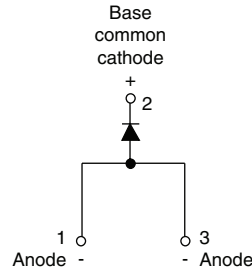




## Fast Soft Recovery Rectifier Diode, 20 A



D<sup>2</sup>PAK (SMD-220)



### FEATURES/DESCRIPTION

The 20ETF..SPbF fast soft recovery rectifier series has been optimized for combined short reverse recovery time and low forward voltage drop.

The glass passivation ensures stable reliable operation in the most severe temperature and power cycling conditions.

This product series has been designed and qualified for industrial level.

Compliant to RoHS directive 2002/95/EC.

Halogen-free according to IEC 61249-2-21 definition.



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

### PRODUCT SUMMARY

$V_F$ at 20 A	< 1.31 V
$I_{FSM}$	355 A
$V_{RRM}$	800 V to 1200 V

### APPLICATIONS

- Output rectification and freewheeling in inverters, choppers and converters
- Input rectifications where severe restrictions on conducted EMI should be met

### MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Sinusoidal waveform	20	A
$V_{RRM}$		800 to 1200	V
$I_{FSM}$		355	A
$V_F$	20 A, $T_J = 25^\circ\text{C}$	1.31	V
$t_{rr}$	1 A, 100 A/ $\mu\text{s}$	95	ns
$T_J$	Range	- 40 to 150	$^\circ\text{C}$

### VOLTAGE RATINGS

PART NUMBER	$V_{RRM}$ , MAXIMUM PEAK REVERSE VOLTAGE V	$V_{RSM}$ , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V	$I_{RRM}$ AT 150 $^\circ\text{C}$ mA
20ETF08SPbF	800	900	6
20ETF10SPbF	1000	1100	
20ETF12SPbF	1200	1300	

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current	$I_{F(AV)}$	$T_C = 97^\circ\text{C}$ , 180 $^\circ$ conduction half sine wave	20	A
Maximum peak one cycle non-repetitive surge current	$I_{FSM}$	10 ms sine pulse, rated $V_{RRM}$ applied	300	
		10 ms sine pulse, no voltage reapplied	355	
Maximum $I^2t$ for fusing	$I^2t$	10 ms sine pulse, rated $V_{RRM}$ applied	450	$\text{A}^2\text{s}$
		10 ms sine pulse, no voltage reapplied	635	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	$t = 0.1$ ms to 10 ms, no voltage reapplied	6350	$\text{A}^2\sqrt{\text{s}}$

\* Pb containing terminations are not RoHS compliant, exemptions may apply

# 20ETF..SPbF Soft Recovery Series

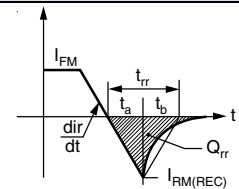


Vishay High Power Products

Fast Soft Recovery  
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ELECTRICAL SPECIFICATIONS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum forward voltage drop	$V_{FM}$	20 A, $T_J = 25\text{ }^\circ\text{C}$		1.31	V
Forward slope resistance	$r_t$	$T_J = 150\text{ }^\circ\text{C}$		11.88	$\text{m}\Omega$
Threshold voltage	$V_{F(TO)}$			0.93	V
Maximum reverse leakage current	$I_{RM}$	$T_J = 25\text{ }^\circ\text{C}$	$V_R = \text{Rated } V_{RRM}$	0.1	mA
		$T_J = 150\text{ }^\circ\text{C}$		6	

RECOVERY CHARACTERISTICS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Reverse recovery time	$t_{rr}$	$I_F$ at 20 Apk 25 A/ $\mu\text{s}$ $25\text{ }^\circ\text{C}$	400	ns
Reverse recovery current	$I_{rr}$		6.1	A
Reverse recovery charge	$Q_{rr}$		1.7	$\mu\text{C}$
Snap factor	S	Typical	0.6	



THERMAL - MECHANICAL SPECIFICATIONS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction and storage temperature range	$T_J, T_{Stg}$		- 40 to 150	$^\circ\text{C}$
Maximum thermal resistance, junction to case	$R_{thJC}$	DC operation	0.9	$^\circ\text{C/W}$
Maximum thermal resistance, junction to ambient (PCB mount)	$R_{thJA}^{(1)}$		62	
Soldering temperature	$T_S$		240	$^\circ\text{C}$
Approximate weight			2	g
			0.07	oz.
Marking device		Case style D <sup>2</sup> PAK (SMD-220)	20ETF08S	
			20ETF10S	
			20ETF12S	

**Note**

<sup>(1)</sup> When mounted on 1" square (650 mm<sup>2</sup>) PCB of FR-4 or G-10 material 4 oz. (140  $\mu\text{m}$ ) copper 40  $^\circ\text{C/W}$   
For recommended footprint and soldering techniques refer to application note #AN-994

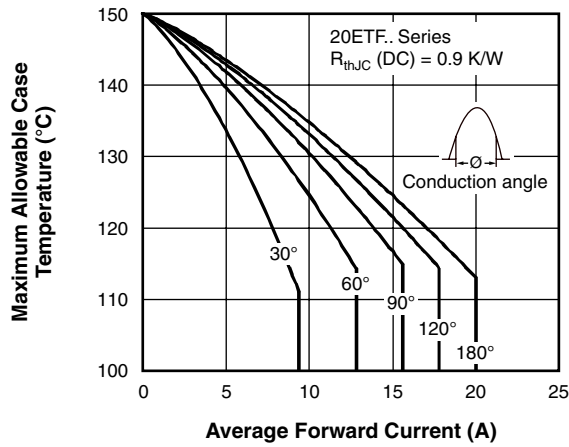


Fig. 1 - Current Rating Characteristics

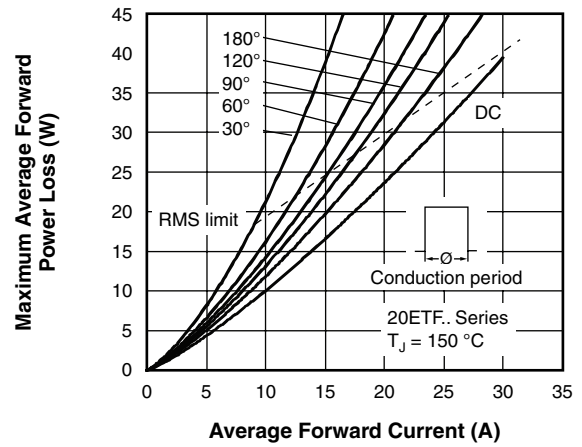


Fig. 4 - Forward Power Loss Characteristics

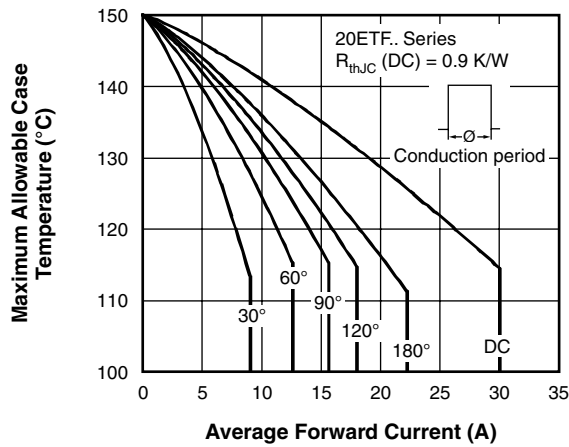


Fig. 2 - Current Rating Characteristics

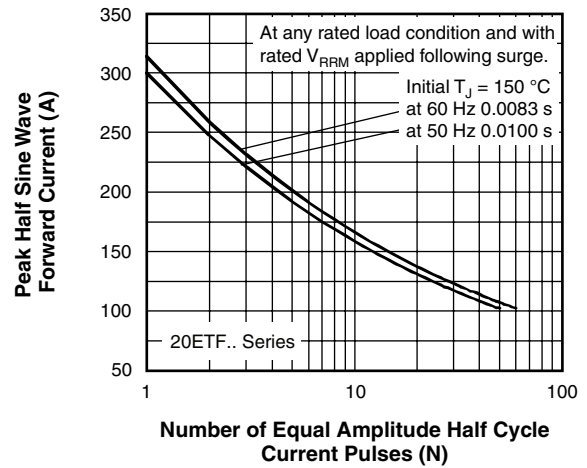


Fig. 5 - Maximum Non-Repetitive Surge Current

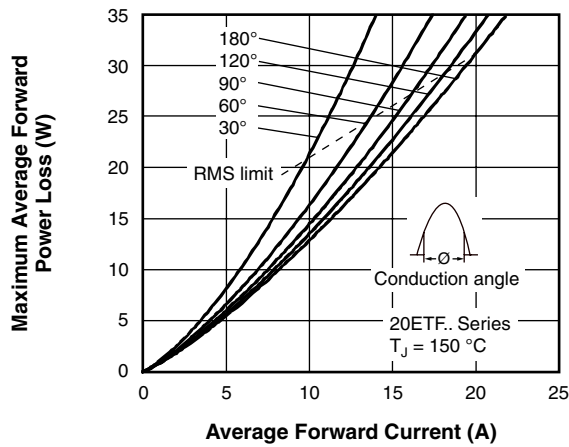


Fig. 3 - Forward Power Loss Characteristics

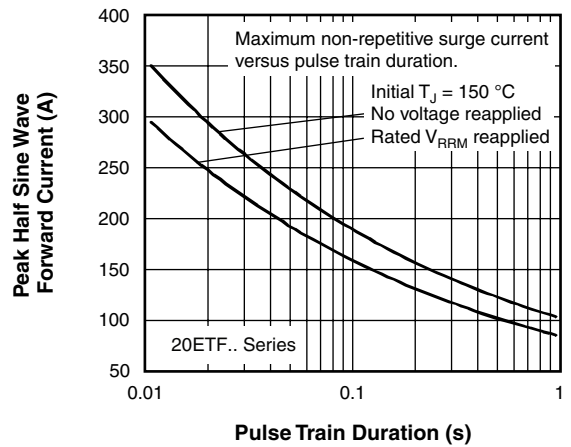


Fig. 6 - Maximum Non-Repetitive Surge Current

# 20ETF..SPbF Soft Recovery Series



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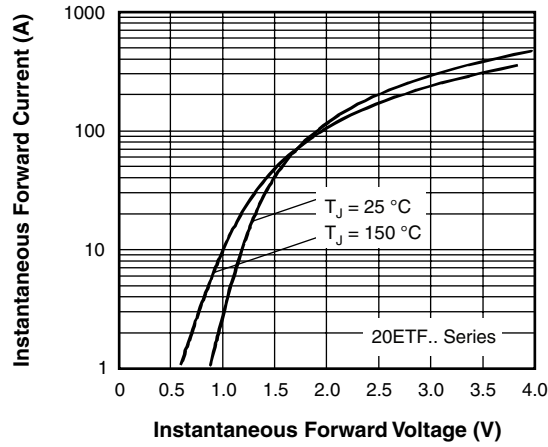


Fig. 7 - Forward Voltage Drop Characteristics

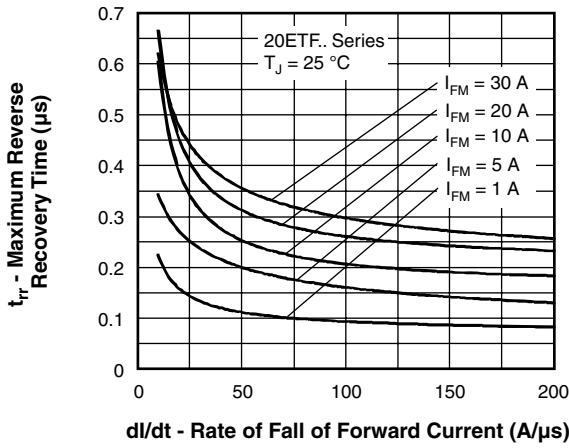


Fig. 8 - Recovery Time Characteristics,  $T_J = 25\text{ °C}$

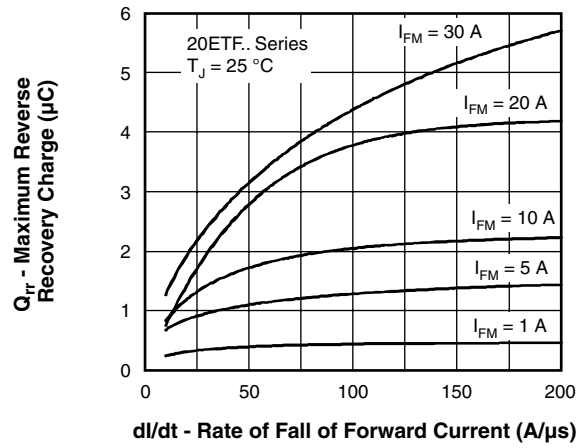


Fig. 10 - Recovery Charge Characteristics,  $T_J = 25\text{ °C}$

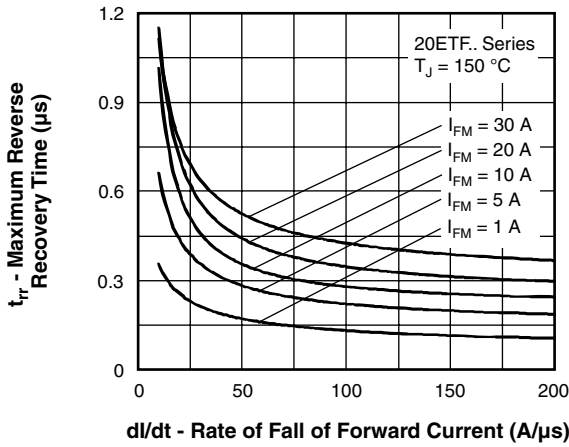


Fig. 9 - Recovery Time Characteristics,  $T_J = 150\text{ °C}$

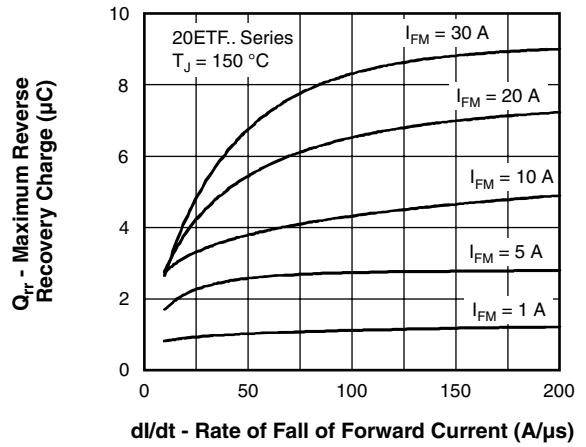


Fig. 11 - Recovery Charge Characteristics,  $T_J = 150\text{ °C}$



# 20ETF..SPbF Soft Recovery Series

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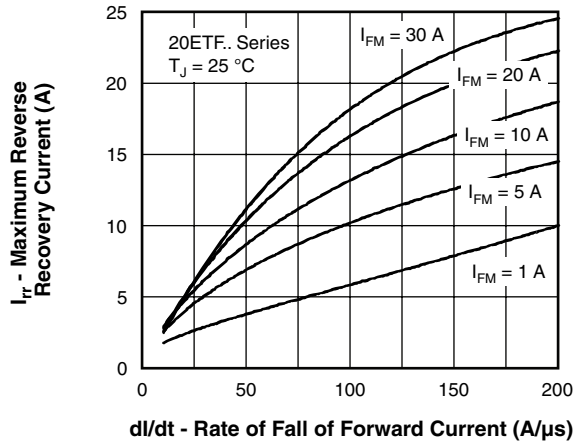


Fig. 12 - Recovery Current Characteristics,  $T_J = 25\text{ }^\circ\text{C}$

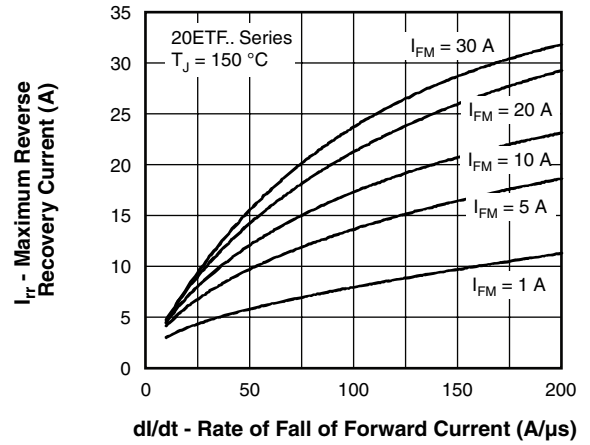


Fig. 13 - Recovery Current Characteristics,  $T_J = 150\text{ }^\circ\text{C}$

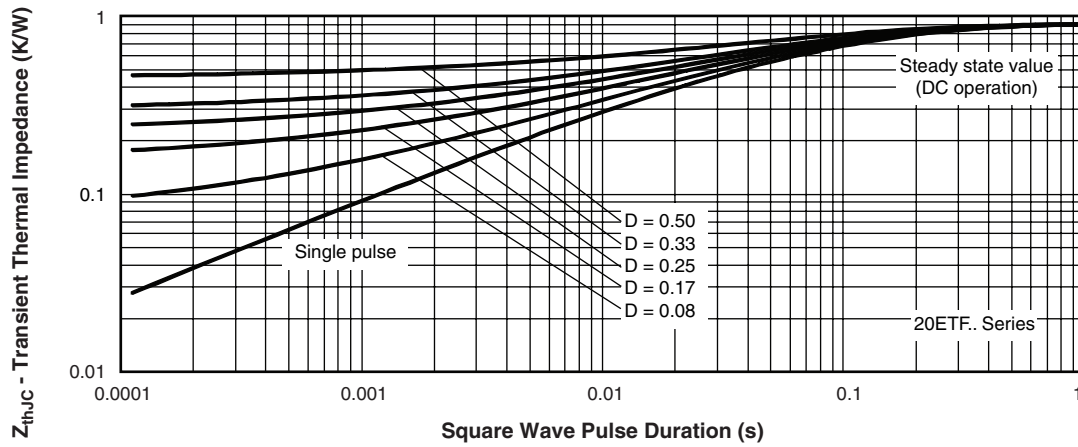


Fig. 14 - Thermal Impedance  $Z_{thJC}$  Characteristics

# 20ETF..SPbF Soft Recovery Series



Vishay High Power Products

Fast Soft Recovery  
Rectifier Diode, 20 A

## ORDERING INFORMATION TABLE

Device code	<b>20</b>	<b>E</b>	<b>T</b>	<b>F</b>	<b>12</b>	<b>S</b>	<b>TRL</b>	<b>PbF</b>
	①	②	③	④	⑤	⑥	⑦	⑧

- 1** - Current rating (20 = 20 A)
- 2** - Circuit configuration:  
E = Single diode
- 3** - Package:  
T = D<sup>2</sup>PAK (TO-220AC)
- 4** - Type of silicon:  
F = Fast soft recovery rectifier
- 5** - Voltage code x 100 = V<sub>RRM</sub> ————
- 6** - S = Surface mountable
- 7** -
  - None = Tape
  - TRR = Tape and reel (right oriented)
  - TRL = Tape and reel (left oriented)
- 8** -
  - None = Standard production
  - PbF = Lead (Pb)-free

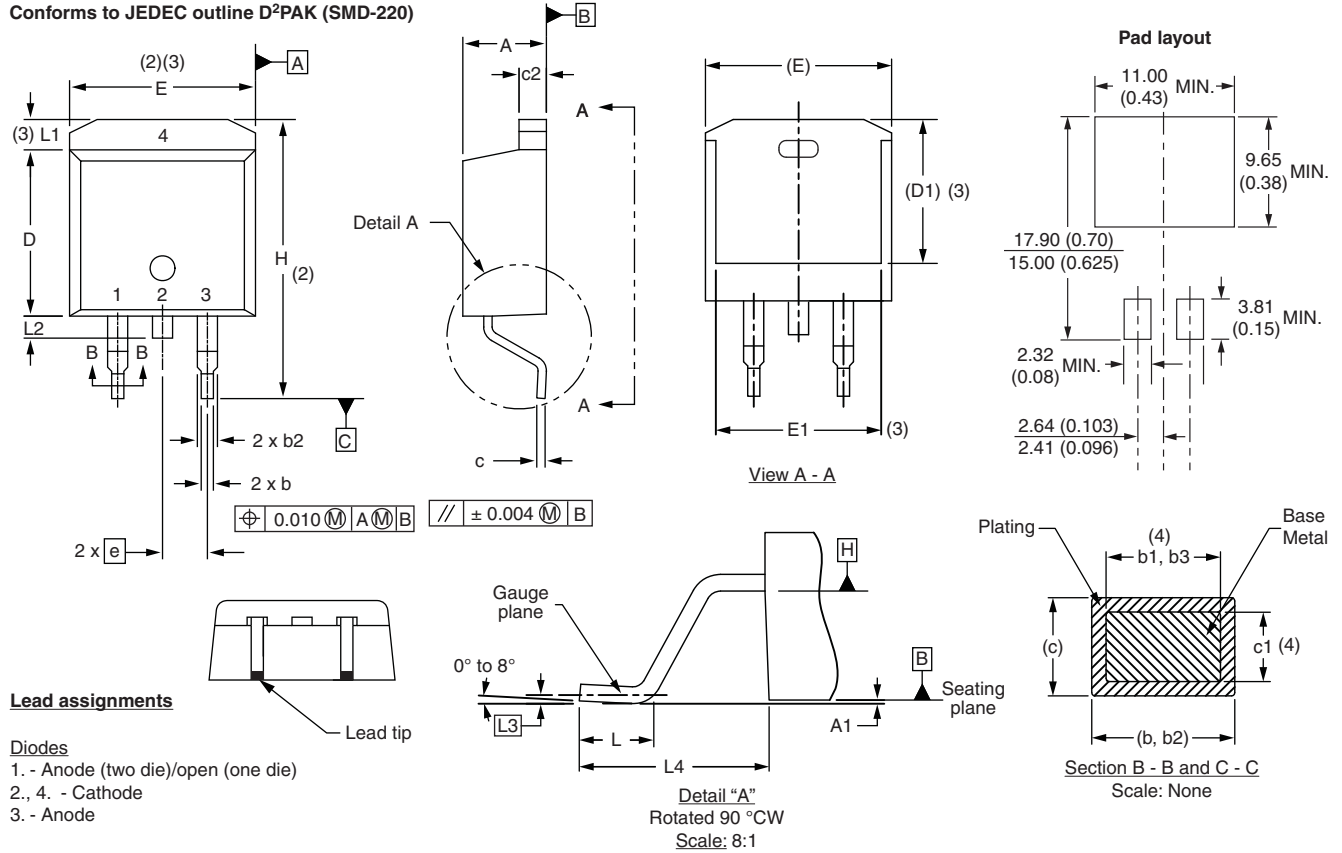
08 = 800 V
10 = 1000 V
12 = 1200 V

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95046">www.vishay.com/doc?95046</a>
Part marking information	<a href="http://www.vishay.com/doc?95054">www.vishay.com/doc?95054</a>
Packaging information	<a href="http://www.vishay.com/doc?95032">www.vishay.com/doc?95032</a>

## D<sup>2</sup>PAK

### DIMENSIONS in millimeters and inches

Conforms to JEDEC outline D<sup>2</sup>PAK (SMD-220)



SYMBOL	MILLIMETERS		INCHES		NOTES	SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.			MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	0.160	0.190		D1	6.86	8.00	0.270	0.315	3
A1	0.00	0.254	0.000	0.010		E	9.65	10.67	0.380	0.420	2, 3
b	0.51	0.99	0.020	0.039		E1	7.90	8.80	0.311	0.346	3
b1	0.51	0.89	0.020	0.035	4	e	2.54 BSC		0.100 BSC		
b2	1.14	1.78	0.045	0.070		H	14.61	15.88	0.575	0.625	
b3	1.14	1.73	0.045	0.068	4	L	1.78	2.79	0.070	0.110	
c	0.38	0.74	0.015	0.029		L1	-	1.65	-	0.066	3
c1	0.38	0.58	0.015	0.023	4	L2	1.27	1.78	0.050	0.070	
c2	1.14	1.65	0.045	0.065		L3	0.25 BSC		0.010 BSC		
D	8.51	9.65	0.335	0.380	2	L4	4.78	5.28	0.188	0.208	

### Notes

- Dimensioning and tolerancing per ASME Y14.5 M-1994
- Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outmost extremes of the plastic body
- Thermal pad contour optional within dimension E, L1, D1 and E1
- Dimension b1 and c1 apply to base metal only
- Datum A and B to be determined at datum plane H
- Controlling dimension: inch
- Outline conforms to JEDEC outline TO-263AB



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**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

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