

AUTOMOTIVE TRANSIENT VOLTAGE SUPPRESSOR

Premium Automotive Overvoltage Protection

Jon Schleisner, Senior Applications Engineer

General Semiconductor has developed a TVS style transient voltage suppressor specifically for automotive applications. As we approach the twenty first century, automotive electrical systems are becoming;

- More complex
- Increasingly vital to vehicle operation
- A larger percentage of manufacturing and replacement cost.

To protect this principle automotive system, General Semiconductor has developed the 6KA24 "load dump" rectifier.

The 6KA component offers superior performance compared to the standard 5KP series and the leaded button rectifier several manufactures supply for this application. The features include:

- Enhanced power handling capability. With a $10 \times 1000\mu\text{s}$ power rating of 6500 watts and 2000 watt rating on a 50ms. to 1/2 Ipp surge the 6KA24 is among the most rugged automotive TVS devices.
- Superior clamping performance, Fig.1 displays the very low impedance and resultant tight clamping characteristics. This implies more protection for the dollar invested.

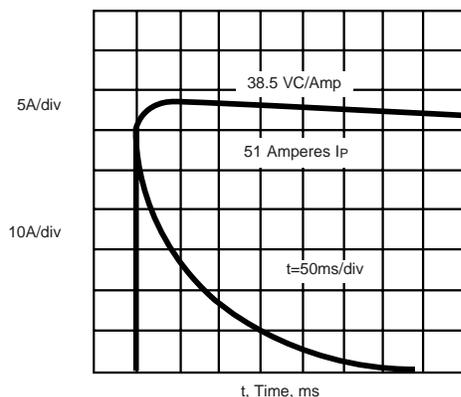


Figure 1

- Excellent high temperature reverse leakage characteristics (see Fig. 2). This TVS component has a 180°C upper temperature limit.

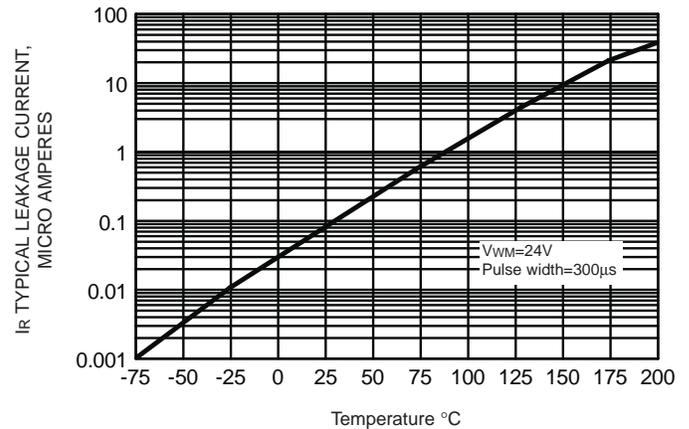


Figure 2

- Specified to withstand "double battery" and "load dump" conditions.
- Exclusive PAR chip design for Superior Reliability performance.

The PAR (Passivated Anisotropic etched Rectifier) has two physical characteristics that help realize superior "under the hood" performance.

1. The junction allows for very uniform current density across the surface area of the die. This results in minimum "hot spots" across the chip. Uniform surface area temperature results in efficient use of the available die area.

(cont.)

2. The passivation is a grown oxide. This oxide has thermal properties similar to silicon. The benefit here is excellent thermal cycling characteristics. Figure 3 is composite reliability summary of the 6KA24.

LIFE AND ENVIRONMENT TEST SUMMARY

6KA24 TVS	QUALIFICATION DATA	
	F/T	N
LIFE TESTS		
(1000 HRS) STORAGE: 200°C	0/45	0/45
(1000 HRS) HTRB: 175°C T_j/RATED BIAS	0/45	0/45
(1000 HRS) HUMIDITY: 85°C/85% R.H.		
121°C, 15 PSI AUTOCLAVE: 24 HOURS		0/45
SOLDER DIP: 260°C/10 SEC.		0/45
(JEDEC SPEC) FORWARD SURGE: 400 AMPS		0/45
TEMP CYCLE: 1000 CYCLES -55°C to +200°C/30 MIN.		0/45

F/T=Number of fails per thousand device hours.
N=Number of units tested.

The 6KA TVS is an ideal product to protect automotive electrical systems from automotive “load dump” transients and other unexpected surges within the electrical system. A typical applications circuit including a GP30 for reverse battery protection is shown in Figure 4.

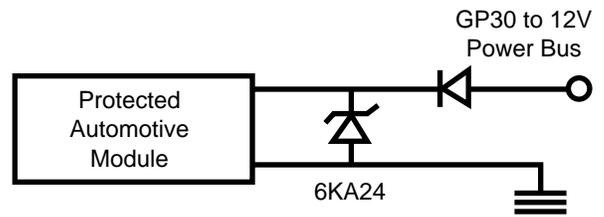


Figure 4

Typical application circuit