



# Test Report

Product Name	Link Box
Model No	200-30250
FCC ID.	DoC

Applicant	NEXCOM International Co., LTD
Address	15F, No.920, Chung-Cheng Rd., Zhonghe Dist., New Taipei City 235, Taiwan.

Date of Receipt	Sep. 16, 2011
Issue Date	Oct. 25, 2011
Report No.	119320R-RFUSP24V02
Report Version	V1.0

The test results relate only to the samples tested.  
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# Test Report Certification

Issue Date: Oct. 25, 2011

Report No.: 119320R-RFUSP24V02



Accredited by NIST (NVLAP)  
NVLAP Lab Code: 200533-0

Product Name	Link Box
Applicant	NEXCOM International Co., LTD
Address	15F, No.920, Chung-Cheng Rd., Zhonghe Dist., New Taipei City 235, Taiwan.
Manufacturer	NEXCOM International Co., LTD
Model No.	200-30250
FCC ID.	DoC
EUT Rated Voltage	DC 12V
EUT Test Voltage	AC 120V/60Hz
Trade Name	LAERDAL
Applicable Standard	FCC CFR Title 47 Part 15 Subpart B: 2010 ANSI C63.4: 2009
Test Result	Complied



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## TABLE OF CONTENTS

Description	Page
<b>1. GENERAL INFORMATION .....</b>	<b>4</b>
1.1. EUT Description.....	4
1.2. Tested System Details.....	6
1.3. Configuration of Tested System .....	7
1.4. EUT Exercise Software .....	7
1.5. Test Facility .....	8
<b>2. Conducted Emission.....</b>	<b>9</b>
2.1. Test Equipment.....	9
2.2. Test Setup .....	9
2.3. Limits .....	10
2.4. Test Procedure .....	10
2.5. Uncertainty .....	10
2.6. Test Result of Conducted Emission.....	11
<b>3. Radiated Emission.....</b>	<b>13</b>
3.1. Test Equipment.....	13
3.2. Test Setup .....	14
3.3. Limits .....	15
3.4. Test Procedure .....	15
3.5. Uncertainty .....	16
3.6. Test Result of Radiated Emission.....	17
<b>4. EMI Reduction Method During Compliance Testing .....</b>	<b>21</b>
Attachment 1: EUT Test Photographs	
Attachment 2: EUT Detailed Photographs	

## 1. GENERAL INFORMATION

### 1.1. EUT Description

Product Name	Link Box
Trade Name	LAERDAL
Model No.	200-30250
FCC ID.	DoC
Frequency Range	2412-2462MHz for 802.11b/g
Number of Channels	802.11b/g: 11
Data Speed	802.11b: 1-11Mbps, 802.11g: 6-54Mbps
Type of Modulation	802.11b:DSSS (DBPSK, DQPSK, CCK) 802.11g:OFDM (BPSK, QPSK, 16QAM, 64QAM)
Antenna Type	PIFA
Antenna Gain	Refer to the table "Antenna List"
Channel Control	Auto
Power Adapter	MFR: FSP, M/N: FSP040-DGAA1 Input: AC 100-240V~1.3A, 50-60Hz Output: DC 12.0V, 3.33A MAX (40W MAX) Cable Out: Non-shielded, 1.5m, with one ferrite core bonded.

#### Antenna List

No.	Manufacturer	Model No.	Peak Gain
1	SpeedTech	DPLP12R-00001-H	1.82 dBi for 2.4GHz

Note: The antenna of EUT is conform to FCC 15.203.

## 802.11b/g Center Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 01:	2412 MHz	Channel 02:	2417 MHz	Channel 03:	2422 MHz	Channel 04:	2427 MHz
Channel 05:	2432 MHz	Channel 06:	2437 MHz	Channel 07:	2442 MHz	Channel 08:	2447 MHz
Channel 09:	2452 MHz	Channel 10:	2457 MHz	Channel 11:	2462 MHz		

## Note:

1. The EUT is a Link Box with a built-in 2.4GHz WLAN transceiver.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. These tests are conducted on a sample for demonstrating the compliance of 802.11b/g and receiver with Part 15 Subpart B.
4. Part 15 Subpart C compliance for spread spectrum devices is shown on the report no. 119320R-RFUSP42V01 and certified under FCC ID: YHI-V10001.

Test Mode:	Mode 1: Receive (802.11g 6Mbps)
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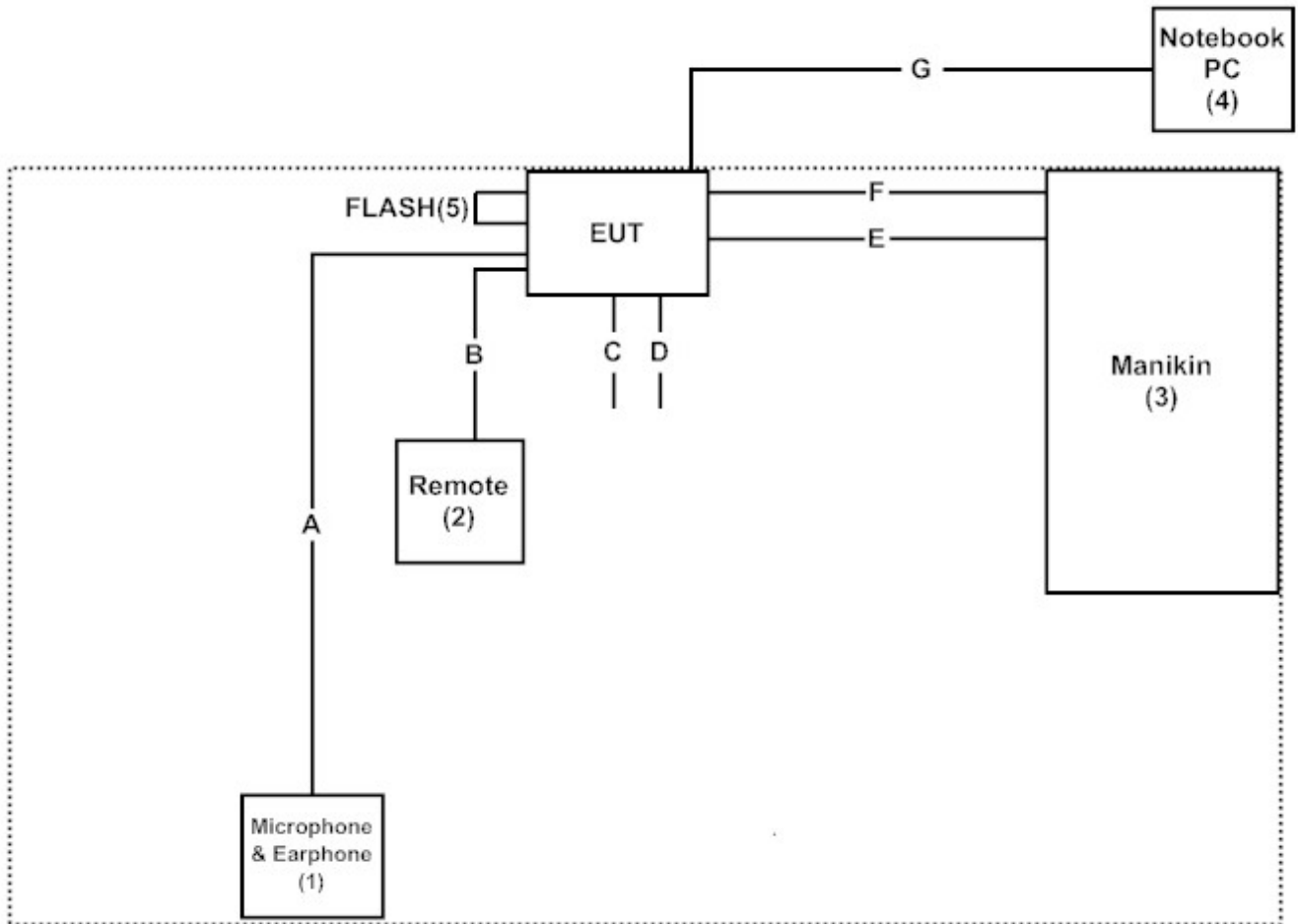
## 1.2. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.	Serial No.	FCC ID	Power Cord
1 Microphone & Earphone	Lobos	LB-EW020	N/A	DoC	N/A
2 Remote	NEXCOM	N/A	N/A	DoC	N/A
3 Manikin	NEXCOM	N/A	N/A	DoC	N/A
4 Notebook PC	DELL	PPT	N/A	DoC	N/A
5 FLASH 1GB	Pqi	U172P	BB55-B1G6R C084000200281	DoC	N/A

Signal Cable Type	Signal cable Description
A Microphone & Earphone Cable	Non-Shielded, 1.0m
B Remote Cable	Non-Shielded, 0.9m
C Power Cable	Non-Shielded, 0.4m
D Power Cable	Non-Shielded, 0.4m
E Pipe Cable	Non-Shielded, 3.2m
F Single Cable	Shielded, 1.0m
G LAN Cable	Non-Shielded, 5.0m

### 1.3. Configuration of Tested System



### 1.4. EUT Exercise Software

- (1) Setup the EUT as shown in section 1.3.
- (2) Execute test command on the notebook.
- (3) Configure the test mode, the test channel, and the data rate.
- (4) Start the continuous transmission.
- (5) Verify that the EUT works properly.

**1.5. Test Facility**

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from Quietek Corporation’s Web Site : <http://www.quietek.com/tw/ctg/cts/accreditations.htm>  
 The address and introduction of Quietek Corporation’s laboratories can be founded in our Web site : <http://www.quietek.com/>

Site Description: File on  
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Accreditation on NVLAP  
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## 2. Conducted Emission

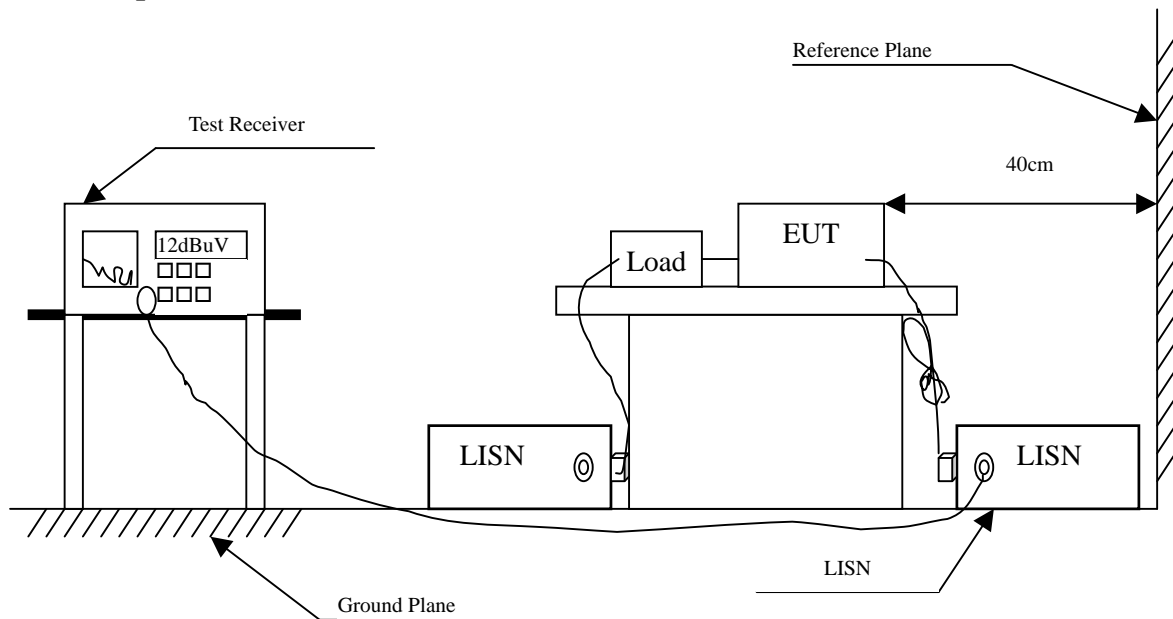
### 2.1. Test Equipment

The following test equipment are used during the conducted emission test:

Item	Instrument	Manufacturer	Type No./Serial No	Last Cal.	Remark
1	Test Receiver	R & S	ESCS 30/825442/17	May, 2011	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 2011	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 2011	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2	May, 2011	
5	No.1 Shielded Room			N/A	

Note: All instruments are calibrated every one year.

### 2.2. Test Setup



**2.3. Limits**

<b>FCC Part 15 Subpart B Paragraph 15.107 (dBuV) Limit</b>		
Frequency MHz	Limits	
	QP	AVG
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

**2.4. Test Procedure**

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2009 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

**2.5. Uncertainty**

± 2.26 dB

## 2.6. Test Result of Conducted Emission

Product : Link Box  
 Test Item : Conducted Emission Test  
 Power Line : Line 1  
 Test Mode : Mode 1: Receive (802.11g 6Mbps) (2437MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
<b>Line 1</b>					
<b>Quasi-Peak</b>					
0.166	9.724	36.460	46.184	-19.359	65.543
0.216	9.686	29.220	38.906	-25.208	64.114
0.420	9.650	31.280	40.930	-17.356	58.286
0.709	9.655	38.920	48.575	-7.425	56.000
0.912	9.688	16.240	25.928	-30.072	56.000
1.517	9.695	10.180	19.875	-36.125	56.000
<b>Average</b>					
0.166	9.724	19.470	29.194	-26.349	55.543
0.216	9.686	14.520	24.206	-29.908	54.114
0.420	9.650	19.770	29.420	-18.866	48.286
0.709	9.655	29.900	39.555	-6.445	46.000
0.912	9.688	8.830	18.518	-27.482	46.000
1.517	9.695	1.710	11.405	-34.595	46.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. "■" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Link Box  
 Test Item : Conducted Emission Test  
 Power Line : Line 2  
 Test Mode : Mode 1: Receive (802.11g 6Mbps) (2437MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
<b>Line 2</b>					
<b>Quasi-Peak</b>					
0.162	9.727	36.560	46.287	-19.370	65.657
0.205	9.694	30.240	39.934	-24.495	64.429
0.384	9.650	27.880	37.530	-21.784	59.314
0.685	9.650	37.200	46.850	-9.150	56.000
0.798	9.670	27.420	37.090	-18.910	56.000
14.427	9.953	2.120	12.073	-47.927	60.000
<b>Average</b>					
0.162	9.727	20.930	30.657	-25.000	55.657
0.205	9.694	14.250	23.944	-30.485	54.429
0.384	9.650	19.090	28.740	-20.574	49.314
0.685	9.650	27.800	37.450	-8.550	46.000
0.798	9.670	18.350	28.020	-17.980	46.000
14.427	9.953	-2.650	7.303	-42.697	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. "█" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

### 3. Radiated Emission

#### 3.1. Test Equipment

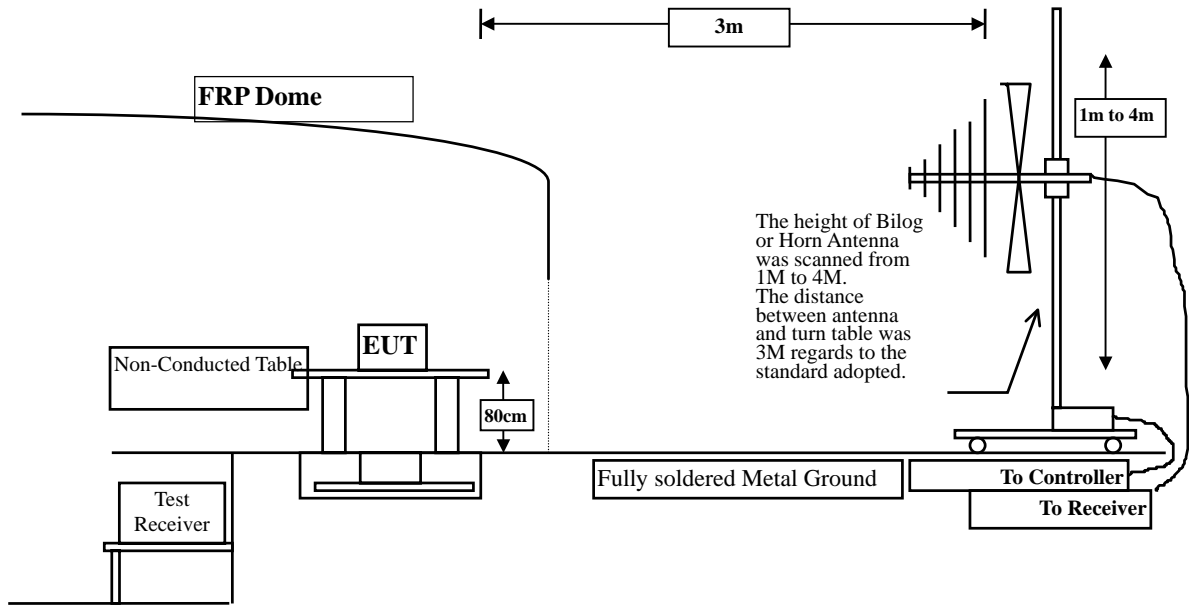
The following test equipment are used during the radiated emission test:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ Site # 3	X	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2011
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2011
	X	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2011
	X	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2011
	X	Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2011
	X	Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/ 925975	Mar, 2011
	X	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2011
	X	Spectrum Analyzer	Advantest	R3162/91700283	Oct., 2011
	X	Coaxial Cable	Quietek	QTK-CABLE/ CAB5	Feb., 2011
	X	Controller	Quietek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

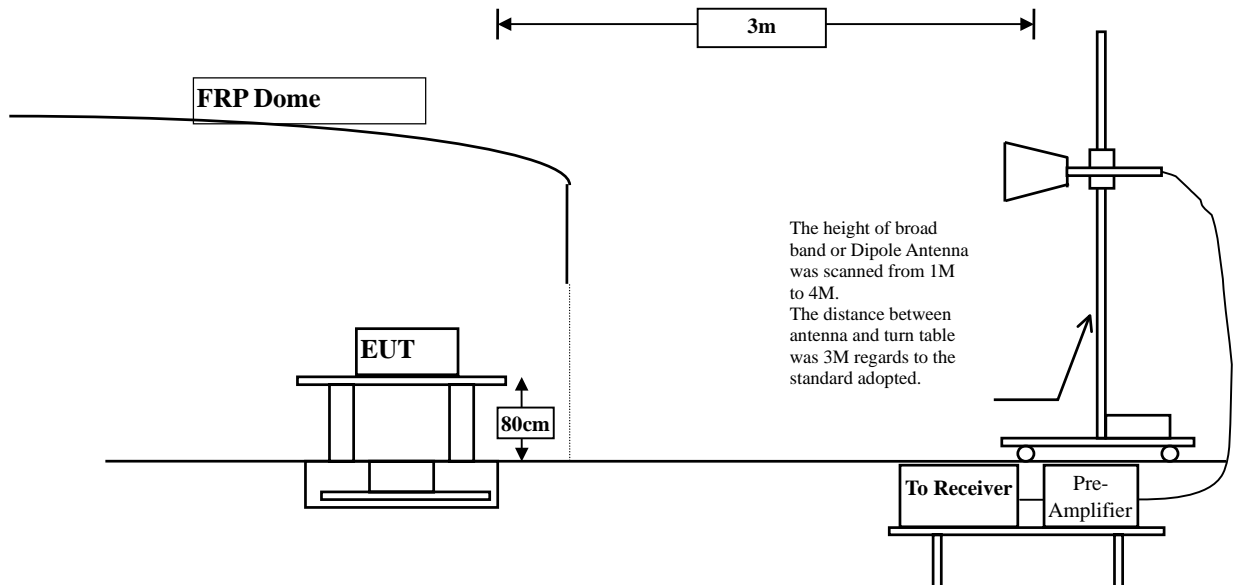
- Note:
1. All instruments are calibrated every one year.
  2. The test instruments marked by "X" are used to measure the final test results.

### 3.2. Test Setup

Below 1GHz



Above 1GHz



### 3.3. Limits

<b>FCC Part 15 Subpart B Paragraph 15.109 Limits</b>		
Frequency MHz	uV/m @3m	dBuV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

- Remarks :
1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
  2. In the Above Table, the tighter limit applies at the band edges.
  3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

### 3.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4:2009 on radiated measurement.

The resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

Radiated emission measurements below 1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The worst radiated emission is measured in the Open Area Test Site on the Final Measurement.

The frequency range from 30MHz to 10th harmonics is checked.

### 3.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz



### 3.6. Test Result of Radiated Emission

Product : Link Box  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Receive (802.11g 6Mbps) (2412MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
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#### Horizontal

##### Peak Detector:

2412.000	-4.644	42.510	37.867	-36.133	74.000
4824.000	0.246	42.010	42.257	-31.743	74.000
7236.000	7.359	39.630	46.989	-27.011	74.000

##### Average Detector:

--

#### Vertical

##### Peak Detector:

2412.000	-6.167	42.080	35.914	-38.086	74.000
4824.000	0.654	41.450	42.105	-31.895	74.000
7236.000	7.858	38.970	46.828	-27.172	74.000

##### Average Detector:

--

#### Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Link Box  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Receive (802.11g 6Mbps) (2437 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
2437.000	-4.637	42.150	37.513	-36.487	74.000
4874.000	-0.058	40.990	40.933	-33.067	74.000
7311.000	7.672	38.590	46.262	-27.738	74.000
<b>Average Detector:</b>					
--					
<b>Vertical</b>					
<b>Peak Detector:</b>					
2437.000	-6.106	42.390	36.284	-37.716	74.000
4874.000	0.398	41.510	41.908	-32.092	74.000
7311.000	8.249	38.810	47.059	-26.941	74.000

**Average Detector:**

--

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Link Box  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Receive (802.11g 6Mbps) (2462 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
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**Horizontal**
**Peak Detector:**

4924.000	0.063	41.720	41.783	-32.217	74.000
7386.000	8.504	39.820	48.325	-25.675	74.000
9848.000	8.156	40.260	48.416	-25.584	74.000

**Average Detector:**

--

**Vertical**
**Peak Detector:**

4924.000	0.677	41.420	42.097	-31.903	74.000
7386.000	9.311	38.530	47.841	-26.159	74.000
9848.000	8.993	39.040	48.032	-25.968	74.000

**Average Detector:**

--

**Note:**

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Link Box  
 Test Item : General Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Receive (802.11g 6Mbps) (2437 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
249.220	-6.014	47.807	41.793	-4.207	46.000
375.320	-1.209	42.581	41.372	-4.628	46.000
499.480	0.048	40.289	40.337	-5.663	46.000
625.580	1.770	35.368	37.138	-8.862	46.000
792.420	5.209	31.889	37.098	-8.902	46.000
1000.000	9.119	41.969	51.088	-2.912	54.000
<b>Vertical</b>					
64.920	-5.683	41.721	36.038	-3.962	40.000
249.220	-7.634	50.382	42.748	-3.252	46.000
375.320	-2.029	42.942	40.913	-5.087	46.000
499.480	-0.852	41.758	40.906	-5.094	46.000
815.700	3.221	34.681	37.902	-8.098	46.000
1000.000	4.329	42.373	46.702	-7.298	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

#### **4. EMI Reduction Method During Compliance Testing**

No modification was made during testing.