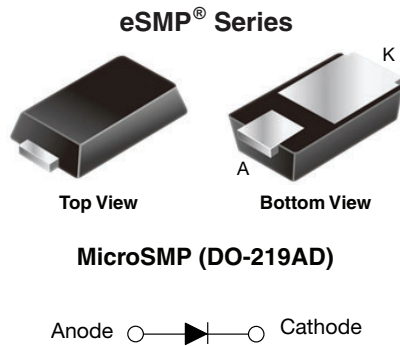


## Surface-Mount ESD Capability Rectifier



### LINKS TO ADDITIONAL RESOURCES



PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	1.0 A
$V_{RRM}$	400 V, 600 V
$I_{FSM}$	15 A
$V_F$ at $I_F = 1.0$ A	0.99 V
$T_J$ max.	175 °C
Package	MicroSMP (DO-219AD)
Circuit configuration	Single

### 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
- Meet 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)



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

### TYPICAL APPLICATIONS

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

### MECHANICAL DATA

**Case:** MicroSMP (DO-219AD)

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 AEC-Q101 qualified

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

M3 and HM3 suffix meet JESD 201 class 2 whisker test

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

MAXIMUM RATINGS ( $T_A = 25$ °C, unless otherwise noted)				
PARAMETER	SYMBOL	MSQ1PG	MSQ1PJ	UNIT
Device marking code		QG	QJ	
Max. repetitive peak reverse voltage	$V_{RRM}$	400	600	V
Max. average forward rectified current (fig. 1)	$I_{F(AV)}$	1.0		A
Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load	$I_{FSM}$	15		A
Operating junction and storage temperature range	$T_J, T_{STG}$	-55 to +175		°C



ELECTRICAL CHARACTERISTICS ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)						
PARAMETER	TEST CONDITIONS		SYMBOL	TYP.	MAX.	UNIT
Max. instantaneous forward voltage	$I_F = 0.5\text{ A}$	$T_A = 25\text{ }^\circ\text{C}$	$V_F^{(1)}$	0.99	-	V
	$I_F = 1.0\text{ A}$			1.09	1.2	
	$I_F = 0.5\text{ A}$	$T_A = 125\text{ }^\circ\text{C}$		0.88	-	
	$I_F = 1.0\text{ A}$			0.99	1.05	
Max. reverse current	Rated $V_R$	$T_A = 25\text{ }^\circ\text{C}$	$I_R^{(2)}$	-	1.0	$\mu\text{A}$
		$T_A = 125\text{ }^\circ\text{C}$		6.0	50	
Typical reverse recovery time	$I_F = 0.5\text{ A}$ , $I_R = 1.0\text{ A}$ , $I_{rr} = 0.25\text{ A}$		$t_{rr}$	650	-	ns
Typical junction capacitance	4.0 V, 1 MHz		$C_J$	4	-	pF

**Notes**

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

THERMAL CHARACTERISTICS ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)				
PARAMETER	SYMBOL	MSQ1PG	MSQ1PJ	UNIT
Typical thermal resistance	$R_{\theta JA}^{(1)(2)}$	110		$^\circ\text{C/W}$
	$R_{\theta JM}^{(2)}$	30		

**Notes**

- (1) The heat generated must be less than the thermal conductivity from junction to ambient:  $dP_D/dT_J < 1/R_{\theta JA}$   
(2) Thermal resistance  $R_{\theta JA}$  – junction to ambient and  $R_{\theta JM}$  – mounted on PCB with 6.0 mm x 6.0 mm copper pad areas.

IMMUNITY TO ELECTRICAL STATIC DISCHARGE TO THE FOLLOWING STANDARDS ( $T_A = 25\text{ }^\circ\text{C}$ , 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	$> 8\text{ kV}$
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	$> 15\text{ kV}$

**Notes**

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

ORDERING INFORMATION (Example)				
PREFERRED P/N	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
MSQ1PJ-M3/H	0.006	H	4500	7" diameter plastic tape and reel
MSQ1PJHM3/H <sup>(1)</sup>	0.006	H	4500	7" diameter plastic tape and reel

**Note**

- (1) AEC-Q101 qualified

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

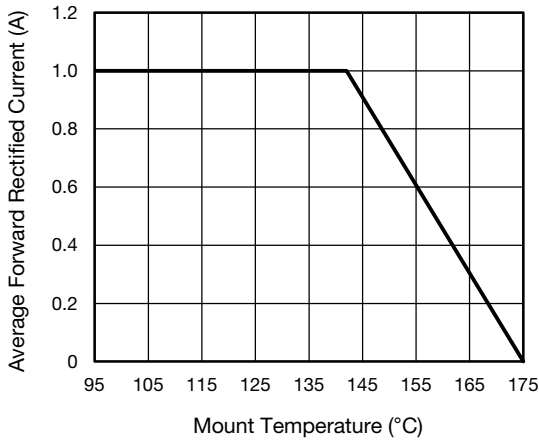


Fig. 1 - Forward Current Derating Curve

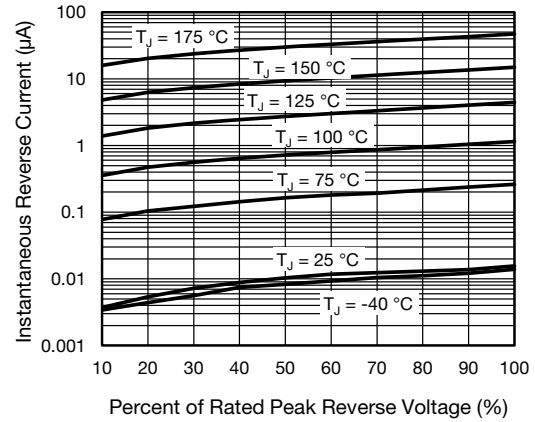


Fig. 4 - Typical Reverse Leakage Characteristics

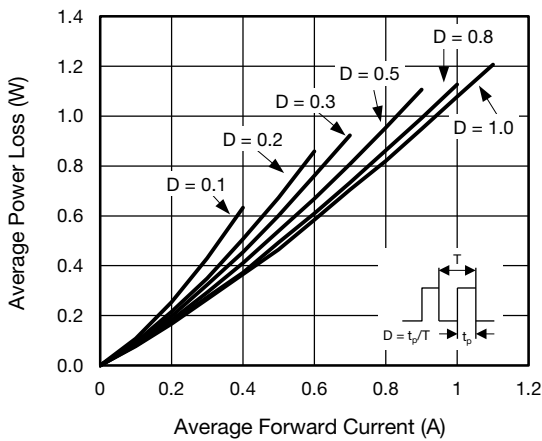


Fig. 2 - Forward Power Loss Characteristics

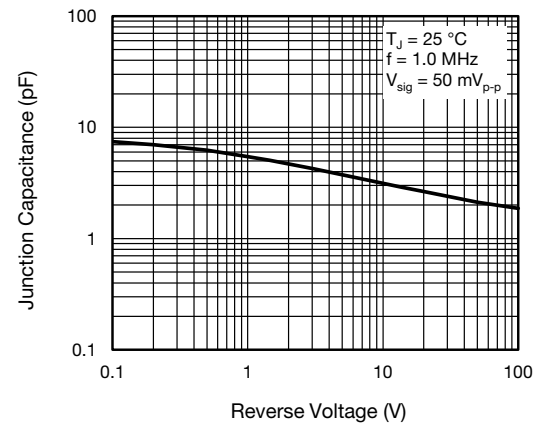


Fig. 5 - Typical Junction Capacitance

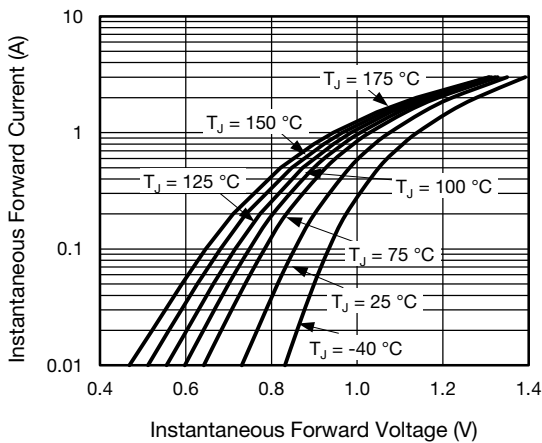


Fig. 3 - Typical Instantaneous Forward Characteristics

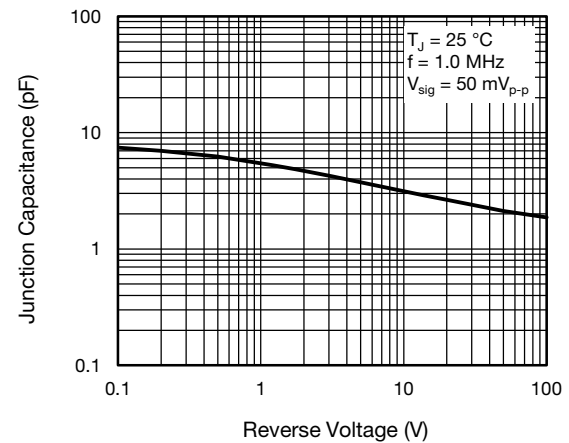


Fig. 6 - Typical Transient Thermal Impedance

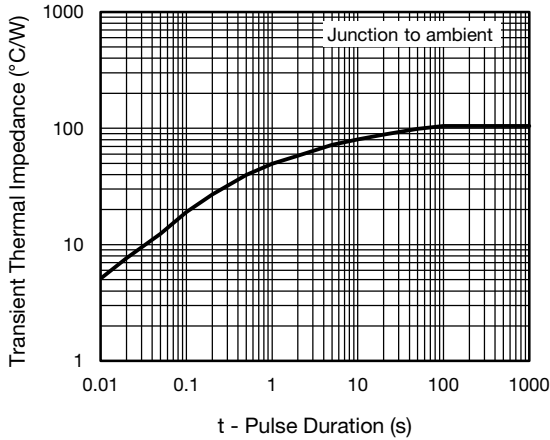
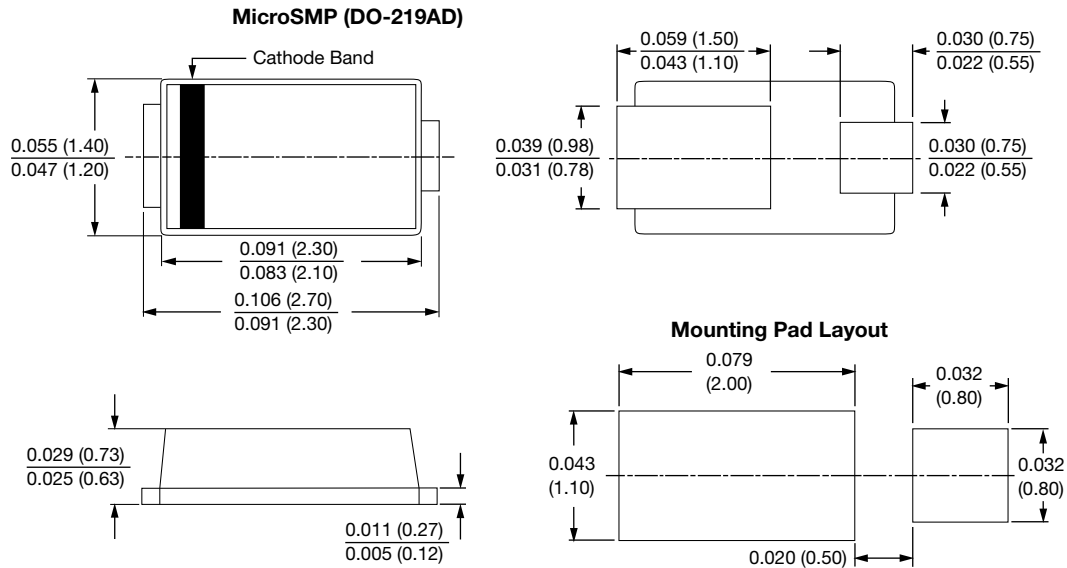


Fig. 7 - Thermal Resistance

**PACKAGE OUTLINE DIMENSIONS** in inches (millimeters)





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