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

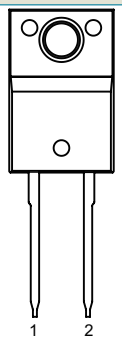
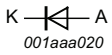
4. Quick reference data

Table 1. Quick reference data

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

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode		 001aaa020
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

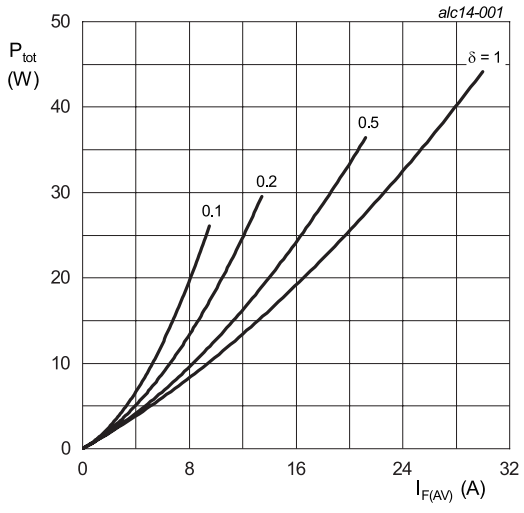
Type number	Marking codes
BYC30X-600PS	BYC30X 600PS

8. Limiting values

Table 5. Limiting values

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

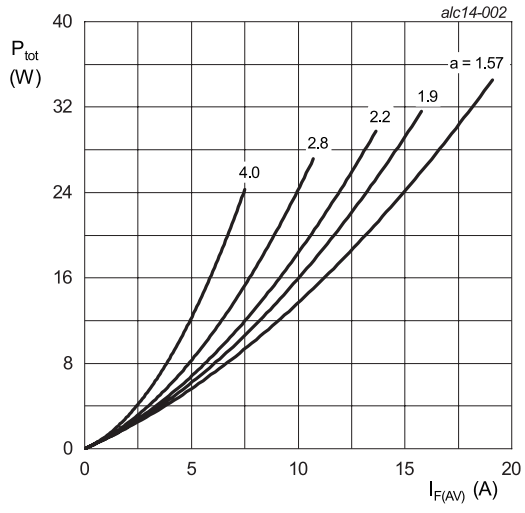
Symbol	Parameter	Conditions	Values	Unit
V_{RRM}	repetitive peak reverse voltage		600	V
V_{RWM}	crest working reverse voltage		600	V
V_R	reverse voltage	DC	600	V
$I_{F(AV)}$	average forward current	δ = 0.5 ; square-wave pulse; $T_h \leq 51$ °C; Fig. 1; Fig. 2; Fig. 3	30	A
I_{FRM}	repetitive peak forward current	δ = 0.5 ; t_p = 25 µs; $T_h \leq 51$ °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; Fig. 4	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 V; R_s = 0.0197Ω

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



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

V_o = 0.883 V; R_s = 0.0197Ω

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

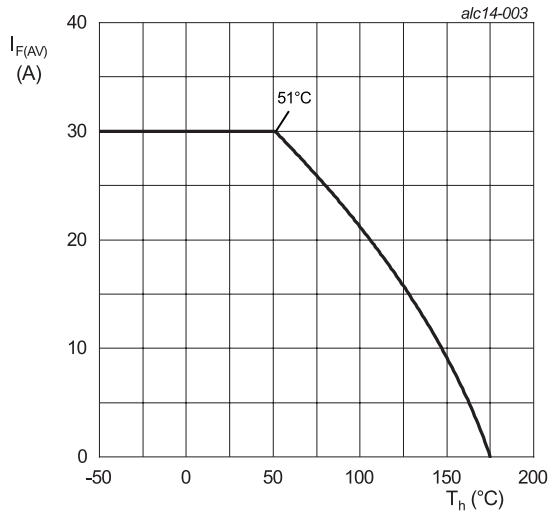


Fig. 3. Forward current as a function of heatsink temperature; maximum values

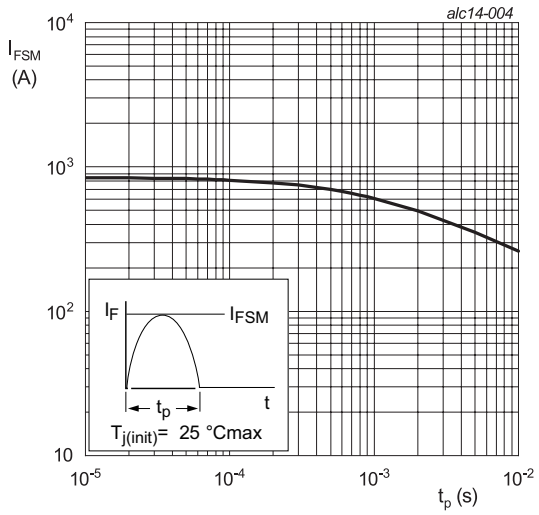


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

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

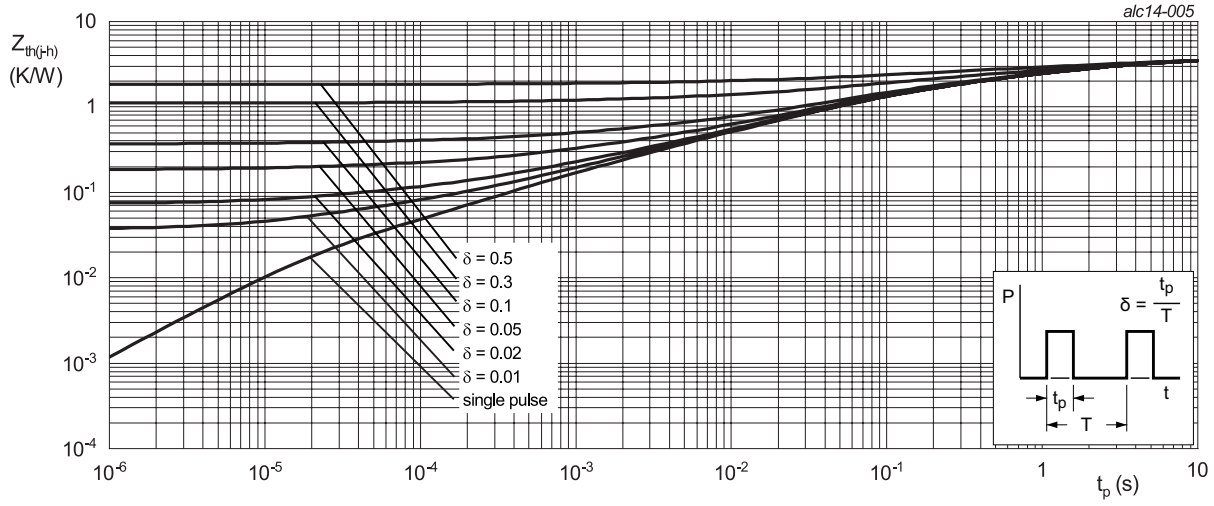


Fig. 5. Transient thermal impedance from junction to heatsink as a function of pulse duration

10. Isolation characteristics

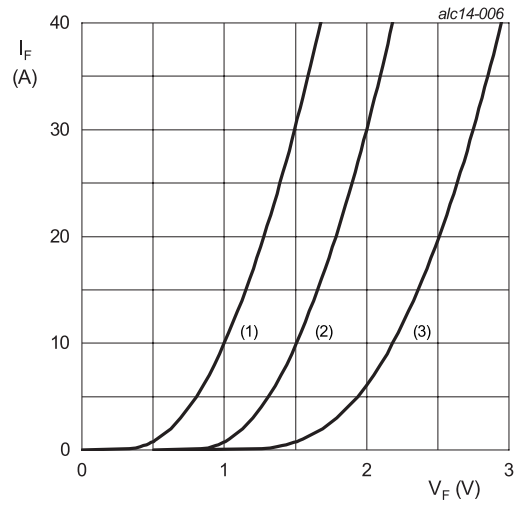
Table 7. Isolation characteristics

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

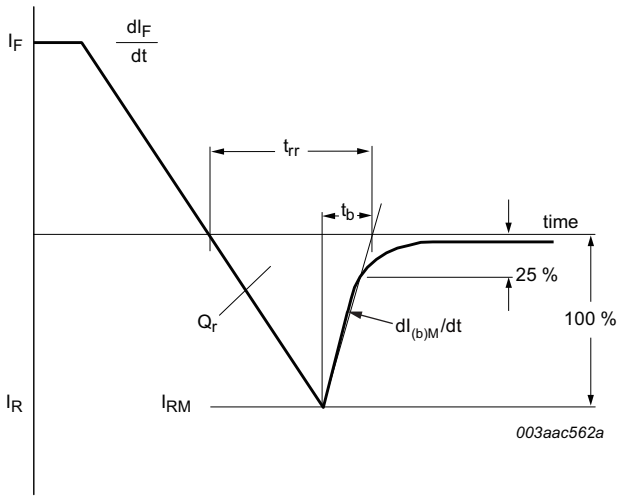
Table 8. Characteristics

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



V_o = 0.883 V; R_s = 0.0197Ω
(1) T_j = 150 °C; typical values
(2) T_j = 150 °C; maximum values
(3) T_j = 25 °C; maximum values

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

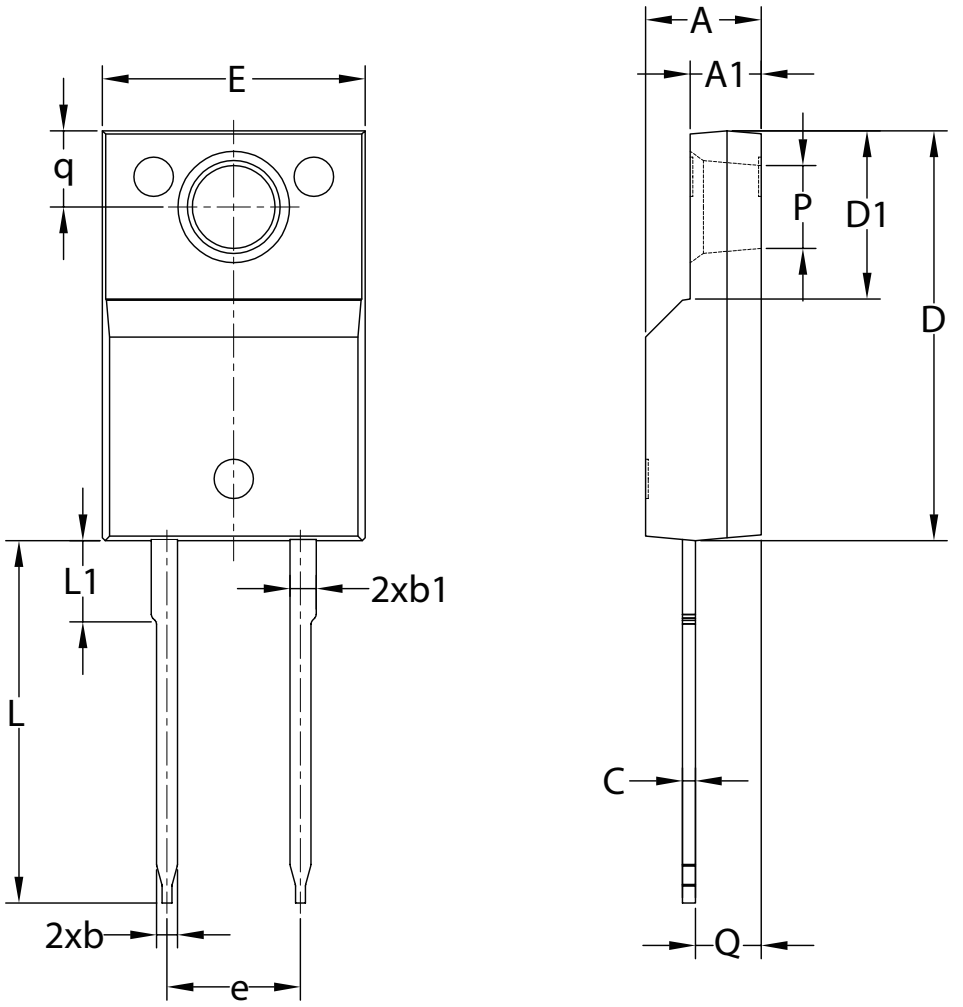


S_{factor} = $[dI_F/dt]$ / $[dI_{(b)M}/dt]$
$dI_{(b)M}/dt$ = peak rate of change of current during t_b portion of t_{rr}

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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Product [short] data sheet	Production	This document contains the product specification.

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