

# DATA SHEET

**BYC10B-600**

Rectifier diode

ultrafast, low switching loss

Product specification

March 2001



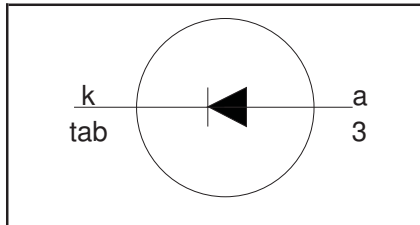
# Rectifier diode ultrafast, low switching loss

**BYC10B-600**

## FEATURES

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

## SYMBOL



## QUICK REFERENCE DATA

$V_R = 600\text{ V}$
$V_F \leq 1.8\text{ V}$
$I_{F(AV)} = 10\text{ A}$
$t_{rr} = 19\text{ ns (typ)}$

## APPLICATIONS

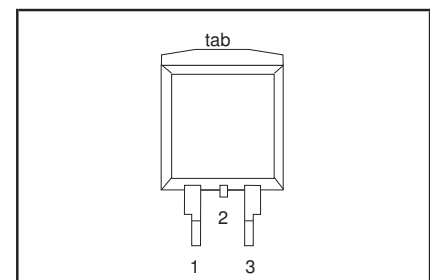
- Active power factor correction
- Half-bridge lighting ballasts
- Half-bridge/ full-bridge switched mode power supplies.

The BYC10B-600 is supplied in the SOT404 surface mounting package.

## PINNING

PIN	DESCRIPTION
1	no connection
2	cathode <sup>1</sup>
3	anode
tab	cathode

## SOT404



## 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	$T_{mb} \leq 114\text{ °C}$	-	500	V
$I_{F(AV)}$	Average forward current	$\delta = 0.5$ ; with reappplied $V_{RRM(max)}$ ; $T_{mb} \leq 78\text{ °C}$	-	10	A
$I_{FRM}$	Repetitive peak forward current	$\delta = 0.5$ ; with reappplied $V_{RRM(max)}$ ; $T_{mb} \leq 78\text{ °C}$	-	20	A
$I_{FSM}$	Non-repetitive peak forward current.	$t = 10\text{ ms}$	-	65	A
		$t = 8.3\text{ ms}$	-	71	A
		sinusoidal; $T_j = 150\text{ °C}$ prior to surge with reappplied $V_{RWM(max)}$			
$T_{stg}$	Storage temperature		-40	150	°C
$T_j$	Operating junction temperature		-	150	°C

## THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$R_{th\ j-mb}$	Thermal resistance junction to mounting base		-	-	2	K/W
$R_{th\ j-a}$	Thermal resistance junction to ambient	minimum footprint, FR4 board	-	50	-	K/W

<sup>1</sup> it is not possible to make connection to pin 2 of the SOT404 package

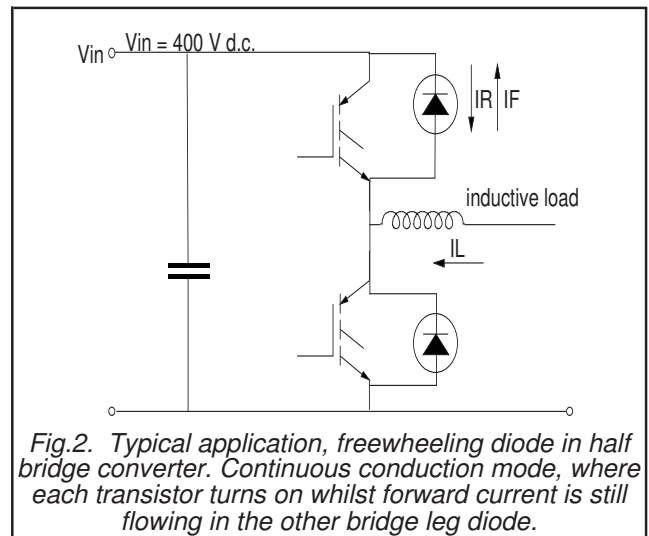
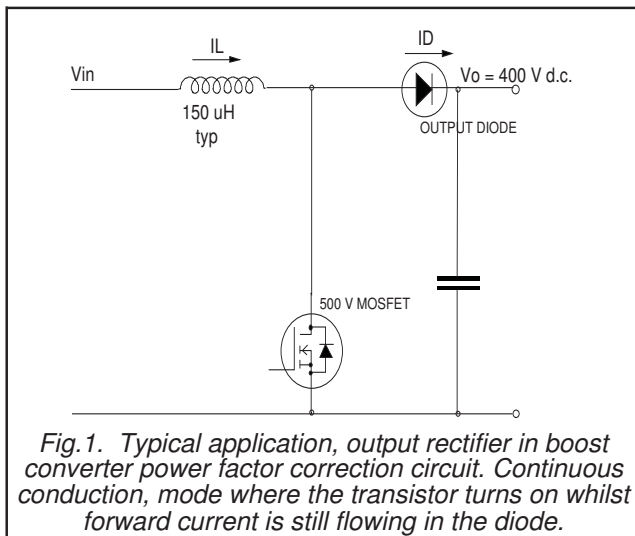
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**ELECTRICAL CHARACTERISTICS**

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_F$	Forward voltage	$I_F = 10\text{ A}; T_j = 150\text{ }^\circ\text{C}$	-	1.4	1.8	V
		$I_F = 20\text{ A}; T_j = 150\text{ }^\circ\text{C}$	-	1.7	2.3	V
		$I_F = 10\text{ A}; V_R = 600\text{ V}$	-	2.0	2.9	V
$I_R$	Reverse current	$V_R = 600\text{ V}$	-	9	200	$\mu\text{A}$
		$V_R = 500\text{ V}; T_j = 100\text{ }^\circ\text{C}$	-	1.1	3.0	mA
$t_{rr}$	Reverse recovery time	$I_F = 1\text{ A}; V_R = 30\text{ V}; dI_F/dt = 50\text{ A}/\mu\text{s}$	-	35	55	ns
$t_{rr}$	Reverse recovery time	$I_F = 10\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}$	-	19	-	ns
$t_{rr}$	Reverse recovery time	$I_F = 10\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 100\text{ }^\circ\text{C}$	-	32	40	ns
$I_{rrm}$	Peak reverse recovery current	$I_F = 10\text{ A}; V_R = 400\text{ V}; dI_F/dt = 100\text{ A}/\mu\text{s}; T_j = 125\text{ }^\circ\text{C}$	-	3	7.5	A
$I_{rrm}$	Peak reverse recovery current	$I_F = 10\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 125\text{ }^\circ\text{C}$	-	9.5	12	A
$V_{fr}$	Forward recovery voltage	$I_F = 10\text{ A}; dI_F/dt = 100\text{ A}/\mu\text{s}$	-	8	11	V



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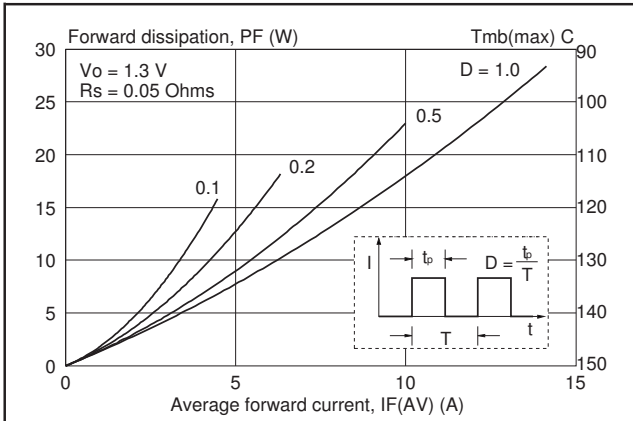


Fig.3. Maximum forward dissipation as a function of average forward current; rectangular current waveform where  $I_{F(AV)} = I_{F(RMS)} \times \sqrt{D}$ .

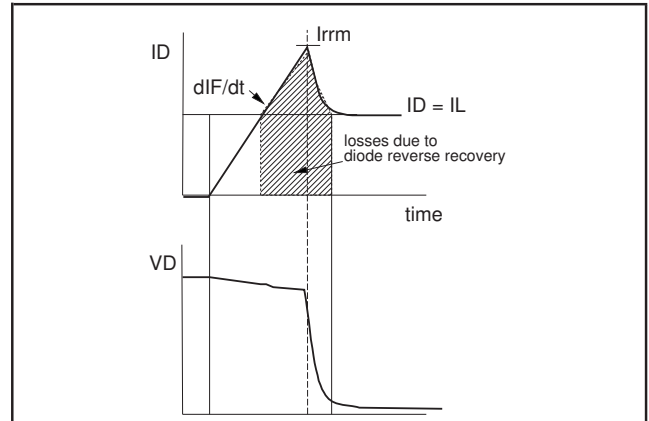


Fig.6. Origin of switching losses in transistor due to diode reverse recovery.

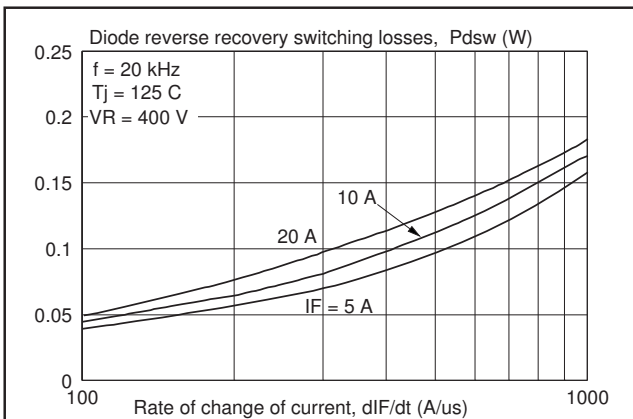


Fig.4. Typical reverse recovery switching losses in diode, as a function of rate of change of current  $dI_F/dt$ .

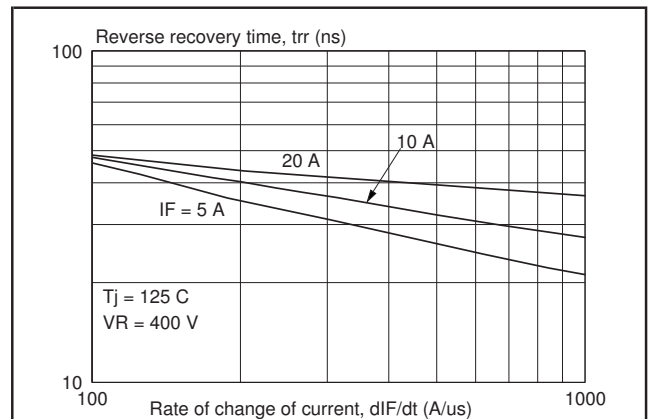


Fig.7. Typical reverse recovery time  $t_{rr}$  as a function of rate of change of current  $dI_F/dt$ .

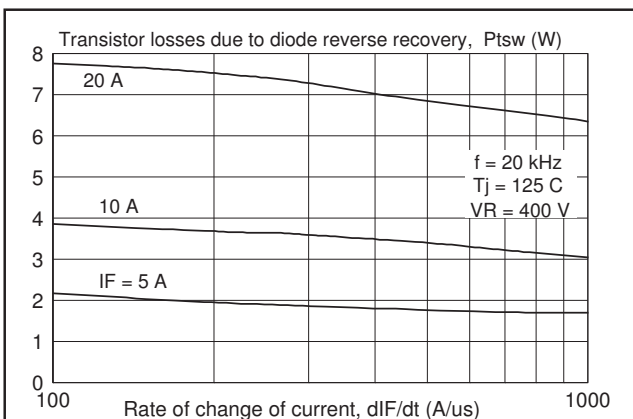


Fig.5. Typical switching losses in transistor due to reverse recovery of diode, as a function of of change of current  $dI_F/dt$ .

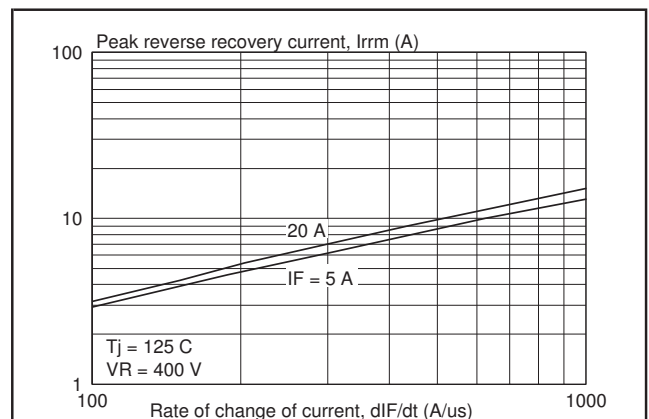
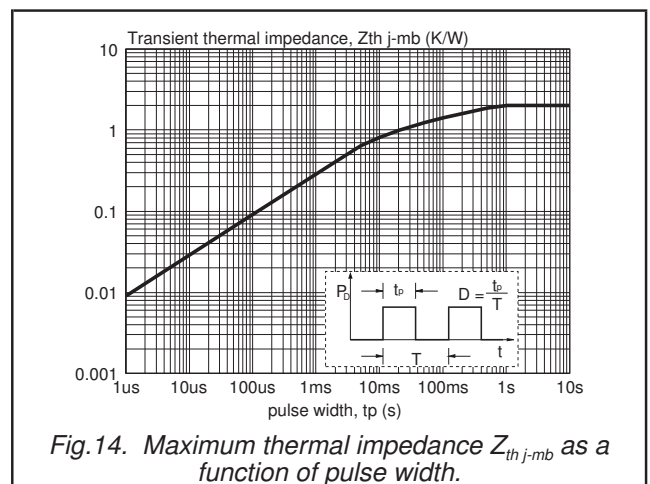
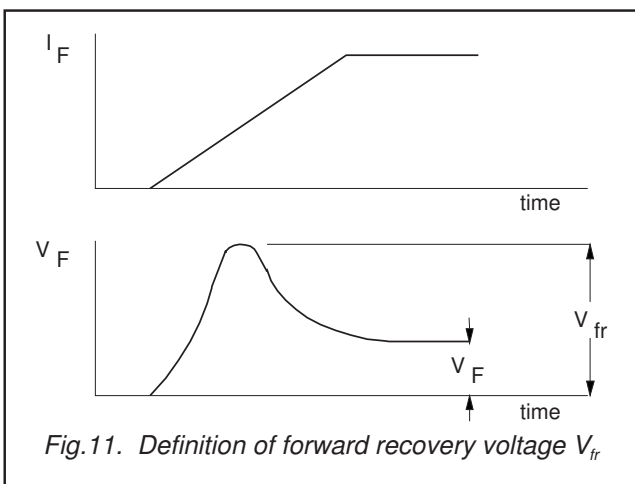
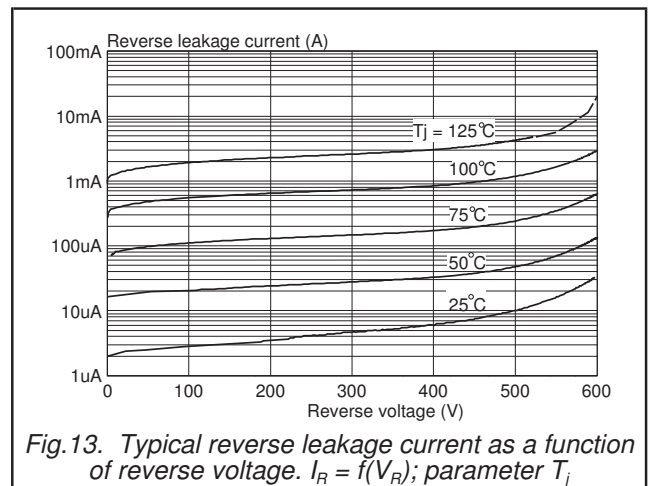
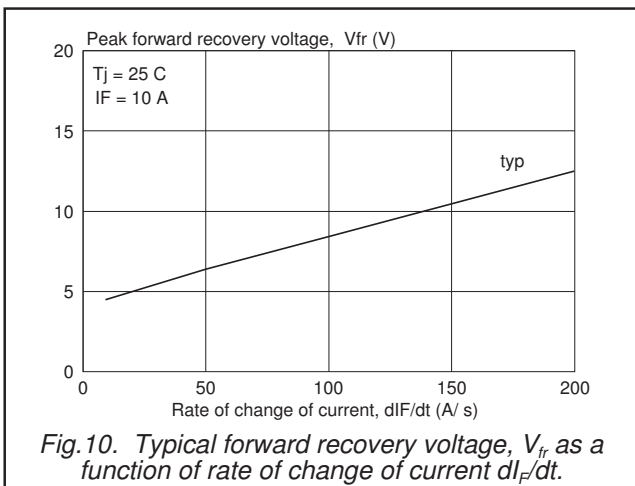
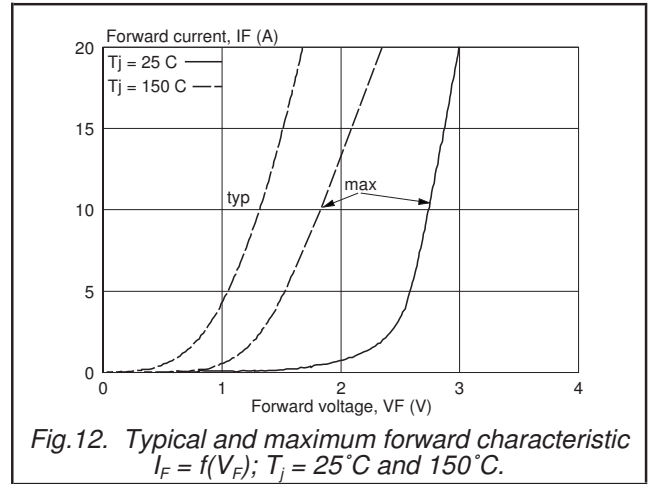


Fig.8. Typical peak reverse recovery current,  $I_{rrm}$  as a function of rate of change of current  $dI_F/dt$ .

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**MECHANICAL DATA**

Dimensions in mm

Net Mass: 1.4 g

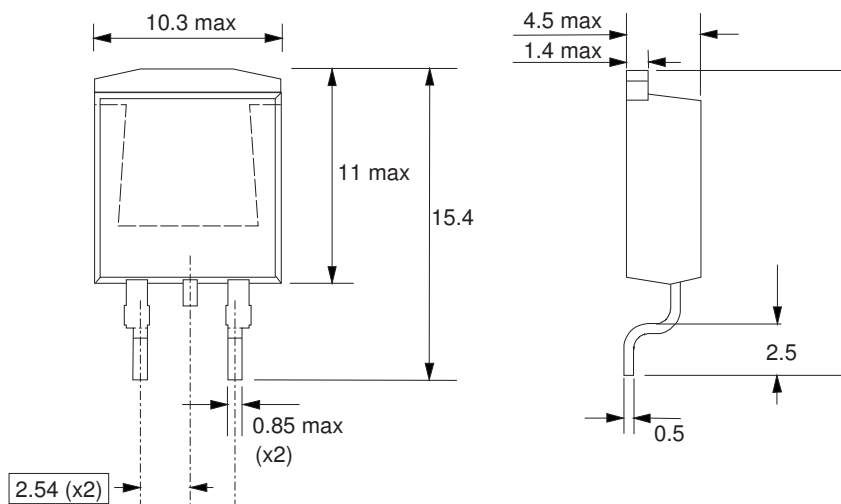


Fig. 15. SOT404 : centre pin connected to mounting base.

**MOUNTING INSTRUCTIONS**

Dimensions in mm

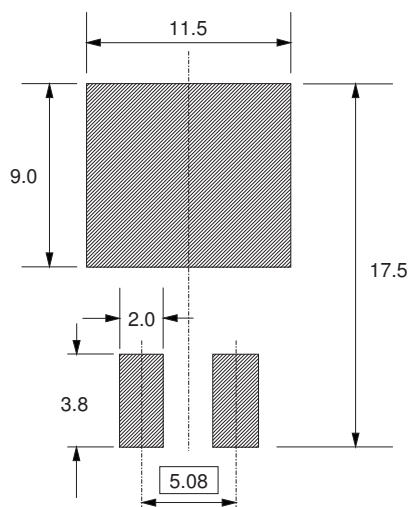


Fig. 16. SOT404 : minimum pad sizes for surface mounting.

**Notes**

1. Plastic meets UL94 V0 at 1/8".

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DOCUMENT STATUS <sup>(1)</sup>	PRODUCT STATUS <sup>(2)</sup>	DEFINITION
Objective data sheet	Development	This document contains data from the objective specification for product development.
Preliminary data sheet	Qualification	This document contains data from the preliminary specification.
Product data sheet	Production	This document contains the product specification.

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