



BYC10-600

Hyperfast power diode

27 May 2013

Product data sheet

1. General description

Hyperfast power diode in a SOD59 (2-lead TO-220AC) plastic package

2. Features and benefits

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

3. Applications

- Continuous Current Mode (CCM) Power Factor Correction (PFC)
- Half-bridge/full-bridge switched-mode power supplies
- Half-bridge lighting ballasts

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	-	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_{mb} \leq 78^\circ\text{C}$; square-wave pulse; Fig. 1 ; Fig. 2	-	-	10	A
Static characteristics						
V_F	forward voltage	$I_F = 10\text{ A}$; $T_j = 150^\circ\text{C}$; Fig. 4	-	1.4	1.8	V
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 10\text{ A}$; $V_R = 400\text{ V}$; $di_F/dt = 500\text{ A}/\mu\text{s}$; $T_j = 25^\circ\text{C}$; Fig. 6	-	19	-	ns

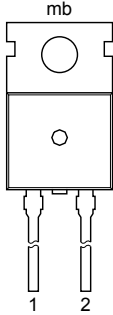
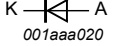


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5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 <p>TO-220AC (SOD59)</p>	
2	A	anode		
mb	mb	mounting base; connected to cathode		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BYC10-600	TO-220AC	plastic single-ended package; heatsink mounted; 1 mounting hole; 2-lead TO-220AC	SOD59

7. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	600	V
V_{RWM}	crest working reverse voltage		-	600	V
V_R	reverse voltage	$T_{mb} \leq 114\text{ °C}$	-	500	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_{mb} \leq 78\text{ °C}$; square-wave pulse; Fig. 1; Fig. 2	-	10	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $T_{mb} \leq 78\text{ °C}$; square-wave pulse	-	20	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\text{ ms}$; $T_{j(init)} = 25\text{ °C}$; sine-wave pulse	-	65	A
		$t_p = 8.3\text{ ms}$; $T_{j(init)} = 25\text{ °C}$; sine-wave pulse	-	71	A
T_{stg}	storage temperature		-40	150	°C
T_j	junction temperature		-	150	°C

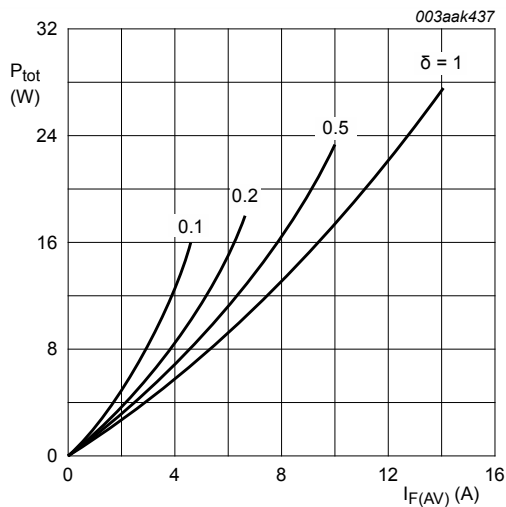


Fig. 1. Forward power dissipation as a function of average forward current; square waveform; maximum values

$$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$$
$$V_O = 1.300 \text{ V}; R_S = 0.050 \text{ } \Omega$$

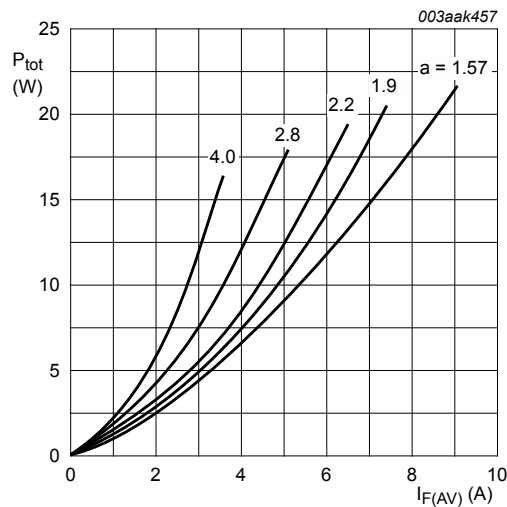


Fig. 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values

$$a = \text{form factor} = I_{F(RMS)} / I_{F(AV)}$$
$$V_O = 1.300 \text{ V}; R_S = 0.050 \text{ } \Omega$$

8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	Fig. 3	-	-	2	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	60	-	K/W

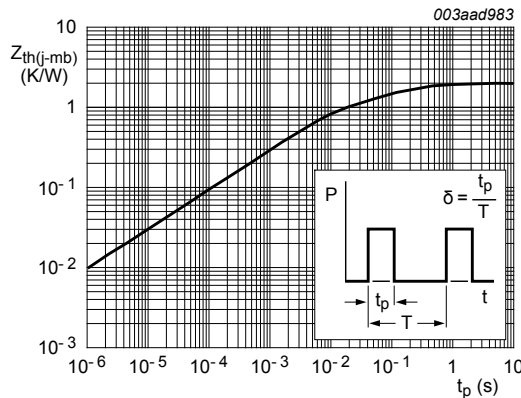


Fig. 3. Transient thermal impedance from junction to mounting base as a function of pulse width

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V _F	forward voltage	I _F = 10 A; T _j = 25 °C; Fig. 4		-	2	2.9	V
		I _F = 10 A; T _j = 150 °C; Fig. 4		-	1.4	1.8	V
		I _F = 20 A; T _j = 150 °C; Fig. 4		-	1.7	2.3	V
I _R	reverse current	V _R = 600 V; T _j = 25 °C; Fig. 5		-	9	200	μA
		V _R = 500 V; T _j = 100 °C; Fig. 5		-	1.1	3	mA
Dynamic characteristics							
t _{rr}	reverse recovery time	I _F = 1 A; V _R = 30 V; dI _F /dt = 50 A/μs; T _j = 25 °C; Fig. 6		-	35	55	ns
		I _F = 10 A; V _R = 400 V; dI _F /dt = 500 A/μs; T _j = 25 °C; Fig. 6		-	19	-	ns
		I _F = 10 A; V _R = 400 V; dI _F /dt = 500 A/μs; T _j = 100 °C; Fig. 6		-	32	40	ns
I _{RM}	peak reverse recovery current	I _F = 10 A; V _R = 400 V; dI _F /dt = 100 A/μs; T _j = 125 °C; Fig. 6		-	3	7.5	A
		I _F = 10 A; V _R = 400 V; dI _F /dt = 500 A/μs; T _j = 125 °C; Fig. 6		-	9.5	12	A
V _{FRM}	forward recovery voltage	I _F = 10 A; dI _F /dt = 100 A/μs; T _j = 25 °C; Fig. 7		-	8	11	V

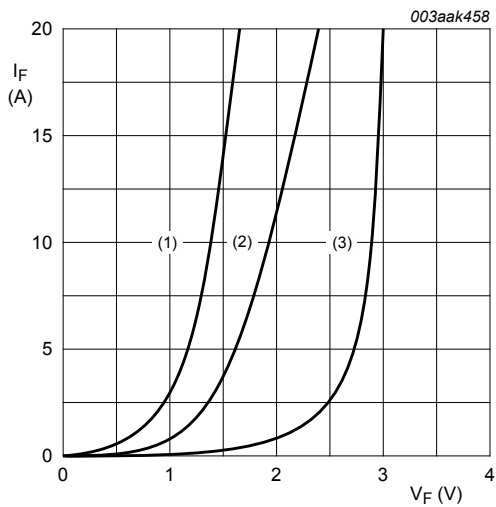


Fig. 4. Forward current as a function of forward voltage

- (1) $T_j = 150\text{ }^{\circ}\text{C}$; typical values;
 - (2) $T_j = 150\text{ }^{\circ}\text{C}$; maximum values;
 - (3) $T_j = 25\text{ }^{\circ}\text{C}$; maximum values;
- $V_O = 1.300\text{ V}$; $R_S = 0.050\text{ }\Omega$

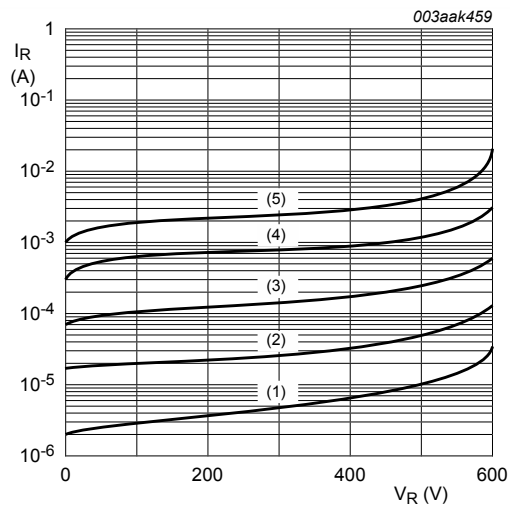


Fig. 5. Reverse leakage current as a function of reverse voltage; typical values

- (1) $T_j = 25\text{ }^{\circ}\text{C}$; typical values;
- (2) $T_j = 50\text{ }^{\circ}\text{C}$; typical values;
- (3) $T_j = 75\text{ }^{\circ}\text{C}$; typical values;
- (4) $T_j = 100\text{ }^{\circ}\text{C}$; typical values;
- (5) $T_j = 125\text{ }^{\circ}\text{C}$; typical value

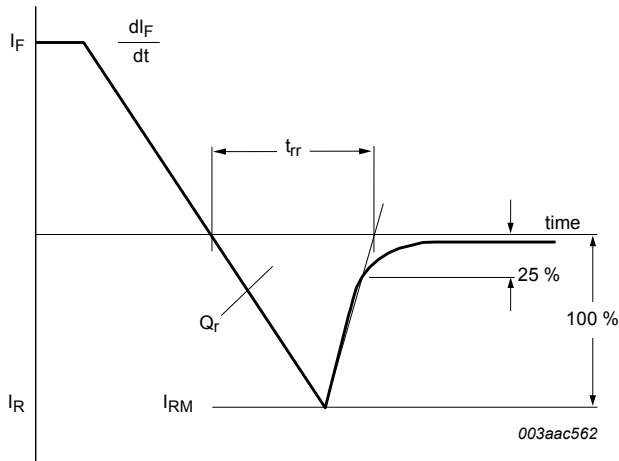


Fig. 6. Reverse recovery definitions; ramp recovery

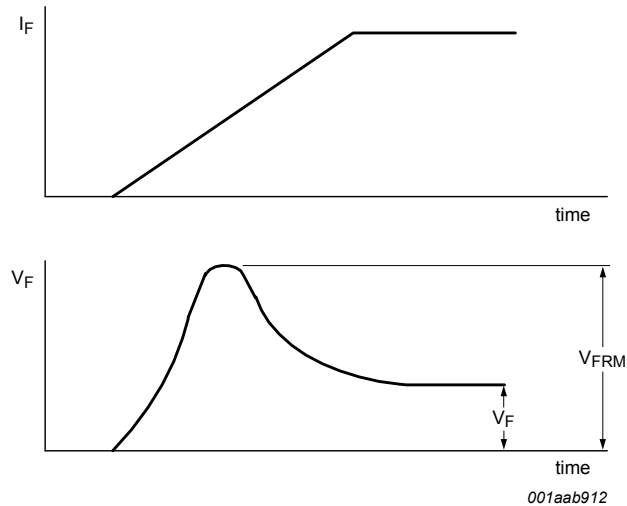


Fig. 7. Forward recovery definitions

10. Package outline

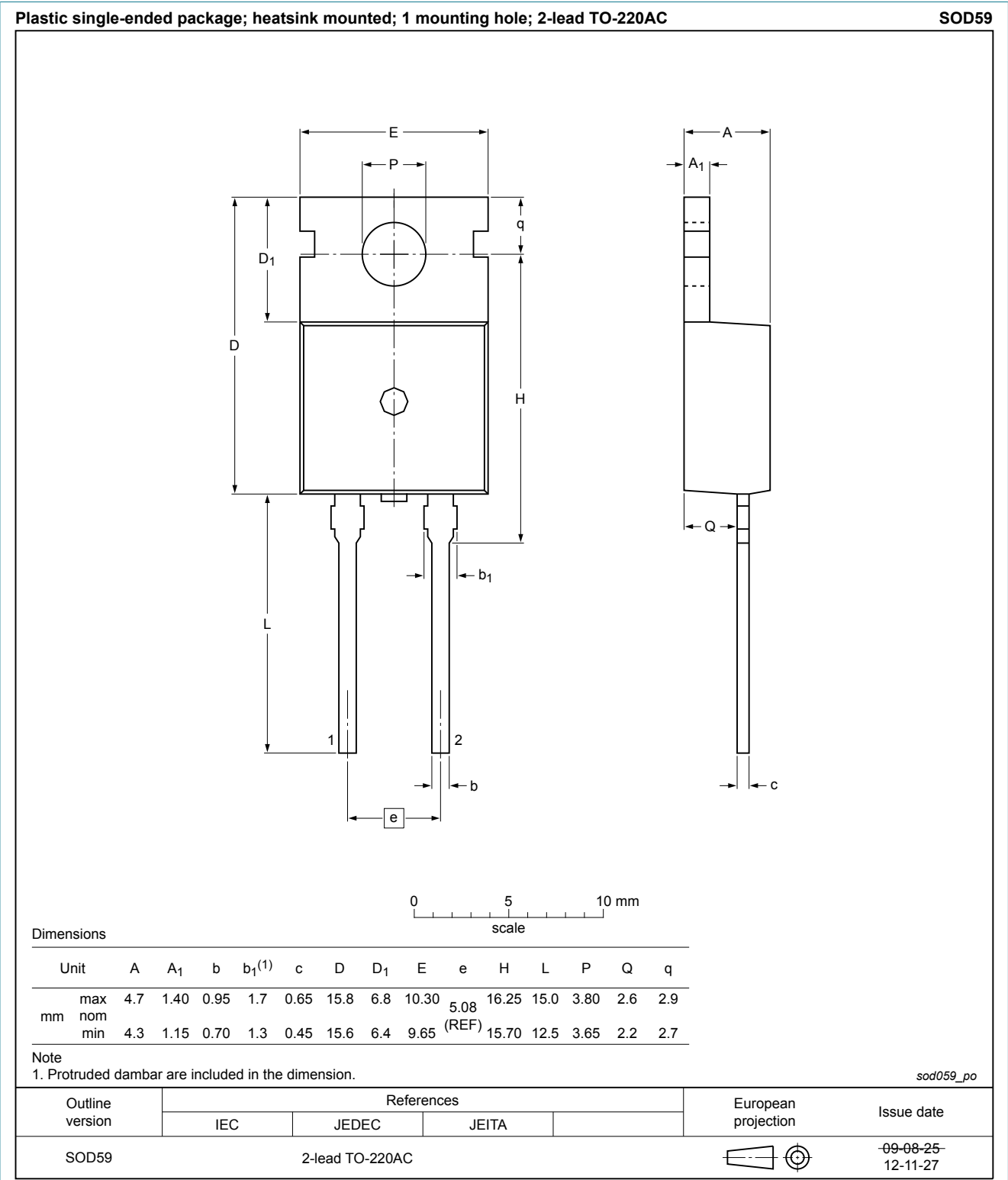


Fig. 8. Package outline TO-220AC (SOD59)

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Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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