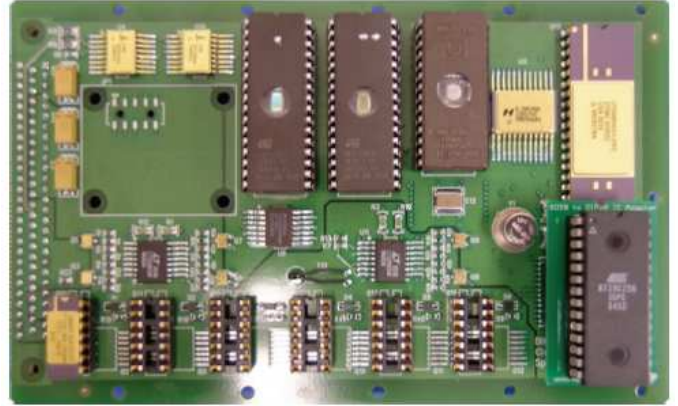


# Space Radiation Dosimeter MicroRAD100™

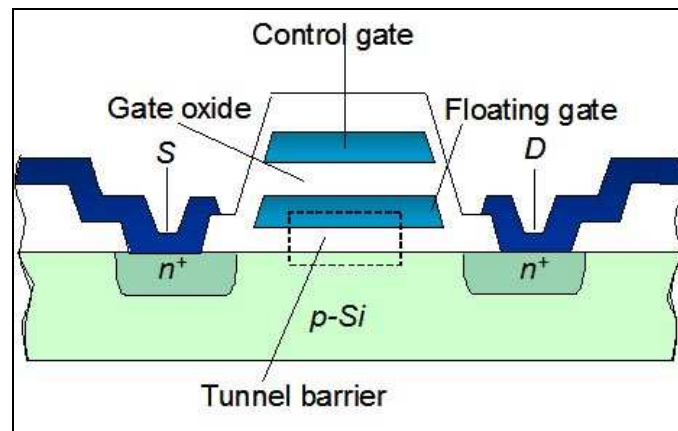
Space Micro's next generation space radiation dosimeter, the MicroRAD100™, represents the state-of-the-art solution for measuring and monitoring single event and total dose radiation effects in space.

The MicroRAD100™ is a low power, high performance space dosimeter solution that meets the challenges of space and satellite harsh environment platforms. Partnered with Clemson University, our patented UVEPROM detector technology is space-flight proven on the Naval Research Laboratory's Microelectronics and Photonics Test Bed (MPTB) mission and NASA's Living With a Star (LWS) program. By utilizing Space Micro's patented radiation hardening technologies on commercial microelectronics that need space radiation mitigation, the MicroRAD100™ is able to provide industry superior performance in radiation monitoring and measurement along with ultra-low power utilization, all while avoiding highly custom and inherently high cost solutions.



Space Micro's MicroRAD100™ Dosimetry Card

## Theory of Operation:



Basic UVEPROM Dosimeter Cell

- Charge Stored on a Floating Gate
- Charged = "0" State
- Uncharged = "1" State
- Ionizing Radiation Decrease
- Charge on the Gate
- Sample UVEPROM: 1mm x 3mm die, 8M cells

## Space Micro Inc

### MicroRAD100™

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San Diego, CA 92121

Phone: 858-332-0700  
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www.spacemicro.com



SPACE MICRO INC.

YOUR ACE IN SPACE

# Space Radiation Dosimeter

## Benefits:

### Lowest Power:

Measures incoming radiation while functionally "idle" (no power supplied), requires power only during readout.

### Lower Cost Potential:

The use of standard interfaces and COTS sensors minimizes non-recurring and special component costs.

### Maximum Flexibility:

Employs a standard Micro Read Only Memory interface; the architecture facilitates integration and scaling. The MicroRAD100™ can be reprogrammed in flight and has a digital readout.

## Space Radiation Detector Comparison

<i>Type</i>	<i>Measurement</i>	<i>Dynamic Range</i>	<i>Advantages</i>	<i>Disadvantages</i>
PIN Diode	TID, Dose Rate, particle sensor	Range $10^{14}$ #/cm <sup>2</sup> Sensitivity $10^9$ /cm <sup>2</sup> -nA	Detection of dose rate events, Fluence	Requires support hardware for dosimetry, Analog
RadFET <i>Thick Oxide</i>	TID	1 krad Sensitivity 1 rad	Small, Unpowered while sensing	Not in Human range, Analog
RadFET <i>Thin Oxide</i>	TID	10 Mrad Sensitivity 10s rad	Small, Unpowered while sensing	Not in Human range, Analog
OSL	TID	μrad- 10 krad	Wide range accurate, Proven	Passive, Destructive readout
Geiger	TID/Dose Rate	μrad- 500rad/hr	Wide range, Proven	Requires accumulation electronics
UVEPROM	TID	100 Mrad Sensitivity 1 rad	Permanent record (until erased), Digital, Large range, Unpowered while sensing, Easy readout	Not in Human range

## Applications:

- Space Industry
  - Federal or Commercial
  - Manned or Unmanned
  - LEO, GEO, or Interplanetary
- Nuclear Industry
  - Power Plants

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# Space Radiation Dosimeter MicroRAD100™

## MicroRAD100™ Dosimetry Card Detailed Features:

- Radiation Measurement Sensitivity, TID  
1 Rad to 100 MRad (Si)
- Single Event Latchup (SEL) Immunity  
>70 LET (MeV\*cm<sup>2</sup>/mg)
- >100 kRad (Si) Total Dose Tolerance
- 2 Flash Devices for Characterization
- Programmable Readout (per  
minute/day/orbit/etc.)
- Built in Rad-Tolerant Digital Signal  
Processing (DSP)
- Temperature Sensor for Read  
Compensation
- Voltage Sensor for Read Compensation
- Power Supply Converts +28V Bus to  
cPCI Supplies
- RS 422 Serial Port for External  
Communications
- 64 Million Independent Radiation  
Sensors
- 100-500 Bin Granularity for Continuous  
Data
- Passive UVEPROM Sensors
- Permanent Physical Record
- Device Reprogrammable in Flight
- 32 kbit Instruction Cache, 16 kbit Data  
Cache, Each 32 Bits Wide
- Power:
  - “Read” Mode = 1 W
  - “Standby” Mode = 0 WRad Measurements Occur While  
Card is in “Standby” Mode
- Input Voltage = 5.0 V
- Compact PCI 3U Form Factor
  - 33 MHz PCI Internal and External  
(v 2.1) Bus
  - 400 kbps IIC Single Master
  - Synchronous Serial Interface
- Weight = 12 ounces
- Temperature Range
  - Operating: -15°C to +55°C
  - Storage: -40°C to +80°C
- Available with COTS or MIL-SPEC  
Components

## Part Ordering:

### Part Number

MicroRAD100-MIL

MicroRAD100-COTS

### Description

MIL-SPEC components

Space COTS components

Please contact Space Micro Inc for application specific configurations or further details.

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