



**THE DATASHEET OF  
TB1500M-13-F**



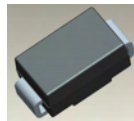
## 50A BIDIRECTIONAL SURFACE MOUNT THYRISTOR SURGE PROTECTION DEVICE

### Features

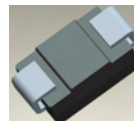
- 50A Peak Pulse Current @ 10/1000µs
- 250A Peak Pulse Current @ 8/20µs
- 58 - 320V Stand-Off Voltages
- Oxide-Glass Passivated Junction
- Bidirectional Protection In a Single Device
- High Off-State impedance and Low On-State Voltage
- Helps Equipment Meet GR-1089-CORE, IEC 61000-4-5, FCC Part 68, ITU-T 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



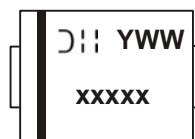
Bottom View

### 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%.

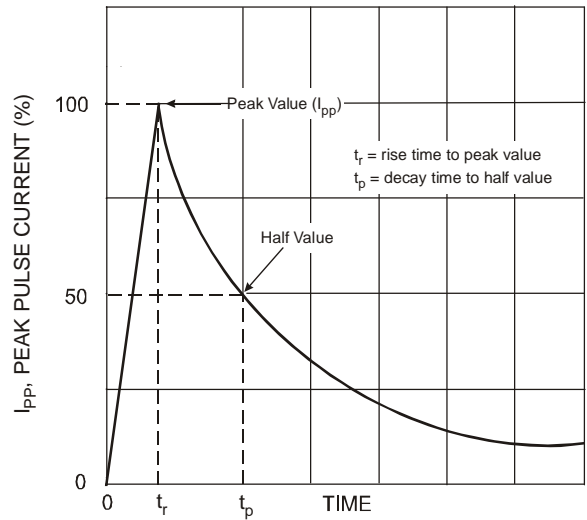
Characteristic	Symbol	Value	Unit
Non-Repetitive Peak Impulse Current @10/1000us	$I_{pp}$	50	A
Non-Repetitive Peak On-State Current @8.3ms (one-half cycle)	$I_{TSM}$	30	A
Typical Positive Temperature Coefficient for Breakdown Voltage	$\Delta VBR/\Delta T_j$	0.1	%/ $^\circ\text{C}$

### 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

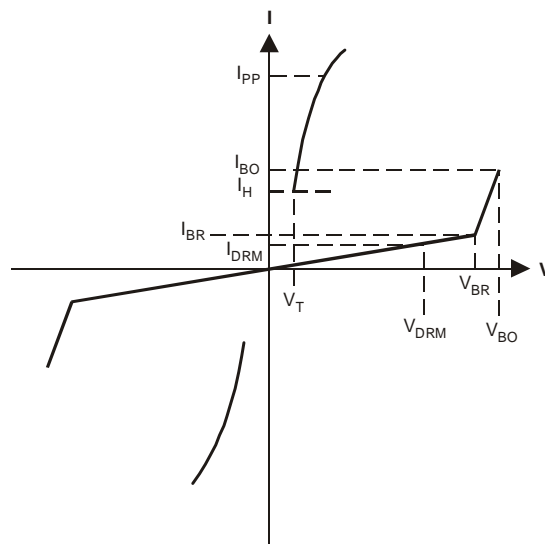


**Electrical Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

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.



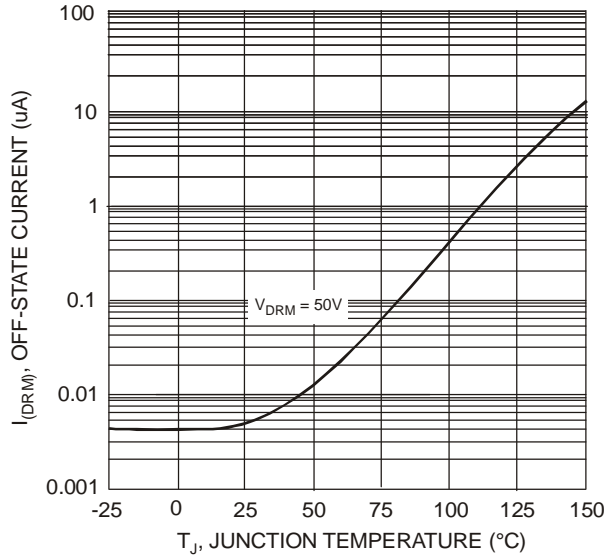


Fig. 1 Off-State Current vs. Junction Temperature

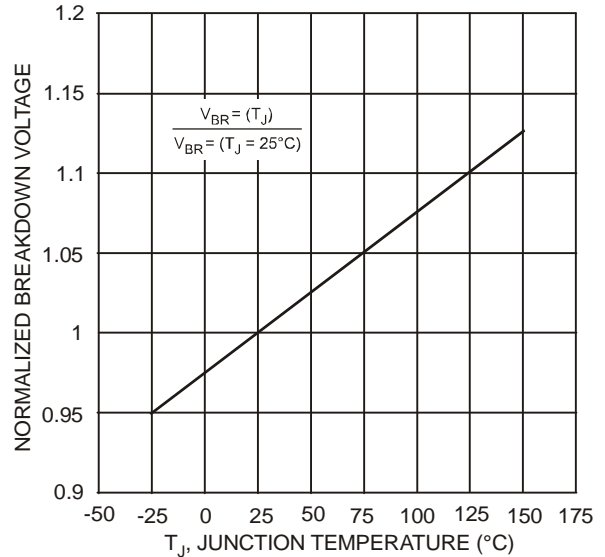


Fig. 2 Relative Variation of Breakdown Voltage vs. Junction Temperature

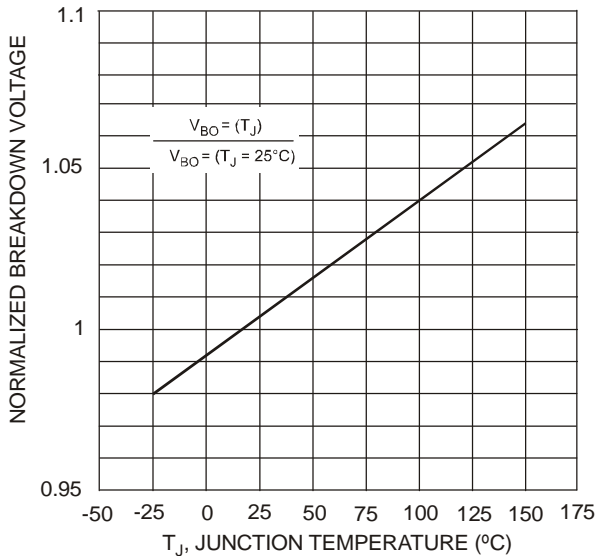


Fig. 3 Relative Variation of Breakover Voltage vs. Junction Temperature

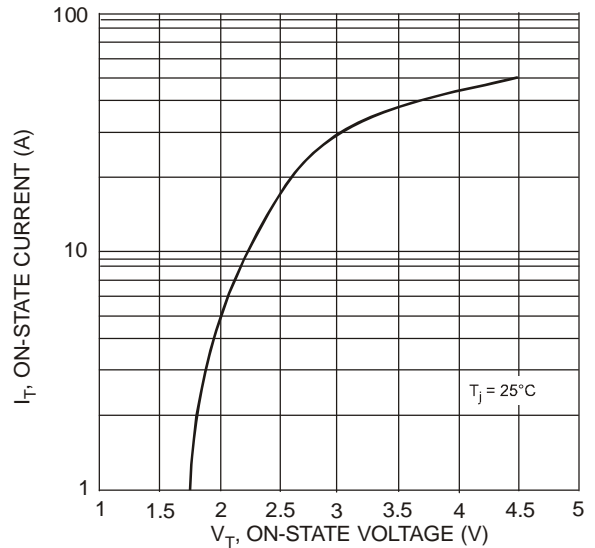


Fig. 4 On-State Current vs. On-State Voltage

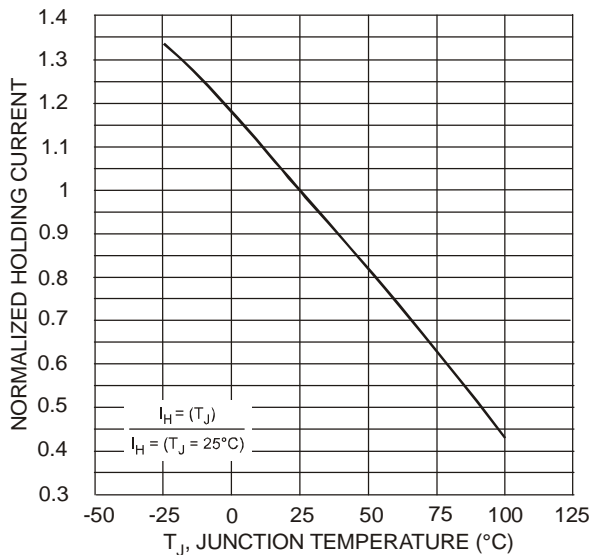


Fig. 5 Relative Variation of Holding Current vs. Junction Temperature

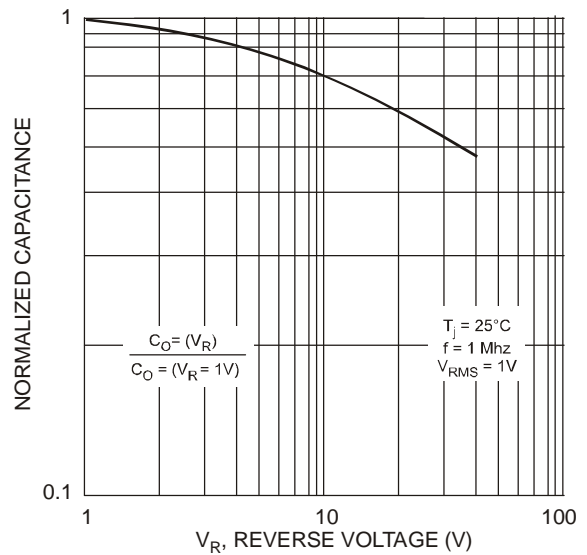
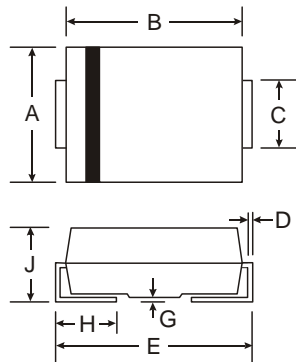


Fig. 6 Relative Variation of Junction Capacitance vs. Reverse Voltage Bias

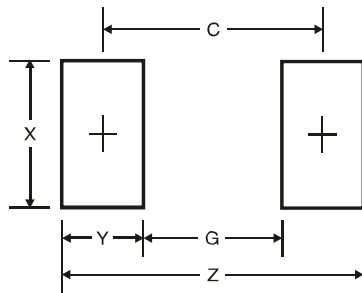
**Package Outline Dimensions**



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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