



# BYC30X-600PS

Hyperfast power diode

Rev.01 - 02 March 2021

Product data sheet

## 1. General description

WeEn's 5th Generation Hyper Fast diode with softer recovery in a 2-lead TO220F plastic package.

## 2. Features and benefits

- Isolated plastic package
- Low leakage current
- Low thermal resistance
- Soft reverse recovery with low recovery current
- Reduces switching losses in associated MOSFET or IGBT

## 3. Applications

- Active PFC in air conditioner
- Continuous Current Mode (CCM) Power Factor Correction (PFC)
- Half-bridge/full-bridge switched-mode power supplies

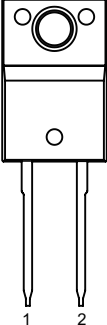

## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values			Unit
<b>Absolute maximum rating</b>						
$V_{RRM}$	repetitive peak reverse voltage		600			V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; square-wave pulse; $T_h \leq 51$ °C; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	30			A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25$ $\mu$ s; $T_h \leq 51$ °C; square-wave pulse	60			A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse; <a href="#">Fig. 4</a>	260			A
		$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse	286			A
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 30$ A; $T_j = 25$ °C; <a href="#">Fig. 6</a>	-	2	2.75	V
		$I_F = 30$ A; $T_j = 150$ °C; <a href="#">Fig. 6</a>	-	1.5	2	V
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $di_F/dt = 50$ A/ $\mu$ s; $T_j = 25$ °C; <a href="#">Fig. 7</a>	-	-	45	ns

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode		
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
BYC30X-600PS	TO220F-2L	BYC30X-600PSQ	Tube	50	TO220FE-2L	21-Dec-2020

## 7. Marking

Table 4. Marking codes

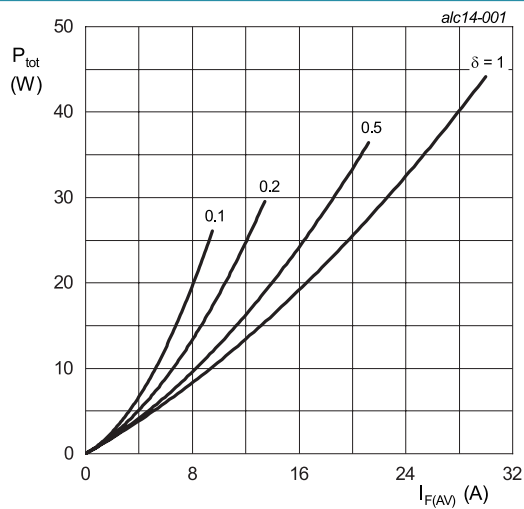
Type number	Marking codes
BYC30X-600PS	BYC30X 600PS

## 8. Limiting values

**Table 5. Limiting values**

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

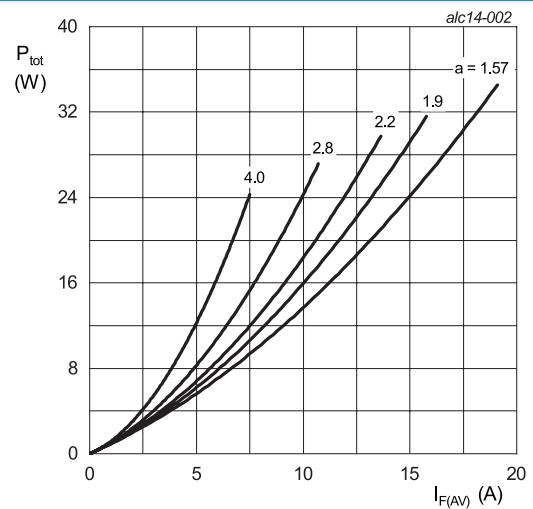
Symbol	Parameter	Conditions	Values	Unit
$V_{RRM}$	repetitive peak reverse voltage		600	V
$V_{RWM}$	crest working reverse voltage		600	V
$V_R$	reverse voltage	DC	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; square-wave pulse; $T_h \leq 51$ °C; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	30	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25$ $\mu$ s; $T_h \leq 51$ °C; square-wave pulse	60	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse; <a href="#">Fig. 4</a>	260	A
		$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse	286	A
$T_{stg}$	storage temperature		-65 to 175	°C
$T_j$	junction temperature		175	°C



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

$$V_o = 0.883 \text{ V}; R_s = 0.0197 \Omega$$

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



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

$$V_o = 0.883 \text{ V}; R_s = 0.0197 \Omega$$

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

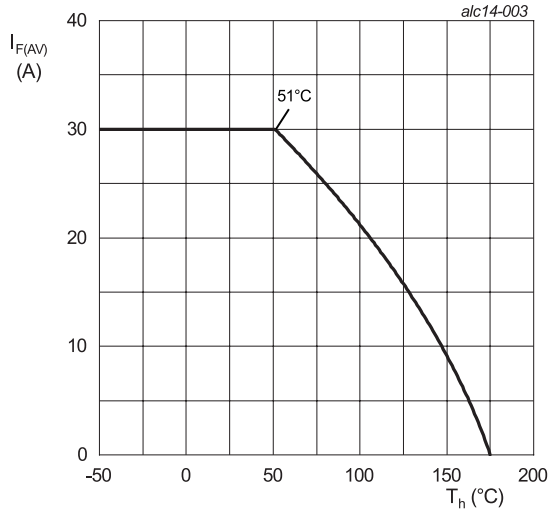


Fig. 3. Forward current as a function of heatsink temperature; maximum values

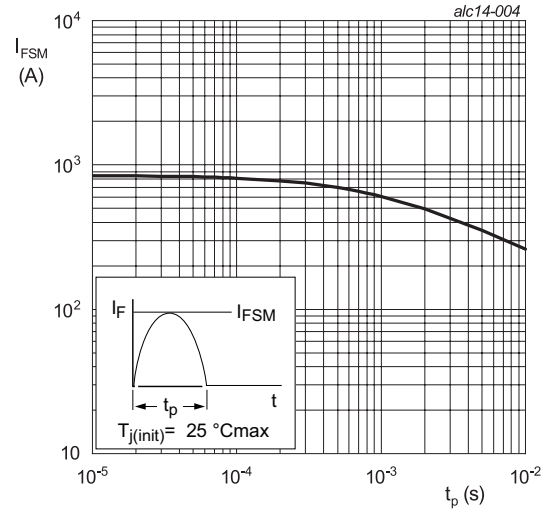


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

### 9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-c)}$	thermal resistance from junction to case		-	-	3	K/W
$R_{th(c-h)}$	thermal resistance from case to heatsink		-	-	0.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	55	-	K/W

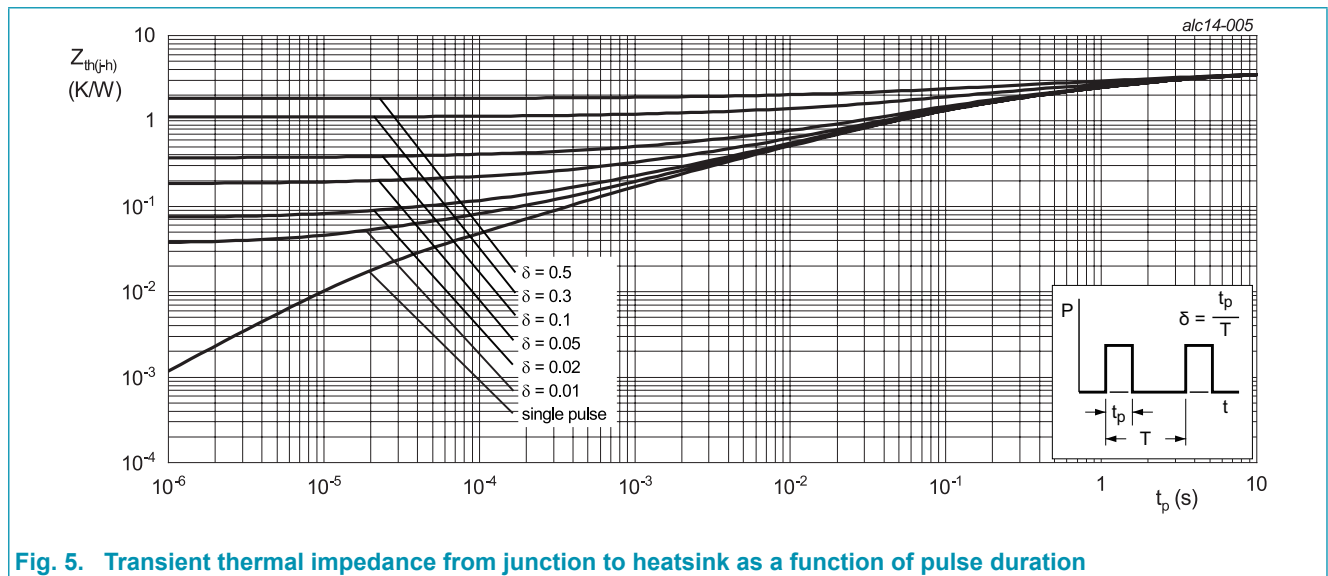


Fig. 5. Transient thermal impedance from junction to heatsink as a function of pulse duration

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

### 11. Characteristics

Table 8. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 30\text{ A}; T_J = 25\text{ °C}; \text{Fig. 6}$	-	2	2.75	V
		$I_F = 30\text{ A}; T_J = 150\text{ °C}; \text{Fig. 6}$	-	1.5	2	V
$I_R$	reverse current	$V_R = 600\text{ V}; T_J = 25\text{ °C}$	-	-	10	$\mu\text{A}$
		$V_R = 600\text{ V}; T_J = 150\text{ °C}$	-	-	600	$\mu\text{A}$
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1\text{ A}; V_R = 30\text{ V}; dI_F/dt = 50\text{ A}/\mu\text{s}; T_J = 25\text{ °C}; \text{Fig. 7}$	-	-	45	ns
		$I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_J = 25\text{ °C}; \text{Fig. 7}$	-	51	-	ns
		$I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_J = 125\text{ °C}; \text{Fig. 7}$	-	105	-	ns
$I_{RM}$	peak reverse recovery current	$I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_J = 25\text{ °C}; \text{Fig. 7}$	-	3.7	-	A
		$I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_J = 125\text{ °C}; \text{Fig. 7}$	-	9.5	-	A
$Q_r$	recovered charge	$I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_J = 25\text{ °C}; \text{Fig. 7}$	-	95	-	nC
		$I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_J = 125\text{ °C}; \text{Fig. 7}$	-	498	-	nC
$S_{factor}$	softness factor	$I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_J = 125\text{ °C}; \text{Fig. 7}$	-	0.55	-	

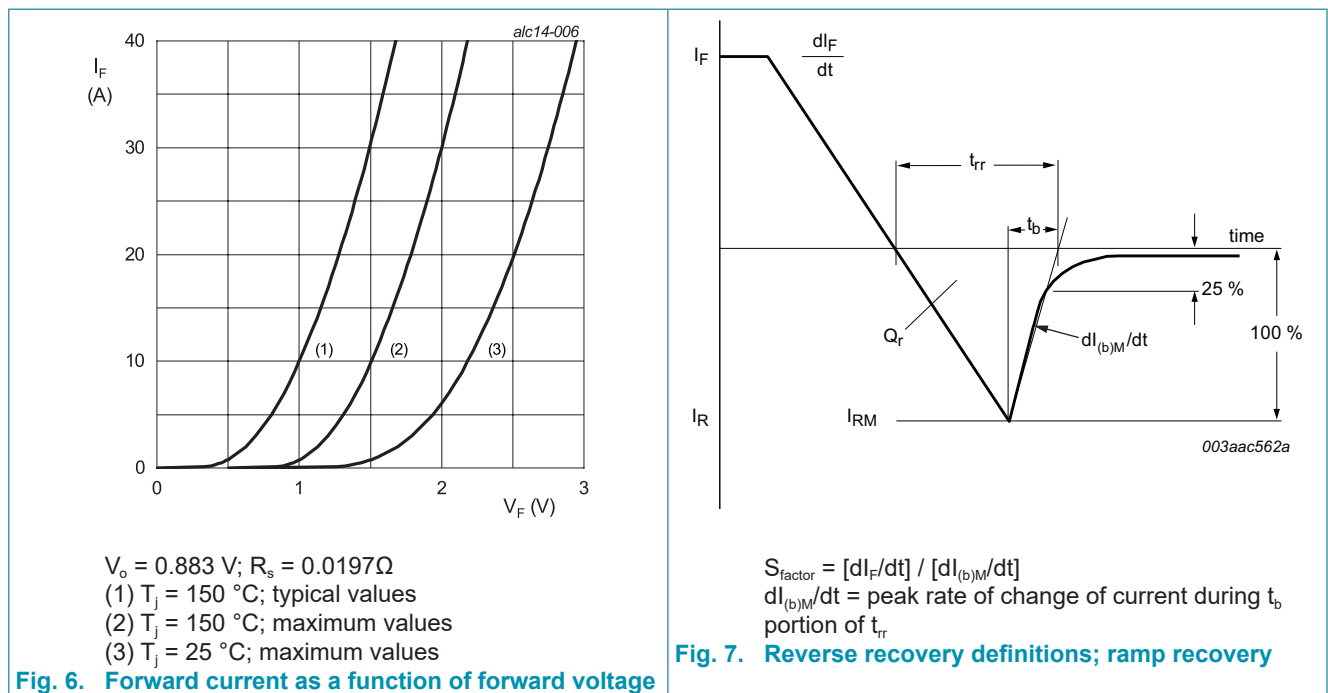


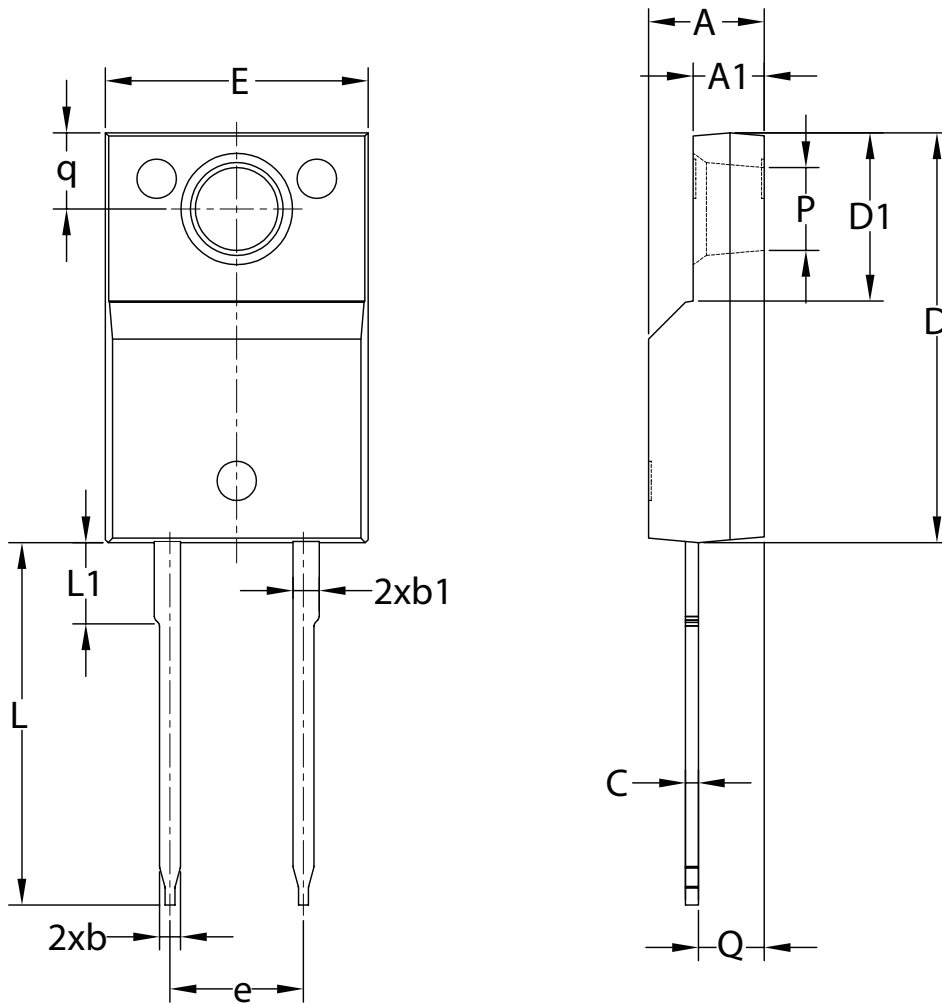
Fig. 6. Forward current as a function of forward voltage

Fig. 7. Reverse recovery definitions; ramp recovery

**12. Package outline**

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

TO220F-2L



Unit	A	A1	b	b1	c	D	D1	E	e	L	L1	P	Q	q	
MM	min	4.20	2.50	0.70	0.90	0.40	15.40	6.00	9.70	5.08 (BSC)	13.50	2.80	3.00	2.30	2.60
	max	4.60	2.90	0.90	1.30	0.60	15.80	6.40	10.30		14.40	3.30	3.30	2.60	3.00

## 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.
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