

1. General description

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

2. Features and benefits

- Fast switching
- Low thermal resistance
- High thermal cycling performance
- Very low forward voltage drop
- High reverse surge capability
- Soft recovery characteristic

3. Applications

- Output rectifiers in high-frequency switched-mode power supplies

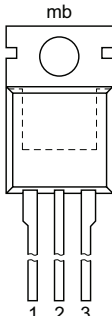
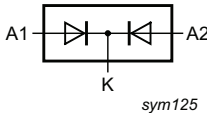
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values			Unit
Absolute maximum rating						
V_{RRM}	repetitive peak reverse voltage		200			V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_{mb} \leq 114$ °C; SQW; Fig. 1 ; Fig. 2 ; Fig. 3	15			A
$I_{O(AV)}$	average output current	$\delta = 0.5$; $T_{mb} \leq 114$ °C; SQW; both diodes conducting	30			A
I_{FSM}	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(init)} = 25$ °C; SIN; per diode; Fig. 4	150			A
		$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; SIN; per diode	165			A
V_{ESD}	electrostatic discharge voltage	HBM; all pins; C = 250 pF; R = 1.5 k Ω	8			kV
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 15$ A; $T_j = 25$ °C; Fig. 6	-	0.95	1.05	V
		$I_F = 30$ A; $T_j = 150$ °C; Fig. 6	-	1	1.2	V
		$I_F = 15$ A; $T_j = 150$ °C; Fig. 6	-	0.78	0.85	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; ramp recovery; Fig. 7	-	18	25	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		
mb	K	mounting base; cathode		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BYQ42E-200	TO-220AB	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78

7. Marking

Table 4. Marking codes

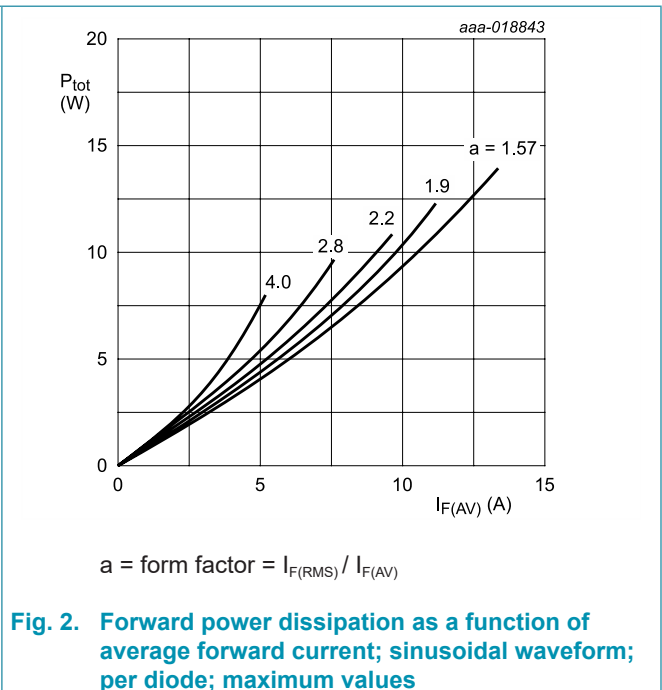
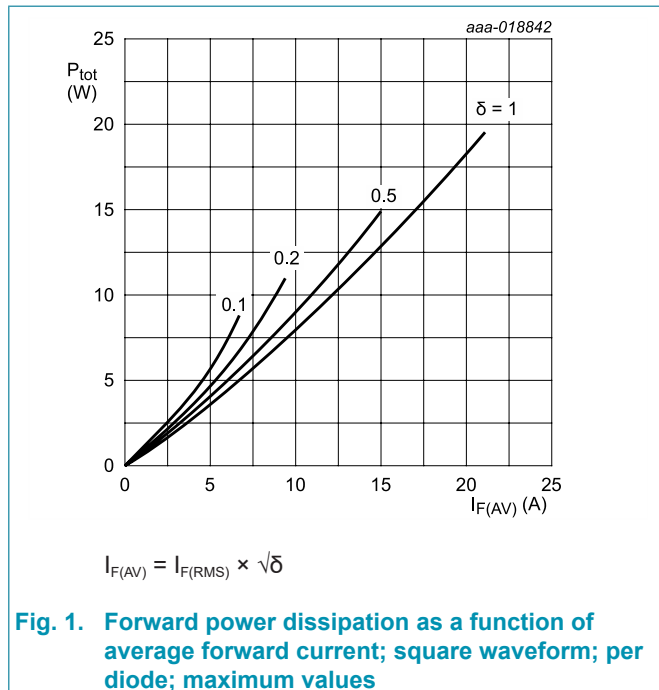
Type number	Marking codes
BYQ42E-200	BYQ42E-200

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		200	V
V_{RWM}	crest working reverse voltage		200	V
V_R	reverse voltage	DC	200	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_{mb} \leq 114\text{ °C}$; SQW; Fig. 1 ; Fig. 2 ; Fig. 3	15	A
$I_{O(AV)}$	average output current	$\delta = 0.5$; $T_{mb} \leq 114\text{ °C}$; SQW; both diodes conducting	30	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\text{ ms}$; $T_{j(\text{init})} = 25\text{ °C}$; SIN; per diode; Fig. 4	150	A
		$t_p = 8.3\text{ ms}$; $T_{j(\text{init})} = 25\text{ °C}$; SIN; per diode	165	A
I_{RRM}	repetitive peak reverse current	$\delta = 0.001$; $t_p = 2\text{ }\mu\text{s}$	0.2	A
I_{RSM}	non-repetitive peak reverse current	$t_p = 100\text{ }\mu\text{s}$	0.2	A
T_{stg}	storage temperature		-40 to 150	°C
T_j	junction temperature		150	°C
Electrostatic discharge				
V_{ESD}	electrostatic discharge voltage	HBM; all pins; C = 250 pF; R = 1.5 kΩ	8	kV



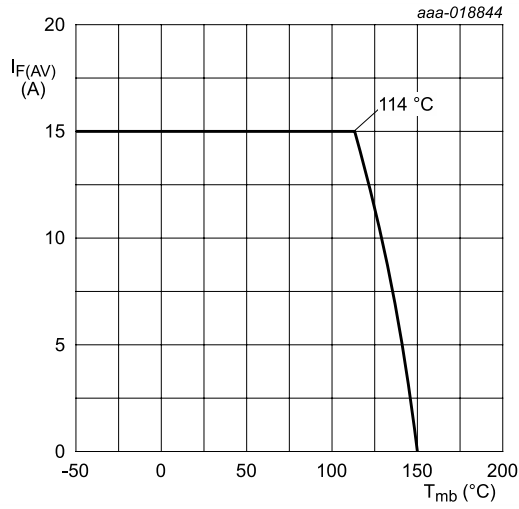


Fig. 3. Average forward current as a function of mounting base temperature; per diode; maximum values

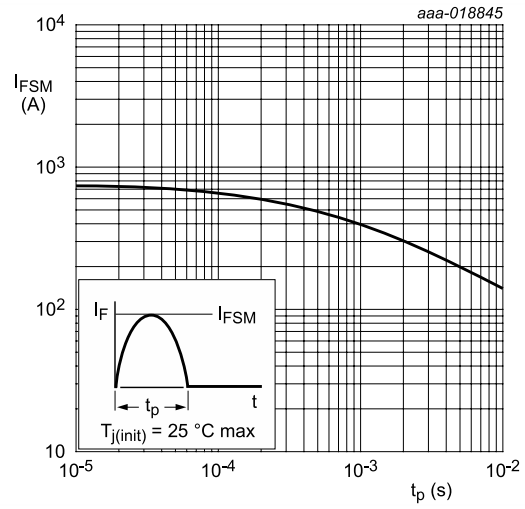


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; per diode; maximum values

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	-	-	1.4	K/W
		with heatsink compound; per diode; Fig. 5	-	-	2.4	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air		-	60	-	K/W

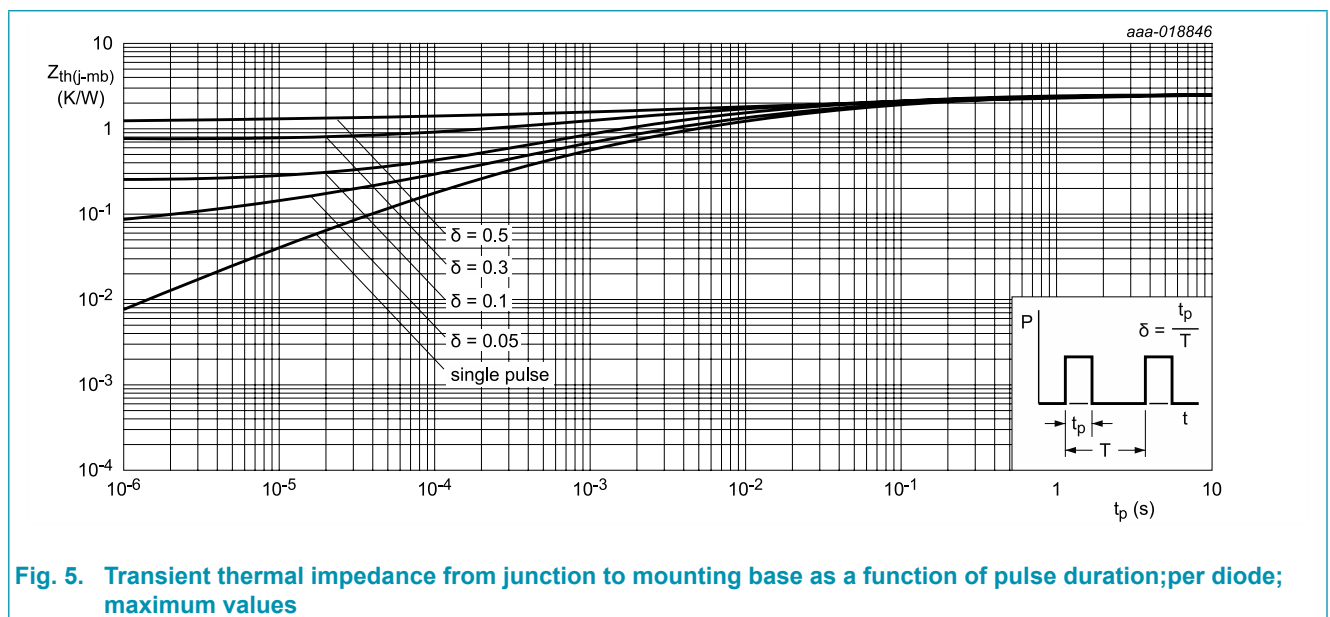
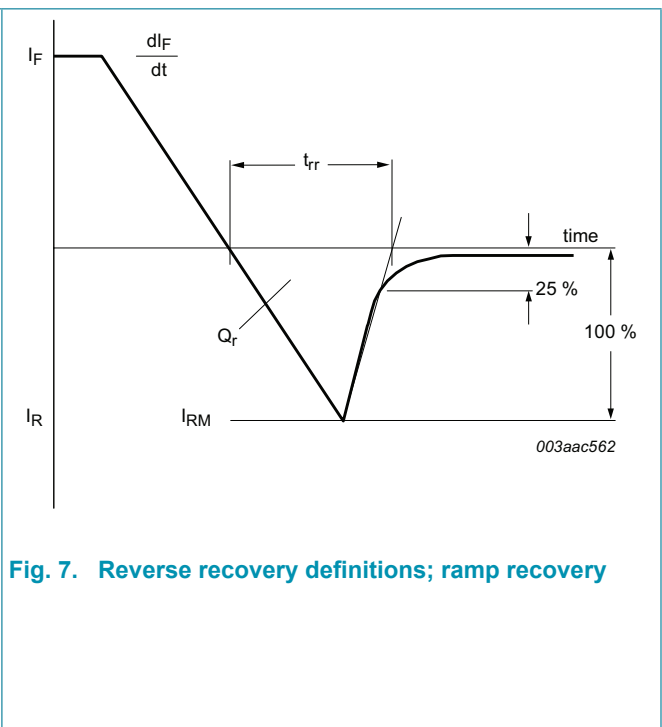
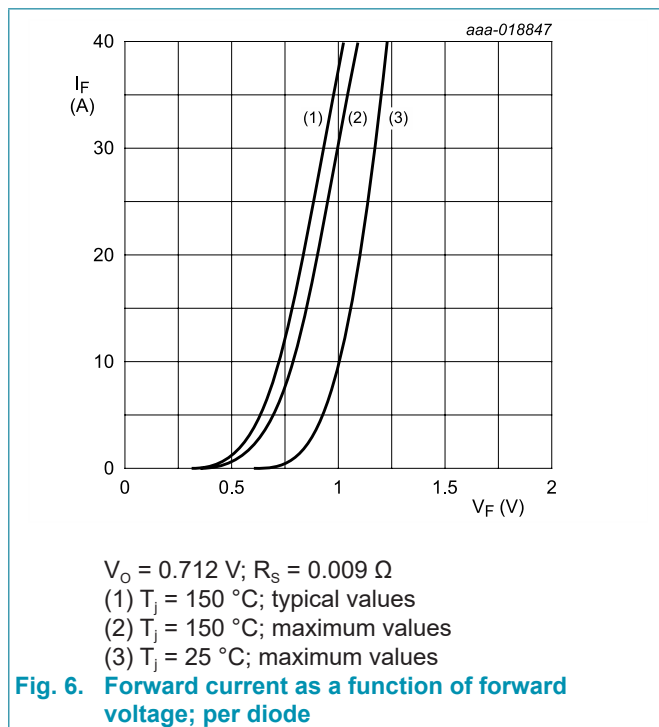


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration; per diode; maximum values

10. Characteristics

Table 7. Characteristics

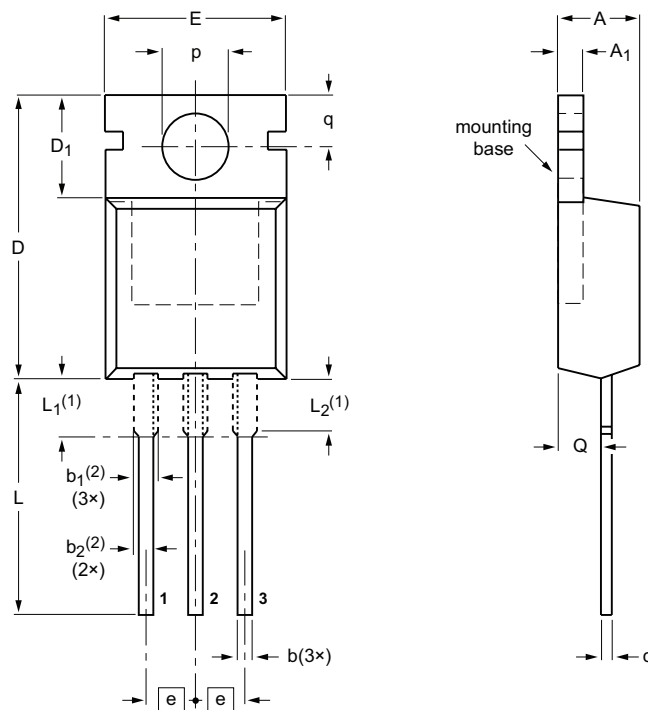
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 15 \text{ A}; T_j = 150 \text{ }^\circ\text{C}; \text{Fig. 6}$	-	0.78	0.85	V
		$I_F = 15 \text{ A}; T_j = 25 \text{ }^\circ\text{C}; \text{Fig. 6}$	-	0.95	1.05	V
		$I_F = 30 \text{ A}; T_j = 150 \text{ }^\circ\text{C}; \text{Fig. 6}$	-	1	1.2	V
I_R	reverse current	$V_R = 200 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	3	20	μA
		$V_R = 200 \text{ V}; T_j = 150 \text{ }^\circ\text{C}$	-	0.3	1	mA
Dynamic characteristics						
Q_r	recovered charge	$I_F = 2 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 20 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{Fig. 7}$	-	6	15	nC
		$I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 100 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{Fig. 7}$	-	10	-	nC
t_{rr}	reverse recovery time	$I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 100 \text{ A}/\mu\text{s}; \text{ramp recovery}; T_j = 25 \text{ }^\circ\text{C}; \text{Fig. 7}$	-	18	25	ns
I_{RM}	peak reverse recovery current	$I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 100 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{Fig. 7}$	-	1	-	V



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

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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