

# FCC Test Report

Product Name : Tire Pressure Monitoring System  
Trade Name : ORO  
Model No. : W206  
FCC ID. : W55206FM1B2

Applicant : Oro Technology Co., LTD  
Address : 3F, No.29, 21th Road, Industrial Park,  
Taichung 408, Taiwan

Date of Receipt : Dec. 13, 2016  
Issued Date : Feb. 23, 2017  
Report No. : 16C0270R-RFUSP14V00  
Report Version : V1.0



The declaration results relate only to the samples calculated.

The declaration shall not be reproduced except in full without the written approval of DEKRA Testing and Certification Co., Ltd.

# Test Report Certification

Issued Date : Feb. 23, 2017

Report No. : 16C0270R-RFUSP14V00



Product Name : Tire Pressure Monitoring System  
Applicant : Oro Technology Co., LTD  
Address : 3F, No.29, 21th Road, Industrial Park, Taichung 408, Taiwan  
Manufacturer : Oro Technology Co., LTD  
Model No. : W206  
FCC ID. : W55206FM1B2  
EUT Voltage : DC 3V (Power by Battery)  
Testing Voltage : DC 3V (Power by Battery)  
Trade Name : ORO  
Applicable Standard : FCC 15 Subpart C Section 15.231(b): 2015  
Test Lab : Hsin Chu Laboratory  
Test Result : Complied

The test results relate only to the samples tested.

The test report shall not be reproduced except in full without the written approval of DEKRA Testing and Certification Co., Ltd.

Documented By :



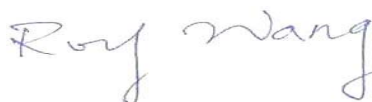
( Carol Tsai / Senior Engineering Adm. Specialist )

Reviewed By :



(Elwin Lin / Assistant Engineer)

Approved By :



( Roy Wang / Director )

**Revision History**

| Report No.          | Version | Description              | Issued Date   |
|---------------------|---------|--------------------------|---------------|
| 16C0270R-RFUSP14V00 | V1.0    | Initial issue of report. | Feb. 23, 2017 |
|                     |         |                          |               |
|                     |         |                          |               |
|                     |         |                          |               |
|                     |         |                          |               |
|                     |         |                          |               |
|                     |         |                          |               |
|                     |         |                          |               |
|                     |         |                          |               |
|                     |         |                          |               |
|                     |         |                          |               |
|                     |         |                          |               |

## Laboratory Information

We, **DEKRA Testing and Certification Co., Ltd.**, are an independent RF consultancy that was established the whole facility in our laboratories. The test facility has been accredited/accepted (audited or listed) by the following related bodies in compliance with ISO 17025 specified testing scopes:

|                      |          |                                                                                            |
|----------------------|----------|--------------------------------------------------------------------------------------------|
| <b>Taiwan R.O.C.</b> | <b>:</b> | <b>TAF, Accreditation Number: 3024</b>                                                     |
| <b>USA</b>           | <b>:</b> | <b>FCC, Registration Number: 834100</b>                                                    |
| <b>Canada</b>        | <b>:</b> | <b>IC, Submission No: 181665 /<br/>IC Registration Number: 22397-1 / 22397-2 / 22397-3</b> |

The related certificate for our laboratories about the test site and management system can be downloaded from DEKRA Testing and Certification Co., Ltd. Web Site:

<http://www.dekra.com.tw/english/about/certificates.aspx?bval=5>

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site : [http://www.dekra.com.tw/index\\_en.aspx](http://www.dekra.com.tw/index_en.aspx)

If you have any comments, Please don't hesitate to contact us. Our contact information is as below:

### **Hsin Chu Laboratory:**

No.75-2, 3rd Lin, WangYe Keng, Yonghxing Tsuen, Qionglin Shiang, Hsinchu County 307, Taiwan (R.O.C.)

TEL:+886-3-592-8858 / FAX:+886-3-592-8859

No.372, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 310, Taiwan

No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 310, Taiwan

TEL:+886-3-582-8001 / FAX:+886-3-5828-958 E-Mail : [info.tw@dekra.com](mailto:info.tw@dekra.com)

### **Lin Kou Laboratory:**

No. 5-22, Ruishukeng, Linkou Dist., New Taipei City 24451, Taiwan (R.O.C.)

TEL : +886-2-8601-3788 / FAX : +886-2-8601-3789 E-Mail : [info.tw@dekra.com](mailto:info.tw@dekra.com)

## TABLE OF CONTENTS

| Description                               | Page |
|-------------------------------------------|------|
| 1. General Information.....               | 6    |
| 1.1. EUT Description .....                | 6    |
| 1.2. Test Mode .....                      | 7    |
| 1.3. Tested System Details .....          | 8    |
| 1.4. Configuration of tested System ..... | 8    |
| 1.5. EUT Exercise Software .....          | 8    |
| 2. Radiated Emission .....                | 9    |
| 2.1. Test Equipment.....                  | 9    |
| 2.2. Test Setup .....                     | 9    |
| 2.3. Limits .....                         | 10   |
| 2.4. Test Procedure .....                 | 11   |
| 2.5. Test Specification.....              | 11   |
| 2.6. Uncertainty .....                    | 11   |
| 2.7. Test Result.....                     | 12   |
| 3. Occupied Bandwidth.....                | 25   |
| 3.1. Test Equipment.....                  | 25   |
| 3.2. Test Setup .....                     | 25   |
| 3.3. Limits .....                         | 25   |
| 3.4. Test Specification.....              | 25   |
| 3.5. Uncertainty .....                    | 25   |
| 3.6. Test Result.....                     | 26   |
| 4. Duty cycle .....                       | 27   |
| 4.1. Test Equipment.....                  | 27   |
| 4.2. Test Setup .....                     | 27   |
| 4.3. Limits .....                         | 27   |
| 4.4. Test Specification.....              | 27   |
| 4.5. Uncertainty .....                    | 27   |
| 4.6. Test Result.....                     | 27   |
| 5. Transmitter time.....                  | 29   |
| 5.1. Test Equipment.....                  | 29   |
| 5.2. Test Setup .....                     | 29   |
| 5.3. Limits .....                         | 29   |
| 5.4. Test Specification.....              | 29   |
| 5.5. Uncertainty .....                    | 29   |
| 5.6. Test Result.....                     | 30   |
| Attachment 1.....                         | 32   |
| Test Setup Photograph .....               | 32   |
| Attachment 2.....                         | 34   |
| EUT External Photograph.....              | 34   |
| Attachment 3.....                         | 36   |
| EUT Internal Photograph.....              | 36   |

## 1. General Information

### 1.1. EUT Description

|                    |                                 |
|--------------------|---------------------------------|
| Product Name       | Tire Pressure Monitoring System |
| Trade Name         | ORO                             |
| Model No.          | W206                            |
| Frequency Range    | 433.92 MHz                      |
| Channel Number     | 1                               |
| Type of Modulation | FSK, ASK                        |

| Antenna Information |                  |
|---------------------|------------------|
| Antenna Type        | Monopole Antenna |
| Antenna Gain        | 0 dBi            |

| Working Frequency of Each Channel |            |
|-----------------------------------|------------|
| Channel                           | Frequency  |
| 001                               | 433.92 MHz |

Note:

1. This device is a Tire Pressure Monitoring System included a 433.92MHz transceiver function.
2. These tests are conducted on a sample for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.231.
3. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.
4. This device is a composite device in accordance with Part 15 regulations. The function receiving was measured and made a test report that the report number is 16C0270R-RFUSP01V00 under Declaration of Conformity.

## 1.2. Test Mode

DEKRA verified the construction and function in typical operation. All the test modes are performed in normal operation and are defined as:

|                 |                  |
|-----------------|------------------|
| Pre-Test Mode   |                  |
| TX              | Mode 1: Transmit |
| Final Test Mode |                  |
| TX              | Mode 1: Transmit |

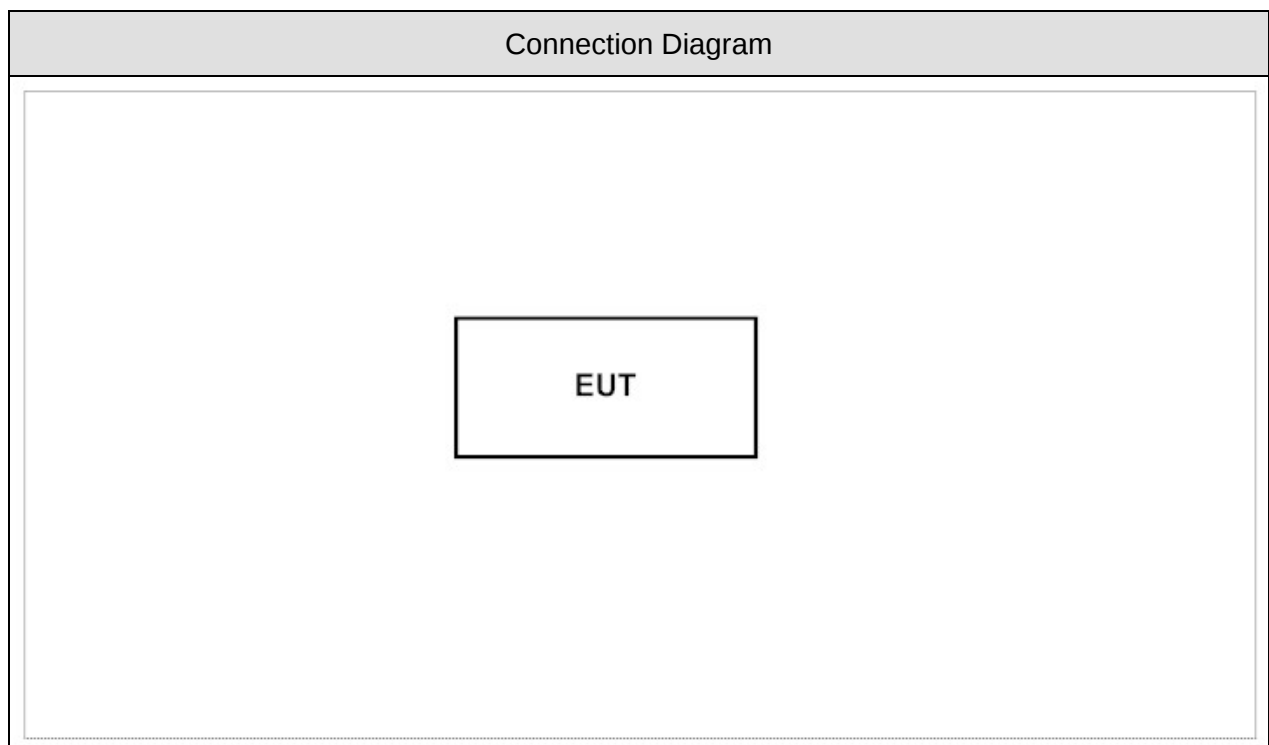
| Emission           |        |
|--------------------|--------|
| Performed Item     | Mode 1 |
| Conducted Emission | No     |
| Radiated Emission  | Yes    |
| Occupied Bandwidth | Yes    |
| Duty cycle         | Yes    |
| Transmitter time   | Yes    |

### 1.3. Tested System Details

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

| Product | Manufacturer | Model No. | Serial No. | FCC ID | Power Cord |
|---------|--------------|-----------|------------|--------|------------|
| N/A     |              |           |            |        |            |

### 1.4. Configuration of tested System



### 1.5. EUT Exercise Software

|   |                                        |
|---|----------------------------------------|
| 1 | Setup the EUT as shown in section 1.4. |
| 2 | The EUT will transmit automatically.   |
| 3 | Verify that the EUT works properly.    |

## 2. Radiated Emission

### 2.1. Test Equipment

The following test equipments are used during the test:

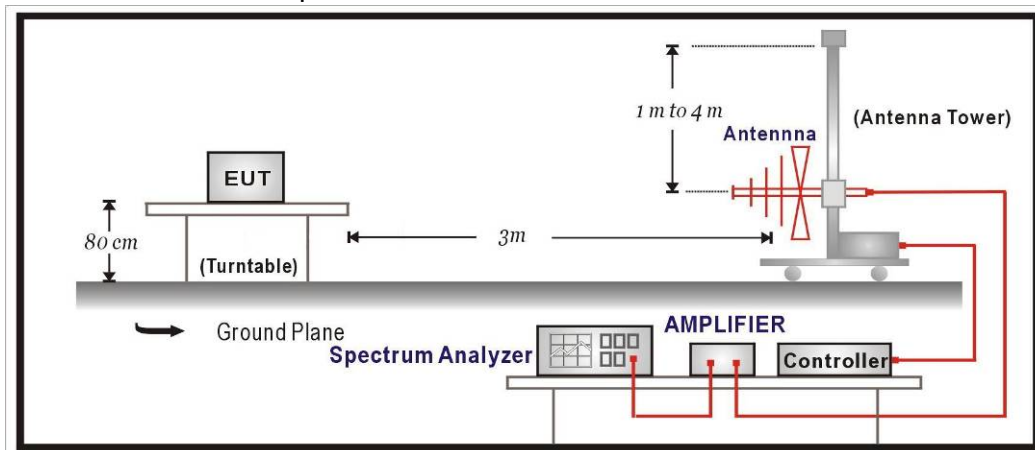
#### Radiated Emission / CB4-H

| Instrument                 | Manufacturer | Model No.            | Serial No | Next Cal. Date |
|----------------------------|--------------|----------------------|-----------|----------------|
| Bilog Antenna              | Schaffner    | CBL6112B             | 2891      | 2017/08/14     |
| Horn Antenna               | Schwarzbeck  | BBHA 9120            | D312      | 2017/10/25     |
| Pre-Amplifier              | EMCI         | EMC0031835           | 980233    | 2018/02/02     |
| Pre-Amplifier              | Schwarzbeck  | DBL-1840N506         | 013       | 2017/09/29     |
| Pre-Amplifier              | Miteq        | JS41-001040000-58-5P | 1573954   | 2017/10/04     |
| Horn Antenna               | Schwarzbeck  | BBHA 9170            | 203       | 2017/08/28     |
| Signal & Spectrum Analyzer | R&S          | FSV40                | 101049    | 2018/01/22     |

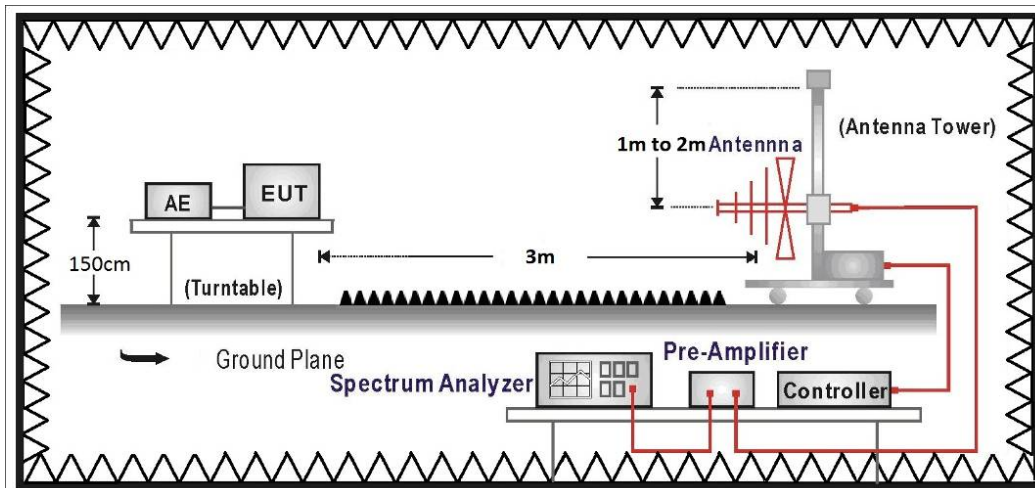
Note: All equipments that need to calibrate are with calibration period of 1 year.

### 2.2. Test Setup

Under 1GHz Test Setup:



Above 1GHz Test Setup:



## 2.3. Limits

### ➤ Fundamental and Harmonics Emission Limits

| FCC Part 15 Subpart C Paragraph 15.231(b) Limits |                                  |               |                                |               |
|--------------------------------------------------|----------------------------------|---------------|--------------------------------|---------------|
| Fundamental Frequency<br>MHz                     | Field Strength of<br>Fundamental |               | Field Strength of<br>Harmonics |               |
|                                                  | uV/m                             | dBuV/m        | uV/m                           | dBuV/m        |
| 40.66 - 40.70                                    | 2250                             | 67.04         | 225                            | 47.04         |
| 70 - 130                                         | 1250                             | 61.94         | 125                            | 41.94         |
| 130 - 174                                        | 1250 - 3750                      | 61.94 - 71.48 | 125 - 375                      | 41.94 - 51.48 |
| 174 - 260                                        | 3750                             | 71.48         | 375                            | 51.48         |
| 260 - 470                                        | 3750 - 12500                     | 71.48 - 81.94 | 375 - 1250                     | 51.48 - 61.94 |
| above 470                                        | 12500                            | 81.94         | 1250                           | 61.94         |

Remarks: 1. RF Voltage (dBuV) = 20 log RF Voltage (uV)  
 2. 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. The emission limit in this paragraph is based on measurement instrumentation employing an average detector.

### ➤ Spurious electric field strength limits

| FCC Part 15 Subpart C Paragraph 15.209 Limits |              |                         |                                 |
|-----------------------------------------------|--------------|-------------------------|---------------------------------|
| Frequency<br>MHz                              | uV/m         | dBuV/m                  | Measurement<br>distance (meter) |
| 0.009 - 0.490                                 | 2400/F(kHz)  | See Remark <sup>1</sup> | 300                             |
| 0.490 - 1.705                                 | 24000/F(kHz) | See Remark <sup>1</sup> | 30                              |
| 1.705 - 30                                    | 30           | 29.5                    | 30                              |
| 30 - 88                                       | 100          | 40                      | 3                               |
| 88 - 216                                      | 150          | 43.5                    | 3                               |
| 216 - 960                                     | 200          | 46                      | 3                               |
| Above 960                                     | 500          | 54                      | 3                               |

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.

## **2.4. Test Procedure**

The EUT and its simulators are placed on a turn table which is 0.8 and 1.5 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 can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 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 beamwidth of the antenna.

The worst radiated emission is measured on the Final Measurement.

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

## **2.5. Test Specification**

According to FCC Part 15 Subpart C Paragraph 15.231(b): 2015

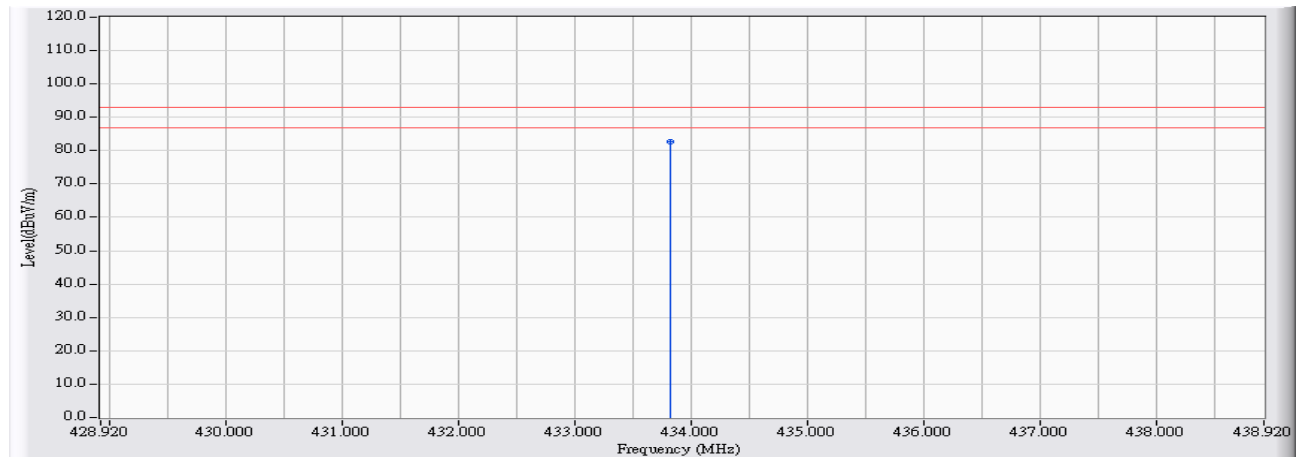
## **2.6. Uncertainty**

± 3.8 dB below 1GHz

± 3.9 dB above 1GHz

## 2.7. Test Result

|                                                        |                                  |
|--------------------------------------------------------|----------------------------------|
| Site : CB4-H                                           | Time : 2017/02/10                |
| Limit : FCC_SpartC_15.231(e)_F_433.92MHz_03M_PK        | Margin : 6                       |
| Probe : CB4-H_FCC_EFS_S2_30M-1GHz_1116 -<br>HORIZONTAL | Power : DC 3V (Power by Battery) |
| EUT : Tire Pressure Monitoring System                  | Note : 433.92MHz_X-axis          |

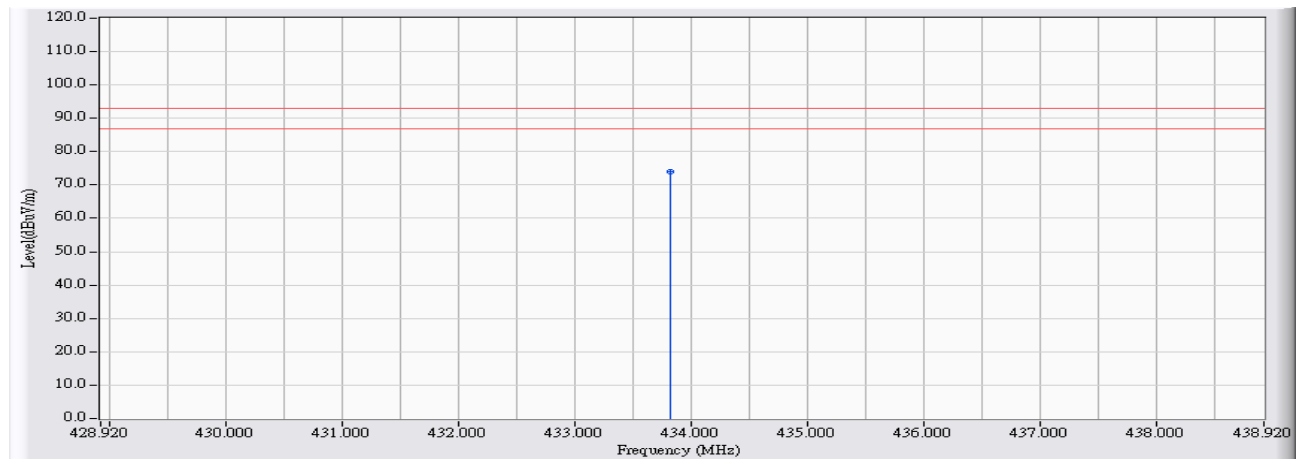


|   |   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 | * | 433.819            | 25.916                 | 56.642                  | 82.558                    | -10.312        | 92.870            | PEAK          |

Note:

1. All Reading Levels are Peak value.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

|                                                      |                                  |
|------------------------------------------------------|----------------------------------|
| Site : CB4-H                                         | Time : 2017/02/10                |
| Limit : FCC_SpartC_15.231(e)_F_433.92MHz_03M_PK      | Margin : 6                       |
| Probe : CB4-H_FCC_EFS_S2_30M-1GHz_1116 -<br>VERTICAL | Power : DC 3V (Power by Battery) |
| EUT : Tire Pressure Monitoring System                | Note : 433.92MHz_X-axis          |

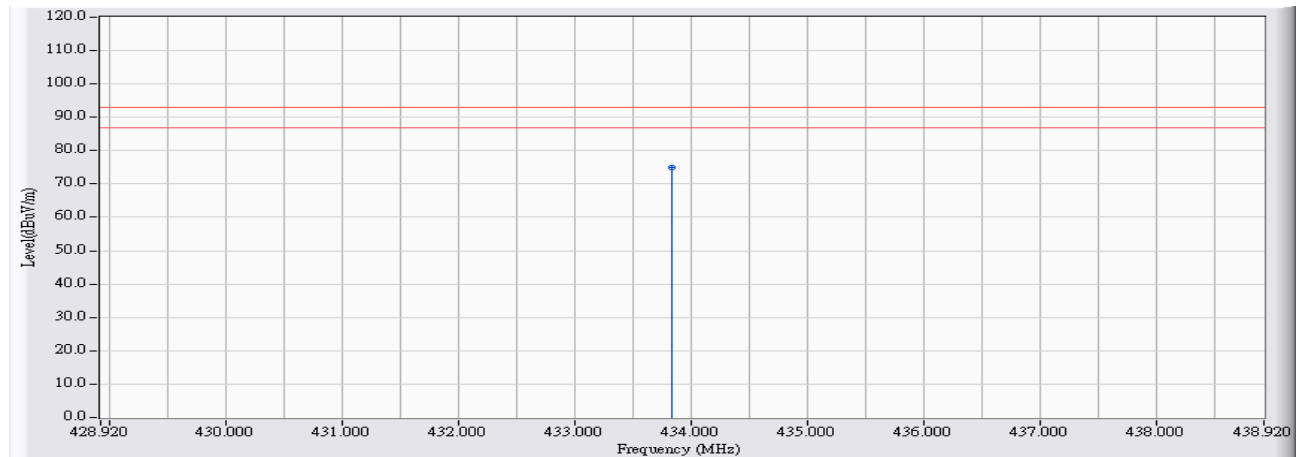


|   |   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 | * | 433.819            | 25.916                 | 47.940                  | 73.856                    | -19.014        | 92.870            | PEAK          |

Note:

1. All Reading Levels are Peak value.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

|                                                        |                                  |
|--------------------------------------------------------|----------------------------------|
| Site : CB4-H                                           | Time : 2017/02/10                |
| Limit : FCC_SpartC_15.231(e)_F_433.92MHz_03M_PK        | Margin : 6                       |
| Probe : CB4-H_FCC_EFS_S2_30M-1GHz_1116 -<br>HORIZONTAL | Power : DC 3V (Power by Battery) |
| EUT : Tire Pressure Monitoring System                  | Note : 433.92MHz_Y-axis          |

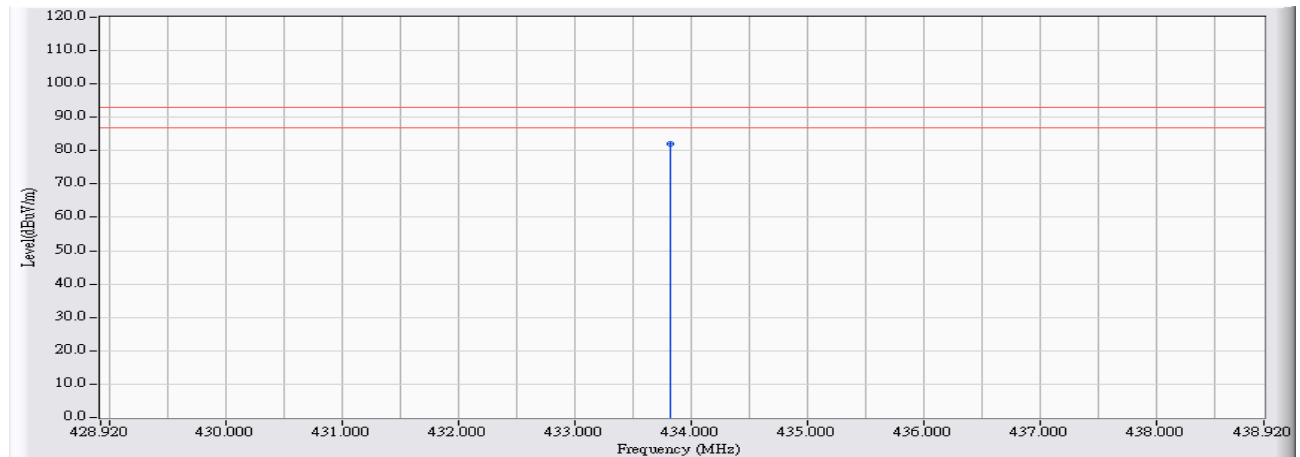


|   |   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 | * | 433.824            | 25.917                 | 48.903                  | 74.819                    | -18.051        | 92.870            | PEAK          |

Note:

1. All Reading Levels are Peak value.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

|                                                      |                                  |
|------------------------------------------------------|----------------------------------|
| Site : CB4-H                                         | Time : 2017/02/10                |
| Limit : FCC_SpartC_15.231(e)_F_433.92MHz_03M_PK      | Margin : 6                       |
| Probe : CB4-H_FCC_EFS_S2_30M-1GHz_1116 -<br>VERTICAL | Power : DC 3V (Power by Battery) |
| EUT : Tire Pressure Monitoring System                | Note : 433.92MHz_Y-axis          |

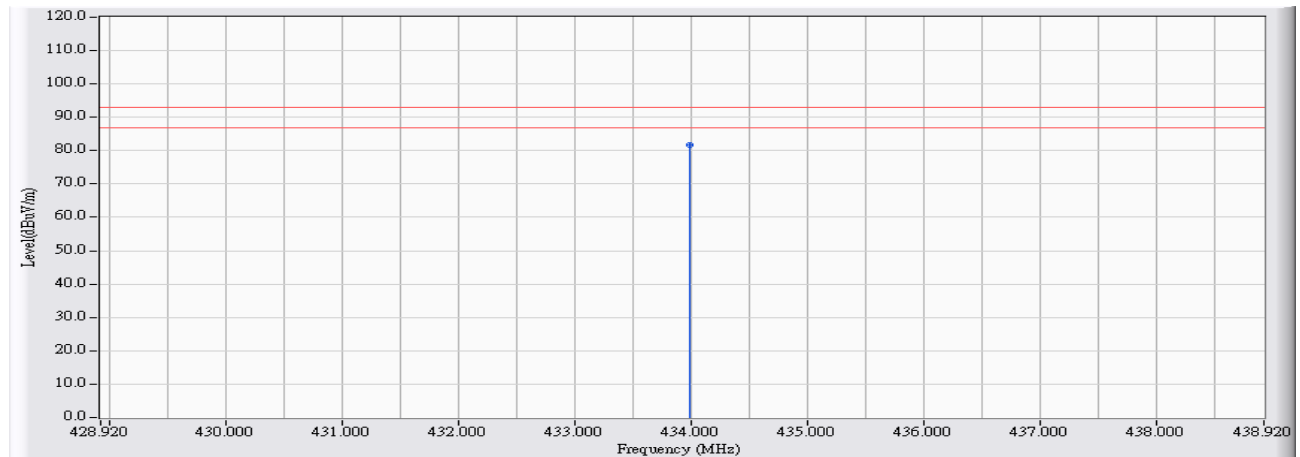


|   |   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 | * | 433.819            | 25.916                 | 55.998                  | 81.914                    | -10.956        | 92.870            | PEAK          |

Note:

1. All Reading Levels are Peak value.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

|                                                        |                                  |
|--------------------------------------------------------|----------------------------------|
| Site : CB4-H                                           | Time : 2017/02/10                |
| Limit : FCC_SpartC_15.231(e)_F_433.92MHz_03M_PK        | Margin : 6                       |
| Probe : CB4-H_FCC_EFS_S2_30M-1GHz_1116 -<br>HORIZONTAL | Power : DC 3V (Power by Battery) |
| EUT : Tire Pressure Monitoring System                  | Note : 433.92MHz_Z-axis          |

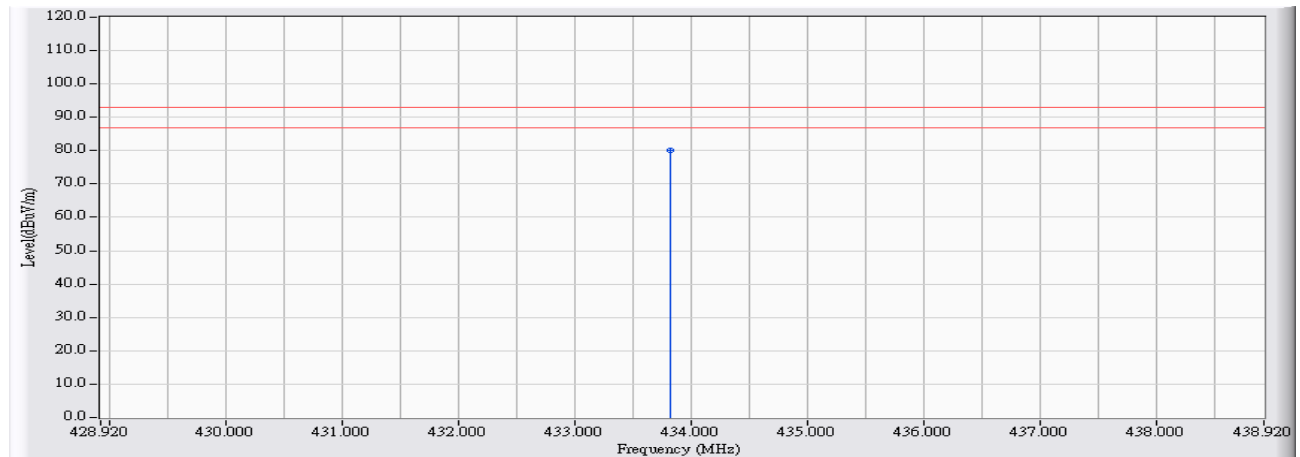


|   |   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 | * | 433.980            | 25.919                 | 55.935                  | 81.854                    | -11.016        | 92.870            | PEAK          |

Note:

1. All Reading Levels are Peak value.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

|                                                      |                                  |
|------------------------------------------------------|----------------------------------|
| Site : CB4-H                                         | Time : 2017/02/10                |
| Limit : FCC_SpartC_15.231(e)_F_433.92MHz_03M_PK      | Margin : 6                       |
| Probe : CB4-H_FCC_EFS_S2_30M-1GHz_1116 -<br>VERTICAL | Power : DC 3V (Power by Battery) |
| EUT : Tire Pressure Monitoring System                | Note : 433.92MHz_Z-axis          |



|   |   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 | * | 433.820            | 25.917                 | 54.276                  | 80.192                    | -12.678        | 92.870            | PEAK          |

Note:

1. All Reading Levels are Peak value.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

|              |                                 |           |       |
|--------------|---------------------------------|-----------|-------|
| Product      | Tire Pressure Monitoring System |           |       |
| Test Item    | Fundamental Radiated Emission   |           |       |
| Test Mode    | Mode 1: Transmit                |           |       |
| Date of Test | 2017/02/10                      | Test Site | CB4-H |

| Frequency<br>(MHz) | Correct<br>Factor<br>(dB) | Reading<br>Level<br>(dBuV) | Peak<br>Measurement<br>Level<br>(dBuV/m) | Average<br>Measurement<br>Level<br>(dBuV/m) | Average Limit<br>(dBuV/m) |
|--------------------|---------------------------|----------------------------|------------------------------------------|---------------------------------------------|---------------------------|
| <b>Horizontal</b>  |                           |                            |                                          |                                             |                           |
| 433.920(X-axis)    | 25.916                    | 56.642                     | 82.558                                   | 62.558                                      | 72.870                    |
| 433.920(Y-axis)    | 25.917                    | 48.903                     | 74.819                                   | 54.819                                      | 72.870                    |
| 433.920(Z-axis)    | 25.919                    | 55.935                     | 81.854                                   | 61.854                                      | 72.870                    |
| <b>Vertical</b>    |                           |                            |                                          |                                             |                           |
| 433.920(X-axis)    | 25.916                    | 47.940                     | 73.856                                   | 53.856                                      | 72.870                    |
| 433.920(Y-axis)    | 25.916                    | 55.998                     | 81.914                                   | 61.914                                      | 72.870                    |
| 433.920(Z-axis)    | 25.917                    | 54.276                     | 80.192                                   | 60.192                                      | 72.870                    |

Note1:

Peak Measurement Level = Reading Level +Correct factor

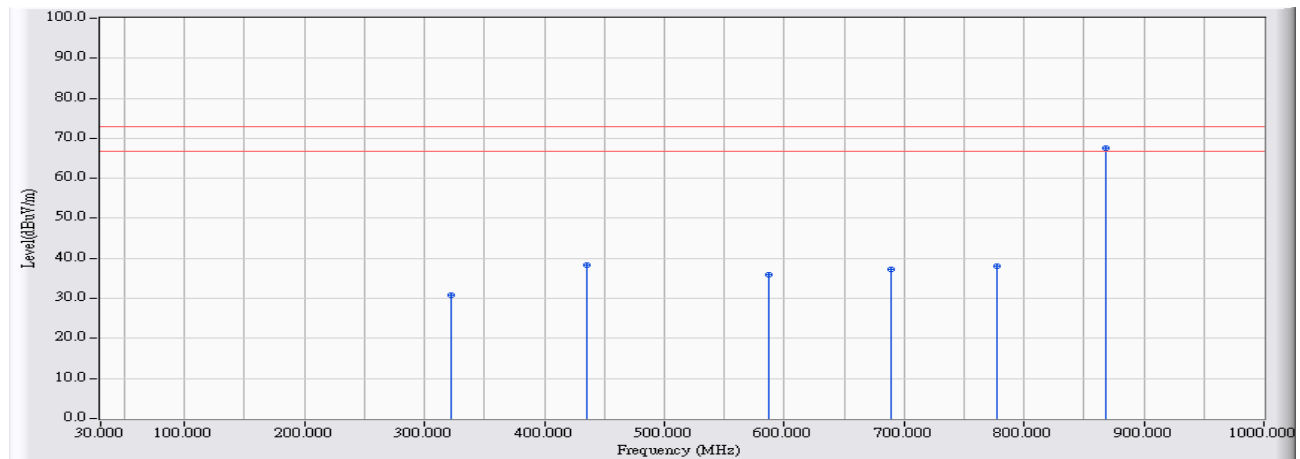
Average Measurement Level = Peak Measurement Level +20Log(Duty Cycle)

(Duty Cycle)=(Ton/(Ton+Toff))=8.62/93.5=0.09219

20Log(Duty Cycle)= -20.715

**30MHz-1GHz Spurious :**

|                                                        |                                  |
|--------------------------------------------------------|----------------------------------|
| Site : CB4-H                                           | Time : 2017/02/10                |
| Limit : FCC_SpartC_15.231(e)_H_433.92MHz_03M_PK        | Margin : 6                       |
| Probe : CB4-H_FCC_EFS_S2_30M-1GHz_1116 -<br>HORIZONTAL | Power : DC 3V (Power by Battery) |
| EUT : Tire Pressure Monitoring System                  | Note : 433.92MHz                 |

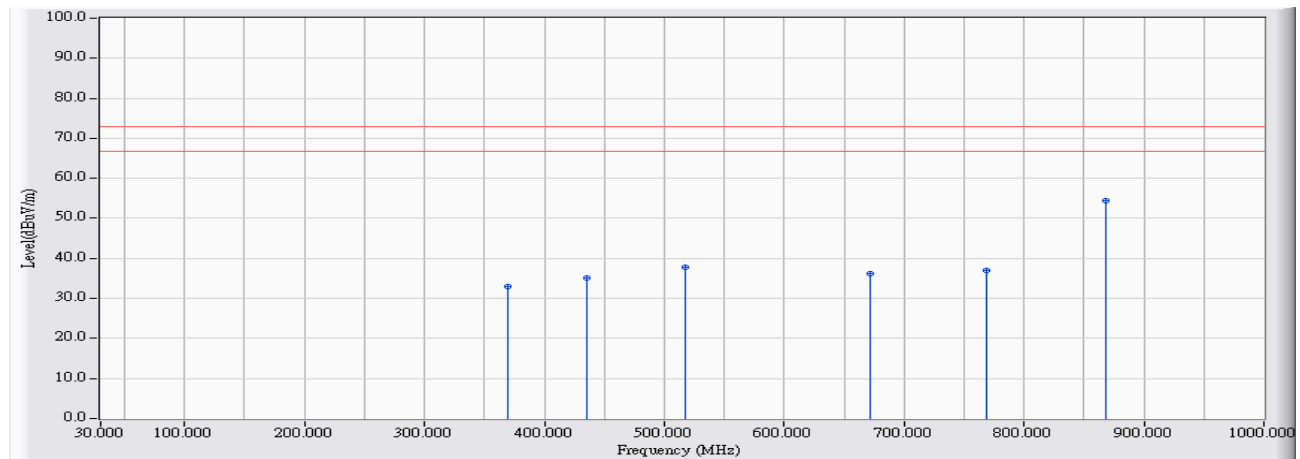


|   |   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 |   | 322.717            | 22.938                 | 7.847                   | 30.785                    | -42.085        | 72.870            | QUASIPeAK     |
| 2 |   | 435.710            | 25.946                 | 12.498                  | 38.444                    | -34.426        | 72.870            | QUASIPeAK     |
| 3 |   | 587.112            | 28.082                 | 7.758                   | 35.840                    | -37.030        | 72.870            | QUASIPeAK     |
| 4 |   | 688.564            | 28.853                 | 8.327                   | 37.181                    | -35.689        | 72.870            | QUASIPeAK     |
| 5 |   | 777.698            | 29.893                 | 8.134                   | 38.028                    | -34.842        | 72.870            | QUASIPeAK     |
| 6 | * | 867.608            | 30.886                 | 36.708                  | 67.594                    | -5.276         | 72.870            | QUASIPeAK     |

Note:

1. All Reading Levels are Quasi-Peak value.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

|                                                      |                                  |
|------------------------------------------------------|----------------------------------|
| Site : CB4-H                                         | Time : 2017/02/10                |
| Limit : FCC_SpartC_15.231(e)_H_433.92MHz_03M_PK      | Margin : 6                       |
| Probe : CB4-H_FCC_EFS_S2_30M-1GHz_1116 -<br>VERTICAL | Power : DC 3V (Power by Battery) |
| EUT : Tire Pressure Monitoring System                | Note : 433.92MHz                 |



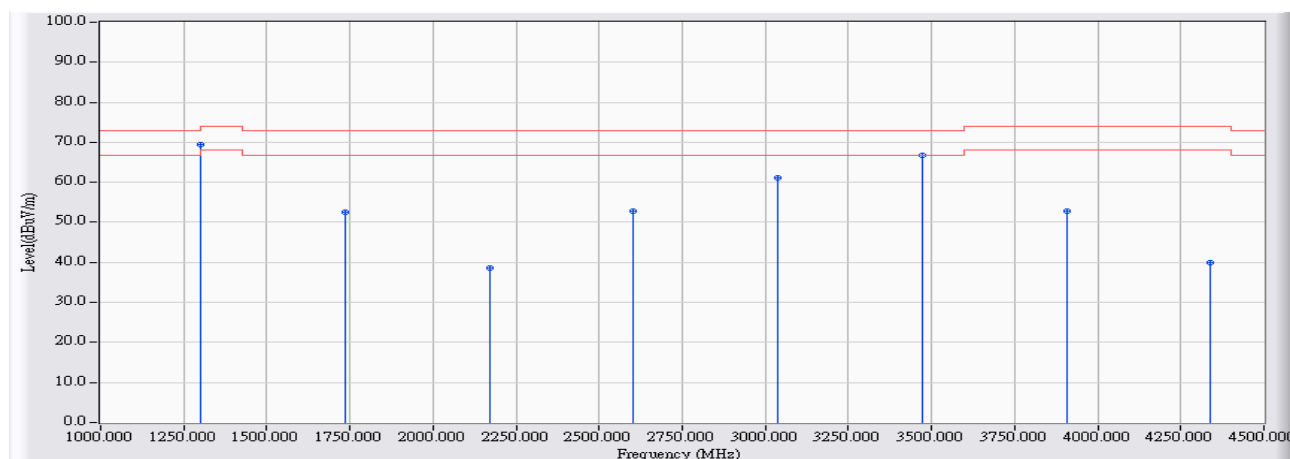
|   |   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 |   | 368.884            | 24.353                 | 8.565                   | 32.918                    | -39.952        | 72.870            | QUASIPeAK     |
| 2 |   | 435.613            | 25.945                 | 9.236                   | 35.181                    | -37.689        | 72.870            | QUASIPeAK     |
| 3 |   | 517.182            | 27.208                 | 10.574                  | 37.782                    | -35.088        | 72.870            | QUASIPeAK     |
| 4 |   | 671.979            | 28.805                 | 7.487                   | 36.292                    | -36.578        | 72.870            | QUASIPeAK     |
| 5 |   | 768.290            | 29.734                 | 7.234                   | 36.967                    | -35.903        | 72.870            | QUASIPeAK     |
| 6 | * | 867.899            | 30.885                 | 23.626                  | 54.511                    | -18.359        | 72.870            | QUASIPeAK     |

Note:

1. All Reading Levels are Quasi-Peak value.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

**Above 1GHz Spurious:**

|                                                            |                                  |
|------------------------------------------------------------|----------------------------------|
| Site : CB4-H                                               | Time : 2017/02/15                |
| Limit : FCC_SpartC_15.231(e)_H_433.92MHz_03M_PK            | Margin : 6                       |
| Probe : CB4-H_FCC_EFS_B091_1-18GHz_3M_0117 -<br>HORIZONTAL | Power : DC 3V (Power by Battery) |
| EUT : Tire Pressure Monitoring System                      | Note : 433.92MHz                 |



|   |   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 | * | 1301.670           | -6.618                 | 75.957                  | 69.339                    | -4.661         | 74.000            | PEAK          |
| 2 |   | 1735.274           | -5.063                 | 57.560                  | 52.497                    | -20.373        | 72.870            | PEAK          |
| 3 |   | 2169.233           | -3.375                 | 42.101                  | 38.726                    | -34.144        | 72.870            | PEAK          |
| 4 |   | 2602.492           | -1.643                 | 54.532                  | 52.890                    | -19.980        | 72.870            | PEAK          |
| 5 |   | 3036.796           | -0.591                 | 61.739                  | 61.147                    | -11.723        | 72.870            | PEAK          |
| 6 |   | 3470.403           | 0.166                  | 66.475                  | 66.641                    | -6.229         | 72.870            | PEAK          |
| 7 |   | 3905.760           | 1.720                  | 51.084                  | 52.803                    | -21.197        | 74.000            | PEAK          |
| 8 |   | 4339.716           | 3.420                  | 36.528                  | 39.948                    | -34.052        | 74.000            | PEAK          |

**Note:**

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. " \* ", means this data is the worst emission level.
4. Measurement Level = Reading Level + Correct Factor.
5. Average Measurement Level = Peak Measurement Level + 20Log (Duty Cycle)  
 $\text{Duty Cycle(Only Ton)} = \text{Ton} / (\text{Ton} + \text{off}) = 8.45 / 100 = 0.0845$   
 $20 * \text{Log}(\text{Duty Cycle}) = -21.463$
6. The average measurement was not performed when the peak measured data under the limit of peak detection.

|                                                            |                                  |
|------------------------------------------------------------|----------------------------------|
| Site : CB4-H                                               | Time : 2017/02/16                |
| Limit : FCC_SpartC_15.231(e)_H_433.92MHz_03M_AV            | Margin : 6                       |
| Probe : CB4-H_FCC_EFS_B091_1-18GHz_3M_0117 -<br>HORIZONTAL | Power : DC 3V (Power by Battery) |
| EUT : Tire Pressure Monitoring System                      | Note : 433.92MHz                 |

| Frequency | Peak        | Duty Cycle | Measurement | Margin | Limit  |
|-----------|-------------|------------|-------------|--------|--------|
|           | Measurement | Factor     | Level       |        |        |
| MHz       | dBuV/m      | dB         | dBuV/m      | dB     | dBuV/m |

**Horizontal****Average Detector:**

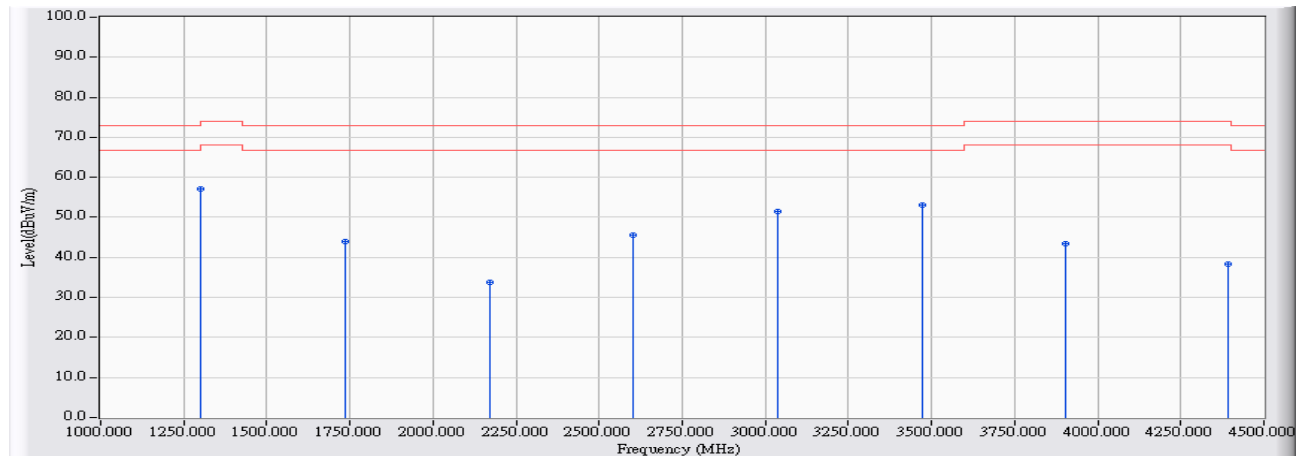
|          |        |         |        |         |        |
|----------|--------|---------|--------|---------|--------|
| 1301.67  | 69.339 | -20.000 | 49.339 | -4.661  | 54.000 |
| 3036.796 | 61.147 | -20.000 | 41.147 | -11.723 | 52.870 |
| 3470.403 | 66.641 | -20.000 | 46.641 | -6.229  | 52.870 |

Average Measurement Level = Peak Measurement Level + 20Log (Duty Cycle)

Duty Cycle(Only Ton)= Ton/ (Ton+off)=8.45/100=0.0845

20\*Log(Duty Cycle) = -21.463

|                                                          |                                  |
|----------------------------------------------------------|----------------------------------|
| Site : CB4-H                                             | Time : 2017/02/15                |
| Limit : FCC_SpartC_15.231(e)_H_433.92MHz_03M_PK          | Margin : 6                       |
| Probe : CB4-H_FCC_EFS_B091_1-18GHz_3M_0117 -<br>VERTICAL | Power : DC 3V (Power by Battery) |
| EUT : Tire Pressure Monitoring System                    | Note : 433.92MHz                 |



|   |   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 | * | 1301.670           | -6.618                 | 63.620                  | 57.002                    | -16.998        | 74.000            | PEAK          |
| 2 |   | 1735.276           | -5.063                 | 49.132                  | 44.069                    | -28.801        | 72.870            | PEAK          |
| 3 |   | 2170.283           | -3.370                 | 37.093                  | 33.723                    | -39.147        | 72.870            | PEAK          |
| 4 |   | 2603.889           | -1.639                 | 47.223                  | 45.585                    | -27.285        | 72.870            | PEAK          |
| 5 |   | 3036.796           | -0.591                 | 52.103                  | 51.511                    | -21.359        | 72.870            | PEAK          |
| 6 |   | 3470.404           | 0.166                  | 52.811                  | 52.977                    | -19.893        | 72.870            | PEAK          |
| 7 |   | 3904.009           | 1.713                  | 41.694                  | 43.406                    | -30.594        | 74.000            | PEAK          |
| 8 |   | 4391.161           | 3.637                  | 34.771                  | 38.407                    | -35.593        | 74.000            | PEAK          |

## Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. “ \* ”, means this data is the worst emission level.
4. Measurement Level = Reading Level + Correct Factor.
5. Average Measurement Level = Peak Measurement Level + 20Log (Duty Cycle)  
 Duty Cycle(Only Ton)= Ton/ (Ton+off)=8.45/100=0.0845  
 $20 \times \text{Log}(\text{Duty Cycle}) = -21.463$
6. The average measurement was not performed when the peak measured data under the limit of peak detection.

|                                                          |                                  |
|----------------------------------------------------------|----------------------------------|
| Site : CB4-H                                             | Time : 2017/02/16                |
| Limit : FCC_SpartC_15.231(e)_H_433.92MHz_03M_AV          | Margin : 6                       |
| Probe : CB4-H_FCC_EFS_B091_1-18GHz_3M_0117 -<br>VERTICAL | Power : DC 3V (Power by Battery) |
| EUT : Tire Pressure Monitoring System                    | Note : 433.92MHz                 |

| Frequency<br>MHz         | Peak<br>Measurement<br>dBuV/m | Duty Cycle<br>Factor<br>dB | Measurement<br>Level<br>dBuV/m | Margin<br>dB | Limit<br>dBuV/m |
|--------------------------|-------------------------------|----------------------------|--------------------------------|--------------|-----------------|
| <b>Horizontal</b>        |                               |                            |                                |              |                 |
| <b>Average Detector:</b> |                               |                            |                                |              |                 |
| 1301.67                  | 57.002                        | -20.000                    | 37.002                         | -16.998      | 54.000          |
| 3470.404                 | 52.977                        | -20.000                    | 32.977                         | -19.893      | 52.870          |

Average Measurement Level = Peak Measurement Level + 20Log (Duty Cycle)

Duty Cycle(Only Ton)= Ton/ (Ton+off)=8.45/100=0.0845

20\*Log(Duty Cycle) = -21.463

### 3. Occupied Bandwidth

#### 3.1. Test Equipment

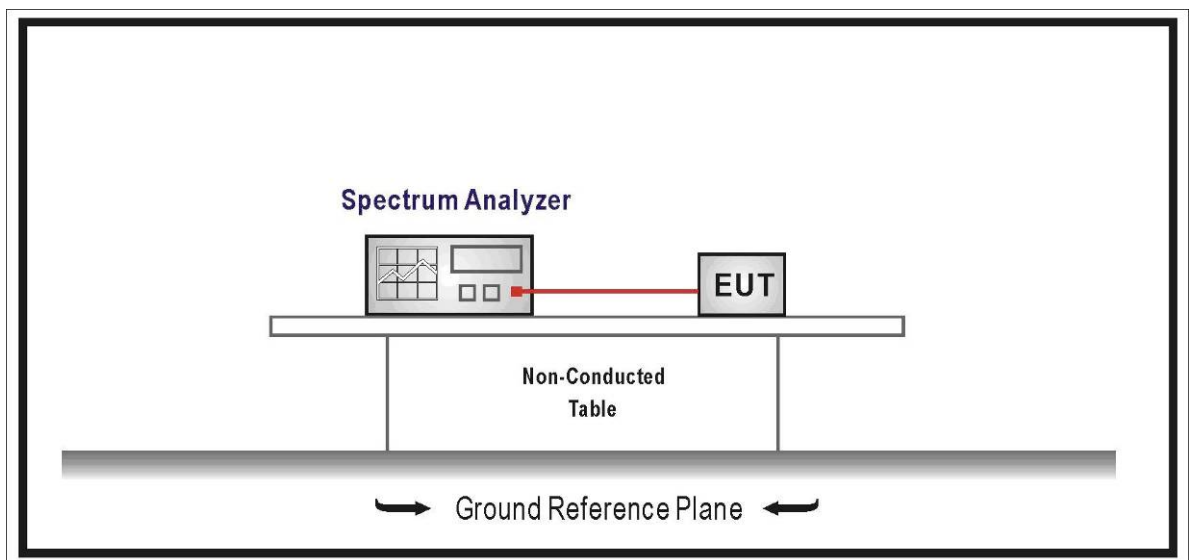
The following test equipments are used during the radiated emission tests:

Occupied Bandwidth / SR10-H

| Instrument        | Manufacturer | Model No. | Serial No  | Next Cal. Date |
|-------------------|--------------|-----------|------------|----------------|
| Spectrum Analyzer | Agilent      | N9010A    | US47140172 | 2016/08/09     |

Note: All equipments that need to calibrate are with calibration period of 1 year.

#### 3.2. Test Setup



#### 3.3. Limits

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. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

#### 3.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.231(b): 2015

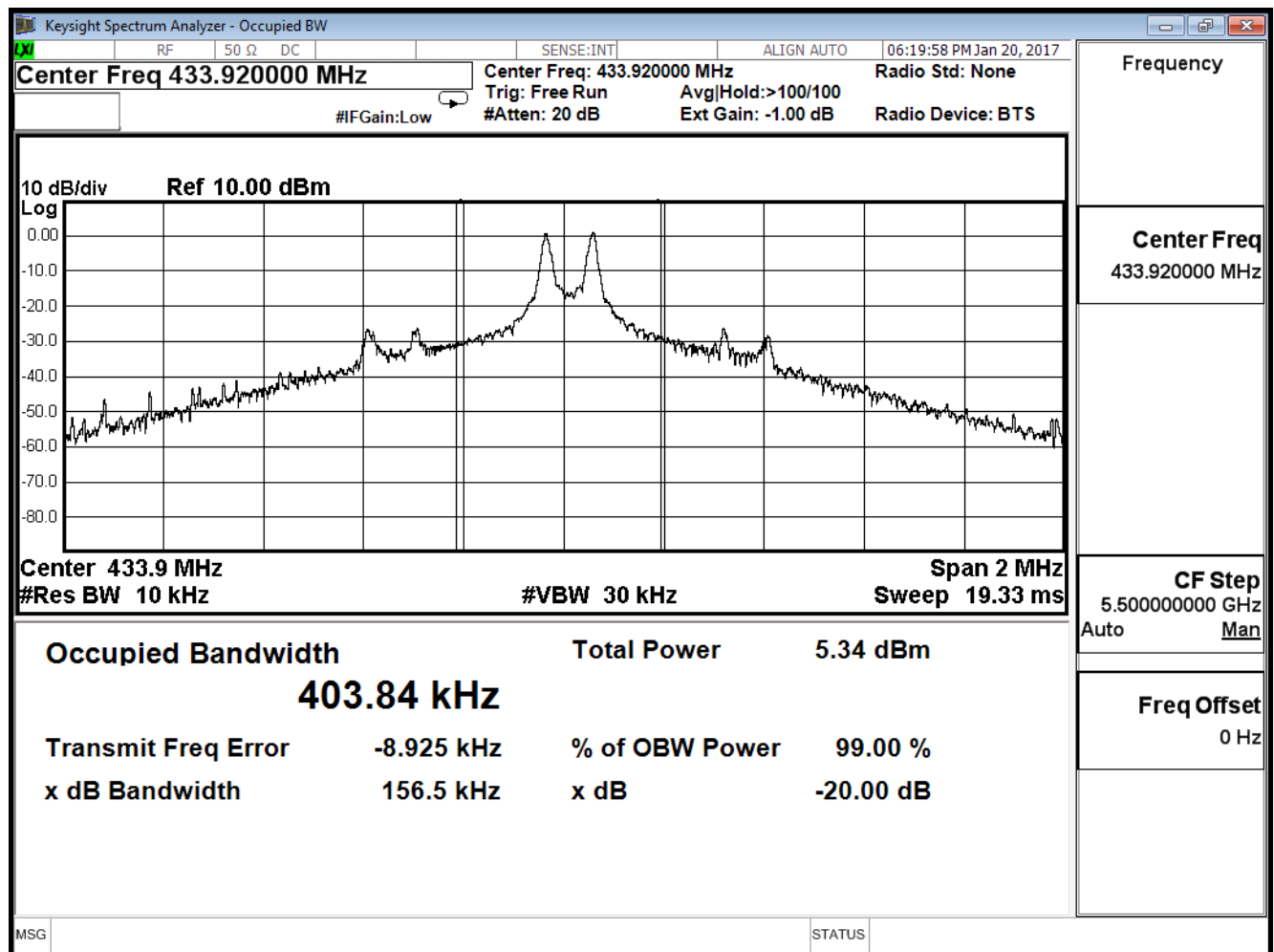
#### 3.5. Uncertainty

$\pm 150\text{Hz}$

### 3.6. Test Result

|              |                                 |           |        |
|--------------|---------------------------------|-----------|--------|
| Product      | Tire Pressure Monitoring System |           |        |
| Test Item    | Occupied Bandwidth              |           |        |
| Test Mode    | Mode 1: Transmit                |           |        |
| Date of Test | 2017/01/20                      | Test Site | SR10-H |

| Channel No. | Frequency<br>(MHz) | Measure Level<br>(MHz) | Limit<br>(MHz) |
|-------------|--------------------|------------------------|----------------|
| 01          | 433.92             | 0.157                  | 1.0848         |



#### 4. Duty cycle

##### 4.1. Test Equipment

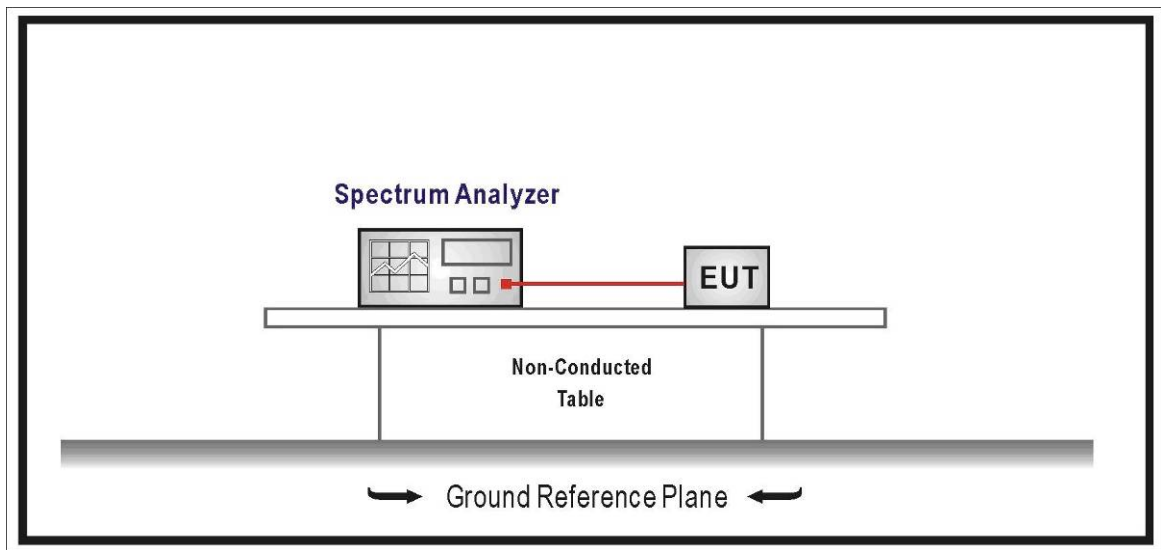
The following test equipments are used during the radiated emission tests:

Duty cycle / SR10-H

| Instrument        | Manufacturer | Model No. | Serial No  | Next Cal. Date |
|-------------------|--------------|-----------|------------|----------------|
| Spectrum Analyzer | Agilent      | N9010A    | US47140172 | 2016/08/09     |

Note: All equipments that need to calibrate are with calibration period of 1 year.

##### 4.2. Test Setup



##### 4.3. Limits

N/A

##### 4.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.231(b): 2015

##### 4.5. Uncertainty

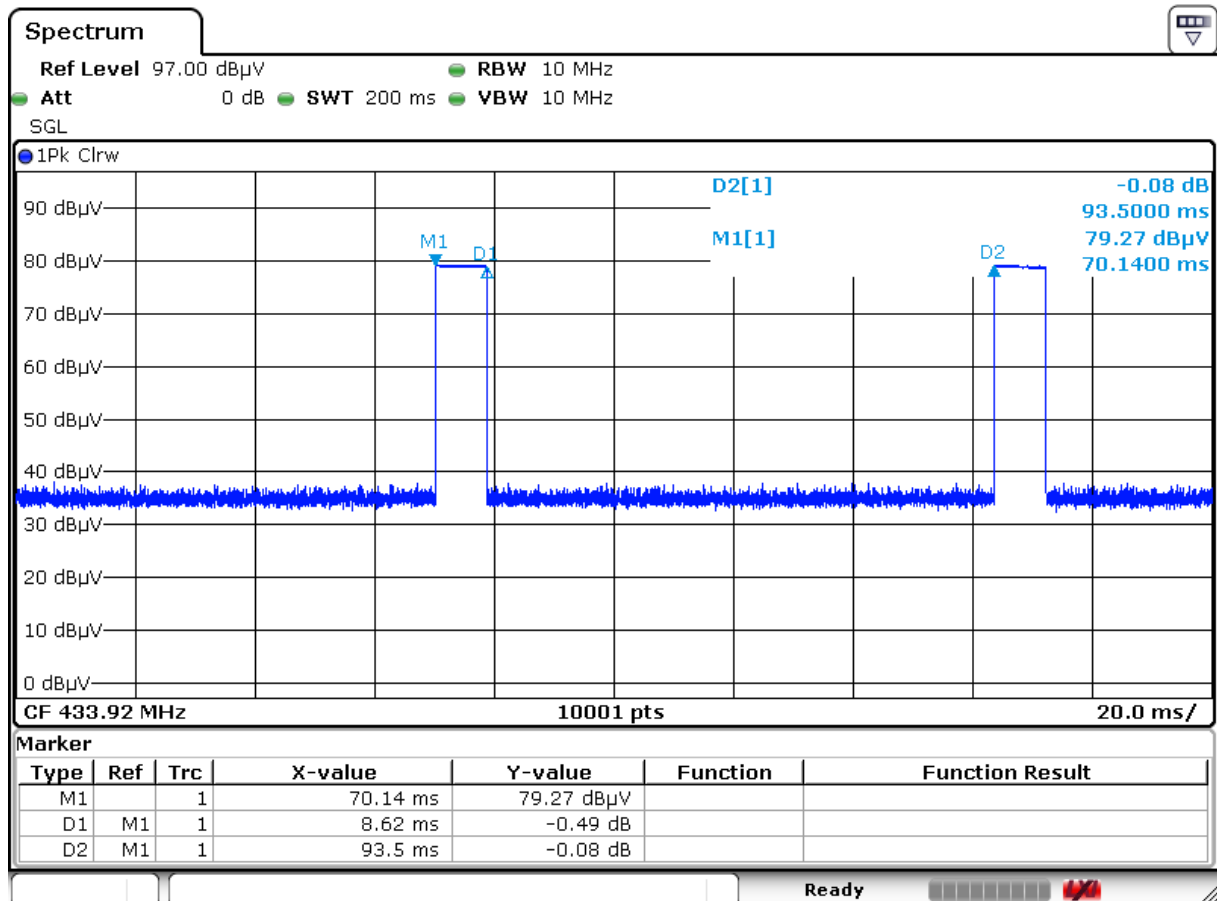
± 25msec

##### 4.6. Test Result

|         |                                 |
|---------|---------------------------------|
| Product | Tire Pressure Monitoring System |
|---------|---------------------------------|

|              |                  |           |        |
|--------------|------------------|-----------|--------|
| Test Item    | Duty Cycle       |           |        |
| Test Mode    | Mode 1: Transmit |           |        |
| Date of Test | 2017/02/16       | Test Site | SR10-H |

| 433.92MHz |             |                 |               |                 |
|-----------|-------------|-----------------|---------------|-----------------|
| Mode      | On Time(ms) | On+Off Time(ms) | Duty Cycle(%) | Duty Factor(dB) |
| 433.92MHz | 8.620       | 93.500          | 9.21          | 20.715          |



Date: 16.FEB.2017 02:51:47

## 5. Transmitter time

### 5.1. Test Equipment

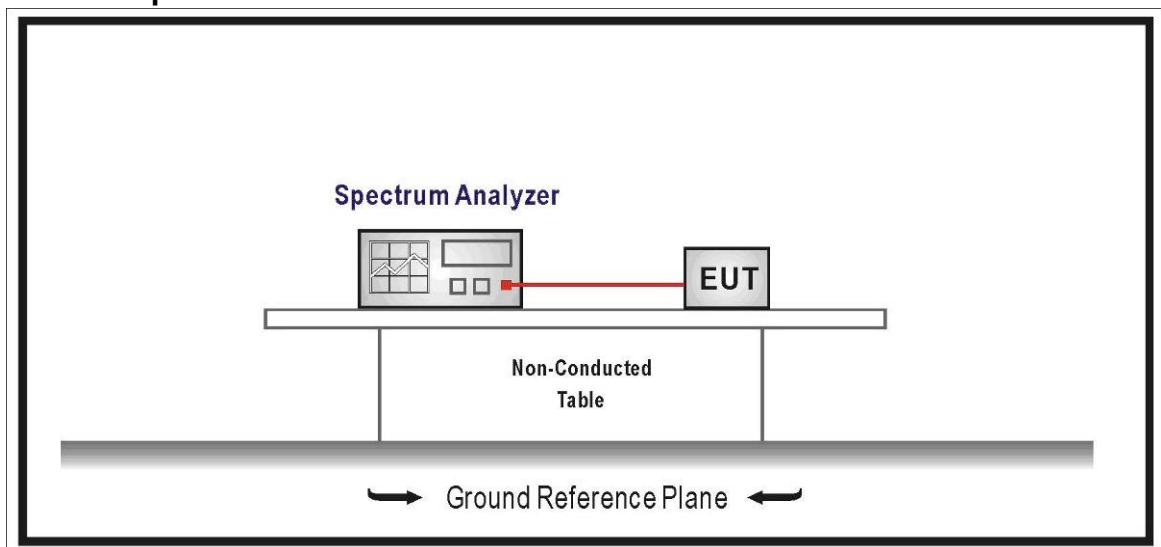
The following test equipments are used during the radiated emission tests:

Transmitter time / SR10-H

| Instrument        | Manufacturer | Model No. | Serial No  | Next Cal. Date |
|-------------------|--------------|-----------|------------|----------------|
| Spectrum Analyzer | Agilent      | N9010A    | US47140172 | 2016/08/09     |

Note: All equipments that need to calibrate are with calibration period of 1 year.

### 5.2. Test Setup



### 5.3. Limits

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released. A transmitter activated automatically shall cease transmission within 5 seconds after activation.

### 5.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.231(b): 2015

### 5.5. Uncertainty

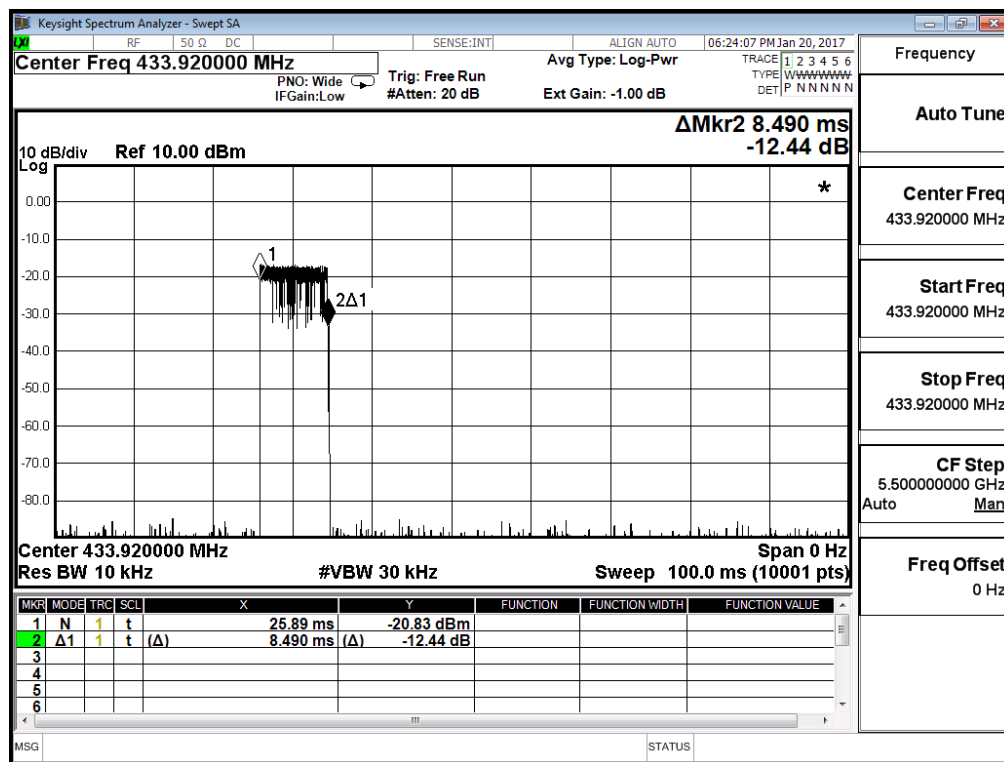
± 25msec

## 5.6. Test Result

|              |                                 |           |        |
|--------------|---------------------------------|-----------|--------|
| Product      | Tire Pressure Monitoring System |           |        |
| Test Item    | Transmitter time                |           |        |
| Test Mode    | Mode 1: Transmit                |           |        |
| Date of Test | 2017/02/16                      | Test Site | SR10-H |

|                 |                                                 |             |
|-----------------|-------------------------------------------------|-------------|
| Frequency (MHz) | Transmitter time (ms.)                          |             |
|                 | Measure value                                   | Limit       |
| 433.92          | 8.49                                            | $\leq 1000$ |
| Frequency (MHz) | Silent period (sec.)                            |             |
|                 | Measure value                                   | Limit       |
| 433.92          | 59.58                                           | $\geq 10$   |
| Frequency (MHz) | Total duration of transmissions per hour (sec.) |             |
|                 | Measure value                                   | Limit       |
| 433.92          | 0.513                                           | $\leq 2$    |

### Transmitter time



Transmitter time

