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	δ = 0.5 ; T_{mb} ≤ 78 °C; square-wave pulse; Fig. 1; Fig. 2		-	-	10	A
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/µs; T_j = 25 °C; Fig. 6		-	19	-	ns

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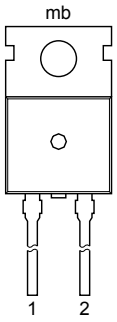
5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 TO-220AC (SOD59)	
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	$T_{mb} \leq 114$ °C		-	500	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
T_{stg}	storage temperature			-40	150	°C
T_j	junction temperature			-	150	°C

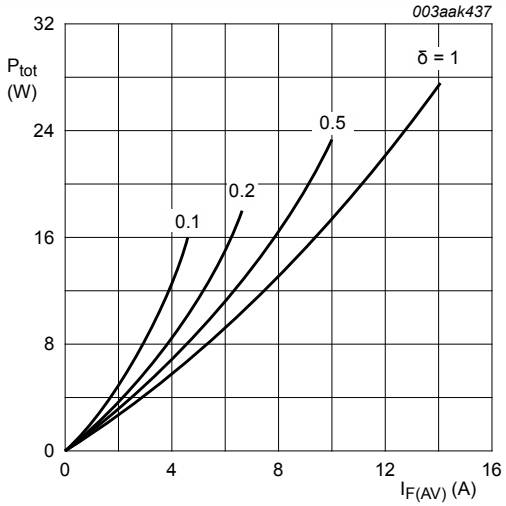


Fig. 1. Forward power dissipation as a function of average forward current; square waveform; maximum values

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

$V_O = 1.300\ V;\ R_S = 0.050\ \Omega$

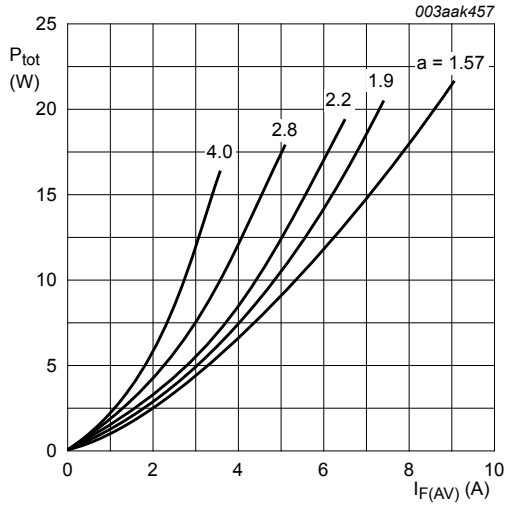


Fig. 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values

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

$V_O = 1.300\ V;\ R_S = 0.050\ \Omega$

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

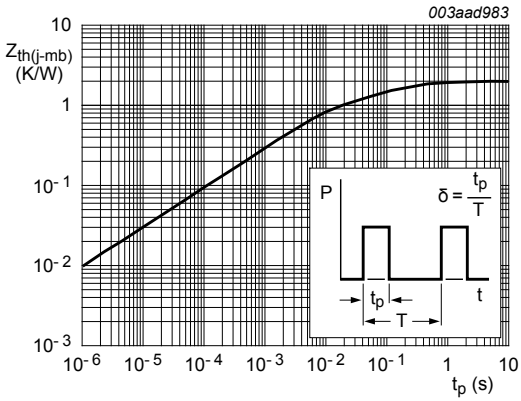


Fig. 3. Transient thermal impedance from junction to mounting base as a function of pulse width

9. Characteristics

Table 6. Characteristics

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

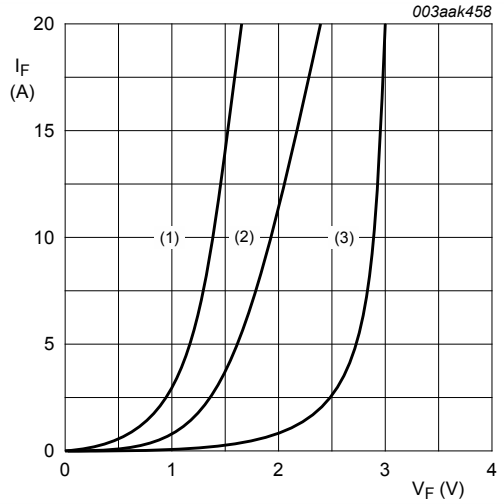


Fig. 4. Forward current as a function of forward voltage

(1) $T_j = 150$ °C; typical values;
(2) $T_j = 150$ °C; maximum values;
(3) $T_j = 25$ °C; maximum values;
$V_O = 1.300$ V; $R_s = 0.050\ \Omega$

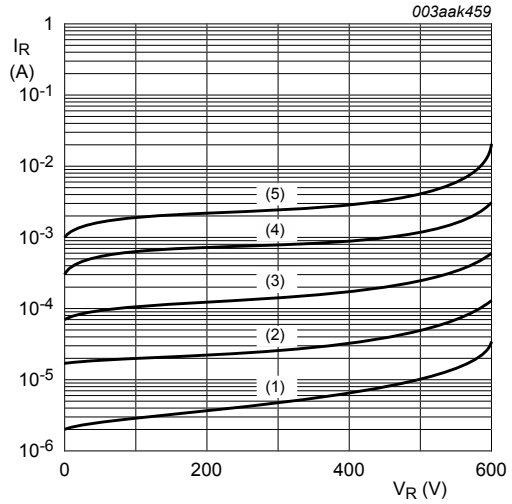


Fig. 5. Reverse leakage current as a function of reverse voltage; typical values

(1) $T_j = 25$ °C; typical values;
(2) $T_j = 50$ °C; typical values;
(3) $T_j = 75$ °C; typical values;
(4) $T_j = 100$ °C; typical values;
(5) $T_j = 125$ °C; typical value

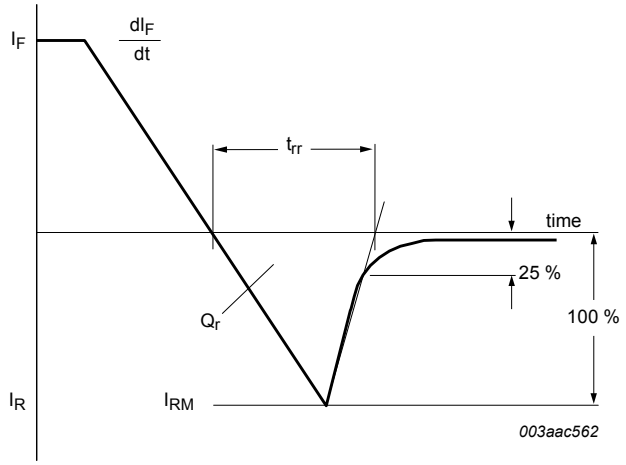


Fig. 6. Reverse recovery definitions; ramp recovery

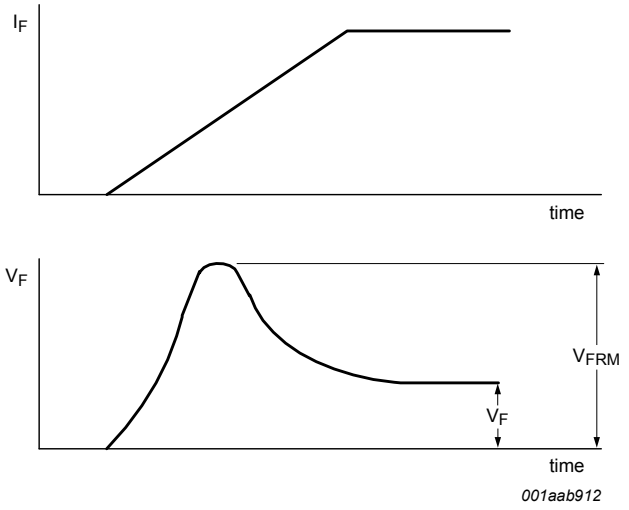
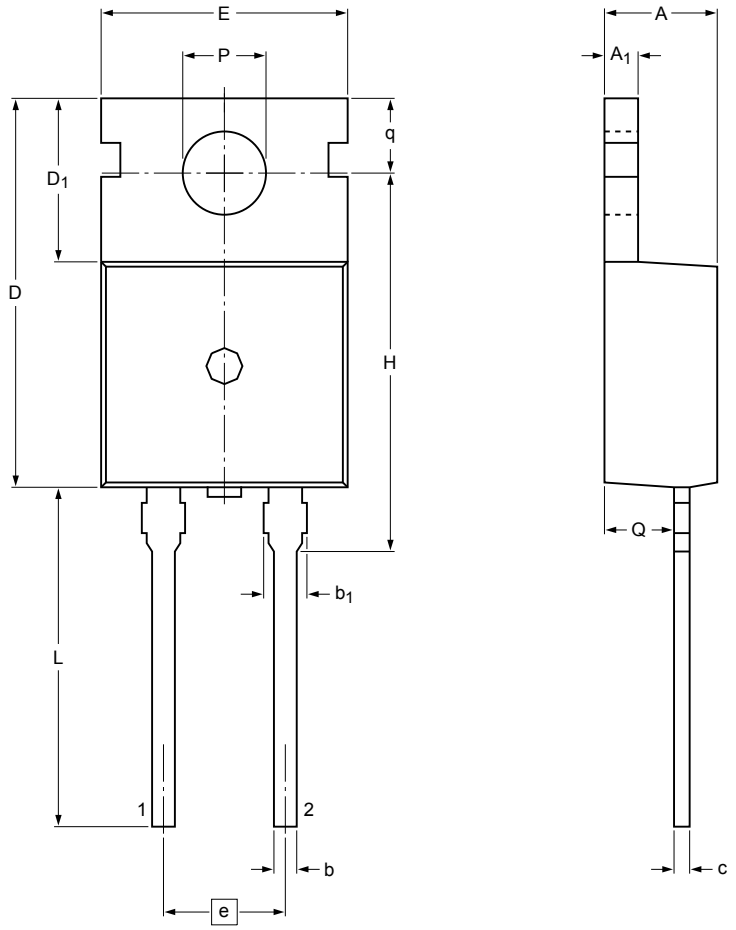


Fig. 7. Forward recovery definitions

10. 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
mm	max	4.7	1.40	0.95	1.7	0.65	15.8	6.8	10.30	5.08 (REF)	16.25	15.0	3.80	2.6	2.9
	nom														
	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

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

11. Legal information

11.1 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.
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