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CE EMC TEST REPORT

REPORT NO. : CE970403H01C

MODEL NO. : L007KN

RECEIVED : May 05, 2010

TESTED : May 05 to 19, 2010

ISSUED : May 28, 2010

APPLICANT : Coretronic Display Solution Corporation

ADDRESS : 5F, No. 11, Li Hsing Rd, Science-Based Industrial
Park, Hsinchu, Taiwan, R.O.C.

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

LAB LOCATION : No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen,
Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan

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1 CERTIFICATION

PRODUCT: Multi Media player
BRAND NAME: NEC
MODEL NO.: L007KN
TESTED: May 05 to 19, 2010
TEST SAMPLE: ENGINEERING SAMPLE
APPLICANT: Coretronic Display Solution Corporation
STANDARDS: EN 55022:2006+A1:2007, Class B EN 55024:1998+A1:2001
 EN 61000-3-2:2006, Class A +A2:2003
 EN 61000-3-3:2008 IEC 61000-4-2:2008 ED.2.0
 IEC 61000-4-3:2006+A1:2007
 ED.3.0
 IEC 61000-4-4:2004 ED.2.0
 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: L007KN) 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

PREPARED BY : Sunny Wen , **DATE:** May 28, 2010
(Sunny Wen, Specialist)

TECHNICAL ACCEPTANCE : Ray Yeh , **DATE:** May 28, 2010
(Ray Yeh, Deputy Manager)

APPROVED BY : May Chen , **DATE:** May 28, 2010
(May Chen, Deputy Manager)

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

EMISSION			
Standard	Test Type	Result	Remarks
EN 55022:2006 +A1:2007, Class B	Conducted Test	PASS	Meets Class B Limit Minimum passing margin is -12.58 dB at 0.185 MHz
	Telecommunication Ports Conducted Test	PASS	Meets Class B Limit Minimum passing margin is -18.11 dB at 23.129 MHz
	Radiated Test	PASS	Meets Class B Limit Minimum passing margin is -3.66 dB at 733.33 MHz
EN 61000-3-2:2006, Class A	Harmonic current emissions	PASS	The power consumption of EUT is less than 75W and no limits apply
EN 61000-3-3:2008	Voltage fluctuations & flicker	PASS	Meets the requirements

IMMUNITY (EN 55024:1998+A1:2001+A2:2003)			
Standard	Test Type	Result	Remarks
IEC 61000-4-2:2008 ED.2.0	Electrostatic discharge immunity test	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-3:2006 +A1:2007 ED.3.0	Radiated, radio-frequency, electromagnetic field immunity test	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-4:2004 ED.2.0	Electrical fast transient / burst immunity test.	PASS	Meets the requirements of Performance Criterion A
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, short interruptions and voltage variations immunity tests	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 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	Value
Conducted emissions	2.45 dB
Telecommunication ports conducted test	3.69 dB
Radiated emissions (30MHz-1GHz)	3.70 dB
Radiated emissions (1GHz-6GHz)	2.44 dB

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Multi Media player
MODEL NO.	L007KN
POWER SUPPLY	Power adapter, Class II
POWER CORD	AC input cable (unshielded, 3.0m) DC output cable (unshielded, 1.0m)
DATA CABLE SUPPLIED	DVI cable (shielded, 1.8m with 2 cores) Audio cable (unshielded, 1.8m) USB cable (shielded, 1.0m) RS232 cable (unshielded, 1.8m) IR cable (unshielded, 1.5m) S-Video cable (unshielded, 1.8m)
I/O PORT	DVI port x 1 Audio in port x 1 Audio out port x 1 USB port x 1 RS232 port x 1 LAN port x 1 IR port x 1 S-Video port x 1
ASSOCIATED DEVICES	Adapter Remote Control (Model No.: SSR-STD33) Vendor (SMK High-Tech Taiwan Trading Co., Ltd.)

Note:

1. The EUT must be supplied with a power adapter as following table:

Brand	Model No.	Spec.
NEC	SQN30W12P-04	AC Input: 100-240V, 0.35-0.65A, 50/60Hz DC Output: 12V, 2.5A

2. The EUT was pre-tested under following test modes :

Pre-test Mode	Description
Mode A	LAN: 10Mbps
Mode B	LAN: 100Mbps

The telecommunication ports conducted test was found in **Mode B**. Therefore only the test data of the modes were recorded in this report.

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

3.2 GENERAL DESCRIPTION OF TEST MODE

The EUT was tested under the following test mode, and its data were recorded in this report:

Conducted / Radiated test	
Test Mode	Description
Mode 1	Full display
Telecommunication ports conducted test	
Test Mode	Description
Mode 1	LAN: 100Mbps
Harmonics Current / Voltage Fluctuation and Flicker / Immunity test	
Test Mode	Description
Mode 1	Full display

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

EN 55022:2006+A1:2007, Class B	EN 55024:1998+A1:2001+A2:2003
EN 61000-3-2:2006, Class A	IEC 61000-4-2:2008 ED.2.0
EN 61000-3-3:2008	IEC 61000-4-3:2006+A1:2007 ED.3.0
	IEC 61000-4-4:2004 ED.2.0
	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

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

All tests have been performed and recorded as per the above standards.

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.

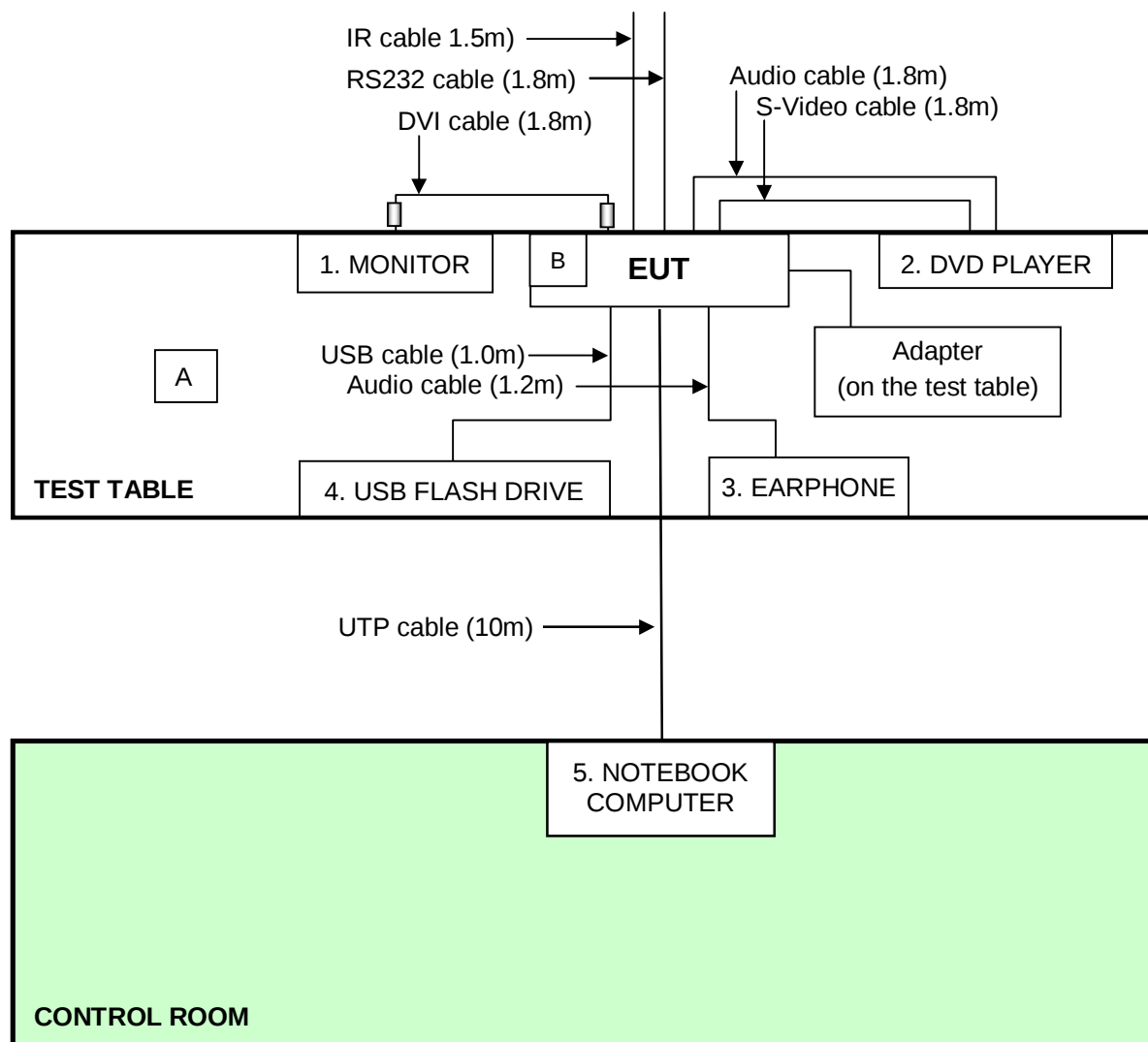
Conducted / Telecommunication ports conducted test / Radiated test					
No.	Product	Brand	Model No.	Serial No.	FCC ID
1	MONITOR	Lenovo	L2440x	VN08455	FCC DoC
2	DVD PLAYER	PIONEER	DV-600AV	GIKD005519LS	FCC DoC
3	EARPHONE	PHILIPS	SBC HL145	8710895759472	NA
4	USB FLASH DRIVE	SanDisk	SDCZ2-512-A10	5597844849	FCC DoC
5	NOTEBOOK COMPUTER	DELL	PP18L	12252644560	FCC DoC
Harmonics Current / Voltage Fluctuation & Flicker / Immunity test					
No.	Product	Brand	Model No.	Serial No.	FCC ID
1	MONITOR	DELL	2408WFPb	CN-0NN792-74261-83B-03US	FCC DoC
2	DVD PLAYER	PIONEER	DV-600AV	GIKD005519LS	FCC DoC
3	SPEAKER	SANYO	SYSP-802	SP07500040301141	NA
4	USB FLASH DRIVE	SanDisk	SDCZ2-512	5675968612	NA
5	NOTEBOOK COMPUTER	DELL	PP18L	4799903248	FCC DoC

Conducted / Telecommunication ports conducted test / Radiated test	
No.	Signal cable description
1	1.8 m braid shielded wire, terminated with DVI connector via metallic frame, with two cores.
2	1.8 m unshielded Audio cable. / 1.8 m unshielded S-Video cable.
3	1.2 m wrapped shielded wire, terminated via drain wire, with 3.5 mm phone plug, w/o core.
4	1.0 m unshielded USB cable.
5	10 m UTP cable.
Harmonics Current / Voltage Fluctuation & Flicker / Immunity test	
No.	Signal cable description
1	1.8 m braid shielded wire, terminated with DVI connector via metallic frame, with two cores.
2	1.8 m unshielded Audio cable. / 1.8 m unshielded S-Video cable.
3	1.8 m wrapped shielded wire, terminated via drain wire, with 3.5 mm phone plug, w/o core.
4	1.0 m unshielded USB cable.
5	10 m UTP cable.

Note: The power cords of the above support units were unshielded (1.8m).

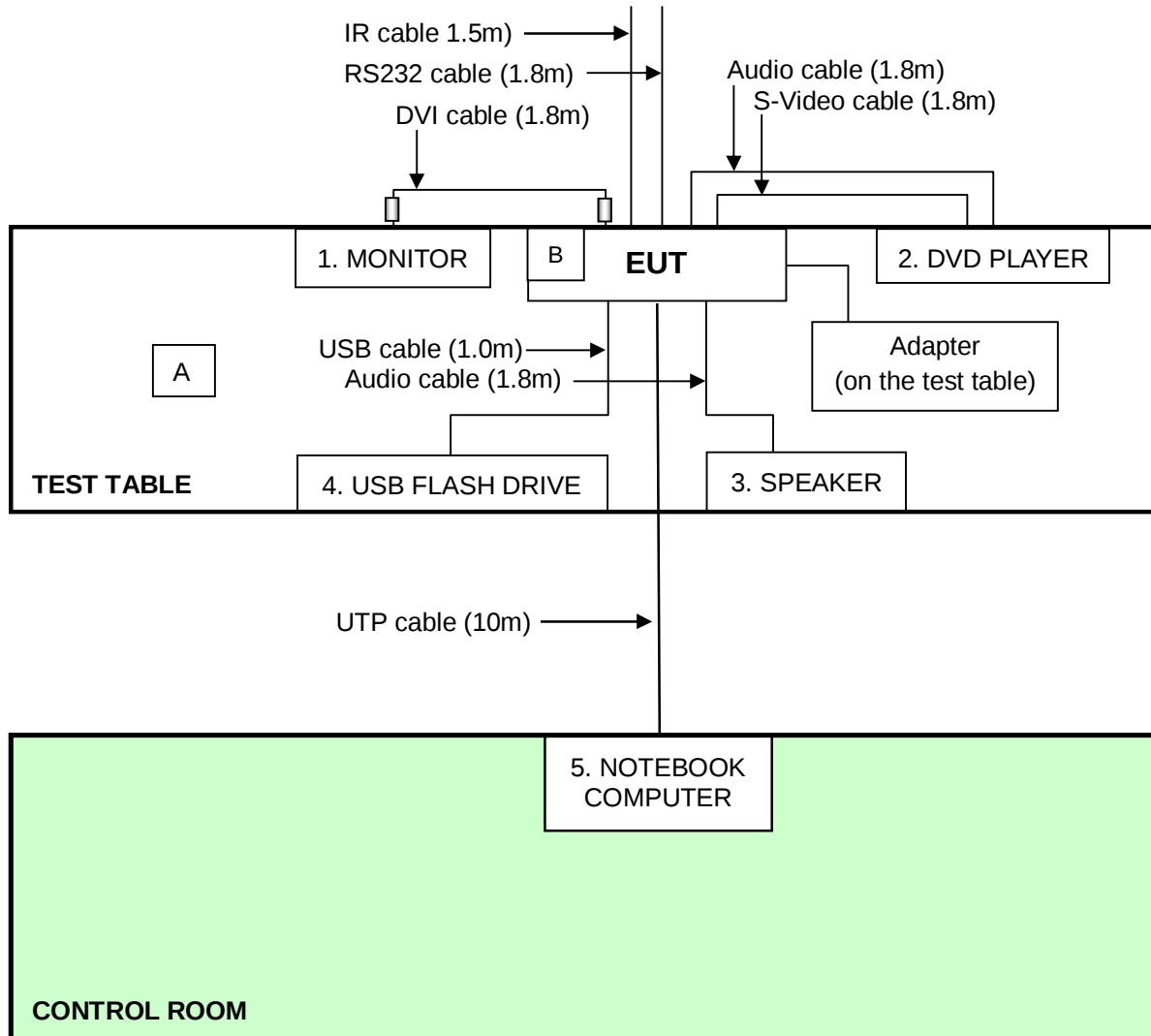
3.5 CONFIGURATION OF SYSTEM UNDER TEST

For Conducted & Telecommunication ports conducted / Radiated test :



NOTE: 1. Item A is the remote control of the EUT.
2. Item B is SD card.

For Harmonics Current / Voltage Fluctuation & Flicker / Immunity test :



NOTE: 1. Item A is the remote control of the EUT.
2. Item B is SD card.

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	100287	Mar. 01, 2010	Feb. 28, 2011
Line-Impedance Stabilization Network (for EUT)	NSLK 8127	8127-523	Sep. 23, 2009	Sep. 22, 2010
Line-Impedance Stabilization Network (for Peripheral)	ENV-216	100072	June 08, 2009	June 07, 2010
RF Cable (JYEBAO)	5DFB	COACAB-001	Dec. 14, 2009	Dec. 13, 2010
50 ohms Terminator	50	3	Oct. 28, 2009	Oct. 27, 2010
Software	BV ADT_Cond_V7.3.7	NA	NA	NA

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. A.
3. The VCCI Con A Registration No. is C-817.

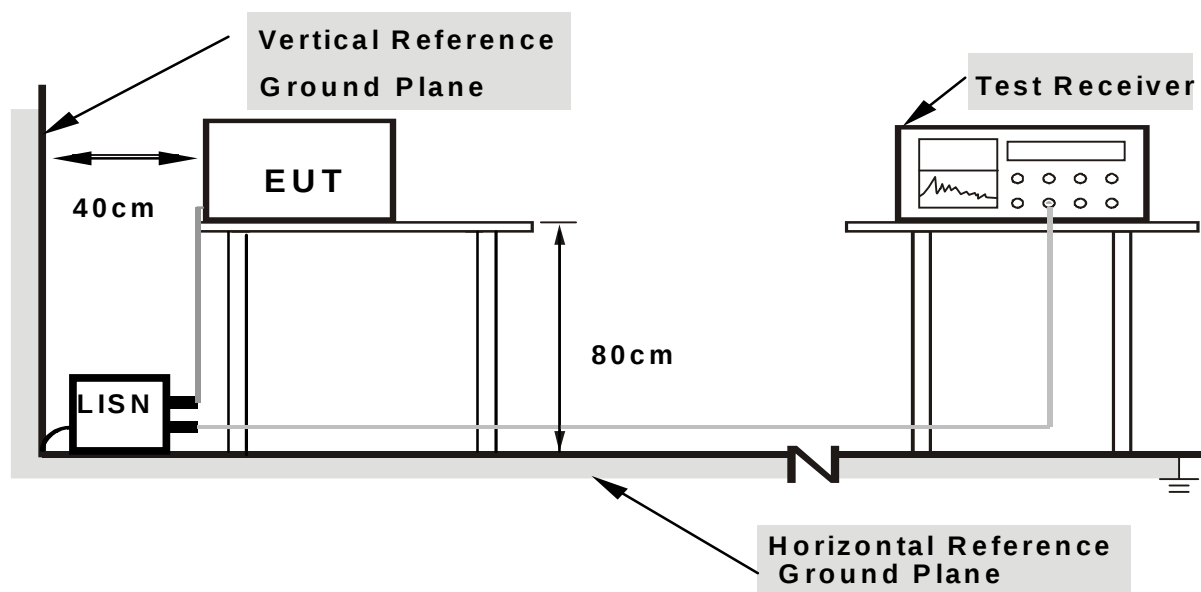
4.1.3 TEST PROCEDURE

- 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.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 10dB under the prescribed limits could not be reported.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



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

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

4.1.6 EUT OPERATING CONDITIONS

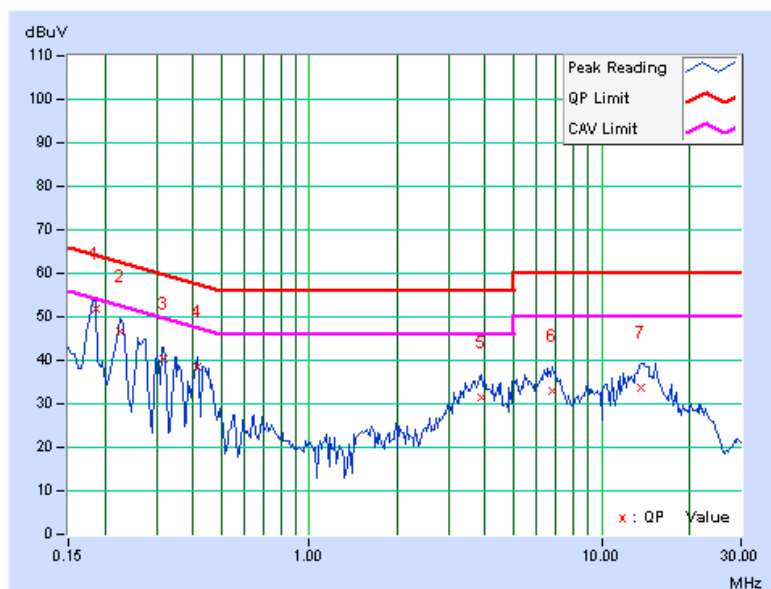
1. Turn on the power of all equipment.
2. Support unit 5 (Notebook Computer) runs a test program "Ping.exe" to enable of EUT via one UTP cable.
3. Plug the SD card into EUT, EUT reads video messages from SD card. Then EUT sends video messages to support unit 1 (Monitor) displays the messages on its screen.
4. EUT reads audio messages from SD and sends these messages to support unit 3 (Earphone).
5. Repeat steps 2-4.

4.1.7 TEST RESULTS

TEST MODE	Mode 1	PHASE	Line (L)
INPUT POWER	230Vac, 50 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	28 deg. C, 62 % RH, 1014 hPa	TESTED BY	Leo Peng

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.185	0.04	51.63	-	51.67	-	64.25	54.25	-12.58	-
2	0.224	0.04	46.55	-	46.59	-	62.66	52.66	-16.07	-
3	0.318	0.05	40.46	-	40.51	-	59.76	49.76	-19.25	-
4	0.416	0.06	38.37	-	38.43	-	57.54	47.54	-19.10	-
5	3.879	0.20	31.40	-	31.60	-	56.00	46.00	-24.40	-
6	6.762	0.27	32.51	-	32.78	-	60.00	50.00	-27.22	-
7	13.680	0.44	33.36	-	33.80	-	60.00	50.00	-26.20	-

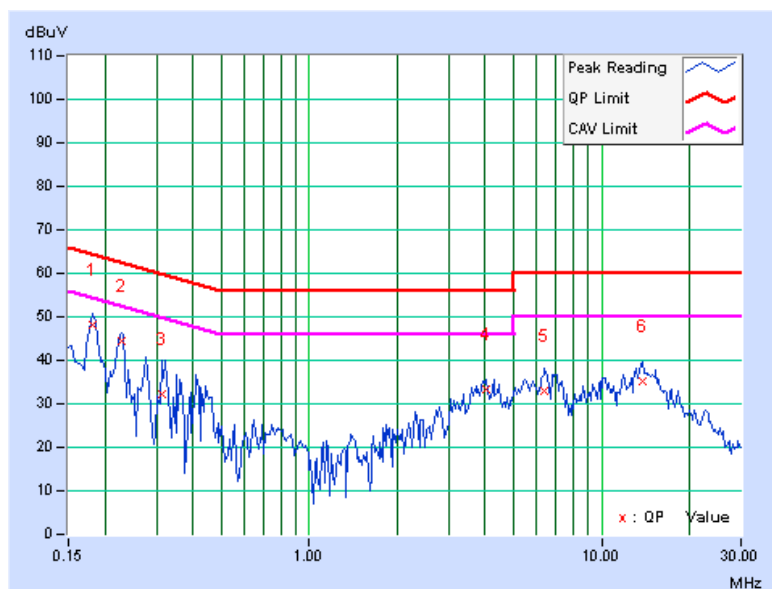
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. Correction factor = Insertion loss + Cable loss
 6. Emission Level = Correction Factor + Reading Value.



TEST MODE	Mode 1	PHASE	Neutral (N)
INPUT POWER	230Vac, 50 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	28 deg. C, 62 % RH, 1014 hPa	TESTED BY	Leo Peng

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.181	0.05	48.22	-	48.27	-	64.43	54.43	-16.16	-
2	0.228	0.05	44.41	-	44.46	-	62.52	52.52	-18.06	-
3	0.314	0.06	32.19	-	32.25	-	59.86	49.86	-27.61	-
4	4.008	0.22	33.25	-	33.47	-	56.00	46.00	-22.53	-
5	6.371	0.28	32.81	-	33.09	-	60.00	50.00	-26.91	-
6	13.895	0.46	34.58	-	35.04	-	60.00	50.00	-24.96	-

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. Correction factor = Insertion loss + Cable loss
 6. 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	100287	Mar. 01, 2010	Feb. 28, 2011
Line-Impedance Stabilization Network (for EUT)	NSLK 8127	8127-523	Sep. 23, 2009	Sep. 22, 2010
Line-Impedance Stabilization Network (for Peripheral)	ENV-216	100072	June 08, 2009	June 07, 2010
FCC ISN (FCC-TLISN-T4-02)	FCC-TLISN-T4-02	20172	Oct. 05, 2009	Oct. 04, 2010
FCC ISN (FCC-TLISN-T2-02)	FCC-TLISN-T2-02	20171	Oct. 05, 2009	Oct. 04, 2010
FCC ISN (FCC-TLISN-T8-02)	FCC-TLISN-T8-02	20608	July. 11, 2009	July. 10, 2010
FCC ISN (FCC-TLISN-S8-RJ45)	FCC-TLISN-S8-RJ45	20610	July 13, 2009	July 12, 2010
FCC ISN (FCC-TLISN-C1-BNC-50)	FCC-TLISN-C1-BNC-50	20609	July 10, 2009	July 09, 2010
RF Cable (JYEBAO)	5DFB	COACAB-001	Dec.14, 2009	Dec. 13, 2010
CURRENT PROBE	SMZ 11	18001	Aug. 17, 2009	Aug. 16, 2010
Capacitive Voltage Probe	CVP 2200	18312	Aug. 17, 2009	Aug. 16, 2010
RF Current Probe	F-35	455	July 31, 2009	July 30, 2010
RF- ABSORBING CLAMP	KEMA 801	16617	NA	NA
FCC ISN (F-071115-1057-1)	F-071115-1057-1	09053	Aug. 11, 2009	Aug. 10, 2010

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. A.
3. The VCCI ISN A Registration No. is T-1545.

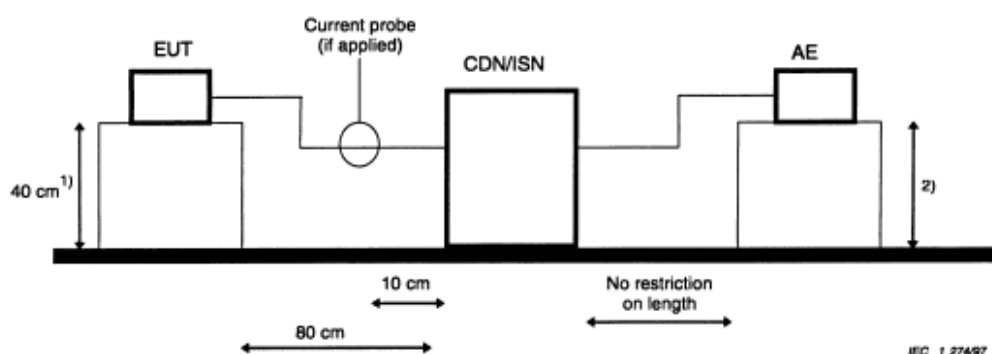
4.2.3 TEST PROCEDURE

- The EUT was placed 0.4 meters from the conducting wall of the shielded room and connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN.
- Voltage at the measurement port of the ISN was detected, the reading was corrected by adding the voltage division factor of the ISN, and was compared to the voltage limits.
- The disturbance levels and the frequencies of at least six highest disturbances were recorded from each telecommunication port which comprises the EUT.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation

4.2.5 TEST SETUP



IEC 1 274/67

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.

NOTE:

1. The methods of conformance testing were selected according to the EN 55022, section: 9.6.1 of measurement method using an ISN with a longitudinal conversion loss (LCL) as defined in rule.
2. When measurements were performed on a single unscreened balanced pair, an adequate ISN for two wires were used; when performed on unscreened cables containing two balanced pairs, an adequate ISN for four wires were used; when performed on unscreened cables containing four balanced pairs, an adequate ISN for eight wires were used.
3. The communication function of EUT was executed and ISN was connected between EUT and associated equipment and the ISN was connected directly to reference ground plane.

4.2.6 EUT OPERATING CONDITIONS

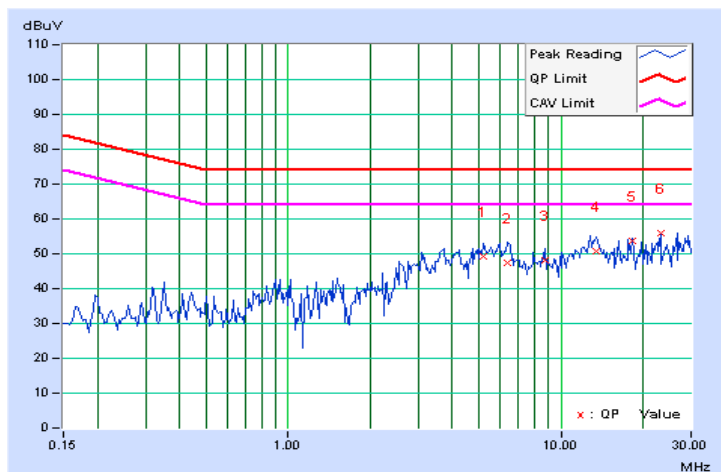
Same as 4.1.6

4.2.7 TEST RESULTS

TEST MODE	Mode 1	INPUT POWER	230Vac, 50Hz
TELECOM PORT	LAN: 100Mbps	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	21 deg. C, 65% RH, 1014 hPa	TESTED BY	Leo Peng

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	A.V.	Q.P.	A.V.
1	5.188	9.37	39.84	-	49.21	-	74.00	64.00	-24.79	-
2	6.387	9.38	37.96	-	47.34	-	74.00	64.00	-26.66	-
3	8.715	9.39	38.65	-	48.04	-	74.00	64.00	-25.96	-
4	13.418	9.44	41.44	-	50.88	-	74.00	64.00	-23.12	-
5	18.242	9.52	44.08	-	53.60	-	74.00	64.00	-20.40	-
6	23.129	9.62	46.27	-	55.89	-	74.00	64.00	-18.11	-

- REMARKS:
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. Correction factor = Insertion loss + Cable loss
 6. 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)	Class B (at 10m)
	dBuV/m	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 Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	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

**A D T**

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ADVANTEST Spectrum Analyzer	U3751	170100022	Nov. 18, 2009	Nov. 17, 2010
ADVANTEST Spectrum Analyzer	U3772	160100280	Sep. 21, 2009	Sep. 20, 2010
HP Pre_Amplifier	8449B	3008A01922	Sep. 25, 2009	Sep. 24, 2010
ROHDE & SCHWARZ Test Receiver	ESCS 30	100375	Mar. 09, 2010	Mar. 08, 2011
SCHWARZBECK Broadband Antenna	VULB-9168	263	Apr. 28, 2010	Apr. 27, 2011
Schwarzbeck Horn_Antenna	BBHA9120	D123	Sep. 21, 2009	Sep. 20, 2010
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 23, 2010	Jan. 22, 2011
RF Switches	EM-H-01-1	1009	Aug. 10, 2009	Aug. 08, 2010
RF Cable	8DFB	STACAB-30M-1GHz-091	Nov. 20, 2009	Nov. 19, 2010
Software	ADT_Radiated_V7.6.15.9.2	NA	NA	NA
CT Antenna Tower & Turn Table	TT100	ADT01	NA	NA
CORCOM AC Filter	MRI2030	107/108	NA	NA

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 horn antenna, preamplifier (model: 8449B) and Spectrum Analyzer (model: U3772) are used only for the measurement of emission frequency above 1GHz if tested.

3. The test was performed in Open Site No. A.

4. The VCCI Site Registration No. is R-782.

5. The FCC Site Registration No. is 91097.

6. The CANADA Site Registration No. is IC 7450G-1.

4.3.3 TEST PROCEDURE

For below 1GHz:

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

NOTE:

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

For Above 1GHz test:

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meters open field site. 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 spectrum analyzer 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:

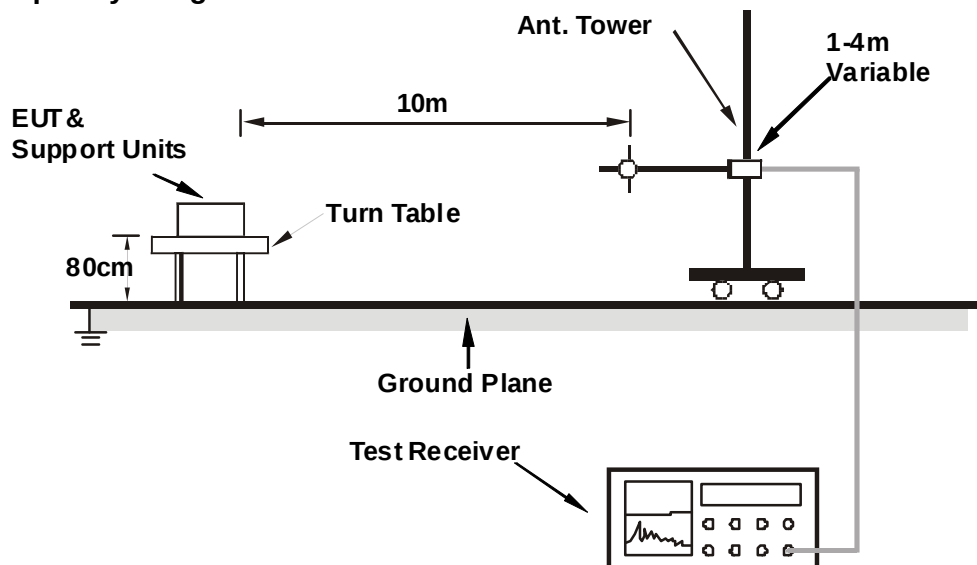
1. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.
2. For measurement of frequency above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

4.3.4 DEVIATION FROM TEST STANDARD

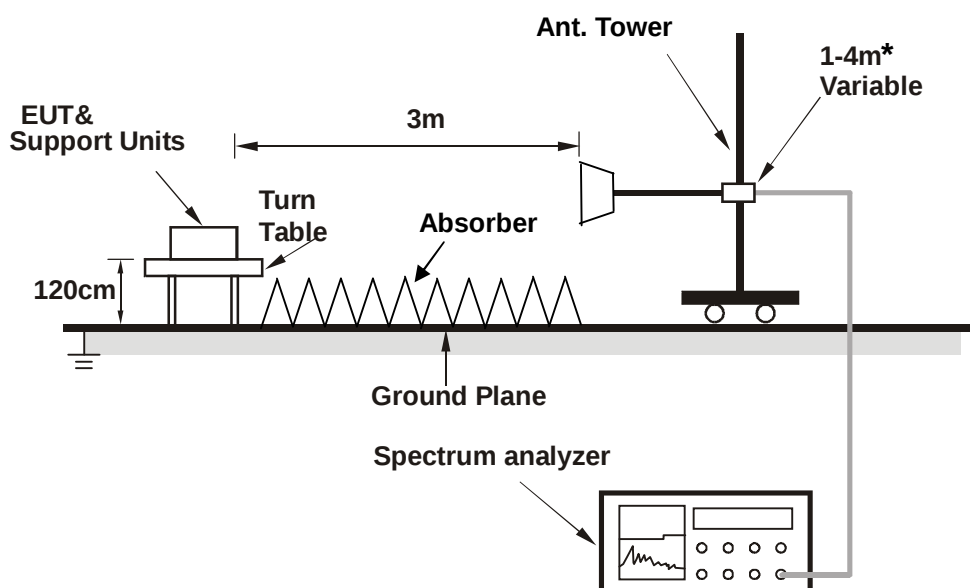
No deviation

4.3.5 TEST SETUP

<Frequency Range below 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 4.1.6

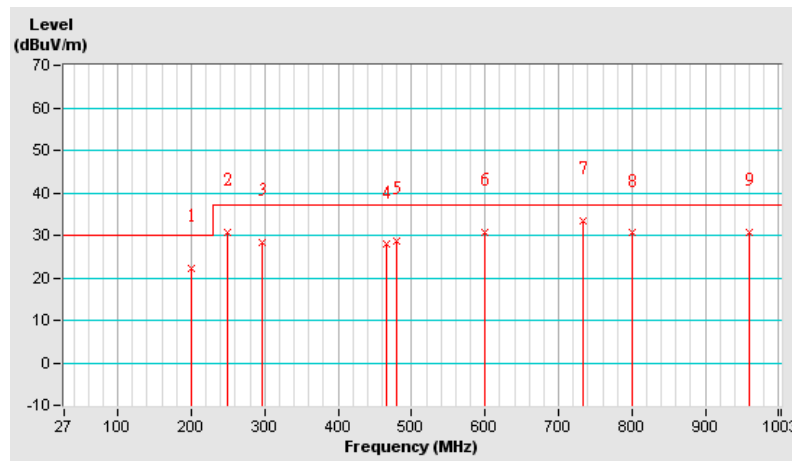
4.3.7 TEST RESULTS

TEST MODE	Mode 1	INPUT POWER	230Vac, 50Hz
FREQUENCY RANGE	30-1000 MHz	DETECTOR FUNCTION & BANDWIDTH	Quasi-Peak, 120kHz
ENVIRONMENTAL CONDITIONS	26 deg. C, 75 % RH, 1014 hPa	TESTED BY	Eagle Chen

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	200.00	22.22 QP	30.00	-7.78	4.00 H	345	11.51	10.71
2	250.00	30.66 QP	37.00	-6.34	4.00 H	25	15.90	14.76
3	297.00	28.25 QP	37.00	-8.75	2.94 H	354	13.00	15.25
4	466.67	27.81 QP	37.00	-9.19	1.78 H	25	7.40	20.41
5	480.04	28.65 QP	37.00	-8.35	2.28 H	354	7.93	20.72
6	600.00	30.77 QP	37.00	-6.23	1.19 H	23	7.50	23.27
7	733.33	33.34 QP	37.00	-3.66	1.39 H	25	8.30	25.04
8	800.00	30.55 QP	37.00	-6.45	1.26 H	352	4.20	26.35
9	960.09	30.68 QP	37.00	-6.32	1.00 H	28	1.95	28.73

- 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.

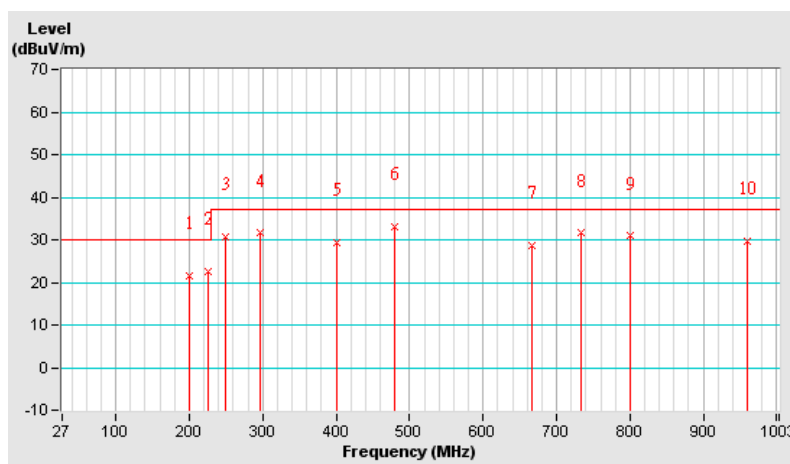


TEST MODE	Mode 1	INPUT POWER	230Vac, 50Hz
FREQUENCY RANGE	30-1000 MHz	DETECTOR FUNCTION & BANDWIDTH	Quasi-Peak, 120kHz
ENVIRONMENTAL CONDITIONS	26 deg. C, 75 % RH, 1014 hPa	TESTED BY	Eagle Chen

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	200.00	21.69 QP	30.00	-8.31	1.00 V	23	10.98	10.71
2	225.00	22.58 QP	30.00	-7.42	1.00 V	352	9.84	12.74
3	250.01	30.71 QP	37.00	-6.29	1.00 V	354	15.95	14.76
4	297.00	31.54 QP	37.00	-5.46	1.00 V	29	16.29	15.25
5	400.00	29.46 QP	37.00	-7.54	1.00 V	26	10.61	18.85
6	480.04	33.22 QP	37.00	-3.78	1.00 V	351	12.50	20.72
7	666.67	28.79 QP	37.00	-8.21	3.46 V	354	4.81	23.98
8	733.34	31.55 QP	37.00	-5.45	2.72 V	24	6.51	25.04
9	800.00	30.92 QP	37.00	-6.08	1.99 V	356	4.57	26.35
10	960.09	29.73 QP	37.00	-7.27	1.81 V	54	1.00	28.73

- 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.





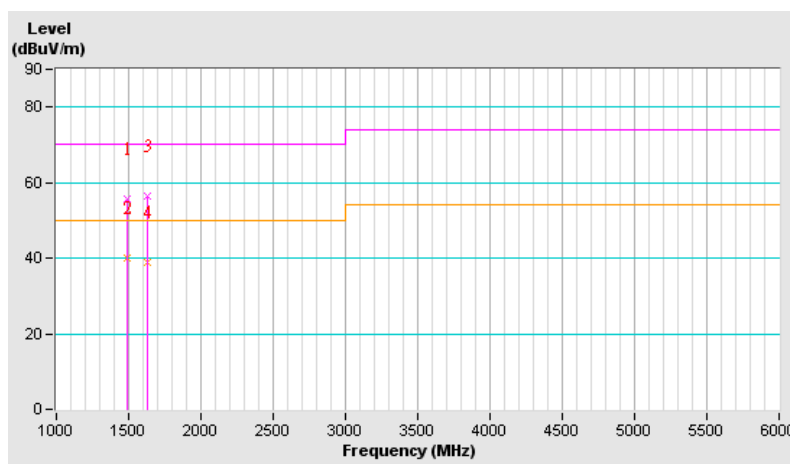
A D T

TEST MODE	Mode 1	INPUT POWER	230Vac, 50 Hz
FREQUENCY RANGE	1000-2000 MHz	DETECTOR FUNCTION & BANDWIDTH	Peak (PK) / Average (AV), 1MHz
ENVIRONMENTAL CONDITIONS	26 deg. C, 75 % RH, 1014 hPa	TESTED BY	Eagle Chen

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	1485.99	55.74 PK	70.00	-14.26	1.00 H	259	26.96	28.78
2	1485.99	40.16 AV	50.00	-9.84	1.00 H	259	11.38	28.78
3	1631.69	56.37 PK	70.00	-13.63	1.00 H	14	27.27	29.10
4	1631.69	38.84 AV	50.00	-11.16	1.00 H	14	9.74	29.10

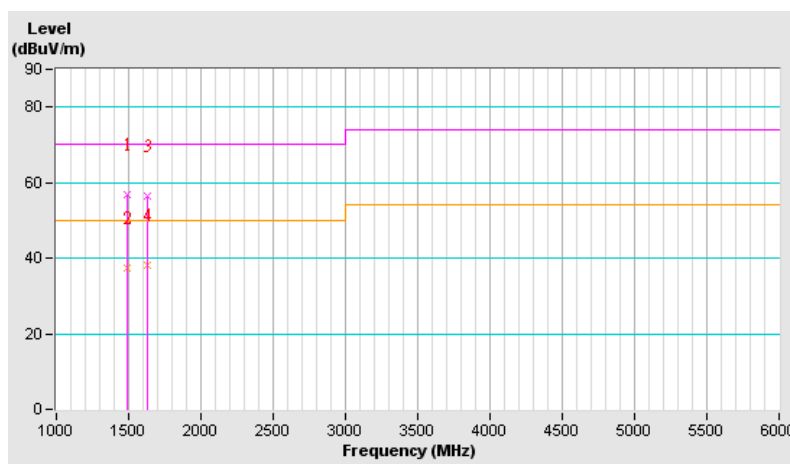
- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
 2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.



TEST MODE	Mode 1	INPUT POWER	230Vac, 50 Hz
FREQUENCY RANGE	1000-2000 MHz	DETECTOR FUNCTION & BANDWIDTH	Peak (PK) / Average (AV), 1MHz
ENVIRONMENTAL CONDITIONS	26 deg. C, 75 % RH, 1014 hPa	TESTED BY	Eagle Chen

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	1485.58	56.71 PK	70.00	-13.29	1.00 V	114	27.93	28.78
2	1485.58	37.41 AV	50.00	-12.59	1.00 V	114	8.63	28.78
3	1631.15	56.46 PK	70.00	-13.54	1.00 V	58	27.36	29.10
4	1631.15	38.16 AV	50.00	-11.84	1.00 V	58	9.06	29.10

- 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 mAW	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. The classifications of equipment are defined in Section 5 of EN 61000-3-2.
2. The above limits for all equipment except for lighting equipment are for all applications having an active input power > 75 W. 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	086	June 03, 2009	June 02, 2010
EMC Partner(Software)	HARCS_V4.16	NA	NA	NA

- 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 EMS room.

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.

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.

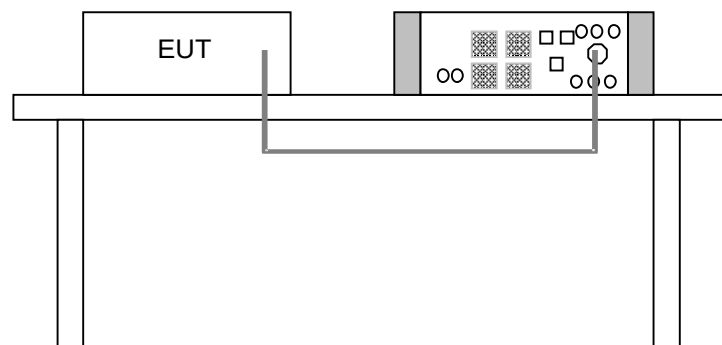
Class B: Portable tools.; Arc welding equipment which is not professional equipment

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.

- 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 TEST SETUP



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

4.4.5 EUT OPERATING CONDITIONS

1. Turn on the power of all equipment.
2. Support unit 5 (Notebook Computer) runs a test program "Ping.exe" to enable of EUT via one UTP cable.
3. Plug the SD card into EUT, EUT reads video messages from SD card. Then EUT sends video messages to support unit 1 (Monitor) displays the messages on its screen.
4. EUT reads audio messages from SD and sends these messages to support unit 3 (Speaker).
5. Repeat steps 2-4.



4.4.6 TEST RESULTS

FUNDAMENTAL VOLTAGE/AMPERE	230.1 Vrms / 0.129 Arms	POWER FREQUENCY	50.013 Hz
POWER CONSUMPTION	12.17 W	POWER FACTOR	0.409
ENVIRONMENTAL CONDITIONS	24 deg. C, 72 % RH, 1014 hPa	TESTED BY	Anderson Chen

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

4.5 VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

4.5.1 LIMITS OF VOLTAGE FLUCTUATION AND FLICKER 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_{dt} (ms)	500	T_{dt} means maximum time that dt 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

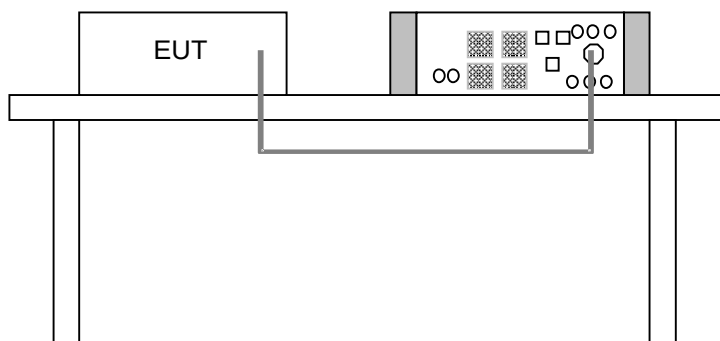
DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
EMC PARTNER EMC Emission Tester	HAR1000-1P	086	June 03, 2009	June 02, 2010
EMC Partner(Software)	HARCS_V4.16	NA	NA	NA

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 EMS room.

4.5.3 TEST PROCEDURE

- 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.

4.5.4 TEST SETUP



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

4.5.5 EUT OPERATING CONDITIONS

Same as 4.4.5

4.5.6 TEST RESULTS

FUNDAMENTAL VOLTAGE/AMPERE	230.1 Vrms / 0.121 Arms	POWER FREQUENCY	50.000 Hz
OBSERVATION PERIOD (TP)	10 min.	POWER FACTOR	0.416
ENVIRONMENTAL CONDITIONS	24 deg. C, 72 % RH, 1014 hPa	TESTED BY	Anderson Chen

TEST PARAMETER	MEASUREMENT VALUE	LIMIT	REMARKS
P _{st}	0.072	1.00	Pass
P _{lt}	0.072	0.65	Pass
T _{dt} (ms)	0.000	500	Pass
d _{max} (%)	0.000	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_{dt} means maximum time that dt 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 55024:1998+A1:2001+A2:2003	
Basic Standard, Specification, 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, Power line: 1kV, Signal line: 0.5kV, Performance Criterion B
	IEC 61000-4-5	Surge Immunity Test: 1.2/50 us Open Circuit Voltage, 8 /20 us Short Circuit Current AC Power Line: line to line 1kV, line to earth 2kV DC Power Line: line to earth 0.5kV Signal line: 1kV Performance Criterion B
	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 Criteria 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 7.1 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.

5.3 EUT OPERATING CONDITION

Same as 4.4.5

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 – 2, 4, 8kV (Direct) Contact Discharge – 2, 4kV (Direct/Indirect)
Polarity:	Positive / Negative
Number of Discharge:	Air Discharge: min. 20 times at each test point Contact Discharge: min. 50 times at each test point
Discharge Mode:	Single Discharge
Discharge Period:	1-second minimum

5.4.2 TEST INSTRUMENTS

Test Data: May 19

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
NoiseKen, ESD Simulator	ESS-100L(A)	0189C01491	July 17, 2009	July 16, 2010
Key Tek, ESD Simulator	MZ-15/EC	9906323	June 09, 2009	June 08, 2010
Key Tek, ESD Simulator	MZ-15/EC	0912389	Jan. 06, 2010	Jan. 05, 2011
NoiseKen, ESD Simulator	ESS-2002	ESS062521 2/244	May 07, 2010	May 06, 2011

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 ESD room A.

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.

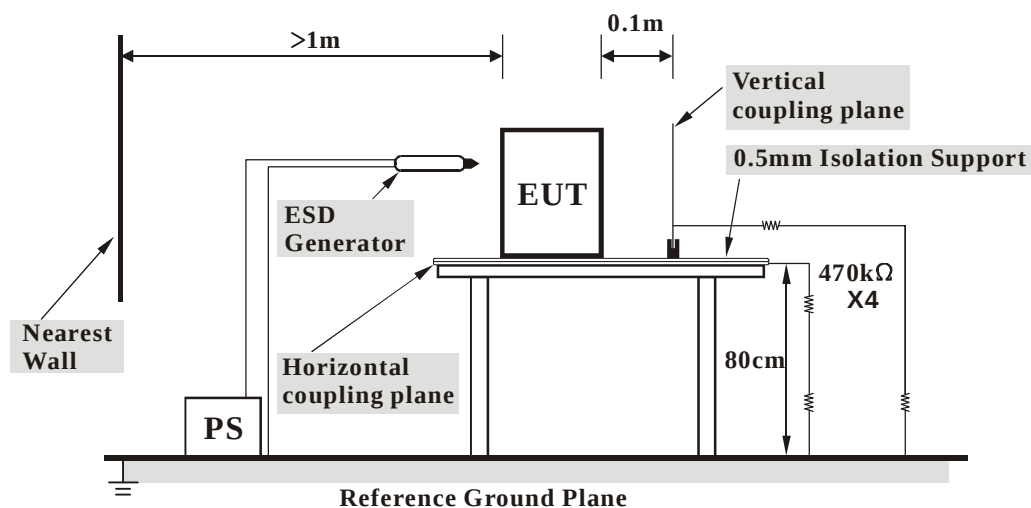
The basic test procedure was in accordance with IEC 61000-4-2:

- 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 **Horizontal Coupling Plane** at points on each side of the EUT. The ESD generator was positioned at a distance of 0.1 meters from the EUT with the discharge electrode touching the **HCP**.
- h. At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the **Vertical Coupling Plane** 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 **Ground Reference Plane**. 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 **Horizontal Coupling Plane** (1.6m x 0.8m) was placed on the table and attached to the **GRP** by means of a cable with $940\text{k}\Omega$ 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	230Vac, 50Hz
ENVIRONMENTAL CONDITIONS	20 deg. C, 42 % RH, 1014 hPa	TESTED BY	Kyle Huang

TEST RESULTS OF DIRECT APPLICATION					
Discharge Level (kV)	Polarity (+/-)	Test Point	Contact Discharge	Air Discharge	Performance Criterion
2, 4	+/-	1, 2, 6	Note (1)	NA	A
2, 4, 8	+/-	3 ~ 5, 7 ~ 12	NA	Note (1)	A

Description of test point: Please refer to following page for representative mark only.

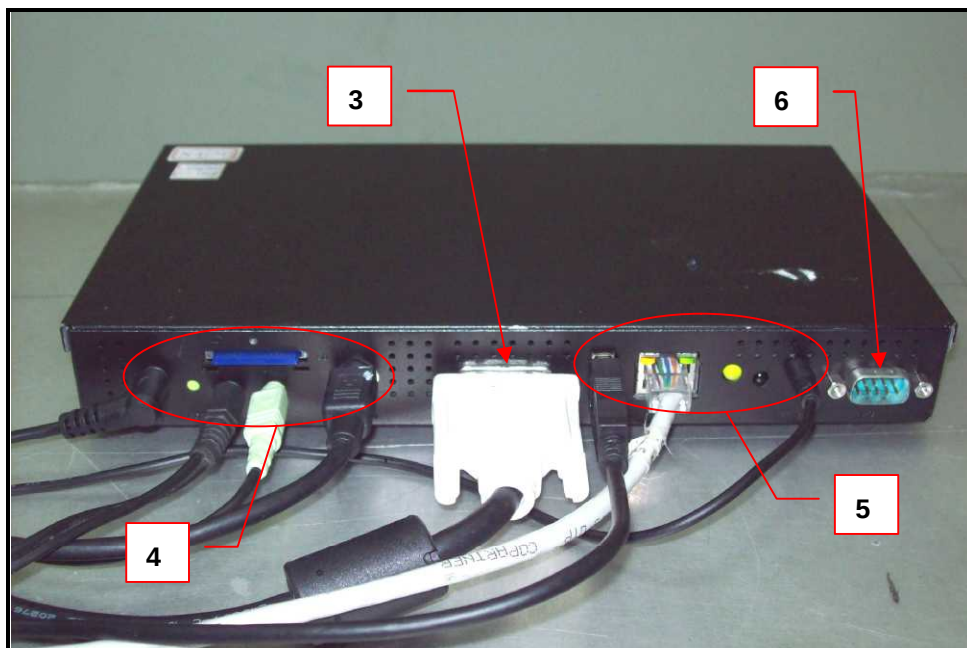
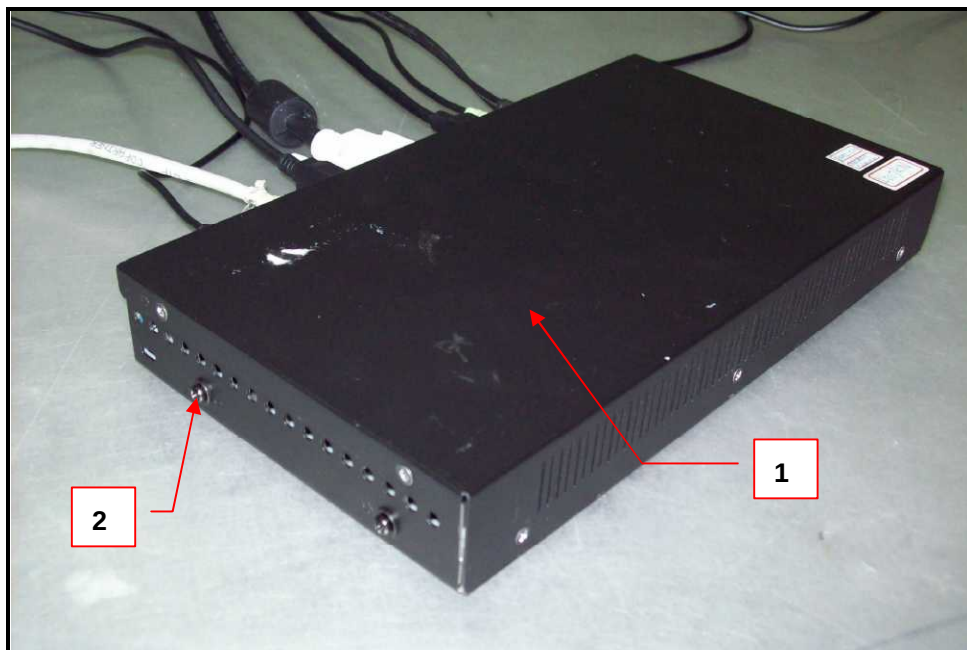
TEST RESULTS OF INDIRECT APPLICATION					
Discharge Level (kV)	Polarity (+/-)	Test Point	Horizontal Coupling Plane	Vertical Coupling Plane	Performance Criterion
2, 4	+/-	1 ~ 4	Note (1)	Note (1)	A

Description of test point:

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

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

DESCRIPTION OF TEST POINT







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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:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Polarity of Antenna:	Horizontal and Vertical
Antenna Height:	1.5m
Dwell Time:	3 seconds

5.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
AR Power Amplifier	150W1000M3	311567	NA	NA
AR Power Amplifier	60S1G3M1	306171	NA	NA
AR LOG ANTENNA	AT5080ANT	309740	NA	NA
BOONTON RF Voltage Meter	4232A	93801	Dec. 19, 2009	Dec. 18, 2010
R&S Signal Generator	SML03	101159	Dec. 28, 2009	Dec. 27, 2010
Electric Field Probe	FP6001	308178	Dec. 04, 2009	Dec. 03, 2010
ADT RS Test Workbench(Software)	ADT_RS_V7.5	NA	NA	NA

- 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 Room No. B.
3. The transmit antenna was located at a distance of 2.0 meters from the EUT.

5.5.3 TEST PROCEDURE

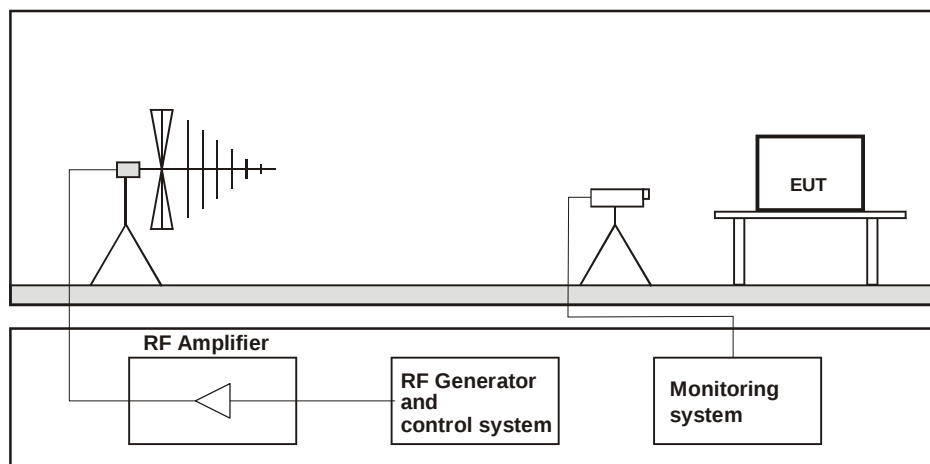
The test procedure was in accordance with IEC 61000-4-3

- The testing was performed in a fully-anechoic chamber.
- The frequency range is swept from 80 MHz to 1000 MHz, with the signal 80% amplitude modulated with a 1kHz sine wave.
- The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond, but shall in no case be less than 0,5s.
- The field strength level was 3V/m.
- 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	230Vac, 50Hz
ENVIRONMENTAL CONDITIONS	20 deg. C, 42 % RH, 1014 hPa	TESTED BY	Barry Lee

Frequency (MHz)	Result	Polarity	Azimuth	Field Strength (V/m)	Observation	Performance Criterion
80 -1000	PASS	V&H	0	3	Note	A
80 -1000	PASS	V&H	90	3		
80 -1000	PASS	V&H	180	3		
80 -1000	PASS	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:	5 kHz
Impulse Wave shape :	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
EMC PARTNER, TRANSIENT	TRA2000IN6	1211	Jan. 29, 2010	Jan. 28, 2011
EMC PARTNER, CN-EFT100	CN-EFT1000	662	NA	NA
Adapter (EMC Partner)	NA	SU1ADA-002	NA	NA
EMC Partner(Software)	Test Manger_V1.53	NA	NA	NA

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 EMS room B.

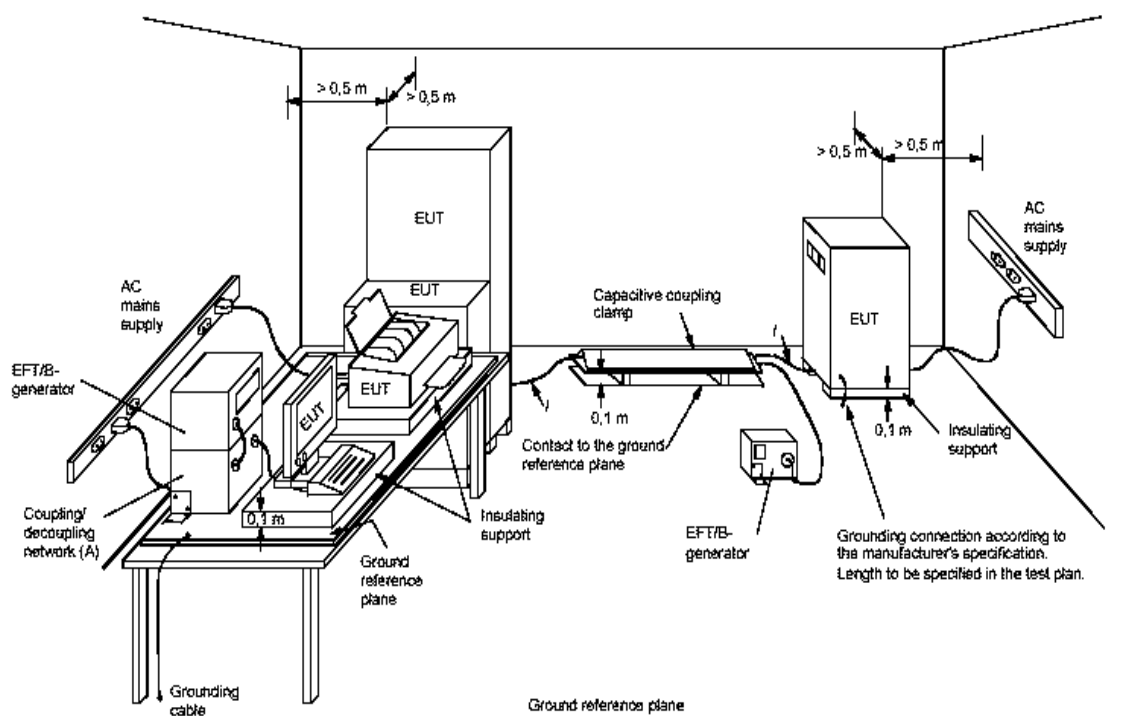
5.6.3 TEST PROCEDURE

- Both positive and negative polarity discharges were applied.
- The length of the “hot wire” from the coaxial output of the EFT generator to the terminals on the EUT should be $0.5\text{m} \pm 0.05\text{m}$.
- The duration time of each test sequential was 1 minute.
- 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



NOTE:

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

(A) location for supply line coupling

(B) location for signal lines coupling

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

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 $0,1 \text{ m} \pm 0,01 \text{ m}$ 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	230Vac, 50Hz
ENVIRONMENTAL CONDITIONS	25 deg. C, 45 % RH, 1014 hPa	TESTED BY	Jason Huang

I. POWER PORT

VOLTAGE (kV)	TEST POINT	POLARITY (+/-)	OBSERVATION	PERFORMANCE CRITERION
1	L1	+/-	Note (1)	A
1	L2	+/-	Note (1)	A
1	L1-L2	+/-	Note (1)	A

II. SIGNAL PORTS AND CONTROL PORTS

VOLTAGE (kV)	TEST POINT	POLARITY (+/-)	OBSERVATION	PERFORMANCE CRITERION
0.5	LAN	+/-	Note (1)	A

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

5.7 SURGE IMMUNITY TEST

5.7.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-5
Wave-Shape:	Combination Wave 1.2/50 us Open Circuit Voltage 8 /20 us Short Circuit Current
Test Voltage:	Power Line – 0.5 kV / 1 kV Signal Line – Not Applicable
Surge Input/Output:	L1-L2
Generator Source Impedance:	2 ohm between networks
Polarity:	Positive/Negative
Phase Angle (degree):	0 / 90 / 180 / 270
Pulse Repetition Rate:	1 time / 20 sec.
Number of Tests:	5 positive and 5 negative at selected points

5.7.2 TEST INSTRUMENTS

Test Data: May 14

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
EMC PARTNER, TRANSIENT	TRA2000IN6	1211	Jan. 29, 2010	Jan. 28, 2011
EMC PARTNER, CDN-UTP8	CDN-UTP8	036	Jan. 28, 2010	Jan. 27, 2011
Adapter (EMC PARTNER)	NA	SU1ADA-002	NA	NA
EMC Partner(Software)	Test Manger_V1.53	NA	NA	NA
KeyTek, EMS Simulator	EMC Pro	9712339	May 12, 2010	May 11, 2011
Adapter (EMC Pro)	NA	SU1ADA-001	NA	NA
KeyTek(Software)	CEWare32_V3.0	NA	NA	NA

- 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 EMS room B.

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).

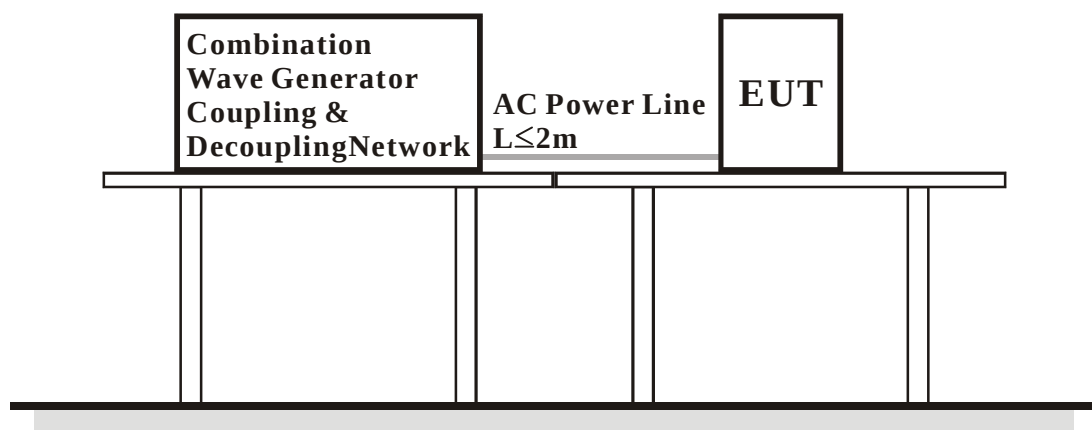
b. For test applied to unshielded unsymmetrically operated interconnection lines of EUT:

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 TEST SETUP



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



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5.7.5 TEST RESULTS

TEST MODE	Mode 1	INPUT POWER	230Vac, 50 Hz
ENVIRONMENTAL CONDITIONS	23 deg. C, 45% RH, 1014 hPa	TESTED BY	Jason Huang

I. POWER PORT

VOLTAGE (kV)	TEST POINT	POLARITY (+/-)	OBSERVATION	PERFORMANCE CRITERION
0.5	L1-L2	+/-	NOTE (1)	A

NOTE: (1) There was no change compared with the 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
Voltage Level:	3 V
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Coupled Cable:	Power Mains, Unshielded Signal / Control Line
Coupling Device:	CDN-M2 (2 wires), CDN-T4
Dwell Time	3 seconds

5.8.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATE D UNTIL
R&S Signal Generator	SML 01	102731	Dec. 21, 2009	Dec. 20, 2010
AR Amplifier	75A250AM2	307297	NA	NA
BOONTON RF Voltage Meter	4232A	93801	Dec. 19, 2009	Dec. 18, 2010
LUTHIE EM Injection Clamp	EM-101	35453	May 26, 2009	May 25, 2010
FCC CDN M2	FCC-801-M2-16A	03048	Jan. 11, 2010	Jan. 10, 2011
FCC CDN M3	FCC-801-M3-16A	03055	Jan. 12, 2010	Jan. 11, 2011
Fischer Custom Communications Inc Coupling Decoupling Network	FCC-801-T2	02025	Oct. 27, 2009	Oct. 26, 2010
Fischer Custom Communications Inc Coupling Decoupling Network	FCC-801-T4	02030	Oct. 27, 2009	Oct. 26, 2010
Fischer Custom Communications Inc Coupling Decoupling Network	FCC-801-T8	02036	Oct. 27, 2009	Oct. 26, 2010
ADT CS Test Workbench(Software)	ADT_CS_V7.4.2	NA	NA	NA

- 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 Room No. B.

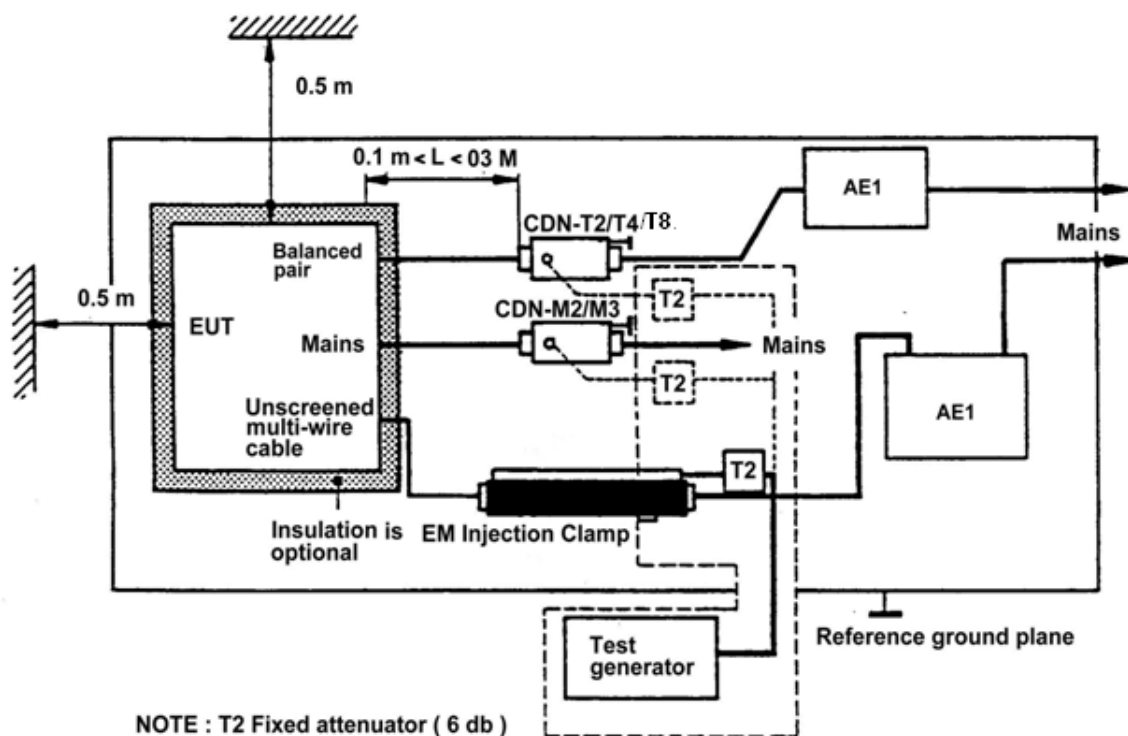
5.8.3 TEST PROCEDURE

- a. The EUT shall be tested within its intended operating and climatic conditions.
- b. The test shall be 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.
- c. 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. The step size shall not exceed 1 % of the start and thereafter 1 % of the preceding frequency value where the frequency is swept incrementally.
- d. The dwell time at each frequency shall not be 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, shall be analyzed separately.
- e. 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 0.5m.
 2. All non-excited input ports of the CDNs shall be terminated by 50Ω loads.
 3. The EUT is setup 0.1m above Reference Ground Plane
 4. The CDNs and / or EM clamp used for real test depends on ports and cables configuration of EUT.

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

NOTE:

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.

5.8.6 TEST RESULTS

TEST MODE	Mode 1	INPUT POWER	230Vac, 50Hz
ENVIRONMENTAL CONDITIONS	20 deg. C, 42 % RH, 1014 hPa	TESTED BY	Barry Lee

I. FOR MAINS POWER:

Frequency (MHz)	Voltage Level (Vr.m.s.)	Cable	Injection Method	Obser-vation	Performance Criterion
0.15 – 80	3	AC power line	CDN-M2	Note (1)	A

II. FOR SIGNAL / CONTROL LINE:

Frequency (MHz)	Voltage Level (Vr.m.s.)	Cable	Injection Method	Obser-vation	Performance Criterion
0.15 – 80	3	LAN	CDN-T4	Note (1)	A

NOTE: (1) 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:	Helmholtz coil, diameter 1.5m

5.9.2 TEST INSTRUMENTS

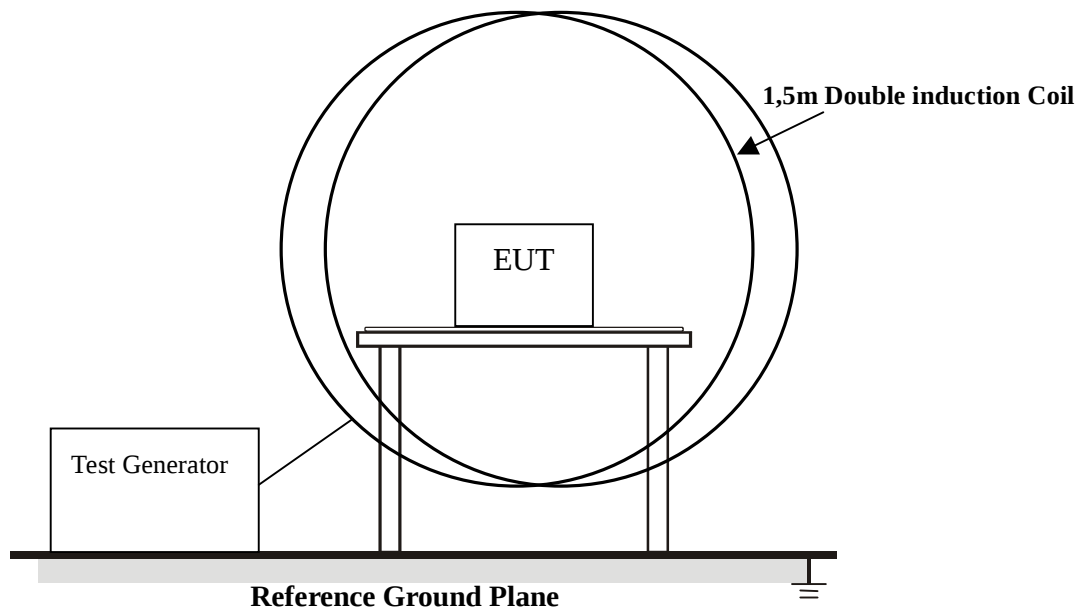
DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
BELL, Triaxial Elf Magnetic Field Meter	4090	NA	Feb. 03, 2010	Feb. 02, 2011
MONTENA, Helmholtz Coil	HC150-360	NA	NA	NA

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 EMS room.

5.9.3 TEST PROCEDURE

- The equipment is configured and connected to satisfy its functional requirements.
- The power supply, input and output circuits shall be connected to the sources of power supply, control and signal.
- 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 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 (diameter 1.5m). The EUT placement shall then be rotated by 90 degrees in order to expose to the test field with different orientations.



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5.9.5 TEST RESULTS

TEST MODE	Mode 1	INPUT POWER	230Vac, 50Hz
ENVIRONMENTAL CONDITIONS	26 deg. C, 68 % RH, 1014 hPa	TESTED BY	Anderson Chen

DIRECTION	RESULTS	OBSERVATION	PERFORMANCE CRITERION
X	PASS	Note	A
Y	PASS	Note	A
Z	PASS	Note	A

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

5.10 VOLTAGE DIP/SHORT INTERRUPTIONS/VOLTAGE VARIATIONS (DIP) IMMUNITY TEST

5.10.1 TEST SPECIFICATION

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

5.10.2 TEST INSTRUMENTS

Test Data: May 14

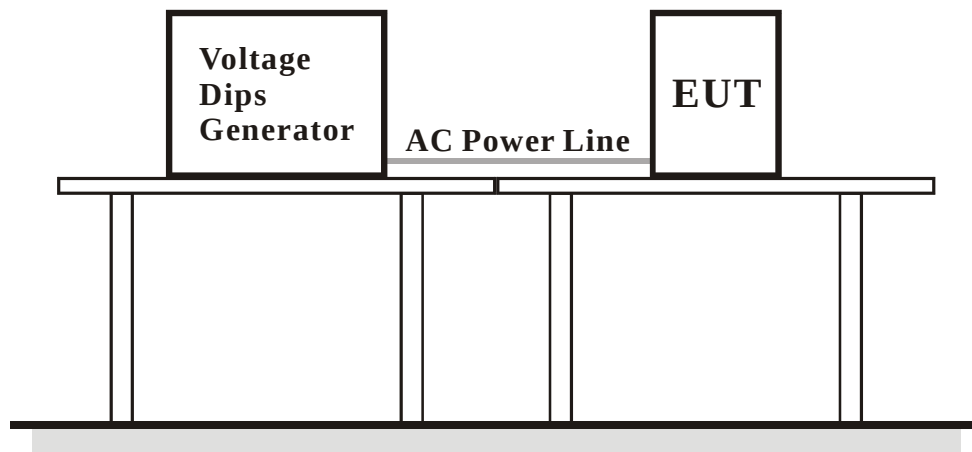
DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
EMC PARTNER, TRANSIENT	TRA1Z332N	1121	Jan. 29, 2010	Jan. 28, 2011
Adapter (EMC PARTNER)	NA	SU1ADA-002	NA	NA
EMC Partner(Software)	Test Manger_V1.53	NA	NA	NA
KeyTek, EMS Simulator	EMC Pro	9712339	May 12, 2010	May 11, 2011
Adapter (EMC Pro)	NA	SU1ADA-001	NA	NA
KeyTek(Software)	CEWare32_V3.0	NA	NA	NA

- 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 EMS room B.

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 TEST SETUP



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



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5.10.5 TEST RESULTS

TEST MODE	Mode 1	INPUT POWER	240Vac / 230Vac / 100Vac, 50 Hz
ENVIRONMENTAL CONDITIONS	23 deg. C, 45 % RH, 1014 hPa	TESTED BY	Jason Huang

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

Input Power for testing: 240Vac, 50 Hz (Maximum Voltage)				
VOLTAGE % REDUCTION	PERIODS	RESULTS	OBSERVATION	PERFORMANCE CRITERION
>95	0.5	PASS	Note (1)	A
30	25	PASS	Note (1)	A
>95	250	PASS	Note (2)	B

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

NOTE: (1) There was no change compared with initial operation during the test.
(2) The EUT shut down during the test, but could be recovered to normal operation after the test.

6 PHOTOGRAPHS OF THE TEST CONFIGURATION

CONDUCTED EMISSION TEST



TELECOMMUNICATION PORT OF CONDUCTED EMISSION TEST



RADIATED EMISSION TEST



HARMONICS EMISSION TEST & VOLTAGE FLUCTUATIONS AND FLICKER TEST



ESD TEST



RS TEST



EFT TEST



EFT TEST (LAN)



SURGE & VOLTAGE DIPS AND INTERRUPTIONS TEST



CONDUCTED SUSCEPTIBILITY TEST



CONDUCTED SUSCEPTIBILITY TEST (LAN)



POWER-FREQUENCY MAGNETIC FIELDS TEST





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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:

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: www.adt.com.tw/index.5/phtml.
If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab:

Tel: 886-2-26052180

Fax: 886-2-26052943

Hsin Chu EMC/RF Lab:

Tel: 886-3-5935343

Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety/Telecom Lab:

Tel: 886-3-3183232

Fax: 886-3-3185050

Email: service@adt.com.tw

Web Site: www.adt.com.tw

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

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