



**FCC 47 CFR PART 15 SUBPART C  
ANSI C63.4: 2003**

**TEST REPORT**

**For**

**Z-WAVE LIGHT-RELAY**

**Model: ZL7201**

**Trade Name: N/A**

Issued to

Vision Automobile Electronics Industrial Co., Ltd.  
No. 17, Alley 92, Lane 189, Sec. 1, An Chung Road, Tainan, Taiwan

Issued by

**Compliance Certification Services Inc.  
Tainan Lab.**

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**Issued Date: June 29, 2012**



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**REVISION HISTORY**

Rev.		Issue Date		Revisions	Effect Page	Revised By
00		June 28, 2011		Initial Issue	ALL	Daphne Liang
01		June 26, 2012		Update test procedure&data	P22, P25-26	Daphne Liang
02		June 29, 2012		Update test procedure	P15, P22	Daphne Liang



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## 1. TEST RESULT CERTIFICATION

**Product:** Z-WAVE LIGHT-RELAY

**Model:** ZL7201

**Brand Name:** N/A

**Applicant:** Vision Automobile Electronics Industrial Co., Ltd.

No. 17, Alley 92, Lane 189, Sec. 1, An Chung Road, Tainan, Taiwan

**Manufacturer:** Vision Automobile Electronics Industrial Co., Ltd.

No. 17, Alley 92, Lane 189, Sec. 1, An Chung Road, Tainan, Taiwan

**Tested:** May 11, 2011 ~ June 15, 2011

### APPLICABLE STANDARDS

STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart C ANSI C63.4 : 2003	No non-compliance noted

### We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4: 2003 and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements emission limits of FCC Rules Part 15.107, 15.109, 15.207, 15.209 and 15.249.

The test results of this report relate only to the tested sample identified in this report.

Approved by:

**Jeter Wu**

Assistant Manager

Reviewed by:

**Eric Huang**

Assistant Section Manager



## 2. EUT DESCRIPTION

<b>Product</b>	Z-WAVE LIGHT-RELAY
<b>Model Number</b>	ZL7201
<b>Brand Name</b>	N/A
<b>Received Date</b>	May 10, 2011
<b>Operating Frequency</b>	908.42MHz ± 20KHz
<b>Data Rate</b>	9.6 kbps , 40kbps
<b>Number of Channels</b>	1 Channel
<b>Type of Modulation</b>	FSK
<b>Power Supply</b>	Powered from AC source, 120V/60Hz
<b>Antenna Type</b>	Wire antenna Gain: -10 dBm
<b>Temperature Range</b>	-15°C ~ +60°C

**Remark:**

1. Client consigns only one model sample to test (Model Number: **ZL7201**). Therefore, the testing Lab. just guarantees the unit, which has been tested.
2. This submittal(s) (test report) is intended for FCC ID: **KFR-ZL7201US** filing to comply with Section 15.107 & 15.109 (FCC Part 15, Subpart B) and Section 15.207, 15.209, 15.249.



### 3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 15.207, 15.209 and 15.249.

#### 3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

#### 3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.107 and 15.109 under the FCC Rules Part 15 Subpart B and Section 15.207, 15.209, 15.249 under the FCC Rules Part 15 Subpart C.

#### 3.3 GENERAL TEST PROCEDURES

##### Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

##### Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4.



### 3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41	322 - 335.4		

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

### 3.5 DESCRIPTION OF TEST MODES

The EUT( **Model: ZL7201** ) had been tested under engineering test mode condition and the EUT staying in continuous transmitting mode.

Note :

1)The field strength of spurious emission was measured in the following position:

EUT have three test modes(X, Y, Z axis). The worst emission was found in X axis and the worst case was recorded.

1) EUT has supported two data rates (9.6kbps , 40kbps) which have been investigated during the test, and found the 40kbps as the worst case recorded.



## 4. INSTRUMENT CALIBRATION

### 4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

### 4.2 MEASUREMENT EQUIPMENT USED

#### Equipment Used for Emissions Measurement

Open Area Test Site # 6				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
TYPE N COAXIAL CABLE	SUHNER	CHA9513	6	NOV. 17, 2011
BI-LOG Antenna	Sunol	JB1	A070506-2	OCT. 4, 2011
LOOP ANTENNA	EMCO	6502	8905-2356	JUN. 10, 2011
Pre-Amplifier	HP	8447F	2944A03817	NOV. 23, 2011
EMI Receiver	R&S	ESVS10	833206/012	MAY 10, 2012
RF Cable	SUHNER	SUCOFLEX104PEA	20520/4PEA	NOV. 10, 2011
Horn Antenna	Com-Power	AH-118	071032	DEC. 27, 2011
Spectrum Analyzer	R&S	FSEK 30	835253/002	JUL. 14, 2011
Pre-Amplifier	MITEQ	AFS44-00108650-42-10P-44	1205908	NOV. 23, 2011
Turn Table	Yo Chen	001	-----	N.C.R.
Antenna Tower	AR	TP1000A	309874	N.C.R.
Controller	CT	SC101	-----	N.C.R.
RF Switch	E-INSTRUMENT TELH LTD	ERS-180A	EC1204141	N.C.R
Test S/W	e-3 (5.04303e)			

**Remark:** Each piece of equipment is scheduled for calibration once a year.



### 4.3 MEASUREMENT UNCERTAINTY

Parameter	Uncertainty
Radiated Emission, 30 to 200 MHz Test Site : OATS-6	$\pm 3.38\text{dB}$
Radiated Emission, 200 to 1000 MHz Test Site : OATS-6	$\pm 3.04\text{dB}$
Radiated Emission, 1 to 26.5 GHz	$\pm 2.38 \text{ dB}$
Power Line Conducted Emission	$\pm 2.01\text{dB}$
Band Width	136.49kHz
Peak Output Power MU	$\pm 1.904\text{dB}$
Band Edge MU	$\pm 0.302\text{dBuV}$
Channel Separation MU	361.69Hz
Duty Cycle MU	0.064ms
Frequency Stability MU	0.223kHz

Uncertainty figures are valid to a confidence level of 95%, k=2



## **5. FACILITIES AND ACCREDITATIONS**

### **5.1 FACILITIES**

All measurement facilities used to collect the measurement data are located at

No.8, Jiucengling, Xinhua Dist., Tainan City 712, Taiwan (R.O.C.)

The sites are constructed in conformance with the requirements of ANSI C63.7:1992, ANSI C63.4 : 2003 and CISPR Publication 22.

### **5.2 EQUIPMENT**

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

### **5.3 TABLE OF ACCREDITATIONS AND LISTINGS**

The test facilities used to perform radiated and conducted emissions tests are accredited by Taiwan Accreditation Foundation for the specific scope of accreditation under Lab Code: 1109 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by TAF or any agency of the Government. In addition, the test facilities are listed with Federal Communications Commission (registration no: TW-1037).



## 5.1 TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements	 TW-1037
Taiwan	TAF	CISPR 11, FCC METHOD-47 CFR Part 18, EN 55011, EN 60601-1-2, CISPR 22, CNS 13438, EN 55022, EN 55024, AS/NZS CISPR 22 CISPR 14, EN 55014-1, EN 55014-2, CNS 13783-1, CISPR 22, CNS 13439, EN 55013, FCC Method-47 CFR Part 15 Subpart B, IC ICES-003, VCCI V-3 & V-4 FCC Method-47 CFR Part 15 Subpart C and ANSI C63.4, LP 0002 EN / IEC 61000-4-2 / -3 / -4 / -5 / -6 / -8 / -11 EN 61000-3-2, EN 61000-3-3 EN 61000-6-3, EN 61000-6-1, AS/NZS 4251.1, EN 61000-6-4, EN 61000-6-2, AS/NZS 4251.2, EN 61204-3, EN 50130-4, EN 62040-2, EN 50371, EN 50385, AS/NZS 4268, ETSI EN 300 386 ETSI EN 300 328, ETSI EN 301 489-1/-3/-9/-17 ETSI EN 301 893, ETSI EN 300 220-2/-1 ETSI EN 300 440-2/-1 ETSI EN 301 357-2/-1 RSS-310, RSS-210 Issue 8, RSS-Gen Issue 3	  Testing Laboratory 1109
Taiwan	BSMI	CNS 13438, CNS 13783-1, CNS13439	 SL2-IN-E-0039 SL2-R1/R2-0039 SL2-A1-E-0039
Canada	Industry Canada	RSS210, Issue 8	

\* No part of this report may be used to claim or imply product endorsement by TAF or any agency of the US Government.



## 6. SETUP OF EQUIPMENT UNDER TEST

### 6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix I for the actual connections between EUT and support equipment.

### 6.2 SUPPORT EQUIPMENT

No.	Product	Manufacturer	Model No.	Certify No.	Signal cable
1	N/A	-----	-----	-----	-----

No.	Signal cable description
A	N/A

#### Remark:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.



## 7. FCC PART 15.249 REQUIREMENTS

### 7.1 20 DB BANDWIDTH

#### LIMIT

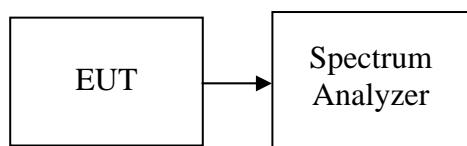
None; for reporting purposes only.

#### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
SPECTRUM ANALYZER	R&S	FSEK 30	835253/002	JUL. 14, 2011

**Remark:** Each piece of equipment is scheduled for calibration once a year.

#### Test Configuration



#### TEST PROCEDURE

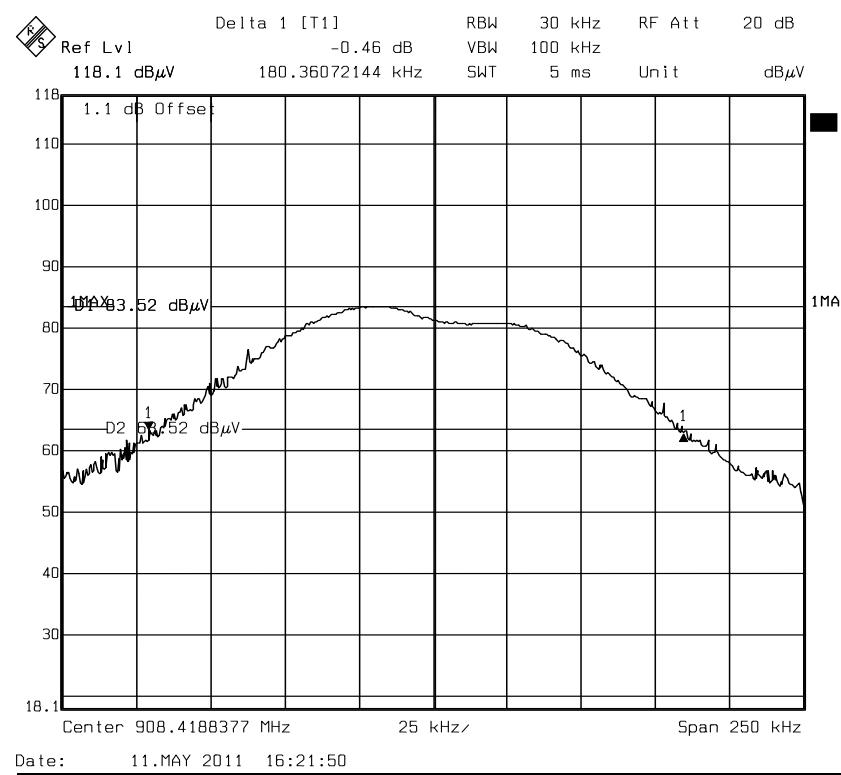
The transmitter output is connected to the spectrum analyzer. The spectrum analyzer center frequency is set to the transmitter frequency. The RBW is set to 10 kHz and VBW is set 30kHz.

#### TEST RESULTS

No non-compliance noted.

#### Test Data

Frequency (MHz)	20dB Bandwidth (KHz)
908.4188377	180.36

**Test Plot**

## 7.2 BAND EDGES MEASUREMENT

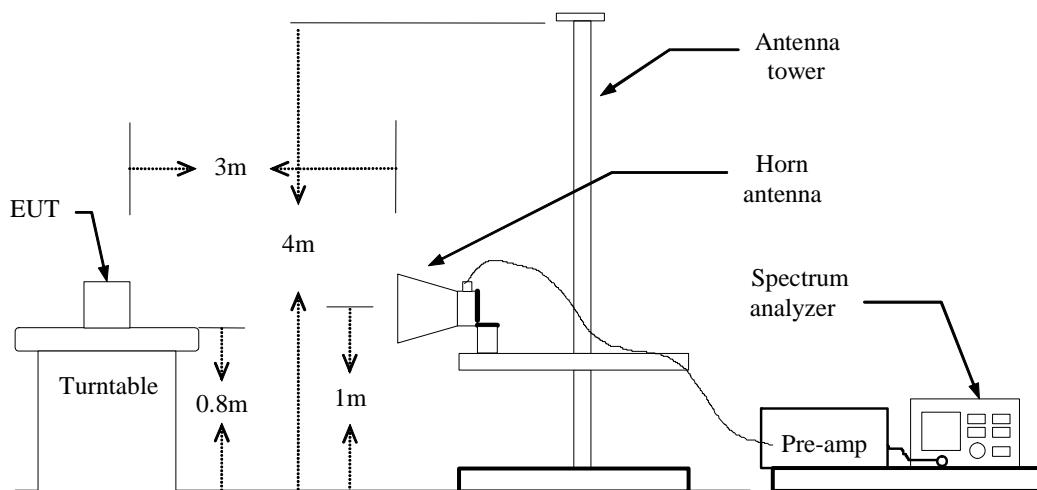
### LIMIT

1. In the above emission table, the tighter limit applies at the band edges.

Frequency (MHz)	Field Strength ( $\mu\text{V/m}$ at 3-meter)	Field Strength ( $\text{dB}\mu\text{V/m}$ at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

2. As shown in Section 15.35(b), for frequencies above 1000 MHz, the above field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

### Test Configuration

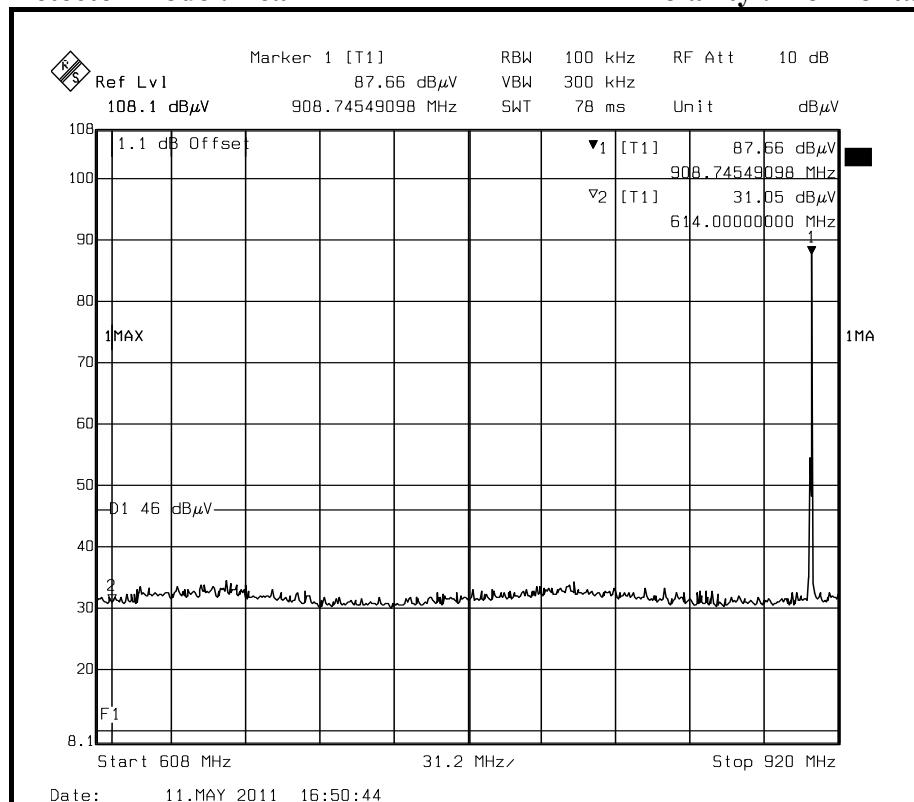
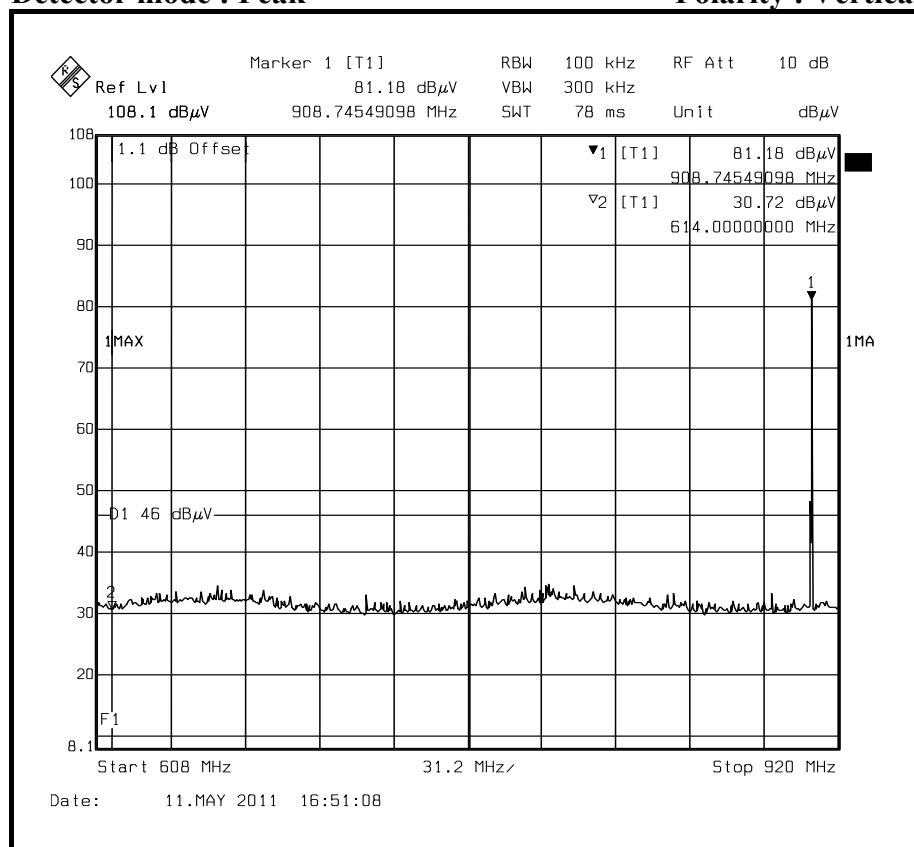


### TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
  - (a) PEAK: RBW=100kHz / VBW=300kHz

### TEST RESULTS

Refer to attach spectrum analyzer data chart.

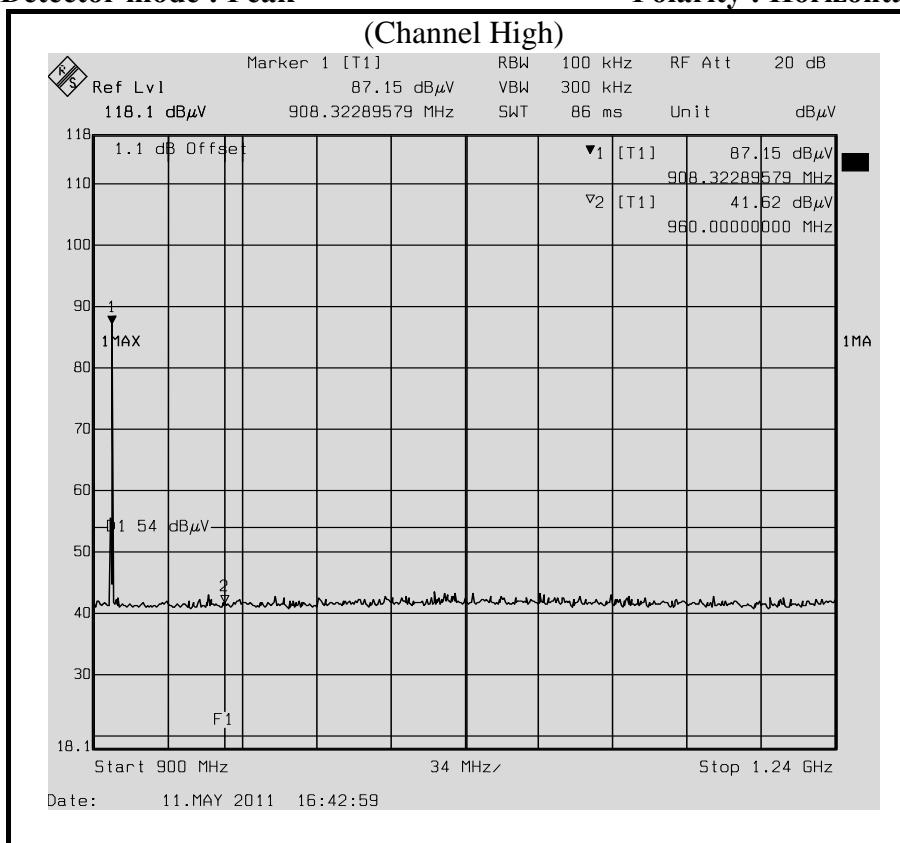
**Low Band Edges****Detector mode : Peak****Polarity : Horizontal****Detector mode : Peak****Polarity : Vertical**



## High Band Edges

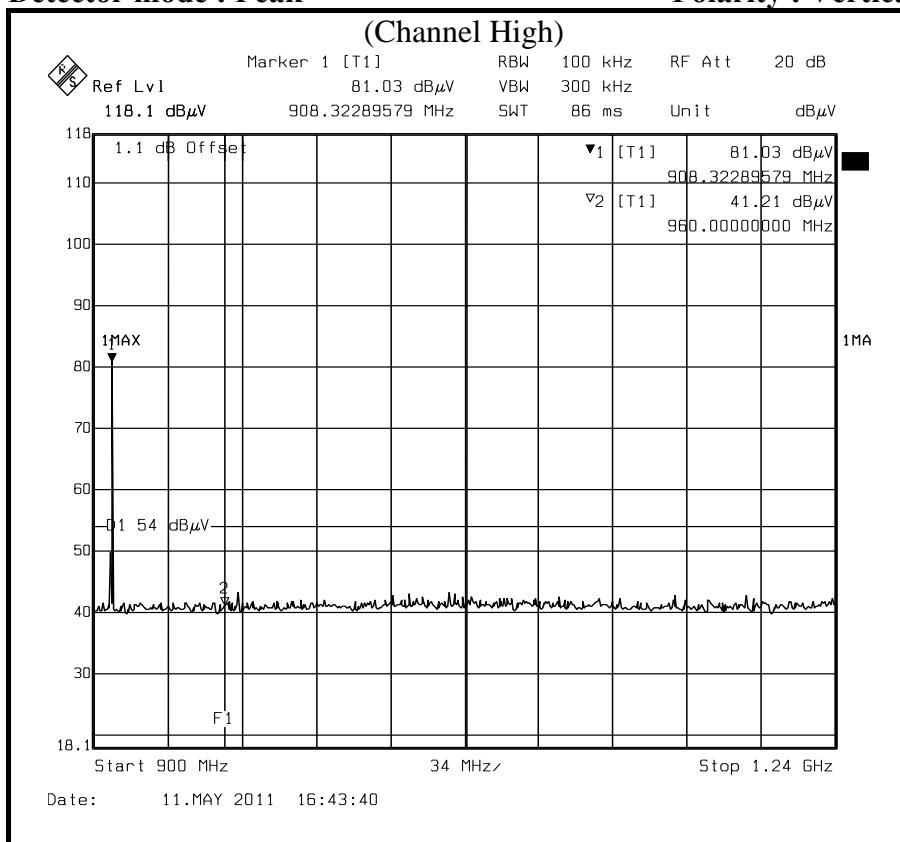
Detector mode : Peak

Polarity : Horizontal



Detector mode : Peak

Polarity : Vertical





## 7.3 SPURIOUS EMISSION

### LIMIT

1. In the section 15.249(a):

Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental Field Strength (mV/m)	Field Strength of Harmonics (μV/m)
902-928 MHz	50	500
2400 - 2483.5 MHz	50	500
5725 - 5875 MHz	50	500
24.0 - 24.25 GHz	250	2500

2. Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

**Remark:** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

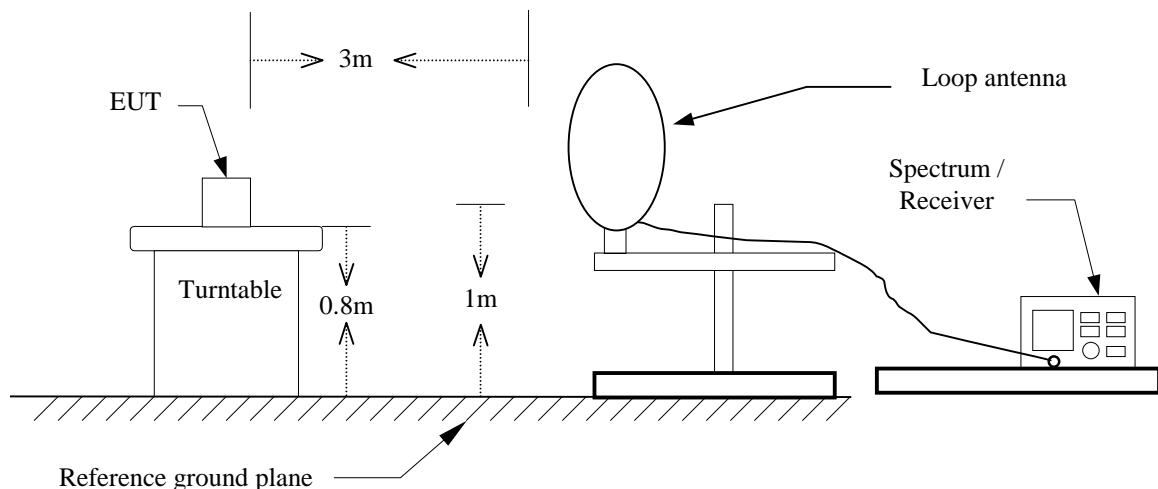
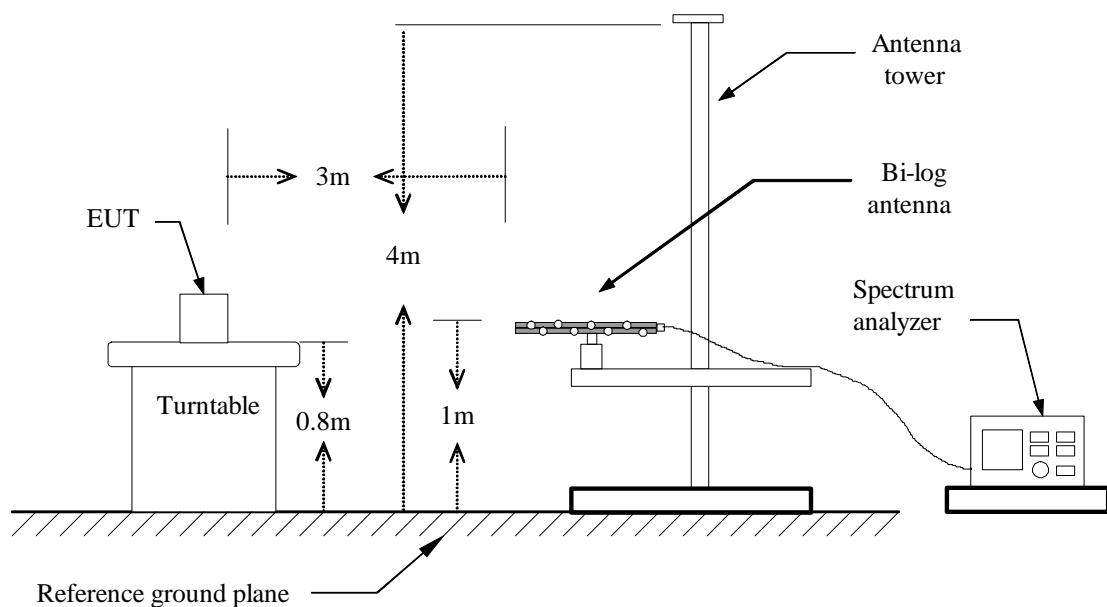
3. In the above emission table, the tighter limit applies at the band edges.

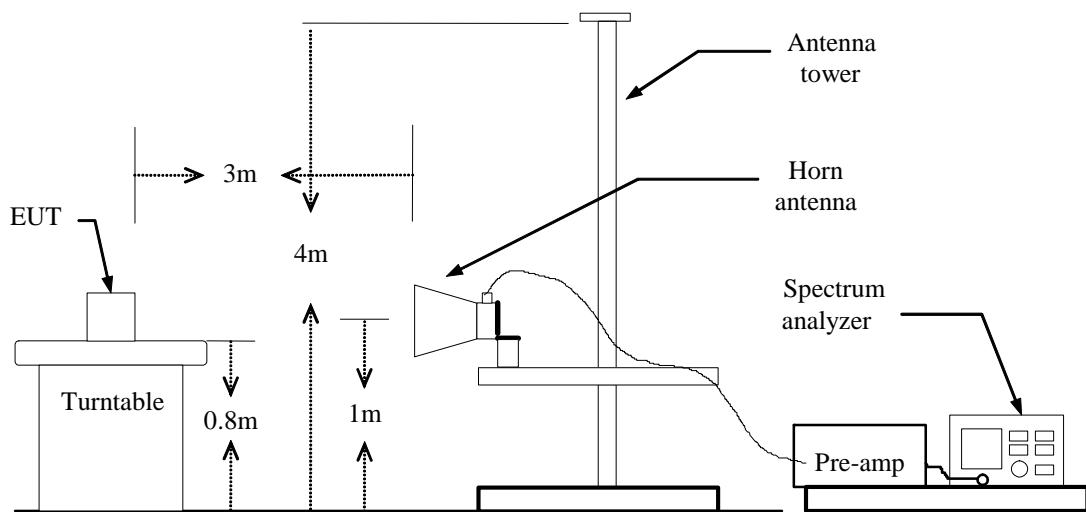
Frequency (MHz)	Field Strength (μV/m at 3-meter)	Field Strength (dBμV/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

**MEASUREMENT EQUIPMENT USED**

<b>Open Area Test Site # 6</b>				
<b>Name of Equipment</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration Due</b>
TYPE N COAXIAL CABLE	SUHNER	CHA9513	6	NOV. 17, 2011
BI-LOG Antenna	Sunol	JB1	A070506-2	OCT. 4, 2011
LOOP ANTENNA	EMCO	6502	8905-2356	JUN. 10, 2011
Pre-Amplifier	HP	8447F	2944A03817	NOV. 23, 2011
EMI Receiver	R&S	ESVS10	833206/012	MAY 10, 2012
RF Cable	SUHNER	SUCOFLEX104PEA	20520/4PEA	NOV. 10, 2011
Horn Antenna	Com-Power	AH-118	071032	DEC. 27, 2011
Spectrum Analyzer	R&S	FSEK 30	835253/002	JUL. 14, 2011
Pre-Amplifier	MITEQ	AFS44-00108650-42-10P-44	1205908	NOV. 23, 2011
Turn Table	Yo Chen	001	-----	N.C.R.
Antenna Tower	AR	TP1000A	309874	N.C.R.
Controller	CT	SC101	-----	N.C.R.
RF Swicth	E-INSTRUMENT TELH LTD	ERS-180A	EC1204141	N.C.R
Test S/W		e-3 (5.04303e)		

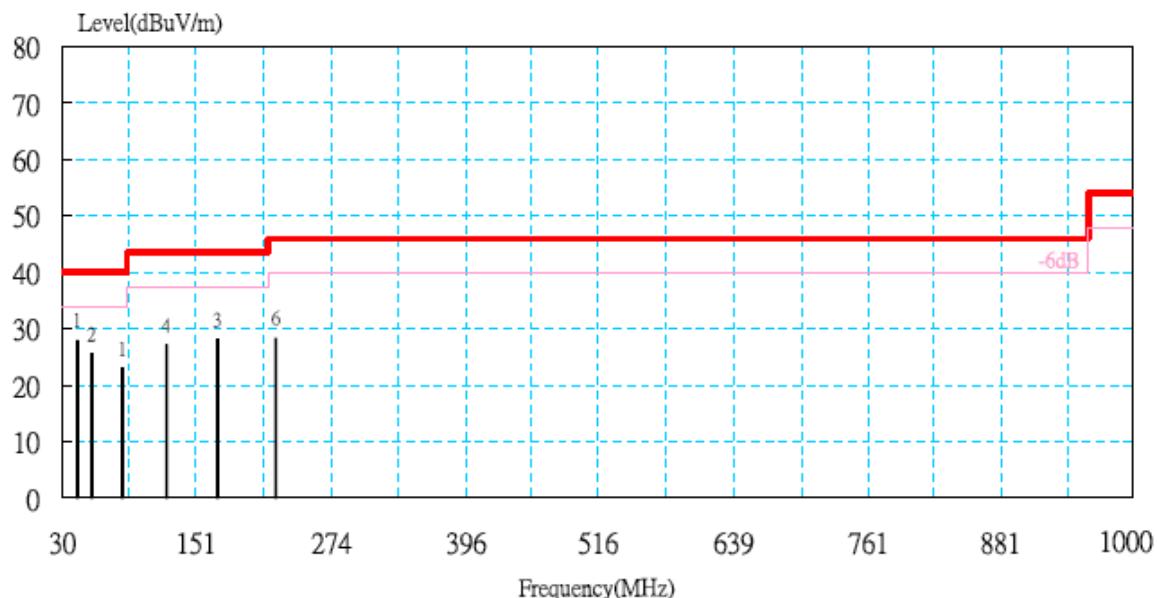
**Remark:** Each piece of equipment is scheduled for calibration once a year.

**Test Configuration****9kHz ~ 30MHz****30MHz ~ 1GHz**

**Above 1 GHz**

**TEST PROCEDURE**

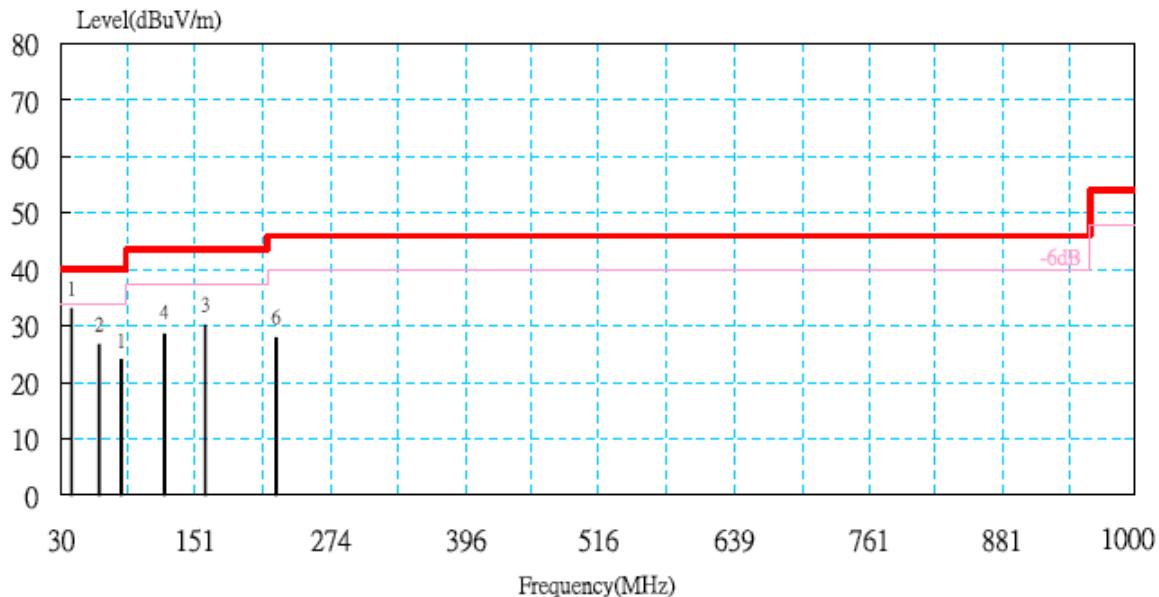
1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:  
Below 1GHz:
  - (a) PEAK: RBW=100kHz / VBW=300kHz / Sweep=AUTOAbove 1GHz:
  - (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
  - (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
7. Repeat above procedures until the measurements for all frequencies are complete.

**Below 1 GHz****Operation Mode:** ZL7201**Test Date:** May 13, 2011**Temperature:** 28.6°C**Tested by:** John Chen**Humidity:** 61% RH**Polarity:** Ver. / Hor.**Horizontal**

No.	Freq-Uency (MHz)	Meter Reading at 3 m Level (dB $\mu$ V)	Antenna Factor (dB/m)	Cable Loss (dB)	Emission at 3 m Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Mode
								PK/QP
1	43.32	9.90	16.89	1.08	27.87	40.00	-12.13	QP
2	56.63	12.30	12.05	1.17	25.53	40.00	-14.47	QP
3	84.20	13.30	8.16	1.46	22.92	40.00	-17.08	QP
4	124.96	12.80	12.40	1.83	27.03	43.50	-16.47	QP
5	170.77	13.20	12.62	2.22	28.04	43.50	-15.46	QP
6	223.45	12.70	12.87	2.70	28.27	46.00	-17.73	QP

**Remark:**

1. No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.
3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " 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.
5. Margin (dB) = Remark result (dB $\mu$ V/m) – Quasi-peak limit (dB $\mu$ V/m).

**Operation Mode:** ZL7201**Temperature:** 28.6°C**Humidity:** 61% RH**Test Date:** May 13, 2011**Tested by:** John Chen**Polarity:** Ver. / Hor.Vertical

No.	Freq-Uency (MHz)	Meter Reading at 3 m Level (dB $\mu$ V)	Antenna Factor (dB/m)	Cable Loss (dB)	Emission at 3 m Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Mode
								PK/QP
1	39.52	13.60	18.42	1.06	33.07	40.00	-6.93	QP
2	64.52	15.50	9.93	1.24	26.67	40.00	-13.33	QP
3	84.75	14.30	8.19	1.47	23.96	40.00	-16.04	QP
4	123.25	14.90	11.79	1.79	28.48	43.50	-15.02	QP
5	160.36	14.60	13.30	2.19	30.09	43.50	-13.41	QP
6	224.98	12.30	12.84	2.71	27.86	46.00	-18.14	QP

**Remark:**

1. No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.
3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " 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.
5. Margin (dB) = Remark result (dB $\mu$ V/m) – Quasi-peak limit (dB $\mu$ V/m).

**Above 1 GHz**

EUT has supported two data rates (9.6kbps , 40kbps ) which have been investigated during the test, and found the 40kbps as the worst case recorded.

**Operation Mode:** ZL7201**Test Date:** March 13, 2011**Temperature:** 28.7°C**Tested by:** John Chen**Humidity:** 58% RH**Polarity:** Ver. / Hor.**Horizontal**

<b>Freq.</b> (MHz)	<b>Reading</b> (dB $\mu$ V)	<b>AF</b> (dB/m)	<b>Cable Loss</b> (dB)	<b>Pre-amp</b> (dB)	<b>Filter</b> (dB)	<b>Level</b> (dB $\mu$ V/m)	<b>Limit</b> (dB $\mu$ V/m)	<b>Margin</b> (dB)	<b>Mark</b> (P/Q/A)	
908.40	86.69	22.78	4.52	26.18	0.00	87.81	114.00	-26.19	P	
1816.82	63.41	29.27	2.23	41.70	0.95	54.16	74.00	-19.84	P	
1816.82	59.61	29.27	2.23	41.70	0.95	50.36	54.00	-3.64	A	
2725.04	55.74	30.24	2.38	42.07	1.40	47.69	74.00	-26.31	P	
*	2725.04	50.02	30.24	2.38	42.07	1.40	41.97	54.00	-12.03	A
*	3633.62	54.78	30.97	3.26	42.92	0.82	46.90	74.00	-27.10	P
*	3633.62	42.37	30.97	3.26	42.92	0.82	34.49	54.00	-19.51	A
*	N/A	---	---	---	---	---	---	---	---	

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ 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.
6. Margin (dB) = Remark result (dB $\mu$ V/m) – Average limit (dB $\mu$ V/m). Peak detector mode and average detector mode of the emission shown in Result column.

**Operation Mode:** ZL7201**Test Date:** March 13, 2011**Temperature:** 28.7°C**Tested by:** John Chen**Humidity:** 58% RH**Polarity:** Ver. / Hor.

Vertical

Freq. (MHz)	Reading (dB $\mu$ V)	AF (dB/m)	Cable Loss (dB)	Pre-amp (dB)	Filter (dB)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Mark	
908.40	80.33	22.78	4.52	26.18	0.00	81.45	114.00	-32.55	P	
1816.79	63.21	29.27	2.23	41.70	0.95	53.96	74.00	-20.04	P	
1816.79	58.38	29.27	2.23	41.70	0.95	49.13	54.00	-4.87	A	
2725.05	56.38	30.24	2.38	42.07	1.40	48.33	74.00	-25.67	P	
*	2725.05	50.59	30.24	2.38	42.07	1.40	42.54	54.00	-11.46	A
*	3633.59	53.41	30.97	3.26	42.92	0.82	45.53	74.00	-28.47	P
*	3633.59	41.82	30.97	3.26	42.92	0.82	33.94	54.00	-20.06	A
*	N/A	---	---	---	---	---	---	---	---	

**Remark:**

7. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
8. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
9. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
10. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
11. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ 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.
12. Margin (dB) = Remark result (dB $\mu$ V/m) – Average limit (dB $\mu$ V/m). Peak detector mode and average detector mode of the emission shown in Result column.



## 7.4 POWERLINE CONDUCTED EMISSIONS

### LIMIT

According to §15.207(a), except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Limits (dB $\mu$ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

### MEASUREMENT EQUIPMENT USED

Conducted Emission room #1				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
L.I.S.N.	SCHWARZBECK	NNLK 8121	8121-308	MAR. 09, 2012
TEST RECEIVER	Rohde & Schwarz	ESCS 30	100348	JUL. 13, 2011
BNC COAXIAL CABLE	CCS	BNC50	11	OCT. 04, 2011
Test S/W		e-3 (5.04211c) R&S (2.27)		

**Remark:** Each piece of equipment is scheduled for calibration once a year.

### Test Configuration

See test photographs attached in Appendix I for the actual connections between EUT and support equipment.



## **TEST PROCEDURE**

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

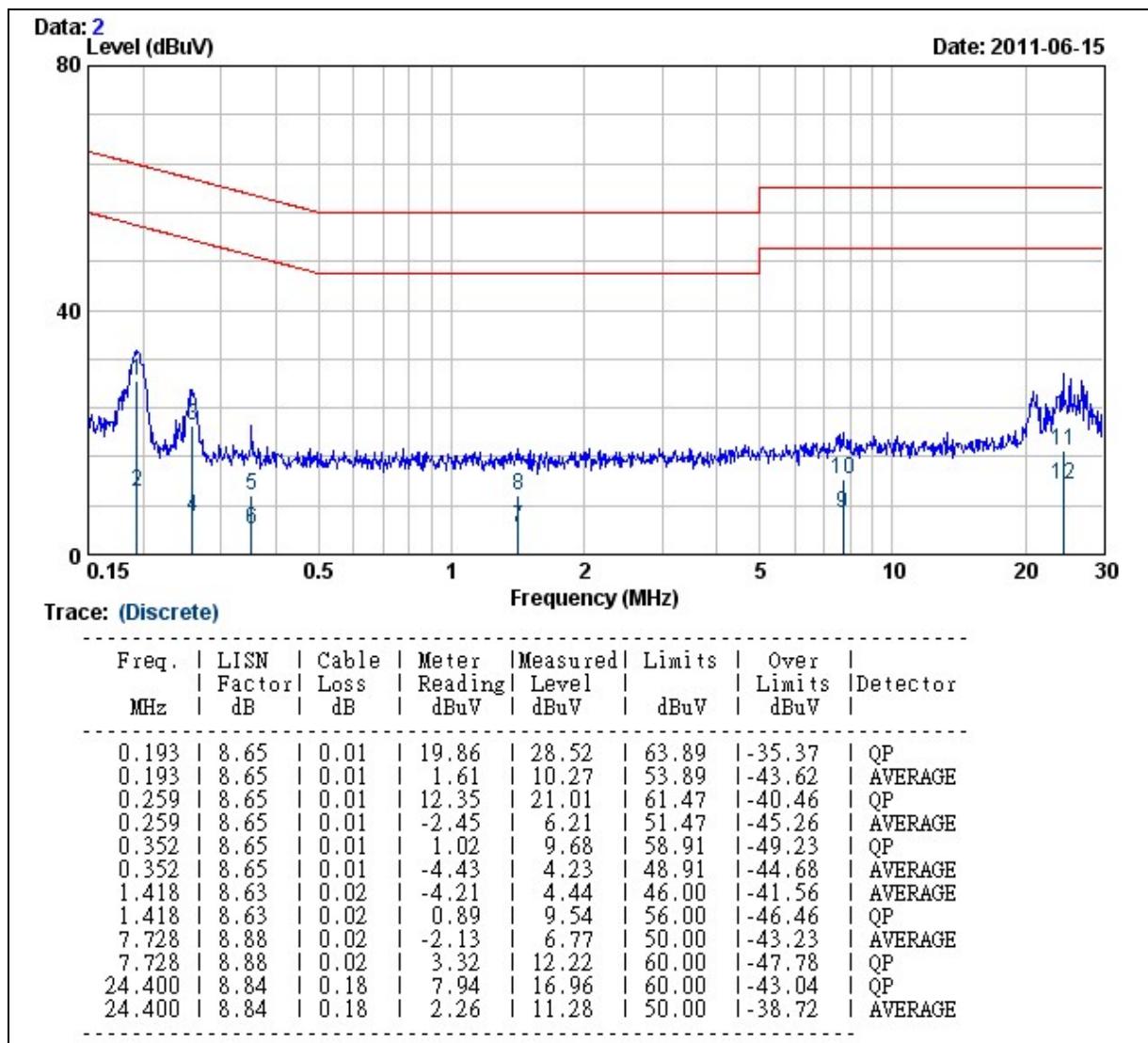
## **TEST RESULTS**

No non-compliance noted.

**CONDUCTED RF VOLTAGE MEASUREMENT**

<b>Product Name</b>	Z-WAVE LIGHT-RELAY	<b>Test Date</b>	2011/06/15
<b>Model</b>	ZL7201	<b>Test By</b>	Shiang Su
<b>Test Mode</b>	Normal operating / worst case	<b>TEMP&amp; Humidity</b>	23°C, 63%

LINE

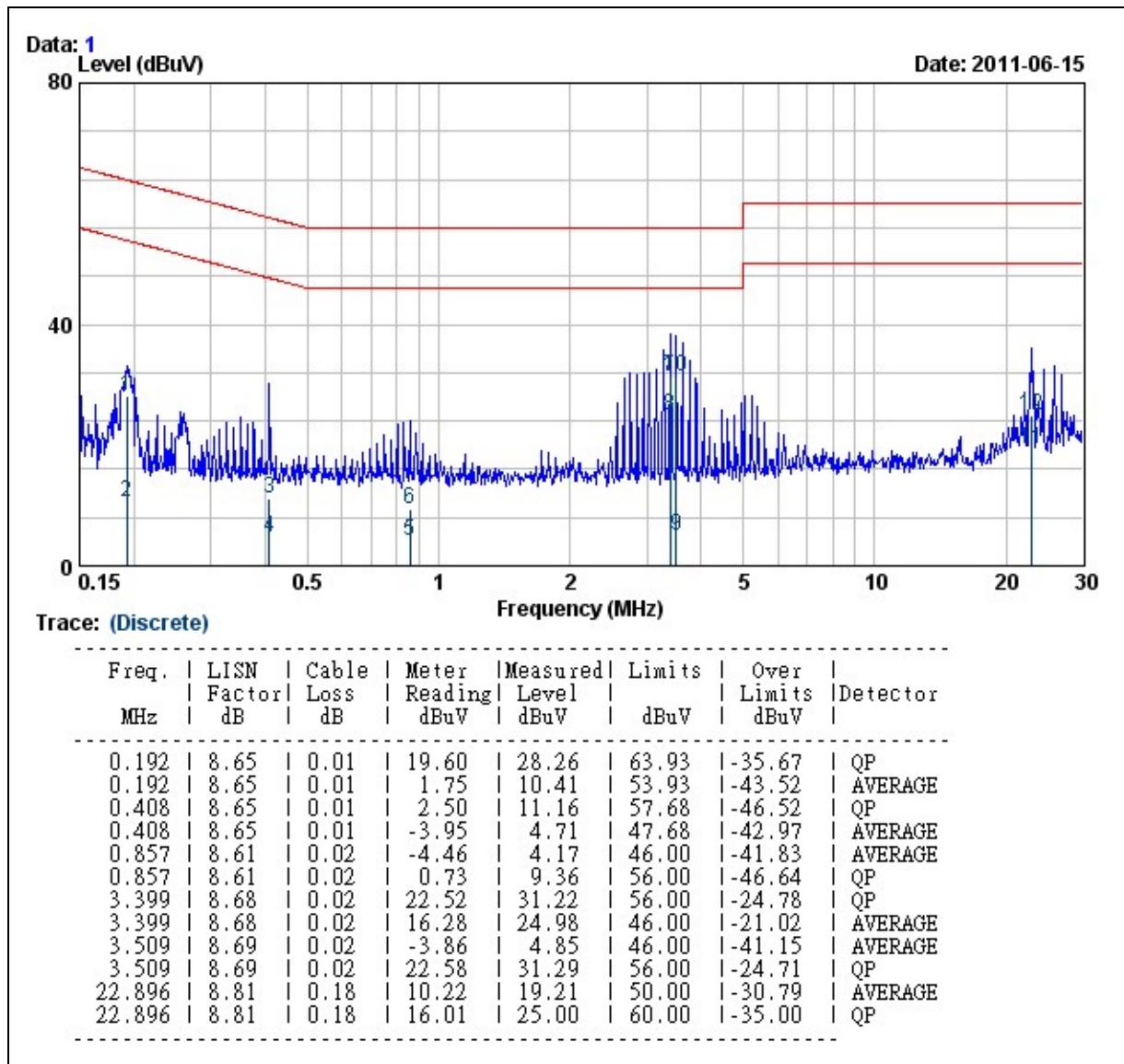
**REMARK:**

1. Correction Factor = Insertion loss + cable loss
2. Margin value = Emission level – Limit value



<b>Product Name</b>	Z-WAVE LIGHT-RELAY	<b>Test Date</b>	2011/06/15
<b>Model</b>	ZL7201	<b>Test By</b>	Shiang Su
<b>Test Mode</b>	Normal operating / worst case	<b>TEMP&amp; Humidity</b>	23°C, 63%

## NEUTRAL



## REMARK:

1. Correction Factor = Insertion loss + cable loss
2. Margin value = Emission level – Limit value