



# 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	$\delta = 0.5$ ; $T_{mb} \leq 78$ °C; square-wave pulse; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a>	-	-	10	A
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 10$ A; $T_j = 150$ °C; <a href="#">Fig. 4</a>	-	1.4	1.8	V
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 10$ A; $V_R = 400$ V; $di_F/dt = 500$ A/ $\mu$ s; $T_j = 25$ °C; <a href="#">Fig. 6</a>	-	19	-	ns

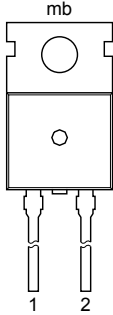
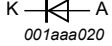


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## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 <p>TO-220AC (SOD59)</p>	 <p>001aaa020</p>
2	A	anode		
mb	mb	mounting base; connected to cathode		

## 6. Ordering information

Table 3. Ordering information

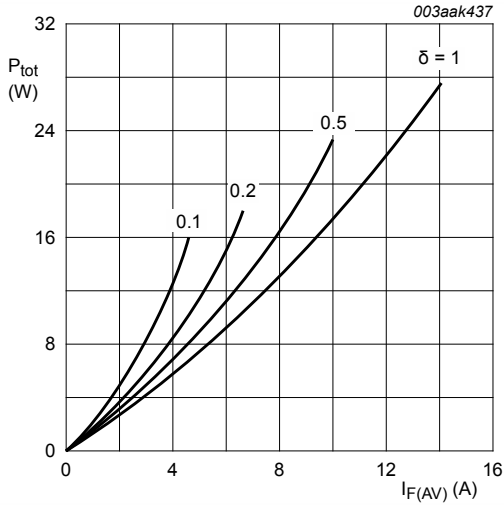
Type number	Package		
	Name	Description	Version
BYC10-600	TO-220AC	plastic single-ended package; heatsink mounted; 1 mounting hole; 2-lead TO-220AC	SOD59

## 7. Limiting values

Table 4. Limiting values

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

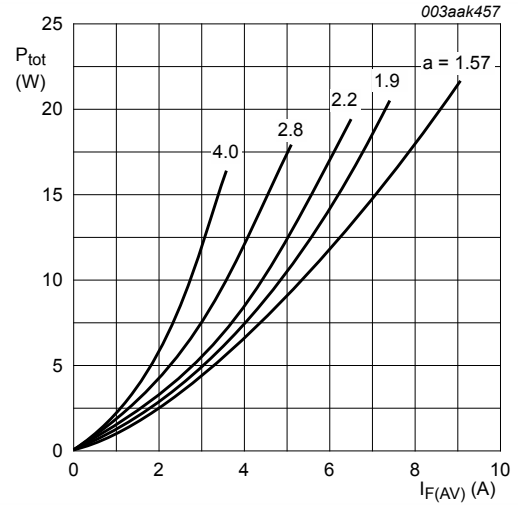
Symbol	Parameter	Conditions	Min	Max	Unit
$V_{RRM}$	repetitive peak reverse voltage		-	600	V
$V_{RWM}$	crest working reverse voltage		-	600	V
$V_R$	reverse voltage	$T_{mb} \leq 114\text{ °C}$	-	500	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; $T_{mb} \leq 78\text{ °C}$ ; square-wave pulse; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a>	-	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	$t_p = 10\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ °C}$ ; sine-wave pulse	-	65	A
		$t_p = 8.3\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ °C}$ ; 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**

$$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$$

$V_O = 1.300 \text{ V}; R_S = 0.050 \Omega$



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

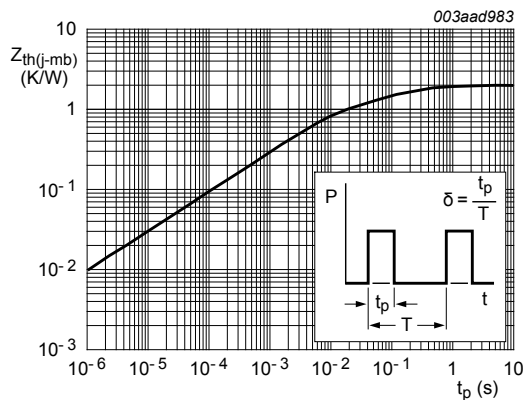
$a = \text{form factor} = I_{F(RMS)} / I_{F(AV)}$

$V_O = 1.300 \text{ V}; R_S = 0.050 \Omega$

## 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	<a href="#">Fig. 3</a>	-	-	2	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	60	-	K/W

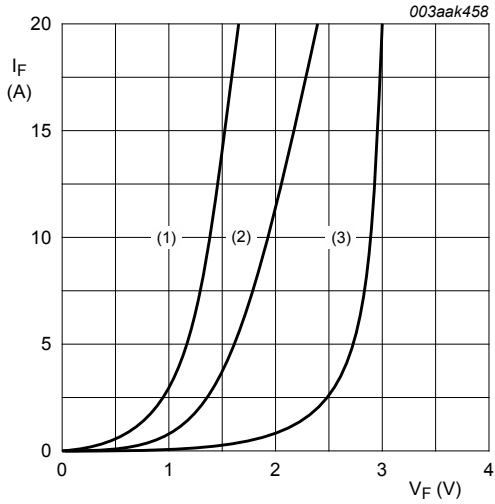


**Fig. 3. Transient thermal impedance from junction to mounting base as a function of pulse width**

## 9. Characteristics

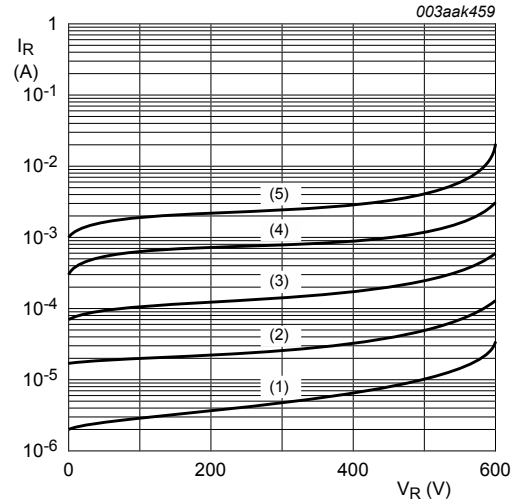
Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 10\text{ A}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 4</a>	-	2	2.9	V
		$I_F = 10\text{ A}$ ; $T_j = 150\text{ °C}$ ; <a href="#">Fig. 4</a>	-	1.4	1.8	V
		$I_F = 20\text{ A}$ ; $T_j = 150\text{ °C}$ ; <a href="#">Fig. 4</a>	-	1.7	2.3	V
$I_R$	reverse current	$V_R = 600\text{ V}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 5</a>	-	9	200	$\mu\text{A}$
		$V_R = 500\text{ V}$ ; $T_j = 100\text{ °C}$ ; <a href="#">Fig. 5</a>	-	1.1	3	$\text{mA}$
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1\text{ A}$ ; $V_R = 30\text{ V}$ ; $dI_F/dt = 50\text{ A}/\mu\text{s}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 6</a>	-	35	55	ns
		$I_F = 10\text{ A}$ ; $V_R = 400\text{ V}$ ; $dI_F/dt = 500\text{ A}/\mu\text{s}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 6</a>	-	19	-	ns
		$I_F = 10\text{ A}$ ; $V_R = 400\text{ V}$ ; $dI_F/dt = 500\text{ A}/\mu\text{s}$ ; $T_j = 100\text{ °C}$ ; <a href="#">Fig. 6</a>	-	32	40	ns
$I_{RM}$	peak reverse recovery current	$I_F = 10\text{ A}$ ; $V_R = 400\text{ V}$ ; $dI_F/dt = 100\text{ A}/\mu\text{s}$ ; $T_j = 125\text{ °C}$ ; <a href="#">Fig. 6</a>	-	3	7.5	A
		$I_F = 10\text{ A}$ ; $V_R = 400\text{ V}$ ; $dI_F/dt = 500\text{ A}/\mu\text{s}$ ; $T_j = 125\text{ °C}$ ; <a href="#">Fig. 6</a>	-	9.5	12	A
$V_{FRM}$	forward recovery voltage	$I_F = 10\text{ A}$ ; $dI_F/dt = 100\text{ A}/\mu\text{s}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 7</a>	-	8	11	V



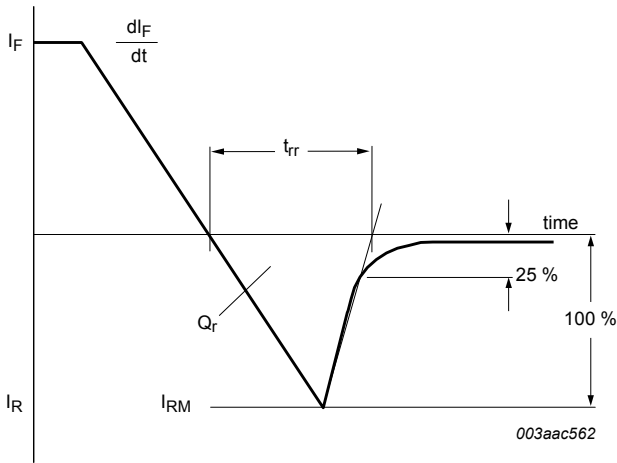
**Fig. 4. Forward current as a function of forward voltage**

- (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;
- $V_O = 1.300\text{ V}$ ;  $R_S = 0.050\ \Omega$

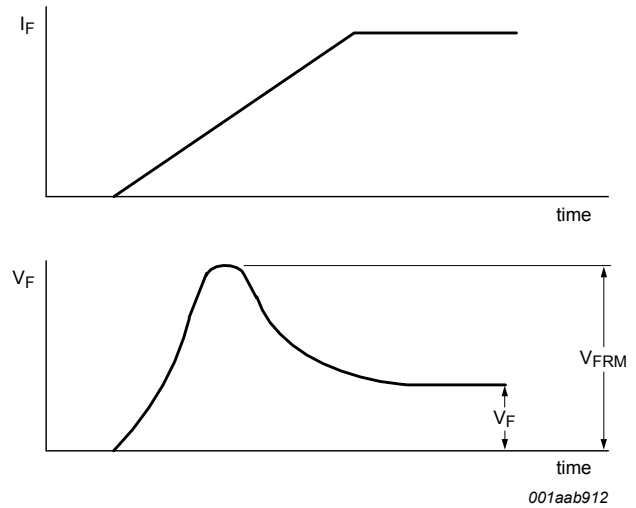


**Fig. 5. Reverse leakage current as a function of reverse voltage; typical values**

- (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

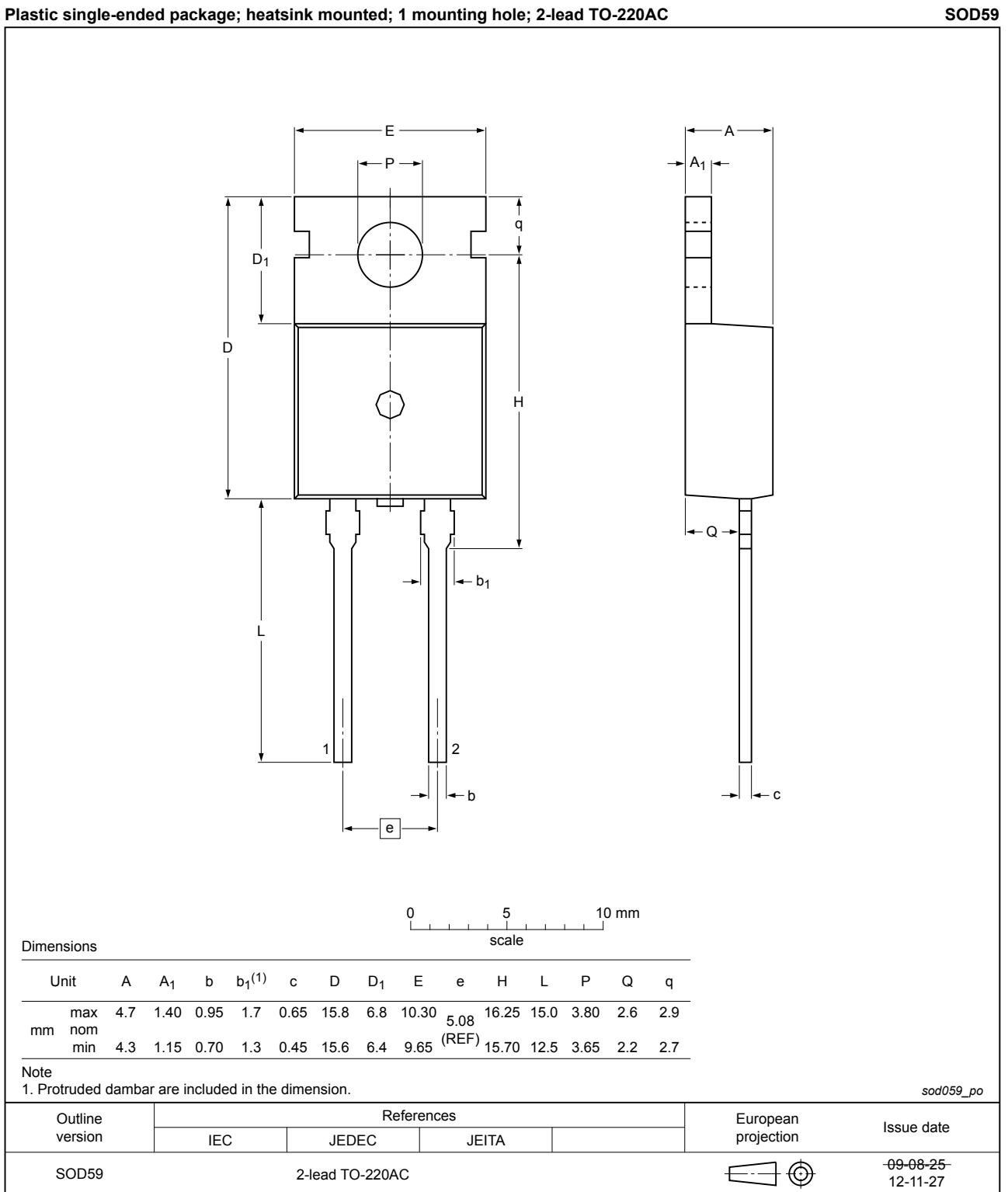


Fig. 8. Package outline TO-220AC (SOD59)

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