



BYC5-600P

Hyperfast power diode

24 December 2014

Product data sheet

1. General description

Hyperfast power diode in a SOD59 package.

2. Features and benefits

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

3. Applications

- Half-bridge/full-bridge 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	$\delta = 0.5$; $T_{mb} \leq 133$ °C; square-wave pulse; Fig. 1 ; Fig. 2 ; Fig. 3	-	-	5	A
Static characteristics						
V_F	forward voltage	$I_F = 5$ A; $T_j = 25$ °C; Fig. 6	-	2.5	3.3	V
		$I_F = 5$ A; $T_j = 150$ °C; Fig. 6	-	1.4	2.1	V
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $dI_F/dt = 200$ A/ μ s; $T_j = 25$ °C; Fig. 7	-	11	-	ns

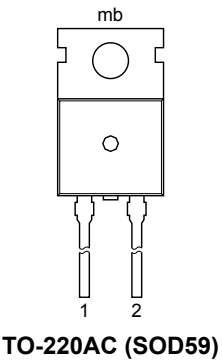
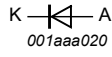


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5. Pinning information

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
BYC5-600P	TO-220AC	plastic single-ended package; heatsink mounted; 1 mounting hole; 2-lead TO-220AC	SOD59

7. Marking

Table 4. Marking codes

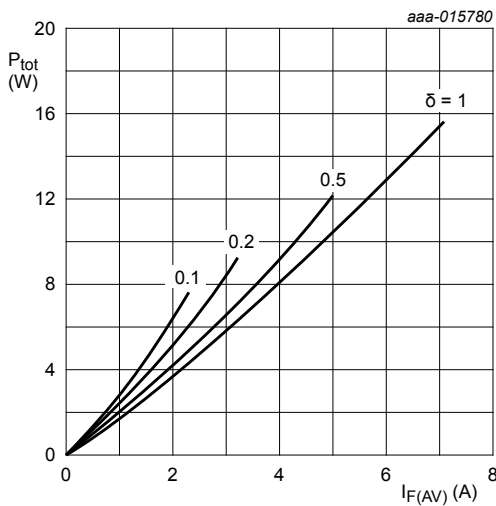
Type number	Marking code
BYC5-600P	BYC5-600P

8. Limiting values

Table 5. Limiting values

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

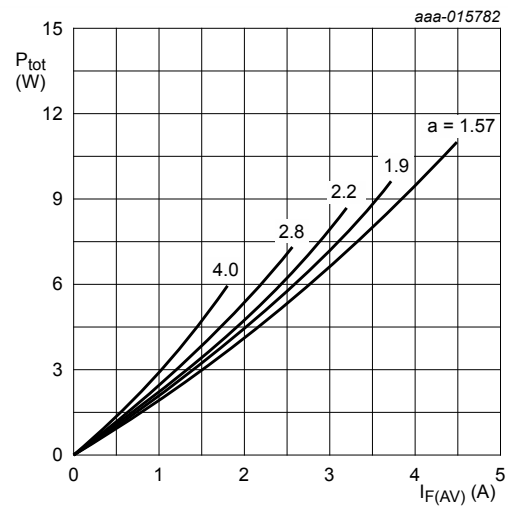
Symbol	Parameter	Conditions	Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	600	V
V_{RWM}	crest working reverse voltage		-	600	V
V_R	reverse voltage	DC	-	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_{mb} \leq 133\text{ }^\circ\text{C}$; square-wave pulse; Fig. 1; Fig. 2; Fig. 3	-	5	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 133\text{ }^\circ\text{C}$; square-wave pulse	-	10	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\text{ ms}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; sine-wave pulse; Fig. 4	-	60	A
		$t_p = 8.3\text{ ms}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; sine-wave pulse; Fig. 4	-	65	A
T_{stg}	storage temperature		-65	175	$^\circ\text{C}$
T_j	junction temperature		-	175	$^\circ\text{C}$



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

$$V_o = 1.801\text{ V}; R_s = 0.062\text{ }\Omega$$

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



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

$$V_o = 1.801\text{ V}; R_s = 0.062\text{ }\Omega$$

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

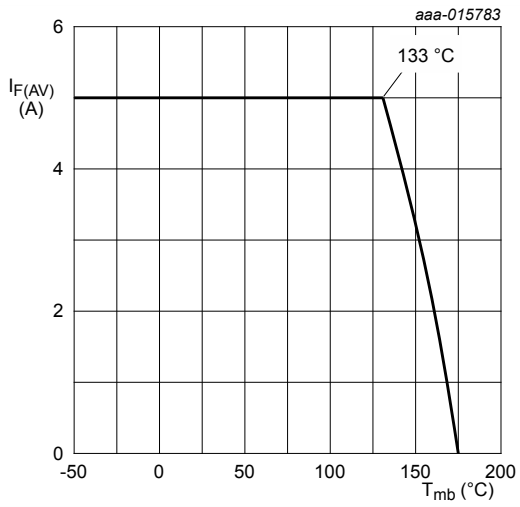


Fig. 3. Forward current as a function of mounting base temperature; maximum values

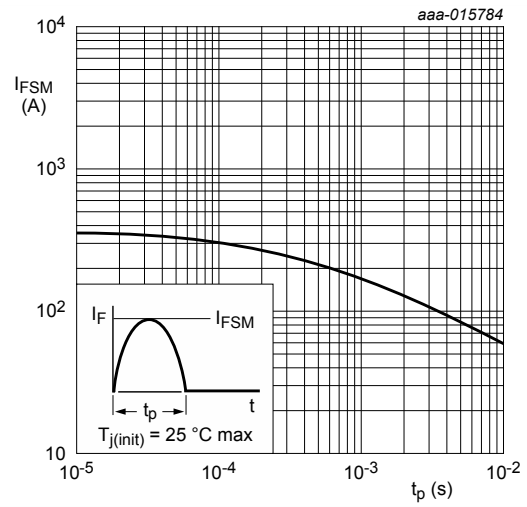


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

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; Fig. 5	-	-	3.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W

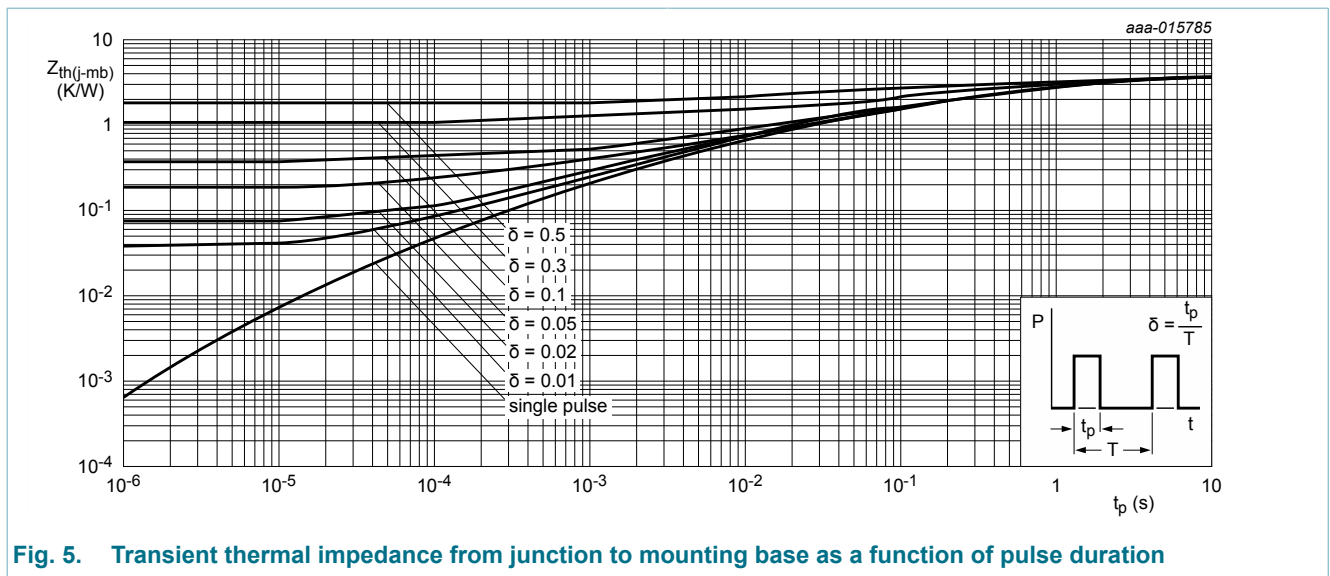
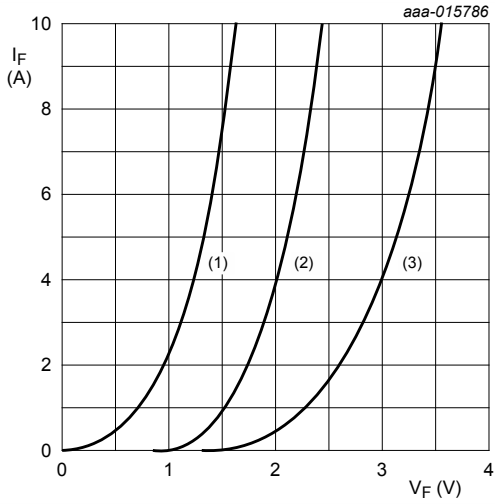


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 5\text{ A}$; $T_j = 25\text{ °C}$; Fig. 6	-	2.5	3.3	V
		$I_F = 5\text{ A}$; $T_j = 150\text{ °C}$; Fig. 6	-	1.4	2.1	V
I_R	reverse current	$V_R = 600\text{ V}$; $T_j = 25\text{ °C}$	-	-	10	μA
		$V_R = 600\text{ V}$; $T_j = 150\text{ °C}$	-	-	0.6	mA
Dynamic characteristics						
Q_r	recovered charge	$I_F = 5\text{ A}$; $V_R = 200\text{ V}$; $dI_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$; Fig. 7	-	19	-	nC
		$I_F = 5\text{ A}$; $V_R = 200\text{ V}$; $dI_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 125\text{ °C}$; Fig. 7	-	45	-	nC
t_{rr}	reverse recovery time	$I_F = 1\text{ A}$; $V_R = 30\text{ V}$; $dI_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$; Fig. 7	-	11	-	ns
		$I_F = 5\text{ A}$; $V_R = 200\text{ V}$; $dI_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$; Fig. 7	-	23	-	ns
		$I_F = 5\text{ A}$; $V_R = 200\text{ V}$; $dI_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 125\text{ °C}$; Fig. 7	-	28	-	ns
		$I_F = 5\text{ A}$; $V_R = 400\text{ V}$; $dI_F/dt = 500\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$; Fig. 7	-	13	25	ns
I_{RM}	peak reverse recovery current	$I_F = 5\text{ A}$; $V_R = 200\text{ V}$; $dI_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$; Fig. 7	-	1.7	-	A
		$I_F = 5\text{ A}$; $V_R = 200\text{ V}$; $dI_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 125\text{ °C}$; Fig. 7	-	3.2	-	A



$V_o = 1.801 \text{ V}; R_s = 0.062 \Omega$
 (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

Fig. 6. Forward current as a function of forward voltage

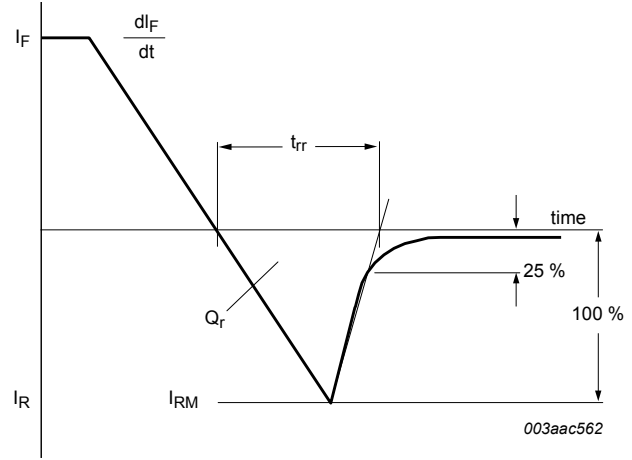


Fig. 7. Reverse recovery definitions; ramp recovery

11. Package outline

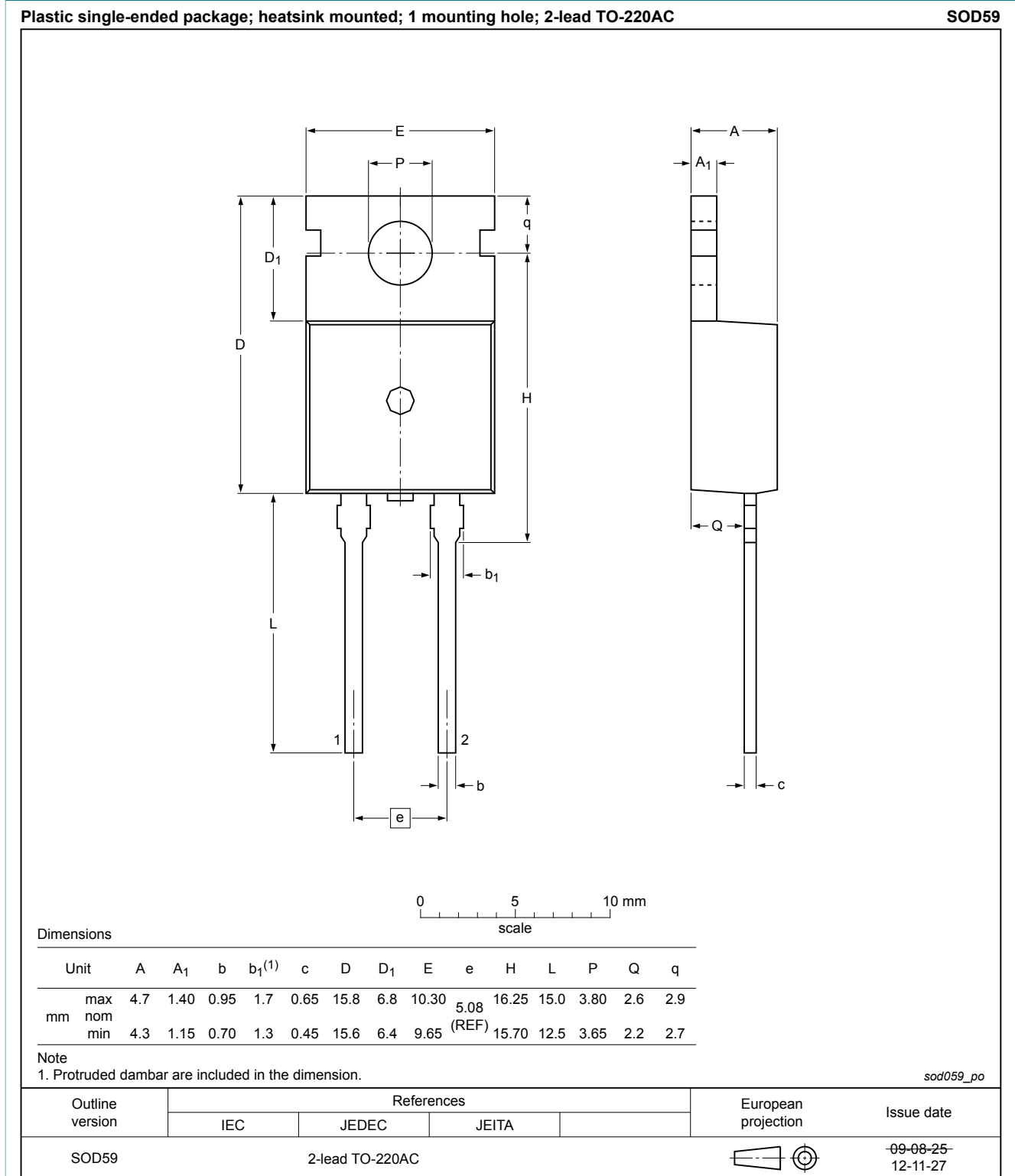


Fig. 8. Package outline TO-220AC (SOD59)

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Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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Date of release: 24 December 2014