

# 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 breaker-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.

- Outstanding High Surge Current Capability: 100 Amps 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 Amps 2x10  $\mu$ sec Waveforms
- $\text{⚡}$  Indicates UL Registered – File #E210057
- Device Marking: MMT10B230T3: RPDPF; MMT10B260T3: RPDG; MMT10B310T3: RPDJ, and Date Code

#### MAXIMUM RATINGS ( $T_J = 25^{\circ}\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Off-State Voltage – Maximum MMT10B230T3 MMT10B260T3 MMT10B310T3	$V_{DM}$	$\pm 170$ $\pm 200$ $\pm 270$	Volts
Maximum Pulse Surge Short Circuit Current Non-Repetitive Double Exponential Decay Waveform (Notes 1. and 2.) ( $-20^{\circ}\text{C}$ to $+65^{\circ}\text{C}$ ) 2 x 10 $\mu$ sec 10 x 700 $\mu$ sec 10 x 1000 $\mu$ sec	$I_{PPS1}$ $I_{PPS2}$ $I_{PPS3}$	$\pm 500$ $\pm 180$ $\pm 100$	A(pk)
Maximum Non-Repetitive Rate of Change of On-State Current Double Exponential Waveform, $R = 2.0$ , $L = 1.5 \mu\text{H}$ , $C = 1.67 \mu\text{F}$ , $I_{pk} = 110\text{A}$	$di/dt$	$\pm 100$	A/ $\mu$ s

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



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



RPDx = Specific Device Code  
x = F, G or J  
Y = Year  
WW = Work Week

#### ORDERING INFORMATION

Device	Package	Shipping†
MMT10B230T3	SMB	12mm Tape and Reel (2.5K/Reel)
MMT10B260T3	SMB	12mm Tape and Reel (2.5K/Reel)
MMT10B310T3	SMB	12mm Tape and Reel (2.5K/Reel)

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

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



## MMT10B230T3, MMT10B260T3, MMT10B310T3

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Operating Temperature Range Blocking or Conducting State	$T_{J1}$	-40 to +125	°C
Overload Junction Temperature – Maximum Conducting State Only	$T_{J2}$	+175	°C
Instantaneous Peak Power Dissipation ( $I_{PK} = 100$ A, $10 \times 1000$ $\mu$ sec @ 25°C)	$P_{PK}$	4000	W
Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 10 Seconds	$T_L$	260	°C

### ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

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

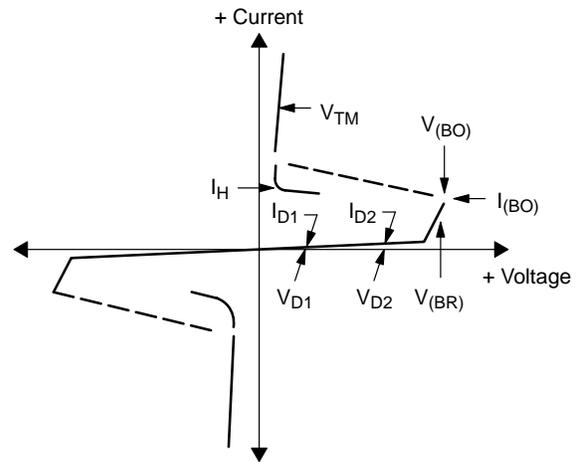
Characteristic	Symbol	Min	Typ	Max	Unit
Breakover Voltage (Both polarities) ( $dv/dt = 100$ V/ $\mu$ s, $I_{SC} = 1.0$ A, $V_{dc} = 1000$ V)  (+65°C)	$V_{(BO)}$	–	–	265 320 365	Volts
	MMT10B230T3	–	–	290	
	MMT10B260T3	–	–	340	
	MMT10B310T3	–	–	400	
Breakover Voltage (Both polarities) ( $f = 60$ Hz, $I_{SC} = 1.0$ A(rms), $V_{OC} = 1000$ V(rms), $R_I = 1.0$ k $\Omega$ , $t = 0.5$ cycle) (Note 3.)  (+65°C)	$V_{(BO)}$	–	–	265 320 365	Volts
	MMT10B230T3	–	–	290	
	MMT10B260T3	–	–	340	
	MMT10B310T3	–	–	400	
Breakover Voltage Temperature Coefficient	$dV_{(BO)}/dT_J$	–	0.08	–	%/°C
Breakdown Voltage ( $I_{(BR)} = 1.0$ mA) Both polarities	$V_{(BR)}$	–	190 240 280	–	Volts
	MMT10B230T3	–	–	–	
	MMT10B260T3	–	–	–	
	MMT10B310T3	–	–	–	
Off State Current ( $V_{D1} = 50$ V) Both polarities ( $V_{D2} = V_{DM}$ ) Both polarities	$I_{D1}$ $I_{D2}$	–	–	2.0 5.0	$\mu$ A
On-State Voltage ( $I_T = 1.0$ A) ( $PW \leq 300$ $\mu$ s, Duty Cycle $\leq 2\%$ ) (Note 3.)	$V_T$	–	1.53	5.0	Volts
Breakover Current ( $f = 60$ Hz, $V_{DM} = 1000$ V(rms), $R_S = 1.0$ k $\Omega$ ) Both polarities	$I_{BO}$	–	260	–	mA
Holding Current (Both polarities) (Note 3.) $V_S = 500$ Volts; $I_T$ (Initiating Current) = $\pm 1.0$ A	$I_H$	150	270	–	mA
Critical Rate of Rise of Off-State Voltage (Linear waveform, $V_D = \text{Rated } V_{BR}$ , $T_J = 25^\circ\text{C}$ )	$dv/dt$	2000	–	–	V/ $\mu$ s
Capacitance ( $f = 1.0$ MHz, 50 Vdc, 1.0 V rms Signal) ( $f = 1.0$ MHz, 2.0 Vdc, 15 mV rms Signal)	$C_O$	–	65 160	– 200	pF

3. Measured under pulse conditions to reduce heating.

## MMT10B230T3, MMT10B260T3, MMT10B310T3

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

Symbol	Parameter
$I_{D1}, I_{D2}$	Off State Leakage Current
$V_{D1}, V_{D2}$	Off State Blocking Voltage
$V_{BR}$	Breakdown Voltage
$V_{BO}$	Breakover Voltage
$I_{BO}$	Breakover Current
$I_H$	Holding Current
$V_{TM}$	On State Voltage



## MMT10B230T3, MMT10B260T3, MMT10B310T3

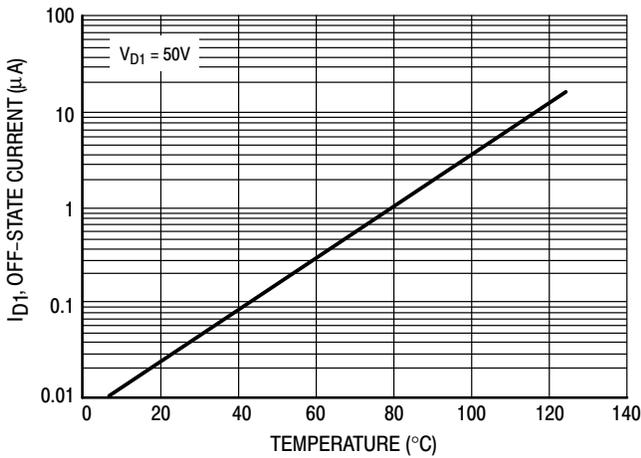


Figure 1. Off-State Current versus Temperature

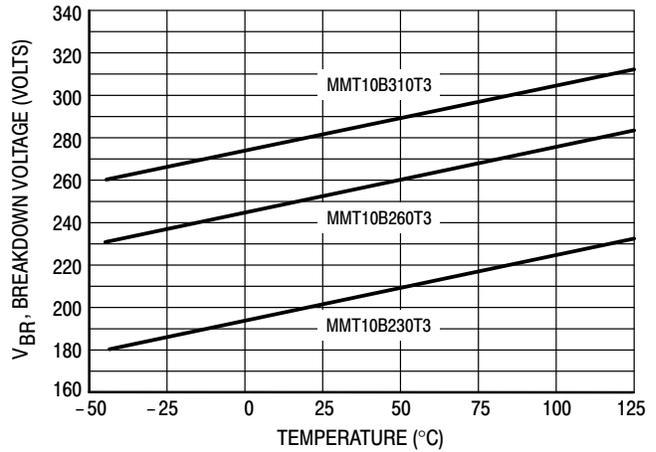


Figure 2. Breakdown Voltage versus Temperature

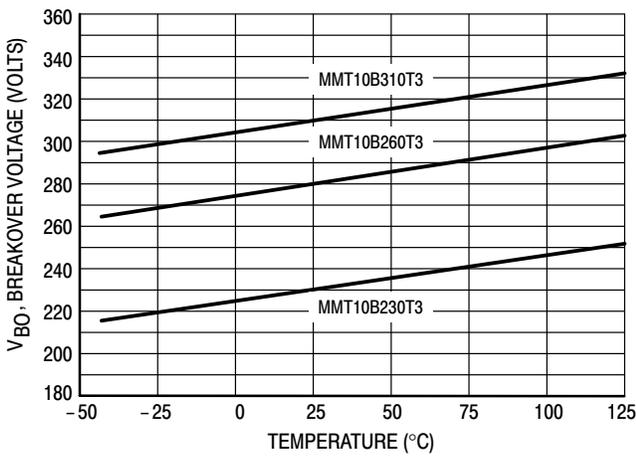


Figure 3. Breakover Voltage versus Temperature

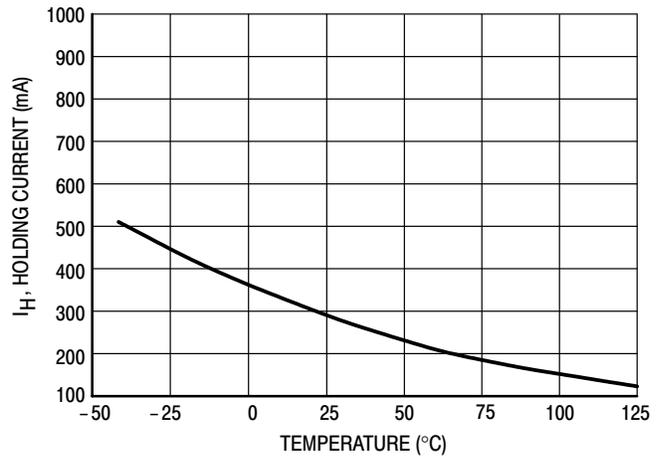


Figure 4. Holding Current versus Temperature

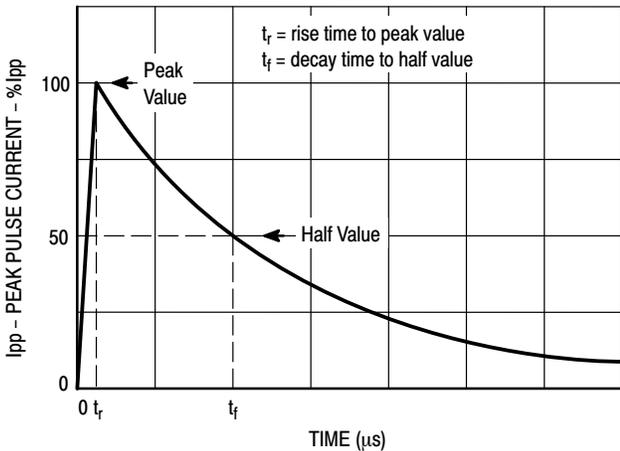


Figure 5. Exponential Decay Pulse Waveform

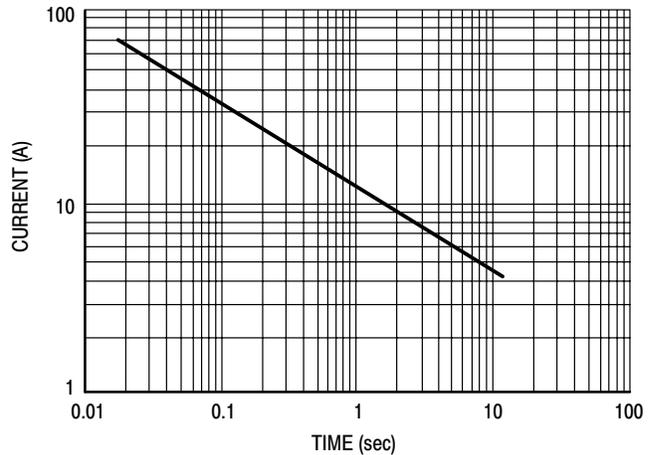
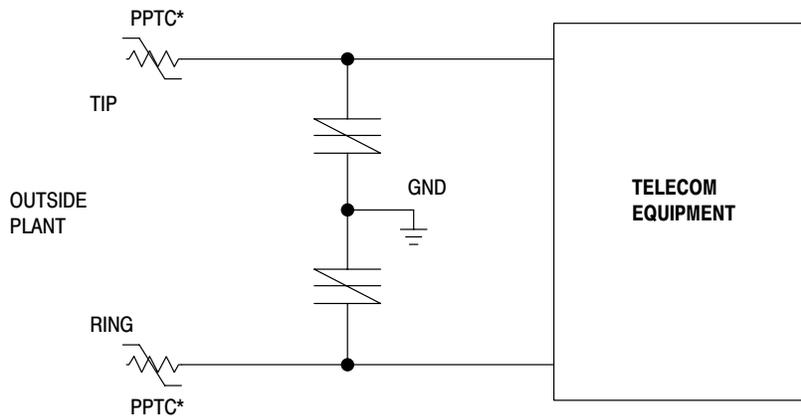
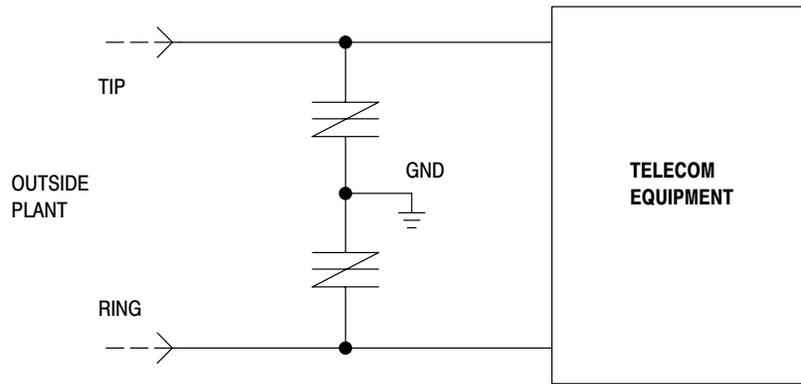
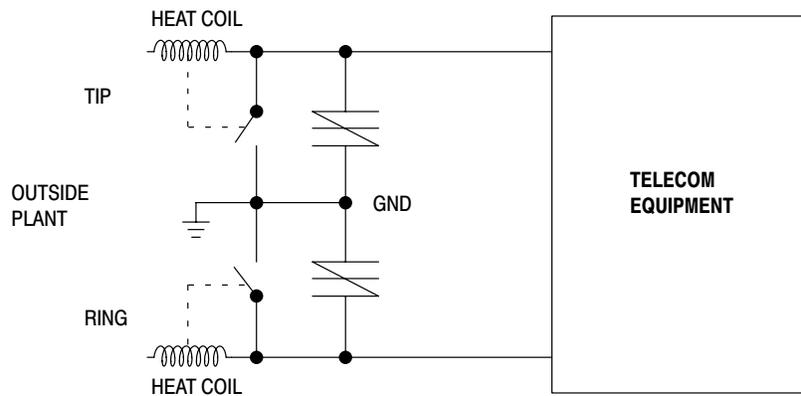


Figure 6. Peak Surge On-State Current versus Surge Current Duration, Sinusoidal Waveform

**MMT10B230T3, MMT10B260T3, MMT10B310T3**



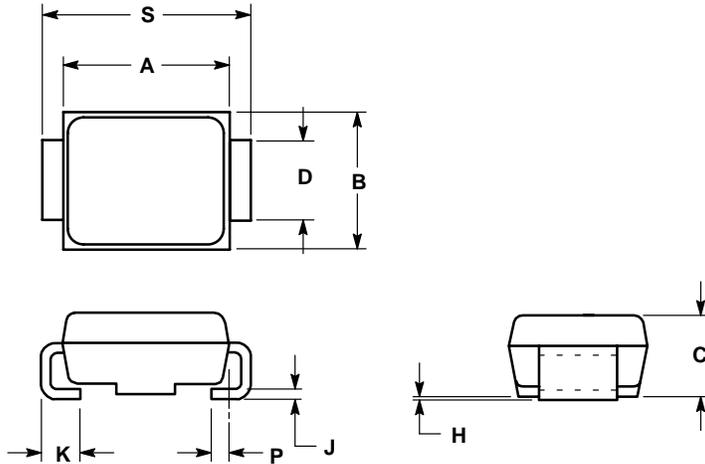
\*Polymeric PTC (positive temperature coefficient) overcurrent protection device



# MMT10B230T3, MMT10B260T3, MMT10B310T3

## PACKAGE DIMENSIONS

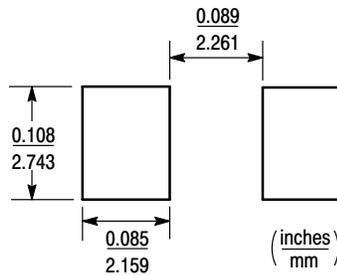
**SMB**  
(No Polarity)  
(Essentially JEDEC DO-214AA)  
CASE 403C-01  
ISSUE A



- 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.

ON Semiconductor and  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## PUBLICATION ORDERING INFORMATION

### LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor  
P.O. Box 5163, Denver, Colorado 80217 USA  
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada  
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada  
Email: orderlit@onsemi.com

**N. American Technical Support:** 800-282-9855 Toll Free  
USA/Canada

**Japan:** ON Semiconductor, Japan Customer Focus Center  
2-9-1 Kamimeguro, Meguro-ku, Tokyo, Japan 153-0051  
Phone: 81-3-5773-3850

**ON Semiconductor Website:** <http://onsemi.com>

**Order Literature:** <http://www.onsemi.com/litorder>

For additional information, please contact your local Sales Representative.