CE EMC
TEST REPORT

For

Power

MODEL: Please refer to report section 3 note.

Issued to:

TRACO ELECTRONIC AG

Sihlbruggstrasse 111 CH-6340 Baar Switzerland

Issued by:

Compliance Certification Services Inc.

Wugu Laboratory

No.11, Wugong 6th Rd., Wugu Dist.,
New Taipei City, Taiwan. (R.O.C.)

Issued Date: May 18, 2020

Note: *This document may be altered or revised by Compliance Certification Services Inc. personnel only, and shall be noted in the revision section of the document. The client should not use it to claim product endorsement by TAF, A2LA, NIST or any government agencies. The test results in the report only apply to the tested sample.*

Revision History

Rev.		Issue Date		Revisions	Effect Page	Revised By
00		May 18, 2020		Initial Issue Note 1	ALL	May Lin

Note:

Rev. (01):

1. *T190524L01-A-E licensed to TRACO ELECTRONIC AG. All construction, materials, components are the same, except instruction manual, marking plate, packaging, according to technical judgement, no necessary to perform test.*

TABLE OF CONTENTS

1 TEST CERTIFICATION

Product:	Power
Model:	Please refer to report section 3 note.
Brand:	TRACO POWER
Applicant:	**TRACO ELECTRONIC AG** Sihlbruggstrasse 111 CH-6340 Baar Switzerland
Manufacturer:	**TRACO ELECTRONIC AG** Sihlbruggstrasse 111 CH-6340 Baar Switzerland
Tested:	February 6, 2013 ~ August 26, 2019
Test Voltage:	230Vac, 50Hz
Applicable Standards:	**EN 55032: 2012 / AC: 2013** EN 61000-3-2:2014 EN 61000-3-3:2013 **EN 55024 : 2010 +A1:2015** IEC 61000-4-2:2008 IEC 61000-4-3:2006+A1:2007+A2:2010 IEC 61000-4-4:2012 IEC 61000-4-5:2014 IEC 61000-4-6:2008 IEC 61000-4-8:2009 IEC 61000-4-11:2004

Deviation from Applicable Standard
None

Statements of Conformity
Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

The above equipment has been tested by Compliance Certification Services Inc., and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Approved by:

Hex Chiang

Hex Chiang
Supervisor

2 TEST RESULT SUMMARY

EMISSION			
Standard	**Item**	**Result**	**Remarks**
EN 55032: 2012 / AC: 2013	Conducted (Power Port)	PASS	Meet Class B limit
	Asymmetric mode conducted emissions	N/A	Not applicable, the EUT doesn't have LAN Port or Modem port.
	Radiated	PASS	Meet Class A limit
	Radiated emissions from FM receivers	N/A	Not applicable, the EUT doesn't have FM receiver's functionality.
	Conducted differential voltage emissions from Class B equipment	N/A	Not applicable, the EUT is not (TV broadcast receiver / RF modulator output ports / FM broadcast receiver)
EN 61000-3-2:2014	Harmonic current emissions	PASS	Meet Class A limit
EN 61000-3-3:2013	Voltage fluctuations & flicker	PASS	Meets the requirements

IMMUNITY【 EN 55024 : 2010 +A1:2015 】			
Standard	**Item**	**Result**	**Remarks**
IEC 61000-4-2:2008	ESD	PASS	Meets the requirements of Performance Criterion B
IEC 61000-4-3:2006+A1:2007+A2:2010	RS	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-4:2012	EFT	PASS	Meets the requirements of Performance Criterion B
IEC 61000-4-5:2014	Surge	PASS	Meets the requirements of Performance Criterion B
IEC 61000-4-6:2013	CS	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-8:2009	PFMF	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-11:2004	Voltage dips & voltage variations	PASS	Meets the requirements of **Voltage Dips:** 1) >95% reduction Performance Criterion B 2) 30% reduction Performance Criterion C **Voltage Interruptions:** 1) >95% reduction Performance Criterion C

Note: 1. The statements of test result on the above are decided by the request of test standard only; the measurement uncertainties are not factored into this compliance determination.
2. The information of measurement uncertainty is available upon the customer's request.

3 EUT DESCRIPTION

Product	Power
Brand Name	TRACO POWER
Model	Please refer to report section 3 note.
Housing material	Metal
Applicant	TRACO ELECTRONIC AG
Identify Number	T200325E01
Received Date	March 25, 2020
EUT Power Rating	48VDC, 2.09A (TPI 100-148A) 12VDC, 10.42A (TPI 125-112A)
AC Power Cord Type	N/A
DC Power Cord Type	N/A

Note:

1. Difference of the model numbers (list on this report) is just for rating difference as below:

No.	Model Name	Input Range	Output Voltage	Output Current
1	TPI 100-112A	85 – 264 VAC	12 VDC	8.34A
2	TPI 100-115A	85 – 264 VAC	15 VDC	6.67A
3	TPI 100-124A	85 – 264 VAC	24 VDC	4.17A
4	TPI 100-128A	85 – 264 VAC	28 VDC	3.58A
5	TPI 100-136A	85 – 264 VAC	36 VDC	2.78A
6	TPI 100-148A	85 – 264 VAC	48 VDC	2.09A
7	TPI 100-112U	85 – 264 VAC	12 VDC	8.34A
8	TPI 100-115U	85 – 264 VAC	15 VDC	6.67A
9	TPI 100-124U	85 – 264 VAC	24 VDC	4.17A
10	TPI 100-128U	85 – 264 VAC	28 VDC	3.58A
11	TPI 100-136U	85 – 264 VAC	36 VDC	2.78A
12	TPI 100-148U	85 – 264 VAC	48 VDC	2.09A
13	TPI 100-112	85 – 264 VAC	12 VDC	8.34A

No.	Model Name	Input Range	Output Voltage	Output Current
14	TPI 100-115	85 – 264 VAC	15 VDC	6.67A
15	TPI 100-124	85 – 264 VAC	24 VDC	4.17A
16	TPI 100-128	85 – 264 VAC	28 VDC	3.58A
17	TPI 100-136	85 – 264 VAC	36 VDC	2.78A
18	TPI 100-148	85 – 264 VAC	48 VDC	2.09A
19	TPI 100-112D	85 – 264 VAC	12 VDC	8.34A
20	TPI 100-115D	85 – 264 VAC	15 VDC	6.67A
21	TPI 100-124D	85 – 264 VAC	24 VDC	4.17A
22	TPI 100-128D	85 – 264 VAC	28 VDC	3.58A
23	TPI 100-136D	85 – 264 VAC	36 VDC	2.78A
24	TPI 100-148D	85 – 264 VAC	48 VDC	2.09A
25	TPI 100-118A	85 – 264 VAC	18 VDC	5.56A
26	TPI 100-118U	85 – 264 VAC	18 VDC	5.56A
27	TPI 100-118	85 – 264 VAC	18 VDC	5.56A
28	TPI 100-118D	85 – 264 VAC	18 VDC	5.56A
29	TPI 125-112A	85 ~ 264 VAC	12 VDC	10.42A
30	TPI 125-115A	85 ~ 264 VAC	15 VDC	8.34A
31	TPI 125-118A	85 ~ 264 VAC	18 VDC	6.95A
32	TPI 125-124A	85 ~ 264 VAC	24 VDC	5.21A
33	TPI 125-128A	85 ~ 264 VAC	28 VDC	4.47A
34	TPI 125-136A	85 ~ 264 VAC	36 VDC	3.48A
35	TPI 125-148A	85 ~ 264 VAC	48 VDC	2.61A
36	TPI 125-112U	85 ~ 264 VAC	12 VDC	10.42A
37	TPI 125-115U	85 ~ 264 VAC	15 VDC	8.34A
38	TPI 125-118U	85 ~ 264 VAC	18 VDC	6.95A
39	TPI 125-124U	85 ~ 264 VAC	24 VDC	5.21A
40	TPI 125-128U	85 ~ 264 VAC	28 VDC	4.47A
41	TPI 125-136U	85 ~ 264 VAC	36 VDC	3.48A
42	TPI 125-148U	85 ~ 264 VAC	48 VDC	2.61A
43	TPI 125-112E	85 ~ 264 VAC	12 VDC	10.42A
44	TPI 125-115E	85 ~ 264 VAC	15 VDC	8.34A
45	TPI 125-118E	85 ~ 264 VAC	18 VDC	6.95A

No.	Model Name	Input Range	Output Voltage	Output Current
46	TPI 125-124E	85 ~ 264 VAC	24 VDC	5.21A
47	TPI 125-128E	85 ~ 264 VAC	28 VDC	4.47A
48	TPI 125-136E	85 ~ 264 VAC	36 VDC	3.48A
49	TPI 125-148E	85 ~ 264 VAC	48 VDC	2.61A
50	TPI 125-112D	85 ~ 264 VAC	12 VDC	10.42A
51	TPI 125-115D	85 ~ 264 VAC	15 VDC	8.34A
52	TPI 125-118D	85 ~ 264 VAC	18 VDC	6.95A
53	TPI 125-124D	85 ~ 264 VAC	24 VDC	5.21A
54	TPI 125-128D	85 ~ 264 VAC	28 VDC	4.47A
55	TPI 125-136D	85 ~ 264 VAC	36 VDC	3.48A
56	TPI 125-148D	85 ~ 264 VAC	48 VDC	2.61A

2. Client consigns three samples to test (model number: TPI 100-112A, TPI 100-148A, TPI 125-112A). Therefore, the testing Lab. just guarantees the unit, which has been tested.
3. For more details, please refer to the User's manual of the EUT.
4. The model TPI 100-148A, TPI 125-112A was considered the main model for testing.
5. Difference of the all model numbers (list on this report) is just for marketing purpose only.

I/O Port

I/O PORT TYPES	Q'TY	TESTED WITH
1. DC Power Port	1	1
2. AC Power Port	1	1

4 TEST METHODOLOGY

4.1. DECISION OF FINAL TEST MODE

The EUT was tested together with the above additional components, and a configuration, which produced the worst emission levels, was selected and recorded in this report.

1. The following test modes were scanned during the preliminary test:

Pre-Test Mode
Mode 1: Full Load (TPI 100-112A)
Mode 2: Full Load (TPI 100-148A)
Mode 3: Full Load (TPI 125-112A)

2. After the preliminary scan, the following test modes were found to produce the highest emission level.

Final Test Mode		
Emission	Conducted Emission	**Mode 2, 3**
	Radiated Emission	**Mode 2, 3**
PH & PF		**Mode 2**
Immunity (ESD, RS, EFT, Surge, CS, DIPS)		**Mode 2**
Immunity (RS)		**Mode 2, 3**

Then, the above highest emission mode of the configuration of the EUT and cable was chosen for all final test items.

4.2. EUT SYSTEM OPERATION

1. Setup the EUT and simulators as shown on 5.2.
2. Turn on the power of all equipment.
3. Setup the condition for test mode and begin the test.

Note: Test program is self-repeating throughout the test.

5 SETUP OF EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Peripherals Devices:

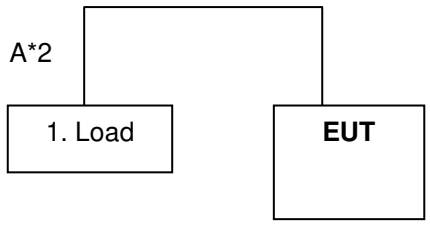
No.	Equipment	Trade Name	Model No.	Serial No.	FCC ID / BSMI ID	Power Cord
1	Load	N/A	N/A	N/A	N/A	N/A

No.	Cable Name	Unit	Shielded	Length	With Core
(A)	DC Power Cable	2	☐Shielded, ☒Non	0.1 m	☐With Core×____, ☒Non

Note:

1) All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2) Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

5.2. CONFIGURATION OF SYSTEM UNDER TEST



6 FACILITIES AND ACCREDITATIONS

6.1. FACILITIES

All measurement facilities used to collect the measurement data are located at:

☐ No.11, Wugong 6th Rd., Wugu Dist., New Taipei City, Taiwan. (R.O.C.)

☒ No.139, Wugong Rd., Wugu Dist., New Taipei City, Taiwan. (R.O.C.)

☒ No.163-1, Jhongsheng Rd. Sindian City, Taipei County, Taiwan.

Remark: *The radiated, radio-frequency, electromagnetic field test item was tested at Compliance Certification Services Inc. (Sindian Lab.) TAF code: 1108. The test equipment's were listed in page 53 and the test data, please refer page 57.*

6.2. ACCREDITATIONS

Our laboratories are accredited and approved by the following accreditation body according to ISO/IEC 17025.

Taiwan	TAF (TAF 1309)
USA	A2LA (0824.01)

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada	Industry Canada (10M Semi Anechoic Chamber: IC 2324G-1 / IC 2324G-2 / 2324J-1 / 2324J-2 to perform)
Japan	VCCI Radiated emissions: 30 MHz -1000 MHz: R-14343 / Above 1GHz: G-10945 Conducted Test Site No.B: C-13700 / T-11839
USA	FCC (10M Semi Anechoic Chamber (FCC MRA: TW1039) to perform FCC Part 15 measurements)

Copies of granted accreditation certificates are available for downloading from our web site.

6.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Uncertainty
Conducted Test Site No.B	0.15MHz ~ 30MHz	±3.14 dB
Conducted Test Site No.B (Telecommunication Ports)	0.15MHz ~ 30MHz	±3.08 dB
Radiated emissions (10M Chamber)	30MHz ~ 200MHz	±4.23 dB
	200MHz ~ 1000MHz	±4.13 dB
	Above 1GHz	±4.89 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Consistent with industry standard (e.g. CISPR 32: 2015, clause 11, Measurement Uncertainty) determining compliance with the limits shall be base on the results of the compliance measurement. Consequently the measure emissions being less than the maximum allowed emission result in this be a compliant test or passing test.

The listed uncertainties of above table are the worst case values for the entire range of measurement. Please note that the uncertainty values are only provided for informational purpose and aren't used in determining the PASS/FAIL results.

7 EMISSION TEST

7.1. CONDUCTED EMISSION MEASUREMENT AT AC MAINS PORT

7.1.1. LIMITS

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

Note:

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

7.1.2. TEST INSTRUMENTS

For Mode 2

Conducted Test Site No.B					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
EMI Test Receiver	R&S	ESCI	101073	08/20/2016	08/19/2017
LISN	R&S	ENV216	101054	05/18/2017	05/17/2018
LISN	Schwarzbeck	NSLK8128	5012	04/25/2017	04/24/2018
Capacitive Voltage Probe	FCC	F-CVP-1	100185	02/28/2017	02/27/2018
Software	CCS-3A1-CE				

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.*

For Mode 3

Conducted Test Site No.B					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Coaxial Cable	EMCI	CFD300-NL	CE2	04/30/2019	04/29/2020
EMI Test Receiver	R&S	ESCI	101073	07/17/2018	07/16/2019
LISN	R&S	ENV216	101054	05/02/2019	05/01/2020
LISN	Schwarzbeck	NSLK8128	5012	04/18/2019	04/17/2020
Software	CCS-3A1-CE				

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.*

TEST PROCEDURES (please refer to measurement standard or CCS SOP PA-031)

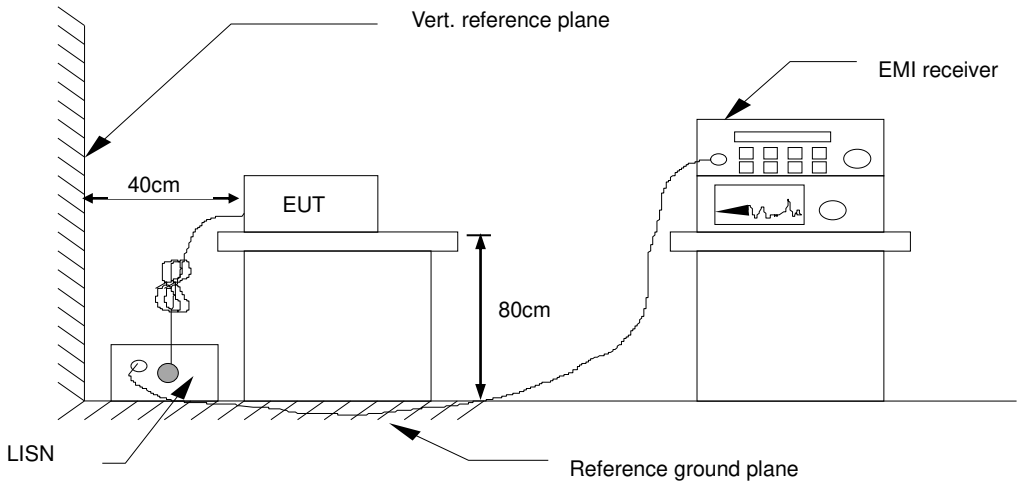
Procedure of Preliminary Test

- The EUT and Support equipment, if needed, was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per EN 55032 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor standing equipment, it is placed on the ground plane, which has a 15 cm non-conductive covering to insulate the EUT from the ground plane.
- All I/O cables were positioned to simulate typical actual usage as per EN 55032.
- The test equipment EUT installed received AC main power, through a Line Impedance Stabilization Network (LISN), which supplied power source and was grounded to the ground plane.
- All support equipment power received from a second LISN.
- The EUT test program was started. Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.
- The Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
- During the above scans, the emissions were maximized by cable manipulation.
- The test mode(s) described in Item 4.1 were scanned during the preliminary test.
- After the preliminary scan, we found the test mode described in Item 4.1 producing the highest emission level.
- The EUT configuration and cable configuration of the above highest emission levels were recorded for reference of the final test.

Procedure of Final Test

- EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.
- A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.
- The test data of the worst-case condition(s) was recorded.

7.1.3. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.1.4. DATA SAMPLE

Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector (P/Q/A)	Line (L1/L2)
x.xx	42.95	0.55	43.50	56	-12.50	Q	L1

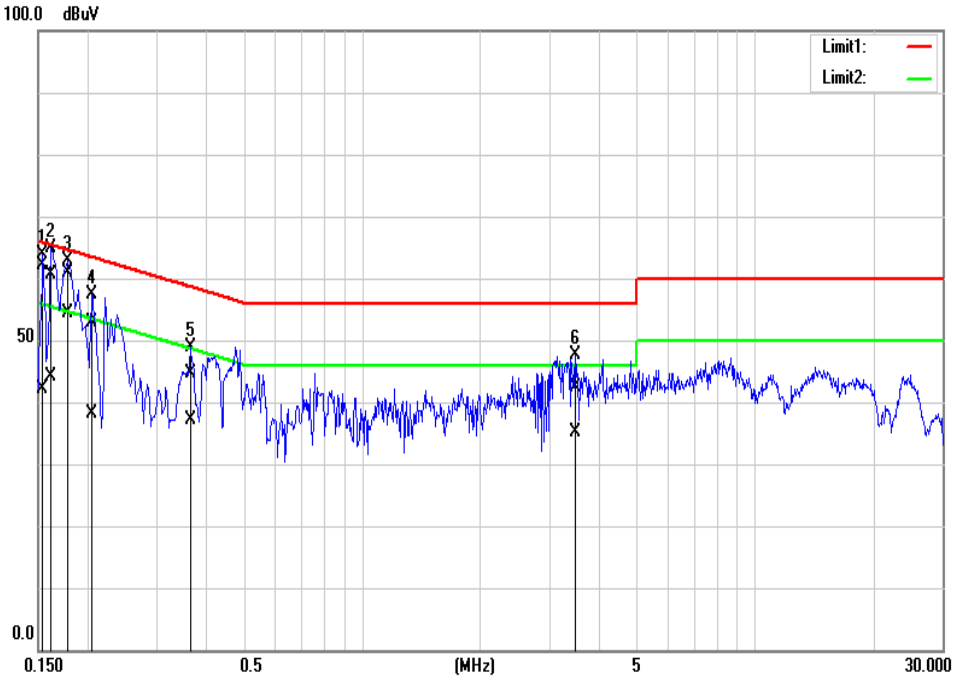
Freq. = Emission frequency in MHz
Reading = Uncorrected Analyzer/Receiver reading
Factor = Insertion loss of LISN + Cable Loss + Pulse Limit
Result = Reading + Factor
Limit = Limit stated in standard
Margin = Reading in reference to limit
P = Peak Reading
Q = Quasi-peak Reading
A = Average Reading
L1 = Hot side
L2 = Neutral side

Calculation Formula

Margin (dB) = Result (dBuV) – Limit (dBuV)

7.1.5. TEST RESULTS

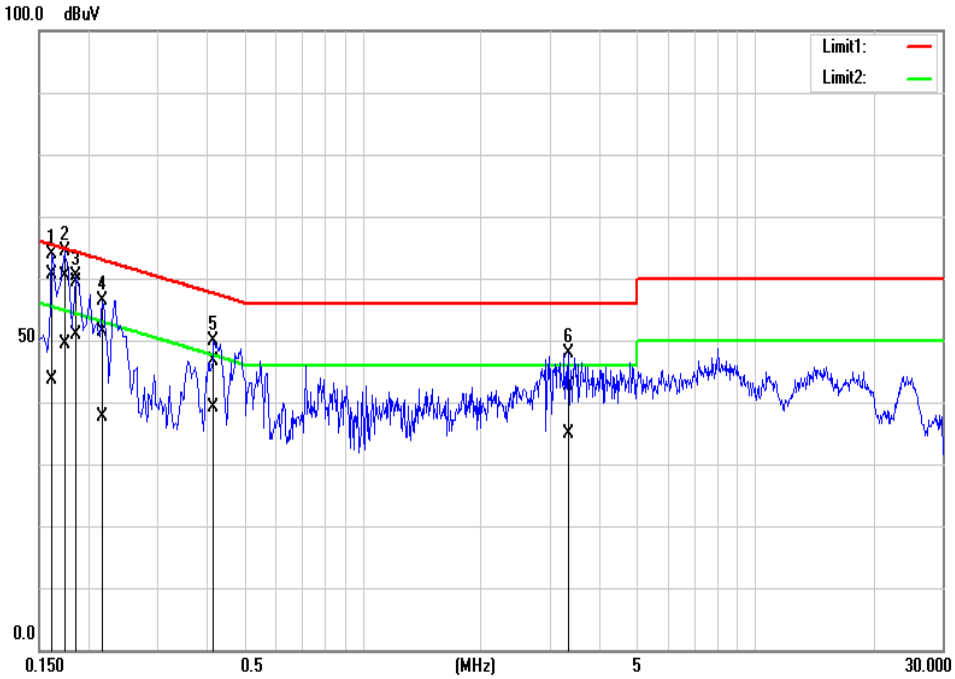
Model no.	TPI 100-148A	Line:	L1
Environmental Conditions	24°C, 50% RH	Test Date	2017/7/14
Test Mode	Mode 2	Tested by	Eason Liu
6dB Bandwidth	9 kHz		



NO.	Frequency	Quasi Peak reading	Average reading	Correction factor	Quasi Peak result	Average result	Quasi Peak limit	Average limit	Quasi Peak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	(Pass/Fail)
1	0.1539	52.58	32.58	9.66	62.24	42.24	65.78	55.79	-3.54	-13.55	Pass
2	0.1620	51.03	34.55	9.66	60.69	44.21	65.36	55.36	-4.67	-11.15	Pass
3*	0.1780	51.23	44.59	9.67	60.90	54.26	64.57	54.58	-3.67	-0.32	Pass
4	0.2060	43.29	28.46	9.67	52.96	38.13	63.36	53.37	-10.40	-15.24	Pass
5	0.3660	34.86	27.49	9.68	44.54	37.17	58.59	48.59	-14.05	-11.42	Pass
6	3.5060	32.60	25.36	9.75	42.35	35.11	56.00	46.00	-13.65	-10.89	Pass

Note: L1 = Line One (Live Line)

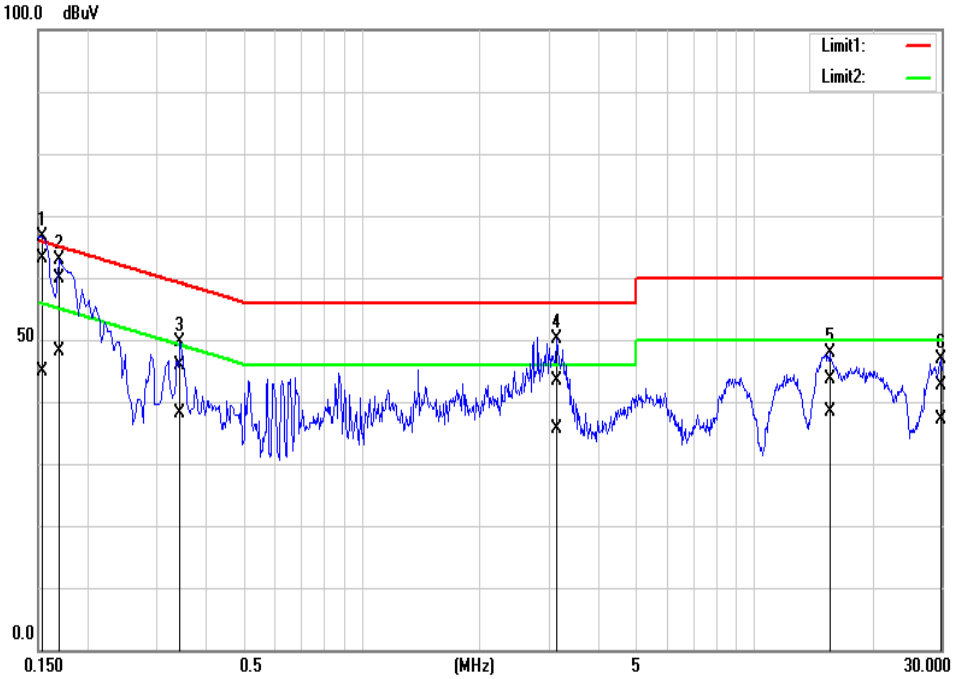
Model no.	TPI 100-148A	**Line:**	L2
Environmental Conditions	24°C, 50% RH	**Test Date**	2017/7/14
Test Mode	Mode 2	**Tested by**	Eason Liu
6dB Bandwidth	9 kHz		



NO.	Frequency	Quasi Peak reading	Average reading	Correction factor	Quasi Peak result	Average result	Quasi Peak limit	Average limit	Quasi Peak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	(Pass/Fail)
1	0.1620	50.86	33.87	9.66	60.52	43.53	65.36	55.36	-4.84	-11.83	Pass
2	0.1740	50.76	39.66	9.66	60.42	49.32	64.76	54.77	-4.34	-5.45	Pass
3*	0.1874	49.64	41.18	9.67	59.31	50.85	64.15	54.15	-4.84	-3.30	Pass
4	0.2180	41.61	27.88	9.67	51.28	37.55	62.89	52.89	-11.61	-15.34	Pass
5	0.4180	36.84	29.42	9.68	46.52	39.10	57.49	47.49	-10.97	-8.39	Pass
6	3.3500	32.82	25.10	9.74	42.56	34.84	56.00	46.00	-13.44	-11.16	Pass

Note: L2 = Line Two (Neutral Line).

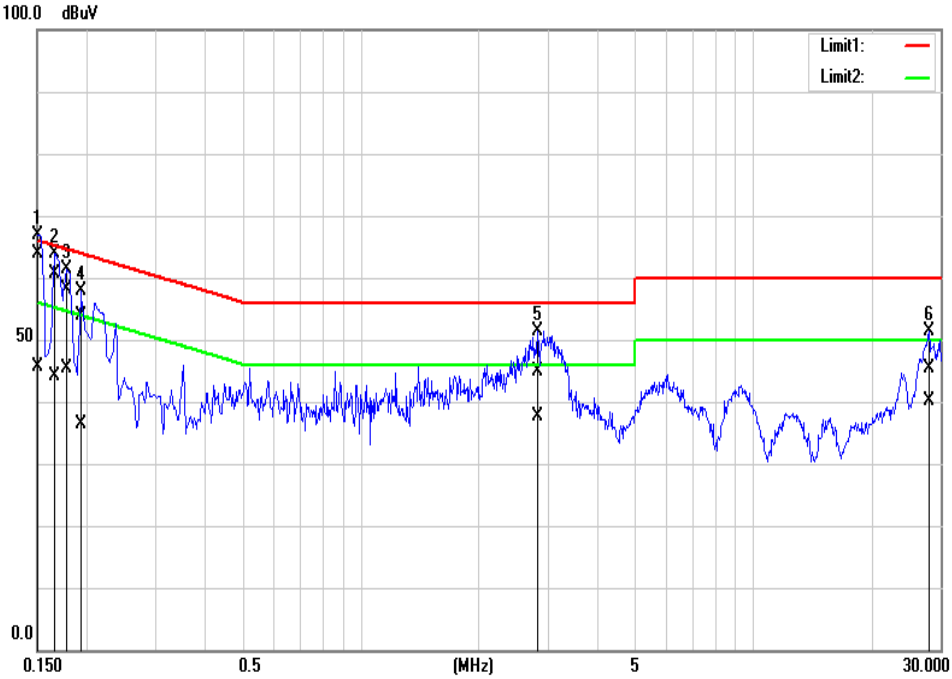
Model No.	TPI 125-112A	**Line:**	L1
Environmental Conditions	24℃, 50% RH	**Test Date**	2019/5/29
Test Mode	Mode 3	**Tested by**	Jemmy Wang
6dB Bandwidth	9 kHz		



NO.	Frequency	Quasi Peak reading	Average reading	Correction factor	Quasi Peak result	Average result	Quasi Peak limit	Average limit	Quasi Peak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	(Pass/Fail)
1*	0.1539	53.34	35.24	9.76	63.10	45.00	65.78	55.79	-2.68	-10.79	Pass
2	0.1700	50.21	38.32	9.76	59.97	48.08	64.96	54.96	-4.99	-6.88	Pass
3	0.3460	36.21	28.29	9.76	45.97	38.05	59.06	49.06	-13.09	-11.01	Pass
4	3.1540	33.64	25.80	9.82	43.46	35.62	56.00	46.00	-12.54	-10.38	Pass
5	15.5700	33.50	28.39	10.05	43.55	38.44	60.00	50.00	-16.45	-11.56	Pass
6	29.9580	32.69	27.13	10.04	42.73	37.17	60.00	50.00	-17.27	-12.83	Pass

REMARKS: L1 = Line One (Live Line)

Model No.	TPI 125-112A	**Line:**	L2
Environmental Conditions	24℃, 50% RH	**Test Date**	2019/5/29
Test Mode	Mode 3	**Tested by**	Jemmy Wang
6dB Bandwidth	9 kHz		



NO.	Frequency	Quasi Peak reading	Average reading	Correction factor	Quasi Peak result	Average result	Quasi Peak limit	Average limit	Quasi Peak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	(Pass/Fail)
1*	0.1500	54.09	35.72	9.80	63.89	45.52	65.99	56.00	-2.10	-10.48	Pass
2	0.1660	50.88	34.38	9.79	60.67	44.17	65.15	55.16	-4.48	-10.99	Pass
3	0.1780	48.31	35.49	9.80	58.11	45.29	64.57	54.58	-6.46	-9.29	Pass
4	0.1940	44.12	26.50	9.79	53.91	36.29	63.86	53.86	-9.95	-17.57	Pass
5	2.8260	35.12	27.76	9.84	44.96	37.60	56.00	46.00	-11.04	-8.40	Pass
6	28.0860	35.24	29.92	10.23	45.47	40.15	60.00	50.00	-14.53	-9.85	Pass

REMARKS: L2 = Line Two (Neutral Line)

7.2. REQUIREMENTS FOR ASYMMETRIC MODE CONDUCTED EMISSIONS

7.2.1. LIMITS

For Class A Equipment

FREQUENCY (MHz)	Voltage Limit (dBuV)		Current Limit (dBuA)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 ~ 0.5	97 ~ 87	84 ~ 74	53 ~ 43	40 ~ 30
0.5 ~ 30.0	87	74	43	30

NOTE: The limits decrease linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz

For Class B Equipment

FREQUENCY (MHz)	Voltage Limit (dBuV)		Current Limit (dBuA)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	84 ~ 74	74 ~ 64	40 ~ 30	30 ~ 20
0.5 - 30.0	74	64	30	20

NOTE: The limits decrease linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz

7.2.2. TEST INSTRUMENTS

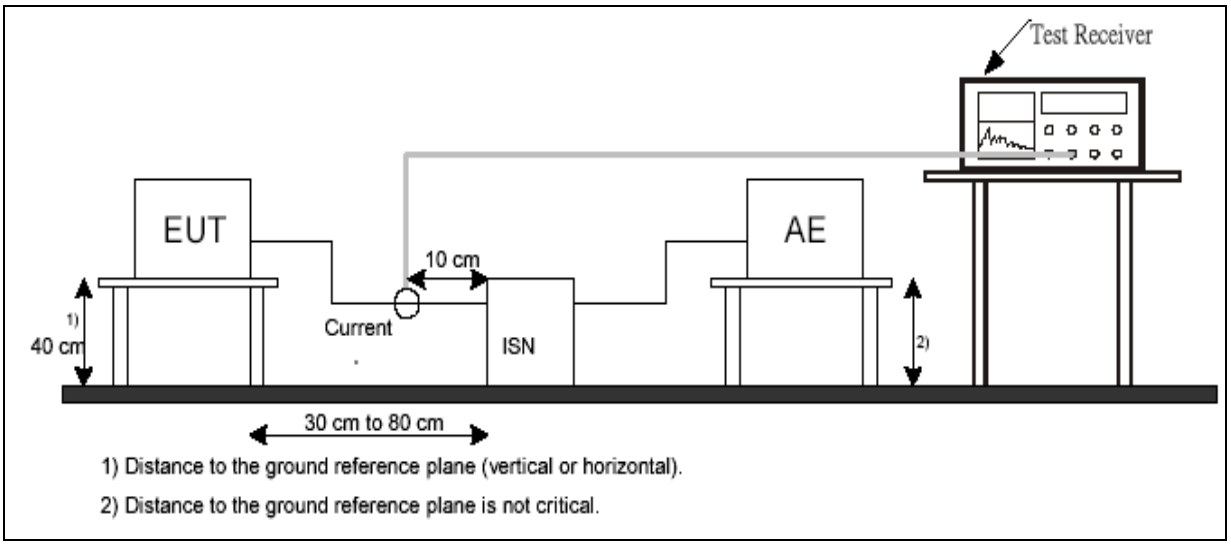
Conducted Test Site No.B					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
N/A					

7.2.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-031)

- Selecting ISN for unscreened cable or a current probe for screened cable to take measurement.
- The port of the EUT was connected to the remote side support equipment through the ISN/Current Probe and communication in normal condition.
- Making a overall range scan by using the test receiver controlled by controller and record at least six highest emissions for showing in the test report.
- Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.
- In case of measuring on the screened cable, the current limit shall be applied; otherwise the voltage limit should be applied.

Not applicable, the EUT doesn't have LAN Port or Modem port.

7.2.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.2.5. DATA SAMPLE

Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector (P/Q/A)
x.xx	62.95	0.55	63.50	84	-20.50	Q

Freq. = Emission frequency in MHz
Reading = Uncorrected Analyzer/Receiver reading
Factor = Insertion loss of LISN + Cable Loss + Pulse Limit
Result = Reading + Factor
Limit = Limit stated in standard
Margin = Reading in reference to limit
P = Peak Reading
Q = Quasi-peak Reading
A = Average Reading

Calculation Formula

Margin (dB) = Result (dBuV) – Limit (dBuV)

7.2.6. TEST RESULTS

Not applicable, the EUT doesn't have LAN Port or Modem port.

7.3. RADIATED EMISSION MEASUREMENT

7.3.1. LIMITS

Below 1GHz

FREQUENCY (MHz)	dBuV/m (At 10m)		dBuV/m (At 3m)	
	Class A	Class B	Class A	Class B
30 ~ 230	40	30	50	40
230 ~ 1000	47	37	57	47

Above 1GHz

Frequency (MHz)	Class A (dBuV/m) (At 3m)		Class B (dBuV/m) (At 3m)	
	Average	Peak	Average	Peak
1000 ~ 3000	56	76	50	70
3000 ~ 6000	60	80	54	74

NOTE: The lower limit shall apply at the transition frequencies.

According to EN 55032:2012/AC:2013 Table 1 the measurement frequency range shown in the following table:

Table 1 – Required highest frequency for radiated measurement

Highest internal frequency (F_x)	Highest internal frequency
$F_X \leq 108$ MHz	1 GHz
108 MHz < $F_X \leq 500$ MHz	2 GHz
500 MHz < $F_X \leq 1$ GHz	5 GHz
$F_X > 1$ GHz	5 x F_X up to a maximum of 6 GHz
NOTE 1 For FM and TV broadcast receivers, F_X is determined from the highest frequency generated or used excluding the local oscillator and tuned frequencies. NOTE 2 F_X is defined in 3.1.19.	

Where F_x is unknown, the radiated emission measurements shall be performed up to 6 GHz.

Radiated emissions from FM receivers

Frequency range MHz	Measurement		Class B limit dB(μV/m)	
	Distance m	Detector type / bandwidth	Fundamental	Harmonics
			OATS / SAC (see Table A.1)	OATS / SAC (see Table A.1)
30 – 230	10	Quasi peak/ 120kHz	50	42
230 – 300				42
300 – 1000				46
30 – 230	3		60	52
230 – 300				52
300 – 1000				56
These relaxed limits apply only to emissions at the fundamental and harmonic frequencies of the local oscillator. Signals at all other frequencies shall be compliant with the limits given in 7.3.1 Class B Limit				

7.3.2. TEST INSTRUMENTS

For Mode 2
Below 1GHz

Wugu 10M Chamber					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Bilog Antenna	TESEQ	CBL 6112D	31674	03/20/2017	03/19/2018
Bilog Antenna	TESEQ	CBL 6112D	31675	03/22/2017	03/21/2018
Coaxial Cable	Huber+Suhner	SUCOFLEX 104PEA	330029	05/02/2017	05/01/2018
Coaxial Cable	Huber+Suhner	SUCOFLEX 104PEA	330028	05/02/2017	05/01/2018
Coaxial Cable	Huber+Suhner	SUCOFLEX 104PEA	329383	05/02/2017	05/01/2018
Coaxial Cable	Huber+Suhner	104PEA	33948/4PEA	05/02/2017	05/01/2018
Coaxial Cable	Huber+Suhner	104PEA	33949/4PEA	05/02/2017	05/01/2018
EMI Test Receiver	R&S	ESCI	100961	08/04/2016	08/03/2017
EMI Test Receiver	R&S	ESCI	100962	08/13/2016	08/12/2017
Horn Antenna	EMCO	3117	00055167	01/09/2017	01/08/2018
Horn Antenna	ETS LINDGREN	3116	00026370	01/12/2017	01/11/2018
Pre-Amplifier	HP	8447D	2944A07754	05/02/2017	05/01/2018
Pre-Amplifier	HP	8447D	2944A08150	05/02/2017	05/01/2018
Pre-Amplifier	EMC	EMC051845	980040	05/02/2017	05/01/2018
Pre-Amplifier	MITEQ	AMF-6F-260400-40-8P	985646	01/10/2017	01/09/2018
Spectrum Analyzer	Agilent	E4446A	MY48250297	09/09/2016	09/08/2017
Thermo-Hygro Meter	ROTRONIC	M800	0GYJ	11/15/2016	11/14/2017
AC POWER SOURE	APE	AFC-130	991259	N.C.R	N.C.R
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Antenna Tower	Sunol Sciences	TLT2	031010-5	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Controller	Sunol Sciences	SC104V	031010-1	N.C.R	N.C.R
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R
Software	EZ-EMC (CCS-3A1RE)				

Note:

1. *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.*
2. *N.C.R. = No Calibration Required.*

For Mode 3
Below 1GHz

Wugu 10M Chamber					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Bilog Antenna	TESEQ	CBL 6112D	31674	03/06/2019	03/05/2020
Bilog Antenna	TESEQ	CBL 6112D	31675	03/22/2019	03/21/2020
Coaxial Cable	Huber+Suhner	SUCOFLEX 104PEA	330029	04/30/2019	04/29/2020
Coaxial Cable	Huber+Suhner	104PEA	33948/4PEA	04/30/2019	04/29/2020
Coaxial Cable	Huber+Suhner	104PEA	33949/4PEA	04/30/2019	04/29/2020
Coaxial Cable	Huber+Suhner	SUCOFLEX 104PEA	24813	04/30/2019	04/29/2020
EMI Test Receiver	R&S	ESCI	100961	07/04/2018	07/03/2019
EMI Test Receiver	R&S	ESCI	100962	07/10/2018	07/09/2019
Pre-Amplifier	HP	8447D	2944A07754	04/30/2019	04/29/2020
Pre-Amplifier	HP	8447D	2944A08150	04/30/2019	04/29/2020
AC POWER SOURE	APE	AFC-130	991259	N.C.R	N.C.R
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R
Software	EZ-EMC (CCS-3A1RE)				

Note:

3. *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.*
4. *N.C.R. = No Calibration Required.*

7.3.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-031)

Procedure of Preliminary Test

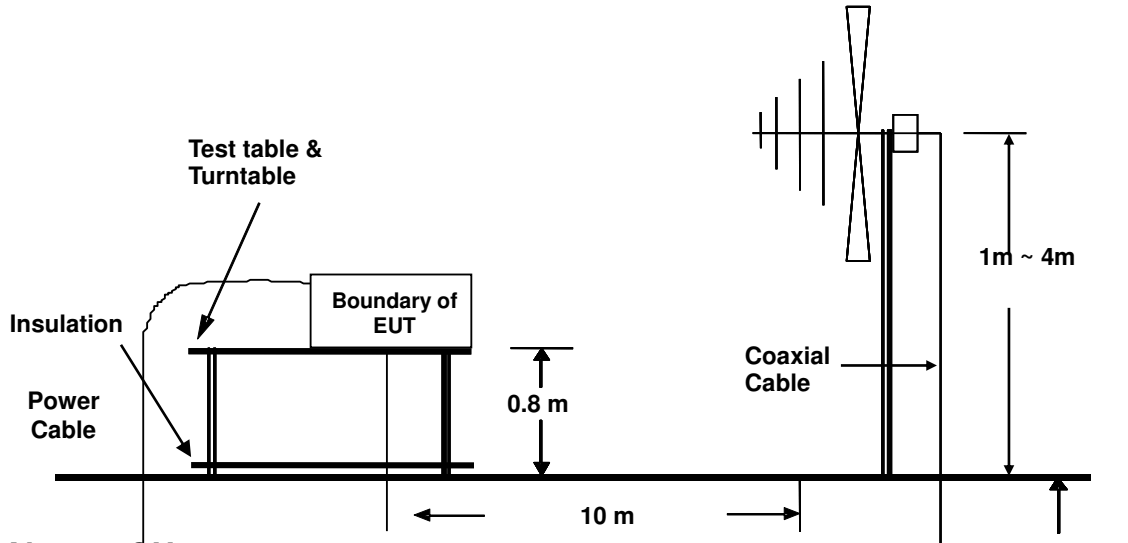
- The equipment was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane. When the EUT is a floor standing equipment, it is placed on the ground plane which has a 15 cm non-conductive covering to insulate the EUT from the ground plane.
- Support equipment, if needed, was placed as per EN 55032.
- All I/O cables were positioned to simulate typical usage as per EN 55032.
- The EUT received AC power source from the outlet socket under the turntable. All support equipment power received from another socket under the turntable.
- The antenna was placed at 3 meter away from the EUT as stated in EN 55032. The antenna connected to the Spectrum Analyzer via a cable and at times a pre-amplifier would be used.
- The Analyzer / Receiver quickly scanned from 30MHz to 6000MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- The test mode(s) described in Item 4.1 were scanned during the preliminary test:
- After the preliminary scan, we found the test mode described in Item 4.1 producing the highest emission level.
- The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the final test.

Procedure of Final Test

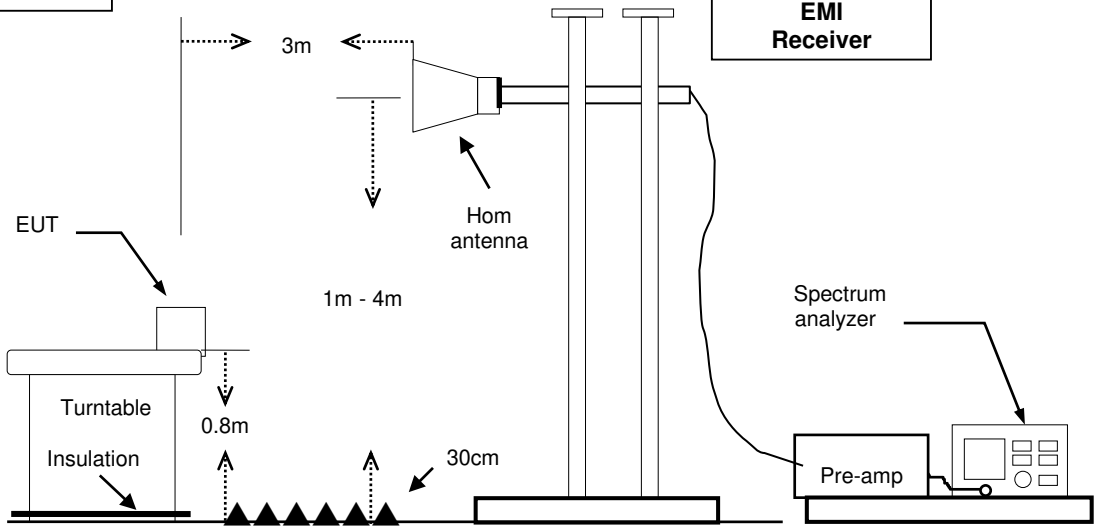
- EUT and support equipment were set up on the turntable as per the configuration with highest emission level in the preliminary test.
- The Analyzer / Receiver scanned from 30MHz to 6000MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. Below 1GHz the Q.P. reading and above 1GHz the Peak and Average reading are presented.
- The test data of the worst-case condition(s) was recorded.

7.3.4. TEST SETUP

Below 1GHz



Above 1GHz



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.3.5. DATA SAMPLE

Below 1GHz

Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (P/Q)	Pol. (H/V)
x.xx	14.0	12.2	26.2	30	-3.8	Q	H

Above 1GHz

Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (P/A)	Pol. (H/V)
x.xx	42.95	0.55	43.50	54	-10.50	A	H

Freq. = Emission frequency in MHz
Reading = Uncorrected Analyzer/Receiver reading
Factor = Antenna Factor + Cable Loss - Amplifier Gain
Result = Reading + Factor
Limit = Limit stated in standard
Margin = Reading in reference to limit
P = Peak Reading
Q = Quasi-peak Reading
A = Average Reading
H = Antenna Polarization: Horizontal
V = Antenna Polarization: Vertical

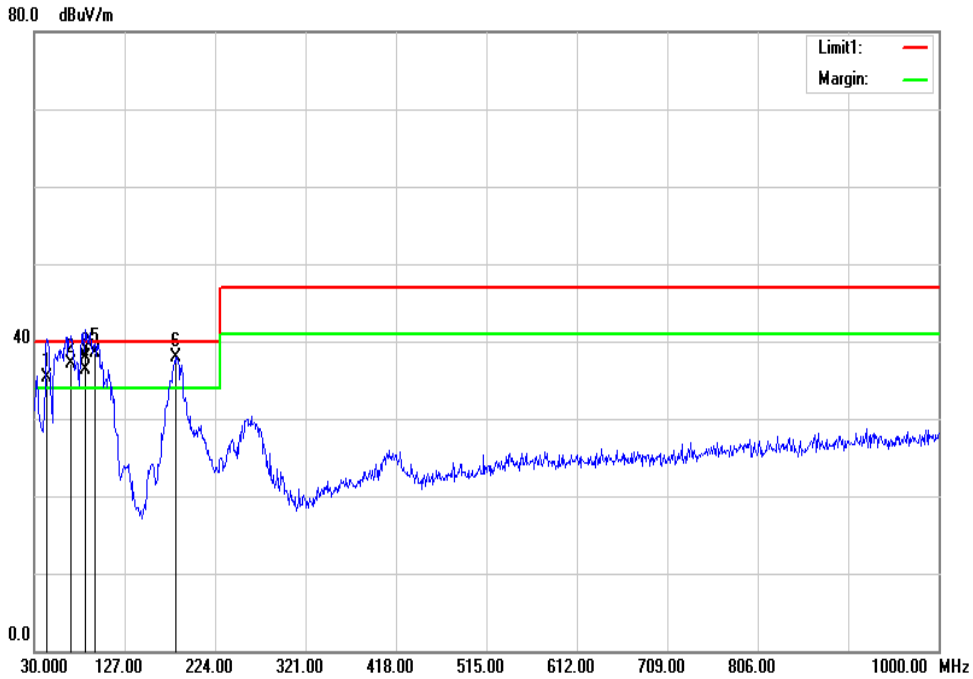
Calculation Formula

Margin (dB) = Result (dBuV/m) – Limit (dBuV/m)

7.3.6. TEST RESULTS

Below 1GHz

Model No.	TPI 100-148A	**Test Mode**	Mode 2
Environmental Conditions	26°C, 60% RH	**6dB Bandwidth**	120 kHz
Antenna Pole	Vertical	**Antenna Distance**	10m
Detector Function	Quasi-peak.	**Tested by**	Rex Kuo
Standard	EN 55032 CLASS A	**Test Date**	2017/7/13

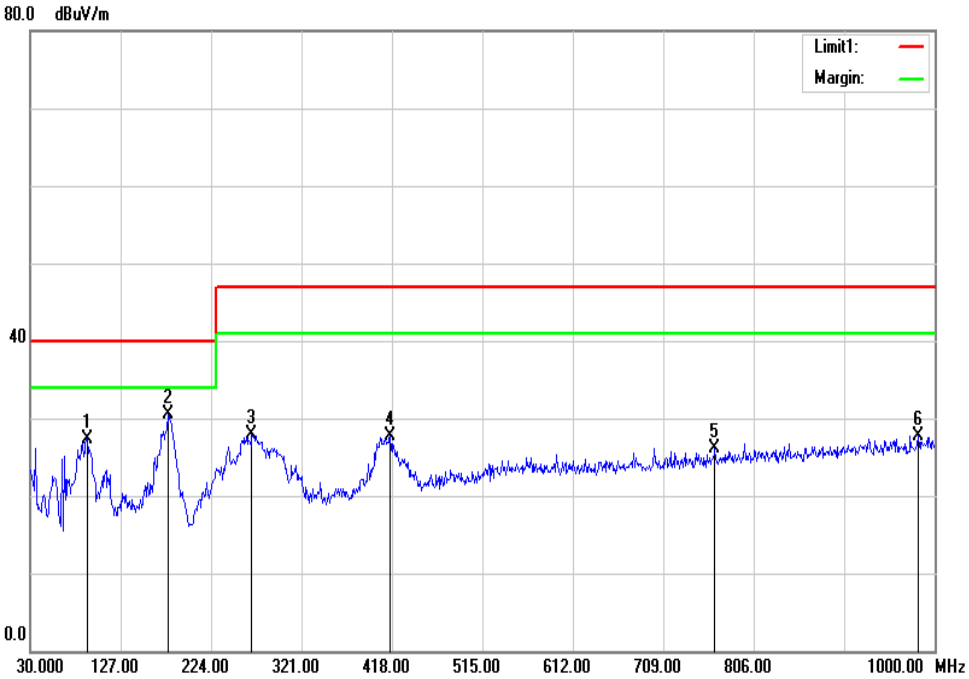


No.	Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	43.5800	45.06	-9.80	35.26	40.00	-4.74	100	214	QP
2	69.7700	51.50	-14.35	37.15	40.00	-2.85	199	99	QP
3	85.2900	50.04	-12.22	37.82	40.00	-2.18	100	229	QP
4	85.2900	48.48	-12.22	36.26	40.00	-3.74	100	229	QP
5	94.9900	48.95	-10.40	38.55	40.00	-1.45	100	221	QP
6	182.2900	47.84	-9.86	37.98	40.00	-2.02	100	304	QP

Note:

1. *PK= Peak Reading; QP= Quasi-peak Reading*
2. *The other emission levels were very low against the limit.*

Model No.	TPI 100-148A	**Test Mode**	Mode 2
Environmental Conditions	26°C, 60% RH	**6dB Bandwidth**	120 kHz
Antenna Pole	Horizontal	**Antenna Distance**	10m
Detector Function	Quasi-peak.	**Tested by**	Rex Kuo
Standard	EN 55032 CLASS A	**Test Date**	2017/7/13

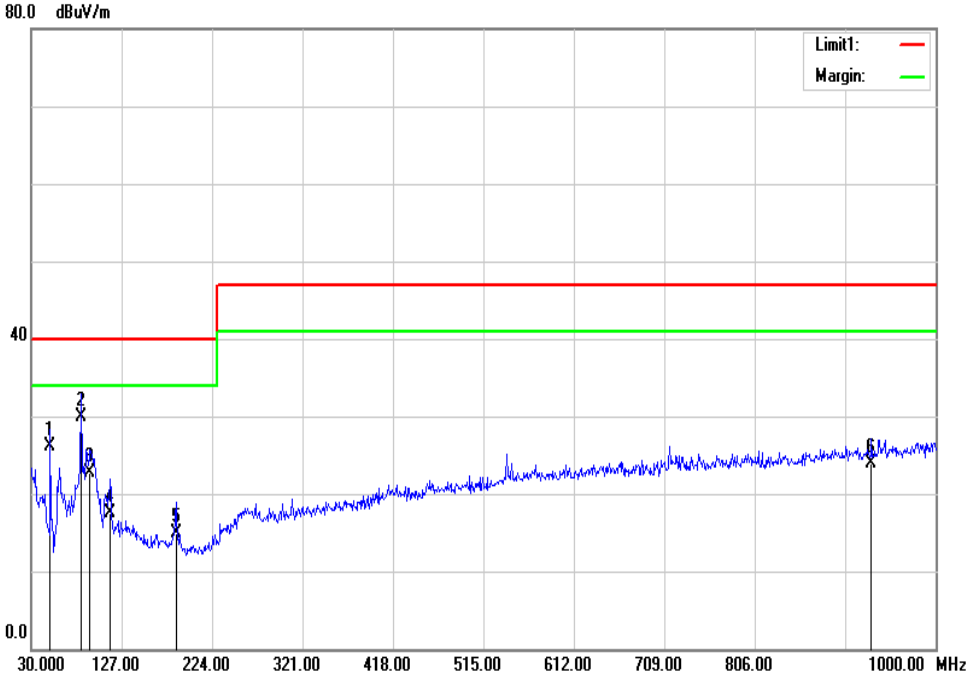


No.	Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	91.1100	39.53	-12.15	27.38	40.00	-12.62	399	43	QP
2	177.4400	41.46	-11.02	30.44	40.00	-9.56	399	49	QP
3	267.6500	34.02	-6.04	27.98	47.00	-19.02	300	33	QP
4	416.0600	31.09	-3.45	27.64	47.00	-19.36	300	193	QP
5	764.2900	25.05	1.07	26.12	47.00	-20.88	200	22	QP
6	982.5400	23.89	3.84	27.73	47.00	-19.27	100	211	QP

Note:

1. *PK= Peak Reading; QP= Quasi-peak Reading*
2. *The other emission levels were very low against the limit.*

Model No.	TPI 125-112A	Test Mode	Mode 3
Environmental Conditions	26℃, 60% RH	Test Date	2019/6/19
Antenna Pole	Vertical	Antenna Distance	10m
Detector Function	Quasi-peak.	Tested by	Rex Kuo
6dB Bandwidth	120 kHz		

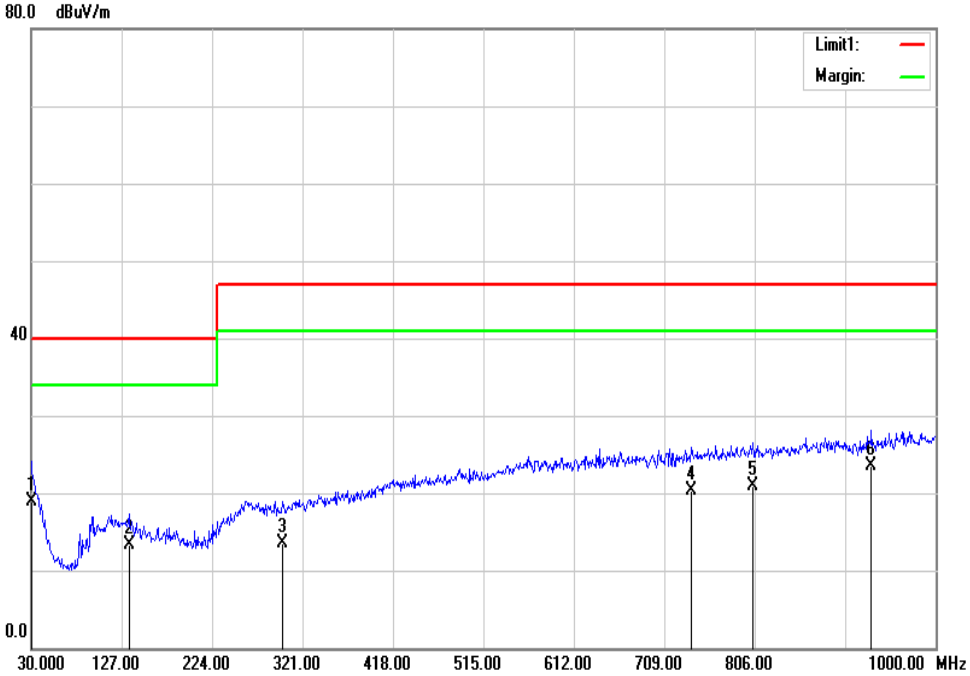


No.	Frequency (MHz)	Reading (dBuV)	Correction Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	50.3700	39.22	-13.11	26.11	40.00	-13.89	399	0	QP
2	83.3500	43.31	-13.48	29.83	40.00	-10.17	100	359	QP
3	93.0500	34.03	-11.38	22.65	40.00	-17.35	100	0	QP
4	114.3900	26.33	-8.89	17.44	40.00	-22.56	100	146	QP
5	185.2000	25.10	-10.25	14.85	40.00	-25.15	100	197	QP
6	931.1300	20.76	3.07	23.83	47.00	-23.17	299	0	QP

Note:

1. *P= Peak Reading; Q= Quasi-peak Reading.*
2. *The other emission levels were very low against the limit.*

Model No.	TPI 125-112A	**Test Mode**	Mode 3
Environmental Conditions	26℃, 60% RH	**Test Date**	2019/6/19
Antenna Pole	Horizontal	**Antenna Distance**	10m
Detector Function	Quasi-peak.	**Tested by**	Rex Kuo
6dB Bandwidth	120 kHz		



No.	Frequency (MHz)	Reading (dBuV)	Correction Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	30.0000	22.03	-3.09	18.94	40.00	-21.06	299	0	QP
2	134.7600	22.25	-9.00	13.25	40.00	-26.75	300	359	QP
3	299.6600	19.16	-5.65	13.51	47.00	-33.49	300	343	QP
4	738.1000	19.41	0.98	20.39	47.00	-26.61	399	197	QP
5	804.0600	19.20	1.61	20.81	47.00	-26.19	100	359	QP
6	931.1300	20.48	3.07	23.55	47.00	-23.45	299	0	QP

Note:

1. *P= Peak Reading; Q= Quasi-peak Reading.*
2. *The other emission levels were very low against the limit.*

Above 1GHz

Model No.	N/A	**Test Mode**	N/A
Environmental Conditions	N/A	**Test Date**	N/A
Antenna Pole	N/A	**Antenna Distance**	N/A
Highest frequency generated or used	70kHz	**Upper frequency**	1GHz
Detector Function	N/A	**Tested by**	N/A
6dB Bandwidth	N/A		

Note: *No applicable, when the highest frequency of the internal sources of the EUT is less than 108MHz, the measurement shall only be made up to 1GHz.*

7.4. CONDUCTED DIFFERENTIAL VOLTAGE EMISSIONS FROM CLASS B EQUIPMENT

Applicable to
1. TV broadcast receiver tuner ports with an accessible connector
2. RF modulator output ports
3. FM broadcast receiver tuner ports with an accessible connector

Frequency range MHz	Class B limits dB(µV) 75 Ω			Applicability
	other	Local Oscillator Fundamental	Local Oscillator Harmonics	
30 – 950	46	46	46	See a)
950 – 2 150	46	54	54	
950 – 2 150	46	54	54	See b)
30 – 300	46	54	50	See c)
300 – 1 000			52	
30 – 300	46	66	59	See d)
300 – 1 000			52	
30 – 950	46	76	46	See e)
950 – 2 150		n/a	54	

a) Television receivers (analogue or digital), video recorders and PC TV broadcast receiver tuner cards working in channels between 30 MHz and 1 GHz, and digital audio receivers.

b) Tuner units (not the LNB) for satellite signal reception.

c) Frequency modulation audio receivers and PC tuner cards.

d) Frequency modulation car radios.

e) Applicable to EUTs with RF modulator output ports (for example DVD equipment, video recorders, camcorders and decoders etc.) designed to connect to TV broadcast receiver tuner ports.

Testing is required at only one EUT supply voltage and frequency.

The term ‘other’ refers to all emissions other than the fundamental and the harmonics of the local oscillator.

The test shall be performed with the device operating at each reception channel.

The test shall cover the entire frequency range.

7.4.1. TEST INSTRUMENTS

20 Immunity Room				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
N/A				

7.4.2. TEST PROCEDURES (please refer to measurement standard or CCS SOP PA-041)

Procedure of Preliminary Test

- The equipment was set up as per the test configuration to simulate typical usage per the user's manual. The EUT was place on a wooden table with a height of 0.8 meters was used that was placed on the ground plane.
- Support equipment, if needed, was placed as per EN 55032.
- All I/O cables were positioned to simulate typical usage as per EN 55032.
- The EUT received AC power source, from the outlet socket. All support equipment received power was from another socket.
- Added a 75←→50Ω matching network, between EUT and EMI test receiver to get impedance match condition during the test.
- The output level of the auxiliary signal generator shall be set to give the value of 60 dB (μV) for FM receiver or 70 dB (μV) for TV and VCR to the input of the frequency-modulation or television receiver (or video recorder) respectively, on a 75Ω impedance. An additional amplifier should be insert at the generator output, if necessary.
- The output level of the auxiliary signal generator shall be a standard TV color bar Move signal for TV receivers and video recorders with sound carrier that defined in Table A12 of EN 55032. An additional amplifier should be insert at the generator output, if necessary.
- The results shall be expressed in the terms of the substitution voltage in decibels (μV), as supplied by the standard signal generator. The specified source impedance of the receiver shall be stated with the results.
- When measurements are made at the antenna terminals of the EUT, an auxiliary signal generator shall be used to feed the equipment under test input with a standard test signal (see Table A.12 of EN 55032) at the receiver tuning frequency (30MHz to 2150MHz).
- The test mode(s) described in Item 4.1 were scanned during the preliminary test:
- After the preliminary scan, we found the test mode described in Item 4.1 producing the highest emission level.
- The EUT and cable configuration of the above highest emission levels were recorded for the final test.

Procedure of Final Test

- EUT and support equipment were set up on the table as per the configuration with highest emission level in the preliminary test.
- The Analyzer / Receiver scanned from 30MHz to 2150MHz. recorded the value, the local frequency, amplitude, were recorded in which correction factors were used to calculate the emission level and compare reading to the applicable limit, and only Q.P reading will record in this report.
- Recorded at least the six highest emissions. Emission frequencies, amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and only Q.P. reading is presented.
- The test data of the worst-case condition(s) was recorded.

7.4.3. DATA SAMPLE

Freq. (MHz)	Matching Factor (dB)	Spectrum Reading (dBuV)	SG Level (dBuV)	Emission (dBuV)	Limit Line (dBuV)	Over Limit (dB)	Note (F/H/O)
x.xx	12.2	14.0	38.4	26.2	46	-19.8	F

Freq. = Emission frequency in MHz
Matching Factor = Matching network(50/75Ω) attenuation
Spectrum Reading=Spectrum analyzer reading
S.G. Level = Standard S.G. output level
Emission = SG Level - Matching Factor
Limit Line = Limit stated in standard
Over Limit = Reading in reference to limit
F = Fundamental
H = Harmonics
O = Other

Calculation Formula

Over Limit (dB) = Emission (dBμV) – Limit Line (dBμV)

7.4.4. TEST RESULTS

Not applicable, the EUT is not (TV broadcast receiver / RF modulator output ports / FM broadcast receiver).

7.5. HARMONICS CURRENT MEASUREMENT

7.5.1. LIMITS OF HARMONICS CURRENT MEASUREMENT

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<=n<=39	0.15x15/n
Even harmonics	
2	1.08
4	0.43
6	0.30
8<=n<=40	0.23x8/n

Limits for Class D equipment		
Harmonics Order n	Max. permissible harmonics current per watt mA/W	Max. permissible harmonics current A
Odd Harmonics only		
3	3.4	2.30
5	1.9	1.14
7	1.0	0.77
9	0.5	0.40
11	0.35	0.33
13	0.30	0.21
15<=n<=39	3.85/n	0.15x15/n

Note:

1. Class A and Class D are classified according to item 7.4.3.
2. According to section 7 of EN 61000-3-2, the above limits for all equipment except for lighting equipment having an active input power > 75 W and no limits apply for equipment with an active input power up to and including 75 W.

7.5.2. TEST INSTRUMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
HARMONICS SYSTEM	EMC-PARTNER	HARMONICS-1000 / PS3	107 / PS3-0211	06/30/2017	06/29/2018
Software	HARCS Immunity (4.10)				

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.*

7.5.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-029)

- 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 classification of EUT is according to section 5 of EN 61000-3-2.
- The EUT 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.

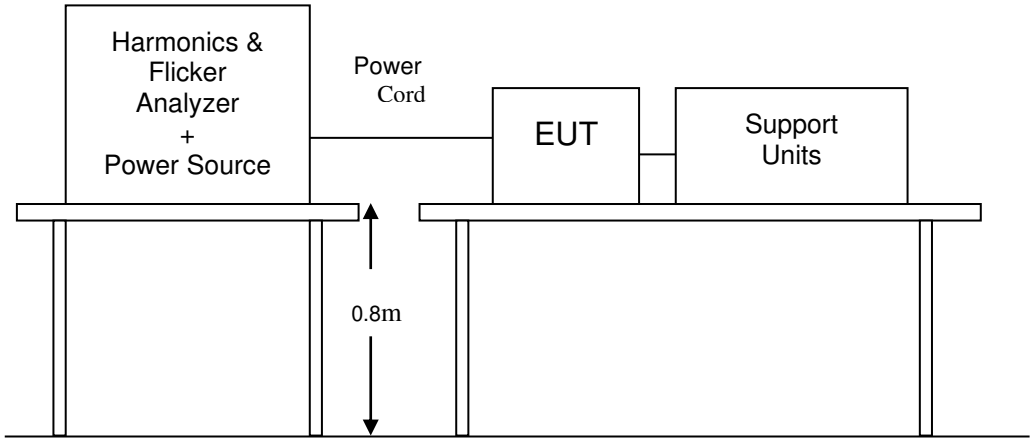
Class B: Portable tools; Arc welding equipment which is not professional equipment.

Class C: Lighting equipment.

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

- 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 time necessary for the EUT to be exercised.

7.5.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.5.5. TEST RESULTS

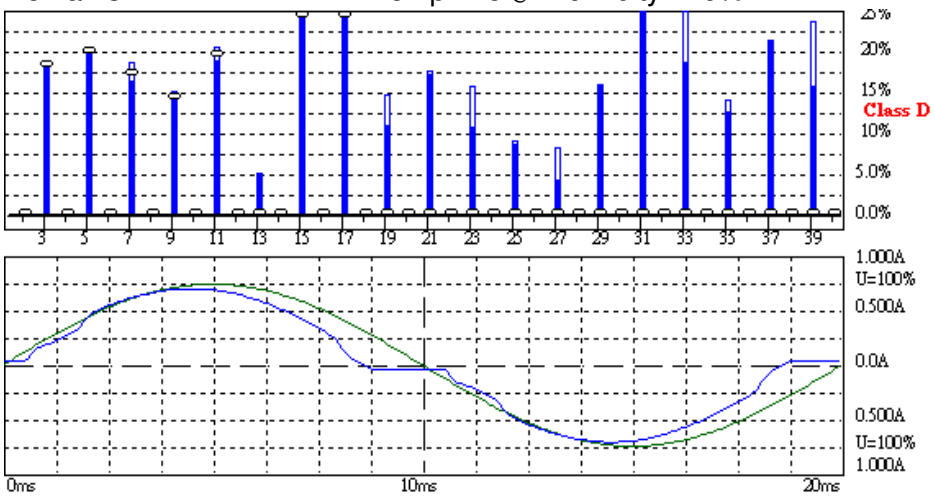
Power Consumption	103.3W	Test Mode	Mode 2
Environmental Conditions	25℃, 46% RH	Tested by	Ray Huang
Test Date	2017/7/17		

Note:

1. *Limits classified according to item 7.4.3.*
2. *According to clause 7 of EN 61000-3-2: 2014, equipment with a rated power of 75W or less, no limits apply. The test result is only for reference.*

Test result of EN 61000-3-2

Operator : Ray Huang
EUT : Power
Model : TPI 100-148A
Remarks : Temp : 25℃ Humidity : 46% RH



Harmonic Emission - IEC 61000-3-2 , EN 61000-3-2 , (EN60555-2)

Urms =	230.3	V	P =	103.3	W	THC =	0.083	A	
Irms =	0.463	A	pf =	0.968		Pmax =	108.0	W	

V-nom: 231 V
TestTime: 5 min (100%)

Power

Test completed, Result: PASSED

Temp : 25℃ Humidity : 46% RH

HAR-1000 EMC-Partner

Full Bar : Actual Values

Empty Bar : Maximum Values

Blue : Current , Green : Voltage , Red : Failed

7.6. VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

7.6.1. LIMITS OF VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

TEST ITEM	LIMIT	REMARK
P_{st}	1.0	P_{st} means short-term flicker indicator.
P_{lt}	0.65	P_{lt} means long-term flicker indicator.
T_{dt} (ms)	500	T_{dt} means maximum time that dt exceeds 3 %.
d_{max} (%)	4%	d_{max} means maximum relative voltage change.
dc (%)	3.3%	dc means relative steady-state voltage change

7.6.2. TEST INSTRUMENTS

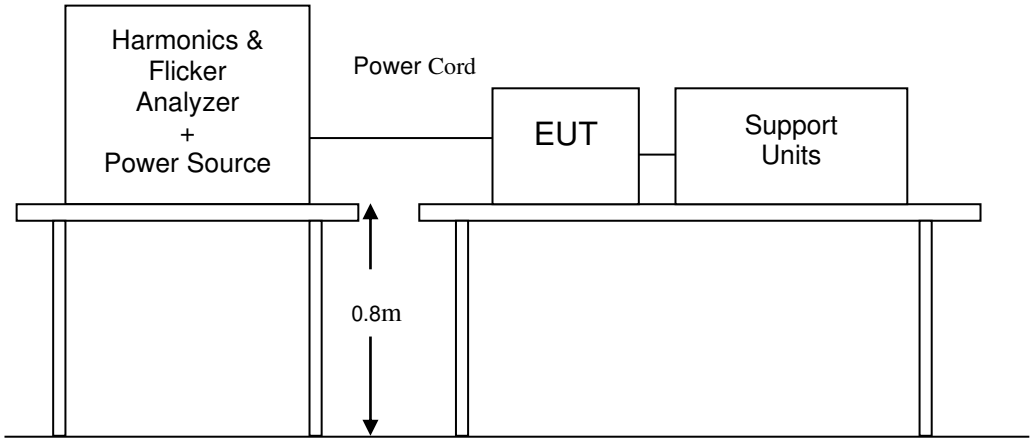
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
HARMONICS SYSTEM	EMC-PARTNER	HARMONICS-1000 / PS3	107 / PS3-0211	06/30/2017	06/29/2018
Software	HARCS Immunity (4.10)				

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.*

7.6.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-030)

- 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 operating conditions.
- During the flick measurement, the measure time shall include that part of whole operation cycle in which the EUT produce the most unfavorable sequence of voltage changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

7.6.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.6.5. TEST RESULTS

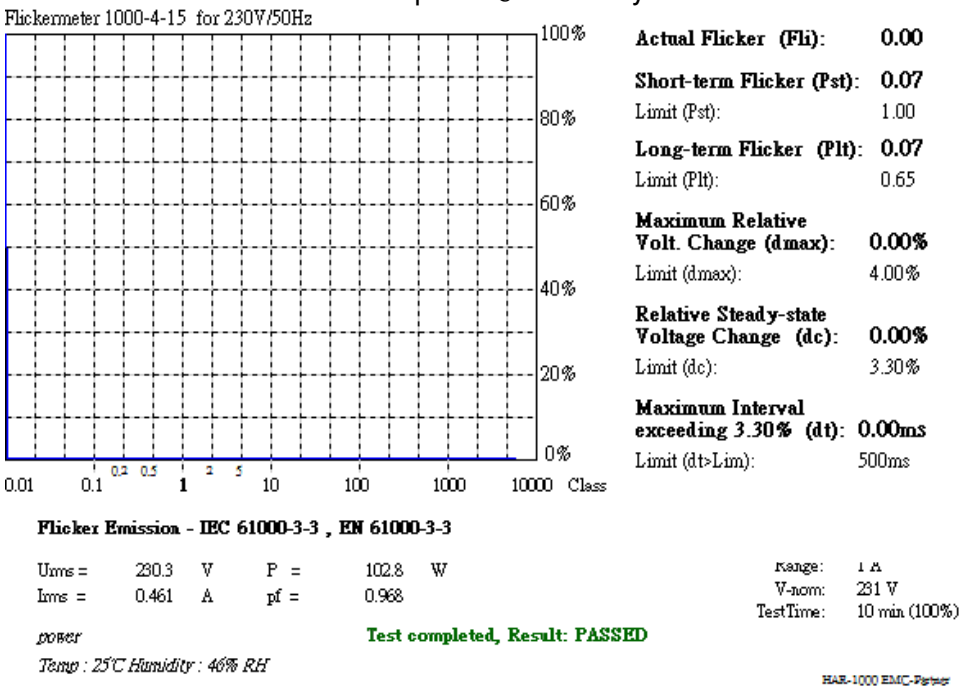
Observation Period (Tp)	10mins	Test Mode	Mode 2
Environmental Conditions	25℃, 46% RH	Tested by	Ray Huang
Test Date	2017/7/17		

TEST PARAMETER	MEASUREMENT VALUE	LIMIT	REMARK
P_{st}	0.07	1.0	Pass
P_{lt}	0.07	0.65	Pass
T_{dt} (ms)	0.00	500	Pass
d_{max} (%)	0.00	4.0%	Pass
dc (%)	0.00	3.3%	Pass

Note: *None.*

Test result of EN 61000-3-3

Operator : Ray Huang
EUT : Power
Model : TPI 100-148A
Remarks : Temp : 25℃ Humidity : 46% RH



Full Bar : Actual Values
Empty Bar : Maximum Values
Circles : Average Values
Blue : Current , Green : Voltage , Red : Failed

8 IMMUNITY TEST

8.1. GENERAL DESCRIPTION

Product Standard	EN 55024 : 2010 +A1:2015	
	Test Type	Minimum Requirement
Basic Standard, Specification, and Performance Criterion required	IEC 61000-4-2	Electrostatic Discharge – ESD: 8KV air discharge, 4kV Contact discharge, Performance Criterion B
	IEC 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test – RS: 80 ~1000 MHz, 3V/m, 80% AM(1kHz), Performance Criterion A
	IEC 61000-4-4	Electrical Fast Transient/Burst - EFT, AC Power Port: 1kV DC Power Port: 0.5kV Signal Ports and Telecommunication Ports: 0.5kV Performance Criterion B
	IEC 61000-4-5	Combination Wave for power port 1.2/50μs Open Circuit Voltage 8/20μs Short Circuit Current Combination Wave for Signal and Telecommunication port 10/700μs Open Circuit Voltage 5/320μs Short Circuit Current AC Power Port ~ line to line: 1kV, line to earth (ground): 2kV DC Power Port ~ line to earth: 0.5kV Performance Criterion B Signal and Telecommunication Ports ~ line to ground: 1kV Performance Criterion C
	IEC 61000-4-6	Conducted Radio Frequency Disturbances Test –CS: 0.15 ~ 80 MHz, 3Vrms, 80% AM, 1kHz, Performance Criterion A
	IEC 61000-4-8	Power frequency magnetic field immunity test 50 Hz, 1A/m Performance Criterion A
	IEC 61000-4-11	Voltage Dips: i) >95% reduction for 0.5 periods, Performance Criterion B ii) 30% reduction for 25 periods, Performance Criterion C Voltage Interruptions: i) >95% reduction for 250 periods Performance Criterion C

8.2. GENERAL PERFORMANCE CRITERIA DESCRIPTION

Criteria 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. 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, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.
Criteria 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. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.
Criteria C:	Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

8.3. ELECTROSTATIC DISCHARGE (ESD)

8.3.1. TEST SPECIFICATION

Basic Standard:	IEC 61000-4-2
Discharge Impedance:	330 ohm / 150 pF
Discharge Voltage:	Air Discharge: 2 ; 4 ; 8 kV (Direct) Contact Discharge: 2 ; 4 kV (Direct/Indirect)
Polarity:	Positive & Negative
Number of Discharge:	Air Discharge: min. 10 times at each test point for each polarity Contact Discharge: min. 200 times in total
Discharge Mode:	Single Discharge 1 second minimum

8.3.2. TEST INSTRUMENT

IMMUNITY SHIELDED ROOM					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
ESD Simulator	EM TEST	dito	V0947105559	05/09/2013	05/08/2014
Software	N/A				

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.*

8.3.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-022)

The discharges shall be applied in two ways:

a) Contact discharges to the conductive surfaces and 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. One of the test points shall be subjected to at least 50 indirect discharges to the center of the front edge of the Horizontal Coupling Plane (HCP). The remaining three test points shall each receive at least 50 direct contact discharges. If no direct contact test points are available, then at least 200 indirect discharges shall be applied in the indirect mode. Test shall be performed at a maximum repetition rate of one discharge per second.

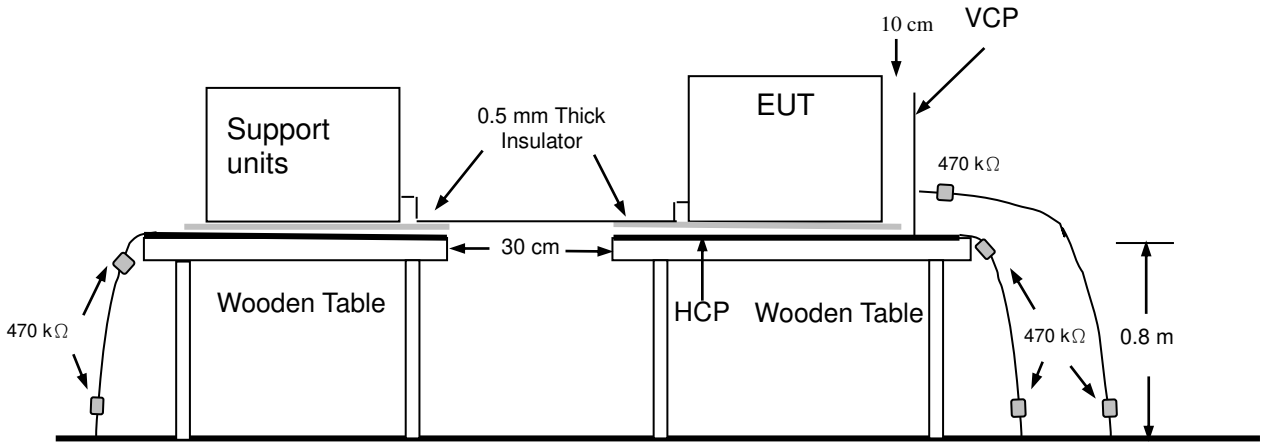
b) Air discharges at slots and apertures and insulating surfaces:

On those parts of the EUT where it is not possible to perform contact discharge testing, the equipment should be investigated to identify user accessible points where breakdown may occur. Such points are tested using the air discharge method. This investigation should be restricted to those area normally handled by the user. A minimum of 10 single air discharges shall be applied to the selected test point for each such area.

The basic test procedure was in accordance with IEC 61000-4-2:

a) The EUT was located 0.1 m minimum from all side of the HCP (dimensions 1.6m x 0.8m).
b) The support units were located another table 30 cm away from the EUT, but direct support unit was/were located at same location as EUT on the HCP and keep at a distance of 10 cm with EUT.
c) The time interval between two successive single discharges was at least 1 second.
d) Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
e) Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were complete.
f) At least ten single discharges (in the most sensitive polarity) were applied at the front edge of each HCP opposite the center point of each unit of the EUT and 0.1 meters from the front of the EUT. The long axis of the discharge electrode was in the plane of the HCP and perpendicular to its front edge during the discharge.
g) At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the Vertical Coupling Plane (VCP) in sufficiently different positions that the four faces of the EUT were completely illuminated. The VCP (dimensions 0.5m x 0.5m) was placed vertically to and 0.1 meters from the EUT.

8.3.4. TEST SETUP



Ground Reference Plane

- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

Note:
TABLE-TOP EQUIPMENT
The configuration consisted of a wooden table 0.8 meters high standing on the **G**round **R**eference **P**lane. The **GRP** consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A **H**orizontal **C**oupling **P**lane (1.6m x 0.8m) was placed on the table and attached to the **GRP** by means of a cable with 940k total impedance. The equipment under test, was installed in a representative system as described in section 7 of IEC 61000-4-2 / EN 61000-4-2, and its cables were placed on the **HCP** and isolated by an insulating support of 0.5mm thickness. A distance of 1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

FLOOR-STANDING EQUIPMENT
The equipment under test was installed in a representative system as described in section 7 of IEC 61000-4-2 / EN 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.

8.3.5. TEST RESULTS

Temperature	23°C	**Humidity**	50% RH
Pressure	997mbar	**Tested By**	Moore Cheng
Test Mode	Mode 2	**Required Passing Performance**	**Criterion B**

Air Discharge												
Test Points	Test Levels								Results		
	± 2 kV	Performance Criterion		± 4 kV	Performance Criterion		± 8 kV	Performance Criterion		Pass	Fail	Observation
Front	☒	☒A	☐B	☒	☒A	☐B	☒	☒A	☐B	☒	☐	Note 1
Back	☒	☒A	☐B	☒	☒A	☐B	☒	☒A	☐B	☒	☐	Note 1
Left	☐	☐A	☐B	☐	☐A	☐B	☐	☐A	☐B	☐	☐	Note 2
Right	☐	☐A	☐B	☐	☐A	☐B	☐	☐A	☐B	☐	☐	Note 2
Top	☐	☐A	☐B	☐	☐A	☐B	☐	☐A	☐B	☐	☐	Note 2
Bottom	☐	☐A	☐B	☐	☐A	☐B	☐	☐A	☐B	☐	☐	Note 2

Contact Discharge												
Test Points	Test Levels								Results		
	± 2 kV	Performance Criterion		± 4 kV	Performance Criterion		± 8 kV	Performance Criterion		Pass	Fail	Observation
Front	☐	☐A	☐B	☐	☐A	☐B	☐	☐A	☐B	☐	☐	Note 2
Back	☐	☐A	☐B	☐	☐A	☐B	☐	☐A	☐B	☐	☐	Note 2
Left	☐	☐A	☐B	☐	☐A	☐B	☐	☐A	☐B	☐	☐	Note 2
Right	☐	☐A	☐B	☐	☐A	☐B	☐	☐A	☐B	☐	☐	Note 2
Top	☐	☐A	☐B	☐	☐A	☐B	☐	☐A	☐B	☐	☐	Note 2
Bottom	☐	☐A	☐B	☐	☐A	☐B	☐	☐A	☐B	☐	☐	Note 2

For the tested points to EUT, please refer to attached page. (Blue arrow mark for Air Discharge)

Discharge To Horizontal Coupling Plane							
Side of EUT	Test Levels			Results			
	± 2 kV	± 4 kV	± 6 kV	Pass	Fail	Performance Criterion	Observation
Front	☒	☒	☒	☒	☐	☒A ☐B	Note 1
Back	☒	☒	☒	☒	☐	☒A ☐B	Note 1
Left	☒	☒	☒	☒	☐	☒A ☐B	Note 1
Right	☒	☒	☒	☒	☐	☒A ☐B	Note 1

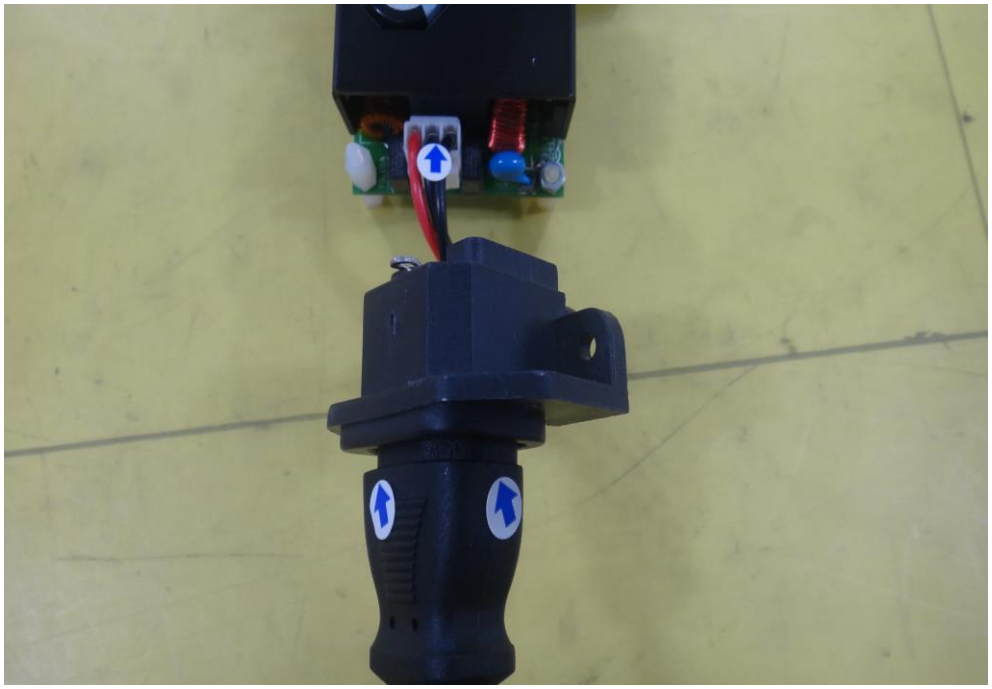
Discharge To Vertical Coupling Plane							
Side of EUT	Test Levels			Results			
	± 2 kV	± 4 kV	± 6 kV	Pass	Fail	Performance Criterion	Observation
Front	☒	☒	☒	☒	☐	☒A ☐B	Note 1
Back	☒	☒	☒	☒	☐	☒A ☐B	Note 1
Left	☒	☒	☒	☒	☐	☒A ☐B	Note 1
Right	☒	☒	☒	☒	☐	☒A ☐B	Note 1

Note:

1. *There was no change compared with initial operation during the test.*
2. *Means that no discharge point had been occurred during that particular coupling method.*

The Photo for Discharge Points of EUT

Mode 2



8.4. RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD (RS)

8.4.1. TEST SPECIFICATION

Basic Standard:	IEC 61000-4-3
Frequency Range:	80 MHz ~1000 MHz
Field Strength:	3 V/m 10/20 V/m (Client Required)
Modulation:	1kHz sine Wave, 80%, AM Modulation.
Frequency Step:	1 % of preceding frequency value
Polarity of Antenna:	Horizontal and Vertical
Test Distance:	3 m
Antenna Height:	1.5 m

8.4.2. TEST INSTRUMENT

For Mode 2

RS Chamber				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
S.G.	Agilent	E8257C	US42340383	09/26/2013
Power Meter	BOONTON	4232A-01-02	98501	02/05/2014
Power Sensor	BOONTON	51011-EMC	32862	02/05/2014
Power Sensor	BOONTON	51011-EMC	32864	02/05/2014
Power Amplifier	ar	150W1000M3	306730	N.C.R
Power Amplifier	ar	500W1000A	320994	N.C.R
Power Amplifier	ar	1000W1000D	0339180	N.C.R
Power Amplifier	ar	250T1G3M1	0320245	N.C.R
Power Amplifier	ar	300T2G8M1	0320255	N.C.R
Power Amplifier	ar	250T8G18M1	0320246	N.C.R
Dual Directional Coupler	ar	DC6180A	320285	N.C.R.
Dual Directional Coupler	ar	DC7144A	313674	N.C.R.
Dual Directional Coupler	ar	DC7280A	320524	N.C.R.
Dual Directional Coupler	ar	DC7450M1	320073	N.C.R.
RF Test System Controller	ar	SC1000M3	306666	N.C.R.
Bilog Antenna	ar	AT1080	306709	N.C.R
Horn Antenna	SCHWARZBECK	BBHA 9120D	530	N.C.R.
EM PROBE	ar	FL7018	311430	08/17/2013
Test S/W	SW1006 (V1.13)			

Note:

1. *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.*
2. *N.C.R.= No Calibration required.*

For Mode 3

RS Chamber (Wugu Lab.)					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
AVG Power Sensor	R&S	NRP-Z21	101860	09/03/2018	09/02/2019
AVG Power Sensor	R&S	NRP-Z21	101861	09/03/2018	09/02/2019
Signal Generator	R&S	SMJ100A	101258	09/03/2018	09/02/2019
Bilog Antenna	AR	ATL80M1G	044851	N.C.R	N.C.R
Dual Directional Coupler	AR	DC6180A	433803	N.C.R	N.C.R
Dual Directional Coupler	RD Microswaves	C1-A47NFNF	31	N.C.R	N.C.R
Horn Antenna	SCHWARZBECK	STLP 9149	9149-261	N.C.R	N.C.R
Power Amplifier	AR	50S1G6M1	0433952	N.C.R	N.C.R
Power Amplifier	AR	250W1000BM1	0579919	N.C.R	N.C.R
RF Test System Controller	AR	SC1000M3	0433953	N.C.R	N.C.R
Software	SW1006 (V1.13)				

844 Chamber#RS (Sindian Lab.)					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Electric Field Probe	AR	FL7006	0338955	05/07/2019	05/06/2020
Field of Calibration	CCS	Chamber#RS	80-1000MHz	04/24/2019	04/23/2020
Power Sensor	Boonton	51013-4E	35812	01/29/2019	01/28/2020
Power Sensor	Boonton	51013-4E	2972	01/29/2019	01/28/2020
RF Power Meter	Boonton	4242-01-02	14357	01/29/2019	01/28/2020
Signal Generator	Agilent	N5181A	MY47421336	11/19/2018	11/18/2019
Thermo-Hygro Meter	Wisewind	N/A	SD-S019	10/29/2018	10/28/2019
Broadband Antenna	AR	AT1080	311819	N.C.R	N.C.R
Power Amplifier	Milmega	80RF1000-600	1079361	N.C.R	N.C.R
Software	EmcwareVer. 2.6.0.16				

Note: *1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.*
2. N.C.R. = No Calibration Required.

8.4.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-023)

The test procedure was in accordance with IEC 61000-4-3

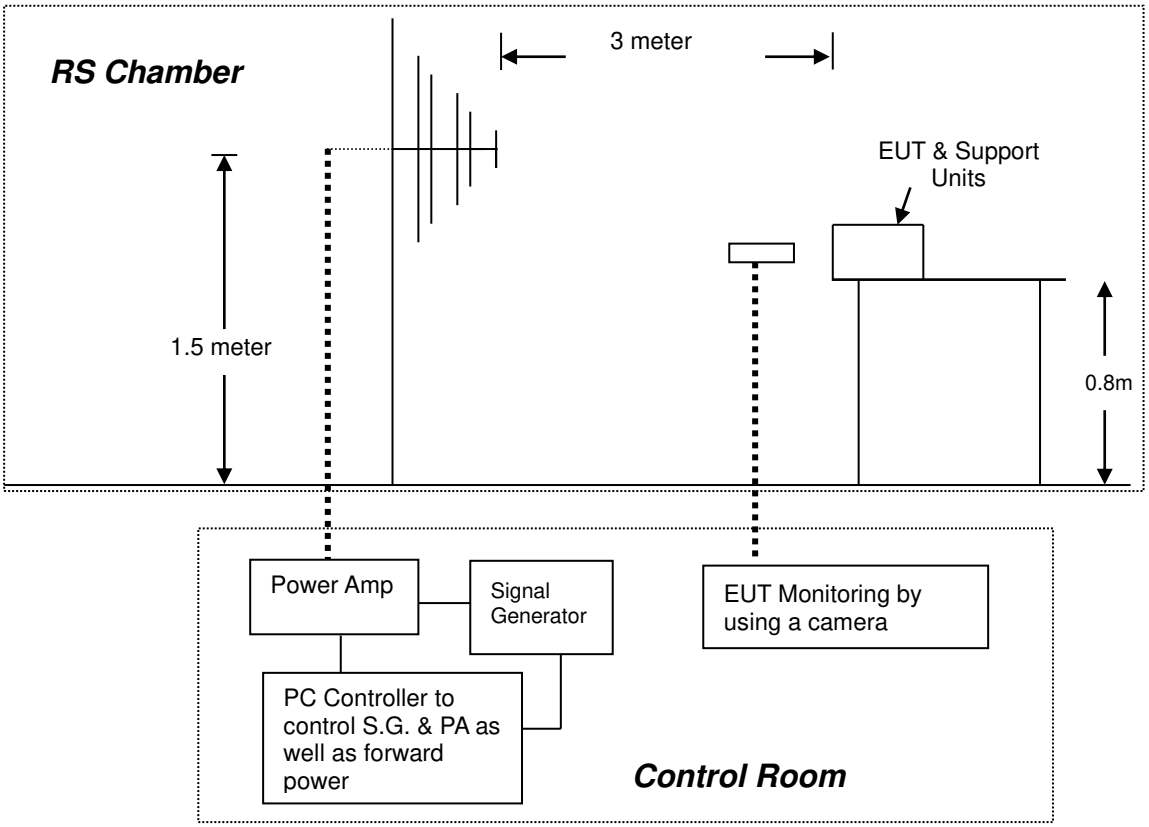
a) The testing was performed in a fully anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.

b) The frequency range is swept from 80 MHz to 1000 MHz, with the signal 80% amplitude modulated with a 1kHz sine-wave. The rate of sweep did not exceed 1.5 x 10^{-3} decade/s, where the frequency range is swept incrementally, the step size was 1% of preceding frequency value.

c) The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.

e) The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

8.4.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

Note:
TABLETOP EQUIPMENT
The EUT installed in a representative system as described in section 7 of IEC 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

FLOOR STANDING EQUIPMENT
The EUT installed in a representative system as described in section 7 of IEC 61000-4-3 was placed on a non-conductive wood support 0.1 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

8.4.5. TEST RESULTS

Temperature	23°C	**Humidity**	49% RH
Pressure	999mbar	**Dwell Time**	3 sec.
Tested By	Hank Wang	**Test Mode**	Mode 2
Required Passing Performance	**Criterion A**		

For Standard requirement:

Frequency (MHz)	Polarity	Azimuth	Field Strength (V/m)	Performance Criterion	Observation	Result
80 ~ 1000	V&H	0	3	☒A ☐B	Note ☒1 ☐2	PASS
80 ~ 1000	V&H	90	3	☒A ☐B	Note ☒1 ☐2	PASS
80 ~ 1000	V&H	180	3	☒A ☐B	Note ☒1 ☐2	PASS
80 ~ 1000	V&H	270	3	☒A ☐B	Note ☒1 ☐2	PASS
1G~2.5G	V&H	0	3	☒A ☐B	Note ☒1 ☐2	PASS
1G~2.5G	V&H	90	3	☒A ☐B	Note ☒1 ☐2	PASS
1G~2.5G	V&H	180	3	☒A ☐B	Note ☒1 ☐2	PASS
1G~2.5G	V&H	270	3	☒A ☐B	Note ☒1 ☐2	PASS

Note: *1. There was no change compared with the initial operation during the test.*

According to the customer's requirement:

Frequency (MHz)	Polarity	Azimuth	Field Strength (V/m)	Performance Criterion	Observation	Result
80 ~ 1000	V&H	0	20	☒A ☐B	Note ☒1 ☐2	PASS
80 ~ 1000	V&H	90	20	☒A ☐B	Note ☒1 ☐2	PASS
80 ~ 1000	V&H	180	20	☒A ☐B	Note ☒1 ☐2	PASS
80 ~ 1000	V&H	270	20	☒A ☐B	Note ☒1 ☐2	PASS
1G~2.5G	V&H	0	10	☒A ☐B	Note ☒1 ☐2	PASS
1G~2.5G	V&H	90	10	☒A ☐B	Note ☒1 ☐2	PASS
1G~2.5G	V&H	180	10	☒A ☐B	Note ☒1 ☐2	PASS
1G~2.5G	V&H	270	10	☒A ☐B	Note ☒1 ☐2	PASS

Note: *1. There was no change compared with the initial operation during the test.*

Temperature	21℃	**Humidity**	47% RH
Pressure	999mbar	**Dwell Time**	3 sec.
Test Date	2019/6/26	**Tested By**	James Shen
Test Mode	Mode 3	**Required Passing Performance**	**Criterion A**

Frequency (MHz)	Polarity	Azimuth	Field Strength (V/m)	Performance Criterion	Observation	Result
80 ~ 1000	V&H	0	3	☒A ☐B	Note ☒1 ☐2	PASS
80 ~ 1000	V&H	90	3	☒A ☐B	Note ☒1 ☐2	PASS
80 ~ 1000	V&H	180	3	☒A ☐B	Note ☒1 ☐2	PASS
80 ~ 1000	V&H	270	3	☒A ☐B	Note ☒1 ☐2	PASS

Temperature	20℃	**Humidity**	53% RH
Pressure	1006mbar	**Dwell Time**	3 sec.
Test Date	2019/8/26	**Tested By**	Mike Xie
Test Mode	Mode 3	**Required Passing Performance**	**Criterion A**

According to client's requirement:

Frequency (MHz)	Polarity	Azimuth	Field Strength (V/m)	Performance Criterion	Observation	Result
80 ~ 1000	V&H	0	20	☒A ☐B	Note ☒1 ☐2	PASS
80 ~ 1000	V&H	90	20	☒A ☐B	Note ☒1 ☐2	PASS
80 ~ 1000	V&H	180	20	☒A ☐B	Note ☒1 ☐2	PASS
80 ~ 1000	V&H	270	20	☒A ☐B	Note ☒1 ☐2	PASS

Note: *1. There was no change compared with the initial operation during the test.*

8.5. ELECTRICAL FAST TRANSIENT (EFT)

8.5.1. TEST SPECIFICATION

Basic Standard:	IEC 61000-4-4
Test Voltage:	AC Power Port: 1kV 2kV (Client Required) DC Power Port: 0.5kV Signal Ports and Telecommunication Ports: 0.5
Polarity:	Positive & Negative
Impulse Frequency:	5 kHz
Impulse Wave-shape:	5/50 ns
Burst Duration:	15 ms
Burst Period:	300 ms
Test Duration:	Not less than 1 min.

8.5.2. TEST INSTRUMENT

Immunity Shield Room					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
EMC Immunity Tester	EMC Partner	TRA2000IN6	1144	01/03/2014	01/02/2015
CDN	EMC Partner	CDCN-UTP8	046	01/09/2014	01/08/2015
Clamp	EMC Partner	CN-EFT1000	683	N.C.R.	N.C.R.
Software	Genecs (3.03)				

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.*

8.5.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-024)

a) Both positive and negative polarity discharges were applied.

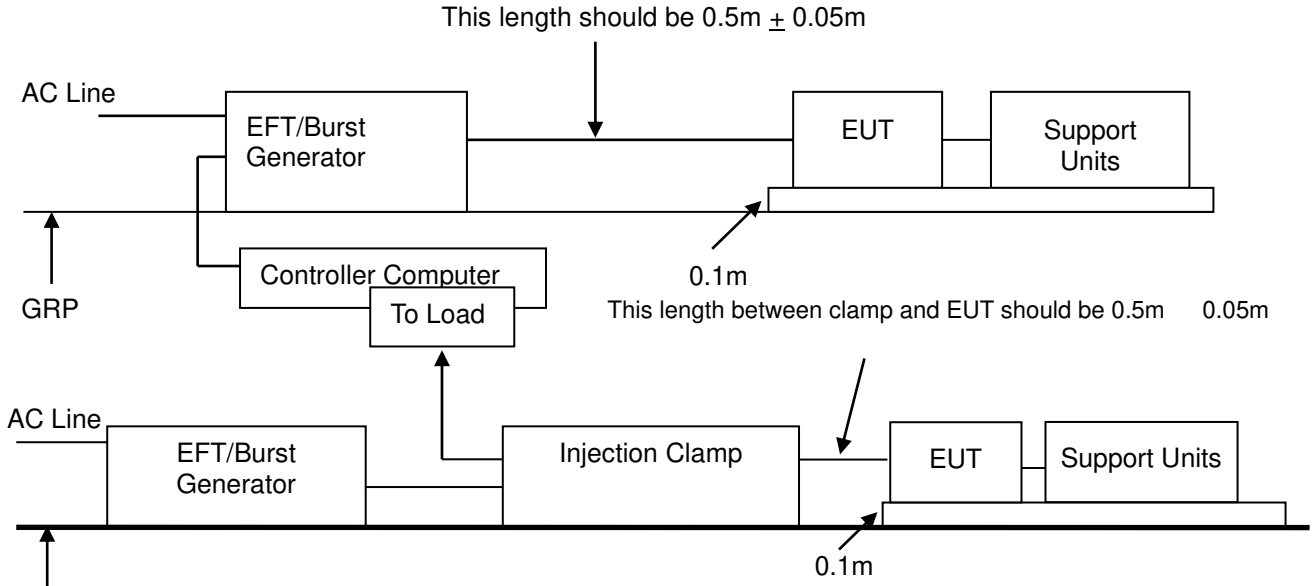
b) The length of the "hot wire" from the coaxial output of the EFT generator to the terminals on the EUT should not exceed 0.5 meter.

c) The duration time of each test sequential was 1 minute.

d) The transient/burst waveform was in accordance with IEC 61000-4-4 5/50ns

.

8.5.4. TEST SETUP



– the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

Note:

TABLETOP EQUIPMENT

The configuration consisted of a wooden table (0.1m high) standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system. A minimum distance of 0.5m was provided between the EUT and the walls of the laboratory or any other metallic structure.

FLOOR STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC 61000-4-4 and its cables were isolated from the Ground Reference Plane by an insulating support that is 0.1-meter thick. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system.

8.5.5. TEST RESULTS

Temperature	22°C	**Humidity**	50% RH
Pressure	999mbar	**Tested By**	Moore Cheng
Test Mode	Mode 2	**Required Passing Performance**	**Criterion B**

Test Point	Polarity	Test Level (kV)	Performance Criterion	Observation	Result
L	+/-	2	☒A ☐B	Note ☒1 ☐2	PASS
N	+/-	2	☒A ☐B	Note ☒1 ☐2	PASS
PE	+/-	2	☒A ☐B	Note ☒1 ☐2	PASS
L + N	+/-	2	☒A ☐B	Note ☒1 ☐2	PASS
L + PE	+/-	2	☒A ☐B	Note ☒1 ☐2	PASS
N + PE	+/-	2	☒A ☐B	Note ☒1 ☐2	PASS
L + N + PE	+/-	2	☒A ☐B	Note ☒1 ☐2	PASS

Note: *1. There was no change compared with initial operation during the test.*

8.6. SURGE IMMUNITY TEST

8.6.1. TEST SPECIFICATION

Basic Standard:	IEC 61000-4-5
Wave-Shape:	Combination Wave 1.2/50 µs Open Circuit Voltage 8/20 µs Short Circuit Current Combination Wave for Signal and Telecommunication port 10/700µs Open Circuit Voltage 5/320µs Short Circuit Current
Test Voltage:	AC Power Port ~ line to line: 1kV line to line: 2kV (Client Required) line to earth (ground): 2kV DC Power Port ~ line to earth: 0.5kV Performance Criterion B Signal and Telecommunication Ports ~ line to ground: 1kV Performance Criterion C
Surge Input/Output:	AC Power Line: L - N
Generator Source Impedance:	2 ohm between networks 12 ohm between network and ground
Polarity:	Positive/Negative
Phase Angle:	0° / 90° / 180° / 270°
Pulse Repetition Rate:	1 time / min. (maximum)
Number of Tests:	5 positive and 5 negative at selected points

8.6.2. TEST INSTRUMENT

Immunity Shield Room					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
CDN	EMC Partner	CDN-UTP8	046	12/22/2016	12/21/2017
Clamp	EMC Partner	CN-EFT1000	683	09/10/2016	09/09/2017
EMC Immunity Tester	EMC Partner	TRA2006	1144	01/16/2017	01/15/2018
Software	Genecs (3.03)				

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.*

8.6.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-025)

a) For EUT power supply:

The surge is applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines, and to provide sufficient decoupling impedance to the surge wave. The power cord between the EUT and the coupling/decoupling networks was shorter than 2 meters in length.

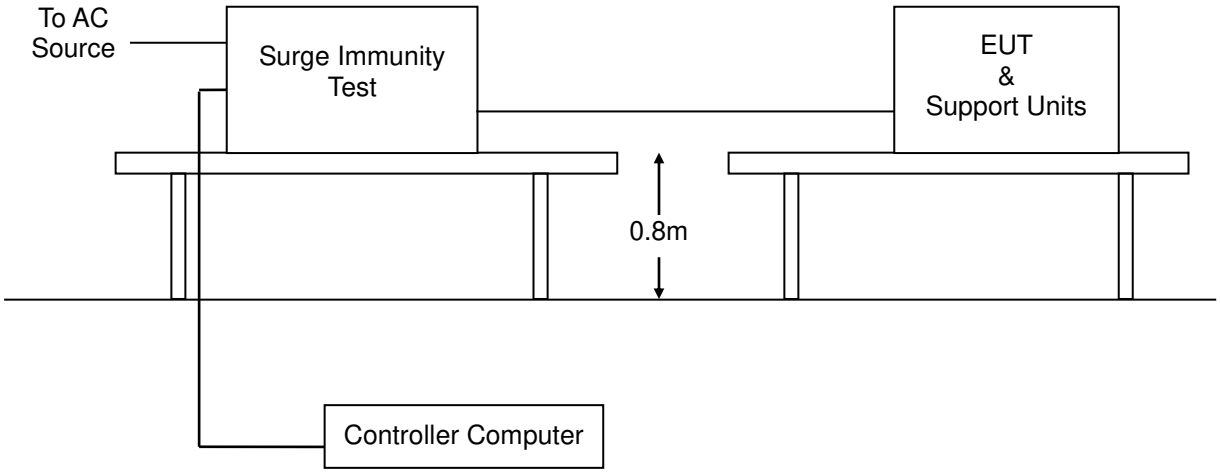
b) For test applied to unshielded un-symmetrically operated interconnection lines of EUT:

The surge was applied to the lines via the capacitive coupling. The coupling / decoupling networks didn't influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling/decoupling networks was shorter than 2 meters in length.

c) For test applied to unshielded symmetrically operated interconnection / telecommunication lines of EUT:

The surge was applied to the lines via gas arrestors coupling. Test levels below the ignition point of the coupling arrestor were not specified. The interconnection line between the EUT and the coupling/decoupling networks was shorter than 2 meters in length.

8.6.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

8.6.5. TEST RESULT

Temperature	25ºC	**Humidity**	54% RH
Pressure	1001mbar	**Tested By**	Eason Liu
Test Date	2017/7/14	**Test Mode**	Mode 2
Required Passing Performance	**Criterion B**		

Test Point	Polarity	Test Level (kV)	Performance Criterion	Observation	Result
L - N	+/-	1	☒A ☐B	Note ☒1 ☐2	PASS
L – PE	+/-	2	☒A ☐B	Note ☒1 ☐2	PASS
N - PE	+/-	2	☒A ☐B	Note ☒1 ☐2	PASS

Note: *1. There was no change compared with initial operation during the test.*

8.7. CONDUCTED RADIO FREQUENCY DISTURBANCES (CS)

8.7.1. TEST SPECIFICATION

Basic Standard:	IEC 61000-4-6
Frequency Range:	0.15 MHz - 80 MHz
Field Strength:	3 Vrms 10 Vrms (Client Required)
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of preceding frequency value
Coupled cable:	Power Mains, Unshielded
Coupling device:	☐ CDN-M2 (2 wires) ☒ CDN-M3 (3 wires) ☐ CDN-T2 for Line ☐ CDN-T4 for LAN ☐ CDN-T8 for LAN ☐ Clamp

8.7.2. TEST INSTRUMENT

CS Room					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
S.G.	R&S	SMY02	100094	10/02/2013	10/01/2014
Power Meter	BOONTON	4242	13760	01/07/2014	01/06/2015
Power Sensor	BOONTON	51013-4E	35522	01/07/2014	01/06/2015
Power Sensor	BOONTON	51013-4E	35523	01/07/2014	01/06/2015
Power Amplifier	ar	500A100A	300299	N.C.R	N.C.R
Dual Directional Coupler	ar	DC2600A	306621	N.C.R.	N.C.R.
Attenuator	EPX	ECA500-6-1-NF-NM	0809180	N.C.R.	N.C.R.
CDN	FCC	FCC-801-M2-16A	121695	12/11/2013	12/10/2014
CDN	FCC	FCC-801-M3-16A	03027	10/16/2013	10/15/2014
CDN	FCC	FCC-801-T2	03016	10/16/2013	10/15/2014
CDN	FCC	FCC-801-T4	03017	10/16/2013	10/15/2014
CDN	FCC	FCC-801-T8-RJ45	04024	10/16/2013	10/15/2014
EM Injection Clamp	FCC	F-203I-23mm	421	12/25/2013	12/24/2014
Power Sensor	BOONTON	51013-4E	34241	11/11/2013	11/10/2014
Power Sensor	BOONTON	51013-4E	35087	11/11/2013	11/10/2014
Software	SW1006 (V1.22)				

Note: *1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.*
2. N.C.R. = No Calibration Required.

8.7.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-026)

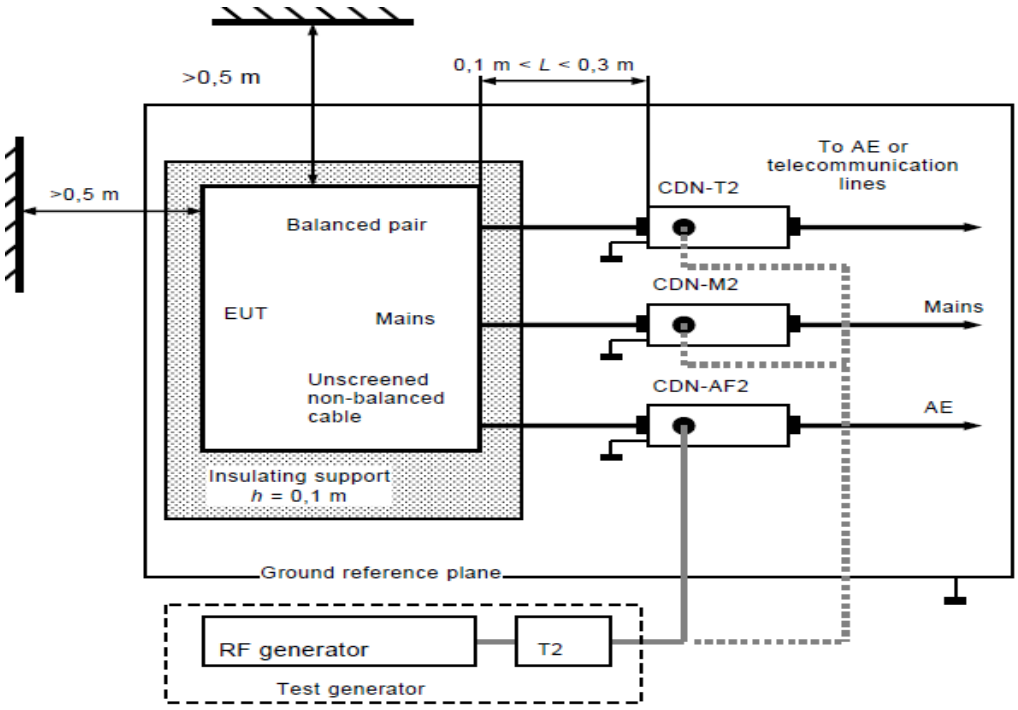
The EUT shall be tested within its intended operating and climatic conditions.
The test shell performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.

The frequency range was swept from 150 kHz to 80MHz, using the signal level established during the setting process and with a disturbance signal of 80 % amplitude. The signal was modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or the switch coupling devices as necessary. The sweep rate was 1.5×10^{-3} decades/s. Where the frequency range is swept incrementally, the step size was 1 % of preceding frequency value from 150 kHz to 80 MHz.

The dwell time at each frequency was less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies such as clock frequency(ies) and harmonics or frequencies of dominant interest, was analyzed separately.

Attempts was made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility.

8.7.4. TEST SETUP



Note:

1. *The EUT is setup 0.1m above Ground Reference Plane*
2. *The CDNs and / or EM clamp used for real test depend on ports and cables configuration of EUT.*

- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

Note:

TABLE-TOP AND FLOOR-STANDING EQUIPMENT

The equipment to be tested is placed on an insulating support of 0.1 meters height above a ground reference plane. All relevant cables shall be provided with the appropriate coupling and decoupling devices at a distance between 0.1 meters and 0.3 meters from the projected geometry of the EUT on the ground reference plane.

8.7.5. TEST RESULTS

Temperature	25°C	**Humidity**	50% RH
Pressure	999mbar	**Tested By**	Eason Liu
Test Mode	Mode 2	**Required Passing Performance**	**Criterion A**

For Standard requirement:

Frequency Band (MHz)	Field Strength (Vrms)	Cable	Injection Method	Performance Criterion	Observation	Result
0.15 ~ 80	3	AC Power Line	CDN-M3	☒A ☐B	Note ☒1 ☐2	PASS

Note: *1. There was no change compared with initial operation during the test.*

According to the customer's requirement:

Frequency Band (MHz)	Field Strength (Vrms)	Cable	Injection Method	Performance Criterion	Observation	Result
0.15 ~ 80	20	AC Power Line	CDN-M3	☒A ☐B	Note ☒1 ☐2	PASS

Note: *1. There was no change compared with initial operation during the test.*

8.8. POWER FREQUENCY MAGNETIC FIELD

8.8.1. TEST SPECIFICATION

Basic Standard:	IEC 61000-4-8
Frequency Range:	50Hz & 60Hz
Field Strength:	1 A/m
Observation Time:	1 minute
Inductance Coil:	Rectangular type, 1mx1m

8.8.2. TEST INSTRUMENT

Immunity Shield Room					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Triax Elf Magnetic Field Meter	F.W.BELL	4190	0845014	02/21/2014	02/20/2015
Clamp Meter	DHA	CM-312A	W3010087	07/03/2013	07/02/2014
Magnetic Field Tester	HAEFELY TRENCH	MAG 100.1	081 436-02	N.C.R.	N.C.R.
Frequency Converter	EXTECH	CFC-105	810390	N.C.R.	N.C.R.
Software	N/A				

Note: *1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.*
2. N.C.R. = No Calibration Required.

8.8.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-027)

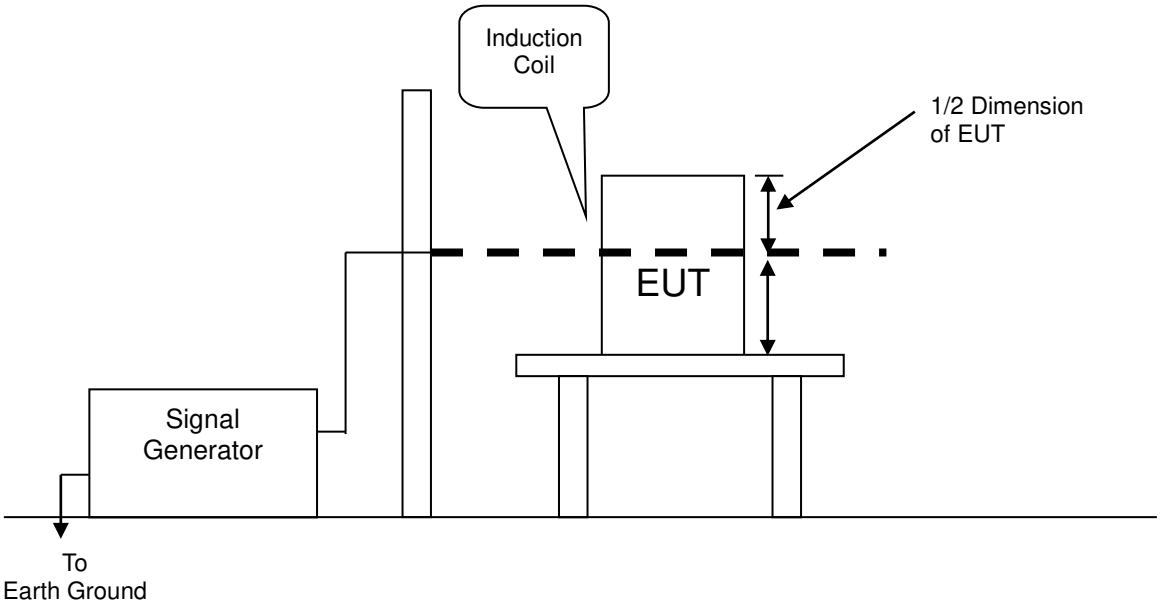
a. The equipment is configured and connected to satisfy its functional requirements. It shall be placed on the GRP with the interposition of a 0.1m-thick insulating support.

b. The equipment cabinets shall be connected to the safety earth directly on the GRP via the earth terminal of the EUT.

c. The power supply, input and output circuits shall be connected to the sources of power supply, control and signal.

d. The cables supplied or recommended by the equipment manufacturer shall be used. 1 meter of all cables used shall be exposed to the magnetic field.

8.8.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

Note:
TABLETOP EQUIPMENT
The equipment shall be subjected to the test magnetic field by using the induction coil of standard dimension (1 m x 1 m). The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.

FLOOR-STANDING EQUIPMENT
The equipment shall be subjected to the test magnetic field by using induction coils of suitable dimensions. The test shall be repeated by moving and shifting the induction coils, in order to test the whole volume of the EUT for each orthogonal direction. The test shall be repeated with the coil shifted to different positions along the side of the EUT, in steps corresponding to 50 % of the shortest side of the coil. The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.

8.8.5. TEST RESULTS

Temperature	27°C	**Humidity**	48% RH
Pressure	999mbar	**Tested By**	Michael Chen
Test Mode	Mode 2	**Required Passing Performance**	**Criterion A**

For Standard requirement:

DIRECTION	Field Strength (A/m)	Performance Criterion	OBSERVATION	RESULTS
X	1	☒A ☐B	Note ☒1 ☐2	PASS
Y	1	☒A ☐B	Note ☒1 ☐2	PASS
Z	1	☒A ☐B	Note ☒1 ☐2	PASS

Note: *1. There was no change compared with the initial operation during the test.*

According to the customer's requirement:

DIRECTION	Field Strength (A/m)	Performance Criterion	OBSERVATION	RESULTS
X	10	☒A ☐B	Note ☒1 ☐2	PASS
Y	10	☒A ☐B	Note ☒1 ☐2	PASS
Z	10	☒A ☐B	Note ☒1 ☐2	PASS

Note: *1. There was no change compared with the initial operation during the test.*

8.9. VOLTAGE DIP & VOLTAGE INTERRUPTIONS

8.9.1. TEST SPECIFICATION

Basic Standard:	IEC 61000-4-11
Test duration time:	Minimum three test events in sequence
Interval between event:	Minimum 10 seconds
Angle:	0~360 degree
Step:	45 degree

8.9.2. TEST INSTRUMENT

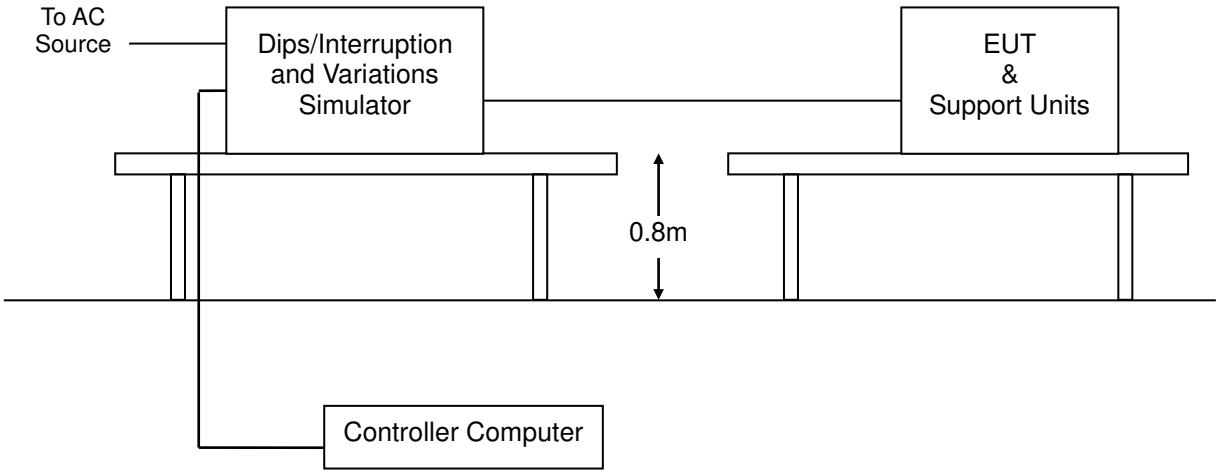
Immunity Shield Room					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
EMC Immunity Tester	EMC Partner	TRA2000IN6	1144	01/03/2014	01/02/2015
CDN	EMC Partner	CDCN-UTP8	046	01/09/2014	01/08/2015
Clamp	EMC Partner	CN-EFT1000	683	N.C.R.	N.C.R.
Software	Genecs (3.03)				

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.*

8.9.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-028)

1. The EUT and support units were located on a wooden table, 0.8 m away from ground floor.
2. Setting the parameter of tests and then perform the test software of test simulator.
3. Conditions changes to occur at 0 degree crossover point of the voltage waveform.
4. Recording the test result in test record form.

8.9.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

8.9.5. TEST RESULTS

Temperature	22°C	**Humidity**	50% RH
Pressure	999mbar	**Tested By**	Moore Cheng
Test Mode	Mode 2		
Required Passing Performance	**Criterion B: >95% reduction 0.5 periods** **Criterion C: 30% reduction 25 periods & >95% reduction 250 periods**		

Test Power: 230Vac, 50Hz and 100Vac, 50Hz				
Voltage (% Reduction)	**Duration (Period)**	**Performance Criterion**	**Observation**	**Test Result**
>95	0.5	☒**A** ☐**B** ☐**C**	**Note** ☒**1** ☐**2**	PASS
30	25	☒**A** ☐**B** ☐**C**	**Note** ☒**1** ☐**2**	PASS
>95	250	☐**A** ☒**B** ☐**C**	**Note** ☐**1** ☒**2**	PASS

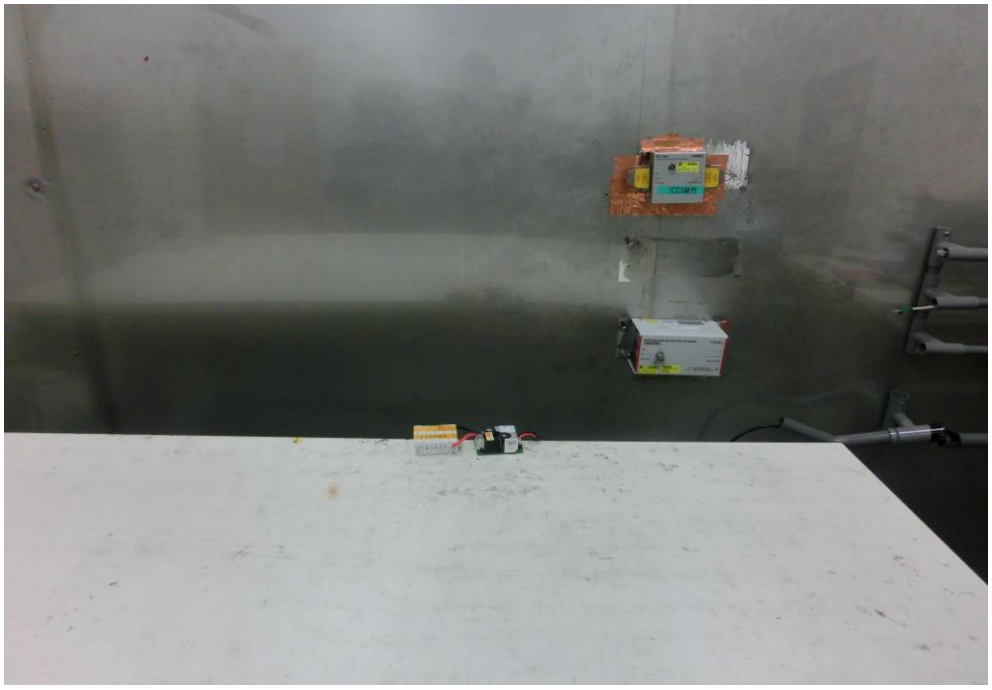
Note:

1. *There was no change compared with initial operation during and after the test. No unintentional response was found during the test.*
2. *EUT shut down, but can be recovered manually as the events disappeared.*

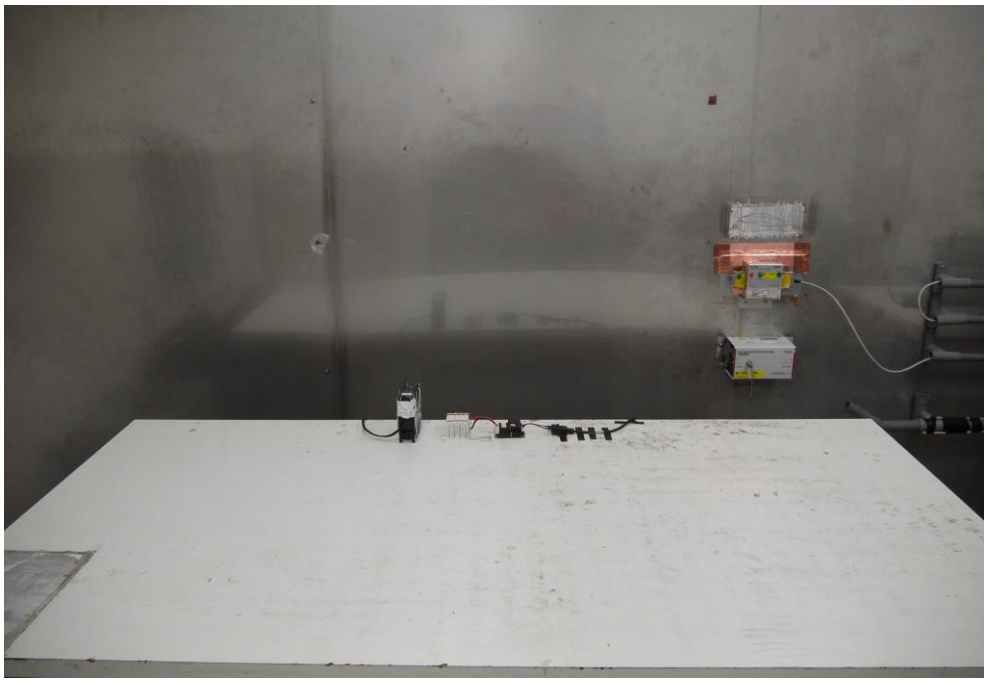
9 PHOTOGRAPHS OF THE TEST CONFIGURATION

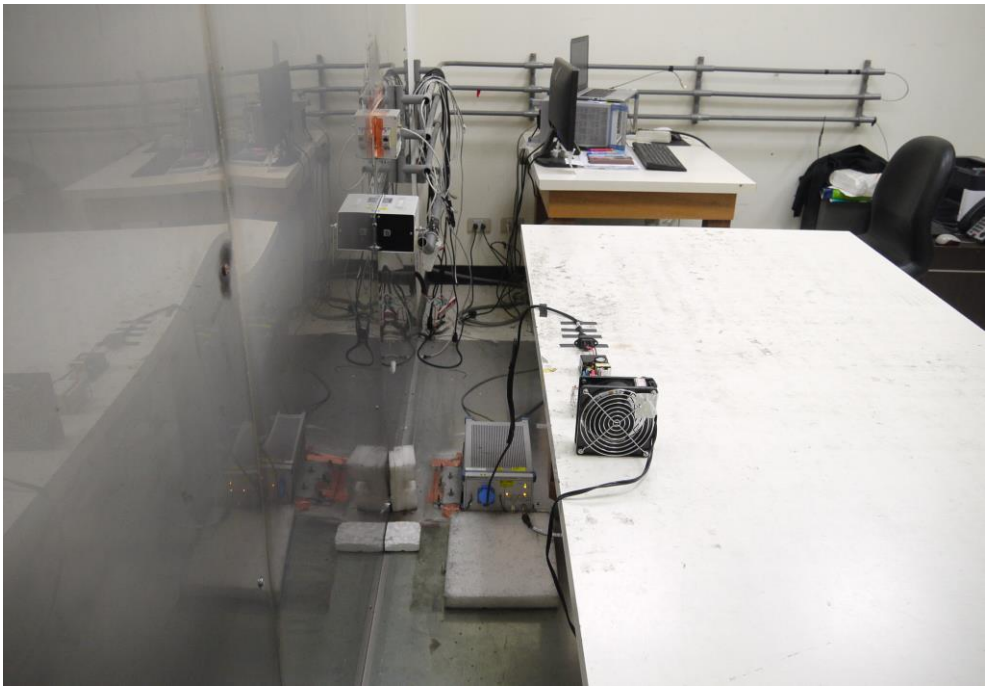
CONDUCTED EMISSION TEST

Mode 2



Mode 3

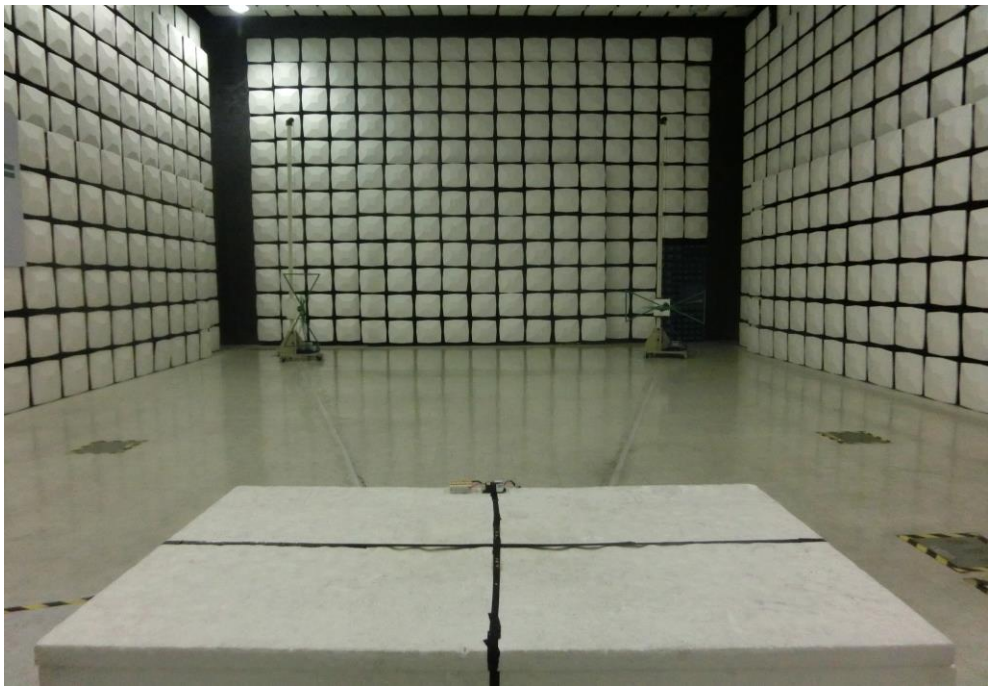


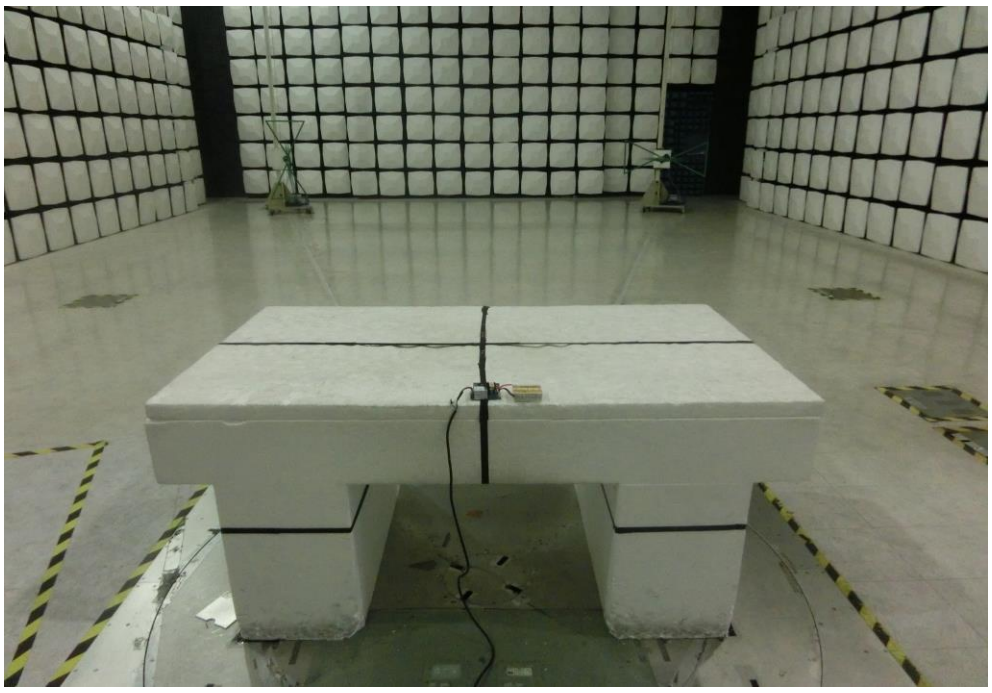


RADIATED EMISSION TEST

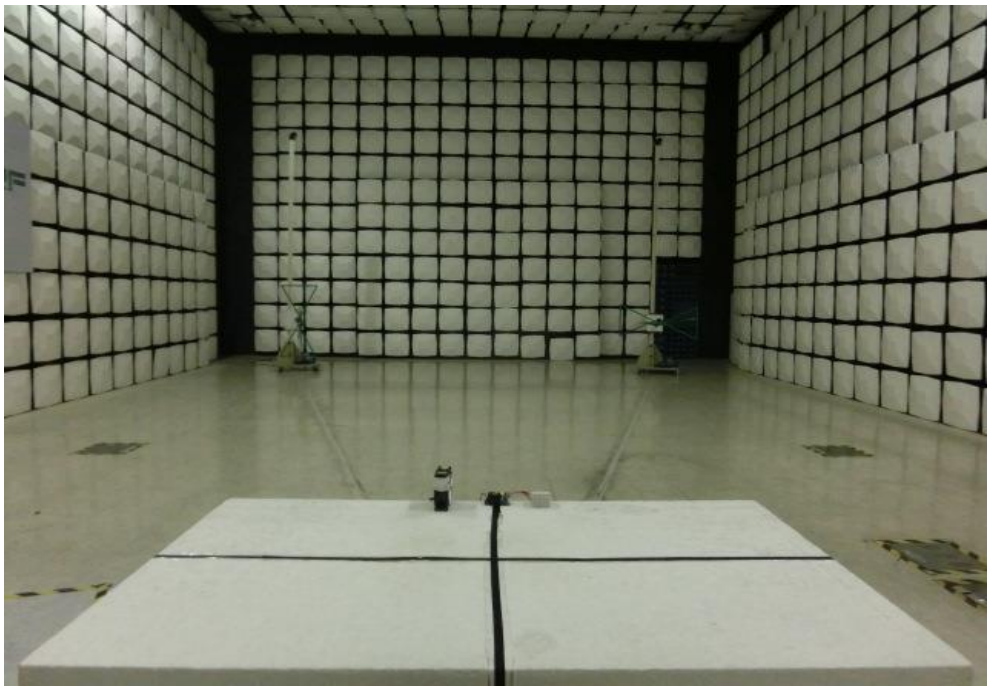
Below 1GHz

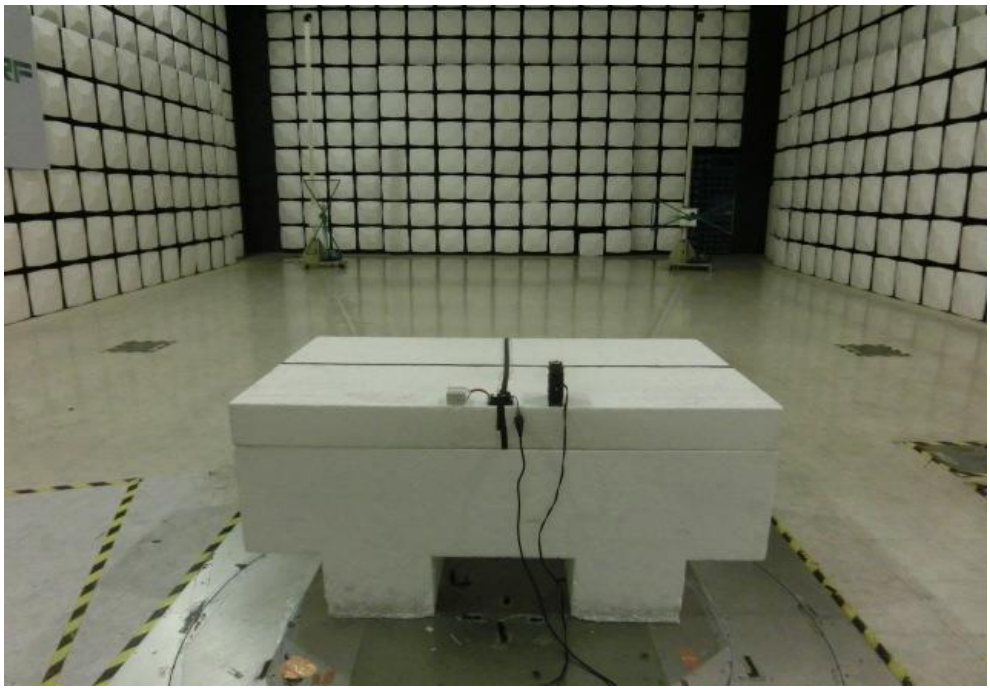
Mode 2





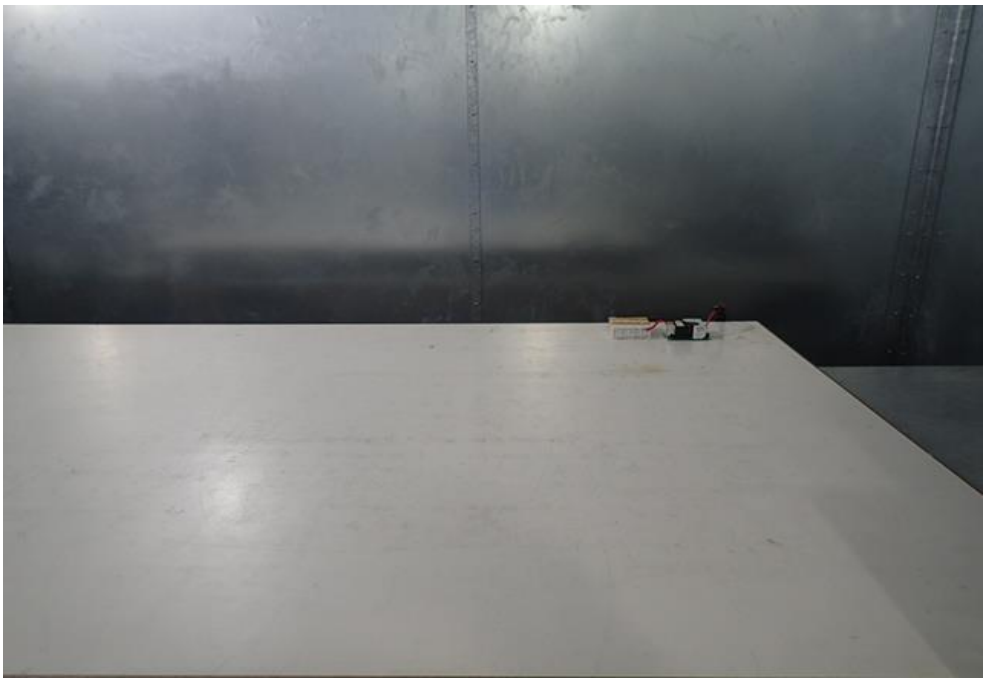
Mode 3





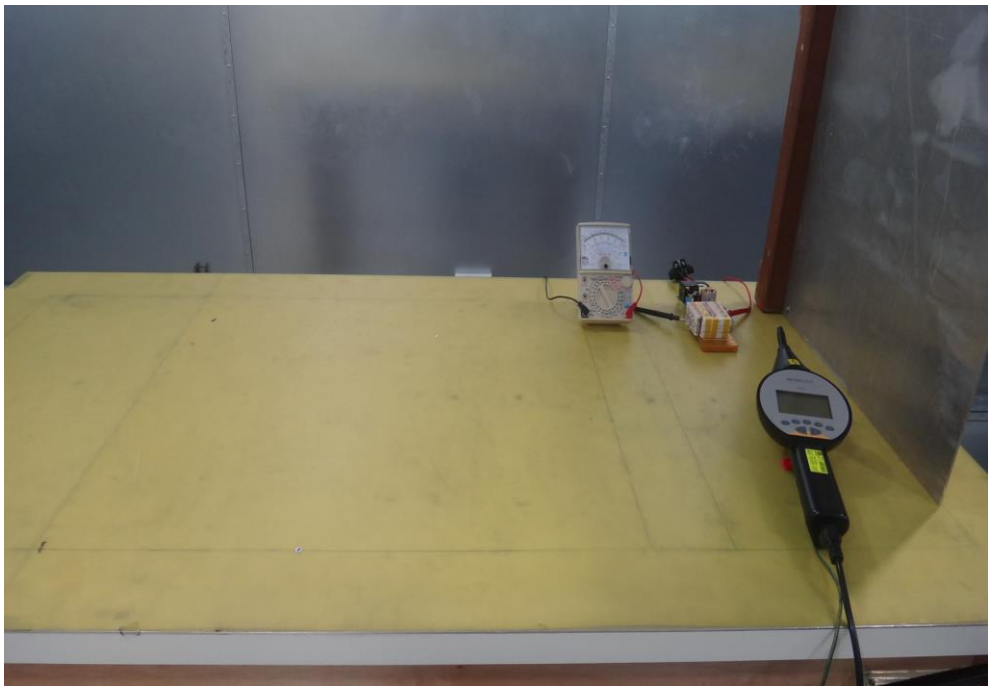
HARMONIC & FLICKER TEST

Mode 2



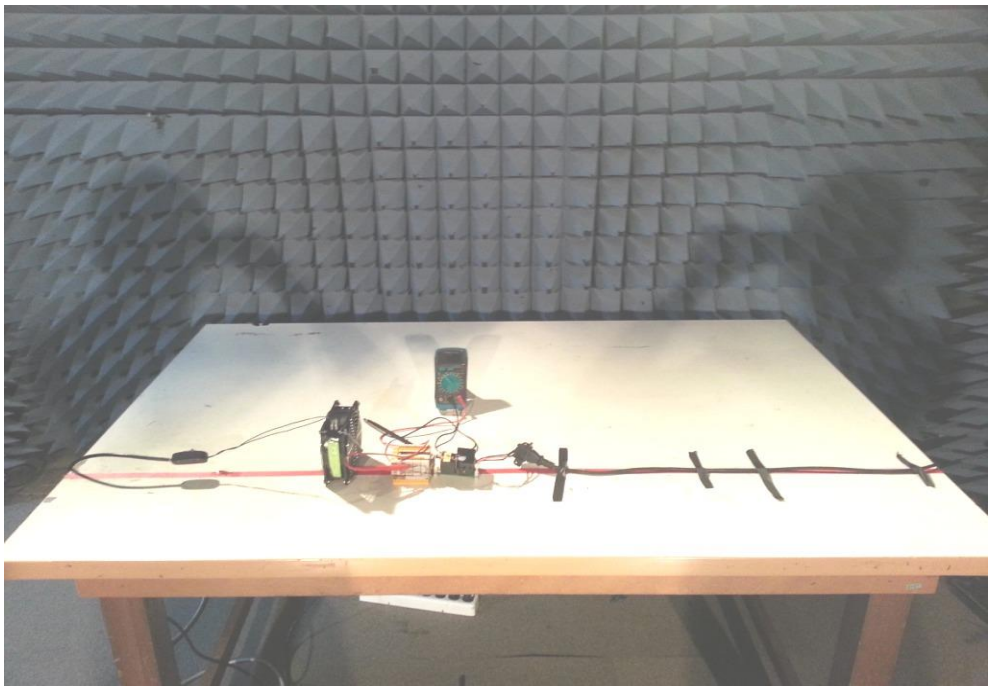
ESD TEST

Mode 2

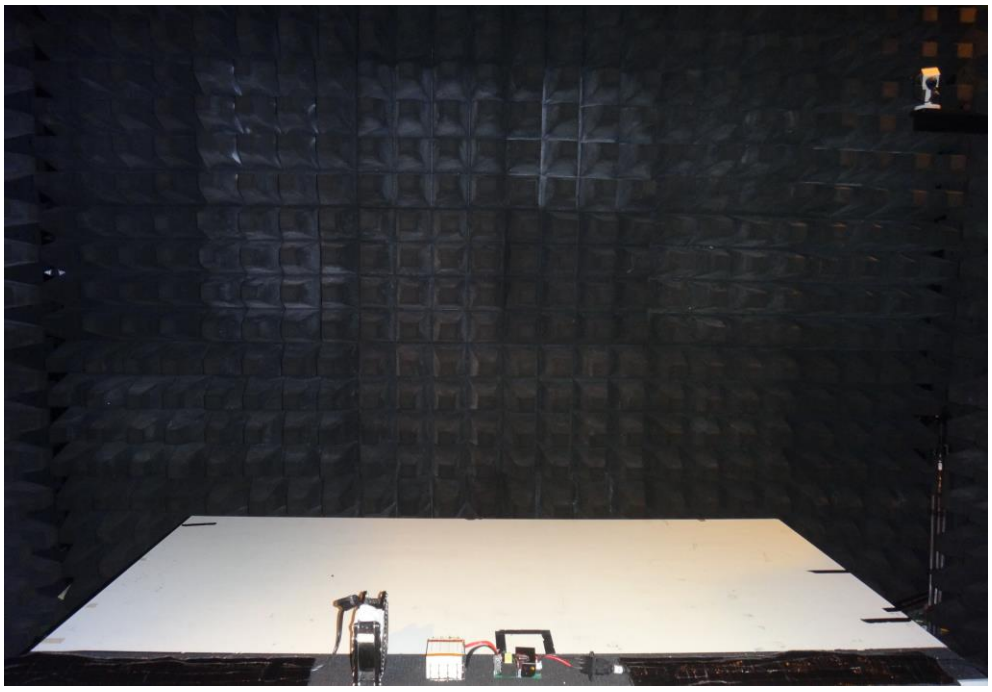


RS TEST

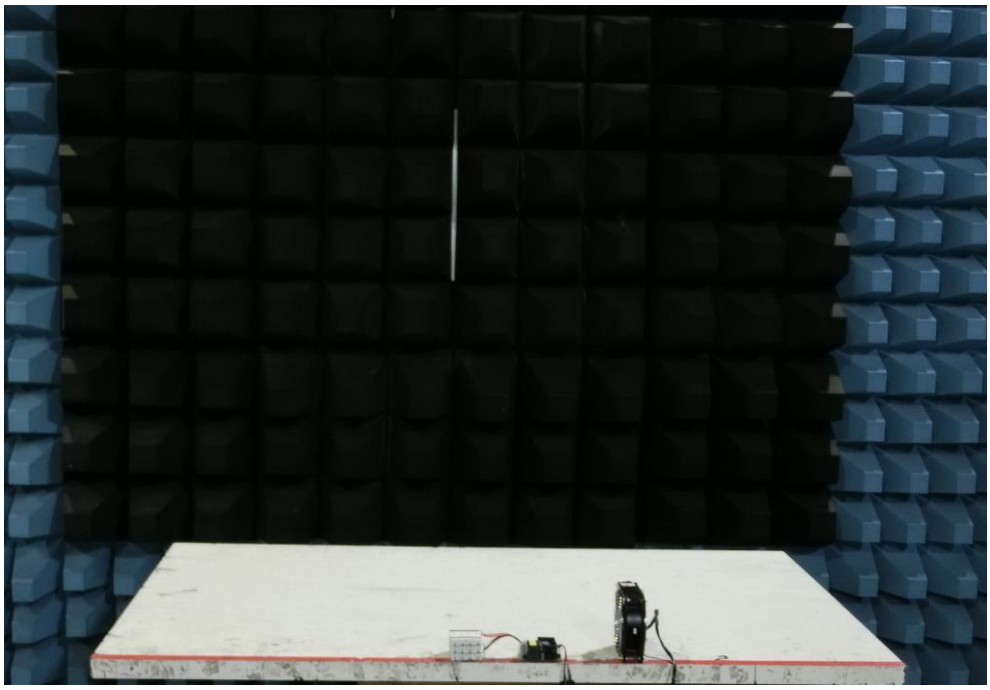
Mode 2

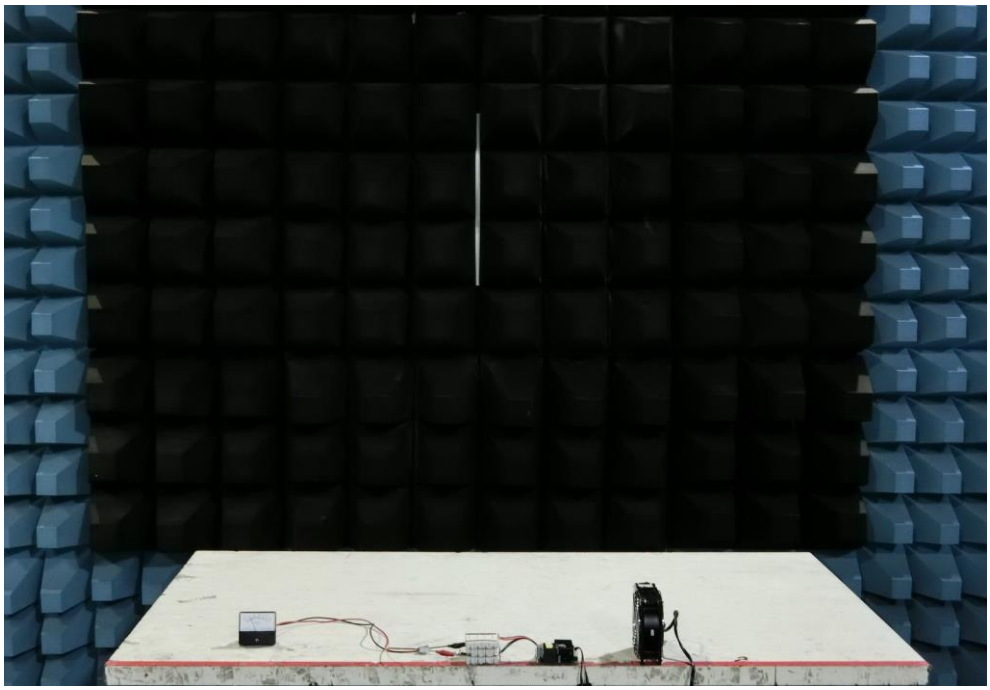


Mode 3



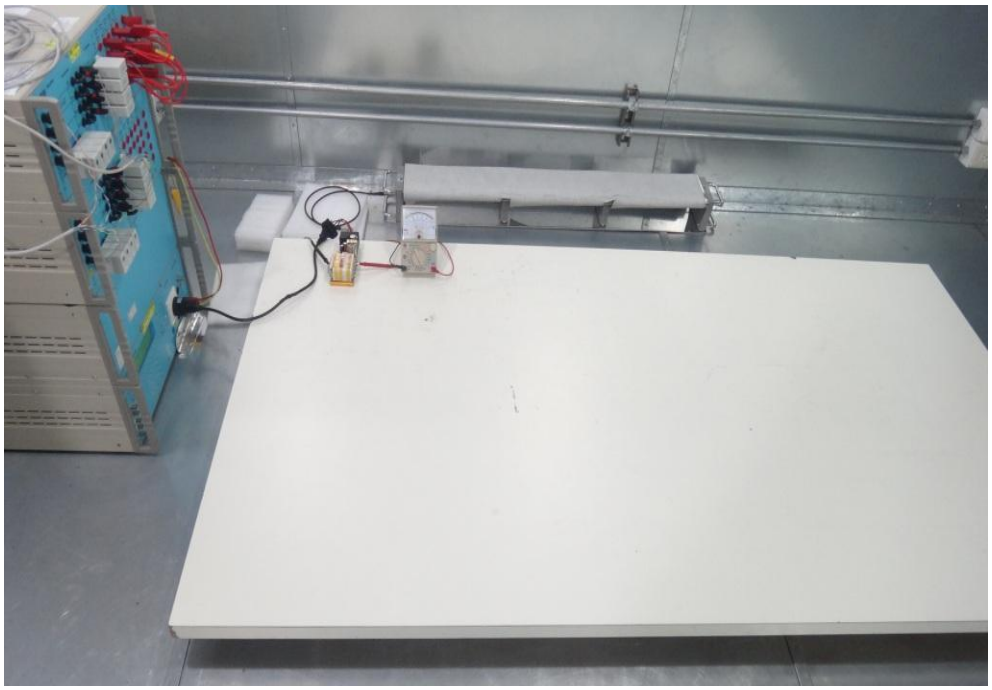
Mode 3
(Client Required)





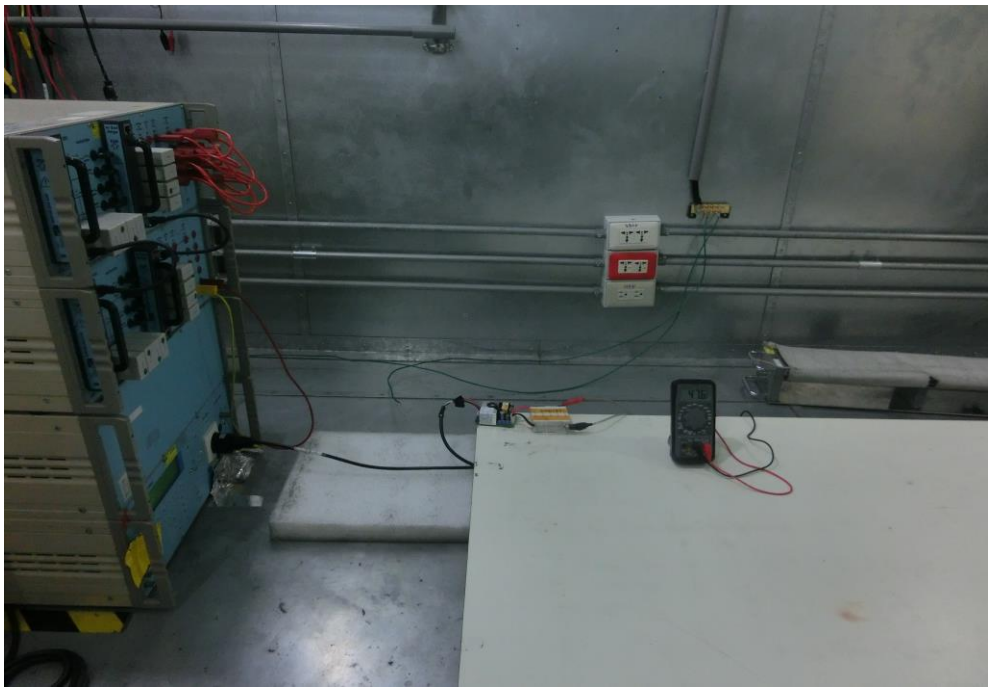
EFT Test

Mode 2



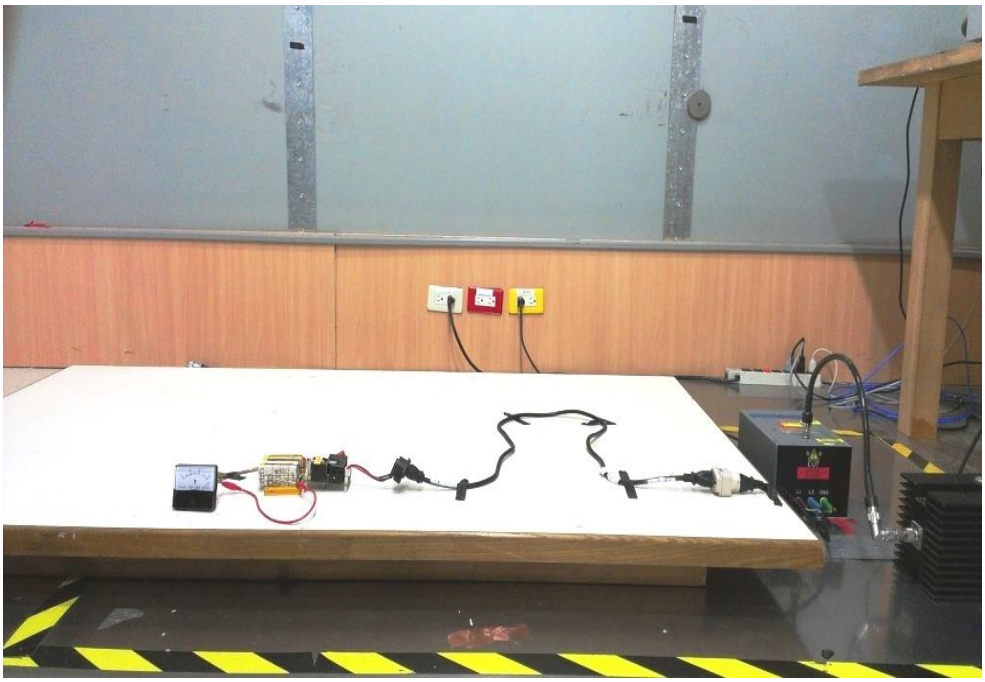
SURGE TEST

Mode 2



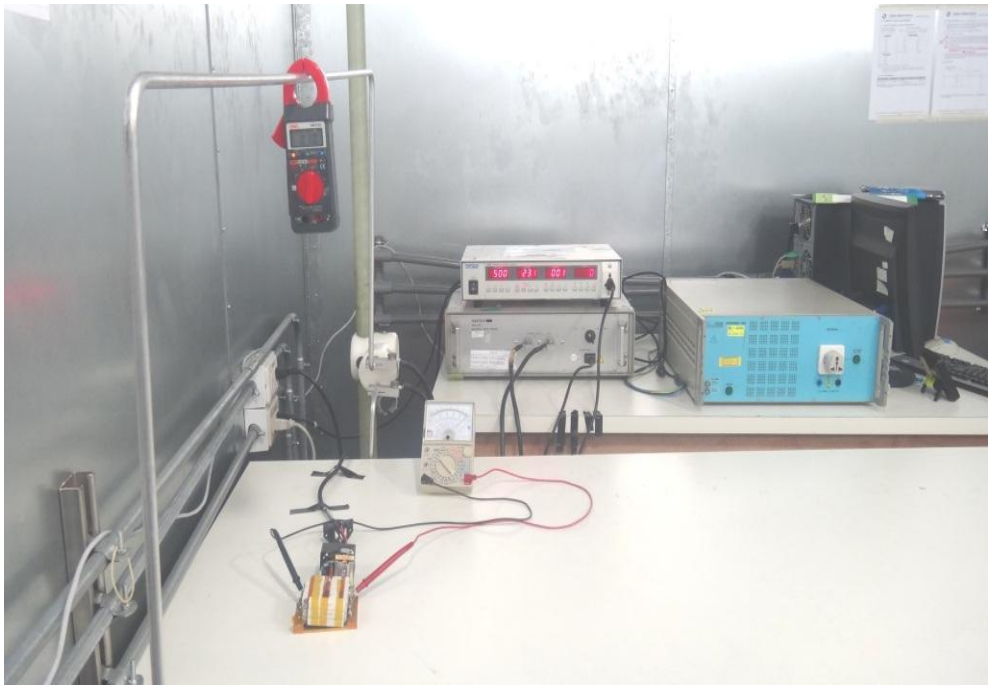
CS Test

Mode 2



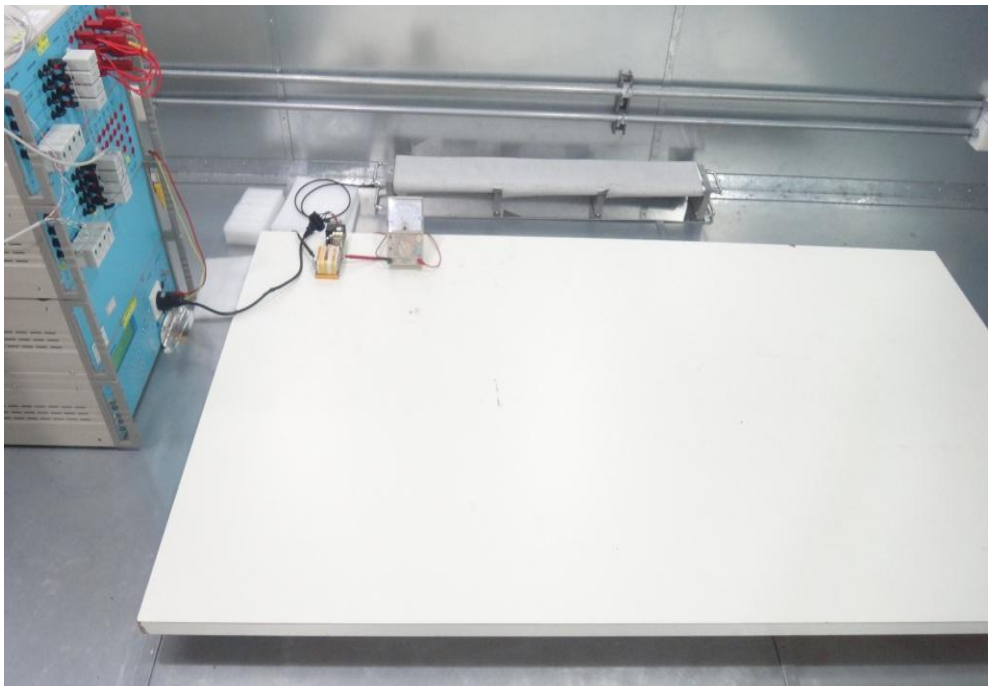
POWER FREQUENCY MAGENTIC FIELD

Mode 2



VOLTAGE DIPS / INTERRUPTION TEST

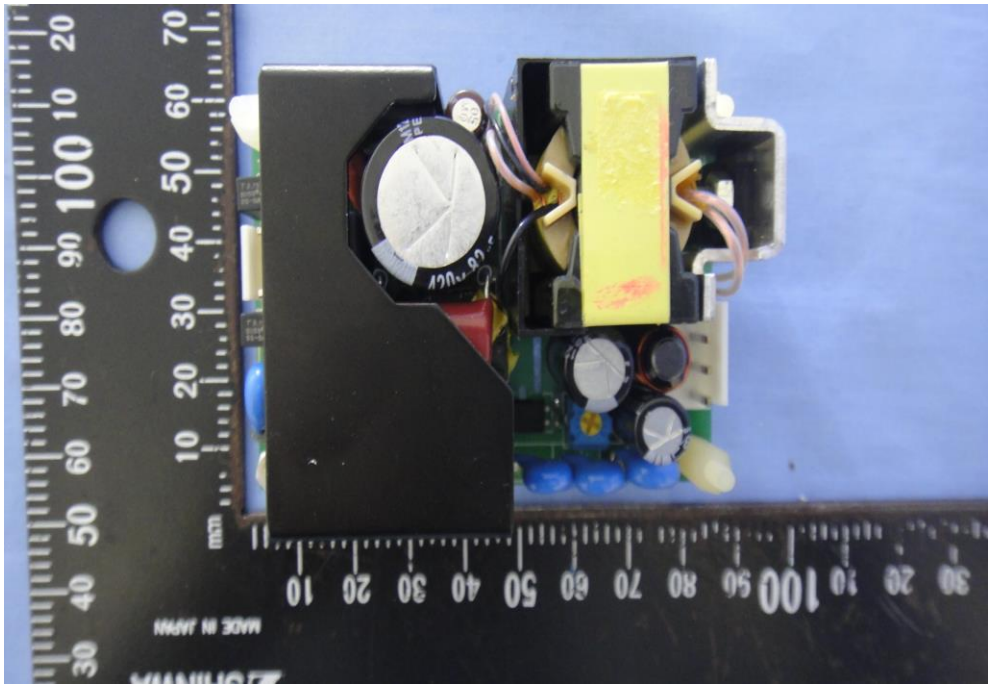
Mode 2

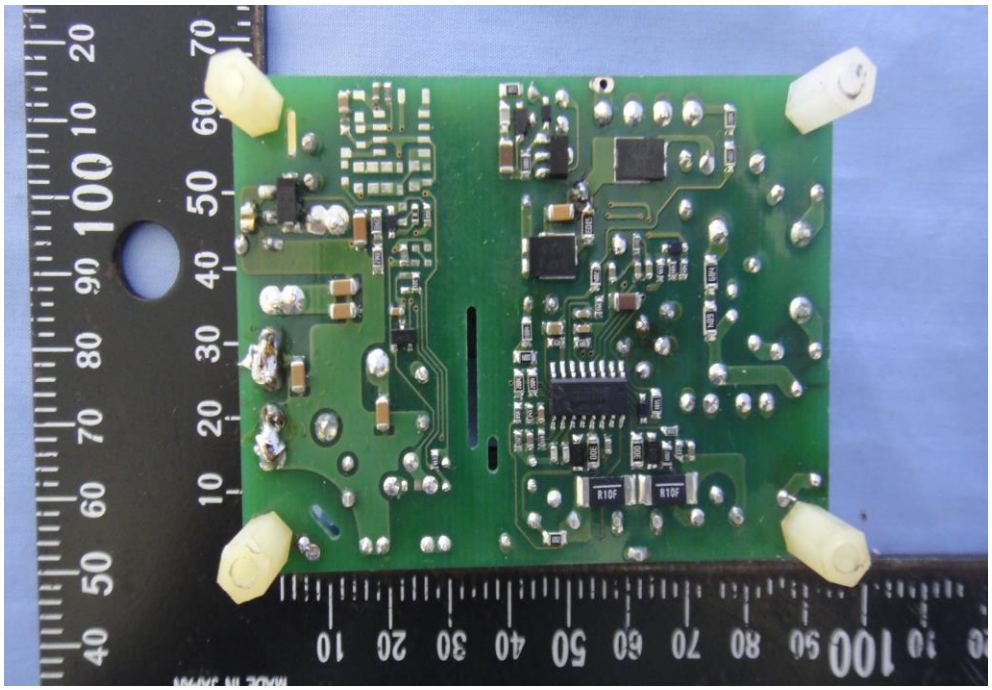


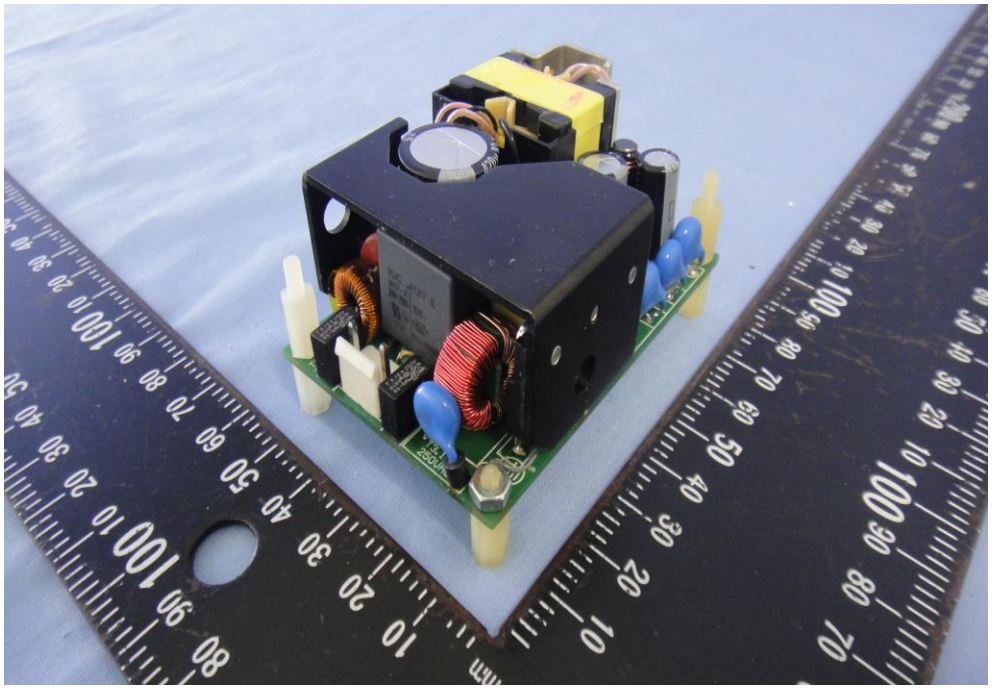
APPENDIX 1 - PHOTOGRAPHS OF EUT

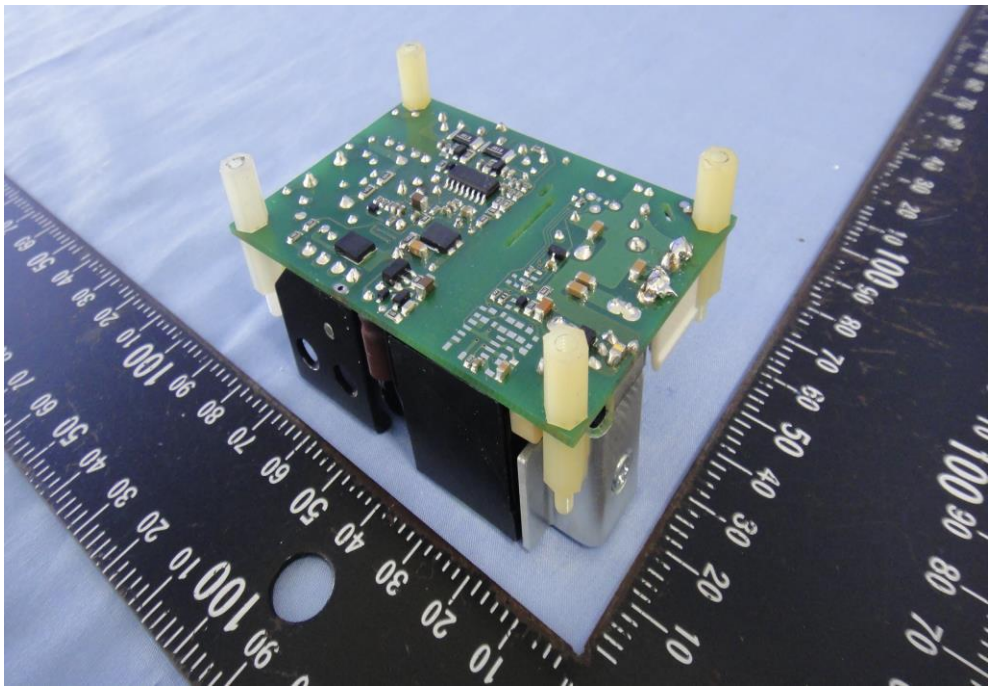
EXTERNAL PHOTOGRAPHS OF EUT

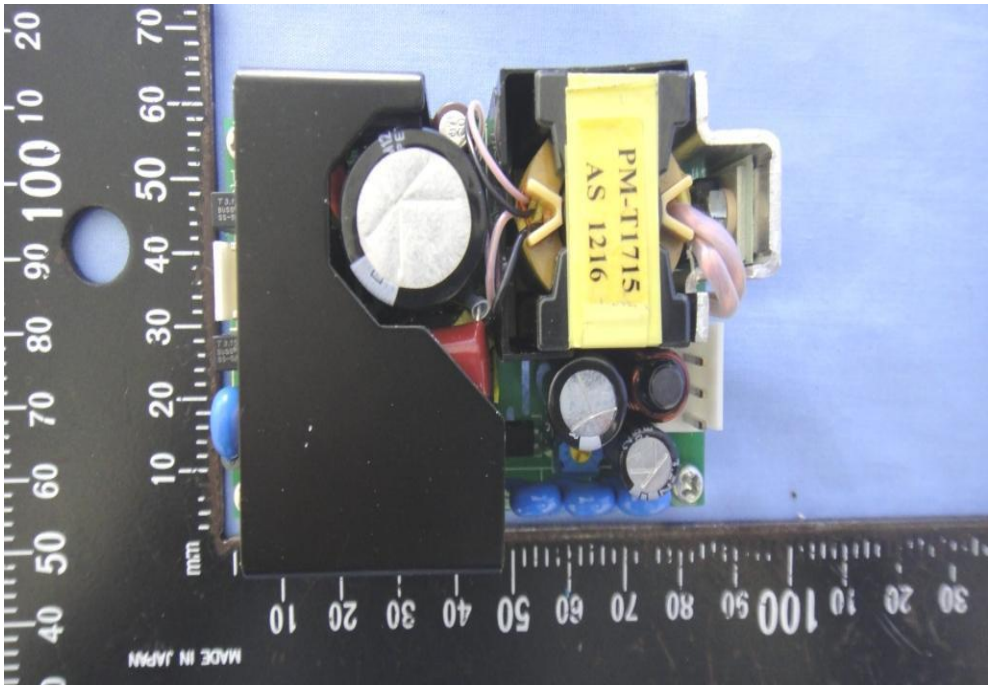
Model No.: TPI 100-148A

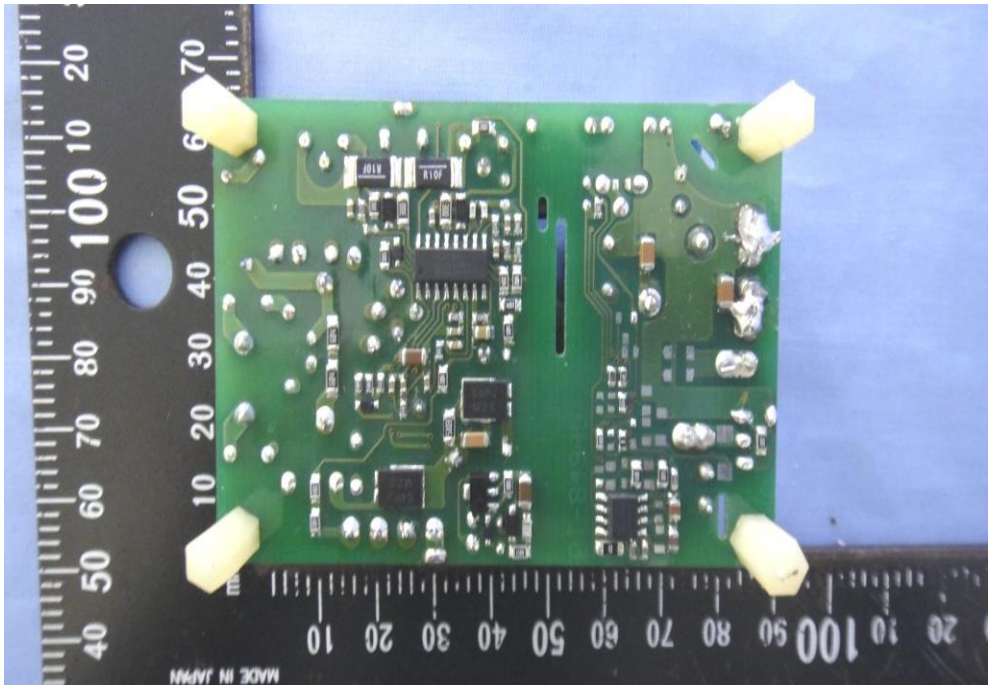


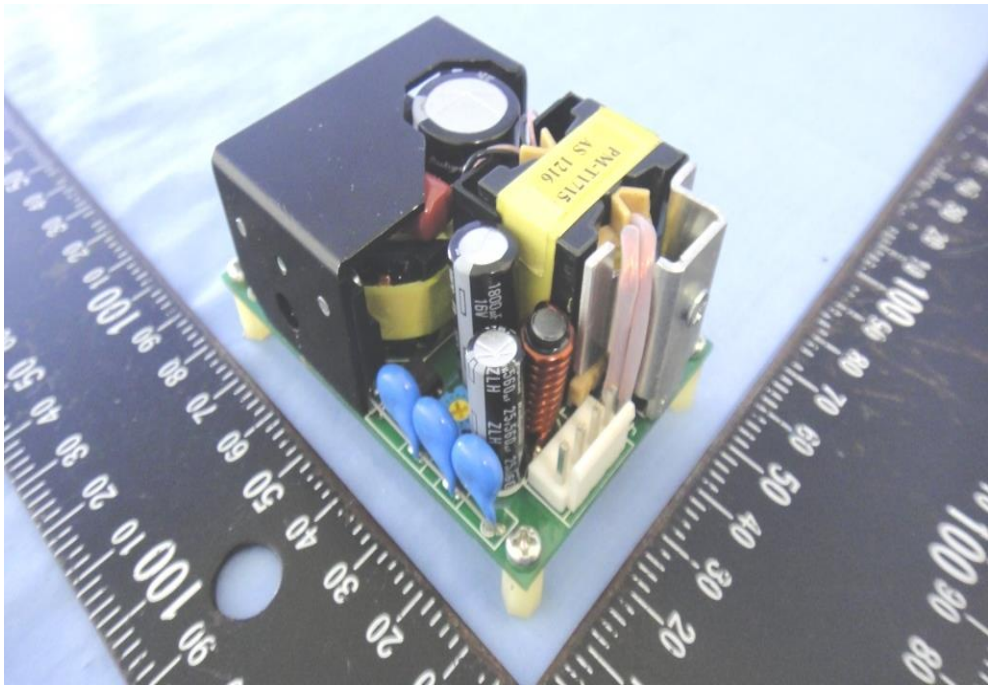


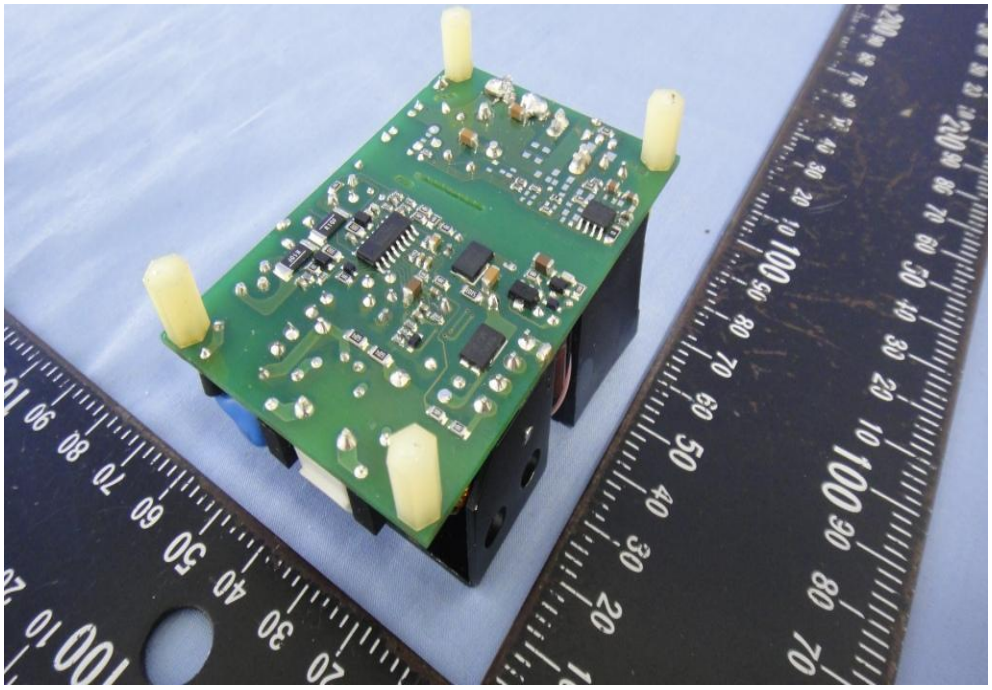


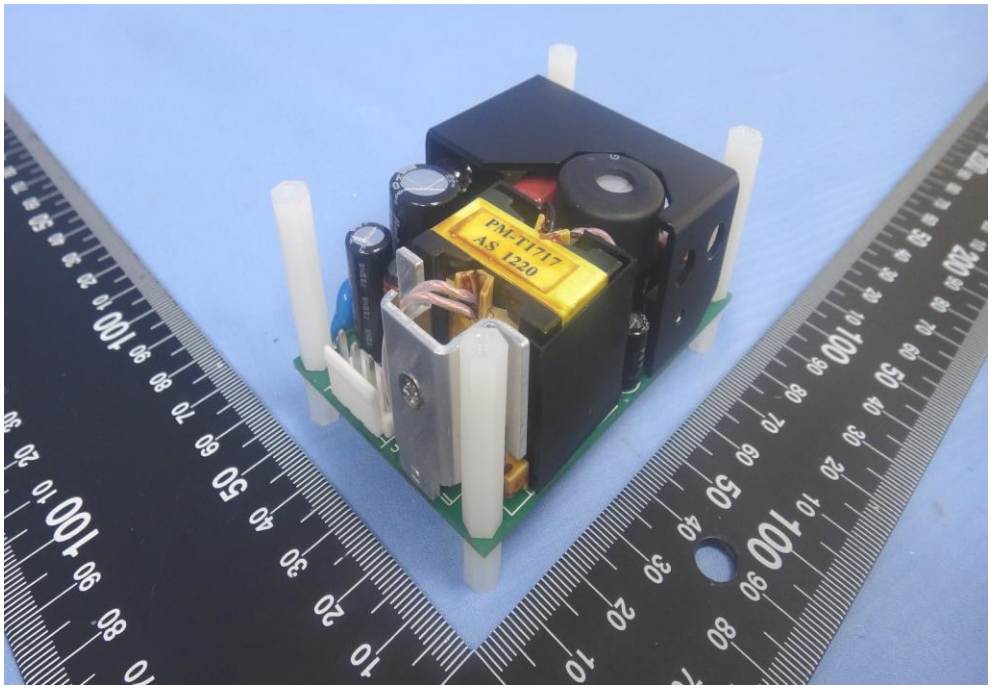


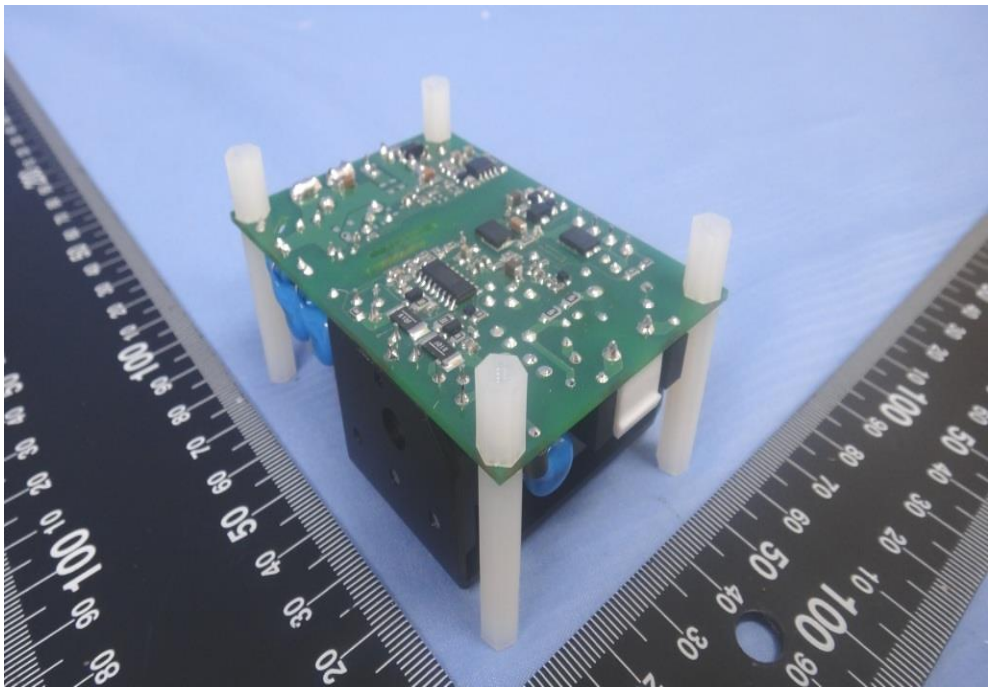












Model No.: TPI 125-112A