

1. General description

Dual ultrafast power diodes in a TO3PF plastic package.

2. Features and benefits

- Very low on-state loss
- Reduces switching losses in associated MOSFET or IGBT
- Low leakage current
- Isolated plastic package

3. Applications

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

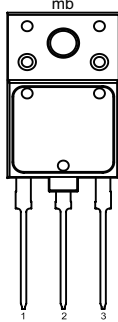
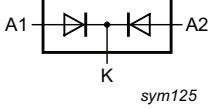
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values			Unit
Absolute maximum rating						
V_R	repetitive peak reverse voltage	DC	600			V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_h \leq 100$ °C; square-wave pulse; per diode; Fig. 1 ; Fig. 2 ; Fig. 3	15			A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25$ μ s; $T_h \leq 100$ °C; square-wave pulse; per diode	30			A
I_{FSM}	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse; per diode; Fig. 4	150			A
		$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse; per diode	165			A
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 15$ A; $T_j = 25$ °C; per diode; Fig. 6	-	1.4	2.1	V
		$I_F = 15$ A; $T_j = 150$ °C; per diode; Fig. 6	-	1.1	1.4	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; per diode; Fig. 7	-	25	50	ns
		$I_F = 15$ A; $V_R = 400$ V; $di_F/dt = 200$ A/ μ s; $T_j = 25$ °C; per diode; Fig. 7	-	45	-	ns
		$I_F = 15$ A; $V_R = 400$ V; $di_F/dt = 200$ A/ μ s; $T_j = 125$ °C; per diode; Fig. 7	-	65	-	ns

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode 1		
2	K	cathode		
3	A2	anode 2		
mb	n.c.	mounting base; isolated		

6. Ordering information

Table 3. Ordering information

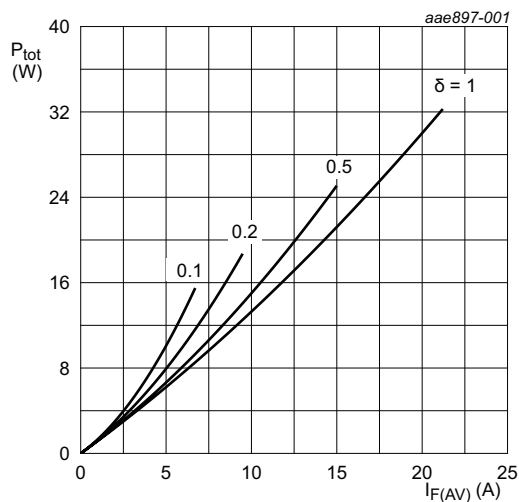
Type number	Package		
	Name	Description	Version
BYV415J-600P	TO3PF	Plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 3-lead TO-3P 'full pack'	TO3PF

7. Limiting values

Table 5. Limiting values

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

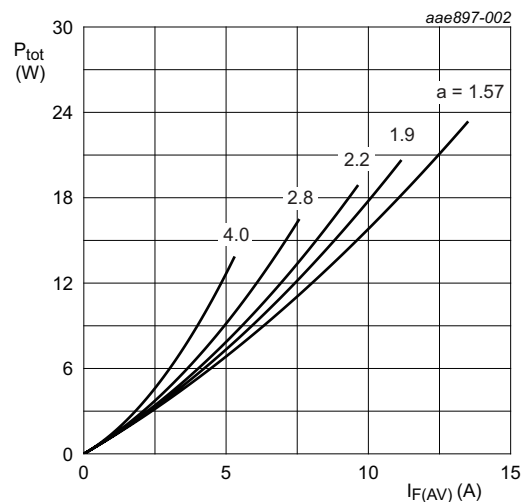
Symbol	Parameter	Conditions	Values	Unit
V_{RRM}	repetitive peak reverse voltage		600	V
V_{RWM}	crest working reverse voltage		600	V
V_R	reverse voltage	DC	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_h \leq 100\text{ }^\circ\text{C}$; square-wave pulse; per diode; Fig. 1 ; Fig. 2 ; Fig. 3	15	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_h \leq 100\text{ }^\circ\text{C}$; square-wave pulse; per diode	30	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\text{ ms}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; sine-wave pulse; per diode; Fig. 4	150	A
		$t_p = 8.3\text{ ms}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; sine-wave pulse; per diode	165	A
T_{stg}	storage temperature		-65 to 175	$^\circ\text{C}$
T_j	junction temperature		175	$^\circ\text{C}$



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

$$V_o = 1.156\text{ V}; R_s = 0.0172\text{ }\Omega$$

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



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

$$V_o = 1.156\text{ V}; R_s = 0.0172\text{ }\Omega$$

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

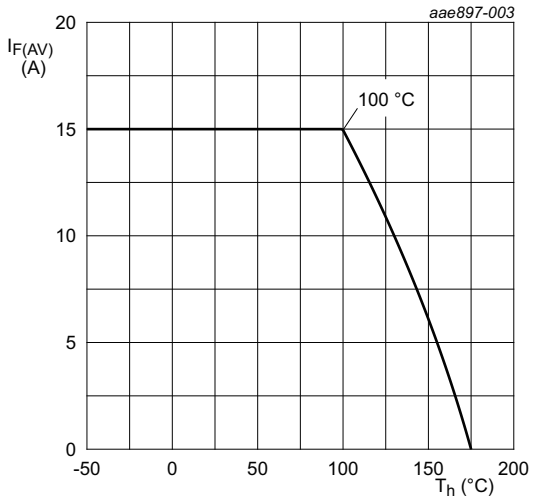


Fig. 3. Average forward current as a function of heatsink temperature; maximum values; per diode

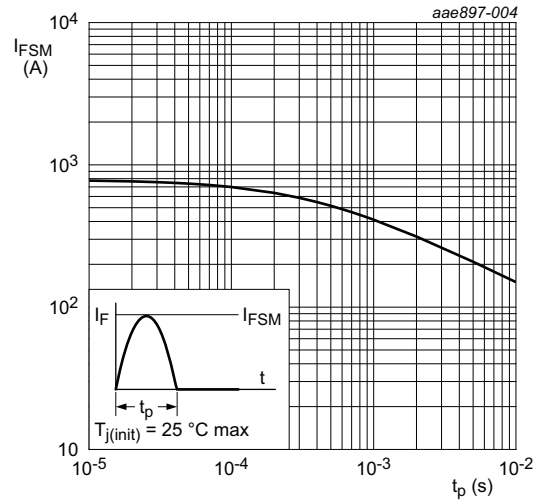


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values; per diode

8. 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; per diode;	-	-	3	K/W
		with heatsink compound; both diodes conducting	-	-	2.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	60	-	K/W

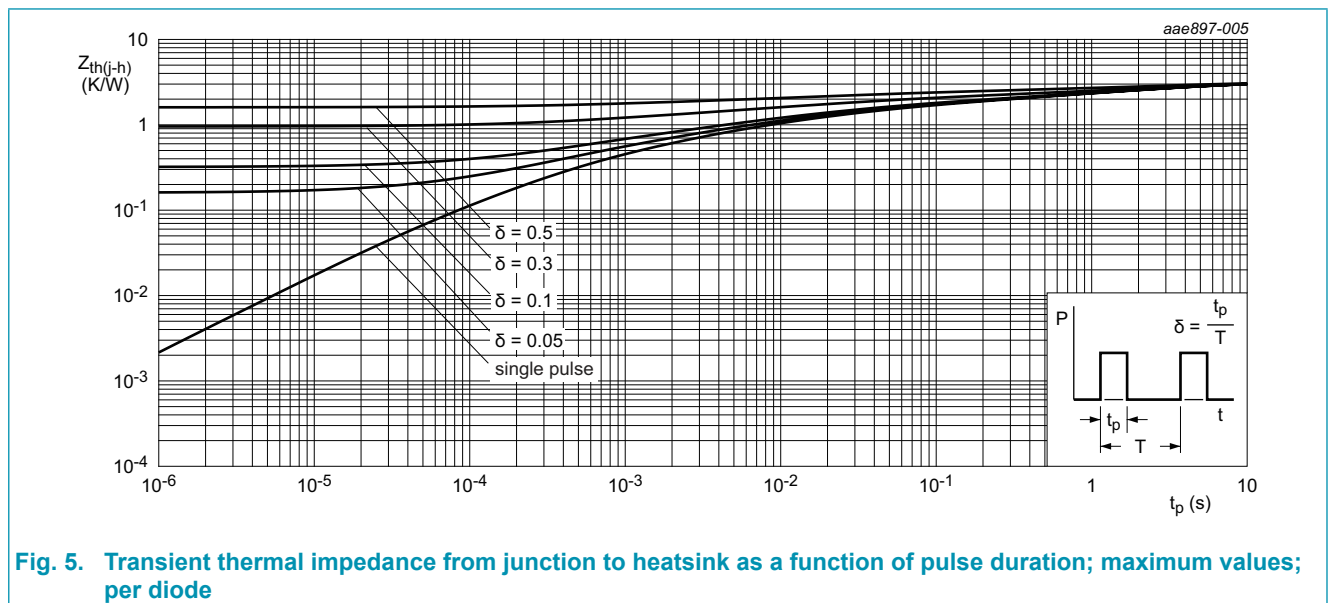


Fig. 5. Transient thermal impedance from junction to heatsink as a function of pulse duration; maximum values; per diode

9. Isolation characteristics

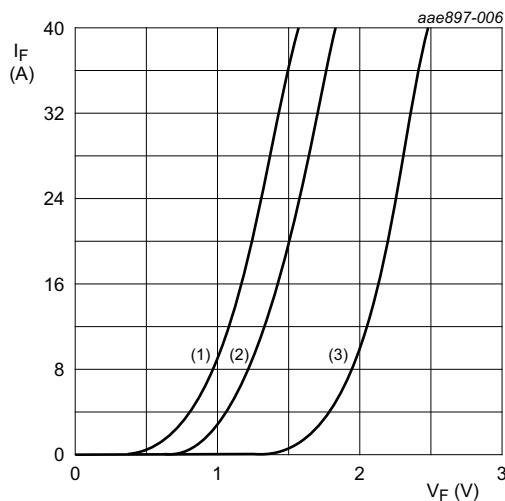
Table 7. Isolation characteristics

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	from cathode to external heatsink	-	10	-	PF

10. Characteristics

Table 8. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 15\text{ A}; T_j = 25\text{ °C};$ per diode; Fig. 6	-	1.4	2.1	V
		$I_F = 15\text{ A}; T_j = 150\text{ °C};$ per diode; Fig. 6	-	1.1	1.4	V
I_R	reverse current	$V_R = 600\text{ V}; T_j = 25\text{ °C};$ per diode	-	-	10	μA
		$V_R = 600\text{ V}; T_j = 150\text{ °C};$ per diode	-	-	500	μA
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1\text{ A}; V_R = 30\text{ V}; dI_F/dt = 100\text{ A}/\mu\text{s}; T_j = 25\text{ °C};$ per diode; Fig. 7	-	25	50	ns
		$I_F = 15\text{ A}; V_R = 400\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 25\text{ °C};$ per diode; Fig. 7	-	45	-	ns
		$I_F = 15\text{ A}; V_R = 400\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 125\text{ °C};$ per diode; Fig. 7	-	65	-	ns
		$I_F = 15\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 25\text{ °C};$ per diode; Fig. 7	-	34	-	ns
I_{RM}	peak reverse recovery current	$I_F = 15\text{ A}; V_R = 400\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 25\text{ °C};$ per diode; Fig. 7	-	5.5	-	A
		$I_F = 15\text{ A}; V_R = 400\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 125\text{ °C};$ per diode; Fig. 7	-	9.7	-	A
Q_r	recovered charge	$I_F = 15\text{ A}; V_R = 400\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 25\text{ °C};$ per diode; Fig. 7	-	125	-	nC
		$I_F = 15\text{ A}; V_R = 400\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 125\text{ °C};$ per diode; Fig. 7	-	318	-	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
 $V_o = 1.156\text{ V}; R_s = 0.0172\ \Omega$

Fig. 6. Forward current as a function of forward voltage, per diode

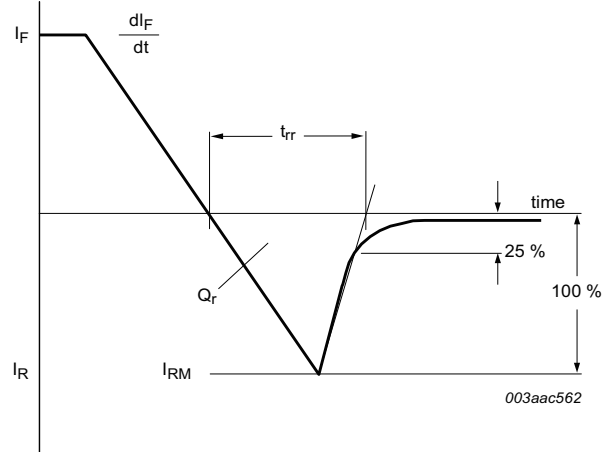
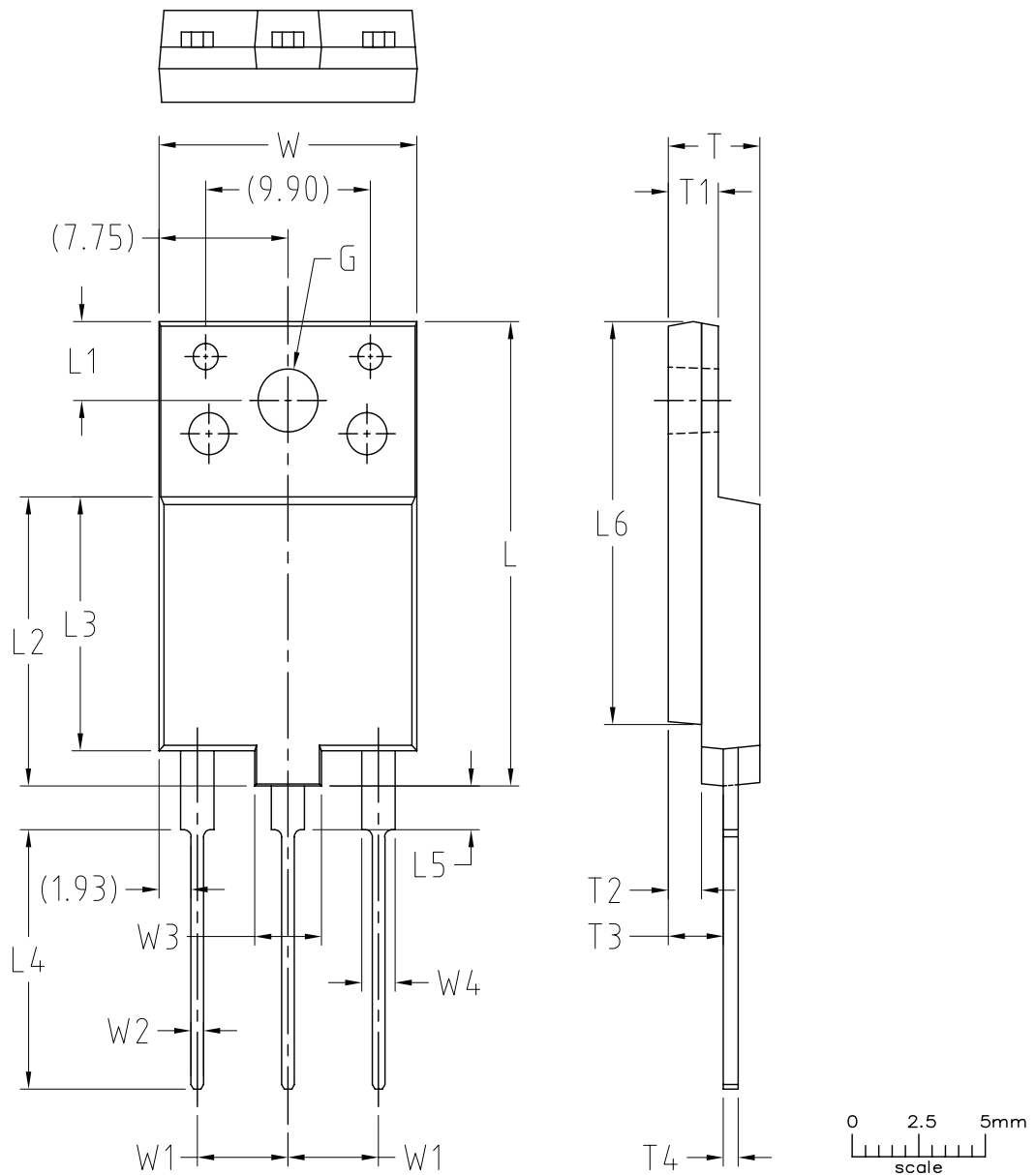


Fig. 7. Reverse recovery definitions; ramp recovery

11. 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			

12. 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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For sales office addresses, please send an email to: salesaddresses@ween-semi.com
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