

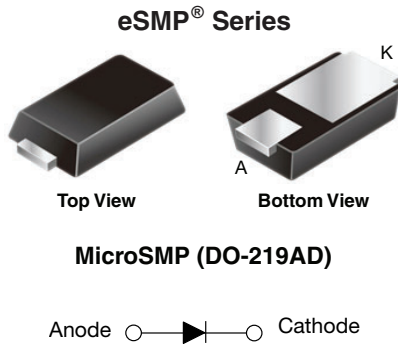


**THE DATASHEET OF  
MSX1PD-M3/89A**





## Surface-Mount ESD Capability Rectifier



### 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 available  
- Automotive ordering code: base P/NHM3
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



### LINKS TO ADDITIONAL RESOURCES



### TYPICAL APPLICATIONS

General purpose, polarity protection, and rail-to-rail protection in commercial, industrial, and automotive applications.

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	1.0 A
$V_{RRM}$	100 V, 200 V, 400 V, 600 V
$I_{FSM}$	18 A
$V_F$ at $I_F = 1.0$ A (125 °C)	0.9 V
$T_J$ max.	175 °C
Package	MicroSMP (DO-219AD)
Circuit configuration	Single

### MECHANICAL DATA

**Case:** MicroSMP (DO-219AD)  
Molding compound meets UL 94 V-0 flammability rating  
Base P/N-M3 - halogen-free and RoHS-compliant  
Base P/NHM3 - halogen-free, RoHS-compliant, and AEC-Q101 qualified

**Terminals:** matte tin plated leads, solderable per J-STD-002 and JESD 22-B102  
M3 and HM3 suffix meets JESD 201 class 2 whisker test

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

MAXIMUM RATINGS ( $T_A = 25$ °C unless otherwise noted)						
PARAMETER	SYMBOL	MSX1PB	MSX1PD	MSX1PG	MSX1PJ	UNIT
Device marking code		XB	XD	XG	XJ	
Maximum repetitive peak reverse voltage	$V_{RRM}$	100	200	400	600	V
Maximum average forward rectified current	$I_{F(AV)}$	1.0				A
Peak forward surge current 10 ms single half sine-wave superimposed on rated load	$I_{FSM}$	18				A
Operating junction and storage temperature range	$T_J, T_{STG}$	-55 to +175				°C



<b>ELECTRICAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)						
PARAMETER	TEST CONDITIONS		SYMBOL	TYP.	MAX.	UNIT
Maximum instantaneous forward voltage	$I_F = 0.5\text{ A}$	$T_A = 25\text{ }^\circ\text{C}$	$V_F^{(1)}$	0.93	-	V
	$I_F = 1.0\text{ A}$			1.0	1.1	
	$I_F = 0.5\text{ A}$	$T_A = 125\text{ }^\circ\text{C}$		0.81	-	
	$I_F = 1.0\text{ A}$			0.9	0.98	
Maximum reverse current	Rated $V_R$	$T_A = 25\text{ }^\circ\text{C}$	$I_R^{(2)}$	-	1.0	$\mu\text{A}$
		$T_A = 125\text{ }^\circ\text{C}$		4.1	50	
Typical reverse recovery time	$I_F = 0.5\text{ A}, I_R = 1.0\text{ A}, I_{rr} = 0.25\text{ A}$		$t_{rr}$	960	-	ns
Typical junction capacitance	4.0 V, 1 MHz		$C_J$	5	-	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	MSX1PB	MSX1PD	MSX1PG	MSX1PJ	UNIT
Typical thermal resistance	$R_{\theta JA}^{(1)}$	110				$^\circ\text{C/W}$
	$R_{\theta JL}^{(1)}$	30				

**Note**(1) Thermal resistance from junction to ambient and junction to lead mounted on PCB with 5.0 mm x 5.0 mm copper pad areas.  $R_{\theta JL}$  is measured at the terminal of cathode band

<b>IMMUNITY TO ELECTRICAL STATIC DISCHARGE TO THE FOLLOWING STANDARDS</b>						
$(T_A = 25\text{ }^\circ\text{C}, \text{ unless otherwise noted})$						
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	$> 8\text{ kV}$	
AEC-Q101-002	Machine model (contact mode)	$C = 200\text{ pF}, R = 0\text{ }\Omega$		M4	$> 400\text{ V}$	
JESD 22-A114	Human body model (contact mode)	$C = 100\text{ pF}, R = 1.5\text{ k}\Omega$		3B	$> 8\text{ kV}$	
JESD 22-A115	Machine model (contact mode)	$C = 200\text{ pF}, R = 0\text{ }\Omega$		C	$> 400\text{ V}$	
IEC 61000-4-2 <sup>(2)</sup>	Human body model (contact mode)	$C = 150\text{ pF}, R = 330\text{ }\Omega$		4	$> 8\text{ kV}$	
	Human body model (air-discharge mode) <sup>(1)</sup>	$C = 150\text{ pF}, R = 330\text{ }\Omega$		4	$> 15\text{ kV}$	
ISO 10605	Contact mode	$C = 330\text{ pF}, R = 2\text{ k}\Omega$		-		20 kV typ.

**Notes**(1) Immunity to IEC 61000-4-2 air discharge mode has a typical performance  $> 30\text{ kV}$ 

(2) System ESD standard

<b>ORDERING INFORMATION</b> (Example)				
PREFERRED P/N	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
MSX1PJ-M3/89A	0.006	89A	4500	7" diameter plastic tape and reel
MSX1PJHM3/89A <sup>(1)</sup>	0.006	89A	4500	7" diameter plastic tape and reel

**Note**

(1) AEC-Q101 qualified



## RATINGS AND CHARACTERISTICS CURVES (T<sub>A</sub> = 25 °C unless otherwise noted)

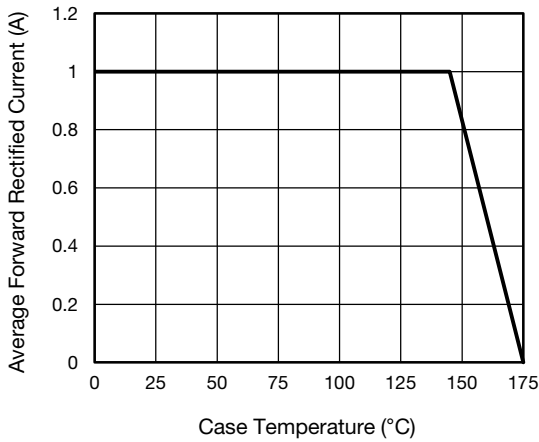


Fig. 1 - Maximum Forward Current Derating Curve

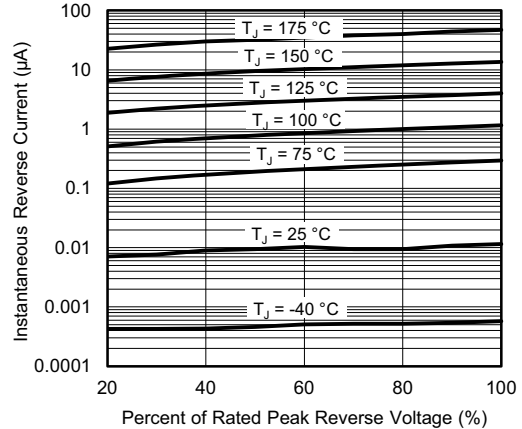


Fig. 4 - Typical Reverse Leakage Characteristics

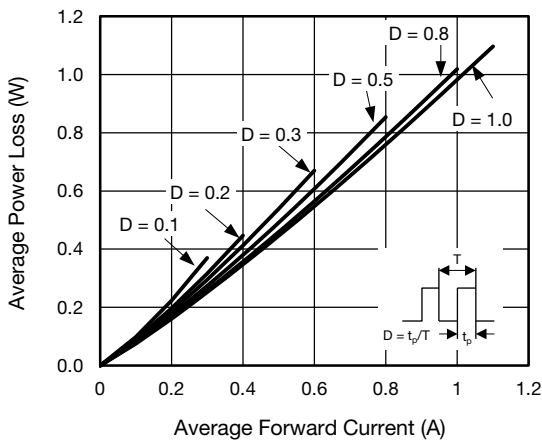


Fig. 2 - Average Power Loss Characteristics

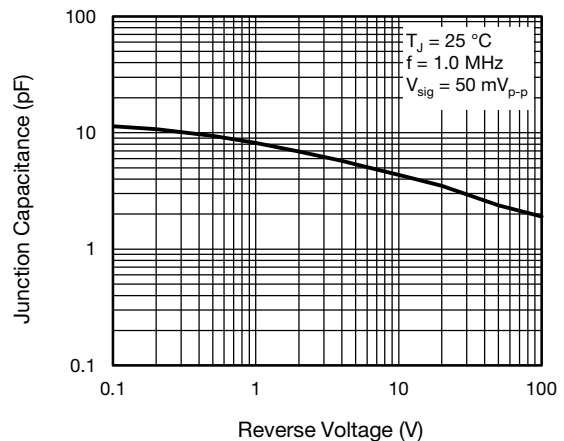


Fig. 5 - Typical Junction Capacitance

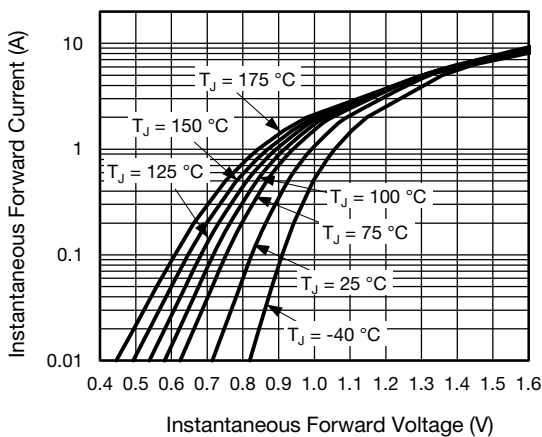


Fig. 3 - Typical Instantaneous Forward Characteristics

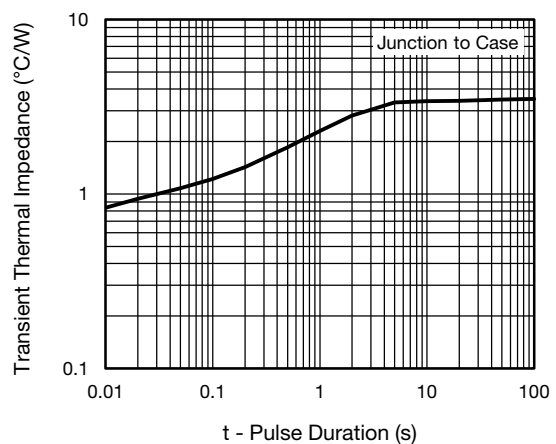


Fig. 6 - Typical Transient Thermal Impedance

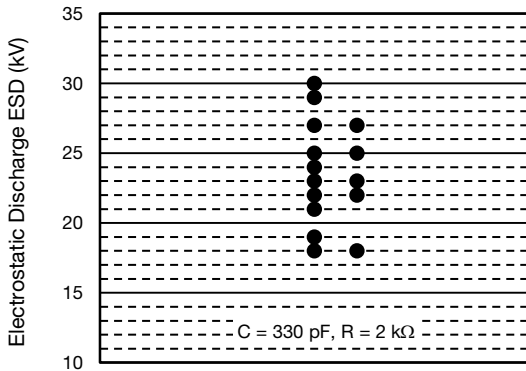
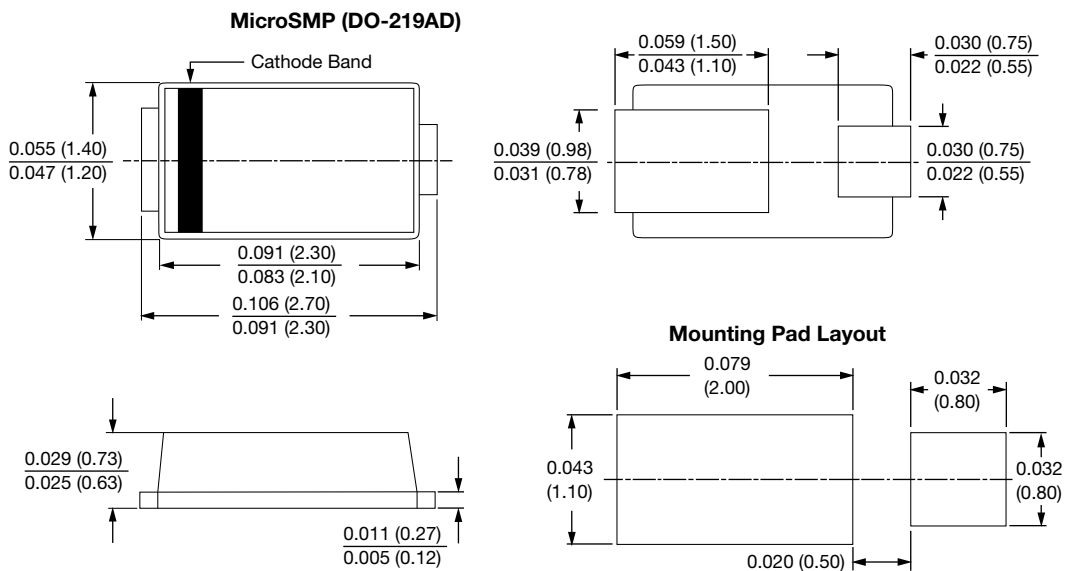


Fig. 7 - ESD Dispersion Map

## PACKAGE OUTLINE DIMENSIONS in inches (millimeters)





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