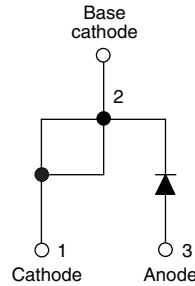


## Fast Soft Recovery Rectifier Diode, 10 A



TO-220AC



### FEATURES/DESCRIPTION

The 10ETF..PbF 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 and lead (Pb)-free.



RoHS\*  
COMPLIANT

### APPLICATIONS

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

### PRODUCT SUMMARY

$V_{RRM}$	200 to 600 V
$V_F$ at 10 A	< 1.2 V
$t_{rr}$	50 ns

### MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
$V_{RRM}$		200 to 600	V
$I_{F(AV)}$	Sinusoidal waveform	10	A
$I_{FSM}$		150	
$t_{rr}$	1 A, 100 A/ $\mu$ s	50	ns
$V_F$	10 A, $T_J = 25^\circ\text{C}$	1.2	V
$T_J$		- 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
10ETF02PbF	200	300	2
10ETF04PbF	400	500	
10ETF06PbF	600	700	

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current	$I_{F(AV)}$	$T_C = 128^\circ\text{C}$ , 180 $^\circ$ conduction half sine wave	10	A
Maximum peak one cycle non-repetitive surge current	$I_{FSM}$	10 ms sine pulse, rated $V_{RRM}$ applied	150	
		10 ms sine pulse, no voltage reapplied	160	
Maximum $I^2t$ for fusing	$I^2t$	10 ms sine pulse, rated $V_{RRM}$ applied	112.5	$\text{A}^2\text{s}$
		10 ms sine pulse, no voltage reapplied	160	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	$t = 0.1$ to 10 ms, no voltage reapplied	1600	$\text{A}^2\sqrt{\text{s}}$

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

# 10ETF..PbF Soft Recovery Series

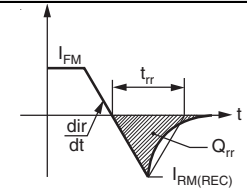


Vishay High Power Products

Fast Soft Recovery  
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ELECTRICAL SPECIFICATIONS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum forward voltage drop	$V_{FM}$	10 A, $T_J = 25^\circ\text{C}$		1.2	V
Forward slope resistance	$r_t$	$T_J = 150^\circ\text{C}$		23.5	$\text{m}\Omega$
Threshold voltage	$V_{F(TO)}$			0.85	V
Maximum reverse leakage current	$I_{RM}$	$T_J = 25^\circ\text{C}$	$V_R = \text{Rated } V_{RRM}$	0.1	mA
		$T_J = 150^\circ\text{C}$		3.0	

RECOVERY CHARACTERISTICS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Reverse recovery time	$t_{rr}$	$I_F$ at 10 Apk 25 A/ $\mu\text{s}$ $25^\circ\text{C}$	145	ns
Reverse recovery current	$I_{rr}$		2.75	A
Reverse recovery charge	$Q_{rr}$		0.32	$\mu\text{C}$
Snap factor	S		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	1.5	$^\circ\text{C/W}$
Maximum thermal resistance junction to ambient	$R_{thJA}$		62	
Typical thermal resistance, case to heatsink	$R_{thCS}$	Mounting surface, smooth and greased	0.5	
Approximate weight			2	g
			0.07	oz.
Mounting torque	minimum		6 (5)	kgf · cm (lbf · in)
	maximum		12 (10)	
Marking device		Case style TO-220AC (JEDEC)	10ETF06	



# 10ETF..PbF Soft Recovery Series

Fast Soft Recovery  
Rectifier Diode, 10 A

Vishay High Power Products

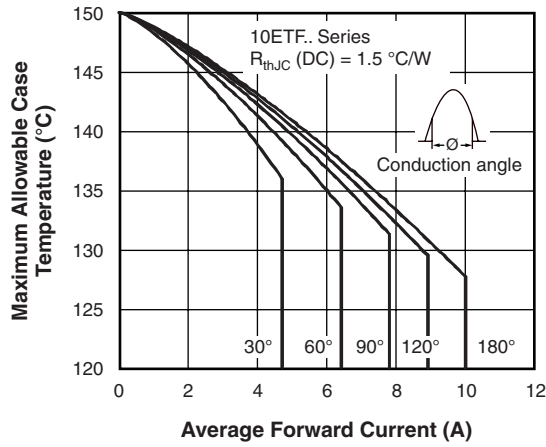


Fig. 1 - Current Rating Characteristics

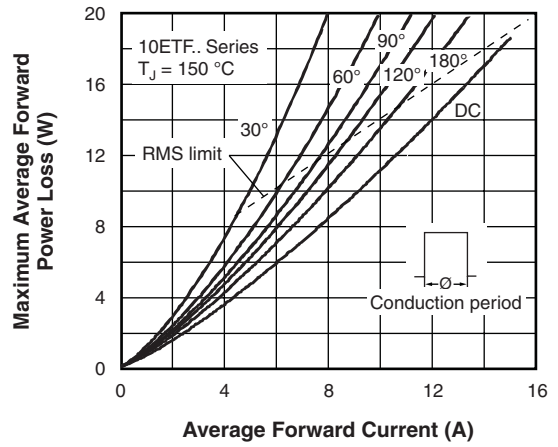


Fig. 4 - Forward Power Loss Characteristics

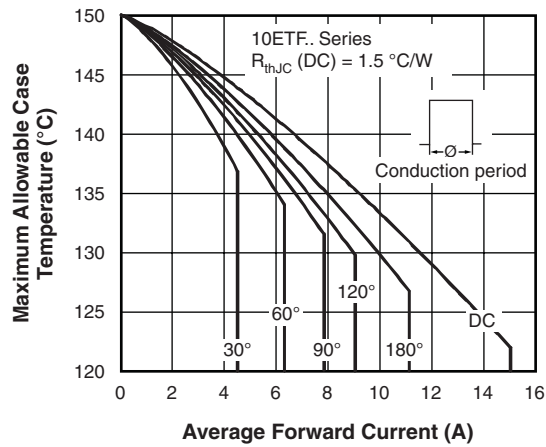


Fig. 2 - Current Rating Characteristics

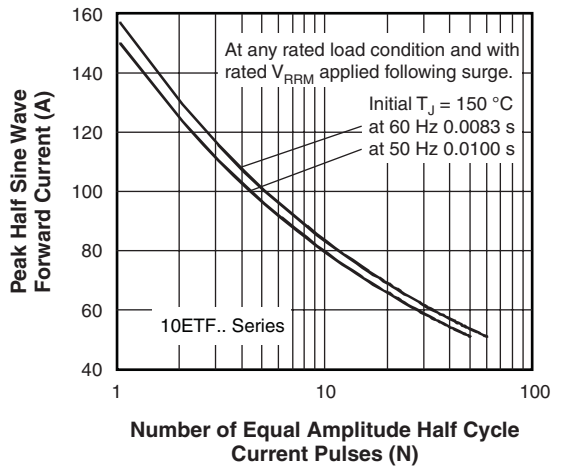


Fig. 5 - Maximum Non-Repetitive Surge Current

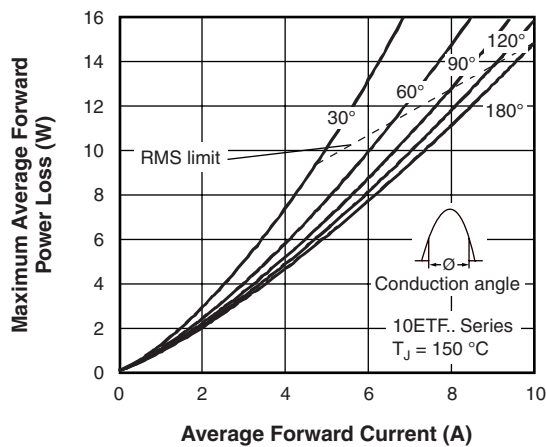


Fig. 3 - Forward Power Loss Characteristics

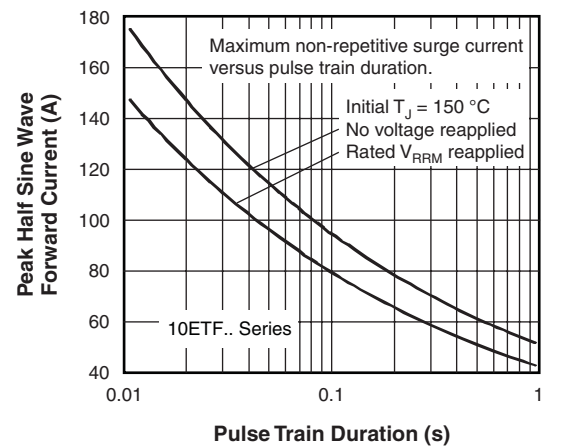


Fig. 6 - Maximum Non-Repetitive Surge Current

# 10ETF..PbF Soft Recovery Series



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Fast Soft Recovery Rectifier Diode, 10 A

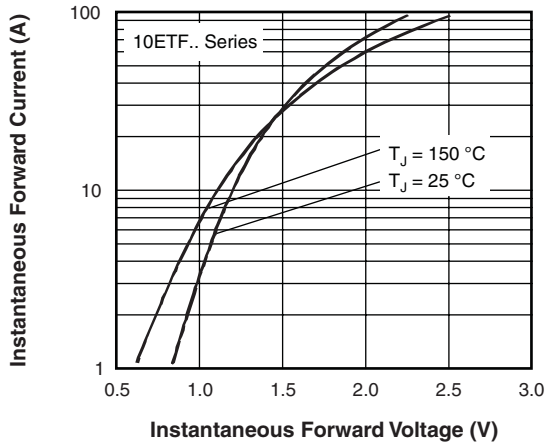


Fig. 7 - Forward Voltage Drop Characteristics

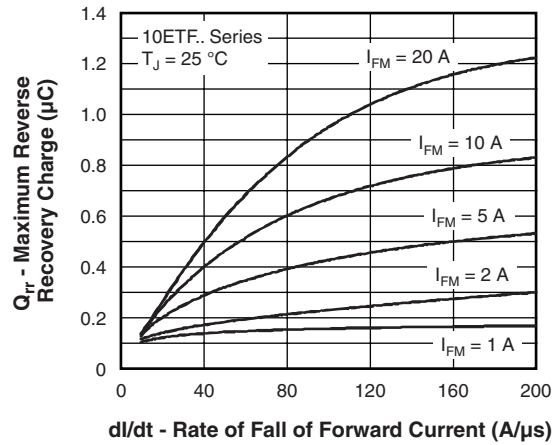


Fig. 10 - Recovery Charge Characteristics,  $T_J = 25\text{ }^\circ\text{C}$

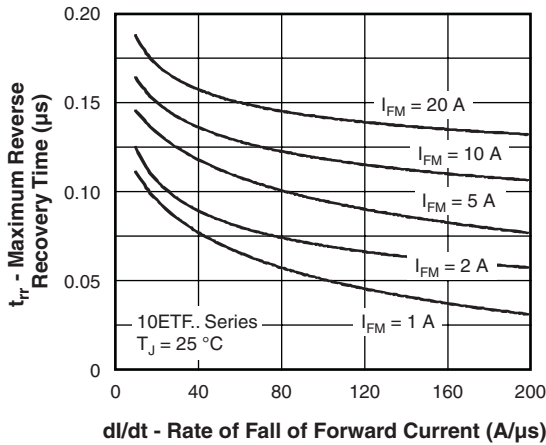


Fig. 8 - Recovery Time Characteristics,  $T_J = 25\text{ }^\circ\text{C}$

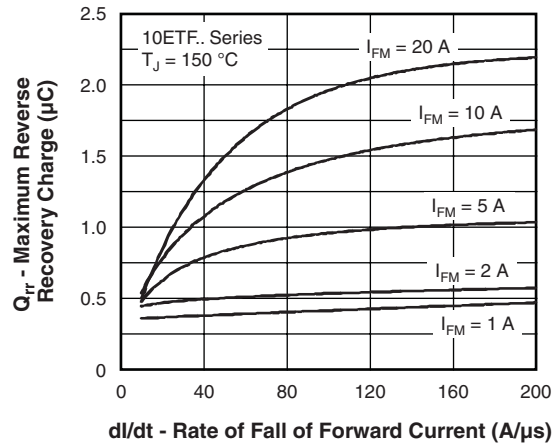


Fig. 11 - Recovery Charge Characteristics,  $T_J = 150\text{ }^\circ\text{C}$

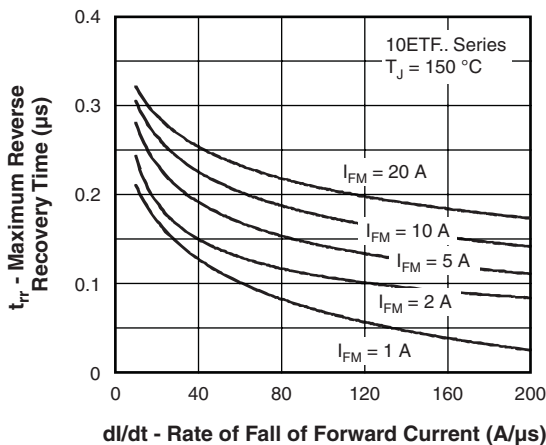


Fig. 9 - Recovery Time Characteristics,  $T_J = 150\text{ }^\circ\text{C}$

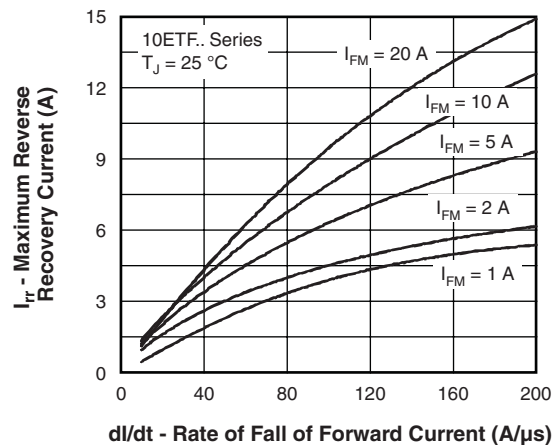


Fig. 12 - Recovery Current Characteristics,  $T_J = 25\text{ }^\circ\text{C}$



# 10ETF..PbF Soft Recovery Series

Fast Soft Recovery  
Rectifier Diode, 10 A

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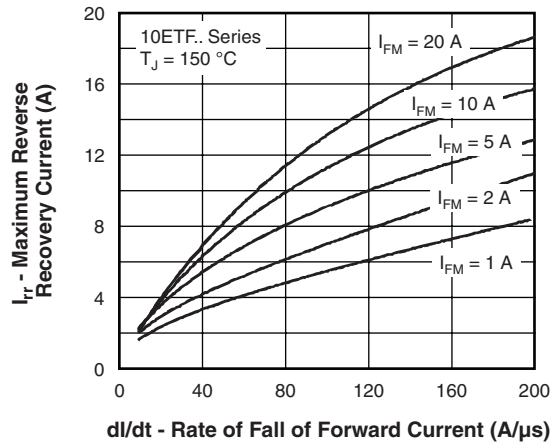


Fig. 13 - Recovery Current Characteristics,  $T_J = 150\text{ }^\circ\text{C}$

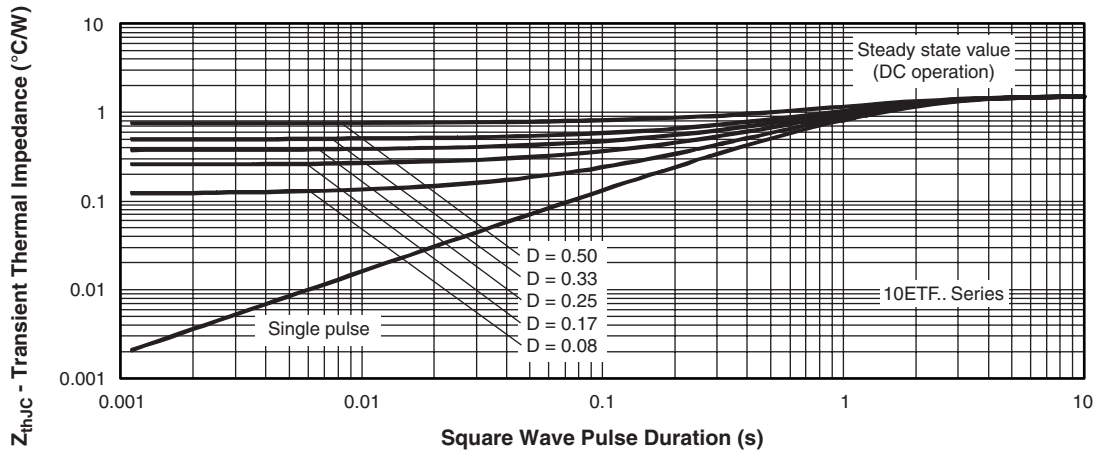


Fig. 14 - Thermal Impedance  $Z_{thJC}$  Characteristics

# 10ETF..PbF Soft Recovery Series



Vishay High Power Products

Fast Soft Recovery  
Rectifier Diode, 10 A

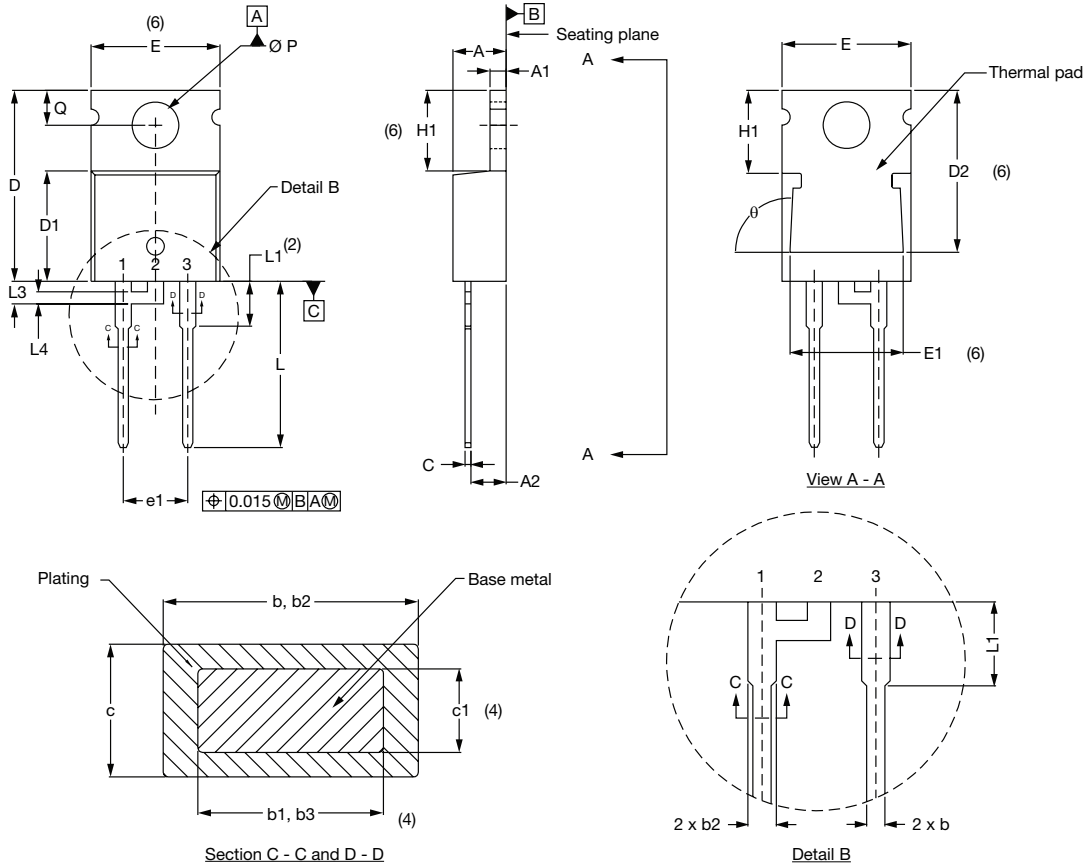
## ORDERING INFORMATION TABLE

Device code	10	E	T	F	06	PbF
	①	②	③	④	⑤	⑥
<b>1</b>	-	Current rating (10 = 10 A)				
<b>2</b>	-	Circuit configuration: E = Single diode				
<b>3</b>	-	Package: T = TO-220AC				
<b>4</b>	-	Type of silicon: F = Fast soft recovery rectifier				
<b>5</b>	-	Voltage code x 100 = $V_{RRM}$				
<b>6</b>	-	• None = Standard production • PbF = Lead (Pb)-free				

02 = 200 V  
04 = 400 V  
06 = 600 V

## TO-220AC

**DIMENSIONS** in millimeters and inches



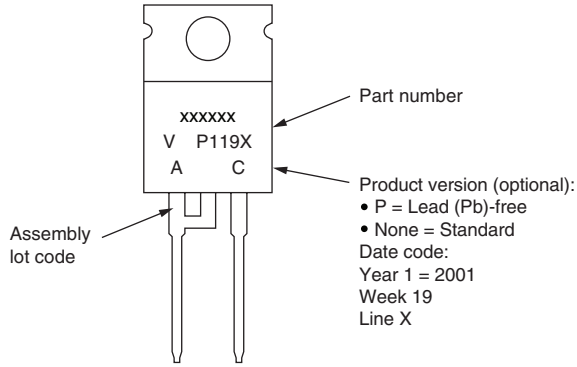
SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	3.56	4.82	0.140	0.190	
A1	0.51	1.40	0.020	0.055	
A2	2.04	2.92	0.080	0.115	
b	0.38	1.01	0.015	0.040	
b1	0.38	0.96	0.015	0.038	4
b2	1.15	1.77	0.045	0.070	
b3	1.15	1.73	0.045	0.068	4
c	0.36	0.61	0.014	0.024	
c1	0.36	0.56	0.014	0.022	4
D	14.22	15.87	0.560	0.625	3
D1	8.38	9.02	0.330	0.355	
D2	12.19	12.88	0.480	0.507	6
E	9.66	10.66	0.380	0.420	3, 6
E1	8.38	8.89	0.330	0.350	6
e	2.54 BSC		0.100 BSC		
e1	5.08 BSC		0.200 BSC		
H1	5.85	6.86	0.230	0.270	6
L	12.70	14.73	0.500	0.580	
L1	3.55	3.96	0.140	0.150	2
L3	1.78	2.13	0.070	0.084	
L4	0.76	1.27	0.030	0.050	
Ø P	3.54	3.73	0.139	0.147	
Q	2.54	3.05	0.100	0.120	
θ	90° to 93°		90° to 93°		

**Notes**

- (1) Dimensioning and tolerancing per ASME Y14.5M-1994
- (2) Lead dimension and finish uncontrolled in L1
- (3) 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 outermost extremes of the plastic body
- (4) Dimension b1, b3 and c1 apply to base metal only
- (5) Controlling dimensions: inches
- (6) Thermal pad contour optional within dimensions E, H1, D2 and E1
- (7) Outline conforms are derived from the actual package outline



### TO-220AC



Example: This is a xxxxxx with assembly lot code AC, assembled on WW 19, 2001 in the assembly line "X"





## Disclaimer

All product specifications and data are subject to change without notice.

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