MMT05B230T3, MMT05B260T3, MMT05B310T3

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 µsec, for Controlled Temperature Environments
- The MMT05B230T3 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)
- ℛℒ Indicates UL Registered – File #E210057
- Device Marking: MMT05B230T3: RPBF; MMT05B260T3: RPBG; MMT05B310T3: RPBJ, and Date Code

MAXIMUM RATINGS (T$_J$ = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Off–State Voltage – Maximum 　　MMT05B230T3 　　MMT05B260T3 　　MMT05B310T3	V$_{DM}$	± 170 ± 200 ± 270	Volts
Maximum Pulse Surge Short Circuit Current Non–Repetitive Double Exponential Decay Waveform (Notes 1. and 2.) 　10 x 1000 µsec (–25°C Initial Temperature) 　　8 x 20 µsec 　　10 x 160 µsec 　　10 x 560 µsec	 I$_{PPS1}$ I$_{PPS2}$ I$_{PPS3}$ I$_{PPS4}$	 ± 50 ± 150 ± 100 ± 70	A(pk)
Maximum Non–Repetitive Rate of Change of On–State Current Double Exponential Waveform, R = 1.0, L = 1.5 µH, C = 1.67 µF, I$_{pk}$ = 110A	di/dt	± 150	A/µs

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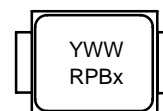

ON Semiconductor™

BIDIRECTIONAL TSPD (ℛℒ)
50 AMP SURGE
265 thru 365 VOLTS

MT1 ○———|N|———○ MT2

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

MARKING DIAGRAMS

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

ORDERING INFORMATION

Device	Package	Shipping
MMT05B230T3	SMB	12mm Tape and Reel (2.5K/Reel)
MMT05B260T3	SMB	12mm Tape and Reel (2.5K/Reel)
MMT05B310T3	SMB	12mm Tape and Reel (2.5K/Reel)

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
Instantaneous Peak Power Dissipation (I_{pk} = 50 A, 10x1000 μsec @ 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°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 V/μs, I_{SC} = 1.0 A, Vdc = 1000 V)	MMT05B230T3 MMT05B260T3 MMT05B310T3	$V_{(BO)}$	– – –	– – –	265 320 365	Volts
(+65°C)	MMT05B230T3 MMT05B260T3 MMT05B310T3		– – –	– – –	280 340 400	

Breakover Voltage (Both polarities)
  (f = 60 Hz, I_{SC} = 1.0 A(rms), V_{OC} = 1000 V(rms),
  R_I = 1.0 kΩ, t = 0.5 cycle) (Note 3.)
	MMT05B230T3
	MMT05B260T3
	MMT05B310T3
		$V_{(BO)}$	–
			–
			–
				–
				–
				–
					265
					320
					365
						Volts

(+65°C)	MMT05B230T3 MMT05B260T3 MMT05B310T3		– – –	– – –	280 340 400	
Breakover Voltage Temperature Coefficient		$dV_{(BO)}/dT_J$	–	0.08	–	%/°C
Breakdown Voltage ($I_{(BR)}$ = 1.0 mA) Both polarities	MMT05B230T3 MMT05B260T3 MMT05B310T3	$V_{(BR)}$	– – –	190 240 280	– – –	Volts
Off State Current (V_{D1} = 50 V) Both polarities (V_{D2} = V_{DM}) Both polarities		I_{D1} I_{D2}	– –	– –	2.0 5.0	μA
On–State Voltage (I_T = 1.0 A) (PW ≤ 300 μs, Duty Cycle ≤ 2%) (Note 3.)		V_T	–	1.53	3.0	Volts
Breakover Current (f = 60 Hz, V_{DM} = 1000 V(rms), R_S = 1.0 kΩ) Both polarities		I_{BO}	–	230	–	mA
Holding Current (Both polarities) (Note 3.) V_S = 500 Volts; I_T (Initiating Current) = ± 1.0 Amp (+65°C)		I_H	175 130	340 –	– –	mA
Critical Rate of Rise of Off–State Voltage (Linear waveform, V_D = Rated V_{BR}, T_J = 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_O	– –	22 53	– 75	pF

3. Measured under pulse conditions to reduce heating.

MMT05B230T3, MMT05B260T3, MMT05B310T3

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
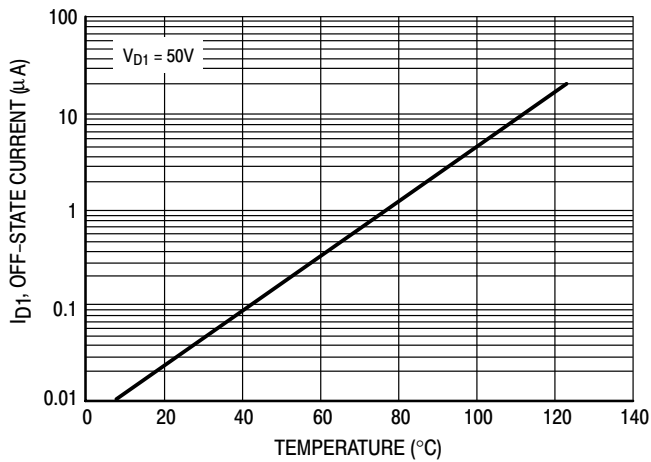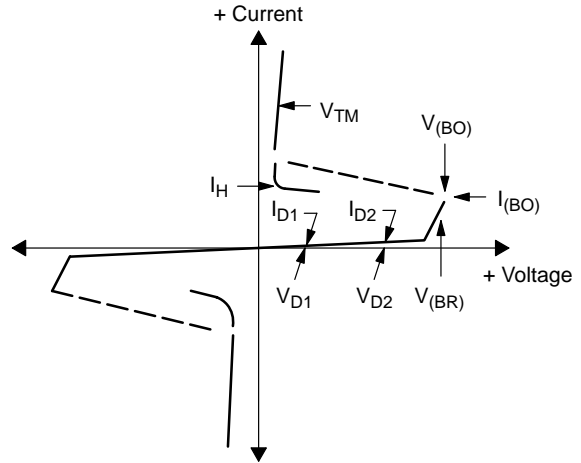
Figure 1. Off–State Current versus Temperature
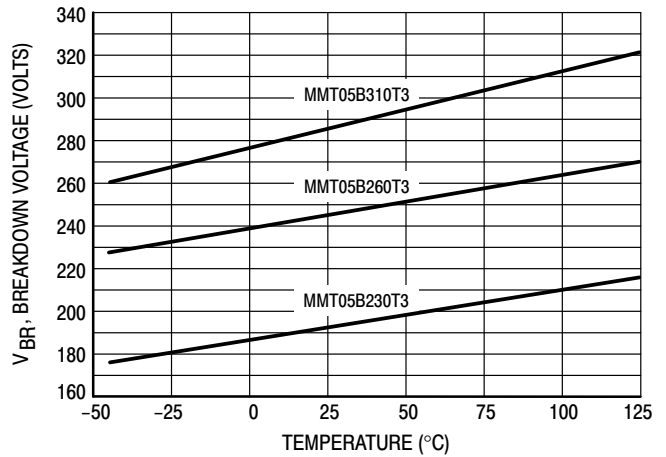
Figure 2. Breakdown Voltage versus Temperature
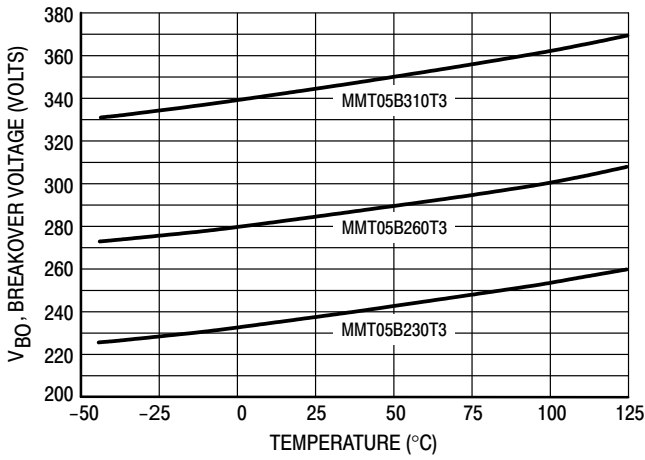
Figure 3. Breakover Voltage versus Temperature
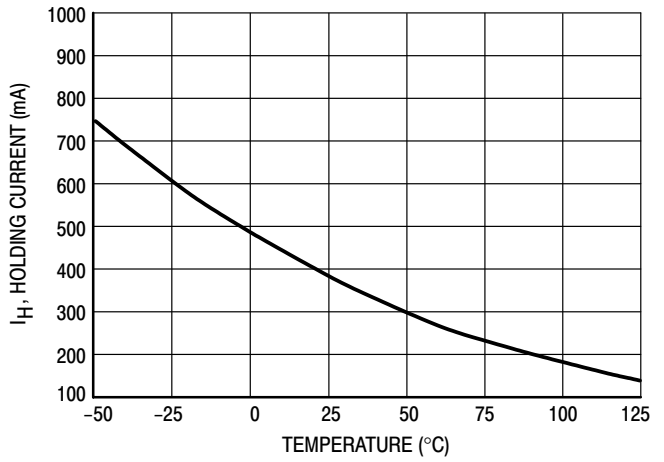
Figure 4. Holding Current versus Temperature
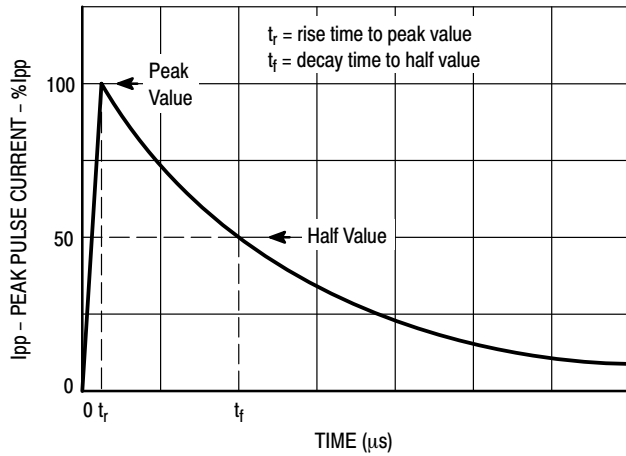
Figure 5. Exponential Decay Pulse Waveform
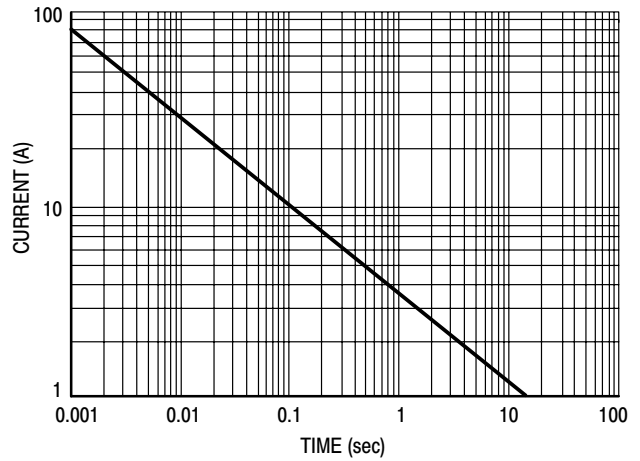
Figure 6. Peak Surge On–State Current versus Surge Current Duration, Sinusoidal Waveform

TIP

OUTSIDE
PLANT

GND

RING

TELECOM
EQUIPMENT

PPTC*

TIP

OUTSIDE
PLANT

GND

RING

PPTC*

TELECOM
EQUIPMENT
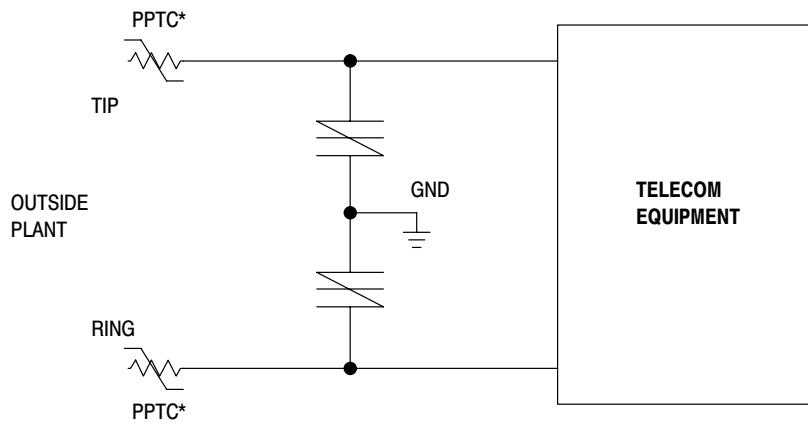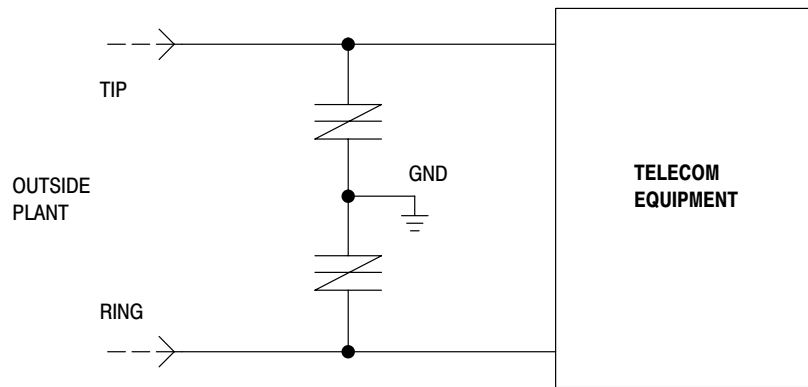
*Polymeric PTC (positive temperature coefficient) overcurrent protection device

HEAT COIL

TIP

OUTSIDE
PLANT

GND

RING

HEAT COIL

TELECOM
EQUIPMENT
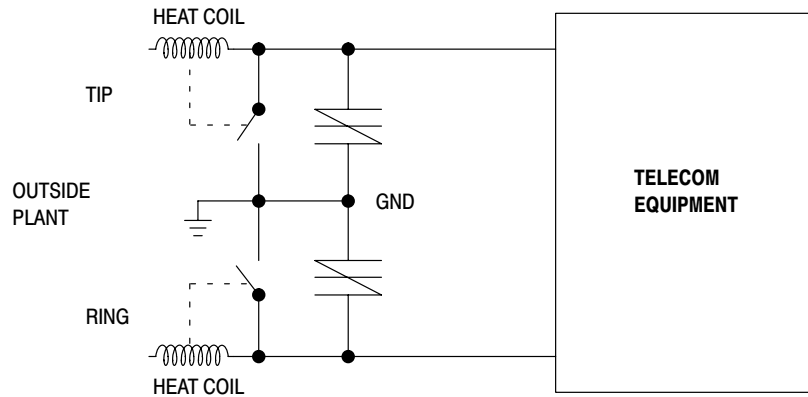
MINIMUM RECOMMENDED FOOTPRINT FOR SURFACE MOUNTED APPLICATIONS

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.

$$\frac{0.089}{2.261}$$

$$\frac{0.108}{2.743}$$

$$\frac{0.085}{2.159}$$
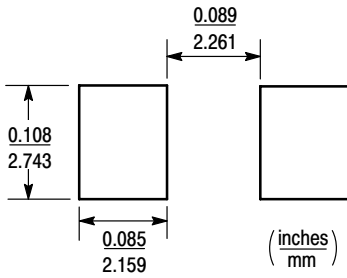
$\left(\frac{\text{inches}}{\text{mm}}\right)$

SMB

PACKAGE DIMENSIONS

SMB
(No Polarity)
(Essentially JEDEC DO–214AA)
CASE 403C–01
ISSUE O
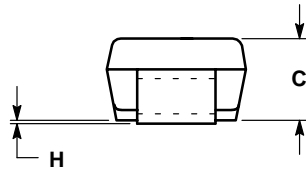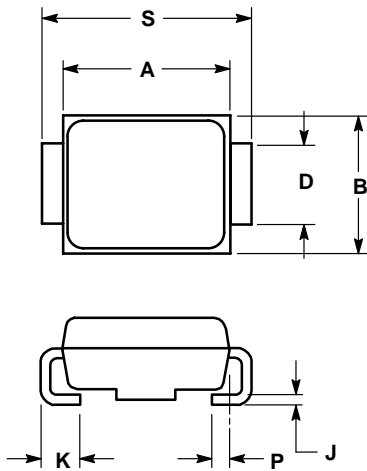
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. D DIMENSION SHALL BE MEASURED WITHIN DIMENSION P.

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

<u>Notes</u>

MMT05B230T3, MMT05B260T3, MMT05B310T3

MMT05B230T3/D