



BYV34-500

Dual ultrafast power diodes

4 June 2014

Product data sheet

1. General description

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

2. Features and benefits

- Fast switching
- High thermal cycling performance
- Low forward voltage drop
- Low switching loss
- Low thermal resistance
- Soft recovery characteristic

3. Applications

- Discontinuous Current Mode (DCM) Power Factor Correction (PFC)
- 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		-	-	500	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. 5	-	50	60	ns

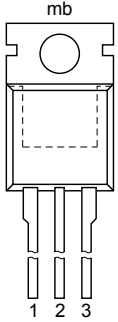
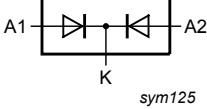


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5. Pinning information

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

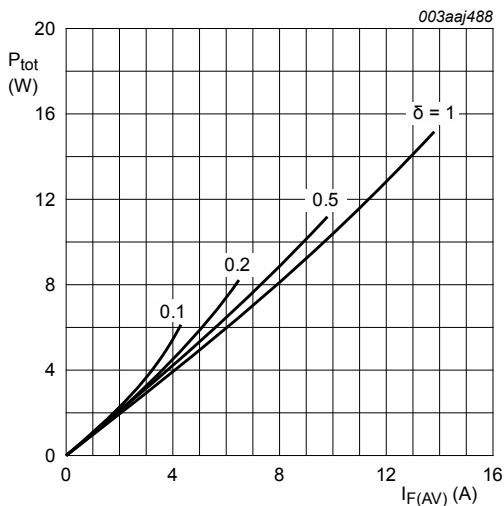
Type number	Package		
	Name	Description	Version
BYV34-500	TO-220AB	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78

7. Limiting values

Table 4. Limiting values

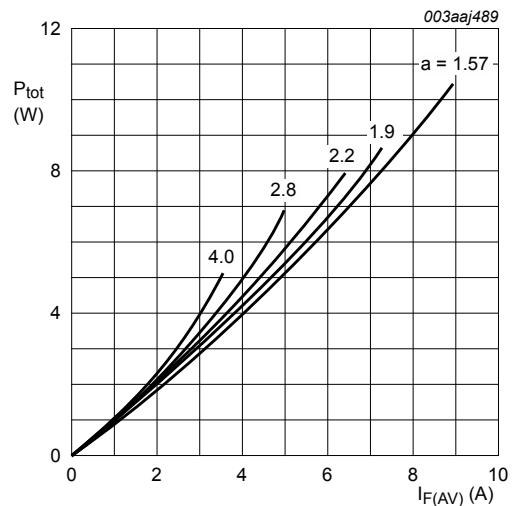
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	500	V
V_{RWM}	crest working reverse voltage		-	500	V
V_R	reverse voltage	$T_{mb} \leq 138\text{ }^\circ\text{C}$; DC	-	500	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	SQW; $\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 115\text{ }^\circ\text{C}$; 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	in free air	-	60	-	K/W

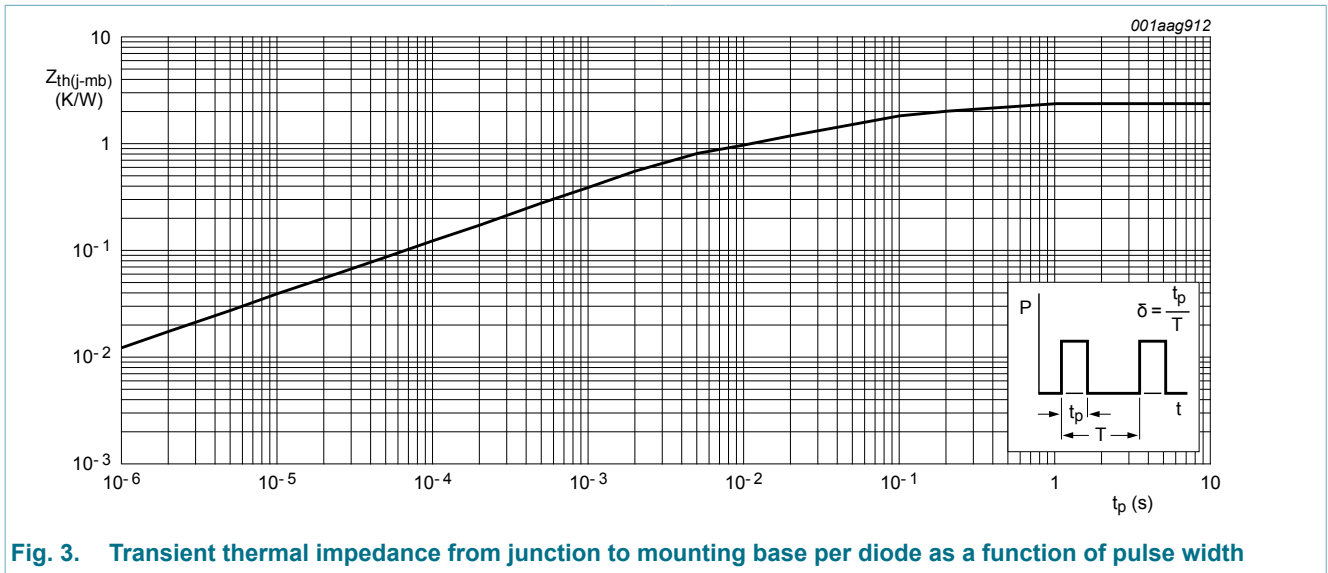
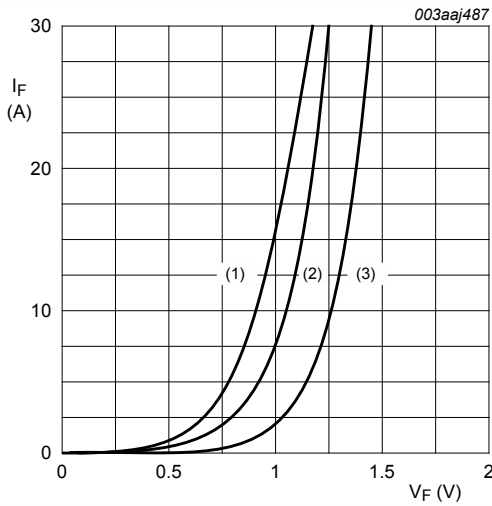


Fig. 3. Transient thermal impedance from junction to mounting base per diode as a function of pulse width

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V _F	forward voltage	I _F = 20 A; T _j = 25 °C; Fig. 4	-	1.1	1.35	V
		I _F = 10 A; T _j = 150 °C; Fig. 4	-	0.87	1.05	V
I _R	reverse current	V _R = 500 V; T _j = 25 °C	-	10	50	μA
		V _R = 500 V; T _j = 100 °C	-	0.2	0.6	mA
Dynamic characteristics						
Q _r	recovered charge	I _F = 2 A; V _R = 30 V; dI _F /dt = 20 A/s; T _j = 25 °C; Fig. 5; Fig. 6	-	50	60	nC
t _{rr}	reverse recovery time	I _F = 1 A; V _R = 30 V; dI _F /dt = 100 A/μs; T _j = 25 °C; Fig. 7; Fig. 5	-	50	60	ns
I _{RM}	peak reverse recovery current	I _F = 10 A; V _R = 30 V; dI _F /dt = 50 A/μs; T _j = 100 °C; Fig. 8; Fig. 5	-	4	5	A
V _{FRM}	forward recovery voltage	I _F = 10 A; dI _F /dt = 10 A/μs; T _j = 25 °C; Fig. 9	-	2.5	-	V



V₀ = 0.94 V; R_s = 0.01 Ω
 (1) T_j = 150 °C; typical values
 (2) T_j = 150 °C; maximum values
 (3) T_j = 25 °C; maximum values

Fig. 4. Forward current as a function of forward voltage; per diode

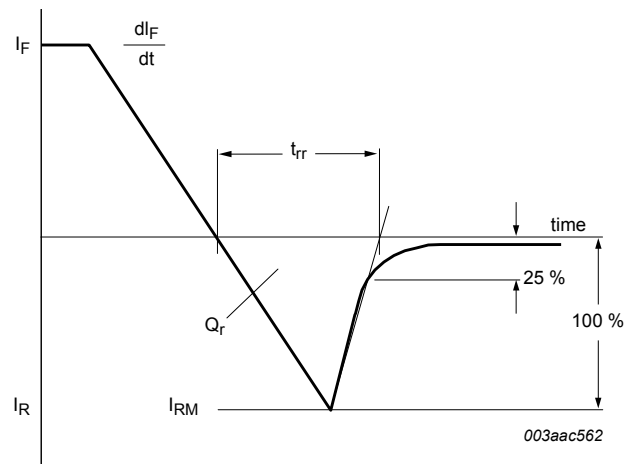
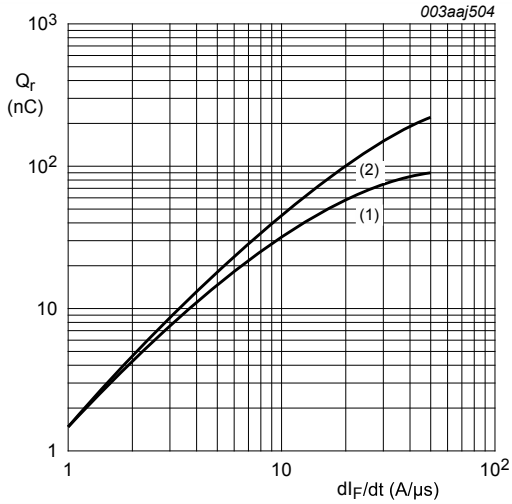
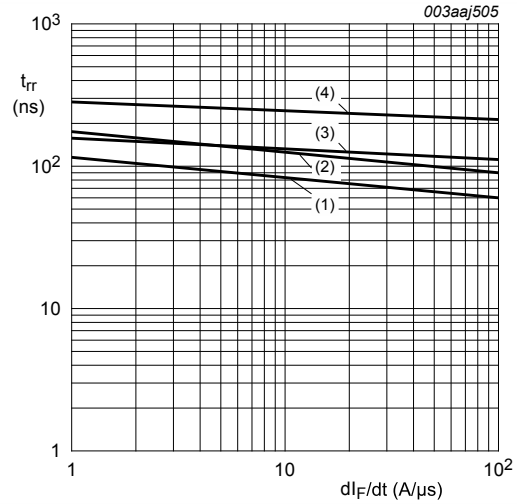


Fig. 5. Reverse recovery definitions; ramp recovery



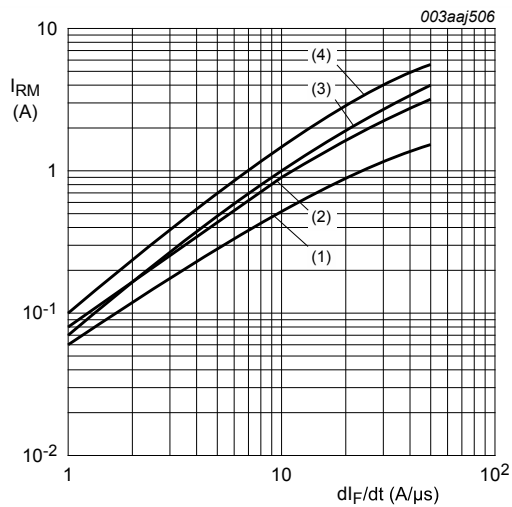
- (1) $I_F = 2 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$
- (2) $I_F = 20 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$

Fig. 6. Recovered charge 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. 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

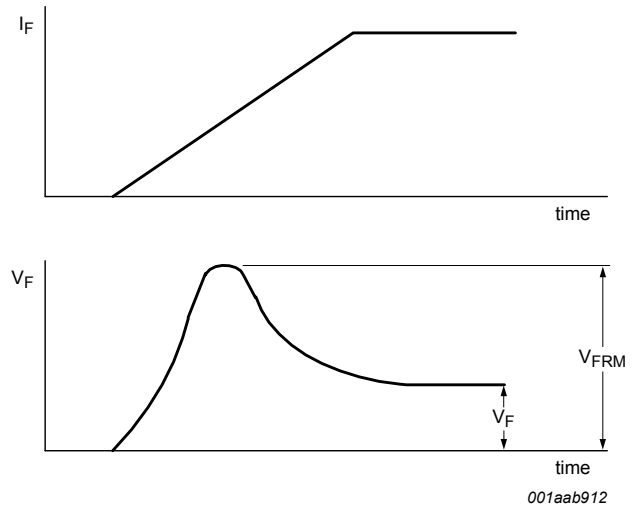
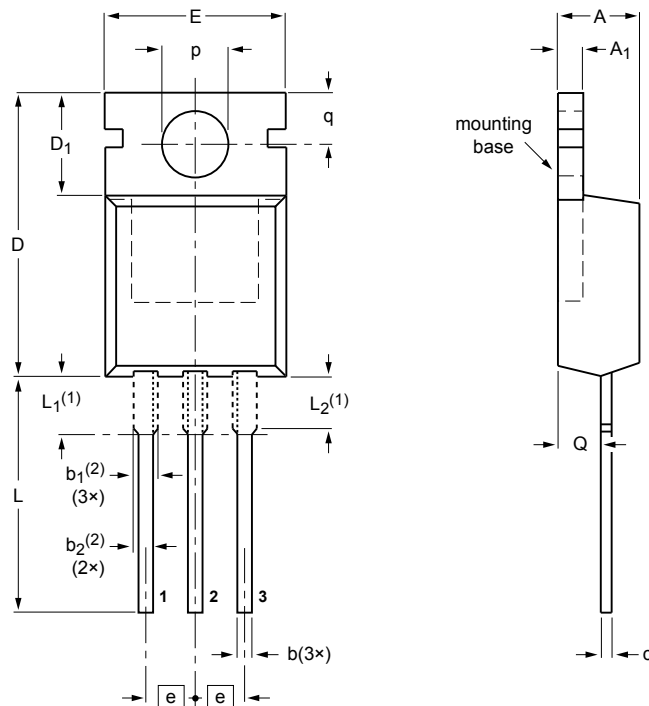


Fig. 9. Forward recovery definitions

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)

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