BYC5D-500

Hyperfast power diode

Rev. 1 — 6 July 2011 **Product data sheet**

1. Product profile

1.1 General description

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

1.2 Features and benefits

- Low reverse recovery current and low thermal resistance
- Reduces switching losses in associated MOSFET

1.3 Applications

- Continuous Current Mode (CCM) Power Factor Correction (PFC)
- Half-bridge/full-bridge switched-mode power supplies
- Half-bridge lighting ballasts

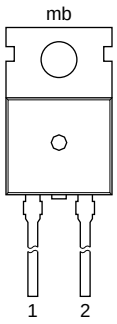
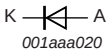
1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	-	500	V
$I_{F(AV)}$	average forward current	square-wave pulse; δ = 0.5 ; T_{mb} ≤ 129 °C; see Figure 1; see Figure 2	-	-	5	A
Static characteristics						
V_F	forward voltage	I_F = 5 A; T_j = 25 °C; see Figure 5	-	1.5	2	V
		I_F = 5 A; T_j = 150 °C; see Figure 5	-	1.15	1.45	V
Dynamic characteristics						
t_{rr}	reverse recovery time	I_F = 5 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 25 °C; see Figure 6	-	16	-	ns

2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode		 001aaa020
2	A	anode		
mb	mb	mounting base; connected to cathode		

SOD59 (TO-220AC)

3. Ordering information

Table 3. Ordering information

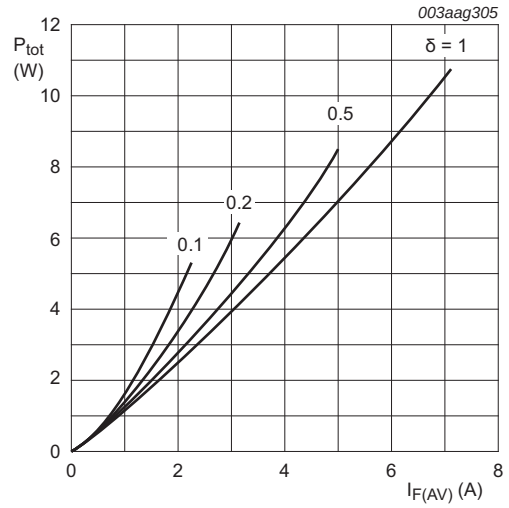
Type number	Package		
	Name	Description	Version
BYC5D-500	TO-220AC	plastic single-ended package; heatsink mounted; 1 mounting hole; 2-lead TO-220AC	SOD59

4. Limiting values

Table 4. Limiting values

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

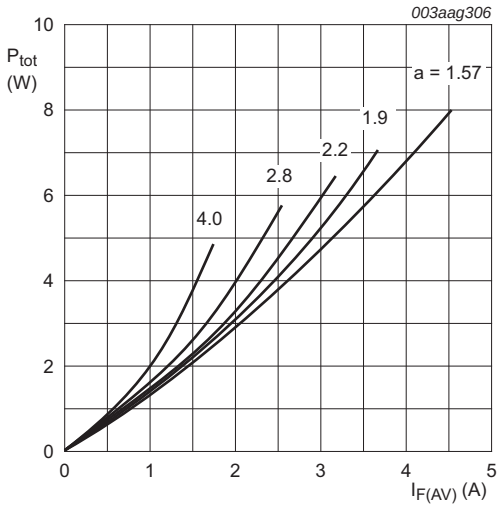
Symbol	Parameter	Conditions	Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	500	V
V_{RWM}	crest working reverse voltage		-	500	V
V_R	reverse voltage	DC	-	500	V
$I_{F(AV)}$	average forward current	square-wave pulse; δ = 0.5 ; $T_{mb} \leq 129$ °C; see Figure 1; see Figure 2	-	5	A
I_{FRM}	repetitive peak forward current	square-wave pulse; δ = 0.5 ; t_p = 25 µs; $T_{mb} \leq 129$ °C	-	10	A
I_{FSM}	non-repetitive peak forward current	t_p = 8.3 ms; sine-wave pulse; $T_{j(init)}$ = 25 °C; see Figure 3	-	44	A
		t_p = 10 ms; sine-wave pulse; $T_{j(init)}$ = 25 °C; see Figure 3	-	40	A
T_{stg}	storage temperature		-40	150	°C
T_j	junction temperature		-	150	°C



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

$$V_o = 1.141\,V;\ R_s = 0.057\,\Omega$$

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



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

$$V_o = 1.141\,V;\ R_s = 0.057\,\Omega$$

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

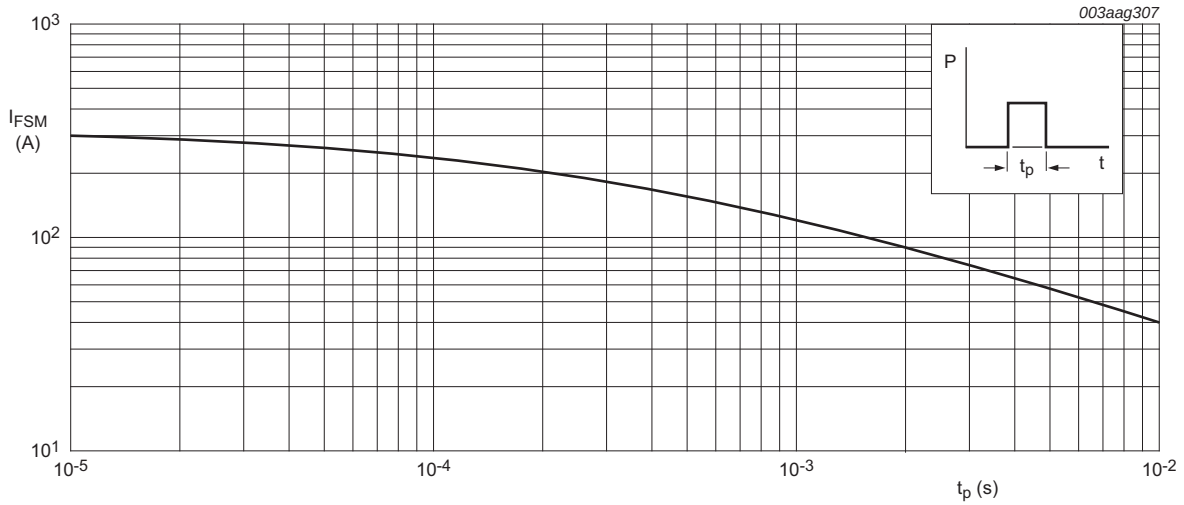


Fig 3. Non-repetitive peak forward current as a function of pulse width; square waveform; maximum values

5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	see Figure 4	-	-	2.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	60	-	K/W

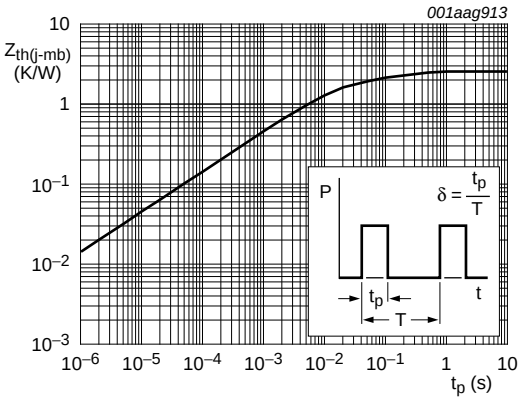
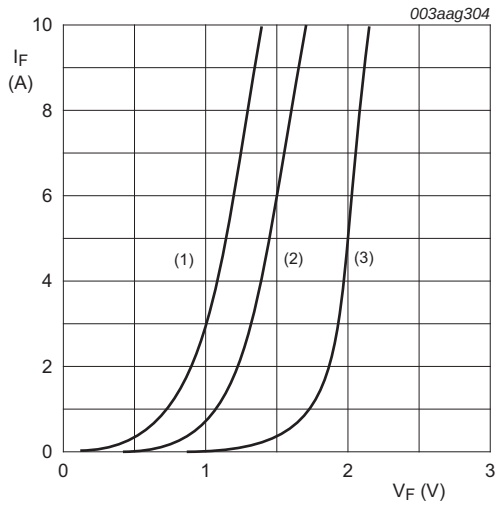


Fig 4. Transient thermal impedance from junction to mounting base as a function of pulse width

6. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	I_F = 10 A; T_j = 150 °C; see Figure 5	-	1.4	1.7	V
		I_F = 5 A; T_j = 25 °C; see Figure 5	-	1.5	2	V
		I_F = 5 A; T_j = 150 °C; see Figure 5	-	1.15	1.45	V
I_R	reverse current	V_R = 500 V	-	9	40	µA
		V_R = 500 V; T_j = 100 °C	-	0.9	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; see Figure 6	-	15	30	ns
		I_F = 5 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 25 °C; see Figure 6	-	16	-	ns
I_{RM}	peak reverse recovery current	I_F = 5 A; V_R = 400 V; dI_F/dt = 50 A/µs; T_j = 125 °C; see Figure 6	-	0.9	3	A
		I_F = 5 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 100 °C; see Figure 6	-	9.5	11	A
V_{FR}	forward recovery voltage	I_F = 5 A; dI_F/dt = 100 A/µs; T_j = 25 °C; see Figure 7	-	9	11	V



(1) $T_j = 150$ °C; typical values;
(2) $T_j = 150$ °C; maxium values;
(3) $T_j = 25$ °C; maxium values;
$V_o = 1.141$ V; $R_s = 0.057\ \Omega$

Fig 5. Forward current as a function of forward voltage

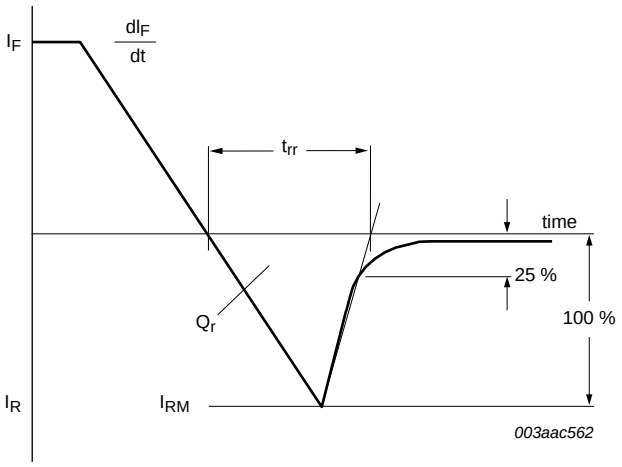


Fig 6. Reverse recovery definitions; ramp recovery

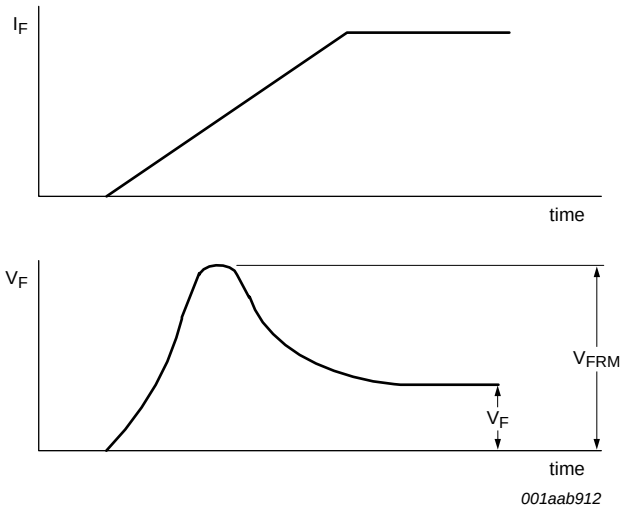
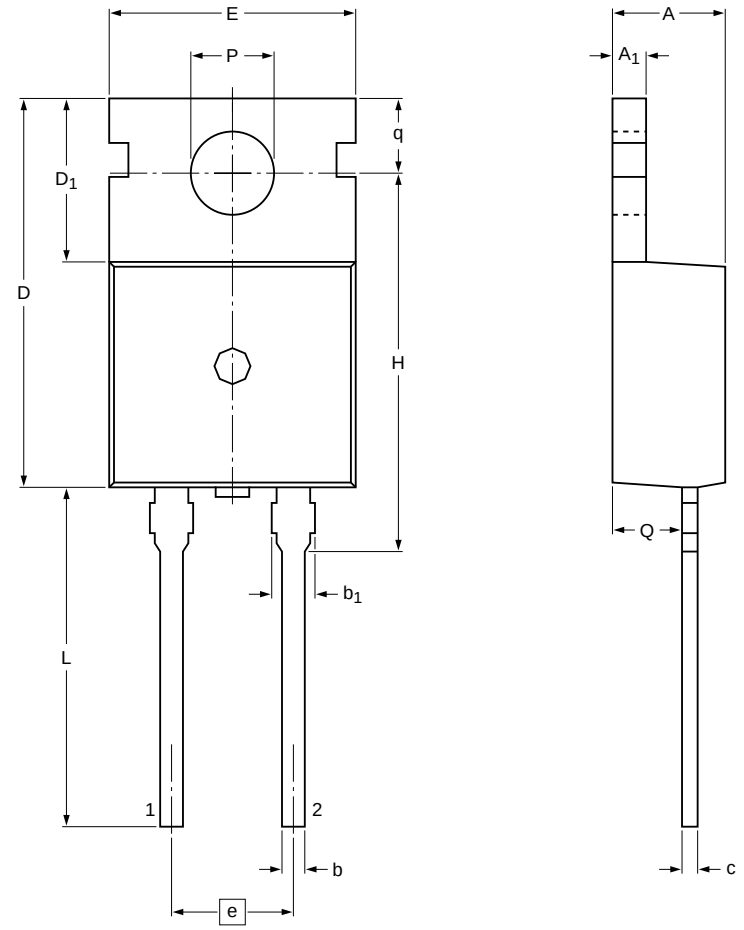


Fig 7. Forward recovery definitions

7. Package outline

Plastic single-ended package; heatsink mounted; 1 mounting hole; 2-lead TO-220AC **SOD59**



0 5 10 mm

scale

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	3.7	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	3.5	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				~~09-08-17~~ 09-08-25

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

8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYC5D-500 v.1	20110706	Product data sheet	-	-

9. Legal information

9.1 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.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

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11. Contents

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