	9.70	30.36	46.00	-15.64	AVG	
5		1.5420	24.68	9.71	34.39	56.00	-21.61	QP	
6		1.5420	19.18	9.71	28.89	46.00	-17.11	AVG	
7		2.1180	24.33	9.72	34.05	56.00	-21.95	QP	
8		2.1180	18.09	9.72	27.81	46.00	-18.19	AVG	
9		6.6580	26.54	9.79	36.33	60.00	-23.67	QP	
10		6.6580	17.64	9.79	27.43	50.00	-22.57	AVG	
11		14.5860	27.39	9.91	37.30	60.00	-22.70	QP	
12		14.5860	17.80	9.91	27.71	50.00	-22.29	AVG	

4. RADIATION EMISSION TEST

4.1. Block Diagram of Test Setup



4.2. Test Standard

EN 55032:2015

4.3. Radiation Limit

Frequency MHz	Distance (Meters)	Field Strengths Limits dB(μV)/m	Detector
30 ～ 230	3	40.0	QP
230 ～ 1000	3	47.0	QP
1000 ～ 3000	3	76.0	PEAK
1000 ～ 3000	3	56.0	AVERAGE
3000 ～ 6000	3	80.0	PEAK
3000 ～ 6000	3	60.0	AVERAGE

Remark:

(1) Emission level (dB(μV)/m) = 20 log Emission level (μV/m)

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance refers to the distance in meters between the measuring instrument, antenna and the closed point of any part of the device or system.

4.4. EUT Configuration on Test

The EN 55032 regulations test method must be used to find the maximum emission during radiated emission test.
The configuration of EUT is the same as used in conducted emission test. Please refer to Section 2.2.

4.5. Operating Condition of EUT

Same as conducted emission test, which is listed in Section 2.2 except the test set up replaced as Section 4.1.

4.6. Test Procedure

The EUT and its simulators are placed on a turned table that is 0.8 meter above the ground. The turned table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna that is mounted on the antenna tower. The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated biconical and log periodical antenna) is used as receiving antenna. Both horizontal and vertical polarization of the antenna is set on test. In order to find the maximum emission levels, the interface cable must be manipulated according to EN 55032 on radiated emission test.
The bandwidth setting on the field strength meter (R&S Test Receiver ESCI) is set at 120KHz below 1GHz, set at 1MHz above 1GHz
The frequency range from 30MHz to 1000MHz is checked.

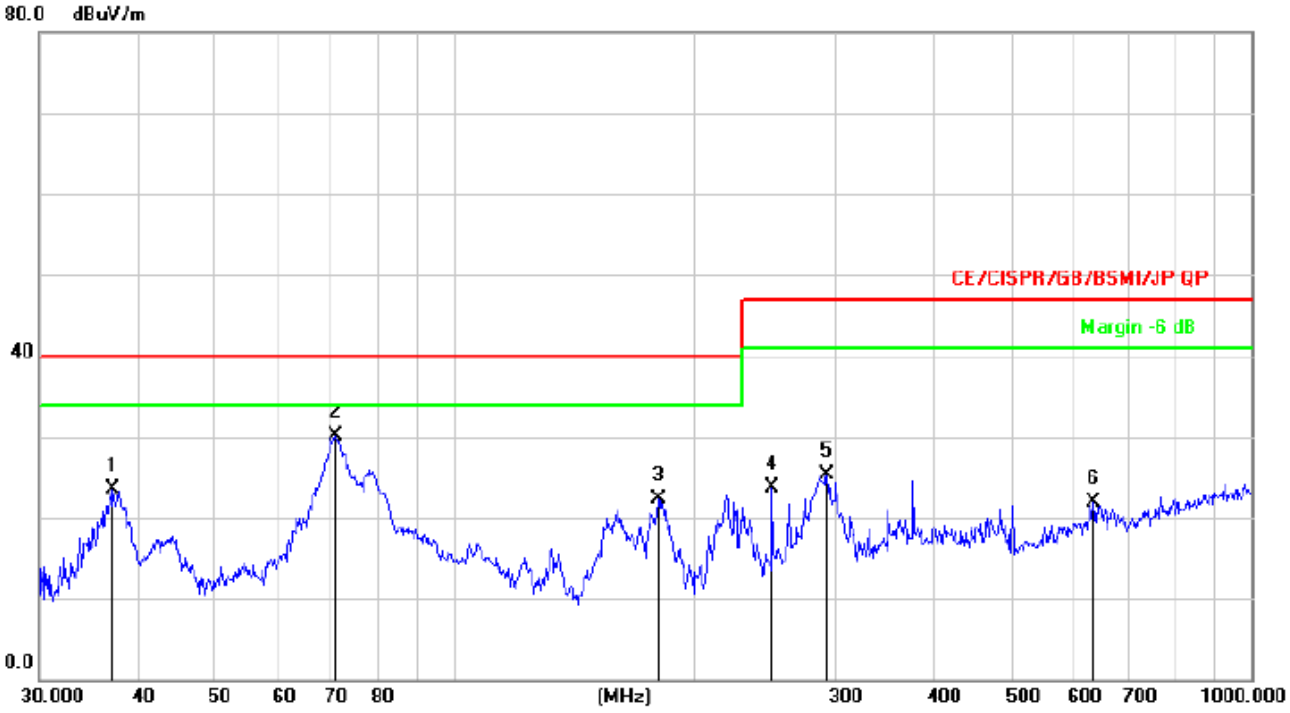
The highest frequency of the internal sources of the EUT was below 108MHz, so the measurement was only made up to 1GHz.

4.7. Test Result

PASS

Please refer to the following page.

Radiation Emission Test Data			
Temperature:	24.5 ℃	Relative Humidity:	54%
Pressure:	1009hPa	Phase :	Horizontal
Test Voltage :	DC 5V from adapter input AC 230V/50Hz	Test Mode:	On Mode



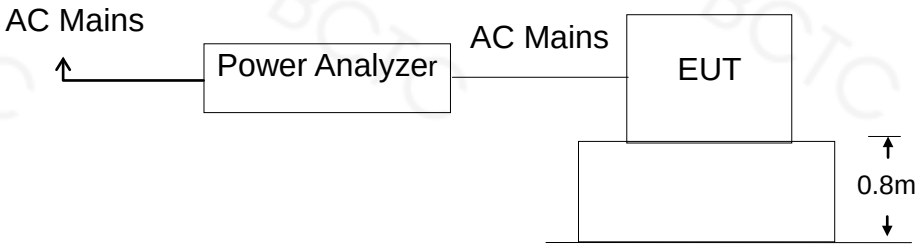
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		37.1550	40.13	-16.54	23.59	40.00	-16.41	QP			
2	*	70.8315	49.39	-19.19	30.20	40.00	-9.80	QP			
3		180.0165	40.12	-17.76	22.36	40.00	-17.64	QP			
4		250.3012	37.53	-13.75	23.78	47.00	-23.22	QP			
5		293.0842	37.48	-12.25	25.23	47.00	-21.77	QP			
6		633.9073	25.98	-4.09	21.89	47.00	-25.11	QP			

Radiation Emission Test Data			
Temperature:	24.5 ℃	Relative Humidity:	54%
Pressure:	1009hPa	Phase :	Vertical
Test Voltage :	DC 5V from adapter input AC 230V/50Hz	Test Mode:	On Mode

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1	!	38.3462	50.94	-16.15	34.79	40.00	-5.21	QP			
2	!	43.2017	50.24	-14.92	35.32	40.00	-4.68	QP			
3	*	70.3365	54.36	-18.98	35.38	40.00	-4.62	QP			
4		158.6677	48.11	-19.10	29.01	40.00	-10.99	QP			
5		180.0165	46.23	-17.76	28.47	40.00	-11.53	QP			
6		219.0753	44.09	-15.43	28.66	40.00	-11.34	QP			

5. HARMONIC CURRENT EMISSION TEST

5.1. Block Diagram of Test Setup



5.2. Test Standard

EN 61000-3-2:2014

5.3. Operating Condition of EUT

5.3.1 Setup the EUT as shown in Section 5.1.

5.3.2 Turn on the power of all equipments.

5.3.3 Let the EUT work in test mode and test it.

5.4. Test Procedure

The power cord of the EUT is connected to the output of the test system. Turn on the power of the EUT and use the test system to test the harmonic current level.

5.5. Test Results

The EUT is powered by the DC only, the test item is not applicable.

6. VOLTAGE FLUCTUATIONS & FLICKER TEST

6.1. Block Diagram of Test Setup

Same as Section 6.1..

6.2. Test Standard

EN 61000-3-3:2013

6.3. Operating Condition of EUT

Same as Section 5.3.. The power cord of the EUT is connected to the output of the test system. Turn on the power of the EUT and use the test system to test the harmonic current level.

Flicker Test Limit

Test items	Limits
Pst	1.0
dc	3.3%
dmax	4.0%
dt	Not exceed 3.3% for 500ms

6.4. Test Procedure

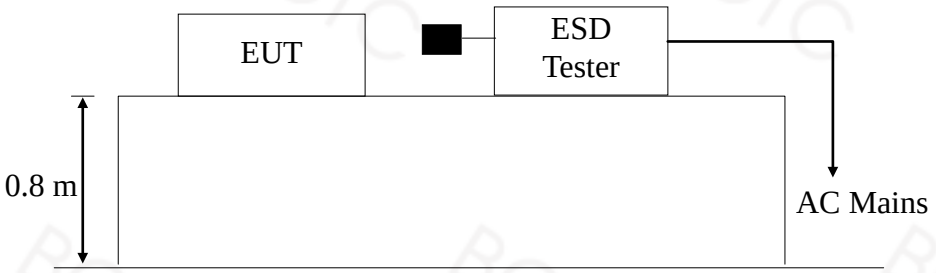
The power cord of the EUT is connected to the output of the test system. Turn on the power of the EUT and use the test system to test the harmonic current level.

6.5. Test Results

The EUT is powered by the DC only, the test item is not applicable.

7. ELECTROSTATIC DISCHARGE IMMUNITY TEST

7.1. Block Diagram of Test Setup



7.2. Test Standard

EN55024:2010+A1:2015, EN 61000-4-2:2009

Severity Level: 3 / Air Discharge:±8KV
Level: 2 / Contact Discharge:±4KV

7.3. Severity Levels and Performance Criterion

7.3.1 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

7.3.2 Performance criterion : B

A. The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.

B. The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.

C. Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

7.4. EUT Configuration

The following equipments are installed on Electrostatic Discharge Immunity test to meet EN55024:2010+A1:2015, EN 61000-4-2:2009, requirement and operating in a manner which tends to maximize its emission characteristics in a normal application. The configuration of EUT is the same as used in conducted emission test.
Please refer to Section 2.4.

7.5. Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section 3.5 except the test setup replaced by Section 7.1.2.

7.6. Test Procedure

7.6.1 Air Discharge**:**

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

7.6.2 Contact Discharge**:**

All the procedure shall be same as Section 7.6.1. Except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

7.6.3 Indirect discharge for horizontal coupling plane

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

the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

7.6.4 Indirect discharge for vertical coupling plane

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

7.7. Test Results

PASS

Please refer to the following page.

ESD Test Data			
Temperature:	24.5℃	Humidity:	53%
Power Supply :	DC 5V	Test Mode:	On

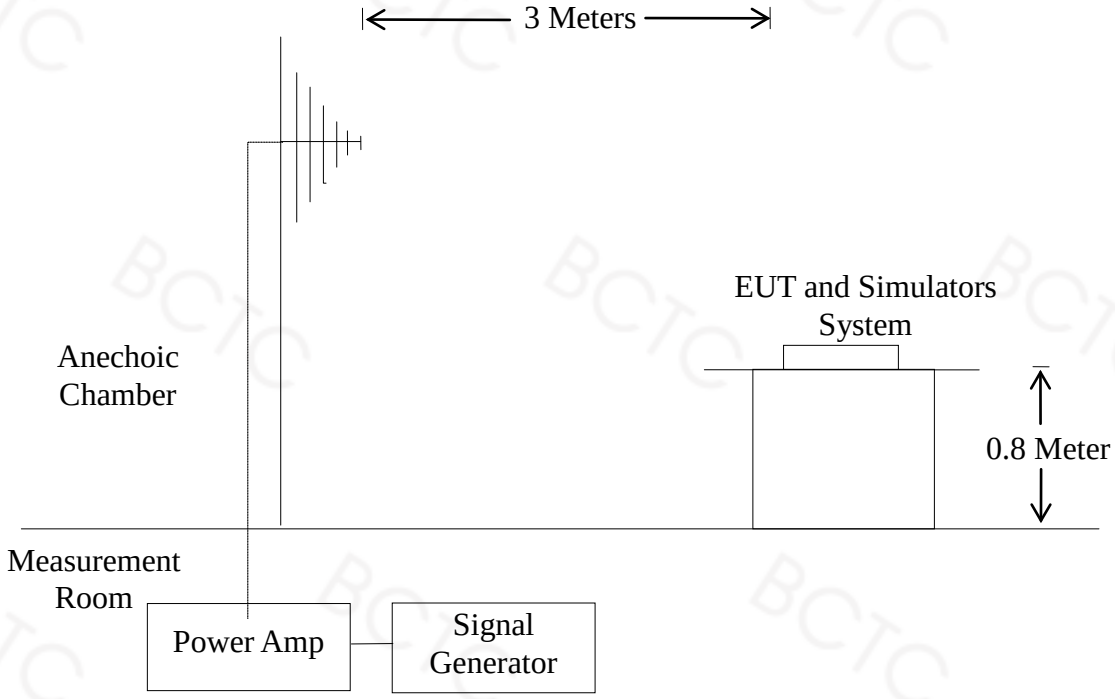
Air Discharge: ± 8KV
Contact Discharge: ± 4KV
For each point positive 25 times and negative 25 times discharge

Test Points	Air Discharge	Contact Discharge	Performance Criterion	Result
Enclosure	±2,4,8KV	N/A	B	PASS
Slit	±2,4,8KV	N/A	B	PASS
Metal Part	N/A	±2,4 KV	B	PASS
VCP	N/A	±2,4 KV	B	PASS
HCP	N/A	±2,4 KV	B	PASS

Note: N/A

8. RF FIELD STRENGTH SUSCEPTIBILITY TEST

8.1. Block Diagram of Test Setup



8.2. Test Standard

EN55024:2010+A1:2015, EN 61000-4-3: 2006+A1:2008+A2:2010
Severity Level 2, 3V / m

8.3. Severity Levels and Performance Criterion

8.3.1. Severity level

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

8.3.2. **Performance criterion: A**

A、 The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.

B、 The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.

C、 Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

8.4. EUT Configuration on Test

The following equipments are installed on Electrical Fast Transient/Burst Immunity test to meet EN55024:2010+A1:2015, EN 61000-4-4:2012, requirement and operating in a manner which tends to maximize its emission characteristics in a normal application. The configuration of EUT is the same as used in conducted emission test.
Please refer to Section 3.4.

8.5. Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section 2.5 except the test setup replaced by Section 8.1.

8.6. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. EUT 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 EUT must be faced this transmitting antenna and measured individually.

All the scanning conditions are as follows **:**

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

8.7. Test Results

PASS

Please refer to the following page.

R/S Test Data			
Temperature : 25℃		Humidity : 53%	
Field Strength: 3 V/m		Criterion: A	
Power Supply: DC 5V		Frequency Range: 80 MHz to 1000 MHz	
Modulation: ☑ AM ☐ Pulse ☐none 1 KHz 80%			
Test Mode **:** On			
	Frequency Range : 80-1000MHz		
Steps	1 %		
	Horizontal	Vertical	Result
Front	A	A	Pass
Right	A	A	Pass
Rear	A	A	Pass
Left	A	A	Pass
Note: N/A			

9. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

9.1. Block Diagram of EUT Test Setup

9.2. Test Standard

EN55024:2010+A1:2015, EN 61000-4-4:2012

9.3. Severity Levels and Performance Criterion

Severity Level 2 at 1KV, Pulse Rise time & Duration: 5 nS / 50 nS
Severity Level:

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

Performance criterion: B

A. The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.

B. The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.

C. Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

9.4. EUT Configuration on Test

The following equipments are installed on Electrical Fast Transient/Burst Immunity test to meet EN55024:2010+A1:2015, EN 61000-4-4:2012, requirement and operating in a manner which tends to maximize its emission characteristics in a normal application. The configuration of EUT is the same as used in conducted emission test.
Please refer to Section 3.4.

9.5. Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section 2.6 except the test setup replaced by Section 9.1.

9.6. Test Procedure

EUT shall be placed 0.8m high above the ground reference plane which is a min.1m*1m metallic sheet with 0.65mm minimum thickness. 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

9.6.1. 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 2 minutes.

9.7. Test Results

The EUT is powered by the DC only, the test item is not applicable.

10. SURGE TEST

10.1. Block Diagram of EUT Test Setup

10.2. Test Standard

EN55024:2010+A1:2015, EN61000-4-5:2014

10.3. Severity Levels and Performance Criterion

Severity Level: Line to Line, Level 2 at 1KV;
Severity Level: Line to Earth, Level 3 at 2KV.

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

Performance criterion: B

A. The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.

B. The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.

C. Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

10.4. EUT Configuration on Test

The following equipments are installed on Electrical Fast Transient/Burst Immunity test to meet EN55024:2010+A1:2015, EN61000-4-5:2014, requirement and operating in a manner which tends to maximize its emission characteristics in a normal application

The configuration of EUT is the same as used in conducted emission test. Please refer to Section 3.4.

10.5. Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section 2.7 except the test setup replaced by Section 10.1.

10.6. Test Procedure

1) Set up the EUT and test generator as shown on section 10.1
2) 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.
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) Repeat procedure 2) to 4) except the open-circuit test voltage change from 1KV to 2KV for line to earth coupling mode test.
6) Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

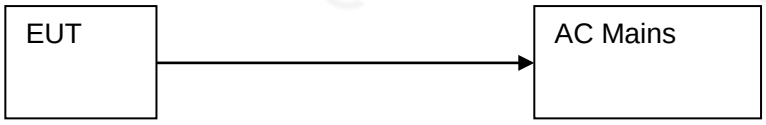
10.7. Test Result

The EUT is powered by the DC only, the test item is not applicable.

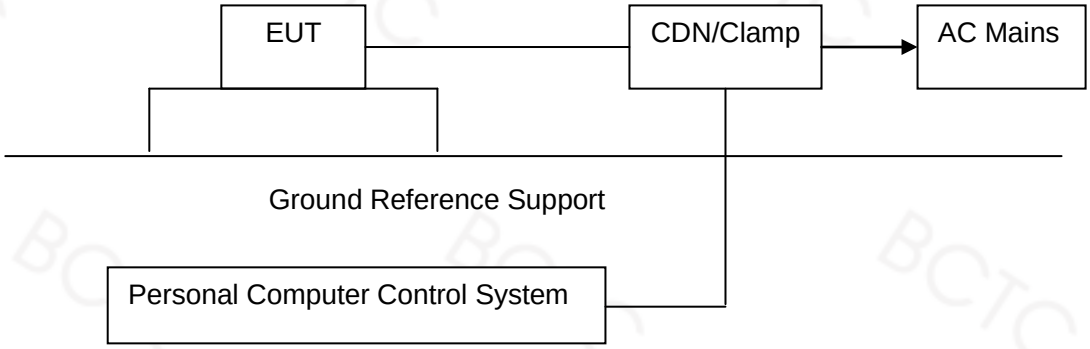
11. INJECTED CURRENTS SUSCEPTIBILITY TEST

11.1. Block Diagram of EUT Test Setup

11.1.1. Block Diagram of EUT Test Setup



11.1.2. Block Diagram of Test Setup



11.2. Test Standard

EN55024:2010+A1:2015, EN61000-4-6:2014

11.3. Severity Levels and Performance Criterion

Severity Level 2: 3V(rms), 150KHz ～ 80MHz

Severity Level:

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

Performance criterion: A

A. The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.

B. The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.

C. Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

11.4. EUT Configuration on Test

The configuration of EUT is the same as used in conducted emission test. Please refer to Section 2.8.

11.5. Operating Condition of EUT

Same as conducted emission test, which is listed in Section 2.8 except the test set up replaced as Section 11.1.

11.6. Test Procedure

1) Set up the EUT, CDN and test generator as shown on section 11.1

2) Let EUT work in test mode and measure.

3) The EUT and supporting equipments 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 at above 0.1-0.3m 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).

4) The disturbance signal described below is injected to EUT through CDN.

5) The EUT operates within its operational mode(s) under intended climatic conditions after power on.

6) The frequency range is swept from 150KHz to 80MHz using 3V 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.

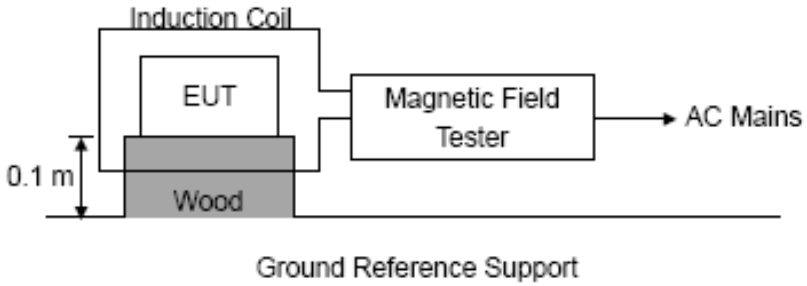
8) Recording the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

11.7. Test Result

The EUT is powered by the DC only, the test item is not applicable.

12. MAGNETIC FIELD IMMUNITY TEST

12.1. Block Diagram of Test Setup



12.2. Test Standard

EN55024:2010+A1:2015, EN61000-4-8:2010
Severity Level 1 at 1A/m

12.3. Severity Levels and Performance Criterion

12.3.1 Severity level

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

12.3.2 Performance criterion**:** B

A. The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.
B. The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.
C. Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

12.4. EUT Configuration on Test

The configuration of EUT is listed in Section 2.9.

12.5. Operating Condition of EUT

Same as conducted emission test, which is listed in Section 2.9 except the test set up replaced as Section 12.1.

12.6. Test Procedure

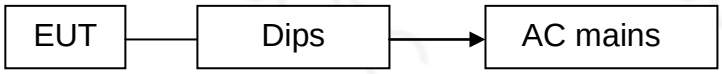
The EUT shall be subjected to the test magnetic field by using the induction coil of standard dimensions (1m*1m) and shown in Section 10.1. The induction coil shall then be rotated by 90° in order to expose the EUT to the test field with different orientations.

12.7. Test Results

The EUT is powered by the DC only, the test item is not applicable.

13. VOLTAGE DIPS AND INTERRUPTIONS TEST

13.1. Block Diagram of EUT Test Setup



13.2. Test Standard

EN55024:2010+A1:2015, EN61000-4-11:2004

13.3. Severity Levels and Performance Criterion

Severity Level:

Input and Output AC Power Ports.

☑ Voltage Dips.

☑ Voltage Interruptions.

Environmental Phenomena	Test Specification	Units	Performance Criterion
Voltage Dips	>95 0.5	% Reduction period	B
	30 25	% Reduction period	C
Voltage Interruptions	>95 250	% Reduction period	C

Performance criterion: B, C, C

A. The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.

B. The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.

C. Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

13.4. EUT Configuration on Test

The configuration of EUT is the same as used in conducted emission test. Please refer to Section 2.10.

13.5. Operating Condition of EUT

Same as conducted emission test, which is listed in Section 2.10 except the test set up replaced as Section 13.1.

13.6. Test Procedure

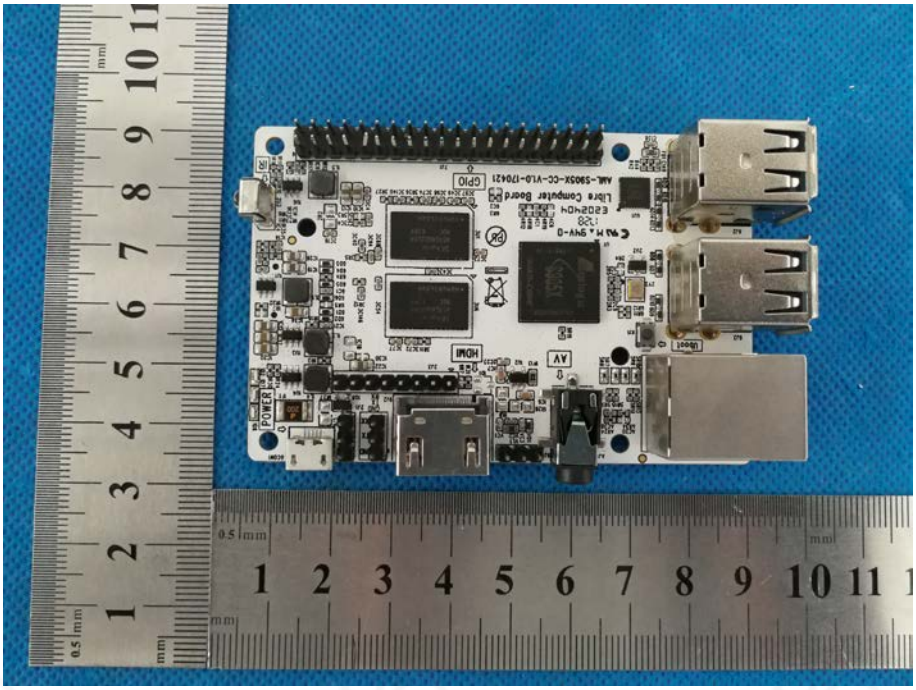
1) Set up the EUT and test generator as shown on section 13.1
2) The interruption is introduced at selected phase angles with specified duration. There is a 3mins minimum interval between each test event.
3) After each test a full functional check is performed before the next test.
4) Repeat procedures 2 & 3 for voltage dips, only the level and duration is changed.
5) Record any degradation of performance.

13.7. Test Result

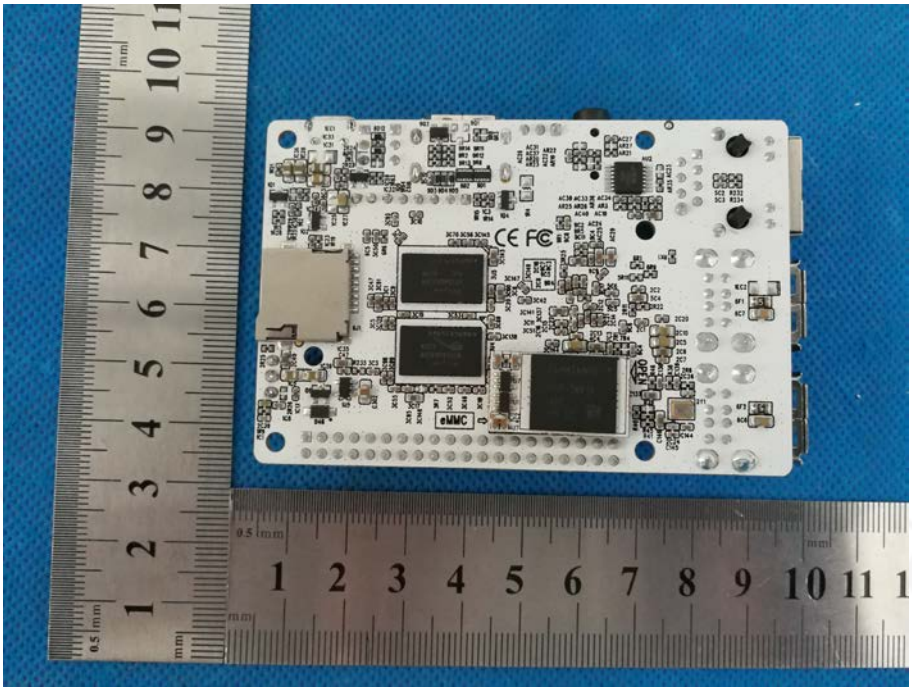
The EUT is powered by the DC only, the test item is not applicable.

14. EUT PHOTOGRAPHS

EUT Photo 1



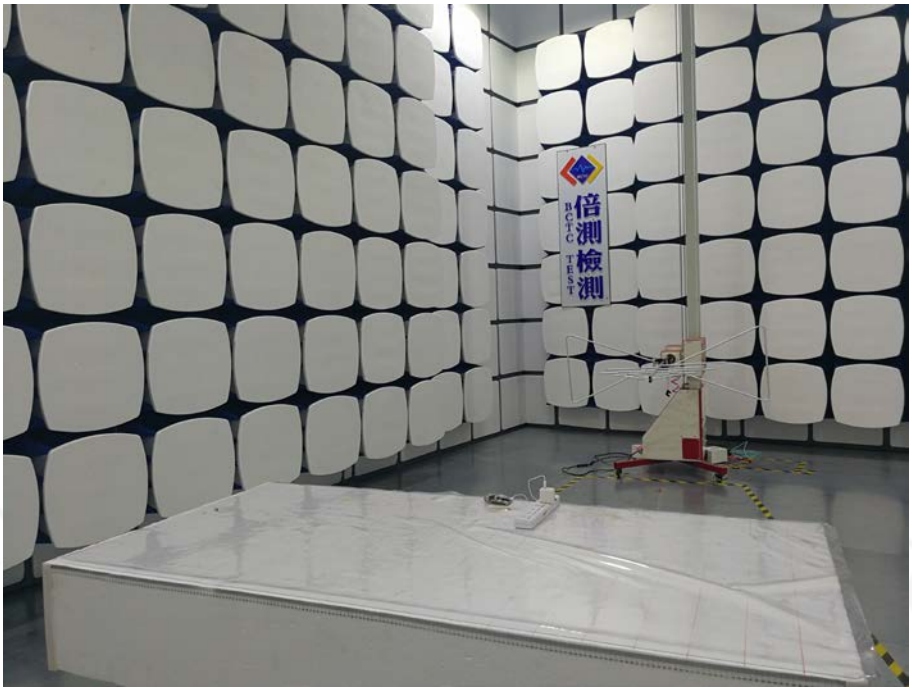
EUT Photo 2



15. EUT TEST PHOTOGRAPHS

CE

RE



ESD

RS

※※※※※ END OF REPORT ※※※※※