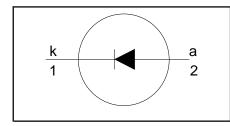
Rectifier diode ultrafast, low switching loss

BYC5-600

FEATURES

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

SYMBOL



QUICK REFERENCE DATA

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

$$V_{F} \le 1.75 \text{ V}$$

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

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

APPLICATIONS

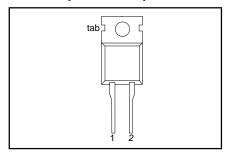
- Active power factor correction
- Half-bridge lighting ballasts
- Half-bridge/full-bridge switched mode power supplies.

The BYC5-600 is supplied in the SOD59 (TO220AC) conventional leaded package.

PINNING

DESCRIPTION	
cathode	
anode	
cathode	

SOD59 (TO220AC)



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 _{RWM}	Crest working reverse voltage		-	600	V
V _R	Continuous reverse voltage	$T_{mb} \le 110 ^{\circ}C$	-	500	V
I _{F(AV)}	Average forward current	$\delta = 0.5$; with reapplied $V_{RRM(max)}$;	-	5	A
I _{FRM}	Repetitive peak forward current	$T_{mb} \le 89 ^{\circ}C$ $\delta = 0.5$; with reapplied $V_{RRM(max)}$; $T_{mb} \le 89 ^{\circ}C$	-	10	A
I _{FSM}	Non-repetitive peak forward	t = 10 ms	-	40	A
1 SW	current.	t = 8.3 ms sinusoidal; T _i = 150°C prior to surge	-	44	A
		with reapplied V _{RWM(max)}			
T _{stg}	Storage temperature	· · · · · · · · · · · · · · · · · · ·	-40	150	°C
Tj	Operating junction temperature		-	150	°C

THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
R _{th j-mb}	Thermal resistance junction to mounting base		-	-	2.5	K/W
R _{th j-a}	1	in free air.	-	60	-	K/W

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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 = 5 A; T _i = 150°C I _F = 10 A; T _i = 150°C	-	1.4	1.75	V
		$I_{\rm F} = 10 \text{A}; T_{\rm j} = 150 ^{\circ} \text{C}$	-	1.75	2.2	V
1	Reverse current	$I_F = 5 \text{ A};$ $V_R = 600 \text{ V}$	-	2.0 9	2.9 100	V
I _R	Reverse current	$V_R = 600 \text{ V}$ $V_R = 500 \text{ V}$; $T_j = 100 \text{ °C}$	-	0.9	3.0	μA 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	$I_F = 5 \text{ A}; V_R = 400 \text{ V};$	-	19	-	ns
t _{rr}	Reverse recovery time	$dI_{F}/dt = 500 A/\mu s$ $I_{F} = 5 A; V_{R} = 400 V;$ $dI_{F}/dt = 500 A/\mu s; T_{j} = 100 ^{\circ} C$	ı	25	30	ns
I _{rrm}	Peak reverse recovery current	$I_F = 5 \text{ A}; V_R = 400 \text{ V};$	-	0.7	3	Α
I _{rrm}	Peak reverse recovery current	$dI_F/dt = 50 A/\mu s; T_i = 125 C$ $I_F = 5 A; V_R = 400 V;$ $dI_F/dt = 500 A/\mu s; T_j = 125 C$	-	8	11	А
V_{fr}	Forward recovery voltage	$I_F = 10 \text{ A}; dI_F/dt = 100 \text{ A/}\mu\text{s}$	-	9	11	V

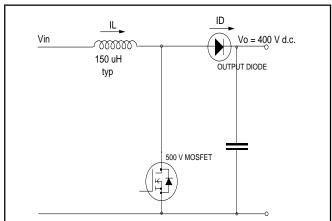


Fig.1. Typical application, output rectifier in boost converter power factor correction circuit. Continuous conduction mode, where the transistor turns on whilst forward current is still flowing in the diode.

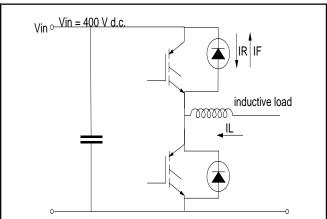


Fig.2. Typical application, freewheeling diode in half bridge converter. Continuous conduction mode, where each transistor turns on whilst forward current is still flowing in the other bridge leg diode.

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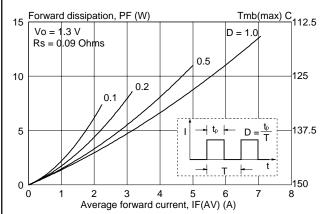
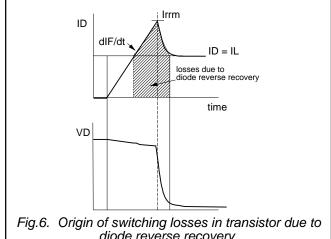


Fig.3. Maximum forward dissipation as a function of average forward current; rectangular current waveform where $I_{F(AV)} = I_{F(RMS)} \times \sqrt{D}$.



diode reverse recovery.

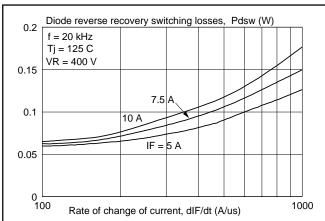


Fig.4. Typical reverse recovery switching losses in diode, as a function of rate of change of current dl_E/dt.

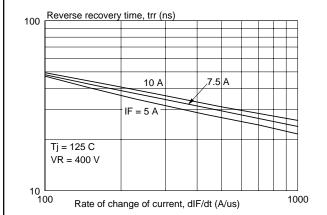


Fig.7. Typical reverse recovery time t_{rr} , as a function of rate of change of current dl /dt.

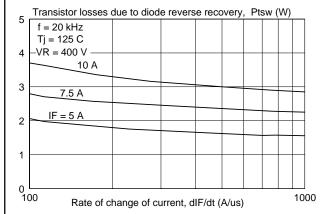


Fig.5. Typical switching losses in transistor due to reverse recovery of diode, as a function of of change of current dl₋/dt.

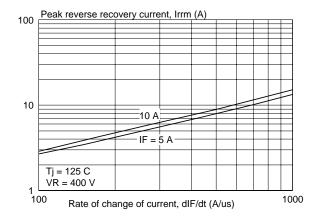


Fig.8. Typical peak reverse recovery current, I_{rrm} as a function of rate of change of current dl_F/dt.

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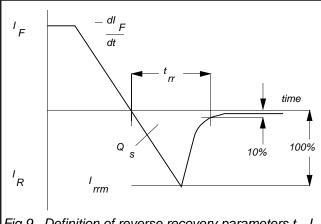


Fig.9. Definition of reverse recovery parameters t_{rr}, I_{rrm}

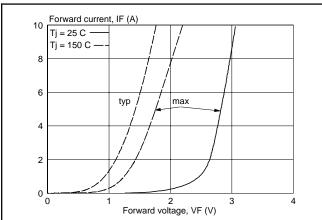


Fig.12. Typical and maximum forward characteristic $I_F = f(V_F); T_i = 25 ^{\circ}C \text{ and } 150 ^{\circ}C.$

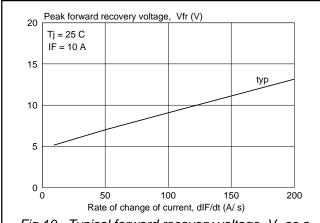


Fig.10. Typical forward recovery voltage, $V_{\rm fr}$ as a function of rate of change of current $dl_{\rm F}/dt$.

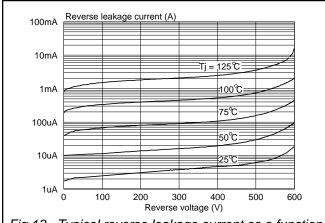
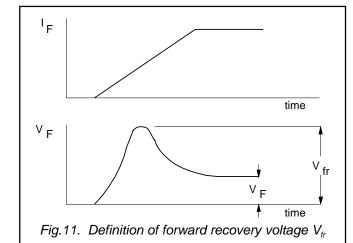


Fig.13. Typical reverse leakage current as a function of reverse voltage. $I_R = f(V_R)$; parameter T_j



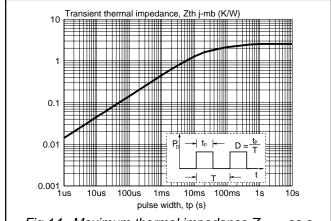
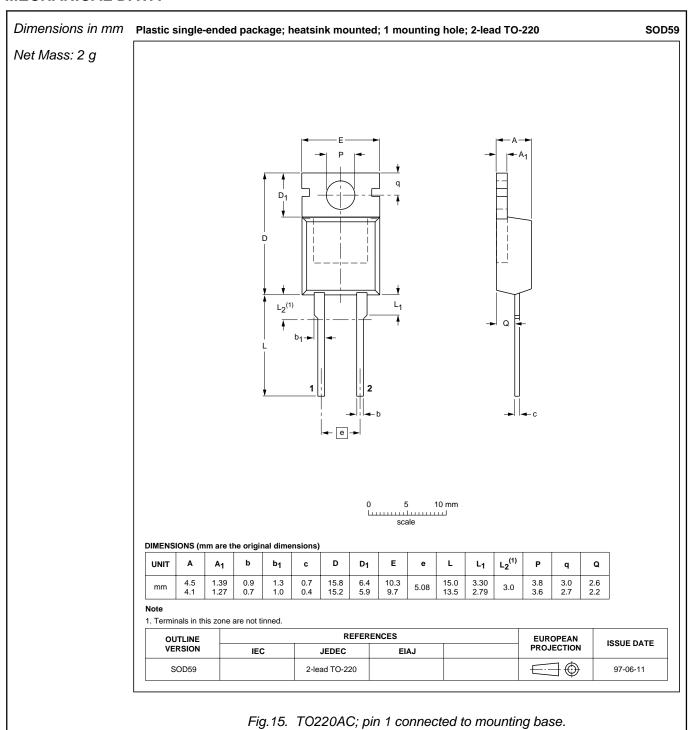


Fig.14. Maximum thermal impedance $Z_{th j-mb}$ as a function of pulse width.

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MECHANICAL DATA



- Refer to mounting instructions for TO220 envelopes.
 Epoxy meets UL94 V0 at 1/8".

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DEFINITIONS

Data sheet status				
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.			

Limiting values

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.

Application information

Where application information is given, it is advisory and does not form part of the specification.

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