

# MMT05B350T3

Preferred Devices

## Product Preview

### 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.

#### Features

- High Surge Current Capability: 50 A 10 x 1000  $\mu$ sec, for Controlled Temperature Environments
- The MMT05B350T3 is used to help equipment meet various regulatory requirements including: Bellcore 1089, ITU K.20 and K.21, IEC 950, UL 1459 and 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)
- $\text{⚡}$  Indicates UL Recognized – File #E210057
- Pb-Free Package is Available

#### MAXIMUM RATINGS ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Off-State Voltage – Maximum	$V_{DM}$	300	V
Maximum Pulse Surge Short Circuit Current Non-Repetitive Double Exponential Decay Waveform ( $-25^\circ\text{C}$ Initial Temperature) (Notes 1 and 2)			A(pk)
2 x 10 $\mu$ sec	$I_{PPS1}$	$\pm 150$	
8 x 20 $\mu$ sec	$I_{PPS2}$	$\pm 150$	
10 x 160 $\mu$ sec	$I_{PPS3}$	$\pm 100$	
10 x 360 $\mu$ sec	$I_{PPS4}$	$\pm 100$	
10 x 560 $\mu$ sec	$I_{PPS5}$	$\pm 70$	
10 x 700 $\mu$ sec	$I_{PPS6}$	$\pm 70$	
10 x 1000 $\mu$ sec	$I_{PPS7}$	$\pm 50$	
Non-Repetitive Peak On-State Current 60 Hz Full Sign Wave	$I_{TSM}$	32	A(pk)
Maximum Non-Repetitive Rate of Change of On-State Current Exponential Waveform, < 100 A	di/dt	$\pm 300$	A/ $\mu$ s

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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

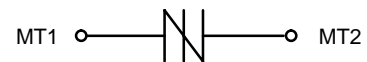
This document contains information on a product under development. ON Semiconductor reserves the right to change or discontinue this product without notice.



ON Semiconductor®

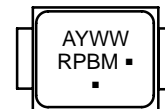
<http://onsemi.com>

### BIDIRECTIONAL TSPD ( $\text{⚡}$ ) 50 AMP SURGE, 350 VOLTS



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

#### MARKING DIAGRAMS



A = Assembly Location  
Y = Year  
WW = Work Week  
RPBM = Specific Device Code  
▪ = Pb-Free Package  
(Note: Microdot may be in either location)

#### ORDERING INFORMATION

Device	Package	Shipping†
MMT05B350T3	SMB	12 mm Tape & Reel (2.5 K/Reel)
MMT05B350T3G	SMB (Pb-Free)	12 mm Tape & Reel (2.5 K/Reel)

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

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

# MMT05B350T3

## 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
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)

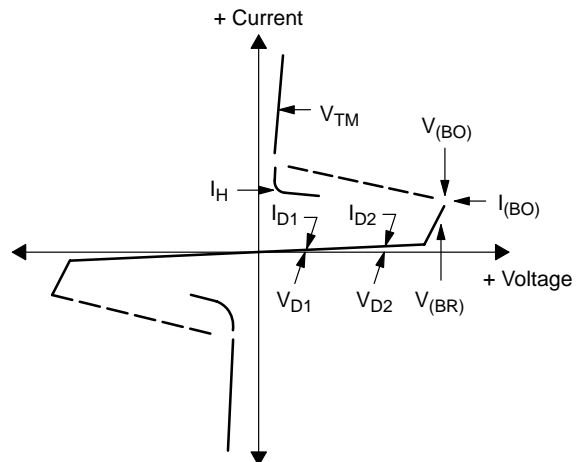
Devices are bidirectional. All electrical parameters apply to forward and reverse polarities.

Characteristics	Symbol	Min	Typ	Max	Unit
Breakover Voltage (Both polarities) ( $dv/dt = 100 \text{ V}/\mu\text{s}$ , $I_{SC} = 1.0 \text{ A}$ , $V_{dc} = 1000 \text{ V}$ ) (+65°C)	$V_{(BO)}$	-	-	400 412	V
Breakover Voltage (Both polarities) ( $f = 60 \text{ Hz}$ , $I_{SC} = 1.0 \text{ A(rms)}$ , $V_{OC} = 1000 \text{ V(rms)}$ , $R_I = 1.0 \text{ k}\Omega$ , $t = 0.5 \text{ cycle}$ ) (Note 3) (+65°C)	$V_{(BO)}$	-	-	400 412	V
Breakover Voltage Temperature Coefficient	$dV_{(BO)}/dT_J$	-	0.12	-	V/°C
Breakdown Voltage ( $I_{(BR)} = 1.0 \text{ mA}$ ) Both polarities	$V_{(BR)}$	-	350	-	V
Off State Current ( $V_{D1} = 50 \text{ V}$ ) Both polarities ( $V_{D2} = V_{DM}$ ) Both polarities	$I_{D1}$ $I_{D2}$	-	-	2.0 5.0	$\mu\text{A}$
On-State Voltage ( $I_T = 1.0 \text{ A}$ ) ( $PW \leq 300 \mu\text{s}$ , Duty Cycle $\leq 2\%$ ) (Note 3)	$V_T$	-	1.6	3.0	V
Breakover Current ( $f = 60 \text{ Hz}$ , $V_{DM} = 1000 \text{ V(rms)}$ , $R_S = 1.0 \text{ k}\Omega$ ) Both polarities	$I_{BO}$	-	475	-	mA
Holding Current (Both polarities) (Note 3) $V_S = 500 \text{ V}$ ; $I_T$ (Initiating Current) = $\pm 1.0 \text{ A}$ (+65°C)	$I_H$	150 130	270 -	- -	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/ $\mu\text{s}$
Capacitance ( $f = 1.0 \text{ MHz}$ , $50 \text{ Vdc}$ , $1.0 \text{ V rms}$ Signal) ( $f = 1.0 \text{ MHz}$ , $2.0 \text{ Vdc}$ , $1.0 \text{ V rms}$ Signal)	$C_O$	-	14 27	18 30	pF

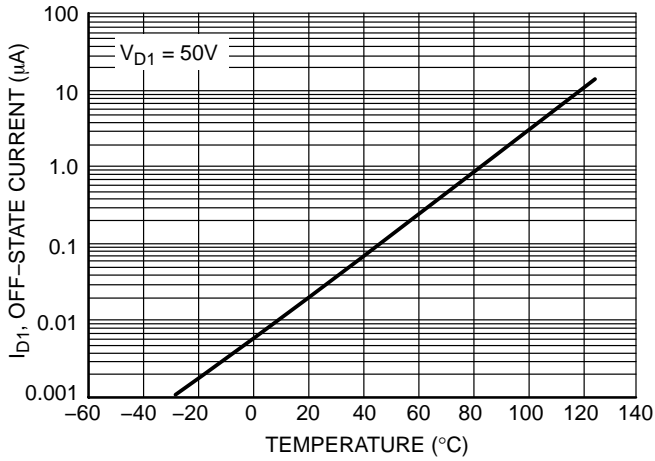
3. Measured under pulse conditions to reduce heating.

## Voltage Current Characteristic of TSPD (Bidirectional Device)

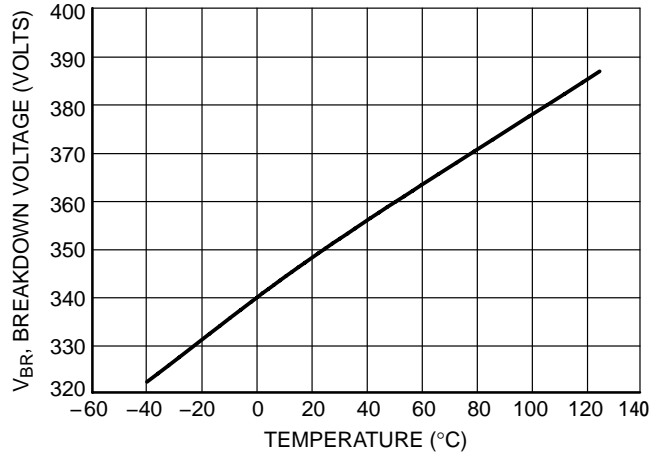
Symbol	Parameter
$I_{D1}$ , $I_{D2}$	Off State Leakage Current
$V_{D1}$ , $V_{D2}$	Off State Blocking Voltage
$V_{BR}$	Breakdown Voltage
$V_{BO}$	Breakover Voltage
$I_{BO}$	Breakover Current
$I_H$	Holding Current
$V_{TM}$	On State Voltage



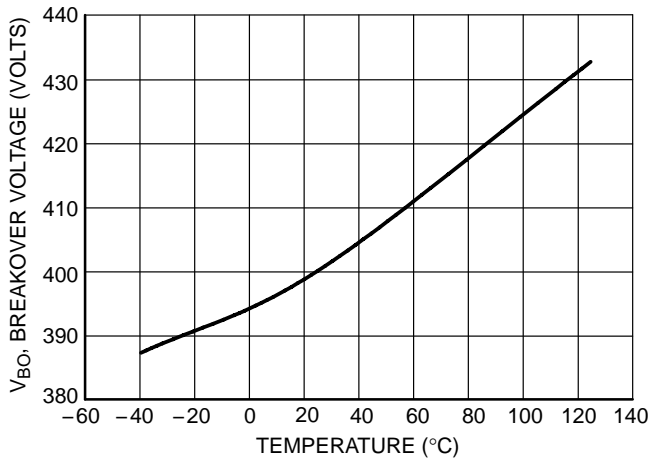
# MMT05B350T3



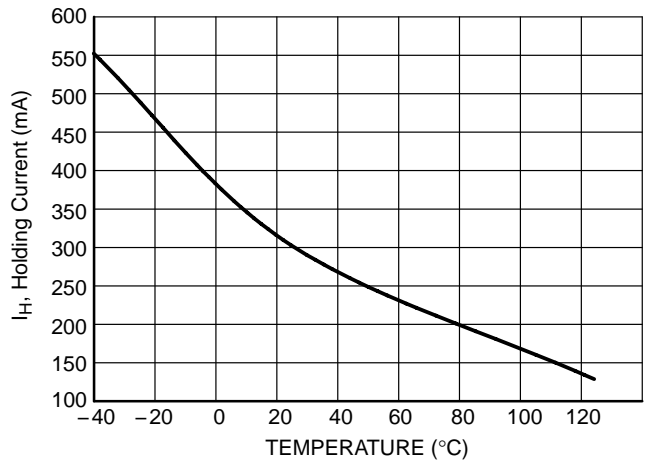
**Figure 1. Typical Off-State Current versus Temperature**



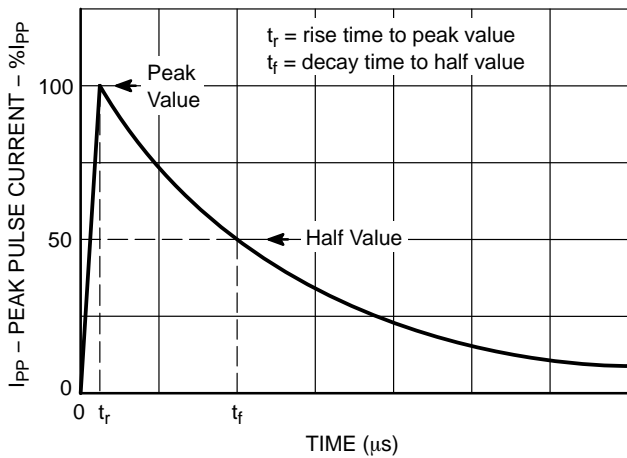
**Figure 2. Typical Breakdown Voltage versus Temperature**



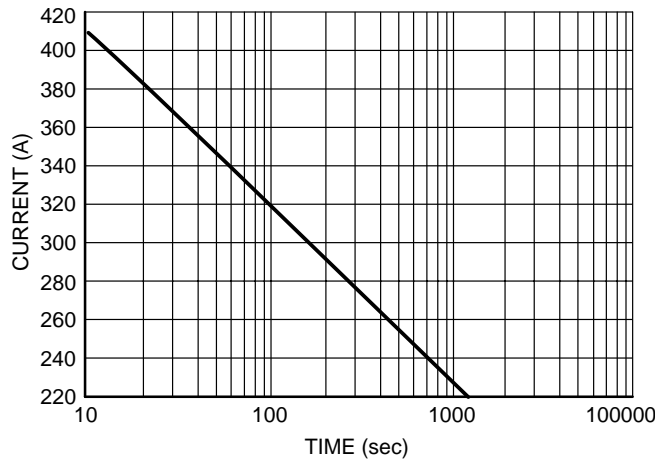
**Figure 3. Maximum Breakover Voltage versus Temperature**



**Figure 4. Typical Holding Current versus Temperature**

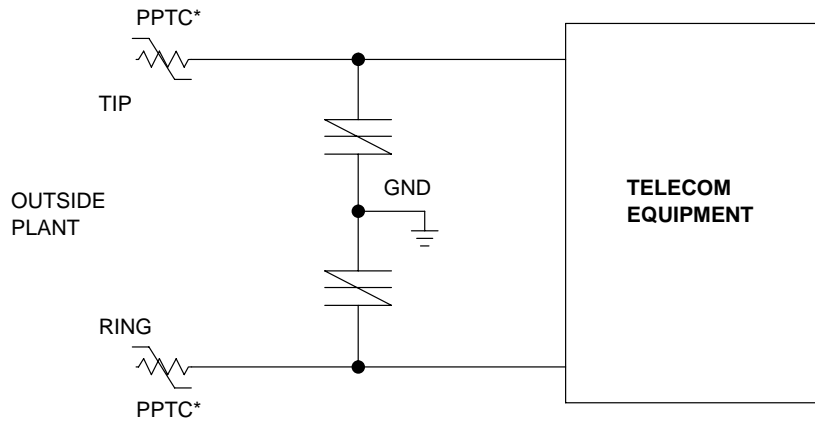
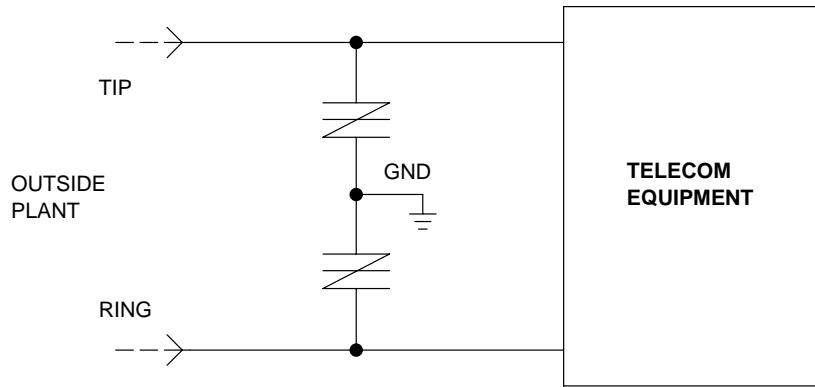


**Figure 5. Exponential Decay Pulse Waveform**

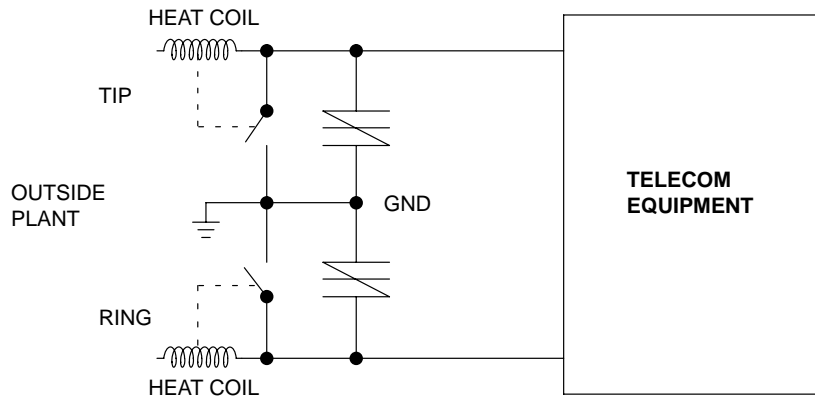


**Figure 6. Peak Surge On-State Current versus Surge Current Duration, Sinusoidal Waveform**

# MMT05B350T3



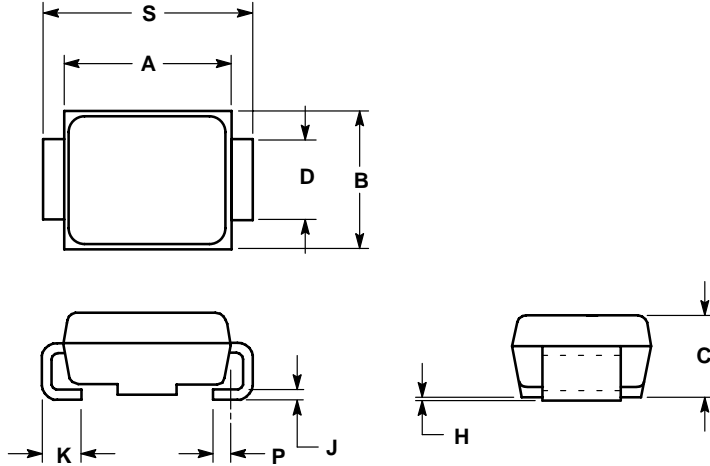
\*Polymeric PTC (positive temperature coefficient) overcurrent protection device



# MMT05B350T3

## PACKAGE DIMENSIONS

**SMB**  
CASE 403C-01  
ISSUE A

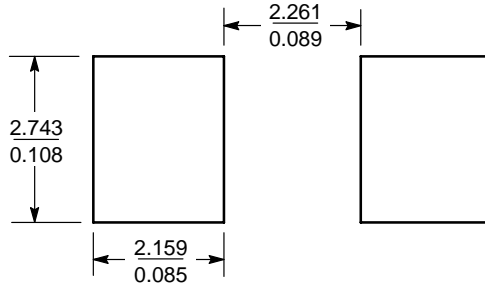


**NOTES:**

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

### SOLDERING FOOTPRINT\*



SCALE 8:1  $\left(\frac{\text{mm}}{\text{inches}}\right)$

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

ON Semiconductor and are registered 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. This literature is subject to all applicable copyright laws and is not for resale in any manner.

### PUBLICATION ORDERING INFORMATION

**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:** orderlit@onsemi.com

**N. American Technical Support:** 800-282-9855 Toll Free USA/Canada  
**Europe, Middle East and Africa Technical Support:**  
Phone: 421 33 790 2910  
**Japan Customer Focus Center**  
Phone: 81-3-5773-3850

**ON Semiconductor Website:** [www.onsemi.com](http://www.onsemi.com)  
**Order Literature:** <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative