P6SMB6.8AT3 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.

Specification Features:

- Working Peak Reverse Voltage Range − 5.8 to 171 V
- Standard Zener Breakdown Voltage Range − 6.8 to 200 V
- Peak Power − 600 W @ 1 ms
- ESD Rating of Class 3 (>16 KV) per Human Body Model
- Maximum Clamp Voltage @ Peak Pulse Current
- Low Leakage < 5 μA Above 10 V
- UL 497B for Isolated Loop Circuit Protection
- Response Time is Typically < 1 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

MAXIMUM RATINGS

Please See the Table on the Following Page

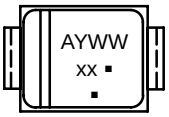
*Please see P6SMB11CAT3 to P6SMB91CAT3 for Bidirectional devices.

ON Semiconductor®

PLASTIC SURFACE MOUNT ZENER OVERVOLTAGE TRANSIENT SUPPRESSORS 5.8−171 VOLTS 600 WATT 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†
P6SMBxxxAT3	SMB	2500/Tape & Reel
P6SMBxxxAT3G	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.

Publication Order Number:
P6SMB6.8AT3/D

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Peak Power Dissipation (Note 1) @ T_L = 25°C, Pulse Width = 1 ms	P_{PK}	600	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 $R_{\theta JL}$	3.0 40 25	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 $R_{\theta JA}$	0.55 4.4 226	W mW/°C °C/W
Forward Surge Current (Note 4) @ T_A = 25°C	I_{FSM}	100	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.

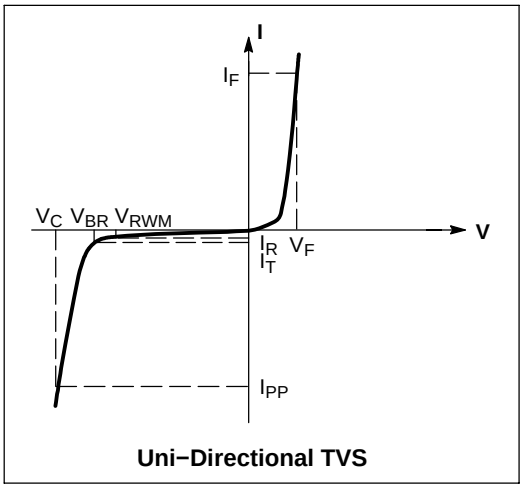
1. 10 X 1000 μs, non−repetitive
2. 1″ square copper pad, FR−4 board
3. FR−4 board, using ON Semiconductor minimum recommended footprint, as shown in 403A case outline dimensions spec.
4. 1/2 sine wave (or equivalent square wave), PW = 8.3 ms, duty cycle = 4 pulses per minute maximum.

ELECTRICAL CHARACTERISTICS

(T_A = 25°C unless otherwise noted, V_F = 3.5 V Max. @ I_F (Note 4) = 30 A) (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
ΘV_{BR}	Maximum Temperature Coefficient of V_{BR}
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 (Devices listed in bold, italic are ON Semiconductor Preferred devices.)

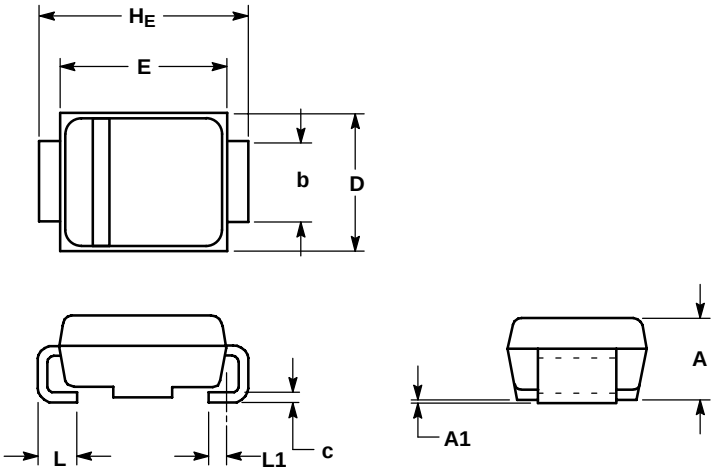
Device	Device Marking	V_{RWM} (Note 6)	I_R @ V_{RWM}	Breakdown Voltage				V_C @ I_{PP} (Note 8)		ΘV_{BR}	C_{typ} (Note 9)
				V_{BR} V (Note 7)			@ I_T	V_C	I_{PP}		
		V	μA	Min	Nom	Max	mA	V	A	%/°C	pF
P6SMB6.8AT3, G	***6V8A***	***5.8***	***1000***	***6.45***	***6.8***	***7.14***	***10***	***10.5***	***57***	***0.057***	***2380***
P6SMB7.5AT3, G	***7V5A***	***6.4***	***500***	***7.13***	***7.51***	***7.88***	***10***	***11.3***	***53***	***0.061***	***2180***
P6SMB8.2AT3, G	8V2A	7.02	200	7.79	8.2	8.61	10	12.1	50	0.065	2015
P6SMB9.1AT3, G	9V1A	7.78	50	8.65	9.1	9.55	1	13.4	45	0.068	1835
P6SMB10AT3, G	***10A***	***8.55***	***10***	***9.5***	***10***	***10.5***	***1***	***14.5***	***41***	***0.073***	***1690***
P6SMB11AT3, G	11A	9.4	5	10.5	11.05	11.6	1	15.6	38	0.075	1550
P6SMB12AT3, G	12A	10.2	5	11.4	12	12.6	1	16.7	36	0.078	1435
P6SMB13AT3, G	***13A***	***11.1***	***5***	***12.4***	***13.05***	***13.7***	***1***	***18.2***	***33***	***0.081***	***1335***
P6SMB15AT3, G	**15A**	**12.8**	**5**	**14.3**	**15.05**	**15.8**	**1**	**21.2**	**28**	**0.084**	***1175***
P6SMB16AT3, G	**16A**	**13.6**	**5**	**15.2**	**16**	**16.8**	**1**	**22.5**	**27**	**0.086**	***1110***
P6SMB18AT3, G	**18A**	**15.3**	**5**	**17.1**	**18**	**18.9**	**1**	**25.2**	**24**	**0.088**	***1000***
P6SMB20AT3, G	**20A**	**17.1**	**5**	**19**	**20**	**21**	**1**	**27.7**	**22**	**0.09**	***910***
P6SMB22AT3,G	***22A***	***18.8***	***5***	***20.9***	***22***	***23.1***	***1***	***30.6***	***20***	***0.092***	***835***
P6SMB24AT3, G	24A	20.5	5	22.8	24	25.2	1	33.2	18	0.094	775
P6SMB27AT3, G	***27A***	***23.1***	***5***	***25.7***	***27.05***	***28.4***	***1***	***37.5***	***16***	***0.096***	***700***
P6SMB30AT3, G	***30A***	***25.6***	***5***	***28.5***	***30***	***31.5***	***1***	***41.4***	***14.4***	***0.097***	***635***
P6SMB33AT3, G	33A	28.2	5	31.4	33.*05*	34.7	1	45.7	13.2	0.098	585
P6SMB36AT3, G	***36A***	***30.8***	***5***	***34.2***	***36***	***37.8***	***1***	***49.9***	***12***	***0.099***	***540***
P6SMB39AT3, G	***39A***	***33.3***	***5***	***37.1***	***39.05***	***41***	***1***	***53.9***	***11.2***	***0.1***	***500***
P6SMB43AT3, G	43A	36.8	5	40.9	43.05	45.2	1	59.3	10.1	0.101	460
P6SMB47AT3, G	47A	40.2	5	44.7	47.05	49.4	1	64.8	9.3	0.101	425
P6SMB51AT3, G	***51A***	***43.6***	***5***	***48.5***	***51.05***	***53.6***	***1***	***70.1***	***8.6***	***0.102***	***395***
P6SMB56AT3, G	56A	47.8	5	53.2	56	58.8	1	77	7.8	0.103	365
P6SMB62AT3, G	62A	53	5	58.9	62	65.1	1	85	7.1	0.104	335
P6SMB68AT3, G	68A	58.1	5	64.6	68	71.4	1	92	6.5	0.104	305
P6SMB75AT3, G	75A	64.1	5	71.3	75.05	78.8	1	103	5.8	0.105	280
P6SMB82AT3, G	82A	70.1	5	77.9	82	86.1	1	113	5.3	0.105	260
P6SMB91AT3, G	91A	77.8	5	86.5	91	95.5	1	125	4.8	0.106	235
P6SMB100AT3, G	100A	85.5	5	95	100	105	1	137	4.4	0.106	215
P6SMB110AT3, G	110A	94	5	105	110.5	116	1	152	4.0	0.107	200
P6SMB120AT3, G	120A	102	5	114	120	126	1	165	3.6	0.107	185
P6SMB130AT3, G	130A	111	5	124	130.5	137	1	179	3.3	0.107	170
P6SMB150AT3, G	150A	128	5	143	150.5	158	1	207	2.9	0.108	150
P6SMB160AT3, G	***160A***	***136***	***5***	***152***	***160***	***168***	***1***	***219***	***2.7***	***0.108***	***140***
P6SMB170AT3, G	170A	145	5	162	170	179	1	234	2.6	0.108	135
P6SMB180AT3, G	180A	154	5	171	180	189	1	246	2.4	0.108	130
P6SMB200AT3, G	200A	171	5	190	200	210	1	274	2.2	0.108	115

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 MHz, T_J = 25°C

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

PACKAGE DIMENSIONS

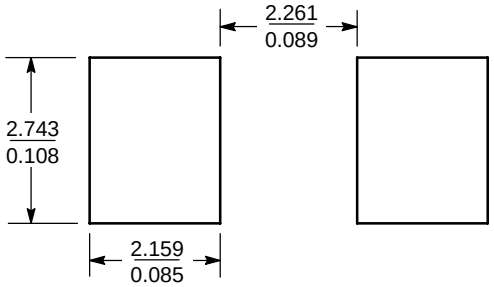
SMB
CASE 403A−03
ISSUE F



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

	MILLIMETERS			INCHES		
DIM	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
H_E	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.