



**THE DATASHEET OF  
MMT10B230T3**



# MMT10B230T3, MMT10B260T3, MMT10B310T3

Preferred Device


## Thyristor Surge Protectors

### High Voltage Bidirectional TSPD

These Thyristor Surge Protective devices (TSPD) prevent overvoltage damage to sensitive circuits by lightning, induction and power line crossings. They are breakover-triggered crowbar protectors. Turn-off occurs when the surge current falls below the holding current value.

Secondary protection applications for electronic telecom equipment at customer premises.

#### Features

- Outstanding High Surge Current Capability: 100 A 10x1000  $\mu$ sec Guaranteed at the extended temp range of  $-20^{\circ}\text{C}$  to  $65^{\circ}\text{C}$
- The MMT10B230T3 Series is used to help equipment meet various regulatory requirements including: Bellcore 1089, ITU K.20 & K.21, IEC 950, UL 1459 & 1950 and FCC Part 68.
- Bidirectional Protection in a Single Device
- Little Change of Voltage Limit with Transient Amplitude or Rate
- Freedom from Wearout Mechanisms Present in Non-Semiconductor Devices
- Fail-Safe, Shorts When Overstressed, Preventing Continued Unprotected Operation
- Surface Mount Technology (SMT)
- Complies with GR1089 Second Level Surge Spec at 500 A 2x10  $\mu$ sec Waveforms
-  Indicates UL Registered – File #E210057
- Pb-Free Packages are Available



ON Semiconductor®

<http://onsemi.com>

**BIDIRECTIONAL TSPD (⚡)**  
**100 AMP SURGE**  
**265 thru 365 VOLTS**



**SMB**  
**(No Polarity)**  
**(Essentially JEDEC DO-214AA)**  
**CASE 403C**

#### MARKING DIAGRAMS



A = Assembly Location  
Y = Year  
WW = Work Week  
RPDx = Device Code  
x = F, G, or J  
▪ = Pb-Free Package  
(Note: Microdot may be in either location)

#### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

**Preferred** devices are recommended choices for future use and best overall value.

# MMT10B230T3, MMT10B260T3, MMT10B310T3

## MAXIMUM RATINGS (T<sub>J</sub> = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Off-State Voltage – Maximum  MMT10B230T3 MMT10B260T3 MMT10B310T3	V <sub>DM</sub>	± 170 ± 200 ± 270	V
Maximum Pulse Surge Short Circuit Current Non-Repetitive Double Exponential Decay Waveform (Notes 1 and 2) (–20°C to +65°C)  2 x 10 μsec 10 x 700 μsec 10 x 1000 μsec	I <sub>PPS1</sub> I <sub>PPS2</sub> I <sub>PPS3</sub>	± 500 ± 180 ± 100	A(pk)
Maximum Non-Repetitive Rate of Change of On-State Current Double Exponential Waveform, R = 2.0, L = 1.5 μH, C = 1.67 μF, I <sub>pk</sub> = 110A	di/dt	± 100	A/μs

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

1. Allow cooling before testing second polarity.
2. Measured under pulse conditions to reduce heating.

## THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Operating Temperature Range Blocking or Conducting State	T <sub>J1</sub>	–40 to +125	°C
Overload Junction Temperature – Maximum Conducting State Only	T <sub>J2</sub>	+175	°C
Instantaneous Peak Power Dissipation (I <sub>pk</sub> = 100 A, 10x1000 μsec @ 25°C)	P <sub>PK</sub>	4000	W
Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 10 Seconds	T <sub>L</sub>	260	°C

## ORDERING INFORMATION

Device	Package	Shipping†
MMT10B230T3	SMB	(12mm) Tape & Reel 2500 Units per Reel
MMT10B230T3G	SMB (Pb-Free)	
MMT10B260T3	SMB	
MMT10B260T3G	SMB (Pb-Free)	
MMT10B310T3	SMB	
MMT10B310T3G	SMB (Pb-Free)	

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

# MMT10B230T3, MMT10B260T3, MMT10B310T3

## ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25°C unless otherwise noted)

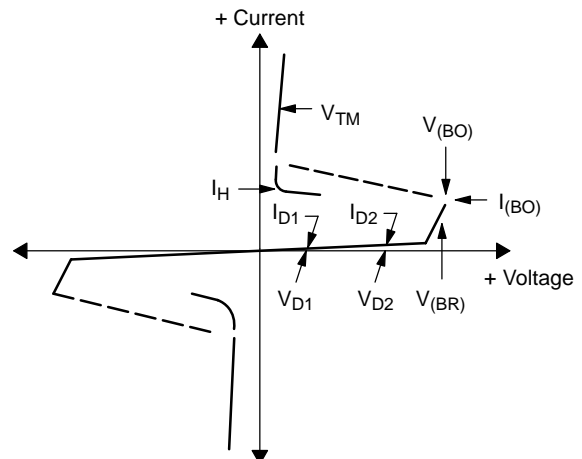
Devices are bidirectional. All electrical parameters apply to forward and reverse polarities.

Characteristic	Symbol	Min	Typ	Max	Unit
Breakover Voltage (Both polarities) (dv/dt = 100 V/μs, I <sub>SC</sub> = 1.0 A, V <sub>dc</sub> = 1000 V)  (+65°C)	V <sub>(BO)</sub>	–	–	265 320 365  290 340 400	V
Breakover Voltage (Both polarities) (f = 60 Hz, I <sub>SC</sub> = 1.0 A(rms), V <sub>OC</sub> = 1000 V(rms), R <sub>I</sub> = 1.0 kΩ, t = 0.5 cycle) (Note 3)  (+65°C)	V <sub>(BO)</sub>	–	–	265 320 365  290 340 400	V
Breakover Voltage Temperature Coefficient	dV <sub>(BO)</sub> /dT <sub>J</sub>	–	0.08	–	%/°C
Breakdown Voltage (I <sub>(BR)</sub> = 1.0 mA) Both polarities	V <sub>(BR)</sub>	–	190 240 280	–	V
Off State Current (V <sub>D1</sub> = 50 V) Both polarities (V <sub>D2</sub> = V <sub>DM</sub> ) Both polarities	I <sub>D1</sub> I <sub>D2</sub>	–	–	2.0 5.0	μA
On–State Voltage (I <sub>T</sub> = 1.0 A) (PW ≤ 300 μs, Duty Cycle ≤ 2%) (Note 3)	V <sub>T</sub>	–	1.53	5.0	V
Breakover Current (f = 60 Hz, V <sub>DM</sub> = 1000 V(rms), R <sub>S</sub> = 1.0 kΩ) Both polarities	I <sub>BO</sub>	–	260	–	mA
Holding Current (Both polarities) (Note 3) V <sub>S</sub> = 500 Volts; I <sub>T</sub> (Initiating Current) = ± 1.0 A	I <sub>H</sub>	150	270	–	mA
Critical Rate of Rise of Off–State Voltage (Linear waveform, V <sub>D</sub> = Rated V <sub>BR</sub> , T <sub>J</sub> = 25°C)	dv/dt	2000	–	–	V/μs
Capacitance (f = 1.0 MHz, 50 Vdc, 1.0 V rms Signal) (f = 1.0 MHz, 2.0 Vdc, 15 mV rms Signal)	C <sub>O</sub>	–	65 160	– 200	pF

3. Measured under pulse conditions to reduce heating.

### Voltage Current Characteristic of TSPD (Bidirectional Device)

Symbol	Parameter
I <sub>D1</sub> , I <sub>D2</sub>	Off State Leakage Current
V <sub>D1</sub> , V <sub>D2</sub>	Off State Blocking Voltage
V <sub>BR</sub>	Breakdown Voltage
V <sub>BO</sub>	Breakover Voltage
I <sub>BO</sub>	Breakover Current
I <sub>H</sub>	Holding Current
V <sub>TM</sub>	On State Voltage



# MMT10B230T3, MMT10B260T3, MMT10B310T3

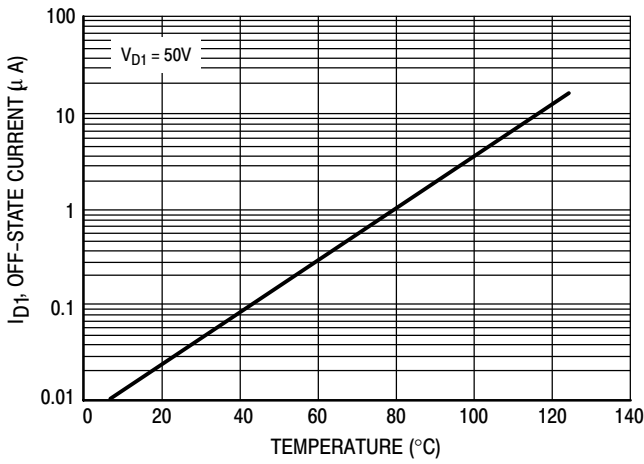


Figure 1. Off-State Current versus Temperature

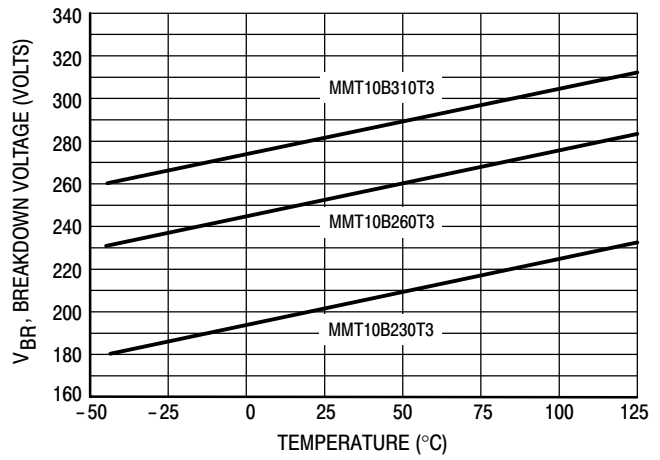


Figure 2. Breakdown Voltage versus Temperature

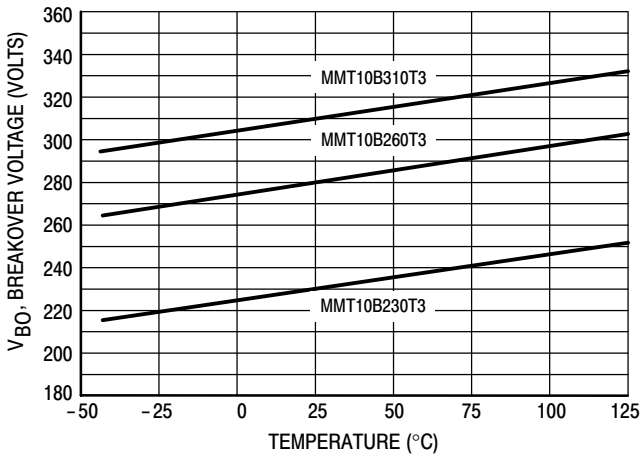


Figure 3. Breakover Voltage versus Temperature

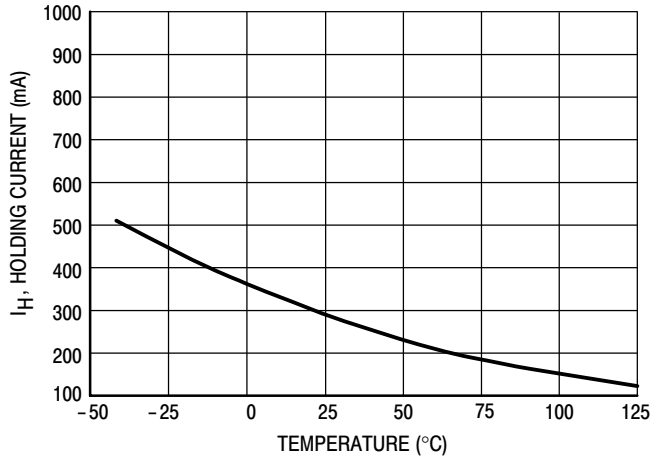


Figure 4. Holding Current versus Temperature

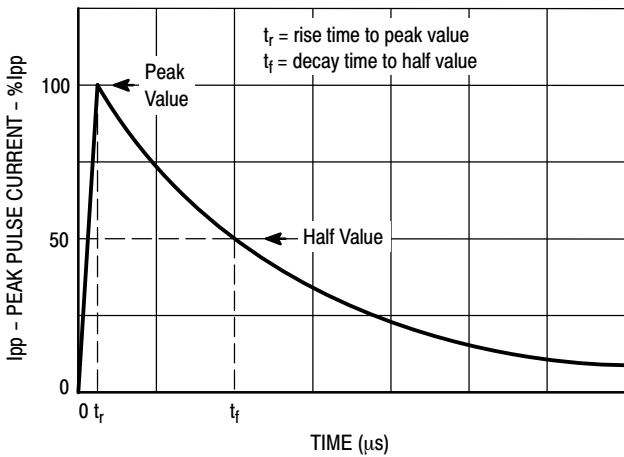


Figure 5. Exponential Decay Pulse Waveform

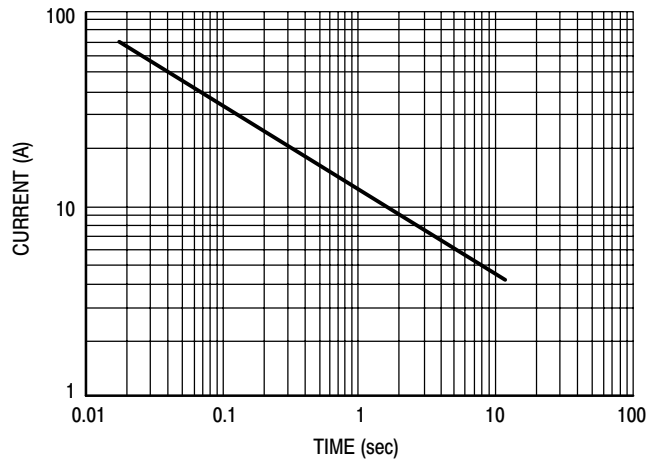
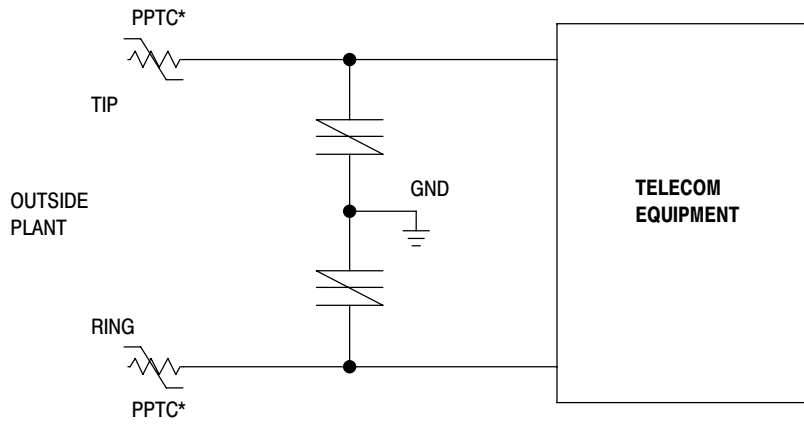
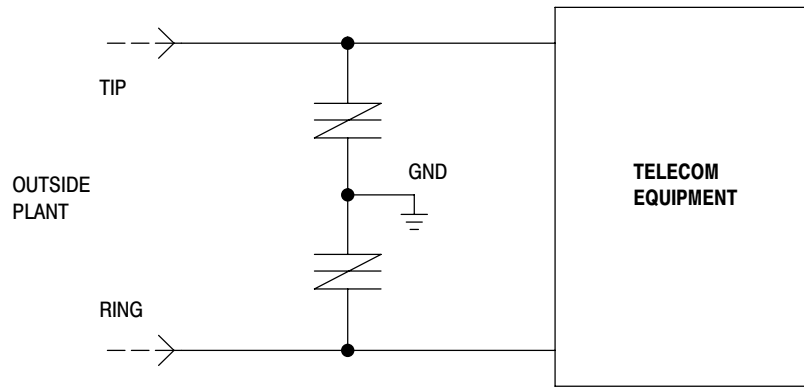
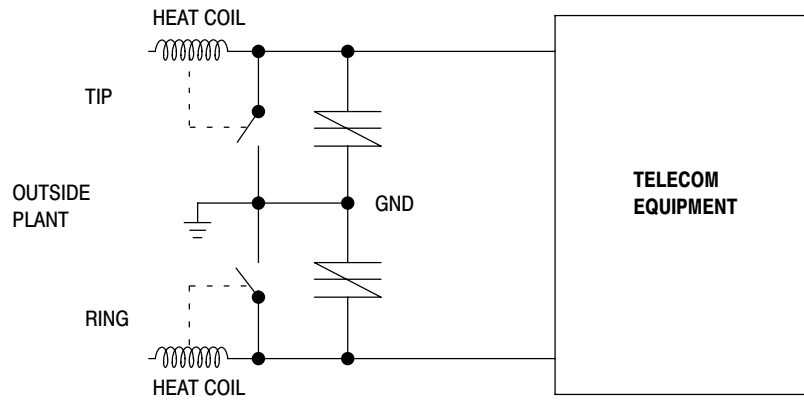


Figure 6. Peak Surge On-State Current versus Surge Current Duration, Sinusoidal Waveform

# MMT10B230T3, MMT10B260T3, MMT10B310T3



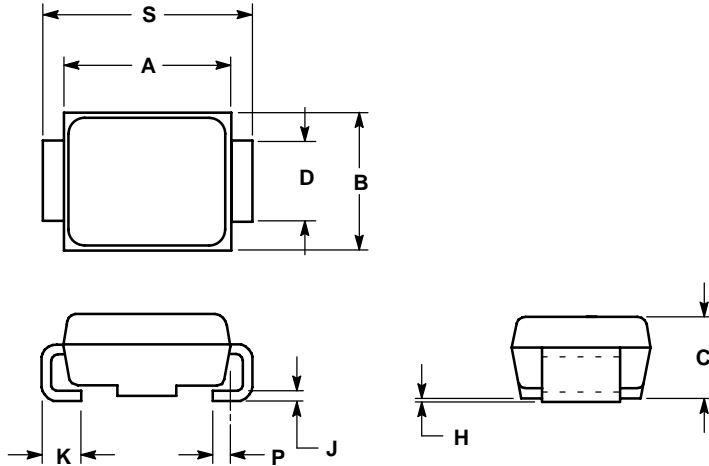
\*Polymeric PTC (positive temperature coefficient) overcurrent protection device



# MMT10B230T3, MMT10B260T3, MMT10B310T3

## PACKAGE DIMENSIONS

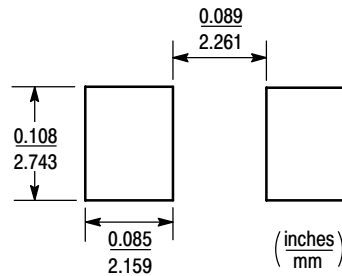
**SMB**  
(No Polarity)  
(Essentially JEDEC DO-214AA)  
CASE 403C-01  
ISSUE A




- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. D DIMENSION SHALL BE MEASURED WITHIN DIMENSION P.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.160	0.180	4.06	4.57
B	0.130	0.150	3.30	3.81
C	0.075	0.095	1.90	2.41
D	0.077	0.083	1.96	2.11
H	0.0020	0.0060	0.051	0.152
J	0.006	0.012	0.15	0.30
K	0.030	0.050	0.76	1.27
P	0.020 REF		0.51 REF	
S	0.205	0.220	5.21	5.59

## SOLDERING FOOTPRINT\*



\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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**MMT10B230T3/D**

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