CE EMC Test Report

Report No.:	CE961212A15E
Test Model:	TMP 10103
Series Model:	TMP 10212, TMP 10215, TMP 10105, TMP 10112, TMP 10115, TMP 10124
Received Date:	Dec. 10, 2007
Test Date:	Dec. 25 ~ 26, 2007 & Aug. 11 ~ 15, 2016
Issued Date:	Nov. 24, 2016
Applicant:	TRACO ELECTRONIC AG
Address:	SIHLBRUGGSTRASSE 111 CH-6340 BAAR, SWITZERLAND
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.)

Testing Laboratory
2021

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Release Control Record

Issue No.	Description	Date Issued
CE961212A15E	Original release.	Nov. 24, 2016

1 Certificate of Conformity

Product:	AC/DC Power Modules
Brand:	TRACO POWER
Test Model:	TMP 10103
Series Model:	TMP 10212, TMP 10215, TMP 10105, TMP 10112, TMP 10115, TMP 10124
Sample Status:	ENGINEERING SAMPLE
Applicant:	TRACO ELECTRONIC AG
Test Date:	Dec. 25 ~ 26, 2007 & Aug. 11 ~ 15, 2016
Standards:	**EN 61000-6-3:2007+ A1:2011** **EN 55032:2012 +AC:2013, Class B** **EN 61000-3-2:2014** **EN 61000-3-3:2013** **EN 61000-6-1:2007** **EN 55024:2010** IEC 61000-4-2:2008 ED. 2.0 IEC 61000-4-3:2010 ED. 3.2 IEC 61000-4-4:2012 ED. 3.0 IEC 61000-4-5:2014 ED. 3.0 IEC 61000-4-6:2013 ED. 4.0 IEC 61000-4-8:2009 ED. 2.0 IEC 61000-4-11:2004 ED. 2.0

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : Sandra Lin , **Date:** Nov. 24, 2016

Sandra Lin / Specialist

Approved by : Henry Lai , **Date:** Nov. 24, 2016

Henry Lai / Director

2 Summary of Test Results

Emission				
Standard	Clause	Test Item	Result/Remarks	Verdict
EN 61000-6-3: 2007+ A1: 2011 EN 55032:2012 +AC:2013	A.3	Conducted emission from the AC mains power port	Minimum passing Class B margin is -4.62 dB at 0.174 MHz	Pass
	A.3	Asymmetric mode conducted emission at telecommunication ports	Without telecom port of the EUT	N/A
	A.2	Radiated emission 30-1000 MHz	Minimum passing Class B margin is -5.14 dB at 169.26 MHz	Pass
	A.2	Radiated emission above 1GHz	Not applicable because the EUT's highest frequency is below 108 MHz	N/A
EN 61000-3-2:2014	-	Harmonic current emissions	The power consumption of EUT is less than 75W and no limits apply.	Pass
EN 61000-3-3:2013	-	Voltage fluctuations and flicker	$P_{st} \leqq 1.0$ $d_{max} \leqq 4\%$ $P_{lt} \leqq 0.65$ $d_c \leqq 3.3\%$ $T_{max} \leqq 500ms$	Pass

Immunity (EN 61000-6-1:2007 & EN 55024:2010)			
Basic standard	Test Item	Result/Remarks	Verdict
IEC 61000-4-2:2008 ED. 2.0	Electrostatic discharges (ESD)	Performance Criterion A	Pass
IEC 61000-4-3:2010 ED. 3.2	Continuous radiated disturbances (RS)	Performance Criterion A	Pass
IEC 61000-4-4:2012 ED. 3.0	Electrical fast transients (EFT)	Performance Criterion A	Pass
IEC 61000-4-5:2014 ED. 3.0	Surges	Performance Criterion A	Pass
IEC 61000-4-6:2013 ED. 4.0	Continuous conducted disturbances (CS)	Performance Criterion A	Pass
IEC 61000-4-8:2009 ED. 2.0	Power-frequency magnetic fields (PFMF)	Performance Criterion A	Pass
IEC 61000-4-11:2004 ED. 2.0 **(For EN 61000-6-1)**	Voltage dips and interruptions	**Voltage Dips:** i) 0% residual - Performance Criterion A ii) 70% residual – Performance Criterion B **Voltage Interruptions:** i) 0% residual – Performance Criterion B	Pass
IEC 61000-4-11:2004 ED. 2.0 **(For EN 55024)**	Voltage dips and interruptions	**Voltage Dips:** i). >95% reduction - Performance Criterion A ii). 30% reduction – Performance Criterion B **Voltage Interruptions:** i). >95% reduction – Performance Criterion B	Pass

Note:

1. There is no deviation to the applied test methods and requirements covered by the scope of this report.
2. The above IEC basic standards are applied with latest version if customer has no special requirement.
3. N/A: Not Applicable.

2.1 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:

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

Measurement	Expended Uncertainty (k=2) (±)	Maximum allowable uncertainty (±)
Conducted emission from AC mains power port using AMN, 150kHz ~ 30MHz	2.77 dB	3.4 dB (U_{cispr})
Radiated emission, 30MHz ~ 1GHz	3.89 dB	6.3 dB (U_{cispr})

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 Features of EUT

The tests reported herein were performed according to the method specified by TRACO ELECTRONIC AG, for detailed feature description, please refer to the manufacturer's specifications or user's manual.

3.2 General Description of EUT

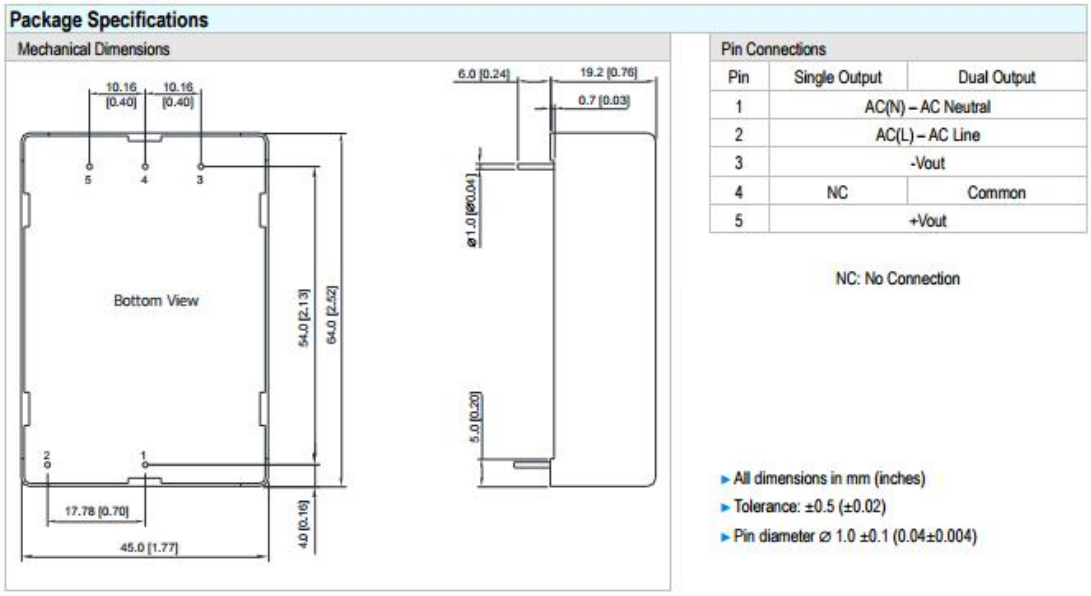
Product	AC/DC Power Modules
Brand	TRACO POWER
Test Model	TMP 10103
Series Model	TMP 10212, TMP 10215, TMP 10105, TMP 10112, TMP 10115, TMP 10124
Model Difference	Refer to table as below
Sample Status	R&D sample
Operating Software	N/A
Power Supply Rating	Refer to table as below
Accessory Device	N/A
Data Cable Supplied	N/A

Note:

1. The EUT is a AC/DC Power Modules (AC 2-pin), and it has the following models, which are identical to each other except for their rating differences , as the following:

Model No.	Input Voltage	Output Voltage
TMP 10103	230Vac/ 50Hz	3.3V
TMP 10105		5V
TMP 10112		12V
TMP 10115		15V
TMP 10124		24V
TMP 10212		±12V
TMP 10215		±15V

2. Package Specifications：



3.3 Operating Modes of EUT and Determination of Worst Case Operating Mode

1. The EUT was pre-tested under operating and standby condition and the worst emission level was found under **operating condition**.
2. For radiated emission evaluation, 230Vac/50Hz & 110Vac/60Hz had been covered during the pre-test. The worst data was found at **230Vac/50Hz** and recorded in the applied test report.
3. As client's requirement, the EUT was tested under the following modes:

Test Item	Test Mode	Model No.	Test Condition
Conducted Test	Mode 1	TMP 10103	Full load
	Mode 2	TMP 10105	
	Mode 3	TMP 10112	
	Mode 4	TMP 10115	
	Mode 5	TMP 10124	
	Mode 6	TMP 10212	
	Mode 7	TMP 10215	
Radiated & Surge Tests	Mode 1	TMP 10103	
Harmonic, Flicker, Immunity Tests <Except for Surge>	Mode 1	TMP 10103	
	Mode 5	TMP 10124	
	Mode 7	TMP 10215	

3.4 Test Program Used and Operation Descriptions

- **For Conducted & Radiated tests:**

  Set the EUT under full resistor load.

- **For Harmonics, Flicker tests:**

  Connected a resistor load to DC output port of EUT to make EUT have maximum power consumption.

- **For Immunity tests:**

  Connected a resistor load to DC output port of EUT to make EUT have maximum power consumption and then multimeter was used to monitor voltage of output.

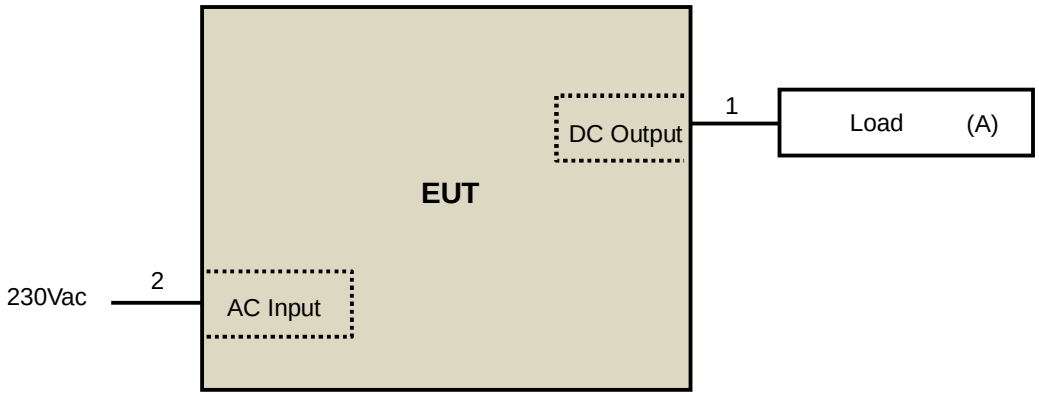
3.5 Primary Clock Frequencies of Internal Source

The highest frequency generated or used within the EUT or on which the EUT operates or tunes is below 108MHz, provided by TRACO ELECTRONIC AG, for detailed internal source, please refer to the manufacturer's specifications.

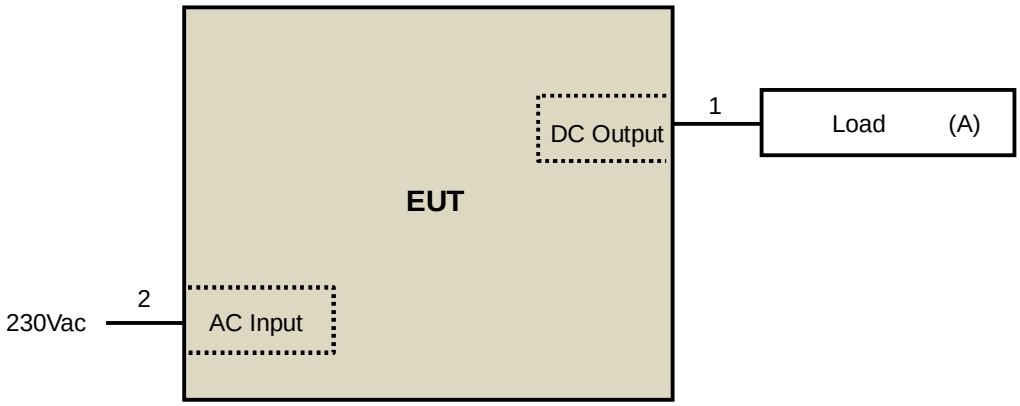
4 Configuration and Connections with EUT

4.1 Connection Diagram of EUT and Peripheral Devices

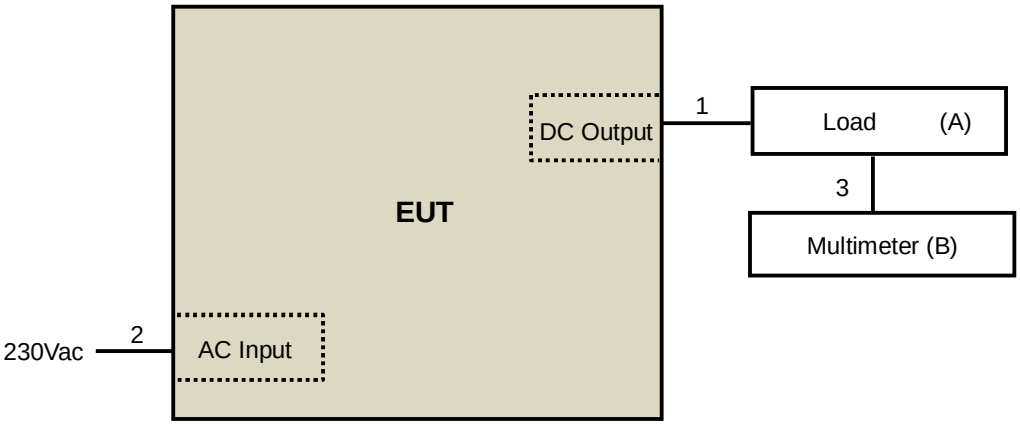
Emission tests (Harmonics & Flicker excluded):



Harmonics, Flicker tests:



Immunity tests:



4.2 Configuration of Peripheral Devices and Cable Connections

Emission tests (Harmonics & Flicker excluded):

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Load	N/A	N/A	N/A	N/A	Supplied by client

Note: All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC cable	1	0.2	N	0	Supplied by client
2.	AC power cord	1	1.8	N	0	Supplied by client

Note: The core(s) is(are) originally attached to the cable(s).

Harmonics, Flicker, Immunity tests:

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	LOAD	N/A	N/A	N/A	N/A	Supplied by client
B.	Multimeter	YFE	YF-370A	N/A	N/A	Provided by Lab

Note: All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC cable	1	0.2	N	0	Supplied by client
2.	AC power cord	1	1.8	N	0	Supplied by client
3.	Data cable	1	0.3	N	0	Provided by Lab

Note: The core(s) is(are) originally attached to the cable(s).

5 Conducted Emission from the AC Mains Power Port

5.1 Limits

EN 55032 Table clause	Frequency range (MHz)	Coupling device	Detector type / bandwidth	Class A limits (dBuV)
A8.1	0.15 - 0.5	AMN	Quasi-peak / 9kHz	79
	0.5 - 30.0			73
A8.2	0.15 - 0.5		Average / 9kHz	66
	0.5 - 30.0			60

EN 55032 Table clause	Frequency range (MHz)	Coupling device	Detector type / bandwidth	Class B limits (dBuV)
A9.1	0.15 - 0.5	AMN	Quasi-peak / 9kHz	66 - 56
	0.5 - 5			56
	5 - 30.0			60
A9.2	0.15 - 0.5		Average / 9kHz	56 - 46
	0.5 - 5			46
	5 - 30.0			50

Standard	Frequency range (MHz)	Quasi-peak dB(uV)	Average dB(uV)
EN 61000-6-3	0.15 - 0.5	66 - 56	56 - 46
	0.50 - 5.0	56	46
	5.0 - 30.0	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.

5.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS30	834115/016	Jan. 09, 2008
SCHWARZBECK Artificial Mains Network (For EUT)	NSLK 8128	8128-244	Jul. 25, 2008
LISN With Adapter (for EUT)	AD10	C03Ada-001	Jul. 25, 2008
EMCO L.I.S.N. (For peripherals)	3825/2	9504-2359	Jun. 27, 2008
Software	ADT_Cond_V7.3.5	NA	NA
Software	ADT_ISN_V7.3.5	NA	NA
RF cable (JYEBAO)	5D-FB	Cable-C03.01	Jan. 09, 2008
LYNICS Terminator (For EMCO LISN)	NA	E1-01-300	Jan. 16, 2008
LYNICS Terminator (For EMCO LISN)	NA	E1-01-301	Jan. 16, 2008

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. The test was performed in ADT Shielded Room No. 3.
3. The VCCI Site Registration No. C-274.
4. Test date: Dec. 25 ~ 26, 2007

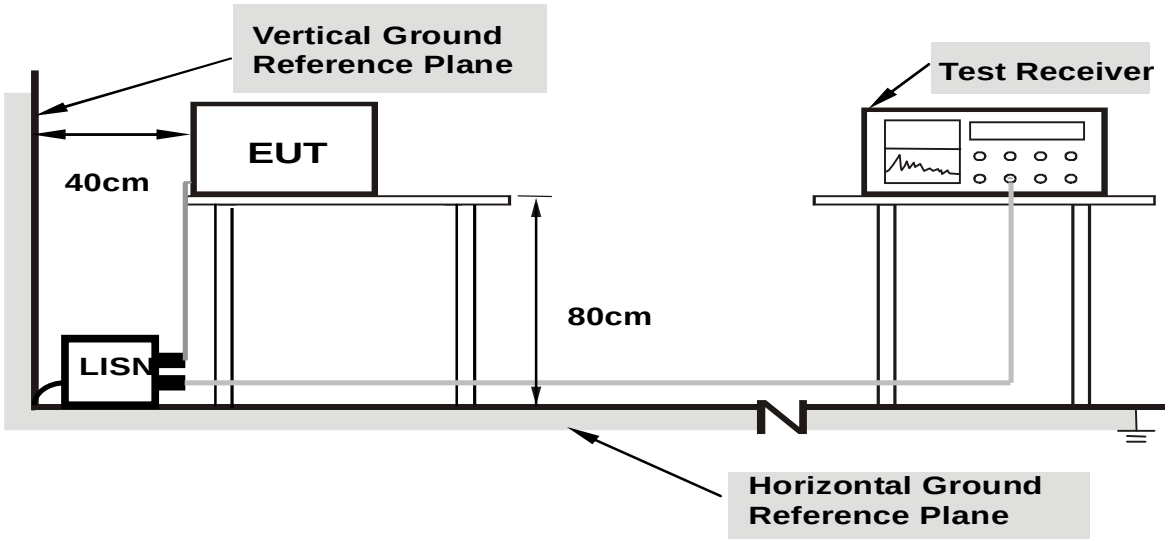
5.3 Test Arrangement

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

c. The test results of conducted emissions at mains ports are recorded of six worst margins for quasi-peak (mandatory) [and average (if necessary)] values against the limits at frequencies of interest unless the margin is 20 dB or greater.

Note: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.



Note: 1. Support units were connected to second LISN.
2. The distance specified between EUT/AE and other metallic objects is ≥ 0.8 m in the measurement arrangement for table-top EUT.

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

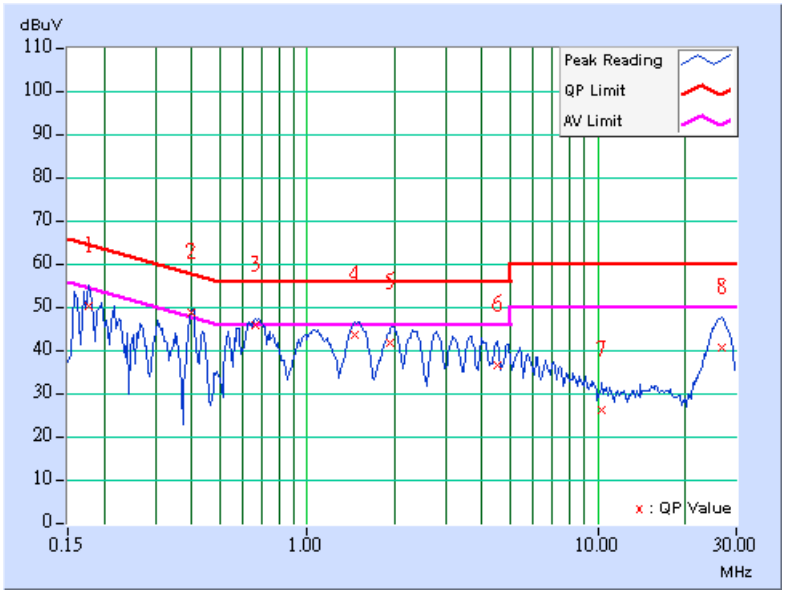
5.4 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	230Vac, 50Hz	Environmental Conditions	20℃, 70%RH, 1003mbar
Tested by	Nick Liu		
Test Mode	Mode 1		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.177	0.19	49.35	-	49.54	-	64.61	54.61	-15.07	-
2	**0.400**	**0.22**	**48.02**	**43.02**	**48.24**	**43.24**	**57.86**	**47.86**	**-9.62**	**-4.62**
3	0.662	0.23	45.01	-	45.24	-	56.00	46.00	-10.76	-
4	1.453	0.25	42.74	-	42.99	-	56.00	46.00	-13.01	-
5	1.934	0.26	41.08	-	41.34	-	56.00	46.00	-14.66	-
6	4.539	0.29	35.83	-	36.12	-	56.00	46.00	-19.88	-
7	10.363	0.49	25.60	-	26.09	-	60.00	50.00	-33.91	-
8	26.820	0.84	39.97	-	40.81	-	60.00	50.00	-19.19	-

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

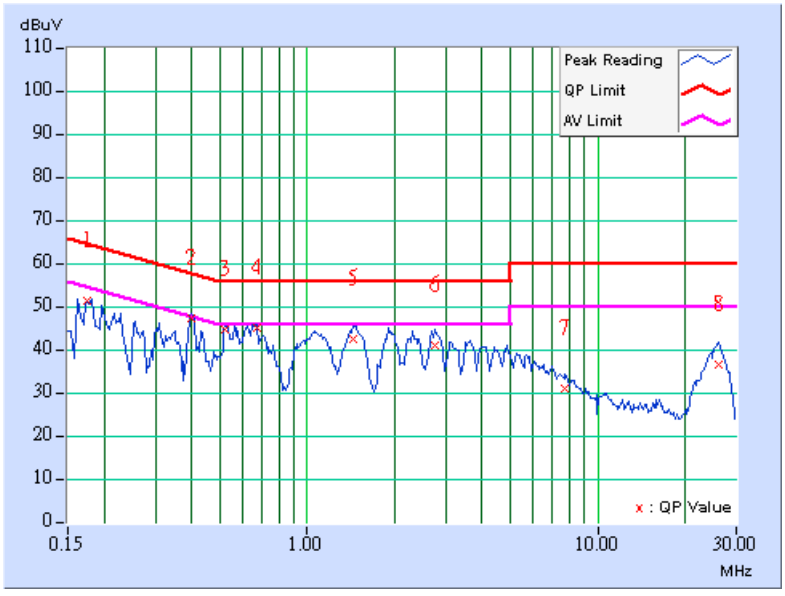


Frequency Range	150kHz ~ 30MHz	**Detector Function & Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	230Vac, 50Hz	**Environmental Conditions**	20℃, 70%RH, 1003mbar
Tested by	Nick Liu		
Test Mode	Mode 1		

Phase Of Power : Neutral (N)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.175	0.19	50.59	-	50.78	-	64.72	54.72	-13.95	-
2	0.400	0.22	46.56	-	46.78	-	57.85	47.85	-11.07	-
3	0.521	0.22	43.92	-	44.14	-	56.00	46.00	-11.86	-
4	0.670	0.23	44.21	-	44.44	-	56.00	46.00	-11.56	-
5	1.445	0.25	41.58	-	41.83	-	56.00	46.00	-14.17	-
6	2.750	0.26	40.07	-	40.33	-	56.00	46.00	-15.67	-
7	7.738	0.40	30.26	-	30.66	-	60.00	50.00	-29.34	-
8	25.988	0.93	35.86	-	36.79	-	60.00	50.00	-23.21	-

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

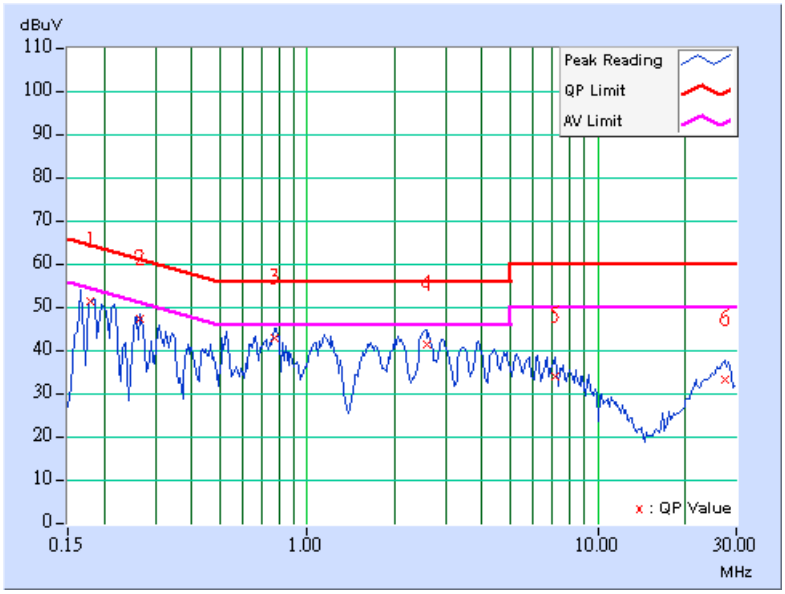


Frequency Range	150kHz ~ 30MHz	**Detector Function & Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	230Vac, 50Hz	**Environmental Conditions**	20℃, 70%RH, 1003mbar
Tested by	Nick Liu		
Test Mode	Mode 2		

Phase Of Power : Line (L)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.180	0.20	50.65	-	50.85	-	64.50	54.50	-13.66	-
2	0.267	0.22	46.52	-	46.74	-	61.20	51.20	-14.46	-
3	0.775	0.23	42.29	-	42.52	-	56.00	46.00	-13.48	-
4	2.574	0.26	40.65	-	40.91	-	56.00	46.00	-15.09	-
5	7.094	0.38	33.24	-	33.62	-	60.00	50.00	-26.38	-
6	27.512	0.85	32.44	-	33.29	-	60.00	50.00	-26.71	-

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

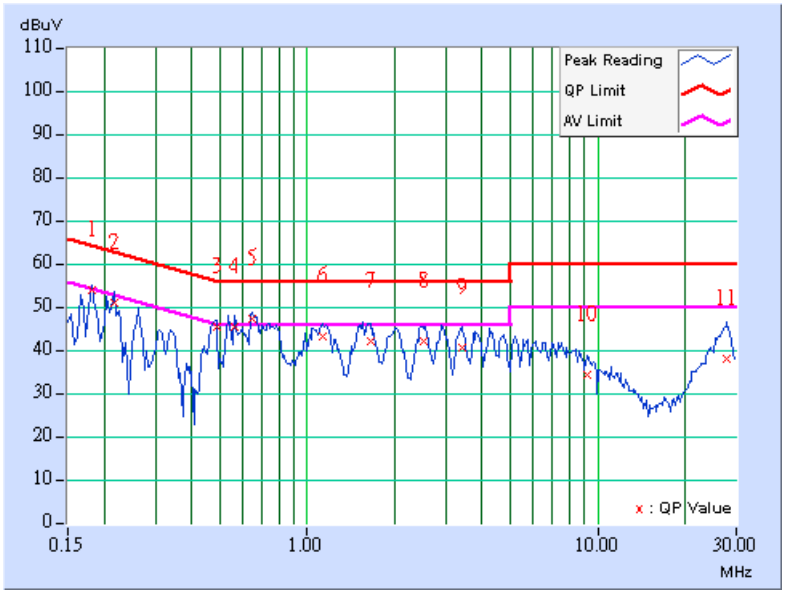


Frequency Range	150kHz ~ 30MHz	**Detector Function & Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	230Vac, 50Hz	**Environmental Conditions**	20℃, 70%RH, 1003mbar
Tested by	Nick Liu		
Test Mode	Mode 2		

Phase Of Power : Neutral (N)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.181	0.20	52.97	-	53.17	-	64.43	54.43	-11.26	-
2	0.216	0.22	50.24	-	50.46	-	62.96	52.96	-12.50	-
3	0.486	0.22	44.74	-	44.96	-	56.24	46.24	-11.27	-
4	0.564	0.23	44.77	-	45.00	-	56.00	46.00	-11.00	-
5	0.646	0.23	46.30	36.12	46.53	36.35	56.00	46.00	-9.47	-9.65
6	1.129	0.24	42.40	-	42.64	-	56.00	46.00	-13.36	-
7	1.648	0.25	41.10	-	41.35	-	56.00	46.00	-14.65	-
8	2.523	0.26	41.10	-	41.36	-	56.00	46.00	-14.64	-
9	3.395	0.27	39.87	-	40.14	-	56.00	46.00	-15.86	-
10	9.160	0.45	33.53	-	33.98	-	60.00	50.00	-26.02	-
11	27.777	0.95	37.37	-	38.32	-	60.00	50.00	-21.68	-

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

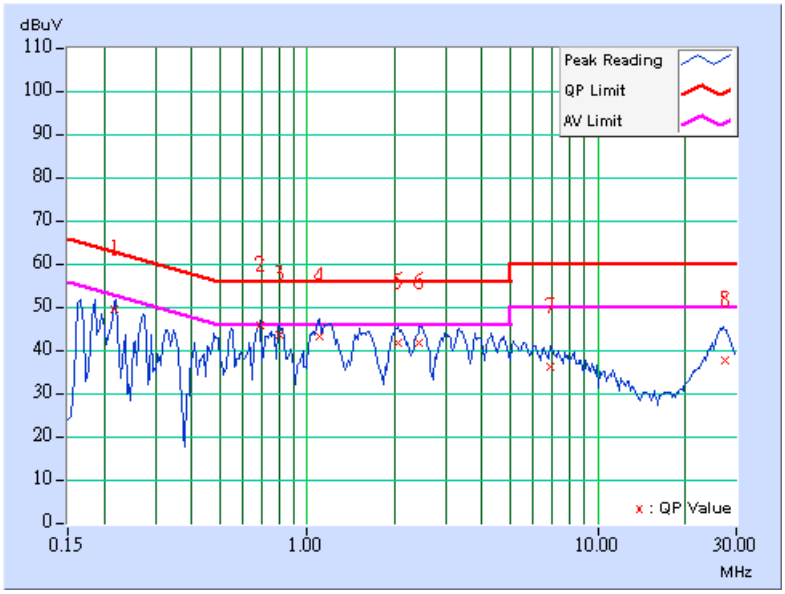


Frequency Range	150kHz ~ 30MHz	**Detector Function & Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	230Vac, 50Hz	**Environmental Conditions**	20℃, 70%RH, 1003mbar
Tested by	Nick Liu		
Test Mode	Mode 3		

Phase Of Power : Line (L)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.218	0.22	48.69	-	48.91	-	62.90	52.90	-13.99	-
2	0.685	0.23	44.94	-	45.17	-	56.00	46.00	-10.83	-
3	0.798	0.23	42.74	-	42.97	-	56.00	46.00	-13.03	-
4	1.105	0.24	42.40	-	42.64	-	56.00	46.00	-13.36	-
5	2.055	0.26	40.82	-	41.08	-	56.00	46.00	-14.92	-
6	2.434	0.26	41.05	-	41.31	-	56.00	46.00	-14.69	-
7	6.875	0.37	35.34	-	35.71	-	60.00	50.00	-24.29	-
8	27.438	0.85	37.07	-	37.92	-	60.00	50.00	-22.08	-

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

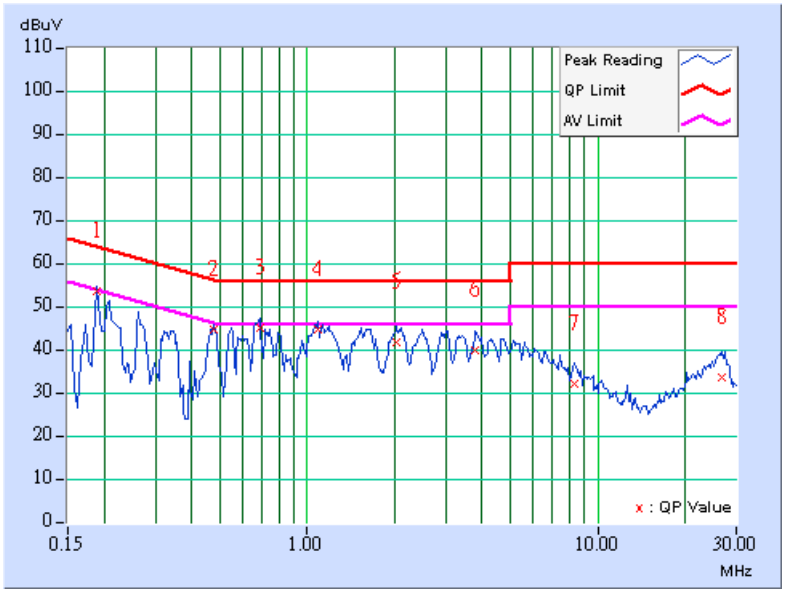


Frequency Range	150kHz ~ 30MHz	**Detector Function & Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	230Vac, 50Hz	**Environmental Conditions**	20℃, 70%RH, 1003mbar
Tested by	Nick Liu		
Test Mode	Mode 3		

Phase Of Power : Neutral (N)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.189	0.21	52.88	-	53.09	-	64.08	54.08	-10.99	-
2	0.478	0.22	43.78	-	44.00	-	56.37	46.37	-12.37	-
3	0.685	0.23	44.25	-	44.48	-	56.00	46.00	-11.52	-
4	1.090	0.24	43.70	-	43.94	-	56.00	46.00	-12.06	-
5	2.027	0.26	41.01	-	41.27	-	56.00	46.00	-14.73	-
6	3.805	0.27	38.94	-	39.21	-	56.00	46.00	-16.79	-
7	8.301	0.42	31.36	-	31.78	-	60.00	50.00	-28.22	-
8	26.777	0.94	32.75	-	33.69	-	60.00	50.00	-26.31	-

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

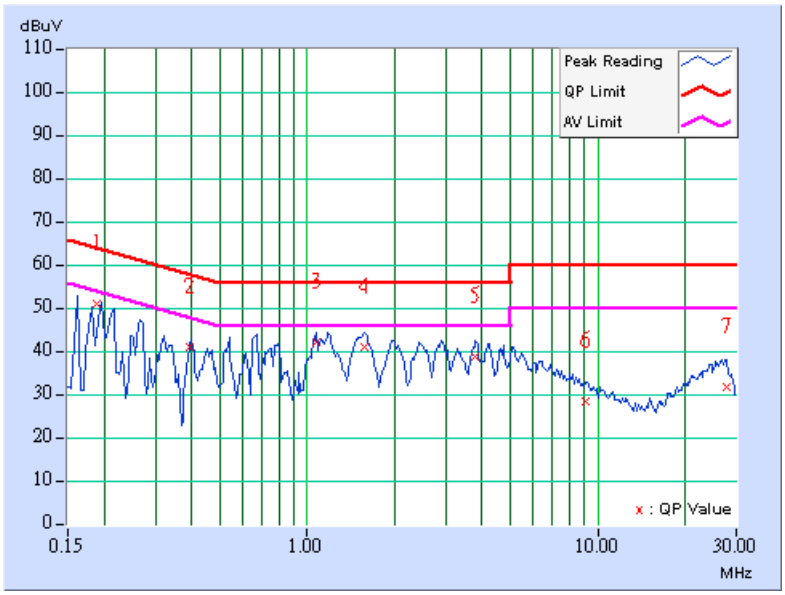


Frequency Range	150kHz ~ 30MHz	**Detector Function & Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	230Vac, 50Hz	**Environmental Conditions**	20℃, 70%RH, 1003mbar
Tested by	Nick Liu		
Test Mode	Mode 4		

Phase Of Power : Line (L)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.189	0.21	50.21	-	50.42	-	64.07	54.07	-13.65	-
2	0.392	0.22	40.37	-	40.59	-	58.02	48.02	-17.43	-
3	1.070	0.24	41.20	-	41.44	-	56.00	46.00	-14.56	-
4	1.574	0.25	40.38	-	40.63	-	56.00	46.00	-15.37	-
5	3.805	0.27	37.91	-	38.18	-	56.00	46.00	-17.82	-
6	9.109	0.45	27.81	-	28.26	-	60.00	50.00	-31.74	-
7	27.738	0.85	30.82	-	31.67	-	60.00	50.00	-28.33	-

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

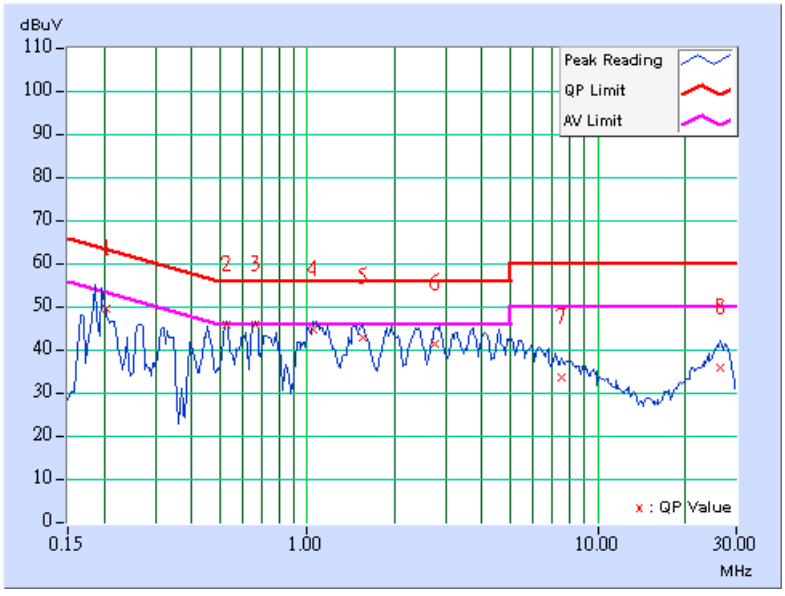


Frequency Range	150kHz ~ 30MHz	**Detector Function & Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	230Vac, 50Hz	**Environmental Conditions**	20℃, 70%RH, 1003mbar
Tested by	Nick Liu		
Test Mode	Mode 4		

Phase Of Power : Neutral (N)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.204	0.22	48.68	-	48.90	-	63.45	53.45	-14.55	-
2	0.529	0.22	45.15	-	45.37	-	56.00	46.00	-10.63	-
3	0.662	0.23	45.17	-	45.40	-	56.00	46.00	-10.60	-
4	1.051	0.24	43.88	-	44.12	-	56.00	46.00	-11.88	-
5	1.555	0.25	42.13	-	42.38	-	56.00	46.00	-13.62	-
6	2.766	0.26	40.63	-	40.89	-	56.00	46.00	-15.11	-
7	7.492	0.39	32.87	-	33.26	-	60.00	50.00	-26.74	-
8	26.438	0.93	34.92	-	35.85	-	60.00	50.00	-24.15	-

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

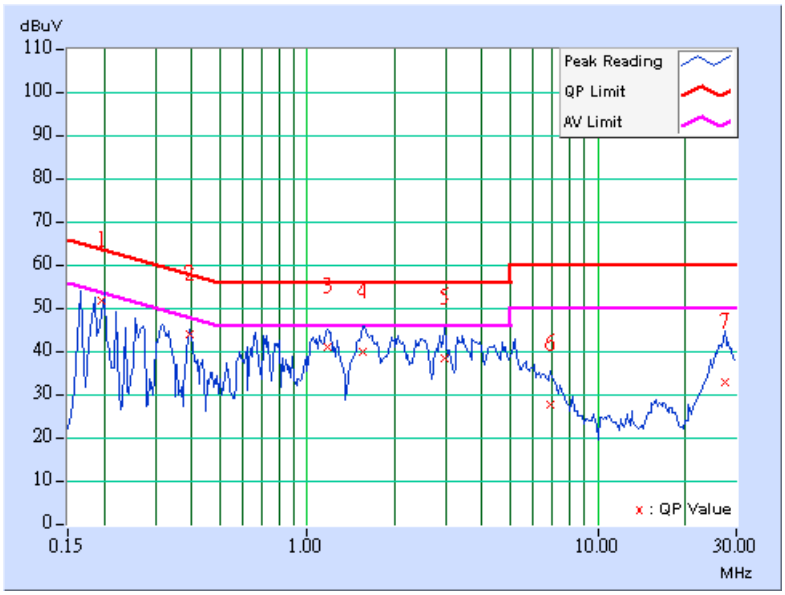


Frequency Range	150kHz ~ 30MHz	**Detector Function & Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	230Vac, 50Hz	**Environmental Conditions**	20℃, 70%RH, 1003mbar
Tested by	Nick Liu		
Test Mode	Mode 5		

Phase Of Power : Line (L)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.196	0.22	51.05	-	51.27	-	63.77	53.77	-12.51	-
2	0.396	0.22	43.06	-	43.28	-	57.93	47.93	-14.65	-
3	1.176	0.24	40.41	-	40.65	-	56.00	46.00	-15.35	-
4	1.555	0.25	39.29	-	39.54	-	56.00	46.00	-16.46	-
5	2.977	0.26	37.57	-	37.83	-	56.00	46.00	-18.17	-
6	6.906	0.37	27.06	-	27.43	-	60.00	50.00	-32.57	-
7	27.289	0.85	32.30	-	33.15	-	60.00	50.00	-26.85	-

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

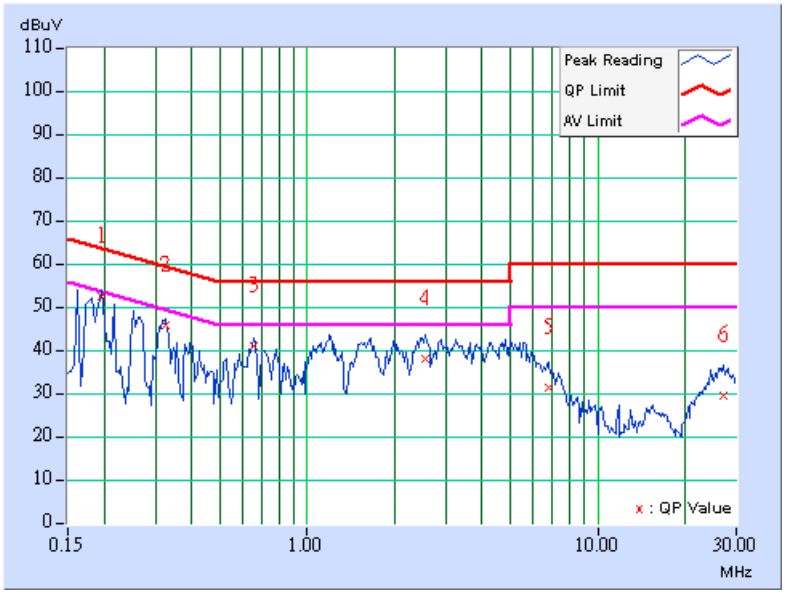


Frequency Range	150kHz ~ 30MHz	**Detector Function & Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	230Vac, 50Hz	**Environmental Conditions**	20℃, 70%RH, 1003mbar
Tested by	Nick Liu		
Test Mode	Mode 5		

Phase Of Power : Neutral (N)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.196	0.21	51.63	-	51.84	-	63.80	53.80	-11.95	-
2	0.326	0.22	45.15	-	45.37	-	59.56	49.56	-14.19	-
3	0.654	0.23	40.05	-	40.28	-	56.00	46.00	-15.72	-
4	2.566	0.26	37.30	-	37.56	-	56.00	46.00	-18.44	-
5	6.766	0.37	30.38	-	30.75	-	60.00	50.00	-29.25	-
6	27.047	0.94	28.85	-	29.79	-	60.00	50.00	-30.21	-

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

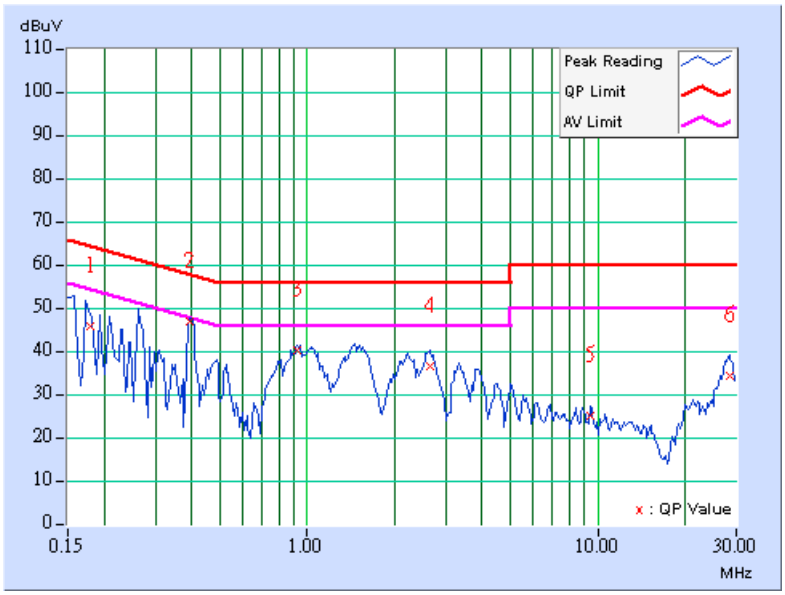


Frequency Range	150kHz ~ 30MHz	**Detector Function & Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	230Vac, 50Hz	**Environmental Conditions**	20℃, 70%RH, 1003mbar
Tested by	Nick Liu		
Test Mode	Mode 6		

Phase Of Power : Neutral (N)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.179	0.19	45.23	-	45.42	-	64.55	54.55	-19.13	-
2	0.396	0.22	46.20	-	46.42	-	57.93	47.93	-11.51	-
3	0.927	0.24	39.36	-	39.60	-	56.00	46.00	-16.40	-
4	2.641	0.26	35.95	-	36.21	-	56.00	46.00	-19.79	-
5	9.473	0.46	24.31	-	24.77	-	60.00	50.00	-35.23	-
6	28.363	0.86	33.54	-	34.40	-	60.00	50.00	-25.60	-

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

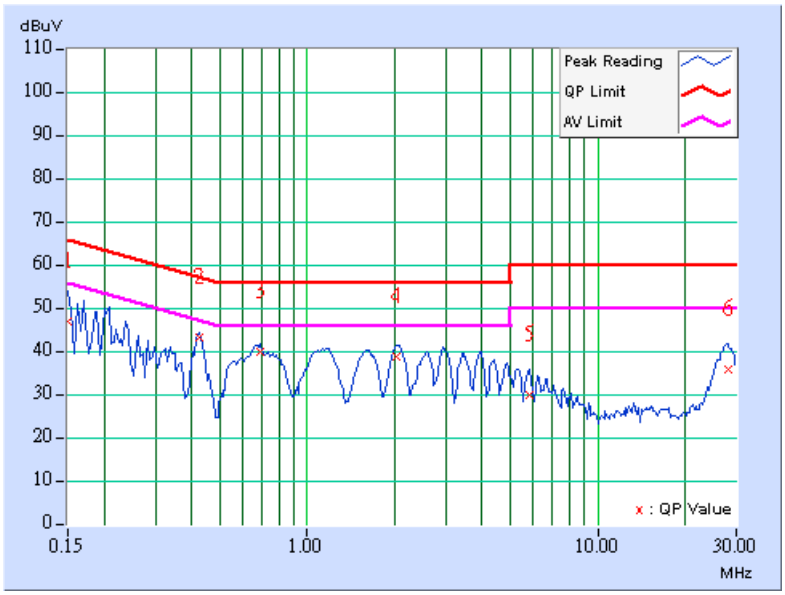


Frequency Range	150kHz ~ 30MHz	**Detector Function & Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	230Vac, 50Hz	**Environmental Conditions**	20℃, 70%RH, 1003mbar
Tested by	Nick Liu		
Test Mode	Mode 6		

Phase Of Power : Neutral (N)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.150	0.16	46.14	-	46.30	-	65.99	55.99	-19.69	-
2	0.425	0.22	42.36	-	42.58	-	57.34	47.34	-14.76	-
3	0.685	0.23	39.19	-	39.42	-	56.00	46.00	-16.58	-
4	2.035	0.26	38.08	-	38.34	-	56.00	46.00	-17.66	-
5	5.840	0.33	29.06	-	29.39	-	60.00	50.00	-30.61	-
6	28.043	0.96	34.87	-	35.83	-	60.00	50.00	-24.17	-

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

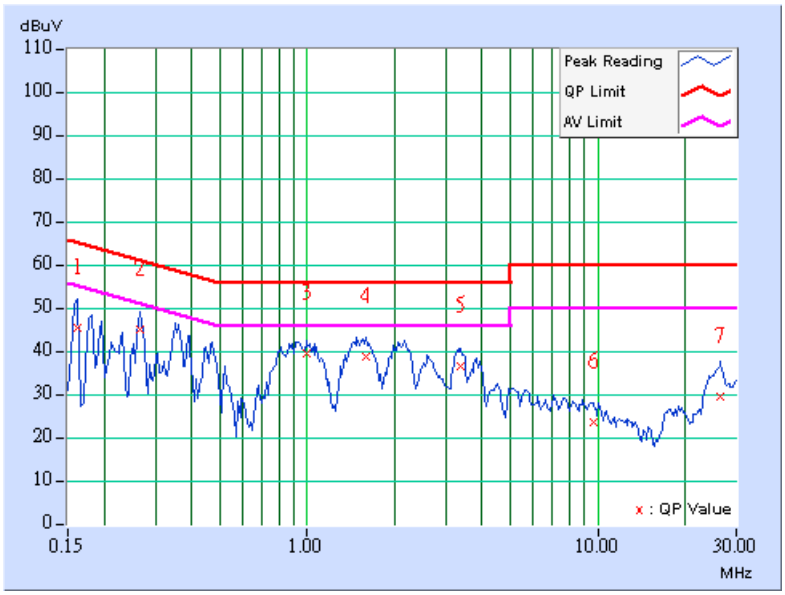


Frequency Range	150kHz ~ 30MHz	**Detector Function & Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	230Vac, 50Hz	**Environmental Conditions**	20℃, 70%RH, 1003mbar
Tested by	Nick Liu		
Test Mode	Mode 7		

Phase Of Power : Neutral (N)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.162	0.17	44.71	-	44.88	-	65.38	55.38	-20.49	-
2	0.267	0.22	44.29	-	44.51	-	61.20	51.20	-16.69	-
3	0.994	0.24	38.93	-	39.17	-	56.00	46.00	-16.83	-
4	1.594	0.25	37.95	-	38.20	-	56.00	46.00	-17.80	-
5	3.387	0.27	35.99	-	36.26	-	56.00	46.00	-19.74	-
6	9.695	0.47	23.05	-	23.52	-	60.00	50.00	-36.48	-
7	26.426	0.83	28.65	-	29.48	-	60.00	50.00	-30.52	-

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

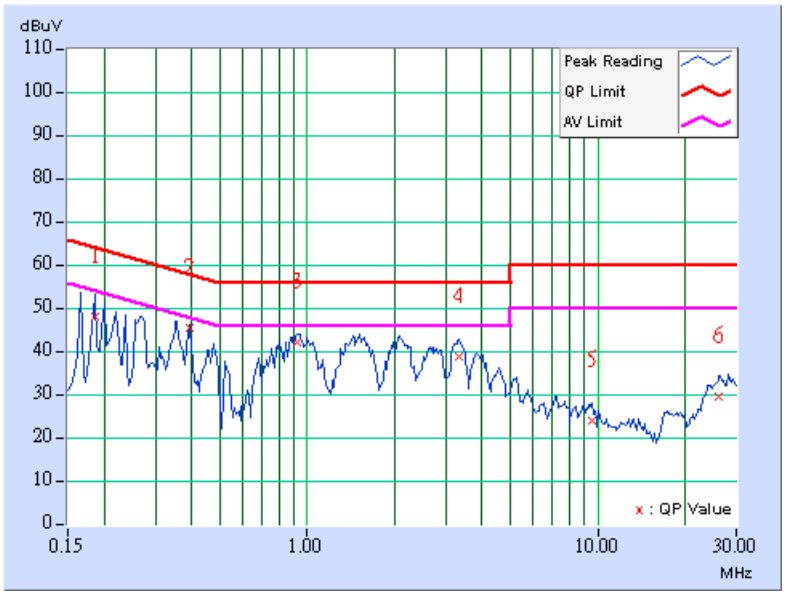


Frequency Range	150kHz ~ 30MHz	**Detector Function & Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	230Vac, 50Hz	**Environmental Conditions**	20℃, 70%RH, 1003mbar
Tested by	Nick Liu		
Test Mode	Mode 7		

Phase Of Power : Neutral (N)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.185	0.20	47.20	-	47.40	-	64.25	54.25	-16.85	-
2	0.392	0.22	44.67	-	44.89	-	58.02	48.02	-13.13	-
3	0.923	0.24	41.32	-	41.56	-	56.00	46.00	-14.44	-
4	3.332	0.27	37.84	-	38.11	-	56.00	46.00	-17.89	-
5	9.551	0.46	23.31	-	23.77	-	60.00	50.00	-36.23	-
6	26.063	0.93	28.57	-	29.50	-	60.00	50.00	-30.50	-

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



6 Radiated Emission at Frequencies up to 1GHz

6.1 Limits

For Class A Equipment

EN 55032 Table clause	Frequency range (MHz)	Distance (m)	Limits (dBuV/m)
A2.1	30 - 230	10	40
	230 - 1000		47
A2.2	30 - 230	3	50
	230 - 1000		57

For Class B Equipment

EN 55032 Table clause	Frequency range (MHz)	Distance (m)	Limits (dBuV/m)
A4.1	30 - 230	10	30
	230 - 1000		37
A4.2	30 - 230	3	40
	230 - 1000		47

Standard	Frequency range (MHz)	Quasi-peak dB(uV/m)
EN 61000-6-3	30 – 230	30
	230 - 1000	37

NOTE: (1) The lower limit shall apply at the transition frequencies.

(2) If the internal emission source(s) is operating at a frequency below 9kHz then measurements shall only be performed up to 230MHz.

6.2 Test Instruments

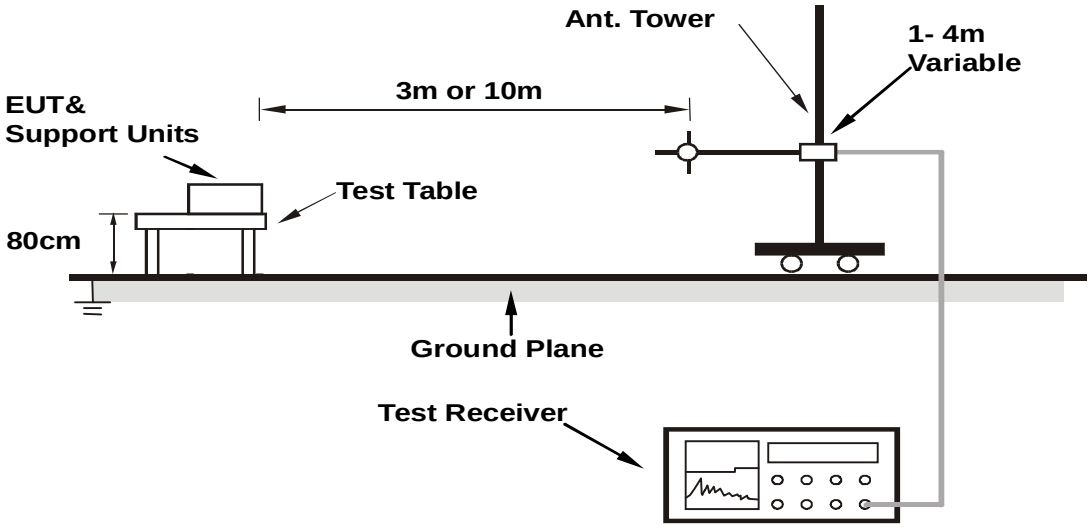
Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
ROHDE & SCHWARZ TEST RECEIVER	ESCI	100412	Aug. 24, 2015	Aug. 23, 2016
Schwarzbeck BILOG Antenna	VULB9168	9168-479	Jan. 05, 2016	Jan. 04, 2017
CT Turn Table	TT100	CT-0055	NA	NA
CT Tower	AT100	CT-0055	NA	NA
Software	Radiated_V7.6.15.9.4	NA	NA	NA
ADT RF Switches BOX	EM-H-01-1	1002	Mar. 22 2016	Mar. 21, 2017
WOKEN RF cable With 5dB PAD	8D	CABLE-ST6-01	Mar. 22 2016	Mar. 21, 2017

Notes:
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Open Site No. 6.
3. The VCCI Site Registration No. R-728.
4. The FCC Site Registration No. 90427.
5. Tested Date: Aug. 11, 2016

6.3 Test Arrangement

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at an accredited test facility. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is up to 1 GHz.

Note:
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for quasi-peak detection (QP) at frequency up to 1GHz.
2. The measurement distance is the shortest horizontal distance between an imaginary circular periphery just encompassing this arrangement and the calibration point of the antenna.



Note: Cable on the RGP must to be insulated.

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

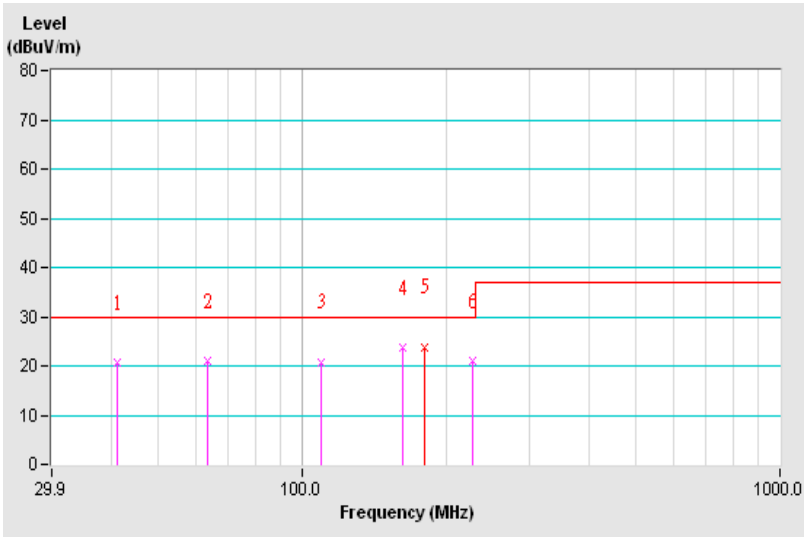
6.4 Test Results

Frequency Range	30MHz ~ 1GHz	Detector Function & Bandwidth	Quasi-Peak (QP), 120kHz
Tested by	Paul Chen	Environmental Conditions	28℃, 63%RH, 992mbar
Test Mode	Mode 1		

Antenna Polarity & Test Distance : Horizontal at 10 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	41.11	20.58 QP	30.00	-9.42	4.00 H	39	2.00	18.58
2	63.33	20.87 QP	30.00	-9.13	4.00 H	74	2.54	18.33
3	109.79	20.81 QP	30.00	-9.19	4.00 H	108	4.45	16.36
4	162.81	23.60 QP	30.00	-6.40	4.00 H	160	4.18	19.42
5	180.04	23.80 QP	30.00	-6.20	4.00 H	253	5.86	17.94
6	227.46	20.87 QP	30.00	-9.13	4.00 H	196	4.00	16.87

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
   – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

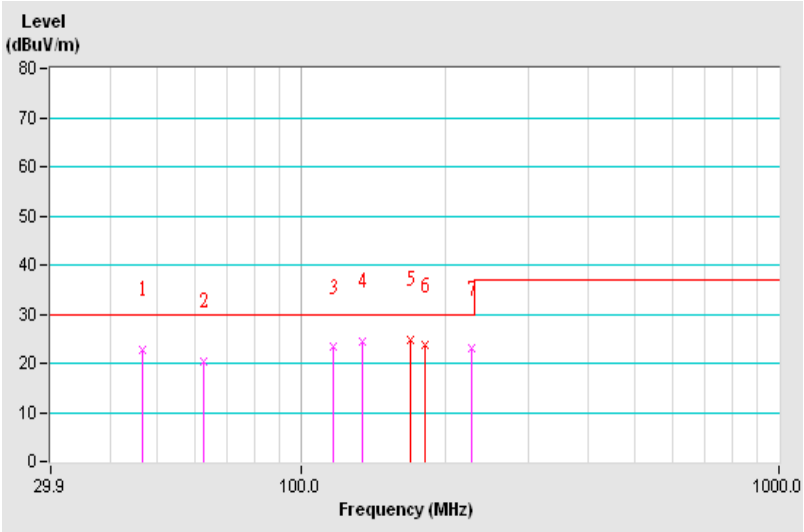


Frequency Range	30MHz ~ 1GHz	Detector Function & Bandwidth	Quasi-Peak (QP), 120kHz
Tested by	Paul Chen	Environmental Conditions	28℃, 63%RH, 992mbar
Test Mode	Mode 1		

Antenna Polarity & Test Distance : Vertical at 10 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	46.53	22.68 QP	30.00	-7.32	1.27 V	70	3.37	19.31
2	62.63	20.39 QP	30.00	-9.61	1.39 V	113	1.98	18.41
3	116.69	23.28 QP	30.00	-6.72	1.00 V	343	6.45	16.83
4	134.36	24.45 QP	30.00	-5.55	1.00 V	122	5.82	18.63
5	**169.26**	**24.86 QP**	**30.00**	**-5.14**	**1.00 V**	**0**	**5.90**	**18.96**
6	181.05	23.64 QP	30.00	-6.36	1.00 V	0	5.81	17.83
7	227.98	22.92 QP	30.00	-7.08	1.00 V	287	6.02	16.90

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



7 Harmonics Current Measurement

7.1 Limits

Limits for Class A equipment		Limits for Class D equipment		
Harmonic Order n	Max. permissible harmonics current A	Harmonic Order n	Max. permissible harmonics current per watt mA/W	Max. permissible harmonics current A
Odd harmonics		Odd Harmonics only		
3	2.30	3	3.4	2.30
5	1.14	5	1.9	1.14
7	0.77	7	1.0	0.77
9	0.40	9	0.5	0.40
11	0.33	11	0.35	0.33
13	0.21	13	0.30	0.21
15≦n≦39	0.15 x 15/n	15≦n≦39	3.85/n	0.15 x 15/n
Even harmonics				
2	1.08			
4	0.43			
6	0.30			
8≦n≦40	0.23 x 8/n			

Notes: 1. Class A and Class D are classified according to section 5 of EN 61000-3-2.
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.

7.2 Classification of Equipment

Class A	Class B	Class C	Class D
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.	Portable tools; Arc welding equipment which is not professional equipment.	Lighting equipment.	Equipment having a specified power less than or equal to 600 W of the following types: Personal computers and personal computer monitors; Television receivers; Refrigerators and freezers having one or more variable-speed drives to control compressor motor(s).

7.3 Test Instruments

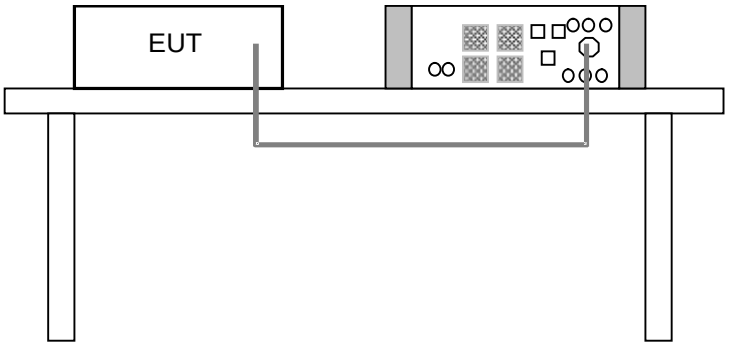
DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
EMC PARTNER EMC Emission Tester	HAR1000-1P	084	Apr. 25, 2008
Software	HARCS	NA	NA

NOTE: 1. The test was performed in EMS Room No. 1.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Test date: Dec. 25 ~ 26, 2007

7.4 Test Arrangement

a. 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.

b. 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.



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

7.5 Test Results

TEST MODE	Mode 1		
FUNDAMENTAL VOLTAGE/AMPERE	230.3Vrms/ 0.084Arms	**POWER FREQUENCY**	50.000Hz
POWER CONSUMPTION	8.749W	**POWER FACTOR**	0.451
ENVIRONMENTAL CONDITIONS	21deg. C, 67%RH, 1003hPa	**TESTED BY:** Bin Cheng	

NOTE: Limits are not specified for equipment with a rated power of 75W or less (other than lighting equipment).

TEST MODE	Mode 5		
FUNDAMENTAL VOLTAGE/AMPERE	230.3Vrms/ 0.111Arms	**POWER FREQUENCY**	50.013Hz
POWER CONSUMPTION	11.78W	**POWER FACTOR**	0.459
ENVIRONMENTAL CONDITIONS	21deg. C, 67%RH, 1003hPa	**TESTED BY:** Bin Cheng	

NOTE: Limits are not specified for equipment with a rated power of 75W or less (other than lighting equipment).

TEST MODE	Mode 7		
FUNDAMENTAL VOLTAGE/AMPERE	230.3Vrms/ 0.107Arms	**POWER FREQUENCY**	49.987Hz
POWER CONSUMPTION	11.29W	**POWER FACTOR**	0.458
ENVIRONMENTAL CONDITIONS	21deg. C, 67%RH, 1003hPa	**TESTED BY:** Bin Cheng	

NOTE: Limits are not specified for equipment with a rated power of 75W or less (other than lighting equipment).

8 Voltage Fluctuations and Flicker Measurement

8.1 Limits

Test item	Limit	Note
P_{st}	1.0	P_{st}: short-term flicker severity.
P_{lt}	0.65	P_{lt}: long-term flicker severity.
T_{max} (ms)	500	T_{max}: maximum time duration during the observation period that the voltage deviation d(t) exceeds the limit for d_c .
d_{max} (%)	4	d_{max}: maximum absolute voltage change during an observation period.
d_c (%)	3.3	d_c: maximum steady state voltage change during an observation period.

8.2 Test Instruments

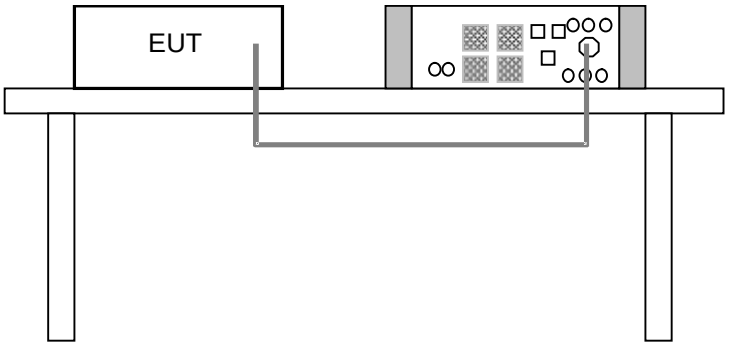
DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
EMC PARTNER EMC Emission Tester	HAR1000-1P	084	Apr. 25, 2008
Software	HARCS	NA	NA

NOTE: 1. The test was performed in EMS Room No. 1.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Test date: Dec. 25 ~ 26, 2007

8.3 Test Arrangement

a. 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.

b. 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.



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

8.4 Test Results

TEST MODE	Mode 1		
FUNDAMENTAL VOLTAGE/AMPERE	230.3Vrms/ 0.084Arms	POWER FREQUENCY	50.000Hz
OBSERVATOPM PERIOD (Tp)	10 min	POWER FACTOR	0.450
ENVIRONMENTAL CONDITIONS	21deg. C, 67%RH, 1003mbar	**TESTED BY:** Bin Cheng	

TEST PARAMETER	MEASUREMENT VALUE	LIMIT	REMARKS
P_{st}	0.072	1.0	Pass
P_{lt}	0.072	0.65	Pass
d(t) (%)	0	3.3	Pass
d_{max} (%)	0	4	Pass
dc (%)	0	3.3	Pass

NOTE: (1) P_{st} means short-term flicker indicator.
(2) P_{lt} means long-term flicker indicator.
(3) d(t) means maximum time that not exceeds 500ms.
(4) d_{max} means maximum relative voltage change.
(5) dc means relative steady-state voltage change.

TEST MODE	Mode 5		
FUNDAMENTAL VOLTAGE/AMPERE	230.3Vrms/ 0.110Arms	POWER FREQUENCY	50.000Hz
OBSERVATOPM PERIOD (Tp)	10 min	POWER FACTOR	0.464
ENVIRONMENTAL CONDITIONS	21deg. C, 67%RH, 1003mbar	**TESTED BY:** Bin Cheng	

TEST PARAMETER	MEASUREMENT VALUE	LIMIT	REMARKS
P_{st}	0.072	1.0	Pass
P_{lt}	0.072	0.65	Pass
d(t) (%)	0	3.3	Pass
d_{max} (%)	0	4	Pass
dc (%)	0.020	3.3	Pass

NOTE: (1) P_{st} means short-term flicker indicator.
(2) P_{lt} means long-term flicker indicator.
(3) d(t) means maximum time that not exceeds 500ms.
(4) d_{max} means maximum relative voltage change.
(5) dc means relative steady-state voltage change.

TEST MODE	Mode 7		
FUNDAMENTAL VOLTAGE/AMPERE	230.3Vrms/ 0.106Arms	**POWER FREQUENCY**	50.000Hz
OBSERVATOPM PERIOD (Tp)	10 min	**POWER FACTOR**	0.464
ENVIRONMENTAL CONDITIONS	21deg. C, 67%RH, 1003mbar	**TESTED BY:** Bin Cheng	

TEST PARAMETER	MEASUREMENT VALUE	LIMIT	REMARKS
P_{st}	0.072	1.0	Pass
P_{lt}	0.072	0.65	Pass
d(t) (%)	0	3.3	Pass
d_{max} (%)	0	4	Pass
dc (%)	0	3.3	Pass

NOTE: (1) P_{st} means short-term flicker indicator.
(2) P_{lt} means long-term flicker indicator.
(3) d(t) means maximum time that not exceeds 500ms.
(4) d_{max} means maximum relative voltage change.
(5) dc means relative steady-state voltage change.

9 Immunity Test

9.1 General Immunity Requirements

EN 61000-6-1: 2007, Immunity requirements		
Reference standard	Test specification	Performance Criterion
IEC 61000-4-2 ESD	Enclosure port: ±8kV Air discharge, ±4kV Contact discharge,	B
IEC 61000-4-3 RS	Enclosure port: 80-1000 MHz, 3V/m, 80% AM (1kHz), 1.4-2.0 GHz, 3V/m, 80% AM (1kHz), 2.0-2.7 GHz, 1V/m, 80% AM (1kHz)	A
IEC 61000-4-4 EFT	AC Power line: ±1kV, DC Power line: ±0.5kV Signal line: ±0.5kV	B
IEC 61000-4-5 Surge	1.2/50 us Open Circuit Voltage, 8 /20 us Short Circuit Current AC Power Line: line to line 1 kV, line to earth 2kV DC Power Line: line to earth 0.5kV	B
IEC 61000-4-6 CS	0.15-80 MHz, 3 Vr.m.s, 80% AM, 1kHz	A
IEC 61000-4-8 PFMF	50 Hz, 3A/m, 60 Hz, 3 A/m,	A
IEC 61000-4-11 Dips & Interruptions	Voltage Dips: 0% residual– 0.5, 1 period, 70% residual – 25, 30 period	B C
	Voltage Interruptions: 0% residual – 250, 300 period	C

EN 55024:2010, Immunity requirements				
Clause	Reference standard	Table	Test specification	Performance Criterion
4.2.1	IEC 61000-4-2 ESD	1.3	Enclosure port: ±8kV Air discharge, ±4kV Contact discharge	B
4.2.3.2	IEC 61000-4-3 RS	1.2	Enclosure port: 80-1000 MHz, 3V/m, 80% AM (1kHz)	A
4.2.2	IEC 61000-4-4 EFT	2.3	Signal ports and telecommunication ports: xDSL equipment: ±0.5kV, 5/50 (T_r/T_h) ns, 100kHz others: ±0.5kV, 5/50 (T_r/T_h) ns, 5kHz	B
		3.3	Input DC power port: ±0.5kV, 5/50 (T_r/T_h) ns, 5kHz	
		4.5	Input AC Power ports: ±1kV, 5/50 (T_r/T_h) ns, 5kHz	
4.2.5	IEC 61000-4-5 Surge	2.2	Signal and telecommunication ports (direct to outdoor cables): 10/700 (5/320) (T_r/T_h) µs w/o primary protectors: ±1kV, or with primary protectors fitted: ±4kV	C
		3.2	Input DC power port (direct to outdoor cables): 1.2/50 (8/20) (T_r/T_h) µs Line to earth: ±0.5kV	B
		4.4	Input AC Power ports: 1.2/50 (8/20) (T_r/T_h) µs, Line to line: ±1kV Line to earth: ±2kV	
4.2.3.3	IEC 61000-4-6 CS	2.1	Signal and telecommunication ports(cable length > 3m): 0.15-80 MHz, 3V, 80% AM (1kHz)	A
		3.1	Input DC power port: 0.15-80 MHz, 3V, 80% AM (1kHz)	
		4.1	Input AC Power ports: 0.15-80 MHz, 3V, 80% AM (1kHz)	
4.2.4	IEC 61000-4-8 PFMF	1.1	Enclosure port: 50 or 60 Hz, 1A/m	A
4.2.6	IEC 61000-4-11 Dips & Interruptions	4.2	Input AC Power ports: Voltage Dips: >95% reduction – 0.5 period 30% reduction – 25 periods	B C
		4.3	Input AC Power ports: Voltage Interruptions: >95% reduction – 250 periods	C

9.2 Performance Criteria

General Performance Criteria

Performance criterion A

The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion B

After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test. If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion C

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

Particular performance criteria

The particular performance criteria which are specified in the normative annexes of EN 55024 take precedence over the corresponding parts of the general performance criteria. Where particular performance criteria for specific functions are not given, then the general performance criteria shall apply.

10 Electrostatic Discharge Immunity Test (ESD)

10.1 Test Specification

Basic Standard:	IEC 61000-4-2
Discharge Impedance:	330 ohm / 150 pF
Discharge Voltage:	Air Discharge: ±2, ±4, ±8kV (Direct) Contact Discharge: ±2, ±4kV (Indirect)
Number of Discharge: **<EN 61000-6-1>**	Minimum 20 times at each test point
Number of Discharge: **<EN 55024>**	Air – Direct: 10 discharges per location (each polarity) Contact – Direct & Indirect: 25 discharges per location (each polarity) and min. 200 times in total
Discharge Mode:	Single Discharge
Discharge Period:	1-second minimum

10.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
KeyTek, ESD Simulator	MZ-15/EC	9902287	Mar. 06, 2008

NOTE: 1. The test was performed in ESD Room No. 2.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Test date: Dec. 25 ~ 26, 2007

10.3 Test Arrangement

The discharges shall be applied in two ways: <For EN 55024>

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. 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. Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation.

b. The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.

c. The time interval between two successive single discharges was at least 1 second.

d. The ESD generator was held perpendicularly to the surface to which the discharge was applied and the return cable was at least 0.2 meters from the EUT.

e. Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.

f. 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.

g. At least ten single discharges (in the most sensitive polarity) were applied to the **H**orizontal **C**oupling **P**lane at points on each side of the EUT. The ESD generator was positioned at a distance of 0.1 meters from the EUT with the discharge electrode touching the **HCP.**

h. At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the **V**ertical **C**oupling **P**lane 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.

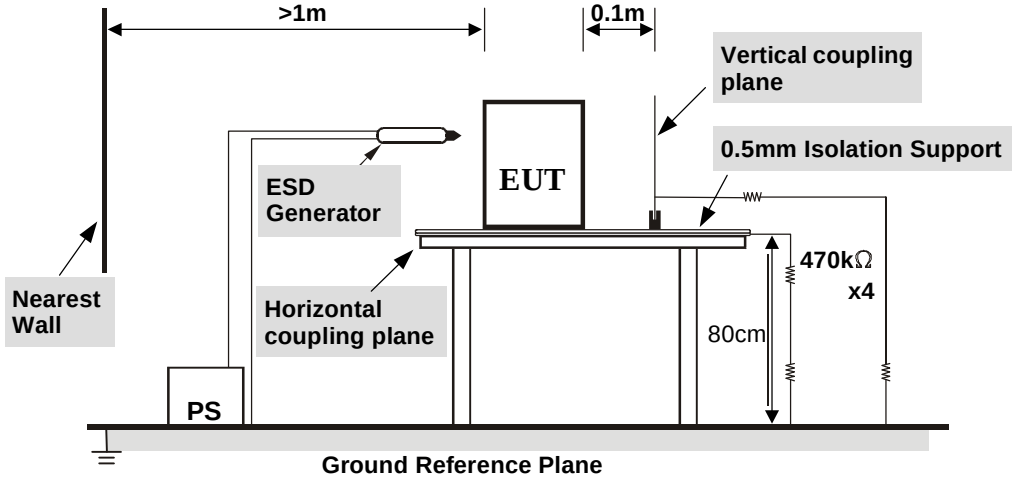


TABLE-TOP EQUIPMENT

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 940kΩ total impedance. The equipment under test, was installed in a representative system as described in section 7 of
IEC 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.

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

10.4 Test Results

Test mode	Mode 1 & 5 & 7	Input Power	230 Vac, 50 Hz
Environmental Conditions	20 °C, 40% RH 1006 mbar	Tested by	Bin Cheng

Test Results of Direct Application					
Discharge Level (kV)	Polarity (+/-)	Test Point	Contact Discharge	Air Discharge	Performance Criterion
2, 4, 8	+/-	1, 2	NA	Note	A

Description of test points of direct application: Please refer to following page for representative mark only.

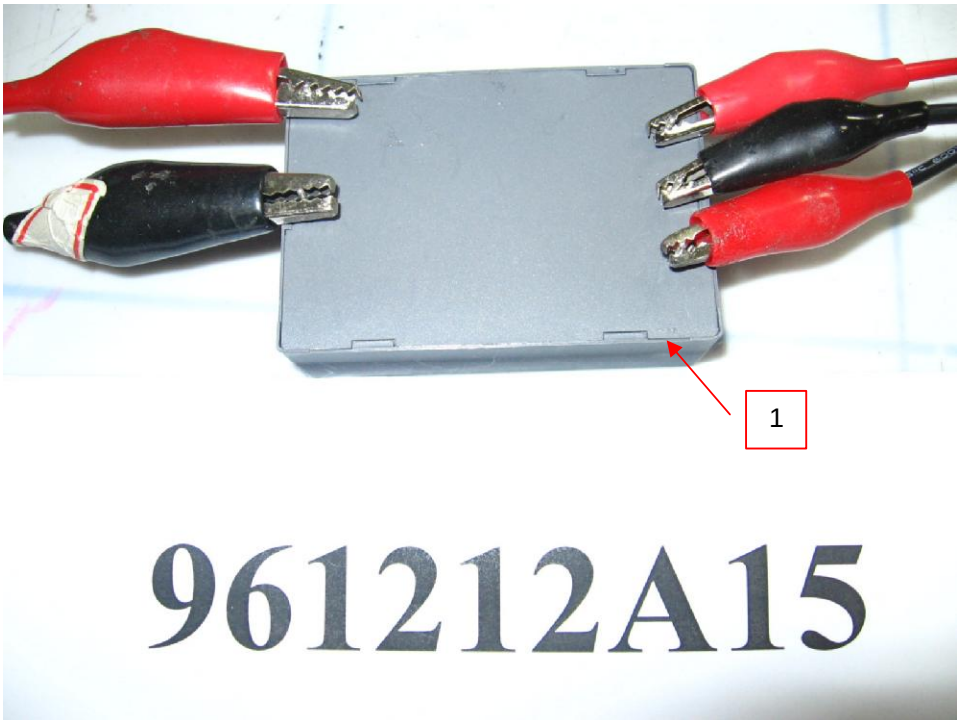
Test Results of Indirect Application					
Discharge Level (kV)	Polarity (+/-)	Test Point	Horizontal Coupling Plane	Vertical Coupling Plane	Performance Criterion
2, 4	+/-	Four Sides	Note	Note	A

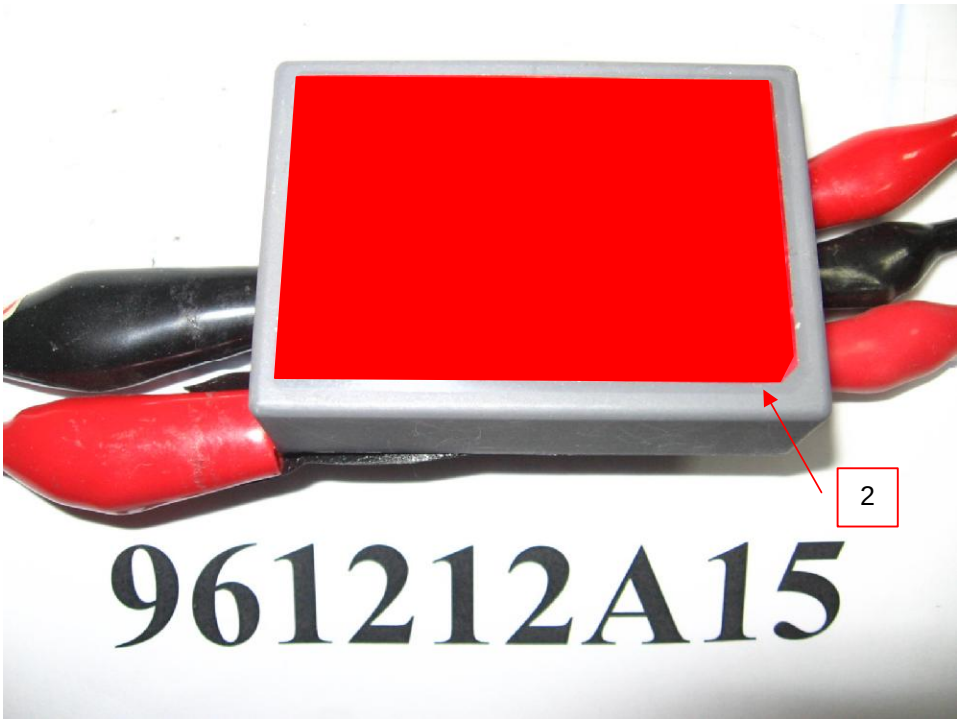
Description of test points of indirect application:

1. Front side 2. Rear side 3. Right side 4. Left side

Note: The EUT function was correct during the test.

Description of Test Points





11 Radiated, Radio-frequency, Electromagnetic Field Immunity Test (RS)

11.1 Test Specification

<EN 61000-6-1>

Basic Standard:	IEC 61000-4-3
Frequency Range:	80 MHz - 1000 MHz, 1400-2000MHz, 2000-2700MHz
Field Strength:	3 V/m, 1 V/m
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of preceding frequency value
Polarity of Antenna:	Horizontal and Vertical
Antenna Height:	1.5m
Dwell Time:	3 seconds

<EN 55024>

Basic Standard:	IEC 61000-4-3
Frequency Range:	80 MHz - 1000 MHz
Field Strength:	3 V/m
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of preceding frequency value
Polarity of Antenna:	Horizontal and Vertical
Antenna Height:	1.5m
Dwell Time:	3 seconds

11.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
R&S Signal Generator	SML03	101074	Nov. 01, 2008
AR RF Amplifier	60S1G3	304334	NA
Electric Field Sensor	CTR1001A	06D00232SN0-02	Aug. 08, 2008
BOONTON RF Voltage Meter	4232A	10180	Jun. 07, 2008
BOONTON Power Sensor	51011-EMC	34152	Jun. 06, 2008
BOONTON Power Sensor	51011-EMC	34153	May 27, 2008
FRANKONIA Power Amplifier	FLH 100	0042	NA
Log-Periodic Antenna	AT 5080	312115	NA
HP-IB Extender	37204	3212U26684	NA
EMCO BiconiLog Antenna	3141	1001	NA
COMTEST Compact Full Anechoic Chamber (7x3x3 m)	CFAC	ADT-S01	Oct. 20, 2008
Software	ADT_RS_V7.6	NA	NA

NOTE: 1. The test was performed in RS Room No.1.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Test date: Dec. 25 ~ 26, 2007

11.3 Test Arrangement

The test procedure was in accordance with IEC 61000-4-3. **<EN 61000-6-1>**

a. The testing was performed in a modified semi-anechoic chamber.

b. The frequency range is swept from 80 MHz to 1000 MHz, 1400 MHz to 2000 MHz, 2000MHz to 2700MHz, with the signal 80% amplitude modulated with a 1kHz sine wave.

c. The dwell time of the amplitude modulated carrier was applied in 3 s at each of the frequencies during the scan. The sensitive frequencies (e.g. clock frequencies or frequencies identified by the manufacturer or obtained as outcome of the test) shall be analyzed in addition to the stepped frequencies.

d. The field strength level was 3 V/m, 1V/m.

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

The test procedure was in accordance with IEC 61000-4-3. **<EN 55024>**

a. The testing was performed in a modified semi-anechoic chamber.

b. The frequency range is swept from 80 MHz to 1000 MHz, with the signal 80% amplitude modulated with a 1kHz sine wave.

c. The field strength level was 3 V/m.

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

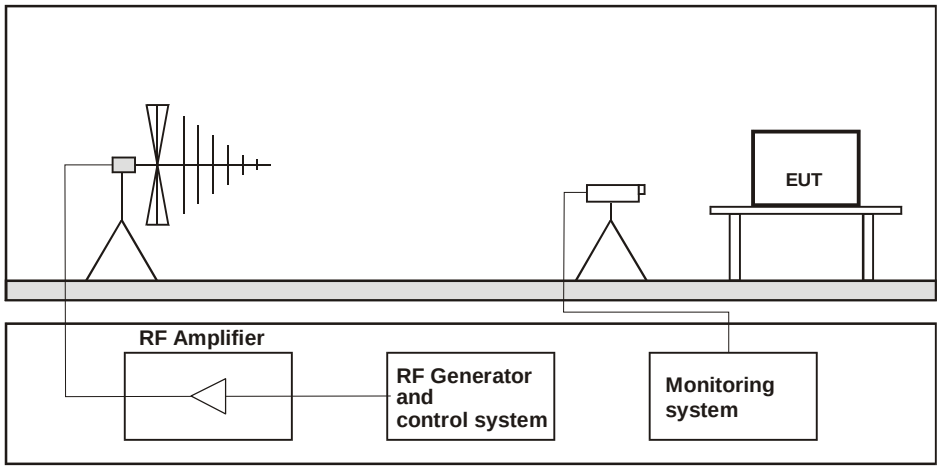


Table-top Equipment

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.

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

11.4 Test Results

Test mode	Mode 1 & 5 & 7	Input Power	230 Vac, 50 Hz
Environmental conditions	22 °C, 67% RH	Tested by	Bin Cheng

Frequency (MHz)	Polarity	Azimuth(°)	Applied Field Strength		Observation	Performance Criterion
			(V/m)	Modulation		
80 -1000	V&H	0, 90, 180, 270	3	80% AM (1kHz)	Note	A
1400 - 2000	V&H	0, 90, 180, 270	3	80% AM (1kHz)	Note	A
2000 -2700	V&H	0, 90, 180, 270	1	80% AM (1kHz)	Note	A

Note: The EUT function was correct during the test.

12 Electrical Fast Transient/Burst Immunity Test (EFT)

12.1 Test Specification

<EN 61000-6-1 & EN 55024>

Basic Standard:	IEC 61000-4-4
Test Voltage:	Signal / telecommunication port: N/A Input DC power port: N/A Input AC power port: ±1kV
Impulse Repetition Frequency:	xDSL telecommunication port: 100kHz others: 5kHz
Impulse Wave Shape:	5/50 ns
Burst Duration:	0.75 ms for 100kHz Repetition Frequency 15 ms for 5kHz Repetition Frequency
Burst Period:	300 ms
Test Duration:	1 min.

12.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Haefely, EFT Generator	PEFT 4010	154954	Mar. 14, 2008
Haefely,Capacitive Clamp	IP4A	155173	NA

NOTE: 1. The test was performed in EMS Room No. 1.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Test date: Dec. 25 ~ 26, 2007

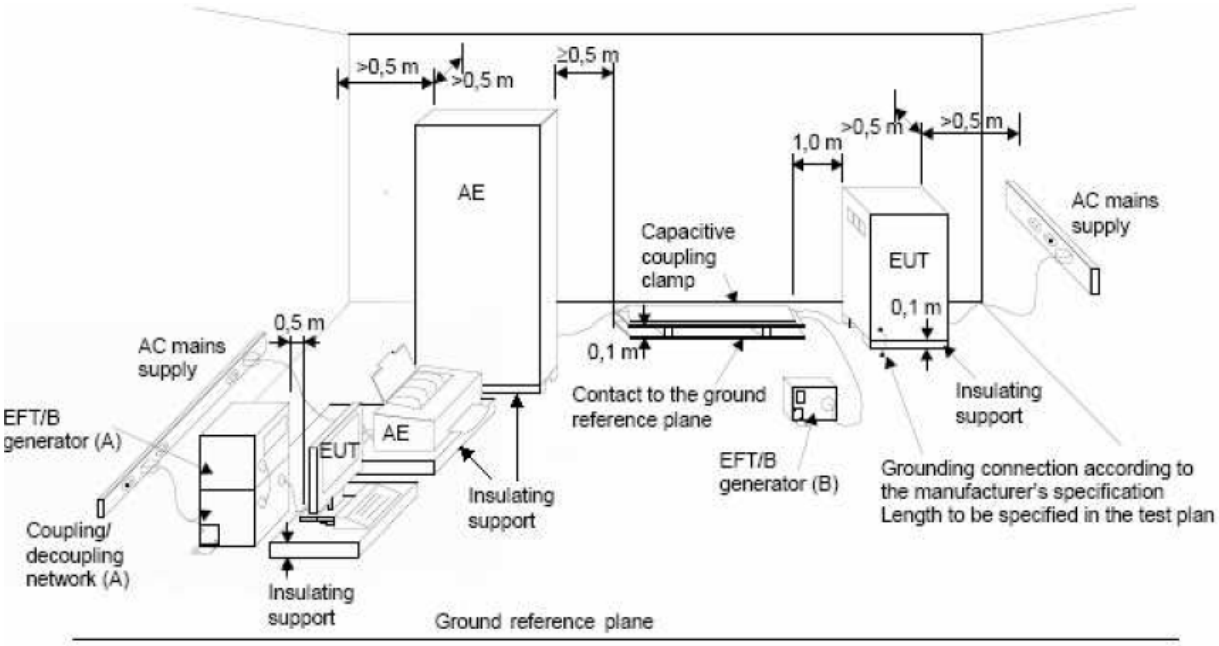
12.3 Test Arrangement

a. Both positive and negative polarity discharges were applied.

b. The distance between any coupling devices and the EUT should be 0.5 m for table-top equipment testing, and 1.0 m for floor standing equipment.

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

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



NOTE:
(A) location for supply line coupling
(B) location for signal lines coupling

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

12.4 Test Results

Test mode	Mode 1 & 5 & 7	Input Power	230 Vac, 50 Hz
Environmental conditions	22 °C, 68% RH	Tested by	Bin Cheng

Input AC power port

Voltage (kV)	Test Point	Polarity (+/-)	Observation	Performance Criterion
1	L1	+/-	Note	A
1	L2	+/-	Note	A
1	L1-L2	+/-	Note	A

Note: The EUT function was correct during the test.

13 Surge Immunity Test

13.1 Test Specification

<EN 61000-6-1 & EN 55024>

Basic Standard:	IEC 61000-4-5
Wave-Shape:	Signal / telecommunication port (direct to outdoor cables*): 10/700 µs Open Circuit Voltage 5/320 µs Short Circuit Current Input DC power port (direct to outdoor cables*): 1.2/50 µs Open Circuit Voltage 8/20 µs Short Circuit Current Input AC power port: 1.2/50 µs Open Circuit Voltage 8/20 µs Short Circuit Current
Test Voltage:	Signal and telecommunication ports**: w/o primary protectors: N/A with primary protectors fitted: N/A Input DC power port: Line to earth or ground:N/A Input AC power ports: Line to line: ±0.5kV, ±1kV Line to earth or ground: N/A
AC Phase Angle (degree):	0°, 90°, 180°, 270°
Pulse Repetition Rate:	1 time / 20 sec.
Number of Tests:	5 positive and 5 negative at selected points

* This test is only applicable only to ports, which according to the manufacturer's specification, may connect directly to outdoor cables.

** For ports where primary protection is intended, surges are applied at voltages up to 4 kV with the primary protectors fitted. Otherwise the 1 kV test level is applied without primary protection in place.

13.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
TESEQ, Surge Simulator	NSG 3060	1572	May 19, 2016	May 18, 2017
Coupling Decoupling Network	CDN-UTP8	028	Aug. 20, 2015	Aug. 19, 2016

Notes: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in EMS Room No. 2.
3. Tested Date: Aug. 15, 2016

13.3 Test Arrangement

a. Input AC/DC Power ports:

The surge is to be 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 shall be 2 meters in length (or shorter).

For double-insulated products without PE or external earth connections, the test shall be done in a similar way as for grounded products but without adding any additional external grounded connections. If there are no other possible connections to earth, line-to-ground tests may be omitted.

b. Signal and telecommunication ports,

I Unshielded unsymmetrical interconnection lines:

The surge is applied to the lines via the capacitive coupling. The coupling / decoupling networks shall not influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length.

I Unshielded symmetrical interconnections communication lines:

The surge is applied to the lines via gas arrestors coupling. Test levels below the ignition point of the coupling arrestor cannot be specified. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length.

I High speed communications lines

Prior to the test, the correct operation of the port shall be verified; the external connection shall then be removed and the surge applied directly to the port's terminals with no coupling /decoupling network. After the surge, the correct operation of the port shall again be verified.

I Shielded lines:

- Direct application,

The EUT is isolated from ground and the surge is applied to its metallic enclosure; the termination (or auxiliary equipment) at the port(s) under test is grounded. This test applies to equipment with single or multiple shielded cables.

Rules for application of the surge to shielded lines:

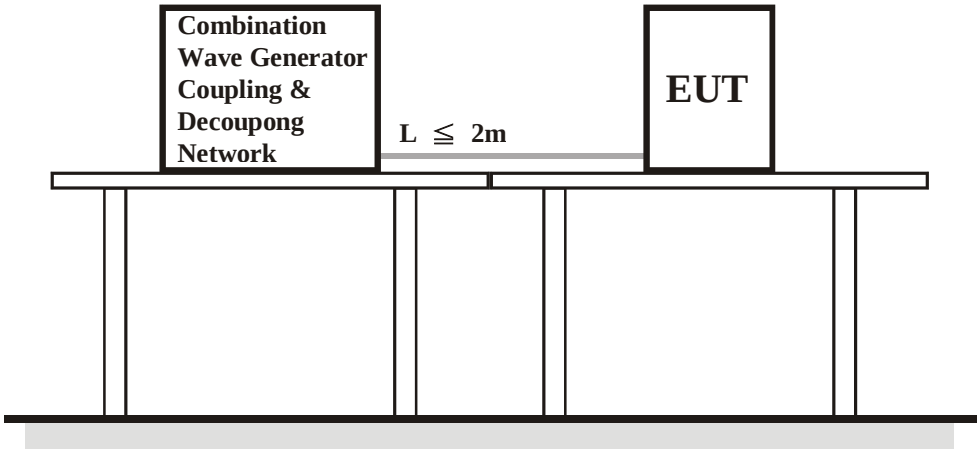
a) Shields grounded at both ends
   - The surge injection on the shield.

b) Shields grounded at one end
   - If in the installation the shield is connected only at the auxiliary equipment, test shall be done in that configuration but with the generator still connected to the EUT side. If cable lengths allow, the cables shall be on insulated supports 0,1 m above the ground plane or cable tray.

For products which do not have metallic enclosures, the surge is applied directly to the shielded cable.

- Alternative coupling method for testing single cables in a multi-shield configuration,

Surges are applied in close proximity to the interconnection cable under test by a wire. The length of the cable between the port(s) under test and the device attached to the other end of the cable shall be the lesser of: the maximum length permitted by the EUT's specification, or 20 m. Where the length exceeds 1 m, excess lengths of cables shall be bundled at the approximate centre of the cables with the bundles 30 cm to 40 cm in length.



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

13.4 Test Results

Test mode	Mode 1	Input Power	230 Vac, 50 Hz
Environmental conditions	27 °C, 70% RH	Tested by	Aga Lin

Input AC power port

Voltage (kV)	Test Point	Polarity (+/-)	Observation	Performance Criterion
0.5, 1	L1-L2	+/-	Note	A

Note: The EUT function was correct during the test.

14 Immunity to Conducted Disturbances Induced by RF Fields (CS)

14.1 Test Specification

<EN 61000-6-1 & EN 55024>

Basic Standard:	IEC 61000-4-6
Frequency Range:	0.15 MHz - 80 MHz
Voltage Level:	3 V
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of preceding frequency value
Dwell Time	3 seconds

14.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
ROHDE & SCHWARZ Signal Generator	SMY01	841104/033	Nov. 27, 2008
Digital Sweep Function Generator	8120	984801	NA
AR Power Amplifier	75A250AM1	306331	NA
FCC Coupling Decoupling Network	FCC-801-M3-25A	48	Jul. 22, 2008
FCC Coupling Decoupling Network	FCC-801-M3-25A	01022	Mar. 02, 2008
FCC Coupling Decoupling Network	FCC-801-M2-16A	01047	Jul. 13, 2008
FISCHER CUSTOM COMMUNICATIONS EM Injection Clamp	FCC-203I	50	NA
FCC Coupling Decoupling Network	FCC-801-T8	02038	May 28, 2008
FCC Coupling Decoupling Network	FCC-801-T2	02020	May 28, 2008
FCC Coupling Decoupling Network	FCC-801-T4	02031	Jun. 14, 2008
R&S Power Sensor	NRV-Z5	837878/038	Oct. 25, 2008
R&S Power Sensor	NRV-Z5	837878/039	Oct. 25, 2008
R&S Power Meter	NRVD	837794/040	Oct. 25, 2008
Software	ADT_CS_V7.3.8	NA	NA

NOTE: 1. The test was performed in CS Room No. 1.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Test date: Dec. 25 ~ 26, 2007

14.3 Test Arrangement

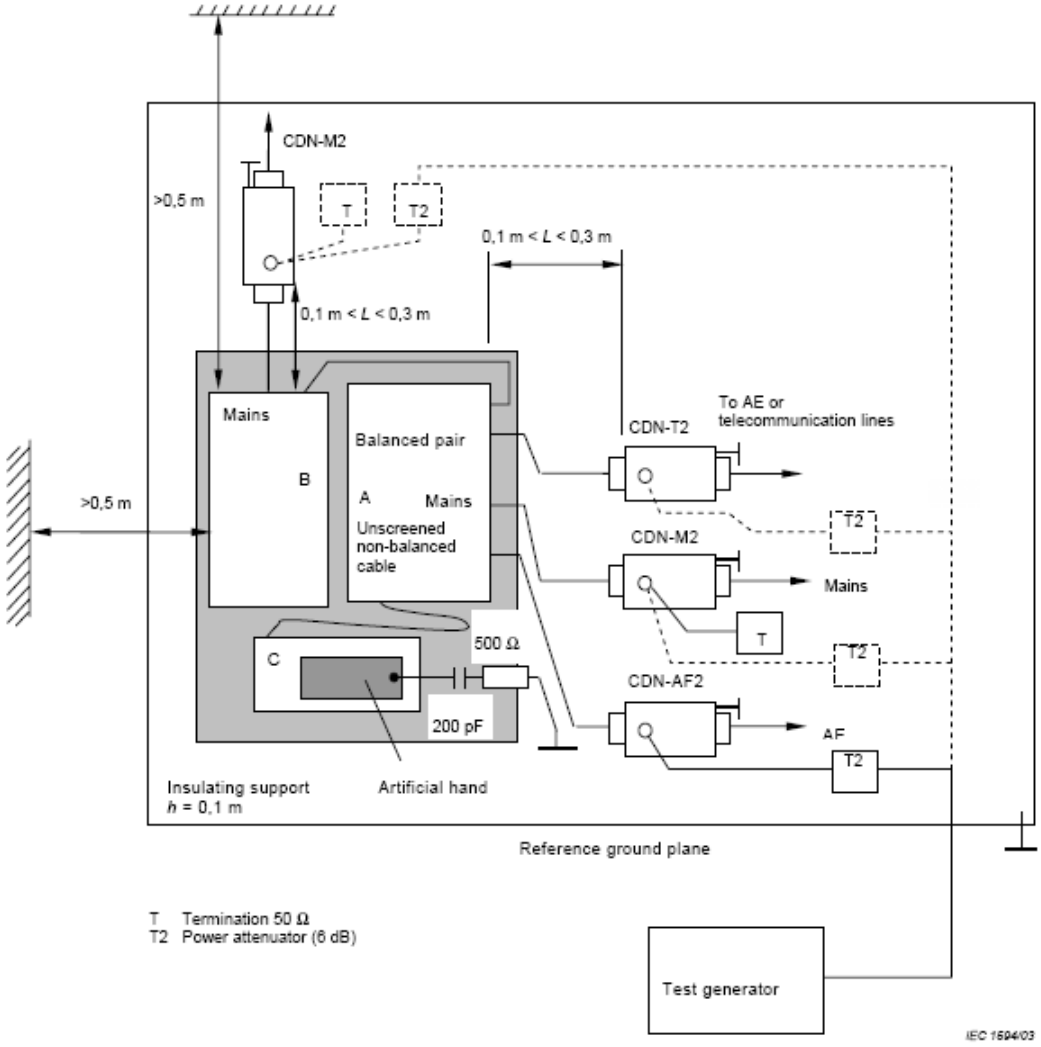
a. The EUT shall be tested within its intended operating and climatic conditions.

b. An artificial hand was placed on the hand-held accessory and connected to the ground reference plane.

c. One of the CDNs not used for injection was terminated with 50 ohm, providing only one return path. All other CDNs were coupled as decoupling networks.

d. The frequency range is swept from 150 kHz to 80 MHz, using the signal level established during the setting process and with a disturbance signal of 80 % amplitude. The signal is modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or the switch coupling devices as necessary. Where the frequency is swept incrementally, the step size shall not exceed 1 % of the preceding frequency value.

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



Note: 1.The EUT clearance from any metallic obstacles shall be at least 0,5 m.
2. Interconnecting cables (≦1 m) belonging to the EUT shall remain on the insulating support.
3. 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.

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

14.4 Test Results

Test mode	Mode 1 & 5 & 7	Input Power	230 Vac, 50 Hz
Environmental conditions	22 °C, 72% RH	Tested by	Bin Cheng

Frequency (MHz)	Level (Vrms)	Tested Line	Injection Method	Return Path	Observation	Performance Criterion
0.15 – 80	3	AC Power	CDN-M2	N/A	Note	A

Note: The EUT function was correct during the test.

15 Power Frequency Magnetic Field Immunity Test

15.1 Test Specification

<EN 61000-6-1>

Basic Standard:	IEC 61000-4-8
Frequency Range:	50Hz, 60Hz
Field Strength:	3A/m
Observation Time:	1 minute
Inductance Coil:	Rectangular type, 1 m x 1 m

<EN 55024>

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

15.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
HAEFELY Magnetic Field Tester	MAG 100.1	083794-06	NA
COMBINOVA Magnetic Field Meter	MFM10	224	Aug. 23, 2008

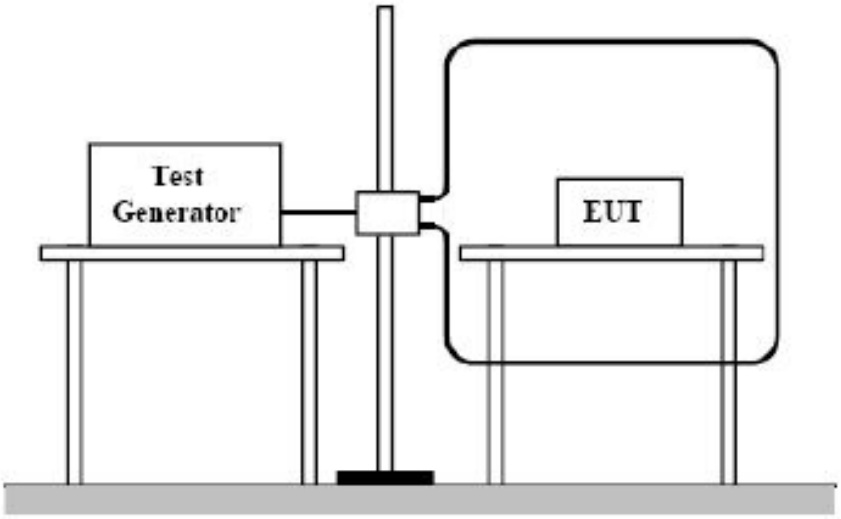
NOTE: 1. The test was performed in EMS Room No. 1.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Test date: Dec. 25 ~ 26, 2007

15.3 Test Arrangement

a. The equipment is configured and connected to satisfy its functional requirements.

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

c. 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.



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.

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

15.4 Test Results

Test mode	Mode 1 & 5 & 7	Input Power	230 Vac, 50 Hz/ 60 Hz
Environmental conditions	22 °C, 68% RH	Tested by	Bin Cheng

Application	Frequency (Hz)	Field Strength (A/m)	Observation	Performance Criterion
X - Axis	50, 60	3	Note	A
Y - Axis	50, 60	3	Note	A
Z - Axis	50, 60	3	Note	A

Note: The EUT function was correct during the test.

16 Voltage Dips and Interruptions

16.1 Test Specification

<EN 61000-6-1>

Basic Standard:	IEC 61000-4-11
Test levels:	Voltage Dips: 0% residual– 0.5, 1 period 70% residual – 25, 30 period Voltage Interruptions: 0% residual – 250, 300 period
Interval between Event:	Minimum ten seconds
Sync Angle (degrees):	0° / 180°
Test Cycle:	3 times

<EN 55024>

Basic Standard:	IEC 61000-4-11
Test levels:	Voltage Dips: >95% reduction – 0.5 period 30% reduction – 25 periods Voltage Interruptions: >95% reduction – 250 periods
Interval between Event:	Minimum ten seconds
Sync Angle (degrees):	0° / 180°
Test Cycle:	3 times

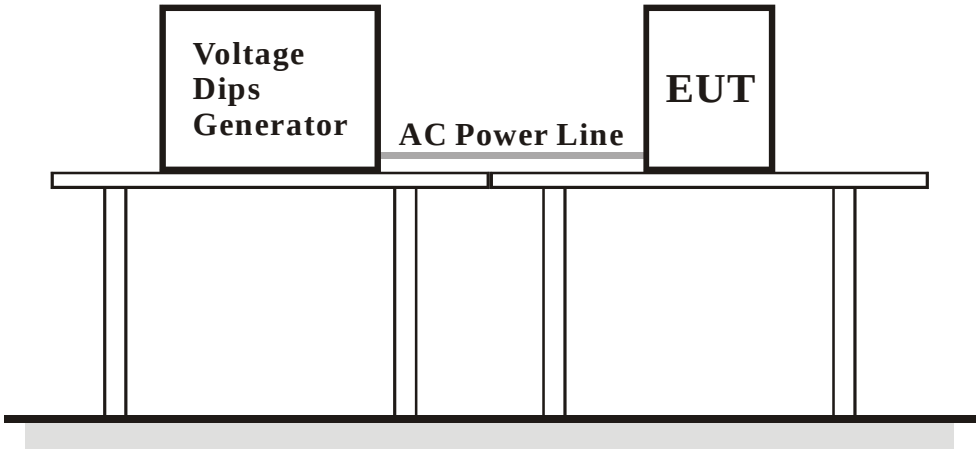
16.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
HAEFELY Mains Interference Simulator	PLINE1610	083690-17	May 08, 2008

NOTE: 1. The test was performed in EMS Room No. 1.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Test date: Dec. 25 ~ 26, 2007

16.3 Test Arrangement

The EUT shall be tested for each selected combination of test levels and duration with a sequence of 3 dips/interruptions with intervals of 10 s minimum (between each test event). Each representative mode of operation shall be tested. Abrupt changes in supply voltage shall occur at 0 dregee crossover point of the voltage waveform.



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

16.4 Test Results

Test mode	Mode 1 & 5 & 7	Input Power	230Vac, 50Hz, 220Vac, 60Hz, 110Vac, 60Hz, 100Vac, 50Hz
Environmental conditions	22 °C, 77% RH	Tested by	Bin Cheng

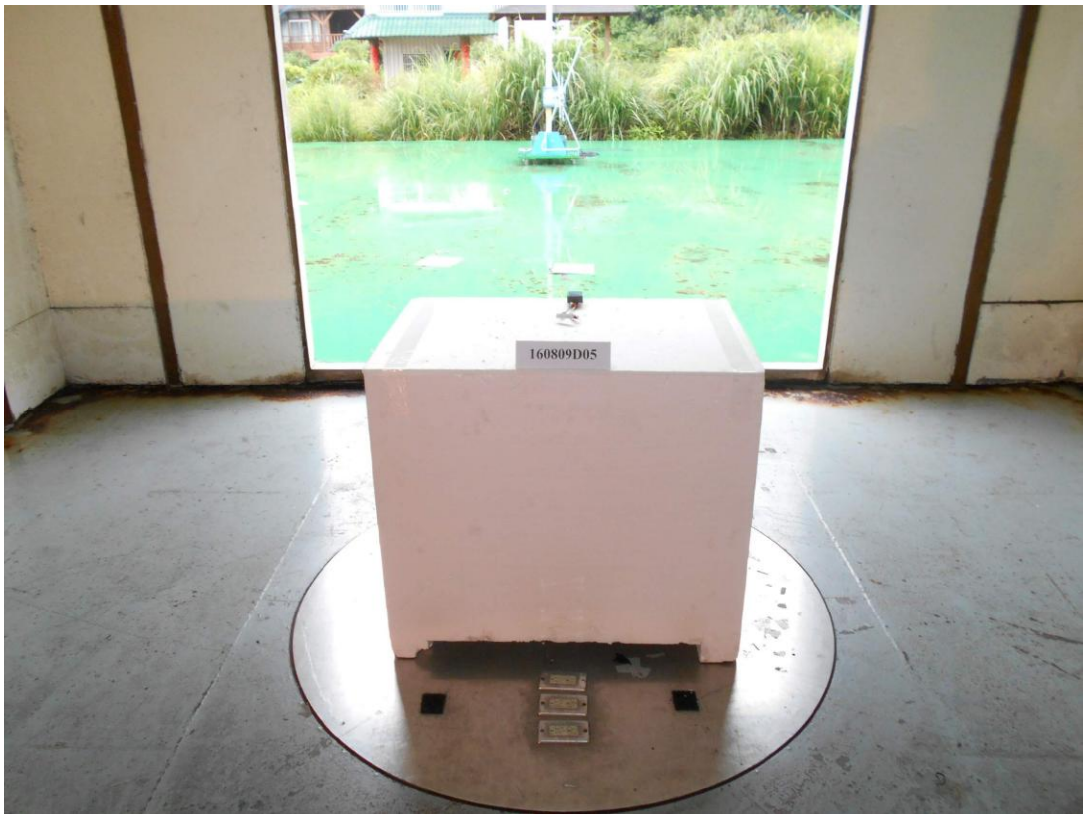
Input Power for testing: 230 Vac, 50 Hz					
Voltage Residual (%)	Duration (period)	Interval (sec)	Times	Observation	Performance Criterion
0	0.5, 1	10	3	Note 1	A
70	25	10	3	Note 1	A
0	250	10	3	Note 2	B
Input Power for testing: 220 Vac, 60 Hz					
Voltage Residual (%)	Duration (period)	Interval (sec)	Times	Observation	Performance Criterion
0	0.5, 1	10	3	Note 1	A
70	30	10	3	Note 1	A
0	300	10	3	Note 2	B
Input Power for testing: 100 Vac, 50 Hz					
Voltage Residual (%)	Duration (period)	Interval (sec)	Times	Observation	Performance Criterion
0	0.5, 1	10	3	Note 1	A
70	25	10	3	Note 2	B
0	250	10	3	Note 2	B
Input Power for testing: 110 Vac, 60 Hz					
Voltage Residual (%)	Duration (period)	Interval (sec)	Times	Observation	Performance Criterion
0	0.5, 1	10	3	Note 1	A
70	30	10	3	Note 2	B
0	300	10	3	Note 2	B

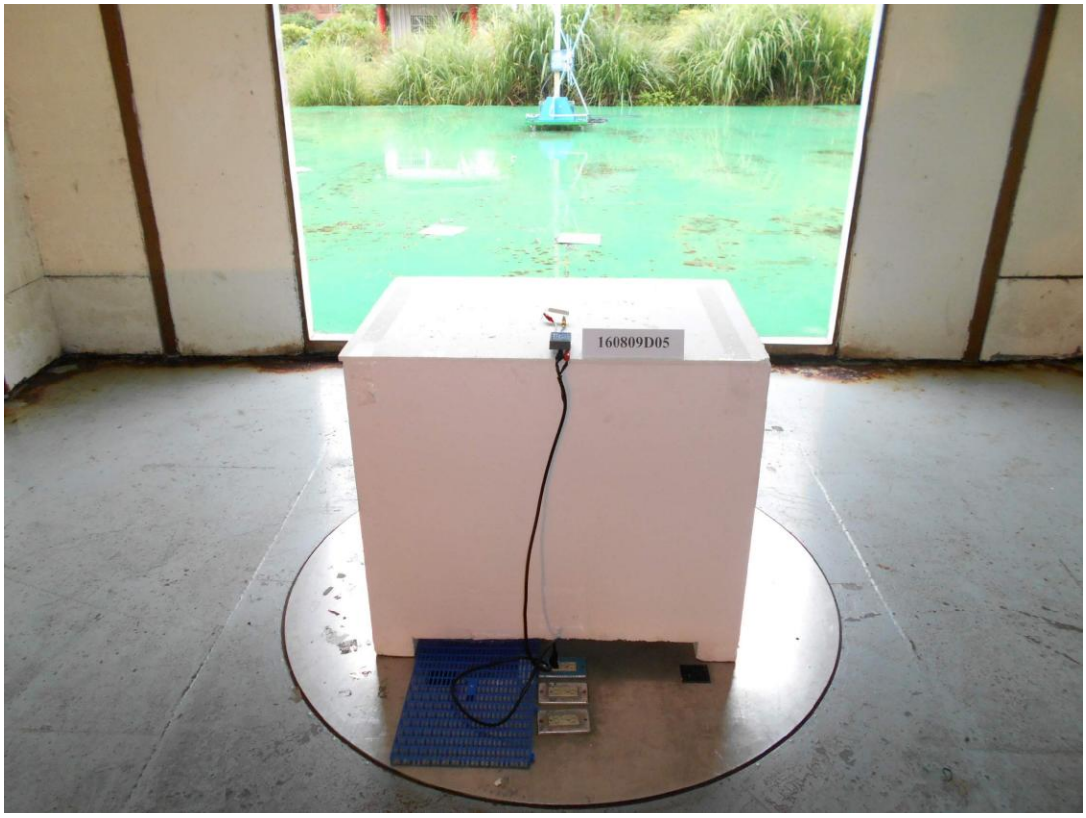
Note: 1. The EUT function was correct during the test.
2. The EUT reset during the test.

17 Pictures of Test Arrangements

17.1 Conducted Emission from the AC Mains Power Port

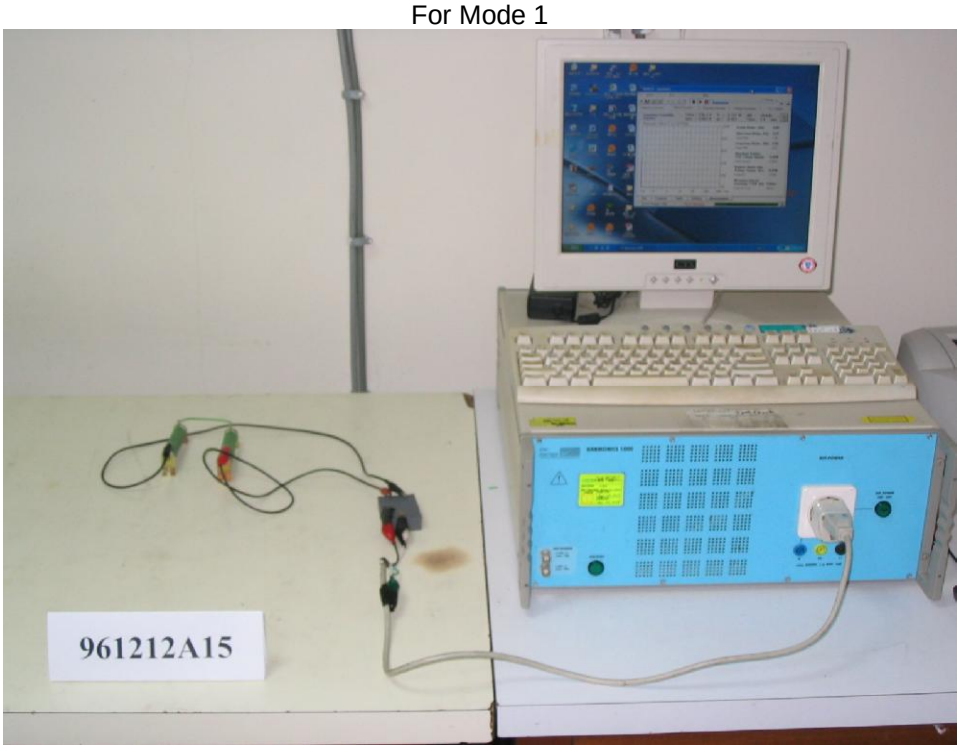
17.2 Radiated Emission at Frequencies up to 1GHz



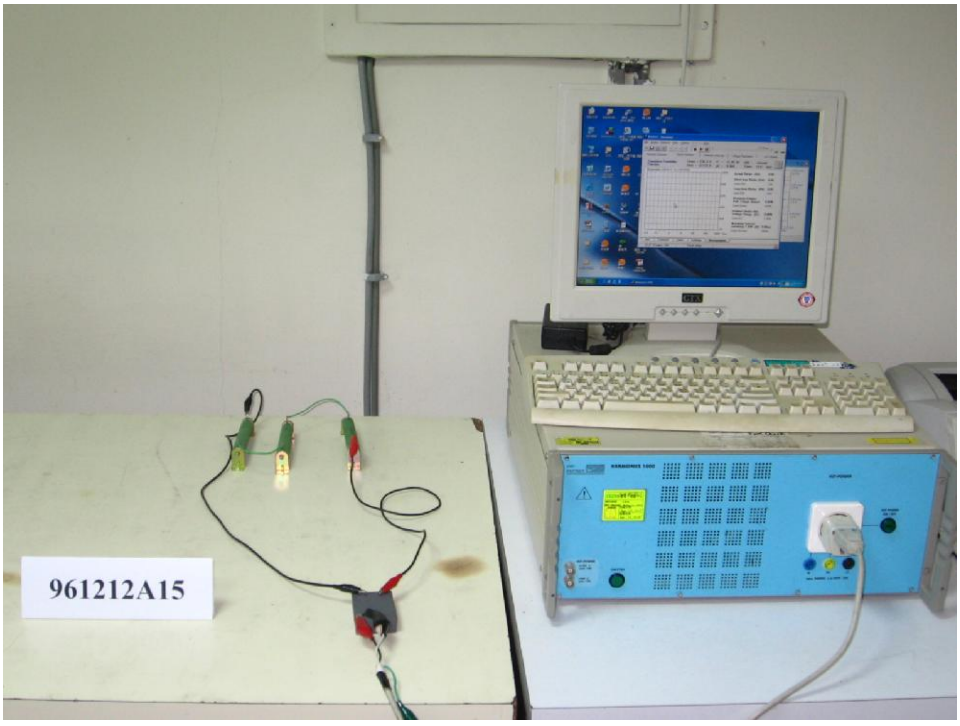


17.3 Harmonics Current, Voltage Fluctuations and Flicker Measurement

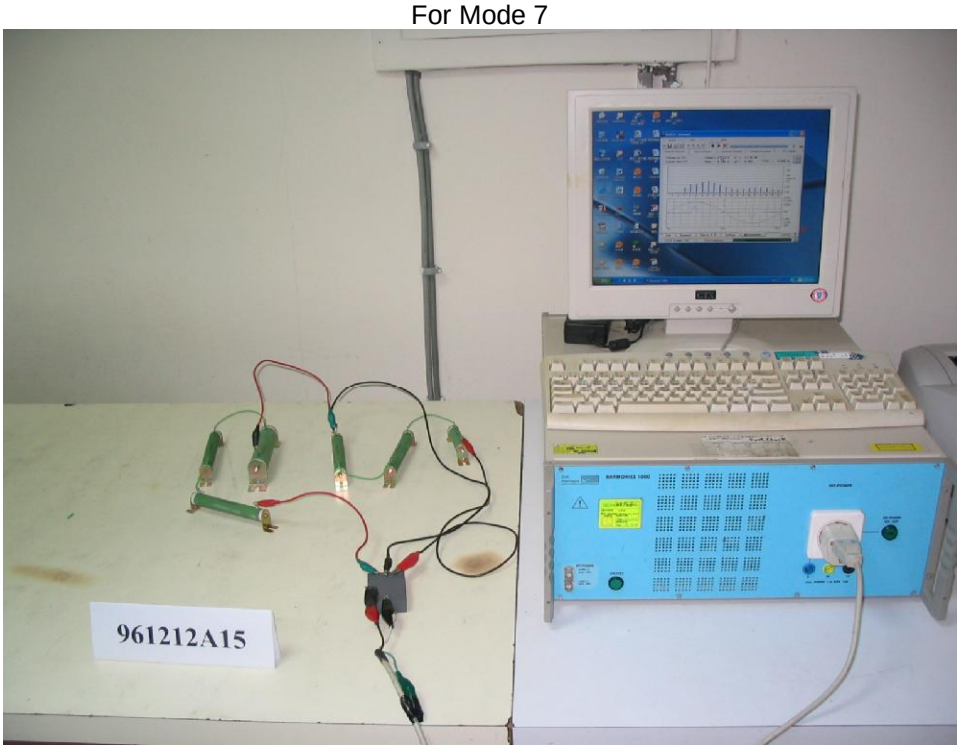
For Mode 1



For Mode 5

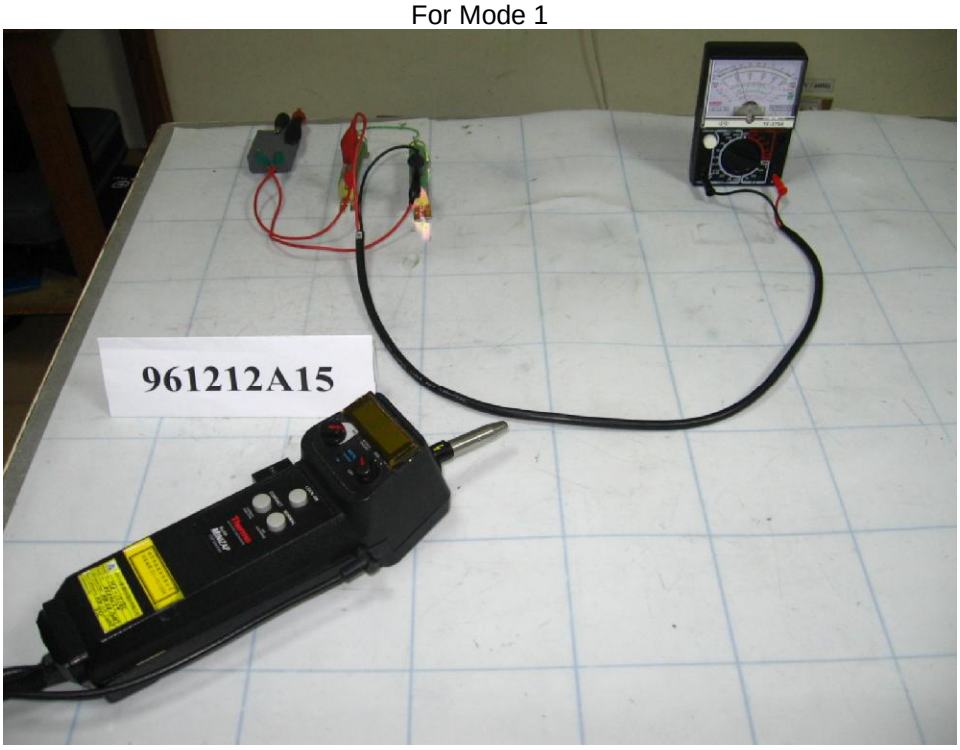


For Mode 7



17.4 Electrostatic Discharge Immunity Test (ESD)

For Mode 1

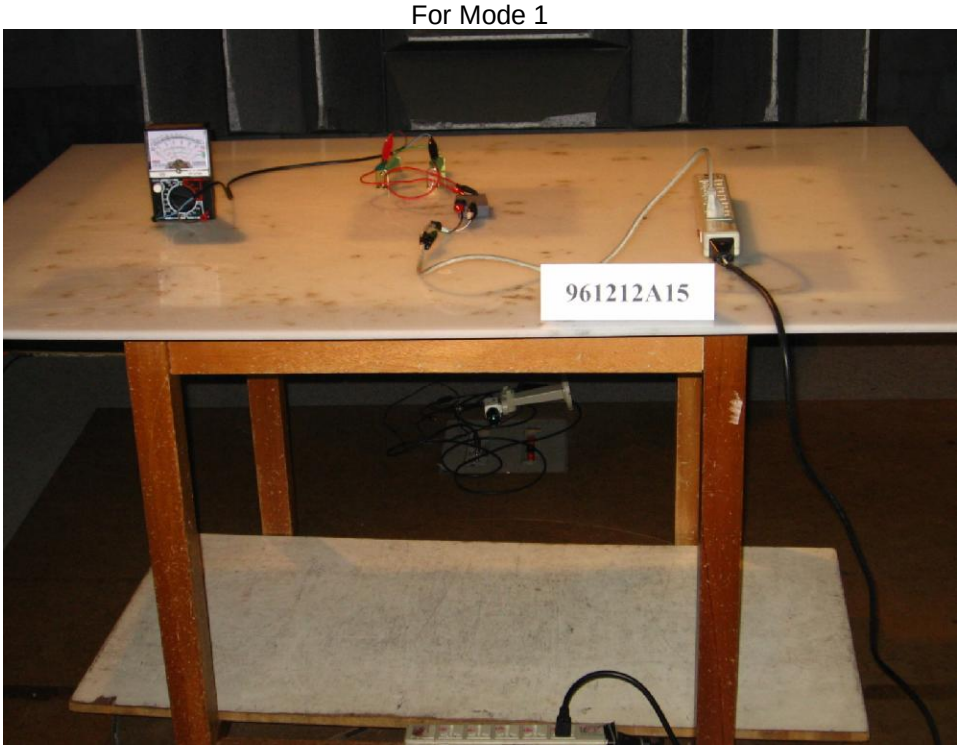


For Mode 5

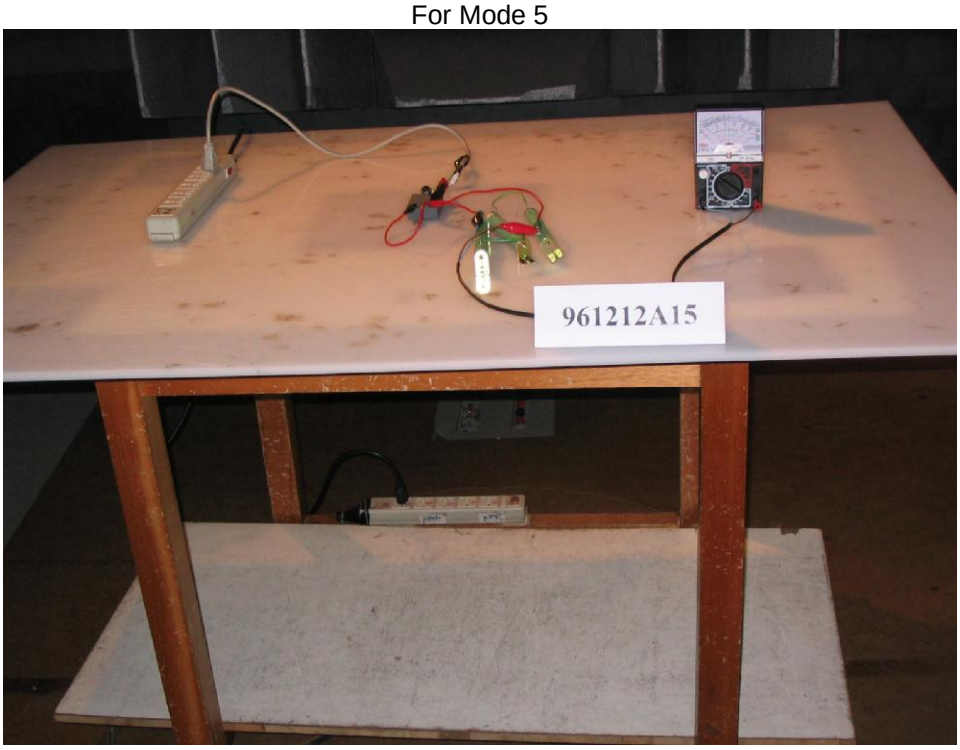
For Mode 7

17.5 Radio-frequency, Electromagnetic Field Immunity Test (RS)

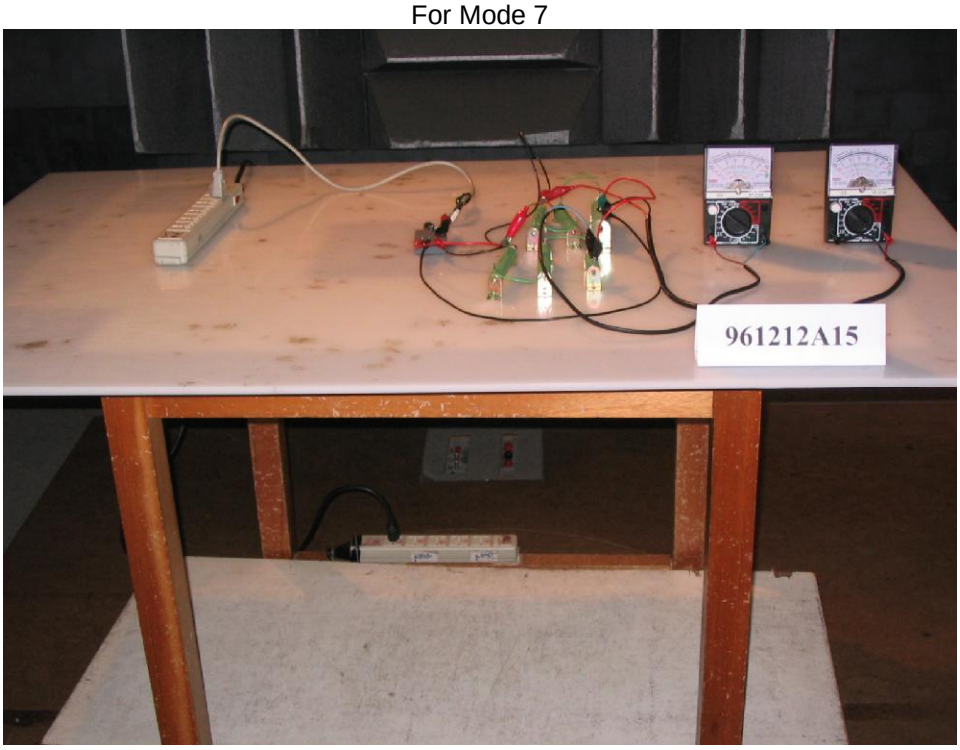
For Mode 1



For Mode 5

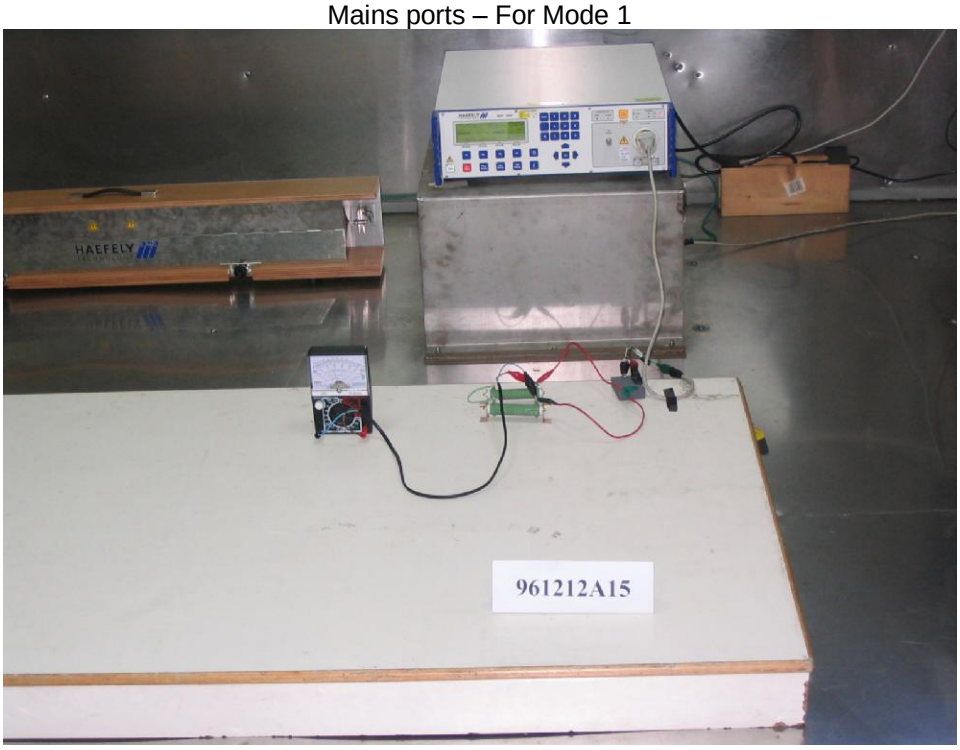


For Mode 7

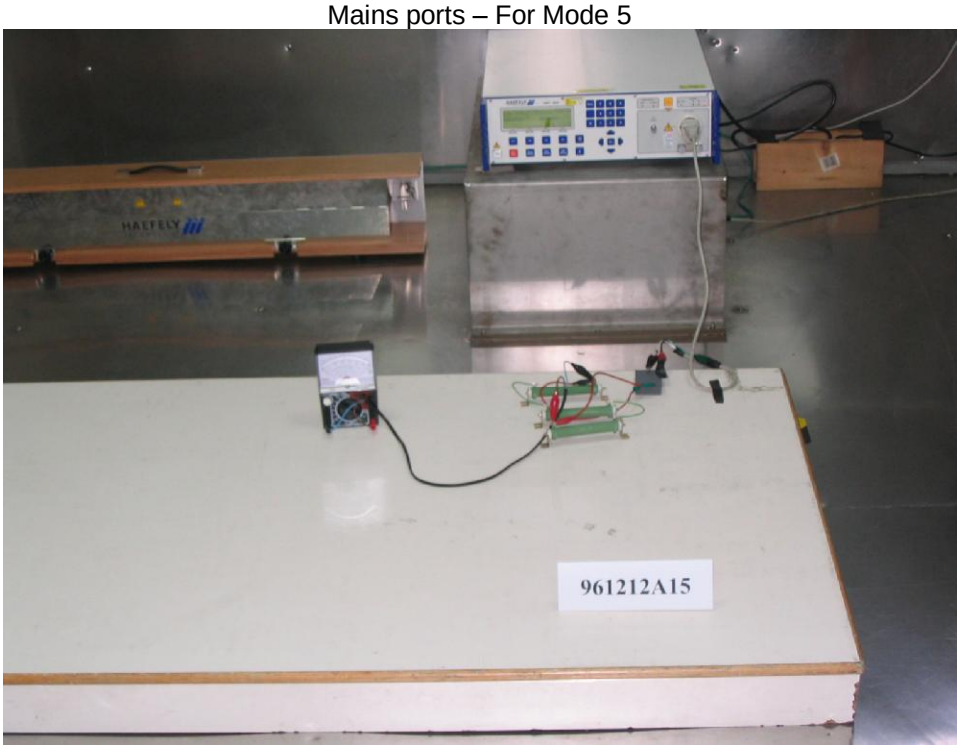


17.6 Electrical Fast Transient/Burst Immunity Test (EFT)

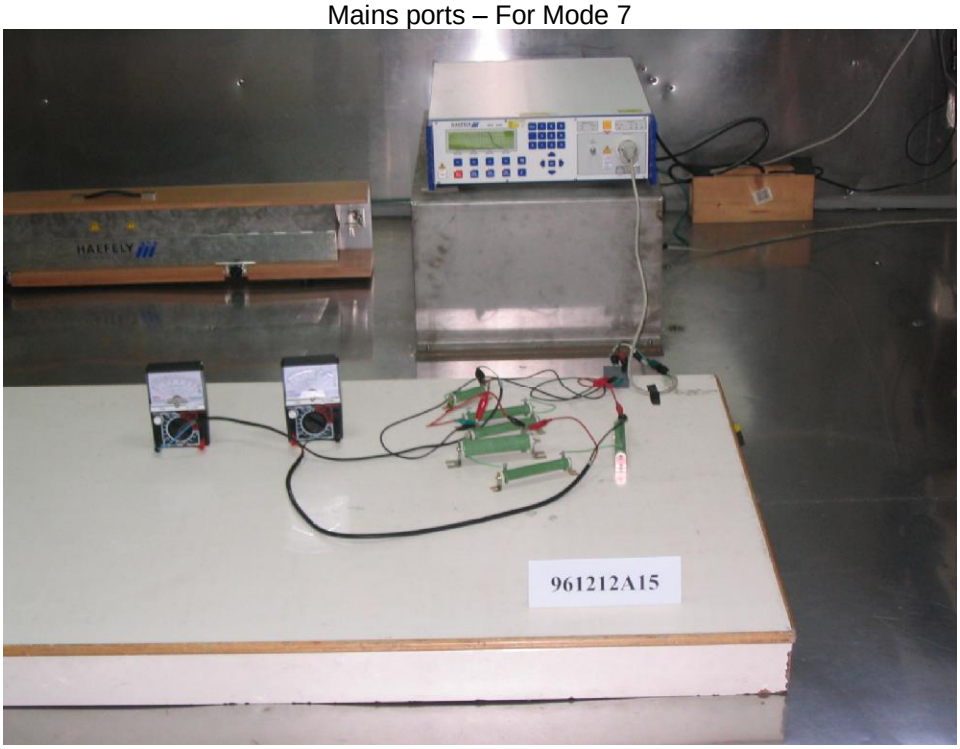
Mains ports – For Mode 1



Mains ports – For Mode 5

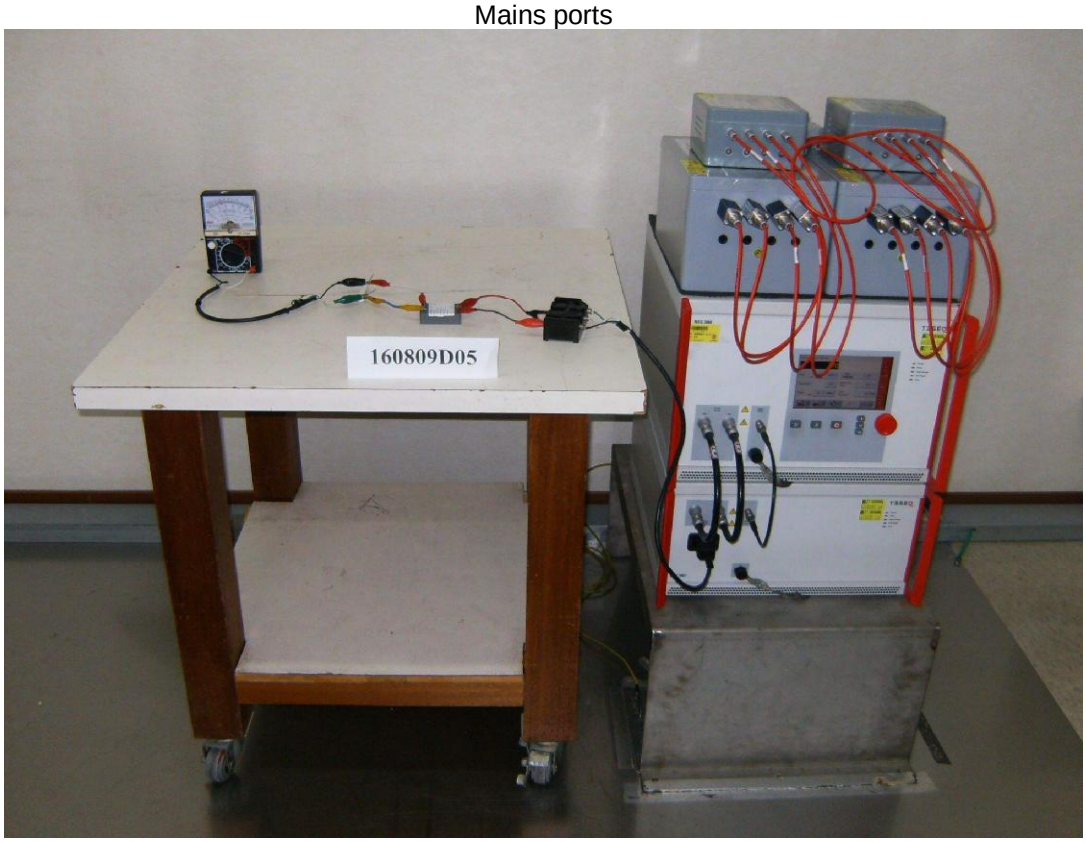


Mains ports – For Mode 7



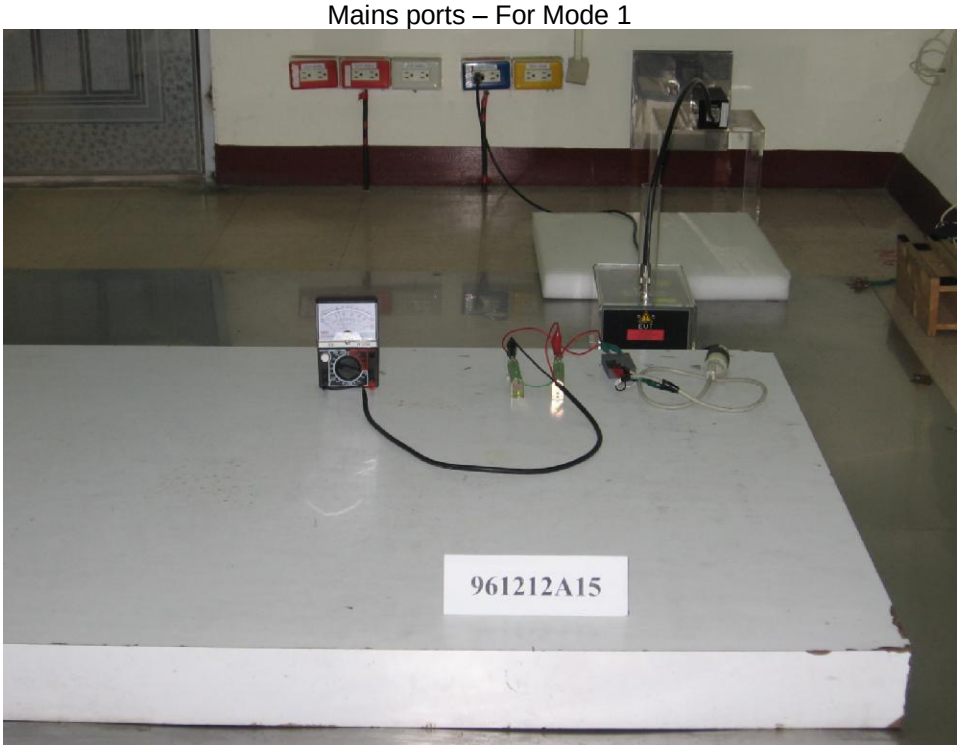
17.7 Surge Immunity Test

Mains ports

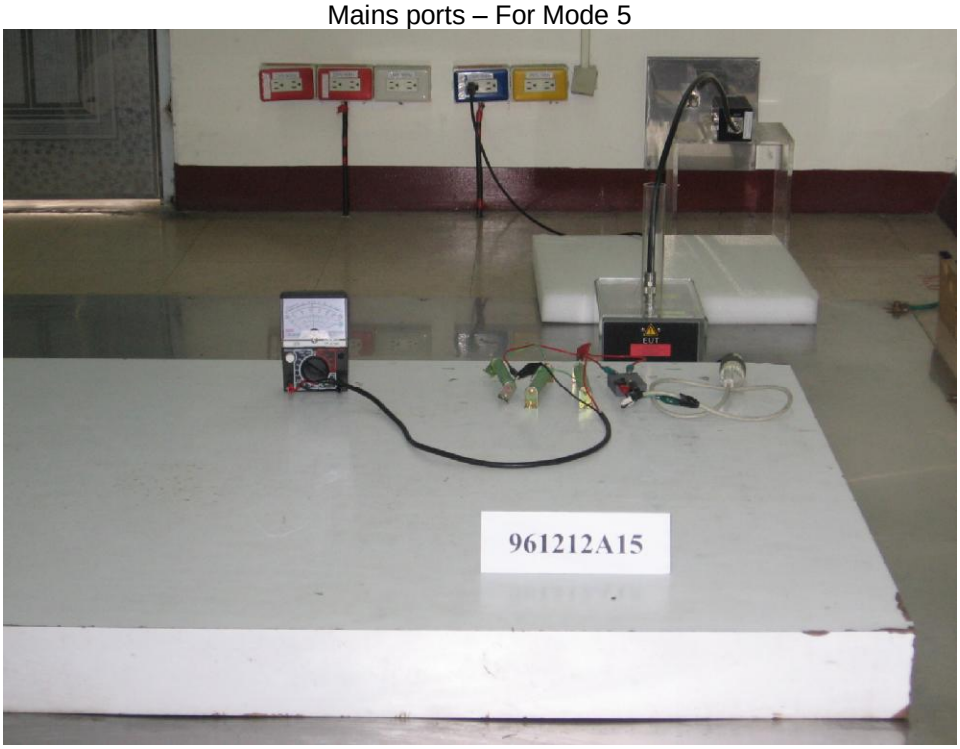


17.8 Conducted Disturbances Induced by RF Fields (CS)

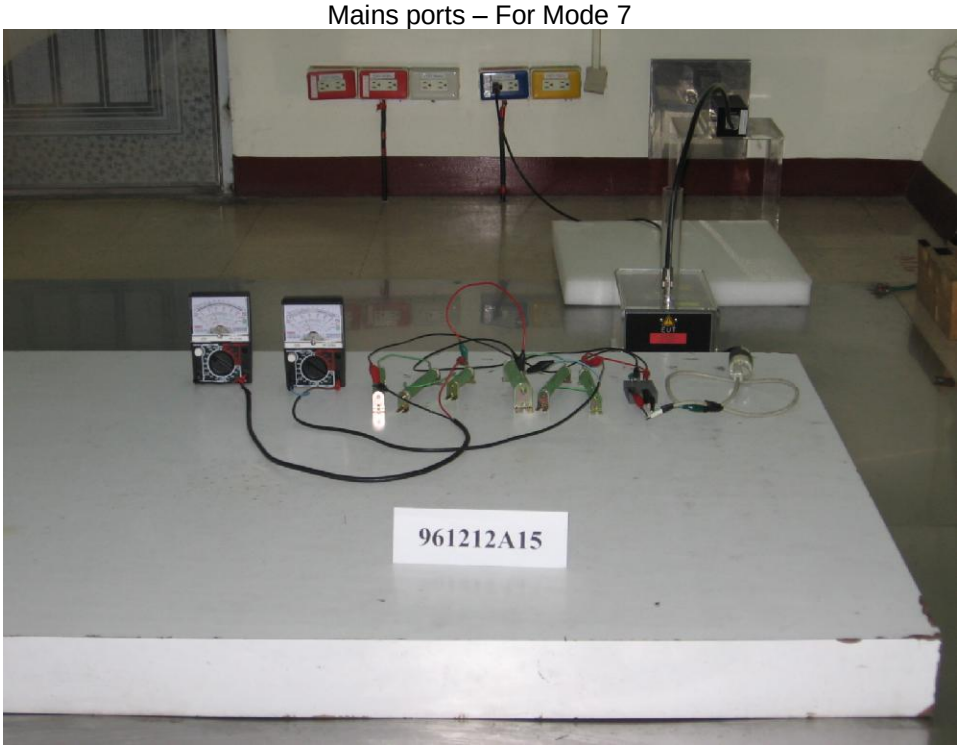
Mains ports – For Mode 1



Mains ports – For Mode 5



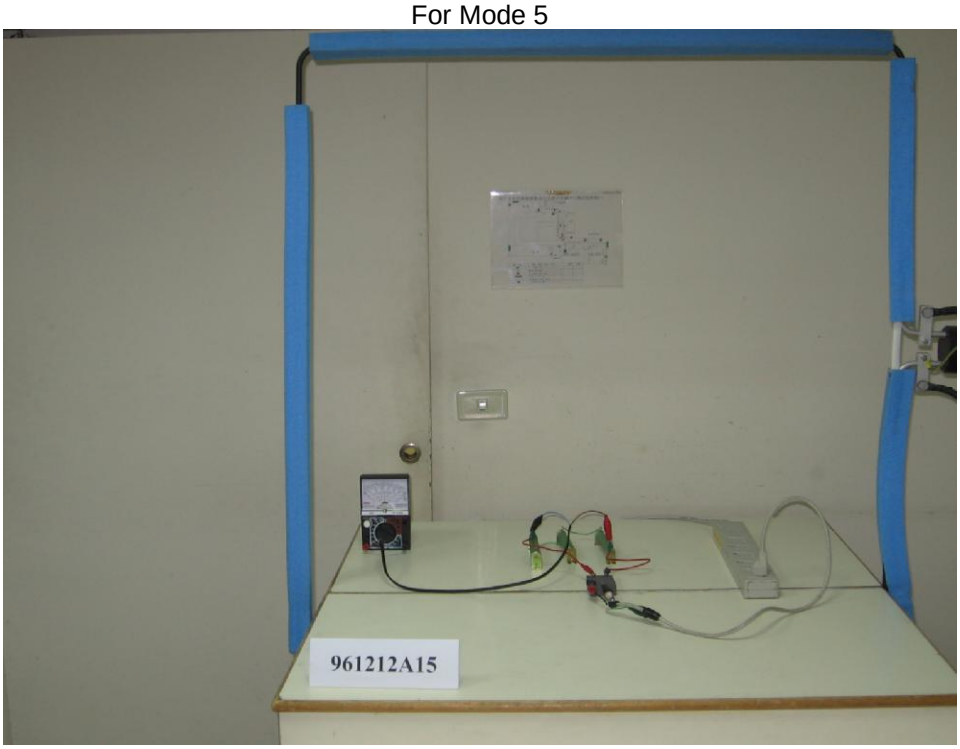
Mains ports – For Mode 7



17.9 Power Frequency Magnetic Field Immunity Test (PFMF)

For Mode 1

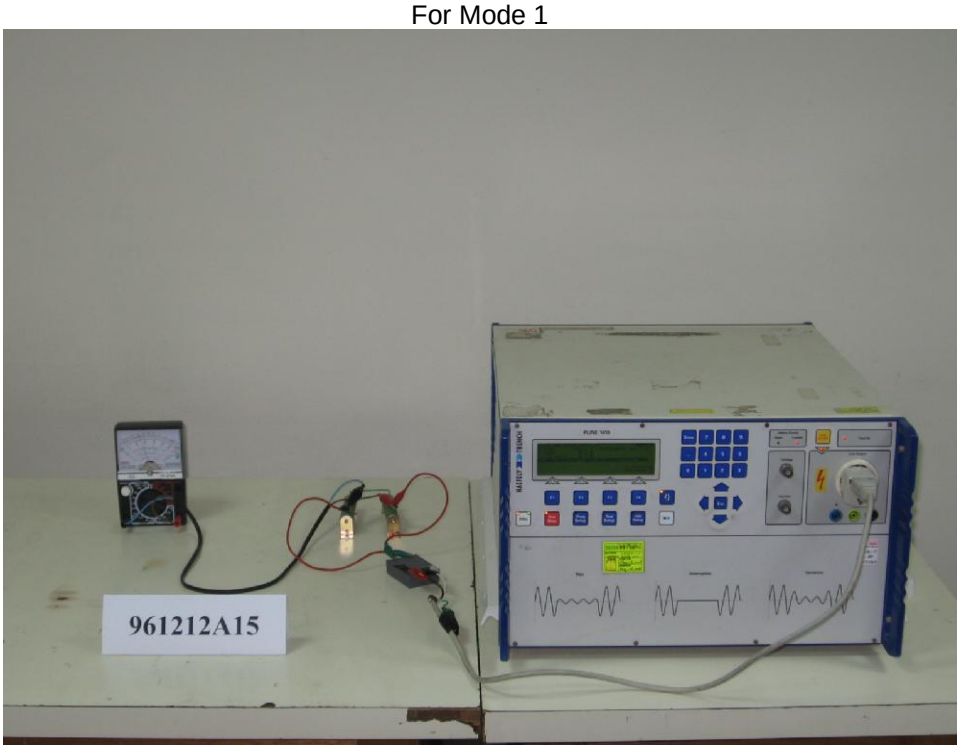
For Mode 5



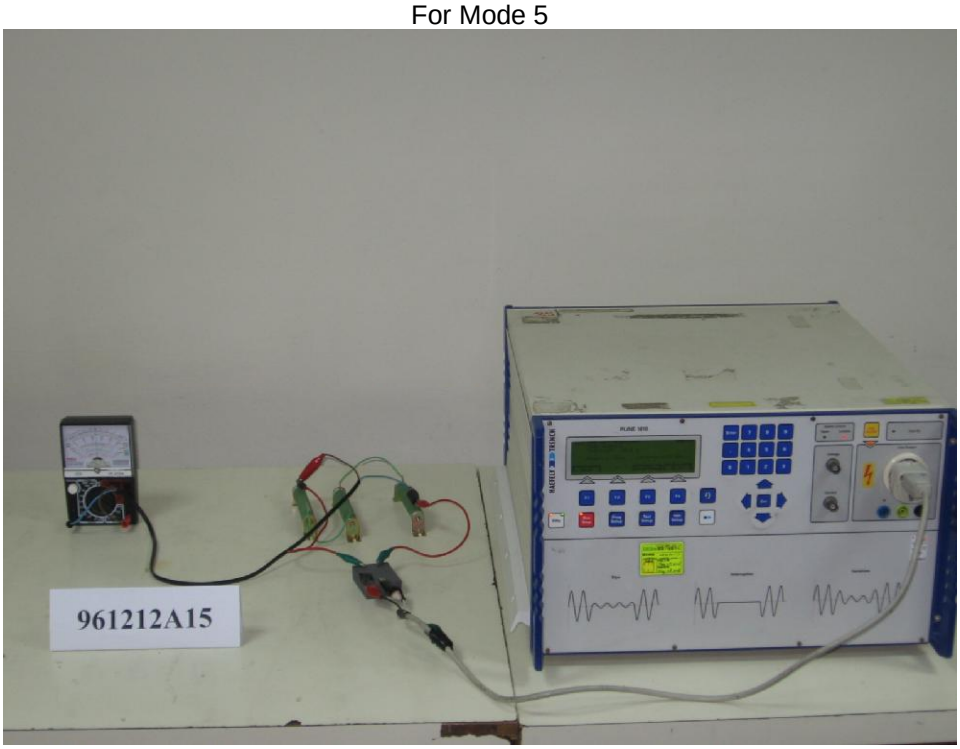
For Mode 7

17.10 Voltage Dips and Interruptions

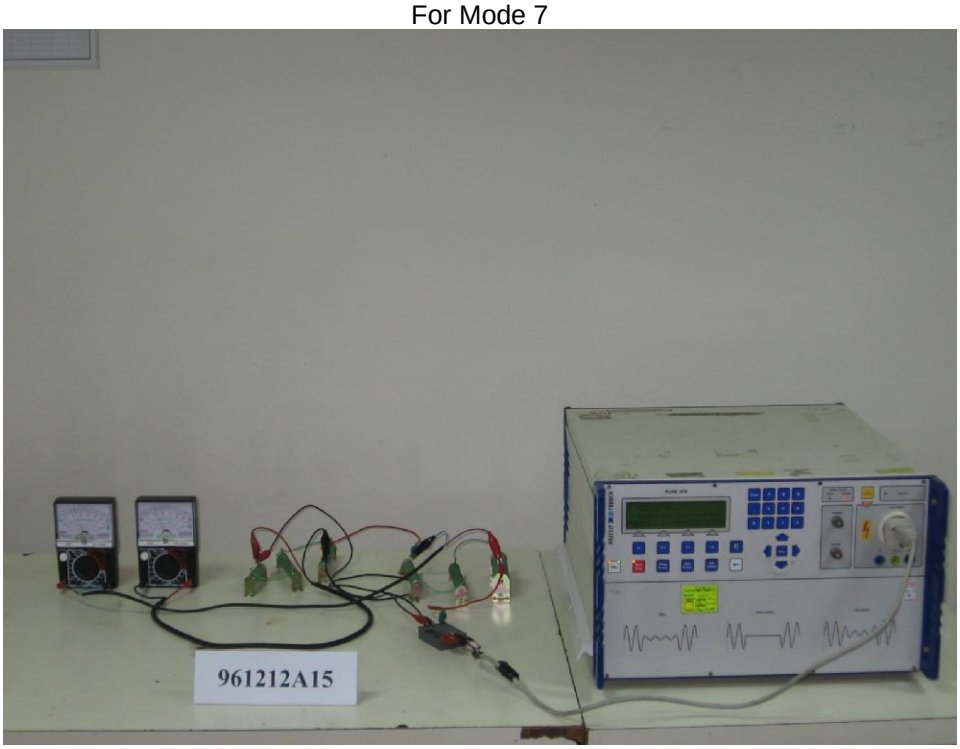
For Mode 1



For Mode 5



For Mode 7



Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab
Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
Tel: 886-3-6668565
Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab
Tel: 886-3-3183232
Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

--- END ---