

## Introduction to Rectifiers

Rectifiers are the largest class of products in the diode family. They are primarily used for blocking in one direction and conducting in the other. These include General Purpose, Standard, Fast, UltraFast, Signal/Switching, High-voltage and Schottky Rectifiers. Except for Schottky rectifiers, all are of p-n junction technology with different processing features to optimize parametric requirements for the variety of applications implied by their titles. In addition, these diode products can be further placed into more useful packaged configurations of bridges, half bridges, doublers, center taps, arrays, or power modules. Sometimes these are also referred to as packaged assemblies or hybrids.

Because of their predominant rectifying qualities, they are primarily used for power or signal conditioning in a variety of applications. This can range from high power output rectifier applications to very low power signal or switching rectifier diode requirements. They can also be used in a variety of other specialized ways including "catch diodes", "freewheeling diodes", or simply "clamp diodes" to act as safety valves for voltage protection.

In specialized "controlled" rectifying applications, Silicon Controlled Rectifiers (SCRs) are applicable. However these are not simply diodes, since they are "gated" three terminal structures.

The basic rectifier diode parameters are shown in Figure 1. The

parameters of greatest interest for a simple rectifier are the rated values of average forward current  $I_O$  and the working peak reverse voltage  $V_{RWM}$ . This latter feature can also be referred to as peak inverse voltage (PIV) or  $V_{PK}$ , and sometimes as repetitive peak reverse voltage  $V_{RRM}$  when including all repeated reverse transient voltages. The rectifier avalanche breakdown voltage  $V_{(BR)}$  is not always specified, but is typically 20% or more greater than the rated  $V_{RWM}$  or  $V_{RRM}$ .

Additional parameters may include forward surge current ratings  $I_{FSM}$  or other provided characteristics such as forward voltage  $V_F$  at various currents  $I_F$ . Other parametric features will be further described in this 300 series of MicroNotes for various specialized applications requiring Fast, UltraFast, Signal/Switching, as

well as Standard and General Purpose Rectifiers.

Another class of Schottky Rectifiers using a barrier metal design rather than a p-n junction technology is described separately in the 400 series of MicroNotes. Rectifier Bridges, Arrays, Power Modules, Hybrids, or Assemblies will be in the 500 series. Silicon Controlled Rectifiers (SCRs) will be described in the 600 series. Another class of PIN diodes now being used in a variety of RF switching applications will also be described in the 700 series of MicroNotes.

### Kent Walters

Manager of Corporate  
Application Engineering  
Telephone: (602) 941-6524  
Fax: (602) 947-1503

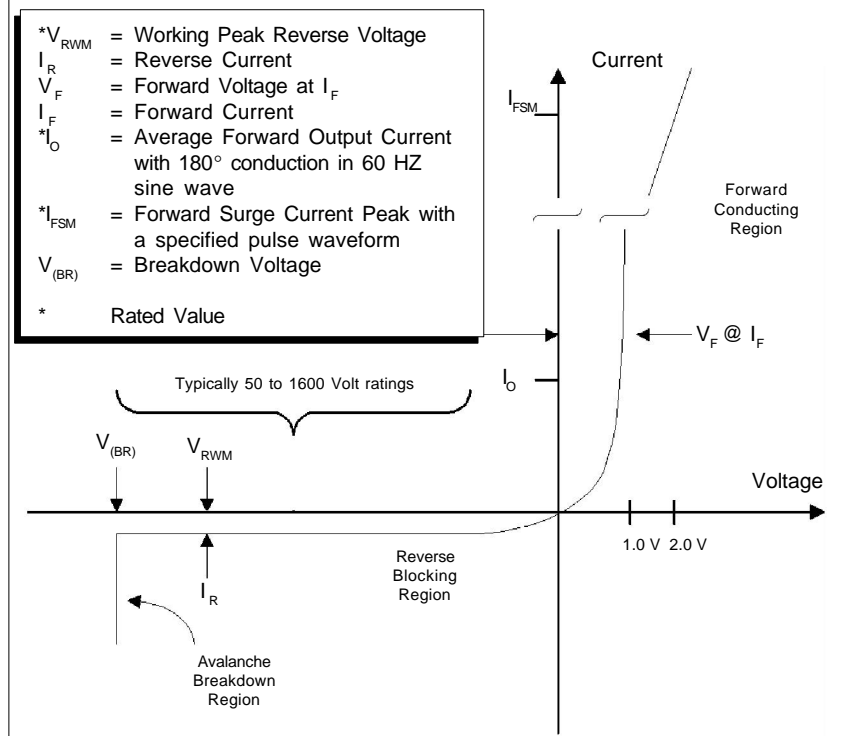


Figure 1: Basic Rectifier Characteristics and Parameters