

## 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

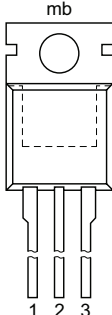
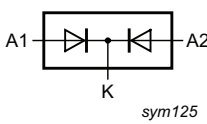
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values				Unit
Absolute maximum rating							
V <sub>RRM</sub>	repetitive peak reverse voltage		200				V
I <sub>O(AV)</sub>	average output current	δ = 0.5; square-wave pulse; T <sub>mb</sub> ≤ 119 °C; both diodes conducting; <a href="#">Fig. 5</a> ; <a href="#">Fig. 6</a>	10				A
I <sub>FRM</sub>	repetitive peak forward current	δ = 0.5; t <sub>p</sub> = 25 μs; T <sub>mb</sub> ≤ 119 °C; square-wave pulse; per diode	10				A
I <sub>FSM</sub>	non-repetitive peak forward current	t <sub>p</sub> = 10 ms; sine-wave pulse; per diode	50				A
		t <sub>p</sub> = 8.3 ms; sine-wave pulse; per diode	55				A
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 5 A; T <sub>J</sub> = 25 °C; <a href="#">Fig. 2</a>		-	0.95	1.1	V
		I <sub>F</sub> = 5 A; T <sub>J</sub> = 150 °C; <a href="#">Fig. 2</a>		-	0.8	0.895	V
		I <sub>F</sub> = 10 A; T <sub>J</sub> = 25 °C; <a href="#">Fig. 2</a>		-	1.1	1.25	V
Dynamic characteristics							
t <sub>rr</sub>	reverse recovery time	ramp recovery; I <sub>F</sub> = 1 A; V <sub>R</sub> = 30 V; dI <sub>F</sub> /dt = 100 A/μs; T <sub>J</sub> = 25 °C; <a href="#">Fig. 3</a>		-	15	25	ns
		step recovery; when switched from I <sub>F</sub> = 0.5 A to I <sub>R</sub> = 1 A; measured at I <sub>R</sub> = 0.25 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; <a href="#">Fig. 5</a> ; <a href="#">Fig. 6</a>	10	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_{mb} \leq 119\text{ }^{\circ}\text{C}$ ; 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	$^{\circ}\text{C}$
<b>Electrostatic discharge</b>				
$V_{ESD}$	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; <a href="#">Fig 1</a>		-	-	4.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air		-	60	-	K/W

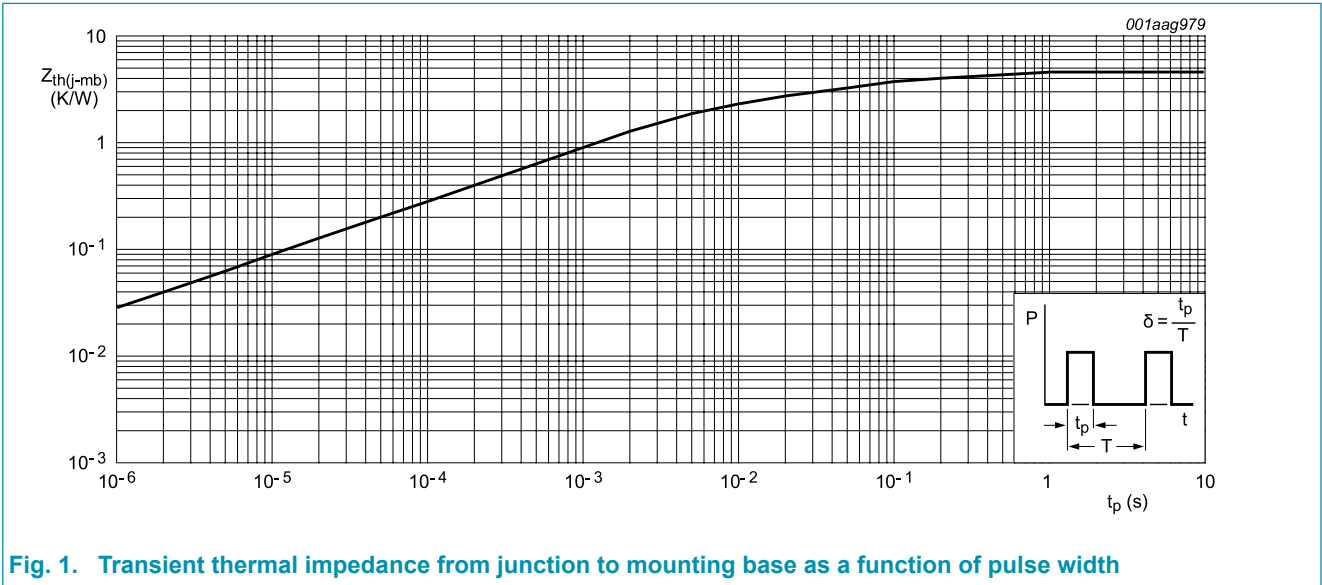
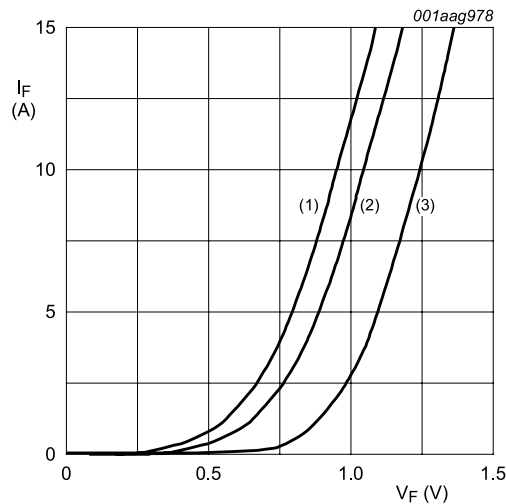


Fig. 1. Transient thermal impedance from junction to mounting base as a function of pulse width

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 5 A; T <sub>j</sub> = 150 °C; <a href="#">Fig. 2</a>		-	0.8	0.895	V
		I <sub>F</sub> = 5 A; T <sub>j</sub> = 25 °C; <a href="#">Fig. 2</a>		-	0.95	1.1	V
		I <sub>F</sub> = 10 A; T <sub>j</sub> = 25 °C; <a href="#">Fig. 2</a>		-	1.1	1.25	V
I <sub>R</sub>	reverse current	V <sub>R</sub> = 200 V		-	2	10	μA
		V <sub>R</sub> = 200 V; T <sub>j</sub> = 100 °C		-	0.1	0.2	mA
Dynamic characteristics							
Q <sub>r</sub>	recovered charge	I <sub>F</sub> = 2 A; V <sub>R</sub> = 30 V; dI <sub>F</sub> /dt = 20 A/μs; T <sub>j</sub> = 25 °C; <a href="#">Fig. 3</a>		-	4	9	nC
t <sub>rr</sub>	reverse recovery time	ramp recovery; I <sub>F</sub> = 1 A; V <sub>R</sub> = 30 V; dI <sub>F</sub> /dt = 100 A/μs; T <sub>j</sub> = 25 °C; <a href="#">Fig. 3</a>		-	15	25	ns
		step recovery; when switched from I <sub>F</sub> = 0.5 A to I <sub>R</sub> = 1 A; measured at I <sub>R</sub> = 0.25 A		-	10	20	ns
I <sub>RM</sub>	peak reverse recovery current	I <sub>F</sub> = 5 A; V <sub>R</sub> = 30 V; dI <sub>F</sub> /dt = 50 A/μs; T <sub>j</sub> = 25 °C; <a href="#">Fig. 3</a>		-	0.5	0.7	A
V <sub>FR</sub>	forward recovery voltage	I <sub>F</sub> = 1 A; dI <sub>F</sub> /dt = 10 A/μs; T <sub>j</sub> = 25 °C; <a href="#">Fig. 4</a>		-	1	-	V



- (1) T<sub>J</sub> = 150 °C; typical values
- (2) T<sub>J</sub> = 150 °C; maximum values
- (3) T<sub>J</sub> = 25 °C; maximum values

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

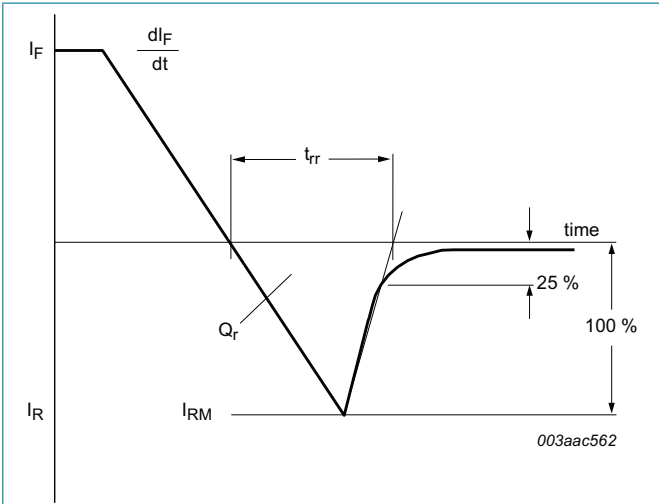


Fig. 3. Reverse recovery definitions; ramp recovery

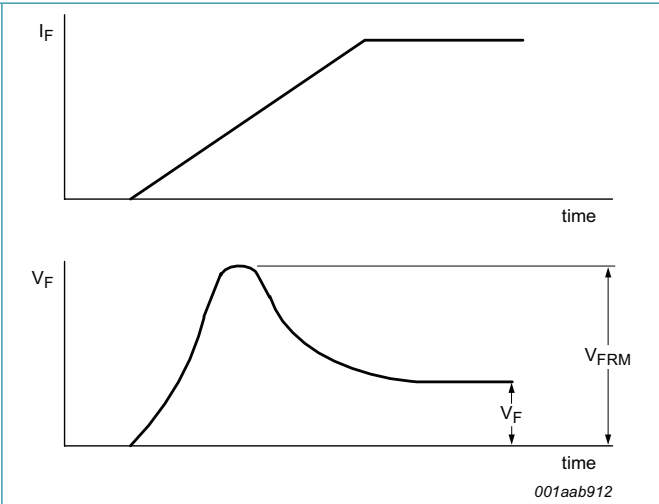


Fig. 4. Forward recovery definitions

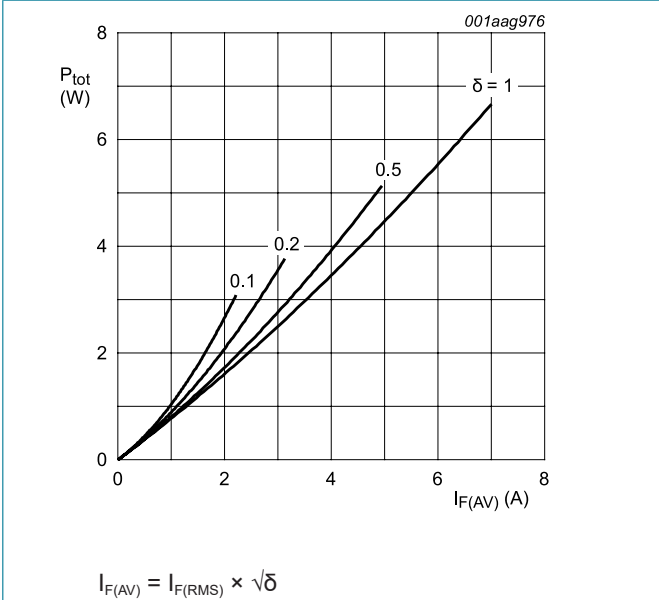


Fig. 5. Forward power dissipation as a function of average forward current; square waveform; maximum values; per diode

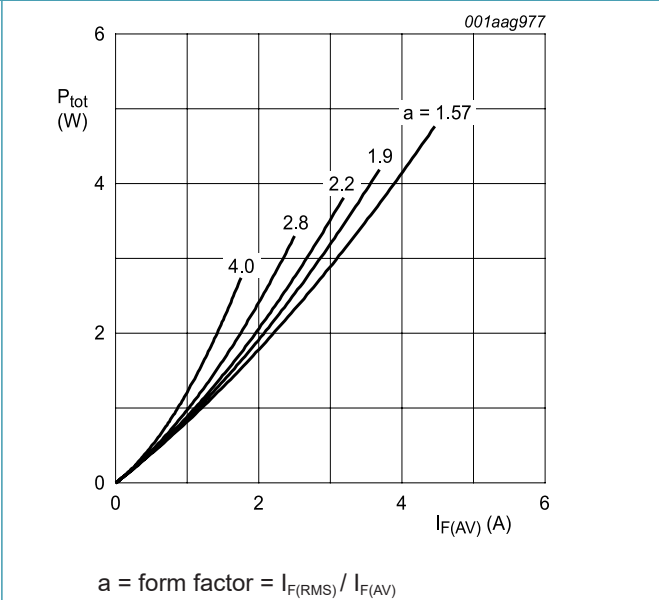
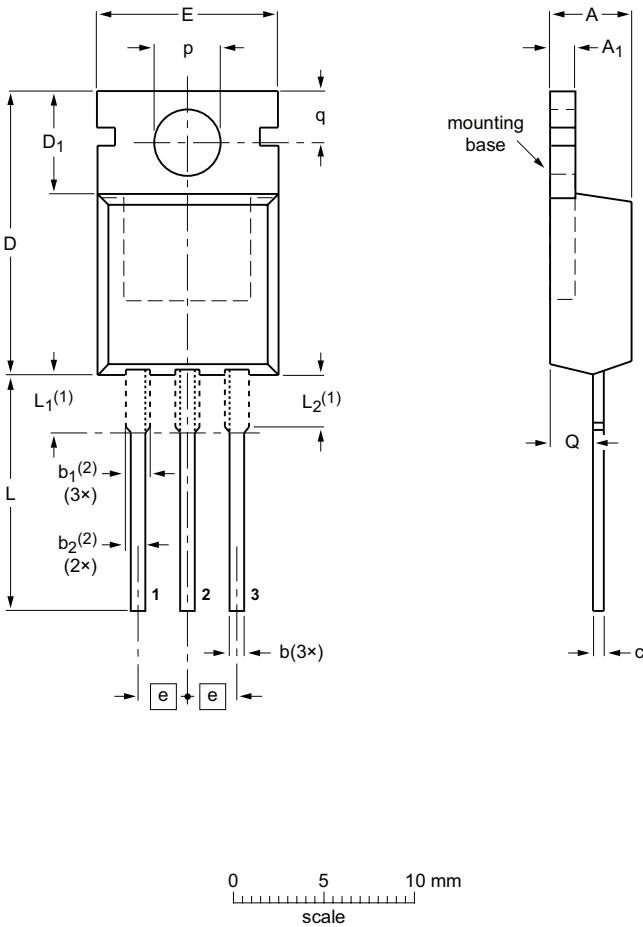


Fig. 6. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values; per diode

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 <sub>1</sub>	b	b <sub>1</sub> (2)	b <sub>2</sub> (2)	c	D	D <sub>1</sub>	E	e	L	L <sub>1</sub> (1)	L <sub>2</sub> (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"> <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> <li>• Limiting values table: some parameter descriptions amended to conform to latest standards; IFRM conditions amended; VESD row added.</li> <li>• Characteristics: Qrr changed to Qr 'recovered charge'; trr1 and trr2 changed to trr with 'ramp recovery' and 'step recovery' added to conditions.</li> </ul>				
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.

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