

FCC PART 15.231

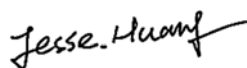
TEST REPORT

For

**Velong Enterprises Co., Ltd**

No.3-7 west of 5th Najin Rd., North of 4th Huoda Rd., Nahou Industrial Zone, Yangdong District,  
Yangjiang City, China

**FCC ID: 2AJUYGT003802**

|                                                                                                                                                                                                                                                                          |                                                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| <b>Report Type:</b><br>Original Report                                                                                                                                                                                                                                   | <b>Product Type:</b><br>EG WIRELESS THERMOMETER |
| <b>Report Number:</b> RSZ160922003-00                                                                                                                                                                                                                                    |                                                 |
| <b>Report Date:</b> 2016-09-29                                                                                                                                                                                                                                           |                                                 |
| Jesse Huang                                                                                                                                                                         |                                                 |
| <b>Reviewed By:</b> Manager                                                                                                                                                                                                                                              |                                                 |
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**Note:** This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

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## GENERAL INFORMATION

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

The *Velong Enterprises Co., Ltd.*'s product, model number: *XG1709603586 (FCC ID: 2AJUYGT003802)* (or the "EUT") in this report was a *EG WIRELESS THERMOMETER*, which was measured approximately: 73 mm (L) x 60 mm (W) x 65 mm (H), rated input voltage: DC 3V battery.

*Note: This series products model: STG-5951-KBand XG1709603586 are electrically identical, the difference between them is just model name. Model XG1709603586 was selected for fully testing, the detailed information can be referred to the declaration letter that stated and guaranteed by the applicant.*

*\*All measurement and test data in this report was gathered from production sample serial number: 1603305 (Assigned by BACL, Kunshan). The EUT supplied by the applicant was received on 2016-09-22.*

### Objective

This test report is prepared on behalf of *Velong Enterprises Co., Ltd.* All the test measurements were performed according to the measurement procedure described in ANSI C63.10 - 2013.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, section 15.203, 15.205, 15.209, 15.35(c) and 15.231 rules.

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

FCC PART 15B CYC submissions with FCC ID: 2AJUYGT003801.

### Test Methodology

All measurements contained in this report were conducted with ANSI C63.10 - 2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

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.

### Measurement Uncertainty

| Item              |              | Uncertainty |
|-------------------|--------------|-------------|
| Radiated emission | 30MHz ~1 GHz | 5.91dB      |
|                   | Above 1 GHz  | 4.92dB      |

## Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the Chenghu Lake Road, Kunshan Development Zone No.248, Kunshan, Jiangsu, China

Test site at Bay Area Compliance Laboratories Corp. (Kunshan) 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 November 06, 2014. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 815570. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

## SYSTEM TEST CONFIGURATION

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### Justification

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

### Special Accessories

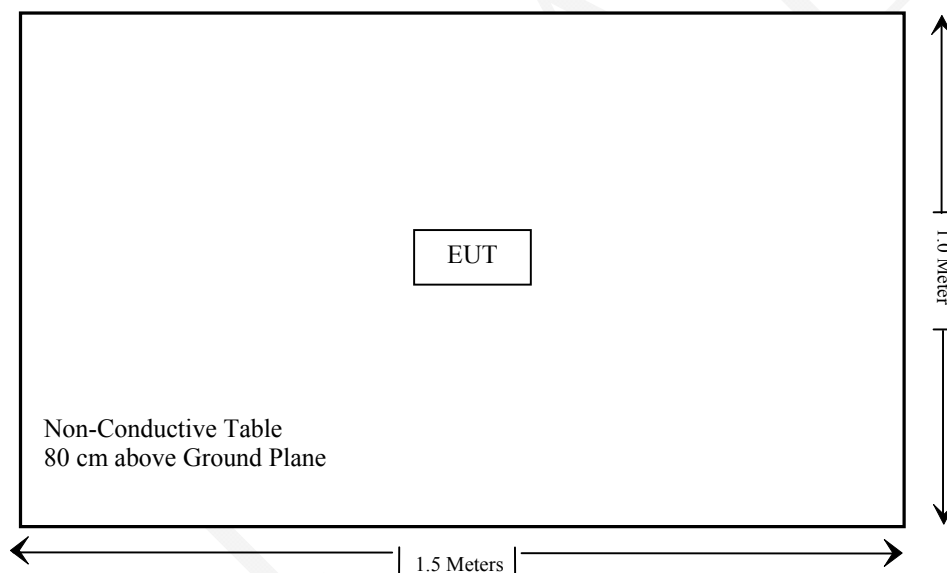
No special accessories was used

### Equipment Modifications

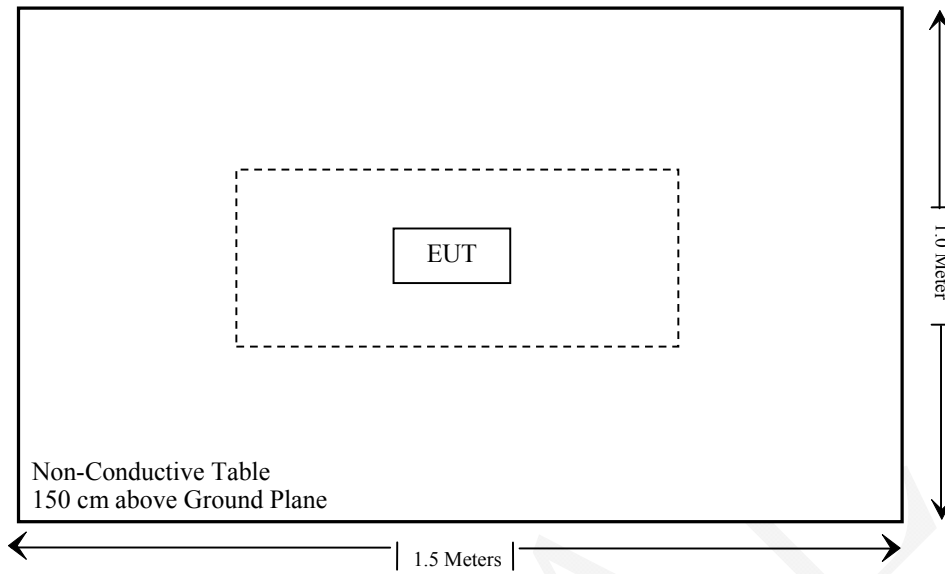
No modification was made to the EUT.

### Block Diagram of Test Setup

Below 1GHz:



Above 1GHz:



**SUMMARY OF TEST RESULTS**

| FCC Rules                    | Description of Test              | Result         |
|------------------------------|----------------------------------|----------------|
| §15.203                      | Antenna Requirement              | Compliance     |
| §15.207(a)                   | Conducted Emissions              | Not Applicable |
| §15.205, §15.209, §15.231(e) | Radiated Emissions               | Compliance     |
| §15.231(c)                   | 20dB Emission Bandwidth          | Compliance     |
| §15.231(e)                   | Transmission Time, Silent period | Compliance     |

Not Applicable: The EUT is powered by battery only.

**TEST EQUIPMENT LIST**

| Manufacturer      | Description        | Model      | Serial Number | Calibration Date | Calibration Due Date |
|-------------------|--------------------|------------|---------------|------------------|----------------------|
| Sonoma Instrument | Amplifier          | 330        | 171377        | 2016-09-16       | 2017-09-15           |
| Rohde & Schwarz   | EMI Test Receiver  | ESCI       | 100195        | 2015-11-12       | 2016-11-11           |
| Sunol Sciences    | Broadband Antenna  | JB3        | A090314-2     | 2015-11-07       | 2016-11-06           |
| ETS               | Horn Antenna       | 3115       | 6229          | 2015-11-07       | 2016-11-06           |
| Rohde & Schwarz   | Signal Analyzer    | FSIQ26     | 100048        | 2015-11-12       | 2016-11-11           |
| Mini              | Pre-amplifier      | ZVA-183-S+ | 857001418     | 2016-09-16       | 2017-09-16           |
| R&S               | Auto test Software | EMC32      | V 09.10.0     | NCR              | NCR                  |
| BACL              | RF cable           | KS-LAB-012 | KS-LAB-012    | 2015-12-16       | 2016-12-15           |
| BACL              | RF cable           | KS-LAB-010 | KS-LAB-010    | 2015-12-16       | 2016-12-15           |

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

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

---

### **Applicable Standard**

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

### **Antenna Connector Construction**

The EUT has an internal antenna arrangement which was permanently attached and the antenna gain is 0 dBi; fulfill the requirement of this section. Please refer to EUT photos.

**Result:** Compliant.

**FCC §15.205, §15.209, §15.231 (e) - RADIATED EMISSIONS****Applicable Standard**

FCC §15.205, §15.209, §15.231 (e)

According to §15.231 (e), intentional radiators may operate at a periodic rate exceeding that specified in paragraph (a) of this section and may be employed for any type of operation, including operation prohibited in paragraph (a) of this section, provided the intentional radiator complies with the provisions of paragraphs (b) through (d) of this section, except the field strength table in paragraph (b) of this section is replaced by the following:

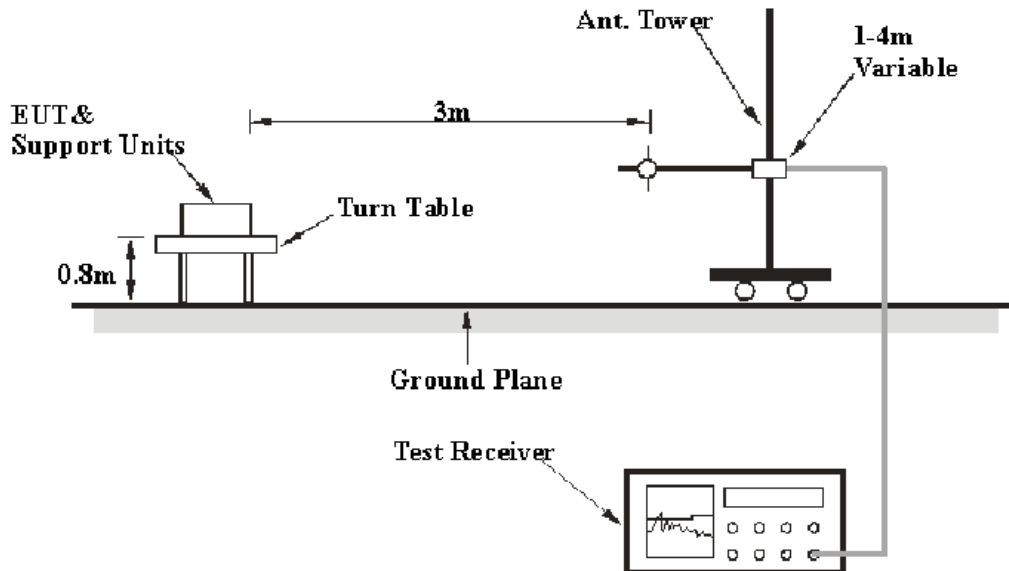
| <b>Fundamental frequency<br/>(MHz)</b> | <b>Field Strength of<br/>Fundamental<br/>(Microvolts /meter)</b> | <b>Field Strength of spurious<br/>emissions<br/>(Microvolts /meter)</b> |
|----------------------------------------|------------------------------------------------------------------|-------------------------------------------------------------------------|
| 40.66-40.70                            | 1000                                                             | 100                                                                     |
| 70-130                                 | 500                                                              | 50                                                                      |
| 130-174                                | 500 to 1500**                                                    | 50 to 150**                                                             |
| 174-260                                | 1500                                                             | 150                                                                     |
| 260-470                                | 1500 to 5000**                                                   | 150 to 500**                                                            |
| Above 470                              | 5000                                                             | 500                                                                     |

\*\*Linear interpolations.

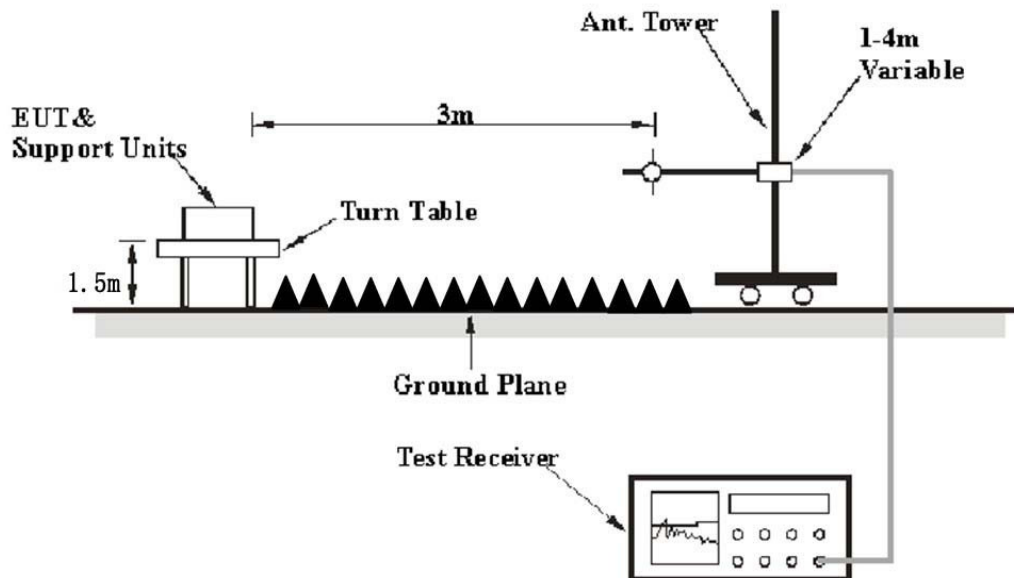
The above field strength limits are specified at a distance of 3-meters the tighter limits apply at the band edges.

## EUT Setup

### Below 1 GHz:



### Above 1 GHz:



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10 - 2013. The specification used was the FCC 15 § 15.209, 15.205 and 15.231.

## EMI Test Receiver Setup

The system was investigated from 30 MHz to 4.5 GHz.

During the radiated emission test, the test receiver was set with the following configurations:

| Frequency Range  | RBW     | Video B/W | IF B/W  | Detector |
|------------------|---------|-----------|---------|----------|
| 30MHz – 1000 MHz | 100 kHz | 300 kHz   | 120 kHz | QP       |
| Above 1 GHz      | 1 MHz   | 3 MHz     | /       | PK       |

## Test Procedure

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

All final data was recorded in the Quasi-peak detection mode from 30MHz to 1GHz, Peak detection mode above 1 GHz.

## Corrected Amplitude & Margin Calculation

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

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

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 5.8 dB means the emission is 5.8 dB below the limit. The equation for margin calculation is as follows:

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

## Test Results Summary

According to the data in the following table, the EUT complied with the FCC §15.205, §15.209, §15.231 (e).

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

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

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

**Test Data****Environmental Conditions**

|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 25 °C     |
| <b>Relative Humidity:</b> | 50 %      |
| <b>ATM Pressure:</b>      | 101.0 kPa |

The testing was performed by Chris Wang on 2016-09-24 and 2016-09-28.

Test mode: Transmitting

**30MHz-4.5GHz:**

| Frequency (MHz) | Receiver       |                       | Turntable Degree | Rx Antenna |             | Corrected Factor (dB) | Corrected Amplitude (dBμV/m) | FCC Part 15.231(e)/205/209 |             |             |
|-----------------|----------------|-----------------------|------------------|------------|-------------|-----------------------|------------------------------|----------------------------|-------------|-------------|
|                 | Reading (dBμV) | Detector (PK/QP/Ave.) |                  | Height (m) | Polar (H/V) |                       |                              | Limit (dBμV/m)             | Margin (dB) | Comment     |
| 433.92          | 93.77          | PK                    | 211              | 1.2        | H           | -7.33                 | 86.44                        | 92.9                       | 6.46        | Fundamental |
| 433.92          | 91.30          | PK                    | 283              | 1.5        | V           | -7.33                 | 83.97                        | 92.9                       | 8.93        | Fundamental |
| 867.84          | 56.08          | PK                    | 155              | 1.6        | H           | -1.09                 | 54.99                        | 72.9                       | 17.91       | Harmonic    |
| 867.84          | 57.26          | PK                    | 236              | 1.6        | V           | -1.09                 | 56.17                        | 72.9                       | 16.73       | Harmonic    |
| 1301.76         | 46.56          | PK                    | 174              | 1.4        | H           | -3.89                 | 42.67                        | 72.9                       | 30.23       | Harmonic    |
| 1301.76         | 49.61          | PK                    | 339              | 1.6        | V           | -3.89                 | 45.72                        | 72.9                       | 27.18       | Harmonic    |

| Field Strength of Average Emission |                               |             |                                   |                              |                            |             |             |
|------------------------------------|-------------------------------|-------------|-----------------------------------|------------------------------|----------------------------|-------------|-------------|
| Frequency (MHz)                    | Peak Measurement @3m (dBμV/m) | Polar (H/V) | Duty Cycle Correction Factor (dB) | Corrected Amplitude (dBμV/m) | FCC Part 15.231(e)/205/209 |             |             |
|                                    |                               |             |                                   |                              | Limit (dBμV/m)             | Margin (dB) | Comment     |
| 433.92                             | 86.44                         | H           | -14.42                            | 72.02                        | 72.9                       | 0.88        | Fundamental |
| 433.92                             | 83.97                         | V           | -14.42                            | 69.55                        | 72.9                       | 3.35        | Fundamental |
| 867.84                             | 54.99                         | H           | -14.42                            | 40.57                        | 52.9                       | 12.33       | Harmonic    |
| 867.84                             | 56.17                         | V           | -14.42                            | 41.75                        | 52.9                       | 11.15       | Harmonic    |
| 1301.76                            | 42.67                         | H           | -14.42                            | 28.25                        | 52.9                       | 24.65       | Harmonic    |
| 1301.76                            | 45.72                         | V           | -14.42                            | 31.30                        | 52.9                       | 21.60       | Harmonic    |

**Note 1:**

Corrected Amplitude = Corrected Factor + Reading

Corrected Factor = Antenna factor (Rx) + cable loss – amplifier factor

Margin = Limit - Corr. Amplitude

**Note 2:**

Calculate Average value based on Duty Cycle correction factor:

Ton1 = 1\*Pulses=1\*1.004ms =1.004ms

Ton2 = 8\*Pulses=8\*0.75ms =6ms

Ton3 = 47\*Pulses=41\*0.262ms =12.314ms

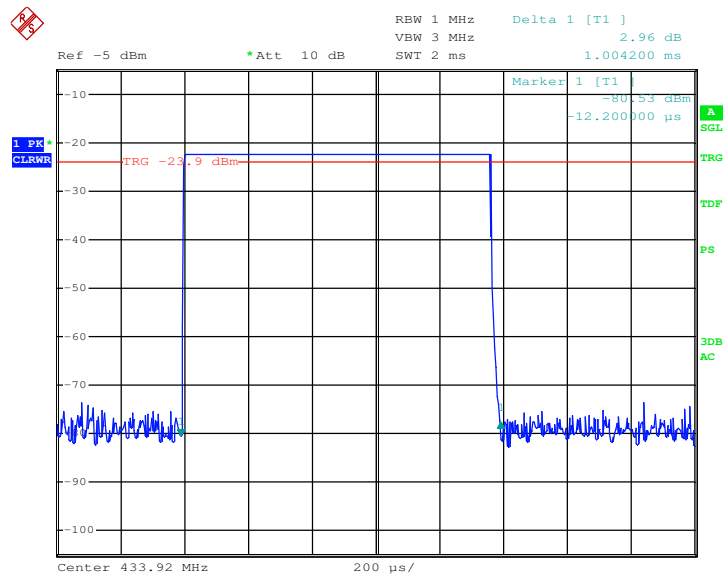
Tp = 100ms

Duty cycle = (Ton1+ Ton2+ Ton3)/Tp = (1.004+6+12.314)ms/100ms= 0.19

Duty Cycle Corrected Factor = 20lg (Duty cycle) = 20lg0.19= -14.42 dB

Average = Peak – Duty Cycle Corrected Factor

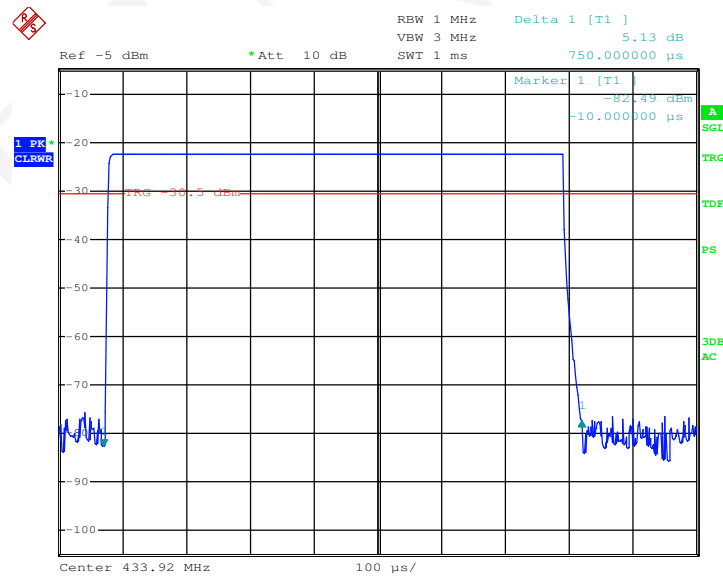
### Duty Cycle 1



EUT

Date: 28.SEP.2016 19:23:56

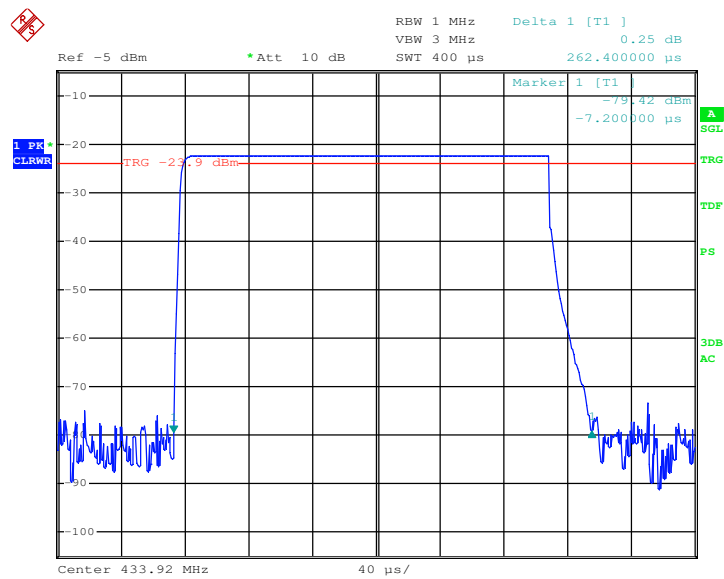
### Duty Cycle 2



EUT

Date: 28.SEP.2016 19:33:29

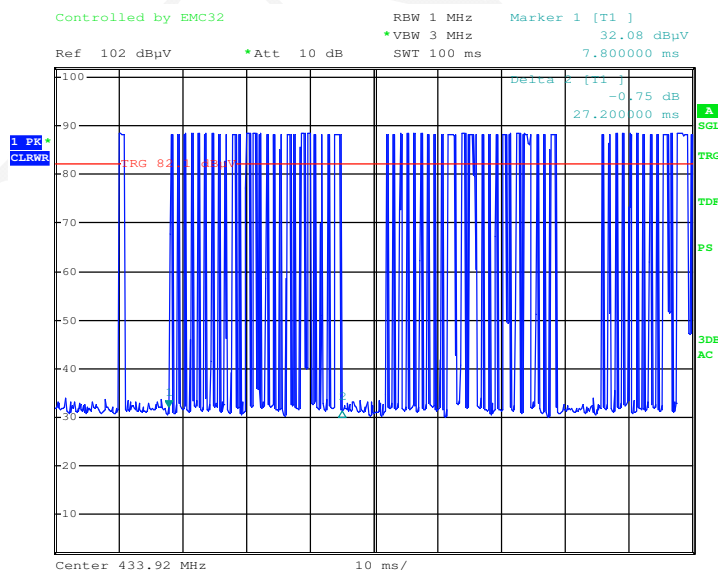
### Duty Cycle 3



EUT

Date: 28.SEP.2016 19:26:21

100 ms



EUT

Date: 24.SEP.2016 12:51:15

**FCC §15.231(c) – 20 dB EMISSION BANDWIDTH TESTING****Applicable Standard**

Per 15.231(c), The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

**Test Procedure**

With the EUT's antenna attached, the waveform was received by the test antenna which was connected to the spectrum analyzer, plot the 20 dB bandwidth.

**Test Data****Environmental Conditions**

|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 24 °C     |
| <b>Relative Humidity:</b> | 50 %      |
| <b>ATM Pressure:</b>      | 101.0 kPa |

*The testing was performed by Chris Wang on 2016-09-24.*

*Test Mode: Transmitting*

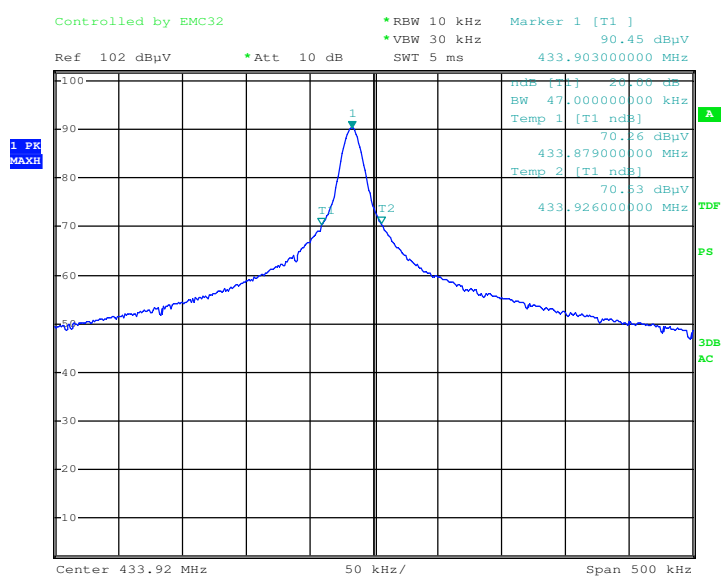
Please refer to following table and plot.

ASK modulation:

| Channel Frequency (MHz) | 20 dB Emission Bandwidth (kHz) | <Limit (MHz) | Result |
|-------------------------|--------------------------------|--------------|--------|
| 433.92                  | 47                             | 1.0848       | Pass   |

Note: Limit = 0.25% \* center frequency = 0.25% \* 433.92 MHz = 1.0848 MHz  
 20dB bandwidth = 66 kHz < 1.0848 MHz

## 20 dB Emission Bandwidth



EUT

Date: 24.SEP.2016 12:34:41

**FCC §15.231(e) – TRANSMISSION AND SILENT PERIOD TESTING****Applicable Standard**

Per FCC §15.231(e), devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

**Test Procedure**

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set center frequency of spectrum analyzer=operating frequency.
3. Set the spectrum analyzer as RBW=1MHz, VBW=3MHz, Span=0Hz.
4. Repeat above procedures until all frequency measured was complete.

**Test Data****Environmental Conditions**

|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 24 °C     |
| <b>Relative Humidity:</b> | 50 %      |
| <b>ATM Pressure:</b>      | 101.0 kPa |

*The testing was performed by Chris Wang on 2016-09-24.*

Test Mode: Transmitting

Deactivation

| Transmission period<br>(s) | Limit<br>(s) | Result |
|----------------------------|--------------|--------|
| 0.174                      | < 1          | Pass   |

Silent period

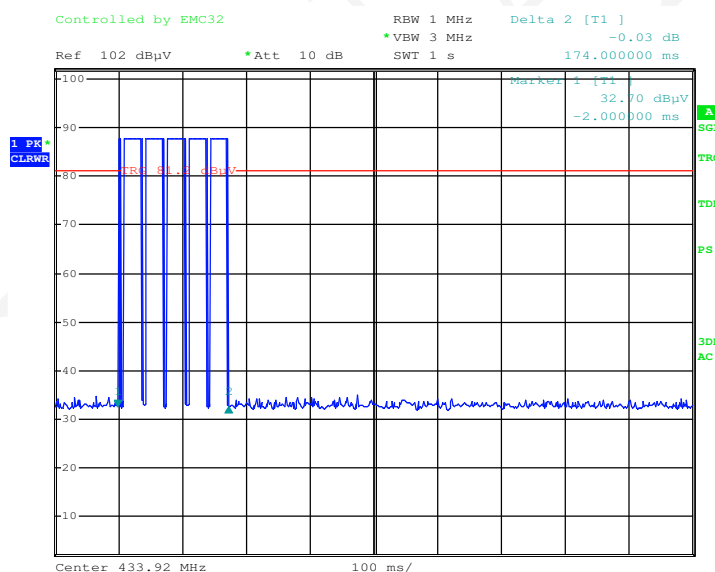
| Silent period<br>(s) | Limit<br>(s) | Result |
|----------------------|--------------|--------|
| 13.014               | > 10         | Pass   |

**Note:** The silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

The duration time is 0.174s,  $0.174 \times 30 = 5.22\text{s}$ .

**Test Result:** Compliant, please refer to following plot

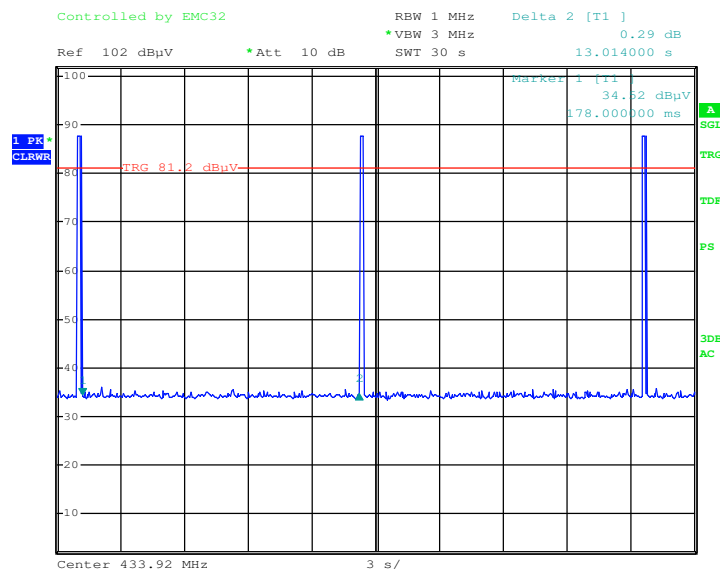
### Transmission period



EUT

Date: 24.SEP.2016 17:10:01

### Silent period



EUT

Date: 24.SEP.2016 17:11:31

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