



**Report No.:** 60.870.13.020.02F  
**Date:** 2013-12-31

## **TEST REPORT**

**Applicant:** Cycle Parts GmbH  
Le Quartier Hornbach 13, Neustadt D-67433, Germany

**Description of Samples:** Model name: Wireless Cycle Computer (Speed Transmitter)  
Brand name: VDO  
Model no.: D3 SPD  
FCCID: TFO-13011

**Date Samples Received:** 2013-12-04

**Date Tested:** 2013-12-04 to 2013-12-30

**Investigation Requested:** FCC Part 15, Section 15.209

**Conclusions:** The submitted product COMPLIED with the requirements of Federal Communications Commission [FCC] Rules and Regulations Part 15. The tests were performed in accordance with the standards described above and on Section 2.2 in this Test Report.

**Remarks:** ----

Checked by:

Approved by:-

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Ray Cheung  
Project Engineer  
Wireless & Telecom department

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Jeff Pong  
Operation Manager  
Wireless & Telecom department



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**1.0 General Details**

**1.1 Test Laboratory**

Global United Technology Services Co., Ltd.  
1<sup>st</sup> Floor, Block No.2, Laodong Industrial Zone, Xixiang  
road Baoan District, Shenzhen, China  
Registration Number: 600491  
File Number: 9079A-1  
Tested by:

A handwritten signature in blue ink, appearing to read 'John Zhi', written over a horizontal line.

John Zhi

**1.2 Applicant Details**  
**Applicant**

**Cycle Parts GmbH**  
Le Quartier Hornbach 13, Neustadt D-67433, Germany

**Manufacturer**

**Sigma-Elektro (Hong Kong) Ltd**  
Room 2010, 20/F, No.1 Hung To Road, Kwun Tong,  
Kowloon, Hong Kong



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### **1.3 Equipment Under Test [EUT]**

#### **Description of EUT**

|                                      |                                             |
|--------------------------------------|---------------------------------------------|
| Model Name:                          | Wireless Cycle Computer (Speed Transmitter) |
| Brand Name:                          | VDO                                         |
| Model Number:                        | D3 SPD                                      |
| FCCID:                               | TFO-13011                                   |
| Rating:                              | DC 3.0V (CR 2032 battery)                   |
| Antenna Type:                        | Integral                                    |
| Operated Frequency:                  | 112 kHz                                     |
| No. of Channel:                      | 1                                           |
| Accessories and Auxiliary Equipment: | None                                        |
| EUT Exercising Software:             | None                                        |

#### **General Operation of EUT**

The Equipment Under Test (EUT) is a Speed transmitter of Cycle Computer operated at 112 kHz.

### **1.4 Equipment Modification**

No modification was made to the tested unit by TÜV SÜD Hong Kong Ltd.

### **1.5 Related Submittal(s) Grants**

This is a single application of certification for this transmitter.

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## **2.0 Technical Details**

### **2.1 Investigations Requested**

Perform ElectroMagnetic Interference measurement in accordance with  
CFR 47, Part 15 and ANSI C63.4: 2003

### **2.2 Test Standards and Results Summary Tables**

| <b>EMISSION<br/>Results Summary</b>         |                              |                                     |                                     |
|---------------------------------------------|------------------------------|-------------------------------------|-------------------------------------|
| Test Condition                              | Test Requirement             | Test Result                         |                                     |
|                                             |                              | Pass                                | N/A                                 |
| Field Strength of Fundamental and Harmonics | Part 15.209 (a)              | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Spurious Radiated Emission                  | Part 15.209 (a), Part 15.205 | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Bandwidth Measurement                       | Part 15.215 (c)              | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Conducted Emission                          | Part 15.207                  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |

Note: N/A - Not Applicable

### **3.0 Test Methodology**

#### **3.1 Radiated Emission**

The sample was placed 0.8m above the ground plane on a standard emission test site \*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

#### **3.2 Field Strength Calculation**

The field strength at 3 m was established by adding the meter reading of the spectrum analyzer to the factors associated with antenna correction factor, cable loss, preamplifiers and filter attenuation.

The equation is expressed as follow:

FS = R + System Factor

System Factor = AF + CF + FA – PA

Where FS = Net Field Strength in dBuV/m at 3 meters.

R = Reading of Spectrum Analyzer / Test Receiver in dBuV.

AF = Antenna Factor in dB.

CF = Cable Attenuation Factor in dB.

FA = Filter Attenuation Factor in dB.

PA = Preamplifier Factor in dB.

FA and PA are only be used for the measuring frequency above 1 GHz.

#### **3.3 Conducted Emissions**

The EUT was placed on a non-metallic table 0.8m above the horizontal metal reference plane and 0.4m from a vertical ground plane which is connected to the horizontal metal ground plane. Meanwhile, the AC main of EUT was connected to the distance of 0.8m line impedance stabilization network (LISN) during measurement.

Initial measurements were performed in quasi-peak and average detection modes by the test receiver, any emissions recorded within 30dB of the relevant limit lines were re-measured using quasi-peak and average detection on the live and neutral lines with the worst case recorded in the table of results.

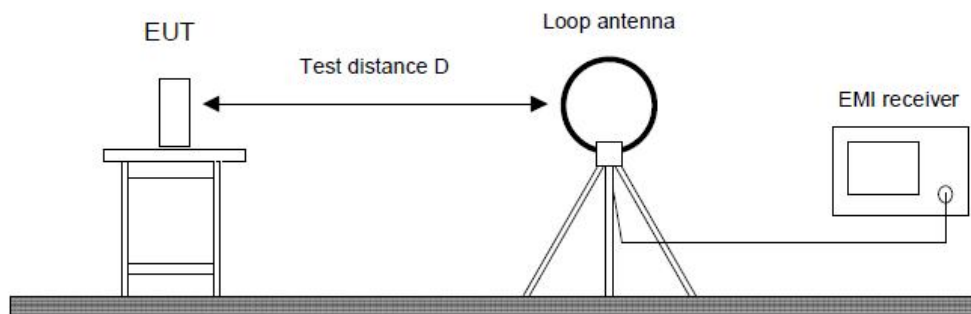
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#### **4.0 Test Results**

##### **4.1 Field Strength of Fundamental and Harmonics**

|                    |                                                                                                   |
|--------------------|---------------------------------------------------------------------------------------------------|
| Test Requirement:  | FCC part 15 section 15.209 (a)<br>RSS-210 Issue 8 Section 2.2, 2.5<br>RSS-Gen Issue 3 Section 4.8 |
| Test Method:       | ANSI C63.4:2003                                                                                   |
| Test Date:         | 2013-12-30                                                                                        |
| Mode of Operation: | Transmitting mode.                                                                                |
| Detector Function: | Average and Peak                                                                                  |
| Measurement BW:    | 200 Hz (RBW)                                                                                      |

##### **Test Setup:**



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**Results: PASS**

| Field Strength of Fundamental and Harmonics |                     |                              |                              |                              |         |
|---------------------------------------------|---------------------|------------------------------|------------------------------|------------------------------|---------|
| Value                                       | Emissions Frequency | Field Strength (at 3m)       | Limit Line (at 3m)           | Delta to Limit               | Remarks |
|                                             | <b>kHz</b>          | <b>dB<math>\mu</math>V/m</b> | <b>dB<math>\mu</math>V/m</b> | <b>dB<math>\mu</math>V/m</b> |         |
| PK                                          | 112.00              | 49.36                        | 106.61                       | -57.25                       | Fund.   |

Remark : - ( \* ) Radiated emissions which fall in the restricted bands as defined in Part 15 Section 15.205(a) and RSS-Gen Section 7.2.2.

- Calculated measurement uncertainty:  $\pm 5.0$ dB

**Limit for Radiated Emission [ Part 15 Section 15.209, RSS-Gen Section 7.2.5 ]:**

| Frequency (MHz) | Field Strength [ $\mu$ V/m] | Measurement Distance (Meter) |
|-----------------|-----------------------------|------------------------------|
| 0.009 – 0.490   | 2400/F (kHz)                | 300                          |
| 0.049 – 1.705   | 24000/F (kHz)               | 30                           |
| 1.705 – 30      | 30                          | 30                           |
| 30 – 88         | 100                         | 3                            |
| 88 – 216        | 150                         | 3                            |
| 216 – 960       | 200                         | 3                            |
| Above 960       | 500                         | 3                            |

Note :

- Emission Level (dB $\mu$ V/m) = 20 log Emission Level ( $\mu$ V/m)
- Distance extrapolation factor = 40 log (specific distance / test distance) (dB)
- Limit line = specific limit (dB $\mu$ V) + distance extrapolation factor.

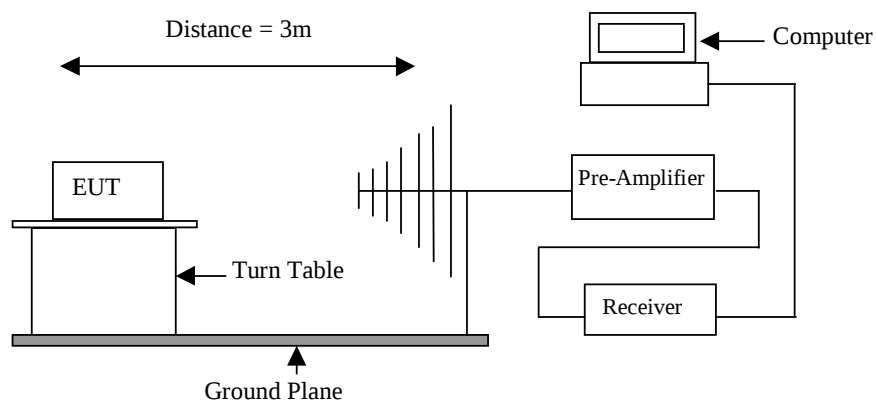
Radiated emissions, which fall in the restricted bands, as defined in Part 15 Section 15.205(a) and RSS-Gen Section 7.2.2, must also comply with the radiated emission limits as above.

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#### **4.2 Spurious Radiated Emission**

|                    |                                                                                                             |
|--------------------|-------------------------------------------------------------------------------------------------------------|
| Test Requirement:  | FCC part 15 section 15.209 (a)<br>RSS-210 Issue 8 Section 2.2, 2.5<br>RSS-Gen Issue 3 Section 4.8           |
| Test Method:       | ANSI C63.4:2003                                                                                             |
| Test Date:         | 2013-12-30                                                                                                  |
| Mode of Operation: | Transmitting Mode                                                                                           |
| Detector Function: | Quasi-peak, Average and Peak                                                                                |
| Measurement BW:    | 200 Hz (Below 150 kHz)<br>9 kHz (150kHz to 30 MHz)<br>120 kHz (30MHz to 1000 MHz)<br>1 MHz (Above 1000 MHz) |

#### **Test Setup:**



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**Results: PASS**

| <b>Spurious Radiated Emissions (Below 30MHz)</b> |                        |                           |                       |                   |
|--------------------------------------------------|------------------------|---------------------------|-----------------------|-------------------|
| Value                                            | Emissions<br>Frequency | Field Strength<br>(at 3m) | Limit Line<br>(at 3m) | Delta to<br>Limit |
|                                                  | <b>MHz</b>             | <b>dBμV/m</b>             | <b>dBμV/m</b>         | <b>dBμV/m</b>     |
| QP                                               | 0.02                   | 41.05                     | 69.54                 | -28.49            |
| QP                                               | 0.03                   | 36.01                     | 69.54                 | -33.53            |

| <b>Spurious Radiated Emissions (Above 30MHz)</b> |                        |                     |               |                  |                            |               |                   |
|--------------------------------------------------|------------------------|---------------------|---------------|------------------|----------------------------|---------------|-------------------|
| Value                                            | Emissions<br>Frequency | E-Field<br>Polarity | Reading       | System<br>Factor | Field<br>Strength<br>at 3m | Limit         | Delta to<br>Limit |
|                                                  | <b>MHz</b>             |                     | <b>dBμV/m</b> | <b>dB</b>        | <b>dBμV/m</b>              | <b>dBμV/m</b> | <b>dBμV/m</b>     |
| QP                                               | 41.13                  | V                   | 36.74         | -15.81           | 20.93                      | 40.00         | -19.07            |
| QP                                               | 50.70                  | V                   | 36.37         | -16.64           | 19.73                      | 40.00         | -20.27            |
| QP                                               | 96.10                  | V                   | 36.98         | -15.69           | 21.29                      | 43.50         | -22.21            |
| QP                                               | 191.07                 | V                   | 38.04         | -17.75           | 20.29                      | 43.50         | -23.21            |
| QP                                               | 463.97                 | V                   | 37.06         | -10.81           | 26.25                      | 46.00         | -19.75            |
| QP                                               | 958.79                 | V                   | 36.18         | -2.65            | 33.53                      | 46.00         | -12.47            |
| QP                                               | 42.45                  | H                   | 36.28         | -15.77           | 20.51                      | 40.00         | -19.49            |
| QP                                               | 60.92                  | H                   | 36.64         | -16.63           | 20.01                      | 40.00         | -19.99            |
| QP                                               | 101.64                 | H                   | 35.42         | -15.54           | 19.88                      | 43.50         | -23.62            |
| QP                                               | 250.30                 | H                   | 36.75         | -15.97           | 20.78                      | 46.00         | -25.22            |
| QP                                               | 365.54                 | H                   | 37.12         | -12.81           | 24.31                      | 46.00         | -21.69            |
| QP                                               | 972.34                 | H                   | 36.87         | -2.55            | 34.32                      | 54.00         | -19.68            |

Note: - No further spurious emissions found between 150 kHz and lowest internal used / generated frequency.  
 - Result data graph is shown at the following pages for reference.

Remark : - ( \* ) Radiated emissions which fall in the restricted bands as defined in Part 15 Section 15.205(a) and RSS-Gen Section 7.2.2.  
 - Calculated measurement uncertainty: ±5.0dB.

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**Limit for Radiated Emission [ Part 15 Section 15.209, RSS-Gen Section 7.2.5 ]:**

| Frequency (MHz) | Field Strength<br>[ $\mu\text{V/m}$ ] | Measurement Distance<br>(Meter) |
|-----------------|---------------------------------------|---------------------------------|
| 0.009 – 0.490   | 2400/F (kHz)                          | 300                             |
| 0.049 – 1.705   | 24000/F (kHz)                         | 30                              |
| 1.705 – 30      | 30                                    | 30                              |
| 30 – 88         | 100                                   | 3                               |
| 88 – 216        | 150                                   | 3                               |
| 216 – 960       | 200                                   | 3                               |
| Above 960       | 500                                   | 3                               |

Note :

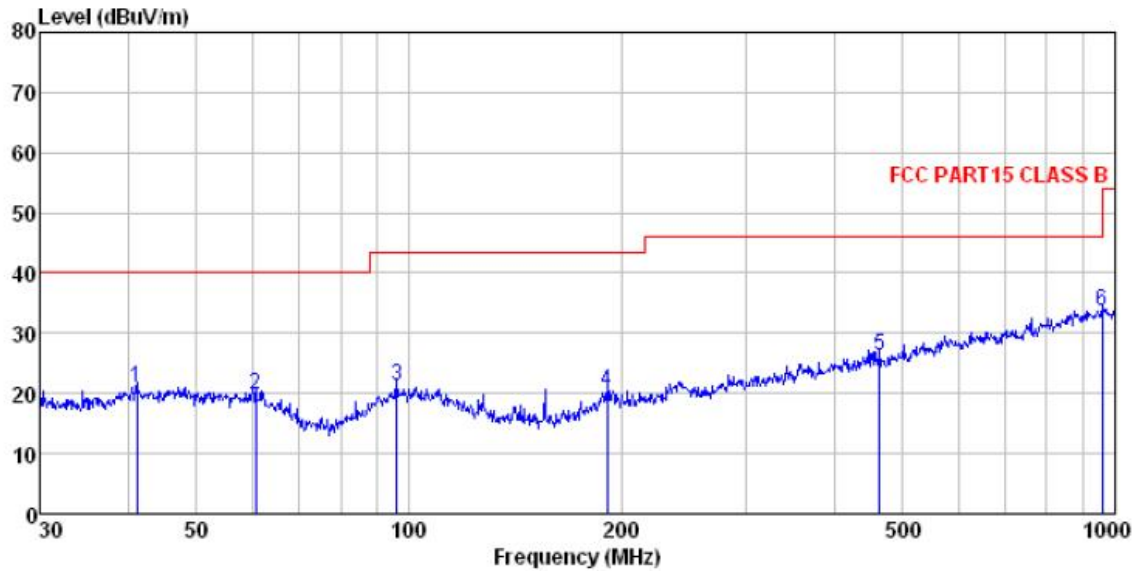
- Emission Level ( $\text{dB}\mu\text{V/m}$ ) =  $20 \log$  Emission Level ( $\mu\text{V/m}$ )
- Distance extrapolation factor =  $40 \log$  (specific distance / test distance) (dB)
- Limit line = specific limit ( $\text{dB}\mu\text{V}$ ) + distance extrapolation factor.

Radiated emissions, which fall in the restricted bands, as defined in Part 15 Section 15.205(a) and RSS-Gen Section 7.2.2, must also comply with the radiated emission limits as above.

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

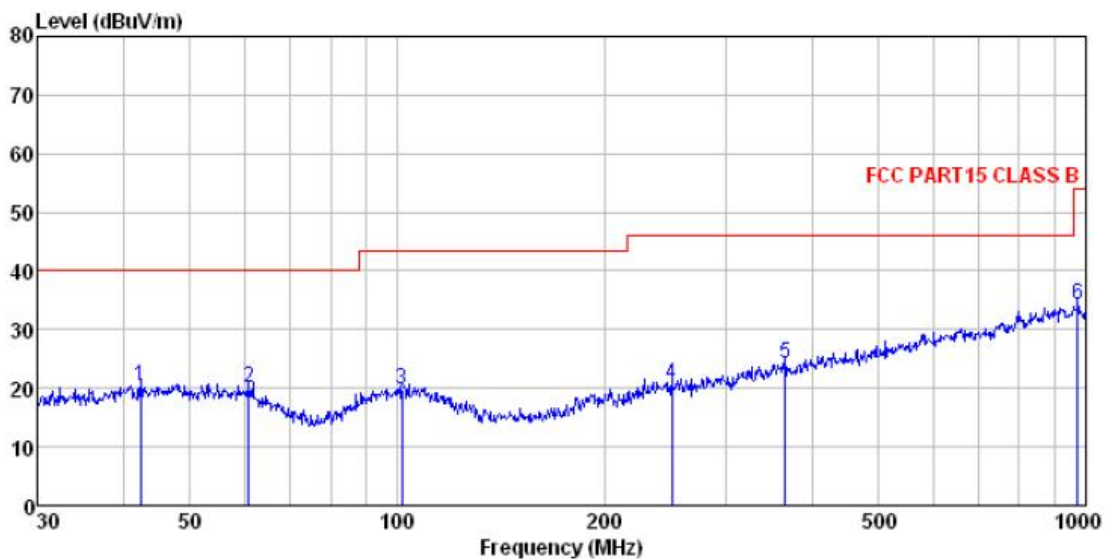
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### Vertical (30 to 1000MHz)



Remark: Only background noise was measured above 1GHz.

### Horizontal (30 to 1000MHz)



Remark: Only background noise was measured above 1GHz.



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#### **4.3 Bandwidth Measurement**

|                    |                                                               |
|--------------------|---------------------------------------------------------------|
| Test Requirement:  | FCC part 15 section 15.215 (c)<br>RSS-Gen Issue 3 Section 4.6 |
| Test Method:       | ANSI C63.4:2003                                               |
| Test Date:         | 2013-12-30                                                    |
| Mode of Operation: | Transmitting mode.                                            |
| Detector Function: | Peak                                                          |

**Results: PASS**

| 20 dB BW   | 99% OBW   | Test Result |
|------------|-----------|-------------|
| 335.239 Hz | 282.420Hz | Complies    |

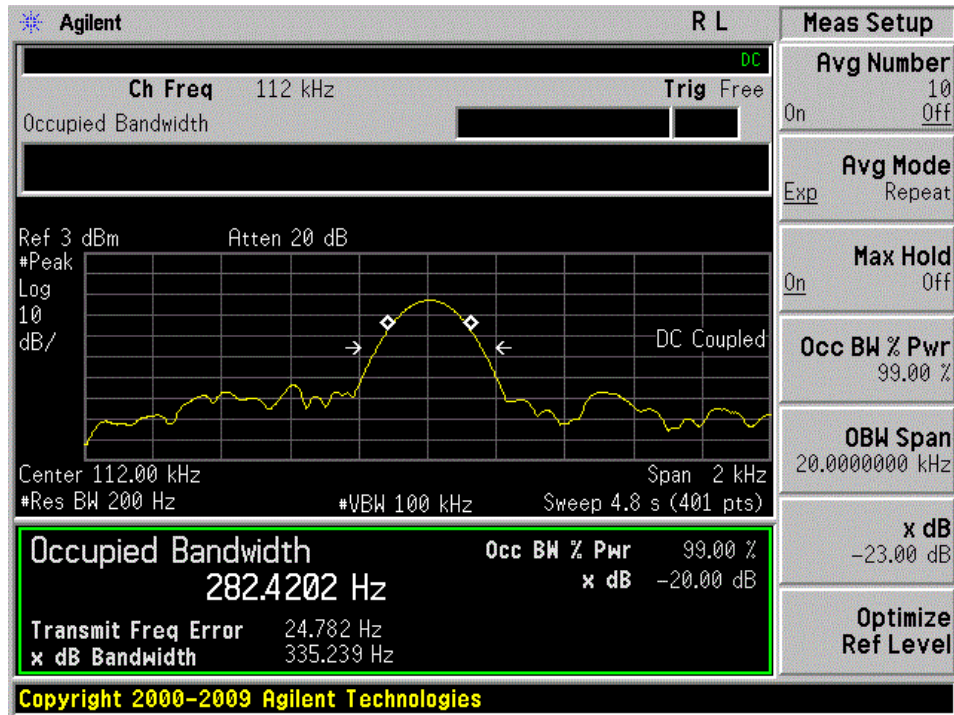
**Remarks:** Result data graph is shown at the following pages for reference.

#### **Limit for Bandwidth**

The 20dB bandwidth of the emission shall be within the frequency band designated in the rule section under which the equipment is operated.

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### Bandwidth



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#### **4.4 Conducted Emissions (0.15MHz to 30MHz)**

|                    |                                                                     |
|--------------------|---------------------------------------------------------------------|
| Test Requirement:  | FCC part 15 Section 15.207 Class B<br>RSS-Gen Issue 3 Section 7.2.4 |
| Test Method:       | ANSI C63.4:2003                                                     |
| Test Date:         | ---                                                                 |
| Mode of Operation: | ---                                                                 |
| Detector Function: | ---                                                                 |
| Measurement BW:    | ---                                                                 |

**Result : N/A**

**Note : This testing is not applicable for the battery operated EUT.**

#### **Limits for Conducted Emission [ FCC Part 15.207 and RSS-Gen table 2]:**

| Frequency Range<br>[MHz] | Quasi-Peak Limit<br>[dB $\mu$ V] | Average Limit<br>[dB $\mu$ V] |
|--------------------------|----------------------------------|-------------------------------|
| 0.15-0.5                 | 66 to 56*                        | 56 to 46*                     |
| 0.5-5.0                  | 56                               | 46                            |
| 5.0-30.0                 | 60                               | 50                            |

\* Decreases with the logarithm of the frequency.



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## **5.0 List of Measurement Equipment**

### **Radiated Emission and Out of Band Emissions**

| <b>Description</b>           | <b>Manufacturer</b> | <b>Model no.</b>     | <b>Serial no.</b> | <b>CAL due</b> |
|------------------------------|---------------------|----------------------|-------------------|----------------|
| 3m Semi-Anechoic Chamber     | ZhongYu Electron    | 9.0(L)*6.0(W)*6.0(H) | GTS250            | 29 Mar 2014    |
| ESU EMI Test Receiver        | R&S                 | ESU26                | GTS203            | 06 Jul 2014    |
| BiConiLog Antenna            | SCHWARZBECK         | VULB9163             | GTS214            | 09 Mar 2014    |
| Double-ridged waveguide horn | SCHWARZBECK         | 9120D                | GTS208            | 09 Mar 2014    |
| RF Amplifier                 | HP                  | 8347A                | GTS204            | 06 Jul 2014    |
| Preamplifier                 | HP                  | 8349B                | GTS206            | 06 Jul 2014    |

Remarks:

CM Corrective Maintenance

N/A Not Applicable or Not Available