

FCC - TEST REPORT

Report Number : **60.790.17.008.01** Date of Issue : September 15, 2017

Model : **Cycle Computer: VDO M6.1;**
Docking Station: VDO DS M6.1

Product Type : **Cycle Computer and Docking Station**

Applicant : Cycle Parts GmbH

Address : Le Quartier Hornbach 13, Neustadt/Weinstrasse D-67433, Germany

Production Facility : Sigma-Elektro (Hong Kong) Ltd

Address : Room 2010, 20/F, No.1 Hung To Road, Kwun Tong, Kowloon, Hong Kong

Test Result : ☒ **Positive** ☐ **Negative**

Total pages
including
Appendices : 29

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2. Details about the Test Laboratory

Details about the Test Laboratory

Company name: TÜV SÜD Cert and Testing (China) Co., Ltd.
Building 12&13, Zhiheng Wisdomland Business Park,
Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052,
P. R. China

FCC Registration Number: 514049

Telephone: 86 755 8828 6998
Fax: 86 755 8828 5299

3. Description of Equipment Under Test

Description of the Equipment Under Test

Product: Cycle Computer and Docking Station

Model no.: Cycle Computer: VDO M6.1
Docking Station: VDO DS M6.1

FCC ID: TFOM61

Frequency: 112kHz (Receive only)

Antenna Type: Integral

Antenna Gain: 0 dBi

Rating: VDO M6.1: 3.0VDC (1 x 3.0VDC "CR2450" size battery)
VDO DS 6.1: 5.0VDC (From USB Port)

4. Summary of Test Standards

| Test Standards | |
|--|-------------------------|
| FCC Part 15 Subpart B 10-1-16 Edition | Unintentional Radiators |

5. Summary of Test Results

| Emission Tests | | | | |
|---|-------|-------------------------------------|--------------------------|--------------------------|
| FCC Part 15 Subpart B | | | | |
| Test Condition | Pages | Test Result | | |
| | | Pass | Fail | N/A |
| FCC Title 47 Part 15.109 Radiated Emission 30MHz-1000MHz | 11-15 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| FCC Title 47 Part 15.107 Conduct Emission 150kHz-30MHz | 8-10 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

6. General Remarks

Remarks

120VAC / 60Hz and 240VAC / 50Hz operation conditions have been tested. Only worse case data is shown.

SUMMARY:

- All tests according to the regulations cited on page 5 were

■ - Performed

□ - **Not** Performed

- The Equipment Under Test

■ - **Fulfills** the general approval requirements.

□ - **Does not** fulfill the general approval requirements.

Sample Received Date: June 1, 2017

Testing Start Date: June 2, 2017

Testing End Date: August 31, 2017


- TÜV SÜD CERT AND TESTING (CHINA) CO., LTD. -

Reviewed by:



CHAN Kwong Ngai
EMC Test Engineer

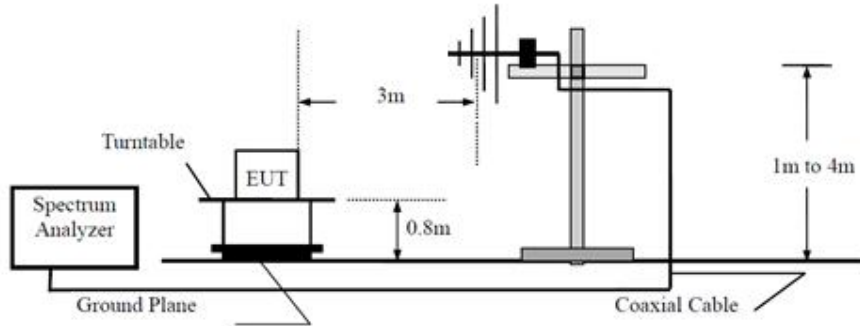
Prepared by:



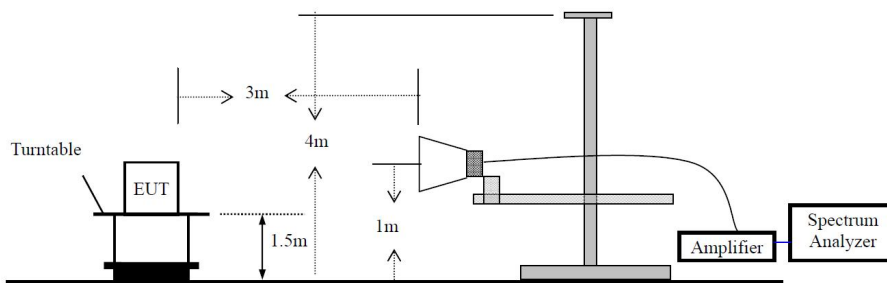
Alex CHAN
EMC Project Engineer

7. Test Setups

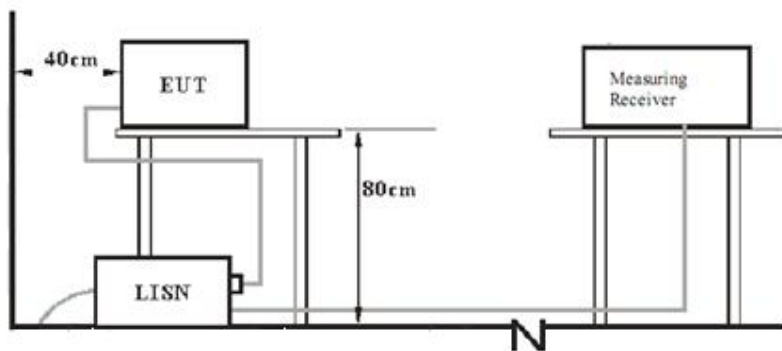
7.1. Below 1GHz



7.2. Above 1GHz



7.3. AC Power Line Conducted Emission test setups



8. Systems test configuration

Auxiliary Equipment Used during Test:

| DESCRIPTION | MANUFAC-TURER | MODEL NO. (SHIELD) | S/N (LENGTH) | PARAMETERS |
|-------------|---------------|--------------------|------------------|------------|
| Notebook | Lenovo | X240 | SL10F316 38JS | --- |
| Adapter | --- | --- | - | --- |

The device was charging form external adapter

9. Emission Test Results

9.1. Conducted Emission Test

Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line

Limit

According to §15.107, conducted emissions limit as below:

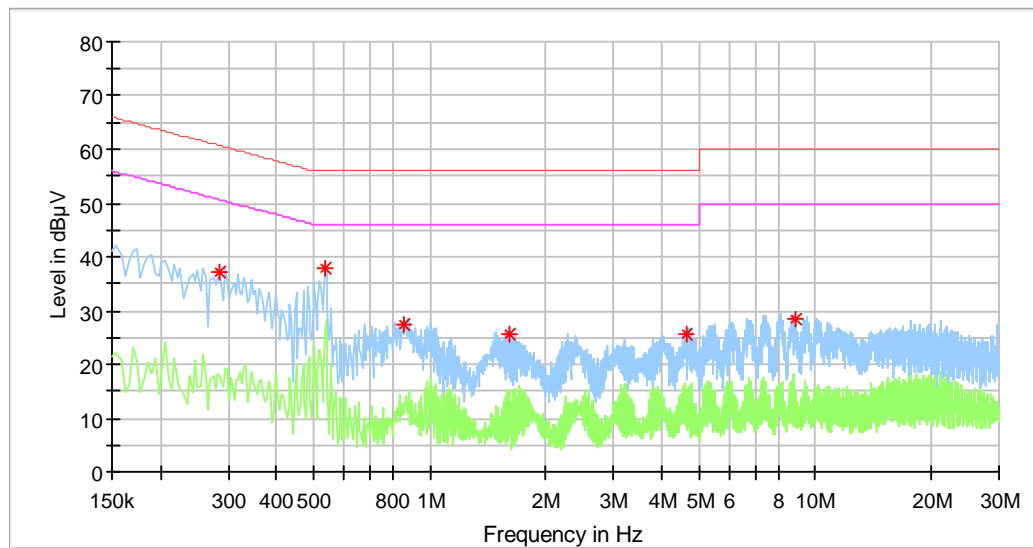
| Frequency MHz | QP Limit dB μ V | AV Limit dB μ V |
|------------------|------------------------|------------------------|
| 0.150-0.500 | 66-56* | 56-46* |
| 0.500-5 | 56 | 46 |
| 5-30 | 60 | 50 |

*Decreasing linearly with logarithm of the frequency

Conducted Emission

EUT: VDO M6.1, VDO DS M6.1
 Op Condition: Data Transfer
 Test Specification: AC Mains, L Line
 Comment: 3.0VDC (VDO M6.1)
 5.0VDC (VDO DS M6.1, connected with PC via
 USB port)
 120VAC, 60Hz (Notebook)

| Test Result | |
|-------------------------------------|------------|
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

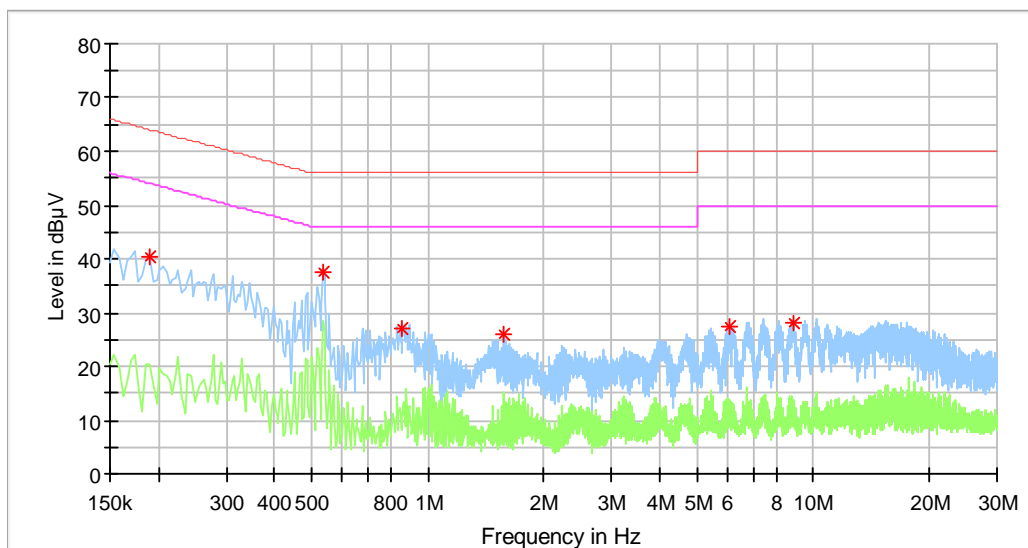


| Frequency (MHz) | QuasiPeak (dBµV) | Average (dBµV) | Limit (dBµV) | Margin (dB) | Corr. (dB) |
|-----------------|------------------|----------------|--------------|-------------|------------|
| 0.286000 | 37.30 | --- | 60.64 | 23.34 | 10.3 |
| 0.534000 | 37.77 | --- | 56.00 | 18.23 | 10.3 |
| 0.854000 | 27.45 | --- | 56.00 | 28.55 | 10.4 |
| 1.610000 | 25.64 | --- | 56.00 | 30.36 | 10.4 |
| 4.638000 | 25.67 | --- | 56.00 | 30.33 | 10.5 |
| 8.858000 | 28.48 | --- | 60.00 | 31.52 | 10.7 |

Conducted Emission

EUT: VDO M6.1, VDO DS M6.1
 Op Condition: Data Transfer
 Test Specification: AC Mains, N Line
 Comment: 3.0VDC (VDO M6.1)
 5.0VDC (VDO DS M6.1, connected with PC via USB port)
 120VAC, 60Hz (Notebook)

| Test Result | |
|-------------------------------------|------------|
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |



| Frequency (MHz) | QuasiPeak (dBμV) | Average (dBμV) | Limit (dBμV) | Margin (dB) | Corr. (dB) |
|-----------------|------------------|----------------|--------------|-------------|------------|
| 0.190000 | 40.50 | --- | 64.04 | 23.54 | 10.3 |
| 0.534000 | 37.55 | --- | 56.00 | 18.45 | 10.3 |
| 0.862000 | 27.17 | --- | 56.00 | 28.83 | 10.4 |
| 1.574000 | 25.81 | --- | 56.00 | 30.19 | 10.4 |
| 6.082000 | 27.47 | --- | 60.00 | 32.53 | 10.6 |
| 8.898000 | 28.09 | --- | 60.00 | 31.91 | 10.7 |

9.2. Radiated Emission Test 30MHz – 1000MHz

Test Method

- 1: The EUT was placed on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2: The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
- 3: The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 4: For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- 5: Use the following spectrum analyzer settings According to C63.10:
 For Above 1GHz
 Span = wide enough to capture the peak level of the in-band emission and all spurious
 RBW = 1MHz, VBW ≥ RBW for peak measurement and VBW = 10Hz for average measurement,
 Sweep = auto, Detector function = peak, Trace = max hold.
 For Below 1GHz
 Use the following spectrum analyzer settings:
 Span = wide enough to capture the peak level of the in-band emission and all spurious
 RBW = 100 KHz, VBW ≥ RBW for peak measurement, Sweep = auto, Detector function = peak,
 Trace = max hold.

Note:

- 1: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Quasi-peak detection (QP) at frequency below 1GHz.
- 2: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for peak detection (PK) at frequency above 1GHz.
- 3: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average ((duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor (20log(1/duty cycle)).
- 4: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.

Limits

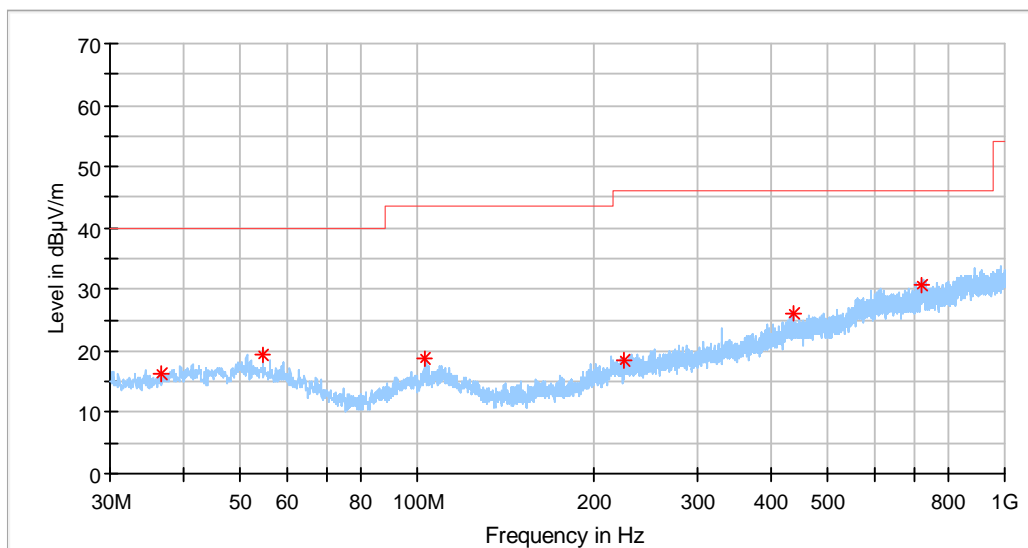
The radio emission outside the operating frequency band shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Radiated emissions which fall in the restricted bands, as defined in section 15.205, must comply with the radiated emission limits specified in section 15.209.

| Frequency MHz | Field Strength uV/m | Field Strength dBμV/m | Detector |
|------------------|------------------------|--------------------------|----------|
| 30-88 | 100 | 40 | QP |
| 88-216 | 150 | 43.5 | QP |
| 216-960 | 200 | 46 | QP |
| 960-1000 | 500 | 54 | QP |
| Above 1000 | 500 | 54 | AV |
| Above 1000 | 5000 | 74 | PK |

Radiated Emission

EUT: VDO M6.1
 Op Condition: Normal Working
 Test Specification: Antenna: Horizontal
 Comment: 3.0VDC

| Test Result | |
|-------------------------------------|------------|
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

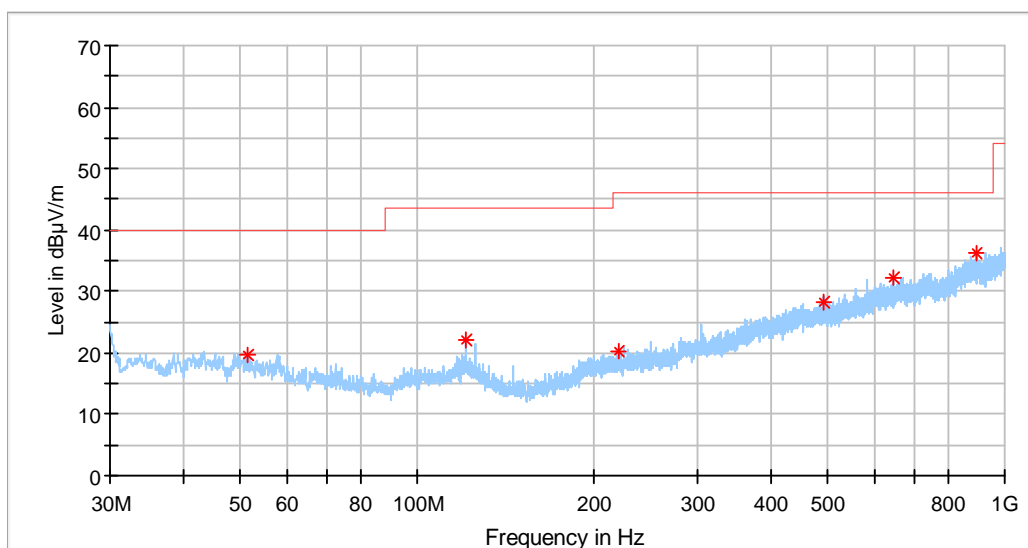


| Frequency (MHz) | QuasiPeak (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Corr. (dB) |
|-----------------|--------------------|----------------|-------------|------------|
| 36.608125 | 16.28 | 40.00 | -23.72 | 15.9 |
| 54.492500 | 19.22 | 40.00 | -20.78 | 17.0 |
| 103.295625 | 18.87 | 43.50 | -24.63 | 15.9 |
| 225.879375 | 18.44 | 46.00 | -27.56 | 16.4 |
| 436.915000 | 26.08 | 46.00 | -19.92 | 22.5 |
| 723.246875 | 30.57 | 46.00 | -15.43 | 26.8 |

Radiated Emission

EUT: VDO M6.1
 Op Condition: Normal Working
 Test Specification: Antenna: Vertical
 Comment: 3.0VDC

| Test Result | |
|-------------------------------------|------------|
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

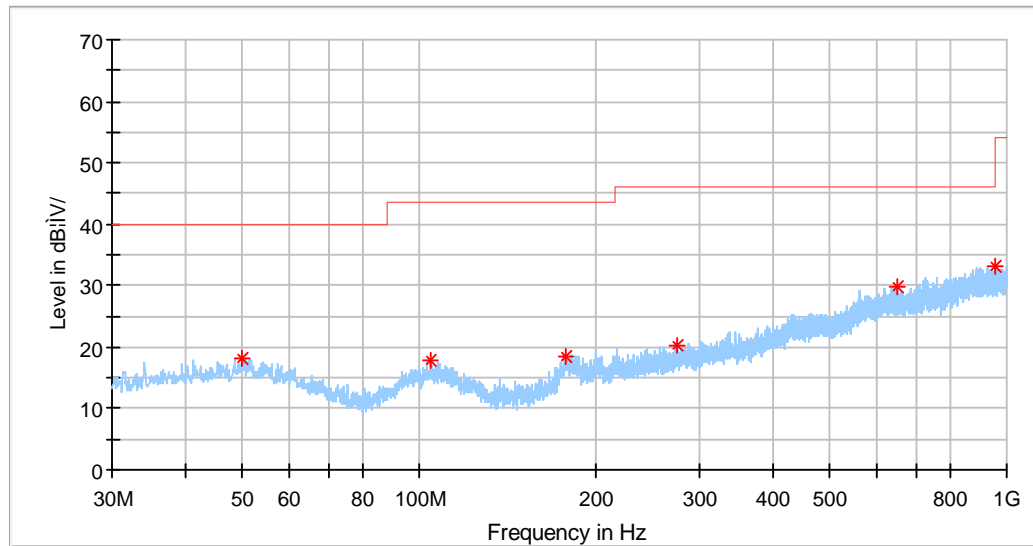


| Frequency (MHz) | QuasiPeak (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Corr. (dB) |
|-----------------|--------------------|----------------|-------------|------------|
| 51.279375 | 19.78 | 40.00 | -20.22 | 18.4 |
| 121.361875 | 22.15 | 43.50 | -21.35 | 14.7 |
| 220.301875 | 20.30 | 46.00 | -25.70 | 17.6 |
| 492.023125 | 28.35 | 46.00 | -17.65 | 25.1 |
| 645.646875 | 32.38 | 46.00 | -13.62 | 27.8 |
| 897.968125 | 36.17 | 46.00 | -9.83 | 32.0 |

Radiated Emission

EUT: VDO M6.1, VDO DS M6.1
 Op Condition: Data Transfer
 Test Specification: Antenna: Horizontal
 Comment: 3.0VDC (VDO M6.1)
 5.0VDC (VDO DS M6.1, connected with PC via USB port)
 120VAC, 60Hz (Notebook)

| Test Result | |
|-------------------------------------|------------|
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

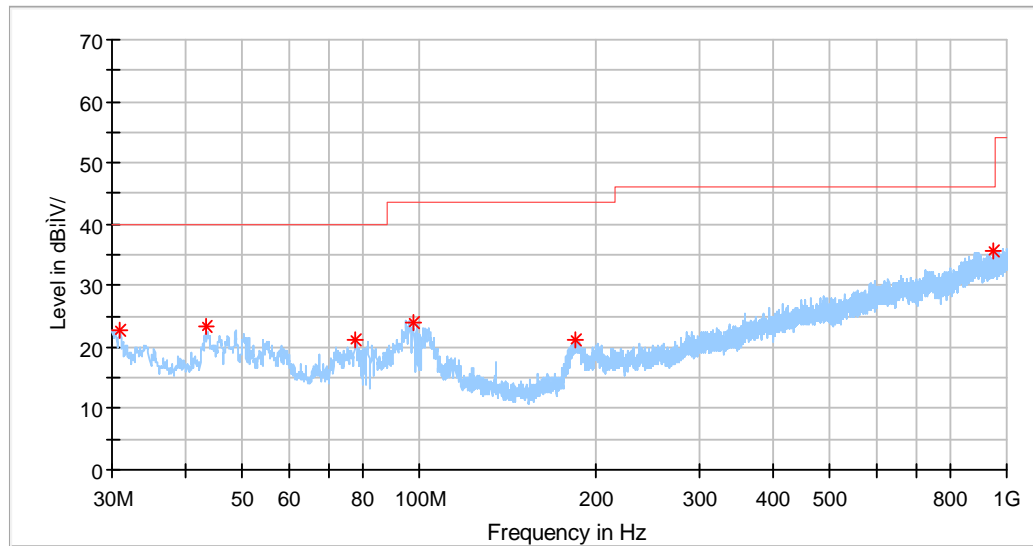


| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Corr. (dB) |
|-----------------|--------------------|----------------|-------------|------------|
| 50.006250 | 18.19 | 40.00 | 21.81 | 17.7 |
| 104.205000 | 17.74 | 43.50 | 25.76 | 15.9 |
| 177.985625 | 18.53 | 43.50 | 24.97 | 13.5 |
| 274.985625 | 20.29 | 46.00 | 25.71 | 18.2 |
| 650.315000 | 29.70 | 46.00 | 16.30 | 26.1 |
| 956.956250 | 33.05 | 46.00 | 12.95 | 29.4 |

Radiated Emission

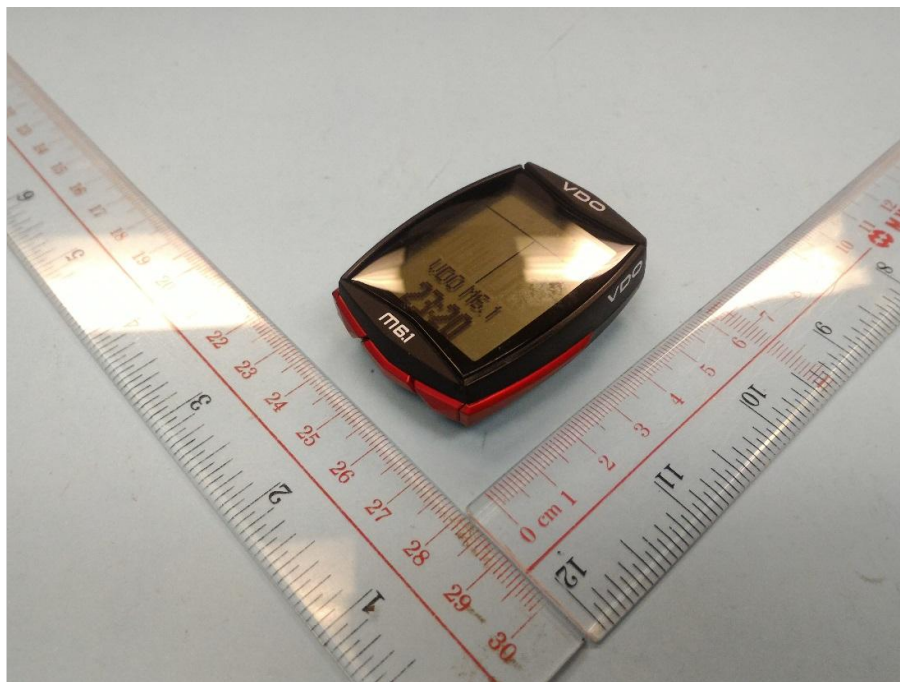
EUT: VDO M6.1, VDO DS M6.1
 Op Condition: Data Transfer
 Test Specification: Antenna: Vertical
 Comment: 3.0VDC (VDO M6.1)
 5.0VDC (VDO DS M6.1, connected with PC via USB port)
 120VAC, 60Hz (Notebook)

| Test Result | |
|-------------------------------------|------------|
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |



| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Corr. (dB) |
|-----------------|--------------------|----------------|-------------|------------|
| 30.909375 | 22.62 | 40.00 | 17.38 | 16.5 |
| 43.337500 | 23.40 | 40.00 | 16.60 | 18.5 |
| 77.530000 | 21.29 | 40.00 | 18.71 | 14.3 |
| 97.657500 | 24.02 | 43.50 | 19.48 | 15.7 |
| 183.866250 | 21.11 | 43.50 | 22.39 | 15.3 |
| 948.650625 | 35.51 | 46.00 | 10.49 | 32.0 |

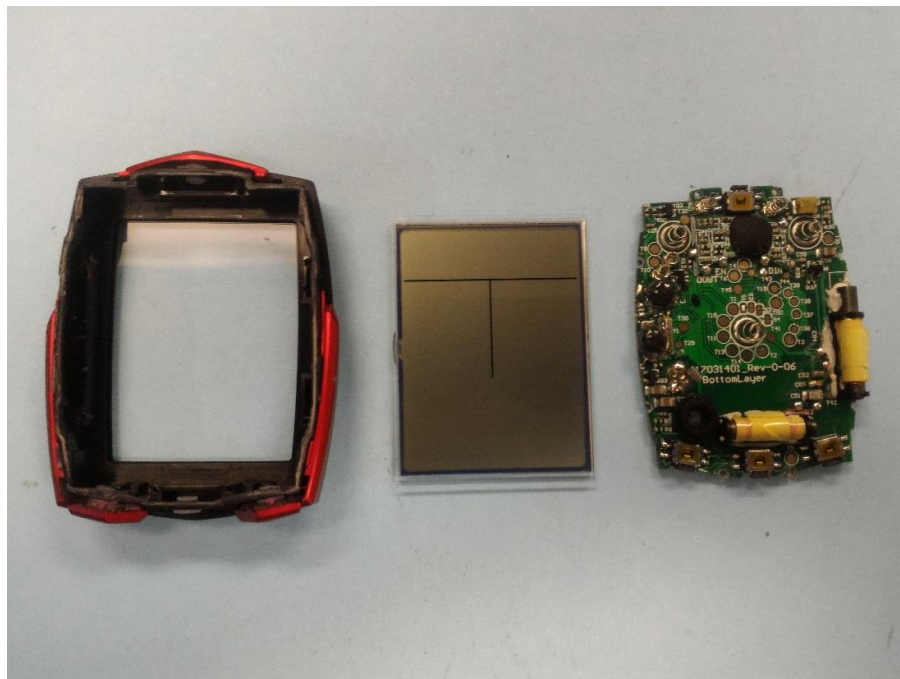
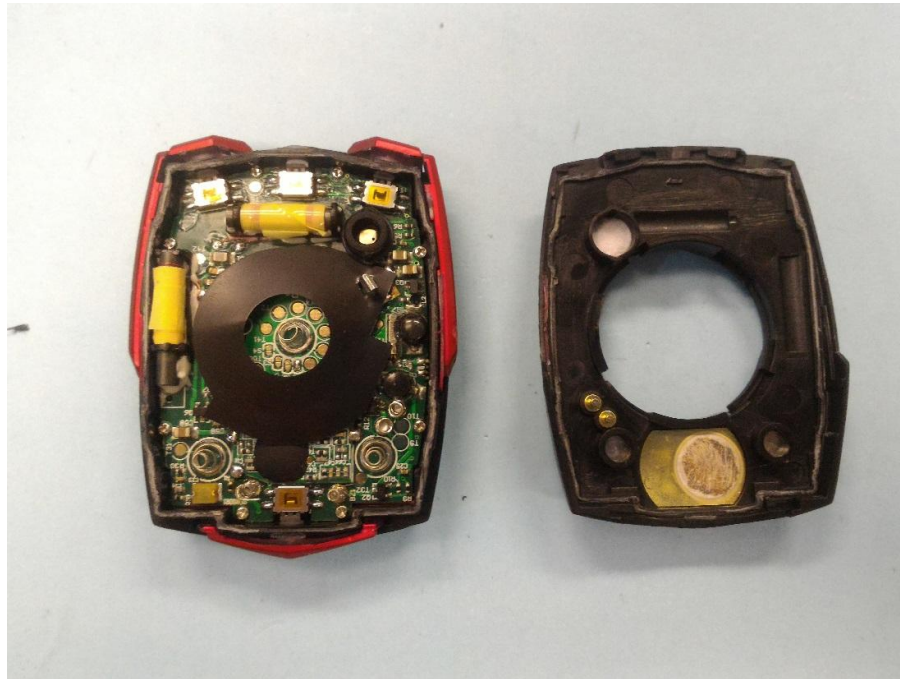
10. Appendix A - Photographs of EUT



Appendix A



Appendix A



17031 401_Rev-0-06
Bottom Layer



Appendix A



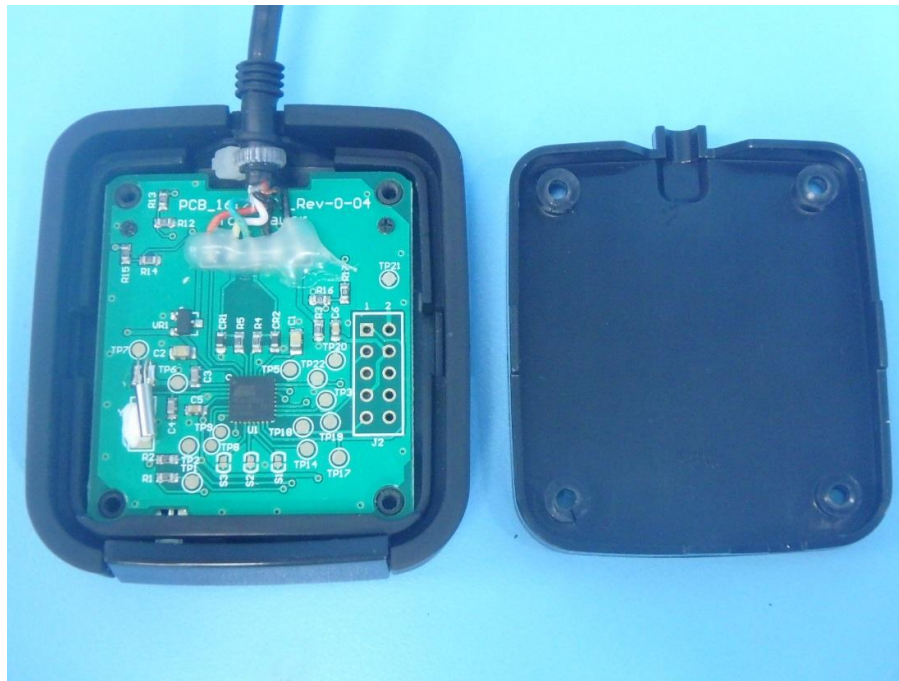
Appendix A



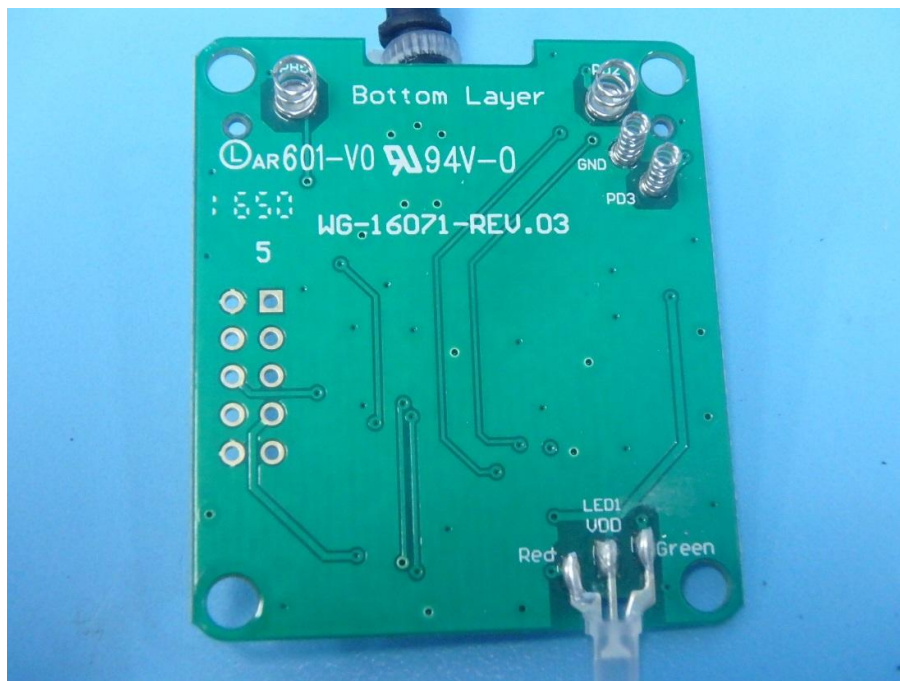
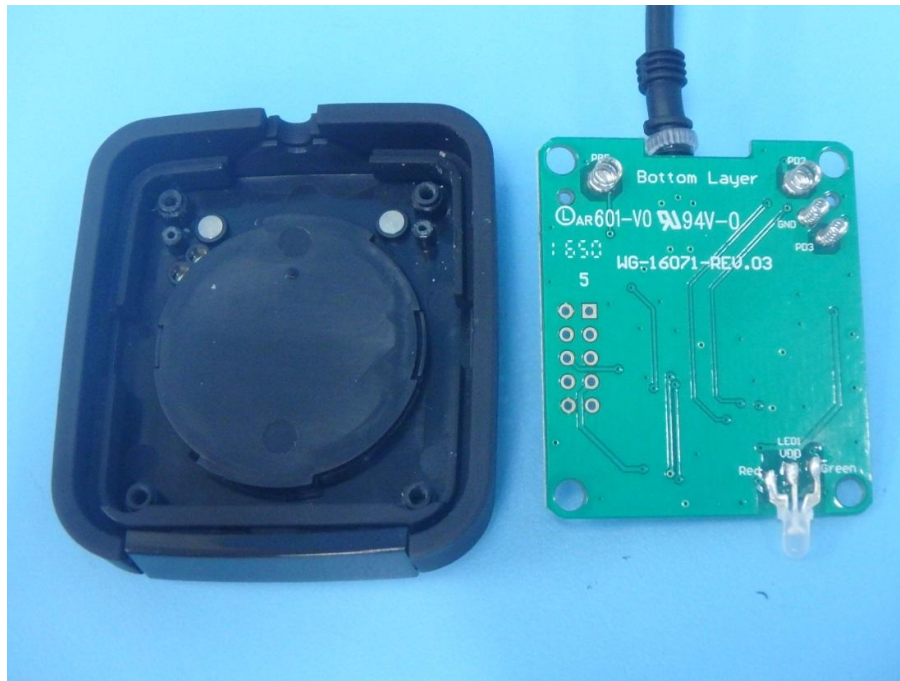
Appendix A



Appendix A



Appendix A

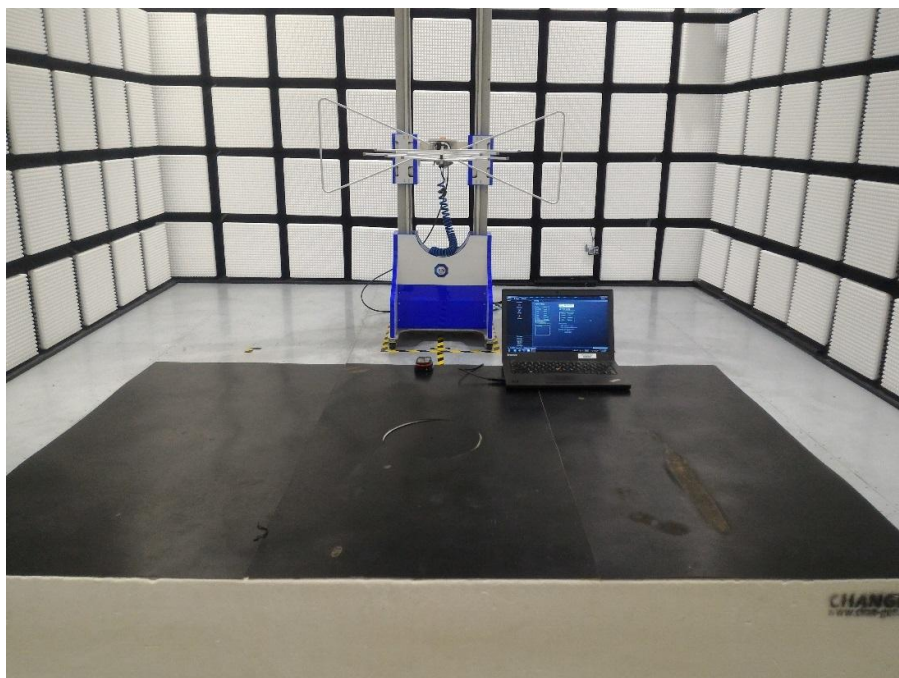
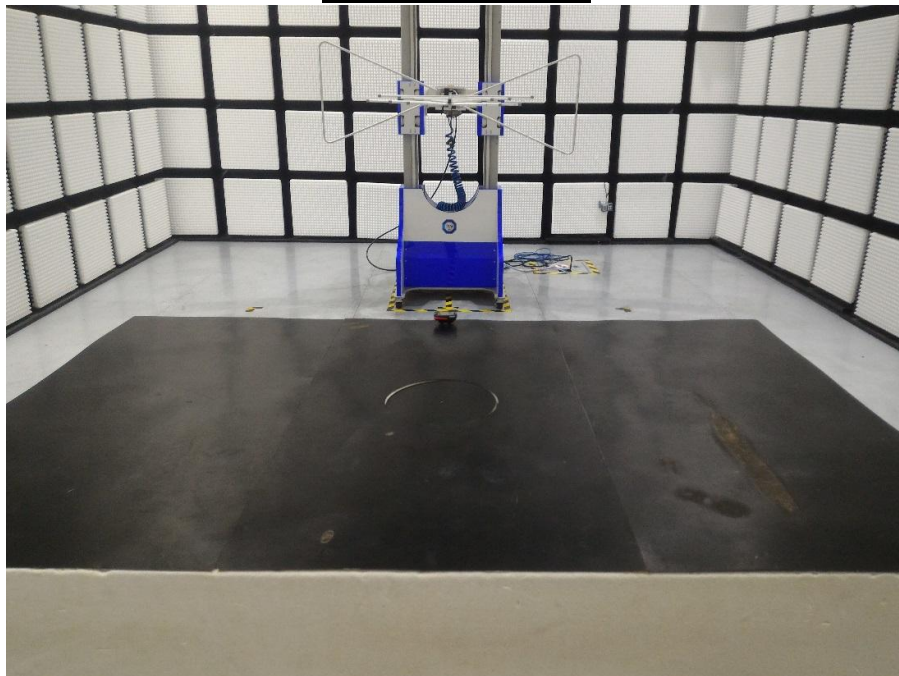


11. Appendix B - Test Support Equipment



12. Appendix C - Setup Photographs of EUT

Radiated Emission



Appendix C

Conducted Emission



13. Test Equipment Site List

Radiated emission Test – Site 2

| DESCRIPTION | MANUFACTURER | MODEL NO. | SERIAL NO. | CAL. DUE DATE |
|-------------------------------------|-----------------|-----------|-----------------|---------------|
| EMI Test Receiver | Rohde & Schwarz | ESR 26 | 101269 | 07-July-18 |
| Trilog Super Broadband Test Antenna | Schwarzbeck | VULB 9163 | 707 | 07-July-18 |
| Horn Antenna | Rohde & Schwarz | HF907 | 102294 | 07-July-18 |
| Pre-amplifier | Rohde & Schwarz | SCU 18 | 102230 | 07-July-18 |
| 3m Semi-anechoic chamber | TDK | 9X6X6 | ---- | 14-July-20 |
| Cable | Hubersuhner | NIL | NIL | Cal in use |
| Test software | Rohde & Schwarz | EMC32 | Version 9.15.00 | N/A |

Conducted emission Test – Site 2

| DESCRIPTION | MANUFACTURER | MODEL NO. | SERIAL NO. | CAL. DUE DATE |
|--------------------|-----------------|-----------------|-----------------|---------------|
| EMI Test Receiver | Rohde & Schwarz | ESR 3 | 101782 | 14-July-18 |
| LISN | Rohde & Schwarz | ENV4200 | 100249 | 14-July-18 |
| LISN | Rohde & Schwarz | ENV216 | 100326 | 14-July-18 |
| ISN | Rohde & Schwarz | ENY81 | 100177 | 14-July-18 |
| ISN | Rohde & Schwarz | ENY81-CAT6 | 101664 | 14-July-18 |
| High Voltage Probe | Rohde & Schwarz | TK9420(VT94 20) | 9420-58 | 14-July-18 |
| RF Current probe | Rohde & Schwarz | EZ-17 | 100816 | 14-July-18 |
| Cable | Hubersuhner | NIL | NIL | Cal in use |
| Test software | Rohde & Schwarz | EMC32 | Version 9.15.00 | N/A |

14. Measurement System Uncertainty

Measurement System Uncertainty Emissions

| System Measurement Uncertainty | |
|--|--|
| Items | Extended Uncertainty |
| Uncertainty for Radiated Emission in 3m chamber 30MHz-1000MHz | Horizontal: 4.83dB; Vertical: 4.91dB; |
| Uncertainty for Conducted Emission 150kHz-30MHz | 3.50dB |