



# THE DATASHEET OF ES1D-E3



## Surface Mount Ultrafast Plastic Rectifier


**SMA (DO-214AC)**

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

**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)

**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

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)
Diode variations	Single

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



<b>ELECTRICAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^\circ\text{C}$ 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			$I_R$	$T_A = 25\text{ }^\circ\text{C}$	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	$I_F = 0.6\text{ A}, V_R = 30\text{ V}, dI/dt = 50\text{ A}/\mu\text{s}, I_{rr} = 10\% I_{RM}$		$t_{rr}$	$T_J = 25\text{ }^\circ\text{C}$	25	ns
				$T_J = 100\text{ }^\circ\text{C}$	35	
Maximum stored charge	$I_F = 0.6\text{ A}, V_R = 30\text{ V}, dI/dt = 50\text{ A}/\mu\text{s}, I_{rr} = 10\% I_{RM}$		$Q_{rr}$	$T_J = 25\text{ }^\circ\text{C}$	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

<b>THERMAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)						
PARAMETER	SYMBOL	ES1A	ES1B	ES1C	ES1D	UNIT
Typical thermal resistance	$R_{\theta JA}^{(1)}$	85				$^\circ\text{C}/\text{W}$
	$R_{\theta JL}^{(1)}$	35				

**Note**

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

<b>ORDERING INFORMATION</b> (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)

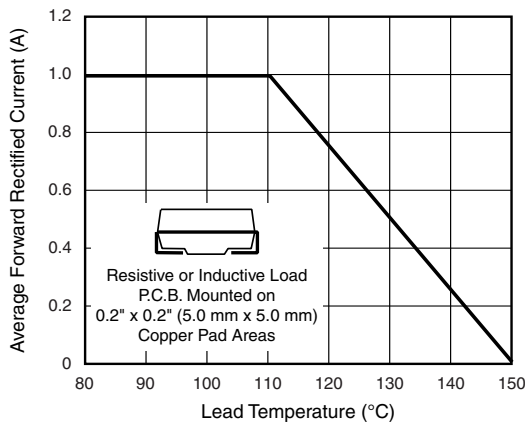


Fig. 1 - Maximum Forward Current Derating Curve

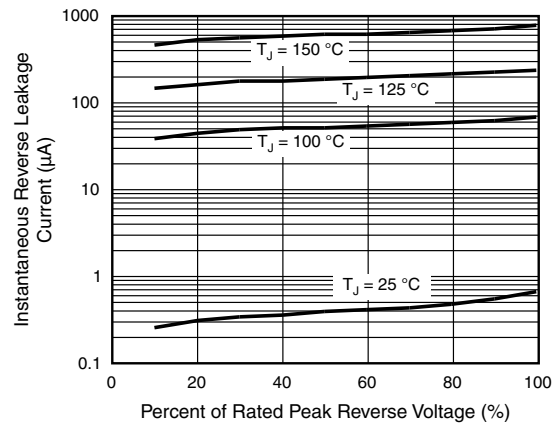


Fig. 4 - Typical Reverse Leakage Characteristics

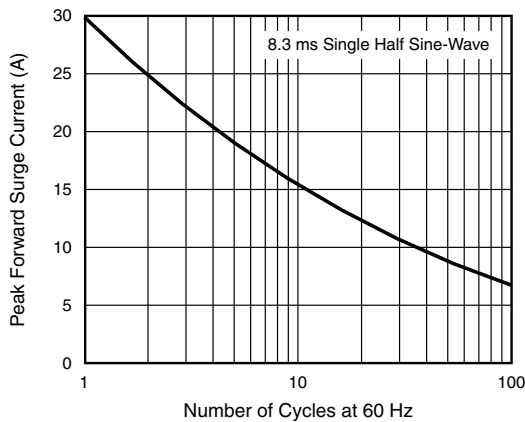


Fig. 2 - Maximum Non-Repetitive Peak Forward Surge Current

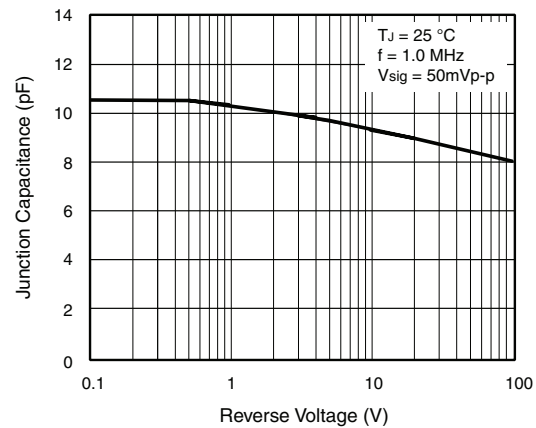


Fig. 5 - Typical Junction Capacitance

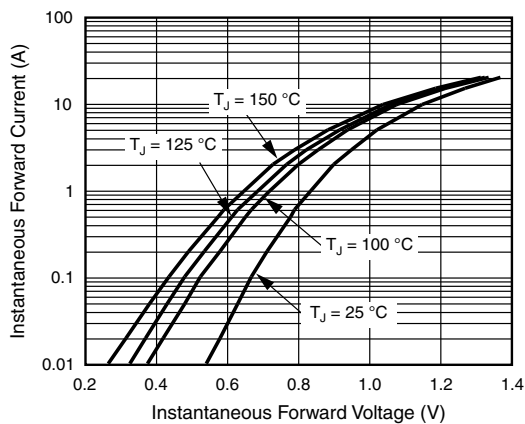


Fig. 3 - Typical Instantaneous Forward Characteristics

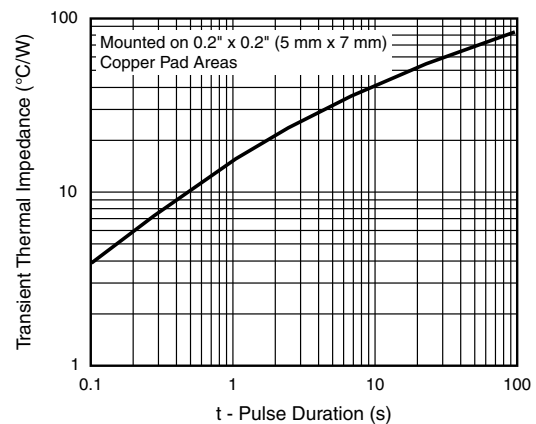
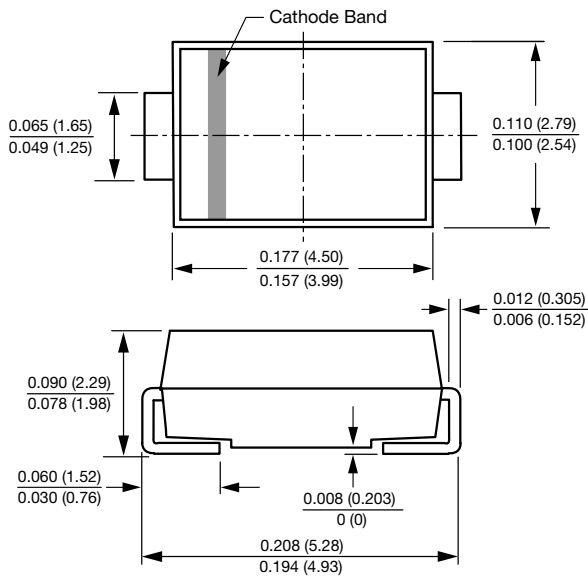


Fig. 6 - Typical Thermal Impedance

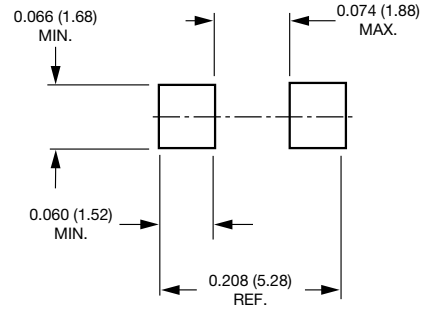


## PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

### SMA (DO-214AC)



### Mounting Pad Layout





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