

CE EMC Test Report

Report No.: EN150512D04A

Test Model: P212

Model No.: Refer to item 3.2

Received Date: Nov. 24, 2016

Test Date: Dec. 1 ~ 2, 2016

Issued Date: Dec. 6, 2016

Applicant: TOP VICTORY ELECTRONICS (TAIWAN) CO., LTD.

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

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Release Control Record

Issue No.	Description	Date Issued
EN150512D04A	Original release.	Dec. 6, 2016

1 Certificate of Conformity

Product: LCD Monitor
Brand: NEC
Test Model: P212
Model No.: Refer to item 3.2
Sample Status: Engineering sample
Applicant: TOP VICTORY ELECTRONICS (TAIWAN) CO., LTD.
Test Date: Dec. 1 ~ 2, 2016
Standards: EN 55032:2012 +AC:2013, Class B
CISPR 32:2012+Cor 2, Class B
AS/NZS CISPR 32:2013, Class B

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.

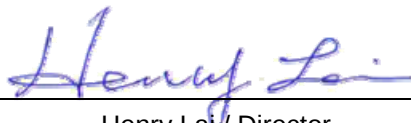
Prepared by :



, Date: Dec. 6, 2016

Albee Chu / Specialist

Approved by :



, Date: Dec. 6, 2016

Henry Lai / Director

2 Summary of Test Results

Emission				
Standard	Clause	Test Item	Result/Remarks	Verdict
EN 55032:2012 +AC:2013 / CISPR 32:2012+Cor2	A.3	Conducted emission from the AC mains power port	Minimum passing Class B margin is -4.03 dB at 0.64609 MHz	Pass
EN 55032:2012 +AC:2013 / CISPR 32:2012+Cor2	A.3	Asymmetric mode conducted emission at telecommunication ports	Without telecom port of the EUT	N/A
EN 55032:2012 +AC:2013 / CISPR 32:2012+Cor2	A.2	Radiated emission 30-1000 MHz	Minimum passing Class B margin is -4.02 dB at 531.47 MHz	Pass
EN 55032:2012 +AC:2013 / CISPR 32:2012+Cor2	A.2	Radiated emission above 1GHz	Minimum passing Class B margin is -4.63 dB at 2790.37 MHz	Pass

Note: There is no deviation to the applied test methods and requirements covered by the scope of this report.

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	Expanded Uncertainty (k=2) ($\pm$)	Maximum allowable uncertainty ($\pm$)
Conducted emission from AC mains power port using AMN, 150kHz ~ 30MHz	2.77 dB	3.4 dB (U_{cispr})
Radiated emission, 30MHz ~ 1GHz	4.01 dB	6.3 dB (U_{cispr})
Radiated emission, 1GHz ~ 6GHz	4.92 dB	5.2 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 TOP VICTORY ELECTRONICS (TAIWAN) CO., LTD., for detailed feature description, please refer to the manufacturer's specifications or user's manual.

3.2 General Description of EUT

Product	LCD Monitor
Brand	NEC
Test Model	P212
Model No.	Refer to note as below
Model Difference	Refer to note as below
Sample Status	Engineering sample
Operating Software	N/A
Power Supply	Internal switching power supply Rating: 100-240Vac, 50/60Hz Power Cord: Non-Shielded AC cable (1.8m)
Accessory Device	N/A
Data Cable Supplied	Shielded DVI cable (1.8m) with two ferrite cores Shielded DisplayPort cable (1.8m) Shielded HDMI cable (1.8m) Non-Shielded Audio cable (1.8 m) with two ferrite cores

Note:

1. This report is issued as a supplementary report to the original BV CPS report no.: CE150512D04 R1.
The difference compared with the original report is updating standard from EN55022 to EN55032.
Therefore conducted emission, radiated emission testing need to be verified for the test. Other testing is described as original one.
2. The EUT is a LCD Monitor with resolution is up to 1600 x 1200.
3. The EUT has several models as below:

Model No.	Difference	Interface
P212	Marketing differentiation	◆ HDMI ◆ DVI ◆ DisplayPort ◆ D-Sub ◆ USB 3.0 x4 ◆ Audio in ◆ Audio out ◆ AC in
MultiSync P212		
MultiSync P212-BK		
L214AD		
P212-BK		

During the test, **model: P212** was selected as the representative one and therefore only its test data was recorded this report.

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

1. The EUT was pre-tested under operating and standby condition and the worst emission level was found under **operating condition**.
2. During the test, the EUT was tested with previous worst case as following:

Mode	Interface / Resolution
1	HDMI/ 1600 x 1200 (60Hz)
2	HDMI to DVD/ 720p

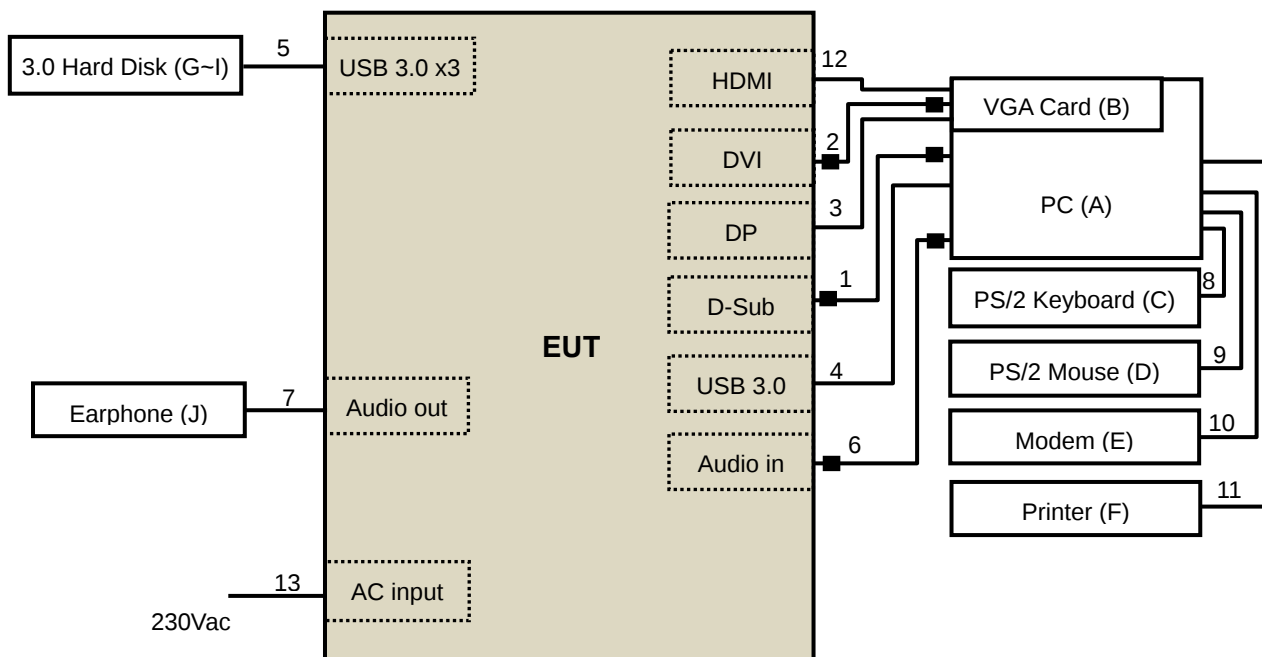
3.4 Test Program Used and Operation Descriptions

- a. Installed VGA card and USB 3.0 card into PC.
- b. Turned on the power of all equipments.
- c. PC ran a test program (WINEMC) to enable all functions.
- d. PC read and wrote messages from HDD.
- e. EUT read and wrote data from/ to ext. HDDs.
- f. PC sent "color bar patterns" messages to EUT, and then displayed them on the screen. **(for Mode 1)**
- g. DVD player sent color bars to EUT and then they displayed them on their screen. **(for Mode 2)**
- h. PC sent messages to printer and printer printed them out.
- i. PC sent messages to modem.
- j. PC/ DVD sent 1kHz audio signal to earphone via EUT.
- k. Steps c-j were repeated.

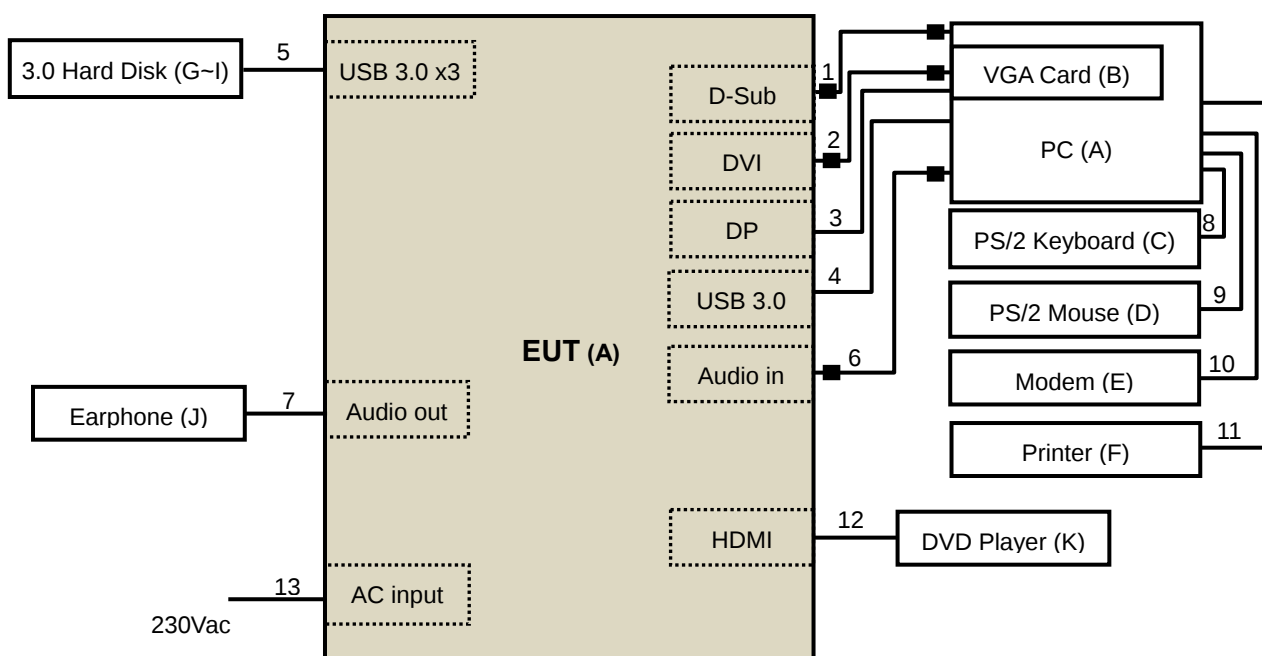
4 Configuration and Connections with EUT

4.1 Connection Diagram of EUT and Peripheral Devices

Mode 1



Mode 2



4.2 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	PERSONAL COMPUTER	HP	HP ProDesk 400 G1 MT	SGH449P2P9	FCC DoC Approved	Provided by Lab
B.	VGA CARD	ASUS	STRIX-GTX980-DC 20C-4GD5	EBYVCM102330	FCC DoC Approved	Provided by Lab
C.	PS/2 KEYBOARD	HP	KB-0316	BC3520BGAUJ010	FCC DoC Approved	Provided by Lab
D.	PS/2 MOUSE	HP	N8ROP-02	N/A	FCC DoC Approved	Provided by Lab
E.	MODEM	ACEEX	1414	0206026747	IFAXDM1414	Provided by Lab
F.	PRINTER	LEXMARK	Z33	03331652893	FCC DoC Approved	Provided by Lab
G.	USB 3.0 Hard Disk	WD	WDBUZG0010BBK-PESN	WXF1E15ED8MF	FCC DoC Approved	Provided by Lab
H.	USB 3.0 Hard Disk	WD	WDBUZG0010BBK-PESN	WXN1E84CDYR1	FCC DoC Approved	Provided by Lab
I.	USB 3.0 Hard Disk	WD	WDBUZG0010BBK-PESN	WXF1E84H2ASN	FCC DoC Approved	Provided by Lab
J.	EARPHONE	PHILIPS	SBC HL150	H2010149	N/A	Provided by Lab
K.	DVD PLAYER (for mode 2 only)	SONY	BDP-S470	3205078	Verification	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 cable	1	1.8	Y	2	Provided by Lab
2.	DVI cable	1	1.8	Y	2	Supplied by client
3.	DP cable	1	1.8	Y	0	Supplied by client
4.	USB cable	1	1.2	Y	0	Provided by Lab
5.	USB cable	3	0.5	Y	0	Provided by Lab
6.	Audio cable	1	1.8	N	2	Supplied by client
7.	Audio cable	1	1.2	N	0	Provided by Lab
8.	PS/2 cable	1	1.8	Y	0	Provided by Lab
9.	PS/2 cable	1	1.8	Y	0	Provided by Lab
10.	RS232 cable	1	1.5	Y	0	Provided by Lab
11.	USB cable	1	1.8	Y	0	Provided by Lab
12.	HDMI cable	1	1.8	Y	0	Supplied by client
13.	AC power cable	1	1.8	N	0	Supplied by client

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

5 Conducted Emission from the AC Mains Power Port

5.1 Limits

EN 55032 Table clause	Frequency range (MHz)	Coupling device	Detector type / bandwidth	Class A limits (dBuV)
A8.1	0.15 - 0.5	AMN	Quasi-peak / 9kHz	79
	0.5 - 30.0			73
A8.2	0.15 - 0.5		Average / 9kHz	66
	0.5 - 30.0			60

EN 55032 Table clause	Frequency range (MHz)	Coupling device	Detector type / bandwidth	Class B limits (dBuV)
A9.1	0.15 - 0.5	AMN	Quasi-peak / 9kHz	66 - 56
	0.5 - 5			56
	5 - 30.0			60
A9.2	0.15 - 0.5		Average / 9kHz	56 - 46
	0.5 - 5			46
	5 - 30.0			50

5.2 Test Instruments

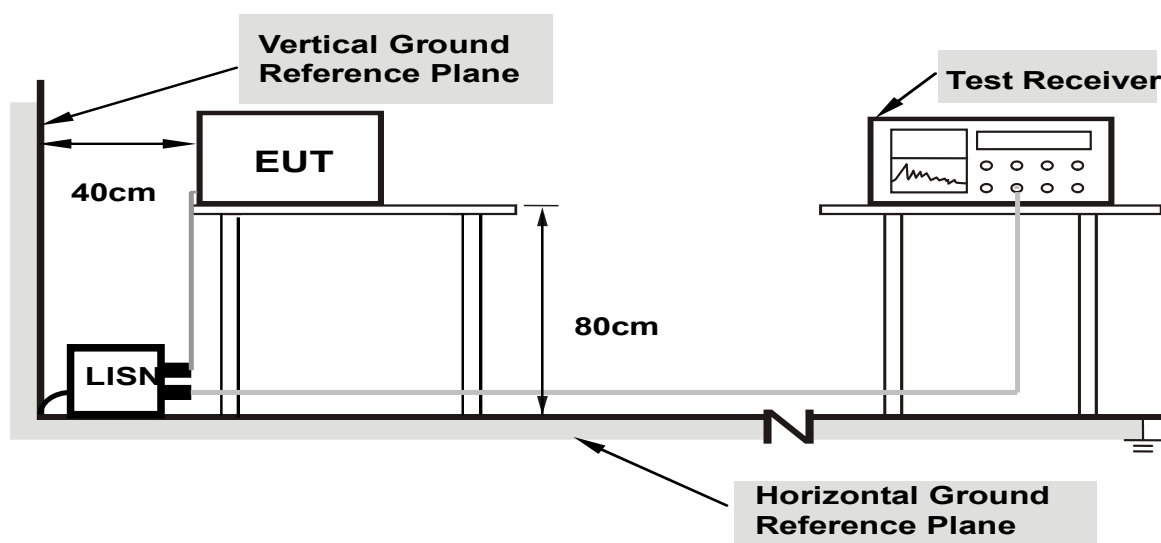
Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
ROHDE & SCHWARZ TEST RECEIVER	ESCS 30	100276	Apr. 12, 2016	Apr. 11, 2017
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ENV216	101197	May 04, 2016	May 03, 2017
LISN With Adapter (for EUT)	AD10	C10Ada-002	May 04, 2016	May 03, 2017
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	100218	Nov. 23, 2016	Nov. 22, 2017
SCHWARZBECK Artificial Mains Network (For EUT)	NNLK8129	8129229	May 04, 2016	May 03, 2017
Software	Cond_V7.3.7.4	NA	NA	NA
RF cable (JYEBAO) With 10dB PAD	5D-FB	Cable-C10.01	Feb. 15, 2016	Feb. 14, 2017
SUHNER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-011484	May 12, 2016	May 11, 2017
ROHDE & SCHWARZ Artificial Mains Network (For TV EUT)	ESH3-Z5	100220	Nov. 08, 2016	Nov. 07, 2017
LISN With Adapter (for TV EUT)	100220	N/A	Nov. 08, 2016	Nov. 07, 2017

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. 10.
 3. The VCCI Site Registration No. C-1852.
 4. Tested Date: Dec. 2, 2016.

5.3 Test Arrangement

- 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 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: 1. Support units were connected to second LISN.
2. The distance specified between EUT/AE and other metallic objects is ≥ 0.8 m in the measurement arrangement for table-top EUT.

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

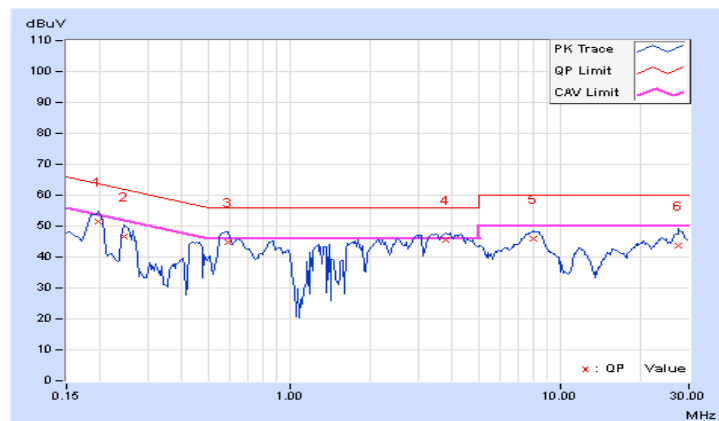
5.4 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	230Vac, 50Hz	Environmental Conditions	25°C, 87%RH, 1015mbar
Tested by	Vincent Chen		
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	0.19687	9.70	41.73	34.66	51.43	44.36	63.74	53.74	-12.31	-9.38
2	0.24375	9.70	36.93	24.49	46.63	34.19	61.97	51.97	-15.34	-17.78
3	0.59531	9.71	35.23	22.27	44.94	31.98	56.00	46.00	-11.06	-14.02
4	3.76563	9.86	35.60	21.41	45.46	31.27	56.00	46.00	-10.54	-14.73
5	7.96875	9.90	36.01	22.46	45.91	32.36	60.00	50.00	-14.09	-17.64
6	27.52734	9.98	33.72	24.19	43.70	34.17	60.00	50.00	-16.30	-15.83

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

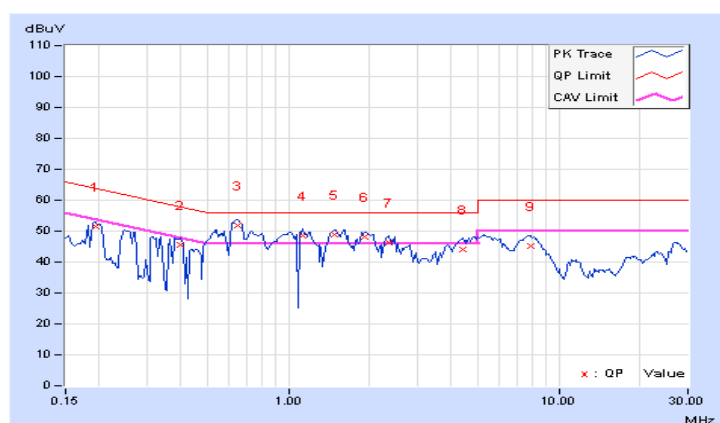


Frequency Range	150kHz ~ 30MHz	Detector Function & Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	230Vac, 50Hz	Environmental Conditions	25°C, 87%RH, 1015mbar
Tested by	Vincent Chen		
Test Mode	Mode 1		

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	0.19297	9.69	41.64	34.96	51.33	44.65	63.91	53.91	-12.58	-9.26
2	0.39609	9.69	35.87	25.80	45.56	35.49	57.93	47.93	-12.37	-12.44
3	0.64609	9.71	42.26	28.13	51.97	37.84	56.00	46.00	-4.03	-8.16
4	1.13672	9.74	38.87	24.66	48.61	34.40	56.00	46.00	-7.39	-11.60
5	1.47656	9.75	39.11	25.82	48.86	35.57	56.00	46.00	-7.14	-10.43
6	1.91406	9.77	38.25	23.92	48.02	33.69	56.00	46.00	-7.98	-12.31
7	2.35156	9.79	36.59	22.28	46.38	32.07	56.00	46.00	-9.62	-13.93
8	4.41797	9.86	34.23	16.37	44.09	26.23	56.00	46.00	-11.91	-19.77
9	7.85156	9.89	35.28	20.98	45.17	30.87	60.00	50.00	-14.83	-19.13

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

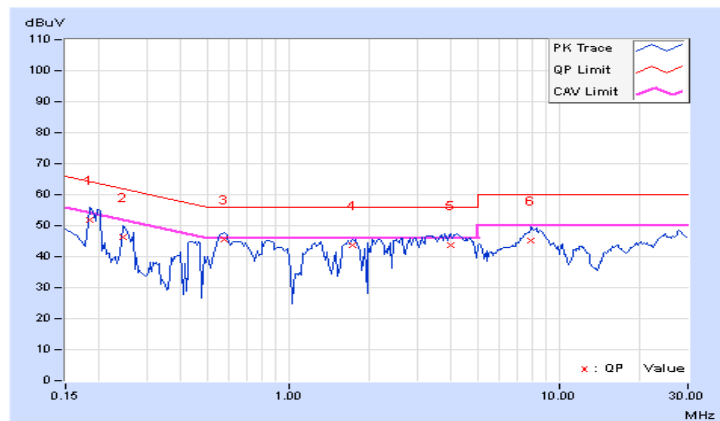


Frequency Range	150kHz ~ 30MHz	Detector Function & Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	230Vac, 50Hz	Environmental Conditions	25°C, 87%RH, 1015mbar
Tested by	Vincent Chen		
Test Mode	Mode 2		

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	0.18516	9.70	42.32	32.79	52.02	42.49	64.25	54.25	-12.23	-11.76
2	0.24375	9.70	36.46	23.37	46.16	33.07	61.97	51.97	-15.81	-18.90
3	0.57969	9.70	35.99	22.74	45.69	32.44	56.00	46.00	-10.31	-13.56
4	1.73047	9.77	33.97	20.85	43.74	30.62	56.00	46.00	-12.26	-15.38
5	3.96875	9.87	33.79	18.54	43.66	28.41	56.00	46.00	-12.34	-17.59
6	7.88281	9.90	35.24	21.87	45.14	31.77	60.00	50.00	-14.86	-18.23

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

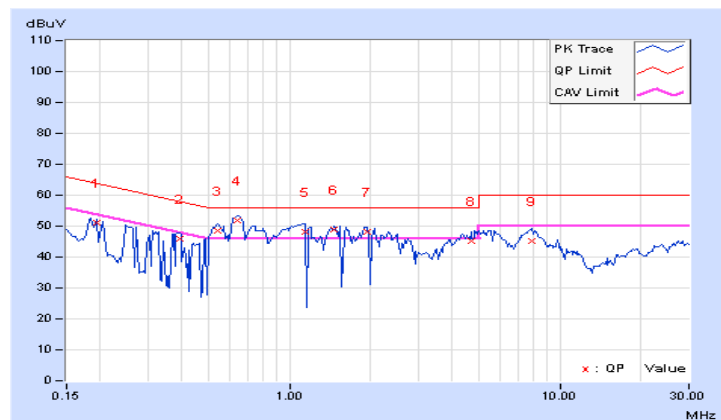


Frequency Range	150kHz ~ 30MHz	Detector Function & Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	230Vac, 50Hz	Environmental Conditions	25°C, 87%RH, 1015mbar
Tested by	Vincent Chen		
Test Mode	Mode 2		

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	0.19297	9.69	41.58	34.86	51.27	44.55	63.91	53.91	-12.64	-9.36
2	0.39219	9.69	36.07	25.86	45.76	35.55	58.02	48.02	-12.26	-12.47
3	0.54063	9.70	38.72	22.19	48.42	31.89	56.00	46.00	-7.58	-14.11
4	0.64219	9.71	42.09	27.71	51.80	37.42	56.00	46.00	-4.20	-8.58
5	1.14453	9.74	38.55	24.02	48.29	33.76	56.00	46.00	-7.71	-12.24
6	1.46484	9.75	39.11	25.06	48.86	34.81	56.00	46.00	-7.14	-11.19
7	1.92969	9.77	38.37	24.16	48.14	33.93	56.00	46.00	-7.86	-12.07
8	4.67969	9.86	35.35	21.11	45.21	30.97	56.00	46.00	-10.79	-15.03
9	7.89063	9.89	35.20	21.46	45.09	31.35	60.00	50.00	-14.91	-18.65

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 Emission at Frequencies up to 1GHz

6.1 Limits

For Class A Equipment

EN 55032 Table clause	Frequency range (MHz)	Distance (m)	Limits (dBuV/m)
A2.1	30 - 230	10	40
	230 - 1000		47
A2.2	30 - 230	3	50
	230 - 1000		57

For Class B Equipment

EN 55032 Table clause	Frequency range (MHz)	Distance (m)	Limits (dBuV/m)
A4.1	30 - 230	10	30
	230 - 1000		37
A4.2	30 - 230	3	40
	230 - 1000		47

6.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Sonoma Preamplifier	310N	352922	Feb. 27, 2016	Feb. 26, 2017
Sonoma Preamplifier	310N	352921	Feb. 27, 2016	Feb. 26, 2017
Agilent Test Receiver	N9038A	MY50010158	Aug. 04, 2016	Aug. 03, 2017
Agilent Test Receiver	N9038A	MY51210114	Sep. 09, 2016	Sep. 08, 2017
Schwarzbeck Antenna	VULB9168	9168-316	Jan. 20, 2016	Jan. 19, 2017
Schwarzbeck Antenna	VULB9168	9168-317	Jan. 21, 2016	Jan. 20, 2017
Max Full. Turn Table & Tower	MF7802	MF7802121	NA	NA
Max Full. Tower	MF7802	MF780208105	NA	NA
Software	Radiated_V8.7.08	NA	NA	NA
JYEBAO RF cable With 5dB PAD	LMR-600	CABLE-CH8-01.V	Jun. 27, 2016	Jun. 26, 2017
JYEBAO RF cable With 5dB PAD	LMR-600	CABLE-CH8-02.H	Jun. 27, 2016	Jun. 26, 2017
WOKEN RF cable With 5dB PAD	8D	CABLE-CH8-03.3M	Jun. 27, 2016	Jun. 26, 2017

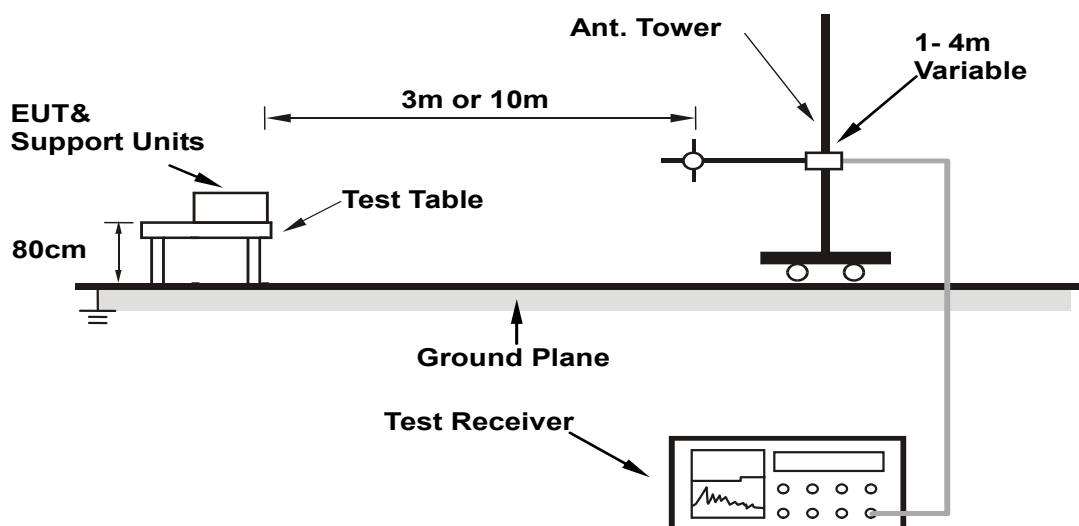
- Notes: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Chamber No. 8.
3. The Industry Canada Reference No. IC 7450E-8.
4. The VCCI Site Registration No. R-2946.
5. The FCC Site Registration No. 493821.
6. Tested Date: Dec. 1, 2016.

6.3 Test Arrangement

- 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.
- The EUT was set 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 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.
- 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.
- 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.
- The measurement distance is the shortest horizontal distance between an imaginary circular periphery just encompassing this arrangement and the calibration point of the antenna.



Note: Cable on the RGP must be insulated.

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

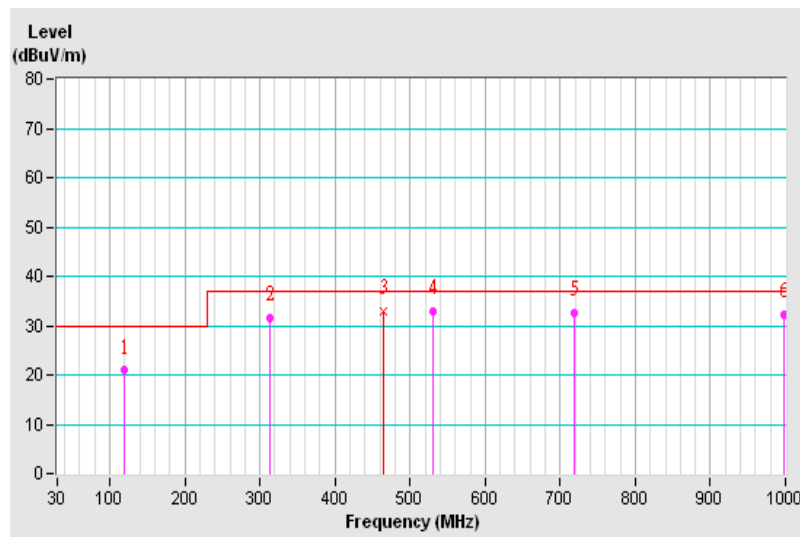
6.4 Test Results

Frequency Range	30MHz ~ 1GHz	Detector Function & Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	230Vac, 50Hz	Environmental Conditions	23°C, 73%RH, 1014mbar
Tested by	Vincent Chen		
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	120.02	20.86 QP	30.00	-9.14	3.64 H	309	35.66	-14.80
2	312.66	31.69 QP	37.00	-5.31	1.54 H	261	43.21	-11.52
3	465.04	32.89 QP	37.00	-4.11	1.87 H	334	40.25	-7.36
4	531.47	32.98 QP	37.00	-4.02	3.62 H	31	39.09	-6.11
5	718.14	32.48 QP	37.00	-4.52	1.10 H	19	35.39	-2.91
6	998.13	32.17 QP	37.00	-4.83	1.07 H	54	29.33	2.84

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

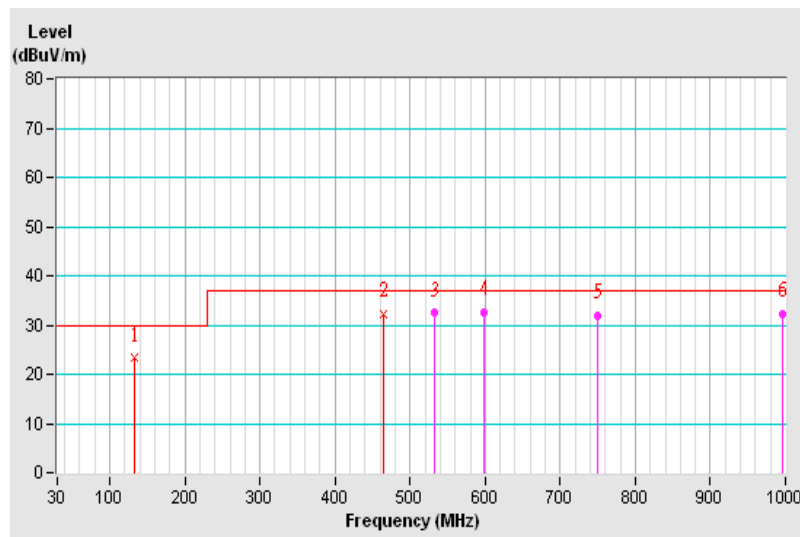


Frequency Range	30MHz ~ 1GHz	Detector Function & Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	230Vac, 50Hz	Environmental Conditions	23°C, 73%RH, 1014mbar
Tested by	Vincent Chen		
Test Mode	Mode 1		

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	132.87	23.26 QP	30.00	-6.74	1.00 V	51	37.05	-13.79
2	465.05	32.36 QP	37.00	-4.64	3.54 V	242	39.91	-7.55
3	531.49	32.44 QP	37.00	-4.56	1.52 V	247	38.52	-6.08
4	597.91	32.56 QP	37.00	-4.44	3.64 V	80	37.27	-4.71
5	749.89	31.78 QP	37.00	-5.22	2.21 V	224	33.25	-1.47
6	996.53	32.24 QP	37.00	-4.76	1.02 V	88	29.69	2.55

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

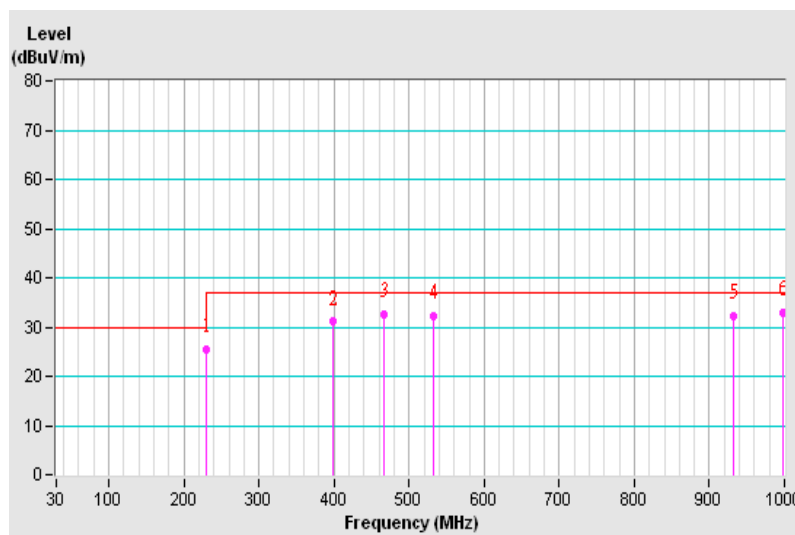


Frequency Range	30MHz ~ 1GHz	Detector Function & Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	230Vac, 50Hz	Environmental Conditions	23°C, 73%RH, 1014mbar
Tested by	Kobe Lu		
Test Mode	Mode 2		

Antenna Polarity & Test Distance : Horizontal at 3 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	229.75	25.52 QP	30.00	-4.48	3.67 H	237	40.90	-15.38
2	399.50	31.06 QP	37.00	-5.94	1.88 H	214	40.34	-9.28
3	466.09	32.60 QP	37.00	-4.40	2.13 H	338	39.95	-7.35
4	532.68	32.12 QP	37.00	-4.88	1.78 H	21	38.22	-6.10
5	932.15	32.36 QP	37.00	-4.64	2.36 H	227	30.54	1.82
6	998.74	32.91 QP	37.00	-4.09	2.54 H	264	30.05	2.86

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

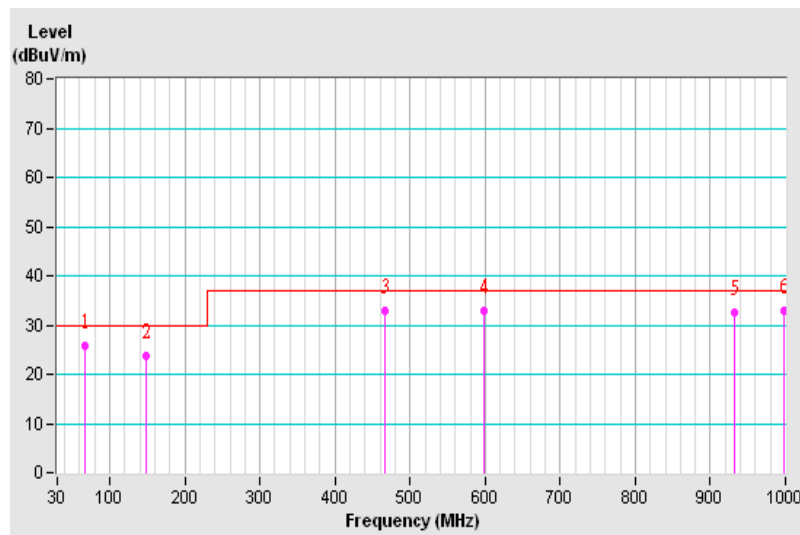


Frequency Range	30MHz ~ 1GHz	Detector Function & Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	230Vac, 50Hz	Environmental Conditions	23°C, 73%RH, 1014mbar
Tested by	Kobe Lu		
Test Mode	Mode 2		

Antenna Polarity & Test Distance : Vertical at 3 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	66.59	25.85 QP	30.00	-4.15	1.06 V	138	40.30	-14.45
2	148.36	23.70 QP	30.00	-6.30	1.54 V	166	36.57	-12.87
3	466.09	32.85 QP	37.00	-4.15	2.69 V	51	40.43	-7.58
4	599.24	32.83 QP	37.00	-4.17	3.74 V	81	37.51	-4.68
5	932.17	32.54 QP	37.00	-4.46	2.16 V	80	30.94	1.60
6	998.74	32.93 QP	37.00	-4.07	1.15 V	87	30.32	2.61

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 Radiated Emission at Frequencies above 1GHz

7.1 Limits

For Class A Equipment

EN 55032 Table clause	Frequency range (MHz)	Distance (m)	Detector type	Limits (dBuV/m)
A3.1	1000 - 3000	3	Average	56
	3000 - 6000			60
A3.2	1000 - 3000		Peak	76
	3000 - 6000			80

For Class B Equipment

EN 55032 Table clause	Frequency range (MHz)	Distance (m)	Detector type	Limits (dBuV/m)
A5.1	1000 - 3000	3	Average	50
	3000 - 6000			54
A5.2	1000 - 3000		Peak	70
	3000 - 6000			74

Required highest frequency for radiated measurement

EN 55032 Table clause	Highest internal frequency (F_x)	Highest measured frequency
1	$F_x \leq 108 \text{ MHz}$	1 GHz
	$108 \text{ MHz} < F_x \leq 500 \text{ MHz}$	2 GHz
	$500 \text{ MHz} < F_x \leq 1 \text{ GHz}$	5 GHz
	$F_x > 1 \text{ GHz}$	5 x F_x up to a maximum of 6 GHz

NOTE 1 For FM and TV broadcast receivers, F_x is determined from the highest frequency generated or used excluding the local oscillator and tuned frequencies.

NOTE 2 F_x is highest fundamental frequency generated or used within the EUT or highest frequency at which it operates.

Where F_x is unknown, the radiated emission measurements shall be performed up to 6 GHz.

7.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Agilent Spectrum	E4446A	MY51100009	May 30, 2016	May 29, 2017
Agilent Test Receiver	N9038A	MY51210137	Jul. 27, 2016	Jul. 26, 2017
Agilent Preamplifier	8449B	3008A01292	Feb. 26, 2016	Feb. 25, 2017
MITEQ Preamplifier	AMF-6F-260400-33-8P	892164	Mar. 01, 2016	Feb. 28, 2017
EMCI Preamplifier	EMC184045B	980235	Mar. 01, 2016	Feb. 28, 2017
Schwarzbeck Horn Antenna	BBHA-9170	212	Jan. 08, 2016	Jan. 07, 2017
EMCO Horn Antenna	3115	6714	Jan. 19, 2016	Jan. 18, 2017
Max Full. Turn Table	MF7802	MF780208216	NA	NA
Software	Radiated_V8.7.08	NA	NA	NA
SUHNER RF cable With 3dB PAD	SF102	Cable-CH10-3.6m	Aug. 15, 2016	Aug. 14, 2017

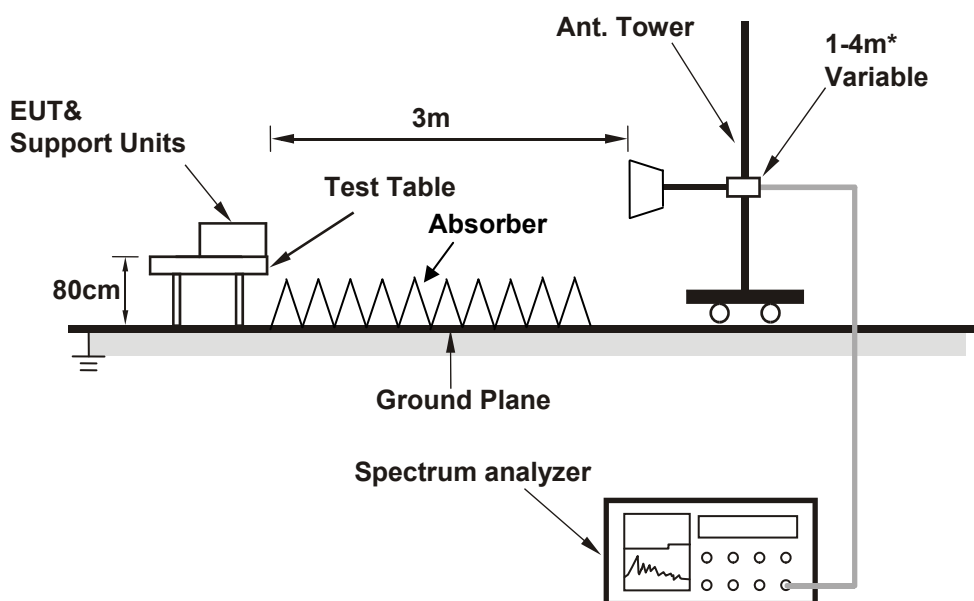
- Notes:
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The 3dB beamwidth of the horn antenna is minimum 30 degree (or $w = 1.6m$ at 3m distance) for 1~6 GHz.
 3. The test was performed in Chamber No. 10.
 4. The Industry Canada Reference No. IC 7450E-11.
 5. The VCCI Site Registration No. G-427
 6. The FCC Site Registration No. 367016
 7. Tested Date: Dec. 1, 2016.

7.3 Test Arrangement

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at an accredited chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The height of antenna can be varied from one meter to four meters, the height of adjustment depends on the EUT height and the antenna 3dB beamwidth both, to detect the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 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.
- The spectrum analyzer system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

Note:

- The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection (PK) at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.
- The measurement distance is the shortest horizontal distance between an imaginary circular periphery just encompassing this arrangement and the calibration point of the antenna.



Note: Cable on the RGP must be insulated.

* :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.

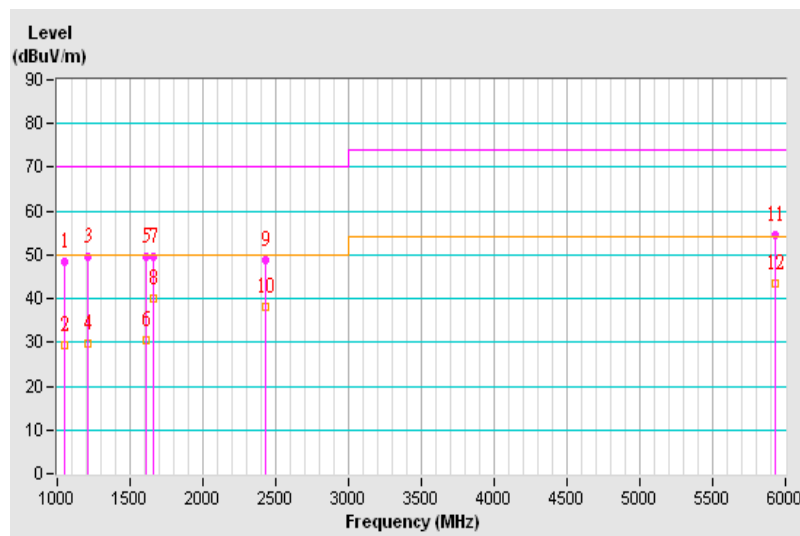
7.4 Test Results

Frequency Range	1GHz ~ 6GHz	Detector Function & Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	230Vac, 50Hz	Environmental Conditions	23°C, 67%RH, 1014mbar
Tested by	Kobe Lu		
Test Mode	Mode 1		

Antenna Polarity & Test Distance : Horizontal at 3 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	1052.87	48.31 PK	70.00	-21.69	1.00 H	196	52.59	-4.28
2	1052.87	29.37 AV	50.00	-20.63	1.00 H	196	33.65	-4.28
3	1211.12	49.61 PK	70.00	-20.39	1.94 H	205	53.30	-3.69
4	1211.12	29.65 AV	50.00	-20.35	1.94 H	205	33.34	-3.69
5	1614.00	49.72 PK	70.00	-20.28	1.00 H	114	52.04	-2.32
6	1614.00	30.34 AV	50.00	-19.66	1.00 H	114	32.66	-2.32
7	1660.87	49.62 PK	70.00	-20.38	1.88 H	164	51.66	-2.04
8	1660.87	40.02 AV	50.00	-9.98	1.88 H	164	42.06	-2.04
9	2430.12	48.87 PK	70.00	-21.13	1.00 H	108	47.83	1.04
10	2430.12	38.15 AV	50.00	-11.85	1.00 H	108	37.11	1.04
11	5933.75	54.65 PK	74.00	-19.35	1.09 H	360	45.60	9.05
12	5933.75	43.49 AV	54.00	-10.51	1.09 H	360	34.44	9.05

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

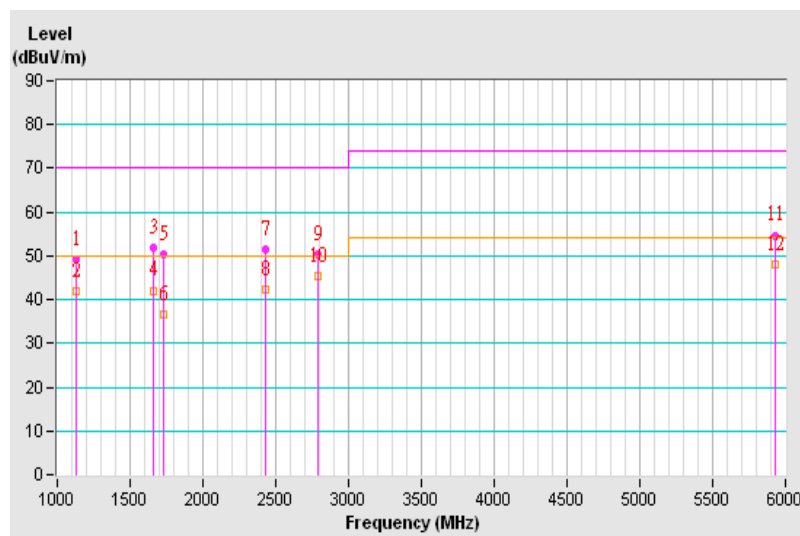


Frequency Range	1GHz ~ 6GHz	Detector Function & Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	230Vac, 50Hz	Environmental Conditions	23°C , 67%RH, 1014mbar
Tested by	Kobe Lu		
Test Mode	Mode 1		

Antenna Polarity & Test Distance : Vertical at 3 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	1129.50	49.18 PK	70.00	-20.82	1.00 V	201	53.15	-3.97
2	1129.50	41.97 AV	50.00	-8.03	1.00 V	201	45.94	-3.97
3	1660.75	52.00 PK	70.00	-18.00	1.00 V	158	54.04	-2.04
4	1660.75	42.12 AV	50.00	-7.88	1.00 V	158	44.16	-2.04
5	1727.25	50.37 PK	70.00	-19.63	1.05 V	196	52.00	-1.63
6	1727.25	36.71 AV	50.00	-13.29	1.05 V	196	38.34	-1.63
7	2430.05	51.43 PK	70.00	-18.57	1.14 V	153	50.39	1.04
8	2430.05	42.47 AV	50.00	-7.53	1.14 V	153	41.43	1.04
9	2790.37	50.21 PK	70.00	-19.79	1.96 V	200	47.61	2.60
10	2790.37	45.37 AV	50.00	-4.63	1.96 V	200	42.77	2.60
11	5933.83	54.72 PK	74.00	-19.28	2.03 V	360	45.67	9.05
12	5933.83	48.12 AV	54.00	-5.88	2.03 V	360	39.07	9.05

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

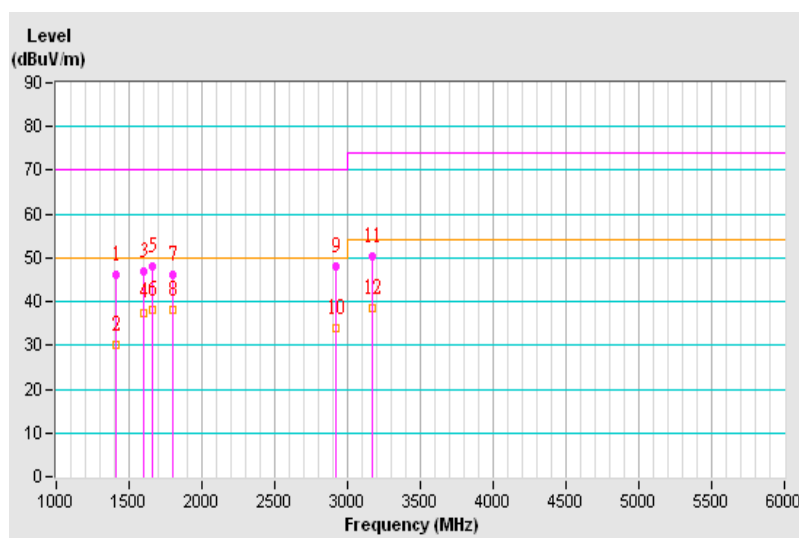


Frequency Range	1GHz ~ 6GHz	Detector Function & Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	230Vac, 50Hz	Environmental Conditions	23°C, 67%RH, 1014mbar
Tested by	Kobe Lu		
Test Mode	Mode 2		

Antenna Polarity & Test Distance : Horizontal at 3 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	1412.50	46.27 PK	70.00	-23.73	1.95 H	157	49.34	-3.07
2	1412.50	30.23 AV	50.00	-19.77	1.95 H	157	33.30	-3.07
3	1598.00	46.86 PK	70.00	-23.14	1.00 H	239	49.27	-2.41
4	1598.00	37.55 AV	50.00	-12.45	1.00 H	239	39.96	-2.41
5	1664.62	48.04 PK	70.00	-21.96	1.92 H	172	50.07	-2.03
6	1664.62	38.24 AV	50.00	-11.76	1.92 H	172	40.27	-2.03
7	1797.63	46.28 PK	70.00	-23.72	1.89 H	236	47.40	-1.12
8	1797.63	38.25 AV	50.00	-11.75	1.89 H	236	39.37	-1.12
9	2922.50	48.05 PK	70.00	-21.95	1.06 H	328	45.04	3.01
10	2922.50	34.06 AV	50.00	-15.94	1.06 H	328	31.05	3.01
11	3166.52	50.46 PK	74.00	-23.54	1.00 H	181	46.64	3.82
12	3166.52	38.66 AV	54.00	-15.34	1.00 H	181	34.84	3.82

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

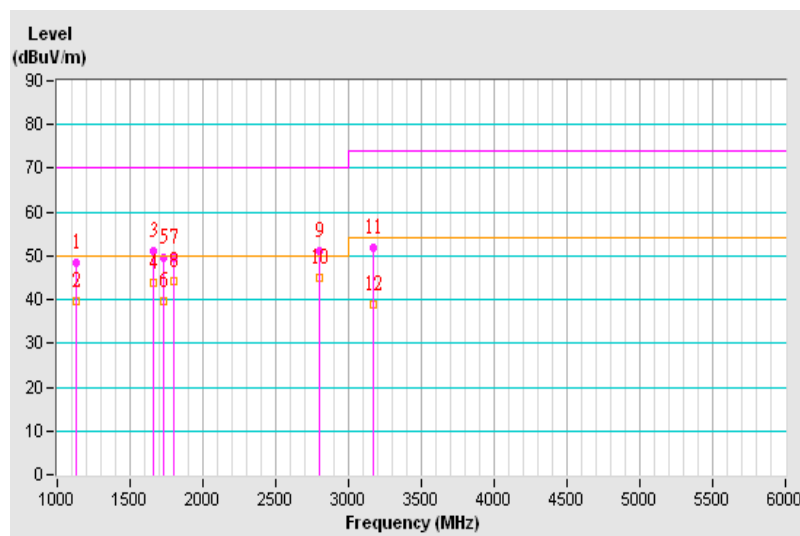


Frequency Range	1GHz ~ 6GHz	Detector Function & Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	230Vac, 50Hz	Environmental Conditions	23°C, 67%RH, 1014mbar
Tested by	Kobe Lu		
Test Mode	Mode 2		

Antenna Polarity & Test Distance : Vertical at 3 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	1131.87	48.55 PK	70.00	-21.45	1.00 V	168	52.50	-3.95
2	1131.87	39.53 AV	50.00	-10.47	1.00 V	168	43.48	-3.95
3	1664.56	51.20 PK	70.00	-18.80	1.44 V	160	53.23	-2.03
4	1664.56	43.92 AV	50.00	-6.08	1.44 V	160	45.95	-2.03
5	1731.12	49.60 PK	70.00	-20.40	1.00 V	165	51.19	-1.59
6	1731.12	39.48 AV	50.00	-10.52	1.00 V	165	41.07	-1.59
7	1797.75	49.52 PK	70.00	-20.48	1.04 V	190	50.63	-1.11
8	1797.75	44.14 AV	50.00	-5.86	1.04 V	190	45.25	-1.11
9	2796.62	51.20 PK	70.00	-18.80	1.95 V	199	48.58	2.62
10	2796.62	44.88 AV	50.00	-5.12	1.95 V	199	42.26	2.62
11	3169.12	51.72 PK	74.00	-22.28	1.47 V	204	47.90	3.82
12	3169.12	38.91 AV	54.00	-15.09	1.47 V	204	35.09	3.82

Remarks:

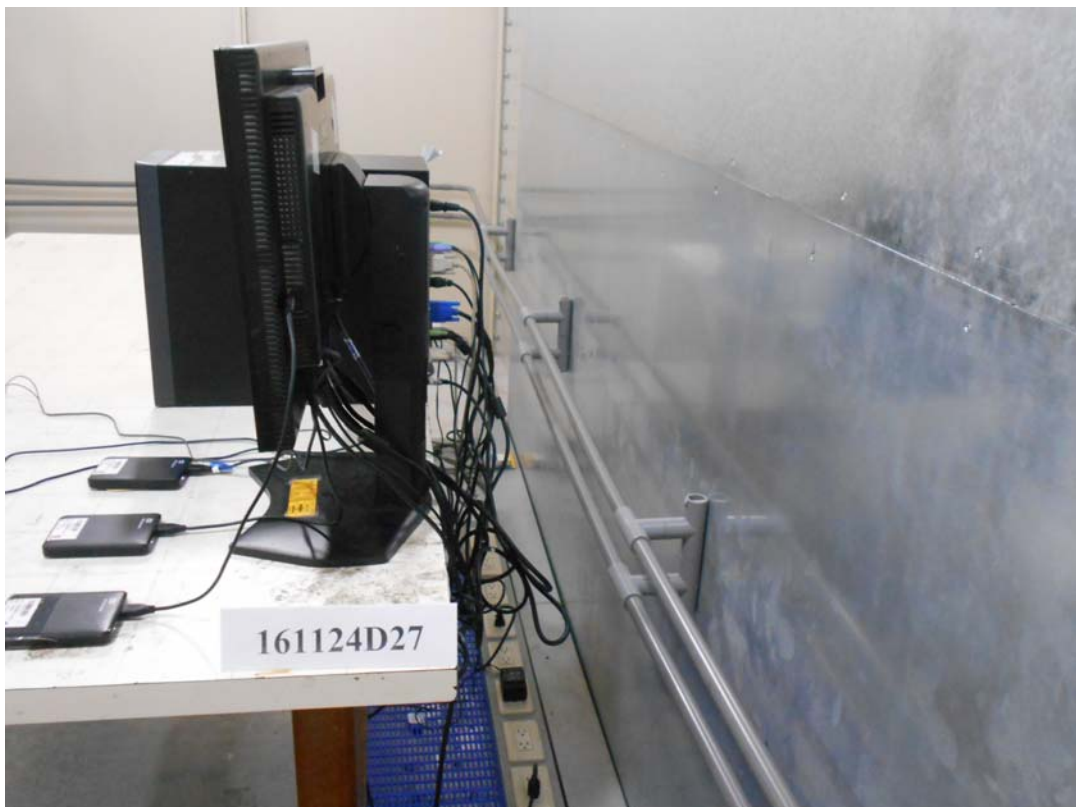
1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



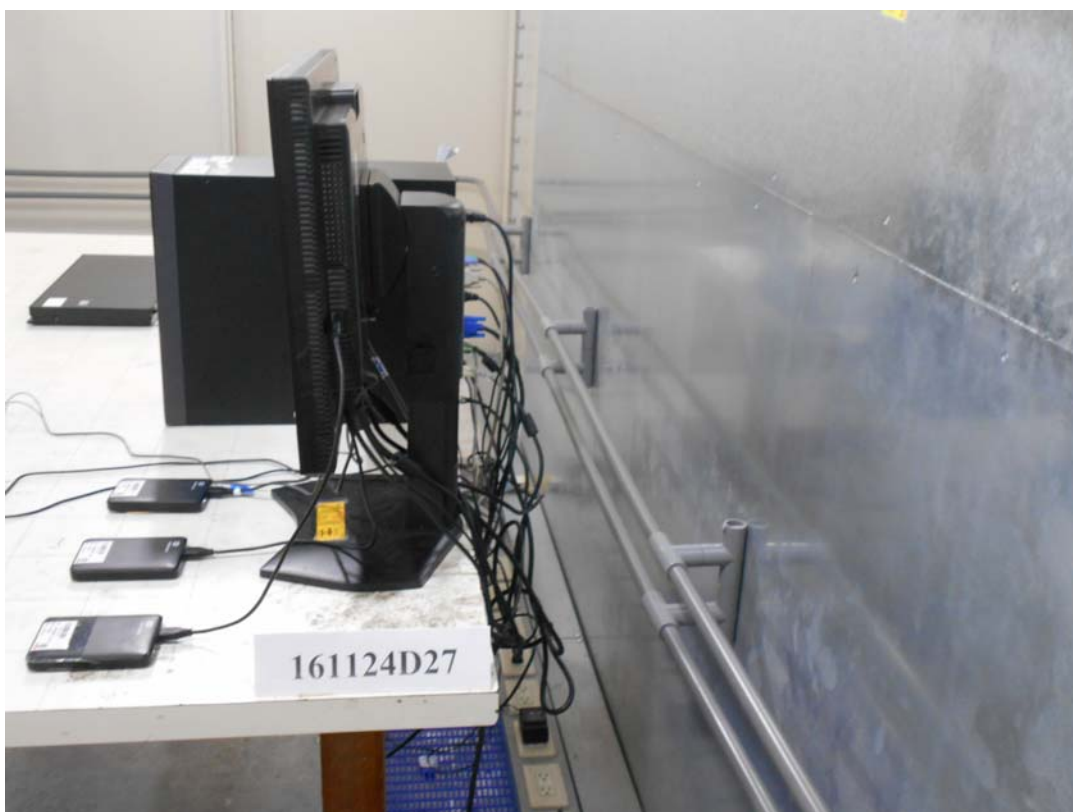
8 Pictures of Test Arrangements

8.1 Conducted Emission from the AC Mains Power Port

Mode 1



Mode 2



8.2 Radiated Emission at Frequencies up to 1GHz

Mode 1



Mode 2



8.3 Radiated Emission at Frequencies above 1GHz

Mode 1



Mode 2



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

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

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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.

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