

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

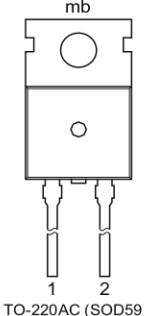

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values			Unit
Absolute maximum rating						
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; Fig. 1 ; Fig. 2	10			A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $T_{mb} \leq 78$ °C; square-wave pulse	20			A
I_{FSM}	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse	65			A
		$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse	71			A
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 10$ A; $T_j = 150$ °C; Fig. 4	-	1.4	1.8	V
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 10$ A; $V_R = 400$ V; $di_F/dt = 500$ A/ μ s; $T_j = 25$ °C; Fig. 6	-	19	-	ns

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		

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. Marking

Table 4. Marking codes

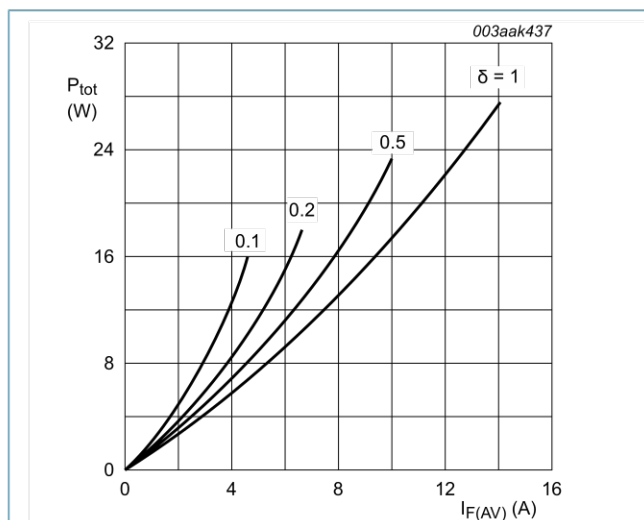
Type number	Marking codes
BYC10-600	BYC10-600

8. Limiting values

Table 5. Limiting values

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

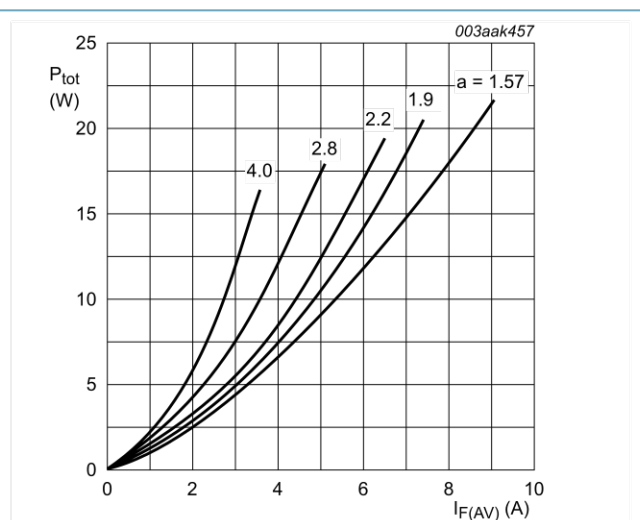
Symbol	Parameter	Conditions	Values	Unit
V_{RRM}	repetitive peak reverse voltage		600	V
V_{RWM}	crest working reverse voltage		600	V
V_R	reverse voltage	$T_{mb} \leq 114\text{ }^\circ\text{C}$	500	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_{mb} \leq 78\text{ }^\circ\text{C}$; square-wave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



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

$$V_o = 1.300\text{ V}; R_s = 0.050\text{ }\Omega$$

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



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

$$V_o = 1.300\text{ V}; R_s = 0.050\text{ }\Omega$$

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

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

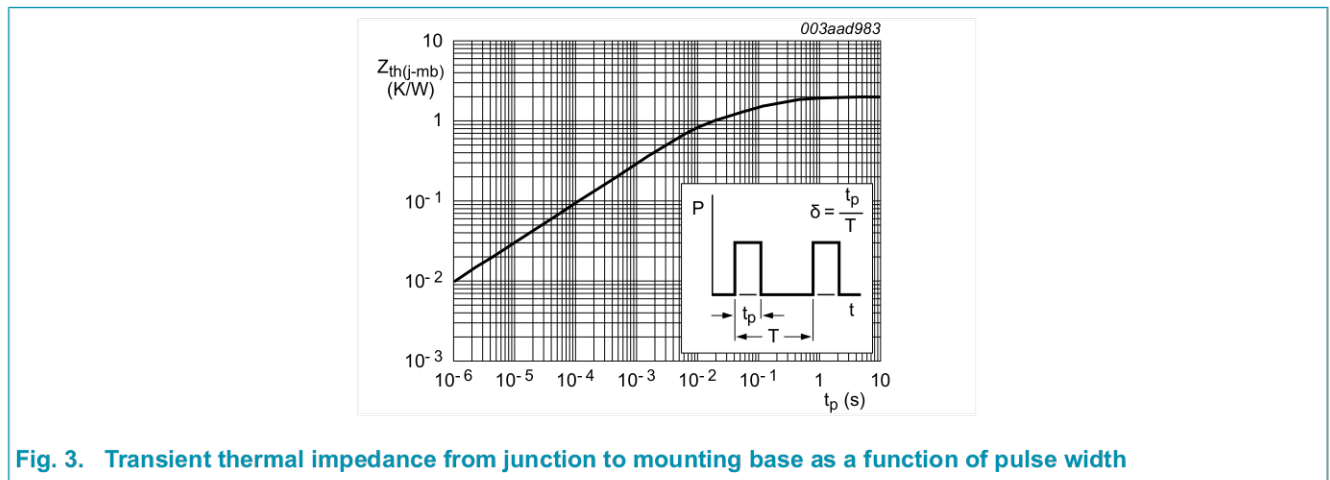
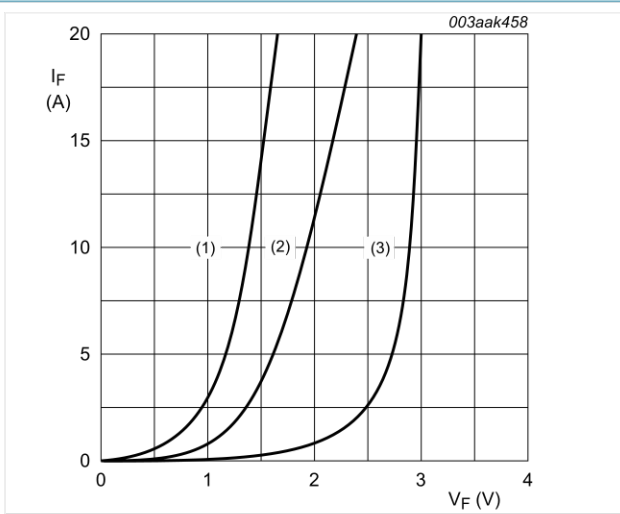


Fig. 3. Transient thermal impedance from junction to mounting base as a function of pulse width

10. Characteristics

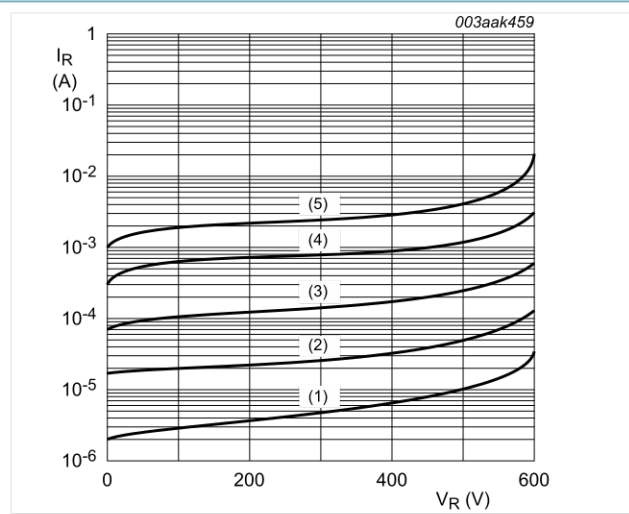
Table 7. Characteristics

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



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

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



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

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

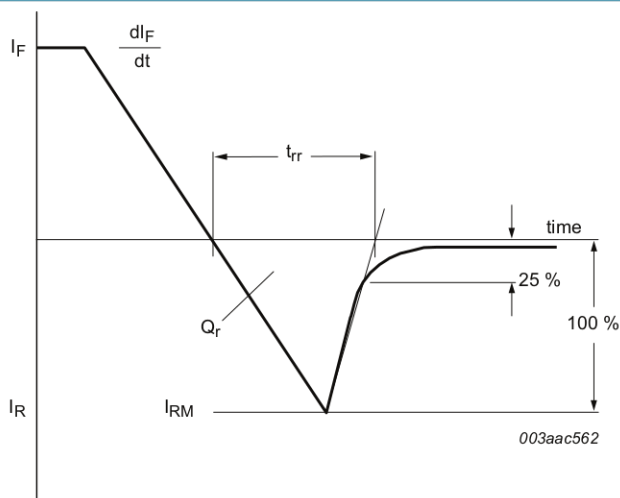


Fig. 6. Reverse recovery definitions; ramp recovery

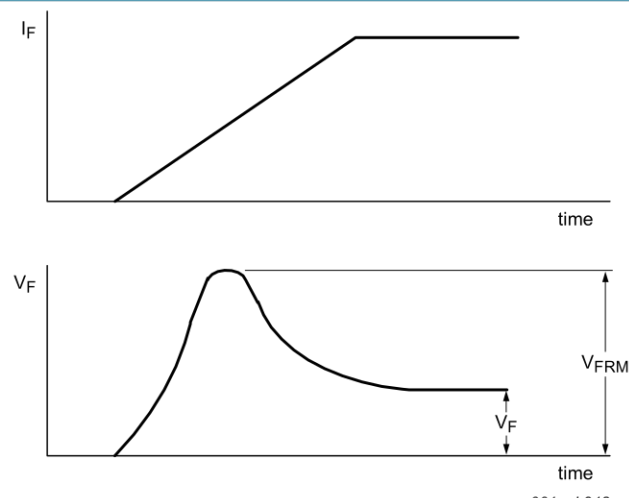
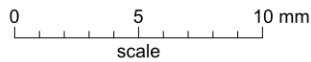
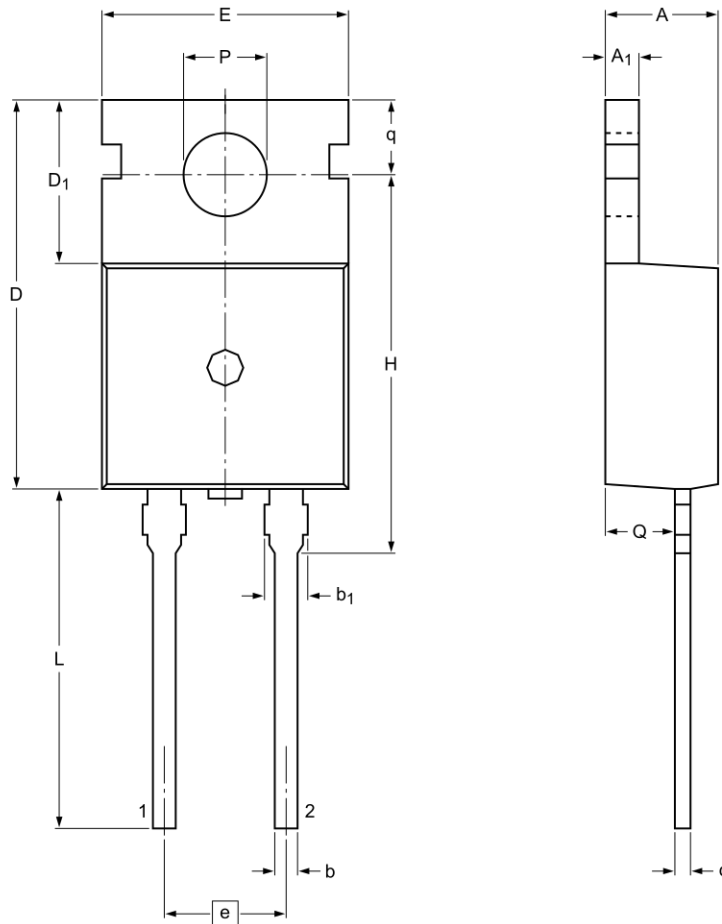


Fig. 7. Forward recovery definitions

11. Package outline

Plastic single-ended package; heatsink mounted; 1 mounting hole; 2-lead TO-220AC

SOD59



Dimensions

Unit	A	A ₁	b	b ₁ (¹)	c	D	D ₁	E	e	H	L	P	Q	q
max	4.7	1.40	0.95	1.7	0.65	15.8	6.8	10.30	5.08	16.25	15.0	3.80	2.6	2.9
nom									(REF)					
min	4.3	1.15	0.70	1.3	0.45	15.6	6.4	9.65		15.70	12.5	3.65	2.2	2.7

Note

1. Protruded dambar are included in the dimension.

sod059_po

Outline version	References			European projection	Issue date
	IEC	JEDEC	JEITA		
SOD59	2-lead TO-220AC				09-08-25 12-11-27

12. Legal information

Data sheet status

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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