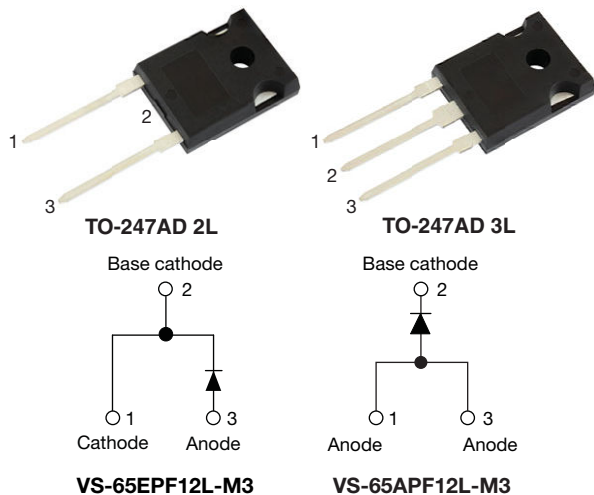


## Fast Soft Recovery Rectifier Diode, 65 A



### FEATURES

- Very low forward voltage drop and short reverse recovery time
- Glass passivated pellet chip junction
- Designed and qualified according to JEDEC®-JESD 47
- Flexible solution for reliable AC power rectification
- High surge, low  $V_F$  rugged blocking diode for DC charging stations
- AEC-Q101 qualified P/N available (VS-65EPF12LHM3, VS-65APF12LHM3)
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://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-65EPF12L-M3, VS-65APF12L-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

$I_{F(AV)}$	65 A
$V_R$	1200 V
$V_F$ at $I_F$	1.42 V
$I_{FSM}$	830 A
$t_{rr}$	95 ns
$T_J$ max.	150 °C
Package	TO-247AD 2L, TO-247AD 3L
Circuit configuration	Single
Snap factor	0.6

### MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Sinusoidal waveform	65	A
$V_{RRM}$		1200	V
$I_{FSM}$		830	A
$t_{rr}$	1 A, 100 A/μs	95	ns
$V_F$	30 A, $T_J = 25$ °C	1.20	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-65EPF12L-M3	1200	1300	16
VS-65APF12L-M3	1200	1300	

**ABSOLUTE MAXIMUM RATINGS**

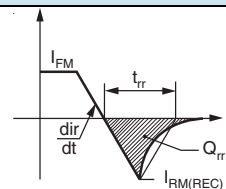
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current	$I_{F(AV)}$	$T_C = 113\text{ }^{\circ}\text{C}$ , 180° conduction half sine wave	65	A
Maximum peak one cycle non-repetitive surge current	$I_{FSM}$	10 ms sine pulse, rated $V_{RRM}$ applied	700	
		10 ms sine pulse, no voltage reapplied	830	
Maximum $I^2t$ for fusing	$I^2t$	10 ms sine pulse, rated $V_{RRM}$ applied	2450	$\text{A}^2\text{s}$
		10 ms sine pulse, no voltage reapplied	3460	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	$t = 0.1\text{ ms to }10\text{ ms}$ , no voltage reapplied	34 600	$\text{A}^2\sqrt{\text{s}}$

**ELECTRICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum forward voltage drop	$V_{FM}$	65 A, $T_J = 25\text{ }^{\circ}\text{C}$	1.42	V
Forward slope resistance	$r_t$	$T_J = 150\text{ }^{\circ}\text{C}$	4.6	$\text{m}\Omega$
Threshold voltage	$V_{F(TO)}$		0.9	V
Maximum reverse leakage current	$I_{RM}$	$T_J = 25\text{ }^{\circ}\text{C}$	0.1	mA
		$T_J = 150\text{ }^{\circ}\text{C}$	16	

**RECOVERY CHARACTERISTICS**

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Reverse recovery time	$t_{rr}$	$I_F$ at 60 A <sub>pk</sub> 25 A/ $\mu\text{s}$ 25 $^{\circ}\text{C}$	480	ns
Reverse recovery current	$I_{rr}$		8	A
Reverse recovery charge	$Q_{rr}$		2.7	$\mu\text{C}$
Snap factor	S	Typical	0.6	

**THERMAL - MECHANICAL SPECIFICATIONS**

THERMAL MECHANICAL CHARACTERISTICS					
PARAMETER		SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction and storage temperature range		T <sub>J</sub> , T <sub>Stg</sub>		-40 to +150	°C
Maximum thermal resistance, junction to case		R <sub>thJC</sub>	DC operation	0.25	°C/W
Maximum thermal resistance, junction to ambient		R <sub>thJA</sub>		40	
Typical thermal resistance, case to heatsink		R <sub>thCS</sub>	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	65EPF12L	
			Case style TO-247AD 3L	65APF12L	

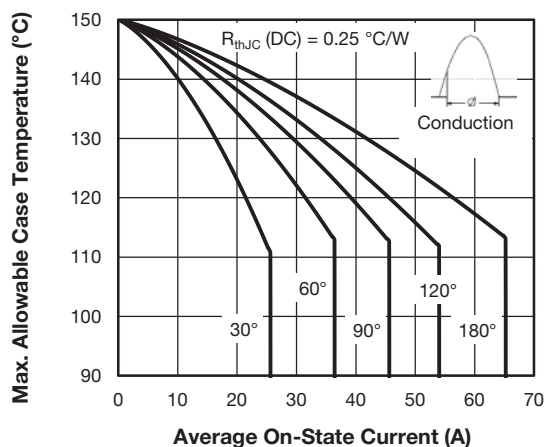


Fig. 1 - Current Rating Characteristics

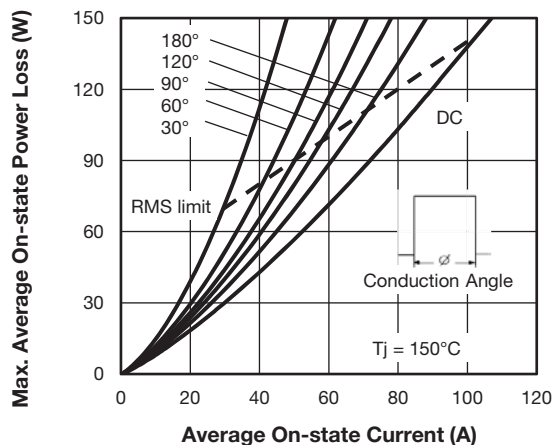


Fig. 4 - Forward Power Loss Characteristics

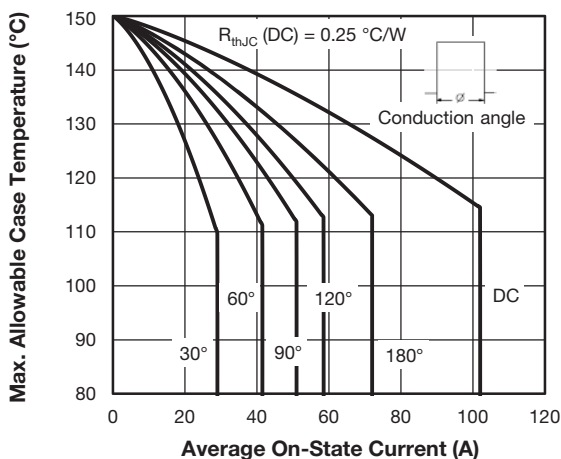


Fig. 2 - Current Rating Characteristics

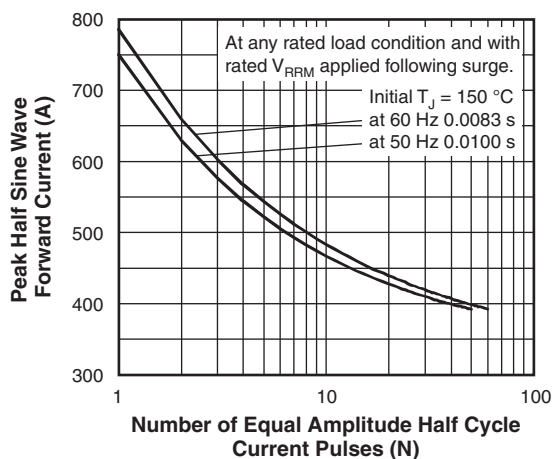


Fig. 5 - Maximum Non-Repetitive Surge Current

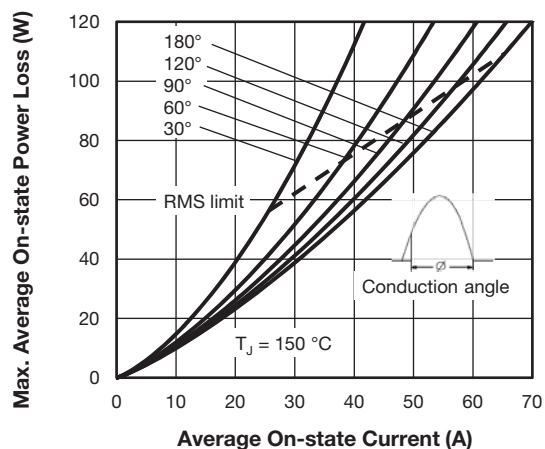


Fig. 3 - Forward Power Loss Characteristics

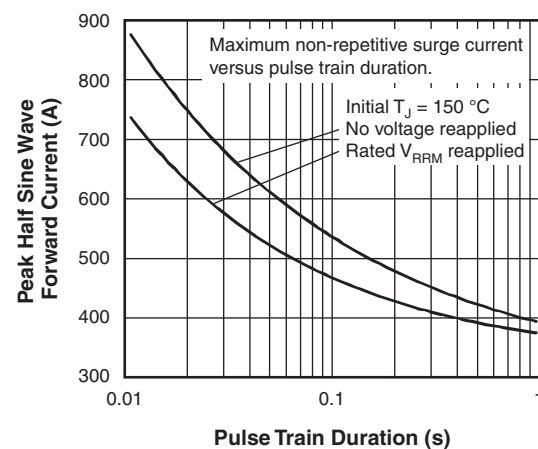


Fig. 6 - Maximum Non-Repetitive Surge Current

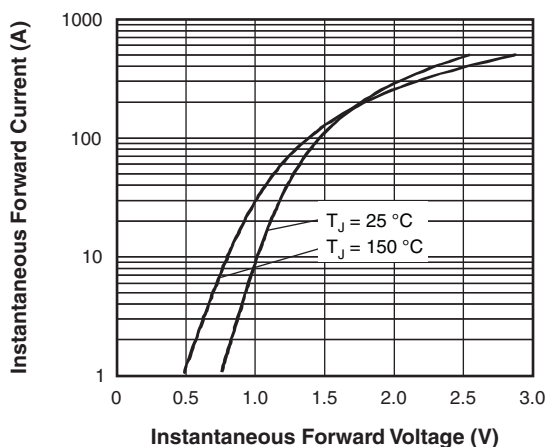
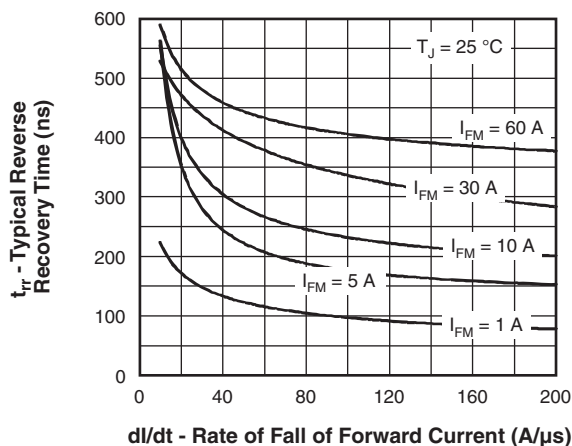
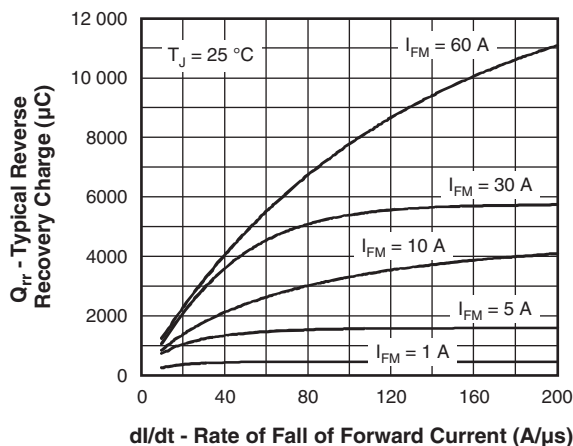
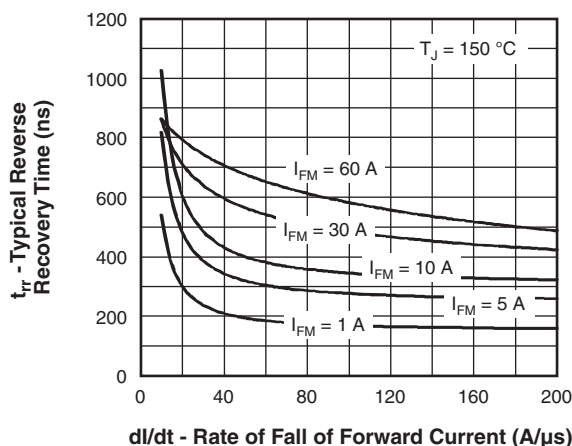
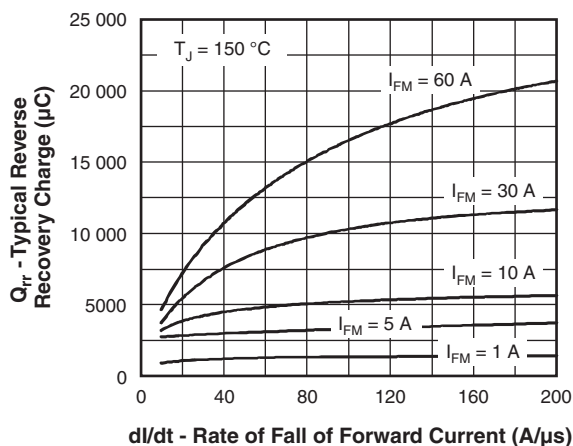


Fig. 7 - Forward Voltage Drop Characteristics


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

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

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

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

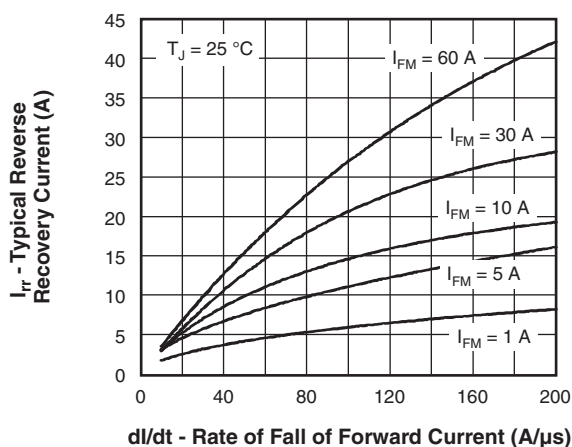


Fig. 12 - Recovery Current Characteristics,  $T_J = 25\text{ }^{\circ}\text{C}$

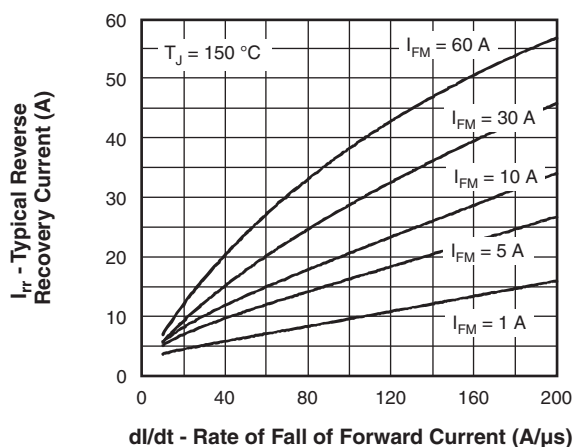


Fig. 13 - Recovery Current Characteristics,  $T_J = 150\text{ }^{\circ}\text{C}$

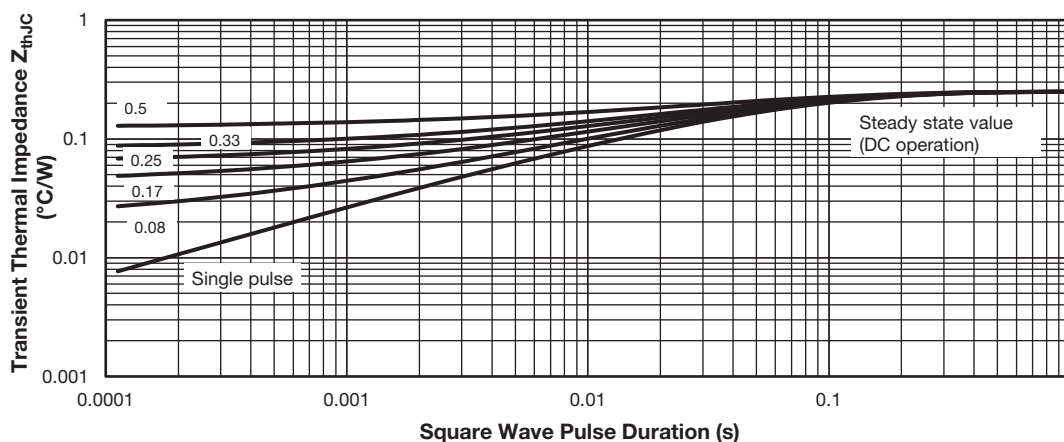


Fig. 14 - Thermal Impedance  $Z_{thJC}$  Characteristics

**ORDERING INFORMATION TABLE**

Device code

<b>VS-</b>	<b>65</b>	<b>E</b>	<b>P</b>	<b>F</b>	<b>12</b>	<b>L</b>	<b>-M3</b>
1	2	3	4	5	6	7	8

- 1** - Vishay Semiconductors product
- 2** - Current rating (65 = 65 A)
- 3** - Circuit configuration:
  - E = single, 2 pins
  - A = single, 3 pins
- 4** - Package:
  - P = TO-247AD
- 5** - Type of silicon:
  - F = fast recovery rectifier
- 6** - Voltage code  $\times 100 = V_{RRM}$  ——— **12 = 1200 V**
- 7** - L = long leads
- 8** - Environmental digit:
  - -M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

<b>ORDERING INFORMATION</b> (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-65EPF12L-M3	25	500	Antistatic plastic tubes
VS-65APF12L-M3	25	500	Antistatic plastic tubes

<b>LINKS TO RELATED DOCUMENTS</b>		
Dimensions	TO-247AD 2L	<a href="http://www.vishay.com/doc?95536">www.vishay.com/doc?95536</a>
	TO-247AD 3L	<a href="http://www.vishay.com/doc?95626">www.vishay.com/doc?95626</a>
Part marking information	TO-247AD 2L	<a href="http://www.vishay.com/doc?95648">www.vishay.com/doc?95648</a>
	TO-247AD 3L	<a href="http://www.vishay.com/doc?95007">www.vishay.com/doc?95007</a>



### 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	

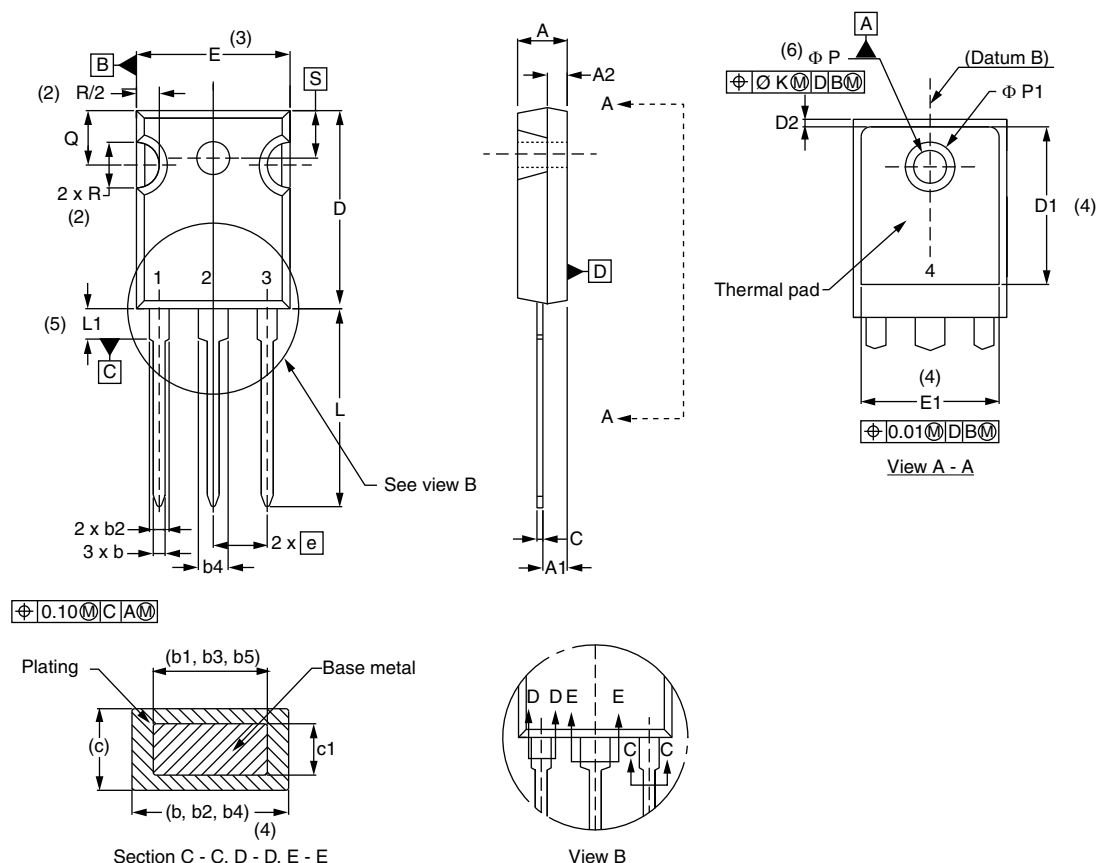
SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
E	15.29	15.87	0.602	0.625	3
E1	13.46	-	0.53	-	
e	5.46 BSC		0.215 BSC		
$\phi K$	0.254		0.010		
L	19.81	20.32	0.780	0.800	
L1	3.71	4.29	0.146	0.169	
$\phi P$	3.56	3.66	0.14	0.144	
$\phi P1$	-	6.98	-	0.275	
Q	5.31	5.69	0.209	0.224	
R	4.52	5.49	0.178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

#### Notes

- Dimensioning and tolerancing per ASME Y14.5M-1994
- Contour of slot optional
- Dimension D and E do not include mold flash. These dimensions are measured at the outermost extremes of the plastic body
- Thermal pad contour optional with dimensions D1 and E1
- Lead finish uncontrolled in L1
- $\phi P$  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")
- 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



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	
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

## 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





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