

1. General description

Ultrafast, dual common cathode, epitaxial rectifier diodes in a SOT78 (TO-220AB) plastic package.

2. Features and benefits

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

3. Applications

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

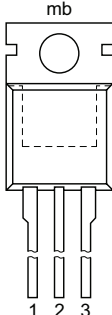
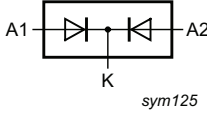
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values			Unit
Absolute maximum rating						
V_{RRM}	repetitive peak reverse voltage		200			V
$I_{O(AV)}$	average output current	$\delta = 0.5$; square-wave pulse; $T_{mb} \leq 119\text{ °C}$; both diodes conducting; Fig. 5 ; Fig. 6	10			A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\ \mu\text{s}$; $T_{mb} \leq 119\text{ °C}$; square-wave pulse; per diode	10			A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\ \text{ms}$; sine-wave pulse; per diode	50			A
		$t_p = 8.3\ \text{ms}$; sine-wave pulse; per diode	55			A
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 5\ \text{A}$; $T_J = 25\text{ °C}$; Fig. 2	-	0.95	1.1	V
		$I_F = 5\ \text{A}$; $T_J = 150\text{ °C}$; Fig. 2	-	0.8	0.895	V
		$I_F = 10\ \text{A}$; $T_J = 25\text{ °C}$; Fig. 2	-	1.1	1.25	V
Dynamic characteristics						
t_{rr}	reverse recovery time	ramp recovery; $I_F = 1\ \text{A}$; $V_R = 30\ \text{V}$; $di_F/dt = 100\ \text{A}/\mu\text{s}$; $T_J = 25\text{ °C}$; Fig. 3	-	15	25	ns
		step recovery; when switched from $I_F = 0.5\ \text{A}$ to $I_R = 1\ \text{A}$; measured at $I_R = 0.25\ \text{A}$	-	10	20	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; connected to cathode		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BYQ28E-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
BYQ28E-200	BYQ28E-200

8. Limiting values

Table 5. Limiting values

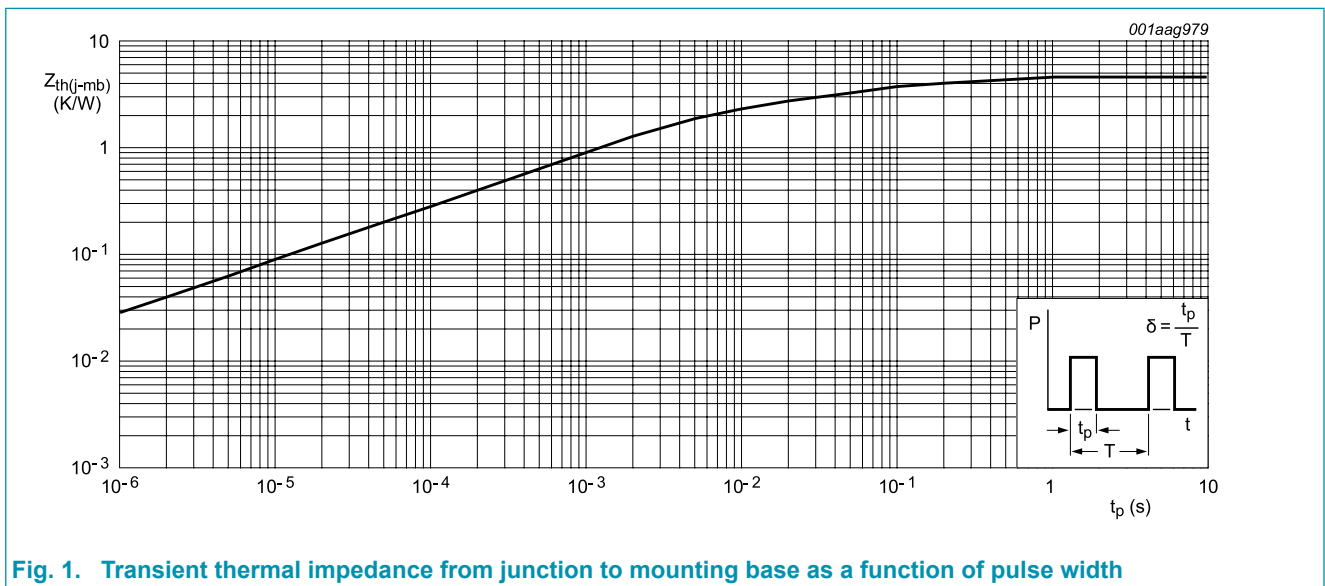
In accordance with the Absolute Maximum Rating System (IEC 60134).

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	$\delta = 1.0$; square-wave pulse	200	V
$I_{O(AV)}$	average output current	$\delta = 0.5$; square-wave pulse; $T_{mb} \leq 119\text{ }^\circ\text{C}$; both diodes conducting; Fig. 5 ; Fig. 6	10	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 119\text{ }^\circ\text{C}$; square-wave pulse; per diode	10	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\text{ ms}$; sine-wave pulse; per diode	50	A
		$t_p = 8.3\text{ ms}$; sine-wave pulse; per diode	55	A
I_{RM}	peak reverse recovery 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	$^\circ\text{C}$
T_j	junction temperature		150	$^\circ\text{C}$
Electrostatic discharge				
V_{ESD}	electrostatic discharge voltage	all pins; human body model; $C = 250\text{ pF}$; $R = 1.5\text{ k}\Omega$	8	kV

9. Thermal characteristics

Table 6. Thermal characteristics

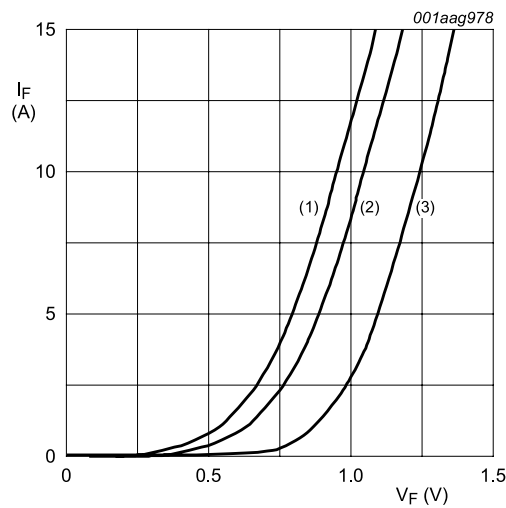
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	with heatsink compound; both diodes conducting	-	-	3	K/W
		with heatsink compound; per diode; Fig 1	-	-	4.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W



10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 5 \text{ A}; T_j = 150 \text{ }^\circ\text{C}; \text{ Fig. 2}$	-	0.8	0.895	V
		$I_F = 5 \text{ A}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 2}$	-	0.95	1.1	V
		$I_F = 10 \text{ A}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 2}$	-	1.1	1.25	V
I_R	reverse current	$V_R = 200 \text{ V}$	-	2	10	μA
		$V_R = 200 \text{ V}; T_j = 100 \text{ }^\circ\text{C}$	-	0.1	0.2	mA
Dynamic characteristics						
Q_r	recovered charge	$I_F = 2 \text{ A}; V_R = 30 \text{ V}; di_F/dt = 20 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 3}$	-	4	9	nC
t_{rr}	reverse recovery time	ramp recovery; $I_F = 1 \text{ A}; V_R = 30 \text{ V}; di_F/dt = 100 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 3}$	-	15	25	ns
		step recovery; when switched from $I_F = 0.5 \text{ A}$ to $I_R = 1 \text{ A}$; measured at $I_R = 0.25 \text{ A}$	-	10	20	ns
I_{RM}	peak reverse recovery current	$I_F = 5 \text{ A}; V_R = 30 \text{ V}; di_F/dt = 50 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 3}$	-	0.5	0.7	A
V_{FR}	forward recovery voltage	$I_F = 1 \text{ A}; di_F/dt = 10 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 4}$	-	1	-	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

Fig. 2. Forward current as a function of forward voltage

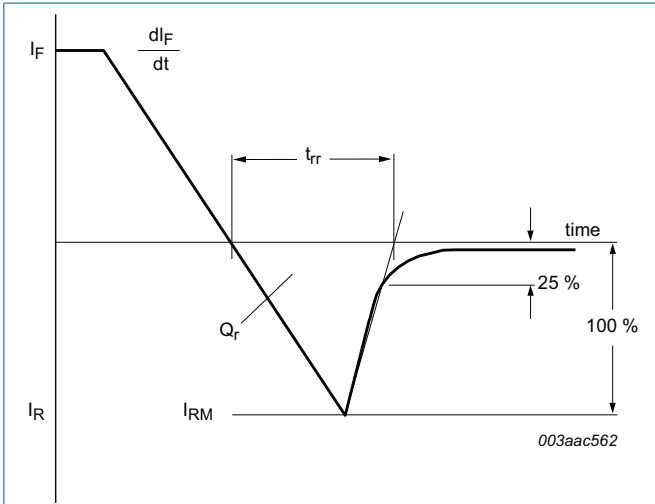


Fig. 3. Reverse recovery definitions; ramp recovery

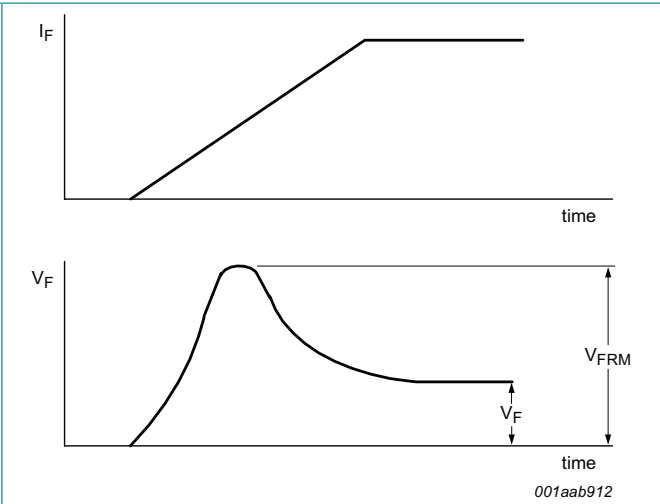
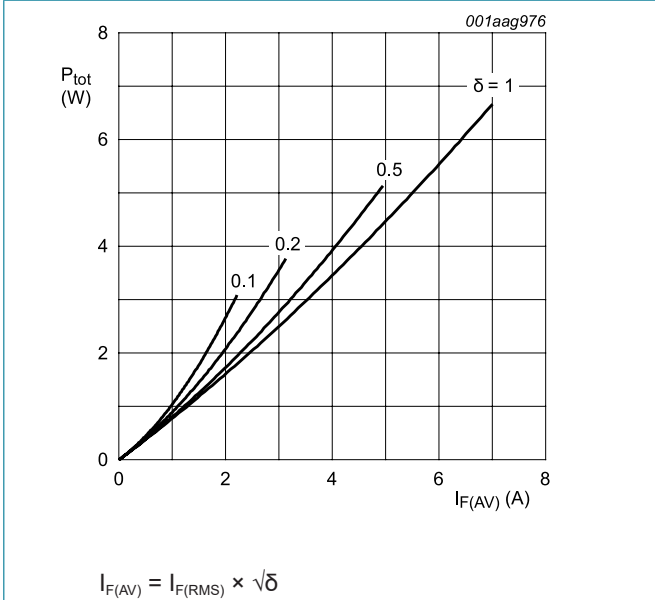
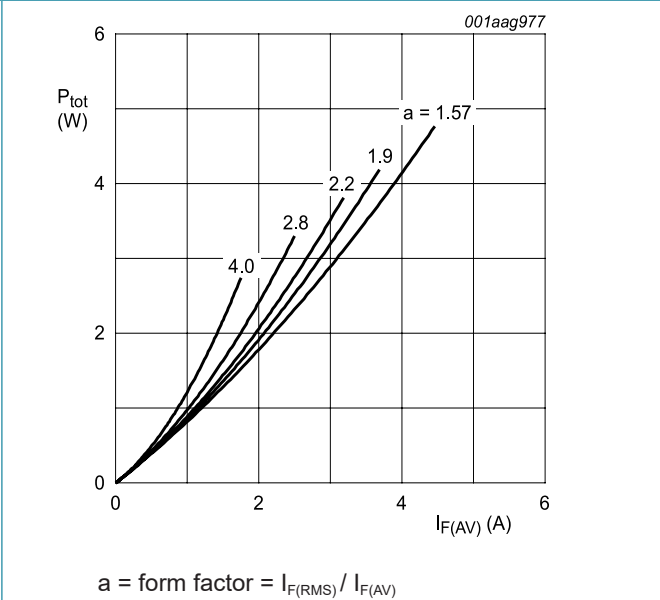


Fig. 4. Forward recovery definitions



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

Fig. 5. Forward power dissipation as a function of average forward current; square waveform; maximum values; per diode



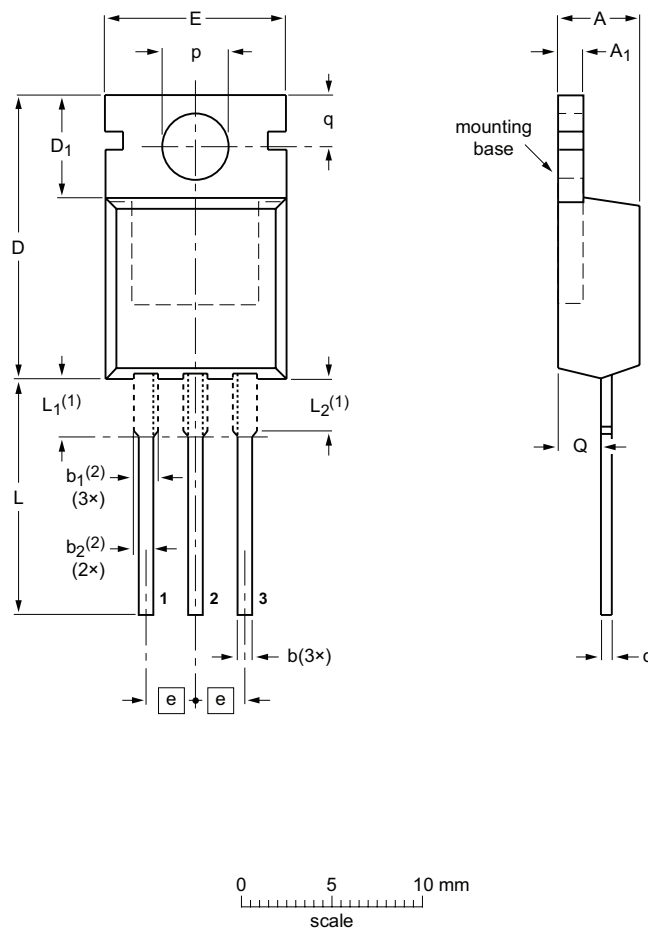
$$a = \text{form factor} = I_{F(RMS)} / I_{F(AV)}$$

Fig. 6. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values; per diode

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. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYQ28E-200 v.5	20180307	Product data sheet	-	BYQ28_SER_E_ED_4
Modifications: Change from NXP version to WeEn version				
BYQ28_SER_E_ED_4	20071205	Product data sheet	-	BYQ28E_SERIES_3
Modifications: <ul style="list-style-type: none"> • The format of this data sheet 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. • Limiting values table: some parameter descriptions amended to conform to latest standards; IFRM conditions amended; VESD row added. • Characteristics: Qrr changed to Qr 'recovered charge'; trr1 and trr2 changed to trr with 'ramp recovery' and 'step recovery' added to conditions. 				
BYQ28E_SERIES_3	19981001	Product specification	-	BYQ28E_SERIES_2
BYQ28E_SERIES_2	19980701	Product specification	-	BYQ28E_SERIES_1; BYQ28EB_SERIES_1
BYQ28E_SERIES_1; BYQ28EB_SERIES_1	19960801	Product specification	-	-

13. 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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