CE EMC
TEST REPORT

for

Motherboard

MODEL: IMB-152D; IMB-152M; IMB-152N

Test Report Number:
T140326D12-E

Issued to:

ASRock Incorporation

**2F., No.37, Sec. 2, Jhongyang S. Rd., Beitou Dist.,
Taipei City 11270, Taiwan (R.O.C.)**

Issued by:

Compliance Certification Services Inc.

Xindian Lab.

**No.163-1, Jhongsheng Rd., Xindian Dist.,
New Taipei City, 23151 Taiwan.**

TEL: 886-2-22170894

FAX: 886-2-22171029

Issued Date: June 04, 2014

TESTING CERT #0824.01

Revision History

Rev.		Issue Date		Revisions	Effect Page	Revised By
00		June 04, 2014		Initial Issue	ALL	Joy Hsiao

TABLE OF CONTENTS

1 TEST CERTIFICATION

Product:	Motherboard
Model:	IMB-152D; IMB-152M; IMB-152N
Brand:	ASRock
Applicant:	**ASRock Incorporation** 2F., No.37, Sec. 2, Jhongyang S. Rd., Beitou Dist., Taipei City 11270, Taiwan (R.O.C.)
Manufacturer:	**ASRock Incorporation** 2F., No.37, Sec. 2, Jhongyang S. Rd., Beitou Dist., Taipei City 11270, Taiwan (R.O.C.)
Tested:	May 13, 2014 ~ June 04, 2014
Applicable Standards:	**EN 55022: 2010, Class B** **CISPR 22: 2008 (Ed 6.0)** **AS/NZS CISPR 22: 2009 + A1(2010)** **EN 61000-3-2: 2006 + A1: 2009 + A2: 2009** **EN 61000-3-3: 2013** **EN 55024: 2010** IEC 61000-4-2: 2008 IEC 61000-4-3: 2006 + A1: 2007 + A2: 2010 IEC 61000-4-4: 2012 IEC 61000-4-5: 2005 IEC 61000-4-6: 2008 IEC 61000-4-8: 2009 IEC 61000-4-11: 2004

Deviation from Applicable Standard
None

The above equipment was tested by Compliance Certification Services Inc. for compliance with the requirements of technical standards specified above under the EMC Directive 2004/108/EC. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Approved by:	Reviewed by:
Sam Hu	Vesta Hsu
Sam Hu Assistant Manager	Vesta Hsu Supervisor of report document dept.

2 TEST RESULT SUMMARY

EMISSION			
Standard	**Item**	**Result**	**Remarks**
EN 55022: 2010 CISPR 22: 2008 (Ed 6.0) AS/NZS CISPR 22: 2009 + A1(2010)	Conducted (Power Port)	PASS	Meet Class B limit
	Conducted (Telecom port)	PASS	Meet Class B limit
	Radiated	PASS	Meet Class B limit
EN 61000-3-2: 2006 + A1: 2009 + A2: 2009	Harmonic current emissions	PASS	Meet Class D limit
EN 61000-3-3: 2013	Voltage fluctuations & flicker	PASS	Meets the requirements

IMMUNITY【 EN 55024 (2010) 】			
Standard	**Item**	**Result**	**Remarks**
IEC 61000-4-2: 2008	ESD	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-3: 2006 + A1: 2007 + A2: 2010	RS	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-4: 2012	EFT	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-5: 2005	Surge	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-6: 2008	CS	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-8: 2009	PFMF	N/A	Please see the page 54
IEC 61000-4-11: 2004	Voltage dips & voltage variations	PASS	Meets the requirements of **Voltage Dips:** 1) >95% reduction Performance Criterion A 2) 30% reduction Performance Criterion A **Voltage Interruptions:** 1) >95% reduction Performance Criterion C

Note: 1. The statements of test result on the above are decided by the request of test standard only; the measurement uncertainties are not factored into this compliance determination.

2. The information of measurement uncertainty is available upon the customer's request.

3 EUT DESCRIPTION

Product	Motherboard
Brand Name	ASRock
Model	IMB-152D; IMB-152M; IMB-152N
Applicant	ASRock Incorporation
Housing material	N/A
Identify Number	T140326D12
Received Date	March 26, 2014
EUT Power Rating	3.3VDC/ ±5VDC/ ±12VDC from Host PC Power Supply
AC Power During Test	230VAC / 50Hz to Host PC Power Supply

Model Difference

Model Name	Difference (CPU)	Tested (Checked)
IMB-152D	INTEL / J1900 (2.0GHz)	☒
IMB-152M	INTEL / N2920 (1.86GHz)	☒
IMB-152N	INTEL / N2930 (1.83GHz)	☒

I/O PORT

I/O PORT TYPES	Q'TY	TESTED WITH
1. PIO Port	1	1
2. SIO Port	6	6
3. PS/2 Keyboard Port	1	1
4. PS/2 Mouse Port	1	1
5. VGA Port	1	1
6. Earphone Port	1	1
7. Microphone Port	1	1
8. USB 2.0 Port	6	6
9. USB 3.0 Port	4	4
10. LAN Port	1	1

Note: None.

4 TEST METHODOLOGY

4.1. DECISION OF FINAL TEST MODE

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

The test configuration/ modes are as the following:

Conduction Modes (Power port):

No.	Model	Operate State
1	IMB-152D	1920X1200, VF=60Hz
2		1024X768, VF=75Hz
3		800X600, VF=75Hz
4	IMB-152M	1920X1200, VF=60Hz
5	IMB-152N	1920X1200, VF=60Hz

Conduction Modes (Telecom port):

No.	Model	Operate State
1	IMB-152D	10Mbps
2		100Mbps
3		1Gbps

Radiation Modes:

No.	Model	Operate State
1	IMB-152D	1920X1200, VF=60Hz
		1920X1200, VF=60Hz / 1-6GHz
2		1024X768, VF=75Hz
3		800X600, VF=75Hz
4	IMB-152M	1920X1200, VF=60Hz
5	IMB-152N	1920X1200, VF=60Hz

Worst:
Conduction (Power port): Mode 1
Conduction (Telecom port): Mode 2
Radiation: Mode 1

4.2. EUT SYSTEM OPERATION

1. Windows 7 boots system.
2. Run Emctest.exe to activate all peripherals and display “H” pattern on monitor screen.
3. Run Winemc.exe and choose “F:/ & G:/ & H:/ & I:/” to test EUT.
4. Press the start menu, select executive and type ping 192.168.0.2 –t (EUT), ping 192.168.0.1 –t (Server Notebook).

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

5 SETUP OF EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF SUPPORT UNITS

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

Host PC Devices:

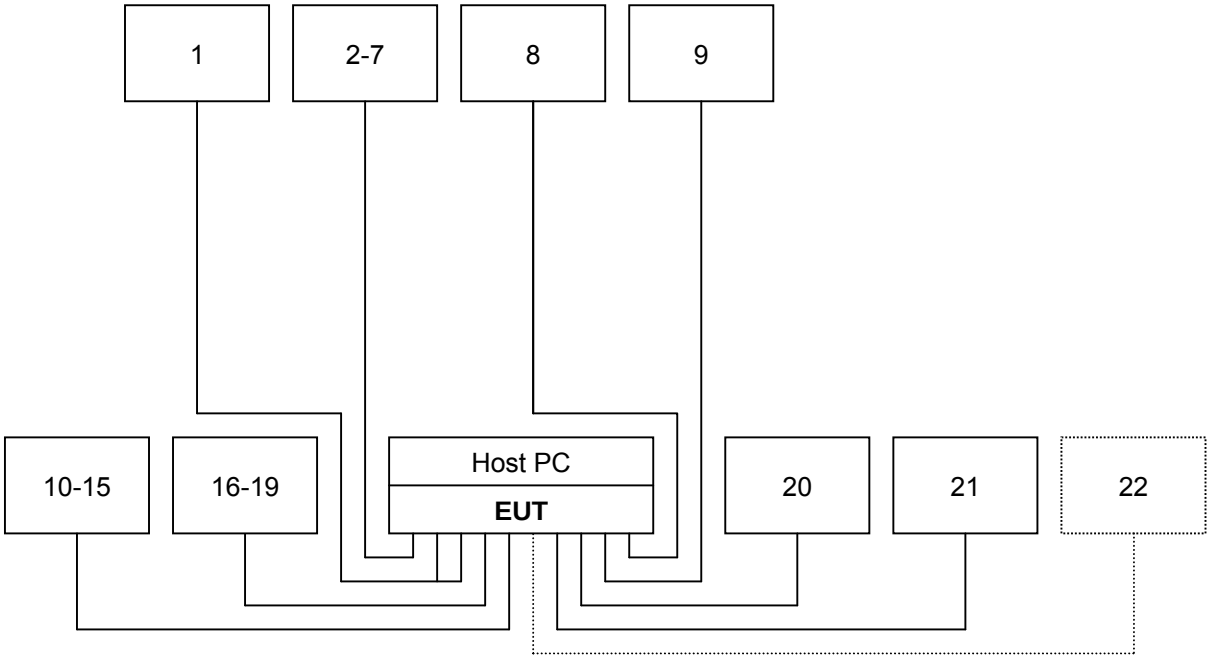
No	Equipment	Model No.	Serial No.	FCC ID / BSMI ID	Brand Name
1	HDD	ST340016A	3HR0ZMB9	BSMI ID: 3902B322 BSMI: D33016	Seagate
2	Power supply	SS-500FB Active PFC	N/A	BSMI: D33080 DOC	Seasonic
3	CD/R	CD-552E	5145319	BSMI: D33066 DOC	TEAC
4	CPU (2.0GHz)	J1900	N/A	N/A	INTEL
	CPU (1.86GHz)	N2920	N/A	N/A	INTEL
	CPU (1.83GHz)	N2930	N/A	N/A	INTEL
5	SODIMM (DDRIII1333)	N/A	N/A	N/A	NANYA
6	SATA3 HDD	WD6402AAEX	N/A	N/A	WD

Peripherals Devices:

No.	Equipment	Model No.	Serial No.	FCC ID / BSMI ID	Brand Name	Data Cable	Power Cord
1	Earphone & Microphone	SEP912	N/A	N/A	Atayal	Unshielded, 1.5m	N/A
2-7	USB Mouse	M-BE58	N/A	DOC BSMI: T41126	Logitech	Shielded, 1.8m	N/A
8	PS/2 Mouse	M-SBF96	FATSQ0C5BYJQKZ	DOC BSMI: R41126	hp	Shielded, 1.8m	N/A
9	PS/2 Keyboard	SK-2880	BAUEL0HCPY76G7	DOC BSMI: T3A002	hp	Shielded, 1.8m	N/A
10-15	Modem	AL-56ERM	0MERM04A0212	DOC	GALILEO	Shielded, 1.5m	Shielded, 1.5m with a core
16-19	USB 3.0 HDD	HD-EG5	N/A	N/A	SONY	Shielded, 0.5m	N/A
20	Printer	C20SX	N/A	BSMI ID: 3902E004	EPSON	Shielded, 1.8m	Shielded, 1.8m
21	Monitor	U2713HMt	N/A	N/A	DELL	Shielded, 1.8m with two cores	Unshielded, 1.5m
22	Server Notebook	E5420	N/A	DOC BSMI: R33002	DELL	Unshielded, 20m	Unshielded, 1.8m

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

5.2. CONFIGURATION OF SYSTEM UNDER TEST



6 FACILITIES AND ACCREDITATIONS

6.1. FACILITIES

All measurement facilities used to collect the measurement data are located at CCSrf Taiwan Xindian Lab. at No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, 23151 Taiwan.

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. All receiving equipment conforms to CISPR 16-1-1, CISPR 16-1-2, CISPR 16-1-3, CISPR 16-1-4 and CISPR 16-1-5.

6.2. ACCREDITATIONS

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

Taiwan	TAF
USA	A2LA

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

Canada	Industry Canada
Norway	Nemko
Japan	VCCI
Taiwan	BSMI
USA	FCC

Copies of granted accreditation certificates are available for downloading from our web site, http:///www.ccsrf.com

6.3. MEASUREMENT UNCERTAINTY

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

Measurement	Frequency	Uncertainty
Conducted emissions (Power port)	0.15MHz ~ 30MHz	± 1.56
Conducted emissions (Telecom port)	0.15MHz ~ 30MHz	± 2.19
Radiated emissions	30MHz ~ 1000MHz	± 3.91
	1000MHz ~ 6000MHz	± 3.23

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

Consistent with industry standard (e.g. CISPR 22: 2005, clause 11, Measurement Uncertainty) determining compliance with the limits shall be base on the results of the compliance measurement. Consequently the measure emissions being less than the maximum allowed emission result in this be a compliant test or passing test.

The acceptable measurement uncertainty value without requiring revision of the compliance statement is base on conducted and radiated emissions being less than U_{CISPR} which is 3.6dB and 5.2dB respectively. CCS values (called U_{Lab} in CISPR 16-4-2) is less than U_{CISPR} as shown in the table above. Therefore, MU need not be considered for compliance.

7 EMISSION TEST

7.1. CONDUCTED EMISSION MEASUREMENT

7.1.1. LIMITS

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

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

7.1.2. TEST INSTRUMENTS

Conducted Emission room # A				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
TEST RECEIVER	R&S	ESCI	101201	09/15/2014
LISN (EUT)	SCHWARZBECK	NSLK 8127	8127527	12/12/2014
LISN	SCHWARZBECK	NSLK 8127	8127526	12/12/2014
BNC CABLE	EMCI	5Dr	BNC A7	04/20/2015
Pulse Limiter	R&S	ESH3-Z2	C3010026-2	09/05/2014
THERMO-HYGRO METER	WISEWIND	201A	No. 02	05/12/2015
Test S/W	EZ-EMC			

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

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

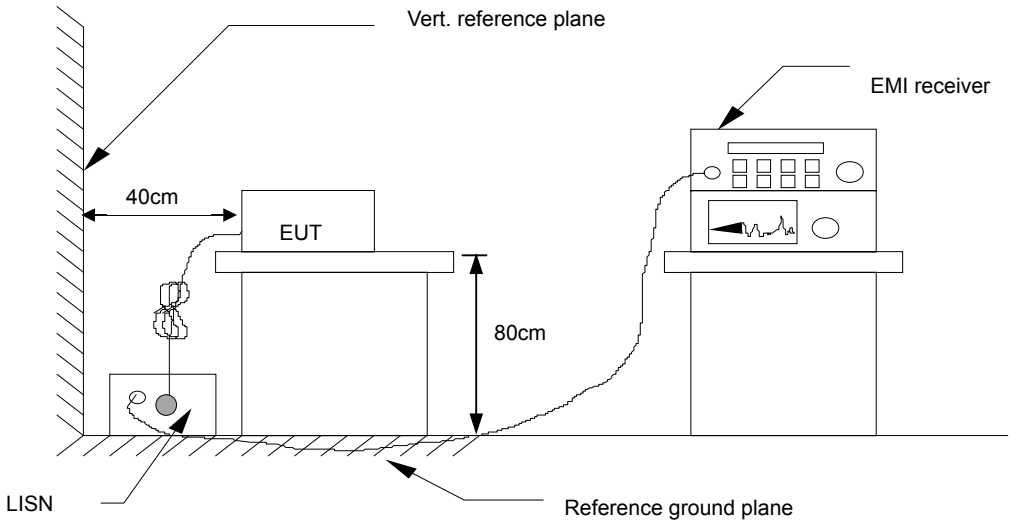
Procedure of Preliminary Test

- The EUT and Support equipment, if needed, was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per EN 55022 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor standing equipment, it is placed on the ground plane, which has a 15 cm non-conductive covering to insulate the EUT from the ground plane.
- All I/O cables were positioned to simulate typical actual usage as per EN 55022.
- The test equipment EUT installed received AC main power, through a Line Impedance Stabilization Network (LISN), which supplied power source and was grounded to the ground plane.
- All support equipment power received from a second LISN.
- The EUT test program was started. Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.
- The Receiver scanned from 150kHz to 30MHz for emissions in each of the test modes.
- During the above scans, the emissions were maximized by cable manipulation.
- The test mode(s) described in Item 4.1 were scanned during the preliminary test.
- After the preliminary scan, we found the test mode described in Item 4.1 producing the highest emission level.
- The EUT configuration and cable configuration of the above highest emission levels were recorded for reference of the final test.

Procedure of Final Test

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

7.1.4. TEST SETUP



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

7.1.5. DATA SAMPLE

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

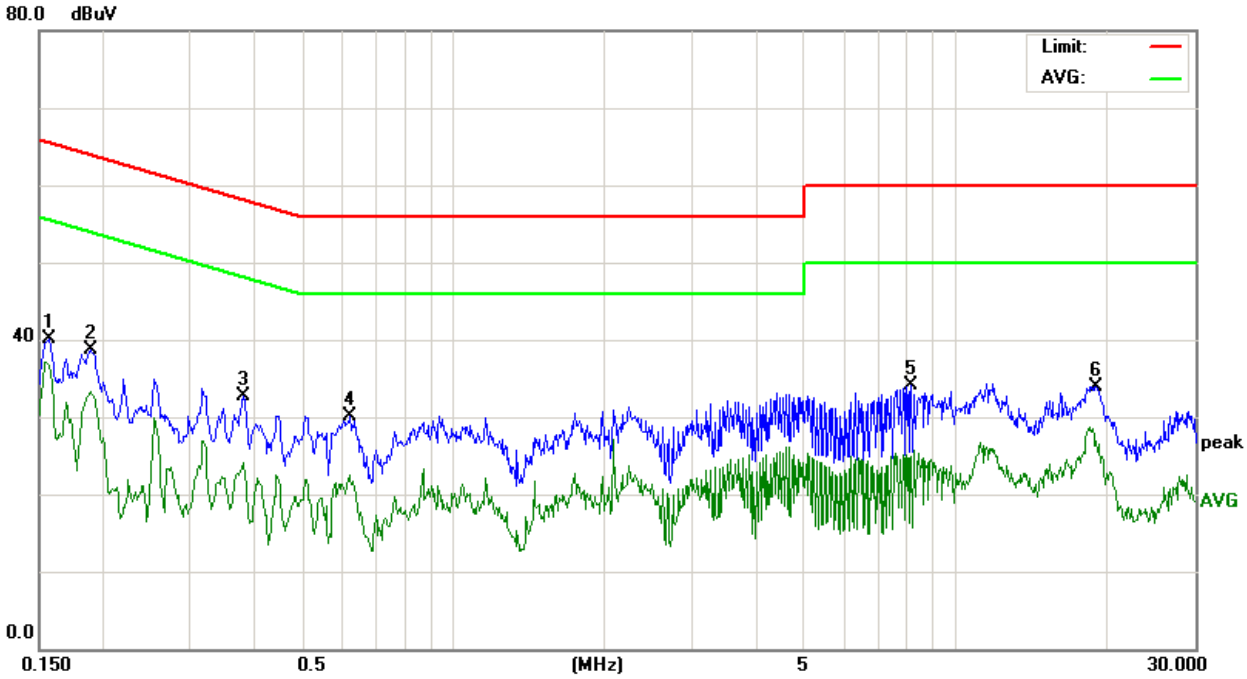
Freq. = Emission frequency in MHz
Reading = Uncorrected Analyzer/Receiver reading
Factor = Insertion loss of LISN + Cable Loss + Pulse Limit
Result = Reading + Factor
Limit = Limit stated in standard
Margin = Reading in reference to limit
P = Peak Reading
Q = Quasi-peak Reading
A = Average Reading
L1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

Calculation Formula

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

7.1.6. TEST RESULTS

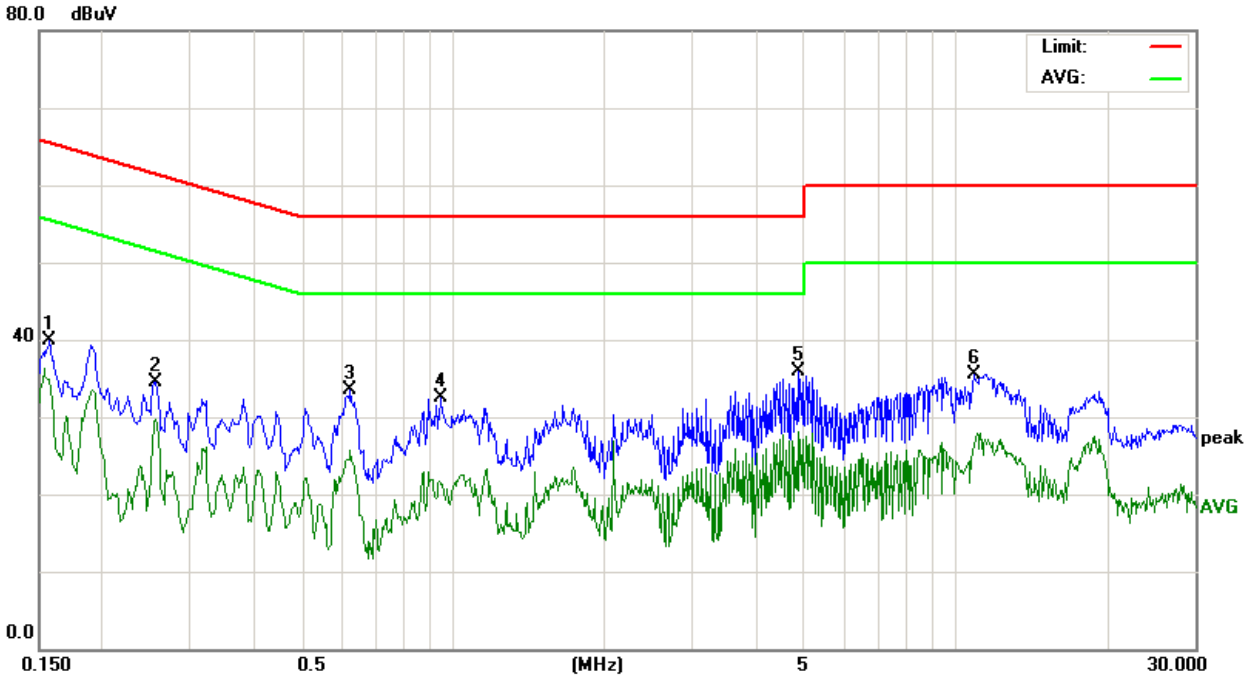
Model No.	IMB-152D	6dB Bandwidth	9 kHz
Environmental Conditions	24°C, 56% RH	Test Mode	Mode 1
Tested by	Frank Liao	Phase	L1
Standard	EN 55022 CLASS B		



Conducted Emission Readings							
Frequency Range Investigated				150 kHz to 30 MHz			
Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector (P/Q/A)	Line (L1/L2)
0.1580	30.23	9.96	40.19	65.56	-25.37	P	L1
0.1900	28.76	9.94	38.70	64.03	-25.33	P	L1
0.3820	22.83	9.94	32.77	58.23	-25.46	P	L1
0.6260	20.18	9.95	30.13	56.00	-25.87	P	L1
8.1775	23.81	10.21	34.02	60.00	-25.98	P	L1
19.0415	23.62	10.33	33.95	60.00	-26.05	P	L1

Note: 1. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).
2. The emission level was or more than 2dB below the Average limit, so no re-check anymore.

Model No.	IMB-152D	**6dB Bandwidth**	9 kHz
Environmental Conditions	24°C, 56% RH	**Test Mode**	Mode 1
Tested by	Frank Liao	**Phase**	L2
Standard	EN 55022 CLASS B		



Conducted Emission Readings							
Frequency Range Investigated				**150 kHz to 30 MHz**			
Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector (P/Q/A)	Line (L1/L2)
0.1580	**29.96**	**10.01**	**39.97**	**65.56**	**-25.59**	**P**	**L2**
0.2545	**24.63**	**9.97**	**34.60**	**61.61**	**-27.01**	**P**	**L2**
0.6260	**23.45**	**10.01**	**33.46**	**56.00**	**-22.54**	**P**	**L2**
0.9455	**22.42**	**10.05**	**32.47**	**56.00**	**-23.53**	**P**	**L2**
4.8578	**25.68**	**10.32**	**36.00**	**56.00**	**-20.00**	**P**	**L2**
10.9259	**25.09**	**10.51**	**35.60**	**60.00**	**-24.40**	**P**	**L2**

Note: 1. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).
2. The emission level was or more than 2dB below the Average limit, so no re-check anymore.

7.2. CONDUCTED EMISSION MEASUREMENT AT TELECOMMUNICATION PORTS

7.2.1. LIMITS

For Class A Equipment

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

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

For Class B Equipment

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

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

7.2.2. TEST INSTRUMENTS

Conducted Emission room # A				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
TEST RECEIVER	R&S	ESCI	101201	09/15/2014
LISN (EUT)	SCHWARZBECK	NSLK 8127	8127527	12/12/2014
LISN	SCHWARZBECK	NSLK 8127	8127526	12/12/2014
BNC CABLE	EMCI	5Dr	BNC A7	04/20/2015
Pulse Limiter	R&S	ESH3-Z2	C3010026-2	09/05/2014
THERMO-HYGRO METER	WISEWIND	201A	No. 02	05/14/2014
ISN	TESEQ	ISN T800	29449	12/12/2014
Test S/W	EZ-EMC			

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

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

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

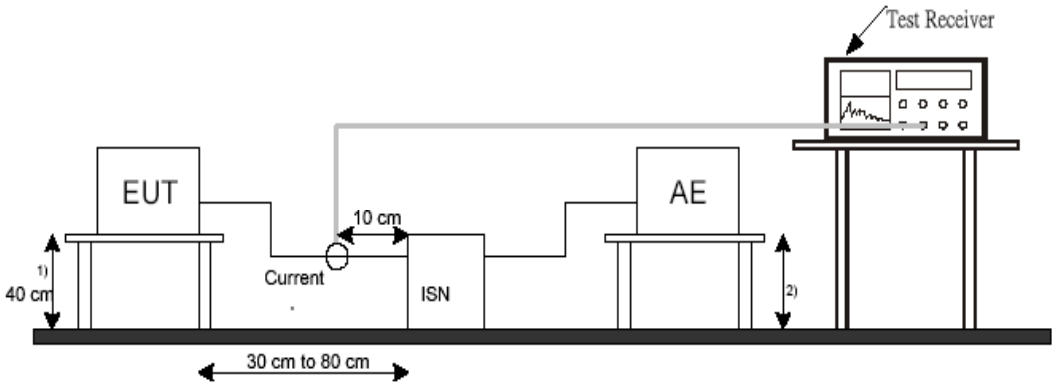
  Modes:

No.	Model	Operate State
1	IMB-152D	10Mbps
2		100Mbps
3		1Gbps

- After the preliminary scan, we found the following test mode(s) producing the highest emission level and test data of the worst case was recorded.

  Mode: 2.

7.2.4. TEST SETUP



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

7.2.5. DATA SAMPLE

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

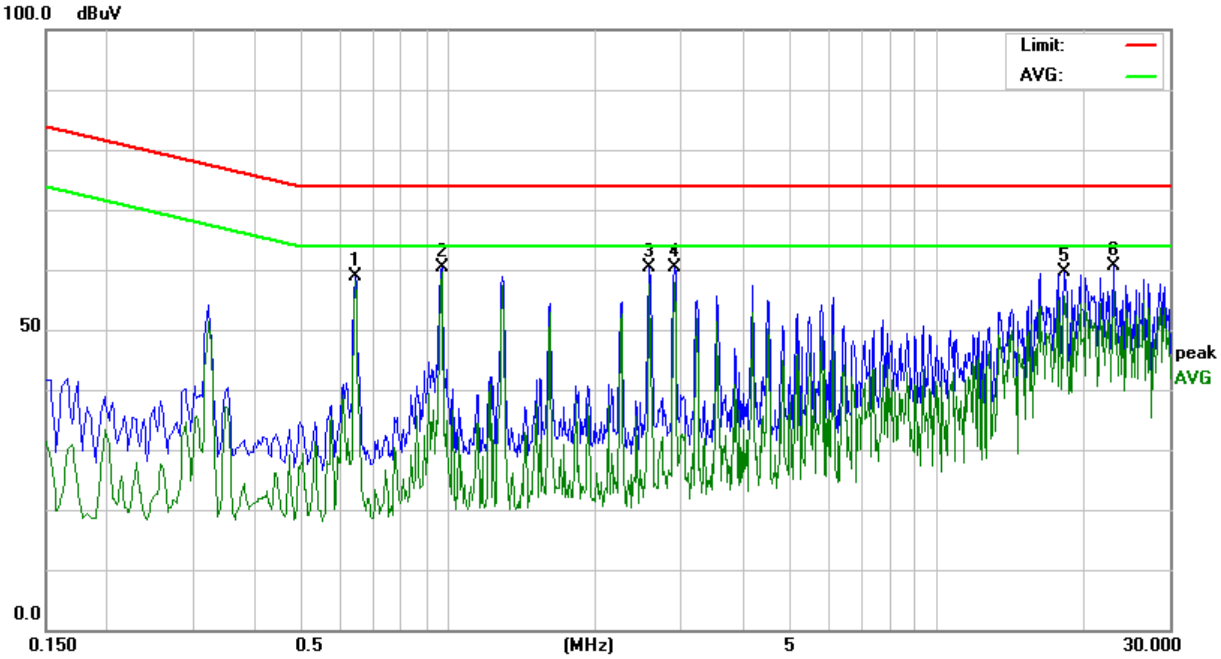
Freq. = Emission frequency in MHz
Reading = Uncorrected Analyzer/Receiver reading
Factor = Insertion loss of LISN + Cable Loss + Pulse Limit
Result = Reading + Factor
Limit = Limit stated in standard
Margin = Reading in reference to limit
P = Peak Reading
Q = Quasi-peak Reading
A = Average Reading

Calculation Formula

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

7.2.6. TEST RESULTS

Model No.	IMB-152D	6dB Bandwidth	9 kHz
Environmental Conditions	24°C, 56% RH	Test Mode	Mode 2
Tested by	David Cheng	Standard	EN 55022 CLASS B



Conducted Emission Readings						
Frequency Range Investigated				150 kHz to 30 MHz		
Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector (P/Q/A)
0.6460	39.20	19.58	58.78	74.00	-15.22	P
0.9700	40.75	19.55	60.30	74.00	-13.70	P
2.5820	40.76	19.60	60.36	74.00	-13.64	P
2.9060	40.86	19.62	60.48	74.00	-13.52	P
18.2420	39.84	19.77	59.61	74.00	-14.39	P
23.1299	40.83	19.91	60.74	74.00	-13.26	P

Note: The emission level was or more than 2dB below the Average limit, so no re-check anymore.

7.3. RADIATED EMISSION MEASUREMENT

7.3.1. LIMITS

Below 1GHz

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

Above 1GHz

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

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

According to EN 55022: 2010 clause 6.2, the measurement frequency range shown in the following table:

Highest frequency generated or used within the EUT or on which the EUT operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Less than 108	1000
108-500	2000
500-1000	5000
Above 1000	5 times of the highest frequency or 6GHz, whichever is less

7.3.2. TEST INSTRUMENTS

Open Area Test Site # J				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
MEASURE RECEIVER	R&S	ESCI	101054	04/01/2015
ANTENNA	SUNOL	JB1	A100209-2	09/08/2014
PRE-AMPLIFIER	SCHAFFNER	CPA9231A	3613	05/29/2015
CABLE	EMCI	8Dr	N-TYPE #J4、J6	08/15/2014
THERMO-HYGRO METER	WISEWIND	201A	No. 04	06/10/2014
Test S/W	EZ-EMC			
Above 1GHz Used				
SPECTRUM ANALYZER (9kHz-30GHz)	R&S	FSP 30	100112	10/22/2014
SIGNAL ANALYZER (9kHz-44GHz)	Agilent	N9010A	MY53440125	12/23/2014
ANTENNA (1-18GHz)	ETS	3117	00139062	10/31/2014
AMPLIFIER (1-26.5GHz)	HP	8449B	3008A01266	12/15/2014
CABLE (1-40GHz)	HUBER +SUHNER	SUCOFLEX 102	33106/2	12/15/2014
CABLE (1-40GHz)	HUBER +SUHNER	SUCOFLEX 102	33633/2	12/15/2014
CABLE (1-26.5GHz)	HUBER +SUHNER	SUCOFLEX 104PEA	33960/4PEA	12/15/2014
THERMO-HYGRO METER	WISEWIND	201A	No. 02	05/12/2015
Test S/W	EZ-EMC			

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

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

Procedure of Preliminary Test

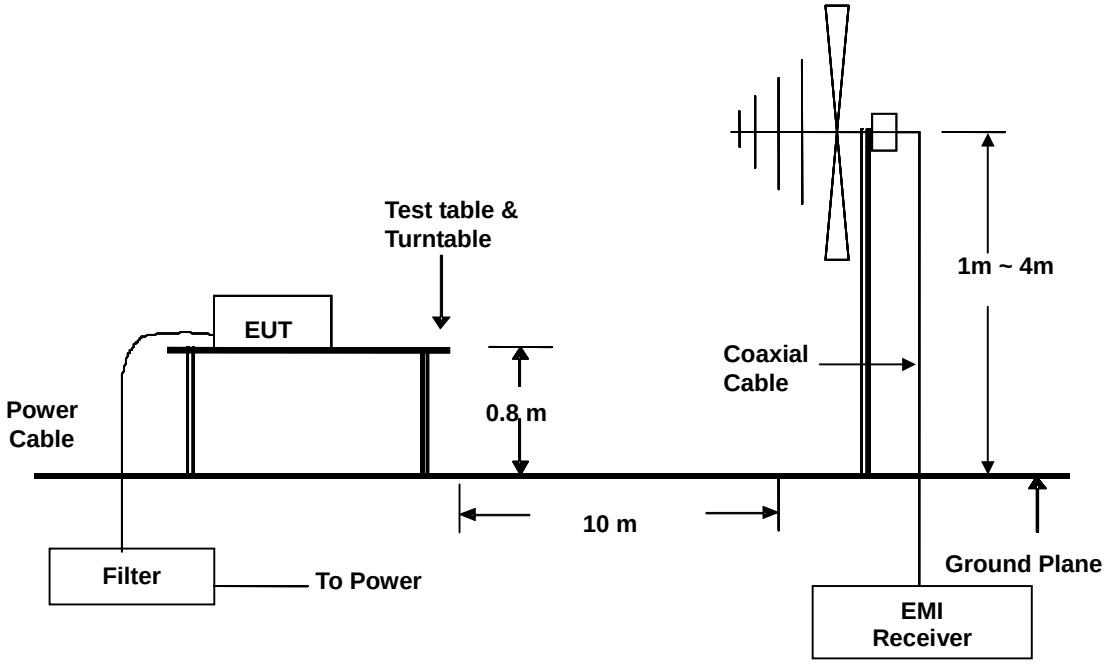
- The equipment was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane. When the EUT is a floor standing equipment, it is placed on the ground plane which has a 15 cm non-conductive covering to insulate the EUT from the ground plane.
- Support equipment, if needed, was placed as per EN 55022.
- All I/O cables were positioned to simulate typical usage as per EN 55022.
- The EUT received AC power source from the outlet socket under the turntable. All support equipment power received from another socket under the turntable.
- The antenna was placed at 3 or 10 meter away from the EUT as stated in EN 55022. The antenna connected to the Spectrum Analyzer via a cable and at times a pre-amplifier would be used.
- The Analyzer / Receiver quickly scanned from 30MHz to 6000MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- The test mode(s) described in Item 4.1 were scanned during the preliminary test:
- After the preliminary scan, we found the test mode described in Item 4.1 producing the highest emission level.
- The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the final test.

Procedure of Final Test

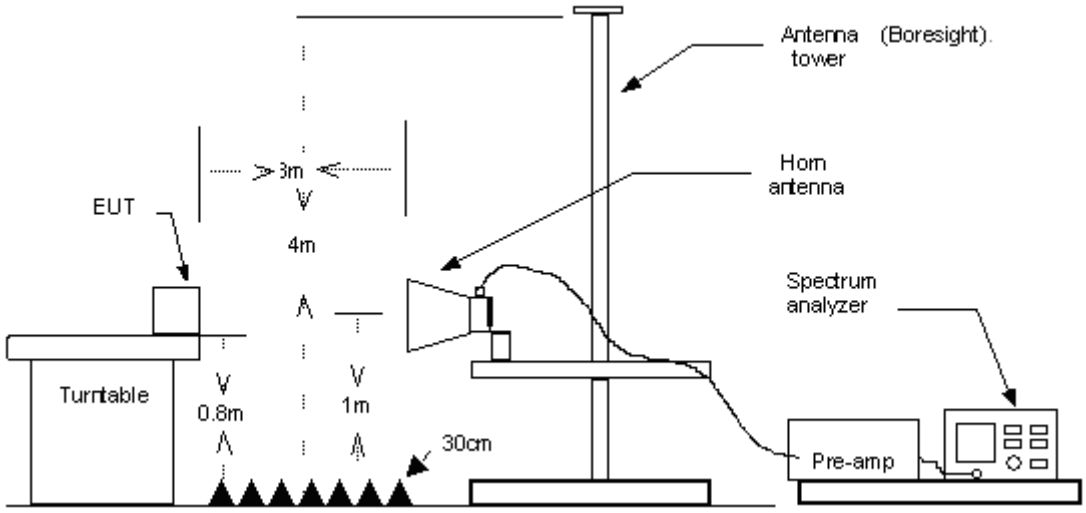
- EUT and support equipment were set up on the turntable as per the configuration with highest emission level in the preliminary test.
- The Analyzer / Receiver scanned from 30MHz to 6000MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning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

7.3.4. TEST SETUP

Below 1GHz



Above 1GHz



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

7.3.5. DATA SAMPLE

Below 1GHz

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

Above 1GHz

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

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

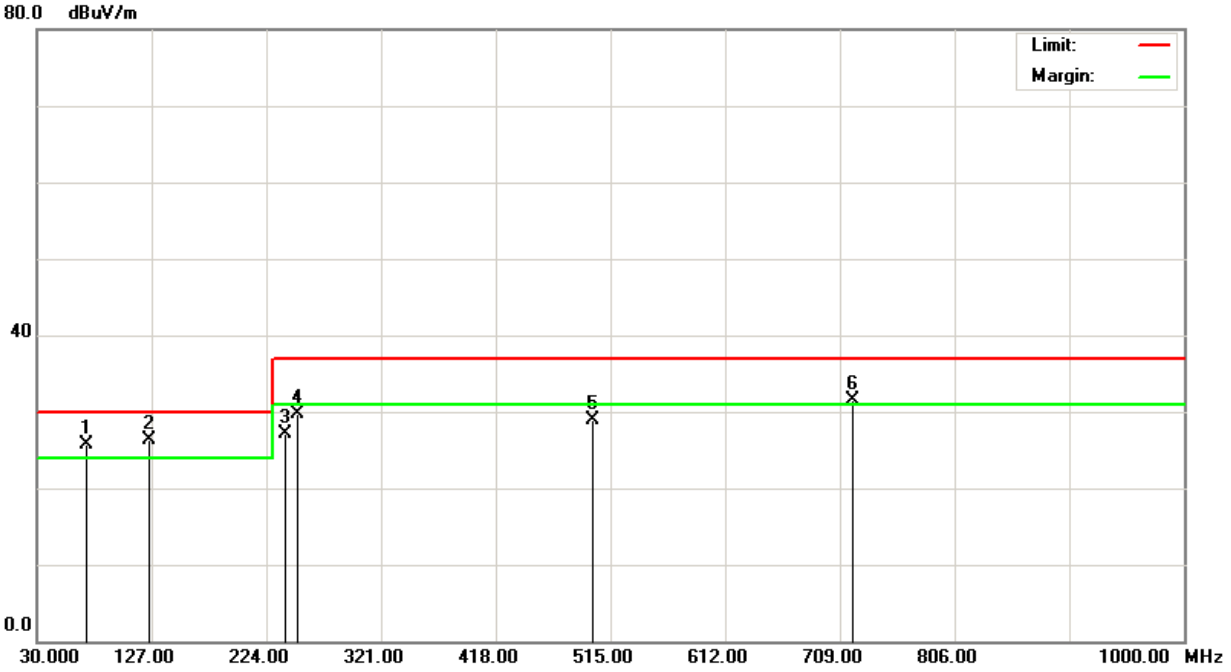
Calculation Formula

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

7.3.6. TEST RESULTS

Below 1GHz

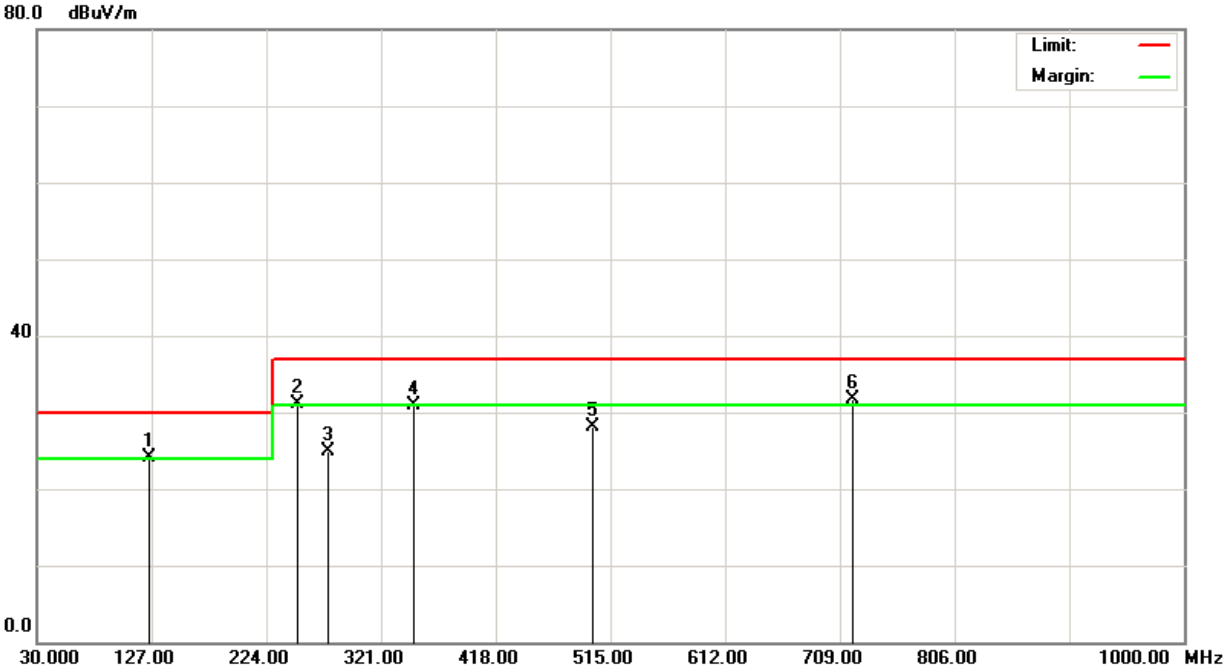
Model No.	IMB-152D	Test Mode	Mode 1
Environmental Conditions	23°C, 61% RH	6dB Bandwidth	120 kHz
Antenna Pole	Vertical	Antenna Distance	10m
Detector Function	Quasi-peak.	Tested by	Frank Liao
Standard	EN 55022 CLASS B		



Radiated Emission Readings									
Frequency Range Investigated				30 MHz to 1000 MHz at 10m					
Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Detector (P/Q)	Pol. (H/V)
72.3600	45.40	-19.62	25.78	30.00	-4.22	100	140	Q	V
125.0120	39.60	-13.30	26.30	30.00	-3.70	100	255	Q	V
240.0400	42.10	-14.99	27.11	37.00	-9.89	100	154	Q	V
250.0360	44.30	-14.61	29.69	37.00	-7.31	100	278	Q	V
500.0520	36.10	-7.16	28.94	37.00	-8.06	400	126	Q	V
720.0400	34.80	-3.22	31.58	37.00	-5.42	400	230	Q	V

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

Model No.	IMB-152D	Test Mode	Mode 1
Environmental Conditions	23°C, 61% RH	6dB Bandwidth	120 kHz
Antenna Pole	Horizontal	Antenna Distance	10m
Detector Function	Quasi-peak.	Tested by	Frank Liao
Standard	EN 55022 CLASS B		



Radiated Emission Readings									
Frequency Range Investigated				30 MHz to 1000 MHz at 10m					
Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Detector (P/Q)	Pol. (H/V)
125.0200	37.40	-13.30	24.10	30.00	-5.90	400	128	Q	H
250.0300	45.80	-14.61	31.19	37.00	-5.81	400	199	Q	H
276.1400	38.00	-13.15	24.85	37.00	-12.15	400	274	Q	H
348.5799	42.40	-11.52	30.88	37.00	-6.12	400	130	Q	H
500.0160	35.30	-7.16	28.14	37.00	-8.86	100	312	Q	H
720.0339	34.90	-3.22	31.68	37.00	-5.32	100	143	Q	H

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

Above 1GHz

Model No.	IMB-152D	**Test Mode**	Mode 1
Environmental Conditions	23°C, 54% RH	**6dB Bandwidth**	1 MHz
Antenna Pole	Vertical / Horizontal	**Antenna Distance**	3m
Highest frequency generated or used	2000MHz	**Upper frequency**	6000MHz
Detector Function	Peak and average.	**Tested by**	Frank Liao
Standard	EN 55022 CLASS B		

Radiated Emission Readings							
Frequency Range Investigated				**Above 1GHz at 3m**			
Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (P/A)	Pol. (H/V)
1115.000	**53.46**	**-6.92**	**46.54**	**70.00**	**-23.46**	**P**	**V**
1475.000	**54.85**	**-6.43**	**48.42**	**70.00**	**-21.58**	**P**	**V**
1625.000	**53.49**	**-5.32**	**48.17**	**70.00**	**-21.83**	**P**	**V**
1795.000	**52.35**	**-3.87**	**48.48**	**70.00**	**-21.52**	**P**	**V**
2065.000	**50.26**	**-1.98**	**48.28**	**70.00**	**-21.72**	**P**	**V**
4585.000	**50.18**	**2.22**	**52.40**	**74.00**	**-21.60**	**P**	**V**

Radiated Emission Readings							
Frequency Range Investigated				**Above 1GHz at 3m**			
Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (P/A)	Pol. (H/V)
1195.000	**54.57**	**-6.81**	**47.76**	**70.00**	**-22.24**	**P**	**H**
1335.000	**53.87**	**-6.61**	**47.26**	**70.00**	**-22.74**	**P**	**H**
1750.000	**51.60**	**-4.25**	**47.35**	**70.00**	**-22.65**	**P**	**H**
2375.000	**49.17**	**-1.32**	**47.85**	**70.00**	**-22.15**	**P**	**H**
3520.000	**50.89**	**0.32**	**51.21**	**74.00**	**-22.79**	**P**	**H**
4995.000	**49.23**	**2.54**	**51.77**	**74.00**	**-22.23**	**P**	**H**

Note: 1. The other emission levels were very low against the limit.
2. P= Peak Reading; A= Average Reading.

7.4. HARMONICS CURRENT MEASUREMENT

7.4.1. LIMITS OF HARMONICS CURRENT MEASUREMENT

Limits for Class A equipment	
Harmonics Order n	Max. permissible harmonics current A
Odd harmonics	
3	2.30
5	1.14
7	0.77
9	0.40
11	0.33
13	0.21
15<=n<=39	0.15x15/n
Even harmonics	
2	1.08
4	0.43
6	0.30
8<=n<=40	0.23x8/n

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

NOTE: 1. Class A and Class D are classified according to item 7.4.3.

2. According to section 7 of EN 61000-3-2, the above limits for all equipment except for lighting equipment having an active input power > 75 W and no limits apply for equipment with an active input power up to and including 75 W.

7.4.2. TEST INSTRUMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
H/F Measurement System	EMC Partner	HAR1000-1P	189	08/13/2014
Digital Power Meter	Protronix	1201	201091	No Calibration Required
Software	HARCS V4.19			

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

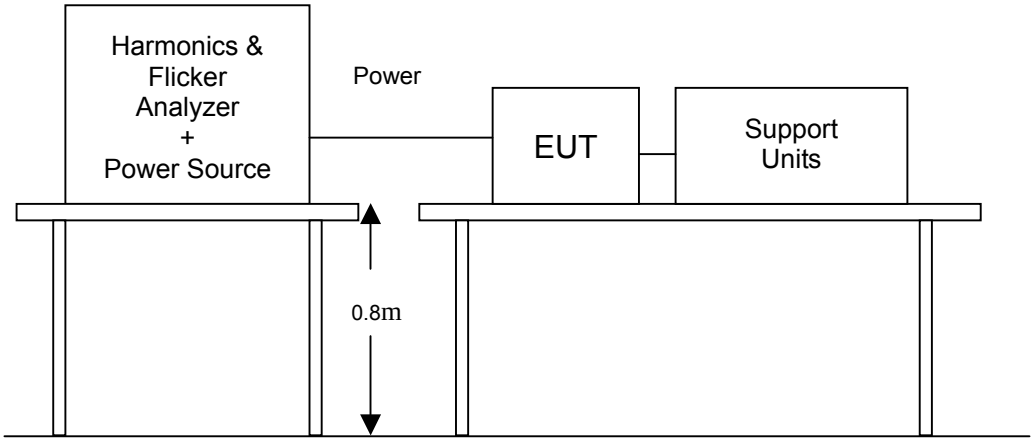
7.4.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-029)

- The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.
- The classification of EUT is according to section 5 of EN 61000-3-2.
- The EUT is classified as follows:

  Class A: Balanced three-phase equipment, Household appliances excluding equipment as Class D, Tools excluding portable tools, Dimmers for incandescent lamps, audio equipment, equipment not specified in one of the three other classes.
  Class B: Portable tools; Arc welding equipment which is not professional equipment.
  Class C: Lighting equipment.
  Class D: Equipment having a specified power less than or equal to 600 W of the following types: Personal computers and personal computer monitors and television receivers.

- The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the time necessary for the EUT to be exercised.

7.4.4. TEST SETUP



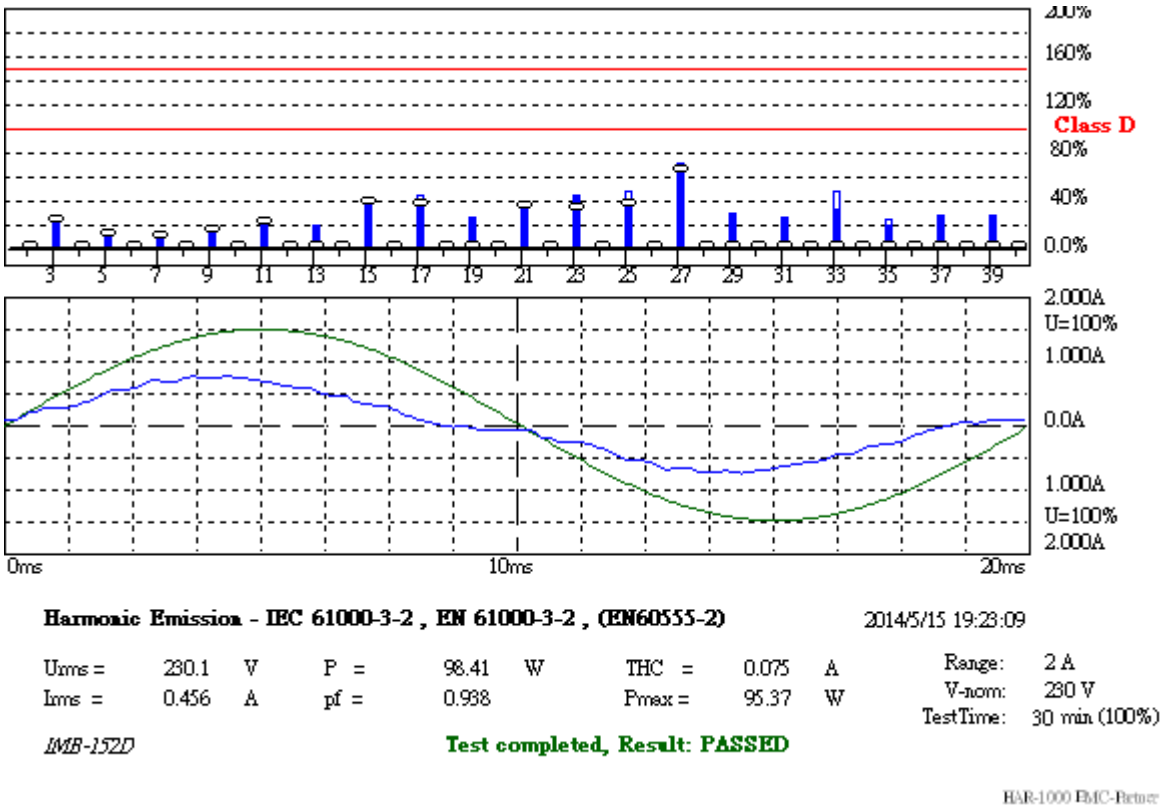
- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.4.5. TEST RESULTS

Power Consumption	98.41W	**Test Results**	PASS
Environmental Conditions	20°C, 58% RH, 1010mbar	**Limits**	Class ☐ A ☐ B ☐ C ☒ D
Test Mode	Operating	**Tested by**	Andy Lin

NOTE: Limits classified according to item 7.4.1.

Test result of EN 61000-3-2



Harmonic Emission - IEC 61000-3-2 , EN 61000-3-2 , (EN60555-2) 2014/5/15 19:23:09

Urms =	230.1	V	P =	98.41	W	THC =	0.075	A	Range:	2 A
Irms =	0.456	A	pf =	0.938		Pmax =	95.37	W	V-nom:	230 V
									TestTime:	30 min (100%)

IMB-152D **Test completed, Result: PASSED**

HAR-1000 EMC-Partner

Urms =	230.1V	Freq =	50.131	Range:	2 A
Irms =	0.456A	Ipk =	0.773A	cf =	1.696
P =	98.41W	S =	104.9VA	pf =	0.938
THDi =	17.0 %	THDu =	0.10 %	Class D	

Test - Time : 30min (100 %)

Limit Reference: Pmax = 95.371W

Test completed, Result: PASSED

Order	Freq. [Hz]	Iavg [A]	Irms [A]	Irms% [%]	Irms%L [%]	Imax [A]	Imax% [%]	Imax%L [%]	Limit [A]	Status
1	50	0.4432	0.4452	97.618		0.4648	101.93			
2	100	0.0000	0.0040	0.8833		0.0050	1.0974			
3	150	0.0694	0.0691	15.150	21.307	0.0708	15.525	21.834	0.3243	
4	200	0.0000	0.0005	0.1071		0.0005	0.1071			
5	250	0.0192	0.0192	4.2024	10.576	0.0195	4.2827	10.779	0.1812	
6	300	0.0000	0.0002	0.0535		0.0004	0.0803			
7	350	0.0079	0.0078	1.7131	8.1917	0.0083	1.8201	8.7037	0.0954	
8	400	0.0000	0.0004	0.0803		0.0006	0.1338			
9	450	0.0063	0.0063	1.3919	13.311	0.0063	1.3919	13.311	0.0477	
10	500	0.0000	0.0005	0.1071		0.0007	0.1606			
11	550	0.0066	0.0067	1.4722	20.114	0.0067	1.4722	20.114	0.0334	
12	600	0.0000	0.0005	0.1071		0.0007	0.1606			
13	650	0.0000	0.0044	0.9636	15.559	0.0049	1.0707	17.288	0.0282	
14	700	0.0000	0.0006	0.1338		0.0009	0.1874			
15	750	0.0090	0.0088	1.9272	35.905	0.0098	2.1413	39.895	0.0245	
16	800	0.0000	0.0006	0.1338		0.0007	0.1606			
17	850	0.0074	0.0071	1.5525	32.780	0.0089	1.9540	41.258	0.0216	
18	900	0.0000	0.0006	0.1338		0.0009	0.1874			
19	950	0.0000	0.0043	0.9368	22.108	0.0046	1.0171	24.003	0.0193	
20	1000	0.0000	0.0009	0.1874		0.0011	0.2409			
21	1050	0.0058	0.0056	1.2313	32.115	0.0062	1.3651	35.606	0.0175	
22	1100	0.0000	0.0013	0.2944		0.0016	0.3480			
23	1150	0.0050	0.0063	1.3919	39.762	0.0067	1.4722	42.056	0.0160	
24	1200	0.0000	0.0015	0.3212		0.0020	0.4283			
25	1250	0.0053	0.0052	1.1510	35.739	0.0066	1.4454	44.881	0.0147	
26	1300	0.0000	0.0016	0.3480		0.0020	0.4283			
27	1350	0.0086	0.0085	1.8737	62.834	0.0093	2.0343	68.220	0.0136	
28	1400	0.0000	0.0011	0.2409		0.0013	0.2944			
29	1450	0.0000	0.0033	0.7227	26.031	0.0033	0.7227	26.031	0.0127	
30	1500	0.0000	0.0006	0.1338		0.0009	0.1874			
31	1550	0.0000	0.0026	0.5621	21.643	0.0027	0.5889	22.673	0.0118	
32	1600	0.0000	0.0006	0.1338		0.0007	0.1606			
33	1650	0.0001	0.0034	0.7495	30.719	0.0050	1.0974	44.981	0.0111	
34	1700	0.0000	0.0005	0.1071		0.0006	0.1338			
35	1750	0.0000	0.0017	0.3747	16.290	0.0022	0.4818	20.945	0.0105	
36	1800	0.0000	0.0005	0.1071		0.0006	0.1338			
37	1850	0.0000	0.0023	0.5086	23.372	0.0024	0.5353	24.602	0.0099	
38	1900	0.0000	0.0005	0.1071		0.0007	0.1606			
39	1950	0.0000	0.0022	0.4818	23.338	0.0023	0.5086	24.635	0.0094	
40	2000	0.0000	0.0005	0.1071		0.0005	0.1071			

Definitions of Abbreviations

Urms	***	Actual total Voltage in Volt RMS
Irms	***	Actual total Current in Ampere RMS
Ipk	***	Actual Peak value of the Current in Ampere
cf	***	Actual Crest Factor (Ipk/Irms)
P	***	Actual Active Power in Watt
S	***	Actual Apparent Power in VA (Urms*Irms)
pf	***	Actual Power Factor (P/S)
THDi	***	Actual Total Harmonic Current Distortion in %
THDu	***	Actual Total Harmonic Voltage Distortion in %
THC	***	Actual Total Harmonic Current in Ampere
PHC	***	Actual Partial Harmonic Current in Ampere

Individual measurements for 2nd to 40th order:

Iavg		Average value of the Individual Harmonic Current in Ampere RMS
Irms	***	Actual Individual Harmonic Current in Ampere RMS
Irms%	***	Actual Individual Harmonic Current in percentage of the actual total RMS Current
Irms%L	***	Actual Individual Harmonic Current in percentage of the applicable Limit
Imax		Maximum Individual Harmonic Current in Ampere RMS
Imax%		Maximum Individual Harmonic Current in percentage of the actual total RMS Current
Imax%lim		Maximum Individual Harmonic Current in percentage of the applicable Limit
Limit Irms		Individual Limit (100%) for the selected Class in Ampere RMS

7.5. VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

7.5.1. LIMITS OF VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

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

7.5.2. TEST INSTRUMENTS

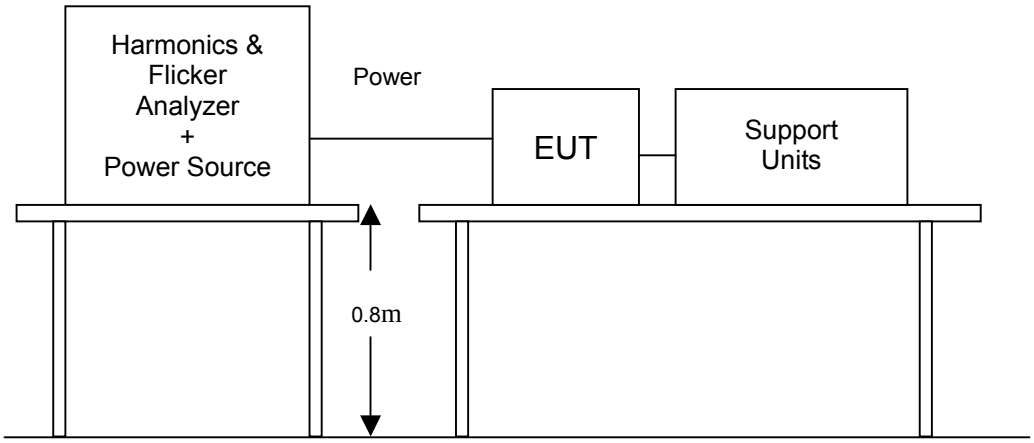
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
H/F Measurement System	EMC Partner	HAR1000-1P	189	08/13/2014
Digital Power Meter	Protronix	1201	201091	No Calibration Required
Software	HARCS V4.19			

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

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

- The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under normal operating conditions.
- During the flick measurement, the measure time shall include that part of whole operation cycle in which the EUT produce the most unfavorable sequence of voltage changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

7.5.4. TEST SETUP



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

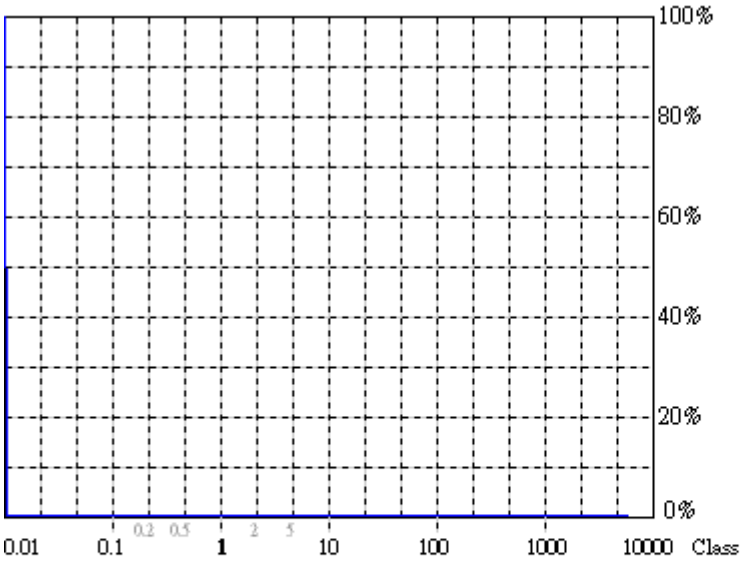
7.5.5. TEST RESULTS

Observation Period (Tp)	30mins	**Test Mode**	Operating
Environmental Conditions	20°C, 58% RH, 1010mbar	**Tested by**	Andy Lin

TEST PARAMETER	MEASUREMENT VALUE	LIMIT	REMARK
P_{st}	0.07	1.0	PASS
P_{lt}	0.07	0.65	PASS
T_{dt} (ms)	0	500	PASS
d_{max} (%)	0	4%	PASS
dc (%)	0.04	3.3%	PASS

Note: None.

Test result of EN 61000-3-3



Actual Flicker (Fli):	**0.00**
Short-term Flicker (Pst):	**0.07**
Limit (Pst):	1.00
Long-term Flicker (Plt):	**0.07**
Limit (Plt):	0.65
Maximum Relative Volt. Change (dmax):	**0.00%**
Limit (dmax):	4.00%
Relative Steady-state Voltage Change (dc):	**0.04%**
Limit (dc):	3.30%
Maximum Interval exceeding 3.30% (dt):	**0.00ms**
Limit (dt>Lim):	500ms

Flicker Emission - IEC 61000-3-3 , EN 61000-3-3 , (EN60555-3) 2014/5/14 08:36:43

Urms =	229.7	V	P =	90.02	W
Irms =	0.519	A	pf =	0.756	

Range: 2 A
V-nom: 230 V
TestTime: 30 min (100%)

IMB-152D **Test completed, Result: PASSED**

HAR-1000 EMC-Retest

8 IMMUNITY TEST

8.1. GENERAL DESCRIPTION

Product Standard	EN 55024: 2010	
	Test Type	Minimum Requirement
Basic Standard, Specification, and Performance Criterion required	IEC 61000-4-2	Electrostatic Discharge – ESD: 8kV air discharge, 4kV Contact discharge, Performance Criterion B
	IEC 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test – RS: 80 ~1000 MHz, 3V/m, 80% AM(1kHz), Performance Criterion A
	IEC 61000-4-4	Electrical Fast Transient/Burst - EFT, AC Power Port: 1kV DC Power Port: 0.5kV Signal Ports and Telecommunication Ports: 0.5kV Performance Criterion B
	IEC 61000-4-5	Surge Immunity Test: 1.2/50 μs Open Circuit Voltage, 8/20 μs Short Circuit Current, AC Power Port ~ line to line: 1kV, line to earth (ground): 2kV DC Power Port ~ line to earth: 0.5kV Signal Ports and Telecommunication Ports ~ line to ground: 1kV Performance Criterion B 10/700 μs Open Circuit Voltage, Performance Criterion C
	IEC 61000-4-6	Conducted Radio Frequency Disturbances Test – CS: 0.15 ~ 80 MHz, 3Vrms, 80% AM, 1kHz, Performance Criterion A
	IEC 61000-4-8	Power frequency magnetic field immunity test 50 Hz or 60 Hz, 1A/m, Performance Criterion A
	IEC 61000-4-11	Voltage Dips: i) >95% reduction for 0.5 period, Performance Criterion B ii) 30% reduction for 25 period, Performance Criterion C Voltage Interruptions: >95% reduction for 250 period Performance Criterion C

8.2. GENERAL PERFORMANCE CRITERIA DESCRIPTION

Criteria A:	The apparatus shell continues 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 apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the manufacturer does not specify the minimum performance level or the permissible performance loss, 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.
Criteria B:	After test, the apparatus shell continues to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomenon 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. However, no change of operating state if stored data is allowed to persist after the test. If the manufacturer does not specify the minimum performance level or the permissible performance loss, 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.
Criteria C:	Temporary loss of function is allowed, provided the functions is self-recoverable or can be restored by the operation of controls by the user in accordance with the manufacturer instructions. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

8.3. ELECTROSTATIC DISCHARGE (ESD)

8.3.1. TEST SPECIFICATION

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

8.3.2. TEST INSTRUMENT

IMMUNITY SHIELDED ROOM				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
ESD Generator	Teseq	NSG 437	249	12/16/2014
Aneroid Barometer	Sato	7610-20	89090	10/20/2014
Thermo-Hygro meter	TECPEL	DTM-303	080269	04/20/2015

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

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

The discharges shall be applied in two ways:

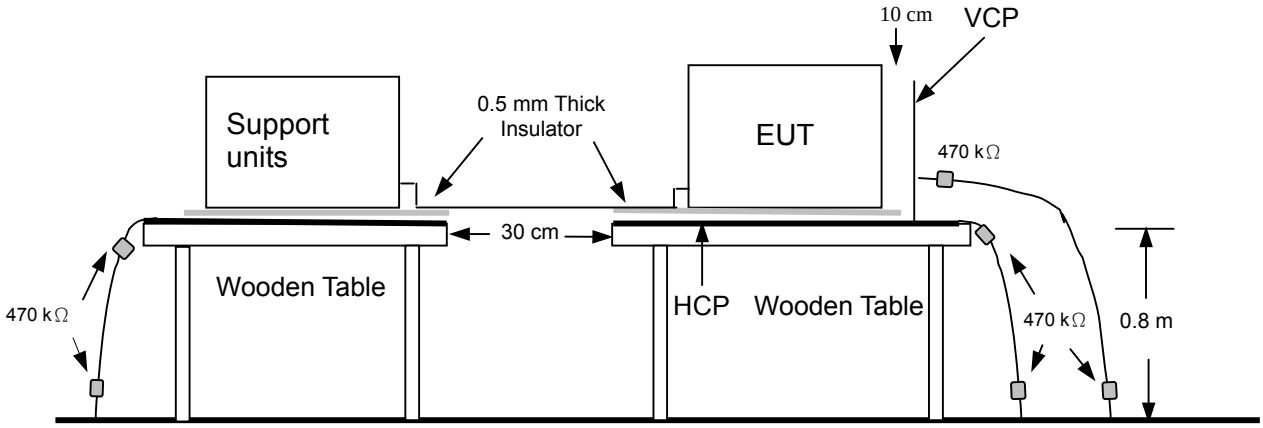
a) Contact discharges to the conductive surfaces and coupling planes:
   The EUT shall be exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points. One of the test points shall be subjected to at least 50 indirect discharges to the center of the front edge of the **H**orizontal **C**oupling **P**lane (**HCP**). The remaining three test points shall each receive at least 50 direct contact discharges. If no direct contact test points are available, then at least 200 indirect discharges shall be applied in the indirect mode. Test shall be performed at a maximum repetition rate of one discharge per second.

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

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

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

8.3.4. TEST SETUP



Ground Reference Plane

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

NOTE:

TABLE-TOP EQUIPMENT

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

FLOOR-STANDING EQUIPMENT

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

8.3.5. TEST RESULTS

Temperature	20°C	Humidity	58% RH
Pressure	1010mbar	Tested By	Andy Lin
Required Passing Performance		Criterion B	

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

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

Discharge To Horizontal Coupling Plane							
Side of EUT	Test Levels			Results			
	± 2 kV	± 4 kV	± 8 kV	Pass	Fail	Performance Criterion	Observation
Front	☒	☒	☐	☒	☐	☒A ☐B	Note ☒1 ☐2
Back	☒	☒	☐	☒	☐	☒A ☐B	Note ☒1 ☐2
Left	☒	☒	☐	☒	☐	☒A ☐B	Note ☒1 ☐2
Right	☒	☒	☐	☒	☐	☒A ☐B	Note ☒1 ☐2

Discharge To Vertical Coupling Plane							
Side of EUT	Test Levels			Results			
	± 2 kV	± 4 kV	± 8 kV	Pass	Fail	Performance Criterion	Observation
Front	☒	☒	☐	☒	☐	☒A ☐B	Note ☒1 ☐2
Back	☒	☒	☐	☒	☐	☒A ☐B	Note ☒1 ☐2
Left	☒	☒	☐	☒	☐	☒A ☐B	Note ☒1 ☐2
Right	☒	☒	☐	☒	☐	☒A ☐B	Note ☒1 ☐2

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

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

8.4.1. TEST SPECIFICATION

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

8.4.2. TEST INSTRUMENT

844 RS Chamber				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Calibration of Field	N/A	Chamber#RS	80-1000MHz	04/05/2015
Signal Generator	Agilent	E4421B	MY43350597	05/30/2014
Electric Field Probe	AR	FL7006	0338955	07/08/2014
RF Power Meter	Boonton	4242-01-02	14357	03/19/2015
Amplifier	AR	500W1000A	320994	No Calibration Required
Direction Coupler	AR	DC6180A	312189	No Calibration Required
Broadband Antenna	AR	AT1080	311819	No Calibration Required
Thermo-Hygro meter	TFA	N/A	NO.6	11/11/2014
Software	Emcware Ver. 2.6.0.16			

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

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

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

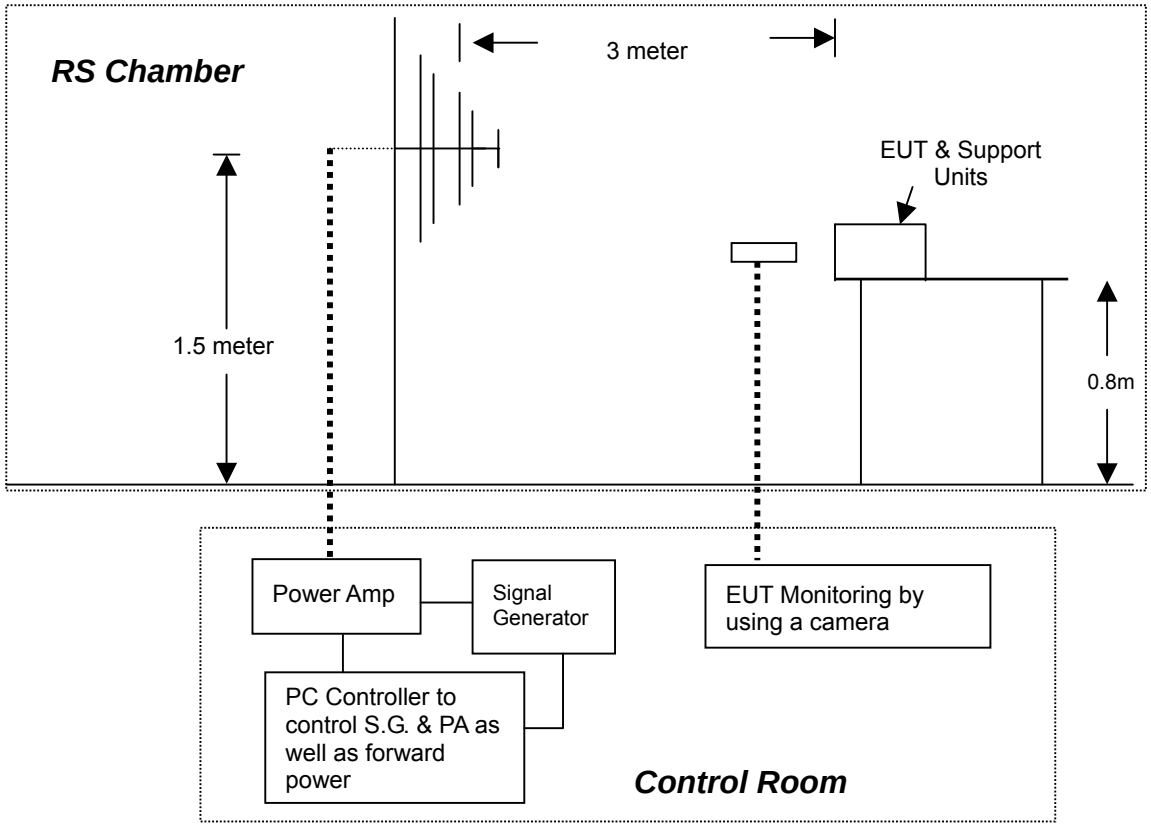
a) The testing was performed in a fully anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.

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

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

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

8.4.4. TEST SETUP



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

NOTE:

TABLETOP EQUIPMENT

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

FLOOR STANDING EQUIPMENT

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

8.4.5. TEST RESULTS

Temperature	19°C	**Humidity**	57% RH
Pressure	1010mbar	**Dwell Time**	3 sec.
Tested By	Andy Lin	**Required Passing Performance**	**Criterion A**

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

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

8.5. ELECTRICAL FAST TRANSIENT (EFT)

8.5.1. TEST SPECIFICATION

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

8.5.2. TEST INSTRUMENT

Immunity Shield Room				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
EMC Immunity Tester	EMC Partner	TRANSIENT 2000	1117	03/04/2015
Capacitive Clamp	EMC-Partner	CN-EFT1000	589	07/25/2014
Software	Genecs Ver. 3.27			

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

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

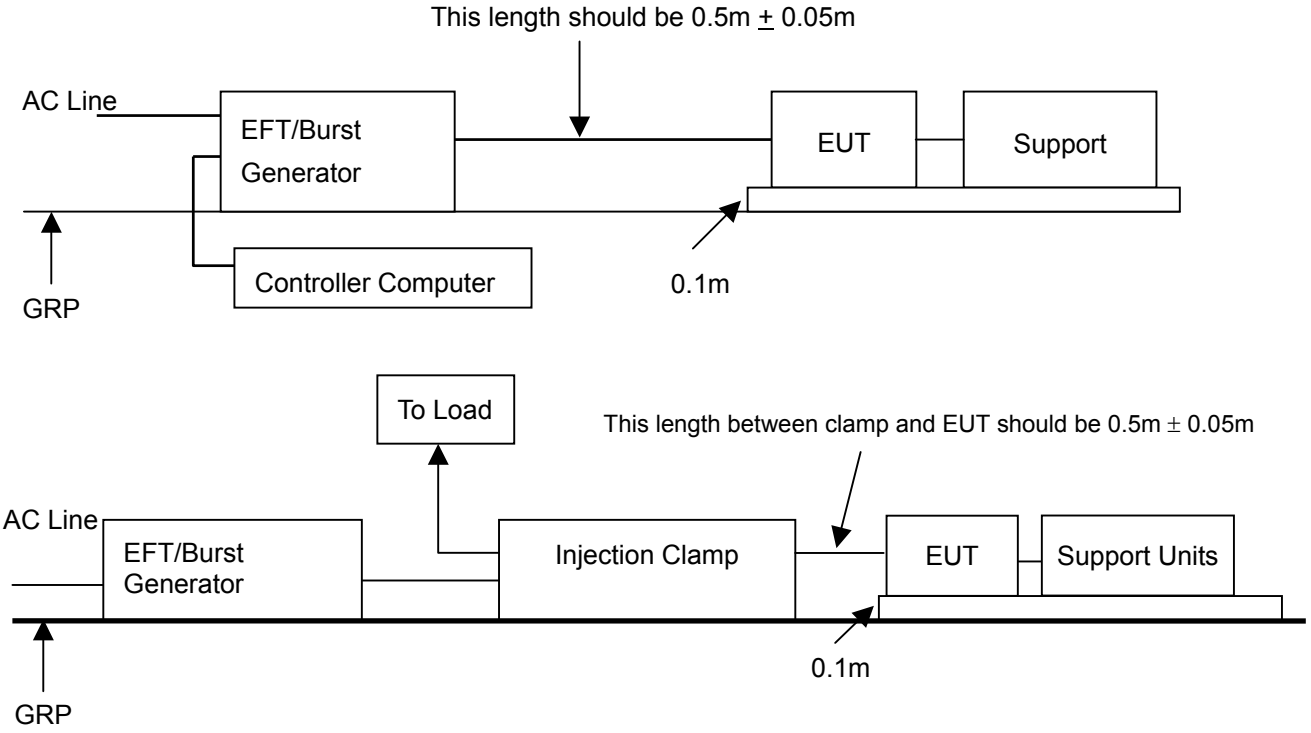
a) Both positive and negative polarity discharges were applied.

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

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

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

8.5.4. TEST SETUP



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

NOTE:

TABLETOP EQUIPMENT

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

FLOOR STANDING EQUIPMENT

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

8.5.5. TEST RESULTS

Temperature	20°C	Humidity	58% RH
Pressure	1010mbar	Tested By	Andy Lin
Required Passing Performance		Criterion B	

Test Point	Polarity	Test Level (kV)	Performance Criterion	Observation	Result
L	+/-	1	☒A ☐B	Note ☒1 ☐2	PASS
N	+/-	1	☒A ☐B	Note ☒1 ☐2	PASS
L - N	+/-	1	☒A ☐B	Note ☒1 ☐2	PASS
PE	+/-	1	☒A ☐B	Note ☒1 ☐2	PASS
L - PE	+/-	1	☒A ☐B	Note ☒1 ☐2	PASS
N - PE	+/-	1	☒A ☐B	Note ☒1 ☐2	PASS
L - N - PE	+/-	1	☒A ☐B	Note ☒1 ☐2	PASS
RJ45	+/-	0.5	☒A ☐B	Note ☒1 ☐2	PASS

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

8.6. SURGE IMMUNITY TEST

8.6.1. TEST SPECIFICATION

Basic Standard:	IEC 61000-4-5
Wave-Shape:	Combination Wave 1.2/50 μs Open Circuit Voltage 8/20 μs Short Circuit Current 10/700 μs Open Circuit Voltage
Test Voltage:	AC Power Port~ line to line: 1kV, line to ground: 2kV Signal Port / other supply ~ line to ground: 1 kV
Surge Input/Output:	AC Power Line: L-N / L-PE / N-PE Signal Line: L-G
Generator Source Impedance:	2 ohm between networks 12 ohm between network and ground 42 ohm between network and ground
Polarity:	Positive/Negative
Phase Angle:	0° / 90° / 180° / 270°
Pulse Repetition Rate:	1 time / min. (maximum)
Number of Tests:	5 positive and 5 negative at selected points

8.6.2. TEST INSTRUMENT

Immunity Shield Room				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
EMC Immunity Tester	EMC Partner	TRANSIENT 2000	1117	03/04/2015
CDN	EMC Partner	CDN-UTP8	CDN-UTP8-1505	03/05/2015
Software	Genecs Ver. 3.27			

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

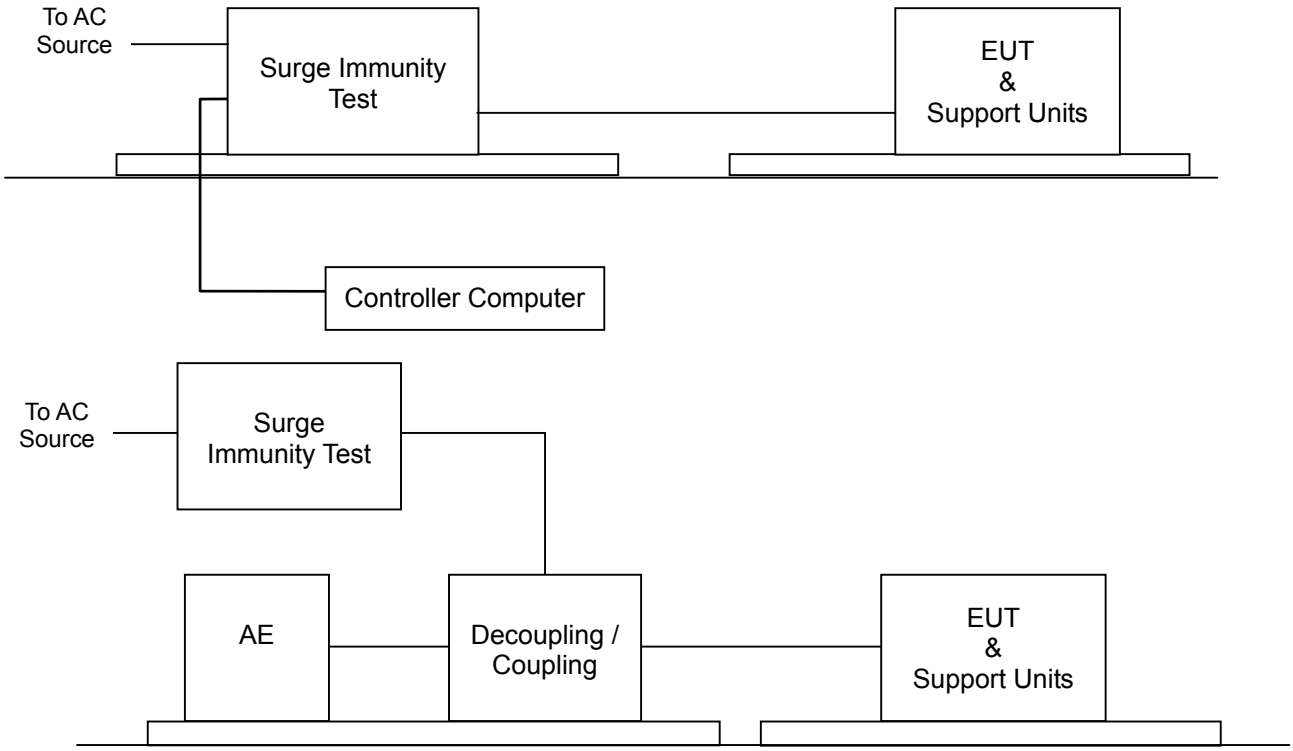
8.6.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-025)

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

b) For test applied to unshielded un-symmetrically operated interconnection lines of EUT:
The surge was applied to the lines via the capacitive coupling. The coupling / decoupling networks didn't influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling/decoupling networks was shorter than 2 meters in length.

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

8.6.4. TEST SETUP



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

8.6.5. TEST RESULTS

Temperature	20°C	Humidity	58% RH
Pressure	1010mbar	Tested By	Andy Lin
Required Passing Performance		Criterion B	

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

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

Temperature	20°C	Humidity	58% RH
Pressure	1010mbar	Tested By	Andy Lin
Required Passing Performance		Criterion C	

Test Point	Polarity	Test Level (kV)	Performance Criterion	Observation	Result
RJ45	+/-	1	☒A ☐B ☐C	Note ☒1 ☐2	PASS

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

8.7. CONDUCTED RADIO FREQUENCY DISTURBANCES (CS)

8.7.1. TEST SPECIFICATION

Basic Standard:	IEC 61000-4-6
Frequency Range:	0.15 MHz ~ 80 MHz
Field Strength:	3 Vrms
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of preceding frequency value
Coupled cable:	Power Mains, Unshielded; RJ45 Line, Unshielded
Coupling device:	CDN-M3 (3 wires); CDN-T8

8.7.2. TEST INSTRUMENT

CS Room				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
CWS Generator	EM Test	CWS 500N1	V0395105080	10/02/2014
CDN (EUT)	Teseq	CDN M016	35820	06/21/2014
CDN	Teseq	CDN M016	35821	06/21/2014
CDN	Teseq	CDN T400A	25674	01/09/2015
CDN	Teseq	CDN T800	26155	01/26/2015
Attenuator	EMCI	SA3NL	10006F	No Calibration Required
Software	icd.control Ver. 5.1.9			

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

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

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

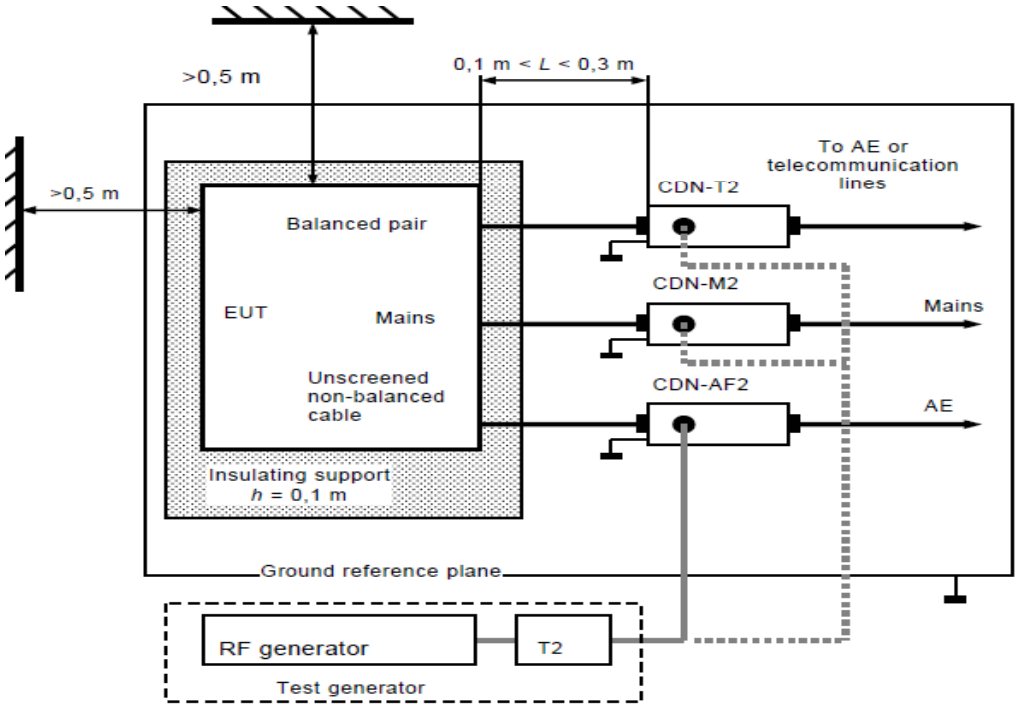
The test shell performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.

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

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

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

8.7.4. TEST SETUP



Note: 1. The CDNs and / or EM clamp used for real test depends on ports and cables configuration of EUT.
2. The EUT clearance from any metallic obstacles shall be at least 0.5m

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

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

8.7.5. TEST RESULTS

Temperature	21°C	**Humidity**	55% RH
Pressure	1010mbar	**Tested By**	Andy Lin
Required Passing Performance		**Criterion A**	

Frequency Band (MHz)	Field Strength (Vrms)	Cable	Injection Method	Performance Criterion	Observation	Result
0.15 ~ 80	3	AC Power Line (0.3m)	CDN-M3	☒A ☐B	Note ☒1 ☐2	PASS
0.15 ~ 80	3	RJ 45 Line (0.3m)	CDN-T8	☒A ☐B	Note ☒1 ☐2	PASS

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

8.8. POWER FREQUENCY MAGNETIC FIELD

8.8.1. TEST SPECIFICATION

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

8.8.2. TEST INSTRUMENT

Immunity Shield Room				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**

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

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

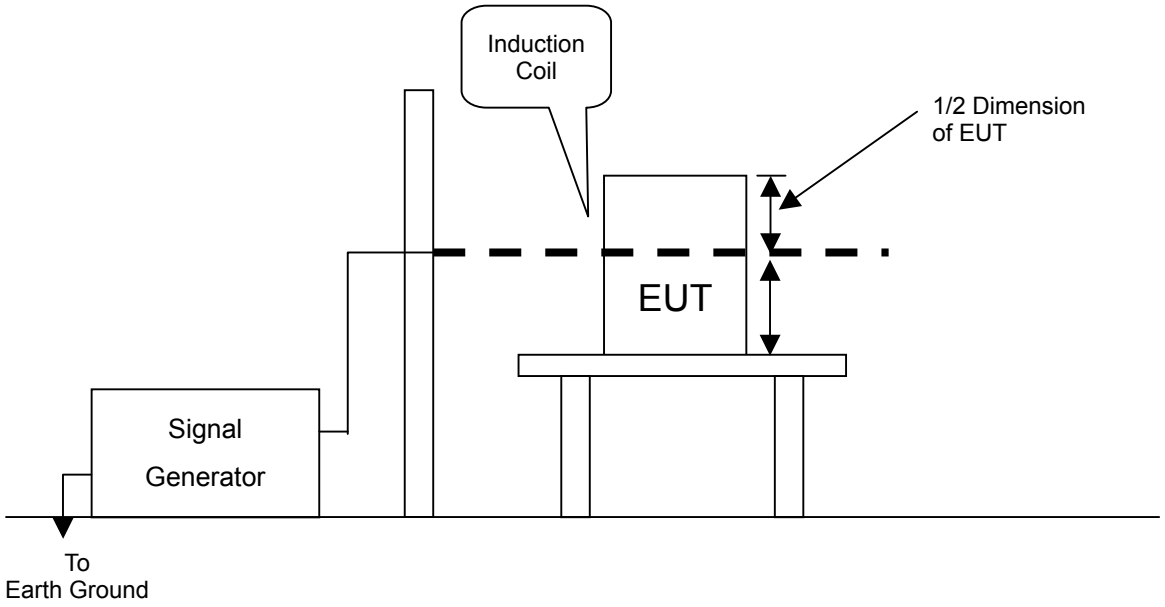
a. The equipment is configured and connected to satisfy its functional requirements. It shall be placed on the GRP with the interposition of a 0.1m-thick insulating support.

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

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

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

8.8.4. TEST SETUP



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

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

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

8.8.5. TEST RESULTS

Temperature	N/A	**Humidity**	N/A
Pressure	N/A	**Tested By**	N/A
Required Passing Performance		**Criterion A**	

DIRECTION	Field Strength (A/m)	Performance Criterion	OBSERVATION	RESULTS
X	1	A	Note	N/A
Y	1	A	Note	N/A
Z	1	A	Note	N/A

NOTE: There is no any sensitive part for magnetic field test. Applicable only to equipment containing susceptible to magnetic field.

8.9. VOLTAGE DIPS & VOLTAGE INTERRUPTIONS

8.9.1. TEST SPECIFICATION

Basic Standard:	IEC 61000-4-11
Test duration time:	Minimum three test events in sequence
Interval between event:	Minimum 10 seconds
Phase Angle:	0^o / 180^o
Test cycle:	3 times

8.9.2. TEST INSTRUMENT

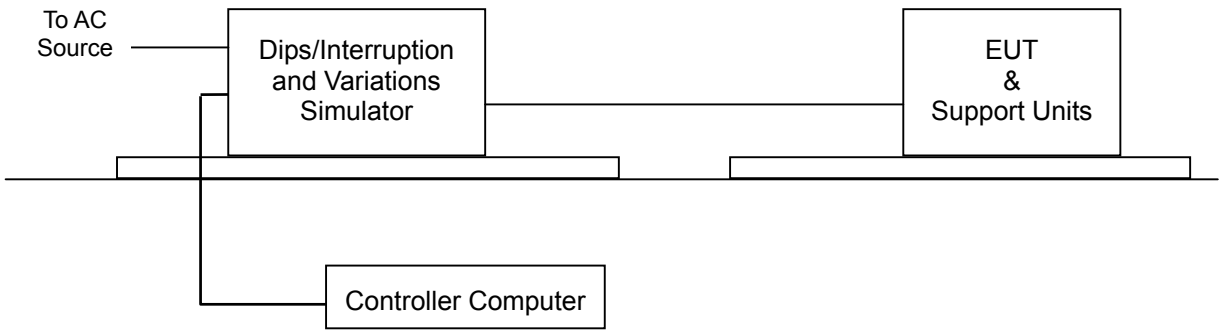
Immunity shielded room				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
EMC Immunity Tester	EMC Partner	TRANSIENT 2000	1117	03/04/2015
AC/DC Clamp Meter	Lutron	CM-9930R	I.200121	06/04/2014
Software	Genecs Ver. 3.27			

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

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

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

8.9.4. TEST SETUP



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

8.9.5. TEST RESULTS

Temperature	20°C	**Humidity**	58% RH
Pressure	1010mbar	**Tested By**	Andy Lin
Required Passing Performance	**Criterion B: >95% reduction 0.5 period** **Criterion C: 30% reduction 25 period & >95% reduction 250 period**		

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

NOTE: 1. There was no change compared with initial operation during and after the test. No unintentional response was found during the test.

2. EUT shut down, it could not become normal except reinstalled by operator.

9 PHOTOGRAPHS OF THE TEST CONFIGURATION

CONDUCTED EMISSION TEST

CONDUCTED EMISSION TEST AT TELECOMMUNICATION PORTS

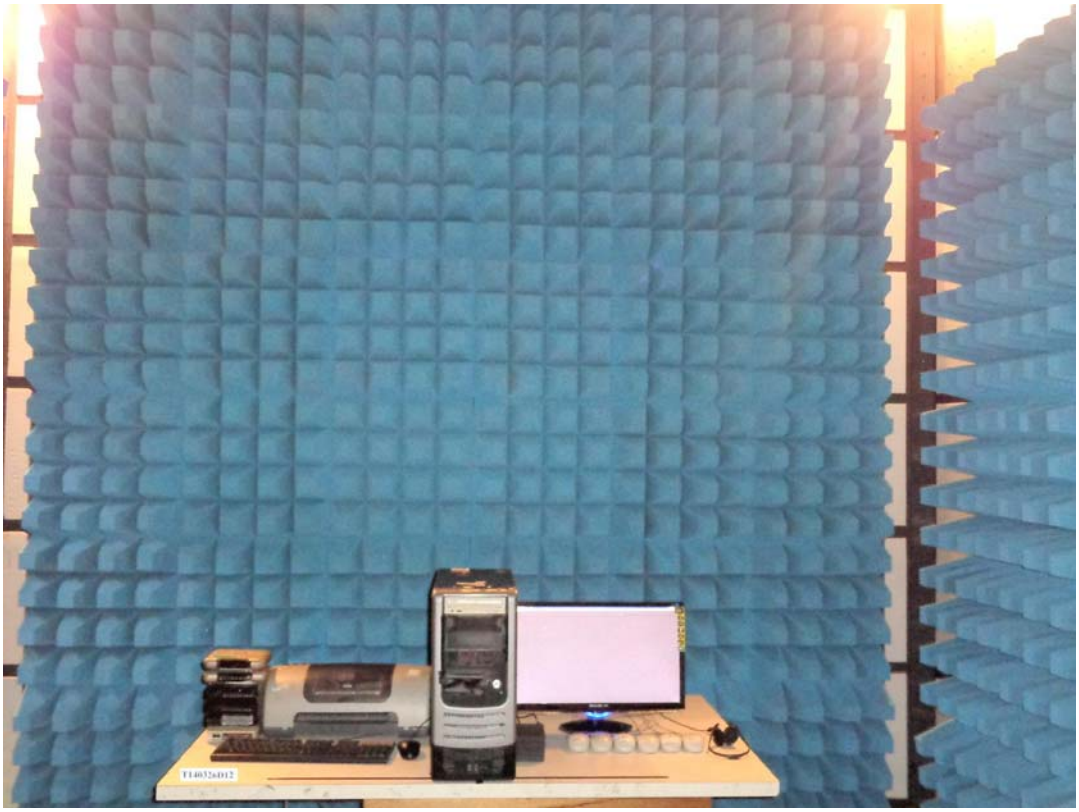
RJ45 Telecom Port with ISN (10Mbps & 100Mbps & 1Gbps)

RADIATED EMISSION TEST

Harmonic & Flicker Test

ESD Test

RS Test



EFT Test

EFT For I/O Test

Surge Test

Surge For I/O Test

CS Test

CS For I/O Test

Voltage Dips / Interruptions Test