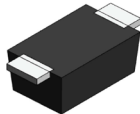


# SMFE

## 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

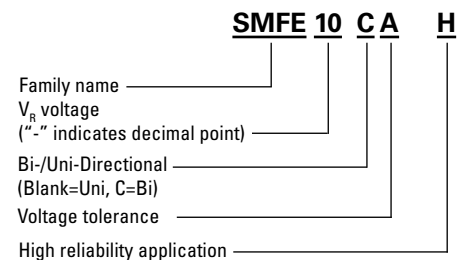
- Automotive chassis and safety systems
- Advanced driver assistance systems (ADAS)
- Communication and infotainment systems
- Network systems and body electronics
- Power train controls
- xEV and battery systems

### Environmental compliance and general specifications

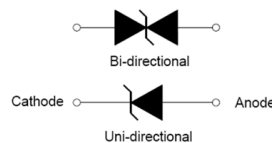
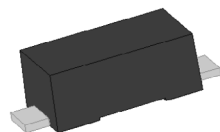
- AEC-Q101 qualified



### Ordering part number



### PIN configuration

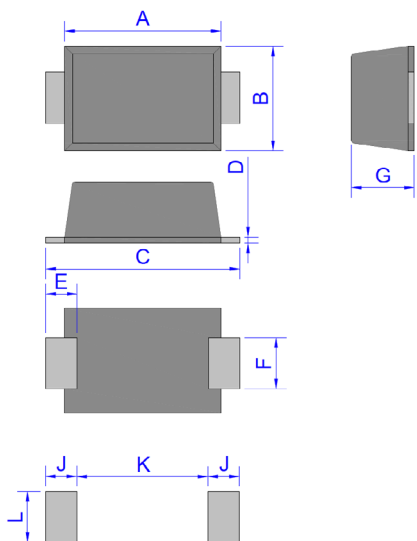


**Absolute maximum ratings**

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

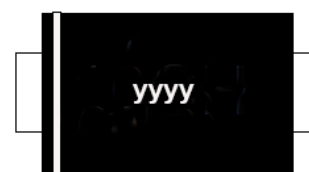
Parameter	Symbol	Value	Unit
Storage operating junction temperature range	$T_{STG}/T_J$	-55 to +150	°C
Peak pulse power dissipation on 10/1000 $\mu$ s waveform	$P_{PP}$	200	W
Maximum instantaneous forward voltage at 20 A for unidirectional	$V_F$	3.5	V
Typical thermal resistance junction to lead	$R_{\theta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

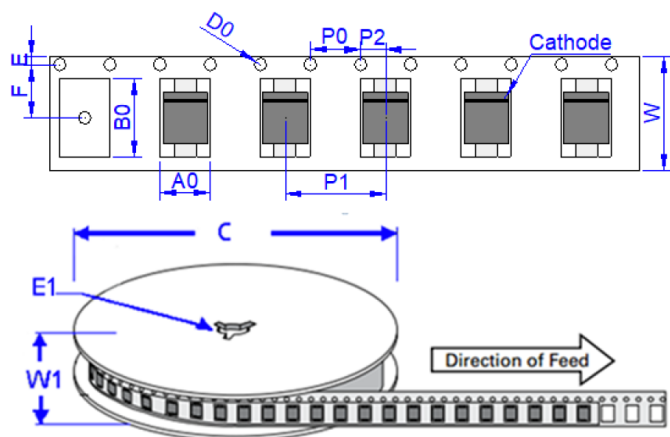


Cathode band (uni-polar only)  
Part marking:  
yyyy- Placeholder-refer to "Marking" listed in  
Electrical characteristics table for actual marking

**Packaging information - mm/inches**

Drawing not to scale.

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



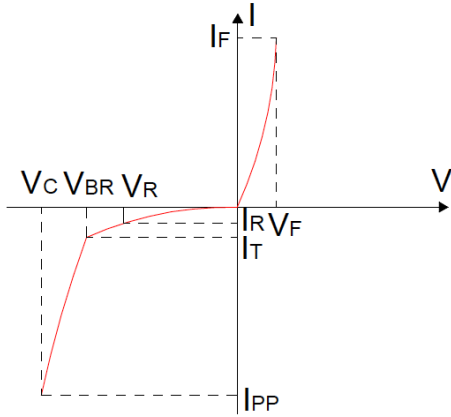
Dimensions	Millimeters	Inches
A0	1.95 ± 0.3	0.077 ± 0.012
B0	3.95 ± 0.3	0.156 ± 0.012
C	178	7.0
D0	1.55 ± 0.1	0.061 ± 0.004
E	1.75 ± 0.2	0.069 ± 0.008
E1	13.3 ± 0.3	0.524 ± 0.012
F	3.50 ± 0.2	0.138 ± 0.008
P0	4.00 ± 0.2	0.157 ± 0.008
P1	4.00 ± 0.2	0.157 ± 0.008
P2	2.00 ± 0.2	0.079 ± 0.008
W	8.0 ± 0.2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

Electrical specifications (+25 °C)

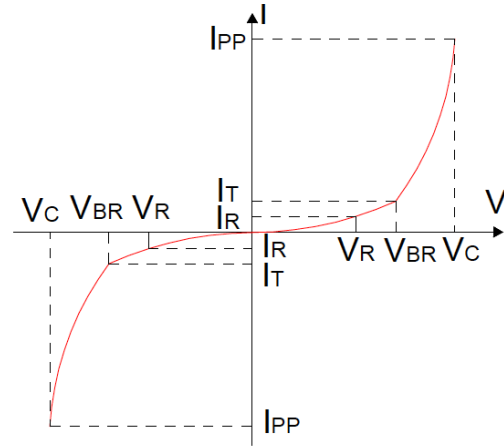
Part number		Marking		$V_R$	$I_R @ V_R$	$V_{BR} @ I_T$		$I_T$	$V_C @ I_{PP}$	$I_{PP}$
Uni-polar	Bi-polar	Uni	Bi	(V)	max (μA)	min (V)	max (V)	(mA)	max (V)	(A)
SMFE5-0AH	/	KEH	/	5	10	6.4	7	10	9.2	21.7
SMFE6-0AH	/	KGH	/	6	10	6.67	7.37	10	10.3	19.4
/	SMFE5-0CAH	/	5CH	5	40	6.4	7	10	9.2	21.7
/	SMFE6-0CAH	/	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

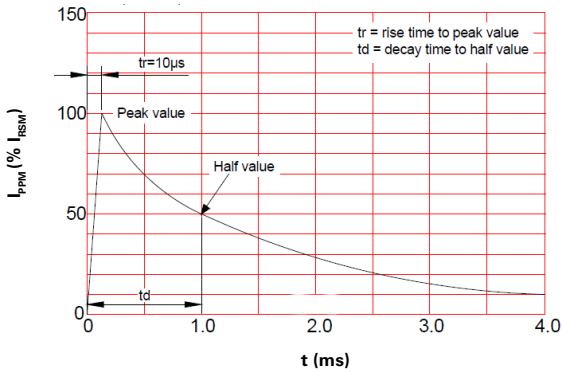
$V_C$ : Clamping voltage – Peak voltage measured across the suppressor at a specified  $I_{PP}$

$I_R$ : Reverse leakage current

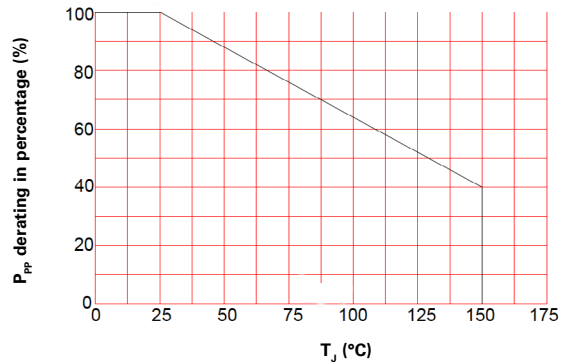
$I_T$ : Test current

$V_F$ : 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	<ul style="list-style-type: none"> <li>Temperature min. (T<sub>smin</sub>)</li> <li>Temperature max. (T<sub>smax</sub>)</li> <li>Time (T<sub>smin</sub> to T<sub>smax</sub>) (t<sub>s</sub>)</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 <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.

Life Support Policy: Eaton does not authorize the use of any of its products for use in life support devices or systems without the express written approval of an officer of the Company. Life support systems are devices which support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.

Eaton reserves the right, without notice, to change design or construction of any products and to discontinue or limit distribution of any products. Eaton also reserves the right to change or update, without notice, any technical information contained in this bulletin.

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

© 2021 Eaton  
All Rights Reserved  
Printed in USA  
Publication No. ELX1066 BU-ELX21066  
June 2021

Eaton is a registered trademark.  
All other trademarks are property of their respective owners.

Follow us on social media to get the latest product and support information.



# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

## Eaton:

[SMFE110AH](#) [SMFE18AH](#) [SMFE220CAH](#) [SMFE45CAH](#) [SMFE78AH](#) [SMFE120CAH](#) [SMFE13AH](#) [SMFE170AH](#)  
[SMFE24CAH](#) [SMFE36AH](#) [SMFE51CAH](#) [SMFE120AH](#) [SMFE220AH](#) [SMFE43AH](#) [SMFE64CAH](#) [SMFE13CAH](#)  
[SMFE150CAH](#) [SMFE16AH](#) [SMFE33CAH](#) [SMFE78CAH](#) [SMFE90CAH](#) [SMFE12AH](#) [SMFE130CAH](#) [SMFE180CAH](#)  
[SMFE20CAH](#) [SMFE40CAH](#) [SMFE64AH](#) [SMFE110CAH](#) [SMFE180AH](#) [SMFE54AH](#) [SMFE58AH](#) [SMFE10CAH](#)  
[SMFE18CAH](#) [SMFE24AH](#) [SMFE48AH](#) [SMFE51AH](#) [SMFE58CAH](#) [SMFE11CAH](#) [SMFE17AH](#) [SMFE22AH](#)  
[SMFE43CAH](#) [SMFE54CAH](#) [SMFE11AH](#) [SMFE17CAH](#) [SMFE22CAH](#) [SMFE45AH](#) [SMFE90AH](#) [SMFE12CAH](#)  
[SMFE160AH](#) [SMFE26CAH](#) [SMFE40AH](#) [SMFE150AH](#) [SMFE15AH](#) [SMFE16CAH](#) [SMFE28CAH](#) [SMFE30AH](#)  
[SMFE130AH](#) [SMFE15CAH](#) [SMFE28AH](#) [SMFE36CAH](#) [SMFE75AH](#) [SMFE75CAH](#) [SMFE10AH](#) [SMFE160CAH](#)  
[SMFE200AH](#) [SMFE48CAH](#) [SMFE70AH](#) [SMFE70CAH](#) [SMFE170CAH](#) [SMFE5-0CAH](#) [SMFE14AH](#) [SMFE14CAH](#)  
[SMFE30CAH](#) [SMFE33AH](#) [SMFE85AH](#) [SMFE85CAH](#) [SMFE100AH](#) [SMFE100CAH](#) [SMFE200CAH](#) [SMFE20AH](#)  
[SMFE26AH](#) [SMFE5-0AH](#) [SMFE60AH](#) [SMFE60CAH](#) [SMFE6.0AH](#) [SMFE6.0CAH](#)