

FCC Certification Test Report

Report No.: FC140124C26

Test Model: USC5310

FCC ID: LDK53100936

Received Date: Jan. 27, 2014

Test Date: Jan. 28, 2014 ~ Jan. 29, 2014

Issued Date: Feb. 10, 2014

Applicant: Cisco Systems, Inc

Address: 170 Tasman Drive, San Jose, CA95134, USA.

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

Lab Address: No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

This report should not be used by the client to claim product certification, approval, or endorsement by TAF, NVLAP, NIST or any government agencies.



LAB CODE: 200837-0



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

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 Brief Description of EUT	6
3.2 Operating Modes of EUT and Determination of Worst Case Operating Mode	6
3.3 Test Program Used	6
3.4 Primary Clock Frequencies of Internal Source	6
3.5 Miscellaneous	7
4 Configuration and Connections with EUT	8
4.1 Connection Diagram of EUT and Peripheral Devices	8
4.2 Configuration of EUT and Peripheral Devices	8
4.3 Cable Connections to/from EUT	8
5 Conducted Emissions at Mains Ports	9
5.1 Limits for conducted Emissions at mains ports	9
5.2 Test Instruments	9
5.3 Test Arrangement for Conducted Emissions at Mains Ports	10
5.4 Test Results of Conducted Emissions at Mains Ports	11
6 Radiated Emissions up to 1 GHz	13
6.1 Limits of Radiated Emissions up to 1 GHz	13
6.2 Test Instruments	14
6.3 Test Arrangement for Radiated Emissions up to 1 GHz	15
6.4 Test Results of Radiated Emissions up to 1 GHz	16
7 Radiated Emissions above 1 GHz	18
7.1 Limits of Radiated Emissions above 1 GHz	18
7.2 Test Instruments	19
7.3 Test Arrangement for Radiated Emissions above 1 GHz	20
7.4 Test Results of Radiated Emissions above 1 GHz	21
8 Pictures of Test Arrangements	23
Appendix – Information on the Testing Laboratories	24



A D T

Release Control Record

Issue No.	Description	Date Issued
FC140124C26	Original Release	Feb. 10, 2014

1 Certificate of Conformity

Product: Universal Small Cell 5310 3G Module

Brand: Cisco

Test Model: USC5310

Sample Status: Production Unit

Applicant: Cisco Systems, Inc

Test Date: Jan. 28, 2014 ~ Jan. 29, 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:

Feb. 10, 2014

Vera Huang / Specialist

Approved by :



Date:

Feb. 10, 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 Cl.	ICES-003 Cl.	Test Item	Result/Remarks	Verdict
15.107	6.1	AC Power Line Conducted Emissions	Minimum passing Class B margin is -8.91 dB at 0.45469 MHz	Pass
15.109	6.2.1	Radiated Emissions up to 1 GHz	Minimum passing Class B margin is -3.80 dB at 37.130 MHz	Pass
	6.2.2	Radiated Emissions above 1 GHz	Minimum passing Class B margin is -10.97 dB at 17999.861 MHz	Pass

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

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

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	4.29 dB
Radiated Emissions above 1 GHz	Above 1GHz	2.26 dB

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.

2.2 Modification Record:

There were no modifications required for compliance.

3 General Information

Name and Features of EUT

The tests reported herein were performed according to the method specified by Cisco Systems, Inc, for detailed feature description, please refer to the manufacturer's specifications or user's manual.

3.1 Brief Description of EUT

Product	Universal Small Cell 5310 3G Module
Brand Name	Cisco
Model No.	USC5310
Power Supply rating	48Vdc (from adapter for AP3600)
Accessory Device	Refer to Note as below
Data Cable Supplied	Refer to Note as below
S/N	FOC1802N50T for WCDMA850 FOC1802N52W for WCDMA1900

Note: The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

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

Mode	Test Condition
Conducted Emission	
1	WCDMA850 Idle + Smartbit Link + LG Phone 1 (Voice Idle) + LG Phone 2 (Voice Idle) + 3G Router (Data Idle) + POE Switch <LAN 1Gbps>
2	WCDMA1900 Idle + Smartbit Link + LG Phone 1 (Voice Idle) + LG Phone 2 (Voice Idle) + 3G Router (Data Idle) + POE Switch <LAN 1Gbps>
Radiated Emission	
1	WCDMA850 Idle + Smartbit Link + LG Phone 1 (Voice Idle) + LG Phone 2 (Voice Idle) + 3G Router (Data Idle) + POE Switch <LAN 1Gbps>
2	WCDMA1900 Idle + Smartbit Link + LG Phone 1 (Voice Idle) + LG Phone 2 (Voice Idle) + 3G Router (Data Idle) + POE Switch <LAN 1Gbps>
Remark:	
1. For conducted emission test, test mode 2 was the worst case and only this mode was presented in the report.	
2. For radiated emission test, test mode 1 was the worst case and only this mode was presented in the report.	

3.3 Test Program Used

- Placed the EUT on the testing table.
- EUT linked with POE Switch via LAN Cable.
- POE Switch linked with SmartBit and wireless AP via LAN Cable.
- Wireless AP linked with notebook via LAN Cable.
- The EUT linked with the 3G Router and phones, which acted as communication partners.

3.4 Primary Clock Frequencies of Internal Source

The the highest frequency generated or used within the EUT or on which the EUT operates or tunes is 1990 MHz, provided by Cisco Systems, Inc, for detailed internal source, please refer to the manufacturer's specifications.

3.5 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)).



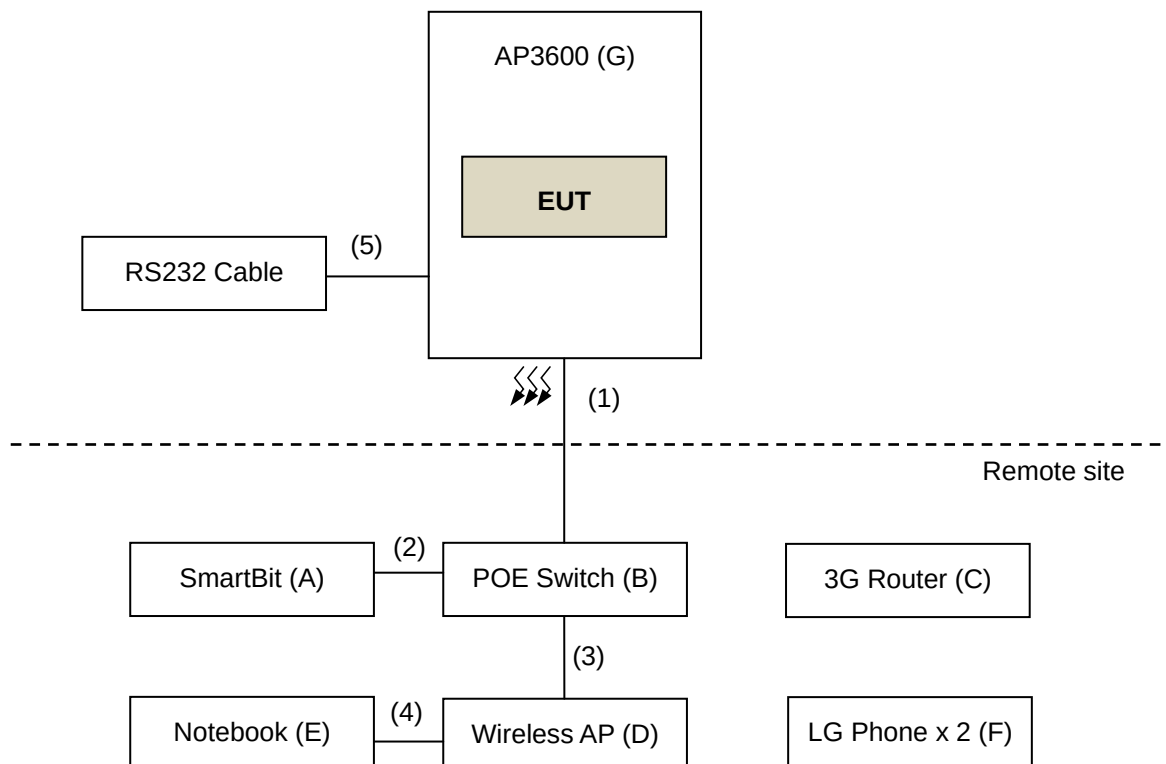
Part 15 Declaration of Conformity (DoC) Label Examples

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

4 Configuration and Connections with EUT

4.1 Connection Diagram of EUT and Peripheral Devices



4.2 Configuration of EUT and Peripheral Devices

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	SmartBit	Spirent	SMB-600B	E06011309	N/A	--
B.	POE Switch	CISCO	Cisco 897VAM	FGL162322CR	N/A	Provided by client
C.	3G Router	CISCO	Cisco C881CW	FGL151526G5	N/A	Provided by client
D.	Wireless AP	D-Link	DIR-815	N/A	KA2IR815A1	Provided by client
E.	Notebook	DELL	Latitude E5420	DELL E5420	N/A	Provided by client
F.	Phone x 2	LG	LG-E960	N/A	NA	Provided by client
G.	Platform	CISCO	AP3600	FGL1703W2PY	LDK102075	Provided by client

4.3 Cable Connections to/from EUT

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	LAN Cable	1	10	N	0	Between EUT and POE Switch
2.	LAN Cable	1	2	N	0	Between POE Switch and SmartBit
3.	LAN Cable	1	1.5	N	0	Between POE Switch and Wireless AP
4.	LAN Cable	1	1	N	0	Between Wireless AP and Notebook
5.	RS232 Cable	1	1	N	0	Linked with EUT

5 Conducted Emissions at Mains Ports

5.1 Limits for conducted Emissions at mains ports

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 in line 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	100288	Nov. 17, 2013	Nov. 16, 2014
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. 08, 2013	Jul. 07, 2014
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

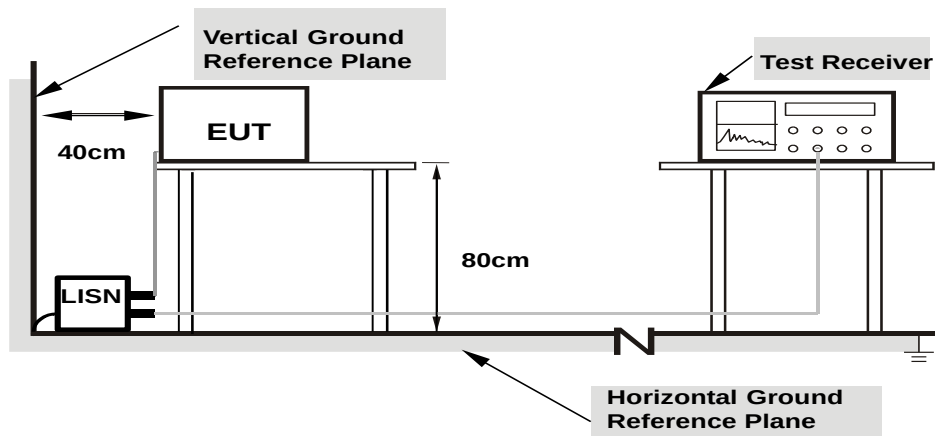
NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Shielded Room 2.
3. The VCCI Site Registration No. is C-2047.

5.3 Test Arrangement for Conducted Emissions at Mains Ports

- 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

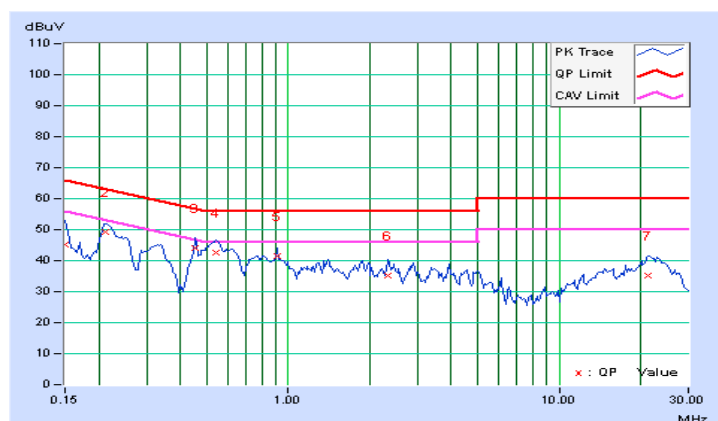
5.4 Test Results of Conducted Emissions at Mains Ports

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 9kHz Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	20°C, 55%RH
Tested by	Fox Chang		
Test Mode	Mode 2		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	0.26	45.08	29.68	45.34	29.94	66.00	56.00	-20.66	-26.06
2	0.21250	0.28	48.83	32.16	49.11	32.44	63.11	53.11	-14.00	-20.67
3	0.45469	0.30	43.95	37.45	44.25	37.75	56.79	46.79	-12.54	-9.04
4	0.54063	0.31	42.15	26.33	42.46	26.64	56.00	46.00	-13.54	-19.36
5	0.91172	0.33	41.17	27.66	41.50	27.99	56.00	46.00	-14.50	-18.01
6	2.32813	0.37	34.66	26.21	35.03	26.58	56.00	46.00	-20.97	-19.42
7	21.42188	0.57	34.65	26.32	35.22	26.89	60.00	50.00	-24.78	-23.11

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

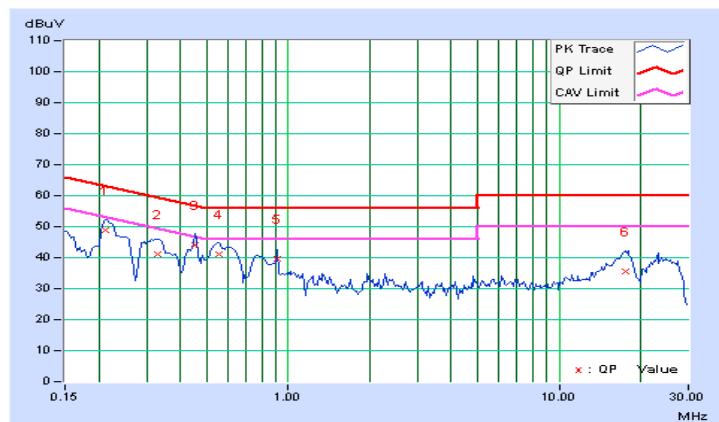


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 9kHz Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	20°C, 55%RH
Tested by	Fox Chang		
Test Mode	Mode 2		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.21250	0.28	48.57	31.79	48.85	32.07	63.11	53.11	-14.26	-21.04
2	0.32969	0.29	40.73	24.16	41.02	24.45	59.46	49.46	-18.44	-25.01
3	0.45469	0.30	43.93	37.58	44.23	37.88	56.79	46.79	-12.56	-8.91
4	0.55234	0.31	40.94	24.39	41.25	24.70	56.00	46.00	-14.75	-21.30
5	0.90781	0.33	39.32	25.72	39.65	26.05	56.00	46.00	-16.35	-19.95
6	17.60156	0.60	35.09	27.75	35.69	28.35	60.00	50.00	-24.31	-21.65

Remarks:

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



6 Radiated Emissions up to 1 GHz

6.1 Limits of Radiated Emissions up to 1 GHz

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			57.5	47.5
960-1000	60	54		

NOTE: 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	Mar. 19, 2013	Mar. 18, 2014
BILOG Antenna SCHWARZBECK (H)	VULB9168	9168-149	Mar. 19, 2013	Mar. 18, 2014
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 7.7.03.8	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.

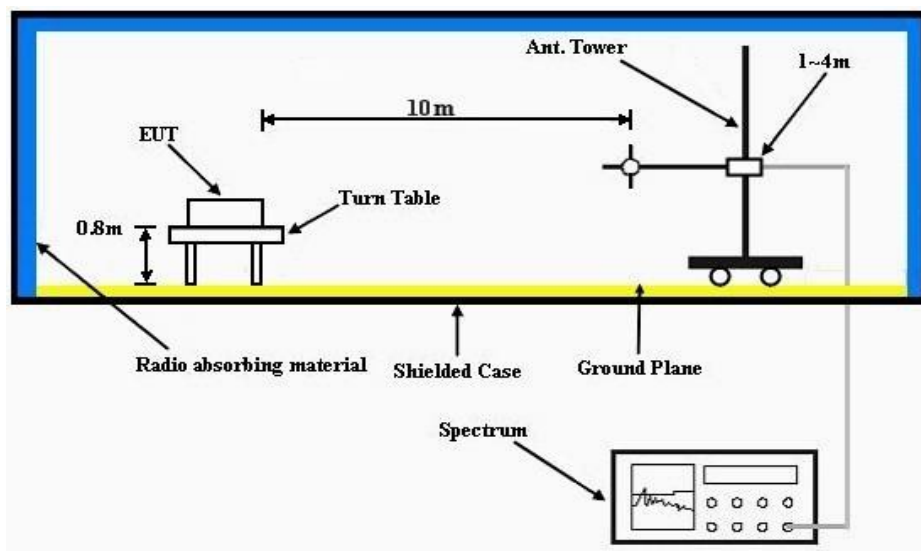
4. The IC Site Registration No. is IC 7450F-1.

5. The VCCI Site Registration No. is R-1893, G-113.

6.3 Test Arrangement for Radiated Emissions up to 1 GHz

- 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.



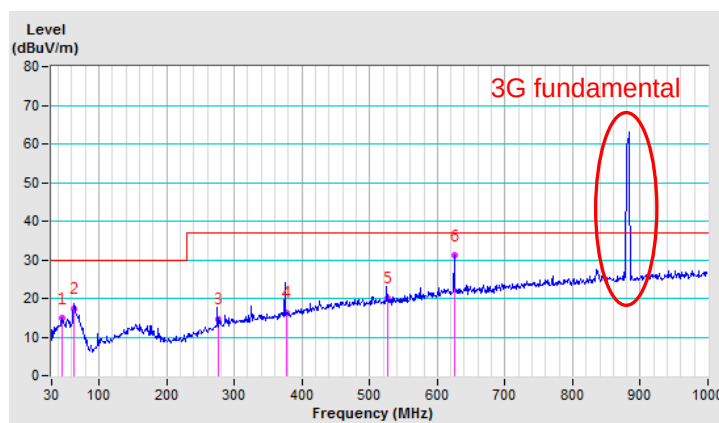
6.4 Test Results of Radiated Emissions up to 1 GHz

Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	120Vac, 60Hz	Environmental Conditions	20°C, 58%RH
Tested by	Daniel Lin		
Test Mode	Mode 1		

Antenna Polarity & Test Distance : Horizontal at 10 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	44.700	14.83 QP	30.00	-15.17	3.00 H	35	29.13	-14.30
2	62.930	17.25 QP	30.00	-12.75	3.00 H	209	32.14	-14.89
3	277.310	14.53 QP	37.00	-22.47	2.00 H	344	27.35	-12.82
4	376.600	16.38 QP	37.00	-20.62	2.00 H	45	26.39	-10.01
5	526.910	20.15 QP	37.00	-16.85	1.50 H	12	27.35	-7.20
6	625.030	31.09 QP	37.00	-5.91	1.50 H	340	35.64	-4.55

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

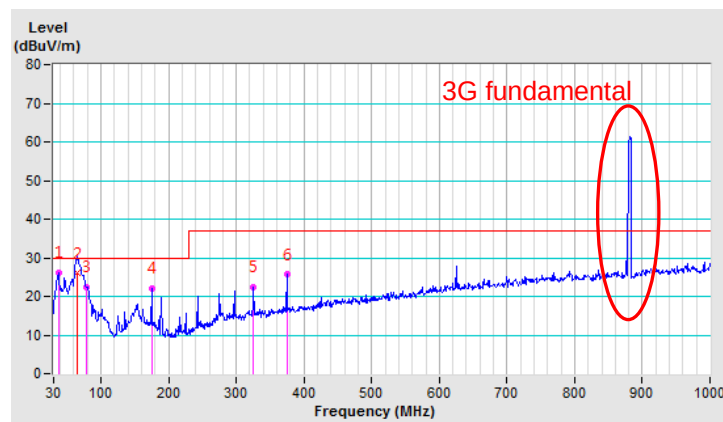


Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	120Vac, 60Hz	Environmental Conditions	20°C, 58%RH
Tested by	Daniel Lin		
Test Mode	Mode 1		

Antenna Polarity & Test Distance : Vertical at 10 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	37.130	26.20 QP	30.00	-3.80	3.00 V	271	40.98	-14.78
2	63.950	25.93 QP	30.00	-4.07	2.00 V	80	40.57	-14.64
3	79.230	22.49 QP	30.00	-7.51	1.50 V	357	40.69	-18.20
4	174.970	22.17 QP	30.00	-7.83	1.00 V	290	36.45	-14.28
5	324.990	22.34 QP	37.00	-14.66	1.00 V	140	32.82	-10.48
6	375.000	25.67 QP	37.00	-11.33	1.00 V	70	35.29	-9.62

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 of Radiated Emissions above 1 GHz

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 of Radiated Measurement (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	Jan. 09, 2013	Jan. 08, 2014
BILOG Antenna SCHWARZBECK	VULB9168	9168-157	Mar. 20, 2013	Mar. 19, 2014
RF signal cable Woken	8D-FB	NA	Mar. 22, 2013	Mar. 21, 2014
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-404	Jan. 05, 2014	Jan. 04, 2015
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170243	Jan. 09, 2014	Jan. 08, 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
RF signal cable HUBER+SUHNER	SUCOFLEX 102	38218/2+ 37433/2	Oct. 26, 2013	Oct. 25, 2014
Fix tool for Boresight antenna tower	BAF-01	2	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 18, 2013	Oct. 17, 2014

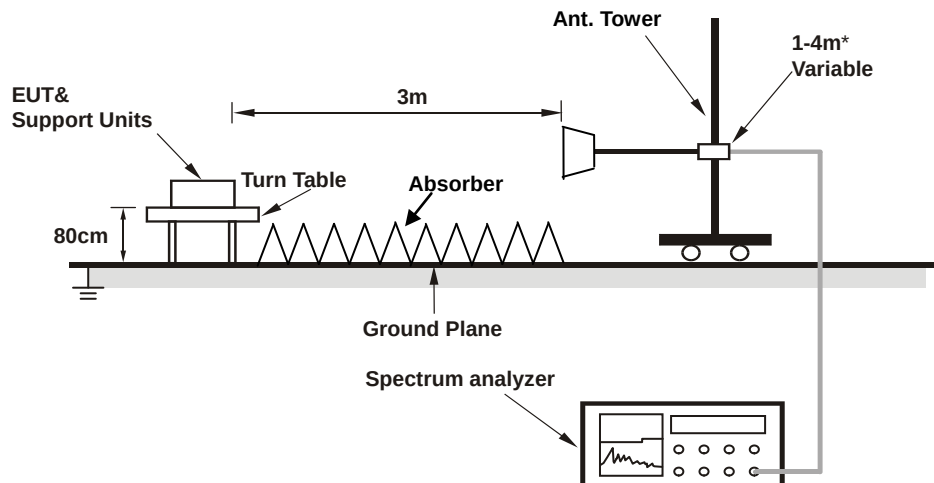
- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 2.
3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 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 for Radiated Emissions above 1 GHz.

- 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.
- For measurement of frequency above 1000 MHz, the EUT was set 3 meters away from the interference-receiving antenna.



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

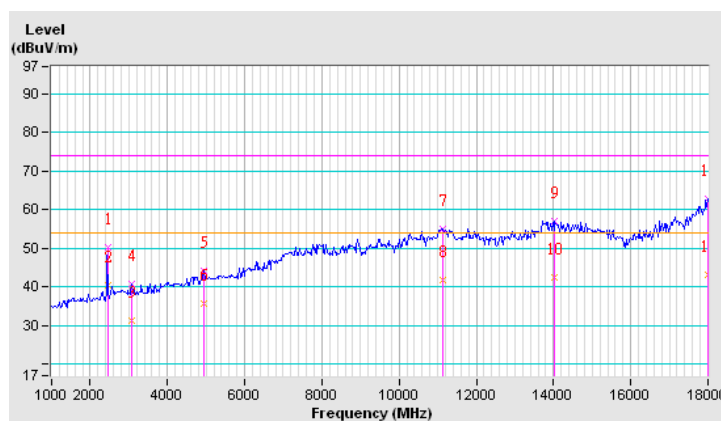
7.4 Test Results of Radiated Emissions above 1 GHz

Frequency Range	1000-18000 MHz	Detector Function & Resolution Bandwidth	Peak (PK), 1MHz Average (AV), 1MHz
Input Power	120Vac, 60Hz	Environmental Conditions	19°C, 62%RH
Tested by	Mick Chou		
Test Mode	Mode 1		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2445.121	50.12 PK	74.00	-23.88	1.21 H	82	53.76	-3.64
2	2445.121	40.52 AV	54.00	-13.48	1.21 H	82	44.16	-3.64
3	3068.333	31.25 AV	54.00	-22.75	1.00 H	22	33.22	-1.97
4	3068.333	40.64 PK	74.00	-33.36	1.00 H	12	42.61	-1.97
5	4938.333	44.02 PK	74.00	-29.98	1.00 H	12	40.78	3.24
6	4938.336	35.63 AV	54.00	-18.37	1.00 H	15	32.39	3.24
7	11115.211	54.82 PK	74.00	-19.18	1.08 H	32	38.84	15.98
8	11115.211	41.66 AV	54.00	-12.34	1.08 H	32	25.68	15.98
9	14033.333	56.89 PK	74.00	-17.11	1.00 H	12	37.65	19.24
10	14033.333	42.53 AV	54.00	-11.47	1.00 H	12	23.29	19.24
11	17999.861	62.89 PK	74.00	-11.11	1.00 H	355	38.40	24.49
12	17999.861	43.03 AV	54.00	-10.97	1.00 H	355	18.54	24.49

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

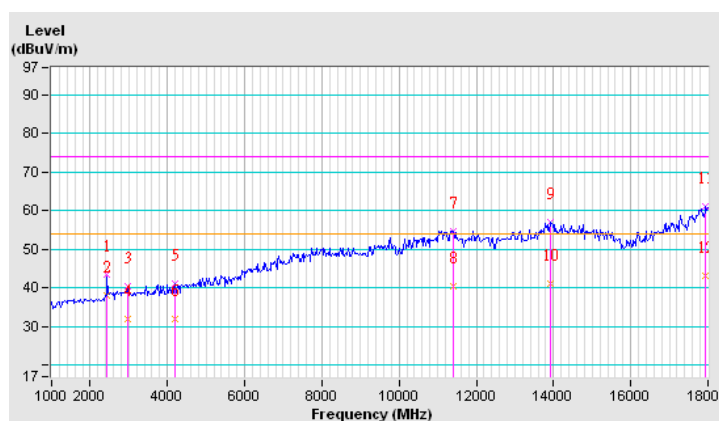


Frequency Range	1000-18000 MHz	Detector Function & Resolution Bandwidth	Peak (PK), 1MHz Average (AV), 1MHz
Input Power	120Vac, 60Hz	Environmental Conditions	19°C, 62%RH
Tested by	Mick Chou		
Test Mode	Mode 1		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2443.122	43.58 PK	74.00	-30.42	1.20 V	185	47.23	-3.65
2	2443.122	37.88 AV	54.00	-16.12	1.20 V	185	41.53	-3.65
3	2955.021	40.34 PK	74.00	-33.66	1.00 V	298	42.48	-2.14
4	2955.021	32.01 AV	54.00	-21.99	1.00 V	298	34.15	-2.14
5	4201.166	40.94 PK	74.00	-33.06	1.00 V	12	39.78	1.16
6	4201.166	32.03 AV	54.00	-21.97	1.00 V	12	30.87	1.16
7	11398.333	54.68 PK	74.00	-19.32	1.00 V	9	38.68	16.00
8	11398.333	40.33 AV	54.00	-13.67	1.00 V	9	24.33	16.00
9	13920.111	56.89 PK	74.00	-17.11	1.00 V	16	37.85	19.04
10	13920.111	41.22 AV	54.00	-12.78	1.00 V	16	22.18	19.04
11	17943.330	60.93 PK	74.00	-13.07	1.00 V	355	36.70	24.23
12	17943.330	43.00 AV	54.00	-11.00	1.00 V	355	18.77	24.23

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

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 Lab

Tel: 886-3-5935343

Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety/Telecom Lab

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

--- END ---