

FCC PART 15.249

TEST REPORT

For

**Zhejiang Feishen Vehicle Co., LTD**

North Lake Road Hardware Science And Technology Industry Yong Kang City  
ZheJiang Province, China

**FCC ID: A6EZJFSH62832**

|  |  |
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| <b>Report Type:</b><br>Original Report | <b>Product Type:</b><br>2.4G Digital Proportional R/C System<br>(Transmitter)  |
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| <b>Report Number:</b>                  | RSZ120110802-00  |
| <b>Report Date:</b>                    | 2012-02-29   |
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\* This report contains data that are not covered by the NVLAP accreditation and are marked with an asterisk "★" (Rev.2)

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## GENERAL INFORMATION

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

The Zhejiang Feishen Vehicle Co., LTD 's product, model FSH62832 (FCC ID: A6EZJFSH62832) or the "EUT" in this report is a 2.4G Digital Proportional R/C System, which was measured approximately: 27.5 cm (L) x 19.5 cm (W) x 7.0 cm (H), rated input voltage: DC 1.5 V\*8 AA battery.

*All measurement and test data in this report was gathered from production sample serial number: 1201802 (Assigned by BACL, Shenzhen). The EUT was received on 2012-01-10.*

### Objective

This Type approval report is prepared on behalf of Zhejiang Feishen Vehicle Co., LTD in accordance with Part 2-Subpart J, and Part 15-Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.249 rules.

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

No related submittal(s)

### Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

### 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.

Additionally, Bay Area Compliance Laboratories Corp. (Shenzhen) is an ISO/IEC 17025 accredited laboratory, and is accredited by National Voluntary Laboratory Accredited Program (Lab Code 200707-0).



The current scope of accreditations can be found at <http://ts.nist.gov/Standards/scopes/2007070.htm>

## SYSTEM TEST CONFIGURATION

### Justification

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

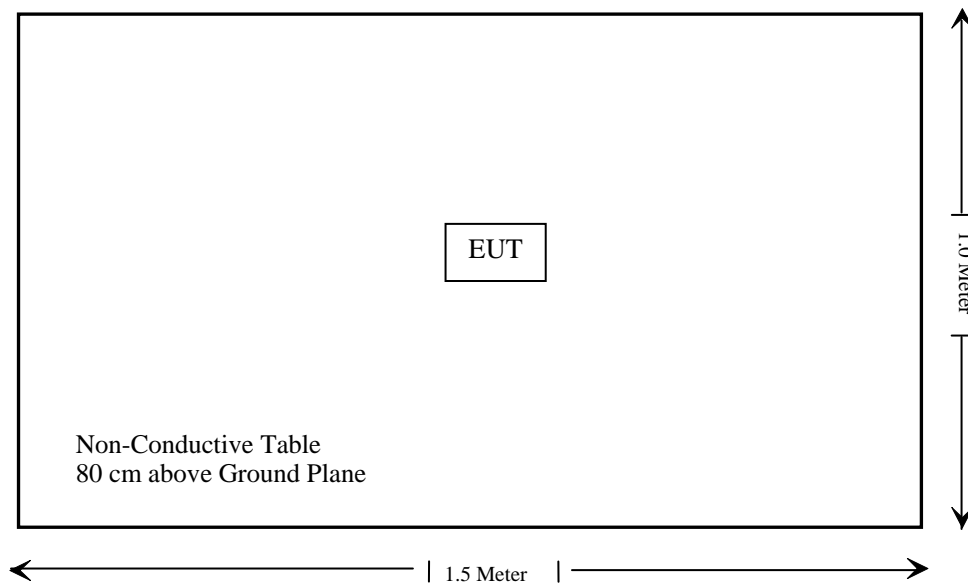
### Equipment Modifications

No modifications were made to the unit tested.

### Configuration of Test Setup



### Block Diagram of Test Setup



**SUMMARY OF TEST RESULTS**

| <b>FCC Rules</b>         | <b>Description of Test</b> | <b>Result</b> |
|--------------------------|----------------------------|---------------|
| §15.203                  | Antenna Requirement        | Compliance    |
| §15.207(a)               | Conduction Emissions       | N/A*          |
| 15.205, §15.209, §15.249 | Radiated Emissions         | Compliance    |
| §15.215(c)               | 20dB Bandwidth             | Compliance    |

Note: EUT is powered by battery only.

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## **FCC§15.203 - ANTENNA REQUIREMENT**

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### **Applicable Standard**

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used.

### **Antenna Connector Construction**

The EUT has an omni-directional antenna soldered to PCB, Antenna gain is 2 dBi, which in accordance to section 15.203 is considered sufficient to comply with the provisions of this section.

**Result:** Compliant, Please refer to the EUT photos.

## **FCC§15.205, §15.209&§15.249- RADIATED EMISSIONS**

### **Applicable Standard**

As per FCC§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:

| <b>Fundamental frequency</b> | <b>Field strength of fundamental (millivolts/meter)</b> | <b>Field strength of harmonics (microvolts/meter)</b> |
|------------------------------|---|---|
| 902–928 MHz                  | 50  | 500   |
| 2400–2483.5 MHz              | 50  | 500   |
| 5725–5875 MHz                | 50  | 500   |
| 24.0–24.25 GHz               | 250   | 2500  |

As per FCC§15.249 (c), Field strength limits are specified at a distance of 3 meters.

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

### **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 16-4-4, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Bay Area Compliance Laboratories Corp. (Shenzhen) is 4.0 dB.

### **Test Equipment Setup**

The spectrum analyzer or receiver is set as:

Below 1000MHz:

$$\text{RBW} = 100 \text{ kHz} / \text{VBW} = 300 \text{ kHz} / \text{Sweep} = \text{Auto}$$

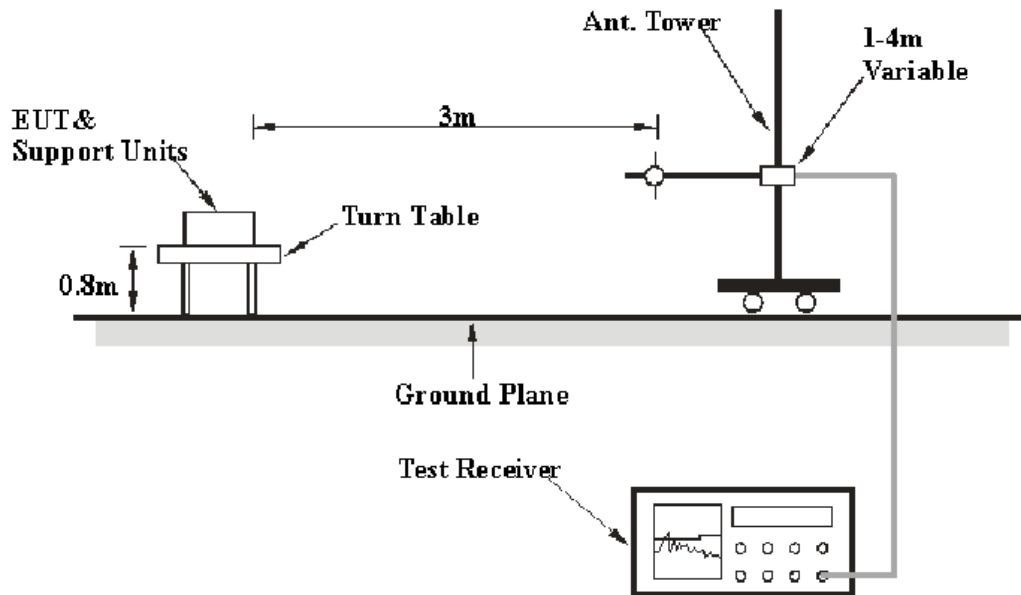
Above 1000MHz:

$$\text{Peak: RBW} = 1\text{MHz} / \text{VBW} = 1\text{MHz} / \text{Sweep} = \text{Auto}$$

$$\text{Average: RBW} = 1\text{MHz} / \text{VBW} = 10\text{Hz} / \text{Sweep} = \text{Auto}$$



## EUT Setup



The radiated emission and out of band emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2009. The specification used was the FCC 15.209/15.205 and FCC 15.249 limits.

## Test Procedure

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

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 mete, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

## Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

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 |
|-------------------|-------------------|----------|---------------|------------------|----------------------|
| HP                | Amplifier         | 8447E    | 1937A01046    | 2011-08-02       | 2012-08-01           |
| Rohde & Schwarz   | EMI Test Receiver | ESCI     | 100224        | 2011-11-11       | 2012-11-10           |
| Sunol Sciences    | Broadband Antenna | JB1      | A040904-1     | 2011-07-05       | 2012-07-04           |
| Mini-Circuits     | Amplifier         | ZVA-213+ | T-E27H        | 2011-03-08       | 2012-03-07           |
| Sunol Sciences    | Horn Antenna      | DRH-118  | A052604       | 2011-05-05       | 2012-05-04           |
| Rohde & Schwarz   | Signal Analyzer   | FSIQ 26  | 609358        | 2011-07-08       | 2012-07-07           |
| Electro-Mechanics | Horn antenna      | 3116     | 9510-2270     | 2011-10-11       | 2012-11-10           |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

## Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.209 & 15.205 & 15.249, with the worst margin reading of:

**1.40 dB at 2410.00 MHz in the Vertical polarization**

## Test Data

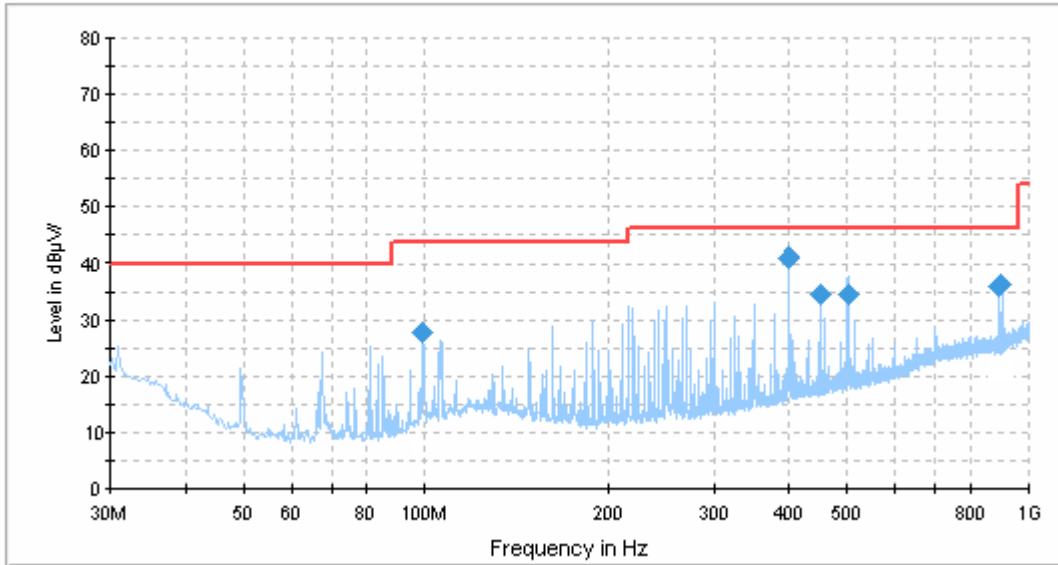
### Environmental Conditions

|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 25 °C     |
| <b>Relative Humidity:</b> | 56 %      |
| <b>ATM Pressure:</b>      | 100.2 kPa |

*The testing was performed by Henry Ding on 2012-02-08.*

Test Mode: Transmitting (worst case at low channel)

**1) 30-1000 MHz**



| Frequency (MHz) | Corrected Amplitude (dBµV/m) | Antenna Height (cm) | Antenna Polarity | Turntable Position (Degree) | Correction Factor (dB) | Limit (dBµV/m) | Margin (dB) |
|-----------------|------------------------------|---------------------|------------------|-----------------------------|------------------------|----------------|-------------|
| 400.040250      | 41.0                         | 134.0               | V                | 240.0                       | -10.0                  | 46.0           | 5.0         |
| 905.014250      | 35.3                         | 170.0               | H                | 64.0                        | -0.6                   | 46.0           | 10.7        |
| 898.372250      | 34.9                         | 205.0               | H                | 112.0                       | -0.9                   | 46.0           | 11.1        |
| 500.149500      | 34.8                         | 100.0               | V                | 244.0                       | -8.4                   | 46.0           | 11.2        |
| 450.106500      | 34.7                         | 100.0               | V                | 142.0                       | -9.1                   | 46.0           | 11.3        |
| 98.910000       | 27.7                         | 203.0               | H                | 215.0                       | -14.9                  | 43.5           | 15.8        |

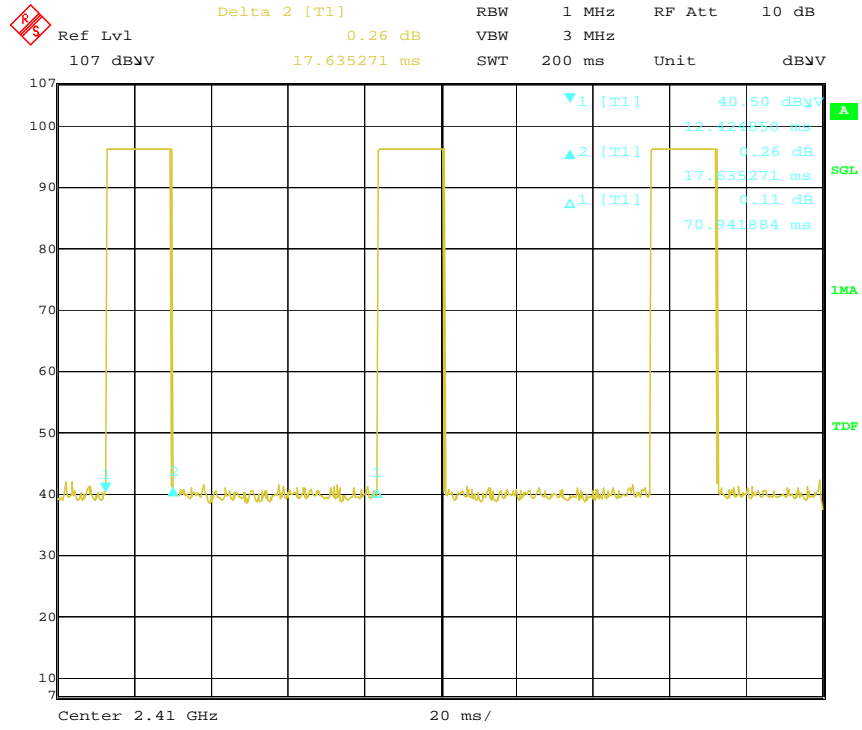
2) 1 ~25 GHz:

| Freq. (MHz)           | S.A. Reading (dBµV) | Detector PK/Ave | Direction Degree | Height (m) | Polar H/V | Ant. Loss (dB) | Cable loss (dB) | Amp. Gain (dB) | Corrected Amplitude (dBµV/m) | FCC 15.209/ FCC 15.249/15.205 |             |          |
|-----------------------|---------------------|-----------------|------------------|------------|-----------|----------------|-----------------|----------------|------------------------------|-------------------------------|-------------|----------|
|                       |                     |                 |                  |            |           |                |                 |                |                              | Limit (dBµV/m)                | Margin (dB) | Comment  |
| <b>Low Channel</b>    |                     |                 |                  |            |           |                |                 |                |                              |                               |             |          |
| 2410                  | 71.16               | PK              | 135              | 1.7        | V         | 30.5           | 3.03            | 0              | 104.69                       | 114                           | 9.31        | Fund.    |
| 4819.95               | 50.24               | PK              | 190              | 1.5        | H         | 36.2           | 4.36            | 26.87          | 63.93                        | 74                            | 10.7        | Harmonic |
| 2410                  | 67.43               | PK              | 121              | 1.4        | H         | 30.5           | 3.03            | 0              | 100.96                       | 114                           | 13.04       | Fund.    |
| 4819.95               | 46.81               | PK              | 213              | 1          | V         | 34.7           | 4.36            | 26.87          | 59.00                        | 74                            | 15.00       | Harmonic |
| 9640.06               | 35.10               | PK              | 120              | 1.8        | H         | 41.2           | 5.99            | 26.42          | 55.87                        | 74                            | 18.13       | Harmonic |
| 7229.93               | 35.26               | PK              | 87               | 1.6        | H         | 39.2           | 5.22            | 26.64          | 53.04                        | 74                            | 20.96       | Harmonic |
| 7229.93               | 36.38               | PK              | 110              | 1.4        | V         | 37.8           | 5.22            | 26.64          | 52.76                        | 74                            | 21.24       | Harmonic |
| 9640.06               | 32.56               | PK              | 90               | 1.4        | V         | 40.1           | 5.99            | 26.42          | 52.23                        | 74                            | 21.77       | Harmonic |
| 2369                  | 34.25               | PK              | 75               | 1.3        | H         | 30             | 3.03            | 26.87          | 37.38                        | 74                            | 36.62       | Spurious |
| 2357                  | 34.19               | PK              | 122              | 1.0        | V         | 29.3           | 3.03            | 26.87          | 36.62                        | 74                            | 37.38       | Spurious |
| <b>Middle Channel</b> |                     |                 |                  |            |           |                |                 |                |                              |                               |             |          |
| 4899.95               | 50.53               | PK              | 173              | 1.7        | H         | 36.2           | 4.36            | 26.87          | 64.22                        | 74                            | 9.78        | Harmonic |
| 2450                  | 68.66               | PK              | 185              | 1.5        | V         | 30.5           | 3.03            | 0              | 102.19                       | 114                           | 11.81       | Fund.    |
| 4899.95               | 49.25               | PK              | 220              | 1.5        | V         | 34.7           | 4.36            | 26.87          | 61.44                        | 74                            | 12.56       | Harmonic |
| 7350.14               | 41.43               | PK              | 10               | 1          | H         | 39.1           | 5.21            | 26.64          | 59.10                        | 74                            | 14.9        | Harmonic |
| 9800.16               | 37.77               | PK              | 140              | 1.8        | H         | 41.3           | 6.09            | 26.42          | 58.74                        | 74                            | 15.26       | Harmonic |
| 2450                  | 62.55               | PK              | 165              | 1.4        | H         | 30.5           | 3.03            | 0              | 96.08                        | 114                           | 17.92       | Fund.    |
| 9800.16               | 35.21               | PK              | 166              | 1.1        | V         | 40.3           | 6.09            | 26.42          | 55.18                        | 74                            | 18.82       | Harmonic |
| 7350.14               | 36.61               | PK              | 120              | 1.7        | V         | 37.8           | 5.21            | 26.64          | 52.98                        | 74                            | 21.02       | Harmonic |
| <b>High Channel</b>   |                     |                 |                  |            |           |                |                 |                |                              |                               |             |          |
| 4961.92               | 49.05               | PK              | 185              | 1.5        | H         | 36.4           | 4.40            | 26.87          | 62.98                        | 74                            | 11.02       | Harmonic |
| 2481                  | 67.14               | PK              | 165              | 1.4        | V         | 30.5           | 3.03            | 0              | 100.67                       | 114                           | 13.33       | Fund.    |
| 4961.92               | 45.98               | PK              | 275              | 2.1        | V         | 35             | 4.40            | 26.87          | 58.51                        | 74                            | 15.49       | Harmonic |
| 9924.31               | 34.60               | PK              | 140              | 1.5        | H         | 41.3           | 6.09            | 26.42          | 55.57                        | 74                            | 18.43       | Harmonic |
| 9924.31               | 32.73               | PK              | 161              | 1.6        | V         | 40.3           | 6.09            | 26.42          | 52.70                        | 74                            | 21.30       | Harmonic |
| 7443.21               | 35.12               | PK              | 162              | 1.6        | H         | 39             | 5.20            | 26.64          | 52.68                        | 74                            | 21.32       | Harmonic |
| 2481                  | 58.56               | PK              | 145              | 1.6        | H         | 30.5           | 3.03            | 0              | 92.09                        | 114                           | 21.91       | Fund.    |
| 7443.21               | 33.54               | PK              | 120              | 1.0        | V         | 37.7           | 5.20            | 26.64          | 49.8                         | 74                            | 24.20       | Harmonic |
| 2489                  | 40.95               | PK              | 220              | 1.6        | H         | 31.1           | 3.07            | 26.87          | 45.18                        | 74                            | 28.82       | Spurious |
| 2490                  | 41.34               | PK              | 308              | 1.3        | V         | 30.4           | 3.07            | 26.87          | 44.87                        | 74                            | 29.13       | Spurious |

| Field Strength of Radiated Emissions (Average) |                              |                     |                        |                     |                               |             |          |
|--|------------------------------|---------------------|------------------------|---------------------|-------------------------------|-------------|----------|
| Freq. (MHz)                                    | Peak Cord. Amp. @3m (dBμV/m) | Antenna Polar (H/V) | Duty Cycle Factor (dB) | Cord. Amp. (dBμV/m) | FCC 15.209/ FCC 15.249/15.205 |             | Comment  |
|  |                              |                     |                        |                     | Limit (dBμV/m)                | Margin (dB) |          |
| <b>Low Channel</b>                             |                              |                     |                        |                     |                               |             |          |
| 2410.00  | 104.69                       | V                   | -12.09                 | 92.60               | 94                            | 1.40*       | Fund.    |
| 4819.95  | 63.93                        | H                   | -12.09                 | 51.84               | 54                            | 2.16*       | Harmonic |
| 2410.00  | 100.96                       | H                   | -12.09                 | 88.87               | 94                            | 5.13        | Fund.    |
| 4819.95  | 59.00                        | V                   | -12.09                 | 46.91               | 54                            | 7.09        | Harmonic |
| 9640.06  | 55.87                        | H                   | -12.09                 | 43.78               | 54                            | 10.22       | Harmonic |
| 7229.93  | 53.04                        | H                   | -12.09                 | 40.95               | 54                            | 13.05       | Harmonic |
| 7229.93  | 52.76                        | V                   | -12.09                 | 40.67               | 54                            | 13.33       | Harmonic |
| 9640.06  | 52.23                        | V                   | -12.09                 | 40.14               | 54                            | 13.86       | Harmonic |
| 2369   | 37.38                        | H                   | -12.09                 | 25.29               | 54                            | 28.71       | Spurious |
| 2357   | 36.62                        | V                   | -12.09                 | 24.53               | 54                            | 29.47       | Spurious |
| <b>Middle Channel</b>                          |                              |                     |                        |                     |                               |             |          |
| 4899.95  | 64.22                        | H                   | -12.09                 | 52.13               | 54                            | 1.87*       | Harmonic |
| 2450.00  | 102.19                       | V                   | -12.09                 | 90.10               | 94                            | 3.90*       | Fund.    |
| 4899.95  | 61.44                        | V                   | -12.09                 | 49.35               | 54                            | 4.65        | Harmonic |
| 7350.14  | 59.10                        | H                   | -12.09                 | 47.01               | 54                            | 6.99        | Harmonic |
| 9800.16  | 58.74                        | H                   | -12.09                 | 46.65               | 54                            | 7.35        | Harmonic |
| 2450.00  | 96.08                        | H                   | -12.09                 | 83.99               | 94                            | 10.01       | Fund.    |
| 9800.16  | 55.18                        | V                   | -12.09                 | 43.09               | 54                            | 10.91       | Harmonic |
| 7350.14  | 52.98                        | V                   | -12.09                 | 40.89               | 54                            | 13.11       | Harmonic |
| <b>High Channel</b>                            |                              |                     |                        |                     |                               |             |          |
| 4961.92  | 62.98                        | H                   | -12.09                 | 50.89               | 54                            | 3.11*       | Harmonic |
| 2481.00  | 100.67                       | V                   | -12.09                 | 88.58               | 94                            | 5.42        | Fund.    |
| 4961.92  | 58.51                        | V                   | -12.09                 | 46.42               | 54                            | 7.58        | Harmonic |
| 9924.31  | 55.57                        | H                   | -12.09                 | 43.48               | 54                            | 10.52       | Harmonic |
| 9924.31  | 52.70                        | V                   | -12.09                 | 40.61               | 54                            | 13.39       | Harmonic |
| 7443.21  | 52.68                        | H                   | -12.09                 | 40.59               | 54                            | 13.41       | Harmonic |
| 2481.00  | 92.09                        | H                   | -12.09                 | 80.00               | 94                            | 14.00       | Fund.    |
| 7443.21  | 49.80                        | V                   | -12.09                 | 37.71               | 54                            | 16.29       | Harmonic |
| 2489   | 45.18                        | H                   | -12.09                 | 33.09               | 54                            | 20.91       | Spurious |
| 2490   | 44.87                        | V                   | -12.09                 | 32.78               | 54                            | 21.22       | Spurious |

Note: Duty Cycle=Ton/Tp\*100%  
Ton=17.635ms, Tp=70.942 ms  
Duty Cycle=Ton/Tp= 24.17%  
Duty cycle factor = 20lg (Duty Cycle) = -12.09  
Average=PK+ Duty Cycle Factor

### Duty Cycle



## FCC§15.215(c) – 20dB BANDWIDTH

### Applicable Standard

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

### Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that indicated 20dB bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

### Test Equipment List and Details

| Manufacturer    | Description       | Model    | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|----------|---------------|------------------|----------------------|
| Rohde & Schwarz | EMI Test Receiver | ESCI     | 100224        | 2011-11-11       | 2012-11-10           |
| Mini-Circuits   | Amplifier         | ZVA-213+ | T-E27H        | 2011-03-08       | 2012-03-07           |
| Sunol Sciences  | Horn Antenna      | DRH-118  | A052604       | 2011-05-05       | 2012-05-04           |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

### Test Data

#### Environmental Conditions

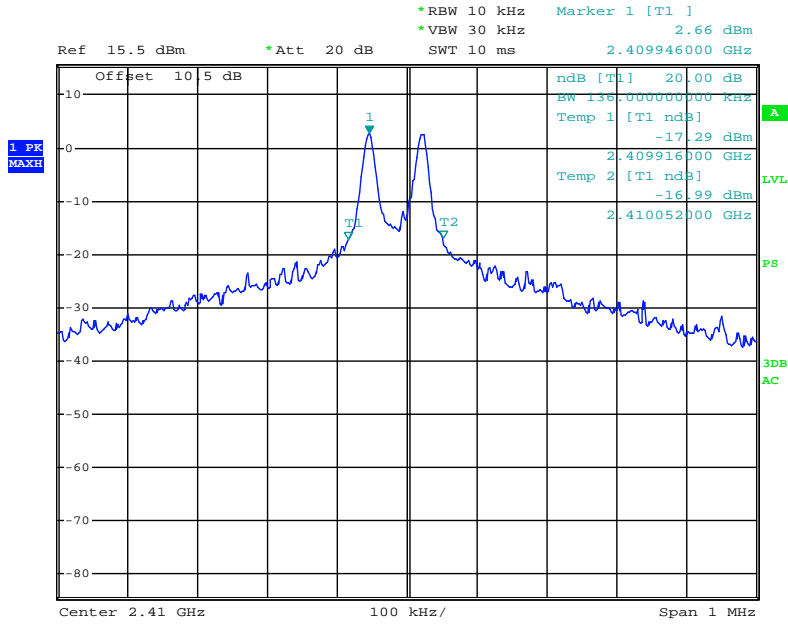
|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 25 °C     |
| <b>Relative Humidity:</b> | 56 %      |
| <b>ATM Pressure:</b>      | 100.2 kPa |

\*The testing was performed by Henry Ding on 2012-02-08.

Test Mode: Transmitting

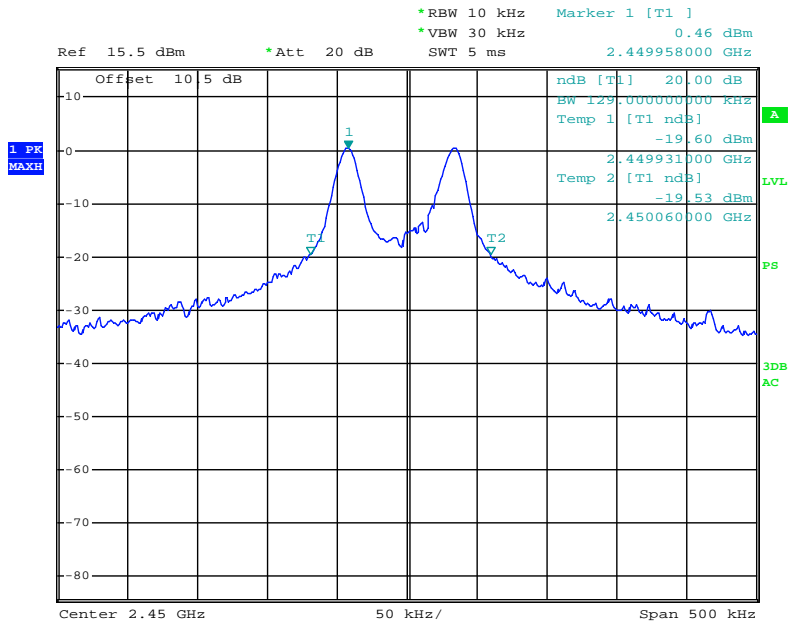
Please refer to the following plots.

### Low Channel



Date: 8.FEB.2012 11:48:05

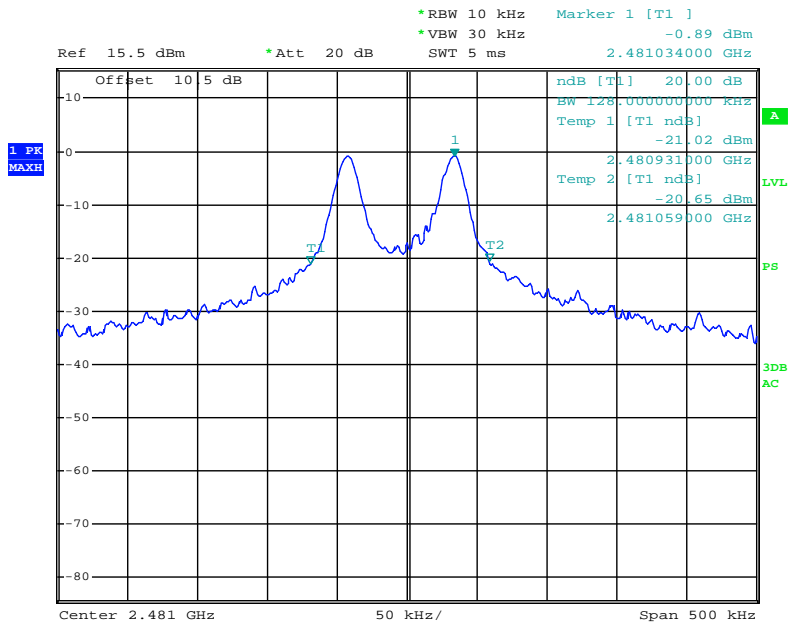
### Middle Channel



Date: 8.FEB.2012 13:16:06



### High Channel



Date: 8.FEB.2012 13:40:38

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