

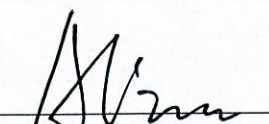
EMC TEST REPORT

The device described below is tested by Dongguan Nore Testing Center 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. Dongguan Nore Testing Center Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

Applicant : Boardcon Technology Limited
Address : Room 702, HuaFeng XinAn Business Building, 45Zone, BaoAn District, Shenzhen, Guangdong Province, China
Manufacturer : Boardcon Technology Limited
Address : Room 702, HuaFeng XinAn Business Building, 45Zone, BaoAn District, Shenzhen, Guangdong Province, China
E.U.T. : MINI3288 Computer on Module
Brand Name : N/A
Model No. : MINI3288
Measurement Standard : EN 55032: 2015
EN 61000-3-2: 2014, EN 61000-3-3: 2013
EN 55024: 2010+A1: 2015
(EN 61000-4-2: 2009, EN 61000-4-3: 2006+A2: 2010,
EN 61000-4-4: 2012, EN 61000-4-5: 2014,
EN 61000-4-6: 2014, EN 61000-4-11: 2004)
Date of Receiver : November 19, 2016
Date of Test : November 21, 2016 to November 26, 2016
Date of Report : November 26, 2016

This Test Report is Issued Under the Authority of :

Prepared by



Alma Guo / Engineer

Approved & Authorized Signer



Iori Fan / Authorized Signatory

This report shows that the E.U.T. is technically compliant with the EN 55032, EN 61000-3-2, EN 61000-3-3, and EN 55024. This report applies to above tested sample only and shall not be reproduced in part without written approval of Dongguan Nore Testing Center Co., Ltd. .

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Appendix I (Photos of E.U.T.) (1 page)

Revision History of This Test Report

Report Number	Description	Issued Date
NTC1611250E	Initial Issue	2016-11-26

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	Mains Terminal Disturbance Voltage Test	PASS	Uncertainty: 2.7dB
	Radiated Emission Test	PASS	Uncertainty: 3.4dB
EN 61000-3-2: 2014	Harmonic current emission	PASS	Not applicable.
EN 61000-3-3: 2013	Voltage fluctuations & flicker	PASS	Meets the requirements.

IMMUNITY(EN 55024: 2010+A1: 2015)			
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: 2006	Surge immunity test	PASS	Meets the requirements of Performance Criterion B
EN 61000-4-6: 2014	Injected Currents immunity test	PASS	Meets the requirements of Performance Criterion A
EN 61000-4-11: 2004	Voltage Dips and Interruptions	PASS	Meets the requirements of Performance Criterion B&C

2. GENERAL INFORMATION

2.1 Details of E.U.T.

E.U.T. : MINI3288 Computer on Module

Model No. : MINI3288

Brand Name : N/A

EUT Type : Class B

Operation Frequency : Below 108MHz (Declaration by manufacturer)

Rating : DC 5V From Adapter

Test Voltage : AC 230V/50Hz

Cable : None

Description of model difference : None

Remark : None

2.2 Description of Support Device

Adapter : M/N: GDP30A-0503000-EU
Input: AC 100-240V, 50/60Hz, 0.8A
Output: DC 5V, 3.0A

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, August 14, 2015
The certificate is valid until August 13, 2018
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 18, 2014
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 and Technology
Park, Hongtu Road, Nancheng District, Dongguan
City, Guangdong Province, China.

2.5 Abnormalities from Standard Conditions

According to the applicant's requirement:

ESD Immunity test at Indirect Discharge (HCP and VCP).

3. MEASURING DEVICES AND TEST EQUIPMENT

3.1 For 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, 2016	1 Year
2.	L.I.S.N	Rohde & Schwarz	ENV 216	101317	Mar. 07, 2016	1 Year
3.	L.I.S.N	Schwarzbeck	NNLK8129	8129-212	Mar. 07, 2016	1 Year
4.	RF Switching Unit	Compliance Direction Systems Inc.	RSU-M2	38311	Mar. 07, 2016	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, 2016	1 Year
2.	Antenna	Schwarzbeck	VULB9162	9162-010	Apr. 25, 2016	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	PF401A-200	110318	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, 2016	1 Year
9.	Cable	Huber+Suhner	RG223U	N/A	Mar. 07, 2016	1 Year
10.	Power Amplifier	HP	HP 8447D	1145A00203	Mar. 07, 2016	1 Year

3.3 For Harmonic / Flicker Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Power Frequency Test System	California Instruments	CTS	72846	Apr. 25, 2016	1 Year
2.	Software	California Instruments	CTS30	N/A	N/A	N/A

3.4 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, 2016	1 Year

3.5 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, 2016	1 Year
2.	Antenna	Schwarzbeck	VULB9162	9162-010	Apr. 25, 2016	1 Year
3.	RF Power Meter	ESE	4242	13984	Aug. 31, 2016	1 Year
4.	Power Amplifier	TESEQ	CBA 1G-150	T44029	N/A	N/A
5.	Power Sensor	ESE	51011EMC	35716	Aug. 31, 2016	1 Year

3.6 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, 2016	1 Year
2.	Coupling Clamp	EM TEST	HFK	0311-94	Mar. 07, 2016	1 Year
3.	Test Soft	EM TEST	lec. control	N/A	N/A	N/A

3.7 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, 2016	1 Year
2.	Test Soft	EM TEST	lec. control	N/A	N/A	N/A

3.8 For Injected Currents Immunity Measurement

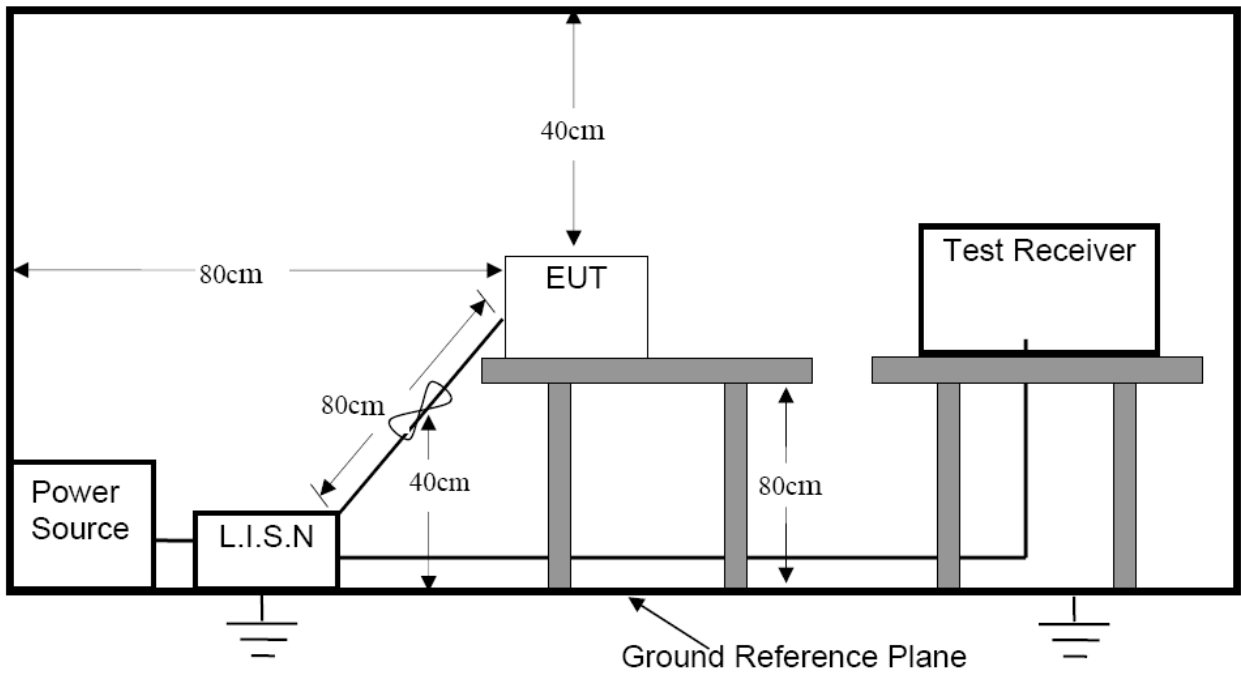
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	CDN	Luthi	L-801M2/M3	2015	Oct.19, 2016	1 Year
2.	C/S Test System	HAEFELY	WinPAMP	NSEMC002	N/A	N/A

3.9 For Voltage Dips and Interruptions Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Dips Tester	EM TEST	UCS500N	V1104108683	Mar. 07, 2016	1 Year
2.	Test Soft	EM TEST	lec.control	N/A	N/A	N/A
3.	Dips Modulator	EM TEST	V4780S2	0111-11	Mar. 07, 2016	1 Year

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 of class B.

Frequency range	Limits (dB(uV))	
(MHz)	Quasi-peak	Average
0.15 to 0.5	66 to 56	56 to 46
0.5 to 5	56	46
5 to 30	60	50

- 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 mode (Empty Load) and test it.

4.5 Mains Terminal Disturbance Voltage Test Results

PASS.

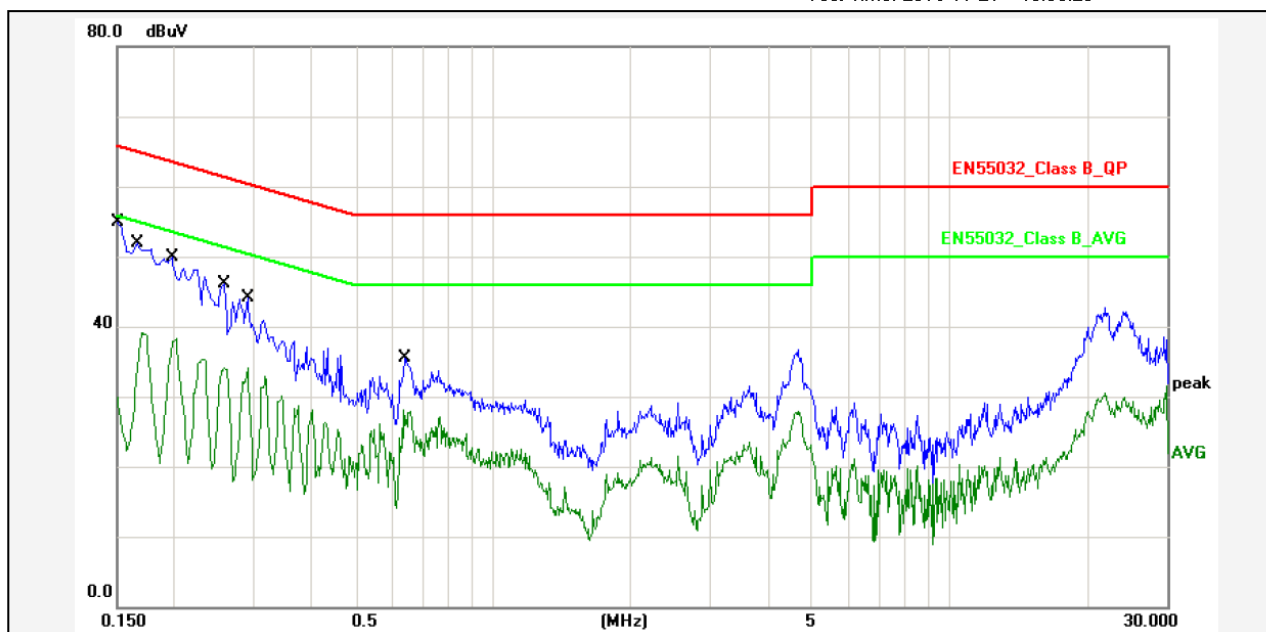
Please refer to the following pages.



Dongguan NTC Co., Ltd.
Tel: +86-769-22022444 Fax: +86-769-22022799
Web: [Http://www.ntc-c.com](http://www.ntc-c.com)

Site: Conduction

Test Time: 2016-11-21 18:03:20



Report No.: MINI3288

Test Standard: EN55032_Class B_QP

Test item: Conducted Emission

Phase: L1

Applicant: Boardcon

Temp.()/Hum.(%): 22(C) / 52 %

Product: MINI3288 Computer on Module

Power Rating: AC 230V/50Hz

Model No.: MINI3288

Test Engineer: Ryan

Test Mode: Empty Load

Remark:

No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1500	10.80	42.00	52.80	65.99	-13.19	QP	P	
2	0.1500	10.80	16.50	27.30	55.99	-28.69	AVG	P	
3	0.1660	10.80	38.80	49.60	65.15	-15.55	QP	P	
4	0.1660	10.80	26.40	37.20	55.15	-17.95	AVG	P	
5	0.1980	10.80	37.00	47.80	63.69	-15.89	QP	P	
6	0.1980	10.80	25.40	36.20	53.69	-17.49	AVG	P	
7	0.2580	10.80	33.90	44.70	61.49	-16.79	QP	P	
8	0.2580	10.80	22.70	33.50	51.49	-17.99	AVG	P	
9	0.2900	10.80	31.70	42.50	60.52	-18.02	QP	P	
10	0.2900	10.80	21.40	32.20	50.52	-18.32	AVG	P	
11	0.6419	10.80	22.60	33.40	56.00	-22.60	QP	P	
12	0.6419	10.80	15.00	25.80	46.00	-20.20	AVG	P	

Note: Level=Reading+Factor.

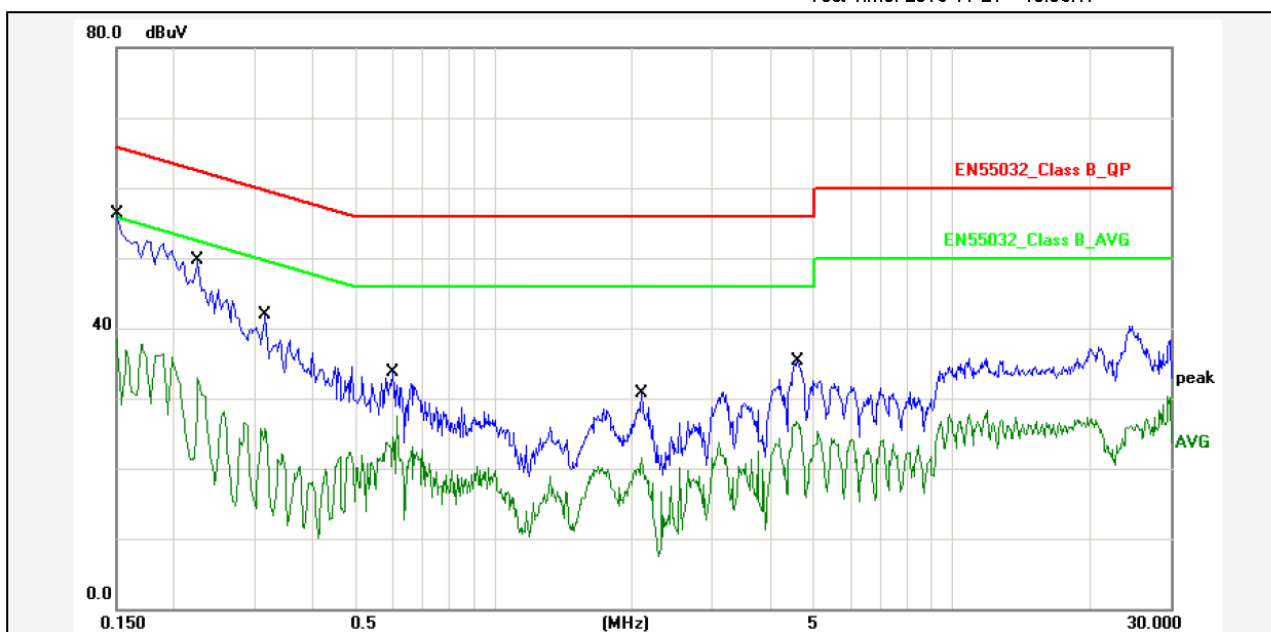
Margin=Limit-Level.



Dongguan NTC Co., Ltd.
Tel: +86-769-22022444 Fax: +86-769-22022799
Web: [Http://www.ntc-c.com](http://www.ntc-c.com)

Site: Conduction

Test Time: 2016-11-21 18:56:17



Report No.: MINI3288

Test Standard: EN55032_Class B_QP

Test item: Conducted Emission

Applicant: Boardcon

Product: MINI3288 Computer on Module

Model No.: MINI3288

Phase: N

Temp.()/Hum.(%): 22(C) / 52 %

Power Rating: AC 230V/50Hz

Test Engineer: Ryan

Test Mode: Empty Load

Remark:

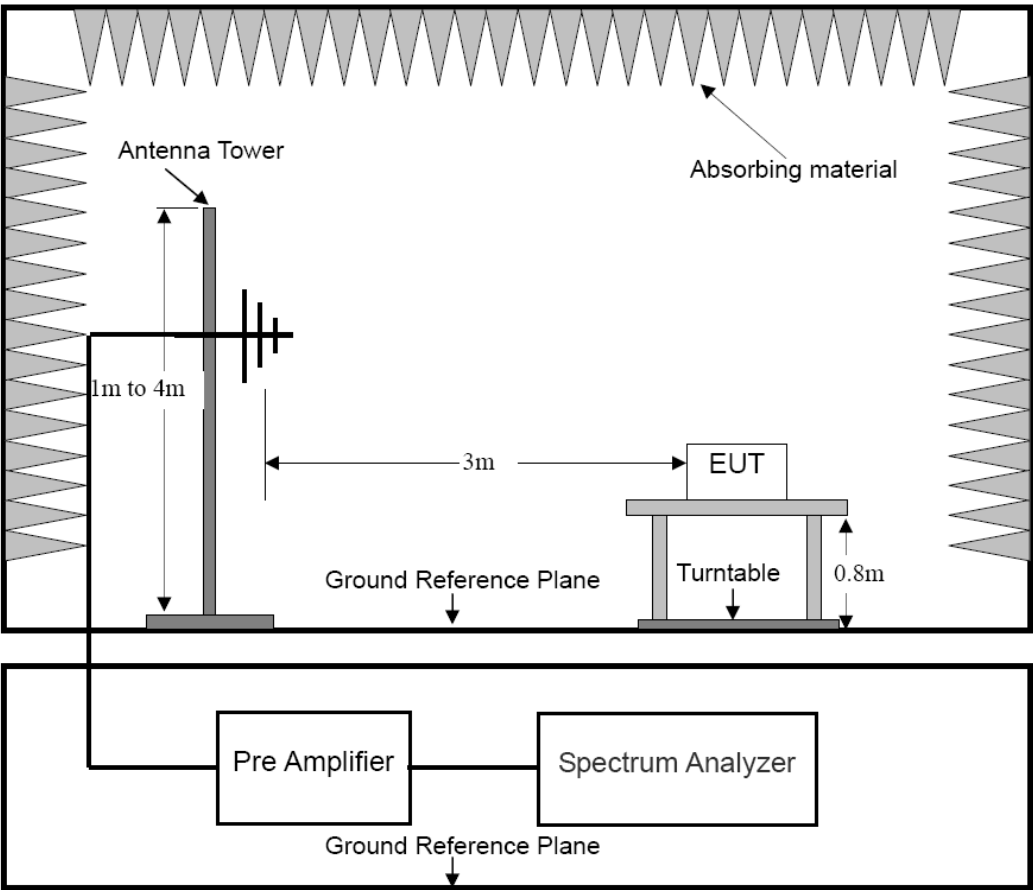
No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1500	10.80	43.50	54.30	65.99	-11.69	QP	P	
2	0.1500	10.80	25.70	36.50	55.99	-19.49	AVG	P	
3	0.2260	10.80	36.40	47.20	62.59	-15.39	QP	P	
4	0.2260	10.80	20.00	30.80	52.59	-21.79	AVG	P	
5	0.3180	10.80	29.00	39.80	59.76	-19.96	QP	P	
6	0.3180	10.80	13.50	24.30	49.76	-25.46	AVG	P	
7	0.6020	10.80	20.80	31.60	56.00	-24.40	QP	P	
8	0.6020	10.80	14.70	25.50	46.00	-20.50	AVG	P	
9	2.1060	10.80	17.90	28.70	56.00	-27.30	QP	P	
10	2.1060	10.80	8.50	19.30	46.00	-26.70	AVG	P	
11	4.6179	10.80	22.40	33.20	56.00	-22.80	QP	P	
12	4.6179	10.80	13.80	24.60	46.00	-21.40	AVG	P	

Note: Level=Reading+Factor.

Margin=Limit-Level.

5. RADIATED EMISSION MEASUREMENT

5.1 Block Diagram of Test



5.1 Limit of Radiated Emission Measurement

Test Standard: EN 55032

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

Frequency range MHz	Quasi-peak limits dB(uV/m)
30 to 230	40
230 to 1000	47

Note 1 The lower limit shall apply at the transition frequency.
Note 2 Additional provisions may be required for cases where interference occurs.

5.2 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.

The bandwidth of the EMI test receiver (R&S ESCI7) is set at 120 KHz.
The frequency range from 30 MHz to 1000 MHz is checked.

5.3 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 mode (Empty Load) and test it.

5.4 Radiated Emission Measurement Result

PASS.

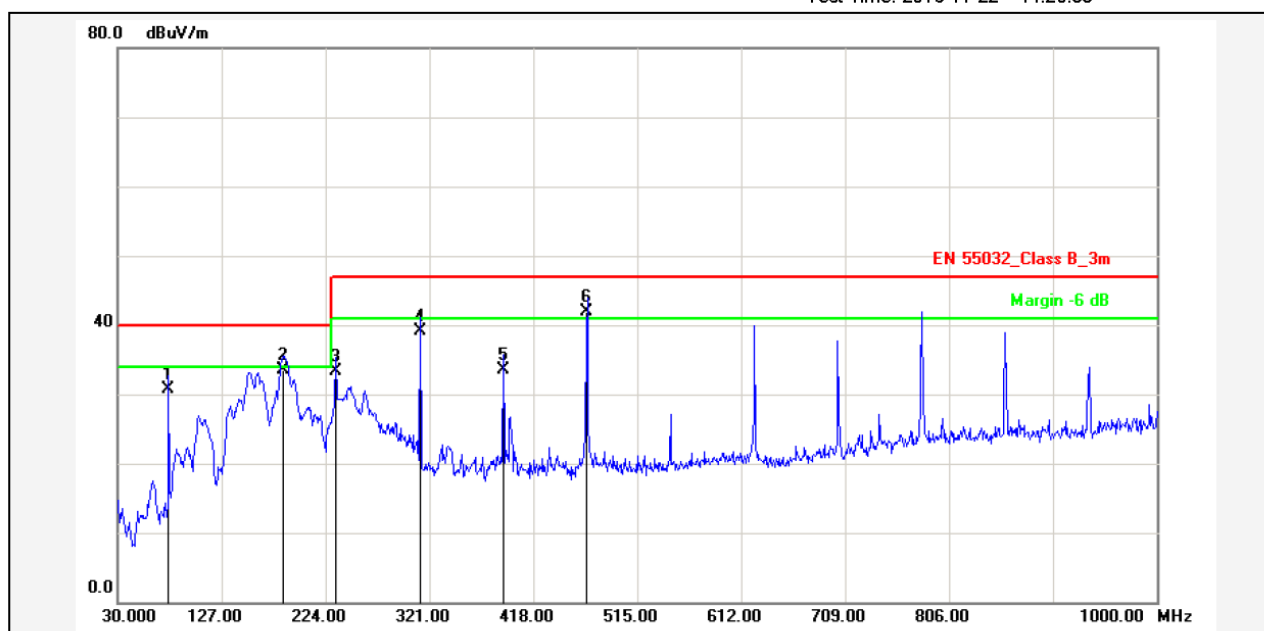
Please refer to the following pages.



Dongguan NTC Co., Ltd.
Tel: +86-769-22022444 Fax: +86-769-22022799
Web: <http://www.ntc-c.com>

Site: Radiation

Test Time: 2016-11-22 14:20:53



Report No.: MINI3288

Test Standard: EN 55032_Class B_3m

Test item: Radiation Emission

Applicant: Boardcon

Product: MINI3288 Computer on Module

Model No.: MINI3288

Test Distance: 3m

Ant. Polarization: Horizontal

Temp.(C)/Hum.(%): 22(C) / 54 %

Power Rating: AC 230V/50Hz

Test Engineer: Ryan

Test Mode: Empty Load

Remark:

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	77.5300	-18.55	49.25	30.70	40.00	-9.30	QP			P	
2	184.2298	-13.88	47.38	33.50	40.00	-6.50	QP			P	
3	233.6999	-12.30	45.60	33.30	47.00	-13.70	QP			P	
4	312.2699	-10.13	49.23	39.10	47.00	-7.90	QP			P	
5	389.8700	-9.15	42.75	33.60	47.00	-13.40	QP			P	
6	468.4399	-7.52	49.42	41.90	47.00	-5.10	QP			P	

Note: Level=Reading+Factor.

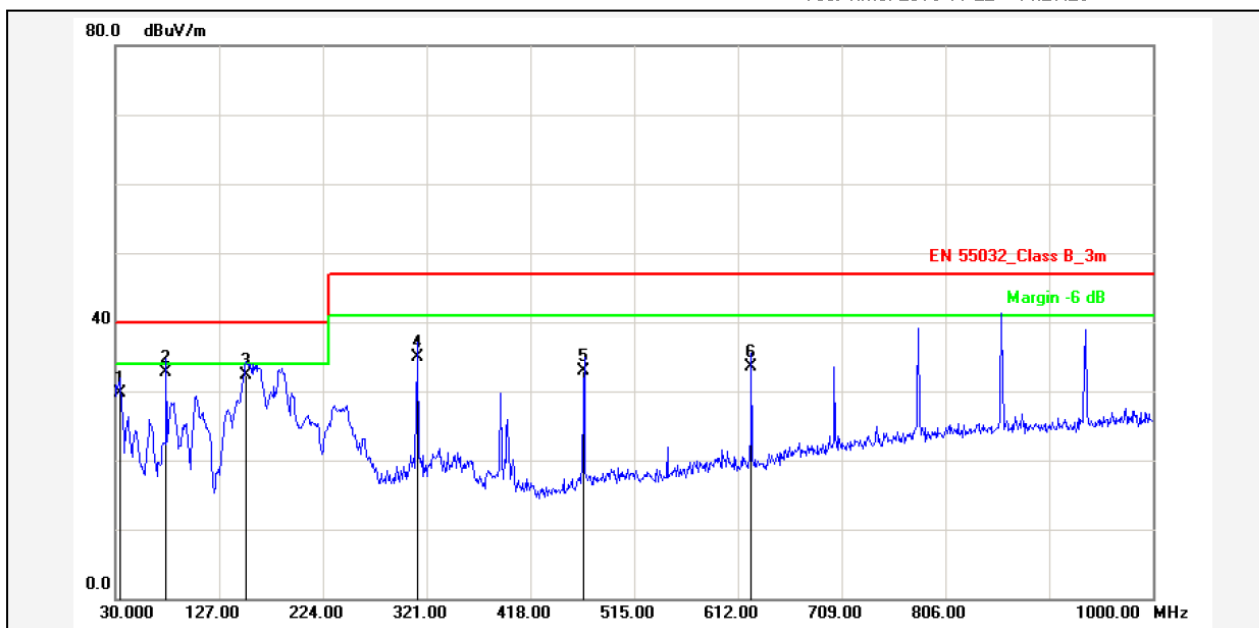
Margin=Limit-Level.



Dongguan NTC Co., Ltd.
Tel: +86-769-22022444 Fax: +86-769-22022799
Web: [Http://www.ntc-c.com](http://www.ntc-c.com)

Site: Radiation

Test Time: 2016-11-22 14:27:26



Report No.: MINI3288

Test Standard: EN 55032_Class B_3m

Test item: Radiation Emission

Applicant: Boardcon

Product: MINI3288 Computer on Module

Model No.: MINI3288

Test Distance: 3m

Ant. Polarization: Vertical

Temp.(C)/Hum.(%): 22(C) / 54 %

Power Rating: AC 230V/50Hz

Test Engineer: Ryan

Test Mode: Empty Load

Remark:

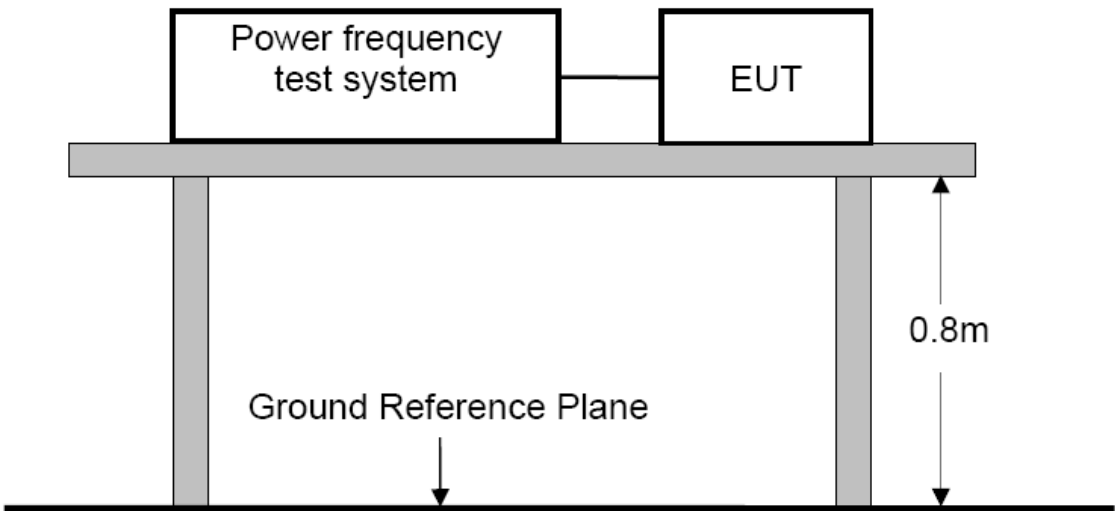
No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	33.8800	-15.57	45.37	29.80	40.00	-10.20	QP			P	
2	77.5300	-19.08	51.78	32.70	40.00	-7.30	QP			P	
3	152.2199	-18.43	50.73	32.30	40.00	-7.70	QP			P	
4	312.2699	-12.13	47.13	35.00	47.00	-12.00	QP			P	
5	468.4399	-9.52	42.42	32.90	47.00	-14.10	QP			P	
6	624.6100	-6.85	40.35	33.50	47.00	-13.50	QP			P	

Note: Level=Reading+Factor.

Margin=Limit-Level.

6. HARMONIC CURRENT EMISSION TEST

6.1 Block Diagram of Test Setup



6.2 Limits of Harmonics current measurement

Test Standard: EN 61000-3-2: 2014

Limits for Class A equipment	
Harmonics Order n	Max. permissible harmonics current A
Odd harmonics	
3	2.30
5	1.14
7	0.77
9	0.40
11	0.33
13	0.21
$15 \leq n \leq 39$	$0.15 \times 15/n$
Even harmonics	
2	1.08
4	0.43
6	0.30
$8 \leq n \leq 40$	$0.23 \times 8/n$

For the following categories of equipment limits are not specified in this edition of the standard.

Note 1: Equipment with a rated power of 75W or less, other than lighting equipment.

6.3 Test Procedure

The E.U.T. was put on the top of a wooden table 0.8m above the ground and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.

The E.U.T. is classified as follows:

Class A:

Balanced three-phase equipment, Household appliances excluding equipment as Class D, Tools excluding portable tools, Dimmers for incandescent lamps, audio equipment, equipment not specified in one of the three other classes.

Class B:

Portable tools; Arc welding equipment which is not professional equipment.

Class C:

Lighting equipment.

Class D:

Equipment having a specified power less than or equal to 600W of the following types: Personal computers and personal computer monitors and television receivers.

6.4 Operating Condition of E.U.T.

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

6.4.2 Turn on the power of all equipments.

6.4.3 Let the E.U.T. work in test mode (Empty Load) and test it.

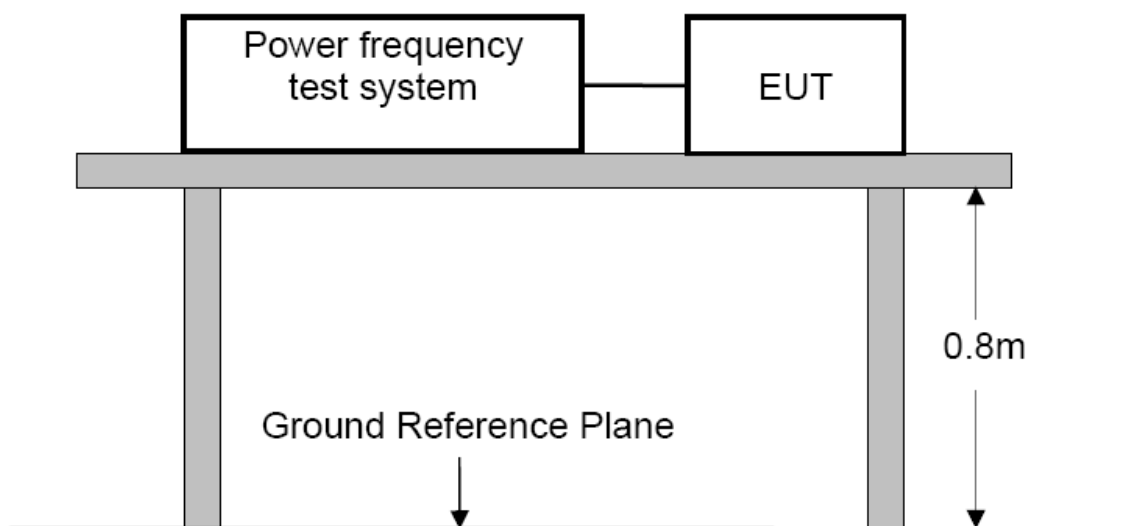
6.5 Harmonics Current Measurement Result

PASS.

According to clause 7 of EN 61000-3-2, equipment with a rated power of 75W or less, no limits apply. It is considered to meet the requirements of the standard.

7. VOLTAGE FLUCTUATIONS & FLICKER TEST

7.1 Block Diagram of Test Setup



7.2 Limits of Voltage Fluctuations & Flicker Measurement

Test Standard: EN 61000-3-3: 2013

Test Item	Limit
P_{st} (Short-term flicker indicator.)	1.0
P_{lt} (Long-term flicker indicator.)	0.65
$T_{d(t)}$ (ms) (Maximum time that $d(t)$ exceeds 3.3%)	500
$d_{max}(\%)$ (Maximum relative voltage change.)	4
$d_c(\%)$ (Relative steady-state voltage change)	3.3

7.3 Test Procedure

The E.U.T. was put on the top of a wooden table 0.8m above the ground and operated to produce the most unfavorable sequence of voltage changes under normal operating conditions.

7.4 Operating Condition of E.U.T.

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

7.4.2 Turn on the power of all equipments.

7.4.3 Let the E.U.T. work in test mode (Empty Load) and test it.

7.5 Test Results

PASS.

Please refer to the following page.

Flicker Test Summary per EN/IEC61000-3-3 (Run time)

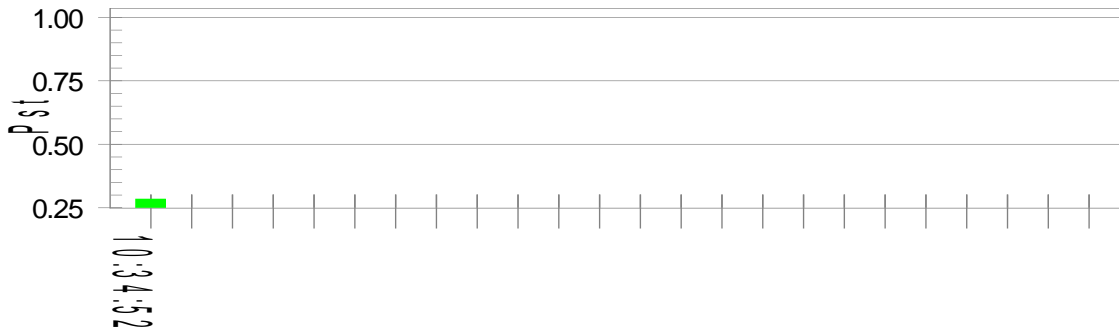
EUT: MINI3288 Computer on Module
Test category: All parameters (European limits)
Test date: 2016-11-22
Test duration (min): 10
Comment: Empty Load
Customer: Boardcon
M/N: MINI3288
Test Result: Pass

Tested by: Ryan
Test Margin: 100
Start time: 10:24:22
End time: 10:34:53
Data file name: F-000073.cts_data

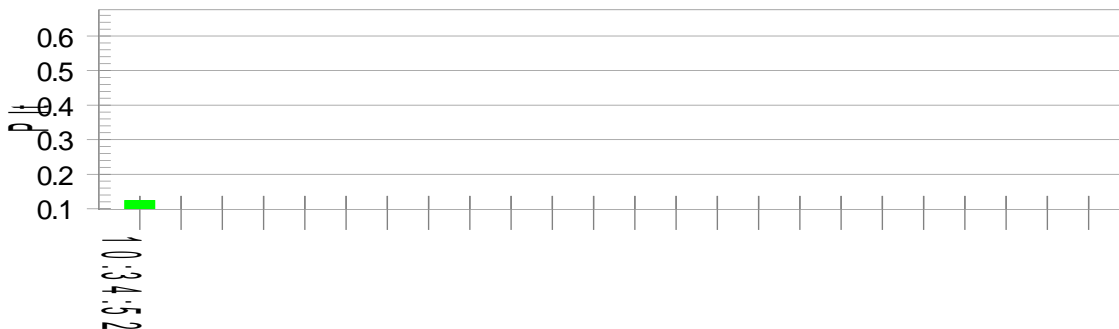
Status: Test Completed

Pst_i and limit line

European Limits



Plt and limit line



Parameter values recorded during the test:

Vrms at the end of test (Volt):	230.25		
Highest dt (%):	-0.24	Test limit (%):	N/A
T-max (mS):	0	Test limit (mS):	500.0
Highest dc (%):	0.00	Test limit (%):	3.30
Highest dmax (%):	0.21	Test limit (%):	4.00
Highest Pst (10 min. period):	0.284	Test limit:	1.000
Highest Plt (2 hr. period):	0.124	Test limit:	0.650
			Pass

8. PERFORMANCE CRITERIA FOR IMMUNITY

The performance criteria are referred to the test standard: EN 55024

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 or 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 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.

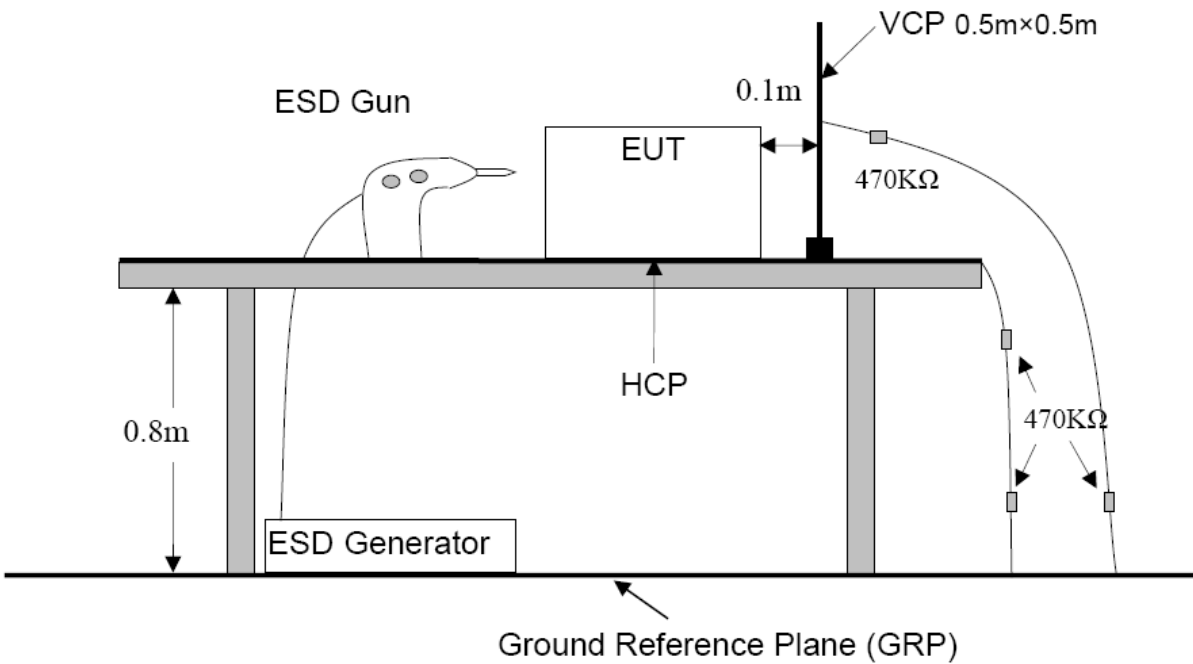
Performance Criteria C

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.

9. ELECTROSTATIC DISCHARGE TEST

9.1 Block Diagram of Test Setup



9.2 Test Standard and Severity Levels

9.2.1 Test Standard:
EN 55024
(EN 61000-4-2: 2009 Air Discharge: Severity Level: 3, ± 8KV;
Contact Discharge: Level: 2, ± 4KV)

9.2.2 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

9.3 Test Procedure

9.3.1 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 (10 of each polarity) for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

9.3.2 Contact discharges to the conductive surfaces and to coupling planes:

The EUT shall be exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points. For table-top equipment one of the test points shall be the centre front edge of the horizontal coupling plane, which shall be subjected to at least 50 indirect discharges (25 of each polarity). All other test points shall each receive at least 50 direct contact discharges (25 of each polarity). All areas normally touched by the user should be tested. If no direct contact test points are available, then at least 200 indirect discharges shall be applied in the indirect mode.

9.3 Test Results

PASS.

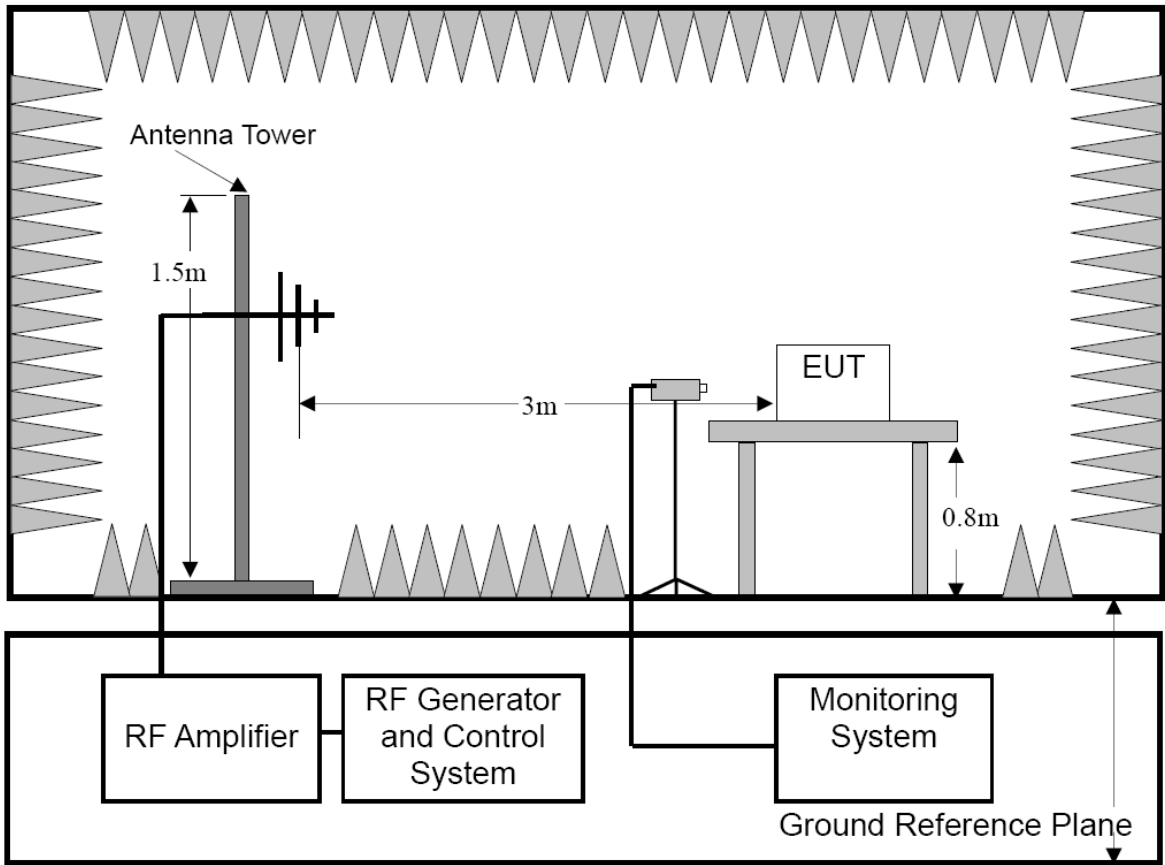
Please refer to the following page.

Electrostatic Discharge Test Results

Ambient Condition:	Temp.: 25℃	R.H.: 56%	Air Pressure : 101 kPa
Power Supply:	AC 230V/50Hz	Required Performance Criterion : B	
Test level:	±2, 4 KV Contact Discharge; For each point positive 25 times and negative 25 times ±2, 4, 8 KV Air Discharge For each point positive 10 times and negative 10 times		
Tested mode:	Empty Load		
Test Point		Kind A-Air Discharge C-Contact Discharge	Result (Performance Criterion)
Indirect Discharge (HCP)		C	A
Indirect Discharge (VCP)		C	A
Note:			
Test Equipment : ESD Tester (TESEQ, NSG 437)		Test Engineer : Ryan	

10. RF FIELD STRENGTH SUSCEPTIBILITY TEST

10.1 Block Diagram of Test Setup



10.2 Test Standard and Severity Levels

10.2.1 Test Standard
EN 55024
(EN 61000-4-3: 2006+A2: 2010, Severity Level: 2, 3V / m)

10.2.2 Severity Levels

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

10.3 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	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.

10.4 Test Results

PASS.

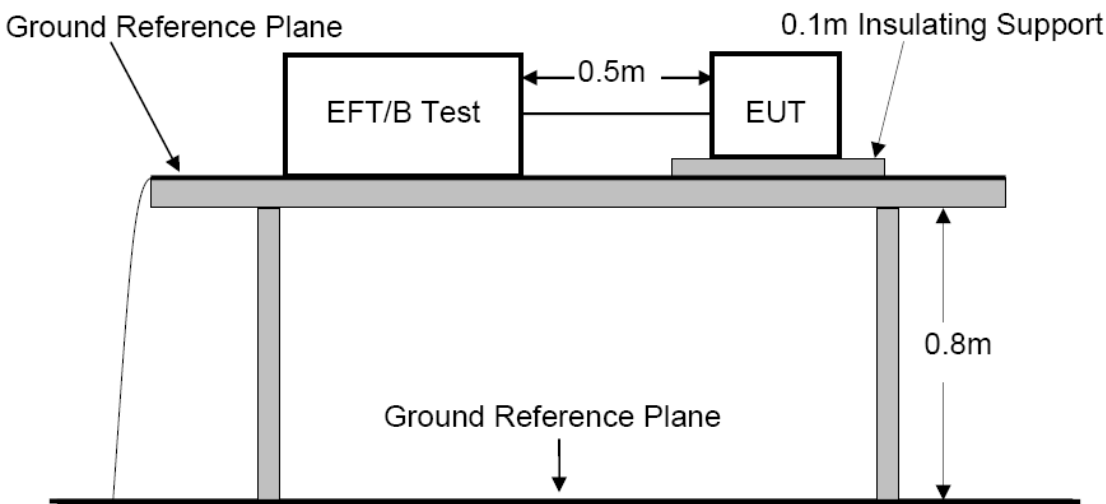
Please refer to the following page.

RF Field Strength Susceptibility Test Results

Ambient Condition:	Temp.: 25℃	R.H.: 56%	Air Pressure: 101 kPa	
Power Supply:	AC 230V/50Hz	Required Performance Criterion: A		
Test Specifications:	Modulation: 1kHz, 80%AM; Step Size: 1%; Dwell Time: 1s			
Tested mode:	Empty Load			
Frequency (MHz)	Level (V/m)	Antenna polarity	Side	Result (Performance Criterion)
80-1000	3	Horizontal	Front	A
			Left	A
			Right	A
			Back	A
		Vertical	Front	A
			Left	A
			Right	A
			Back	A
Note:				
Test Equipment : 1. RF Power Meter : (ESE, 4242) 2. Power Amplifier : (TESEQ, CBA 1G-150) 3. Signal Generator : (Agilent, N5181A) 4. Power Sensor : (ESE, 51011EMC) 5. Antenna (Schwarzbeck, VULB9162)				
				Test Engineer : Ryan

11. ELECTRICAL FAST TRANSIENT/BURST TEST

11.1 Block Diagram of Test Setup



11.2 Test Standard and Severity Levels

11.2.1 Test Standard
EN 55024
(EN 61000-4-4: 2012, Severity Level, Level 2: 1KV)

11.2.2 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
<p>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.</p> <p>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.</p> <p>Note 3 "X" is an open level. The level has to be specified in the dedicated equipment specification.</p>				

11.3 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.

11.3.1 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 minus.

11.3.2 For signal lines ports:

It's unnecessary to test.

11.3.3 For DC ports:

It's unnecessary to test.

11.4 Test Result

PASS.

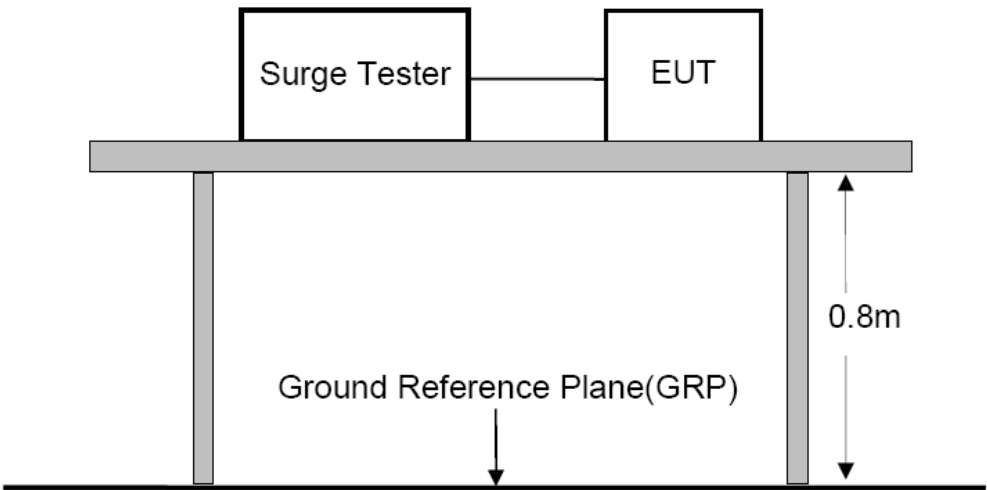
Please refer to the following page.

Electrical Fast Transient/Burst Test Results

Ambient Condition:	Temp.: 25°C	R.H.: 56%	Air Pressure: 101 kPa
Power Supply:	AC 230V/50Hz	Required Performance Criterion: B	
Test Specifications:	Repetition Frequency: 5kHz; Duration: 15ms; Period: 300ms		
Test mode:	Empty Load		
Line : <input checked="" type="checkbox"/> AC Mains <input type="checkbox"/> Signal line <input type="checkbox"/> DC line Coupling : <input checked="" type="checkbox"/> Direct <input type="checkbox"/> Capacitive			
Line	Test Voltage	Result (Performance Criterion)	
L	±1KV	A	
N	±1KV	A	
PE			
L、N	±1KV	A	
L、PE			
N、PE			
L、N、PE			
Signal line			
DC line			
Note :			
Test Equipment : Burst Tester(EM TEST, UCS500N)		Test Engineer : Ryan	

12. SURGE IMMUNITY TEST

12.1 Block Diagram of Test Setup



12.2 Test Standard and Severity Levels

12.2.1 Test Standard

EN 55024

(EN 61000-4-5: 2014, Severity Level: Line To Line, Level 2:
1.0KV)

12.2.2 Severity level

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

12.3 Test Procedure

1. Set up the E.U.T. and test generator as shown on Section 12.1.
2. For line to line coupling mode, provide a 4.0KV 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.

12.4 Test Result

PASS.

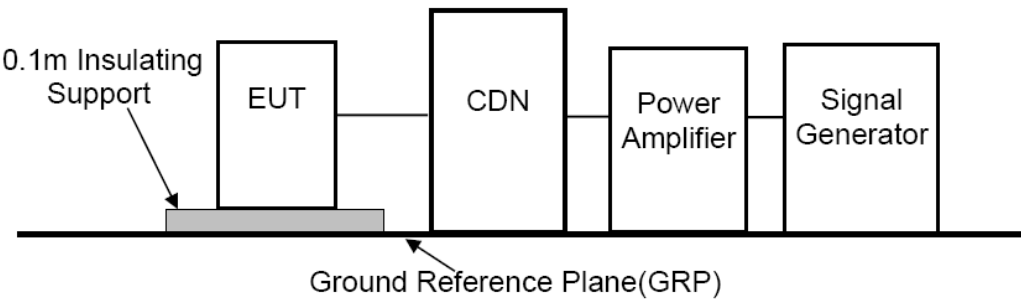
Please refer to the following page.

Surge Immunity Test Results

Ambient Condition:	Temp.: 25°C	R.H.: 56%	Air Pressure: 101 kPa
Power Supply:	AC 230V/50Hz	Required Performance Criterion: B	
Test Specifications:	Voltage surge 1.2/50 us ; Current surge 8/20 us ; Five positive and five negative pulses each at 0°, 90°, 180° and 270°.		
Test mode:	Empty Load		
Line	Phase Angle	Test Voltage	Result (Performance Criterion)
L-N	0°, 90°, 180°, 270°	±1KV	A
L-PE			
N-PE			
Signal line			
DC line			
Note :			
Test Equipment : Burst Tester(EM TEST, UCS500N)		Test Engineer : Ryan	

13. INJECTED CURRENTS SUSCEPTIBILITY TEST

13.1 Block Diagram of Test Setup



13.2 Test Standard and Severity Levels

13.2.1 Test Standard

EN 55024

(EN 61000-4-6: 2014, Severity Level: 3V (rms),0.15MHz ~ 80MHz)

13.2.2 Severity level

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

13.3 Test Procedure

1. Set up the E.U.T., CDN and test generators as shown on Section 13.1.
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 80 MHz 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 E.U.T. operating situation during compliance testing and decide the E.U.T. immunity criterion.

13.4 Test Result

PASS.

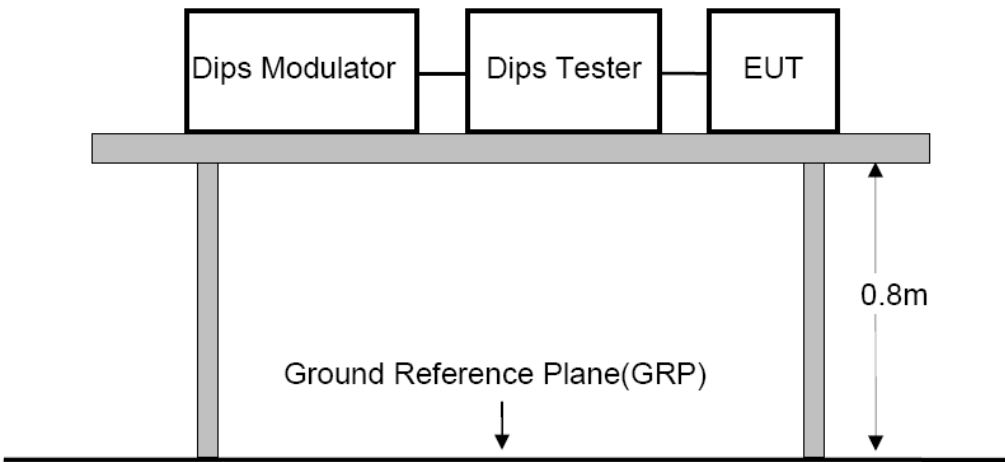
Please refer to the following page.

Injected Currents Susceptibility Test Results

Ambient Condition:	Temp.: 25℃	R.H.: 56%	Air Pressure:101 kPa
Power Supply:	AC 230V/50Hz	Required Performance Criterion: A	
Test Specifications:	Modulation : 1KHz, 80%AM, Step Size : 1%, Dwell Time : 1s		
Test mode:	Empty Load		
Test Port	Frequency (MHz)	Level(V)	Result (Performance Criterion)
AC Mains	0.15~80	3	A
Note :			
Test Equipment : FRANNOKIA, CIT-10		Test Engineer : Ryan	

14.VOLTAGE DIPS AND INTERRUPTIONS TEST

14.1 Block Diagram of Test Setup



14.2 Test Standard and Severity Levels

14.2.1 Test Standard
EN 55024
(EN 61000-4-11: 2004)

14.2.2 Severity level

Test Level %U _T	Voltage dip and short interruptions %U _T	Duration (in period)
0	100	0.5
		1
40	60	5
		10
70	30	25
		50
		*

14.3 Test Procedure

1. Set up the E.U.T. and test generator as shown on Section 14.1.
2. The interruptions is introduced at selected phase angles with specified duration.
3. Record any degradation of performance.

14.4 Test Result

PASS.

Please refer to the following page.

Voltage Dips And Interruptions Test Results

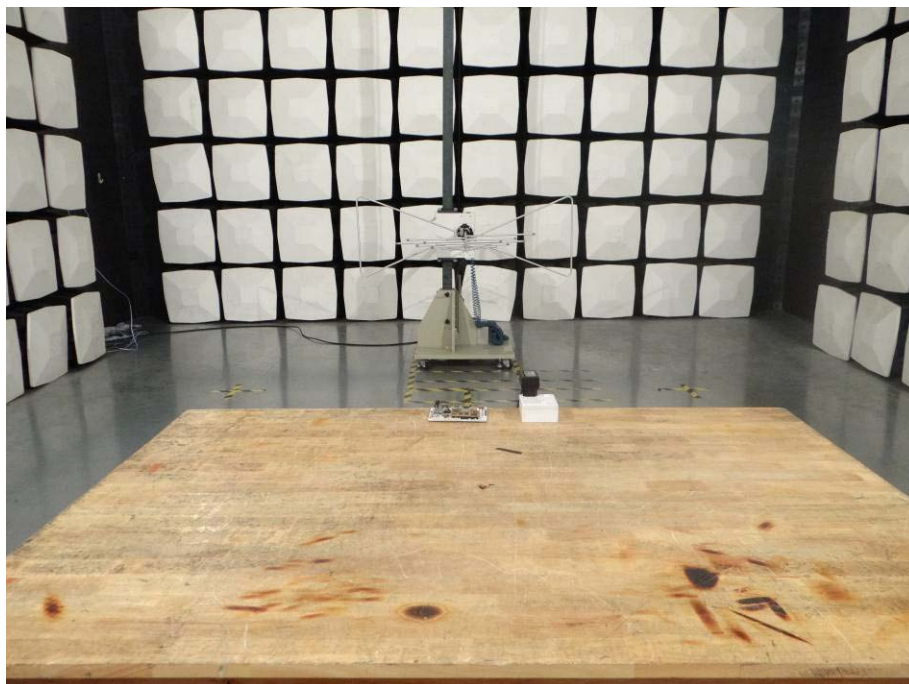
Ambient Condition:	Temp.: 25℃	R.H.: 56%	Air Pressure: 101 kPa
Power Supply:	AC 230V/50Hz	Required Performance Criterion: B & C	
Test Specifications:	0%U _T , 0.5Cycle; 70%U _T , 25Cycle; 0%U _T ,250Cycle		
Test mode:	Empty Load		
Test Level % UT	Duration (in period)	Result (Performance Criterion)	
0	0.5P	A	
70	25P	A	
0	250P	C	
Note : During the test, the EUT power off but it could be restored by user after test.			
Test Equipment : Dips Tester: EM TEST, UCS 500N		Test Engineer : Ryan	

15. PHOTOGRAPH

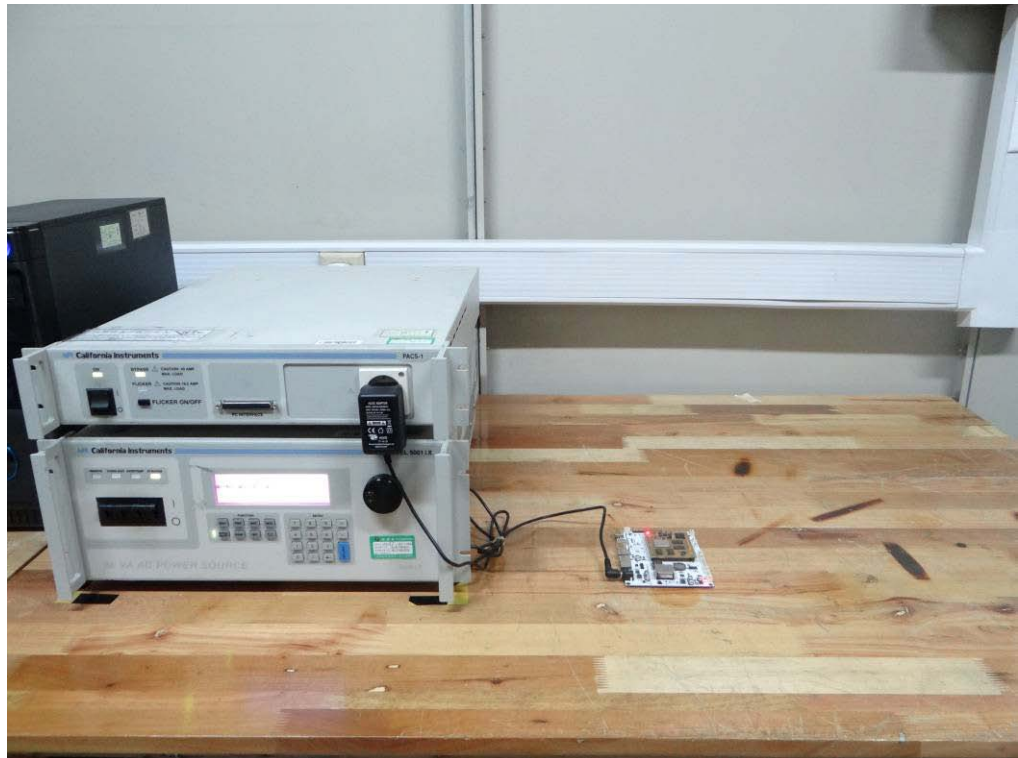
15.1 Photo of Conducted Emission Measurement



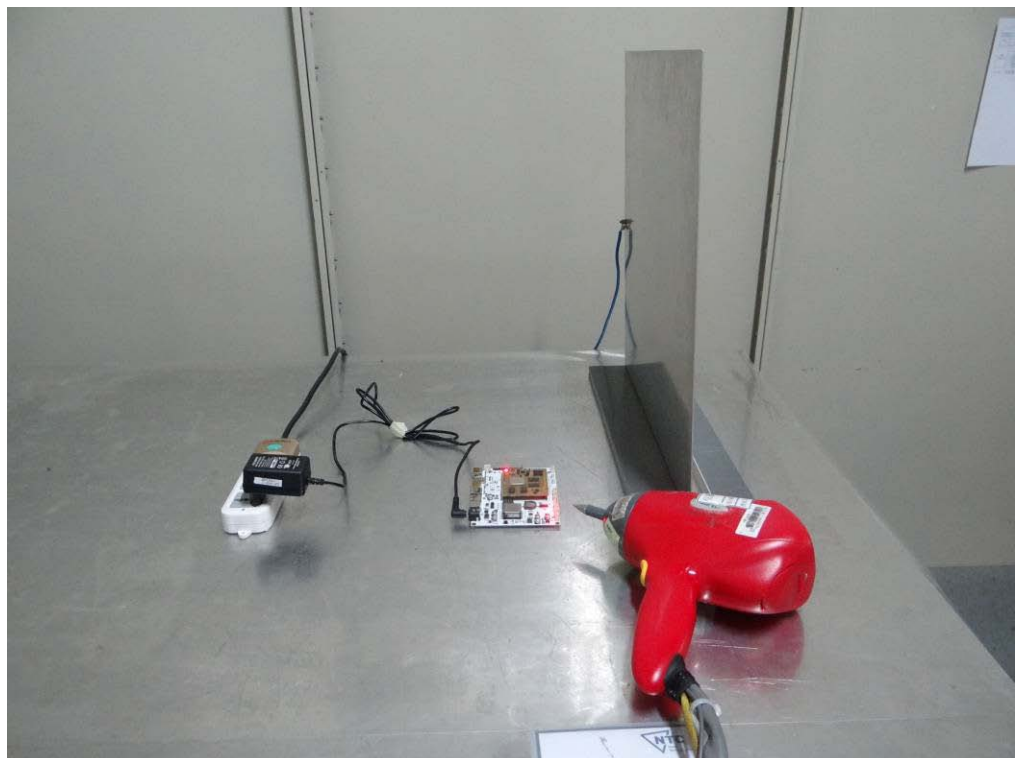
15.2 Photo of Radiation Emission Measurement



15.3 Photo of Harmonic/Flicker Measurement



15.4 Photo of Electrostatic Discharge Test



15.5 Photo of RF Field Strength susceptibility Test



15.6 Photo of Electrical Fast Transient /Surge /Voltage Dips Test



APPENDIX I

(Photos of E.U.T.)

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

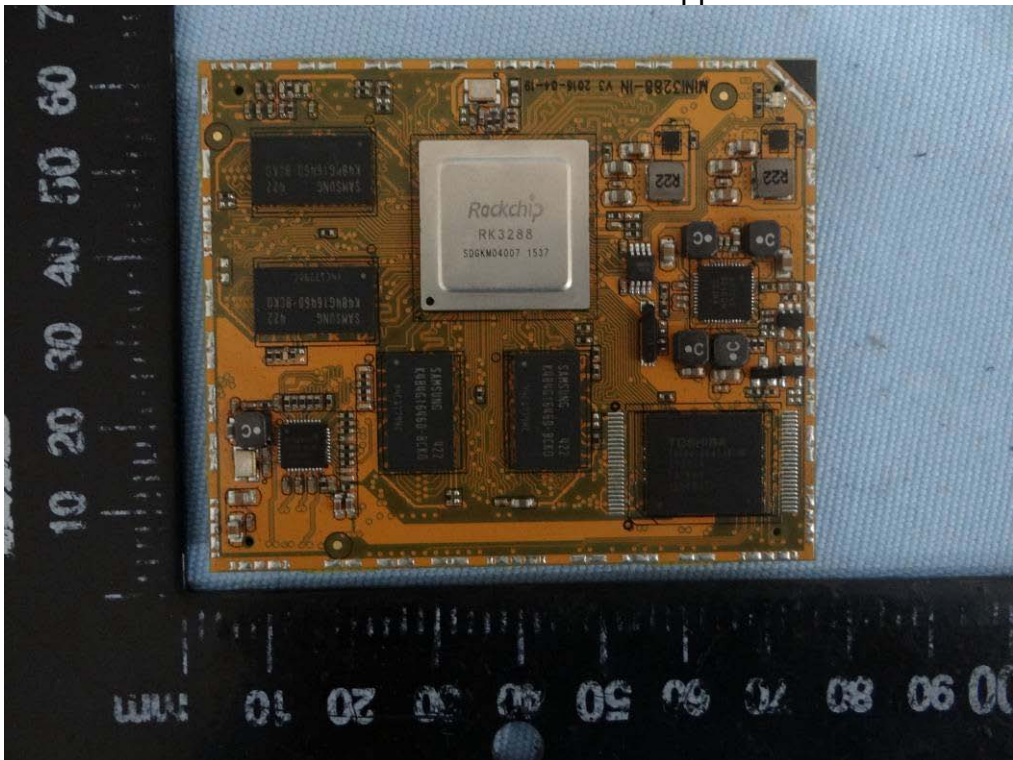
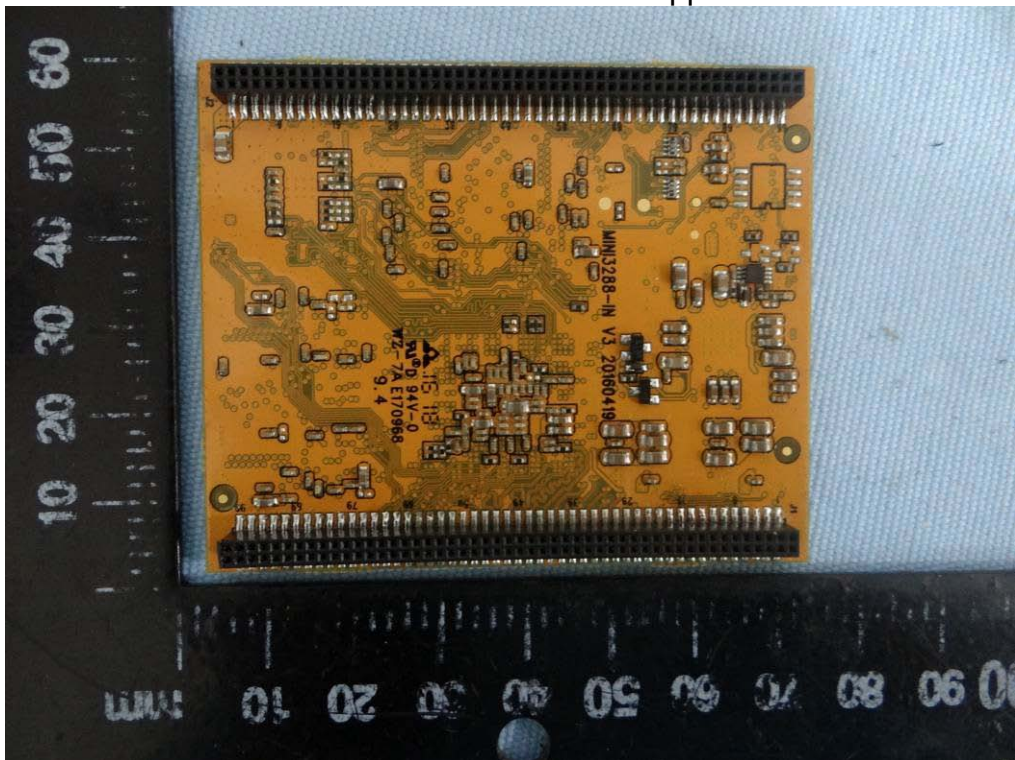


Figure 2
General Appearance of the E.U.T.



---End---