CE EMC TEST REPORT

REPORT NO.: CE121017D09

MODEL NO.: V652 ***– multiple listing see item 3.1***

RECEIVED: Oct. 17, 2012

TESTED: Oct. 18 ~ 24, 2012

ISSUED: Oct. 25, 2012

APPLICANT: TOP VICTORY ELECTRONICS (TAIWAN) CO., LTD.

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ISSUED BY: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

LAB LOCATION: No. 47, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

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LAB CODE: 200836-0

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
CE121017D09	Original release	Oct. 25, 2012

1 CERTIFICATION

PRODUCT:	LCD Monitor
BRAND NAME:	NEC
MODEL NO.:	V652 ***– multiple listing see item 3.1***
APPLICANT:	TOP VICTORY ELECTRONICS (TAIWAN) CO., LTD.
TEST ITEM:	ENGINEERING SAMPLE
TESTED:	Oct. 18 ~ 24, 2012
STANDARDS:	**EN 55022 2010, Class B**
	CISPR 22:2008, Class B
	AS/NZS CISPR 22:2009, Class B
	EN 61000-3-2:2006 +A1:2009 +A2:2009, Class D
	EN 61000-3-3:2008
	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 61000-4-5:2005 ED.2.0
	IEC 61000-4-6:2008 ED.3.0
	IEC 61000-4-8:2009 ED.2.0
	IEC 61000-4-11:2004 ED.2.0

The above equipment (model no.: V652) 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 : Albee Chu , **DATE:** Oct. 25, 2012

(Albee Chu / Specialist)

APPROVED BY : Kenny Meng , **DATE:** Oct. 25, 2012

(Kenny Meng / Assistant Manager)

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

EMISSION			
Standard	**Test Type**	**Result**	**Remarks**
EN 55022:2010, Class B CISPR 22:2008, Class B AS/NZS CISPR 22: 2009, Class B	Conducted Test	PASS	Meets Class B Limit Minimum passing margin is –15.78 dB at 4.59375 MHz
	Conducted Test (Telecom port)	PASS	Meets Class B Limit Minimum passing margin is –4.30 dB at 10.00000 MHz
	Radiated Test (30MHz ~ 6GHz)	PASS	Meets Class B Limit Minimum passing margin is –4.10 dB at 2246.97 MHz
EN 61000-3-2:2006 +A1:2009 +A2:2009, Class D	Harmonic current emissions	PASS	Meets Class D limit
EN 61000-3-3:2008	Voltage fluctuations & flicker	PASS	Meets the requirements

IMMUNITY (EN 55024:2010)			
Standard	**Test Type**	**Result**	**Remarks**
IEC 61000-4-2:2008 ED.2.0	Electrostatic discharge immunity test	PASS	Meets the requirements of Performance Criterion B
IEC 61000-4-3:2010 ED.3.2	Radiated, radio-frequency, electromagnetic field immunity test	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-4:2012 ED.3.0	Electrical fast transient / burst immunity test.	PASS	Meets the requirements of Performance Criterion B
IEC 61000-4-5:2005 ED.2.0	Surge immunity test	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-6:2008 ED.3.0	Immunity to conducted disturbances, induced by radio-frequency fields	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-8:2009 ED.2.0	Power frequency magnetic field immunity test.	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-11:2004 ED.2.0	Voltage dips and short interruptions immunity tests	PASS	Meets the requirements of **Voltage Dips:** i) >95% reduction - Performance Criterion A ii) 30% reduction – Performance Criterion A **Voltage Interruptions:** i) >95% reduction – Performance Criterion B

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:

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

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	150kHz ~ 30MHz	3.43 dB
Conducted emissions at telecom port	150kHz ~ 30MHz	2.9795 dB
Radiated emissions	30MHz ~ 1GHz	3.78 dB
	Above 1GHz	3.36 dB

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.

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	LCD Monitor
MODEL NO.	V652 – ***multiple listing see note below***
POWER SUPPLY	Internal Switching Power Supply Rating: 100-240V, 50/60Hz Power Cord: Non-shielded AC 3-pin (3m).
DATA CABLE SUPPLIED	Shielded D-Sub cable (4m) with two ferrite cores

NOTE:

1. The EUT is a LCD Monitor with resolution is up to 1920 x 1080, (60Hz). And it has several models, which are identical to each other except for their marketing differences only, as the following:

Brand	Model No.	Difference
NEC	V652	For marketing differences
	MultiSync V652	
	V652(C)	

During the test, **model: V652** was selected as the representative one and therefore only its test data was recorded in this report.

2. The EUT is equipped the following interfaces:

Input		Output
♦ DVI ♦ D-Sub ♦ Display ♦ RS-232C ♦ HDMI	♦ LAN (10/100Mbps) ♦ RGB/HV (BNC) ♦ Video 1 ♦ Audio ♦ Remote (IR control)	♦ RS-232C ♦ DVI ♦ Audio ♦ External Speaker Terminal
Accessory		
Remote controller (NEC/ RU-M117)		
Speaker (NEC/ SP-RM1)		

3. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

3.2 DESCRIPTION OF TEST MODES

1. The EUT is designed with AC power supply of 100-240Vac, 50/60Hz.
   For radiated emission evaluation, 230Vac/ 50Hz (for EN 55022 & AS/NZS CISPR 22), 120Vac/ 60Hz (for FCC Part 15), 100Vac/ 50Hz (for VCCI) had been covered during the pre-test. The worst radiated emission data was founded at **230Vac/ 50Hz** and recorded in the applied test report.

2. The EUT was pre-tested under the following resolution & refresh rate modes:

Interface	Resolution	Monitor's angle
Display	1920 x 1080 (60Hz)	♦ Horizontal ♦ Vertical

3. The worst emission level was found under **Monitor's angle: Horizontal**, therefore the EUT was pre-testing other interfaces as the following:

Interface	Resolution	Monitor's angle
DVI	1920 x 1080 (60Hz)	Horizontal
D-Sub		
Display		
HDMI		
RGB/HV(Note) to D-Sub		

4. Per evaluation **Display** produced worst emission level and therefore the EUT was pre-testing under the following resolution & refresh rate modes:

Interface	Resolution	Monitor's angle
Display	1920 x 1080 (60Hz)	Horizontal
	1680 x 1050 (60Hz)	
	1440 x 900 (60Hz)	
	1360 x 768 (60Hz)	
	1280 x 1024 (60Hz)	
	1024 x 768 (60Hz)	
	800 x 600 (60Hz)	
	640 x 480 (60Hz)	
DVD to HDMI	1080p	
DVD to HDMI in, RS-232C out	1080p	
Component (Note)	1080p	
Video 1	-	
Video 2(Note)	-	
S-Video(Note)	-	
LAN (10Mbps)	-	
LAN (100Mbps)	-	

Note: Common terminal.

The worst emission level was found under following mode:

Interface	Resolution	Monitor's angle
Display	1920 x 1080 (60Hz)	Horizontal

5. According to the pre-test result and client's requirement, the EUT was tested under following mode:

Test Item	Test Mode	Interface	Resolution
Conducted & Radiated tests	Mode 1	Display	1920 x 1080 (60Hz)
	Mode 2	DVD to HDMI	1080p
Conducted Test at Telecom Port test	Mode 1	LAN (10/100Mbps)	-
Harmonic Flicker & Immunity tests	Mode 1	Display	1920 x 1080 (60Hz)

All above test modes were recorded in this report.

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a kind of ITE equipment and, according to the specifications of the manufacturers, must comply with the requirements of the following standards:

EN 55022:2010, Class B

CISPR 22:2008, Class B

AS/NZS CISPR 22:2009, Class B

EN 61000-3-2:2006 +A1:2009 +A2:2009, Class D

EN 61000-3-3:2008

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 61000-4-5:2005 ED.2.0

IEC 61000-4-6:2008 ED.3.0

IEC 61000-4-8:2009 ED.2.0

IEC 61000-4-11:2004 ED.2.0

Notes: The above IEC basic standards are applied with latest version if customer has no special requirement

3.4 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.

3.4.1 FOR EMISSION TEST

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	PERSONAL COMPUTER	HP	DX-7400MT	SGH8460H2S	FCC DoC Approved
2	VGA CARD	MSI	MS-V279	602-V279-030B 1207067050	FCC DoC Approved
3	PERSONAL COMPUTER	HP	6000ProMT	SGH110SGNF	FCC DoC Approved
4	VGA CARD	DELL	X300SE	260629000096	FCC DoC Approved
5	24" LCD MONITOR	DELL	U2410	CN082WXD728 720CC0UHL	FCC DoC Approved
6	DVD PLAYER	SONY	BDP-S470	3205076	Verification
7	EXTERNAL USB 1.1 FLOPPY	SONY	MPF82E	50010254	FCC DoC Approved
8	PRINTER	EPSON	LQ-300+II	G88Y058145	FCC DoC Approved
9	EARPHONE	PHILIPS	SBC HL150	H2010152	N/A
10	PS/2 KEYBOARD	HP	KB-0316	BC3520GVBWH 1DJ	FCC DoC Approved
11	PS/2 MOUSE	BTC	M851	N/A	E5XMSM860
12	PS/2 KEYBOARD	HP	KB-0316	BC3520DGAVF 050	FCC DoC Approved
13	PS/2 MOUSE	BTC	M851	N/A	E5XMSM860
14	IR	NEC	N/A	N/A	N/A
15	NOTEBOOK COMPUTER	DELL	PP04X	7C1VY1S	FCC DoC Approved

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	4 m Shielded D-Sub cable with two ferrite cores (provided by client).
2	N/A
3	1.8 m Shielded DVI cable with two ferrite cores; 1.8 m Shielded BNC to D-Sub cable with one ferrite core; 1.8 m Shielded RS-232C cable; 1.8 m Shielded Display cable; 1.8 m Shielded Audio cable
4	N/A
5	1.8 m Shielded DVI cable with two ferrite cores.
6	1.8 m Shielded Video cable; 1.8 m Shielded HDMI cable.
7	1.8m USB cable.
8	1.8m braid shielded wire, terminated with DB25 and Centronics connector via metallic frame, w/o core
9	1.2 m wrapped shielded wire, terminated with 3.5mm phone plug via drain wire, w/o core.
10	1.8 m foil shielded wire, terminated with PS/2 connector via metallic frame, w/o core.
11	1.5 m Non shielded wire, terminated with PS/2 connector via drain wire, w/o core.
12	1.8 m foil shielded wire, terminated with PS/2 connector via metallic frame, w/o core.
13	1.5 m Non shielded wire, terminated with PS/2 connector via drain wire, w/o core.
14	1.8 m Shielded data cable.
15	10 m UTP LAN cable

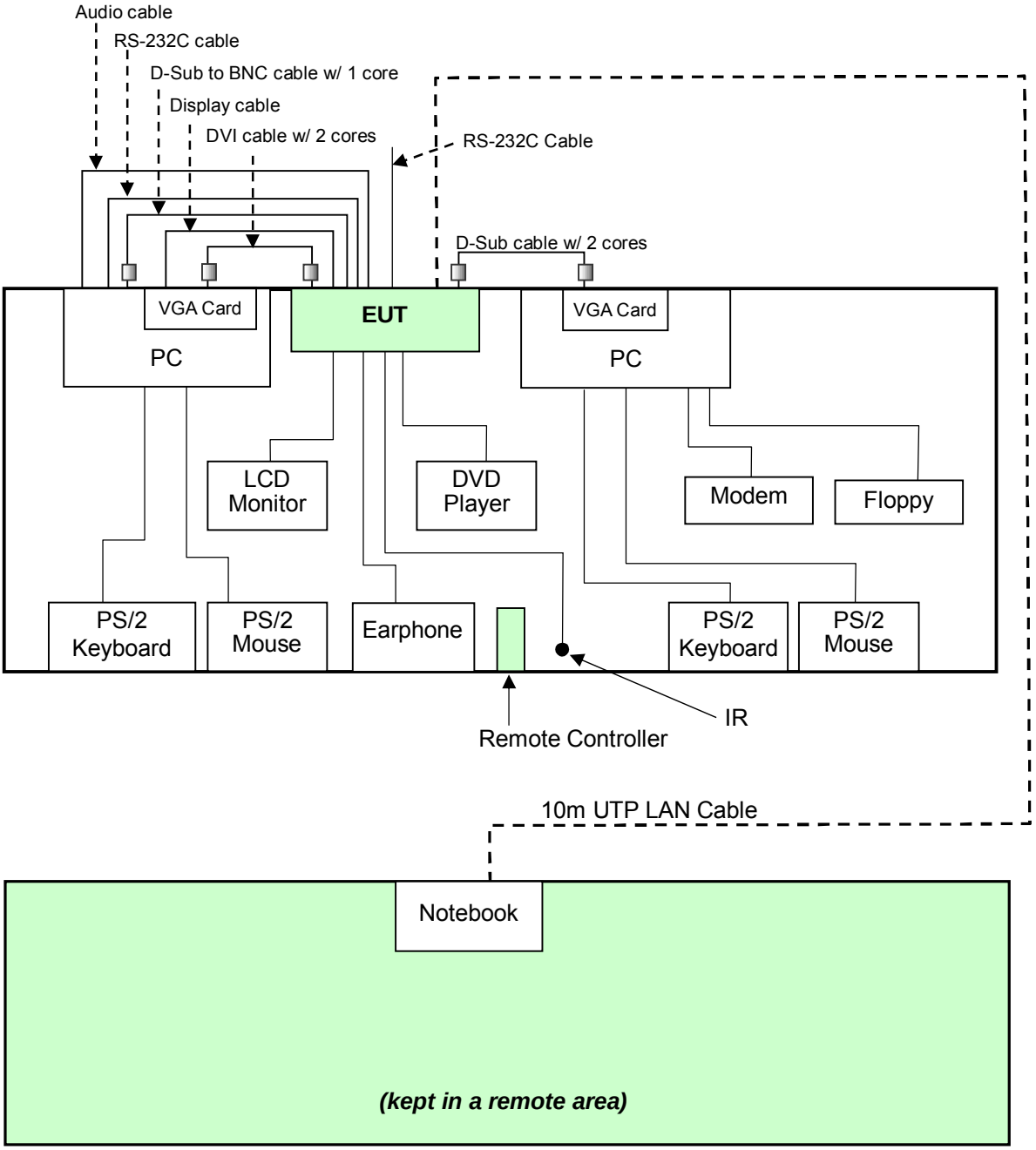
NOTE: (1) All power cords of the above support units are non-shielded (1.8 m).

(2) The support unit 2 was installed in support unit 1 and the support unit 4 was installed in support unit 3.

(3) The support unit 14 was provided by client.

(4) One RS-232C cable (1.8m) was connected to EUT to form an open loop cable.

TEST CONFIGURATION



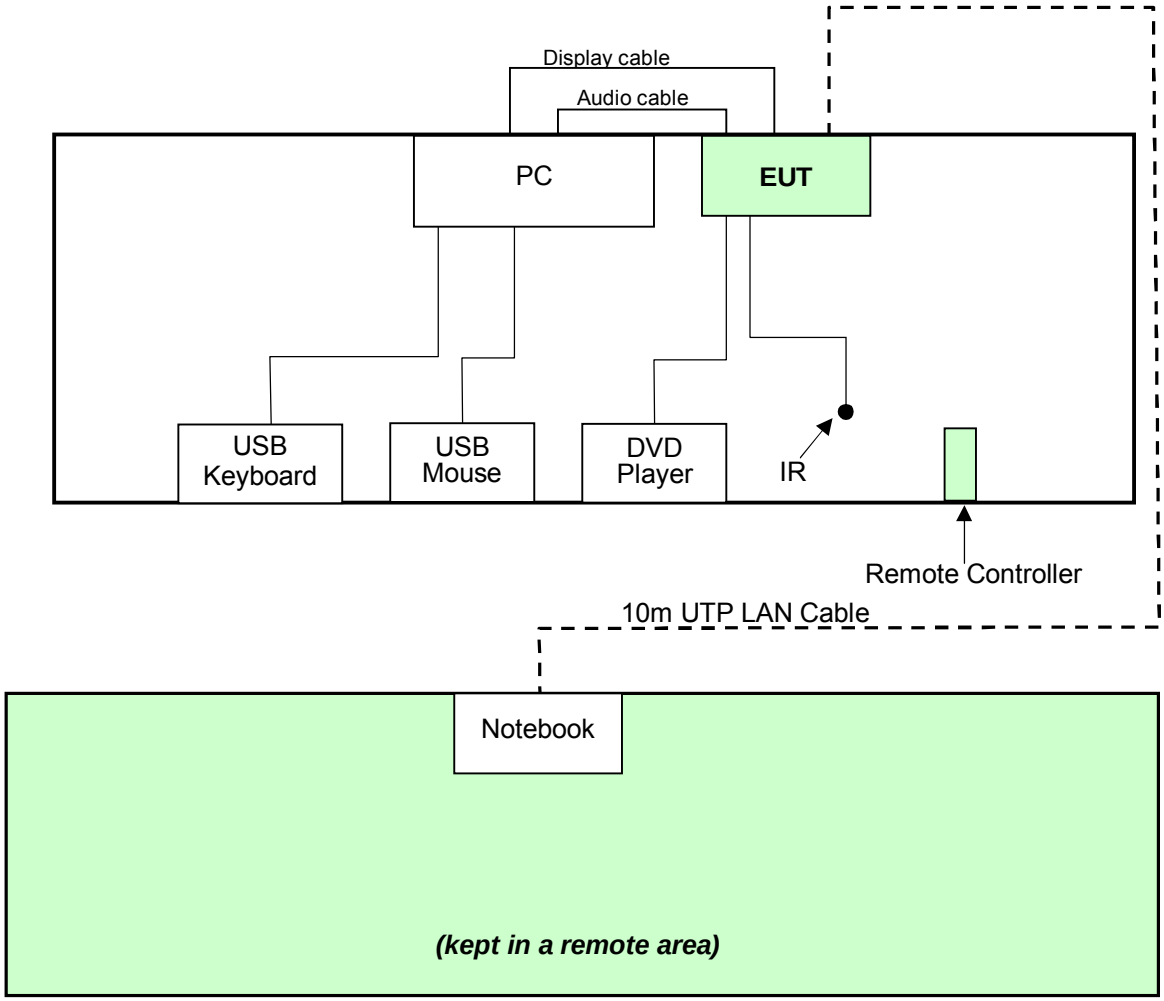
3.4.2 FOR HARMONICS / FLICKER / IMMUNITY TEST

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	DELL COMPUTER	DELL	OptiPlex GX620	1PPMJ1S	FCC DoC Approved
2	VGA CARD	ATI	B382	260836000135	FCC DoC Approved
3	DVD player	SONY	DVP-NS530	1002858	Verification
4	USB KEYBOARD	DELL	SK-8115	CN-0J4635-716 16-63I-076X	FCC DoC Approved
5	USB MOUSE	HP	M-UAE96	F93A90H5BWG 04YT	FCC DoC Approved
6	IR	NEC	N/A	N/A	N/A
7	Notebook PC	DELL	Latitude E6520	2ZW55Q1	FCC DoC Approved

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	1.8 m Shielded Display cable 1.8 m Shielded Audio cable
2	N/A
3	1.8 m Shielded BNC cable
4	2.0 m foil shielded wire, terminated with USB connector via drain wire, one core
5	1.8 m Non shielded wire, terminated with USB connector via drain wire, w/o core.
6	1.8 m Shielded data cable.
7	10 m UTP LAN cable

NOTE: (1) All power cords of the above support units are non-shielded (1.8 m).
(2) The support unit 6 was provided by client.

Test Configuration



4 EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

TEST STANDARD: EN 55022

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.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	100292	Dec. 20, 2011	Dec. 19, 2012
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH2-Z5	100104	Dec. 19, 2011	Dec. 18, 2012
LISN With Adapter (for EUT)	AD10	C09Ada-001	Dec. 19, 2011	Dec. 18, 2012
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	835239/002	Mar. 20, 2012	Mar. 19, 2013
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	100220	Nov. 21, 2011	Nov. 20, 2012
Software	ADT_Cond_V7.3.7	NA	NA	NA
Software	ADT_ISN_V7.3.7	NA	NA	NA
RF cable (JYEBAO)	5D-FB	Cable-C09.01	Feb. 22, 2012	Feb. 21, 2013
SUHNER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-010789	May 21, 2012	May 20, 2013

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 Shielded Room No. 9.
3. The VCCI Site Registration No. C-1312.
4. Tested Date: Oct. 18, 2012

4.1.3 TEST PROCEDURE

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.

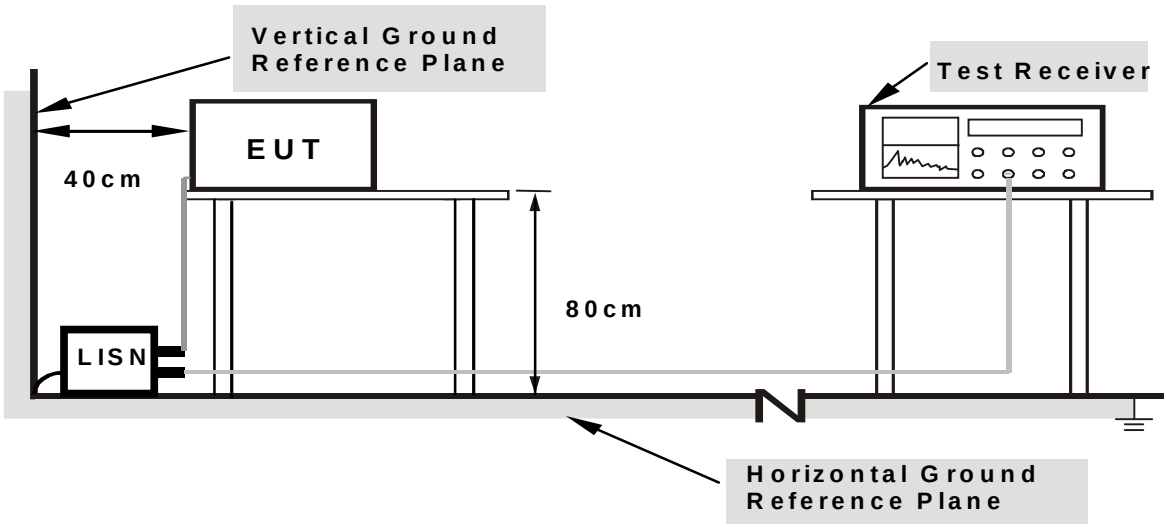
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit - 20dB) were not recorded.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.

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

4.1.6 EUT OPERATING CONDITIONS

a. Turned on the power of all equipment.
b. PC ran a test program to enable all functions.
c. PC read and wrote messages from HDD and ext. floppy.
d. PC sent and received messages to/from Server PC (kept in a remote area) via EUT with an UTP LAN cable (10m).
e. PC sent “H” messages to EUT, and then EUT displayed them on its screen. **(For Mode 1)**
f. PC sent “H” messages to ext. monitor via EUT, and then monitor displayed them on its screen. **(For Mode 1)**
g. DVD player sent video messages to EUT, and then EUT displayed video messages on its screen. **(For Mode 2)**
h. DVD player sent video messages to ext. monitor via EUT, and then EUT displayed video messages on its screen. **(For Mode 2)**.
i. PC sent messages to printer and printer printed them out.
j. PC/ DVD sent audio signal to earphone via EUT and ext. speaker of EUT.
k. Steps c-k were repeated.

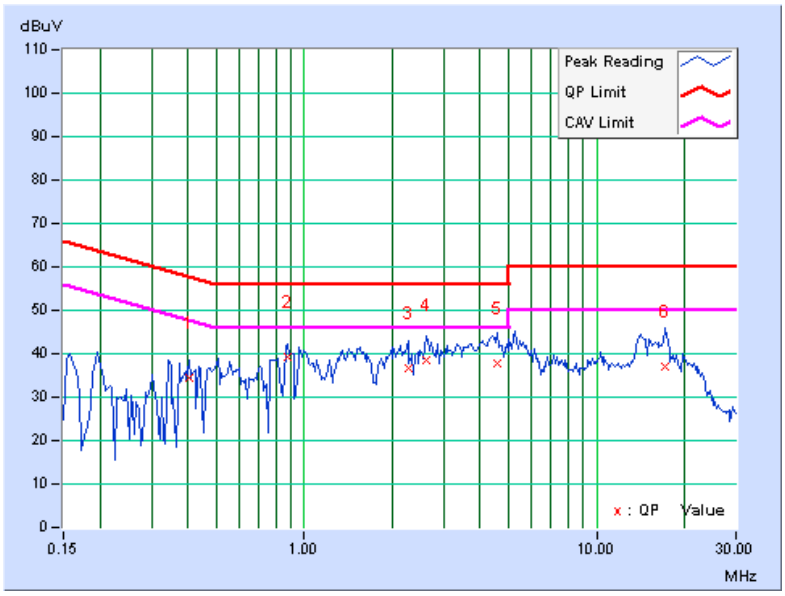
4.1.7 TEST RESULTS (1)

TEST MODE	Mode 1	6DB BANDWIDTH	9 kHz
INPUT POWER	230 Vac, 50 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	27deg. C, 70% RH	TESTED BY: Justin Liu	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.40391	0.29	34.31	27.49	34.60	27.78	57.77	47.77	-23.17	-19.99
2	0.88047	0.39	38.73	29.08	39.12	29.47	56.00	46.00	-16.88	-16.53
3	2.26563	0.50	36.14	24.40	36.64	24.90	56.00	46.00	-19.36	-21.10
4	2.60938	0.51	37.91	26.72	38.42	27.23	56.00	46.00	-17.58	-18.77
5	**4.59375**	**0.58**	**37.14**	**29.64**	**37.72**	**30.22**	**56.00**	**46.00**	**-18.28**	**-15.78**
6	17.15625	0.98	36.20	25.41	37.18	26.39	60.00	50.00	-22.82	-23.61

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.

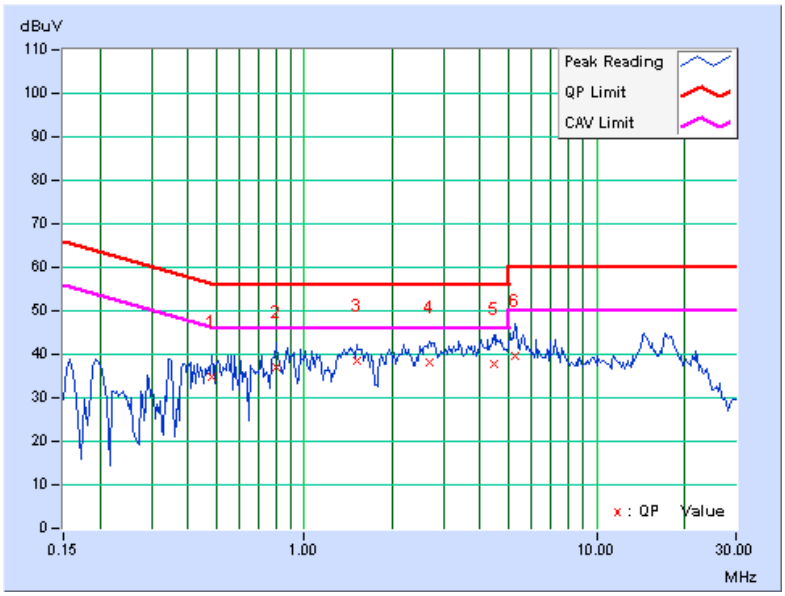


TEST MODE	Mode 1	**6dB BANDWIDTH**	9 kHz
INPUT POWER	230 Vac, 50 Hz	**PHASE**	Neutral (N)
ENVIRONMENTAL CONDITIONS	27deg. C, 70% RH	**TESTED BY**: Justin Liu	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.48203	0.32	34.58	25.73	34.90	26.05	56.30	46.30	-21.41	-20.26
2	0.80625	0.37	36.82	26.90	37.19	27.27	56.00	46.00	-18.81	-18.73
3	1.50781	0.46	37.91	26.29	38.37	26.75	56.00	46.00	-17.63	-19.25
4	2.68750	0.52	37.64	26.72	38.16	27.24	56.00	46.00	-17.84	-18.76
5	4.45313	0.58	37.32	28.91	37.90	29.49	56.00	46.00	-18.10	-16.51
6	5.23828	0.59	39.11	28.30	39.70	28.89	60.00	50.00	-20.30	-21.11

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.



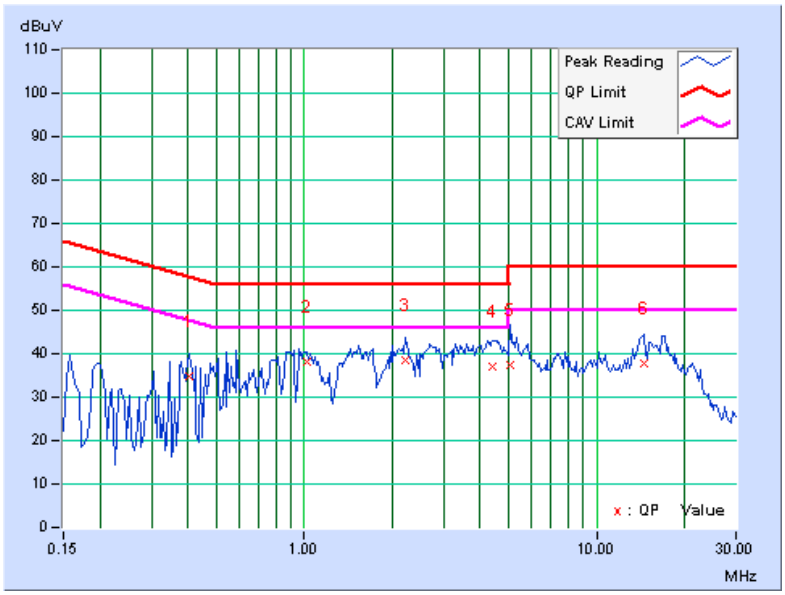
4.1.8 TEST RESULTS (2)

TEST MODE	Mode 2	6DB BANDWIDTH	9 kHz
INPUT POWER	230 Vac, 50 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	27deg. C, 70% RH	TESTED BY: Justin Liu	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.40391	0.29	34.49	27.81	34.78	28.10	57.77	47.77	-22.99	-19.67
2	1.01563	0.41	37.60	26.76	38.01	27.17	56.00	46.00	-17.99	-18.83
3	2.22266	0.50	38.07	26.01	38.57	26.51	56.00	46.00	-17.43	-19.49
4	4.42188	0.58	36.37	28.00	36.95	28.58	56.00	46.00	-19.05	-17.42
5	5.07031	0.59	36.87	28.53	37.46	29.12	60.00	50.00	-22.54	-20.88
6	14.47656	0.87	36.91	22.72	37.78	23.59	60.00	50.00	-22.22	-26.41

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.

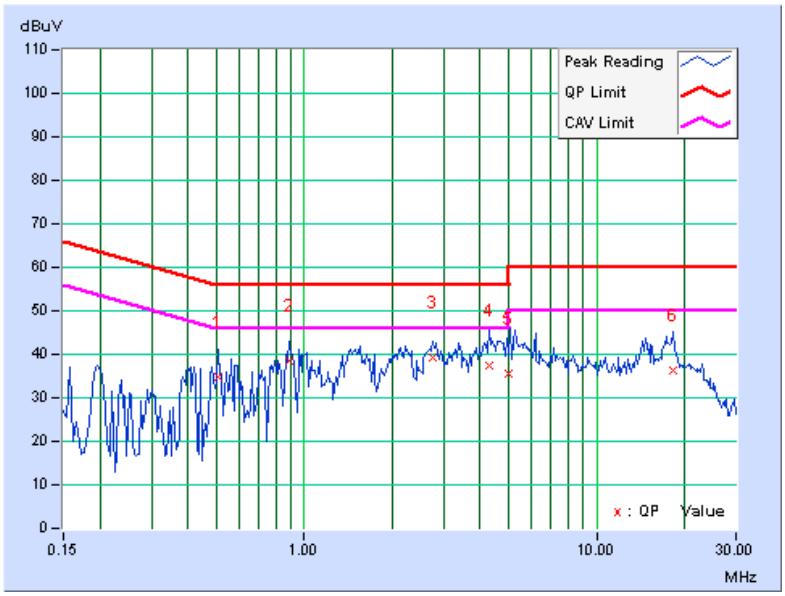


TEST MODE	Mode 2	**6dB BANDWIDTH**	9 kHz
INPUT POWER	230 Vac, 50 Hz	**PHASE**	Neutral (N)
ENVIRONMENTAL CONDITIONS	27deg. C, 70% RH	**TESTED BY**: Justin Liu	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.50938	0.32	34.39	23.60	34.71	23.92	56.00	46.00	-21.29	-22.08
2	0.88828	0.39	38.16	28.37	38.55	28.76	56.00	46.00	-17.45	-17.24
3	2.76172	0.53	38.82	28.71	39.35	29.24	56.00	46.00	-16.65	-16.76
4	4.28516	0.57	36.84	26.68	37.41	27.25	56.00	46.00	-18.59	-18.75
5	5.00000	0.59	35.11	26.56	35.70	27.15	56.00	46.00	-20.30	-18.85
6	18.19531	0.83	35.57	26.18	36.40	27.01	60.00	50.00	-23.60	-22.99

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.



4.2 CONDUCTED EMISSION MEASUREMENT AT TELECOMMUNICATION PORTS

4.2.1 LIMIT OF CONDUCTED COMMON MODE DISTURBANCE AT TELECOMMUNICATION PORTS

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

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

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	100292	Dec. 20, 2011	Dec. 19, 2012
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH2-Z5	100104	Dec. 19, 2011	Dec. 18, 2012
LISN With Adapter (for EUT)	AD10	C09Ada-001	Dec. 19, 2011	Dec. 18, 2012
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	835239/002	Mar. 20, 2012	Mar. 19, 2013
Software	ADT_Cond_V7.3.7	NA	NA	NA
Software	ADT_ISN_V7.3.7	NA	NA	NA
RF cable (JYEBAO)	5D-FB	Cable-C09.01	Feb. 22, 2012	Feb. 21, 2013
SUHNER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-010789	May 21, 2012	May 20, 2013
FCC ISN	F-071115-1057-1	20651	Feb. 22, 2012	Feb. 21, 2013

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 Shielded Room No. 9.
3. The VCCI Site Registration No. T-1587
4. Tested Date: Oct. 18, 2012

4.2.3 TEST PROCEDURE

For using ISN:

a. The EUT is placed 0.4 meters from the conducting wall of the shielded room and connected to ISN directly to reference ground plane.

b. If voltage measurement is used, measure voltage at the measurement port of the ISN, correct the reading by adding the ISN voltage division factor, and compare to the voltage limit.

c. If current measurement is used, measure current with the current probe and compare to the current limit.

d. It is not necessary to apply the voltage and the current limit if the ISN is used. A 50 Ω load has to be connected to the measurement port of the ISN during the current measurement.

e. The disturbance levels and the frequencies of at least six highest disturbances are recorded from be measured each telecommunication port, which comprises the EUT.

For using a 150 W load to the outside surface of the shield cable:

a. Break the insulation and connect a 150 Ω resistor from the outside surface of the shield cable to ground, and apply a ferrite tube or clamp between 150 Ω connection and AE.

b. The EUT is placed 0.4 meters from the conducting wall of the shielded room and connected to AE with the shield cable.

c. Measure current with a current probe and compare to the current limit. The common mode impedance towards the right of the 150 Ω resistor.

d. The disturbance levels and the frequencies of at least six highest disturbances are recorded from be measured each telecommunication port, which comprises the EUT.

For using a combination of current probe and capacitive voltage probe:

a. The EUT is placed 0.4 meters from the conducting wall of the shielded room and connected to AE with a cable. The cable contains more than four balanced pairs or to unbalanced cable.

b. Measure current with a current probe and compare to the current limit.

c. Measure voltage with a capacitive probe and adjust the measured voltage as follows:

– current margin ≤ 6 dB – subtract the actual current margin from measured voltage;
– current margin > 6 dB – subtract 6 dB from measured voltage.
Compare adjusted voltage with the applicable voltage limit.

d. Both the measured current and the adjusted voltage shall be below the applicable current and voltage limits.

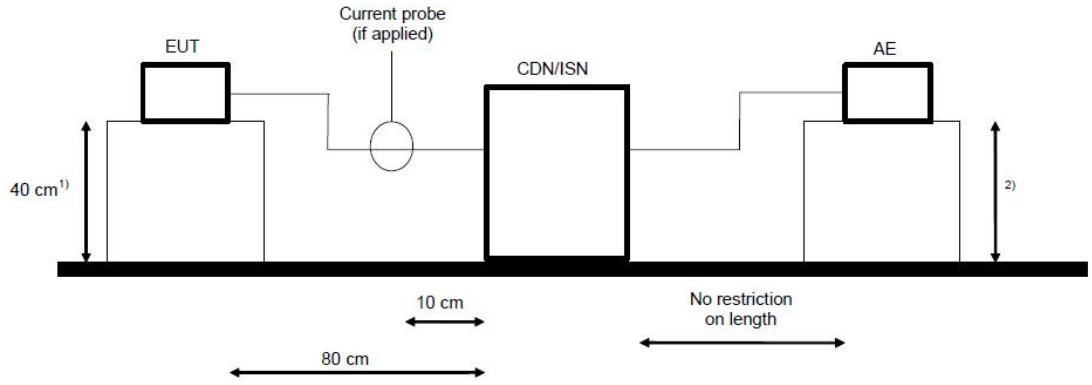
e. The disturbance levels and the frequencies of at least six highest disturbances are recorded from be measured each telecommunication port, which comprises the EUT.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation

4.2.5 TEST SETUP

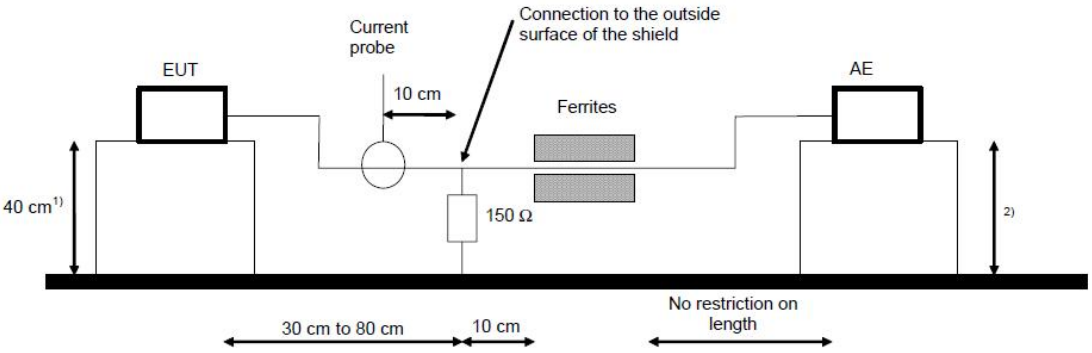
For using ISN:



AE = Associated equipment
EUT = Equipment under test

1) Distance to the reference groundplane (vertical or horizontal).
2) Distance to the reference groundplane is not critical.

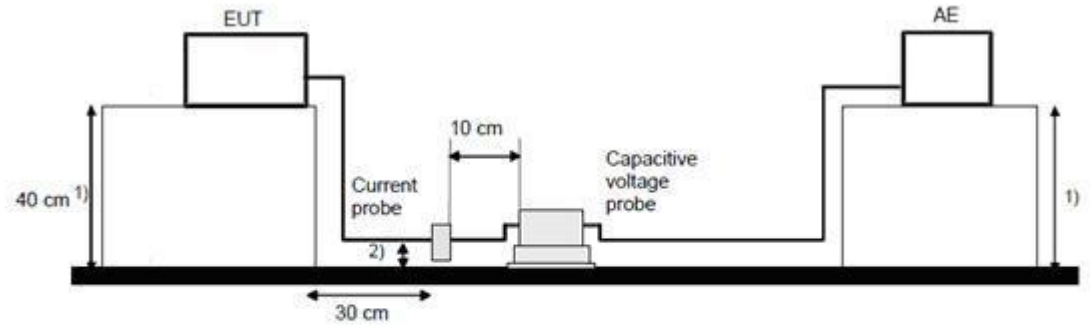
For using a 150 W load to the outside surface of the shield cable:



AE = Associated equipment
EUT = Equipment under test

1) Distance to the reference groundplane (vertical or horizontal).
2) Distance to the reference groundplane is not critical.

For using a combination of current probe and capacitive voltage probe:



1) Distance to the reference groundplane (vertical or horizontal)
2) Distance 4± 1 cm from the reference groundplane.

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

4.2.6 EUT OPERATING CONDITIONS

a. Turned on the power of all equipment.
b. PC ran a test program to enable all functions.
c. PC read and wrote messages from HDD and ext. floppy.
d. PC run "TFGEN"+ "Ping" (286kB, 10% of transmission rate 10/100Mbps) then sent and received messages to/from Server PC (kept in a remote area) via EUT with an UTP LAN cable (10m).
e. PC sent "H" messages to EUT, and then EUT displayed them on its screen. **(For Mode 1)**
f. PC sent "H" messages to ext. monitor via EUT, and then monitor displayed them on its screen. **(For Mode 1)**
g. DVD player sent video messages to EUT, and then EUT displayed video messages on its screen. **(For Mode 2)**
h. DVD player sent video messages to ext. monitor via EUT, and then EUT displayed video messages on its screen. **(For Mode 2)**.
i. PC sent messages to printer and printer printed them out.
j. PC/ DVD sent audio signal to earphone via EUT and ext. speaker of EUT.
k. Steps c-k were repeated.

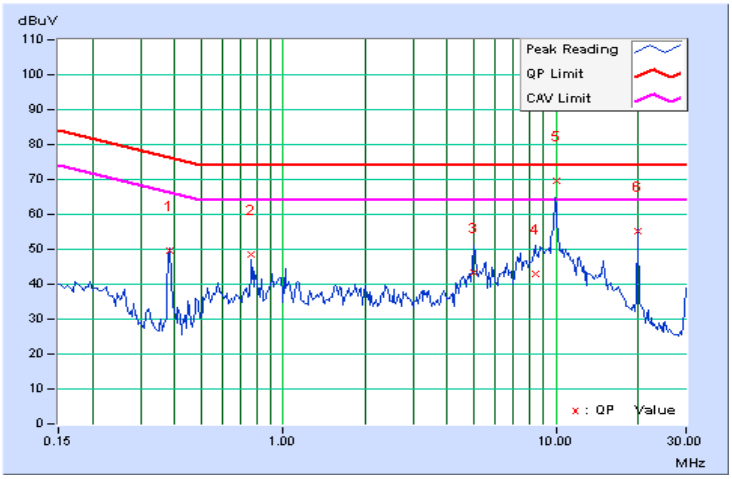
4.2.7 TEST RESULTS

TEST MODE	Mode 1	6dB BANDWIDTH	9 kHz
INPUT POWER	230Vac, 50 Hz	PHASE	RJ45 TELECOM PORT (10Mbps)
ENVIRONMENTAL CONDITIONS	26deg. C, 55% RH	TESTED BY: ED. Lin	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	A.V.	Q.P.	A.V.
1	0.38438	9.64	40.10	40.30	49.74	49.94	76.18	66.18	-26.45	-16.25
2	0.76719	9.51	38.85	37.01	48.36	46.52	74.00	64.00	-25.64	-17.48
3	4.98438	9.37	34.10	14.96	43.47	24.33	74.00	64.00	-30.53	-39.67
4	8.40625	9.46	33.47	16.73	42.93	26.19	74.00	64.00	-31.07	-37.81
5	**10.00000**	**9.50**	**60.20**	**48.40**	**69.70**	**57.90**	**74.00**	**64.00**	**-4.30**	**-6.10**
6	20.00409	9.96	45.30	14.58	55.26	24.54	74.00	64.00	-18.74	-39.46

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.

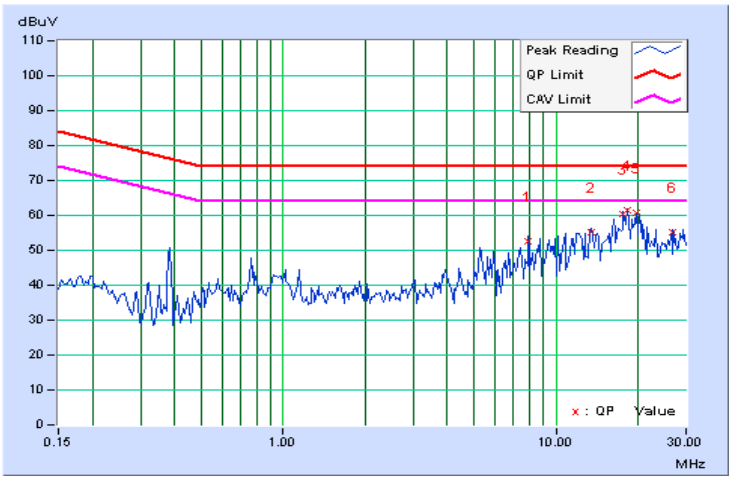


TEST MODE	Mode 1	**6dB BANDWIDTH**	9 kHz
INPUT POWER	230Vac, 50 Hz	**PHASE**	RJ45 TELECOM PORT (100Mbps)
ENVIRONMENTAL CONDITIONS	26deg. C, 55% RH	**TESTED BY**: ED. Lin	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	A.V.	Q.P.	A.V.
1	7.92188	9.45	43.15	39.82	52.60	49.27	74.00	64.00	-21.40	-14.73
2	13.41797	9.64	45.72	42.67	55.36	52.31	74.00	64.00	-18.64	-11.69
3	17.69531	9.84	50.39	47.54	60.23	57.38	74.00	64.00	-13.77	-6.62
4	18.24474	9.87	51.54	48.74	61.41	58.61	74.00	64.00	-12.59	-5.39
5	19.70958	9.95	50.95	47.64	60.90	57.59	74.00	64.00	-13.10	-6.41
6	26.60938	10.39	44.98	43.29	55.37	53.68	74.00	64.00	-18.63	-10.32

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.



4.3 RADIATED EMISSION MEASUREMENT

4.3.1 LIMITS OF RADIATED EMISSION MEASUREMENT

TEST STANDARD: EN 55022

FOR FREQUENCY BELOW 1000 MHz

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

FOR FREQUENCY ABOVE 1000 MHz

FREQUENCY (GHz)	Class A (dBuV/m) (at 3m)		Class B (dBuV/m) (at 3m)	
	PEAK	AVERAGE	PEAK	AVERAGE
1 to 3	76	56	70	50
3 to 6	80	60	74	54

NOTE: (1) The lower limit shall apply at the transition frequencies.
(2) Emission level (dBuV/m) = 20 log Emission level (uV/m).
(3) All emanation 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.

FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	Up to 5 times of the highest frequency or 6 GHz, whichever is less

4.3.2 TEST INSTRUMENTS

Frequency Range 30MHz~1GHz

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Agilent Preamplifier	8447D	2944A11062	Mar. 01, 2012	Feb. 28, 2013
Agilent Preamplifier	8447D	2944A11064	Mar. 01, 2012	Feb. 28, 2013
Agilent Test Spectrum	E4443A	MY46182050	Aug. 06, 2012	Aug. 05, 2013
Agilent Test Spectrum	E4443A	MY46182049	Jul. 23, 2012	Jul. 22, 2013
Agilent Test Preselector	N9039A	MY46520284	Aug. 06, 2012	Aug. 05, 2013
Agilent Test Preselector	N9039A	MY46520283	Jul. 23, 2012	Jul. 22, 2013
Agilent Signal Generator	N5181A	MY47421329	Jul. 13, 2012	Jul. 12, 2013
Schwarzbeck Antenna	VULB9168	9168-316	Apr. 09, 2012	Apr. 08, 2013
Schwarzbeck Antenna	VULB9168	9168-317	Apr. 09, 2012	Apr. 08, 2013
Max Full. Turn Table & Tower	MF7802	MF7802121	NA	NA
Max Full. Tower	MF7802	MF780208105	NA	NA
Software	ADT_Radiated_V8.7.05	NA	NA	NA
WOKEN RF cable	8D	CABLE-CH8-01.V	Dec. 22, 2011	Dec. 21, 2012
JYE BAO RF cable	8D	CABLE-CH8-02.H	Dec. 22, 2011	Dec. 21, 2012
JYE BAO RF cable	8D	CABLE-CH8-03.3M	Dec. 22, 2011	Dec. 21, 2012

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 Chamber No. 8.
3. The Industry Canada Reference No. IC 7450E-8.
4. The VCCI Site Registration No. R-2946
5. The FCC Site Registration No. 493821.
6. Tested Date: Oct. 18, 2012

Frequency Range above 1GHz

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Agilent Spectrum	E4446A	MY46180403	Jun. 13, 2012	Jun. 12, 2013
Agilent Preamplifier	8449B	3008A01924	Mar. 01, 2012	Feb. 28, 2013
MITEQ Preamplifier	AMF-6F-260400-33-8P	892164	Mar. 02, 2012	Mar. 01, 2013
Schwarzbeck Horn Antenna	BBHA-9170	BBHA9170190	Oct. 04, 2012	Oct. 03, 2013
ETS Horn Antenna	3117	00123980	Jan. 12, 2012	Jan. 11, 2013
Max Full. Turn Table	MF7802	MF7802121	NA	NA
Max Full. Tower	MF7802	MF780208105	NA	NA
Software	ADT_Radiated_V 8.7.05	NA	NA	NA
SUHNER RF cable	SF106-18	Cable-CH8	Aug. 19, 2012	Aug. 18, 2013

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 Chamber No. 8.
3. The Industry Canada Reference No. IC 7450E-8.
4. The VCCI Site Registration No. G-19
5. The FCC Site Registration No. 493821.
6. Tested Date: Oct. 18, 2012

4.3.3 TEST PROCEDURE

<Frequency Range 30MHz ~ 1GHz>

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter Semi-anechoic chamber room. 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 height of antenna 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 turn 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 below 1 GHz.

NOTE: The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.

<Frequency Range above 1GHz>

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter Semi-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna can be varied from one meter-to four meters, the height of adjustment depends on the EUT height and the antenna 3dB beamwidth both, to detect 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 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 peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

NOTE:

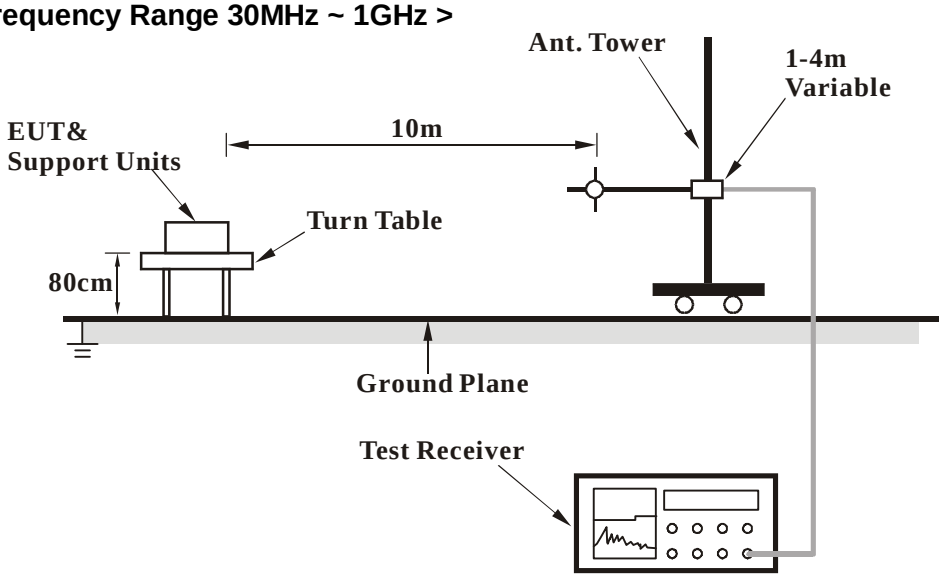
1. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.
2. For measurement of frequency above 1000 MHz, the EUT was set 3 meters away from the receiver antenna.

4.3.4 DEVIATION FROM TEST STANDARD

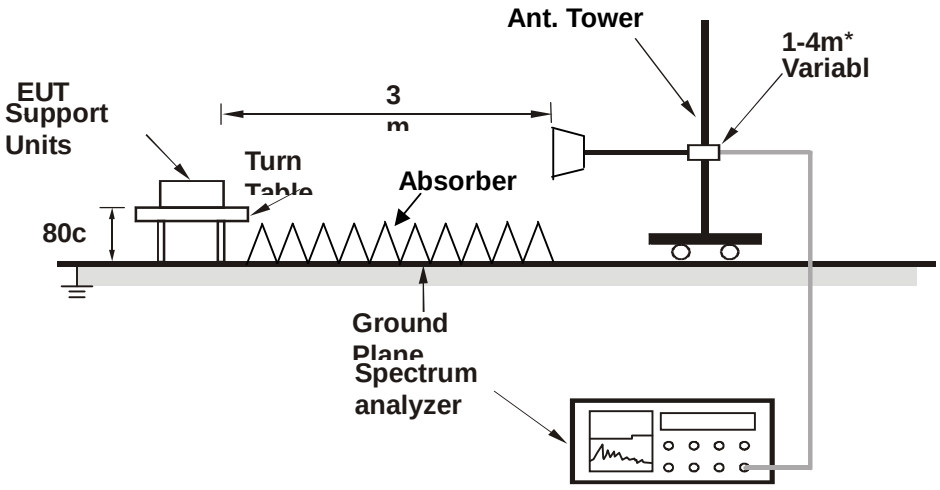
No deviation

4.3.5 TEST SETUP

<Frequency Range 30MHz ~ 1GHz >



<Frequency Range above 1GHz>



* : depends on the EUT height and the antenna 3dB beamwidth both, refer to section 7.3 of CISPR 16-2-3.

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

4.3.6 EUT OPERATING CONDITIONS

Same as item 4.1.6

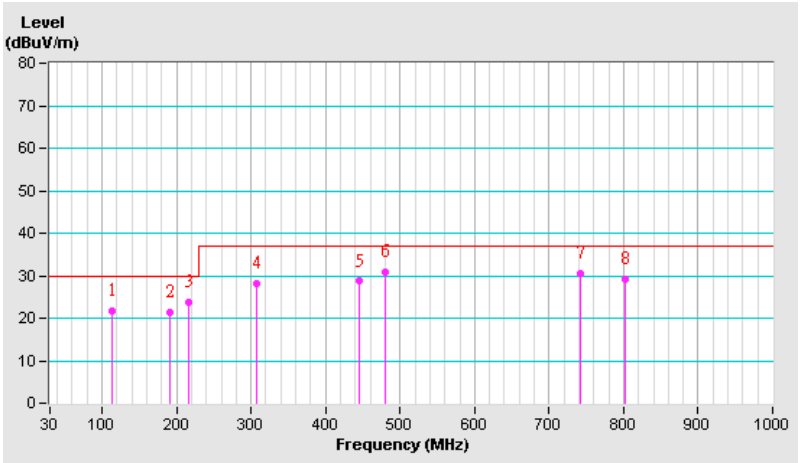
4.3.7 TEST RESULTS (1)

TEST MODE	Mode 1		
FREQUENCY RANGE	30-1000 MHz	DETECTOR FUNCTION & BANDWIDTH	Quasi-Peak, 120 kHz
ENVIRONMENTAL CONDITIONS	25deg. C, 70% RH	**TESTED BY**: Koven Chuang	

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 10 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	114.08	21.77 QP	30.00	-8.23	3.98 H	344	9.79	11.98
2	191.17	21.51 QP	30.00	-8.49	3.32 H	39	8.88	12.63
3	215.92	23.69 QP	30.00	-6.31	3.05 H	74	11.17	12.52
4	306.87	28.12 QP	37.00	-8.88	3.48 H	332	11.69	16.43
5	445.55	28.69 QP	37.00	-8.31	2.02 H	282	8.28	20.41
6	480.12	30.84 QP	37.00	-6.16	2.20 H	356	9.48	21.36
7	742.55	30.53 QP	37.00	-6.47	2.14 H	211	4.24	26.29
8	801.29	29.21 QP	37.00	-7.79	1.08 H	318	1.92	27.29

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

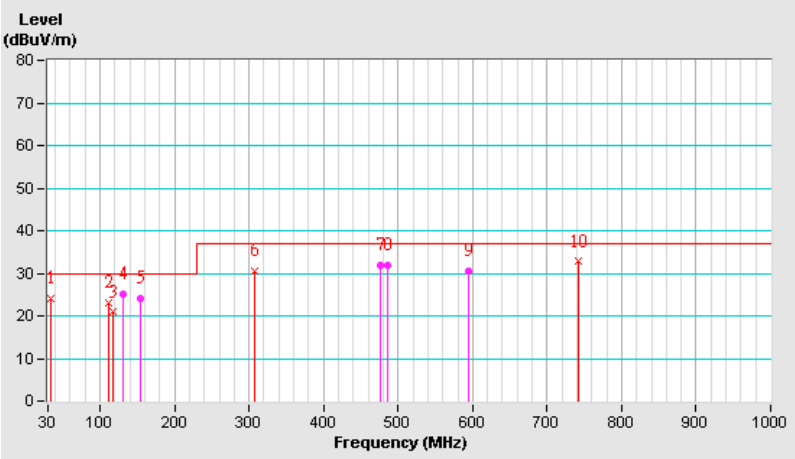


TEST MODE	Mode 1		
FREQUENCY RANGE	30-1000 MHz	DETECTOR FUNCTION & BANDWIDTH	Quasi-Peak, 120 kHz
ENVIRONMENTAL CONDITIONS	25deg. C, 70% RH	**TESTED BY**: Koven Chuang	

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 10 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	34.02	24.09 QP	30.00	-5.91	1.02 V	234	11.19	12.90
2	112.01	23.20 QP	30.00	-6.80	1.08 V	308	11.34	11.86
3	117.45	20.88 QP	30.00	-9.12	1.12 V	291	8.28	12.60
4	130.42	25.01 QP	30.00	-4.99	1.94 V	312	11.27	13.74
5	153.51	24.06 QP	30.00	-5.94	1.42 V	305	8.81	15.25
6	306.63	30.63 QP	37.00	-6.37	3.16 V	338	14.30	16.33
7	475.51	31.94 QP	37.00	-5.06	2.04 V	314	10.92	21.02
8	486.28	31.81 QP	37.00	-5.19	3.84 V	284	10.51	21.30
9	594.05	30.66 QP	37.00	-6.34	1.15 V	246	6.93	23.73
10	742.53	32.75 QP	37.00	-4.25	3.48 V	154	6.56	26.19

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

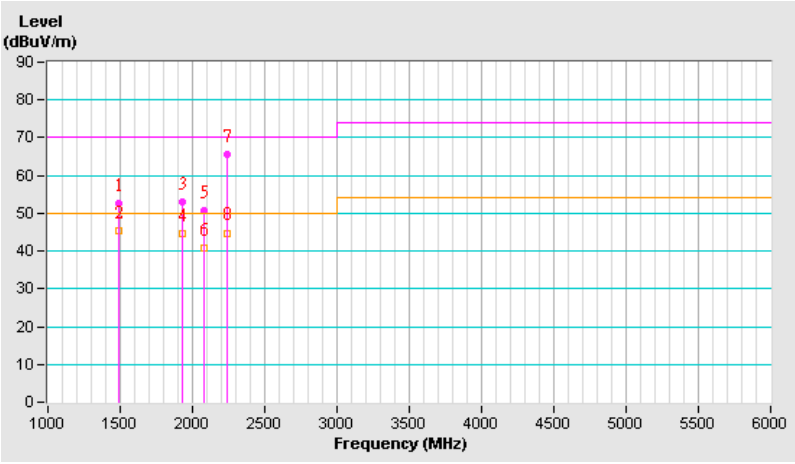


TEST MODE	Mode 1		
FREQUENCY RANGE	1-6 GHz	**DETECTOR FUNCTION & BANDWIDTH**	Peak/Average, 1MHz
ENVIRONMENTAL CONDITIONS	25deg. C, 70% RH	**TESTED BY**: Koven Chuang	

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1485.01	52.51 PK	70.00	-17.49	1.16 H	245	21.24	31.27
2	1485.01	45.29 AV	50.00	-4.71	1.16 H	245	14.02	31.27
3	1930.47	52.94 PK	70.00	-17.06	1.52 H	222	18.33	34.61
4	1930.47	44.57 AV	50.00	-5.43	1.52 H	222	9.96	34.61
5	2079.11	50.84 PK	70.00	-19.16	1.71 H	258	15.59	35.25
6	2079.11	40.85 AV	50.00	-9.15	1.71 H	258	5.60	35.25
7	2236.83	65.67 PK	70.00	-4.33	1.13 H	73	29.96	35.71
8	2236.83	44.77 AV	50.00	-5.23	1.13 H	73	9.06	35.71

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

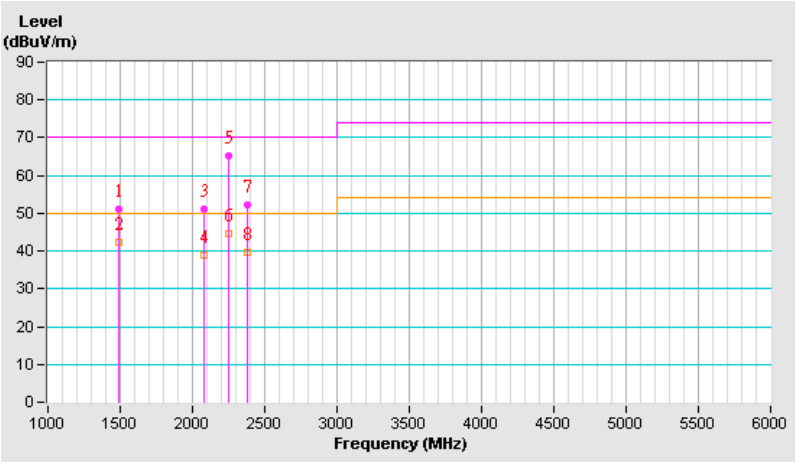


TEST MODE	Mode 1		
FREQUENCY RANGE	1-6 GHz	**DETECTOR FUNCTION & BANDWIDTH**	Peak/Average, 1MHz
ENVIRONMENTAL CONDITIONS	25deg. C, 70% RH	**TESTED BY**: Koven Chuang	

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1485.05	51.22 PK	70.00	-18.78	1.22 V	164	19.95	31.27
2	1485.05	42.26 AV	50.00	-7.74	1.22 V	164	10.99	31.27
3	2079.07	51.20 PK	70.00	-18.80	1.01 V	360	15.95	35.25
4	2079.07	39.02 AV	50.00	-10.98	1.01 V	360	3.77	35.25
5	2246.58	65.18 PK	70.00	-4.82	1.25 V	147	29.44	35.74
6	2246.58	44.65 AV	50.00	-5.35	1.25 V	147	8.91	35.74
7	2376.02	52.18 PK	70.00	-17.82	1.59 V	219	16.07	36.11
8	2376.02	39.76 AV	50.00	-10.24	1.59 V	219	3.65	36.11

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.



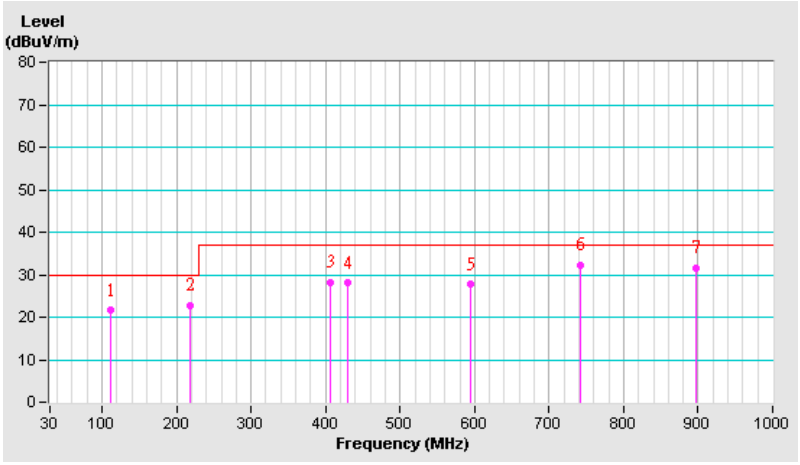
4.3.8 TEST RESULTS (2)

TEST MODE	Mode 2		
FREQUENCY RANGE	30-1000 MHz	DETECTOR FUNCTION & BANDWIDTH	Quasi-Peak, 120 kHz
ENVIRONMENTAL CONDITIONS	25deg. C, 70% RH	**TESTED BY**: Koven Chuang	

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 10 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	111.12	21.57 QP	30.00	-8.43	3.42 H	162	10.05	11.52
2	217.34	22.70 QP	30.00	-7.30	2.28 H	71	10.11	12.59
3	405.52	28.07 QP	37.00	-8.93	2.01 H	240	8.78	19.29
4	430.03	28.00 QP	37.00	-9.00	2.34 H	218	8.02	19.98
5	594.05	27.70 QP	37.00	-9.30	1.95 H	327	3.51	24.19
6	742.55	32.35 QP	37.00	-4.65	1.04 H	197	6.06	26.29
7	897.80	31.47 QP	37.00	-5.53	1.22 H	355	2.83	28.64

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

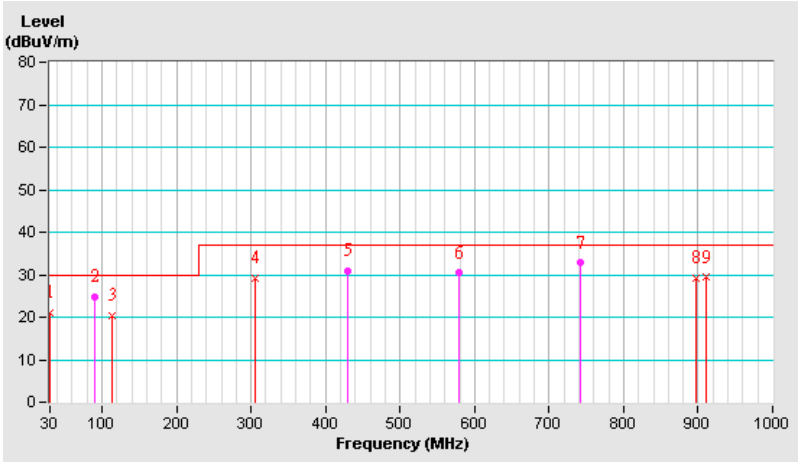


TEST MODE	Mode 2		
FREQUENCY RANGE	30-1000 MHz	DETECTOR FUNCTION & BANDWIDTH	Quasi-Peak, 120 kHz
ENVIRONMENTAL CONDITIONS	25deg. C, 70% RH	**TESTED BY**: Koven Chuang	

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 10 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	30.15	21.01 QP	30.00	-8.99	1.01 V	201	8.64	12.37
2	90.75	24.75 QP	30.00	-5.25	1.45 V	332	15.66	9.09
3	112.95	20.47 QP	30.00	-9.53	1.28 V	312	8.49	11.98
4	306.35	29.21 QP	37.00	-7.79	3.04 V	343	12.88	16.33
5	430.15	31.00 QP	37.00	-6.00	1.16 V	76	11.24	19.76
6	579.84	30.39 QP	37.00	-6.61	3.16 V	295	6.98	23.41
7	741.72	32.78 QP	37.00	-4.22	3.03 V	288	6.61	26.17
8	897.82	29.07 QP	37.00	-7.93	1.81 V	348	0.34	28.73
9	911.09	29.34 QP	37.00	-7.66	2.14 V	310	0.46	28.88

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

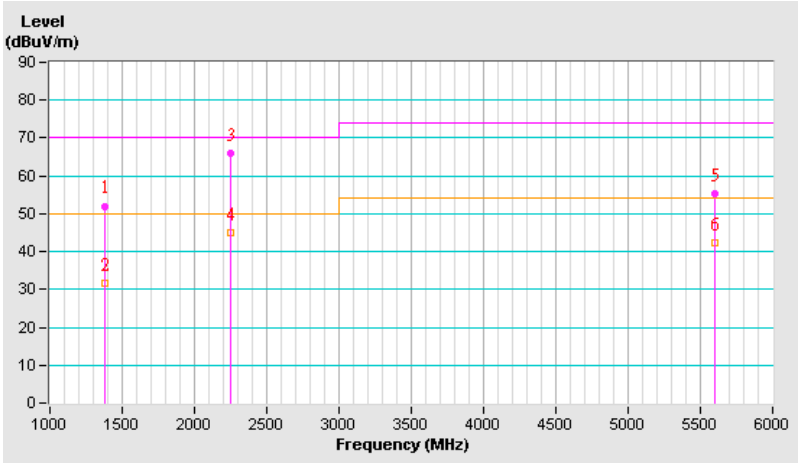


TEST MODE	Mode 2		
FREQUENCY RANGE	1-6 GHz	**DETECTOR FUNCTION & BANDWIDTH**	Peak/Average, 1MHz
ENVIRONMENTAL CONDITIONS	25deg. C, 70% RH	**TESTED BY**: Koven Chuang	

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1375.33	52.04 PK	70.00	-17.96	1.69 H	241	20.93	31.11
2	1375.33	31.78 AV	50.00	-18.22	1.69 H	241	0.67	31.11
3	**2246.97**	**65.90 PK**	**70.00**	**-4.10**	**1.11 H**	**73**	**30.16**	**35.74**
4	2246.97	45.00 AV	50.00	-5.00	1.11 H	73	9.26	35.74
5	5596.83	55.13 PK	74.00	-18.87	1.52 H	144	13.57	41.56
6	5596.83	42.33 AV	54.00	-11.67	1.52 H	144	0.77	41.56

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

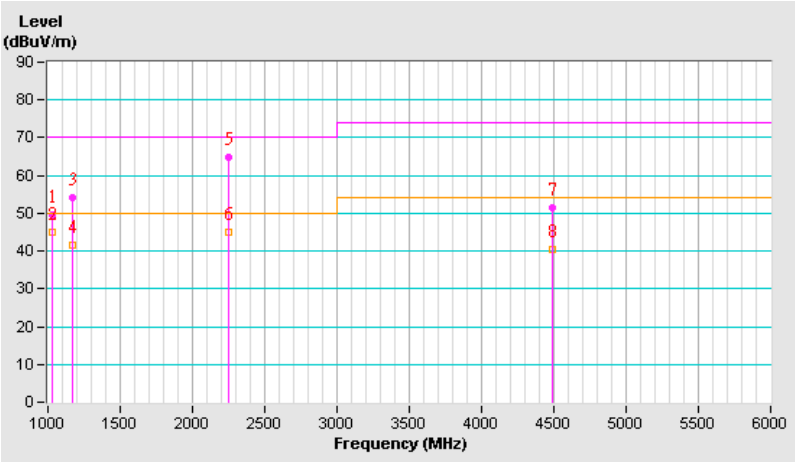


TEST MODE	Mode 2		
FREQUENCY RANGE	1-6 GHz	DETECTOR FUNCTION & BANDWIDTH	Peak/Average, 1MHz
ENVIRONMENTAL CONDITIONS	25deg. C, 70% RH	**TESTED BY**: Koven Chuang	

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1026.00	49.60 PK	70.00	-20.40	1.26 V	360	19.15	30.45
2	1026.00	45.00 AV	50.00	-5.00	1.26 V	360	14.55	30.45
3	1168.10	54.21 PK	70.00	-15.79	1.00 V	0	23.50	30.71
4	1168.10	41.55 AV	50.00	-8.45	1.00 V	0	10.84	30.71
5	2246.46	64.86 PK	70.00	-5.14	1.22 V	143	29.12	35.74
6	2246.46	44.83 AV	50.00	-5.17	1.22 V	143	9.09	35.74
7	4493.10	51.31 PK	74.00	-22.69	1.02 V	162	11.31	40.00
8	4493.10	40.49 AV	54.00	-13.51	1.02 V	162	0.49	40.00

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.



4.4 HARMONICS CURRENT MEASUREMENT

4.4.1 LIMITS OF HARMONICS CURRENT MEASUREMENT

TEST STANDARD: EN 61000-3-2

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 section 5 of EN 61000-3-2: 2006.

2. According to section 7 of EN 61000-3-2: 2006, the above limits for all equipment except for lighting equipment are for all applications having an active input power > 75 W and no limits apply for equipment with an active input power up to and including 75 W.

4.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
EMC PARTNER EMC Emission Tester	HAR1000-1P	084	Apr. 10, 2012	Apr. 09, 2013
Software	HARCS	NA	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. According to IEC 61000-4-7: 2002, the time window shall be synchronized with each group of 10 or 12 cycles (200 ms)for power frequency of 50 or 60Hz.

4. Tested Date: Oct. 24, 2012.

4.4.3 TEST PROCEDURE

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 classification of EUT is according to section 5 of EN 61000-3-2: 2006.
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.

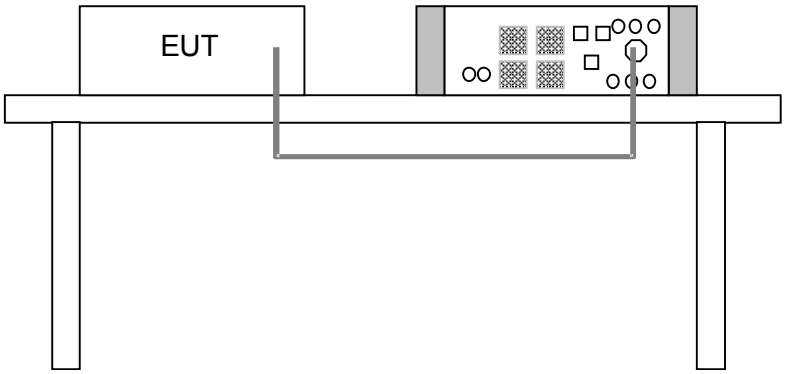
Class D: Equipment having a specified power less than or equal to 600 W of the following types: Personal computers and personal computer monitors.

c. 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.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation

4.4.5 TEST SETUP



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

4.4.6 EUT OPERATING CONDITIONS

a. Turned on the power of all equipment.
b. PC ran a test program to enable all functions.
c. PC read and wrote messages from HDD.
d. PC sent “full white screen pattern” to EUT, and then EUT displayed them on its screen.
e. Notebook PC (kept in a remote area) sent “full white screen pattern” to EUT via an UTP LAN cable (10m), and then EUT displayed them on its screen.
f. DVD player sent “color bar” messages to EUT and EUT used PIP function display.
g. Steps c-g were repeated.

4.4.7 TEST RESULTS

TEST MODE	Mode 1		
FUNDAMENTAL VOLTAGE/AMPERE	230.3Vrms/ 0.646Arms	POWER FREQUENCY	49.987Hz
POWER CONSUMPTION	138.38W	POWER FACTOR	0.929
ENVIRONMENTAL CONDITIONS	24deg. C, 72%RH	**TESTED BY:** Aga Lin	

Harm. Order	Iavg (A)	Iavg Limit (A)	Imax (A)	Imax Limit (A)
1	0.6345	-	1.9717	-
3	0.1322	2.3000	0.1334	3.4500
5	0.0635	1.1400	0.0638	1.7100
7	0.0155	0.7700	0.0161	1.1550
9	0.0023	0.4000	0.0055	0.6000
11	0.0102	0.3300	0.0107	0.4950
13	0.0088	0.2100	0.0090	0.3150
15	0.0075	0.1500	0.0078	0.2250
17	0.0000	0.1324	0.0042	0.1985
19	0.0078	0.1184	0.0082	0.1776
21	0.0072	0.1071	0.0074	0.1607
23	0.0000	0.0978	0.0042	0.1467
25	0.0058	0.0900	0.0062	0.1350
27	0.0038	0.0833	0.0052	0.1250
29	0.0000	0.0776	0.0022	0.1164
31	0.0051	0.0726	0.0055	0.1089
33	0.0065	0.0682	0.0070	0.1023
35	0.0000	0.0643	0.0031	0.0964
37	0.0052	0.0608	0.0056	0.0912
39	0.0000	0.0577	0.0043	0.0865

Harm. Order	Iavg (mA/W)	Iavg Limit (mA/W)	Imax (mA/W)	Imax Limit (mA/W)
1	4.5852	-	14.2484	-
3	0.9553	3.4000	0.9640	5.1000
5	0.4589	1.9000	0.4610	2.8500
7	0.1120	1.0000	0.1163	1.5000
9	0.0166	0.5000	0.0397	0.7500
11	0.0737	0.3500	0.0773	0.5250
13	0.0636	0.2962	0.0650	0.4442
15	0.0542	0.2567	0.0564	0.3850
17	0.0000	0.2265	0.0304	0.3397
19	0.0564	0.2026	0.0593	0.3039
21	0.0520	0.1833	0.0535	0.2750
23	0.0000	0.1674	0.0304	0.2511
25	0.0419	0.1540	0.0448	0.2310
27	0.0275	0.1426	0.0376	0.2139
29	0.0000	0.1328	0.0159	0.1991
31	0.0369	0.1242	0.0397	0.1863
33	0.0470	0.1167	0.0506	0.1750
35	0.0000	0.1100	0.0224	0.1650
37	0.0376	0.1041	0.0405	0.1561
39	0.0000	0.0987	0.0311	0.1481

NOTE: Steady state values on AC mains are recorded in the table.

4.5 VOLTAGE FLUCTUATION AND FLICKS MEASUREMENT

4.5.1 LIMITS OF VOLTAGE FLUCTUATION AND FLICKS MEASUREMENT

TEST STANDARD: EN 61000-3-3

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

4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
EMC PARTNER EMC Emission Tester	HAR1000-1P	084	Apr. 10, 2012	Apr. 09, 2013
Software	HARCS	NA	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. Tested Date: Oct. 24, 2012.

4.5.3 TEST PROCEDURE

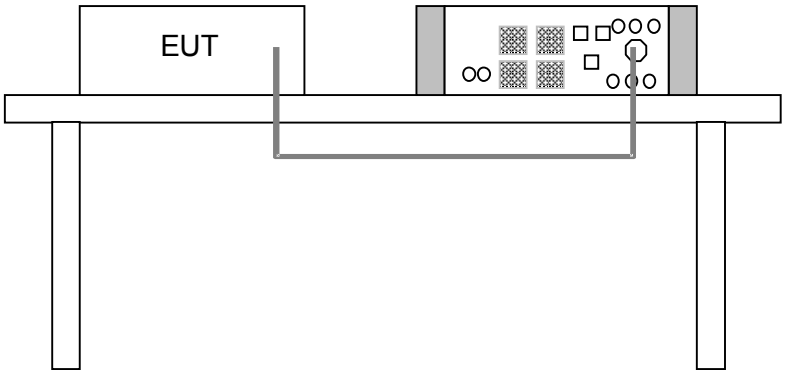
a. The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under normal operating conditions.

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.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



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

4.5.6 EUT OPERATING CONDITIONS

Same as item 4.4.6

4.5.7 TEST RESULTS

TEST MODE	Mode 1		
FUNDAMENTAL VOLTAGE/AMPERE	230.3 Vrms/ 0.644 Arms	POWER FREQUENCY	49.987 Hz
OBSERVATION PERIOD (Tp)	10 minutes	POWER FACTOR	0.928
ENVIRONMENTAL CONDITIONS	24deg. C, 72%RH	**TESTED BY:** Aga Lin	

TEST PARAMETER	MEASUREMENT VALUE	LIMIT	REMARKS
P_{st}	0.072	1.0	Pass
P_{lt}	0.072	0.65	Pass
$T_{d(t)}$ (ms)	0	500	Pass
d_{max} (%)	0	4	Pass
dc (%)	0.010	3.3	Pass

NOTE: (1) P_{st} means short-term flicker indicator.
(2) P_{lt} means long-term flicker indicator.
(3) $T_{d(t)}$ means maximum time that d(t) exceeds 3.3%.
(4) d_{max} means maximum relative voltage change.
(5) dc means relative steady-state voltage change.

5 IMMUNITY TEST

5.1 GENERAL DESCRIPTION

Product Standard:	**EN 55024:2010**	
Basic Standard, specification requirement, and Performance Criteria:	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 line: 1kV, DC Power line: 0.5kV Signal line: 0.5kV Performance Criterion B
	IEC 61000-4-5	Surge Immunity Test: AC Power Line: line to line 1 kV, line to earth 2kV DC Power Line: line to earth 0.5kV Performance Criterion B Outdoor Signal line: i) 1 kV without primary protectors, Performance Criteria C ii) 4 kV with primary protectors, Performance Criterion C
	IEC 61000-4-6	Conducted Radio Frequency Disturbances Test – CS: 0.15-80 MHz, 3V, 80% AM, 1kHz, Performance Criterion A
	IEC 61000-4-8	Power Frequency Magnetic Field Test, 50 Hz, 1A/m, Performance Criterion A
	IEC 61000-4-11	Voltage Dips: i) >95% reduction – 0.5 period, Performance Criterion B ii) 30% reduction – 25 period, Performance Criterion C Voltage Interruptions: i) >95% reduction – 250 period, Performance Criterion C

5.2 GENERAL PERFORMANCE CRITERIA DESCRIPTION

According to Clause 7 of EN 55024 standard, the following describes the general performance criteria.

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.
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 phenomenon 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 if 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.
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.

5.3 EUT OPERATING CONDITION

a. Turned on the power of all equipment.
b. PC ran a test program to enable all functions.
c. PC read and wrote messages from HDD.
d. PC sent "H" messages to EUT, and then EUT displayed them on its screen.
e. Notebook PC (kept in a remote area) sent "H" messages to EUT via an UTP LAN cable (10m), and then EUT displayed them on its screen.
f. DVD player sent “color bar” messages to EUT and EUT used PIP function display.
g. Steps c-g were repeated.

5.4 ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD)

5.4.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-2
Discharge Impedance:	330 ohm / 150 pF
Discharge Voltage:	Air Discharge : 2kV/ 4kV/ 8 kV (Direct) Contact Discharge : 2kV/ 4 kV (Direct/ Indirect)
Polarity:	Positive & Negative
Number of Discharge:	Air Discharge: Min. 20 times at each test point Contact Discharge: Min. 200 times in total
Discharge Mode:	Single Discharge
Discharge Period:	1 second minimum

5.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
KeyTek, ESD Simulator	MZ-15/EC	0504259	Jul. 05, 2012	Jul. 04, 2013

NOTE: 1. The test was performed in ESD Room No. 3.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Tested Date: Oct. 23, 2012.

5.4.3 TEST PROCEDURE

The discharges shall be applied in two ways:

a. Contact discharges to the conductive surfaces and coupling planes:

   The EUT shall be exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points. One of the test points shall be subjected to at least 50 indirect discharges to the center of the front edge of the horizontal coupling plane. 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.

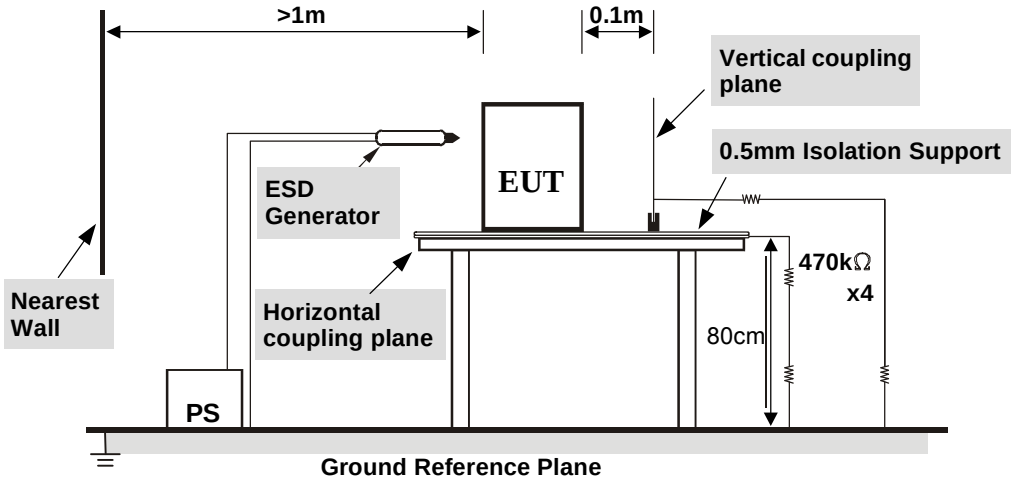
g. At least ten single discharges (in the most sensitive polarity) were applied to the **H**orizontal **C**oupling **P**lane at points on each side of the EUT. The ESD generator was positioned horizontally at a distance of 0.1 meters from the EUT with the discharge electrode touching the **HCP.**

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.

5.4.4 DEVIATION FROM TEST STANDARD

No deviation

5.4.5 TEST SETUP



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 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.

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.

5.4.6 TEST RESULTS

TEST MODE	Mode 1	INPUT POWER	230 Vac, 50 Hz
ENVIRONMENTAL CONDITIONS	27deg. C, 56%RH, 1006hPa	**TESTED BY:** Louis Liao	

TEST RESULTS OF DIRECT APPLICATION					
Discharge Level (kV)	Polarity	Test Point	Contact Discharge	Air Discharge	Performance Criterion
2, 4	+/-	1 ~ 3	Note (2)	N/A	B
2, 4	+/-	4 ~ 9	N/A	Note (1)	A
8	+/-	5, 8, 9	N/A	Note (1)	A
8	+/-	4, 6, 7	N/A	Note (2)	B

Description of test point: Please refer to ESD test photo 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	+/-	1 ~ 4	Note (2)	Note (2)	B

Description of test point:

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

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

(2) There were dot flashing or flicker disturbance on the PIP screen during the test, but self-recoverable after the test.

5.5 RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY TEST (RS)

5.5.1 TEST SPECIFICATION

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

5.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Agilent Signal Generator	E8257D	MY48050465	Jul. 11, 2012	Jul. 10, 2013
PRANA RF Amplifier	AP32DP280	0811-894	NA	NA
AR RF Amplifier	150W1000M3	306601	NA	NA
AR RF Amplifier	35S4G8AM4	0326094	NA	NA
AR RF Amplifier	100S1G4M3	0329249	NA	NA
AR Controller	SC1000M3	305910	NA	NA
Radisense Electric Field Sensor	CTR1002A	08D00057SNO-07	Jun. 06, 2012	Jun. 05, 2013
BOONTON RF Voltage Meter	4232A	10180	Jun. 14, 2012	Jun. 13, 2013
BOONTON Power Sensor	51011-EMC	34152	Jun. 14, 2012	Jun. 13, 2013
BOONTON Power Sensor	51011-EMC	34153	Jun. 14, 2012	Jun. 13, 2013
AR Log-Periodic Antenna	AT6080	0329465	NA	NA
EMCO BiconiLog Antenna	3141	1001	NA	NA
AR High Gain Antenna	AT4002A	306533	NA	NA
AR High Gain Horn Antenna	AT4010	0329800	NA	NA
CHANCE MOST Full Anechoic Chamber (9x5x3m)	Chance Most	RS-002	Feb. 10, 2012	Feb. 09, 2013
Software	ADT_RS_V7.6	NA	NA	NA

NOTE: 1. The test was performed in RS 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. The transmit antenna was located at a distance of 3 meters from the EUT.
4. Tested Date: Oct. 24, 2012.

5.5.3 TEST PROCEDURE

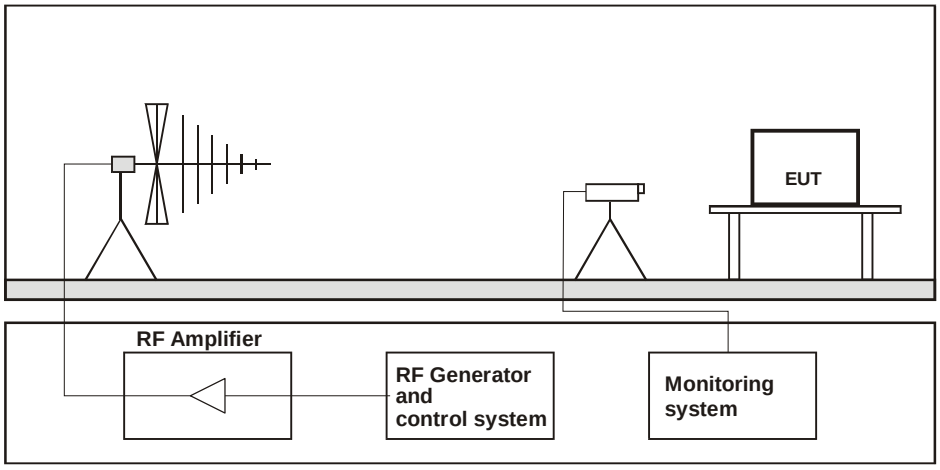
The test procedure was in accordance with IEC 61000-4-3

a. The testing was performed in a fully-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 dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0,5s.
d. The field strength level was 3V/m.
e. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

5.5.4 DEVIATION FROM TEST STANDARD

No deviation

5.5.5 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.

5.5.6 TEST RESULTS

TEST MODE	Mode 1	INPUT POWER	230 Vac, 50 Hz
ENVIRONMENTAL CONDITIONS	25deg. C, 62%RH	**TESTED BY:** Ryan Chen	

Frequency (MHz)	Polarity	Azimuth	Field Strength (V/m)	Observation	Performance Criterion
80 - 1000	V & H	0	3	Note	A
	V & H	90	3		
	V & H	180	3		
	V & H	270	3		

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

5.6 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST (EFT)

5.6.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-4
Test Voltage:	Power Line : 1 kV
	Signal/Control Line : 0.5 kV
Polarity:	Positive & Negative
Impulse Frequency:	100 kHz: only for signal lines of xDSL equipment
	5 kHz: except for xDSL equipment
Impulse Waveshape :	5/50 ns
Burst Duration:	15 ms
Burst Period:	300 ms
Test Duration:	1 min.

5.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Haefely, EFT Generator	PEFT 4010	154954	Apr. 26, 2012	Apr. 25, 2013
Haefely,Capacitive Clamp	IP4A	155173	NA	NA

NOTE: 1. The test was performed in EFT Room
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Tested Date: Oct. 24, 2012.

5.6.3 TEST PROCEDURE

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 ± 0.05 meter.

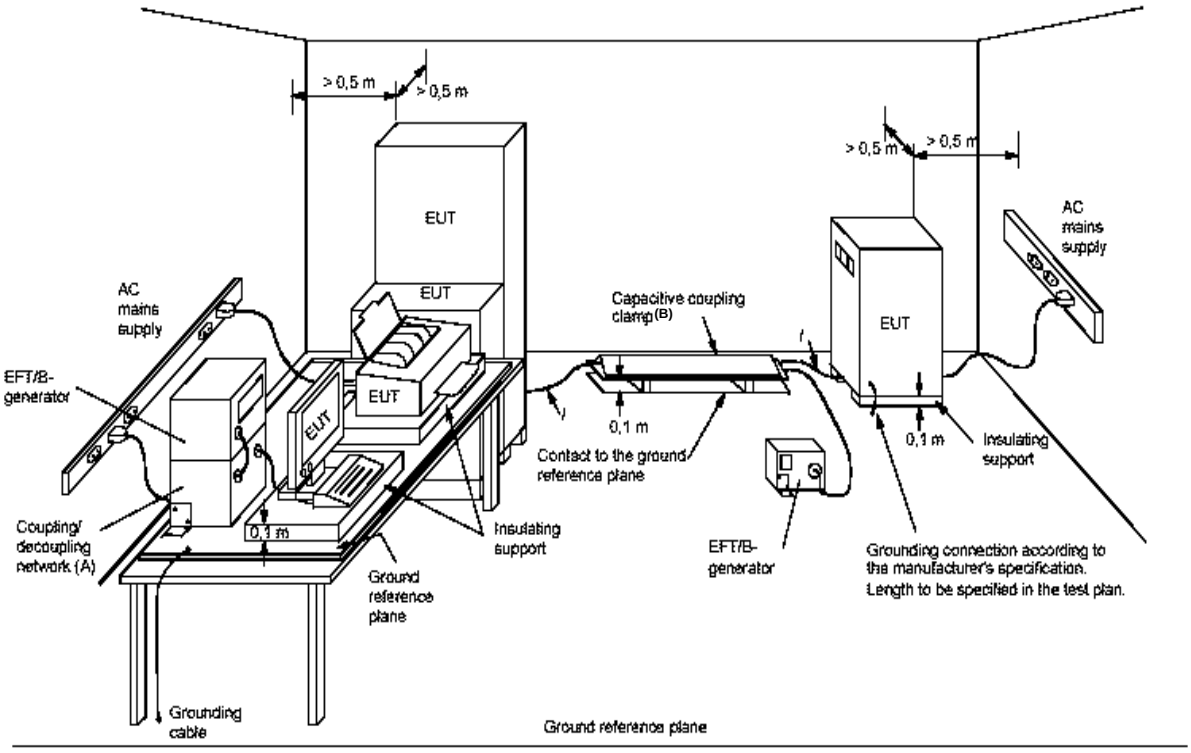
c. The duration time of each test sequential was 1 minute.

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

5.6.4 DEVIATION FROM TEST STANDARD

No deviation

5.6.5 TEST SETUP



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

l: length between clamp and the EUT to be tested (should be 0.5 ± 0.05m)

(A): location for supply line coupling

(B): location for signal lines coupling

NOTE:

EUTs, whether stationary floor-mounted or table top, and equipment designed to be mounted in other configurations, shall be placed on a ground reference plane and shall be insulated from it by an insulating support 0,1 m ± 0,01 m thick. A minimum distance of 0.5m was provided between the EUT and the walls of the laboratory or any other metallic structure.

5.6.6 TEST RESULTS

TEST MODE	Mode 1	INPUT POWER	230 Vac, 50 Hz
ENVIRONMENTAL CONDITIONS	25deg. C, 72%RH	**TESTED BY:** Aga Lin	

Test Point	Polarity	Test Level (Kv)	Observation	Performance Criterion
L1	+/-	1	Note	B
L2	+/-	1	Note	B
PE	+/-	1	Note	B
L1–L2-PE	+/-	1	Note	B
Cat.5 Lien	+/-	0.5	Note	B
BNC cable	+/-	0.5	Note	B

NOTE: There were dot flashing or flicker disturbance on the PIP screen during the test, but self-recoverable after the test.

5.7 SURGE IMMUNITY TEST

5.7.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-5
Wave-Shape:	Combination Wave for power lines 1.2/50 us Open Circuit Voltage 8 /20 us Short Circuit Current 10/700 us Wave for signal lines 10/700 us Open Circuit Voltage
Test Voltage:	Power Line : 0.5kV/ 1 kV/ 2kV
Surge Input/Output:	L1-L2, L1-PE, L2-PE
Generator Source Impedance:	2 ohm between networks 12 ohm between network and ground
Polarity:	Positive/Negative
Phase Angle:	0° /90°/180°/270°
Pulse Repetition Rate:	1 time / 20 sec.
Number of Tests:	5 positive and 5 negative at selected points

5.7.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATION DATE	CALIBRATION UNTIL
KeyTek, EMS Simulator	EMC Pro	9902207	Apr. 18, 2012	Apr. 17, 2013
Surge Cable	WE-4	SU2Cab-001	NA	NA
Surge Adapter WONPRO	WA-9	SU2ADA-002	NA	NA
KeyTek External Coupler/Decoupler for Telecom Lines	CM-TELCD	9906194	NA	NA
Software	CEWare32	NA	NA	NA

NOTE: 1. The test was performed in EMS 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. Tested Date: Oct. 23, 2012.

5.7.3 TEST PROCEDURE

a. For EUT power supply:

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).

b. For test applied to unshielded unsymmetrically operated interconnection lines of EUT:

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 (or shorter).

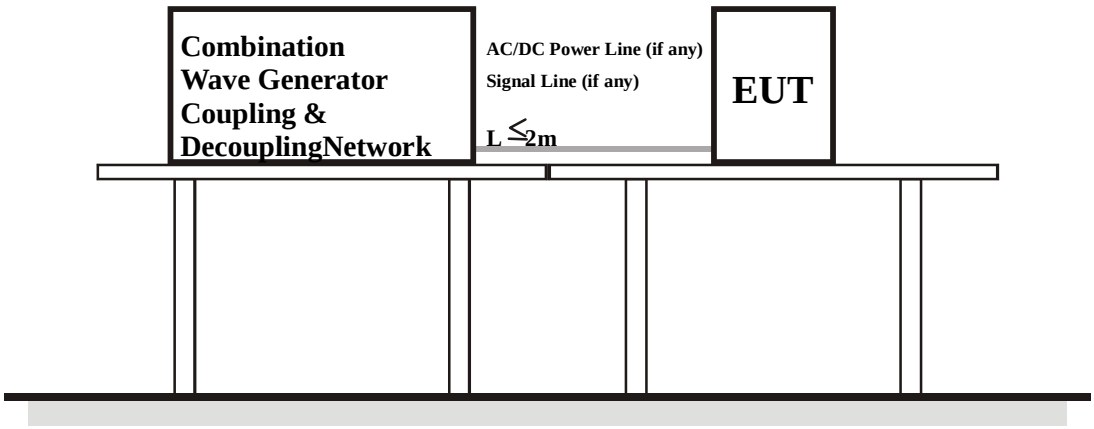
c. For test applied to unshielded symmetrically operated interconnection / telecommunication lines of EUT:

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 (or shorter).

5.7.4 DEVIATION FROM TEST STANDARD

No deviation

5.7.5 TEST SETUP



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

5.7.6 TEST RESULTS

TEST MODE	Mode 1	INPUT POWER	230 Vac, 50 Hz
ENVIRONMENTAL CONDITIONS	25deg. C, 61%RH	**TESTED BY:** Ted Huang	

Voltage (kV)	Test Point	Polarity	Phase Angle				Performance Criterion
			0°	90°	180°	270°	
0.5, 1	L1-L2	+/-	Note	Note	Note	Note	A
0.5, 1, 2	L1-PE	+/-	Note	Note	Note	Note	A
	L2-PE	+/-	Note	Note	Note	Note	A

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

5.8 IMMUNITY TO CONDUCTED DISTURBANCES INDUCED BY RF FIELDS (CS)

5.8.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-6
Frequency Range:	0.15 MHz - 80 MHz
Field Strength:	3 $V_{r.m.s.}$
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Coupled Cable:	Power Mains, Signal cable
Coupling Device:	CDN-M3 (3wires), CDN-T4, EM-Clamp

5.8.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Signal Generator	SMY01	841104/033	Nov. 23, 2011	Nov. 22, 2012
Digital Sweep Function Generator	8120	984801	NA	NA
AR Power Amplifier	75A250AM 1	312196	NA	NA
FCC Coupling Decoupling Network	FCC-801-M 3-25A	48	Aug. 17, 2012	Aug. 16, 2013
FCC Coupling Decoupling Network	FCC-801-M 3-25A	01022	Feb. 24, 2012	Feb. 23, 2013
FCC Coupling Decoupling Network	FCC-801-M 2-16A	01047	Aug. 17, 2012	Aug. 16, 2013
FISCHER CUSTOM COMMUNICATIONS EM Injection Clamp	FCC-203I	50	NA	NA
FISCHER CUSTOM COMMUNICATIONS Current Injection Clamp	F-120-9A	361	NA	NA
EM TEST Coupling Decoupling Network	CDN M1/32A	306508	Feb. 24, 2012	Feb. 23, 2013
FCC Coupling Decoupling Network	FCC-801-T 8	02038	Feb. 24, 2012	Feb. 23, 2013
FCC Coupling Decoupling Network	FCC-801-T 4	02031	Feb. 24, 2012	Feb. 23, 2013
FCC Coupling Decoupling Network	FCC-801-T 2	02021	Feb. 24, 2012	Feb. 23, 2013
R&S Power Sensor	NRV-Z5	837878/038	Nov. 15, 2011	Nov. 14, 2012
R&S Power Sensor	NRV-Z5	837878/039	Nov. 14, 2011	Nov. 13, 2012
R&S Power Meter	NRVD	837794/040	Nov. 15, 2011	Nov. 14, 2012
Software	ADT_CS_V 7.4.2	NA	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. Tested Date: Oct. 23, 2012.

5.8.3 TEST PROCEDURE

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 50Ω, 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.

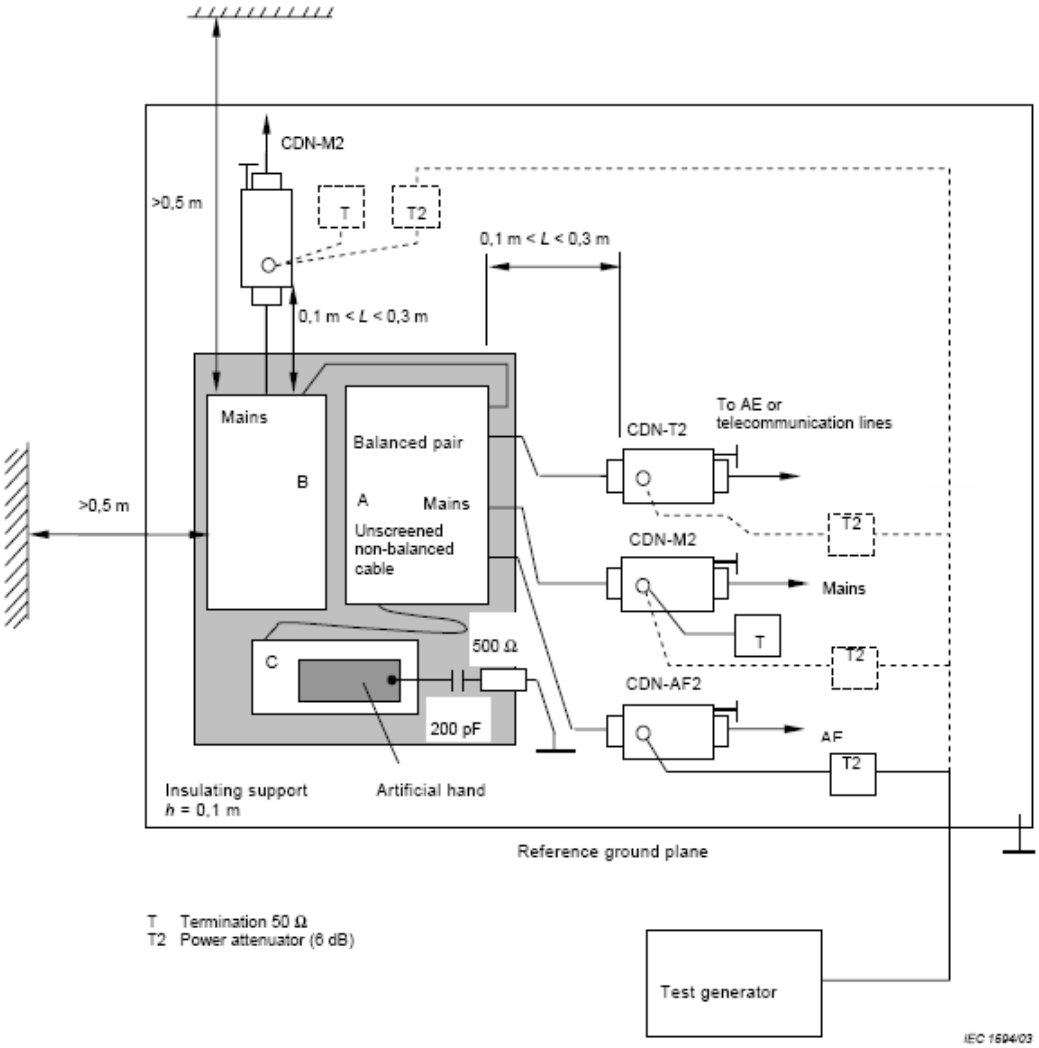
e. The dwell time of the amplitude modulated carrier at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0,5 s. The sensitive frequencies (e.g. clock frequencies) shall be analyzed separately.

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

5.8.4 DEVIATION FROM TEST STANDARD

No deviation

5.8.5 TEST SETUP



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.

5.8.6 TEST RESULTS

TEST MODE	Mode 1	INPUT POWER	230 Vac, 50 Hz
ENVIRONMENTAL CONDITIONS	22deg. C, 68%RH	**TESTED BY:** York Chiu	

Frequency (MHz)	Field Strength ($V_{r.m.s.}$)	Cable	Injection Method	RETURN PATH	Observation	Performance Criterion
0.15 – 80	3	AC power line	CDN-M3	CDN-T4	Note	A
0.15 – 80	3	RJ 45	CDN-T4	CDN-M3	Note	A
0.15 – 80	3	BNC	EM-Clamp	CDN-M3	Note	A

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

5.9 POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST

5.9.1 TEST SPECIFICATION

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

5.9.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
HAEFELY Magnetic Field Tester	MAG 100.1	083794-06	NA	NA
COMBINOVA Magnetic Field Meter	MFM10	224	Apr. 12, 2012	Apr. 11, 2013

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. Tested Date: Oct. 24, 2012.

5.9.3 TEST PROCEDURE

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

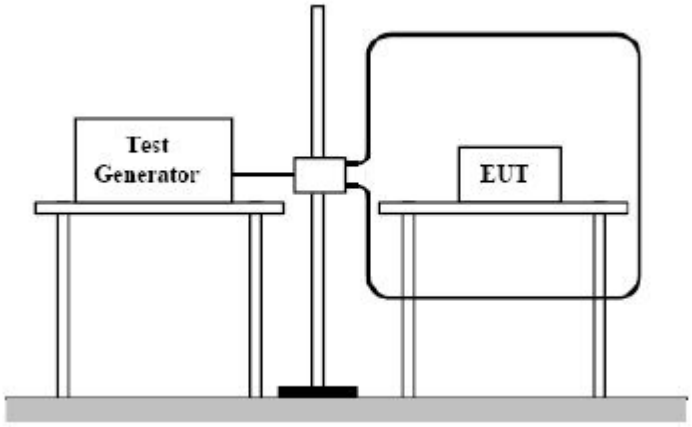
b. The power supply, input and output circuits shall be connected to the sources of power supply, control and signal.

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.

5.9.4 DEVIATION FROM TEST STANDARD

No deviation

5.9.5 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.

5.9.6 TEST RESULTS

TEST MODE	Mode 1	INPUT POWER	230 Vac, 50 Hz
ENVIRONMENTAL CONDITIONS	25deg. C, 74%RH	**TESTED BY:** Aga Lin	

Direction	Field Strength (A/m)	Observation	Performance Criterion
X - Axis	1	Note	A
Y - Axis	1	Note	A
Z - Axis	1	Note	A

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

5.10 VOLTAGE DIP/SHORT INTERRUPTIONS (DIP) IMMUNITY TEST

5.10.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-11
Test Duration Time:	Minimum three test events in sequence
Interval between Event:	Minimum ten seconds
Phase Angle:	0°/180°
Test Cycle:	3 times

5.10.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
HAEFELY Mains Interference Simulator	PLINE1610	083690-17	Jul. 06, 2012	Jul. 05, 2013

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. Tested Date: Oct. 24, 2012.

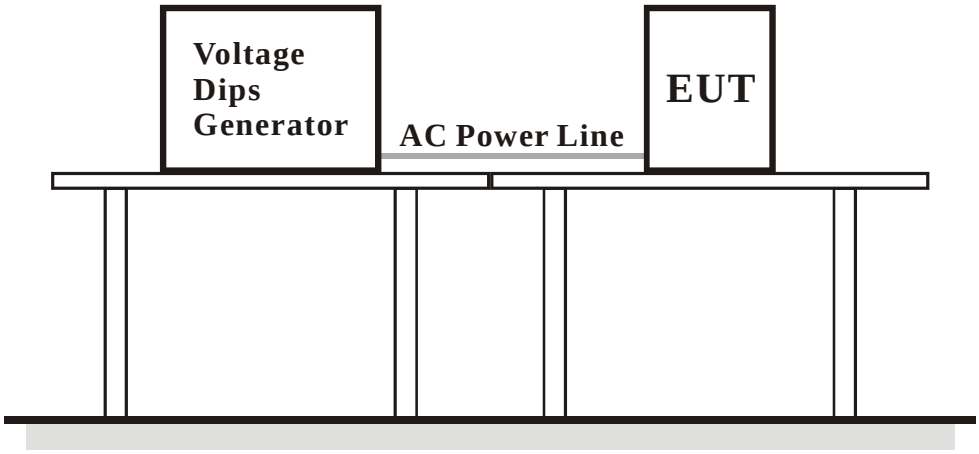
5.10.3 TEST PROCEDURE

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

5.10.4 DEVIATION FROM TEST STANDARD

No deviation

5.10.5 TEST SETUP



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

5.10.6 TEST RESULTS

TEST MODE	Mode 1	INPUT POWER	230 Vac, 50 Hz & 100 Vac, 50 Hz
ENVIRONMENTAL CONDITIONS	25deg. C, 74%RH	**TESTED BY:** Aga Lin	

Input Power for testing: 230 Vac, 50 Hz			
VOLTAGE % REDUCTION	PERIODS	OBSERVATION	PERFORMANCE CRITERION
>95	0.5	Note (1)	A
30	25	Note (1)	A
>95	250	Note (2)	B

Input Power for testing: 100 Vac, 50 Hz			
VOLTAGE % REDUCTION	PERIODS	OBSERVATION	PERFORMANCE CRITERION
>95	0.5	Note (1)	A
30	25	Note (1)	A
>95	250	Note (2)	B

NOTES: (1) There was no change compared with the initial operation during the test.
(2) The EUT reset during the test.

6 PHOTOGRAPHS OF THE TEST CONFIGURATION

CONDUCTED EMISSION TEST – For Mode 1





CONDUCTED EMISSION TEST – For Mode 2





TELECOMMUNICATION PORT (RJ-45)
OF CONDUCTED EMISSION TEST





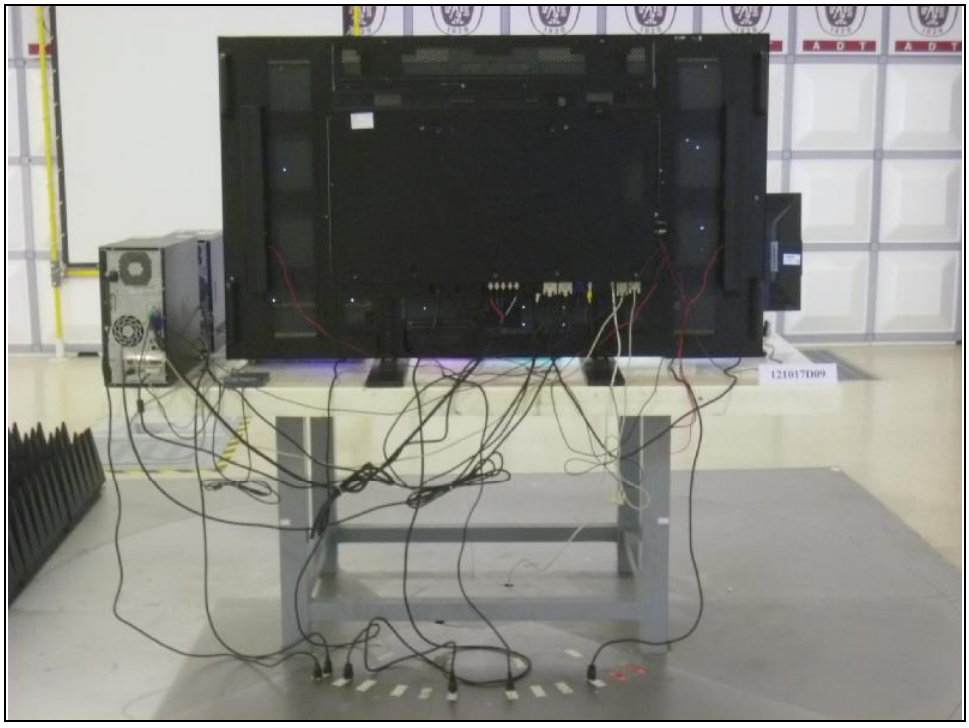
RADIATED EMISSION TEST – For Mode 1
(Frequency Range 30MHz ~ 1GHz)





RADIATED EMISSION TEST – For Mode 1
(Frequency Range above 1GHz)





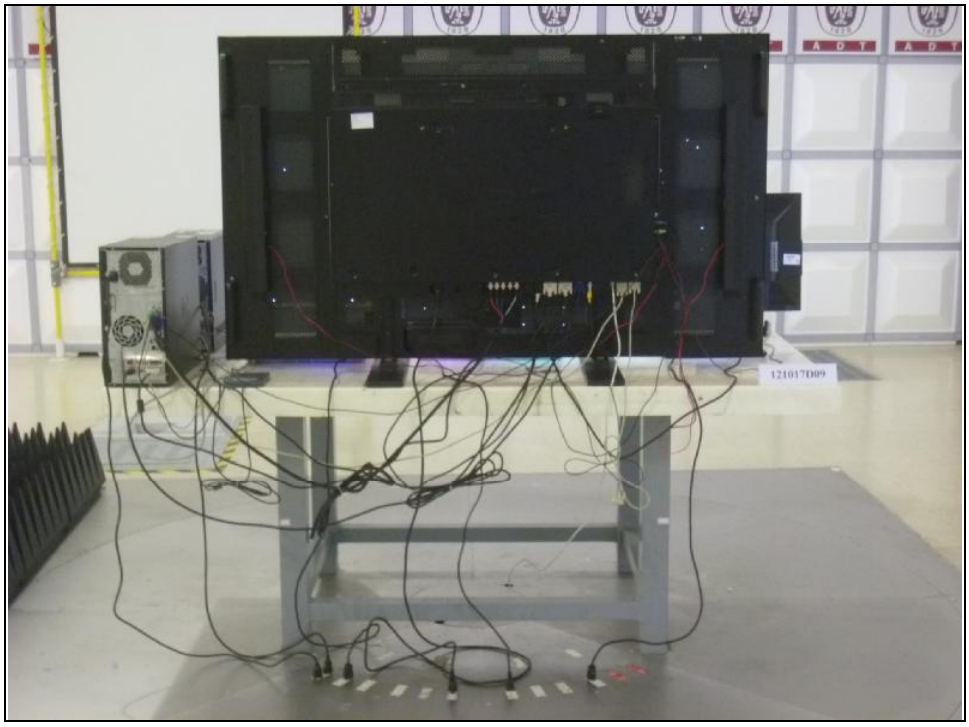
RADIATED EMISSION TEST – For Mode 2
(Frequency Range 30MHz ~ 1GHz)



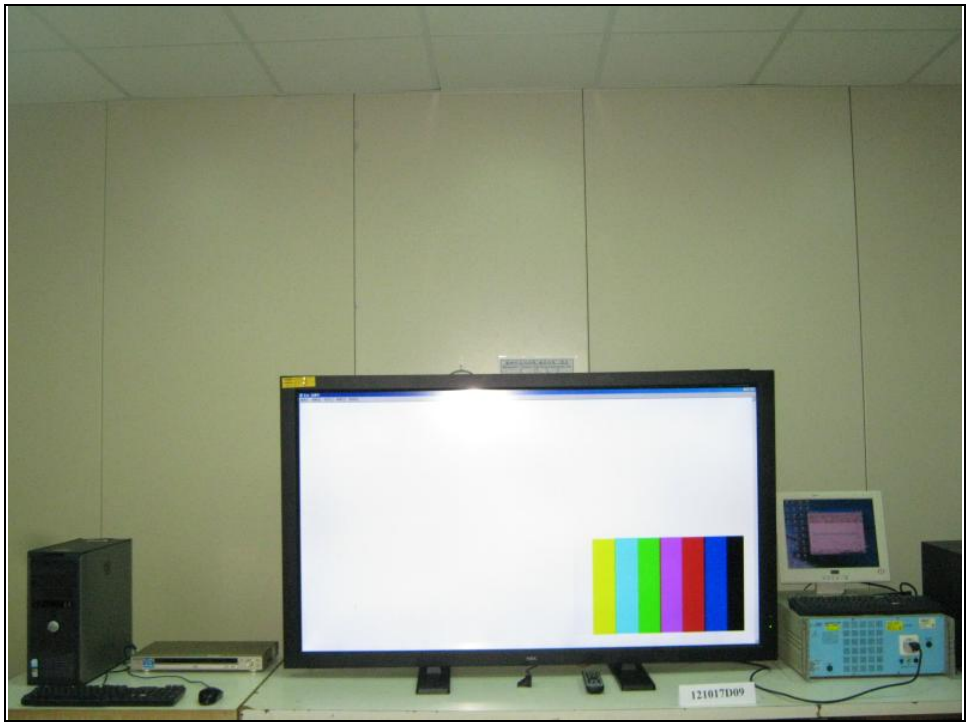


RADIATED EMISSION TEST – For Mode 2
(Frequency Range above 1GHz)

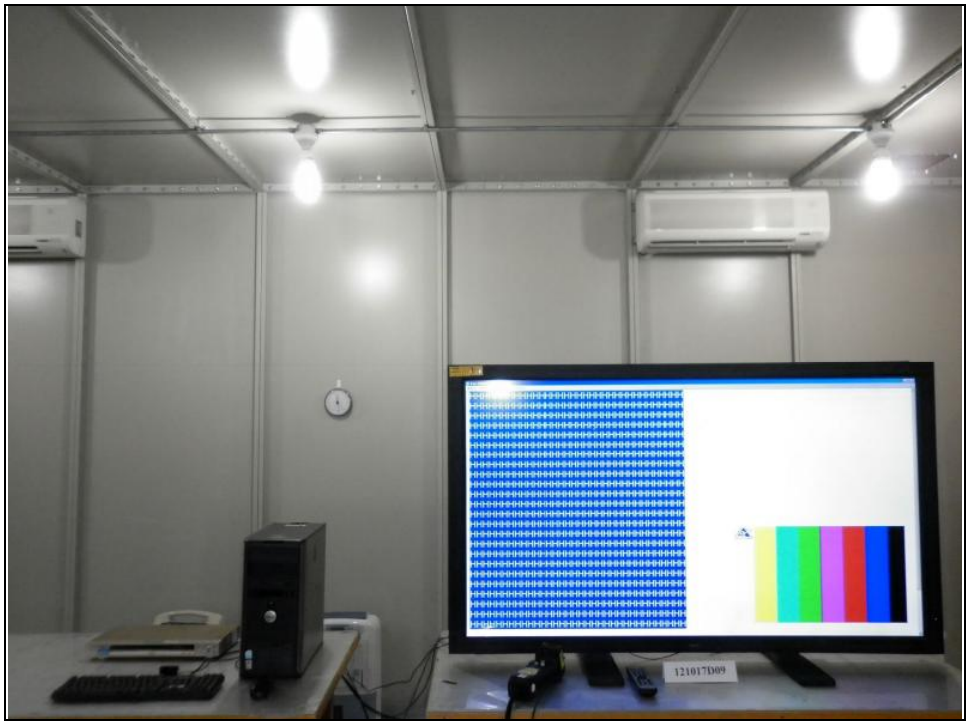




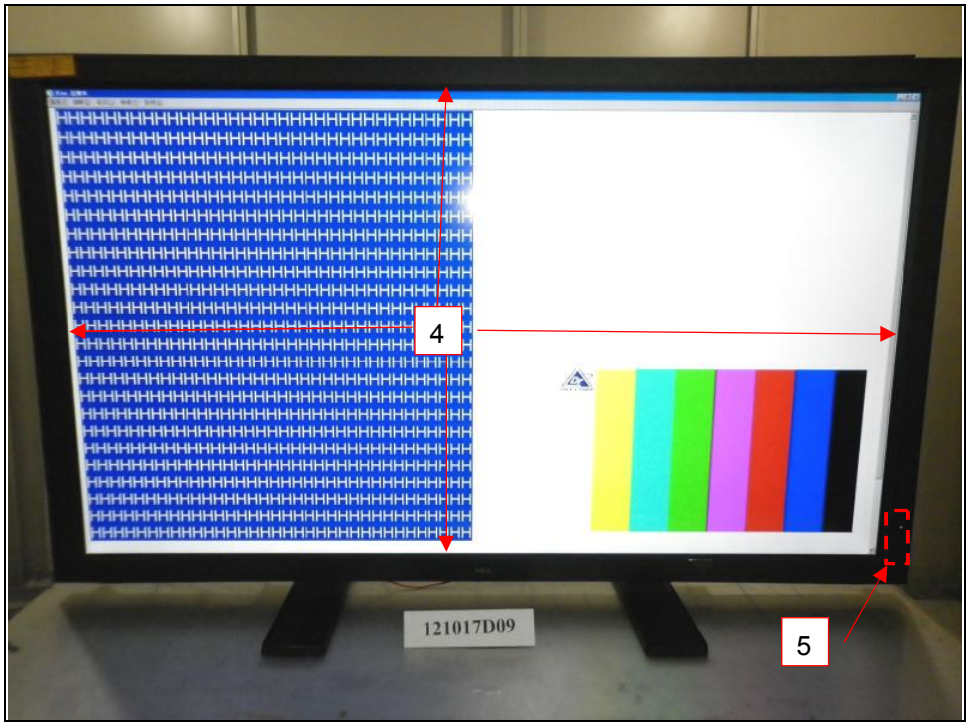
HARMONICS EMISSION TEST &
VOLTAGE FLUCTUATIONS AND FLICKER TEST

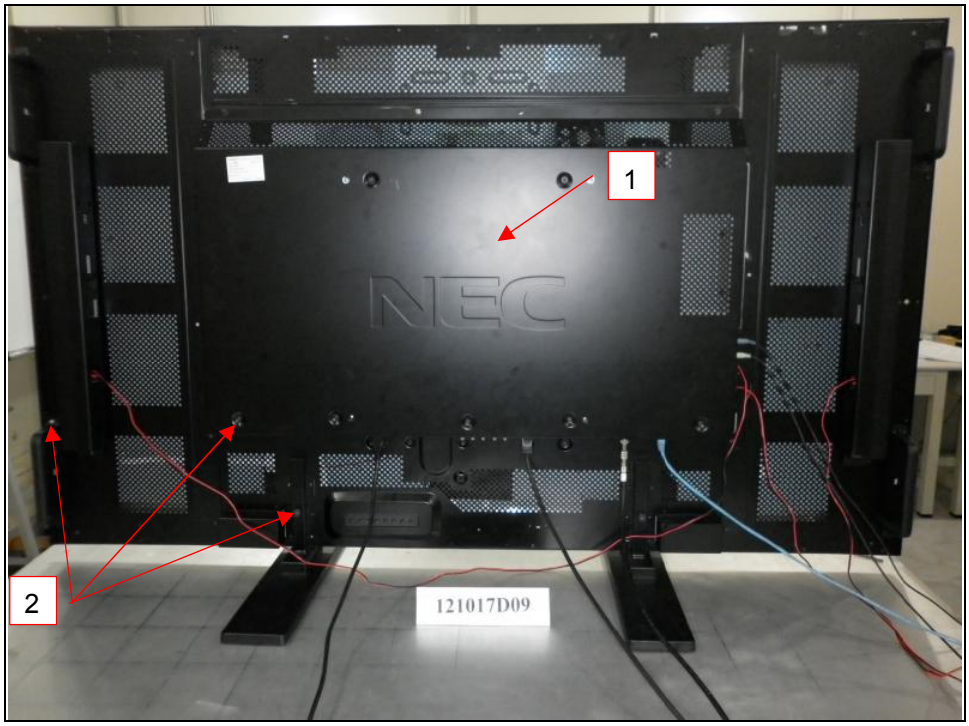


ESD TEST

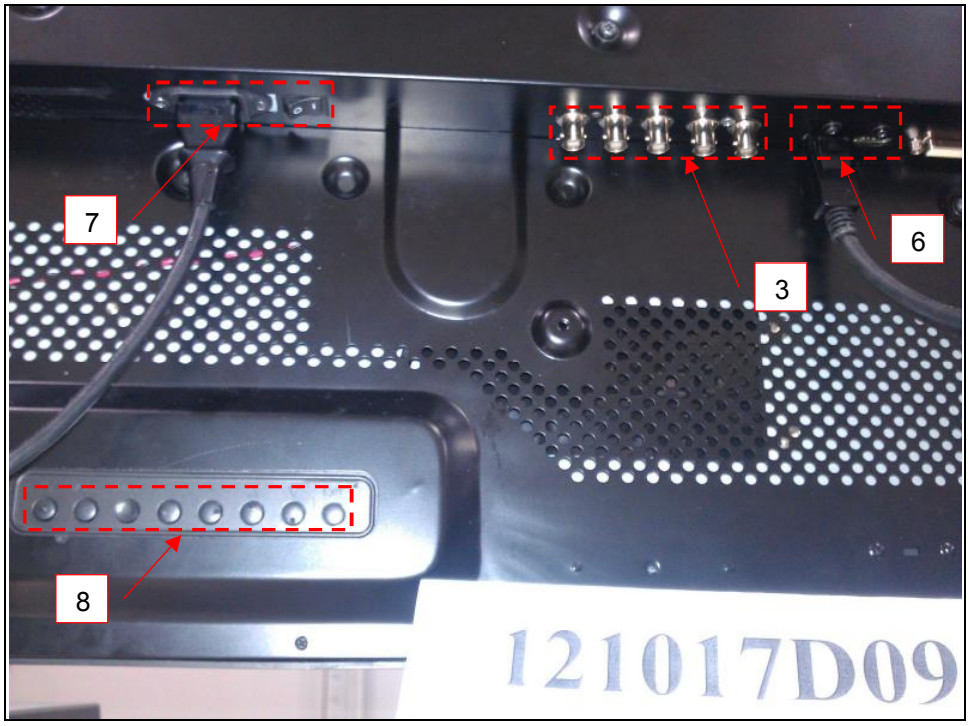


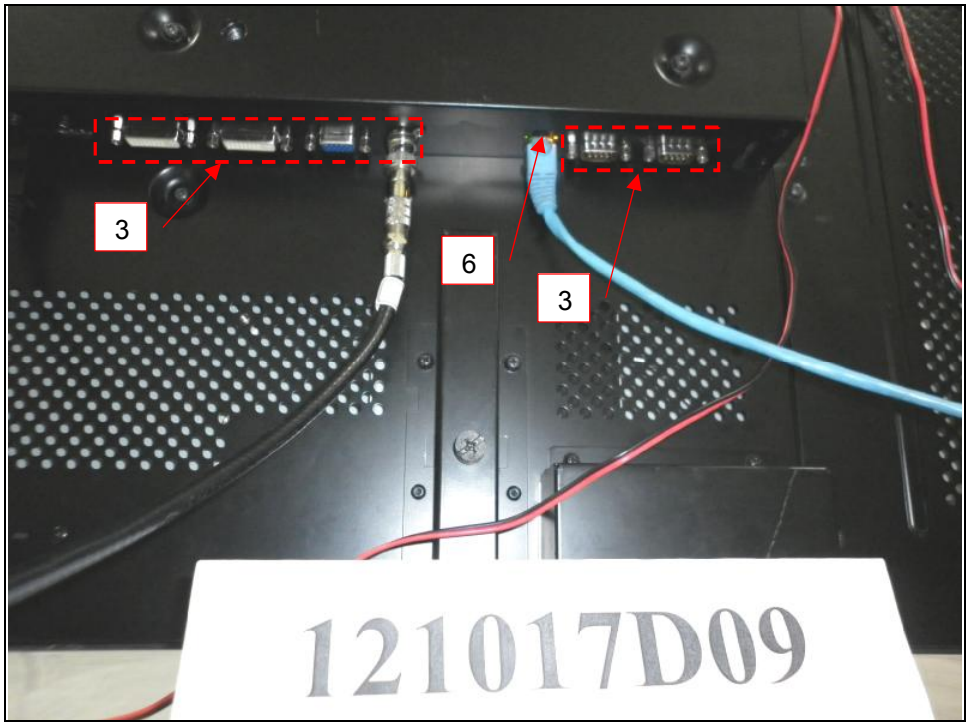
ESD TEST POINT



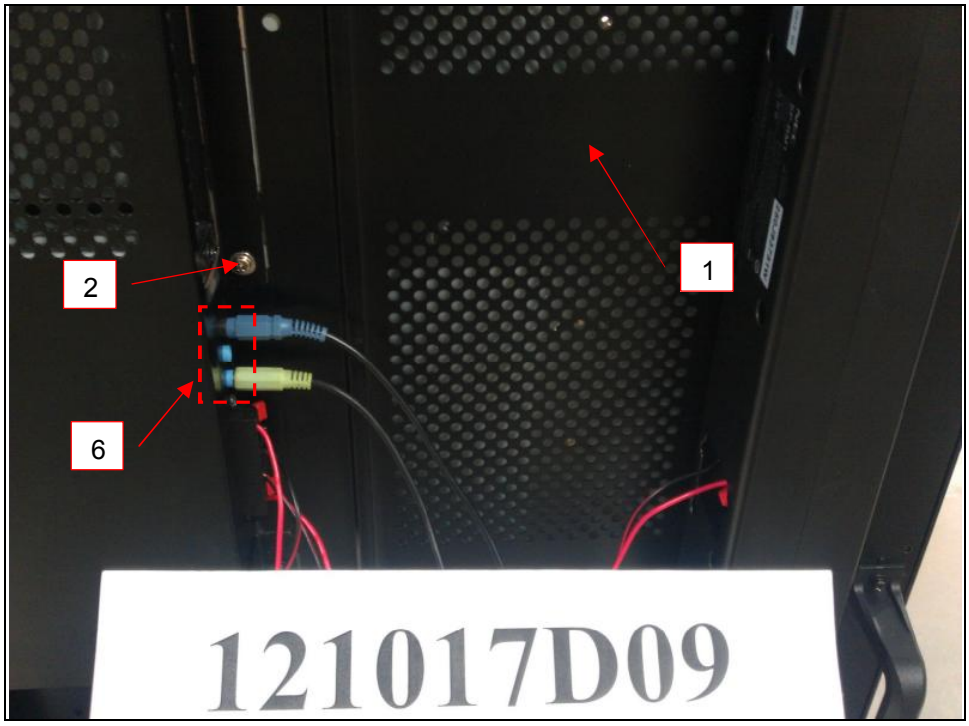


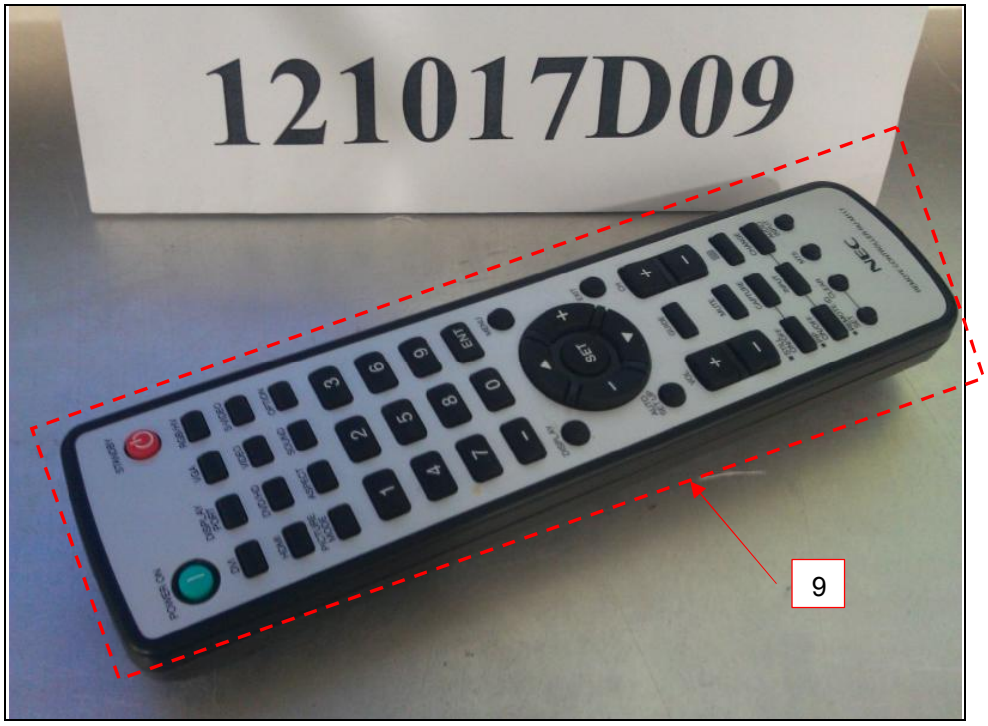
ESD TEST POINT



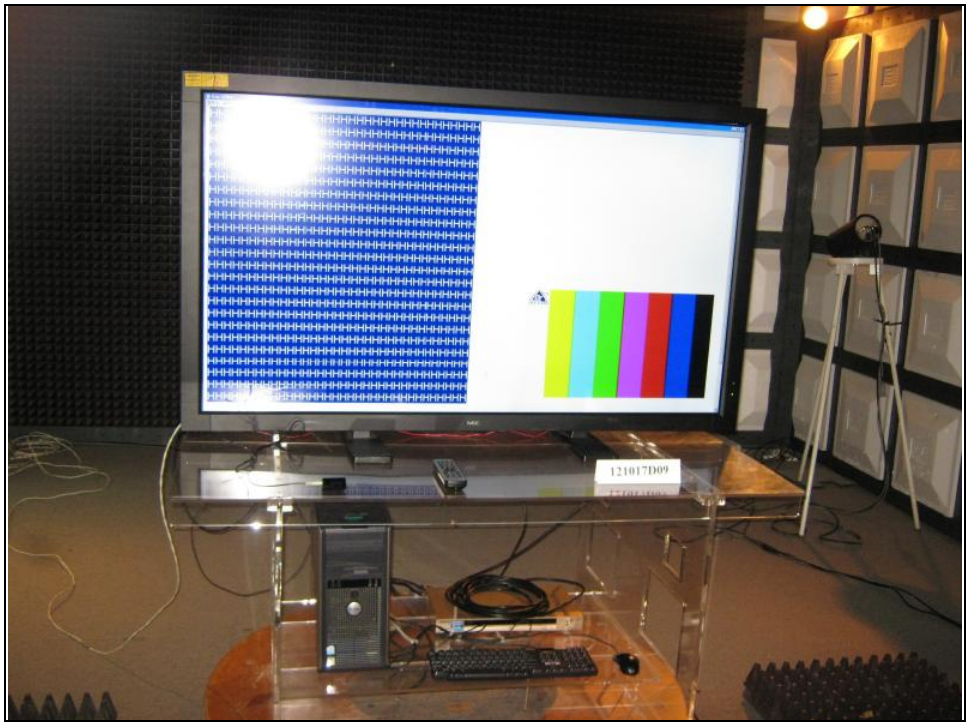


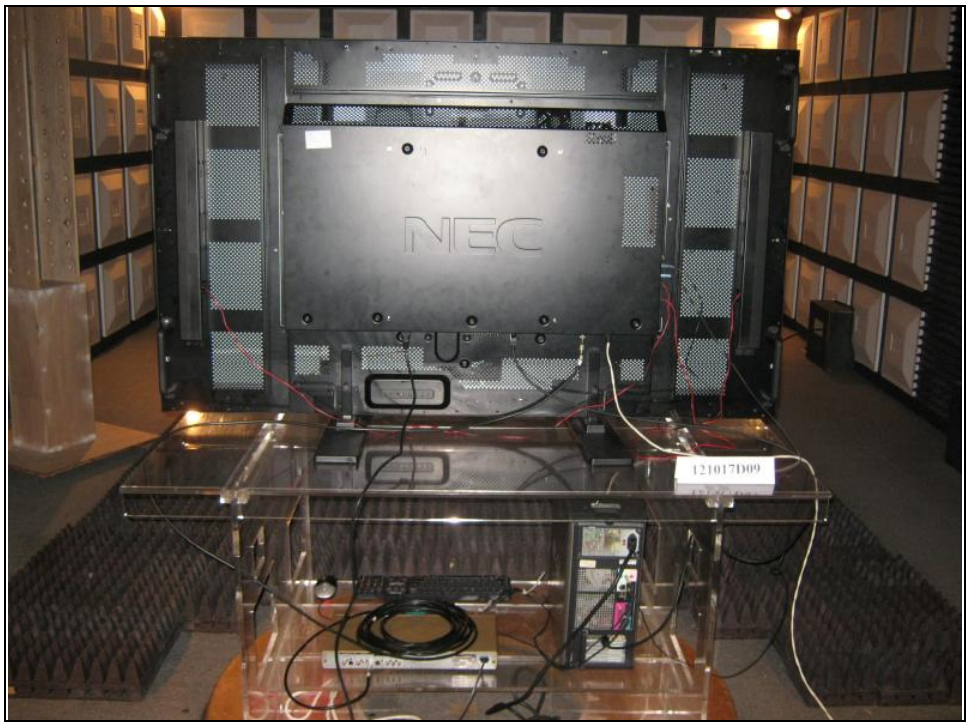
ESD TEST POINT



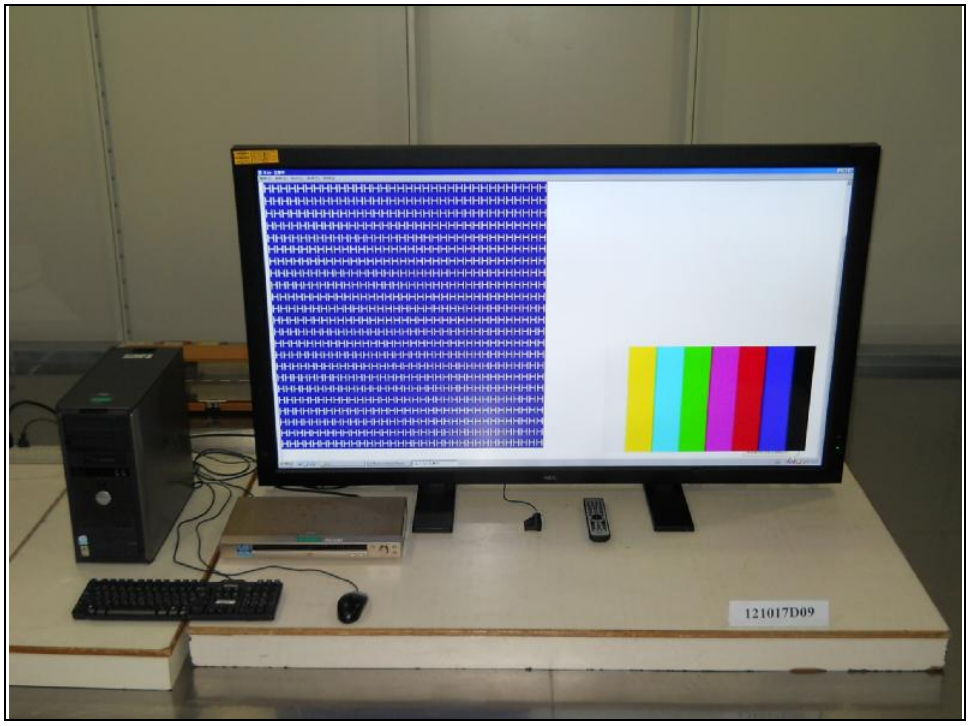


RS TEST

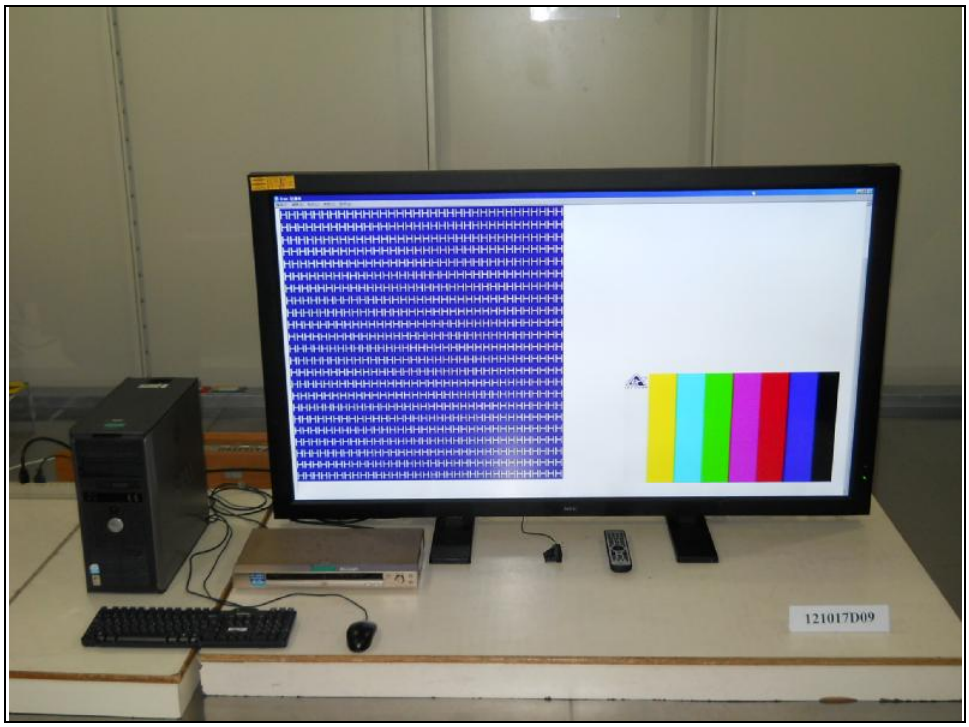




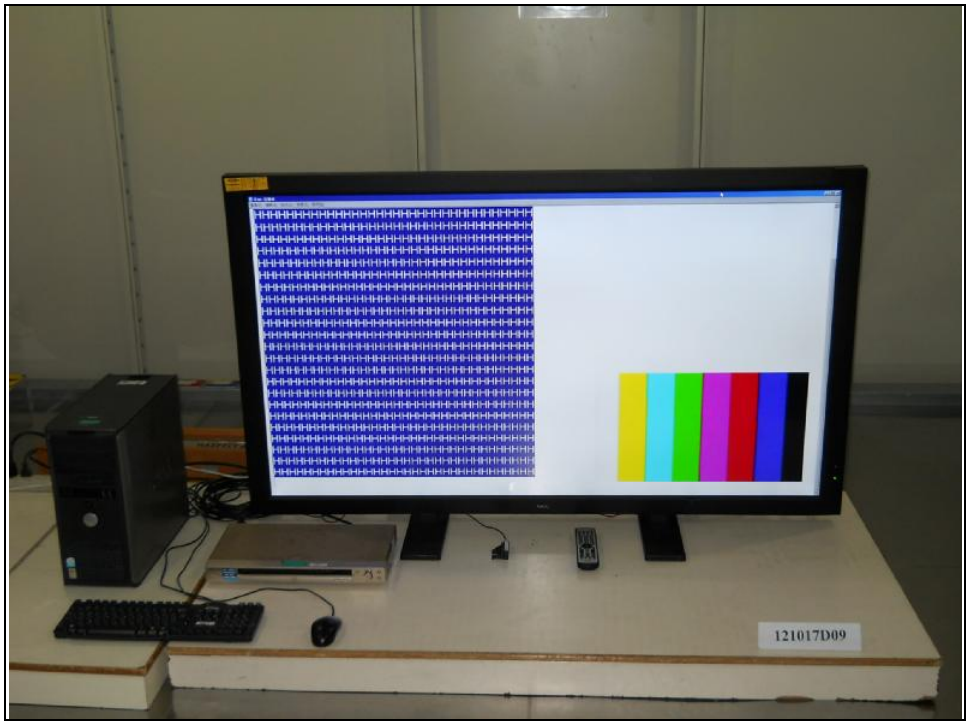
EFT TEST



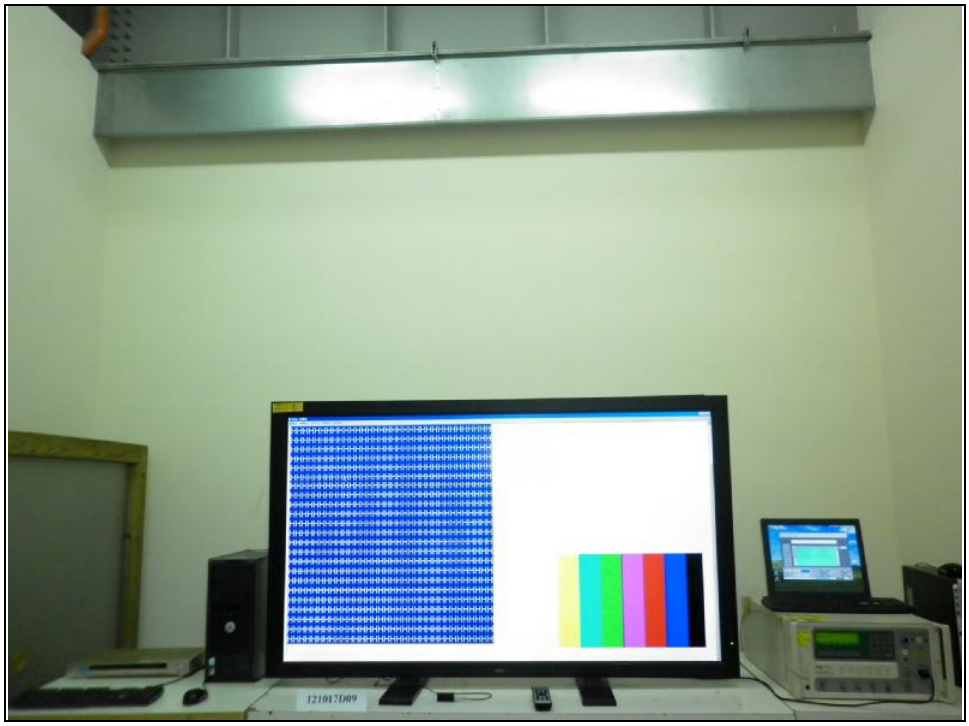
EFT TEST – Cat.5e Line



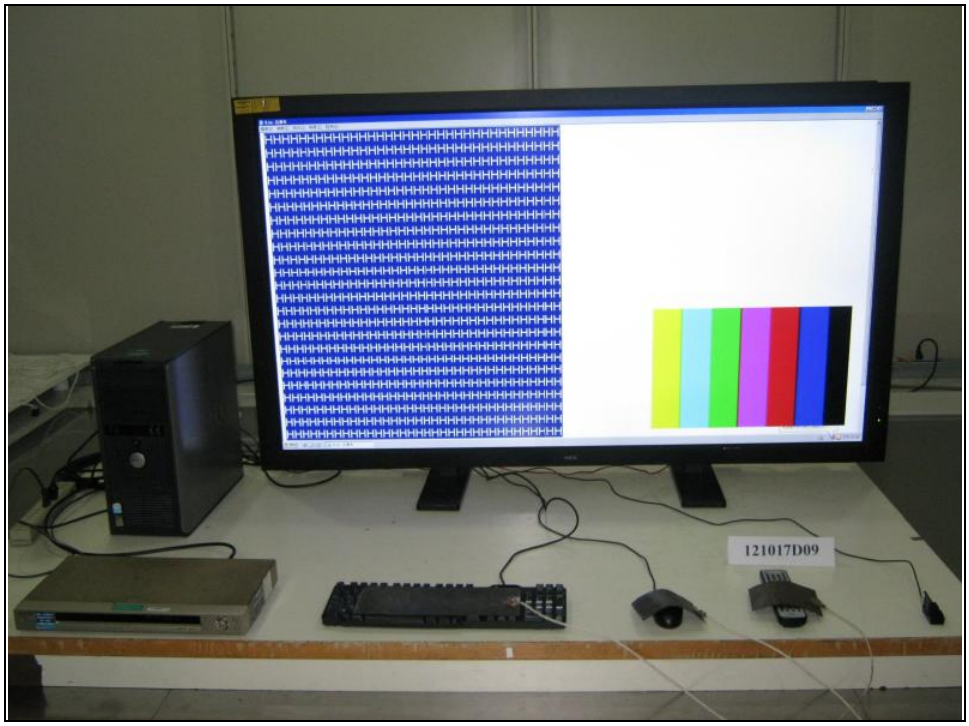
EFT TEST – BNC cable



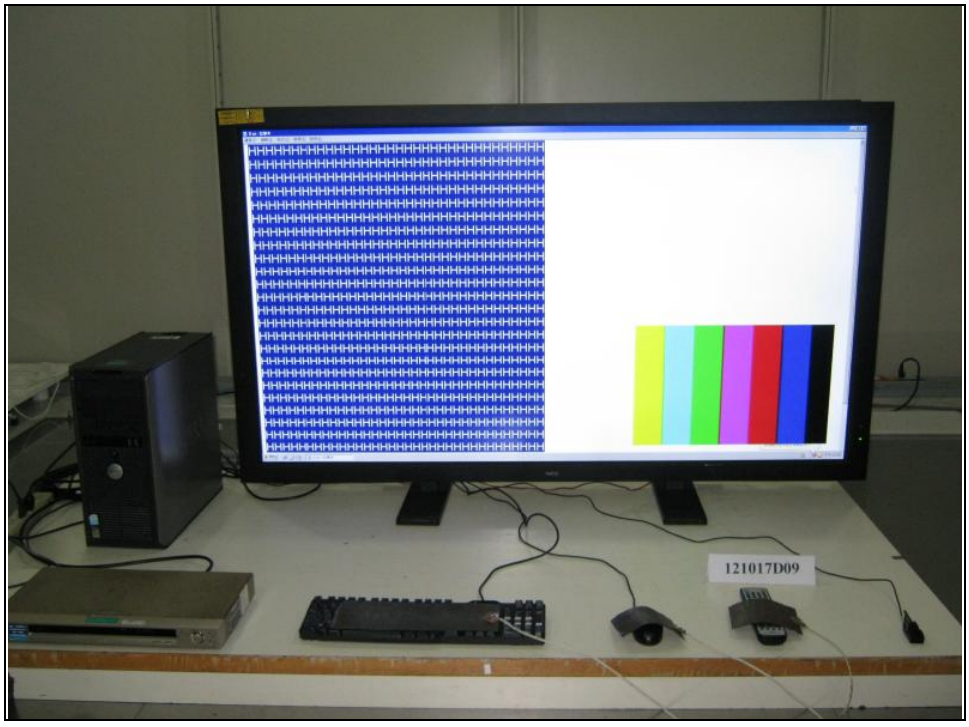
SURGE TEST



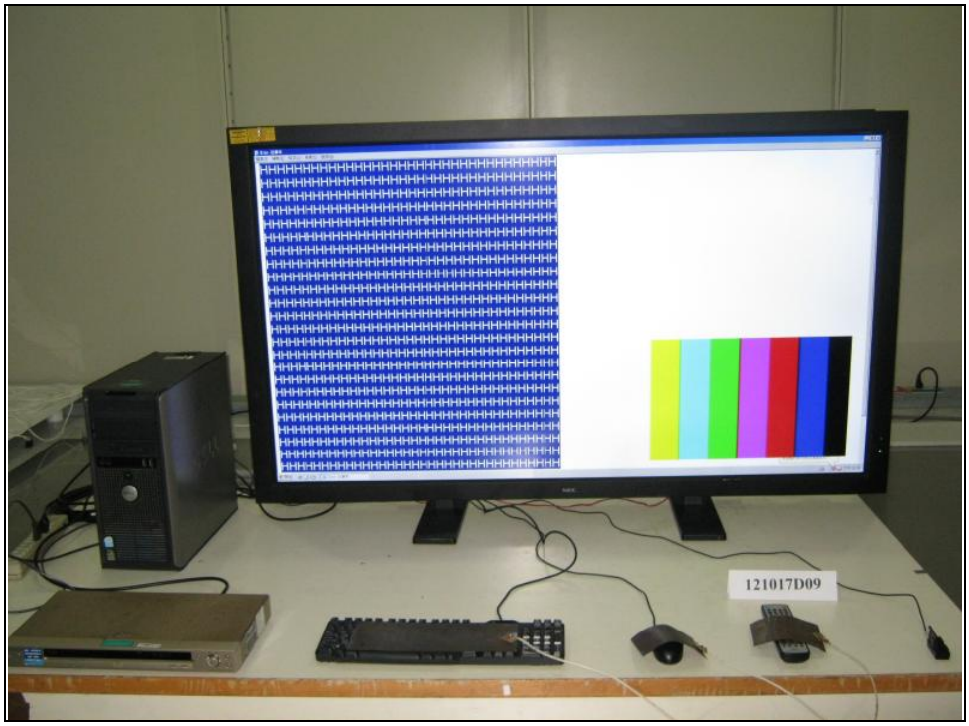
CONDUCTED SUSCEPTIBILITY TEST



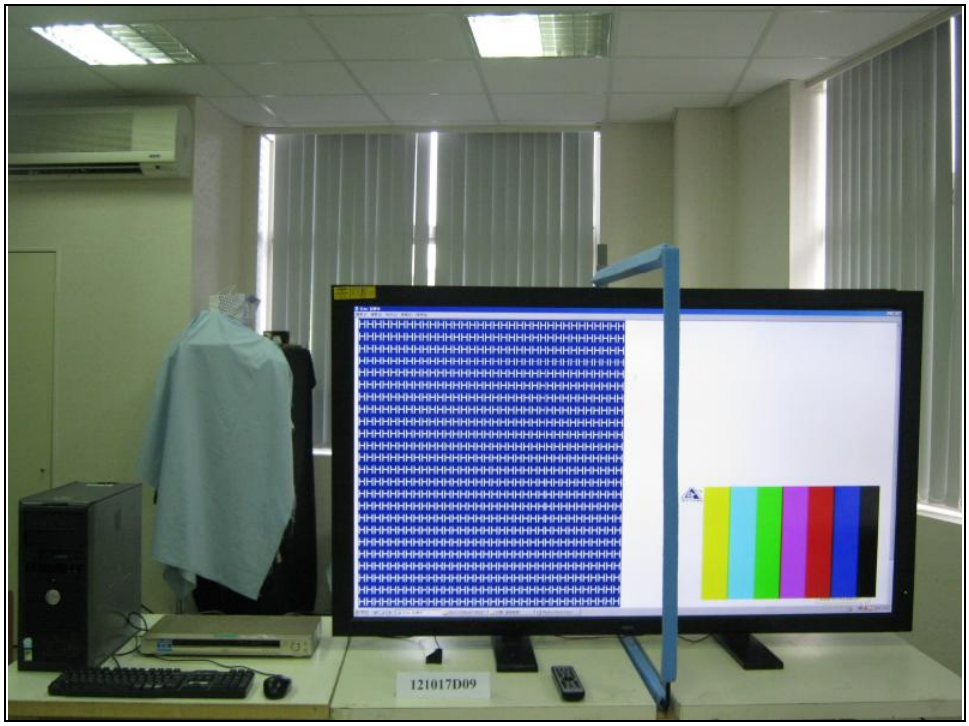
CONDUCTED SUSCEPTIBILITY TEST – Cat.5e Line



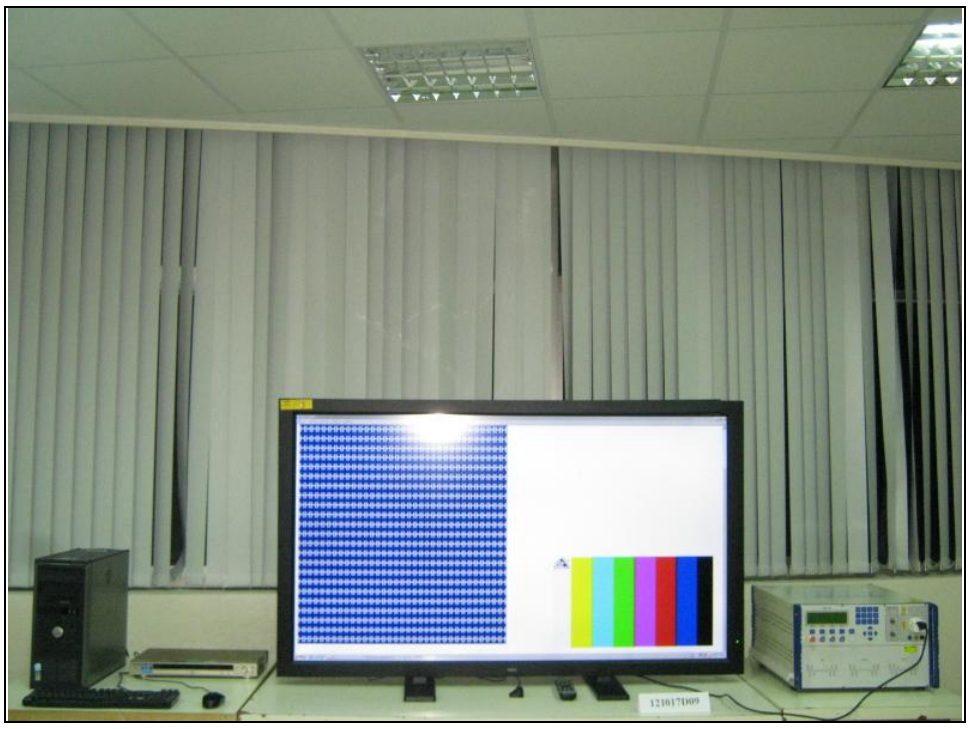
CONDUCTED SUSCEPTIBILITY TEST – BNC cable



POWER-FREQUENCY MAGNETIC FIELDS TEST



VOLTAGE DIPS AND INTERRUPTIONS TEST



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:

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

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