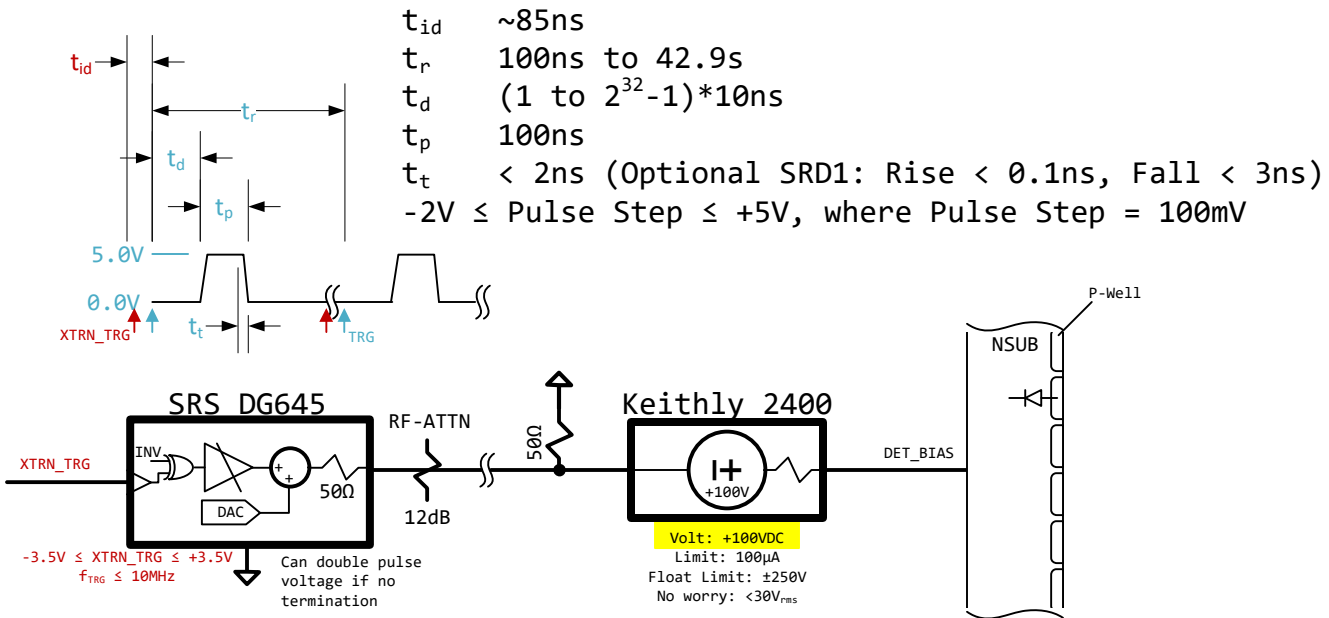


ePix10kA: Proposed Idea for Voltage-Pulse to substrate

20230213

Scott T. Block

BURST GEN



What I know...

DET_BIAS \approx +100V to reverse bias substrate

Pair creation energy in Si is $\sim 3.6\text{[eV]}$

PIX_TOT = 4 x 176x192 = 135168 pixels

C_pix $\approx 150\text{fF}$ (not sure if at this bias)

Trip point: 2.4MeV/pix \rightarrow 6.6e5 electrons \rightarrow 107fC of charge over 50psec

Max Pulse is 10MeV/pix

What this means to generate same charge, as we can't generate same pulse, is we need to hit the back plain with $V = Q/C_{\text{pix}} = 712\text{[mV]}$ in at least the integration window time. Our integration window is 100 μ sec (10kHz) this setup can do it. Just need an attenuator of 12dB gives us steps from 0 to 1.2V in 24mV steps. The 1.2V is to give us close to the same charge seen at max pulse value.

What will change this setup slightly is measuring substrate capacitance to get a better idea of what it really is when biased, but all that would change is the attenuator value.

Where my work is...

<https://colab.research.google.com/drive/1UixspSZB9yI2C3I9ExHlxnj23dLeqB0M#scrollTo=4MsMp45MP3I9>