

Mu2e SiPMs test

Incontri di Fisica 2017

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Measurement description

Each group will measure the SiPM I-V curve for :

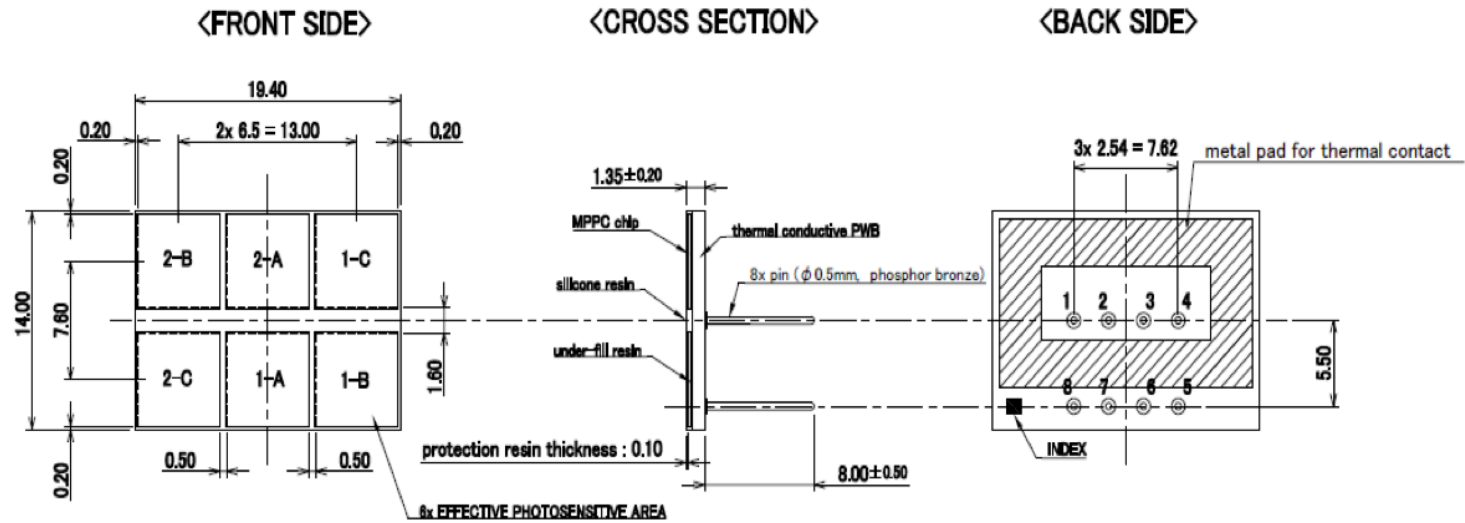
- 1 not irradiated SiPM
- 1 irradiated SiPM at different temperatures (20 – 15 – 10 - 5 °C)

Mu2e SiPM (1)

- Mu2e SiPMs are made of a 2x3 matrix (6 cells) of 6x6 mm²
 - Parallel arrangement of two groups of three cells biased in series
 - 2 SiPM per crystals to ensure redundancy
 - Fast signal for pileup and timing resolution
- Operational voltage of a single 6x6 mm² cell: $V_{op} = V_{br} + 3V$



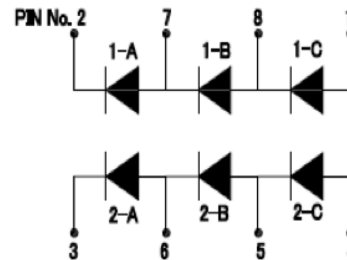
Mu2e SiPM (2)



EFFECTIVE PHOTOSENSITIVE AREA : 6.0mm x 6.0mm
 MPPC CHIP SIZE : 6.1mm x 6.1mm

* 1-A ~ 2-C : CHANNEL No.

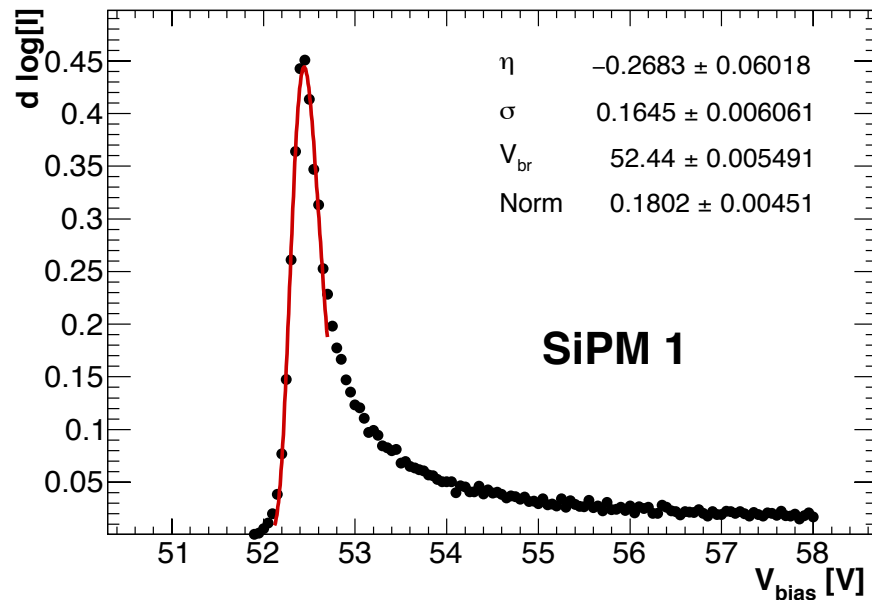
GENERAL TOLERANCE : ±0.1



PIN No.	1	2	3	4
Channel	Anode (1-C)	Cathode (1-A)	Cathode (2-A)	Anode (2-C)

PIN No.	8	7	6	5
Channel	Anode (1-B) Cathode (1-G) [short]	Anode (1-A) Cathode (1-B) [short]	Anode (2-A) Cathode (2-B) [short]	Anode (2-B) Cathode (2-C) [short]

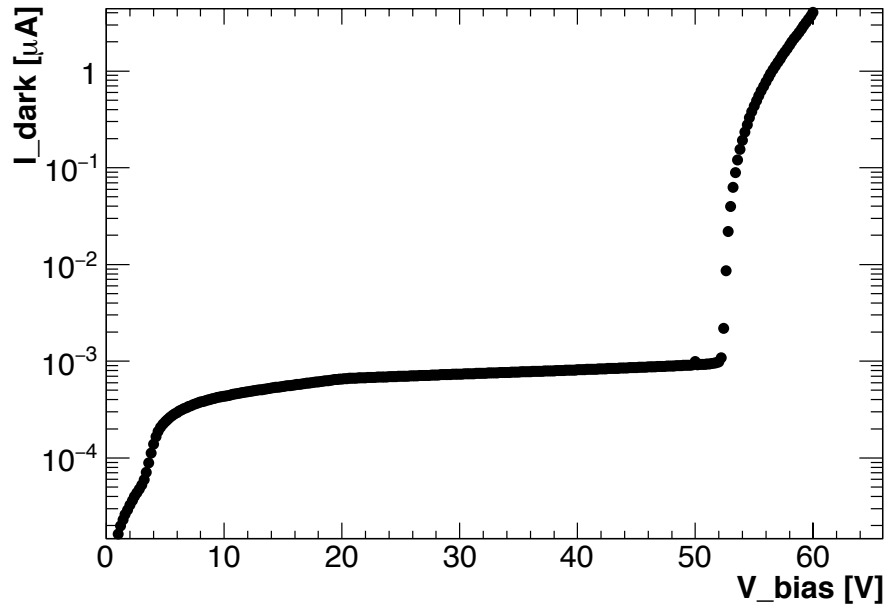
I-V curve and V_{br}



- $V \ll V_{br}$: I monotonically increase with V
- $V \sim V_{br}$: I increases more rapidly with each voltage step, reaching the highest rate of increase when $V = V_{br}$
- $V > V_{br}$: Geiger mode, gain is linearly proportional to ΔV

If $V > V_{br}$ I increases faster the linear. Total increase rate of I is between V^n and e^V . Calculating derivative of I curve in log scale **the local maximum value is V_{br}**

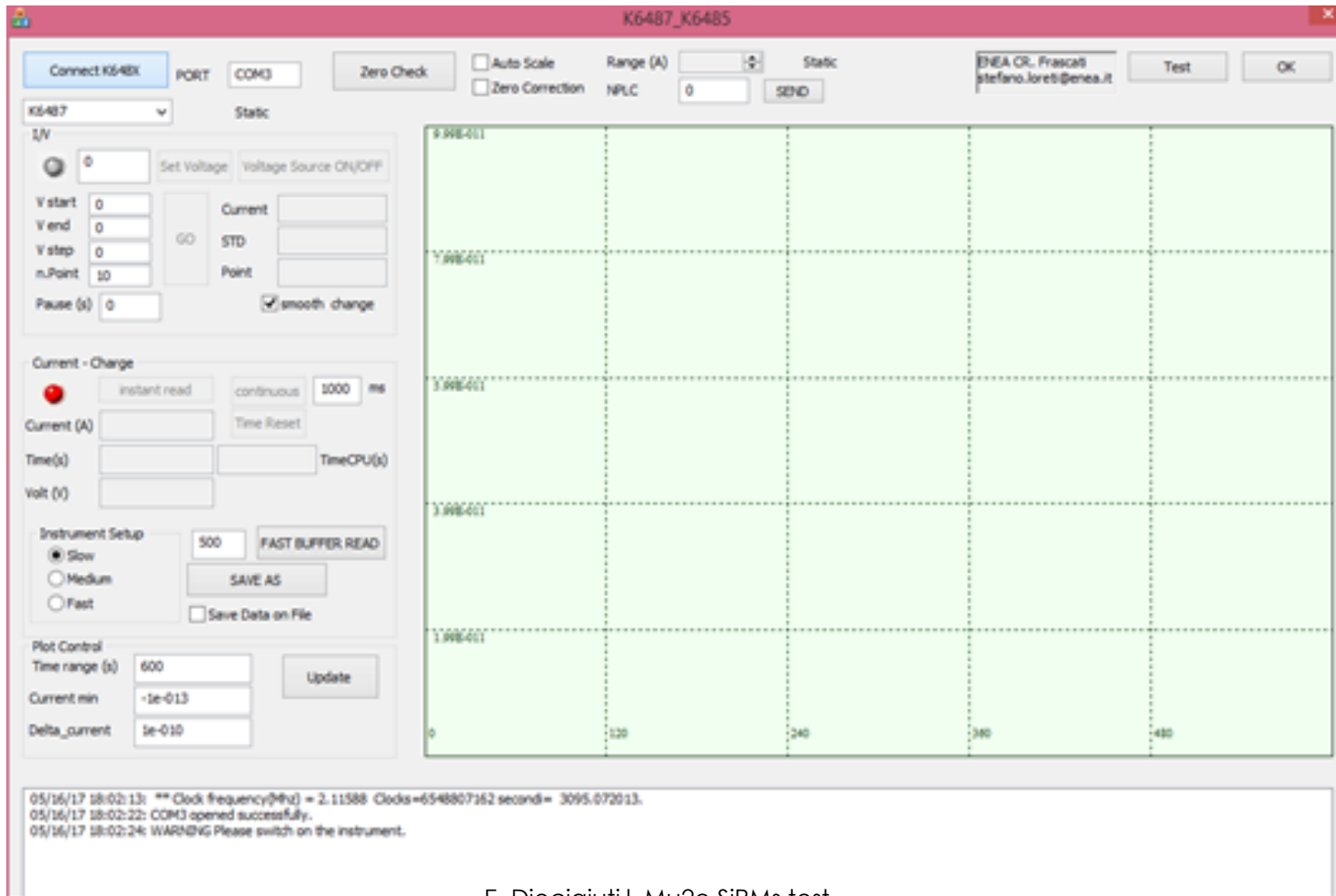
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Program you will use..



Ready to start?

- Open the program K648x
- Select COM3 and the Keithley 6487
- Zerocheck and autoscale
- Select the directory to save the data on (MUSE_outreach)
- Select the V_{bias} range and V step

GO!