

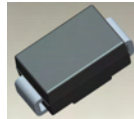
## 50A BIDIRECTIONAL SURFACE MOUNT THYRISTOR SURGE PROTECTION DEVICE

### Features

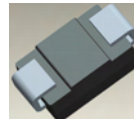
- 50A Peak Pulse Current @ 10/1000µs
- 250A Peak Pulse Current @ 8/20µs
- 58 - 320V Stand-Off Voltages
- Oxide-Glass Passivated Junction
- Bidirectional Protection In a Single Device
- High Off-State impedance and Low On-State Voltage
- Helps Equipment Meet GR-1089-CORE, IEC 61000-4-5, FCC Part 68, ITU-T K.20/K.21, and UL497B
- UL Listed Under Recognized Component Index, File Number 156346
- **Lead Free Finish/RoHS Compliant (Note 1)**
- **Green Molding Compound (No Halogen and Antimony) (Note 2)**

### Mechanical Data

- Case: SMB
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Lead Free Plating (Matte Tin Finish). Solderable per MIL-STD-202, Method 208
- Polarity: None; Bidirectional Devices Have No Polarity Indicator
- Weight: 0.093 grams (approximate)



Top View



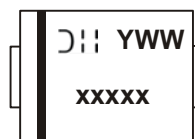
Bottom View

### Ordering Information (Note 3)

| Part Number  | Case | Packaging        |
|--------------|------|------------------|
| TB0640M-13-F | SMB  | 3000/Tape & Reel |
| TB0720M-13-F | SMB  | 3000/Tape & Reel |
| TB0900M-13-F | SMB  | 3000/Tape & Reel |
| TB1100M-13-F | SMB  | 3000/Tape & Reel |
| TB1300M-13-F | SMB  | 3000/Tape & Reel |
| TB1500M-13-F | SMB  | 3000/Tape & Reel |
| TB1800M-13-F | SMB  | 3000/Tape & Reel |
| TB2300M-13-F | SMB  | 3000/Tape & Reel |
| TB2600M-13-F | SMB  | 3000/Tape & Reel |
| TB3100M-13-F | SMB  | 3000/Tape & Reel |
| TB3500M-13-F | SMB  | 3000/Tape & Reel |

- Notes:
1. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied, see EU Directive 2002/95/EC Annex Notes.
  2. Product manufactured with Data Code 0924 (week 24, 2009) and newer are built with Green Molding Compound.
  3. For packaging details, go to our website at <http://www.diodes.com>.

### Marking Information



xxxxx = Product type marking code  
 (See Electrical Characteristics table on page 3)  
 DII = Manufacturers' code marking  
 YWW = Date code marking  
 Y = Last digit of year (ex: 2 for 2002)  
 WW = Week code (01 to 53)

### Maximum Ratings @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Single phase, half wave, 60Hz, resistive or inductive load.  
For capacitance load, derate current by 20%.

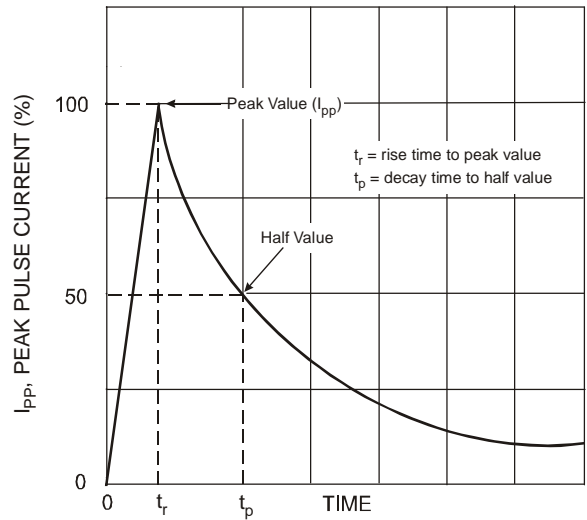
| Characteristic                                                 | Symbol                  | Value | Unit                |
|----------------------------------------------------------------|-------------------------|-------|---------------------|
| Non-Repetitive Peak Impulse Current @10/1000us                 | $I_{pp}$                | 50    | A                   |
| Non-Repetitive Peak On-State Current @8.3ms (one-half cycle)   | $I_{TSM}$               | 30    | A                   |
| Typical Positive Temperature Coefficient for Breakdown Voltage | $\Delta VBR/\Delta T_j$ | 0.1   | %/ $^\circ\text{C}$ |

### Thermal Characteristics

| Characteristic                          | Symbol          | Value       | Unit                      |
|-----------------------------------------|-----------------|-------------|---------------------------|
| Thermal Resistance, Junction to Lead    | $R_{\theta JL}$ | 20          | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 100         | $^\circ\text{C}/\text{W}$ |
| Junction Temperature Range              | $T_J$           | -40 to +150 | $^\circ\text{C}$          |
| Storage Temperature Range               | $T_{STG}$       | -55 to +150 | $^\circ\text{C}$          |

### Maximum Rated Surge Waveform

| Waveform   | Standard         | $I_{pp}$ (A) |
|------------|------------------|--------------|
| 2/10 us    | GR-1089-CORE     | 300          |
| 8/20 us    | IEC 61000-4-5    | 250          |
| 10/160 us  | FCC Part 68      | 150          |
| 10/700 us  | ITU-T, K.20/K.21 | 100          |
| 10/560 us  | FCC Part 68      | 75           |
| 10/1000 us | GR-1089-CORE     | 50           |



**Electrical Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

| Part Number | Maximum Rated Repetitive Off-State Voltage | Maximum Off-State Leakage Current @ V <sub>DRM</sub> | Maximum Breakover Voltage | Maximum On-State Voltage @ I <sub>T</sub> = 1A | Breakover Current I <sub>BO</sub> |          | Holding Current I <sub>H</sub> |          | Typical Off-State Capacitance | Marking Code |
|-------------|--------------------------------------------|------------------------------------------------------|---------------------------|------------------------------------------------|-----------------------------------|----------|--------------------------------|----------|-------------------------------|--------------|
|             | V <sub>DRM</sub> (V)                       | I <sub>DRM</sub> (µA)                                | V <sub>BO</sub> (V)       | V <sub>T</sub> (V)                             | Min (mA)                          | Max (mA) | Min (mA)                       | Max (mA) | C <sub>O</sub> (pF)           |              |
| TB0640M     | 58                                         | 5                                                    | 77                        | 3.5                                            | 50                                | 800      | 150                            | 800      | 140                           | T064M        |
| TB0720M     | 65                                         | 5                                                    | 88                        | 3.5                                            | 50                                | 800      | 150                            | 800      | 140                           | T072M        |
| TB0900M     | 75                                         | 5                                                    | 98                        | 3.5                                            | 50                                | 800      | 150                            | 800      | 140                           | T090M        |
| TB1100M     | 90                                         | 5                                                    | 130                       | 3.5                                            | 50                                | 800      | 150                            | 800      | 90                            | T110M        |
| TB1300M     | 120                                        | 5                                                    | 160                       | 3.5                                            | 50                                | 800      | 150                            | 800      | 90                            | T130M        |
| TB1500M     | 140                                        | 5                                                    | 180                       | 3.5                                            | 50                                | 800      | 150                            | 800      | 90                            | T150M        |
| TB1800M     | 160                                        | 5                                                    | 220                       | 3.5                                            | 50                                | 800      | 150                            | 800      | 90                            | T180M        |
| TB2300M     | 190                                        | 5                                                    | 265                       | 3.5                                            | 50                                | 800      | 150                            | 800      | 60                            | T230M        |
| TB2600M     | 220                                        | 5                                                    | 300                       | 3.5                                            | 50                                | 800      | 150                            | 800      | 60                            | T260M        |
| TB3100M     | 275                                        | 5                                                    | 350                       | 3.5                                            | 50                                | 800      | 150                            | 800      | 60                            | T310M        |
| TB3500M     | 320                                        | 5                                                    | 400                       | 3.5                                            | 50                                | 800      | 150                            | 800      | 60                            | T350M        |

| Symbol           | Parameter                                                       |
|------------------|-----------------------------------------------------------------|
| V <sub>DRM</sub> | Stand-off Voltage                                               |
| I <sub>DRM</sub> | Leakage current at stand-off voltage                            |
| V <sub>BR</sub>  | Breakdown voltage                                               |
| I <sub>BR</sub>  | Breakdown current                                               |
| V <sub>BO</sub>  | Breakover voltage                                               |
| I <sub>BO</sub>  | Breakover current                                               |
| I <sub>H</sub>   | Holding current <span style="float: right;">Note 4</span>       |
| V <sub>T</sub>   | On state voltage                                                |
| I <sub>PP</sub>  | Peak pulse current                                              |
| C <sub>O</sub>   | Off-state capacitance <span style="float: right;">Note 5</span> |

- Notes:
4. I<sub>H</sub> > (V<sub>L</sub>/R<sub>L</sub>) If this criterion is not obeyed, the TSPD triggers but does not return correctly to high-resistance state. The surge recovery time does not exceed 30ms.
  5. Off-state capacitance measured at f = 1.0MHz, 1.0V<sub>RMS</sub> signal, V<sub>R</sub> = 2V<sub>DC</sub> bias.

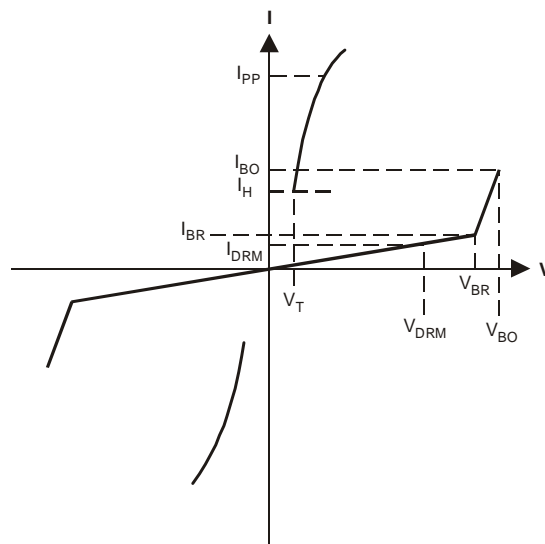




Fig. 1 Off-State Current vs. Junction Temperature

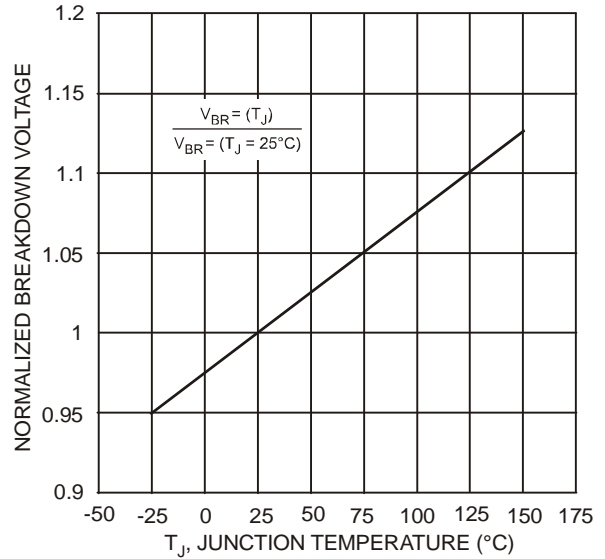


Fig. 2 Relative Variation of Breakdown Voltage vs. Junction Temperature

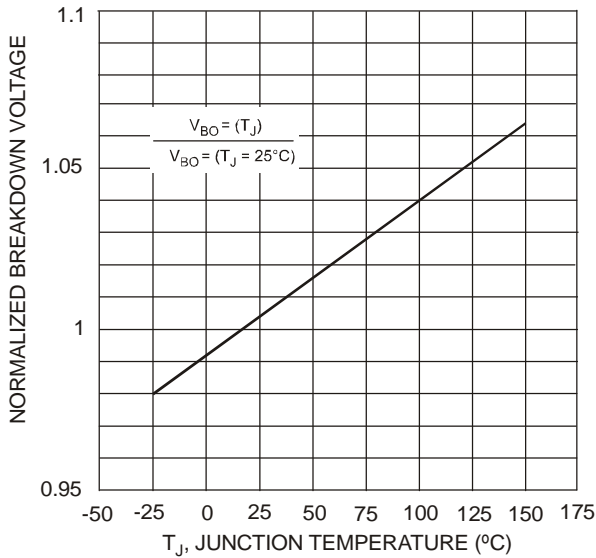


Fig. 3 Relative Variation of Breakover Voltage vs. Junction Temperature

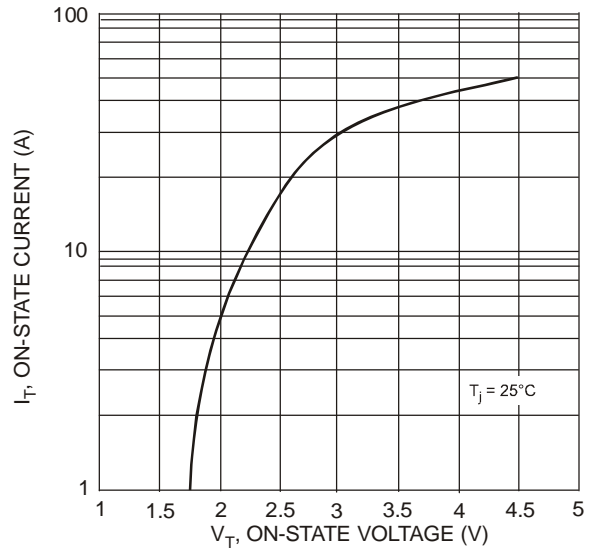


Fig. 4 On-State Current vs. On-State Voltage



Fig. 5 Relative Variation of Holding Current vs. Junction Temperature



Fig. 6 Relative Variation of Junction Capacitance vs. Reverse Voltage Bias

**Package Outline Dimensions**



| SMB |      |      |
|-----|------|------|
| Dim | Min  | Max  |
| A   | 3.30 | 3.94 |
| B   | 4.06 | 4.57 |
| C   | 1.96 | 2.21 |
| D   | 0.15 | 0.31 |
| E   | 5.00 | 5.59 |
| G   | 0.05 | 0.20 |
| H   | 0.76 | 1.52 |
| J   | 2.00 | 2.50 |

All Dimensions in mm

**Suggested Pad Layout**



| SMB Dimensions | Value (in mm) |
|----------------|---------------|
| Z              | 6.8           |
| G              | 1.8           |
| X              | 2.3           |
| Y              | 2.5           |
| C              | 4.3           |

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Тел: +7 (812) 336 43 04 (многоканальный)  
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