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

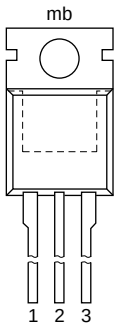
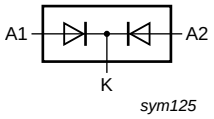
1.4 Quick reference data

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; δ = 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

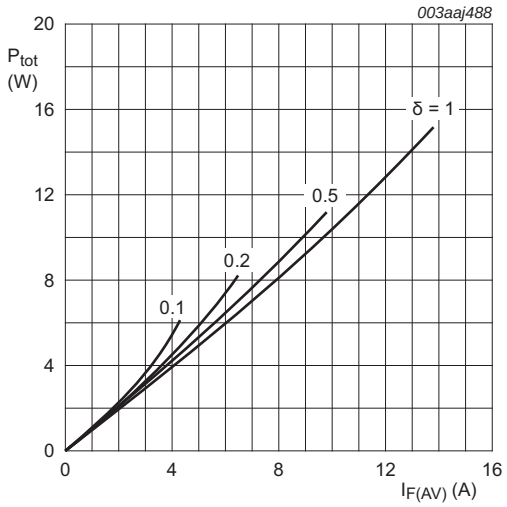
Type number	Package		
	Name	Description	Version
BYV34-500	TO-220AB	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78

4. Limiting values

Table 4. Limiting values

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

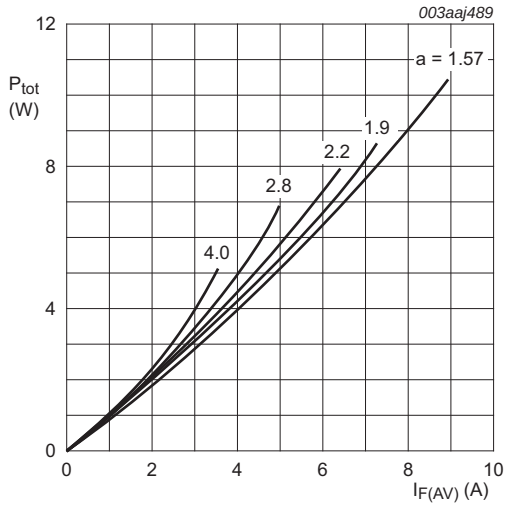
Symbol	Parameter	Conditions	Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	500	V
V_{RWM}	crest working reverse voltage		-	500	V
V_R	reverse voltage	$T_{mb} \leq 138$ °C; DC	-	500	V
$I_{O(AV)}$	average output current	square-wave pulse; $\delta = 0.5$; $T_{mb} \leq 115$ °C; both diodes conducting; see Figure 1; see Figure 2	-	20	A
I_{FRM}	repetitive peak forward current	square-wave pulse; $\delta = 0.5$; $t_p = 25$ µs; $T_{mb} \leq 115$ °C; per diode	-	20	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10$ ms; sine-wave pulse; $T_{j(init)} = 25$ °C; per diode	-	120	A
		$t_p = 8.3$ ms; sine-wave pulse; $T_{j(init)} = 25$ °C; per diode	-	132	A
T_{stg}	storage temperature		-40	150	°C
T_j	junction temperature		-	150	°C



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

$V_O = 0.940\ V;\ R_S = 0.010\ \Omega$

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



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

$V_O = 0.940\ V;\ R_S = 0.010\ \Omega$

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

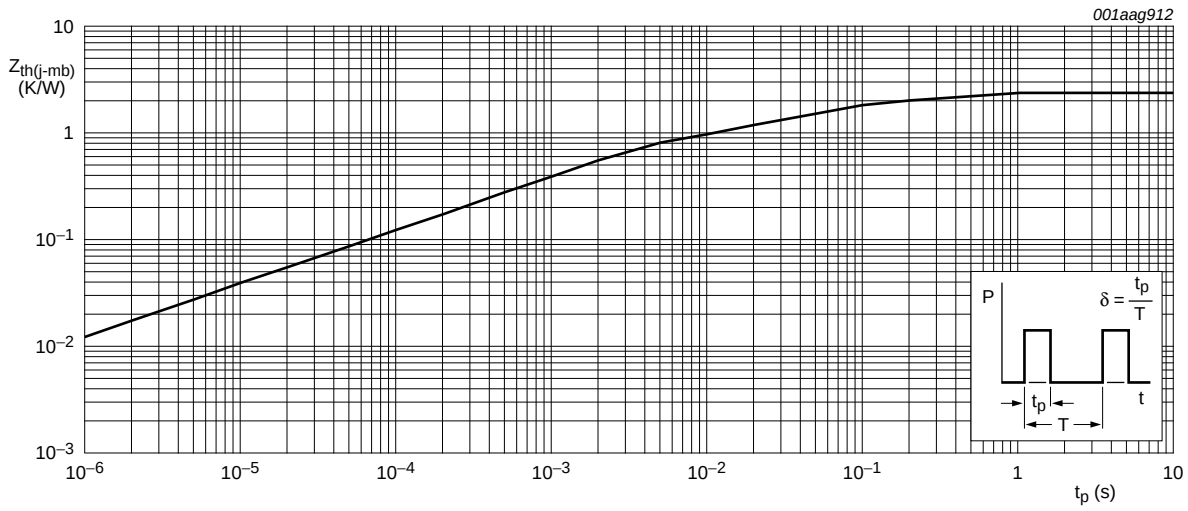
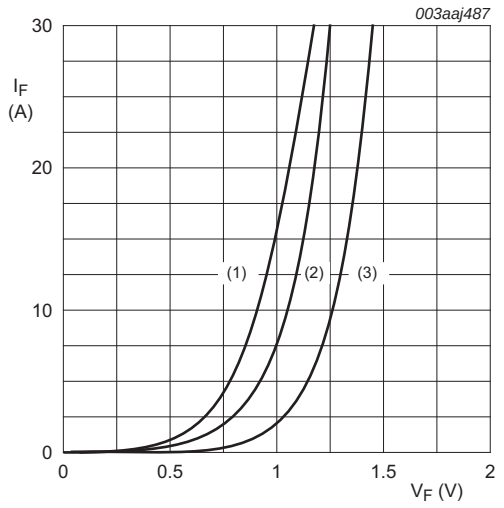


Fig 3. Transient thermal impedance from junction to mounting base per diode as a function of pulse width

6. Characteristics

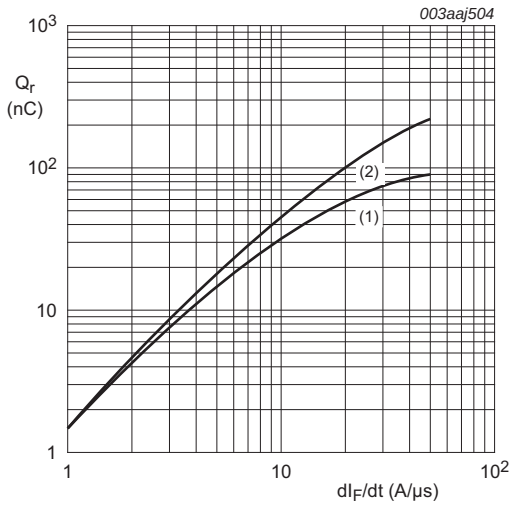
Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	I_F = 20 A; T_j = 25 °C; see Figure 4	-	1.1	1.35	V
		I_F = 10 A; T_j = 150 °C; see Figure 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; see Figure 5; see Figure 6	-	50	60	nC
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
I_{RM}	peak reverse recovery current	I_F = 10 A; V_R = 30 V; dI_F/dt = 50 A/s; T_j = 100 °C; see Figure 6; see Figure 8	-	4	5	A
V_{FRM}	forward recovery voltage	I_F = 10 A; dI_F/dt = 10 A/s; T_j = 25 °C; see Figure 9	-	2.5	-	V



(1) T_j = 150 °C; typical values;
(2) T_j = 150 °C; maximum values;
(3) T_j = 25 °C; maximum values;
V_O = 0.940 V; R_S = 0.010 Ω

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



(1) I_F = 2 A; T_j = 25 °C
(2) I_F = 20 A; T_j = 25 °C

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

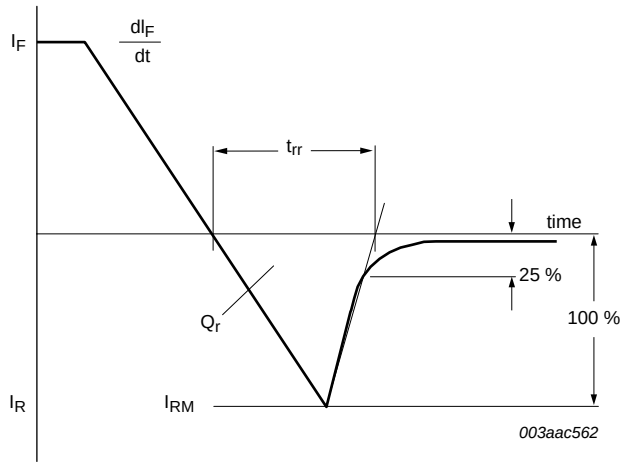
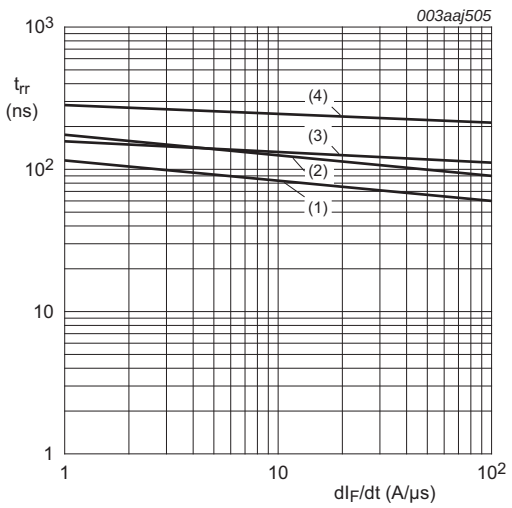
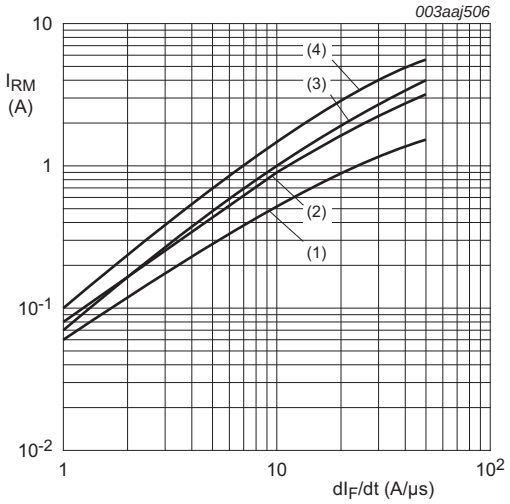


Fig 6. Reverse recovery definitions; ramp recovery



(1) $I_F = 1$ A; $T_j = 25$ °C
(2) $I_F = 1$ A; $T_j = 100$ °C
(3) $I_F = 20$ A; $T_j = 25$ °C
(4) $I_F = 20$ A; $T_j = 100$ °C

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



(1) $I_F = 1$ A; $T_j = 25$ °C
(2) $I_F = 1$ A; $T_j = 100$ °C
(3) $I_F = 20$ A; $T_j = 25$ °C
(4) $I_F = 20$ A; $T_j = 100$ °C

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

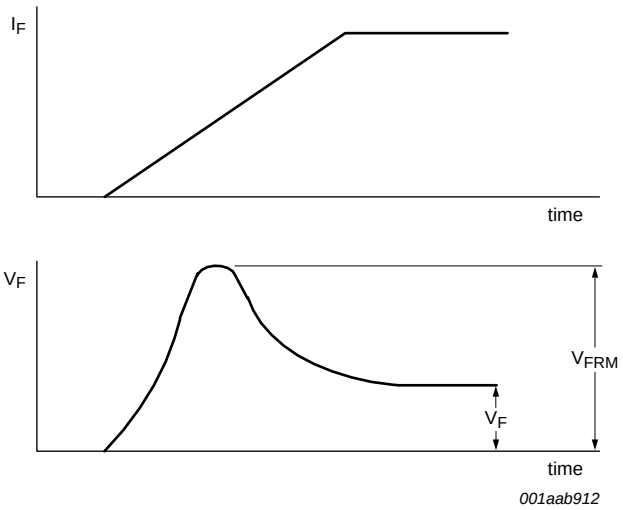
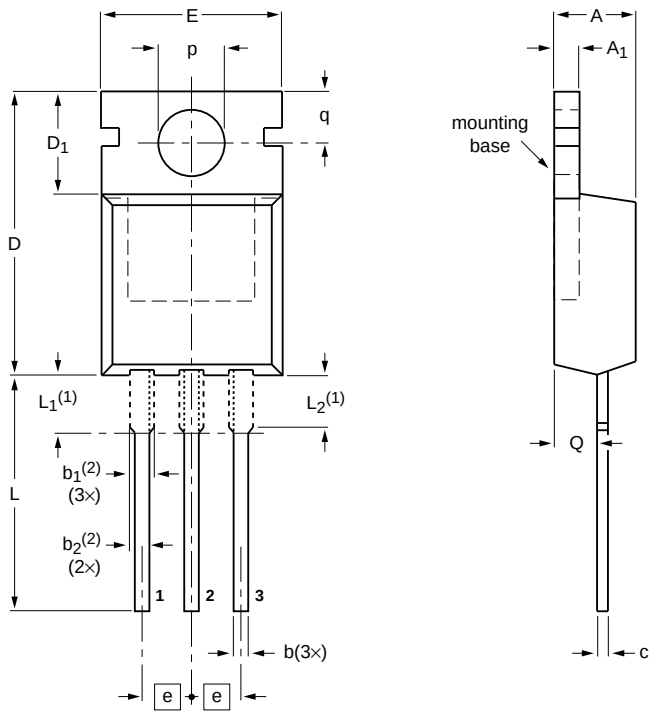


Fig 9. Forward recovery definitions

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 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
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:	• 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

9. Legal information

9.1 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.
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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11. Contents

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