

# Ke Mei Ou Laboratory Co., Ltd.

E506, 5th Floor, No.39 Keji Middle 2nd Rd, Science & Technology  
Park, Nanshan District, Shenzhen, P. R. China  
Tel: + 86 755 83642690 Fax: + 86 755 83297077  
www.kmolab.com

## ***FCC TEST REPORT***


Under :  
FCC Part 15, Class B

Prepared For :

**SmartRG Inc**

501 SE Columbia Shores Boulevard, Suite 500 Vancouver, Washington, 98661 USA

<b>FCC ID: VW7SR310N</b>
<b>EUT: 4 Port ADSL2+ 11n 150Mbps Router</b>
<b>Model: SR310N</b>

November 26, 2012 <b>Issue Date:</b>
Original Report <b>Report Type:</b>
<i>Eric Guo</i> <b>Test Engineer: Eric Guo</b>
 <b>Review By: Apollo Liu / Manager</b>

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## 1. General Information

### 1.1 Notes

The test results of this report relate exclusively to the test item specified in 1.5. The KMO Lab does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the KMO Lab.

### 1.2 Testing Laboratory

Sintek Laboratory

Site on File with the Federal Communications Commission – United States

Registration Number: 963441

Site Listed with Industry Canada of Ottawa, Canada

Registration Number: 7353A

### 1.3 Details of Applicant

**Name** : SmartRG Inc

**Address** : 501 SE Columbia Shores Boulevard, Suite 500 Vancouver, Washington, 98661 USA

**Contact** : Zhaiyingui

**Tel** : 021-65635566-8191

**Fax** : N/A

### 1.4 Application Details

Date of Receipt of Application : August 28, 2012

Date of Receipt of Test Item : August 31, 2012

Date of Test : August 31, 2012~November 1, 2012

### 1.5 Test Item

Manufacturer

: SHANGHAI CHONGZHENG ELECTRONICS TECHNOLOGY CO.,LTD

Address

: NO.178 Renqing Road,Pudong,Shanghai.

Trade Name

: SMART RG

Model No.(Base)

: SR310N

Model No.(Extension)

: N/A

Description

: 4 Port ADSL2+ 11n 150Mbps Router

### Additional Information

Product Type

: WLAN (1TX, 1RX)

Radio Type

: Intentional Transceiver

Power Type

: DC12V/500mA(Adapter model: DY600-120005100)  
DC12V/500mA(Adapter model: RD1200500-C55-8MG)

Modulation

: see the below tables

Data Modulation

: IEEE 802.11b: DQPSK, DBPSK, DSSS, and CCK  
IEEE 802.11g: BPSK, QPSK, 16QAM, 64QAM  
IEEE 802.11n: HT20/HT40: OFDM (64QAM,16QAM, QPSK, BPSK)

Date Rate (Mbps)

: see the below table

Frequency Range

: 2412~2462MHz

Channel Number

: For 2.4GHz Band: 11 for 20MHz bandwidth; 7 for 40MHz bandwidth

Antenna

: Dipole

Antenna & Band Width

Antenna	Single (TX)		Two (TX)	
	20 MHz	40 MHz	20 MHz	40 MHz
Band width Mode	20 MHz	40 MHz	20 MHz	40 MHz
802.11a	X	X	X	X
802.11b / 11,5.5,2 and 1 Mbps with auto-rate fall back	√	X	X	X
802.11g / 54,48,36,24,18,12,9&6 Mbps	√	X	X	X
Draft n / up to 150Mbps	√	√	X	X

### 1.6 Test Standards

FCC 15 Subpart B

Note: All radiated measurements were made in all three orthogonal planes. The values reported are the maximum values.

## 2. Technical Test

### 2.1 Summary of Test Results

The EUT has been tested according to the following specifications:

**FCC 15 Subpart B: 2007, Class B**

Standard	Test Type	Result	Notes
FCC Part 15, Paragraph 15.107	Conducted Test	PASS	Complies
FCC Part 15, Paragraph 15.109	Radiated Test	PASS	Complies

## 3. EUT Modifications

No modification by test lab.

## 4. Conducted Power Line Test

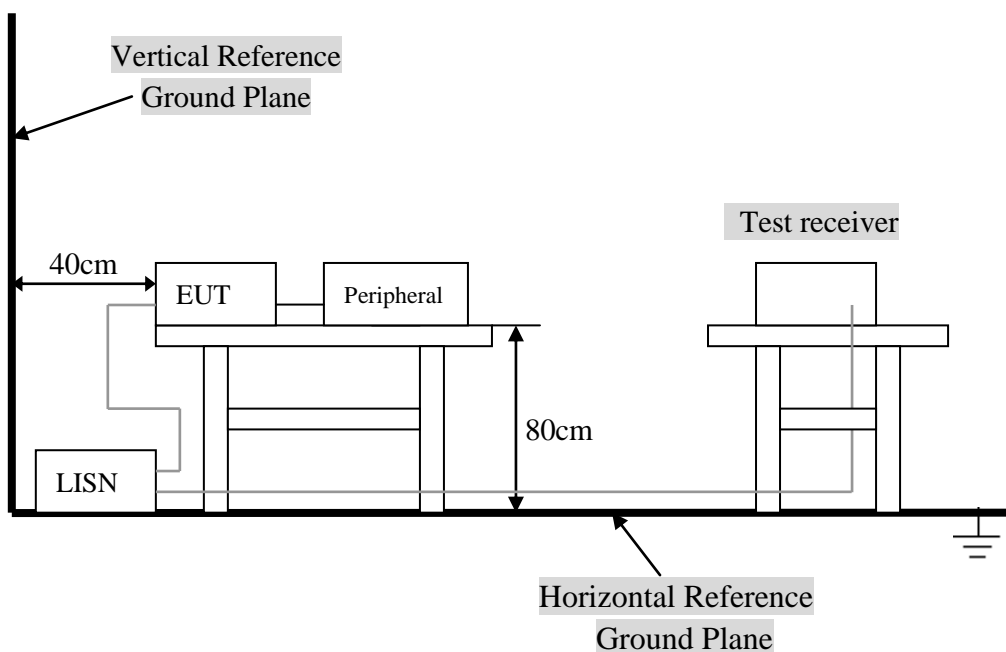
### 4.1 Test Equipment

Please refer to Section 8 this report.

### 4.2 Test Procedure

The EUT was tested according to ANSI C63.4 - 2003. The frequency spectrum from 0.15 MHz to 30 MHz was investigated. The LISN used was 50 ohm / 50 u-Henry as specified by section 5.1 OF ANSI C63.4 - 2003. cables and peripherals were moved to find the maximum emission levels for each frequency.

### 4.3 Test Setup



For the actual test configuration, Please refer to the related items – Photos of Testing.

### 4.4 Configuration of The EUT

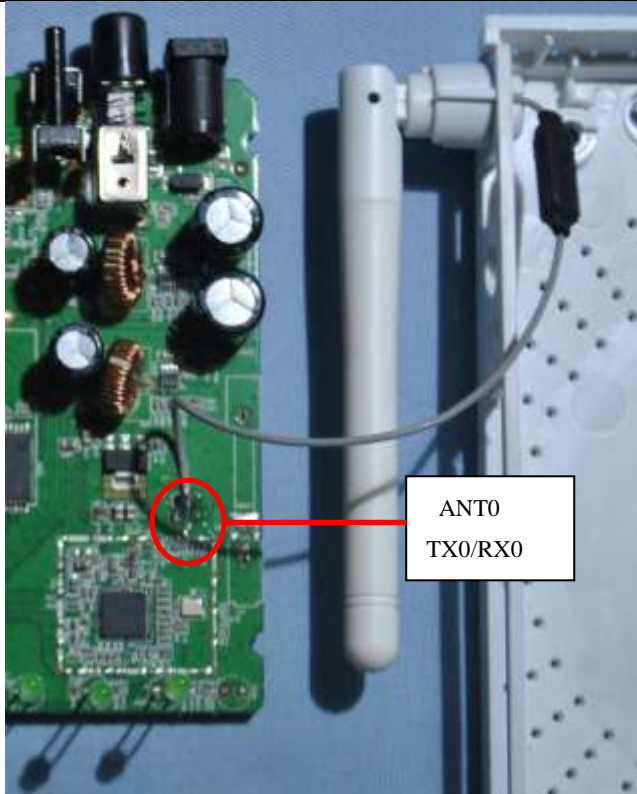
The EUT was configured according to ANSI C63.4-2003. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

#### A. EUT

Device	Manufacturer	Model #	FCC ID
4 Port ADSL2+ 11n 150Mbps Router	SHANGHAI CHONGZHENG ELECTRONICS TECHNOLOGY CO.,LTD	SR310N	VW7SR310N

#### Field Antenna For 2.4GHz Band

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Remark
0	Mag.layers	2.4GHz Dipole Antenna MSA-2715-2G4C1-A3	Dipole	NA	3.00	TX/RX



Note:

The EUT incorporates a WiFi function with 802.11b, 802.11g, and 802.11n. Physically, the EUT provides one completed transmit and receiver. The device was tested in a 802.11b/g/n type operation.

#### B. Internal Devices

Device	Manufacturer	Model #	FCCID / DoC
N/A			

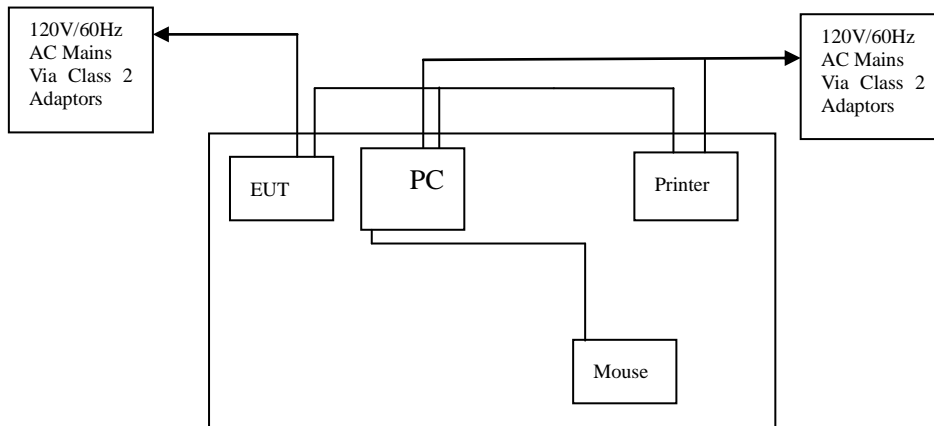
#### C. Peripherals

Device	Manufacturer	Model # Serial #	FCC ID/ DoC	Cable
Printer	HP	HP930C	DoC	1.5m unshielded power cord 1.2m unshielded data cable.
Mouse	DELL	OCJ339	DoC	1.2m unshielded cable
Notebook	DELL	PP10L	DoC	1.5m unshielded power cord
PC	DELL	2400n	DoC	1.5m unshielded power cord

### 4.5 EUT Operating Condition

Operating condition is according to ANSI C63.4 - 2003.

- A. Setup the EUT and simulators as shown on follow.
- B. Enable RF signal and confirm EUT active.
- C. Modulate output capacity of EUT up to specification.



### 4.6 Conducted Power Line Emission Limits

Frequency Range (MHz)	Class A QP/AV (dBuV)	Class B QP/AV (dBuV)
0.15 – 0.5	79/66	66 –56/56 –46
0.5 – 5.0	73/60	56/46
5.0 – 30	73/60	60/50

**Note:** In the above table, the tighter limit applies at the band edges.

## 4.7 Conducted Power Line Test Result

Product	: 4 Port ADSL2+ 11n 150Mbps Router	Test Mode	: Normal Link / Auto
Test Item	: Conducted Emission Data	Temperature	: 25 °C
Test Voltage	: DC 12V (by DC Power Supply)	Humidity	: 56%RH
Test Result	: <b>PASS</b>	Adapter Model	:

The frequency spectrum from 0.15 MHz to 30 MHz was investigated. All readings are quasi -peak values with a resolution bandwidth of 9 KHz.

- Temperature : 26 °C
- Humidity : 53 % RH

Adapter Model: DY600-120005100

FCC Part 15 Paragraph 15.207							
Frequency (MHz)	Emission (dBuV)		LINE/NEUTRAL	Limit (dBuV)		Margin (dB)	
	QP	AV		QP	AV	QP	AV
0.170	40.28	29.47	Line	64.96	54.96	-24.68	-25.49
0.166	39.89	30.58	Neutral	65.16	55.16	-25.27	-24.58
0.178	39.82	29.31	Line	64.58	54.58	-24.76	-25.27
0.186	39.37	29.76	Neutral	64.21	54.21	-24.84	-24.45
23.470	42.62	37.78	Line	60.00	50.00	-17.38	-12.22
23.466	39.28	36.44	Neutral	60.00	50.00	-20.72	-13.56

Note: NF = No Significant Peak was Found.

Adapter Model: RD1200500-C55-8MG

FCC Part 15 Paragraph 15.207							
Frequency (MHz)	Emission (dBuV)		LINE/NEUTRAL	Limit (dBuV)		Margin (dB)	
	QP	AV		QP	AV	QP	AV
0.158	42.87	31.68	Line	65.57	55.57	-22.70	-23.89
0.178	40.41	32.38	Neutral	64.58	54.58	-24.17	-22.20
0.326	41.72	35.46	Line	59.55	49.55	-17.83	-14.09
0.326	45.81	44.03	Neutral	59.55	49.55	-13.74	-5.52
0.358	43.51	36.67	Line	58.77	48.77	-15.26	-12.10
0.358	45.22	43.21	Neutral	58.77	48.77	-13.55	-5.56

Note: NF = No Significant Peak was Found.

### Note:

- 1.Uncertainty in conducted emission measured is <+/- 2dB.
- 2.The emission levels of other frequencies were very low against the limit.
- 3.All Reading Levels are Quasi-Peak and Average value.
- 4.Emission = Meter Reading + Factor; Factor = Insertion Loss + Cable Loss.
- 5.Margin Value = Emission Level - Limit Value.



**Conducted Emission**

**EN55022**

EUT: 4 Port ADSL2+ 11n 150Mbps Router

M/N: SR310N

Manufacturer: SHANGHAI CHONGZHENG ELECTRONICS TECHNOLOGY CO.,LTD

Operating Condition: Transmitter

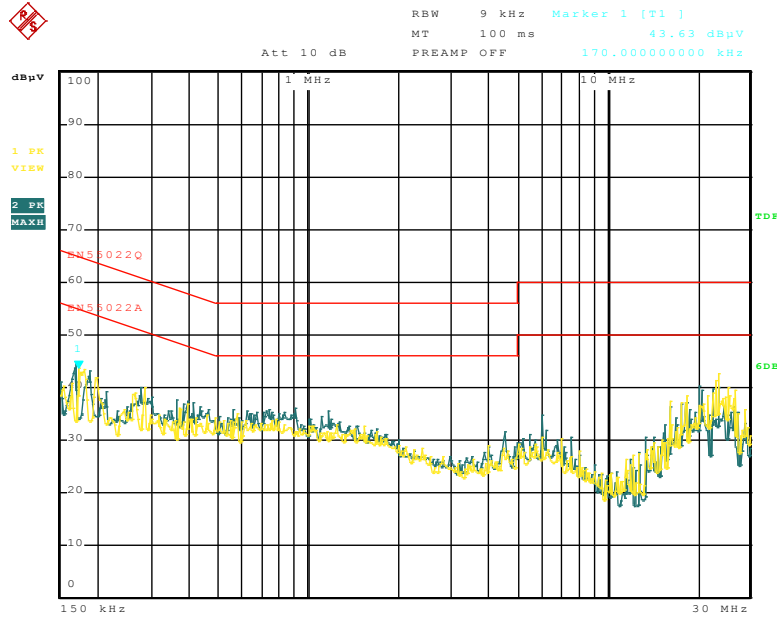
Test Site: Normal

Operator: Eric

Test Specification: LINE&NEUTRAL

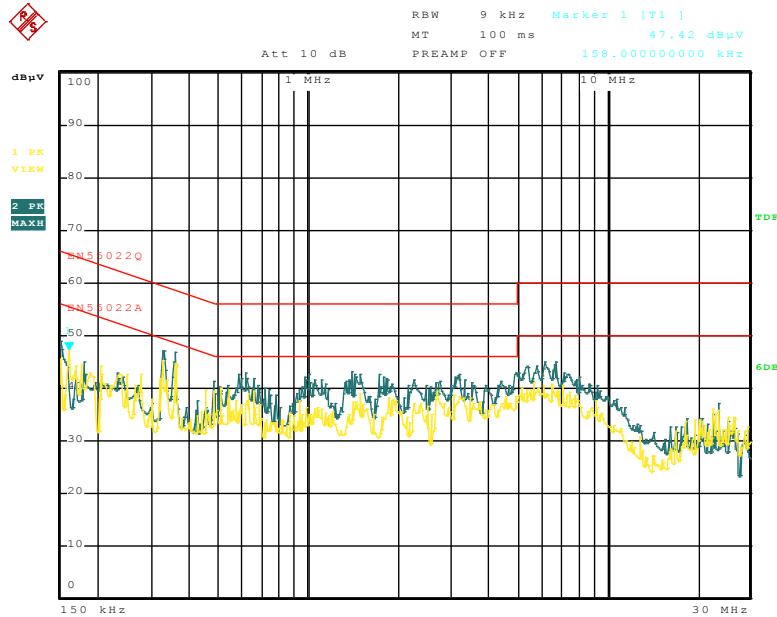
Comment:

Adapter Model: DY600-120005100



Date: 31.AUG.2012 16:06:39

Adapter Model: RD1200500-C55-8MG



Date: 31.AUG.2012 16:13:11

## 5. Radiated Emission Test

### 5.1 Test Equipment

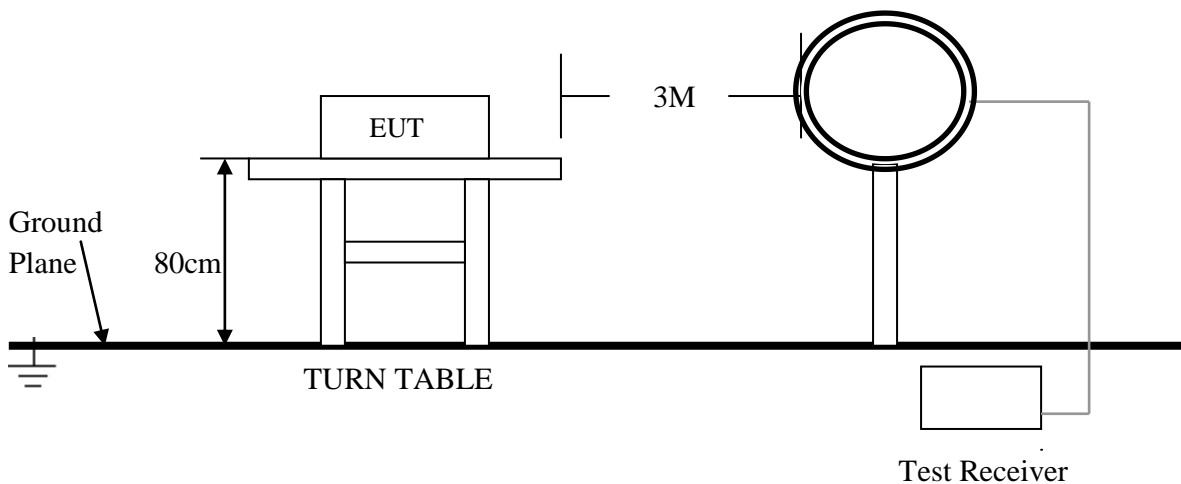
Please refer to Section 8 this report.

### 5.2 Test Procedure

1. The EUT was tested according to ANSI C63.4 - 2003.
2. The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.4-2003.
3. The frequency spectrum from 9 kHz to 25 GHz was investigated. All readings from 9 kHz to 150 kHz are quasi-peak values with a resolution bandwidth of 200 Hz. All readings from 150 kHz to 30 MHz are quasi-peak values with a resolution bandwidth of 9 KHz. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 KHz. All readings are above 1 GHz , peak values with a resolution bandwidth of 1 MHz . Measurements were made at 3 meters.
4. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. The Receiving antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency. Emissions below 30MHz were measured with a loop antenna while emission above 30MHz were measured using a broadband E-field antenna.
5. Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a "QP" in the data table.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 8 and 13 of ANSI C63.4 - 2003.

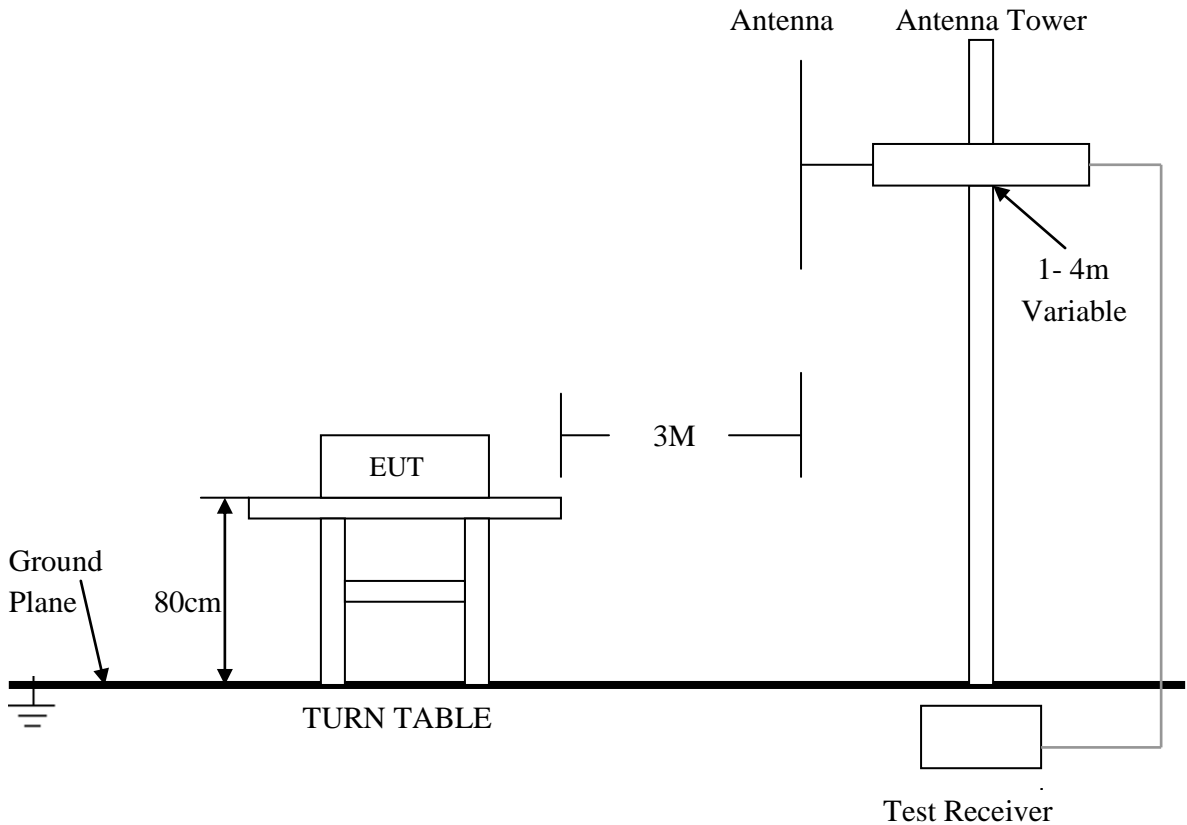
### 5.3 Radiated Test Setup

For Frequencies below 30 MHz



**For the actual test configuration , please refer to the related items – Photos of Testing**

**For Frequencies above 30 MHz**



**For the actual test configuration , please refer to the related items – Photos of Testing**

**5. 4 Configuration of The EUT**

Same as section 4.4 of this report

**5. 5 EUT Operating Condition**

Same as section 4.5 of this report

**5. 6 Radiated Emission Limit**

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

Frequencies in restricted band are complied to limit on Paragraph 15.109.

Frequency (MHz)	Distance (m)	Field Strength (dBuV/m)
30 - 88	3	40.0
88 - 216	3	43.5
216 - 960	3	46.0
Above 960	3	54.0

**Note:**

1. In the emission tables above, the tighter limit applies at the band edges.
2. Distance refers to the distance between measuring instrument, antenna, and the closest point of any part of the device or system.
3. The lower limit shall apply at the transition frequencies.

### 5.7 Radiated Emission Test Result

Product	: 4 Port ADSL2+ 11n 150Mbps Router	Test Mode	: Normal Link / Auto
Test Item	: Fundamental Radiated Emission Data	Temperature	: 25 °C
Test Voltage	: DC 12V(by DC Adapter )	Humidity	: 56%RH
Test Result	: <b>PASS</b>	Model	:

**For Frequency Below 30MHz - Data Transfer**

*Adapter Model: DY600-120005100*

Freq. (MHz)	Emission (dBuV/m) QP Detector	HORIZ / VERT	Limits (dBuV/m)	Margin (dB)
N/A	N/A	N/A	N/A	N/A

*Adapter Model: RD1200500-C55-8MG*

Freq. (MHz)	Emission (dBuV/m) QP Detector	HORIZ / VERT	Limits (dBuV/m)	Margin (dB)
N/A	N/A	N/A	N/A	N/A

- Note:**
- (1) All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
  - (2) "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
  - (3) Emission Level = Reading Level + Probe Factor + Cable Loss.

**For Frequency Above 30MHz - Data Transfer**

*Adapter Model: DY600-120005100*

Freq. (MHz)	Emission (dBuV/m) QP Detector	HORIZ / VERT	Limits (dBuV/m)	Margin (dB)
291.280	27.07	HORZ	46.0	-18.93
291.560	28.65	VERT	46.0	-17.35
420.000	42.41	HORZ	46.0	-3.59
420.000	38.48	VERT	46.0	-7.52
700.000	34.42	HORZ	46.0	-11.58
834.640	28.67	VERT	46.0	-17.33

*Adapter Model: RD1200500-C55-8MG*

Freq. (MHz)	Emission (dBuV/m) QP Detector	HORIZ / VERT	Limits (dBuV/m)	Margin (dB)
152.120	32.46	HORZ	43.5	-11.04
151.800	33.28	VERT	43.5	-10.22
334.840	26.37	HORZ	46.0	-19.63
289.520	26.75	VERT	46.0	-19.25
420.000	42.18	HORZ	46.0	-3.82
420.000	40.12	VERT	46.0	-5.88

- Note:**
- (1) All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
  - (2) Emission Level = Reading Level + Probe Factor + Cable Loss.

## 6. Photo of Testing

### 6.1 Emission test view

Conducted emission test view



Radiated Emission test view



## 6.2 Photograph - EUT

EUT top view



EUT bottom view



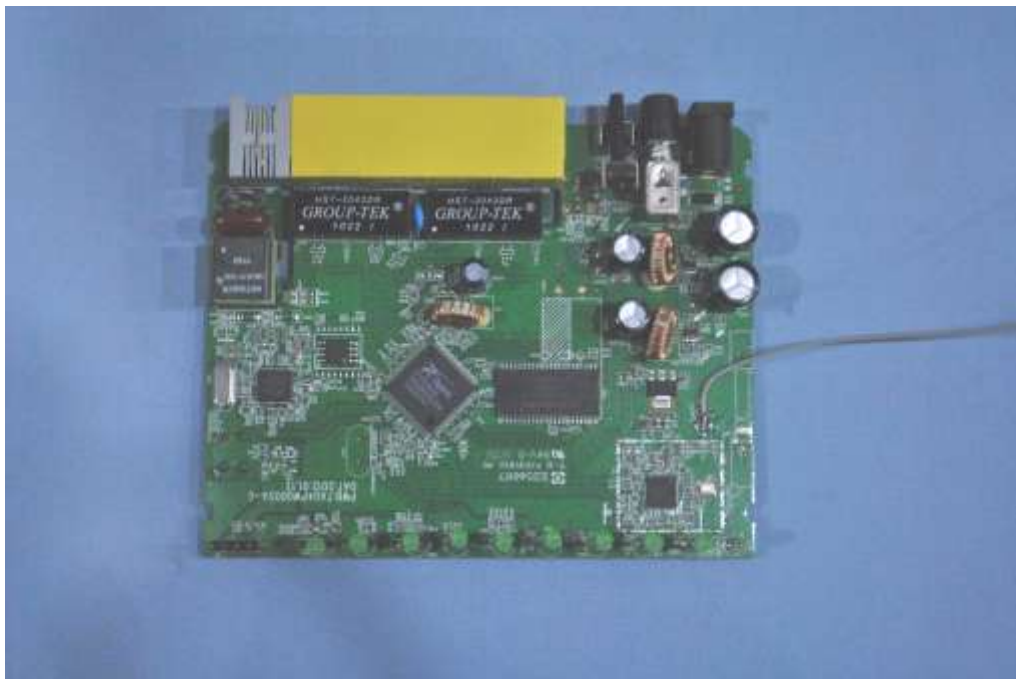




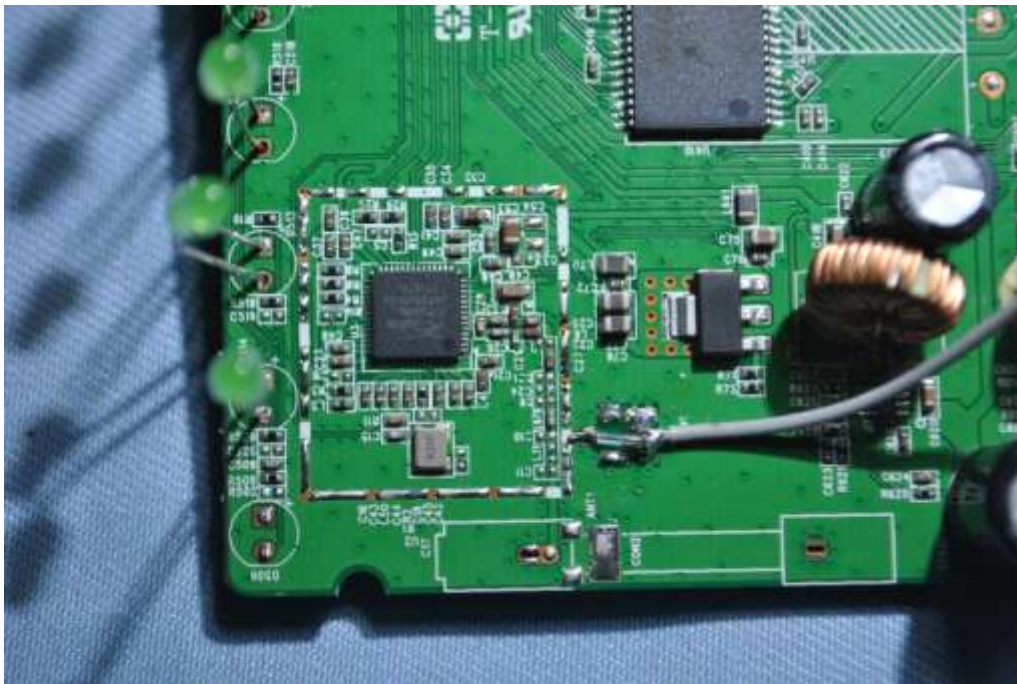
EUT inside whole view



Main & RF board component side



RF module



Crystal



Main & RF board solder side



Adapter model: DY600-120005100

Adapter top view



Adapter side view



Adapter inside whole view



Adapter model: RD1200500-C55-8MG

Adapter top view



Adapter side view





Adapter inside whole view



## 7. FCC ID Label

FCC ID: VW7SR310N

**This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.**

The Label must not be a stick-on paper label. The Label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

### Proposed Label Location on EUT

EUT Bottom View/Proposed FCC ID Label Location



## 8. Test Equipment

The following test equipments were used during the radiated & conducted emission test:

Equipment/ Facilities	Manufacturer	Model #	Serial No.	Due Date
Turntable	SinTek	N/A	N/A	NCR
Antenna Tower	SinTek	N/A	N/A	NCR
OATS	SinTek	N/A	N/A	Sep.28, 2013
Bilog Antenna	SCHAFFNER	CBL6111C	2775	June 12, 2013
Pre-Amplifier	HP	8449B	3008B00965	June 12, 2013
Horn Antenna	EMCO	3115	9602-4659	June 12, 2013
Horn Antenna	Rohde & Schwarz	AT4560	SB3435/03	May 4, 2013
EMI Test Receiver	Rohde & Schwarz	ESPI7	100013	June 01, 2013
Spectrum Analyzer	Rohde & Schwarz	FSP40	100273	May 27, 2013
Power Meter	Rohde & Schwarz	NRP	KMO-SZ300	May 27, 2013
Signal Generator	FLUKE	PM5418+Y/C	LO747012	May 27, 2013
Loop Antenna	Rohde & Schwarz	HFH2-Z2	872096/16	Jan. 30, 2013
Trilog-Super Broadband Antenna	SCHWARZBECK	VULB9161	9161-4079	Sep.18, 2013
Trilog-Super Broadband Antenna	SCHWARZBECK	VULB9161	9161-4080	Sep.18, 2013
Broad-Band Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-564	Sep.18, 2013
Broad-Band Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-565	Sep.18, 2013
AMN	Rohde & Schwarz	ESH3-Z5	100197	May 27, 2013
Pulse Limiter	SCHWARZBECK	VTSD 9561-F	9604	Nov.29, 2012
ISN	SCHWARZBECK	NTFM 8158 CAT3	CAT 3 8158-0010	Nov.19, 2012
ISN	SCHWARZBECK	NTFM 8158 CAT5	CAT 5 8158-0009	Nov.19, 2012
ISN	SCHWARZBECK	NTFM 8158 CAT6	CAT 6 8158-0012	Nov.19, 2012
KMO Shielded Room	KMO	KMO-001	N/A	N/A
Coaxial Cable with N-Connectors	SCHWARZBECK	AK9515H	95549	Sep.18, 2013
SOHO Telephone Switching System	IKE	2000-108C	N/A	NCR
3m Anechoic Chamber	KMO	KMO-3AC	KMO-3AC-1	May 29, 2013
Temperature Chamber	TABAI	PSL-4GTW	N/A	Feb.10, 2013