

FCC Certification Test Report

Report No.: FC160303C21

FCC ID: XIA-POE02

Test Model: POE-02

Received Date: Mar. 03, 2016

Test Date: Mar. 21 ~ Apr. 27, 2016

Issued Date: Apr. 29, 2016

Applicant: NetComm Wireless Limited

Address: 18-20 Orion Road, Lane Cove NSW 2066, Australia

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

Test Location: No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)



LAB CODE: 200837-0



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Release Control Record

Issue No.	Description	Date Issued
FC160303C21	Original release	Apr. 29, 2016

1 Certificate of Conformity

Product: POE Injector

Brand: NetComm Wireless

Test Model: POE-02

Sample Status: Engineering sample


Applicant: NetComm Wireless Limited

Test Date: Mar. 21 ~ Apr. 27, 2016

Standards: 47 CFR FCC Part 15, Subpart B, Class B
ICES-003:2016 Issue 6, Class B
ANSI C63.4:2014

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:** Apr. 29, 2016
Polly Chien / Specialist

Approved by :  , **Date:** Apr. 29, 2016
Ken Liu / Senior Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart B / ICES-003:2016 Issue 6, Class B

ANSI C63.4:2014

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 -1.80 dB at 0.53390 MHz	Pass
15.109	6.2.1	Radiated Emissions up to 1 GHz	Minimum passing Class B margin is -4.14 dB at 80.34 MHz	Pass
	6.2.2	Radiated Emissions above 1 GHz	EUT's highest frequency is below 108 MHz	N/A

N/A: 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	Expanded Uncertainty (k=2) (\pm)
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 NetComm Wireless Limited, for detailed feature description, please refer to the manufacturer's specifications or user's manual.

3.2 General Description of EUT

Product	POE Injector
Brand	NetComm Wireless
Test Model	POE-02
Sample Status	Engineering sample
Operating Software	NA
Power Supply Rating	Input Power : 100~240Vac, 50/60Hz Output Power: 48Vdc, 15.4W
Accessory Device	NA
Power Cable	1.7m non-shielded AC cable without core
Data Cable Supplied	1.5m non-shielded RJ45 cable without core

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

The EUT consumes power from AC Power of rating 100-240Vac, 50/60Hz.

For radiated emissions below 1GHz test, EUT has been pre-tested under following test modes, and test mode 4 was the worst case for final test.

Mode	Test Condition
1	EUT Laying-flat + LAN 1Gbps Link + Load
2	EUT Laying-flat + LAN 100Mbps Link + Load
3	EUT Laying-flat + LAN 10Mbps Link + Load
4	EUT stand-up + LAN 1Gbps Link + Load

Test modes are presented in the report as below.

Mode	Test Condition
Conducted emission test	
-	EUT stand-up + LAN 1Gbps Link + Load
Radiated emission up to 1GHz test	
-	EUT stand-up + LAN 1Gbps Link + Load

3.4 Test Program Used and Operation Descriptions

- a. Placed the EUT on the test table and connected with Outdoor LTE Router via LAN cables.
- b. The EUT linked with NB through RouterBoard via LAN cables.
- c. The communication partners sent data through the EUT via LAN.

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 132kHz, provided by NetComm Wireless 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:

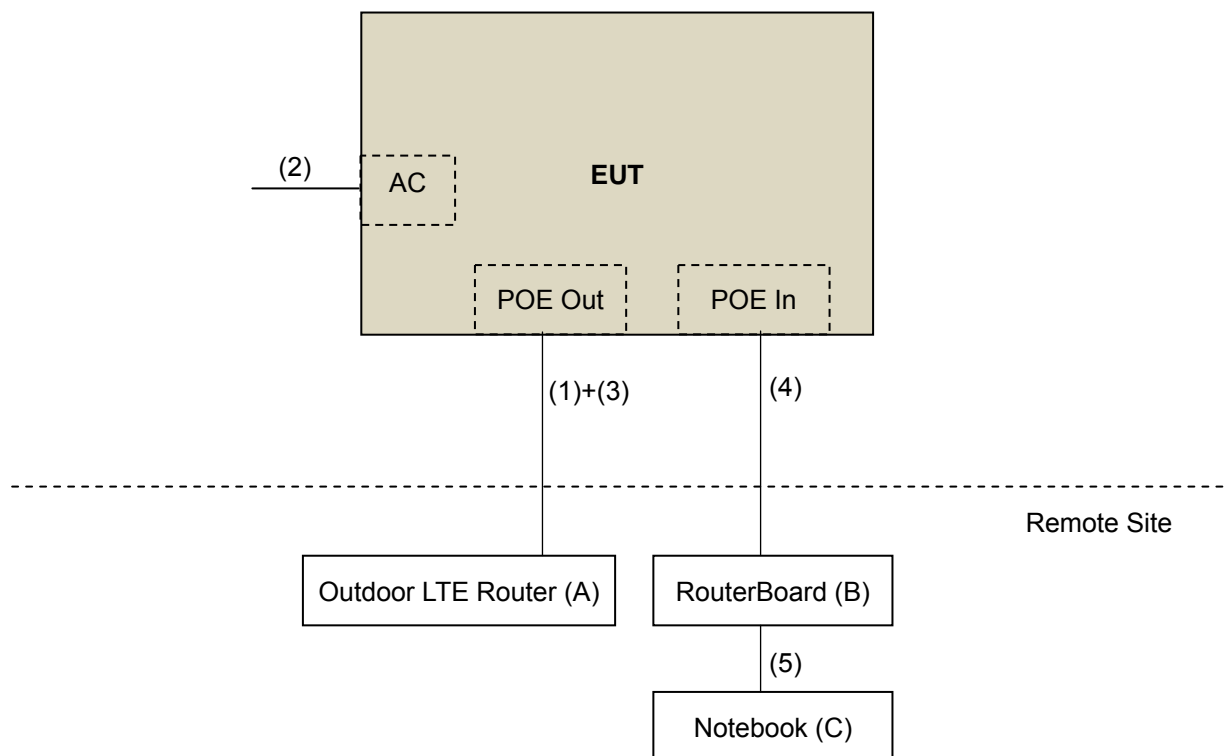
➤ Industry Canada ICES-003 Compliance Label:

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.	Outdoor LTE Router	NetComm Wireless	NRB-51	N/A	N/A	Provided by the manufacturer
B.	RouterBoard	MikroTik	260GS	N/A	N/A	Provided by the manufacturer
C.	Notebook	DELL	E6400	HJ2M32S	FCC DoC Approved	-

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item A-C acted as a communication partners to transfer data.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	LAN cable	1	1.5	N	0	Accessory of EUT
2.	Power cable	1	1.7	N	0	Accessory of EUT
3.	LAN cable	1	10	N	0	Cat5e
4.	LAN cable	1	10	N	0	Cat5e
5.	LAN cable	1	1	N	0	Cat5e

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

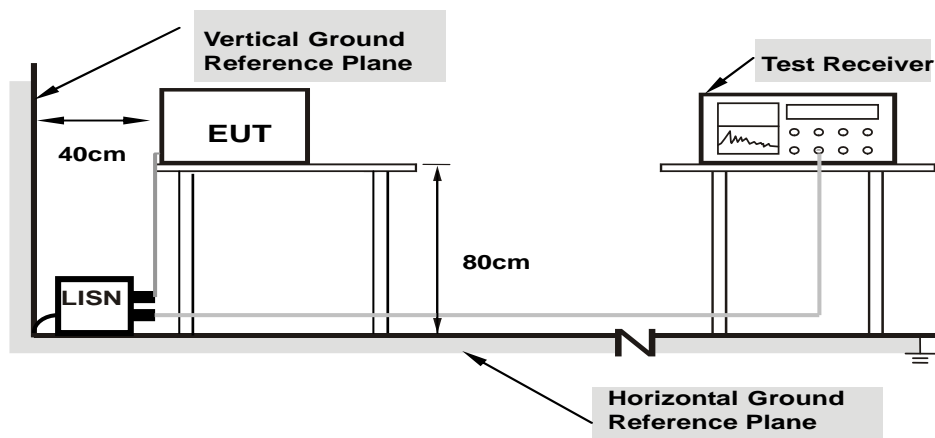
Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCS 30	100288	Apr. 27, 2015	Apr. 26, 2016
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond2-01	Dec. 26, 2015	Dec. 25, 2016
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Jan. 11, 2016	Jan. 10, 2017
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Jul. 21, 2015	Jul. 20, 2016
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:**
- Support units were connected to second LISN.
 - Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

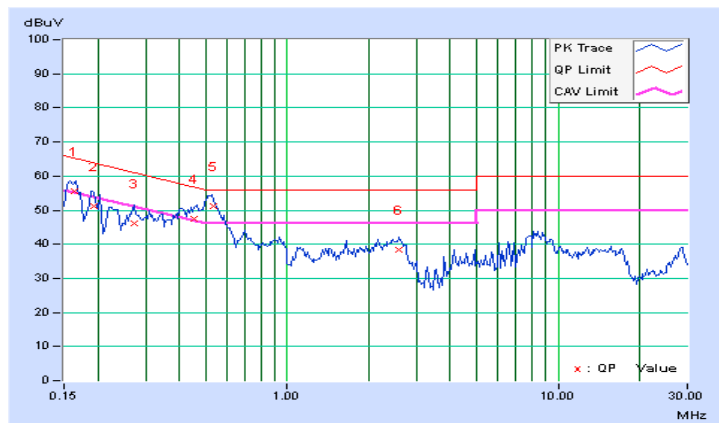
5.4 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23°C, 62%RH
Tested by	Mick Chou	Test Date	2016/3/21

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	0.16307	10.13	45.59	36.15	55.72	46.28	65.31	55.31	-9.59	-9.03
2	0.19297	10.15	40.97	31.71	51.12	41.86	63.91	53.91	-12.78	-12.04
3	0.27109	10.17	35.92	31.25	46.09	41.42	61.08	51.08	-14.99	-9.66
4	0.45569	10.19	37.23	28.51	47.42	38.70	56.77	46.77	-9.35	-8.07
5	0.53390	10.20	40.89	34.00	51.09	44.20	56.00	46.00	-4.91	-1.80
6	2.58984	10.30	28.21	23.39	38.51	33.69	56.00	46.00	-17.49	-12.31

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

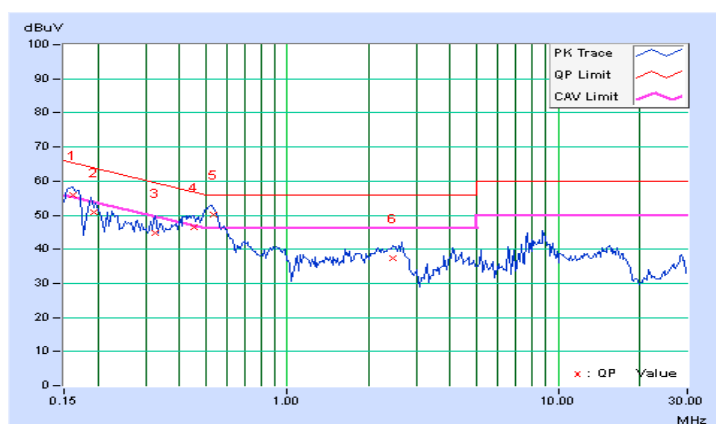


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23°C, 62%RH
Tested by	Mick Chou	Test Date	2016/3/21

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	0.16172	10.14	45.69	36.18	55.83	46.32	65.38	55.38	-9.55	-9.06
2	0.19288	10.16	40.77	31.72	50.93	41.88	63.91	53.91	-12.99	-12.04
3	0.32578	10.18	34.55	24.46	44.73	34.64	59.56	49.56	-14.83	-14.92
4	0.45450	10.19	36.26	27.07	46.45	37.26	56.79	46.79	-10.34	-9.53
5	0.53136	10.19	40.04	32.80	50.23	42.99	56.00	46.00	-5.77	-3.01
6	2.44531	10.32	26.95	21.31	37.27	31.63	56.00	46.00	-18.73	-14.37

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	101240	Oct. 06, 2015	Oct. 05, 2016
Test Receiver ROHDE & SCHWARZ (H)	ESR7	101471	Feb. 19, 2016	Feb. 18, 2017
BILOG Antenna SCHWARZBECK (V)	VULB9168	9168-149	Jan. 05, 2016	Jan. 04, 2017
BILOG Antenna SCHWARZBECK (H)	VULB9168	9168-154	Jan. 05, 2016	Jan. 04, 2017
Preamplifier Agilent (V)	310N	352924	Jul. 20, 2015	Jul. 19, 2016
Preamplifier Agilent (H)	310N	352923	Jul. 20, 2015	Jul. 19, 2016
RF signal cable (with 5dB PAD) Woken (V)	8D-FB	Cable-CH(V)-01	Oct. 25, 2015	Oct. 24, 2016
RF signal cable (with 5dB PAD) Woken (H)	8D-FB	Cable-CH(H)-01	Oct. 25, 2015	Oct. 24, 2016
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

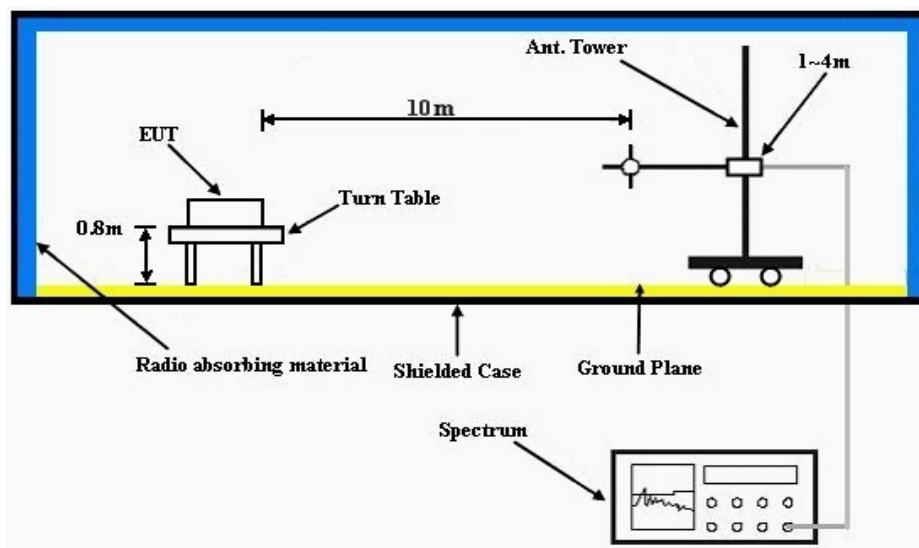
Notes: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

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

- 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 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.



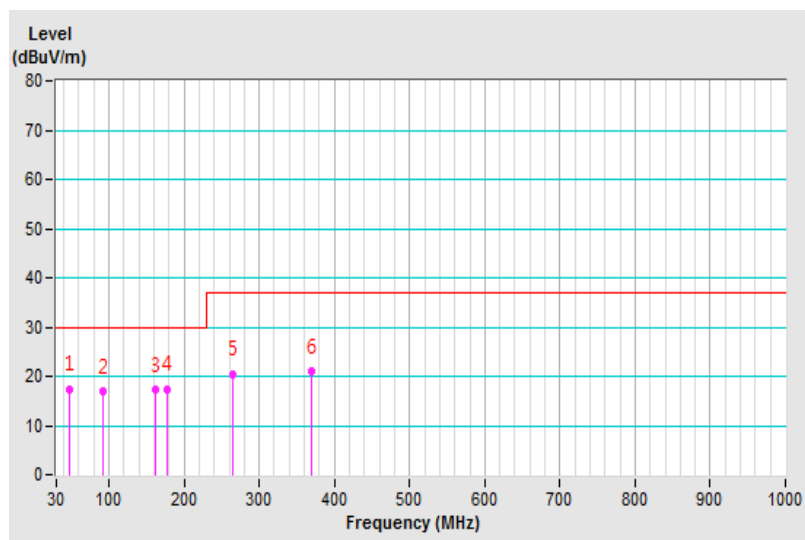
6.4 Test Results

Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	120Vac, 60Hz	Environmental Conditions	20°C, 62%RH
Tested by	Fox Chang	Test Date	2016/4/27

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	46.64	17.33 QP	30.00	-12.67	2.50 H	118	30.45	-13.12
2	91.70	16.79 QP	30.00	-13.21	1.50 H	34	35.06	-18.27
3	162.17	17.12 QP	30.00	-12.88	3.50 H	2	29.66	-12.54
4	176.57	17.24 QP	30.00	-12.76	4.00 H	153	30.69	-13.45
5	265.29	20.28 QP	37.00	-16.72	3.50 H	103	32.97	-12.69
6	368.60	20.85 QP	37.00	-16.15	3.00 H	348	30.13	-9.28

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

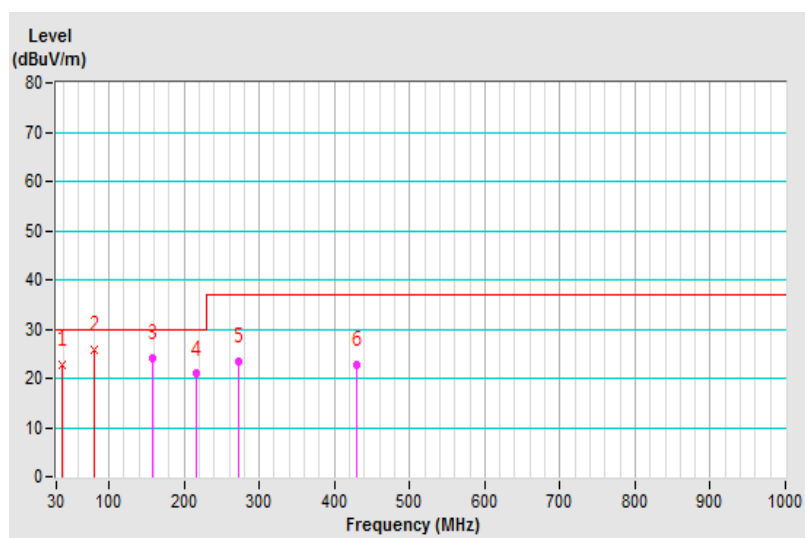


Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	120Vac, 60Hz	Environmental Conditions	20°C, 62%RH
Tested by	Fox Chang	Test Date	2016/4/27

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	37.32	22.76 QP	30.00	-7.24	1.50 V	98	35.83	-13.07
2	80.34	25.86 QP	30.00	-4.14	2.00 V	358	43.16	-17.30
3	158.24	24.07 QP	30.00	-5.93	2.00 V	23	36.57	-12.50
4	216.25	20.91 QP	30.00	-9.09	1.00 V	343	36.10	-15.19
5	273.09	23.45 QP	37.00	-13.55	1.00 V	302	35.49	-12.04
6	428.93	22.86 QP	37.00	-14.14	1.00 V	296	30.29	-7.43

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: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

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