



BYQ28E-200E

Dual ultrafast power diodes

Rev. 4 — 14 July 2011

Product data sheet

1. Product profile

1.1 General description

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

1.2 Features and benefits

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

1.3 Applications

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

1.4 Quick reference data

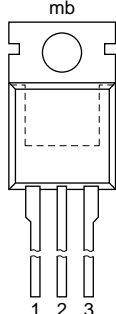
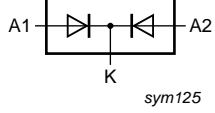
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
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; see Figure 1 ; see Figure 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
Static characteristics						
V_F	forward voltage	$I_F = 5\text{ A}$; $T_j = 150\text{ }^{\circ}\text{C}$; see Figure 4	-	0.8	0.89 5	V
Dynamic characteristics						
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; see Figure 5	-	15	25	ns
Electrostatic discharge						
V_{ESD}	electrostatic discharge voltage	HBM; $C = 250\text{ pF}$; $R = 1.5\text{ k}\Omega$; all pins	-	-	8	kV



2. 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		

SOT78 (TO-220AB)

3. Ordering information

Table 3. Ordering information

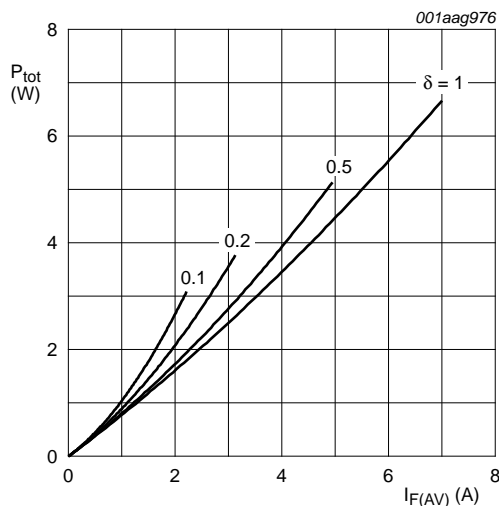
Type number	Package		
	Name	Description	Version
BYQ28E-200E	TO-220AB	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78

4. Limiting values

Table 4. Limiting values

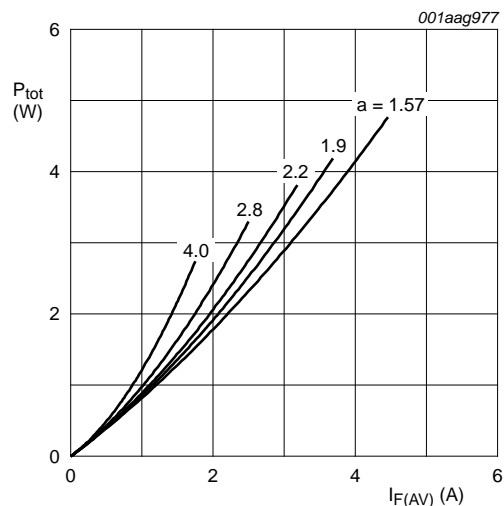
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	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	square-wave pulse; $\delta = 0.5$; $T_{mb} \leq 119^\circ\text{C}$; both diodes conducting; see Figure 1 ; see Figure 2	-	10	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\ \mu\text{s}$; $T_{mb} \leq 119^\circ\text{C}$; per diode; square-wave pulse	-	10	A
I_{FSM}	non-repetitive peak forward current	$t_p = 8.3\ \text{ms}$; sine-wave pulse; $T_{j(\text{init})} = 25^\circ\text{C}$; per diode	-	55	A
		$t_p = 10\ \text{ms}$; sine-wave pulse; $T_{j(\text{init})} = 25^\circ\text{C}$; per diode	-	50	A
I_{RRM}	repetitive peak reverse current	$\delta = 0.001$; $t_p = 2\ \mu\text{s}$	-	0.2	A
I_{RSM}	non-repetitive peak reverse current	$t_p = 100\ \mu\text{s}$	-	0.2	A
T_{stg}	storage temperature		-40	150	$^\circ\text{C}$
T_j	junction temperature		-	150	$^\circ\text{C}$
Electrostatic discharge					
V_{ESD}	electrostatic discharge voltage	HBM; $C = 250\ \text{pF}$; $R = 1.5\ \text{k}\Omega$; all pins	-	8	kV



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

Fig 1. Forward power dissipation as a function of average forward current; square waveform; maximum values



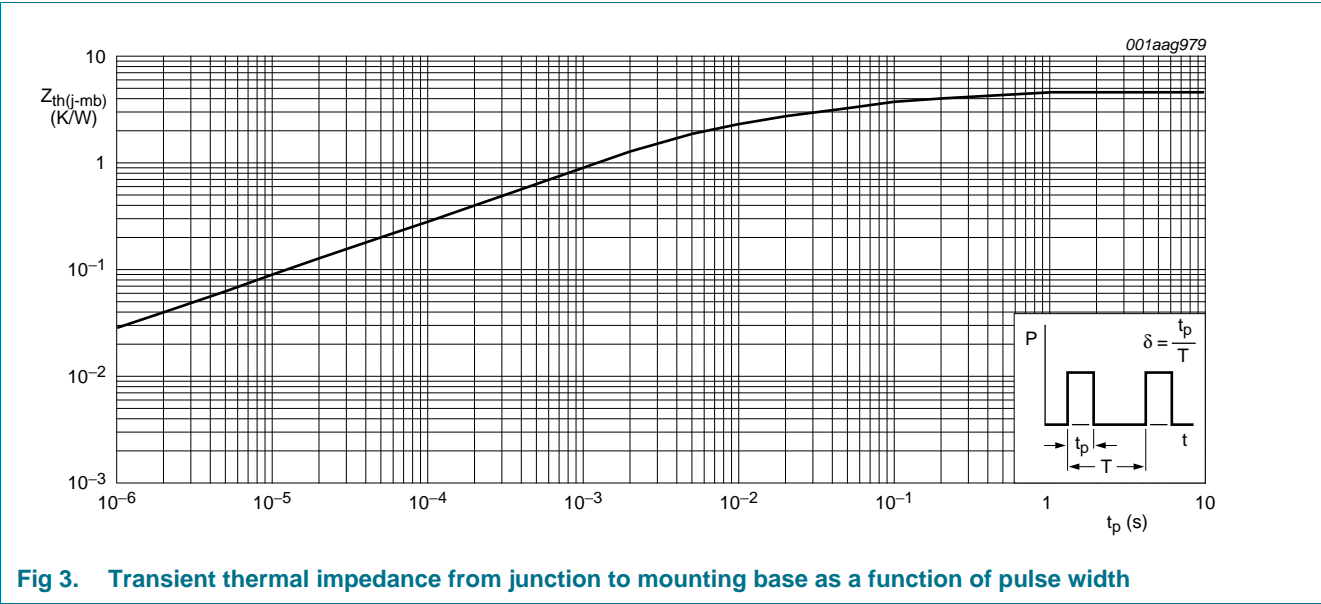
$$a = \text{form factor} = I_{F(RMS)} / I_{F(AV)}$$

Fig 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values

5. Thermal characteristics

Table 5. Thermal characteristics

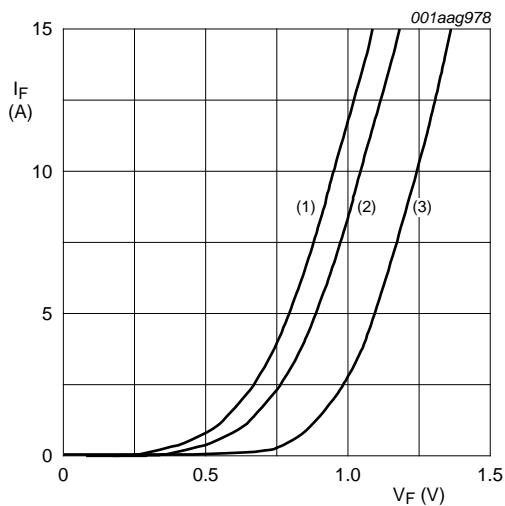
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	with heatsink compound; both diodes conducting	-	-	3	K/W
		with heatsink compound; per diode; see Figure 3	-	-	4.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient		-	60	-	K/W



6. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V _F	forward voltage	I _F = 5 A; T _j = 25 °C; see Figure 4	-	0.95	1.1	V
		I _F = 5 A; T _j = 150 °C; see Figure 4	-	0.8	0.895	V
		I _F = 10 A; T _j = 25 °C; see Figure 4	-	1.1	1.25	V
I _R	reverse current	V _R = 200 V; T _j = 25 °C	-	2	10	μA
		V _R = 200 V; T _j = 100 °C	-	0.1	0.2	mA
Dynamic characteristics						
Q _r	recovered charge	I _F = 2 A; V _R ≥ 30 V; dI _F /dt = 20 A/μs; T _j = 25 °C; see Figure 5	-	4	9	nC
t _{rr}	reverse recovery time	I _F = 1 A; V _R = 30 V; dI _F /dt = 100 A/μs; ramp recovery; T _j = 25 °C; see Figure 5	-	15	25	ns
		I _F = 0.5 A; I _R = 1 A; step recovery; T _j = 25 °C; see Figure 6	-	10	20	ns
I _{RM}	peak reverse recovery current	I _F = 2 A; V _R ≥ 30 V; dI _F /dt = 20 A/μs; T _j = 25 °C; see Figure 5	-	0.4	0.7	A
V _{FR}	forward recovery voltage	I _F = 1 A; dI _F /dt = 10 A/μs; T _j = 25 °C; see Figure 7	-	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 4. Forward current as a function of forward voltage

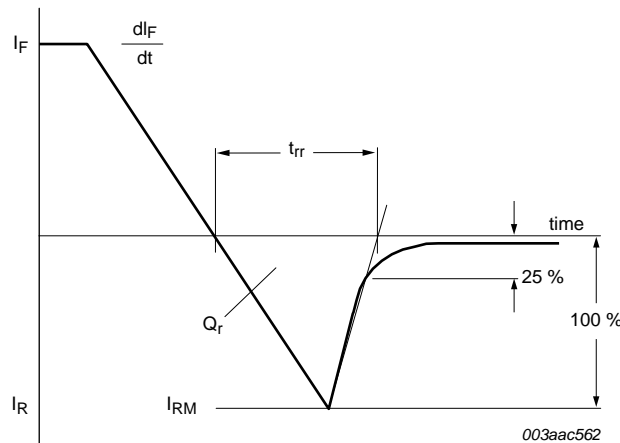


Fig 5. Reverse recovery definitions; ramp recovery

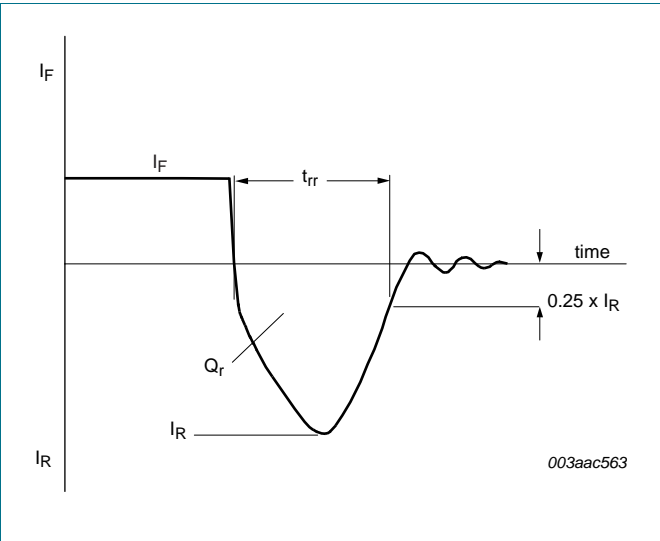


Fig 6. Reverse recovery definitions; step recovery

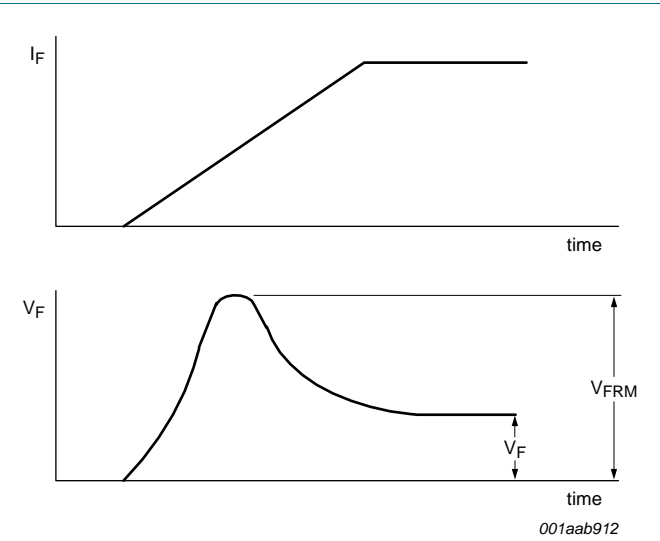


Fig 7. Forward recovery definitions

7. Package outline

Plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB SOT78

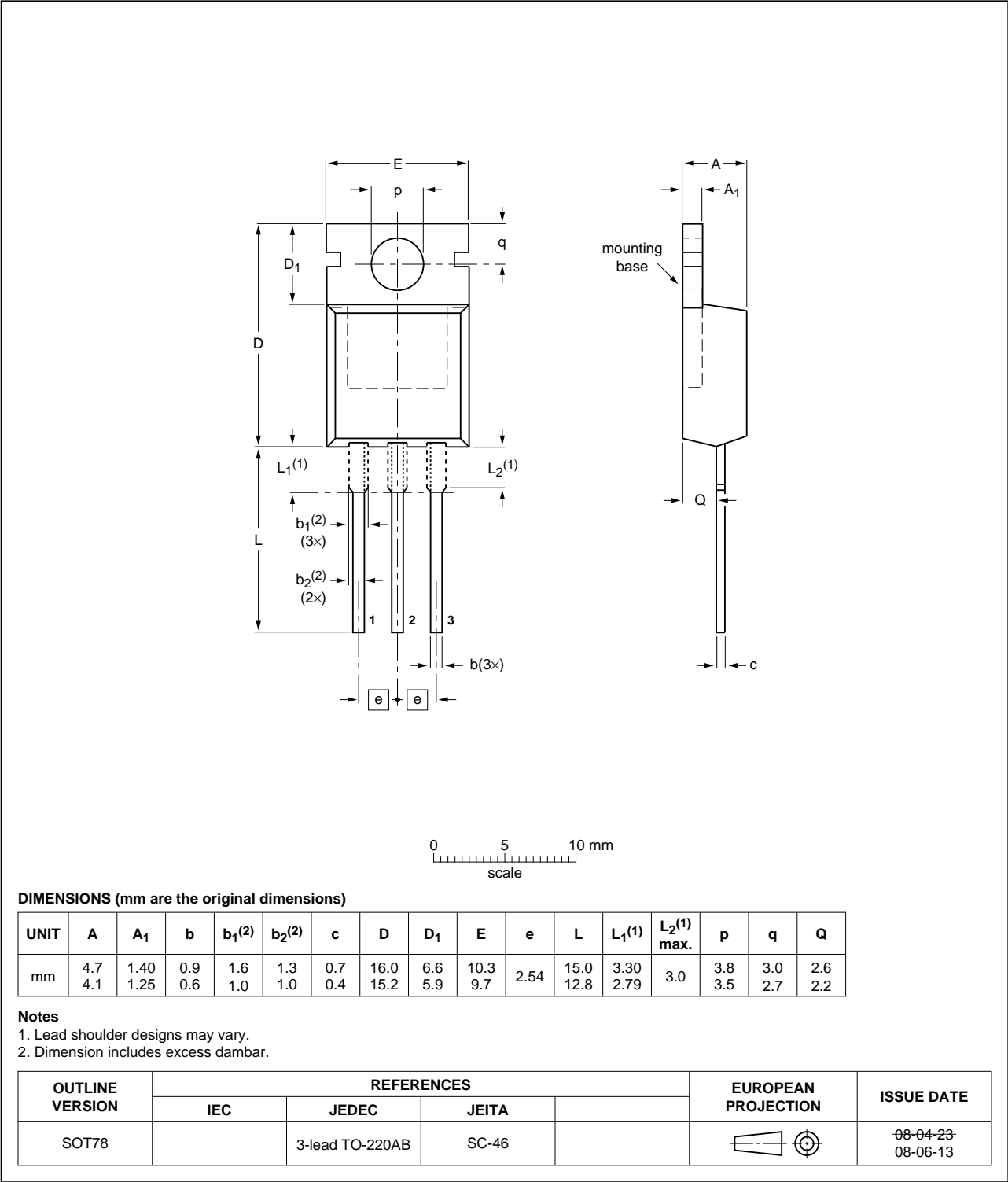


Fig 8. Package outline SOT78 (TO-220AB)

8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYQ28E-200E v.4	20110714	Product data sheet	-	BYQ28E_SERIES v.3
Modifications:	<ul style="list-style-type: none">• Type number BYQ28E-200E separated from data sheet BYQ28E_SERIES v.3.• 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.			
BYQ28E_SERIES v.3	19981001	Product specification	-	BYQ28E_SERIES v.2

9. Legal information

9.1 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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