

# 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)
- 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) 10 x 1000 $\mu$ sec 8 x 20 $\mu$ sec 10 x 160 $\mu$ sec 10 x 560 $\mu$ sec	$I_{PPS1}$ $I_{PPS2}$ $I_{PPS3}$ $I_{PPS4}$	$\pm 50$ $\pm 150$ $\pm 100$ $\pm 70$	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.

This document contains information on a new product. Specifications and information herein are subject to change without notice.



ON Semiconductor™

<http://onsemi.com>

**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)

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 ( $I_{pk} = 50A, 10 \times 1000 \mu\text{sec} @ 25^\circ\text{C}$ )	$P_{PK}$	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)	$V_{(BO)}$	–	–	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)	$V_{(BO)}$	–	–	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	$V_{(BR)}$	–	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 ( $I_T = 1.0 \text{ A}$ ) ( $PW \leq 300 \mu\text{s}, \text{Duty Cycle} \leq 2\%$ ) (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) = $\pm 1.0 \text{ Amp}$ (+65°C)	$I_H$	175 130	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 ( $f = 1.0 \text{ MHz}, 50 \text{ Vdc}, 1.0 \text{ V(rms)}$ Signal) ( $f = 1.0 \text{ MHz}, 2.0 \text{ Vdc}, 1.0 \text{ V(rms)}$ 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

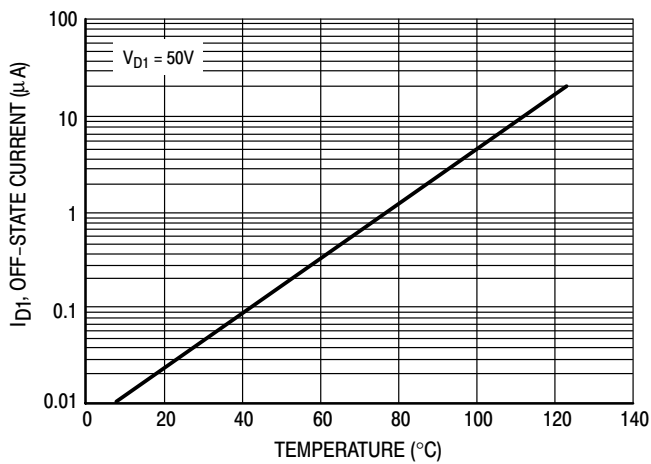
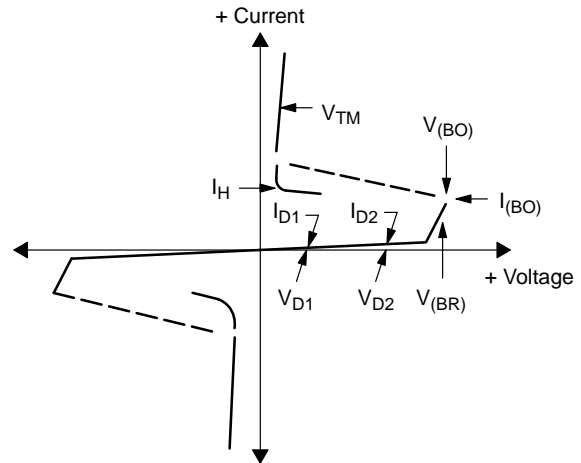


Figure 1. Off-State Current versus Temperature

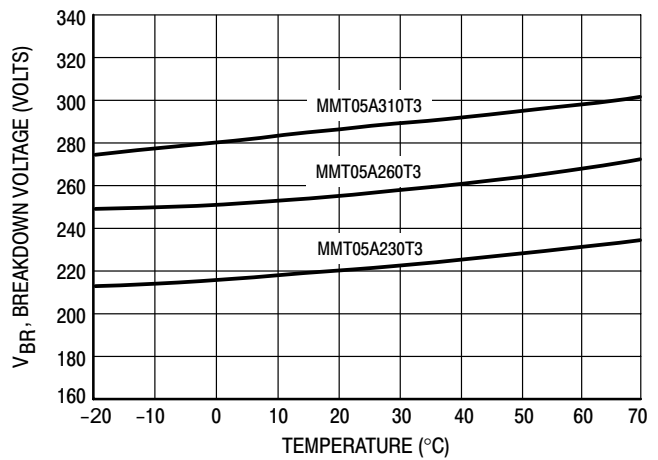
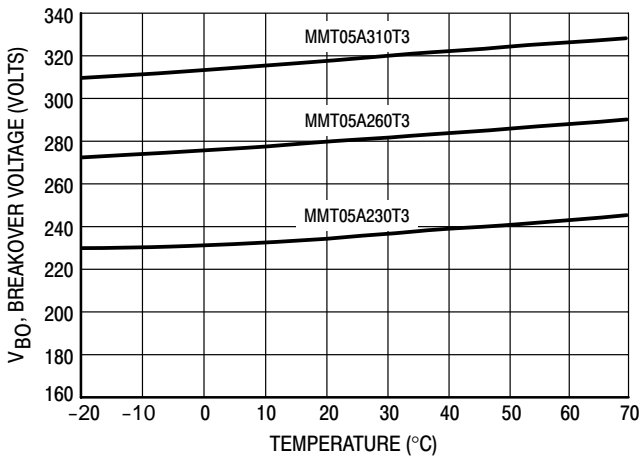
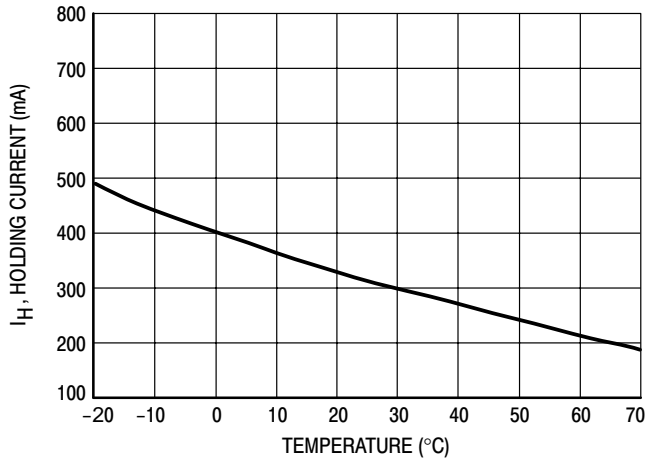


Figure 2. Typical Breakdown Voltage versus Temperature

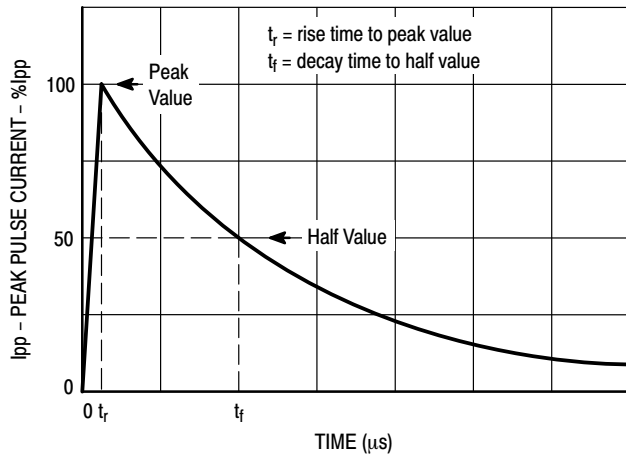
**MMT05A230T3, MMT05A260T3, MMT05A310T3**



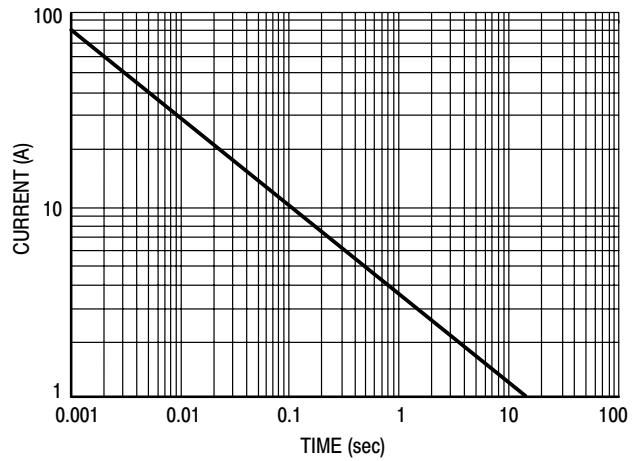
**Figure 3. Typical Breakover Voltage versus Temperature**



**Figure 4. Typical Holding Current versus Temperature**

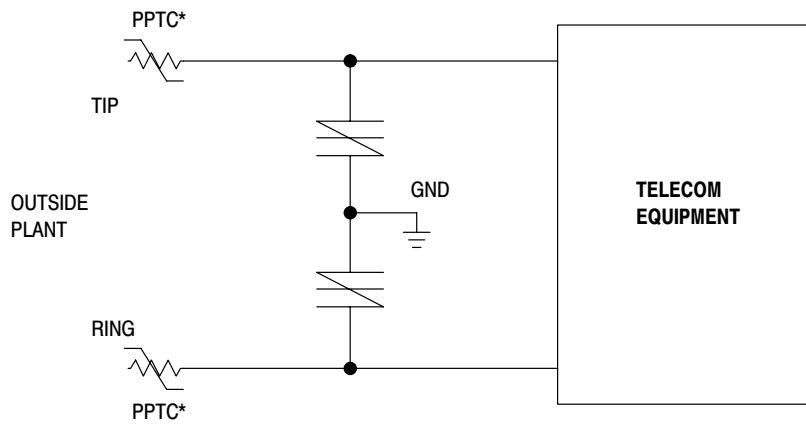
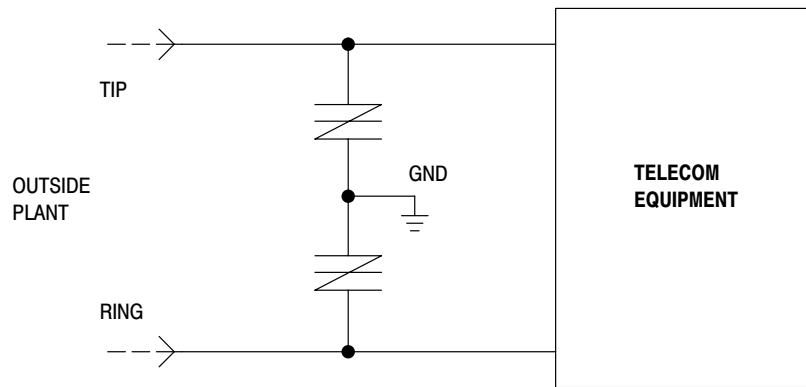


**Figure 5. Exponential Decay Pulse Waveform**

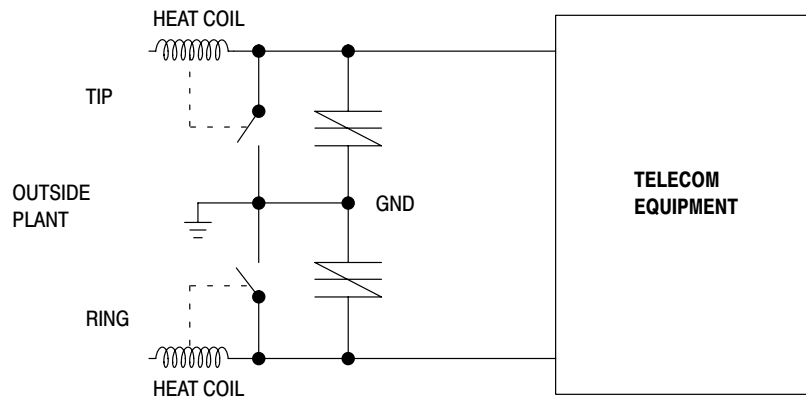


**Figure 6. Peak Surge On-State Current versus Surge Current Duration, Sinusoidal Waveform**

# MMT05A230T3, MMT05A260T3, MMT05A310T3



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

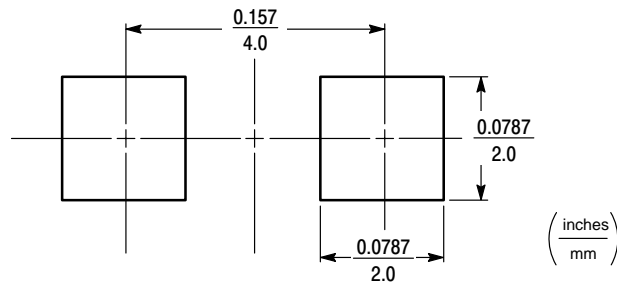


# MMT05A230T3, MMT05A260T3, MMT05A310T3

## MINIMUM RECOMMENDED FOOTPRINT FOR SURFACE MOUNTED APPLICATIONS

Surface mount board layout is a critical portion of the total design. The footprint for the semiconductor packages must be the correct size to insure proper solder connection

interface between the board and the package. With the correct pad geometry, the packages will self align when subjected to a solder reflow process.

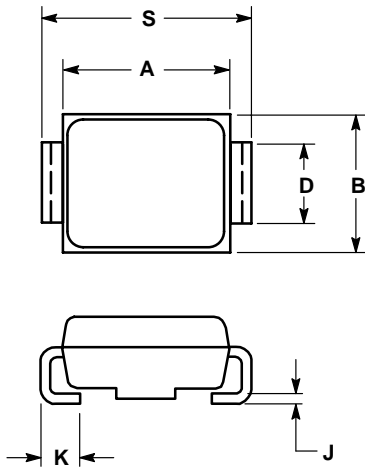


**SMA**

# MMT05A230T3, MMT05A260T3, MMT05A310T3

## PACKAGE DIMENSIONS

**SMA**  
(No Polarity)  
CASE 403D-01  
ISSUE O



- NOTES:  
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.  
2. CONTROLLING DIMENSION: INCH.

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	0.105	1.91	2.67
D	0.050	0.064	1.27	1.63
H	0.004	0.008	0.10	0.20
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

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