

# MMT05A230T3, MMT05A260T3, MMT05A310T3


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.

- High Surge Current Capability: **50 Amps** 10 x 1000  $\mu$ sec; for Controlled Temperature Environments in the **SMA** package
- The MMT05A230T3 Series is used to help equipment meet various regulatory requirements including: Telcordia 1089, ITU K.20 & K.21, IEC 950 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 Registered – File #E210057
- Device Marking: MMT05A230T3: PBF; MMT05A260T3: PBG; MMT05A310T3: PBJ

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

Rating	Symbol	Value	Unit
Off-State Voltage – Maximum MMT05A230T3 MMT05A260T3 MMT05A310T3	$V_{DM}$	$\pm 170$ $\pm 200$ $\pm 270$	Volts
Maximum Pulse Surge Short Circuit Current Non-Repetitive Double Exponential Decay Waveform (Notes 1 and 2) 8 x 20 $\mu$ sec 10 x 160 $\mu$ sec 10 x 560 $\mu$ sec 10 x 1000 $\mu$ sec	$I_{PPS1}$ $I_{PPS2}$ $I_{PPS3}$ $I_{PPS4}$	$\pm 150$ $\pm 100$ $\pm 70$ $\pm 50$	A(pk)
Maximum Non-Repetitive Rate of Change of On-State Current Double Exponential Waveform, $I_{PK} = 50$ A, $P_W = 15$ $\mu$ s	$di/dt$	$\pm 100$	A/ $\mu$ s

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



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### BIDIRECTIONAL TSPD 50 AMP SURGE 265 thru 365 VOLTS



**SMA**  
(No Polarity)  
CASE 403D

#### MARKING DIAGRAM



xxx = Specific Device Code  
A = Assembly Location  
Y = Year  
W = Work Week

#### ORDERING INFORMATION

Device	Package	Shipping†
MMT05A230T3	SMA	12 mm Tape and Reel (5 K/Reel)
MMT05A260T3	SMA	12 mm Tape and Reel (5 K/Reel)
MMT05A310T3	SMA	12 mm Tape and Reel (5 K/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.

# MMT05A230T3, MMT05A260T3, MMT05A310T3

## 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 ( $I_{pk} = 50A$ , 10x1000 $\mu$ sec @ 25°C)	$P_{PK}$	2000	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.

Characteristics	Symbol	Min	Typ	Max	Unit
Breakover Voltage (Both polarities) ( $dv/dt = 100 \text{ V}/\mu\text{s}$ , $I_{SC} = 1.0 \text{ A}$ , $V_{dc} = 1000 \text{ V}$ )  (+65°C)  MMT05A230T3 MMT05A260T3 MMT05A310T3  MMT05A230T3 MMT05A260T3 MMT05A310T3	$V_{(BO)}$	– – – – – –	– – – – – –	265 320 365  280 340 400	Volts
Breakover Voltage (Both polarities) ( $f = 60 \text{ Hz}$ , $I_{SC} = 1.0 \text{ A(rms)}$ , $V_{OC} = 1000 \text{ V(rms)}$ , $R_I = 1.0 \text{ k}\Omega$ , $t = 0.5 \text{ cycle}$ ) (Note 3)  (+65°C)  MMT05A230T3 MMT05A260T3 MMT05A310T3  MMT05A230T3 MMT05A260T3 MMT05A310T3	$V_{(BO)}$	– – – – – –	– – – – – –	265 320 365  280 340 400	Volts
Breakover Voltage Temperature Coefficient	$dV_{(BO)}/dT_J$	–	0.08	–	%/°C
Breakdown Voltage ( $I_{(BR)} = 1.0 \text{ mA}$ ) Both polarities  MMT05A230T3 MMT05A260T3 MMT05A310T3	$V_{(BR)}$	– – –	190 240 280	– – –	Volts
Off State Current ( $V_{D1} = 50 \text{ V}$ ) Both polarities ( $V_{D2} = V_{DM}$ ) Both polarities	$I_{D1}$ $I_{D2}$	– –	– –	2.0 5.0	$\mu\text{A}$
On-State Voltage ( $I_T = 1.0 \text{ A}$ ) ( $PW \leq 300 \mu\text{s}$ , Duty Cycle $\leq 2\%$ ) (Note 3)	$V_T$	–	1.53	3.0	Volts
Breakover Current ( $f = 60 \text{ Hz}$ , $V_{DM} = 1000 \text{ V(rms)}$ , $R_S = 1.0 \text{ k}\Omega$ ) Both polarities	$I_{BO}$	–	230	–	mA
Holding Current (Both polarities) (Note 3) $V_S = 500 \text{ Volts}$ ; $I_T$ (Initiating Current) = $\pm 1.0 \text{ Amp}$	$I_H$	150	340	–	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	–	–	$\text{V}/\mu\text{s}$
Capacitance ( $f = 1.0 \text{ MHz}$ , 50 Vdc, 1.0 V(rms) Signal) ( $f = 1.0 \text{ MHz}$ , 2.0 Vdc, 1.0 V(rms) Signal)	$C_O$	– –	22 35	– 50	pF

3. Measured under pulse conditions to reduce heating.

# MMT05A230T3, MMT05A260T3, MMT05A310T3

## 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

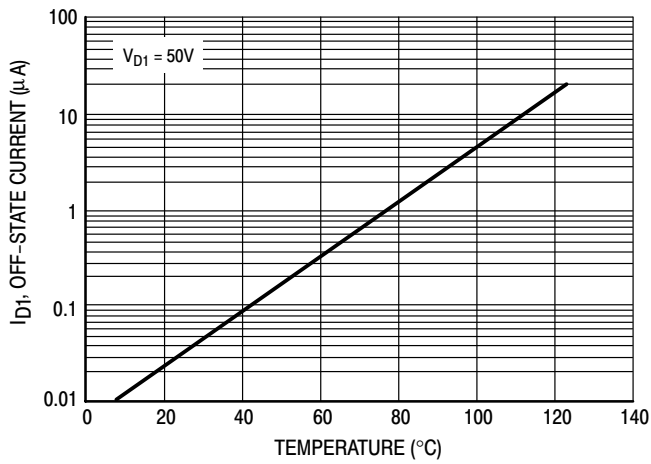
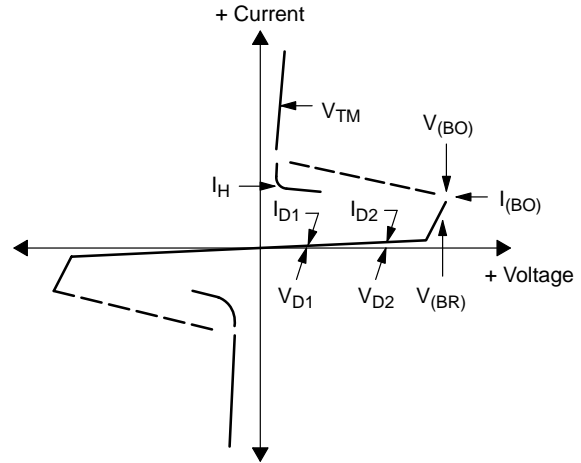


Figure 1. Off-State Current versus Temperature

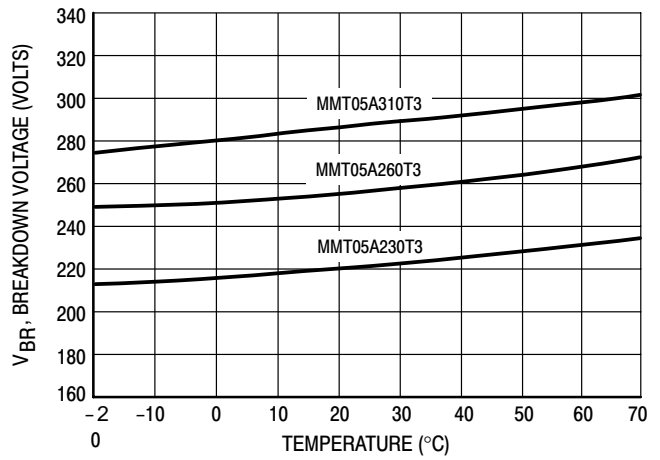


Figure 2. Typical Breakdown Voltage versus Temperature

# MMT05A230T3, MMT05A260T3, MMT05A310T3

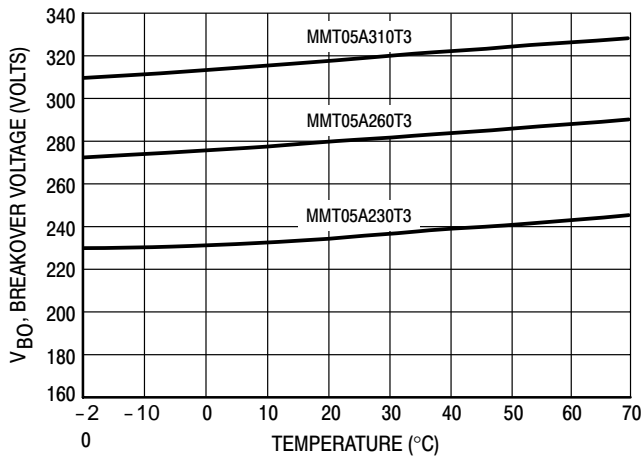


Figure 3. Typical Breakover Voltage versus Temperature

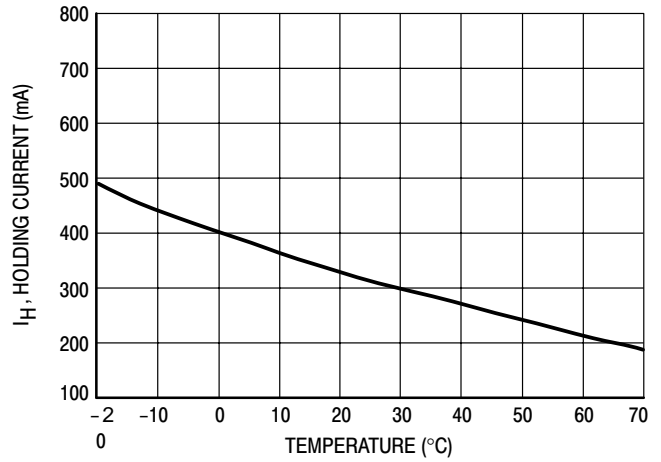


Figure 4. Typical Holding Current versus Temperature

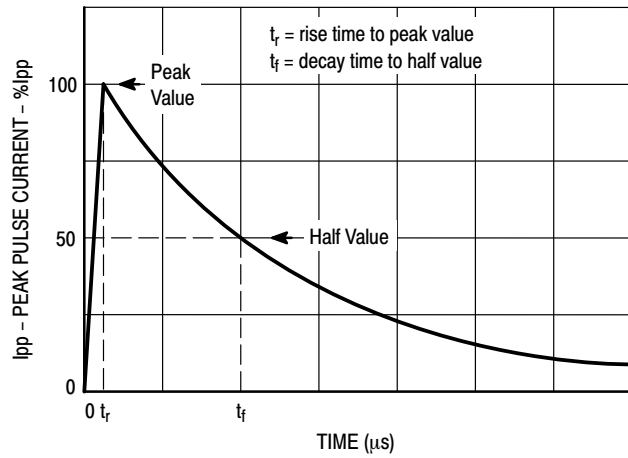


Figure 5. Exponential Decay Pulse Waveform

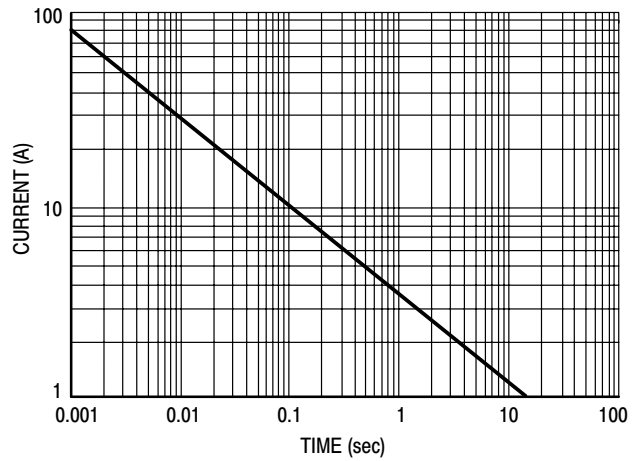
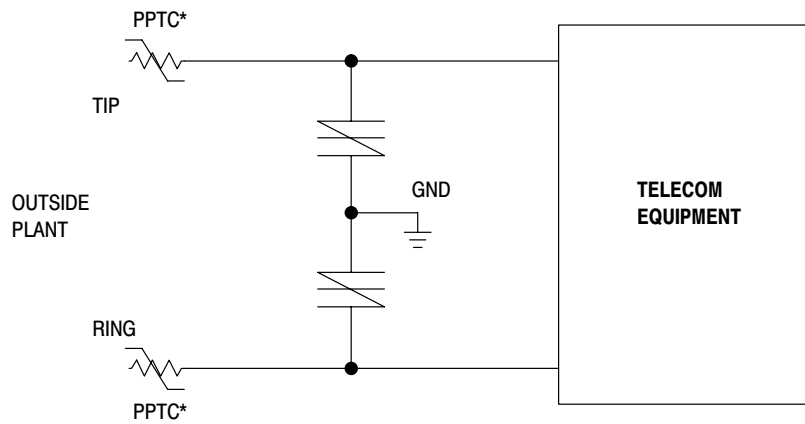
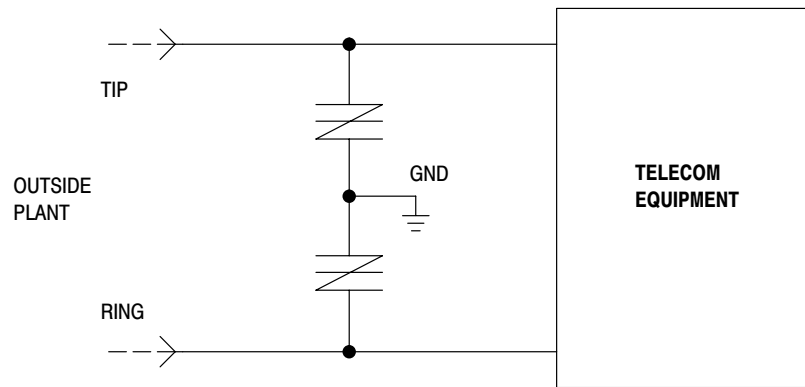
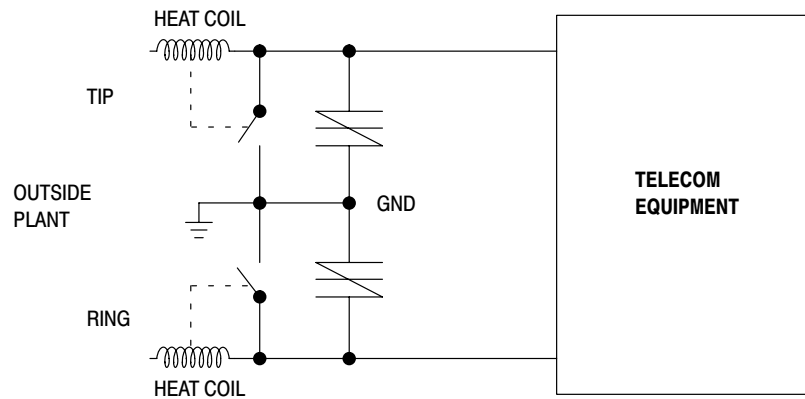


Figure 6. Peak Surge On-State Current versus Surge Current Duration, Sinusoidal Waveform

# MMT05A230T3, MMT05A260T3, MMT05A310T3



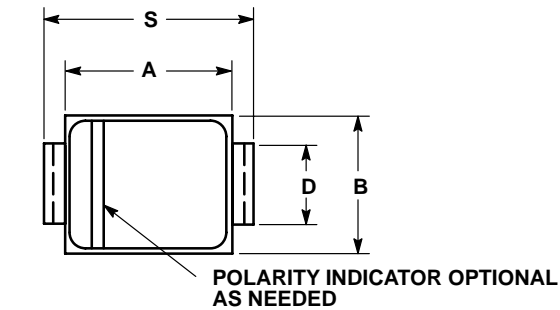
\*Polymeric PTC (positive temperature coefficient) overcurrent protection device



# MMT05A230T3, MMT05A260T3, MMT05A310T3

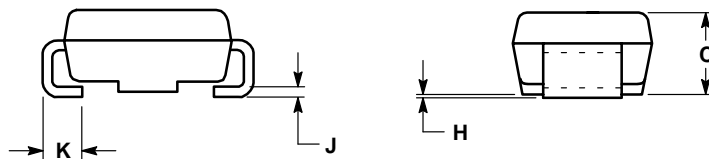
## PACKAGE DIMENSIONS

SMA  
CASE 403D-02  
ISSUE A

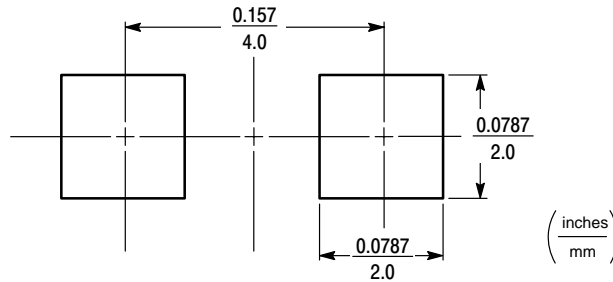


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. 403D-01 OBSOLETE, NEW STANDARD IS 403D-02.


DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.160	0.180	4.06	4.57
B	0.090	0.115	2.29	2.92
C	0.075	0.095	1.91	2.41
D	0.050	0.064	1.27	1.63
H	0.002	0.006	0.05	0.15
J	0.006	0.016	0.15	0.41
K	0.030	0.060	0.76	1.52
S	0.190	0.220	4.83	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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