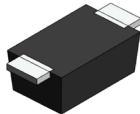


# SMFE

## Automotive grade 200 W Transient voltage suppressor



### Product features

- Automotive grade (AEC-Q101 qualified)
- Low profile SOD-123FL package
- Excellent clamping capability
- High reliability application
- 200 W peak pulse power capability at 10/1000  $\mu$ s waveform
- Typical  $I_R$  less than 1  $\mu$ A above 6 V
- Fast response time: typically less than 1.0 ps from 0 V to  $V_{BR}$  minimum
- Plastic package meets UL 94 V-0 flammability rating
- Meets moisture sensitivity level (MSL) level 1
- Terminal: tin plated, solderable per J-STD-002

### Applications

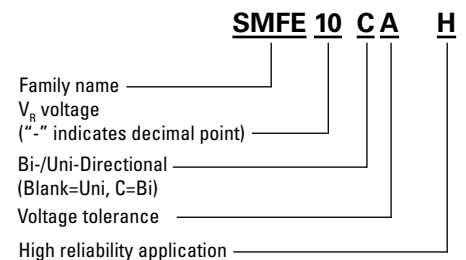
- Automotive chassis and safety systems
- Advanced driver assistance systems (ADAS)
- Communication and infotainment systems
- Network systems and body electronics
- Power train controls
- xEV and battery systems

### Environmental compliance and general specifications

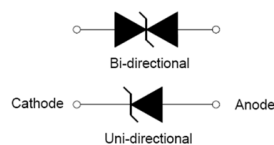
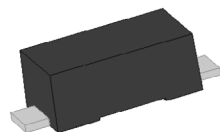
- AEC-Q101 qualified



### Ordering part number



### PIN configuration

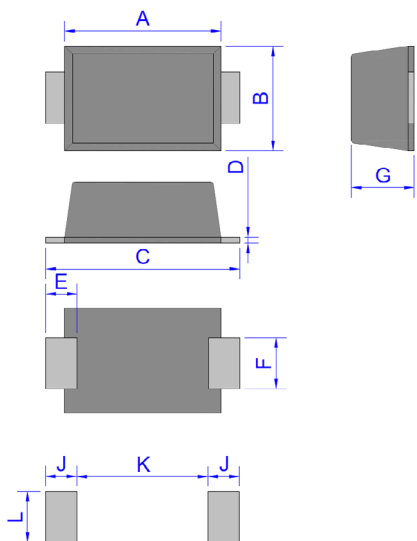


**Absolute maximum ratings**

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

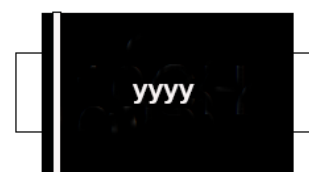
Parameter	Symbol	Value	Unit
Storage operating junction temperature range	$T_{STG}/T_J$	-55 to +150	°C
Peak pulse power dissipation on 10/1000 $\mu$ s waveform	$P_{PP}$	200	W
Maximum instantaneous forward voltage at 20 A for unidirectional	$V_F$	3.5	V
Typical thermal resistance junction to lead	$R_{\theta JL}$	100	°C/W
Typical thermal resistance junction to ambient	$R_{\theta JA}$	220	°C/W

**Mechanical parameters, pad layout- mm/inches**



Dimension	Millimeters		Inches	
	Minimum	Maximum	Minimum	Maximum
A	2.60	3.00	0.102	0.118
B	1.60	2.00	0.063	0.079
C	3.45	3.95	0.136	0.156
D	0.10	0.25	0.004	0.010
E	0.30	0.90	0.012	0.035
F	0.80	1.20	0.031	0.047
G	0.95	1.35	0.037	0.053
J	1.30	-	0.051	-
K	-	1.70	-	0.067
L	1.30	-	0.051	-

**Part marking**

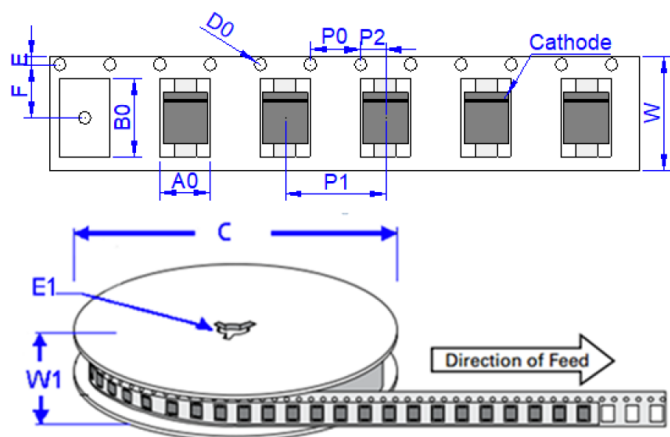


Cathode band (uni-polar only)  
Part marking:  
yyyy- Placeholder-refer to "Marking" listed in  
Electrical characteristics table for actual marking

**Packaging information - mm/inches**

Drawing not to scale.

Supplied in tape and reel packaging, 3,000 parts per 7" diameter reel (EIA-481 compliant)



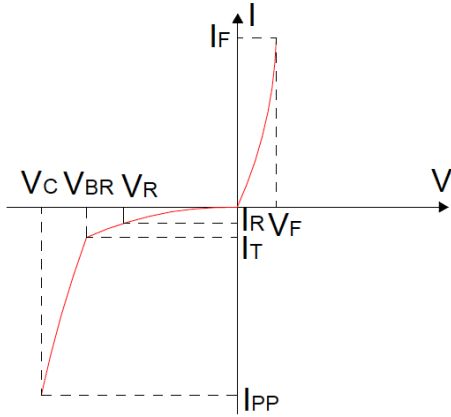
Dimensions	Millimeters	Inches
A0	1.95 ± 0.3	0.077 ± 0.012
B0	3.95 ± 0.3	0.156 ± 0.012
C	178	7.0
D0	1.55 ± 0.1	0.061 ± 0.004
E	1.75 ± 0.2	0.069 ± 0.008
E1	13.3 ± 0.3	0.524 ± 0.012
F	3.50 ± 0.2	0.138 ± 0.008
P0	4.00 ± 0.2	0.157 ± 0.008
P1	4.00 ± 0.2	0.157 ± 0.008
P2	2.00 ± 0.2	0.079 ± 0.008
W	8.0 ± 0.2	0.315 ± 0.008
W1	11.5 ± 1.0	0.453 ± 0.039

Electrical specifications (+25 °C)

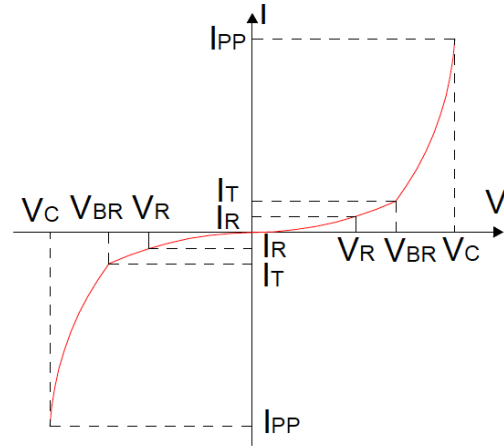
Part number		Marking		$V_R$	$I_R @ V_R$	$V_{BR} @ I_T$		$I_T$	$V_C @ I_{PP}$	$I_{PP}$
Uni-polar	Bi-polar	Uni	Bi	(V)	max (µA)	min (V)	max (V)	(mA)	max (V)	(A)
SMFE5-0AH	/	KEH	/	5	10	6.4	7	10	9.2	21.7
SMFE6-0AH	/	KGH	/	6	10	6.67	7.37	10	10.3	19.4
/	SMFE5-0CAH	/	5CH	5	40	6.4	7	10	9.2	21.7
/	SMFE6-0CAH	/	6CH	6	40	6.67	7.37	10	10.3	19.4
SMFE10AH	SMFE10CAH	KXH	10CH	10	1	11.1	12.3	1	17	11.8
SMFE11AH	SMFE11CAH	KZH	11CH	11	1	12.2	13.5	1	18.2	11
SMFE12AH	SMFE12CAH	LEH	12CH	12	1	13.3	14.7	1	19.9	10.1
SMFE13AH	SMFE13CAH	LGH	13CH	13	1	14.4	15.9	1	21.5	9.3
SMFE14AH	SMFE14CAH	LKH	14CH	14	1	15.6	17.2	1	23.2	8.6
SMFE15AH	SMFE15CAH	LMH	15CH	15	1	16.7	18.5	1	24.4	8.2
SMFE16AH	SMFE16CAH	LPH	16CH	16	1	17.8	19.7	1	26	7.7
SMFE17AH	SMFE17CAH	LRH	17CH	17	1	18.9	20.9	1	27.6	7.2
SMFE18AH	SMFE18CAH	LTH	18CH	18	1	20	22.1	1	29.2	6.8
SMFE20AH	SMFE20CAH	LVH	20CH	20	1	22.2	24.5	1	32.4	6.2
SMFE22AH	SMFE22CAH	LXH	22CH	22	1	24.4	26.9	1	35.5	5.6
SMFE24AH	SMFE24CAH	LZH	24CH	24	1	26.7	29.5	1	38.9	5.1
SMFE26AH	SMFE26CAH	MEH	26CH	26	1	28.9	31.9	1	42.1	4.8
SMFE28AH	SMFE28CAH	MGH	28CH	28	1	31.1	34.4	1	45.4	4.4
SMFE30AH	SMFE30CAH	MKH	30CH	30	1	33.3	36.8	1	48.4	4.1
SMFE33AH	SMFE33CAH	MMH	33CH	33	1	36.7	40.6	1	53.3	3.8
SMFE36AH	SMFE36CAH	MPH	36CH	36	1	40	44.2	1	58.1	3.4
SMFE40AH	SMFE40CAH	MRH	40CH	40	1	44.4	49.1	1	64.5	3.1
SMFE43AH	SMFE43CAH	MTH	43CH	43	1	47.8	52.8	1	69.4	2.8
SMFE45AH	SMFE45CAH	MVH	45CH	45	1	50	55.3	1	72.7	2.7
SMFE48AH	SMFE48CAH	MXH	48CH	48	1	53.3	58.9	1	77.4	2.6
SMFE51AH	SMFE51CAH	MZH	51CH	51	1	56.7	62.7	1	82.4	2.4
SMFE54AH	SMFE54CAH	NEH	54CH	54	1	60	66.3	1	87.1	2.3
SMFE58AH	SMFE58CAH	NGH	58CH	58	1	64.4	71.2	1	93.6	2.1
SMFE60AH	SMFE60CAH	NKH	60CH	60	1	66.7	73.7	1	96.8	2
SMFE64AH	SMFE64CAH	NMH	64CH	64	1	71.1	78.6	1	103	1.9
SMFE70AH	SMFE70CAH	NPH	70CH	70	1	77.8	86	1	113	1.8
SMFE75AH	SMFE75CAH	NRH	75CH	75	1	83.3	92.1	1	121	1.7
SMFE78AH	SMFE78CAH	NVH	78CH	78	1	86.7	95.8	1	126	1.6
SMFE85AH	SMFE85CAH	NXH	85CH	85	1	94.4	104	1	137	1.5
SMFE90AH	SMFE90CAH	NZH	90CH	90	1	100	111	1	146	1.4
SMFE100AH	SMFE100CAH	PEH	100CH	100	1	111	123	1	162	1.2
SMFE110AH	SMFE110CAH	PGH	110CH	110	1	122	135	1	177	1.1
SMFE120AH	SMFE120CAH	PKH	120CH	120	1	133	147	1	193	1
SMFE130AH	SMFE130CAH	PMH	130CH	130	1	144	159	1	209	0.9
SMFE150AH	SMFE150CAH	PRH	150CH	150	1	167	185	1	243	0.8
SMFE160AH	SMFE160CAH	PVH	160CH	160	1	178	197	1	259	0.8
SMFE170AH	SMFE170CAH	PXH	170CH	170	1	189	209	1	275	0.7
SMFE180AH	SMFE180CAH	PZH	180CH	180	1	201	222	1	292	0.7
SMFE200AH	SMFE200CAH	QEH	200CH	200	1	224	247	1	324	0.6
SMFE220AH	SMFE220CAH	QRH	220CH	220	1	246	272	1	356	0.5

**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

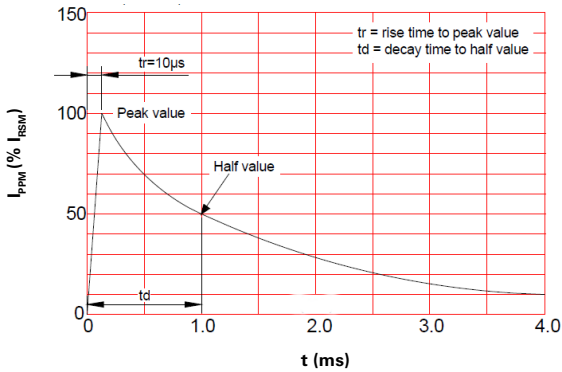
$V_C$ : Clamping voltage – Peak voltage measured across the suppressor at a specified  $I_{PP}$

$I_R$ : Reverse leakage current

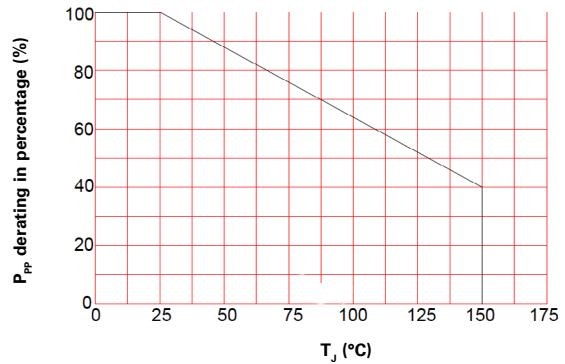
$I_T$ : Test current

$V_F$ : Forward voltage drop for Uni-directional

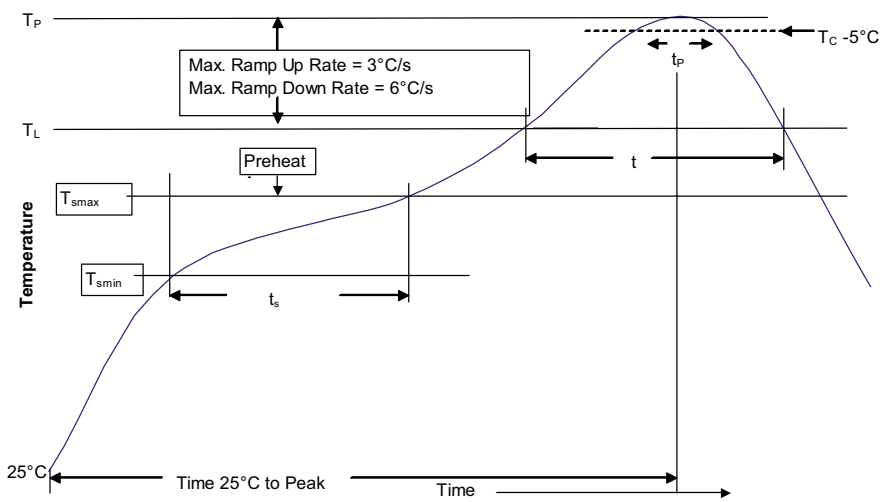
**Pulse waveform**



**Pulse derating curve**



**Solder reflow profile**



**Table 1 - Standard SnPb solder (T<sub>C</sub>)**

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<sub>C</sub>)**

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 <sub>smin</sub> )	100 °C	150 °C
• Temperature max. (T <sub>smax</sub> )	150 °C	200 °C
• Time (T <sub>smin</sub> to T <sub>smax</sub> ) (t <sub>s</sub> )	60-120 seconds	60 - 180 seconds
Ramp up rate T <sub>L</sub> to T <sub>p</sub>	3 °C/ second max.	3 °C/ second max.
Liquidous temperature (T <sub>L</sub> )	183 °C	217 °C
Time (t <sub>L</sub> ) maintained above T <sub>L</sub>	60-150 seconds	60-150 seconds
Peak package body temperature (T <sub>p</sub> )*	Table 1	Table 2 (+0, -5 °C)
Time (t <sub>p</sub> )* within 5 °C of the specified classification temperature (T <sub>C</sub> )	20 seconds*	40 seconds*
Ramp-down rate (T <sub>p</sub> to T <sub>L</sub> )	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<sub>p</sub>) is defined as a supplier minimum and a user maximum.

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