



A D T

CE EMC TEST REPORT

REPORT NO. : CE131028E04

MODEL NO. : NP-L102W, NP-L102WG, NP-L102WJD, NP-L102W+

RECEIVED : Oct. 28, 2013

TESTED : Oct. 31 to Nov. 08, 2013

ISSUED : Nov. 18, 2013

APPLICANT : Coretronic Corp.

ADDRESS : No. 11, Li Hsing Rd, Science-Based Industrial Park,
Hsinchu, Taiwan.

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

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

TEST LOCATION (1): No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen,
Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan
R.O.C.

TEST LOCATION (2): No. 49, Ln. 206, Wende Rd., Shangshan Tsuen,
Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan
R.O.C.

This report should not be used by the client to claim
product certification, approval, or endorsement by
TAF or any government agencies.



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification

Table of Contents

RELEASE CONTROL RECORD	5
1 CERTIFICATION	6
2 SUMMARY OF TEST RESULTS	7
2.1 MEASUREMENT UNCERTAINTY	8
3 GENERAL INFORMATION	9
3.1 GENERAL DESCRIPTION OF EUT	9
3.2 GENERAL DESCRIPTION OF TEST MODE	11
3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS	12
3.4 DESCRIPTION OF SUPPORT UNITS	13
3.5 CONFIGURATION OF SYSTEM UNDER TEST	15
4 EMISSION TEST	18
4.1 CONDUCTED EMISSION MEASUREMENT	18
4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT	18
4.1.2 TEST INSTRUMENTS	18
4.1.3 TEST PROCEDURE	19
4.1.4 DEVIATION FROM TEST STANDARD	19
4.1.5 TEST SETUP	19
4.1.6 EUT OPERATING CONDITIONS	20
4.1.7 TEST RESULTS	21
4.2 RADIATED EMISSION MEASUREMENT	23
4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT	23
4.2.2 TEST INSTRUMENTS	24
4.2.3 TEST PROCEDURE	26
4.2.4 DEVIATION FROM TEST STANDARD	26
4.2.5 TEST SETUP	27
4.2.6 EUT OPERATING CONDITIONS	27
4.2.7 TEST RESULTS	28
4.3 HARMONICS CURRENT MEASUREMENT	32
4.3.1 LIMITS OF HARMONICS CURRENT MEASUREMENT	32
4.3.2 TEST INSTRUMENTS	33
4.3.3 TEST PROCEDURE	33
4.3.4 DEVIATION FROM TEST STANDARD	33
4.3.5 TEST SETUP	34
4.3.6 EUT OPERATING CONDITIONS	34
4.3.7 TEST RESULTS	35
4.4 VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT	36
4.4.1 LIMITS OF VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT	36
4.4.2 TEST INSTRUMENTS	36
4.4.3 TEST PROCEDURE	36
4.4.4 DEVIATION FROM TEST STANDARD	37
4.4.5 TEST SETUP	37
4.4.6 EUT OPERATING CONDITIONS	37
4.4.7 TEST RESULTS	38
5 IMMUNITY TEST	39
5.1 GENERAL DESCRIPTION	39
5.2 GENERAL PERFORMANCE CRITERIA DESCRIPTION	40



A D T

5.3	EUT OPERATING CONDITION	40
5.4	ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD).....	41
5.4.1	TEST SPECIFICATION	41
5.4.2	TEST INSTRUMENTS	41
5.4.3	TEST PROCEDURE	41
5.4.4	DEVIATION FROM TEST STANDARD	42
5.4.5	TEST SETUP	43
5.4.6	TEST RESULTS	44
5.5	RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY TEST (RS).....	48
5.5.1	TEST SPECIFICATION	48
5.5.2	TEST INSTRUMENTS	48
5.5.3	TEST PROCEDURE	49
5.5.4	DEVIATION FROM TEST STANDARD	49
5.5.5	TEST SETUP	49
5.5.6	TEST RESULTS	50
5.6	ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST (EFT)	51
5.6.1	TEST SPECIFICATION	51
5.6.2	TEST INSTRUMENTS	51
5.6.3	TEST PROCEDURE	51
5.6.4	DEVIATION FROM TEST STANDARD	52
5.6.5	TEST SETUP	52
5.6.6	TEST RESULTS	53
5.7	SURGE IMMUNITY TEST	54
5.7.1	TEST SPECIFICATION	54
5.7.2	TEST INSTRUMENTS	54
5.7.3	TEST PROCEDURE	55
5.7.4	DEVIATION FROM TEST STANDARD	55
5.7.5	TEST SETUP	56
5.7.6	TEST RESULTS	57
5.8	IMMUNITY TO CONDUCTED DISTURBANCES INDUCED BY RF FIELDS (CS).....	58
5.8.1	TEST SPECIFICATION	58
5.8.2	TEST INSTRUMENTS	58
5.8.3	TEST PROCEDURE	59
5.8.4	DEVIATION FROM TEST STANDARD	59
5.8.5	TEST SETUP	60
5.8.6	TEST RESULTS	61
5.9	POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST	62
5.9.1	TEST SPECIFICATION	62
5.9.2	TEST INSTRUMENTS	62
5.9.3	TEST PROCEDURE	62
5.9.4	DEVIATION FROM TEST STANDARD	62
5.9.5	TEST SETUP	63
5.9.6	TEST RESULTS	64
5.10	VOLTAGE DIP/SHORT INTERRUPTIONS (DIP) IMMUNITY TEST	65
5.10.1	TEST SPECIFICATION	65
5.10.2	TEST INSTRUMENTS	65



A D T

5.10.3	TEST PROCEDURE	65
5.10.4	DEVIATION FROM TEST STANDARD	66
5.10.5	TEST SETUP	66
5.10.6	TEST RESULTS	67
6	PHOTOGRAPHS OF THE TEST CONFIGURATION.....	68
7	INFORMATION ON THE TESTING LABORATORIES	75



A D T

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
CE131028E04	Original release	Nov. 18, 2013



A D T

1 CERTIFICATION

PRODUCT: DLP Projector
BRAND NAME: NEC
MODEL NO.: NP-L102W, NP-L102WG, NP-L102WJD, NP-L102W+
TEST SAMPLE: ENGINEERING SAMPLE
APPLICANT: Coretronic Corp.
TESTED: Oct. 31 to Nov. 08, 2013
STANDARDS: **EN 55022:2010+AC:2011, Class B**
AS/NZS CISPR 22: 2009+A1:2010, Class B
CISPR 22: 2008, Class B
EN 61000-3-2:2006+A1:2009+A2:2009, Class A
EN 61000-3-3:2008
EN 55024:2010
IEC 61000-4-2:2008 ED.2.0
IEC 61000-4-3:2010 ED.3.2
IEC 61000-4-4:2012 ED.3.0
IEC 61000-4-5:2005 ED.2.0
IEC 61000-4-6:2008 ED.3.0
IEC 61000-4-8:2009 ED.2.0
IEC 61000-4-11:2004 ED.2.0

The above equipment (Model: NP-L102W) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY :  , **DATE:** Nov. 18, 2013
(Elsie Hsu, Specialist)

APPROVED BY :  , **DATE:** Nov. 18, 2013
(Ken Lu, Manager)

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

EMISSION			
Standard	Test Type	Result	Remarks
EN 55022:2010+AC:2011, Class B	Conducted Test	PASS	Meets Class B Limit Minimum passing margin is -15.17 dB at 1.84722 MHz
	Telecom port conducted emission test	NA	Not Applicable
	Radiated Test	PASS	Meets Class B Limit Minimum passing margin is -5.70 dB at 138.20 MHz
EN 61000-3-2:2006 +A1:2009+A2:2009, Class A	Harmonic current emissions	PASS	Meets Class A Limit
EN 61000-3-3:2008	Voltage fluctuations & flicker	PASS	Meets the requirements.

IMMUNITY (EN 55024: 2010)			
Standard	Test Type	Result	Remarks
IEC 61000-4-2:2008 ED.2.0	Electrostatic discharge immunity test	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-3: 2010 ED.3.2	Radiated, radio-frequency, electromagnetic field immunity test	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-4: 2012 ED.3.0	Electrical fast transient / burst immunity test.	PASS	Meets the requirements of Performance Criterion 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 immunity tests	PASS	Meets the requirements of Voltage Dips: i) >95% reduction -0.5 period, Performance Criterion A ii) 30% reduction -25 periods, Performance Criterion A Voltage Interruptions: i) >95% reduction -250 periods, 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:

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

Measurement	Value
Conducted emissions	2.98 dB
Radiated emissions (30MHz-1GHz)	4.17 dB
Radiated emissions (1GHz-6GHz)	3.73 dB

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	DLP Projector
MODEL NO.	NP-L102W, NP-L102WG, NP-L102WJD, NP-L102W+
POWER SUPPLY	LVPS: Coretronic CT-P145
POWER CORD	AC Input cable (unshielded, 1.8m)
DATA CABLE	VGA cable(Shielded, 1.8m with 2 cores) x 1 HDMI (Shielded, 1.8m with 2 core) x 1 Video cable(Shielded, 1.8m) x 1 Audio cable(Shielded, 1.8m) x 2 Mini USB cable(Shielded, 1.8m with 2 core) x 1
ASSOCIATED DEVICES	Remote controller x 1 (Brand: NEC / Model: RD-459E)
MAX. CORE FREQUENCY	162 MHz (The highest frequency of the internal sources of the EUT is between 108 MHz and 500 MHz, the measurement shall only be made up to 2 GHz. But the applicant appoints the measurement shall be made up to 6 GHz.)

NOTE:

1. The EUT has four model names, which are identical to each other in all aspects except for the following information:

Brand	Model No.	Note	Different
NEC	NP-L102W	TI 0.45" WXGA	For marketing requirement
	NP-L102WG		
	NP-L102WJD		
	NP-L102W+		

From the above models, model: **NP-L102W** was selected as representative model for the test and its data was recorded in this report.

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

Pre-test Mode	Signal Input Type
Mode A	VGA1 1920*1080/60Hz
Mode B	HDMI 1920*1080/60Hz
Mode C	Mini USB
Mode D	CVBS
Mode E	SD Card Mode
Mode F	HDMI 1280*1024/60Hz
Mode G	HDMI 800*600/60Hz

For the above modes, "Mode B" was selected by client as representative test mode for the test and its data was recorded in this report.

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

3.2 GENERAL DESCRIPTION OF TEST MODE

1. The EUT is designed with AC power of 100-240V, 50/60Hz. For radiated evaluation (30-1000MHz), 230V/50Hz (for EN 55022) and 120V/ 60Hz (for FCC Part 15) had been covered during the pre-test. The worst emission was founded at 230V/50Hz and recorded in the applied test report.
2. The EUT is tested under following test mode:

Test Mode	Signal Input Type
Mode 1	HDMI 1920*1080/60Hz

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

EN 55022:2010+AC:2011, Class B

AS/NZS CISPR 22: 2009+A1:2010, Class B

CISPR 22: 2008, Class B

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

EN 61000-3-3:2008

EN 55024:2010

IEC 61000-4-2:2008 ED.2.0

IEC 61000-4-3:2010 ED.3.2

IEC 61000-4-4:2012 ED.3.0

IEC 61000-4-5:2005 ED.2.0

IEC 61000-4-6:2008 ED.3.0

IEC 61000-4-8:2009 ED.2.0

IEC 61000-4-11:2004 ED.2.0

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

3.4 DESCRIPTION OF SUPPORT UNITS

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

For conducted emission and radiated emission test						
No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
A	EUT	NEC	P1283	NA	FCC DoC	-
B	PC	DELL	DCSCMF	BKKB32S	FCC DoC	Provided by Lab
C	KEYBOARD	DELL	SK-8115	MY-0DJ325-71619-99 B-0476	FCC DoC	Provided by Lab
D	MOUSE	DELL	MOC5UO	I1401LVG	FCC DoC	Provided by Lab
E	PRINTER	EPSON	LQ-300+II	G88Y074083	FCC DoC	Provided by Lab
F	DVD	Pioneer	DV-600AV-S	HCKD011979LS	FCC DoC	Provided by Lab
G	REMOTE CONTROLLER	NEC	RD-459E	NA	NA	Supplied by Client
H	iPod shuffle	Apple	MD778TA/A	CC4JMA9KF4T1	NA	Provided by Lab
I	MODEM	ACEEX	1414	0206026778	IFAXDM1414	Provided by Lab
J	SPEAKERS	J-S	JY2003	090404619	FCC DoC	Provided by Lab

NOTE:

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

For conducted emission and radiated emission test						
No.	Cable	Qty.	Length (m)	Shielded (Yes/ No)	Cores (Number)	Remark
1	Mini USB	1	1.8	Y	2	Supplied by Client
2	VGA	1	1.8	Y	2	Supplied by Client
3	Audio	1	1.8	Y	0	Supplied by Client
4	RS232	1	1	Y	0	Provided by Lab
5	USB	1	1.8	Y	1	Provided by Lab
6	USB	1	1.8	Y	0	Provided by Lab
7	USB	1	1.8	Y	0	Provided by Lab
8	HDMI	1	1.8	Y	0	Supplied by Client
9	Video	1	1.8	Y	0	Supplied by Client
10	USB	1	0.1	Y	0	Provided by Lab
11	Audio	1	1.2	Y	0	Provided by Lab
12	AC	1	1.8	N	0	Supplied by Client

NOTE:

1. The core(s) is(are) originally attached to the cable(s).



A D T

For Harmonics Current / Voltage Fluctuation and Flicker / Immunity test						
No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
A	EUT	NEC	P1283	NA	FCC DoC	-
B	PC	DELL	DCSCMF	BKKB32S	FCC DoC	Provided by Lab
C	KEYBOARD	DELL	SK-8115	MY-0DJ325-71619-99 B-0476	FCC DoC	Provided by Lab
D	MOUSE	DELL	MOC5UO	I1401LVG	FCC DoC	Provided by Lab
E	DVD	Pioneer	DV-600AV-S	HCKD011979LS	FCC DoC	Provided by Lab
F	REMOTE CONTROLLER	NEC	RD-459E	NA	NA	Supplied by Client
G	USB HDD	Transcend	TS4GJF300	A59064 0004	FCC DoC	Provided by Lab
H	Speaker	Lenovo	LXB-J203A	NA	NA	Provided by Lab
I	SD Card	NA	NA	NA	NA	Provided by Lab

NOTE:

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

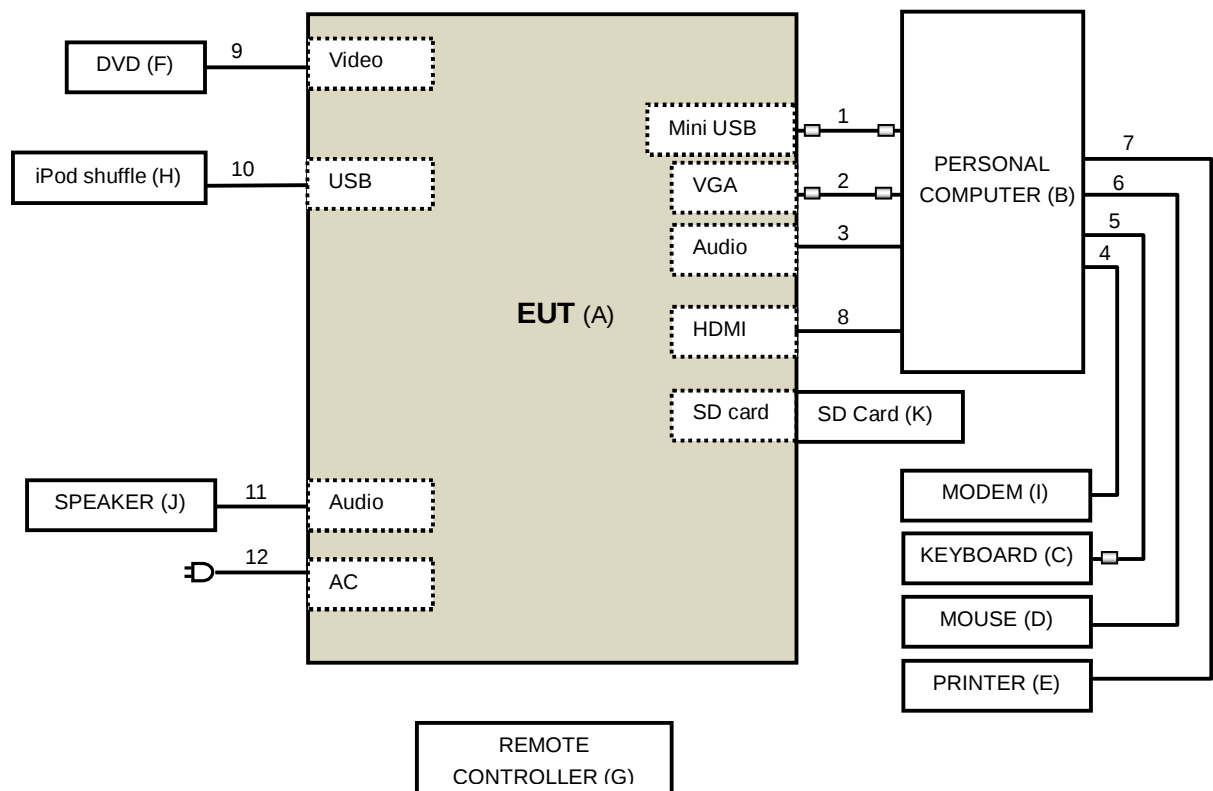
For Harmonics Current / Voltage Fluctuation and Flicker / Immunity test						
No.	Cable	Qty.	Length (m)	Shielded (Yes/ No)	Cores (Number)	Remark
1	Mini USB	1	1.8	Y	2	Supplied by client
2	VGA	1	1.8	Y	2	Supplied by client
3	Audio	1	1.8	Y	0	Supplied by client
4	Audio	1	1.2	Y	0	Provided by Lab
5	USB	1	1.8	Y	1	Provided by Lab
6	USB	1	1.8	Y	0	Provided by Lab
7	AC	1	1.8	No	0	Supplied by client
8	HDMI	1	1.8	Y	0	Supplied by client
9	Video	1	1.8	Y	0	Supplied by client
10	USB	1	0.1	Y	0	Provided by Lab

NOTE:

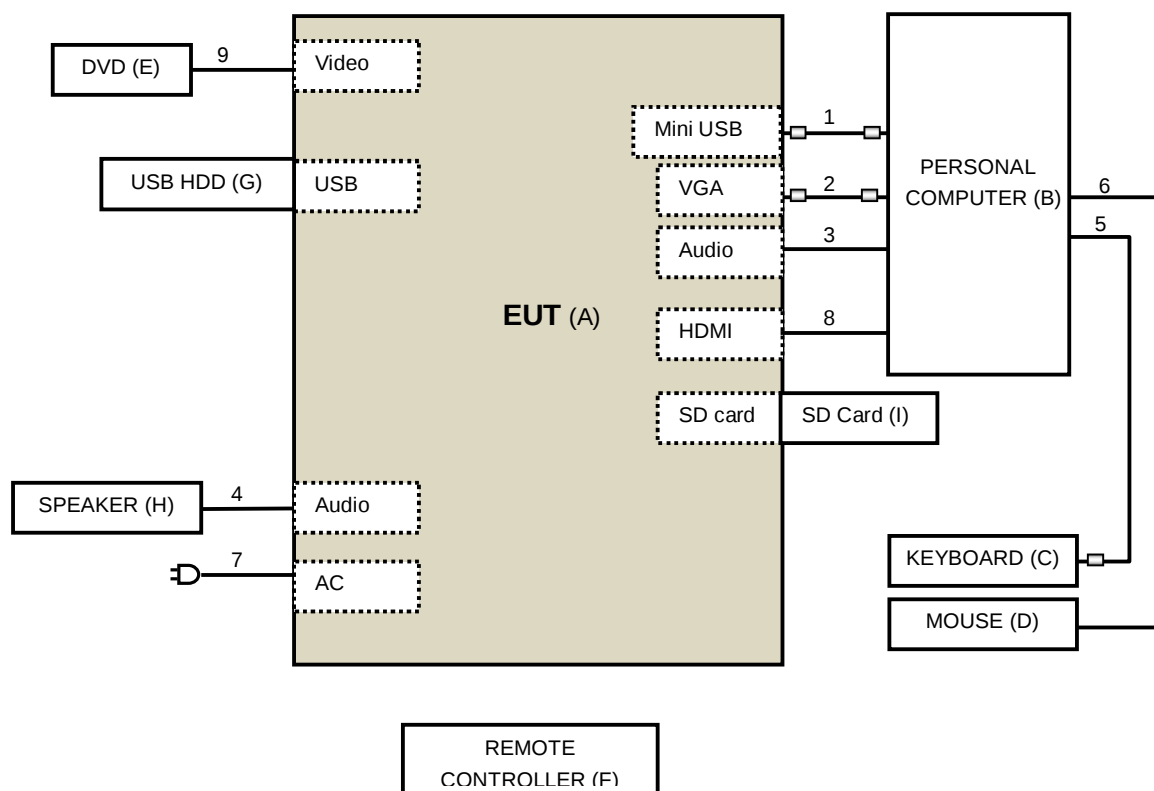
1. The core(s) is(are) originally attached to the cable(s).

3.5 CONFIGURATION OF SYSTEM UNDER TEST

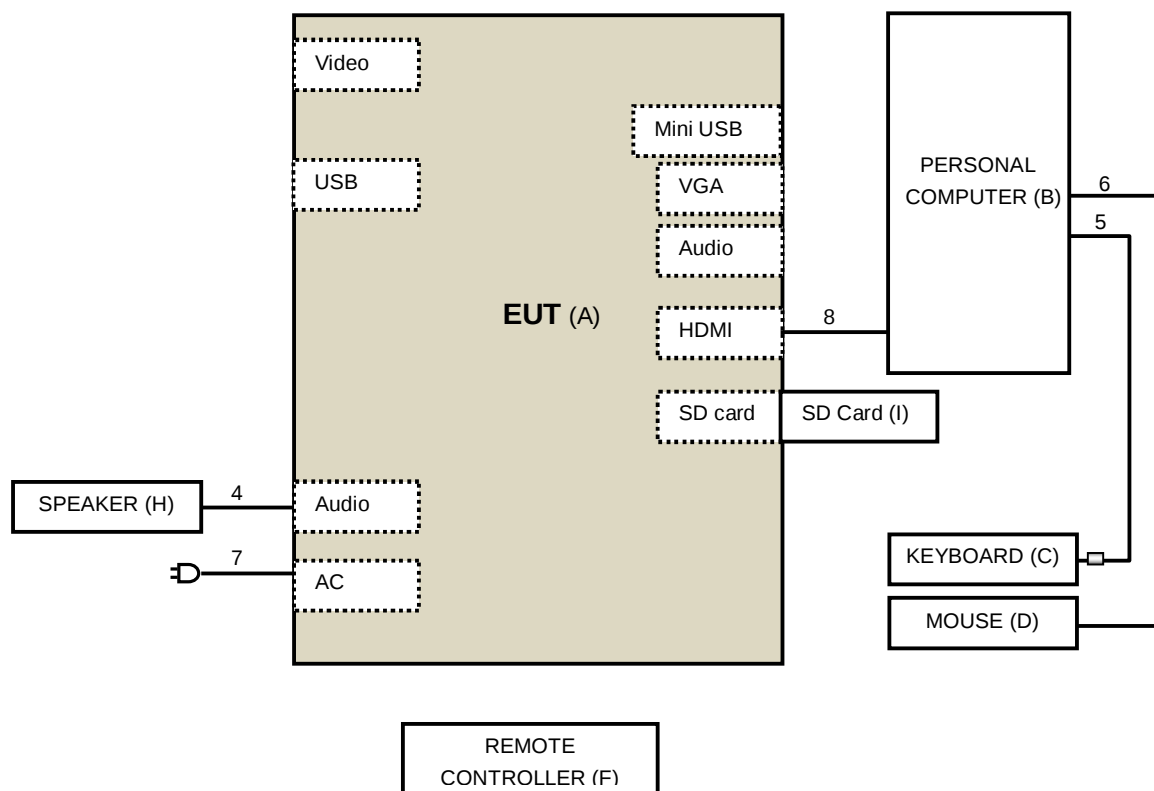
For Conducted / Radiated test



For Immunity (only ESD & RS) test:



For Harmonics Current / Voltage fluctuation and flicker / Immunity (Except for ESD & RS) test:



4 EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

TEST STANDARD: EN 55022

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

- NOTE:** (1) The lower limit shall apply at the transition frequencies.
 (2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS 30	100375	Mar. 08, 2013	Mar. 07, 2014
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK8127	8127-522	Sep. 05, 2013	Sep. 04, 2014
Line-Impedance Stabilization Network (for Peripheral)	ENV216	100072	June 06, 2013	June 05, 2014
RF Cable (JYEBAO)	5DFB	COCCAB-001	Mar. 11, 2013	Mar. 10, 2014
50 ohms Terminator	50	EMC-03	Sep. 24, 2013	Sep. 23, 2014
Software ADT	BV ADT_Cond_V7.3.7. 3	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. C.
3. The VCCI Con C Registration No. is C-3611.
4. Tested Date: Oct. 31, 2013

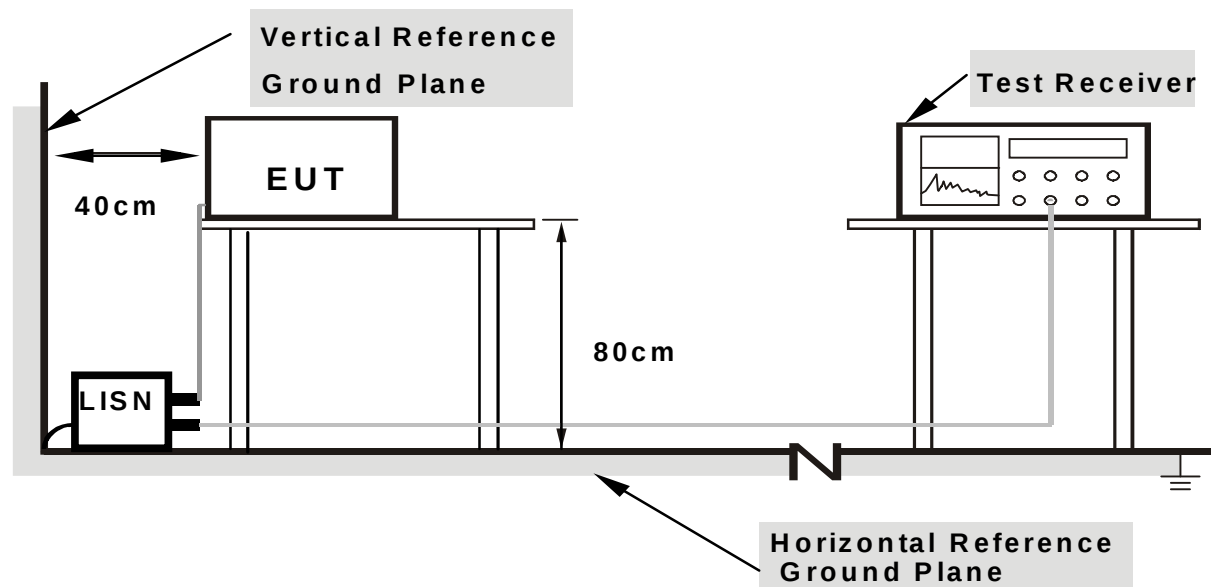
4.1.3 TEST PROCEDURE

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

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



Note: 1.Support units were connected to second LISN.

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. PC (support unit B) sends "H" pattern messages to EUT. These messages are projected on the wall
3. PC (support unit B) sends audio messages to speaker (support unit J) via EUT.

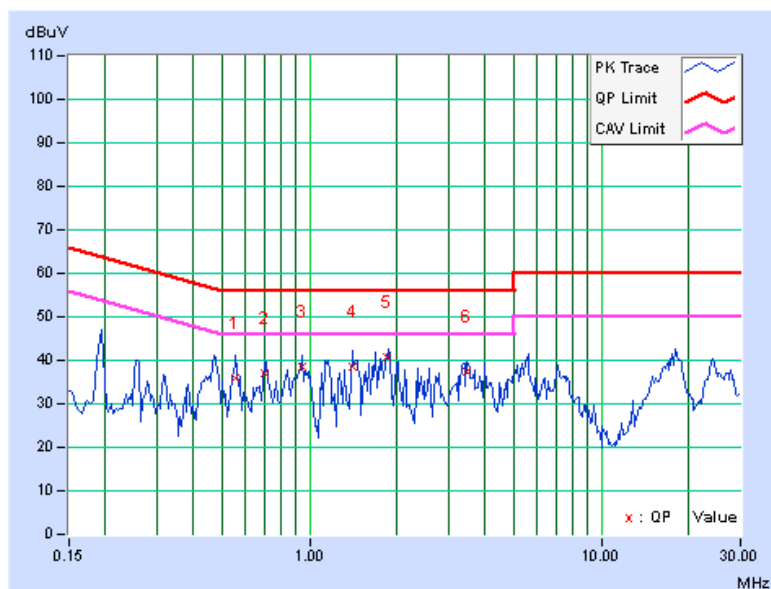
4.1.7 TEST RESULTS

TEST MODE	Mode 1	PHASE	Line (L)
INPUT POWER	230Vac, 50Hz	DETECTOR FUNCTION & BANDWIDTH	Quasi-Peak (QP) / Average (AV), 9 kHz
ENVIRONMENTAL CONDITIONS	26 deg. C, 57 % RH	TESTED BY	Sean Huang

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.56016	0.15	35.85	18.27	36.00	18.42	56.00	46.00	-20.00	-27.58
2	0.70469	0.16	36.93	27.56	37.09	27.72	56.00	46.00	-18.91	-18.28
3	0.94297	0.17	38.46	24.99	38.63	25.16	56.00	46.00	-17.37	-20.84
4	1.40625	0.19	38.43	27.51	38.62	27.70	56.00	46.00	-17.38	-18.30
5	1.84722	0.20	40.63	29.11	40.83	29.31	56.00	46.00	-15.17	-16.69
6	3.47656	0.26	37.13	24.70	37.39	24.96	56.00	46.00	-18.61	-21.04

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission Level – Limit value
4. Correction Factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

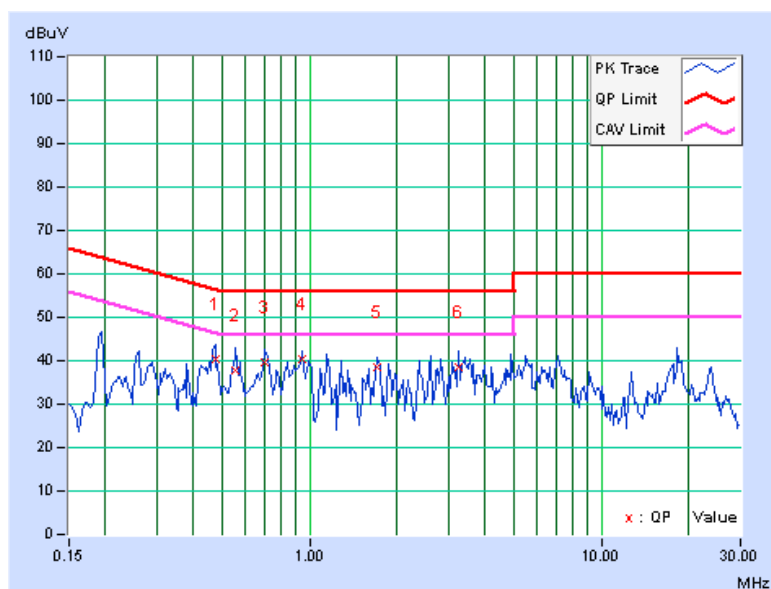


TEST MODE	Mode 1	PHASE	Neutral (N)
INPUT POWER	230Vac, 50Hz	DETECTOR FUNCTION & BANDWIDTH	Quasi-Peak (QP) / Average (AV), 9 kHz
ENVIRONMENTAL CONDITIONS	26 deg. C, 57 % RH	TESTED BY	Sean Huang

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.47422	0.14	40.22	26.61	40.36	26.75	56.44	46.44	-16.08	-19.69
2	0.56016	0.15	37.45	23.78	37.60	23.93	56.00	46.00	-18.40	-22.07
3	0.70469	0.16	39.34	29.92	39.50	30.08	56.00	46.00	-16.50	-15.92
4	0.93906	0.17	40.07	26.60	40.24	26.77	56.00	46.00	-15.76	-19.23
5	1.70313	0.21	38.48	25.92	38.69	26.13	56.00	46.00	-17.31	-19.87
6	3.26172	0.26	38.39	26.15	38.65	26.41	56.00	46.00	-17.35	-19.59

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 RADIATED EMISSION MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

TEST STANDARD: EN 55022

FOR FREQUENCY BELOW 1000 MHz

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

FOR FREQUENCY ABOVE 1000 MHz

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

NOTE:

- (1) The lower limit shall apply at the transition frequencies.
- (2) Emission level (dBuV/m) = 20 log Emission level (uV/m).
- (3) All emanation from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

FREQUENCY RANGE OF RADIATED MEASUREMENT (FOR UNINTENTIONAL RADIATORS)

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

**A D T**

4.2.2 TEST INSTRUMENTS

For below 1GHz

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATE D DATE	CALIBRATED UNTIL
Spectrum Analyzer Agilent	E9038A	MY50010125	Feb. 01, 2013	Jan. 31, 2014
	E9038A	MY50010132	Dec. 27, 2012	Dec. 26, 2013
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-01	Nov. 14, 2012	Nov. 13, 2013
	ZFL-1000VH2B	AMP-ZFL-02	Nov. 14, 2012	Nov. 13, 2013
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-359	Mar. 22, 2013	Mar. 21, 2014
	VULB 9168	9168-358	Mar. 20, 2013	Mar. 19, 2014
RF Cable	8DFB	CHFCAB-001 CHFCAB-002 CHFCAB-003	Oct. 04, 2013	Oct. 03, 2014
Pre-Amplifier Agilent	8449B	3008A01975	Mar. 02, 2013	Mar. 01, 2014
Horn Antenna SCHWARZBECK	BBHA9120-D	9120D-406	May 07, 2013	May 06, 2014
RF Cable	NA	RF104-110 RF104-206 RF104-209	Dec. 21, 2012	Dec.20, 2013
Spectrum Analyzer Agilent	E4446A	MY48250253	Aug. 28, 2013	Aug. 27, 2014
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 14, 2012	Nov. 13, 2013
Horn Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 08, 2013	Oct. 07, 2014
Software	ADT_Radiated_ V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	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 10m Chamber No. F.
- 3 The FCC Site Registration No. is 928149.
4. The VCCI Site Registration No. is R-3252 & G-136.
- 5 The CANADA Site Registration No. is IC 7450H-1.
- 6 Tested Date: Nov. 05, 2013



A D T

For above 1GHz

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY51210105	Jan. 29, 2013	Jan. 28, 2014
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-03	Nov. 14, 2012	Nov. 13, 2013
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Mar. 19, 2013	Mar. 18, 2014
RF Cable	NA	CHGCAB_001	Oct. 05, 2013	Oct. 04, 2014
Horn_Antenna AISI	AIH.8018	0000320091110	Nov. 19, 2012	Nov. 18, 2013
Pre-Amplifier Agilent	8449B	3008A02578	June 25, 2013	June 24, 2014
RF Cable	NA	RF104-201 RF104-203 RF104-204	Dec. 25, 2012	Dec. 24, 2013
Spectrum Analyzer Agilent	E4446A	MY48250253	Aug. 28, 2013	Aug. 27, 2014
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 14, 2012	Nov. 13, 2013
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 08, 2013	Oct. 07, 2014
Software	ADT_Radiated _V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	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 horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
- 3 The test was performed in 966 Chamber No. G.
4. The FCC Site Registration No. is 966073.
- 5 The VCCI Site Registration No. is G-137.
- 6 The CANADA Site Registration No. is IC 7450H-2.
- 7 The 3dB beamwidth of the horn antenna is minimum 30 degree (or w = 1.6m at 3m distance) for 1~6 GHz.
- 8 Tested Date: Oct. 31, 2013

4.2.3 TEST PROCEDURE

For Below 1GHz test:

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

NOTE:

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

For Above 1GHz test:

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at an accredited test facility. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna can be varied from one meter to four meters, the height of adjustment depends on the EUT height and the antenna 3dB beamwidth both, detect the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

NOTE:

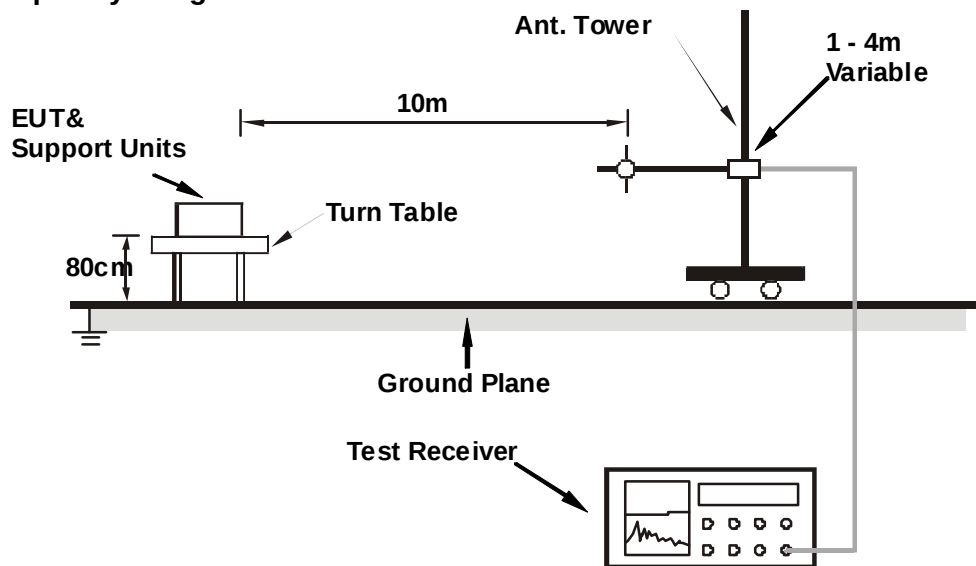
1. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.

4.2.4 DEVIATION FROM TEST STANDARD

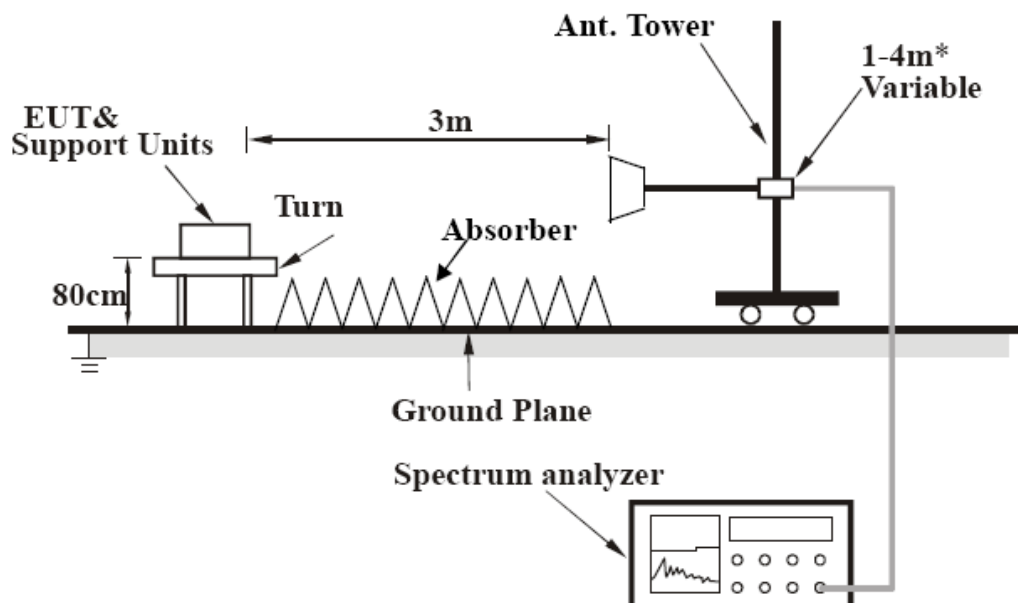
No deviation

4.2.5 TEST SETUP

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



* : depends on the EUT height and the antenna 3dB beamwidth both.

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

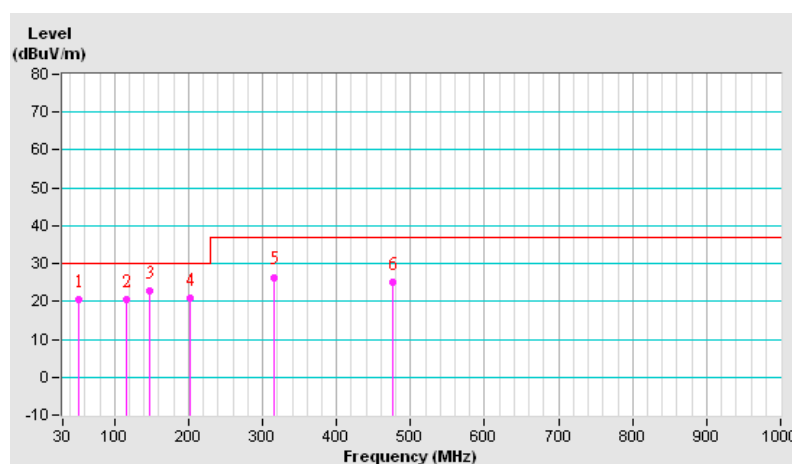
4.2.7 TEST RESULTS

TEST MODE	Mode 1	FREQUENCY RANGE	30-1000 MHz
DETECTOR FUNCTION & BANDWIDTH	Quasi-Peak, 120kHz	ENVIRONMENTAL CONDITIONS	23 deg. C, 67 % RH
TESTED BY	Gavin Peng		

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	51.83	20.43 QP	30.00	-9.57	3.50 H	210	32.24	-11.81
2	116.96	20.56 QP	30.00	-9.44	4.00 H	145	34.43	-13.87
3	147.95	22.71 QP	30.00	-7.29	4.00 H	114	35.08	-12.37
4	202.71	20.82 QP	30.00	-9.18	3.00 H	70	36.14	-15.32
5	314.84	26.41 QP	37.00	-10.59	3.00 H	117	37.12	-10.71
6	476.10	24.97 QP	37.00	-12.03	2.00 H	192	31.23	-6.26

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)
– Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value



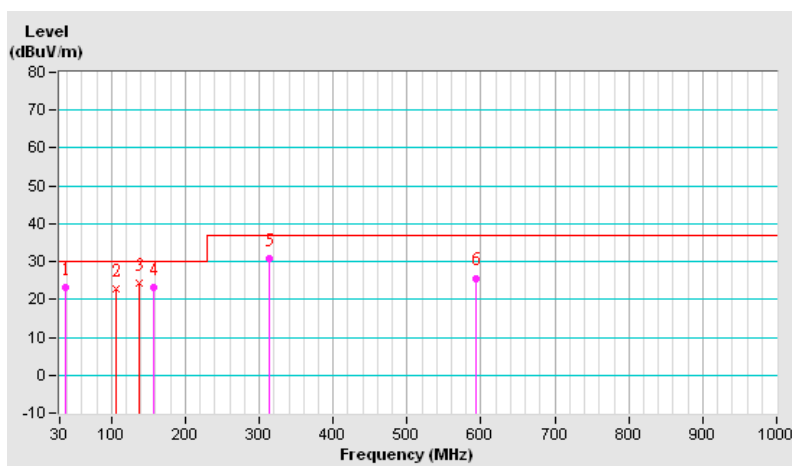
TEST MODE	Mode 1	FREQUENCY RANGE	30-1000 MHz
DETECTOR FUNCTION & BANDWIDTH	Quasi-Peak, 120kHz	ENVIRONMENTAL CONDITIONS	23 deg. C, 67 % RH
TESTED BY	Gavin Peng		

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	37.32	23.09 QP	30.00	-6.91	1.00 V	92	36.29	-13.20
2	106.34	22.79 QP	30.00	-7.21	2.50 V	70	38.98	-16.19
3	138.20	24.30 QP	30.00	-5.70	1.50 V	331	37.41	-13.11
4	157.65	23.19 QP	30.00	-6.81	1.50 V	266	35.80	-12.61
5	313.00	30.71 QP	37.00	-6.29	1.00 V	233	41.63	-10.92
6	594.01	25.66 QP	37.00	-11.34	3.00 V	96	29.55	-3.89

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)
– Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value



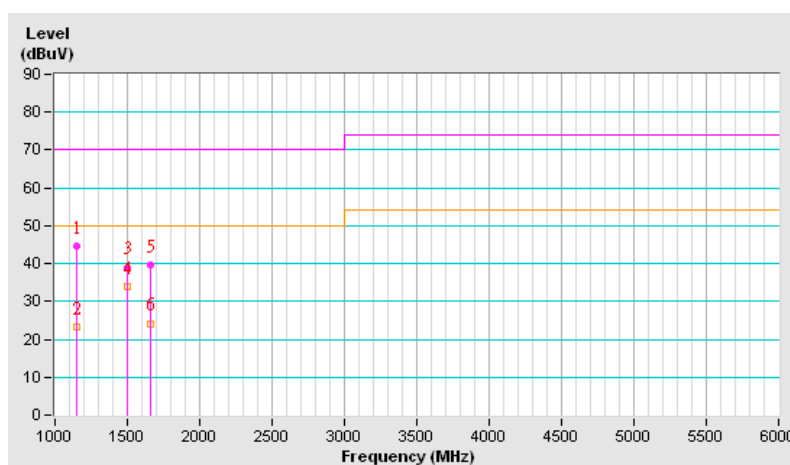
TEST MODE	Mode 1	FREQUENCY RANGE	1000-6000 MHz
DETECTOR FUNCTION & BANDWIDTH	Peak (PK) / Average (AV), 1MHz	ENVIRONMENTAL CONDITIONS	23 deg. C, 66 % RH
TESTED BY	Anderson Chen		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1145.00	44.44 PK	70.00	-25.56	1.00 H	315	50.52	-6.08
2	1145.00	23.37 AV	50.00	-26.63	1.00 H	315	29.45	-6.08
3	1500.00	39.06 PK	70.00	-30.94	1.00 H	3	43.32	-4.26
4	1500.00	33.77 AV	50.00	-16.23	1.00 H	3	38.03	-4.26
5	1660.25	39.69 PK	70.00	-30.31	1.00 H	317	43.19	-3.50
6	1660.25	24.18 AV	50.00	-25.82	1.00 H	317	27.68	-3.50

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value





A D T

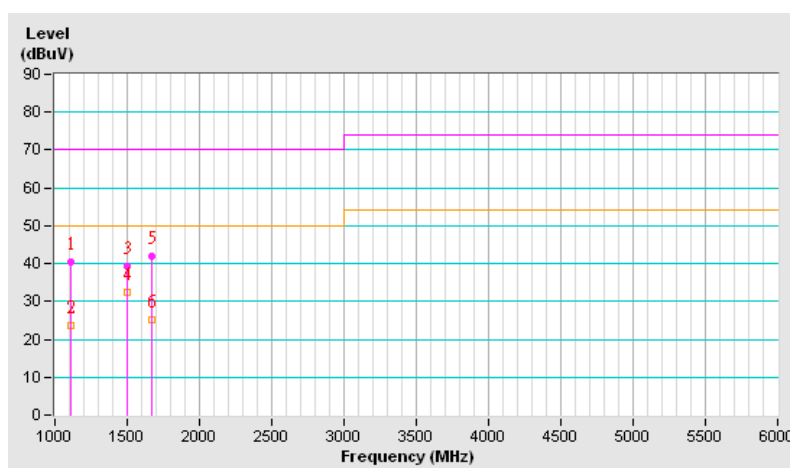
TEST MODE	Mode 1	FREQUENCY RANGE	1000-6000 MHz
DETECTOR FUNCTION & BANDWIDTH	Peak (PK) / Average (AV), 1MHz	ENVIRONMENTAL CONDITIONS	23 deg. C, 66 % RH
TESTED BY	Anderson Chen		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1109.75	40.37 PK	70.00	-29.63	1.00 V	172	46.70	-6.33
2	1109.75	23.49 AV	50.00	-26.51	1.00 V	172	29.82	-6.33
3	1500.00	39.29 PK	70.00	-30.71	1.00 V	174	43.55	-4.26
4	1500.00	32.33 AV	50.00	-17.67	1.00 V	174	36.59	-4.26
5	1666.00	41.99 PK	70.00	-28.01	1.00 V	83	45.46	-3.47
6	1666.00	25.04 AV	50.00	-24.96	1.00 V	83	28.51	-3.47

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)
– Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value



4.3 HARMONICS CURRENT MEASUREMENT

4.3.1 LIMITS OF HARMONICS CURRENT MEASUREMENT

TEST STANDARD: EN 61000-3-2

Limits for Class A equipment		Limits for Class D equipment		
Harmonic Order n	Max. permissible harmonics current A	Harmonic Order n	Max. permissible harmonics current per watt mAW	Max. permissible harmonics current A
Odd harmonics		Odd Harmonics only		
3	2.30	3	3.4	2.30
5	1.14	5	1.9	1.14
7	0.77	7	1.0	0.77
9	0.40	9	0.5	0.40
11	0.33	11	0.35	0.33
13	0.21	13	0.30	0.21
15≤n≤39	0.15x15/n	15≤n≤39	3.85/n	0.15x15/n
Even harmonics				
2	1.08			
4	0.43			
6	0.30			
8≤n≤40	0.23x8/n			

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

♦ Limits for Class B equipment:

For class B equipment, the harmonics of the input current shall not exceed the maximum permissible values given for class A equipment multiplied by a factor of 1.5.

Limits for Class C equipment	
Harmonic Order n	Max. permissible harmonics current expressed as a percentage of the input current at the fundamental frequency %
2	2
3	30 · λ [*]
5	10
7	7
9	5
11≤n≤39 (odd harmonics only)	3

^{*} λ is the circuit power factor

NOTE: Discharge lighting equipment having an active input power smaller than or equal to 25W, the harmonic currents shall not exceed the power related limits of Class D.

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
EMC Emission Tester EMC PARTNER	1000-1P	086	Jan. 28, 2013	Jan. 27, 2014
EMC Partner(Software)	HARCS_V4.18	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in EMS A room.
- 3 Tested Date: Nov. 07, 2013

4.3.3 TEST PROCEDURE

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

The EUT is classified as follows:

Class A: Balanced three-phase equipment, Household appliances excluding equipment as Class D, Tools excluding portable tools, Dimmers for incandescent lamps, audio equipment, equipment not specified in one of the three other classes.

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

Class C: Lighting equipment.

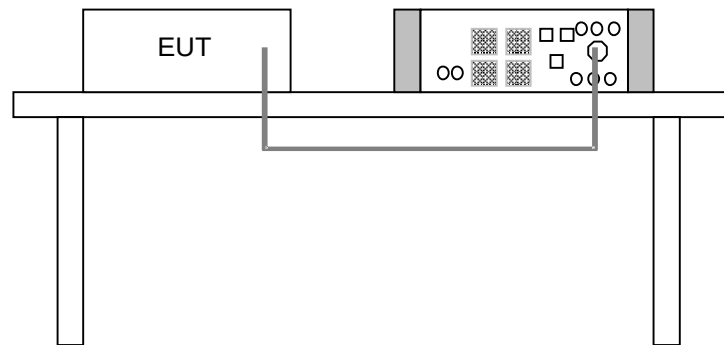
Class D: Equipment having a specified power less than or equal to 600 W of the following types: Personal computers and personal computer monitors and television receivers.

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

4.3.4 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

1. Turn on the power of all equipment.
2. PC (support unit B) sends "H" pattern messages to EUT. These messages are projected on the wall
3. PC (support unit B) sends audio messages to speaker (support unit H) via EUT.

4.3.7 TEST RESULTS

FUNDAMENTAL VOLTAGE/AMPERE	230.3Vrms/ 0.400Arms	POWER FREQUENCY	50Hz
POWER CONSUMPTION	79.88W	POWER FACTOR	0.866
ENVIRONMENTAL CONDITIONS	25;deg. C, 58%RH	TESTED BY	Timmy Hu

Harm. Order	Iavg (A)	Iavg Limit (A)	Imax (A)	Imax Limit (A)	Harm. Order	Iavg (A)	Iavg Limit (A)	Imax (A)	Imax Limit (A)
1	0.3869	-	0.3877	-	2	0.0000	1.0800	0.0015	1.6200
3	0.0762	2.3000	0.0764	3.4500	4	0.0000	0.4300	0.0015	0.6450
5	0.0483	1.1400	0.0485	1.7100	6	0.0000	0.3000	0.0015	0.4500
7	0.0308	0.7700	0.0309	1.1550	8	0.0000	0.2300	0.0005	0.3450
9	0.0226	0.4000	0.0228	0.6000	10	0.0000	0.1840	0.0004	0.2760
11	0.0166	0.3300	0.0167	0.4950	12	0.0000	0.1533	0.0003	0.2300
13	0.0125	0.2100	0.0126	0.3150	14	0.0000	0.1314	0.0003	0.1971
15	0.0115	0.1500	0.0117	0.2250	16	0.0000	0.1150	0.0003	0.1725
17	0.0088	0.1324	0.0090	0.1985	18	0.0000	0.1022	0.0003	0.1533
19	0.0090	0.1184	0.0093	0.1776	20	0.0000	0.0920	0.0003	0.1380
21	0.0089	0.1071	0.0092	0.1607	22	0.0000	0.0836	0.0003	0.1255
23	0.0069	0.0978	0.0070	0.1467	24	0.0000	0.0767	0.0003	0.1150
25	0.0064	0.0900	0.0065	0.1350	26	0.0000	0.0708	0.0003	0.1062
27	0.0062	0.0833	0.0064	0.1250	28	0.0000	0.0657	0.0003	0.0986
29	0.0069	0.0776	0.0071	0.1164	30	0.0000	0.0613	0.0004	0.0920
31	0.0071	0.0726	0.0074	0.1089	32	0.0000	0.0575	0.0004	0.0863
33	0.0062	0.0682	0.0064	0.1023	34	0.0000	0.0541	0.0004	0.0812
35	0.0052	0.0643	0.0054	0.0964	36	0.0000	0.0511	0.0004	0.0767
37	0.0000	0.0608	0.0046	0.0912	38	0.0000	0.0484	0.0004	0.0726
39	0.0000	0.0577	0.0045	0.0865	40	0.0000	0.0460	0.0004	0.0690

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

4.4 VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

4.4.1 LIMITS OF VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

TEST STANDARD: EN 61000-3-3

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

4.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
EMC Emission Tester EMC PARTNER	1000-1P	086	Jan. 28, 2013	Jan. 27, 2014
EMC Partner(Software)	HARCS_V4.18	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in EMS A room.
- 3 Tested Date: Nov. 07, 2013

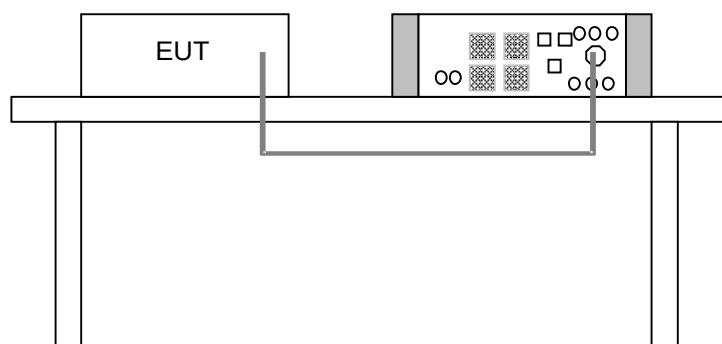
4.4.3 TEST PROCEDURE

- a. The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the 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.

4.4.4 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

Same as 4.3.6.



4.4.7 TEST RESULTS

FUNDAMENTAL VOLTAGE/AMPERE	230.3 Vrms / 0.400 Arms	POWER FREQUENCY	50 Hz
OBSERVATION PERIOD (TP)	10 min.	POWER FACTOR	0.866
ENVIRONMENTAL CONDITIONS	25 deg. C, 58 %RH	TESTED BY	Timmy Hu

TEST PARAMETER	MEASUREMENT VALUE	LIMIT	REMARKS
P _{st}	0.072	1.00	Pass
P _{lt}	0.072	0.65	Pass
T _{dt} (ms)	0.000	500	Pass
d _{max} (%)	0.000	4%	Pass
dc (%)	0.010	3.3%	Pass

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

5 IMMUNITY TEST

5.1 GENERAL DESCRIPTION

Product Standard:	EN 55024:2010	
Basic Standard, Specification, and Performance Criteria:	IEC 61000-4-2	Electrostatic Discharge - ESD: 8kV air discharge, 4kV Contact discharge, Performance Criterion B
	IEC 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test - RS: 80-1000 MHz, 3V/m, 80% AM (1kHz), Performance Criterion A
	IEC 61000-4-4	Electrical Fast Transient/Burst - EFT, AC Power line: 1kV, DC Power line: 0.5kV, Signal line: 0.5kV, Performance Criterion B
	IEC 61000-4-5	Surge Immunity Test: AC Power Line: line to line 1kV, line to earth 2kV DC Power Line: line to earth 0.5kV Performance Criterion B Outdoor Signal line: i) 1 kV without primary protectors, Performance Criteria C ii) 4 kV with primary protectors, Performance Criterion C
	IEC 61000-4-6	Conducted Radio Frequency Disturbances Test - CS: 0.15-80 MHz, 3V, 80% AM, 1kHz, Performance Criterion A
	IEC 61000-4-8	Power Frequency Magnetic Field Test, 50 Hz, 1A/m, Performance Criterion A
	IEC 61000-4-11	Voltage Dips: i) >95% reduction -0.5 period, Performance Criteria B ii) 30% reduction - 25 period, Performance Criterion C Voltage Interruptions: i) >95% reduction - 250 period, Performance Criterion C

5.2 GENERAL PERFORMANCE CRITERIA DESCRIPTION

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

General performance criteria

CRITERION A	The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.
CRITERION B	After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomenon below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed. However, no change of operating state if stored data is allowed to persist after the test. If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.
CRITERION C	Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

Particular performance criteria

The particular performance criteria which are specified in the normative annexes of EN 55024 take precedence over the corresponding parts of the general performance criteria.

Where particular performance criteria for specific functions are not given, then the general performance criteria shall apply.

5.3 EUT OPERATING CONDITION

Same as 4.3.6.

5.4 ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD)

5.4.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-2
Discharge Impedance:	330 ohm / 150 pF
Discharge Voltage:	Air Discharge – 2, 4, 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. 200 times in total
Discharge Mode:	Single Discharge
Discharge Period:	1-second minimum

5.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ESD Simulator KeyTek	MZ-15/EC	0912389	Mar. 29, 2013	Mar. 28, 2014

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.
- 3 Tested Date: Nov. 08, 2013

5.4.3 TEST PROCEDURE

The discharges shall be applied in two ways:

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

The EUT shall be exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points. One of the test points shall be subjected to at least 50 indirect discharges to the center of the front edge of the horizontal coupling plane. The remaining three test points shall each receive at least 50 direct contact discharges. If no direct contact test points are available, then at least 200 indirect discharges shall be applied in the indirect mode. Test shall be performed at a maximum repetition rate of one discharge per second.

- b. Air discharges at slots and apertures and insulating surfaces:

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

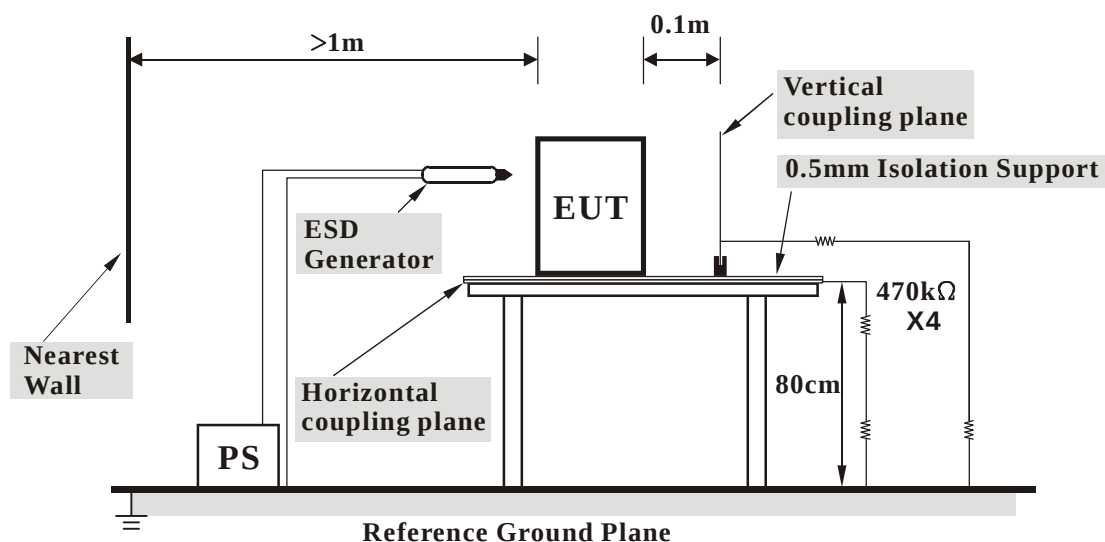
The basic test procedure was in accordance with IEC 61000-4-2:

- a. Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation.
- b. The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.
- c. The time interval between two successive single discharges was at least 1 second.
- d. The ESD generator was held perpendicularly to the surface to which the discharge was applied and the return cable was at least 0.2 meters from the EUT.
- e. Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
- f. Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were complete.
- g. At least ten single discharges (in the most sensitive polarity) were applied to the **Horizontal Coupling Plane** at points on each side of the EUT. The ESD generator was positioned at a distance of 0.1 meters from the EUT with the discharge electrode touching the **HCP**.
- h. At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the **Vertical Coupling Plane** in sufficiently different positions that the four faces of the EUT were completely illuminated. The **VCP** (dimensions 0.5m x 0.5m) was placed vertically to and 0.1 meters from the EUT.

5.4.4 DEVIATION FROM TEST STANDARD

No deviation

5.4.5 TEST SETUP



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

NOTE:

TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the **Ground Reference Plane**. The **GRP** consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A **Horizontal Coupling Plane** (1.6m x 0.8m) was placed on the table and attached to the **GRP** by means of a cable with 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.



5.4.6 TEST RESULTS

TEST MODE	Mode 1	INPUT POWER	230Vac, 50 Hz
ENVIRONMENTAL CONDITIONS	25 deg. C, 50 % RH, 990 mbar	TESTED BY	Anderson Chen

TEST RESULTS OF DIRECT APPLICATION					
Discharge Level (kV)	Polarity (+/-)	Test Point	Contact Discharge	Air Discharge	Performance Criterion
2, 4, 8	+/-	1 ~ 23	NA	NOTE (1)	A

Note: No conductive surfaces found, therefore no contact discharge was executed.

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

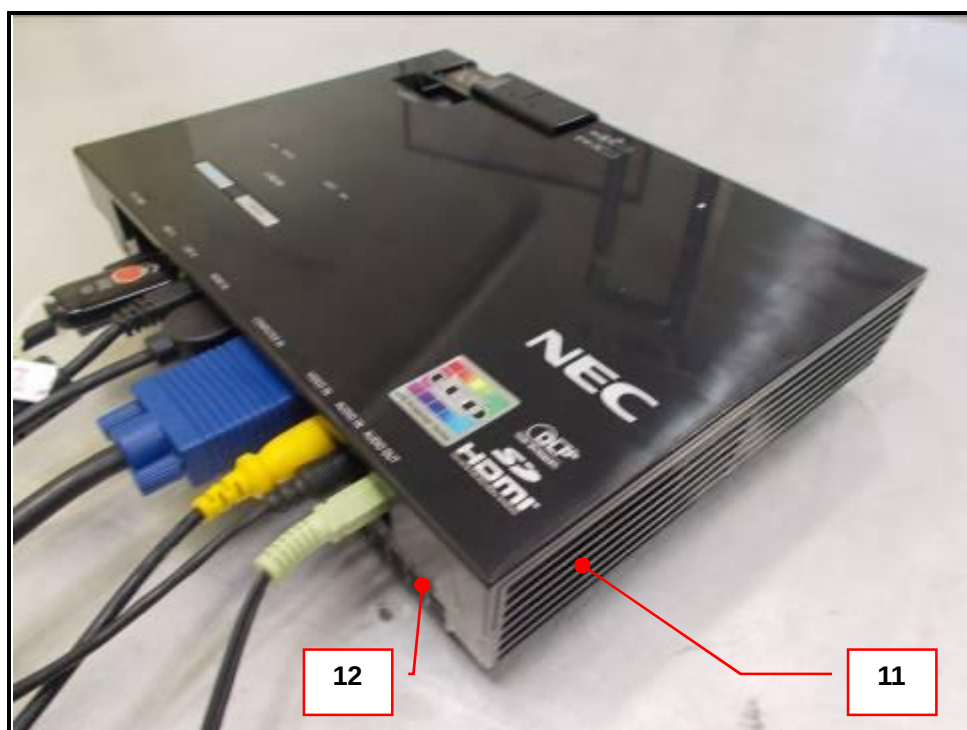
TEST RESULTS OF INDIRECT APPLICATION					
Discharge Level (kV)	Polarity (+/-)	Test Point	Horizontal Coupling Plane	Vertical Coupling Plane	Performance Criterion
2, 4	+/-	1 ~ 4	NOTE (1)	NOTE (1)	A

Description of test point:

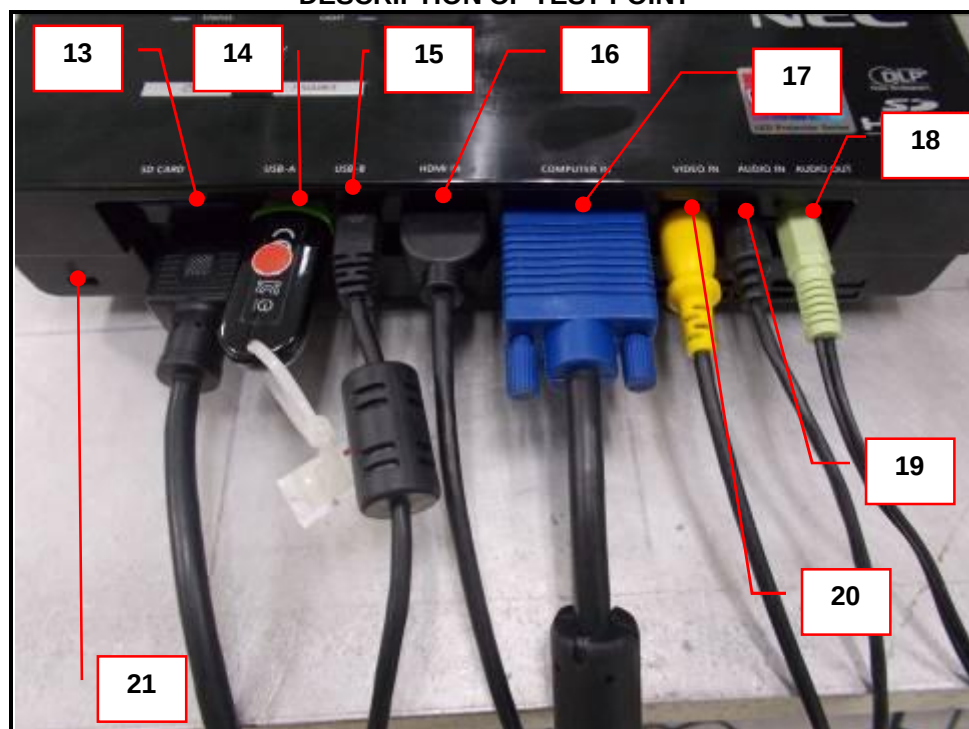
1. Front side 2. Right side 3. Left side 4. Rear side

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

DESCRIPTION OF TEST POINT



DESCRIPTION OF TEST POINT



DESCRIPTION OF TEST POINT



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

5.5.1 TEST SPECIFICATION

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

5.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power Amplifier AR	150W1000M3	311567	NA	NA
Power Amplifier AR	60S1G3M1	306171	NA	NA
LOG ANTENNA AR	AT5080ANT	309740	NA	NA
RF Voltage Meter BOONTON	4232A-01	93801	Dec. 11, 2012	Dec. 10, 2013
Signal Generator R&S	SMIQ 03B	102114	Aug. 30, 2013	Aug. 29, 2014
Electric Field Probe Narda	EF 0619	D-0049	Oct. 30, 2013	Oct. 29, 2014
RS Test Workbench(Software) ADT	ADT_RS_V7.6.4	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Chamber Room No. B.
- 3 The transmit antenna was located at a distance of 2.0 meters from the EUT.
4. Tested Date: Nov. 08, 2013

5.5.3 TEST PROCEDURE

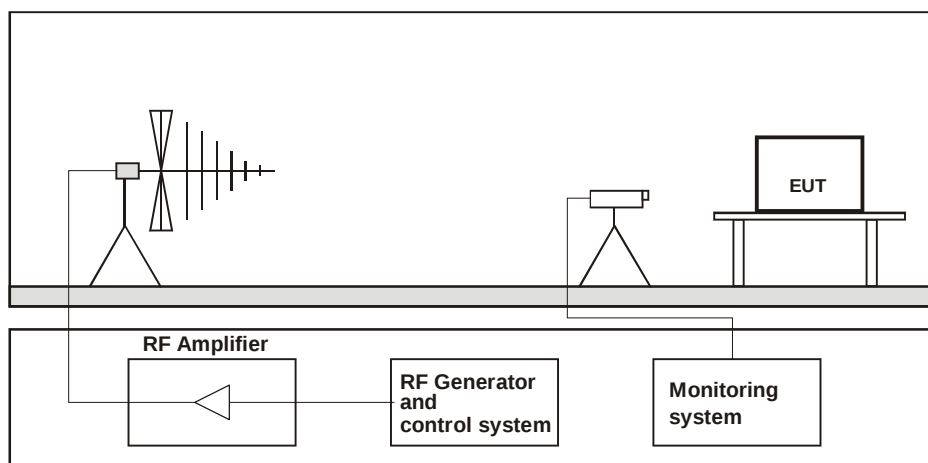
The test procedure was in accordance with IEC 61000-4-3

- The testing was performed in a modified semi-anechoic chamber.
- The frequency range is swept from 80 MHz to 1000 MHz with the signal 80% amplitude modulated with a 1kHz sine wave.
- The dwell time at each frequency shall 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.
- The field strength level was 3V/m.
- The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

5.5.4 DEVIATION FROM TEST STANDARD

No deviation

5.5.5 TEST SETUP



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

NOTE:

TABLETOP EQUIPMENT

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

FLOOR STANDING EQUIPMENT

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

5.5.6 TEST RESULTS

TEST MODE	Mode 1	INPUT POWER	230Vac, 50 Hz
ENVIRONMENTAL CONDITIONS	28 deg. C, 57 % RH	TESTED BY	Barry Lee

Frequency (MHz)	Result	Polarity	Azimuth	Field Strength (V/m)	Observation	Performance Criterion
80 -1000	PASS	V&H	0	3	NOTE(1)	A
80 -1000	PASS	V&H	90	3		
80 -1000	PASS	V&H	180	3		
80 -1000	PASS	V&H	270	3		

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

5.6 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST (EFT)

5.6.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-4
Test Voltage:	Power Line – 1 kV Signal-Line – NA
Polarity:	Positive/Negative
Impulse Frequency:	100 kHz : only for single lines of xDSL equipment 5 kHz : other
Impulse Wave Shape :	5/50 ns
Burst Duration:	15 ms
Burst Period:	300 ms
Test Duration:	1 min.

5.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
TRANSIENT EMC PARTNER	TRA2000IN6	1121	Jan. 17, 2013	Jan. 16, 2014
TRANSIENT EMC PARTNER	TRA2000IN6	683	June 24, 2013	June 23, 2014
CN-EFT100 EMC PARTNER	CN-EFT1000	362	NA	NA
CN-EFT100 EMC PARTNER	CN-EFT1000	662	NA	NA
Adapter	NA	SU1ADA-002	NA	NA
Software EMC PARTNER,	Test Manger_V1.53	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in EMS room B.
- 3 Tested Date: Nov. 07, 2013

5.6.3 TEST PROCEDURE

- a. Both positive and negative polarity discharges were applied.
- b. The distance between any coupling devices and the EUT should be (0.5 – 0/+0.1) m for table-top equipment testing, and (1.0 ± 0.1) m for floor standing equipment.
- 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.

No deviation

The diagram illustrates the test setup for the immunity test of a vehicle control unit (VCU) according to IEC 61326-4:2019. The setup is divided into two main sections: the EUT (Equipment Under Test) and the AE (Antenna Element).

EUT Section:

- The EUT is placed on an insulating support, with a height of 0,1 m from the ground reference plane.
- The EUT is connected to an AC mains supply and an EFT/B generator (B).
- The EUT is connected to a capacitive coupling clamp, which is placed on a contact to the ground reference plane.
- The EUT is connected to a grounding connection according to the manufacturer's specification.
- The EUT is connected to a coupling/decoupling network (A).
- The EUT is connected to an EFT/B generator (A).
- The EUT is connected to a ground reference plane.
- The EUT is connected to a grounding cable.

AE Section:

- The AE is placed on an insulating support, with a height of 0,5 m from the ground reference plane.
- The AE is connected to an AC mains supply and an EFT/B generator (A).
- The AE is connected to a coupling/decoupling network (A).
- The AE is connected to a ground reference plane.
- The AE is connected to a grounding cable.

Distances:

- The distance between the EUT and the AE is $\geq 0,5$ m.
- The distance between the EUT and the AC mains supply is $> 0,5$ m.
- The distance between the EUT and the EFT/B generator (B) is $> 0,5$ m.
- The distance between the EUT and the AC mains supply is $> 0,5$ m.
- The distance between the EUT and the EFT/B generator (B) is $> 0,5$ m.
- The distance between the EUT and the AC mains supply is $> 0,5$ m.
- The distance between the EUT and the EFT/B generator (B) is $> 0,5$ m.

IEC 645/12

(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.

5.6.6 TEST RESULTS

TEST MODE	Mode 1	INPUT POWER	230Vac, 50Hz
ENVIRONMENTAL CONDITIONS	28 deg. C, 57 % RH	TESTED BY	Ping Liu

POWER PORT

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

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

5.7 SURGE IMMUNITY TEST

5.7.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-5
Wave-Shape:	Combination Wave for power lines 1.2/50 us Open Circuit Voltage 8 /20 us Short Circuit Current 10/700 us Wave for outdoor signal lines 10/700 us Open Circuit Voltage
Test Voltage:	Power Line – 0.5 kV / 1 kV / 2 kV Signal Line – NA
Polarity:	Positive/Negative
Phase Angle (degree):	0 / 90 / 180 / 270
Pulse Repetition Rate:	1 time / 20 sec.
Number of Tests:	5 positive and 5 negative at selected points

5.7.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
TRANSIENT EMC PARTNER	TRA2000IN6	1121	Jan. 17, 2013	Jan. 16, 2014
TRANSIENT EMC PARTNER	TRA2000IN6	683	June 24, 2013	June 23, 2014
CDN-UTP8 EMC PARTNER	CDN-UTP8	036	Jan. 26 ,2013	Jan. 25, 2014
Adapter	NA	SU1ADA-002	NA	NA
Software EMC PARTNER	Test Manger_V1.53	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in EMS room A.
3. Tested Date: Nov. 07 ,2013

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).

For double-insulated products without PE or external earth connections, the test shall be done in a similar way as for grounded products but without adding any additional external grounded connections. If there are no other possible connections to earth, line-to-ground tests may be omitted.

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

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

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

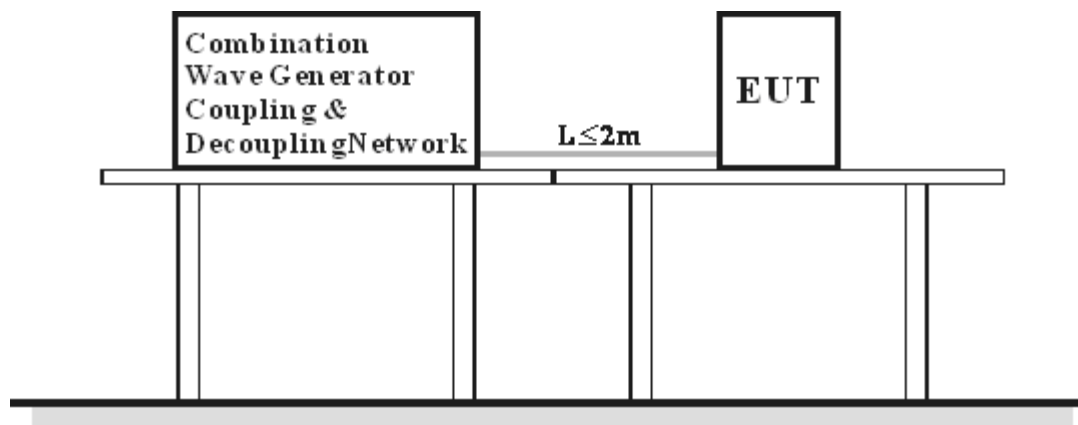
The surge is applied to the lines via gas arrestors coupling. Test levels below the ignition point of the coupling arrestor cannot be specified. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

5.7.4 DEVIATION FROM TEST STANDARD

As per client requests, the following a test point was also applied:

TEST POINT: L1, L2-PE – 0.5, 1, 2 kV

5.7.5 TEST SETUP



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

5.7.6 TEST RESULTS

TEST MODE	Mode 1	INPUT POWER	230Vac, 50 Hz
ENVIRONMENTAL CONDITIONS	28 deg. C, 57 % RH	TESTED BY	Ping Liu

POWER PORT

VOLTAGE (kV)	TEST POINT	POLARITY (+/-)	OBSERVATION	PERFORMANCE CRITERION
0.5, 1	L1-L2	+/-	NOTE (1)	A
0.5, 1, 2	L1-PE	+/-	NOTE (1)	A
0.5, 1, 2	L2-PE	+/-	NOTE (1)	A
0.5, 1, 2	L1, L2-PE	+/-	NOTE (1)	A

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

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

5.8.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-6
Frequency Range:	0.15 MHz - 80 MHz
Voltage Level:	3 V
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of preceding frequency value
Coupling Device:	CDN-M3
Dwell Time	3 seconds

5.8.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATE D UNTIL
Signal Generator R&S	SML 01	102731	Dec. 11, 2012	Dec. 10, 2013
Amplifier AR	75A250AM2	306331	NA	NA
Voltage Meter BOONTON RF	4232A	93801	Dec. 11, 2012	Dec. 10, 2013
LUTHIE EM Injection Clamp	EM-101	35453	May 22, 2013	May 21, 2014
CDN M2 FCC	FCC-801-M2-16A	03048	Jan. 08, 2013	Jan. 07, 2014
CDN M3 FCC	FCC-801-M3-16A	03055	Jan. 08, 2013	Jan. 07, 2014
Coupling Decoupling Network Fischer Custom Communications Inc	FCC-801-T2	02025	Oct. 08, 2013	Oct. 07, 2014
Coupling Decoupling Network Fischer Custom Communications Inc	FCC-801-T4	02030	Oct. 08, 2013	Oct. 07, 2014
Coupling Decoupling Network Fischer Custom Communications Inc	FCC-801-T8	02036	Oct. 08, 2013	Oct. 07, 2014
ADT CS Test Workbench(Software)	ADT_CS_V7.4.2	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Chamber Room No. B.
- 3 Tested Date: Nov. 08, 2013

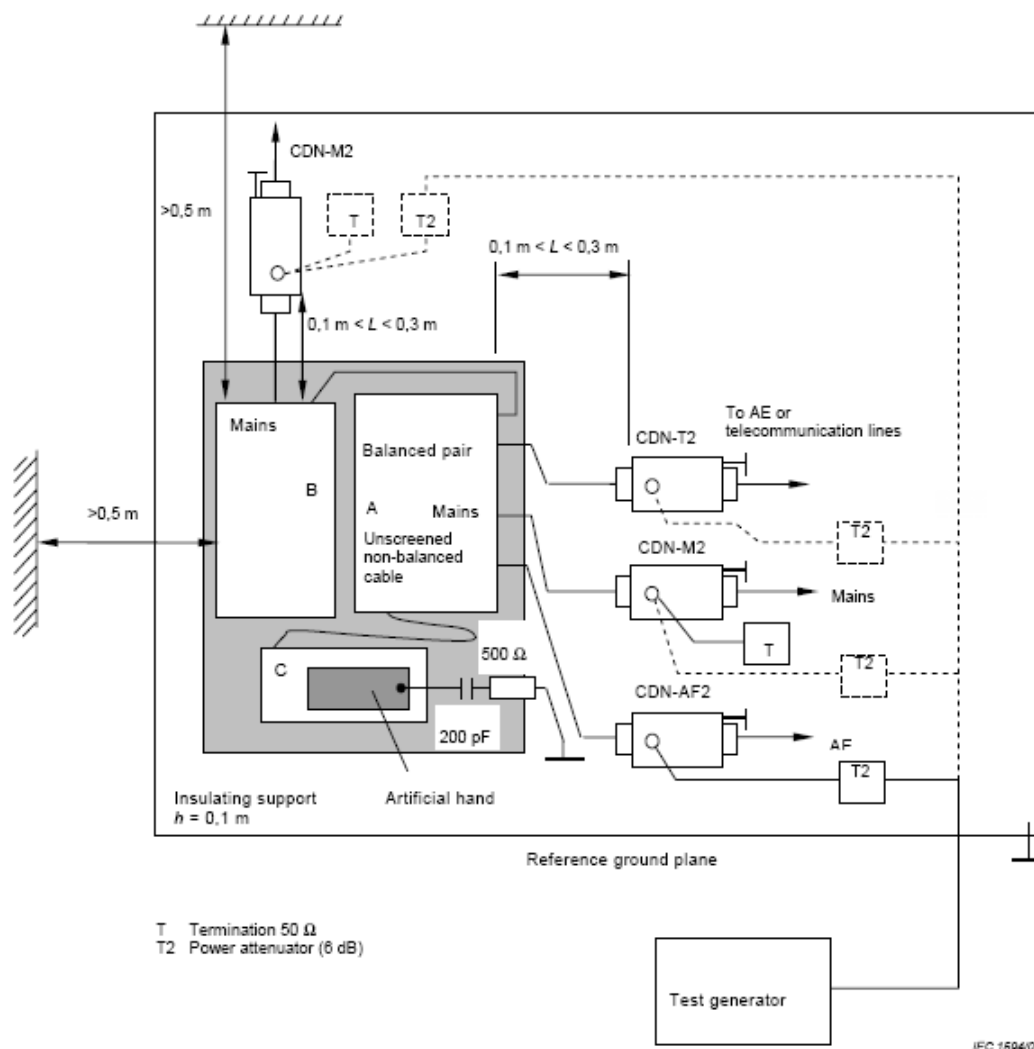
5.8.3 TEST PROCEDURE

- a. The EUT shall be tested within its intended operating and climatic conditions.
- b. One of the CDNs not used for injection was terminated with 50 ohm, providing only one return path. All other CDNs were coupled as decoupling networks.
- 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.

5.8.4 DEVIATION FROM TEST STANDARD

No deviation

5.8.5 TEST SETUP



Note: 1. The EUT clearance from any metallic obstacles shall be at least 0,5 m.
2. Interconnecting cables ($\leq 1\text{ m}$) belonging to the EUT shall remain on the insulating support.

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

**A D T**

5.8.6 TEST RESULTS

TEST MODE	Mode 1	INPUT POWER	230Vac, 50 Hz
ENVIRONMENTAL CONDITIONS	28 deg. C, 57 % RH	TESTED BY	Barry Lee

Frequency Band (MHz)	Applied Voltage (Vrms)	Tested Line	Injection Method	Return Path	Observation	Performance Criterion
0.15-80	3	AC MAIN	CDN-M3	NA	NOTE (1)	A

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

5.9 POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST

5.9.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-8
Frequency Range:	50Hz
Field Strength:	1 A/m
Observation Time:	1 minute
Inductance Coil:	Helmholtz coil, diameter 1.5m

5.9.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Triaxial Elf Magnetic Field Meter BELL	4090	NA	Jan. 04, 2013	Jan. 03, 2014
Helmholtz Coil MONTENA	HC150-360	NA	Apr. 30, 2013	Apr. 29, 2014

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.
- 3 Tested Date: Nov. 07, 2013

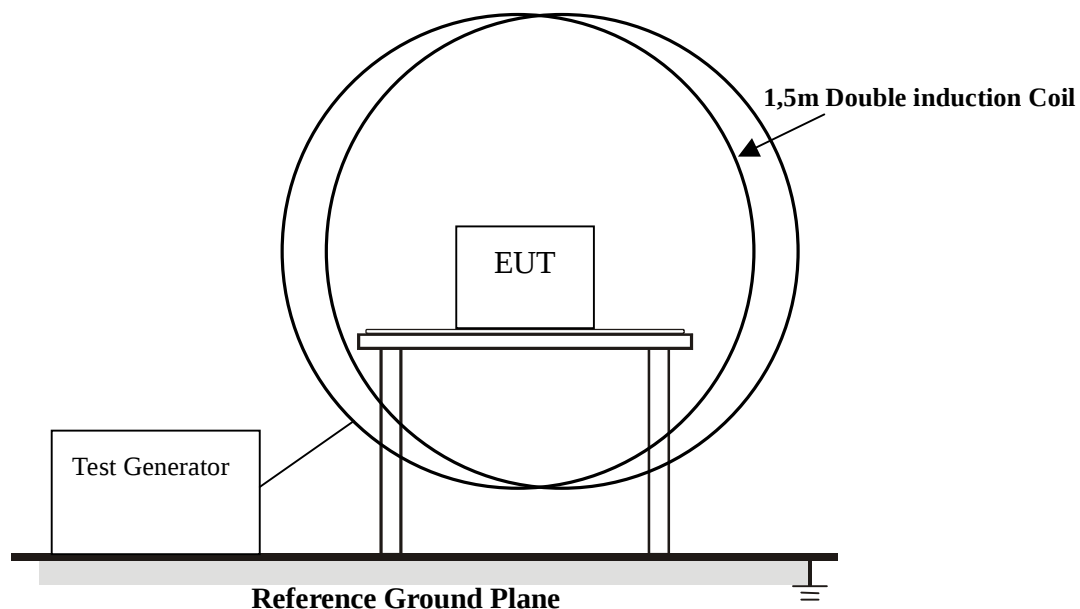
5.9.3 TEST PROCEDURE

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

5.9.4 DEVIATION FROM TEST STANDARD

No deviation

5.9.5 TEST SETUP



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

NOTE:

TABLETOP EQUIPMENT

The equipment shall be subjected to the test magnetic field by using the induction coil of standard dimension (diameter 1.5m). The EUT placement shall then be rotated by 90 degrees in order to expose to the test field with different orientations.



5.9.6 TEST RESULTS

TEST MODE	Mode 1	INPUT POWER	230Vac, 50 Hz
ENVIRONMENTAL CONDITIONS	25 deg. C, 58 % RH	TESTED BY	Timmy Hu

DIRECTION	RESULTS	OBSERVATION	PERFORMANCE CRITERION
X	PASS	NOTE(1)	A
Y	PASS	NOTE(1)	A
Z	PASS	NOTE(1)	A

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

5.10 VOLTAGE DIP/SHORT INTERRUPTIONS (DIP) IMMUNITY TEST

5.10.1 TEST SPECIFICATION

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

5.10.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
TRANSIENT EMC PARTNER	TRA2000IN6	1121	Jan. 17, 2013	Jan. 16, 2014
TRANSIENT EMC PARTNER	TRA2000IN6	683	June 24, 2013	June 23, 2014
Adapter	NA	SU1ADA-002	NA	NA
(Software) EMC Partner	Test Manger_V1.53	NA	NA	NA

Note:

- The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
- The test was performed in EMS room A.
- Tested Date: Nov. 07, 2013

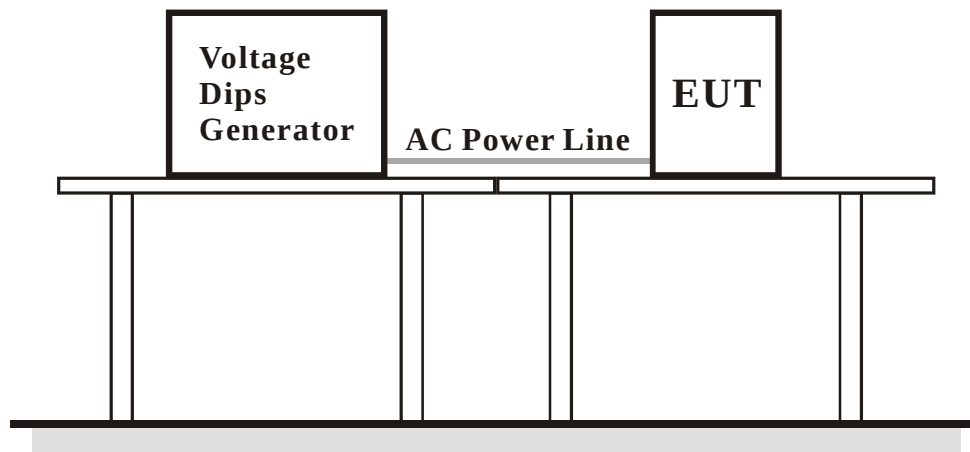
5.10.3 TEST PROCEDURE

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

5.10.4 DEVIATION FROM TEST STANDARD

No deviation

5.10.5 TEST SETUP



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



5.10.6 TEST RESULTS

TEST MODE	Mode 1	INPUT POWER	230Vac / 240Vac / 100Vac, 50 Hz
ENVIRONMENTAL CONDITIONS	28 deg. C, 57 % RH	TESTED BY	Ping Liu

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

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

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

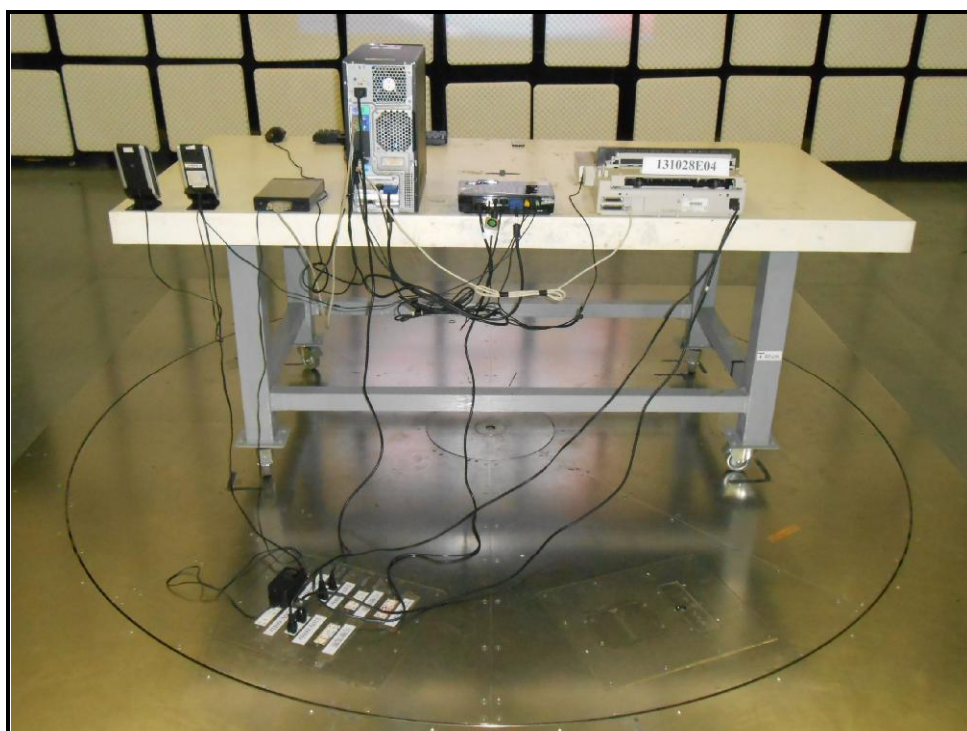
NOTE: (1) There was no change compared with initial operation during the test.
(2) The EUT had “reboot” situation during the test, but could be recovered to normal operation by reset manually after the test.

6 PHOTOGRAPHS OF THE TEST CONFIGURATION

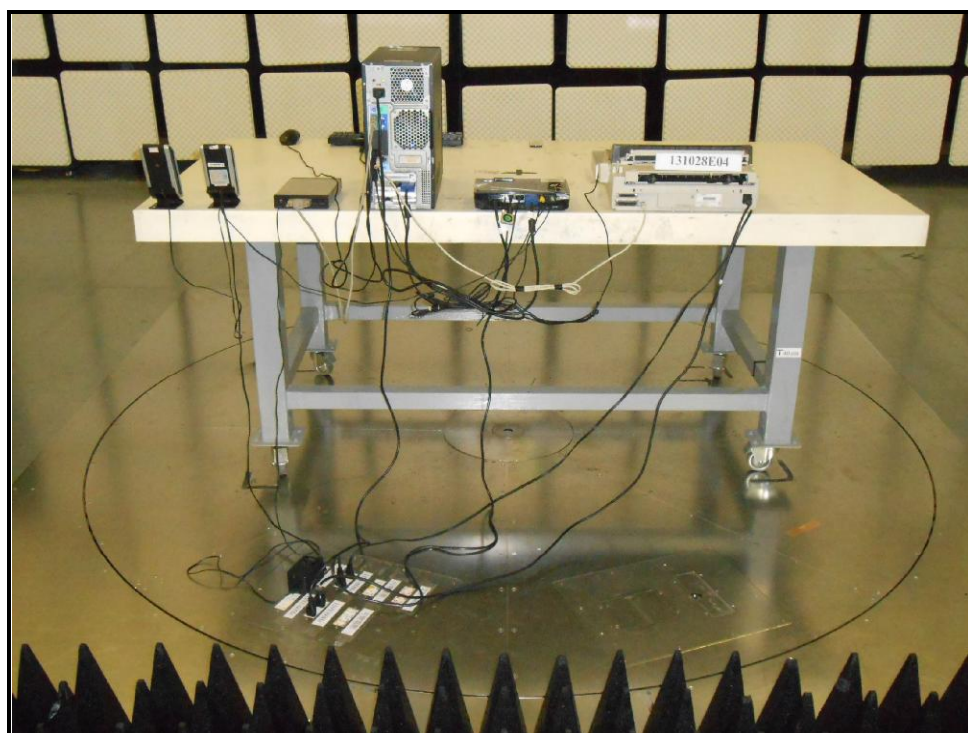
CONDUCTED EMISSION TEST



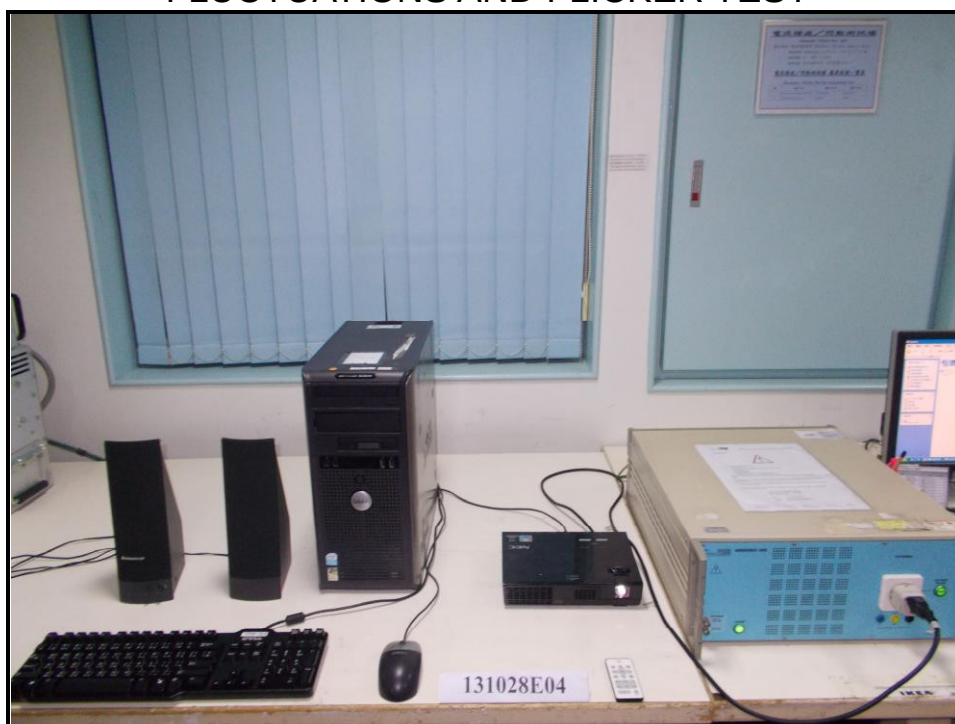
RADIATED EMISSION TEST (Below 1GHz)



RADIATED EMISSION TEST (Above 1GHz)



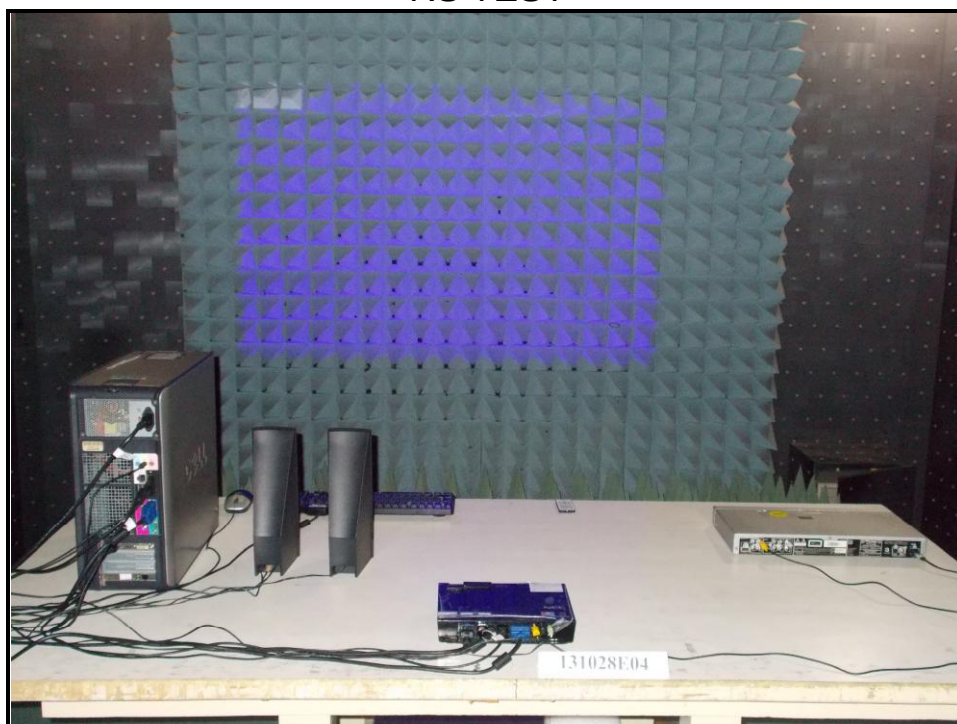
HARMONICS EMISSION TEST & VOLTAGE FLUCTUATIONS AND FLICKER TEST



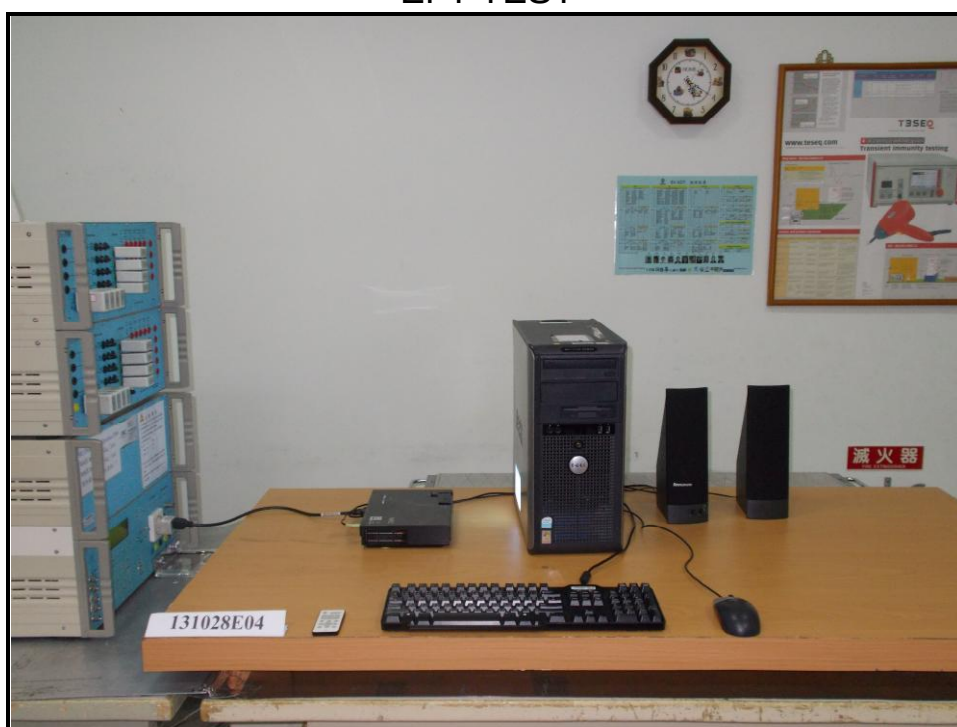
ESD TEST



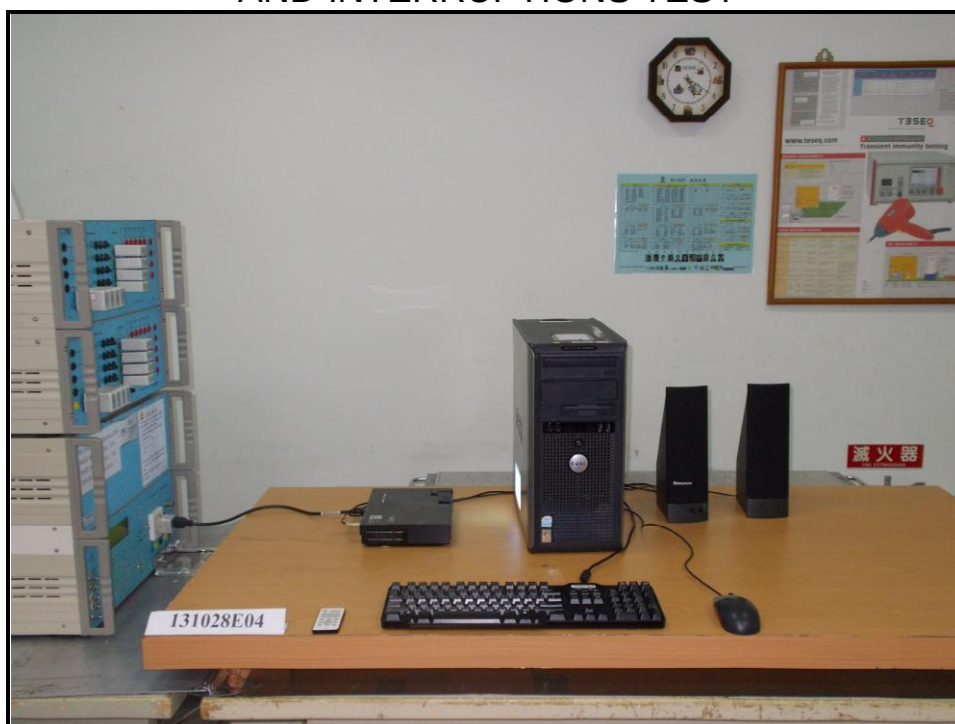
RS TEST



EFT TEST



SURGE & VOLTAGE DIPS AND INTERRUPTIONS TEST



CS TEST



POWER-FREQUENCY MAGNETIC FIELDS TEST



7 INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

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

--- END ---