



Project Name:

Sunset LED Specification test sheet

Test Case ID: BDCSUNSET03UW

Test Designed by: Adenowo Gbadebo & Vladimir Osipov

Test Title: Underwater operating range evaluation

Test Designed date: 23 Mar 2019

Description: Testing Sunset prototype LEDs to evaluate it works consistently under high pressure of water

Test Executed by: Adenowo Gbadebo & Vladimir Osipov

Test Execution date: 23 Mar – 30 Apr 2019

Test Conditions and parameters:

- The LED was measured under pressure.in and out of water to observe the effect of pressure on the LED
- The maximum pressure of 3 bar (30m) underwater was applied over a period of 6 days. Other pressures were measured over a period of 12 hours maximum. Every bar over atmospheric pressure is equivalent to 10 m underwater.
- The time was gradually increased from 5 mins to 1 day (overnight experiments was run only on one set of parameters for health and safety reasons).
- The LED was measured while underwater.
- The measurements were then plotted on a color map that make fluctuations in parameter obvious from inspection
- The data's Fourier transform was plotted as color maps
- Measurements were taken every 60 ms
- To reduce the criticality of alignment across experiments that data is normalized

Step	Test Steps	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	LED mounted in a pressure tank	No variation in LED performance when LED experiencing pressure	No variation in LED performance when tank pressurised	Pass	The pressure was increased from 0 to 3 bars and measurements were taken over a period
2	LED measured with and without water	No variation in LED performance	No variation in LED performance	Pass	The intensity of the light increased. This is attributed to a Lensing effect by water which helps the photodiode collect more light. The parts of the setup underwater rusted at a fast rate, but the performance of the LED was unaffected
3	Captured data was analysed using FFT	The frequencies observed in the FFT should imply there is no fluctuation in the light source frequency.	The frequencies observed in the FFT imply there is no fluctuation in the light source frequency.	Pass	



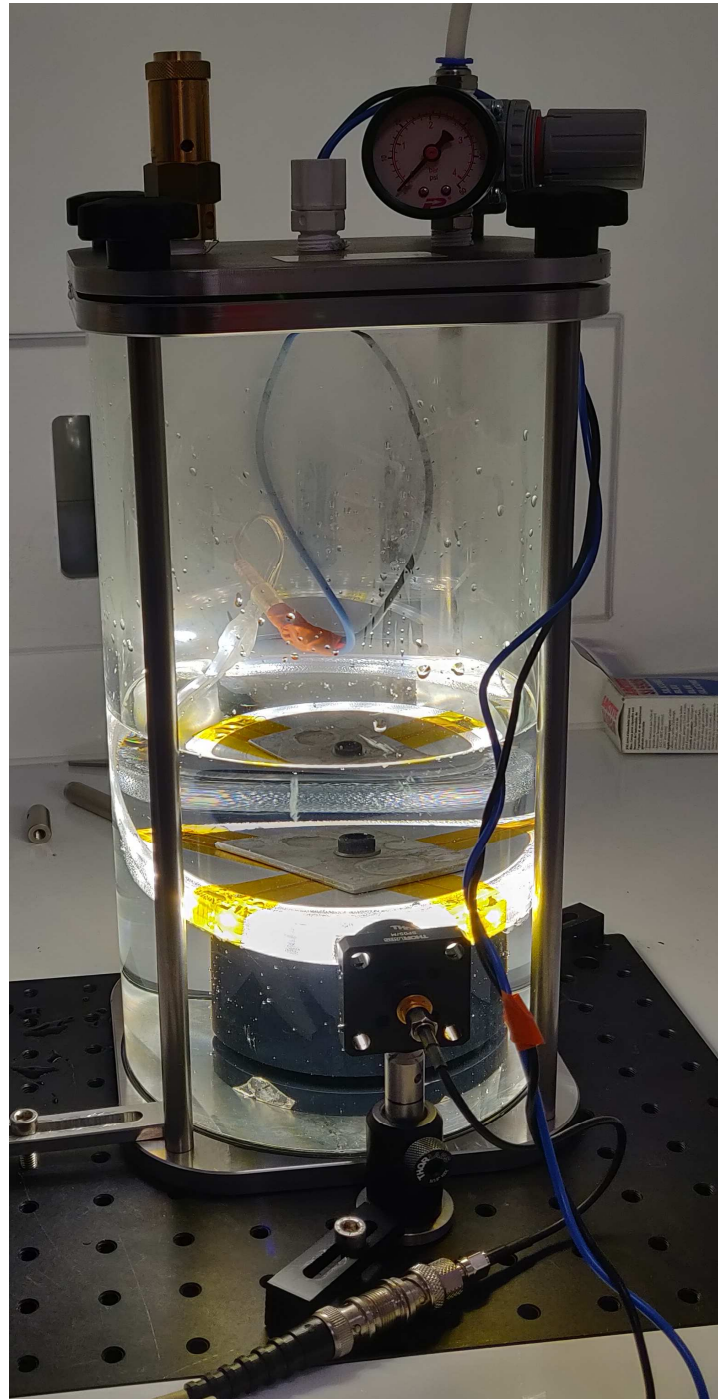
EUROPEAN UNION

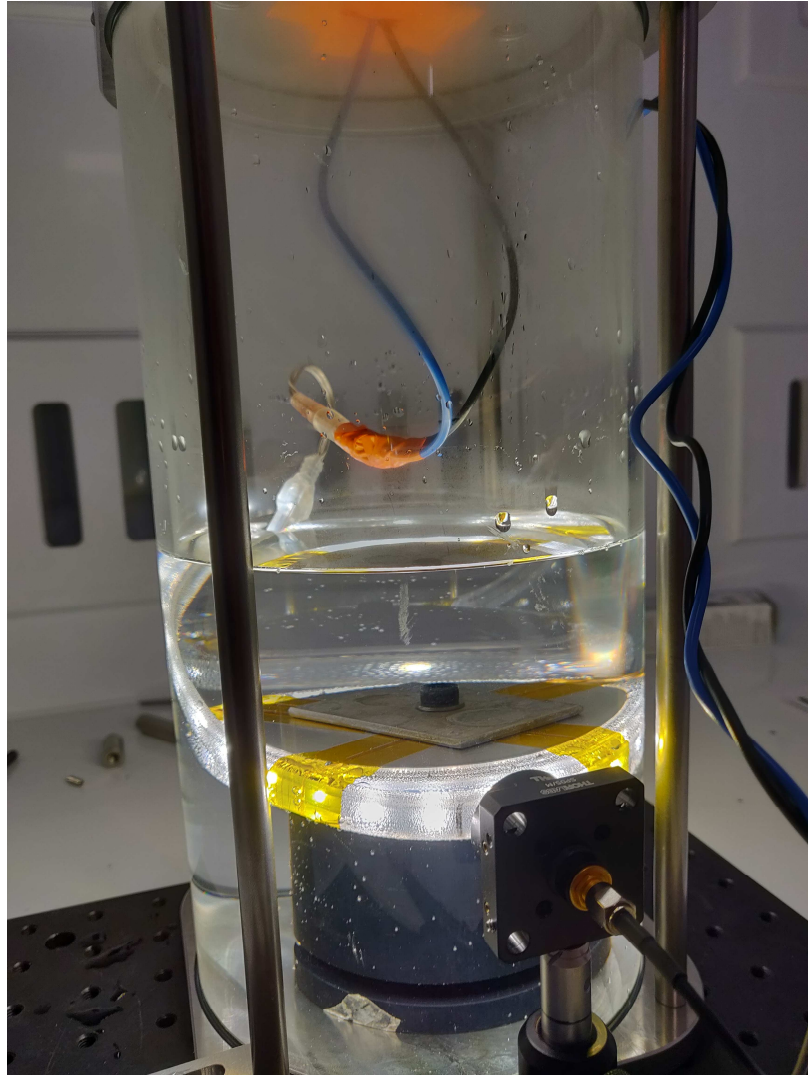
European Regional Development Fund

BIG DATA CORRIDOR
Innovation support for SMEs

Post-conditions:

- The experiments show that there the LEDs can work continuously underwater at a depth of 30 m.
- Measurements were taken every 60 ms
- Measurements were saved on a computer using a photodiode, amplifier and Arduino





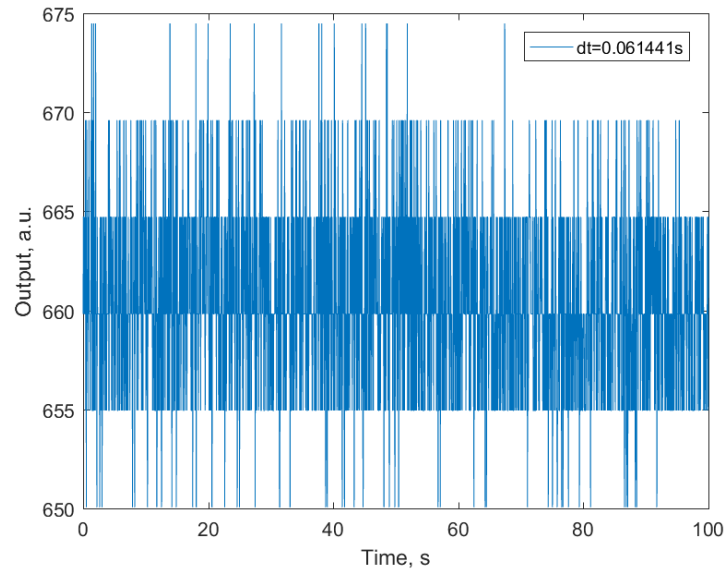


Figure 1 100s sample of data captured at 3 Bar (30m) underwater (after 1 hour each) captured every 10ms (avg.)

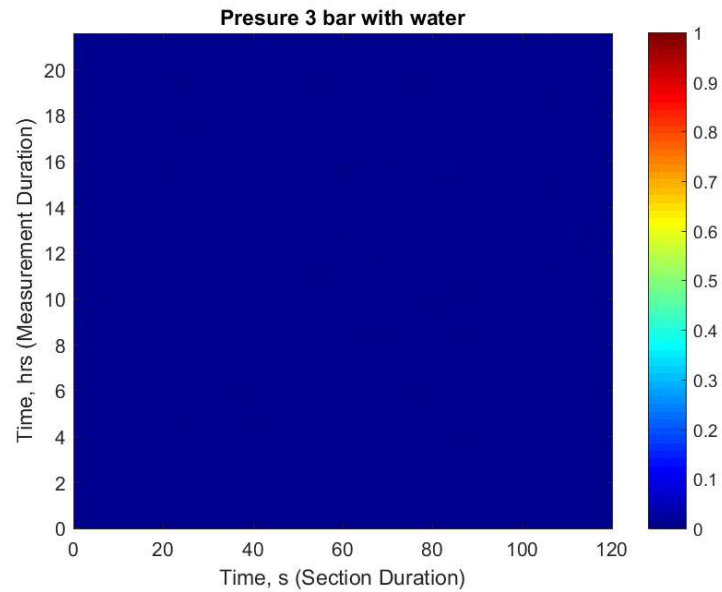


Figure 2 underwater with 3 Bar (30m) of pressure in water (last 24 hours in 6 days): Single blue color indicates constant output of LED

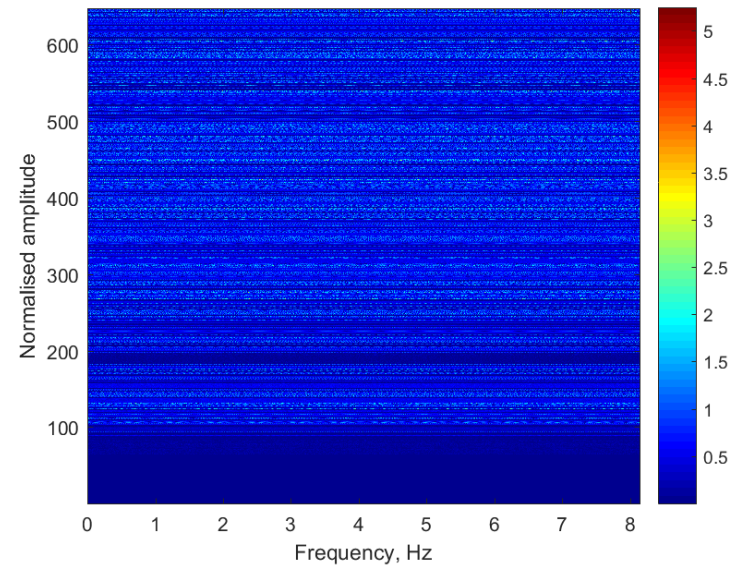


Figure 3 There is no change in frequency. The horizontal lines indicate a consistent change in intensity this is attributed to measurement errors as fluctuations in readings will be vertical.