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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1. Table of Contents

1. Table of Contents 2
2. Details about the Test Laboratory 3
3. Description of Equipment Under Test 3
4. Summary of Test Standards 4
5. Summary of Test Results 4
6. General Remarks 5
7. Test Setups 6
   - 7.1. Below 1GHz 6
   - 7.2. Above 1GHz 6
   - 7.3. AC Power Line Conducted Emission test setups 6
8. Systems test configuration 7
9. Emission Test Results 8
   - 9.1. Conducted Emission Test 8
   - 9.2. Radiated Emission Test 30MHz – 1000MHz 11
10. Appendix A - Photographs of EUT 16
11. Appendix B - Setup Photographs of EUT 26
12. Test Equipment Site List 28
13. Measurement System Uncertainty 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 battary) 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	☒	☐	☐
FCC Title 47 Part 15.107 Conduct Emission 150kHz-30MHz	8-10	☒	☐	☐

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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

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Reviewed by:

CHAN Kwong Ngai
EMC Test Engineer

Prepared by:

Alex CHAN
EMC Project Engineer

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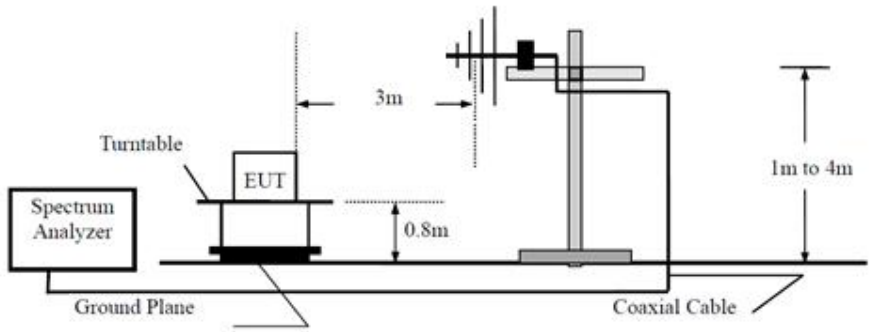
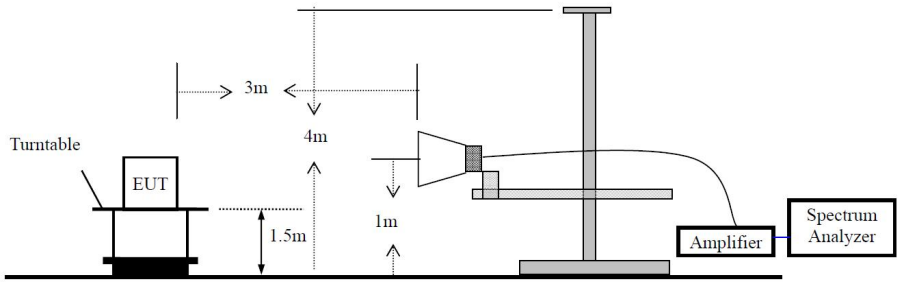
7. Test Setups

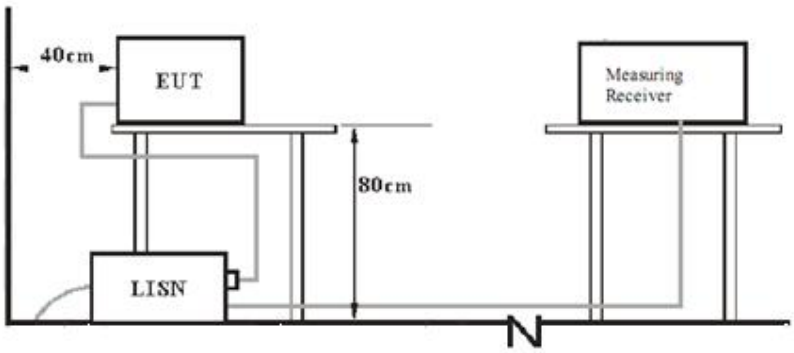
7.1. Below 1GHz



7.2. Above 1GHz



7.3. AC Power Line Conducted Emission test setups



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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

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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 dBµV	AV Limit dBµV
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

*Decreasing linearly with logarithm of the frequency

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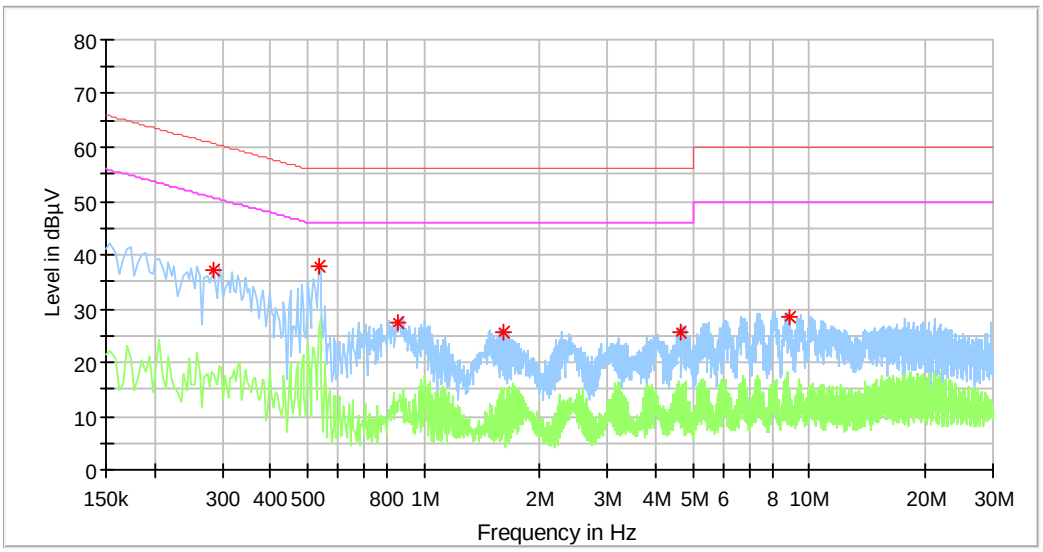
Conducted Emission

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
☒ Passed
☐ 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

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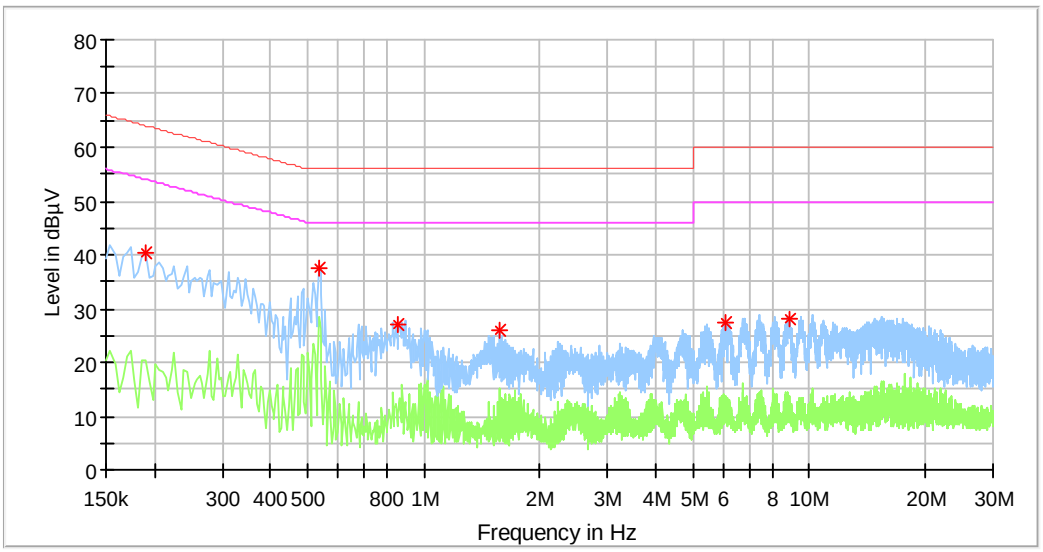
Conducted Emission

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
☒ Passed
☐ 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

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9.2. Radiated Emission Test 30MHz – 1000MHz

Test Method

1: The EUT was place 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 above1GHz

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 section15.205, 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

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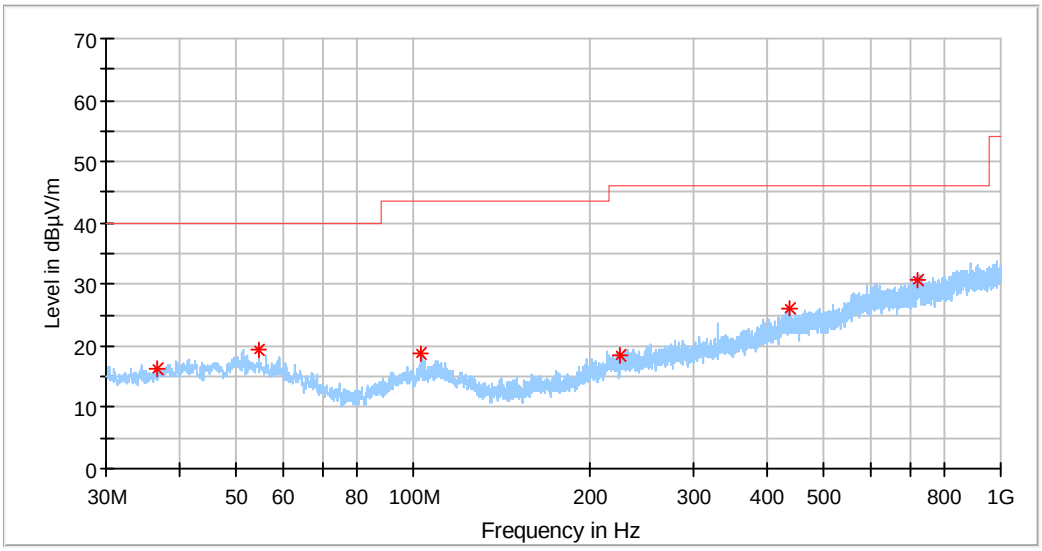
Radiated Emission

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

Test Result
☒ Passed
☐ 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

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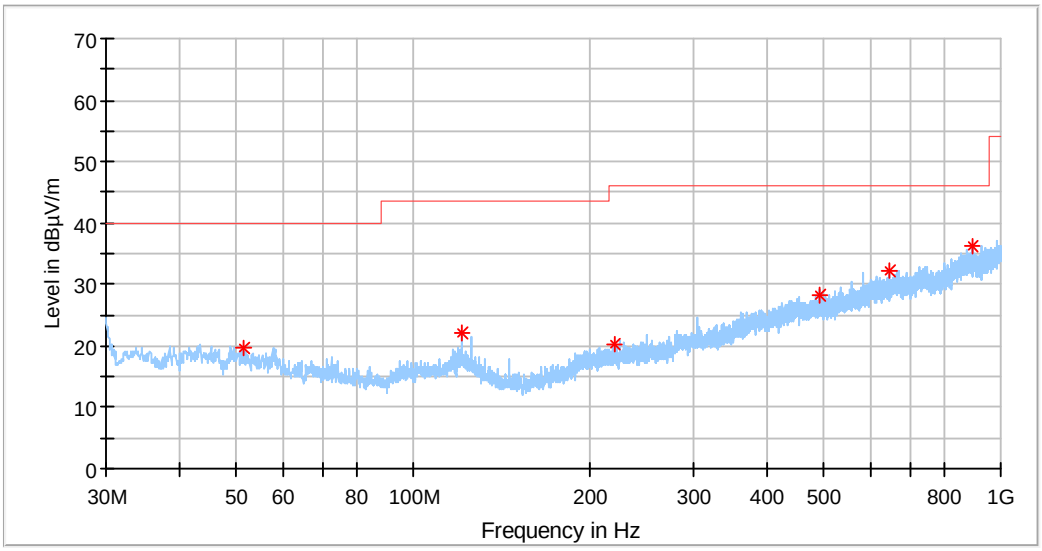
Radiated Emission

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

Test Result
☒ Passed
☐ 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

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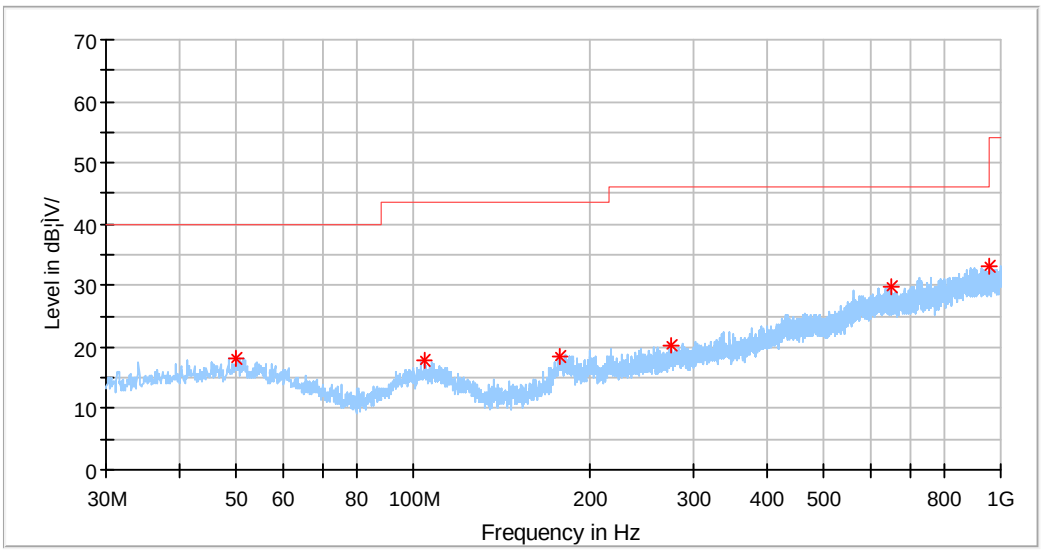
Radiated Emission

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
☒ Passed
☐ 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

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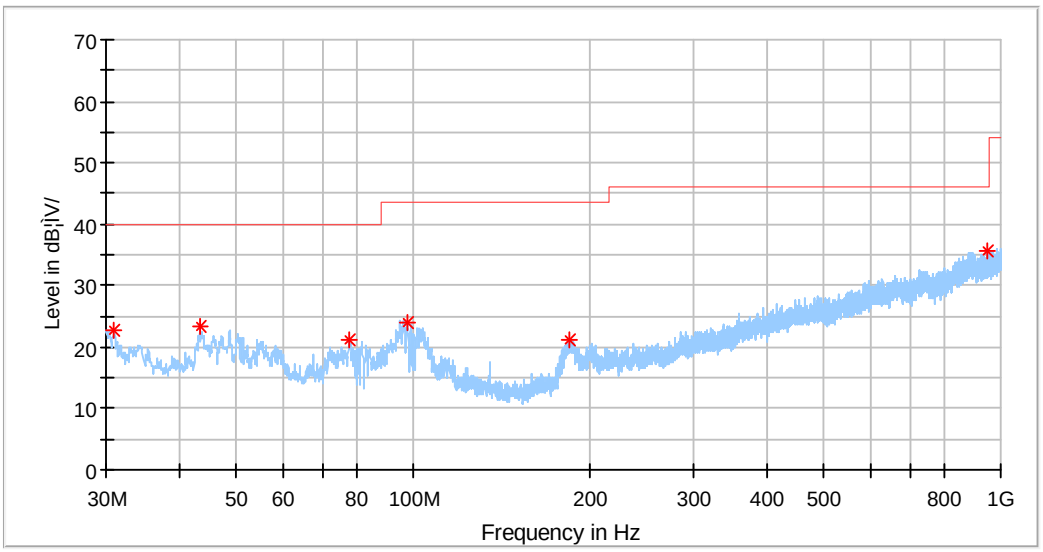
Radiated Emission

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
☒ Passed
☐ 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

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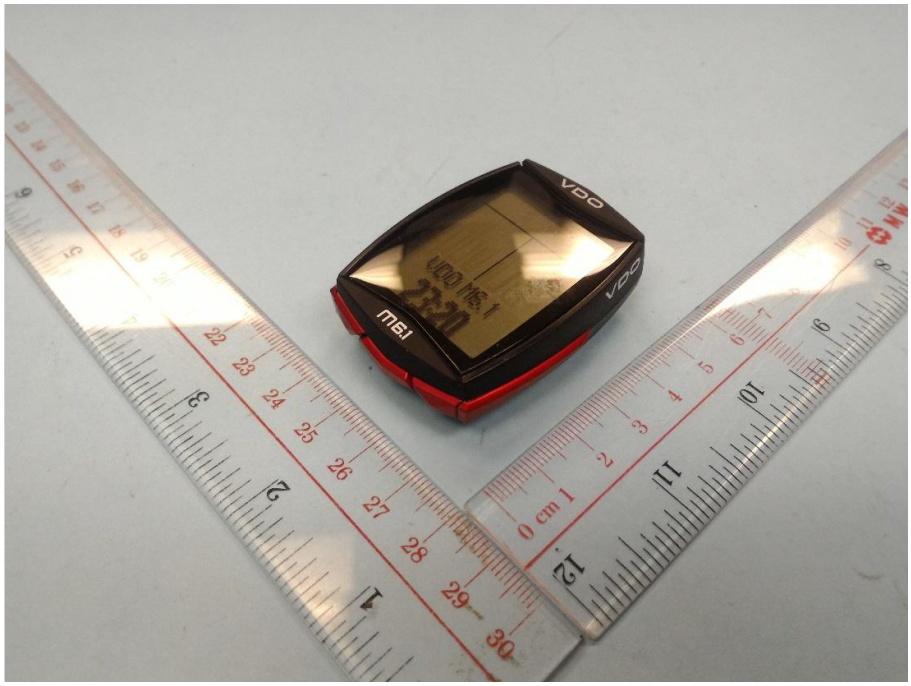
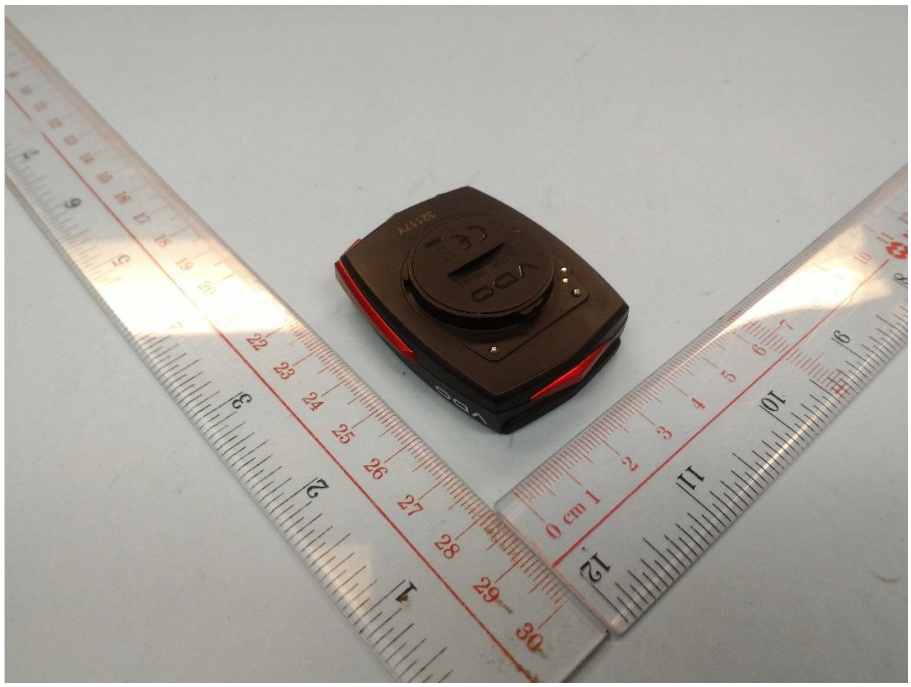
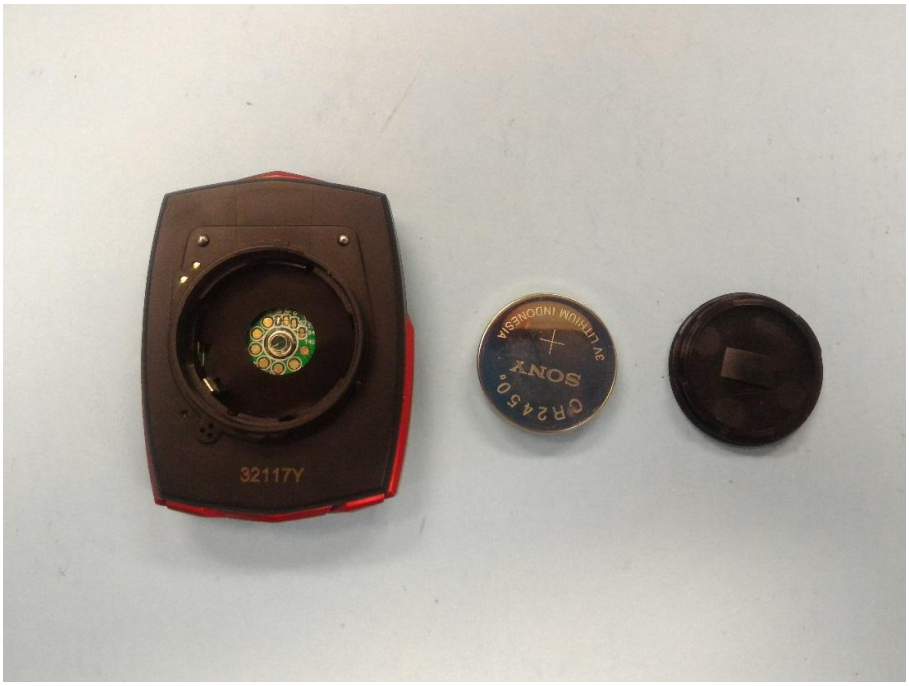
10. Appendix A - Photographs of EUT



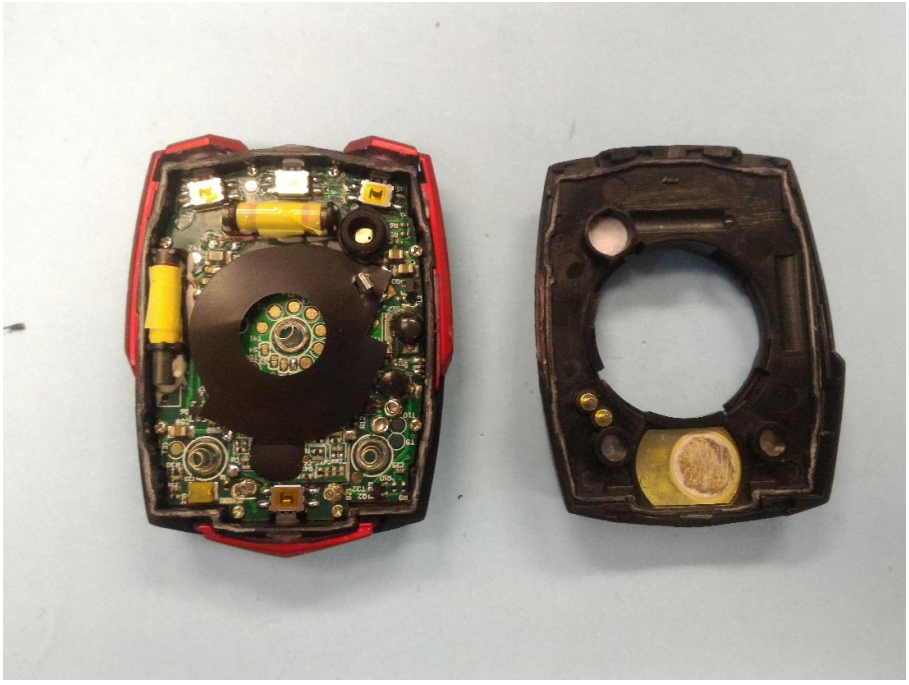


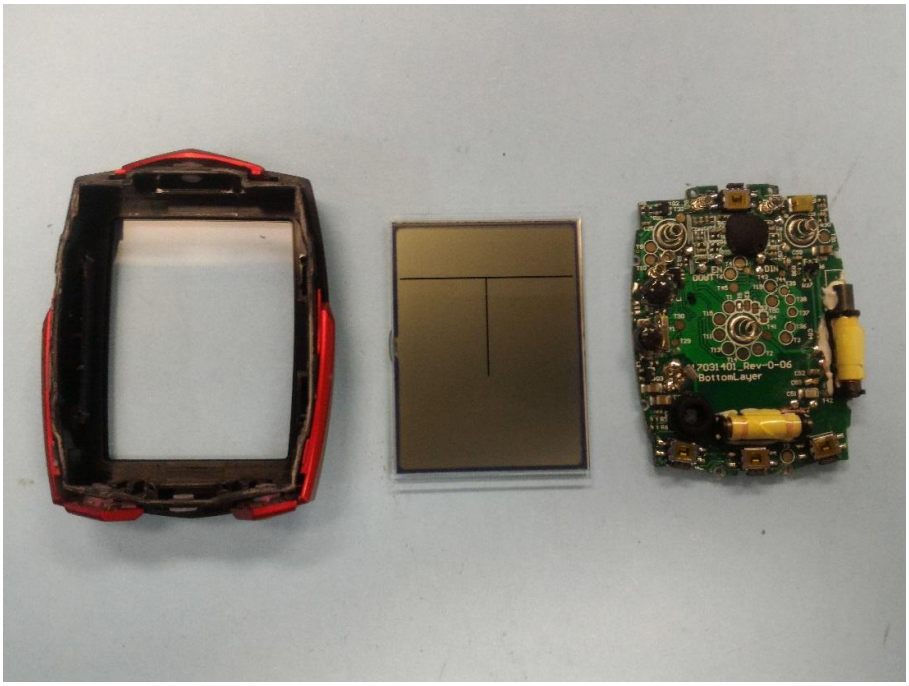
Appendix A

VDO
BATTERY CR2450
32117Y

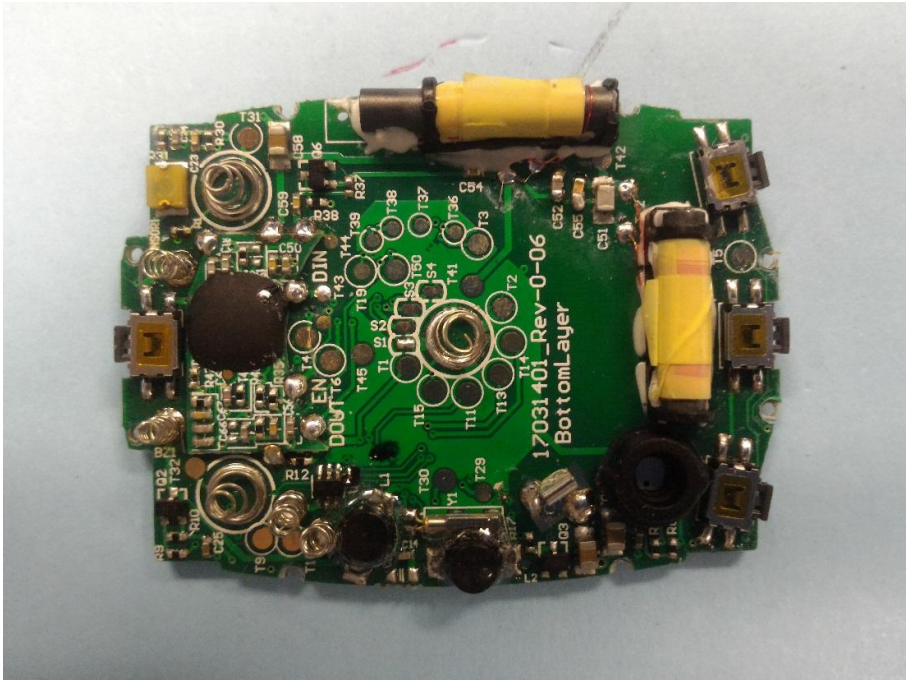

32117Y
SONY
CR2450
3V LITHIUM INDONESIA

Appendix A





Appendix A



Appendix A

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Appendix A

Appendix A

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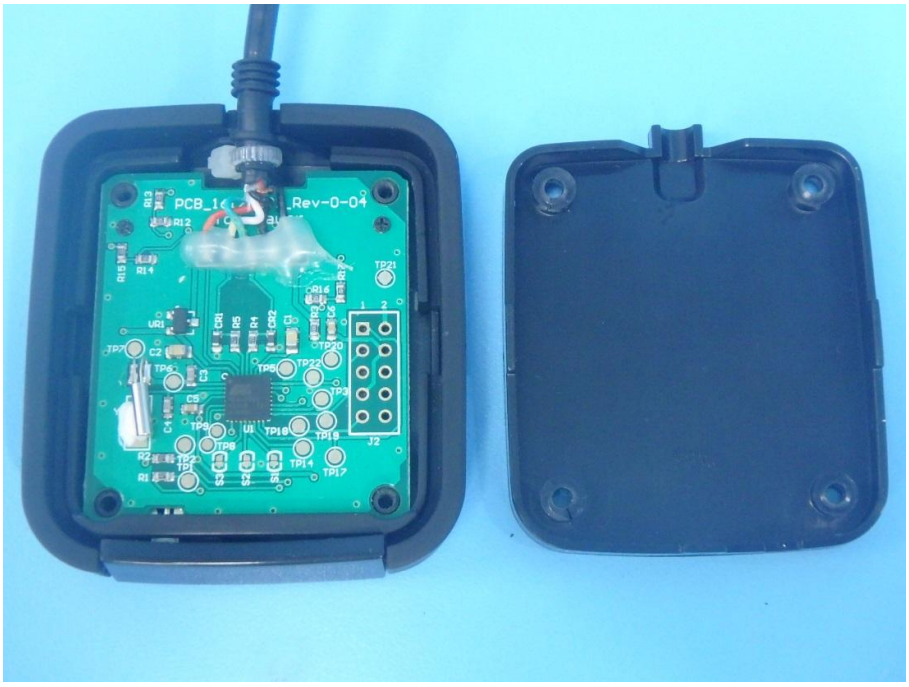
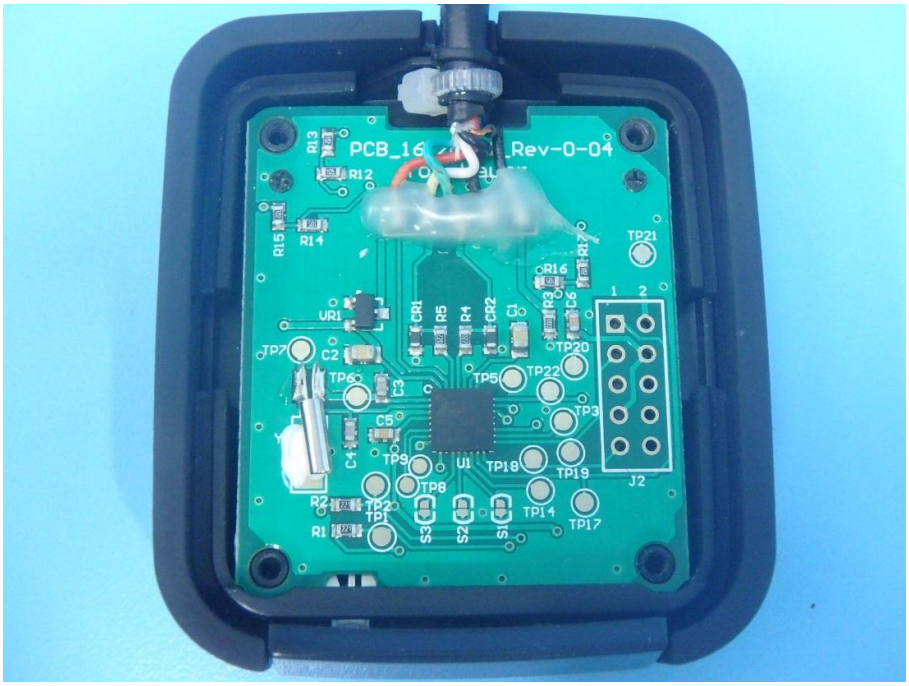
Appendix A





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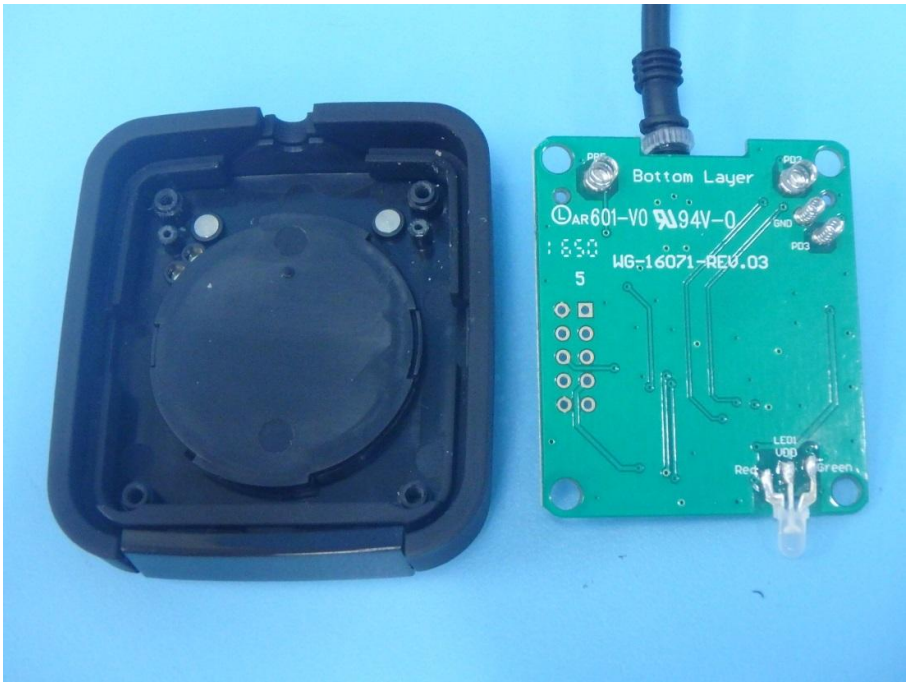

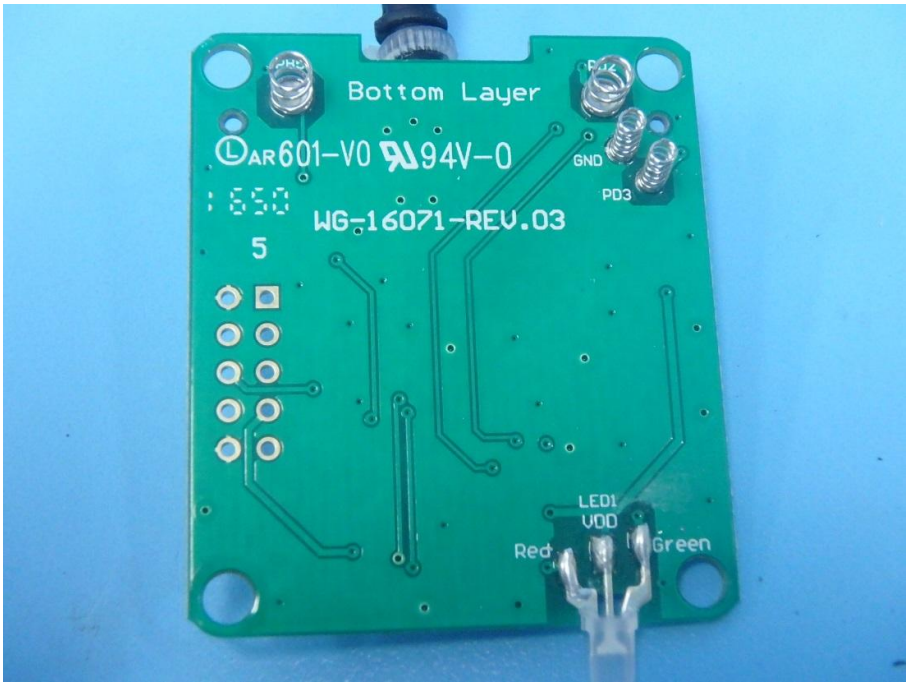

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11. Appendix B - Test Support Equipment

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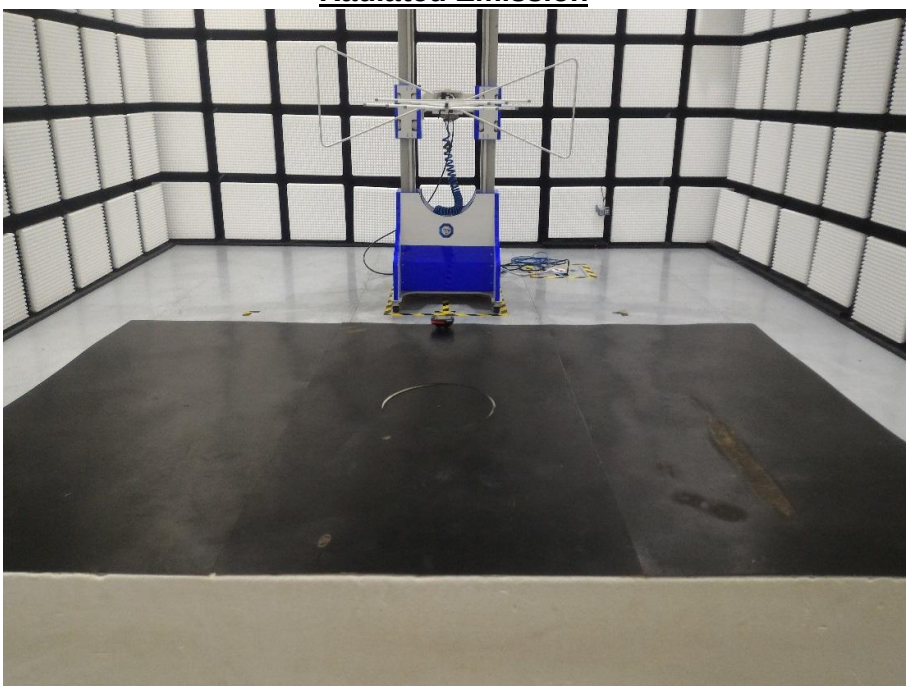
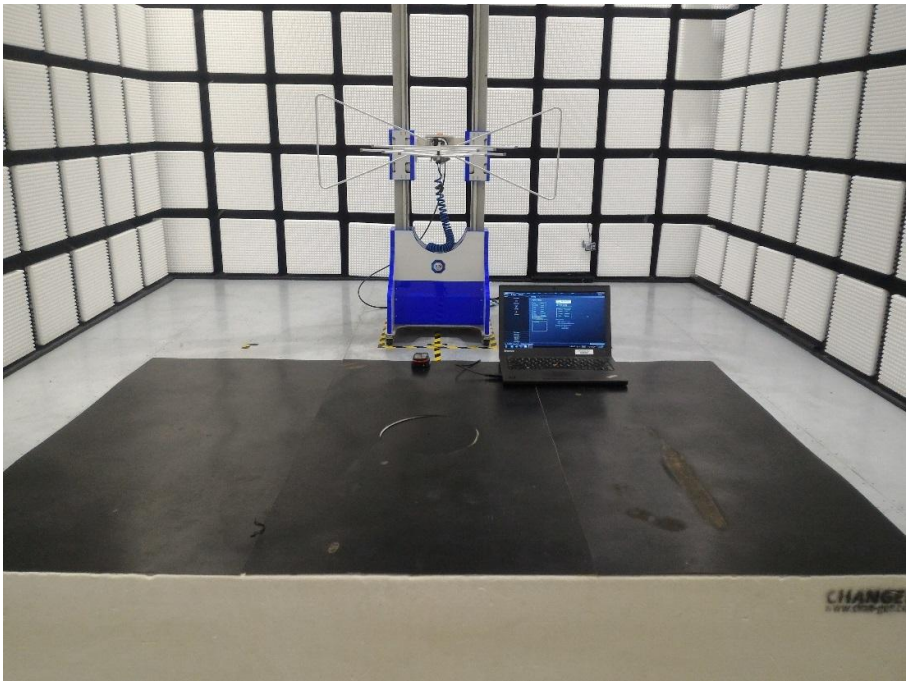
12. Appendix C - Setup Photographs of EUT

Radiated Emission





Appendix C

Conducted Emission

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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 Proble	Rohde & Schwarz	TK9420(VT9420)	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	Version9.15.00	N/A

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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

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