BYC5X-600

Hyperfast power diode

Rev. 02 — 29 August 2018 Product data sheet

1. Product profile

1.1 General description

Hyperfast, epitaxial rectifier diode in a SOD113 (2-lead 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)

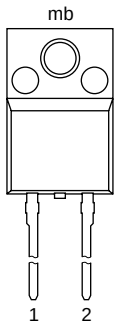
1.4 Quick reference data

- $V_{RRM} \leq 600$ V
- $V_F = 1.40$ V (typ)
- $I_{F(AV)} \leq 5$ A
- $t_{rr} = 19$ ns (typ)

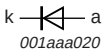
2. Pinning information

Table 1. Pinning

Pin	Description	Simplified outline	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
BYC5X-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; $\delta = 0.5$; $T_h \leq 87$ °C	-	5	A
I_{FRM}	repetitive peak forward current	square waveform; $\delta = 0.5$; $T_h \leq 87$ °C	-	10	A
I_{FSM}	non-repetitive peak forward current	t = 10 ms; sinusoidal waveform	-	40	A
		t = 8.3 ms; sinusoidal waveform	-	44	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	-	-	5.5	K/W
		without heatsink compound	-	-	7.2	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W

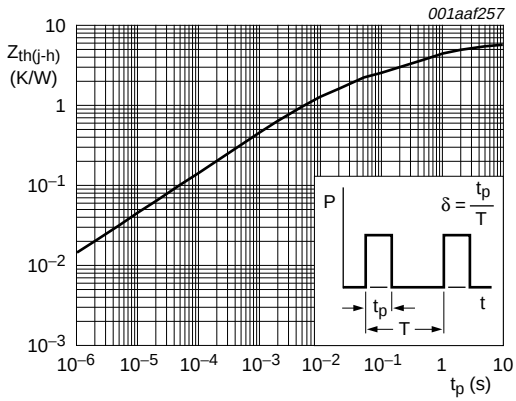


Fig 1. Transient thermal impedance from junction to heatsink as a function of pulse width

6. Isolation characteristics

Table 5. Isolation limiting values and characteristics

T_h = 25 °C unless otherwise specified.

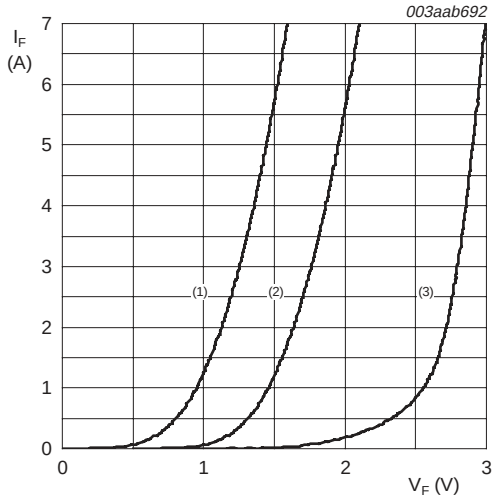
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	from all terminals to external heatsink; f = 50 Hz to 60 Hz; sinusoidal waveform; relative humidity ≤ 65 %; clean and dust free	-	-	2500	V
C_{isol}	isolation capacitance	from cathode to external heatsink; f = 1 MHz	-	10	-	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 = 5 A; T_j = 150 °C; see Figure 2	-	1.40	1.75	V
		I_F = 10 A; T_j = 150 °C; see Figure 2	-	1.75	2.20	V
		I_F = 5 A; see Figure 2	-	2.00	2.90	V
I_R	reverse current	V_R = 600 V	-	9	100	µA
		V_R = 500 V; T_j = 100 °C	-	0.9	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	-	30	50	ns
		I_F = 5 A to V_R = 400 V; dI_F/dt = 500 A/µs; see Figure 3	-	19	-	ns
		I_F = 5 A to V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 100 °C; see Figure 3	-	25	30	ns
I_{RM}	peak reverse recovery current	I_F = 5 A to V_R = 400 V; dI_F/dt = 50 A/µs; T_j = 125 °C; see Figure 3	-	0.7	3	A
		I_F = 5 A to V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 100 °C; see Figure 3	-	8	11	A
V_{FR}	forward recovery voltage	I_F = 10 A; dI_F/dt = 100 A/µs; see Figure 4	-	9	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

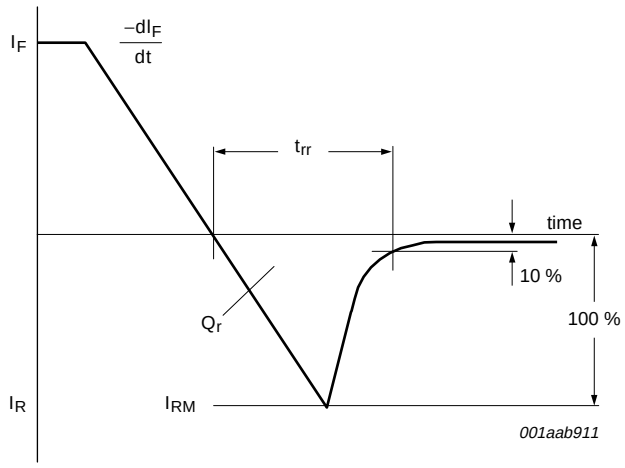


Fig 3. Reverse recovery definitions; ramp recovery

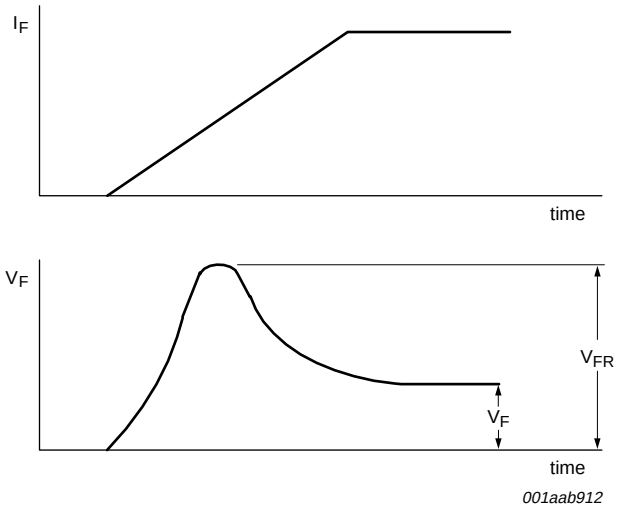
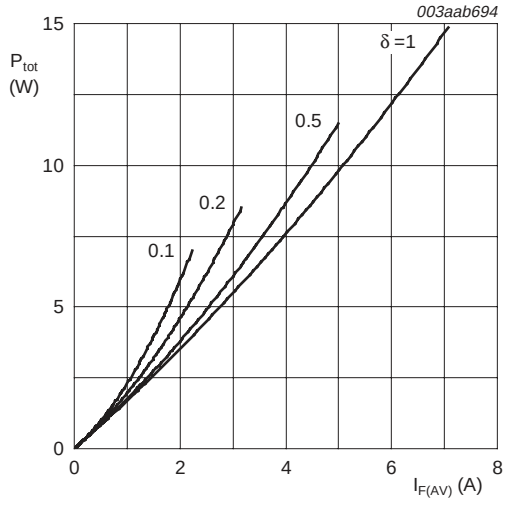
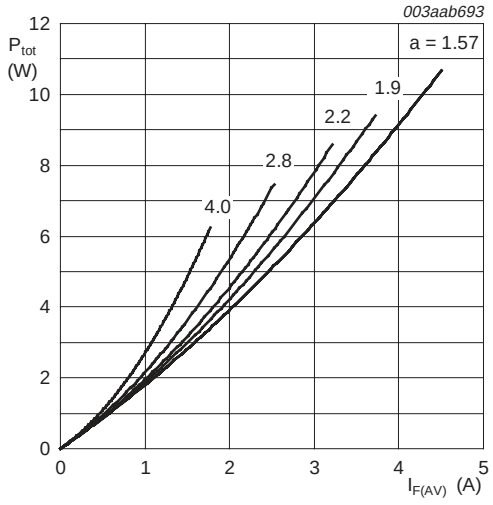


Fig 4. Forward recovery definitions



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

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

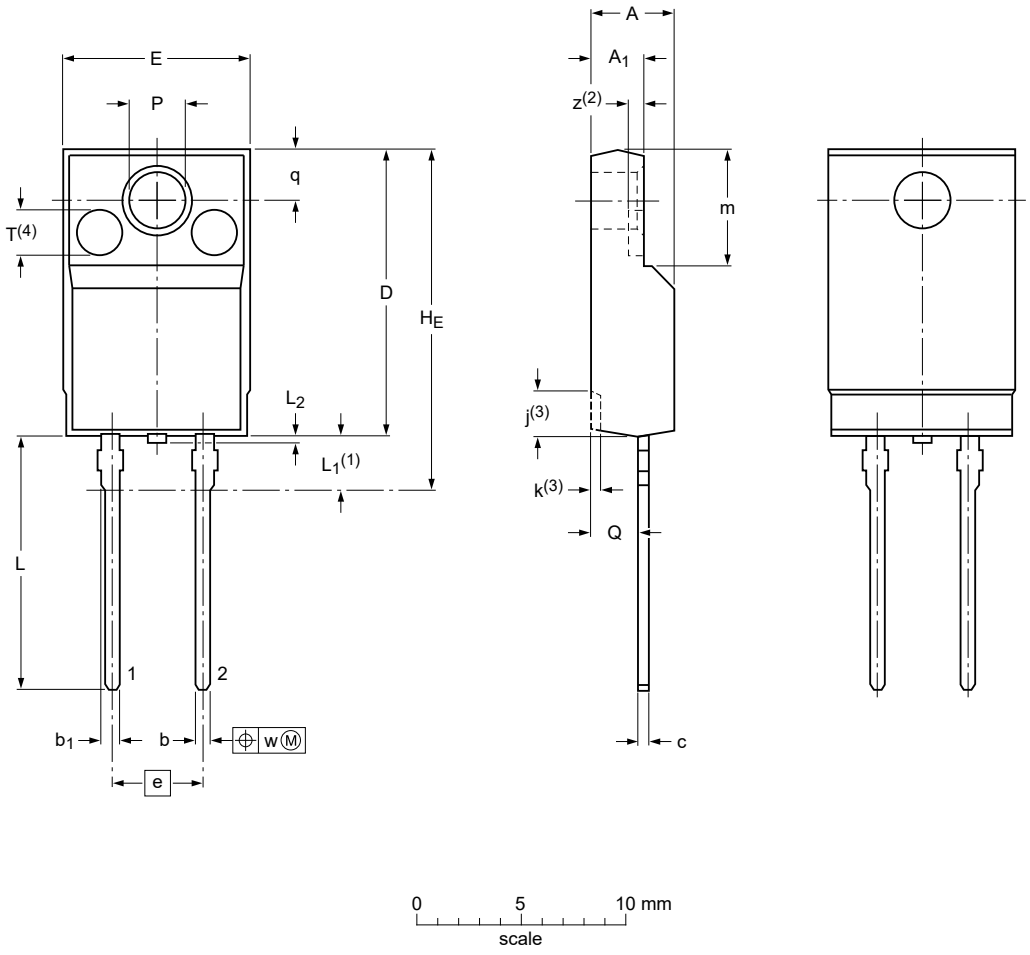


a = form factor = $I_{F(RMS)} / I_{F(AV)}$

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



Dimensions (mm are the original dimensions)

Unit		A	A_1	b	b_1	c	D	E	e	H_E max	$j^{(3)}$	$k^{(3)}$	L	$L_1{}^{(1)}$	L_2 max	m	P	Q	q	$T^{(4)}$	w	$z^{(2)}$
mm	max	4.6	2.9	0.9	1.1	0.7	15.8	10.3			2.7	0.6	14.4	3.3		6.5	3.2	2.6				
	nom								5.08	19.0					0.5				2.6	2.55	0.4	0.8
	min	4.0	2.5	0.7	0.9	0.4	15.2	9.7			1.7	0.4	13.5	2.8		6.3	3.0	2.3				

Notes
1. Terminals are uncontrolled within zone L1.
2. z is depth of T.
3. Dot lines area designs may vary.
4. Eject pin mark is for reference only.

sod113_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOD113		2-lead TO-220F				~~07-06-08~~ 15-08-28

9. Legal information

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.

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