

# MMT05B064T3

Preferred Devices

## 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

- High Surge Current Capability: 50 Amps 10 x 1000  $\mu$ sec, for Controlled Temperature Environments
- The MMT05B064T3 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)
-  Indicates UL Recognized – File #E210057
- Pb-Free Package is Available

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

| Rating                                                                                                                                                         | Symbol     | Value     | Unit       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------|------------|
| Off-State Voltage – Maximum                                                                                                                                    | $V_{DM}$   | 58        | V          |
| Maximum Pulse Surge Short Circuit Current<br>Non-Repetitive<br>Double Exponential Decay Waveform<br>( $-25^\circ\text{C}$ Initial Temperature) (Notes 1 and 2) |            |           | A(pk)      |
| 2 x 10 $\mu$ sec                                                                                                                                               | $I_{PPS1}$ | $\pm 150$ |            |
| 8 x 20 $\mu$ sec                                                                                                                                               | $I_{PPS2}$ | $\pm 150$ |            |
| 10 x 160 $\mu$ sec                                                                                                                                             | $I_{PPS3}$ | $\pm 100$ |            |
| 10 x 360 $\mu$ sec                                                                                                                                             | $I_{PPS4}$ | $\pm 100$ |            |
| 10 x 560 $\mu$ sec                                                                                                                                             | $I_{PPS5}$ | $\pm 70$  |            |
| 10 x 700 $\mu$ sec                                                                                                                                             | $I_{PPS6}$ | $\pm 70$  |            |
| 10 x 1000 $\mu$ sec                                                                                                                                            | $I_{PPS7}$ | $\pm 50$  |            |
| Non-Repetitive Peak On-State Current 60 Hz<br>Full Sign Wave                                                                                                   | $I_{TSM}$  | 32        | A(pk)      |
| Maximum Non-Repetitive Rate of Change of<br>On-State Current Exponential Waveform, < 100 A                                                                     | $di/dt$    | $\pm 150$ | A/ $\mu$ s |

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.

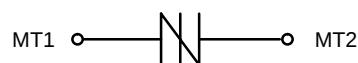
1. Allow cooling before testing second polarity.
2. Measured under pulse conditions to reduce heating.



**ON Semiconductor®**

<http://onsemi.com>

### BIDIRECTIONAL TSPD () 50 AMP SURGE, 64 VOLTS



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

#### MARKING DIAGRAM



A = Assembly Location  
Y = Year  
WW = Work Week  
RPBC = Device Code  
▪ = Pb-Free Package  
(Note: Microdot may be in either location)

#### ORDERING INFORMATION

| Device       | Package          | Shipping <sup>†</sup> |
|--------------|------------------|-----------------------|
| MMT05B064T3  | SMB              | 2500 Tape & Reel      |
| MMT05B064T3G | SMB<br>(Pb-Free) | 2500 Tape & Reel      |

<sup>†</sup>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.

**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   |
| Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 10 Seconds | $T_L$    | 260         | °C   |

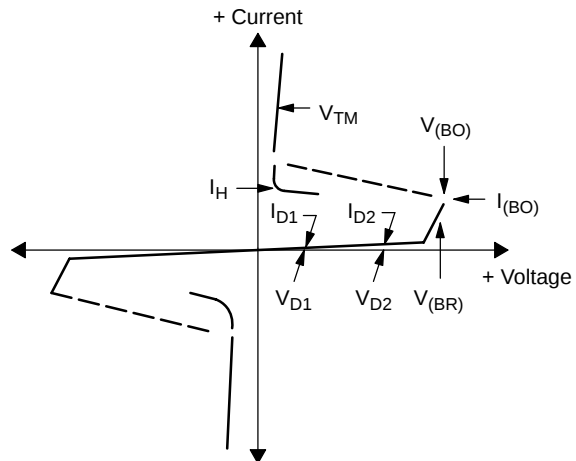
**ELECTRICAL CHARACTERISTICS** ( $T_J = 25^\circ\text{C}$  unless otherwise noted) Devices are bidirectional. All electrical parameters apply to forward and reverse polarities.

| Characteristics                                                                                                                                                                                                | Symbol               | Min        | Typ      | Max        | Unit             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|------------|----------|------------|------------------|
| Breakover Voltage (Both polarities)<br>( $dv/dt = 100 \text{ V}/\mu\text{s}$ , $I_{SC} = 1.0 \text{ A}$ , $V_{dc} = 1000 \text{ V}$ )<br>(+65°C)                                                               | $V_{(BO)}$           | -          | -        | 77<br>80   | V                |
| Breakover Voltage (Both polarities)<br>( $f = 60 \text{ Hz}$ , $I_{SC} = 1.0 \text{ A(rms)}$ , $V_{OC} = 1000 \text{ V(rms)}$ ,<br>$R_f = 1.0 \text{ k}\Omega$ , $t = 0.5 \text{ cycle}$ ) (Note 3)<br>(+65°C) | $V_{(BO)}$           | -          | -        | 77<br>80   | V                |
| Breakover Voltage Temperature Coefficient                                                                                                                                                                      | $dV_{(BO)}/dT_J$     | -          | 0.054    | -          | V/°C             |
| Breakdown Voltage ( $I_{(BR)} = 1.0 \text{ mA}$ ) Both polarities                                                                                                                                              | $V_{(BR)}$           | 58         | -        | -          | V                |
| Off State Current ( $V_{D1} = 50 \text{ V}$ ) Both polarities<br>( $V_{D2} = V_{DM}$ ) Both polarities                                                                                                         | $I_{D1}$<br>$I_{D2}$ | -          | -        | 2.0<br>5.0 | $\mu\text{A}$    |
| On-State Voltage ( $I_T = 1.0 \text{ A}$ )<br>( $PW \leq 300 \mu\text{s}$ , Duty Cycle $\leq 2\%$ ) (Note 3)                                                                                                   | $V_T$                | -          | -        | 3.0        | V                |
| Breakover Current ( $f = 60 \text{ Hz}$ , $V_{DM} = 1000 \text{ V(rms)}$ , $R_S = 1.0 \text{ k}\Omega$ )<br>Both polarities                                                                                    | $I_{BO}$             | -          | 91       | -          | mA               |
| Holding Current (Both polarities) (Note 3)<br>$V_S = 500 \text{ V}$ ; $I_T$ (Initiating Current) = $\pm 1.0 \text{ A}$ (+65°C)                                                                                 | $I_H$                | 150<br>130 | -        | -          | mA               |
| Critical Rate of Rise of Off-State Voltage<br>(Linear waveform, $V_D = \text{Rated } V_{BR}$ , $T_J = 25^\circ\text{C}$ )                                                                                      | $dv/dt$              | 2000       | -        | -          | V/ $\mu\text{s}$ |
| Capacitance ( $f = 1.0 \text{ MHz}$ , $50 \text{ Vdc}$ , $1.0 \text{ V rms}$ Signal)<br>( $f = 1.0 \text{ MHz}$ , $2.0 \text{ Vdc}$ , $1.0 \text{ V rms}$ Signal)                                              | $C_O$                | -          | 42<br>80 | -          | pF               |

3. Measured under pulse conditions to reduce heating.

**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           |



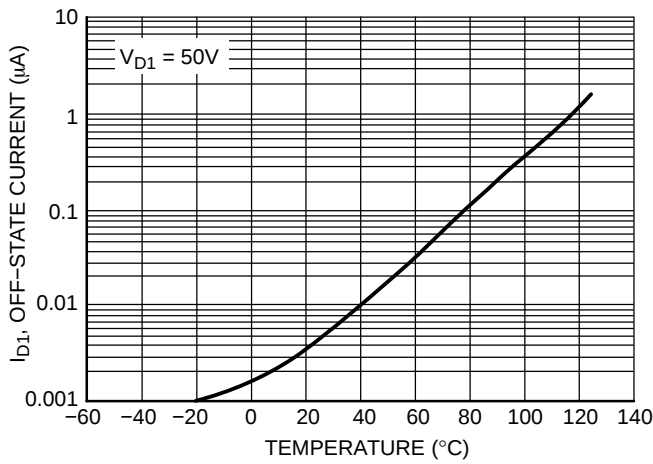


Figure 1. Typical Off-State Current versus Temperature

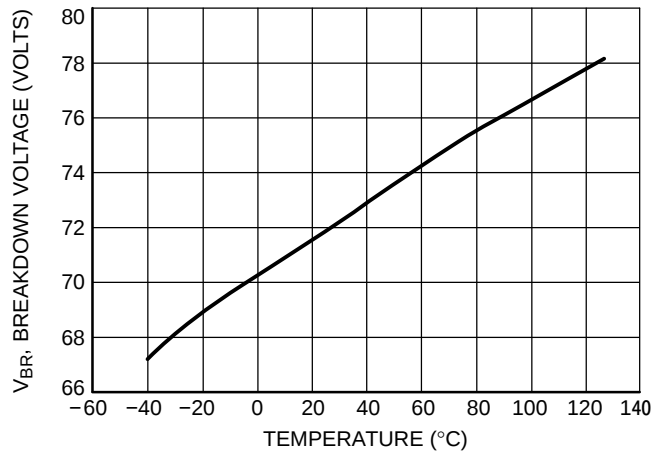


Figure 2. Typical Breakdown Voltage versus Temperature

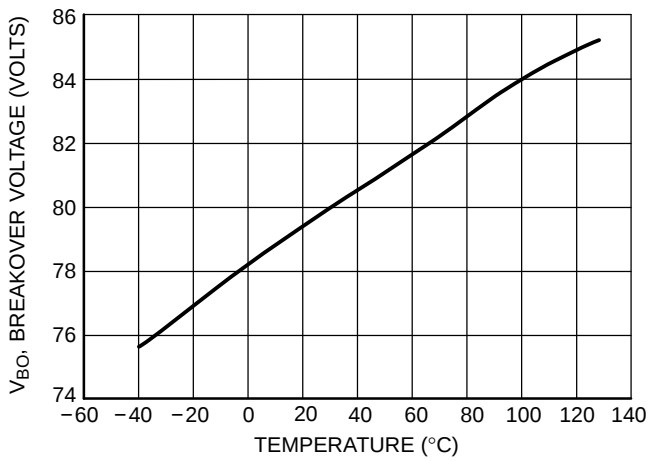


Figure 3. Maximum Breakover Voltage versus Temperature

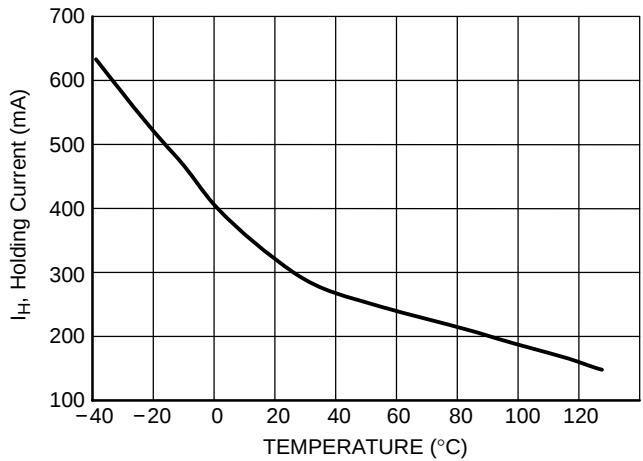


Figure 4. Typical Holding Current versus Temperature

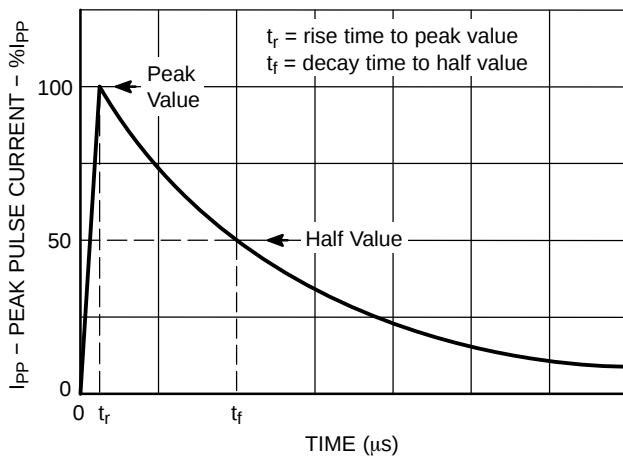


Figure 5. Exponential Decay Pulse Waveform

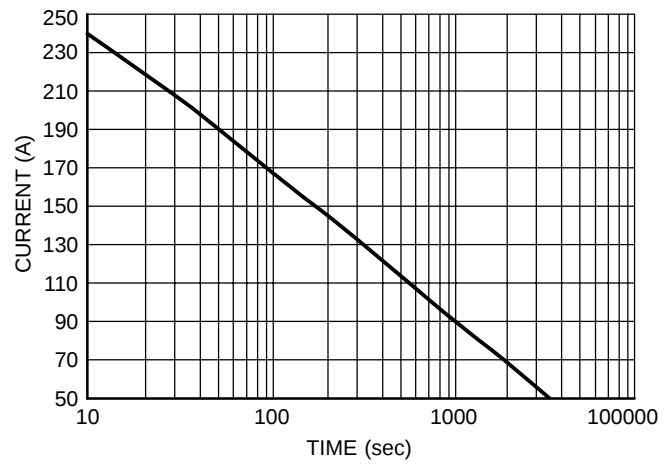
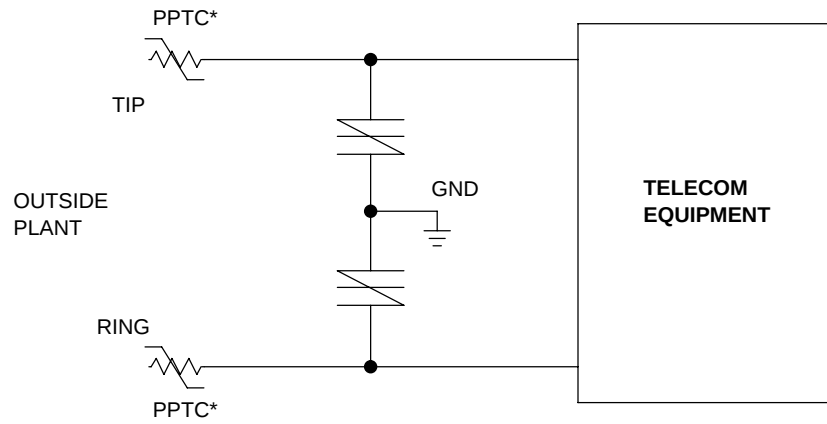
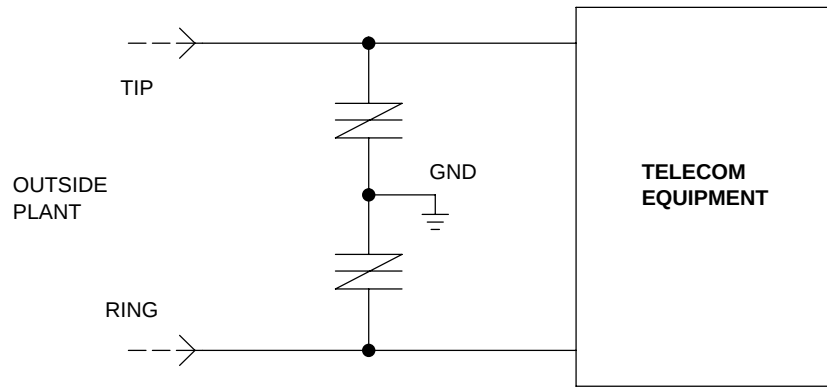
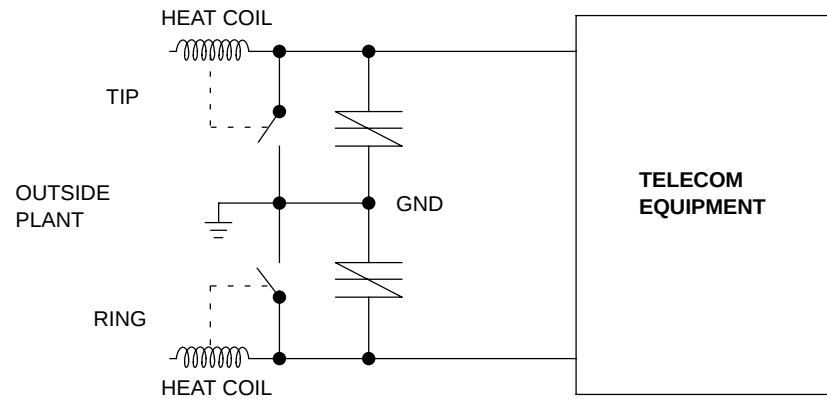


Figure 6. Peak Surge On-State Current versus Surge Current Duration, Sinusoidal Waveform

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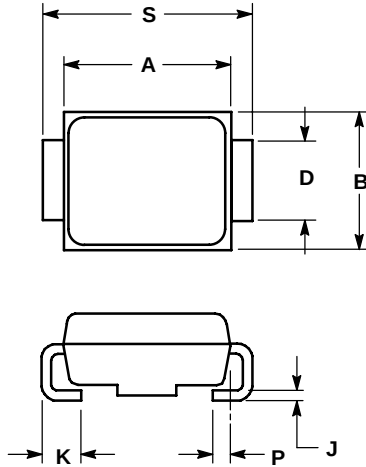
\*Polymeric PTC (positive temperature coefficient) overcurrent protection device



# MMT05B064T3

## PACKAGE DIMENSIONS

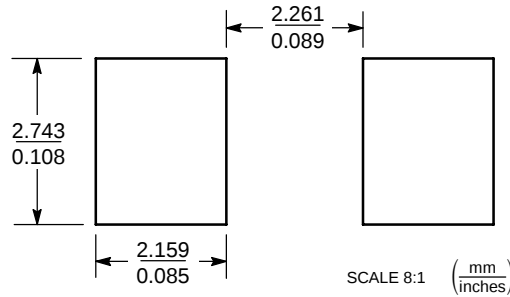
### SMB CASE 403C-01 ISSUE A



- 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, SOLDERM/D.

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