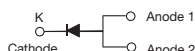


## Surface Mount ESD Capability Rectifiers

### eSMP® Series



### TO-277A (SMPC)



### FEATURES

- Very low profile - typical height of 1.1 mm
- Ideal for automated placement
- Oxid planar chip junction
- Low forward voltage drop
- ESD capability
- 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)



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

### PRIMARY CHARACTERISTICS

|                                  |                |
|----------------------------------|----------------|
| Package                          | TO-277A (SMPC) |
| $I_{F(AV)}$                      | 4.0 A          |
| $V_{RRM}$                        | 100 V to 600 V |
| $I_{FSM}$                        | 60 A           |
| $I_R$                            | 10 $\mu$ A     |
| $V_F$ at $I_F = 4.0$ A, (125 °C) | 0.91 V         |
| $T_J$ max.                       | 175 °C         |
| Diode variations                 | Single die     |

### TYPICAL APPLICATIONS

General purpose, power line polarity protection in both consumer and automotive applications.

### 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 1A whisker test, HM3 suffix meets JESD 201 class 2 whisker test

### MAXIMUM RATINGS ( $T_A = 25$ °C unless otherwise noted)

| PARAMETER                                                                         | SYMBOL                            | SE40PB      | SE40PD | SE40PG | SE40PJ | UNIT |
|-----------------------------------------------------------------------------------|-----------------------------------|-------------|--------|--------|--------|------|
| Device marking code                                                               |                                   | 40B         | 40D    | 40G    | 40J    |      |
| Maximum repetitive peak reverse voltage                                           | V <sub>RRM</sub>                  | 100         | 200    | 400    | 600    | V    |
| Maximum DC forward current                                                        | I <sub>F</sub> <sup>(1)</sup>     | 4.0         |        |        |        | A    |
|                                                                                   | I <sub>F</sub> <sup>(2)</sup>     | 2.4         |        |        |        |      |
| Peak forward surge current 10 ms single half sine-wave superimposed on rated load | I <sub>FSM</sub>                  | 60          |        |        |        | A    |
| Operating junction and storage temperature range                                  | T <sub>J</sub> , T <sub>STG</sub> | -55 to +175 |        |        |        | °C   |

### Notes

- (1) Mounted on 14 mm x 14 mm pad areas, 2 oz. FR4 PCB
- (2) Free air, mounted on recommended copper pad area

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

| PARAMETER                     | TEST CONDITIONS                                                        | SYMBOL      | TYP. | MAX. | UNIT          |
|-------------------------------|------------------------------------------------------------------------|-------------|------|------|---------------|
| Instantaneous forward voltage | $I_F = 2.0\text{ A}$                                                   | $V_F^{(1)}$ | 0.92 | -    | V             |
|                               | $I_F = 4.0\text{ A}$                                                   |             | 1.00 | 1.05 |               |
|                               | $I_F = 2.0\text{ A}$                                                   |             | 0.82 | -    |               |
|                               | $I_F = 4.0\text{ A}$                                                   |             | 0.91 | 0.96 |               |
| Reverse current               | rated $V_R$                                                            | $I_R^{(2)}$ | 0.1  | 10   | $\mu\text{A}$ |
|                               |                                                                        |             | 19   | 150  |               |
| Typical reverse recovery time | $I_F = 0.5\text{ A}$ , $I_R = 1.0\text{ A}$ , $I_{rr} = 0.25\text{ A}$ | $t_{rr}$    | 2.2  | -    | $\mu\text{s}$ |
| Typical junction capacitance  | 4.0 V, 1 MHz                                                           | $C_J$       | 28   | -    | 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                          | SE40PB | SE40PD | SE40PG | SE40PJ | UNIT |
|----------------------------|---------------------------------|--------|--------|--------|--------|------|
| Typical thermal resistance | R <sub>θJA</sub> <sup>(1)</sup> | 70     |        |        |        | °C/W |
|                            | R <sub>θJM</sub> <sup>(2)</sup> | 6.6    |        |        |        |      |

**Notes**(1) Free air, mounted on recommended PCB 1 oz. pad area; thermal resistance  $R_{\theta JA}$  - junction to ambient(2) Units mounted on PCB with 14 mm x 14 mm pad areas, 2 oz. FR4 PCB;  $R_{\theta JM}$  - junction to mount**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   | $> 8\text{ kV}$ |

**ORDERING INFORMATION** (Example)

| PREFERRED P/N                | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
|------------------------------|-----------------|------------------------|---------------|------------------------------------|
| SE40PJ-M3/86A                | 0.10            | 86A                    | 1500          | 7" diameter plastic tape and reel  |
| SE40PJ-M3/87A                | 0.10            | 87A                    | 6500          | 13" diameter plastic tape and reel |
| SE40PJHM3/86A <sup>(1)</sup> | 0.10            | 86A                    | 1500          | 7" diameter plastic tape and reel  |
| SE40PJHM3/87A <sup>(1)</sup> | 0.10            | 87A                    | 6500          | 13" diameter plastic tape and reel |
| SE40PJHM3_A/H <sup>(1)</sup> | 0.10            | H                      | 1500          | 7" diameter plastic tape and reel  |
| SE40PJHM3_A/I <sup>(1)</sup> | 0.10            | I                      | 6500          | 13" diameter plastic tape and reel |

**Note**<sup>(1)</sup> AEC-Q101 qualified



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

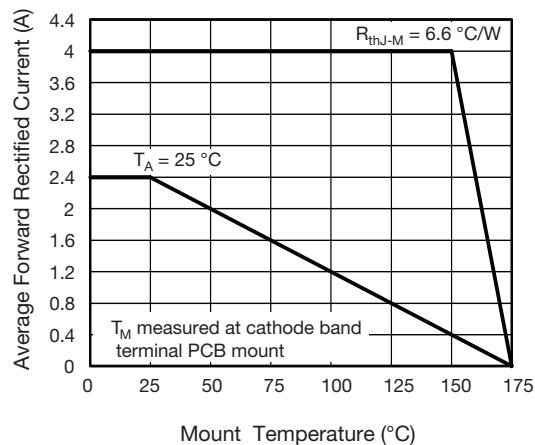


Fig. 1 - Maximum Forward Current Derating Curve

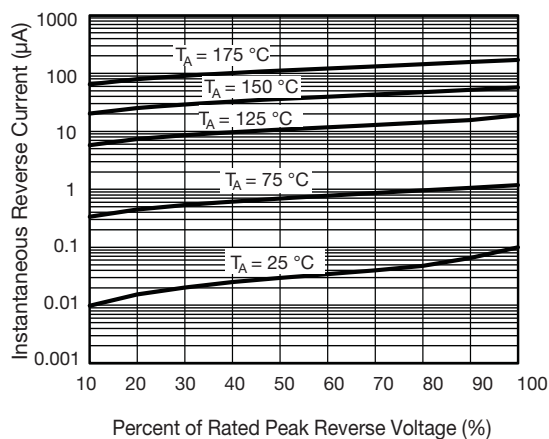


Fig. 4 - Typical Reverse Leakage Characteristics

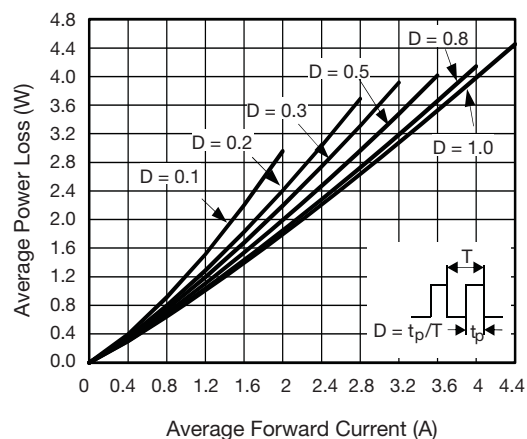


Fig. 2 - Forward Power Loss Characteristics

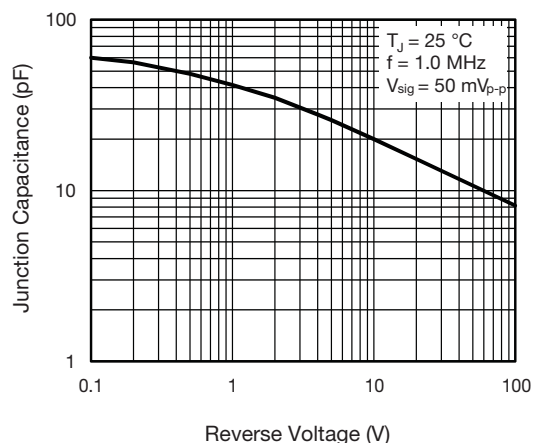


Fig. 5 - Typical Junction Capacitance

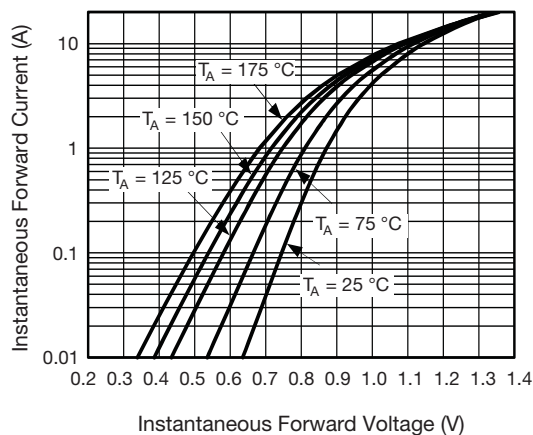


Fig. 3 - Typical Instantaneous Forward Characteristics

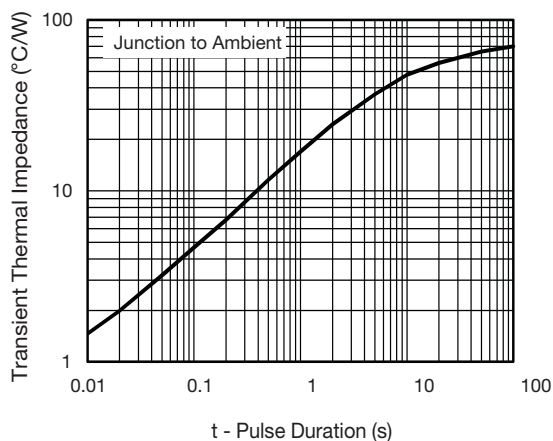
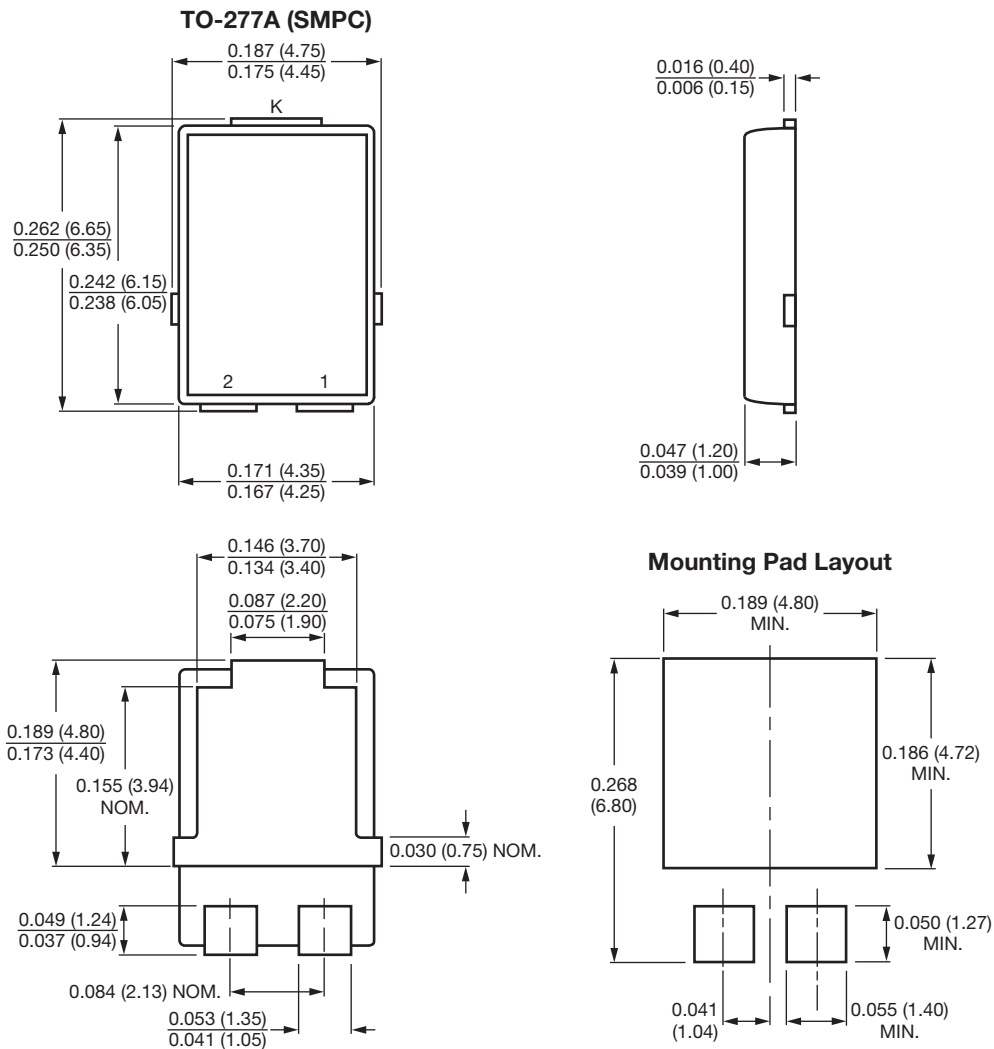


Fig. 6 - Typical Transient Thermal Impedance



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





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