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.

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

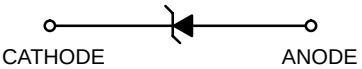
POLARITY: Cathode indicated by molded polarity notch or polarity band

MOUNTING POSITION: Any

ON Semiconductor®

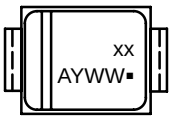
http://onsemi.com

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



SMA
CASE 403D
PLASTIC

MARKING DIAGRAM



xx = Device Code (Refer to page 3)
A = Assembly Location
Y = Year
WW = Work Week
▪ = Pb−Free Package

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.

DEVICE MARKING INFORMATION

See specific marking information in the device marking column of the Electrical Characteristics table on page 3 of this data sheet.

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MAXIMUM RATINGS

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

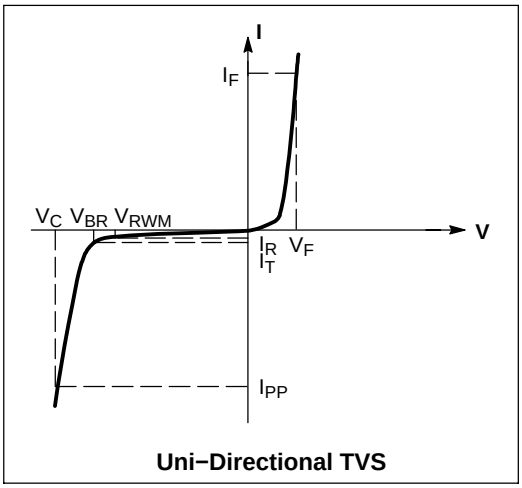
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. 10 X 1000 μs, non−repetitive.
2. 1″ square copper pad, FR−4 board.
3. FR−4 board, using ON Semiconductor minimum recommended footprint, as shown in 403B case outline dimensions spec.
4. 1/2 sine wave (or equivalent square wave), PW = 8.3 ms, duty cycle = 4 pulses per minute maximum.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted, V_F = 3.5 V Max. @ I_F = 30 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

5. 1/2 sine wave or equivalent, PW = 8.3 ms, non−repetitive duty cycle.



Uni−Directional TVS

ELECTRICAL CHARACTERISTICS

Device	Device Marking	V_{RWM} (Note 6)	I_R @ V_{RWM}	Breakdown Voltage				V_C @ I_{PP} (Note 8)		C Typ. (Note 9)
				V_{BR} (Volts) (Note 7)			@ I_T	V_C	I_{PP}	
		Volts	μA	Min	Nom	Max	mA	Volts	Amps	pF
1SMA5.0AT3, G	QE	5.0	400	6.4	6.7	7.0	10	9.2	43.5	2035
1SMA6.0AT3, G	QG	6.0	400	6.67	7.02	7.37	10	10.3	38.8	1730
1SMA6.5AT3, G	QK	6.5	250	7.22	7.6	7.98	10	11.2	35.7	1605
1SMA7.0AT3, G	QM	7.0	250	7.78	8.19	8.6	10	12.0	33.3	1505
1SMA7.5AT3, G	QP	7.5	50	8.33	8.77	9.21	1	12.9	31.0	1415
1SMA8.0AT3, G	QR	8.0	25	8.89	9.36	9.83	1	13.6	29.4	1035
1SMA8.5AT3, G	QT	8.5	5.0	9.44	9.92	10.4	1	14.4	27.8	1265
1SMA9.0AT3, G	QV	9.0	2.5	10	10.55	11.1	1	15.4	26.0	1200
1SMA10AT3, G	QX	10	2.5	11.1	11.7	12.3	1	17.0	23.5	1090
1SMA11AT3, G	QZ	11	2.5	12.2	12.85	13.5	1	18.2	22.0	1000
1SMA12AT3, G	RE	12	2.5	13.3	14.0	14.7	1	19.9	20.1	925
1SMA13AT3, G	RG	13	2.5	14.4	15.15	15.9	1	21.5	18.6	860
1SMA15AT3, G	RM	15	2.5	16.7	17.6	18.5	1	24.4	16.4	758
1SMA16AT3, G	RP	16	2.5	17.8	18.75	19.7	1	26.0	15.4	715
1SMA17AT3, G	RR	17	2.5	18.9	19.9	20.9	1	27.6	14.5	680
1SMA18AT3, G	RT	18	2.5	20	21.05	22.1	1	29.2	13.7	645
1SMA20AT3, G	RV	20	2.5	22.2	23.35	24.5	1	32.4	12.3	585
1SMA22AT3, G	RX	22	2.5	24.4	25.65	26.9	1	35.5	11.3	540
1SMA24AT3, G	RZ	24	2.5	26.7	28.1	29.5	1	38.9	10.3	500
1SMA26AT3, G	SE	26	2.5	28.9	30.4	31.9	1	42.1	9.5	460
1SMA28AT3, G	SG	28	2.5	31.1	32.75	34.4	1	45.4	8.8	430
1SMA30AT3, G	SK	30	2.5	33.3	35.05	36.8	1	48.4	8.3	405
1SMA33AT3, G	SM	33	2.5	36.7	38.65	40.6	1	53.3	7.5	375
1SMA36AT3, G	SP	36	2.5	40	42.1	44.2	1	58.1	6.9	345
1SMA40AT3, G	SR	40	2.5	44.4	46.75	49.1	1	64.5	6.2	315
1SMA43AT3, G	ST	43	2.5	47.8	50.3	52.8	1	69.4	5.8	295
1SMA45AT3, G	SV	45	2.5	50	52.65	55.3	1	72.2	5.5	280
1SMA48AT3, G	SX	48	2.5	53.3	56.1	58.9	1	77.4	5.2	265
1SMA51AT3, G	SZ	51	2.5	56.7	59.7	62.7	1	82.4	4.9	250
1SMA54AT3, G	TE	54	2.5	60	63.15	66.3	1	87.1	4.6	240
1SMA58AT3, G	TG	58	2.5	64.4	67.8	71.5	1	93.6	4.3	225
1SMA64AT3, G	TM	64	2.5	71.1	74.85	78.6	1	103	3.9	205
1SMA70AT3, G	TP	70	2.5	77.8	81.9	86.0	1	113	3.5	190
1SMA75AT3, G	TR	75	2.5	83.3	87.7	92.1	1	121	3.3	180

6. A transient suppressor is normally selected according to the working peak reverse voltage (V_{RWM}), which should be equal to or greater than the DC or continuous peak operating voltage level.
7. V_{BR} measured at pulse test current I_T at an ambient temperature of 25°C.
8. Surge current waveform per Figure 2 and derate per Figure 3.
9. Bias voltage = 0 V, F = 1.0 MHz, T_J = 25°C.

†Please see 1SMA10CAT3 to 1SMA75CAT3 for Bidirectional devices.

* The “G” suffix indicates Pb−Free package available.

RATING AND TYPICAL CHARACTERISTIC CURVES

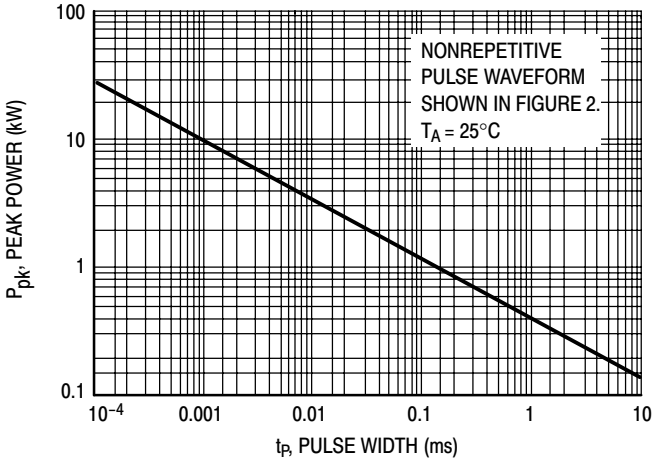


Figure 1. Pulse Rating Curve

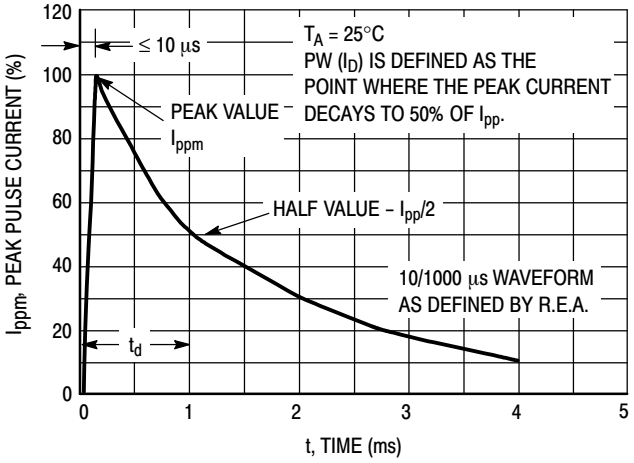


Figure 2. Pulse Waveform

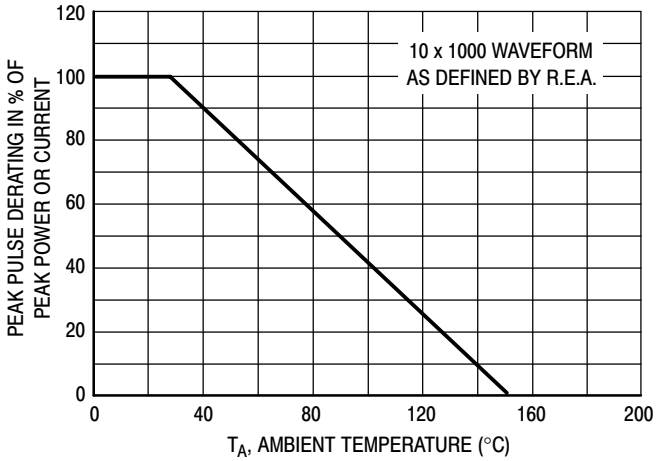


Figure 3. Pulse Derating Curve

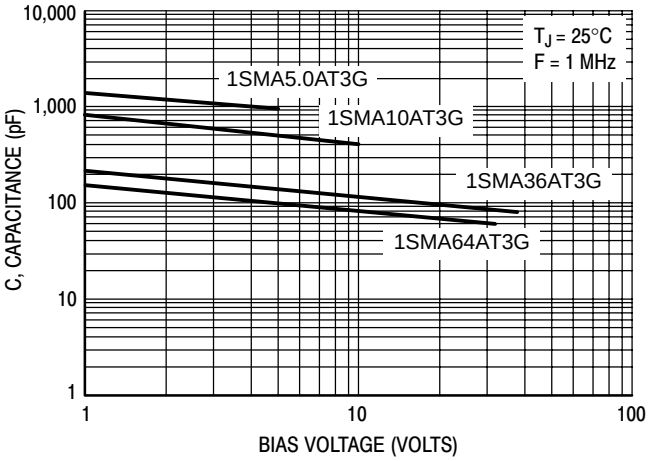


Figure 4. Typical Junction Capacitance vs. Bias Voltage

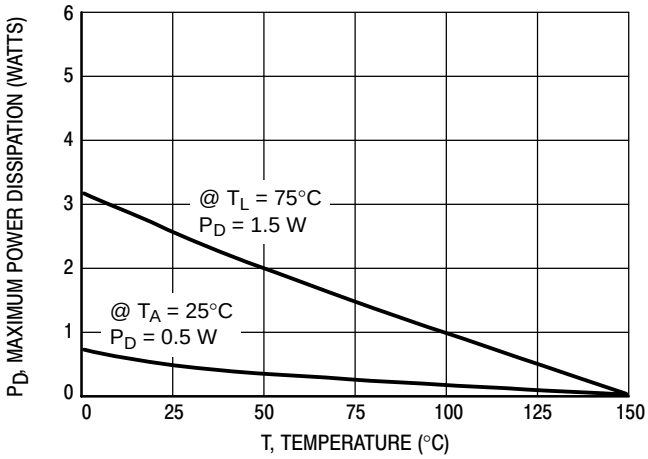
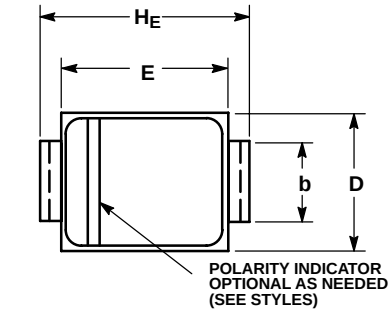
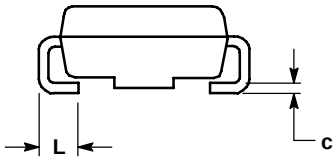


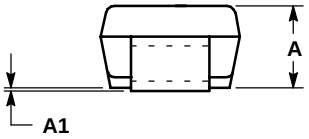
Figure 5. Steady State Power Derating

PACKAGE DIMENSIONS

SMA
CASE 403D−02
ISSUE C





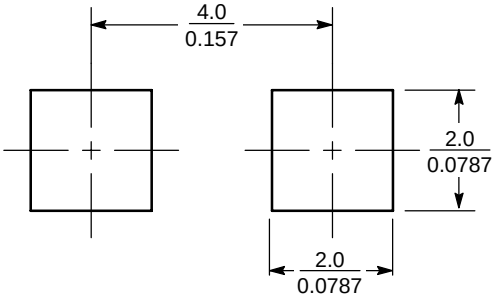


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 403D−01 OBSOLETE, NEW STANDARD IS 403D−02.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	1.91	2.16	2.41	0.075	0.085	0.095
A1	0.05	0.10	0.15	0.002	0.004	0.006
b	1.27	1.45	1.63	0.050	0.057	0.064
c	0.15	0.28	0.41	0.006	0.011	0.016
D	2.29	2.60	2.92	0.090	0.103	0.115
E	4.06	4.32	4.57	0.160	0.170	0.180
H_E	4.83	5.21	5.59	0.190	0.205	0.220
L	0.76	1.14	1.52	0.030	0.045	0.060

STYLE 1:
PIN 1. CATHODE (POLARITY BAND)
2. ANODE

SOLDERING FOOTPRINT*



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

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

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