DATA SHEET

BYC5B-600
Rectifier diode
ultrafast, low switching loss

Product specification

March 2001

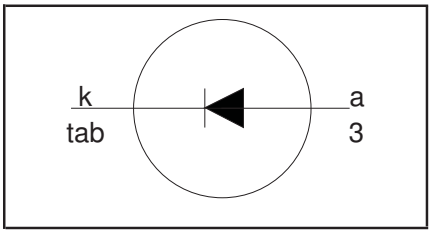
Rectifier diode ultrafast, low switching loss

BYC5B-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 V

$V_F \leq 1.75$ V

$I_{F(AV)}$ = 5 A

t_{rr} = 19 ns (typ)

APPLICATIONS

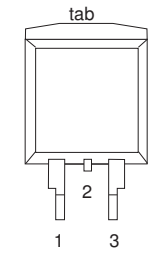
- Active power factor correction
- Half-bridge lighting ballasts
- Half-bridge/ full-bridge switched mode power supplies.

The BYC5B-600 is supplied in the SOT404 surface mounting package.

PINNING

PIN	DESCRIPTION
1	no connection
2	cathode[1]
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	$T_{mb} \leq 110$ ˚C	-	500	V
$I_{F(AV)}$	Average forward current	$\delta = 0.5$; with reapplied $V_{RRM(max)}$; $T_{mb} \leq 89$ ˚C	-	5	A
I_{FRM}	Repetitive peak forward current	$\delta = 0.5$; with reapplied $V_{RRM(max)}$; $T_{mb} \leq 89$ ˚C	-	10	A
I_{FSM}	Non-repetitive peak forward current.	t = 10 ms	-	40	A
		t = 8.3 ms sinusoidal; T_j = 150˚C prior to surge with reapplied $V_{RWM(max)}$	-	44	A
T_{stg}	Storage temperature		-40	150	˚C
T_j	Operating junction temperature		-	150	˚C

THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$R_{th\ j\text{-}mb}$	Thermal resistance junction to mounting base		-	-	2.5	K/W
$R_{th\ j\text{-}a}$	Thermal resistance junction to ambient	minimum footprint, FR4 board	-	50	-	K/W

1 it is not possible to make connection to pin 2 of the SOT404 package

ELECTRICAL CHARACTERISTICS

T_j = 25 ˚C unless otherwise stated

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

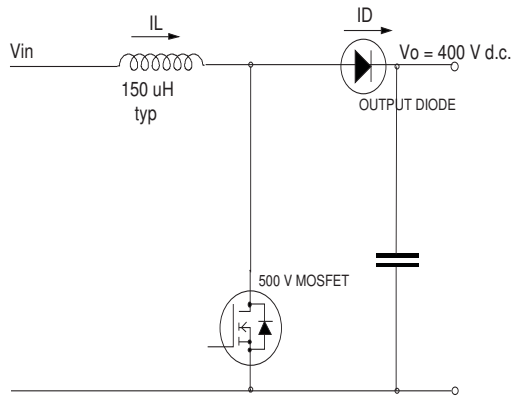


Fig.1. Typical application, output rectifier in boost converter power factor correction circuit. Continuous conduction mode, where the transistor turns on whilst forward current is still flowing in the diode.

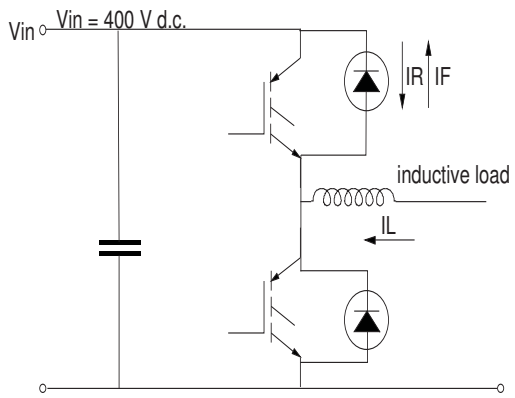


Fig.2. Typical application, freewheeling diode in half bridge converter. Continuous conduction mode, where each transistor turns on whilst forward current is still flowing in the other bridge leg diode.

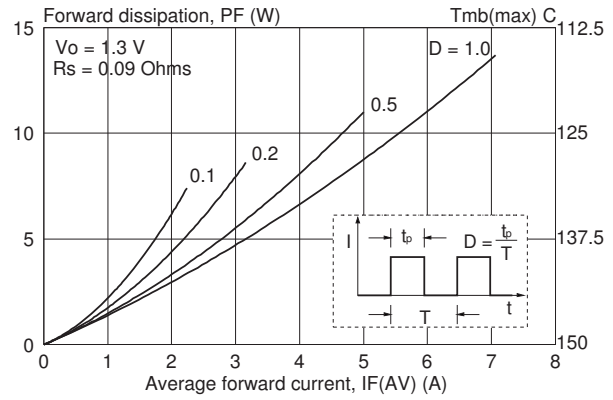


Fig.3. Maximum forward dissipation as a function of average forward current; rectangular current waveform where $I_{F(AV)} = I_{F(RMS)} \times \sqrt{D}$.

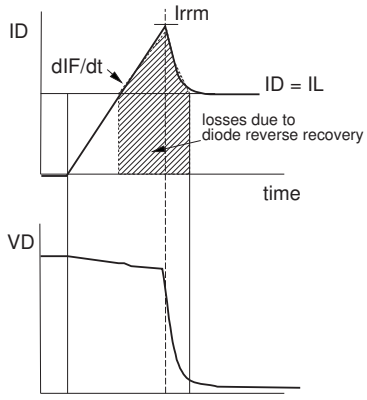


Fig.6. Origin of switching losses in transistor due to diode reverse recovery.

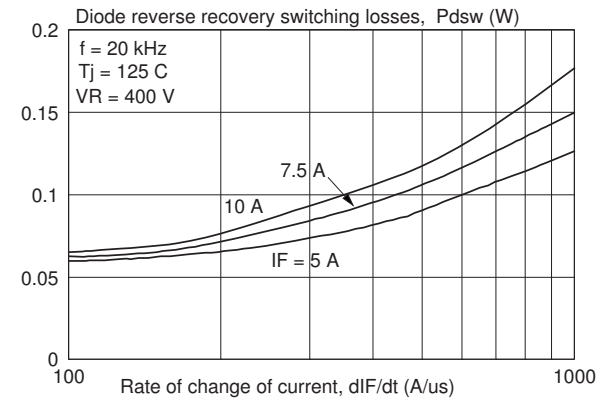


Fig.4. Typical reverse recovery switching losses in diode, as a function of rate of change of current dI_F/dt.

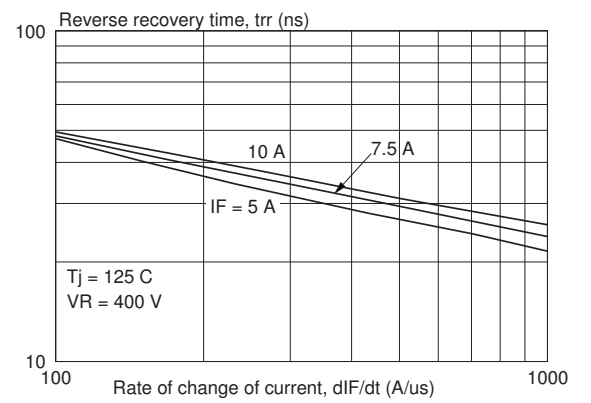


Fig.7. Typical reverse recovery time t_{rr}, as a function of rate of change of current dI_F/dt.

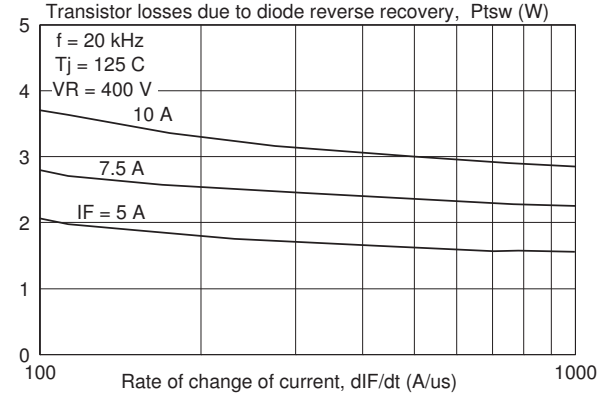


Fig.5. Typical switching losses in transistor due to reverse recovery of diode, as a function of of change of current dI_F/dt.

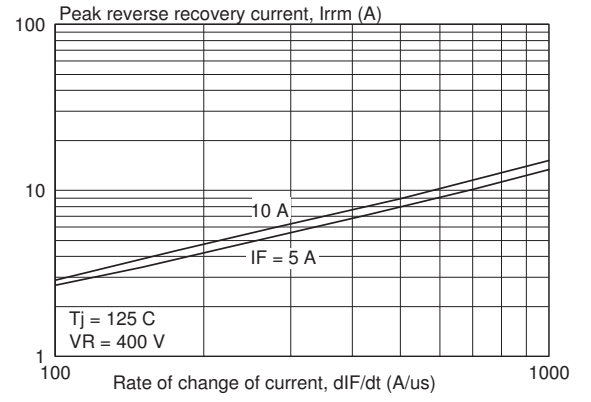


Fig.8. Typical peak reverse recovery current, I_{rrm} as a function of rate of change of current dI_F/dt.

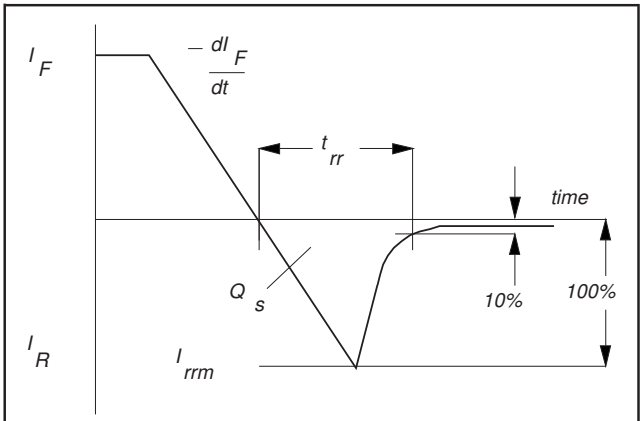


Fig.9. Definition of reverse recovery parameters t_{rr}, I_{rrm}

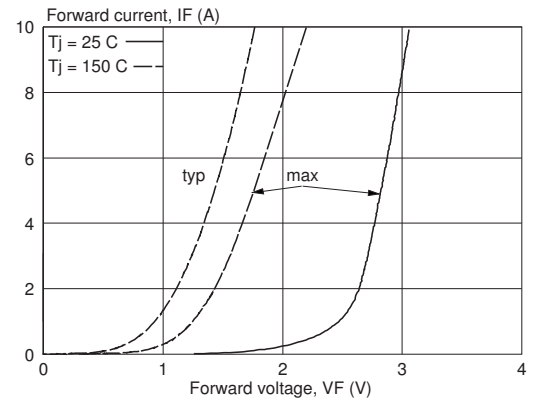


Fig.12. Typical and maximum forward characteristic $I_F = f(V_F)$; T_j = 25˚C and 150˚C.

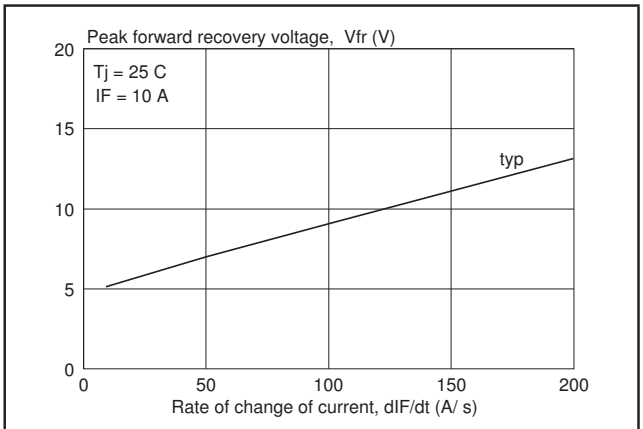


Fig.10. Typical forward recovery voltage, V_{fr} as a function of rate of change of current dI_F/dt.

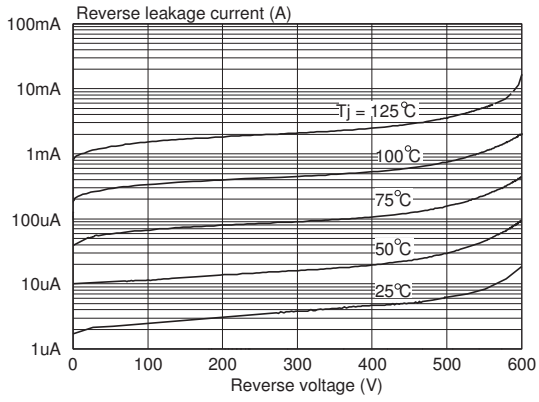


Fig.13. Typical reverse leakage current as a function of reverse voltage. $I_R = f(V_R)$; parameter T_j

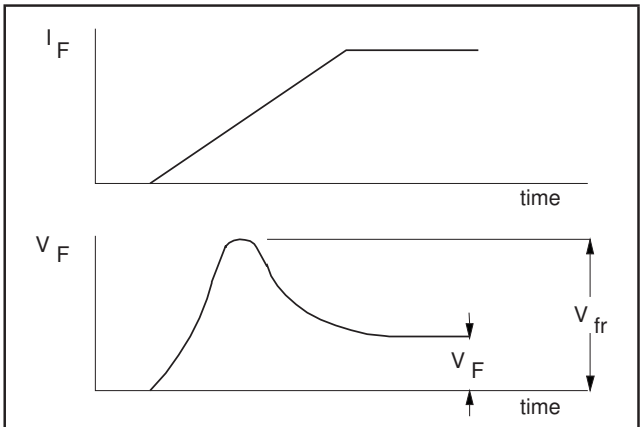


Fig.11. Definition of forward recovery voltage V_{fr}

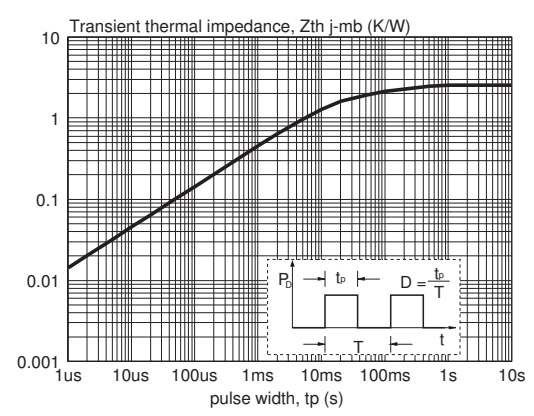


Fig.14. Maximum thermal impedance $Z_{th\ j\text{-}mb}$ as a function of pulse width.

MECHANICAL DATA

Dimensions in mm

Net Mass: 1.4 g

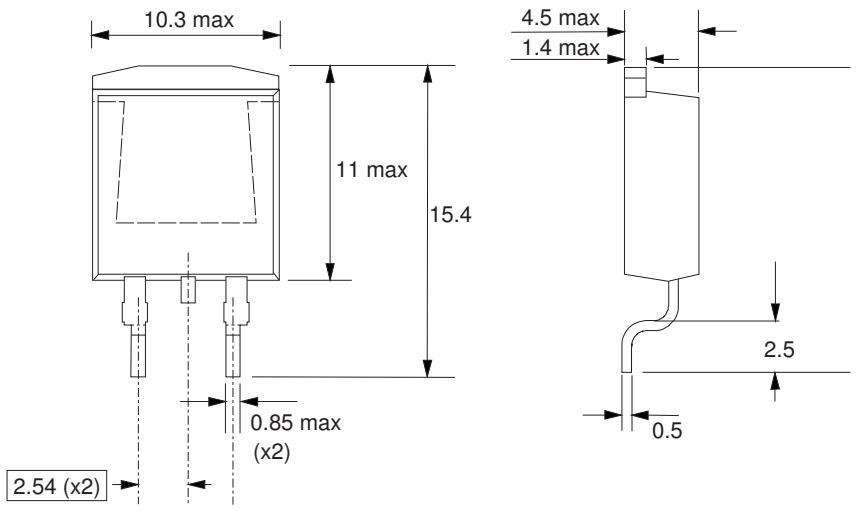


Fig.15. SOT404 : centre pin connected to mounting base.

MOUNTING INSTRUCTIONS

Dimensions in mm

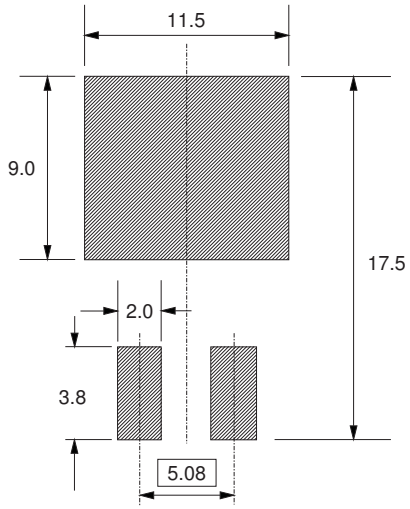


Fig.16. SOT404 : soldering pattern for surface mounting.

Notes
1. Epoxy meets UL94 V0 at 1/8".

Legal information

DATA SHEET STATUS

DOCUMENT STATUS[1]	PRODUCT STATUS[2]	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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