

SMD Photovoltaic Solar Cell Protection Schottky Rectifier



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

TYPICAL APPLICATIONS

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

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
- Compliant to RoHS directive 2002/95/EC and in accordance to WEEE 2002/96/EC
- **Halogen-free according to IEC 61249-2-21 definition**



MECHANICAL DATA

Case: TO-277A (SMPC)

Molding compound meets UL 94 V-0 flammability rating

Base P/N-M3 - halogen-free and RoHS compliant, commercial grade

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

M3 suffix meets JESD 201 class 1A whisker test

MAXIMUM RATINGS ($T_A = 25$ °C unless otherwise noted)			
PARAMETER	SYMBOL	SS12P4S	UNIT
Device marking code		124S	
Maximum repetitive peak reverse voltage	V_{RRM}	30	V
Maximum DC forward current (fig. 1)	I_F	12 ⁽¹⁾ 4.4 ⁽²⁾	A
Peak forward surge current 10 ms single half sine-wave superimposed on rated load	I_{FSM}	280	A
Non-repetitive avalanche energy at $I_{AS} = 2$ 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 ⁽³⁾	T_J	≤ 200	°C

Notes

⁽¹⁾ Mounted on 30 mm x 30 mm Al P.C.B. 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



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

Notes

- (1) Pulse test: 300 μs 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	SS12P4S	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 P.C.B. with 50 mm x 25 mm x 100 mm fin heat sink. Thermal resistance $R_{\theta JM}$ - junction to mount.

ORDERING INFORMATION (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)

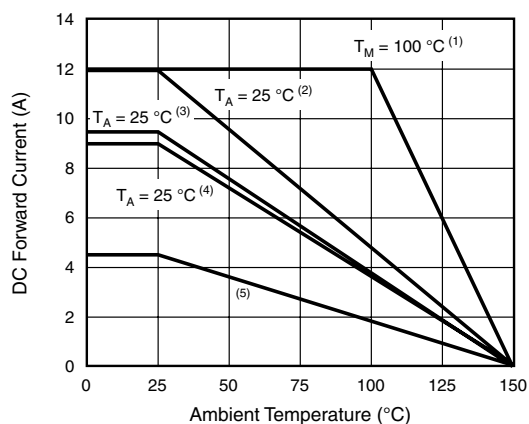


Figure 1. Maximum Current Derating Curve

Notes

- (1) Mounted on 30 mm x 30 mm Al P.C.B. 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 P.C.B. ($R_{\theta JA} = 20\text{ }^\circ\text{C/W}$)
- (3) Mounted on 30 mm x 30 mm x 2 copper pad areas FR4 P.C.B. ($R_{\theta JA} = 30\text{ }^\circ\text{C/W}$)
- (4) Mounted on 25 mm x 25 mm x 2 copper pad areas FR4 P.C.B. ($R_{\theta J} = 30\text{ }^\circ\text{C/W}$)
- (5) Free air, mounted on recommended copper pad area ($R_{\theta JA} = 100\text{ }^\circ\text{C/W}$)

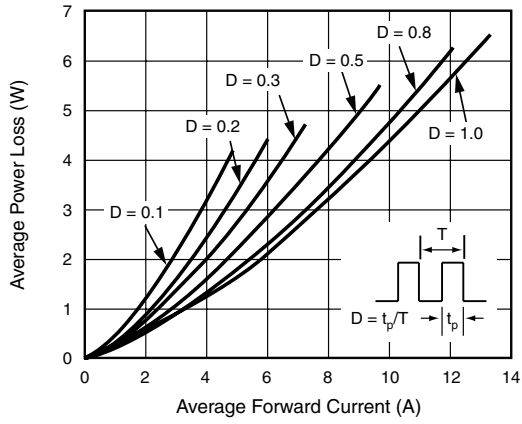


Figure 2. Forward Power Loss Characteristics

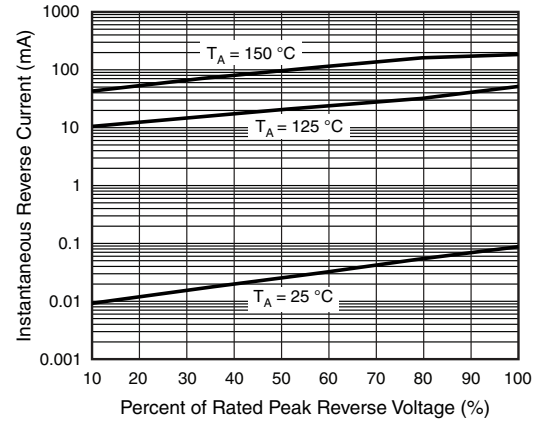


Figure 4. Typical Reverse Leakage Characteristics

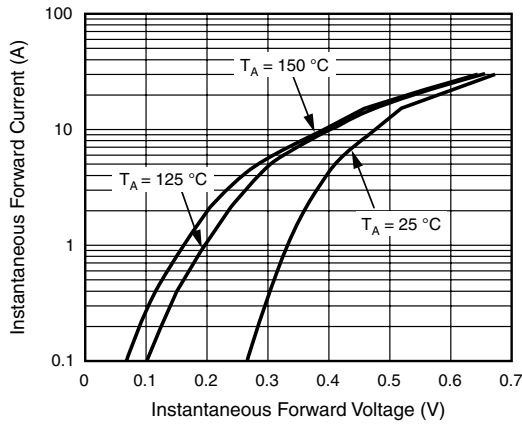


Figure 3. Typical Instantaneous Forward Characteristics

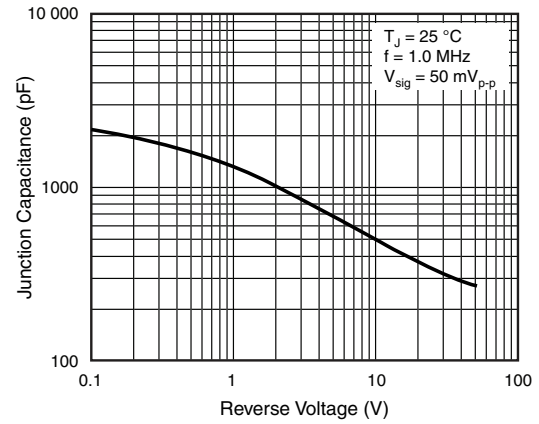
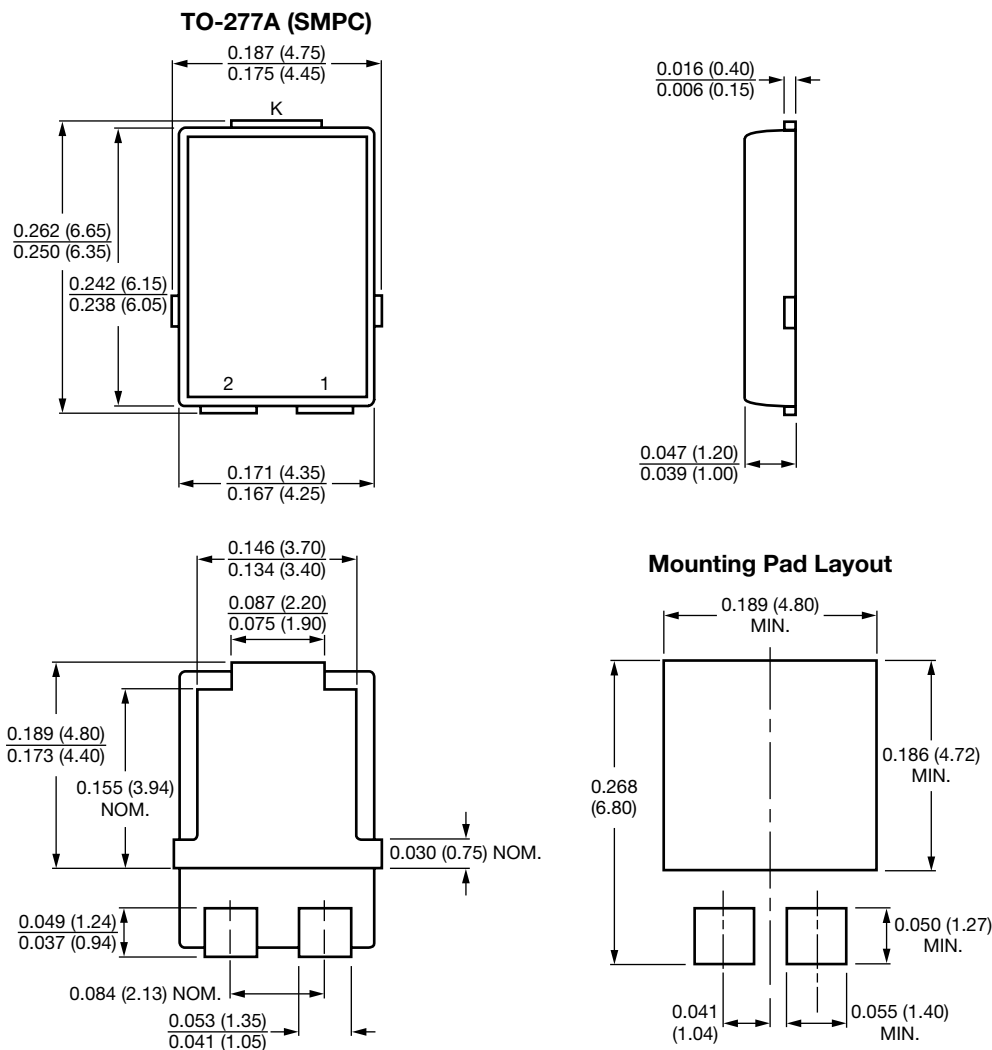


Figure 5. Typical Junction Capacitance

PACKAGE OUTLINE DIMENSIONS in inches (millimeters)



Conform to JEDEC TO-277A



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