DISCRETE SEMICONDUCTORS

DATA SHEET

BYC10B-600 Rectifier diode ultrafast, low switching loss

Product specification

August 2018



Product specification WeEn Semiconductors

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

$$V_{R} = 600 \text{ V}$$

$$V_{F} \le 1.8 \text{ V}$$

$$I_{F(AV)} = 10 \text{ A}$$

$$t_{rr} = 19 \text{ ns (typ)}$$

APPLICATIONS

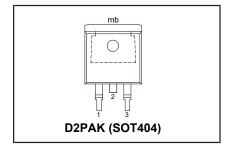
- Active power factor correction
- Half-bridge lighting ballastsHalf-bridge/ full-bridge switched mode power supplies.

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

PINNING

PIN	DESCRIPTION	
1	no connection	
2	cathode 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} ≤ 114 °C	-	500	V
I _{F(AV)}	Average forward current	$\delta = 0.5$; with reapplied $V_{RRM(max)}$;	-	10	A
, ,		$IT_{mb} \le 78 ^{\circ}C$			
I _{FRM}	Repetitive peak forward current	$\delta = 0.5$; with reapplied $V_{BBM(max)}$;	-	20	A
		$T_{mb} \le 78 ^{\circ}C$			
I I _{FSM}	Non-repetitive peak forward	t = 10 ms	-	65	A
	current.	t = 8.3 ms	-	71	A
		sinusoidal; $T_i = 150^{\circ}C$ prior to surge			
		with reapplied V _{RWM(max)}			
T _{stg}	Storage temperature		-40	150	°C
T _i	Operating junction temperature		-	150	°C

THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
R _{th j-mb}	Thermal resistance junction to		-	-	2	K/W
R _{th j-a}	mounting base 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

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ELECTRICAL CHARACTERISTICS

 $T_i = 25$ °C unless otherwise stated

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V _F	Forward voltage	$I_F = 10 \text{ A}; T_j = 150^{\circ}\text{C}$	-	1.4	1.8	V
		$I_F = 20 \text{ A}; T_j = 150^{\circ}\text{C}$	-	1.7	2.3	V
l _B	Reverse current	$I_F = 10 \text{ A};$ $V_R = 600 \text{ V}$	-	2.0 9	2.9 200	V μA
		$V_{R}^{''} = 500 \text{ V}; T_{j} = 100 \text{ °C}$	-	1.1	3.0	mΑ
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	$I_{\rm F} = 10 \text{Å}; V_{\rm R} = 400 \text{V};$	-	19	-	ns
t _{rr}	Reverse recovery time	$dI_F/dt = 500 \text{ A/}\mu\text{s}$ $I_F = 10 \text{ A}; V_R = 400 \text{ V};$ $dI_F/dt = 500 \text{ A/}\mu\text{s}; T_i = 100^{\circ}\text{C}$	-	32	40	ns
I _{rrm}	Peak reverse recovery current	I _F = 10 A; V _R = 400 V; dI _F /dt = 100 A/μs; T _i = 125°C	-	3	7.5	Α
I _{rrm}	Peak reverse recovery current	$d_{I_F}/dt = 100 \text{ A/}\mu\text{s}, \ T_i = 125 \text{ C}$ $I_F = 10 \text{ A}; \ V_R = 400 \text{ V};$ $d_{I_F}/dt = 500 \text{ A/}\mu\text{s}; \ T_j = 125 ^{\circ}\text{C}$	-	9.5	12	А
V _{fr}	Forward recovery voltage	$I_F = 10 \text{ A}; dI_F/dt = 100 \text{ A/}\mu\text{s}$	-	8	11	V

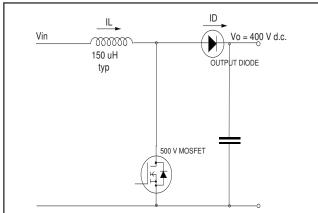


Fig.1. Typical application, output rectifier in boost converter power factor correction circuit. Continuous conduction, mode where the transistor turns on whilst forward current is still flowing in the diode.

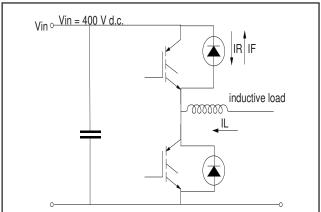


Fig.2. Typical application, freewheeling diode in half bridge converter. Continuous conduction mode, where each transistor turns on whilst forward current is still flowing in the other bridge leg diode.

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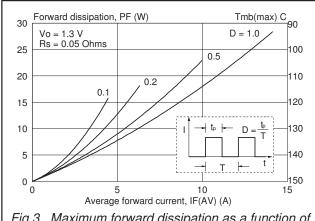


Fig.3. Maximum forward dissipation as a function of average forward current; rectangular current waveform where $I_{F(AV)} = I_{F(RMS)} \times \sqrt{D}$.

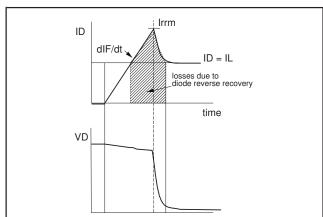


Fig.6. Origin of switching losses in transistor due to diode reverse recovery.

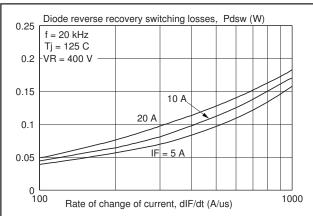


Fig.4. Typical reverse recovery switching losses in diode, as a function of rate of change of current dl_F/dt.

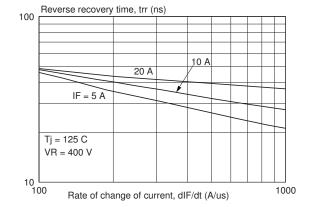


Fig.7. Typical reverse recovery time t_{rr} , as a function of rate of change of current dl_{r}/dt .

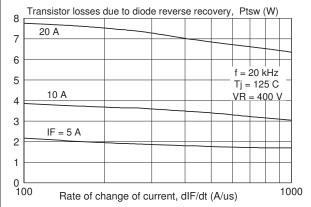


Fig.5. Typical switching losses in transistor due to reverse recovery of diode, as a function of of change of current dl_p/dt.

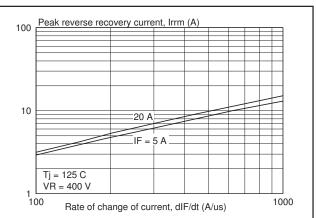


Fig.8. Typical peak reverse recovery current, I_{rrm} as a function of rate of change of current dI_r/dt.

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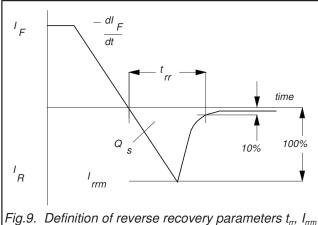


Fig.9. Definition of reverse recovery parameters t_{rr} , l_{rrm}

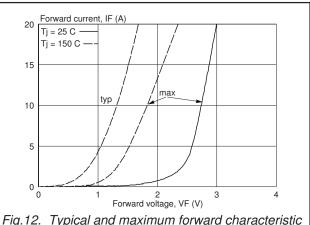


Fig.12. Typical and maximum forward characteristic $I_F = f(V_F)$; $T_j = 25^{\circ}C$ and $150^{\circ}C$.

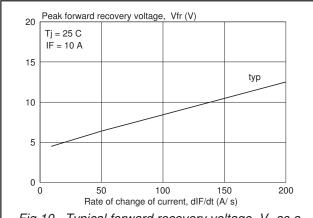


Fig.10. Typical forward recovery voltage, $V_{\rm fr}$ as a function of rate of change of current $dl_{\rm F}/dt$.

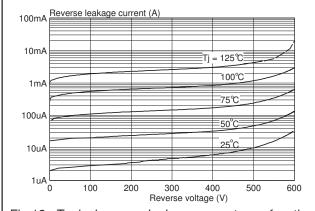
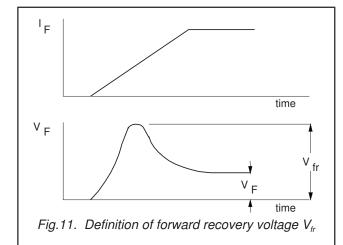
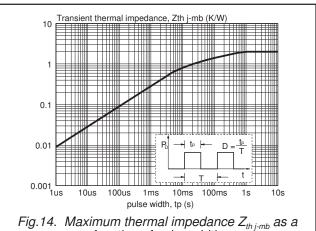


Fig.13. Typical reverse leakage current as a function of reverse voltage. $I_R = f(V_R)$; parameter T_j





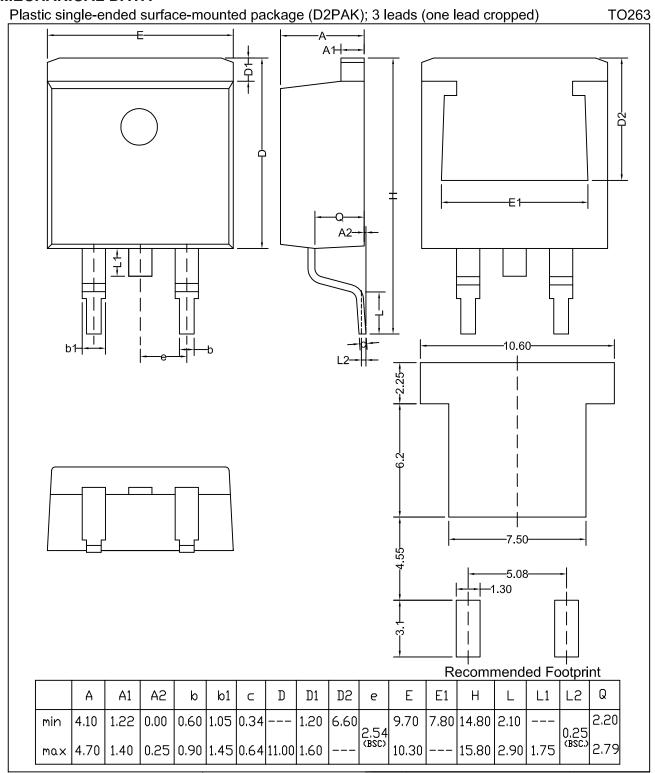
function of pulse width.

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Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

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