

## MSE1PB thru MSE1PJ

AUTOMOTIVE

Available

COMPLIANT

HALOGEN

FREE

### Vishay General Semiconductor

# Surface Mount ESD Capability Rectifier



PRIMARY CHARACTERISTICS					
I <sub>F(AV)</sub>	1.0 A				
V <sub>RRM</sub>	100 V, 200 V, 400 V, 600 V				
I <sub>FSM</sub>	20 A				
V <sub>F</sub> at IF = 1.0 A	0.925 V				
I <sub>R</sub>	1 μΑ				
T <sub>J</sub> max.	175 °C				

#### **TYPICAL APPLICATIONS**

General purpose, polarity protection, and rail-to-rail protection in both consumer and automotive applications.

#### **FEATURES**

- Very low profile typical height of 0.65 mm
- Ideal for automated placement
- Oxide planar chip junction
- Low forward voltage drop, low leakage current
- ESD capability
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC
- Halogen-free according to IEC 61249-2-21 definition

### **MECHANICAL DATA**

Case: MicroSMP

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

MAXIMUM RATINGS (T <sub>A</sub> = 25 °C, unless otherwise noted)							
PARAMETER	SYMBOL	MSE1PB	MSE1PD	MSE1PG	MSE1PJ	UNIT	
Device marking code		SB	SD	SG	SJ		
Maximum repetitive peak reverse voltage	V <sub>RRM</sub>	100 200 400 600			600	V	
Maximum average forward rectified current (fig. 1)	I <sub>F(AV)</sub>	1.0				Α	
Peak forward surge current 10 ms single half sine-wave superimposed on rated load	I <sub>FSM</sub>	20				А	
Operating junction and storage temperature range	T <sub>J</sub> , T <sub>STG</sub>	- 55 to + 175				°C	

<b>ELECTRICAL CHARACTERISTICS</b> (T <sub>A</sub> = 25 °C, unless otherwise noted)							
PARAMETER	TEST CONDITIONS		SYMBOL	TYP.	MAX.	UNIT	
Maximum instantaneous forward voltage	I <sub>F</sub> = 0.5 A	T <sub>A</sub> = 25 °C	V <sub>F</sub> <sup>(1)</sup>	0.940	-	V	
	I <sub>F</sub> = 1.0 A	1A = 25 C		1.016	1.1		
	I <sub>F</sub> = 0.5 A	T <sub>A</sub> = 125 °C		0.834	-		
	I <sub>F</sub> = 1.0 A	1A = 125 C		0.925	0.98		
Maximum reverse current	Rated V <sub>R</sub>	T <sub>A</sub> = 25 °C	I <sub>R</sub> <sup>(2)</sup>	-	1.0	μA	
Maximum reverse current	nated v <sub>R</sub>	T <sub>A</sub> = 125 °C		3.7	50		
Typical reverse recovery time	I <sub>F</sub> = 0.5 A, I <sub>R</sub> = 1.0 A, I <sub>rr</sub> = 0.25 A		t <sub>rr</sub>	780	-	ns	
Typical junction capacitance	4.0 V, 1 MHz		CJ	5	-	рF	

### Notes

 $^{(1)}\,$  Pulse test: 300  $\mu s$  pulse width, 1 % duty cycle

(2) Pulse test: Pulse width ≤ 40 ms

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THERMAL CHARACTERISTICS (T <sub>A</sub> = 25 °C, unless otherwise noted)							
PARAMETER	SYMBOL MSE1PB MSE1PD MSE1PG MSE1PJ				UNIT		
	R <sub>0JA</sub> (1)	110				°C/W	
Typical thermal resistance	R <sub>0</sub> JL (1)						
	R <sub>0</sub> JC (1)	40					

#### Note

 $<sup>^{(1)}</sup>$  Thermal resistance from junction to ambient and junction to lead mounted on PCB with 6.0 mm x 6.0 mm copper pad areas.  $R_{\theta JL}$  is measured at the terminal of cathode band.

IMMUNITY TO ELECTRICAL STATIC DISCHARGE TO THE FOLLOWING STANDARDS ( $T_A = 25~^{\circ}\text{C}$ , unless otherwise noted)							
STANDARD	TEST TYPE	TEST CONDITIONS	SYMBOL	CLASS	VALUE		
AEC-Q101-001	Human body model (contact mode)	C = 100 pF, R = 1.5 kW		НЗВ	> 8 kV		
AEC-Q101-002	Machine model (contact mode)	C = 200 pF, R = 0 W		M4	> 400 V		
JESD22-A114	Human body model (contact mode)	C = 150 pF, R = 1.5 kW	\ <u>\</u>	3B	> 8 kV		
JESD22-A115	Machine model (contact mode)	C = 200 pF, R = 0 W	V <sub>C</sub>	С	> 400 V		
IEC 61000-4-2 (2)	Human body model (contact mode)	C = 150 pF, R = 150 W		4	> 8 kV		
IEG 01000-4-2 (-)	Human body model (air-discharge mode) (1)	C = 150 pF, R = 150 W		4	> 15 kV		

#### Notes

<sup>(2)</sup> System ESD standard

ORDERING INFORMATION (Example)						
PREFERRED P/N	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	DELIVERY MODE		
MSE1PJ-M3/89A	0.006	89A	4500	7" diameter plastic tape and reel		
MSE1PJHM3/89A (1)	0.006	89A	4500	7" diameter plastic tape and reel		

#### Note

### **RATINGS AND CHARACTERISTICS CURVES**

 $(T_A = 25 \, ^{\circ}C \text{ unless otherwise noted})$ 

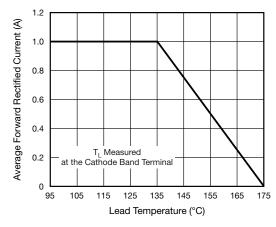


Fig. 1 - Forward Current Derating Curve

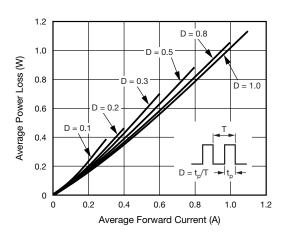


Fig. 2 - Forward Power Loss Characteristics

<sup>(1)</sup> Immunity to IEC 61000-4-2 air discharge mode has a typical performance > 30 kV

<sup>(1)</sup> Automotive grade



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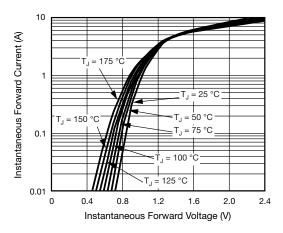


Fig. 3 - Typical Instantaneous Forward Characteristics

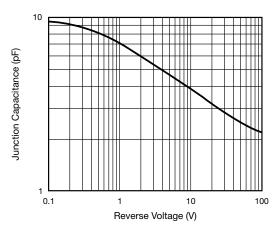


Fig. 5 - Typical Junction Capacitance

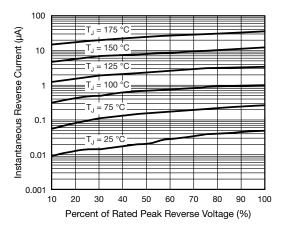


Fig. 4 - Typical Reverse Leakage Characteristics

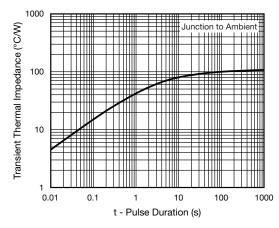
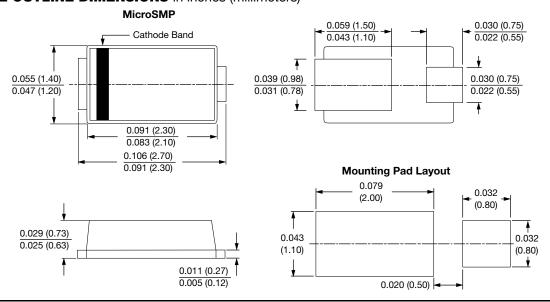


Fig. 6 - Typical Transient Thermal Impedance

### PACKAGE OUTLINE DIMENSIONS in inches (millimeters)



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