Designer's™ Data Sheet

Thyristor Surge Protectors

High Voltage Bidirectional TSPD

MMT10B230T3
MMT10B280T3
MMT10B310T3

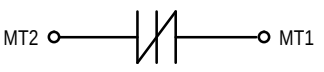
Motorola preferred devices

BIDIRECTIONAL THYRISTOR SURGE PROTECTOR

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.

- Outstanding High Surge Current Capability: 150 Amps 10x1000 μsec Guaranteed at the extended temp range of –20°C to 65°C
- 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 μsec waveforms
- Supplied in 12mm Tape and Reel, 2500 units per reel. (T3 suffix)



CASE 403A–03
SMB

DEVICE RATINGS: @ 25°C unless otherwise noted

Parameter	Symbol	Value	Unit
Off–State Voltage — Maximum	V_{DM}		Volts
MMT10B230T3		±170	
MMT10B280T3		±200	
MMT10B310T3		±240	
Minimum Impulse Surge Short Circuit Current Non–Repetitive double exponential wave, Notes 1, 2			A(pk)
10 x 1000 μsec (–20°C to +65°C)	I_{PPS1}	±150	
2 x 10 μsec	I_{PPS2}	±500	
10 x 700 μsec	I_{PPS3}	±180	
Maximum Non–Repetitive Rate of Change of On–State Current Double Exponential Waveform, R = 2.0, L = 1.5 μH, C = 1.67 μF, I_{pk} = 110A	di/dt	±100	A/μs

DEVICE THERMAL RATINGS

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} = 100A, 10x100 μsec @ 25°C)	P_{PK}	4000	W

Designer's Data for "Worst Case" Conditions — The Designer's Data Sheet permits the design of most circuits entirely from the information presented. SOA Limit curves — representing boundaries on device characteristics — are given to facilitate "worst case" design.

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

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Characteristics		Symbol	Min	Typ	Max	Unit
Breakover Voltage (Both polarities)		$V_{(BO)}$				Volts
(dv/dt = 100 V/μs, I_{SC} = 1.0 A, Vdc = 1000 V)	MMT10B230T3		—	230	265	
	MMT10B280T3		—	280	320	
	MMT10B310T3		—	310	350	
(+65°C)						
	MMT10B230T3		—	—	290	
	MMT10B280T3		—	—	340	
	MMT10B310T3		—	—	370	
Breakover Voltage (Both polarities)		$V_{(BO)}$				Volts
(f = 60 Hz, I_{SC} = 1.0 A(rms), V_{OC} = 1000 V(rms),	MMT10B230T3		—	230	265	
R_I = 1.0 kΩ, t = 0.5 cycle, Note 2)	MMT10B280T3		—	280	320	
	MMT10B310T3		—	310	350	
(+65°C)						
	MMT10B230T3		—	—	290	
	MMT10B280T3		—	—	340	
	MMT10B310T3		—	—	370	
Breakover Voltage Temperature Coefficient		$dV_{(BO)}/dT_J$	—	0.08	—	%/°C
Breakdown Voltage ($I_{(BR)}$ = 1.0 mA) Both polarities		$V_{(BR)}$				Volts
	MMT10B230T3		190	—	—	
	MMT10B280T3		220	—	—	
	MMT10B310T3		265	—	—	
Off State Current (V_{D1} = 50 V) Both polarities		I_{D1}	—	—	2.0	μA
(V_{D2} = V_{DM}) Both polarities		I_{D2}	—	—	5.0	
On–State Voltage (I_T = 1.0 A)		V_T	—	1.53	5.0	Volts
(PW ≤ 300 μs, Duty Cycle ≤ 2%, Note 2)						
Breakover Current (f = 60 Hz, V_{DM} = 1000 V(rms), R_S = 1.0 kΩ)		I_{BO}	—	260	—	mA
Both polarities						
Holding Current (Both polarities)	Note 2	I_H	175	270	—	mA
	(+65°C)		130	—	—	
Critical Rate of Rise of Off–State Voltage		dv/dt	2000	—	—	V/μs
(Linear waveform, V_D = Rated V_{BR}, T_J = 25°C)						
Capacitance (f = 1.0 MHz, 50 V, 1.0 V)		C_O	—	65	—	pF
(f = 1.0 MHz, 2.0 V, 15 mV)			—	160	200	

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

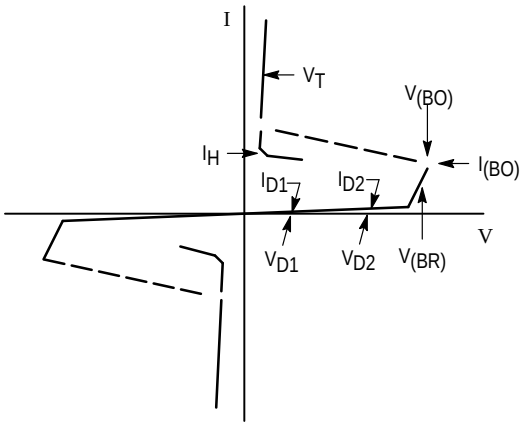


Figure 1. Voltage – Current Characteristics

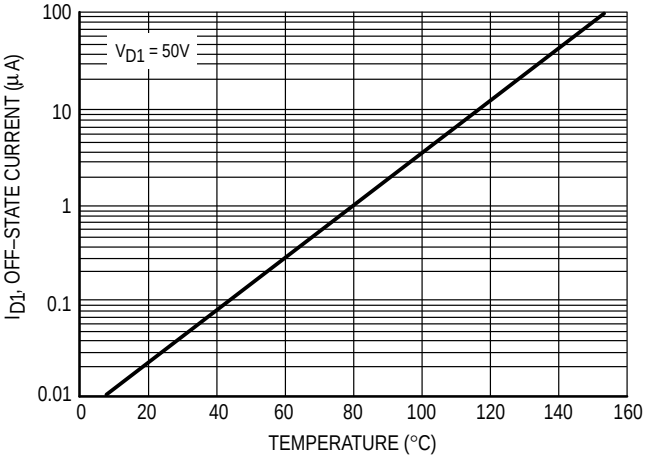


Figure 2. Off–State Current versus Temperature

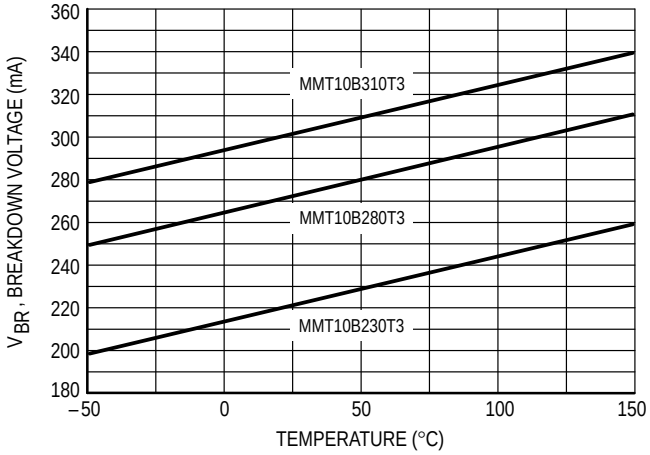


Figure 3. Breakdown Voltage versus Temperature

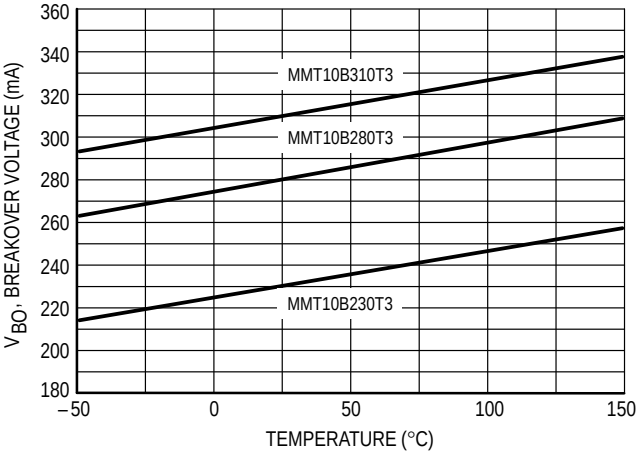


Figure 4. Breakover Voltage versus Temperature

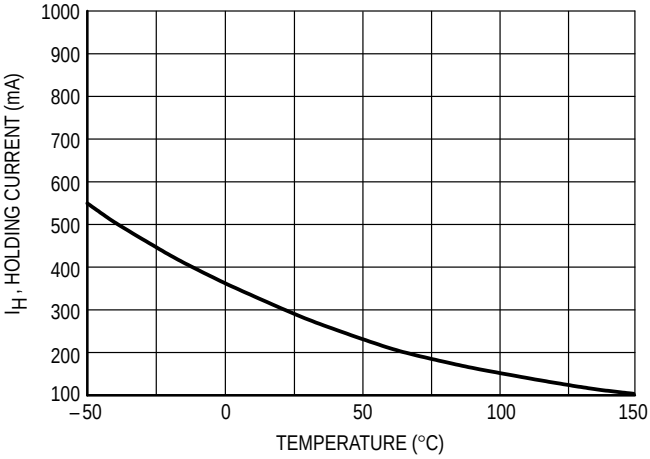


Figure 5. Holding Current versus Temperature

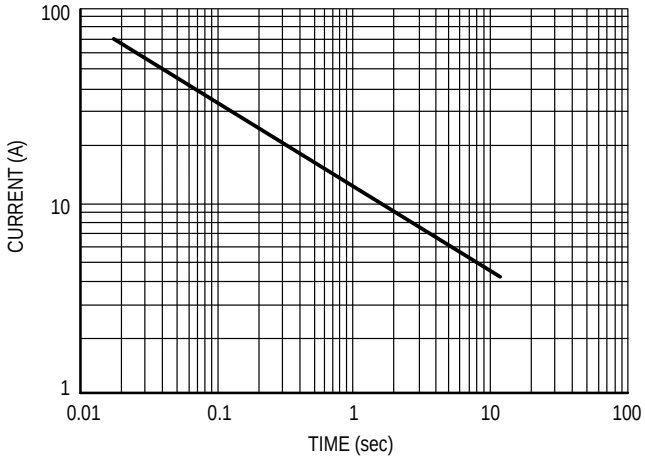
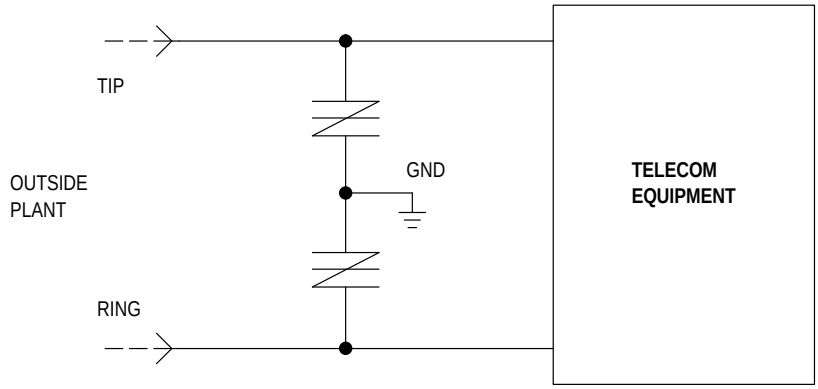


Figure 6. Peak Surge On–State Current versus Surge Current Duration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OUTSIDE
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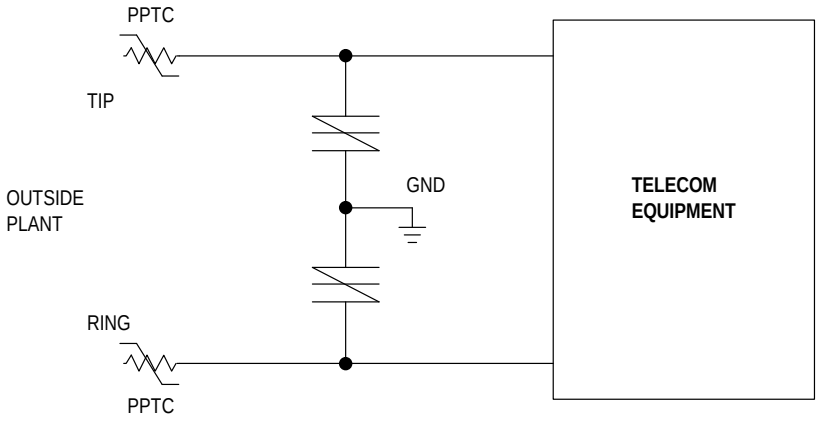
TELECOM
EQUIPMENT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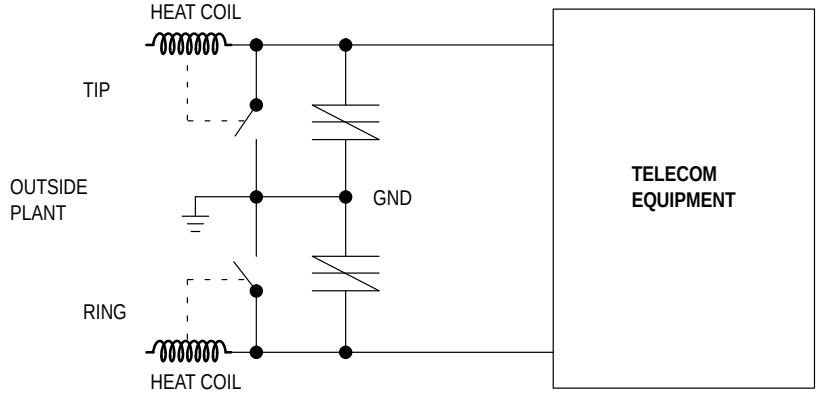
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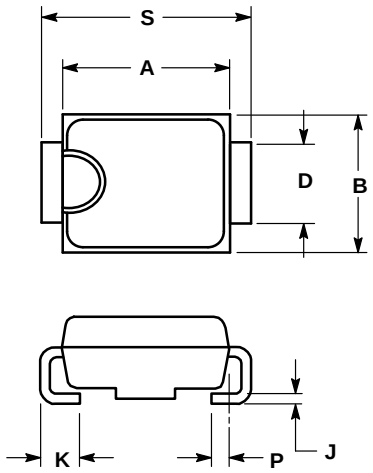
PACKAGE DIMENSIONS



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. D DIMENSION SHALL BE MEASURED WITHIN DIMENSION P.

	INCHES		MILLIMETERS	
DIM	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

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ISSUE C

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