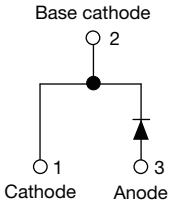
VS-90EPF12L-M3, VS-90APF12L-M3

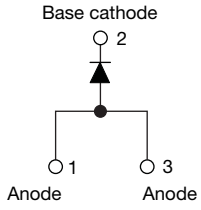
Fast Soft Recovery Rectifier Diode, 90 A

TO-247AD 2L

TO-247AD 3L



VS-90EPF12L-M3



VS-90APF12L-M3

FEATURES

- Glass passivated pellet chip junction
- Low forward voltage drop and short reverse recovery time
- Designed and qualified according to JEDEC®-JESD 47
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT
HALOGEN FREE

APPLICATIONS

These devices are intended for use in output rectification and freewheeling in inverters, choppers and converters as well as in input rectification where severe restrictions on conducted EMI should be met.

DESCRIPTION

The VS-90EPF12L-M3, VS-90APF12L-M3 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.

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	90 A
V_R	1200 V
V_F at I_F	1.38 V
I_{FSM}	1000 A
t_{rr}	90 ns
T_J max.	150 °C
Package	TO-247AD 2L, TO-247AD 3L
Circuit configuration	Single
Snap factor	0.5

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	TEST CONDITIONS	VALUES	UNITS
V_{RRM}		1200	V
$I_{F(AV)}$	Sinusoidal waveform	90	A
I_{FSM}		100	
t_{rr}	1 A, - 100 A/µs	90	ns
V_F	40 A, T_J = 25 °C	1.2	V
T_J		-40 to +150	°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 °C mA
VS-90EPF12L-M3	1200	1300	17
VS-90APF12L-M3	1200	1300	17

ABSOLUTE MAXIMUM RATINGS

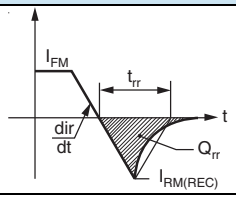
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current	$I_{F(AV)}$	T_C = 106 °C, 180° conduction half sine wave	90	A
Maximum peak one cycle non-repetitive surge current	I_{FSM}	10 ms sine pulse, rated V_{RRM} applied	850	A
		10 ms sine pulse, no voltage reapplied	1000	A
Maximum I^2t for fusing	I^2t	10 ms sine pulse, rated V_{RRM} applied	3610	A^2s
		10 ms sine pulse, no voltage reapplied	5100	A^2s
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 ms to 10 ms, no voltage reapplied	51 000	$A^2\sqrt{s}$

ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum forward voltage drop	V_{FM}	90 A, T_J = 25 °C		1.38	V
Forward slope resistance	r_t	T_J = 150 °C		4.03	mΩ
Threshold voltage	$V_{F(TO)}$			0.87	V
Maximum reverse leakage current	I_{RM}	T_J = 25 °C	V_R = Rated V_{RRM}	0.1	mA
		T_J = 150 °C		17	

RECOVERY CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Reverse recovery time	t_{rr}	I_F at 80 A_{pk} 25 A/µs 25 °C	480	ns
Reverse recovery current	I_{rr}		7.1	A
Reverse recovery charge	Q_{rr}		2.1	µC
Snap factor	S		0.5	



THERMAL - MECHANICAL SPECIFICATIONS

PARAMETER		SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction and storage temperature range		T_J, T_{Stg}		-40 to +150	°C
Maximum thermal resistance, junction to case		R_{thJC}	DC operation	0.2	°C/W
Maximum thermal resistance, junction to ambient		R_{thJA}		40	
Typical thermal resistance, case to heatsink		R_{thCS}	Mounting surface, smooth and greased	0.25	
Approximate weight				6	g
				0.21	oz.
Mounting torque	minimum			6 (5)	kgf · cm (lbf · in)
	maximum			12 (10)	
Marking device			Case style TO-247AD 2L	90EPF12L	
			Case style TO-247AD 3L	90APF12L	

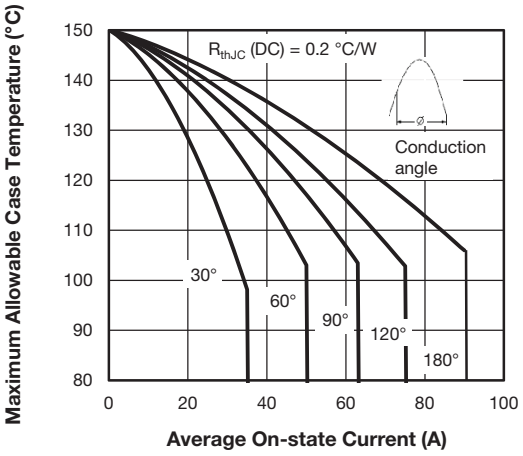


Fig. 1 - Current Rating Characteristics

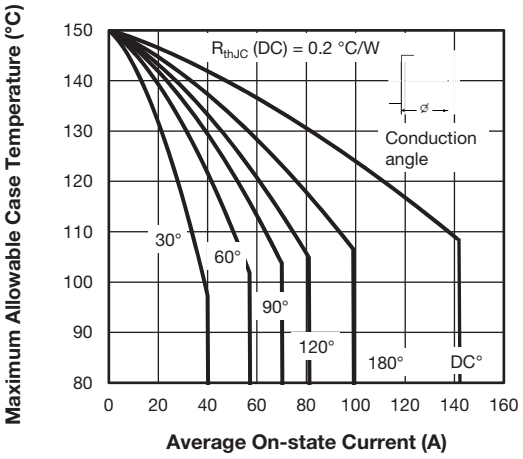


Fig. 2 - Current Rating Characteristics

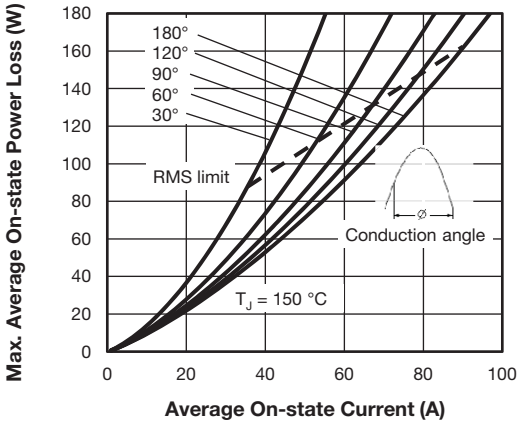


Fig. 3 - Forward Power Loss Characteristics

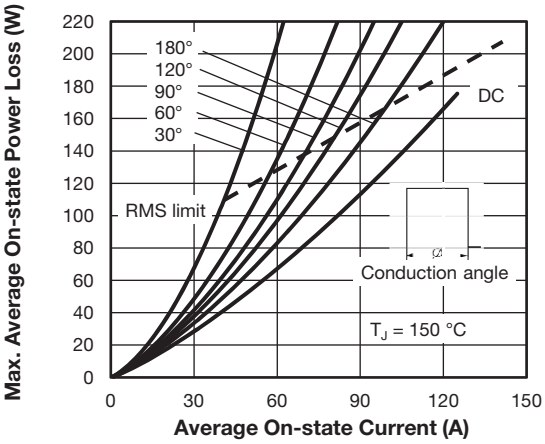


Fig. 4 - Forward Power Loss Characteristics

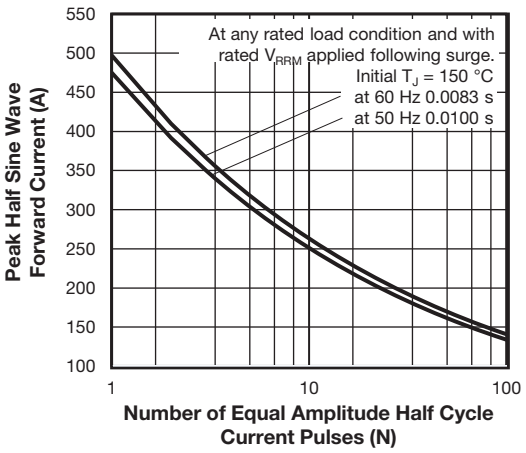


Fig. 5 - Maximum Non-Repetitive Surge Current

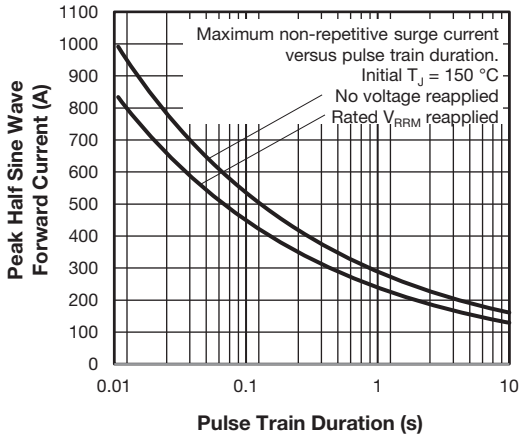


Fig. 6 - Maximum Non-Repetitive Surge Current

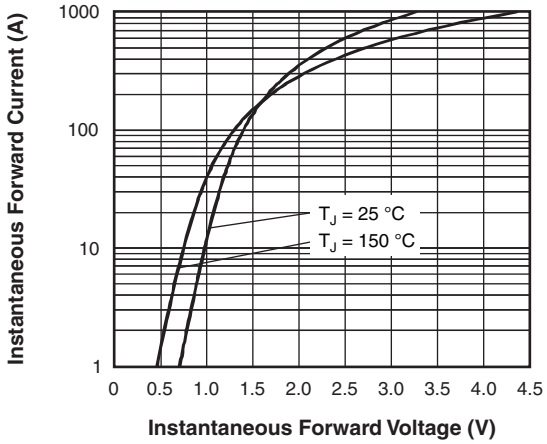


Fig. 7 - Forward Voltage Drop Characteristics

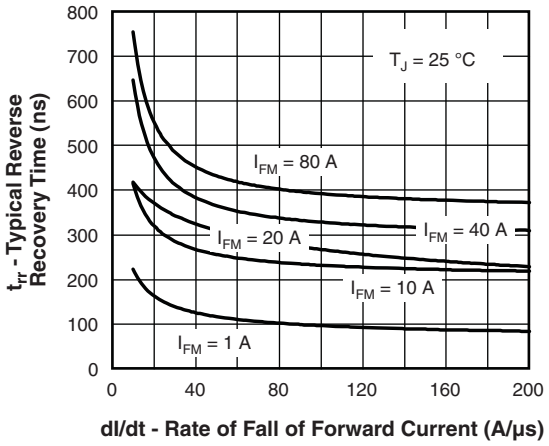


Fig. 8 - Recovery Time Characteristics, T_J = 25 °C

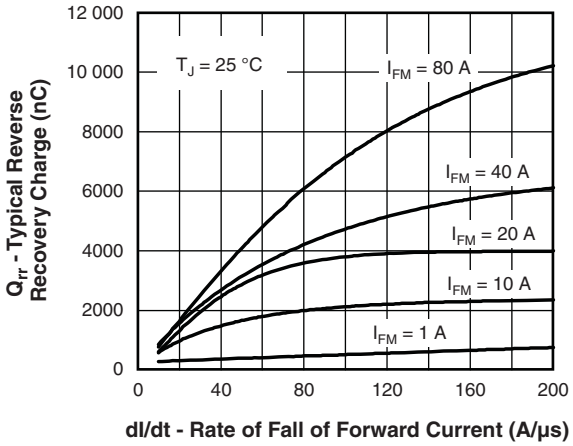


Fig. 10 - Recovery Charge Characteristics, T_J = 25 °C

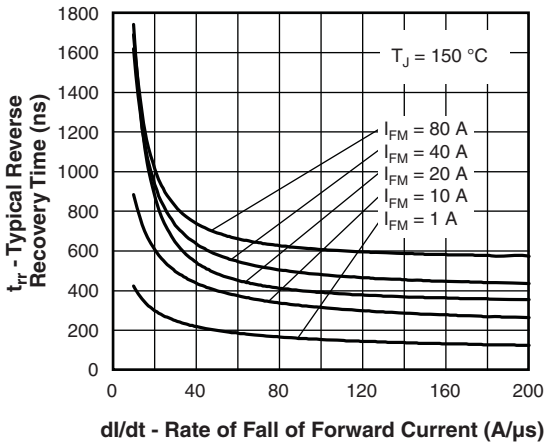


Fig. 9 - Recovery Time Characteristics, T_J = 150 °C

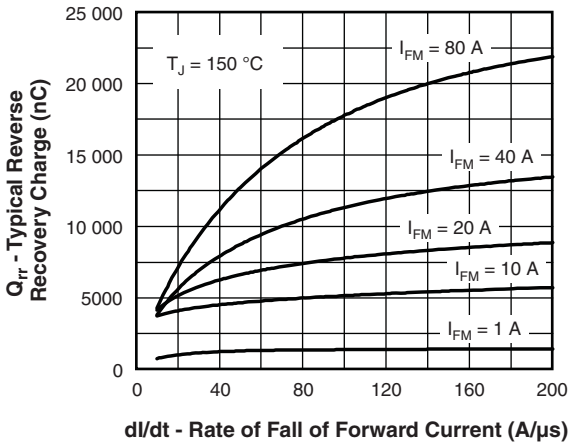


Fig. 11 - Recovery Charge Characteristics, T_J = 150 °C

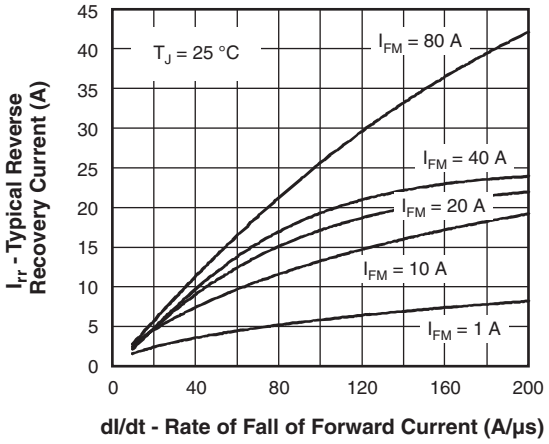


Fig. 12 - Recovery Current Characteristics, T_J = 25 °C

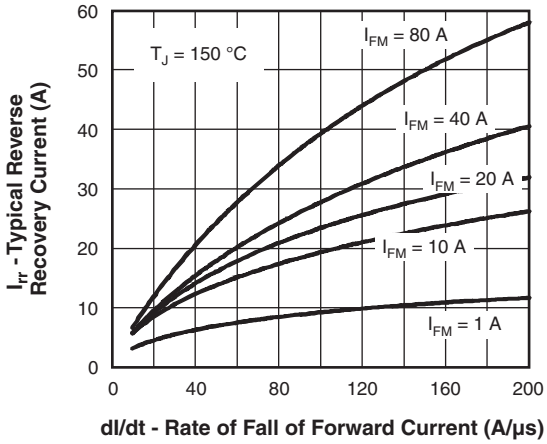


Fig. 13 - Recovery Current Characteristics, T_J = 150 °C

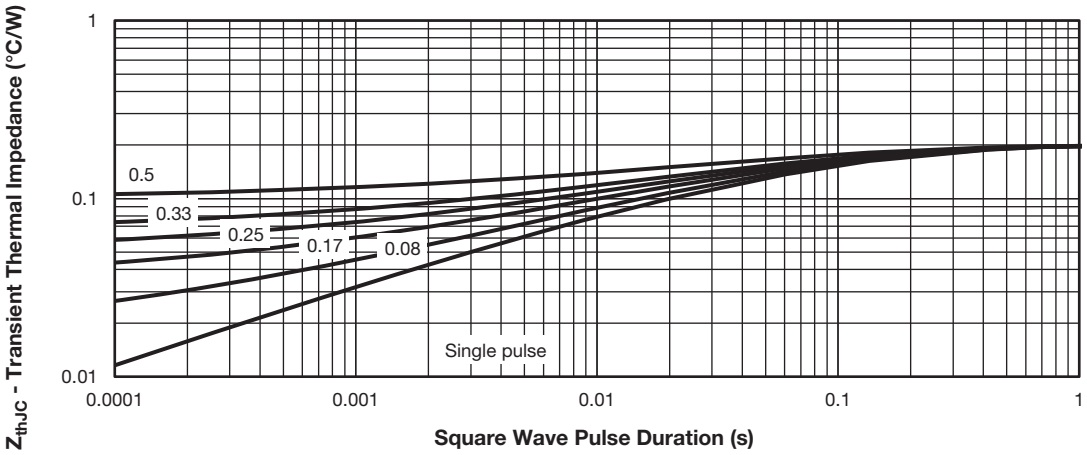
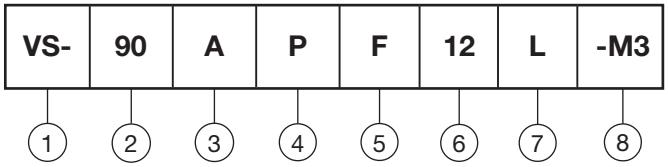


Fig. 14 - Thermal Impedance Z_{thJC} Characteristics

ORDERING INFORMATION TABLE

Device code



1 - Vishay Semiconductors product

2 - Current rating (90 = 90 A)

3 - Circuit configuration:
E = single, 2 pins
A = single, 3 pins

4 - Package:
P = TO-247AD

5 - Type of silicon:
F = fast recovery

6 - Voltage code x 100 = V_{RRM} — 12 = 1200 V

7 - L = long lead

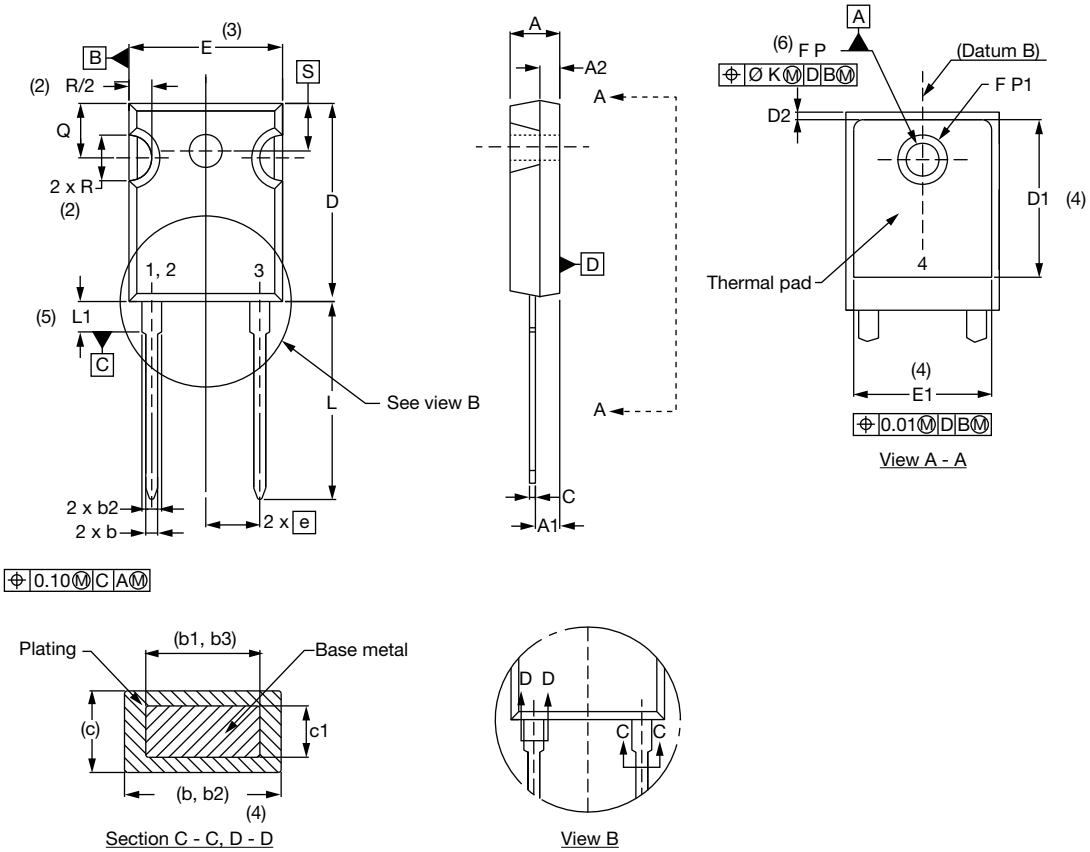
8 - Environmental digit:
- -M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

ORDERING INFORMATION (Example)			
PREFERRED P/N	**QUANTITY PER TUBES**	**MINIMUM ORDER QUANTITY**	**PACKAGING DESCRIPTION**
VS-90EPF12L-M3	25	500	Antistatic plastic tubes
VS-90APF12L-M3	25	500	Antistatic plastic tubes

LINKS TO RELATED DOCUMENTS		
Dimensions	TO-247AD 2L	www.vishay.com/doc?95536
	TO-247AD 3L	www.vishay.com/doc?95626
Part marking information	TO-247AD 2L	www.vishay.com/doc?95648
	TO-247AD 3L	www.vishay.com/doc?95007

TO-247AD 2L

DIMENSIONS in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.65	5.31	0.183	0.209	
A1	2.21	2.59	0.087	0.102	
A2	1.50	2.49	0.059	0.098	
b	0.99	1.40	0.039	0.055	
b1	0.99	1.35	0.039	0.053	
b2	1.65	2.39	0.065	0.094	
b3	1.65	2.34	0.065	0.092	
c	0.38	0.89	0.015	0.035	
c1	0.38	0.84	0.015	0.033	
D	19.71	20.70	0.776	0.815	3
D1	13.08	-	0.515	-	4
D2	0.51	1.35	0.020	0.053	

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
E	15.29	15.87	0.602	0.625	3
E1	13.46	-	0.53	-	
e	5.46 BSC		0.215 BSC		
Ø K	0.254		0.010		
L	19.81	20.32	0.780	0.800	
L1	3.71	4.29	0.146	0.169	
Ø P	3.56	3.66	0.14	0.144	
Ø P1	-	6.98	-	0.275	
Q	5.31	5.69	0.209	0.224	
R	4.52	5.49	0.178	0.216	
S	5.51 BSC		0.217 BSC		

Notes

(1) Dimensioning and tolerancing per ASME Y14.5M-1994

(2) Contour of slot optional

(3) Dimension D and E do not include mold flash. These dimensions are measured at the outermost extremes of the plastic body

(4) Thermal pad contour optional with dimensions D1 and E1

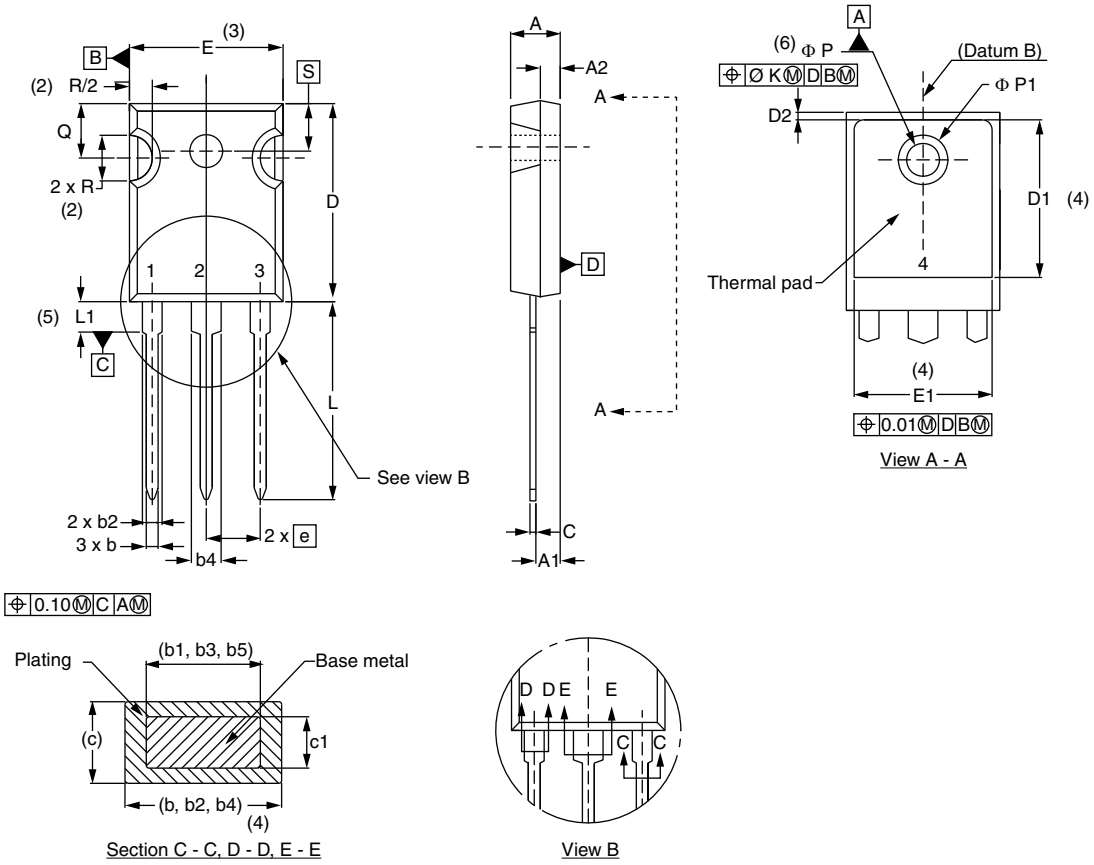
(5) Lead finish uncontrolled in L1

(6) Ø P to have a maximum draft angle of 1.5 to the top of the part with a maximum hole diameter of 3.91 mm (0.154")

(7) Outline conforms to JEDEC® outline TO-247 with exception of dimension A min., D, E min., Q min., S, and note 4

TO-247AD 3L

DIMENSIONS in millimeters and inches



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b3	1.65	2.34	0.065	0.092	
b4	2.59	3.43	0.102	0.135	
b5	2.59	3.38	0.102	0.133	
c	0.38	0.89	0.015	0.035	
c1	0.38	0.84	0.015	0.033	
D	19.71	20.70	0.776	0.815	3
D1	13.08	-	0.515	-	4

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
D2	0.51	1.30	0.020	0.051	
E	15.29	15.87	0.602	0.625	3
E1	13.46	-	0.53	-	
e	5.46 BSC		0.215 BSC		
Ø K	0.254		0.010		
L	19.81	20.32	0.780	0.800	
L1	3.71	4.29	0.146	0.169	
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