

# TRANSIENT VOLTAGE SUPPRESSORS

TVS305-TVS430  
TVS505-TVS528

### FEATURES

- Up to 500W for 1mS Pulse Power Capability
- Clamping Time in Picoseconds
- Direct Applicability for all popular Microprocessors and IC families
- Metallurgically bonded assembly system to assure long term reliability
- Miniature glass encased hermetically sealed package

### DESCRIPTION

Microsemi's TVS series of transient voltage suppressors feature oxide passivated zener type chips with full-faced metallurgical bonds on both sides to achieve high surge capability and negligible electrical degradation under repeated surge conditions. The series is especially useful in protecting microprocessor, MOS, CMOS, TTL, ECL, I<sup>2</sup>L and linear integrated circuits from spurious transient disturbances.

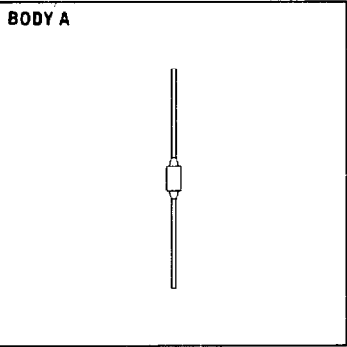
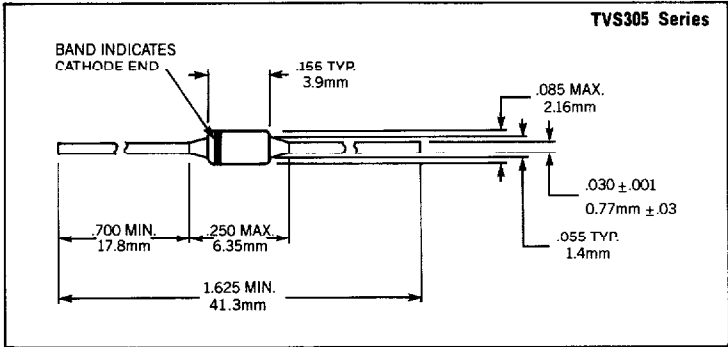
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### ABSOLUTE MAXIMUM RATINGS @ 25°C

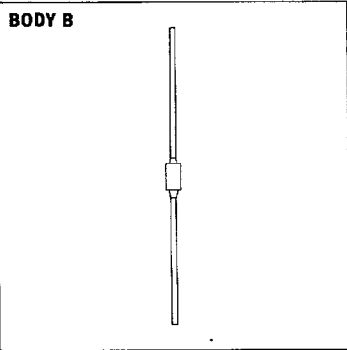
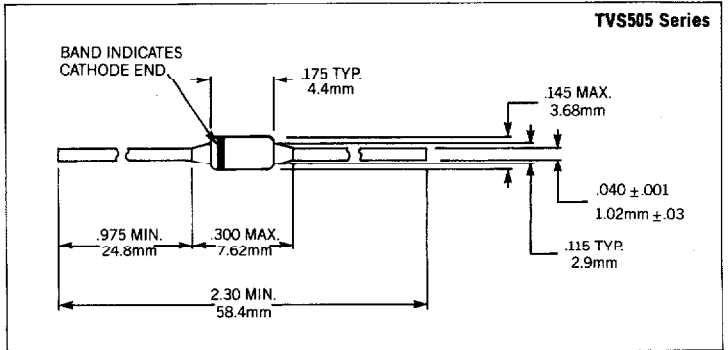
|                                             | TVS305-TVS430 | TVS505-TVS528 |
|---------------------------------------------|---------------|---------------|
| Stand-off Voltage, V <sub>R</sub>           | 5 to 300V     | 5.0V to 28.0V |
| Peak Pulse Power (1mS)*                     | 150W          | 500W          |
| Forward Surge Current (8.3mS half sinewave) | 15A           | 50A           |
| Peak Pulse Current                          | See Table     | See Table     |
| Breakdown Voltage                           | See Table     | See Table     |
| Power, Continuous                           | 3W            | 5W            |
| Storage and Operating Temperature           | -65 to +175°C | -65 to +175°C |

\*See Figures 3 and 4 for Peak Pulse Power vs Pulse Duration.

### MECHANICAL SPECIFICATIONS



THESE DEVICES ALSO AVAILABLE IN SURFACE MOUNT PACKAGE. SEE SECTION 10  
**MECHANICAL SPECIFICATIONS**



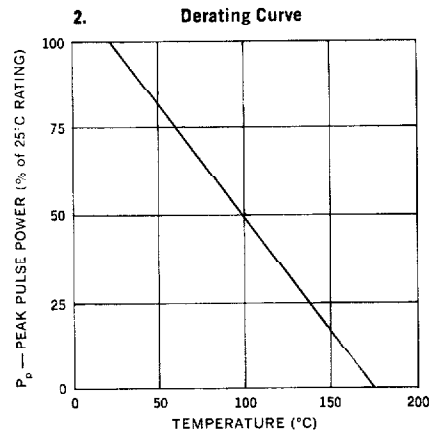
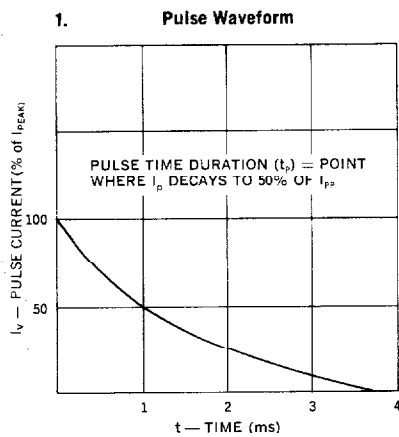
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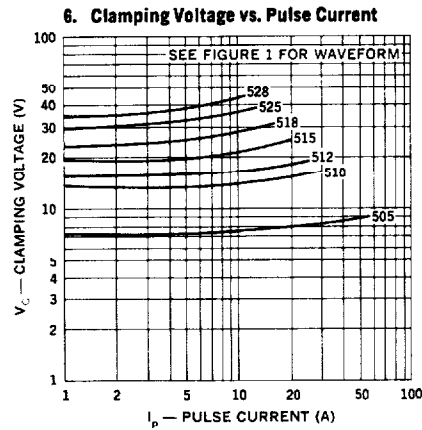
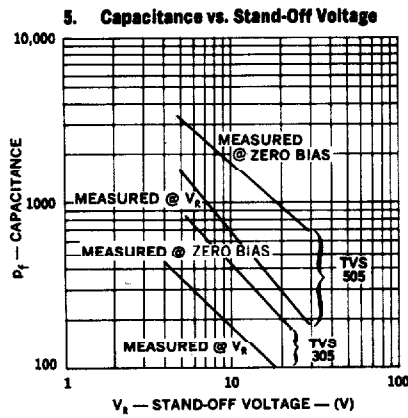
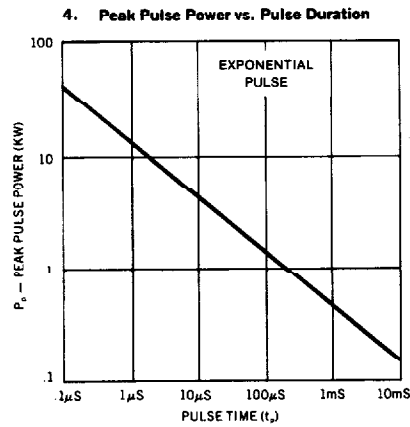
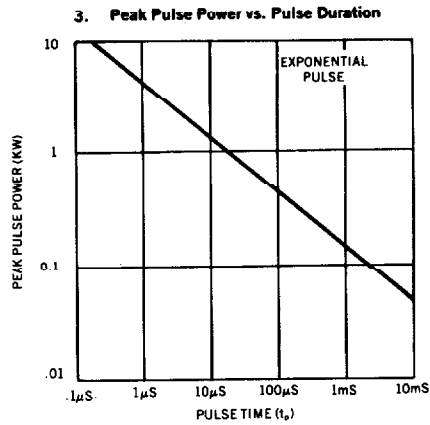
**Microsemi Corp.**  
**Watertown**  
The diode experts

ELECTRICAL SPECIFICATIONS @ 25°C

| TVS<br>Part No. | Stand-Off<br>Voltage<br>$V_R$ | Min.<br>Breakdown<br>Voltage<br>$BV_{(min)}$ @ 1mA | Max.<br>Leakage<br>Current<br>$I_R$ @ $V_R$ | Max.<br>Peak<br>Pulse Current*<br>$I_{PP}$ | Max.<br>Clamping<br>Voltage*<br>$V_C$ @ $I_{PP}$ | Max.<br>Clamping<br>Voltage*<br>$V_C$ @ 1A | Max.<br>Clamping<br>Voltage*<br>$V_C$ @ |      |
|-----------------|-------------------------------|----------------------------------------------------|---------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|-----------------------------------------|------|
|                 | V                             | V                                                  | $\mu A$                                     | A                                          | V                                                | V                                          | 5A                                      | 10A  |
| TVS305          | 5.0                           | 6.0                                                | 50                                          | 17                                         | 8.7                                              | —                                          | —                                       | —    |
| TVS310          | 10.0                          | 11.1                                               | 2                                           | 8.9                                        | 16.8                                             | —                                          | —                                       | —    |
| TVS312          | 12                            | 13.8                                               | 1                                           | 7.1                                        | 21.0                                             | —                                          | —                                       | —    |
| TVS315          | 15                            | 16.7                                               | 1                                           | 5.9                                        | 25                                               | —                                          | —                                       | —    |
| TVS318          | 18                            | 20.4                                               | 1                                           | 4.9                                        | 31                                               | —                                          | —                                       | —    |
| TVS324          | 24                            | 28.4                                               | 1                                           | 3.6                                        | 42                                               | —                                          | —                                       | —    |
| TVS328          | 28                            | 30.7                                               | 1                                           | 3.2                                        | 46                                               | —                                          | —                                       | —    |
| TVS348          | 48                            | 54                                                 | 1                                           | 1.7                                        | 82                                               | —                                          | —                                       | —    |
| TVS360          | 60                            | 67                                                 | 1                                           | 1.4                                        | 105                                              | —                                          | —                                       | —    |
| TVS410          | 100                           | 111                                                | 1                                           | .91                                        | 160                                              | —                                          | —                                       | —    |
| TVS420          | 200                           | 234                                                | 1                                           | .42                                        | 360                                              | —                                          | —                                       | —    |
| TVS430          | 300                           | 342                                                | 1                                           | .28                                        | 520                                              | —                                          | —                                       | —    |
| TVS505          | 5.0                           | 6.0                                                | 300                                         | 53.7                                       | 9.3                                              | 7.4                                        | —                                       | 7.9  |
| TVS510          | 10.0                          | 11.1                                               | 5                                           | 30.3                                       | 16.5                                             | 13.2                                       | —                                       | 14.4 |
| TVS512          | 12.0                          | 13.8                                               | 5                                           | 23.8                                       | 21.0                                             | 16.5                                       | —                                       | 18.5 |
| TVS515          | 15.0                          | 16.7                                               | 5                                           | 19.8                                       | 25.2                                             | 19.7                                       | —                                       | 22.2 |
| TVS518          | 18.0                          | 20.4                                               | 5                                           | 16.3                                       | 30.5                                             | 23.8                                       | 26.0                                    | —    |
| TVS524          | 24.0                          | 28.4                                               | 5                                           | 11.9                                       | 42.0                                             | 32.4                                       | 37.0                                    | —    |
| TVS528          | 28.0                          | 30.7                                               | 5                                           | 10.7                                       | 46.5                                             | 35.9                                       | 41.0                                    | —    |

\*For 1mS pulse: see Figure 1.





## CHOOSING AND SPECIFYING THE PROPER TVS

The following terms are generally used in specifying Transient Voltage Suppressors (TVS):

1. Stand-off Voltage ( $V_R$ ) is the highest reverse voltage at which the TVS will be non-conducting.
2. Minimum Breakdown Voltage ( $BV_{min}$ ) is the reverse voltage at which the TVS conducts 1 milli-amp. This is the point where the TVS begins to limit the transient.
3. Maximum Clamping Voltage ( $V_C \max$ ) is the maximum voltage the TVS will allow during a transient "spike."

Figure 7 graphically shows all three terms.

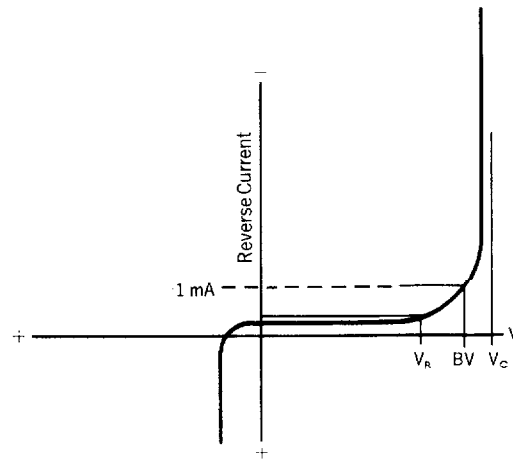


Figure 7

The three most important factors in choosing the appropriate TVS for an application in their order of importance are:

1. Pulse power ( $P_P$ ) — Choose the TVS series that will handle the Transient Pulse Power. Transient Pulse Power is equal to the clamping voltage ( $V_C$ ) times the peak pulse current ( $I_{PP}$ ). The pulse duration vs. pulse power graph on the TVS data sheet can then be used to determine the maximum allowable pulse duration. (Figure 3 or 4).
2. Standoff voltage ( $V_R$ ) — From the TVS series selected, choose the device with the stand-off voltage equal to or greater than the normal circuit operating voltage.
3. Maximum Clamping Voltage ( $V_{C \max}$ ) — Determine the clamping voltage of the device chosen for the transient given and be sure it is below the voltage that might damage any components.