T-23-07

Philips Components

Data sheet	
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BYV32E-100/150/200

Ultra fast rugged dual rectifier

GENERAL DESCRIPTION

Glass passivated, high efficiency, rugged dual epitaxial rectifier diodes in plastic envelopes, featuring low forward voltage drop, ultra-fast recovery time, very low stored charge and soft recovery characteristic. They are intended for use in switched-mode power supplies and high-frequency circuits in general, where both low conduction and low switching losses are essential. Their single chip (monolithic) construction ensures excellent matching of the forward and switching characteristics of the two halves, allowing parallel operation without the need for derating. The series consists of common-cathode types.

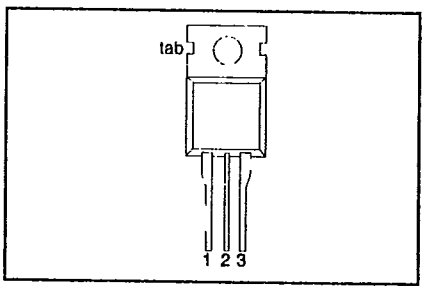
QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
	BYV32E-	100 150 200	
V_{RRM}	Repetitive peak voltage	100 150 200	V
I_O	Average forward current	20	A
V_F	Forward voltage	0.85	V
E_{RSM}	Non-repetitive reverse avalanche energy	30	mJ
t_{rr}	Reverse recovery time	25	ns

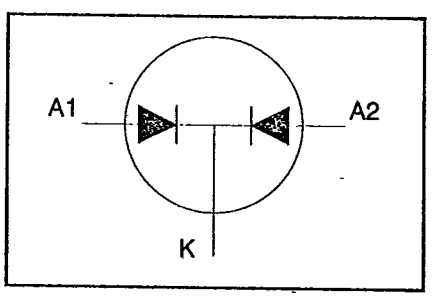
PINNING - TO220AB

PIN	DESCRIPTION
1	Anode (A1)
2	Cathode (K)
3	Anode (A2)
tab	Cathode

PIN CONFIGURATION



SYMBOL



DISCRETE SEMICONDUCTORS
SC02

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LIMITING VALUES

Limiting values in accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MAX.			UNIT
	Voltages	BYV32E-	100	150	200	
V_{RRM}	Repetitive peak reverse voltage		100	150	200	V
V_{RWM}	Crest working reverse voltage		100	150	200	V
V_R	Continuous reverse voltage	$R_{th\ j\text{-}a}$ < 14 K/W	100	150	200	V
	Avalanche Energy					
E_{RSM}	Non-repetitive reverse avalanche energy	L = 40 mH	30			mJ
	Currents (both diodes conducting[1])					
I_O	Average forward current[2]	square wave; δ = 0.5; $T_{mb} \leq$ 118 °C	20			A
		square wave; δ = 0.5; $T_{mb} \leq$ 125 °C	16.5			A
		sinusoidal; $T_{mb} \leq$ 120 °C	18			A
		sinusoidal; $T_{mb} \leq$ 125 °C	16			A
$I_{F(RMS)}$	R.M.S. forward current		28			A
I_{FRM}	Repetitive peak forward current	t_p = 20 µs; δ = 0.02; per diode	230			A
I_{FSM}	Non-repetitive peak forward current	half sine-wave; T_j = 150 °C; per diode; with re-applied V_{RWM}				
		t = 10 ms	125			A
		t = 8.3 ms	137.5			A
I^2t	I^2t for fusing	t = 10 ms; per diode	78			A^2s
	Temperatures		MIN.	MAX.		
T_{stg}	Storage temperature		-40	150		°C
T_j	Operating junction temperature		-40	150		°C

CHARACTERISTICS

T_j at 25 °C unless otherwise stated

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_F	Forward voltage[3]	I_F = 20 A	-	-	1.15	V
		I_F = 8 A; T_j = 150 °C	-	-	0.85	V
I_R	Reverse current	$V_R = V_{RWM}$ max	-	-	30	µA
		$V_R = V_{RWM}$ max; T_j = 100 °C	-	-	0.6	mA
t_{rr1}	Reverse recovery time	I_F = 1 A to $V_R \geq$ 30 V; dI_F/dt = 100 A/µs	-	-	25	ns
t_{rr2}	Reverse recovery time	I_F = 0.5 A; I_R = 1 A; I_{rec} = 0.25 A	-	-	40	ns
Q_s	Reverse recovery charge	I_F = 2 A to $V_R \geq$ 30 V; dI_F/dt = 20 A/µs	-	-	12.5	nC
V_{fr}	Forward recovery voltage	I_F = 1 A; dI_F/dt = 10 A/µs	-	1.5	-	V

1 The limits for both diodes apply whether both diodes conduct simultaneously or on alternate half cycles.

2 Switching losses negligible up to 500 kHz.

3 Measured under pulsed conditions; pulse width t_p = 300 µs.

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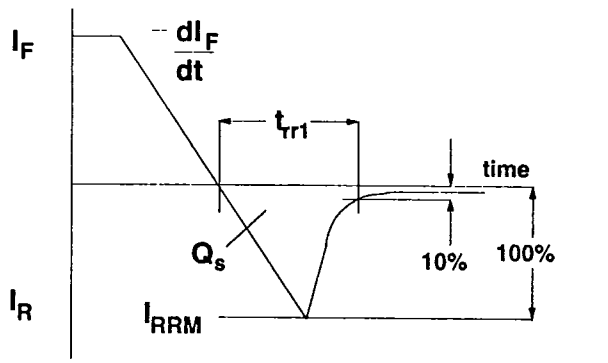

Fig. 1. Definition of t_{rr1}, Q_s and I_{RRM}

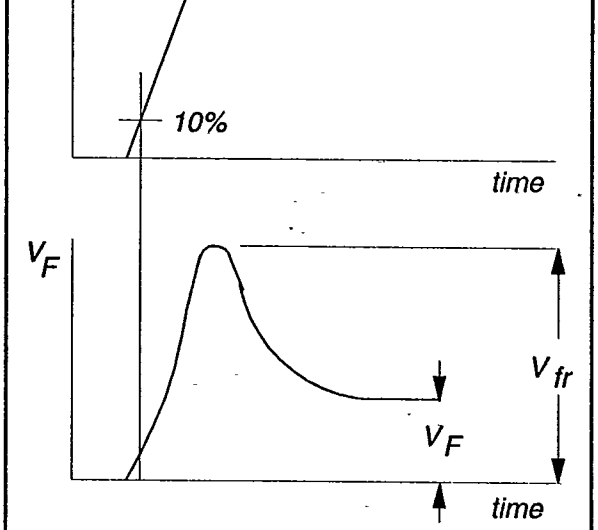

Fig. 2. Definition of V_{fr}

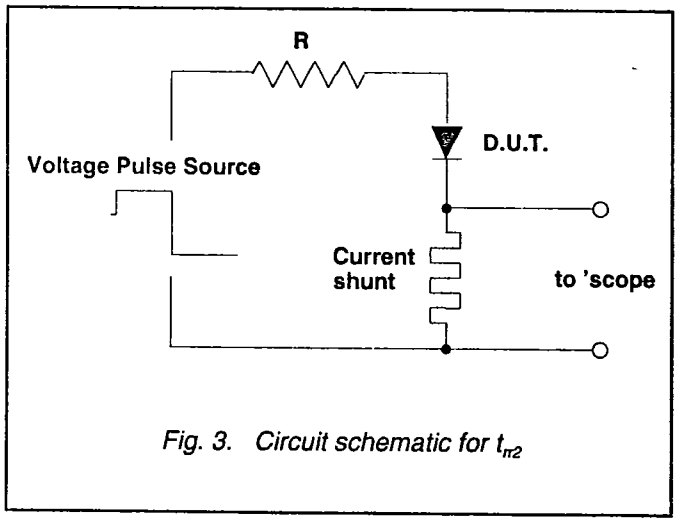

Fig. 3. Circuit schematic for t_{rr2}

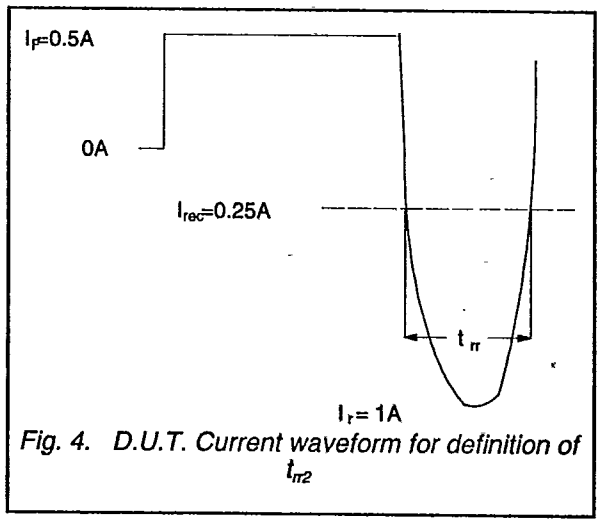

Fig. 4. D.U.T. Current waveform for definition of t_{rr2}

THERMAL RESISTANCE

From junction to mounting base (both diodes conducting)	$R_{th\ j\text{-}mb}$ = 1.6 K/W
From junction to mounting base (per diode)	$R_{th\ j\text{-}mb}$ = 2.4 K/W

Influence of mounting method

1. Heatsink mounted with clip (see mounting instructions)

Thermal resistance from mounting base to heatsink

a.	with heatsink compound	$R_{th\ mb\text{-}h}$ = 0.3 K/W
b.	with heatsink compound and 0.06 mm maximum mica insulator	$R_{th\ mb\text{-}h}$ = 1.4 K/W
c.	with heatsink compound and 0.1 mm maximum mica insulator (56369)	$R_{th\ mb\text{-}h}$ = 2.2 K/W
d.	with heatsink compound and 0.25 mm maximum alumina insulator (56367)	$R_{th\ mb\text{-}h}$ = 0.8 K/W
e.	without heatsink compound	$R_{th\ mb\text{-}h}$ = 1.4 K/W

2. Free air operation

The quoted values of $R_{th\ j\text{-}a}$ should be used only when no leads of other dissipating components run to the same tie point.

Thermal resistance from junction to ambient in free air mounted on a circuit board at any device lead length and with copper laminate on the board	$R_{th\ j\text{-}a}$ = 60 K/W

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MOUNTING INSTRUCTIONS

1. The device may be soldered directly into the circuit, bot the maximum permissible temperature of the soldering iron or bath is 275 °C; the heat source must not be in contact with the joint for more than 5 seconds. soldered joints must be at least 4.7 mm from the seal.
2. The leads should not be bent less than 2.4 mm from the seal, and should be supported during bending. The bend radius must be no less than 1.0 mm.
3. Mounting by means of a spring clip is the best mounting method because it offers:
   a. A good thermal contact under the crystal area and slightly lower $R_{th\ mb\text{-}h}$ values than does screw mounting.
   b. Safe isolation for mains operation.
   However, if a screw is used, it should be M3 cross-recess pan head. Care should be taken to avoid damage to the plastic body.
4. For good thermal contact heatsink compound should be used between mounting base and heatsink. Values of $R_{th\ mb\text{-}hs}$ given for mounting with heatsink compound refer to the use of a metallic oxide-loaded compound. Ordinary silicone grease is not recommended.
5. Rivet mounting (only possible for non-insulated mounting).
   Devices may be rivetted to flat heatsinks; such a process must **neither** deform the mounting tab, **nor** enlarge the mounting hole.

OPERATING NOTES

Dissipation and heatsink calculations.
Any measurement of heatsink temperature should be made immediately adjacent to the device.

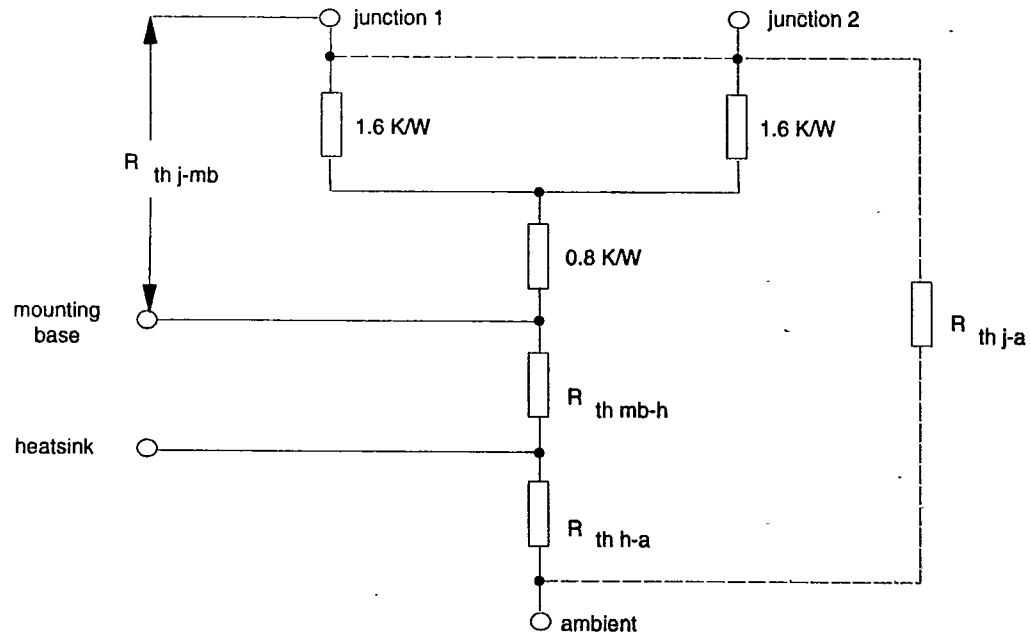

Fig.5. Components of temperature rise from ambient to junction.

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MECHANICAL DATA

Dimensions in mm

Net Mass: 2 g

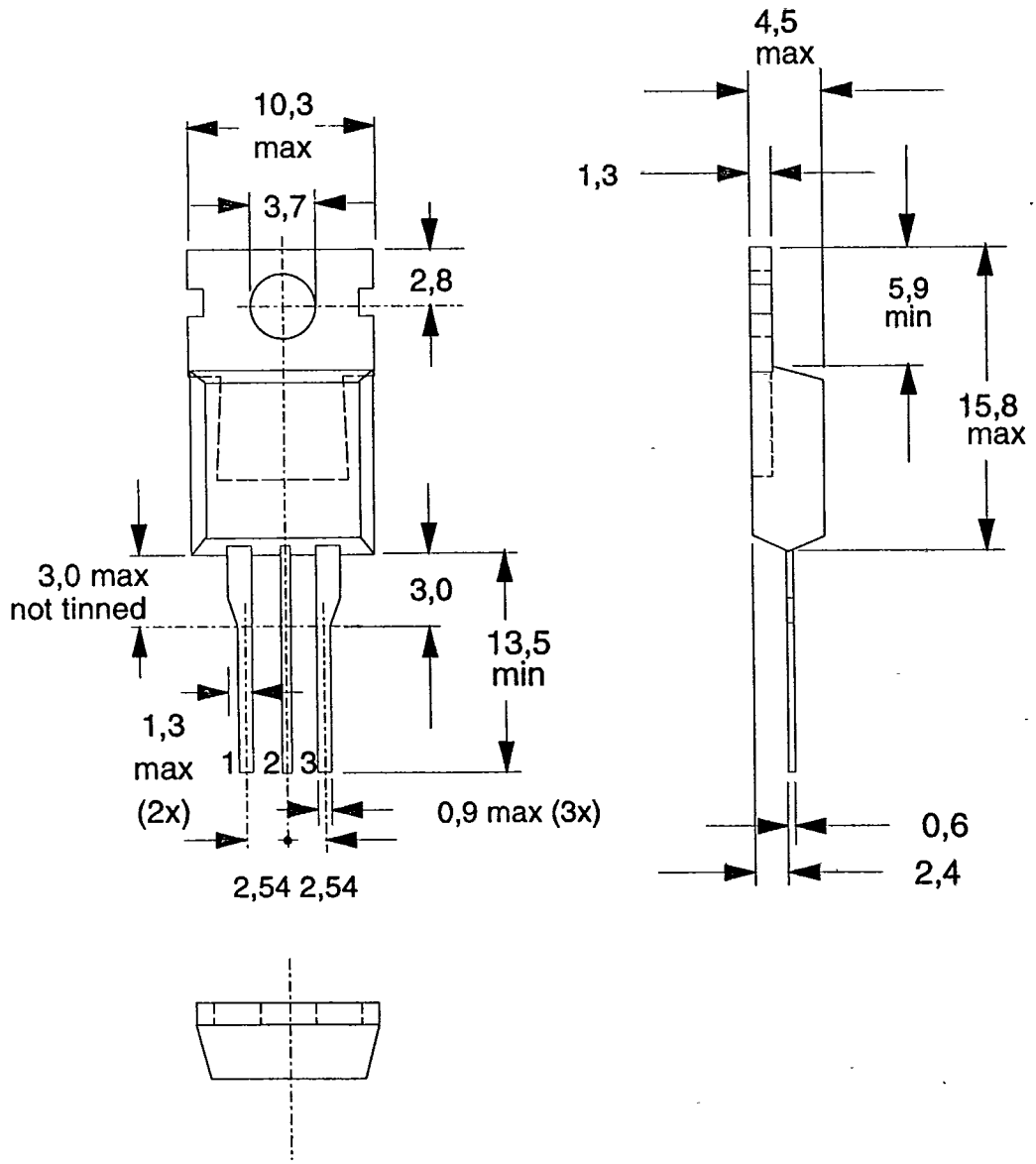

Fig.6. TO220AB; pin 2 connected to mounting base.

Notes

1. Accessories supplied on request: refer to mounting instructions for TO220 envelopes.