



# FCC/IC Test Report

**FOR:**

**Model Name: PMV-C876**  
**Tire Pressure Monitoring System Transmitter**

**FCC ID: PAXPMVC876**

**IC ID: 3729A-PMVC876**

**47 CFR Part 15.231**

**IC RSS-210 Issue 8**

**TEST REPORT #: EMC\_CET10-188-14001\_FCC15.231**

**DATE: 07-23-2014**



**FCC listed**  
**A2LA Accredited**  
**IC recognized #**  
**3462B**

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**1 Assessment**

The following device was tested against the applicable criteria specified in FCC rules Parts 15.231 of Title 47 of the Code of Federal Regulations and Industry Canada Standards RSS 210 Issue 8. No deviations were ascertained during the course of the tests performed.

| Company                     | Description                                 | Model #  |
|-----------------------------|---------------------------------------------|----------|
| Pacific Industrial Co., Ltd | Tire Pressure Monitoring System Transmitter | PMV-C876 |

**Responsible for Testing Laboratory:**

| 07-23-2014 | Compliance | Milton Ponce de Leon<br>(Test Lab Manager) |           |
|------------|------------|--------------------------------------------|-----------|
| Date       | Section    | Name                                       | Signature |

**Responsible for the Report:**

| 07-23-2014 | Compliance | Muhammad Umair Anees<br>(EMC Test Engineer) |           |
|------------|------------|---------------------------------------------|-----------|
| Date       | Section    | Name                                        | Signature |

The test results of this test report relate exclusively to the test item specified in Section 3.

CETECOM Inc. USA does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM Inc. USA.

## 2 Administrative Data

### 2.1 Identification of the Testing Laboratory Issuing the Test Report

|                                    |                                                                       |
|------------------------------------|-----------------------------------------------------------------------|
| <b>Company Name:</b>               | CETECOM Inc.                                                          |
| <b>Department:</b>                 | Compliance                                                            |
| <b>Address:</b>                    | 6370 Nancy Ridge Drive Suite 101-1-2<br>San Diego, CA 92121<br>U.S.A. |
| <b>Telephone:</b>                  | +1 (858) 362 2431                                                     |
| <b>Fax:</b>                        | +1 (858) 587 4809                                                     |
| <b>Test Lab Director:</b>          | Milton Ponce de Leon                                                  |
| <b>Responsible Project Leader:</b> | Muhammad Umair Anees                                                  |

### 2.2 Identification of the Client

|                          |                             |
|--------------------------|-----------------------------|
| <b>Applicant's Name:</b> | Pacific Industrial Co., Ltd |
| <b>Street Address:</b>   | Godo-Cho, Anpachi           |
| <b>City/Zip Code</b>     | Gifu/ 503-2397              |
| <b>Country</b>           | Japan                       |
| <b>Contact Person:</b>   | Kunitaka Yano               |
| <b>Phone No.</b>         | +81-(0)584-28-0111          |
| <b>Fax:</b>              | +81-(0)584-28-0130          |
| <b>e-mail:</b>           | knyano@pacific-ind.co.jp    |

### 2.3 Identification of the Manufacturer

|                               |                |
|-------------------------------|----------------|
| <b>Manufacturer's Name:</b>   | Same as above. |
| <b>Manufacturers Address:</b> |                |
| <b>City/Zip Code</b>          |                |
| <b>Country</b>                |                |

### 3 Equipment under Test (EUT)

#### 3.1 Specification of the Equipment under Test

|                                     |                                             |
|-------------------------------------|---------------------------------------------|
| <b>Marketing Name / Model No:</b>   | PMV-C876                                    |
| <b>FCC-ID:</b>                      | PAXPMVC876                                  |
| <b>IC-ID:</b>                       | 3729A-PMVC876                               |
| <b>Product Description:</b>         | Tire Pressure Monitoring System Transmitter |
| <b>Frequency of operation:</b>      | UHF Transmitter: 314.98 MHz                 |
| <b>Modulation:</b>                  | FSK                                         |
| <b>Antenna Type / Gain:</b>         | Built-in Loop Antenna<br>Gain: -26 dBi      |
| <b>Power Supply:</b>                | 3VDC Lithium battery                        |
| <b>Operating Temperature Range:</b> | -35°C to 100°C                              |
| <b>Prototype / Production unit:</b> | Prototype                                   |

#### 3.2 Identification of the Equipment Under Test (EUT)

| EUT # | Type             | Serial Number |
|-------|------------------|---------------|
| 1     | TPMS transmitter | 000081D       |
| 2     | TPMS transmitter | 000081C       |

#### 3.3 Identification of Accessory equipment

| AE # | Type        | Manufacturer                | Serial No. | Comments                                                      |
|------|-------------|-----------------------------|------------|---------------------------------------------------------------|
| 1    | Trigger Box | Pacific Industrial Co., Ltd | D0033      | For programming the EUT to transmit.<br>Not used for testing. |

#### **4 Subject of Investigation**

The objective of the measurements done by Cetecom Inc. was to measure the performance of the EUT as specified by requirements listed in FCC rules Part 15.231 of Title 47 of the Code of Federal Regulations and Industry Canada Standards RSS 210 Issue 8.

This test report is to support a request for new equipment authorization under the FCC ID: **PAXPMVC876** and IC ID: **3729A-PMVC876**

All testing was performed on the product referred to in Section 3 as EUT.  
This test report contains full radiated and conducted testing results as per

- 47 CFR Part 15: Title 47 of the Code of Federal Regulations: Chapter I-Federal Communications Commission subchapter A- General, Part 15- Radio Frequency Devices.
- RSS-210 Issue 8: Spectrum Management and Telecommunications- Radio Standards Specification. Low-power License-exempt radio communication devices (All frequency bands): Category 1 equipment.

##### **4.1 Modes of operation:**

Three modes of operation are possible: Stationary, Rotating and Pressure Alert.

As the average output power is the same for all modes, it was deemed necessary to only measure the timing behavior in one mode.

The Trigger box provided by the customer was used to force transmit modulated signal for 30 minutes (18000 frames/ 0.1 sec interval) for performing the measurements.

#### 4.2 Timing Diagrams of different transmission modes:

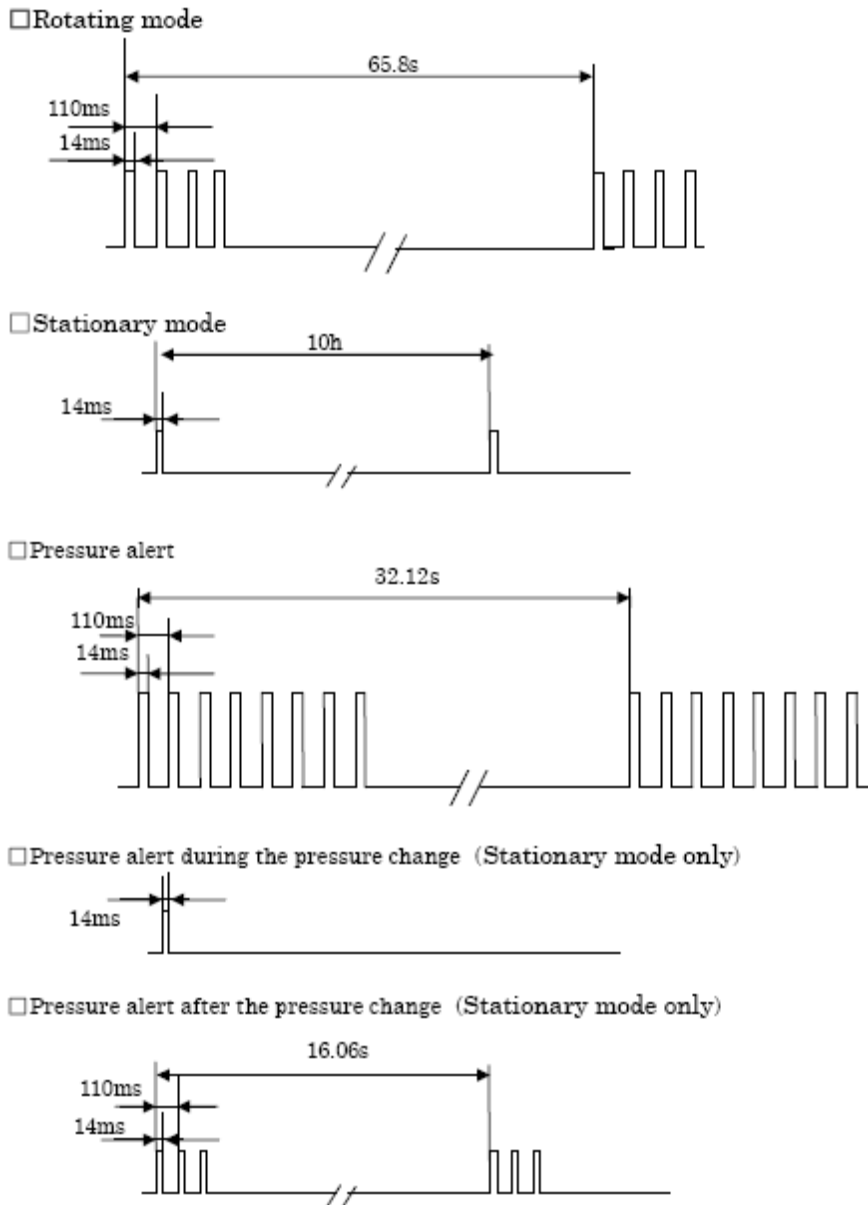


Fig 4

#### Worst Case modes:

Rotating mode: 4 frames/ minute

Stationary mode: 1 frame/ 10 hours

Pressure Alert mode: 8 frames/ 32.12 seconds



## 5 Summary of Measurement Results

| Test Specification     | Test Case                              | Temperature and Voltage Conditions | Pass | Fail | NA | NP | Result   |
|------------------------|----------------------------------------|------------------------------------|------|------|----|----|----------|
| §15.231 (e)            | Transmitter Fundamental Field Strength | Nominal                            | ■    | □    | □  | □  | Complies |
| §15.231 (c)            | Transmitter 20dB bandwidth             | Nominal                            | ■    | □    | □  | □  | Complies |
| §15.231 (a)            | Transmitter Timeout                    | Nominal                            | ■    | □    | □  | □  | Complies |
| §15.35 (c)             | Transmitter Duty Cycle                 | Nominal                            | ■    | □    | □  | □  | Complies |
| §15.231 (e)<br>§15.209 | Transmitter Radiated Emissions         | Nominal                            | ■    | □    | □  | □  | Complies |
| §15.109                | RX Spurious Emissions Radiated         | Nominal                            | □    | □    | ■  | □  | -        |
| §15.207                | TX Conducted Emissions <30MHz          | Nominal                            | □    | □    | ■  | □  | -        |
| §15.107(a)             | RX Conducted Emissions <30MHz          | Nominal                            | □    | □    | ■  | □  | -        |

**Note:** NA= Not Applicable; NP= Not Performed.

## **6 Measurements**

### **6.1 Radiated Measurement Procedure**

#### **ANSI C63.4 2003 Section 8.3.1.1: Exploratory radiated emission measurements**

Exploratory radiated measurements shall be performed at the measurement distance or at a closer distance than that specified for compliance to determine the emission characteristics of the EUT. At near distances, for EUTs of comparably small size, it is relatively easy to determine the spectrum signature of the EUT and, if applicable, the EUT configuration that produces the maximum level of emissions. A shielded room may be used for exploratory testing, but may have anomalies that can lead to significant errors in amplitude measurements.

Broadband antennas and a spectrum analyzer or a radio-noise meter with a panoramic display are often useful in this type of testing. It is recommended that either a headset or loudspeaker be connected as an aid in detecting ambient signals and finding frequencies of significant emission from the EUT when the exploratory and final testing is performed in an OATS with strong ambient signals. Caution should be taken if either antenna height between 1 and 4 meters or EUT azimuth is not fully explored. Not fully exploring these parameters during exploratory testing may require complete testing at the OATS or semi-anechoic chamber when the final full spectrum testing is conducted.

The EUT should be set up in its typical configuration and arrangement, and operated in its various modes. For tabletop systems, cables or wires should be manipulated within the range of likely arrangements. For floor-standing equipment, the cables or wires should be located in the same manner as the user would install them and no further manipulation is made. For combination EUTs, the tabletop and floor-standing portions of the EUT shall follow the procedures for their respective setups and cable manipulation. If the manner of cable installation is not known, or if it changes with each installation, cables or wires for floor-standing equipment shall be manipulated to the extent possible to produce the maximum level of emissions.

For each mode of operation required to be tested, the frequency spectrum shall be monitored. Variations in antenna height between 1 and 4 m, antenna polarization, EUT azimuth, and cable or wire placement (each variable within bounds specified elsewhere) shall be explored to produce the emission that has the highest amplitude relative to the limit. A step-by-step technique for determining this emission can be found in Annex C.

When measuring emissions above 1 GHz, the frequencies of maximum emission shall be determined by manually positioning the antenna close to the EUT and by moving the antenna over all sides of the EUT while observing a spectral display. It will be advantageous to have prior knowledge of the frequencies of emissions above 1 GHz. If the EUT is a device with dimensions approximately equal to that of the measurement antenna beamwidth, the measurement antenna shall be aligned with the EUT.

**ANSI C63.4: 2003 Section 8.3.1.2: Final radiated emission measurements**

Based on the measurement results in 8.3.1.1, the one EUT, cable and wire arrangement, and mode of operation that produces the emission that has the highest amplitude relative to the limit is selected for the final measurement. The final measurement is then performed on a site meeting the requirements of 5.3, 5.4, or 5.5 as appropriate without variation of the EUT arrangement or EUT mode of operation. If the EUT is relocated from an exploratory test site to a final test site, the highest emission shall be remaximized at the final test location before final radiated emissions measurements are performed.

However, antenna height and polarity and EUT azimuth are to be varied. In addition, the full frequency spectrum (for the range to be checked for meeting compliance) shall be investigated.

This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. During the full frequency spectrum investigation, particular focus should be made on those frequencies found in exploratory testing that were used to find the final test configuration, mode of operation, and arrangement (associated with achieving the least margin with respect to the limit). This full spectrum test constitutes the compliance measurement.

For measurements above 1 GHz, use the cable, EUT arrangement, and mode of operation determined in the exploratory testing to produce the emission that has the highest amplitude relative to the limit. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the antenna in the “cone of radiation” from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response. The antenna may have to be higher or lower than the EUT, depending on the EUT’s size and mounting height, but the antenna should be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. If the transmission line for the measurement antenna restricts its range of height and polarization, the steps needed to ensure the correct measurement of the maximum emissions, shall be described in detail in the report of measurements. Data collected shall satisfy the report requirements of Clause 10.

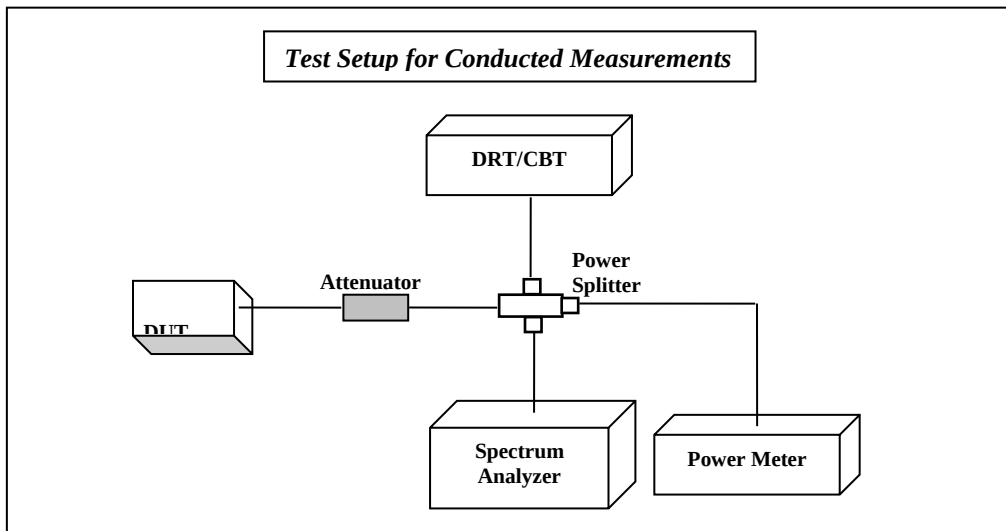
**NOTES**

1— Where limits are specified by agencies for both average and peak (or quasi-peak) detection, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.

2—Use of waveguide and flexible waveguide may be necessary at frequencies above 10 GHz to achieve usable signal-to noise ratios at required measurement distances. If so, it may be necessary to restrict the height search of the antenna, and special care should be taken to ensure that maximum emissions are correctly measured.

3—All presently known devices causing emissions above 10 GHz are physically small compared with the beam-widths of typical horn antennas used for EMC measurements. For such EUTs and frequencies, it may be preferable to vary the height and polarization of the EUT instead of the receiving antenna to maximize the measured emissions.

## 6.2 Conducted Measurement Procedure



1. Connect the equipment as shown in the above diagram.
2. Adjust the settings of the Digital Radio Communication Tester (DRT) to connect the EUT at the required channel.  
Alternatively, the EUT can be programmed using test utility provided by the manufacturer to set the required channel.
3. Measurements are to be performed with the EUT set to the required transmit channel.

### 6.3 Sample Calculations for Radiated Measurements

#### 6.3.1 Field Strength Measurements:

Field Strength measurements are directly taken from the Spectrum Analyzer/ Receiver, taking into account the cable loss between the Receiving Antenna and the Spectrum Analyzer/ Receiver. Antenna Factor is accounted for by the test SW.

FS (dBμV/m)= Measured Value on SA (dBμV)+ Cable Loss (dB)

Eg:

| Frequency (MHz) | Measured SA (dBμV) | Cable Loss (dB) | Field Strength Result (dBμV/m) |
|-----------------|--------------------|-----------------|--------------------------------|
| 1000            | 95.5               | 3.5             | 99.0                           |

#### 6.3.2 Power Measurements using Substitution Procedure:

The measurement on the Spectrum Analyzer is used as a basis for the Substitution procedure. The EUT is replaced with a Signal Generator and an antenna. The setting on the Signal Generator is varied until the Spectrum Analyzer displays the original reading. EIRP is calculated as-

EIRP (dBm)= Signal Generator setting (dBm)- Cable Loss (dB)+ Antenna Gain (dBi)

Eg:

| Frequency (MHz) | Measured SA (dBμV) | Signal Generator setting (dBm) | Antenna Gain (dBi) | Dipole Gain (dBd) | Cable Loss (dB) | EIRP (dBm) |
|-----------------|--------------------|--------------------------------|--------------------|-------------------|-----------------|------------|
| 1000            | 95.5               | 24.5                           | 6.5                | 0                 | 3.5             | 27.5       |

## **6.4 Transmitter Duty Cycle**

According to ANSI C63.4 2009 13.4.2, “Devices transmitting pulsed emissions and subject to a limit requiring an average detector function for radiated emissions shall initially be measured with an instrument that uses a peak detector. A radiated emission measured with a peak detector may then be corrected to a true average using the appropriate factor for emission duty cycle. This correction factor relates the measured peak level to the average limit and is derived by averaging absolute field strength over one complete pulse train that is 0.1 s, or less, in length. If the pulse train is longer than 0.1 s, the average shall be determined from the average absolute field strength during the 0.1 s interval in which the field strength is at a maximum”

### **6.4.1 Reference:**

§15.35 (c)

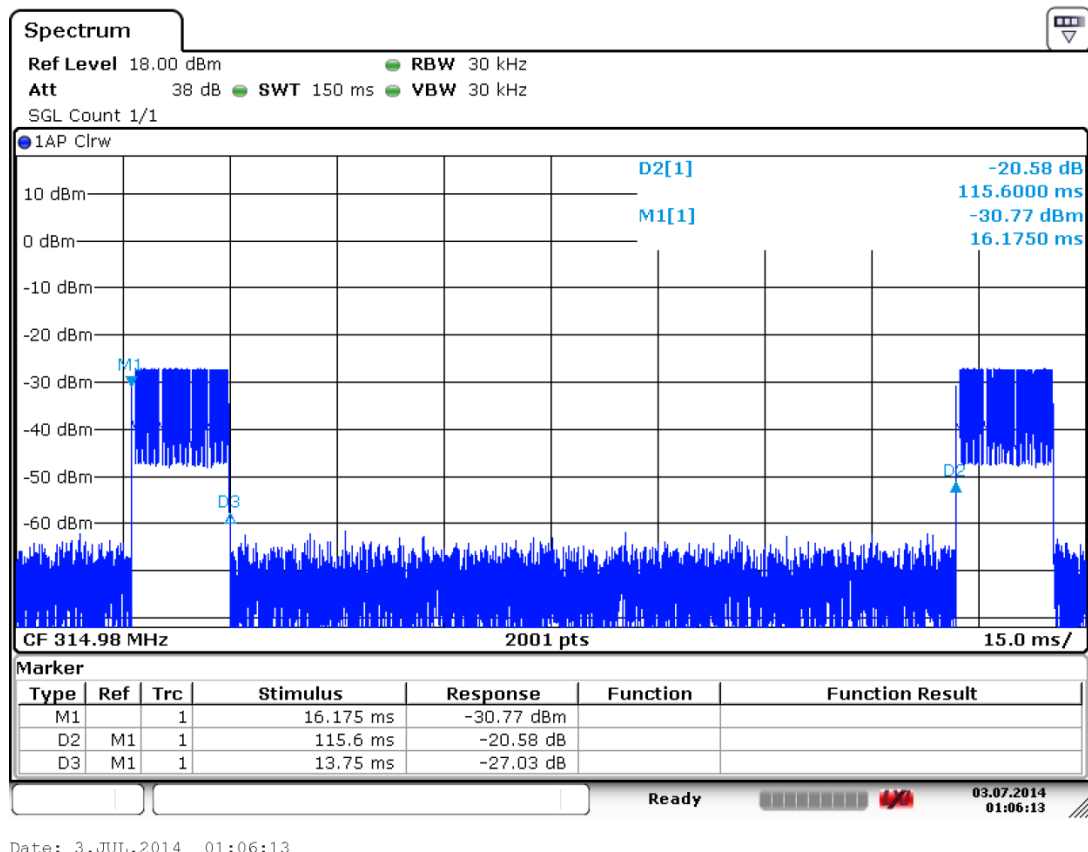
### **6.4.2 Test Conditions:**

Tnom: 25°C; Vnom: 3.0V

### **Spectrum Analyzer settings:**

RBW=30 kHz, VBW=30 kHz, Detector: Peak, Sweep Time: 150 ms, Span=Zero

### 6.4.3 Test Data:



Date: 3.JUL.2014 01:06:13

### 6.4.4 Measurement Result

Transmit on time = 13.75 ms;

Period= 100 ms;

Duty Cycle=13.75 %

**Correction factor** =  $20 \log (\text{Pulse Duration (ms)} / 100 \text{ ms}) = 20 \log (13.75 / 100) = -17.23 \text{ dB}$

Note: Regardless of the transmission mode, the maximum number of bursts in 100ms is 1 and therefore the duty cycle can never exceed the above calculated value.

## 6.5 Transmitter Duration

### 6.5.1 Limits

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

### 6.5.2 Results

Rotating Mode:

Transmission length:  $4 \times 115.6\text{ms} = 462.4 \text{ ms} < 1 \text{ second}$

Minimum silent period:  $30 \times 0.46\text{s} = 13.8\text{s}$

Silent Period:  $65.8\text{s} - 0.46\text{s} = 65.34\text{s} > 13.8\text{s}$

Pressure Alert Mode:

Transmission length:  $8 \times 115.6\text{ms} = 924.8 \text{ ms} < 1 \text{ second}$

Minimum silent period:  $30 \times 0.924\text{s} = 27.74\text{s}$

Silent Period:  $32.12 - 0.924\text{s} = 31.19\text{s} > 27.74\text{s}$

Stationary mode:

Transmission length:  $1 \times 13.75\text{ms} = 13.75 \text{ ms} < 1 \text{ second}$

Minimum silent period:  $30 \times 13.46 \text{ ms} = 412.5 \text{ ms}$

Silent Period:  $36000\text{s} - 13.75\text{ms} = 35999.9 \text{ s} > 10 \text{ s}$

Pressure After the Pressure Change Mode:

Transmission length:  $3 \times 115.6\text{ms} = 346.8 \text{ ms} < 1 \text{ second}$

Minimum silent period:  $30 \times 346.8\text{ms} = 10.4\text{s}$

Silent Period:  $16.06\text{s} - 0.34\text{s} = 15.72\text{s} > 10.4 \text{ s}$



## 6.6 Transmitter Fundamental Field Strength

### 6.6.1 Limits:

#### RSS 210 Issue 8 A.1.1.2

##### §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:

| Fundamental frequency (MHz) | Field strength of fundamental (microvolts/meter) | Field strength of spurious emission (microvolts/meter) |
|-----------------------------|--------------------------------------------------|--------------------------------------------------------|
| 40.66–40.70                 | 1,000                                            | 100                                                    |
| 70–130                      | 500                                              | 50                                                     |
| 130–174                     | 500 to 1,500 <sup>1</sup>                        | 50 to 150 <sup>1</sup>                                 |
| 174–260                     | 1,500                                            | 150                                                    |
| 260–470                     | 1,500 to 5,000 <sup>1</sup>                      | 150 to 500 <sup>1</sup>                                |
| Above 470                   | 5,000                                            | 500                                                    |

<sup>1</sup>Linear interpolations.

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

Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provisions in §15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.

For the EUT operating at 314.98 MHz, the fundamental field strength limit is calculated as follows:

$$\begin{aligned}\text{Field Strength} &= (16.67 \times F) - 2833.33 \text{ where } F \text{ is the frequency in MHz} \\ &= 2417.30 \mu\text{V/m} \\ &= 67.66 \text{ dB } \mu\text{V/m}\end{aligned}$$

### 6.6.2 Test Conditions:

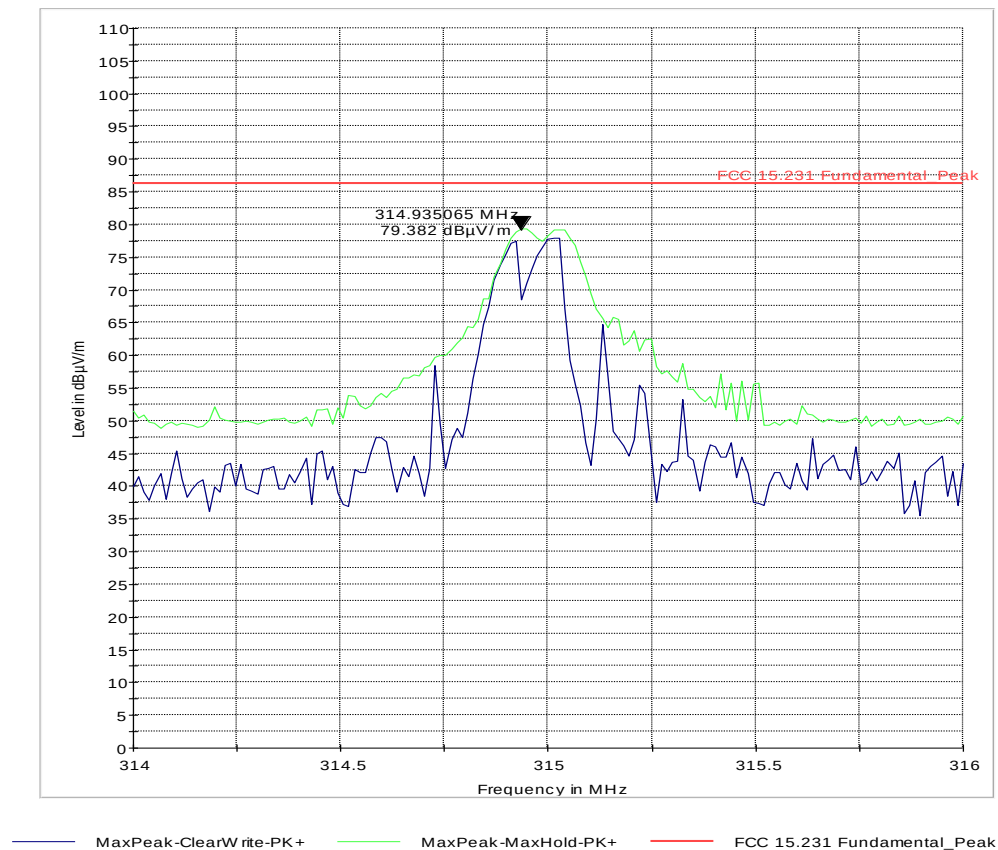
Tnom: 25°C; Vnom : 3V DC

### Spectrum Analyzer settings:

RBW=120 kHz; VBW=300 kHz; Detector: Peak; Sweep Time: Auto; Span=2MHz

Maximized result for all orientations of the EUT and horizontal and vertical measurement antenna polarizations shown here.

### 6.6.3 Test Data:



### 6.6.4 Measurement Result

| Maximum power (dBµV/m at 3m) |                          | Limit (dBµV/m) | Verdict |
|------------------------------|--------------------------|----------------|---------|
| Measured Peak value          | Calculated Average value |                |         |
| 79.38                        | 79.38- 17.23= 62.15      | 67.66          | Pass    |

## 6.7 Transmitter 20dB Bandwidth

### 6.7.1 Limits:

#### §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. 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. For 314.98 MHz transmitter, the 20 dB Bandwidth limit is  $0.0025 \times 314.98 \text{ MHz} = 787.45 \text{ kHz}$ . Therefore, 20dB bandwidth should be  $< 787.45 \text{ kHz}$ .

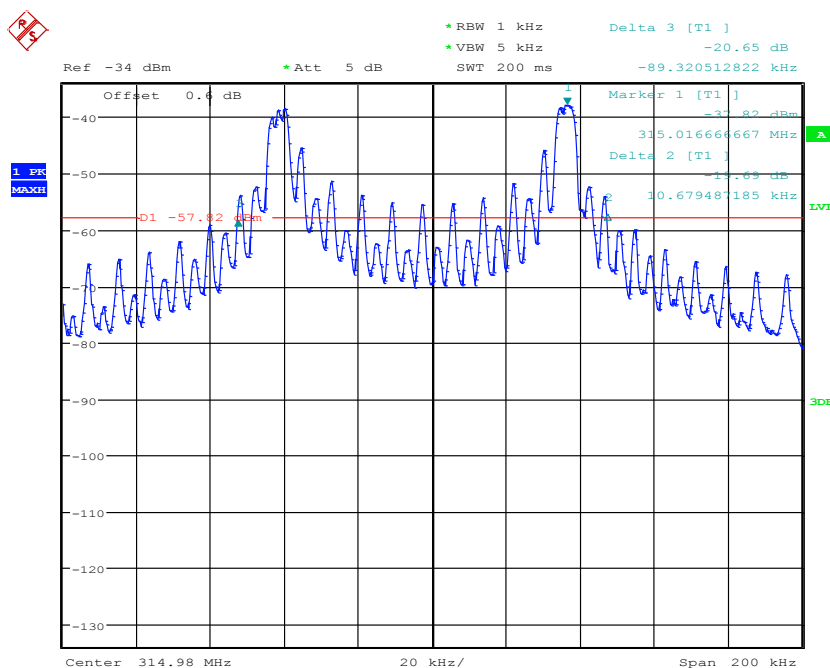
### 6.7.2 Test Conditions:

$T_{\text{nom}}$ : 25°C;  $V_{\text{nom}}$ : 3.0V

#### Spectrum Analyzer settings:

RBW=1 kHz, VBW=5 kHz, Detector: Peak- Max hold; Sweep Time: 100 ms; Span=100 kHz

### 6.7.3 Test Data:



Date: 21.JUL.2014 14:50:59

### 6.7.4 Measurement Result

| Measured 20 dB bandwidth (kHz) | 20 dB Bandwidth Limit(kHz) | Verdict |
|--------------------------------|----------------------------|---------|
| 99.9                           | 787.45                     | Pass    |

**6.8 Transmitter Spurious Emissions- Radiated****6.8.1 References:**

FCC CFR 2.1053

FCC CFR 15.231 (e) and 15.209

**6.8.2 Measurement requirements:**FCC 2.1053: Field strength of spurious radiation.

Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission.

**6.8.3 Limits:****§15.231 (e)**

| Fundamental frequency (MHz) | Field strength of fundamental (microvolts/meter) | Field strength of spurious emission (microvolts/meter) |
|-----------------------------|--------------------------------------------------|--------------------------------------------------------|
| 40.66–40.70                 | 1,000                                            | 100                                                    |
| 70–130                      | 500                                              | 50                                                     |
| 130–174                     | 500 to 1,500 <sup>1</sup>                        | 50 to 150 <sup>1</sup>                                 |
| 174–260                     | 1,500                                            | 150                                                    |
| 260–470                     | 1,500 to 5,000 <sup>1</sup>                      | 150 to 500 <sup>1</sup>                                |
| Above 470                   | 5,000                                            | 500                                                    |

**6.8.4 Measurement Settings:**

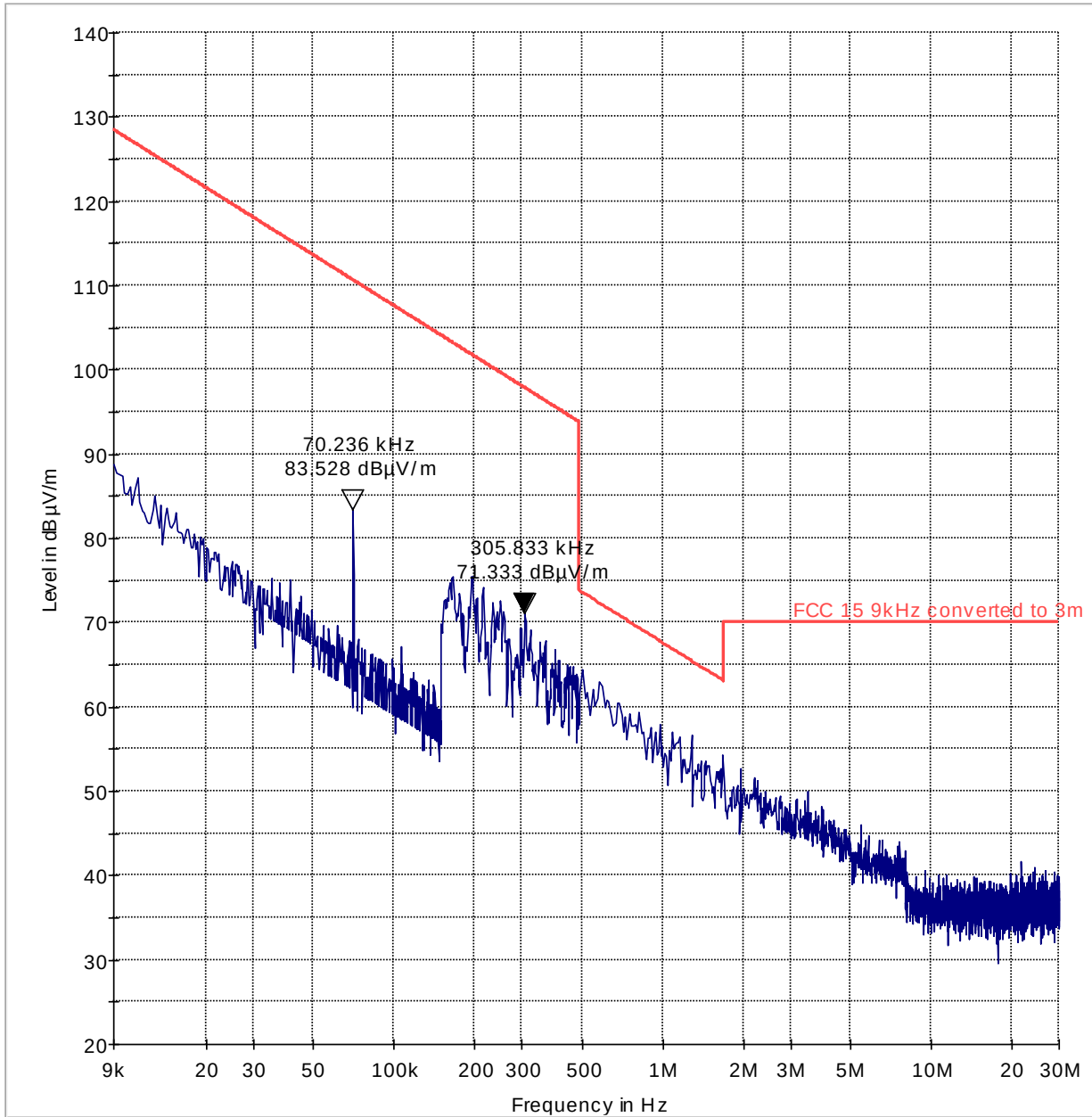
Peak detector used for the measurements- with RBW=120 kHz for measurements below 1GHz and RBW= 1MHz for measurements above 1GHz.

Testing performed up to 10x Transmit frequency.

Measurement distance= 3m

**6.8.5 Measurement Result**

Pass.

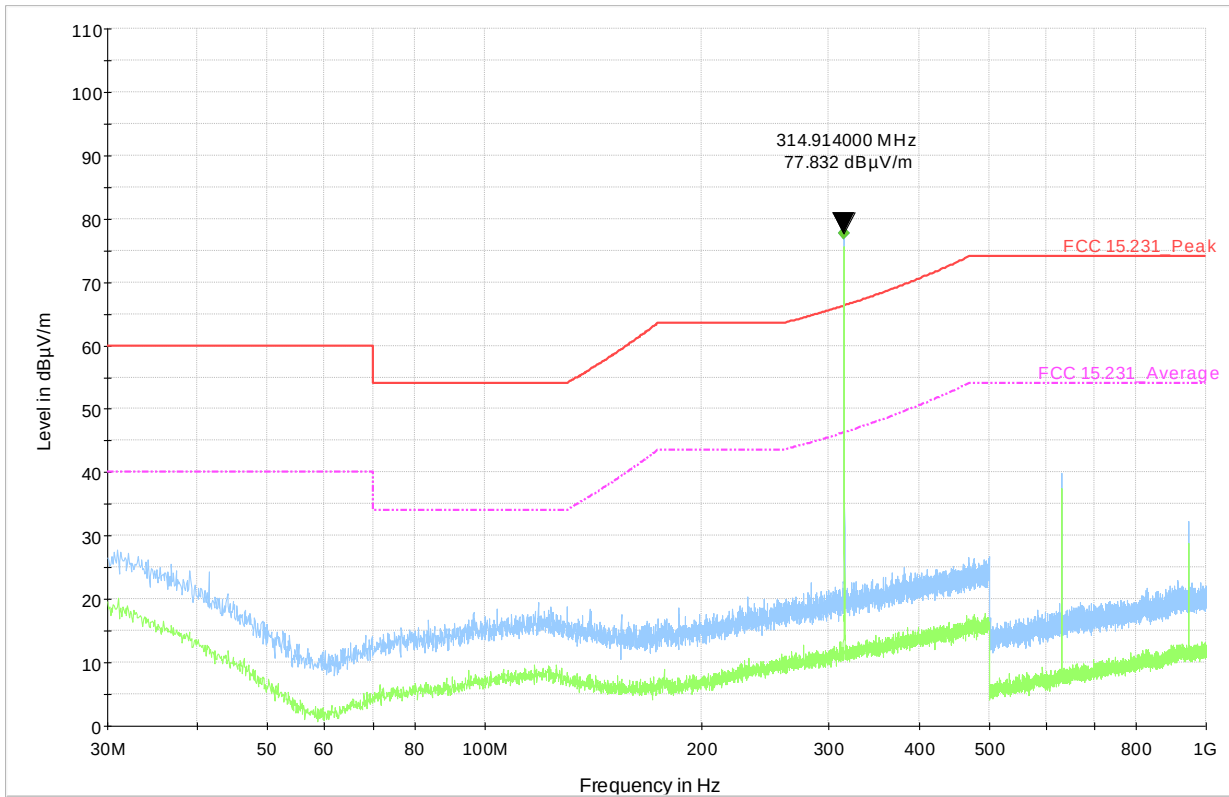
**6.8.6 Test data/ plots:****Radiated spurious emissions: 9kHz- 30MHz**

— FCC 15 9kHz converted to 3m — Preview Result 1-PK+

**Radiated spurious emissions: 30M-1GHz**

Measurement with both Peak and Average detector shown below.

Signal above the limit line is from the 314.98 MHz Transmitter.

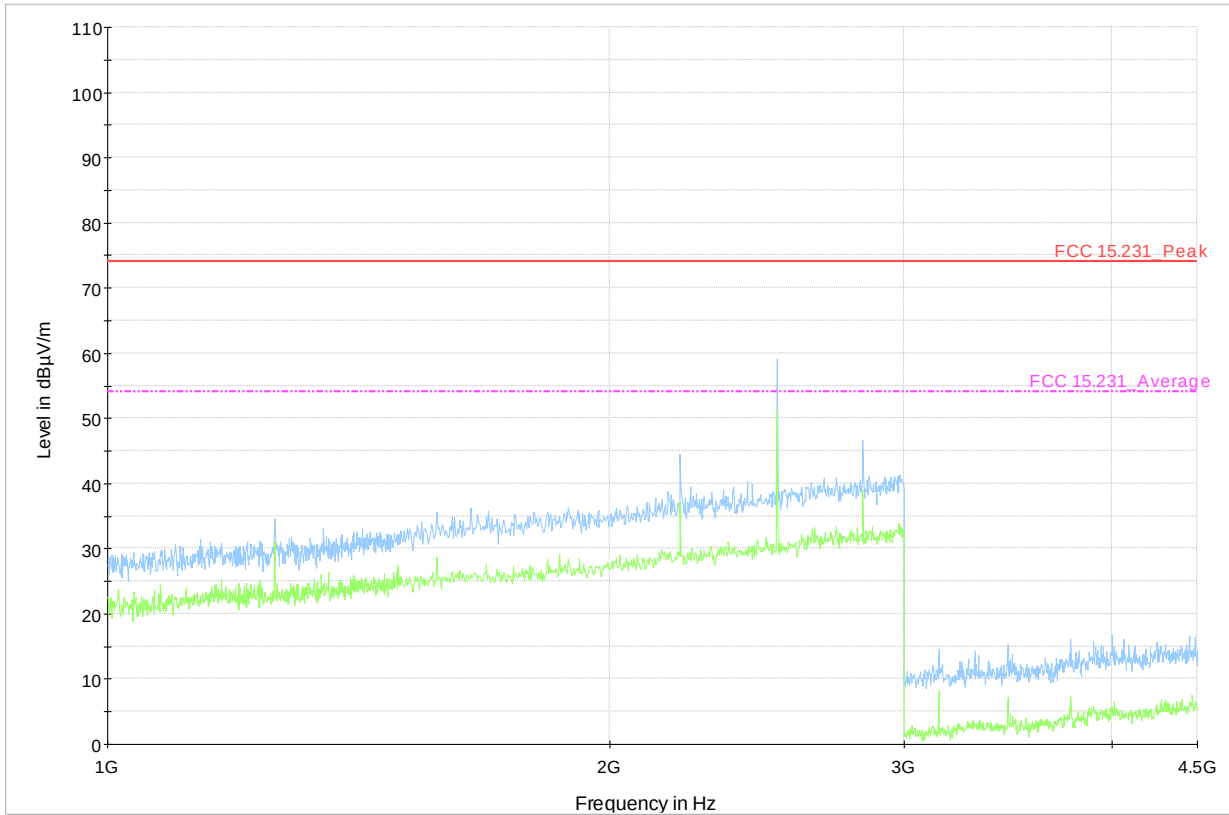


— FCC 15.231\_Peak      - - - - - FCC 15.231\_Average      — Preview Result 1-PK+      ◆ Final Result 1-PK+      ◆ Final Result 2-AVG

— Preview Result 2-AVG

**Radiated spurious emissions: >1GHz**

Measurement with both Peak and Average detector shown below.



**6.9 Receiver Spurious Emissions- Radiated****6.9.1 Limits:**

FCC CFR §15.109

| Frequency of emission (MHz) | Field strength (μV/m) | Measurement Distance (m) |
|-----------------------------|-----------------------|--------------------------|
| 0.009–0.490                 | 2400/F(kHz)           | 300                      |
| 0.490–1.705                 | 24000/F(kHz)          | 30                       |
| 1.705–30.0                  | 30                    | 30                       |
| 30–88                       | 100 (40dBμV/m)        | 3                        |
| 88–216                      | 150 (43.5 dBμV/m)     | 3                        |
| 216–960                     | 200 (46 dBμV/m)       | 3                        |
| Above 960                   | 500 (54 dBμV/m)       | 3                        |

**6.9.2 Test Result:**

This is not applicable since there is no receiver mode available.



## 7 Test Equipment and Ancillaries used for tests

### 7.1 San Diego EMC Lab

| Equipment Name                          | Manufacturer      | Type/Model  | Serial No.                  | Cal Date                       | Cal Interval | Next cal date |
|-----------------------------------------|-------------------|-------------|-----------------------------|--------------------------------|--------------|---------------|
| <b>3m Semi- Anechoic Chamber:</b>       |                   |             |                             |                                |              |               |
| Spectrum Analyzer                       | Rohde und Schwarz | FSU 26      | 200302                      | 6/2013                         | 2 years      | 6/2015        |
| Receiver                                | Rohde und Schwarz | ESR3        | 101663                      | 2/2013                         | 2 years      | 2/2015        |
| LISN                                    | Rohde und Schwarz | ESV 216     | 101129                      | 1/2013                         | 2 years      | 1/2015        |
| Radiocommunication Tester               | Rohde and Schwarz | CMU 200     | 121672                      | 7/2013                         | 2 years      | 7/2015        |
| Log Periodic Antenna                    | Rohde and Schwarz | HL 050      | 100515                      | 4/2013                         | 3 year       | 4/2016        |
| Ultralog Antenna                        | Rohde and Schwarz | HL 562      | 100495                      | 2/2012                         | 3 year       | 2/2015        |
| Open Switch Control Unit                | Rohde and Schwarz | OPS 130     | 10085                       | n/a                            |              |               |
| Extention Unit Open Switch Control Unit | Rohde and Schwarz | OSP 150     | 10086                       | n/a                            |              |               |
| Turn Table TT                           | Maturo            | 1.5 SI      | TT<br>1.5SI/204/60709<br>10 | n/a                            |              |               |
| Compact antenna Mast                    | Maturo            | CAM 4.0-P   | CAM4.0-<br>P/067/6000910    | n/a                            |              |               |
| Multiple Control Unit                   | Maturo            | MCU         | 2140910                     | n/a                            |              |               |
| Pre-Amplifier                           | Rohde and Schwarz | TS-PR 18    | 100072                      | Part of the system calibration |              |               |
| High Pass Filter                        | Mini-Circuits     | SHP-1200+   | RUU11201224                 | Part of the system calibration |              |               |
| High Pass Filter                        | Wainwright Instr. | WHKX 3.0/18 | 109                         | Part of the system calibration |              |               |

## 7.2 Milpitas EMC Lab

| Instrument/Ancillary  | Model         | Manufacturer    | Serial No. | Cal Date                   | Cal Interval |
|-----------------------|---------------|-----------------|------------|----------------------------|--------------|
| EMI Receiver/Analyzer | ESU 40        | Rohde & Schwarz | 100251     | Sept 2013                  | 1 Years      |
| Spectrum Analyzer     | FSU           | Rohde & Schwarz | 200302     | Jun 2013                   | 2 Years      |
| Pre-Amplifier         | Miteq         | JS40010260      | 340125     | N/A                        | N/A          |
| Binconilog Antenna    | EMCO          | 3141            | 0005-1186  | Apr 2012                   | 3 Years      |
| Binconilog Antenna    | ETS           | 3149            | J000123908 | Feb 2012                   | 3 years      |
| Horn Antenna          | EMCO          | 3115            | 35114      | Mar 2012                   | 3 Years      |
| Communication Antenna | IBP5-900/1940 | Kathrein        | n/a        | n/a                        | n/a          |
| High Pass Filter      | 5HC2700       | Trilithic Inc.  | 9926013    | Part of system calibration |              |
| High Pass Filter      | 4HC1600       | Trilithic Inc.  | 9922307    | Part of system calibration |              |
| 6GHz High Pass Filter | HPM50106      | Microtronics    | 001        | Part of system calibration |              |
| Pre-Amplifier         | JS4-00102600  | Miteq           | 00616      | Part of system calibration |              |
| LISN                  | R&S           | ESH3-Z5         | 836679/003 | Jun 2013                   | 3 Years      |

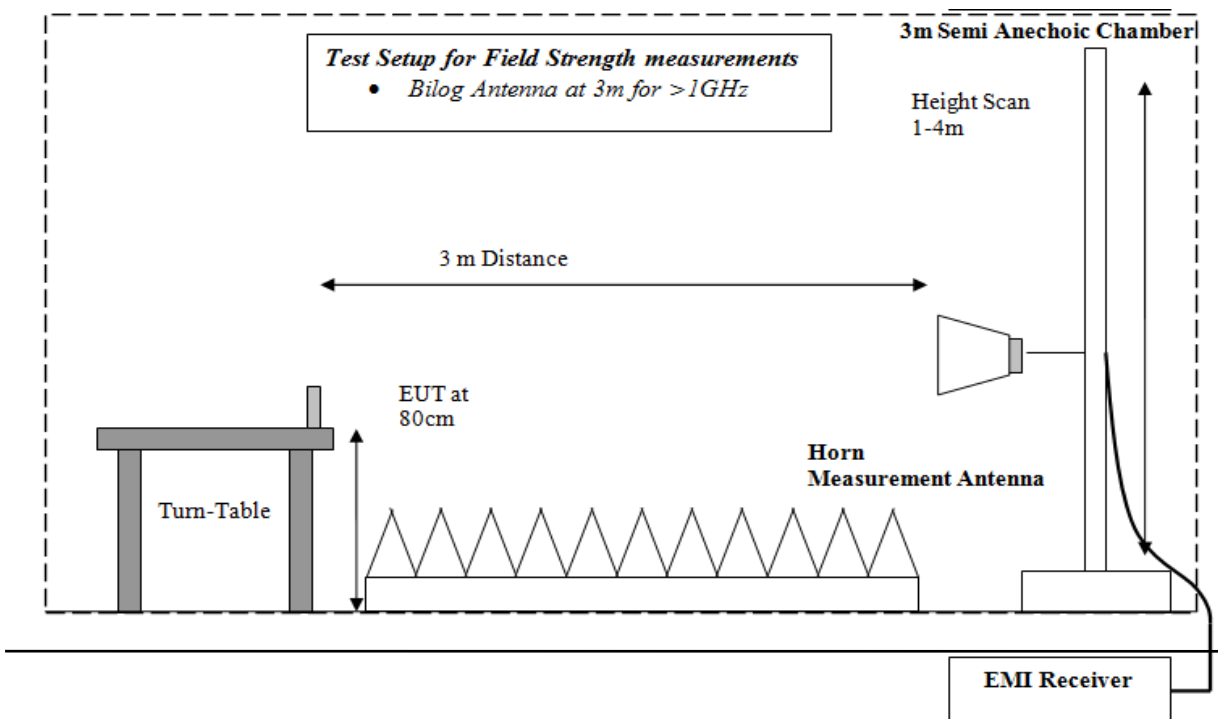
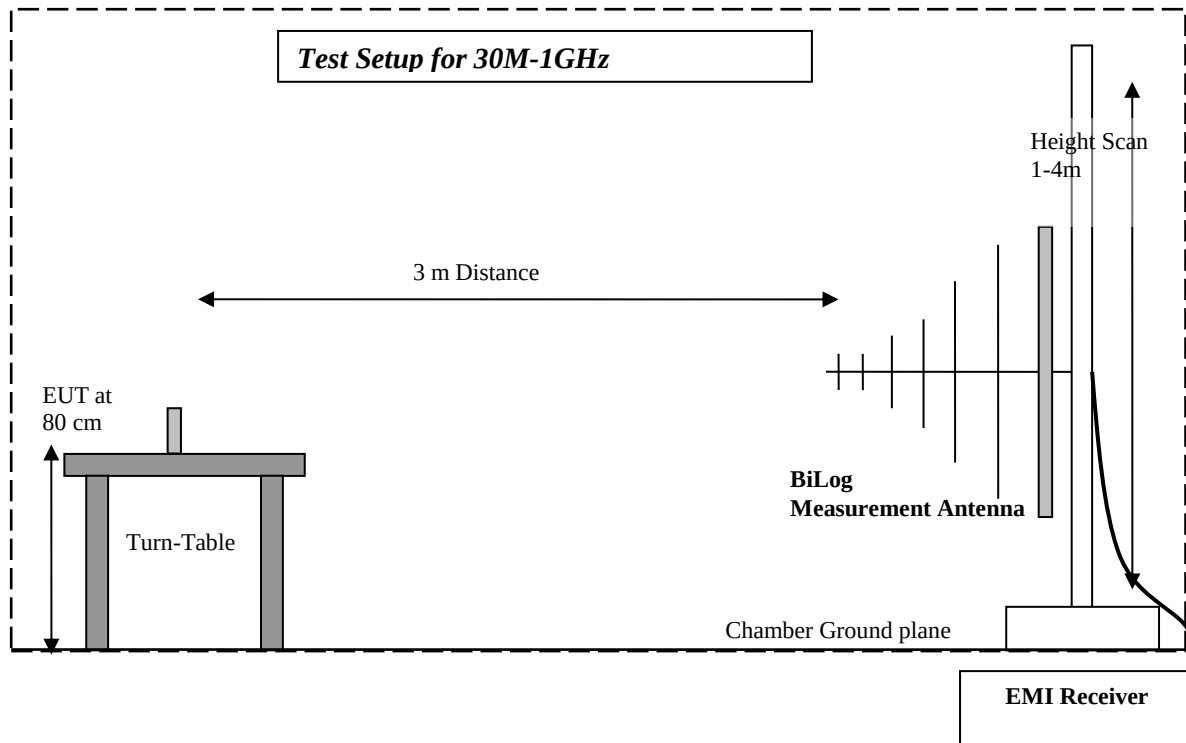
Calibration status valid at the time of testing.

Equipment used meets the measurement uncertainty requirements as required per applicable standards for 95% confidence levels.

Calibration due dates, unless defined specifically, falls on the last day of the month.

Items indicated "N/A" for cal status either do not specifically require calibration or is internally characterized before use.

## 8 Test Setup Info:



**9 Revision History**

| <b>Date</b> | <b>Report Name</b>             | <b>Changes to report</b> | <b>Report prepared by</b> |
|-------------|--------------------------------|--------------------------|---------------------------|
| 7-23-2014   | EMC_CET10-188-14001 _FCC15 231 | First Version            | M.Umair Anees             |