CE EMC TEST REPORT

REPORT NO. : CE951115H04B

MODEL NO. : MD15

RECEIVED : Nov. 27, 2006

TESTED : Dec. 04 to 27, 2006

ISSUED: March 07, 2007

APPLICANT : CTC UNION TECHNOLOGIES CO., LTD.

ADDRESS : 8F, No. 60 ZhouZi St. NeiHu, Taipei 114, Taiwan

ISSUED BY : Advance Data Technology Corporation

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

No. 2177-01

Table of Contents

1 CERTIFICATION

PRODUCT:	IP DSLAM
BRAND NAME:	CTC union
MODEL NO:	MD15
TESTED:	Dec. 04 to 27, 2006
TEST ITEM:	R&D SAMPLE
APPLICANT:	CTC UNION TECHNOLOGIES CO., LTD.
STANDARDS:	EN 300 386 V1.3.3:2005
	EN 55022:1998+A1:2000+A2:2003, Class A
	EN 61000-3-2:2000, Class A
	EN 61000-3-3:1995+A1:2001
	EN 61000-4-2:1995+A1:1998+A2:2001
	EN 61000-4-3:1996+A1:1998+A2:2001
	EN 61000-4-4:2004
	EN 61000-4-5:1995+A1:2001
	EN 61000-4-6:1996+A1:2001

The above equipment (Model: MD15) has been tested by **Advance Data Technology Corporation**, and found compliance with the requirement of the above standards.

Approval signature – on next page

CERTIFICATION - Continued

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 : Carol Liao , **DATE:** *March 07, 2007*
(Carol Liao)

TECHNICAL ACCEPTANCE : Mike Hsieh , **DATE:** *March 07, 2007*
Responsible for EMI
(Mike Hsieh)

TECHNICAL ACCEPTANCE : Ray Yeh , **DATE:** *March 07, 2007*
Responsible for EMS
(Ray Yeh)

APPROVED BY : Ivan Peng , **DATE:** *March 07, 2007*
(Ivan Peng)

Note *: The power consumption of EUT is 29.16W, which is less than 75W and no limits apply. Therefore it is deemed to comply with EN 61000-3-2: 2000 without any testing.

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

EMISSION			
Standard	**Test Type**	**Result**	**Remarks**
EN 55022:1998 +A1:2000+A2:2003 ,Class B	Conducted Test	**PASS**	Meets Class A Limit Minimum passing margin is -0.44 dB at 0.615 MHz
	Telecommunication Ports Conducted Test	**PASS**	Meets Class A Limit Minimum passing margin is -18.77 dB at 0.240 MHz
	Radiated Test	**PASS**	Meets Class A Limit Minimum passing margin is -2.3 dB at 177.40 MHz
EN61000-3-2:2000, Class A	Harmonic current emissions	**PASS**	The power consumption of EUT is less than 75W and no limits apply
EN61000-3-3:1995 + A1:2001	Voltage fluctuations & flicker	**PASS**	Meets the requirements.

IMMUNITY			
Standard	**Test Type**	**Result**	**Remarks**
EN 61000-4-2:1995 +A1:1998+A2:2001	Electrostatic discharge immunity test	**PASS**	Meets the requirements of Performance Criterion A
EN 61000-4-3:1996 +A1:1998+A2:2001	Radiated, radio-frequency, electromagnetic field immunity test	**PASS**	Meets the requirements of Performance Criterion A
EN 61000-4-4:2004	Electrical fast transient / burst immunity test.	**PASS**	Meets the requirements of Performance Criterion B
EN 61000-4-5:1995 +A1:2001	Surge immunity test	**PASS**	Meets the requirements of Performance Criterion B
EN 61000-4-6:1996 +A1:2001	Immunity to conducted disturbances, induced by radio-frequency fields	**PASS**	Meets the requirements of Performance Criterion A

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:

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

Measurement	Value
Conducted emissions	2.53 dB
Radiated emissions (30MHz-1GHz)	3.46 dB

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	IP DSLAM
MODEL NO.	MD15
POWER SUPPLY	Internal power supply (AC input or DC input)
POWER CORD	NA
DATA CABLE SUPPLIED	RJ-45 Cable x1 (10cm/shelded/without core)
I/O PORT	Line interface x 2, POTS Interface x 2, GBE 1 & GBE 2, SFP 1 & SFP 2, MGMT x 1, FAN x 2, HK x1, COM x 1,

Note:

1. The EUT has two samples, one is powered from AC the other is powered from DC.
2. The EUT must be supplied with Internal power supply as following:

AC input power supply information:		
Brand:	SINPRO	
Model No.:	SBU120-246	
Input power :	AC110~240 V 63 Hz 3Pins 2.5m Unshielded w/o core	
Output power :	DC 3.3V 15A 110W & DC 20.5V 3A 110W	
DC input power supply information:		
Brand	Model No.	Spec.
P-DUKE	QBE50-48S3P3	Input: DC-48(-36~-75)V or 48(36~75)V Output: DC 3.3V 15 A 49.5W (Power for System)
ACBEL	SV48-24-100-6	Input: DC-48(-36~-75)V or 48(36~75)V Output: DC 20.5V/ 4A 96W (Power for ADSL line & FAN)

3. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

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

Test Mode	Description
Mode 1	Sample 1: Powered from AC
Mode 2	Sample 2: Powered from DC

For Harmonic current emissions and Voltage fluctuations & flicker test items only test Mode 1 have been tested.

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

EN300 386 V1.3.3:2005
EN 55022:1998+A1:2000+A2:2003, Class A
EN 61000-3-2:2000, Class A
EN 61000-3-3:1995+A1: 2001
EN 61000-4-2:1995+A1:1998+A2:2001
EN 61000-4-3:1996+A1:1998+A2:2001
EN 61000-4-4:2004
EN 61000-4-5:1995+A1:2001
EN 61000-4-6:1996+A1:2001

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

3.4 DESCRIPTION OF SUPPORT UNITS

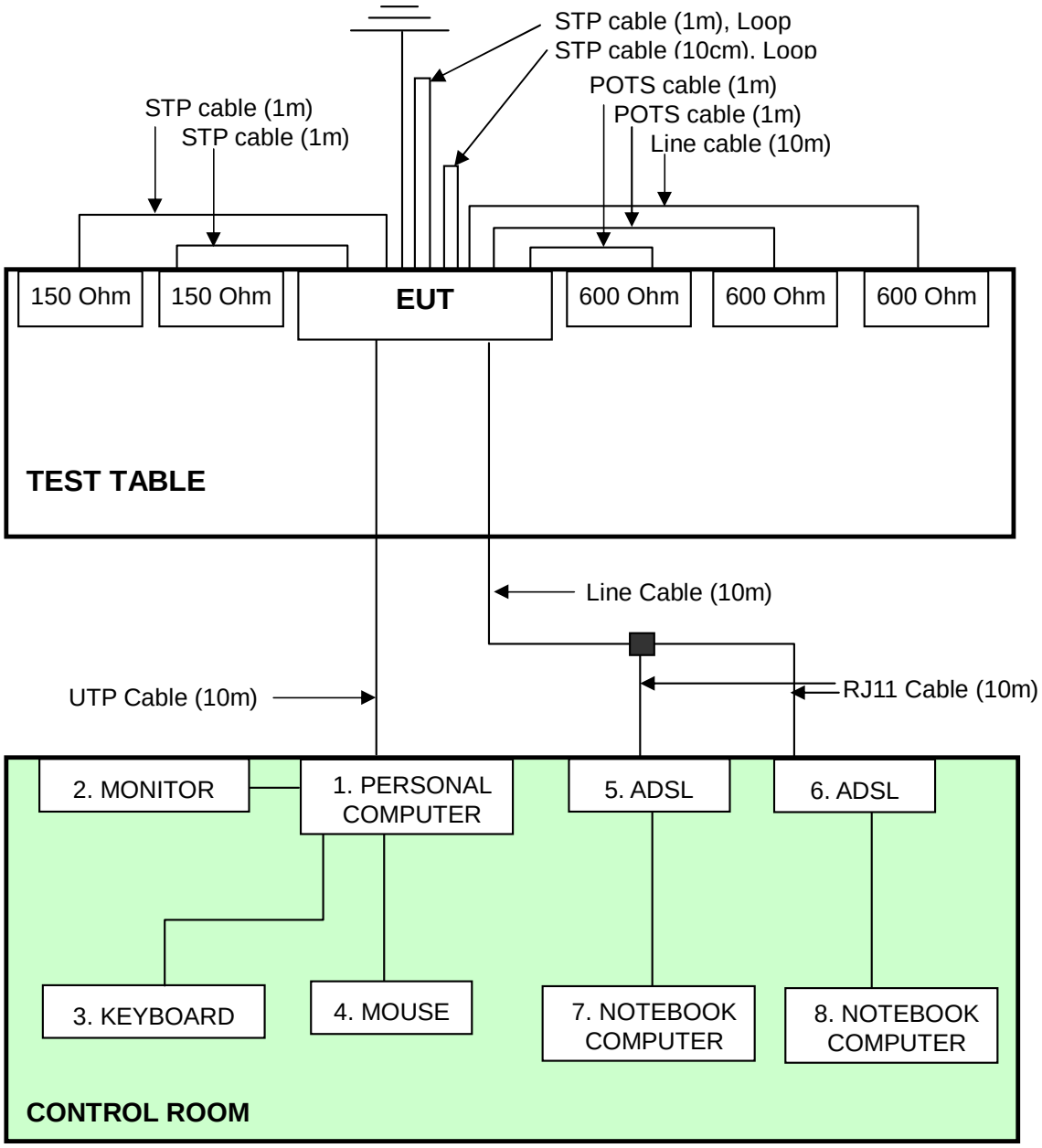
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Conducted and Radiated test					
No.	Product	Brand	Model No.	Serial No.	FCC ID
1	PERSONAL COMPUTER	HP	DX6120MT	SG5190992H	DoC
2	MONITOR	DELL	2001FP	CN-0C0647-46633-58R-2W4L	DoC
3	KEYBOARD	BTC	KB-5200T	F24800406	E5XKB5122WTH0110
4	MOUSE	BTC	M851	G00347024432	DoC
5	ADSL	Brasi Telecom	GS-R2503	G32RG3-017284	NA
6	ADSL	XAVI	X8121r	A811A4003409	NA
7	NOTEBOOK COMPUTER	DELL	PP01L	TW-0791UH-12800-0CK-3735	DoC
8	NOTEBOOK COMPUTER	DELL	PPT	17044664176	E2K24GBRL
9	DC POWER SUPPLY (only for DC Mode)	GOOD WILL INSTRUMENT CO., LTD.	GPC-3030D	7700087	NA
Harmonics Current / Voltage Fluctuation and Flicker / Immunity test					
No.	Product	Brand	Model No.	Serial No.	FCC ID
1	ADSL	Brasi Telecom	GS-R2503	G32RG3-017284	NA
2	ADSL	THOMSON	DSLBA604NP	CP0508GGYZQ	NA
3	NOTEBOOK COMPUTER	DELL	INSPIRON 5000e	DS/N TW-054UGW-12961-0BR-0670	DoC
4	NOTEBOOK COMPUTER	DELL	PP01L	TW-09C748-12800-17Q-C504	DoC
5	DC POWER SUPPLY (only for DC Mode)	GOOD WILL INSTRUMENT CO., LTD.	GPC-3030D	7700087	NA

Conducted and Radiated test	
No.	Signal cable description
1	NA
2	1.8 m braid shielded wire, terminated with VGA connector via metallic frame, w/o core
3	1.7 m foil shielded wire, terminal by frame, PS2 Connector, w/o core.
4	1.5 m foil shielded wire, terminated with PS2 connector via drain wire, w/o core.
5	NA
6	NA
7	NA
8	NA
9	NA
Harmonics Current / Voltage Fluctuation and Flicker / Immunity test	
No.	Signal cable description
1	NA
2	NA
3	NA
4	NA
5	NA

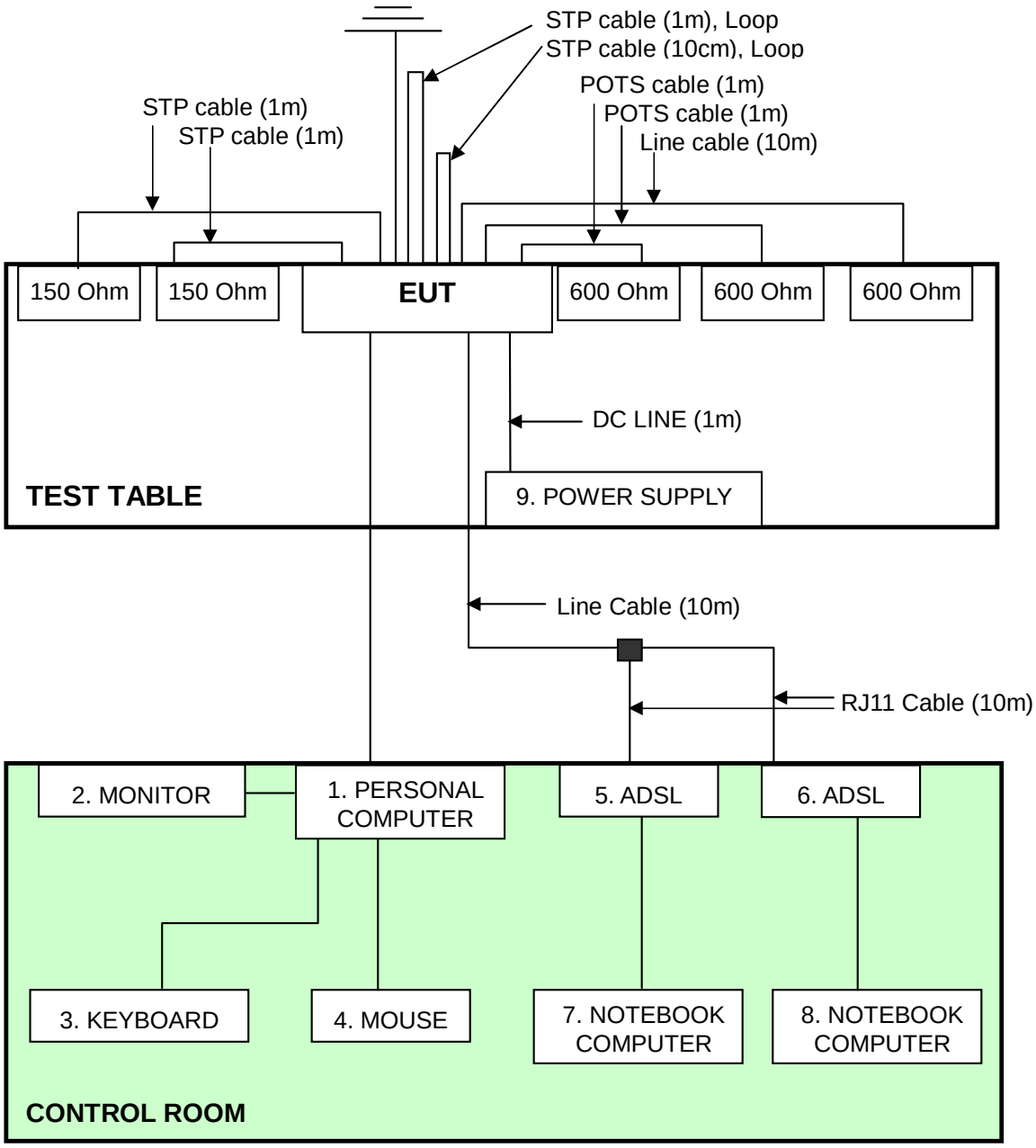
Note: 1. All power cords of the above support units are unshielded (1.8m).

For Conducted and Radiated test (AC Mode):



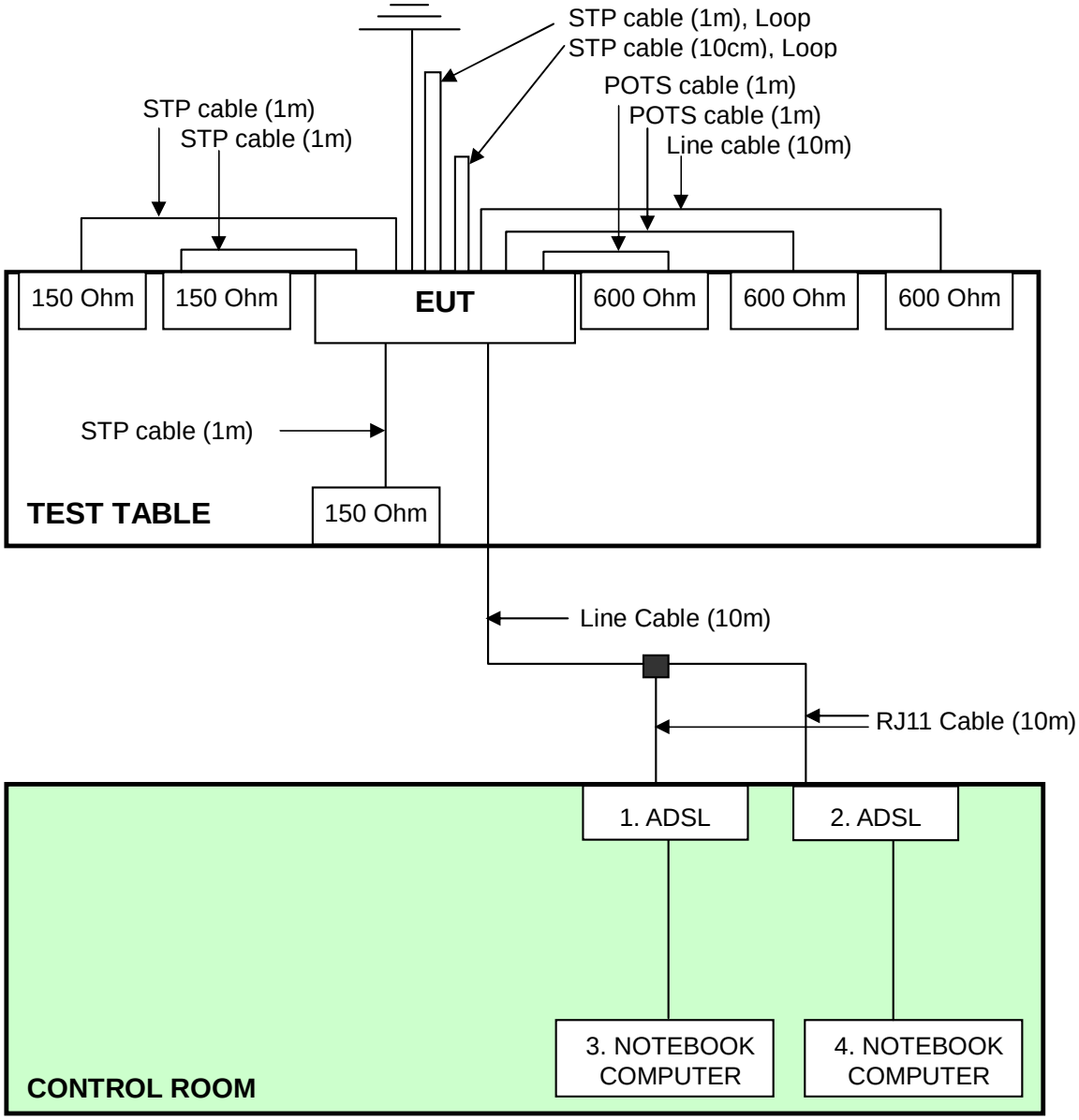
NOTE: 1. Support units 1-8 were kept in the control room during the test.
2. Please refer to the photos of test configuration in Item 6 also.

For Conducted and Radiated test (DC Mode):



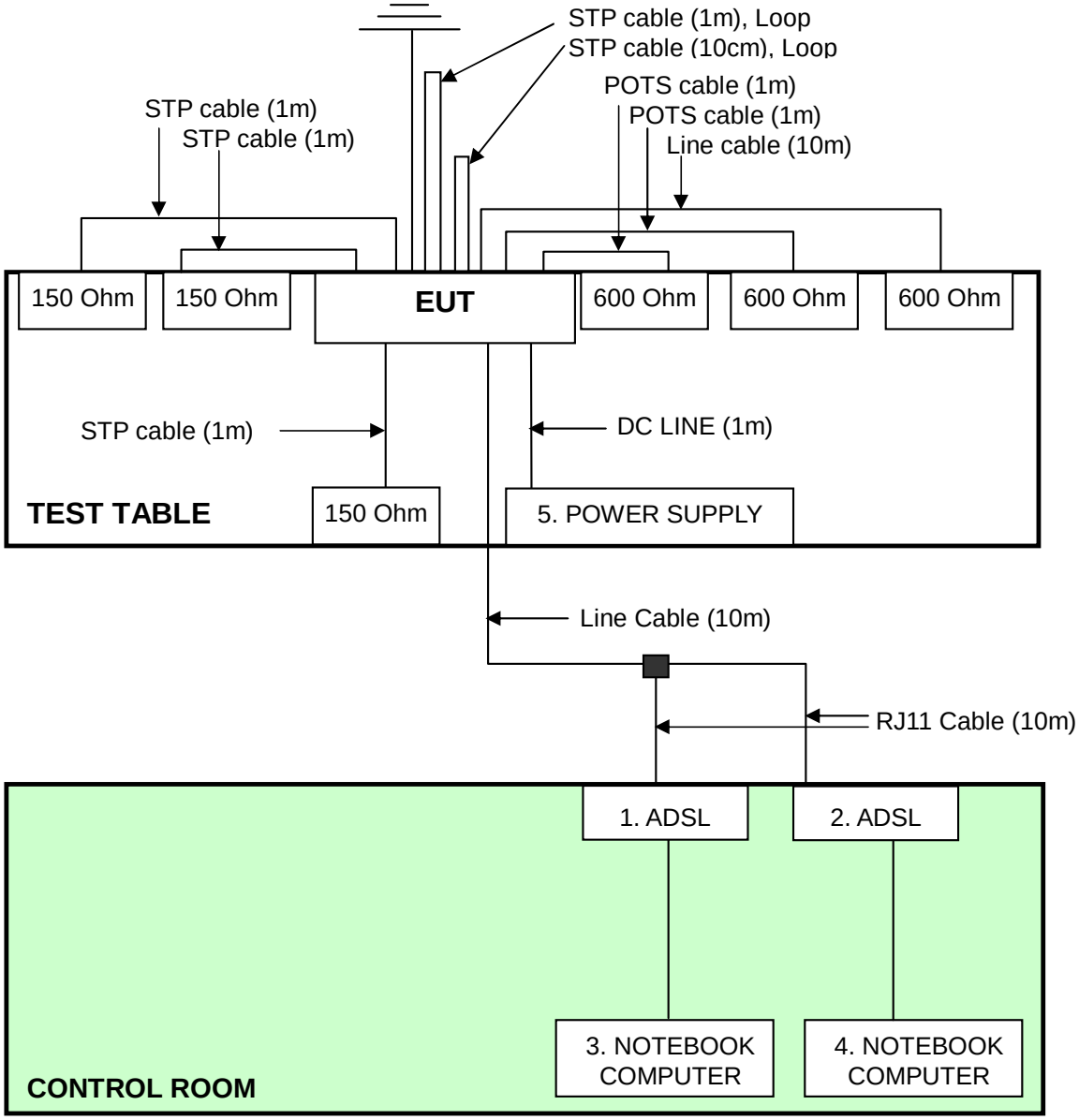
NOTE: 1. Support units 1-8 were kept in the control room during the test.
2. Please refer to the photos of test configuration in Item 6 also.

For Harmonics Current / Voltage Fluctuation and Flicker / Immunity test (AC Mode):



NOTE: 1. Support units 1-4 were kept in the control room during the test.
2. Please refer to the photos of test configuration in Item 6 also.

For Immunity test (DC Mode):



NOTE: 1. Support units 1-4 were kept in the control room during the test.
2. Please refer to the photos of test configuration in Item 6 also.

4 EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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 UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	100287	Feb. 20, 2007
Line-Impedance Stabilization Network(for EUT)	ENV-216	100072	Oct. 26, 2007
Line-Impedance Stabilization Network(for Peripheral)	ESH3-Z5	848773/004	Oct. 26, 2007
RF Cable (JETBAO)	RG233/U	Cable_CA_01	Jul. 19, 2007
Terminator	50	1	Oct. 30, 2007
Software	ADT_Cond_V7.3.2	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 ADT Shielded Room No. A.
3. The VCCI Con A Registration No. is C-817.

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.

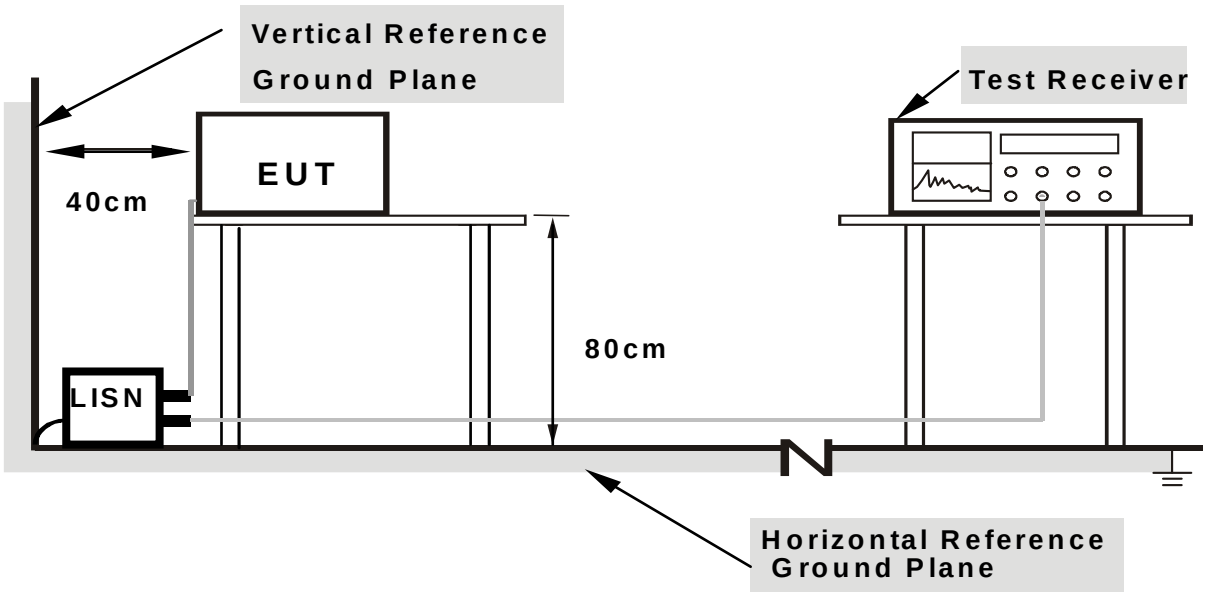
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels 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: 1.Support units were connected to second LISN.

2.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

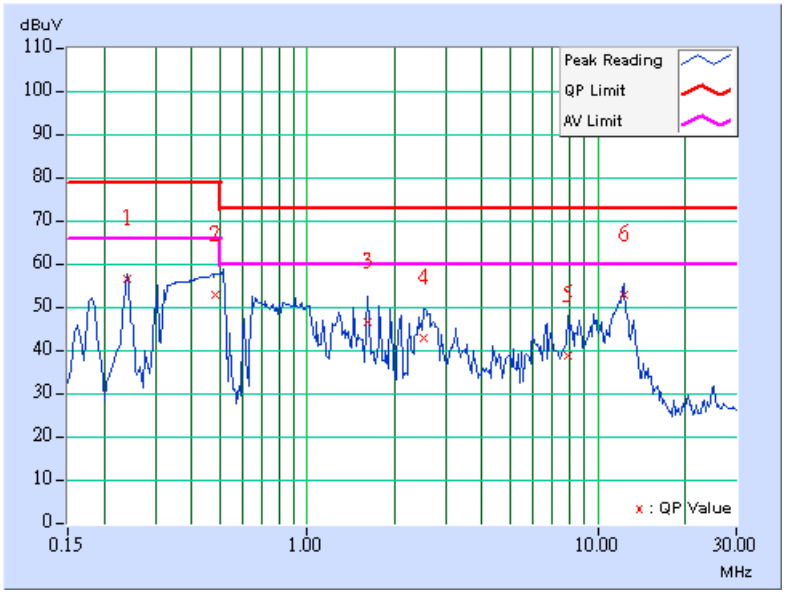
1. Turn on the power of all equipment.
2. Prepared other computer systems (support units 1-8) to act as communication partners and placed them outside of testing area.
3. The computer systems (support units 7 and 8) run “ping.exe” and “TfGen.exe” test program to enable EUT under transmission/receiving condition continuously via line cable and RJ11 cables.

4.1.7 TEST RESULTS

TEST MODE	Mode 1	PHASE	Line (L)
INPUT POWER	230Vac, 50 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	25 deg. C, 60 % RH, 965 hPa	TESTED BY	Eason Chang

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	0.240	9.80	46.46	-	56.26	-	79.00	66.00	-22.74	-
2	0.482	9.81	42.69	-	52.50	-	79.00	66.00	-26.50	-
3	1.611	9.90	36.64	-	46.54	-	73.00	60.00	-26.46	-
4	2.525	9.90	32.80	-	42.70	-	73.00	60.00	-30.30	-
5	7.887	9.96	28.74	-	38.70	-	73.00	60.00	-34.30	-
6	12.254	10.09	43.00	-	53.09	-	73.00	60.00	-19.91	-

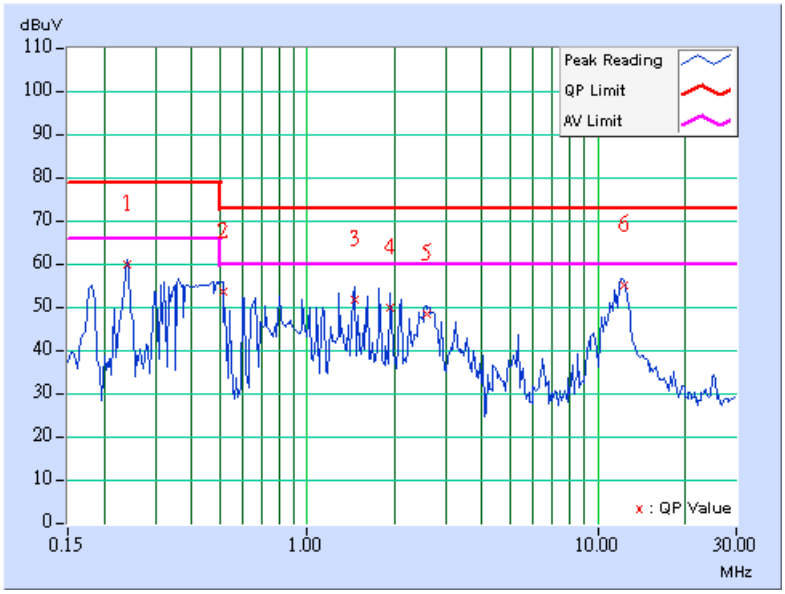
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission 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	25 deg. C, 60 % RH, 965 hPa	**TESTED BY**	Eason Chang

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	0.240	9.80	49.99	-	59.79	-	79.00	66.00	-19.21	-
2	0.513	9.82	43.43	-	53.25	-	73.00	60.00	-19.75	-
3	1.451	9.95	41.58	-	51.53	-	73.00	60.00	-21.47	-
4	1.935	9.99	39.91	-	49.90	-	73.00	60.00	-23.10	-
5	2.584	10.00	38.38	-	48.38	-	73.00	60.00	-24.62	-
6	12.256	10.19	45.01	-	55.20	-	73.00	60.00	-17.80	-

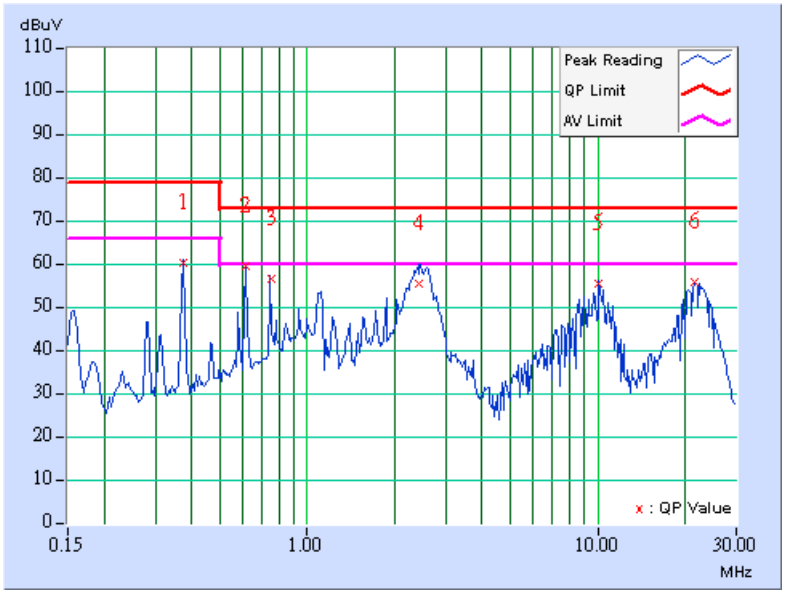
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



TEST MODE	Mode 2	**PHASE**	Positive
INPUT POWER	DC 48V	**6dB BANDWIDTH**	9 kHz
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH, 965hPa	**TESTED BY**	Timmy Hu

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	0.374	9.80	50.41	-	60.21	-	79.00	66.00	-18.79	-
2	0.614	9.84	49.62	-	59.46	-	73.00	60.00	-13.54	-
3	0.749	9.86	46.71	-	56.57	-	73.00	60.00	-16.43	-
4	2.420	9.90	45.41	-	55.31	-	73.00	60.00	-17.69	-
5	10.096	10.00	45.43	-	55.43	-	73.00	60.00	-17.57	-
6	21.683	10.13	45.64	-	55.77	-	73.00	60.00	-17.23	-

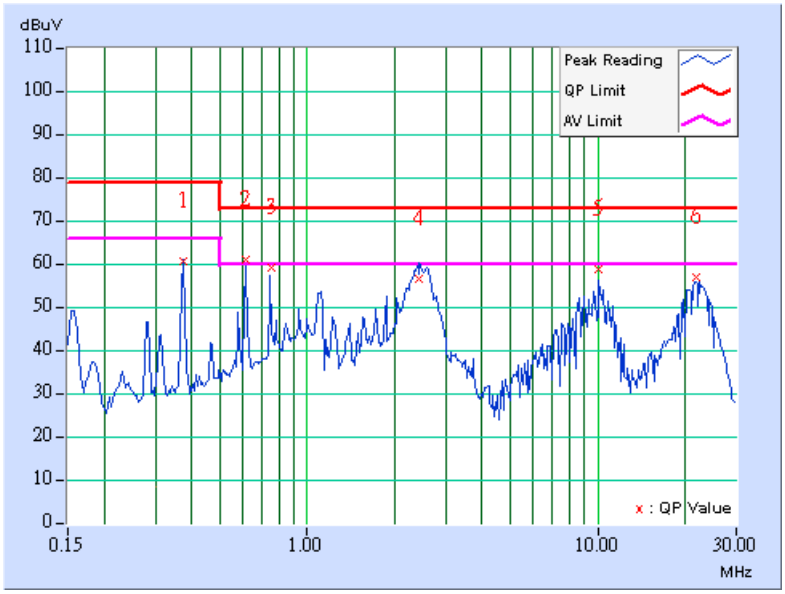
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



TEST MODE	Mode 2	**PHASE**	Negative
INPUT POWER	DC 48V	**6dB BANDWIDTH**	9 kHz
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH, 965hPa	**TESTED BY**	Timmy Hu

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	0.374	9.80	50.41	-	60.21	-	79.00	66.00	-18.79	-
2	**0.615**	**9.84**	**50.62**	**49.72**	**60.46**	**59.56**	**73.00**	**60.00**	**-12.54**	**-0.44**
3	0.752	9.86	48.81	-	58.67	-	73.00	60.00	-14.33	-
4	2.420	10.00	46.41	-	56.41	-	73.00	60.00	-16.59	-
5	10.096	10.10	48.43	-	58.53	-	73.00	60.00	-14.47	-
6	21.723	10.43	46.64	-	57.07	-	73.00	60.00	-15.93	-

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 UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	100287	Feb. 10, 2007
Line-Impedance Stabilization Network(for EUT)	ENV-216	100072	Oct. 26, 2007
Line-Impedance Stabilization Network(for Peripheral)	ESH3-Z5	848773/004	Oct. 20, 2007
ROHDE & SCHWARZ ISN	ENY 41	838119/024	Feb. 24, 2007
ROHDE & SCHWARZ ISN	ENY 22	837497/019	Feb. 24, 2007
RF Cable (JETBAO)	RG233/U	Cable_CA_01	Jul. 18, 2007
CURRENT PROBE	SMZ 11	18001	Jul. 25, 2007
RF Current Probe	F-35	455	Jul. 04, 2007
Capacitive Voltage Probe	CVP 2200	18312	Jul. 25, 2007
RF- ABSORBING CLAMP	KEMA 801	16617	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.
4. The test was performed in ADT Shielded Room No. A.
5. The VCCI Con A Registration No. is C-817.

4.2.3 TEST PROCEDURE

a. 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.

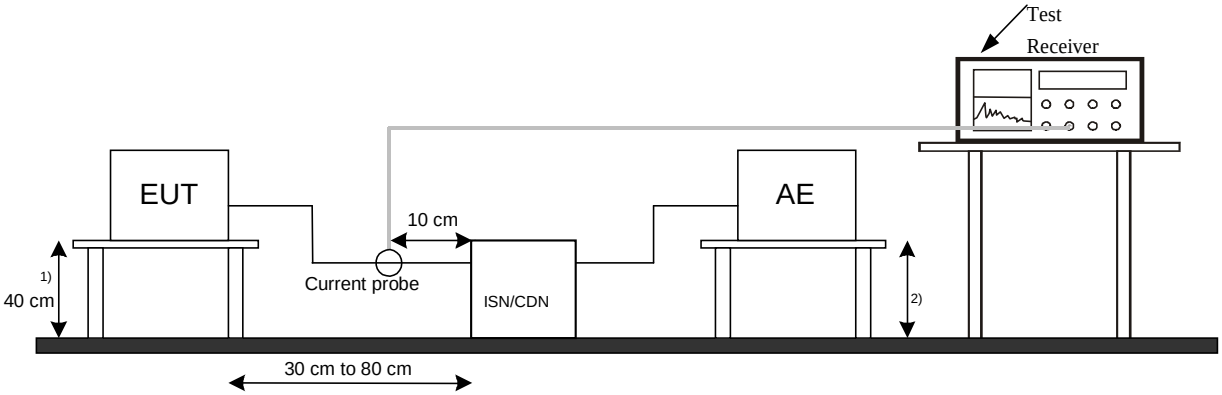
b. Current at the measurement port of the ISN was detected, the reading was corrected by adding the current division factor of the ISN, and was compared to the current limits.

c. 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



1) Distance to the reference ground plane (vertical or horizontal).

2) Distance to the reference ground plane is not critical.

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

4.2.6 EUT OPERATING CONDITIONS

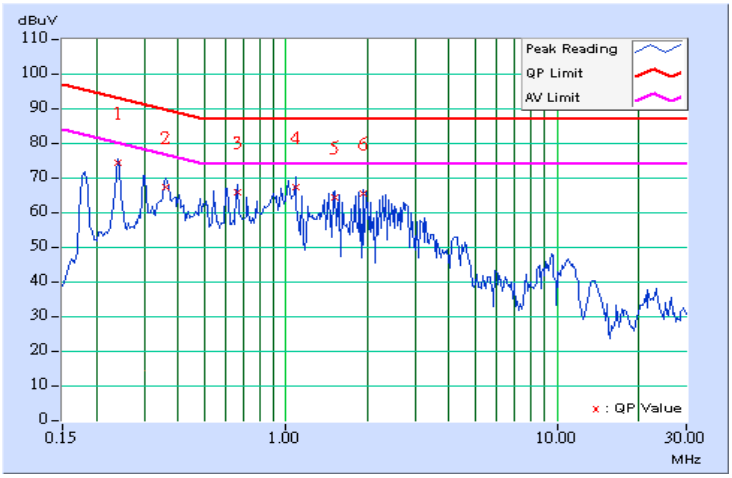
Same as 4.1.6.

4.2.7 TEST RESULTS

INPUT POWER (SYSTEM)	230Vac, 50Hz	**6dB BANDWIDTH**	9 kHz
TELECOM PORT	RJ11(to ADSL)		
ENVIRONMENTAL CONDITIONS	25 deg. C, 60% RH, 965 hPa	**TESTED BY :** Eason Chang	

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	**0.240**	**10.13**	**64.19**	**-**	**74.32**	**-**	**93.09**	**80.09**	**-18.77**	**-**
2	0.361	10.15	57.37	-	67.52	-	89.71	76.71	-22.19	-
3	0.662	10.17	55.55	-	65.72	-	87.00	74.00	-21.28	-
4	1.084	10.17	57.17	-	67.34	-	87.00	74.00	-19.66	-
5	1.505	10.20	54.19	-	64.39	-	87.00	74.00	-22.61	-
6	1.925	10.22	55.42	-	65.64	-	87.00	74.00	-21.36	-

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

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

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

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
*ADVANTEST Spectrum Analyzer	R3271A	85060311	July 03, 2007
*HP Pre_Amplifier	8449B	3008A01922	Sep. 18, 2007
*ROHDE & SCHWARZ Test Receiver	ESVS 30	841977/002	Oct. 30, 2007
*CHASE Broadband Antenna	CBL6111C	2730	Jun. 08, 2007
*Schwarzbeck Horn_Antenna	BBHA9120-D1	D123	Sep. 25, 2007
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 05, 2007
SCHWARZBECK Biconical Antenna	VHBA9123	459	Jun. 08, 2009
SCHWARZBECK Periodic Antenna	UPA6108	1148	Jun. 08, 2009
*RF Switches	MP59B	6100175593	Jul. 17, 2007
*RF Cable(CHASE)	9913-30M N-N Cable	STBCAB-30M-1 GHz	Jul. 17, 2007
*Software	ADT_Radiated_V 5.14	NA	NA
*CHANCE MOST Antenna Tower	AT-100	CM-A007	NA
*CHANCE MOST Turn Table	TC-008	CM-T007	NA
*CORCOM AC Filter	MRI2030	024/019	NA

Note: 1. The calibration interval of the above test instruments is 12 months (36 months for Periodic Antenna) and the calibrations are traceable to NML/ROC and NIST/USA.
2. * = These equipment are used for the final measurement.
3. The horn antenna, HP preamplifier (model: 8449B) and Spectrum Analyzer (model: R3271A) are used only for the measurement of emission frequency above 1GHz if tested.
4. The test was performed in ADT Open Site No. B.
5. The VCCI Site Registration No. is R-847.
6. The FCC Site Registration No. is 92753.
7. The CANADA Site Registration No. is IC 4824A-2.

4.3.3 TEST PROCEDURE

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10-meter 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 polarization 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.

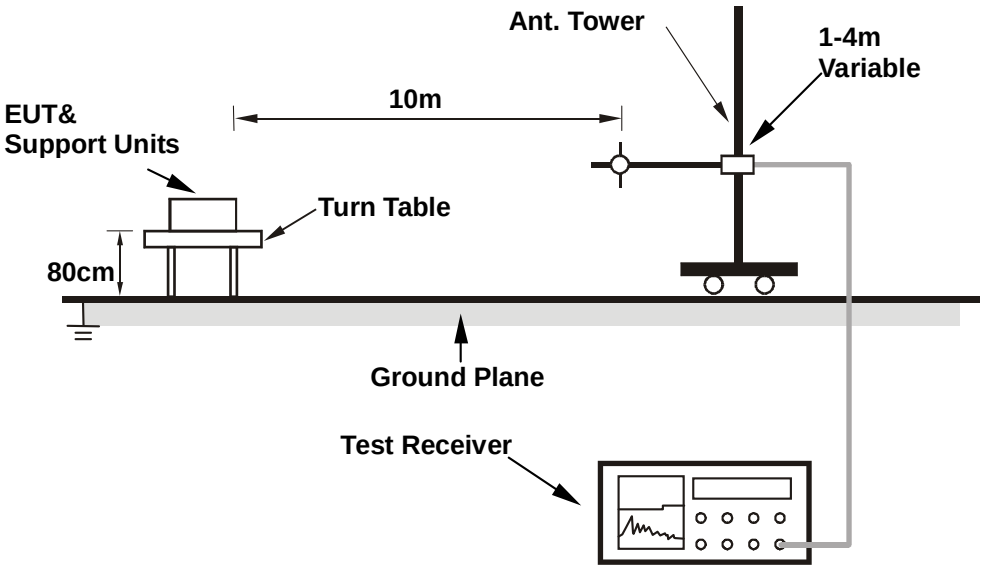
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using the quasi- peak method or average method as specified and then reported In Data sheet peak mode and QP mode.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



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

4.3.6 EUT OPERATING CONDITIONS

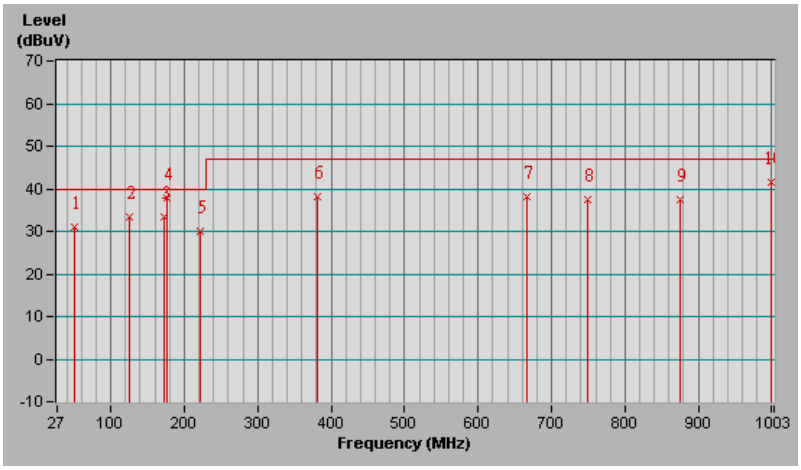
Same as 4.1.6

4.3.7 TEST RESULTS

TEST MODE	Mode 1	**INPUT POWER (SYSTEM)**	230Vac, 50Hz
FREQUENCY RANGE	30-1000 MHz	**DETECTOR FUNCTION & BANDWIDTH**	Quasi-Peak, 120kHz
ENVIRONMENTAL CONDITIONS	24 deg. C, 60 % RH, 965 hPa	**TESTED BY**	Max Tseng

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	50.80	31.20 QP	40.00	-8.80	4.00 H	109	20.80	10.40
2	125.00	33.50 QP	40.00	-6.50	4.00 H	267	20.90	12.60
3	172.63	33.50 QP	40.00	-6.50	4.00 H	85	22.40	11.10
4	**177.40**	**37.70 QP**	**40.00**	**-2.30**	**4.00 H**	**153**	**26.90**	**10.80**
5	221.94	30.10 QP	40.00	-9.90	4.00 H	316	17.40	12.70
6	380.80	38.10 QP	47.00	-8.90	1.88 H	0	18.90	19.10
7	666.66	38.10 QP	47.00	-8.90	1.33 H	306	13.00	25.20
8	750.00	37.50 QP	47.00	-9.50	1.17 H	124	10.10	27.40
9	875.00	37.50 QP	47.00	-9.50	1.00 H	216	8.50	29.00
10	999.99	41.70 QP	47.00	-5.30	1.00 H	308	12.10	29.50

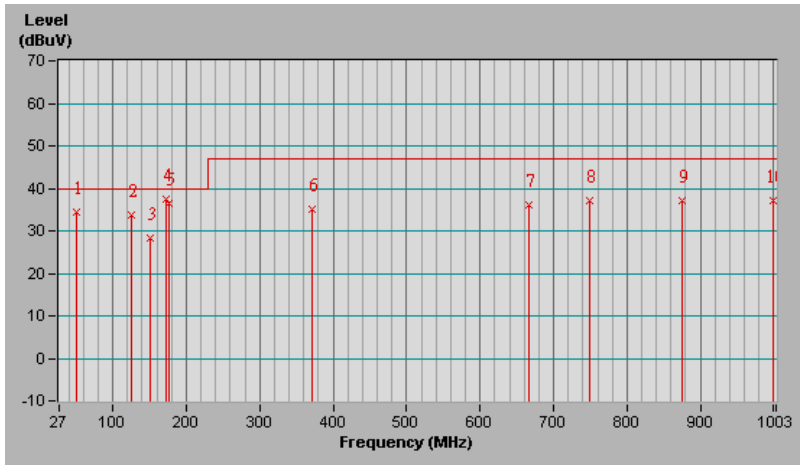
REMARKS: 1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.



TEST MODE	Mode 1	**INPUT POWER (SYSTEM)**	230Vac, 50Hz
FREQUENCY RANGE	30-1000 MHz	**DETECTOR FUNCTION & BANDWIDTH**	Quasi-Peak, 120kHz
ENVIRONMENTAL CONDITIONS	24 deg. C, 60 % RH, 965 hPa	**TESTED BY**	Max Tseng

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	50.00	34.50 QP	40.00	-5.50	1.01 V	216	23.90	10.60
2	125.00	33.80 QP	40.00	-6.20	1.01 V	291	21.20	12.60
3	150.00	28.40 QP	40.00	-11.60	1.01 V	267	15.70	12.70
4	172.63	37.50 QP	40.00	-2.50	1.01 V	27	26.40	11.10
5	177.36	36.50 QP	40.00	-3.50	1.01 V	29	25.70	10.80
6	371.30	35.20 QP	47.00	-11.80	1.01 V	91	16.50	18.70
7	666.66	36.10 QP	47.00	-10.90	2.22 V	4	11.00	25.20
8	750.00	37.20 QP	47.00	-9.80	2.10 V	144	9.80	27.40
9	875.00	37.10 QP	47.00	-9.90	2.00 V	197	8.20	29.00
10	999.99	37.10 QP	47.00	-9.90	1.90 V	0	7.60	29.50

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.

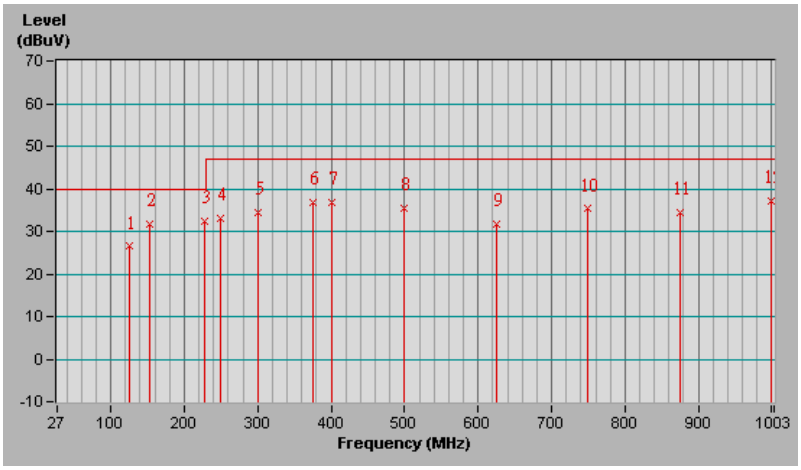


TEST MODE	Mode 2	**INPUT POWER (SYSTEM)**	DC -48V
FREQUENCY RANGE	30-1000 MHz	**DETECTOR FUNCTION & BANDWIDTH**	Quasi-Peak, 120kHz
ENVIRONMENTAL CONDITIONS	26 deg. C, 60 % RH, 965 hPa	**TESTED BY**	Jerry Fan

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	125.00	26.50 QP	40.00	-13.50	4.00 H	1	13.90	12.60
2	151.98	31.80 QP	40.00	-8.20	4.00 H	289	19.30	12.50
3	228.13	32.40 QP	40.00	-7.60	4.00 H	237	19.20	13.10
4	250.00	33.10 QP	47.00	-13.90	2.08 H	49	18.50	14.60
5	300.00	34.40 QP	47.00	-12.60	2.17 H	167	17.80	16.70
6	375.00	36.80 QP	47.00	-10.20	1.93 H	326	17.90	18.90
7	399.99	36.90 QP	47.00	-10.10	1.95 H	16	16.90	20.00
8	500.00	35.40 QP	47.00	-11.60	1.70 H	238	12.80	22.60
9	624.99	31.80 QP	47.00	-15.20	1.59 H	224	7.00	24.80
10	749.99	35.30 QP	47.00	-11.70	1.00 H	200	7.90	27.40
11	874.99	34.40 QP	47.00	-12.60	1.00 H	309	5.40	29.00
12	999.99	37.10 QP	47.00	-9.90	1.00 H	201	7.50	29.50

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.

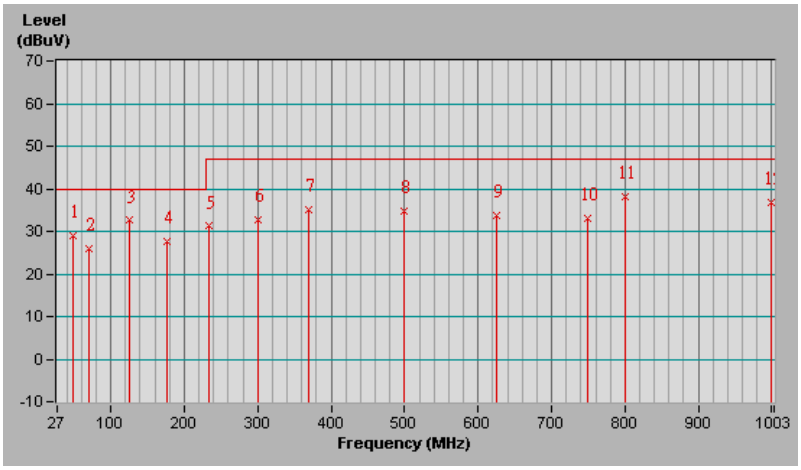


TEST MODE	Mode 2	**INPUT POWER (SYSTEM)**	DC -48V
FREQUENCY RANGE	30-1000 MHz	**DETECTOR FUNCTION & BANDWIDTH**	Quasi-Peak, 120kHz
ENVIRONMENTAL CONDITIONS	26 deg. C, 60 % RH, 965 hPa	**TESTED BY**	Jerry Fan

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	49.58	29.00 QP	40.00	-11.00	1.00 V	93	18.20	10.80
2	70.65	26.10 QP	40.00	-13.90	1.00 V	336	18.20	7.90
3	124.90	32.60 QP	40.00	-7.40	1.00 V	270	20.00	12.60
4	177.36	27.80 QP	40.00	-12.20	1.00 V	196	16.90	10.80
5	234.00	31.20 QP	47.00	-15.80	1.00 V	264	17.70	13.50
6	300.00	32.80 QP	47.00	-14.20	1.00 V	277	16.10	16.70
7	370.30	35.20 QP	47.00	-11.80	1.00 V	205	16.60	18.70
8	499.80	34.80 QP	47.00	-12.20	1.00 V	63	12.20	22.60
9	624.99	33.80 QP	47.00	-13.20	2.98 V	233	9.00	24.80
10	749.99	33.10 QP	47.00	-13.90	2.38 V	85	5.70	27.40
11	799.99	38.20 QP	47.00	-8.80	1.94 V	301	10.90	27.30
12	999.99	36.80 QP	47.00	-10.20	1.87 V	25	7.30	29.50

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

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. The classifications of equipment are defined in Section 5 of EN 61000-3-2:2000.

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 Until
EMC PARTNER EMC Emission Tester	HAR1000	086	Mar. 16, 2007
EMC Partner(Software)	HARCS_V3.15	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: 2000.

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.

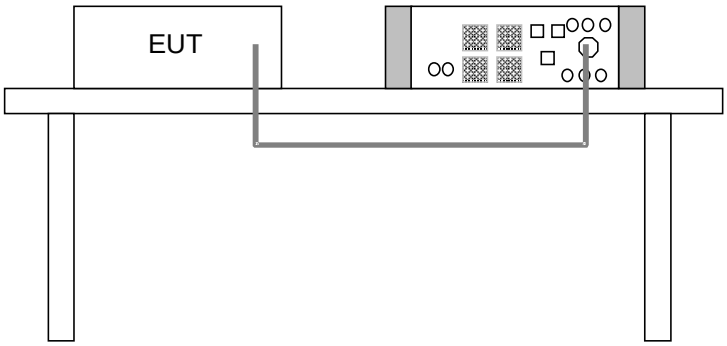
Class B: Portable tools.; Arc welding equipment which is not professional equipment

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. Prepared other computer systems (support units 1-4) to act as communication partners and placed them outside of testing area.
3. The computer systems (support units 3 and 4) run “ping.exe” test program to enable EUT under transmission/receiving condition continuously via line cable and RJ11 cables.

4.4.6 TEST RESULTS

FUNDAMENTAL VOLTAGE/AMPERE	230.1 Vrms / 0.175 Arms	**POWER FREQUENCY**	50.000 Hz
POWER CONSUMPTION	29.16 W	**POWER FACTOR**	0.723
ENVIRONMENTAL CONDITIONS	23 deg. C, 55 % RH, 965 hPa	**TESTED BY**	Ray Yeh

NOTE: 1. Limits are not specified for equipment with a rated power of 75W or less (other than lighting equipment).

2. According to EN61000-3-2: 2000 the manufacturer shall specify the power of the apparatus. This value shall be used for establishing limits. The specified power shall be within +/-10% of the measured power.

4.5 VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

4.5.1 LIMITS OF VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

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 Until
EMC PARTNER EMC Emission Tester	HAR1000	086	Mar. 16, 2007
EMC Partner(Software)	HARCS_V3.15	NA	NA

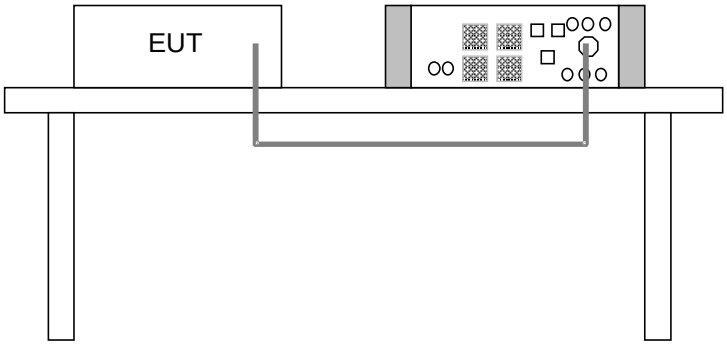
NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in EMS room.

4.5.3 TEST PROCEDURE

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 TEST SETUP



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

4.5.5 EUT OPERATING CONDITIONS

1. Turn on the power of all equipment.
2. Prepared other computer systems (support units 1-4) to act as communication partners and placed them outside of testing area.
3. The computer systems (support units 3 and 4) run “ping.exe” test program to enable EUT under transmission/receiving condition continuously via line cable and RJ11 cables.

4.5.6 TEST RESULTS

FUNDAMENTAL VOLTAGE/AMPERE	230.1 Vrms / 0.175 Arms	**POWER FREQUENCY**	50.013 Hz
OBSERVATION PERIOD (TP)	10 min.	**POWER FACTOR**	0.715
ENVIRONMENTAL CONDITIONS	24 deg. C, 65 % RH, 965 hPa	**TESTED BY**	Ray Yeh

TEST PARAMETER	MEASUREMENT VALUE	LIMIT	REMARKS
P_{st}	0.072	1.00	Pass
P_{lt}	0.072	0.65	Pass
T_{dt} (ms)	0.00	500	Pass
d_{max} (%)	0.00	4%	Pass
dc (%)	0.04	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:	**EN300 386 V1.3.3:2005 (Equipment operating in telecommunication centres)**	
Basic Standard, Specification, and Performance Criteria:	EN 61000-4-2	Electrostatic Discharge - ESD: 4kV air discharge, 4kV Contact discharge, Performance Criterion B
	EN 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test - RS: 80-800 MHz, 3V/m, 80% AM (1kHz), 800-960 MHz, 10V/m, 80% AM (1kHz), 960-1000 MHz, 3V/m, 80% AM (1kHz), 1400-2000 MHz, 10V/m, 80% AM (1kHz), Performance Criterion A
	EN 61000-4-4	Electrical Fast Transient/Burst - EFT, Power line: AC:1kV , DC:0.5 kV, Signal line: 0.5kV, Performance Criterion B
	EN 61000-4-5	Surge Immunity Test: 1.2/50 us Open Circuit Voltage, 8 /20 us Short Circuit Current, Power Line to Line:0.5kV, line to earth : 1kV; indoor signal Line – 0.5 kV, outdoor signal Line – 1kV Performance Criterion B
	EN 61000-4-6	Conducted Radio Frequency Disturbances Test - CS: 0.15-80 MHz, 3V, 80% AM, 1kHz, Performance Criterion A

5.2 GENERAL PERFORMANCE CRITERIA DESCRIPTION

CRITERION A	The apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases 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 deduced from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.
CRITERION B	The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the exposure to an electromagnetic phenomenon, degradation of performance is, however, allowed. No change of actual operating state or stored data is allowed . If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.
CRITERION C	As defined in clause 6 of EN50082-1 [2], temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls, or, in the case of switching equipment, by normal subsequent use.

5.3 EUT OPERATING CONDITION

1. Turn on the power of all equipment.
2. Prepared other computer systems (support units 1-4) to act as communication partners and placed them outside of testing area.
3. The computer systems (support units 3 and 4) run “ping.exe” test program to enable EUT under transmission/receiving condition continuously via line cable and RJ11 cables.

5.4 ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD)

5.4.1 TEST SPECIFICATION

Basic Standard:	EN 61000-4-2
Discharge Impedance:	330 ohm / 150 pF
Discharge Voltage:	Air Discharge – 2, 4 kV (Direct) Contact Discharge –2, 4 kV (Direct/Indirect)
Polarity:	Positive / Negative
Number of Discharge:	Minimum 10 times at all test point
Discharge Mode:	Single Discharge
Discharge Period:	1-second minimum

5.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
NoiseKen, ESD Simulator	ESS-100L(A)	0189C01491	June 20, 2007
Key Tek, ESD Simulator	MZ-15/EC	9906323	April 06, 2007

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 immunity test method and laboratory conditions are described in EN61000-4-2 [7]

ESD shall be applied only to those points and surfaces of the EUT that are expected to be touched during normal operation including users access as specified in the user manual.

The application of discharges to any point of the equipment other than the electrostatic protection point, which is accessible only for maintenance purposes, is not required. The application of ESD to the contacts of open connectors is not required.

The basic test procedure was in accordance with EN 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.

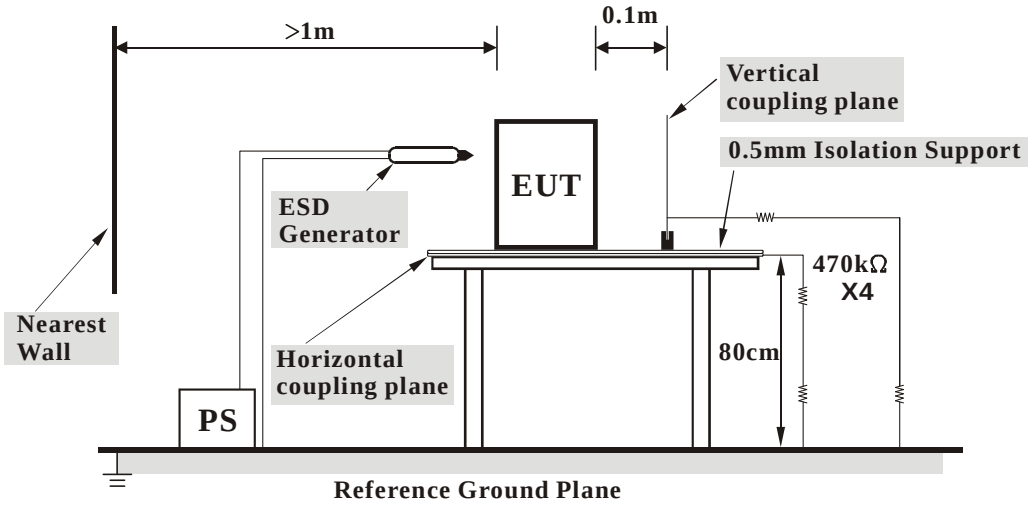
e. Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.

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 vertically 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 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 EN 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 EN 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.

5.4.5 TEST RESULTS

TEST MODE	Mode 1	**INPUT POWER (SYSTEM)**	230Vac, 50Hz
ENVIRONMENTAL CONDITIONS	20 deg. C, 56 % RH, 965 hPa	**TESTED BY**	Anderson Chen

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

Description of test point: Please refers to following photos for representative mark only.

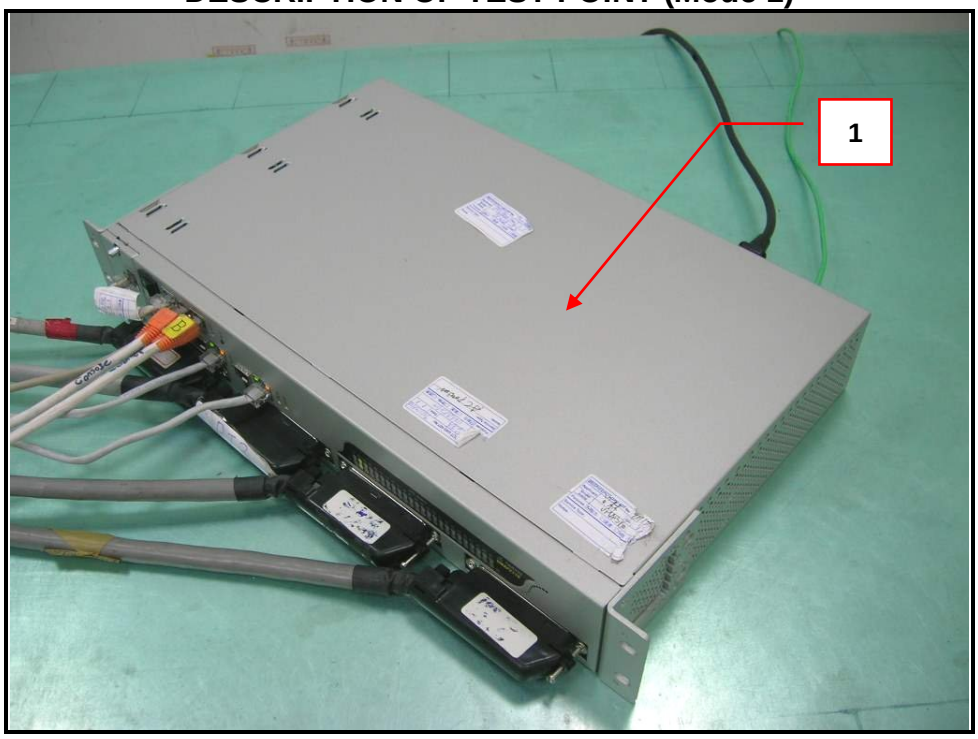
TEST RESULTS OF INDIRECT APPLICATION					
Discharge Level (kV)	Polarity (+/-)	Test Point	Horizontal Coupling Plane	Vertical Coupling Plane	Performance Criterion
2, 4	+/-	1 ~ 4	Note (1)	Note (1)	A

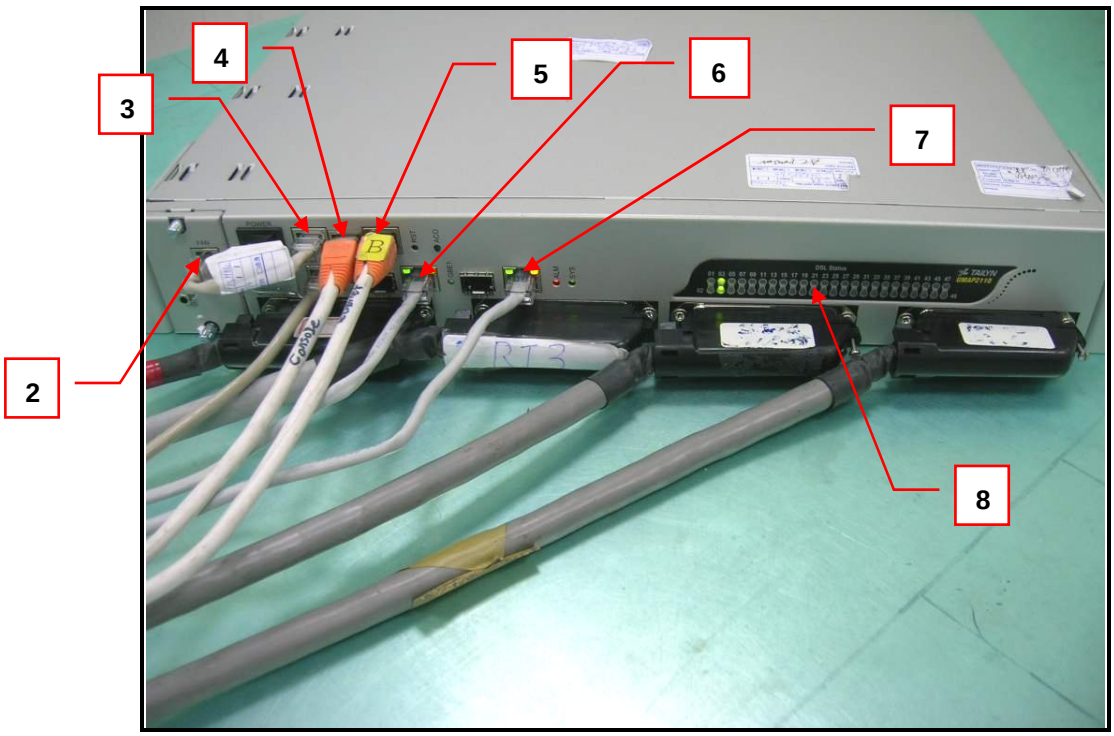
Description of test point:

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

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

DESCRIPTION OF TEST POINT (Mode 1)





TEST MODE	Mode 2	**INPUT POWER (SYSTEM)**	DC 48V
ENVIRONMENTAL CONDITIONS	20 deg. C, 56 % RH, 965 hPa	**TESTED BY**	Anderson Chen

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

Description of test point: Please refers to following photos for representative mark only.

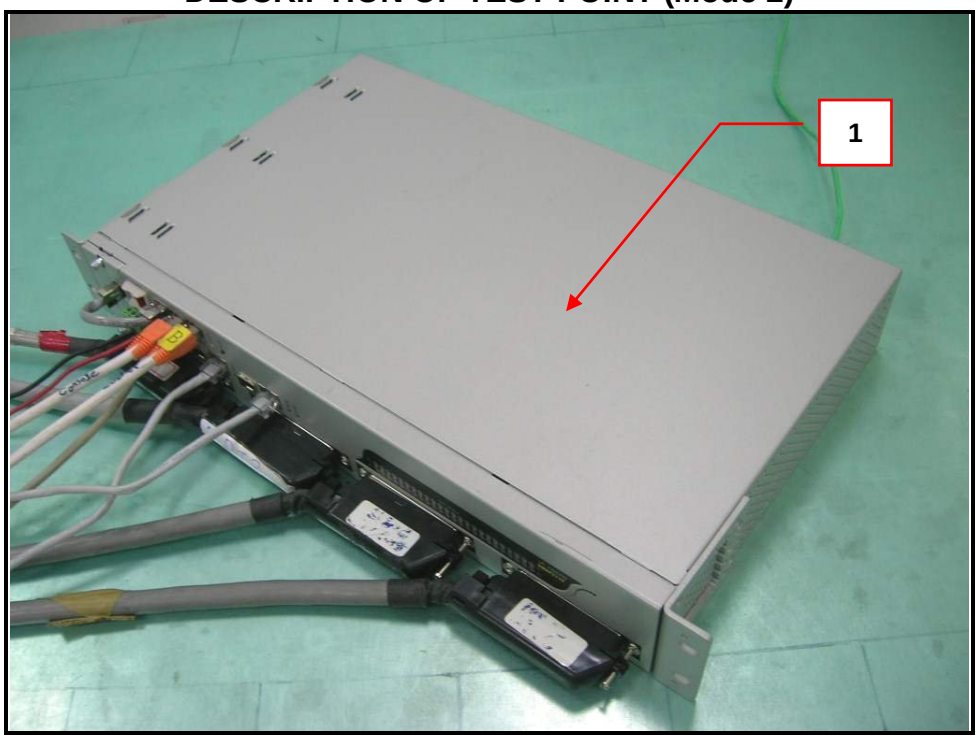
TEST RESULTS OF INDIRECT APPLICATION					
Discharge Level (kV)	Polarity (+/-)	Test Point	Horizontal Coupling Plane	Vertical Coupling Plane	Performance Criterion
2, 4	+/-	1 ~ 4	Note (1)	Note (1)	A

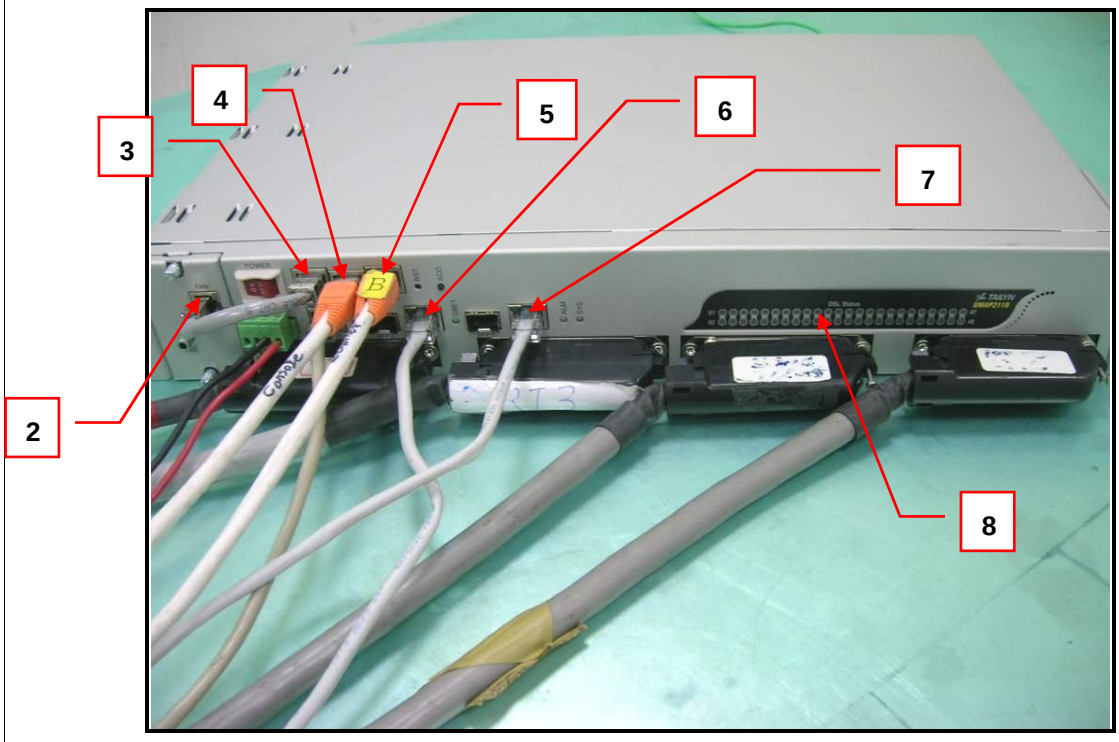
Description of test point:

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

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

DESCRIPTION OF TEST POINT (Mode 2)





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

5.5.1 TEST SPECIFICATION

Basic Standard:	EN 61000-4-3
Frequency Range:	80 -800 MHz, 800-960 MHz, 960-1000 MHz, 1400-2000 MHz
Field Strength:	3 V/m, 10V/m
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Polarity of Antenna:	Horizontal and Vertical
Test Distance:	3 m
Antenna Height:	1.5m
Dwell Time:	3 seconds

5.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
AR Power Amplifier	150W1000M3	311567	NA
AR Power Amplifier	60S1G3M1	304334	NA
AR LOG ANTENNA	AT5080ANT	309740	NA
BOONTON RF Voltage Meter	4232A-01	93801	Jan. 30, 2007
R&S Signal Generator	SML03	101159	Feb. 09, 2007
Electric Field Probe	FP6001	30817	Sep. 14, 2007
ADT RS Test Workbench(Software)	ADT_RS_V7.5	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.

5.5.3 TEST PROCEDURE

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

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

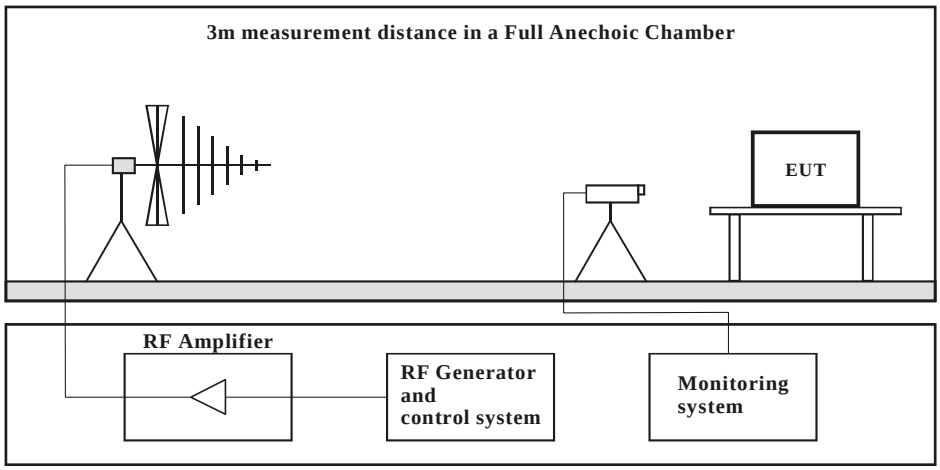
b. The frequency range is swept from 80 -800 MHz, 800-960 MHz, 960-1000 MHz, 1400-2000 MHz, with the signal 80% amplitude modulated with a 1kHz sine wave. The rate of sweep did not exceed 1.5 x 10 -3 decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.

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

d. The field strength level was 3V/m, 10V/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 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 EN 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 EN 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.

5.5.5 TEST RESULTS

TEST MODE	Mode 1	INPUT POWER (SYSTEM)	230Vac, 50Hz
ENVIRONMENTAL CONDITIONS	22 deg. C, 57 % RH, 965 hpa	TESTED BY	Duke Tseng

Frequency (MHz)	Result	Polarity	Azimuth	Field Strength (V/m)	Obser-vation	Performance Criterion
80 -800 MHz	PASS	V&H	0	3	Note	A
80 -800 MHz	PASS	V&H	90	3		
80 -800 MHz	PASS	V&H	180	3		
80 -800 MHz	PASS	V&H	270	3		

Frequency (MHz)	Result	Polarity	Azimuth	Field Strength (V/m)	Obser-vation	Performance Criterion
800 -960 MHz	PASS	V&H	0	10	Note	A
800 -960 MHz	PASS	V&H	90	10		
800 -960 MHz	PASS	V&H	180	10		
800 -960 MHz	PASS	V&H	270	10		

Frequency (MHz)	Result	Polarity	Azimuth	Field Strength (V/m)	Obser-vation	Performance Criterion
960 -1000 MHz	PASS	V&H	0	3	Note	A
960 -1000 MHz	PASS	V&H	90	3		
960 -1000 MHz	PASS	V&H	180	3		
960 -1000 MHz	PASS	V&H	270	3		

Frequency (MHz)	Result	Polarity	Azimuth	Field Strength (V/m)	Obser-vation	Performance Criterion
1400 -2000 MHz	PASS	V&H	0	10	Note	A
1400 -2000 MHz	PASS	V&H	90	10		
1400 -2000 MHz	PASS	V&H	180	10		
1400 -2000 MHz	PASS	V&H	270	10		

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

TEST MODE	Mode 2	INPUT POWER (SYSTEM)	DC 48V
ENVIRONMENTAL CONDITIONS	22 deg. C, 57 % RH, 965 hpa	TESTED BY	Duke Tseng

Frequency (MHz)	Result	Polarity	Azimuth	Field Strength (V/m)	Obser-vation	Performance Criterion
80 -800 MHz	PASS	V&H	0	3	Note	A
80 -800 MHz	PASS	V&H	90	3		
80 -800 MHz	PASS	V&H	180	3		
80 -800 MHz	PASS	V&H	270	3		

Frequency (MHz)	Result	Polarity	Azimuth	Field Strength (V/m)	Obser-vation	Performance Criterion
800 -960 MHz	PASS	V&H	0	10	Note	A
800 -960 MHz	PASS	V&H	90	10		
800 -960 MHz	PASS	V&H	180	10		
800 -960 MHz	PASS	V&H	270	10		

Frequency (MHz)	Result	Polarity	Azimuth	Field Strength (V/m)	Obser-vation	Performance Criterion
960 -1000 MHz	PASS	V&H	0	3	Note	A
960 -1000 MHz	PASS	V&H	90	3		
960 -1000 MHz	PASS	V&H	180	3		
960 -1000 MHz	PASS	V&H	270	3		

Frequency (MHz)	Result	Polarity	Azimuth	Field Strength (V/m)	Obser-vation	Performance Criterion
1400 -2000 MHz	PASS	V&H	0	10	Note	A
1400 -2000 MHz	PASS	V&H	90	10		
1400 -2000 MHz	PASS	V&H	180	10		
1400 -2000 MHz	PASS	V&H	270	10		

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:	EN 61000-4-4
Test Voltage:	Power Line – 1 kV
	Signal/Control Line -- 0.5kV
Polarity:	Positive/Negative
Impulse Frequency:	5 kHz
Impulse Waveshape :	5/50 ns
Burst Duration:	15 ms
Burst Period:	300 ms
Test Duration:	Not less than 1 min.

5.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
EMC PARTNER, TRANSIENT	TRA1Z332N	683	Feb.15, 2007
EMC PARTNER, CN-EFT100	CN-EFT100	352	NA
Adapter (EMC Partner)	NA	SU1ADA-002	Dec. 23, 2007
EMC Partner(Software)	Test Manger_V1.53	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

a. Both positive and negative polarity discharges were applied.

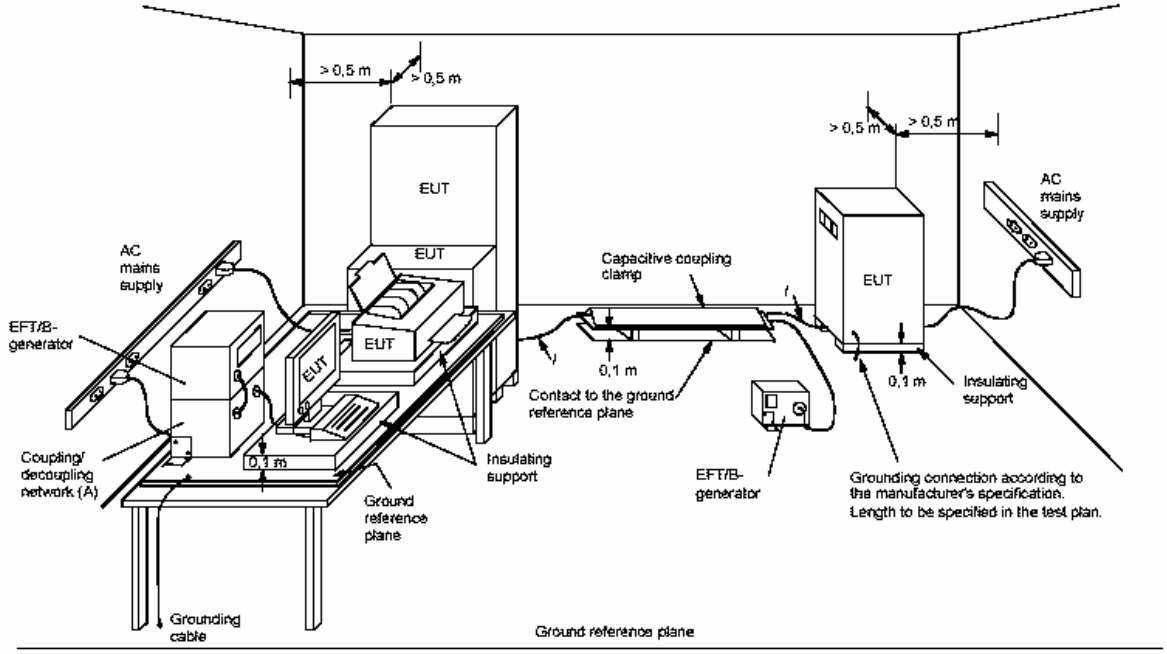
b. The length of the “hot wire” from the coaxial output of the EFT generator to the terminals on the EUT should be 0.5 m ±0.05 m.

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

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

5.6.4 TEST SETUP

Direct Coupling Test Setup



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

5.6.5 TEST RESULTS

TEST MODE	Mode 1	INPUT POWER (SYSTEM)	230Vac, 50Hz
ENVIRONMENTAL CONDITIONS	20 deg. C, 54 % RH, 965 hpa	TESTED BY	Duke Tseng

I. POWER PORT

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

II. SIGNAL PORTS AND CONTROL PORTS

VOLTAGE (kV)	TEST POINT	POLARITY (+/-)	OBSERVATION	PERFORMANCE CRITERION
0.5	RJ-45(GBE1)	+/-	Note (1)	B
0.5	Line cable	+/-	Note (1)	B

NOTES: (1) The EUT time out during the test, but could be self-recoverable after the test.

TEST MODE	Mode 2	**INPUT POWER (SYSTEM)**	DC 48V
ENVIRONMENTAL CONDITIONS	20 deg. C, 54 % RH, 965 hpa	**TESTED BY**	Duke Tseng

I. POWER PORT

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

II. SIGNAL PORTS AND CONTROL PORTS

VOLTAGE (kV)	TEST POINT	POLARITY (+/-)	OBSERVATION	PERFORMANCE CRITERION
0.5	RJ-45(GBE1)	+/-	Note (1)	B
0.5	Line cable	+/-	Note (1)	B

NOTES: (1) The EUT time out during the test, but could be self-recoverable after the test.

5.7 SURGE IMMUNITY TEST

5.7.1 TEST SPECIFICATION

Basic Standard:	EN 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 – 0.5 kV / 1 kV
Surge Input/Output:	T1, R1-G / L1-L2 / L1-G / L2-G / L1, L2-G
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 / min. (maximum)
Number of Tests:	5 positive and 5 negative at selected points

5.7.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
EMC PARTNER, TRANSIENT	TRA1Z332N	683	Feb.15, 2007
EMC PARTNER, CDN-UTP8	CDN-UTP8	012	NA
Adapter (EMC PARTNER)	NA	SU1ADA-002	Dec. 23, 2007
EMC Partner(Software)	Test Manger_V1.53	NA	NA
KeyTek, EMS Simulator	EMC Pro	9712339	Mar.27, 2007
Adapter (EMC Pro)	NA	SU1ADA-001	Dec. 23, 2007
KeyTek(Software)	CEWare32_V2.06	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:

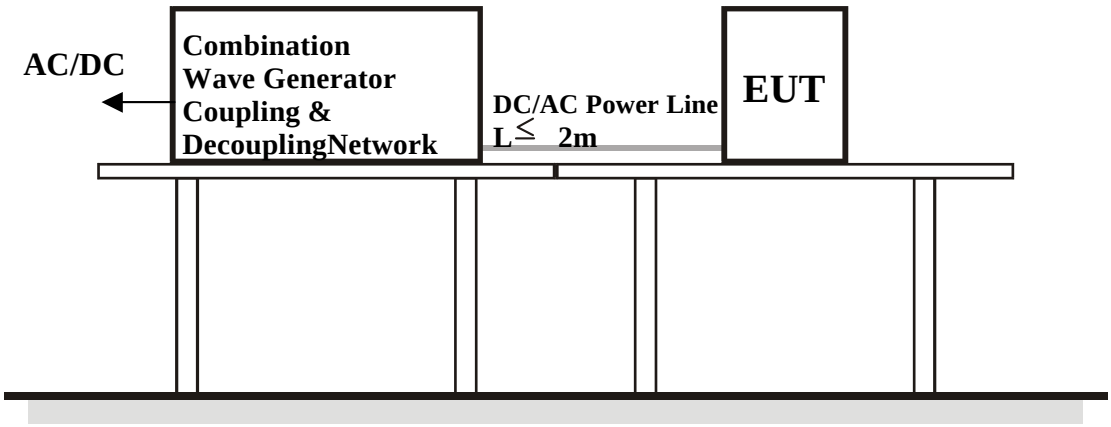
The surge is applied to the lines via the capacitive coupling. The coupling / decoupling networks shall not influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

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

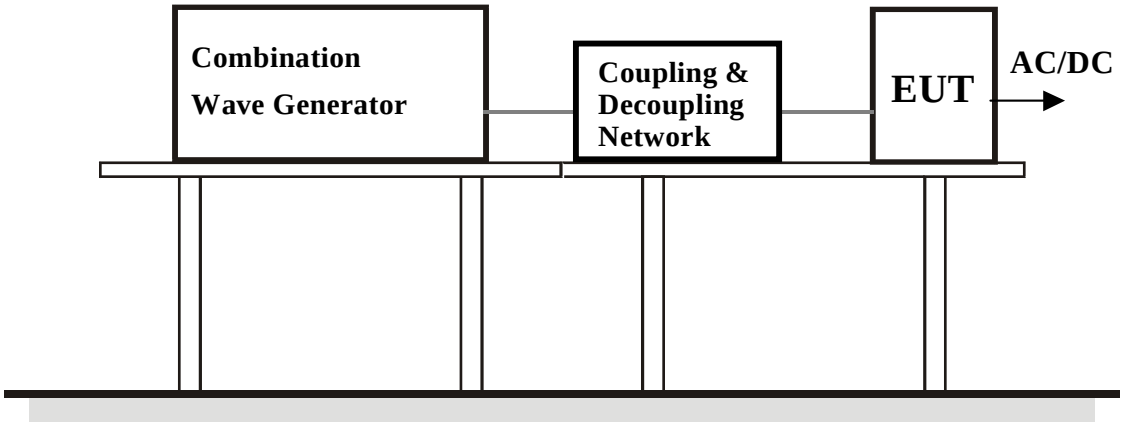
The surge is applied to the lines via gas arrestors coupling. Test levels below the ignition point of the coupling arrestor cannot be specified. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

5.7.4 TEST SETUP

For EUT Power Supply



For test applied to unshielded unsymmetrically operated interconnection lines of EUT or for test applied to unshielded symmetrically operated interconnection / telecommunication lines of EUT



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

5.7.5 TEST RESULTS

TEST MODE	Mode 1	INPUT POWER (SYSTEM)	230Vac, 50Hz
ENVIRONMENTAL CONDITIONS	20 deg. C, 54 % RH, 965 hPa	TESTED BY	Duke Tseng

I. POWER PORT

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

II. SIGNAL PORTS AND TELECOMMUNICATION PORTS

VOLTAGE (kV)	TEST POINT	POLARITY (+/-)	OBSERVATION	PERFORMANCE CRITERION
0.5	RJ-45 (GBE1)	+/-	NOTE (1)	B

NOTE: (1) The EUT time out during the test, but could be self-recoverable after the test.

TEST MODE	Mode 2	**INPUT POWER (SYSTEM)**	DC 48V
ENVIRONMENTAL CONDITIONS	20 deg. C, 54 % RH, 965 hPa	**TESTED BY**	Duke Tseng

II. SIGNAL PORTS AND TELECOMMUNICATION PORTS

VOLTAGE (kV)	TEST POINT	POLARITY (+/-)	OBSERVATION	PERFORMANCE CRITERION
0.5	RJ-45 (GBE1)	+/-	NOTE (1)	B

NOTE: (1) The EUT time out during the test, but could be self-recoverable after the test.

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

5.8.1 TEST SPECIFICATION

Basic Standard:	EN 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-M3 (3 wires), CLAMP
Dwell Time	3 seconds

5.8.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
R&S Signal Generator	SML 01	102731	Jan. 05, 2007
AR Amplifier	75A250AM1	307297	NA
BOONTON RF Voltage Meter	4230	13302	May 22, 2007
LUTHIE EM Injection Clamp	EM-101	35453	Apr. 11 ,2007
FCC CDN M2	FCC-801-M2-16A	03048	Dec. 22, 2007
FCC CDN M3	FCC-801-M3-16A	03055	Dec. 22, 2007
Fischer Custom Communications Inc Coupling Decoupling Network	FCC-801-T2	02025	Oct. 16, 2007
Fischer Custom Communications Inc Coupling Decoupling Network	FCC-801-T4	02030	Oct. 16, 2007
Fischer Custom Communications Inc Coupling Decoupling Network	FCC-801-T8	02036	Oct. 16, 2007
ADT CS Test Workbench(Software)	ADT_CS_V73.90	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.

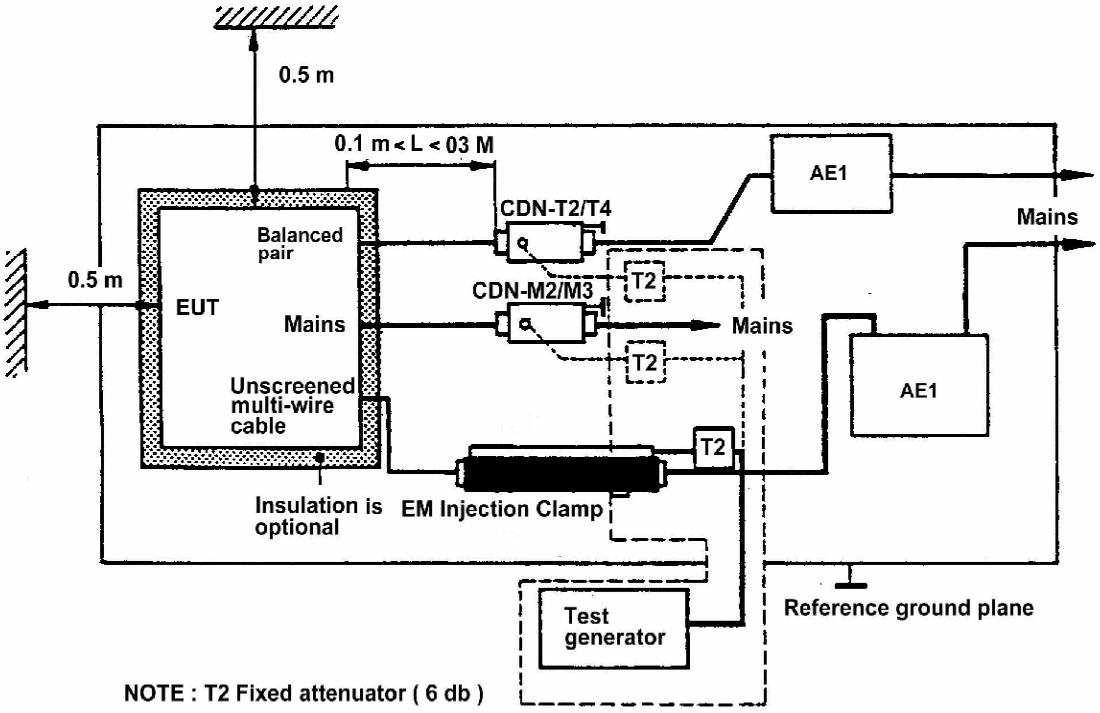
b. The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.

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 sweep rate shall not exceed 1.5×10^{-3} decades/s. 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 TEST SETUP



Note: 1. The EUT is setup 0.1m above Reference Ground Plane

2. 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.

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.

5.8.5 TEST RESULTS

TEST MODE	Mode 1	INPUT POWER (SYSTEM)	230Vac, 50Hz
ENVIRONMENTAL CONDITIONS	22 deg. C, 57 % RH, 965 hpa	TESTED BY	Anderson Chen

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-M3	Note (1)	A

FOR SIGNAL / CONTROL LINE:

Frequency (MHz)	Voltage Level (Vr.m.s.))	Cable	Injection Method	Obser-vation	Performance Criterion
0.15 –80	3	RJ-45(GBE1)	CLAMP	Note (1)	A
0.15 –80	3	Line Cable	CLAMP	Note (1)	A

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

TEST MODE	Mode 2	**INPUT POWER (SYSTEM)**	DC 48V
ENVIRONMENTAL CONDITIONS	22 deg. C, 57 % RH, 965 hpa	**TESTED BY**	Anderson Chen

FOR MAINS POWER:

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

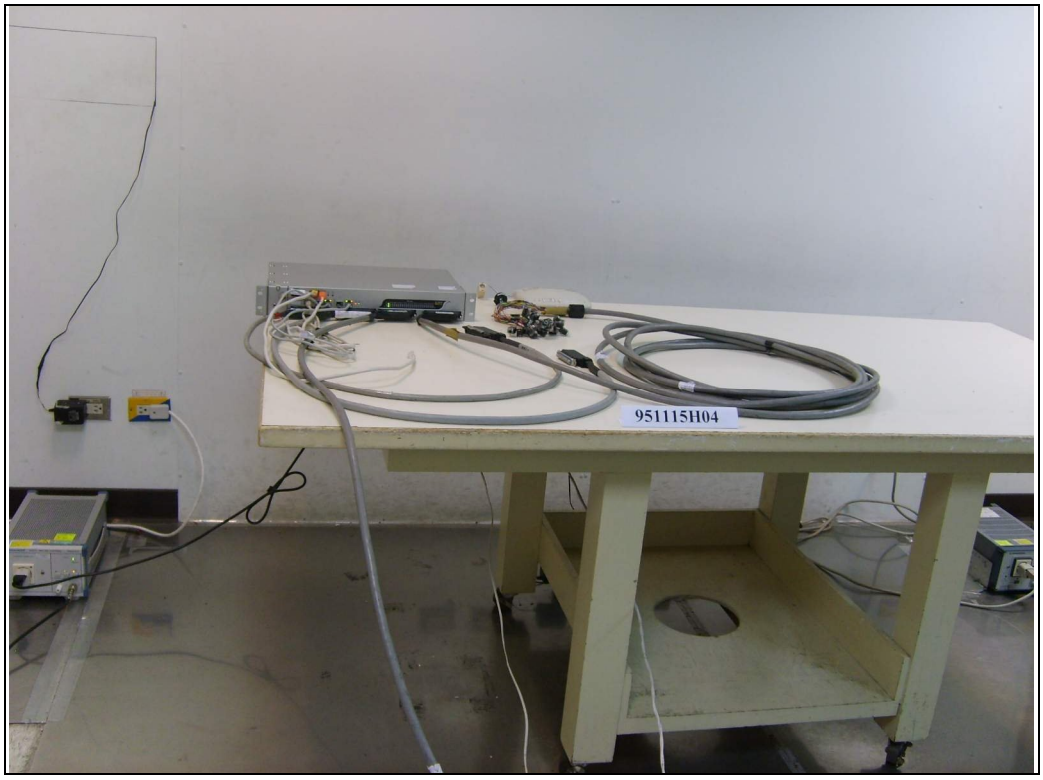
FOR SIGNAL / CONTROL LINE:

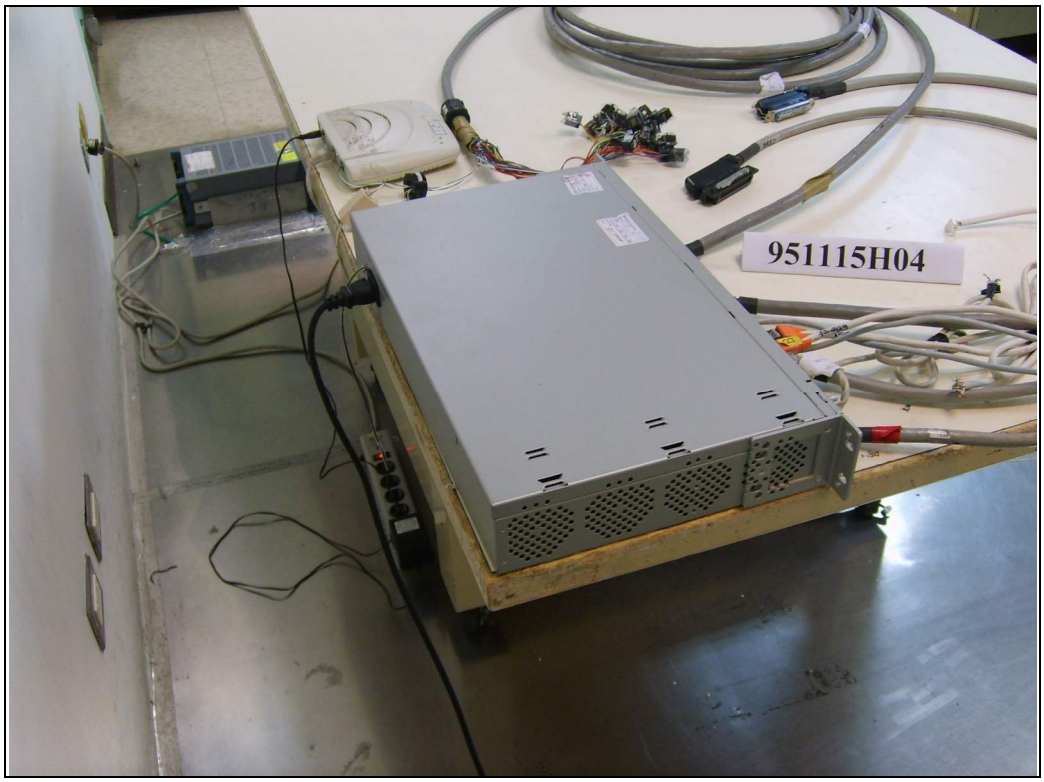
Frequency (MHz)	Voltage Level (Vr.m.s.))	Cable	Injection Method	Obser-vation	Performance Criterion
0.15 –80	3	RJ-45(GBE1)	CLAMP	Note (1)	A
0.15 –80	3	Line Cable	CLAMP	Note (1)	A

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

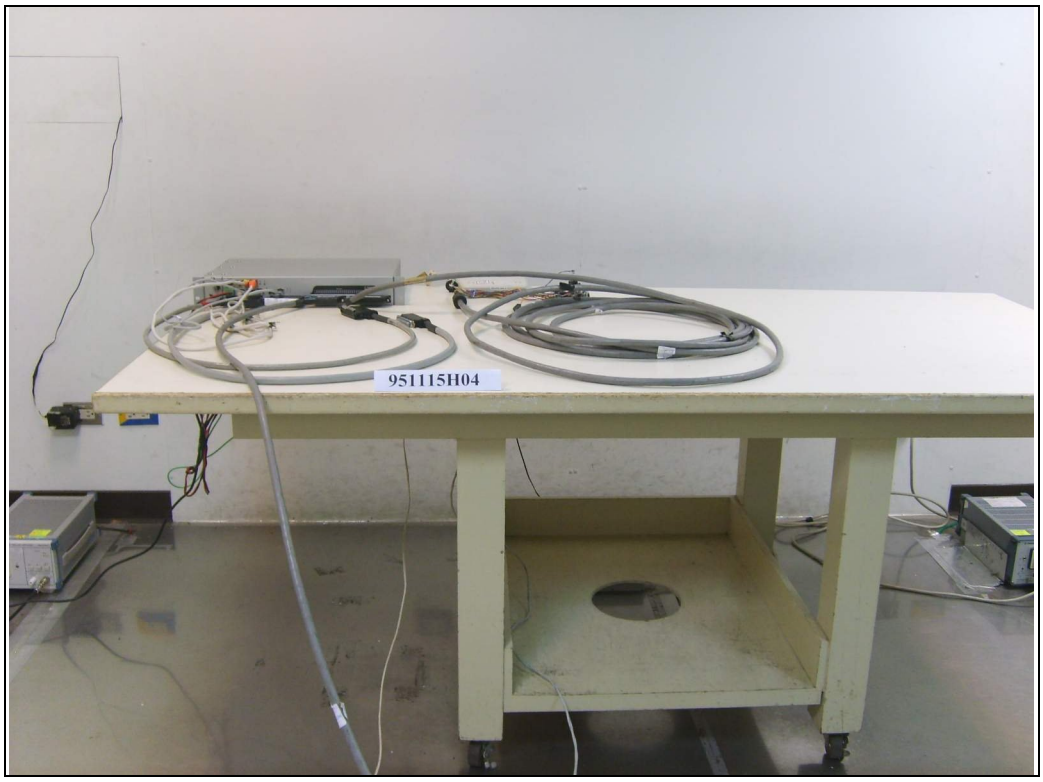
6 PHOTOGRAPHS OF THE TEST CONFIGURATION

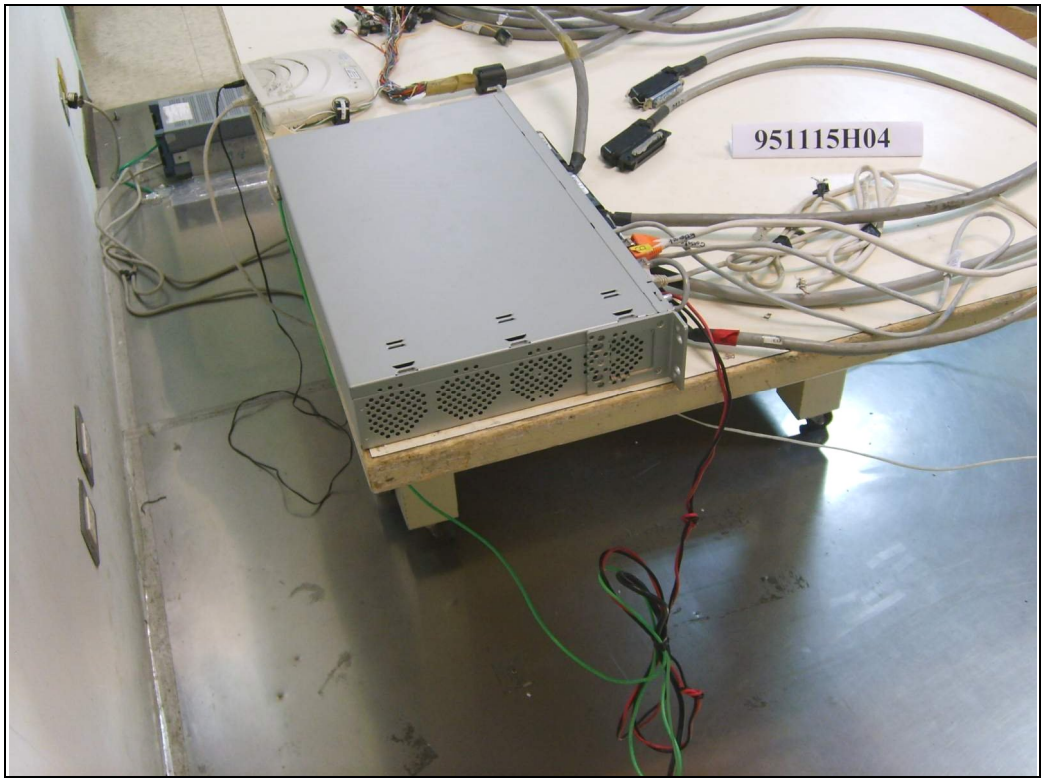
CONDUCTED EMISSION TEST (Mode 1)



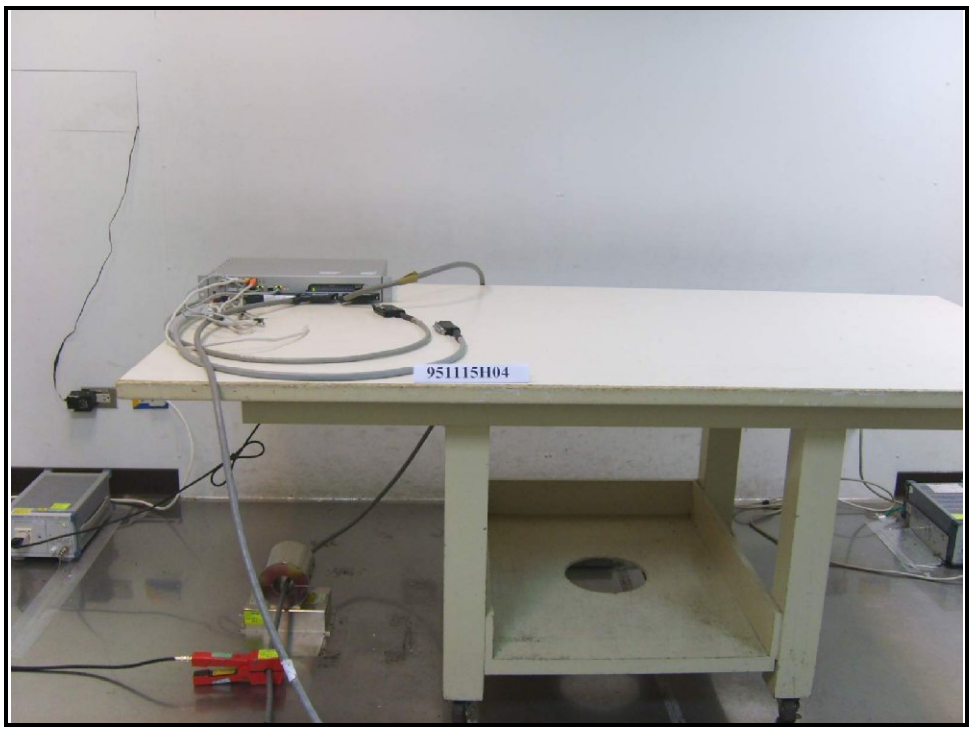


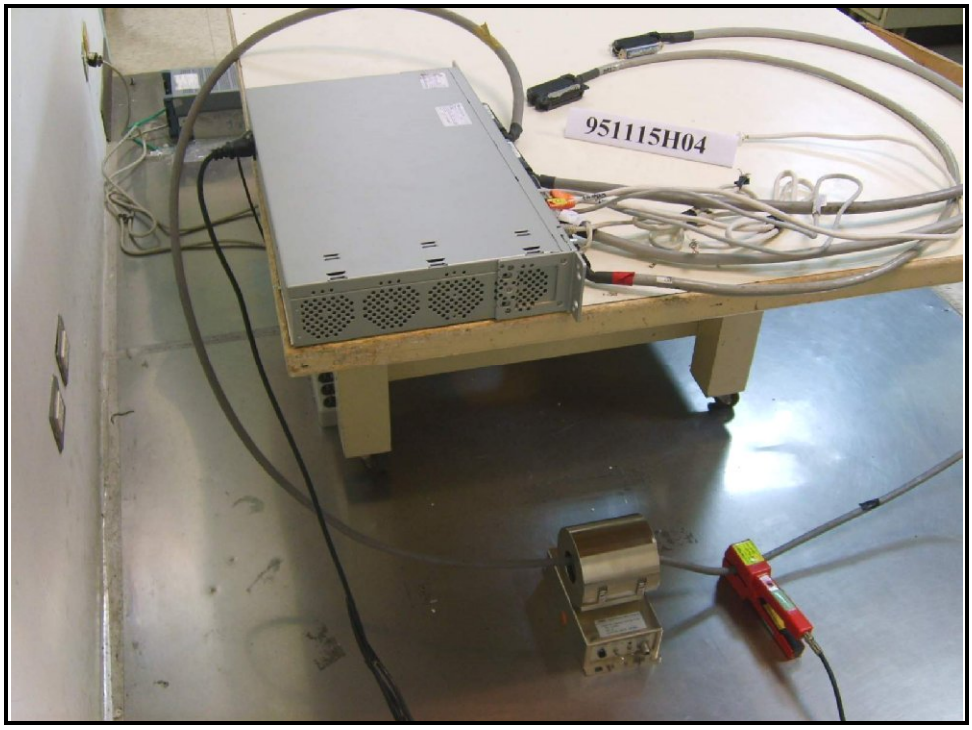
CONDUCTED EMISSION TEST (Mode 2)





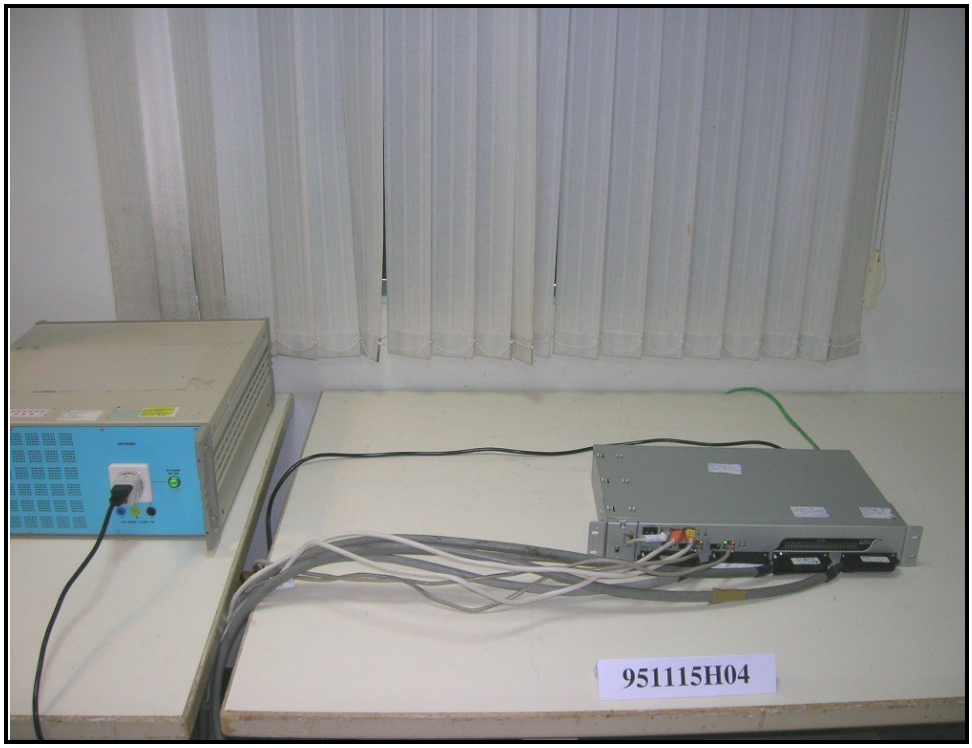
TELECOMMUNICATION PORT
OF CONDUCTED EMISSION TEST





RADIATED EMISSION TEST

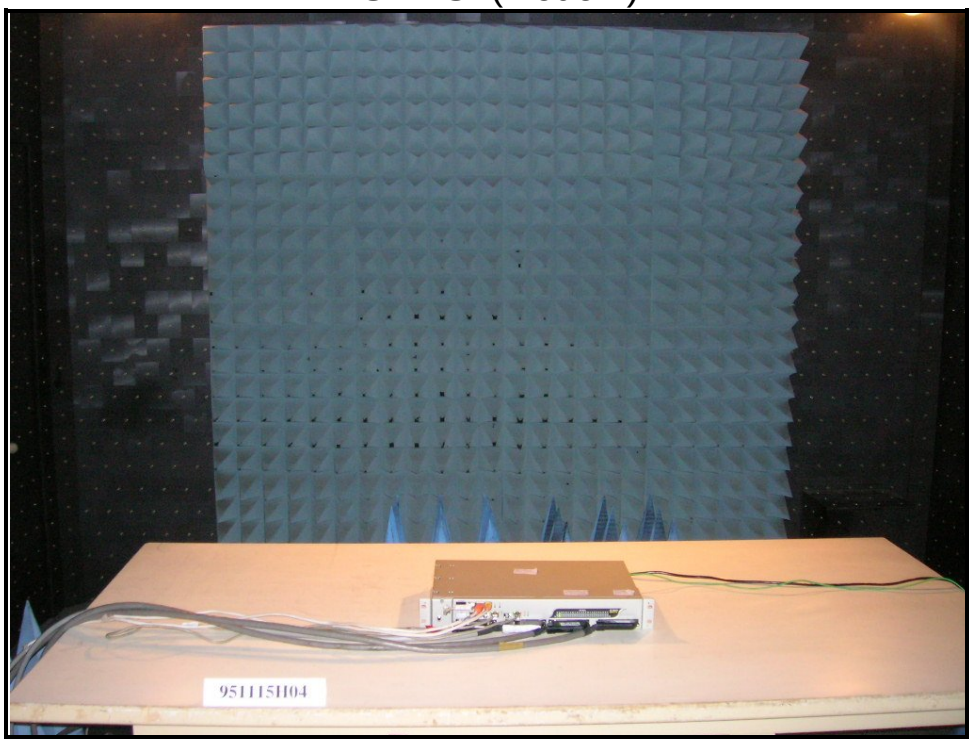
HARMONICS EMISSION TEST & VOLTAGE FLUCTUATIONS AND FLICKER TEST



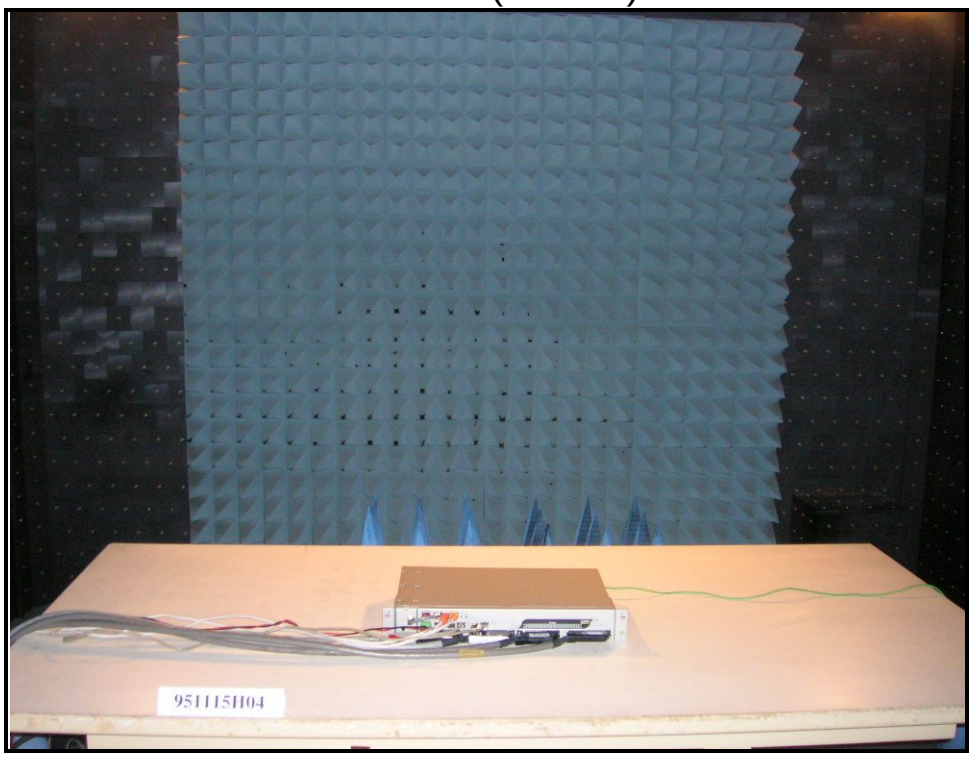
ESD TEST(Mode 1)

ESD TEST(Mode 2)

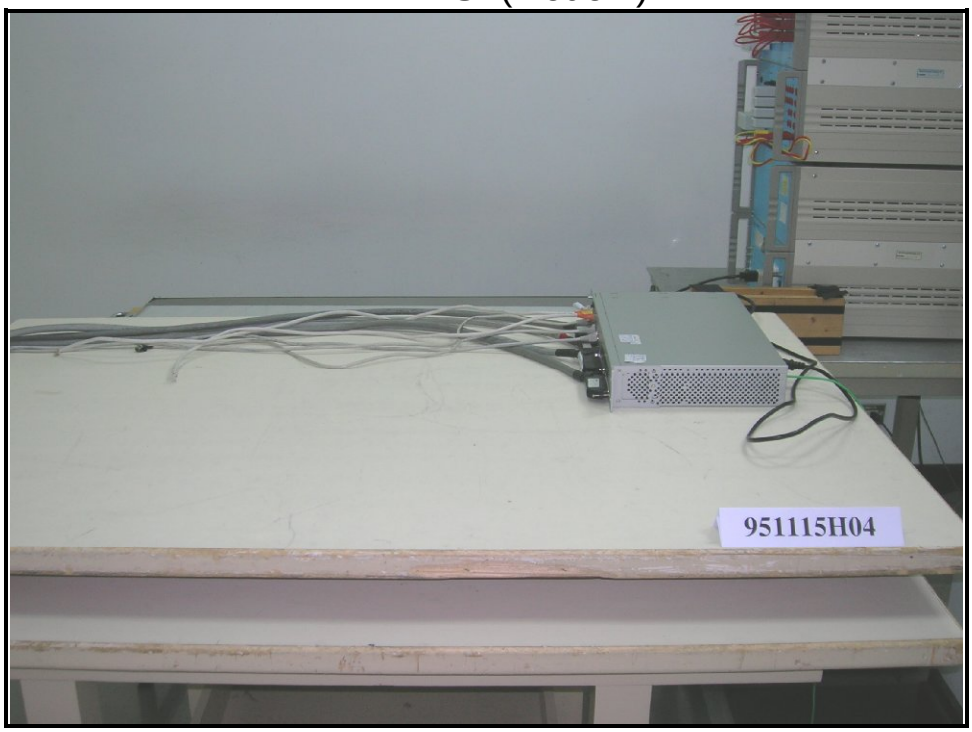
RS TEST(Mode 1)



RS TEST(Mode 2)



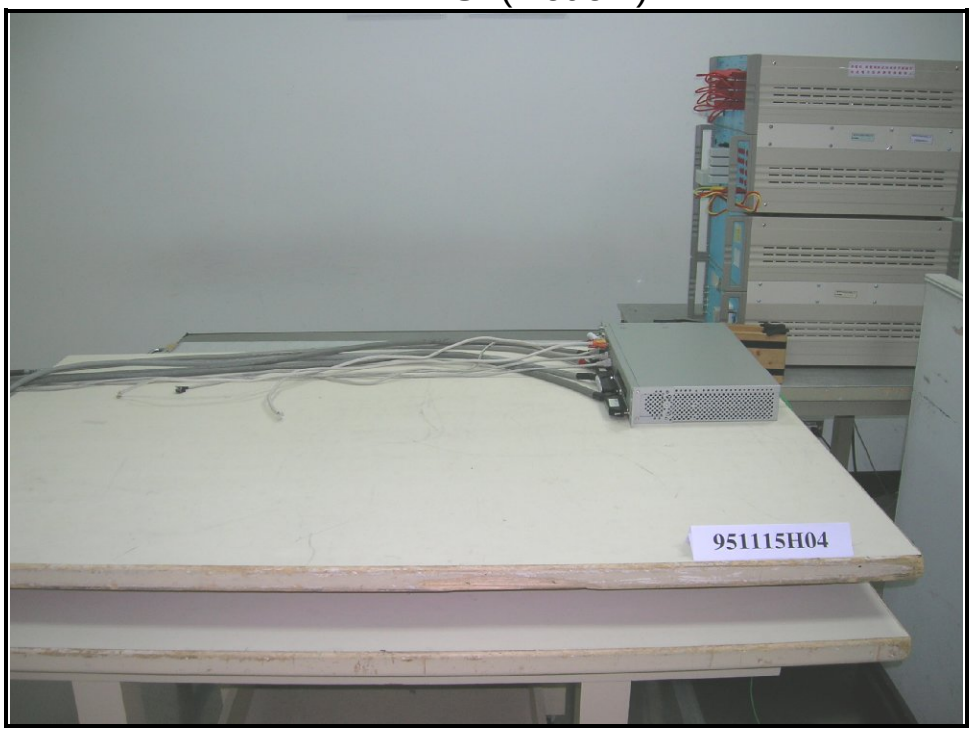
EFT TEST(Mode 1)



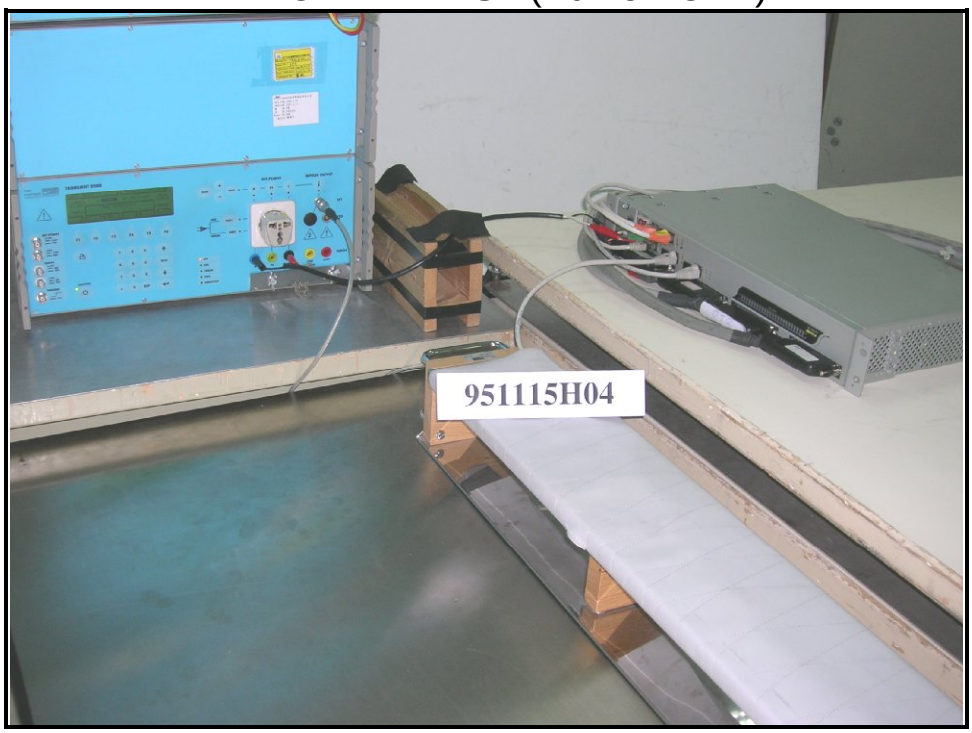
EFT CLAMP TEST (RJ-45 PORT)

EFT CLAMP TEST (Line Cable)

EFT TEST(Mode 2)

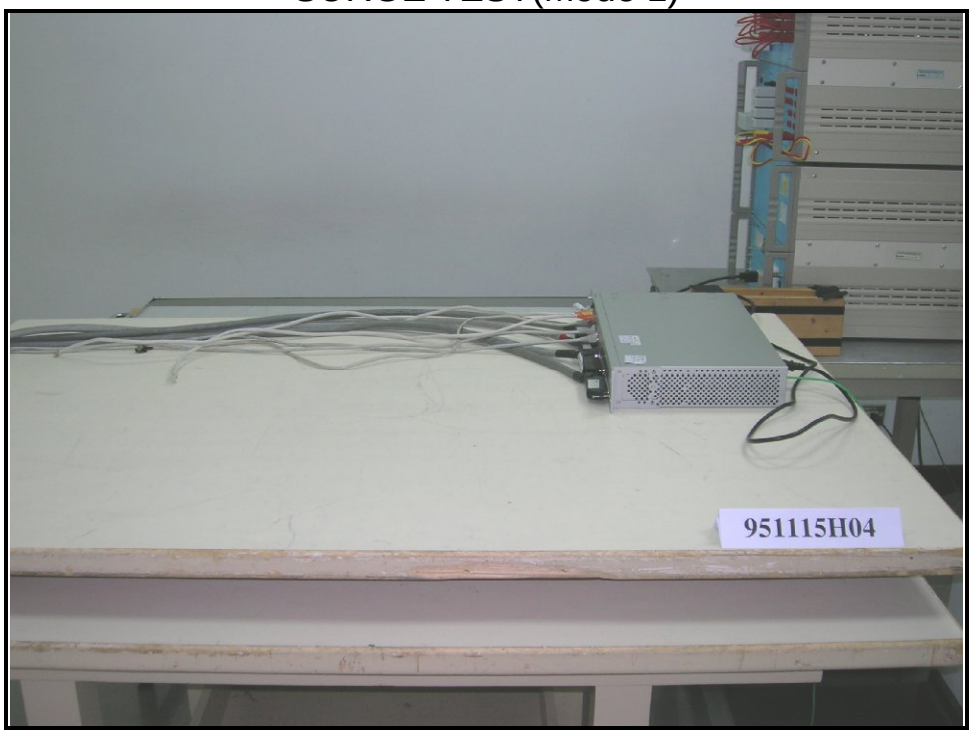


EFT CLAMP TEST (RJ-45 PORT)

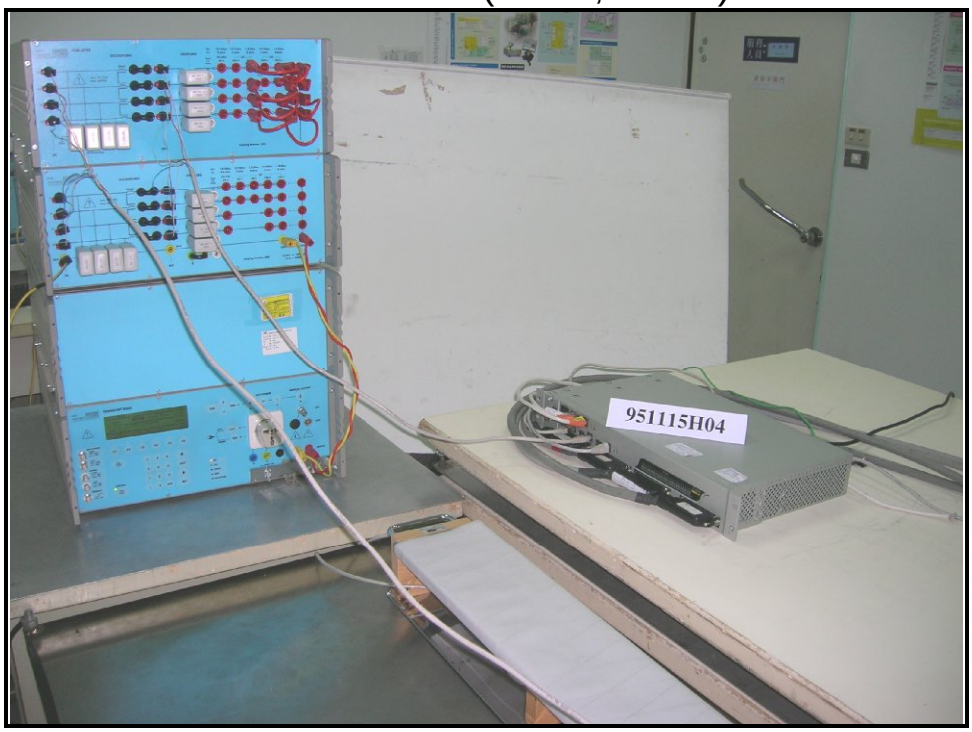


EFT CLAMP TEST (Line Cable)

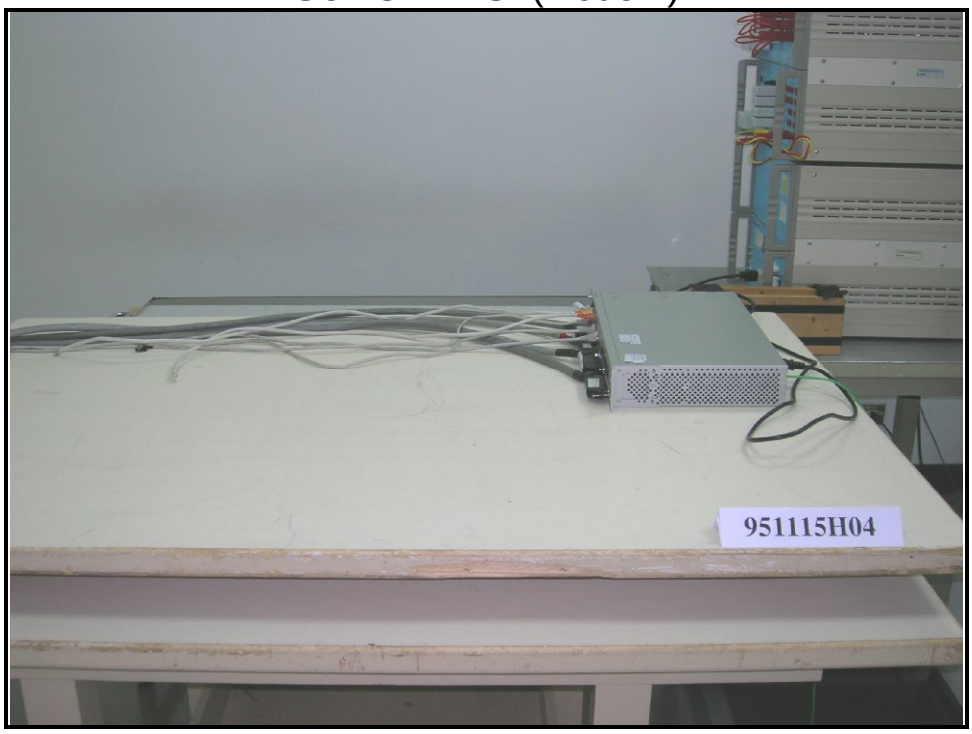
SURGE TEST(Mode 1)



SURGE TEST(RJ-45, PORT)

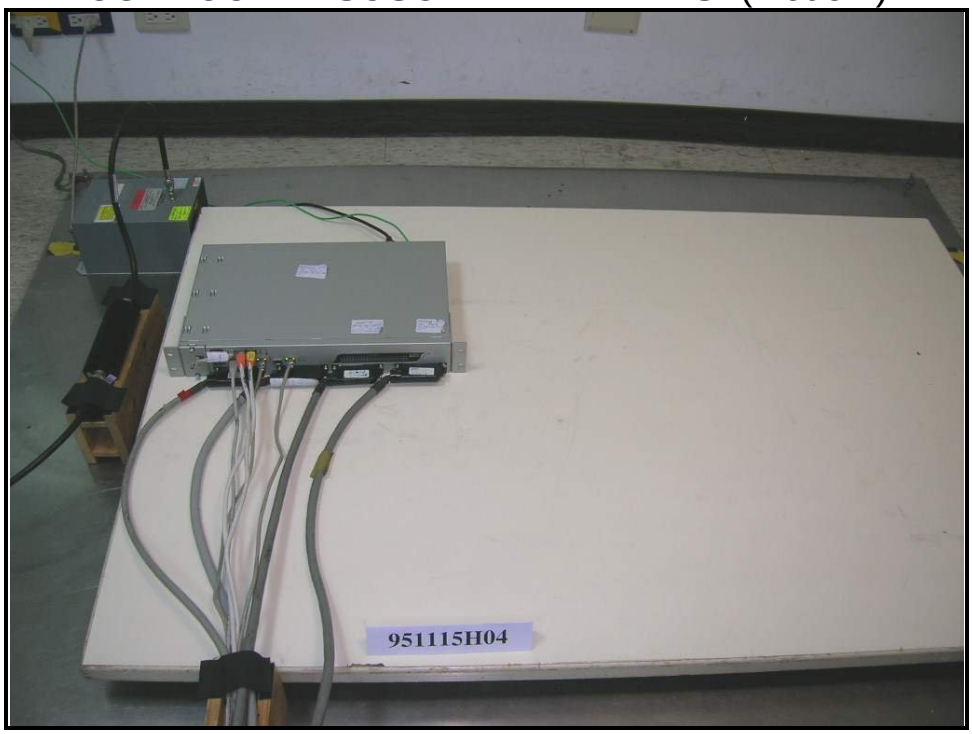


SURGE TEST(Mode 2)



SURGE TEST(RJ-45, PORT)

CONDUCTED SUSCEPTIBILITY TEST(Mode 1)



CONDUCTED SUSCEPTIBILITY TEST (RJ-45 PORT)

CONDUCTED SUSCEPTIBILITY TEST (Line Cable)

CONDUCTED SUSCEPTIBILITY TEST(Mode 2)

CONDUCTED SUSCEPTIBILITY TEST (RJ-45 PORT)

CONDUCTED SUSCEPTIBILITY TEST (Line Cable)

7 APPENDIX - INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025:

USA	FCC, UL, A2LA
Germany	TUV Rheinland
Japan	VCCI
Norway	NEMKO
Canada	INDUSTRY CANADA, CSA
R.O.C.	CNLA, BSMI, NCC
Netherlands	Telefication
Singapore	PSB, GOST-ASIA (MOU)
Russia	CERTIS (MOU)

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.