TECHNICAL REPORT

**ISO/IEC17025 Accredited Lab.**

Report No: FCC/IC1402046
File reference No: 2014-03-25

Applicant: SHANGHAI BAOLONG AUTOMOTIVE CORPORATION

Product: Tyre Pressure Monitoring System

Model No: FS43X0L3

Trademark: Valor, Digitire

Test Standards: FCC Part 15 Subpart C, Paragraph 15.231 and RSS-210 Issue 8

Test result: It is herewith confirmed and found to comply with the requirements set up by ANSI C63.4&FCC Part 15 Subpart C, Paragraph 15.231 and RSS-210 Issue 8 regulations for the evaluation of electromagnetic compatibility

Approved By

Jack Chung

Jack Chung
Manager

Dated: March 25, 2014

**Results appearing herein relate only to the sample tested**
**The technical reports is issued errors and omissions exempt and is subject to withdrawal at**


**SHENZHEN TIMEWAY TECHNOLOGY CONSULTING CO LTD**

5/F,Block 4, Anhua Industrial Zone.,No.8 TaiRan Rd.CheGongMiao,FuTian District, Shenzhen,CHINA.

Tel (755) 83448688 Fax (755) 83442996

## Special Statement:

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19.

The testing quality system of our laboratory meets with ISO/IEC-17025 requirements, which is approved by CNAS. This approval result is accepted by MRA of APLAC.

Our test facility is recognized, certified, or accredited by the following organizations:

**CNAS-LAB Code: L2292**

The EMC Laboratory has been assessed and in compliance with CNAS-CL01 accreditation criteria for testing Laboratories (identical to ISO/IEC 17025:1999 General Requirements) for the Competence of testing Laboratories.

**FCC-Registration No.: 899988**

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission. The acceptance letter from the FCC is maintained in our files. Registration No.:899988.

**IC- Registration No.: IC5205A-02**

The EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration No.: IC 5205A-02.

Test Report Conclusion

Content

## 1.0 General Details

### 1.1 Test Lab Details

Name : SHENZHEN TIMEWAY TECHNOLOGY CONSULTING CO LTD

Address: 5/F,Block 4, Anhua Industrial Zone.,No.8 TaiRan Rd.CheGongMiao,FuTian District, Shenzhen,CHINA.

Telephone: (755) 83448688

Fax: (755) 83442996

Site on File with the Federal Communications Commission – United Sates

Registration Number: 899988

For 3m & 10 m OATS

Site Listed with Industry Canada of Ottawa, Canada

Registration Number: IC: 5205A-02

For 3m & 10 m OATS

### 1.2 Applicant Details

Applicant: SHANGHAI BAOLONG AUTOMOTIVE CORPORATION

Address: 5500, Shenzhuan Rd, Songjiang District, Shanghai 201619, China.

Telephone: --

Fax: --

### 1.3 Description of EUT

| | |
|---|---|
| Product: | Tyre Pressure Monitoring System |
| Manufacturer: | Shanghai Qunying Auto Electronics Co., Ltd. |
| Address: | 5500, Shenzhuan Rd, Songjiang District, Shanghai |
| Brand Name: | Valor |
| Model Number: | FS43X0L3 |
| Additional Model Name | N/A |
| Additional Trade Name | Digitire |
| Rating: | DC 3V (CR2450 Button Battery) |
| Operation Frequency: | 433.92MHz |
| Modulation Type: | FSK |
| Emission Designation: | 184KF1D |
| Antenna Designation | Integral Antenna with Gain 0 dBi |

### 1.4 Submitted Sample

2 Samples

### 1.5 Test Duration

2014-02-24 to 2014-03-25

1.6 Test Uncertainty

Conducted Emissions Uncertainty =3.6dB

Radiated Emissions Uncertainty =4.7dB

1.7 Test Engineer

The sample tested by _____

Print Name: Terry Tang

| **2.0** | **Test Equipments** | | | | |
|---|---|---|---|---|---|
| Instrument Type | Manufacturer | Model | Serial No. | Date of Cal. | Due Date |
| Ultra Broadband ANT | ROHDE&SCHWARZ | HL562 | 100157 | 2013-08-23 | 2014-08-22 |
| System Controller | CT | SC100 | - | 2013-08-23 | 2014-08-22 |
| Power Amplifier | AR | 150W1000 | 300999 | 2013-08-23 | 2014-08-22 |
| ESPI Test Receiver | ROHDE&SCHWARZ | ESI26 | 838786/013 | 2013-08-23 | 2014-08-22 |
| 3m OATS | -- | -- | N/A | 2013-08-23 | 2014-08-22 |
| Horn Antenna | SCHWARZBECK | BBHA 9120D | 9120D-631 | 2013-08-23 | 2014-08-22 |

## 3.0 Technical Details

3.1 Summary of test results

**The EUT has been tested according to the following specifications:**

| Standard | Test Type | Result | Notes |
|---|---|---|---|
| FCC Part 15, Paragraph 15.203 And RSS-210 Issue 8 | Antenna requirements | **PASS** | Compliant |
| FCC Part 15, Paragraph 15.207 And RSS-210 Issue 8 | Conducted Emission Test | **PASS** | N/A |
| FCC Part 15, Paragraph 15.209 And RSS-210 Issue 8 | General Requirement | **PASS** | Compliant |
| FCC Part 15, Paragraph 15.231 (e) And RSS-210 Issue 8 | Radiated Emission Test | **PASS** | Compliant |
| FCC Part 15, Paragraph 15.231 (c) And RSS-210 Issue 8 | 20dB Bandwidth Testing | **PASS** | Compliant |
| FCC Part 15, Paragraph 15.231 (e) And RSS-210 Issue 8 | Deactivate Testing | **PASS** | Compliant |

3.2 Test Standards

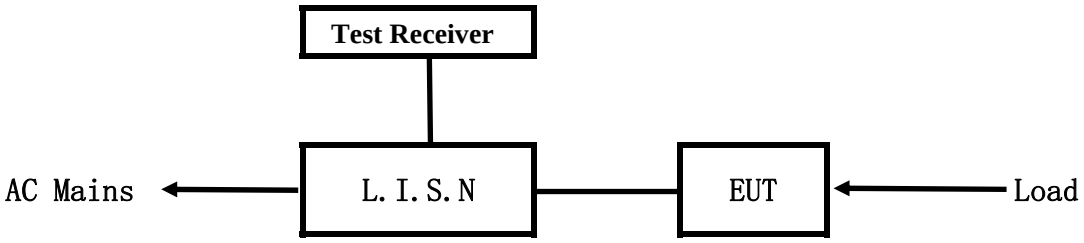
**FCC Part 15 Subpart C, Paragraph 15.231 And RSS-210 Issue 8**

4.0 EUT Modification

No modification by Shenzhen Timeway Technology Consulting Co.,Ltd

## 5. Power Line Conducted Emission Test

5.1 Schematics of the test

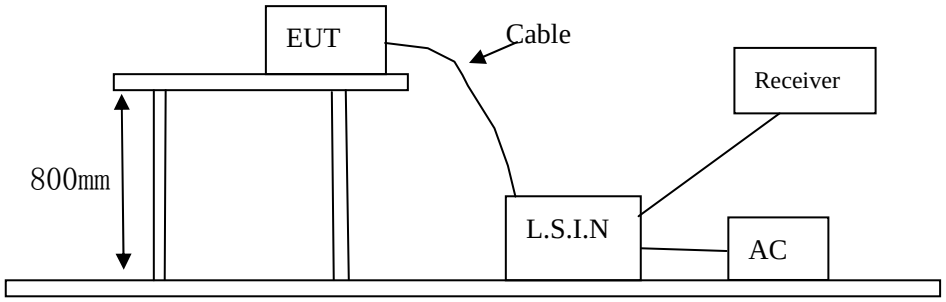



EUT: Equipment Under Test

5.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.4-2003.The Frequency spectrum From 0.15MHz to 30MHz was investigated. The LISN used was 50ohm/50uH as specified by section 5.1 of ANSI C63.4 –2003.

Block diagram of Test setup




5.3 Configuration of The EUT

The EUT was configured according to ANSI C63.4-2003. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

A. EUT

| Device | Manufacturer | Model | FCC ID/IC |
|---|---|---|---|
| Tyre Pressure Monitoring System | Shanghai Qunying Auto Electronics Co., Ltd. | FS43X0L3 | FCCID:Z9F-201FS43X<br>IC: 11852A-201FS43X |

B. Internal Device

| Device | Manufacturer | Model | FCC ID/DOC |
|---|---|---|---|
| N/A | | | |

C. Peripherals

| Device | Manufacturer | Model | FCC ID/DOC | Cable |
|---|---|---|---|---|
| N/A | | | | |

5.4 EUT Operating Condition

Operating condition is according to ANSI C63.4 -2003.

A Setup the EUT and simulators as shown on follow

B Enable AF signal and confirm EUT active to normal condition

5.5 Power line conducted Emission Limit according to Paragraph 15.207

| Frequency (MHz) | Class A Limits (dB μ V) | | Class B Limits (dB μ V) | |
|---|---|---|---|---|
| | Quasi-peak Level | Average Level | Quasi-peak Level | Average Level |
| 0.15 ～ 0.50 | 79.0 | 66.0 | 66.0～56.0* | 56.0～46.0* |
| 0.50 ～ 5.00 | 73.0 | 60.0 | 56.0 | 46.0 |
| 5.00 ～ 30.00 | 73.0 | 60.0 | 60.0 | 50.0 |

Notes: 1. *Decreasing linearly with logarithm of frequency.

2. The tighter limit shall apply at the transition frequencies

5.6 Test Results

The frequency spectrum from 0.15MHz to 30MHz was investigated. All reading are quasi-peak values with a resolution bandwidth of 9kHz. (The average detector is necessary when the Quasi-peak emission level beyond the average Limit.)

**Note: Due to DC operation, this test item not applicable.**

## 6 Radiated Emission Test

6.1 Test Method and test Procedure:

(1) The EUT was tested according to ANSI C63.4 –2003. The radiated test was performed at Timeway Laboratory. This site is on file with the FCC laboratory division, Registration No.899988

(2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.4-2003.

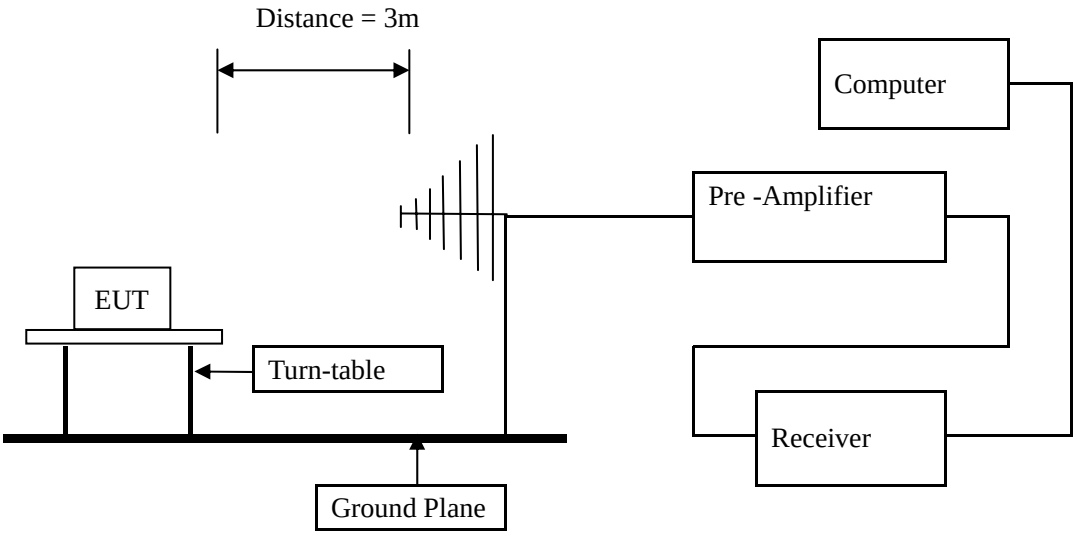
(3) The frequency spectrum from 30 MHz to 5 GHz was investigated. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 kHz. All readings are above 1 GHz, peak values with a resolution bandwidth of 1 MHz . Measurements were made at 3 meters.

(4) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.

(5) Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a "**QP**" in the data table.

(6) The antenna polarization : Vertical polarization and Horizontal polarization.

**Block diagram of Test setup**




6.2 Configuration of The EUT

Same as section 5.3 of this report

6.3 EUT Operating Condition

Same as section 5.4 of this report.

6.4 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

**A FCC Part 15 Subpart C Paragraph 15.231(e) Limit AND RSS-210 A1.1 Table B**

| Fundamental Frequency (MHz) | Field Strength of Fundamental | | Field Strength of Spurious Emission | |
|---|---|---|---|---|
| | **uV/m** | **dBuV/m** | **uV/m** | **dBuV/m** |
| 40.66-40.70 | 1000 | 60.00 | 100 | 40.00 |
| 70-130 | 500 | 53.98 | 50 | 33.98 |
| 130-174 | 500-1500 | 53.98-63.52 | 50-150 | 33.98-43.52 |
| 174-260 | 1500 | 63.52 | 150 | 43.52 |
| 260-470 | 1500-5000 | 63.52-73.98 | 150-500 | 43.52-53.98 |
| Above 470 | 5000 | 73.98 | 500 | 53.98 |

Note: 1. RF Field Strength (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.

4.Linear interpolations for frequency ranges 130-174MHz and 260-470MHz

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

6. New batteries were installed in the equipment under test for radiated emission testing.

**B. Frequencies in restricted band are complied to limit on Paragraph 15.209.**

| Frequency Range (MHz) | Distance (m) | Field strength (dB μ V/m) |
|---|---|---|
| 30-88 | 3 | 40.0 |
| 88-216 | 3 | 43.5 |
| 216-960 | 3 | 46.0 |
| Above 960 | 3 | 54.0 |

Note: 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 EUT

4. All scanning using PK detector. And the final emission level was get using QP detector for frequency range from 30-1000MHz.As to 1G-5G, the final emission level got using PK detector. And Average = peak(dBuV/m) – duty cycle(dB)

**6.5 Test result**

## A Fundamental Radiated Emission Data

| Product: | Tyre Pressure Monitoring System | Test Mode: | Keep Transmitting |
|---|---|---|---|
| Test Item: | Fundamental Radiated Emission and Spurious Emission Data | Temperature: | 25℃ |
| Test Voltage: | DC 3V | Humidity: | 56% |
| Test Result: | Pass | | |

| Frequency (MHz) | Emission PK/AV (dBuV/m) | Horiz / Vert | Limits PK/AV (dBuV/m) | Margin (dB) |
|---|---|---|---|---|
| 433.92 | 52.23(PK) | H | 92.87/72.87 | -20.64 |
| 433.92 | 62.06(PK) | V | 92.87/72.87 | -10.81 |
| 867.84 | -- | H | 72.87/52.87 | -- |
| 867.84 | -- | V | 72.87/52.87 | -- |
| 1301.76 | -- | H | 72.87/52.87 | -- |
| 1301.76 | -- | V | 72.87/52.87 | -- |
| 1735.68 | -- | H | 72.87/52.87 | -- |
| 1735.68 | -- | V | 72.87/52.87 | -- |
| 2169.6 | -- | H/V | 72.87/52.87 | -- |
| 2603.52 | -- | H/V | 72.87/52.87 | -- |
| 3037.44 | -- | H/V | 72.87/52.87 | -- |
| 3471.36 | -- | H/V | 72.87/52.87 | -- |
| 3905.28 | - | H/V | 72.87/52.87 | -- |
| 4339.2 | -- | H/V | 72.87/52.87 | -- |

**Note: Average = peak(dBuV/m) – duty cycle(dB), H=Horizontal, V=Vertical**

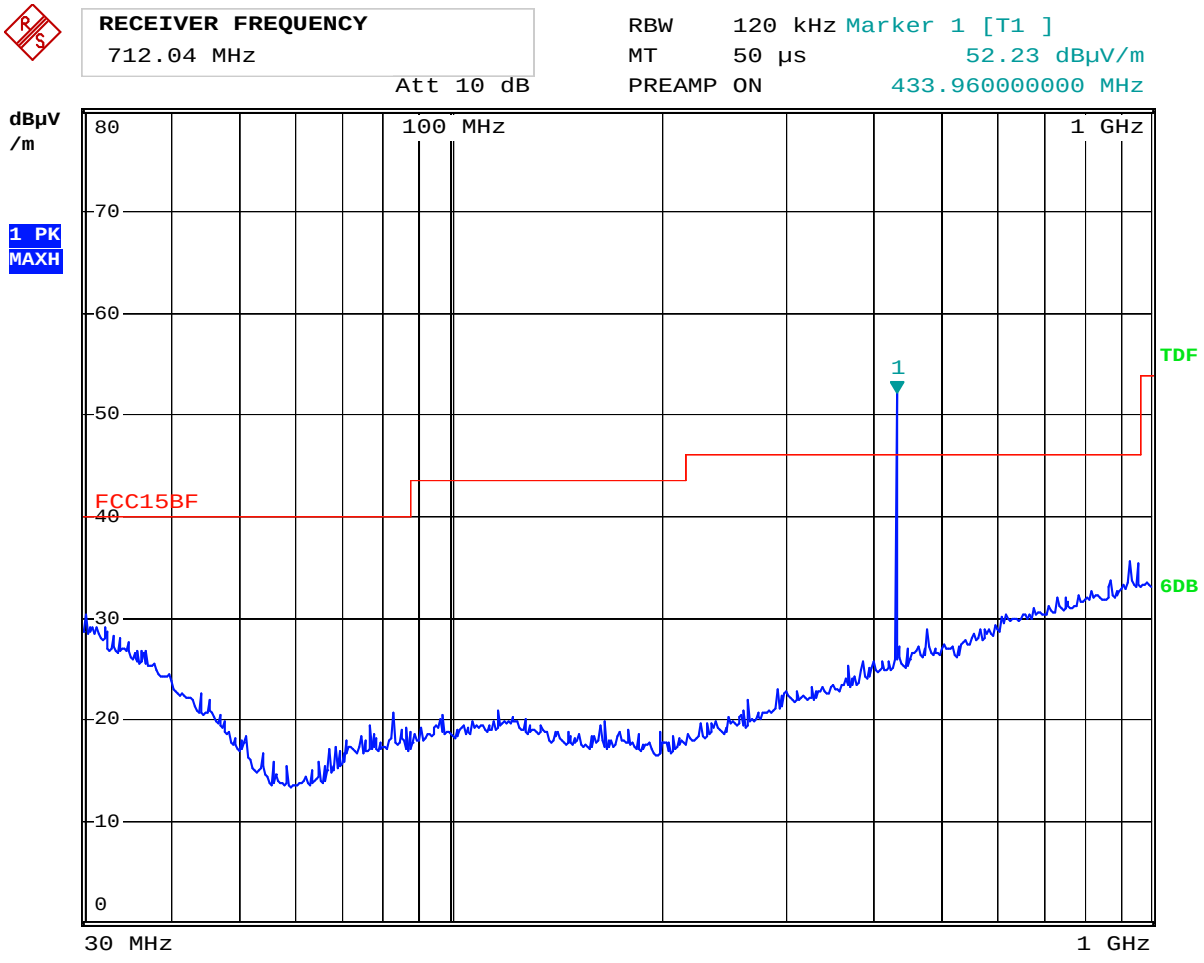
## B. General Radiated Emission Data and Harmonics Radiated Emission Data

**Radiated Emission In Horizontal (30MHz----1000MHz)**

EUT set Condition: Keep Transmitting

**Results:** **Pass**

Please refer to following diagram for individual




Date: 25.FEB.2014 10:41:14

| Frequency (MHz) | Level@3m (dB µ V/m) | Antenna Polarity | Limit@3m (dB µ V/m) |
|---|---|---|---|
| -- | -- | H | -- |

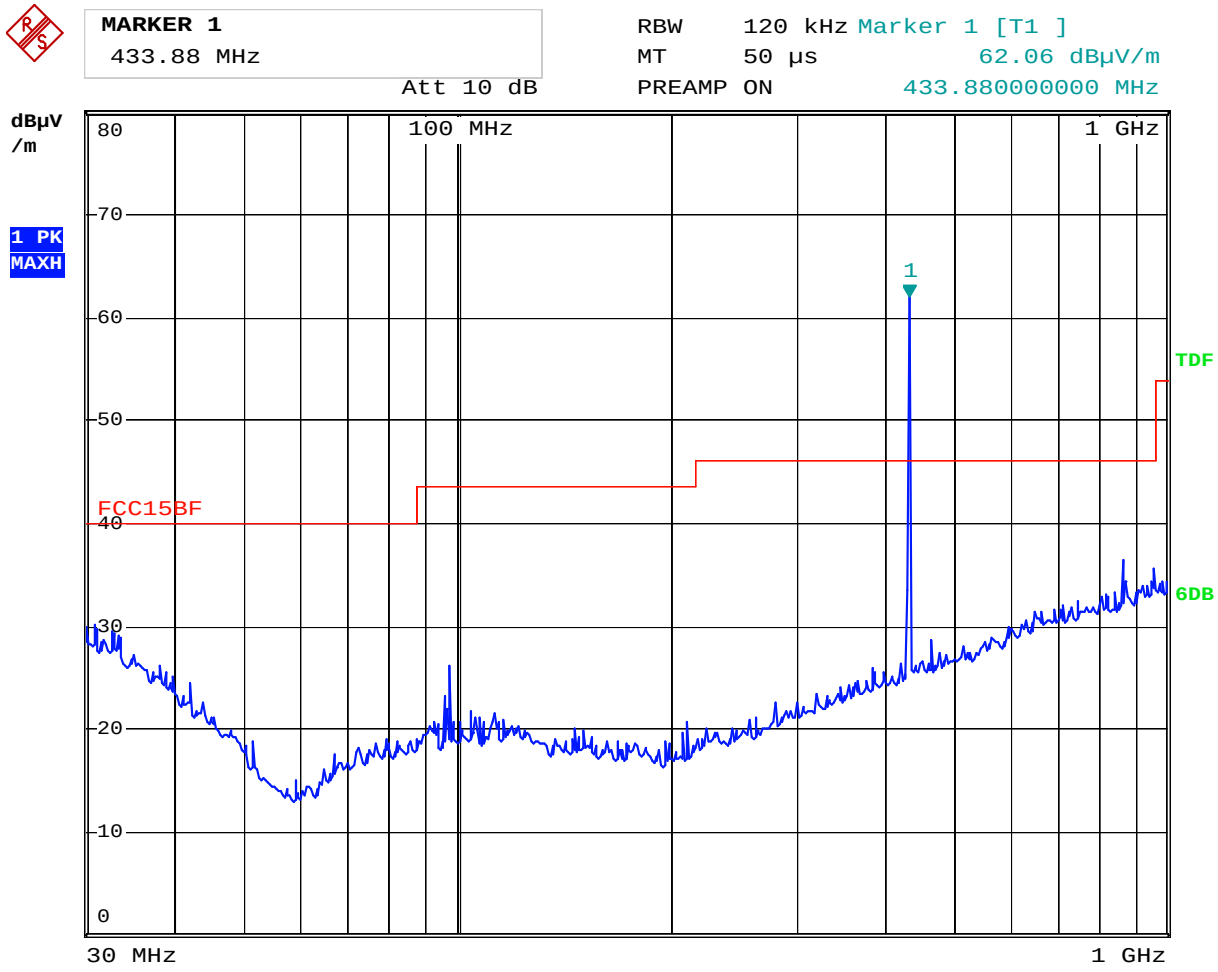
## B. General Radiated Emission Data and Harmonics Radiated Emission Data

**Radiated Emission In Horizontal (30MHz----1000MHz)**

EUT set Condition: Keep Transmitting

**Results:** **Pass**

Please refer to following diagram for individual

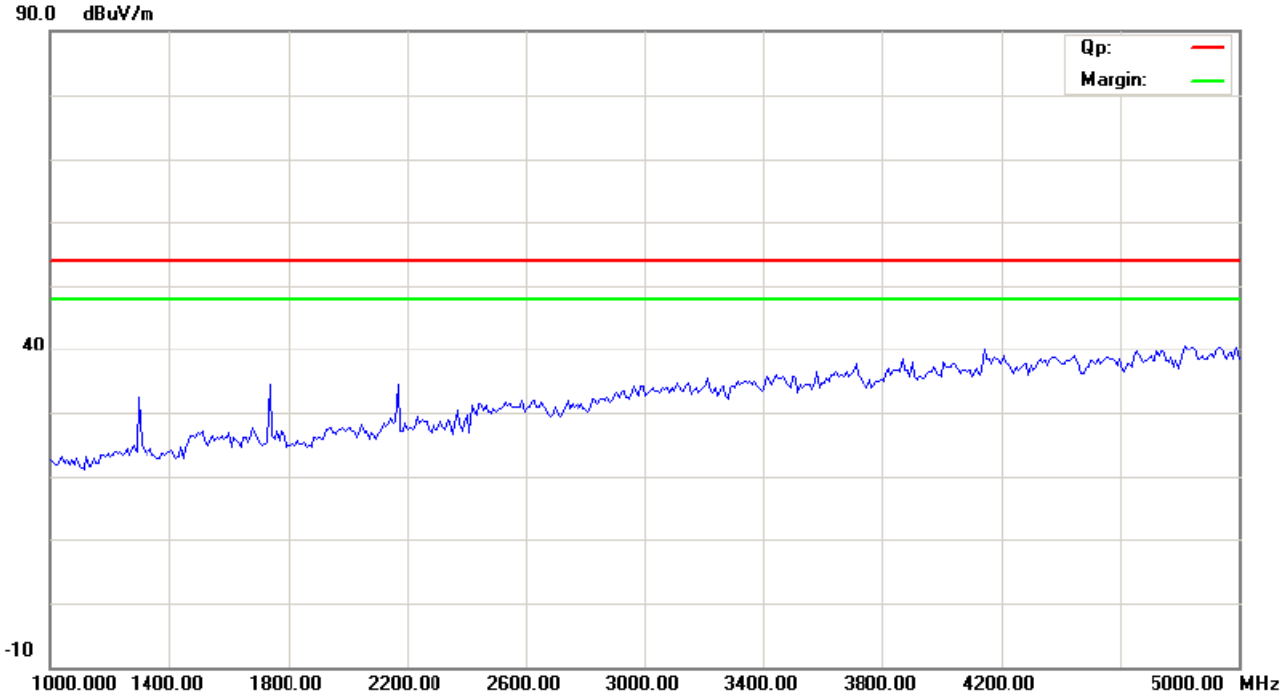



Date: 25.FEB.2014 10:39:05

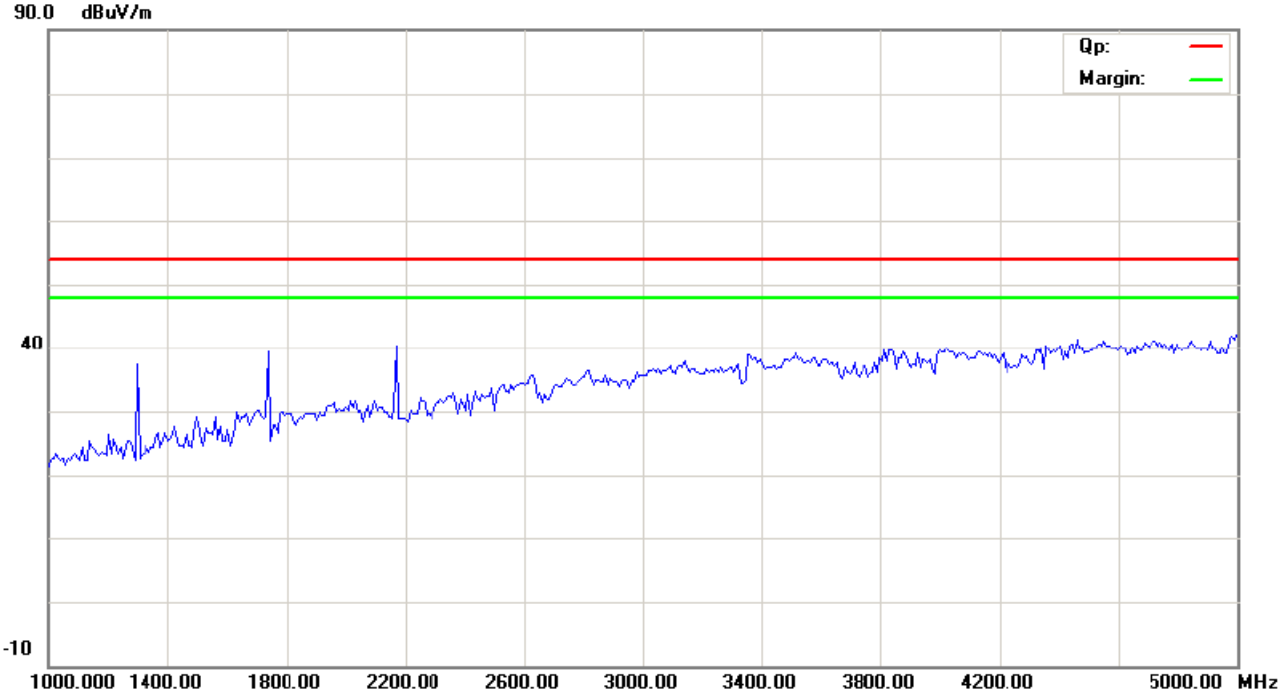
| Frequency (MHz) | Level@3m (dB µ V/m) | Antenna Polarity | Limit@3m (dB µ V/m) |
|---|---|---|---|
| -- | -- | V | -- |

Test Plot above 1G

**Horizontal**




**Vertical**



## 7.0 20dB and 99% Bandwidth Testing

### 7.1 Requirement

Per 15.231(c) and RSS-210 A1, 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.

### 7.2 Test Procedure

With the EUT's antenna attached, the EUT's 20dB Bandwidth power was received by the test antenna which was connected to the spectrum analyzer with the START and STOP frequencies set to the EUT's operation band.

### 7.3 Test Data

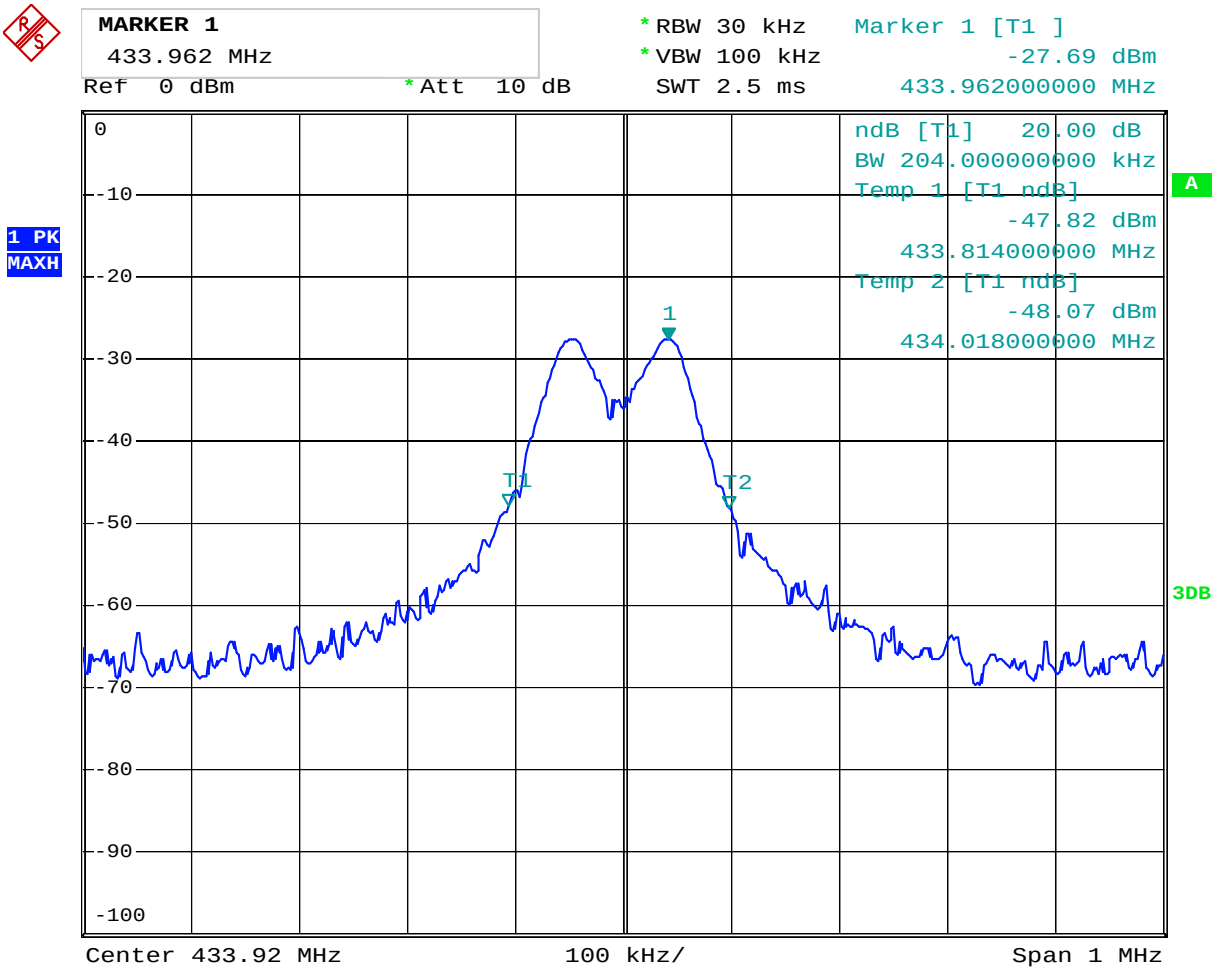
| Frequency （MHz） | 20dB Bandwidth Emission (kHz) | Limit (kHz) | Result |
|---|---|---|---|
| 433.92 | 204 | 1084.80 | Pass |

| Frequency （MHz） | 99% Bandwidth Emission (kHz) | Limit (kHz) | Result |
|---|---|---|---|
| 433.92 | 184 | 1084.80 | Pass |

Limit=Frequency x 0.25%=433.92x 0.25%=1084.80kHz

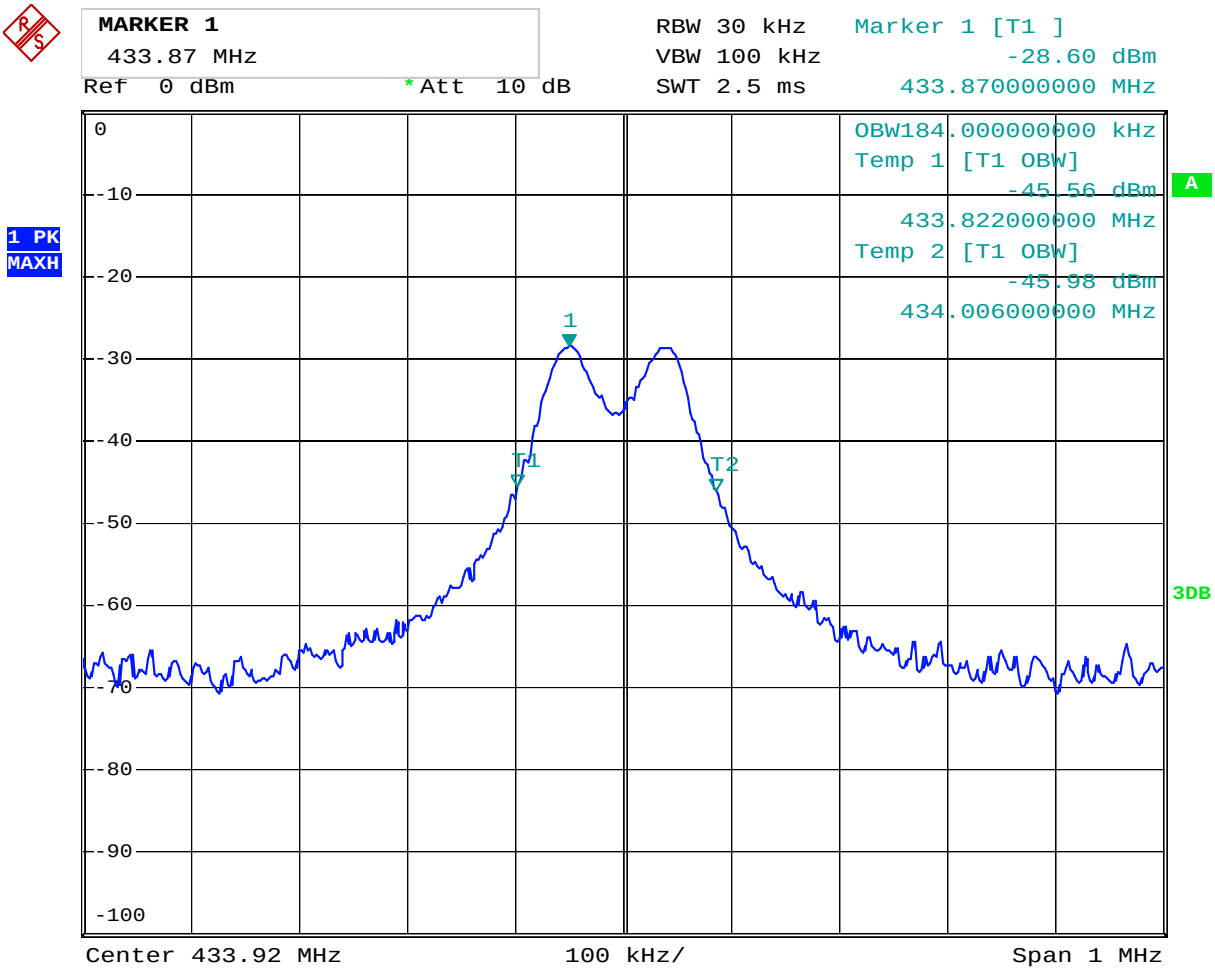
Refer to attached plots:

20dB Bandwidth




Date: 25.FEB.2014 10:11:40

99% Bandwidth:



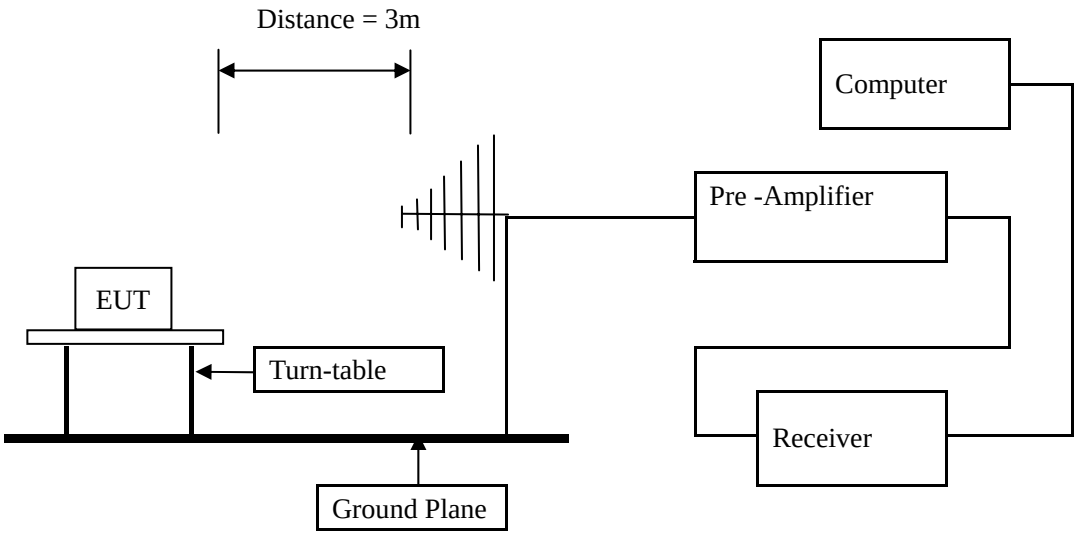
## 8.0 Deactivate Test

## 8.1 Requirement

Per 15.231(e) and RSS-210 A1.1.5

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.

## 8. 2 Radiated Test Setup




For the actual test configuration , please refer to the related items – Photos of Testing

The deactivation test was performed in the 3 meters chamber B test site, using the setup accordance with the ANSI C63.4 - 2003. The specification used was the FCC 15.231(e) limits.

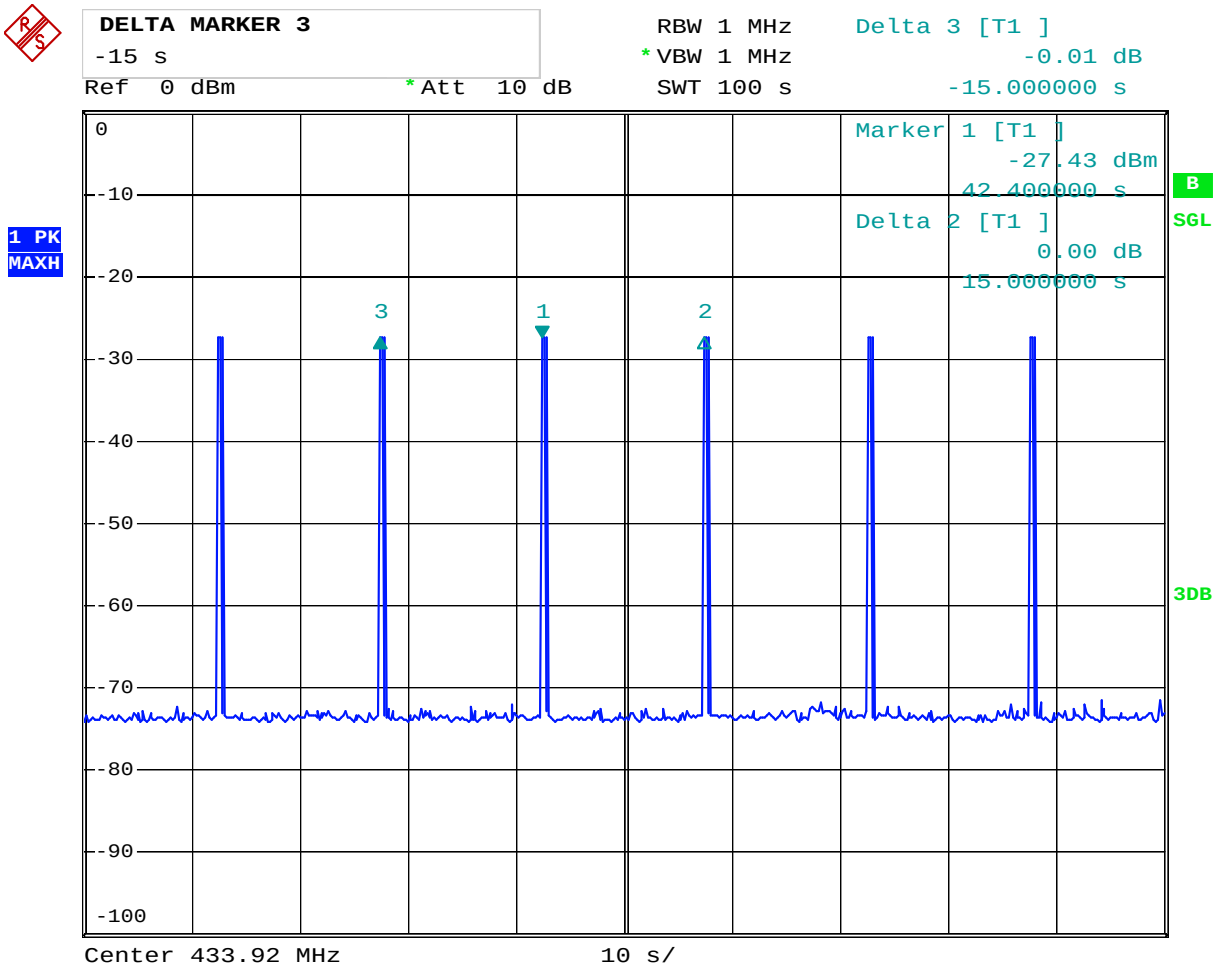
## 8.3 Test Procedure

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

## 8.4 Test Data

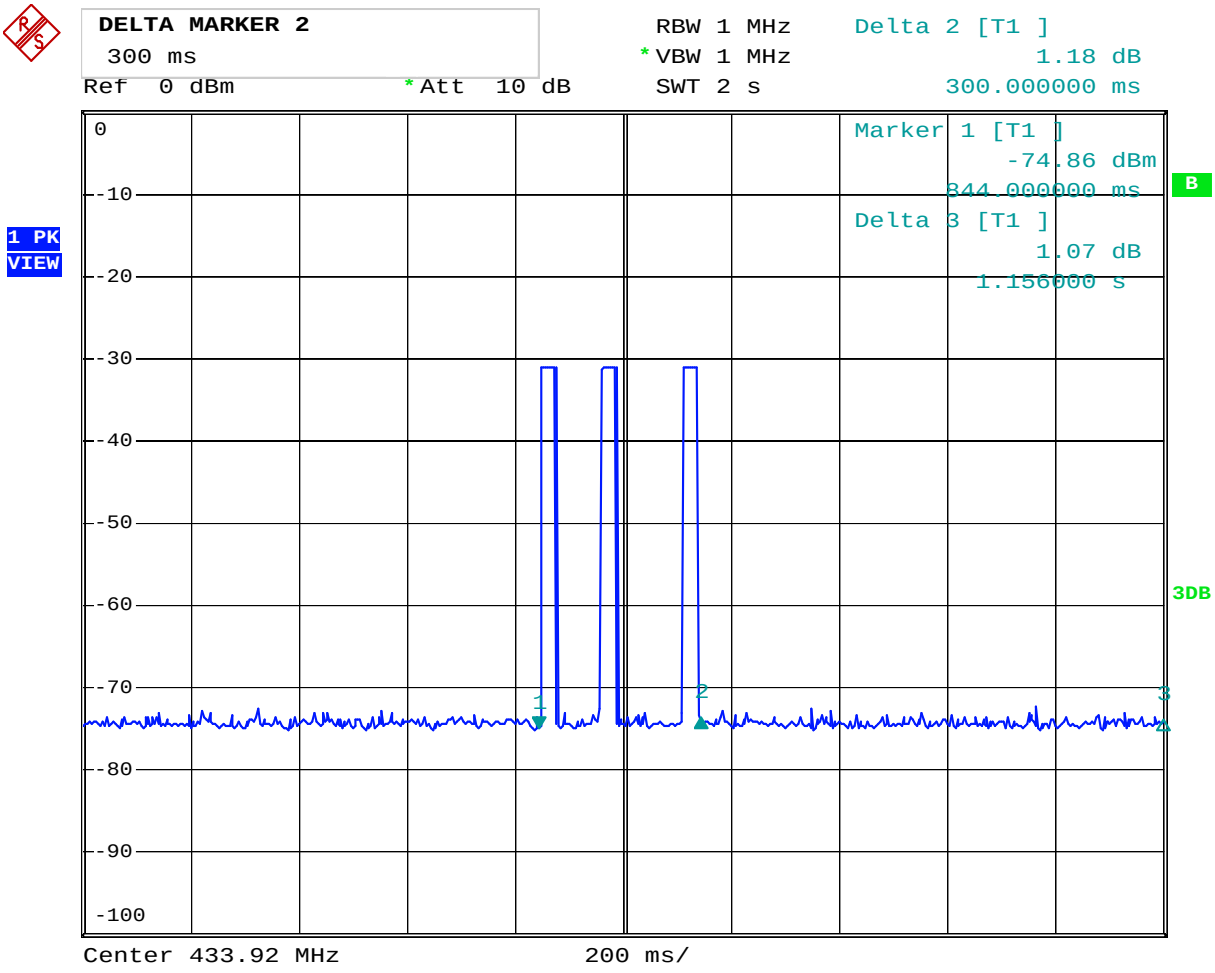
**Refer to attached plots:**

**Periodic**




Date: 1.MAR.2014 10:50:07

**Single**




## 8.5 Test result

**Pass**

## 9.0 **Antenna Requirement**

9.1 Standard Applicable

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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

9.2 Antenna Connected constructions

The antenna is integral antenna which is built-in. So it meets the requirement of 15.203

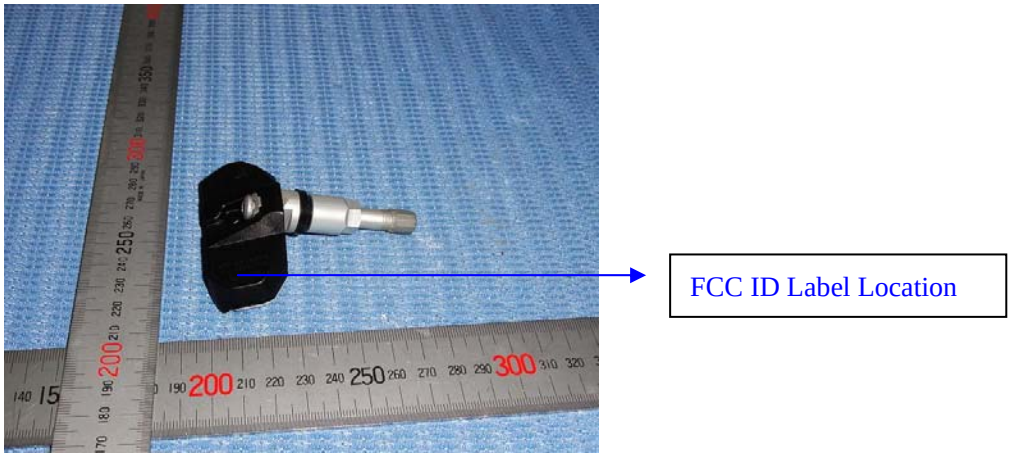
## 10.0 FCC ID Label

**FCC ID: Z9F-201FS43X**
**IC: 11852A-201FS43X**

**This device complies with part 15 of the FCC rules and Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.**

The label must not be a stick-on paper label. The label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

**Mark Location:**



## 11.0. Photo of testing

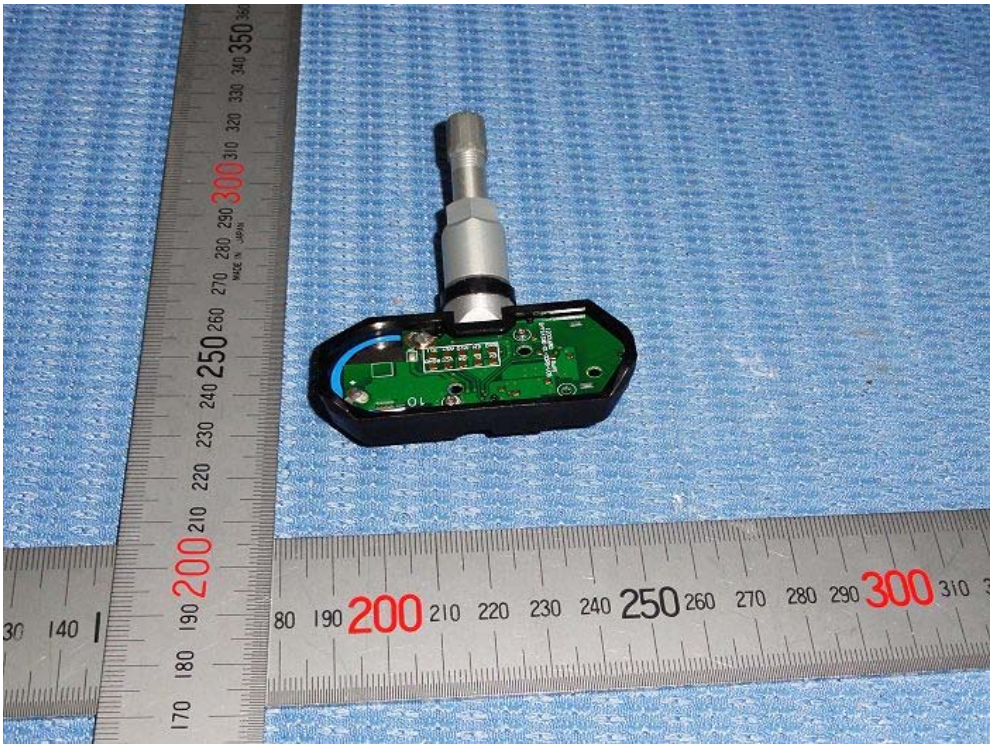
11.1 Conducted test View—N/A

11.2 Radiated emission test view

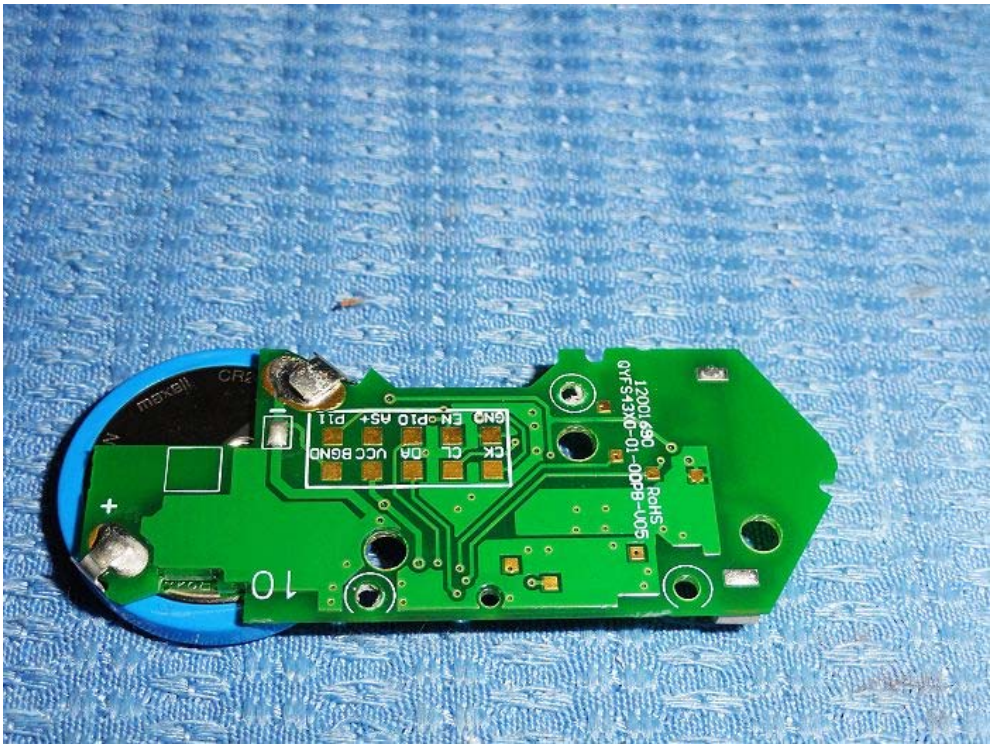
11.3 Photo for the EUT

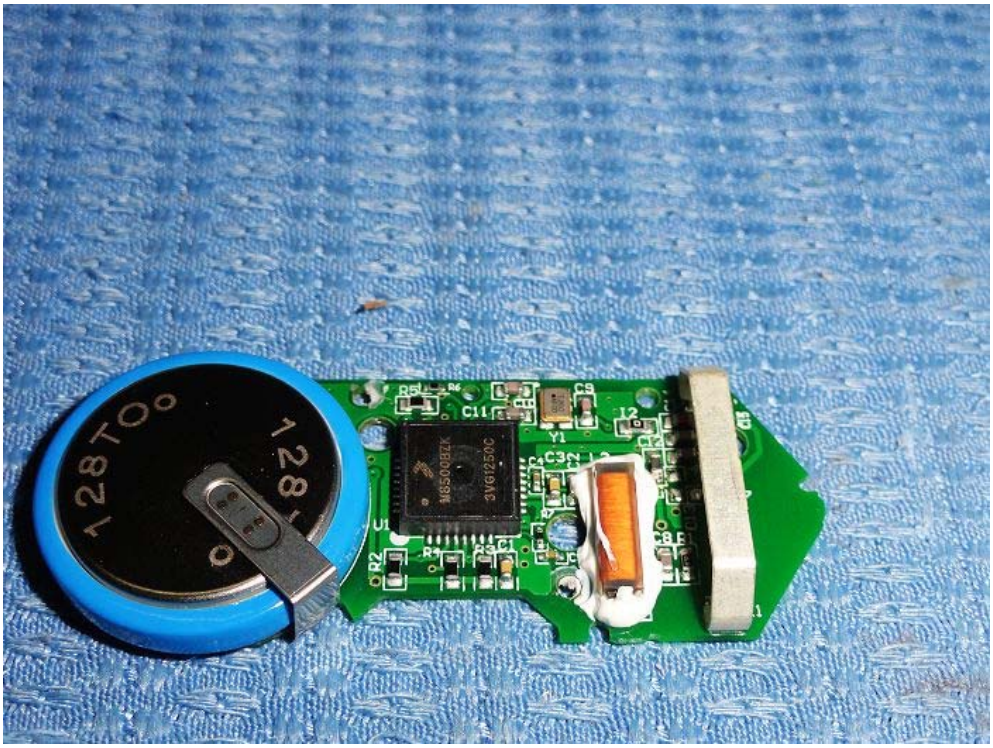
11.3 Photo for the EUT

11.3 Photo for the EUT

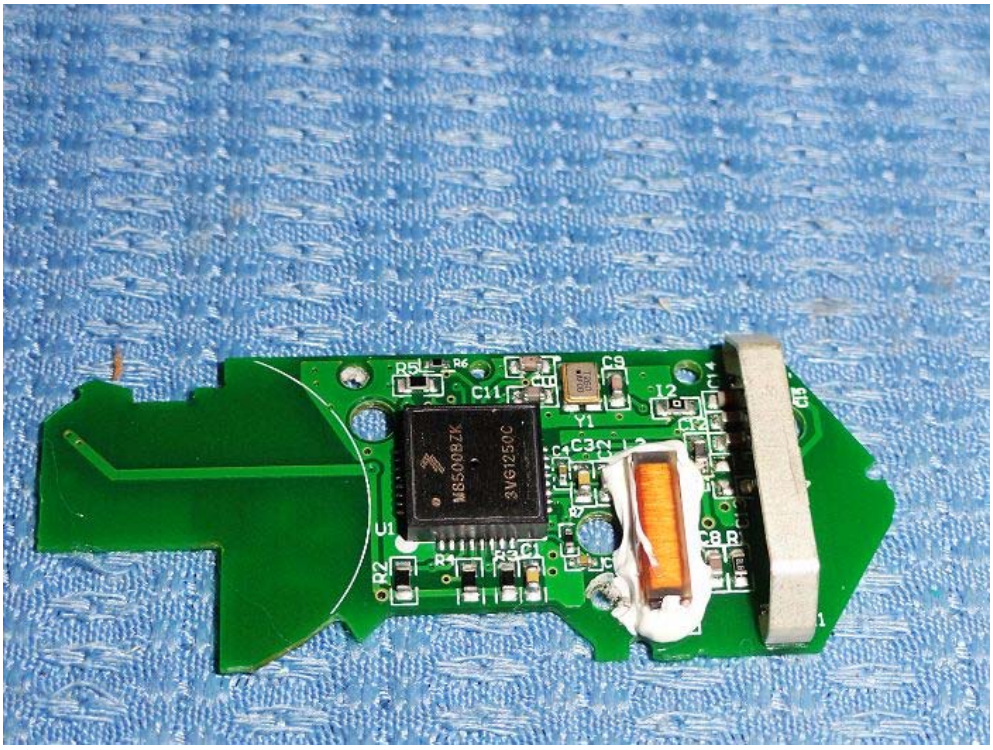


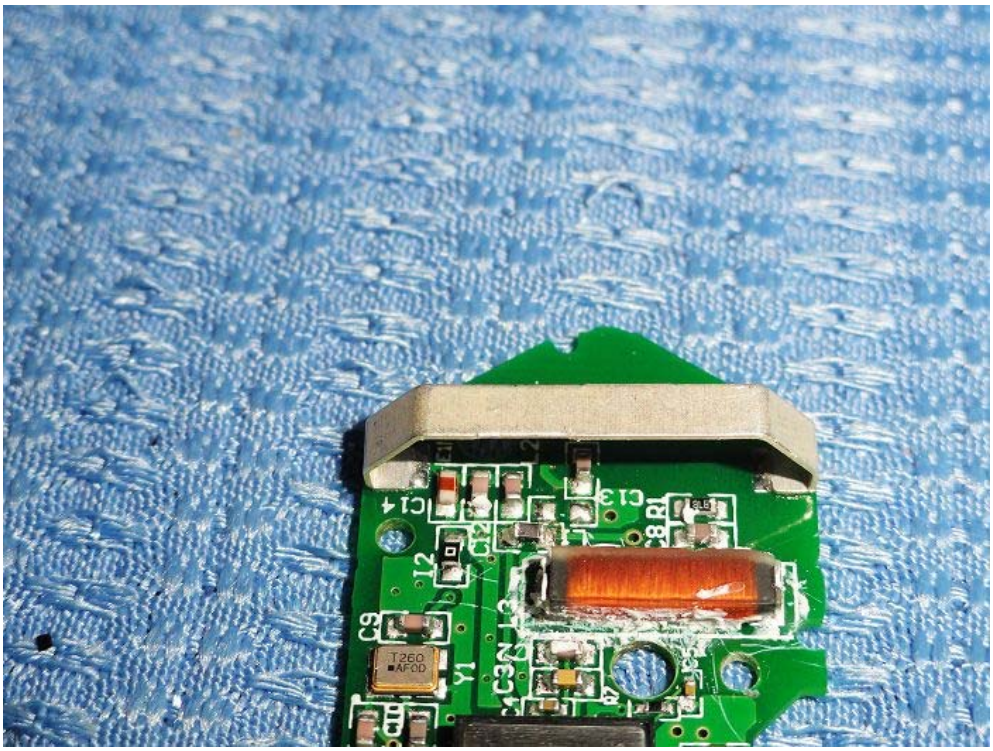
11.3 Photo for the EUT



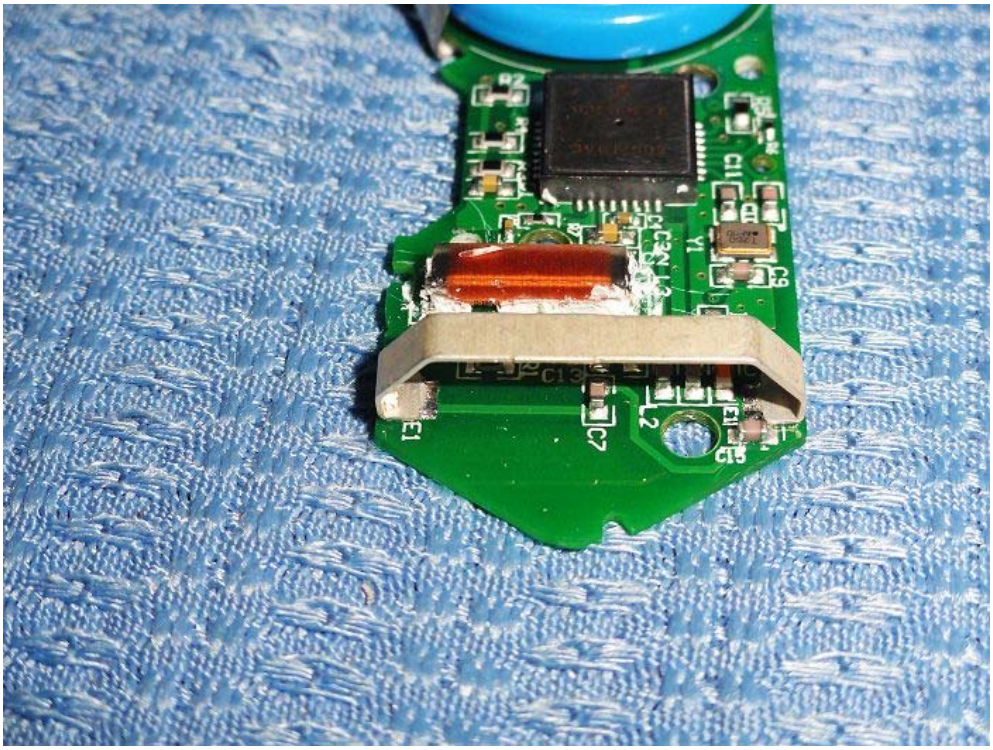


11.3 Photo for the EUT





11.3 Photo for the EUT



**--End of the report--**