

1. General description

Hyperfast, epitaxial rectifier diode in a TO220F plastic package.

2. Features and benefits

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

3. Applications

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

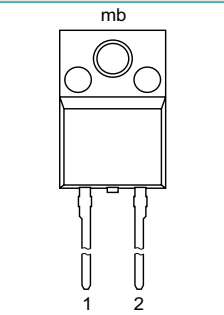
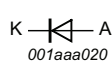
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values			Unit
Absolute maximum rating						
V_{RRM}	repetitive peak reverse voltage		600			V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; square-wave pulse; $T_n \leq 37$ °C; Fig. 1 ; Fig. 2	10			A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25$ μ s; $T_n \leq 37$ °C; square-wave pulse	20			A
I_{FSM}	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse	91			A
		$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse	100			A
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 10$ A; $T_j = 25$ °C; Fig. 4	-	1.89	2.9	V
		$I_F = 10$ A; $T_j = 150$ °C; Fig. 4	-	1.32	2.03	V
		$I_F = 20$ A; $T_j = 150$ °C; Fig. 4	-	1.64	2.34	V
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $di_F/dt = 50$ A/ μ s; $T_j = 25$ °C; Fig. 5	-	35	55	ns

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 <p>SOD113 (2-lead TO-220F)</p>	
2	A	anode		
mb	n.c.	mounting base; isolated		

6. Ordering information

Table 3. Ordering information

Type number	Package Name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
BYC10X-600	TO220F	BYC10X-600,127	Tube	50	SOD113	28-Aug-2015

7. Marking

Table 4. Marking codes

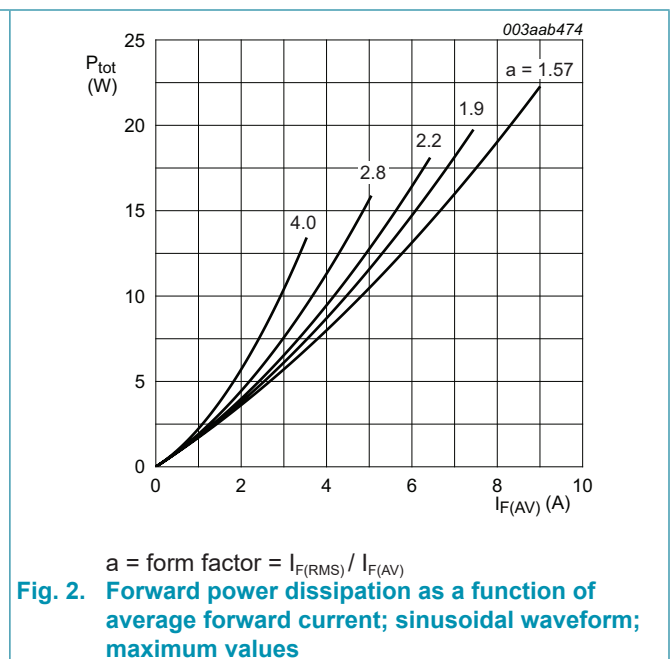
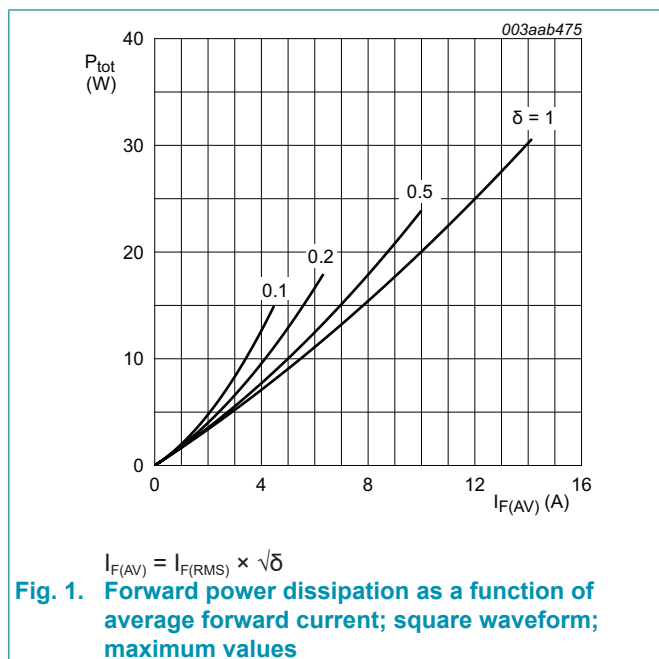
Type number	Marking codes	
	Assembly factory: d	Assembly factory: A
BYC10X-600	BYC10X 600 PJdxxxx xx	BYC10X 600 PJAxxxx xx

8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions	Values	Unit
V_{RRM}	repetitive peak reverse voltage		600	V
V_{RWM}	crest working reverse voltage		600	V
V_R	reverse voltage	$\delta = 1.0$; square-wave pulse; $T_h \leq 100$ °C;	500	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; square-wave pulse; $T_h \leq 37$ °C; Fig. 1 ; Fig. 2	10	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25$ μ s; $T_h \leq 37$ °C; square-wave pulse	20	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse	91	A
		$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse	100	A
T_{stg}	storage temperature		-40 to 150	°C
T_j	junction temperature		150	°C



9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-h)}$	thermal resistance from junction to heatsink	with heatsink compound; Fig 3	-	-	4.8	K/W
		without heatsink compound	-	-	5.9	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	60	-	K/W

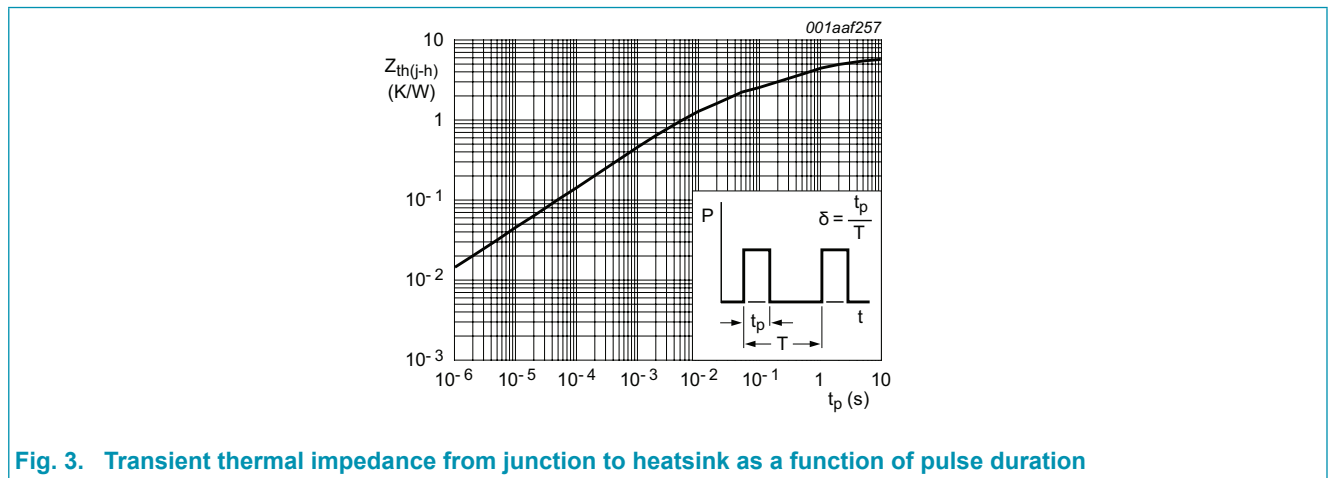


Fig. 3. Transient thermal impedance from junction to heatsink as a function of pulse duration

10. Isolation characteristics

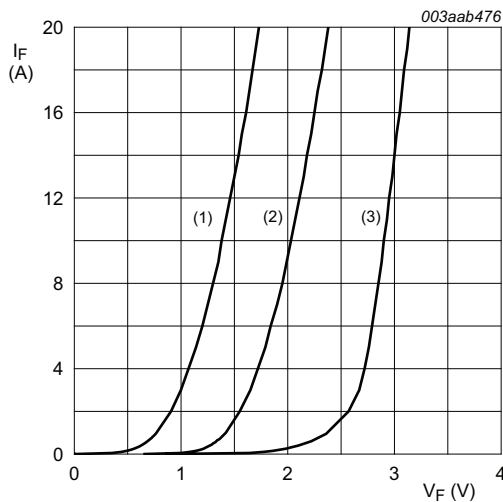
Table 7. Isolation characteristics

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	from cathode to external heatsink; f = 1 MHz	-	10	-	PF

11. Characteristics

Table 8. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 10\text{ A}; T_j = 25\text{ °C}; \text{Fig. 4}$	-	1.89	2.9	V
		$I_F = 10\text{ A}; T_j = 150\text{ °C}; \text{Fig. 4}$	-	1.32	2.03	V
		$I_F = 20\text{ A}; T_j = 150\text{ °C}; \text{Fig. 4}$	-	1.64	2.34	V
I_R	reverse current	$V_R = 600\text{ V}; T_j = 25\text{ °C}$	-	9	200	μA
		$V_R = 500\text{ V}; T_j = 100\text{ °C}$	-	1.1	3	mA
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1\text{ A}; V_R = 30\text{ V}; dI_F/dt = 50\text{ A}/\mu\text{s}; T_j = 25\text{ °C}; \text{Fig. 5}$	-	35	55	ns
		$I_F = 10\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 25\text{ °C}; \text{Fig. 5}$	-	19	-	ns
		$I_F = 10\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 100\text{ °C}; \text{Fig. 5}$	-	32	40	ns
I_{RM}	peak reverse recovery current	$I_F = 10\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 100\text{ °C}; \text{Fig. 5}$	-	9.5	12	A
		$I_F = 10\text{ A}; V_R = 400\text{ V}; dI_F/dt = 50\text{ A}/\mu\text{s}; T_j = 125\text{ °C}; \text{Fig. 5}$	-	3	7.5	A
V_{FR}	forward recovery voltage	$I_F = 10\text{ A}; dI_F/dt = 100\text{ A}/\mu\text{s}; T_j = 25\text{ °C}; \text{Fig. 6}$	-	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. 4. Forward current as a function of forward voltage

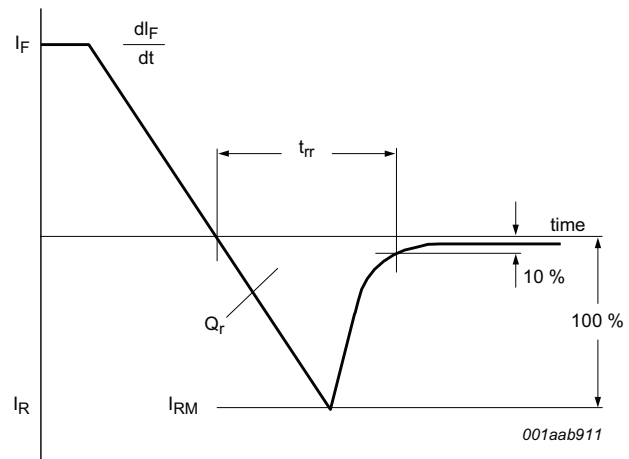


Fig. 5. Reverse recovery definitions; ramp recovery

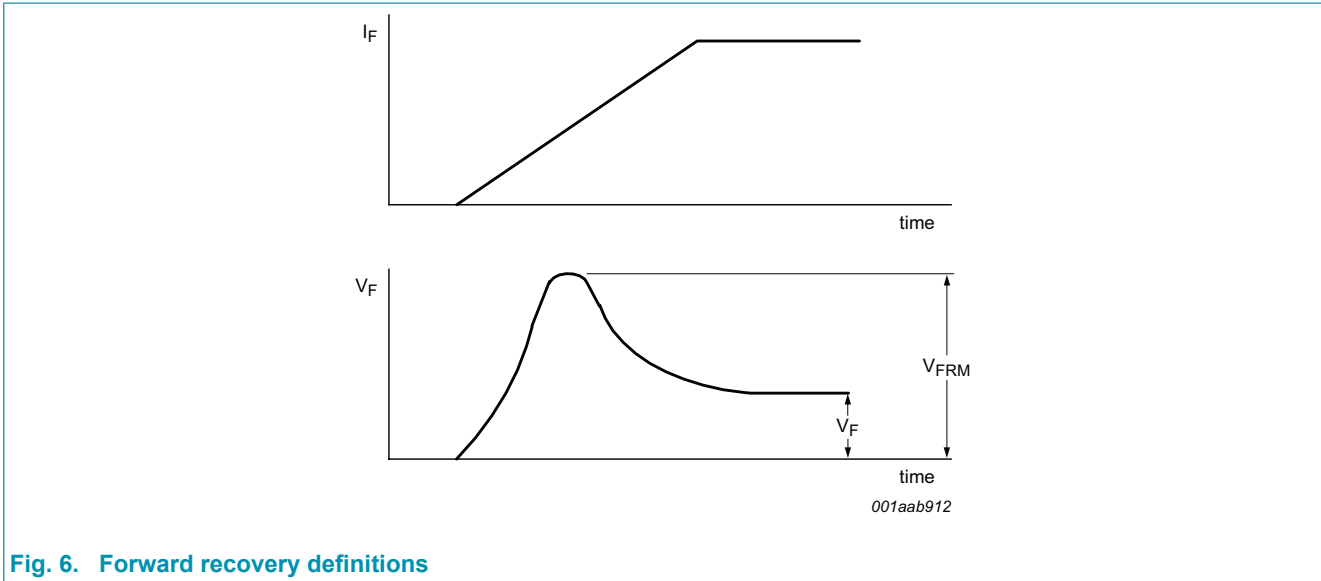


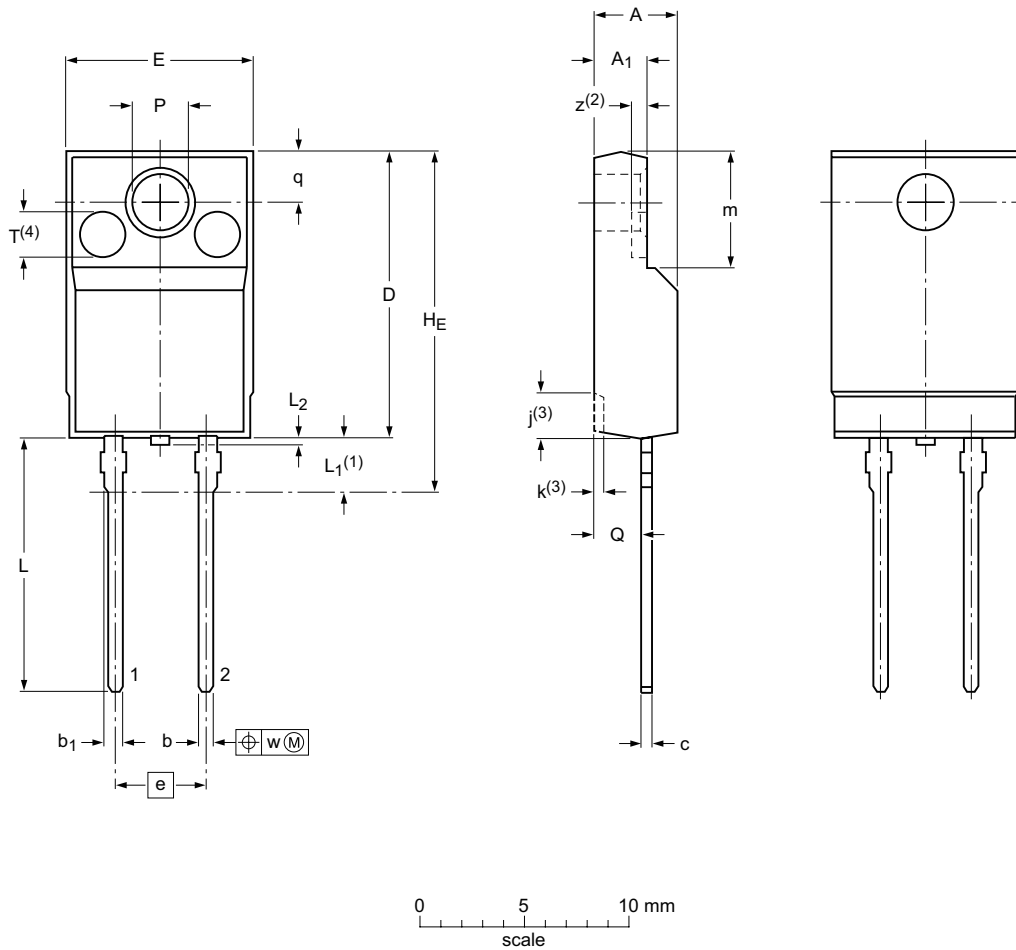
Fig. 6. Forward recovery definitions

12. Package outline

Assembly factory: d & A

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⁾	
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 line area (j & k) design for factory A.
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

13. 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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- [2] The term 'short data sheet' is explained in section "Definitions".
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