



# FCC PART 15B

# TEST REPORT

For

## SHENZHEN TENDA TECHNOLOGY CO.,LTD.

"Tenda Industrial Park, No 34-1,'Shilong Rd.,'Shiyan Town,'Bao'an District,'Shenzhen,'China

**FCC ID: V7TW322E**

<b>Report Type:</b> Original Report	<b>Product Type:</b> Wireless N300 PCI Express Adapter
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<b>Report Number:</b> R2DG130826001-00A	
<b>Report Date:</b> 2013-09-11	
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## GENERAL INFORMATION

### Product Description for Equipment under Test (EUT)

The *SHENZHEN TENDA TECHNOLOGY CO., LTD.*'s product, model number: *W322E (FCC ID: V7TW322E)* (the "EUT") in this report was a *Wireless N300 PCI Express Adapter*, which was measured approximately: 16.0 cm (L) x 12.0 cm (W) x 2.0 cm (H), rated input voltage: DC 3.3V from system

\* All measurement and test data in this report was gathered from production sample serial number: 130826001 (Assigned by *BACL.Dongguan*). The EUT was received on 2013-08-28.

### 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 compliance with FCC Part 15B, Class B.

### Related Submittal(s)/Grant(s)

FCC Part 15C DTS submissions with FCC ID: *V7TW322E* for Wifi.

### 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 Communications 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 C63.4-2003.

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. (Dongguan) is an ISO/IEC 17025 accredited laboratory, and is accredited by National Voluntary Laboratory Accredited Program (Lab Code 500069-0).



The current scope of accreditations can be found at <http://ts.nist.gov/standards/scopes/5000690.htm>

## SYSTEM TEST CONFIGURATION

### Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

### EUT Exercise Software

No software was used.

### Equipment Modifications

No modification was made to the EUT.

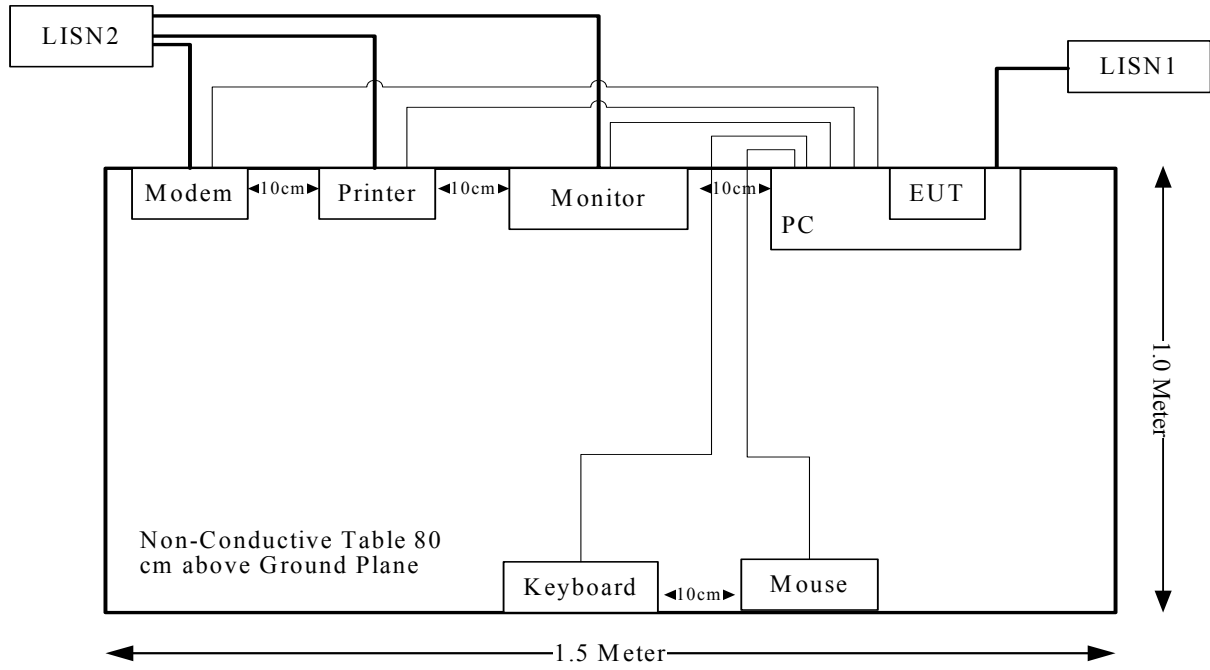
### Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
HP	Printer	C3941A	JPTVOB2337
DELL	Keyboard	L100	CNORH656658907BL05DC
SAST	Modem	AEM-2100	0293
DELL	PC	GX620	/
DELL	Monitor	1706FPVT	CN-0T9401-71618-588-AJ9X
DELL	Mouse	MO56UOA	F0Y02P7Y

### External Cable

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
Parallel Cable	yes	No	1.2	Parallel Port of PC	Printer
Serial Cable	yes	No	1.2	Serial Port of PC	Modem
VGA Cable	yes	No	1.2	VGA Port of PC	monitor
USB Cable	yes	No	1.8	USB Port of PC	Mouse
USB Cable	yes	No	2.0	USB Port of PC	Keyboard

**Block Diagram of Test Setup**



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## **SUMMARY OF TEST RESULTS**

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<b>FCC Rules</b>	<b>Description of Test</b>	<b>Results</b>
§15.107	AC Line Conducted Emissions	Compliance
§15.109	Radiated Emissions	Compliance

## FCC §15.107 – AC LINE CONDUCTED EMISSIONS

### Measurement Uncertainty

Compliance or non-compliance with a disturbance limit shall be determined in the following manner:

If  $U_{lab}$  is less than or equal to  $U_{cispr}$  of Table 1, then:

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If  $U_{lab}$  is greater than  $U_{cispr}$  of Table 1, then:

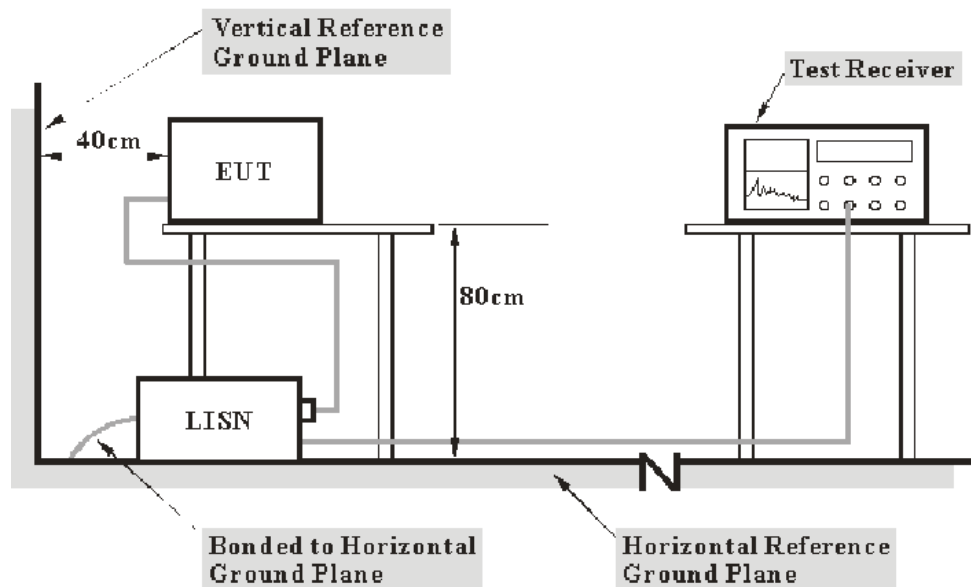
- compliance is deemed to occur if no measured disturbance level, increased by  $(U_{lab} - U_{cispr})$ , exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level, increased by  $(U_{lab} - U_{cispr})$ , exceeds the disturbance limit.

Based on CISPR 16-4-2: 2011, measurement uncertainty of conducted disturbance at mains port using AMN at Bay Area Compliance Laboratories Corp. (Dongguan) is 3.46 dB (150 kHz to 30 MHz).

Table 1 – Values of  $U_{cispr}$

Measurement	$U_{cispr}$
Conducted disturbance at mains port using AMN (150 kHz to 30 MHz)	3.4 dB

### 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 C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.107 Class B limits.

The PC 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 B/W
150 kHz – 30 MHz	9 kHz

### Test Procedure

During the conducted emission test, the PC was connected to the outlet of the first LISN and the other support equipments 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.

### Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$$V_C = V_R + A_C + VDF$$

$$C_f = A_C + VDF$$

Herein,

$V_C$  (cord. Reading): corrected voltage amplitude

$V_R$ : reading voltage amplitude

$A_C$ : attenuation caused by cable loss

VDF: voltage division factor of AMN

$C_f$ : Correction Factor

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

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



### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI TEST RECIEVER	ESCS 30	830245/006	2013-1-10	2014-1-9
R&S	L.I.S.N	ESH3-Z5	843331/015	2012-9-17	2013-9-16
R&S	L.I.S.N	ESH3-Z5	100113	2012-11-29	2013-11-28
BACL	Test Software	BACL-EMC	V1.0-2010	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 National Primary Standards and International System of Units (SI).

### 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:

**15.52 dB at 18.550 MHz** in the **Line** conducted mode

### Test Data

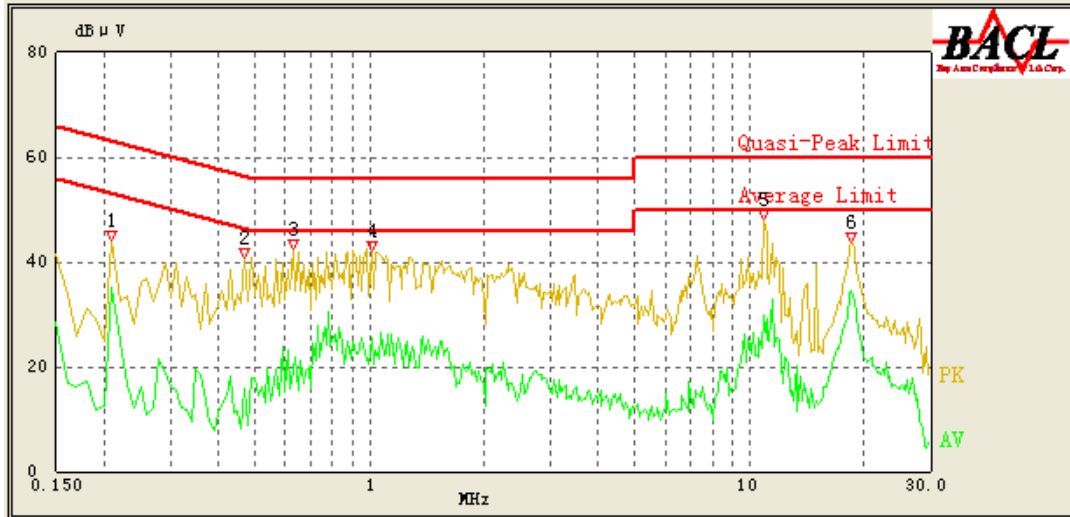
#### Environmental Conditions

<b>Temperature:</b>	27.5 °C
<b>Relative Humidity:</b>	63 %
<b>ATM Pressure:</b>	100.7kPa

*The testing was performed by Leon Chen on 2013-09-06.*

Test mode: Operating

120 V, 60 Hz, Line:



Frequency (MHz)	Cord. Reading (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/AV/QP)
0.210	42.37	0.42	63.21	20.84	QP
0.210	35.31	0.42	53.21	17.90	AV
0.470	32.11	0.31	56.51	24.40	QP
0.470	15.94	0.31	46.51	30.57	AV
0.630	33.81	0.31	56.00	22.19	QP
0.630	19.18	0.31	46.00	26.82	AV
1.020	33.86	0.32	56.00	22.14	QP
1.020	25.64	0.32	46.00	20.36	AV
10.920	30.94	1.03	60.00	29.06	QP
10.920	29.93	1.03	50.00	20.07	AV
18.480	39.26	2.35	60.00	20.74	QP
18.550	34.48	2.36	50.00	15.52	AV

**120 V, 60 Hz, Neutral:**



Frequency (MHz)	Cord. Reading (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/AV/QP)
0.210	44.45	0.25	63.21	18.76	QP
0.210	34.71	0.25	53.21	18.50	AV
0.630	33.79	0.22	56.00	22.21	QP
0.630	20.49	0.22	46.00	25.51	AV
1.060	33.39	0.23	56.00	22.61	QP
1.060	22.03	0.23	46.00	23.97	AV
3.450	28.68	0.33	56.00	27.32	QP
3.450	15.89	0.33	46.00	30.11	AV
10.760	30.02	0.83	60.00	29.98	QP
10.760	29.21	0.83	50.00	20.79	AV
18.690	37.61	1.38	60.00	22.39	QP
18.690	33.74	1.38	50.00	16.26	AV

## FCC §15.109 - RADIATED EMISSIONS

### Measurement Uncertainty

Compliance or non-compliance with a disturbance limit shall be determined in the following manner:

If  $U_{lab}$  is less than or equal to  $U_{cispr}$  of Table 2, then:

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If  $U_{lab}$  is greater than  $U_{cispr}$  of Table 1, then:

- compliance is deemed to occur if no measured disturbance level, increased by  $(U_{lab} - U_{cispr})$ , exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level, increased by  $(U_{lab} - U_{cispr})$ , exceeds the disturbance limit.

Based on CISPR 16-4-2: 2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is:

30M~200MHz: 5.0 dB

200M~1GHz: 6.2 dB

1G~6GHz: 4.45 dB

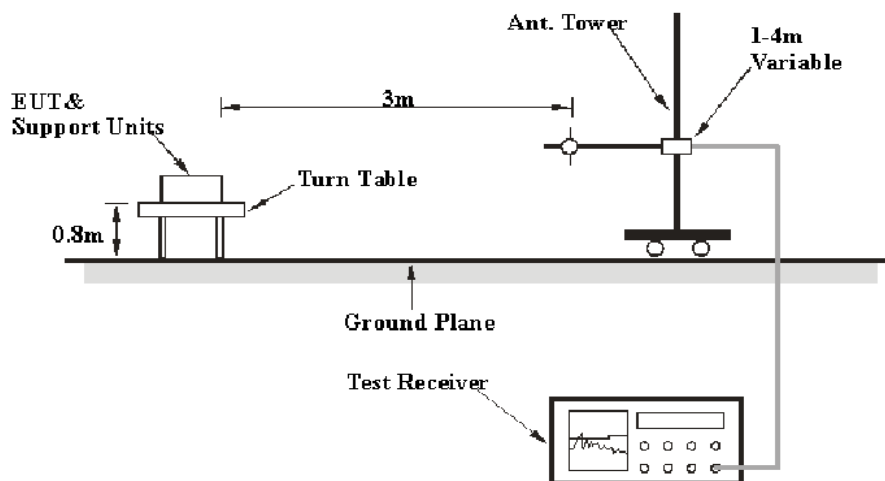
6G~18GHz: 5.23 dB

Table 2 – Values of  $U_{cispr}$

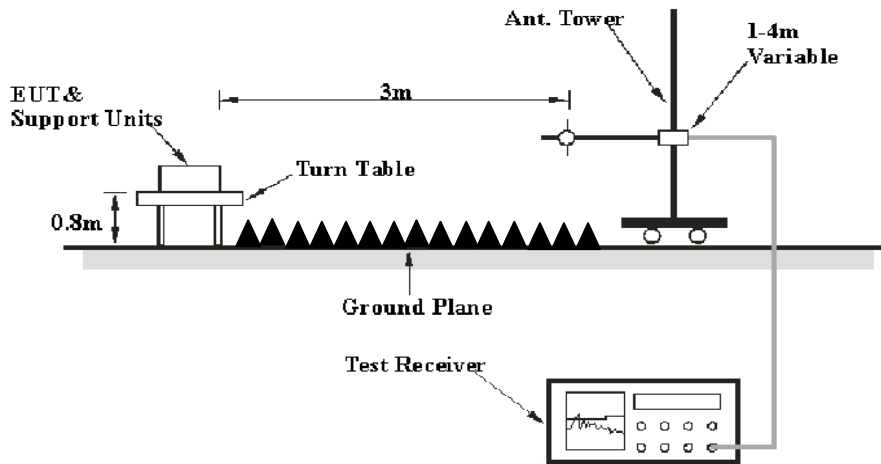
Measurement	$U_{cispr}$
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

### EUT Setup

Below 1 GHz:



**Above 1GHz:**



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2003. 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 PC connected to a 120 VAC/60 Hz power source.

**EMI Test Receiver Setup**

According to FCC 15.33 requirements, the system was measured from 30 MHz to 6 GHz.

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

Frequency Range	RBW	Video B/W	IF B/W	Detector
30MHz – 1000 MHz	120 kHz	300 kHz	120kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

**Test Procedure**

For the radiated emissions test, the PC was connected to the first AC floor outlet and the other support equipments were connected to the second AC floor outlet.

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

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

## 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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI TEST RECEIVER	ESCI	100224	2013-5-6	2014-5-5
Sunol Sciences	Antenna	JB3	A060611-1	2012-9-6	2015-9-5
HP	HP AMPLIFIER	8447E	2434A02181	N/A	N/A
R&S	Spectrum analyzer	FSEM 30	849016/001	2013-9-4	2014-9-3
ETS LINDGREN	horn antenna	3115	000 527 35	2012-9-6	2015-9-5
Mini-Circuit	Amplifier	ZVA-213-S+	54201245	N/A	N/A
Farad	Test Software	EZ-EMC	V1.1.4.2	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 National Primary Standards and International System of Units (SI).

## 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:

**9.20 dB at 298.6900 MHz** in the **Horizontal** polarization for below 1G

## Test Data

### Environmental Conditions

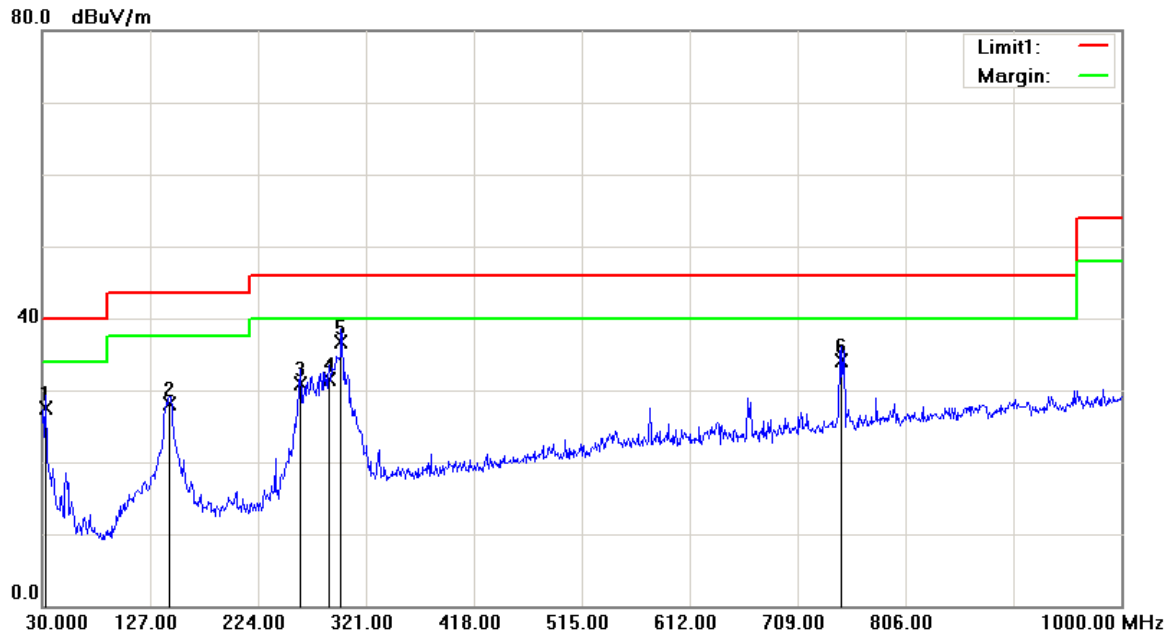
<b>Temperature:</b>	24.5 °C
<b>Relative Humidity:</b>	55 %
<b>ATM Pressure:</b>	100.7 kPa

*The testing was performed by Leon Chen on 2013-09-06.*

**1) Below 1 GHz:**

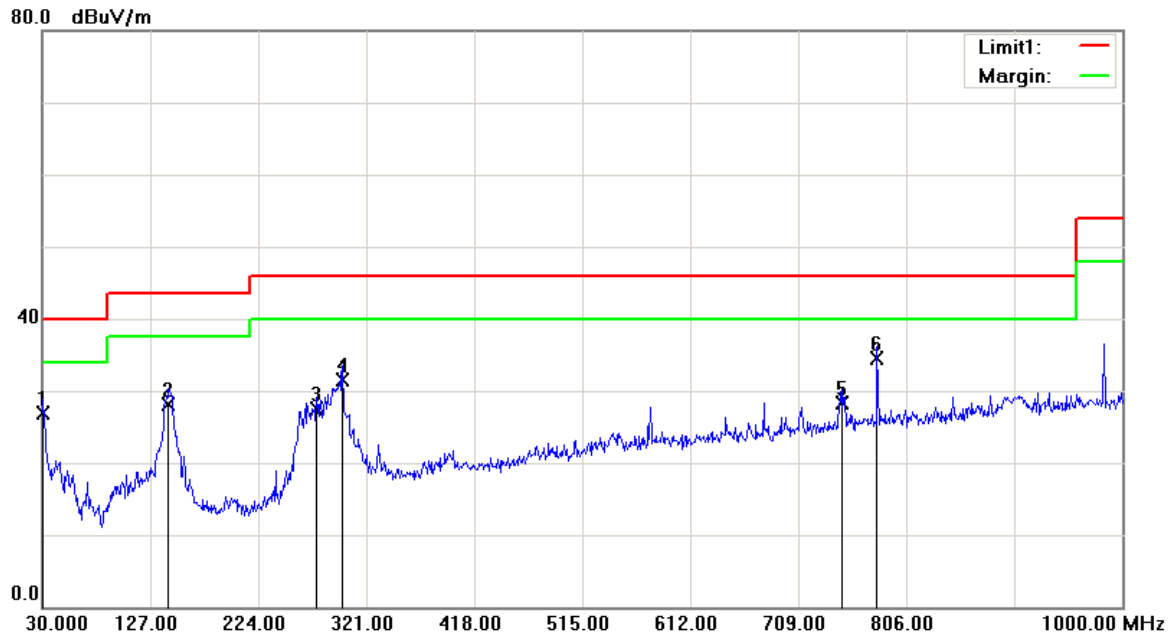
Test mode: Operating

**Horizontal:**



Frequency (MHz)	Receiver Reading (dBuV/m)	Detector (PK/QP/Ave)	Correction Factor (dB)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
32.9100	28.07	QP	-0.57	27.50	40.00	12.50
144.4600	35.19	QP	-6.99	28.20	43.50	15.30
261.8300	37.52	QP	-6.62	30.90	46.00	15.10
288.0200	37.30	QP	-5.70	31.60	46.00	14.40
298.6900	42.45	QP	-5.65	36.80	46.00	9.20
747.8000	31.93	QP	2.17	34.10	46.00	11.90

**Vertical:**



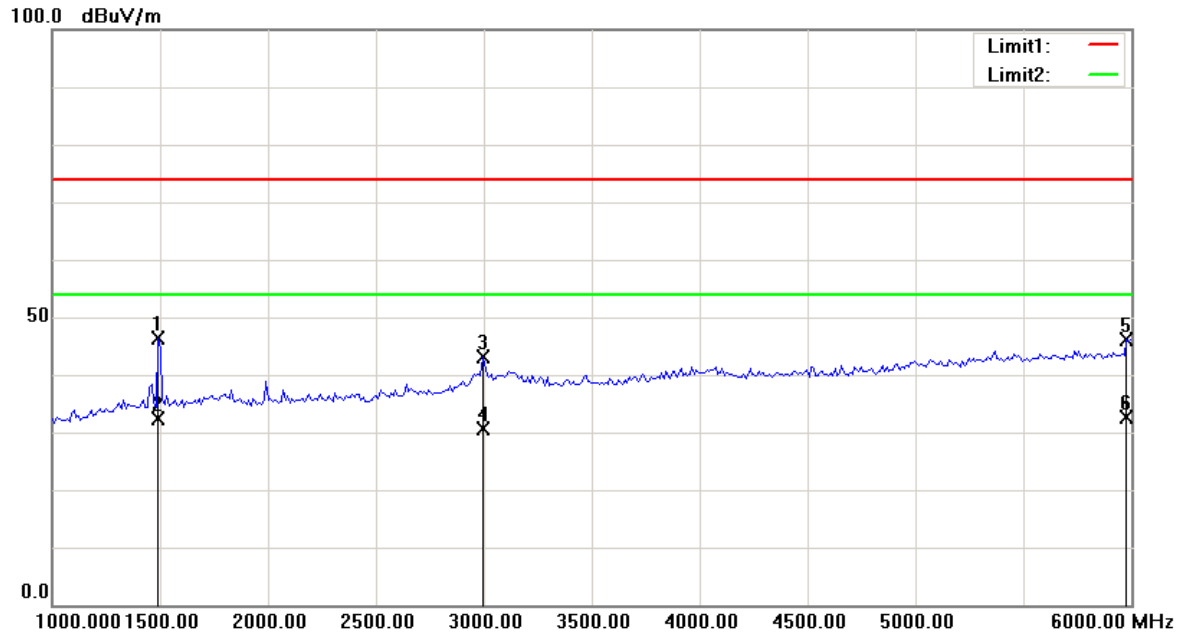
Frequency (MHz)	Receiver Reading (dBuV/m)	Detector (PK/QP/Ave)	Correction Factor (dB)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
30.0000	25.35	QP	1.55	26.90	40.00	13.10
143.4900	35.16	QP	-6.96	28.20	43.50	15.30
276.3800	33.42	QP	-5.92	27.50	46.00	18.50
299.6600	37.26	QP	-5.66	31.60	46.00	14.40
747.8000	26.13	QP	2.17	28.30	46.00	17.70
779.8100	32.10	QP	2.50	34.60	46.00	11.40



**2) Above 1 GHz:**

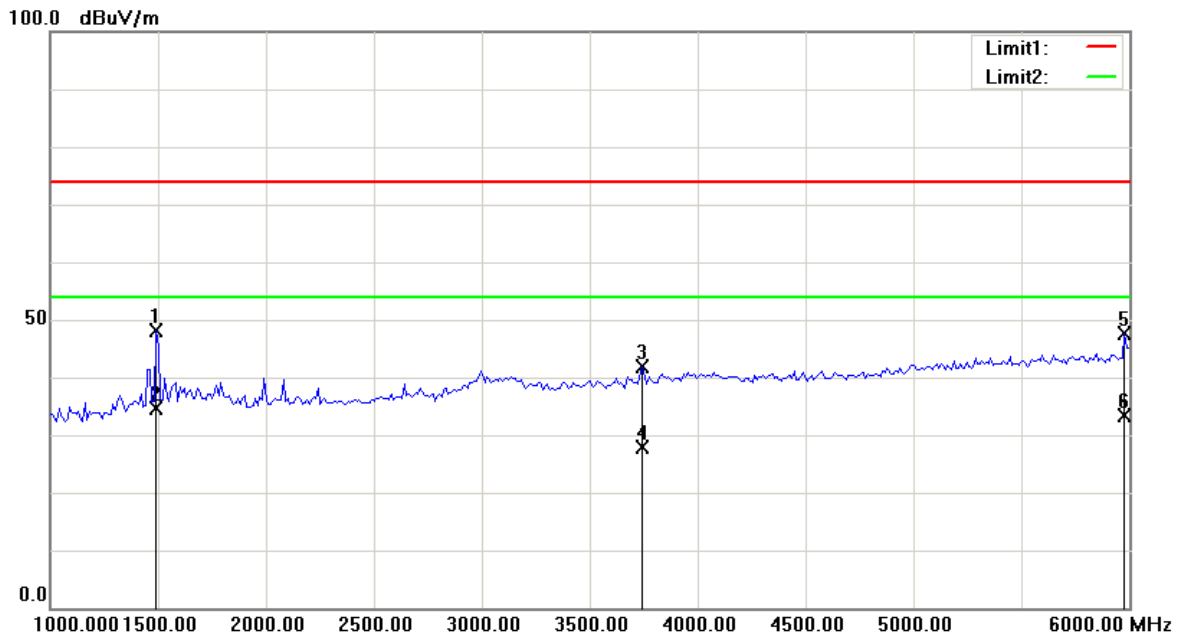
Test mode: Operating

**Horizontal:**



Frequency (MHz)	Receiver Reading (dBuV/m)	Detector (PK/QP/Ave)	Correction Factor (dB)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1490.982	46.87	peak	-0.40	46.47	74.00	27.53
1490.982	32.78	AVG	-0.40	32.38	54.00	21.62
2993.988	35.97	peak	7.07	43.04	74.00	30.96
2993.988	23.51	AVG	7.07	30.58	54.00	23.42
5979.960	34.43	peak	11.78	46.21	74.00	27.79
5979.960	20.89	AVG	11.78	32.67	54.00	21.33

**Vertical:**



Frequency (MHz)	Receiver Reading (dBuV/m)	Detector (PK/QP/Ave)	Correction Factor (dB)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1490.982	48.48	peak	-0.40	48.08	74.00	25.92
1490.982	35.04	AVG	-0.40	34.64	54.00	19.36
3745.491	35.04	peak	6.87	41.91	74.00	32.09
3745.491	21.12	AVG	6.87	27.99	54.00	26.01
5979.960	35.74	peak	11.78	47.52	74.00	26.48
5979.960	21.57	AVG	11.78	33.35	54.00	20.65

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