

TECHNICAL DATA
VT01
400nm RADFET
in 6L SOT-23 Plastic package

VT01 Description and Pin-Out

The VT01 is a Varadis 400nm RADFET chip packaged in a plastic SOT-23 six lead package.

The part consists of a single RADFET and a diode (see Figure 1 and Table 1). The RADFET gate oxide thickness is 400nm and W/L is 300 μ m/50 μ m. The RADFET has individual gate and drain terminals, while the source and bulk are common and connected together; this is also the diode bulk contact.

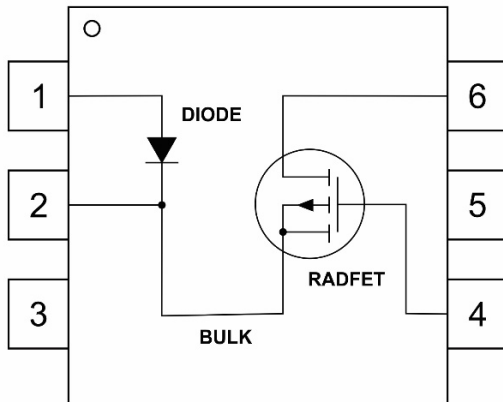


Table 1: VT01 pin-out description.

Pin Number	Description
1	Diode
2	Source/bulk (common)
3	Not connected
4	Gate
5	Not connected
6	Drain

Figure 1: VT01 pin-out drawing.

Maximum Ratings

Table 2: Maximum ratings of the RADFET.

Characteristics	Symbol	Specification	Unit	Remarks
Drain-Source Voltage	V_{DS}	-25	V	
Gate-Source Voltage	V_{GS}	+/- 50	V	
Drain-Gate Voltage	V_{DG}	-50	V	
Drain Current	I_D	-1	mA	Continuous
Source Current	I_S	-1	mA	Continuous

Operating Temperature Range	T_{op}	-20 to +70	°C	
Storage Temperature Range	T_{stg}	-40 to +85	°C	
Soldering Temperature	T_{sol}	+250	°C	

Modes of Operation

Irradiation Mode (Sense Mode)

In this mode of operation it is recommended that all terminals of the RADFET are connected to ground. For alternative biasing options, contact the manufacturer.

Read-Out Mode (Accumulated Radiation Dose Read-Out)

The RADFET can be read at arbitrary intervals, depending on the application. The period between readings can be from seconds to days or even months. The circuit used to read out the RADFET (Reader Circuit - RC) is shown in Figure 2 with connection configuration in Table 3.

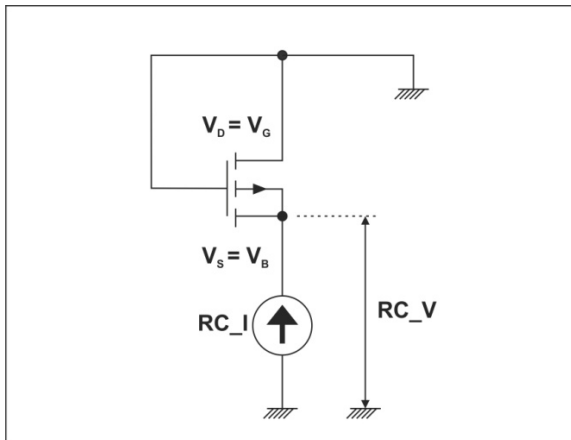


Table 3: Connections in Read-Out mode.

Terminal	Bias
S=B	Current is forced (RC_I) Voltage reading is taken (RC_V)
G=D	0V (common)

Figure 2: Reader Circuit (RC) configuration.

Current RC_I is forced into the RADFET, connected in RC configuration (Figure 2), for several hundred ms. The voltage at the source (RC_V) is measured; this voltage is called “RC threshold voltage”. Typical I-V curve for the un-irradiated device in this configuration is shown in Figure 3. In principle, any read-out current value (RC_I) can be chosen, as long as the value is kept unchanged after the start of radiation exposure. RC_I values $< 5\mu A$ should be used only after consultations with the manufacturer. For best temperature compensation, an RC_I value of $10\mu A$ is recommended.

For more details on RADFET read-out circuitry and temperature compensation Application Notes are available via support@varadis.com

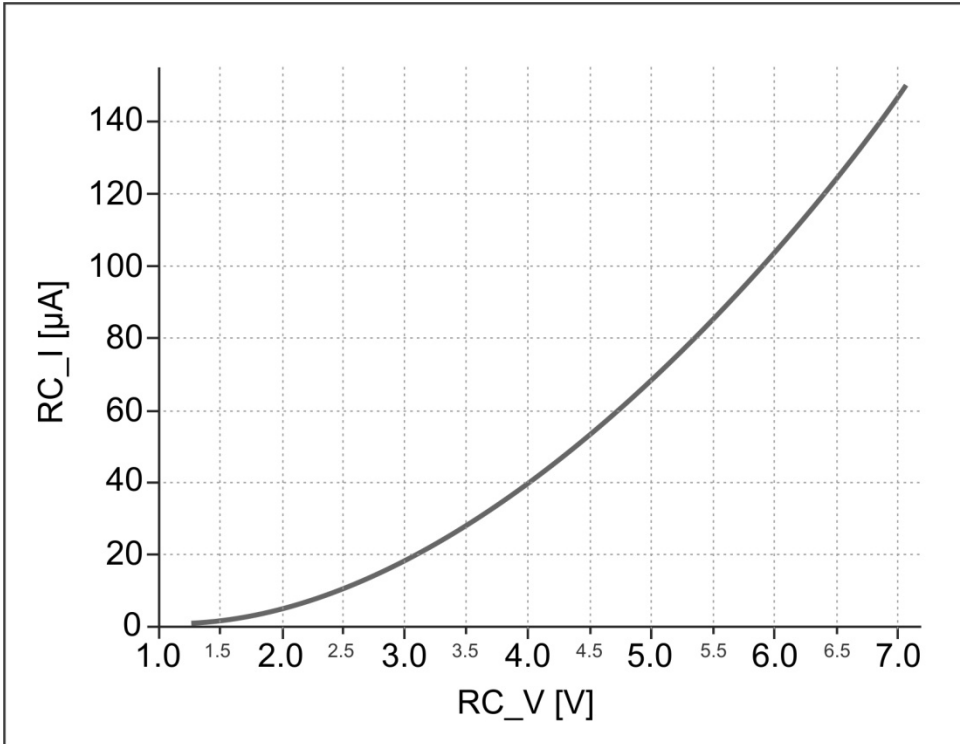


Figure 3: Reader Circuit (RC) typical I-V curve, pre-irradiation.

Electrical Parameters

The most important electrical parameter of un-irradiated RADFET is RC threshold voltage (RC_V). Specification for RC_V is given in Table 4. Results of RC_V measurements prior to shipment are included in documentation that comes with ordered parts. Typically, the range of RC_V of delivered parts is significantly tighter than in the specification.

Table 4: Specification for RC threshold voltage

Parameter	Symbol	Test Circuit and Conditions	Limits		Unit
			Min	Max	
RC Threshold Voltage	RC_V	Figure 2 and Table 3 RC_I = 10µA	0.8	3.0	V

Calibration Data

The calibration curve for the RADFET shows evolution of ΔV (the change in RC threshold voltage with reference to its pre-irradiation value) with dose. Note that a specific calibration curve is associated with each RADFET production batch. The curve will be provided in documentation supplied with ordered parts. For illustration, a typical calibration curve is shown in Figure 4. For applications where the irradiation field is significantly different to that in our calibration curve, we can provide guidance to the customer about how to calibrate the detector for their application.

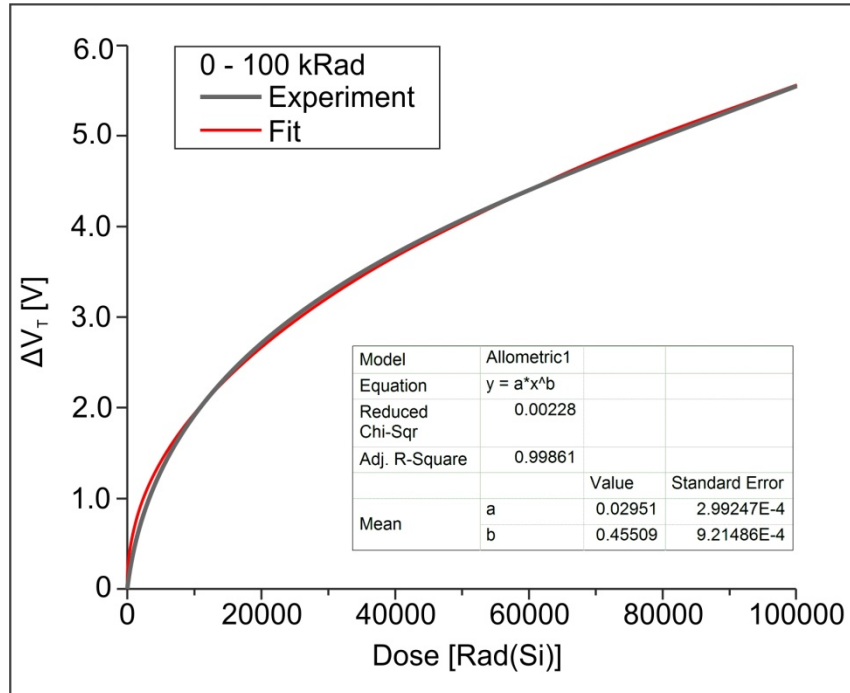


Figure 4: Typical calibration curve indicating change in RC_V during irradiation (Co-60 gamma source ; Dose Rate=100 rad/hour). Note that in this case, all RADFET terminals are grounded during irradiation.

Package Information

Table 4: VT01 package specifications.

Description	Specification
Package Type	Six-pin plastic SOT-23 package
Package Dimensions (L x W x H)	2.90mm x 2.80mm x 1.10mm (see Figure 5)

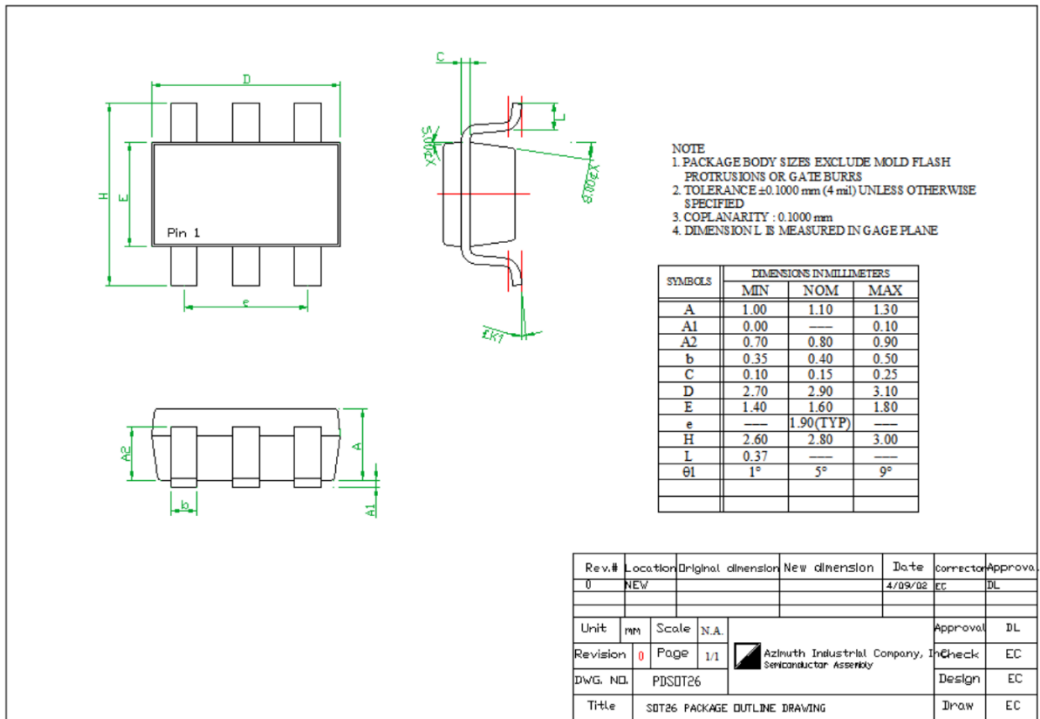


Figure 5: VT01 package diagram.