

FCC DoC Test Report

Report No.: FD141225E09

Test Model: N437

Received Date: Dec. 25, 2014

Test Date: Dec. 26 to 27, 2014

Issued Date: Mar. 02, 2015

Applicant: NETRONIX, INC.

Address: No. 945, Boai St., Jubei City, Hsin-Chu, 302, Taiwan, R.O.C.

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

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

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

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



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

Table of Contents

Release Control Record	3
1 Certificate of Conformity	4
2 Summary of Test Results	5
2.1 Measurement Uncertainty	5
2.2 Modification Record	5
3 General Information	6
3.1 Features of EUT	6
3.2 General Description of EUT	6
3.3 Operating Modes of EUT and Determination of Worst Case Operating Mode	7
3.4 Test Program Used and Operation Descriptions	7
3.5 Primary Clock Frequencies of Internal Source	7
3.6 Miscellaneous	8
4 Configuration and Connections with EUT	9
4.1 Connection Diagram of EUT and Peripheral Devices	9
4.2 Configuration of Peripheral Devices and Cable Connections	10
5 Conducted Emissions at Mains Ports	11
5.1 Limits	11
5.2 Test Instruments	11
5.3 Test Arrangement	12
5.4 Supplementary Information	12
5.5 Test Results	13
6 Radiated Emissions up to 1 GHz	15
6.1 Limits	15
6.2 Test Instruments	16
6.3 Test Arrangement	17
6.4 Supplementary Information	17
6.5 Test Results (Mode 1)	18
6.6 Test Results (Mode 2)	20
7 Radiated Emissions above 1 GHz	22
7.1 Limits	22
7.2 Test Instruments	23
7.3 Test Arrangement	24
7.4 Supplementary Information	24
7.5 Test Results (Mode 1)	25
7.6 Test Results (Mode 2)	27
8 Pictures of Test Arrangements	29
8.1 Conducted Emissions at Mains Ports	29
8.2 Radiated Emissions up to 1 GHz	30
8.3 Radiated Emissions above 1 GHz	32
Appendix – Information on the Testing Laboratories	34



A D T

Release Control Record

Issue No.	Description	Date Issued
FD141225E09	Original release.	Mar. 02, 2015



A D T

1 Certificate of Conformity

Product: Electronic Display Device

Test Model: N437

Sample Status: ENGINEERING SAMPLE

Applicant: NETRONIX, INC.

Test Date: Dec. 26 to 27, 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 :

Lori Chung / Specialist

Date:

Mar. 02, 2015

Approved by :

Ken Lu / Manager

Date:

Mar. 02, 2015

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 -7.58 dB at 0.18906 MHz	Pass
15.109	6.2.1	Radiated Emissions up to 1 GHz	Minimum passing Class B margin is -1.51 dB at 47.99 MHz	Pass
	6.2.2	Radiated Emissions above 1 GHz	Minimum passing Class B margin is -21.87 dB at 3000.02 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:

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) ($\pm$)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.86 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	3.99 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	3.65 dB
	6GHz ~ 18GHz	3.50 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 NETRONIX, INC., for detailed feature description, please refer to the manufacturer's specifications or user's manual.

3.2 General Description of EUT

Product	Electronic Display Device
Test Model	N437
Sample Status	ENGINEERING SAMPLE
Operating Software	NA
Power Supply Rating	3.7-4.2Vdc from battery or 5Vdc from USB interface
Accessory Device	Battery x 1
Data Cable Supplied	USB cable x1

Note:

1. The antenna provided to the EUT, please refer to the following table:

Brand	Model	Gain (dBi)	Antenna Type	Connector Type	Frequency range (GHz to GHz)
Walsin Technology Corporation	RFECA3216060AAT	2	Ceramic	Soldering terminal	2.4 ~ 2.4835

2. The EUT must be supplied with a battery and following two different brands could be chosen:

Battery 1		
Brand	Model No.	Spec.
TCL	PR-285083	3.7-4.2Vdc, 1500mAh
Battery 2		
Brand	Model No.	Spec.
PSE	H285083HG	3.7-4.2Vdc, 1500mAh

3. The EUT incorporates a SISO function.

Modulation Mode	Data Rate (MCS)	TX/RX FUNCTION
802.11b	1 ~ 11Mbps	1TX/1RX
802.11g	6 ~ 54Mbps	1TX/1RX
802.11n (HT20)	MCS 0~7	1TX/1RX

4. The EUT must be supplied with a USB cable, and it has three different models could be chosen:

Model Name	Spec.
AA782400	USB cable (Shielded, 1m)
AA825000	USB cable (Shielded, 1m)
SH-0152	USB cable (Shielded, 1m)

5. The device WiFi function will be disable automatically when the device is connected to the host unit through one USB cable.

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

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

Mode	Test Condition		
	Polarity	Power	Remark
1	X-Y plane	3.7Vdc from Battery 1	With USB cable<Model : AA782400>
2	X-Y plane	3.7Vdc from Battery 2	With USB cable<Model : AA782400>
3	Y-Z plane	3.7Vdc from Battery 1	With USB cable<Model : AA782400>
4	X-Z plane	3.7Vdc from Battery 1	With USB cable<Model : AA782400>
5	X-Y plane	3.7Vdc from Battery 1	With USB cable<Model : AA825000>
6	X-Y plane	3.7Vdc from Battery 1	With USB cable<Model : SH-0152>

Test modes are presented in the report as below.

Mode	Conducted emission test		
	Test Condition		
	Polarity	Power	Remark
1	X-Y plane	5Vdc from USB interface	With USB cable<Model : AA782400>
Mode	Radiated emission test		
	Test Condition		
	Polarity	Power	Remark
1	X-Y plane	3.7Vdc from Battery 1	With USB cable<Model : AA782400>
2	X-Y plane	5Vdc from USB interface	With USB cable<Model : AA782400>

3.4 Test Program Used and Operation Descriptions

For Radiated emission test Mode 1

1. Turn on the power of all equipment.
2. Support unit H (NOTEBOOK COMPUTER) runs test program "ping.exe" to link with EUT via support unit G (WiFi AP) by wireless.

For Conducted emission test Mode 1 / Radiated emission test Mode 2

1. Turn on the power of all equipment.
2. Support unit A (PERSONAL COMPUTER) runs test program "EMC.bat" to read and write messages from EUT
3. Support unit A (PERSONAL COMPUTER) sends "H" messages to support unit B (MONITOR). And MONITOR scrolls "H" patterns on its screen.
4. Support unit A (PERSONAL COMPUTER) sends "H" messages to support unit E (PRINTER), and the PRINTER prints them on paper.
5. Support unit A (PERSONAL COMPUTER) sends "H" messages to support unit F (MODEM).

3.5 Primary Clock Frequencies of Internal Source

The EUT is a 2.4GHz WLAN device, provided by NETRONIX, INC., 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:

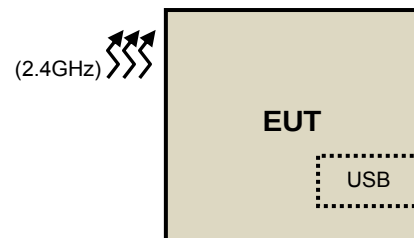
CAN ICES-3 (*)/NMB-3(*)

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

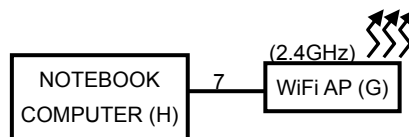
4 Configuration and Connections with EUT

4.1 Connection Diagram of EUT and Peripheral Devices

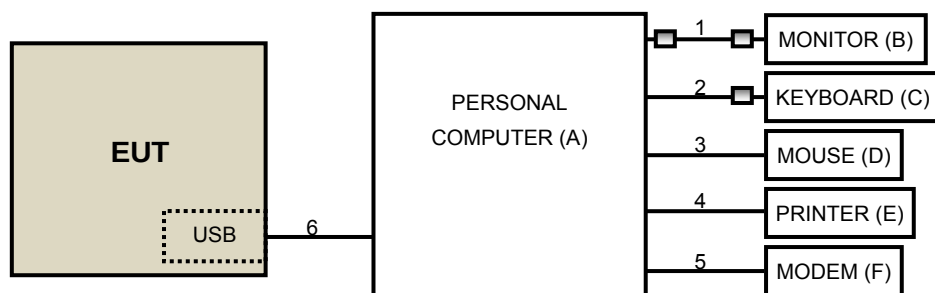
For Radiated emission test Mode 1



Remote site



For Conducted emission test Mode 1 / Radiated emission test Mode 2



4.2 Configuration of Peripheral Devices and Cable Connections

No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
A	PERSONAL COMPUTER	DELL	DCSCMF	CKKB32S	FCC DoC	Provided by Lab
B	MONITOR	DELL	E2210Hc	CN-OG337R-64180-9 7S-OQGS	FCC DoC	Provided by Lab
C	KEYBOARD	DELL	SK-8115	MY-0DJ325-71619-99 B-0476	FCC DoC	Provided by Lab
D	MOUSE	DELL	MOC5UO	I1401LVG	FCC DoC	Provided by Lab
E	PRINTER	EPSON	LQ-300+II	G88Y074083	FCC DoC	Provided by Lab
F	MODEM	ACEEX	1414	0206026778	IFAXDM1414	Provided by Lab
G	WiFi AP	Linksys	WRT320N	NA	NA	Provided by Lab
H	NOTEBOOK COMPUTER	DELL	E5420	CHHYLQ1	FCC DoC	Provided by Lab

NOTE:

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

No.	Cable	Qty.	Length (m)	Shielded (Yes/ No)	Cores (Number)	Remark
1	VGA	1	1.8	Yes	2	Provided by Lab
2	USB	1	1.8	Yes	1	Provided by Lab
3	USB	1	1.8	Yes	0	Provided by Lab
4	USB	1	1.8	Yes	0	Provided by Lab
5	RS232	1	1	Yes	0	Provided by Lab
6	USB	1	1	Yes	0	Supplied by Client
7	RJ45	1	3	No	0	Provided by Lab

- 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.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS 30	100287	Apr. 09, 2014	Apr. 08, 2015
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-523	Sep. 29, 2014	Sep. 28, 2015
RF Cable (JYEBAO)	5D-FB	COACAB-001	May 26, 2014	May 25, 2015
50 ohms Terminator	50	3	Oct. 17, 2014	Oct. 16, 2015
50 ohms Terminator	N/A	EMC-04	Oct. 21, 2014	Oct. 20, 2015
Software ADT	BV ADT_Cond_V7.3.7 .3	NA	NA	NA
Line-Impedance Stabilization Network (for Peripheral) ROHDE & SCHWARZ	ENV216	100072	June 10, 2014	June 09, 2015

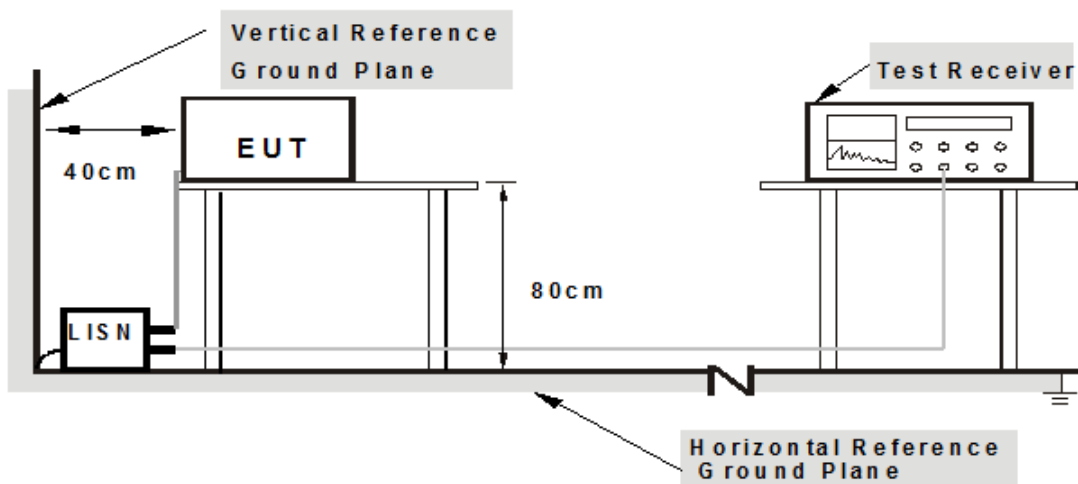
Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. A.
3. The VCCI Con A Registration No. is C-817.
4. Tested Date: Dec. 26, 2014

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.

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

5.4 Supplementary Information

There is not any deviation from the test standards for the test method.

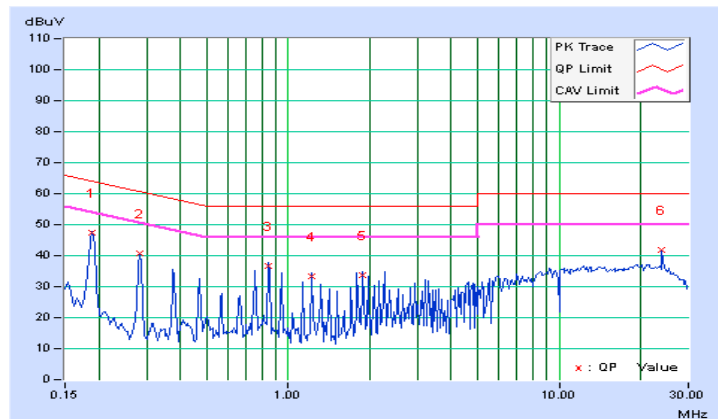
5.5 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power (System)	120Vac, 60Hz	Environmental Conditions	24°C, 56%RH
Tested by	Jyunchun Lin		

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	0.18906	0.07	47.27	46.43	47.34	46.50	64.08	54.08	-16.74	-7.58
2	0.28281	0.08	40.65	40.14	40.73	40.22	60.73	50.73	-20.00	-10.51
3	0.84922	0.10	36.40	35.87	36.50	35.97	56.00	46.00	-19.50	-10.03
4	1.22781	0.12	33.22	32.55	33.34	32.67	56.00	46.00	-22.66	-13.33
5	1.88997	0.15	33.45	32.44	33.60	32.59	56.00	46.00	-22.40	-13.41
6	23.99078	0.74	41.13	40.30	41.87	41.04	60.00	50.00	-18.13	-8.96

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

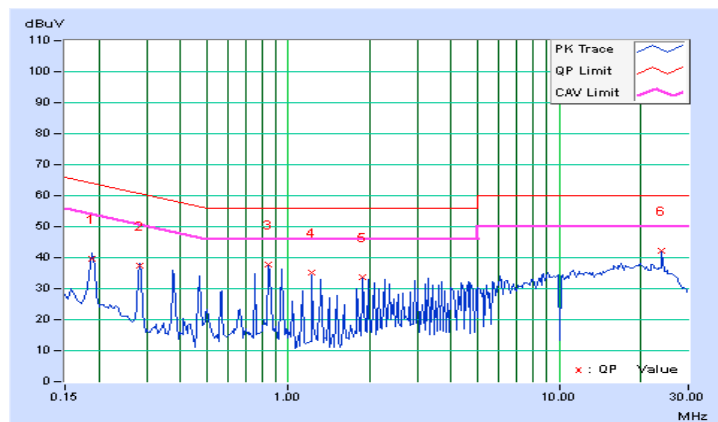


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power (System)	120Vac, 60Hz	Environmental Conditions	24°C, 56%RH
Tested by	Jyunchun Lin		

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	0.18906	0.07	39.46	39.16	39.53	39.23	64.08	54.08	-24.55	-14.85
2	0.28281	0.07	37.50	36.70	37.57	36.77	60.73	50.73	-23.16	-13.96
3	0.84922	0.09	37.66	37.15	37.75	37.24	56.00	46.00	-18.25	-8.76
4	1.22656	0.10	34.92	34.33	35.02	34.43	56.00	46.00	-20.98	-11.57
5	1.88922	0.13	33.57	32.64	33.70	32.77	56.00	46.00	-22.30	-13.23
6	23.98953	0.73	41.36	40.40	42.09	41.13	60.00	50.00	-17.91	-8.87

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 (dBμV/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 (dBμV/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				
960-1000	60	54	57.5	47.5

- 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.	CALIBRATE D DATE	CALIBRATED UNTIL
Spectrum Analyzer Agilent	E9038A	MY50010125	Apr. 17, 2014	Apr. 16, 2015
	E9038A	MY50010132	July 05, 2014	July 04, 2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-01	Nov. 12, 2014	Nov. 11, 2015
	ZFL-1000VH2B	AMP-ZFL-02	Nov. 12, 2014	Nov. 11, 2015
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-359	Feb. 24, 2014	Feb. 23, 2015
	VULB 9168	9168-358	Feb. 25, 2014	Feb. 24, 2015
RF Cable	8DFB	CHFCAB-001 CHFCAB-002 CHFCAB-003	Oct. 03, 2014	Oct. 02, 2015
Pre-Amplifier Agilent	8449B	3008A01975	Mar. 01, 2014	Feb. 28, 2015
Horn Antenna SCHWARZBECK	BBHA 9120	9120D-783	Aug. 27, 2014	Aug. 26, 2015
RF Cable	NA	RF104-206 RF104-209 RF104-110	Dec. 11, 2014	Dec.10, 2015
Spectrum Analyzer R&S	FSV40	100964	July 05, 2014	July 04, 2015
Pre-Amplifier EMCI	EMC184045	980143	Jan. 17, 2014	Jan. 16, 2015
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Aug. 26, 2014	Aug. 25, 2015
RF Cable	NA	RF104-121 RF104-204	Dec. 11, 2014	Dec. 10, 2015
Software	ADT_Radiated_ V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA

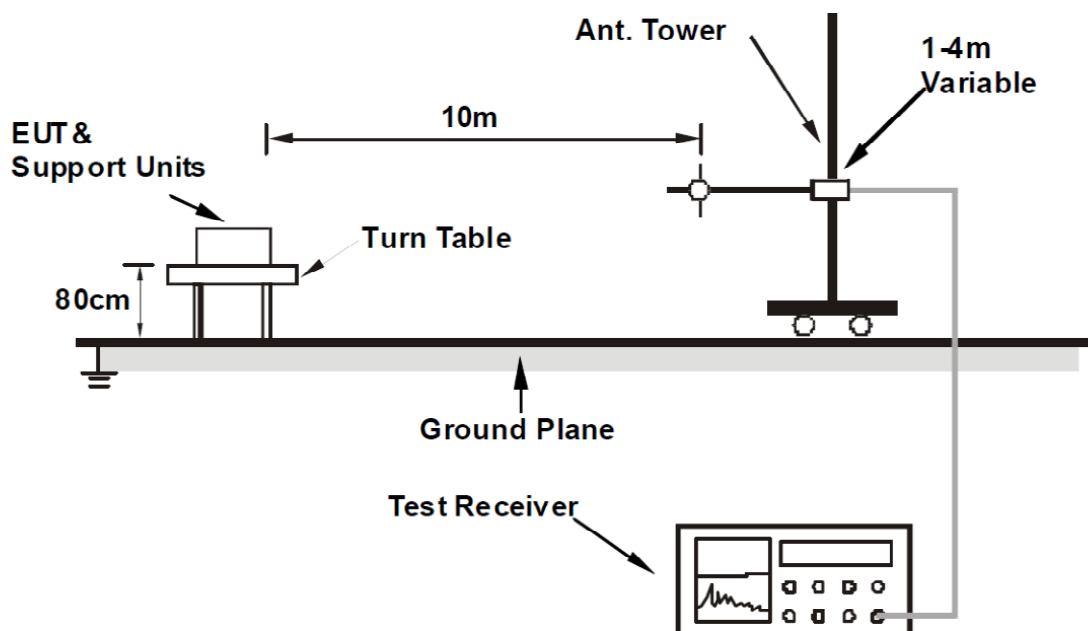
Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 10m Chamber No. F.
- 3 The FCC Site Registration No. is 928149.
4. The VCCI Site Registration No. is R-3252 & G-136.
- 5 The CANADA Site Registration No. is IC 7450H-1.
- 6 Tested Date: Dec. 27, 2014

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.



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

6.4 Supplementary Information

There is not any deviation from the test standards for the test method.

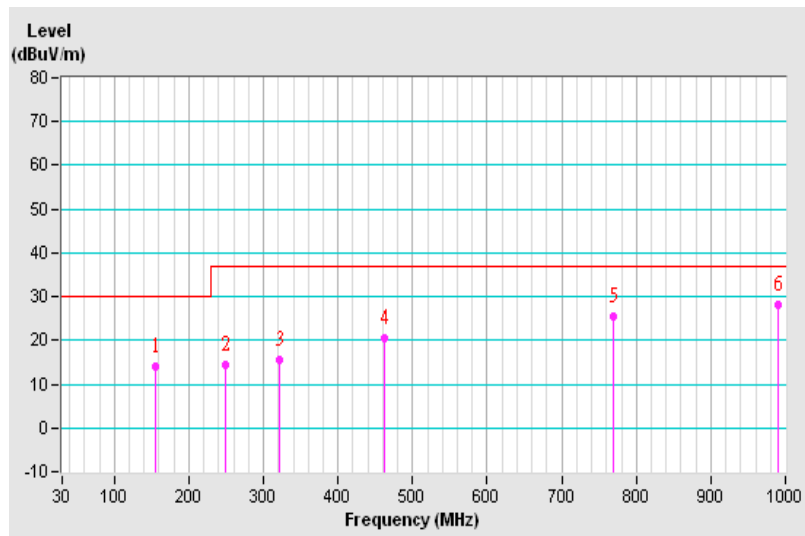
6.5 TEST RESULTS (MODE 1)

Frequency Range	30MHz ~ 1GHz	Detector Function & Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	3.7Vdc from battery	Environmental Conditions	20°C, 70%RH
Tested by	Ping Liu		

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	156.05	14.01 QP	30.00	-15.99	2.00 H	152	25.88	-11.87
2	250.00	14.50 QP	37.00	-22.50	3.00 H	67	27.67	-13.17
3	322.12	15.48 QP	37.00	-21.52	1.00 H	272	25.82	-10.34
4	461.99	20.53 QP	37.00	-16.47	2.00 H	253	26.94	-6.41
5	769.92	25.35 QP	37.00	-11.65	3.00 H	253	24.76	0.59
6	990.01	28.17 QP	37.00	-8.83	3.00 H	145	24.25	3.92

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

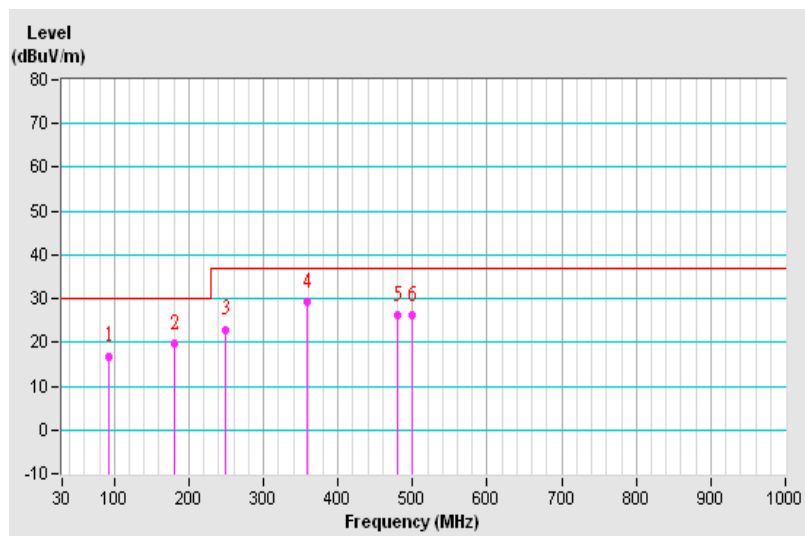


Frequency Range	30MHz ~ 1GHz	Detector Function & Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	3.7Vdc from battery	Environmental Conditions	20°C, 70%RH
Tested by	Ping Liu		

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	93.20	16.88 QP	30.00	-13.12	4.00 V	274	34.85	-17.97
2	181.27	19.75 QP	30.00	-10.25	3.00 V	103	33.54	-13.79
3	250.00	22.95 QP	37.00	-14.05	3.00 V	175	36.01	-13.06
4	358.15	29.21 QP	37.00	-7.79	2.00 V	348	38.75	-9.54
5	479.98	26.07 QP	37.00	-10.93	4.00 V	318	32.09	-6.02
6	500.01	26.32 QP	37.00	-10.68	3.00 V	309	31.78	-5.46

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



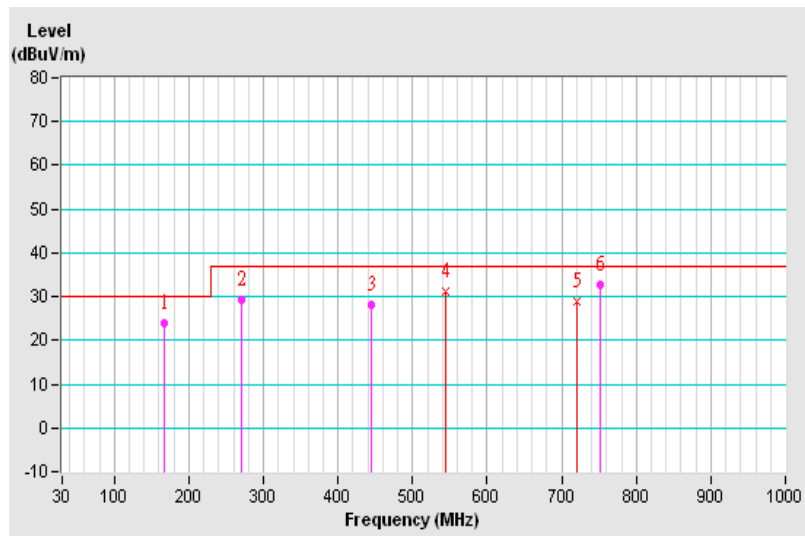
6.6 TEST RESULTS (MODE 2)

Frequency Range	30MHz ~ 1GHz	Detector Function & Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	5Vdc from USB interface	Environmental Conditions	20°C, 70%RH
Tested by	Ping Liu		

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	166.38	23.92 QP	30.00	-6.08	4.00 H	124	35.96	-12.04
2	270.95	29.37 QP	37.00	-7.63	3.00 H	112	41.48	-12.11
3	445.50	28.27 QP	37.00	-8.73	2.00 H	81	34.98	-6.71
4	544.49	31.03 QP	37.00	-5.97	2.00 H	34	35.67	-4.64
5	720.01	28.81 QP	37.00	-8.19	2.00 H	34	29.71	-0.90
6	751.00	32.65 QP	37.00	-4.35	1.00 H	255	32.55	0.10

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

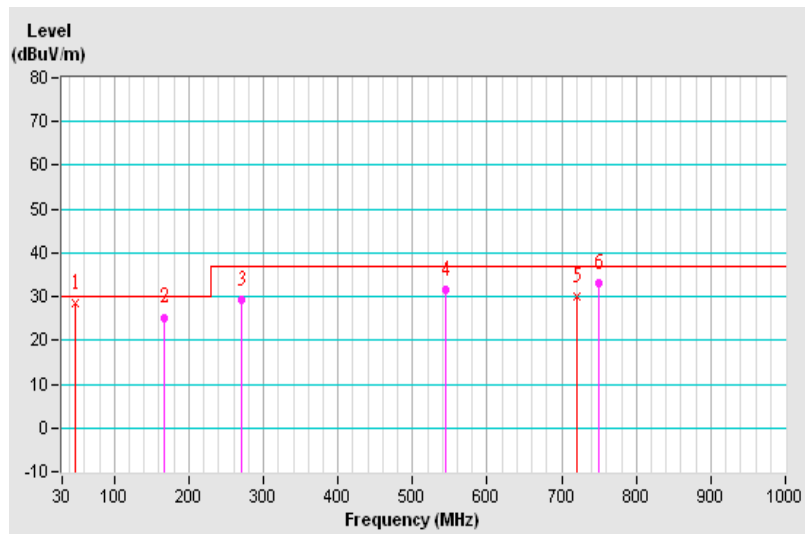


Frequency Range	30MHz ~ 1GHz	Detector Function & Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	5Vdc from USB interface	Environmental Conditions	20°C, 70%RH
Tested by	Ping Liu		

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	47.99	28.49 QP	30.00	-1.51	1.00 V	348	41.13	-12.64
2	165.95	25.24 QP	30.00	-4.76	1.00 V	132	37.62	-12.38
3	270.95	29.25 QP	37.00	-7.75	1.00 V	139	41.31	-12.06
4	544.49	31.50 QP	37.00	-5.50	1.00 V	239	36.12	-4.62
5	719.91	30.16 QP	37.00	-6.84	3.00 V	348	31.21	-1.05
6	749.06	32.91 QP	37.00	-4.09	1.00 V	198	32.86	0.05

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



7 Radiated Emissions above 1 GHz

7.1 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
1000-3000	Avg: 49.5	Avg: 43.5	Not defined	Not defined
Above 3000	Peak: 69.5	Peak: 63.5	Not defined	Not defined

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
1000-3000	Avg: 60	Avg: 54	Avg: 56 Peak: 76	Avg: 50 Peak: 70
Above 3000	Peak: 80	Peak: 74	Avg: 60 Peak: 80	Avg: 54 Peak: 74

- 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. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

Frequency Range (For unintentional radiators)

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30
1.705-108	1000
108-500	2000
500-1000	5000
Above 1000	5th harmonic of the highest frequency or 40GHz, whichever is lower

7.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATE D DATE	CALIBRATED UNTIL
Spectrum Analyzer Agilent	E9038A	MY50010125	Apr. 17, 2014	Apr. 16, 2015
	E9038A	MY50010132	July 05, 2014	July 04, 2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-01	Nov. 12, 2014	Nov. 11, 2015
	ZFL-1000VH2B	AMP-ZFL-02	Nov. 12, 2014	Nov. 11, 2015
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-359	Feb. 24, 2014	Feb. 23, 2015
	VULB 9168	9168-358	Feb. 25, 2014	Feb. 24, 2015
RF Cable	8DFB	CHFCAB-001 CHFCAB-002 CHFCAB-003	Oct. 03, 2014	Oct. 02, 2015
Pre-Amplifier Agilent	8449B	3008A01975	Mar. 01, 2014	Feb. 28, 2015
Horn Antenna SCHWARZBECK	BBHA 9120	9120D-783	Aug. 27, 2014	Aug. 26, 2015
RF Cable	NA	RF104-206 RF104-209 RF104-110	Dec. 11, 2014	Dec.10, 2015
Spectrum Analyzer R&S	FSV40	100964	July 05, 2014	July 04, 2015
Pre-Amplifier EMCI	EMC184045	980143	Jan. 17, 2014	Jan. 16, 2015
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Aug. 26, 2014	Aug. 25, 2015
RF Cable	NA	RF104-121 RF104-204	Dec. 11, 2014	Dec. 10, 2015
Software	ADT_Radiated_ V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA

Note:

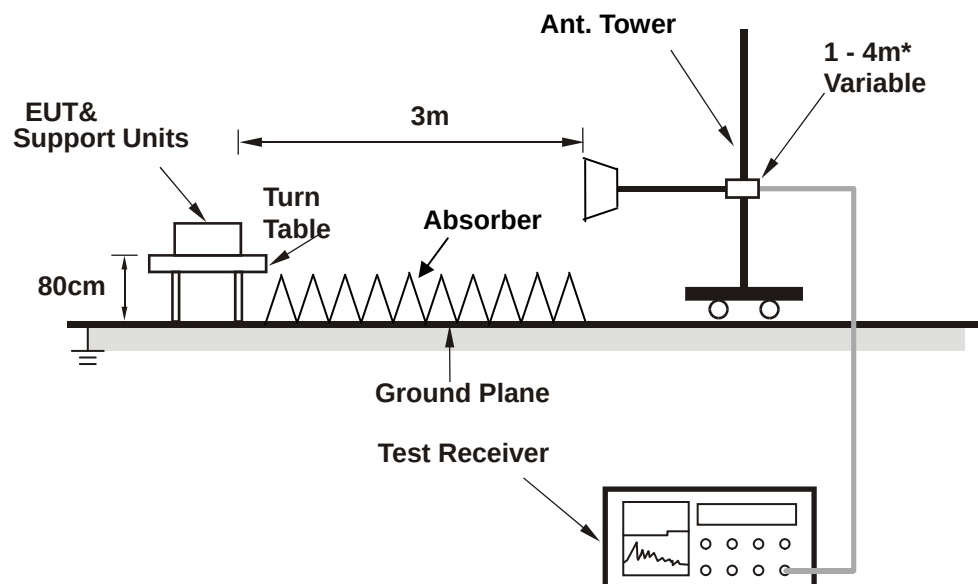
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 10m Chamber No. F.
- 3 The FCC Site Registration No. is 928149.
4. The VCCI Site Registration No. is R-3252 & G-136.
- 5 The CANADA Site Registration No. is IC 7450H-1.
- 6 Tested Date: Dec. 27, 2014

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.

<Frequency Range above 1GHz>



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

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

7.4 Supplementary Information

There is not any deviation from the test standards for the test method.

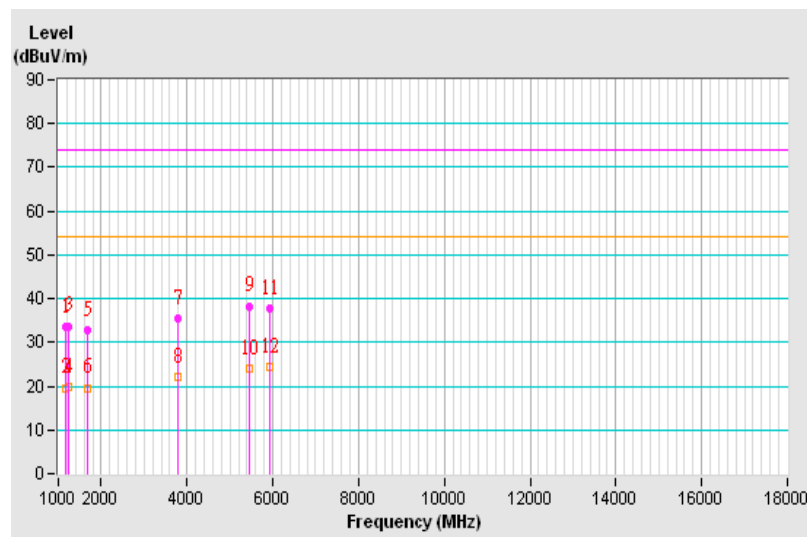
7.5 Test Results (Mode 1)

Frequency Range	1GHz ~ 12.5GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	3.7Vdc from battery	Environmental Conditions	24°C, 64%RH
Tested by	Ping Liu		

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	1163.75	33.60 PK	74.00	-40.40	1.00 H	73	42.81	-9.21
2	1163.75	19.61 AV	54.00	-34.39	1.00 H	73	28.82	-9.21
3	1242.25	33.73 PK	74.00	-40.27	1.00 H	107	42.67	-8.94
4	1242.25	19.93 AV	54.00	-34.07	1.00 H	107	28.87	-8.94
5	1696.50	32.68 PK	74.00	-41.32	1.00 H	360	40.22	-7.54
6	1696.50	19.61 AV	54.00	-34.39	1.00 H	360	27.15	-7.54
7	3800.00	35.30 PK	74.00	-38.70	1.00 H	318	37.39	-2.09
8	3800.00	22.22 AV	54.00	-31.78	1.00 H	318	24.31	-2.09
9	5449.50	38.30 PK	74.00	-35.70	1.00 H	125	36.66	1.64
10	5449.50	24.07 AV	54.00	-29.93	1.00 H	125	22.43	1.64
11	5925.25	37.69 PK	74.00	-36.31	1.00 H	188	35.26	2.43
12	5925.25	24.55 AV	54.00	-29.45	1.00 H	188	22.12	2.43

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

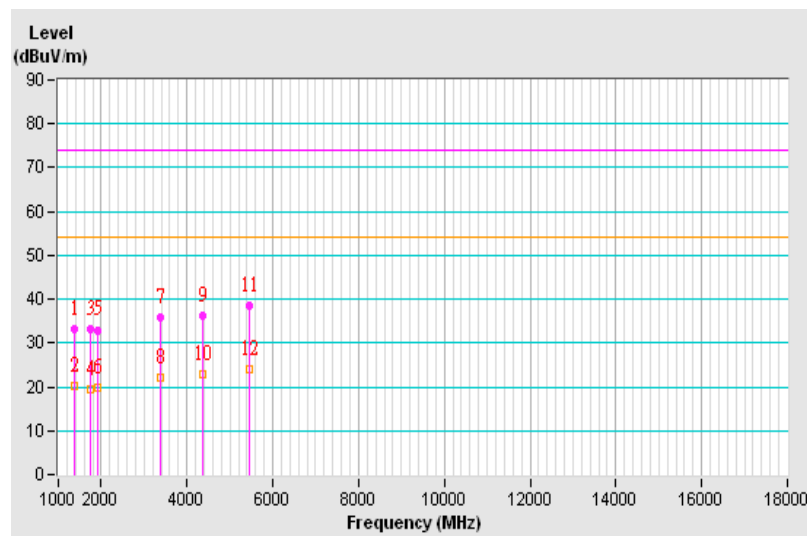


Frequency Range	1GHz ~ 12.5GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	3.7Vdc from battery	Environmental Conditions	24°C, 64%RH
Tested by	Ping Liu		

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	1372.50	33.20 PK	74.00	-40.80	1.00 V	133	41.78	-8.58
2	1372.50	20.19 AV	54.00	-33.81	1.00 V	133	28.77	-8.58
3	1755.75	33.22 PK	74.00	-40.78	1.00 V	194	40.54	-7.32
4	1755.75	19.39 AV	54.00	-34.61	1.00 V	194	26.71	-7.32
5	1919.25	32.97 PK	74.00	-41.03	1.00 V	189	39.89	-6.92
6	1919.25	19.97 AV	54.00	-34.03	1.00 V	189	26.89	-6.92
7	3392.75	35.72 PK	74.00	-38.28	1.00 V	324	38.59	-2.87
8	3392.75	22.03 AV	54.00	-31.97	1.00 V	324	24.90	-2.87
9	4364.25	36.26 PK	74.00	-37.74	1.00 V	40	37.10	-0.84
10	4364.25	22.91 AV	54.00	-31.09	1.00 V	40	23.75	-0.84
11	5452.25	38.35 PK	74.00	-35.65	1.00 V	209	36.70	1.65
12	5452.25	24.09 AV	54.00	-29.91	1.00 V	209	22.44	1.65

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



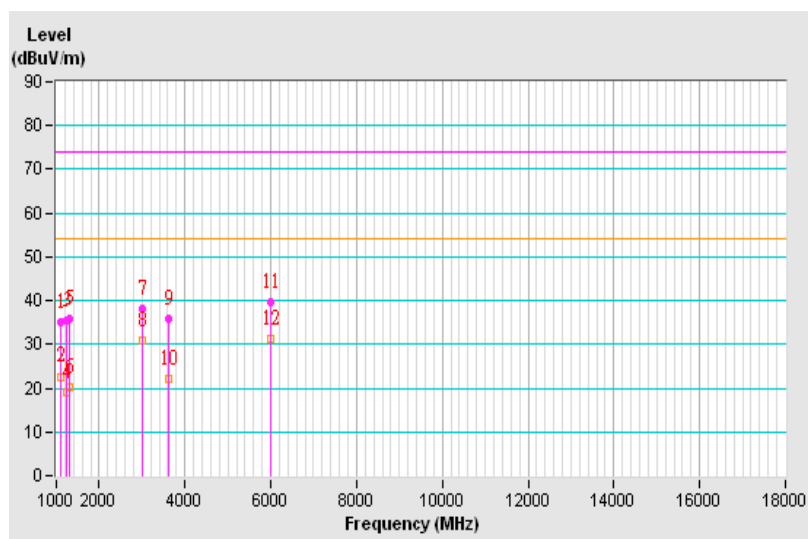
7.6 Test Results (Mode 2)

Frequency Range	1GHz ~ 12.5GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	5Vdc from USB interface	Environmental Conditions	24°C, 64%RH
Tested by	Ping Liu		

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	1089.00	35.21 PK	74.00	-38.79	1.00 H	342	44.72	-9.51
2	1089.00	22.67 AV	54.00	-31.33	1.00 H	342	32.18	-9.51
3	1229.00	35.56 PK	74.00	-38.44	1.00 H	326	44.54	-8.98
4	1229.00	18.94 AV	54.00	-35.06	1.00 H	326	27.92	-8.98
5	1297.25	35.85 PK	74.00	-38.15	1.00 H	45	44.63	-8.78
6	1297.25	20.27 AV	54.00	-33.73	1.00 H	45	29.05	-8.78
7	2999.75	38.14 PK	74.00	-35.86	1.00 H	107	40.93	-2.79
8	2999.75	30.91 AV	54.00	-23.09	1.00 H	107	33.70	-2.79
9	3619.00	35.99 PK	74.00	-38.01	1.00 H	360	38.47	-2.48
10	3619.00	22.23 AV	54.00	-31.77	1.00 H	360	24.71	-2.48
11	5999.75	39.68 PK	74.00	-34.32	1.00 H	142	36.96	2.72
12	5999.75	31.21 AV	54.00	-22.79	1.00 H	142	28.49	2.72

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 ~ 12.5GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	5Vdc from USB interface	Environmental Conditions	24°C, 64%RH
Tested by	Ping Liu		

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	1090.50	36.31 PK	74.00	-37.69	1.00 V	149	45.81	-9.50
2	1090.50	20.54 AV	54.00	-33.46	1.00 V	149	30.04	-9.50
3	1693.50	36.95 PK	74.00	-37.05	1.00 V	360	44.50	-7.55
4	1693.50	21.52 AV	54.00	-32.48	1.00 V	360	29.07	-7.55
5	1747.50	37.90 PK	74.00	-36.10	1.00 V	15	45.26	-7.36
6	1747.50	22.20 AV	54.00	-31.80	1.00 V	15	29.56	-7.36
7	2320.00	42.50 PK	74.00	-31.50	1.00 V	270	47.71	-5.21
8	2320.00	21.62 AV	54.00	-32.38	1.00 V	270	26.83	-5.21
9	3000.02	41.44 PK	74.00	-32.56	1.00 V	174	44.23	-2.79
10	3000.02	32.13 AV	54.00	-21.87	1.00 V	174	34.92	-2.79
11	4979.25	38.25 PK	74.00	-35.75	1.00 V	205	37.50	0.75
12	4979.25	23.84 AV	54.00	-30.16	1.00 V	205	23.09	0.75

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

