

EMC

TEST REPORT

Report No: TW14070219(R6)**Model No:** RPI M30A_XXX**Issued Date:** Oct. 13, 2016

Applicant: Delta Electronics, Inc.
Address: 39 Sec. 2 Huandong Road, Shanhua Dist., Tainan City 74144, Taiwan

Test Methods/ Standards: EN 61000-6-3: 2007+A1: 2011+AC: 2012
EN 61000-6-4: 2007+A1: 2011
IEC 61000-6-3: 2011 / IEC 61000-6-4: 2011
EN 61000-6-2: 2005 / IEC 61000-6-2: 2005
EN 61000-6-1: 2007 / IEC 61000-6-1: 2005
EN 61000-3-11: 2000 / EN 61000-3-12: 2011
EN 61000-4-2: 2009 / IEC 61000-4-2: 2008
EN 61000-4-3: 2006+A1: 2008+A2: 2010 / IEC 61000-4-3: 2010
EN 61000-4-4: 2012 / IEC 61000-4-4: 2012
EN 61000-4-5: 2006 / IEC 61000-4-5: 2005
EN 61000-4-6: 2014 / IEC 61000-4-6: 2013
EN 61000-4-8: 2010 / IEC 61000-4-8: 2009
EN 61000-4-11:2004 / IEC 61000-4-11:2004

Test By: Intertek Testing Services Taiwan Ltd.,
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Note: This verification supersedes all previous verifications with the noted Verification/Report number(s): TW14070219(R5) dated (Mar. 15, 2016) before this verification notice.

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1. General Information

1.1 Identification of the EUT

Product:	PV Inverter
Model No.:	RPI M30A_xxx
Brand Name:	Delta
Software Version:	DSP: V1.00 RED: V1.00
Hardware Version:	EVT sample
Rated Power:	I/P: 200-1000Vdc, Max. 60A O/P: 3 phase 230Vac, 50/60Hz, 48A, 33000 W Max. output power: 33000VA/ 33000W Max. output current: 50A
Power Cord:	2C wires 3 meters cable 3-Phase/5-Wire 5 meter cable
Sample receiving date:	1. Jul. 25, 2014 2. Dec. 29, 2015
Sample condition:	Workable
Testing date:	1. Jul, 29, 2014 ~ Aug. 01, 2014 2. Dec. 29, 2015 ~ Jan. 20, 2016

Note 1: The test report only allows to be revised within three years from its original issued date unless further standard or the requirement was noticed.

Note 2: When determining the test conclusion, the Measurement Uncertainty of test has been considered.

Note 3: Except where explicitly agreed in writing, all work and services performed by Intertek is subject to our standard Terms and Conditions which can be obtained at our website: <http://www.intertek-twn.com/terms/>. Intertek's responsibility and liability are limited to the terms and conditions of the agreement.

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1.2 Additional information about the EUT

Explanation of model designation RPI M30A_XXX:

The 1st “x” denote DC switch (“1” denote with DC switch, “0” denote without DC switch).

The 2nd “x” denote for number of MPPT.

The 3rd “x” denote for option accessories or protection components (“0” denote with SPD & Fuse, “1” denote without SPD & Fuse, “2” denote without SPD & with Fuse).

Model Number	Difference			
	DC switch	SPD	Fuse	Model type
RPI M30A_XXX	V	V	V	RPI M30A_120
	X	V	V	RPI M30A_020
	V	X	X	RPI M30A_121
	X	X	X	RPI M30A_021
	V	X	V	RPI M30A_122
	X	X	V	RPI M30A_022

2. Test Summary

2.1 Test requirements

Standard	Test Type	Enclosure	AC side	DC side	Signal port
EN 61000-6-3: 2007 +A1: 2011+AC: 2012 IEC 61000-6-3: 2011	Conducted Test	×	√	×	×
EN 61000-6-4: 2007+A1: 2011 IEC 61000-6-4: 2011	Radiated Test	√	×	×	×
EN 61000-3-12: 2011	Harmonic current emissions	×	√	×	×
EN 61000-3-11: 2000	Voltage fluctuation & flicker	×	√	×	×
EN 61000-4-2: 2009 IEC 61000-4-2: 2008	ESD test	√	×	×	×
EN 61000-4-3: 2006 +A1: 2008+A2: 2010 IEC 61000-4-3: 2010	RS test	√	×	×	×
EN 61000-4-4: 2012 IEC 61000-4-4: 2012	EFT test	×	√	×	√
EN 61000-4-5: 2006 IEC 61000-4-5: 2005	Surge test	×	√	×	√
EN 61000-4-6: 2014 IEC 61000-4-6: 2013	CS test	×	√	×	×
EN 61000-4-8: 2010 IEC 61000-4-8: 2009	Magnetic Field test	√	×	×	×
EN 61000-4-11: 2004 IEC 61000-4-11: 2004	Dip test	×	√	×	×

√: Applicable ×: Not applicable

2.2 Test results

Emission (EN 61000-6-3: 2007+A1: 2011+AC: 2012 / IEC 61000-6-3: 2011)			
Standard	Test Type	Result	Remarks
EN 61000-6-3: 2007+A1: 2011+AC: 2012 IEC 61000-6-3: 2011	Conducted Test	PASS	Meet the requirements
	Radiated Test	PASS	Meet the requirements
EN 61000-3-12: 2011	Harmonic current emissions	PASS	Meet the requirements
EN 61000-3-11: 2000	Voltage fluctuation & flicker	PASS	Meet the requirements

Immunity (EN 61000-6-1: 2007 / IEC 61000-6-1: 2005)				
Standard	Test Type	Minimum Criteria	Result	Test Judgment
EN 61000-4-2: 2009 IEC 61000-4-2: 2008	ESD test	Criterion B	PASS	Meets the requirements of Performance Criterion B
EN 61000-4-3: 2006 +A1: 2008+A2: 2010 IEC 61000-4-3: 2010	RS test	Criterion A	PASS	Meets the requirements of Performance Criterion A
EN 61000-4-4: 2012 IEC 61000-4-4: 2012	EFT test	Criterion B	PASS	Meets the requirements of Performance Criterion A
EN 61000-4-5: 2006 IEC 61000-4-5: 2005	Surge test	Criterion B	PASS	Meets the requirements of Performance Criterion A
EN 61000-4-6: 2014 IEC 61000-4-6: 2013	CS test	Criterion A	PASS	Meets the requirements of Performance Criterion A
EN 61000-4-8: 2010 IEC 61000-4-8: 2009	Magnetic Field test	Criterion A	PASS	Meets the requirements of Performance Criterion A
EN 61000-4-11: 2004 IEC 61000-4-11: 2004	Dip test	1. 100% reduction- Performance Criterion B 2. 100% reduction- Performance Criterion B 3. 30% reduction- Performance Criterion C 4. 100% reduction- Performance Criterion C	PASS	Meets the requirements of Voltage Dips: 1. 100 % reduction- Performance Criterion A 2. 1000 % reduction- Performance Criterion A 3. 30 % reduction- Performance Criterion B 4. 100 % reduction- Performance Criterion B

Emission (EN 61000-6-4: 2007+A1: 2011 / IEC 61000-6-4: 2011)			
Standard	Test Type	Result	Remarks
EN 61000-6-4: 2007+A1: 2011 IEC 61000-6-4: 2011	Conducted Test	PASS	Meet the requirements
	Radiated Test	PASS	Meet the requirements
EN 61000-3-12: 2011	Harmonic current emissions	PASS	Meet the requirements
EN 61000-3-11: 2000	Voltage fluctuation & flicker	PASS	Meet the requirements

Immunity (EN 61000-6-2: 2005 / IEC 61000-6-2: 2005)				
Standard	Test Type	Minimum Criteria	Result	Test Judgment
EN 61000-4-2: 2009 IEC 61000-4-2: 2008	ESD test	Criterion B	PASS	Meets the requirements of Performance Criterion B
EN 61000-4-3: 2006 +A1: 2008+A2: 2010 IEC 61000-4-3: 2010	RS test	Criterion A	PASS	Meets the requirements of Performance Criterion A
EN 61000-4-4: 2012 IEC 61000-4-4: 2012	EFT test	Criterion B	PASS	Meets the requirements of Performance Criterion A
EN 61000-4-5: 2006 IEC 61000-4-5: 2005	Surge test	Criterion B	PASS	Meets the requirements of Performance Criterion A
EN 61000-4-6: 2014 IEC 61000-4-6: 2013	CS test	Criterion A	PASS	Meets the requirements of Performance Criterion A
EN 61000-4-8: 2010 IEC 61000-4-8: 2009	Magnetic Field test	Criterion A	PASS	Meets the requirements of Performance Criterion A
EN 61000-4-11: 2004 IEC 61000-4-11: 2004	Dip test	1. 100% reduction- Performance Criterion B 2. 60% reduction- Performance Criterion C 3. 30% reduction- Performance Criterion C 4. 100% reduction- Performance Criterion C	PASS	Meets the requirements of Voltage Dips: 1. 100 % reduction- Performance Criterion A 2. 60 % reduction- Performance Criterion B 3. 30 % reduction- Performance Criterion B 4. 100 % reduction- Performance Criterion B

3. Test Specifications

3.1 Standards

EN 61000-6-3: 2007+A1: 2011+AC: 2012 / IEC 61000-6-3: 2011 Electromagnetic Compatibility Generic emission standard — For Residential, commercial and light industry environments.

EN 61000-6-1: 2007 / IEC 61000-6-1: 2005 Electromagnetic compatibility— Generic immunity standard— For Residential, commercial and light industry environments.

EN 61000-6-2: 2005 / IEC 61000-6-2: 2005 Generic standards— Immunity for industrial environments

EN 61000-6-4: 2007+A1: 2011 / IEC 61000-6-4: 2011 Generic standards— Emission standard for industrial environments.

EN 61000-3-11: 2000 Electromagnetic compatibility (EMC)—Part 3-11: Limits-Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems-Equipment with rated current ≤ 75 A and subject to conditional connection.

EN 61000-3-12: 2011 Electromagnetic compatibility (EMC) - Part 3-12: Limits - Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current > 16 A and 75 A per phase

3.2 Test Facility accreditation

Intertek Testing Services Taiwan Ltd., Hsinchu Laboratory is accredited in respect of laboratory and the accreditation criterion is ISO/IEC 17025: 2005.

Certification	Bureau	Code	Accreditation Criteria
Accreditation Certificate	TAF	0597	ISO/IEC 17025
	BSMI	SL2-IS-E-0024 SL2-IN-E-0024 SL2-A1-E-0024 SL2-R2-E-0024 SL2-R1-E-0024 SL2-L1-E-0024	ISO/IEC 17025
Site Filling Code :	FCC	93910	Test facility list & NSA Data
	IC	2042D-1, 2042D-2	Test facility list & NSA Data
	VCCI	R-1534 C-1618 T-1586 G-49	Test facility list & NSA Data

Note 1: Each certificate can be refer to attachment certification.pdf.

Note 2: Each certificate are within the valid calibration period.

3.3 External port

Items	Specifications
DC input port	+,-
AC mains output port	3-Phase/5-Wire(L1, L2, L3, N, PE)
Communication	CNC104(RS-485)

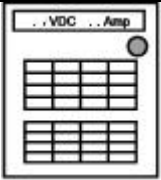

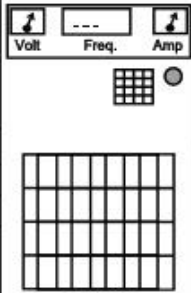
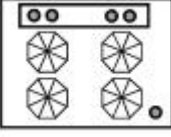

3.4 Performance verification

The EUT has been monitored based on manufacturer's specification; the performance fulfilled the requirements of standard.

3.5 Mode of operation during the test

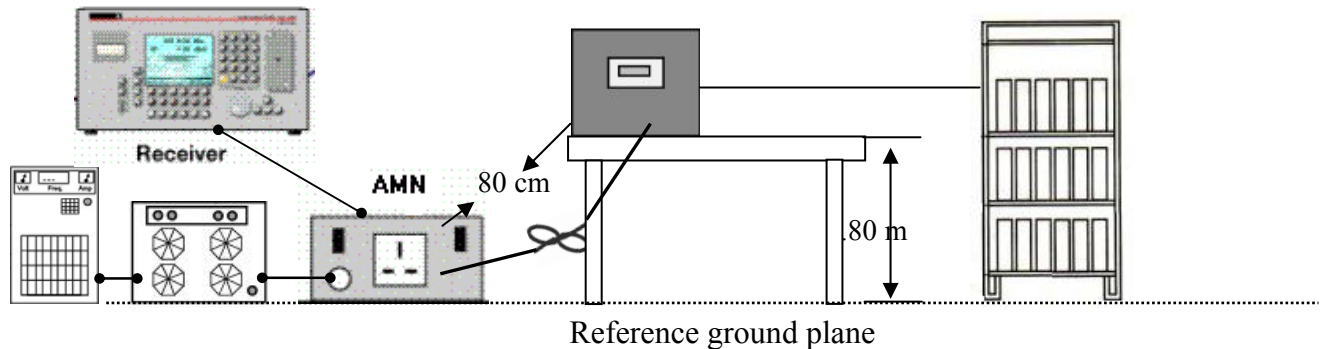
The input power port of EUT is connected with DC source, the output power port of EUT is connected with AC source and load. After EUT joining with AC source, when the output power of EUT raises, the AC source power will decline but not to zero. The margin of EUT raised power is the same as the margin of AC source declined power.

3.6 Peripheral equipment

Peripherals	Brand	Model No.	Serial No.	Description of cable length	Symbol
DC power	Chroma	62120-600	N/A	N/A	
Batteries frame	YUASA& GS	UXH90-12& GPL 121000	N/A	N/A	
AC Converter	APC	AFC-33030J	F311040038	N/A	
Load	N/A	N/A	N/A	N/A	
Notebook PC	IBM	2609	BA-ZHNHN	RS 232 Cable 1 meter	
RS-232 to RS-485 Coverter*	TryCon	TRP-C06	NA	N/A	N/A

4. Conducted Emission Test

4.1 Test arrangement



4.2 Photographs of the test arrangement

Please refer to the appendix B1 of the present report.

4.3 Test Procedures

1. The EUT is set up per the test arrangement and simulate the typical usage based on the user's manual.
2. Equipment designed for wall-mounted operation shall be tested as tabletop EUT. The orientation of the equipment shall be consistent with normal installation practice.
3. The EUT are placed on a 1.0 meter(W)×1.5meter(L) and 0.8 meter in height wooden table and the EUT was adjusted to maintain a 0.4meter space from a vertical reference plane.
4. The rear of the arrangement shall be flush with the back of the supporting tabletop unless that would not be possible or typical of normal use.
5. The EUT is connected to power mains through an Artificial Mains Network (AMN), which provided 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room.
6. The AMN is placed 0.8 meters from the EUT, All other units of the EUT and associated equipment shall be at least 0.8 m from the AMN .
7. The excess power cable between the EUT and the AMN was bundled. All connecting cables of EUT and peripherals were moved to find the maximum emission
8. If the measuring receiver is connected to the voltage probe, the AMN shall be terminated with 50 Ω .
9. If any, measure the conducted emissions on each phase of power line of the EUT's power source by using the test receiver.
10. Sweep the signal from 150kHz to 30MHz by using the receiver with the maximum-Peak detector.
11. If the peak emission level is lower than the average limit, then the emission values presented will be the peak value only. Otherwise, both of Q.P. and average values shall be measured.

4.4 Test Equipment

Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
EMI Receiver	R&S	ESCI	100059	2015/11/03	2016/11/01
Two-Line V-Network	R&S	ENV216	101159	2015/06/08	2016/06/06
Artificial Mains Network (LISN)	SCHAFFNER	MN2050D	1586	2015/05/27	2016/05/25
CON-1 Cable	SUHNER	BNC / RG-58	1521946	2015/05/09	2016/05/08
Brand		Software		Version	
Audix		e3		4.2004-1-12k	

Note: The above equipments are within the valid calibration period.

4.5 Conducted Emission Limit for AC mains port

Freq. (MHz)	Maximum RF Line Voltage	
	Class B (dBμV)	
	Q.P.	Ave.
0.15~0.50	66-56	56-46
0.50~5.00	56	46
5~30.00	60	50

4.6 Uncertainty of Conducted Emission

Expanded uncertainty ($k=2$) of conducted emission measurement is 2.5 dB.

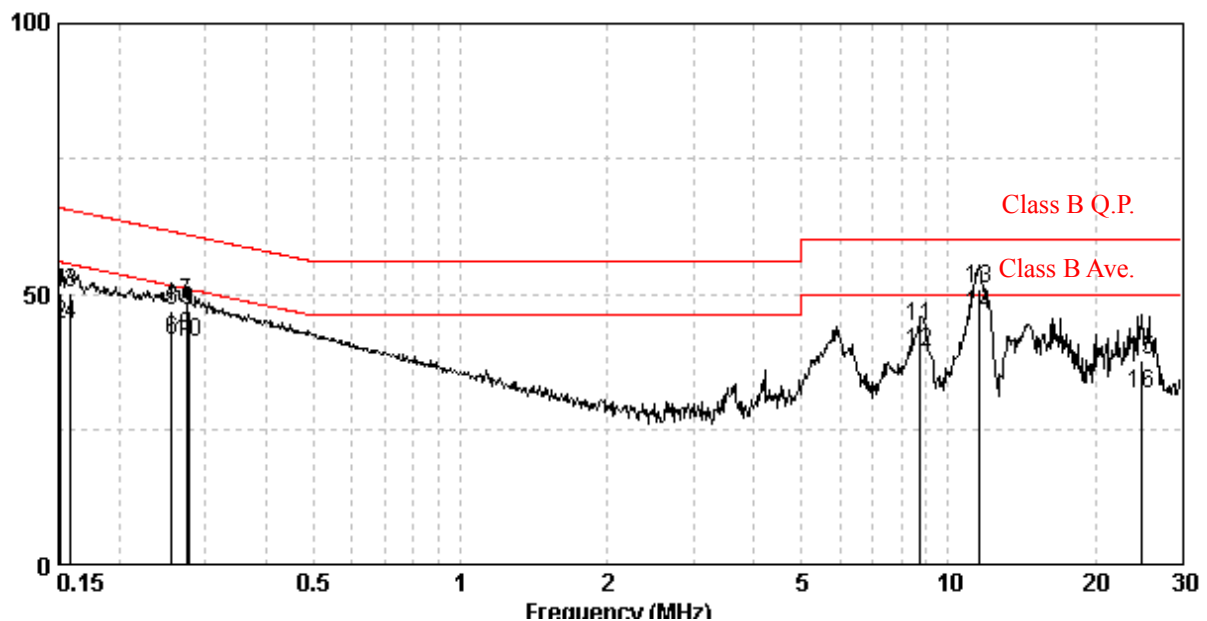
4.7 Test Result: Pass

Phase:	Line 1			
Temperature:	25	°C	Model No.:	RPI M30A_ xxx
Relative Humidity:	53	%	Test Date:	Dec. 30, 2015
Atmospheric Pressure:	1008	hPa	Remark:	N/A
Input voltage:	800	Vdc	Output voltage:	230Vac/ 50Hz
Frequency range:	0.15 MHz to 30 MHz			

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level Av (dBuV)	Limit Av (dBuV)	Margin (dB)	
						Qp	Av
0.152	9.97	50.21	65.91	44.29	55.91	-15.71	-11.62
0.159	9.97	50.26	65.52	44.29	55.52	-15.26	-11.22
0.256	9.97	46.82	61.56	41.22	51.56	-14.74	-10.34
0.274	9.97	48.18	60.98	42.13	50.98	-12.80	-8.85
0.277	9.97	47.06	60.90	41.18	50.90	-13.83	-9.71
8.776	10.07	43.83	60.00	39.04	50.00	-16.17	-10.96
11.559	10.08	50.93	60.00	46.02	50.00	-9.07	-3.98
24.790	10.06	37.83	60.00	31.55	50.00	-22.17	-18.45

Remark:

1. Q.P. stands for Quasi-peak.
2. Corr. Factor (dB) = AMN Factor (dB) + Cable Loss (dB)
3. Margin (dB) = Level (dBuV) – Limit (dBuV)

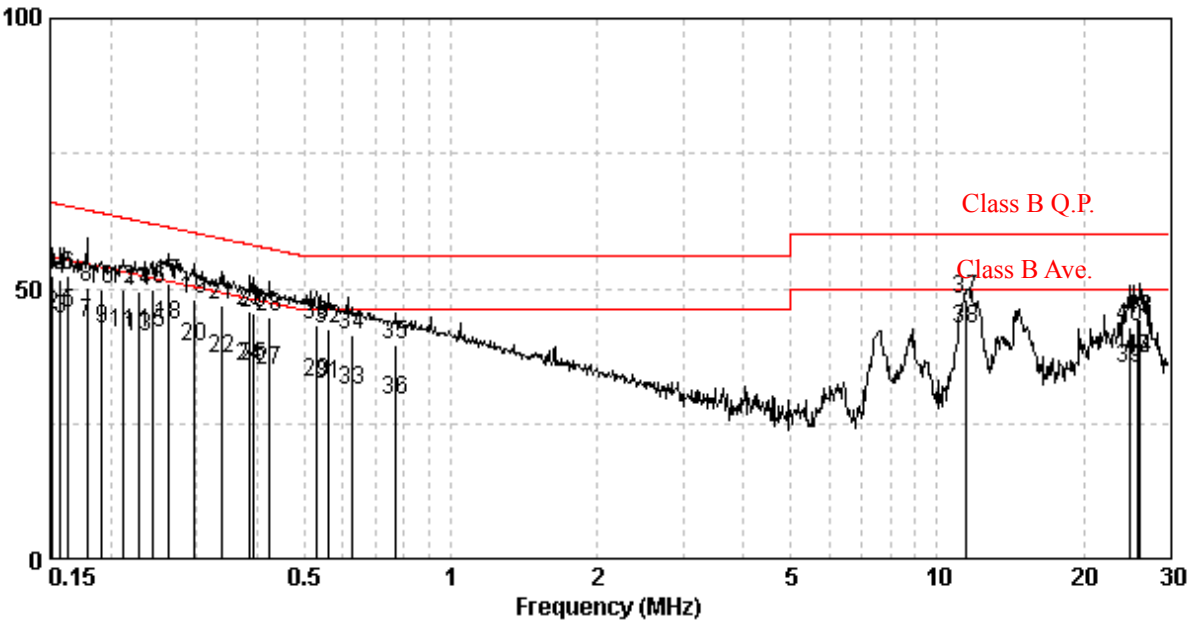


Phase:	Line 2			
Temperature:	25	°C	Model No.:	RPI M30A xxx
Relative Humidity:	53	%	Test Date:	Dec. 30, 2015
Atmospheric Pressure:	1008	hPa	Remark:	N/A
Input voltage:	800	Vdc	Output voltage:	230Vac/ 50Hz
Frequency range:	0.15 MHz to 30 MHz			

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level AV (dBuV)	Limit AV (dBuV)	Margin (dB) Qp	Av
0.152	10.01	52.46	65.91	45.14	55.91	-13.45	-10.77
0.157	10.01	51.59	65.60	44.50	55.60	-14.01	-11.11
0.163	10.01	52.32	65.30	45.30	55.30	-12.98	-10.00
0.179	10.01	50.35	64.55	43.45	54.55	-14.20	-11.09
0.191	10.01	49.93	63.98	42.43	53.98	-14.04	-11.54
0.213	10.00	49.75	63.10	41.71	53.10	-13.34	-11.38
0.228	10.00	49.57	62.52	41.01	52.52	-12.96	-11.51
0.243	9.99	49.84	62.00	41.92	52.00	-12.15	-10.07
0.262	9.98	50.77	61.38	43.29	51.38	-10.61	-8.09
0.296	9.97	48.09	60.37	39.13	50.37	-12.28	-11.24
0.337	9.96	46.86	59.27	36.91	49.27	-12.40	-12.36
0.387	9.94	45.75	58.12	35.67	48.12	-12.38	-12.45
0.393	9.94	45.56	57.99	35.42	47.99	-12.43	-12.57
0.424	9.94	44.66	57.37	34.74	47.37	-12.72	-12.63
0.529	9.94	43.10	56.00	32.75	46.00	-12.90	-13.25
0.561	9.95	42.61	56.00	32.35	46.00	-13.39	-13.65
0.627	9.96	41.52	56.00	31.28	46.00	-14.48	-14.72
0.771	9.98	39.65	56.00	29.30	46.00	-16.35	-16.70
11.438	10.07	47.86	60.00	42.52	50.00	-12.14	-7.48
24.790	10.01	42.79	60.00	35.00	50.00	-17.21	-15.00
25.727	10.01	44.43	60.00	37.08	50.00	-15.57	-12.92
26.139	10.01	44.18	60.00	37.10	50.00	-15.82	-12.90

Remark:

1. Q.P. stands for Quasi-peak.
2. Corr. Factor (dB) = AMN Factor (dB) + Cable Loss (dB)
3. Margin (dB) = Level (dBuV) – Limit (dBuV)

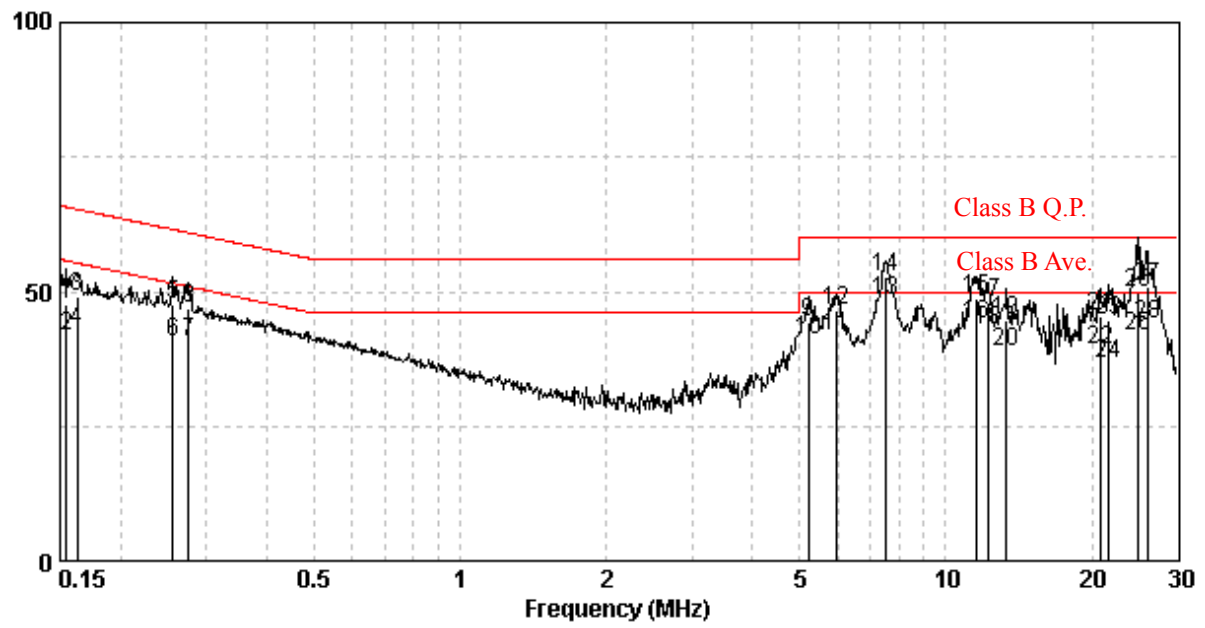


Phase:	Line 3			
Temperature:	25	°C	Model No.:	RPI M30A xxx
Relative Humidity:	53	%	Test Date:	Dec. 30, 2015
Atmospheric Pressure:	1008	hPa	Remark:	N/A
Input voltage:	800	Vdc	Output voltage:	230Vac/ 50Hz
Frequency range:	0.15 MHz to 30 MHz			

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level Av (dBuV)	Limit Av (dBuV)	Margin (dB) Qp	Av
0.155	10.00	47.74	65.74	41.76	55.74	-18.00	-13.97
0.162	10.00	48.95	65.34	42.84	55.34	-16.39	-12.50
0.256	9.98	47.63	61.56	40.59	51.56	-13.93	-10.97
0.276	9.98	46.79	60.94	40.60	50.94	-14.15	-10.34
5.221	10.03	44.46	60.00	40.91	50.00	-15.54	-9.09
5.961	10.04	46.61	60.00	41.87	50.00	-13.39	-8.13
7.526	10.05	52.65	60.00	48.20	50.00	-7.35	-1.80
11.559	10.06	48.78	60.00	44.06	50.00	-11.22	-5.94
12.188	10.07	48.15	60.00	43.04	50.00	-11.85	-6.96
13.337	10.07	44.81	60.00	38.87	50.00	-15.19	-11.13
20.814	10.08	45.29	60.00	39.28	50.00	-14.71	-10.72
21.715	10.08	44.74	60.00	36.78	50.00	-15.26	-13.22
24.790	10.07	49.89	60.00	41.75	50.00	-10.11	-8.25
26.001	10.09	51.01	60.00	44.13	50.00	-8.99	-5.87

Remark:

1. Q.P. stands for Quasi-peak.
2. Corr. Factor (dB) = AMN Factor (dB) + Cable Loss (dB)
3. Margin (dB) = Level (dBuV) – Limit (dBuV)

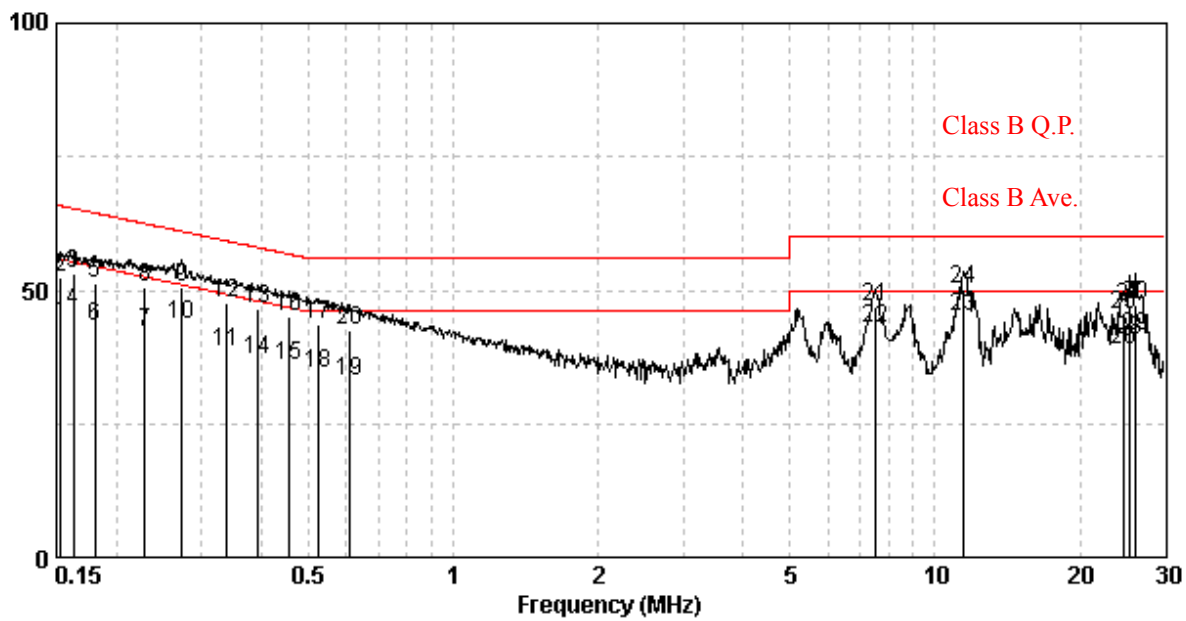


Phase:	Neutral			
Temperature:	25	°C	Model No.:	RPI M30A xxx
Relative Humidity:	53	%	Test Date:	Dec. 30, 2015
Atmospheric Pressure:	1008	hPa	Remark:	N/A
Input voltage:	800	Vdc	Output voltage:	230Vac/ 50Hz
Frequency range:	0.15 MHz to 30 MHz			

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level Av (dBuV)	Limit Av (dBuV)	Margin (dB) Qp	Av
0.153	10.03	52.41	65.82	43.58	55.82	-13.42	-12.24
0.162	10.03	53.00	65.34	46.15	55.34	-12.34	-9.19
0.181	10.02	51.38	64.46	43.12	54.46	-13.08	-11.34
0.229	10.01	50.49	62.48	42.27	52.48	-11.99	-10.21
0.273	9.99	50.73	61.03	43.77	51.03	-10.30	-7.26
0.339	9.97	47.57	59.22	38.33	49.22	-11.65	-10.90
0.393	9.95	46.42	57.99	37.00	47.99	-11.57	-10.99
0.454	9.94	45.16	56.80	35.79	46.80	-11.64	-11.01
0.527	9.95	43.73	56.00	34.32	46.00	-12.27	-11.68
0.608	9.96	42.52	56.00	33.13	46.00	-13.48	-12.87
7.526	10.04	46.87	60.00	42.77	50.00	-13.13	-7.23
11.438	10.04	50.17	60.00	44.90	50.00	-9.83	-5.10
24.659	9.92	45.44	60.00	38.78	50.00	-14.56	-11.22
25.456	9.92	46.71	60.00	40.63	50.00	-13.29	-9.37
26.139	9.92	47.42	60.00	41.23	50.00	-12.58	-8.77

Remark:

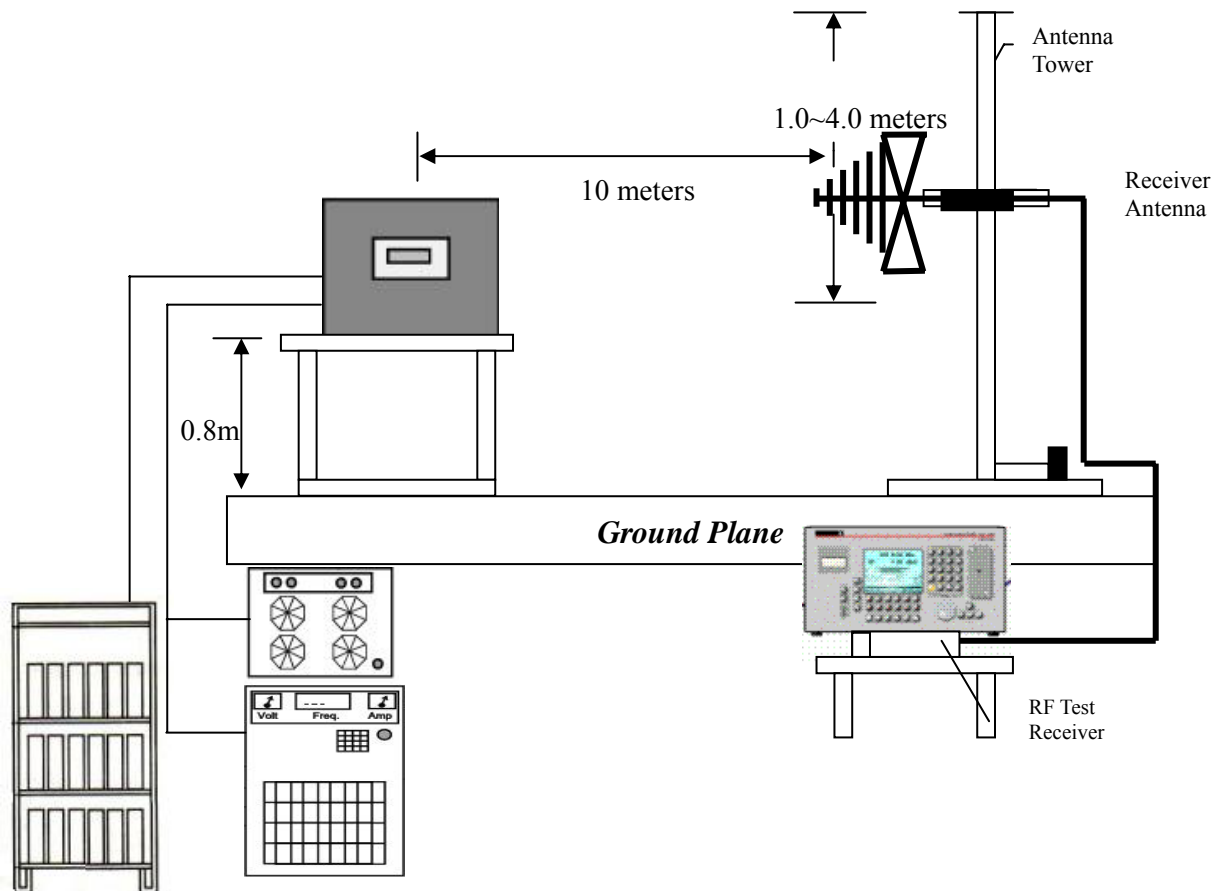
1. Q.P. stands for Quasi-peak.
2. Corr. Factor (dB) = AMN Factor (dB) + Cable Loss (dB)
3. Margin (dB) = Level (dBuV) – Limit (dBuV)



5. Radiated Emission Test

5.1 Test arrangement

The figure below shows the test setup, which is utilized to make these measurements.



5.2 Photographs of the test arrangement

Please refer to the appendix B2 of the present report.

5.3 Test Procedures

1. The EUT is set up per the test arrangement and simulate the typical usage based on the user's manual.
2. Equipment designed for wall-mounted operation shall be tested as tabletop EUT. The orientation of the equipment shall be consistent with normal installation practice.
3. Radiated testing is placed on a wooden table with a height of 0.8 meters above the reference ground plane and 10 meters away from the reference point of the receiver antenna in the open area test site.
4. The table rotates 360 degrees to determine the position of the highest radiation. The antenna height is varied between one meter and four meters above reference ground plane to find the maximum value of the field strength.

5. Both horizontal polarization and vertical polarization of the antenna is set to conduct the measurement.
6. The bandwidth was set on the EMI meter 120 kHz and the levels are quasi peak value readings. The frequency spectrum from 30 MHz to 1000 MHz is investigated.

5.4 Test Equipment

Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
EMI Receiver	R&S	ESCS30	825788/015	2015/05/26	2016/05/24
Antenna (Bi Log Type)	SCHAFFNER	CBL6112B	2836	2014/05/26	2017/05/24
OATS_1	Intertek	N/A	N/A	2015/05/26	2016/05/25
OATS-1 Cable	PEWC.	N / CFD400-NL	N/A	2015/05/08	2016/05/06
Brand		Software		Version	
Audix		e3		4.04112e	

Note: The above equipments are within the valid calibration period.

5.5 Radiated Emission Limit

Frequency (MHz)	Distance(m)	dB(μ V/m)
30~230	10	30
230~1000	10	37

Note:

1. The tighter limit shall apply at the edge between two frequency bands.
2. Distance refers to the distance in meters between the EUT to antenna.

5.6 Uncertainty of Radiated Emission

Vertical: Expanded uncertainty ($k=2$) of radiated emission measurement is 4.96 dB.

Horizontal: Expanded uncertainty ($k=2$) of radiated emission measurement is 4.96 dB.

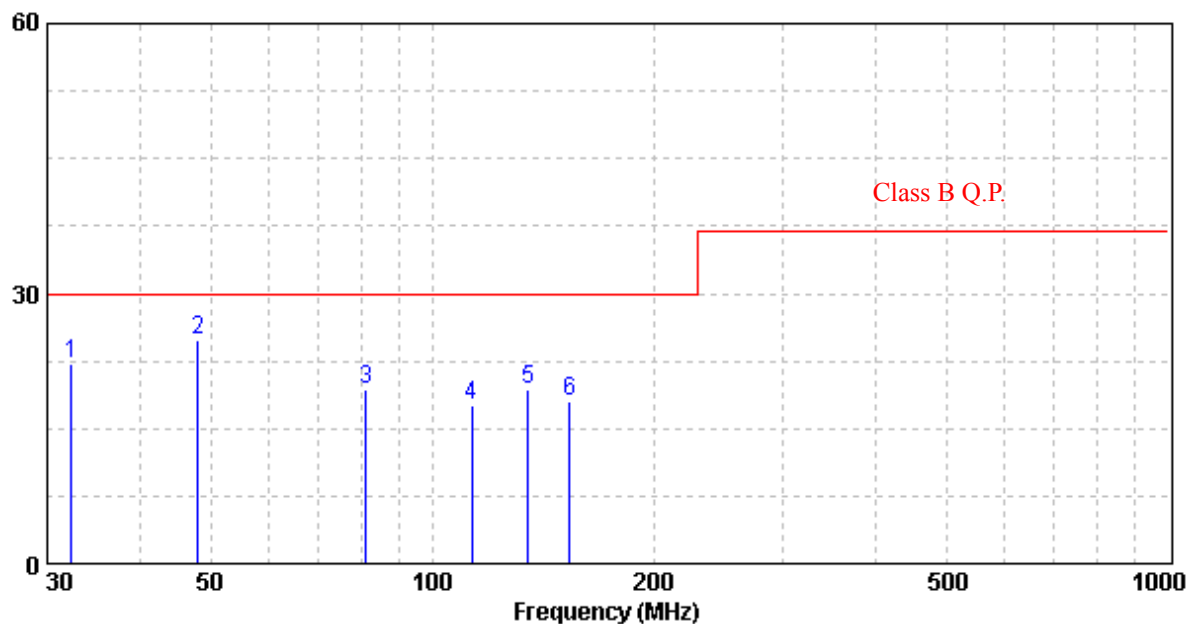
5.7 Test Result: Pass

Phase:	Vertical			
Temperature:	25	°C	Model No.:	RPI M30A xxx
Relative Humidity:	65	%	Test Date:	Jan. 11, 2016
Atmospheric Pressure:	1009	hPa	Remark:	N/A
Input voltage:	800	Vdc	Output voltage:	230Vac/ 50Hz
Frequency range:	30 MHz to 1000 MHz			

Freq	Pol/Phase	Factor	Read Level	Level	Limit Line	Over Limit	Remark
MHz		dB	dBμV	dBμV/m	dBμV/m	dB	
32.36	VERTICAL	20.76	1.40	22.16	30.00	-7.84	QP
48.10	VERTICAL	10.33	14.61	24.94	30.00	-5.06	QP
81.43	VERTICAL	8.57	10.75	19.32	30.00	-10.68	QP
113.05	VERTICAL	12.75	4.94	17.69	30.00	-12.31	QP
134.84	VERTICAL	13.16	6.26	19.42	30.00	-10.58	QP
153.73	VERTICAL	11.60	6.40	18.00	30.00	-12.01	QP

Remark:

1. Q.P. stands for Quasi-peak.
2. Factor = Antenna Factor (dB/m) + Cable Loss (dB)
3. Level (dBμV/m) = Factor (dB) + Read Level (dBμV)
4. Over Limit (dB) = Level (dBμV/m) – Limit Line (dBμV/m)

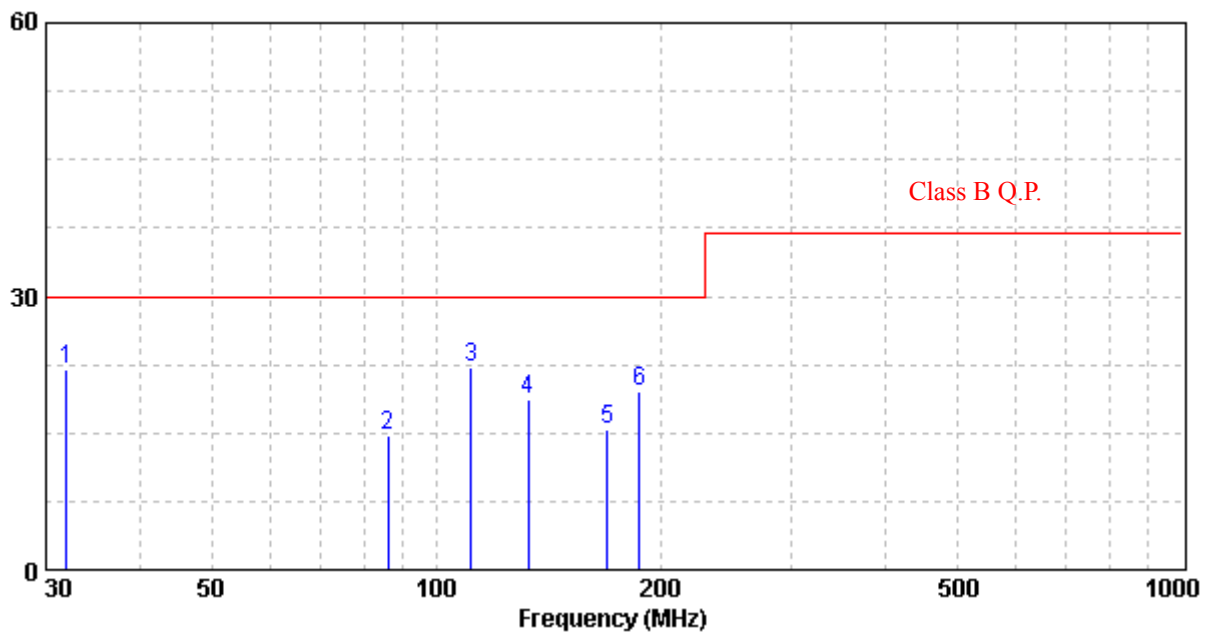


Phase:	Horizontal			
Temperature:	25	°C	Model No.:	RPI M30A_XXX
Relative Humidity:	65	%	Test Date:	Jan. 11, 2016
Atmospheric Pressure:	1009	hPa	Remark:	N/A
Input voltage:	800	Vdc	Output voltage:	230Vac/ 50Hz
Frequency range:	30 MHz to 1000 MHz			

Freq	Pol/Phase	Factor	Read Level	Level	Limit Line	Over Limit	Remark
MHz		dB	dBuV	dBuV/m	dBuV/m	dB	
31.94	HORIZONTAL	20.76	1.30	22.06	30.00	-7.94	QP
86.26	HORIZONTAL	9.07	5.56	14.63	30.00	-15.37	QP
111.48	HORIZONTAL	12.61	9.53	22.14	30.00	-7.86	QP
132.82	HORIZONTAL	13.24	5.49	18.73	30.00	-11.27	QP
169.68	HORIZONTAL	10.74	4.54	15.28	30.00	-14.72	QP
187.14	HORIZONTAL	10.59	9.08	19.67	30.00	-10.33	QP

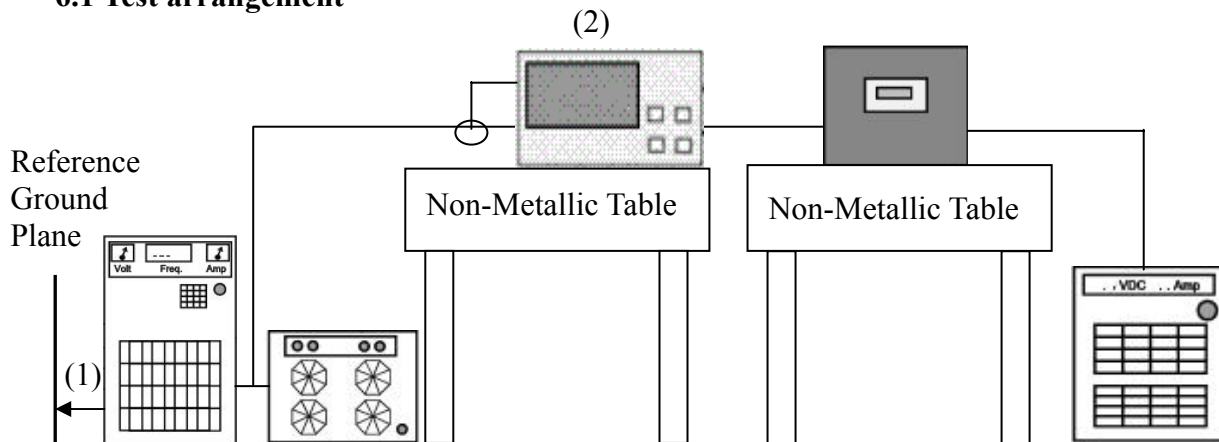
Remark:

1. Q.P. stands for Quasi-peak.
2. Factor = Antenna Factor (dB/m) + Cable Loss (dB)
3. Level (dBμV/m) = Factor (dB) + Read Level (dBμV)
4. Over Limit (dB) = Level (dBμV/m) – Limit Line (dBμV/m)



6. Harmonic Test

6.1 Test arrangement



Note: (1) Connected to mains supply system
(2) Power Analyzer

6.2 Photographs of the test arrangement

Please refer to the appendix B3 of the present report.

6.3 Test Procedure & classification

1. The EUT is set up per the test arrangement and simulate the typical usage based on the user's manual.
2. For each harmonic order, measure the 1.5 s smoothed r.m.s. harmonic current in each discrete Fourier transform time window
3. Measure the 1.5 s smoothed active input power in each discrete Fourier transform time window.
4. The average values for the individual harmonic currents, taken over the entire test observation period shall be less than or equal to the applicable limits.

6.4 Classification

- Class A: – balanced three-phase equipment;
– household appliances, excluding equipment identified as class D;
– tools, excluding portable tools;
– dimmers for incandescent lamps;
– audio equipment.
- Class B: – portable tools;
– arc welding equipment which is not professional equipment.
- Class C: – lighting equipment.
- Class D: – personal computers and personal computer monitors;
– television receivers.

6.5 Test Equipment

Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
Precision Power Analyzer	YOKOGAWA	WT1600	91K651591	2014/04/21	2015/04/20
DC source	Chroma	62150H-1000S	N/A	N/A	N/A

Note: The equipments above are within the valid calibration period.

The equipments above are provided by Delta Electronics, Inc.

6.6 Uncertainty of Harmonic

Expanded uncertainty ($k=2$) of harmonics measurement is 0.58.

6.7 Test Result: Pass

Phase:	L1/L2/L3			
Temperature:	26	°C	Model No.:	RPI M30A_ xxx
Relative Humidity:	57	%	Test Date:	2016.10.07
Atmospheric Pressure:	1009	hPa	Classification:	Class A
Input voltage:	628.3	Vdc	Output voltage:	3-Phase/5-Wire(L1, L2, L3, N, PE)

Power= 32722.4 (W) , Power Factor=0.998

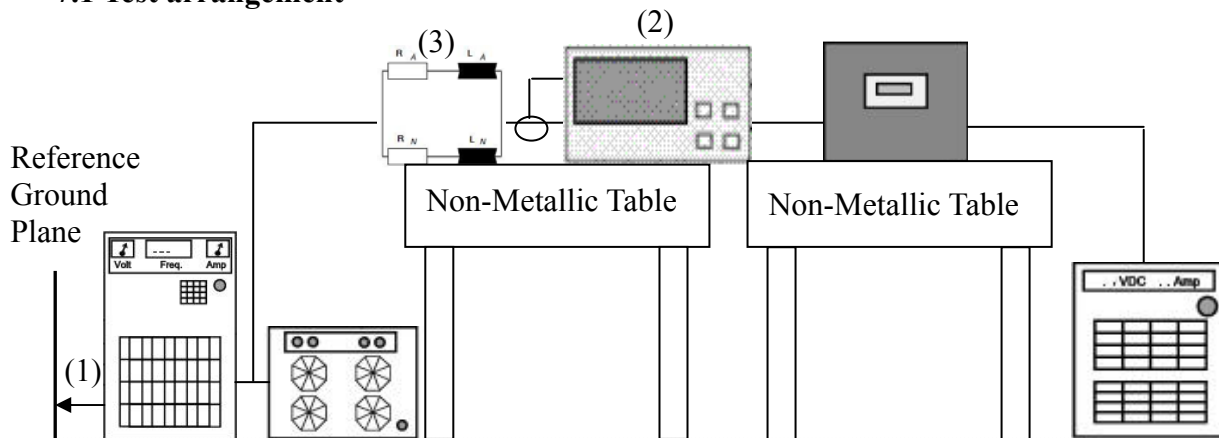
Phase:		L1	Phase:		L2	Phase:		L3
PF : 0.9979		THD : 0.98%	PF : 0.9982		THD : 0.94%	PF : 0.9979		THD : 0.96%
Vrms	231.9	PWHD : 1.86 %	Vrms	232.2	PWHD : 1.86 %	Vrms	232.1	PWHD : 1.88%
Irms	47.14	FREQ=50Hz	Irms	47.22	FREQ=50Hz	Irms	46.94	FREQ=50Hz
Active input power:10.9104 kw			Active input power:10.944 kw			Active input power:10.868 kw		

Harmonic Order	Limit 61000-3-12 Table 3	L1			L2			L3		
		av.Current [A]	Limit	Margin to Limit	av.Current [A]	Limit	Margin to Limit	av.Current [A]	Limit	Margin to Limit
		61000-3-12 Frame:2.5 min	61000-3-12 Bal. 3 ph[A]		61000-3-12 Frame:2.5 min	61000-3-12 Bal. 3 ph[A]		61000-3-12 Frame:2.5 min	61000-3-12 Bal. 3 ph[A]	
1	-	47.098	NA	NA	47.15	NA	NA	46.885	NA	NA
2	8.00%	0.08	5.80	0.17%	0.047	5.84	0.10%	0.066	5.78	0.14%
3	21.60%	0.105	NA	0.22%	0.024	NA	0.05%	0.087	NA	0.18%
4	4.00%	0.028	2.90	0.06%	0.026	2.92	0.06%	0.024	2.89	0.05%
5	10.70%	0.159	7.75	0.34%	0.165	7.81	0.35%	0.176	7.73	0.38%
6	2.67%	0.047	1.93	0.10%	0.014	1.95	0.03%	0.035	1.93	0.07%
7	7.20%	0.145	5.22	0.31%	0.147	5.26	0.31%	0.128	5.20	0.27%
8	2.00%	0.019	1.45	0.04%	0.029	1.46	0.06%	0.025	1.44	0.05%
9	3.80%	0.033	NA	0.07%	0.015	NA	0.03%	0.036	NA	0.08%
10	1.60%	0.008	1.16	0.02%	0.012	1.17	0.03%	0.012	1.16	0.03%
11	3.10%	0.073	2.25	0.16%	0.089	2.26	0.19%	0.078	2.24	0.17%
12	1.33%	0.009	0.96	0.02%	0.013	0.97	0.03%	0.014	0.96	0.03%
13	2.00%	0.315	1.45	0.67%	0.308	1.46	0.65%	0.302	1.44	0.64%
14	1.14%	0.01	NA	0.02%	0.011	NA	0.02%	0.013	NA	0.03%
15	-	0.014	NA	0.03%	0.018	NA	0.04%	0.012	NA	0.03%
16	1.00%	0.01	0.72	0.02%	0.017	0.73	0.04%	0.013	0.72	0.03%
17	-	0.053	NA	0.11%	0.065	NA	0.14%	0.06	NA	0.13%
18	0.89%	0.018	0.64	0.04%	0.009	0.65	0.02%	0.018	0.64	0.04%
19	-	0.17	NA	0.36%	0.166	NA	0.35%	0.167	NA	0.36%
20	0.80%	0.005	0.58	0.01%	0.008	0.58	0.02%	0.006	0.58	0.01%
21	-	0.01	NA	0.02%	0.009	NA	0.02%	0.006	NA	0.01%
22	0.73%	0.005	0.53	0.01%	0.006	0.53	0.01%	0.006	0.53	0.01%
23	-	0.041	NA	0.09%	0.043	NA	0.09%	0.045	NA	0.10%
24	0.67%	0.006	0.49	0.01%	0.007	0.49	0.01%	0.006	0.48	0.01%
25	-	0.056	NA	0.12%	0.058	NA	0.12%	0.061	NA	0.13%
26	0.62%	0.003	0.45	0.01%	0.005	0.45	0.01%	0.004	0.45	0.01%

Harmonic Order	Limit	L1			L2			L3		
	61000-3-12 Table 3	av.Current [A]	Limit	Margin to Limit	av.Current [A]	Limit	Margin to Limit	av.Current [A]	Limit	Margin to Limit
		61000-3-12 Frame:2.5 min	61000-3-12 Bal. 3 ph[A]		61000-3-12 Frame:2.5 min	61000-3-12 Bal. 3 ph[A]		61000-3-12 Frame:2.5 min	61000-3-12 Bal. 3 ph[A]	
27	-	0.003	NA	0.01%	0.01	NA	0.02%	0.006	NA	0.01%
28	0.57%	0.003	0.41	0.01%	0.006	0.41	0.01%	0.005	0.41	0.01%
29	-	0.028	NA	0.06%	0.027	NA	0.06%	0.028	NA	0.06%
30	0.53%	0.008	0.38	0.02%	0.007	0.38	0.01%	0.006	0.38	0.01%
31	-	0.014	NA	0.03%	0.013	NA	0.03%	0.013	NA	0.03%
32	0.50%	0.003	0.36	0.01%	0.004	0.36	0.01%	0.003	0.36	0.01%
33	-	0.005	NA	0.01%	0.009	NA	0.02%	0.009	NA	0.02%
34	0.47%	0.003	0.34	0.01%	0.004	0.34	0.01%	0.003	0.34	0.01%
35	-	0.016	NA	0.03%	0.015	NA	0.03%	0.019	NA	0.04%
36	0.44%	0.003	0.32	0.01%	0.005	0.32	0.01%	0.003	0.32	0.01%
37	-	0.029	NA	0.06%	0.024	NA	0.05%	0.026	NA	0.06%
38	0.42%	0.003	0.30	0.01%	0.005	0.30	0.01%	0.003	0.30	0.01%
39	-	0.004	NA	0.01%	0.006	NA	0.01%	0.007	NA	0.01%
40	0.40%	0.003	0.29	0.01%	0.005	0.29	0.01%	0.004	0.29	0.01%

7. Voltage Fluctuations-Flicker Test

7.1 Test arrangement



Note: (1) Connected to mains supply system

(2) Power Analyzer

(3) Impedance network

7.2 Photographs of the test arrangement

Please refer to the appendix B3 of the present report.

7.3 Test Procedure

1. The EUT is set up per the test arrangement and simulate the typical usage based on the user's manual.
2. The voltage changes at the supply terminals were measured using the voltage method.
3. The test voltage was supplied from an AC source which meets the requirements according to the standard. The voltage source has virtually zero internal impedance and is connected

(1 phase)

$$Z = 0.4 + j 0.25\Omega \text{ (total impedance)}$$

(3 phases)

Impedance in line conductor: $Z_a = 0.24 + j\ 0.15\ \Omega$

Impedance in neutral conductor: $Z_n = 0.16 + j 0.10 \, \Omega$

4. The observation period, T_p , for the assessment of flicker values by flicker measurement, flicker simulation, or analytical method shall be:

- for P_{st} , $T_P = 10$ min
- for P_{lt} , $T_P = 2$ h

5. The observation period shall include that part of the whole operation cycle in which the equipment under test produces the most unfavorable sequence of voltage changes.

24 measurements have been tasted and calculated the average from 22 records, exclude highest and lowest.

7.4 Test Equipment

Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
Precision Power Analyzer	YOKOGAWA	WT1600	91K651591	2014/04/21	2015/04/20
DC source	Chroma	62150H-1000S	N/A	N/A	N/A
Reference impedance network	N/A	N/A	N/A	N/A	N/A

Note: The equipments above are within the valid calibration period.

The equipments above are provided by Delta Electronics, Inc.

7.5 Uncertainty of Flicker

Expanded uncertainty ($k=2$) of flicker measurement is 0.86.

7.6 Test result: Pass

Phase:	Line 1			
Temperature:	23	°C	Model No.:	RPI M30A_ xxx
Relative Humidity:	55	%	Test Date:	Jul. 30, 2014
Atmospheric Pressure:	1008	hPa	Output voltage:	230Vac/ 50Hz
Input voltage:	800	Vdc	Remark:	3-Phase/5-Wire(L1, L2, L3, N, PE)

	EUT DATA	LIMIT	RESULT	TEST ENABLED
Pst max	0.477	1.00	PASS	<input checked="" type="checkbox"/>
Plt max	0.263	0.65	PASS	<input checked="" type="checkbox"/>
d_c %	0.031	3.30	PASS	<input checked="" type="checkbox"/>
d_{max} %	0.416	4.00	PASS	<input checked="" type="checkbox"/>
d_(t) Sec.	0.000	0.50	PASS	<input checked="" type="checkbox"/>

Phase:	Line 2			
Temperature:	23	°C	Model No.:	RPI M30A_ xxx
Relative Humidity:	55	%	Test Date:	Jul. 30, 2014
Atmospheric Pressure:	1008	hPa	Output voltage:	230Vac/ 50Hz
Input voltage:	800	Vdc	Remark:	3-Phase/5-Wire(L1, L2, L3, N, PE)

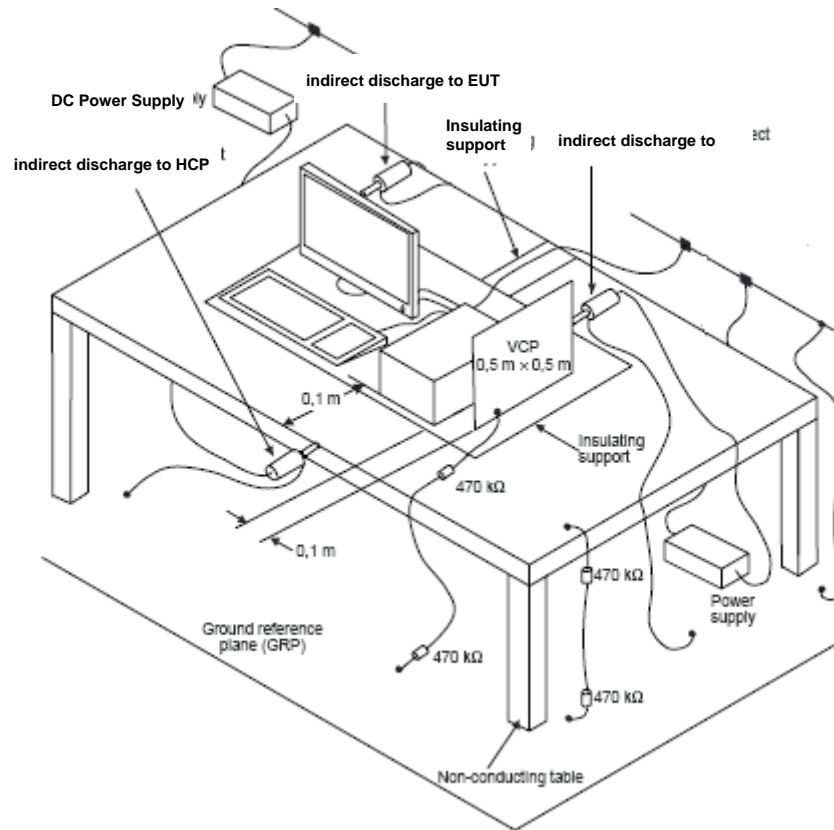
	EUT DATA	LIMIT	RESULT	TEST ENABLED
Pst max	0.479	1.00	PASS	<input checked="" type="checkbox"/>
Plt max	0.264	0.65	PASS	<input checked="" type="checkbox"/>
d_c %	0.031	3.30	PASS	<input checked="" type="checkbox"/>
d_{max} %	0.425	4.00	PASS	<input checked="" type="checkbox"/>
d_(t) Sec.	0.000	0.50	PASS	<input checked="" type="checkbox"/>

Phase:	Line 3			
Temperature:	23	°C	Model No.:	RPI M30A_ xxx
Relative Humidity:	55	%	Test Date:	Jul. 30, 2014
Atmospheric Pressure:	1008	hPa	Output voltage:	230Vac/ 50Hz
Input voltage:	800	Vdc	Remark:	3-Phase/5-Wire(L1, L2, L3, N, PE)

	EUT DATA	LIMIT	RESULT	TEST ENABLED
Pst max	0.484	1.00	PASS	<input checked="" type="checkbox"/>
Plt max	0.267	0.65	PASS	<input checked="" type="checkbox"/>
d_c %	0.031	3.30	PASS	<input checked="" type="checkbox"/>
d_{max} %	0.421	4.00	PASS	<input checked="" type="checkbox"/>
d_(t) Sec.	0.000	0.50	PASS	<input checked="" type="checkbox"/>

8. Electrostatic Discharge Immunity Test

8.1 Test arrangement



8.2 Photographs of the test arrangement

Please refer to the appendix B4 of the present report.

8.3 Test Procedure

1. The EUT is set up per the test arrangement and simulate the typical usage based on the user's manual.
2. ESD testing is placed on a wooden table with a height of 0.8 meters above the reference ground plane.
3. A horizontal coupling plane (HCP) was placed on a non-metallic table 0.8 meter above a ground reference plane (GRP) and connected to it with a cable with two 470 kΩ resistors. GRP shall project beyond the EUT or the HCP by at least 0.5 m on all sides.
4. The EUT is placed on a 0.5mm insulating support and be arranged, connected according to its functional requirements.

5. A distance of 0.8 m minimum shall be provided between the EUT and the walls of the tested room and any other metallic structure.
6. The discharge return cable of the ESD generator shall be connected to the ground reference plane and shall not come closer than 0.2 m to other conductive parts in the test setup except the ground reference plane.
7. Contact discharge is the preferred test method. Air discharges shall be used where contact discharge cannot be applied. Contact discharge to the conductive surfaces and to coupling planes and air discharge at insulating surfaces
8. In the case of contact discharges, the tip of the discharge electrode shall touch the EUT, before the discharge switch is operated.
9. In the case of air discharges, the ESD generator shall approach the EUT as fast as possible until contact between the electrode and the EUT is made (without causing mechanical damage). After each discharge, the ESD generator shall be removed from the EUT.
10. Discharge to the HCP shall be made horizontally to the edge of the HCP. At least 10 single discharges shall be applied at the front edge of each HCP opposite the centre point of each unit of the EUT and 0.1 m from the front of the EUT. and perpendicular to its front edge during the discharge. The discharge electrode shall be in contact with the edge of the HCP before the discharge switch is operated
A vertical coupling plane (VCP) was connected to the GRP with a cable with two 470 kΩ resistors.
11. At least 10 single discharges shall be applied to the centre of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5 m × 0.5 m, is placed parallel to, and positioned at a distance of 0.1 m from, the EUT. Discharges shall be applied to the coupling plane, with sufficient different positions such that the four faces of the EUT are completely illuminated.

8.4 Test Specification

Test level:	Air discharge:	±2kV, ±4kV, ±8kV, ±15kV*
	Contact discharge:	±2kV, ±4kV, ±8kV*
	VCP:	±2kV, ±4Kv, ±8kV
	HCP:	±2kV, ±4kV, ±8kV

Note:

1. Single discharge at 1 second interval positive discharge and negative discharge
The selected test points are listed in this table, the numbers refer to the figures attached.
2. *The level of 15kV and 8kV for air discharge and contact discharge was required by client.

8.5 Test Equipment

Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
Electrostatic Discharge System	NoiseKen	ESS-2002	ESS0291088	2013/10/07	2014/10/06

Note: The above equipments are within the valid calibration period.

8.6 Requirement

Performance criterion 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.

Performance criterion 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.

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

8.7 Test Result: Pass

Temperature:	23	°C	Model No.:	RPI M30A_ xxx
Relative Humidity:	50	%	Test Date:	Jul 30, 2014
Atmospheric	1008	hPa	Remark:	3-Phase/5-Wire(L1, L2, L3, N, PE)

Test Standard: EN 61000-6-1 / EN 61000-6-2

Type of discharge	Applied Voltage (kV)	Total No. of Discharge (Each Point)	Minimum requirement	Result	
Contact (Red points)	±2	20	Criterion B	Criterion A	PASS
	±4	20	Criterion B	Criterion A	PASS
	±8	20	Criterion B	Criterion A	PASS
Air (Yellow points)	±2	20	Criterion B	Criterion A	PASS
	±4	20	Criterion B	Criterion A	PASS
	±8	20	Criterion B	Criterion A	PASS
	±15	20	Criterion B	Criterion B	PASS
VCP (4 sides)	±2	20	Criterion B	Criterion A	PASS
	±4	20	Criterion B	Criterion A	PASS
	±8	20	Criterion B	Criterion A	PASS
HCP (4 sides)	±2	20	Criterion B	Criterion A	PASS
	±4	20	Criterion B	Criterion A	PASS
	±8	20	Criterion B	Criterion A	PASS

Description of Discharge Point

Contact Discharge 80 Test points		Air Discharge	
<input checked="" type="checkbox"/>	Metallic Screws	<input type="checkbox"/>	Plastic Screws
<input checked="" type="checkbox"/>	Metallic Case	<input type="checkbox"/>	Plastic Case (gap)
<input type="checkbox"/>	Metallic Connect ports	<input checked="" type="checkbox"/>	Plastic Connect ports
<input checked="" type="checkbox"/>	Metallic Junctions	<input checked="" type="checkbox"/>	Plastic Junctions
<input type="checkbox"/>	Others:	<input checked="" type="checkbox"/>	LED indicator
		<input checked="" type="checkbox"/>	Panel Board
		<input checked="" type="checkbox"/>	Button

Criteria description:

Criterion A: ☒ Function is operated as intended during and after the test

☐

Criterion B: ☒ Function is temporary degradation and operated as intended after the test.

☐

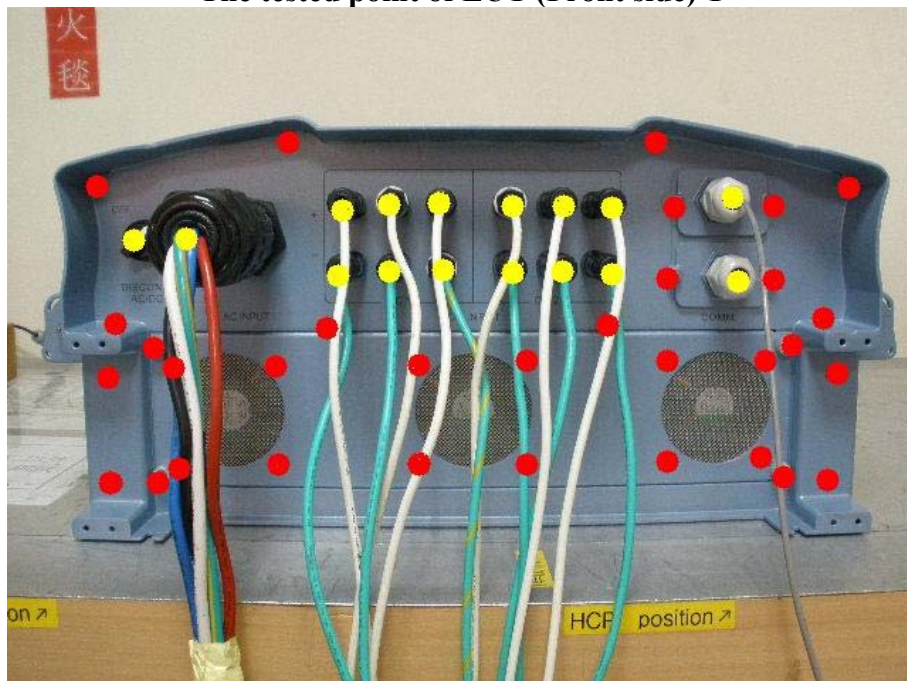
Criterion C: ☐ Function is degradation or loss, requires operator intervention or system reset occurs.

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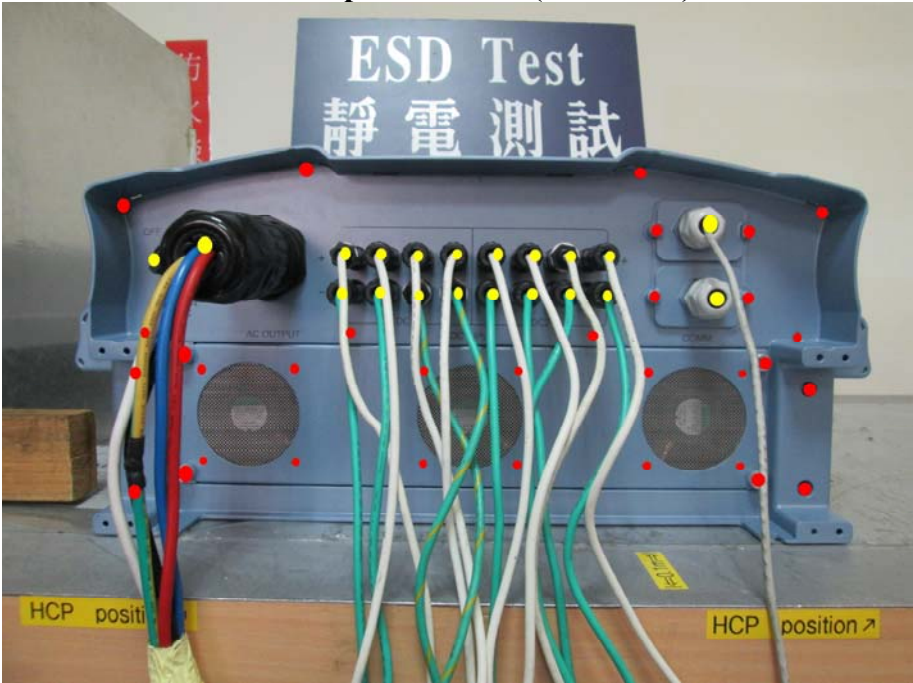
The tested point of EUT (Face side)



The tested point of EUT (Front side)-1



The tested point of EUT (Front side)-2



The tested point of EUT (Right side)



The tested point of EUT (Left side)

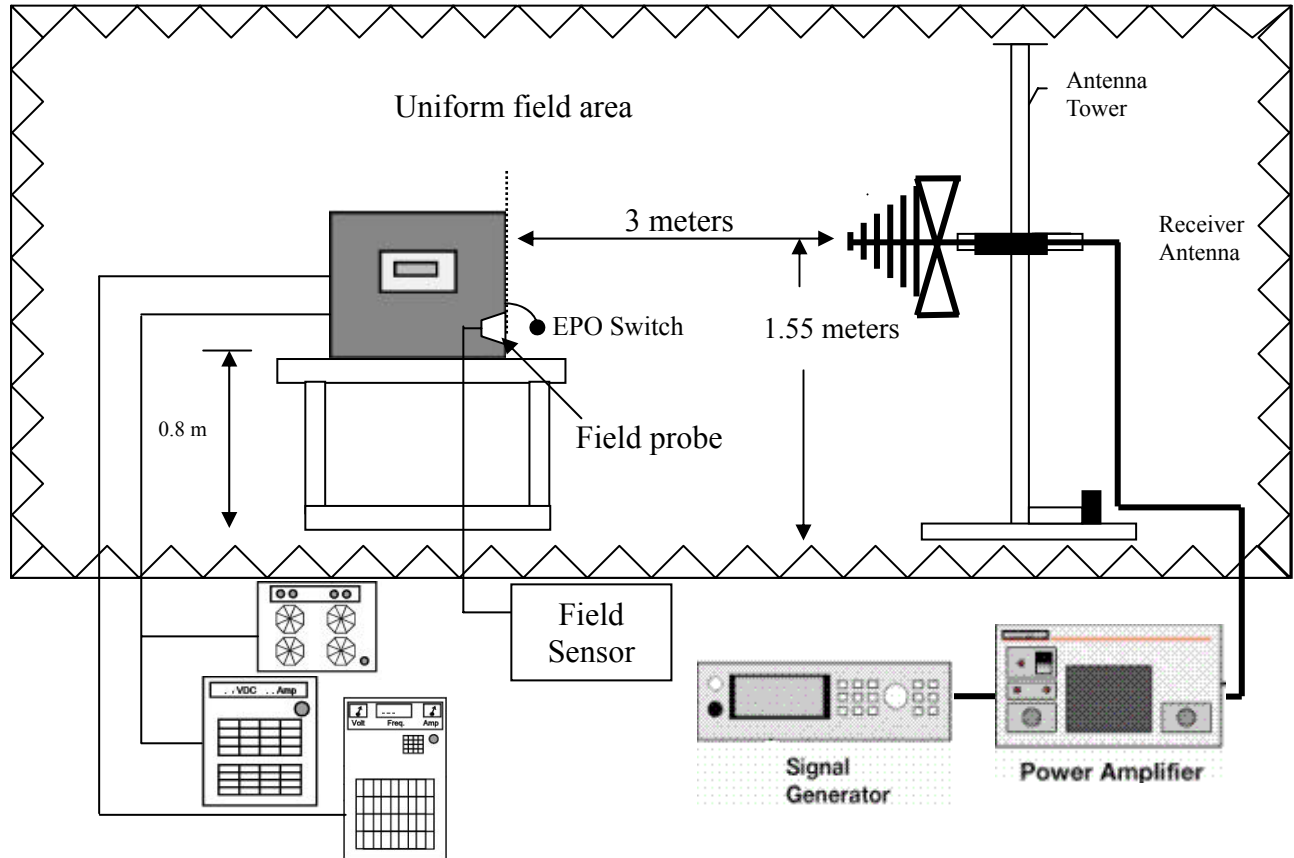


The tested point of EUT (Back side)



9. Radiated Susceptibility Immunity Test

9.1 test arrangement



9.2 Photographs of the test arrangement

Please refer to the appendix B5 of the present report.

9.3 Test Procedure

1. The EUT is set up per the test arrangement and simulate the typical usage based on the user's manual.
2. Radio-Frequency, Electromagnetic Field Immunity testing is placed on a wooden table with a height of 0.8 meters and 3 meters away from the transmitting antenna in the fully anechoic chamber.
3. All EUT's whose individual faces (including any cabling) can be fully covered by the uniform field area.
4. Before testing the intensity of the calibrated field strength should be checked to verify that the test equipment/system is operating properly.

5. After the calibration has been verified, the test field can be generated using the values obtained from the calibration
6. Perform the test with the specified immunity level and modulation method in the test frequency range
7. The transmitting antenna is normally facing each of the four sides of the EUT with two polarizations (Vertical and Horizontal) to perform the test.
8. The test shall normally be performed with the generating antenna facing each side of the EUT. When equipment can be used in different orientations (i.e. vertical or horizontal) all sides shall be exposed to the field during the test.
9. Record the performance of the EUT.

9.4 Test Specification

Frequency range(MHz)	Test field strength V/m	Modulation method
80 to 1000	10	1 kHz 80 % AM
1400 to 2000	3	1 kHz 80 % AM
2000 to 2700	1	1 kHz 80 % AM

The frequency steps 1 %, Log sweep
 Dwell time 3 sec
 Polarization of antenna Horizontal and Vertical
 Test port Enclosure

9.5 Test Equipment

Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
733 Compact Full Anechoic Chamber	Comtest(RS)	9708093	N/A	2013/09/01	2014/08/31
Signal Generator	Rohde & Schwarz	SMB100A	102385	2014/05/09	2015/05/08
Field Meter	Narda	NBM-520	C-0064	2014/06/23	2015/06/22
Field Probe	Narda	EF1891	A-0347	2014/06/23	2015/06/22

Note: The above equipments are within the valid calibration period.

9.6 Requirement

Performance criterion 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.

Performance criterion 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.

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

9.7 Generation of the Electromagnetic Field

The electromagnetic field is generated from a computer controlled signal generator. The output power is amplified and then radiated from broadband log periodic antennas. For each sweep a pre-recorded empty chamber calibration file is used to establish the required field strength. When using these files the field strength inside an area of 1.5/1.0 meter x 1.5 meter is in accordance with the standard.

9.8 Test Results: Pass

Temperature:	23	°C	Model No.:	RPI M30A_ xxx
Relative Humidity:	50	%	Test Date:	Jul. 30, 2014
Atmospheric Pressure:	1008	hPa	Remark:	3-Phase/5-Wire(L1, L2, L3, N, PE)

Test Standard: EN 61000-6-1 / EN 61000-6-2

Exposed Side: ☒ Front ☒ Left ☒ Rear ☒ Right

Frequency (MHz)	Antenna Polarization	Test field strength	Minimum requirement	Result	
80 MHz to 1 GHz	Vertical	10 V/m	Criterion A	Criterion A	PASS
80 MHz to 1 GHz	Horizontal	10 V/m	Criterion A	Criterion A	PASS
1.4 GHz to 2 GHz	Vertical	3 V/m	Criterion A	Criterion A	PASS
1.4 GHz to 2 GHz	Horizontal	3 V/m	Criterion A	Criterion A	PASS
2 GHz to 2.7 GHz	Vertical	1 V/m	Criterion A	Criterion A	PASS
2 GHz to 2.7 GHz	Horizontal	1 V/m	Criterion A	Criterion A	PASS

Criteria description:

Criterion A: ☒ Function is operated as intended during and after the test

☐

Criterion B: ☐ Function is temporary degradation and operated as intended after the test.

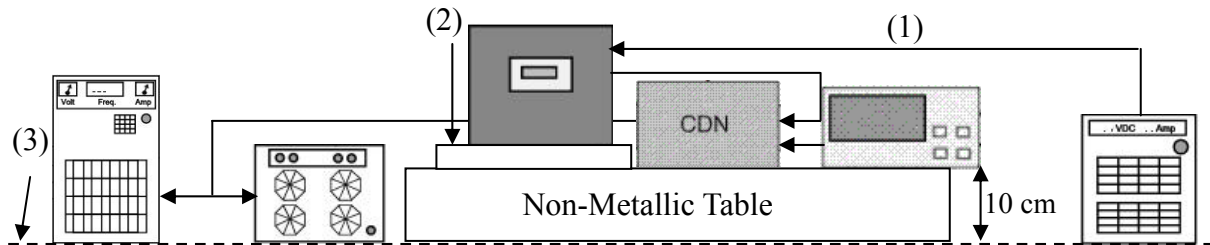
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Criterion C: ☐ Function is degradation or loss, requires operator intervention or system reset occurs.

☐

10. Electrical Fast Transient/Burst Immunity Test

10.1 Test arrangement (for Main power)

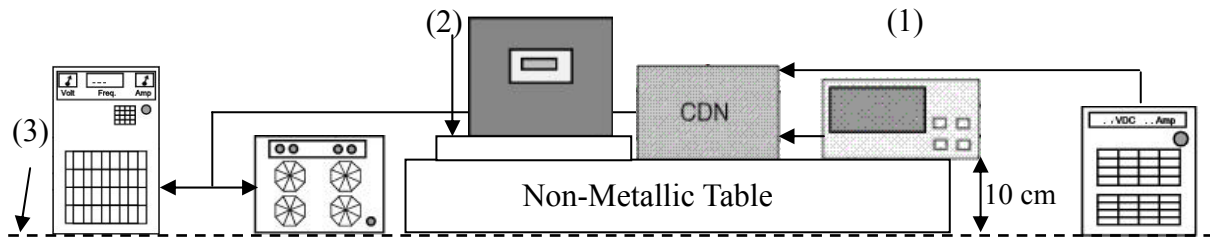


Note: (1) EFT/Burst Signal Generator

(2) 10cm insulating support

(3) Reference ground plane

10.2 Test arrangement (for DC port)

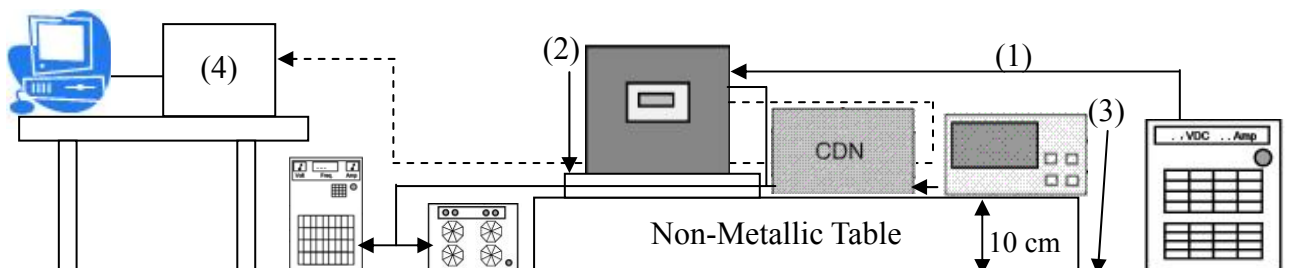


Note: (1) EFT/Burst Signal Generator

(2) 10cm insulating support

(3) Reference ground plane

10.3 Test arrangement (for RS-485 port)



Note: (1) EFT/Burst Signal Generator

(2) 10cm insulating support

(3) Reference ground plane

(4) RS485 to RS-232 Adaptor

10.4 Photographs of the test arrangement

Please refer to the appendix B6 of the present report.

10.5 Test procedure

1. The EUT is set up per the test arrangement and simulate the typical usage based on the user's manual.
2. Equipment designed for wall-mounted operation shall be tested as tabletop EUT. The orientation of the equipment shall be consistent with normal installation practice.
3. Electrical Fast Transient/Burst Immunity testing is placed on a wooden table in height of 0.8 meters with reference ground plane sheet and The ground plane shall extend beyond the clamp by a least 0.1 m on all sides.
4. The test generator and the coupling/decoupling network shall be placed directly on, and bonded to, the ground reference plane.
5. All cables to the EUT shall be placed on the insulation support 0.1 m above the ground reference plane. Cables not subject to electrical fast transients shall be routed as far as possible from the cable under test to minimize the coupling between the cables.
6. The minimum distance between the EUT and all other conductive structures, except the ground reference plane shall be more than 0.5 m, as well as coupling clamp.
7. If the manufacturer provides a non-detachable supply cable more than 0.5 m long with the equipment, the excess length of this cable shall be folded to avoid a flat coil and situated at a distance of 0.1 m above the ground reference plane.
8. Connect the EUT's power source to the AC power source through the coupling/decoupling network/clamp and perform the specified test level.
9. Record the performance of the EUT.

10.6 Test Specification

Test level	4*, 3, 2
Voltage peak	$\pm 4\text{kV(AC)*}; \pm 4\text{kV(RS-485)}$
Repetition frequency	5kHz
Wave shape of the pulse	Rise time $t_r = 5\text{ ns} \pm 30\%$; duration t_d (to 50 %) = $50\text{ ns} \pm 30\%$
Burst duration	$15\text{ ms} \pm 20\%$ at 5 kHz
Burst period	$300\text{ ms} \pm 20\%$

Note:

1. *The level of 4kV for electrical fast transient/burst immunity test was required by client

10.7 Test Equipment

Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
EMC Test System	Teseq	NSG 3060	1366	2013/11/04	2014/11/03
CDN 3063	Teseq	CDN 3063	1992	2013/11/04	2014/11/03
CDN 3425	Teseq	CDN 3425	1682	N/A	N/A

Note: The above equipments are within the valid calibration period.

10.8 Requirement

Performance criterion 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.

Performance criterion 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.

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

10.9 Test Results

Temperature:	23	°C	Model No.:	RPI M30A_ xxx
Relative Humidity:	50	%	Test Date:	Jul. 30, 2014
Atmospheric Pressure:	1008	hPa	Remark:	3-Phase/5-Wire(L1, L2, L3, N, PE)

Test Standard: EN 61000-6-1 / EN 61000-6-2

Coupling line	Voltage peak	Signal Line & Control Line (see Note 1)	Minimum requirement	Result	
Signal power port	±4 kV	RS-485	Criterion B	Criterion A	Pass
AC port	±4 kV	-	Criterion B	Criterion A	Pass

Note 1: Signal Line and Control Line were tested for: RS-485 port

Criteria description:

Criterion A: ☒ Function is operated as intended during and after the test

☐

Criterion B: ☐ Function is temporary degradation and operated as intended after the test.

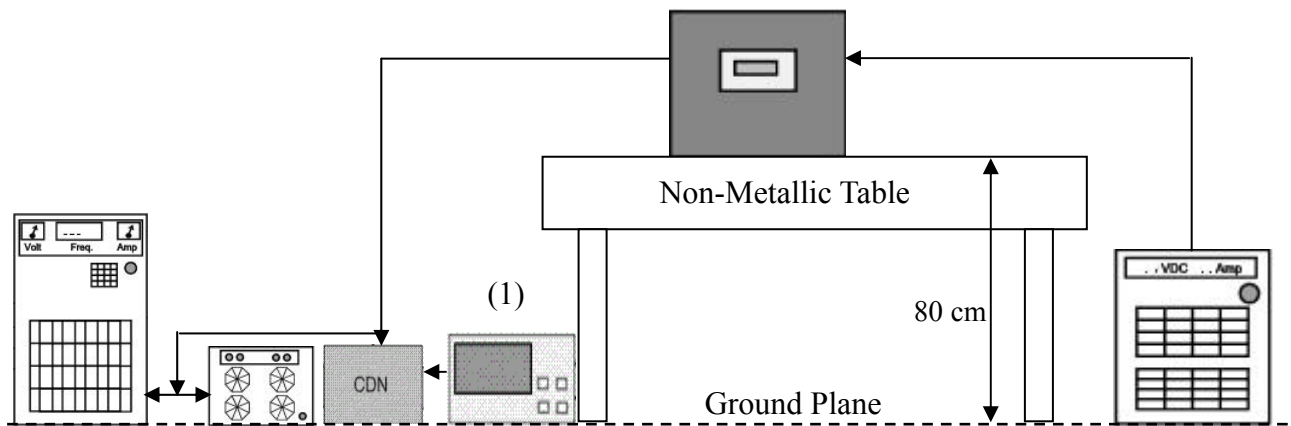
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Criterion C: ☐ Function is degradation or loss, requires operator intervention or system reset occurs.

☐

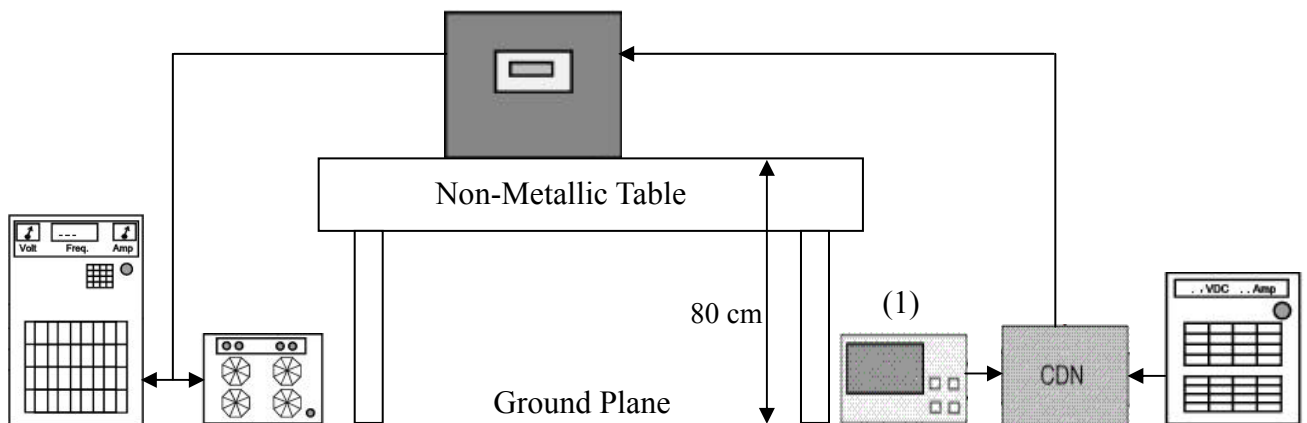
11. Surge Immunity Test

11.1 Test arrangement (AC side)



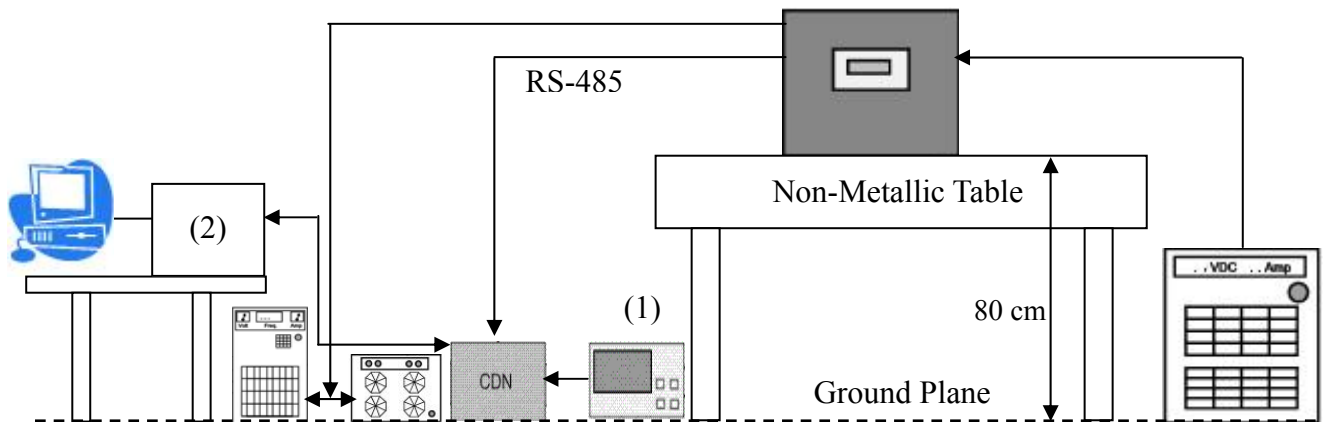
Note: (1) Surge Signal Generator

11.2 Test arrangement (DC side)



Note: (1) Surge Signal Generator

11.3 Test arrangement (Signal port)



Note: (1) Surge Signal Generator
(2) RS485 to RS-232 Adaptor

11.4 Photographs of the test arrangement

Please refer to the appendix B7 of the present report.

11.5 Test procedure

1. The EUT is set up per the test arrangement and simulate the typical usage based on the user's manual.
2. Surge Immunity testing is placed on a wooden table with a height of 0.8 meters.
3. The 1.2/50 us surge is to be applied to the EUT power supply terminals via the capacitive Coupling/decoupling network
4. If not otherwise specified the power cord between the EUT and the coupling/decoupling network shall not exceed 2 m in length.
5. All lower levels including the selected test level shall be satisfied.
6. Connect the EUT's power source to the AC power source through the coupling/decoupling network/clamp and perform the specified test level
7. Record the performance of the EUT.

11.6 Test Specification

Test level	3, 2, 1,
Open-circuit test voltage	±6 kV, ±2 kV, ±1 kV , ±0.5 kV(AC Only) ±0.5 kV(DC Only) ±6 kV,±1 kV , ±0.5 kV (RS-485)
Waveform (Tr/Th)	1.2/50us (open-circuit voltage)
Phase shifting(AC port only)	0°, 90°, 180°, 270°
Repetition rate	1 per minute, maximum
Number of surges	For a.c. power ports five positive and five negative pulses
Test port	AC & RS-485

11.7 Test Equipment

For RS-485 Port

Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
EMC Test System	Teseq	NSG 3060	1366	2013/11/04	2014/11/03
CDN 3063	Teseq	CDN 3063	1992	2013/11/04	2014/11/03
Signal Line Coupling Decoupling Network	EMC- Partner AG	CDN-UTP8	033	N/A	N/A

Note: The above equipments are within the valid calibration period.

For DC Port

Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
EMC Test System	TESEQ	NSG 3060	1366	2015/05/06	2016/05/04
CDN 3061	TESEQ	CDN 3061	1342	2015/05/06	2016/05/04
CDN HSS-2	TESEQ	CDN HSS-2	38145	2015/04/20	2016/04/18
Brand		Software		Version	
TESEQ		WIN3000		1.1.0	

Note: The above equipments are within the valid calibration period.

For AC Port

Equipment	Brand	Model No.	Calibration Date	Next Calibration Date
EMC Immunity tester	EMC-PARTNER	TRANSIENT-2000	2015/09/21	2016/09/20
Surge Decoupling Network	TESEQ	CDN 3083-S100	2015/03/09	2016/03/08
Universal Surge Coupling De-Coupling Network	EMC-PARTNER	CDN-UTP8	2015/09/21	2017/09/20

Note: The above equipments are within the valid calibration period.

11.8 Requirement

Performance criterion 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.

Performance criterion 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.

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

11.9 Test Results: Pass

11.9.1 Main power port

Test port	AC output			
Temperature:	25	°C	Model No.:	RPI M30A_ xxx
Relative Humidity:	50	%	Test Date:	Jan. 19, 2014
Atmospheric	1008	hPa	Remark:	3-Phase/5-Wire(L1, L2, L3, N, PE)

Test 5 times for each voltage

Open-circuit test voltage	Mode	Minimum requirement	Angle			
			0°	90°	180°	270°
±1 kV	L1 to L2	Criterion B	Criterion A	Criterion A	Criterion A	Criterion A
	L2 to L3	Criterion B	Criterion A	Criterion A	Criterion A	Criterion A
	L1 to L3	Criterion B	Criterion A	Criterion A	Criterion A	Criterion A
	L1 to N	Criterion B	Criterion A	Criterion A	Criterion A	Criterion A
	L2 to N	Criterion B	Criterion A	Criterion A	Criterion A	Criterion A
	L3 to N	Criterion B	Criterion A	Criterion A	Criterion A	Criterion A
±2 kV	L1 to G	Criterion B	Criterion A	Criterion A	Criterion A	Criterion A
	L2 to G	Criterion B	Criterion A	Criterion A	Criterion A	Criterion A
	L3 to G	Criterion B	Criterion A	Criterion A	Criterion A	Criterion A
	N to Gnd	Criterion B	Criterion A	Criterion A	Criterion A	Criterion A
±6 kV	L1 to G	Criterion B	Criterion A	Criterion A	Criterion A	Criterion A
	L2 to G	Criterion B	Criterion A	Criterion A	Criterion A	Criterion A
	L3 to G	Criterion B	Criterion A	Criterion A	Criterion A	Criterion A
	N to Gnd	Criterion B	Criterion A	Criterion A	Criterion A	Criterion A
±6 kV	L1 to L2	Criterion B	Criterion A	Criterion A	Criterion A	Criterion A
	L2 to L3	Criterion B	Criterion A	Criterion A	Criterion A	Criterion A
	L1 to L3	Criterion B	Criterion A	Criterion A	Criterion A	Criterion A
	L1 to N	Criterion B	Criterion A	Criterion A	Criterion A	Criterion A
	L2 to N	Criterion B	Criterion A	Criterion A	Criterion A	Criterion A
	L3 to N	Criterion B	Criterion A	Criterion A	Criterion A	Criterion A

Criteria description:

Criterion A: ☒ Function is operated as intended during and after the test

☐

Criterion B: ☐ Function is temporary degradation and operated as intended after the test.

☐

Criterion C: ☐ Function is degradation or loss, requires operator intervention or system reset occurs.

☐

11.9.2 DC power port

Temperature:	25	°C	Model No.:	RPI M30A_ xxx
Relative Humidity:	50	%	Test Date:	Jan. 19, 2016
Atmospheric	1008	hPa	Remark:	3-Phase/5-Wire(L1, L2, L3, N, PE)

Open-circuit test voltage	Mode	Minimum requirement	Result
±0.5 kV	+ to -	Criterion B	Criterion A
±0.5 kV	+ to Gnd	Criterion B	Criterion A
±0.5 kV	- to Gnd	Criterion B	Criterion A
±0.5 kV	+- to Gnd	Criterion B	Criterion A

Criteria description:

Criterion A: ☒ Function is operated as intended during and after the test

☐

Criterion B: ☐ Function is temporary degradation and operated as intended after the test.

☐

Criterion C: ☐ Function is degradation or loss, requires operator intervention or system reset occurs.

☐

11.9.3 Signal port

Test port	AC output			
Temperature:	23	°C	Model No.:	RPI M30A xxx
Relative Humidity:	50	%	Test Date:	Aug. 01, 2014
Atmospheric	1008	hPa	Remark:	3-Phase/5-Wire(L1, L2, L3, N, PE)

Phase		Result	Criteria Level	Remark
Volt	Mode			
±0.5KV	L to Gnd	Pass	A	RS-485 port
±1KV	L to Gnd	Pass	A	RS-485 port
±6KV	L to Gnd	Pass	A	RS-485 port

Criteria description:

Criterion A: ☒ Function is operated as intended during and after the test

☐

Criterion B: ☐ Function is temporary degradation and operated as intended after the test.

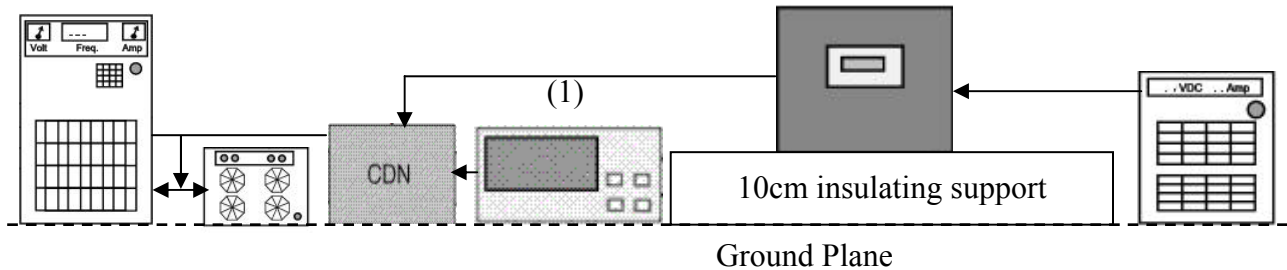
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Criterion C: ☐ Function is degradation or loss, requires operator intervention or system reset occurs.

☐

12. Immunity to Conducted Disturbances, Inducted by Radio-Frequency Fields

12.1 Test arrangement



Note: (1) CS test system

12.2 Photographs of the test arrangement

Please refer to the appendix B8 of the present report.

12.3 Test procedure

1. The EUT is set up per the test arrangement and simulate the typical usage based on the user's manual.
2. Equipment designed for wall-mounted operation shall be tested as tabletop EUT. The orientation of the equipment shall be consistent with normal installation practice.
3. The equipment to be tested is placed on an insulating support of 0.1 m height above a ground reference plane. All cables exiting the EUT shall be supported at a height of at least 30 mm above the ground reference plane.
4. Where coupling and/or decoupling devices are required, they shall be located between 0.1 m and 0.3 m from the EUT. This distance is to be measured horizontally from the projection of the EUT on to the ground reference plane to the coupling and/or decoupling device.
5. The cable(s) between the AE and the decoupling network(s) or in between the AE and the injection clamp shall not be bundled nor wrapped and shall be kept between 30 mm and 50 mm above the ground reference plane.
6. Connect the EUT's power source to the AC power source through the clamp and perform the specified test level in the test frequency range with the specified modulation type.
7. The dwell time of the amplitude modulated carrier at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0.5 s.
8. Record the performance of the EUT.

12.4 Test Specification

Test level	3
Voltage level (e.m.f.)	10Vrms
Frequency range	150 kHz – 80 MHz
Frequency Step	1%, Log sweep
Modulation	1kHz Sine Wave with 80% Amplitude Modulation
Dwell Time	3 sec
Test port	AC side

12.5 Test Equipment

Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
RF-Synthesizer/ Amplifier	SCHAFFNER	NSG 2070	1119	2013/11/05	2014/11/04
Mainsnetwork	COMTEST	4413-016	9818	2013/11/06	2014/11/05
Coupling And Decoupling Network	Schaffner	CDN M016	21272	2014/05/12	2015/05/11

Note: The above equipments are within the valid calibration period.

12.6 Requirement

Performance criterion 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.

Performance criterion 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.

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

12.7 Generation and Calibration of the Disturbance Signal

The disturbance signal is generated from a computer controlled signal generator.

The output signal is amplified and injected to the CDN/injection clamp. The disturbance signal level was calibrated as specified in the standard. A power meter was connected to the EUT side of the CDN through a 150 -50Ω adapter. The auxiliary equipment (AE) side of the network was terminated with 150Ω to ground during the calibration. The generator settings obtained during the calibration procedure were later repeated in the tests.

12.8 Test Results: Pass

Temperature:	23	°C	Model No.:	RPI M30A xxx
Relative Humidity:	50	%	Test Date:	Jul. 29, 2014
Atmospheric	1008	hPa	Remark:	3-Phase/5-Wire(L1, L2, L3, N, PE)

Test Standard: EN 61000-6-1 / EN 61000-6-2

Measurement at power port:

Frequency range	Minimum requirement	Result	
0.15 MHz to 80 MHz	Criterion A	Criterion A	Pass

Criteria description:

Criterion A: ☒ Function is operated as intended during and after the test

☐

Criterion B: ☐ Function is temporary degradation and operated as intended after the test.

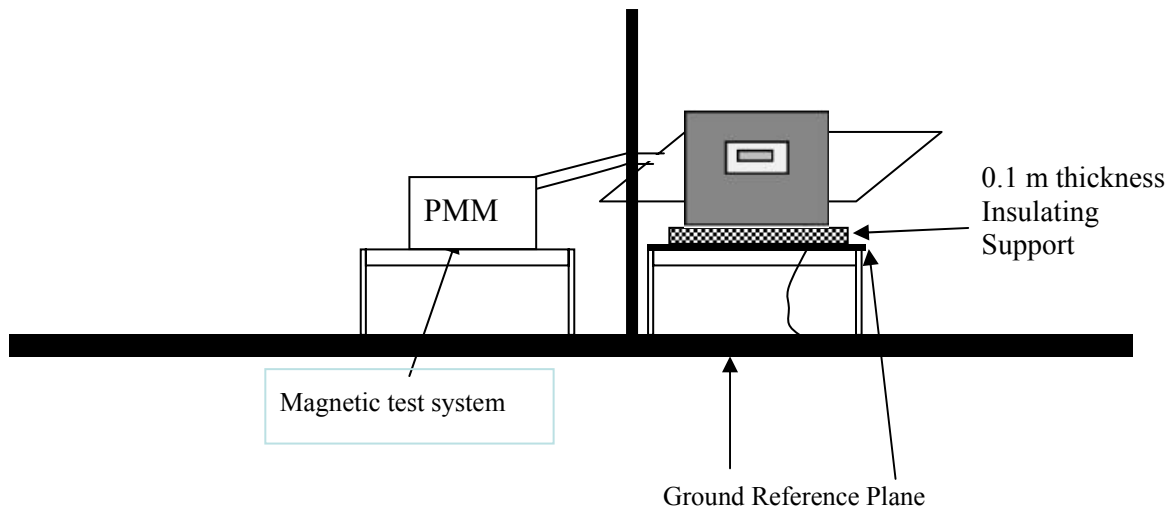
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Criterion C: ☐ Function is degradation or loss, requires operator intervention or system reset occurs.

☐

13. Power Frequency Magnetic Field Immunity Test

13.1 Test arrangement



13.2 Photographs of the test arrangement

Please refer to the appendix B9 of the present report.

13.3 Test procedure

1. The EUT is set up per the test arrangement and simulate the typical usage based on the user's manual.
2. Power Frequency Magnetic Field Immunity testing is placed on a 0.1 m thickness insulating support wooden table with a height of 0.8 meters.
3. The inductive coil of standard dimensions with square form in 1 m side is used and shall put the EUT placed at its center.
4. The Magnetic Field generator shall be placed at twisted cable length maximum 2 m from the induction coil.
5. All cables shall be exposed to the magnetic field for 1 m of their length.
6. The power frequency magnetic field value of the testing environment shall be at least 20 dB lower than the selected test level.
7. Then adjust the currents of the test generator, using the Gauss Meter to calibrate the specified test level at the center of the induction coil.
8. The plane of the inductive coil shall then be rotated by 90° in order to expose the EUT to the test field with different orientations.
9. Record the performance of the EUT.

13.4 Test Specification

Test level	4
Magnetic field strength A/m	30
Power frequencies	50Hz
Test duration	1 minute
Magnetic Field Orientation	X, Y, Z-axis
Test port	Enclosure

13.5 Test Equipment.

Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
Magnetic Test System	PMM	PMM1008	000J90601	2012/11/30	2014/11/30

Note: The above equipments are within the valid calibration period.

13.6 Requirement

Performance criterion 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.

Performance criterion 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.

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

13.7 Test Result: Pass

Temperature:	23	°C	Model No.:	RPI M30A_ xxx
Relative Humidity:	50	%	Test Date:	Jul. 29, 2014
Atmospheric Pressure:	1008	hPa	Remark:	3-Phase/5-Wire(L1, L2, L3, N, PE)

Test Standard: EN 61000-6-1 / EN 61000-6-2

Magnetic Field Orientation	Magnetic field strength A/m	Minimum requirement	Result	
X	30	Criterion A	Criterion A	Pass
Y	30	Criterion A	Criterion A	Pass
Z	30	Criterion A	Criterion A	Pass

Criteria description:

Criterion A: ☒ Function is operated as intended during and after the test

☐

Criterion B: ☐ Function is temporary degradation and operated as intended after the test.

☐

Criterion C: ☐ Function is degradation or loss, requires operator intervention or system reset occurs.

☐

1. The EUT is set up per the test arrangement and simulate the typical usage based on the user's manual.
2. Voltage Dips testing is placed on a wooden table with a height of 0.8 meters.
3. If no cable length is specified, it shall be the shortest possible length suitable to the application of the EUT.
4. During the tests, the mains voltage for testing shall be monitored within an accuracy of 2 %.
5. The EUT shall be tested for each selected combination of test level and duration with a sequence of three dips/interruptions with intervals of 10 s minimum (between each test event). Each representative mode of operation shall be tested.
6. For voltage dips, changes in supply voltage shall occur at zero crossings of the voltage, and at additional angles considered critical by product committees or individual product specifications preferably selected from 45°, 90°, 135°, 180°, 225°, 270° and 315° on each phase.
7. Connect the EUT's power source to the appropriate power through the test generator and perform the specified test level.
8. Record the performance of the EUT.

14.4 Test Specification

Voltage dips & short interruptions

Test Standard: EN 61000-6-1

Test level	3
Time at reduced voltage	100% residual voltage dips with 0.5 cycle 100% residual voltage dips with 1 cycles 30% residual voltage dips with 25 cycles 100 % during 250 cycles
Rated voltage	230V/50Hz
Time interval	10 s minimum (between each test event)
Test Duration	A sequence of three dips/interruptions
Phase Angle	45°, 90°, 135°, 180°, 225°, 270° and 315°
Test port	AC side

Test Standard: EN 61000-6-2

Test level	3
Time at reduced voltage	0% residual voltage dips with 1 cycle 40% residual voltage dips with 10 cycles 70% residual voltage dips with 25 cycles 0 % during 250 cycles
Rated voltage	230V/50Hz
Time interval	10 s minimum (between each test event)
Test Duration	A sequence of three dips/interruptions
Phase Angle	45°, 90°, 135°, 180°, 225°, 270° and 315°
Test port	AC side

14.5 Test Equipment.

Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
Advanced EMC Immunity Test System	Keytek	EMC Pro	9807103	2013/11/21	2014/11/20

Note: The above equipments are within the valid calibration period.

14.6 Requirement

Performance criterion 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.

Performance criterion 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.

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

14.7 Test Result: Pass

Phase	AC Line 1			
Temperature:	23	°C	Model No.:	RPI M30A_ xxx
Relative Humidity:	50	%	Test Date:	Aug. 01, 2014
Atmospheric	1008	hPa	Remark:	3-Phase/5-Wire(L1, L2, L3, N, PE)

Test Standard: EN 61000-6-1

Test Level	Reduction % of rated	Test Level % U _T	Duration Period	Tests	Recovery Time(Sec)	Criteria Level
1	100 %	0 %	0.5	3	10	Criterion A
2	100 %	0 %	1	3	10	Criterion A
3	30 %	70 %	25	3	10	Criterion B
4	100 %	0 %	250	3	10	Criterion B

Criteria description:

Criterion A: ☒ Function is operated as intended during and after the test

☐

Criterion B: ☒ Function is temporary degradation and operated as intended after the test.

☐

Criterion C: ☐ Function is degradation or loss, requires operator intervention or system reset occurs.

☐

Phase	AC Line 2			
Temperature:	23	°C	Model No.:	RPI M30A xxx
Relative Humidity:	50	%	Test Date:	Aug. 01, 2014
Atmospheric	1008	hPa	Remark:	3-Phase/5-Wire(L1, L2, L3, N, PE)

Test Standard: EN 61000-6-1

Test Level	Reduction % of rated	Test Level % U _T	Duration Period	Tests	Recovery Time(Sec)	Criteria Level
1	100 %	0 %	0.5	3	10	Criterion A
2	100 %	0 %	1	3	10	Criterion A
3	30 %	70 %	25	3	10	Criterion B
4	100 %	0 %	250	3	10	Criterion B

Criteria description:

Criterion A: ☒ Function is operated as intended during and after the test

☐

Criterion B: ☒ Function is temporary degradation and operated as intended after the test.

☐

Criterion C: ☐ Function is degradation or loss, requires operator intervention or system reset occurs.

☐

Phase	AC Line 3			
Temperature:	23	°C	Model No.:	RPI M30A xxx
Relative Humidity:	50	%	Test Date:	Aug. 01, 2014
Atmospheric	1008	hPa	Remark:	3-Phase/5-Wire(L1, L2, L3, N, PE)

Test Standard: EN 61000-6-1

Test Level	Reduction % of rated	Test Level % U _T	Duration Period	Tests	Recovery Time(Sec)	Criteria Level
1	100 %	0 %	0.5	3	10	Criterion A
2	100 %	0 %	1	3	10	Criterion A
3	30 %	70 %	25	3	10	Criterion B
4	100 %	0 %	250	3	10	Criterion B

Criteria description:

Criterion A: ☒ Function is operated as intended during and after the test

☐

Criterion B: ☒ Function is temporary degradation and operated as intended after the test.

☐

Criterion C: ☐ Function is degradation or loss, requires operator intervention or system reset occurs.

☐

Phase	AC Line 1			
Temperature:	23	°C	Model No.:	RPI M30A_ xxx
Relative Humidity:	50	%	Test Date:	Aug. 01, 2014
Atmospheric	1008	hPa	Remark:	3-Phase/5-Wire(L1, L2, L3, N, PE)

Test Standard: EN 61000-6-2

Test Level	Reduction % of rated	Test Level % U _T	Duration Period	Tests	Recovery Time(Sec)	Criteria Level
1	100 %	0 %	1	3	10	Criterion A
2	60 %	40 %	10	3	10	Criterion B
3	30 %	70 %	25	3	10	Criterion B
4	100 %	0 %	250	3	10	Criterion B

Criteria description:

Criterion A: ☒ Function is operated as intended during and after the test

☐

Criterion B: ☒ Function is temporary degradation and operated as intended after the test.

☐

Criterion C: ☐ Function is degradation or loss, requires operator intervention or system reset occurs.

☐

Phase	AC Line 2			
Temperature:	23	°C	Model No.:	RPI M30A xxx
Relative Humidity:	50	%	Test Date:	Aug. 01, 2014
Atmospheric	1008	hPa	Remark:	3-Phase/5-Wire(L1, L2, L3, N, PE)

Test Standard: EN 61000-6-2

Test Level	Reduction % of rated	Test Level % U _T	Duration Period	Tests	Recovery Time(Sec)	Criteria Level
1	100 %	0 %	1	3	10	Criterion A
2	60 %	40 %	10	3	10	Criterion B
3	30 %	70 %	25	3	10	Criterion B
4	100 %	0 %	250	3	10	Criterion B

Criteria description:

Criterion A: ☒ Function is operated as intended during and after the test

☐

Criterion B: ☒ Function is temporary degradation and operated as intended after the test.

☐

Criterion C: ☐ Function is degradation or loss, requires operator intervention or system reset occurs.

☐

Phase	AC Line 3			
Temperature:	23	°C	Model No.:	RPI M30A xxx
Relative Humidity:	50	%	Test Date:	Aug. 01, 2014
Atmospheric	1008	hPa	Remark:	3-Phase/5-Wire(L1, L2, L3, N, PE)

Test Standard: EN 61000-6-2

Test Level	Reduction % of rated	Test Level % U _T	Duration Period	Tests	Recovery Time(Sec)	Criteria Level
1	100 %	0 %	1	3	10	Criterion A
2	60 %	40 %	10	3	10	Criterion B
3	30 %	70 %	25	3	10	Criterion B
4	100 %	0 %	250	3	10	Criterion B

Criteria description:

Criterion A: ☒ Function is operated as intended during and after the test

☐

Criterion B: ☒ Function is temporary degradation and operated as intended after the test.

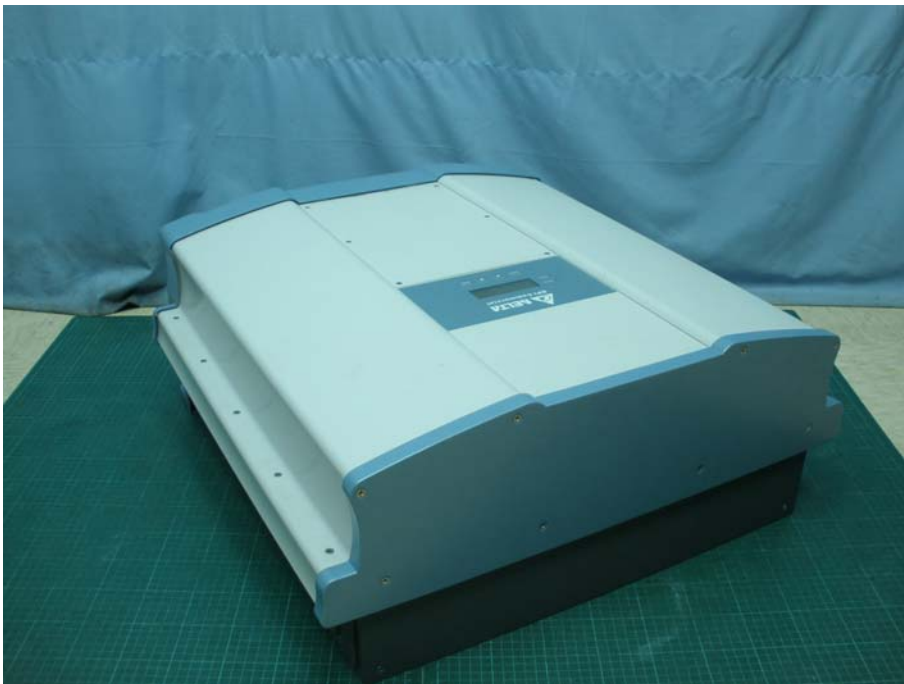
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Criterion C: ☐ Function is degradation or loss, requires operator intervention or system reset occurs.

☐

Appendix A1: External photo of EUT

RPI M30A_121



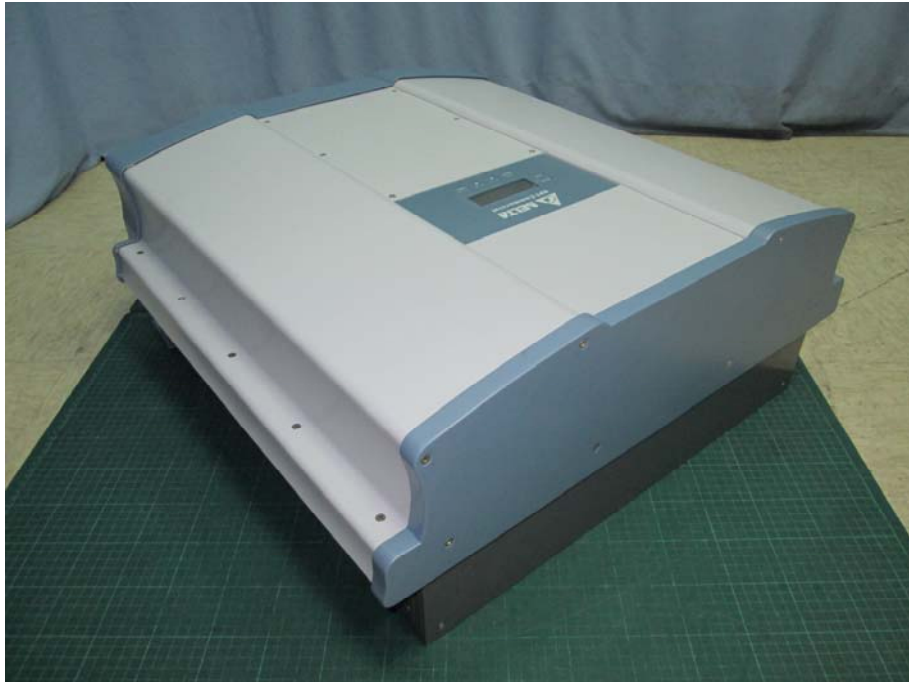
AC Line



DC Line



RPI M30A_120



AC Line



DC Line



Appendix B1: Conducted Emission Test Set-up

RPI M30A_121



RPI M30A_120



Appendix B2: Radiated Emission Test Set-up

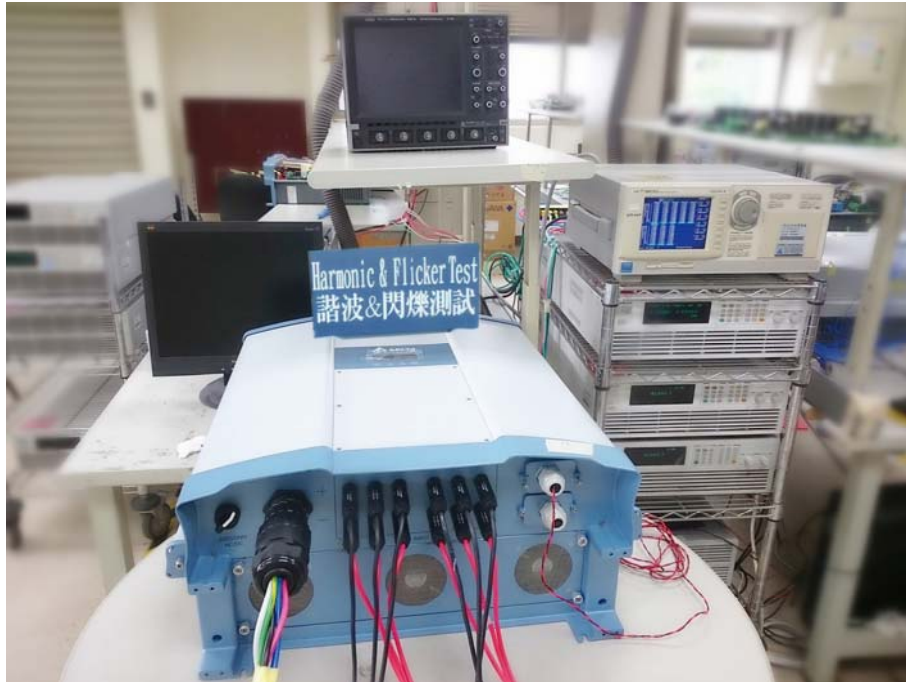
RPI M30A_121



RPI M30A_120

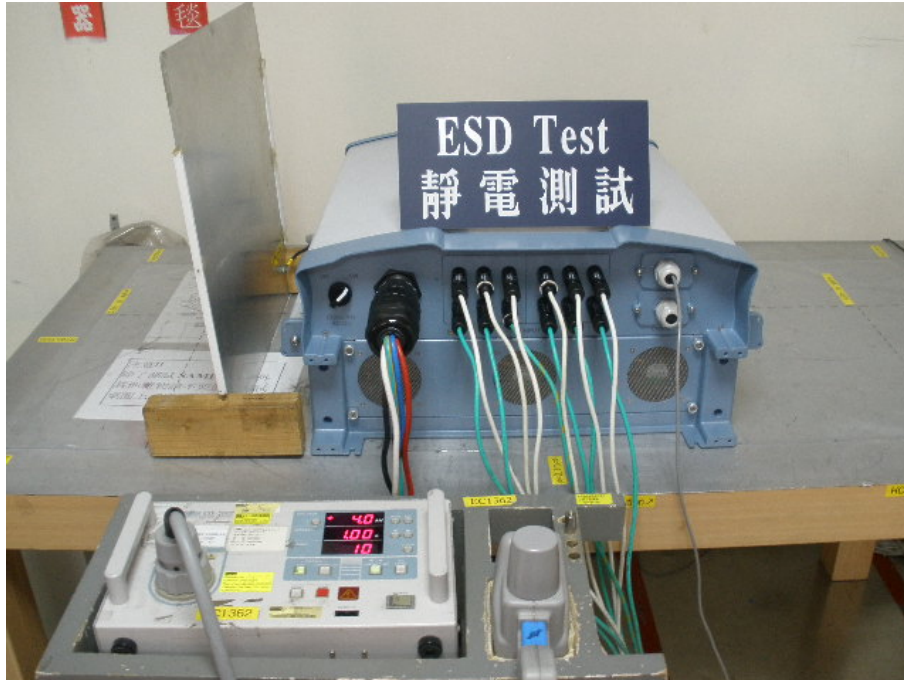


Appendix B3: Harmonic and Flicker Test Set-up



Appendix B4: Electrostatic Discharge (ESD) Test Set-up

RPI M30A_121



RPI M30A_120



Appendix B5: Radiated Susceptibility (RS) Test Set-up

RPI M30A_121



RPI M30A_120



Appendix B6: Electrical fast transient / burst (EFT) Test Set-up

RPI M30A_121_AC port



RPI M30A_121_Signal port



RPI M30A_120_AC port



RPI M30A_120_Signal port

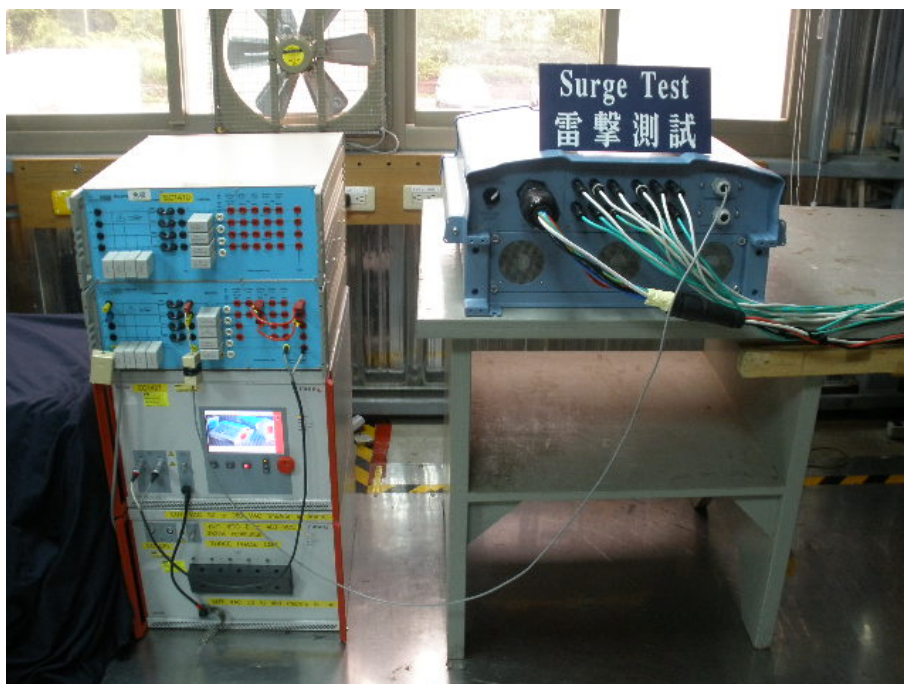


Appendix B7: Surge Test Set-up

RPI M30A_121_AC port



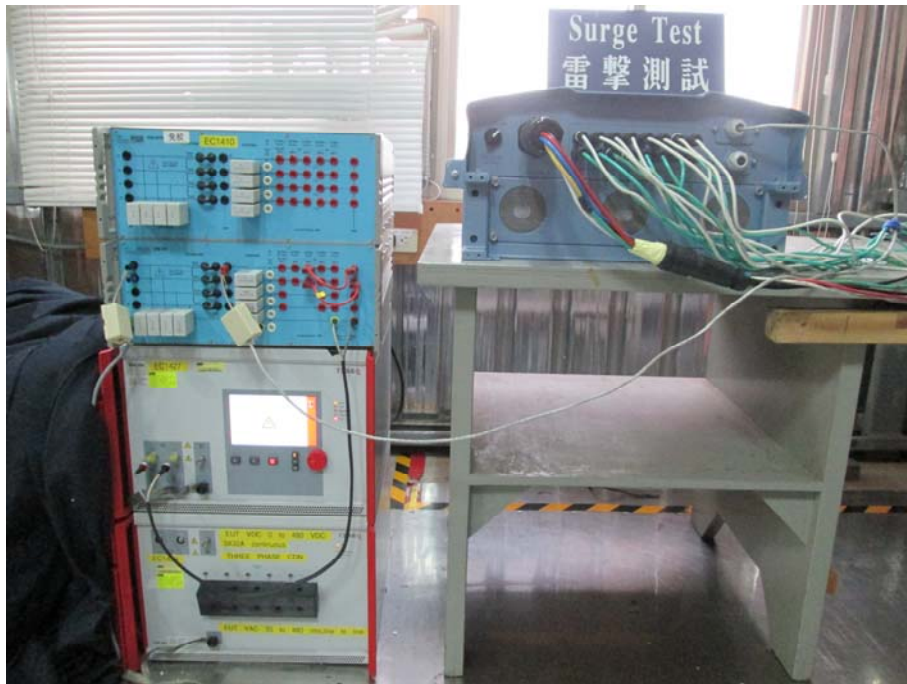
RPI M30A_121_Signal port



RPI M30A_120_AC port



RPI M30A_120_Signal port



Appendix B8: Conducted disturbances (CS) Test Set-up

RPI M30A_121



RPI M30A_120_



Appendix B9: Power frequency magnetic field (PFM) Test Set-up

RPI M30A_121



RPI M30A_120



Appendix B10: Voltage Dips Test Set-up

RPI M30A_121



RPI M30A_120

