

FCC Certification Test Report

Report No.: FC140904C15

Test Model: Tier 1

FCC ID: 2ADA7T1C00001

Received Date: Sep. 04, 2014

Test Date: Sep. 18, 2014

Issued Date: Sep. 22, 2014

Applicant: CAMY International Limited

Address: Unit H, 11th Floor, Sunview Industrial Building, 3 On Yip Street, Chai Wan, Hong Kong

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

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A D T

Release Control Record

Issue No.	Description	Date Issued
FC140904C15	Original release.	Sep. 22, 2014

1 Certificate of Conformity

Product: Tier 1 controller

Brand: Tier 1

Test Model: Tier 1

Sample Status: Engineering Sample

Applicant: CAMY International Limited

Test Date: Sep. 18, 2014

Standards: 47 CFR FCC Part 15, Subpart B, Class B

ICES-003:2012 Issue 5, Class B

ANSI C63.4:2009

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:** Sep. 22, 2014

Polly Chien / Specialist

Approved by : , **Date:** Sep. 22, 2014

Ken Liu / Senior Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart B / ICES-003:2012 Issue 5, Class B

ANSI C63.4:2009

FCC Clause	ICES-003 Clause	Test Item	Result/Remarks	Verdict
15.107	6.1	AC Power Line Conducted Emissions	Minimum passing Class B margin is -12.22 dB at 0.44433 MHz	Pass
15.109	6.2.1	Radiated Emissions up to 1 GHz	Minimum passing Class B margin is -5.25 dB at 229.44 MHz	Pass
	6.2.2	Radiated Emissions above 1 GHz	The EUT's highest operating frequency is less than 108MHz, therefore the radiated emission is tested up to 1GHz.	Not Applicable

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:

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	Frequency	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.44 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	4.70 dB

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 CAMY International Limited, for detailed feature description, please refer to the manufacturer's specifications or user's manual.

3.2 General Description of EUT

Product	Tier 1 controller
Brand	Tier 1
Test Model	Tier 1
Status of EUT	Engineering sample
Operating Software	NA
Power Supply Rating	5Vdc, 0.5-0.9A
Accessory Device	NA
Data Cable Supplied	3.95m non-shielded USB cable with 2 cores

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

Test modes are presented in the report as below.

Mode	Test Condition
Conducted emission test	
-	EUT under workink mode
Radiated emission test	
-	EUT under workink mode

3.4 Test Program Used and Operation Descriptions

- Connected the EUT with a notebook via USB cable and placed on a testing table.
- The notebook ran "H" patterns and displayed it on the monitor.
- The notebook sent "H" patterns to the printer and the printer printed them out.

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 less than 108MHz, provided by CAMY International Limited, for detailed internal source, please refer to the manufacturer's specifications.

3.6 Miscellaneous

Labelling Requirements for Part 15 Devices:

➤ Verification

The specific labelling requirements for a device subject to the Verification procedure are contained in Section 15.19(a). These labelling requirements are:

If the device is subject only to Verification, include a label bearing a unique identifier (Section 2.954) and one of three compliance statements specified in Section 15.19(a). If the labeling area for the device is so small, and/or it is not practical to place the compliance statement on the device, then the statement can be placed in the user manual or product packaging (Section 15.19(a)(5)). However, the device must still be labelled with the unique identifier (Verification). Generally, devices smaller than the palm of the hand are considered too small for the compliance statement.

➤ Certification

If the device is subject to Certification: (1) Section 2.925 contains information on identification of the equipment; (2) include a label bearing an FCC Identifier (FCC ID) (Section 2.926) and (3) include the appropriate compliance statement in Section 15.19(a). If the device is considered too small and therefore it is impractical (smaller than the palm of the hand) to display the compliance statement, then the statement may be placed in the user manual or product packaging. However, the device must still be labelled with the FCC ID. If the device is unquestionably too small for the FCC ID to be readable (smaller than 4-6 points), the FCC ID may be placed in the user manual. However, it must be determined that the device itself is too small – the label area allocated to the FCC ID may not be reduced because of over crowded identification of other product and regulatory information.

An electronic display of the FCC ID (see 9. Electronic Labelling below) may be used for Certification of Section 15.212 modular transmitters and software defined radios (Section 2.944).

➤ Declaration of Conformity (DoC):

The labelling requirements for a device subject to the DoC procedure are specified in Section 15.19(b). The label should include the FCC logo along with the Trade Name and Model Number, which satisfies the unique identifier requirement of Section 2.1074 if it represents the identical equipment tested for DoC compliance. For personal computers assembled from authorized components, the following additional text must also be included: "Assembled from tested components," "Complete system not tested." When the device is so small and/or when it is not practical to place the required additional text on the device, the text may be placed in the user manual or pamphlet supplied to the user. However, the FCC logo, Trade Name, and Model Number must still be displayed on the device (Section 15.19(b)(3)).



Part 15 Declaration of Conformity (DoC) Label Examples

Equipment certified as software defined radio may use a means that readily displays the FCC ID on an electronic display screen, instead of labelling the device (Section 2.925 (e)).

Further information may refer to FCC KDB:784748 D01 Labelling Part 15 &18 Guidelines

Labelling Requirements for ICES-003 Devices:

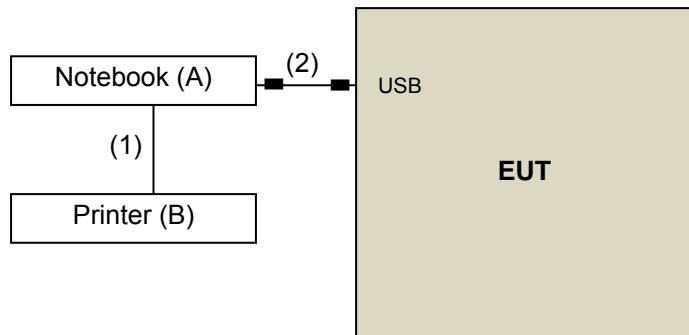
➤ Industry Canada ICES-003 Compliance Label:

CAN ICES-3 (*)/NMB-3(*)

* Insert either "A" or "B" but not both to identify the applicable Class of ITE.

4 Configuration and Connections with EUT

4.1 Connection Diagram of EUT and Peripheral Devices



4.2 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	Lenovo	S430	MP-2DBFW	PD92230BNHU	-
B.	Printer	EPSON	T22	MEEZ070220	FCC DoC Approved	-

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB cable	1	1.8	Y	0	-
2.	USB cable	1	3.95	N	2	Accessory of EUT

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

5 Conducted Emissions 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
Test Receiver ROHDE & SCHWARZ	ESCS30	100288	Apr. 24, 2014	Apr. 23, 2015
RF signal cable Woken	5D-FB	Cable-HYCO2-01	Dec. 27, 2013	Dec. 26, 2014
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Dec. 23, 2013	Dec. 22, 2014
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Jul. 10, 2014	Jul. 09, 2015
Software ADT	BV ADT_Cond_V7.3.7.3	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.

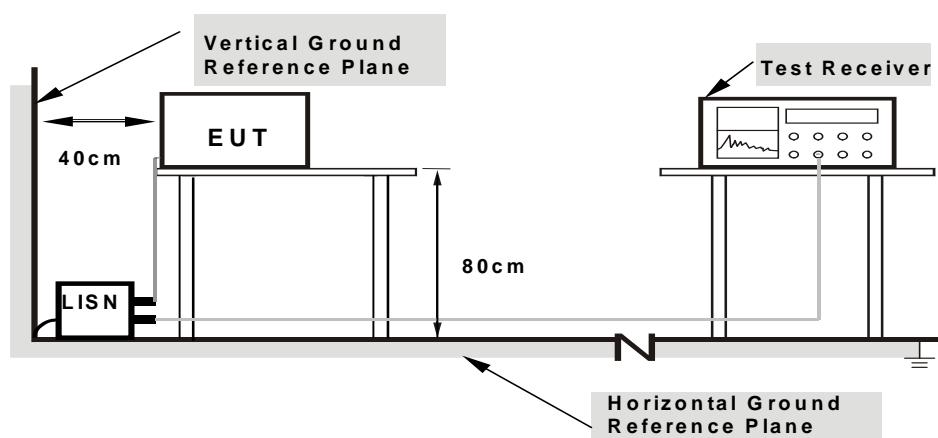
2. The test was performed in HwaYa Shielded Room 2.

3. The VCCI Site Registration No. is C-2047.

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. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

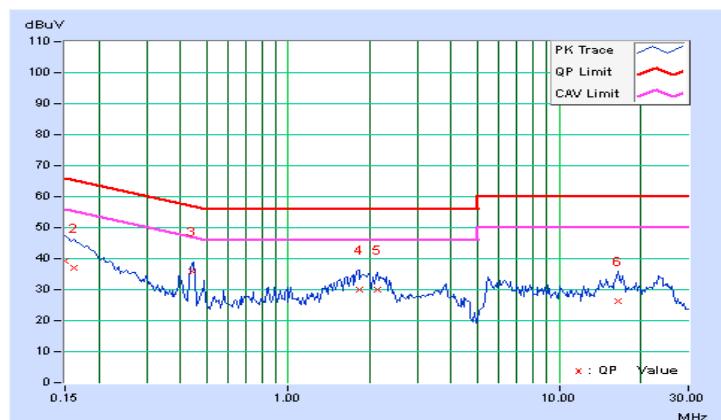
5.4 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz (System)	Environmental Conditions	23°C, 65%RH
Tested by	Felix Chen	Test Date	2014/9/18

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	0.15000	0.26	38.82	18.65	39.08	18.91	66.00	56.00	-26.92	-37.09
2	0.16172	0.27	36.63	13.51	36.90	13.78	65.38	55.38	-28.48	-41.60
3	0.44433	0.30	35.73	34.46	36.03	34.76	56.98	46.98	-20.95	-12.22
4	1.83203	0.36	29.70	20.03	30.06	20.39	56.00	46.00	-25.94	-25.61
5	2.14844	0.37	29.51	18.38	29.88	18.75	56.00	46.00	-26.12	-27.25
6	16.50781	0.55	25.89	19.50	26.44	20.05	60.00	50.00	-33.56	-29.95

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

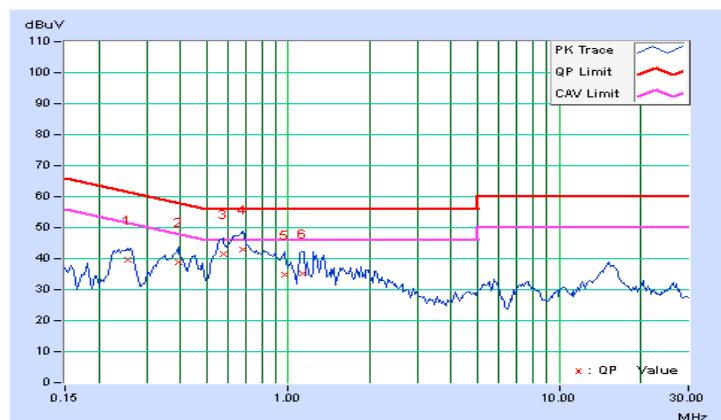


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz (System)	Environmental Conditions	23°C, 65%RH
Tested by	Felix Chen	Test Date	2014/9/18

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	0.25547	0.29	39.40	25.83	39.69	26.12	61.58	51.58	-21.89
2	0.39219	0.30	38.46	27.89	38.76	28.19	58.02	48.02	-19.26	-19.83
3	0.57578	0.31	41.02	26.97	41.33	27.28	56.00	46.00	-14.67	-18.72
4	0.67734	0.32	42.79	28.17	43.11	28.49	56.00	46.00	-12.89	-17.51
5	0.97031	0.34	34.56	27.59	34.90	27.93	56.00	46.00	-21.10	-18.07
6	1.12500	0.34	34.82	21.15	35.16	21.49	56.00	46.00	-20.84	-24.51

Remarks:

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



6 Radiated Emissions up to 1 GHz

6.1 Limits

Emissions radiated outside of the specified bands, shall be according to the general radiated limits as following:

Radiated Emissions Limits at 10 meters (dB μ V/m)				
Frequencies (MHz)	FCC 15B / ICES-003, Class A	FCC 15B / ICES-003, Class B	CISPR 22, Class A	CISPR 22, Class B
30-88	39	29.5	40	30
88-216	43.5	33.1		
216-230	46.4	35.6		
230-960		47	37	
960-1000	49.5			43.5

Radiated Emissions Limits at 3 meters (dB μ V/m)				
Frequencies (MHz)	FCC 15B / ICES-003, Class A	FCC 15B / ICES-003, Class B	CISPR 22, Class A	CISPR 22, Class B
30-88	49.5	40	50.5	40.5
88-216	54	43.5		
216-230	56.9	46		
230-960		57.5	47.5	
960-1000	60			54

Notes: 1. The lower limit shall apply at the transition frequencies.
 2. Emission level (dB μ V/m) = 20 log Emission level (uV/m).
 3. QP detector shall be applied if not specified.

6.2 Test Instruments

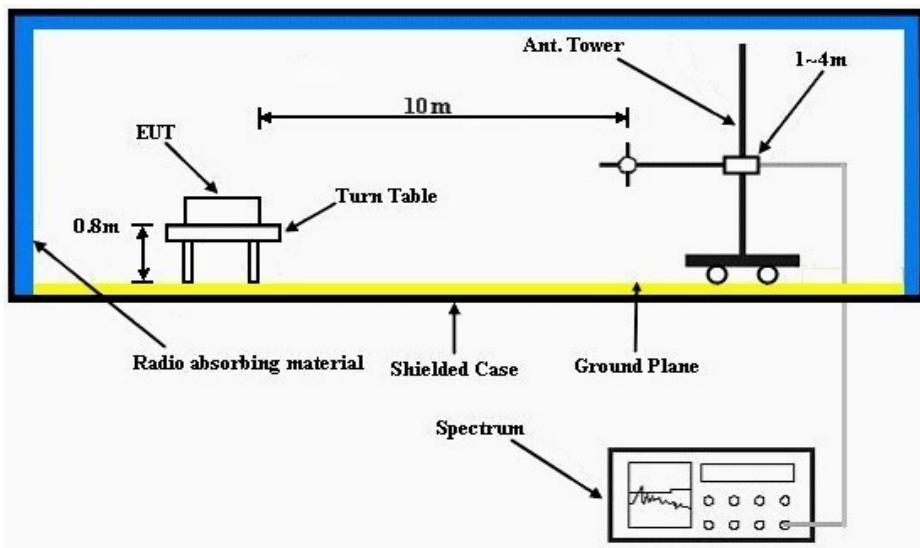
Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ (V)	ESR-7	101240	Sep. 23, 2013	Sep. 22, 2014
Test Receiver ROHDE & SCHWARZ (H)	ESR-7	101264	Nov. 29, 2013	Nov. 28, 2014
BILOG Antenna SCHWARZBECK (V)	VULB9168	9168-148	Feb. 25, 2014	Feb. 24, 2015
BILOG Antenna SCHWARZBECK (H)	VULB9168	9168-149	Feb. 25, 2014	Feb. 24, 2015
Preamplifier Agilent (V)	8447D	2944A10636	Oct. 18, 2013	Oct. 17, 2014
Preamplifier Agilent (H)	8447D	2944A10637	Oct. 18, 2013	Oct. 17, 2014
Preamplifier Agilent	8449B	3008A01959	Oct. 18, 2013	Oct. 17, 2014
RF signal cable Woken (V)	8D-FB	Cable-Hych1-01	Oct. 26, 2013	Oct. 25, 2014
RF signal cable Woken (H)	8D-FB	Cable-Hych1-02	Oct. 26, 2013	Oct. 25, 2014
Software BV ADT	BV ADT_Radiated_V 8.7.07	NA	NA	NA
Antenna Tower (V)	MFA-440	9707	NA	NA
Antenna Tower (H)	MFA-440	970705	NA	NA
Turn Table	DS430	50303	NA	NA
Controller (V)	MF7802	074	NA	NA
Controller (H)	MF7802	08093	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 HwaYa Chamber 1.
 3. The FCC Site Registration No. is 477732.
 4. The IC Site Registration No. is IC 7450F-1.
 5. The VCCI Site Registration No. is R-1893.

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 below 1 GHz.

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



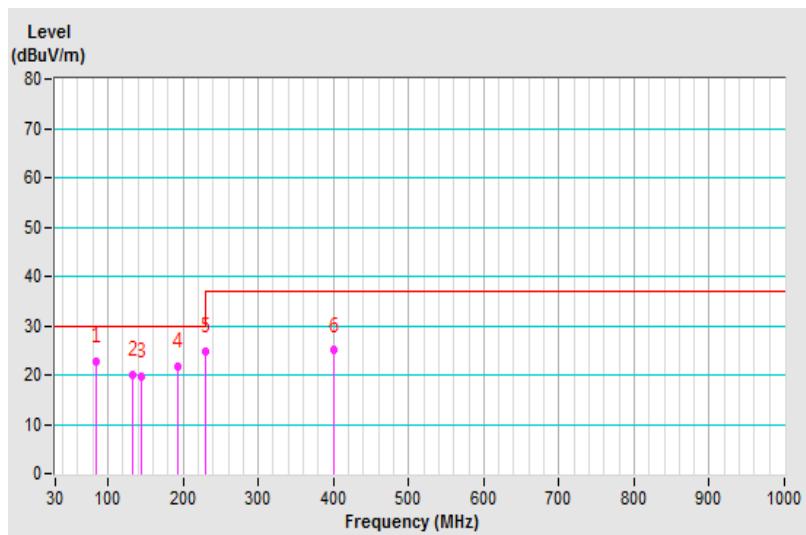
6.4 Test Results

Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	120Vac, 60Hz (System)	Environmental Conditions	23°C, 60%RH
Tested by	Mick Chou	Test Date	2014/9/18

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	84.47	22.76 QP	30.00	-7.24	4.00 H	313	42.63	-19.87
2	132.83	19.94 QP	30.00	-10.06	3.50 H	282	35.47	-15.53
3	144.90	19.68 QP	30.00	-10.32	3.50 H	282	34.09	-14.41
4	193.21	21.76 QP	30.00	-8.24	4.00 H	288	38.20	-16.44
5	229.44	24.75 QP	30.00	-5.25	4.00 H	271	40.93	-16.18
6	400.03	24.93 QP	37.00	-12.07	2.50 H	56	34.49	-9.56

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

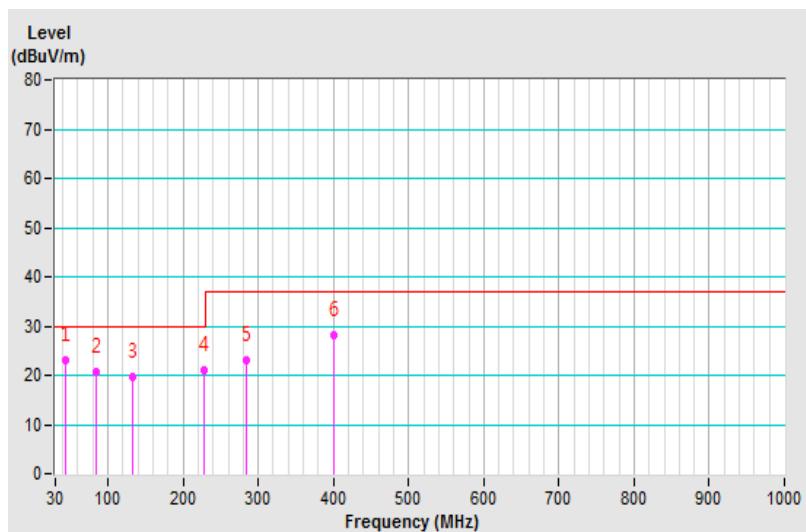


Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	120Vac, 60Hz (System)	Environmental Conditions	23°C, 60%RH
Tested by	Mick Chou	Test Date	2014/9/18

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	44.31	22.99 QP	30.00	-7.01	3.50 V	300	37.09	-14.10
2	84.52	20.68 QP	30.00	-9.32	4.00 V	356	39.98	-19.30
3	132.97	19.65 QP	30.00	-10.35	1.00 V	175	34.46	-14.81
4	227.60	21.18 QP	30.00	-8.82	1.50 V	2	36.68	-15.50
5	284.54	23.11 QP	37.00	-13.89	1.50 V	2	34.74	-11.63
6	400.03	28.15 QP	37.00	-8.85	2.50 V	23	37.24	-9.09

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 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

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: 886-3-5935343

Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

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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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