

Designer's™ Data Sheet

Thyristor Surge Protectors

High Voltage Bidirectional TSPD

MMT10B230T3
MMT10B280T3
MMT10B310T3

Motorola preferred devices

**BIDIRECTIONAL
THYRISTOR SURGE
PROTECTOR**



CASE 403A-03
SMB

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 μ sec 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 μ sec waveforms
- Supplied in 12mm Tape and Reel, 2500 units per reel. (T3 suffix)

DEVICE RATINGS: @ 25°C unless otherwise noted

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

DEVICE THERMAL RATINGS

Operating Temperature Range Blocking or Conducting State	T_{J1}	-40 to $+125$	$^{\circ}\text{C}$
Overload Junction Temperature — Maximum Conducting State Only	T_{J2}	$+175$	$^{\circ}\text{C}$
Instantaneous Peak Power Dissipation ($I_{pk} = 100\text{A}$, 10x100 μ sec @ 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.

MMT10B230T3 MMT10B280T3 MMT10B310T3

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

Characteristics	Symbol	Min	Typ	Max	Unit
Breakover Voltage (Both polarities) (dv/dt = 100 V/μs, I _{SC} = 1.0 A, V _{dc} = 1000 V) (+65°C)	V _(BO)	—	230 280 310	265 320 350	Volts
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 2) (+65°C)	V _(BO)	—	230 280 310	265 320 350	Volts
Breakover Voltage Temperature Coefficient	dV _(BO) /dT _J	—	0.08	—	%/°C
Breakdown Voltage (I _(BR) = 1.0 mA) Both polarities	V _(BR)	190 220 265	— — —	— — —	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 2)	V _T	—	1.53	5.0	Volts
Breakover Current (f = 60 Hz, V _{DM} = 1000 V(rms), R _S = 1.0 kΩ) Both polarities	I _{BO}	—	260	—	mA
Holding Current (Both polarities) (+65°C)	I _H	175 130	270 —	— —	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 V, 1.0 V) (f = 1.0 MHz, 2.0 V, 15 mV)	C _O	— —	65 160	— 200	pF

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

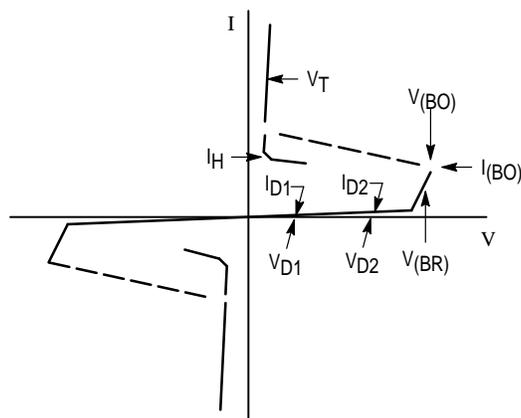


Figure 1. Voltage – Current Characteristics

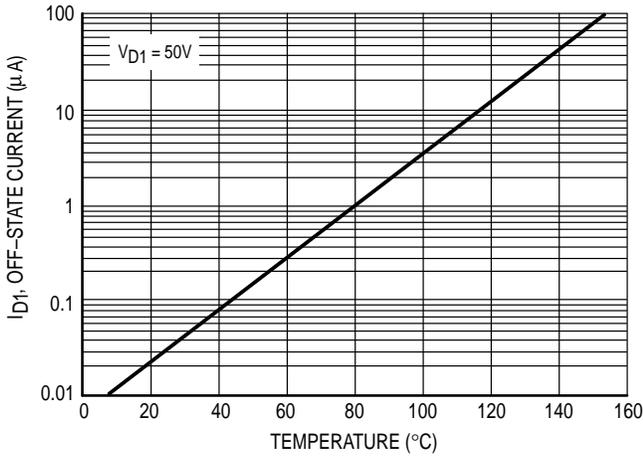


Figure 2. Off-State Current versus Temperature

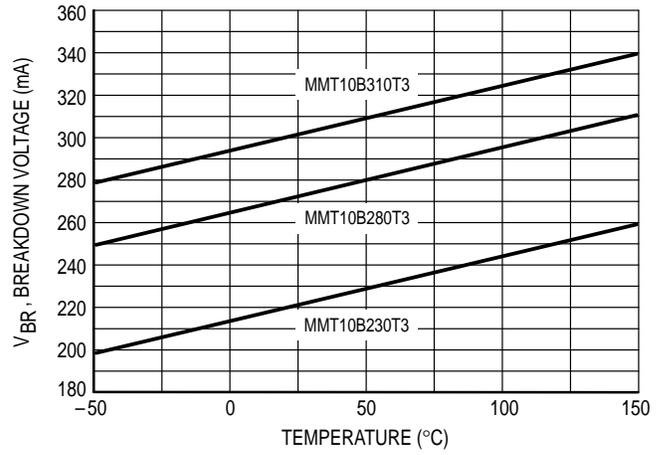


Figure 3. Breakdown Voltage versus Temperature

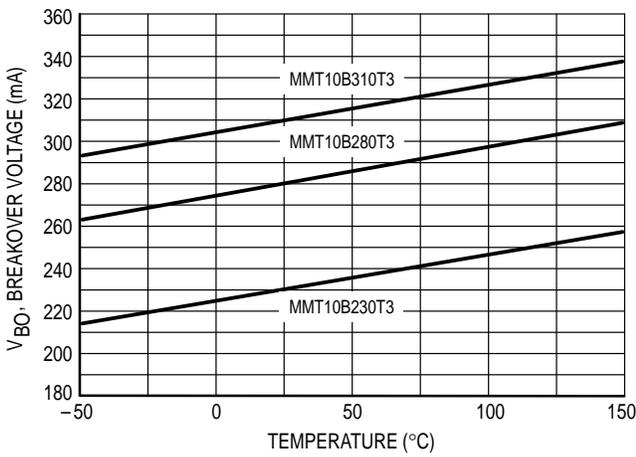


Figure 4. Breakover Voltage versus Temperature

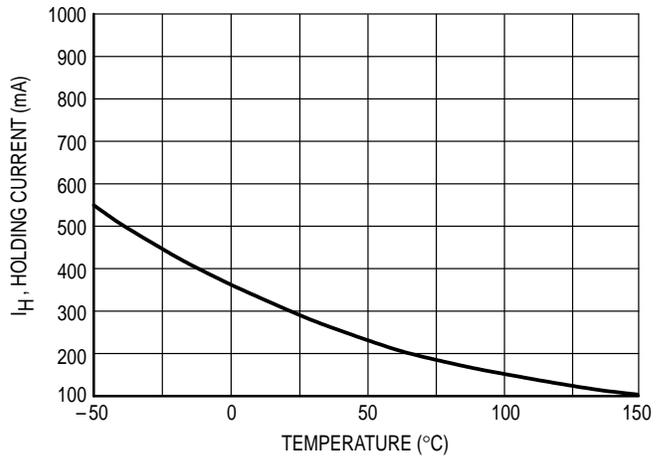


Figure 5. Holding Current versus Temperature

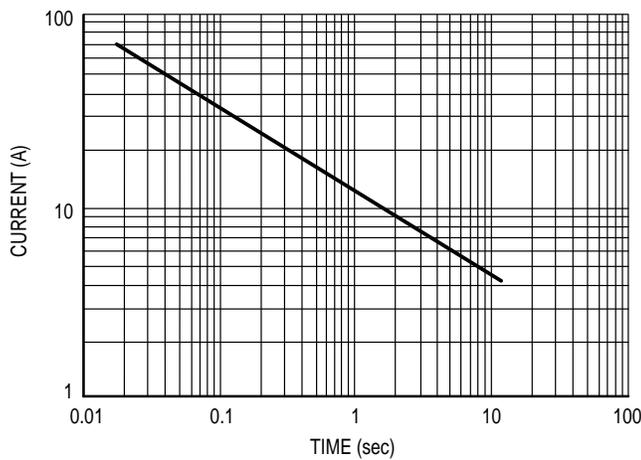
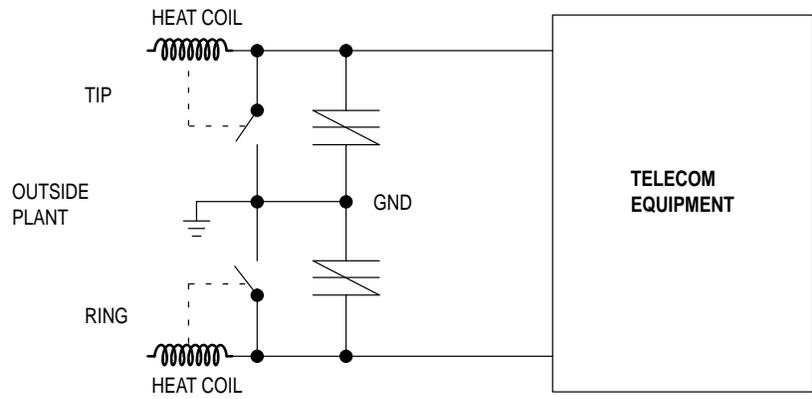
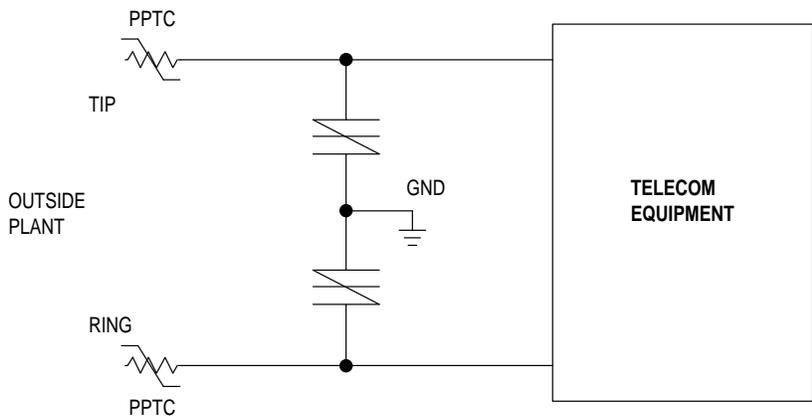
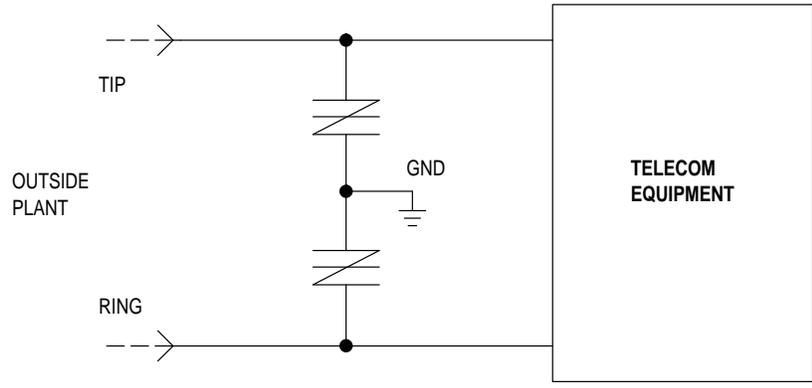
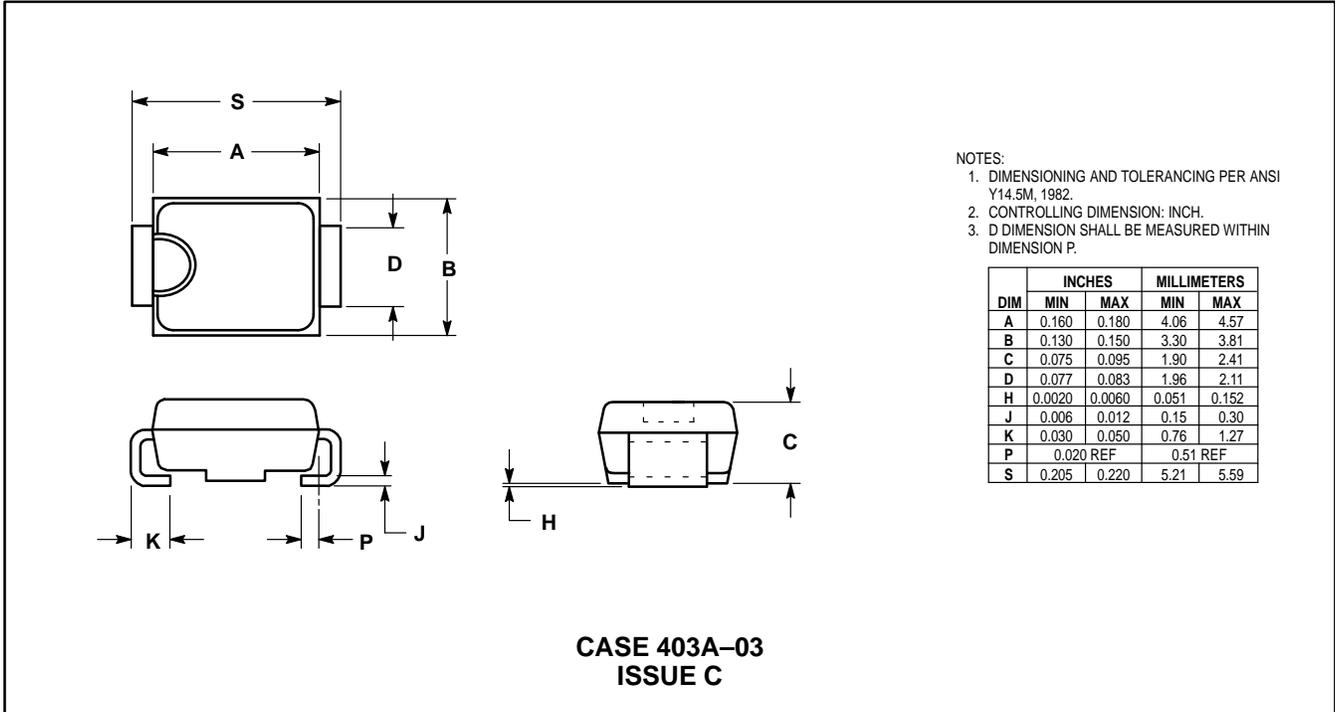


Figure 6. Peak Surge On-State Current versus Surge Current Duration

MMT10B230T3 MMT10B280T3 MMT10B310T3



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