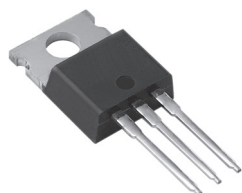
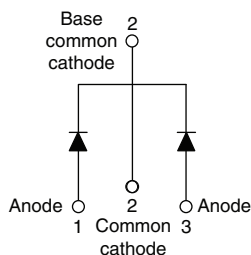


## High Performance Schottky Rectifier, 2 x 15 A



TO-220AB



### FEATURES

- 175 °C T<sub>J</sub> operation
- Very low forward voltage drop
- High frequency operation
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Guard ring for enhanced ruggedness and long term reliability
- AEC-Q101 qualified meets JESD 201 class 2 whisker test
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

### PRODUCT SUMMARY

I <sub>F(AV)</sub>	2 x 15 A
V <sub>R</sub>	35 V, 40 V, 45 V
V <sub>F</sub> at I <sub>F</sub>	0.56 V
I <sub>RM</sub> max.	15 mA at 125 °C
T <sub>J</sub> max.	175 °C
E <sub>AS</sub>	27 mJ
Package	TO-220AC
Diode variation	Common cathode

### DESCRIPTION

The VS-30CTQ... center tap Schottky rectifier has been optimized for very low forward voltage drop, with moderate leakage. The proprietary barrier technology allows for reliable operation up to 175 °C junction temperature. Typical applications are in switching power supplies, converters, freewheeling diodes, and reverse battery protection.

### MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
I <sub>F(AV)</sub>	Rectangular waveform	30	A
V <sub>RRM</sub>	Range	35 to 45	V
I <sub>FSM</sub>	t <sub>p</sub> = 5 μs sine	1060	A
V <sub>F</sub>	20 A <sub>pk</sub> , T <sub>J</sub> = 125 °C (per leg)	0.56	V
T <sub>J</sub>	Range	-55 to 175	°C

### VOLTAGE RATINGS

PARAMETER	SYMBOL	VS-30CTQ035HN3	VS-30CTQ040HN3	VS-30CTQ045HN3	UNITS
Maximum DC reverse voltage	V <sub>R</sub>	35	40	45	V
Maximum working peak reverse voltage	V <sub>RWM</sub>				

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current See fig. 5	I <sub>F(AV)</sub>	50 % duty cycle at T <sub>C</sub> = 127 °C, rectangular waveform	30	A
Maximum peak one cycle non-repetitive surge current See fig. 7	I <sub>FSM</sub>	5 μs sine or 3 μs rect. pulse 10 ms sine or 6 ms rect. pulse	1060 256	A
Non-repetitive avalanche energy	E <sub>AS</sub>	T <sub>J</sub> = 25 °C, I <sub>AS</sub> = 3.0 A, L = 4.40 mH	20	mJ
Repetitive avalanche current	I <sub>AR</sub>	Current decaying linearly to zero in 1 μs Frequency limited by T <sub>J</sub> maximum V <sub>A</sub> = 1.5 x V <sub>R</sub> typical	3.0	A



ELECTRICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS	
Maximum forward voltage drop See fig. 1	$V_{FM}^{(1)}$	15 A	$T_J = 25\text{ }^{\circ}\text{C}$	0.62	V	
		30 A		0.76		
		15 A	$T_J = 125\text{ }^{\circ}\text{C}$	0.56		
		30 A		0.70		
Maximum reverse leakage curent See fig. 2	$I_{RM}^{(1)}$	$T_J = 25\text{ }^{\circ}\text{C}$	$V_R = \text{Rated } V_R$	2	mA	
		$T_J = 125\text{ }^{\circ}\text{C}$		15		
Maximum junction capacitance	$C_T$	$V_R = 5\text{ }V_{DC}$ , (test signal range 100 kHz to 1 MHz) $25\text{ }^{\circ}\text{C}$		900	pF	
Typical series inductance	$L_S$	Measured lead to lead 5 mm from package body		8.0	nH	
Maximum voltage rate of change	dV/dt	Rated $V_R$		10 000	V/ $\mu$ s	

**Note**
<sup>(1)</sup> Pulse width < 300  $\mu$ s, duty cycle < 2 %

THERMAL - MECHANICAL SPECIFICATIONS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction and storage temperature range	T <sub>J</sub> , T <sub>Stg</sub>		-55 to 175	°C
Maximum thermal resistance, junction to case per leg	R <sub>thJC</sub>	DC operation See fig. 4	3.25	°C/W
		DC operation	1.63	
Typical thermal resistance, case to heatsink	R <sub>thCS</sub>	Mounting surface, smooth and greased	0.50	
Approximate weight			2.0	g
			0.07	oz.
Mounting torque	minimum		6 (5)	kgf · cm (lbf · in)
	maximum		12 (10)	
Marking device		Case style TO-220AB	30CTQ035H	
			30CTQ040H	
			30CTQ045H	

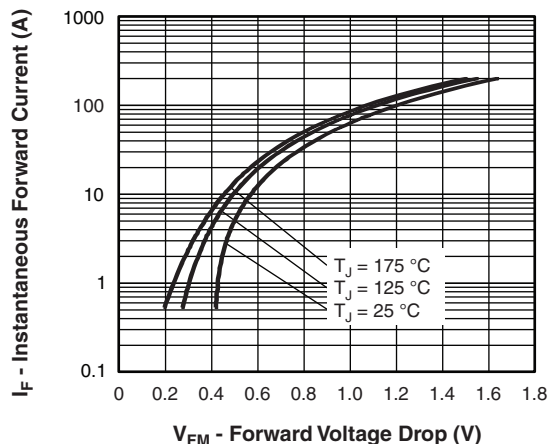


Fig. 1 - Maximum Forward Voltage Drop Characteristics

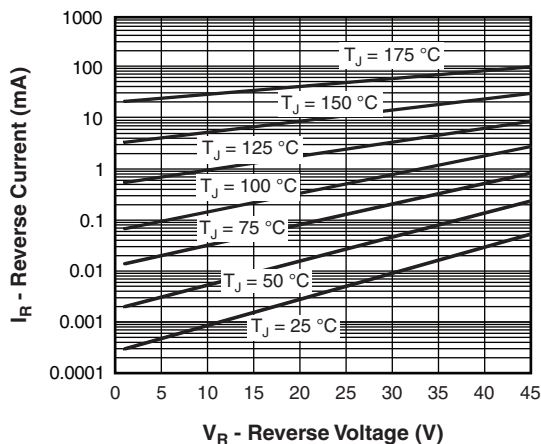


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

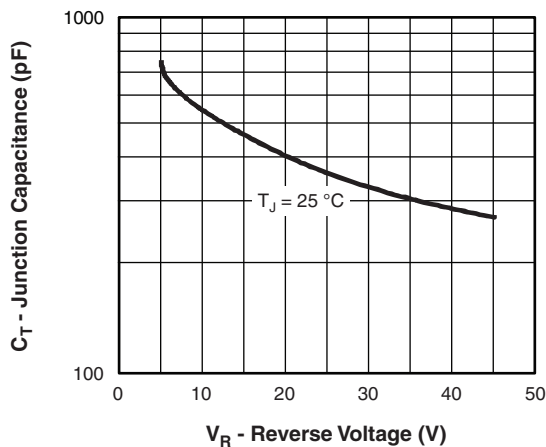
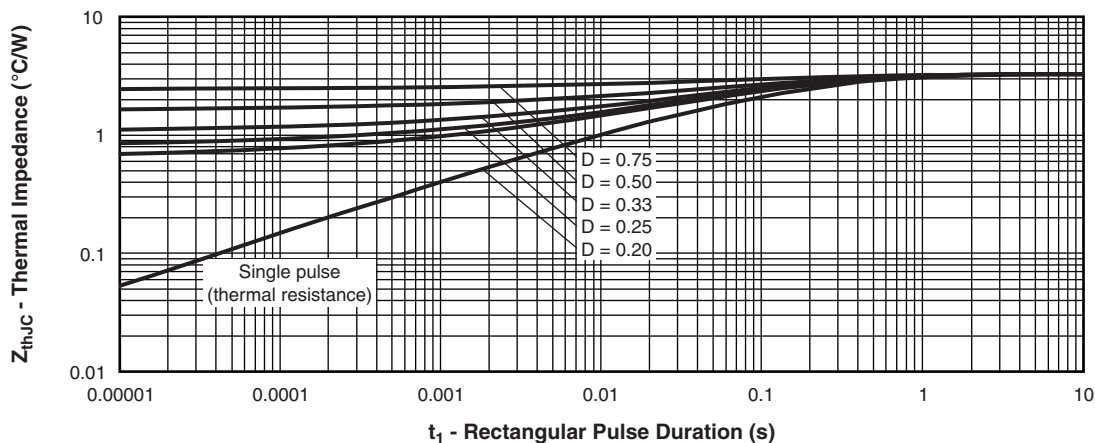


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

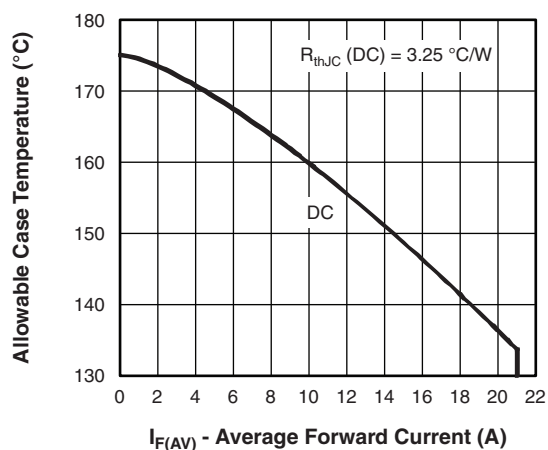


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

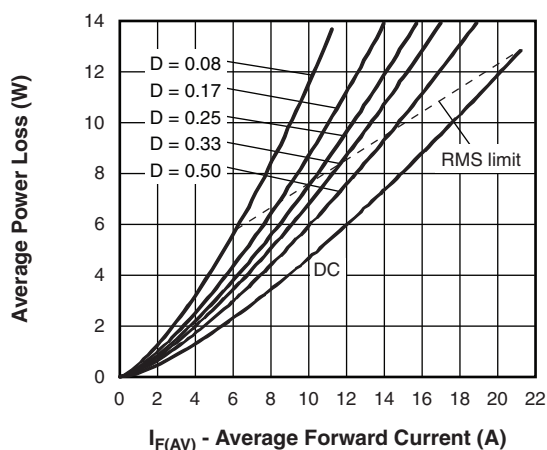


Fig. 6 - Forward Power Loss Characteristics

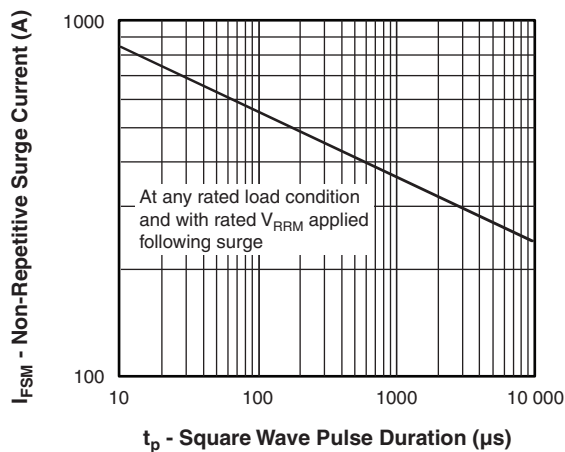


Fig. 7 - Maximum Non-Repetitive Surge Current

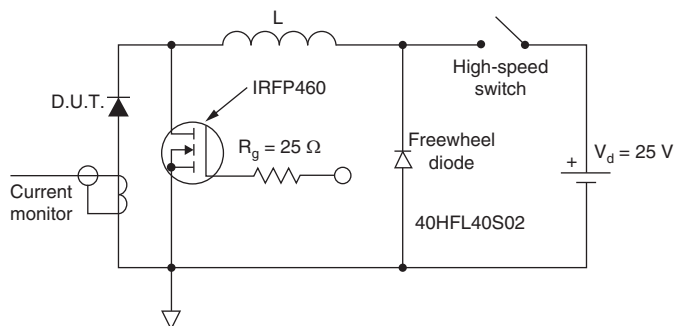


Fig. 8 - Unclamped Inductive Test Circuit

**ORDERING INFORMATION TABLE**

Device code	<b>VS-</b>	<b>30</b>	<b>C</b>	<b>T</b>	<b>Q</b>	<b>045</b>	<b>H</b>	<b>N3</b>
	1	2	3	4	5	6	7	8

- |            |   |  |  |            |            |            |
|------------|---|--|--|------------|------------|------------|
| <b>1</b>   | - | Vishay Semiconductors product                |  |            |            |            |
| <b>2</b>   | - | Current rating (30 = 30 A)                   |  |            |            |            |
| <b>3</b>   | - | Circuit configuration:<br>C = Common cathode |  |            |            |            |
| <b>4</b>   | - | Package:<br>T = TO-220                       |  |            |            |            |
| <b>5</b>   | - | Schottky "Q" series                          | <table border="1"><tr><td>035 = 35 V</td></tr><tr><td>040 = 40 V</td></tr><tr><td>045 = 45 V</td></tr></table> | 035 = 35 V | 040 = 40 V | 045 = 45 V |
| 035 = 35 V |   |  |  |            |            |            |
| 040 = 40 V |   |  |  |            |            |            |
| 045 = 45 V |   |  |  |            |            |            |
| <b>6</b>   | - | Voltage ratings                              |  |            |            |            |
| <b>7</b>   | - | H = AEC-Q101 qualified                       |  |            |            |            |
| <b>8</b>   | - | Environmental digit                          |  |            |            |            |
|            |   |  | • N3 = Halogen-free, RoHS compliant, and totally lead (Pb)-free  |            |            |            |

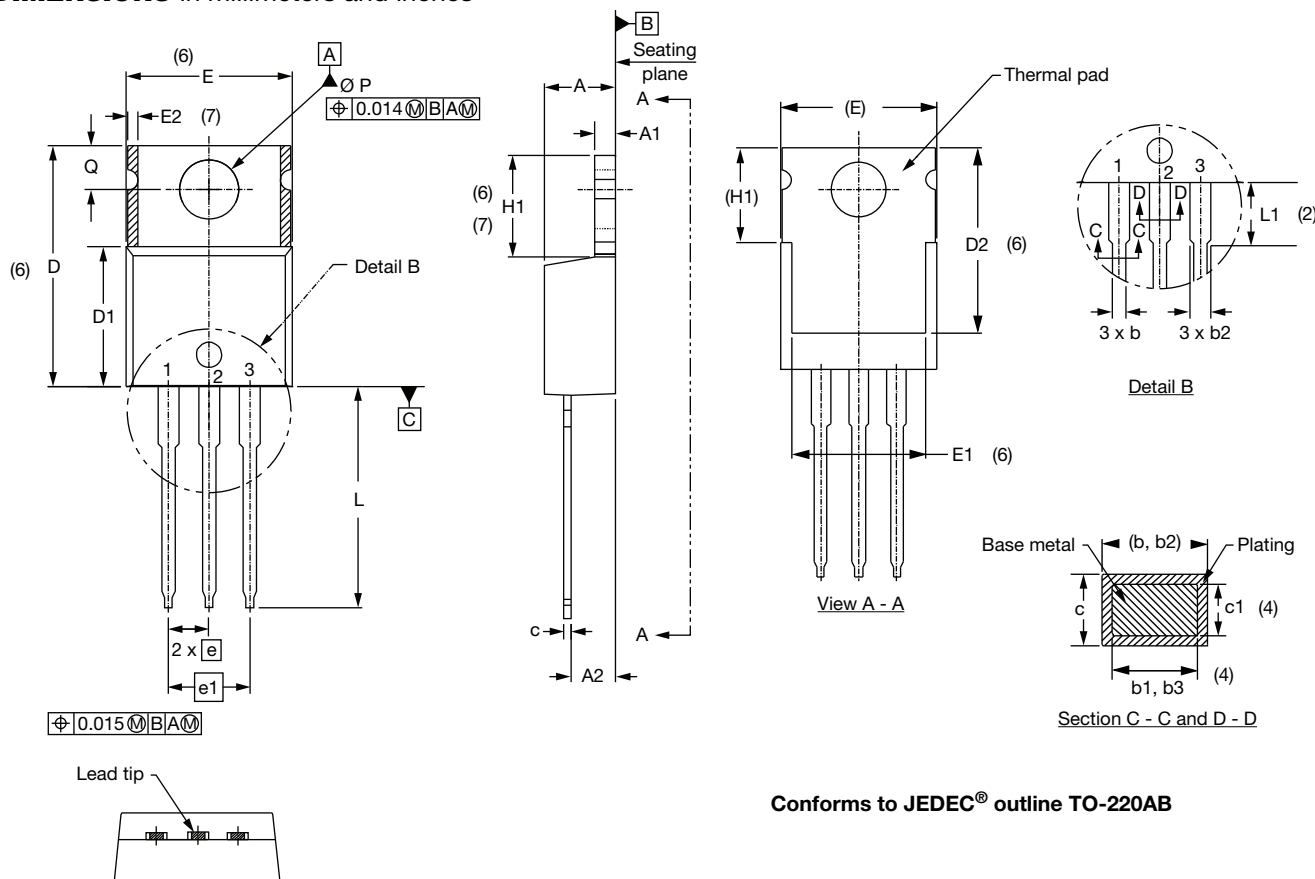
<b>ORDERING INFORMATION</b> (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-30CTQ035HN3	50	1000	Antistatic plastic tube
VS-30CTQ040HN3	50	1000	Antistatic plastic tube
VS-30CTQ045HN3	50	1000	Antistatic plastic tube

<b>LINKS TO RELATED DOCUMENTS</b>	
Dimensions	<a href="http://www.vishay.com/doc?95222">www.vishay.com/doc?95222</a>
Part marking information	TO-220AB-N3 <a href="http://www.vishay.com/doc?95028">www.vishay.com/doc?95028</a>



### TO-220AB

**DIMENSIONS** in millimeters and inches



Conforms to JEDEC® outline TO-220AB

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.25	4.65	0.167	0.183	
A1	1.14	1.40	0.045	0.055	
A2	2.56	2.92	0.101	0.115	
b	0.69	1.01	0.027	0.040	
b1	0.38	0.97	0.015	0.038	4
b2	1.20	1.73	0.047	0.068	
b3	1.14	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	14.85	15.25	0.585	0.600	3
D1	8.38	9.02	0.330	0.355	
D2	11.68	12.88	0.460	0.507	6
E	10.11	10.51	0.398	0.414	3, 6
E1	6.86	8.89	0.270	0.350	6
E2	-	0.76	-	0.030	7
e	2.41	2.67	0.095	0.105	
e1	4.88	5.28	0.192	0.208	
H1	5.84	6.86	0.230	0.270	6, 7
L	13.52	14.02	0.532	0.552	
L1	3.32	3.82	0.131	0.150	2
Ø P	3.54	3.73	0.139	0.147	
Q	2.60	3.00	0.102	0.118	

#### Notes

- Dimensioning and tolerancing as per ASME Y14.5M-1994
- Lead dimension and finish uncontrolled in L1
- Dimension D, D1 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
- Dimension b1, b3 and c1 apply to base metal only
- Controlling dimensions: inches
- Thermal pad contour optional within dimensions E, H1, D2 and E1
- Dimensions E2 x H1 define a zone where stamping and singulation irregularities are allowed
- Outline conforms to JEDEC® TO-220, except A2 (maximum) and D2 (minimum) where dimensions are derived from the actual package outline



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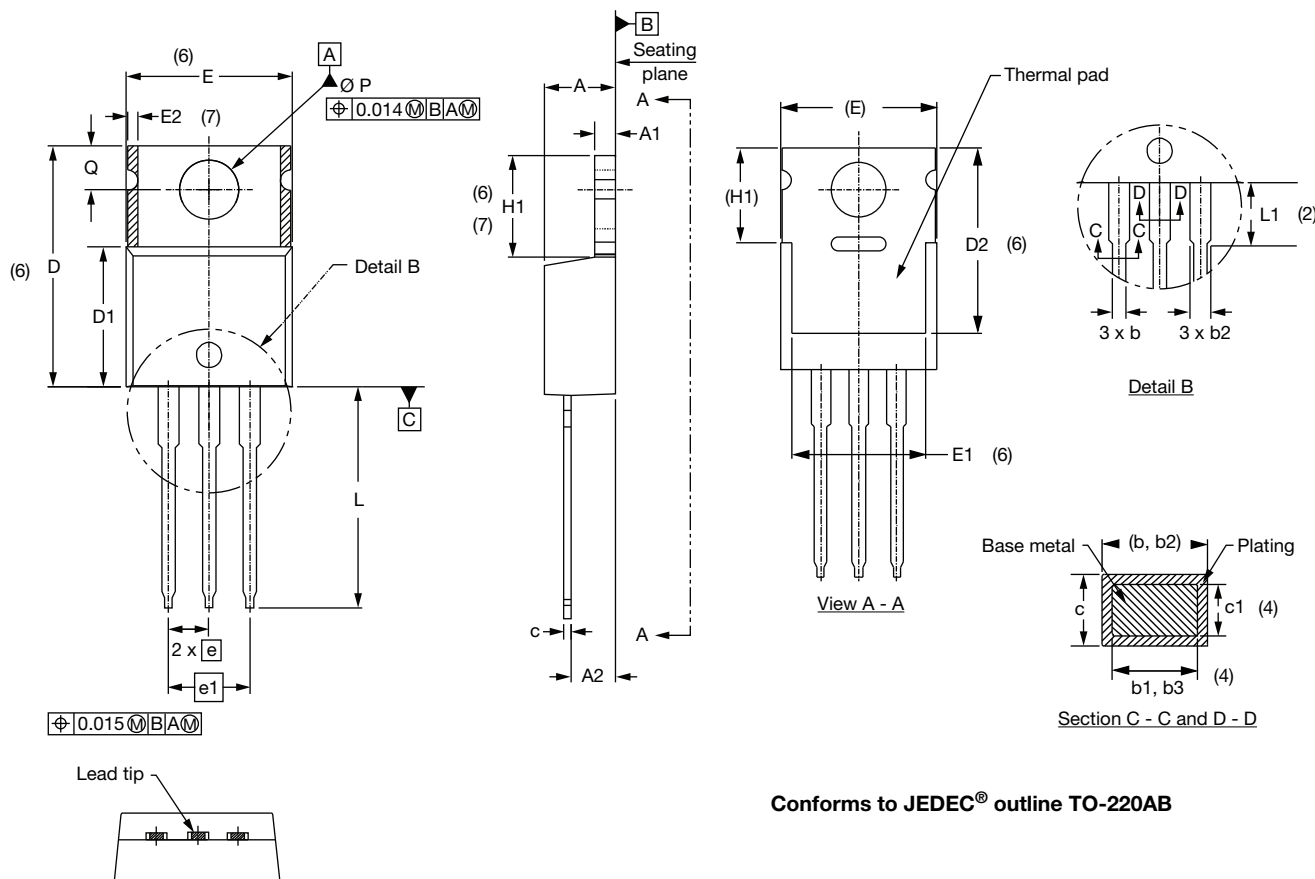
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# TO-220AB

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**Conforms to JEDEC® outline TO-220AB**

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b	0.69	1.01	0.027	0.040			E2	-	0.76	-	0.030	7
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b2	1.20	1.73	0.047	0.068			e1	4.88	5.28	0.192	0.208	
b3	1.14	1.73	0.045	0.068	4		H1	5.84	6.86	0.230	0.270	6, 7
c	0.36	0.61	0.014	0.024			L	13.52	14.02	0.532	0.552	
c1	0.36	0.56	0.014	0.022	4		L1	3.32	3.82	0.131	0.150	2
D	14.85	15.25	0.585	0.600	3		Ø P	3.54	3.73	0.139	0.147	
D1	8.38	9.02	0.330	0.355			Q	2.60	3.00	0.102	0.118	

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