

FCC Certification Test Report

Report No.: FC140506C09A

Test Model: XP7700

FCC ID: WYPL11V012AA

Type Number: L11V012AA

Received Date: Jul. 04, 2014

Test Date: Jul. 09, 2014 ~ Jul. 10, 2014

Issued Date: Aug. 18, 2014

Applicant: Sonim Technologies, Inc.

Address: 825 S. Grant St., Suite 200., San Mateo, CA, 94402

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
FC140506C09A	Original Release	Aug. 18, 2014

1 Certificate of Conformity

Product: LTE Smartphone

Brand: Sonim

Test Model: XP7700

Type Number: L11V012AA

Sample Status: Identical Prototype

Applicant: Sonim Technologies, Inc.

Test Date: Jul. 09, 2014 ~ Jul. 10, 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:

Aug. 18, 2014

Vera Huang / Specialist

Approved by :



Date:

Aug. 18, 2014

Derrick Dai / Assistant 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 -10.96 dB at 0.15391 MHz	Pass
15.109	6.2.1	Radiated Emissions up to 1 GHz	Minimum passing Class B margin is -3.10 dB at 119.970 MHz	Pass
	6.2.2	Radiated Emissions above 1 GHz	Minimum passing Class B margin is -21.44 dB at 2095.080 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	2.44 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	4.70 dB
Radiated Emissions above 1 GHz	Above 1GHz	2.26 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 Sonim Technologies, Inc., for detailed feature description, please refer to the manufacturer's specifications or user's manual.

3.2 General Description of EUT

Product	LTE Smartphone
Brand	Sonim
Test Model	XP7700
Type Number	L11V012AA
Operating Software	Android 4.4.2
Power Supply Rating	3.7Vdc (Battery) 5Vdc (Adapter or host equipment)
Accessory Device	Refer to Note as below
Data Cable Supplied	Refer to Note as below

Note:

1. The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter	Sonim	S11C02	I/P: 100-240Vac, 50/60Hz, 450mA O/P: 5Vdc, 2100mA
Battery	Sonim	BAT-04800-01S	3.7Vdc, 4800mAh
USB Cable	Sunway	N/A	1.1m cable

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	
1	GSM850 Idle + BT Idle + WLAN (2.4G) Idle + GPS Rx + USB Cable + Adapter + Earphone + Battery + NFC Idle
2	PCS1900 Idle + BT Idle + WLAN (2.4G) Idle + MPEG4 + USB Cable + USB Link + Earphone + Battery + NFC Idle
3	WCDMA Band II Idle + BT Idle + WLAN (2.4G) Idle + Camera + USB Cable + Adapter + Earphone + Battery + NFC Idle
4	WCDMA Band V Idle + BT Idle + WLAN (2.4G) Idle + GPS Rx + USB Cable + Adapter + Earphone + Battery + NFC Idle
5	LTE Band 2 Idle + BT Idle + WLAN (2.4G) Idle + GPS Rx + USB Cable + Adapter + Earphone + Battery + NFC Idle
6	LTE Band 4 Idle + BT Idle + WLAN (2.4G) Idle + GPS Rx + USB Cable + Adapter + Earphone + Battery + NFC Idle
7	LTE Band 5 Idle + BT Idle + WLAN (2.4G) Idle + GPS Rx + USB Cable + Adapter + Earphone + Battery + NFC Idle
8	LTE Band 14 Idle + BT Idle + WLAN (2.4G) Idle + GPS Rx + USB Cable + Adapter + Earphone + Battery + NFC Idle
9	LTE Band 17 Idle + BT Idle + WLAN (2.4G) Idle + GPS Rx + USB Cable + Adapter + Earphone + Battery + NFC Idle
10	LTE Band 7 Idle + BT Idle + WLAN (5G) Idle + GPS Rx + USB Cable + Adapter + Earphone + Battery + NFC Idle
Radiated Emission	
1	GSM850 Idle + BT Idle + WLAN (2.4G) Idle + GPS Rx + USB Cable + Adapter + Earphone + Battery + NFC Idle
2	PCS1900 Idle + BT Idle + WLAN (2.4G) Idle + MPEG4 + USB Cable + USB Link + Earphone + Battery + NFC Idle
3	WCDMA Band II Idle + BT Idle + WLAN (2.4G) Idle + Camera + USB Cable + Adapter + Earphone + Battery + NFC Idle
4	WCDMA Band V Idle + BT Idle + WLAN (2.4G) Idle + GPS Rx + USB Cable + Adapter + Earphone + Battery + NFC Idle
5	LTE Band 2 Idle + BT Idle + WLAN (5G) Idle + GPS Rx + USB Cable + Adapter + Earphone + Battery + NFC Idle
6	LTE Band 4 Idle + BT Idle + WLAN (5G) Idle + GPS Rx + USB Cable + Adapter + Earphone + Battery + NFC Idle
7	LTE Band 5 Idle + BT Idle + WLAN (5G) Idle + GPS Rx + USB Cable + Adapter + Earphone + Battery + NFC Idle
8	LTE Band 14 Idle + BT Idle + WLAN (5G) Idle + GPS Rx + USB Cable + Adapter + Earphone + Battery + NFC Idle
9	LTE Band 17 Idle + BT Idle + WLAN (5G) Idle + GPS Rx + USB Cable + Adapter + Earphone + Battery + NFC Idle
10	LTE Band 7 Idle + BT Idle + WLAN (5G) Idle + GPS Rx + USB Cable + Adapter + Earphone + Battery + NFC Idle

Remark:

- For conducted emission test, test mode 1 was the worst case and only this mode was presented in the report.
- For radiated emission test, test mode 2 was the worst case and only this mode was presented in the report.

3.4 Test Program Used and Operation Descriptions

<Conducted Emission test>

- a. Placed the EUT on a testing table.
- b. Set the WWAN, WLAN, BT, and NFC function in idle condition.
- c. The EUT linked with Bluetooth earphone in idle mode.
- d. The EUT sent audio signal to the earphone.
- e. The EUT communicated data with the Wireless AP, Universal Radio Communication Tester, and GPS Simulator which acted as communication partners.

<Radiated Emission test>

- a. Placed the EUT on a testing table.
- b. Set the WWAN, WLAN, BT, and NFC function in idle condition.
- c. The EUT linked with Bluetooth earphone in idle mode.
- d. The EUT played MPEG4 and sent audio signal to the earphone.
- e. The EUT linked with notebook via USB Cable.
- f. The notebook ran test program to enable all functions.
- g. Notebook sent "H" patterns to the printer and the printer printed "H" patterns.
- h. The EUT communicated data with the Wireless AP and Universal Radio Communication Tester which acted as communication partners.

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 5 GHz, provided by Sonim Technologies, 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:

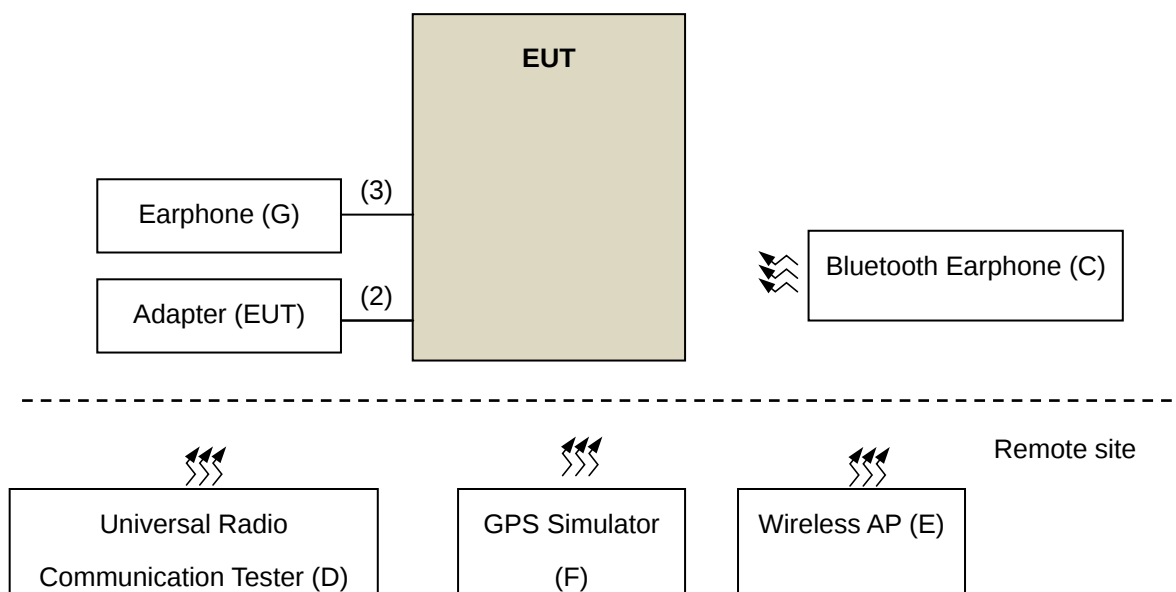
CAN ICES-3 (*)/NMB-3(*)

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

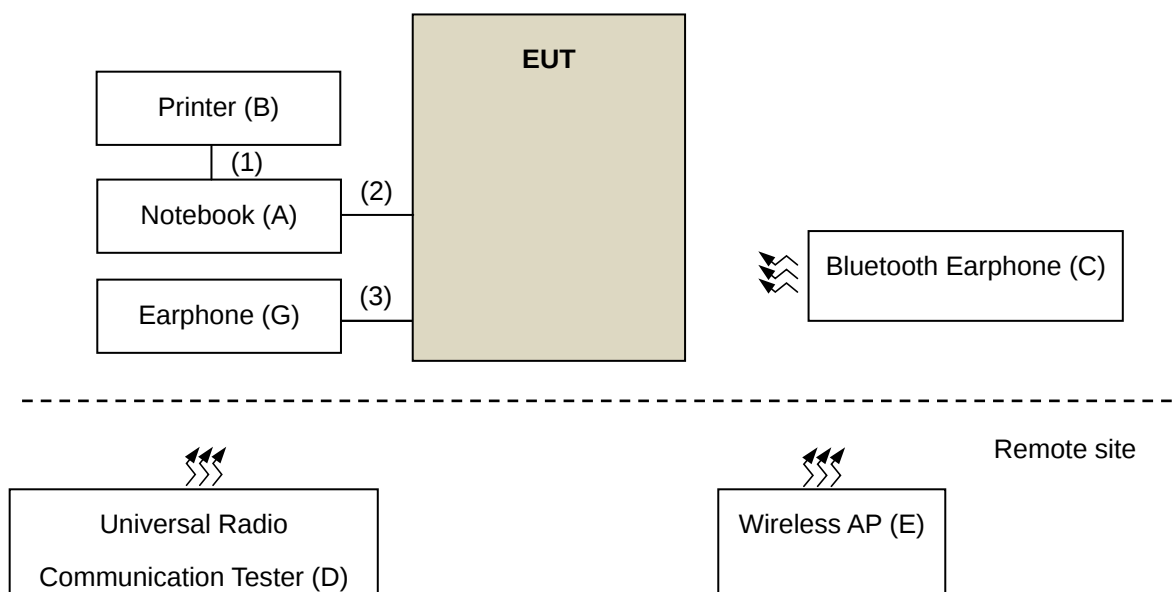
4 Configuration and Connections with EUT

4.1 Connection Diagram of EUT and Peripheral Devices

<Conducted Emission>



<Radiated Emission>



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	N/A	--
C.	BLUETOOTH EARPHONE	ELECOM	LBT-MPHS400	N/A	N/A	--
D.	Universal Radio Communication Tester	R&S	CMU200	122554	N/A	--
E.	Wireless N Dual band Router	D-LINK	DIR-815	PVK21B5000399	KA21R815A1	--
F.	GPS Simulator	PENDULUM	GSG-54	191121	N/A	--
G.	Earphone	Minami	ME-816B5-E	N/A	N/A	--

Note:

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB Cable	1	1.8	Y	0	--
2.	USB Cable	1	1.1	N	0	Accessory of the EUT
3.	Earphone Cable	1	1.2	N	0	Provided by client

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

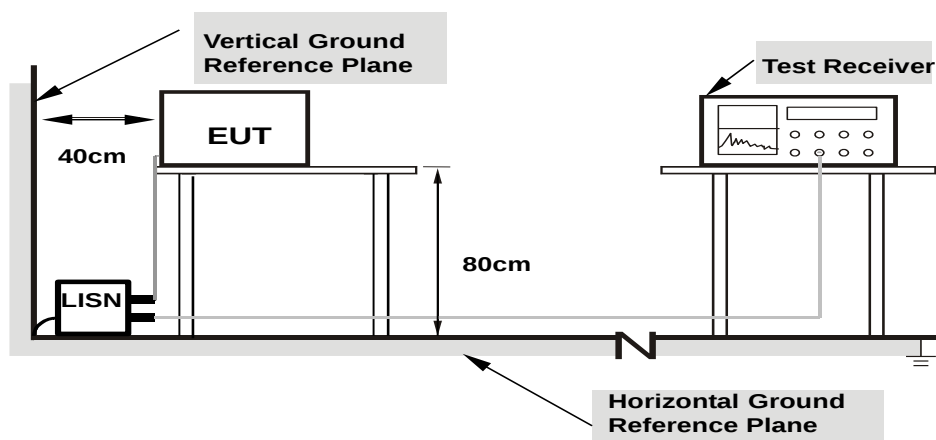
DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCS30	100289	Nov. 29, 2013	Nov. 28, 2014
RF signal cable Woken	5D-FB	Cable-HYC01-01	Dec. 27, 2013	Dec. 26, 2014
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Feb. 13, 2014	Feb. 12, 2015
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 17, 2013	Jul. 16, 2014
Software ADT	BV ADT_Cond_ V7.3.7.3	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 HwaYa Shielded Room 1.
3. The VCCI Site Registration No. is C-2040.

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

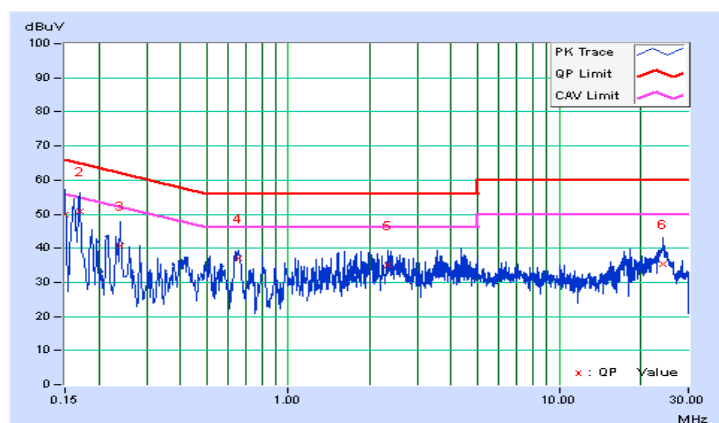
5.4 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 9kHz Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23°C, 56%RH
Tested by	Rolan Zheng		
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	0.15000	0.11	49.71	32.76	49.82	32.87	66.00	56.00	-16.18	-23.13
2	0.16955	0.10	50.83	32.58	50.93	32.68	64.98	54.98	-14.05	-22.30
3	0.23993	0.09	40.50	24.23	40.59	24.32	62.10	52.10	-21.50	-27.77
4	0.65388	0.15	36.78	26.89	36.93	27.04	56.00	46.00	-19.07	-18.96
5	2.32396	0.25	34.61	25.65	34.86	25.90	56.00	46.00	-21.14	-20.10
6	24.23169	1.24	34.18	24.13	35.42	25.37	60.00	50.00	-24.58	-24.63

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

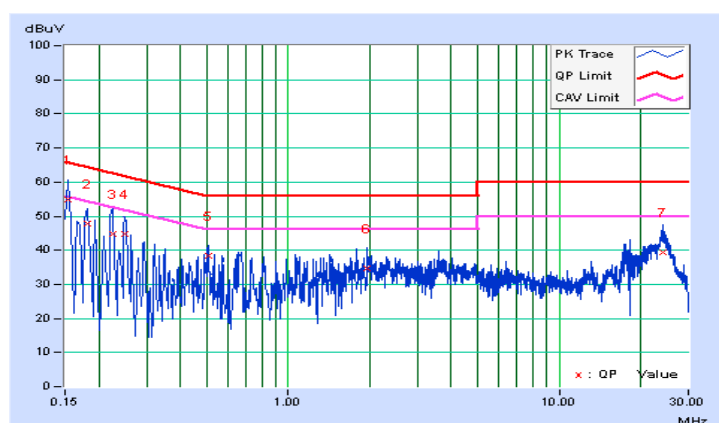


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 9kHz Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23°C, 56%RH
Tested by	Rolan Zheng		
Test Mode	Mode 1		

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	0.15391	0.05	54.77	38.11	54.82	38.16	65.79	55.79	-10.96	-17.62
2	0.18122	0.07	47.70	28.52	47.77	28.59	64.43	54.43	-16.65	-25.83
3	0.22434	0.10	44.58	27.49	44.68	27.59	62.66	52.66	-17.98	-25.07
4	0.24796	0.11	44.69	26.52	44.80	26.63	61.83	51.83	-17.03	-25.20
5	0.50507	0.18	38.10	27.19	38.28	27.37	56.00	46.00	-17.72	-18.63
6	1.95251	0.22	34.32	22.07	34.54	22.29	56.00	46.00	-21.46	-23.71
7	24.27470	1.12	38.26	26.06	39.38	27.18	60.00	50.00	-20.62	-22.82

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:

Showing:

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			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.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
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

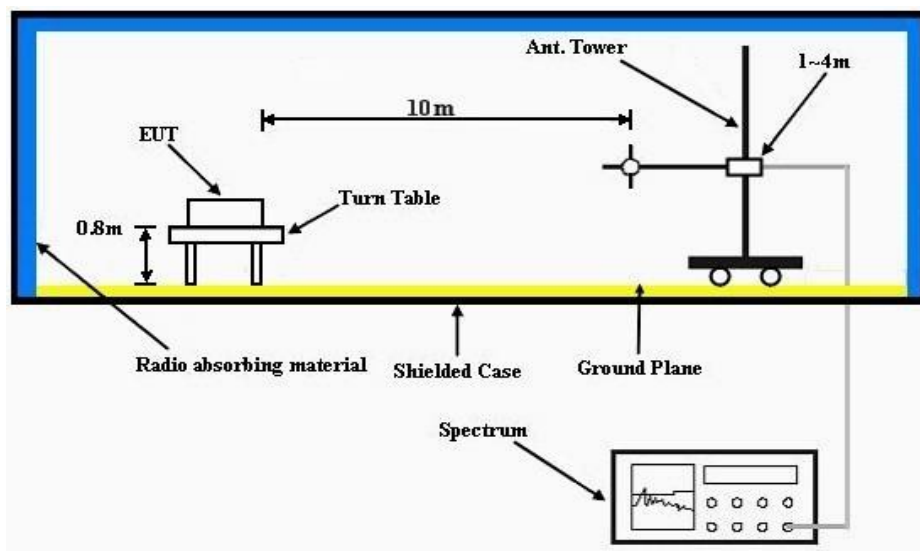
NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in 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, G-113.

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.



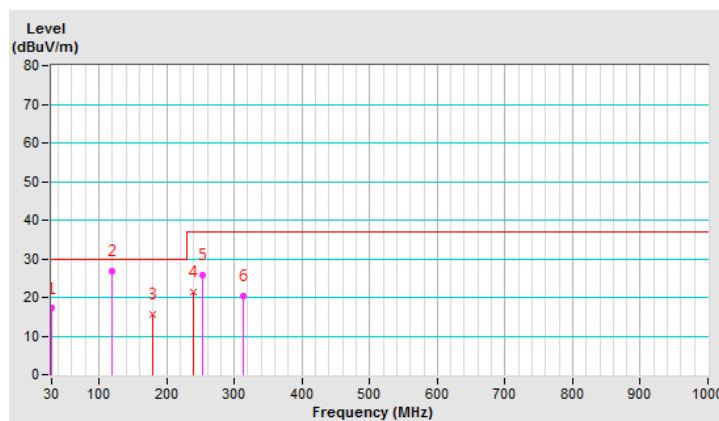
6.4 Test Results

Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Scott Yang		
Test Mode	Mode 2		

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	30.530	17.15 QP	30.00	-12.85	4.00 H	217	33.32	-16.17
2	119.970	26.90 QP	30.00	-3.10	2.00 H	317	43.70	-16.80
3	179.980	15.55 QP	30.00	-14.45	3.00 H	260	30.74	-15.19
4	240.000	21.30 QP	37.00	-15.70	3.50 H	331	36.04	-14.74
5	254.030	25.87 QP	37.00	-11.13	4.00 H	351	40.02	-14.15
6	312.380	20.43 QP	37.00	-16.57	3.00 H	201	31.98	-11.55

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

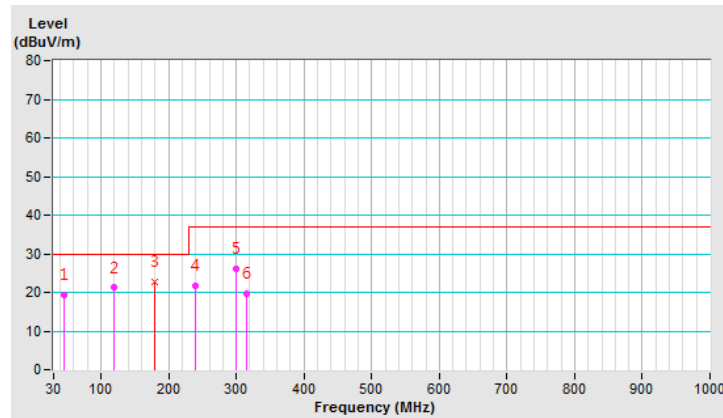


Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Scott Yang		
Test Mode	Mode 2		

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	45.570	19.28 QP	30.00	-10.72	3.00 V	342	33.44	-14.16
2	119.970	21.22 QP	30.00	-8.78	3.00 V	342	37.50	-16.28
3	180.000	22.66 QP	30.00	-7.34	2.00 V	287	37.14	-14.48
4	238.900	21.85 QP	37.00	-15.15	1.00 V	90	35.88	-14.03
5	300.010	26.17 QP	37.00	-10.83	3.50 V	106	37.28	-11.11
6	314.950	19.79 QP	37.00	-17.21	1.00 V	116	30.41	-10.62

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

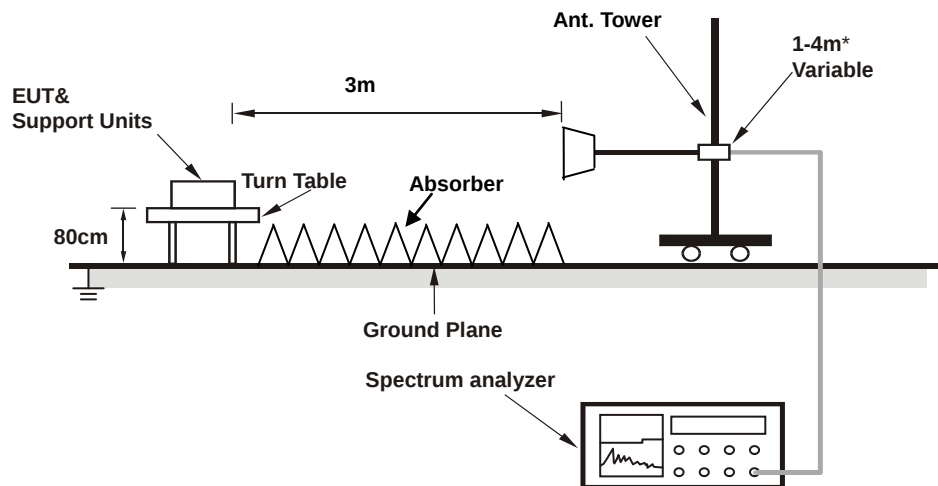
DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Oct. 24, 2013	Oct. 23, 2014
Spectrum Analyzer Agilent	E4446A	MY44360124	Feb. 12, 2014	Feb. 11, 2015
BILOG Antenna SCHWARZBECK	VULB9168	9168-157	Feb. 26, 2014	Feb. 25, 2015
RF signal cable Woken	8D-FB	NA	Mar. 21, 2014	Mar. 20, 2015
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-404	Jan. 05, 2014	Jan. 04, 2015
Preamplifier Agilent (Below 1GHz)	8447D	2944A10629	Oct. 18, 2013	Oct. 17, 2014
Preamplifier Agilent (Above 1GHz)	8449B	3008A01959	Oct. 18, 2013	Oct. 17, 2014
RF signal cable HUBER+SUHNER	SUCOFLEX 104	MWX322+MWX2211308S0295	Sep. 09, 2013	Sep. 08, 2014
Software BV ADT	BV ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Controller BV ADT	SC100	SC93021702	NA	NA
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170243	Jan. 09, 2014	Jan. 08, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 102	38218/2+ 37433/2	Oct. 26, 2013	Oct. 25, 2014
Fix tool for Boresight antenna tower	BAF-01	2	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 HwaYa Chamber 2.
3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 686814.
5. The IC Site Registration No. is IC 7450F-2.
6. The VCCI Site Registration No. is G-18.

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.
- For frequency range 1GHz ~ 18GHz, 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.



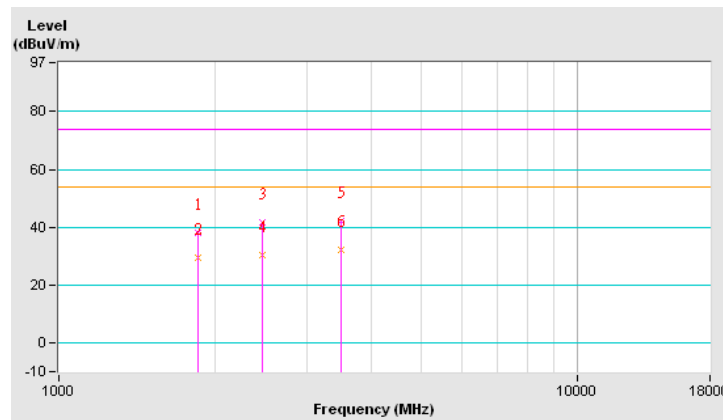
7.4 Test Results

Frequency Range	1GHz ~ 18GHz	Detector Function & Resolution Bandwidth	Peak (PK), 1MHz Average (AV), 1MHz
Input Power	120Vac, 60Hz	Environmental Conditions	18°C, 56%RH
Tested by	Pon Tsai		
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	1850.000	38.25 PK	74.00	-35.75	1.55 H	18	44.24	-5.99
2	1850.000	29.56 AV	54.00	-24.44	1.55 H	18	35.55	-5.99
3	2473.333	41.58 PK	74.00	-32.42	1.48 H	261	45.22	-3.64
4	2473.333	30.26 AV	54.00	-23.74	1.48 H	261	33.90	-3.64
5	3493.222	42.33 PK	74.00	-31.67	1.48 H	73	43.52	-1.19
6	3493.222	32.11 AV	54.00	-21.89	1.48 H	73	33.30	-1.19

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

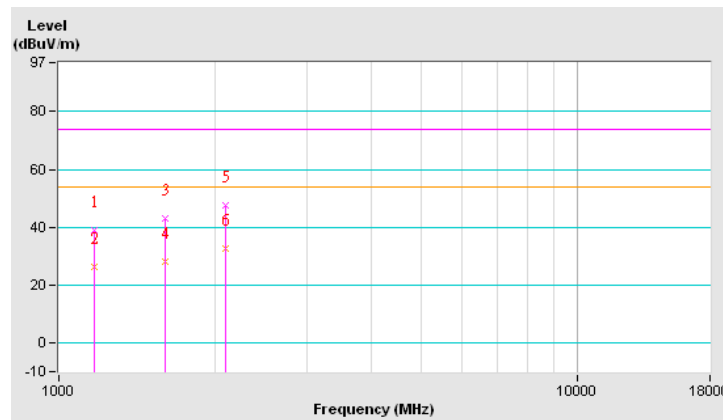


Frequency Range	1GHz ~ 18GHz	Detector Function & Resolution Bandwidth	Peak (PK), 1MHz Average (AV), 1MHz
Input Power	120Vac, 60Hz	Environmental Conditions	18°C, 56%RH
Tested by	Pon Tsai		
Test Mode	Mode 2		

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	1170.330	38.74 PK	74.00	-35.26	1.00 V	45	47.32	-8.58
2	1170.330	26.13 AV	54.00	-27.87	1.00 V	45	34.71	-8.58
3	1599.100	43.20 PK	74.00	-30.80	1.48 V	193	50.02	-6.82
4	1599.100	27.94 AV	54.00	-26.06	1.48 V	193	34.76	-6.82
5	2095.080	47.55 PK	74.00	-26.45	2.14 V	160	52.79	-5.24
6	2095.080	32.56 AV	54.00	-21.44	2.14 V	160	37.80	-5.24

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

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:

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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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