Revision: 01-Apr-2020

# ES2A, ES2B, ES2C, ES2D

Vishay General Semiconductor

# Surface-Mount Ultrafast Plastic Rectifier

### **FEATURES**

- Glass passivated pellet chip junction
- · Ideal for automated placement
- 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: base P/NHE3 or P/NHM3
- Material categorization: for definitions of compliance please see 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: SMB (DO-214AA) 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 gualified

Base P/NHME3\_X - halogen-free, RoHS-compliant, and AEC-Q101 gualified

("\_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

<b>MAXIMUM RATINGS</b> ( $T_A = 25 \text{ °C}$ unless otherwise noted)							
PARAMETER	SYMBOL	ES2A	ES2B	ES2C	ES2D	UNIT	
Device marking code		EA	EB	EC	ED		
Maximum repetitive peak reverse voltage	V <sub>RRM</sub>	50 100 150 200			200	V	
Maximum RMS voltage	V <sub>RMS</sub>	35 70		105	140	V	
Maximum DC blocking voltage	V <sub>DC</sub>	50 100 150 200		200	V		
Maximum average forward rectified current at $T_L$ = 110 °C	I <sub>F(AV)</sub>	2.0					
Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load	I <sub>FSM</sub>	50					
Operating junction and storage temperature range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150					









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SMB (DO-214AA)

Anode O Cathode

### LINKS TO ADDITIONAL RESOURCES



PRIMARY CHARACTERISTICS							
I <sub>F(AV)</sub> 2.0 A							
V <sub>RRM</sub>	50 V, 100 V, 150 V, 200 V						
I <sub>FSM</sub>	50 A						
t <sub>rr</sub>	20 ns						
V <sub>F</sub>	0.90 V						
T <sub>J</sub> max.	150 °C						
Package	SMB (DO-214AA)						
Circuit configuration	Single						

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<b>ELECTRICAL CHARACTERISTICS</b> ( $T_A = 25 \text{ °C}$ unless otherwise noted)								
PARAMETER	TEST CONDITION	SYMBOL	ES2A	ES2B	ES2C	ES2D	UNIT	
Maximum instantaneous forward voltage	2.0 A		V <sub>F</sub> <sup>(1)</sup>	0.90		V		
Maximum DC reverse current at rated DC blocking voltage		T <sub>A</sub> = 25 °C T <sub>A</sub> = 100 °C	I <sub>R</sub>	10 350		μA		
Max. reverse recovery time	I <sub>F</sub> = 0.5 A, I <sub>R</sub> = 1.0 A, I <sub>rr</sub> = 0.25 A		t <sub>rr</sub>	20		ns		
Maximum reverse recovery time	I <sub>F</sub> = 2.0 A, V <sub>R</sub> = 30 V,	T <sub>J</sub> = 25 °C	+		3	0		200
Maximum reverse recovery time	dI/dt = 50 A/µs, I <sub>r</sub> = 10 % I <sub>RM</sub>	T <sub>J</sub> = 100 °C	t <sub>rr</sub>					ns
Maximum stored charge	$I_F = 2.0 \text{ A}, V_R = 30 \text{ V},$	T <sub>J</sub> = 25 °C	0		1	0		nC
Maximum stored charge	dI/dt = 50 A/µs, I <sub>r</sub> = 10 % I <sub>RM</sub>	T <sub>J</sub> = 100 °C	Q <sub>rr</sub>		2	5		10
Typical junction capacitance	4.0 V, 1 MHz		CJ		1	8		pF

#### Note

<sup>(1)</sup> Pulse test: 300 ms pulse width, 1 % duty cycle

<b>THERMAL CHARACTERISTICS</b> ( $T_A = 25 \text{ °C}$ unless otherwise noted)						
PARAMETER	SYMBOL	ES2A	ES2B	ES2C	ES2D	UNIT
Typical thermal resistance	R <sub>0JA</sub> <sup>(1)</sup>	75				°C/W
Typical thermal resistance		20			0/00	

### 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			
ES2D-E3/52T	0.096	52T	750	7" diameter plastic tape and reel			
ES2D-E3/5BT	0.096	5BT	3200	13" diameter plastic tape and reel			
ES2DHE3_A/H <sup>(1)</sup>	0.096	Н	750	7" diameter plastic tape and reel			
ES2DHE3_A/I <sup>(1)</sup>	0.096	I	3200	13" diameter plastic tape and reel			
ES2D-M3/52T	0.096	52T	750	7" diameter plastic tape and reel			
ES2D-M3/5BT	0.096	5BT	3200	13" diameter plastic tape and reel			
ES2DHM3_A/H <sup>(1)</sup>	0.096	Н	750	7" diameter plastic tape and reel			
ES2DHM3_A/I <sup>(1)</sup>	0.096	I	3200	13" diameter plastic tape and reel			

#### Note

(1) AEC-Q101 qualified



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### RATINGS AND CHARACTERISTICS CURVES (T<sub>A</sub> = 25 °C unless otherwise noted)



Fig. 1 - Maximum Forward Current Derating Curve



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



Fig. 3 - Typical Instantaneous Forward Characteristics





Fig. 5 - Typical Junction Capacitance



Fig. 6 - Transient Thermal Impedance

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# ES2A, ES2B, ES2C, ES2D

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







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