A reversed biased PIN diode acts as a radiation event detector, sensing the occurrence of an ionizing radiation pulse, which is connected to a threshold detector, the resistor $R_{\text{Threshold}}$ that drives the base input of a complementary (Q1 and Q2) pulse amplifier. The output of the amplifier is supplied to the base of Q4 that drives a pulse circuit (Q5 and Q6) with a time constant set by $RT \times CT$. The Radiation Event Detector circuit is shown in Figure 1.

The PIN diode structure is generated using Victory Process. Since the PIN diode is cylindrically symmetric, one can use 2D Victory Process to generate the PIN diode structure, as shown in Figure 2A and B.

This structure once generated can now be called from a mixed mode simulation as shown below:

```
ADIODE PWR15V=cathode PIN_NEG=anode GUARD_RING=pgate infile=pin_3D.str cylindrical
```

The generated user defined ionizing pulse is done using the combination of statements below:

```
.RAD PWL 0 0 0.9e-06 0 1.0e-06 1.0 2.0e-06 1.0 2.1e-06 0.0
```

The .RAD statements generates a piece-wise linear pulse at 0.9us with a rise time of 0.1us to a value of 1, with a width of 1us and then a fall time of 0.1us starting at 2us to a value of 0 at 2.1us. This .RAD pulse generations
electron-hole pairs using the radiation statement as described in chapter 4 of the Victory Device manual.

\[
\text{radiation } g0= 4.0e13 \text{ doserate}=1.0e8
\]

The result of the ionizing pulse is shown in Figure 3.

Mixed Mode simulation of this Radiation Event Detector allows the user to explore threshold sensitivity by changing the value of RThreshold from 10 ohm to 10K ohms, and the response time of the circuit by changing C3 and R6 values as well as associated device models for the transistors Q1 and Q2.