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# BYC15-600P

Hyperfast power diode

10 February 2014

Product data sheet

## 1. General description

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

## 2. Features and benefits

- Fast switching
- Low leakage current
- Low reverse recovery current
- Low thermal resistance
- Reduces switching losses in associated MOSFET or IGBT

## 3. Applications

- Active PFC in air conditioner
- High frequency switched-mode power supplies
- Continuous Current Mode (CCM) Power Factor Correction (PFC)

## 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	$\delta = 0.5$ ; $T_{mb} \leq 121$ °C; square-wave pulse; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	-	-	15	A
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 15$ A; $T_j = 150$ °C; <a href="#">Fig. 6</a>	-	1.4	2	V
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $dI_F/dt = 200$ A/μs; $T_j = 25$ °C; <a href="#">Fig. 7</a>	-	13	18	ns



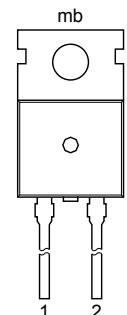
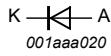
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### 5. Pinning information

**Table 2. Pinning information**

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

### 6. Ordering information

**Table 3. Ordering information**

Type number	Package			Version
	Name	Description		
BYC15-600P	TO-220AC	plastic single-ended package; heatsink mounted; 1 mounting hole; 2-lead TO-220AC		SOD59

### 7. Marking

**Table 4. Marking codes**

Type number	Marking code
BYC15-600P	BYC15-600P

### 8. Limiting values

**Table 5. Limiting values**

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

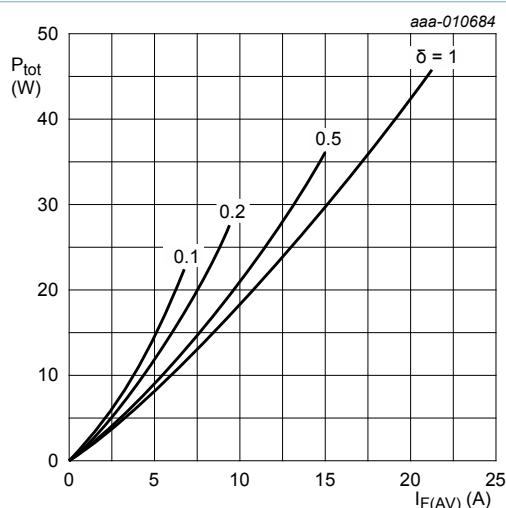
Symbol	Parameter	Conditions	Min	Max	Unit
$V_{RRM}$	repetitive peak reverse voltage		-	600	V
$V_{RWM}$	crest working reverse voltage		-	600	V
$V_R$	reverse voltage	DC	-	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; $T_{mb} \leq 121$ °C; square-wave pulse; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	-	15	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25$ µs; $T_{mb} \leq 121$ °C; square-wave pulse	-	30	A

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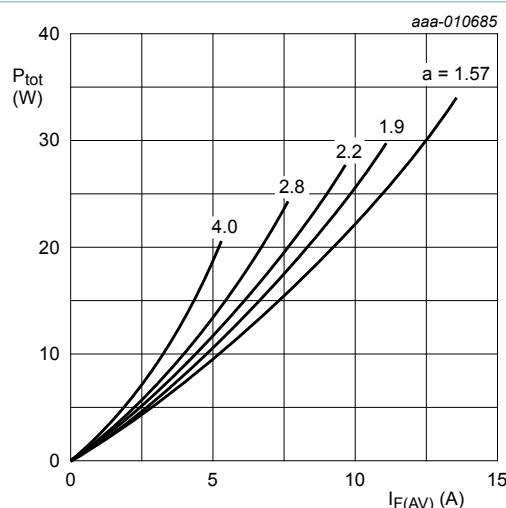
Symbol	Parameter	Conditions	Min	Max	Unit
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10 \text{ ms}; T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$ ; sine-wave pulse; <a href="#">Fig. 4</a>	-	180	A
		$t_p = 8.3 \text{ ms}; T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$ ; sine-wave pulse; <a href="#">Fig. 4</a>	-	200	A
$T_{\text{stg}}$	storage temperature		-65	175	$^\circ\text{C}$
$T_j$	junction temperature		-	175	$^\circ\text{C}$



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

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

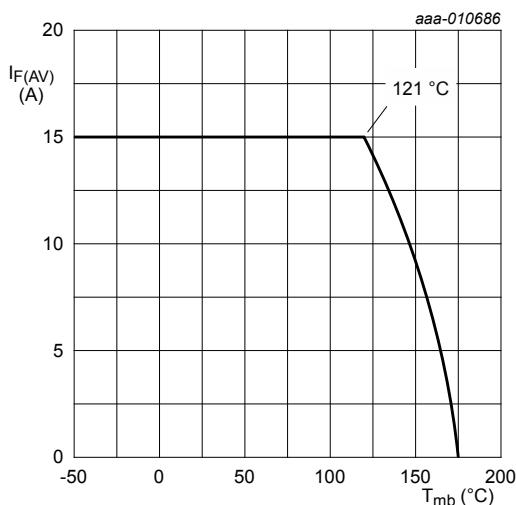
$$V_O = 1.578 \text{ V}; R_S = 0.027 \Omega$$



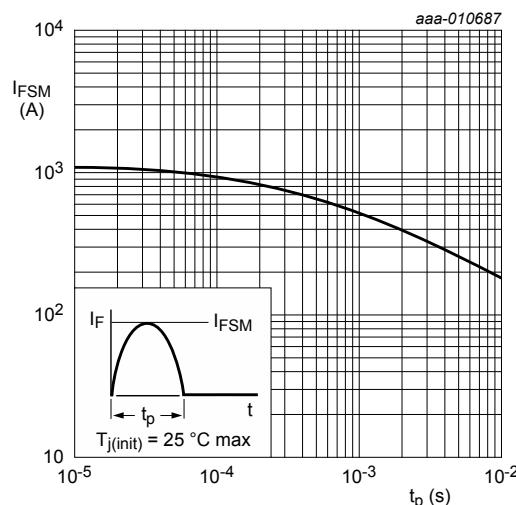
**Fig. 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values**

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

$$V_O = 1.578 \text{ V}; R_S = 0.027 \Omega$$



**Fig. 3. Forward current as a function of mounting base temperature; maximum values**



**Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values**

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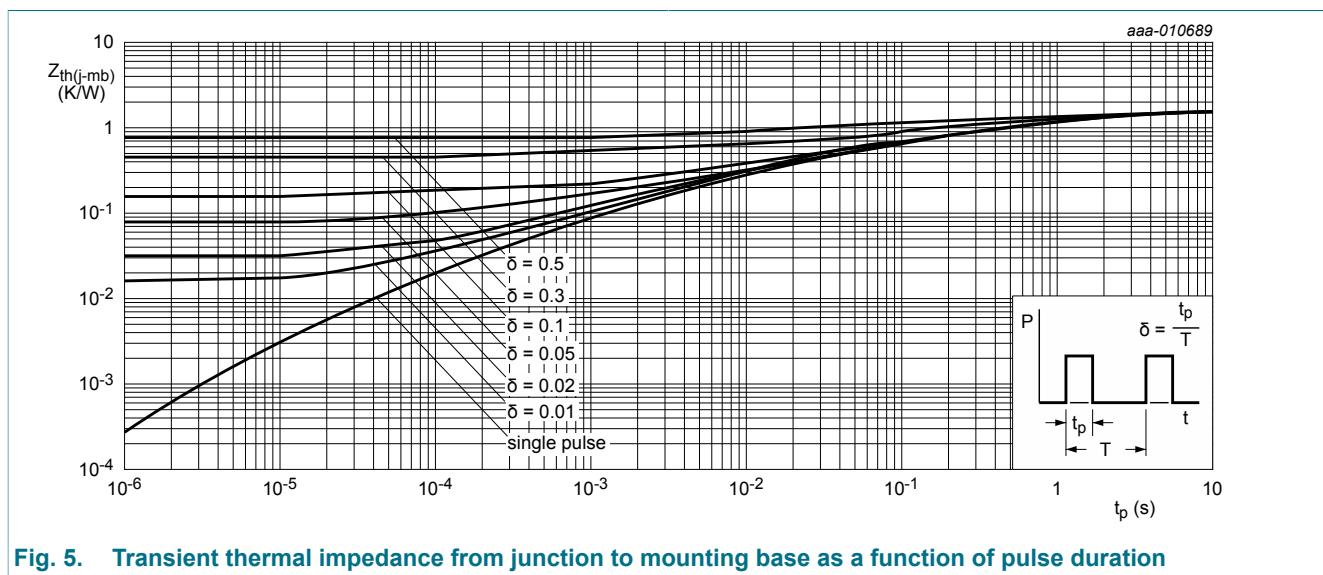
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### 9. Thermal characteristics

**Table 6. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	with heatsink compound; <a href="#">Fig. 5</a>	-	-	1.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W



**Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration**

### 10. Characteristics

**Table 7. Characteristics**

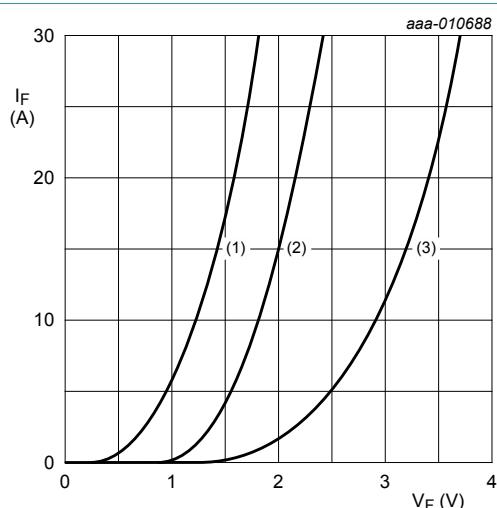
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 15 \text{ A}; T_j = 25^\circ\text{C}$ ; <a href="#">Fig. 6</a>	-	2.7	3.2	V
		$I_F = 15 \text{ A}; T_j = 150^\circ\text{C}$ ; <a href="#">Fig. 6</a>	-	1.4	2	V
$I_R$	reverse current	$V_R = 600 \text{ V}; T_j = 25^\circ\text{C}$	-	-	10	$\mu\text{A}$
		$V_R = 600 \text{ V}; T_j = 150^\circ\text{C}$	-	-	1	$\text{mA}$
<b>Dynamic characteristics</b>						
$Q_r$	recovered charge	$I_F = 15 \text{ A}; V_R = 200 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 25^\circ\text{C}$ ; <a href="#">Fig. 7</a>	-	30	-	$\text{nC}$
		$I_F = 15 \text{ A}; V_R = 200 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 125^\circ\text{C}$ ; <a href="#">Fig. 7</a>	-	115	-	$\text{nC}$

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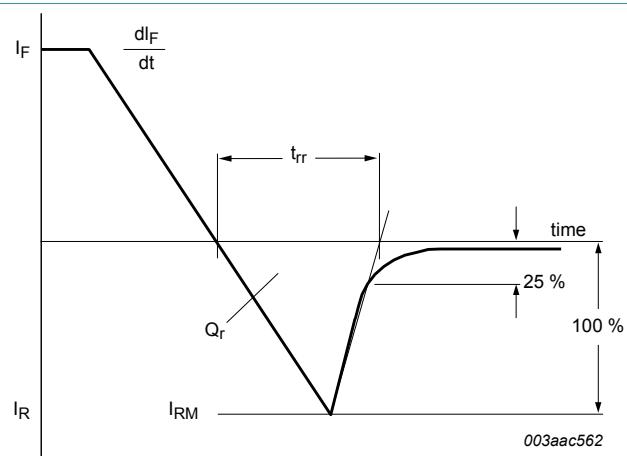
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$t_{rr}$	reverse recovery time	$I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C};$ <a href="#">Fig. 7</a>	-	13	18	ns
		$I_F = 15 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 500 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C};$ <a href="#">Fig. 7</a>	-	22	-	ns
		$I_F = 15 \text{ A}; V_R = 200 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C};$ <a href="#">Fig. 7</a>	-	28	-	ns
		$I_F = 15 \text{ A}; V_R = 200 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 125 \text{ }^\circ\text{C};$ <a href="#">Fig. 7</a>	-	39	-	ns
$I_{RM}$	peak reverse recovery current	$I_F = 15 \text{ A}; V_R = 200 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C};$ <a href="#">Fig. 7</a>	-	2.1	-	A
		$I_F = 15 \text{ A}; V_R = 200 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 125 \text{ }^\circ\text{C};$ <a href="#">Fig. 7</a>	-	5.8	-	A



**Fig. 6. 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;

$V_O = 1.578 \text{ V}; R_S = 0.027 \Omega$



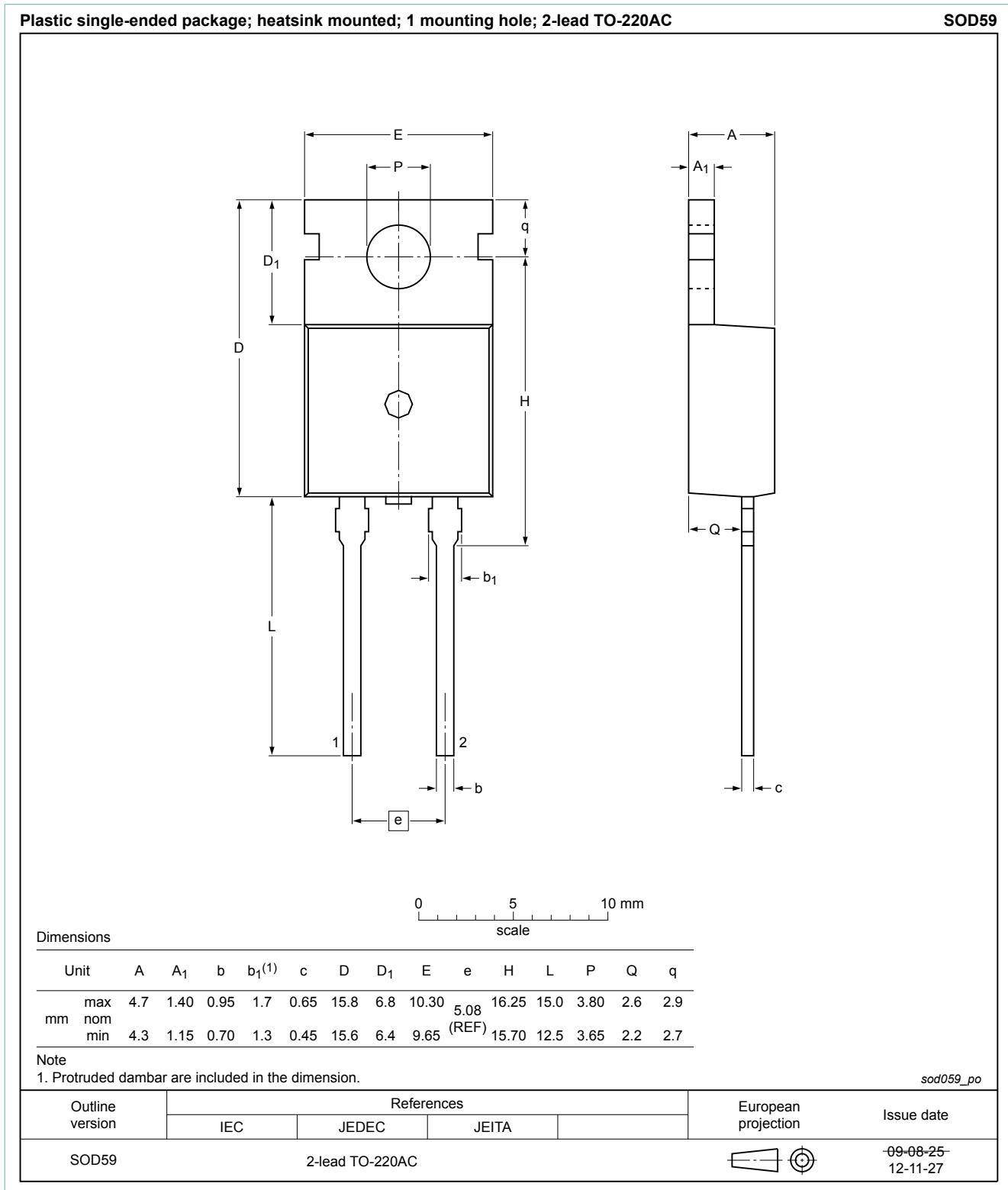
**Fig. 7. Reverse recovery definitions; ramp recovery**

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### 11. Package outline



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## 12. Legal information

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Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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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- [2] The term 'short data sheet' is explained in section "Definitions".
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