

Next HPK Si Sensor

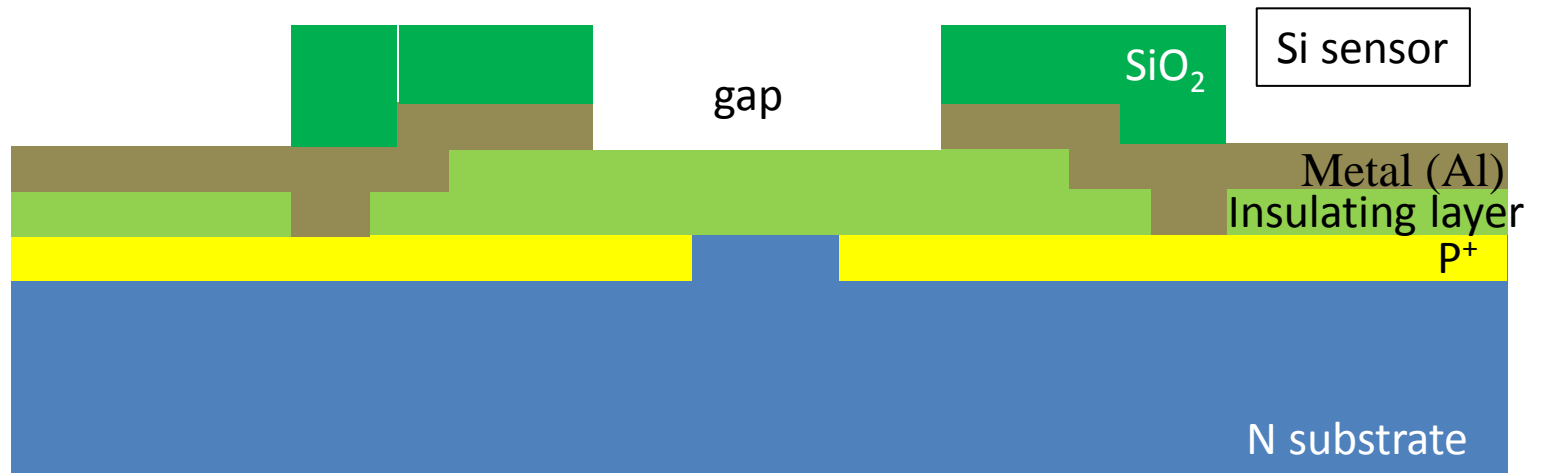
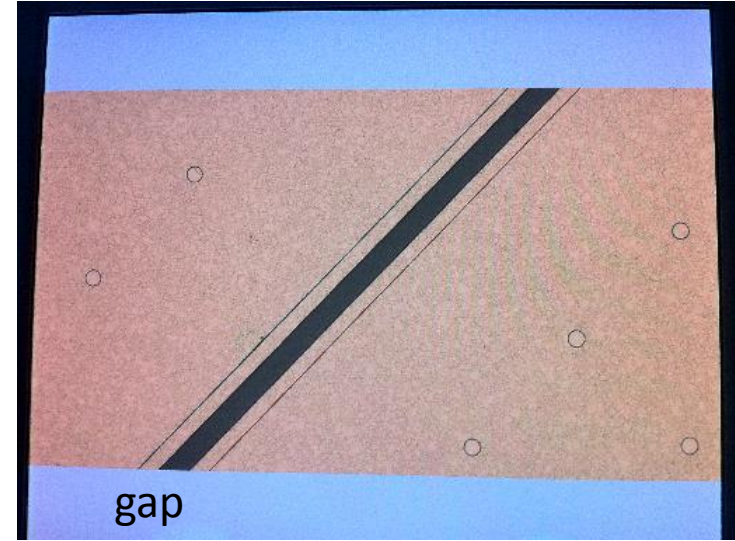
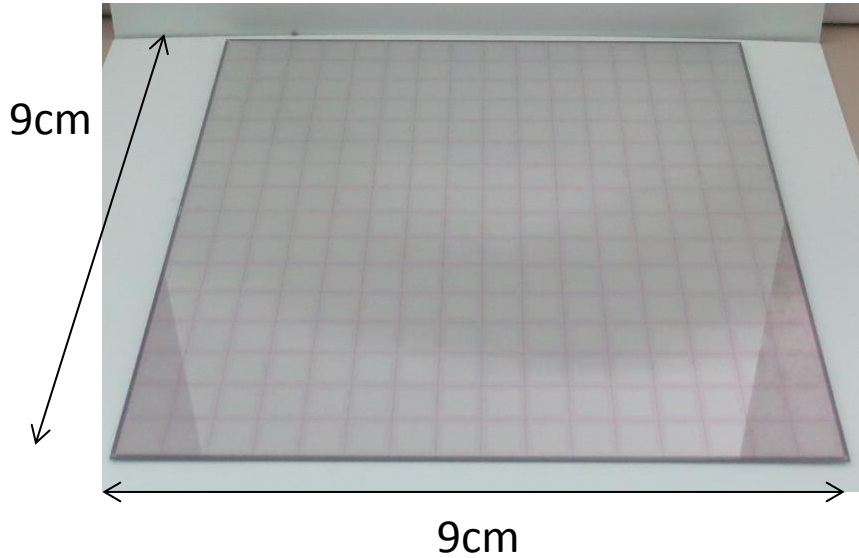
03-04/06/2013

ECAL Meeting @ LPNHE

Yuji Sudo

Kyushu University

HPK Si Sensor



(1) Size 98mm x 98mm

No guard ring

Operating Temperature : -20 ~ 60 °C

Electrical Characteristics (25 °C)

Substrate resistance 3 kΩ·cm

Full depletion voltage: min 20 V , Max 120 V

Leakage current (inner pixel) : Max 25 nA (@200V)

Leakage current (outer pixel) : Max 100 nA (@200V)

Number of NG pixel : Max 10 ch

Device type : P+ pixel on N substrate

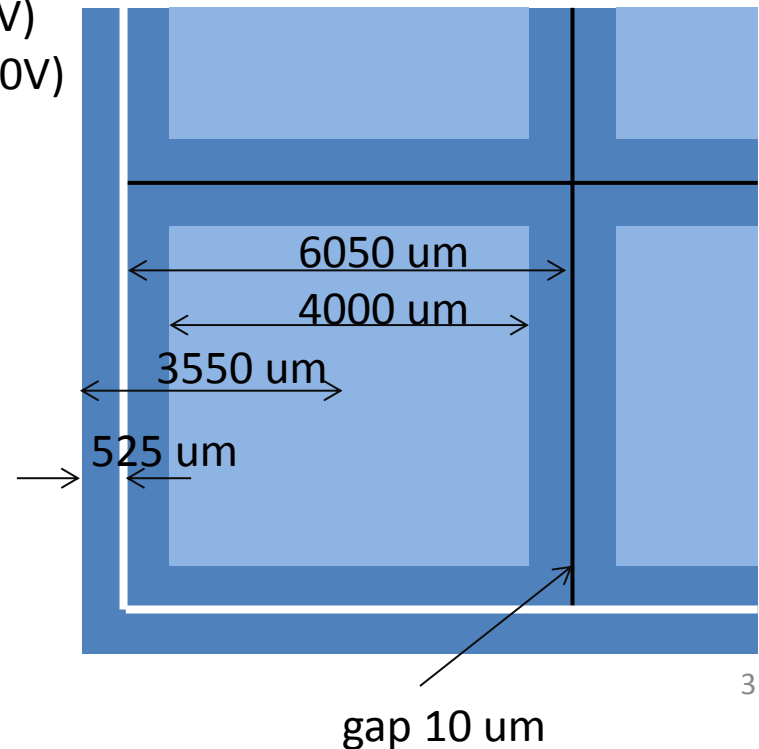
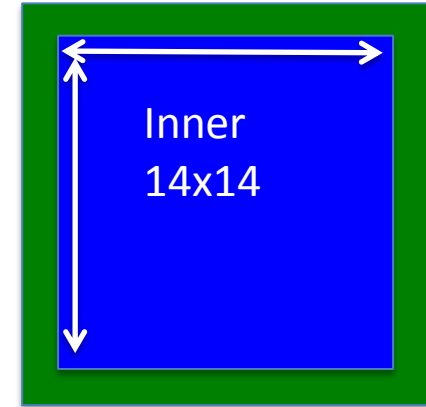
98000 +- 40 x 98000+-40 um

Thickness 320+-15 um

of pixels 256

Pixel size : 6050 um

gap 10 um



(2) Size 89.7mm x 89.7mm

No guard ring

Operating Temperature : -20 ~ 60 °C

Electrical Characteristics (25 °C)

Substrate resistance 3 k Ω ·cm

Full depletion voltage: min 20 V , Max 120 V

Leakage current (inner pixel) : Max 20 nA (@200V)

Leakage current (outer pixel) : Max 85 nA (@200V)

Number of NG pixel : Max 10 ch

Device type : P+ pixel on N substrate

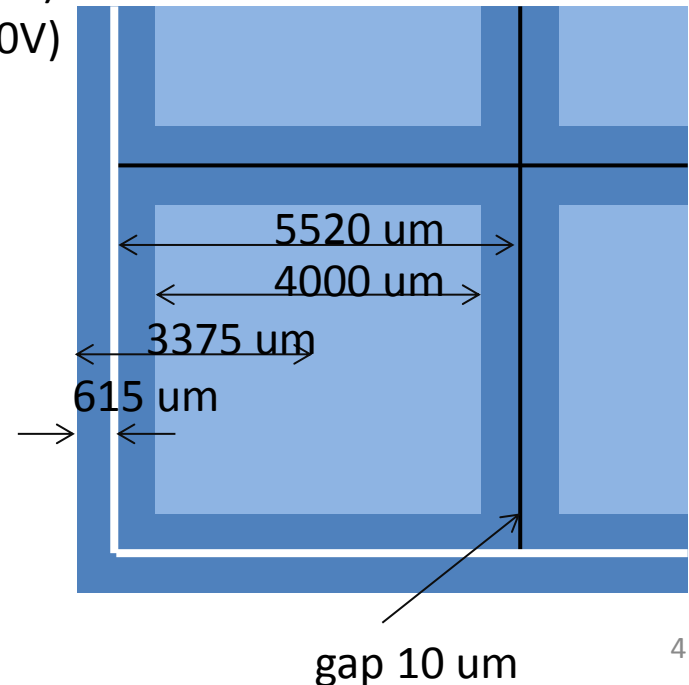
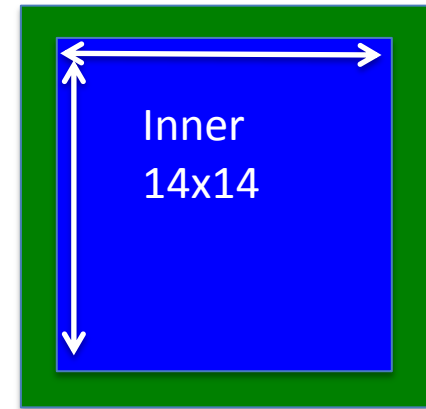
89700 +- 40 x 89700+-40 μ m

Thickness 320+-15 μ m

of pixels 256

Pixel size : 5520 μ m

gap 10 μ m

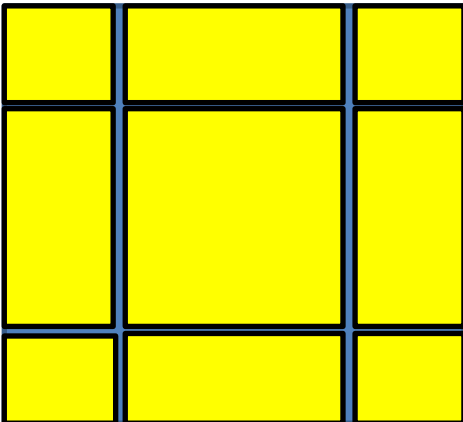


Baby chip design

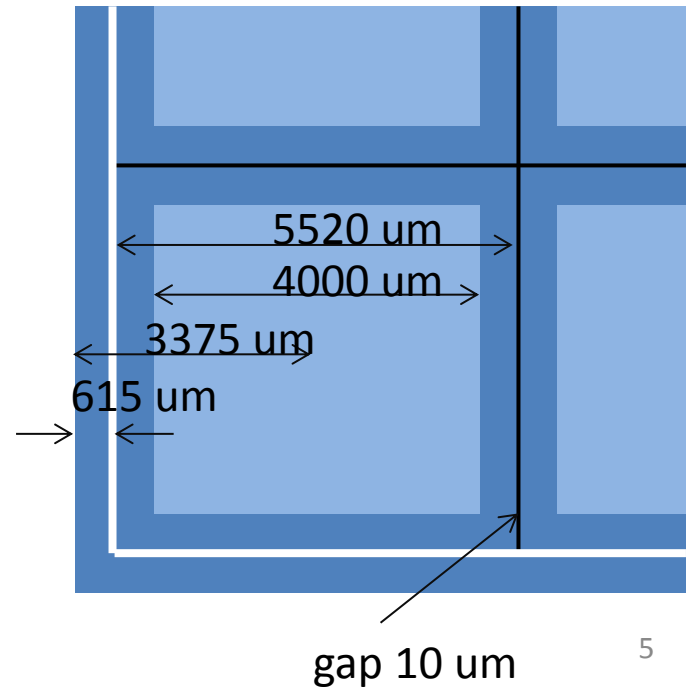
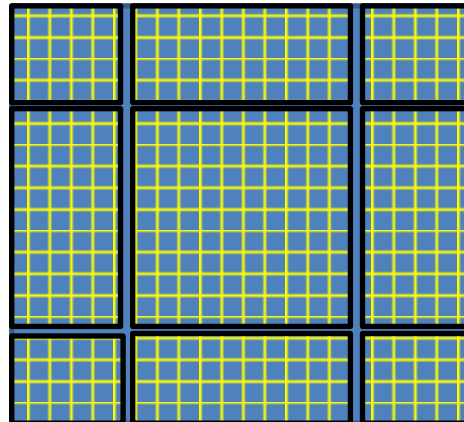
- Meshed electrode
- Guard ring type
- Short width edge

....

Normal electrode is
Thin Metal(Al) plate



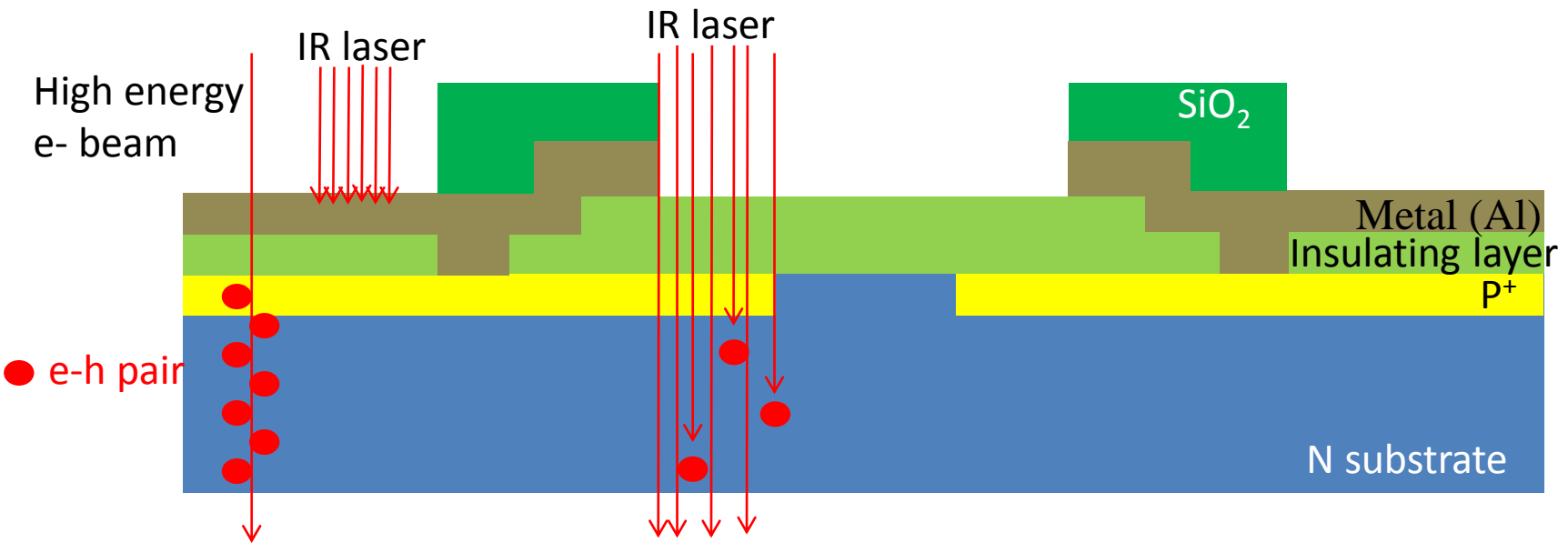
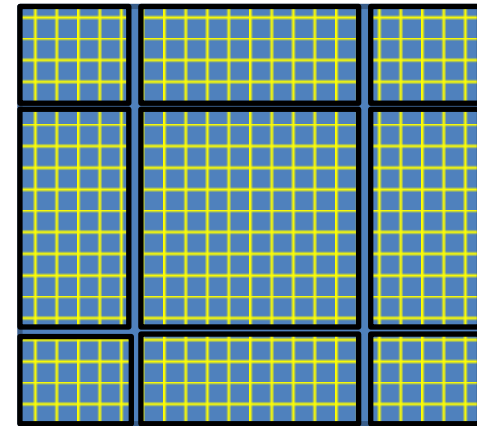
Meshed metal electrode



Measurement with IR Laser

- Cross talk
- Gap
- edge
- We are setting up Infrared laser system to study those issues.

Meshed metal electrode



Laser System

CRYLAS GmbH

DSS1064-Q2(Class 3B)

Wave length : 1064 nm

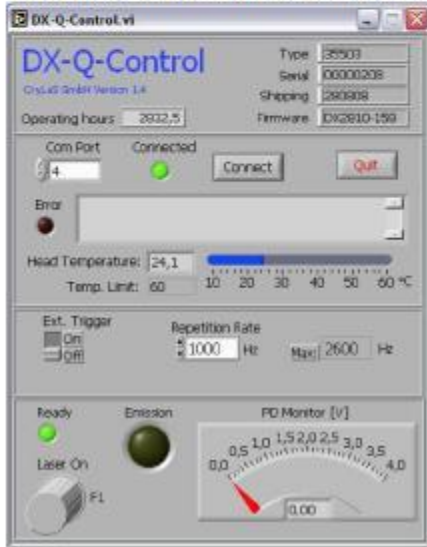
Pulse width : ~1.5 ns

Pulse energy : > 20 $\mu\text{J}/\text{pulse}$
~ 10^{14} photons/pulse

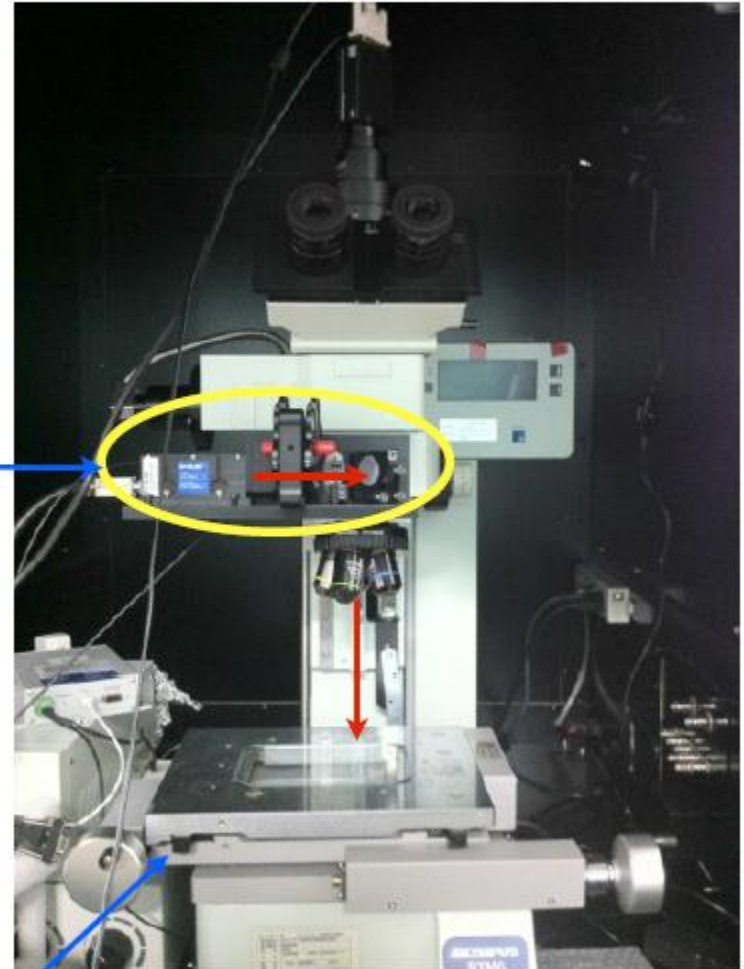
Peak power : > 13 kW

Repetition rate : 1 ~ 10k Hz

Interface of the control software



Laser
Trigger
ND filters
mirror



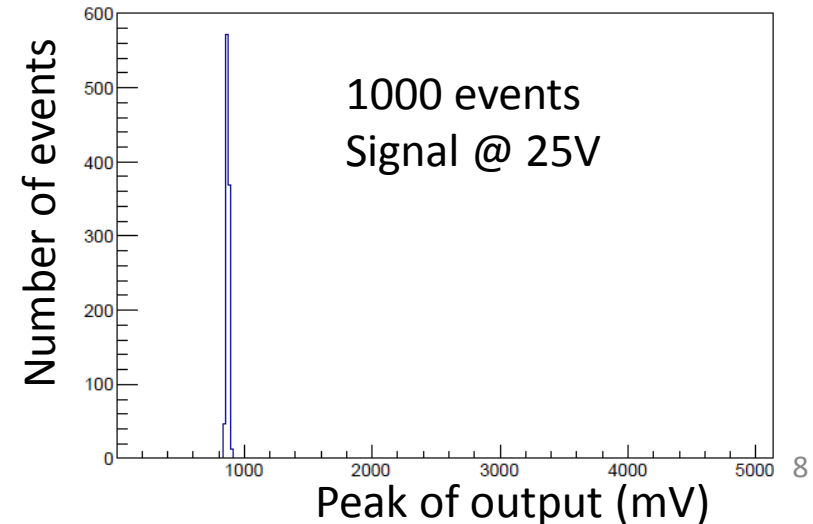
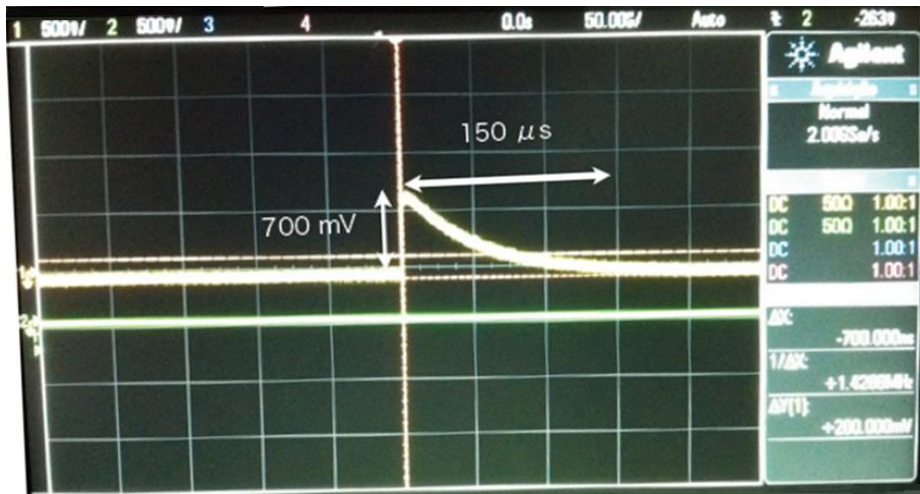
x-y stage

Laser Signal

- We measured laser signal with oscilloscope
- Get peak value from each event
- Fit with gaussian
- Fluctuation of Peak value $\sim 1\%$

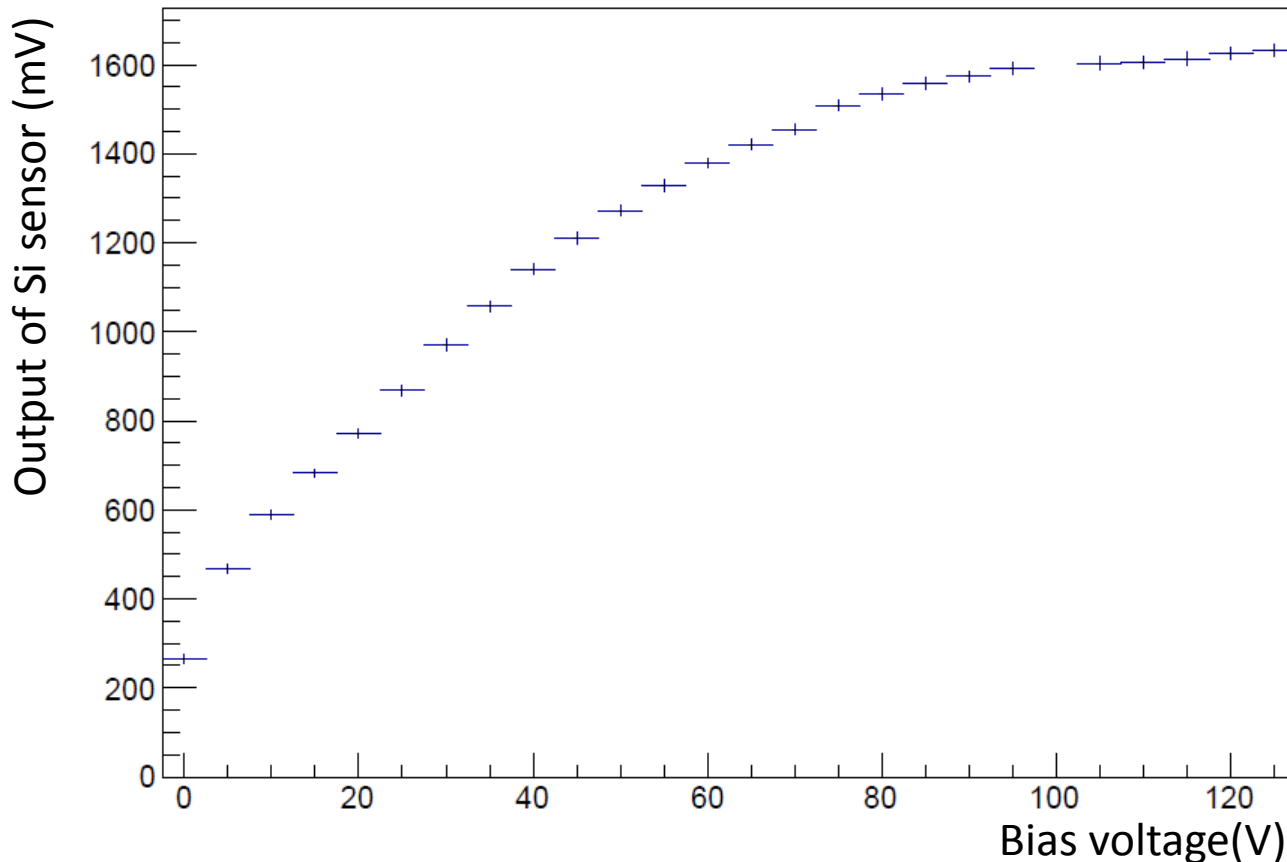


Active area gap Sensor edge



result

- first result of our IR laser measurement system.
(the system is still in preparation)
- Bias V scan ranging from 0 to 130 V
- 4x4 cell baby chip with no guard ring

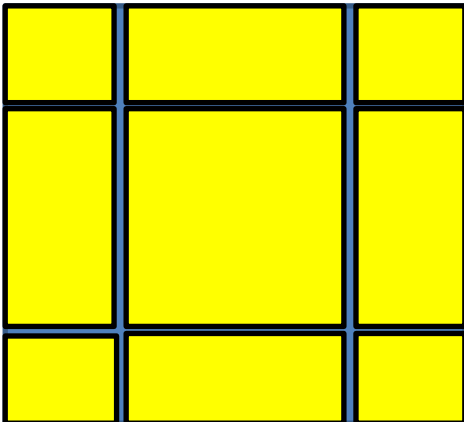


Baby chip design

- Meshed electrode
- Guard ring type
- Short width edge

....

Normal electrode is
Thin Metal(Al) plate



Meshed metal electrode

