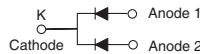


# High Current Density Surface Mount Schottky Barrier Rectifier

## eSMP® Series



### TO-277A (SMPC)



AUTOMOTIVE GRADE


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

## FEATURES

- Very low profile - typical height of 1.1 mm
- Ideal for automated placement
- Low forward voltage drop, low power losses
- High efficiency
- Low thermal impedance
- 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)

## MECHANICAL DATA

### Case: TO-277A (SMPC)

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  
 Base P/NHM3\_X - halogen-free, RoHS-compliant and AEC-Q101 qualified  
 (“\_X” denotes revision code e.g. A, B,.....)

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

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

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	2 x 6.0 A
$V_{RRM}$	40 V
$I_{FSM}$	150 A
$E_{AS}$	20 mJ
$V_F$ at $I_F = 6.0$ A	0.40 V
$T_J$ max.	125 °C
Package	TO-277A (SMPC)
Diode variations	Dual common cathode

## TYPICAL APPLICATIONS

For use in low voltage high frequency inverters, freewheeling, DC/DC converters and polarity protection applications.

MAXIMUM RATINGS ( $T_A = 25$ °C unless otherwise noted)			
PARAMETER	SYMBOL	SS12P4C	UNIT
Device marking code		S124C	
Maximum repetitive peak reverse voltage	$V_{RRM}$	40	V
Maximum average forward rectified current (fig. 1) <sup>(1)</sup>	total device	12	A
	per diode	6.0	
Maximum average forward rectified current <sup>(2)</sup>	$I_{F(AV)}$	3.5	A
Peak forward surge current 10 ms single half sine-wave superimposed on rated load per diode	$I_{FSM}$	150	A
Non-repetitive avalanche energy at $T_J = 25$ °C, $L = 60$ mH per diode	$E_{AS}$	20	mJ
Peak repetitive reverse current at $t_p = 2$ μs, 1 kHz, at $T_J = 25$ °C per diode	$I_{RRM}$	1.0	A
Operating junction and storage temperature range	$T_J, T_{STG}$	-55 to +125	°C

### Notes

<sup>(1)</sup> Mounted on 30 mm x 30 mm Al PCB with 50 mm x 25 mm x 100 mm fin heat sink

<sup>(2)</sup> 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 per diode	$I_F = 1\text{ A}$	$T_A = 25\text{ }^\circ\text{C}$	$V_F^{(1)}$	0.34	-	V
	$I_F = 3\text{ A}$			0.40	-	
	$I_F = 6\text{ A}$			0.46	0.52	
	$I_F = 1\text{ A}$	$T_A = 100\text{ }^\circ\text{C}$		0.24	-	
	$I_F = 3\text{ A}$			0.31	-	
	$I_F = 6\text{ A}$			0.40	0.45	
Reverse current per diode	Rated $V_R$	$T_A = 25\text{ }^\circ\text{C}$	$I_R^{(2)}$	129	500	$\mu\text{A}$
		$T_A = 100\text{ }^\circ\text{C}$		11.9	25	mA
Typical junction capacitance per diode	4.0 V, 1 MHz	$C_J$	400	-	pF	

**Notes**

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

<b>THERMAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)			
PARAMETER	SYMBOL	SS12P4C	UNIT
Typical thermal resistance	$R_{\theta JA}^{(1)}$	100	$^\circ\text{C/W}$
	$R_{\theta JM}^{(2)}$	3	

**Notes**

- (1) Free air, mounted on recommended copper pad area. Thermal resistance  $R_{\theta JA}$  - junction to ambient.  
 (2) Mounted on 30 mm x 30 mm Al PCB with 50 mm x 25 mm x 100 mm fin heat sink. Thermal resistance  $R_{\theta JM}$  - junction to mount.

<b>ORDERING INFORMATION</b> (Example)				
PREFERRED P/N	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
SS12P4C-M3/86A	0.10	86A	1500	7" diameter plastic tape and reel
SS12P4C-M3/87A	0.10	87A	6500	13" diameter plastic tape and reel
SS12P4CHM3/86A <sup>(1)</sup>	0.10	86A	1500	7" diameter plastic tape and reel
SS12P4CHM3/87A <sup>(1)</sup>	0.10	87A	6500	13" diameter plastic tape and reel
SS12P4CHM3_A/H <sup>(1)</sup>	0.10	H	1500	7" diameter plastic tape and reel
SS12P4CHM3_A/I <sup>(1)</sup>	0.10	I	6500	13" diameter plastic tape and reel

**Note**

- (1) AEC-Q101 qualified

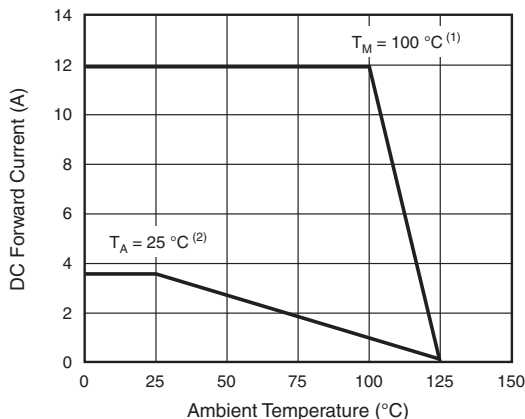
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^\circ\text{C}$  unless otherwise noted)


Fig. 1 - Maximum Forward Current Derating Curve

**Notes**

- Mounted on 30 mm x 30 mm Al PCB with 50 mm x 25 mm x 100 mm fin heat sink,  $T_M$  measured at the terminal of cathode band ( $R_{\theta JM} = 3\text{ }^\circ\text{C/W}$ )
- Free air, mounted on recommended copper pad area ( $R_{\theta JA} = 100\text{ }^\circ\text{C/W}$ )

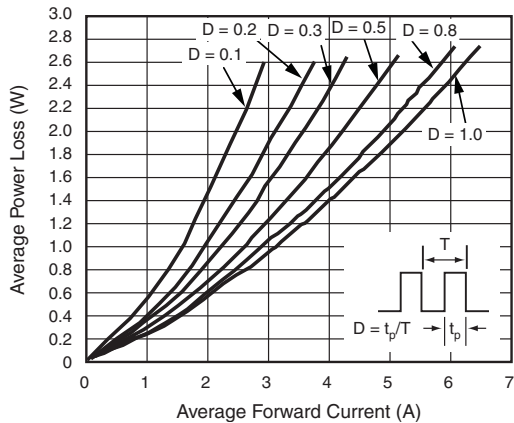


Fig. 2 - Forward Power Loss Characteristics Per Diode

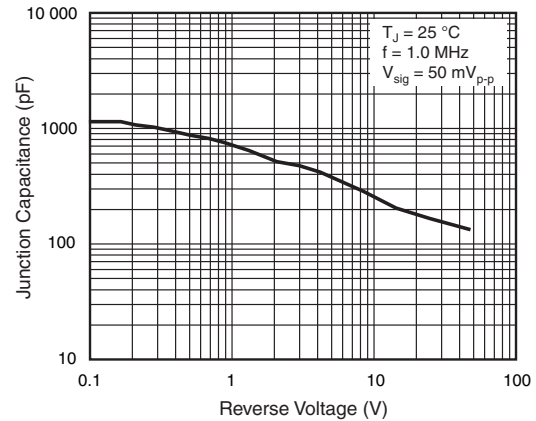


Fig. 5 - Typical Junction Capacitance Per Diode

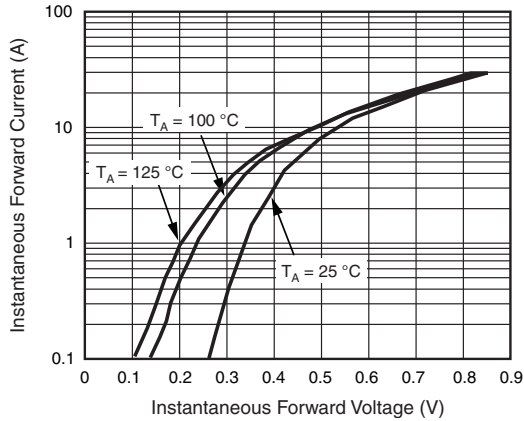


Fig. 3 - Typical Instantaneous Forward Characteristics Per Diode

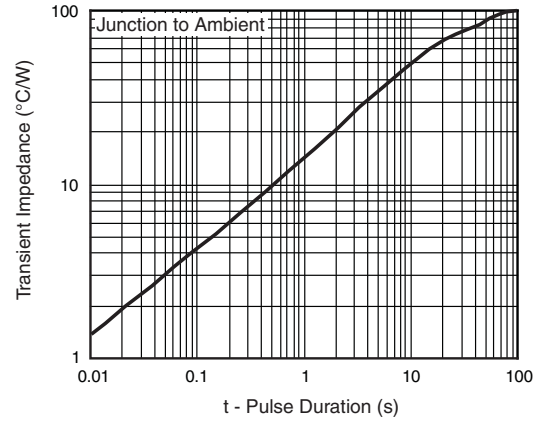


Fig. 6 - Typical Transient Thermal Impedance Per Diode

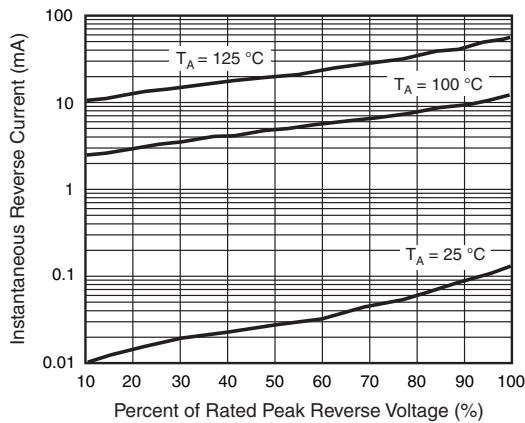
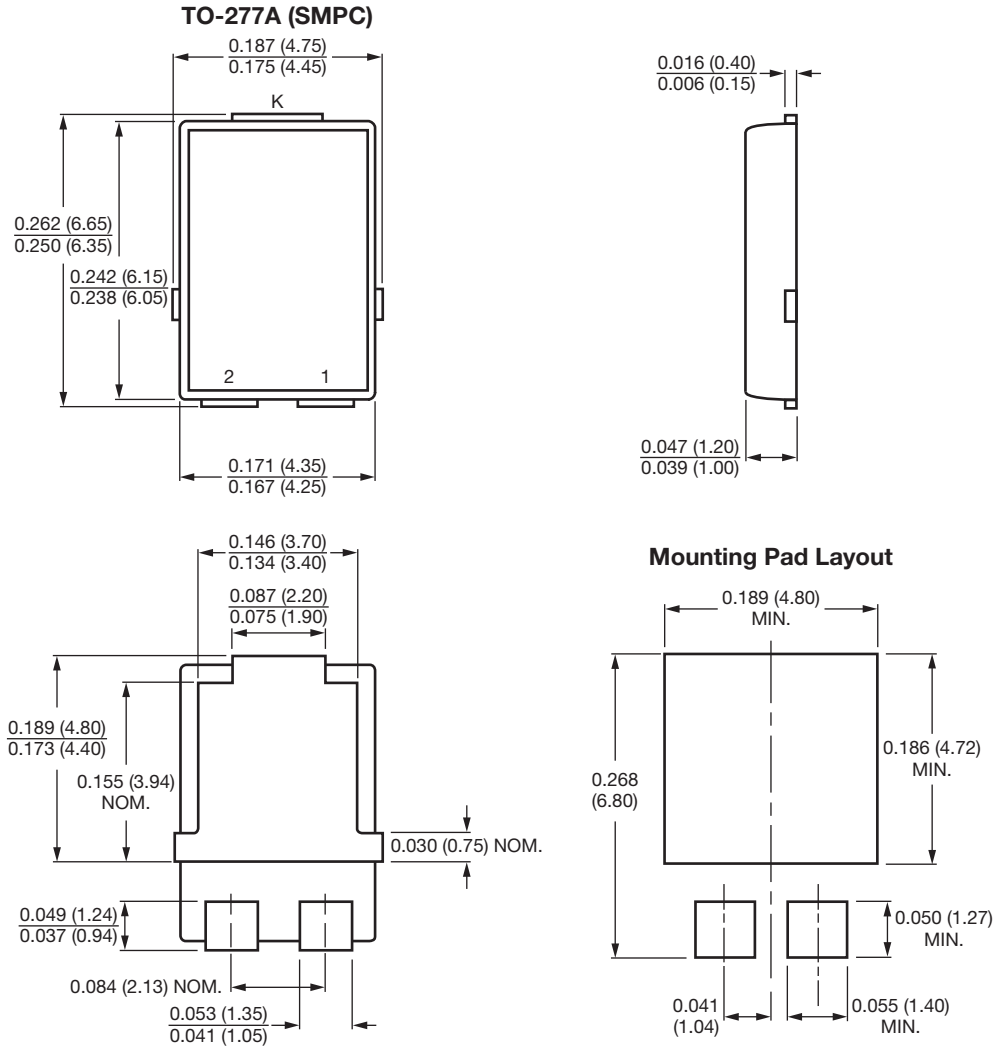


Fig. 4 - Typical Reverse Leakage Characteristics Per Diode

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



Conform to JEDEC® TO-277A



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