

## 1. General description

Dual ultrafast power diodes in a SOT78 (TO-220AB) plastic package. These diodes are rugged with a guaranteed electrostatic discharge voltage capability.

## 2. Features and benefits

- Fast switching
- Low on-state losses
- Guaranteed ESD capability
- Low thermal resistance
- High thermal cycling performance
- Soft recovery minimizes power-consuming oscillations

## 3. Applications

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

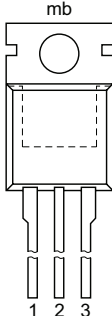
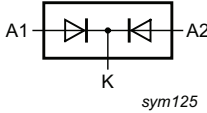
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values			Unit
<b>Absolute maximum rating</b>						
$V_{RRM}$	repetitive peak reverse voltage		200			V
$I_{O(AV)}$	average output current	square-wave pulse; $\delta = 0.5$ ; $T_{mb} \leq 119\text{ }^{\circ}\text{C}$ ; both diodes conducting; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a>	10			A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_{mb} \leq 119\text{ }^{\circ}\text{C}$ ; per diode; square-wave pulse	10			A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10\text{ ms}$ ; sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; per diode	50			A
		$t_p = 8.3\text{ ms}$ ; sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; per diode	55			A
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 5\text{ A}$ ; $T_j = 150\text{ }^{\circ}\text{C}$ ; <a href="#">Fig. 4</a>	-	0.8	0.895	V
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1\text{ A}$ ; $V_R = 30\text{ V}$ ; $dI_F/dt = 100\text{ A}/\mu\text{s}$ ; $T_j = 25\text{ }^{\circ}\text{C}$ ; ramp recovery; <a href="#">Fig. 5</a>	-	15	25	ns
<b>Electrostatic discharge</b>						
$V_{ESD}$	electrostatic discharge voltage	HBM; $C = 250\text{ pF}$ ; $R = 1.5\text{ k}\Omega$ ; all pins	-	-	8	kV

## 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
BYQ28E-200E	TO-220AB	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78

## 7. Marking

Table 4. Marking codes

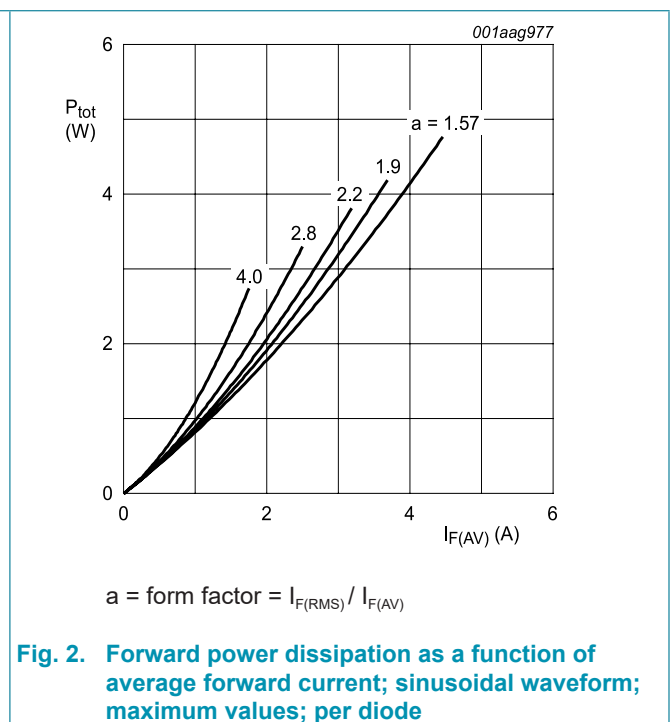
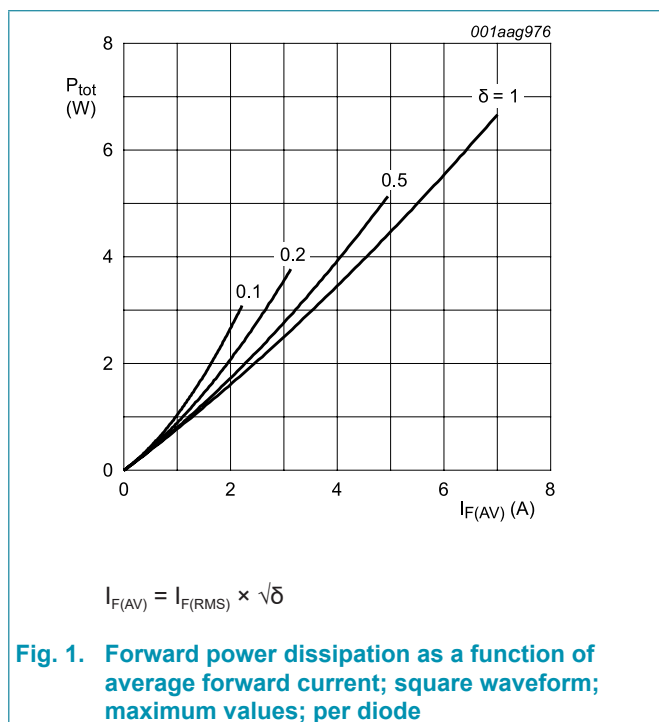
Type number	Marking codes
BYQ28E-200E	BYQ28E-200E

## 8. Limiting values

**Table 5. Limiting values**

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

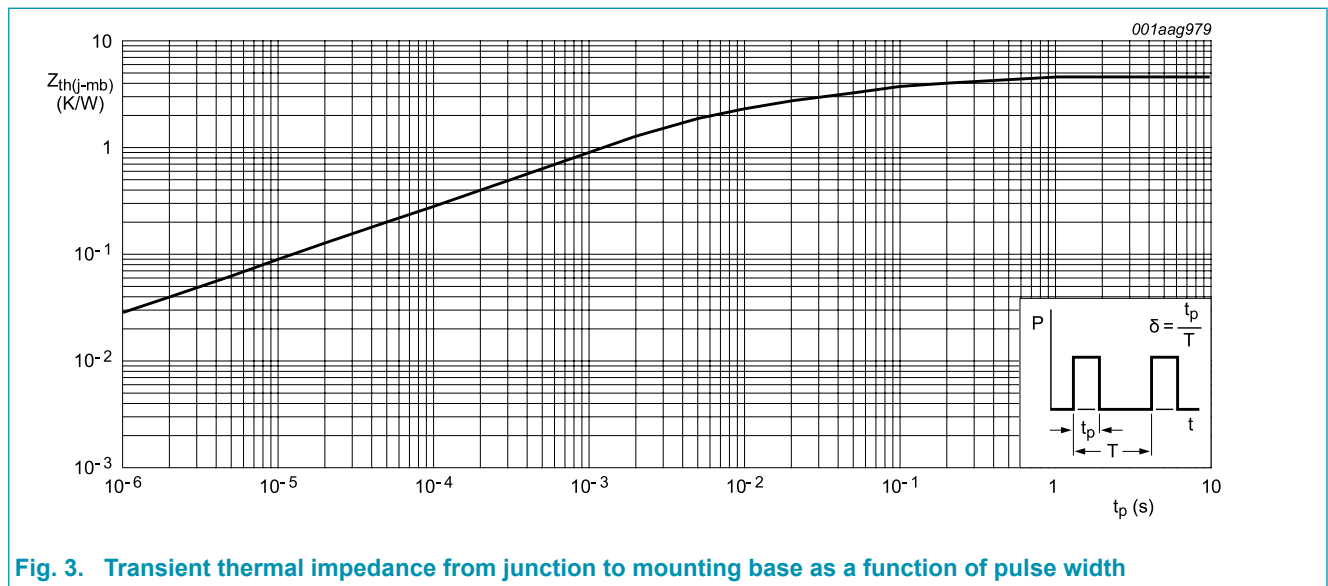
Symbol	Parameter	Conditions	Values	Unit
$V_{RRM}$	repetitive peak reverse voltage		200	V
$V_{RWM}$	crest working reverse voltage		200	V
$V_R$	reverse voltage	DC	200	V
$I_{O(AV)}$	average output current	$\delta = 0.5$ ; square-wave pulse; $T_{mb} \leq 119\text{ }^\circ\text{C}$ ; both diodes conducting; Fig. 1; Fig. 2	10	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_{mb} \leq 119\text{ }^\circ\text{C}$ ; per diode; square-wave pulse	10	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10\text{ ms}$ ; sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; per diode	50	A
		$t_p = 8.3\text{ ms}$ ; sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; per diode	55	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	$^\circ\text{C}$
$T_j$	junction temperature		150	$^\circ\text{C}$
<b>Electrostatic discharge</b>				
$V_{ESD}$	electrostatic discharge voltage	HBM; C = 250 pF; R = 1.5 k $\Omega$ ; all pins	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; <a href="#">Fig. 3</a>	-	-	4.5	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 as a function of pulse width**

### 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 5\text{ A}; T_J = 150\text{ °C}; \text{Fig. 4}$	-	0.8	0.895	V
		$I_F = 5\text{ A}; T_J = 25\text{ °C}; \text{Fig. 4}$	-	0.95	1.1	V
		$I_F = 10\text{ A}; T_J = 25\text{ °C}; \text{Fig. 4}$	-	1.1	1.25	V
$I_R$	reverse current	$V_R = 200\text{ V}; T_J = 25\text{ °C}$	-	2	10	$\mu\text{A}$
		$V_R = 200\text{ V}; T_J = 100\text{ °C}$	-	0.1	0.2	mA
<b>Dynamic characteristics</b>						
$Q_r$	recovered charge	$I_F = 2\text{ A}; V_R = 30\text{ V}; dI_F/dt = 20\text{ A}/\mu\text{s}; T_J = 25\text{ °C}; \text{Fig. 5}$	-	4	9	nC
$t_{rr}$	reverse recovery time	$I_F = 1\text{ A}; V_R = 30\text{ V}; dI_F/dt = 100\text{ A}/\mu\text{s}; \text{ramp recovery}; T_J = 25\text{ °C}; \text{Fig. 5}$	-	15	25	ns
		$I_F = 0.5\text{ A}; I_R = 1\text{ A}; \text{step recovery}; T_J = 25\text{ °C}; \text{Fig. 6}$	-	10	20	ns
$I_{RM}$	peak reverse recovery current	$I_F = 2\text{ A}; V_R = 30\text{ V}; dI_F/dt = 20\text{ A}/\mu\text{s}; T_J = 25\text{ °C}; \text{Fig. 5}$	-	0.4	0.7	A
$V_{FR}$	forward recovery voltage	$I_F = 1\text{ A}; dI_F/dt = 10\text{ A}/\mu\text{s}; T_J = 25\text{ °C}; \text{Fig. 7}$	-	1	-	V

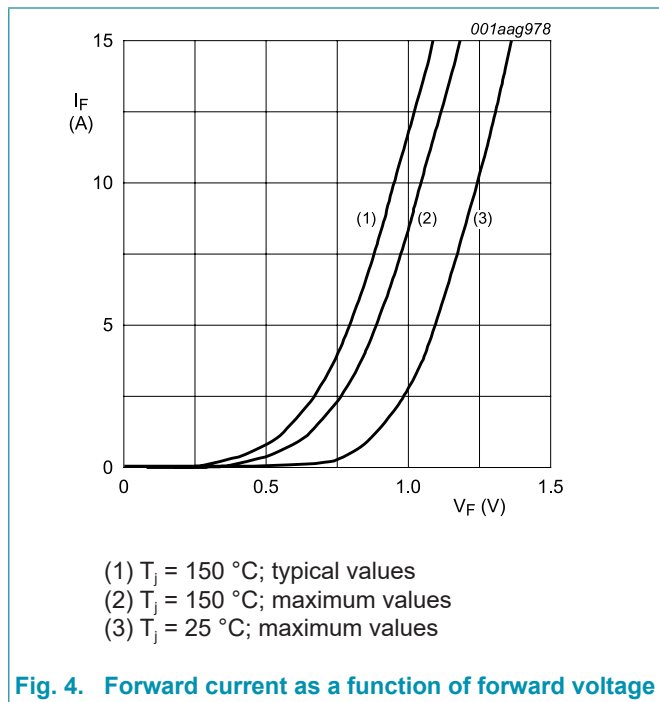


Fig. 4. Forward current as a function of forward voltage

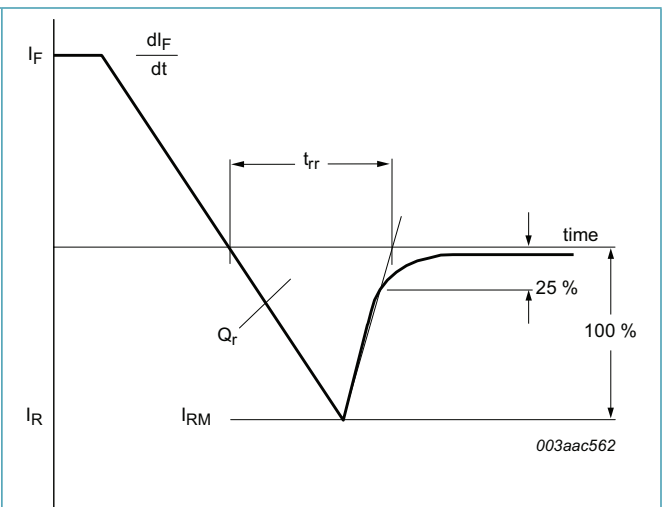
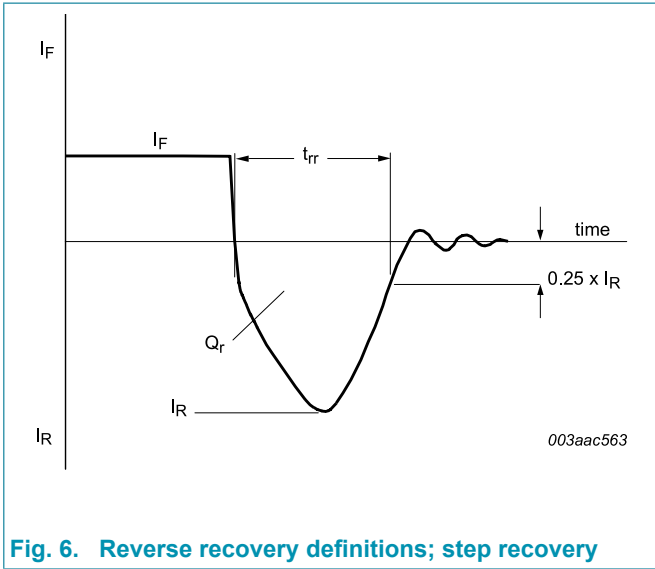
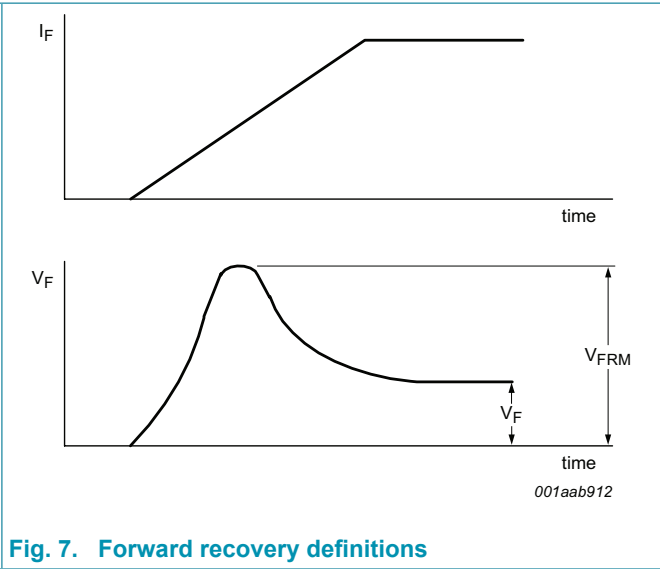


Fig. 5. Reverse recovery definitions; ramp recovery



**Fig. 6. Reverse recovery definitions; step recovery**

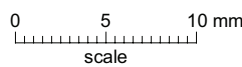
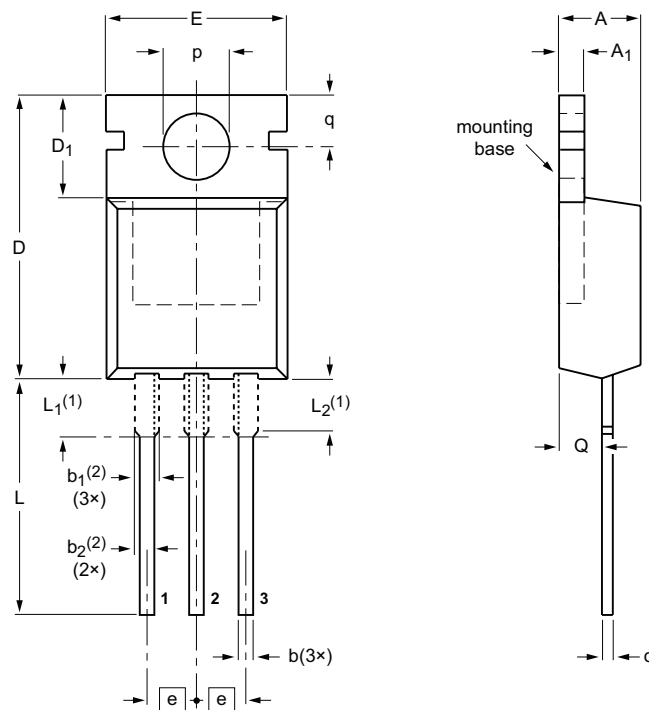


**Fig. 7. Forward recovery definitions**

### 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 <sub>1</sub>	b	b <sub>1</sub> ( <sup>2</sup> )	b <sub>2</sub> ( <sup>2</sup> )	c	D	D <sub>1</sub>	E	e	L	L <sub>1</sub> ( <sup>1</sup> )	L <sub>2</sub> ( <sup>1</sup> ) 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-200E v.5	20180605	Product data sheet	-	BYQ28E-200E v.4
Modifications:	Change from NXP version to WeEn version			
BYQ28E-200E v.4	20110714	Product data sheet	-	BYQ28E_SERIES v.3
Modifications:	<ul style="list-style-type: none"> <li>• Type number BYQ28E-200E separated from data sheet BYQ28E_SERIES v.3.</li> <li>• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li> <li>• Legal texts have been adapted to the new company name where appropriate.</li> </ul>			
BYQ28E_SERIES v.3	19981001	Product specification	-	BYQ28E_SERIES v.2



## 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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## 14. Contents

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1. General description.....	1
2. Features and benefits .....	1
3. Applications .....	1
4. Quick reference data .....	1
5. Pinning information.....	2
6. Ordering information.....	2
7. Marking.....	2
8. Limiting values .....	3
9. Thermal characteristics .....	4
10. Characteristics.....	5
11. Package outline .....	7
12. Revision history.....	8
13. Legal information .....	9
14. Contents .....	11

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