CE EMC Test Report

Report No.:	CE151216D03
Test Model:	VMX-200-8
Series Model:	Vecow VMX Series, VMX-200-4, VMX-XXXXXXXXXX (“X” can be 0-9, A-Z or blank for marketing purpose)
Received Date:	Dec. 16, 2015
Test Date:	Dec. 23, 2015 ~ Jan. 7, 2016
Issued Date:	Jan. 11, 2016
Applicant:	Vecow Co., Ltd.
Address:	12F., No. 111, Zhongcheng Rd., Tucheng Dist., New Taipei City 23674 Taiwan (R. O. C.)
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.)

LAB CODE: 200836-0

Testing Laboratory
2021

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
CE151216D03	Original release.	Jan. 11, 2016

1 Certificate of Conformity

Product:	4-CH/8-CH, H.264, Mini-PCI Express, Software Compression/Video Capture card
Brand:	Vecow
Test Model:	VMX-200-8
Series Model:	Vecow VMX Series, VMX-200-4, VMX-XXXXXXXXXX ("X" can be 0-9, A-Z or blank for marketing purpose)
Sample Status:	Engineering sample
Applicant:	Vecow Co., Ltd.
Test Date:	Dec. 23, 2015 ~ Jan. 7, 2016
Standards:	**EN 55022:2010 +AC:2011, Class B** **CISPR 22:2008, Class B** **AS/NZS CISPR 22:2009 +A1:2010, Class B** **EN 61000-3-2:2014** (Not applicable) **EN 61000-3-3:2013** (Not applicable) **EN 55024:2010** EN 61000-4-2:2009 / IEC 61000-4-2:2008 ED. 2.0 EN 61000-4-3:2006 +A1:2008 +A2:2010 / IEC 61000-4-3:2010 ED. 3.2 EN 61000-4-4:2012 / IEC 61000-4-4:2012 ED. 3.0 (Not applicable) EN 61000-4-5:2014 / IEC 61000-4-5:2014 ED. 3.0 EN 61000-4-6:2014 / IEC 61000-4-6:2013 ED. 4.0 (Not applicable) EN 61000-4-8:2010 / IEC 61000-4-8:2009 ED. 2.0 EN 61000-4-11:2004 / IEC 61000-4-11:2004 ED. 2.0 (Not applicable)

The above equipment 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:** Jan. 11, 2016

Celia Chen / Supervisor

Approved by : _____ , **Date:** Jan. 11, 2016

Henry Lai / Director

2 Summary of Test Results

Emission				
Standard	Clause	Test Item	Result/Remarks	Verdict
EN 55022:2010 +AC:2011 / CISPR 22:2008 / AS/NZS CISPR 22:2009 +A1:2010	5.1	Mains terminal disturbance voltage	Minimum passing Class B margin is -0.47 dB at 3.54688 MHz	Pass
	5.2	Conducted common mode (asymmetric mode) disturbance at telecommunication ports	Without telecom port of the EUT	N/A
	6.1	Radiated disturbance 30-1000 MHz	Minimum passing Class B margin is -1.21 dB at 720.03 MHz	Pass
	6.2	Radiated disturbance above 1GHz	EUT's highest frequency is below 108 MHz	N/A
EN 61000-3-2:2014	-	Harmonic current emissions	Test not applicable because port does not exists	N/A
EN 61000-3-3:2013	-	Voltage fluctuations and flicker	Test not applicable because port does not exists	N/A

Immunity				
EN 55024 Clause	Basic standard	Test Item	Result/Remarks	Verdict
4.2.1	EN 61000-4-2:2009 / IEC 61000-4-2:2008 ED. 2.0	Electrostatic discharges (ESD)	Performance Criterion B	Pass
4.2.3.2	EN 61000-4-3:2006 +A1:2008 +A2:2010 / IEC 61000-4-3:2010 ED. 3.2	Continuous radiated disturbances (RS)	Performance Criterion A	Pass
4.2.2	EN 61000-4-4:2012 / IEC 61000-4-4:2012 ED. 3.0	Electrical fast transients (EFT)	EUT's cable length is not greater than 3m and EUT consumes DC power	N/A
4.2.5	EN 61000-4-5:2014 / IEC 61000-4-5:2014 ED. 3.0	Surges	Performance Criterion C	Pass
4.2.3.3	EN 61000-4-6:2014 / IEC 61000-4-6:2013 ED. 4.0	Continuous conducted disturbances (CS)	EUT's cable length is not greater than 3m and EUT consumes DC power	N/A
4.2.4	EN 61000-4-8:2010 / IEC 61000-4-8:2009 ED. 2.0	Power-frequency magnetic fields (PFMF)	Performance Criterion A	Pass
4.2.6	EN 61000-4-11:2004 / IEC 61000-4-11:2004 ED. 2.0	Voltage dips and interruptions	Test not applicable because AC power port does not exists	N/A

Note:

1. There is no deviation to the applied test methods and requirements covered by the scope of this report.
2. The above EN/IEC basic standards are applied with latest version if customer has no special requirement.
3. N/A: Not Applicable

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:

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.

Measurement	Expended Uncertainty (k=2) (±)	Maximum allowable uncertainty (±)
Conducted disturbance at mains port using AMN, 150kHz ~ 30MHz	2.78 dB	3.4 dB (U_{cispr})
Radiated disturbance, 30MHz ~ 1GHz	4.34 dB	6.3 dB (U_{cispr})

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 Features of EUT

The tests reported herein were performed according to the method specified by Vecow Co., Ltd., for detailed feature description, please refer to the manufacturer's specifications or user's manual.

3.2 General Description of EUT

Product	4-CH/8-CH, H.264, Mini-PCI Express, Software Compression/Video Capture card
Brand	Vecow
Test Model	VMX-200-8
Series Model	Vecow VMX Series, VMX-200-4, VMX-XXXXXXXXXX (“X” can be 0-9, A-Z or blank for marketing purpose)
Model Difference	For marketing purpose
Sample Status	Engineering sample
Operating Software	Windows, Linux
Power Supply Rating	DC power from host equipment
Accessory Device	N/A
Data Cable Supplied	D-Sub 15 to BNC cable (0.3m)*2

Note: The EUT is a 4-CH/8-CH, H.264, Mini-PCI Express, Software Compression/Video Capture card.

3.3 Operating Modes of EUT and Determination of Worst Case Operating Mode

The EUT consumes power from host, which designed with AC power supply of rating 100-240Vac, 50/60Hz.

For radiated emission evaluation, 230Vac/50Hz (for EN 55022), 120Vac/60Hz (for FCC Part 15) had been covered during the pre-test. The worst data was found at **230Vac/50Hz** and recorded in the applied test report.

EUT has been pre-tested under following test modes, and test mode 1 was the worst case for final test.

Mode	Test Condition
1	Audio CH 5 & CH 6
2	Audio CH 1 & CH 2

3.4 Test Program Used and Operation Descriptions

Emission tests (Harmonics & Flicker excluded):

a. Installed EUT into PC.
b. Turned on the power of all equipment.
c. PC ran a test program to enable all functions.
d. DVD Player sent audio/video signal to PC via EUT.
e. PC sent "H" messages to LCD monitor. Then displayed "H" patterns on its screen.
f. PC sent messages to printer and printer printed them out.
g. PC sent messages to modem.
h. Repeated steps d-g.

Harmonics, Flicker, Immunity tests:

a. Installed EUT into PC.
b. Turned on the power of all equipment.
c. PC ran a test program to enable all functions.
d. DVD Player sent audio/video signal to PC via EUT.
e. PC sent messages to LCD monitor via EUT. Then LCD monitor displayed messages on its screen.
f. Repeated steps d-e.

3.5 Primary Clock Frequencies of Internal Source

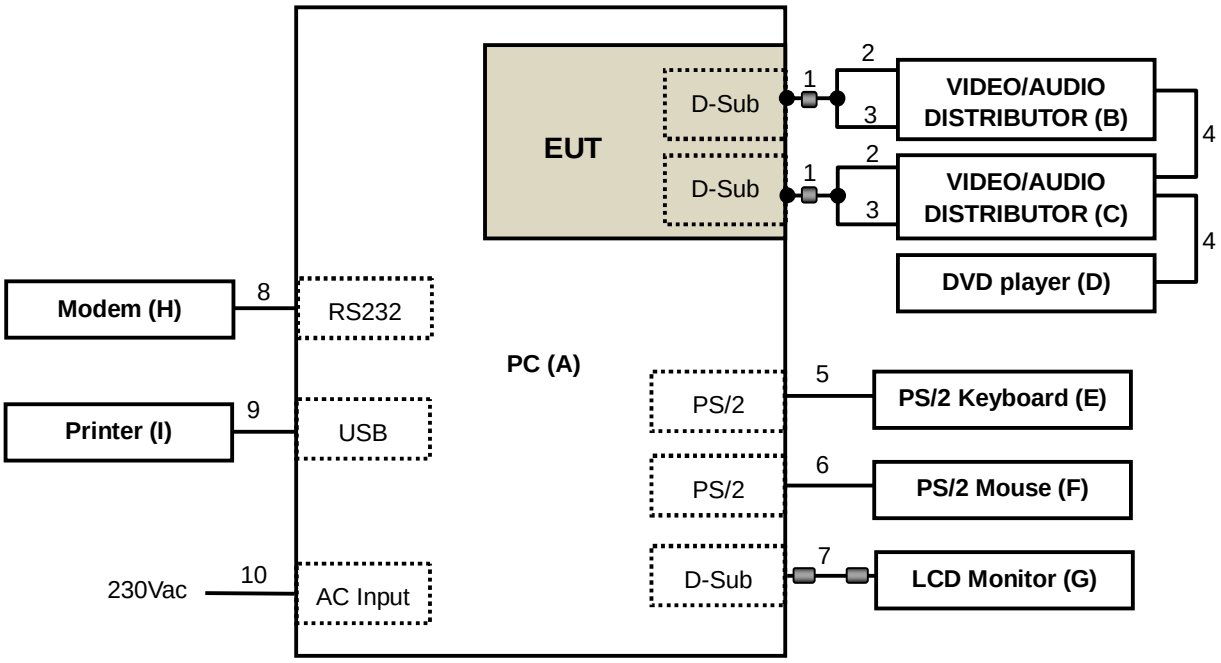
The highest frequency generated or used within the EUT or on which the EUT operates or tunes is 100 MHz, provided by Vecow Co., Ltd., for detailed internal source, please refer to the manufacturer's specifications.

4 Configuration and Connections with EUT

4.1 Connection Diagram of EUT and Peripheral Devices

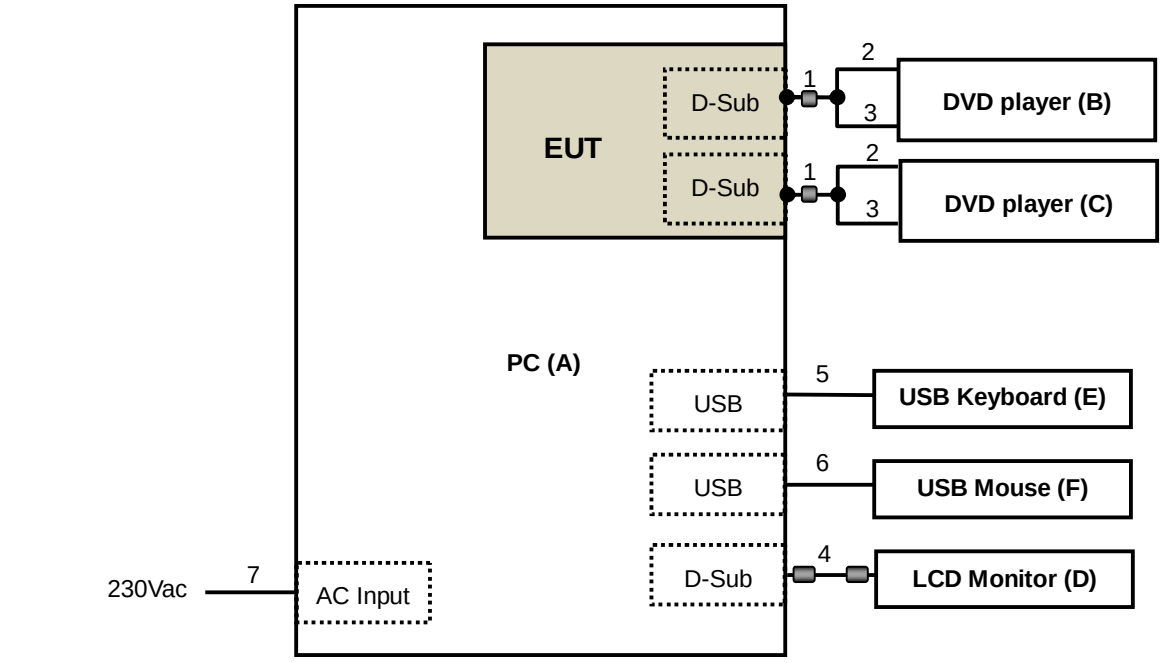
Emission tests (Harmonics & Flicker excluded):

TEST CONFIGURATION



Harmonics, Flicker, Immunity tests:

TEST CONFIGURATION



4.2 Configuration of Peripheral Devices and Cable Connections

Emission tests (Harmonics & Flicker excluded):

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	PERSONAL COMPUTER	HP	6000ProMT	SGH110SGNJ	FCC DoC Approved	Provided by Lab
B.	VIDEO/AUDIO DISTRIBUTOR	JEBSEE	AV-486	N/A	Verification	Provided by Lab
C.	VIDEO/AUDIO DISTRIBUTOR	Trans Electric	AV-004	V4-010027	Verification	Provided by Lab
D.	DVD player	Pioneer	DV-600AV-S	GJKD006924LS	Verification	Provided by Lab
E.	PS/2 KEYBOARD	HP	KB-0316	BC3520BGAUJ0UZ	FCC DoC Approved	Provided by Lab
F.	PS/2 MOUSE	BTC	M851	N/A	E5XMSM860	Provided by Lab
G.	24" LCD MONITOR	DELL	U2410	CN082WXD728720CC0KCL	FCC DoC Approved	Provided by Lab
H.	MODEM	ACEEX	1414	980020532	IFAXDM1414	Provided by Lab
I.	PRINTER	LEXMARK	Z33	N/A	FCC DoC Approved	Provided by Lab

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	D-Sub to BNC cable	2	0.3	Y	1	Supplied by client
2.	Video cable	8	1.5	N	0	Provided by Lab
3.	Audio cable	8	1.5	N	0	Provided by Lab
4.	AV cable	2	1.5	N	0	Provided by Lab
5.	PS/2 cable	1	1.8	N	0	Provided by Lab
6.	PS/2 cable	1	1.5	N	0	Provided by Lab
7.	D-Sub cable	1	1.8	Y	2	Provided by Lab
8.	RS232 cable	1	1.0	Y	0	Provided by Lab
9.	USB cable	1	1.8	Y	0	Provided by Lab
10.	AC power cord	1	1.8	N	0	Provided by Lab

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

Harmonics, Flicker, Immunity tests:

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	PERSONAL COMPUTER	HP	6000ProMT	SGH110SGNJ	FCC DoC Approved	Provided by Lab
B.	DVD player	SONY	DVP-NS530	1002858	Verification	Provided by Lab
C.	DVD player	SONY	DVP-NS530	1002797	Verification	Provided by Lab
D.	WIDESCREEN FLAT PANEL MONITOR	DELL	2408WFP	CN0G293H74261874268S	FCC DoC Approved	Provided by Lab
E.	USB Keyboard	HP	SK-2085	N/A	FCC DoC Approved	Provided by Lab
F.	USB Mouse	HP	N889	N/A	FCC DoC Approved	Provided by Lab

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	D-Sub to BNC cable	2	0.3	Y	1	Supplied by client
2.	Video cable	2	1.5	N	0	Provided by Lab
3.	Audio cable	2	1.5	N	0	Provided by Lab
4.	D-Sub cable	1	1.8	Y	2	Provided by Lab
5.	USB cable	1	1.8	Y	0	Provided by Lab
6.	USB cable	1	1.8	Y	0	Provided by Lab
7.	AC power cord	1	1.8	N	0	Provided by Lab

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

5 Conducted Disturbance at Mains Ports

5.1 Limits

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

Notes: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

5.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
ROHDE & SCHWARZ TEST RECEIVER	ESCS 30	100290	Dec. 24, 2015	Dec. 23, 2016
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH2-Z5	100104	Dec. 07, 2015	Dec. 06, 2016
LISN With Adapter (for EUT)	AD10	C09Ada-001	Dec. 07, 2015	Dec. 06, 2016
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	847265/023	Oct. 21, 2015	Oct. 20, 2016
SCHWARZBECK Artificial Mains Network (For EUT)	NNLK8129	8129229	May 06, 2015	May 05, 2016
Software	Cond_V7.3.7	NA	NA	NA
RF cable (JYEBAO) With 10dB PAD	5D-FB	Cable-C09.01	Feb. 24, 2015	Feb. 23, 2016
SUHNER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-010789	May 19, 2015	May 18, 2016
ROHDE & SCHWARZ Artificial Mains Network (For TV EUT)	ESH3-Z5	100220	Nov. 13, 2015	Nov. 12, 2016
LISN With Adapter (for TV EUT)	100220	N/A	Nov. 13, 2015	Nov. 12, 2016

Notes: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. 9.
3. The VCCI Site Registration No. C-1312.
4. Tested Date: Dec. 24, 2015.

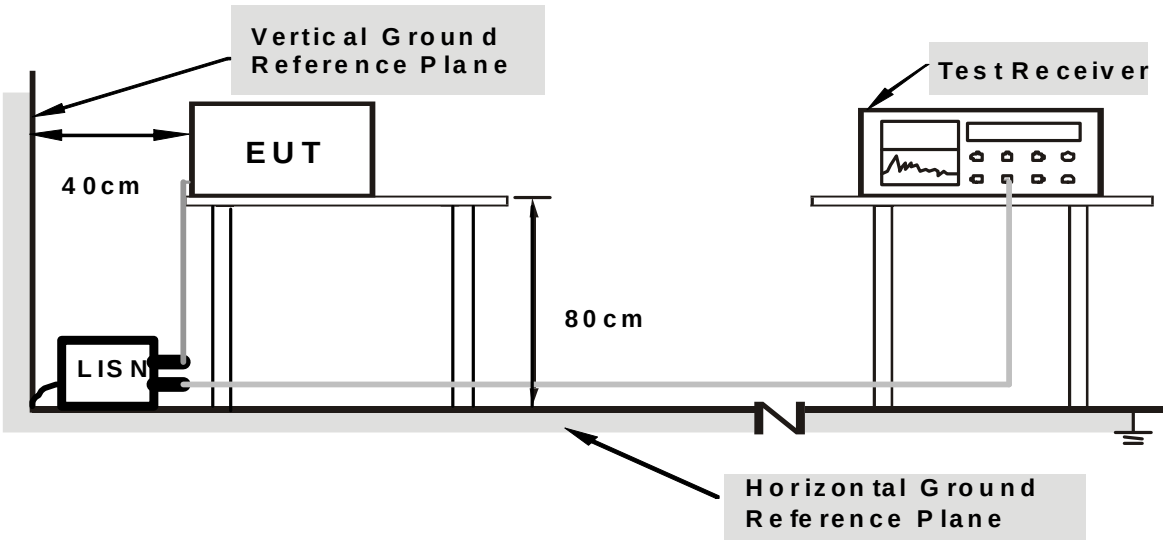
5.3 Test Arrangement

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 test results of conducted emissions at mains ports are recorded of six worst margins for quasi-peak (mandatory) [and average (if necessary)] values against the limits at frequencies of interest unless the margin is 20 dB or greater.

Note: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.



Note: Support units were connected to second LISN.

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

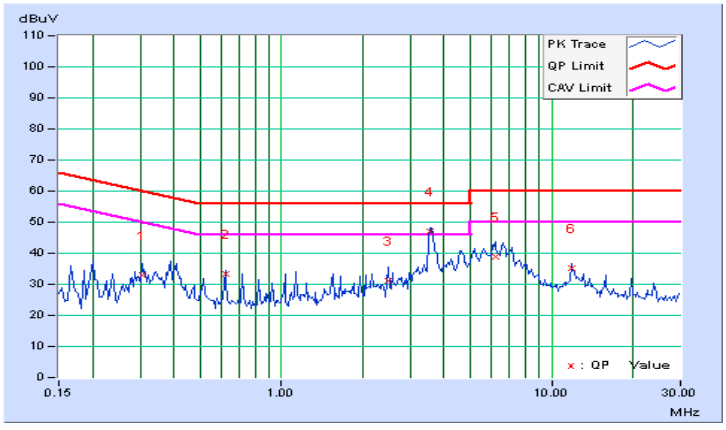
5.4 Test Results

Frequency Range	150kHz ~ 30MHz	**Detector Function & Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	230Vac, 50Hz (System)	**Environmental Conditions**	23℃, 78%RH
Tested by	Ian Chang		
Test Mode	Mode 1		

Phase Of Power : Line (L)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.30625	10.28	22.62	17.61	32.90	27.89	60.07	50.07	-27.18	-22.19
2	0.61875	10.33	22.85	22.42	33.18	32.75	56.00	46.00	-22.82	-13.25
3	2.47266	10.54	20.71	18.05	31.25	28.59	56.00	46.00	-24.75	-17.41
4	**3.54688**	**10.61**	**36.31**	**34.92**	**46.92**	**45.53**	**56.00**	**46.00**	**-9.08**	**-0.47**
5	6.17969	10.69	28.11	23.16	38.80	33.85	60.00	50.00	-21.20	-16.15
6	11.86719	10.83	24.26	21.70	35.09	32.53	60.00	50.00	-24.91	-17.47

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

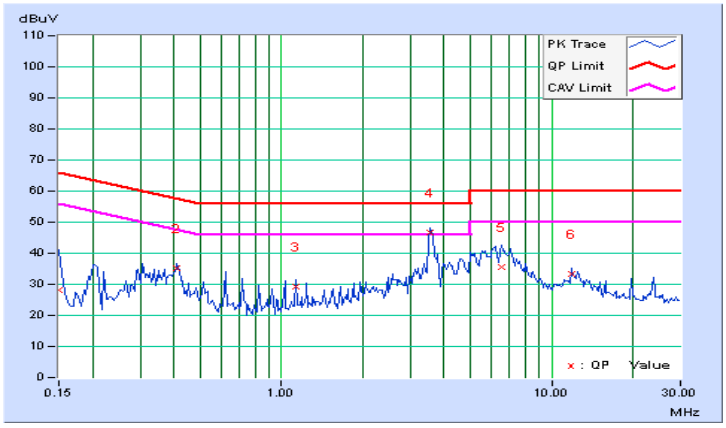


Frequency Range	150kHz ~ 30MHz	**Detector Function & Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	230Vac, 50Hz (System)	**Environmental Conditions**	23℃, 78%RH
Tested by	Ian Chang		
Test Mode	Mode 1		

Phase Of Power : Neutral (N)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.15000	10.22	17.90	7.97	28.12	18.19	66.00	56.00	-37.88	-37.81
2	0.41172	10.30	24.91	18.73	35.21	29.03	57.61	47.61	-22.40	-18.58
3	1.13672	10.41	18.67	17.38	29.08	27.79	56.00	46.00	-26.92	-18.21
4	3.54688	10.61	36.09	34.39	46.70	45.00	56.00	46.00	-9.30	-1.00
5	6.51563	10.68	24.86	20.93	35.54	31.61	60.00	50.00	-24.46	-18.39
6	11.87109	10.76	22.59	20.06	33.35	30.82	60.00	50.00	-26.65	-19.18

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



6 Radiated Disturbance up to 1 GHz

6.1 Limits

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

Notes: 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.

6.2 Test Instruments

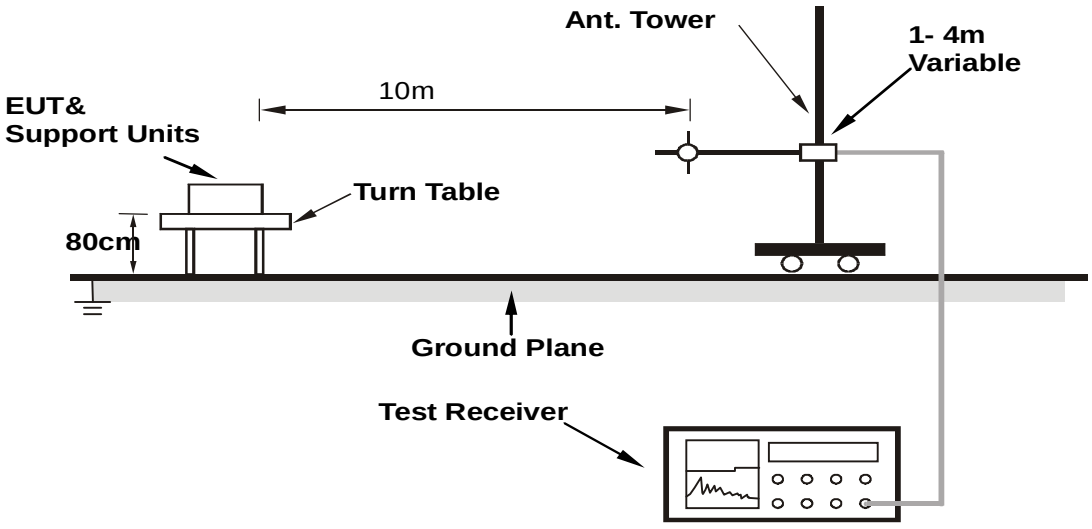
Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
ROHDE & SCHWARZ TEST RECEIVER	ESCI	100412	Aug. 24, 2015	Aug. 23, 2016
Schwarzbeck BILOG Antenna	VULB9168	9168-479	Feb. 02, 2015	Feb. 01, 2016
CT Turn Table	TT100	CT-0055	NA	NA
CT Tower	AT100	CT-0055	NA	NA
Software	Radiated_V7.6.15.9.4	NA	NA	NA
ADT RF Switches BOX	EM-H-01-1	1002	Jun. 17 2015	Jun. 16, 2016
WOKEN RF cable	8D	CABLE-ST6-01	Jun. 17 2015	Jun. 16, 2016

Notes: 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 Open Site No. 6.
3. The VCCI Site Registration No. R-728.
4. The FCC Site Registration No. 90427.
5. Tested Date: Dec. 23, 2015.

6.3 Test Arrangement

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 up to 1 GHz.

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



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

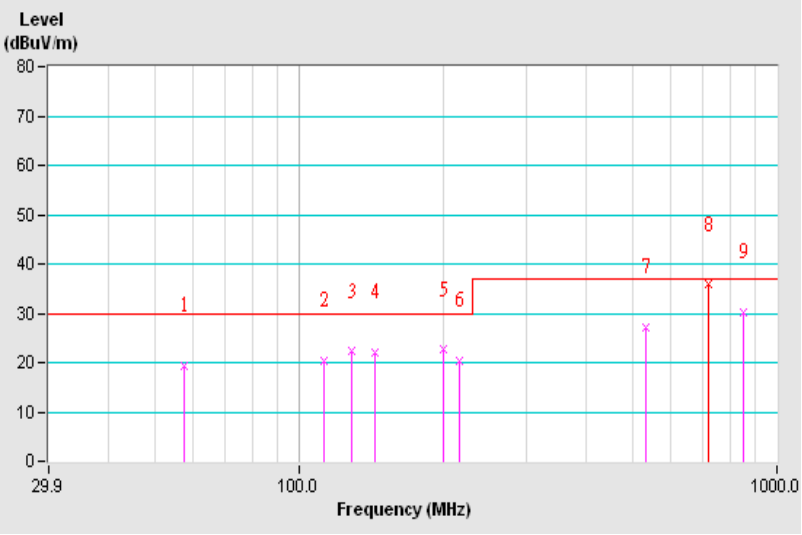
6.4 Test Results

Frequency Range	30MHz ~ 1GHz	Detector Function & Bandwidth	Quasi-Peak (QP), 120kHz
Tested by	Hermes Lin	Environmental Conditions	21℃, 75%RH
Test Mode	Mode 1		

Antenna Polarity & Test Distance : Horizontal at 10 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	57.26	19.33 QP	30.00	-10.67	1.00 H	166	5.09	14.24
2	112.41	20.33 QP	30.00	-9.67	1.00 H	203	8.22	12.11
3	128.69	22.24 QP	30.00	-7.76	1.00 H	359	8.54	13.70
4	144.08	21.97 QP	30.00	-8.03	1.00 H	134	6.73	15.24
5	200.24	22.58 QP	30.00	-7.42	1.00 H	223	10.26	12.32
6	216.00	20.29 QP	30.00	-9.71	1.00 H	169	7.76	12.53
7	531.20	27.17 QP	37.00	-9.83	1.00 H	207	4.27	22.90
8	**720.03**	**35.79 QP**	**37.00**	**-1.21**	**1.55 H**	**296**	**9.59**	**26.20**
9	851.50	30.23 QP	37.00	-6.77	1.54 H	262	1.77	28.46

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

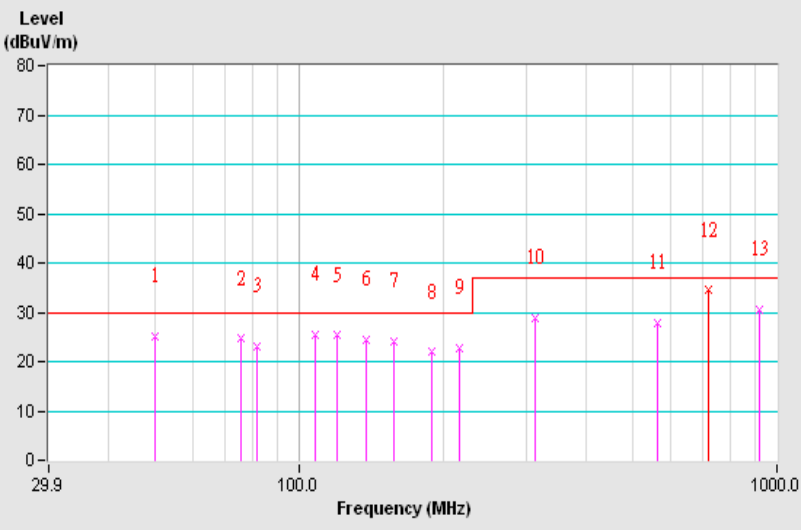


Frequency Range	30MHz ~ 1GHz	Detector Function & Bandwidth	Quasi-Peak (QP), 120kHz
Tested by	Hermes Lin	Environmental Conditions	21℃, 75%RH
Test Mode	Mode 1		

Antenna Polarity & Test Distance : Vertical at 10 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	50.01	25.07 QP	30.00	-4.93	1.00 V	164	10.36	14.71
2	75.55	24.60 QP	30.00	-5.40	1.00 V	227	13.10	11.50
3	81.33	22.97 QP	30.00	-7.03	1.00 V	281	12.87	10.10
4	108.27	25.50 QP	30.00	-4.50	1.00 V	57	13.86	11.64
5	120.28	25.26 QP	30.00	-4.74	1.00 V	314	12.36	12.90
6	138.43	24.44 QP	30.00	-5.56	1.00 V	9	9.81	14.63
7	157.52	24.23 QP	30.00	-5.77	1.00 V	250	8.87	15.36
8	190.00	21.88 QP	30.00	-8.12	1.00 V	28	9.16	12.72
9	216.00	22.71 QP	30.00	-7.29	1.00 V	316	10.18	12.53
10	311.81	28.82 QP	37.00	-8.18	1.00 V	0	11.51	17.31
11	563.49	27.82 QP	37.00	-9.18	3.76 V	20	4.36	23.46
12	720.04	34.41 QP	37.00	-2.59	2.39 V	61	8.21	26.20
13	921.00	30.53 QP	37.00	-6.47	1.56 V	145	0.68	29.85

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



7 General Immunity Requirements

EN 55024:2010, Immunity requirements				
Clause	Reference standard	Table	Test specification	Performance Criterion
4.2.1	EN/IEC 61000-4-2 ESD	1.3	Enclosure port: ±8kV Air discharge, ±4kV Contact discharge	B
4.2.3.2	EN/IEC 61000-4-3 RS	1.2	Enclosure port: 80-1000 MHz, 3V/m, 80% AM (1kHz)	A
4.2.5	EN/IEC 61000-4-5 Surge	2.2	Signal and telecommunication ports (direct to outdoor cables): 10/700 (5/320) (T_r/T_h) µs w/o primary protectors: ±1kV, or with primary protectors fitted: ±4kV	C
		3.2	Input DC power port (direct to outdoor cables): 1.2/50 (8/20) (T_r/T_h) µs Line to earth: ±0.5kV	B
		4.4	Input AC Power ports: 1.2/50 (8/20) (T_r/T_h) µs, Line to line: ±1kV Line to earth: ±2kV	
4.2.4	EN/IEC 61000-4-8 PFMF	1.1	Enclosure port: 50 or 60 Hz, 1A/m	A

7.1 Performance Criteria

General Performance Criteria

Performance 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.

Performance 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 phenomena 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 or 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.

Performance 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.

Product Specific 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.

8 Electrostatic Discharge Immunity Test (ESD)

8.1 Test Specification

Basic Standard:	EN/IEC 61000-4-2
Discharge Impedance:	330 ohm / 150 pF
Discharge Voltage:	Air Discharge: ±2, ±4, ±8kV (Direct) Contact Discharge: ±2, ±4kV (Direct/Indirect)
Number of Discharge:	Air – Direct: 10 discharges per location (each polarity) Contact – Direct & Indirect: 25 discharges per location (each polarity) and min. 200 times in total
Discharge Mode:	Single Discharge
Discharge Period:	1-second minimum

8.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
KeyTek, ESD Simulator	MZ-15/EC	0401299	Oct. 16, 2015	Oct. 15, 2016

Notes: 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 No. 3.
3. Tested Date: Jan. 7, 2016.

8.3 Test Arrangement

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 EN/IEC 61000-4-2:

a. Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation.

b. The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.

c. The time interval between two successive single discharges was at least 1 second.

d. The ESD generator was held perpendicularly to the surface to which the discharge was applied and the return cable was at least 0.2 meters from the EUT.

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

f. Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were complete.

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

h. At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the **V**ertical **C**oupling **P**lane in sufficiently different positions that the four faces of the EUT were completely illuminated. The **VCP** (dimensions 0.5m x 0.5m) was placed vertically to and 0.1 meters from the EUT.

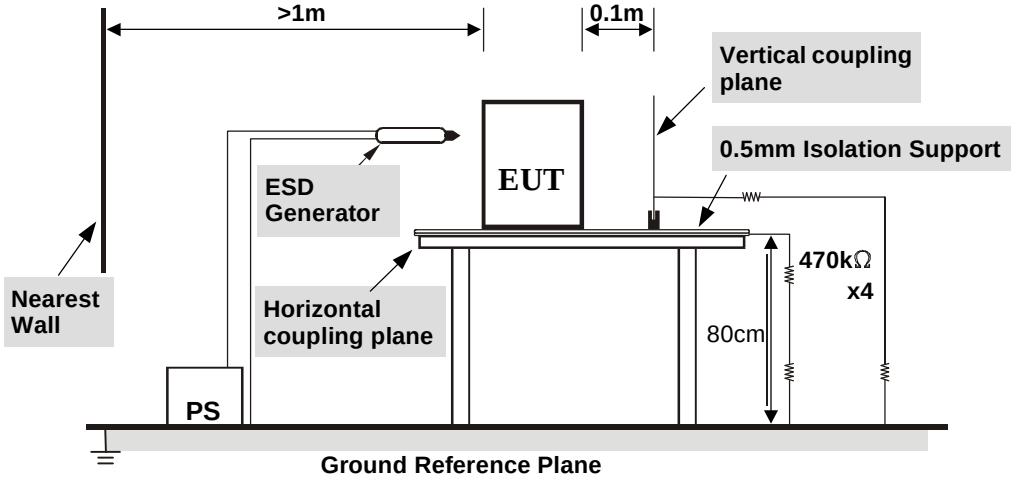


TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the **G**round **R**eference **P**lane. The **GRP** consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A **H**orizontal **C**oupling **P**lane (1.6m x 0.8m) was placed on the table and attached to the **GRP** by means of a cable with 940kΩ total impedance. The equipment under test, was installed in a representative system as described in section 7 of EN/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.

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

8.4 Test Results

Input Power	230 Vac, 50 Hz (System)	Tested by	Louis Liao
Environmental Conditions	24 °C, 48% RH 1013 mbar	Test mode	Mode 1

Test Results of Direct Application					
Discharge Level (kV)	Polarity (+/-)	Test Point	Contact Discharge	Air Discharge	Performance Criterion
2, 4	+/-	1, 2	Note 2	NA	B
2, 4	+/-	3	NA	Note 1	A
8	+/-	3	NA	Note 2	B

Description of test points of direct application: Please refer to following page for representative mark only.

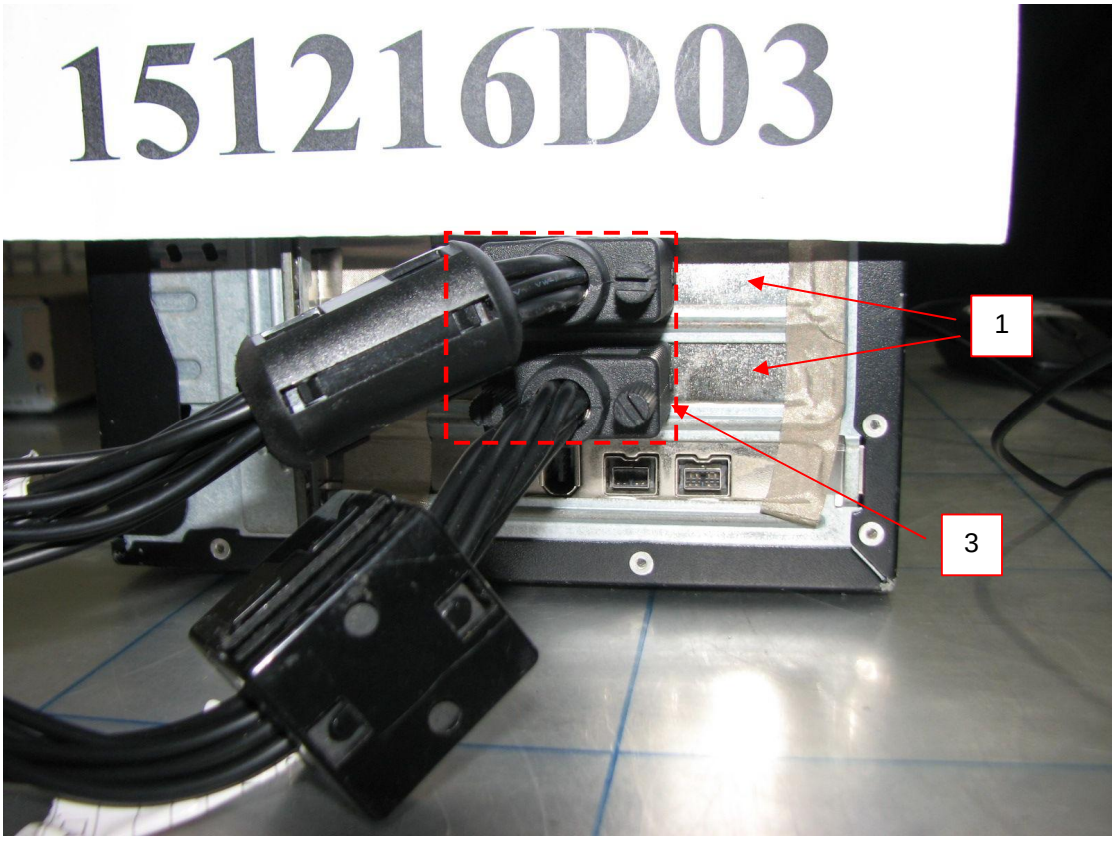
Test Results of Indirect Application					
Discharge Level (kV)	Polarity (+/-)	Test Point	Horizontal Coupling Plane	Vertical Coupling Plane	Performance Criterion
2, 4	+/-	Four Sides	Note 2	Note 2	B

Description of test points of indirect application:

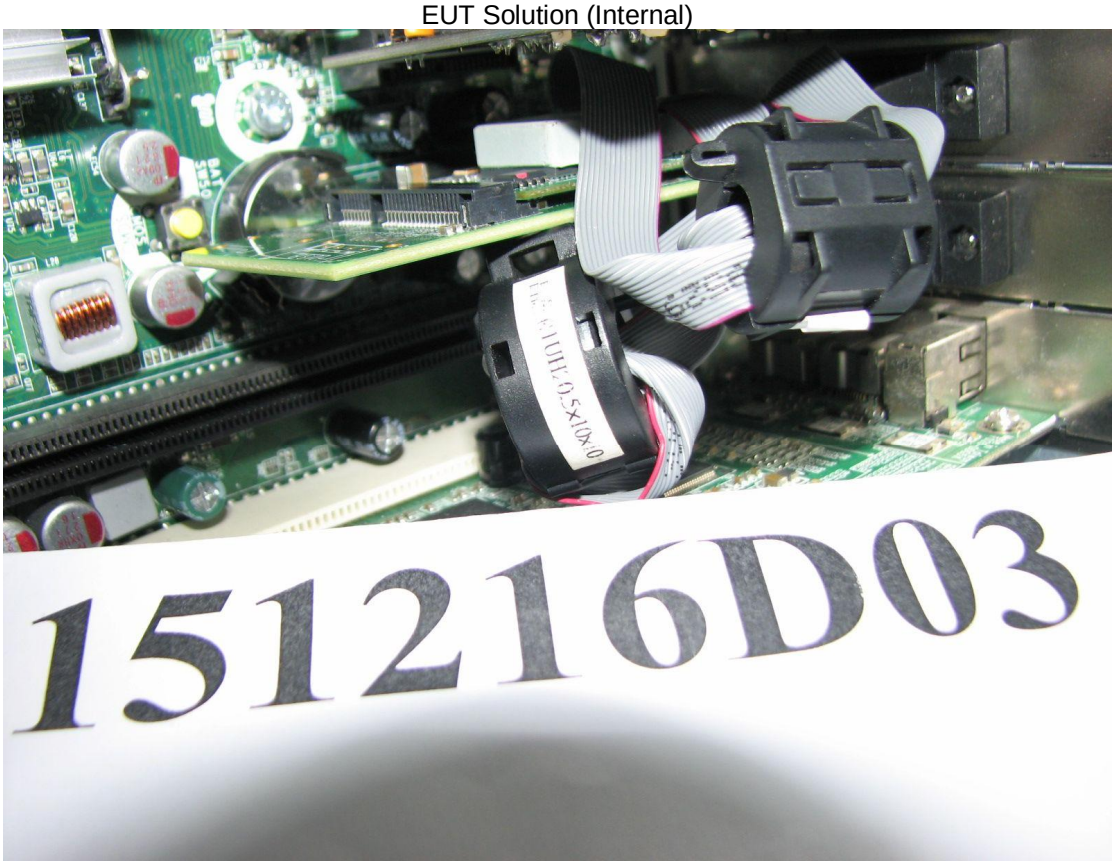
1. Front side 2. Rear side 3. Right side 4. Left side

Note: 1. The EUT function was correct during the test.
2. There was white dots flashing disturbance on screen during the test, but self-recoverable after the test.

Description of Test Points



EUT Solution (Internal)



9 Radiated, Radio-frequency, Electromagnetic Field Immunity Test (RS)

9.1 Test Specification

Basic Standard:	EN/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

9.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Agilent Signal Generator	E8257D	MY48050465	Jul. 21, 2015	Jul. 20, 2016
PRANA RF Amplifier	AP32DP280	0811-894	NA	NA
TESEQ RF Amplifier	CBA1G-150	T44220	NA	NA
AR RF Amplifier	35S4G8AM4	0326094	NA	NA
AR RF Amplifier	100S1G4M3	0329249	NA	NA
AR Controller	SC1000M3	305910	NA	NA
Radisense Electric Field Sensor	CTR1002A	08D00057SNO-07	Nov. 25, 2015	Nov. 24, 2016
BOONTON RF Voltage Meter	4232A	10180	Jun. 01, 2015	May 31, 2016
BOONTON Power Sensor	51011-EMC	34152	Jun. 01, 2015	May 31, 2016
BOONTON Power Sensor	51011-EMC	34153	Jun. 01, 2015	May 31, 2016
AR Log-Periodic Antenna	AT6080	0329465	NA	NA
EMCO BiconiLog Antenna	3141	1001	NA	NA
AR High Gain Antenna	AT4002A	306533	NA	NA
AR High Gain Horn Antenna	AT4010	0329800	NA	NA
CHANCE MOST Full Anechoic Chamber (9x5x3m)	Chance Most	RS-002	Feb. 05, 2015	Feb. 04, 2016
Software	RS_V7.6	NA	NA	NA

Notes: 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 RS Room No.2.
3. Tested Date: Dec. 30, 2015.

9.3 Test Arrangement

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

a. The testing was performed in a modified semi-anechoic chamber.

b. The frequency range is swept from 80 MHz to 1000 MHz, with the signal 80% amplitude modulated with a 1kHz sine wave.

c. The field strength level was 3 V/m.

d. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

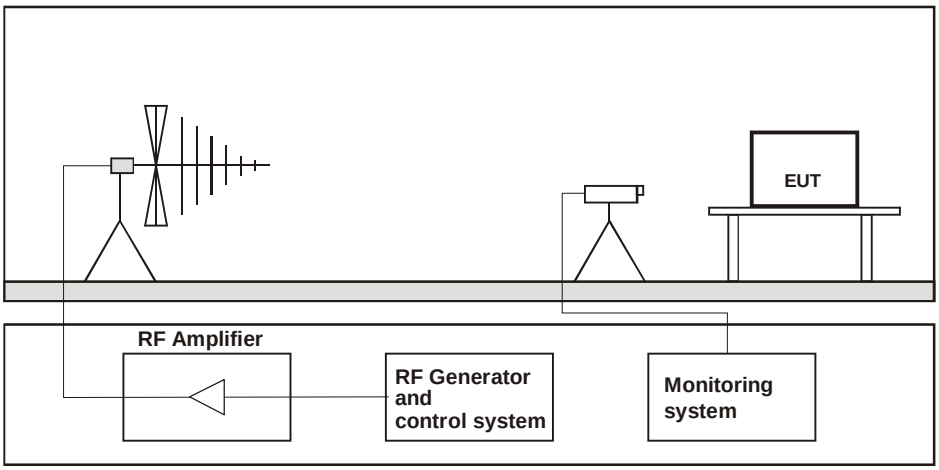


Table-top Equipment

The EUT installed in a representative system as described in section 7 of EN/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.

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

9.4 Test Results

Input Power	230 Vac, 50 Hz (System)	Tested by	Michael Cheng
Environmental Conditions	25 °C, 66% RH	Test mode	Mode 1

Frequency (MHz)	Polarity	Azimuth(°)	Applied Field Strength		Observation	Performance Criterion
			(V/m)	Modulation		
80 -1000	V&H	0	3	80% AM (1kHz)	Note	A
80 -1000	V&H	90	3	80% AM (1kHz)	Note	A
80 -1000	V&H	180	3	80% AM (1kHz)	Note	A
80 -1000	V&H	270	3	80% AM (1kHz)	Note	A

Note: The EUT function was correct during the test.

10 Surge Immunity Test

10.1 Test Specification

Basic Standard:	EN/IEC 61000-4-5
Wave-Shape:	Signal / telecommunication port (direct to outdoor cables*): 10/700 μs Open Circuit Voltage 5/320 μs Short Circuit Current
	Input DC power port (direct to outdoor cables*): 1.2/50 μs Open Circuit Voltage 8/20 μs Short Circuit Current
	Input AC power port: 1.2/50 μs Open Circuit Voltage 8/20 μs Short Circuit Current
Test Voltage:	Signal and telecommunication ports**: w/o primary protectors: ±0.5kV,±1kV, with primary protectors fitted: N/A
	Input DC power port: Line to earth or ground: N/A
	Input AC power ports: Line to line: N/A Line to earth or ground: N/A
AC Phase Angle (degree):	0°, 90°, 180°, 270°
Pulse Repetition Rate:	1 time / 30 sec.
Number of Tests:	5 positive and 5 negative at selected points

* This test is only applicable only to ports, which according to the manufacturer's specification, may connect directly to outdoor cables.

** For ports where primary protection is intended, surges are applied at voltages up to 4 kV with the primary protectors fitted. Otherwise the 1 kV test level is applied without primary protection in place.

10.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
TESEQ, Surge Simulator	NSG 3060	1572	May 20, 2015	May 19, 2016
Coupling Decoupling Network	CDN-UTP8	028	Aug. 20, 2015	Aug. 19, 2016
TESEQ Coupling Decoupling Network	CDN HSS-2	41009	Aug. 05, 2015	Aug. 04,2016
TESEQ Coupling Decoupling Networ	CDN 118-T8	40386	Aug. 31, 2015	Aug. 30,2016

Notes: 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 No. 2.
3. Tested Date: Jan. 4, 2016.

10.3 Test Arrangement

a. Input AC/DC Power ports:

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. Signal and telecommunication ports,

I Unshielded unsymmetrical interconnection lines:

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.

I Unshielded symmetrical interconnections communication lines:

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.

I High speed communications lines

Prior to the test, the correct operation of the port shall be verified; the external connection shall then be removed and the surge applied directly to the port's terminals with no coupling /decoupling network. After the surge, the correct operation of the port shall again be verified.

I Shielded lines:

- Direct application,

The EUT is isolated from ground and the surge is applied to its metallic enclosure; the termination (or auxiliary equipment) at the port(s) under test is grounded. This test applies to equipment with single or multiple shielded cables.

Rules for application of the surge to shielded lines:

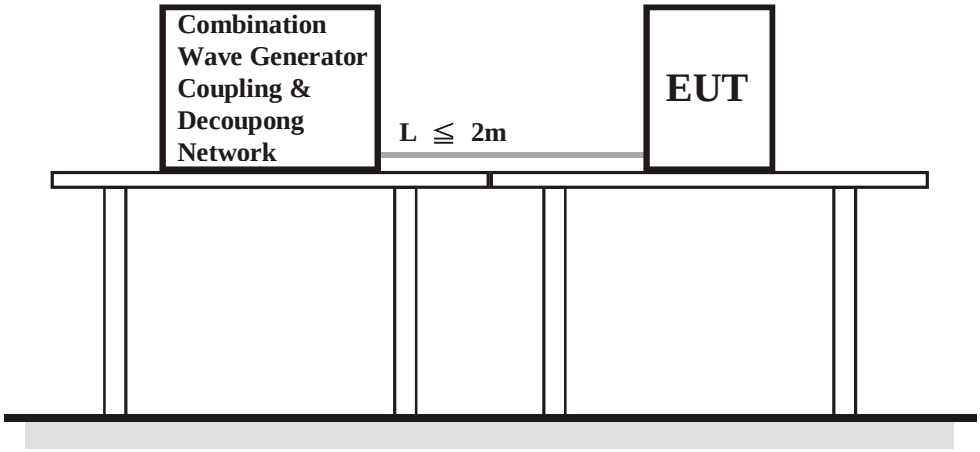
a) Shields grounded at both ends
   - The surge injection on the shield.

b) Shields grounded at one end
   - If in the installation the shield is connected only at the auxiliary equipment, test shall be done in that configuration but with the generator still connected to the EUT side. If cable lengths allow, the cables shall be on insulated supports 0,1 m above the ground plane or cable tray.

For products which do not have metallic enclosures, the surge is applied directly to the shielded cable.

- Alternative coupling method for testing single cables in a multi-shield configuration,

Surges are applied in close proximity to the interconnection cable under test by a wire. The length of the cable between the port(s) under test and the device attached to the other end of the cable shall be the lesser of: the maximum length permitted by the EUT's specification, or 20 m. Where the length exceeds 1 m, excess lengths of cables shall be bundled at the approximate centre of the cables with the bundles 30 cm to 40 cm in length.



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

10.4 Test Results

Input Power	230 Vac, 50 Hz (System)	Tested by	Louis Liao
Environmental Conditions	21 °C, 70% RH	Test mode	Mode 1

Signal port (direct to outdoor cables)

Voltage (kV)	Test Point	Polarity (+/-)	Observation	Performance Criterion
0.5	Screen of Video in	+/-	Note 1	B
1		+/-	Note 2	C
0.5	Screen of Audio in	+/-	Note 1	B
1		+/-	Note 2	C

Note: 1. There was white dots flashing disturbance on screen during the test, but self-recoverable after the test.
2. System lockup during the test, but could be restored by the operator.

11 Power Frequency Magnetic Field Immunity Test

11.1 Test Specification

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

11.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
HAEFELY Magnetic Field Tester	MAG 100	083794-06	NA	NA
COMBINOVA Magnetic Field Meter	MFM10	224	Apr. 24, 2015	Apr. 23, 2016

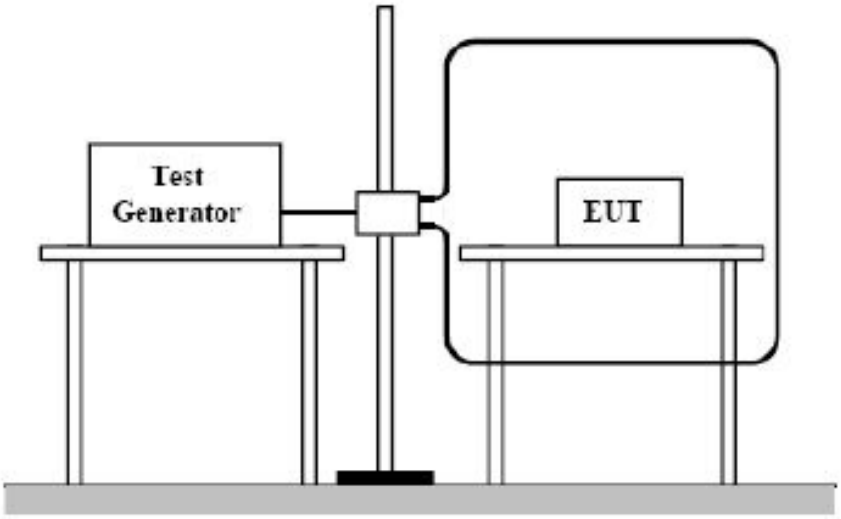
Notes: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in EMS Room No. 1
3. Tested Date: Dec. 31, 2015.

11.3 Test Arrangement

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.



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.

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

11.4 Test Results

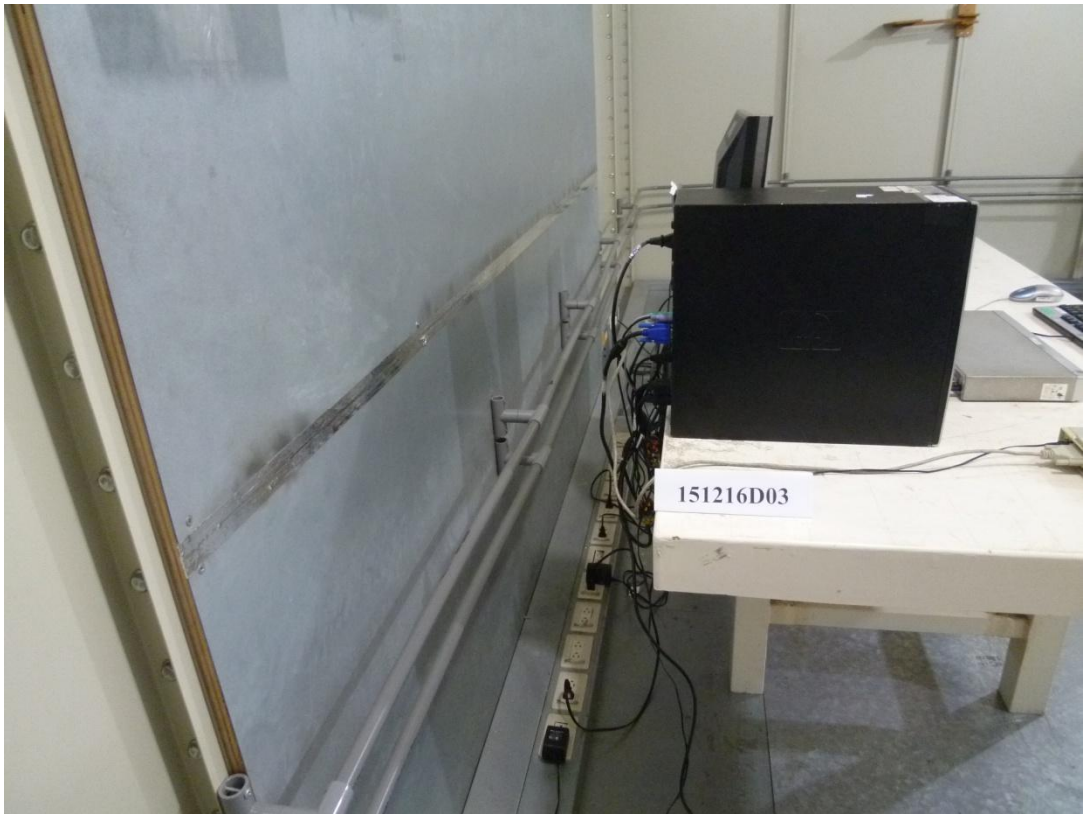
Input Power	230 Vac, 50 Hz (System)	Tested by	Louis Liao
Environmental Conditions	22 °C, 66% RH	Test mode	Mode 1

Application	Frequency (Hz)	Field Strength (A/m)	Observation	Performance Criterion
X - Axis	50	1	Note	A
Y - Axis	50	1	Note	A
Z - Axis	50	1	Note	A

Note: The EUT function was correct during the test.

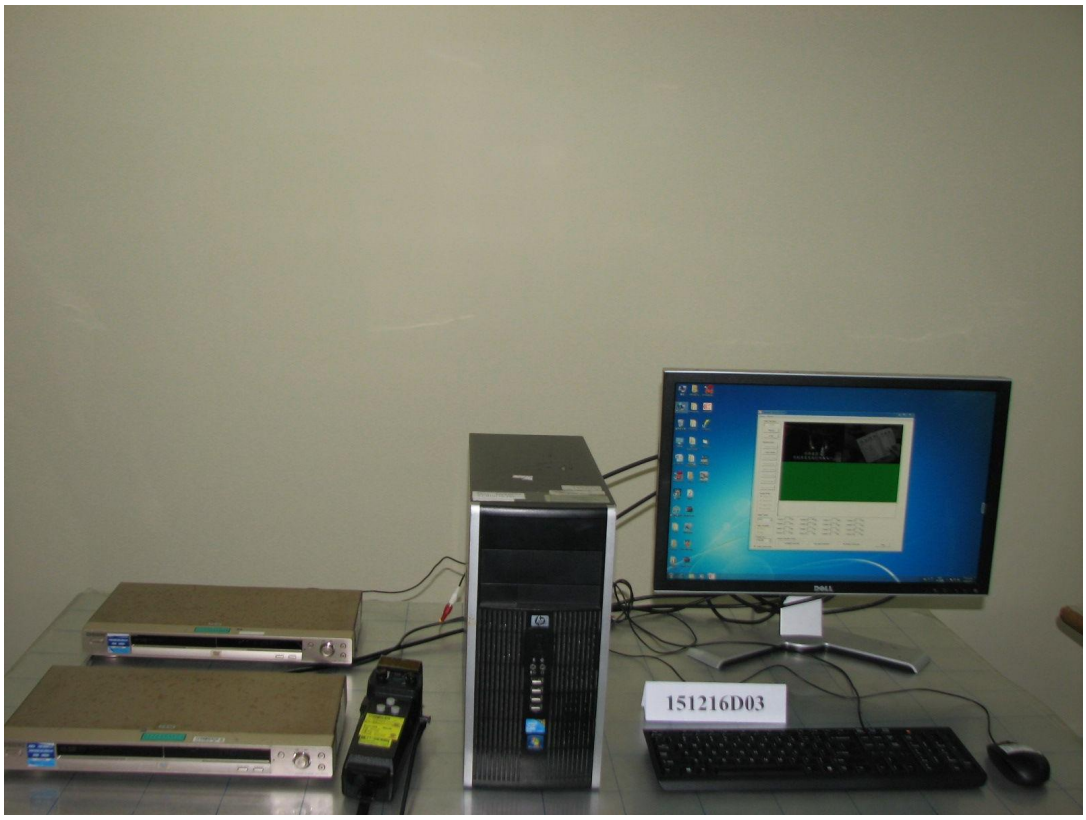
12 Pictures of Test Arrangements

12.1 Conducted Disturbance at Mains Ports



12.2 Radiated Disturbance up to 1 GHz

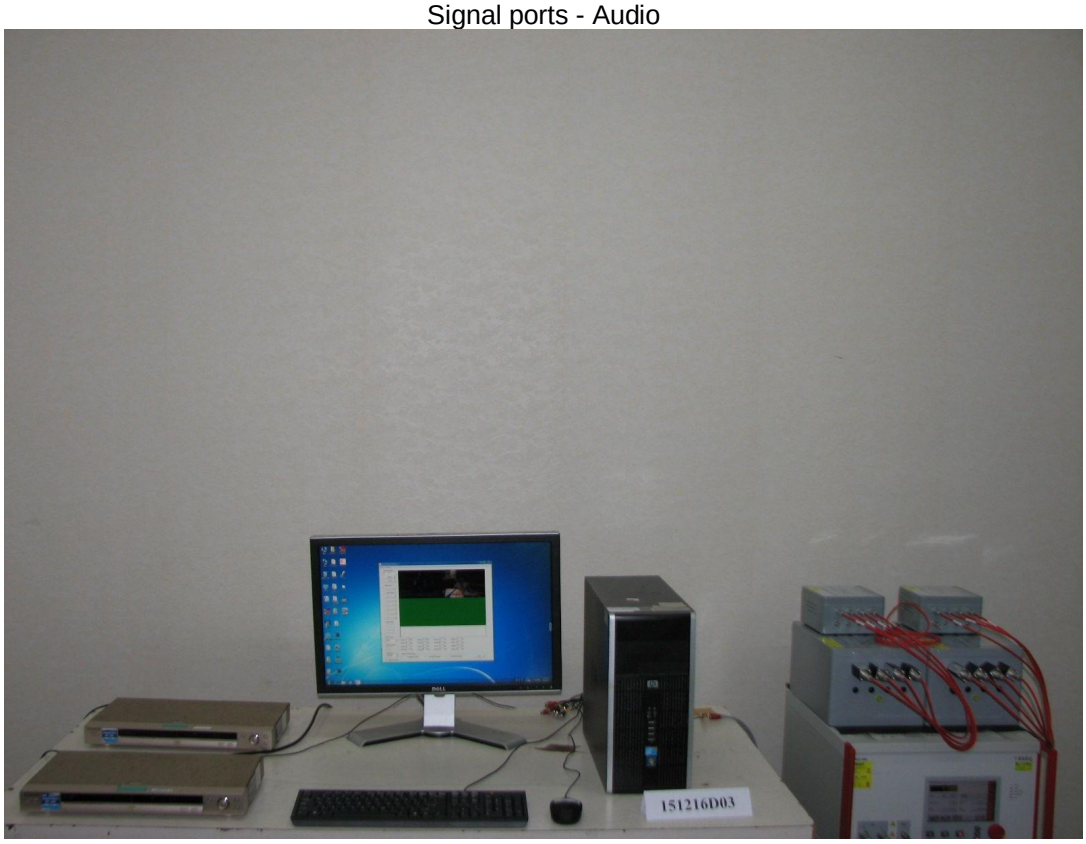
12.3 Electrostatic Discharge Immunity Test (ESD)



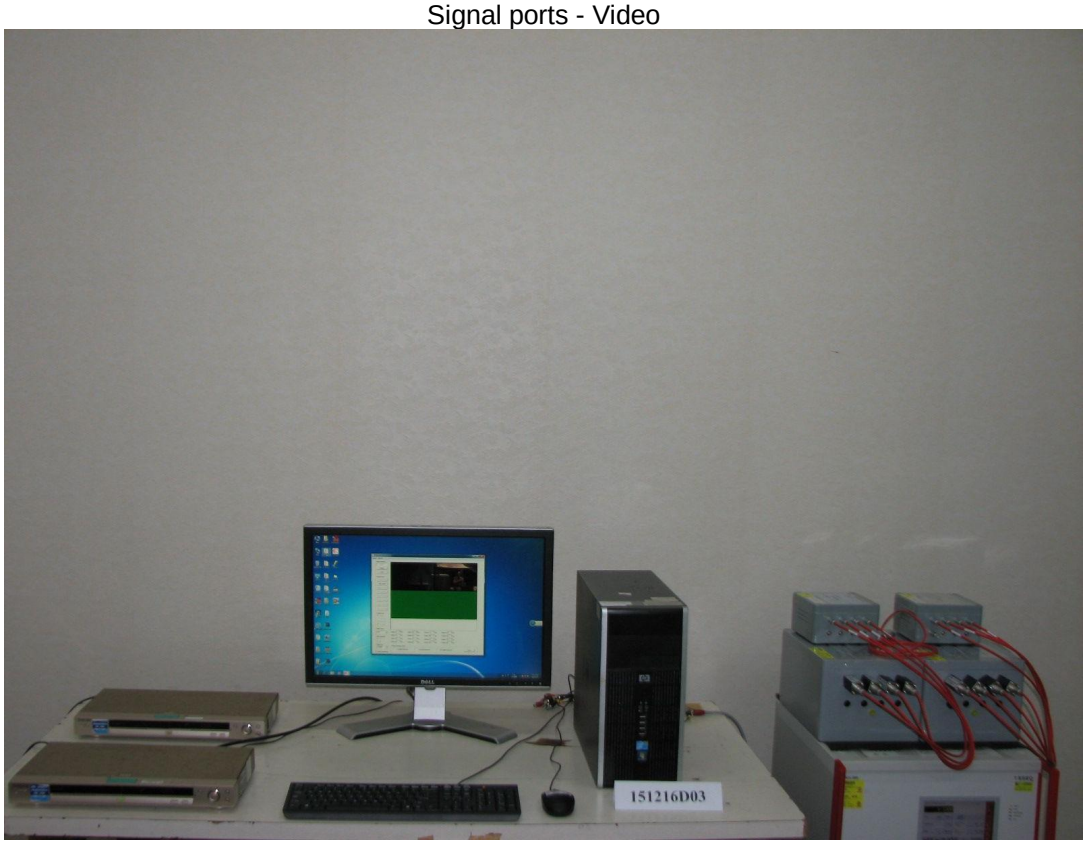
12.4 Radio-frequency, Electromagnetic Field Immunity Test (RS)

12.5 Surge Immunity Test

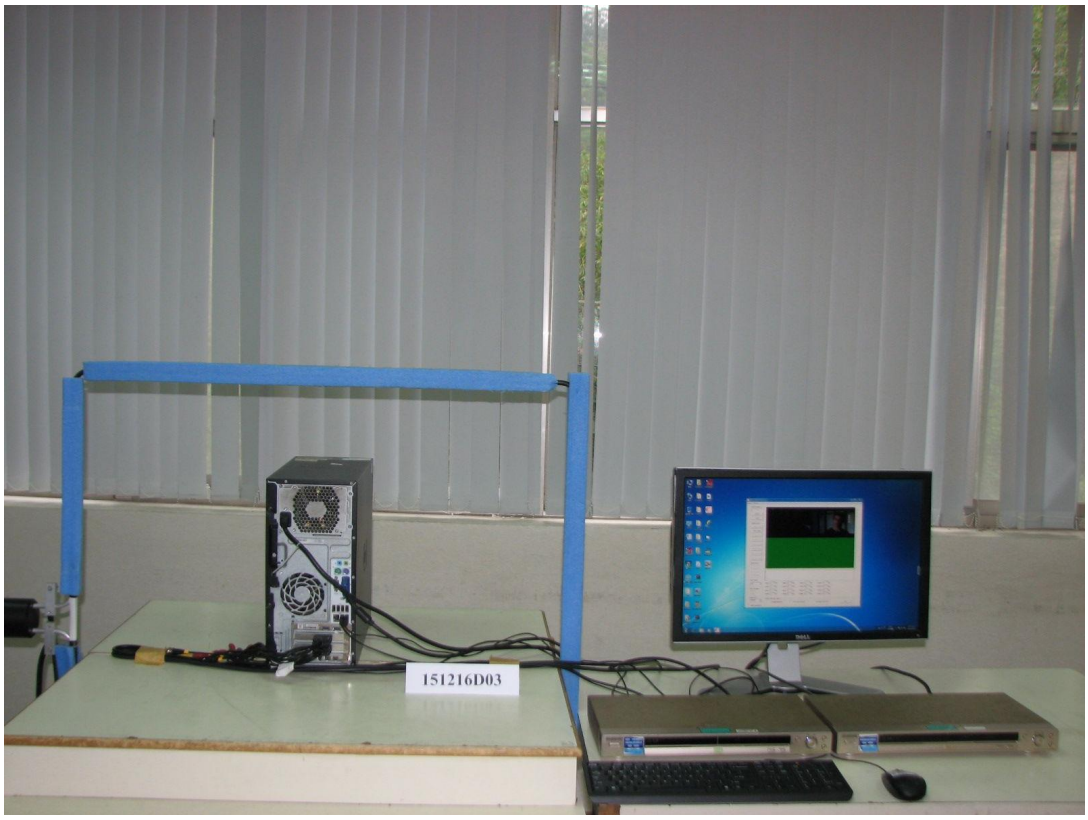
Signal ports - Audio



Signal ports - Video



12.6 Power Frequency Magnetic Field Immunity Test (PFMF)



Appendix – Information on the Testing Laboratories

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

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

Linko EMC/RF Lab
Tel: 886-2-26052180
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Web Site: www.bureauVeritas-adt.com

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

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