



**THE DATASHEET OF  
SE20PB-M3/84A**



## Surface-Mount ESD Capability Rectifiers

### eSMP® Series


**SMP (DO-220AA)**

Cathode Anode

### FEATURES

- Very low profile - typical height of 1.0 mm
- Ideal for automated placement
- Oxide planar chip junction
- Low forward voltage drop
- ESD capability
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

 AUTOMOTIVE  
GRADE  
Available

**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

### TYPICAL APPLICATIONS

General purpose, power line polarity protection and rail-to-rail protection in consumer, industrial, and automotive applications.

### MECHANICAL DATA

**Case:** SMP (DO-221AA)

Molding compound meets UL 94 V-0 flammability rating

Base P/N-M3 - halogen-free, RoHS-compliant, and commercial grade

Base P/NHM3 - halogen-free, RoHS-compliant, and automotive grade

**Terminals:** matte tin plated leads, solderable per J-STD-002 and JESD 22-B102

M3 suffix meets JESD 201 class 1A whisker test, HM3 suffix meets JESD 201 class 2 whisker test

**Polarity:** color band denotes the cathode end

### LINKS TO ADDITIONAL RESOURCES



3D Models

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	2.0 A
$V_{RRM}$	100 V, 200 V, 400 V, 600 V
$I_{FSM}$	32 A
$V_F$ at $I_F = 2.0$ A ( $T_A = 125$ °C)	0.85 V
$I_R$	5 $\mu$ A
$T_J$ max.	175 °C
Package	SMP (DO-220AA)
Circuit configuration	Single

MAXIMUM RATINGS ( $T_A = 25$ °C unless otherwise noted)						
PARAMETER	SYMBOL	SE20PB	SE20PD	SE20PG	SE20PJ	UNIT
Device marking code		20B	20D	20G	20J	
Maximum repetitive peak reverse voltage	$V_{RRM}$	100	200	400	600	V
Average forward current (fig. 1)	$I_{F(AV)}^{(1)}$	2.0				A
	$I_{F(AV)}^{(2)}$	1.6				
Peak forward surge current 10 ms single half sine-wave superimposed on rated load	$I_{FSM}$	32				A
Operating junction and storage temperature range	$T_J, T_{STG}$	-55 to +175				°C

### Notes

(1) Mounted on 5.0 mm x 5.0 mm pad areas, 2 oz. FR4 PCB

(2) Free air, mounted on recommended copper pad area



<b>ELECTRICAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)						
PARAMETER	TEST CONDITIONS		SYMBOL	TYP.	MAX.	UNIT
Instantaneous forward voltage	$I_F = 1.0\text{ A}$	$T_A = 25\text{ }^\circ\text{C}$	$V_F^{(1)}$	0.90	-	V
	$I_F = 2.0\text{ A}$			0.96	1.05	
	$I_F = 1.0\text{ A}$	$T_A = 125\text{ }^\circ\text{C}$		0.78	-	
	$I_F = 2.0\text{ A}$			0.85	0.95	
Reverse current	Rated $V_R$	$T_A = 25\text{ }^\circ\text{C}$	$I_R^{(2)}$	-	5.0	$\mu\text{A}$
		$T_A = 125\text{ }^\circ\text{C}$		16	100	
Typical reverse recovery time	$I_F = 0.5\text{ A}, I_R = 1.0\text{ A}, I_{rr} = 0.25\text{ A}$		$t_{rr}$	1.2	-	$\mu\text{s}$
Typical junction capacitance	4.0 V, 1 MHz		$C_J$	13	-	pF

**Notes**

- (1) Pulse test: 300  $\mu\text{s}$  pulse width, 1 % duty cycle  
(2) Pulse test: Pulse width  $\leq 40\text{ ms}$

<b>THERMAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)						
PARAMETER	SYMBOL	SE20PB	SE20PD	SE20PG	SE20PJ	UNIT
Typical thermal resistance	$R_{\theta JA}^{(1)}$	105				$^\circ\text{C/W}$
	$R_{\theta JM}^{(2)}$	20				

**Notes**

- (1) Free air, mounted on recommended PCB, 1 oz. pad area; thermal resistance  $R_{\theta JA}$  - junction to ambient  
(2) Mounted on 5.0 mm x 5.0 mm pad areas, 2 oz. FR4 PCB;  $R_{\theta JM}$  - junction to mount

<b>IMMUNITY TO ELECTRICAL STATIC DISCHARGE TO THE FOLLOWING STANDARDS</b>					
$(T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)					
STANDARD	TEST TYPE	TEST CONDITIONS	SYMBOL	CLASS	VALUE
AEC-Q101-001	Human body model (contact mode)	$C = 100\text{ pF}, R = 1.5\text{ k}\Omega$	$V_C$	H3B	$> 8\text{ kV}$

<b>ORDERING INFORMATION</b> (Example)				
PREFERRED P/N	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
SE20PJ-M3/84A	0.024	84A	3000	7" diameter plastic tape and reel
SE20PJ-M3/85A	0.024	85A	10 000	13" diameter plastic tape and reel
SE20PJHM3/84A <sup>(1)</sup>	0.024	84A	3000	7" diameter plastic tape and reel
SE20PJHM3/85A <sup>(1)</sup>	0.024	85A	10 000	13" diameter plastic tape and reel

**Note**

- (1) AEC-Q101 qualified

**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^\circ\text{C}$  unless otherwise noted)

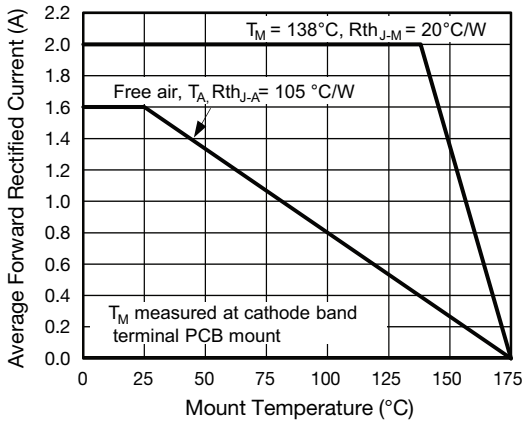


Fig. 1 - Maximum Forward Current Derating Curve

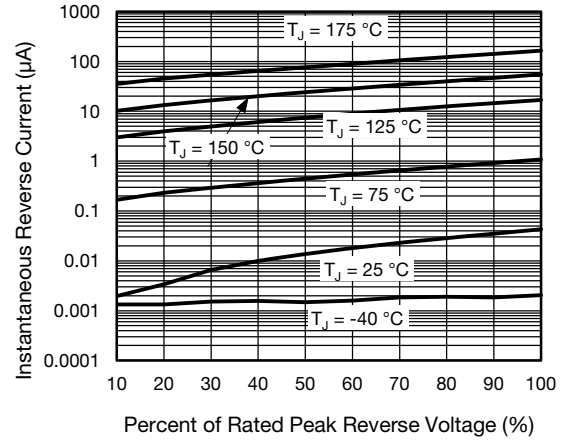


Fig. 4 - Typical Reverse Leakage Characteristics

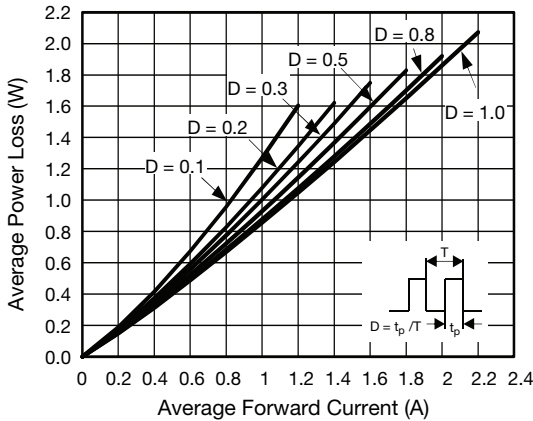


Fig. 2 - Forward Power Loss Characteristics

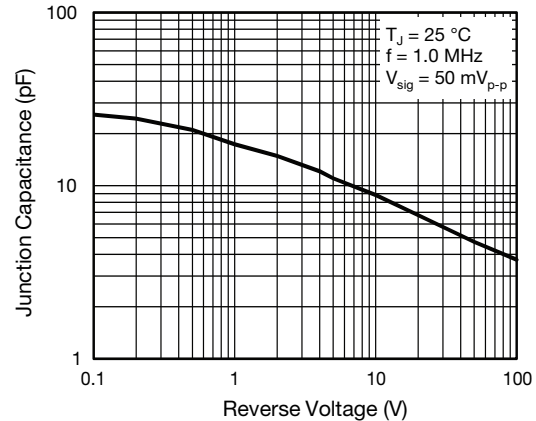


Fig. 5 - Typical Junction Capacitance

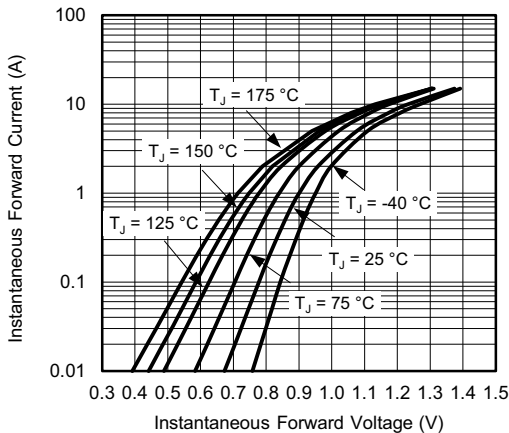


Fig. 3 - Typical Instantaneous Forward Characteristics

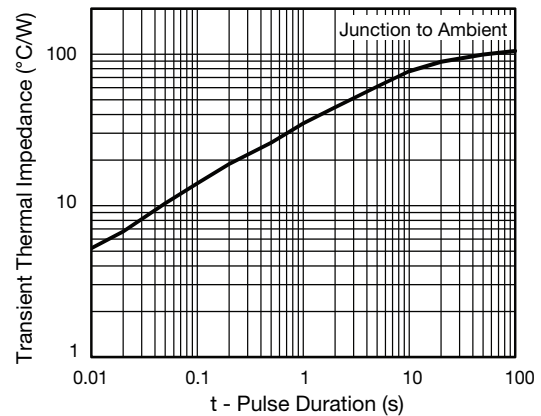
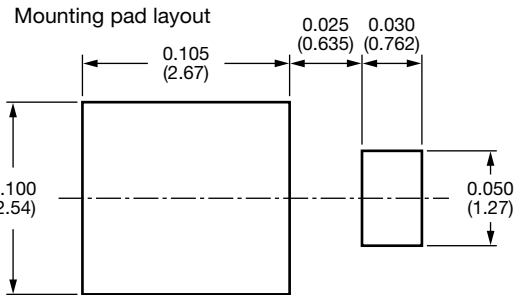
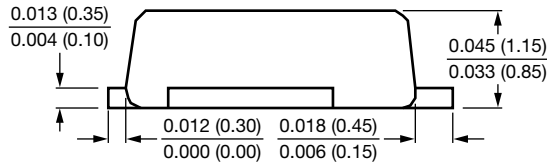
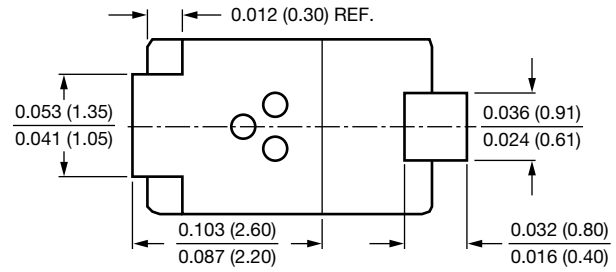
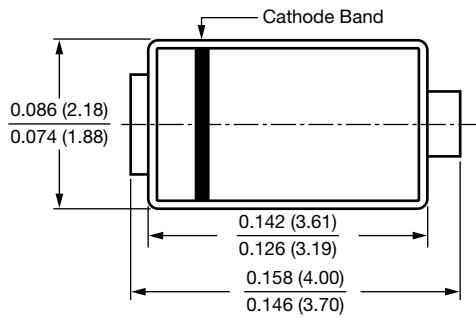


Fig. 6 - Typical Junction Capacitance



### PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

#### SMP (DO-220AA)





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