TEST1: SiPM pre-amplification tested

AIM: To mainly check if the SiPM is giving output and amplification is happening or not.

EXPT:

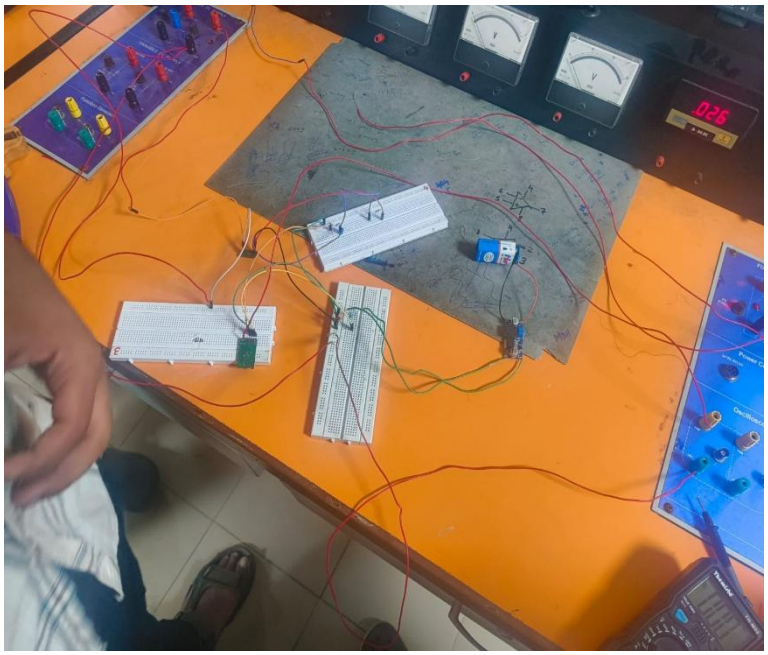
- Prototype built with OVA356 as a non-inverting amplifier.
- Phone Flash light is used to see if the current increases proportionally. It was increasing as expected. The fall time is also very quick (in nanoseconds).

OBSERVATION AND INFERENCE:

- As the flashlight photons hit on SiPM the signal gets increased and the preamplification occurs.
- As the lab was noisy (from external light) there was noise in the signal.
- Even still we could observe a gain of around 3 times.
- Noise after amplification came around 25mV.
- Flashlight hits after amplification came around 72mV.

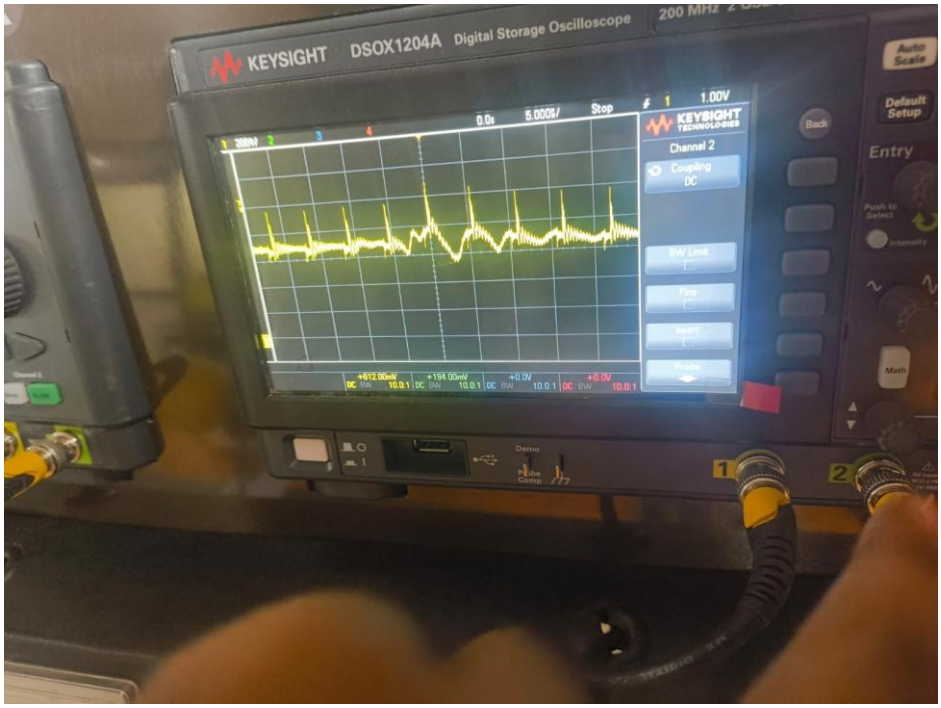
PHOTOS ATTACHED:

1.) Setup →



2.) No flashlight photons →

3.) Flashlight Photons →



RESULTS AND OPINION:

As it was the first circuit prototype, it was an average result. Still a lot of work is left in optimizing the circuit results

TEST2: Pre-amplification tested with function generator

AIM: To mainly check if the amplification is happening properly or not.

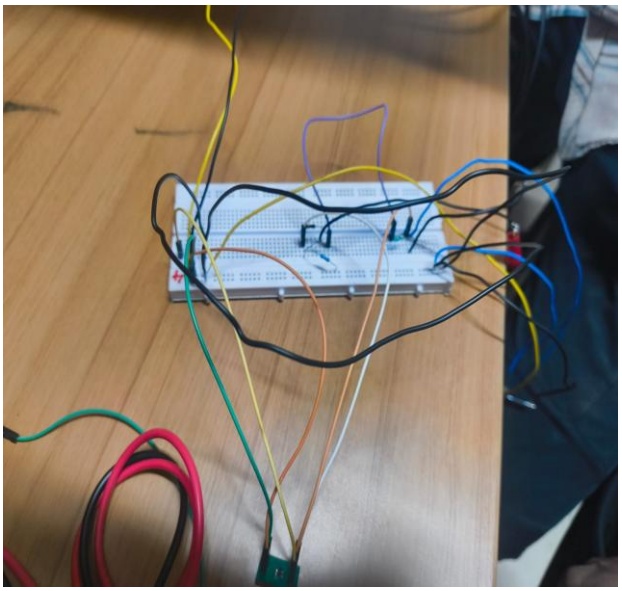
EXPT:

- Prototype built with OVA356 as an inverting amplifier.
- Square wave is given as an input.

OBSERVATION AND INFERENCE:

- It was not amplifying properly, maybe because of some loose connections.
- But after debugging we saw amplification.

PHOTOS ATTACHED:



RESULTS AND OPINIONS:

As the amplification circuit is working, now time to test the second part of the circuit, that is peak and hold circuit.

TEST3: Preamp + Peak-hold circuit with function generator

AIM: To check if the preamp + peak-hold circuit is working properly or not.

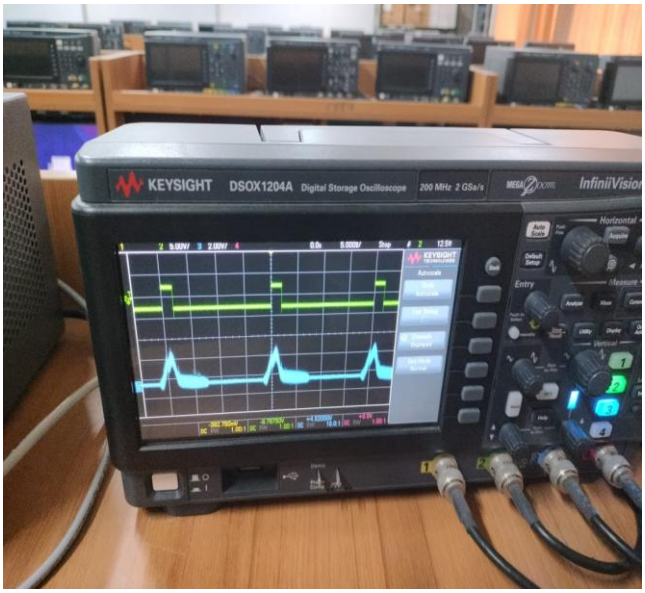
EXPT:

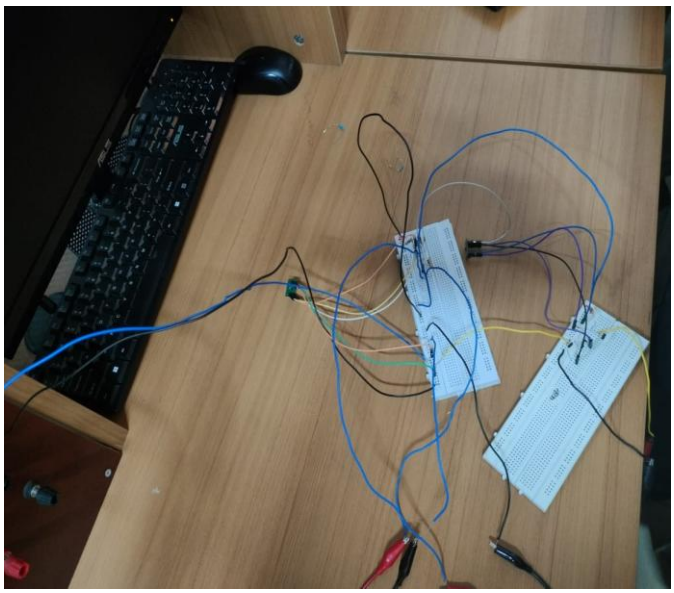
- Prototype built with 2 OVA356s and 2 PN junction diodes (Schottky not available).
- Square wave is given as an input.
- Given a voltage of 1Vp-p to 2Vp-p as PN diode works only if voltage is more than 0.7V.

OBSERVATION AND INFERENCE:

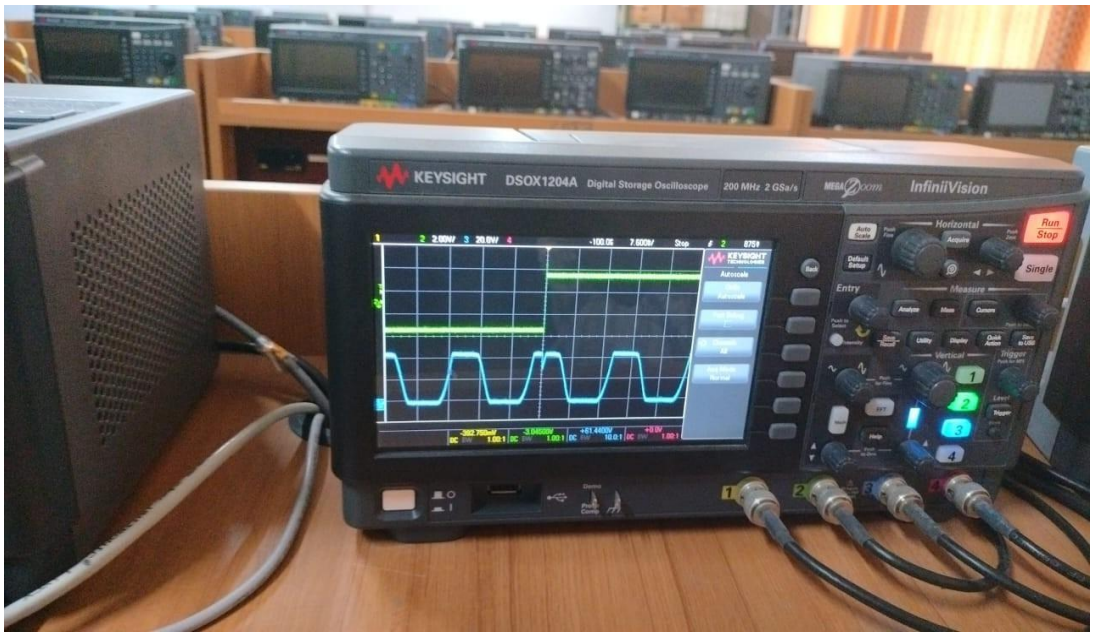
- The results were not that good as hold time is very low.
- Maybe because the capacitors are discharging very fast.
- Also had a problem that output was not coming properly.
- Sometimes error outputs came.
- Maybe wrong resistors, capacitors value used.
- Tried integrated testing, output was full of errors.

PHOTOS ATTACHED:





The Error Output:



RESULTS AND OPINIONS:

Only once the output came kind of good, the others could not even be understood. Some outputs didn't even make sense, might be wrong connection or maybe the circuit is wrong. Have to check it all.

TEST4: Preamp + Peak-hold circuit with function generator

AIM: To check if the preamp + peak-hold circuit is working properly or not.

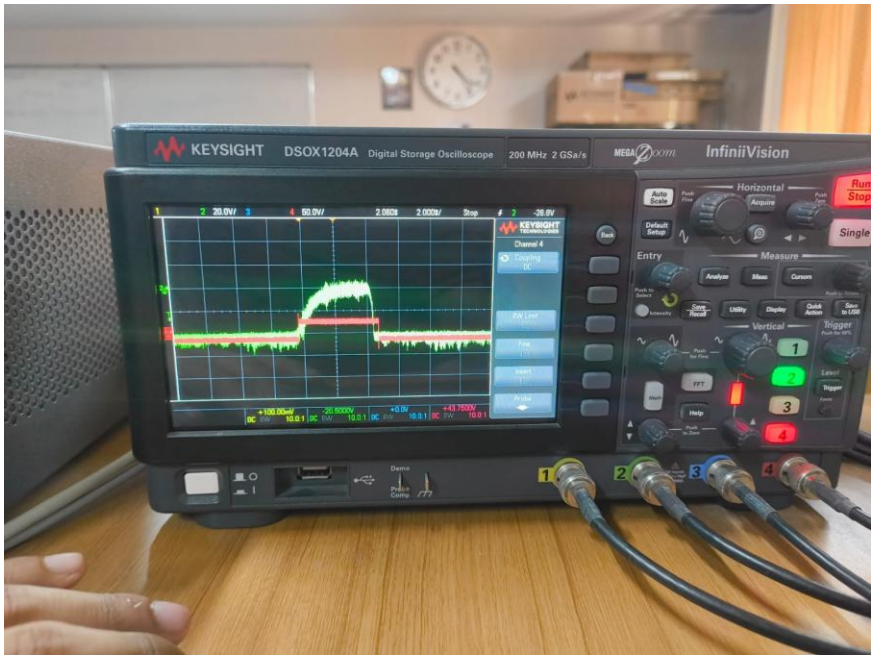
EXPT:

- Prototype built with 2 OVA356s and 2 PN junction diodes (Schottky not available).
- Square wave and pulse wave are given as an input.
- Given a voltage of 2Vp-p as PN diode works only if voltage is more than 0.7V.

OBSERVATION AND INFERENCE:

- The results were very good this time as the output was hold for some time .
- Changing the capacitors worked.
- The output was coming as expected.
- No error output was observed.
- Integrated testing was done.
- The results were satisfactory every time the testing was done.
- Duty cycles were varied.

PHOTOS ATTACHED:

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DSOX1204A
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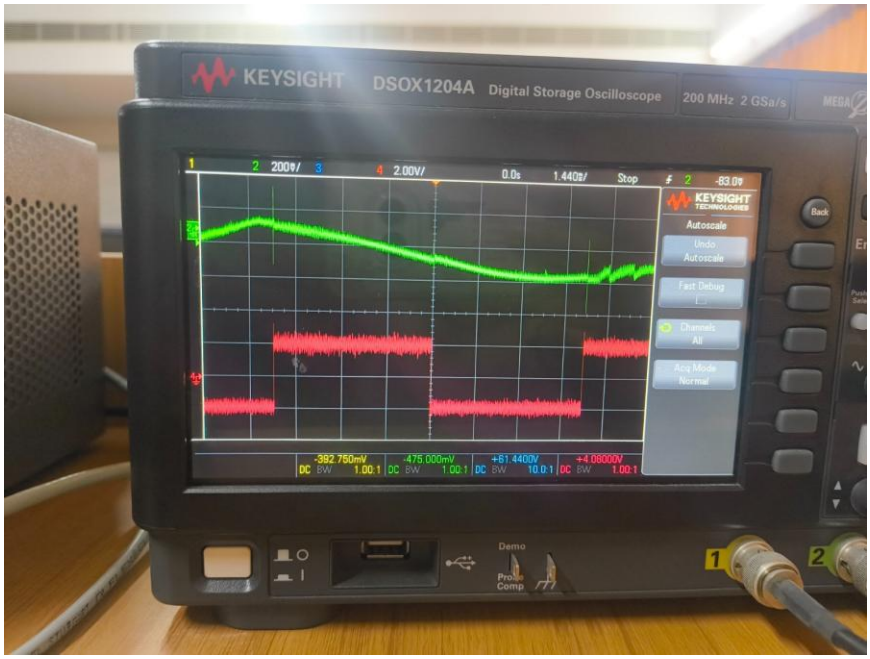
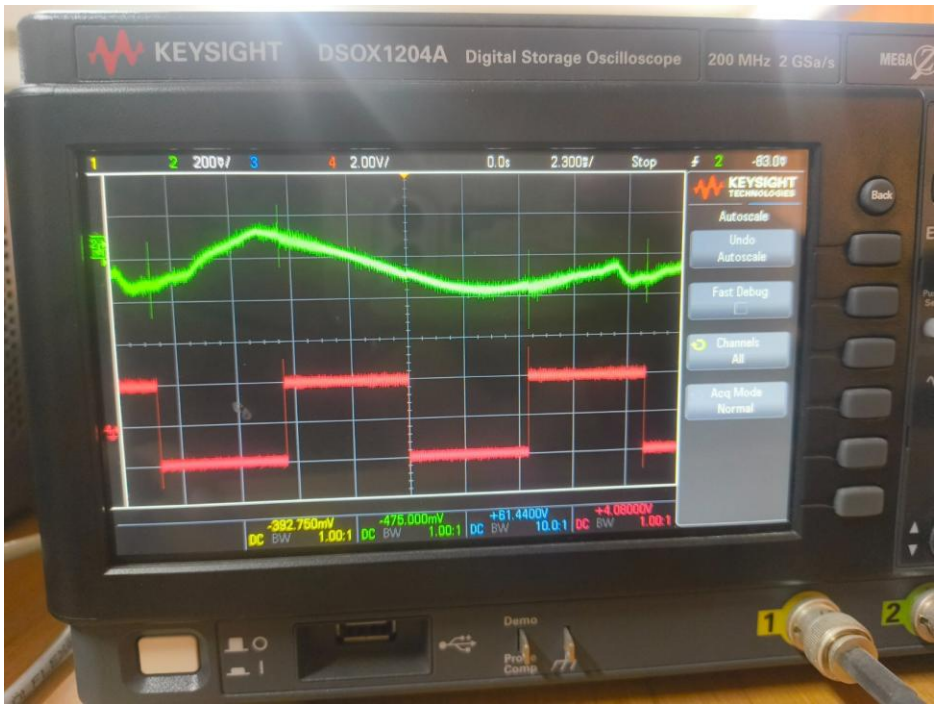
KEYSIGHT
EDU33212A


KEYSIGHT
DSOX1204A
Digital Storage Oscilloscope
200 MHz 2 GSa/s
Autoscale
Undo Autoscale
Fast Debug
Channels All
Acq Mode Normal
Back
Demo
Probe Comp


KEYSIGHT
EDU33212A
Waveform Generator
20 MHz
1 SQU,50Ω
OFF
2 PULS,50Ω
ON
Frequency 50.000,000 Hz
Amplitude 2.000 Vpp
Offset +0.000 V
Phase 0.000 °
Pulse Width 0.0005000000 s
Lead Edge 10.0 ns
Trail Edge 10.0 ns
Sweep
Start Freq 100.000,000 Hz
Stop Freq 1.000,000,000 kHz
Sweep Time 1.000 s
Hold Time 0.000 s
Return Time 0.000 s
Parameter
Frequency
Amplitude
Offset
Phase
Pulse Width
Edge
Back


KEYSIGHT
DSOX1204A
Digital Storage Oscilloscope
200 MHz 2 GSa/s
InfiniiVision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Demo


KEYSIGHT
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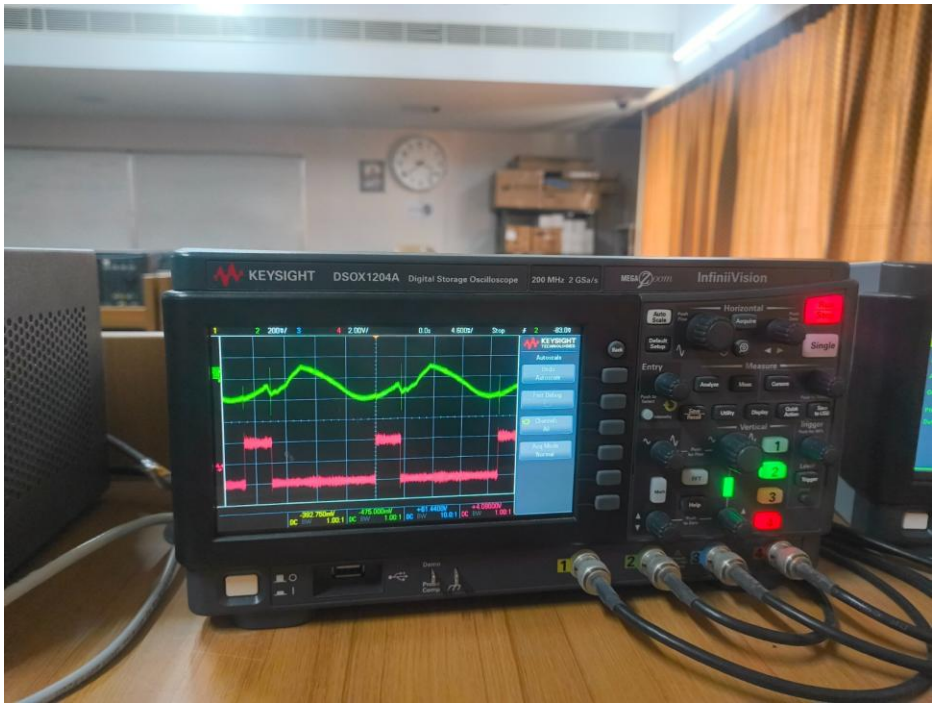
Waveform Generator
20 MHz
SQU,50Ω
OFF
SQU,50Ω
ON
Frequency 1.000000
Amplitude 2.000 Vpp
Offset +0.000 V
Phase 0.000 °
Duty Cycle 20.000 %
Start Freq 100.000,000 Hz
Stop Freq 1.000,000,000 kHz
Sweep Time 1.000 s
Hold Time 0.000 s
Return Time 0.000 s


KEYSIGHT
DSOX1204A
Digital Storage Oscilloscope
200 MHz 2 GSa/s
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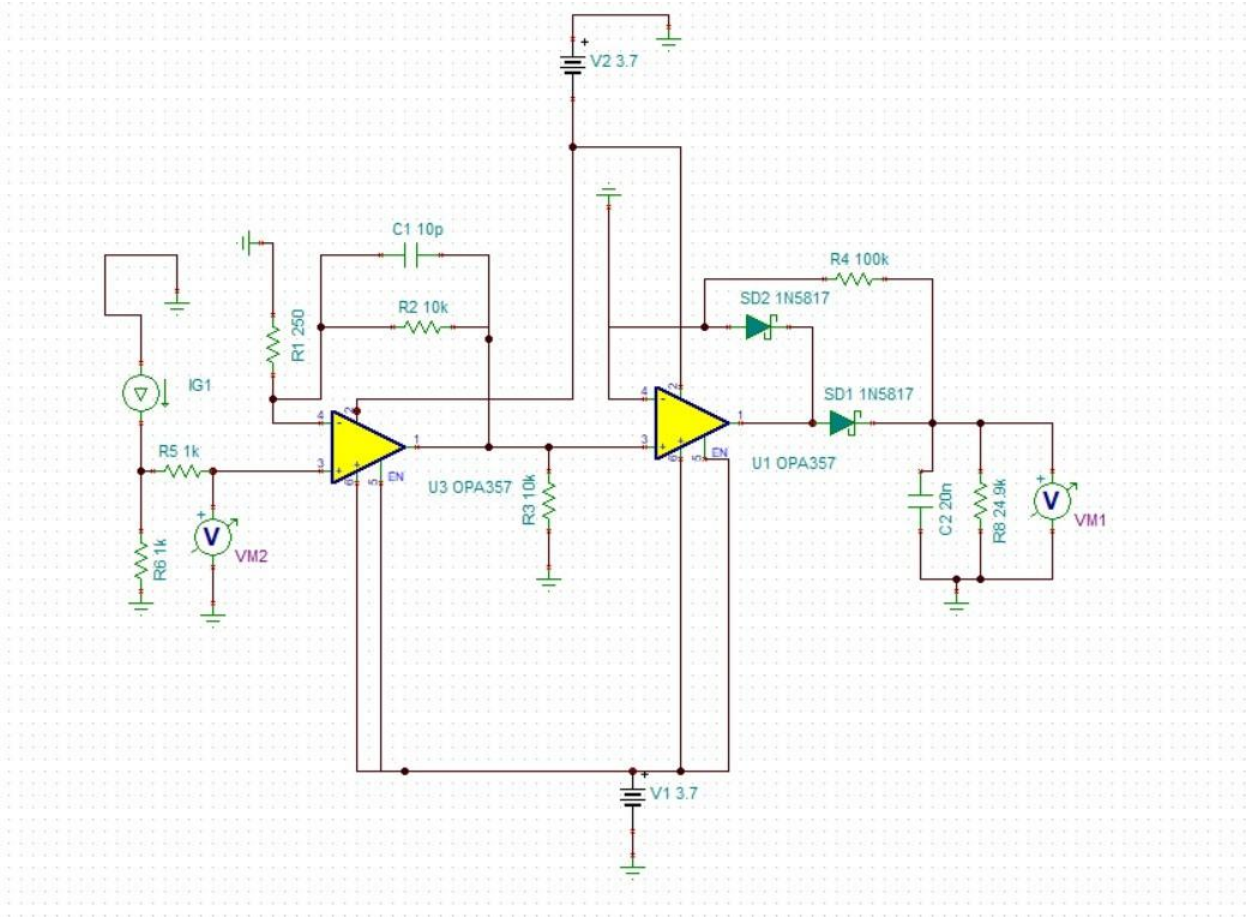
The schematic that was followed:



RESULTS AND OPINIONS:

The output was correct every time the tests were done. Now to optimize the circuit that is to add a SiPM and a scintillator in the next test.