

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 ($T_{j(max)} = 175^{\circ}\text{C}$)

3. Applications

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

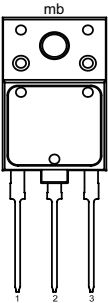
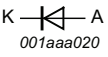
4. Quick reference data

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 ≤ 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 ≤ 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

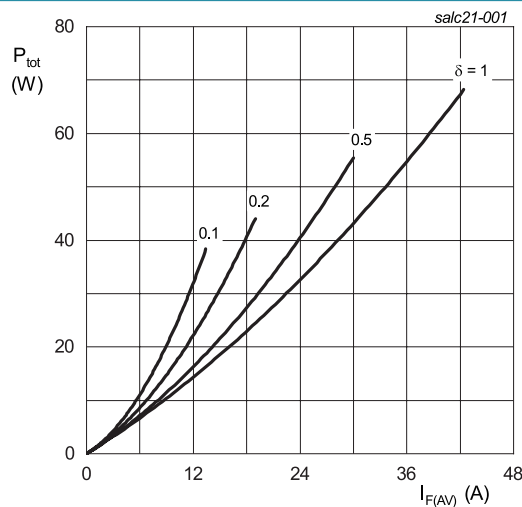
Type number	Marking codes
BYC30JT-600PS	BYC30JT 600PS

8. Limiting values

Table 5. Limiting values

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

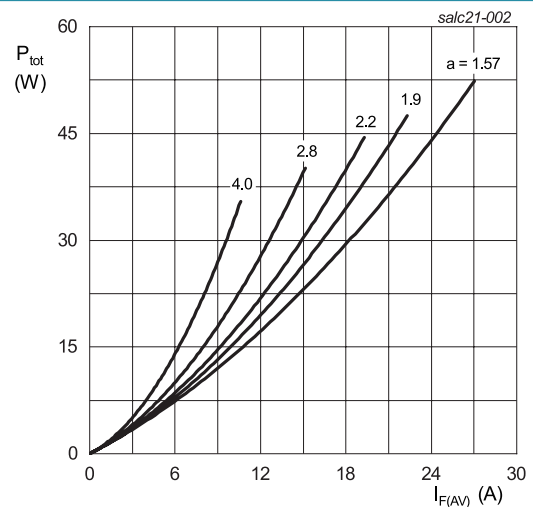
Symbol	Parameter	Conditions	Values	Unit
V_{RRM}	repetitive peak reverse voltage		600	V
V_{RWM}	crest working reverse voltage		600	V
V_R	reverse voltage	DC	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; square-wave pulse; $T_h \leq 36^\circ\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3	30	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\ \mu\text{s}$; $T_h \leq 36^\circ\text{C}$; square-wave pulse	60	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\ \text{ms}$; $T_{j(\text{init})} = 25^\circ\text{C}$; sine-wave pulse; Fig. 4	270	A
		$t_p = 8.3\ \text{ms}$; $T_{j(\text{init})} = 25^\circ\text{C}$; sine-wave pulse	300	A
T_{stg}	storage temperature		-65 to 175	$^\circ\text{C}$
T_j	junction temperature		175	$^\circ\text{C}$



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

$$V_o = 1.410\ \text{V}; R_s = 0.0136\ \Omega$$

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



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

$$V_o = 1.410\ \text{V}; R_s = 0.0136\ \Omega$$

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

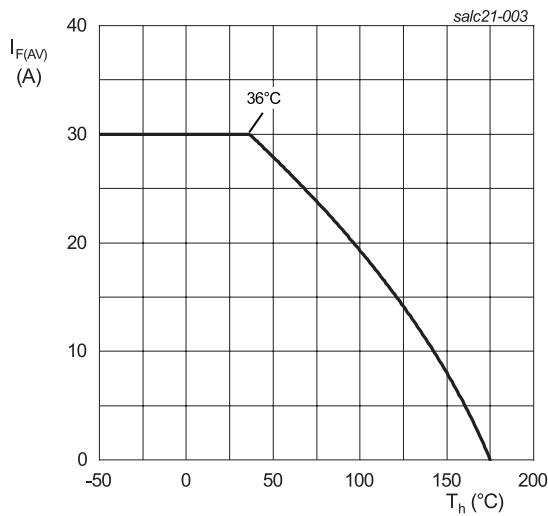


Fig. 3. Forward current as a function of heatsink temperature; typical values

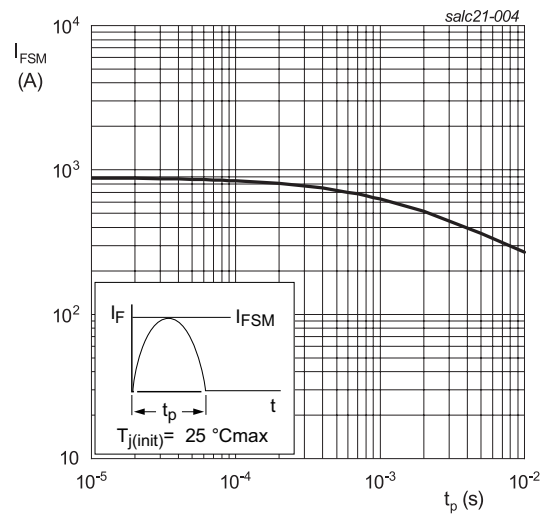


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

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

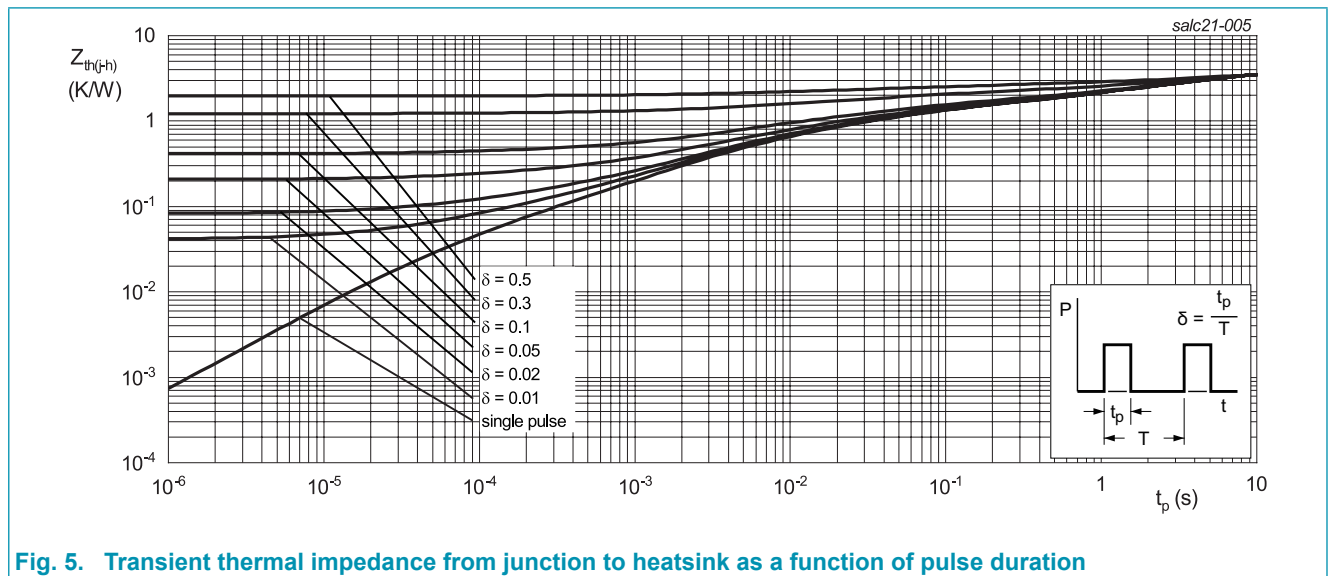


Fig. 5. Transient thermal impedance from junction to heatsink as a function of pulse duration

10. Isolation characteristics

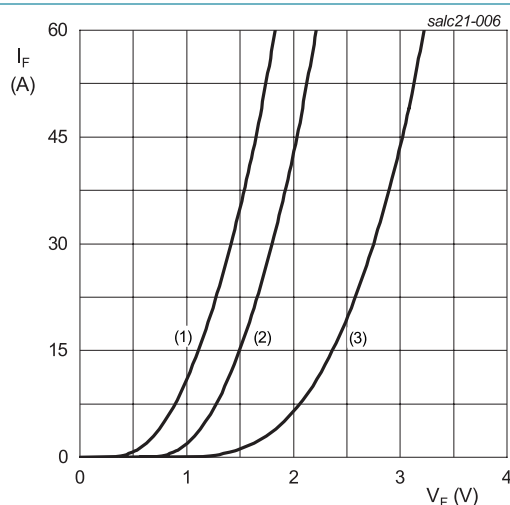
Table 7. Isolation characteristics

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

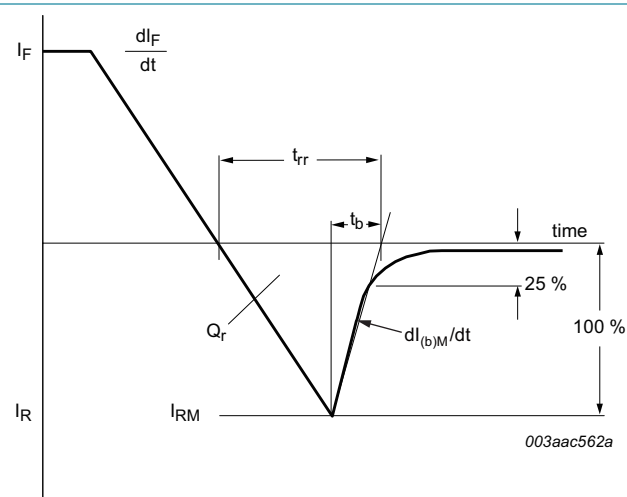
Table 8. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
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	-	



$V_o = 1.410\text{ V}; R_s = 0.0136\text{ }\Omega$
 (1) $T_J = 150\text{ °C}$; typical values
 (2) $T_J = 150\text{ °C}$; maximum values
 (3) $T_J = 25\text{ °C}$; maximum values

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

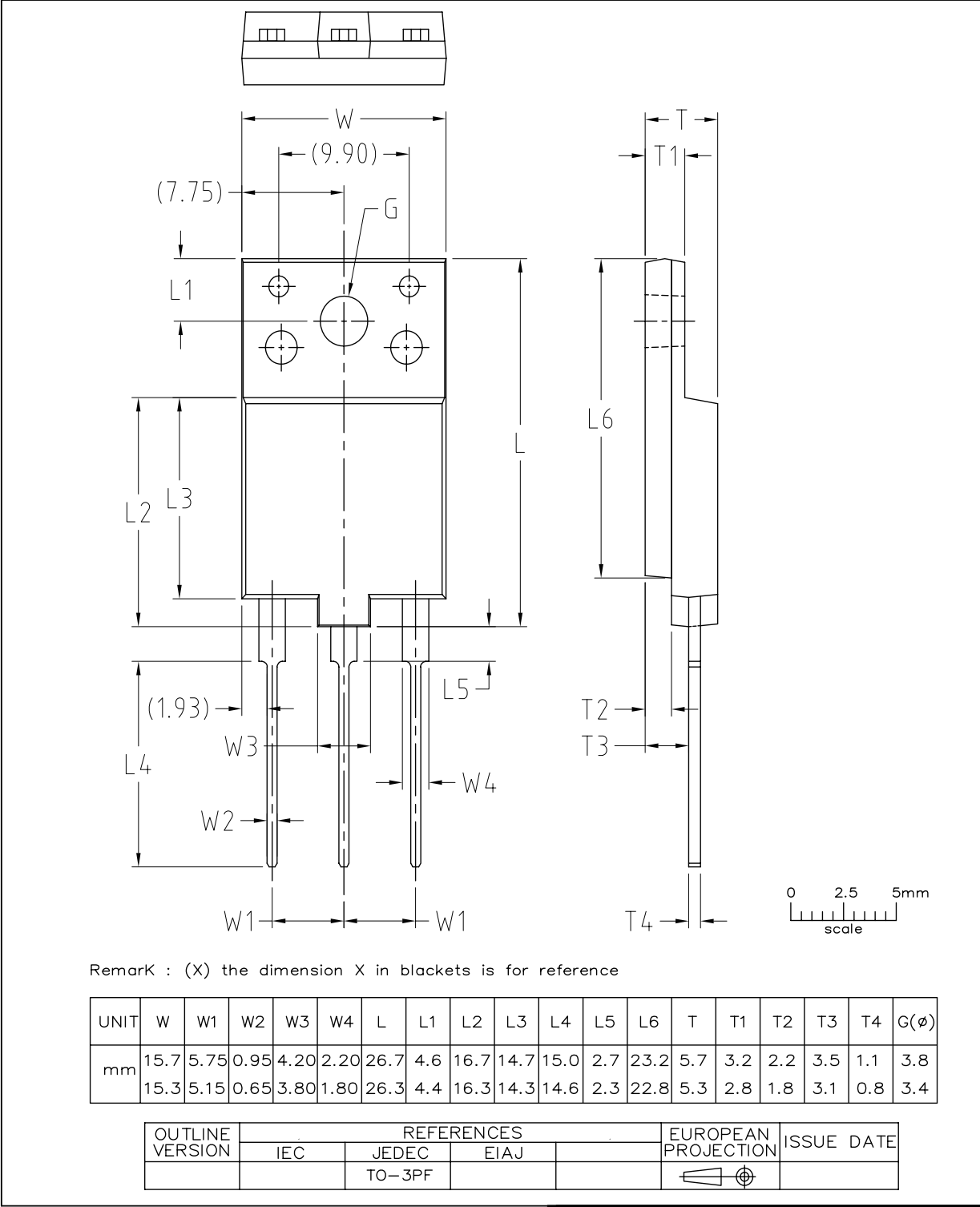


$S_{\text{factor}} = [dI_F/dt] / [dI_{(b)M}/dt]$
 $dI_{(b)M}/dt$ = peak rate of change of current during t_b portion of t_{rr}

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



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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