Status of the Single-Photon-Level Test in SiPM

DAMSA weekly Meeting 2025.4.16

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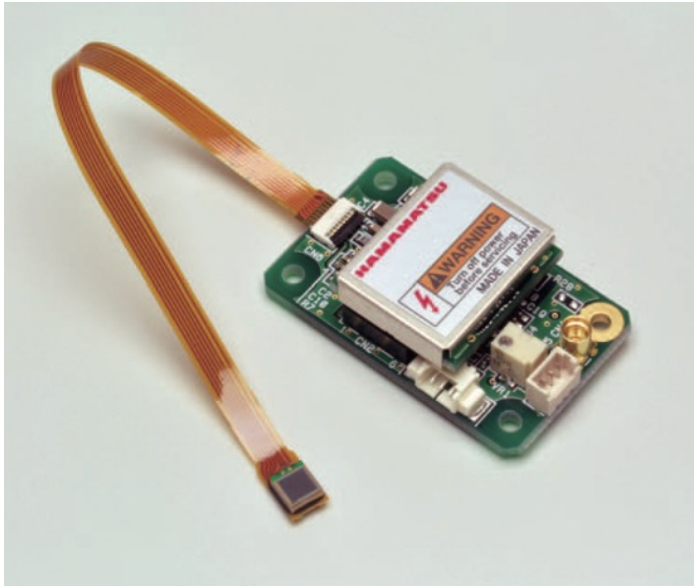
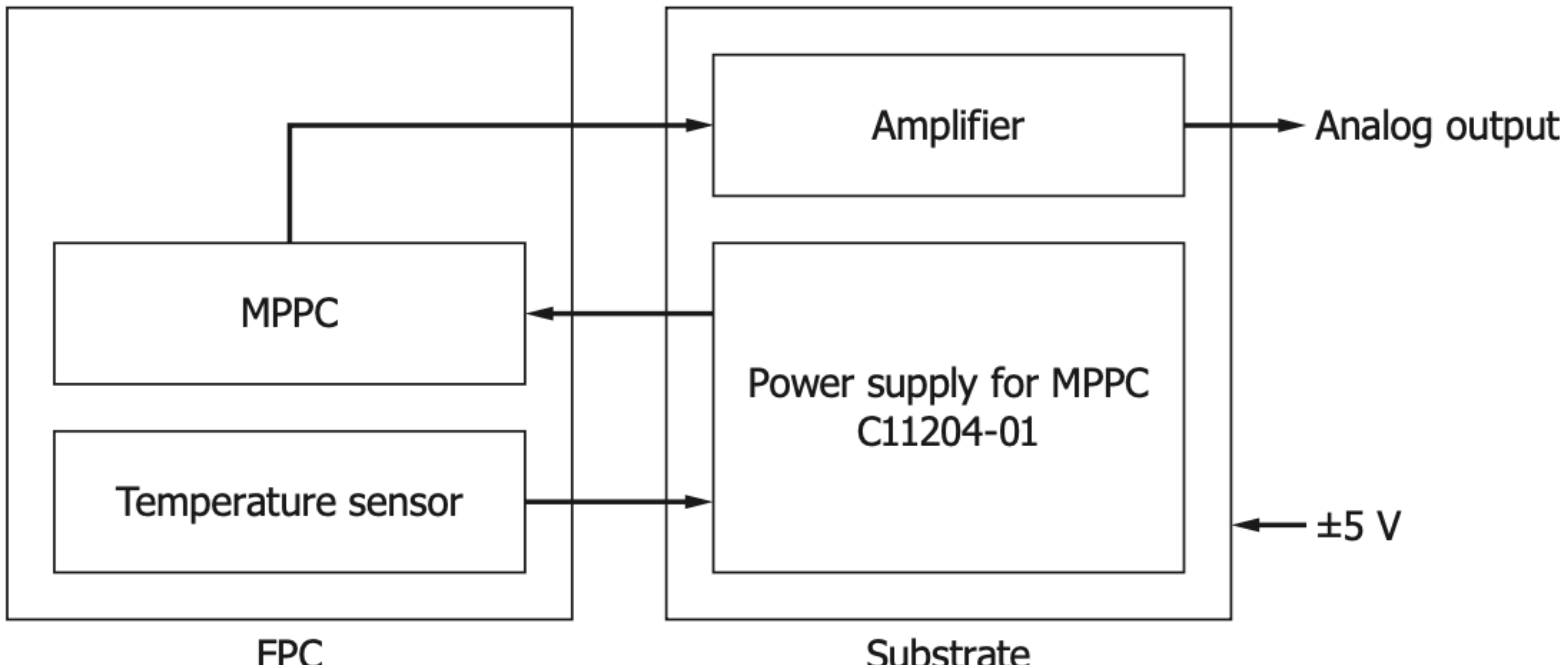
Block diagram & structure of SiPM

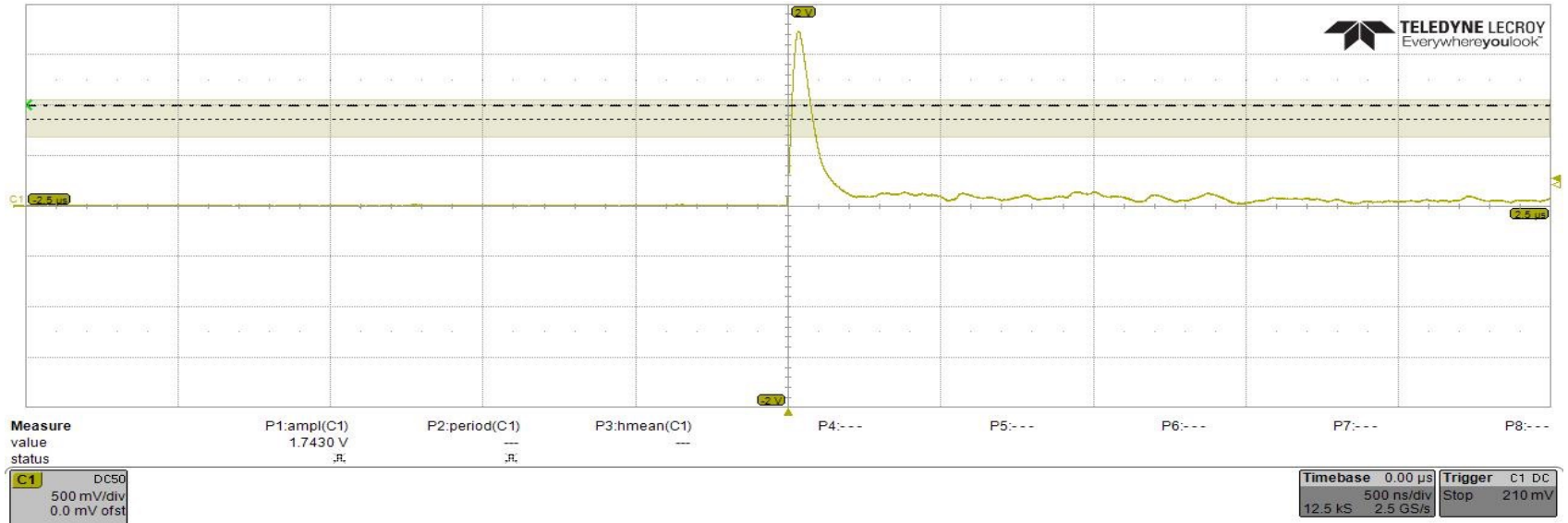




Structure

Parameter	Symbol	C13367-6050EA	Unit
Effective photosensitive area	-	6 × 6	mm
Pixel pitch	-		μm
Number of pixels	-	14400	-

Concepts of Single photon level test



Analog signal shape of radiation source(Co 60)

- Objectives

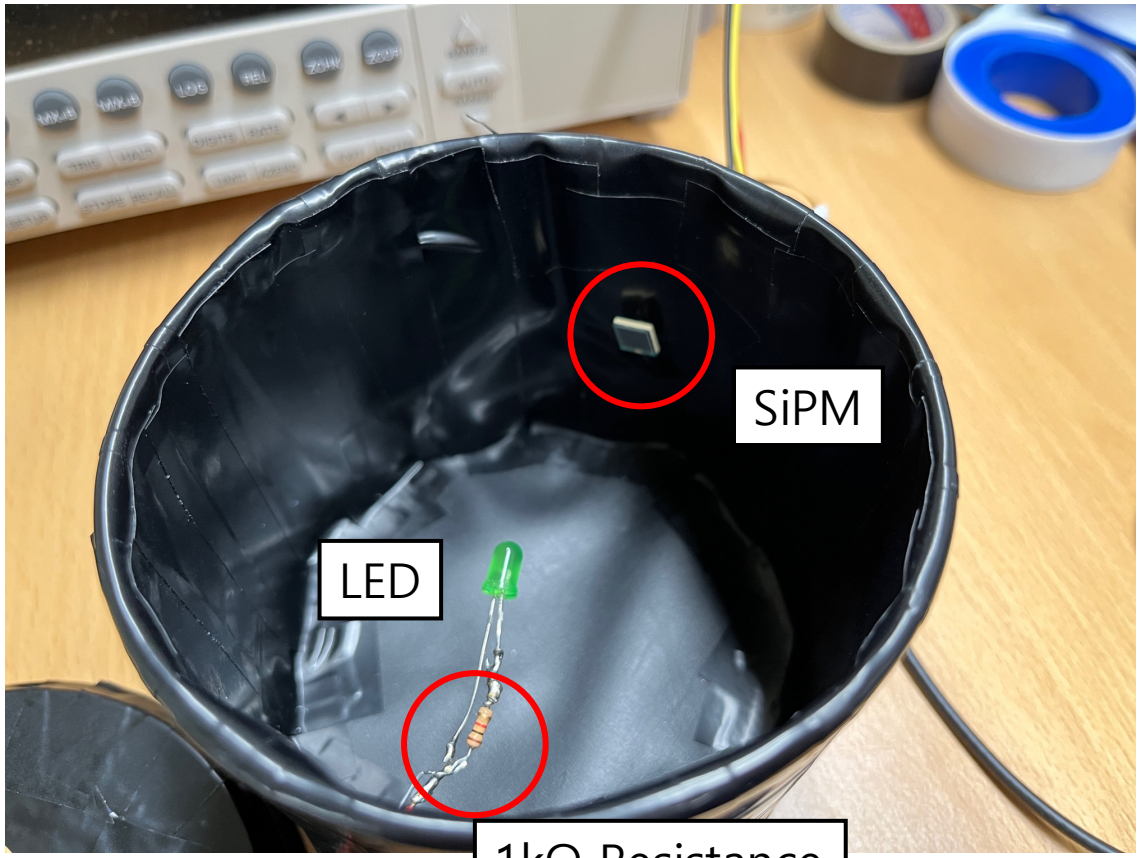
(1) Evaluate the energy resolution of the system

(2) Investigate how the optical response of the SiPM depending on the position of the radiation source or wrapping method with CsI crystal

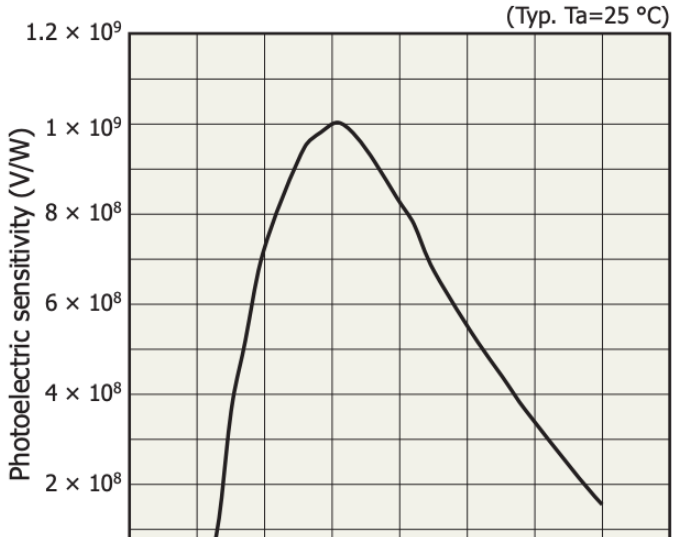
→ Need to check charge generated by single photon level event

Experimental Setting (1)

- Using green LED for photoelectric sensitivity (high sensitivity at 500nm in our Si PM)



Photoelectric sensitivity vs. wavelength



Structure

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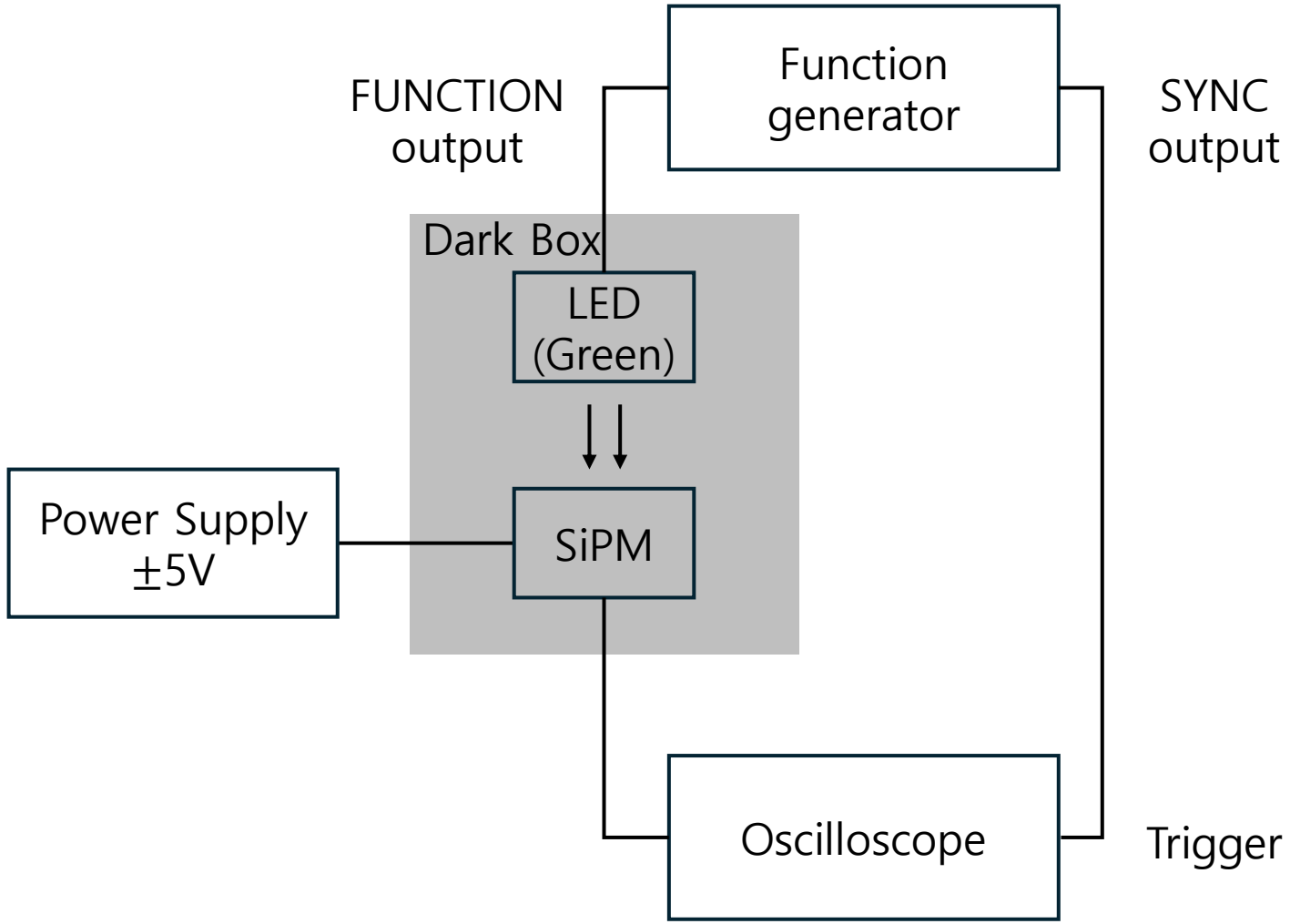
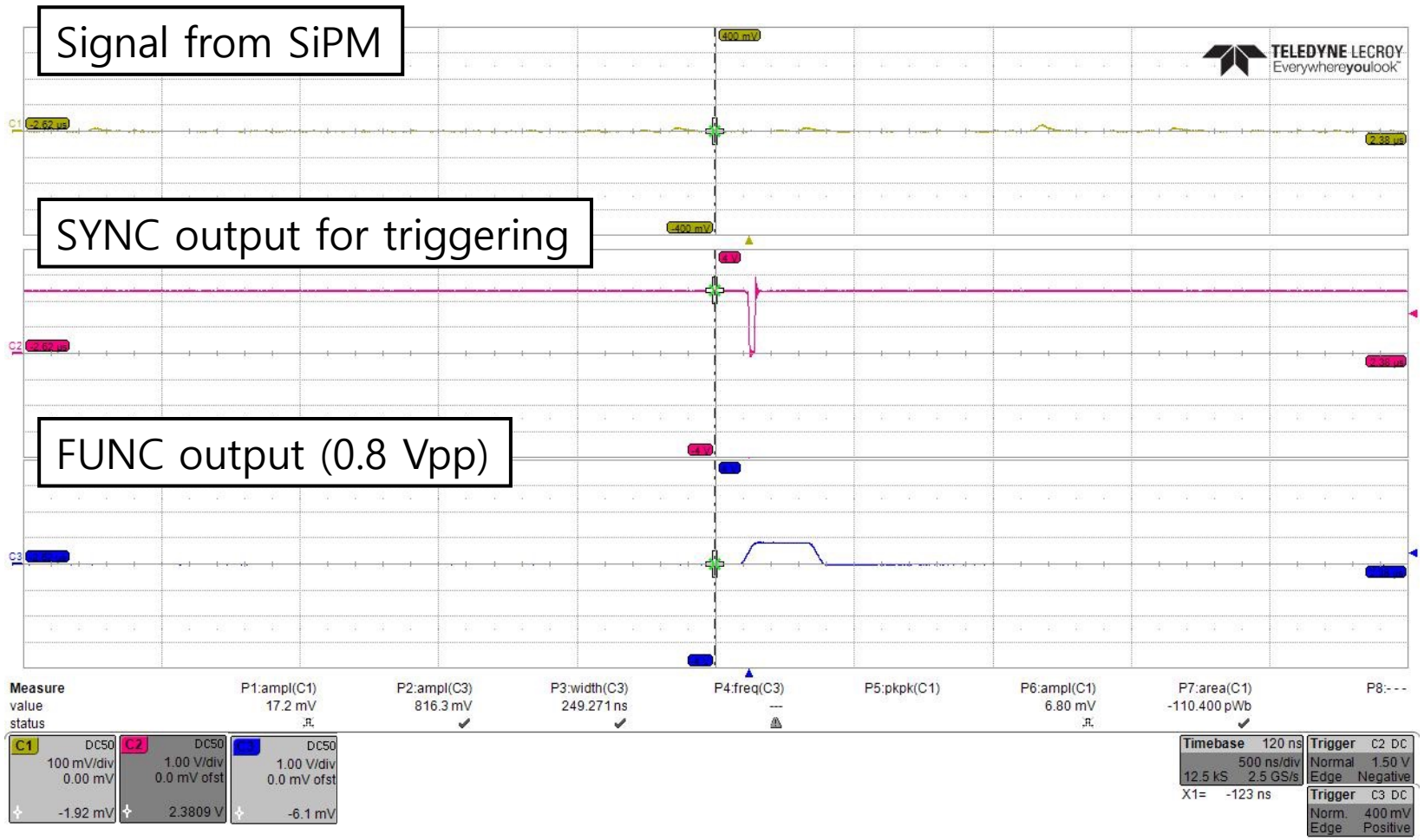
To prevent overcurrent that could damage the LED

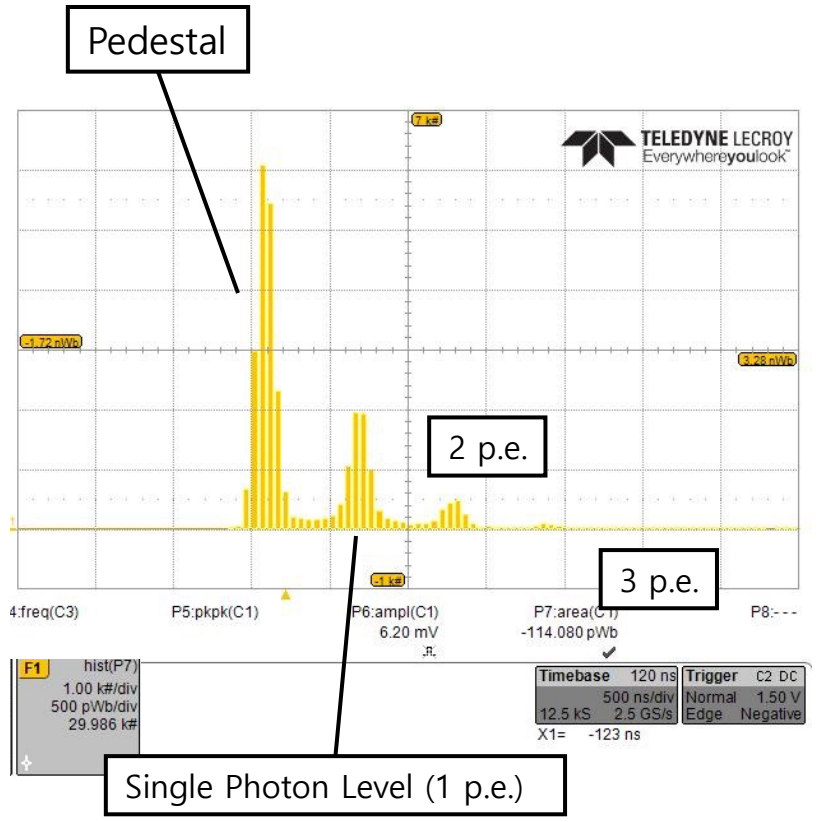
Experimental Setting (2) Block Diagram & Pulse Configuration

Pulse Configuration (FUNC output)	
Amplitude	0.8 Vpp
Offset	0.4 V
Frequency	40 kHz
Width	250 ns
Shape	square



Result





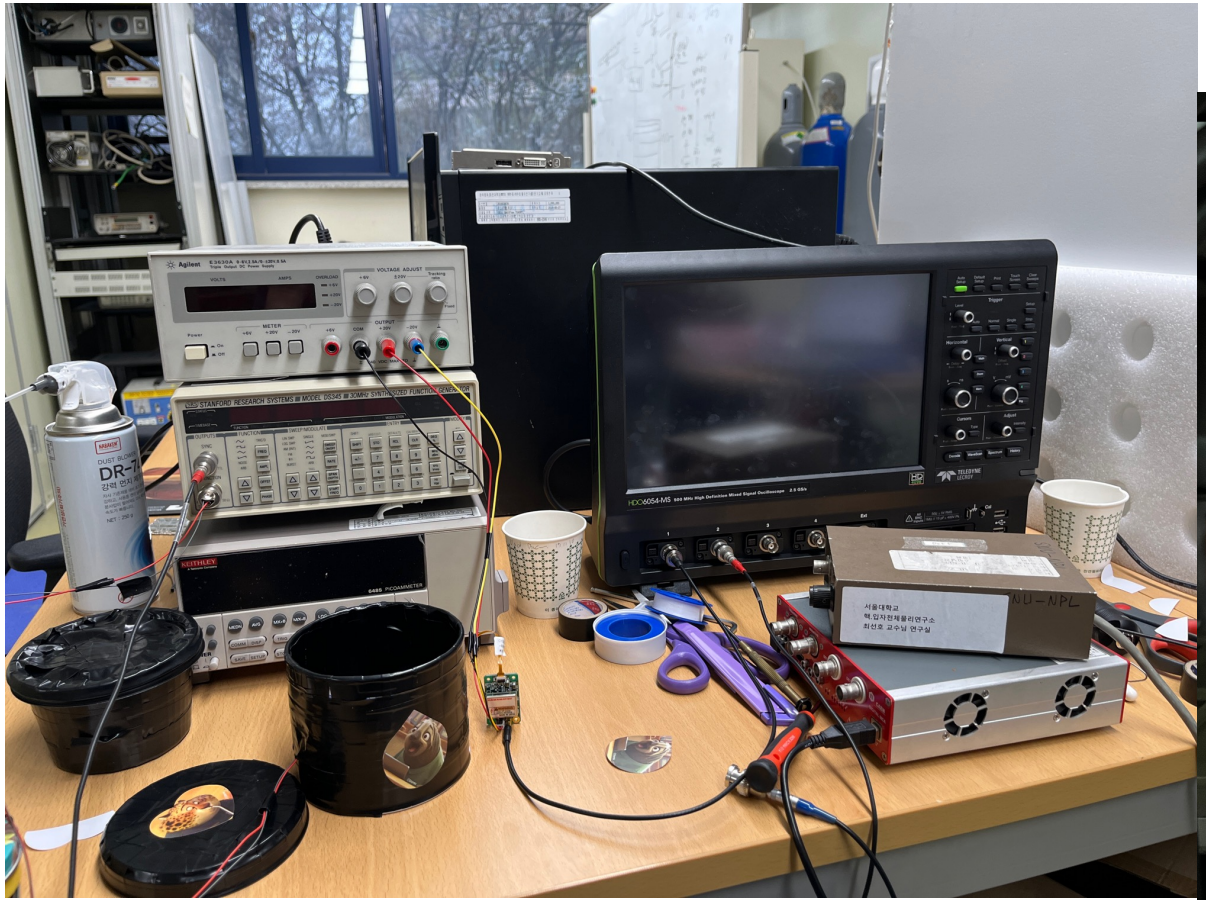
Gate window set from 6 to 7 divisions (horizontal)

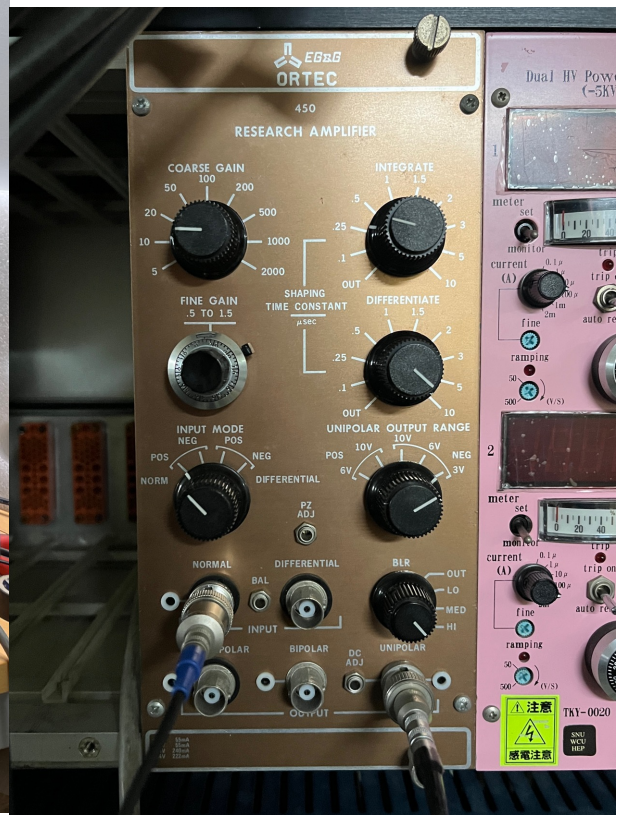
Next steps

- Measure trigger rate or set different function generator voltage (Vpp) to clarify single photon signals, separate dark count from real events
- Using Transimpedance Amplifier(TIA) to improve signal clarity
- Attach CsI Crystal to SiPM so we can do response test with radiation source

Back up

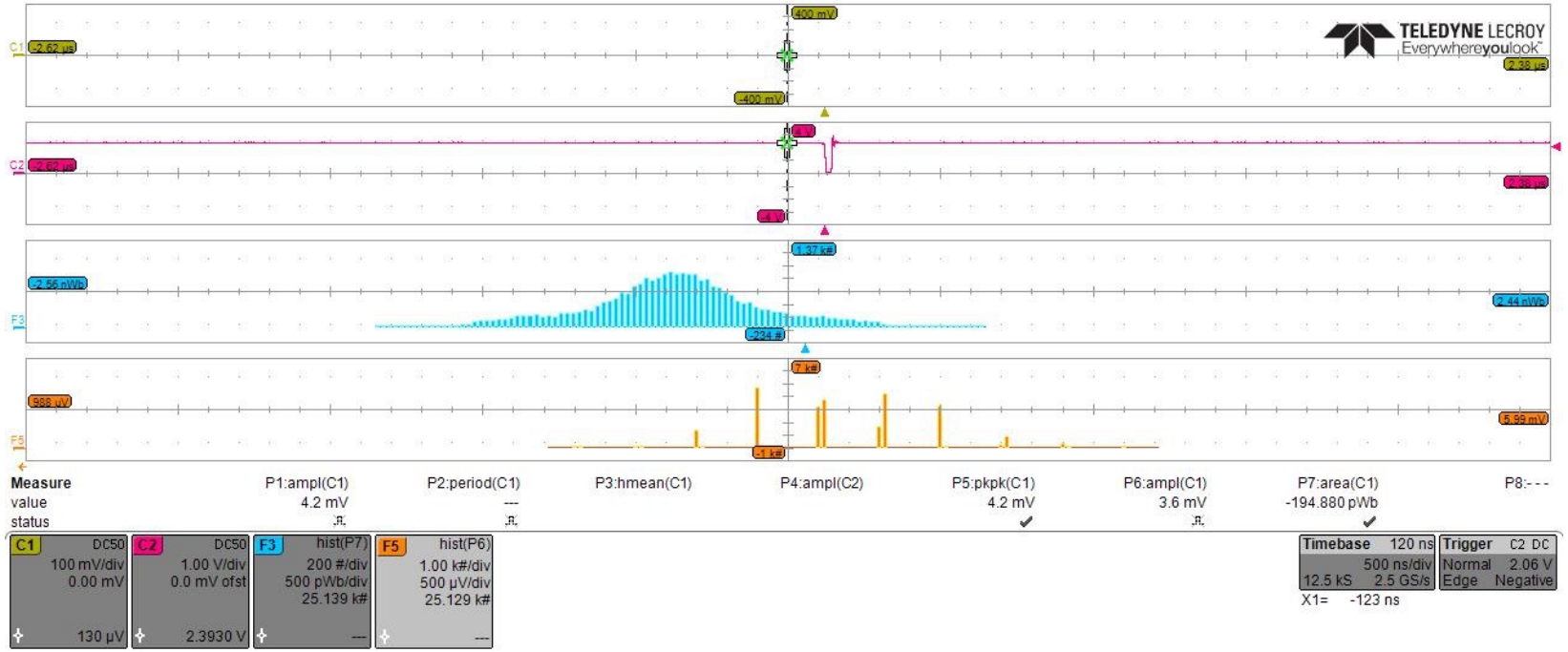
Experimental Setting

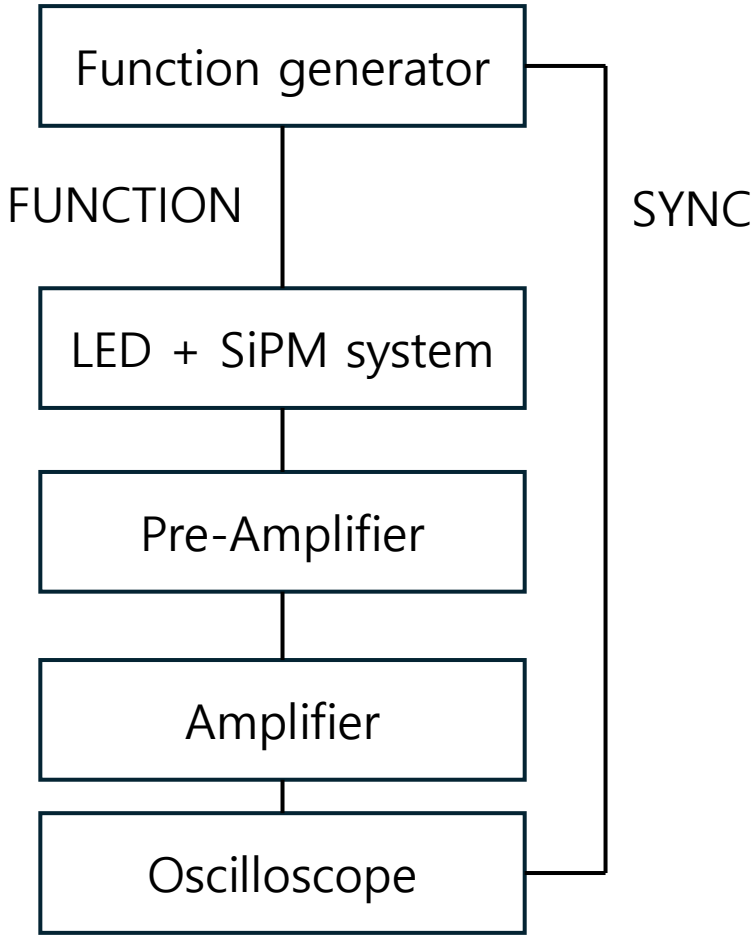




Change in experimental setup

- The external pre-amplifier and amplifier seemed to have a problem, strange results..
- No peak of photons or even pedestal
- removed it and proceeded the experiment





Other Result