

1. General description

Hyperfast, epitaxial rectifier diode in a 2-lead TO220F plastic package.

2. Features and benefits

- Extremely fast switching
- Low thermal resistance
- Low reverse recovery current
- Isolated package
- Reduces switching losses 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

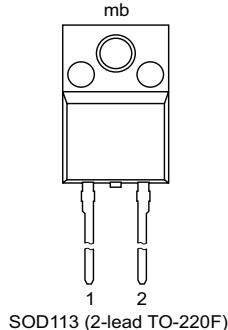

4. Quick reference data

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; $T_h \leq 25\text{ °C}$; Fig. 1 ; Fig. 2	20			A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\ \mu\text{s}$; $T_h \leq 25\text{ °C}$; square-wave pulse	40			A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\ \text{ms}$; $T_{j(\text{init})} = 25\text{ °C}$; sine-wave pulse	250			A
		$t_p = 8.3\ \text{ms}$; $T_{j(\text{init})} = 25\text{ °C}$; sine-wave pulse	274			A
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 20\ \text{A}$; $T_j = 150\text{ °C}$; Fig. 4	-	1.54	1.97	V
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1\ \text{A}$; $V_R = 30\ \text{V}$; $di_F/dt = 50\ \text{A}/\mu\text{s}$; $T_j = 25\text{ °C}$; 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
BYC20X-600	TO220F	BYC20X-600, 127	Tube	50	SOD113	28-Aug-2015

7. Marking

Table 4. Marking codes

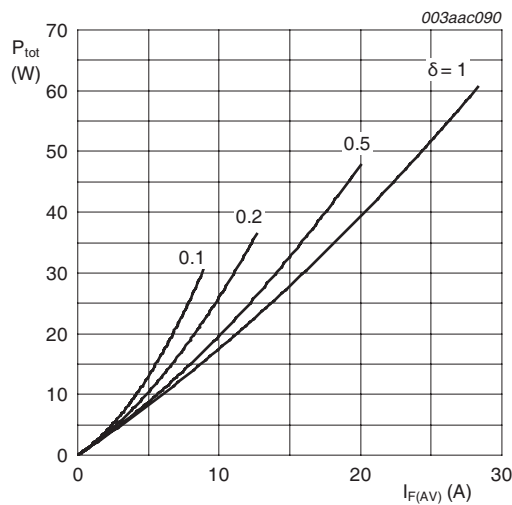
Type number	Marking codes
BYC20X-600	BYC20X 600

8. Limiting values

Table 5. Limiting values

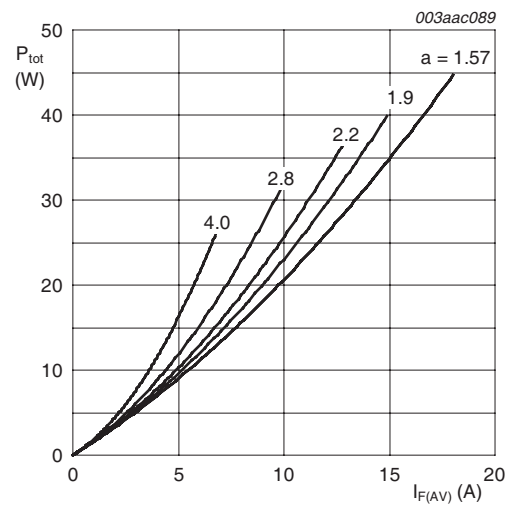
In accordance with the Absolute Maximum Rating System (IEC 60134).

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	$\delta = 1$; square-wave pulse; $T_h \leq 100\text{ °C}$	500	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; square-wave pulse; $T_h \leq 25\text{ °C}$; Fig. 1 ; Fig. 2	20	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_h \leq 25\text{ °C}$; square-wave pulse	40	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\text{ ms}$; $T_{j(\text{init})} = 25\text{ °C}$; sine-wave pulse	250	A
		$t_p = 8.3\text{ ms}$; $T_{j(\text{init})} = 25\text{ °C}$; sine-wave pulse	274	A
T_{stg}	storage temperature		-40 to 150	°C
T_j	junction temperature		150	°C



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

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



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

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

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	-	-	2.6	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	55	-	K/W

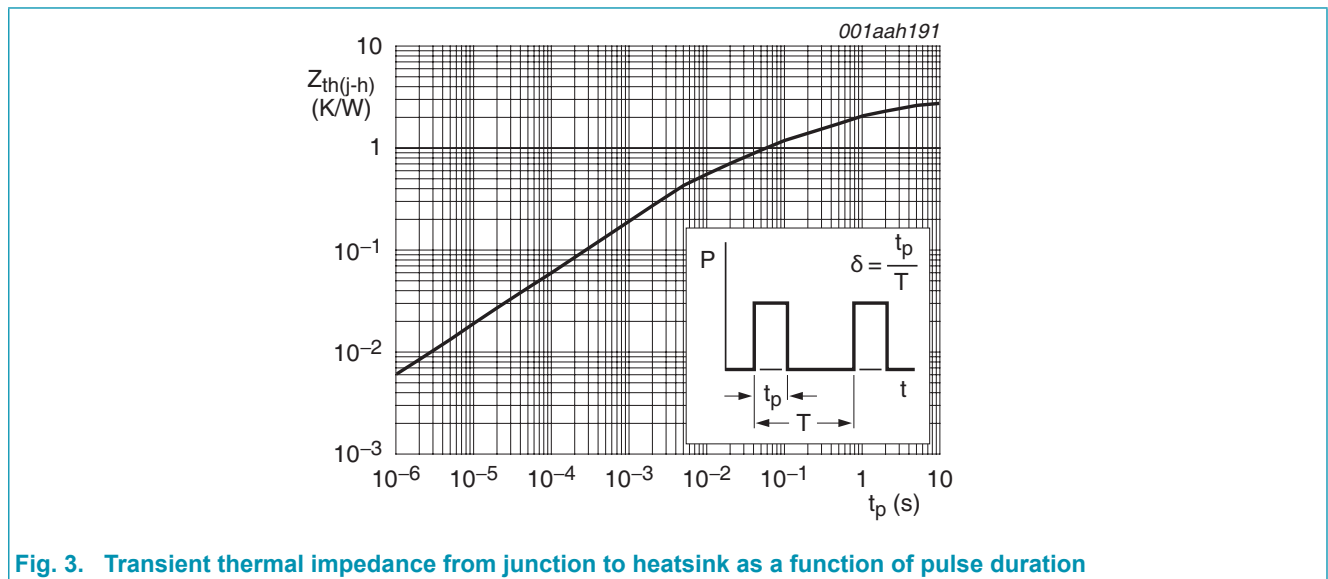


Fig. 3. Transient thermal impedance from junction to heatsink as a function of pulse duration

10. Isolation characteristics

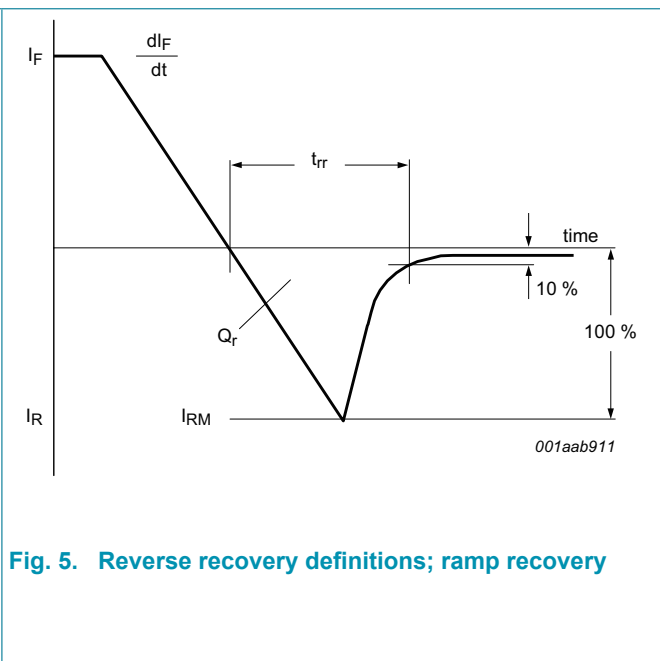
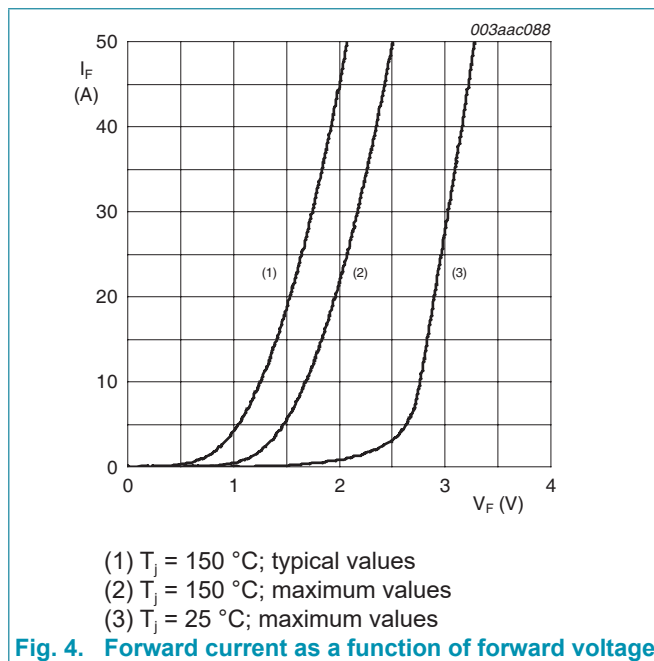
Table 7. Isolation characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	50 Hz ≤ f ≤ 60 Hz; RH ≤ 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

11. Characteristics

Table 8. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 20\text{ A}; T_j = 150\text{ }^\circ\text{C}; \text{Fig. 4}$	-	1.54	1.97	V
		$I_F = 40\text{ A}; T_j = 150\text{ }^\circ\text{C}; \text{Fig. 4}$	-	1.95	2.34	V
		$I_F = 20\text{ A}; \text{Fig. 4}$	-	1.89	2.9	V
I_R	reverse current	$V_R = 600\text{ V}$	-	16	200	μA
		$V_R = 500\text{ V}; T_j = 100\text{ }^\circ\text{C}$	-	1.6	3.0	mA
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1\text{ A}; V_R = 30\text{ V}; dI_F/dt = 50\text{ A}/\mu\text{s}; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 5}$	-	35	55	ns
		$I_F = 20\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 5}$	-	19	-	ns
		$I_F = 20\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 100\text{ }^\circ\text{C}; \text{Fig. 5}$	-	32	40	ns
I_{RM}	peak reverse recovery current	$I_F = 20\text{ A}; V_R = 400\text{ V}; dI_F/dt = 50\text{ A}/\mu\text{s}; T_j = 125\text{ }^\circ\text{C}; \text{Fig. 5}$	-	3	7.5	A
		$I_F = 20\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 125\text{ }^\circ\text{C}; \text{Fig. 5}$	-	9.5	12	A
V_{FR}	forward recovery voltage	$I_F = 20\text{ A}; dI_F/dt = 100\text{ A}/\mu\text{s}; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 6}$	-	8	11	V



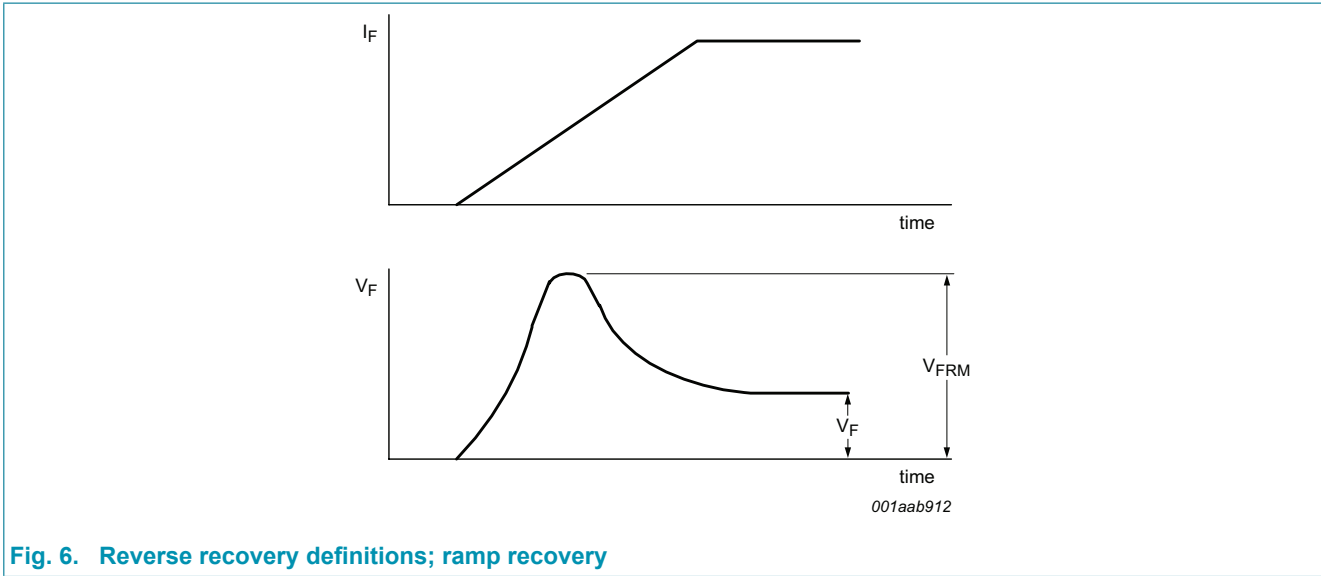
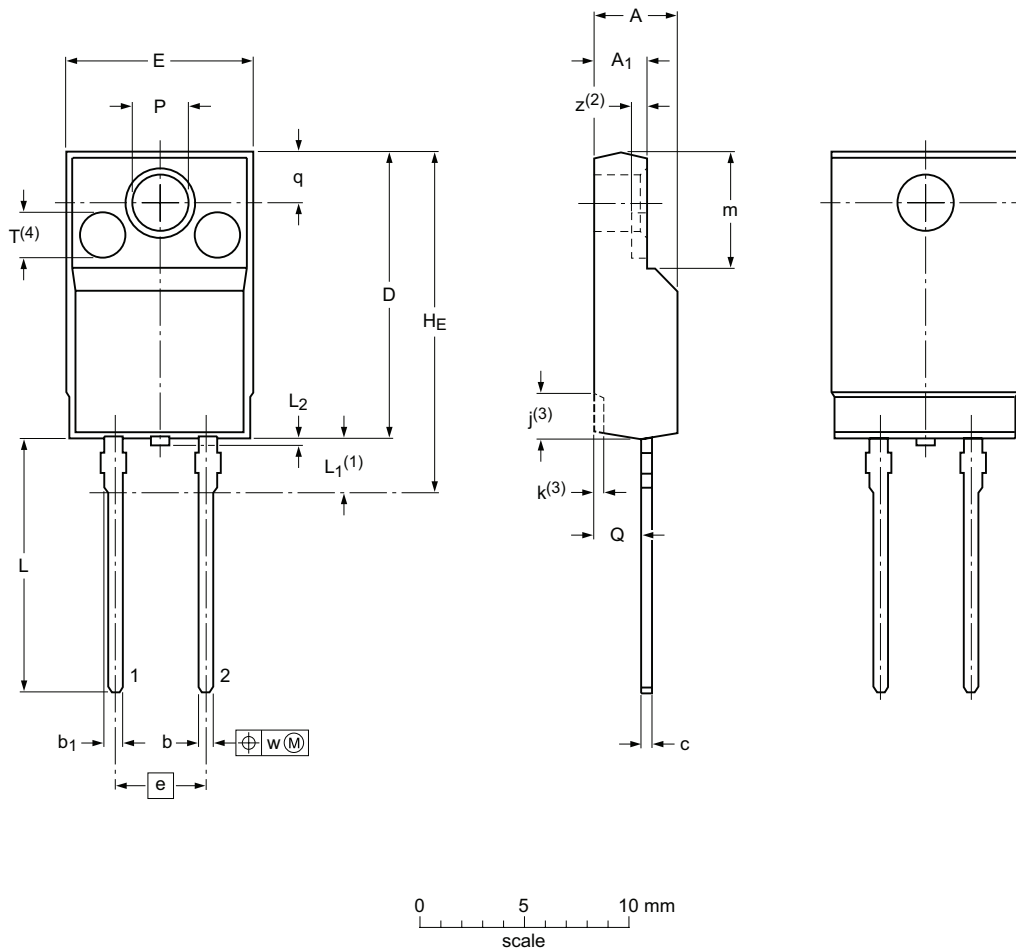


Fig. 6. Reverse recovery definitions; ramp recovery

12. 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⁾	
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

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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