

# MDE Semiconductor, Inc.

78-150 Calle Tampico, Unit 210, La Quinta, CA, U.S.A. 92253 Tel: 760-564-8656 • Fax: 760-564-2414

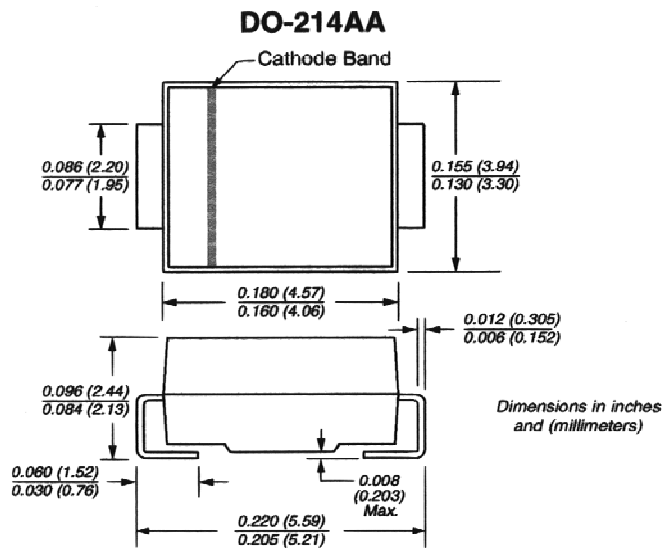
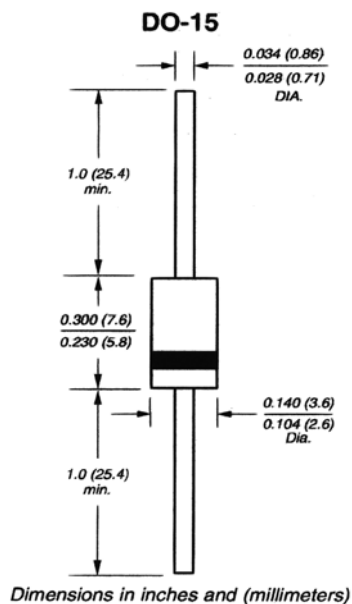
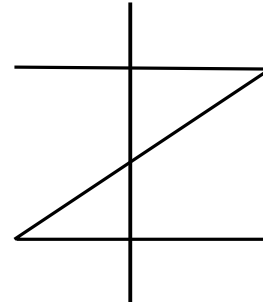
## TWO TERMINAL THYRISTOR SERIES

### SURFACE MOUNT AND AXIAL LEAD TWO TERMINAL THYRISTOR (3T) SURGE SUPPRESSOR

#### FEATURES

- UL94V-O Fammability Classification
- ESD Protection >40 kilovolts
- Low Capacitance for T1/E1 Trunk and Line card applications
- High Surge Current Capability (See Electrical Characteristics)
- Peak Off-State Voltage from 58 to 300 volts
- Meet IEC100-4-4 & 5 Industry Requirement
- Provides Protection in Accordance with FCC Part 68, UL1459, Bellcore 189, ITU-TK, 20 & k. 21

#### DEVICE SYMBOL



#### MECHANICAL DATA

Case: JEDEC DO-15 Molded plastic over glass passivated junction  
Terminals: Solder plated axial leads, solderable per MIL-STD-750, Method 2026  
Polarity: Color band denoted positive end (cathode) except Bipolar  
Mounting Position: Any  
Weight: 0.015 ounces, 0.4 grams

#### MECHANICAL DATA

Case: JEDEC DO214AA. Molded plastic over glass passivated junction  
Terminals: Solder plated, solderable per MIL-STD-750, Method 2026  
Polarity: Color band denoted positive end (cathode) except Bidirectional  
Standard Packaging: 12mm tape (EIA STD RS-481)  
Weight: 0.003 ounces, 0.093 grams

8/6/2002

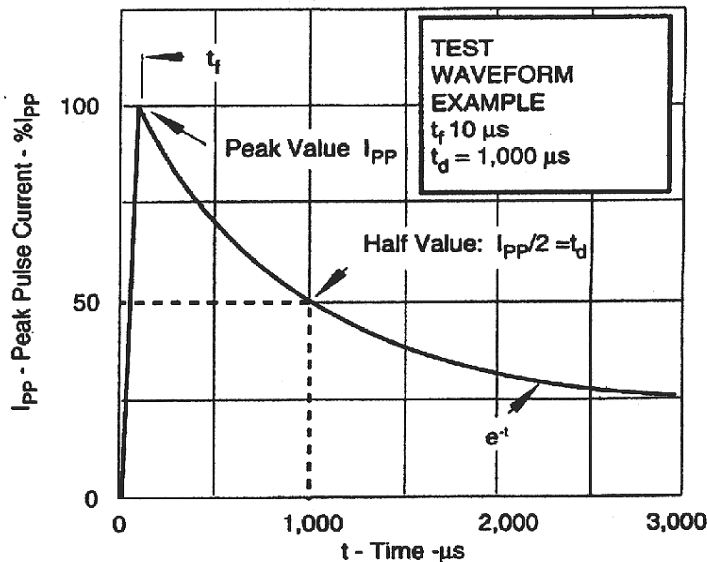
# MDE Semiconductor, Inc.

78-150 Calle Tampico, Unit 210, La Quinta, CA., USA 92253 Tel: 760-564-8656 • Fax: 760-564-2414

## Electrical Characteristics @ 25 °C Ambient Temperature

| PART NUMBER | MARKING CODE FOR SMD PACKAGE | REPETITIVE PEAK OFF-STAGE VOLTAGE<br>V <sub>DRM</sub><br>VOLTS | SWITCHING VOLTAGE @ 100V/ μs<br>V <sub>s</sub><br>VOLTS | MINIMUM HOLDING CURRENT<br>di/dt = 1A/ms<br>I <sub>H</sub><br>mA | SWITCHING CURRENT<br>I <sub>s</sub><br>mA | SURGE RATING<br>I <sub>PP</sub><br>10x1000<br>μs<br>Amps | ON-STAGE CURRENT<br>I <sub>T</sub><br>A | TYPICAL CAPACITANCE<br>@ 2V, 1MHZ<br>C<br>pF |
|-------------|------------------------------|--|---|--|---|--|---|--|
| 3T064A      | GC                           | 58.00  | 77  | 150  | 800.0                                     | 50.0   | 1                                       | 60   |
| 3T072A      | GD                           | 65.00  | 88  | 150  | 800.0                                     | 50.0   | 1                                       | 60   |
| 3T080A      | GE                           | 75.00  | 98  | 150  | 800.0                                     | 50.0   | 1                                       | 60   |
| 3T110A      | GF                           | 90.00  | 130   | 150  | 800.0                                     | 50.0   | 1                                       | 60   |
| 3T130A      | GG                           | 120.00   | 160   | 150  | 800.0                                     | 50.0   | 1                                       | 40   |
| 3T150A      | GH                           | 140.00   | 180   | 150  | 800.0                                     | 50.0   | 1                                       | 40   |
| 3T180A      | GI                           | 160.00   | 220   | 150  | 800.0                                     | 50.0   | 1                                       | 40   |
| 3T230A      | GJ                           | 190.00   | 260   | 150  | 800.0                                     | 50.0   | 1                                       | 30   |
| 3T260A      | GK                           | 220.00   | 300   | 150  | 800.0                                     | 50.0   | 1                                       | 30   |
| 3T310A      | GL                           | 275.00   | 350   | 150  | 800.0                                     | 50.0   | 1                                       | 30   |
| 3T350A      | GM                           | 300.00   | 400   | 150  | 800.0                                     | 50.0   | 1                                       | 30   |
| 3T064B      | GP                           | 58.00  | 77  | 150  | 800.0                                     | 100.0  | 1                                       | 60   |
| 3T072B      | GQ                           | 65.00  | 88  | 150  | 800.0                                     | 100.0  | 1                                       | 60   |
| 3T080B      | GR                           | 75.00  | 98  | 150  | 800.0                                     | 100.0  | 1                                       | 60   |
| 3T110B      | GS                           | 90.00  | 130   | 150  | 800.0                                     | 100.0  | 1                                       | 60   |
| 3T130B      | GT                           | 120.00   | 160   | 150  | 800.0                                     | 100.0  | 1                                       | 40   |
| 3T150B      | GU                           | 140.00   | 180   | 150  | 800.0                                     | 100.0  | 1                                       | 40   |
| 3T180B      | GV                           | 160.00   | 220   | 150  | 800.0                                     | 100.0  | 1                                       | 40   |
| 3T230B      | GW                           | 190.00   | 260   | 150  | 800.0                                     | 100.0  | 1                                       | 30   |
| 3T260B      | GX                           | 220.00   | 300   | 150  | 800.0                                     | 100.0  | 1                                       | 30   |
| 3T310B      | GY                           | 275.00   | 350   | 150  | 800.0                                     | 100.0  | 1                                       | 30   |
| 3T350B      | GZ                           | 300.00   | 400   | 150  | 800.0                                     | 100.0  | 1                                       | 30   |

**FIGURE 1  
PULSE WAVE FORM EXAMPLE**

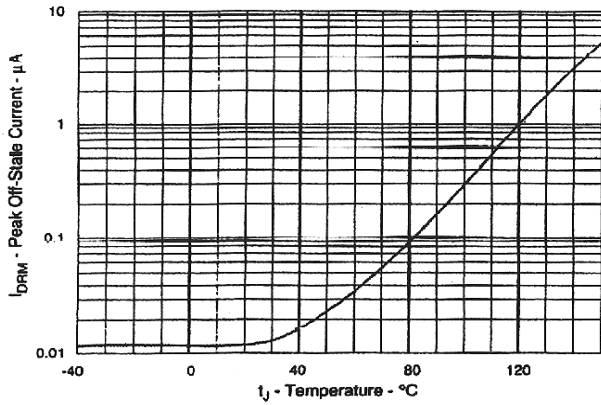


8/6/2002

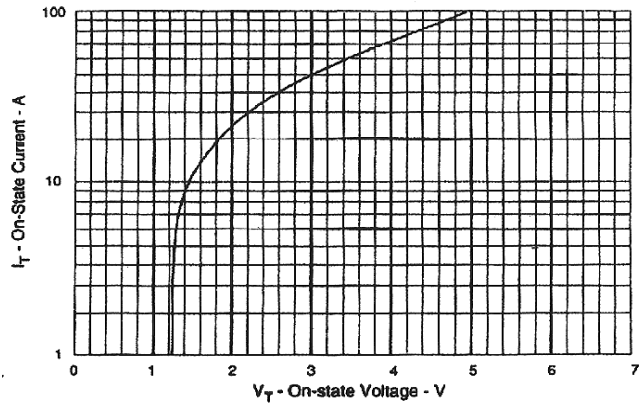
# MDE Semiconductor, Inc.

78-150 Calle Tampico, Unit 210, La Quinta, CA., USA 92253 Tel: 760-564-8656 • Fax: 760-564-2414

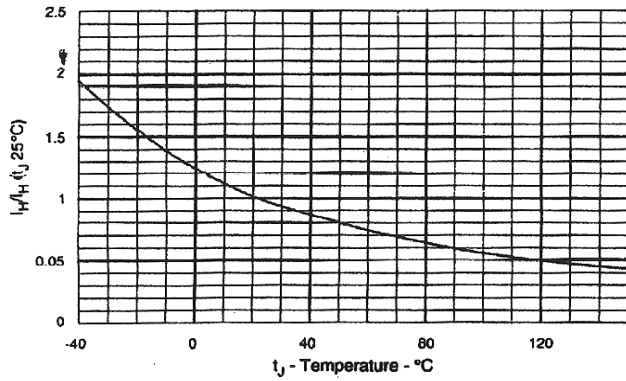
**FIGURE 2**  
TYPICAL PEAK OFF-STATE CURRENT VS JUNCTION TEMPERATURE



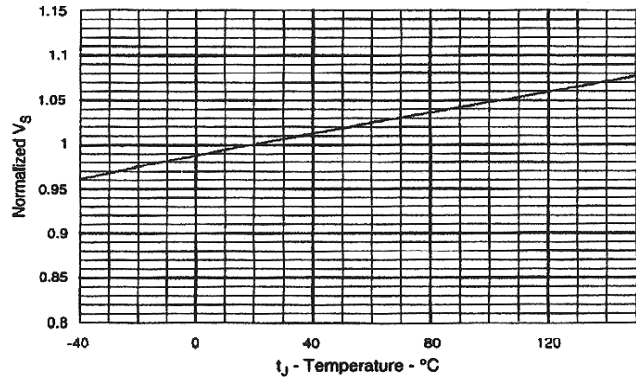
**FIGURE 3**  
TYPICAL ON-STATE CURRENT VS ON-STATE VOLTAGE



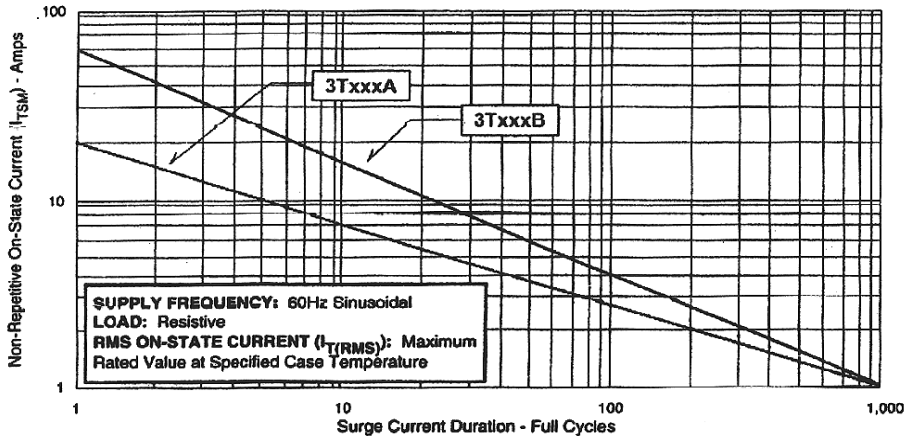
**FIGURE 4**  
TYPICAL HOLDING CURRENT VS JUNCTION TEMPERATURE



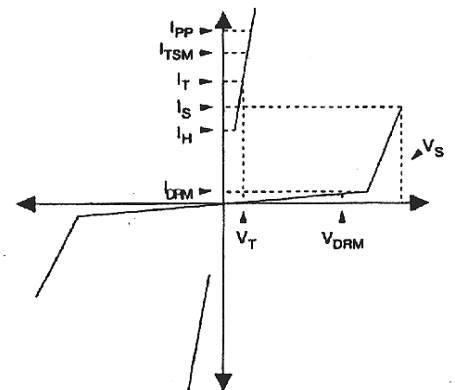
**FIGURE 5**  
TYPICAL NORMALIZED  $V_S$  VS JUNCTION TEMPERATURE



**FIGURE 6**  
ON-STATE CURRENT VS SURGE CURRENT DURATION



**FIGURE 7**  
V - I CHARACTERISTICS CURVE



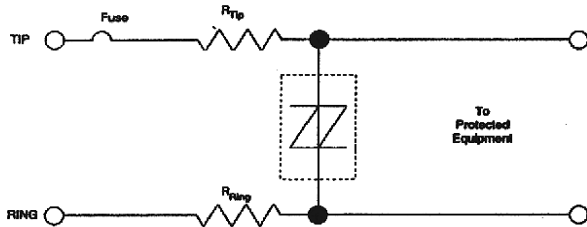
8/6/2002

# MDE Semiconductor, Inc.

78-150 Calle Tampico, Unit 210, La Quinta, CA., USA 92253 Tel: 760-564-8656 • Fax: 760-564-2414

## Application Notes for Thyristor Surge Suppressors used in Telecommunication Circuits

FIGURE 8 - UL 1459 & FCC Part 68 Metallic Protection



The 3T device is located across the tip-to-ring line after a limiting resistor and fuse combination. RTIP and RRING resistors are optional depending upon the 3T device selection. Without the resistors, the 3T310B is recommended. However, with a resistance value of 7.5 ohms for tip and ring, the 3T310A is recommended. Digital signals may use a lower 3T device depending upon the total tip to ring voltage range. Selection of the 3T device, either 3TXXXA or B is based upon the value of the tip and ring resistors. For the National Electronic Code (NEC) article 800, it is recommended that at least one fuse be used in the tip or ring line for metallic surges. Fuses may be replaced with a suitable Positive Temperature Coefficient (PTC) automatic resettable current limiting device.

FIGURE 9 - UL 1459 & FCC Part 68 - Longitudinal Protection

There are two 3T devices, one located from tip-to-ground and one ring-to-ground. For standard analog signals, the 3T310A is recommended with a typical resistor value for tip and ring of 15 ohms. The 3T310B is recommended for resistor values of 7.5 ohms each. The National Electronic Code (NEC) article 800 requires two fuse elements when connecting to ground. Fuses or a suitable Positive Temperature Coefficient (PTC) automatic resettable current limiting device may be used. The purpose of this circuit is to limit AC power current from getting on the ground line causing any safety hazard.

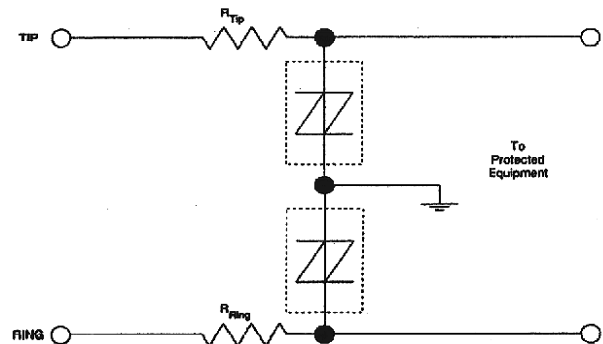
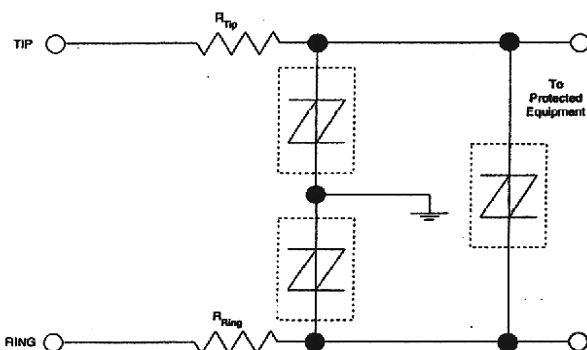


FIGURE 10 - UL 1459 & FCC Part 68 - Metallic and Longitudinal Protection



Three equal 3T devices are used in this application for metallic (tip-to-ring) and longitudinal (tip-to-ground and ring-to-ground) protection. For analog signals, the 3T310B is recommended. With a resistance value of 15 ohms for the tip and ring resistors, the 3T310A may be used. The National Electric Code (NEC) article 800 requires two fuse elements when connecting to ground. Fuses or a suitable Positive Temperature Coefficient (PTC) automatic resettable current limiting device may be used. This circuit is recommended for protection against the Bellcore requirement: First Level Lightning Surge Tests (Telecommunications Port), document # GR-1089-CORE.

8/6/2002