Edal Industries

BULK AVALANCHE RECTIFIERS

Edal Industries is the pioneer in the development of silicon rectifiers utilizing Bulk Avalanche designs techniques. For applications where voltage transients are to be expected, Bulk Avalanche devices are considered mandatory.

All inductive loads, upon interruption generate transients. Particular care should be exercised when specifying rectifiers for these applications. Motors, relays, solenoids, and motor starters are typical of equipment, which are inductive loads capable of rupturing ordinary silicon rectifiers.

Another usage for rectifiers with Bulk Avalanche design is stringing individual diodes in series to obtain high voltage. Voltage divides in proportion to the reverse resistance of each diode, creating an equal reverse current through each diode. A transient of sufficient amplitude will drive the voltage drop across each into the breakdown region. A Bulk Avalanche device is capable of handling transient energy, providing it does not exceed the energy rating of the diode. A diode without the Bulk Avalanche construction characteristics will fail.

DESIGN CHARACTERISTICS OF EDAL BULK AVALANCHE RECTIFIERS

Basically a double diffused junction design, Edal has refined manufacturing techniques to assure Bulk Avalanche rectifiers with maximum performance. To manufacture a rectifier permitting the entire junction are to conduct uniform current density requires techniques pioneered by Edal and unique
to their products.

1. The curve point out the importance of a double diffused junction constructed to conduct uniform current density.

With a uniform junction area void of all unwanted impurities, the junction has a steep slope (bulk breakdown) characteristic of curve A. The "sloppy knee" of curve B is caused by non-uniform junction area or unwanted impurities usually called surface leakage. Referring to curve A & B, if a transient is of sufficient amplitude to penetrate the breakdown region, this energy will be dissipated as follows:

(a) Curve A, by the entire junction area uniformly.
(b) Curve B contains high leakage "points", therefore, the high energy will be concentrated at points and rupture will result.

Alloy junctions are known to have non-uniform junctions, therefore, this process does not lend itself to bulk avalanche devices.

2. The method of dicing the double diffused wafers utilized by Edal is unique and does not introduce surface damage or contamination normally inherent in other makes of rectifiers.
3. The configuration of Edal's "dice" is such that current and voltage concentrations do not exist. Edal semi-conductors can handle higher surge currents and voltage transients.
4. The method of concentrating the "die" to the heat sink is such that the entire area is connected to the heat sink completely free of voids and air traps. This allows maximum transfer of heat from the junction, allowing higher current ratings for a given size.
5. Edal's junctions receive special protective treatment prior to packaging. This prevents the introduction of contamination during further processing.
6. Edal's Bulk Avalanche devices are pulsed tested for forward current surges.
7. Edal's Bulk Avalanche devises are pulsed tested for a measured amount of reverse energy to be encountered in actual use.

EDAL BULK AVALANCHE SILICON RECTIFIERS AVAILABLE IN MANY CONFIGURATIONS

Previously termed "controlled avalanche types" in Edal literature, rectifiers are now produced with the advanced techniques described here and are true Bulk Avalanche designs. In addition to voltage ratings and current ranges detailed in Edal literature, special electrical ratings and physical characteristics can be provided.

Test circuits used for testing Bulk Avalanche silicon rectifiers are available on request.

(203) 467-2591 TEL
(203) 469-5928 FAX
Email: edalind @ aol.com
Internet:http://www.eemonline.com/edal

EDAL industries, inc.
51 Commerce St. East Haven, CT 06512