

# 1SMA5.0AT3 Series

## 400 Watt Peak Power Zener Transient Voltage Suppressors

### Unidirectional\*

The SMA series is designed to protect voltage sensitive components from high voltage, high energy transients. They have excellent clamping capability, high surge capability, low zener impedance and fast response time. The SMA series is supplied in ON Semiconductor's exclusive, cost-effective, highly reliable Surmetic™ package and is ideally suited for use in communication systems, automotive, numerical controls, process controls, medical equipment, business machines, power supplies and many other industrial/consumer applications.

#### Specification Features

- Working Peak Reverse Voltage Range – 5.0 V to 78 V
- Standard Zener Breakdown Voltage Range – 6.7 V to 91.25 V
- Peak Power – 400 W @ 1 ms
- ESD Rating of Class 3 (> 16 KV) per Human Body Model
- Response Time is Typically < 1 ns
- Flat Handling Surface for Accurate Placement
- Package Design for Top Slide or Bottom Circuit Board Mounting
- Low Profile Package
- Pb-Free Packages are Available

#### Mechanical Characteristics

**CASE:** Void-free, transfer-molded plastic

**FINISH:** All external surfaces are corrosion resistant and leads are readily solderable

**MAXIMUM CASE TEMPERATURE FOR SOLDERING PURPOSES:** 260°C for 10 Seconds

**POLARITY:** Cathode indicated by molded polarity notch or polarity band

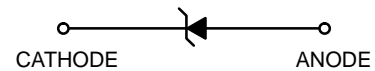
**MOUNTING POSITION:** Any



**ON Semiconductor®**

<http://onsemi.com>

### PLASTIC SURFACE MOUNT ZENER OVERVOLTAGE TRANSIENT SUPPRESSORS 5.0 – 78 V, 400 W PEAK POWER



**SMA  
CASE 403D  
PLASTIC**

#### MARKING DIAGRAM



- xx = Specific Device Code (See Table on Page 3)
- LL = Assembly Location
- Y = Year
- WW = Work Week

#### ORDERING INFORMATION

Device	Package	Shipping†
1SMAxxAT3	SMA	5000/Tape & Reel
1SMAxxAT3G	SMA (Pb-Free)	5000/Tape & Reel

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

Individual devices are listed on page 3 of this data sheet.

\*Please see 1SMA10CAT3 to 1SMA78CAT3 for Bidirectional devices.

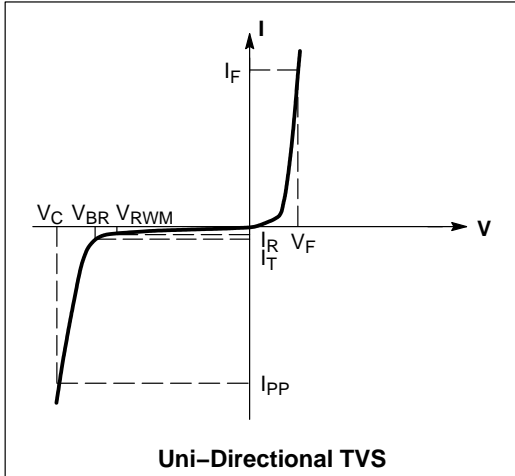
# 1SMA5.0AT3 Series

## MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Peak Power Dissipation (Note 1) @ $T_L = 25^\circ\text{C}$ , Pulse Width = 1 ms	$P_{PK}$	400	W
DC Power Dissipation @ $T_L = 75^\circ\text{C}$ Measured Zero Lead Length (Note 2) Derate Above $75^\circ\text{C}$	$P_D$	1.5	W
Thermal Resistance from Junction to Lead	$R_{\theta JL}$	20	$\text{mW}/^\circ\text{C}$
		50	$^\circ\text{C}/\text{W}$
DC Power Dissipation (Note 3) @ $T_A = 25^\circ\text{C}$ Derate Above $25^\circ\text{C}$	$P_D$	0.5	W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	4.0	$\text{mW}/^\circ\text{C}$
		250	$^\circ\text{C}/\text{W}$
Forward Surge Current (Note 4) @ $T_A = 25^\circ\text{C}$	$I_{FSM}$	40	A
Operating and Storage Temperature Range	$T_J, T_{stg}$	-65 to +150	$^\circ\text{C}$

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

- 10 X 1000  $\mu\text{s}$ , non-repetitive
- 1" square copper pad, FR-4 board
- FR-4 board, using ON Semiconductor minimum recommended footprint, as shown in 403B case outline dimensions spec.
- 1/2 sine wave (or equivalent square wave), PW = 8.3 ms, duty cycle = 4 pulses per minute maximum.



- 1/2 sine wave or equivalent, PW = 8.3 ms, non-repetitive duty cycle.

## ELECTRICAL CHARACTERISTICS

( $T_A = 25^\circ\text{C}$  unless otherwise noted,  $V_F = 3.5\text{ V Max.}$  @  $I_F = 30\text{ A}$  for all types) (Note 5)

Symbol	Parameter
$I_{PP}$	Maximum Reverse Peak Pulse Current
$V_C$	Clamping Voltage @ $I_{PP}$
$V_{RWM}$	Working Peak Reverse Voltage
$I_R$	Maximum Reverse Leakage Current @ $V_{RWM}$
$V_{BR}$	Breakdown Voltage @ $I_T$
$I_T$	Test Current
$I_F$	Forward Current
$V_F$	Forward Voltage @ $I_F$

# 1SMA5.0AT3 Series

## ELECTRICAL CHARACTERISTICS

Device	Device Marking	V <sub>RWM</sub> (Note 6) Volts	I <sub>R</sub> @ V <sub>RWM</sub> μA	Breakdown Voltage				V <sub>C</sub> @ I <sub>PP</sub> (Note 8)	
				V <sub>BR</sub> (Volts) (Note 7)			@ I <sub>T</sub>	V <sub>C</sub>	I <sub>PP</sub>
				Min	Nom	Max	mA	Volts	Amps
1SMA5.0AT3	QE	5.0	400	6.4	6.7	7.0	10	9.2	43.5
1SMA6.0AT3	QG	6.0	400	6.67	7.02	7.37	10	10.3	38.8
1SMA6.5AT3	QK	6.5	250	7.22	7.6	7.98	10	11.2	35.7
1SMA7.0AT3	QM	7.0	250	7.78	8.19	8.6	10	12.0	33.3
1SMA7.5AT3	QP	7.5	50	8.33	8.77	9.21	1	12.9	31.0
1SMA8.0AT3	QR	8.0	25	8.89	9.36	9.83	1	13.6	29.4
1SMA8.5AT3	QT	8.5	5.0	9.44	9.92	10.4	1	14.4	27.8
1SMA9.0AT3	QV	9.0	2.5	10	10.55	11.1	1	15.4	26.0
1SMA10AT3	QX	10	2.5	11.1	11.7	12.3	1	17.0	23.5
1SMA11AT3	QZ	11	2.5	12.2	12.85	13.5	1	18.2	22.0
1SMA12AT3	RE	12	2.5	13.3	14.0	14.7	1	19.9	20.1
1SMA13AT3	RG	13	2.5	14.4	15.15	15.9	1	21.5	18.6
1SMA14AT3	RK	14	2.5	15.6	16.4	17.2	1	23.2	17.2
1SMA15AT3	RM	15	2.5	16.7	17.6	18.5	1	24.4	16.4
1SMA16AT3, G*	RP	16	2.5	17.8	18.75	19.7	1	26.0	15.4
1SMA17AT3	RR	17	2.5	18.9	19.9	20.9	1	27.6	14.5
1SMA18AT3, G*	RT	18	2.5	20	21.05	22.1	1	29.2	13.7
1SMA20AT3	RV	20	2.5	22.2	23.35	24.5	1	32.4	12.3
1SMA22AT3	RX	22	2.5	24.4	25.65	26.9	1	35.5	11.3
1SMA24AT3	RZ	24	2.5	26.7	28.1	29.5	1	38.9	10.3
1SMA26AT3	SE	26	2.5	28.9	30.4	31.9	1	42.1	9.5
1SMA28AT3	SG	28	2.5	31.1	32.75	34.4	1	45.4	8.8
1SMA30AT3	SK	30	2.5	33.3	35.05	36.8	1	48.4	8.3
1SMA33AT3	SM	33	2.5	36.7	38.65	40.6	1	53.3	7.5
1SMA36AT3	SP	36	2.5	40	42.1	44.2	1	58.1	6.9
1SMA40AT3	SR	40	2.5	44.4	46.75	49.1	1	64.5	6.2
1SMA43AT3	ST	43	2.5	47.8	50.3	52.8	1	69.4	5.8
1SMA45AT3	SV	45	2.5	50	52.65	55.3	1	72.2	5.5
1SMA48AT3	SX	48	2.5	53.3	56.1	58.9	1	77.4	5.2
1SMA51AT3	SZ	51	2.5	56.7	59.7	62.7	1	82.4	4.9
1SMA54AT3	TE	54	2.5	60	63.15	66.3	1	87.1	4.6
1SMA58AT3	TG	58	2.5	64.4	67.8	71.5	1	93.6	4.3
1SMA60AT3	TK	60	2.5	66.7	70.2	73.7	1	96.8	4.1
1SMA64AT3	TM	64	2.5	71.1	74.85	78.6	1	103	3.9
1SMA70AT3	TP	70	2.5	77.8	81.9	86.0	1	113	3.5
1SMA75AT3	TR	75	2.5	83.3	87.7	92.1	1	121	3.3
1SMA78AT3	TS	78	2.5	86.7	91.25	95.8	1	126	3.2

6. A transient suppressor is normally selected according to the working peak reverse voltage (V<sub>RWM</sub>), which should be equal to or greater than the DC or continuous peak operating voltage level

7. V<sub>BR</sub> measured at pulse test current I<sub>T</sub> at an ambient temperature of 25°C

8. Surge current waveform per Figure 2 and derate per Figure 3

\* The "G" suffix indicates Pb-Free package available.

# 1SMA5.0AT3 Series

## RATING AND TYPICAL CHARACTERISTIC CURVES

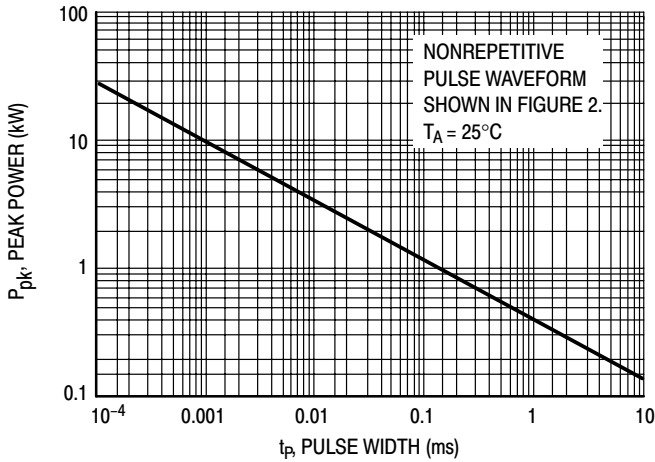


Figure 1. Pulse Rating Curve

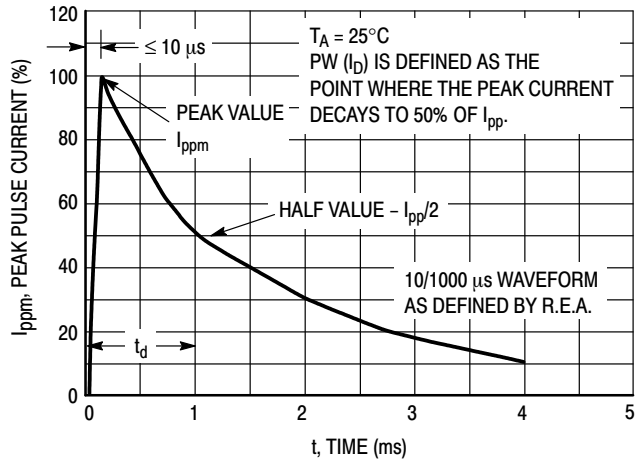


Figure 2. Pulse Waveform

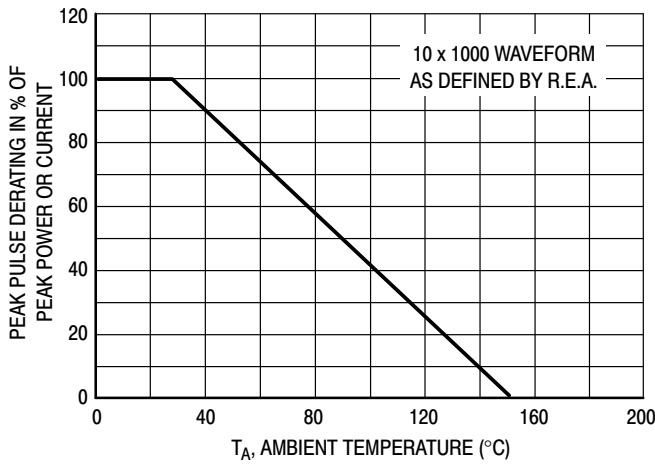


Figure 3. Pulse Derating Curve

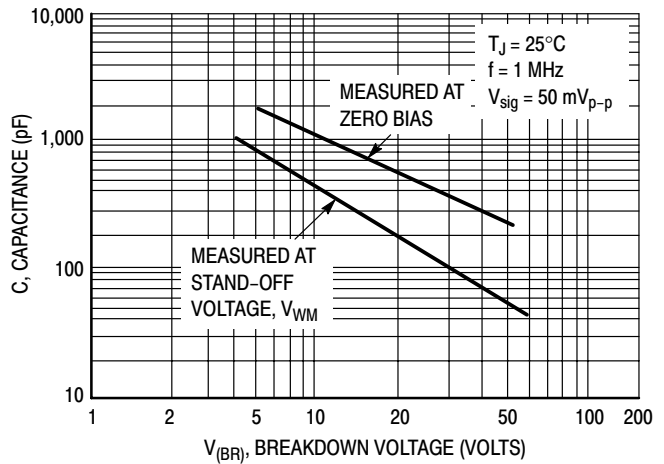


Figure 4. Typical Junction Capacitance

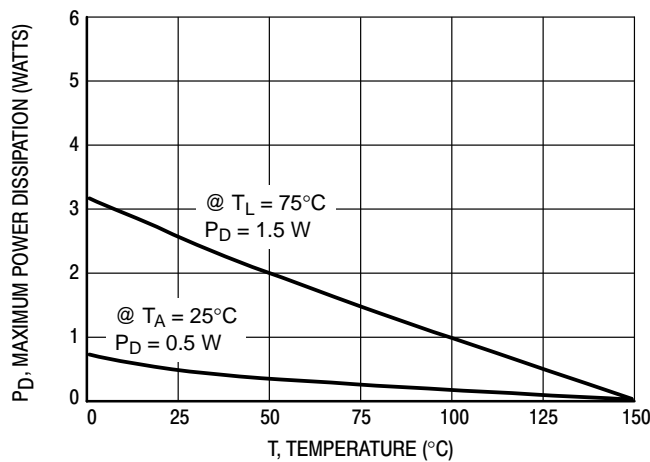
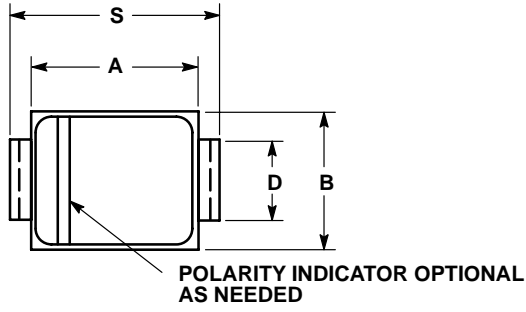


Figure 5. Steady State Power Derating

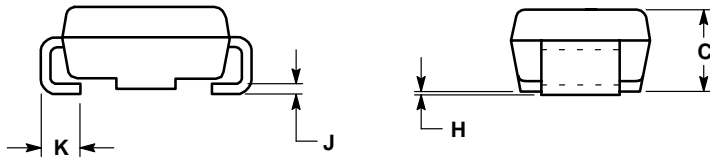
# 1SMA5.0AT3 Series

SMA  
CASE 403D-02  
ISSUE A

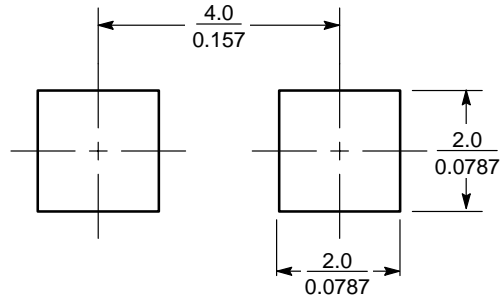


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. 403D-01 OBSOLETE, NEW STANDARD IS 403D-02.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.160	0.180	4.06	4.57
B	0.090	0.115	2.29	2.92
C	0.075	0.095	1.91	2.41
D	0.050	0.064	1.27	1.63
H	0.002	0.006	0.05	0.15
J	0.006	0.016	0.15	0.41
K	0.030	0.060	0.76	1.52
S	0.190	0.220	4.83	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.

# 1SMA5.0AT3 Series

SURMETIC is a trademark of Semiconductor Components Industries, LLC.

**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](mailto:orderlit@onsemi.com)

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

**Japan:** ON Semiconductor, Japan Customer Focus Center

2-9-1 Kamimeguro, Meguro-ku, Tokyo, Japan 153-0051

**Phone:** 81-3-5773-3850

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

**Order Literature:** <http://www.onsemi.com/litorder>

For additional information, please contact your  
local Sales Representative.