



BYV34-500

Dual ultrafast power diodes

Rev. 4 — 20 March 2012

Product data sheet

1. Product profile

1.1 General description

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

1.2 Features and benefits

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

1.3 Applications

- Discontinuous Current Mode (DCM)
Power Factor Correction (PFC)
- Output rectifiers in high-frequency
switched-mode power supplies

1.4 Quick reference data

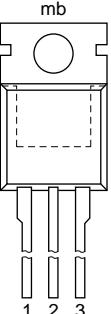
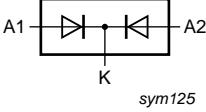
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	-	500	V
$I_{O(AV)}$	average output current	square-wave pulse; $\bar{\delta} = 0.5$; $T_{mb} \leq 115$ °C; both diodes conducting; see Figure 1 ; see Figure 2	-	-	20	A
Static characteristics						
V_F	forward voltage	$I_F = 10$ A; $T_j = 150$ °C; see Figure 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/s; $T_j = 25$ °C; see Figure 6 ; see Figure 7	-	50	60	ns



2. 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	K	mounting base; cathode		

SOT78 (TO-220AB)

3. Ordering information

Table 3. Ordering information

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

4. 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	$T_{mb} \leq 138^\circ\text{C}$; DC	-	500	V
$I_{O(AV)}$	average output current	square-wave pulse; $\delta = 0.5$; $T_{mb} \leq 115^\circ\text{C}$; both diodes conducting; see Figure 1 ; see Figure 2	-	20	A
I_{FRM}	repetitive peak forward current	square-wave pulse; $\delta = 0.5$; $t_p = 25\ \mu\text{s}$; $T_{mb} \leq 115^\circ\text{C}$; per diode	-	20	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\ \text{ms}$; sine-wave pulse; $T_{j(\text{init})} = 25^\circ\text{C}$; per diode	-	120	A
		$t_p = 8.3\ \text{ms}$; sine-wave pulse; $T_{j(\text{init})} = 25^\circ\text{C}$; per diode	-	132	A
T_{stg}	storage temperature		-40	150	°C
T_j	junction temperature		-	150	°C

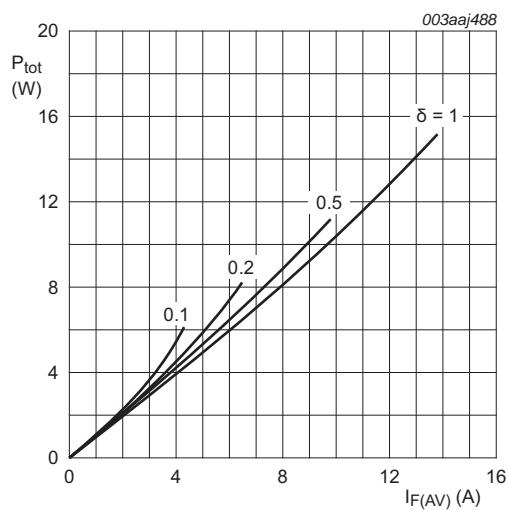


Fig 1. Forward power dissipation as a function of average forward current; square waveform; per diode; maximum values

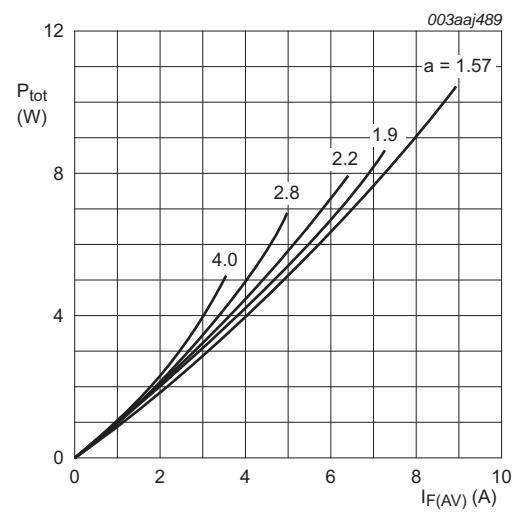


Fig 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; per diode; maximum values

5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j\text{-}mb)}$	thermal resistance from junction to mounting base	with heatsink compound; per diode; see Figure 3	-	-	2.4	K/W
		with heatsink compound; both diodes conducting	-	-	1.6	K/W
$R_{th(j\text{-}a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W

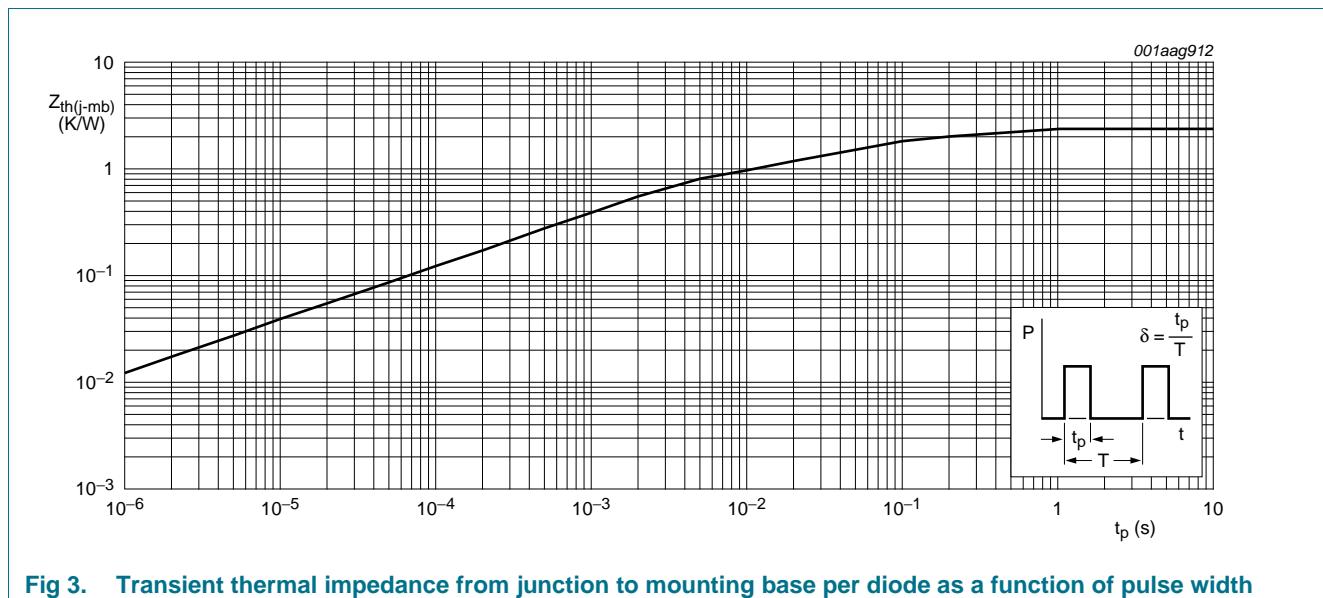
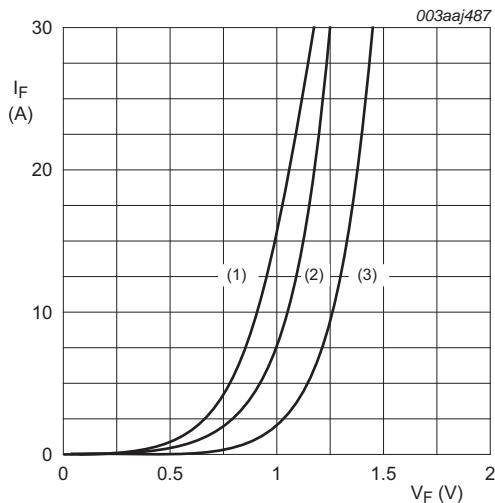


Fig 3. Transient thermal impedance from junction to mounting base per diode as a function of pulse width

6. Characteristics

Table 6. Characteristics

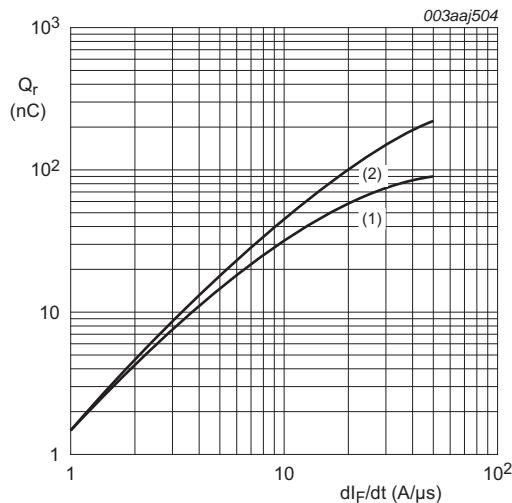
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 20 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$; see Figure 4	-	1.1	1.35	V
		$I_F = 10 \text{ A}; T_j = 150 \text{ }^\circ\text{C}$; see Figure 4	-	0.87	1.05	V
I_R	reverse current	$V_R = 500 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	10	50	μA
		$V_R = 500 \text{ V}; T_j = 100 \text{ }^\circ\text{C}$	-	0.2	0.6	mA
Dynamic characteristics						
Q_r	recovered charge	$I_F = 2 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 20 \text{ A/s}; T_j = 25 \text{ }^\circ\text{C}$; see Figure 5 ; see Figure 6	-	50	60	nC
t_{rr}	reverse recovery time	$I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 100 \text{ A/s}; T_j = 25 \text{ }^\circ\text{C}$; see Figure 6 ; see Figure 7	-	50	60	ns
I_{RM}	peak reverse recovery current	$I_F = 10 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 50 \text{ A/s}; T_j = 100 \text{ }^\circ\text{C}$; see Figure 6 ; see Figure 8	-	4	5	A
V_{FRM}	forward recovery voltage	$I_F = 10 \text{ A}; dI_F/dt = 10 \text{ A/s}; T_j = 25 \text{ }^\circ\text{C}$; see Figure 9	-	2.5	-	V



(1) $T_j = 150 \text{ }^\circ\text{C}$; typical values;
 (2) $T_j = 150 \text{ }^\circ\text{C}$; maximum values;
 (3) $T_j = 25 \text{ }^\circ\text{C}$; maximum values;

$V_O = 0.940 \text{ V}; R_S = 0.010 \Omega$

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



(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 5. Recovered charge as a function of rate of change of forward current; per diode; maximum values

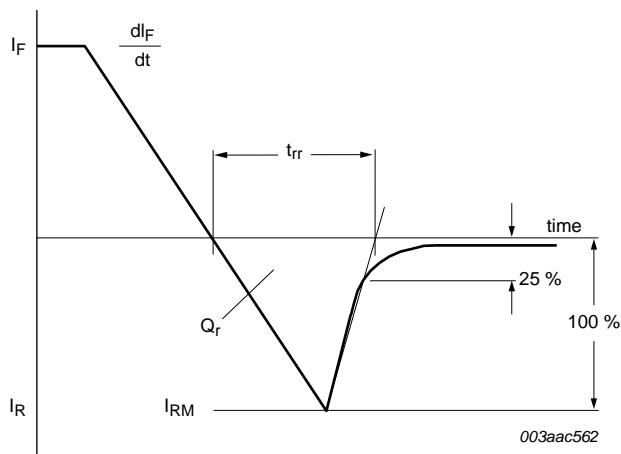


Fig 6. Reverse recovery definitions; ramp recovery

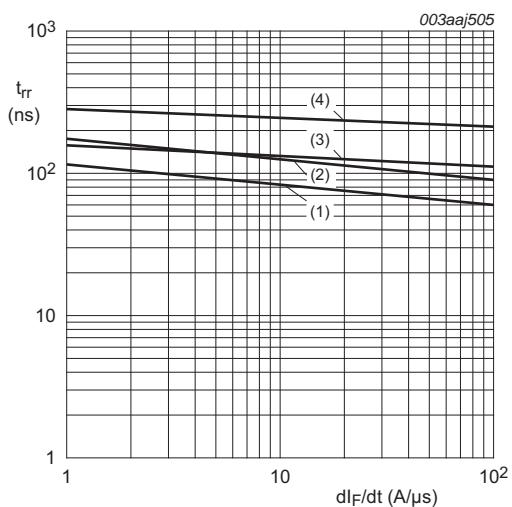
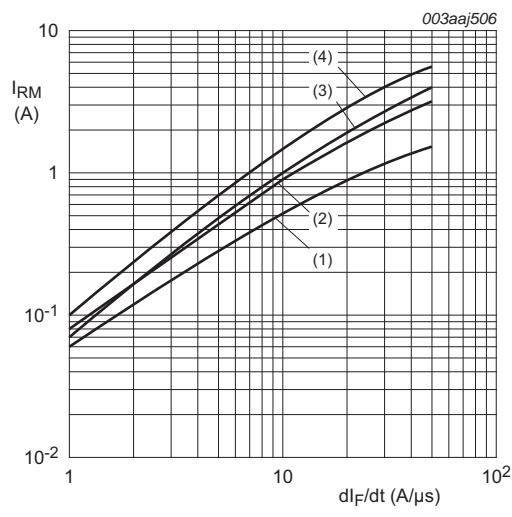


Fig 7. Reverse recovery time as a function of rate of change of forward current; per diode; maximum values



- (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

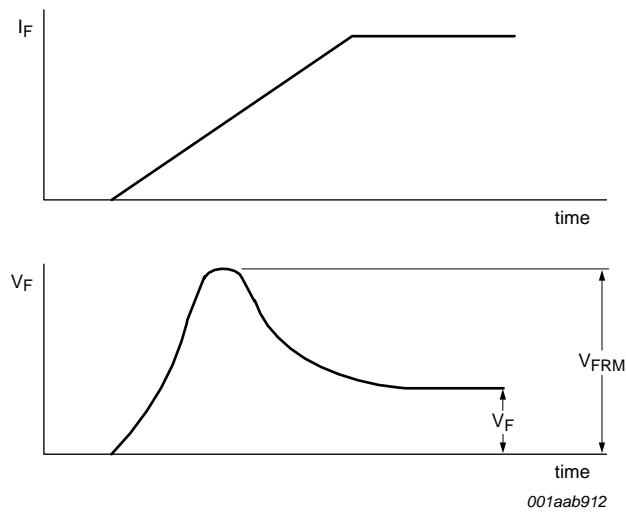
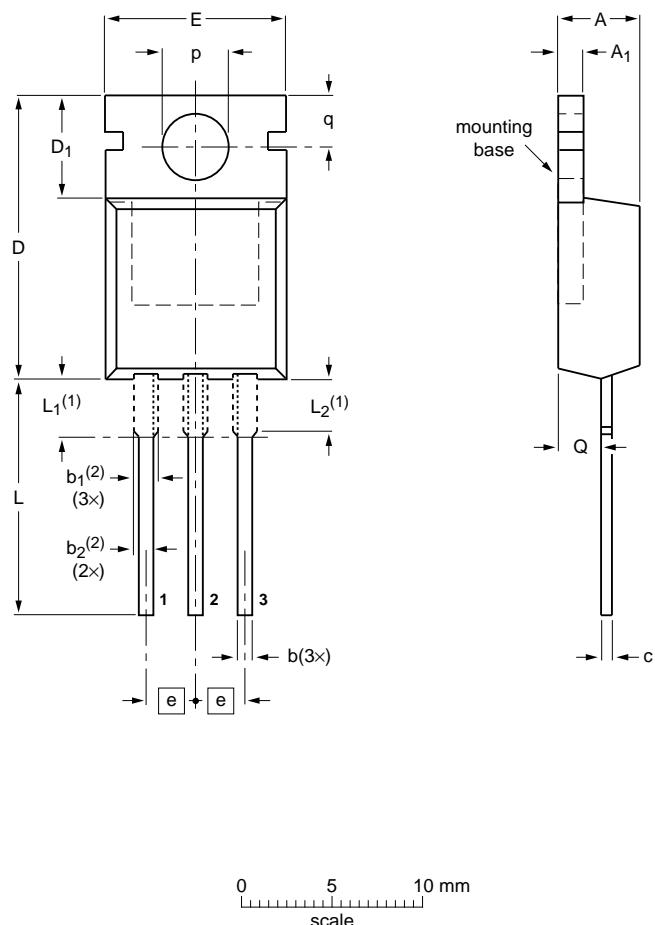


Fig 9. Forward recovery definitions

7. 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	1.40	0.9	1.6	1.3	0.7	16.0	6.6	10.3	2.54	15.0	3.30	3.0	3.8	3.0	2.6
	4.1	1.25	0.6	1.0	1.0	0.4	15.2	5.9	9.7		12.8	2.79	3.0	3.5	2.7	2.2

Notes

1. Lead shoulder designs may vary.
2. 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 SOT78 (TO-220AB)

8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYV34-500 v.4	20120320	Product data sheet	-	BYV34_SERIES v.3
Modifications:	<ul style="list-style-type: none">• The format of this document has been redesigned to comply with the new identity guidelines of NXP Semiconductors.• Legal texts have been adapted to the new company name where appropriate.			
BYV34_SERIES v.3	19981001	Product data sheet	-	BYV34_SERIES v.2

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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.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

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