

BYC58X-600

8 A hyperfast rectifier diode

Rev. 01 — 23 February 2010

Product data sheet

1. Product profile

1.1 General description

Hyperfast epitaxial rectifier diode in a SOD113 (2-lead TO-220F) plastic package specifically for use in CCM PFC applications for reduced switching losses.

1.2 Features and benefits

- Allows use of smaller MOSFETs and heatsinks
- Isolated package
- Low reverse recovery current
- Low thermal resistance
- Reduces switching losses in associated MOSFET
- Superfast switching

1.3 Applications

- Continuous Current Mode (CCM) Power Factor Correction (PFC)
- Desk top computer power supplies
- Flat panel TV power supplies
- Power supply adapters
- Server power supplies
- Telecom power supplies

1.4 Quick reference data

Table 1. Quick reference

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	-	600	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$; $T_h \leq 93^\circ\text{C}$; see Figure 1 and 2	-	-	8	A
I_{FSM}	non-repetitive peak forward current	$T_{j(\text{init})} = 25^\circ\text{C}$; $t_p = 10\text{ ms}$; sine-wave pulse	-	-	110	A
		$T_{j(\text{init})} = 25^\circ\text{C}$; $t_p = 8.3\text{ ms}$; sine-wave pulse	-	-	120	A
$R_{th(j-h)}$	thermal resistance from junction to heatsink	with heatsink compound; see Figure 3	-	2.5	3	K/W

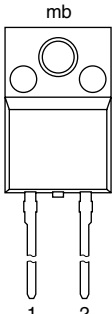



Table 1. Quick reference ...continued

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 8\text{ A}$; $V_R = 400\text{ V}$; $di_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 25\text{ }^\circ\text{C}$; see Figure 6	-	12.5	-	ns
		$I_F = 8\text{ A}$; $V_R = 400\text{ V}$; $di_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 125\text{ }^\circ\text{C}$; see Figure 6 and 7	-	21	-	ns
Q_r	recovered charge	$I_F = 8\text{ A}$; $V_R = 400\text{ V}$; $di_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 125\text{ }^\circ\text{C}$; see Figure 5 and 6	-	40	-	nC
Static characteristics						
V_F	forward voltage	$I_F = 8\text{ A}$; $T_j = 25\text{ }^\circ\text{C}$; see Figure 4	-	2.35	3.2	V
		$I_F = 8\text{ A}$; $T_j = 150\text{ }^\circ\text{C}$; see Figure 4	-	2	2.4	V

2. Pinning information

Table 2. Pinning information

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

SOD113 (TO-220F)

3. Ordering information

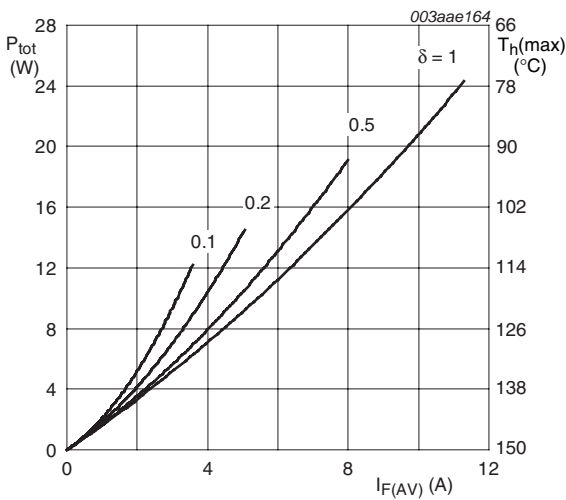
Table 3. Ordering information

Type number	Package		Version
	Name	Description	
BYC58X-600	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 2-lead TO-220 "full pack"	SOD113

4. Limiting values

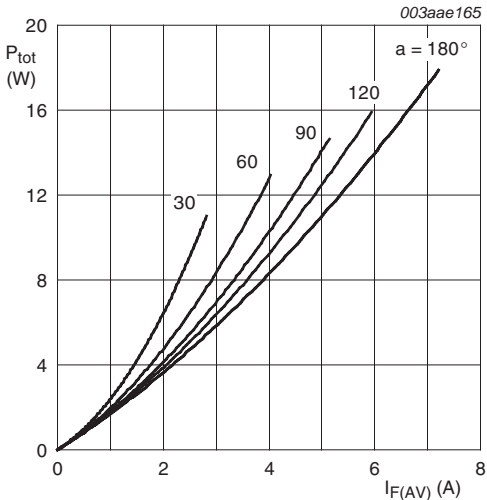
Table 4. Limiting values
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V _{RRM}	repetitive peak reverse voltage		-	600	V
V _{RWM}	crest working reverse voltage		-	600	V
I _{F(AV)}	average forward current	square-wave pulse; δ = 0.5; T _h ≤ 93 °C; see Figure 1 and 2	-	8	A
I _{FRM}	repetitive peak forward current	square-wave pulse; δ = 0.5; t _p = 25 μs	-	16	A
I _{FSM}	non-repetitive peak forward current	t _p = 10 ms; sine-wave pulse; T _{j(init)} = 25 °C	-	110	A
		t _p = 8.3 ms; sine-wave pulse; T _{j(init)} = 25 °C	-	120	A
T _{stg}	storage temperature		-40	150	°C
T _j	junction temperature		-	150	°C



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

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



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

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

5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-h)}$	thermal resistance from junction to heatsink	with heatsink compound; see Figure 3	-	2.5	3	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	55	-	K/W

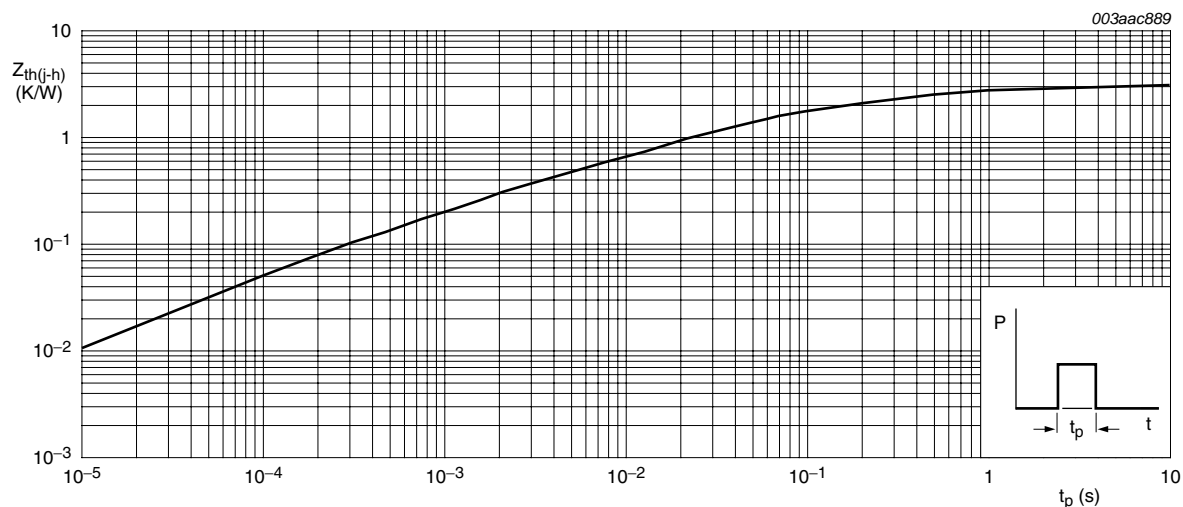


Fig 3. Transient thermal impedance from junction to heatsink as a function of pulse width

6. Isolation characteristics

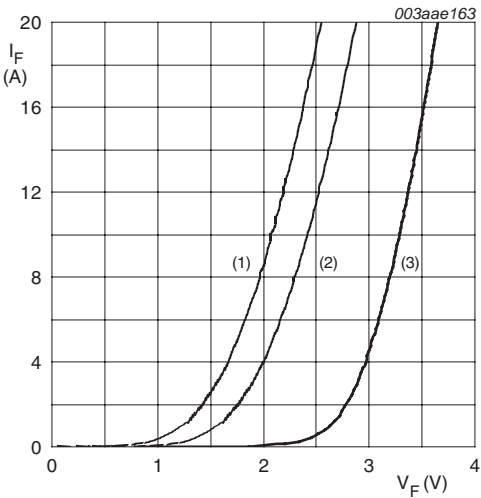
Table 6. Isolation characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	50 Hz $\leq f \leq$ 60 Hz; RH \leq 65 %; from all pins to external heatsink; sinusoidal waveform; clean and dust free	-	-	2500	V
C_{isol}	isolation capacitance	$f = 1$ MHz; from cathode to external heatsink	-	10	-	pF

7. Characteristics

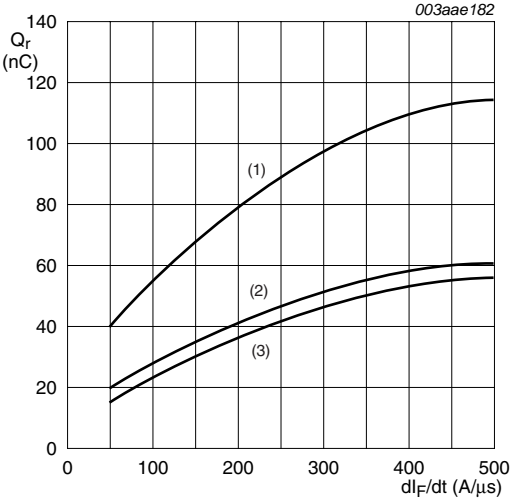
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 8\text{ A}$; $T_j = 25\text{ °C}$; see Figure 4	-	2.35	3.2	V
		$I_F = 8\text{ A}$; $T_j = 150\text{ °C}$; see Figure 4	-	2	2.4	V
I_R	reverse current	$V_R = 600\text{ V}$; $T_j = 25\text{ °C}$	-	-	150	μA
Dynamic characteristics						
Q_r	recovered charge	$I_F = 8\text{ A}$; $V_R = 400\text{ V}$; $dI_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 125\text{ °C}$; see Figure 5 and 6	-	40	-	nC
t_{rr}	reverse recovery time	$I_F = 8\text{ A}$; $V_R = 400\text{ V}$; $dI_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$; see Figure 6	-	12.5	-	ns
		$I_F = 8\text{ A}$; $V_R = 400\text{ V}$; $dI_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 125\text{ °C}$; see Figure 6 and 7	-	21	-	ns
I_{RM}	peak reverse recovery current	$I_F = 8\text{ A}$; $V_R = 400\text{ V}$; $dI_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 125\text{ °C}$	-	4	5.5	A



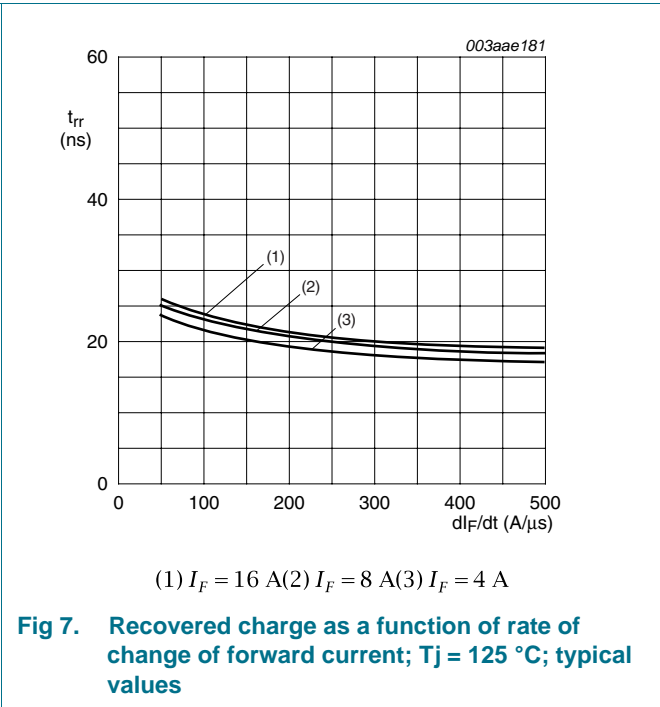
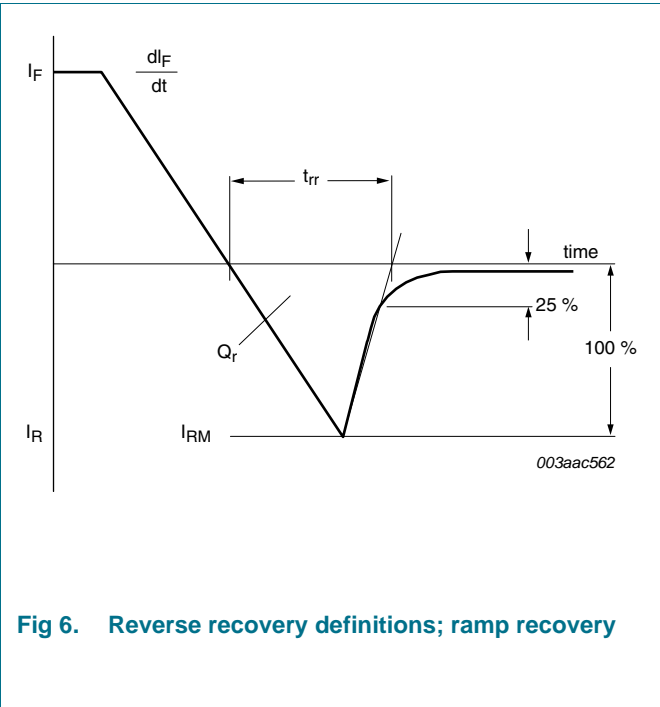
(1) $T_j = 150\text{ °C}$; typical values
(2) $T_j = 150\text{ °C}$; maximum values
(3) $T_j = 25\text{ °C}$; maximum values

Fig 4. Forward current as a function of forward voltage



(1) $I_F = 16\text{ A}$ (2) $I_F = 8\text{ A}$ (3) $I_F = 4\text{ A}$

Fig 5. Recovered charge as a function of rate of change of forward current; $T_j = 125\text{ °C}$; typical values



8. Package outline

Plastic single-ended package; isolated heatsink mounted;
1 mounting hole; 2-lead TO-220 'full pack'

SOD113

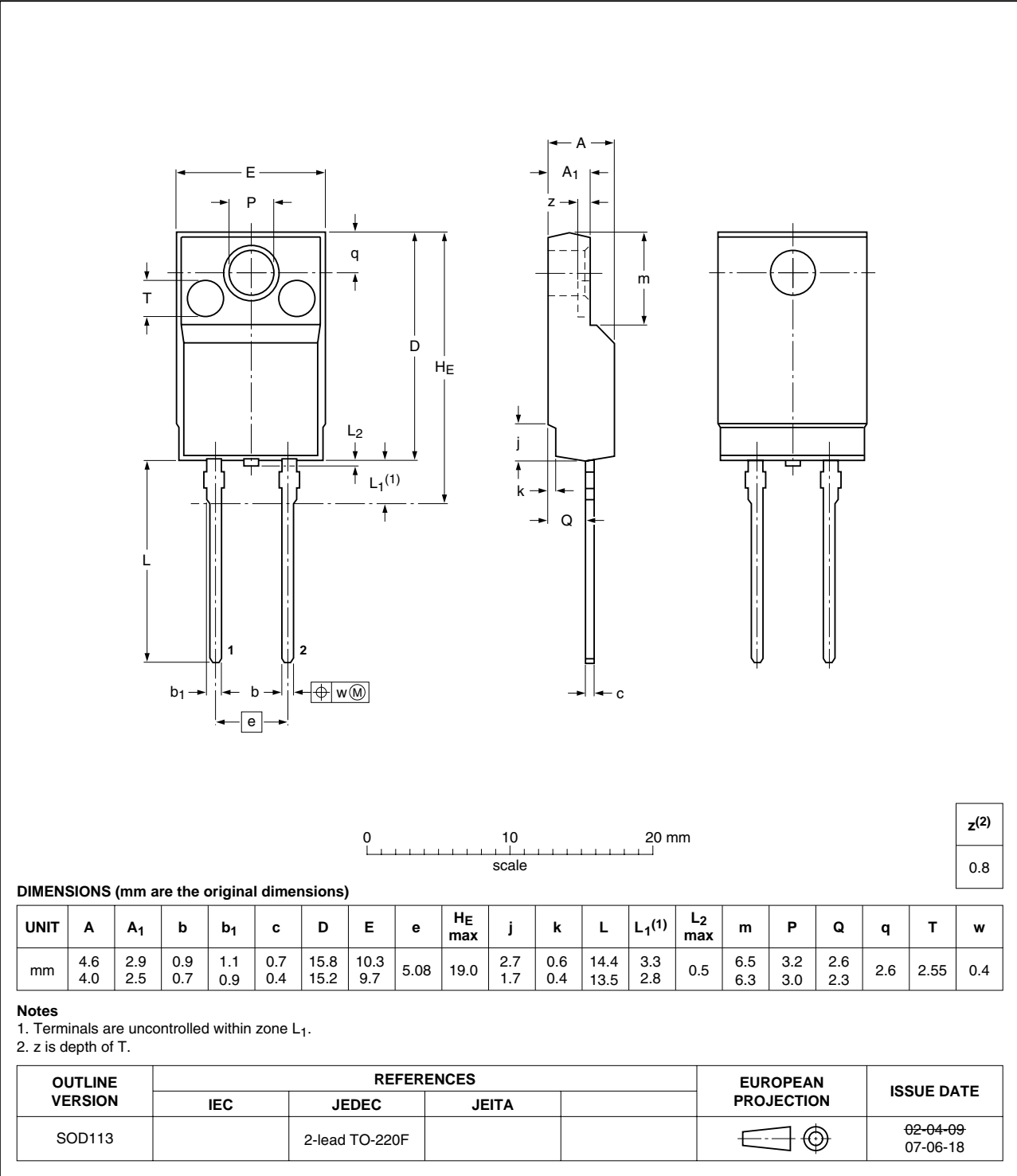


Fig 8. Package outline SOD113 (TO-220F)

9. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYC58X-600_1	20100223	Product data sheet	-	-

10. Legal information

10.1 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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