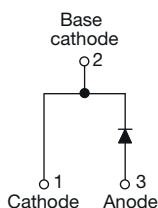


# Ultrafast Rectifier, 8 A FRED Pt®


**TO-220AC 2L**


## FEATURES

- Ultrafast and soft recovery time
- Optimized forward voltage drop
- Polyimide passivation
- 175 °C maximum operating junction temperature
- Rugged design
- Good thermal performance
- Meets JESD 201 class 1A whisker test
- 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

$I_{F(AV)}$	8 A
$V_R$	1200 V
$V_F$ at $I_F$ at 125 °C	1.95 V
$t_{rr}$ typ.	42 ns
$T_J$ max.	175 °C
Package	TO-220AC 2L
Circuit configuration	Single

## DESCRIPTION / APPLICATIONS

Ultrafast recovery rectifiers designed with optimized forward voltage drop, ultrafast recovery time, and soft recovery. Polyimide passivated with a planar structure and platinum doped life time control guarantee ruggedness, reliability, and offer a solid value for efficiency and thermal performance.

These devices are intended for use in boost stage in the AC/DC section of SMPS, high frequency output rectification of battery chargers, inverters for solar inverters or as freewheeling diodes in motor drives.

## ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Repetitive peak reverse voltage	$V_{RRM}$		1200	V
Average rectified forward current	$I_{F(AV)}$	$T_C = 140\text{ °C}$ , $D = 0.50$	8	A
Non-repetitive peak surge current	$I_{FSM}$	$T_C = 25\text{ °C}$ , $t_p = 10\text{ ms}$ , sine wave	80	
Repetitive peak forward current	$I_{FRM}$		16	
Operating junction and storage temperatures	$T_J$ , $T_{Stg}$		-55 to +175	°C

## ELECTRICAL SPECIFICATIONS ( $T_J = 25\text{ °C}$ unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage, blocking voltage	$V_{BR}$ , $V_R$	$I_R = 200\text{ }\mu\text{A}$	1200	-	-	V
Forward voltage	$V_F$	$I_F = 8\text{ A}$	-	2.05	2.55	
		$I_F = 8\text{ A}$ , $T_J = 125\text{ °C}$	-	1.95	2.37	
Reverse leakage current	$I_R$	$V_R = V_R$ rated	-	-	55	$\mu\text{A}$
		$T_J = 125\text{ °C}$ , $V_R = V_R$ rated	-	-	100	
Junction capacitance	$C_T$	$V_R = 200\text{ V}$	-	8	-	pF
Series inductance	$L_S$	Measured lead to lead 5 mm from package body	-	8.0	-	nH

**DYNAMIC RECOVERY CHARACTERISTICS** ( $T_J = 25\text{ }^{\circ}\text{C}$  unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time	$t_{rr}$	$I_F = 1.0\text{ A}$ , $dI_F/dt = 100\text{ A}/\mu\text{A}$ , $V_R = 30\text{ V}$	-	42	-	ns
		$T_J = 25\text{ }^{\circ}\text{C}$	-	144	-	
		$T_J = 125\text{ }^{\circ}\text{C}$	-	204	-	
Peak recovery current	$I_{RRM}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	5	-	A
		$T_J = 125\text{ }^{\circ}\text{C}$	-	7.2	-	
Reverse recovery charge	$Q_{rr}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	370	-	nC
		$T_J = 125\text{ }^{\circ}\text{C}$	-	745	-	

**THERMAL - MECHANICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Thermal resistance, junction to case	$R_{thJC}$		-	1.25	1.5	$^{\circ}\text{C}/\text{W}$
Thermal resistance, junction to case	$R_{thJA}$	Typical socket mount	-	54	60	
Thermal resistance, case to heat sink	$R_{thCS}$	Mounting surface, flat, smooth, and greased	-	0.18	0.4	
Weight			-	2	-	g
Mounting torque			6.0 (5.0)	-	12 (10)	kgf · cm (lbf · in)
Marking device		Case style TO-220AC 2L	8ETU12			

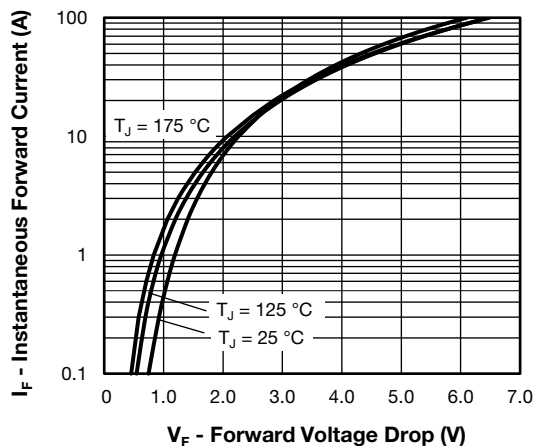


Fig. 1 - Typical Forward Voltage Drop Characteristics

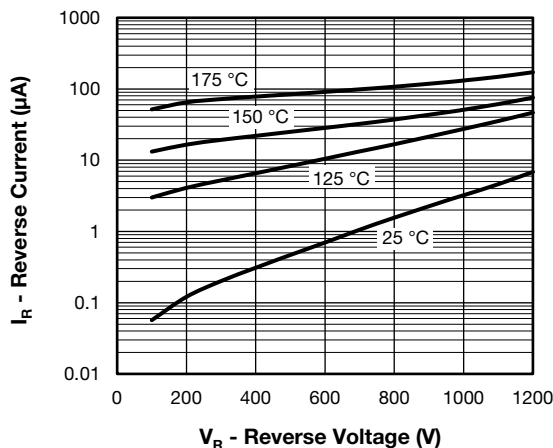


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

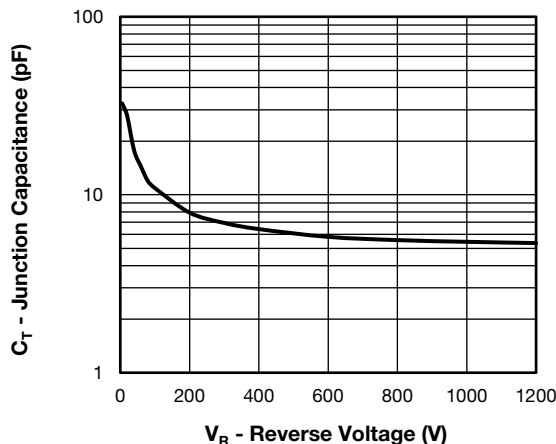


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

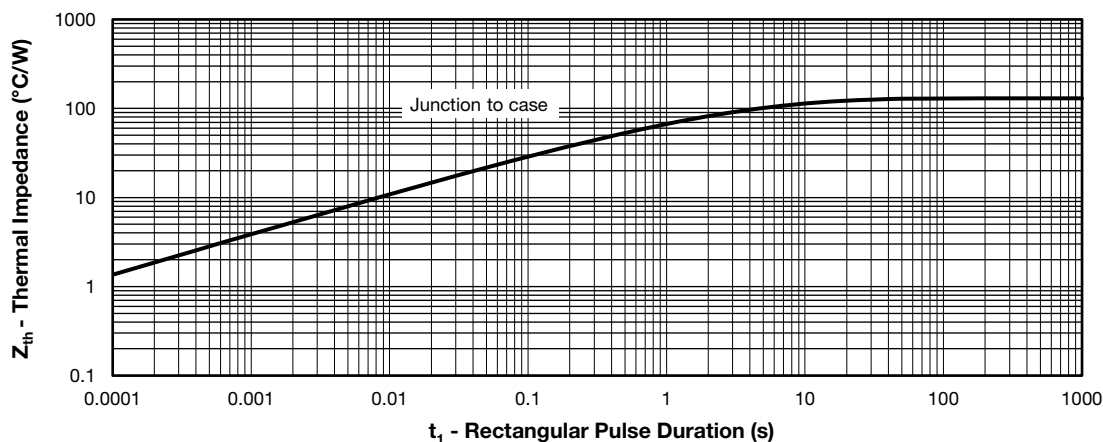
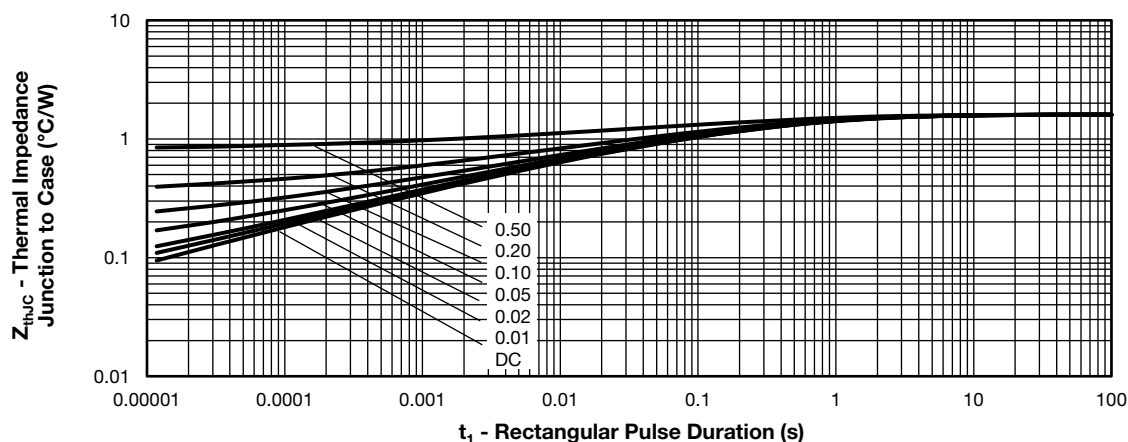
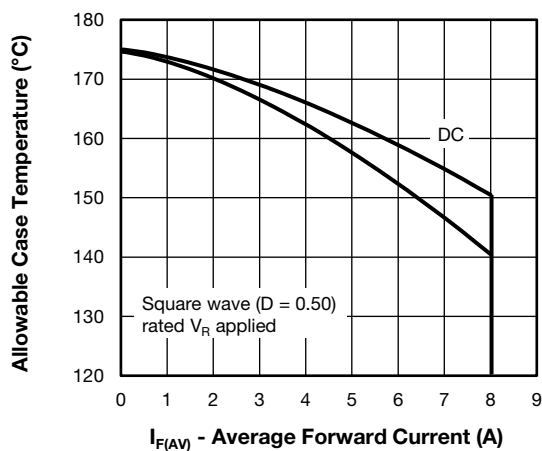

Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

Fig. 5 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics


Fig. 6 - Maximum Allowable Case Temperature vs. Average Forward Current

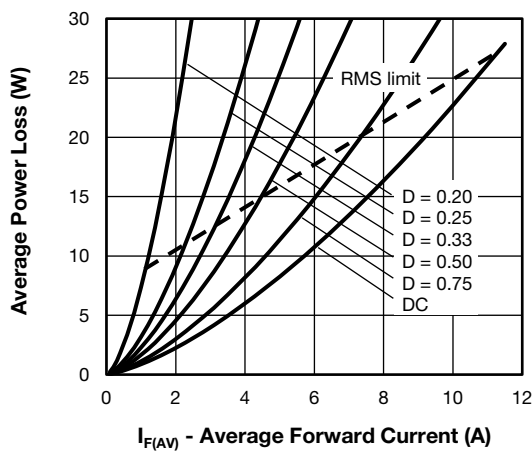
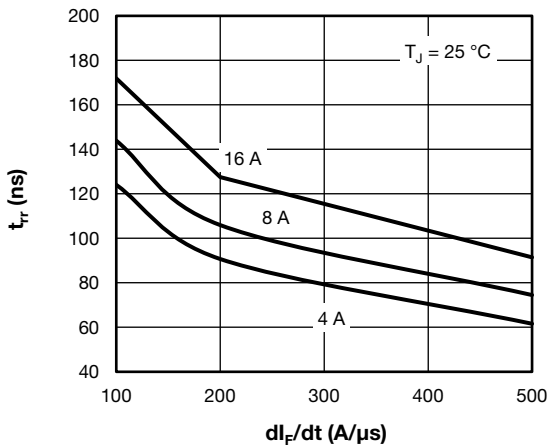
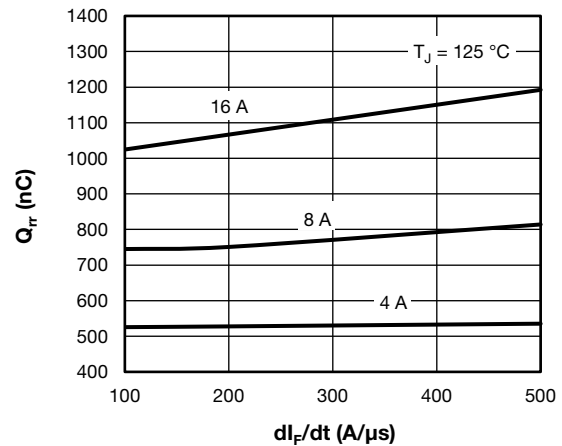
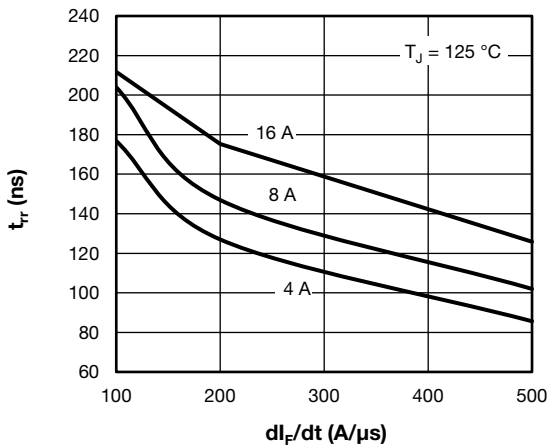
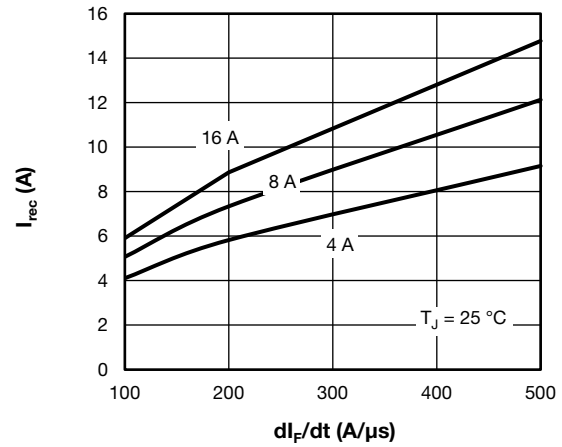
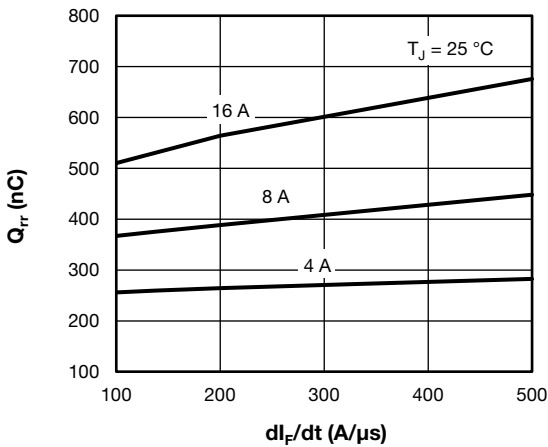
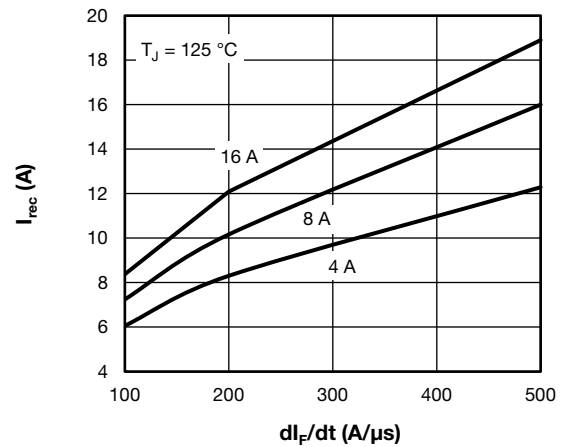


Fig. 7 - Forward Power Loss Characteristics


Fig. 8 - Typical Reverse Recovery Time vs.  $dI_F/dt$ 

Fig. 11 - Typical Stored Charge vs.  $dI_F/dt$ 

Fig. 9 - Typical Reverse Recovery Time vs.  $dI_F/dt$ 

Fig. 12 - Typical Reverse Current vs.  $dI_F/dt$ 

Fig. 10 - Typical Stored Charge vs.  $dI_F/dt$ 

Fig. 13 - Typical Reverse Current vs.  $dI_F/dt$

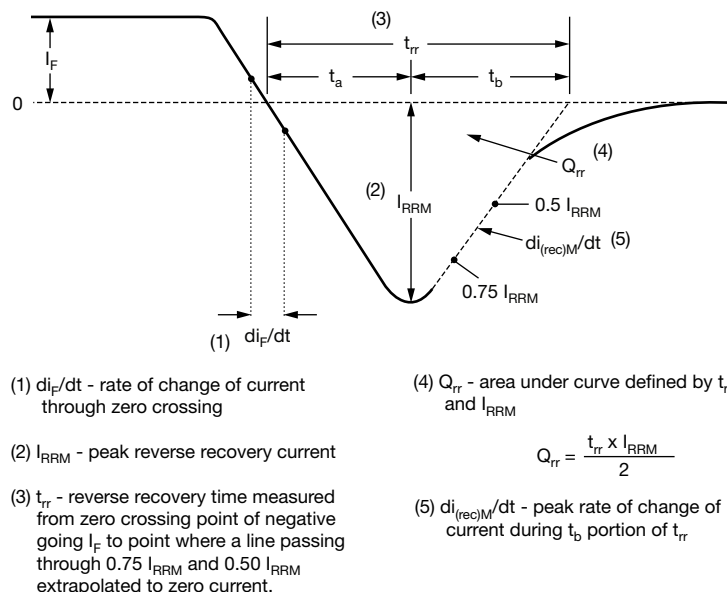


Fig. 14 - Reverse Recovery Waveform and Definitions

## ORDERING INFORMATION TABLE

Device code	VS-	8	E	T	U	12	-M3
	1	2	3	4	5	6	7

- 1** - Vishay Semiconductors product
- 2** - Current rating (8 = 8 A)
- 3** - E = single
- 4** - Package:  
T = 2L TO-220AC
- 5** - U = ultrafast recovery
- 6** - Voltage rating (12 = 1200 V)
- 7** - Environmental digit:  
-M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free

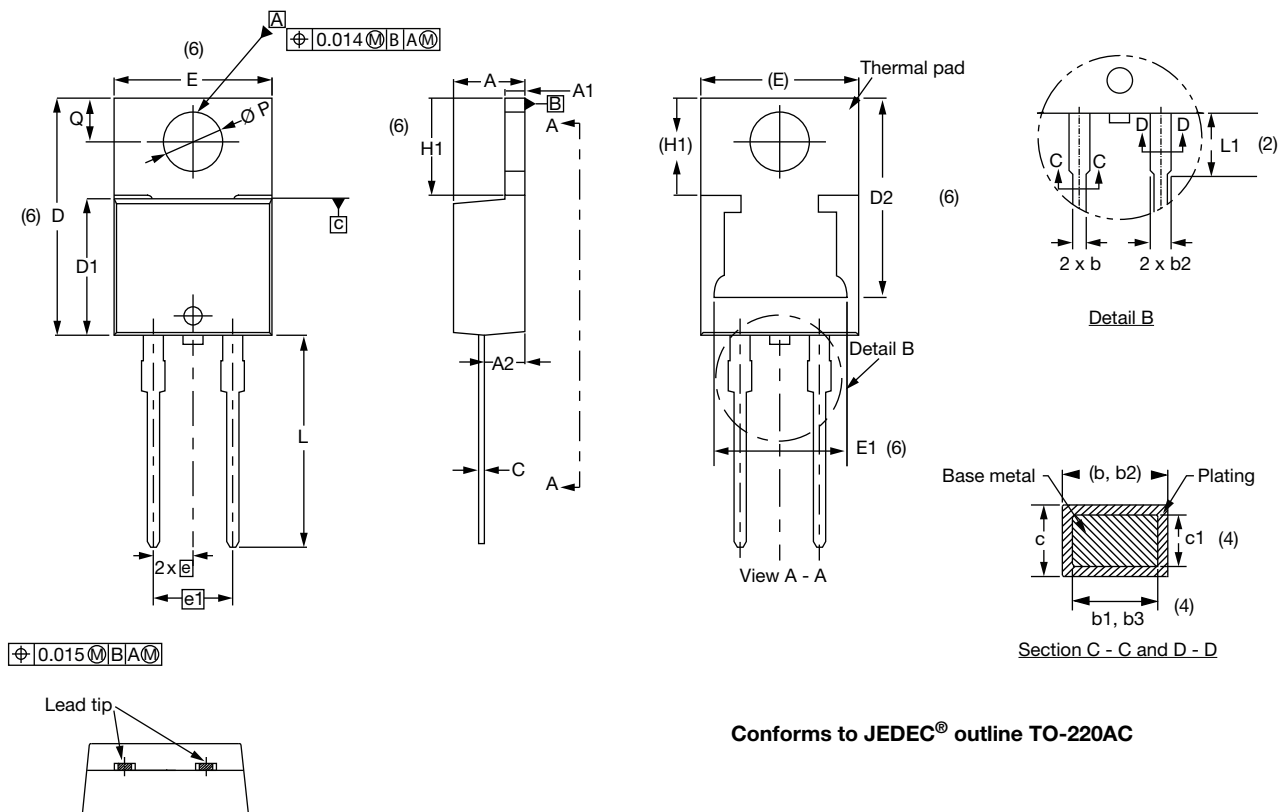
ORDERING INFORMATION (Example)		
PREFERRED P/N	BASE QUANTITY	PACKAGING DESCRIPTION
VS-8ETU12-M3	50	Antistatic plastic tubes

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?96156">www.vishay.com/doc?96156</a>
Part marking information	<a href="http://www.vishay.com/doc?95391">www.vishay.com/doc?95391</a>



### TO-220AC 2L

**DIMENSIONS** in millimeters and inches



Conforms to JEDEC® outline TO-220AC

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.25	4.65	0.167	0.183	
A1	1.14	1.40	0.045	0.055	
A2	2.50	2.92	0.098	0.115	
b	0.69	1.01	0.027	0.040	
b1	0.38	0.97	0.015	0.038	4
b2	1.20	1.73	0.047	0.068	
b3	1.14	1.73	0.045	0.068	4
c	0.36	0.61	0.014	0.024	
c1	0.36	0.56	0.014	0.022	4
D	14.85	15.35	0.585	0.604	3
D1	8.38	9.02	0.330	0.355	
D2	11.68	13.30	0.460	0.524	6, 7
E	10.11	10.51	0.398	0.414	3, 6
E1	6.86	8.89	0.270	0.350	6
e	2.41	2.67	0.095	0.105	
e1	4.88	5.28	0.192	0.208	
H1	6.09	6.48	0.240	0.255	6
L	13.52	14.02	0.532	0.552	
L1	3.32	3.82	0.131	0.150	2
Ø P	3.54	3.91	0.139	0.154	
Q	2.60	3.00	0.102	0.118	

#### Notes

- Dimensioning and tolerancing as per ASME Y14.5M-1994
- Lead dimension and finish uncontrolled in L1
- Dimension D, D1, 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 outermost extremes of the plastic body
- Dimension b1, b3, and c1 apply to base metal only
- Controlling dimensions: inches
- Thermal pad contour optional within dimensions E, H1, D2, and E1
- Outline conforms to JEDEC® TO-220, except D2



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