### **Philips Semiconductors**

**Product specification** 

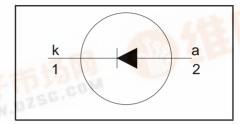
## Rectifier diode ultrafast, low switching loss

**BYC8-600** 

#### **FEATURES**

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

#### **SYMBOL**



#### QUICK REFERENCE DATA

$$V_R = 600 \text{ V}$$
 $V_F \le 1.85 \text{ V}$ 
 $I_{F(AV)} = 8 \text{ A}$ 
 $t_{rr} = 19 \text{ ns (typ)}$ 

### **APPLICATIONS**

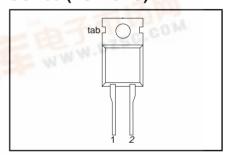
- Active power factor correction
- Half-bridge lighting ballasts
  Half-bridge/ full-bridge switched mode power supplies.

The BYC8-600 is supplied in the SOD59 (TO220AC) conventional leaded package.

### **PINNING**

PIN	DESCRIPTION		
1	cathode		
2	anode		
tab	cathode		
	CO 200		

## 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	1 hab 195	100 W.	600	V
V <sub>RWM</sub>	Crest working reverse voltage	AND AND LOS	W 41	600	V
V <sub>R</sub>	Continuous reverse voltage	T <sub>mb</sub> ≤ 110 °C	-	500	V
I <sub>F(AV)</sub>	Average forward current	$\delta = 0.5$ ; with reapplied $V_{RRM(max)}$ ; $T_{mb} \leq 82  ^{\circ}C^{1}$	-	8	Α
I <sub>FRM</sub>	Repetitive peak forward current	$\delta = 0.5$ ; with reapplied $V_{RRM(max)}$ ; $T_{mb} \le 82  ^{\circ}C^{1}$	-	16	А
I <sub>FSM</sub>	Non-repetitive peak forward	t = 10 ms	-	55	l A
-FSIW	current.	t = 8.3 ms sinusoidal: T <sub>i</sub> = 150°C prior to surge	-	60	Ä
		with reapplied V <sub>RWM(max)</sub>		-7.10	
T <sub>stg</sub>	Storage temperature Operating junction temperature	TT INVIVI(IIIAA)	-40	150 150	.C

### THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
R <sub>th j-mb</sub>	Thermal resistance junction to mounting base	COM	-	-	2.2	K/W
R <sub>th j-a</sub>	Thermal resistance junction to ambient	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 <sub>F</sub>	Forward voltage	I <sub>F</sub> = 8 A; T <sub>i</sub> = 150°C I <sub>F</sub> = 16 A; T <sub>i</sub> = 150°C	-	1.4	1.85	V
		$I_F = 16 \text{ A}; T_i = 150^{\circ}\text{C}$	-	1.7	2.3	V
		$I_{F} = 8 \text{ A};$	-	2.0	2.8	V
I <sub>R</sub>	Reverse current	$V_{R} = 600 \text{ V}$	-	9	150	μΑ
		$V_{R} = 500 \text{ V}; T_{i} = 100 \text{ °C}$	-	1.1	3.0	mΑ
t <sub>rr</sub>	Reverse recovery time	$I_F = 8 \text{ A to } V_R = 400 \text{ V};$	-	19	-	ns
		$dI_F/dt = 500 \text{ A}/\mu\text{s}$				
t <sub>rr</sub>	Reverse recovery time	$I_F = 8 \text{ A to } V_R = 400 \text{ V};$	-	32	40	ns
		$dI_{F}/dt = 500 \text{ A}/\mu\text{s}; T_{i} = 125 ^{\circ}\text{C}$				
l <sub>rrm</sub>	Peak reverse recovery current	$I_F = 8 \text{ A to } V_R = 400' \text{ V};$ $dI_F/dt = 500 \text{ A/}\mu\text{s}; T_i = 125^{\circ}\text{C}$	-	9.5	12	Α
		$ dI_{F}/dt = 500 A/\mu s; T_{i} = 125^{\circ}C$				
$V_{fr}$	Forward recovery voltage	$I_F = 10 \text{ A}$ ; $dI_F/dt = 100 \text{ A}/\mu\text{s}$	-	8	10	V

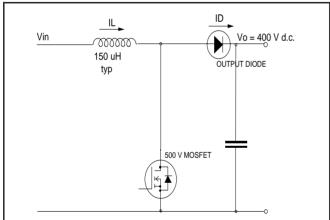


Fig.1. Typical application, output rectifier in boost converter power factor correction circuit. Continuous conduction, mode where the transistor turns on whilst forward current is still flowing in the diode.

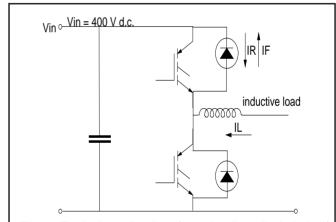


Fig.2. Typical application, freewheeling diode in half bridge converter. Continuous conduction mode, where each transistor turns on whilst forward current is still flowing in the other bridge leg diode.

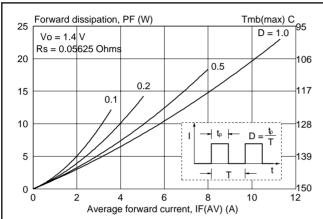


Fig.3. Maximum forward dissipation as a function of average forward current; rectangular current waveform where  $I_{F(AV)} = I_{F(RMS)} \times \sqrt{D}$ .

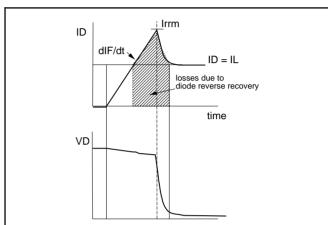


Fig.6. Origin of switching losses in transistor due to diode reverse recovery.

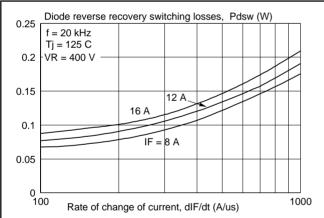


Fig.4. Typical reverse recovery switching losses in diode, as a function of rate of change of current dl<sub>F</sub>/dt.

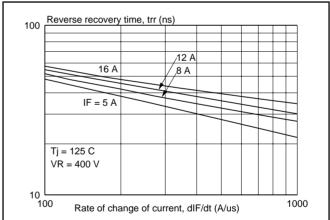


Fig.7. Typical reverse recovery time  $t_{rr}$ , as a function of rate of change of current  $dl_F/dt$ .

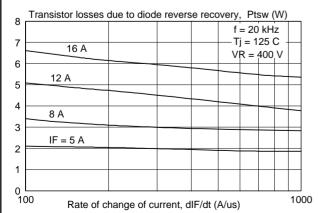


Fig.5. Typical switching losses in transistor due to reverse recovery of diode, as a function of of change of current dl₂/dt.

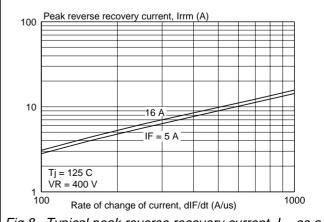


Fig.8. Typical peak reverse recovery current,  $I_{rrm}$  as a function of rate of change of current  $dI_F/dt$ .

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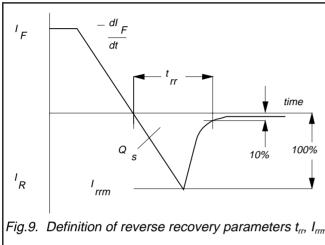


Fig.9. Definition of reverse recovery parameters  $t_r$ ,  $l_{rrm}$ 

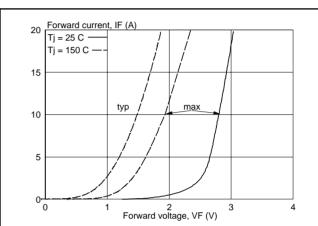


Fig.12. Typical and maximum forward characteristic  $I_F = f(V_F); T_i = 25^{\circ}C \text{ and } 150^{\circ}C.$ 

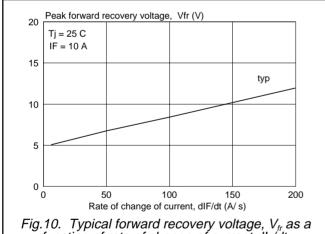


Fig.10. Typical forward recovery voltage,  $V_{\rm fr}$  as a function of rate of change of current dl<sub>F</sub>/dt.

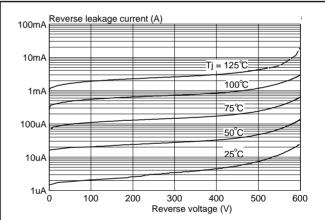
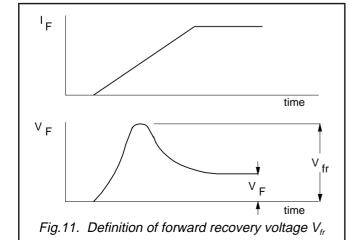


Fig.13. Typical reverse leakage current as a function of reverse voltage.  $I_R = f(V_R)$ ; parameter  $T_j$ 



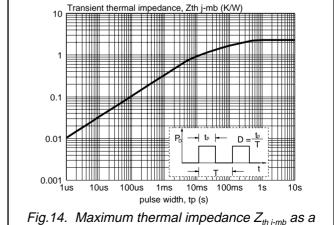
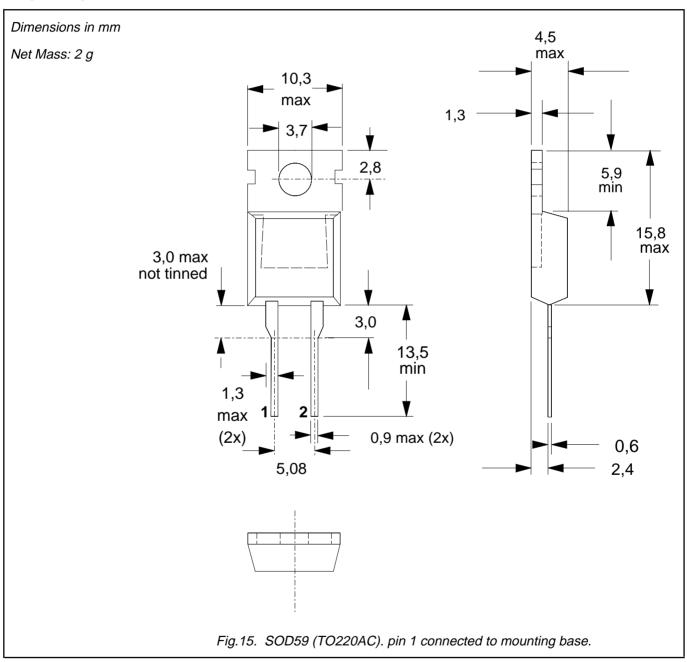


Fig.14. Maximum thermal impedance  $Z_{th j-mb}$  as a function of pulse width.

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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 late				
Product specification This data sheet contains final product specifications.				
Limiting values				

#### 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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