BYV34-500

Dual ultrafast power diode

Rev.01 - 8 June 2018 Product data sheet

1. General description

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

2. Features and benefits

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

3. Applications

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

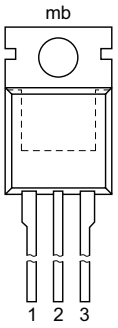
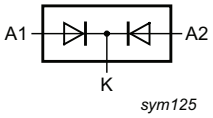
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values				Unit
Absolute maximum rating							
V_{RRM}	repetitive peak reverse voltage		500				V
$I_{O(AV)}$	average output current	SQW; δ = 0.5; $T_{mb} \leq 115$ °C; both diodes conducting; Fig. 1; Fig. 2	20				A
I_{FRM}	repetitive peak forward current	SQW; δ = 0.5 ; t_p = 25 µs; $T_{mb} \leq 115$ °C; per diode	20				A
I_{FSM}	non-repetitive peak forward current	SIN; t_p = 10 ms; $T_{j(init)}$ = 25 °C; per diode	120				A
		SIN; t_p = 8.3 ms; $T_{j(init)}$ = 25 °C; per diode	132				A
Symbol	**Parameter**	**Conditions**		**Min**	**Typ**	**Max**	**Unit**
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/µs; T_j = 25 °C; Fig. 6; Fig. 7		-	50	60	ns

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode 1		
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. Marking

Table 4. Marking codes

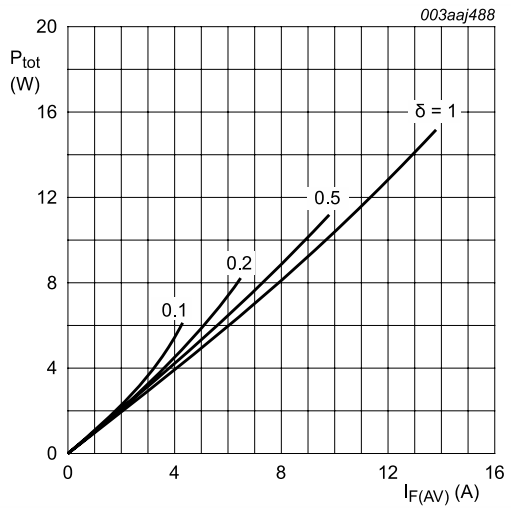
Type number	Marking codes
BYV34-500	BYV34-500

8. Limiting values

Table 5. Limiting values

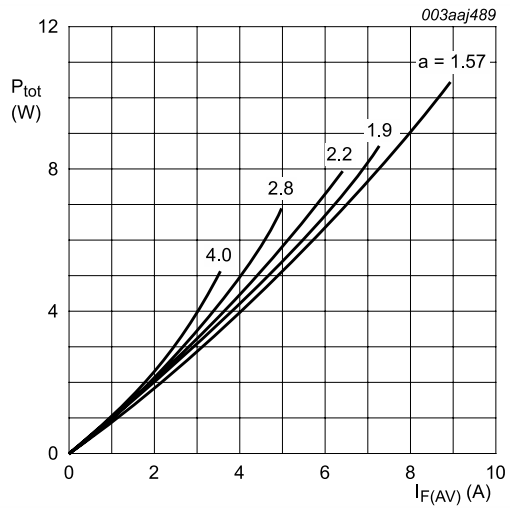
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Values	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	SQW; δ = 0.5; $T_{mb} \leq 115$ °C; both diodes conducting; Fig. 1; Fig. 2	20	A
I_{FRM}	repetitive peak forward current	SQW; δ = 0.5; t_p = 25 µs; $T_{mb} \leq 115$ °C; per diode	20	A
I_{FSM}	non-repetitive peak forward current	SIN; t_p = 10 ms; $T_{j(init)}$ = 25 °C; per diode	120	A
		SIN; t_p = 8.3 ms; $T_{j(init)}$ = 25 °C; per diode	132	A
T_{stg}	storage temperature		-40 to 150	°C
T_j	junction temperature		150	°C



$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$
V_o = 0.94 V; R_s = 0.01 Ω

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



a = form factor = $I_{F(RMS)} / I_{F(AV)}$
V_o = 0.94 V; R_s = 0.01 Ω

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

9. Thermal characteristics

Table 6. Thermal characteristics

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

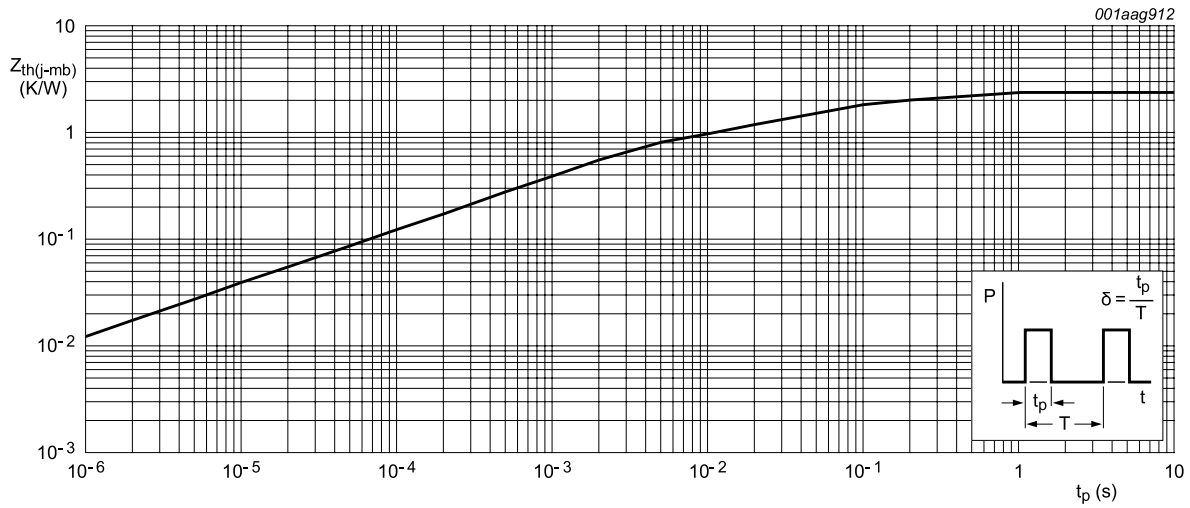
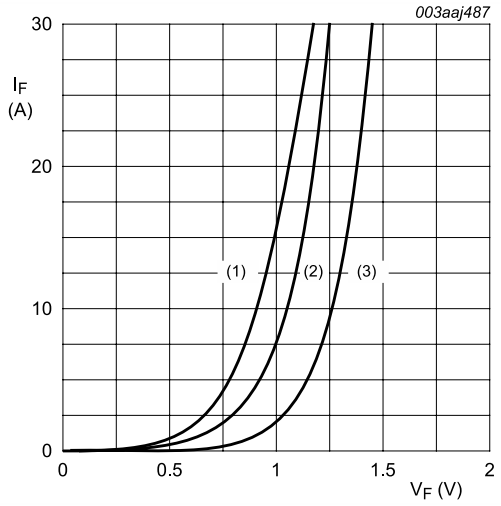


Fig. 3. Transient thermal impedance from junction to mounting base per diode as a function of pulse width

10. Characteristics

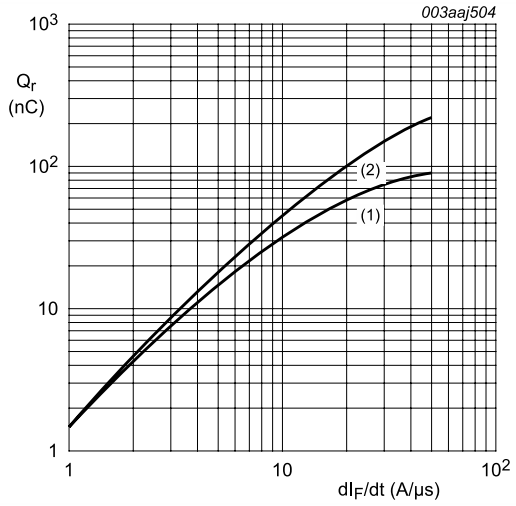
Table 7. Characteristics

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/µs; Fig. 5; Fig. 6		-	50	50	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. 6; Fig. 7		-	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. 6; Fig. 8		-	4	5	A
v_{FRM}	forward recovery voltage	I_F = 10 A; dI_F/dt = 100 A/µs; T_j = 25 °C; Fig. 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 = 0.94 V; R_s = 0.01 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

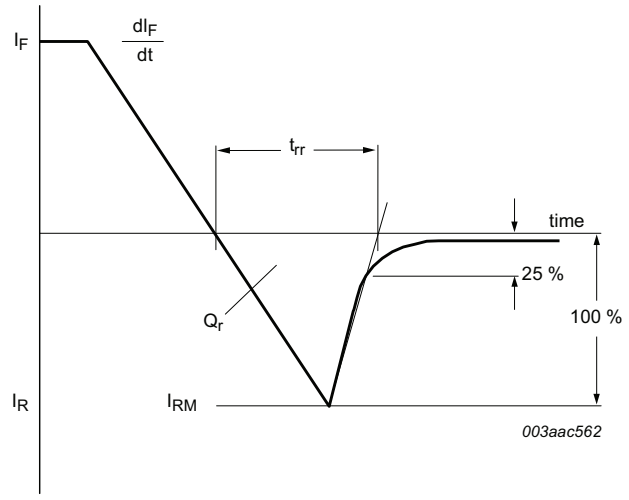
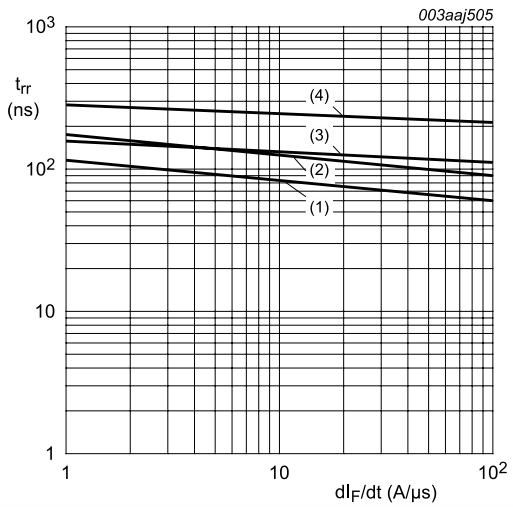
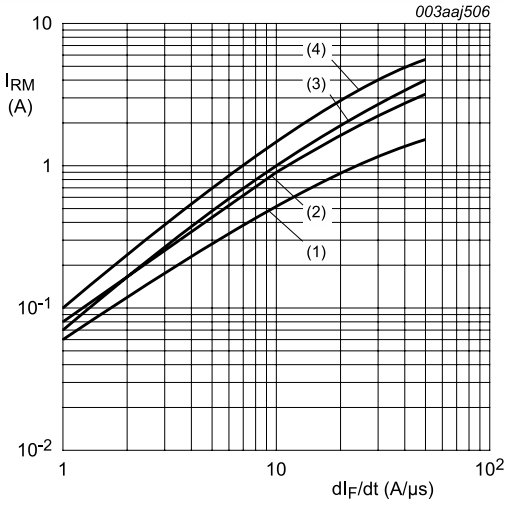


Fig. 6. Reverse recovery definitions; ramp recovery



(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

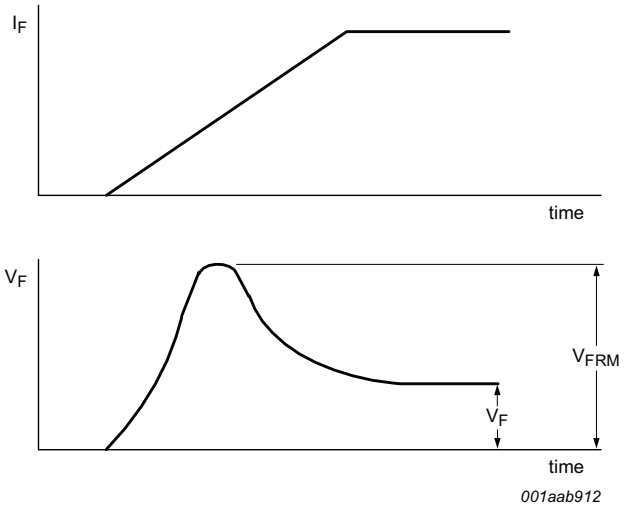
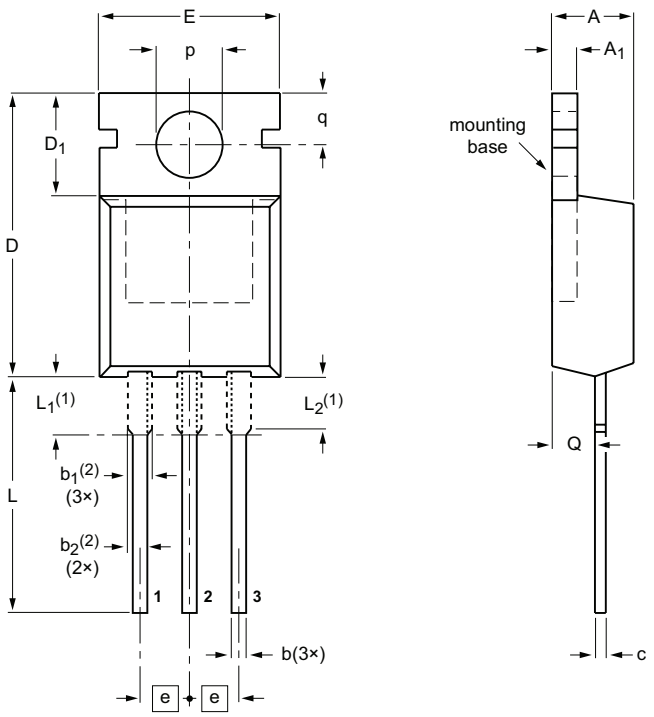


Fig. 9. Forward recovery definitions

11. 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

12. 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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