Silicon Detector for Compton Experiments

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ATF/BNL

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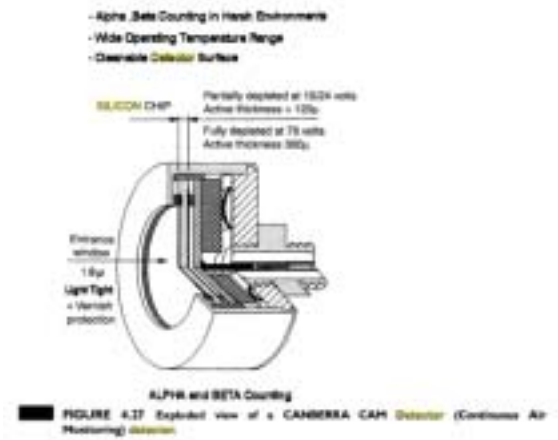
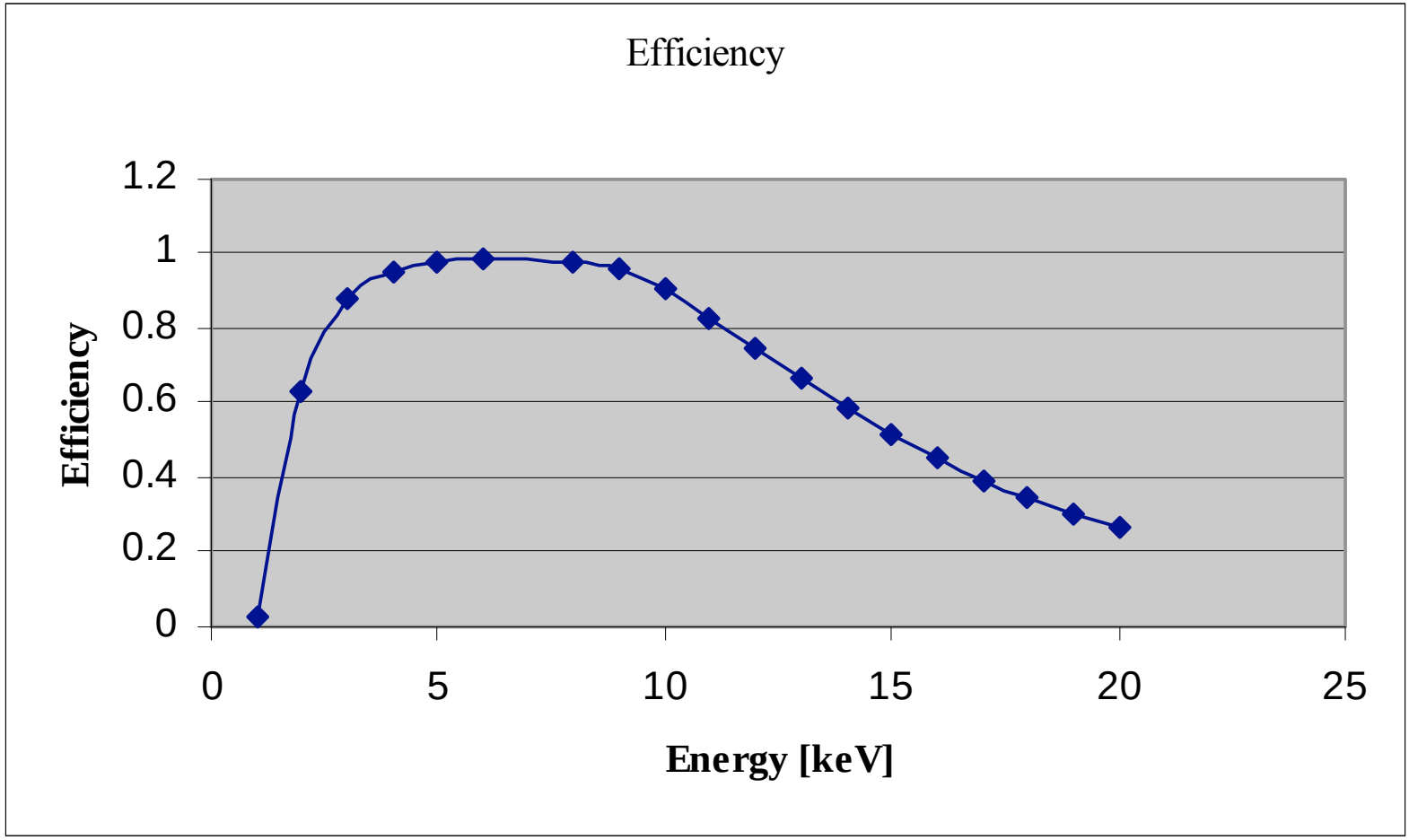
PIPS Silicon Detector

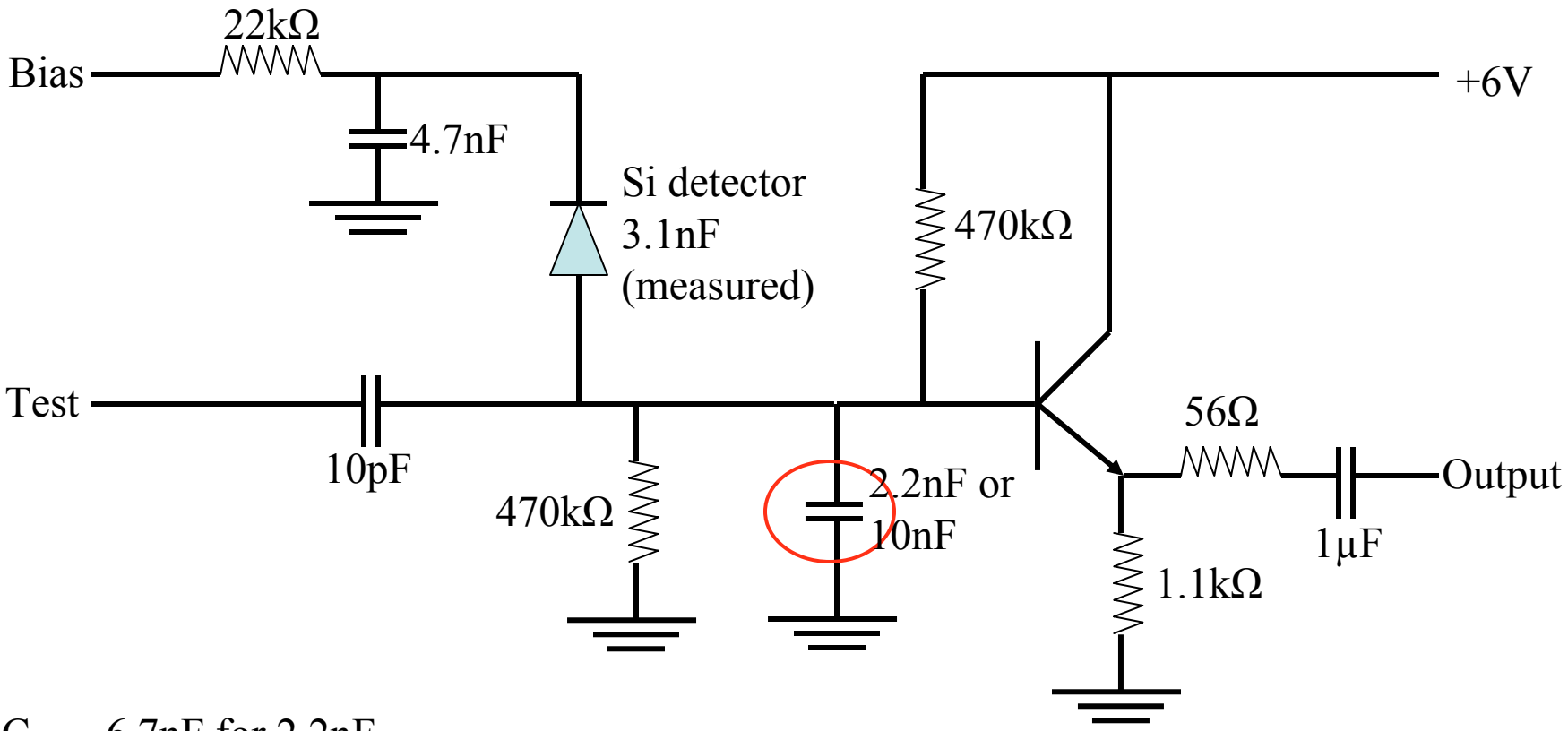
- Type: A300-17AM
- Silicon Thickness: 300um
- Window thickness: < 50nm
- e-h pair energy: 3.66eV
- Capacitance:
  - 3.11 nF @ measurement
  - 20 nF @ applied 12V bias (assume)



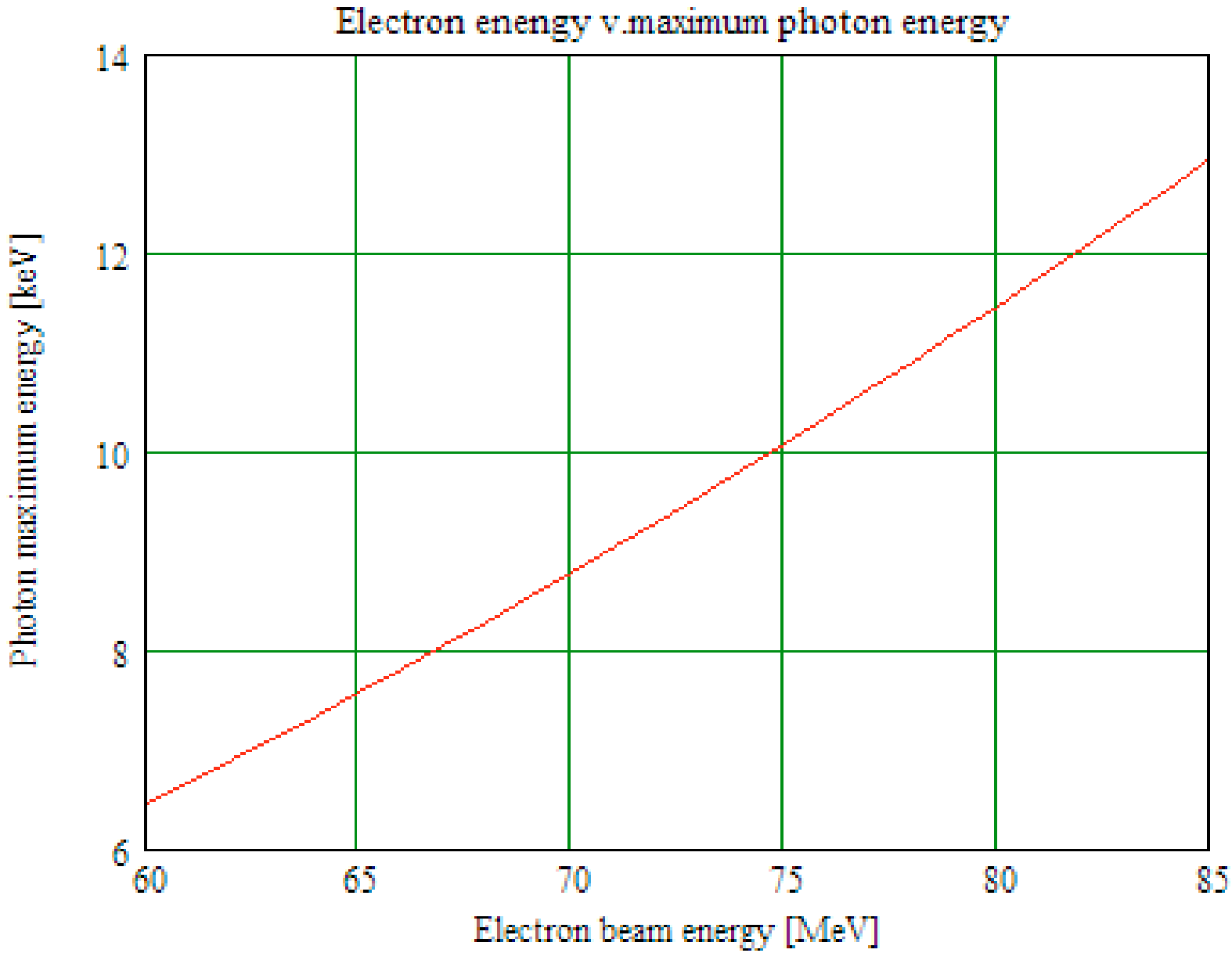
Energy efficiency



Circuit of Si Detector

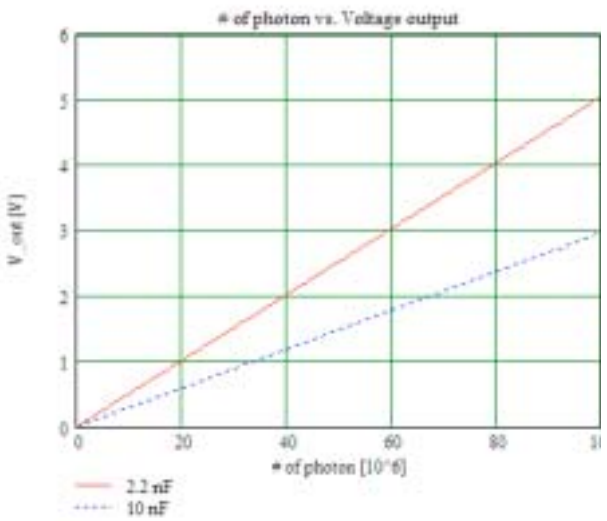


C_{tot} ~ 6.7nF for 2.2nF
C_{tot} ~ 11.4nF for 10nF
R_{in} ~ 22kΩ
T_{in} ~ 0.15us for 2.2nF
T_{in} ~ 0.25us for 10nF


Electron enengy v.maximum photon energy
Photon maximum energy [keV]
14
12
10
8
6
60
65
70
75
80
85
Electron beam energy [MeV]

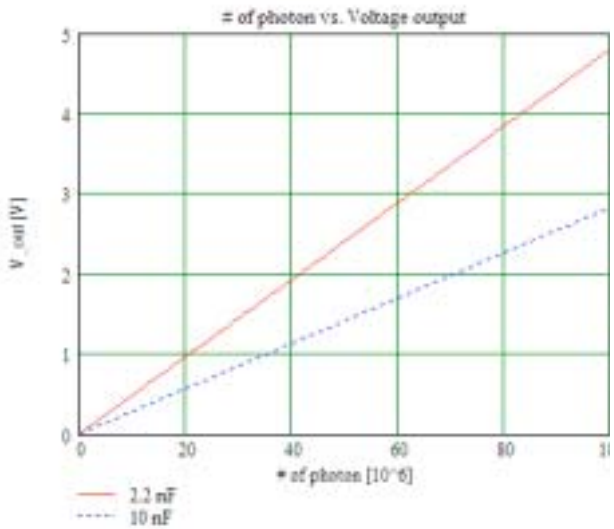
$E_{beam} = 8.5 \times 10^7$ eV, Electron

$E_{max} = 12.947$ keV, Photon



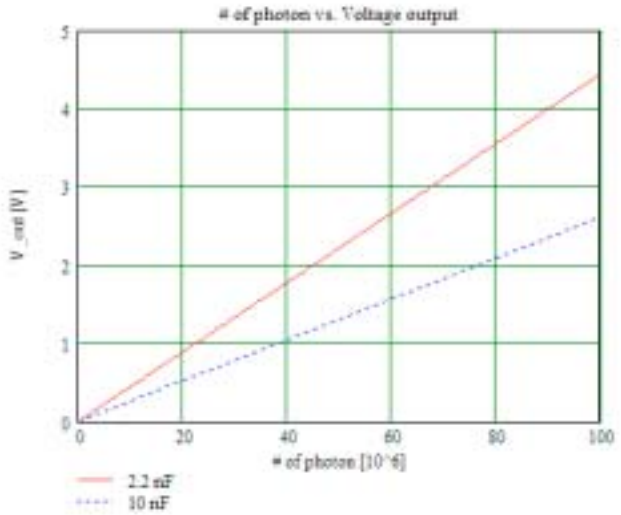
$E_{beam} = 8 \times 10^7$ eV, Electron

$E_{max} = 11.469$ keV, Photon



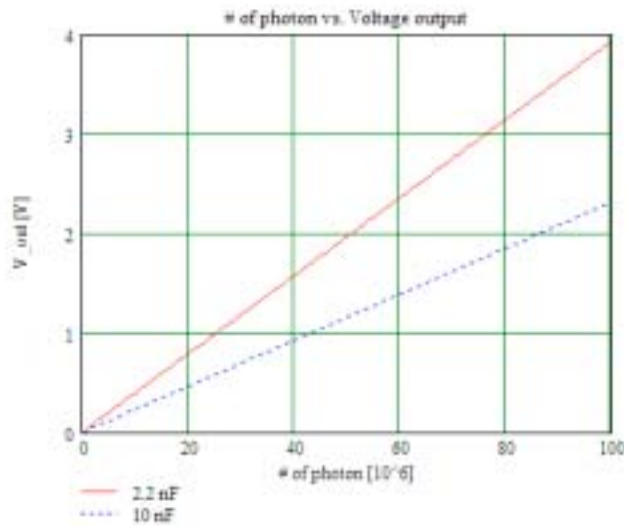
$E_{beam} = 7.5 \times 10^7$ eV, Electron

$E_{max} = 10.08$ keV, Photon



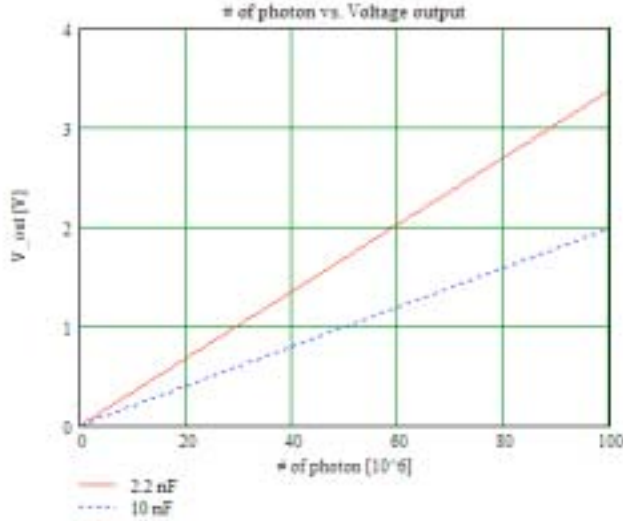
$E_{beam} = 7 \times 10^7$ eV, Electron

$E_{max} = 8.781$ keV, Photon



$E_{beam} = 6.5 \times 10^7$ eV, Electron

$E_{max} = 7.571$ keV, Photon



$E_{beam} = 6 \times 10^7$ eV, Electron

$E_{max} = 6.451$ keV, Photon