

## 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

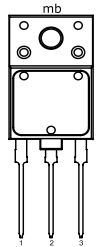
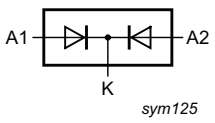
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values			Unit
<b>Absolute maximum rating</b>						
$V_R$	repetitive peak reverse voltage	DC	600			V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; $T_h \leq 96$ °C; square-wave pulse; per diode; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	15			A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25$ $\mu$ s; $T_h \leq 96$ °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; <a href="#">Fig. 4</a>	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
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 15$ A; $T_j = 25$ °C; per diode; <a href="#">Fig. 6</a>	-	1.8	2.1	V
		$I_F = 15$ A; $T_j = 150$ °C; per diode; <a href="#">Fig. 6</a>	-	1.3	1.6	V
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $di_F/dt = 100$ A/ $\mu$ s; $T_j = 25$ °C; per diode <a href="#">Fig. 7</a>	-	25	50	ns
		$I_F = 15$ A; $V_R = 400$ V; $di_F/dt = 200$ A/ $\mu$ s; $T_j = 25$ °C; per diode <a href="#">Fig. 7</a>	-	69	-	ns
		$I_F = 15$ A; $V_R = 400$ V; $di_F/dt = 200$ A/ $\mu$ s; $T_j = 125$ °C; per diode <a href="#">Fig. 7</a>	-	100	-	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	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
BYV415J-600P	TO3PF	BYV415J-600PQ	Tube	30	SOT1293	16-Mar-2006

## 7. Marking

**Table 4. Marking codes**

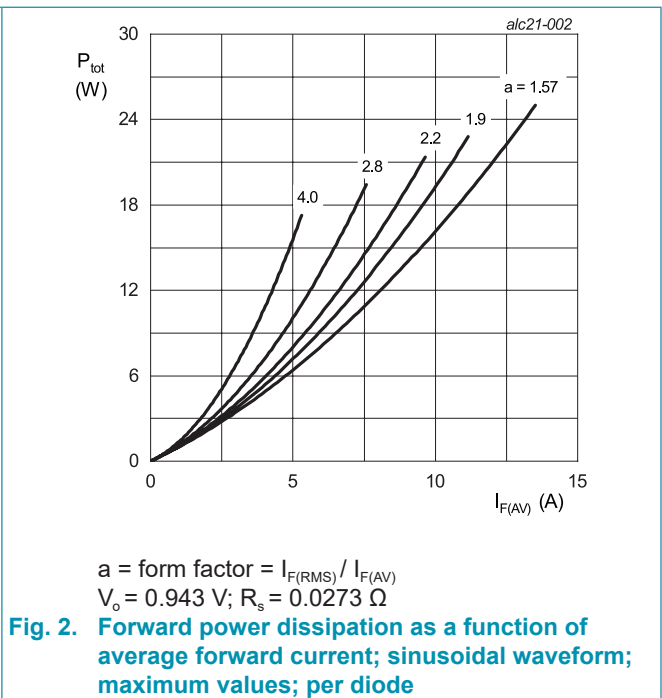
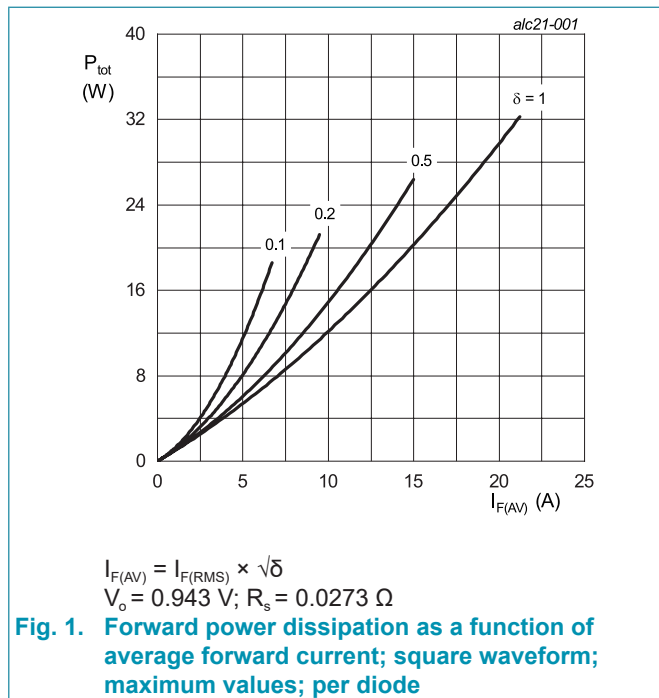
Type number	Marking codes
BYV415J-600P	BYV415J-600P

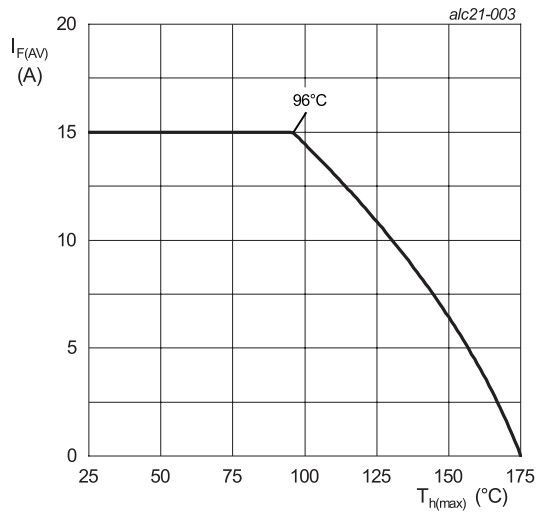
## 8. Limiting values

**Table 5. Limiting values**

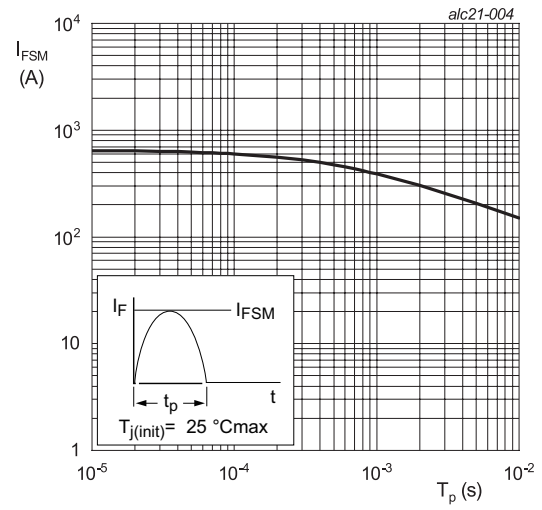
In accordance with the Absolute Maximum Rating System (IEC 60134).

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	$\delta = 0.5$ ; $T_h \leq 96\text{ }^\circ\text{C}$ ; square-wave pulse; per diode; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	15	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_h \leq 96\text{ }^\circ\text{C}$ ; 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; <a href="#">Fig. 4</a>	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	$^\circ\text{C}$





**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**

### 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; per diode; <a href="#">Fig. 5</a>	-	-	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	-	35	-	K/W

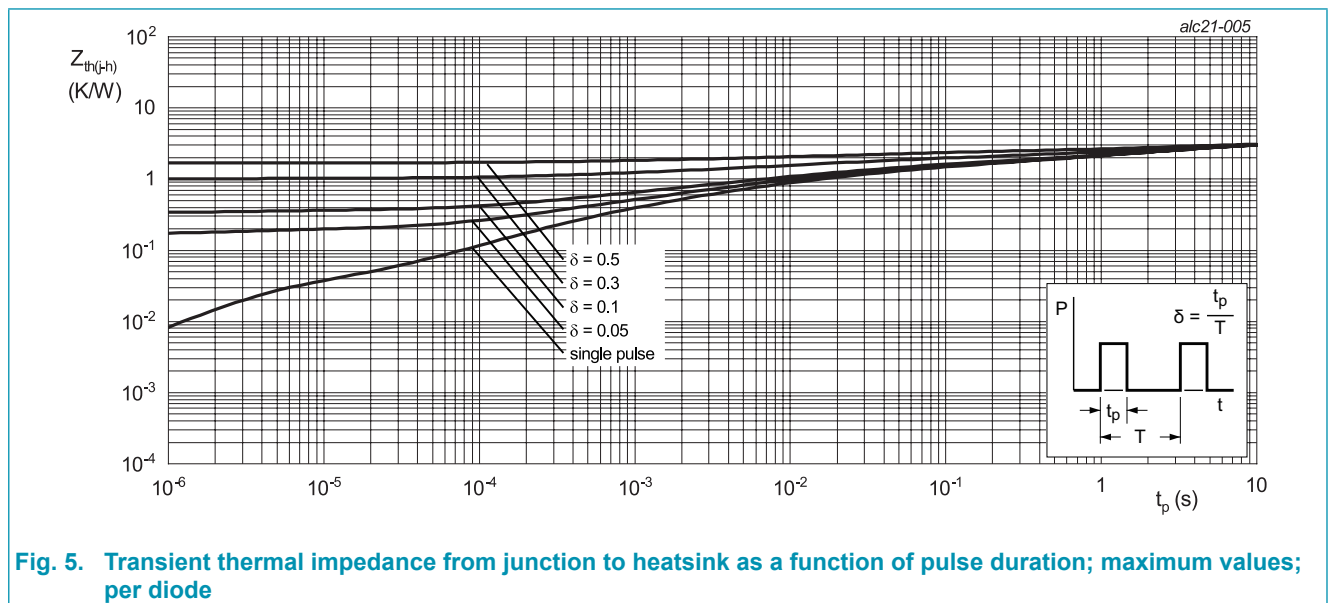


Fig. 5. Transient thermal impedance from junction to heatsink as a function of pulse duration; maximum values; per diode

### 10. Isolation characteristics

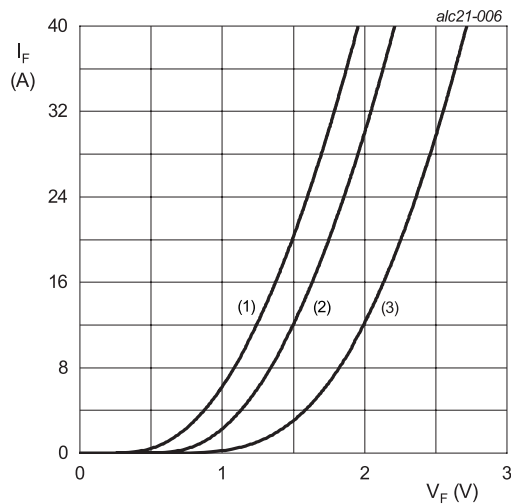
Table 7. Isolation characteristics

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	from cathode to external heatsink	-	10	-	pF

### 11. Characteristics

Table 8. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 15 A; T <sub>J</sub> = 25 °C; per diode; <a href="#">Fig. 6</a>	-	1.8	2.1	V
		I <sub>F</sub> = 15 A; T <sub>J</sub> = 150 °C; per diode; <a href="#">Fig. 6</a>	-	1.3	1.6	V
I <sub>R</sub>	reverse current	V <sub>R</sub> = 600 V; per diode; T <sub>J</sub> = 25 °C	-	-	10	µA
		V <sub>R</sub> = 600 V; per diode; T <sub>J</sub> = 150 °C	-	-	500	µA
<b>Dynamic characteristics</b>						
t <sub>rr</sub>	reverse recovery time	I <sub>F</sub> = 1 A; V <sub>R</sub> = 30 V; dI <sub>F</sub> /dt = 100 A/µs; T <sub>J</sub> = 25 °C; per diode; <a href="#">Fig. 7</a>	-	25	50	ns
		I <sub>F</sub> = 15 A; V <sub>R</sub> = 400 V; dI <sub>F</sub> /dt = 200 A/µs; T <sub>J</sub> = 25 °C; per diode; <a href="#">Fig. 7</a>	-	69	-	ns
		I <sub>F</sub> = 15 A; V <sub>R</sub> = 400 V; dI <sub>F</sub> /dt = 200 A/µs; T <sub>J</sub> = 125 °C; per diode; <a href="#">Fig. 7</a>	-	100	-	ns
I <sub>RM</sub>	peak reverse recovery current	I <sub>F</sub> = 15 A; V <sub>R</sub> = 400 V; dI <sub>F</sub> /dt = 200 A/µs; T <sub>J</sub> = 25 °C; per diode; <a href="#">Fig. 7</a>	-	3.5	-	A
		I <sub>F</sub> = 15 A; V <sub>R</sub> = 400 V; dI <sub>F</sub> /dt = 200 A/µs; T <sub>J</sub> = 125 °C; per diode; <a href="#">Fig. 7</a>	-	7.6	-	A
Q <sub>r</sub>	recovered charge	I <sub>F</sub> = 15 A; V <sub>R</sub> = 400 V; dI <sub>F</sub> /dt = 200 A/µs; T <sub>J</sub> = 25 °C; per diode; <a href="#">Fig. 7</a>	-	120	-	nC
		I <sub>F</sub> = 15 A; V <sub>R</sub> = 400 V; dI <sub>F</sub> /dt = 200 A/µs; T <sub>J</sub> = 125 °C; per diode; <a href="#">Fig. 7</a>	-	380	-	nC



(1) T<sub>J</sub> = 150 °C; typical values  
 (2) T<sub>J</sub> = 150 °C; maximum values  
 (3) T<sub>J</sub> = 25 °C; maximum values  
 V<sub>0</sub> = 0.943 V; R<sub>s</sub> = 0.0273 Ω

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

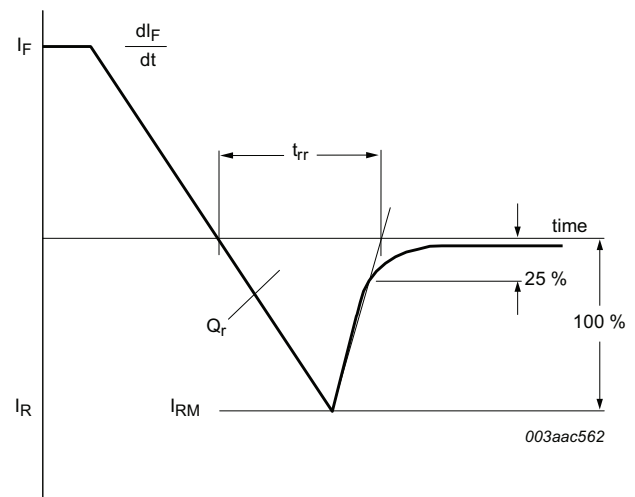
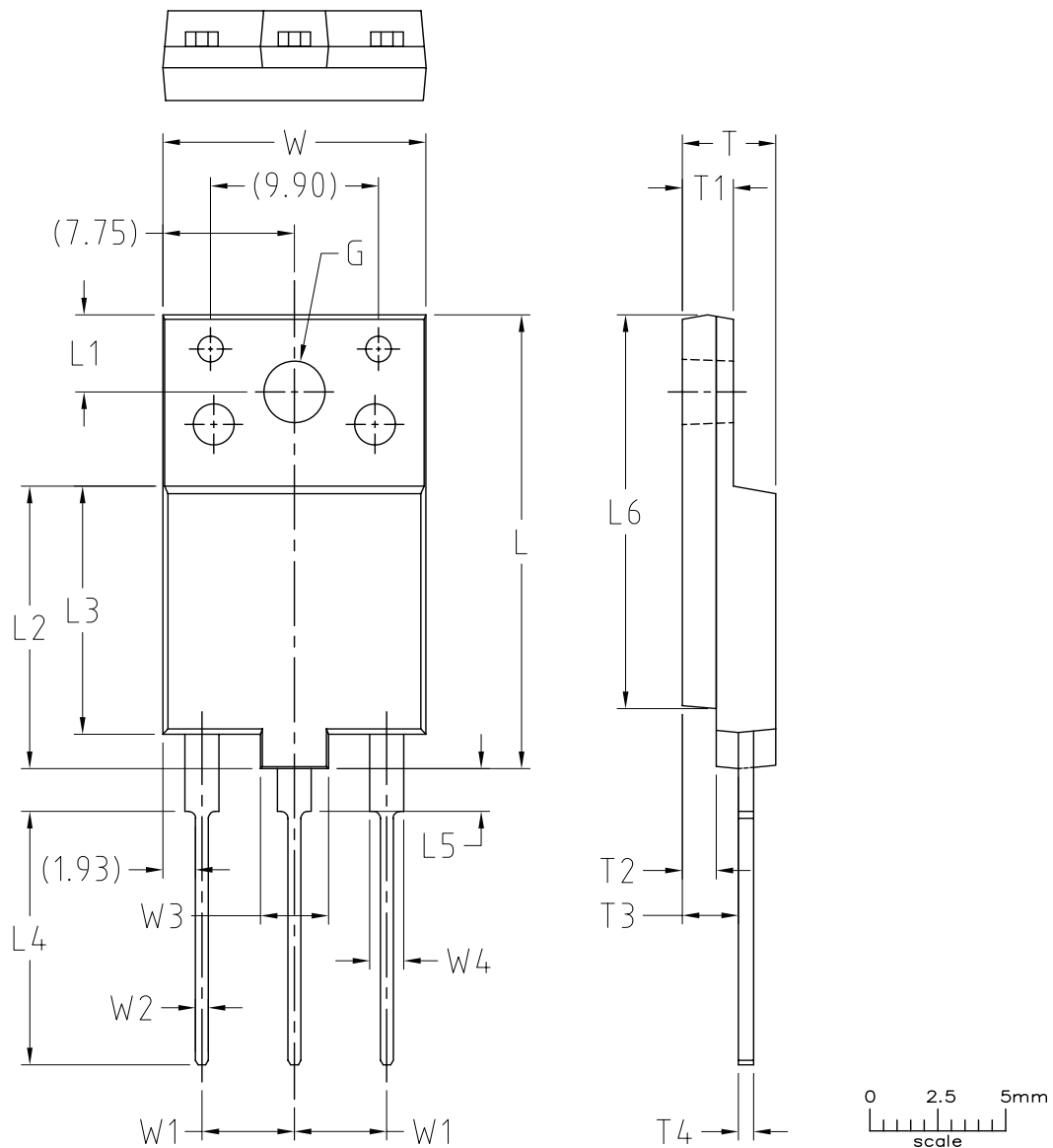


Fig. 7. Reverse recovery definitions; ramp recovery

### 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 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			

## 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.
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