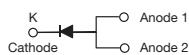


## SMD Photovoltaic Solar Cell Protection Schottky Rectifier


**TO-277A (SMPC)**


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	TO-277A (SMPC)
Diode variations	Single die

### 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

### 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

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

M3 suffix meets JESD 201 class 2 whisker test

### TYPICAL APPLICATIONS

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

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>	$T_J$	≤ 200	°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

<sup>(3)</sup> Meets the requirements of IEC 61215 Ed. 2 bypass diode thermal test

<b>ELECTRICAL CHARACTERISTICS</b> ( $T_A = 25^\circ\text{C}$ unless otherwise noted)							
PARAMETER	TEST CONDITIONS		SYMBOL	TYP.	MAX.	UNIT	
Instantaneous forward voltage	$I_F = 6 \text{ A}$	$T_A = 25^\circ\text{C}$	$V_F^{(1)}$	0.43	-	V	
	$I_F = 12 \text{ A}$			0.50	0.60		
	$I_F = 6 \text{ A}$	$T_A = 125^\circ\text{C}$		0.33	-		
	$I_F = 12 \text{ A}$			0.43	0.52		
Reverse current	$V_R = 40 \text{ V}$	$T_A = 25^\circ\text{C}$	$I_R^{(2)}$	100	800	$\mu\text{A}$	
		$T_A = 125^\circ\text{C}$		50	100	mA	
Typical junction capacitance	$4.0 \text{ V}, 1 \text{ MHz}$		$C_J$	750	-	pF	

**Notes**

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

(2) Pulse test: Pulse width  $\leq 40 \text{ ms}$

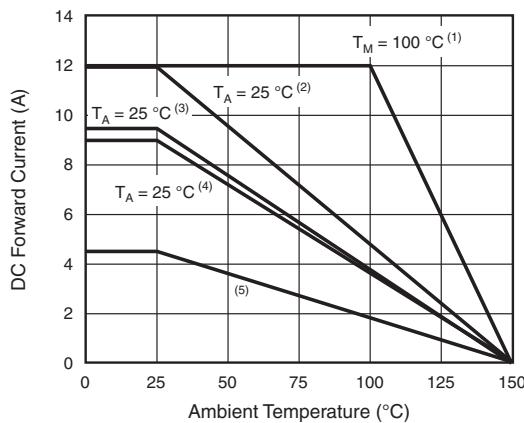
<b>THERMAL CHARACTERISTICS</b> ( $T_A = 25^\circ\text{C}$ unless otherwise noted)					
PARAMETER		SYMBOL	VALUE	UNIT	
Typical thermal resistance		$R_{\theta JA}^{(1)}$	100	$^\circ\text{C/W}$	
		$R_{\theta JM}^{(2)}$	3		

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


100 mm fin heat sink,  $T_M$  measured at the terminal of cathode band

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

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

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

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

Fig. 1 - Maximum Current Derating Curve

**Notes**

(1) Mounted on 30 mm x 30 mm Al PCB with 50 mm x 25 mm x

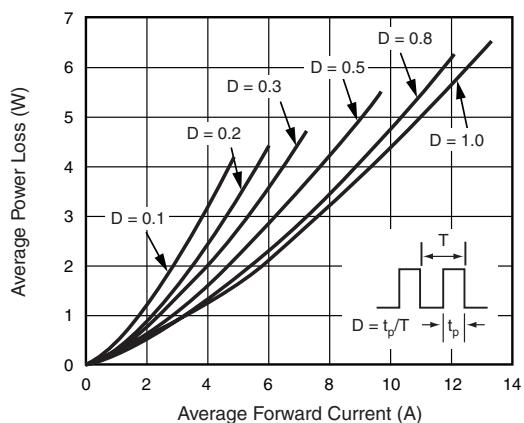


Fig. 2 - Forward Power Loss Characteristics

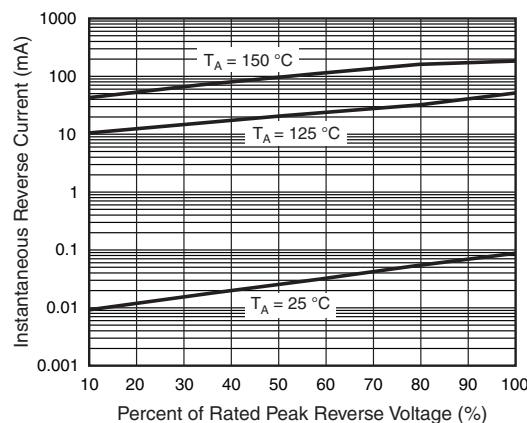


Fig. 4 - Typical Reverse Leakage Characteristics

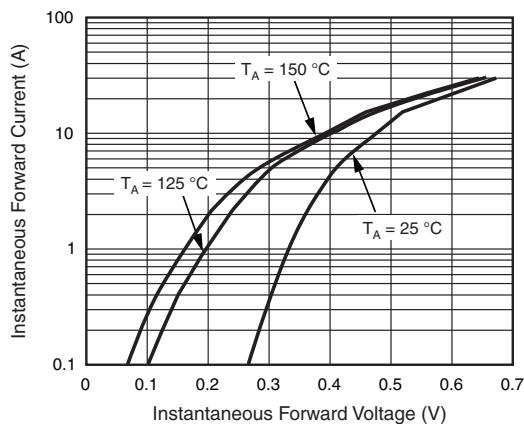


Fig. 3 - Typical Instantaneous Forward Characteristics

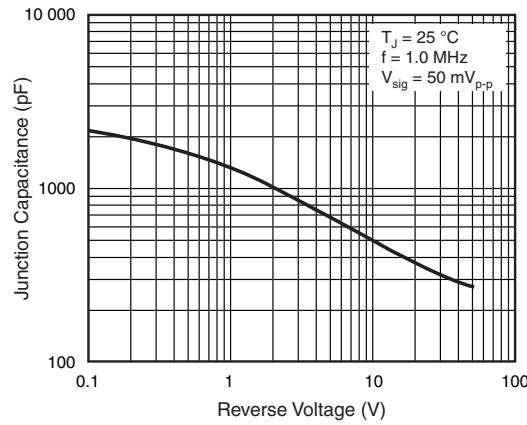
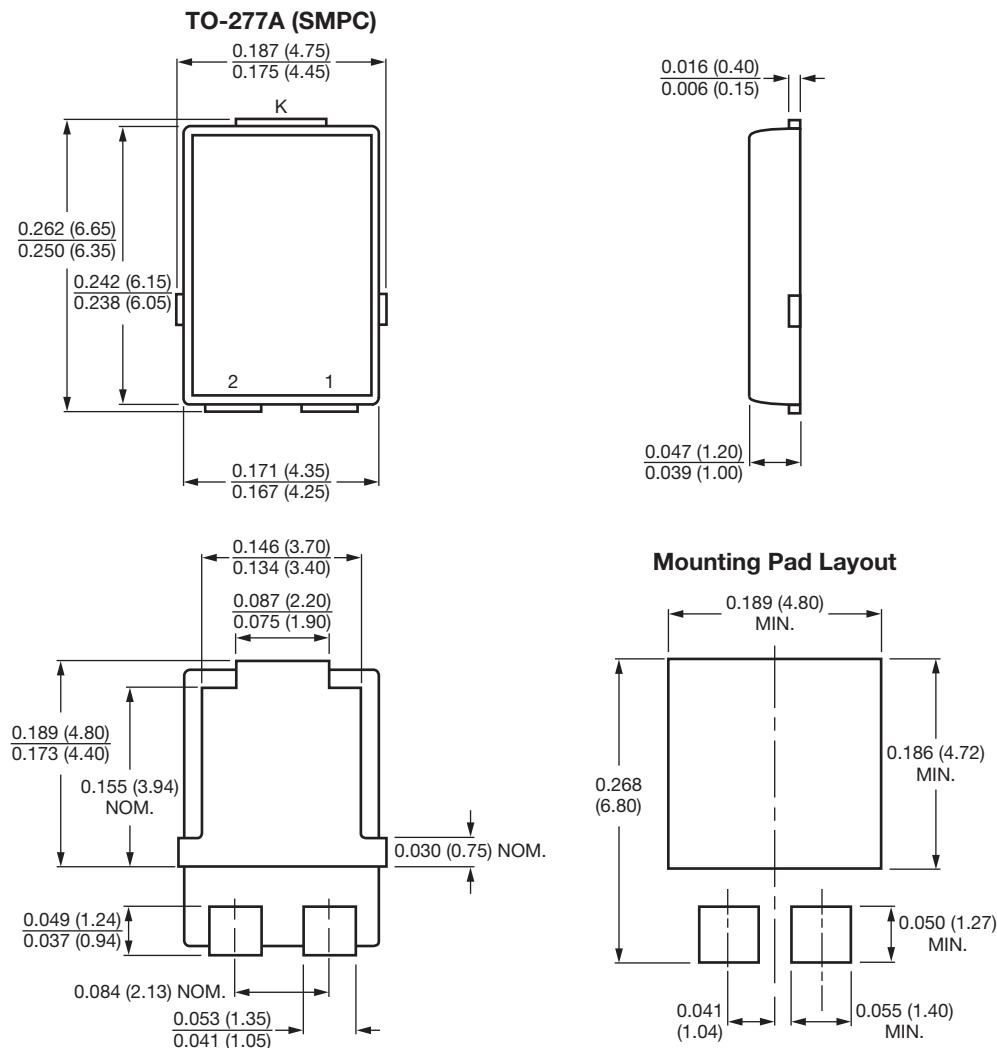


Fig. 5 - Typical Junction Capacitance

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



Conform to JEDEC TO-277A

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