

# Designer's™ Data Sheet

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

**MMT05B230T3**  
**MMT05B280T3**  
**MMT05B330T3**

Motorola preferred devices

**BIDIRECTIONAL**  
**THYRISTOR SURGE**  
**PROTECTOR**



**CASE 403A-03**  
**SMB**

#### DEVICE RATINGS: @ 25°C unless otherwise noted

Parameter	Symbol	Value	Unit
Off-State Voltage — Maximum  MMT05B230T3 MMT05B280T3 MMT05B330T3	$V_{DM}$	$\pm 165$ $\pm 215$ $\pm 240$	Volts
Impulse Surge Short Circuit Current Maximum Non-Repetitive double exponential wave, Notes 1, 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, R = 1.0, L = 1.5 $\mu$ H, C = 1.67 $\mu$ F, $I_{PK} = 110$ A	$di/dt$	$\pm 150$	A/ $\mu$ s

#### 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 ( $I_{PK} = 50$ A, 10x100 $\mu$ sec @ 25°C)	$P_{PK}$	2000	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.

# MMT05B230T3 MMT05B280T3 MMT05B330T3

## ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25°C unless otherwise noted)

Characteristics	Symbol	Min	Typ	Max	Unit
Breakover Voltage (Both polarities) (dv/dt = 100 V/μs, I <sub>SC</sub> = 1.0 A, V <sub>dc</sub> = 1000 V)  (+65°C)	V <sub>(BO)</sub>	195 240 280	238 283 340	265 320 380	Volts
Breakover Voltage (Both polarities) (f = 60 Hz, I <sub>SC</sub> = 1.0 A(rms), V <sub>OC</sub> = 1000 V(rms), R <sub>I</sub> = 1.0 kΩ, t = 0.5 cycle, Note 2)  (+65°C)	V <sub>(BO)</sub>	195 240 280	238 283 340	265 320 380	Volts
Breakover Voltage Temperature Coefficient	dV <sub>(BO)</sub> /dT <sub>J</sub>	—	0.08	—	%/°C
Breakdown Voltage (I <sub>(BR)</sub> = 1.0 mA) Both polarities	V <sub>(BR)</sub>	175 225 265	— — —	— — —	Volts
Off State Current (V <sub>D1</sub> = 50 V) Both polarities (V <sub>D2</sub> = V <sub>DM</sub> ) Both polarities	I <sub>D1</sub> I <sub>D2</sub>	— —	— —	2.0 5.0	μA
On-State Voltage (I <sub>T</sub> = 1.0 A) (PW ≤ 300 μs, Duty Cycle ≤ 2%, Note 2)	V <sub>T</sub>	—	1.53	3.0	Volts
Breakover Current (f = 60 Hz, V <sub>DM</sub> = 1000 V(rms), R <sub>S</sub> = 1.0 kΩ) Both polarities	I <sub>BO</sub>	—	230	—	mA
Holding Current (Both polarities) Note 2 (+65°C)	I <sub>H</sub>	175 130	340 —	— —	mA
Critical Rate of Rise of Off-State Voltage (Linear waveform, V <sub>D</sub> = Rated V <sub>BR</sub> , T <sub>J</sub> = 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 <sub>O</sub>	— —	22 53	— 75	pF

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

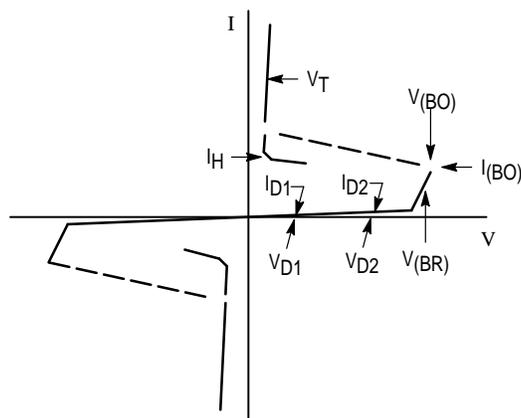


Figure 1. Voltage – Current Characteristics

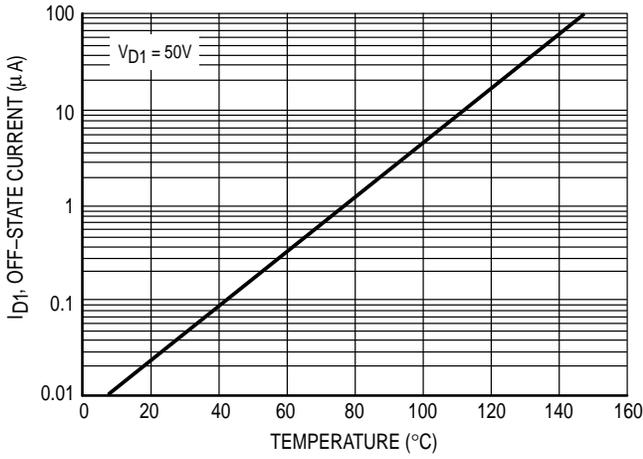


Figure 2. Off-State Current versus Temperature

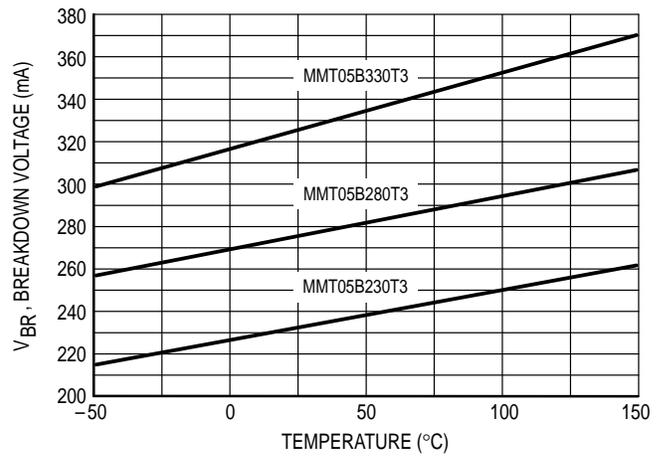


Figure 3. Breakdown Voltage versus Temperature

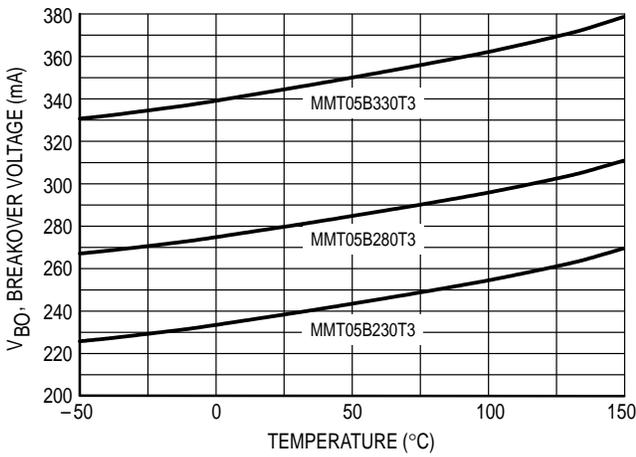


Figure 4. Breakover Voltage versus Temperature

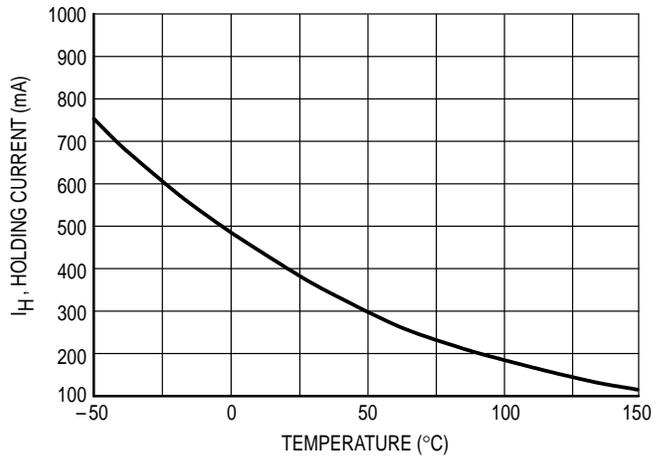


Figure 5. Holding Current versus Temperature

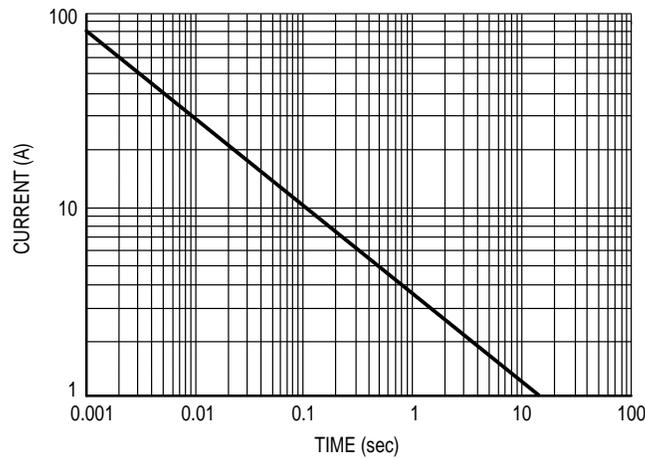
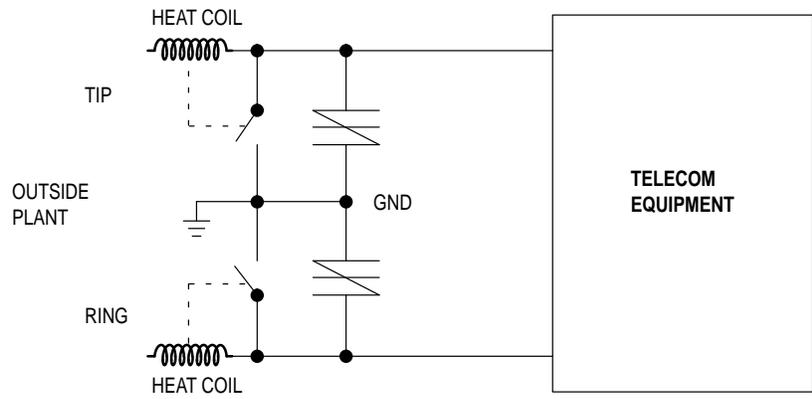
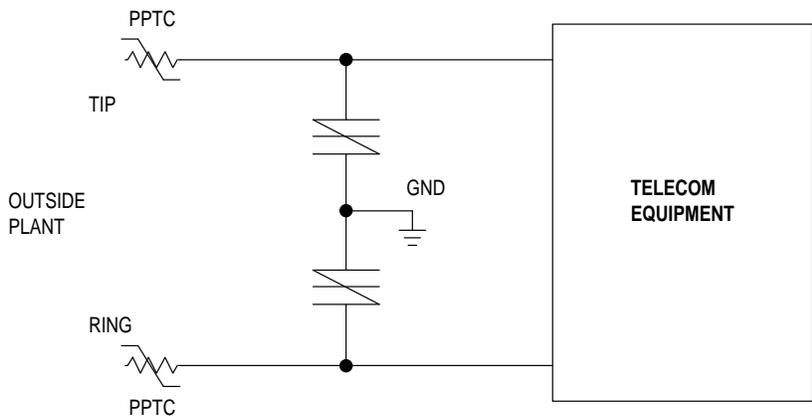
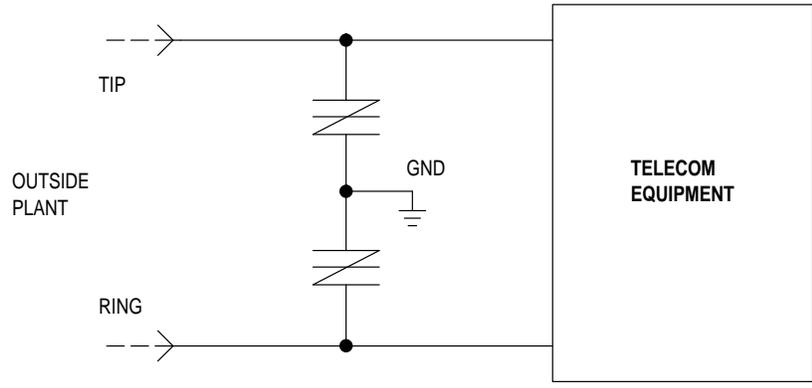
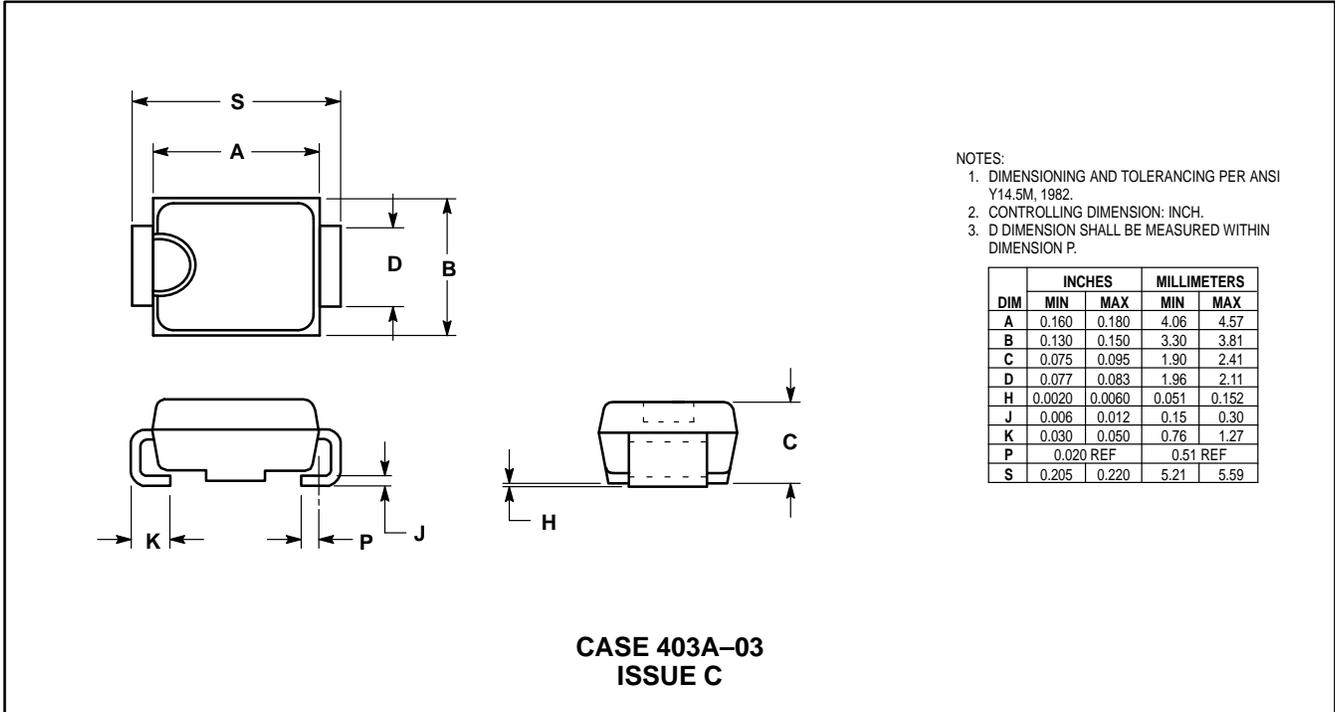


Figure 6. Peak Surge On-State Current versus Surge Current Duration

**MMT05B230T3 MMT05B280T3 MMT05B330T3**



PACKAGE DIMENSIONS



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**USA/EUROPE/Locations Not Listed:** Motorola Literature Distribution;  
P.O. Box 5405, Denver, Colorado 80217. 1-303-675-2140 or 1-800-441-2447

**JAPAN:** Motorola Japan Ltd.; SPD, Strategic Planning Office, 141,  
4-32-1 Nishi-Gotanda, Shinagawa-ku, Tokyo, Japan. 81-3-5487-8488

**Customer Focus Center: 1-800-521-6274**

**Mfax™:** RMFAX0@email.sps.mot.com – TOUCHTONE 1-602-244-6609  
Motorola Fax Back System – US & Canada ONLY 1-800-774-1848  
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**ASIA/PACIFIC:** Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,  
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298

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