BYC30JT-600PS

Hyperfast power diode

Rev.01 - 09 September 2021 Product data sheet

1. General description

Hyperfast power diode in a TO3PF plastic package.

2. Features and benefits

- Isolated plastic package
- Low leakage current
- Low thermal resistance
- Low reverse recovery current
- Soft reverse recovery with low recovery current
- Reduces switching losses in associated MOSFET or IGBT
- High operating temperature capability ($T_{j(max)}$ = 175°C)

3. Applications

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

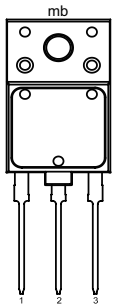
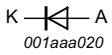
4. Quick reference data

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; $T_h \leq 36$ °C; Fig. 1; Fig. 2; Fig. 3	30				A
I_{FRM}	repetitive peak forward current	δ = 0.5 ; t_p = 25 µs; $T_h \leq 36$ °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	270				A
		t_p = 8.3 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse	300				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		-	1.4	1.8	V
Dynamic characteristics							
t_{rr}	reverse recovery time	I_F = 1 A; V_R = 30 V; dI_F/dt = 200 A/µs; T_j = 25 °C; Fig. 7		-	18	22	ns

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A	anode		
2	K	cathode		
3	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
BYC30JT-600PS	TO3PF	BYC30JT-600PSQ	Tube	30	SOT1293	01-Mar-2017

7. Marking

Table 4. Marking codes

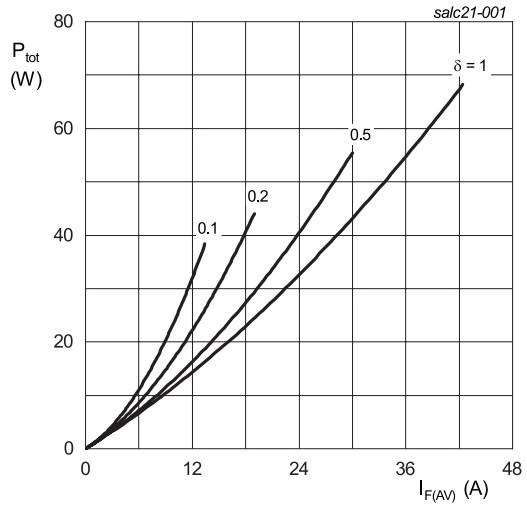
Type number	Marking codes
BYC30JT-600PS	BYC30JT 600PS

8. Limiting values

Table 5. Limiting values

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

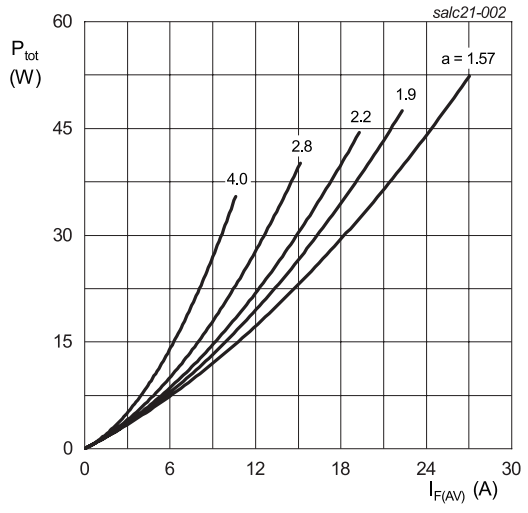
Symbol	Parameter	Conditions	Values	Unit
V_{RRM}	repetitive peak reverse voltage		600	V
V_{RWM}	crest working reverse voltage		600	V
V_R	reverse voltage	DC	600	V
$I_{F(AV)}$	average forward current	δ = 0.5 ; square-wave pulse; $T_h \leq 36$ °C; Fig. 1; Fig. 2; Fig. 3	30	A
I_{FRM}	repetitive peak forward current	δ = 0.5 ; t_p = 25 µs; $T_h \leq 36$ °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	270	A
		t_p = 8.3 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse	300	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 = 1.410 V; R_s = 0.0136 Ω

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 = 1.410 V; R_s = 0.0136 Ω

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

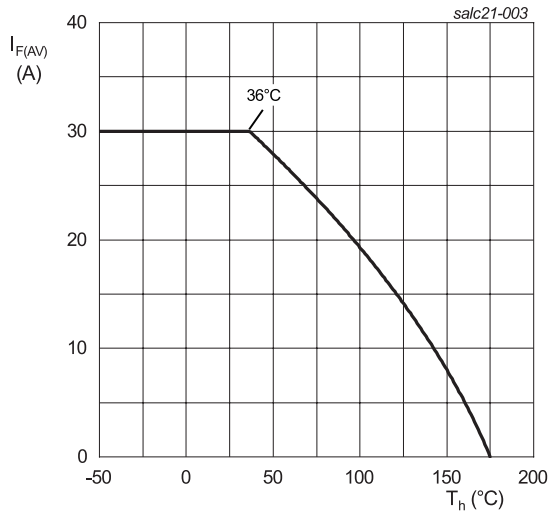


Fig. 3. Forward current as a function of heatsink temperature; typical values

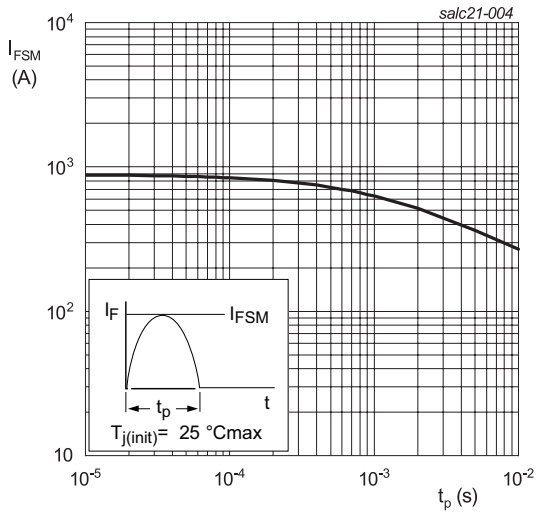


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-h)}$	thermal resistance from junction to heatsink	with heatsink compound; Fig. 5		-	-	3.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	35	-	K/W

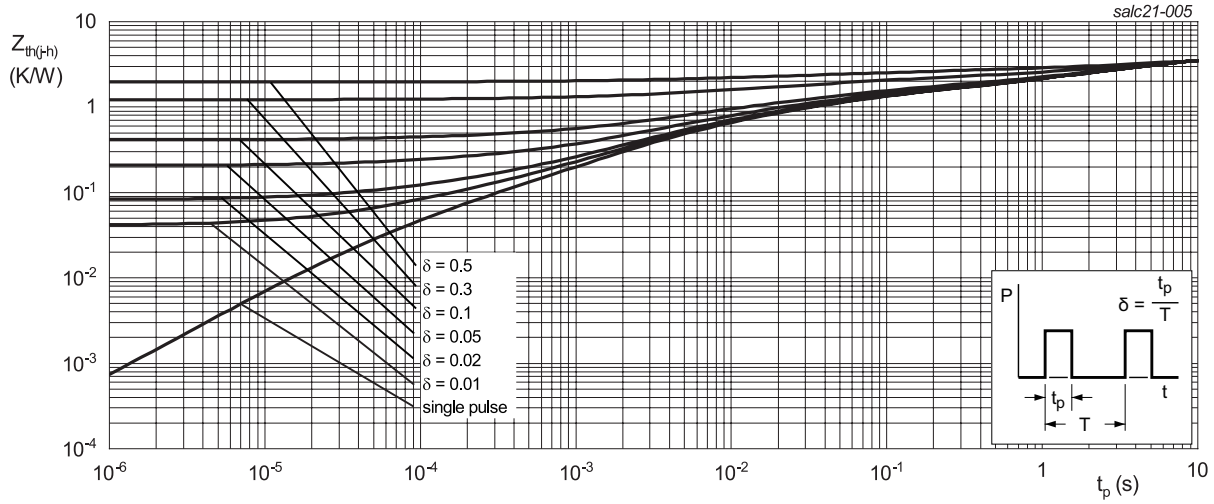


Fig. 5. Transient thermal impedance from junction to heatsink as a function of pulse duration

10. Isolation characteristics

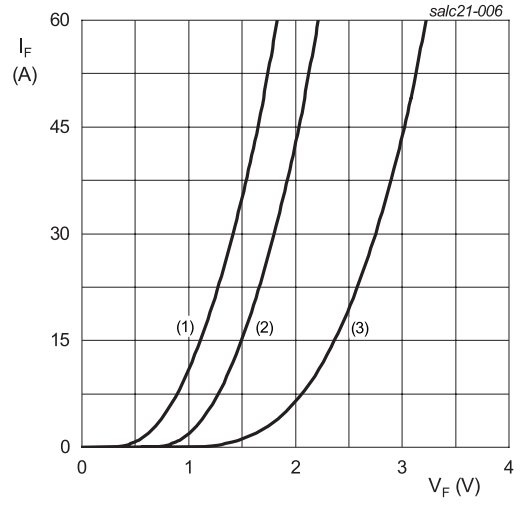
Table 7. Isolation characteristics

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

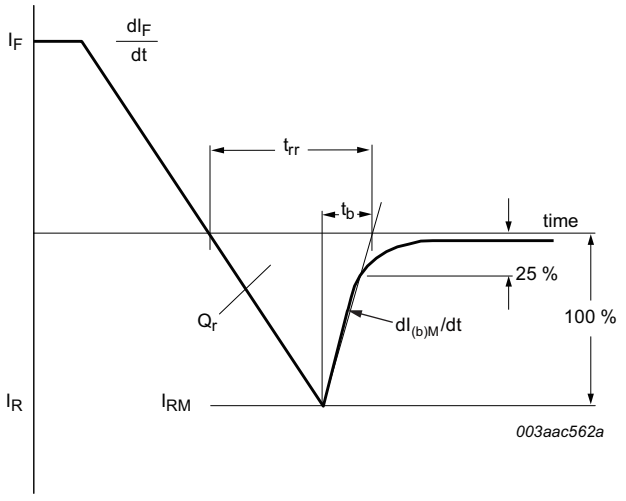
Table 8. Characteristics

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		-	1.4	1.8	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 = 200 A/µs; T_j = 25 °C; Fig. 7		-	18	22	ns
		I_F = 30 A; V_R = 200 V; dI_F/dt = 200 A/µs; T_j = 25 °C; Fig. 7		-	35	-	ns
		I_F = 30 A; V_R = 200 V; dI_F/dt = 200 A/µs; T_j = 125 °C; Fig. 7		-	70	-	ns
		I_F = 30 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 25 °C; Fig. 7		-	29	-	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		-	3.5	-	A
		I_F = 30 A; V_R = 200 V; dI_F/dt = 200 A/µs; T_j = 125 °C; Fig. 7		-	7.6	-	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		-	50	-	nC
		I_F = 30 A; V_R = 200 V; dI_F/dt = 200 A/µs; T_j = 125 °C; Fig. 7		-	280	-	nC
E_{as}	non-repetitive avalanche energy	I_R = 2 A; L = 5 mH; $T_{j(init)}$ = 25 °C		10	-	-	mJ
S_{factor}	softness factor	I_F = 30 A; V_R = 200 V; dI_F/dt = 200 A/µs; T_j = 125 °C; Fig. 7		-	0.26	-	



V_o = 1.410 V; R_s = 0.0136 Ω
(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

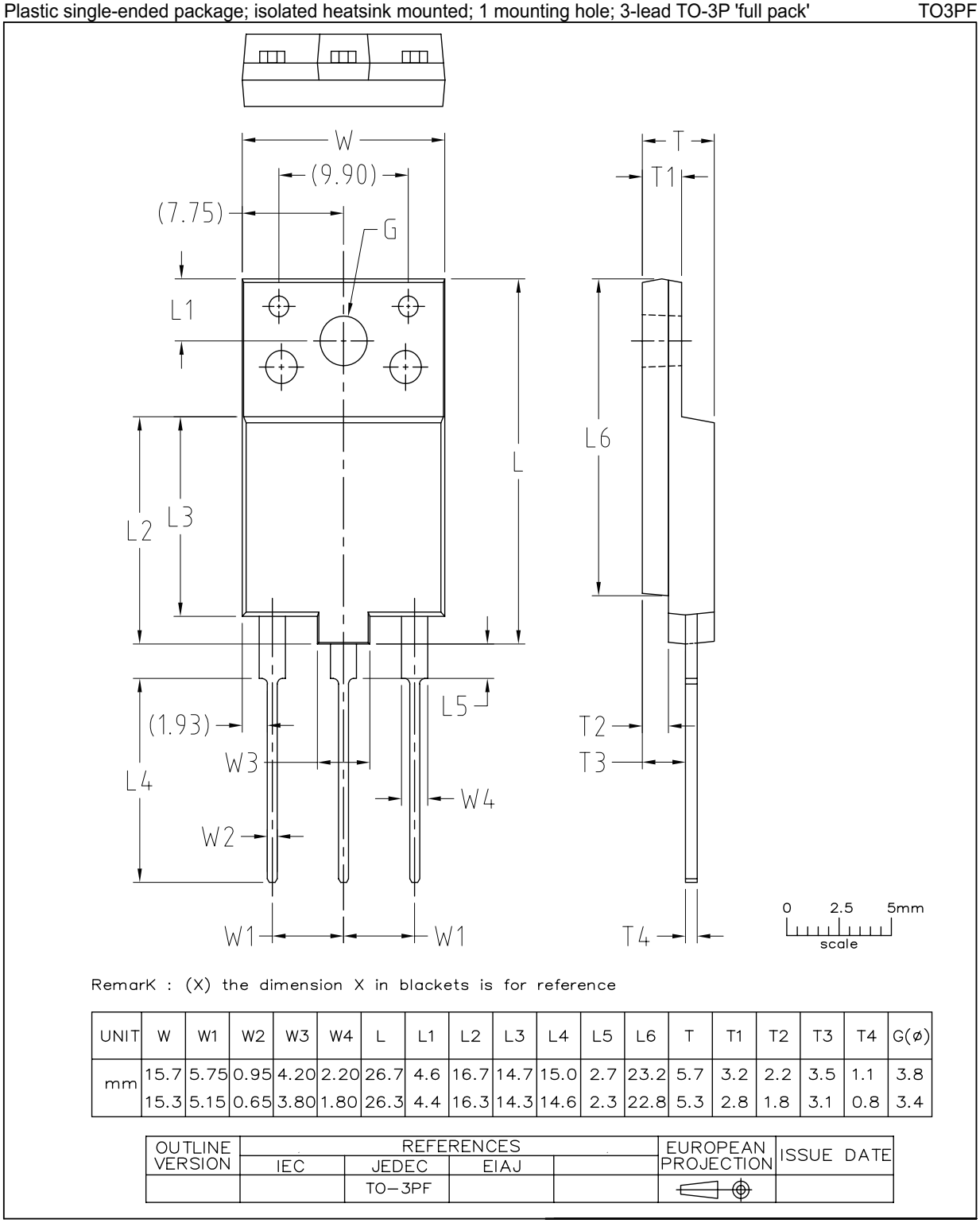


S_{factor} = $[dI_F/dt]$ / $[dI_{(b)M}/dt]$
$dI_{(b)M}/dt$ = peak rate of change of current during t_b portion of t_{rr}

Fig. 7. Reverse recovery definitions; ramp recovery

12. Package outline

Plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 3-lead TO-3P 'full pack' TO3PF



RemarK : (X) the dimension X in blackets is for reference

UNIT	W	W1	W2	W3	W4	L	L1	L2	L3	L4	L5	L6	T	T1	T2	T3	T4	G(ø)
mm	15.7	5.75	0.95	4.20	2.20	26.7	4.6	16.7	14.7	15.0	2.7	23.2	5.7	3.2	2.2	3.5	1.1	3.8
	15.3	5.15	0.65	3.80	1.80	26.3	4.4	16.3	14.3	14.6	2.3	22.8	5.3	2.8	1.8	3.1	0.8	3.4

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
		TO−3PF				

13. 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.
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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Date of release: 09 September 2021

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