

# 5-0SMDJ

## Automotive grade 5000 W Transient voltage suppressor



### Product features

- Automotive grade (AEC-Q101 qualified)
- Low profile SMC package
- Excellent clamping capability
- High reliability application
- 5000 W peak pulse power capability at 10/1000  $\mu$ s waveform
- Typical  $I_R$  less than 5  $\mu$ A
- 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: Tin plated leads, solderable per J-STD-002
- For surface mounted applications in order to optimize board space

### Applications

- Automotive chassis and safety systems
- Advanced driver assistance systems (ADAS)
- Communication and infotainment systems
- Network systems and body electronics
- Power Train controls
- xEV and battery systems

### Environmental compliance and general specifications

- ISO16750-2 P5A: 12 V system (87 V/2  $\Omega$ /150 ms)
- ISO16750-2 P5A: 24 V system (123 V/8  $\Omega$ /150 ms)
- AEC-Q101 qualified

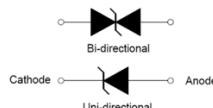
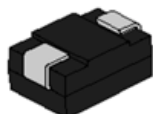


### Ordering part number

**5-0SMDJ 15 C A H**

Family name \_\_\_\_\_  
 $V_R$  voltage \_\_\_\_\_  
 ("-" indicates decimal point) \_\_\_\_\_  
 Bi-/Uni-Directional \_\_\_\_\_  
 (Blank=Uni, C=Bi)  
 Voltage tolerance \_\_\_\_\_  
 High reliability application \_\_\_\_\_

### PIN configuration



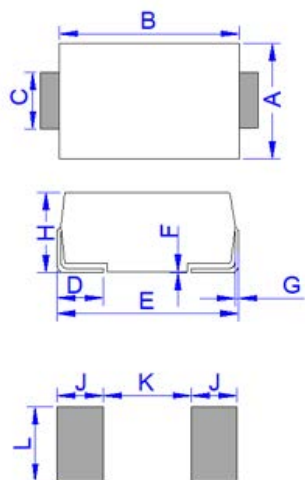
## Absolute maximum ratings

(+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	$P_{M(AV)}$	6.5	W
Peak pulse power dissipation on 10/1000 $\mu$ s waveform	$P_{PP}$	5000	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>	$I_{FSM}$	300	A
Typical thermal resistance junction to lead	$R_{\theta JL}$	15	°C/W
Typical thermal resistance junction to ambient	$R_{\theta JA}$	75	°C/W

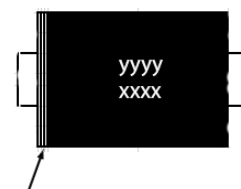
1. Measured on 8.3 ms single half sine wave or equivalent square wave for unidirectional device only, duty cycle = 4 per minute maximum

## Mechanical parameters, pad layout- mm/inches



Dimension	Millimeters		Inches	
	Minimum	Maximum	Minimum	Maximum
A	5.75	6.25	0.226	0.246
B	6.90	7.40	0.272	0.291
C	2.75	3.25	0.108	0.128
D	0.95	1.52	0.037	0.060
E	7.70	8.20	0.303	0.323
F	0.051	0.203	0.002	0.008
G	0.15	0.31	0.006	0.012
H	2.15	2.62	0.085	0.103
J	2.40		0.094	
K		4.20		0.165
L	3.30		0.130	

## Part marking



Cathode band (uni-polar only)

Part marking:

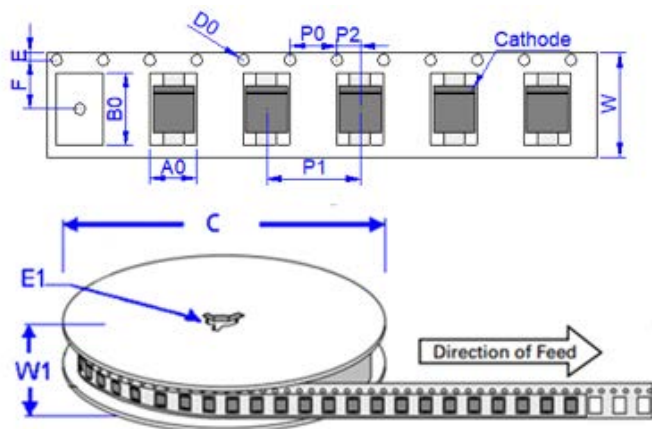
xxxx = Date code

yyyy- Refer to marking designator listed in Electrical characteristics table

## Packaging information- mm/inches

Drawing not to scale.

Supplied in tape and reel packaging, 3,000 parts per 13" diameter reel (EIA-481 compliant)



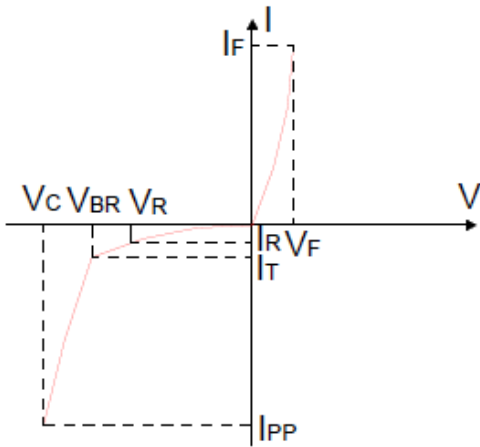
Dimensions	Millimeters	Inches
A0	6.05 ± 0.3	0.238 ± 0.012
B0	8.31 ± 0.3	0.327 ± 0.012
C	330.0	13.0
D0	1.55 ± 0.1	0.061 ± 0.004
E	1.75 ± 0.2	0.069 ± 0.008
E1	13.3 ± 0.3	0.524 ± 0.012
F	7.50 ± 0.2	0.295 ± 0.008
P0	4.00 ± 0.2	0.157 ± 0.008
P1	8.00 ± 0.2	0.3145 ± 0.008
P2	2.00 ± 0.2	0.079 ± 0.008
W	16.0 ± 0.2	0.630 ± 0.008
W1	19.7 ± 2.0	0.776 ± 0.079

Electrical characteristics (+25 °C)

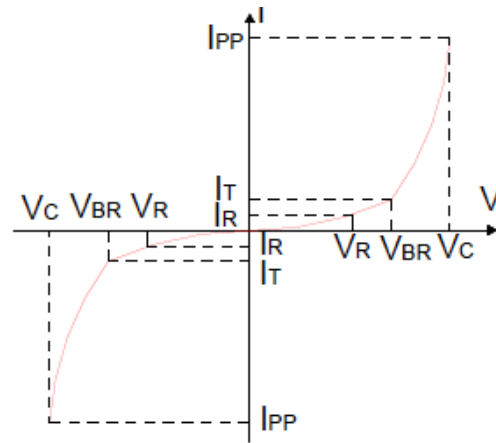
Part number		Marking		$V_R$	$I_R @ V_R$	$V_{BR} @ I_T$		$I_T$	$V_C @ I_{PP}$	$I_{PP}$
Uni-polar	Bi-polar	Uni	Bi	(V)	( $\mu A$ )	min (V)	max (V)	(mA)	max (V)	(A)
5-0SMDJ15AH	5-0SMDJ15CAH	P15A	P15C	15	5	16.7	18.5	5	24.4	205
5-0SMDJ16AH	5-0SMDJ16CAH	P16A	P16C	16	5	17.8	19.7	5	26	192
5-0SMDJ18AH	5-0SMDJ18CAH	P18A	P18C	18	5	20	22.1	5	29.2	171
5-0SMDJ20AH	5-0SMDJ20CAH	P20A	P20C	20	5	22.2	24.5	5	32.4	154
5-0SMDJ22AH	5-0SMDJ22CAH	P22A	P22C	22	5	24.4	26.9	5	35.5	141
5-0SMDJ24AH	5-0SMDJ24CAH	P24A	P24C	24	5	26.7	29.5	5	38.9	129
5-0SMDJ26AH	5-0SMDJ26CAH	P26A	P26C	26	5	28.9	31.9	5	42.1	119
5-0SMDJ28AH	5-0SMDJ28CAH	P28A	P28C	28	5	31.1	34.4	5	45.4	110
5-0SMDJ30AH	5-0SMDJ30CAH	P30A	P30C	30	5	33.3	36.8	5	48.4	103
5-0SMDJ33AH	5-0SMDJ33CAH	P33A	P33C	33	5	36.7	40.6	5	53.3	94
5-0SMDJ36AH	5-0SMDJ36CAH	P36A	P36C	36	5	40	44.2	5	58.1	86
5-0SMDJ40AH	5-0SMDJ40CAH	P40A	P40C	40	5	44.4	49.1	5	64.5	78
5-0SMDJ43AH	5-0SMDJ43CAH	P43A	P43C	43	5	47.8	52.8	5	69.4	72

**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

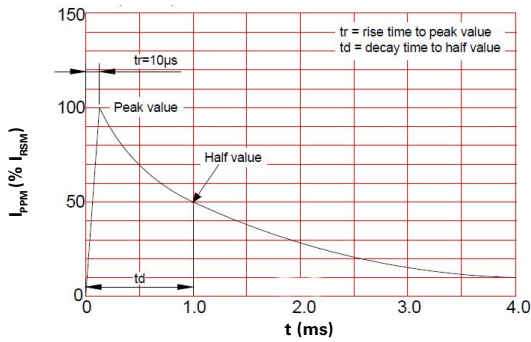
$V_C$ : Clamping voltage – Peak voltage measured across the suppressor at a specified  $I_{PP}$

$I_R$ : Reverse leakage current

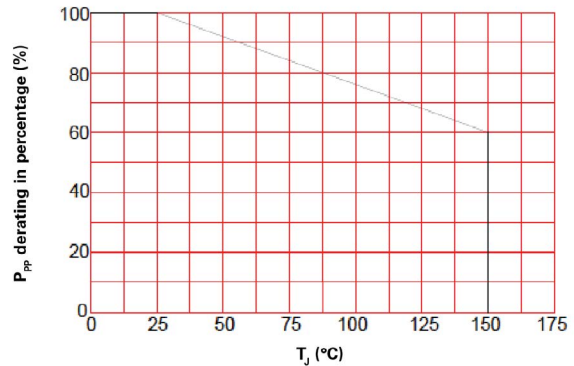
$I_T$ : Test current

$V_F$ : Forward voltage drop for Uni-directional

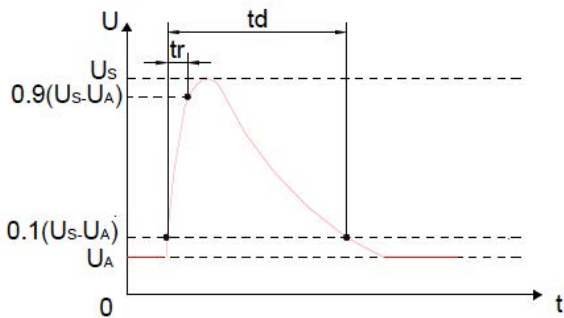
**Pulse waveform**



**Pulse derating curve**



**ISO16750-2 test pulse 5a**



**ISO16750-2 test pulse 5a conditions**

Parameter	12 V system	24 V system
$U_S$	79 V to 101 V	151 V to 202 V
$R_i$	0.5 $\Omega$ to 4 $\Omega$	1 $\Omega$ to 8 $\Omega$
$t_d$	40 ms to 400 ms	100 ms to 350 ms
$t_r$	5 to 10 ms	5 to 10 ms

## Solder reflow profile

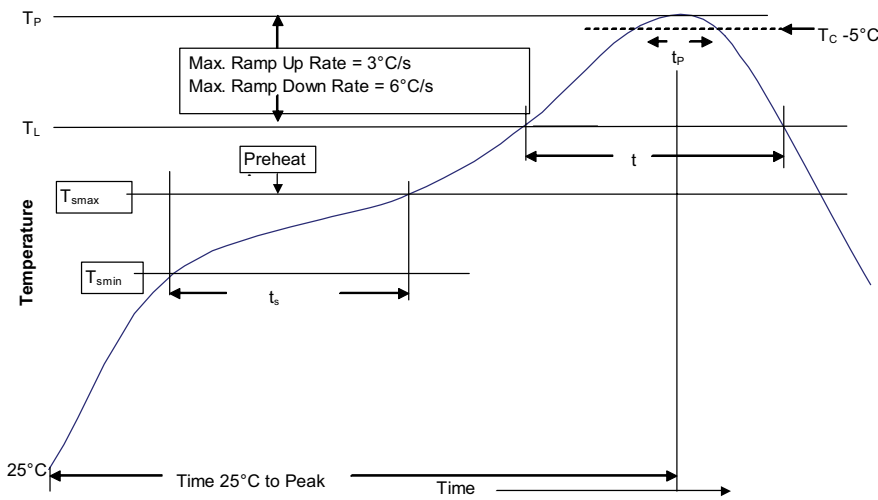


Table 1 - Standard SnPb solder ( $T_C$ )

Package thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> ≥350
<2.5 mm	235 °C	220 °C
≥2.5 mm	220 °C	220 °C

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

Package thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> 350 - 2000	Volume mm <sup>3</sup> >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		
• Temperature min. ( $T_{smin}$ )	100 °C	150 °C
• Temperature max. ( $T_{smax}$ )	150 °C	200 °C
• Time ( $T_{smin}$ to $T_{smax}$ ) ( $t_s$ )	60-120 seconds	60 - 180 seconds
Ramp up rate $T_L$ to $T_p$	3 °C/ second max.	3 °C/ second max.
Liquidous temperature ( $T_L$ )	183 °C	217 °C
Time ( $t_L$ ) maintained above $T_L$	60-150 seconds	60-150 seconds
Peak package body temperature ( $T_p$ )*	Table 1	Table 2 (+0, -5 °C)
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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