

CE EMC TEST REPORT

REPORT NO.: CE980615L01B
MODEL NO.: TS-110 (refer to item 3.1 for more details)
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RELEASE CONTROL RECORD

	ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
	Original release	N/A	Dec. 22, 2010
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1 CERTIFICATION

PRODUCT:	Network Attached Storage
BRAND:	QNAP
MODEL NO.:	TS-110 (refer to item 3.1 for more details)
APPLICANT:	QNAP Systems, Inc.
TESTED:	Aug. 06 ~ Aug. 21, 2009
TEST SAMPLE:	R&D SAMPLE
STANDARD:	EN 55022: 2006+A1: 2007, Class B
	EN 61000-3-2: 2006+A1: 2009+A2: 2009, Class A
	EN 61000-3-3: 2008
	EN 55024: 1998+A1: 2001+A2: 2003
	IEC 61000-4-2: 2008 ED. 2.0
	IEC 61000-4-3: 2006+A1: 2007 ED. 3.0
	IEC 61000-4-4: 2004+A1: 2010 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: TS-110) has been tested by Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

APPROVED BY	: David Liu / Senior Engineer	, DATE :	Dec. 22, 2010
PREPARED BY	Joanna Wang / Senior Specialist	, DATE :	Dec. 22, 2010
)		



2 SUMMARY OF TEST RESULTS

After estimating all the combination of every test mode, the result shown as below is the worst case.

The EUT has been tested according to the following specifications.

EMISSION				
Standard	Test Type	Result	Remarks	
	Conducted emission test	PASS	Meet the requirement of limit. Minimum passing margin is -5.43dB at 0.184MHz.	
EN 55022: 2006+A1: 2007, Class B	Conducted emission test at telecom port	PASS	Meet the requirement of limit. Minimum passing margin is -9.15dB at 0.173MHz.	
	Radiated emission test (30MHz~6GHz)	PASS	Meet the requirement of limit. Minimum passing margin is -2.56dB at 3000.00MHz.	
EN 61000-3-2: 2006+A1: 2009+A2: 2009, Class A	Harmonic current emission test	PASS	The power consumption of EUT is less than 75W and no limits apply.	
EN 61000-3-3: 2008	Voltage fluctuations & flicker tests	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 B	
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+A1: 2010 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 C 	

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:

Measurement	Frequency	Uncertainty
Conducted emission	150kHz ~ 30MHz	2.44dB
Conducted emission at telecom port	150kHz ~ 30MHz	2.69dB
	30MHz ~ 200MHz	3.69dB
Radiated emission	200MHz ~ 1000MHz	3.84dB
	1GHz ~ 6GHz	2.26dB

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



3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Network Attached Storage	
MODEL NO.	TS-110 (refer to NOTE 2 for more details)	
POWER SUPPLY	12Vdc from adapter	
DATA CABLE	NA	
ACCESSORY DEVICE	Adapter	

NOTE:

- 1. This is a duplicate report of CE980615L01A. The differences compared with original report are adding 14 models and updating standard to the latest version.
- 2. The models as below are identical to each other except for their model designation and memory capacity due to marketing purpose. (New models are marked in boldface)

MODEL	DESCRIPTION
Q600	
TS-109 V	
TS-110 Pro	
TS-110	
TS-110 Pro II	
TS-110 II	
TS-110 Pro-G	
TS-110-G	
TS-110 Pro II-G	
TS-110 II-G	
TS-110 Pro-M	
TS-119 V	
TS-110 M	Original models
VS-1204	
VS-1208	
VS-1212	
VS-1216	
NVR-1204	
NVR-1208	
NVR-1212	
NVR-1216	
NV-1204	
NV-1208	
NV-1212	
NV-1216	



MODEL	DESCRIPTION
TS-112	
TS-112P II	
TS-112P II+	
TS-112j	
TS-112j+	
TS-112J II	
TS-112j II+	New models have only half memory from
TS-112 Pro	original models.
TS-112 Pro+	
TS-112G	
TS-112G+	
TS-112G Pro	
TS-112G Pro+	
TS-112G Pro II	

3. The EUT uses following adapter.

BRAND	FSP GROUP INC.				
MODEL	FSP036-RAC				
INPUT POWER	100-240Vac, 50-60Hz, 1.5A				
OUTPUT POWER	12Vdc, 3A				
	AC 1.8m non-shielded cable without core				
POWER LINE	DC 1.5m non-shielded cable with one core				

4. The EUT's highest operating frequency is 1.2GHz.

5. The above EUT information is declared by 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 is designed with AC power supply of 100-240Vac, 50/60Hz. For EMI evaluation, 230Vac/50Hz (for EN 55022) & 120Vac/60Hz (for FCC Part 15) had been covered during the pre-test. The worst radiated emission data was found at **230Vac/50Hz** and recorded in the applied test report.

2 samples were pre-tested, and sample 2 was the worst case for final test.

The EUT was pre-tested under following modes, and test mode 2 was the worst case for final test.

Test Mode	Test Condition
1	LAN 1Gbps, 230Vac/50Hz
2	LAN 100Mbps, 230Vac/50 Hz
3	LAN 10Mbps, 230Vac/50 Hz
4	LAN 100Mbps, EUT horizontal, 230Vac/50 Hz
5	LAN 100Mbps, 120Vac/60Hz

3.3 GENERAL DESCRIPTION OF THE APPLIED STANDARD

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

EN 55022: 2006+A1: 2007, Class B EN 61000-3-2: 2006+A1: 2009+A2: 2009, Class A EN 61000-3-3: 2008 EN 55024: 1998+A1: 2001+A2: 2003 IEC 61000-4-2: 2008 ED. 2.0 IEC 61000-4-3: 2006+A1: 2007 ED. 3.0 IEC 61000-4-3: 2005 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.

For emission test

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	IPOD MINI	apple	A1051	YM5270HGS41	NA
2	IPOD MINI	apple	A1051	YM5270HGS41	NA
3	USB HDD	Terasys	F12-UF	A0100222-4860018	FCC DoC Approved
4	E-SATA HDD	HARD BOX	FHD-354US2	E80E027250070	NA
5	NOTEBOOK	DELL	D610	CRMTH1S	E2K5HCKT

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	1.5m shielded cable, terminated with USB connector, w/o core
2	1.5m shielded cable, terminated with USB connector, w/o core
3	1.5m shielded cable, terminated with USB connector, w/o core
4	1.0m e-SATA cable
5	10m shielded RJ45 cable

NOTE:

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

2. Item 5 acted as a communication partner to transfer data.



NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	USB HDD	HARD BOX	FHD-354US2	E80E027250074	NA
2	USB HDD	HARD BOX	FHD-354US2	E80E027250068	NA
3	USB HDD	Sarotech	FHD-354US	E80P048380919	NA
4	E-SATA HDD	Sarotech	FHD-354UA	E80L229180015	NA
5	PC	DELL	GX620	9C34M1S	FCC DoC Approved
6	LCD MONITOR	DELL	2407WFPb	CN-0YY528-4663 3-76I-1E7S	FCC DoC Approved
7	KEYBOARD	DELL	SK8115	CN-0J4635-71616 -53A-0CL5	FCC DoC Approved
8	MOUSE	Microsoft	ITE78CJ	NA	FCC DoC Approved

For harmonic, flicker & immunity test

	TC
SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNI	13

- 1 1.5m shielded cable, terminated with USB connector, w/o core
- 2 1.5m shielded cable, terminated with USB connector, w/o core
- 3 1.5m shielded cable, terminated with USB connector, w/o core
- 4 1.0m e-SATA cable
- 5 10m shielded RJ45 cable
- 6 1.8m braid shielded wire, D-SUB connector, with two cores
- 7 1.8m shielded cable, terminated with USB connector, w/o core
- 8 1.8m foil shielded wire, USB Connector, with core

NOTE:

NO.

- 1. All power cords of the above support units are non-shielded (1.8 m).
- 2. Items 5~8 acted as communication partners to transfer data.







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)		
Frequency (MHZ)	Quasi-peak Average		Quasi-peak	Average	
0.15-0.5	79	66	66-56	56-46	
0.5-5	73	60	56	46	
5-30	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.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCS30	100291	Nov. 19, 2008	Nov. 18, 2009
RF signal cable Woken	5D-FB	Cable-HYC01-01	Dec. 31, 2008	Dec. 30, 2009
LISN SCHWARZBECK	NNBL 8226-2	8226-142	Jun. 03, 2009	Jun. 02, 2010
LISN ROHDE & SCHWARZ	ESH2-Z5	100104	Dec. 04, 2008	Dec. 03, 2009
Software ADT	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 HwaYa Shielded Room 1.
- 3. The VCCI Site Registration No. is C-2040.



4.1.3 TEST PROCEDURE

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit 20dB) was not reported.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation.



4.1.5 TEST SETUP



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

4.1.6 EUT OPERATING CONDITIONS

- a. The notebook ran a test program to enable all functions.
- b. The notebook communicated data with the EUT, iPods and external HDDs



4.1.7 TEST RESULTS

INPUT POWER	230 Vac, 50 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	22 deg. C, 66% RH, 980 hPa	PHASE	Line 1
TESTED BY	Kevin Chen		

	Freq.	Corr.	Readin	g Value	Emis Le	ssion vel	Lii	nit	Mar	gin
No		Factor	[dB	(uV)]	[dB	(uV)]	[dB	(uV)]	(d	B)
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.154	0.13	59.56	44.33	59.69	44.46	65.79	55.79	-6.10	-11.33
2	0.162	0.13	56.20	39.34	56.33	39.47	65.38	55.38	-9.05	-15.91
3	0.232	0.13	53.57	41.80	53.70	41.93	62.38	52.38	-8.68	-10.45
4	0.283	0.13	50.22	36.17	50.35	36.30	60.73	50.73	-10.38	-14.43
5	0.435	0.14	42.38	24.53	42.52	24.67	57.15	47.15	-14.63	-22.48
6	0.638	0.14	40.08	21.41	40.22	21.55	56.00	46.00	-15.78	-24.45
7	1.035	0.15	36.10	15.34	36.25	15.49	56.00	46.00	-19.75	-30.51

REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

2. The emission levels of other frequencies were very low against the limit.

3. Margin value = Emission level - Limit value

4. Correction factor = Insertion loss + Cable loss

5. Emission Level = Correction Factor + Reading Value.





INPUT POWER	230 Vac, 50 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	22 deg. C, 66% RH, 980 hPa	PHASE	Line 2
TESTED BY	Kevin Chen		

	Freq.	Corr.	Readin	g Value	Emis Le	ssion vel	Lir	nit	Mar	gin
No		Factor	[dB	(uV)]	[dB	(uV)]	[dB	(uV)]	(d	B)
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.184	0.09	58.78	41.62	58.87	41.71	64.30	54.30	-5.43	-12.59
2	0.197	0.09	57.59	47.12	57.68	47.21	63.75	53.75	-6.07	-6.54
3	0.262	0.09	51.66	38.26	51.75	38.35	61.36	51.36	-9.61	-13.01
4	0.384	0.10	46.05	27.71	46.15	27.81	58.19	48.19	-12.04	-20.38
5	0.525	0.10	43.42	27.99	43.52	28.09	56.00	46.00	-12.48	-17.91
6	0.814	0.11	40.12	18.48	40.23	18.59	56.00	46.00	-15.77	-27.41
7	1.254	0.12	35.09	18.07	35.21	18.19	56.00	46.00	-20.79	-27.81

REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

- 2. The emission levels of other frequencies were very low against the limit.
 - 3. Margin value = Emission level Limit value
 - 4. Correction factor = Insertion loss + Cable loss
 - 5. Emission Level = Correction Factor + Reading Value.





4.2 CONDUCTED EMISSION MEASUREMENT AT TELECOMMUNICATION PORTS

4.2.1 LIMIT OF CONDUCTED COMMON MODE DISTURBANCE AT TELECOMMUNICATION PORTS

TEST STANDARD: EN 55022

For Class A Equipment

Frequency	Voltage Li	mit (dBuV)	Current Limit (dBuA)			
(MHz)	Quasi-peak	Average	Quasi-peak	Average		
0.15-0.5	97-87	84-74	53-43	40-30		
0.5-30	87	74	43	30		

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

For Class B Equipment

Frequency	Voltage Li	nit (dBuV)	Current Limit (dBuA)			
(MHz)	Quasi-peak	Average	Quasi-peak	Average		
0.15-0.5	84-74	74-64	40-30	30-20		
0.5-30	74	64	30	20		

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



4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCS30	100291	Nov. 19, 2008	Nov. 18, 2009
RF signal cable Woken	5D-FB	Cable-HYC01-01	Dec. 31, 2008	Dec. 30, 2009
LISN SCHWARZBECK	NNBL 8226-2	8226-142	Jun. 03, 2009	Jun. 02, 2010
LISN ROHDE & SCHWARZ	ESH2-Z5	100104	Dec. 04, 2008	Dec. 03, 2009
Software ADT	ADT_Cond_V7.3.7	NA	NA	NA
ISN	FCC-TLISN-T4-02	20161	Jun. 25, 2009	Jun. 24, 2010
ISN	FCC-TLISN-T2-02	20180	Jun. 25, 2009	Jun. 24, 2010
ISN	FCC-TLISN-T8-02	20181	Jun. 25, 2009	Jun. 24, 2010
COMMON MODE ISN	F-CMISN-CAT5	06001	Jan. 12, 2009	Jan. 11, 2010
Capacitive Voltage Probe	F-CVP-1	82	Jun. 17, 2009	Jun. 16, 2010
RF Current Probe	F-33-4	45	Sep. 15, 2008	Sep. 14, 2009
Coupling And Decoupling Network	CDN RJ45-S	07	Apr. 01, 2008	Mar. 31, 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 HwaYa Shielded Room 1.

3. The VCCI Site Registration No. is C-2040, T-308.



4.2.3 TEST PROCEDURE

For ISN:

- 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. 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.
- c. The disturbance levels and the frequencies of at least six highest disturbances were recorded from each telecommunication port, which comprises the EUT.

For Current Probe:

- a. Current probe shall be placed at 0.1 m from the ISN.
- b. Current at the measurement port of the ISN was detected, the reading was corrected by adding the current division factor of the current probe, 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.
- d. Break the insulation and connect a 150Ω resistor from the outside surface of the shield to ground and apply a clamp between 150Ω connection and associated equipment (For STP LAN only).

For Voltage Probe:

- 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. Voltage at the measurement port of the voltage probe was detected, the reading was corrected by adding the voltage division factor of the voltage probe, and was compared to the voltage 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







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

NOTE:

- 1. The methods of conformance testing were selected according to EN55022: 2006+A1: 2007, section: 9.6.1 of measurement method using an ISN with a longitudinal conversion loss (LCL) as defined in section: 9.6.2.
- 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.
- 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

Ethernet connection was better than 10% utilization by command TfGen.



4.2.7 TEST RESULTS

INPUT POWER	230 Vac, 50 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	24 deg. C, 66% RH, 1006 hPa	TEST MODE	Shielded RJ45 cable with ISN (10Mbps)
TESTED BY	Peter Lin		

	Freq.	Corr.	Rea Va	ding lue	Emis Lev	sion vel	Lin	nit	Mar	gin
No		Factor	[dB	(uV)]	[dB ((uV)]	[dB (uV)]	(dl	B)
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	A.V.	Q.P.	A.V.
1	0.189	9.78	61.32	-	71.10	-	82.08	72.08	-10.98	-
2	0.224	9.78	58.16	-	67.94	-	80.66	70.66	-12.72	-
3	0.255	9.77	56.09	-	65.86	-	79.58	69.58	-13.71	-
4	0.291	9.77	53.48	-	63.25	-	78.51	68.51	-15.26	-
5	0.334	9.76	51.00	-	60.76	-	77.36	67.36	-16.60	-
6	0.396	9.75	49.25	-	59.00	-	75.93	65.93	-16.93	-
7	0.443	9.75	48.11	-	57.86	-	75.01	65.01	-17.15	-
8	0.529	9.74	47.18	-	56.92	-	74.00	64.00	-17.08	-
9	0.576	9.75	46.08	-	55.83	-	74.00	64.00	-18.17	-
10	0.658	9.76	45.27	-	55.03	-	74.00	64.00	-18.97	-
11	10.000	9.93	33.53	-	43.46	-	74.00	64.00	-30.54	-

- **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. The emission levels of other frequencies were very low against the limit.
 - 3.
 - 4. Margin value = Emission level - Limit value

 - Correction factor = Insertion loss + Cable loss
 Emission Level = Correction Factor + Reading Value.





INPUT POWER	230 Vac, 50 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	24 deg. C, 66% RH, 1006 hPa	TEST MODE	Shielded RJ45 cable with ISN (100Mbps)
TESTED BY	Peter Lin		

	Freq.	Corr.	Rea Va	ding lue	Emis Lev	sion vel	Lin	nit	Mar	gin
No		Factor	[dB	(uV)]	[dB ((uV)]	[dB (uV)]	(d	B)
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	A.V.	Q.P.	A.V.
1	0.173	9.78	63.86	48.12	73.64	57.90	82.79	72.79	-9.15	-14.89
2	0.209	9.78	59.81	-	69.59	-	81.26	71.26	-11.67	-
3	0.244	9.77	57.30	-	67.07	-	79.97	69.97	-12.89	-
4	0.287	9.77	53.30	-	63.07	-	78.62	68.62	-15.55	-
5	0.345	9.76	50.46	-	60.22	-	77.07	67.07	-16.85	-
6	0.392	9.75	49.09	-	58.84	-	76.02	66.02	-17.17	-
7	0.431	9.75	48.07	-	57.82	-	75.23	65.23	-17.41	-
8	0.509	9.74	47.12	-	56.86	-	74.00	64.00	-17.14	-
9	0.556	9.75	46.23	-	55.98	-	74.00	64.00	-18.02	-
10	0.693	9.76	44.64	-	54.40	-	74.00	64.00	-19.60	-

REMARKS: 1.

Q.P. and AV. are abbreviations of quasi-peak and average individually.
 "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 The emission levels of other frequencies were very low against the limit.
 Margin value = Emission level - Limit value

- 5.
- Correction factor = Insertion loss + Cable loss Emission Level = Correction Factor + Reading Value. 6.





INPUT POWER	230 Vac, 50 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	24 deg. C, 66% RH, 1006 hPa	TEST MODE	Shielded RJ45 cable with ISN (1Gbps)
TESTED BY	Peter Lin		

	Freq.	Corr.	Rea Va	ding lue	Emis Le ^v	sion vel	Lin	nit	Mar	gin
No		Factor	[dB	(uV)]	[dB((uV)]	[dB (uV)]	(d	B)
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	A.V.	Q.P.	A.V.
1	0.150	9.78	64.82	43.52	74.60	53.30	84.00	74.00	-9.40	-20.70
2	0.162	9.78	64.10	44.83	73.88	54.61	83.38	73.38	-9.50	-18.77
3	0.197	9.78	60.24	-	70.02	-	81.74	71.74	-11.72	-
4	0.252	9.77	57.35	-	67.12	-	79.71	69.71	-12.58	-
5	0.310	9.77	52.24	-	62.01	-	77.97	67.97	-15.96	-
6	0.341	9.76	50.52	-	60.28	-	77.17	67.17	-16.89	-
7	0.384	9.76	48.78	-	58.54	-	76.18	66.18	-17.65	-
8	0.427	9.75	47.72	-	57.47	-	75.30	65.30	-17.83	-
9	0.474	9.74	46.87	-	56.61	-	74.44	64.44	-17.83	-
10	0.545	9.75	45.98	-	55.73	-	74.00	64.00	-18.27	-

REMARKS: 1.

Q.P. and AV. are abbreviations of quasi-peak and average individually.
 "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 The emission levels of other frequencies were very low against the limit.
 Margin value = Emission level - Limit value

- 5.
- Correction factor = Insertion loss + Cable loss Emission Level = Correction Factor + Reading Value. 6.





4.3 RADIATED EMISSION MEASUREMENT

4.3.1 LIMITS OF RADIATED EMISSION MEASUREMENT

TEST STANDARD: EN 55022

	Class A (at 10m)	Class B (at 10m)		
Frequency (MITZ)	Quasi-peak (dBuV/m)	Quasi-peak (dBuV/m)		
30-230	40	30		
230-1000	47	37		

	Class A	(at 3m)	Class B (at 3m)		
Frequency (MHz)	Peak (dBuV/m)	Average (dBuV/m)	Peak (dBuV/m)	Average (dBuV/m)	
1000-3000	76	56	70	50	
3000-6000	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 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.

FREQUENCY RANGE OF RADIATED MEASUREMENT

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



4.3.2 TEST INSTRUMENTS

For frequency below 1 GHz

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION	
Test Receiver ROHDE & SCHWARZ	ESIB7	100186	Dec. 05, 2008	Dec. 04, 2009	
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	Sep. 22, 2008	Sep. 21, 2009	
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100025	Oct. 22, 2008	Oct. 21, 2009	
BILOG Antenna SCHWARZBECK	VULB9168	9168-148	Apr. 28, 2009	Apr. 27, 2010	
BILOG Antenna SCHWARZBECK	VULB9168	9168-149	Apr. 28, 2009	Apr. 27, 2010	
Preamplifier Agilent	8447D	2944A10637	Dec. 04, 2008	Dec. 03, 2009	
Preamplifier Agilent	8447D	2944A10636	Dec. 04, 2008	Dec. 03, 2009	
RF signal cable Woken	8D-FB	Cable-Hych1-01	Oct. 28, 2008	Oct. 27, 2009	
RF signal cable Woken	8D-FB	Cable-Hych1-02	Oct. 28, 2008	Oct. 27, 2009	
Software ADT	ADT_Radiated_ V 7.7.03.6	NA	NA	NA	
Antenna Tower(V)	MFA-440	9707	NA	NA	
Antenna Tower(H)	MFA-440	970705	NA	NA	
Turn Table	DS430	50303	NA	NA	
Controller	MF7802	074	NA	NA	
Controller	MF7802	08093	NA	NA	
RF signal cable EAST COST Microwave	HP 160S-29	NA	Feb. 17, 2009	Feb. 16, 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 HwaYa Chamber 1.

3. The FCC Site Registration No. is 477732.

4. The IC Site Registration No. is IC 7450F-1.

5. The VCCI Site Registration No. is R-1893.



For frequency above 1 GHz

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESIB7	100188	Dec. 22, 2008	Dec. 21, 2009
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100025	Oct. 22, 2008	Oct. 21, 2009
BILOG Antenna SCHWARZBECK	VULB9168	9168-157	Apr. 28, 2009	Apr. 27, 2010
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-405	Jan. 12, 2009	Jan. 11, 2010
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170148	Jul. 06, 2009	Jul. 05, 2010
Preamplifier Agilent	8449B	3008A01961	Oct. 03, 2008	Oct. 02, 2009
Preamplifier Agilent	8447D	2944A10629	Oct. 23, 2008	Oct. 22, 2009
RF signal cable HUBER+SUHNER	SUCOFLEX 104	238141/4	May 13, 2009	May 12, 2010
RF signal cable HUBER+SUHNER	SUCOFLEX 104	12738/6	May 13, 2009	May 12, 2010
Software ADT.	ADT_Radiated_ V7.6.15.9.2	NA	NA	NA
Antenna Tower ADT.	AT100	AT93021702	NA	NA
Turn Table ADT.	TT100.	TT93021702	NA	NA
Controller ADT.	SC100.	SC93021702	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 HwaYa Chamber 2.

- 3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
- 4. The FCC Site Registration No. is 686814.
- 5. The IC Site Registration No. is IC 7450F-2.
- 6. The VCCI Site Registration No. is G-18.



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 semi-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation. The EUT was set 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. **<Frequency Range below 1GHz>**
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. <Frequency Range above 1GHz>
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the 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.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

NOTE:

- 1. The resolution bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
- 2. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3 MHz for Peak (PK) detection at frequency above 1 GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average (AV) detection at frequency above 1 GHz.
- 3. For measurement of frequency above 1000 MHz, the EUT was set 3 meters away from the receiver antenna.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation.



4.3.5 TEST SETUP





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

4.3.6 EUT OPERATING CONDITIONS

Same as item 4.1.6.



4.3.7 TEST RESULTS

ENVIRONMENTAL	25 deg. C, 66% RH,	FREQUENCY	30-1000 MHz
CONDITIONS	980 hPa	RANGE	
DETECTOR FUNCTION & BANDWIDTH	Quasi-Peak, 120 kHz	TESTED BY	Sam Chang

	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	374.07	31.87 QP	37.00	-5.13	2.50 H	105	15.12	16.75	
2	399.99	28.94 QP	37.00	-8.06	1.50 H	203	11.44	17.50	
3	480.15	30.40 QP	37.00	-6.60	2.50 H	299	11.25	19.14	
4	652.04	31.71 QP	37.00	-5.29	2.00 H	338	9.00	22.71	
5	699.92	25.56 QP	37.00	-11.44	1.50 H	16	2.16	23.40	
6	751.18	33.80 QP	37.00	-3.20	1.50 H	278	9.52	24.28	
7	799.98	33.26 QP	37.00	-3.74	1.50 H	355	8.23	25.03	
8	875.59	32.18 QP	37.00	-4.82	1.00 H	94	6.14	26.04	
9	961.12	31.40 QP	37.00	-5.60	1.50 H	181	4.67	26.74	
10	998.06	32.30 QP	37.00	-4.70	1.00 H	98	5.30	27.01	

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.



ENVIRONMENTAL	25 deg. C, 66% RH,	FREQUENCY	30-1000 MHz
CONDITIONS	980 hPa	RANGE	
DETECTOR FUNCTION & BANDWIDTH	Quasi-Peak, 120 kHz	TESTED BY	Sam Chang

	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	144.69	25.88 QP	30.00	-4.12	2.00 V	265	11.99	13.89	
2	400.00	33.11 QP	37.00	-3.89	1.00 V	137	15.01	18.10	
3	480.15	33.49 QP	37.00	-3.51	1.50 V	342	13.64	19.85	
4	500.00	24.06 QP	37.00	-12.94	3.98 V	289	3.73	20.33	
5	550.96	31.67 QP	37.00	-5.33	3.00 V	161	10.08	21.58	
6	720.08	31.60 QP	37.00	-5.40	2.00 V	119	7.18	24.43	
7	799.78	31.14 QP	37.00	-5.86	2.50 V	252	4.99	26.15	

REMARKS: 1

- 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.

INPUT POWER	230 Vac, 50 Hz	FREQUENCY RANGE	1-6 GHz
ENVIRONMENTAL CONDITIONS	23 deg. C, 67% RH, 1006 hPa	DETECTOR FUNCTION & BANDWIDTH	Peak/Average, 1 MHz
TESTED BY	Antony Li		

	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	1002.00	50.96 PK	70.00	-19.04	1.00 H	334	24.65	26.31	
2	1002.00	31.08 AV	50.00	-18.92	1.00 H	334	4.77	26.31	
3	2800.00	49.30 PK	70.00	-20.70	1.00 H	201	17.74	31.56	
4	2800.00	45.99 AV	50.00	-4.01	1.00 H	201	14.43	31.56	
5	3000.00	52.51 PK	70.00	-17.49	1.00 H	164	20.43	32.08	
6	3000.00	47.44 AV	50.00	-2.56	1.00 H	164	15.36	32.08	

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.



INPUT POWER	230 Vac, 50 Hz	FREQUENCY RANGE	1-6 GHz
ENVIRONMENTAL CONDITIONS	23 deg. C, 67% RH, 1006 hPa	DETECTOR FUNCTION & BANDWIDTH	Peak/Average, 1 MHz
TESTED BY	Antony Li		

	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	2800.00	49.42 PK	70.00	-20.58	1.00 V	199	17.86	31.56
2	2800.00	46.05 AV	50.00	-3.95	1.00 V	199	14.49	31.56
3	3000.00	52.45 PK	70.00	-17.55	1.00 V	154	20.37	32.08
4	3000.00	45.78 AV	50.00	-4.22	1.00 V	154	13.70	32.08

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	Max. permissible		
Order	harmonics current		
n	A		
Ode	d 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		
Eve	n harmonics		
2	1.08		
4	0.43		
6	0.30		
8<=n<=40	0.23x8/n		

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

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

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



4.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Schaffner AC Power Source	NSG1007	55616	Nov. 06, 2008	Nov. 05, 2009
Schaffner Signal Conditioning Unit- Lumped Impedance	CCN1000-1-LR1	72224	Nov. 06, 2008	Nov. 05, 2009
Software	Schaffner Win 2100V3	NA	NA	NA

NOTE: 1. The test was performed in Hwa Ya EMS Room.

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

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, personal computer monitors and TV 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 DEVIATION FROM TEST STANDARD

No deviation.

4.4.5 TEST SETUP



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

4.4.6 EUT OPERATING CONDITIONS

- a. The notebook ran a test program to enable all functions.
- b. The notebook communicated data with the EUT and external HDDs.



4.4.7 TEST RESULTS

FUNDAMENTAL VOLTAGE/AMPERE	230.14 Vrms 0.076 Amps	POWER FREQUENCY	50.00 Hz
RATED POWER CONSUMPTION	17.6 W	POWER FACTOR	0.369
ENVIRONMENTAL CONDITIONS	25 deg. C, 54% RH, 980 hPa	TESTED BY	Andy Chang

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

2. The EUT is not required to meet this test item as its power consumption is lower than 75W.



4.5 VOLTAGE FLUCTUATION AND FLICKS MEASUREMENT

4.5.1 LIMITS OF VOLTAGE FLUCTUATION AND FLICKS MEASUREMENT

TEST STANDARD: EN 61000-3-3

Test Item	Limit	Note	
Pst	1.0	Pst means short-term flicker indicator.	
Plt	0.65	Plt means long-term flicker indicator.	
Tdt (ms)	500	Tdt means maximum time that dt exceeds 3.3 %.	
dmax (%)	4%	dmax 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.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Schaffner AC Power Source	NSG1007	55616	Nov. 06, 2008	Nov. 05, 2009
Schaffner Signal Conditioning Unit- Lumped Impedance	CCN1000-1-LR1	72224	Nov. 06, 2008	Nov. 05, 2009
Software	Schaffner Win 2100V3	NA	NA	NA

NOTE: 1. The test was performed in Hwa Ya EMS Room.

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

4.5.3 TEST PROCEDURE

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



4.5.4 DEVIATION FROM TEST STANDARD

No deviation.

4.5.5 TEST SETUP



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

4.5.6 EUT OPERATING CONDITIONS

Same as item 4.4.6.



4.5.7 TEST RESULTS

FUNDAMENTAL	230.05 Vrms	POWER	50.00 Hz
VOLTAGE/AMPERE	0.076 Amps	FREQUENCY	
ENVIRONMENTAL	25 deg. C, 54% RH,	POWER	0.369
CONDITIONS	980 hPa	FACTOR	
OBSERVATION PERIOD (Tp)	10 mins	TESTED BY	Andy Chang

Test Parameter	Measurement Value	Limit	Remark
P _{st}	0.064	1.0	PASS
P _{lt}	0.028	0.65	PASS
T _{dt} (ms)	0	500	PASS
d _{max} (%)	0	4%	PASS
dc (%)	0.14	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	
	IEC 61000-4-2	Electrostatic Discharge – ESD: 8 kV air discharge, 4 kV contact discharge, Performance Criterion B
	IEC 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test – RS: 80-1000 MHz, 3 V/m, 80% AM (1 kHz), Performance Criterion A
	IEC 61000-4-4	Electrical Fast Transient/Burst - EFT AC power line: 1 kV, DC power line: 0.5 kV, Signal line: 0.5 kV Performance Criterion B
	IEC 61000-4-5	Surge Immunity Test: 1.2/50 us Open Circuit Voltage, 8/20 us Short Circuit Current
Basic Standard, specification requirement, and Performance Criteria		AC power line: line to line 1 kV, line to earth 2 kV, DC power line: line to earth 0.5 kV, Signal line: 1 kV
	IEC 61000-4-6	Performance Criterion B
	120 01000-4-0	Test – CS: 0.15-80 MHz, 3 Vrms, 80% AM, 1 kHz, Performance Criterion A
	IEC 61000-4-8	Power Frequency Magnetic Field Test, 50 Hz, 1 A/m, Performance Criterion A
	IEC 61000-4-11	 Voltage Dips: i) >95% reduction -0.5 period, Performance Criterion B ii) 30% reduction – 25 period, Performance Criterion C Voltage Interruptions: i) >95% reduction – 250 period,



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 PARTICULAR PERFORMANCE CRITERIA DESCRIPTION FOR READ, WRITE AND STORAGE OF DATA FUNCTION

Criterion A	Storage devices shall maintain normal operation both in read/write and in stand-by conditions.
Criterion B	Failures which can be recovered by read and write retries are permissible (temporary delay in processing caused by this process is acceptable).Normal operation of the EUT shall be restored after the test, self-recovery to the conditions immediately prior to the application of the test is accepted where this is a normal means of recovery. In these cases, operator response is permitted to re-initialise an operation.
Criterion C	Failures resulting in a delay in processing after the external disturbance is removed, but which can be recovered to normal operation by reset or reboot are permissible.Failures resulting in a system abort, which can be recovered to normal operation by reset or reboot are permissible.

5.4 EUT OPERATING CONDITION

Same as item 4.4.6.



5.5 ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD)

5.5.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-2
Discharge Impedance:	330 ohm / 150 pF
Discharge Voltage:	Air Discharge: 2, 4, 8 kV (Direct)
	Contact Discharge: 2, 4 kV (Direct / Indirect)
Polarity:	Positive & Negative
Number of Discharge:	Air Discharge: min. 20 times at each test point
	Contact Discharge: min. 50 times at each test point
Discharge Mode:	Single Discharge
Discharge Period:	1 second minimum

5.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Schaffner ESD generator	NSG 435	5976	Feb. 03, 2009	Feb. 02, 2010

NOTE: 1. The test was performed in Hwa Ya ESD Room No. 1.

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



5.5.3 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 horizontally at a distance of 0.1 meters from the EUT with the discharge electrode touching the HCP.
- h. At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the 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.



5.5.4 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:

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 940k Ω 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.



5.5.6 TEST RESULTS

INPUT POWER	230 Vac, 50 Hz	ENVIRONMENTAL CONDITIONS	25 deg. C, 45% RH 1006 hPa
TESTED BY	Andy Chang		

TEST RESULTS OF DIRECT APPLICATION					
Discharge Level (kV)	Polarity	Test Point	Contact Discharge	Air Discharge	Performance Criterion
2, 4	+/-	1	NOTE 1	NA	А
2, 4, 8	+/-	2, 4	NA	NOTE 1	А
2, 4	+/-	1, 3	NA	NOTE 1	А
8	+/-	1, 3	NA	NOTE 2	В

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

TEST RESULTS OF INDIRECT APPLICATION					
Discharge Level (kV)PolarityTest PointHorizontal Coupling PlaneVertical Coupling PlanePerformanc Criterion					Performance Criterion
2, 4	+/-	4 sides	NOTE 1	NOTE 1	А

Description of test point:

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

NOTE:

- 1. There was no change compared with initial operation during and after the test.
- 2. The LAN connection broke off during the test, but could self-recover to the initial operation after the test.







5.6 RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMNITY TEST (RS)

5.6.1 TEST SPECIFICATION

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

5.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Boonton RF Power Meter	4232A-01-02	104302	Nov. 03, 2008	Nov. 02, 2009
R&S Signal Generator	SML03	101499	Nov. 27, 2008	Nov. 26, 2009
LOG ANTENNA	AT5080ANT	303730	NA	NA
Amplifier	60S1G3M1	308049	NA	NA
Amplifier RF TEST SYSCTRLR	SC1000M1	308057	NA	NA
Amplifier	150W1000	322011	NA	NA
Amplifier	DC7144A	307880	NA	NA
POWER SENSOR	51011-EMC	30028	Nov. 03, 2008	Nov. 02, 2009
POWER SENSOR	51011-EMC	33029	Nov. 03, 2008	Nov. 02, 2009
Software	ADT_RS_V450	NA	NA	NA

NOTE: 1. The test was performed in Hwa Ya RS Room 1.

- 2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
- 3. The transmit antenna was located at a distance of 2.0 meters from the EUT. (For frequency range 80MHz ~ 1GHz).



5.6.3 TEST PROCEDURE

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

- a. The testing was performed in a fully-anechoic chamber.
- b. The frequency range is swept from 80 MHz to 1000 MHz, with the signal 80% amplitude modulated with a 1 kHz sinewave.
- c. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0.5s.
- d. The field strength level was 3 V/m.
- e. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

5.6.4 DEVIATION FROM TEST STANDARD

No deviation.



5.6.5 TEST SETUP



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

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.



5.6.6 TEST RESULTS

INPUT POWER	230 Vac, 50 Hz	ENVIRONMENTAL CONDITIONS	25 deg. C, 55% RH 1011 hPa
TESTED BY	Andy Chang		

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

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



5.7 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST (EFT)

5.7.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-4
Test Voltage:	Power line: 1 kV
	Signal line: 0.5 kV
Polarity:	Positive & Negative
Impulse Frequency:	5 kHz
Impulse Waveshape:	5/50 ns
Burst Duration:	15 ms
Burst Period:	300 ms
Test Duration:	1 min.

5.7.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
EMC-Partner EFT Generator	TRA2000EFT-C1	623	Sep. 16, 2008	Sep. 15, 2009
EMC-Partner Capacitive Coupling clamp	CN-EFT1000	364	NA	NA
EFT Adapter WONPRO	WA	EF1Ada-001	NA	NA
Software	EMC-Partner GENECS	NA	NA	NA

NOTE: 1. The test was performed in Hwa Ya EFT Room.

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

5.7.3 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 was 0.5 m.
- c. The duration time of each test sequential was 1 minute.
- d. The transient/burst waveform was in accordance with IEC 61000-4-4, 5/50ns.



5.7.4 DEVIATION FROM TEST STANDARD

No deviation.

5.7.5 TEST SETUP



NOTE:

/ length between clamp and the EUT to be tested (should be 0.5 m \pm 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 m \pm 0.01 m thick. A minimum distance of 0.5m was provided between the EUT and the walls of the laboratory or any other metallic structure.



5.7.6 TEST RESULTS

INPUT POWER	230 Vac, 50 Hz	ENVIRONMENTAL CONDITIONS	25 deg. C, 45% RH 1010 hPa
TESTED BY	Jn Chen		

Test Point	Polarity	Test Level (kV)	Observation	Performance Criterion
L1	+/-	1	NOTE	А
L2	+/-	1	NOTE	А
L1-L2	+/-	1	NOTE	A
LAN	+/-	0.5	NOTE	A

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



5.8 SURGE IMMUNITY TEST

5.8.1 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 port: 0.5, 1 kV				
Surge Input/Output:	L1-L2				
Generator Source Impedance:	2 ohm between networks				
Polarity:	Positive/Negative				
Phase Angle:	0°/90°/180°/270°				
Pulse Repetition Rate:	1 time / min				
Number of Tests:	5 positive and 5 negative at selected points				

5.8.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
EMC Immunity Tester	TRANSIENT 2000	622	Aug. 03, 2009	Aug. 02, 2010

NOTE: 1. The test was performed in Hwa Ya Surge Room.

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



5.8.3 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).

5.8.4 DEVIATION FROM TEST STANDARD

No deviation.



5.8.5 TEST SETUP



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



5.8.6 TEST RESULTS

INPUT POWER	230 Vac, 50 Hz	ENVIRONMENTAL CONDITIONS	25 deg. C, 52% RH 1003 hPa
TESTED BY	Eason Chang		

AC/DC power port

Voltage Test Boint		Polarity	Observation			Performance	
(kV)	lest Point	Polarity	0 °	90°	180°	270 °	Criterion
0.5, 1	L1-L2	+/-	NOTE	NOTE	NOTE	NOTE	А

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



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

5.9.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-6
Frequency Range:	0.15 MHz ~ 80 MHz
Field Strength:	3 V _{r.m.s.}
Modulation:	1 kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of preceding frequency value
Coupled Cable:	Power Mains, Unshielded
Coupling Device:	CDN-M2 (2 wires), CDN-T8

5.9.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
FCC POWER LINE COUPLING DECOUPLING NETWORK	M/N:FCC-801 -M1-25A	03030	Nov. 04, 2008	Nov. 03, 2009
FCC POWER LINE COUPLING DECOUPLING NETWORK	M/N:FCC-801 -M2-25A	03049	Nov. 04, 2008	Nov. 03, 2009
FCC POWER LINE COUPLING DECOUPLING NETWORK	M/N:FCC-801 -M2-25A	03050	Nov. 04, 2008	Nov. 03, 2009
FCC POWER LINE COUPLING DECOUPLING NETWORK	M/N:FCC-801 -M3-25A	03056	Nov. 04, 2008	Nov. 03, 2009
FCC POWER LINE COUPLING DECOUPLING NETWORK	M/N:FCC-801 -M3-25A	03057	Nov. 04, 2008	Nov. 03, 2009
FCC SIGNAL LINE POWER LINE COUPLING DECOUPLING NETWORK	P/N:FCC-801-T2	03030	Nov. 04, 2008	Nov. 03, 2009
FCC SIGNAL LINE POWER LINE COUPLING DECOUPLING NETWORK	P/N:FCC-801-T4	03031	Nov. 04, 2008	Nov. 03, 2009
FCC SIGNAL LINE POWER LINE COUPLING DECOUPLING NETWORK	P/N:FCC-801-T8	03032	Nov. 04, 2008	Nov. 03, 2009
EMI Injection Clamp	P/N:F-203I -23MM	434	Nov. 04, 2008	Nov. 03, 2009
BOONTON 4232ARF POWER METER	4232A-01-02	104302	Nov. 03, 2008	Nov. 02, 2009
R&S Signal generator	SML 03	102843	Sep. 02, 2008	Sep. 01, 2009
Software	ADT_CS_V37	NA	NA	NA

NOTE: 1. The test was performed in Hwa Ya CS Room.

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



5.9.3 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. Where the frequency is swept incrementally, the step size shall not exceed 1 % of the preceding frequency value.
- d. The dwell time of the amplitude modulated carrier at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0.5 s. The sensitive frequencies (e.g. clock frequencies) shall be analyzed separately.
- e. Attempts should be made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility.

5.9.4 DEVIATION FROM TEST STANDARD

No deviation.



5.9.5 TEST SETUP



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



5.9.6 TEST RESULTS

INPUT POWER	230 Vac, 50 Hz	ENVIRONMENTAL CONDITIONS	25 deg. C, 52% RH 1011 hPa
TESTED BY	Andy Chang		

Frequency Band (MHz)	Applied Voltage (Vrms)	Tested Line	Injection Method	Observation	Performance Criterion
0.15-80	3	Power line	CDN-M2	NOTE	А
0.15-80	3	LAN	CDN-T8	NOTE	А

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



5.10 POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST

5.10.1 TEST SPECIFICATION

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

5.10.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Schaffner Induction Coil Interface	INA2141	6015	NA	NA
Schaffner AC Power Source	NSG1007	55616	Nov. 06, 2008	Nov. 05, 2009
Schaffner INA702 Coil	INA702	111	NA	NA
Software	Schaffner Win 2120V3	NA	NA	NA

NOTE: 1. The test was performed in Hwa Ya EMS Room.

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

5.10.3 TEST PROCEDURE

- a. The equipment is configured and connected to satisfy its functional requirements.
- b. The power supply, input and output circuits shall be connected to the sources of power supply, control and signal.
- c. The cables supplied or recommended by the equipment manufacturer shall be used. 1 meter of all cables used shall be exposed to the magnetic field.

5.10.4 DEVIATION FROM TEST STANDARD

No deviation.



5.10.5 TEST SETUP



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

NOTE:

TABLETOP EQUIPMENT

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

FLOOR-STANDING EQUIPMENT

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



5.10.6 TEST RESULTS

INPUT POWER	230 Vac, 50 Hz	ENVIRONMENTAL CONDITIONS	25 deg. C, 54% RH, 1010 hPa
TESTED BY	Andy Chang		

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

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



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

5.11.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-11		
Test Duration Time:	Minimum 3 test events in sequence		
Interval between Event:	Minimum 10 seconds		
Phase Angle:	0°/180°		
Test Cycle:	3 times		

5.11.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Schaffner AC Power Source	NSG1007	55616	Nov. 06, 2008	Nov. 05, 2009
Schaffner Signal Conditioning Unit- Lumped Impedance	CCN1000-1-LR1	72224	Nov. 06, 2008	Nov. 05, 2009
Software	Schaffner Win 2100V3	NA	NA	NA

NOTE: 1. The test was performed in Hwa Ya EMS Room.

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

5.11.3 TEST PROCEDURE

The EUT shall be tested for each selected combination of test levels and duration with a sequence of 3 dips/interruptions with intervals of 20 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.

5.11.4 DEVIATION FROM TEST STANDARD

No deviation.


5.11.5 TEST SETUP



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



5.11.6 TEST RESULTS

INPUT POWER	100-240 Vac, 50 Hz	ENVIRONMENTAL CONDITIONS	25 deg. C, 54% RH 1010 hPa
TESTED BY	Andy Chang		

Ut: 230Vac, 50Hz				
Voltage Dips (Reduction %)	Duration (Period)	Total Events (time)	Observation	Performance Criterion
>95	0.5	3	NOTE 1	A
30	25	3	NOTE 1	А
>95	250	3	NOTE 2	С

Ut: 240Vac, 50Hz				
Voltage Dips (Reduction %)	Duration (Period)	Total Events (time)	Observation	Performance Criterion
>95	0.5	3	NOTE 1	А
30	25	3	NOTE 1	А
>95	250	3	NOTE 2	С

Ut: 100Vac, 50Hz					
Voltage Dips (Reduction %)	Duration (Period)	Total Events (time)	Observation	Performance Criterion	
>95	0.5	3	NOTE 1	А	
30	25	3	NOTE 1	А	
>95	250	3	NOTE 2	С	

NOTE:

There was no change compared with the initial operation during the test.
The EUT power off during the test, and must be recovered manually.



6 PHOTOGRAPHS OF THE TEST CONFIGURATION

Conducted Emission Test







Conducted Emission Test at Telecom Port









Radiated Emission Test (Frequency above 1GHz)







980615L01

Harmonics Emission Test & Voltage Fluctuation and Flicker Test

ESD Test







EFT Test









CS Test (LAN cable)



Magnetic Test





Voltage Dip and Interruption Test





7 PHOTOGRAPHS OF THE EQUIPMENT UNDER TEST











































8 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: <u>www.adt.com.tw/index.5/phtml</u>. If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab

Tel: 886-2-26052180 Fax: 886-2-26051924 Hsin Chu EMC/RF 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: <u>service@adt.com.tw</u> Web Site: <u>www.adt.com.tw</u>

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

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