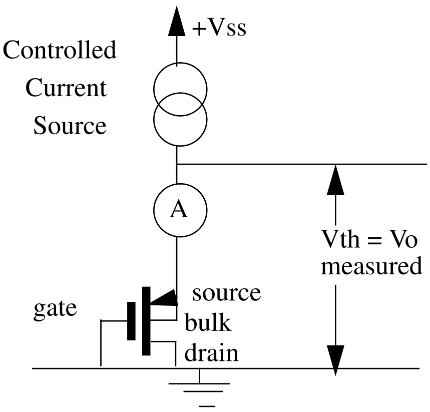
THRESHOLD VOLTAGE READER CIRCUIT



To read the total absorbed dose at any time, connect the dosimeter in the Reader circuit above.
Take Vth reading @ 20sec after power-up. Subtract Vth(zero dose) to give the Vth shift due to irradiation. Dose can be read from ΔVth v's Dose graph, as in Fig 1.

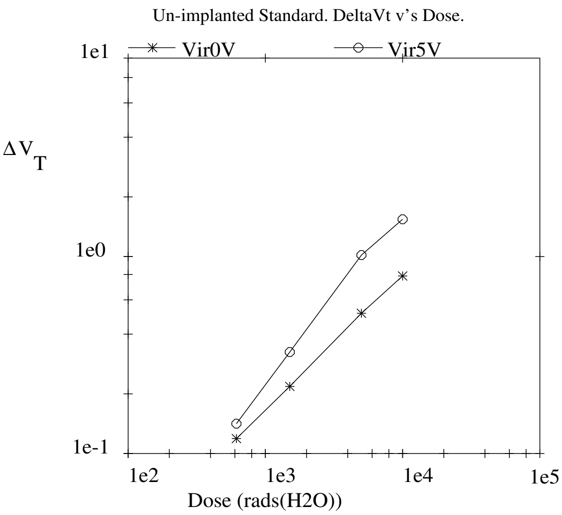


Fig 1.

Fig 1. Radiation response of the standard 4kÅ unimplanted NMRC RADFET. The graph includes 0V and 5V irradiation bias responses.

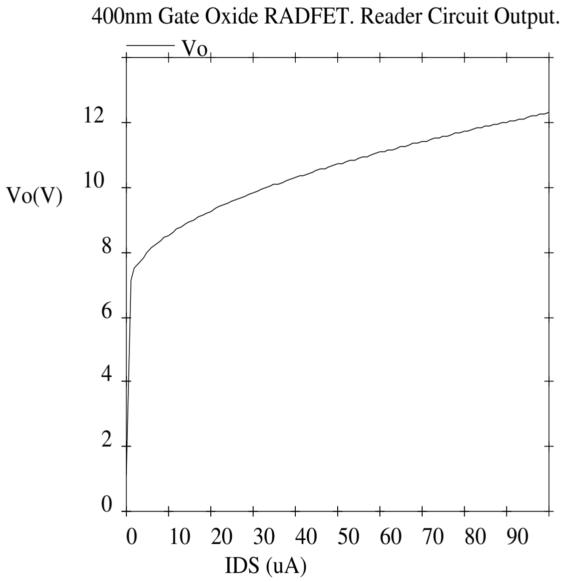


Fig 2.

Fig 2. Vth dependence on Ids, measured using the Vo of the Reader Circuit.

CAUTION: devices are static sensitive. Use grounding straps when handling packages.

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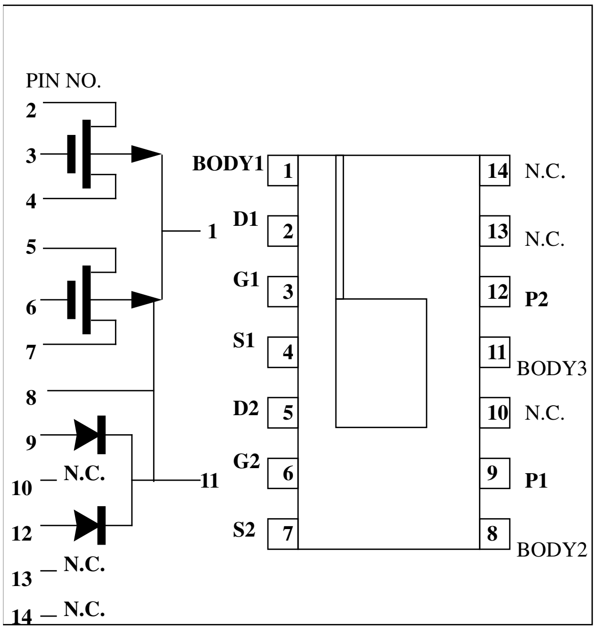
4kÅ Gate Oxide SOLID STATE DOSIMETER



Two types P-MOS dosimeters of different geometry, Type 1 has a W/L value of 300/50. - PINS 1,2,3,4. Type 2 has a W/L value of 868/11. - PINS 1,5,6,7. (where PINS 1,2,3,4 refer to Bulk, Drain, Gate, Source , similarly for Type 2.)
Dosimeter operational specifcations are listed below, and device biasing for radiation sensing and threshold voltage reading is described opposite.

TECHNICAL SPECIFICATIONS

Typical values @ 27^0C.

Oxide Thickness 4000Å

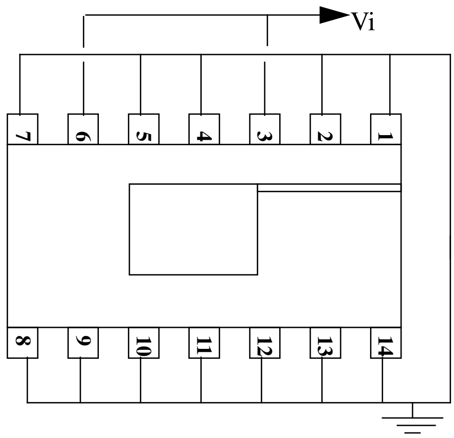
Sensitivity of Vth to Radiation
- Irradiation Field = 0.125 Mv/cm 0.25mV/rad
- Irradiation Field = 0 Mv/cm 0.18mV/rad

(sensitivity at 1.5 krad(H_2O) using a constant 10µA in Reader configuration below.)

Temperature Compensation:
TVTC 6.4mV/^{0}C
(This figure taken from extrapolated Vtp value in linear mode @ temp.s from 27^0C to 100^0C.)
Z.T.C. value in Linear Mode 1.85 µA
(Vs=Vb=0, Vds=-0.1)
Z.T.C. value in Saturation Mode ~ 20 µA
(Using Reader circuit configuration below)
Pre-irradiation Dosimeter Characteristics:
- Threshold Voltage (Extrapolated) -6.9±0.3 V
  (Also see Reader circuit graph - page2)
- Vth drift with time (secs) 1.5mV
  (This figure from Reader configuration forcing 40µA, for a factor of 2 increase in time)
- Oxide Breakdown Voltage >300 V
- Channel Leakage Current with Vd=-12, Vg=Vs=Vbulk=0 2 pA
- Subthreshold Slope 240±20 mV/decade
- Channel On Resistance with Vgs-Vth=5V, Vds=-0.1 0.84 MΩ

Note:Above values refer to to 300/50 device.

OPERATION IN RADIATION ENVIRONMENT



Vi = Irradiation bias.
The above biasing is used when sensing radiation.
For low field mode; Vi=0 (all pins tied together).
For high field mode; Vi=5V is used , giving a field of 0.125MV/cm, and Vth change with dose is measured with the Reader circuit.