

# Surface-Mount Ultrafast Plastic Rectifier


**SMA (DO-214AC)**

Anode  Cathode

## LINKS TO ADDITIONAL RESOURCES


[3D Models](#)

| PRIMARY CHARACTERISTICS |                           |
|-------------------------|---------------------------|
| $I_{F(AV)}$             | 1.0 A                     |
| $V_{RRM}$               | 50 V, 100 V, 150 V, 200 V |
| $I_{FSM}$               | 30 A                      |
| $t_{rr}$                | 15 ns                     |
| $V_F$ at $I_F$          | 0.92 V                    |
| $T_J$ max.              | 150 °C                    |
| Package                 | SMA (DO-214AC)            |
| Circuit configuration   | Single                    |

## FEATURES

- Low profile package
- Ideal for automated placement
- Glass passivated pellet chip junction
- Ultrafast recovery times for high efficiency
- Low forward voltage, low power losses
- High forward surge capability
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified available
  - Automotive ordering code: P/NHE3 or 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**

## TYPICAL APPLICATIONS

For use in high frequency rectification and freewheeling application in switching mode converters and inverters for consumer, computer, automotive and telecommunication.

## MECHANICAL DATA

**Case:** SMA (DO-214AC)

Molding compound meets UL 94 V-0 flammability rating

Base P/N-E3 - RoHS-compliant, commercial grade

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

Base P/NHE3\_X - 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

E3, M3, HE3, and HM3 suffix meets JESD 201 class 2 whisker test

**Polarity:** color band denotes cathode end

| MAXIMUM RATINGS ( $T_A = 25\text{ °C}$ unless otherwise noted)                     |                |             |      |      |      |      |
|------------------------------------------------------------------------------------|----------------|-------------|------|------|------|------|
| PARAMETER                                                                          | SYMBOL         | ES1A        | ES1B | ES1C | ES1D | UNIT |
| Device marking code                                                                |                | EA          | EB   | EC   | ED   |      |
| Maximum repetitive peak reverse voltage                                            | $V_{RRM}$      | 50          | 100  | 150  | 200  | V    |
| Maximum RMS voltage                                                                | $V_{RMS}$      | 35          | 70   | 105  | 140  | V    |
| Maximum DC blocking voltage                                                        | $V_{DC}$       | 50          | 100  | 150  | 200  | V    |
| Maximum average forward rectified current (fig. 1)                                 | $I_{F(AV)}$    | 1.0         |      |      |      | A    |
| Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load | $I_{FSM}$      | 30          |      |      |      | A    |
| Operating junction and storage temperature range                                   | $T_J, T_{STG}$ | -55 to +150 |      |      |      | °C   |



| ELECTRICAL CHARACTERISTICS ( $T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise noted) |                                                                                                            |                                     |             |       |               |
|-----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-------------------------------------|-------------|-------|---------------|
| PARAMETER                                                                               | TEST CONDITIONS                                                                                            |                                     | SYMBOL      | VALUE | UNIT          |
| Maximum instantaneous forward voltage                                                   | $I_F = 0.6\text{ A}$                                                                                       |                                     | $V_F^{(1)}$ | 0.865 | V             |
|                                                                                         | $I_F = 1.0\text{ A}$                                                                                       |                                     | $V_F$       | 0.920 |               |
| Maximum DC reverse current at rated DC blocking voltage                                 |                                                                                                            | $T_A = 25\text{ }^{\circ}\text{C}$  | $I_R$       | 5.0   | $\mu\text{A}$ |
|                                                                                         |                                                                                                            | $T_A = 100\text{ }^{\circ}\text{C}$ |             | 100   |               |
| Maximum reverse recovery time                                                           | $I_F = 0.5\text{ A}$ , $I_R = 1.0\text{ A}$ , $I_{rr} = 0.25\text{ A}$                                     |                                     | $t_{rr}$    | 15    | ns            |
| Maximum reverse recovery time                                                           | $I_F = 0.6\text{ A}$ , $V_R = 30\text{ V}$ , $dI/dt = 50\text{ A}/\mu\text{s}$ ,<br>$I_{rr} = 10\% I_{RM}$ | $T_J = 25\text{ }^{\circ}\text{C}$  | $t_{rr}$    | 25    | ns            |
|                                                                                         |                                                                                                            | $T_J = 100\text{ }^{\circ}\text{C}$ |             | 35    |               |
| Maximum stored charge                                                                   | $I_F = 0.6\text{ A}$ , $V_R = 30\text{ V}$ , $dI/dt = 50\text{ A}/\mu\text{s}$ ,<br>$I_{rr} = 10\% I_{RM}$ | $T_J = 25\text{ }^{\circ}\text{C}$  | $Q_{rr}$    | 10    | nC            |
|                                                                                         |                                                                                                            | $T_J = 100\text{ }^{\circ}\text{C}$ |             | 25    |               |
| Typical junction capacitance                                                            | 4.0 V, 1 MHz                                                                                               |                                     | $C_J$       | 10    | pF            |

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

| THERMAL CHARACTERISTICS (T <sub>A</sub> = 25 °C unless otherwise noted) |                                 |      |      |      |      |      |
|-------------------------------------------------------------------------|---------------------------------|------|------|------|------|------|
| PARAMETER                                                               | SYMBOL                          | ES1A | ES1B | ES1C | ES1D | UNIT |
| Typical thermal resistance                                              | R <sub>θJA</sub> <sup>(1)</sup> | 85   |      |      |      | °C/W |
|                                                                         | R <sub>θJL</sub> <sup>(1)</sup> | 35   |      |      |      |      |

**Note**

(1) Units mounted on PCB 5.0 mm x 5.0 mm (0.013 mm thick) land areas

| ORDERING INFORMATION (Example) |                 |                        |               |                                    |
|--------------------------------|-----------------|------------------------|---------------|------------------------------------|
| PREFERRED P/N                  | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
| ES1D-E3/61T                    | 0.064           | 61T                    | 1800          | 7" diameter plastic tape and reel  |
| ES1D-E3/5AT                    | 0.064           | 5AT                    | 7500          | 13" diameter plastic tape and reel |
| ES1DHE3_A/H <sup>(1)</sup>     | 0.064           | H                      | 1800          | 7" diameter plastic tape and reel  |
| ES1DHE3_A/I <sup>(1)</sup>     | 0.064           | I                      | 7500          | 13" diameter plastic tape and reel |
| ES1D-M3/61T                    | 0.064           | 61T                    | 1800          | 7" diameter plastic tape and reel  |
| ES1D-M3/5AT                    | 0.064           | 5AT                    | 7500          | 13" diameter plastic tape and reel |
| ES1DHM3_A/H <sup>(1)</sup>     | 0.064           | H                      | 1800          | 7" diameter plastic tape and reel  |
| ES1DHM3_A/I <sup>(1)</sup>     | 0.064           | I                      | 7500          | 13" diameter plastic tape and reel |

**Note**

(1) AEC-Q101 qualified

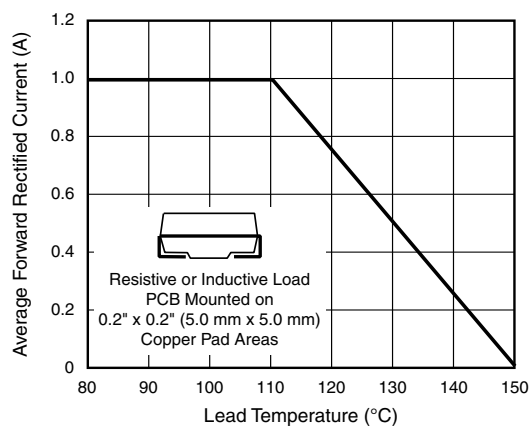
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Maximum Forward Current Derating Curve

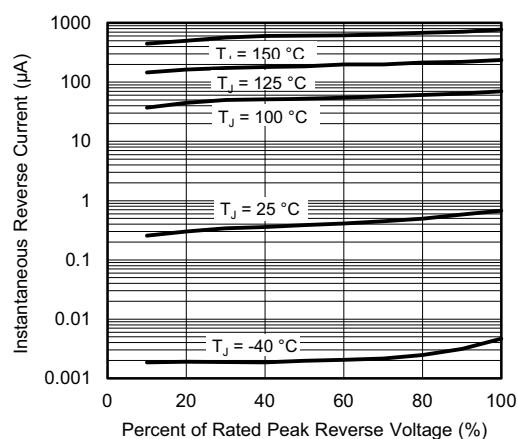


Fig. 4 - Typical Reverse Leakage Characteristics

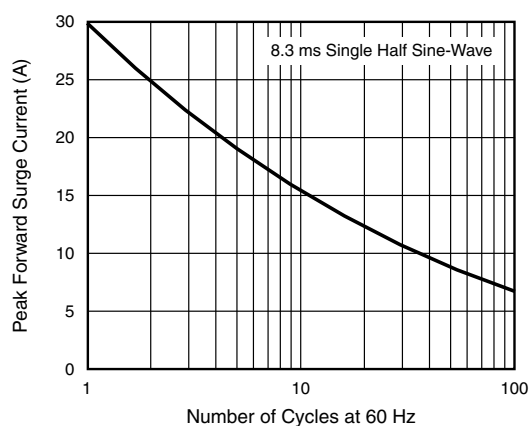


Fig. 2 - Maximum Non-Repetitive Peak Forward Surge Current

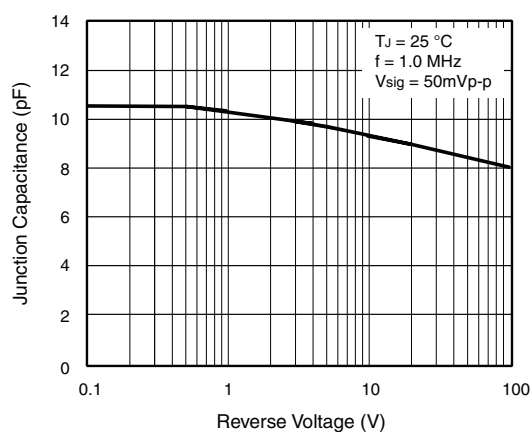


Fig. 5 - Typical Junction Capacitance

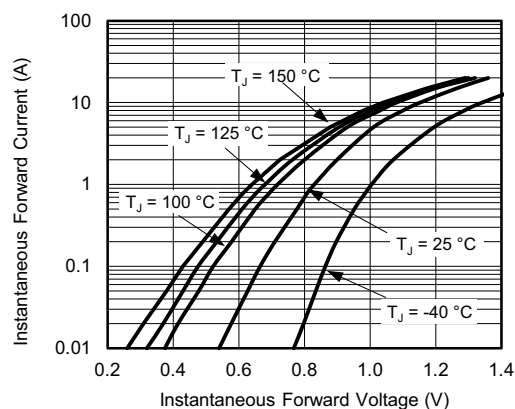


Fig. 3 - Typical Instantaneous Forward Characteristics

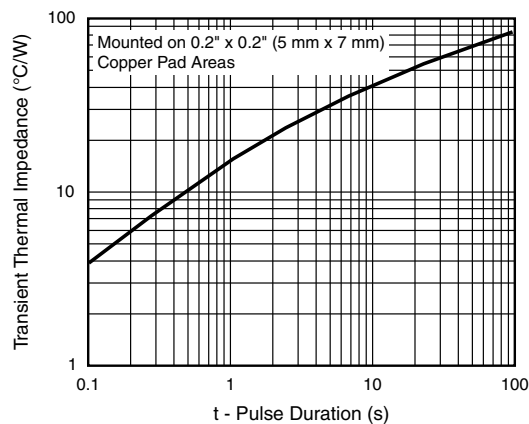
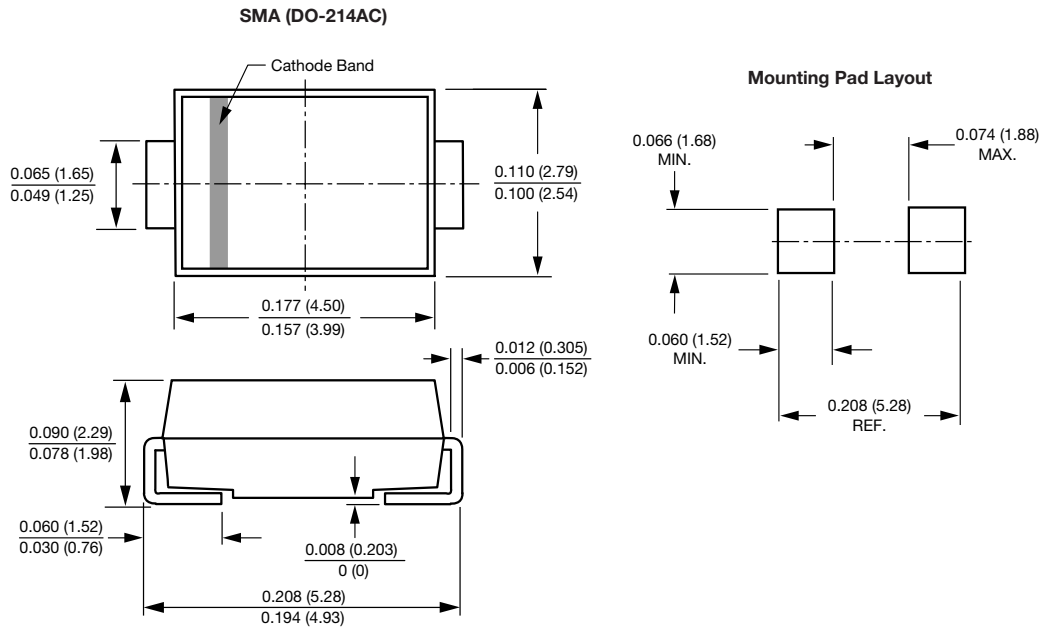


Fig. 6 - Typical Thermal Impedance



## PACKAGE OUTLINE DIMENSIONS in inches (millimeters)





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