

BYC15-600

Hyperfast power diode

Rev. 02 — 29 July 2010

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

- Extremely fast switching
- Low reverse recovery current
- Low thermal resistance
- Reduces switching loss in associated MOSFET

1.3 Applications

- Continuous Current Mode (CCM) Power
- Half-bridge or full-bridge switched-mode
- Half-bridge lighting ballasts

1.4 Quick reference data

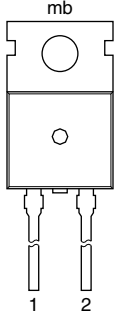
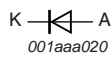
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Specify Name						
V_{RRM}	repetitive peak reverse voltage		-	-	600	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$; $T_{mb} \leq 98$ °C; see Figure 1 ; see Figure 2	-	-	15	A
Static characteristics						
V_F	forward voltage	$I_F = 15$ A; $T_j = 150$ °C; see Figure 3	-	1.4	2	V
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 15$ A; $V_R = 400$ V; $dI_F/dt = 500$ A/ μ s; $T_j = 25$ °C; see Figure 4	-	19	-	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; cathode		

SOD59 (TO-220AC)

3. Ordering information

Table 3. Ordering information

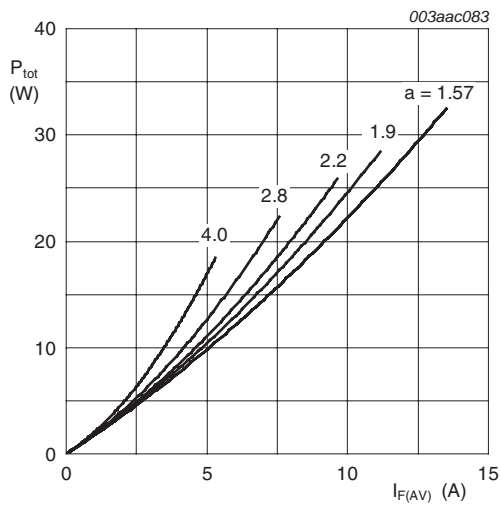
Type number	Package		
	Name	Description	Version
BYC15-600	TO-220AC	plastic single-ended package; heatsink mounted; 1 mounting hole; 2-lead TO-220AC	SOD59

4. Limiting values

Table 4. Limiting values

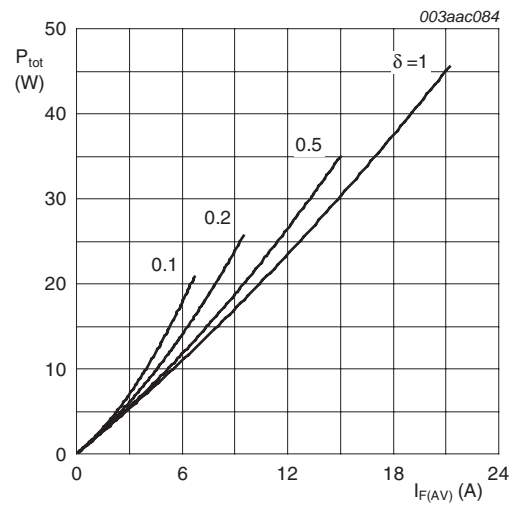
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
Specify Name					
V_{RRM}	repetitive peak reverse voltage		-	600	V
V_{RWM}	crest working reverse voltage		-	600	V
V_R	reverse voltage	$T_{mb} \leq 100\text{ °C}$; DC	-	500	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$; $T_{mb} \leq 98\text{ °C}$; see Figure 1 ; see Figure 2	-	15	A
I_{FRM}	repetitive peak forward current	square-wave pulse; $\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 98\text{ °C}$	-	30	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\text{ ms}$; sine-wave pulse; $T_{j(\text{init})} = 25\text{ °C}$	-	200	A
		$t_p = 8.3\text{ ms}$; sine-wave pulse; $T_{j(\text{init})} = 25\text{ °C}$	-	220	A
T_{stg}	storage temperature		-40	150	°C
T_j	junction temperature		-	150	°C



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

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



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

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

5. Thermal characteristics

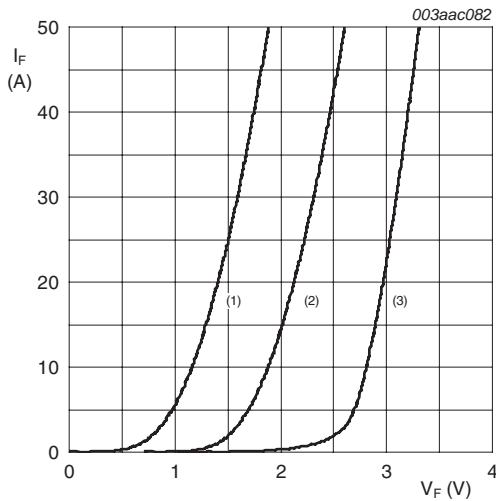
Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Specify Name						
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	with heatsink compound	-	-	1.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W

6. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 30\text{ A}; T_j = 150\text{ °C};$ see Figure 3	-	1.7	2.3	V
		$I_F = 15\text{ A}; T_j = 25\text{ °C};$ see Figure 3	-	1.9	2.9	V
		$I_F = 15\text{ A}; T_j = 150\text{ °C};$ see Figure 3	-	1.4	2	V
I_R	reverse current	$V_R = 500\text{ V}; T_j = 100\text{ °C}$	-	1.1	3	mA
		$V_R = 600\text{ V}; T_j = 25\text{ °C}$	-	12	200	μA
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 15\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 100\text{ °C};$ see Figure 4	-	32	40	ns
		$I_F = 1\text{ A}; V_R = 30\text{ V}; dI_F/dt = 50\text{ A}/\mu\text{s}; T_j = 25\text{ °C};$ see Figure 4	-	35	55	ns
		$I_F = 15\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 25\text{ °C};$ see Figure 4	-	19	-	ns
I_{RM}	peak reverse recovery current	$I_F = 15\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 125\text{ °C};$ see Figure 4	-	9.5	12	A
		$I_F = 15\text{ A}; V_R = 400\text{ V}; dI_F/dt = 50\text{ A}/\mu\text{s}; T_j = 125\text{ °C};$ see Figure 4	-	3	7.5	A
V_{FR}	forward recovery voltage	$I_F = 15\text{ A}; dI_F/dt = 100\text{ A}/\mu\text{s}; T_j = 25\text{ °C};$ see Figure 5	-	8	11	V



- (1) $T_j = 150\text{ °C};$ typical values
- (2) $T_j = 150\text{ °C};$ maximum values
- (3) $T_j = 25\text{ °C};$ maximum values

Fig 3. Forward current as a function of forward voltage

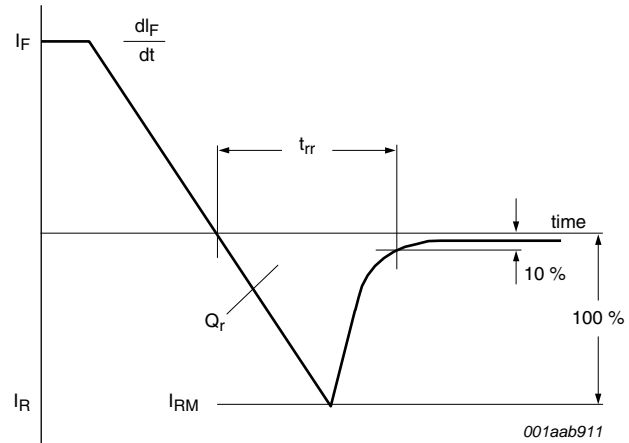


Fig 4. Forward recovery definitions

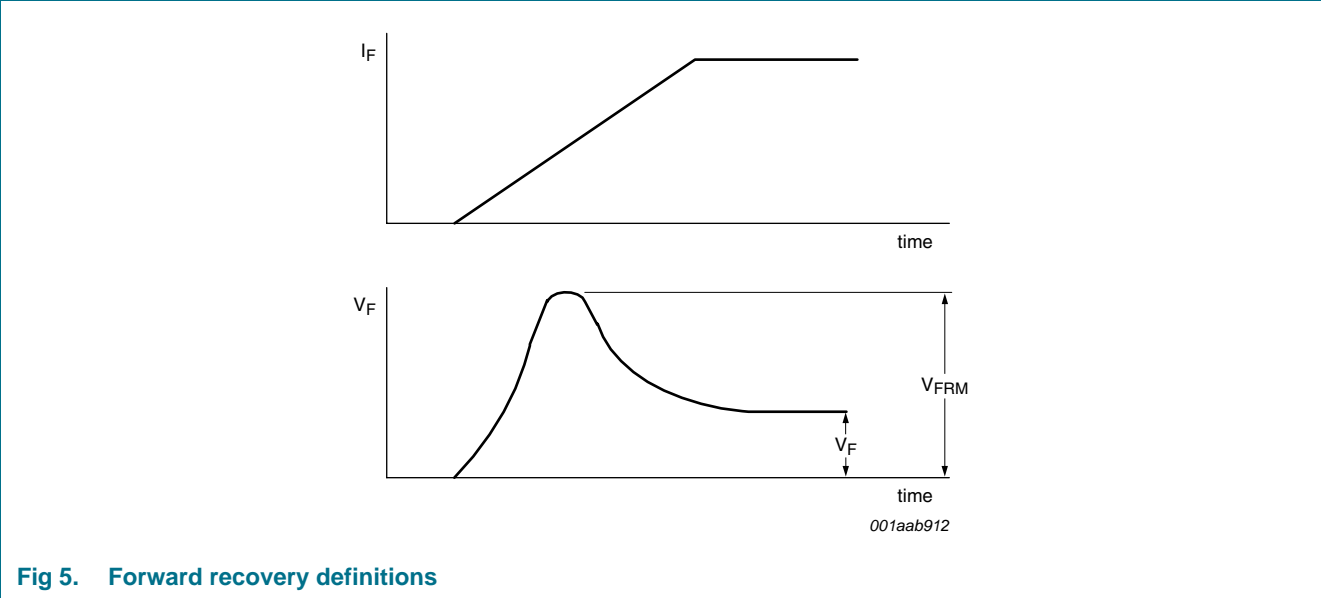


Fig 5. Forward recovery definitions

7. Package outline

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

SOD59

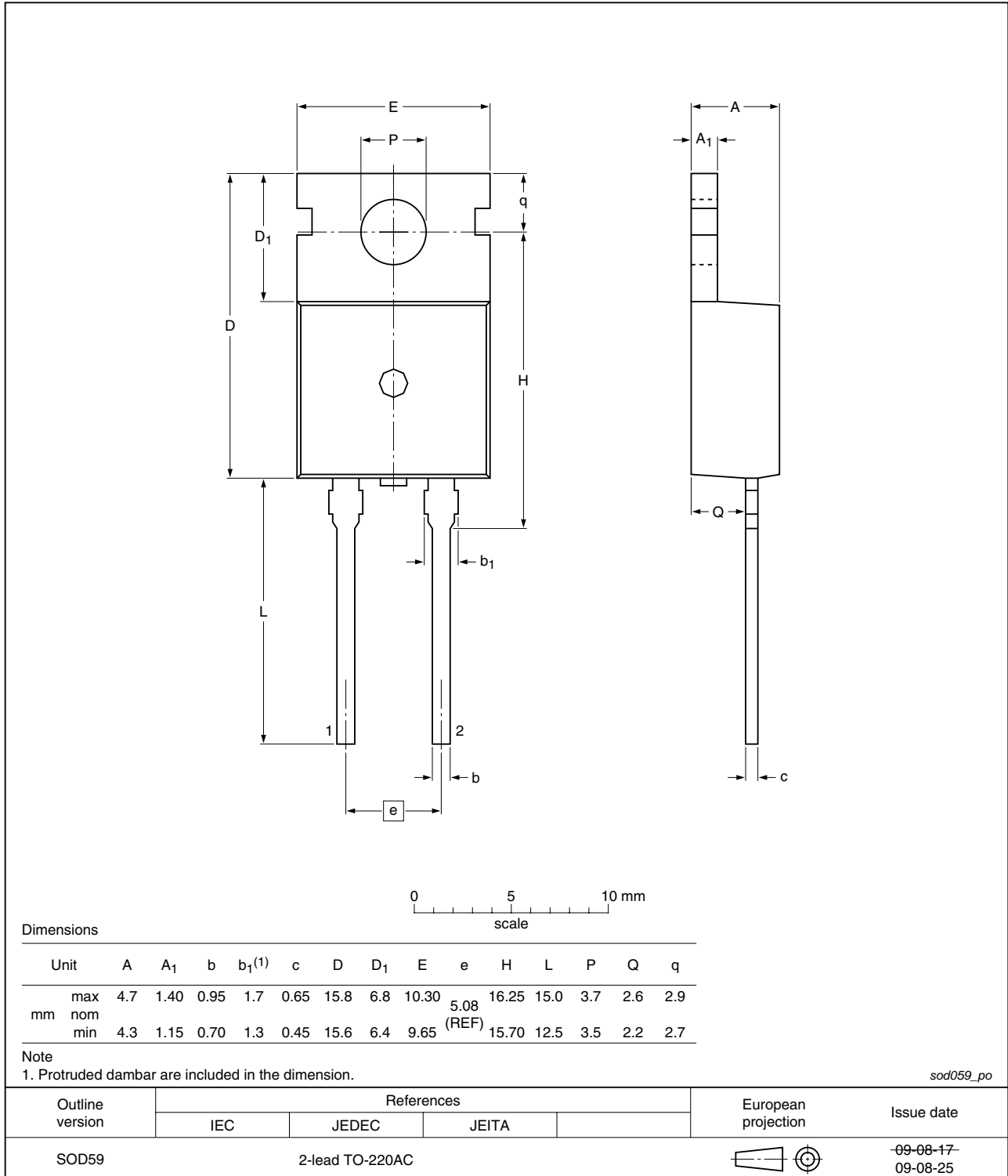


Fig 6. Package outline SOD59 (TO-220AC)

8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYC15-600 v.2	20100729	Product data sheet	-	BYC15-600 v.1
Modifications:	• Various changes to content.			
BYC15-600 v.1	20071129	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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