

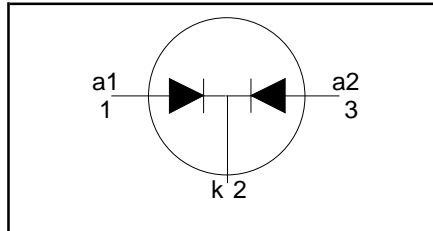
# Rectifier diode ultrafast, low switching loss

BYC10-600CT

## FEATURES

- Dual diode
- Extremely fast switching
- Low reverse recovery current
- Low thermal resistance
- Reduces switching losses in associated MOSFET

## SYMBOL



## QUICK REFERENCE DATA

$V_R = 600 \text{ V}$
$V_F \leq 1.75 \text{ V}$
$I_{O(AV)} = 10 \text{ A}$
$t_{rr} = 19 \text{ ns (typ)}$

## APPLICATIONS

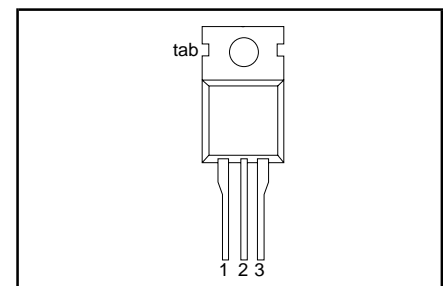
- Active power factor correction
- Half-bridge lighting ballasts
- Half-bridge/ full-bridge switched mode power supplies.

The BYC10-600CT is supplied in the SOT78 (TO220AB) conventional leaded package.

## PINNING

PIN	DESCRIPTION
1	anode 1
2	cathode
3	anode 2
tab	cathode

## SOT78 (TO220AB)



## LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{RRM}$	Peak repetitive reverse voltage		-	600	V
$V_{RWM}$	Crest working reverse voltage		-	600	V
$V_R$	Continuous reverse voltage		-	500	V
$I_{O(AV)}$	Average output current (both diodes conducting)	$T_{mb} \leq 110 \text{ }^\circ\text{C}$ $\delta = 0.5$ ; with reapplied $V_{RRM(max)}$ ;	-	10	A
$I_{FRM}$	Repetitive peak forward current per diode	$T_{mb} \leq 50 \text{ }^\circ\text{C}^1$ $\delta = 0.5$ ; with reapplied $V_{RRM(max)}$ ;	-	10	A
$I_{FSM}$	Non-repetitive peak forward current per diode	$T_{mb} \leq 50 \text{ }^\circ\text{C}^1$ $t = 10 \text{ ms}$ $t = 8.3 \text{ ms}$ sinusoidal; $T_j = 150 \text{ }^\circ\text{C}$ prior to surge with reapplied $V_{RWM(max)}$	-	40	A
$T_{stg}$	Storage temperature		-40	150	$^\circ\text{C}$
$T_j$	Operating junction temperature		-	150	$^\circ\text{C}$

## THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$R_{th\ j-mb}$	Thermal resistance junction to mounting base	per diode	-	-	2.5	K/W
$R_{th\ j-a}$	Thermal resistance junction to ambient	both diodes in free air.	-	-	2.2	K/W
			-	60	-	K/W

<sup>1</sup>  $T_{mb(max)}$  limited by thermal runaway

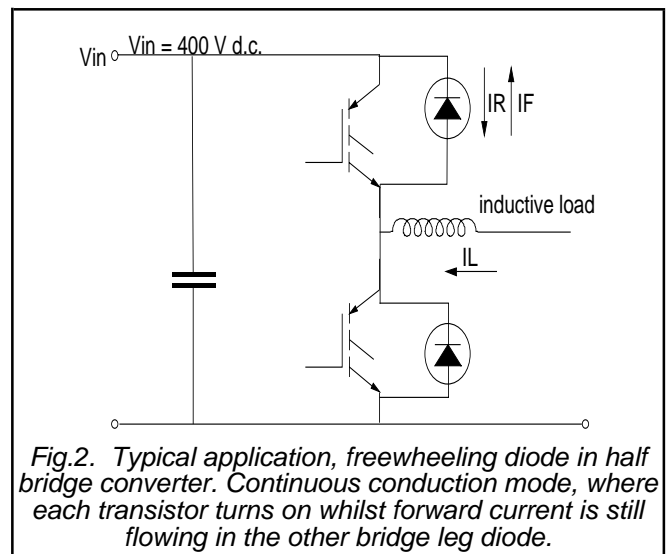
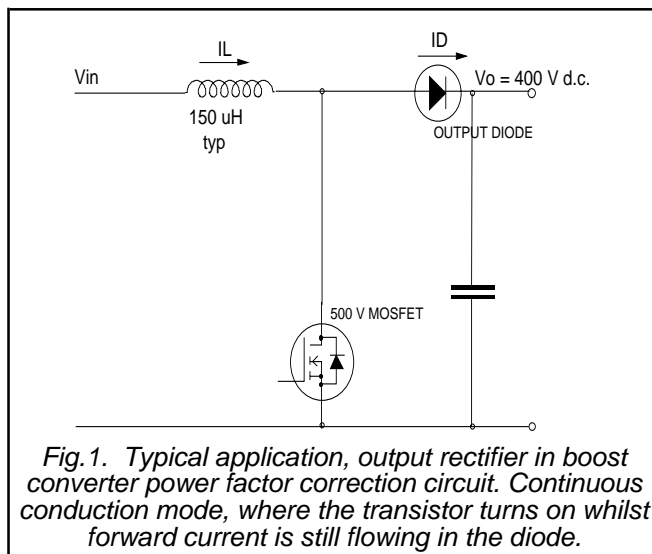
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**ELECTRICAL CHARACTERISTICS**

$T_j = 25\text{ }^\circ\text{C}$ , per diode unless otherwise stated

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_F$	Forward voltage	$I_F = 5\text{ A}$ ; $T_j = 150\text{ }^\circ\text{C}$ $I_F = 10\text{ A}$ ; $T_j = 150\text{ }^\circ\text{C}$	-	1.4 1.75	1.75 2.2	V V
$I_R$	Reverse current	$I_F = 5\text{ A}$ ; $V_R = 600\text{ V}$ $V_R = 500\text{ V}$ ; $T_j = 100\text{ }^\circ\text{C}$	-	2.0 9 0.9	2.9 100 3.0	V $\mu\text{A}$ mA
$t_{rr}$	Reverse recovery time	$I_F = 1\text{ A}$ ; $V_R = 30\text{ V}$ ; $di_F/dt = 50\text{ A}/\mu\text{s}$	-	30	50	ns
$t_{rr}$	Reverse recovery time	$I_F = 5\text{ A}$ ; $V_R = 400\text{ V}$ ; $di_F/dt = 500\text{ A}/\mu\text{s}$	-	19	-	ns
$t_{rr}$	Reverse recovery time	$I_F = 5\text{ A}$ ; $V_R = 400\text{ V}$ ; $di_F/dt = 500\text{ A}/\mu\text{s}$ ; $T_j = 100\text{ }^\circ\text{C}$	-	25	30	ns
$I_{rrm}$	Peak reverse recovery current	$I_F = 5\text{ A}$ ; $V_R = 400\text{ V}$ ; $di_F/dt = 50\text{ A}/\mu\text{s}$ ; $T_j = 125\text{ }^\circ\text{C}$	-	0.7	3	A
$I_{rrm}$	Peak reverse recovery current	$I_F = 5\text{ A}$ ; $V_R = 400\text{ V}$ ; $di_F/dt = 500\text{ A}/\mu\text{s}$ ; $T_j = 125\text{ }^\circ\text{C}$	-	8	11	A
$V_{fr}$	Forward recovery voltage	$I_F = 10\text{ A}$ ; $di_F/dt = 100\text{ A}/\mu\text{s}$	-	9	11	V



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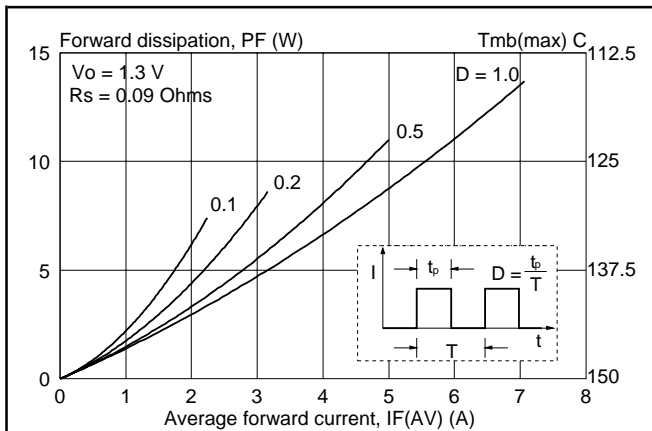


Fig.3. Maximum forward dissipation per diode as a function of average forward current; rectangular current waveform where  $I_{F(AV)} = I_{F(RMS)} \times \sqrt{D}$ .

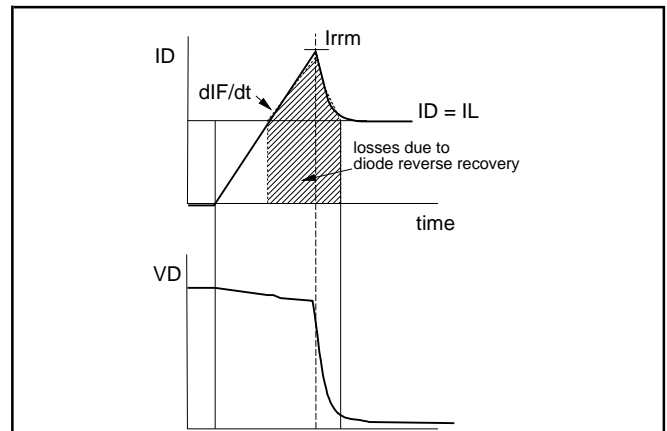


Fig.6. Origin of switching losses in transistor due to diode reverse recovery.

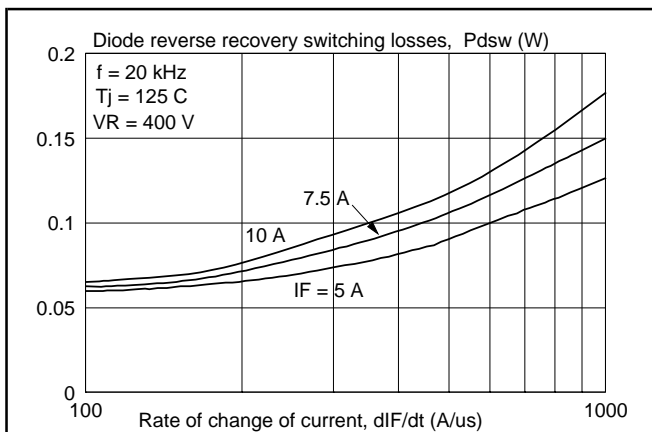


Fig.4. Typical reverse recovery switching losses per diode, as a function of rate of change of current  $dI_F/dt$ .

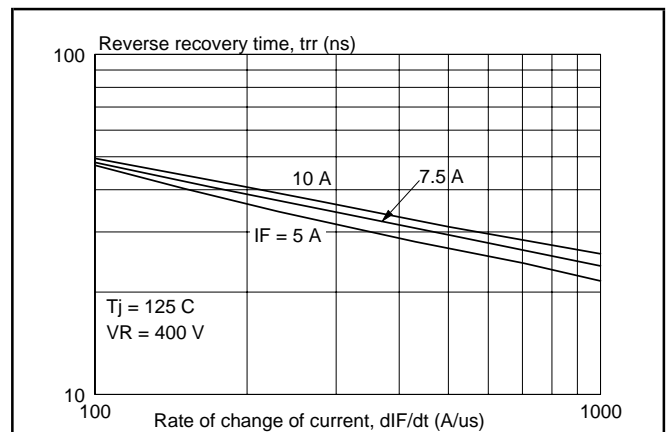


Fig.7. Typical reverse recovery time  $t_{rr}$ , per diode as a function of rate of change of current  $dI_F/dt$ .

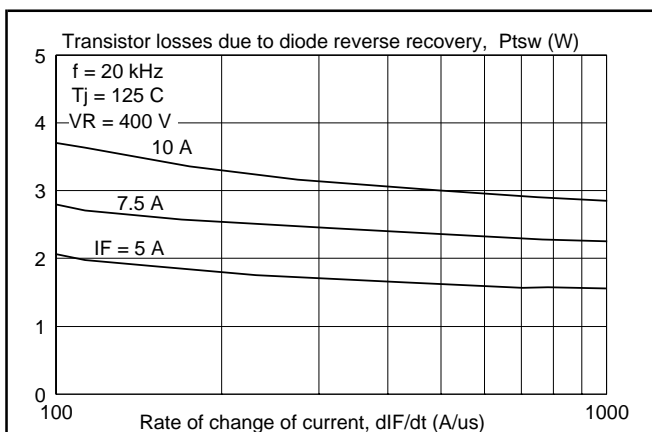


Fig.5. Typical switching losses in transistor due to reverse recovery of diode, as a function of change of current  $dI_F/dt$ .

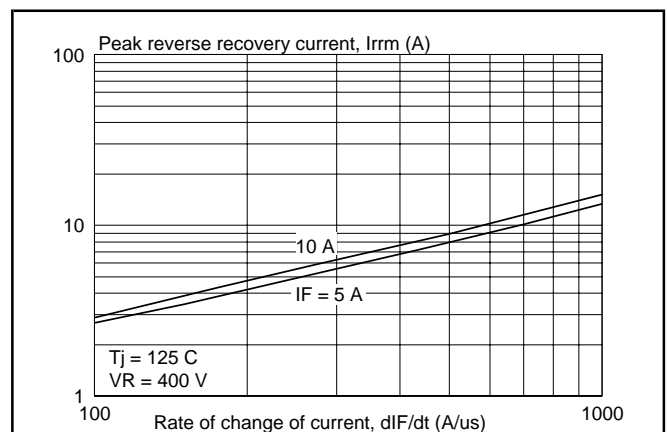
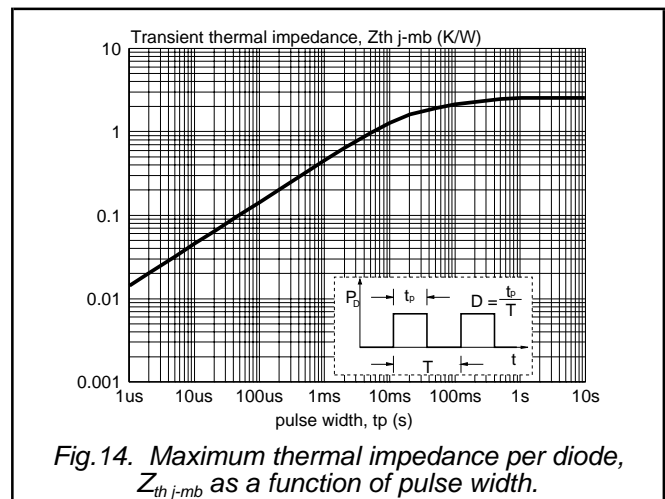
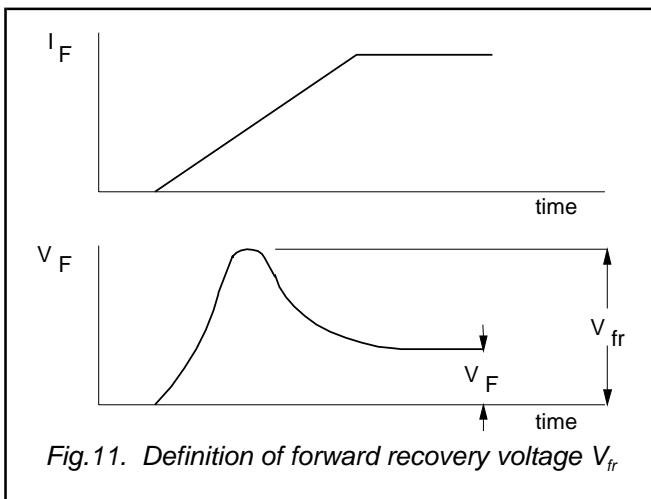
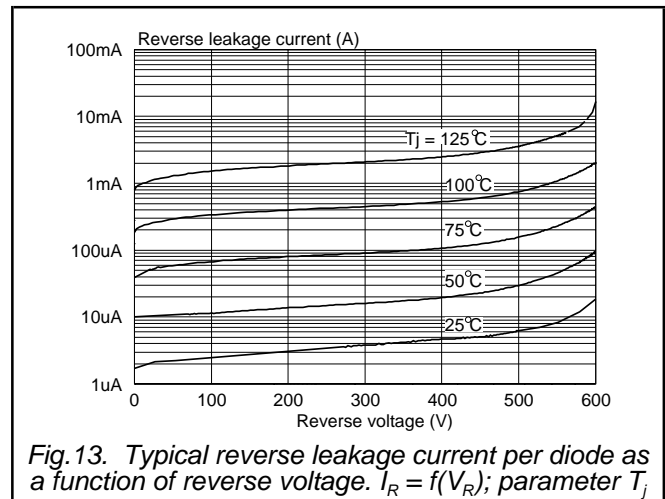
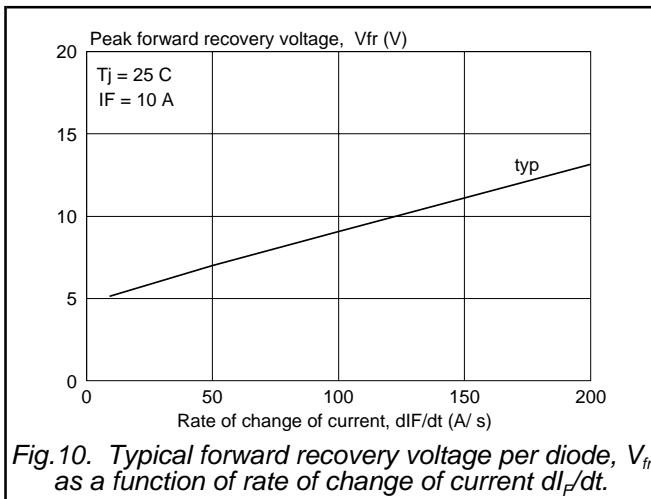
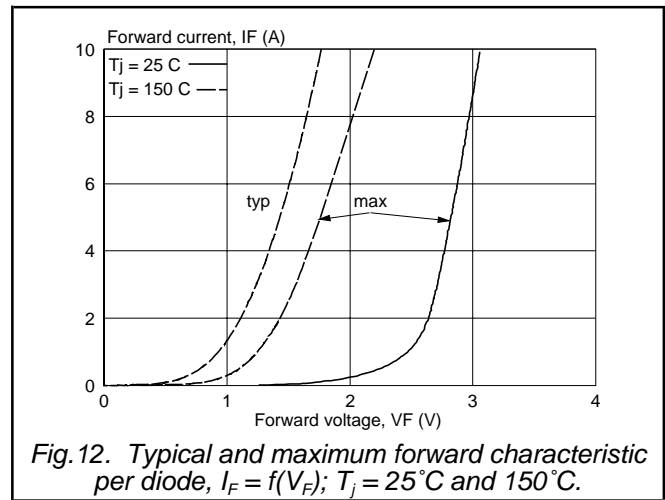
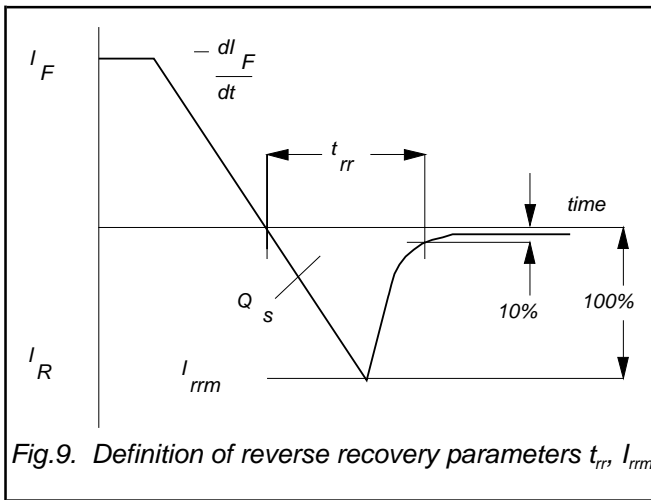


Fig.8. Typical peak reverse recovery current per diode,  $I_{rrm}$  as a function of rate of change of current  $dI_F/dt$ .

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**MECHANICAL DATA**

*Dimensions in mm*

*Net Mass: 2 g*

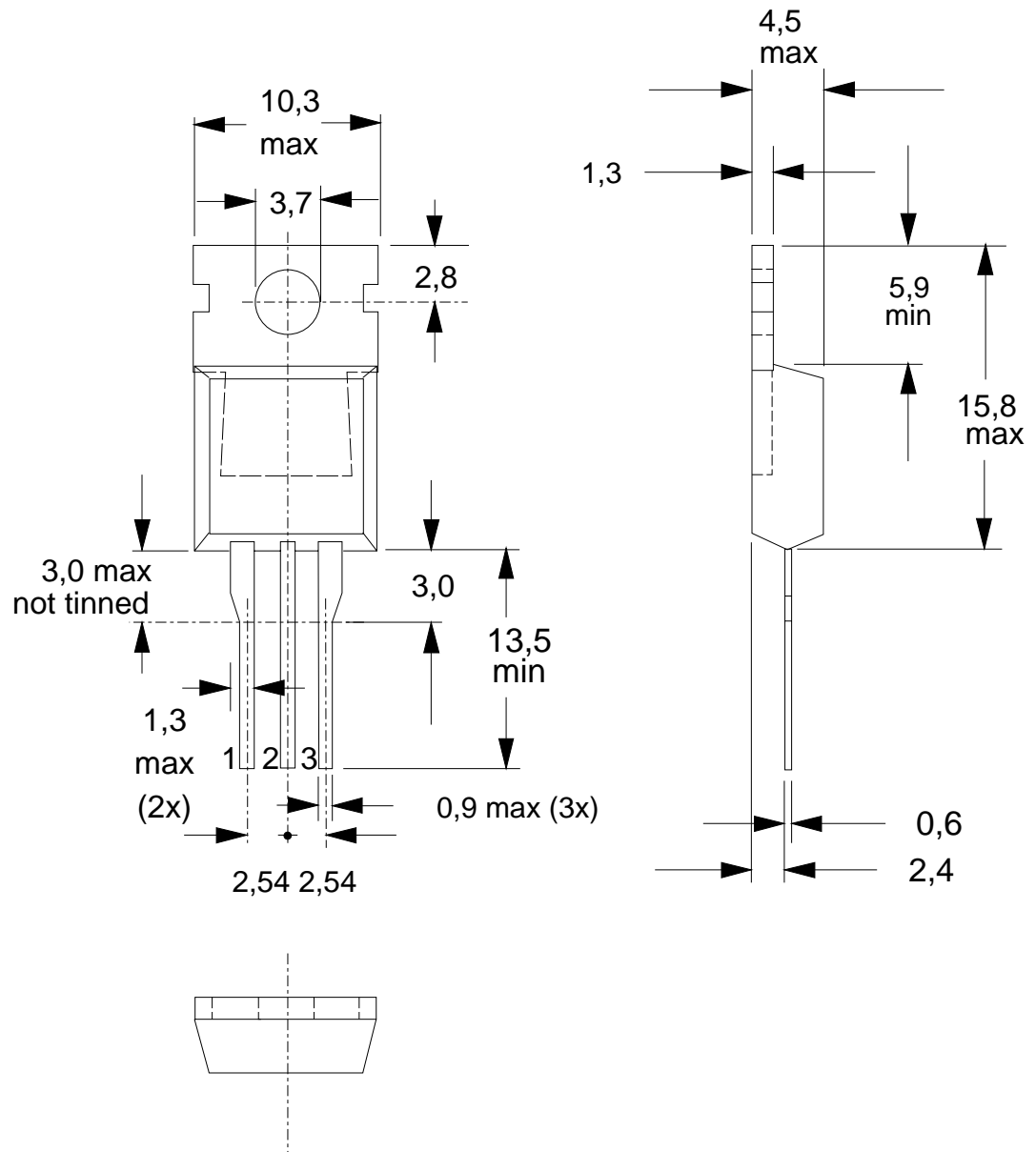


Fig.15. SOT78 (TO220AB); pin 2 connected to mounting base.

**Notes**

1. Refer to mounting instructions for SOT78 (TO220) envelopes.
2. Epoxy meets UL94 V0 at 1/8".

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**DEFINITIONS**

<b>Data sheet status</b>	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
<b>Limiting values</b>	
Limiting values are given in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of this specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
<b>Application information</b>	
Where application information is given, it is advisory and does not form part of the specification.	
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