

1. General description

Ultrafast diode in a TO3PF package.

2. Features and benefits

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

3. Applications

- Active PFC in air conditioner
- S.M.P.S Power Factor Correction (PFC)
- Half-bridge / full-bridge switched-mode power supplies

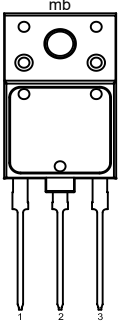
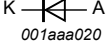
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_R	reverse voltage	DC	-	-	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_h \leq 73$ °C; square-wave; Fig. 1 ; Fig. 2 ; Fig. 3	-	-	30	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25$ μ s; square-wave	-	-	60	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(init)} = 25$ °C; SIN; Fig. 4	-	-	170	A
		$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; SIN	-	-	190	A
Static characteristics						
V_F	forward voltage	$I_F = 30$ A; $T_j = 25$ °C; Fig. 6	-	1.35	1.8	V
		$I_F = 30$ A; $T_j = 150$ °C; Fig. 6	-	0.96	-	V
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $di_F/dt = 100$ A/ μ s; $T_j = 25$ °C; Fig. 7	-	37	65	ns
		$I_F = 30$ A; $V_R = 200$ V; $di_F/dt = 200$ A/ μ s; $T_j = 25$ °C; Fig. 7	-	85	-	ns
		$I_F = 30$ A; $V_R = 200$ V; $di_F/dt = 200$ A/ μ s; $T_j = 125$ °C; Fig. 7	-	138	-	ns

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A	anode	 <p style="text-align: center;">TO3PF</p>	
2	K	cathode		
3	A	anode		
mb	n.c.	mounting base; isolated		

6. Ordering information

Table 3. Ordering information

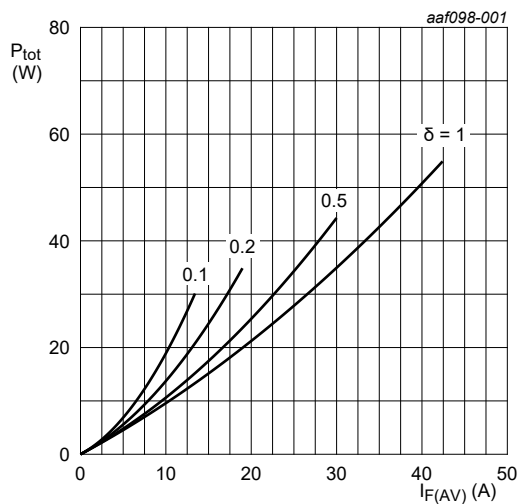
Type number	Package		
	Name	Description	Version
BYV30JT-600P	TO3PF	Plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 3-lead TO-3P 'full pack'	TO3PF

7. Limiting values

Table 4. Limiting values

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

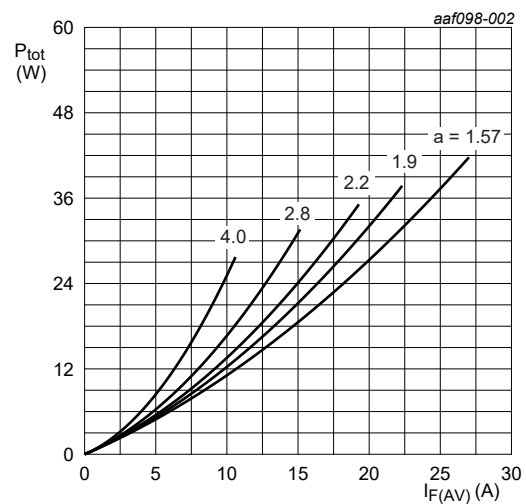
Symbol	Parameter	Conditions	Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	600	V
V_{RWM}	crest working reverse voltage		-	600	V
V_R	reverse voltage	DC	-	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_h \leq 73$ °C; square-wave; Fig. 1 ; Fig. 2 ; Fig. 3	-	30	A
$I_{O(AV)}$	average output current	$\delta = 0.5$; $T_h \leq 73$ °C; SQW	-	60	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25$ μ s; square-wave	-	60	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(init)} = 25$ °C; SIN; Fig. 4	-	170	A
		$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; SIN	-	190	A
T_{stg}	storage temperature		-65	175	°C
T_j	junction temperature		-	175	°C



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

$$V_o = 0.854 \text{ V}; R_s = 0.0104 \text{ } \Omega$$

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



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

$$V_o = 0.854 \text{ V}; R_s = 0.0104 \text{ } \Omega$$

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

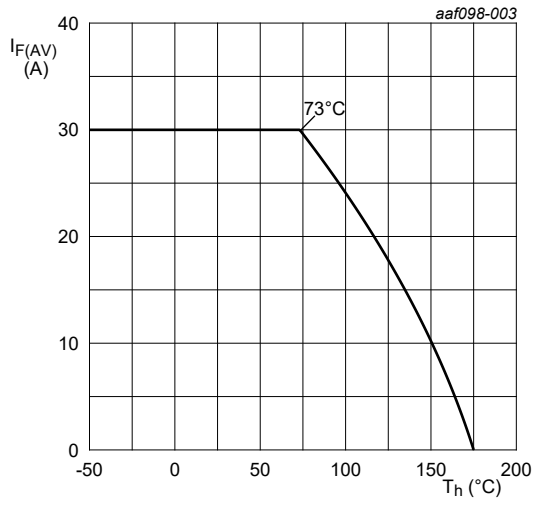


Fig. 3. Average forward current as a function of heatsink temperature; typical values

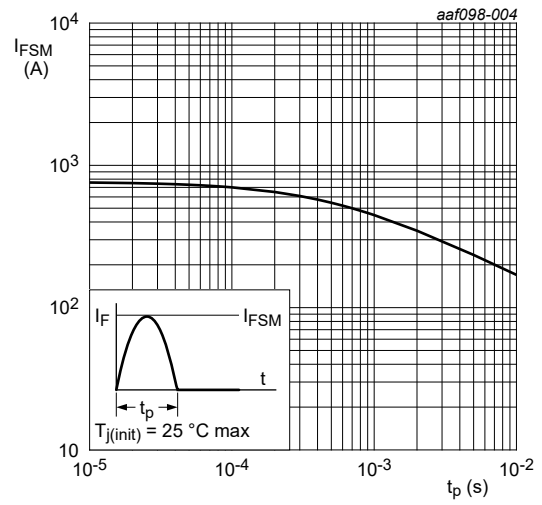


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-h)}$	thermal resistance from junction to heatsink	With heatsink compound; Fig. 5	-	2.3	2.6	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	35	-	K/W

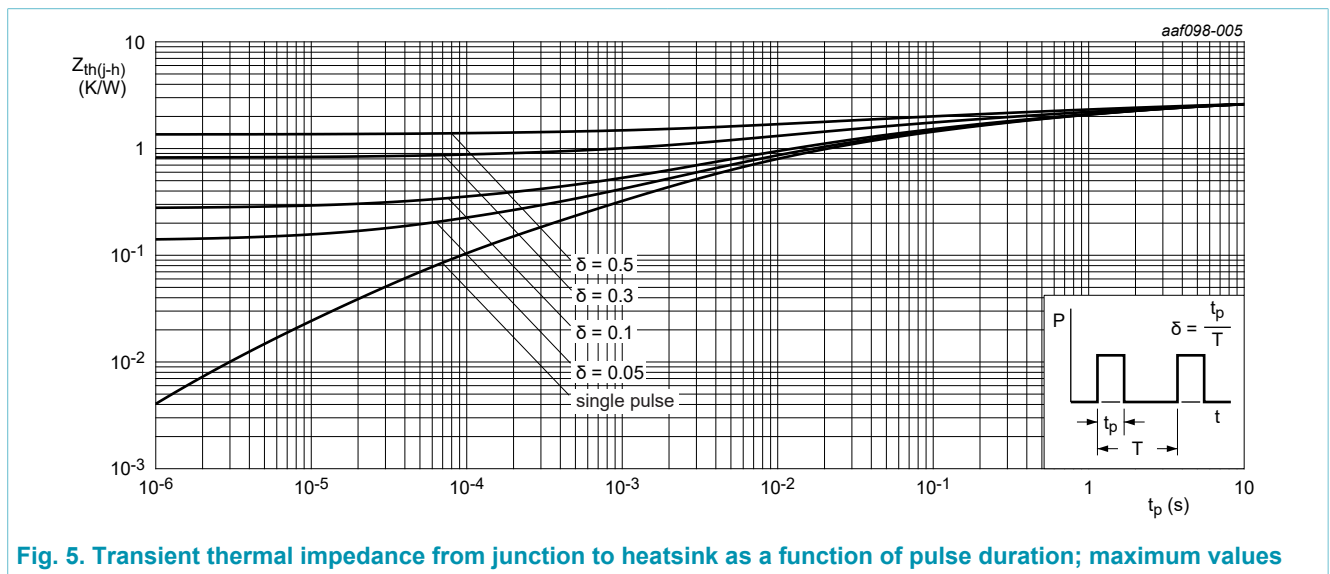
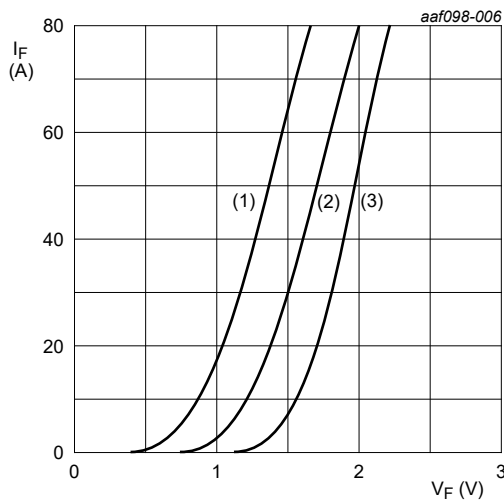


Fig. 5. Transient thermal impedance from junction to heatsink as a function of pulse duration; maximum values

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 30\text{ A}; T_j = 25\text{ °C}; \text{Fig. 6}$	-	1.35	1.8	V
		$I_F = 30\text{ A}; T_j = 150\text{ °C}; \text{Fig. 6}$	-	0.96	-	V
I_R	reverse current	$V_R = 600\text{ V}; T_j = 25\text{ °C}$	-	-	10	μA
		$V_R = 600\text{ V}; T_j = 150\text{ °C}$	-	-	500	μA
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1\text{ A}; V_R = 30\text{ V}; dI_F/dt = 100\text{ A}/\mu\text{s}; T_j = 25\text{ °C}; \text{Fig. 7}$	-	37	65	ns
		$I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 25\text{ °C}; \text{Fig. 7}$	-	85	-	ns
		$I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 125\text{ °C}; \text{Fig. 7}$	-	138	-	ns
I_{RM}	peak reverse recovery current	$I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 25\text{ °C}$	-	11	-	A
		$I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 125\text{ °C}$	-	18	-	A
Q_r	recovered charge	$I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 25\text{ °C}; \text{Fig. 7}$	-	461	-	nC
		$I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 125\text{ °C}; \text{Fig. 7}$	-	1227	-	nC



- (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

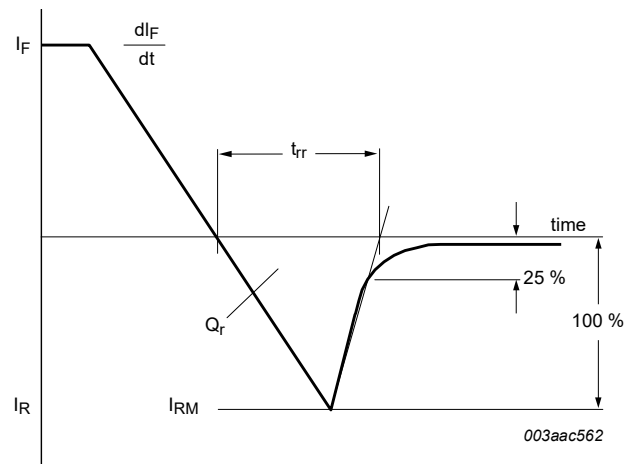
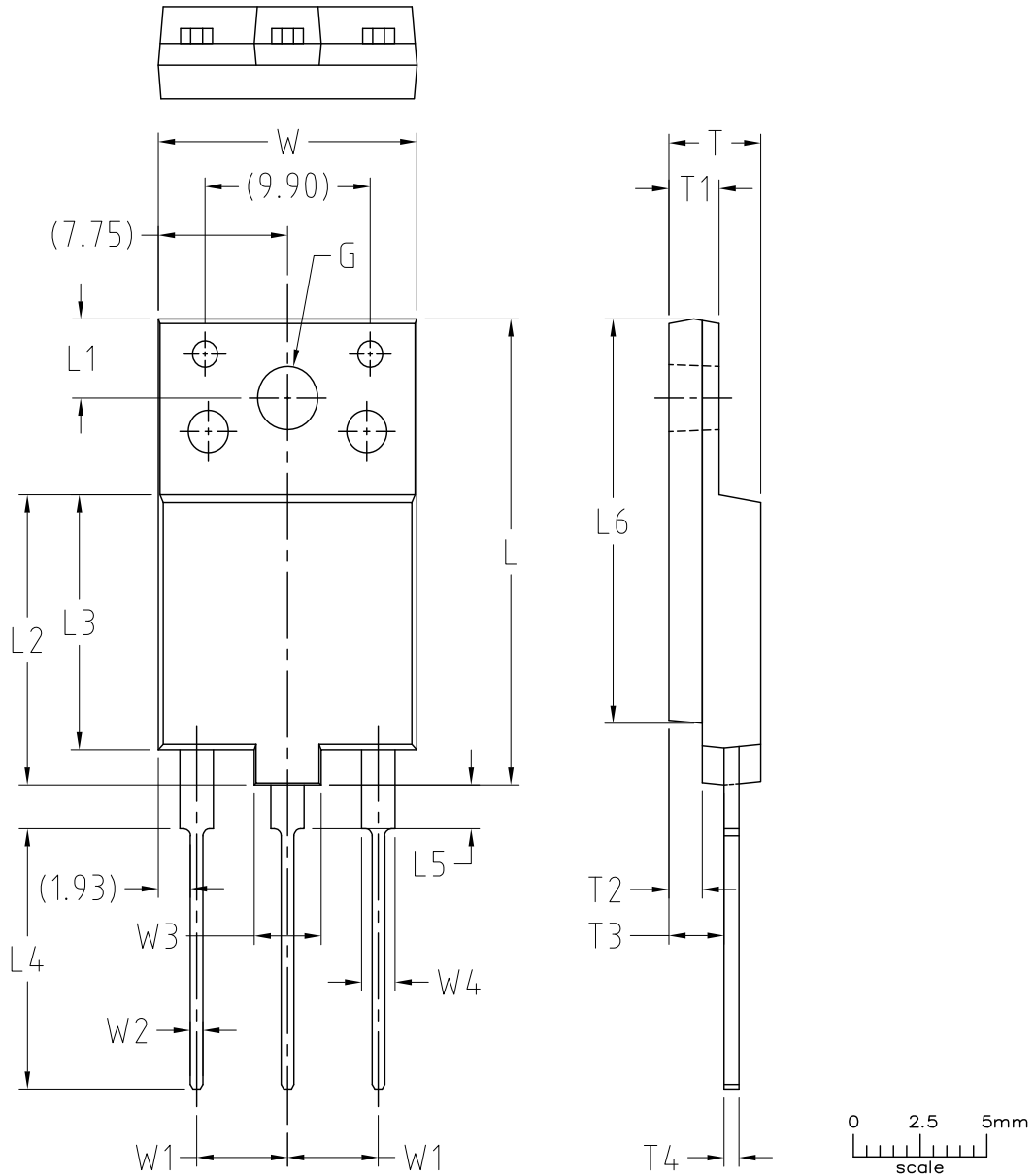


Fig. 7. Reverse recovery definitions; ramp recovery

10. 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 brackets is for reference

UNIT	W	W1	W2	W3	W4	L	L1	L2	L3	L4	L5	L6	T	T1	T2	T3	T4	G(φ)
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			

Fig. 8. Package outline TO3PF

11. 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.
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- [2] The term 'short data sheet' is explained in section "Definitions".
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