FCC Part 15B

Measurement And Test Report

For

HILLSTONE NETWORKS, INC.

3F Hui-Zhong Plaza, No. 1 ShangDi 7th Street, Haidian,

Beijing, P.R China 100085

Model: SG-6000-G5150, SG-6000-G3150

This Report Concerns: ☒ Original Report	**Equipment Type:** FIREWALL APPLIANCE
Report Number:	MTI110620002RF
Test Engineer:	Bill Chen
Reviewed By:	Jason zheng
Approved & Authorized By:	Hebe Lee
Test Date:	June 20-27,2011
Prepared By:	**MTI Technology Laboratory Ltd.** 10F, Yinxing Business Hotel, Xixiang Road, Bao'an District, Shenzhen, P,R.China. Tel: +86-755-8885 0135 Fax: +86-755-8885 0136

Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior written consent of MTI Technology Laboratory Ltd.

.

TABLE OF CONTENTS

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Applicant:	HILLSTONE NETWORKS, INC.
Address of applicant:	3F Hui-Zhong Plaza, No. 1 ShangDi 7th Street, Haidian, Beijing, P.R China 100085
Manufacturer:	HILLSTONE NETWORKS, INC.
Address of manufacturer:	3F Hui-Zhong Plaza, No. 1 ShangDi 7th Street, Haidian, Beijing, P.R China 100085
Equipment Under Test:	FIREWALL APPLIANCE
Tested Model No.:	SG-6000-G5150
Supplementary Models No:	SG-6000-G3150
	Remark: supplementary models are only different in exterior with tested Model and with the same circuit construction.
Trade Name:	HILLSTONE
FCC ID:	ZPKSG6000-G5150
Type of Modulation:	/
Power Supply:	120V/60Hz

Remark: * *The test data gathered are from the production sample provided by the manufacturer.*

1.2 Related Submittal(s) / Grant (s)

This submittal(s) is a test report based on the Electromagnetic Interference (EMI) tests performed on the EUT. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4 - 2003.

The tests were performed in order to determine compliance with FCC Part 15, Subpart B, and section 15.205, 15.107, and 15.109 rules.

1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 - 2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. Radiated testing was performed at an antenna to EUT distance 5 meters.

1.4 Test Facility

All measurement required was performed at laboratory of MTI Technology Laboratory Ltd. at 10F,Yinxing Business Building, Xixiang Road, Bao'an District, Shenzhen, P.R.China.

The test facility is recognized, certified, or accredited by the following organizations:

FCC – Registration No.: 167003

MTI Technology Laboratory Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 167003, May 04, 2009.

2. SYSTEM TEST CONFIGURATION

The tests documented in this report were performed in accordance with ANSI C63.4-2003 and FCC CFR 47 Part 15 Subpart B.

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The calibrated antennas used to sample the radiated field strength are mounted on a non-conductive, motorized antenna mast 5 meters from the leading edge of the turntable.

2.3 General Test Procedures

Conducted Emissions The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 7.1 of ANSI C63.4-2003.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak detector mode.

Radiated Emissions The EUT is a placed on as turntable, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 5m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4-2003.

2.4 Accessories Equipment List and Details

Description	Manufacturer	Model	Serial Number
PC	WINTEC	ANYPOS500	/

2.5 EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
Power Cable	1.2	UNSHIELDED	Without Core

2.6 List of Measuring Equipments Used

Items	Equipment	Manufacturer	Model No.	Serial No.	Last Cal	Calibration Period
1	EMI Test Receiver	ROHDE & SCHWARZ	ESCS30	100038	2010/11	1 year
2	EMI Test Receiver	ROHDE & SCHWARZ	ESI 26	100009	2010/11	1 year
3	Receiver/ Spectrum Analyzer	ROHDE & SCHWARZ	ESCI	100106	2010/11	1 year
4	Spectrum Analyzer	Agilent	E7405A	US41160415	2010/11	1 year
5	Artificial Mains	ROHDE & SCHWARZ	ESH2-Z5	100028	2010/11	1 year
6	Pulse Limiter	ROHDE & SCHWARZ	ESHSZ2	100044	2010/11	1 year
7	LISN	COM Power	LI-200	12212	2010/11	1 year
8	LISN	COM Power	LI-200	12019	2010/11	1 year
9	3m/5m Semi-Anechoic Chamber	ETS	N/A	N/A	2010/11	1 year
10	Ultra-Broadband Antenna	R/S	HL562	100015	2010/11	1 year
11	RF Test Panel	R/S	TS / RSP	335015/ 0017	N/A	N/A
12	Turntable	ETS	2088	2149	N/A	N/A
13	Antenna Mast	ETS	2075	2346	N/A	N/A

3. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.107 (a)	Conducted Emission	Pass
§15.109(a)	Radiated Emission	Pass

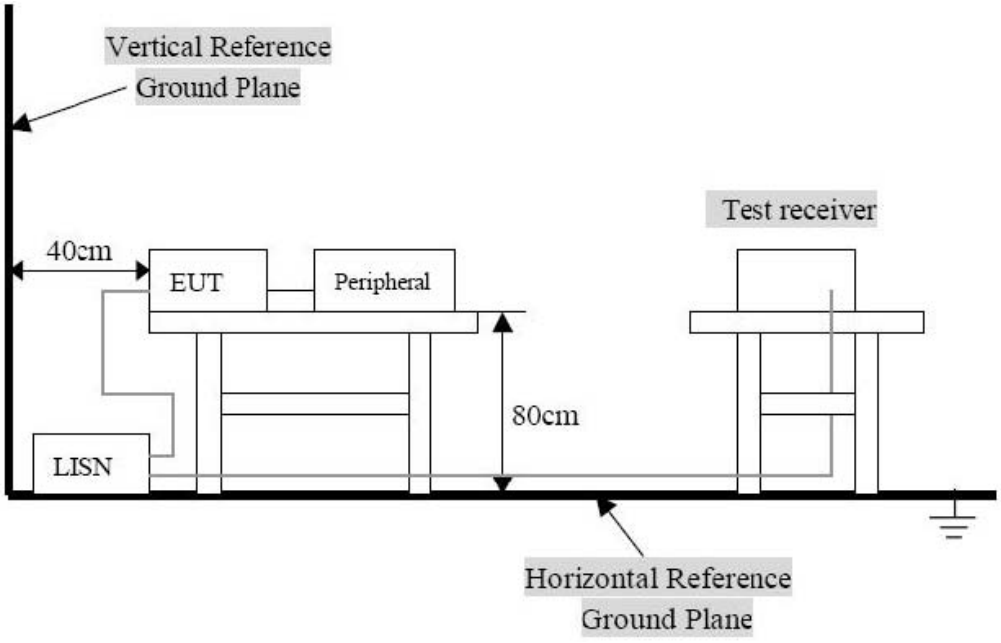
4. CONDUCTED EMISSION Measurement

4.1 Limits of Conducted Emission

Section 15.107: For a Low-power Radio-frequency Device is designed to be connected to the AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

Frequency Range (MHz)	Limits (dBuV)	
	Quasi-Peak	Average
0.150～0.500	66～56	56～46
0.500～5.000	56	46
5.000～30.00	60	50

4.2 Test Setup Diagram



4.3 Instrument Setting

The test receiver was set with the following configurations:

Test Receiver Setting:

Frequency Range……150 KHz to 30 MHz
Detector……..Peak & Quasi-Peak & Average
Sweep Speed……Auto
IF Band Width……..9 KHz

4.4 Test Equipment List and Details

See section 2.4 of this report.

4.5 Test Procedure

1. Configure the EUT according to ANSI C63.4.

2. The EUT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.

3. Connect EUT to the power mains through a line impedance stabilization network (LISN)

4. All the support units are connected to the other LISN. The LISN should provide 50uH/50ohms coupling impedance.

5. The frequency range from 150 KHz to 30 MHz was searched.

6. Use the Channel & Power Controlling software to make the EUT working on selected channel and expected output power, then use the “H” Patter Generator software to make the supporting equipments stay on working condition.

7. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

8. The measurement has to be done between each power line and ground at the power terminal for each RF channel. Only one RF channel has to be investigated since this test is independent with the RF channel selection.

4.6 Test Procedure

Temperature:	26 °C
Relative Humidity:	56 %
ATM Pressure:	1011 mbar

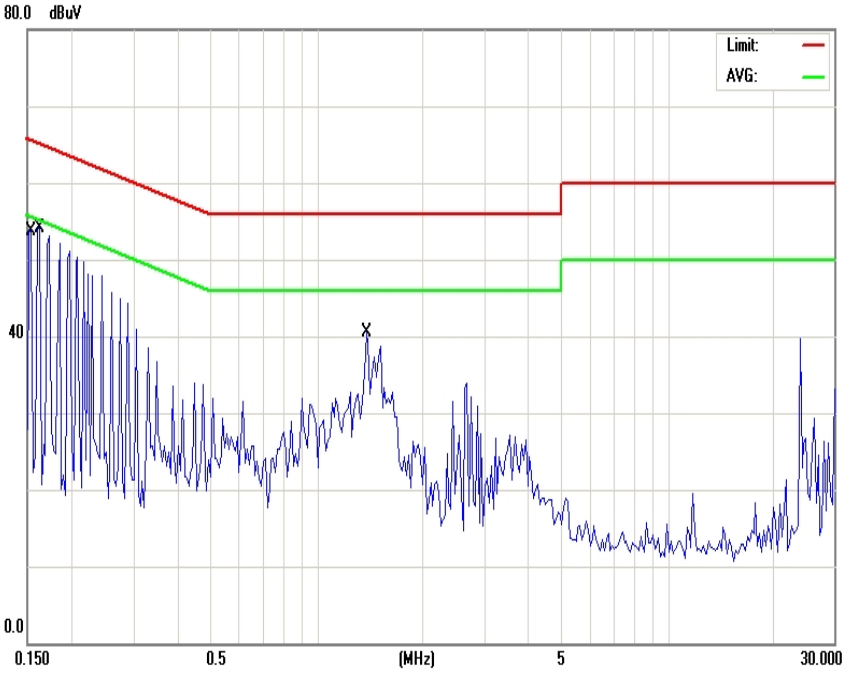
4.7 Test Result

Detailed information please refers to the following page.

According to the data in this section, the EUT complied with the FCC 15.107 Conducted margin for a Class B device, with the worst margin reading of:

-12.84 dBμV at 24.0017 MHz in the **Line** mode**, AVG** detector, **0.15-30MHz**

EUT: FIREWALL APPLIANCE
M/N: SG-6000-G5150
Test Mode: Normal
Operator: Amy
Test Specification: L



EUT: FIREWALL APPLIANCE
M/N: SG-6000-G5150
Test Mode: Normal
Operator: Amy
Test Specification: N

Line	Frequency [MHz]	Corrected QP Reading [dB(μV)]	Limit QP [dB]	Delta QP [dB]	Corrected Average Reading [dB(μV)]	Limit AVE [dB]	Delta Average [dB]
L1	0.1511	49.51	65.93	-16.42	23.46	55.93	-32.47
L1	0.1641	48.26	65.25	-16.99	22.61	55.25	-32.64
L1	1.3924	39.34	56	-16.66	28.46	46	-17.54
L2	0.1524	49.19	65.86	-16.67	23.23	55.86	-32.63
L2	1.4014	39.88	56	-16.12	28.63	46	-17.37
L2	24.0017	38.01	60	-21.99	37.16	50	-12.84
Note: All readings are using a bandwidth of 9 kHz, with a 30 ms sweep time. A video filter was not used.							

5. Radiated Emission Measurement

5.1 Limits of Radiated Emission Measurement

According to § 15.205 15.109(a) &15.35 (b), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Section 15.109:
30 - 88 MHz 35 dBuV/m @5M
88 -216 MHz 38.5 dBuV/m @5M
216 -960 MHz 41 dBuV/m @5M
Above 960 MHz 49dBuV/m @5M

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

Emissions that fall in the restricted bands (15.205) must be less than 49dBuV/m otherwise the spurious and harmonics must be attenuated by at least 20dB.

5.2 EUT Setup

Radiated Measurement Setup

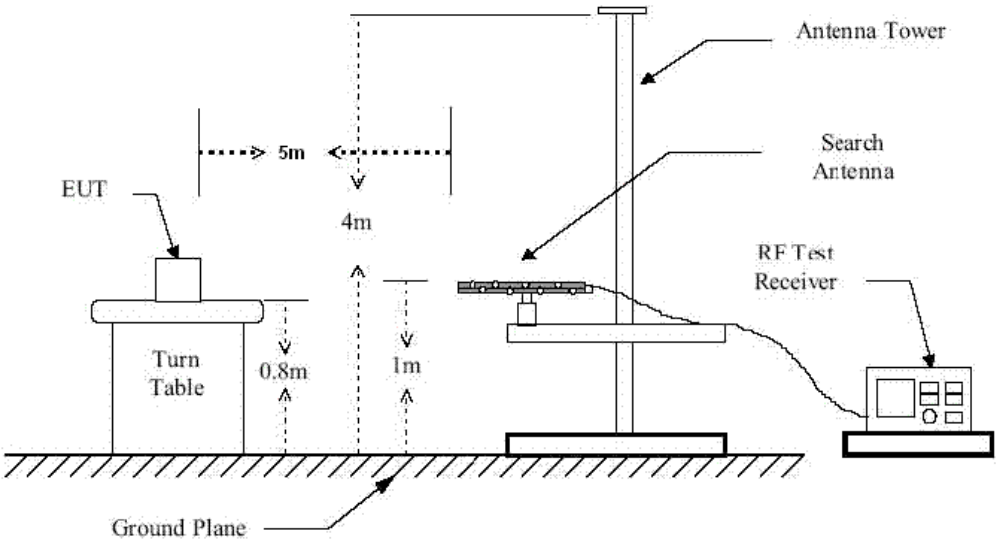


Figure 1 : Frequencies measured below 1 GHz configuration

5.3 Test Equipment List and Details

See section 2.4.

5.4 Test Procedure

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 5 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 5 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. 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.
4. 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.

5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using the quasi-peak method or average method as specified and then reported in Data sheet peak mode and QP mode.

NOTE:
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz.

5.5 Test Procedure

Temperature:	26 °C
Relative Humidity:	56 %
ATM Pressure:	1011 mbar

5.6 Test Result

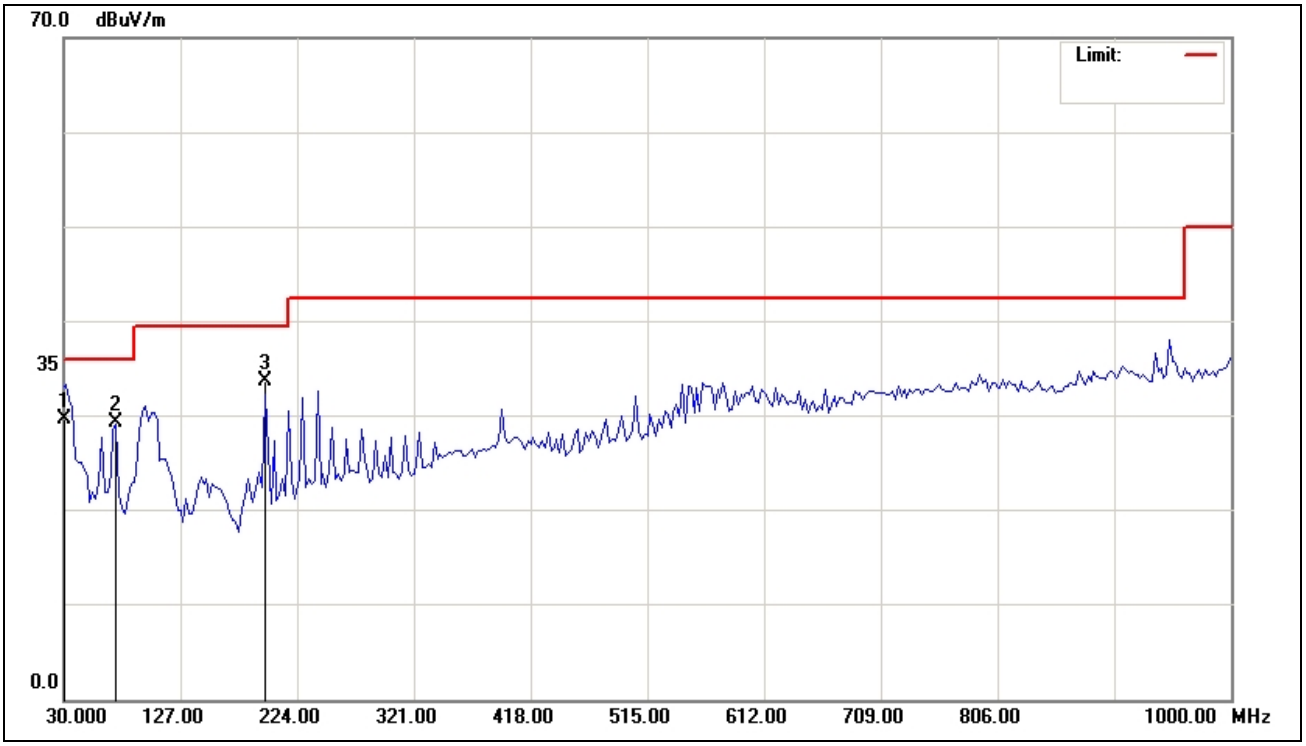
The following test is the worst among all models.

According to the data below, the FCC Part 15.109 class B standards, and had the worst margin of:

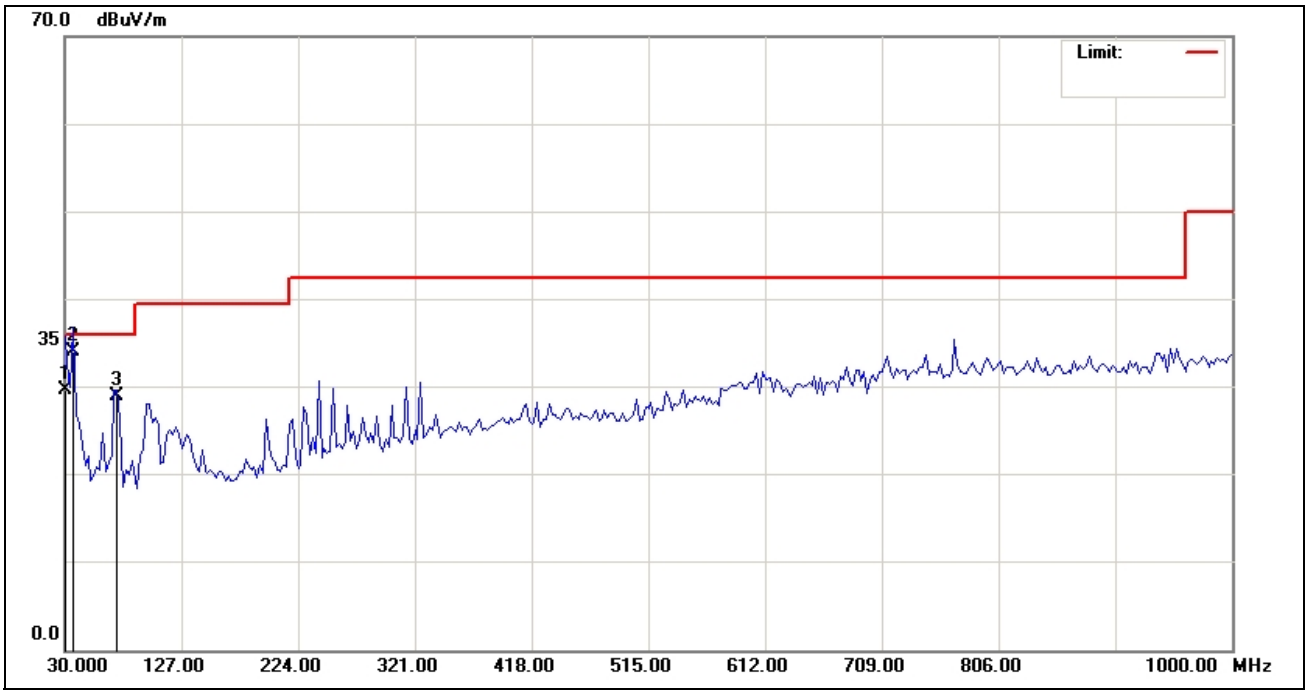
-3.09 dBμV at **31.750 MHz** in the **Vertical** polarization **30 MHz to 1 GHz, 3Meters**

EUT: FIREWALL APPLIANCE
M/N: SG-6000-G5150
Test Mode: Normal
Operator: Amy
Test Specification: Horizontal & Vertical

Horizontal



Vertical



Frequency [MHz]	Antenna Polarization [V/H]	Correction Factors [dB/m]	Corrected Reading [dBμV/m]	5 Meters Limits [dBμV/m]	Delta, QP [dB]	Height of Tower (cm)	Angle of Turner (degree)
30.0158	H	5.43	29.58	35	-5.42	400	360
72.025	H	-5.95	29.23	35	-5.77	250	175
196.613	H	-3.17	33.7	38.5	-4.8	400	170
30.7	V	6.85	29.65	35	-5.35	100	300
36	V	2.48	34.03	35	-0.97	100	310
71.985	V	-6.11	28.95	35	-6.05	100	300
Comments: None							
Note: All readings are quasi-peak unless stated otherwise, using a QPA bandwidth of 120kHz, with a 30 ms sweep time. A video filter was not used.							