BYV415J-600P

Dual ultrafast power diode

Rev.01 - 17 December 2018 Product data sheet

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

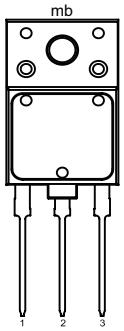
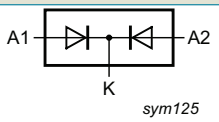
4. Quick reference data

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	δ = 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	δ = 0.5; t_p = 25 µs; $T_h \leq 100$ °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/µs; T_j = 25 °C; per diode; Fig. 7		-	25	50	ns
		I_F = 15 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 25 °C; per diode; Fig. 7		-	45	-	ns
		I_F = 15 A; V_R = 400 V; dI_F/dt = 200 A/µs; 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

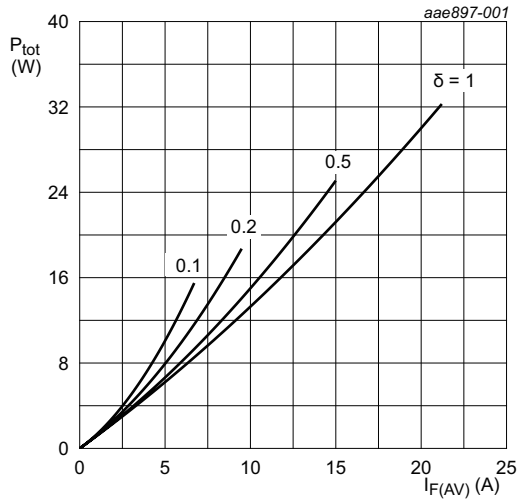
Type number	Package		
	Name	Description	Version
BYV415J-600P	TO3PF	Plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 3-lead TO-3P 'full pack'	TO3PF

7. Limiting values

Table 5. Limiting values

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

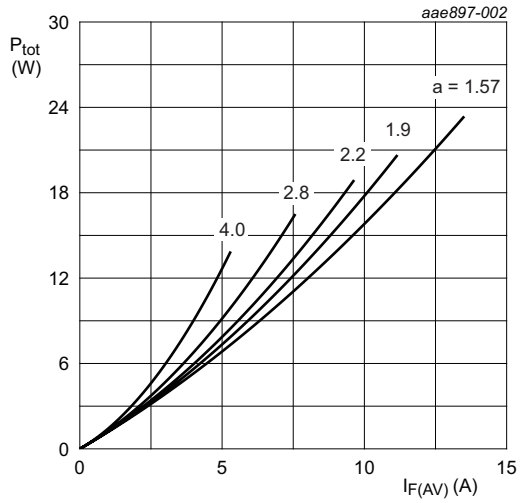
Symbol	Parameter	Conditions	Values	Unit
V_{RRM}	repetitive peak reverse voltage		600	V
V_{RWM}	crest working reverse voltage		600	V
V_R	reverse voltage	DC	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_h \leq 100$ °C; square-wave pulse; per diode; Fig. 1; Fig. 2; Fig. 3	15	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25$ µs; $T_h \leq 100$ °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
T_{stg}	storage temperature		-65 to 175	°C
T_j	junction temperature		175	°C



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

$V_o = 1.156$ V; $R_s = 0.0172$ Ω

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



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

$V_o = 1.156$ V; $R_s = 0.0172$ Ω

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

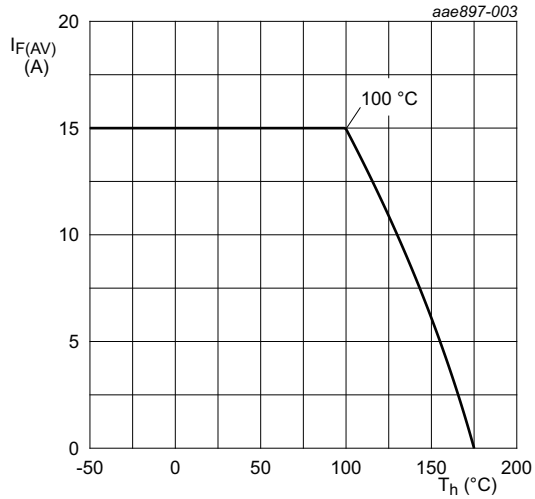


Fig. 3. Average forward current as a function of heatsink temperature; maximum values; per diode

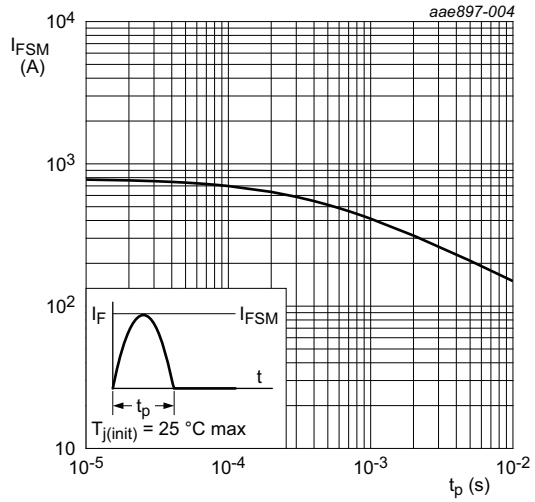


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values; per diode

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; Fig. 5		-	-	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

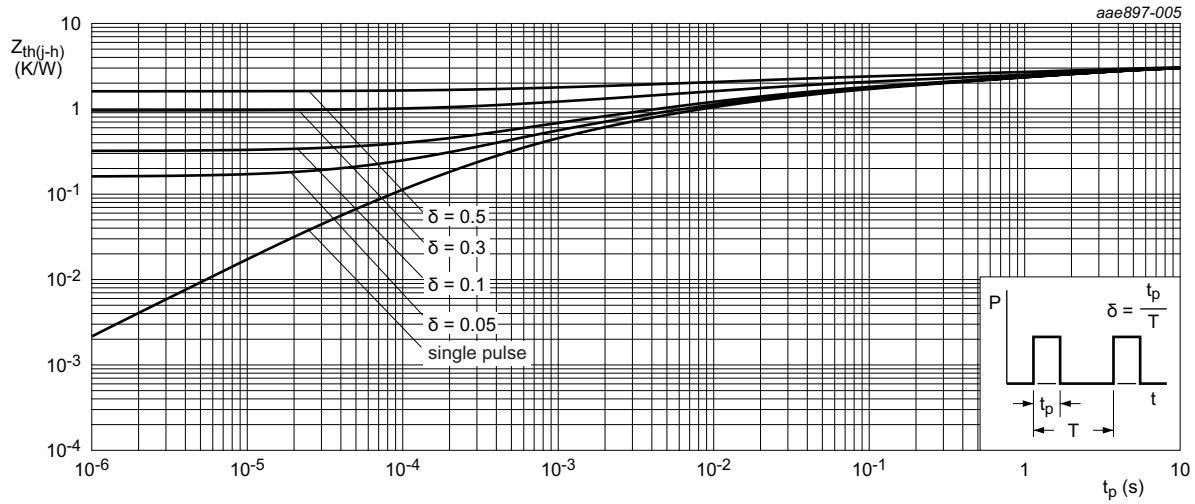


Fig. 5. Transient thermal impedance from junction to heatsink as a function of pulse duration; maximum values; per diode

9. Isolation characteristics

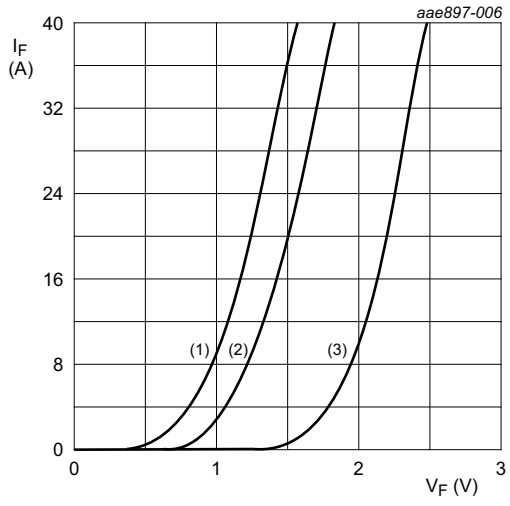
Table 7. Isolation characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	50 Hz ≤ f ≤ 60 Hz; RH ≤ 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 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
I_R	reverse current	V_R = 600 V; T_j = 25 °C; per diode		-	-	10	µA
		V_R = 600 V; T_j = 150 °C; per diode		-	-	500	µA
Dynamic characteristics							
t_{rr}	reverse recovery time	I_F = 1 A; V_R = 30 V; dI_F/dt = 100 A/µs; T_j = 25 °C; per diode; Fig. 7		-	25	50	ns
		I_F = 15 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 25 °C; per diode; Fig. 7		-	45	-	ns
		I_F = 15 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 125 °C; per diode; Fig. 7		-	65	-	ns
		I_F = 15 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 25 °C; per diode; Fig. 7		-	34	-	ns
I_{RM}	peak reverse recovery current	I_F = 15 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 25 °C; per diode; Fig. 7		-	5.5	-	A
		I_F = 15 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 125 °C; per diode; Fig. 7		-	9.7	-	A
Q_r	recovered charge	I_F = 15 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 25 °C; per diode; Fig. 7		-	125	-	nC
		I_F = 15 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 125 °C; per diode; Fig. 7		-	318	-	nC



(1) T_j = 150 °C; typical values
(2) T_j = 150 °C; maximum values
(3) T_j = 25 °C; maximum values
V_o = 1.156 V; R_s = 0.0172 Ω

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

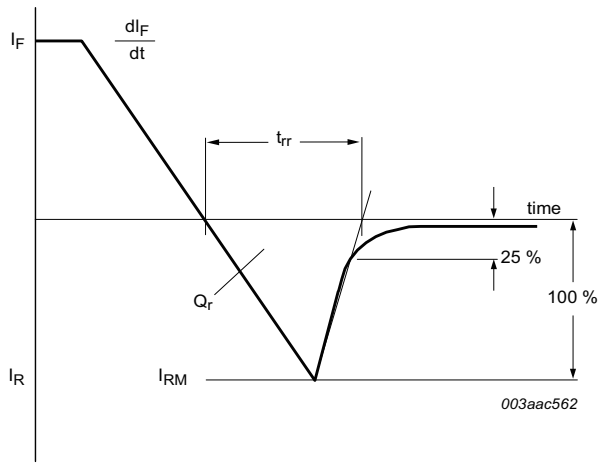
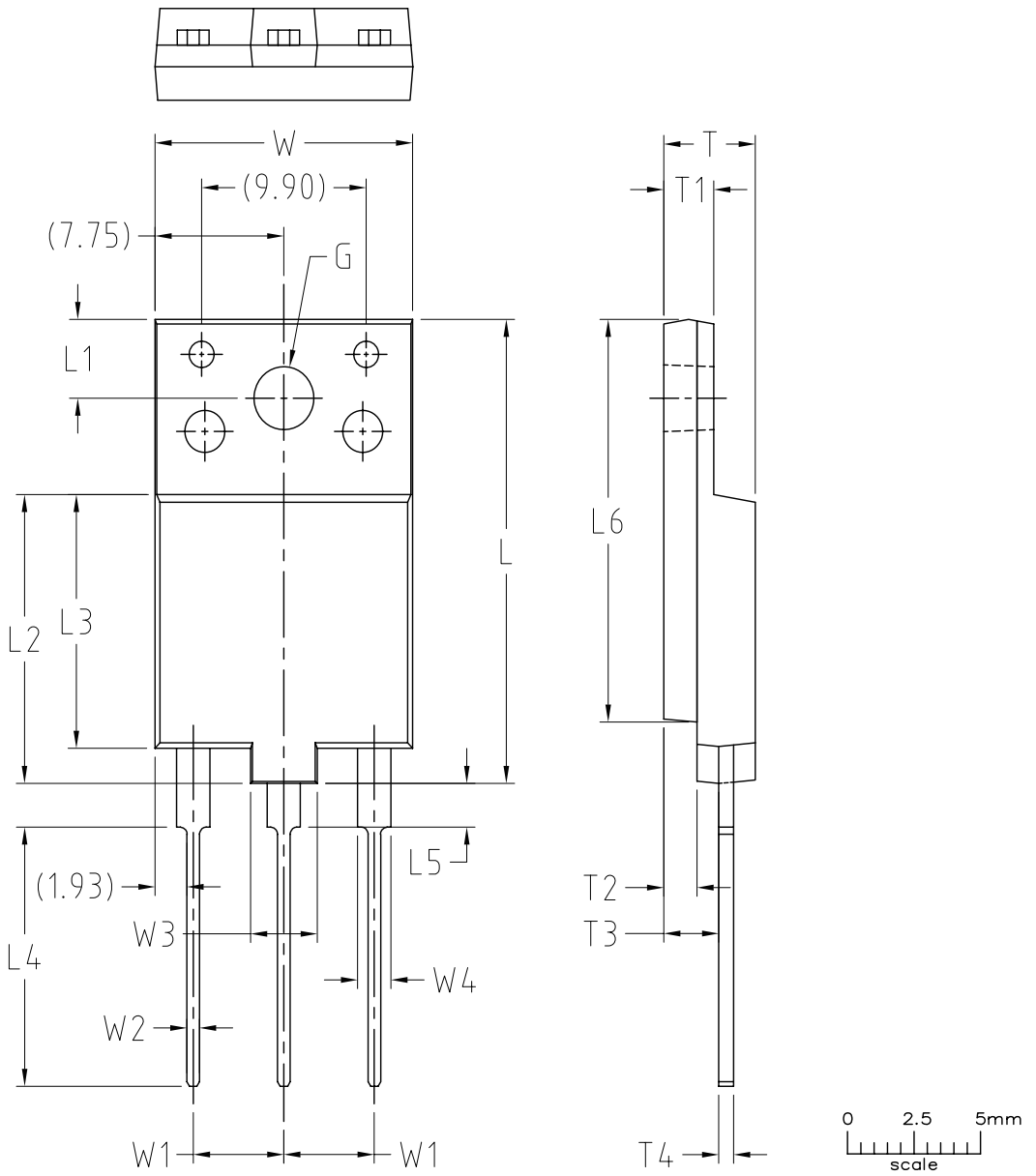


Fig. 7. Reverse recovery definitions; ramp recovery

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 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				

12. 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.
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