



BYC10-600P

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	$\delta = 0.5$; $T_{mb} \leq 127\text{ }^{\circ}\text{C}$; square-wave pulse; Fig. 1 ; Fig. 2 ; Fig. 3	-	-	10	A
Static characteristics						
V_F	forward voltage	$I_F = 10\text{ A}$; $T_j = 150\text{ }^{\circ}\text{C}$; Fig. 6	-	1.3	2	V
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1\text{ A}$; $V_R = 30\text{ V}$; $dI_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 25\text{ }^{\circ}\text{C}$; Fig. 7	-	12	18	ns

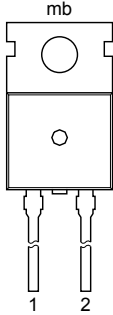
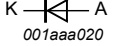


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5. Pinning information

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
BYC10-600P	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
BYC10-600P	BYC10-600P

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	$\delta = 0.5$; $T_{mb} \leq 127\text{ }^{\circ}\text{C}$; square-wave pulse; Fig. 1; Fig. 2; Fig. 3	-	10	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 127\text{ }^{\circ}\text{C}$; square-wave pulse	-	20	A

Symbol	Parameter	Conditions		Min	Max	Unit
I _{FSM}	non-repetitive peak forward current	t _p = 10 ms; T _{j(init)} = 25 °C; sine-wave pulse; Fig. 4		-	150	A
		t _p = 8.3 ms; T _{j(init)} = 25 °C; sine-wave pulse; Fig. 4		-	165	A
T _{stg}	storage temperature			-65	175	°C
T _j	junction temperature			-	175	°C

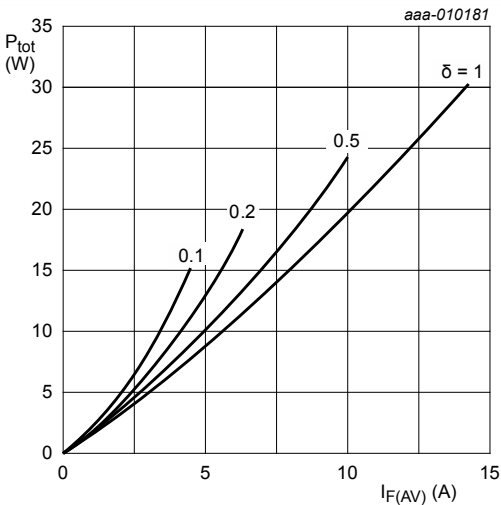


Fig. 1. Forward power dissipation as a function of average forward current; square waveform; maximum values

$$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$$
$$V_O = 1.572 \text{ V}; R_S = 0.040 \text{ }\Omega$$

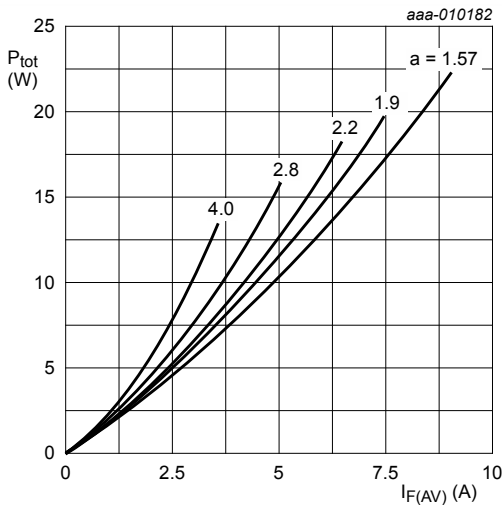


Fig. 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values

$$a = \text{form factor} = I_{F(RMS)} / I_{F(AV)}$$
$$V_O = 1.572 \text{ V}; R_S = 0.040 \text{ }\Omega$$

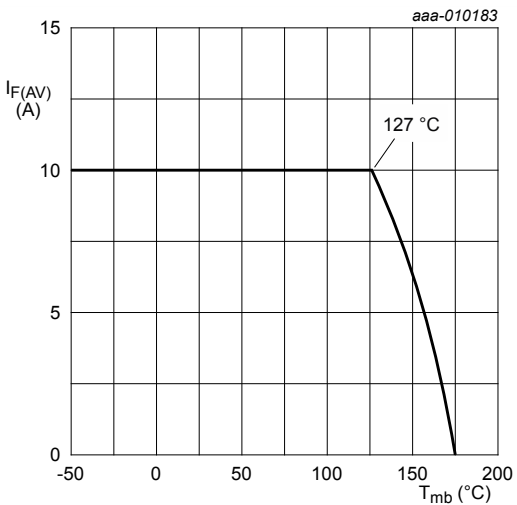


Fig. 3. Forward current as a function of mounting base temperature; maximum values

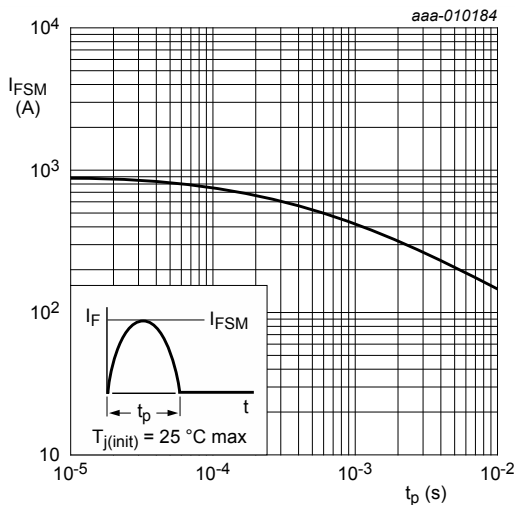


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

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		-	-	2	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air		-	60	-	K/W

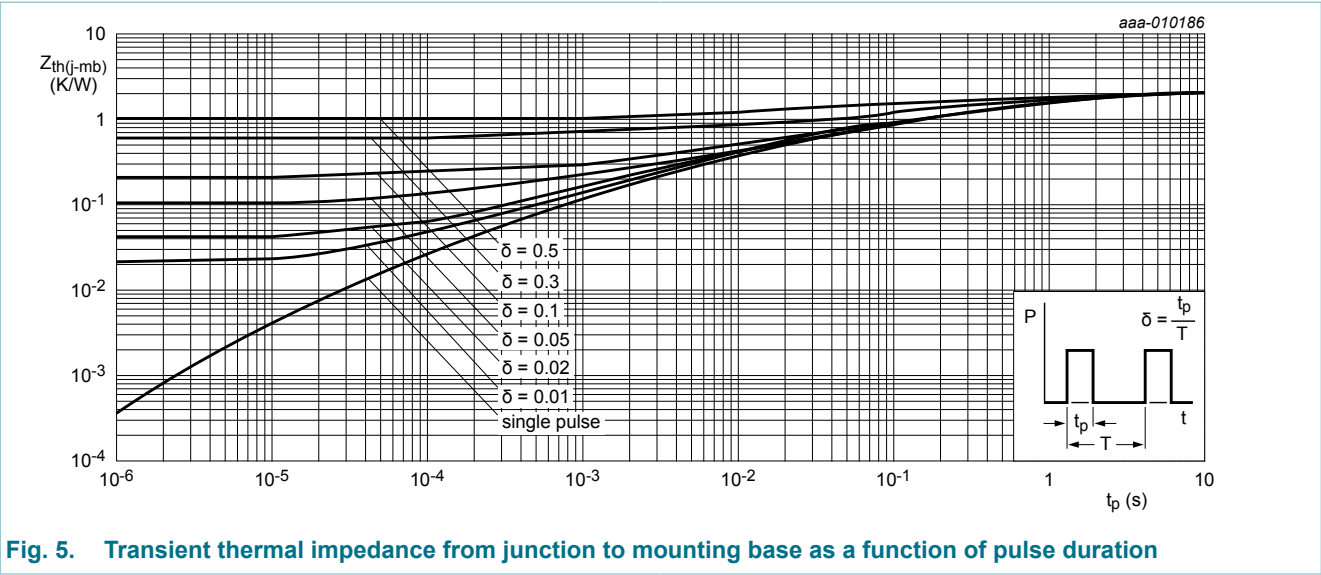


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V _F	forward voltage	I _F = 10 A; T _j = 25 °C; Fig. 6		-	2.5	3.2	V
		I _F = 10 A; T _j = 150 °C; Fig. 6		-	1.3	2	V
I _R	reverse current	V _R = 600 V; T _j = 25 °C		-	-	10	μA
		V _R = 600 V; T _j = 150 °C		-	-	0.8	mA
Dynamic characteristics							
Q _r	recovered charge	I _F = 10 A; V _R = 200 V; di _F /dt = 200 A/μs; T _j = 25 °C; Fig. 7		-	26	-	nC
		I _F = 10 A; V _R = 200 V; di _F /dt = 200 A/μs; T _j = 125 °C; Fig. 7		-	83	-	nC

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
t_{rr}	reverse recovery time	$I_F = 1\text{ A}$; $V_R = 30\text{ V}$; $dI_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 25\text{ }^\circ\text{C}$; Fig. 7	-	12	18	ns
		$I_F = 10\text{ A}$; $V_R = 400\text{ V}$; $dI_F/dt = 500\text{ A}/\mu\text{s}$; $T_j = 25\text{ }^\circ\text{C}$; Fig. 7	-	19	-	ns
		$I_F = 10\text{ A}$; $V_R = 200\text{ V}$; $dI_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 25\text{ }^\circ\text{C}$; Fig. 7	-	26	-	ns
		$I_F = 10\text{ A}$; $V_R = 200\text{ V}$; $dI_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 125\text{ }^\circ\text{C}$; Fig. 7	-	34	-	ns
I_{RM}	peak reverse recovery current	$I_F = 10\text{ A}$; $V_R = 200\text{ V}$; $dI_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 25\text{ }^\circ\text{C}$; Fig. 7	-	2	-	A
		$I_F = 10\text{ A}$; $V_R = 200\text{ V}$; $dI_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 125\text{ }^\circ\text{C}$; Fig. 7	-	4.8	-	A

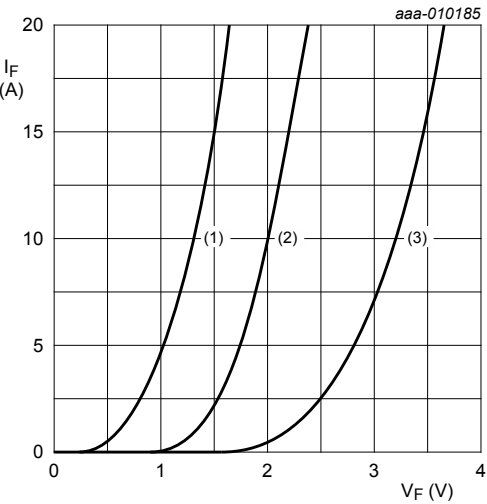


Fig. 6. Forward current as a function of forward voltage

- (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;
- $V_O = 1.572\text{ V}$; $R_S = 0.040\text{ }\Omega$

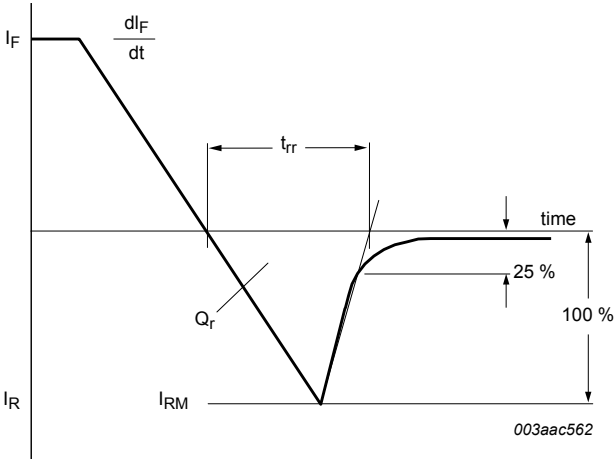


Fig. 7. Reverse recovery definitions; ramp recovery

11. Package outline

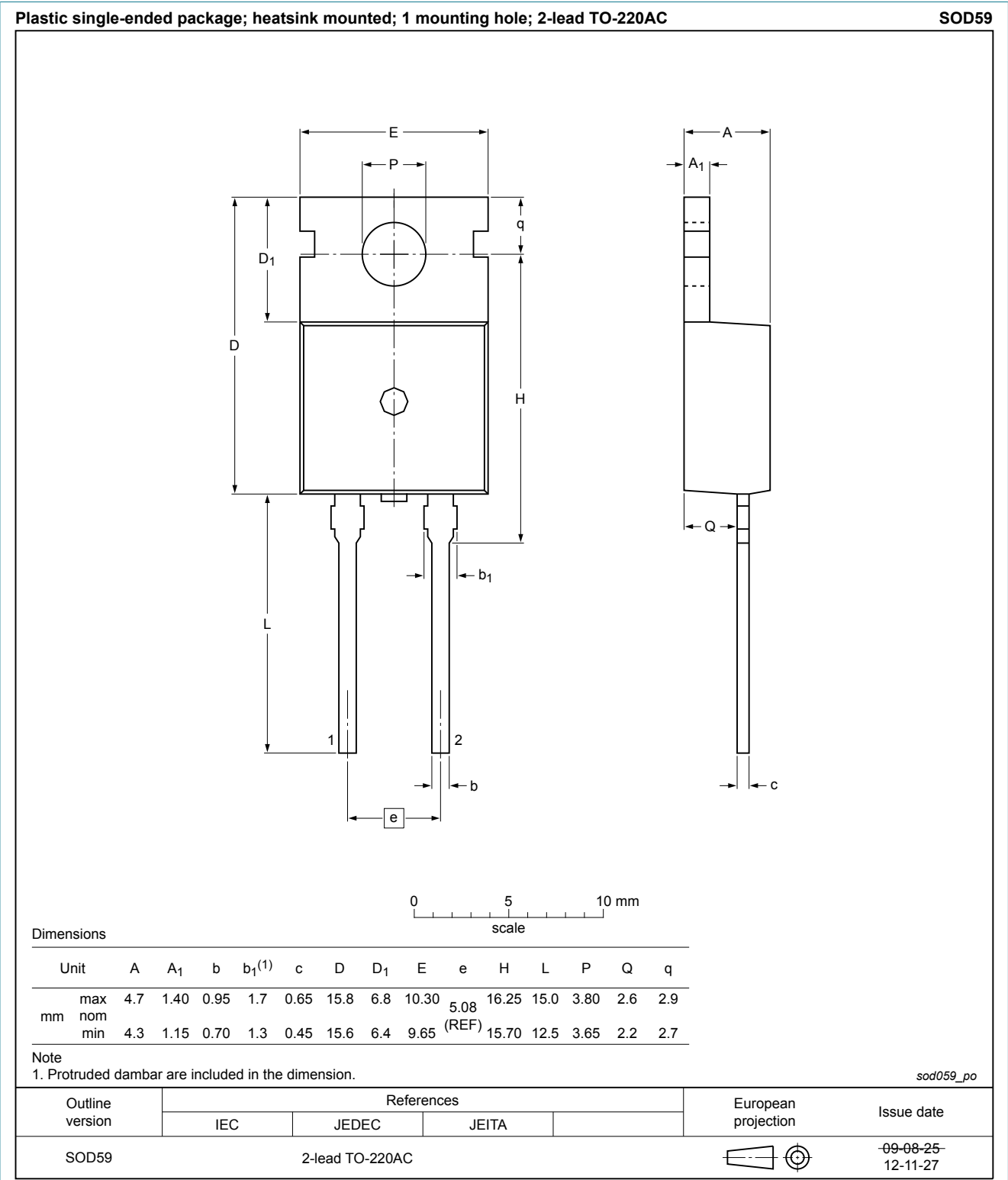


Fig. 8. Package outline TO-220AC (SOD59)

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.
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13. Contents

1 General description 1

2 Features and benefits 1

3 Applications 1

4 Quick reference data 1

5 Pinning information 2

6 Ordering information 2

7 Marking 2

8 Limiting values 2

9 Thermal characteristics 4

10 Characteristics 4

11 Package outline 6

12 Legal information 7

12.1 Data sheet status 7

12.2 Definitions 7

12.3 Disclaimers 7

12.4 Trademarks 8

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