BYC10X-600

Rectifier diode, hyperfast

Rev. 02 — 16 January 2008 Product data sheet

1. Product profile

1.1 General description

Hyperfast, epitaxial rectifier diode in a SOD113 (TO-220F) plastic package.

1.2 Features

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

1.3 Applications

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

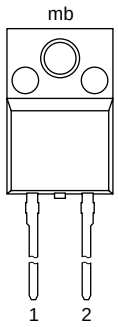
1.4 Quick reference data

- $V_{RRM} \leq 600$ V
- $V_F = 1.32$ V (typ)
- $I_{F(AV)} \leq 10$ A
- $t_{rr} = 19$ ns (typ)

2. Pinning information

Table 1. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	cathode (k)		
2	anode (a)		
mb	mounting base; isolated		



SOD113 (2-lead TO-220F)

3. Ordering information

Table 2. Ordering information

Type number	Package		
	Name	Description	Version
BYC10X-600	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 2-lead TO-220 'full pack'	SOD113

4. Limiting values

Table 3. 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	square waveform; $\delta = 1.0$; $T_h \leq 100$ °C	-	500	V
$I_{F(AV)}$	average forward current	square waveform; $\delta = 0.5$; $T_h \leq 37$ °C	-	10	A
I_{FRM}	repetitive peak forward current	square waveform; $\delta = 0.5$; $T_h \leq 37$ °C	-	20	A
I_{FSM}	non-repetitive peak forward current	t = 10 ms; sinusoidal waveform	-	91	A
		t = 8.3 ms; sinusoidal waveform	-	100	A
T_{stg}	storage temperature		–40	+150	°C
T_j	junction temperature		-	150	°C

5. Thermal characteristics

Table 4. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-h)}$	thermal resistance from junction to heatsink	with heatsink compound; see Figure 1	-	-	4.8	K/W
		without heatsink compound	-	-	5.9	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W

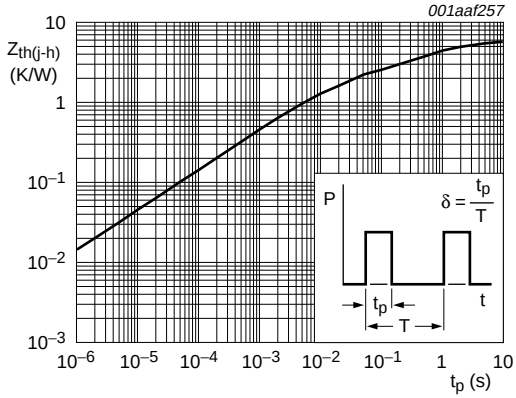


Fig 1. Transient thermal impedance from junction to heatsink as a function of pulse width

6. Isolation characteristics

Table 5. Isolation limiting values and characteristics

T_h = 25 °C unless otherwise specified.

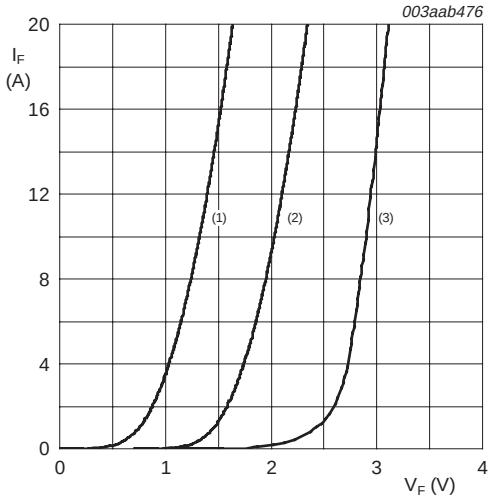
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	from all terminals to external heatsink; f = 50 Hz to 60 Hz; sinusoidal waveform; relative humidity ≤ 65 %; clean and dust free	-	-	2500	V
C_{isol}	isolation capacitance	from cathode to external heatsink; f = 1 MHz	-	10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

7. Characteristics

Table 6. Characteristics

T_j = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	I_F = 10 A; T_j = 150 °C; see Figure 2	-	1.32	2.03	V
		I_F = 20 A; T_j = 150 °C; see Figure 2	-	1.64	2.34	V
		I_F = 10 A; see Figure 2	-	1.89	2.9	V
I_R	reverse current	V_R = 600 V	-	9	200	µA
		V_R = 500 V; T_j = 100 °C	-	1.1	3.0	mA
Dynamic characteristics						
t_{rr}	reverse recovery time	I_F = 1 A to V_R = 30 V; dI_F/dt = 50 A/µs; see Figure 3	-	35	55	ns
		I_F = 10 A to V_R = 400 V; dI_F/dt = 500 A/µs; see Figure 3	-	19	-	ns
		I_F = 10 A to V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 100 °C; see Figure 3	-	32	40	ns
I_{RM}	peak reverse recovery current	I_F = 10 A to V_R = 400 V; dI_F/dt = 50 A/µs; T_j = 125 °C; see Figure 3	-	3.0	7.5	A
		I_F = 10 A to V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 100 °C; see Figure 3	-	9.5	12	A
V_{FR}	forward recovery voltage	I_F = 10 A; dI_F/dt = 100 A/µs; see Figure 4	-	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 2. Forward current as a function of forward voltage

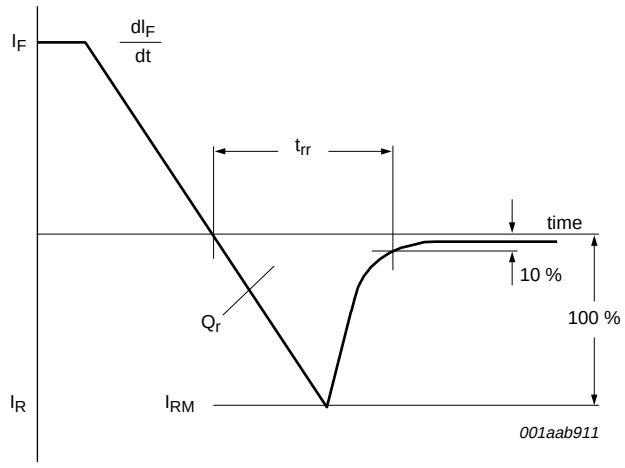


Fig 3. Reverse recovery definitions

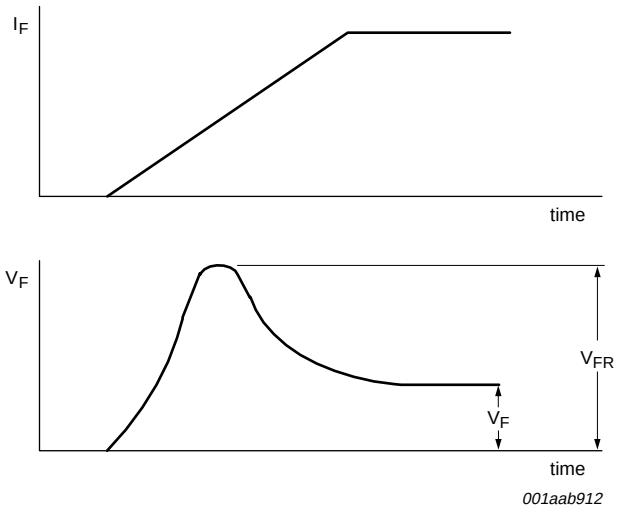
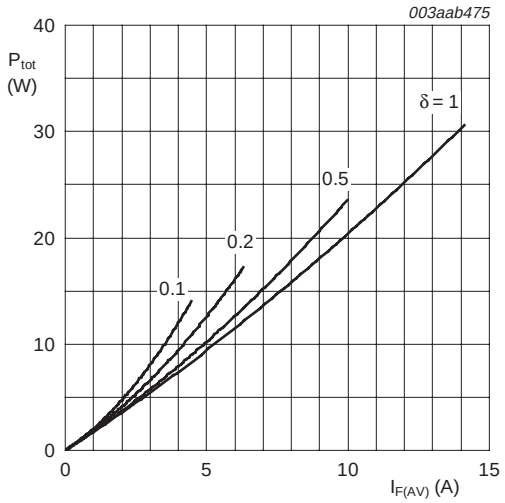
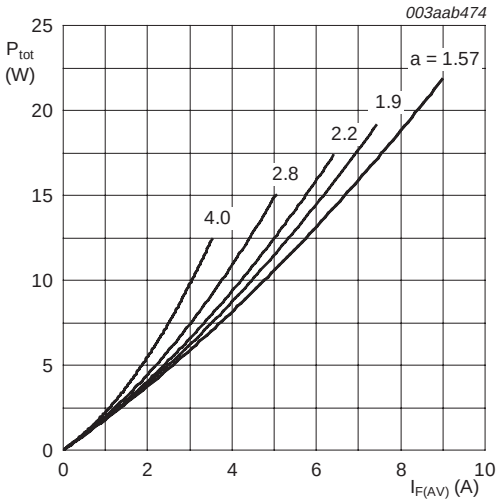


Fig 4. Forward recovery definitions



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

Fig 5. Forward power dissipation as a function of average forward current; square waveform; maximum values

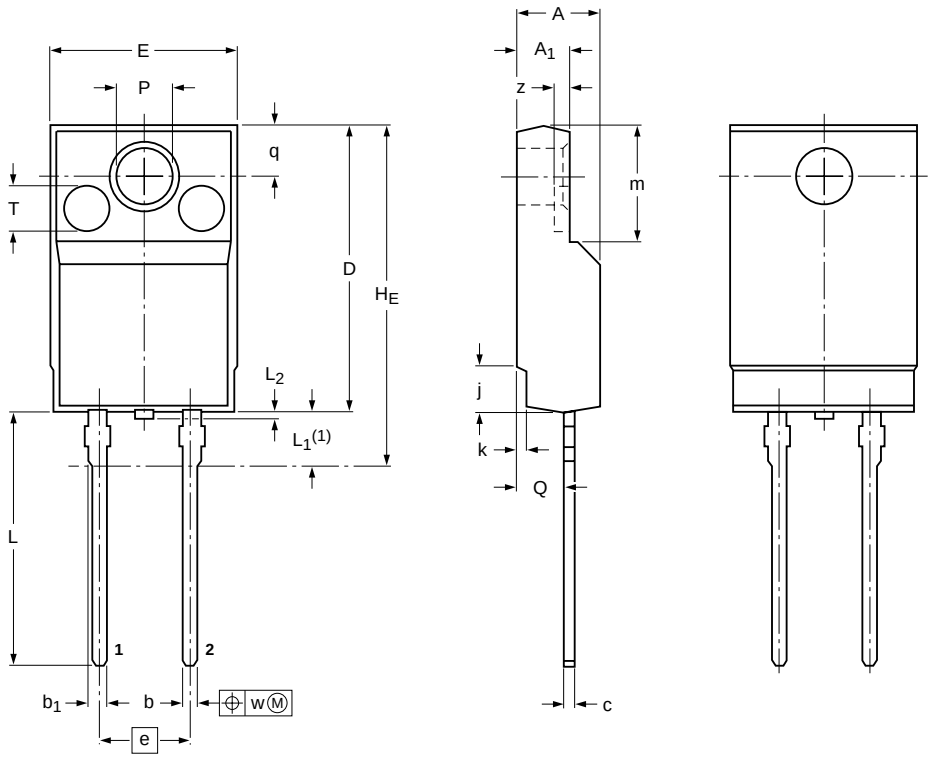


a = form factor = $I_{F(RMS)}$ / $I_{F(AV)}$

Fig 6. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values

8. Package outline

Plastic single-ended package; isolated heatsink mounted;
1 mounting hole; 2-lead TO-220 'full pack' **SOD113**



z(2)
0.8

DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b	b_1	c	D	E	e	H_E max	j	k	L	L_1(1)	L_2 max	m	P	Q	q	T	w
mm	4.6 4.0	2.9 2.5	0.9 0.7	1.1 0.9	0.7 0.4	15.8 15.2	10.3 9.7	5.08	19.0	2.7 1.7	0.6 0.4	14.4 13.5	3.3 2.8	0.5	6.5 6.3	3.2 3.0	2.6 2.3	2.6	2.55	0.4

Notes
1. Terminals are uncontrolled within zone L_1.
2. z is depth of T.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOD113		2-lead TO-220F				~~02-04-09~~ 07-06-18

Fig 7. Package outline SOD113 (2-lead TO-220F)

9. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYC10X-600_2	20080116	Product data sheet	-	BYC10X-600_1
Modifications:	• Table 3 “Limiting values”, $I_{F(AV)}$ and I_{FRM} conditions for T_h changed to 37 °C.			
BYC10X-600_1	20070831	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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12. Contents

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