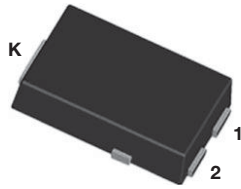
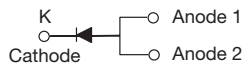


# SMD Photovoltaic Solar Cell Protection Schottky Rectifier

**eSMP® Series**

**SMPC (TO-277A)**

**FEATURES**

- Very low profile - typical height of 1.1 mm
- Ideal for automated placement
- Guardring for overvoltage protection
- Low forward voltage drop, low power losses
- High efficiency
- Low thermal resistance
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- 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**

For use in solar cell junction box as a bypass diode for protection, using DC forward current without reverse bias.

**MECHANICAL DATA**

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

Molding compound meets UL 94 V-0 flammability rating  
 Base P/N-M3 - halogen-free, RoHS-compliant, and commercial grade

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

M3 suffix meets JESD 201 class 2 whisker test

**DESIGN SUPPORT TOOLS**
[click logo to get started](#)


PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	12 A
$V_{RRM}$	40 V
$I_{FSM}$	280 A
$E_{AS}$	20 mJ
$V_F$ at $I_F = 12$ A	0.43 V
$T_J$ max.	150 °C
Package	SMPC (TO-277A)
Circuit configuration	Single

MAXIMUM RATINGS ( $T_A = 25$ °C unless otherwise noted)			
PARAMETER	SYMBOL	SS12P4S	UNIT
Device marking code		124S	
Maximum repetitive peak reverse voltage	$V_{RRM}$	40	V
Maximum DC forward current (fig. 1)	$I_F$	12 <sup>(1)</sup> 4.4 <sup>(2)</sup>	A
Peak forward surge current 10 ms single half sine-wave superimposed on rated load	$I_{FSM}$	280	A
Non-repetitive avalanche energy at $I_{AS} = 2.0$ A, $T_J = 25$ °C	$E_{AS}$	20	mJ
Operating junction and storage temperature range	$T_{OP}, T_{STG}$	-55 to +150	°C
Junction temperature in DC forward current without reverse bias, $t \leq 1$ h <sup>(3)</sup>	$T_J$	$\leq 200$	°C

**Notes**

- (1) Mounted on 30 mm x 30 mm Al PCB with 50 mm x 25 mm x 100 mm fin heat sink
- (2) Free air, mounted on recommended copper pad area
- (3) Meets the requirements of IEC 61215 Ed. 2 bypass diode thermal test

<b>ELECTRICAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)						
PARAMETER	TEST CONDITIONS	SYMBOL	TYP.	MAX.	UNIT	
Instantaneous forward voltage	$I_F = 6\text{ A}$	$T_A = 25\text{ }^\circ\text{C}$	$V_F^{(1)}$	0.43	-	V
	$I_F = 12\text{ A}$			0.50	0.60	
	$I_F = 6\text{ A}$	$T_A = 125\text{ }^\circ\text{C}$		0.33	-	
	$I_F = 12\text{ A}$			0.43	0.52	
Reverse current	$V_R = 40\text{ V}$	$T_A = 25\text{ }^\circ\text{C}$	$I_R^{(2)}$	100	800	$\mu\text{A}$
		$T_A = 125\text{ }^\circ\text{C}$		50	100	mA
Typical junction capacitance	4.0 V, 1 MHz	$C_J$	750	-	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	VALUE	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
SS12P4S-M3/86A	0.10	86A	1500	7" diameter plastic tape and reel
SS12P4S-M3/87A	0.10	87A	6500	13" diameter plastic tape and reel

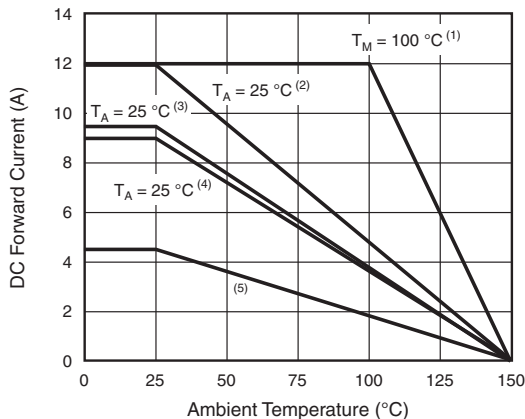
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^\circ\text{C}$  unless otherwise noted)


Fig. 1 - Maximum Current Derating Curve

**Notes**

 (1) 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

 (2) Mounted on 30 mm x 30 mm Al PCB ( $R_{\theta JA} = 20\text{ }^\circ\text{C/W}$ )

 (3) Mounted on 30 mm x 30 mm x 2 copper pad areas FR4 PCB ( $R_{\theta JA} = 30\text{ }^\circ\text{C/W}$ )

 (4) Mounted on 25 mm x 25 mm x 2 copper pad areas FR4 PCB ( $R_{\theta JA} = 30\text{ }^\circ\text{C/W}$ )

 (5) Free air, mounted on recommended copper pad area ( $R_{\theta JA} = 100\text{ }^\circ\text{C/W}$ )

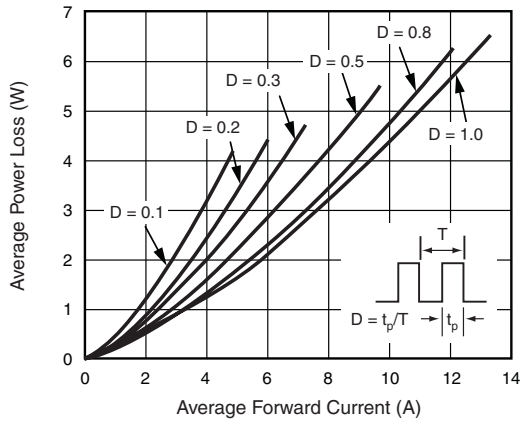


Fig. 2 - Forward Power Loss Characteristics

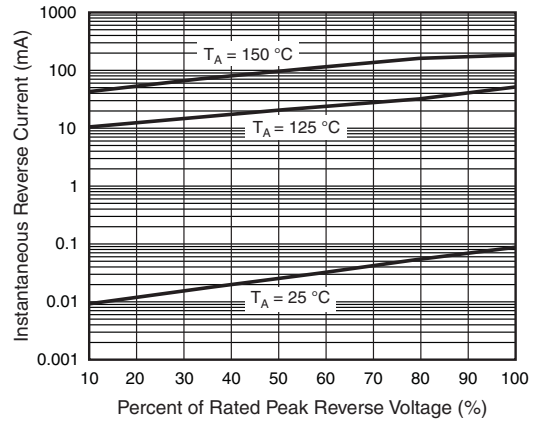


Fig. 4 - Typical Reverse Leakage Characteristics

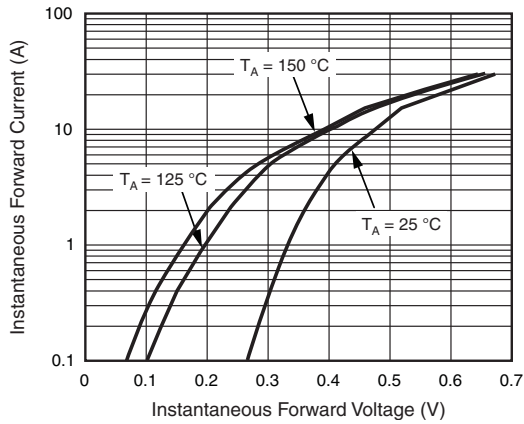


Fig. 3 - Typical Instantaneous Forward Characteristics

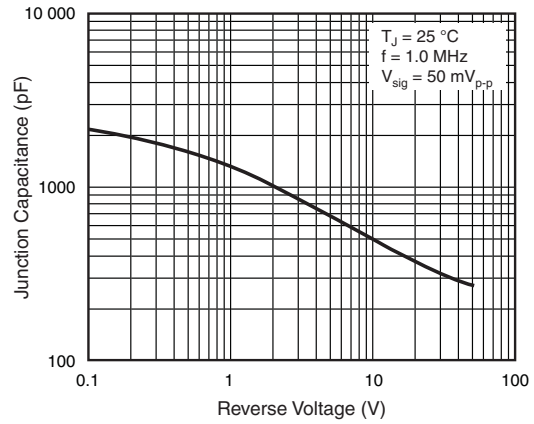
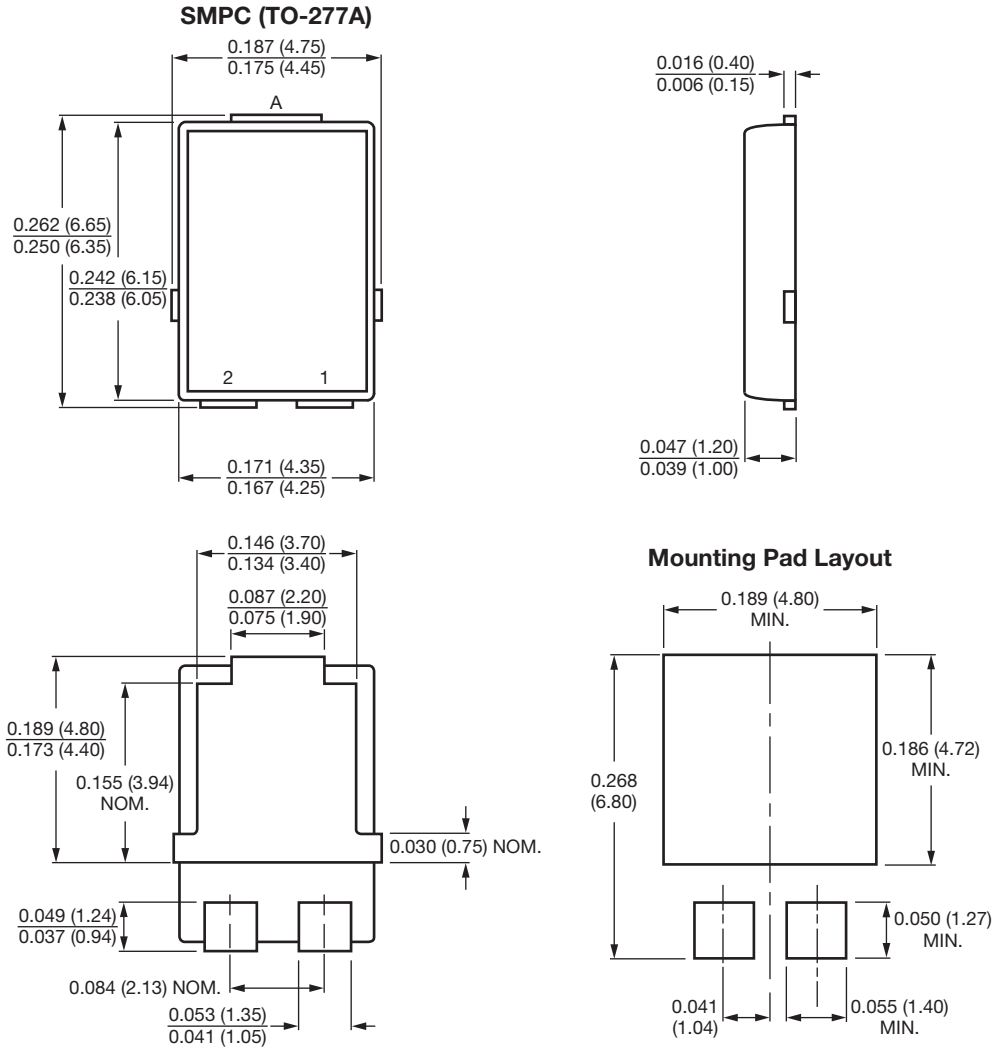


Fig. 5 - Typical Junction Capacitance



PACKAGE OUTLINE DIMENSIONS in inches (millimeters)



Conform to JEDEC® TO-277A



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