

# P4SMA

## 400 W Transient voltage suppressor



### Product features

- Low profile SMA package
- Excellent clamping capability
- 400 W peak pulse power capability at 10/1000  $\mu$ s waveform
- Typical  $I_R$  less than 1  $\mu$ A above 12 V
- Fast response time: typically less than 1.0 ps from 0 V to  $V_{BR}$  minimum
- High temperature reflow soldering: +260 °C /40 s at terminal
- Plastic package meets UL 94 V-0 flammability rating
- Meets moisture sensitivity level (MSL) level 1
- Terminal: Solder plated leads, solderable per J-STD-002
- For surface mounted applications in order to optimize board space
- UL 497B recognized.  
File No. : E198449 Guide QVGO2

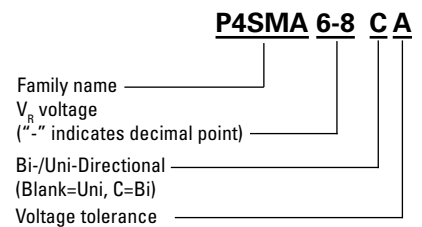
### Applications

- Consumer electronics
- Telecommunications
- Computing and servers
- Appliances
- Industrial automation
- Mobile and wearables

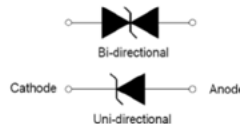
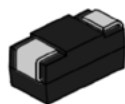
### Environmental compliance and general specifications



### Ordering part number



### PIN configuration



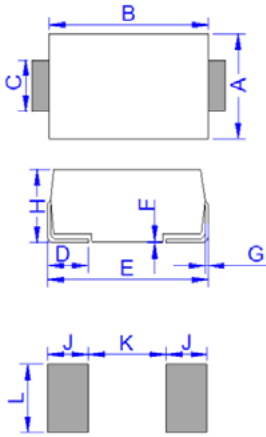
**Absolute maximum ratings**

(+25 °C, RH=45%-75%, unless otherwise noted)

Parameter	Symbol	Value	Unit
Storage operating junction temperature range	$T_{STG} / T_J$	-55 to +150	°C
Steady state power dissipation at $T_L = +75$ °C	$P_{M(AV)}$	3.3	W
Peak pulse power dissipation on 10/1000 $\mu$ s waveform	$P_{PP}$	400	W
Maximum instantaneous forward voltage at 100 A for unidirectional	$V_F$	5.0	V
Peak forward surge current, 8.3 ms single half sine wave <sup>1</sup>	$I_{FSM}$	60	A
Typical thermal resistance junction to lead	$R_{\theta JL}$	30	°C/W
Typical thermal resistance junction to ambient	$R_{\theta JA}$	120	°C/W

1. Measured on 8.3 ms single half sine wave or equivalent square wave for unidirectional device only, duty cycle = 4 per minute maximum

**Mechanical parameters, pad layout- mm**



Dimension	Millimeters		Inches	
	Minimum	Maximum	Minimum	Maximum
A	2.60	3.00	0.102	0.118
B	4.15	4.65	0.163	0.183
C	1.25	1.65	0.049	0.065
D	0.95	1.52	0.037	0.060
E	4.90	5.30	0.193	0.209
F	0.051	0.203	0.002	0.008
G	0.15	0.31	0.006	0.012
H	2.00	2.44	0.079	0.096
J	2.00		0.079	
K		2.30		0.091
L	1.80		0.071	

**Part marking**

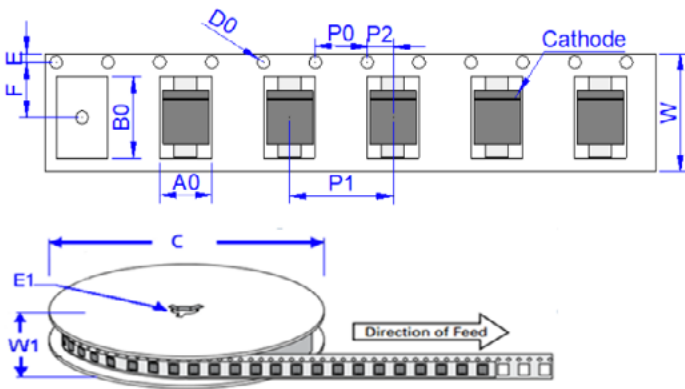


Part marking: xxxx = Date code  
yyyy- Refer to marking designator listed in Electrical Characteristics table

**Packaging information (mm)**

Drawing not to scale.

Supplied in tape and reel packaging, 5,000 parts per 13" diameter reel (EIA-481 compliant)



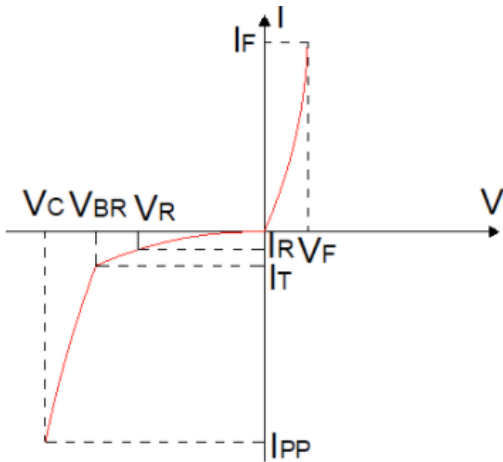
Dimensions	Millimeters	Inches
A0	2.79 ± 0.3	0.110 ± 0.012
B0	5.33 ± 0.3	0.210 ± 0.012
C	330.0	13.0
D0	1.55 ± 0.1	0.061 ± 0.004
E	1.75 ± 0.2	0.069 ± 0.008
E1	13.3 ± 0.3	0.524 ± 0.012
F	5.50 ± 0.2	0.217 ± 0.008
P0	4.00 ± 0.2	0.157 ± 0.008
P1	4.00 ± 0.2	0.157 ± 0.008
P2	2.00 ± 0.2	0.079 ± 0.008
W	12.0 ± 0.2	0.479 ± 0.008
W1	15.7 ± 2.0	0.618 ± 0.079

Electrical characteristics (+25 °C)

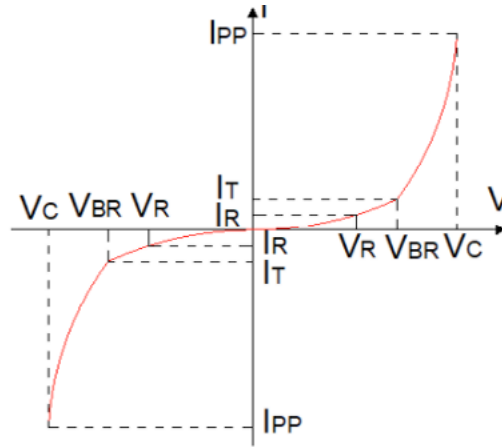
Part number	Bi-polar	Marking		$V_R$ (V)	$I_R @ V_R$ ( $\mu$ A)	$V_{BR} @ I_T$ min (V)	max (V)	$I_T$ (mA)	$V_C @ I_{PP}$ max (V)	$I_{PP}$ (A)
		Uni	Bi							
P4SMA6-8A	P4SMA6-8CA	6V8A	6V8C	5.8	120	6.45	7.14	10	10.5	39
P4SMA7-5A	P4SMA7-5CA	7V5A	7V5C	6.4	80	7.13	7.88	10	11.3	36.3
P4SMA8-2A	P4SMA8-2CA	8V2A	8V2C	7.02	50	7.79	8.61	10	12.1	33.9
P4SMA9-1A	P4SMA9-1CA	9V1A	9V1C	7.78	20	8.65	9.55	1	13.4	30.6
P4SMA10A	P4SMA10CA	10A	10C	8.55	10	9.5	10.5	1	14.5	28.3
P4SMA11A	P4SMA11CA	11A	11C	9.4	5	10.5	11.6	1	15.6	26.3
P4SMA12A	P4SMA12CA	12A	12C	10.2	2	11.4	12.6	1	16.7	24.6
P4SMA13A	P4SMA13CA	13A	13C	11.1	1	12.4	13.7	1	18.2	22.5
P4SMA15A	P4SMA15CA	15A	15C	12.8	1	14.3	15.8	1	21.2	19.3
P4SMA16A	P4SMA16CA	16A	16C	13.6	1	15.2	16.8	1	22.5	18.2
P4SMA18A	P4SMA18CA	18A	18C	15.3	1	17.1	18.9	1	25.2	16.1
P4SMA20A	P4SMA20CA	20A	20C	17.1	1	19	21	1	27.7	14.8
P4SMA22A	P4SMA22CA	22A	22C	18.8	1	20.9	23.1	1	30.6	13.4
P4SMA24A	P4SMA24CA	24A	24C	20.5	1	22.8	25.2	1	33.2	12.3
P4SMA27A	P4SMA27CA	27A	27C	23.1	1	25.7	28.4	1	37.5	10.9
P4SMA30A	P4SMA30CA	30A	30C	25.6	1	28.5	31.5	1	41.4	9.9
P4SMA33A	P4SMA33CA	33A	33C	28.2	1	31.4	34.7	1	45.7	9
P4SMA36A	P4SMA36CA	36A	36C	30.8	1	34.2	37.8	1	49.9	8.2
P4SMA39A	P4SMA39CA	39A	39C	33.3	1	37.1	41	1	53.9	7.6
P4SMA43A	P4SMA43CA	43A	43C	36.8	1	40.9	45.2	1	59.3	6.9
P4SMA47A	P4SMA47CA	47A	47C	40.2	1	44.7	49.4	1	64.8	6.3
P4SMA51A	P4SMA51CA	51A	51C	43.6	1	48.5	53.6	1	70.1	5.8
P4SMA56A	P4SMA56CA	56A	56C	47.8	1	53.2	58.8	1	77	5.2
P4SMA62A	P4SMA62CA	62A	62C	53	1	58.9	65.1	1	85	4.8
P4SMA68A	P4SMA68CA	68A	68C	58.1	1	64.6	71.4	1	92	4.5
P4SMA75A	P4SMA75CA	75A	75C	64.1	1	71.3	78.8	1	103	4
P4SMA82A	P4SMA82CA	82A	82C	70.1	1	77.9	86.1	1	113	3.6
P4SMA91A	P4SMA91CA	91A	91C	77.8	1	86.5	95.5	1	125	3.3
P4SMA100A	P4SMA100CA	100A	100C	85.5	1	95	105	1	137	3
P4SMA110A	P4SMA110CA	110A	110C	94	1	105	116	1	152	2.7
P4SMA120A	P4SMA120CA	120A	120C	102	1	114	126	1	165	2.5
P4SMA130A	P4SMA130CA	130A	130C	111	1	124	137	1	179	2.3
P4SMA150A	P4SMA150CA	150A	150C	128	1	143	158	1	207	2
P4SMA160A	P4SMA160CA	160A	160C	136	1	152	168	1	219	1.9
P4SMA170A	P4SMA170CA	170A	170C	145	1	162	179	1	234	1.8
P4SMA180A	P4SMA180CA	180A	180C	154	1	171	189	1	246	1.6
P4SMA200A	P4SMA200CA	200A	200C	171	1	190	210	1	274	1.5
P4SMA220A	P4SMA220CA	220A	220C	185	1	209	231	1	328	1.3
P4SMA235A	P4SMA235CA	235A	235C	200	1	223	246	1	324	1.3
P4SMA250A	P4SMA250CA	250A	250C	214	1	237	263	1	344	1.2
P4SMA300A	P4SMA300CA	300A	300C	256	1	285	315	1	414	1
P4SMA350A	P4SMA350CA	350A	350C	300	1	332	368	1	482	0.9
P4SMA400A	P4SMA400CA	400A	400C	342	1	380	420	1	548	0.8
P4SMA440A	P4SMA440CA	440A	440C	376	1	418	462	1	602	0.7

**Ratings and V-I characteristic curves (+25 °C unless otherwise noted)**

**V- I curve characteristics (Uni-directional)**



**V- I curve characteristics (Bi-directional)**



Surge waveform: 10/1000  $\mu$ s

$V_R$ : Stand-off voltage – Maximum voltage that can be applied

$V_{BR}$ : Breakdown voltage

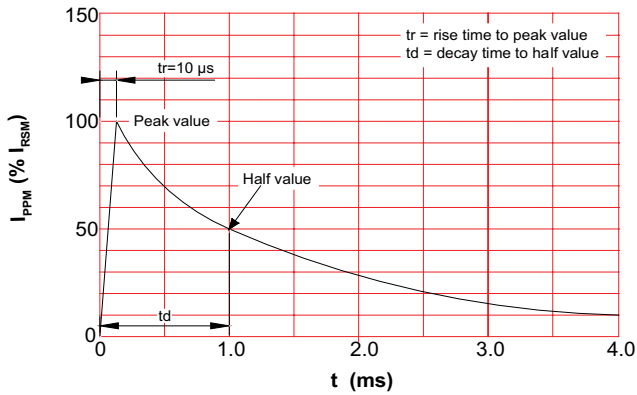
$V_C$ : Clamping voltage – Peak voltage measured across the suppressor at a specified  $I_{pp}$

$I_R$ : Reverse leakage current

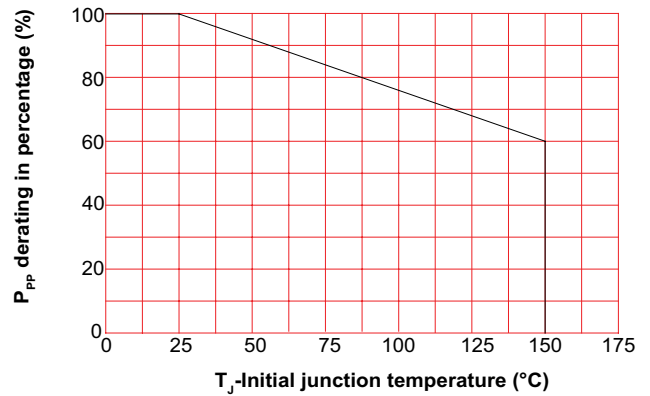
$I_T$ : Test current

$V_F$ : Forward voltage drop for Uni-directional TVS diode

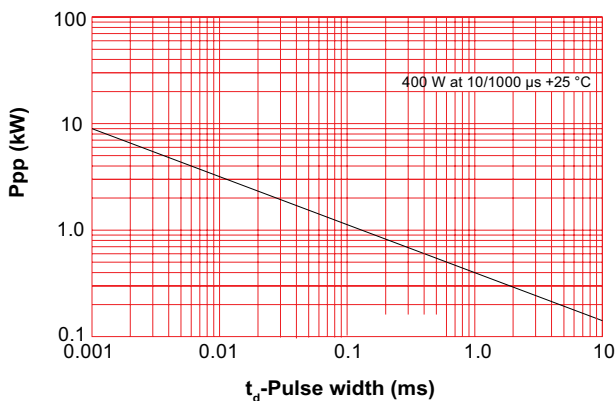
**Pulse waveform**



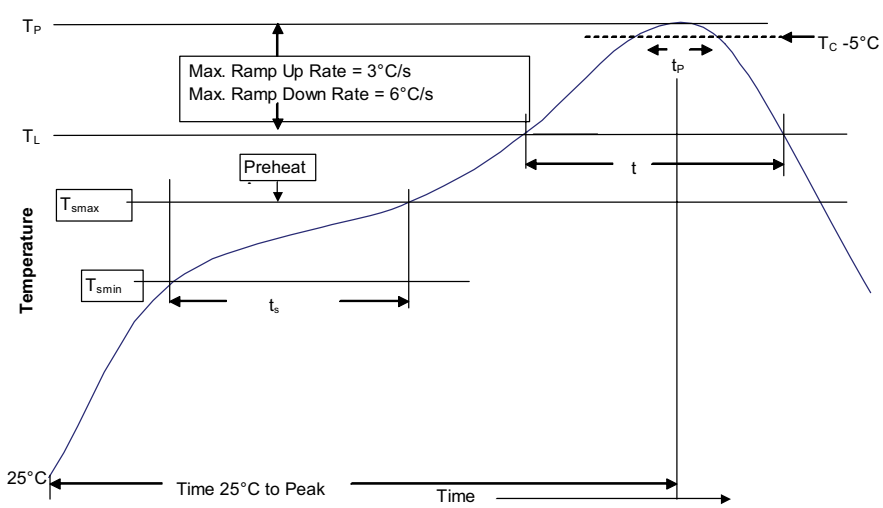
**Pulse derating curve**



**Peak pulse power dissipation vs. pulse width**



**Solder reflow profile**



**Table 1 - Standard SnPb solder ( $T_C$ )**

Package thickness	Volume $\text{mm}^3$ <350	Volume $\text{mm}^3$ $\geq$ 350
<2.5 mm	235 °C	220 °C
$\geq$ 2.5 mm	220 °C	220 °C

**Table 2 - Lead (Pb) free solder ( $T_C$ )**

Package thickness	Volume $\text{mm}^3$ <350	Volume $\text{mm}^3$ 350 - 2000	Volume $\text{mm}^3$ >2000
<1.6 mm	260 °C	260 °C	260 °C
1.6 – 2.5 mm	260 °C	250 °C	245 °C
>2.5 mm	250 °C	245 °C	245 °C

**Reference J-STD-020**

Profile feature	Standard SnPb solder	Lead (Pb) free solder
Preheat and soak	<ul style="list-style-type: none"> <li>Temperature min. (<math>T_{smin}</math>)</li> <li>Temperature max. (<math>T_{smax}</math>)</li> <li>Time (<math>T_{smin}</math> to <math>T_{smax}</math>) (<math>t_s</math>)</li> </ul>	<ul style="list-style-type: none"> <li>100 °C</li> <li>150 °C</li> <li>60-120 seconds</li> </ul>
Ramp up rate $T_L$ to $T_p$	3 °C/ second max.	3 °C/ second max.
Liquidous temperature ( $T_L$ ) Time ( $t_L$ ) maintained above $T_L$	<ul style="list-style-type: none"> <li>183 °C</li> <li>60-150 seconds</li> </ul>	<ul style="list-style-type: none"> <li>217 °C</li> <li>60-150 seconds</li> </ul>
Peak package body temperature ( $T_p$ )*	Table 1	Table 2
Time ( $t_p$ )* within 5 °C of the specified classification temperature ( $T_C$ )	20 seconds*	40 seconds*
Ramp-down rate ( $T_p$ to $T_L$ )	6 °C/ second max.	6 °C/ second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

\* Tolerance for peak profile temperature ( $T_p$ ) is defined as a supplier minimum and a user maximum.

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**Eaton**  
Electronics Division  
1000 Eaton Boulevard  
Cleveland, OH 44122  
United States  
Eaton.com/electronics

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