



# BYV34-400

## Dual ultrafast power diode

4 June 2014

Product data sheet

### 1. General description

Dual ultrafast power diode in a SOT78 (TO-220AB) plastic package.

### 2. Features and benefits

- Soft recovery characteristic minimizes power consuming oscillations
- Very low on-state losses
- Fast switching
- High thermal cycling performance
- Low thermal resistance
- Low forward voltage drop

### 3. Applications

- Output rectifiers in high-frequency switched-mode power supplies

### 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{RRM}$	repetitive peak reverse voltage		-	-	400	V
$I_{O(AV)}$	average output current	SQW; $\delta = 0.5$ ; $T_{mb} \leq 115$ °C; both diodes conducting; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a>	-	-	20	A
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 10$ A; $T_j = 150$ °C; <a href="#">Fig. 4</a>	-	0.87	1.05	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; <a href="#">Fig. 7</a> ; <a href="#">Fig. 6</a>	-	50	60	ns

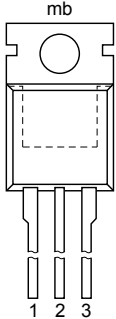
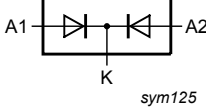


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## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode 1	 <p><b>TO-220AB (SOT78)</b></p>	
2	K	cathode		
3	A2	anode 2		

## 6. Ordering information

Table 3. Ordering information

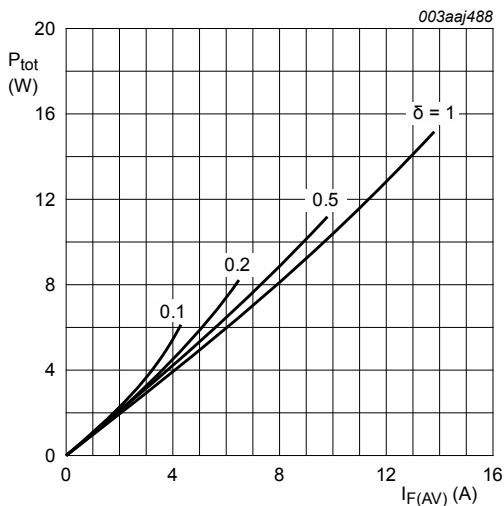
Type number	Package		
	Name	Description	Version
BYV34-400	TO-220AB	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78

## 7. Limiting values

**Table 4. Limiting values**

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

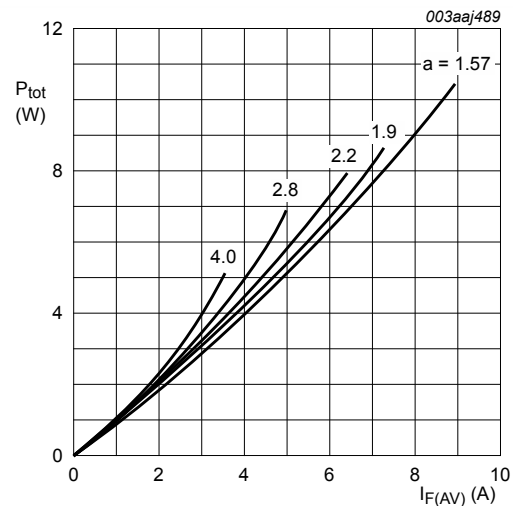
Symbol	Parameter	Conditions	Min	Max	Unit
$V_{RRM}$	repetitive peak reverse voltage		-	400	V
$V_{RWM}$	crest working reverse voltage		-	400	V
$V_R$	reverse voltage	$T_{mb} \leq 138\text{ °C}$ ; DC	-	400	V
$I_{O(AV)}$	average output current	SQW; $\delta = 0.5$ ; $T_{mb} \leq 115\text{ °C}$ ; both diodes conducting; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a>	-	20	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_{mb} \leq 115\text{ °C}$ ; per diode	-	20	A
$I_{FSM}$	non-repetitive peak forward current	SIN; $t_p = 10\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ °C}$ ; per diode	-	120	A
		SIN; $t_p = 8.3\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ °C}$ ; per diode	-	132	A
$T_{stg}$	storage temperature		-40	150	°C
$T_j$	junction temperature		-	150	°C



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

$$V_o = 0.94\text{ V}; R_s = 0.01\text{ }\Omega$$

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



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

$$V_o = 0.94\text{ V}; R_s = 0.01\text{ }\Omega$$

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

### 8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	with heatsink compound; per diode; <a href="#">Fig. 3</a>	-	-	2.4	K/W
		with heatsink compound; both diodes conducting	-	-	1.6	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient		-	60	-	K/W

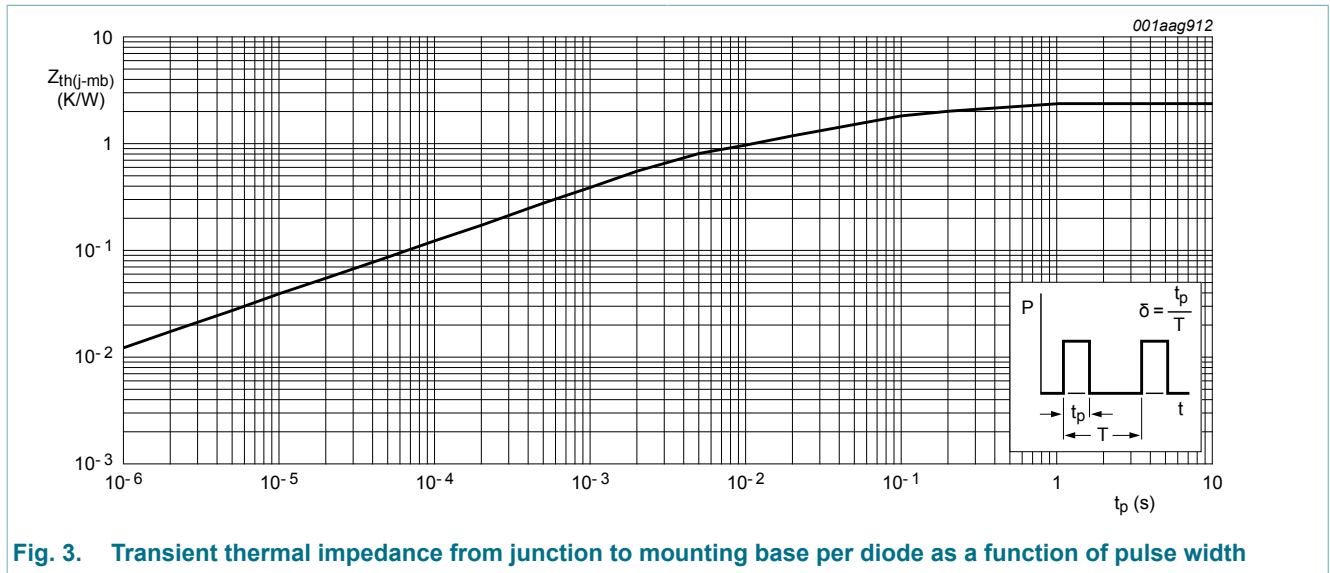
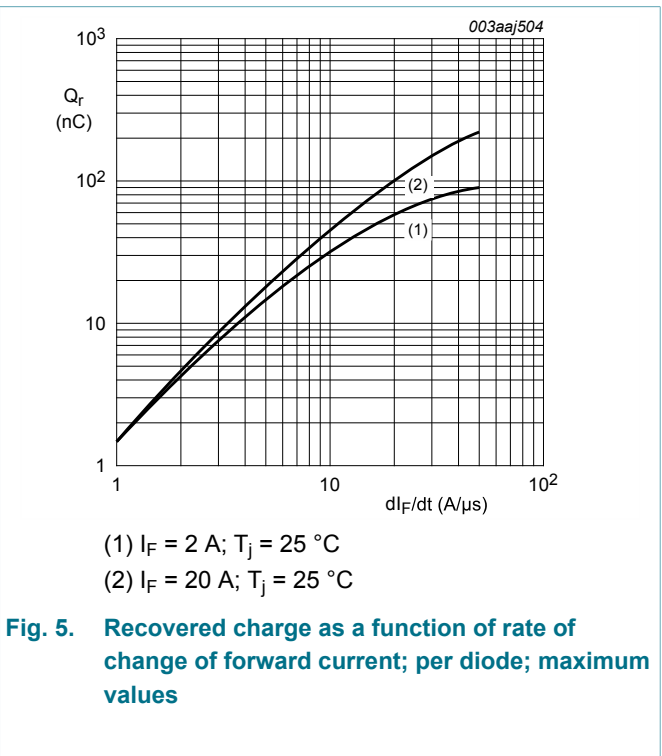
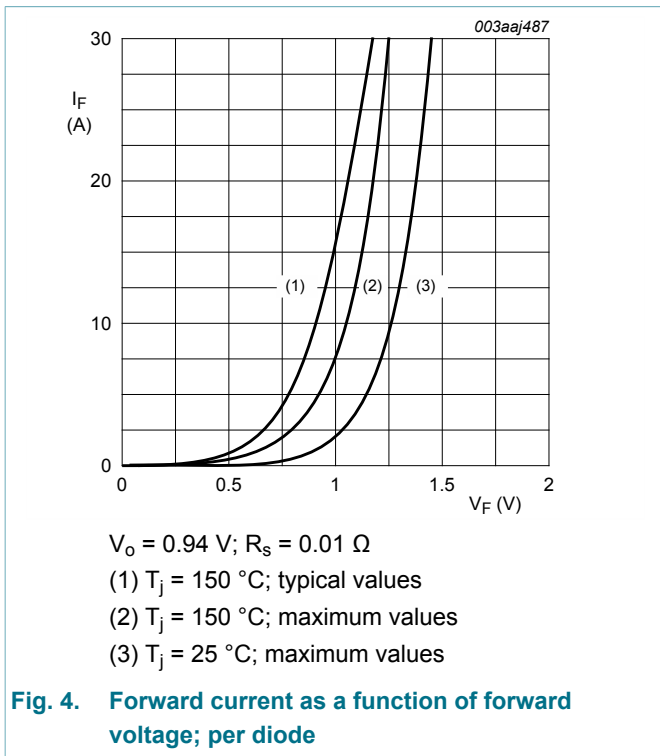


Fig. 3. Transient thermal impedance from junction to mounting base per diode as a function of pulse width

## 9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 20\text{ A}; T_j = 25\text{ }^\circ\text{C};$ Fig. 4	-	1.1	1.35	V
		$I_F = 10\text{ A}; T_j = 150\text{ }^\circ\text{C};$ Fig. 4	-	0.87	1.05	V
$I_R$	reverse current	$V_R = 400\text{ V}; T_j = 25\text{ }^\circ\text{C}$	-	10	50	$\mu\text{A}$
		$V_R = 400\text{ V}; T_j = 100\text{ }^\circ\text{C}$	-	0.2	0.6	mA
<b>Dynamic characteristics</b>						
$Q_r$	recovered charge	$I_F = 2\text{ A}; V_R = 30\text{ V}; dI_F/dt = 20\text{ A}/\mu\text{s};$ Fig. 5; Fig. 6	-	50	50	nC
$t_{rr}$	reverse recovery time	$I_F = 1\text{ A}; V_R = 30\text{ V}; dI_F/dt = 100\text{ A}/\mu\text{s};$ $T_j = 25\text{ }^\circ\text{C};$ Fig. 7; Fig. 6	-	50	60	ns
$I_{RM}$	peak reverse recovery current	$I_F = 10\text{ A}; V_R = 30\text{ V}; dI_F/dt = 50\text{ A}/\mu\text{s};$ $T_j = 100\text{ }^\circ\text{C};$ Fig. 8; Fig. 6	-	4	5	A
$V_{FRM}$	forward recovery voltage	$I_F = 10\text{ A}; dI_F/dt = 10\text{ A}/\mu\text{s}; T_j = 25\text{ }^\circ\text{C};$ Fig. 9	-	2.5	-	V



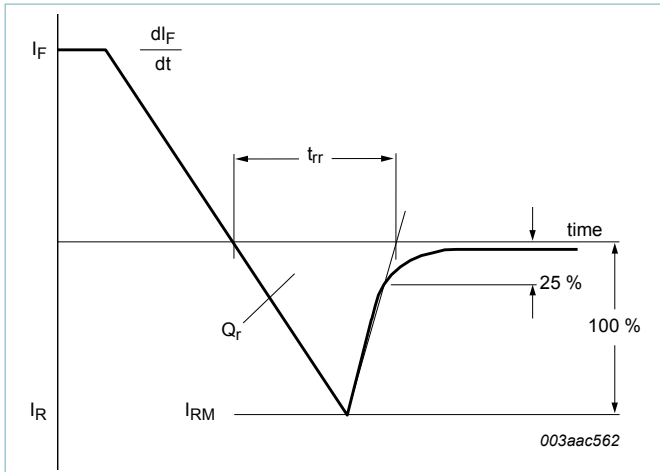
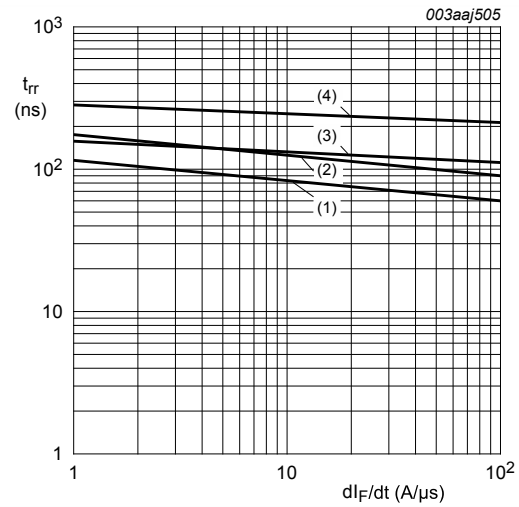
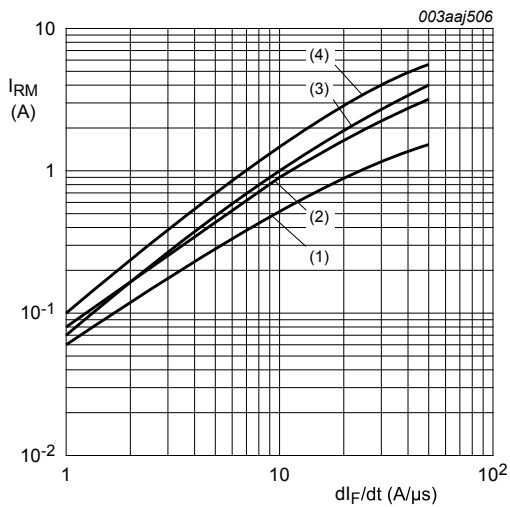


Fig. 6. Reverse recovery definitions; ramp recovery



- (1)  $I_F = 1 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$
- (2)  $I_F = 1 \text{ A}; T_j = 100 \text{ }^\circ\text{C}$
- (3)  $I_F = 20 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$
- (4)  $I_F = 20 \text{ A}; T_j = 100 \text{ }^\circ\text{C}$

Fig. 7. Reverse recovery time as a function of rate of change of forward current; per diode; maximum values



- (1)  $I_F = 1 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$
- (2)  $I_F = 1 \text{ A}; T_j = 100 \text{ }^\circ\text{C}$
- (3)  $I_F = 20 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$
- (4)  $I_F = 20 \text{ A}; T_j = 100 \text{ }^\circ\text{C}$

Fig. 8. Peak reverse recovery current as a function of rate of change of forward current; per diode; maximum values

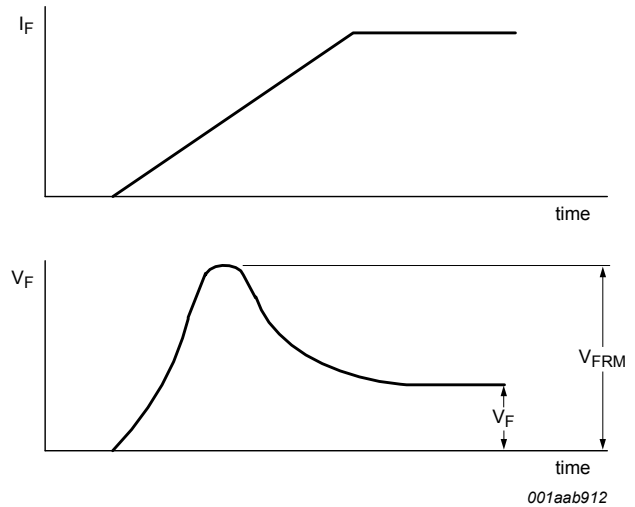
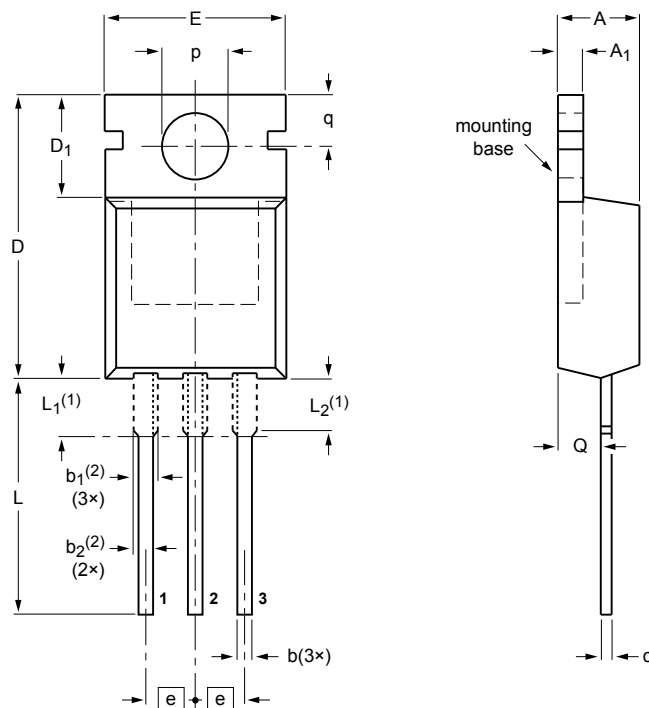


Fig. 9. Forward recovery definitions

### 10. Package outline

Plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB

SOT78



DIMENSIONS (mm are the original dimensions)

UNIT	A	A <sub>1</sub>	b	b <sub>1</sub> (2)	b <sub>2</sub> (2)	c	D	D <sub>1</sub>	E	e	L	L <sub>1</sub> (1)	L <sub>2</sub> (1) max.	p	q	Q
mm	4.7 4.1	1.40 1.25	0.9 0.6	1.6 1.0	1.3 1.0	0.7 0.4	16.0 15.2	6.6 5.9	10.3 9.7	2.54	15.0 12.8	3.30 2.79	3.0	3.8 3.5	3.0 2.7	2.6 2.2

**Notes**

- Lead shoulder designs may vary.
- Dimension includes excess dambar.

OUTLINE VERSION	REFERENCES			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
SOT78		3-lead TO-220AB	SC-46		08-04-23 08-06-13

Fig. 10. Package outline TO-220AB (SOT78)

## 11. Legal information

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Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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