

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

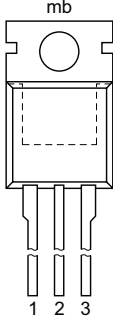
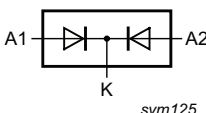
4. Quick reference data

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} ≤ 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} ≤ 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

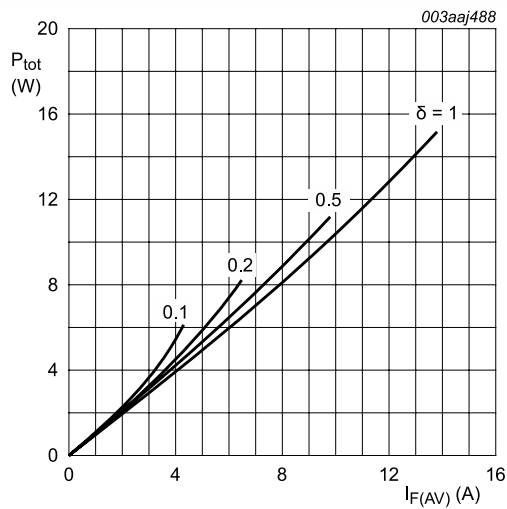
Type number	Marking codes
BYV34-500	BYV34-500

8. Limiting values

Table 5. Limiting values

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

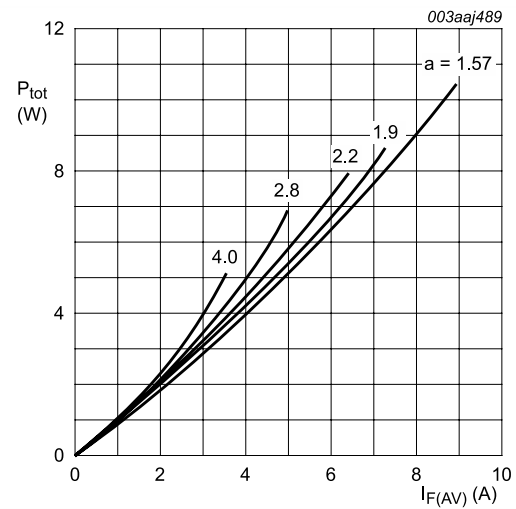
Symbol	Parameter	Conditions	Values	Unit
V_{RRM}	repetitive peak reverse voltage		500	V
V_{RWM}	crest working reverse voltage		500	V
V_R	reverse voltage	$T_{mb} \leq 138\text{ °C}$; DC	500	V
$I_{O(AV)}$	average output current	SQW; $\delta = 0.5$; $T_{mb} \leq 115\text{ °C}$; both diodes conducting; Fig. 1; Fig. 2	20	A
I_{FRM}	repetitive peak forward current	SQW; $\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 115\text{ °C}$; per diode	20	A
I_{FSM}	non-repetitive peak forward current	SIN; $t_p = 10\text{ ms}$; $T_{j(\text{init})} = 25\text{ °C}$; per diode	120	A
		SIN; $t_p = 8.3\text{ ms}$; $T_{j(\text{init})} = 25\text{ °C}$; per diode	132	A
T_{stg}	storage temperature		-40 to 150	°C
T_j	junction temperature		150	°C



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

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

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

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

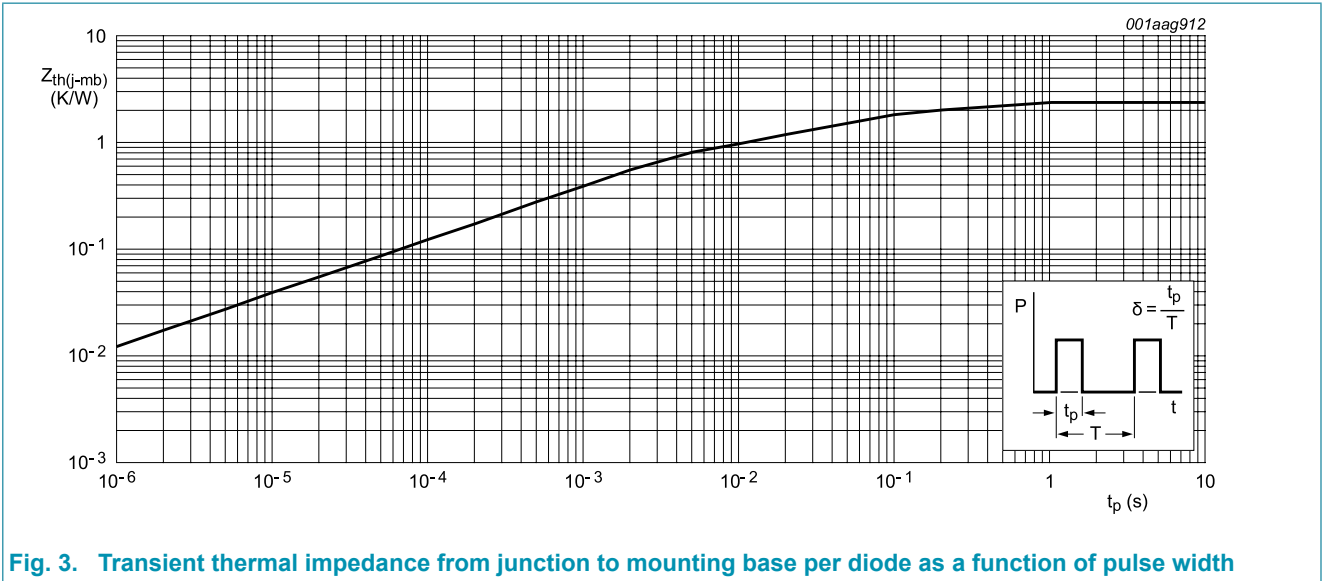
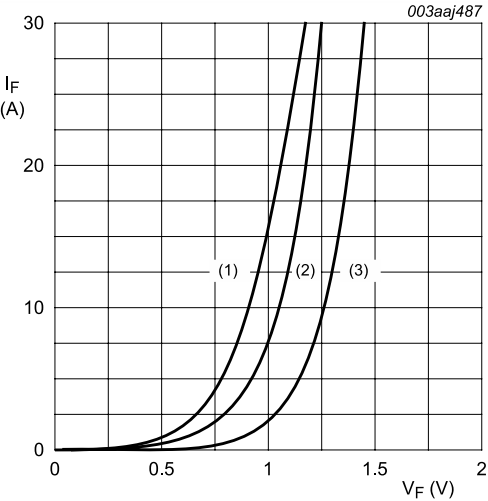


Fig. 3. Transient thermal impedance from junction to mounting base per diode as a function of pulse width

10. Characteristics

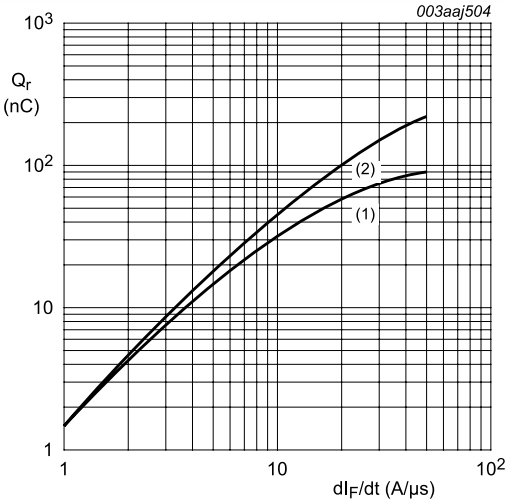
Table 7. Characteristics

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
V₀ = 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

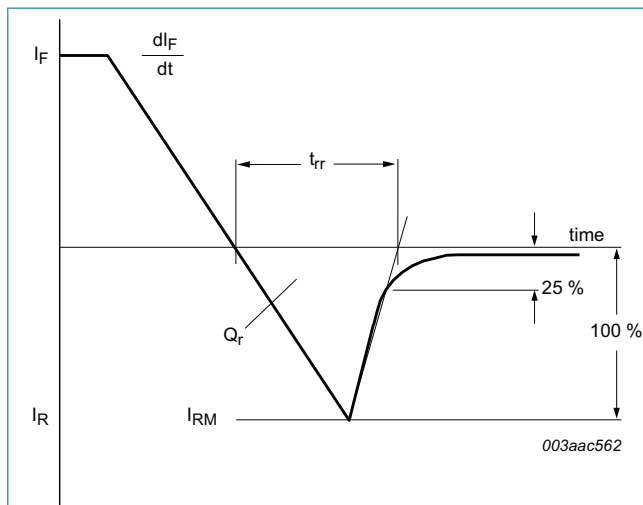
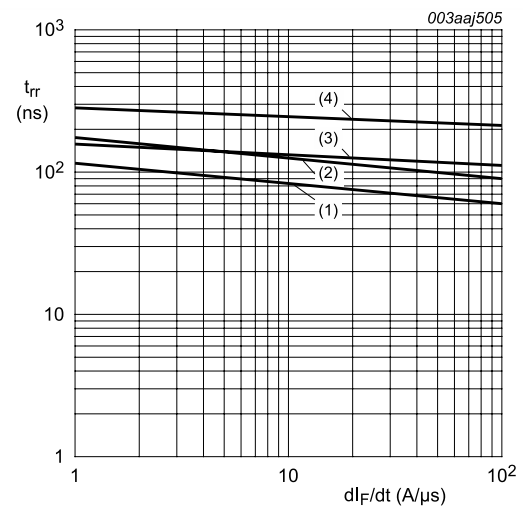
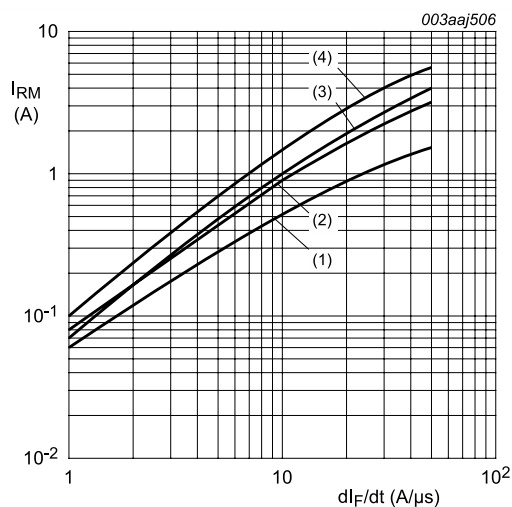


Fig. 6. Reverse recovery definitions; ramp recovery



- (1) $I_F = 1 \text{ A}$; $T_j = 25^\circ \text{C}$
- (2) $I_F = 1 \text{ A}$; $T_j = 100^\circ \text{C}$
- (3) $I_F = 20 \text{ A}$; $T_j = 25^\circ \text{C}$
- (4) $I_F = 20 \text{ A}$; $T_j = 100^\circ \text{C}$

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



- (1) $I_F = 1 \text{ A}$; $T_j = 25^\circ \text{C}$
- (2) $I_F = 1 \text{ A}$; $T_j = 100^\circ \text{C}$
- (3) $I_F = 20 \text{ A}$; $T_j = 25^\circ \text{C}$
- (4) $I_F = 20 \text{ A}$; $T_j = 100^\circ \text{C}$

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

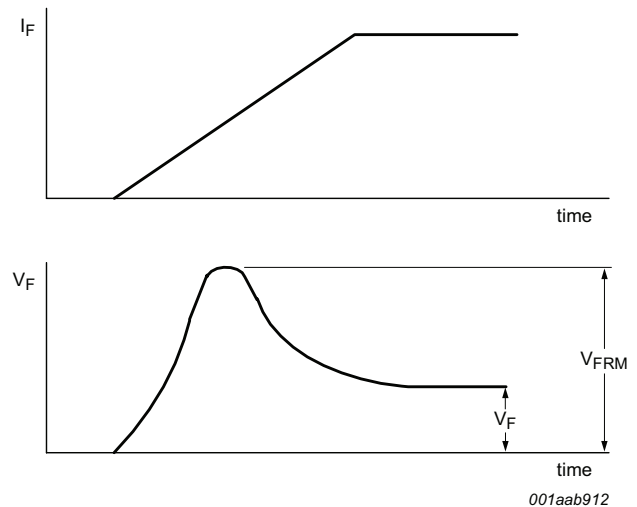


Fig. 9. Forward recovery definitions

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.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
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- [2] The term 'short data sheet' is explained in section "Definitions".
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