



Strobe Luminance Tests

April 19th, 2021



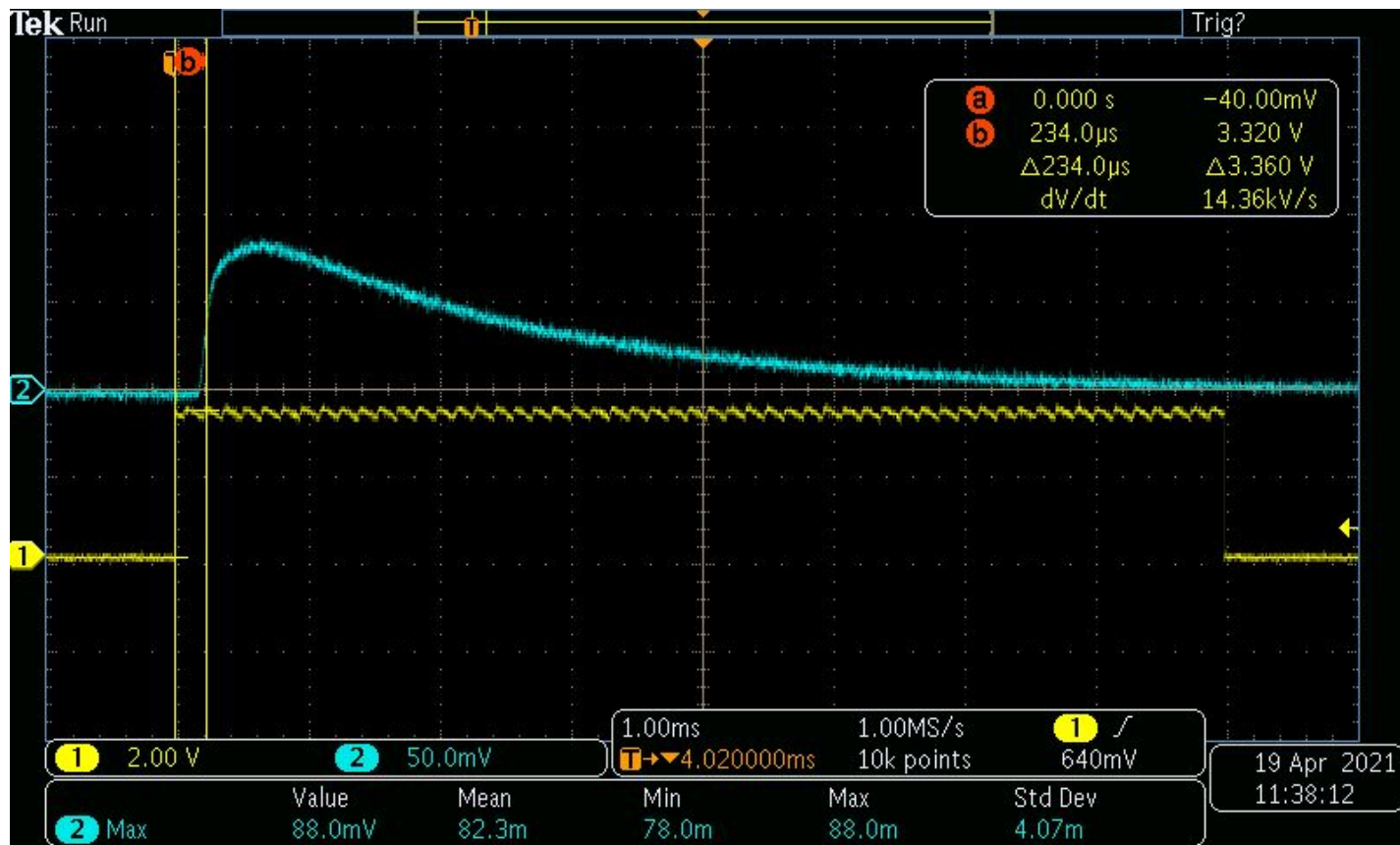
Test Setup

- Used Thorlabs amplified photosensor at roughly 5 meters away from strobe on the upper deck of the test tank at MBARI. One side of the ROV's strobes were pointed at the sensor, the other side covered.
- Two signals captured together:
 - Photosensor output
 - Camera "exposing" trigger output, represents the time window in which the CCD of the camera is collecting photons.
- Measuring:
 - Delay of light signal to trigger signal
 - Peak level of photosensor signal
 - Total length of photosensor signal
- Test Parameters:
 - 1 pair of strobes or 2
 - Framerate of camera acquisition



Test Results for One Pair of Strobes

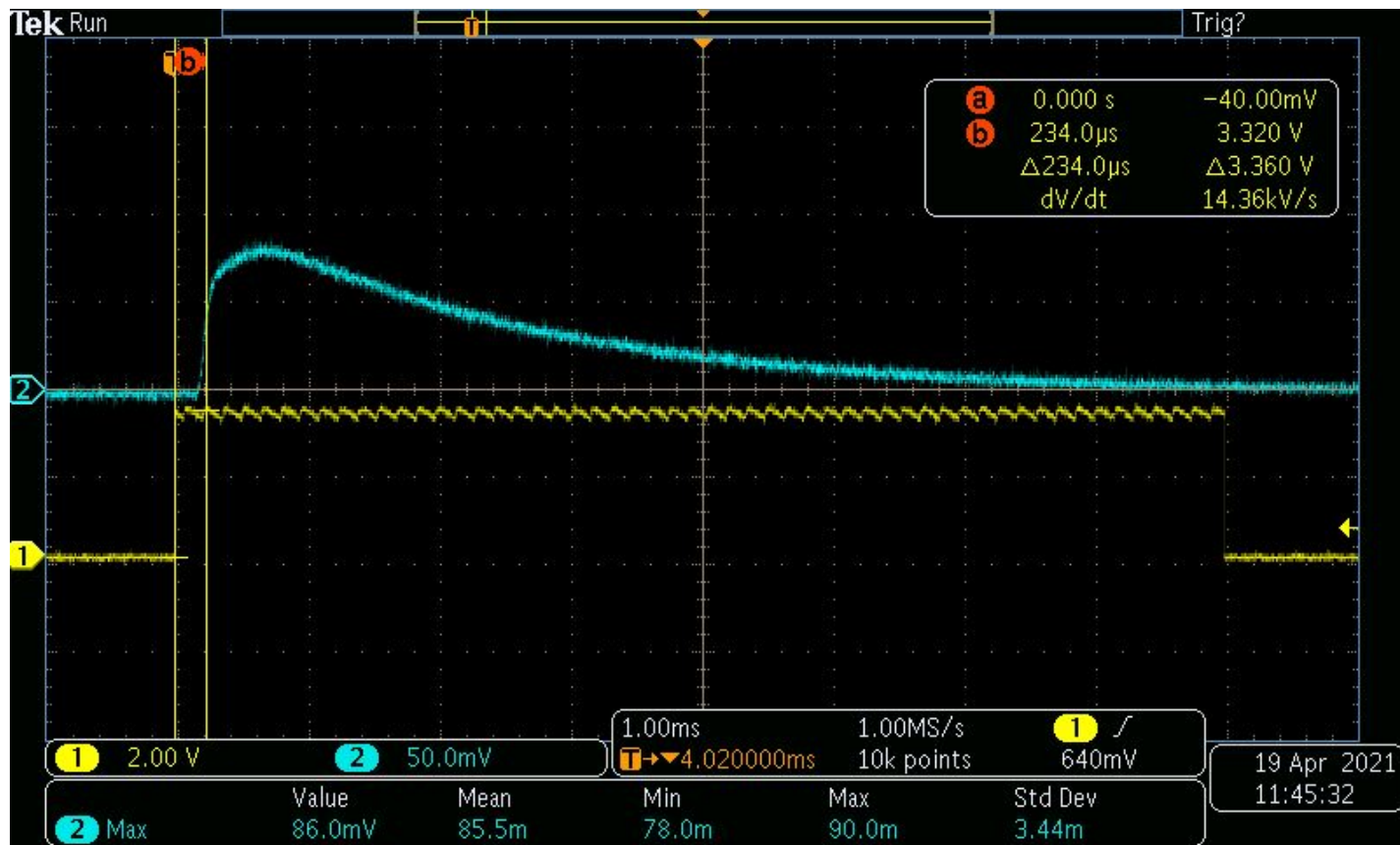
- Since one side of the sled was covered, this is a signal of direct path light for a single lamp.



Legend:

- photosensor
- camera exposure

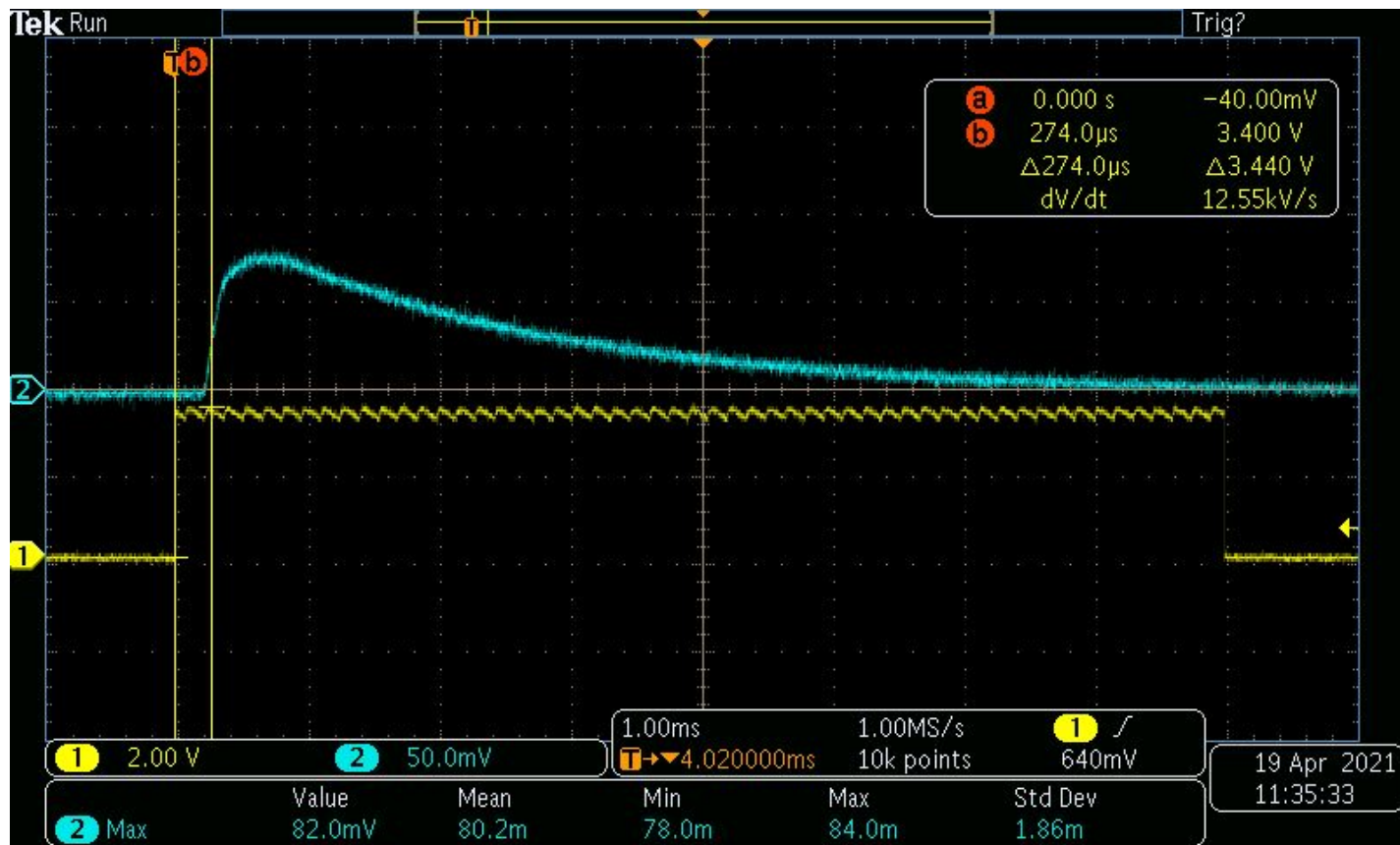
Strobe Count: 1 Framerate: 0.25Hz



Legend:

- photosensor
- camera exposure

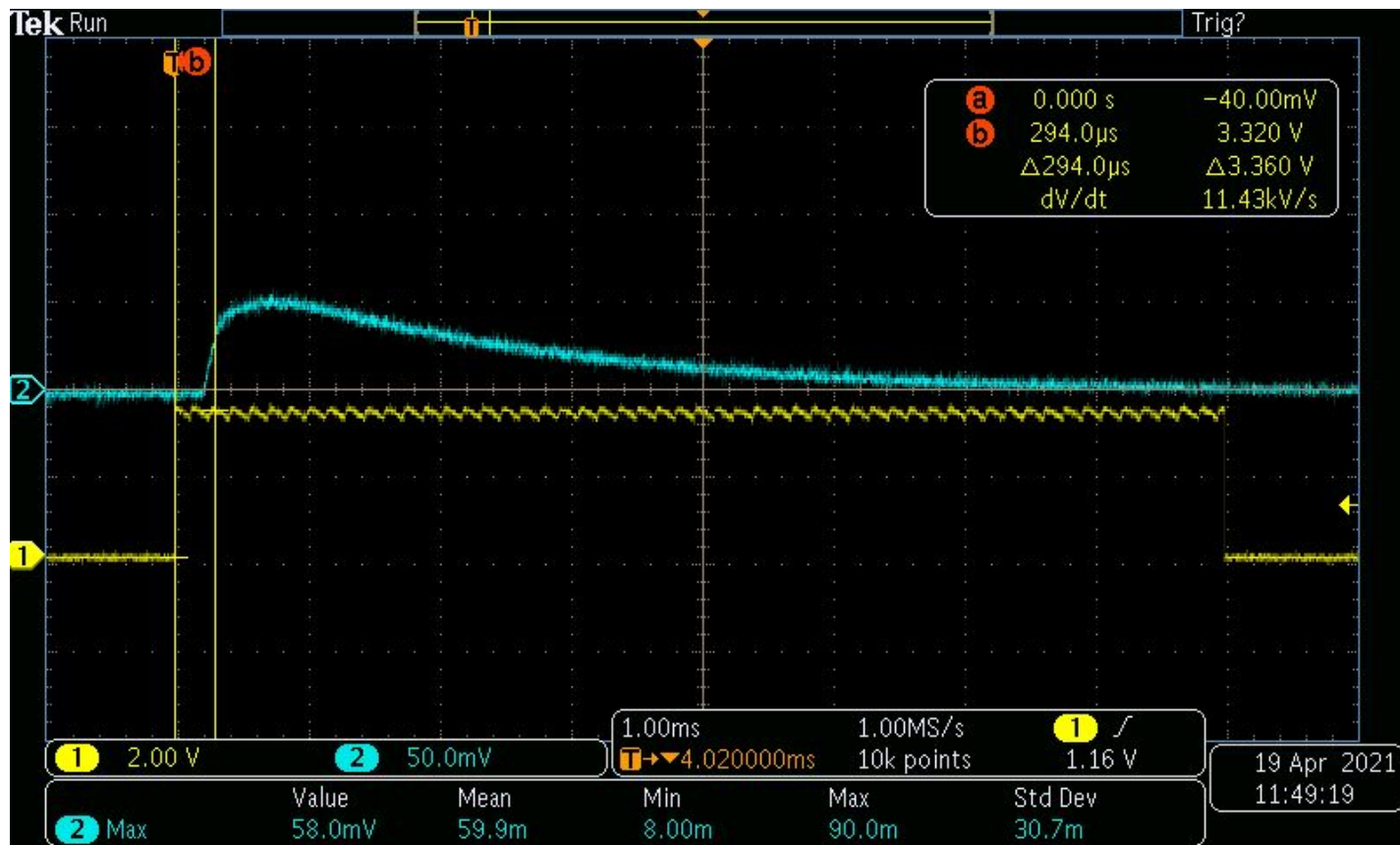
Strobe Count: 1 Framerate: 0.35Hz



Legend:

- photosensor
- camera exposure

Strobe Count: 1 Framerate: 0.4Hz



Legend:

- photosensor
- camera exposure

Strobe Count: 1 Framerate: 0.55Hz



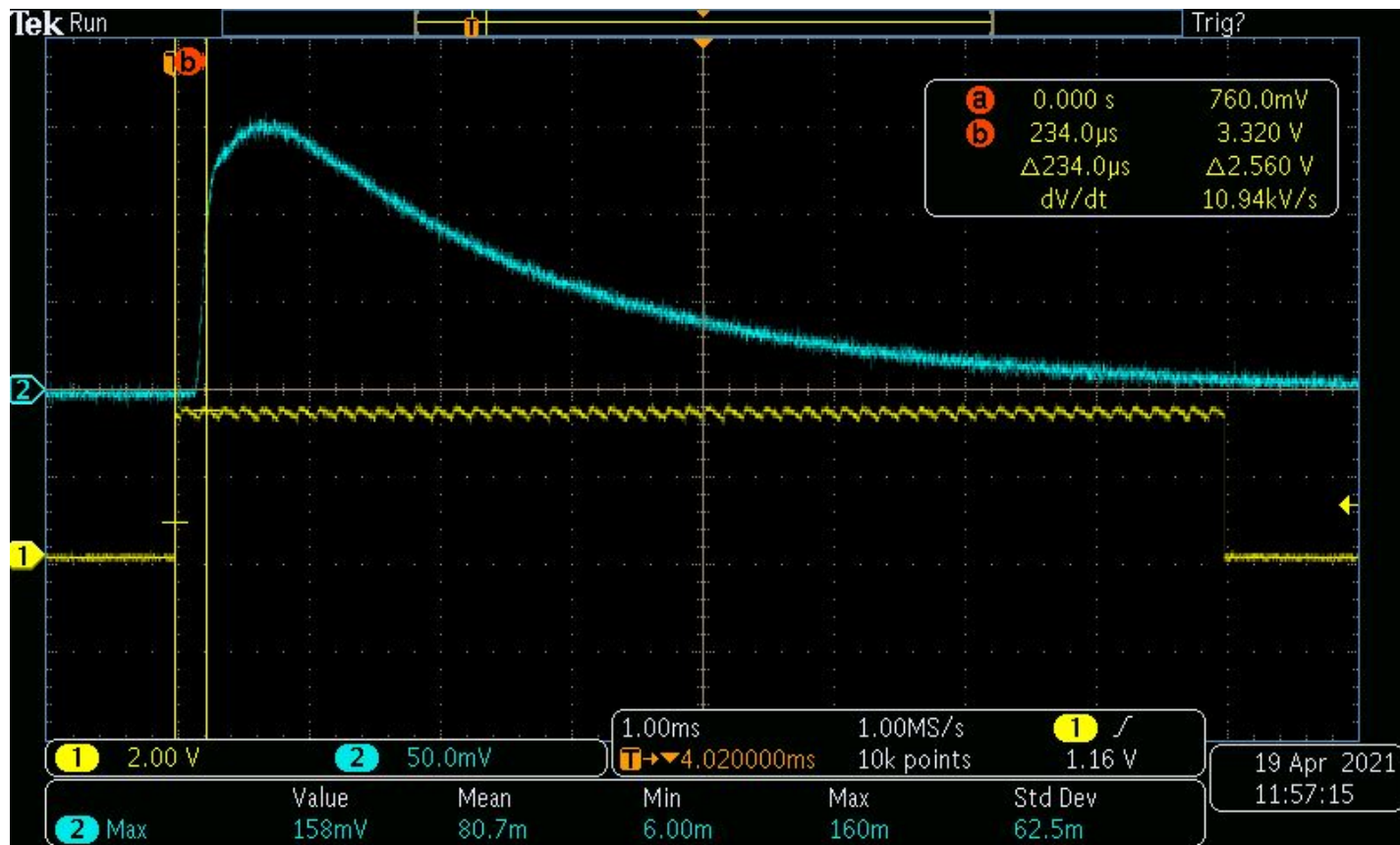
One Pair of Strobes Summary Data

Frame Rate (Hz)	Photosensor Vmax (mV)	Percent of Maximum	Emission Length (ms)	Strobe Delay (ms)	Notes
0.11	84.8	96%	8.5	0.234	
0.18	86	98%	8.5	0.234	
0.25	88	100%	8.5	0.234	
0.35	86	98%	8.5	0.234	
0.44	82	93%	8	0.274	
0.55	58	66%	7.8	0.294	Unreliable strobe triggering
0.65		0%			Test unsuccessful, strobe not triggering
AVG:			8.3	0.251	



Test Results for Two Pairs of Strobes

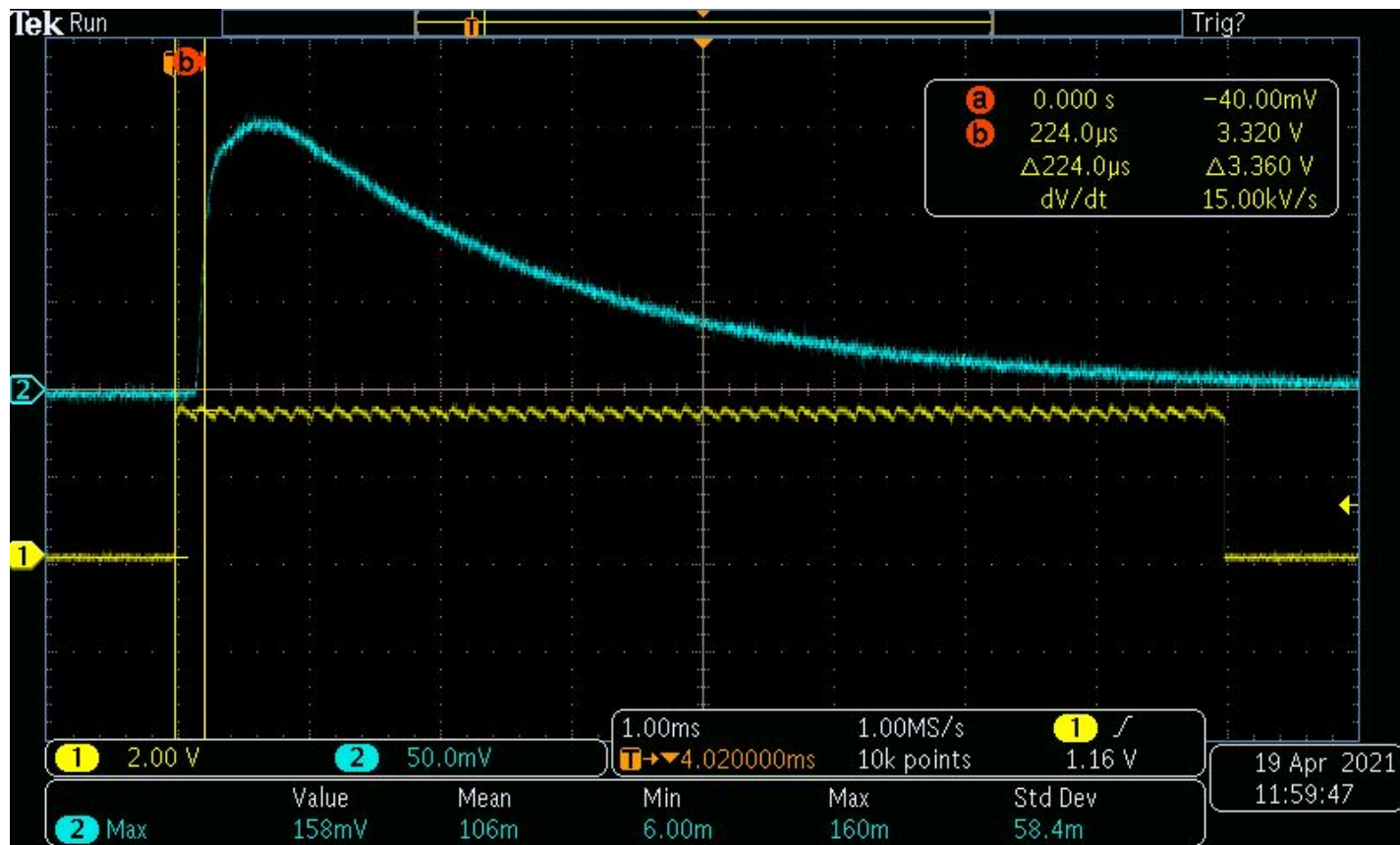
- Since one side of the sled's lamps were covered, this data represents the direct path of two lamps, but includes the electrical load of all four lamps firing.



Legend:

- photosensor
- camera exposure

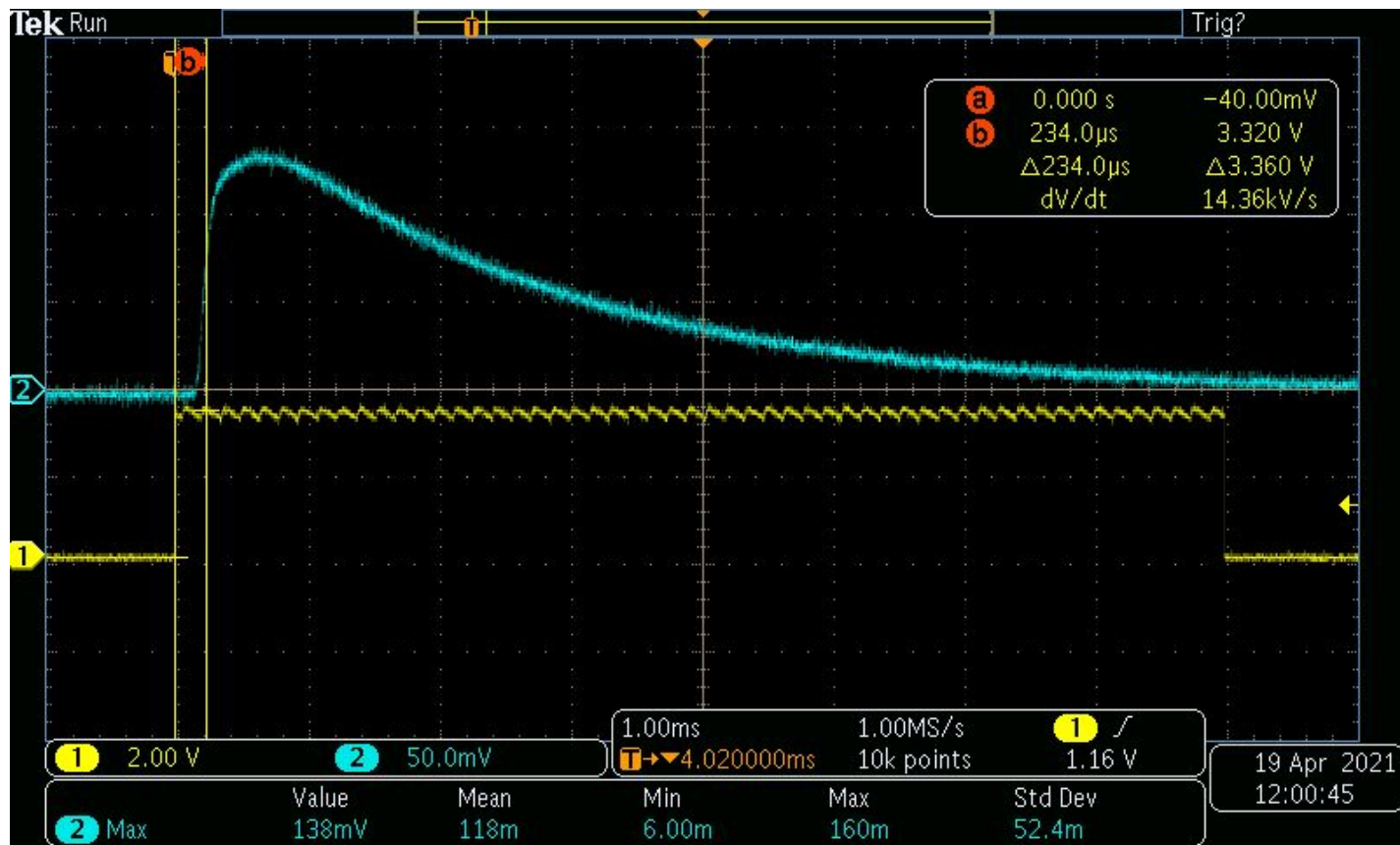
Strobe Count: 2 Framerate: 0.25Hz



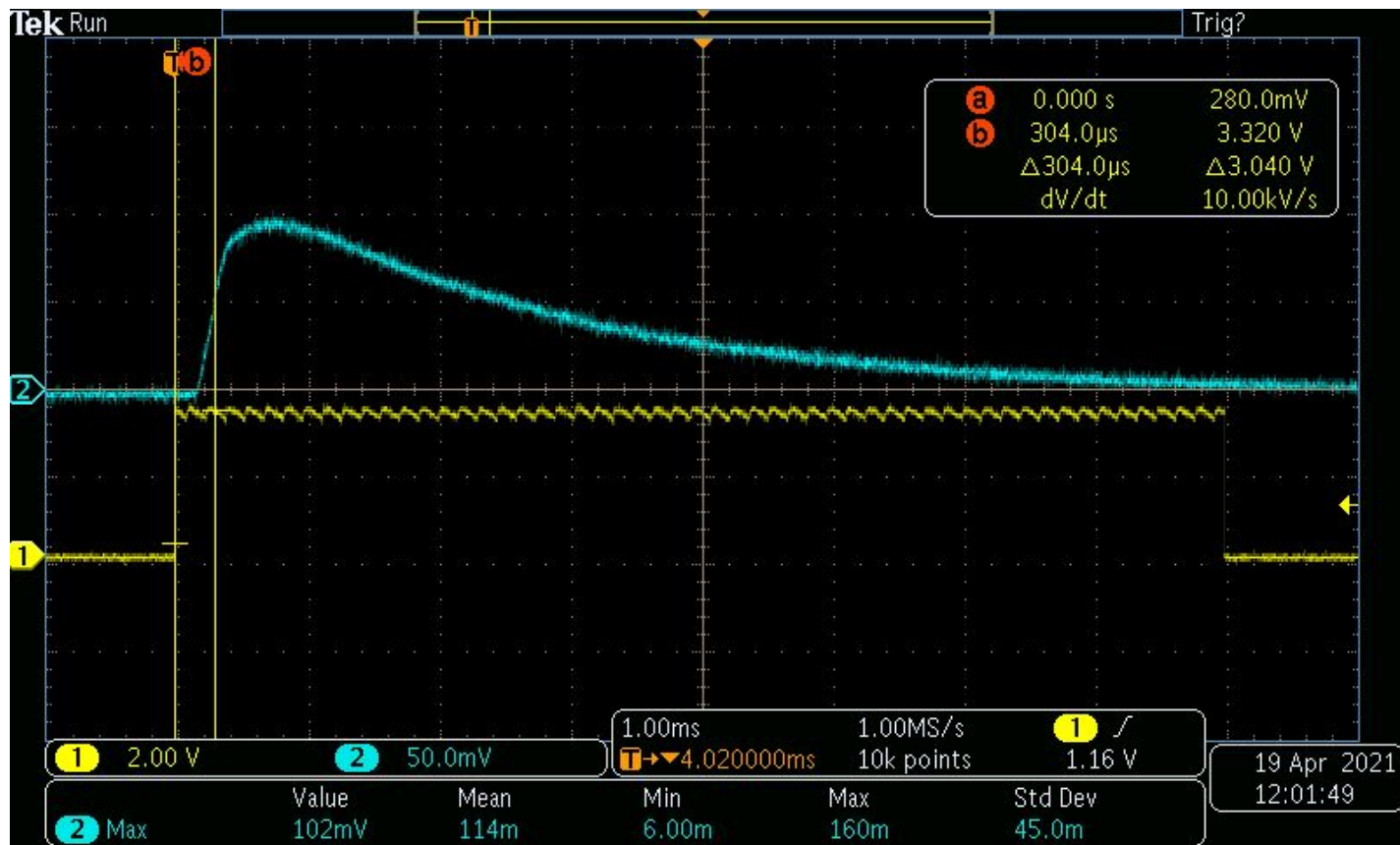
Legend:

- photosensor
- camera exposure

Strobe Count: 2 Framerate: 0.35Hz



Strobe Count: 2 Framerate: 0.44Hz



Legend:

- photosensor
- camera exposure

Strobe Count: 2 Framerate: 0.55Hz



Two Strobes Summary Data

Frame Rate (Hz)	Photosensor Vmax (mV)	Emission Length (ms)	Strobe Delay (ms)
0.1	158	100.0%	9
0.18	154	97.5%	9
0.25	158	100.0%	9
0.35	158	100.0%	9
0.44	138	87.3%	9
0.55	102	64.6%	9
AVG:			9



Preliminary Conclusions

- Confirmed two sets of strobes does in fact double the light output.
 - Seems to be double the value of single pair measures, i.e. is likely not input power limited
- Max time of illumination is 9 milliseconds
 - We should adjust auto-exposure loops accordingly
- Max output is at framerates less than 0.44 Hz
- 0.55 Hz and above will certainly lower output power, but did lead to misfiring events on one lamp
- Strobe illumination delays maximum 0.300 ms into camera exposure
- October expedition used a framerate of 0.44 Hz, this was 15% less peak value
- The percent maximum is likely misleading, we should estimate the integral of the waveform