



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; Fig. 1 ; Fig. 2	-	-	20	A
Static characteristics						
V_F	forward voltage	$I_F = 10$ A; $T_j = 150$ °C; Fig. 4	-	0.87	1.05	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 ; Fig. 6	-	50	60	ns

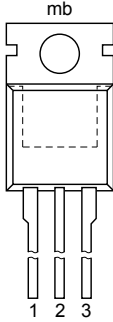
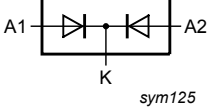


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5. Pinning information

Table 2. Pinning information

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

6. Ordering information

Table 3. Ordering information

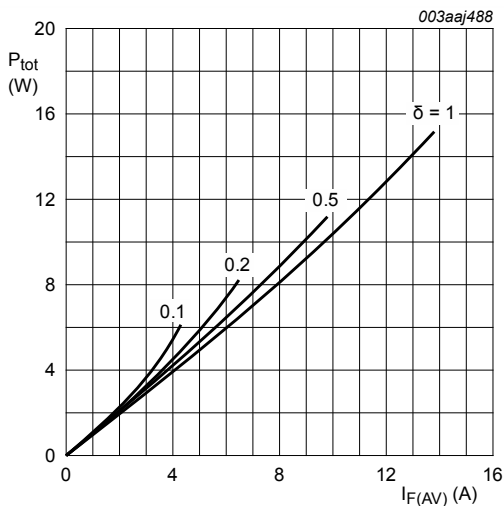
Type number	Package		
	Name	Description	Version
BYV34-400	TO-220AB	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78

7. Limiting values

Table 4. Limiting values

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

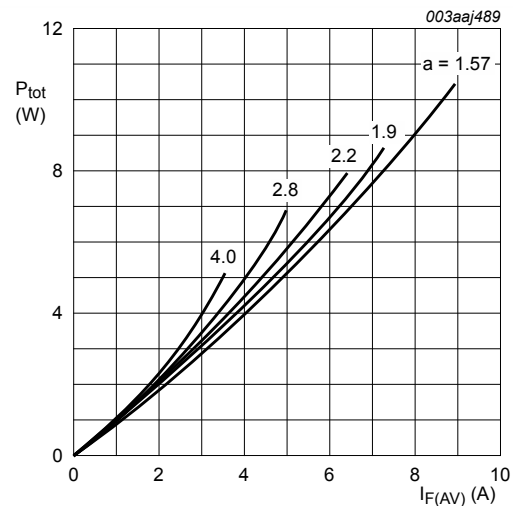
Symbol	Parameter	Conditions	Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	400	V
V_{RWM}	crest working reverse voltage		-	400	V
V_R	reverse voltage	$T_{mb} \leq 138\text{ }^\circ\text{C}$; DC	-	400	V
$I_{O(AV)}$	average output current	SQW; $\delta = 0.5$; $T_{mb} \leq 115\text{ }^\circ\text{C}$;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



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

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

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; Fig. 3	-	-	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

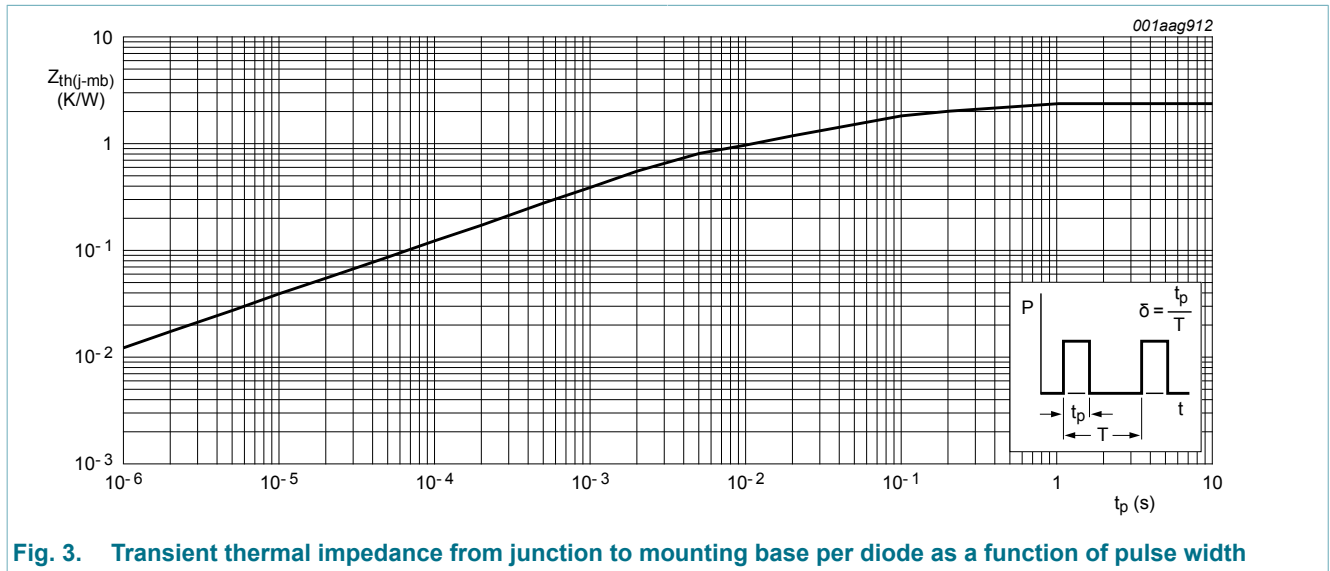
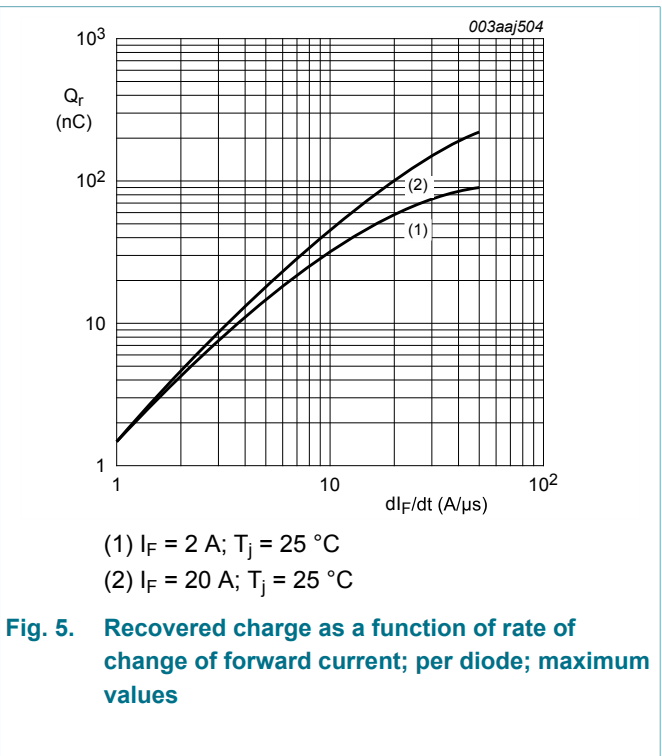
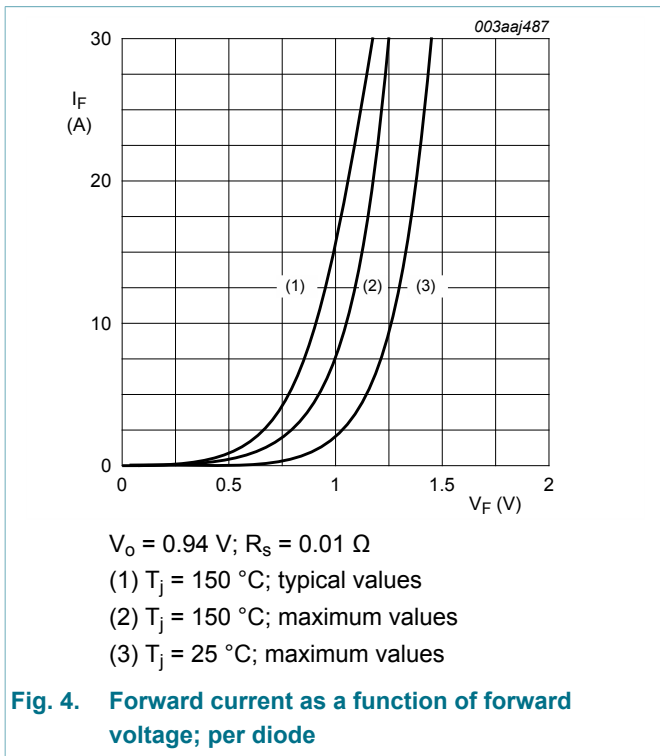


Fig. 3. Transient thermal impedance from junction to mounting base per diode as a function of pulse width

9. Characteristics

Table 6. Characteristics

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



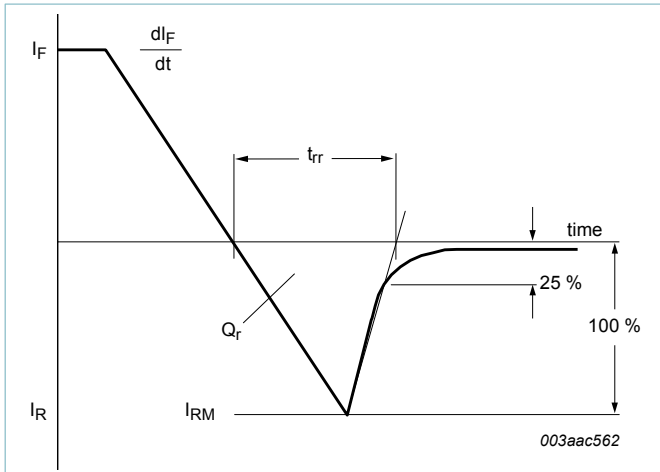
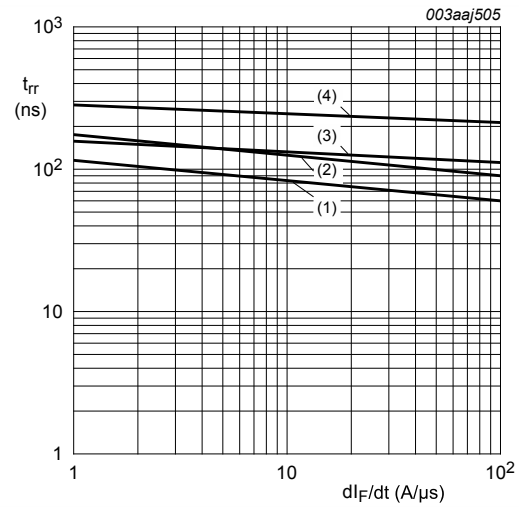
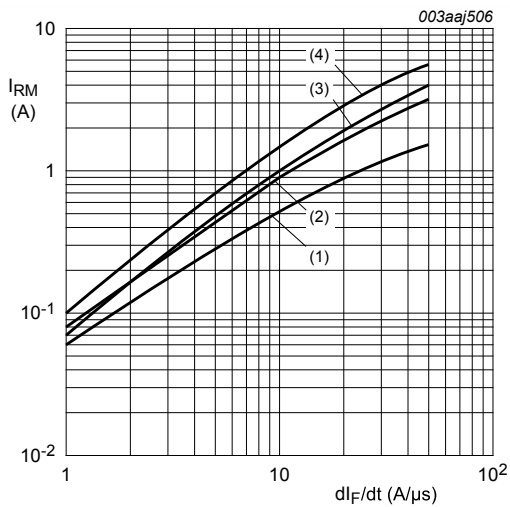


Fig. 6. Reverse recovery definitions; ramp recovery



- (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

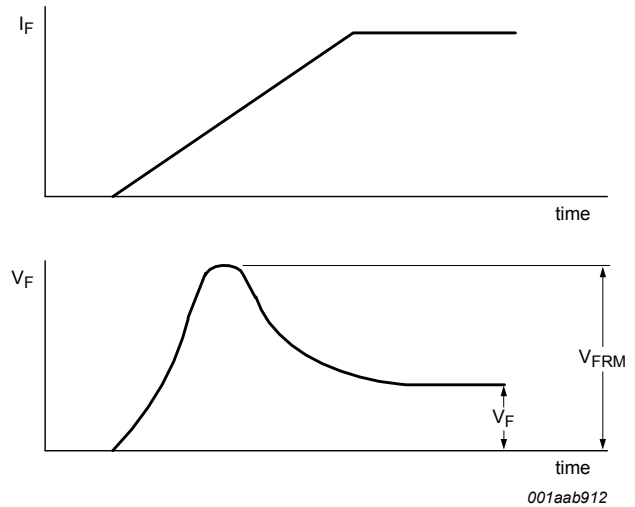
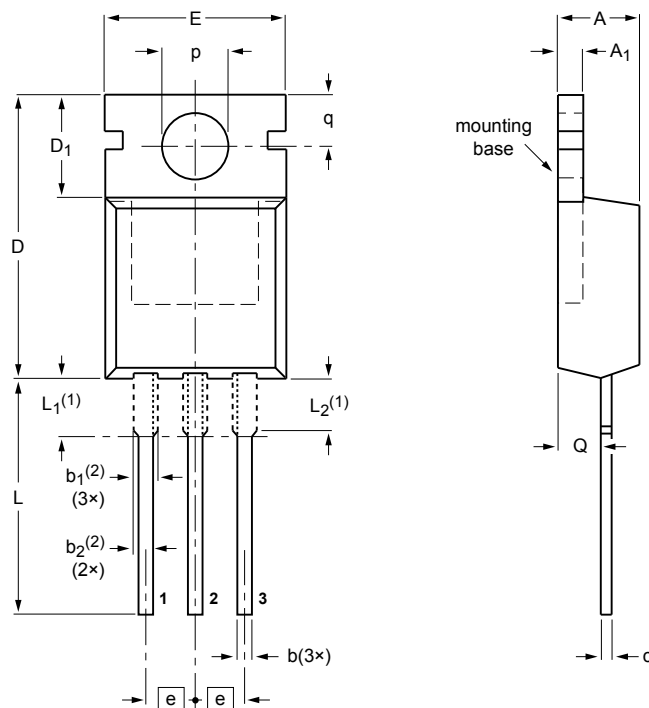


Fig. 9. Forward recovery definitions

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 ₁	b	b ₁ (2)	b ₂ (2)	c	D	D ₁	E	e	L	L ₁ (1)	L ₂ (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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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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