



# FCC PART 15B, CLASS B

## MEASUREMENT AND TEST REPORT

For

**Kasda Digital Technology Co., Ltd.**

B-31 Building, Tanglang Industry Zone, XiLi, Nanshan, Shenzhen, China

**FCC ID: OWI-KW5212**

<b>Report Type:</b> Original Report	<b>Product Type:</b> 802.11b/g/n 4 port VDSL2 Router
<b>Test Engineer:</b> <u>Gardon Zhang</u>	<i>Gardon Zhang</i>
<b>Report Number:</b> <u>RSZ130725006-00A</u>	
<b>Report Date:</b> <u>2013-08-20</u>	
<b>Reviewed By:</b> <u>Alvin Huang</u> <u>RF Leader</u>	<i>Alvin Huang</i>
<b>Prepared By:</b> Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F, the 3rd Phase of WanLi Industrial Building ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 <a href="http://www.baclcorp.com.cn">www.baclcorp.com.cn</a>	

**Note:** This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

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## GENERAL INFORMATION

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

The *Kasda Digital Technology Co., LTD*'s product, model number: *KW5212H (FCC ID: OWI-KW5212)* or the "EUT" in this report was a *802.11b/g/n 4 port VDSL2 Router*, which was measured approximately: 19.0 cm (L) x 6.0 cm (W) x 30.0 cm (H), rated input voltage: DC 12V adapter. The highest operating frequency is 400MHz.

#### Adapter Information:

Model: ADS012PM-W 120100

Input: AC 100-240 V, 50/60Hz, 0.5A

Output: DC 12V, 1.0A

*Note: The serial models KW5212H, KW5212, NG11VO and NG11VH are electrically identical, the differences among them is whether supporting USB function, model KW5212H was selected for fully testing, the details was explained in the attached product similarity declaration letter provided and guaranteed by applicant.*

*\* All measurement and test data in this report was gathered from production sample serial number: 1307080 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2013-07-25.*

### Objective

This report is prepared on behalf of *Kasda Digital 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 15B, Class B.

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

FCC Part 15.247 DTS submissions with FCC ID: OWI-KW5212.

### Test Facility

The test site used by Bay Area Compliance Laboratories Corp.(Shenzhen) to collect test data is located on the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) 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 December 06, 2010. 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.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

The system was configured for testing in a typical mode.

Running Mode: (DSL+LAN+WAN+USB) port working simultaneously

### EUT Exercise Software

N/A

### Equipment Modifications

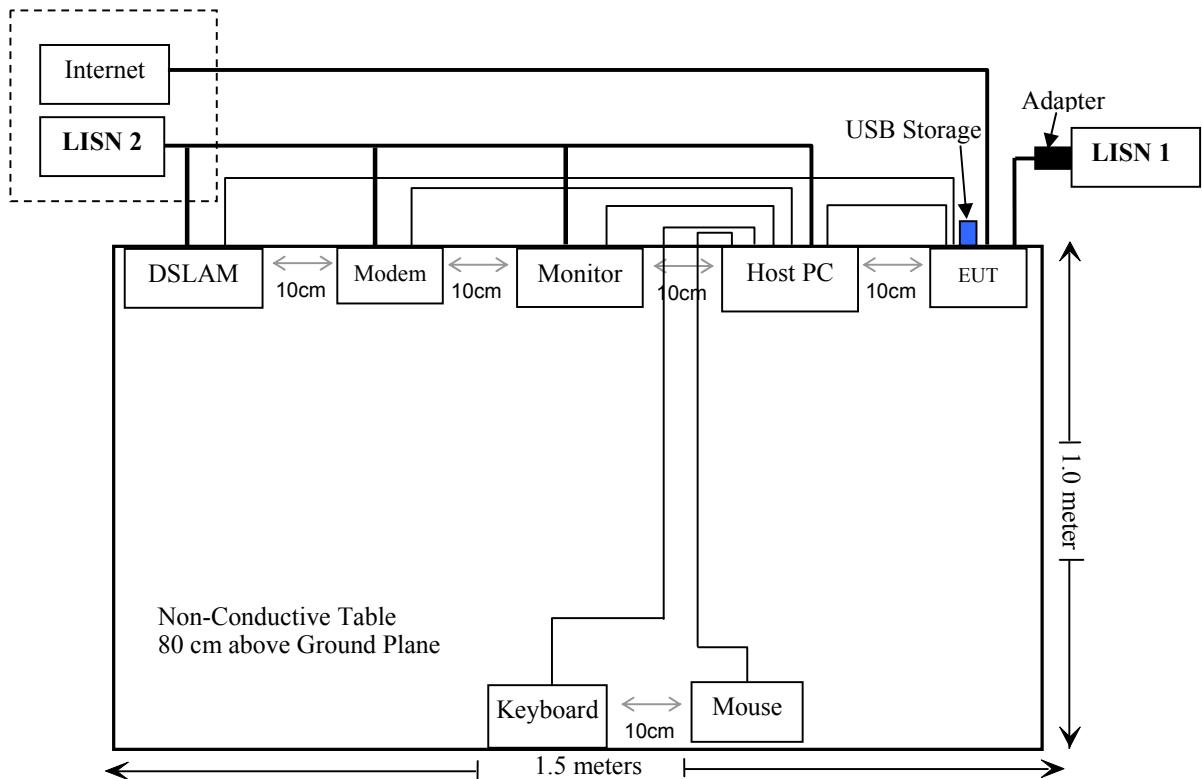
No modification was made to the EUT tested.

### Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
DELL	PC	VOSTRO 220S	127BP2X
DELL	Keyboard	L100	CNORH656658907BL04TY
DELL	Mouse	MOC5UO	G1B0096D
DELL	Monitor	E178WFPC	CN-OWY564-64180-7C4-2SQH
ECOM	Modem	5600pbs	N/A
Huawei	DSLAM	MA5105	N/A
Kingston	USB Storage	U204G-STJAMMDBG	972325

### External I/O Cable

Cable Description	Length (m)	From/Port	To
Shielding Detachable K/B Cable	1.5	Host PC	Keyboard
Shielding Detachable Mouse Cable	1.5	Host PC	Mouse
Shielding Detachable Serial Cable	1.2	Host PC	Modem
Shielding Detachable VGA Cable	1.5	Host PC	Monitor
Unshielding Detachable RJ45 Cable	1.5	EUT	Host PC
Unshielding Detachable RJ11 Cable	1.5	EUT	DSLAM
Unshielding Detachable DC Power Cable	1.5	EUT	Adapter

**Block Diagram of Test Setup**

## **SUMMARY OF TEST RESULTS**

<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

### Applicable Standard

According to FCC §15.107

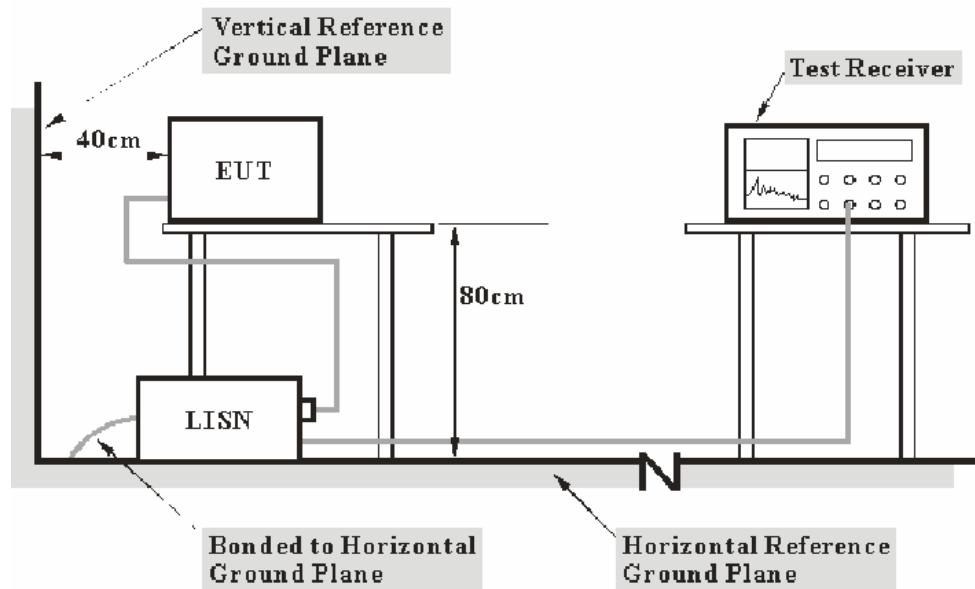
### Measurement Uncertainty

Input quantities to be considered for conducted disturbance measurements maybe receiver reading, attenuation of the connection between AMN/ISN and receiver, AMN/ISN voltage division factor, AMN/ISN VDF frequency interpolation and receiver related input quantities, etc.

Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of conducted disturbance test at Bay Area Compliance Laboratories Corp. (Shenzhen) is shown as below. And the uncertainty will not be taken into consideration for the test data recorded in the report

Port	Measurement uncertainty
AC Mains	3.26 dB (k=2, 95% level of confidence)
CAT 3	3.70 dB (k=2, 95% level of confidence)
CAT 5	3.86 dB (k=2, 95% level of confidence)
CAT 6	4.64 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 measurement procedure of EUT setup is according with ANSI C63.4-2009. The related limit was specified in FCC Part 15.107 Class B.

The spacing between the peripherals was 10 cm.

The adapter was connected to an AC 120V/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 emissions, the adapter was connected to the 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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2013-06-17	2014-06-17
Rohde & Schwarz	L.I.S.N.	ENV216	3560.6650.12-101613-Yb	2013-05-07	2014-05-07
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2013-08-09	2014-08-09
Rohde & Schwarz	CE Test software	EMC 32	8.95	-	-

**\* Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

### Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN/ISN VDF (Voltage Division Factor), Cable Loss and Pulse Limiter Attenuation. The basic equation is as follows:

$$\text{Correction Factor} = \text{LISN VDF} + \text{Cable Loss} + \text{Pulse Limiter Attenuation}$$

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 7 dB below the limit. The equation for margin calculation is as follows:

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

## Test Results Summary

According to the recorded data in following table, with the worst margin reading of:

**11.3 dB at 0.158000 MHz in the Neutral conducted mode**

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cisp}$$

in BACL,  $U_{(Lm)}$  is less than  $U_{cisp}$ , if  $L_m$  is less than  $L_{lim}$ , it implies that the EUT complies with the limit.

## Test Data

### Environmental Conditions

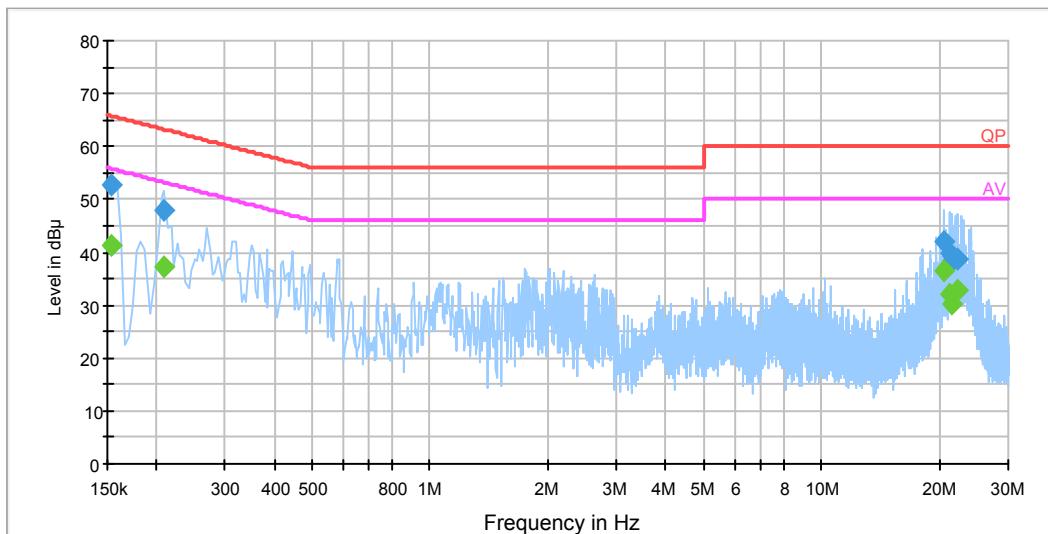
Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

*The testing was performed by Gardon Zhang on 2013-08-13.*

*EUT operation mode: Running*

**AC 120V/60 Hz, Line**

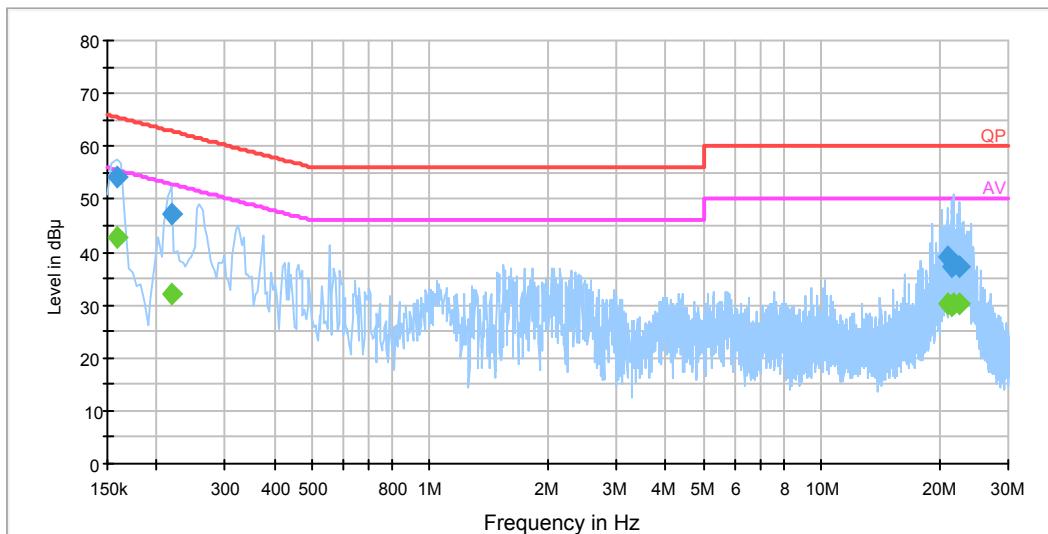
EMI Auto Test L



Frequency (MHz)	Corrected Amplitude (dB $\mu$ V)	Correction Factor (dB)	Limit (dB $\mu$ V)	Margin (dB)	Detector (PK/ QP/Ave.)
0.154000	52.7	19.5	65.8	13.1	QP
20.494000	36.5	20.0	50.0	13.5	Ave.
0.154000	41.5	19.5	55.8	14.3	Ave.
0.210000	47.8	19.5	63.2	15.4	QP
0.210000	37.4	19.5	53.2	15.8	Ave.
22.310000	32.8	20.1	50.0	17.2	Ave.
21.218000	32.2	20.1	50.0	17.8	Ave.
20.494000	42.1	20.0	60.0	17.9	QP
21.570000	30.1	20.1	50.0	19.9	Ave.
21.218000	39.8	20.1	60.0	20.2	QP
22.310000	38.7	20.1	60.0	21.3	QP
21.570000	38.3	20.1	60.0	21.7	QP

## AC 120V/60 Hz, Neutral

EMI Auto Test N



Frequency (MHz)	Corrected Amplitude (dB $\mu$ V)	Correction Factor (dB)	Limit (dB $\mu$ V)	Margin (dB)	Detector (PK/ QP/Ave.)
0.158000	54.3	19.5	65.6	11.3	QP
0.158000	42.8	19.5	55.6	12.8	Ave.
0.218000	47.0	19.5	62.9	15.9	QP
22.518000	30.4	20.2	50.0	19.6	Ave.
21.078000	30.3	20.2	50.0	19.7	Ave.
21.794000	30.3	20.2	50.0	19.7	Ave.
21.422000	29.9	20.2	50.0	20.1	Ave.
0.218000	32.2	19.5	52.9	20.7	Ave.
21.078000	39.2	20.2	60.0	20.8	QP
21.794000	37.6	20.2	60.0	22.4	QP
21.422000	37.3	20.2	60.0	22.7	QP
22.518000	37.3	20.2	60.0	22.7	QP

**Note:**

- 1) Correction Factor =LISN/ISN VDF (Voltage Division Factor) + Cable Loss + Pulse Limiter Attenuation  
The corrected factor has been input into the transducer of the test software.
- 2) Corrected Amplitude = Reading + Correction Factor
- 3) Margin = Limit – Corrected Amplitude

## FCC §15.109 - RADIATED EMISSIONS

### Applicable Standard

According to FCC §15.109

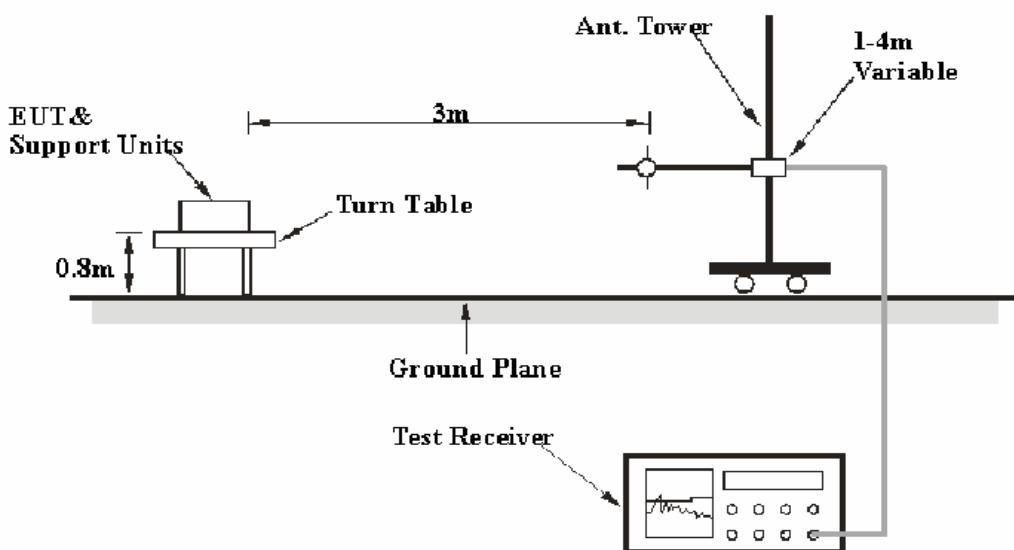
### Measurement Uncertainty

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 16-4-2:2011, the expended combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Shenzhen) is shown in below table. And the uncertainty will not be taken into consideration for the test data recorded in the report

Frequency	Polarity	Measurement uncertainty
30MHz~200MHz	Horizontal	4.62 dB (k=2, 95% level of confidence)
	Vertical	4.54 dB (k=2, 95% level of confidence)
200MHz~1GHz	Horizontal	4.84 dB (k=2, 95% level of confidence)
	Vertical	5.91 dB (k=2, 95% level of confidence)
1 GHz~6 GHz	Horizontal/Vertical	4.68 dB (k=2, 95% level of confidence)
Above 6 GHz	Horizontal/Vertical	4.92 dB (k=2, 95% level of confidence)

### EUT Setup



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 an AC 120V/60 Hz power source

### EMI Test Receiver Setup

The system was investigated from 30 MHz to 2.0 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
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

### Test Procedure

During the radiated emissions, the adapter and relevant equipments were connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation 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
HP	Amplifier	8447E	1937A01046	2013-08-09	2014-08-09
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2013-05-09	2014-05-09
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2011-11-28	2014-11-27
SUPER ULTRA	Amplifier	ZVA-213+	N/A	2012-11-24	2013-11-23
Sunol Sciences	Horn Antenna	DRH-118	A052304	2011-12-01	2014-11-30
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23
R&S	Auto test Software	EMC32	V6.30	-	-

**\* Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

## 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:

$$\text{Correction Factor} = \text{Antenna Loss} + \text{Cable Loss} - \text{Amplifier Gain}$$

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, with the worst margin reading of:

**10.8 dB at 30.647050 MHz in the Vertical polarization**

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cisp}$$

in BACL,  $U_{(Lm)}$  is less than  $U_{cisp}$ , if  $L_m$  is less than  $L_{lim}$ , it implies that the EUT complies with the limit.

## Test Data

### Environmental Conditions

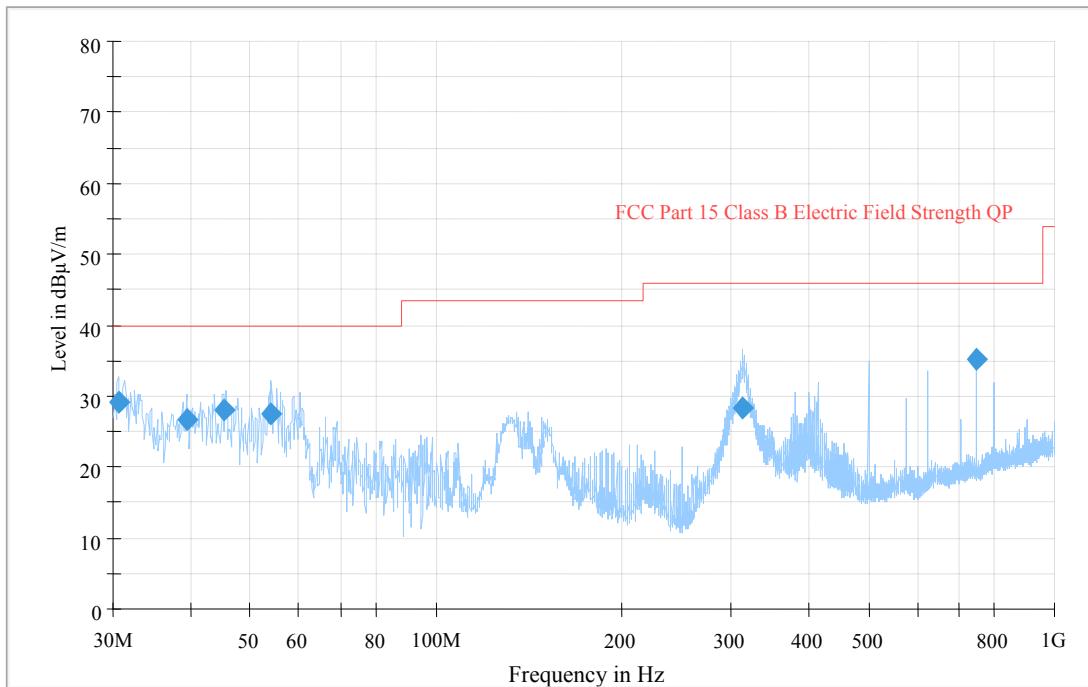
<b>Temperature:</b>	25 °C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Gardon Zhang on 2013-08-13.*

*EUT operation mode: Running*

## 1) 30 MHz ~ 1 GHz

Auto Test (FCC part 15 Class B)



Frequency (MHz)	Corrected Amplitude (dB $\mu$ V/m)	Antenna height (cm)	Antenna Polarity	Turntable position (deg)	Correction Factor (dB/m)	Limit (dB $\mu$ V/m)	Margin (dB)
30.647050	29.2	100.0	V	213.0	-7.3	40.0	10.8
750.001600	35.2	179.0	H	305.0	-6.6	46.0	10.8
45.248450	28.1	100.0	V	311.0	-17.8	40.0	11.9
54.178250	27.5	110.0	V	123.0	-20.8	40.0	12.5
39.542100	26.6	103.0	V	275.0	-14.0	40.0	13.4
312.737300	28.3	118.0	H	251.0	-13.8	46.0	17.7

Note:

- 1) Corrected Amplitude = Meter Reading + Correction Factor
- 2) Correction Factor = Antenna Factor + Cable Loss - Amplifier Gain  
The corrected factor has been input into the transducer of the test software.
- 3) Margin = Limit – Corrected Amplitude

## 2) 1 GHz ~ 2 GHz

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dB $\mu$ V/m)	FCC Part 15.109	
	Reading (dB $\mu$ V)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dB $\mu$ V/m)	Margin (dB)
1527.2	38.14	Ave.	145	1.7	H	1.15	39.29	54	14.71
1527.2	36.24	Ave.	263	1.3	V	1.15	37.39	54	16.61
1527.2	51.67	PK	145	1.7	H	1.15	52.82	74	21.18
1527.2	49.59	PK	263	1.3	V	1.15	50.74	74	23.26

Note:

- 1) Corrected Amplitude = Corrected Factor + Reading
- 2) Corrected Factor=Antenna factor (RX) + Cable loss – Amplifier factor
- 3) Margin = Limit - Corrected Amplitude

## **PRODUCT SIMILARITY DECLARATION LETTER**



Kasda Digital Technology Co.,LTD  
B-31 Building,Tanglang Industry Zone,XiLi,Nanshan,Shenzhen,China  
Tel: 0755-86096689 Fax: 0755-86106137

2013-7-26

### **Product Similarity Declaration**

To Whom It May Concern,

We, Kasda Digital Technology Co.,LTD hereby declare that our 802.11b/g/n 4 port VDSL2 Router, Model Number: KW5212H was tested by BACL for FCC approval, and for our marketing purpose we would like to list another three models on reports, there are : KW5212, NG11VO, NG11VH, the differences between these models for details as below:

The test model: KW5212H supports USB function; NG11VO and NG11VH share the identical schematics with KW5212H, so these three models named differently due to different clients.

As to KW5212, is not support USB function, other functions and schematics are the same as test model: KW5212H.

Please contact me if you have any question.

Signature: Ying Xiong

Ying Xiong

Manager

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