

1SMB5.0AT3 Series

600 Watt Peak Power Zener Transient Voltage Suppressors

Unidirectional*

The SMB 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 SMB 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 170 V
- Standard Zener Breakdown Voltage Range – 6.7 V to 199 V
- Peak Power – 600 W @ 1.0 ms
- ESD Rating of Class 3 (>16 kV) per Human Body Model
- Maximum Clamp Voltage @ Peak Pulse Current
- Low Leakage < 5.0 μA Above 10 V
- UL 497B for Isolated Loop Circuit Protection
- Response Time is Typically < 1.0 ns
- Pb-Free Packages are Available

Mechanical Characteristics

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

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

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

LEADS: Modified L-Bend providing more contact area to bond pads

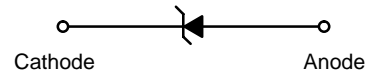
POLARITY: Cathode indicated by polarity band

MOUNTING POSITION: Any



ON Semiconductor®

PLASTIC SURFACE MOUNT ZENER OVERVOLTAGE TRANSIENT SUPPRESSORS 5.0 V – 170 V, 600 W PEAK POWER



SMB
CASE 403A
PLASTIC

MARKING DIAGRAM



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

(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping†
1SMBxxxAT3	SMB	2500/Tape & Reel
1SMBxxxAT3G	SMB (Pb-Free)	2500/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.

1SMB5.0AT3 Series

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Peak Power Dissipation (Note 1) @ $T_L = 25^\circ\text{C}$, Pulse Width = 1 ms	P_{PK}	600	W
DC Power Dissipation @ $T_L = 75^\circ\text{C}$ Measured Zero Lead Length (Note 2) Derate Above 75°C	P_D	3.0	W
Thermal Resistance from Junction-to-Lead	$R_{\theta JL}$	40	mW/ $^\circ\text{C}$
		25	$^\circ\text{C}/\text{W}$
DC Power Dissipation (Note 3) @ $T_A = 25^\circ\text{C}$ Derate Above 25°C	P_D	0.55	W
Thermal Resistance from Junction-to-Ambient	$R_{\theta JA}$	4.4	mW/ $^\circ\text{C}$
		226	$^\circ\text{C}/\text{W}$
Forward Surge Current (Note 4) @ $T_A = 25^\circ\text{C}$	I_{FSM}	100	A
Operating and Storage Temperature Range	T_J, T_{stg}	-65 to +150	$^\circ\text{C}$

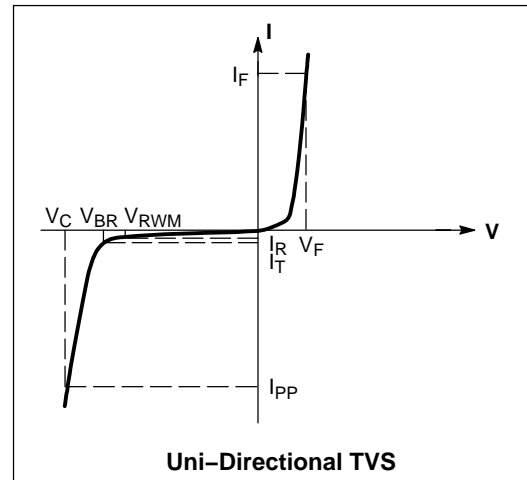
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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

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

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

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



1SMB5.0AT3 Series

ELECTRICAL CHARACTERISTICS (Devices listed in *bold, italic* are ON Semiconductor Preferred devices.)

Device*	Device Marking	V _{RWM} (Note 6) V	I _R @ V _{RWM} μA	Breakdown Voltage			V _C @ I _{PP} (Note 8)		C _{typ} (Note 9) pF	
				V _{BR} (Note 7) Volts			@ I _T	V _C		I _{PP}
				Min	Nom	Max	mA	V		A
1SMB5.0AT3, G	KE	5.0	800	6.40	6.7	7.0	10	9.2	65.2	2700
1SMB6.0AT3, G	KG	6.0	800	6.67	7.02	7.37	10	10.3	58.3	2300
1SMB6.5AT3, G	KK	6.5	500	7.22	7.6	7.98	10	11.2	53.6	2140
1SMB7.0AT3, G	KM	7.0	500	7.78	8.19	8.6	10	12.0	50.0	2005
1SMB7.5AT3, G	KP	7.5	100	8.33	8.77	9.21	1.0	12.9	46.5	1890
1SMB8.0AT3, G	KR	8.0	50	8.89	9.36	9.83	1.0	13.6	44.1	1780
1SMB8.5AT3, G	KT	8.5	10	9.44	9.92	10.4	1.0	14.4	41.7	1690
1SMB9.0AT3, G	KV	9.0	5.0	10.0	10.55	11.1	1.0	15.4	39.0	1605
1SMB10AT3, G	KX	10	5.0	11.1	11.7	12.3	1.0	17.0	35.3	1460
1SMB11AT3, G	KZ	11	5.0	12.2	12.85	13.5	1.0	18.2	33.0	1345
1SMB12AT3, G	LE	12	5.0	13.3	14	14.7	1.0	19.9	30.2	1245
1SMB13AT3, G	LG	13	5.0	14.4	15.15	15.9	1.0	21.5	27.9	1160
1SMB14AT3, G	LK	14	5.0	15.6	16.4	17.2	1.0	23.2	25.8	1085
1SMB15AT3, G	LM	15	5.0	16.7	17.6	18.5	1.0	24.4	24.0	1020
1SMB16AT3, G	LP	16	5.0	17.8	18.75	19.7	1.0	26.0	23.1	965
1SMB17AT3, G	LR	17	5.0	18.9	19.9	20.9	1.0	27.6	21.7	915
1SMB18AT3, G	LT	18	5.0	20.0	21.05	22.1	1.0	29.2	20.5	870
1SMB20AT3, G	LV	20	5.0	22.2	23.35	24.5	1.0	32.4	18.5	790
1SMB22AT3, G	LX	22	5.0	24.4	25.65	26.9	1.0	35.5	16.9	730
1SMB24AT3, G	LZ	24	5.0	26.7	28.1	29.5	1.0	38.9	15.4	675
1SMB26AT3, G	ME	26	5.0	28.9	30.4	31.9	1.0	42.1	14.2	630
1SMB28AT3, G	MG	28	5.0	31.1	32.75	34.4	1.0	45.4	13.2	590
1SMB30AT3, G	MK	30	5.0	33.3	35.05	36.8	1.0	48.4	12.4	555
1SMB33AT3, G	MM	33	5.0	36.7	38.65	40.6	1.0	53.3	11.3	510
1SMB36AT3, G	MP	36	5.0	40.0	42.1	44.2	1.0	58.1	10.3	470
1SMB40AT3, G	MR	40	5.0	44.4	46.75	49.1	1.0	64.5	9.3	430
1SMB43AT3, G	MT	43	5.0	47.8	50.3	52.8	1.0	69.4	8.6	400
1SMB45AT3, G	MV	45	5.0	50.0	52.65	55.3	1.0	72.7	8.3	385
1SMB48AT3, G	MX	48	5.0	53.3	56.1	58.9	1.0	77.4	7.7	365
1SMB51AT3, G	MZ	51	5.0	56.7	59.7	62.7	1.0	82.4	7.3	345
1SMB54AT3, G	NE	54	5.0	60.0	63.15	66.3	1.0	87.1	6.9	330
1SMB58AT3, G	NG	58	5.0	64.4	67.8	71.2	1.0	93.6	6.4	310
1SMB60AT3, G	NK	60	5.0	66.7	70.2	73.7	1.0	96.8	6.2	300
1SMB64AT3, G	NM	64	5.0	71.1	74.85	78.6	1.0	103	5.8	280
1SMB70AT3, G	NP	70	5.0	77.8	81.9	86	1.0	113	5.3	260
1SMB75AT3, G	NR	75	5.0	83.3	87.7	92.1	1.0	121	4.9	245
1SMB85AT3, G	NV	85	55.0	94.4	99.2	104	1.0	137	4.4	220
1SMB90AT3, G	NX	90	5.0	100	105.5	111	1.0	146	4.1	210
1SMB100AT3, G	NZ	100	5.0	111	117	123	1.0	162	3.7	190
1SMB110AT3, G	PE	110	5.0	122	128.5	135	1.0	177	3.4	175
1SMB120AT3, G	PG	120	5.0	133	140	147	1.0	193	3.1	160
1SMB130AT3, G	PK	130	5.0	144	151.5	159	1.0	209	2.9	150
1SMB150AT3, G	PM	150	5.0	167	176	185	1.0	243	2.5	135
1SMB160AT3, G	PP	160	5.0	178	187.5	197	1.0	259	2.3	125
1SMB170AT3, G	PR	170	5.0	189	199	209	1.0	275	2.2	120

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 4 of the General Data – 600 W at the beginning of this group.

9. Bias Voltage = 0 V, F = 1 MHz, T_J = 25°C

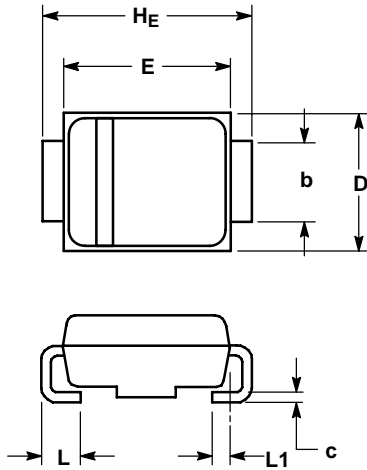
†Please see 1SMB10CAT3 to 1SMB78CAT3 for Bidirectional devices.

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

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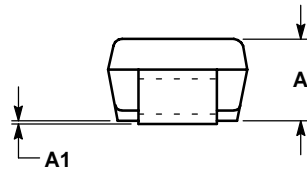
PACKAGE DIMENSIONS

SMB
CASE 403A-03
ISSUE F

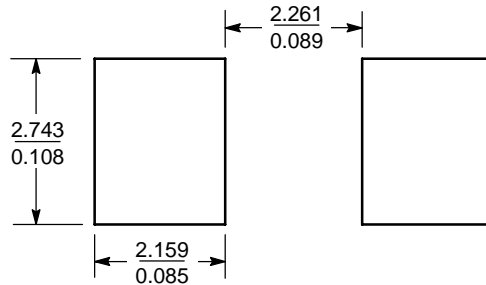


- NOTES:
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. D DIMENSION SHALL BE MEASURED WITHIN DIMENSION P.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.90	2.13	2.45	0.075	0.084	0.096
A1	0.05	0.10	0.20	0.002	0.004	0.008
b	1.96	2.03	2.20	0.077	0.080	0.087
c	0.15	0.23	0.31	0.006	0.009	0.012
D	3.30	3.56	3.95	0.130	0.140	0.156
E	4.06	4.32	4.60	0.160	0.170	0.181
HE	5.21	5.44	5.60	0.205	0.214	0.220
L	0.76	1.02	1.60	0.030	0.040	0.063
L1	0.51 REF			0.020 REF		



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.