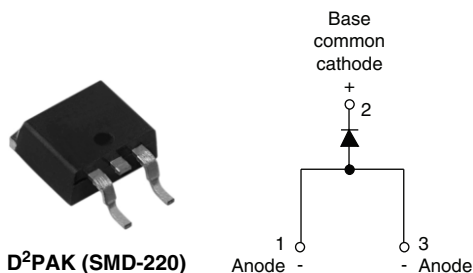


Fast Soft Recovery Rectifier Diode, 20 A



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/ μs	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° 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	A^2s
		10 ms sine pulse, no voltage reapplied	635	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	$t = 0.1\text{ ms to } 10\text{ ms}$, 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

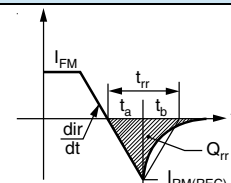
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ELECTRICAL SPECIFICATIONS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum forward voltage drop	V _{FM}	20 A, T _J = 25 °C		1.31	V
Forward slope resistance	r _t	T _J = 150 °C		11.88	mΩ
Threshold voltage	V _{F(TO)}			0.93	V
Maximum reverse leakage current	I _{RM}	T _J = 25 °C	V _R = Rated V _{RRM}	0.1	mA
		T _J = 150 °C		6	

RECOVERY CHARACTERISTICS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Reverse recovery time	t_{rr}	I_F at 20 Apk 25 A/ μs 25 $^{\circ}\text{C}$	400	ns
Reverse recovery current	I_{rr}		6.1	A
Reverse recovery charge	Q_{rr}		1.7	μC
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 ² PAK (SMD-220)	20ETF08S	
			20ETF10S	
			20ETF12S	

Note

⁽¹⁾ When mounted on 1" square (650 mm²) PCB of FR-4 or G-10 material 4 oz. (140 μm) copper 40 $^{\circ}\text{C/W}$
For recommended footprint and soldering techniques refer to application note #AN-994

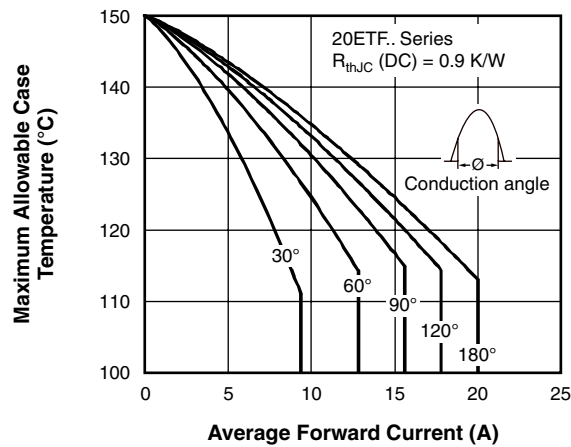


Fig. 1 - Current Rating Characteristics

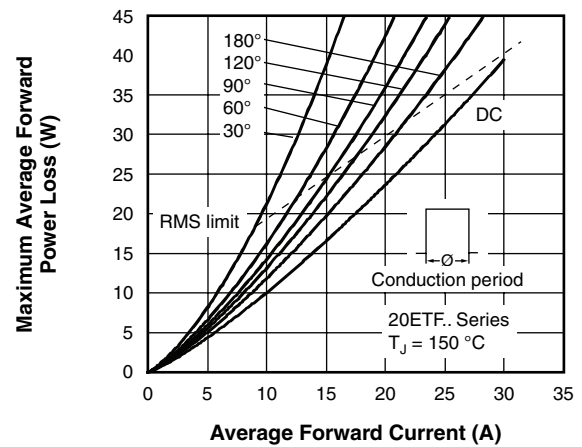


Fig. 4 - Forward Power Loss Characteristics

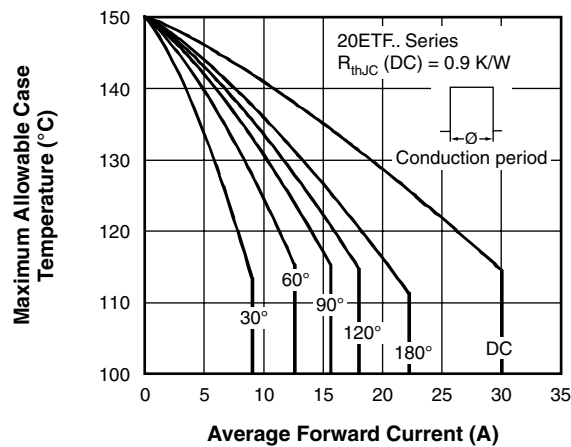


Fig. 2 - Current Rating Characteristics

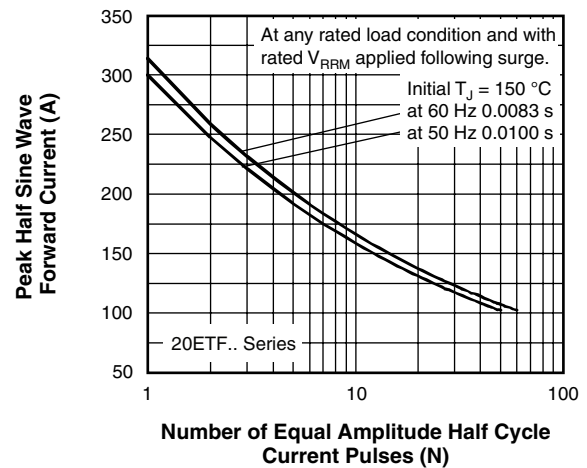


Fig. 5 - Maximum Non-Repetitive Surge Current

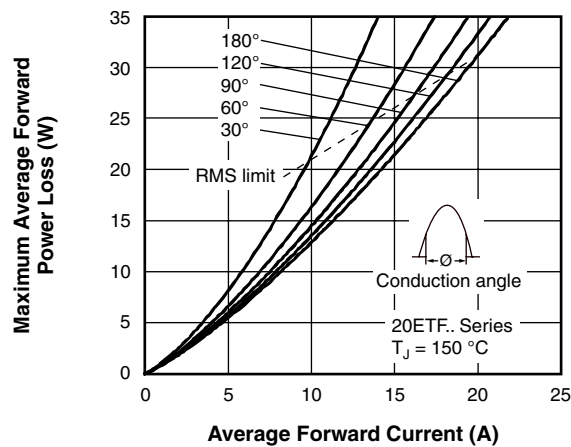


Fig. 3 - Forward Power Loss Characteristics

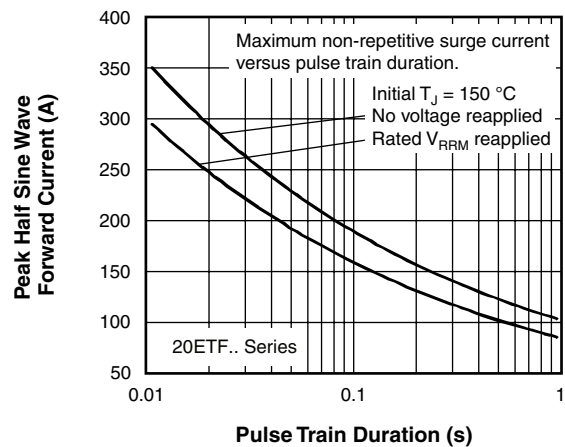


Fig. 6 - Maximum Non-Repetitive Surge Current

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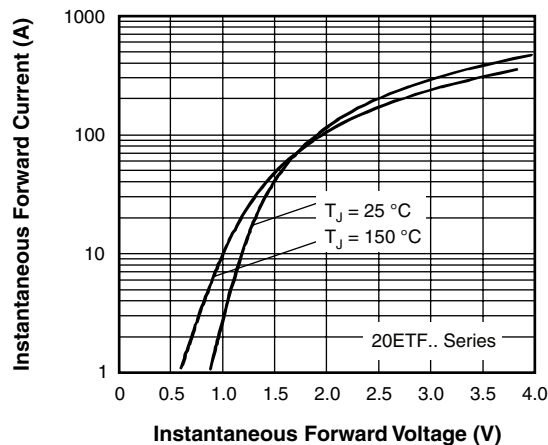


Fig. 7 - Forward Voltage Drop Characteristics

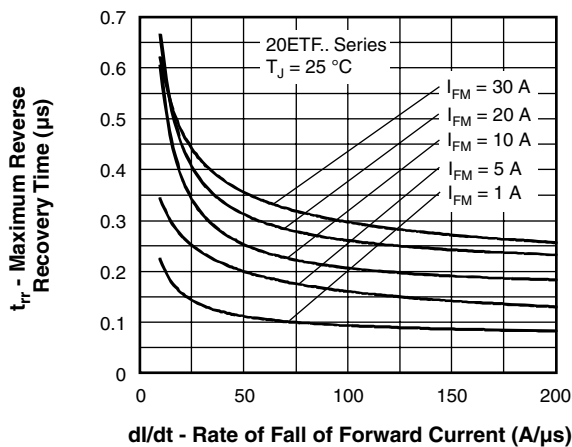


Fig. 8 - Recovery Time Characteristics, $T_J = 25\text{ °C}$

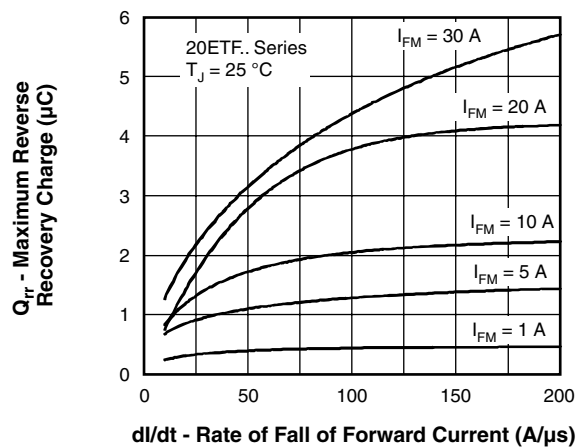


Fig. 10 - Recovery Charge Characteristics, $T_J = 25\text{ °C}$

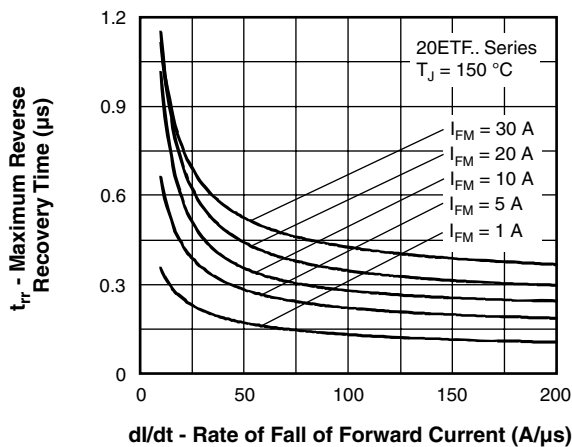


Fig. 9 - Recovery Time Characteristics, $T_J = 150\text{ °C}$

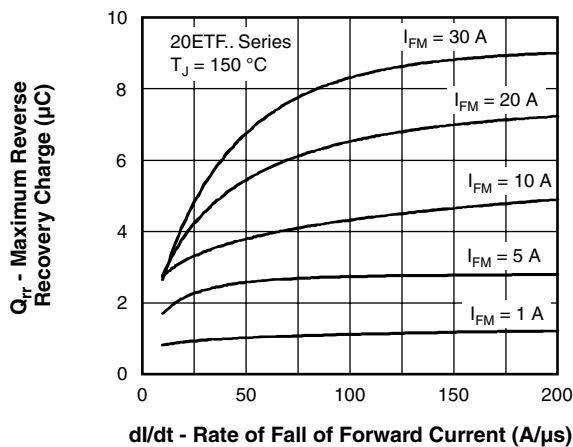


Fig. 11 - Recovery Charge Characteristics, $T_J = 150\text{ °C}$



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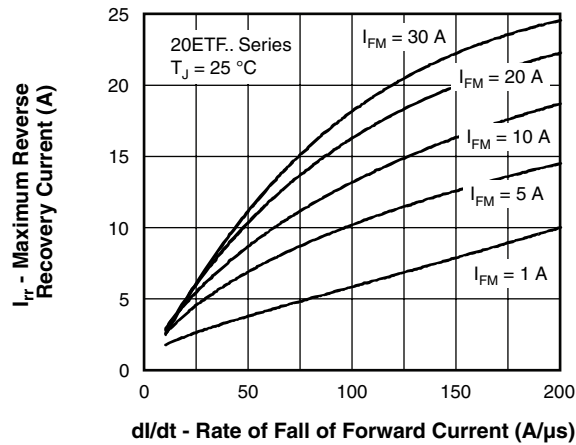


Fig. 12 - Recovery Current Characteristics, $T_J = 25\text{ }^{\circ}\text{C}$

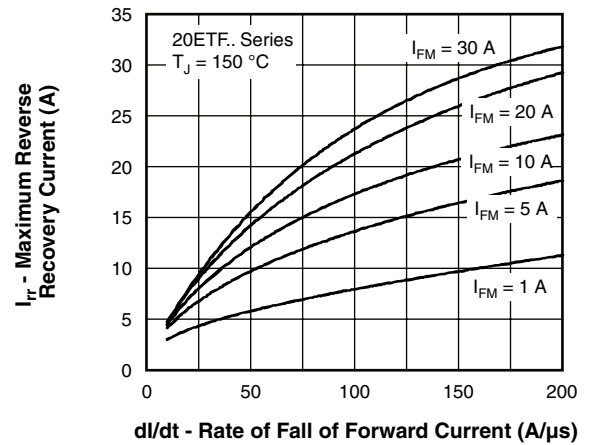


Fig. 13 - Recovery Current Characteristics, $T_J = 150\text{ }^{\circ}\text{C}$

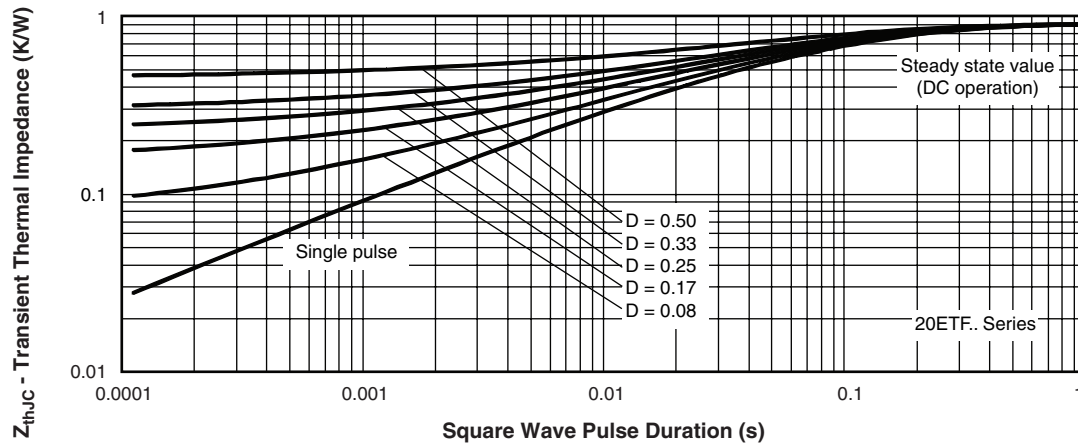


Fig. 14 - Thermal Impedance Z_{thJC} Characteristics

20ETF..SPbF Soft Recovery Series

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ORDERING INFORMATION TABLE

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

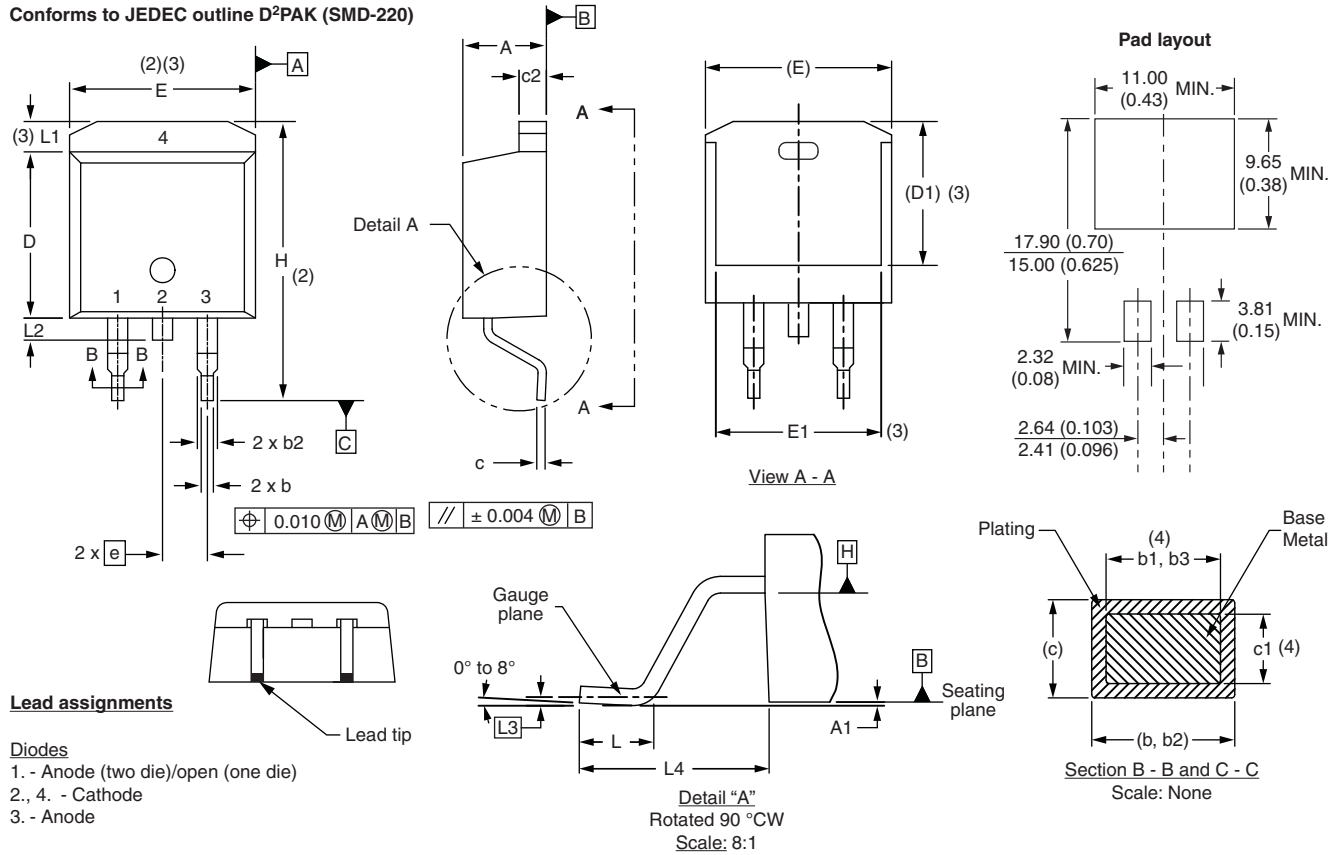
- | | | | |
|----------|---|--|-------------|
| 1 | - | Current rating (20 = 20 A) | |
| 2 | - | Circuit configuration: | |
| | | E = Single diode | |
| 3 | - | Package: | |
| | | T = D ² PAK (TO-220AC) | |
| 4 | - | Type of silicon: | |
| | | F = Fast soft recovery rectifier | |
| 5 | - | Voltage code x 100 = V _{RRM} | 08 = 800 V |
| 6 | - | S = Surface mountable | 10 = 1000 V |
| 7 | - | • None = Tape | 12 = 1200 V |
| | | • TRR = Tape and reel (right oriented) | |
| | | • TRL = Tape and reel (left oriented) | |
| 8 | - | • None = Standard production | |
| | | • PbF = Lead (Pb)-free | |

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95046
Part marking information	www.vishay.com/doc?95054
Packaging information	www.vishay.com/doc?95032

D²PAK

DIMENSIONS in millimeters and inches

Conforms to JEDEC outline D²PAK (SMD-220)



SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	0.160	0.190	
A1	0.00	0.254	0.000	0.010	
b	0.51	0.99	0.020	0.039	
b1	0.51	0.89	0.020	0.035	4
b2	1.14	1.78	0.045	0.070	
b3	1.14	1.73	0.045	0.068	4
c	0.38	0.74	0.015	0.029	
c1	0.38	0.58	0.015	0.023	4
c2	1.14	1.65	0.045	0.065	
D	8.51	9.65	0.335	0.380	2

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
D1	6.86	8.00	0.270	0.315	3
E	9.65	10.67	0.380	0.420	2, 3
E1	7.90	8.80	0.311	0.346	3
e	2.54 BSC		0.100 BSC		
H	14.61	15.88	0.575	0.625	
L	1.78	2.79	0.070	0.110	
L1	-	1.65	-	0.066	3
L2	1.27	1.78	0.050	0.070	
L3	0.25 BSC		0.010 BSC		
L4	4.78	5.28	0.188	0.208	

Notes

- (1) Dimensioning and tolerancing per ASME Y14.5 M-1994
- (2) 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
- (3) Thermal pad contour optional within dimension E, L1, D1 and E1
- (4) Dimension b1 and c1 apply to base metal only
- (5) Datum A and B to be determined at datum plane H
- (6) Controlling dimension: inch
- (7) Outline conforms to JEDEC outline TO-263AB



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