

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 μ sec, 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)
- $\mathcal{N}$ Indicates UL Registered – File #E210057
- Device Marking: MMT05B230T3: RPBx; MMT05B260T3: RPBg; MMT05B310T3: RPBj, and Date Code

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ 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 μ sec (-25°C Initial Temperature) 8 x 20 μ sec 10 x 160 μ sec 10 x 560 μ sec	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, $R = 1.0$, $L = 1.5 \mu\text{H}$, $C = 1.67 \mu\text{F}$, $I_{pk} = 110\text{A}$	di/dt	± 150	A/ μ s

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



ON Semiconductor™

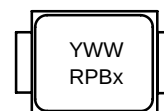
<http://onsemi.com>

BIDIRECTIONAL TSPD ($\mathcal{N}$)
50 AMP SURGE
265 thru 365 VOLTS



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

MARKING DIAGRAMS



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.

MMT05B230T3, MMT05B260T3, MMT05B310T3

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 μ sec @ 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 ($T_J = 25^\circ\text{C}$ 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) ($dv/dt = 100$ V/ μ s, $I_{SC} = 1.0$ A, $V_{dc} = 1000$ V) (+65°C) MMT05B230T3 MMT05B260T3 MMT05B310T3 MMT05B230T3 MMT05B260T3 MMT05B310T3	$V_{(BO)}$	– – – – – –	– – – – – –	265 320 365 280 340 400	Volts
Breakover Voltage (Both polarities) ($f = 60$ Hz, $I_{SC} = 1.0$ A(rms), $V_{OC} = 1000$ V(rms), $R_I = 1.0$ k Ω , $t = 0.5$ cycle) (Note 3.) (+65°C) MMT05B230T3 MMT05B260T3 MMT05B310T3 MMT05B230T3 MMT05B260T3 MMT05B310T3	$V_{(BO)}$	– – – – – –	– – – – – –	265 320 365 280 340 400	Volts
Breakover Voltage Temperature Coefficient	$dV_{(BO)}/dT_J$	–	0.08	–	%/°C
Breakdown Voltage ($I_{(BR)} = 1.0$ 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	μ A
On-State Voltage ($I_T = 1.0$ A) ($PW \leq 300$ μ s, Duty Cycle $\leq 2\%$) (Note 3.)	V_T	–	1.53	3.0	Volts
Breakover Current ($f = 60$ Hz, $V_{DM} = 1000$ V(rms), $R_S = 1.0$ k Ω) 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, $V_D = \text{Rated } V_{BR}$, $T_J = 25^\circ\text{C}$)	dv/dt	2000	–	–	V/ μ s
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

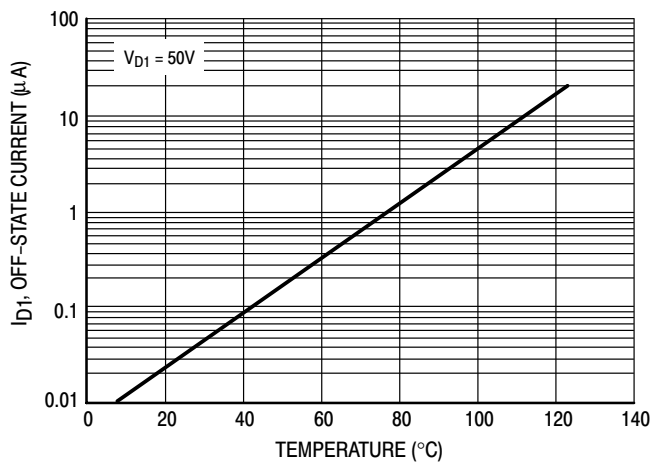
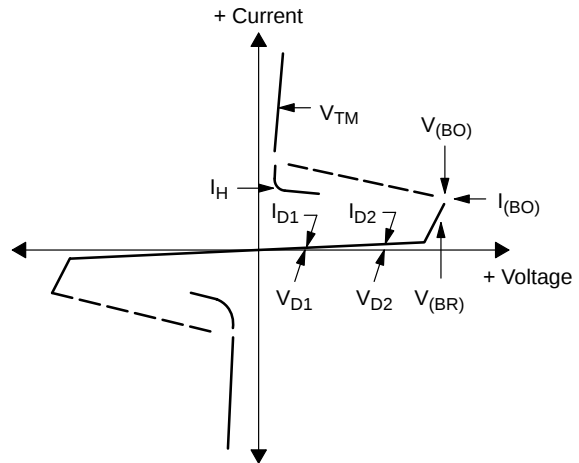


Figure 1. Off-State Current versus Temperature

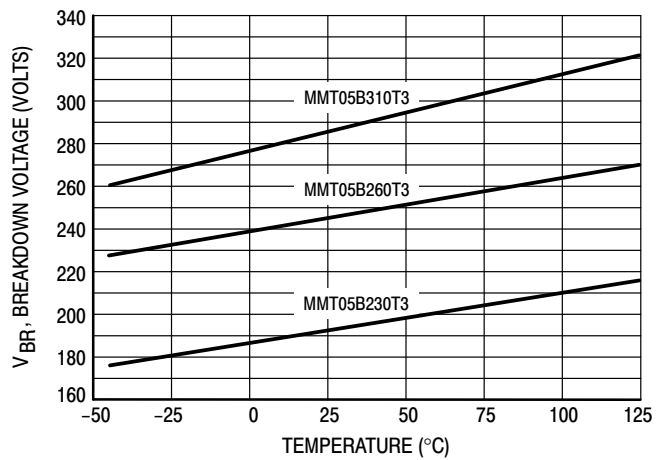


Figure 2. Breakdown Voltage versus Temperature

MMT05B230T3, MMT05B260T3, MMT05B310T3

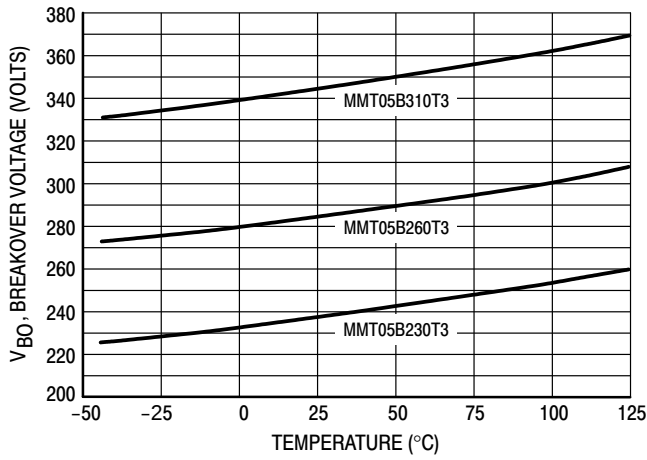


Figure 3. Breakover Voltage versus Temperature

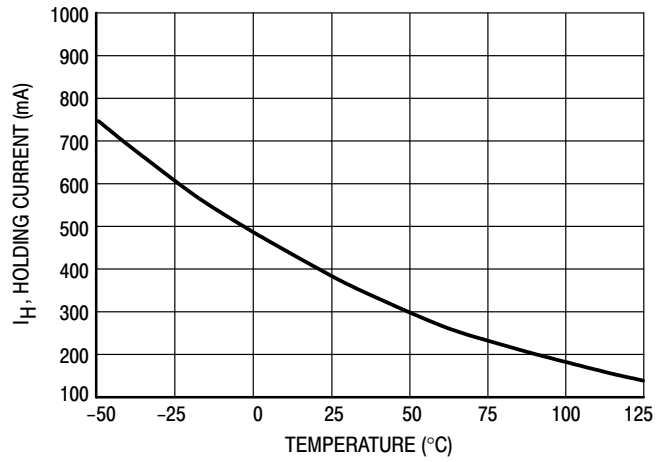


Figure 4. Holding Current versus Temperature

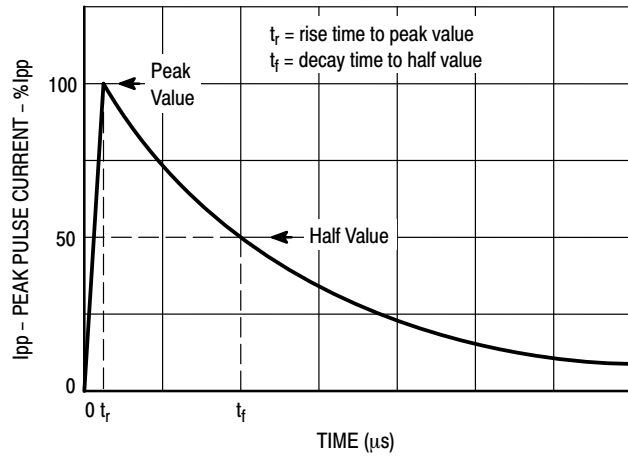


Figure 5. Exponential Decay Pulse Waveform

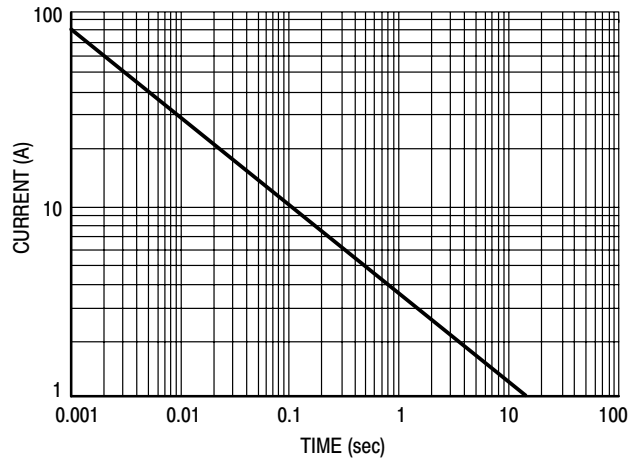
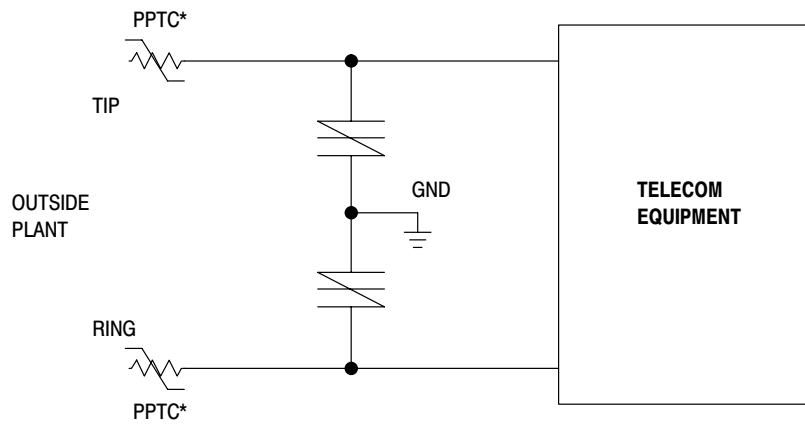
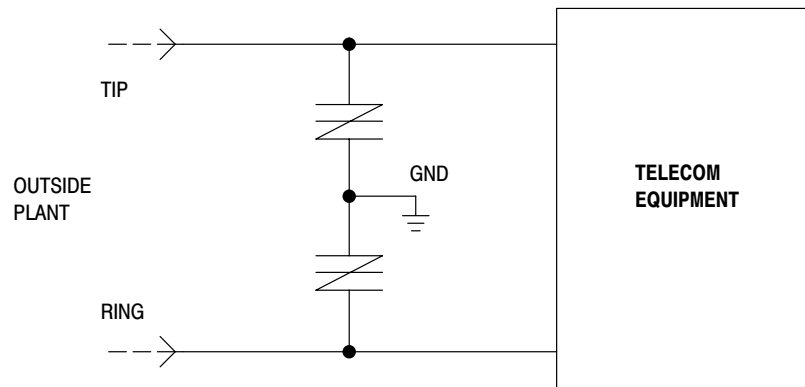
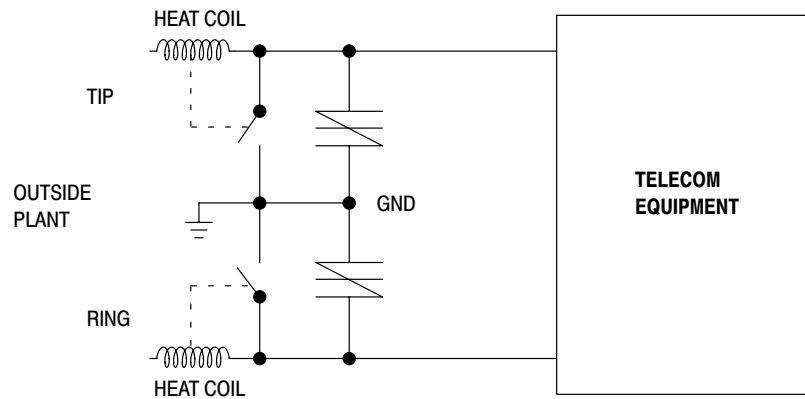


Figure 6. Peak Surge On-State Current versus Surge Current Duration, Sinusoidal Waveform

MMT05B230T3, MMT05B260T3, MMT05B310T3



*Polymeric PTC (positive temperature coefficient) overcurrent protection device

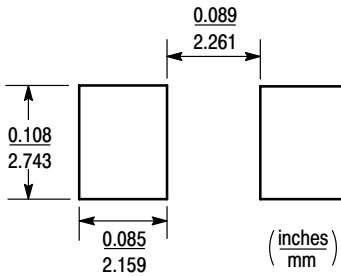


MMT05B230T3, MMT05B260T3, MMT05B310T3

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

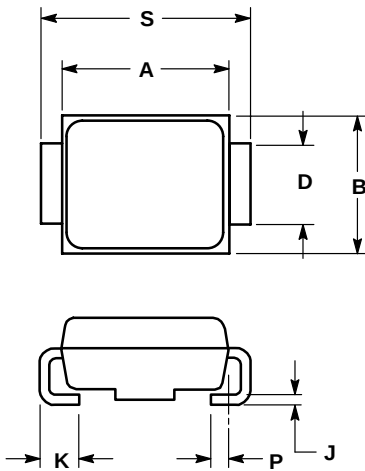
interface between the board and the package. With the correct pad geometry, the packages will self align when subjected to a solder reflow process.



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

Notes

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer.

PUBLICATION ORDERING INFORMATION

NORTH AMERICA Literature Fulfillment:

Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: ONlit@hibbertco.com
Fax Response Line: 303-675-2167 or 800-344-3810 Toll Free USA/Canada

N. American Technical Support: 800-282-9855 Toll Free USA/Canada

EUROPE: LDC for ON Semiconductor – European Support

German Phone: (+1) 303-308-7140 (Mon-Fri 2:30pm to 7:00pm CET)
Email: ONlit-german@hibbertco.com

French Phone: (+1) 303-308-7141 (Mon-Fri 2:00pm to 7:00pm CET)
Email: ONlit-french@hibbertco.com

English Phone: (+1) 303-308-7142 (Mon-Fri 12:00pm to 5:00pm GMT)
Email: ONlit@hibbertco.com

EUROPEAN TOLL-FREE ACCESS*: 00-800-4422-3781

*Available from Germany, France, Italy, UK, Ireland

CENTRAL/SOUTH AMERICA:

Spanish Phone: 303-308-7143 (Mon-Fri 8:00am to 5:00pm MST)
Email: ONlit-spanish@hibbertco.com

Toll-Free from Mexico: Dial 01-800-288-2872 for Access –
then Dial 866-297-9322

ASIA/PACIFIC: LDC for ON Semiconductor – Asia Support

Phone: 303-675-2121 (Tue-Fri 9:00am to 1:00pm, Hong Kong Time)
Toll Free from Hong Kong & Singapore:
001-800-4422-3781

Email: ONlit-asia@hibbertco.com

JAPAN: ON Semiconductor, Japan Customer Focus Center

4-32-1 Nishi-Gotanda, Shinagawa-ku, Tokyo, Japan 141-0031
Phone: 81-3-5740-2700
Email: r14525@onsemi.com

ON Semiconductor Website: <http://onsemi.com>

For additional information, please contact your local
Sales Representative.