



FCC PART 15 CLASS B MEASUREMENT AND TEST REPORT

For

SHENZHEN TENDA TECHNOLOGY CO.,LTD.

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P.R.China

FCC ID: V7TN60

Report Type: Original Report	Product Type: Concurrent Dual Band Wireless N600 Gigabit Router
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Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. This report **must not** be used by the customer to claim product certification, approval, or endorsement by NVLAP*, or any agency of the Federal Government.

* This report contains data that are not covered by the NVLAP accreditation and are marked with an asterisk “★” (Rev.2)

TABLE OF CONTENTS

GENERAL INFORMATION.....	3
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT).....	3
OBJECTIVE	3
RELATED SUBMITTAL(S)/GRANT(S).....	3
TEST FACILITY.....	3
SYSTEM TEST CONFIGURATION.....	5
DESCRIPTION OF TEST CONFIGURATION	5
EUT EXERCISE SOFTWARE	5
EQUIPMENT MODIFICATIONS	5
SUPPORT EQUIPMENT LIST AND DETAILS	5
EXTERNAL I/O CABLE.....	5
BLOCK DIAGRAM OF TEST SETUP	6
SUMMARY OF TEST RESULTS	7
FCC §15.107 – AC LINE CONDUCTED EMISSIONS.....	8
MEASUREMENT UNCERTAINTY	8
EUT SETUP.....	8
EMI TEST RECEIVER SETUP.....	9
TEST EQUIPMENT LIST AND DETAILS.....	9
TEST PROCEDURE	9
TEST RESULTS SUMMARY	9
TEST DATA	9
FCC §15.109 - RADIATED EMISSIONS	12
MEASUREMENT UNCERTAINTY	12
EUT SETUP.....	12
EMI TEST RECEIVER SETUP.....	13
TEST PROCEDURE	13
TEST EQUIPMENT LIST AND DETAILS.....	13
CORRECTED AMPLITUDE & MARGIN CALCULATION	14
TEST RESULTS SUMMARY	14
TEST DATA	14

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The SHENZHEN TENDA TECHNOLOGY CO.,LTD.'s product, model number: N60 (FCC ID: V7TN60) or ("EUT") in this report is a Concurrent Dual Band Wireless N600 Gigabit Router, which was measured approximately: 17.0 cm (L) x13.5 cm (W) x17.5 cm (H), rated input voltage: DC 9V from adapter.

Adapter information:

Model: TEA09U-09100

Input: 100-240V, 50/60Hz, 0.3A

Output: 9V, 1.0A

* All measurement and test data in this report was gathered from production sample serial number: 120716009 (Assigned by BACL, Dongguan). The EUT was received on 2012-07-17.

Objective

This report is prepared on behalf of *SHENZHEN TENDA TECHNOLOGY CO.,LTD.* in accordance with Part 2- Subpart J, Part 15- Subparts A and B of the Federal Communication Commissions rules.

The objective of the manufacturer is to determine the compliance of EUT with FCC Part 15 Class B.

Related Submittal(s)/Grant(s)

FCC Part 15C DTS submissions with FCC ID: V7TN60 for 2400-2483.5MHz.

FCC Part 15C DTS submissions with FCC ID: V7TN60 for 5725-5850MHz.

FCC Part 15E NII submissions with FCC ID: V7TN60 for 5150-5250MHz.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China

Test site at Bay Area Compliance Laboratories Corp. (Dongguan) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 02, 2012. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratories Corp. (Shenzhen) is an ISO/IEC 17025 accredited laboratory, and is accredited by National Voluntary Laboratory Accredited Program (Lab Code 200707-0).



The current scope of accreditations can be found at <http://ts.nist.gov/Standards/scopes/2007070.htm>

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in a typical mode which is provided by manufacturer. The highest frequency is 533MHz.

EUT Exercise Software

The test was performed under “Lantest.exe” and “WINTHRAX.exe”.

Equipment Modifications

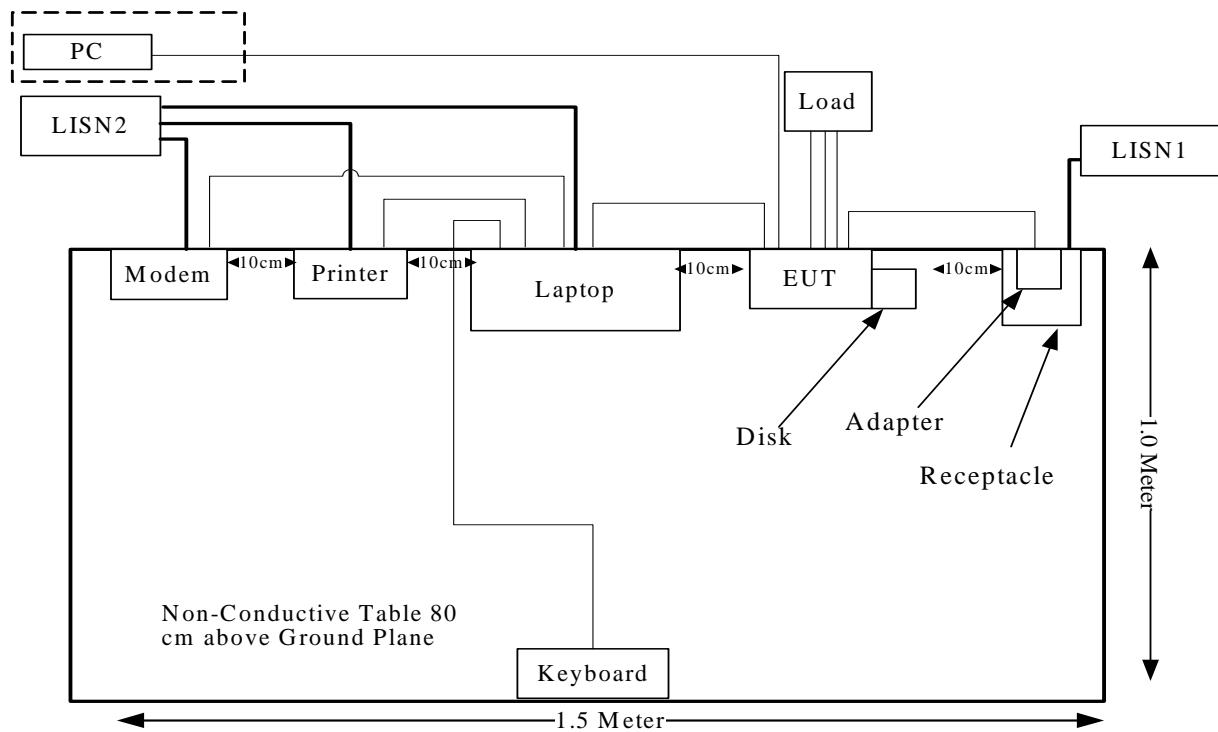
No modification was made to the EUT tested.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
DELL	Laptop	PP11L	QDS-BRCM1017
HP	Printer	C3941A	JPTVOB2337
DELL	Keyboard	L100	CNORH656658907BL05DC
AST	Modem	AEM-2100	0293
KingSton	USB Flash Disk	DT101G2	0236722
DELL	PC	GX620	CK2Z891

External I/O Cable

Cable Description	Length (m)	From Port	To
Shielded Detachable Serial Cable	1.2	Serial Port of Laptop	Modem
Shielded Detachable Keyboard Cable	1.5	Keyboard Port of Laptop	Keyboard
RJ45 Cable	1.5	RJ45 Port of Laptop	EUT
RJ45 Cable	10	RJ45 Port of PC	EUT
RJ45 Cable	0.1	Load	EUT
RJ45 Cable	0.1	Load	EUT
RJ45 Cable	0.1	Load	EUT
Shielded Detachable Printer Cable	1.2	Parallel Port of Laptop	Printer

Block Diagram of Test Setup

SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§15.107	AC Line Conducted Emissions	Compliance
§15.109	Radiated Emissions	Compliance

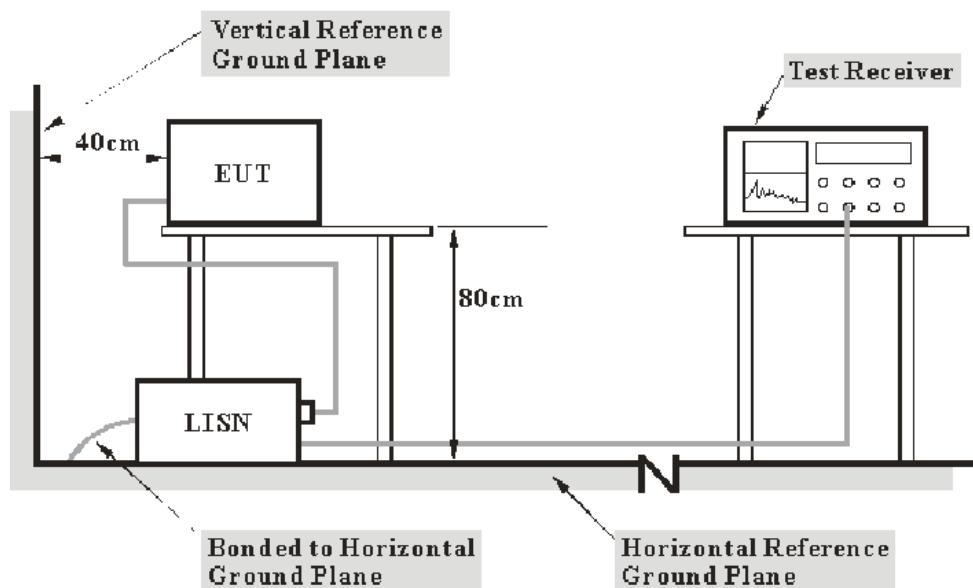
FCC §15.107 – AC LINE CONDUCTED EMISSIONS

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on CISPR 16-4-2, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at Bay Area Compliance Laboratories Corp. (Dongguan) is 2.4 dB.(k=2, 95% level of confidence)

EUT Setup



Note:

1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.4-2009 measurement procedure. The specification used was with the FCC Part 15.107 Class B limits.

The spacing between the peripherals was 10 cm.

The adapter was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF BW
150 kHz – 30 MHz	9 kHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS 30	830245/006	2011-10-08	2012-10-07
Rohde & Schwarz	LISN	ESH3-Z5	843331/015	2011-10-08	2012-10-07
Rohde & Schwarz	LISN	ESH3-Z5	100113	2011-10-08	2012-10-07

* **Statement of Traceability:** Bay Area Compliance Laboratory Corp.(Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the first LISN, the printer, notebook and modem were connected to the outlet of the second LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Test Results Summary

According to the recorded data in following table, the EUT complied with the [FCC Part 15.107](#), with the worst margin reading of:

10.54 dB at 23.130 MHz in the **Neutral** conducted mode

Test Data

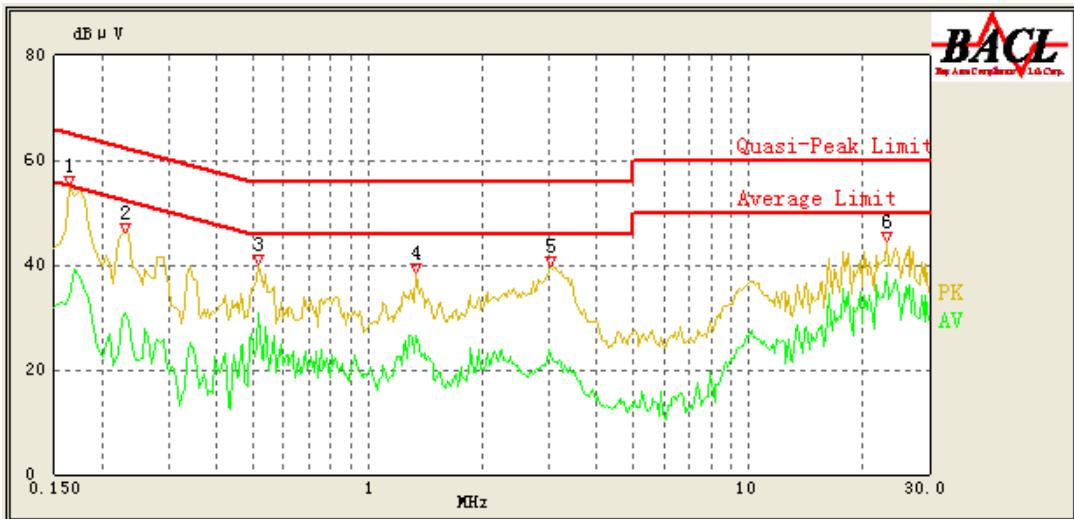
Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	48 %
ATM Pressure:	100.0 kPa

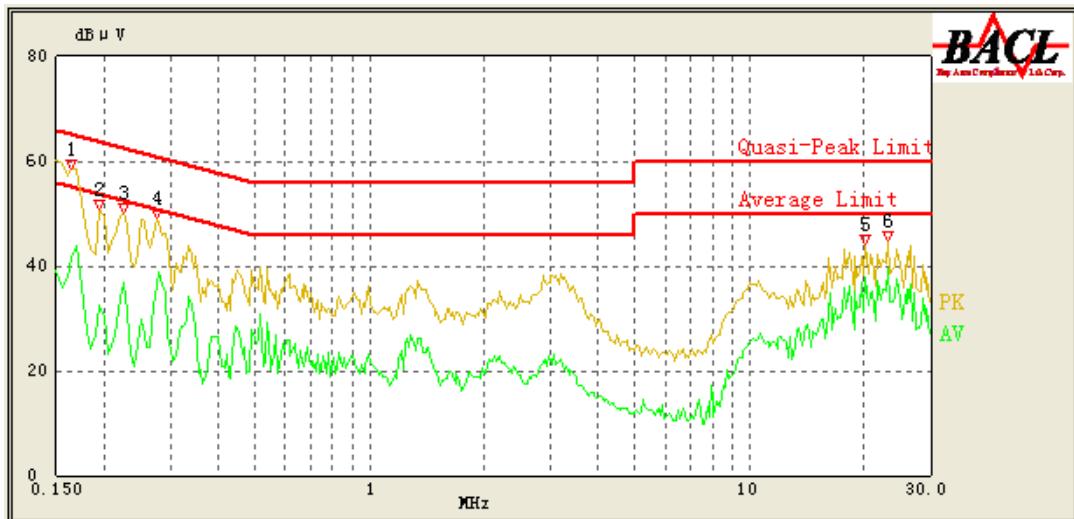
The testing was performed by Ares Liu on 2012-07-26.

Test Mode: Operating

120 V, 60 Hz, Line:



Frequency (MHz)	Corrected Result (dB μ V)	Correction Factor (dB)	Limit (dB μ V)	Margin (dB)	Detector (PK /QP/Ave.)
23.130	38.48	2.18	50.00	11.52	Ave.
0.515	30.70	0.42	46.00	15.30	Ave.
0.165	48.49	0.41	65.57	17.08	QP
23.130	41.88	2.18	60.00	18.12	QP
1.335	26.59	0.46	46.00	19.41	Ave.
0.515	35.16	0.42	56.00	20.84	QP
0.165	33.98	0.41	55.57	21.59	Ave.
0.230	42.10	0.42	63.71	21.61	QP
3.000	23.77	0.49	46.00	22.23	Ave.
0.230	31.00	0.42	53.71	22.71	Ave.
1.335	32.35	0.46	56.00	23.65	QP
3.025	31.86	0.49	56.00	24.14	QP

120V, 60 Hz, Neutral:

Frequency (MHz)	Corrected Result (dB μ V)	Correction Factor (dB)	Limit (dB μ V)	Margin (dB)	Detector (PK /QP/Ave.)
23.130	39.46	2.18	50.00	10.54	Ave.
20.260	37.84	1.76	50.00	12.16	Ave.
0.165	52.12	0.41	65.57	13.45	QP
0.165	41.55	0.41	55.57	14.02	Ave.
0.275	36.02	0.42	52.43	16.41	Ave.
23.130	43.33	2.18	60.00	16.67	QP
0.225	36.79	0.42	53.86	17.07	Ave.
0.225	44.73	0.42	63.86	19.13	QP
0.275	43.04	0.42	62.43	19.39	QP
20.260	39.43	1.76	60.00	20.57	QP
0.195	32.54	0.42	54.71	22.17	Ave.
0.195	35.61	0.42	64.71	29.10	QP

FCC §15.109 - RADIATED EMISSIONS

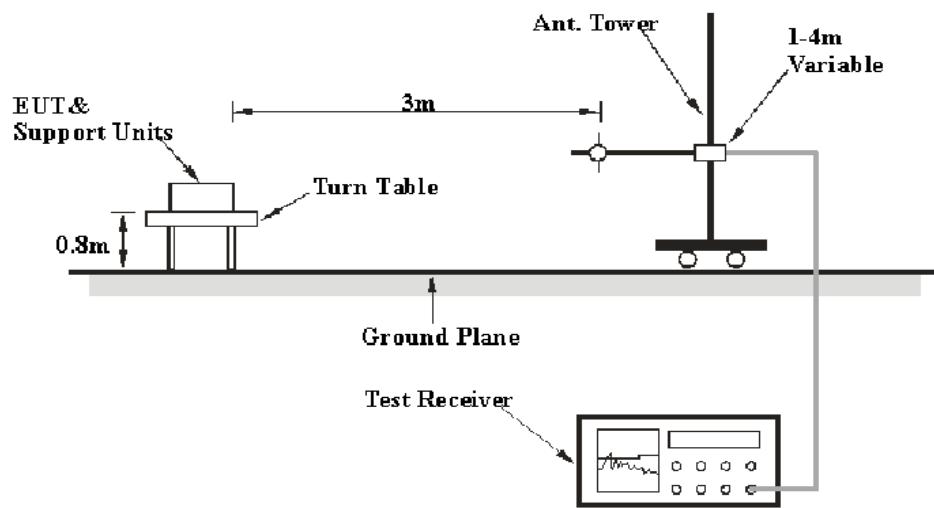
Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

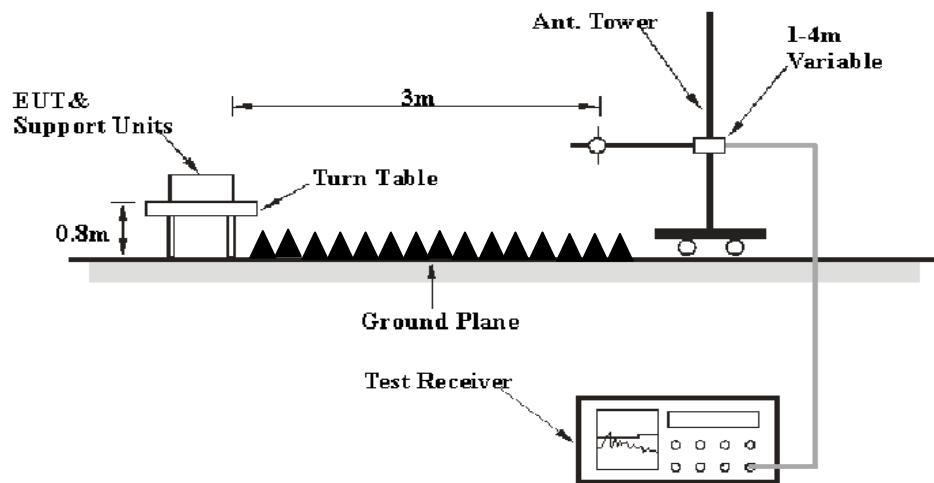
Based on CISPR 16-4-2, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Bay Area Compliance Laboratories Corp. (Dongguan) is ± 4.0 dB. (k=2, 95% level of confidence)

EUT Setup

Below 1GHz:



Above 1 GHz:



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.4-2009. The specification used was the FCC Part 15.109 **Class B** limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

The adapter was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver Setup

The system was investigated from 30 MHz to above 5GHz.

During the radiated emission test, the EMI test receiver was set with the following configurations:

Frequency	RBW	VBW	Detection
30 MHz-1 GHz	100 kHz	300 kHz	Quasi-peak
Above 1 GHz	1 MHz	3 MHz	PK/Ave.

Test Procedure

During the radiated emissions test, the adapter, notebook, modem and the printer were connected to AC floor outlet

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all Install combinations.

All data was recorded in the Quasi-peak detection mode from 30 MHz to 1 GHz, Peak and average detection mode above 1 GHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2011-11-11	2012-11-10
Sunol Sciences	Hybrid Antennas	JB3	A060611-1	2011-09-06	2012-09-05
HP	Pre-amplifier	8447E	2434A02181	2011-10-08	2012-10-07
R&S	Spectrum Analyzer	FSEM	1079 8500	2011-10-09	2012-10-08
Beijingdayang	Horn Antenna	OMCDH10180	10279001B	2010-07-30	2015-07-29
Mini-Circuits	Wideband Amplifier	ZVA-183-S+	96901149	N/A	N/A

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Loss and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Loss} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Results Summary

According to the data in the following table, the EUT complied with the FCC §15.109 Class B, with the worst margin reading of:

3.10 dB at 125.0600 MHz in the **Vertical** polarization for Below 1 GHz.
9.68 dB at 3236.473 MHz in the **Horizontal** polarization for Above 1 GHz.

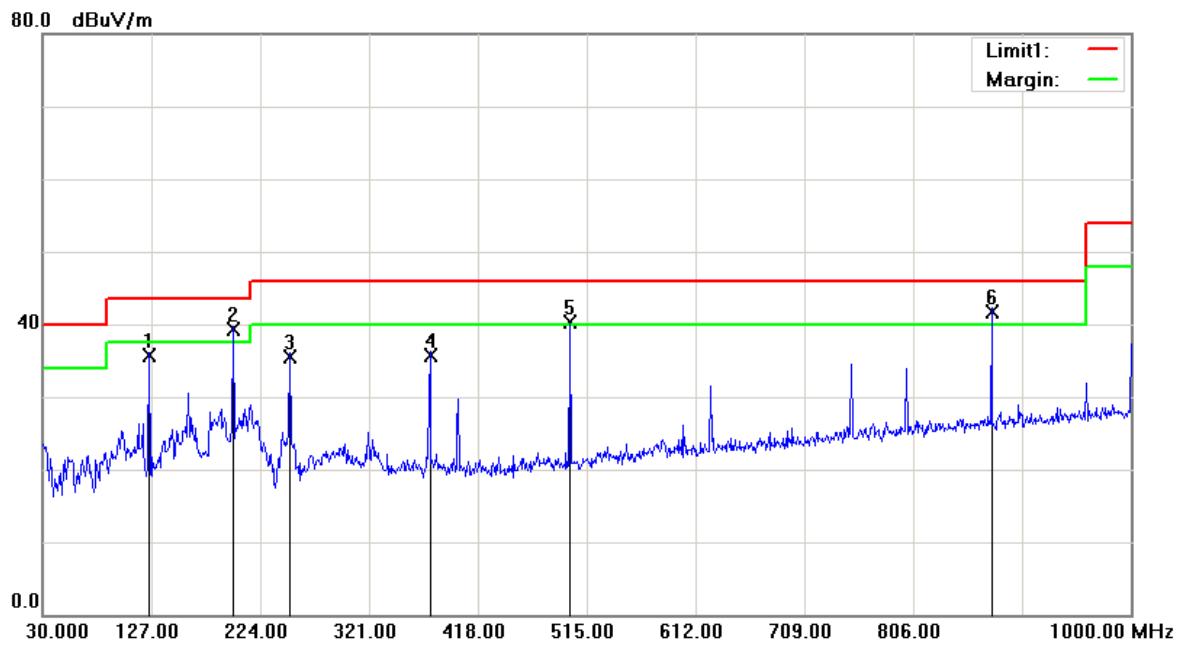
Test Data

Environmental Conditions

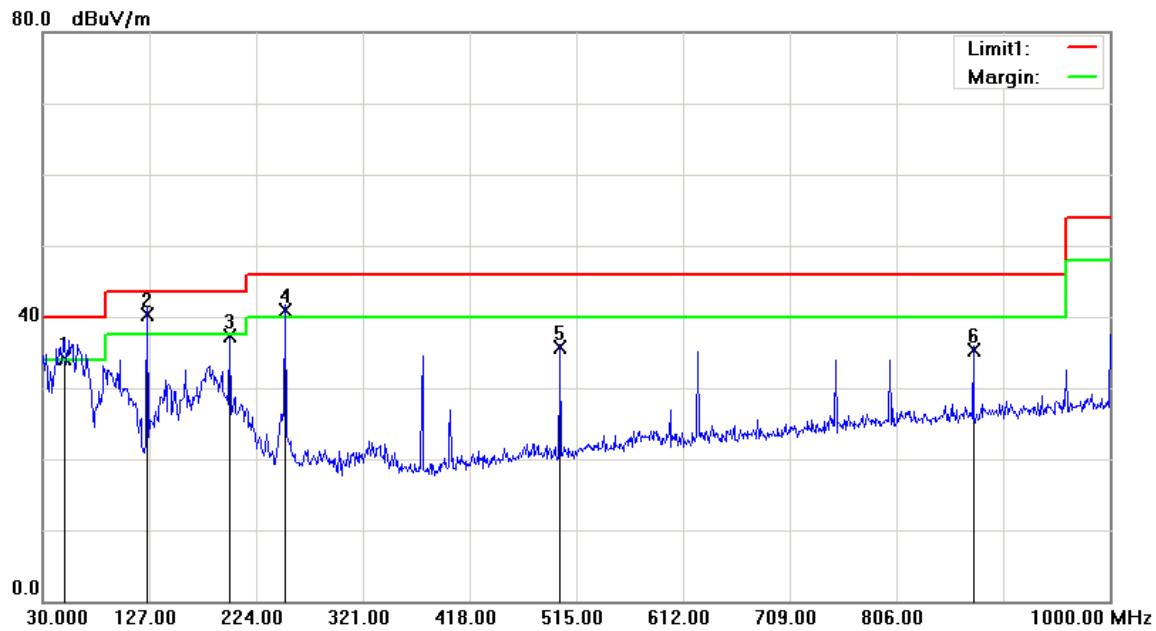
Temperature:	26 °C
Relative Humidity:	60 %
ATM Pressure:	100.0 kPa

The testing was performed by Ares Liu from 2012-07-23 to 2012-07-27.

Test Mode: Operating

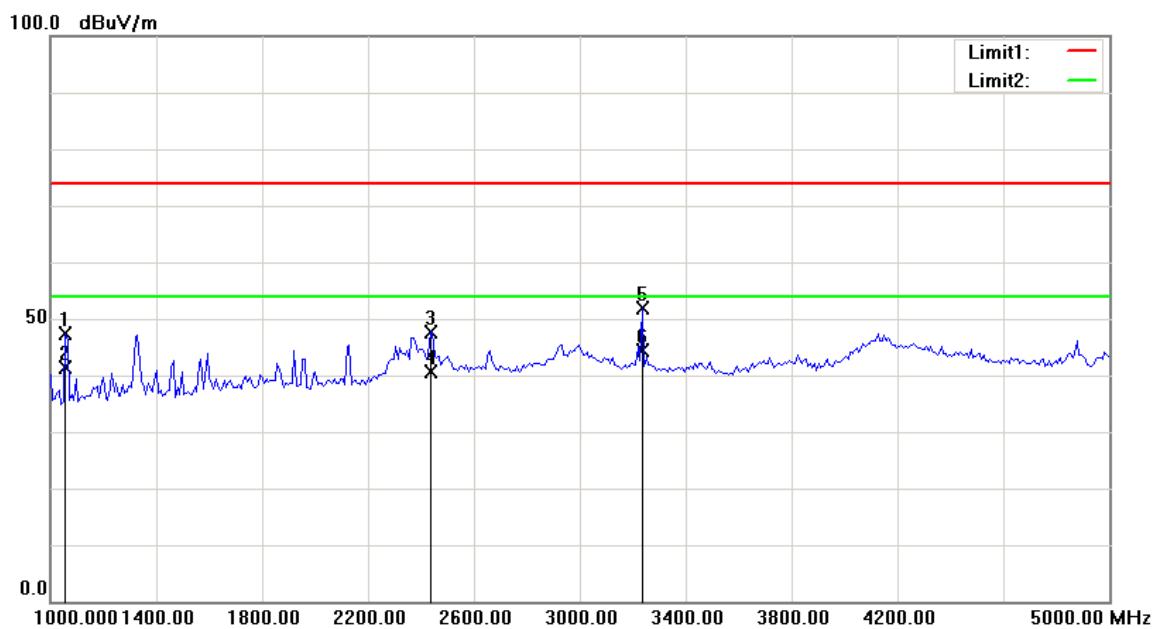
Below 1 GHz**Horizontal**

Frequency (MHz)	Reading (dB μ V)	Detector	Correction Factor (dB)	Corrected Amplitude (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
199.7500	46.51	QP	-7.11	39.40	43.50	4.10
875.8400	37.84	QP	3.86	41.70	46.00	4.30
500.4500	41.60	QP	-1.20	40.40	46.00	5.60
125.0600	41.47	QP	-5.77	35.70	43.50	7.80
375.3200	39.34	QP	-3.64	35.70	46.00	10.30
250.1900	42.90	QP	-7.40	35.50	46.00	10.50

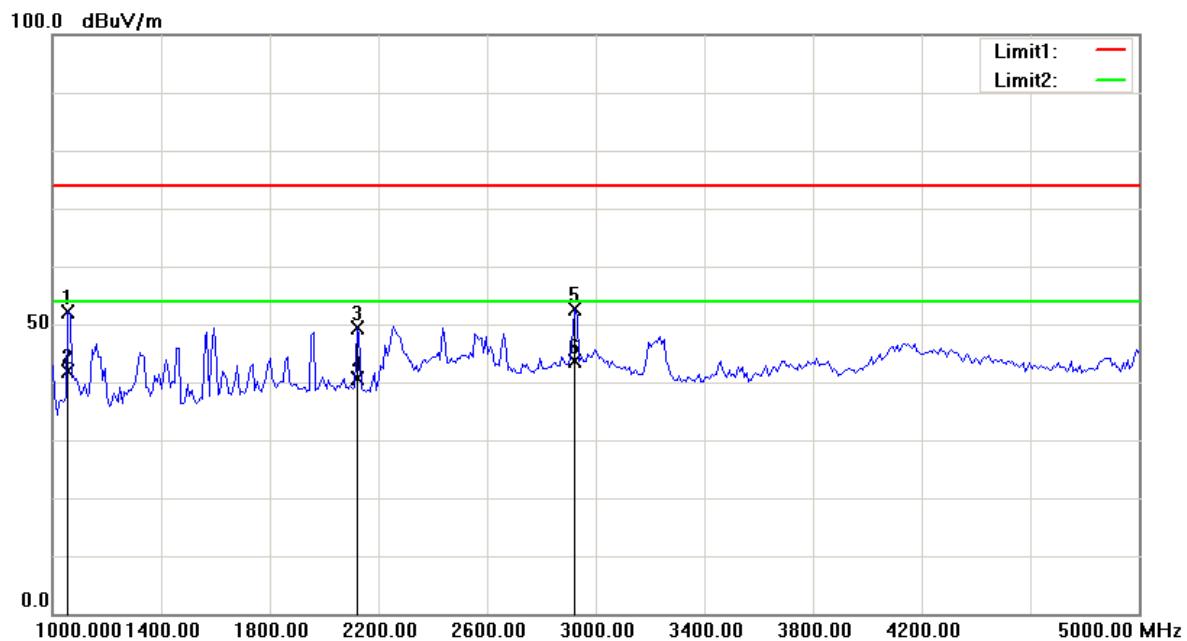
Vertical

Frequency (MHz)	Reading (dB μ V)	Detector	Correction Factor (dB)	Corrected Amplitude (dB μ V/m)	Limit (dBuV/m)	Margin (dB)
125.0600	46.17	QP	-5.77	40.40	43.50	3.10*
250.1900	48.30	QP	-7.40	40.90	46.00	5.10
49.4000	45.73	QP	-11.53	34.20	40.00	5.80
199.7500	44.41	QP	-7.11	37.30	43.50	6.20
500.4500	37.00	QP	-1.20	35.80	46.00	10.20
875.8400	31.54	QP	3.86	35.40	46.00	10.60

* Within measurement uncertainty.

Above 1 GHz:**Horizontal**

Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
3236.473	35.28	AVG	9.04	44.32	54.00	9.68
1056.112	40.92	AVG	0.46	41.38	54.00	12.62
2434.870	33.08	AVG	7.48	40.56	54.00	13.44
3236.473	42.79	peak	9.04	51.83	74.00	22.17
2434.870	40.14	peak	7.48	47.62	74.00	26.38
1056.112	46.92	peak	0.46	47.38	74.00	26.62

Vertical

Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2923.848	34.13	AVG	9.54	43.67	54.00	10.33
1056.112	41.52	AVG	0.46	41.98	54.00	12.02
2122.244	35.14	AVG	5.44	40.58	54.00	13.42
2923.848	42.99	peak	9.54	52.53	74.00	21.47
1056.112	51.56	peak	0.46	52.02	74.00	21.98
2122.244	43.83	peak	5.44	49.27	74.00	24.73

***** END OF REPORT *****