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 lighting ballasts
- Half-bridge or full-bridge switched-mode

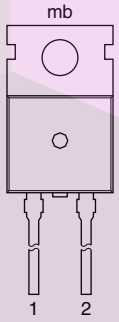
1.4 Quick reference data

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/µs; $T_j = 25$ °C; see Figure 4	-	19	-	ns

2. Pinning information

Table 2. Pinning information

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

SOD59 (TO-220AC)

3. Ordering information

Table 3. Ordering information

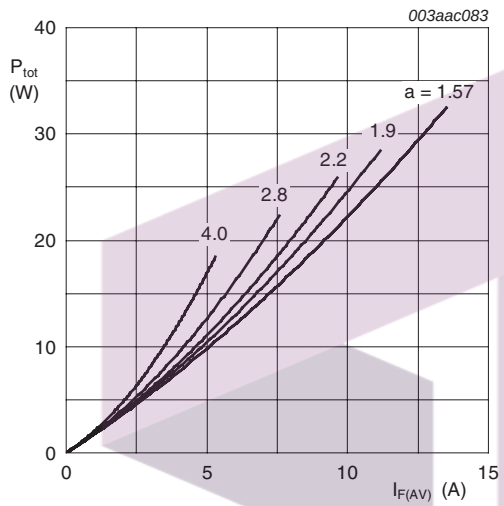
Type number	Package		
	Name	Description	Version
BYC15-600	TO-220AC	plastic single-ended package; heatsink mounted; 1 mounting hole; 2-lead TO-220AC	SOD59

4. Limiting values

Table 4. Limiting values

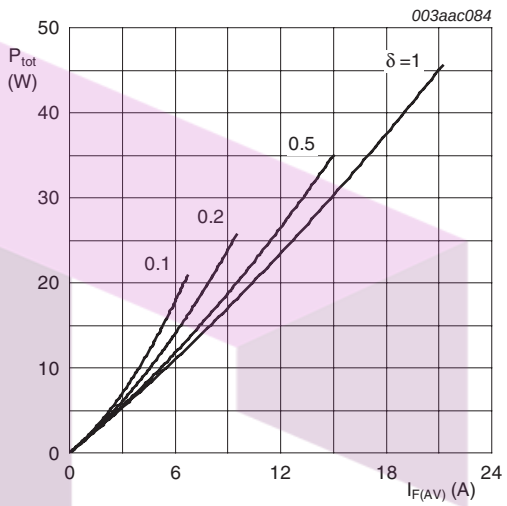
In accordance with the Absolute Maximum Rating System (IEC 60134).

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	$T_{mb} \leq 100$ °C; DC	-	500	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
I_{FRM}	repetitive peak forward current	square-wave pulse; $\delta = 0.5$; $t_p = 25$ µs; $T_{mb} \leq 98$ °C	-	30	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10$ ms; sine-wave pulse; $T_{j(init)} = 25$ °C	-	200	A
		$t_p = 8.3$ ms; sine-wave pulse; $T_{j(init)} = 25$ °C	-	220	A
T_{stg}	storage temperature		-40	150	°C
T_j	junction temperature		-	150	°C



a = 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

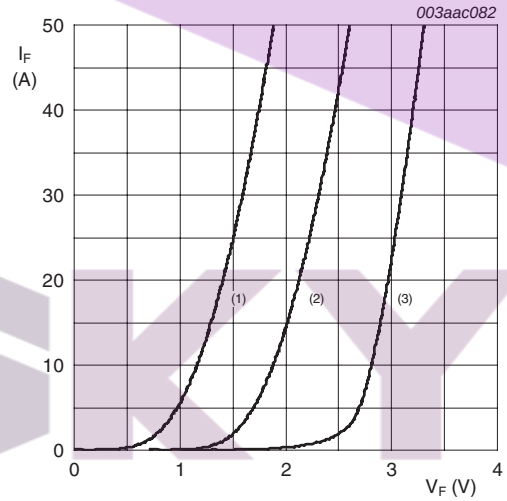
Table 5. Thermal characteristics

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



(1) T_j = 150 °C; typical values
(2) T_j = 150 °C; maximum values
(3) T_j = 25 °C; maximum values

Fig 3. Forward current as a function of forward voltage

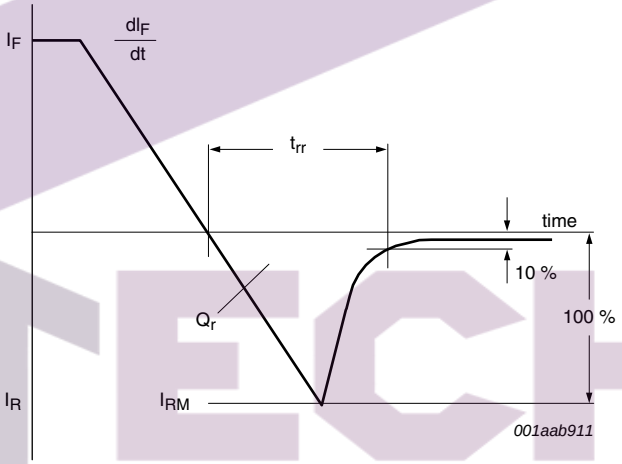


Fig 4. Forward recovery definitions

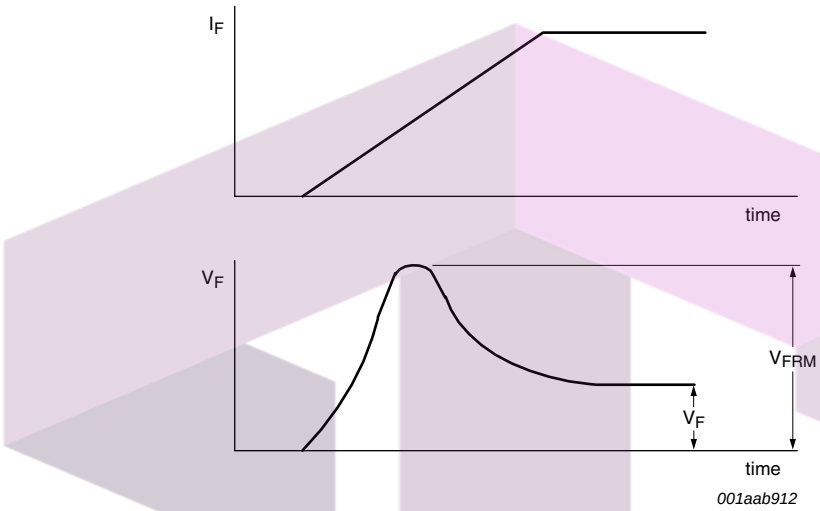
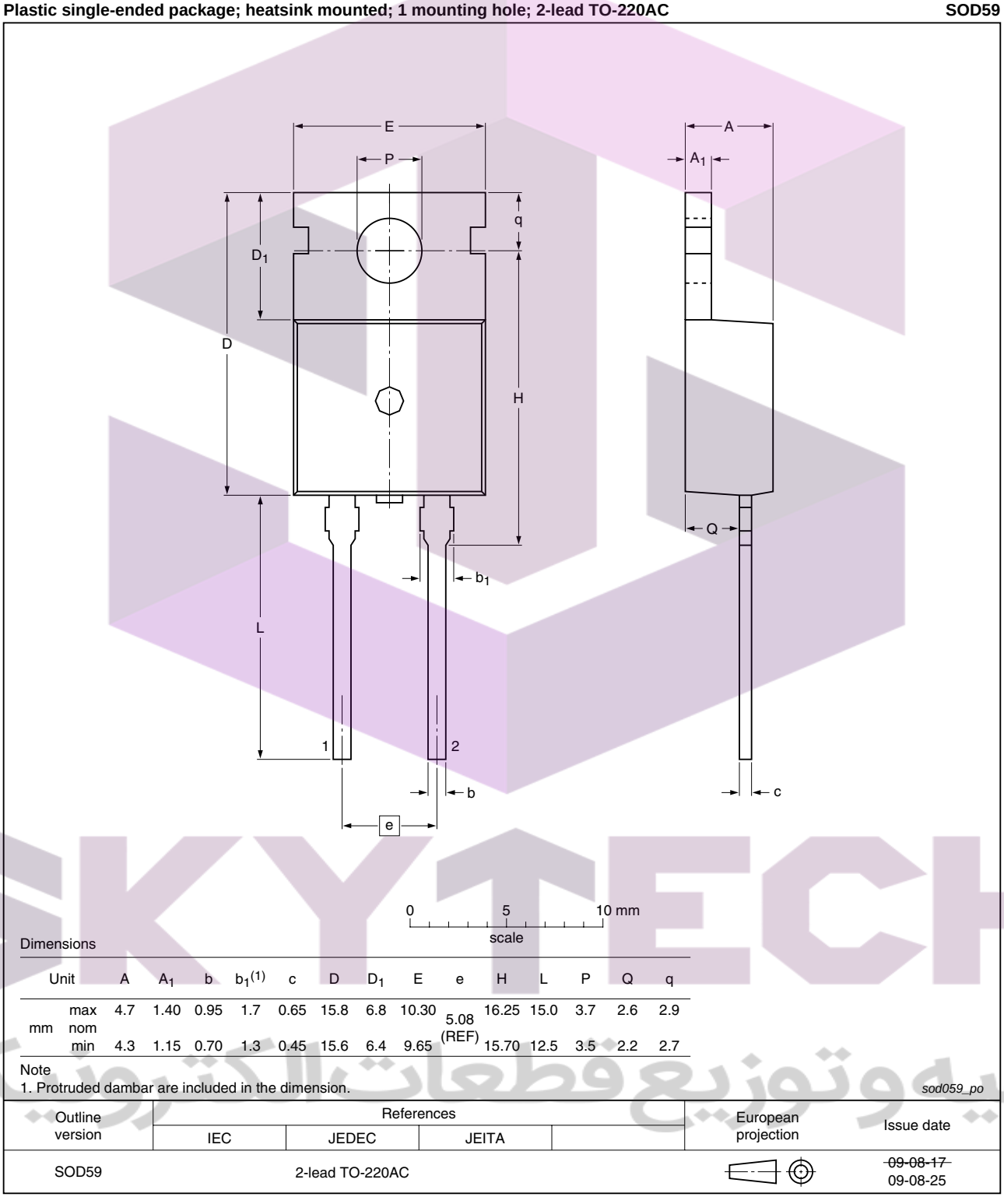


Fig 5. Forward recovery definitions

7. Package outline

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



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 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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11. Contents

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