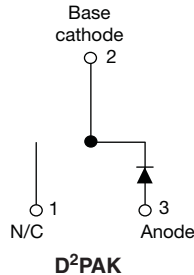


Hyperfast Rectifier, 15 A FRED Pt®



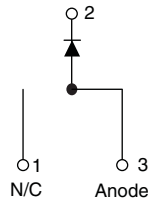
VS-ETH1506S-M3



D²PAK



VS-ETH1506-1-M3



TO-262

FEATURES

- Hyperfast recovery time
- Low forward voltage drop
- 175 °C operating junction temperature
- Low leakage current
- Compliant to RoHS Directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition
- Designed and qualified according to JEDEC-JESD47



RoHS
COMPLIANT
HALOGEN
FREE

DESCRIPTION/APPLICATIONS

Hyperfast recovery rectifiers designed with optimized performance of forward voltage drop, hyperfast recovery time, and soft recovery.

The planar structure and the platinum doped life time control guarantee the best overall performance, ruggedness and reliability characteristics.

These devices are intended for use in PFC Boost stage in the AC/DC section of SMPS, inverters or as freewheeling diodes.

The extremely optimized stored charge and low recovery current minimize the switching losses and reduce over dissipation in the switching element and snubbers.

PRODUCT SUMMARY

Package	TO-263AB (D ² PAK), TO-262AA
I _{F(AV)}	15 A
V _R	600 V
V _F at I _F	2.45 V
t _{rr} (typ.)	21 ns
T _J max.	175 °C
Diode variation	Single die

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Repetitive peak reverse voltage	V _{RRM}		600	V
Average rectified forward current	I _{F(AV)}	T _C = 139 °C	15	A
Non-repetitive peak surge current	I _{FSM}	T _C = 25 °C	160	
Operating junction and storage temperatures	T _J , T _{Stg}		- 65 to 175	°C

ELECTRICAL SPECIFICATIONS (T_J = 25 °C unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage, blocking voltage	V _{BR} , V _R	I _R = 100 μA	600	-	-	V
Forward voltage	V _F	I _F = 15A	-	1.8	2.45	
		I _F = 15 A, T _J = 150 °C	-	1.25	1.6	
Reverse leakage current	I _R	V _R = V _R rated	-	0.01	15	μA
		T _J = 150 °C, V _R = V _R rated	-	20	200	
Junction capacitance	C _T	V _R = 600 V	-	12	-	pF
Series inductance	L _S	Measured lead to lead 5 mm from package body	-	8.0	-	nH

VS-ETH1506S-M3, VS-ETH1506-1-M3



Vishay Semiconductors Hyperfast Rectifier, 15 A FRED Pt®

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}	$I_F = 1.0\text{ A}$, $di_F/dt = 100\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$	-	21	26	ns	
		$I_F = 1.5\text{ A}$, $di_F/dt = 100\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$	-	25	36		
		$T_J = 25\text{ }^\circ\text{C}$	-	29	-		
		$T_J = 125\text{ }^\circ\text{C}$	-	65	-		
Peak recovery current	I_{RRM}	$T_J = 25\text{ }^\circ\text{C}$	-	3.9	-	A	
		$T_J = 125\text{ }^\circ\text{C}$	-	7.0	-		
Reverse recovery charge	Q_{rr}	$T_J = 25\text{ }^\circ\text{C}$	-	60	-	nC	
		$T_J = 125\text{ }^\circ\text{C}$	-	240	-		
Reverse recovery time	t_{rr}	$T_J = 125\text{ }^\circ\text{C}$	-	$I_F = 15\text{ A}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ $V_R = 390\text{ V}$	42	-	ns
Peak recovery current	I_{RRM}			21	-	A	
Reverse recovery charge	Q_{rr}			480	-	nC	

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	T_J, T_{Stg}		- 65	-	175	$^\circ\text{C}$
Thermal resistance, junction to case	R_{thJC}		-	1.3	1.51	$^\circ\text{C}/\text{W}$
Thermal resistance, junction to ambient	R_{thJA}	Typical socket mount	-	-	70	
Thermal resistance, case to heatsink	R_{thCS}	Mounting surface, flat, smooth and greased	-	0.5	-	
Weight			-	2.0	-	g
			-	0.07	-	oz.
Mounting torque			6 (5)	-	12 (10)	kgf · cm (lbf · in)
Marking device		Case style D ² PAK modified	ETH1506S			
		Case style TO-262	ETH1506-1			

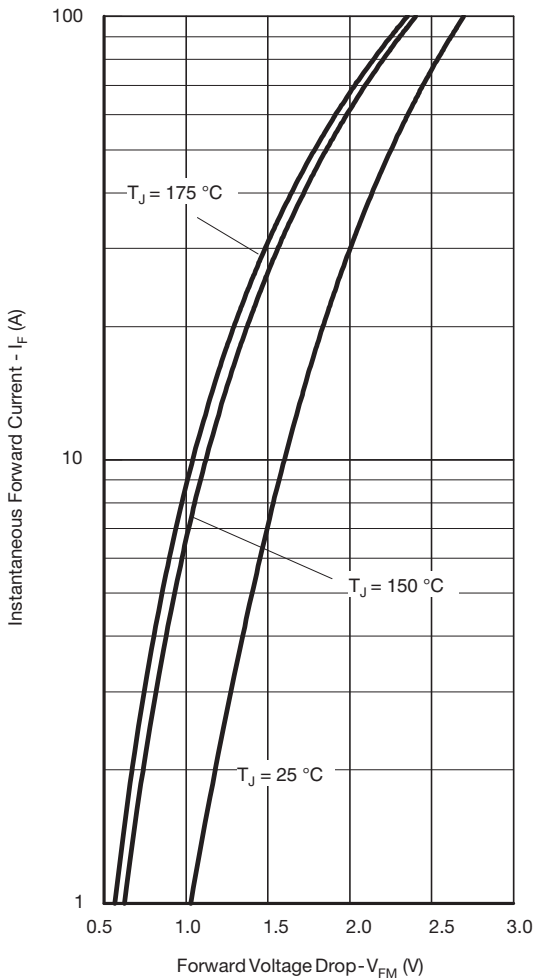


Fig. 1 - Typical Forward Voltage Drop Characteristics

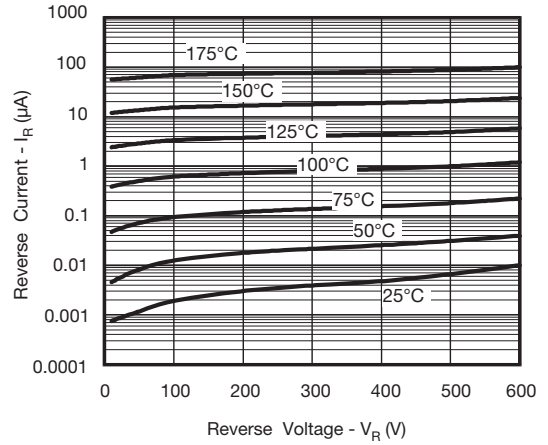


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

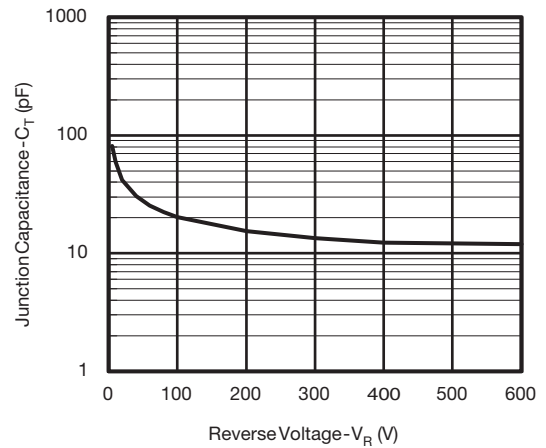


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

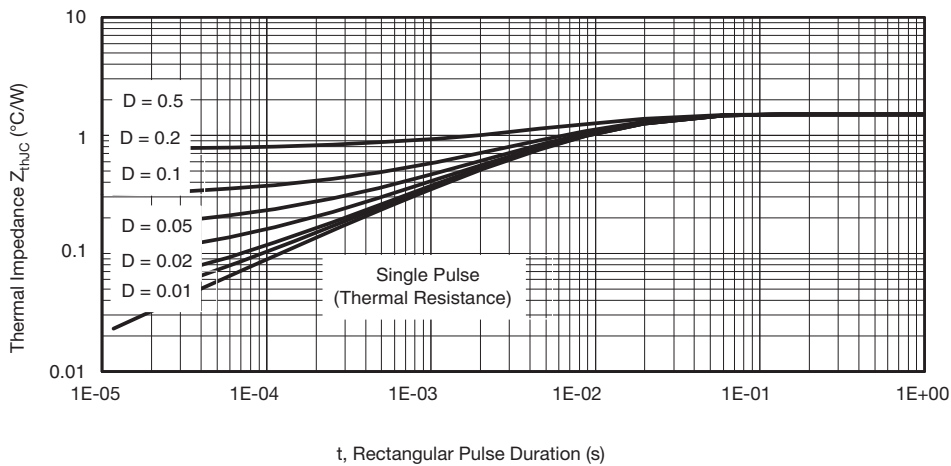


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics

VS-ETH1506S-M3, VS-ETH1506-1-M3



Vishay Semiconductors Hyperfast Rectifier, 15 A FRED Pt®

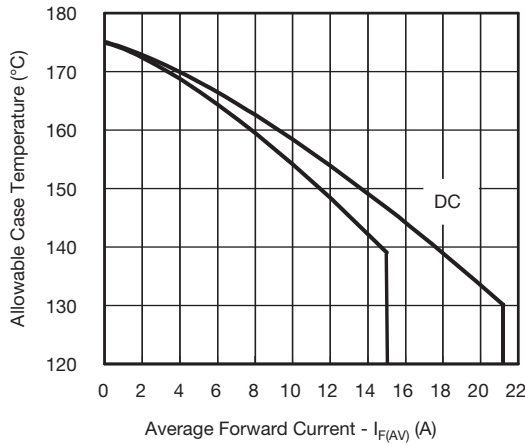


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

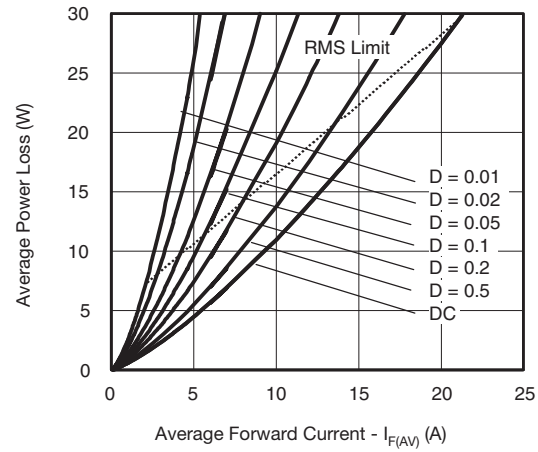


Fig. 6 - Forward Power Loss Characteristics

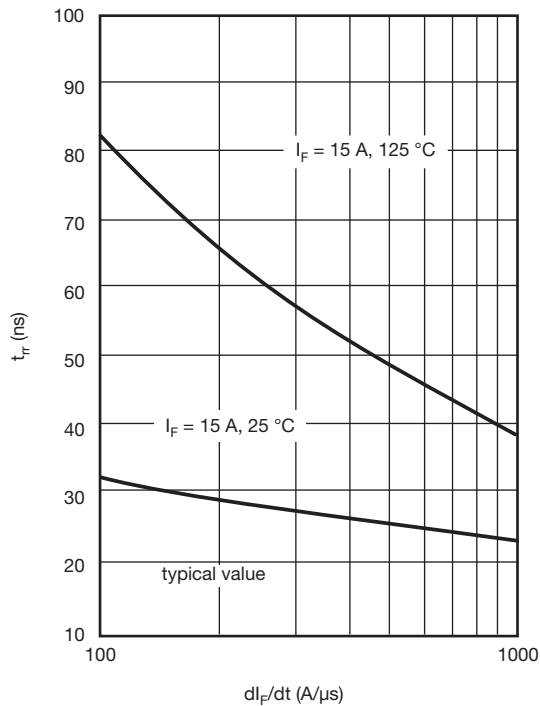


Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt

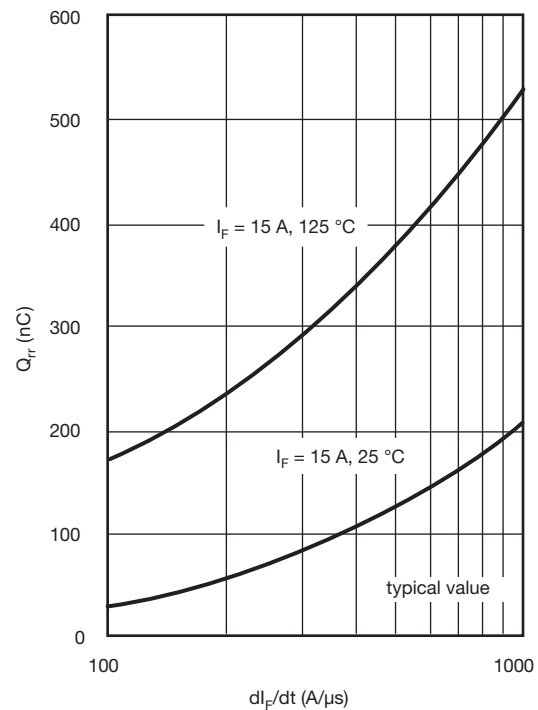


Fig. 8 - Typical Stored Charge vs. dI_F/dt

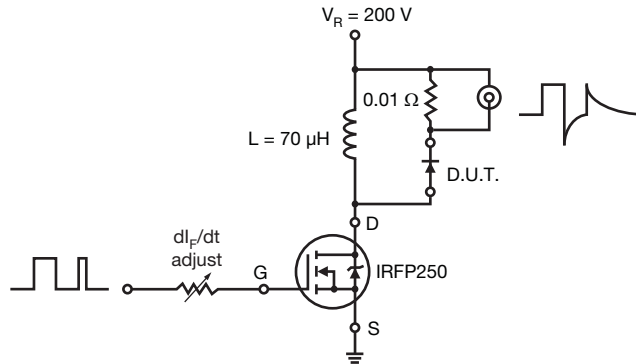


Fig. 9 - Reverse Recovery Parameter Test Circuit

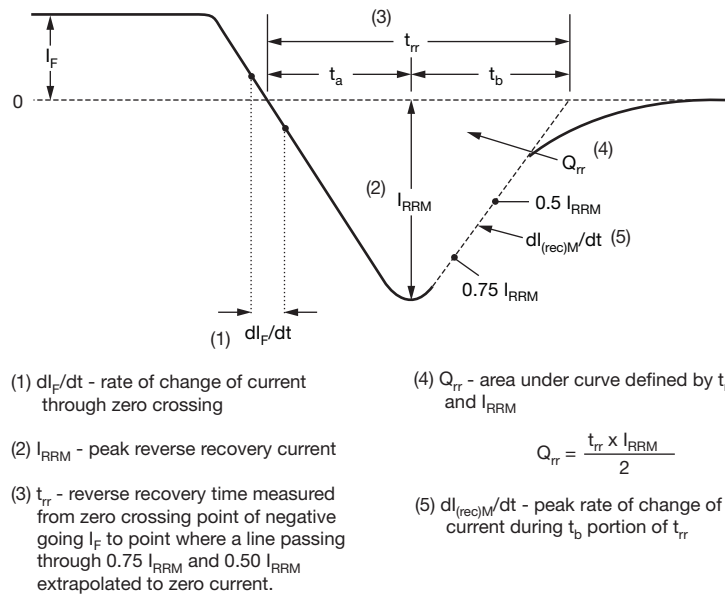


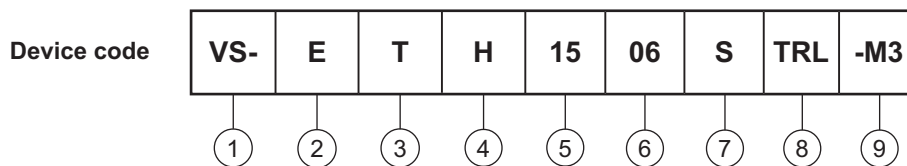
Fig. 10 - Reverse Recovery Waveform and Definitions

VS-ETH1506S-M3, VS-ETH1506-1-M3

Vishay Semiconductors Hyperfast Rectifier, 15 A FRED Pt®



ORDERING INFORMATION TABLE



- 1** - Vishay Semiconductors product
- 2** - Circuit configuration
E = Single diode
- 3** - T = TO-220
- 4** - H = Hyperfast recovery time
- 5** - Current code (15 = 15 A)
- 6** - Voltage code (06 = 600 V)
- 7** - • S = D²PAK
- • -1 = TO-262
- 8** - • None = Tube (50 pieces)
- • TRL = Tape and reel (left oriented, for D²PAK package)
- • TRR = Tape and reel (right oriented, for D²PAK package)
- 9** - -M3 = Halogen-free, RoHS compliant, and terminations lead (Pb)-free

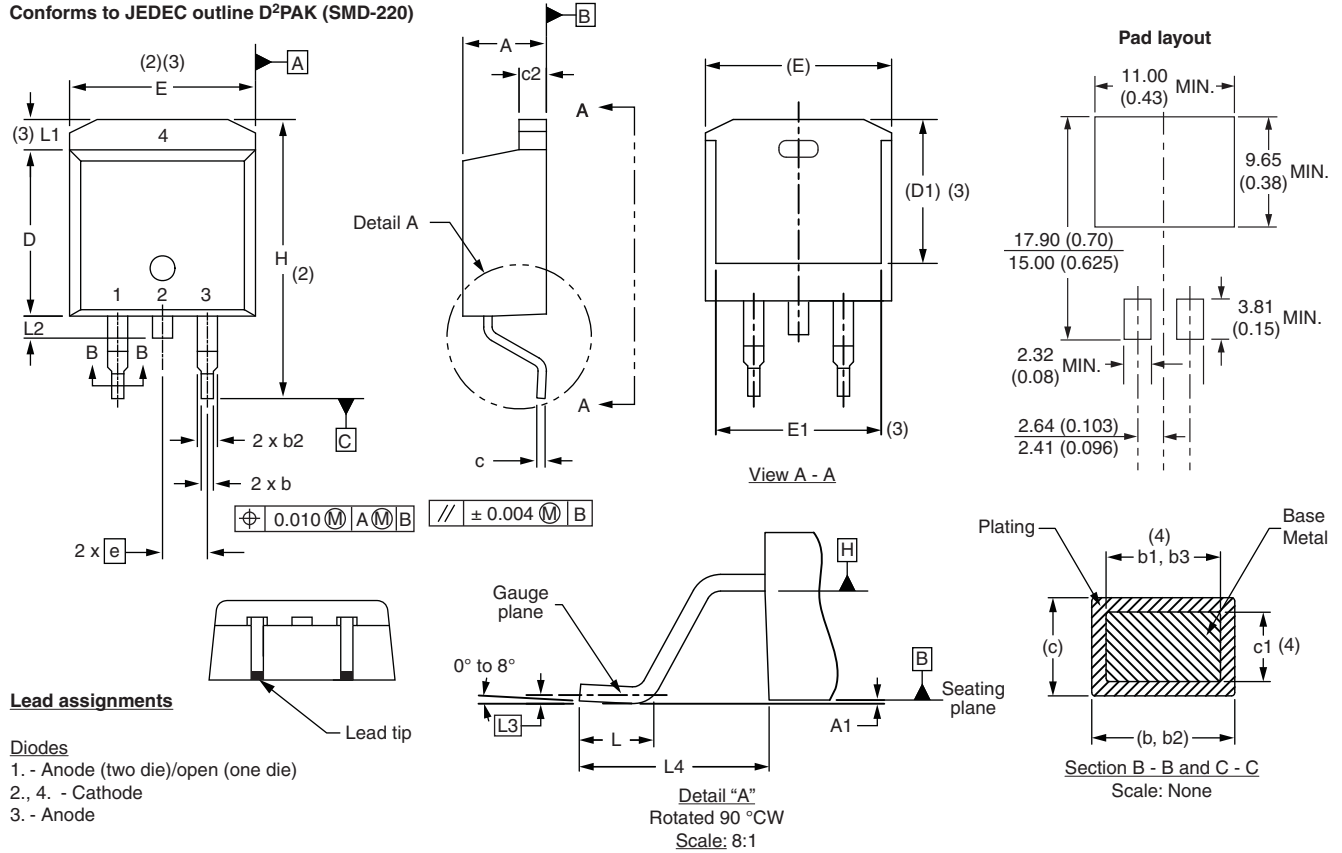
ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER TUBE	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-ETH1506S-M3	50	1000	Antistatic plastic tube
VS-ETH1506-1-M3	50	1000	Antistatic plastic tube
VS-ETH1506STRR-M3	800	800	13" diameter reel
VS-ETH1506STRL-M3	800	800	13" diameter reel

LINKS TO RELATED DOCUMENTS		
Dimensions	TO-263AB (D ² PAK)	www.vishay.com/doc?95046
	TO-262AA	www.vishay.com/doc?95419
Part marking information	TO-263AB (D ² PAK)	www.vishay.com/doc?95444
	TO-262AA	www.vishay.com/doc?95443
Packaging information	TO-263AB (D ² PAK)	www.vishay.com/doc?95032

D²PAK

DIMENSIONS in millimeters and inches

Conforms to JEDEC outline D²PAK (SMD-220)



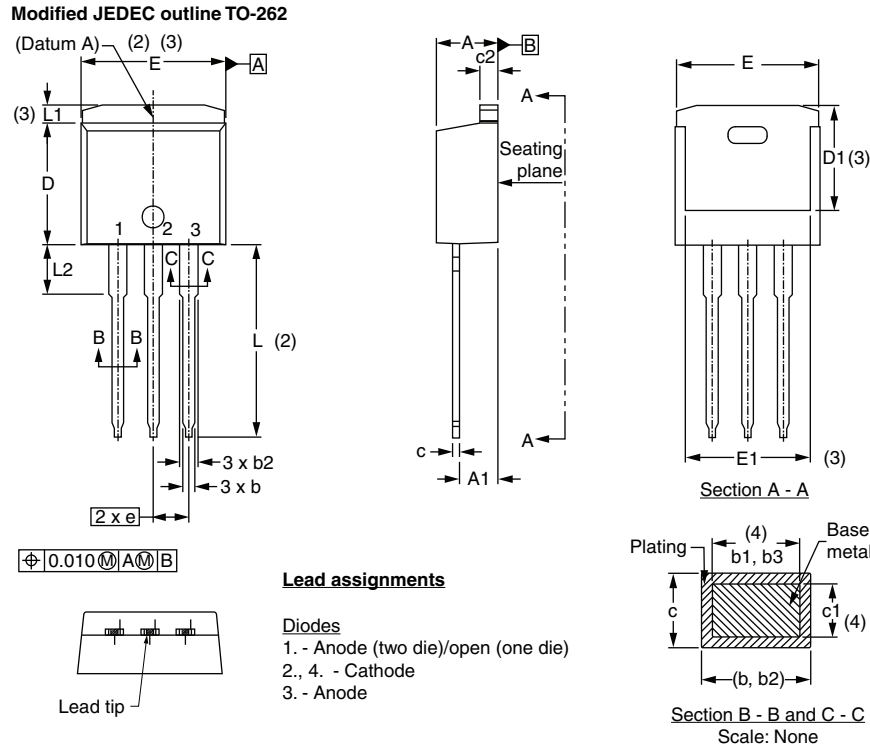
SYMBOL	MILLIMETERS		INCHES		NOTES	SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.			MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	0.160	0.190		D1	6.86	8.00	0.270	0.315	3
A1	0.00	0.254	0.000	0.010		E	9.65	10.67	0.380	0.420	2, 3
b	0.51	0.99	0.020	0.039		E1	7.90	8.80	0.311	0.346	3
b1	0.51	0.89	0.020	0.035	4	e	2.54 BSC		0.100 BSC		
b2	1.14	1.78	0.045	0.070		H	14.61	15.88	0.575	0.625	
b3	1.14	1.73	0.045	0.068	4	L	1.78	2.79	0.070	0.110	
c	0.38	0.74	0.015	0.029		L1	-	1.65	-	0.066	3
c1	0.38	0.58	0.015	0.023	4	L2	1.27	1.78	0.050	0.070	
c2	1.14	1.65	0.045	0.065		L3	0.25 BSC		0.010 BSC		
D	8.51	9.65	0.335	0.380	2	L4	4.78	5.28	0.188	0.208	

Notes

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

TO-262

DIMENSIONS in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	0.160	0.190	
A1	2.03	3.02	0.080	0.119	
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
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		
L	13.46	14.10	0.530	0.555	
L1	-	1.65	-	0.065	3
L2	3.56	3.71	0.140	0.146	

Notes

- Dimensioning and tolerancing as per ASME Y14.5M-1994
- 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
- Thermal pad contour optional within dimension E, L1, D1 and E1
- Dimension b1 and c1 apply to base metal only
- Controlling dimension: inches
- Outline conform to JEDEC TO-262 except A1 (maximum), b (minimum) and D1 (minimum) where dimensions derived the actual package outline



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