**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 Continuous Current Mode (CCM) Power power supplies
- Half-bridge lighting ballasts
- Factor Correction (PFC)

### 1.4 Quick reference data

- $V_{RRM} \le 600 \text{ V}$
- $V_F = 1.54 \text{ V (typ)}$

- $I_{F(AV)} \le 20 \text{ A}$
- $t_{rr} = 19 \text{ ns (typ)}$

# **Pinning information**

Table 1 Pinning

Pin	Description	Simplified outline	Symbol
1	cathode (k)		. 14
2	anode (a)	mb	k ——— a 001aaa020
mb	mounting base; isolated	1 2 SOD113 (2 load TO 22)	OE)
		SOD113 (2-lead TO-22)	OF)

# 3. Ordering information

### Table 2. Ordering information

Type number	Package				
	Name	Description	Version		
BYC20X-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; $T_h \le 100$ °C	-	500	V
I <sub>F(AV)</sub>	average forward current	square waveform; $\delta$ = 0.5; $T_h \leq$ 25 $^{\circ}C$	-	20	Α
I <sub>FRM</sub>	repetitive peak forward current	square waveform; $\delta$ = 0.5; $T_h \leq$ 25 °C; $t_p$ = 25 $\mu s$	-	40	Α
I <sub>FSM</sub>	non-repetitive peak forward current	t = 10 ms; sinusoidal waveform	-	250	Α
		t = 8.3 ms; sinusoidal waveform	-	274	Α
T <sub>stg</sub>	storage temperature		-40	+150	°C
Tj	junction temperature		-	150	°C

# 5. Thermal characteristics

#### Table 4. Thermal characteristics

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
$R_{th(j-h)}$	thermal resistance from junction to heatsink	with heatsink compound; see Figure 1	-	-	2.6	K/W
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient	in free air	-	55	-	K/W

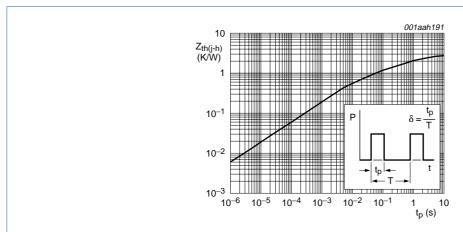


Fig 1. Transient thermal impedance from junction to heatsink as a function of pulse width

# 6. Isolation characteristics

## Table 5. Isolation limiting values and characteristics

 $T_h = 25 \,^{\circ}C$  unless otherwise specified.

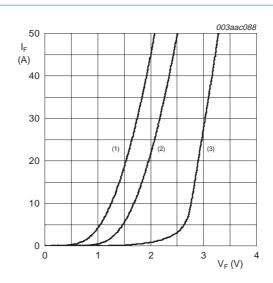
Symbol	Parameter	Conditions	Min	Тур	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	from all terminals to external heatsink; f = 50  Hz to 60 Hz; sinusoidal waveform; relative humidity $\leq 65 \%$ ; clean and dust free	-	-	2500	V
C <sub>isol</sub>	isolation capacitance	from pin 1 (cathode) to external heatsink; f = 1 MHz	-	10	-	pF

# 7. Characteristics

Table 6. Characteristics

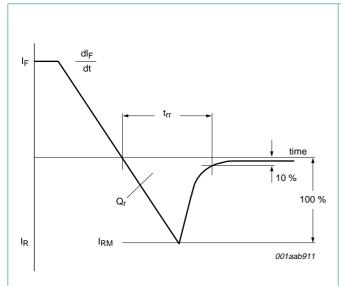
 $T_i = 25 \,^{\circ}C$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
Static char	racteristics					
V <sub>F</sub>	forward voltage	$I_F = 20 \text{ A}$ ; $T_j = 150 ^{\circ}\text{C}$ ; see Figure 2	-	1.54	1.97	V
		$I_F = 40 \text{ A}; T_j = 150 ^{\circ}\text{C}; \text{ see } \frac{\text{Figure 2}}{}$	-	1.95	2.34	V
		I <sub>F</sub> = 20 A; see <u>Figure 2</u>	-	1.89	2.9	V
I <sub>R</sub>	reverse current	V <sub>R</sub> = 600 V	-	16	200	μΑ
		V <sub>R</sub> = 500 V; T <sub>j</sub> = 100 °C	-	1.6	3.0	mA
Dynamic c	haracteristics					
t <sub>rr</sub>	reverse recovery time	$I_F = 1$ A to $V_R = 30$ V; $dI_F/dt = 50$ A/ $\mu$ s; see Figure 3	-	35	55	ns
		$I_F$ = 20 A to $V_R$ = 400 V; $dI_F/dt$ = 500 A/ $\mu$ s; see Figure 3				
		T <sub>j</sub> = 25 °C	-	19	-	ns
		T <sub>j</sub> = 100 °C	-	32	40	ns
I <sub>RM</sub>	peak reverse recovery current	$I_F$ = 20 A to $V_R$ = 400 V; $T_j$ = 125 °C; see Figure 3				
		$dI_F/dt = 50 A/\mu s$	-	3.0	7.5	Α
		$dI_F/dt = 500 A/\mu s$	-	9.5	12	Α
$V_{FR}$	forward recovery voltage	$I_F = 20 \text{ A}$ ; $dI_F/dt = 100 \text{ A/}\mu\text{s}$ ; see Figure 4	-	8	11	V



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

Fig 2. Forward current as a function of forward voltage



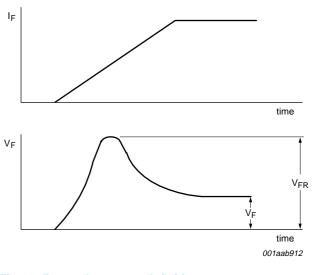
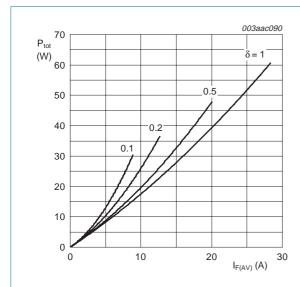


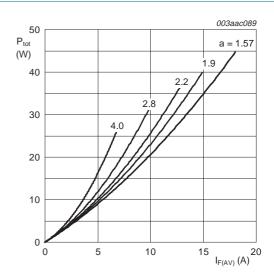
Fig 3. Reverse recovery definitions; ramp recovery

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



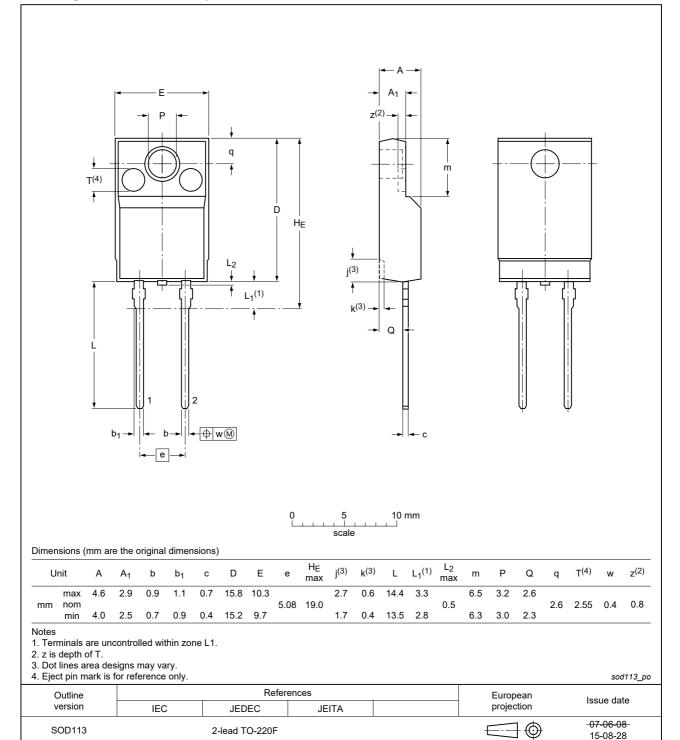
 $a = form factor = I_{F(RMS)} / I_{F(AV)}$ 

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** 



# 9. Legal information

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Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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**BYC20X-600** 

Rectifier diode, hyperfast

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