



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

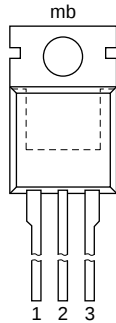
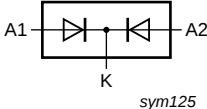
Table 1. Quick reference data

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 pF; R = 1.5 k Ω ; all pins	-	8	kV

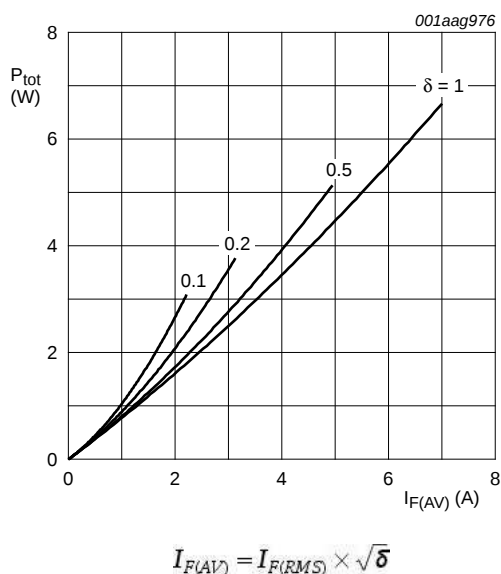


Fig 1. Forward power dissipation as a function of average forward current; square waveform; maximum values

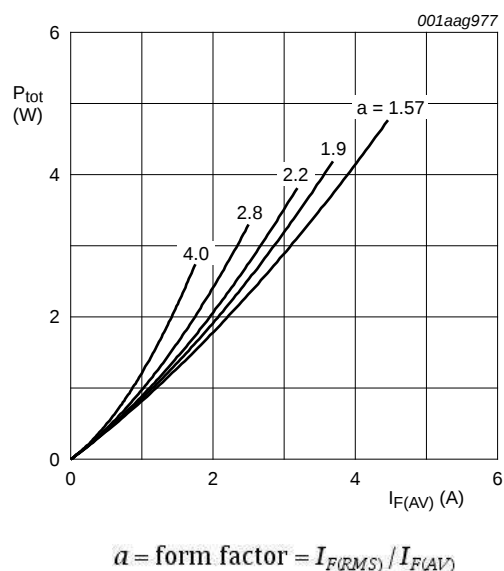
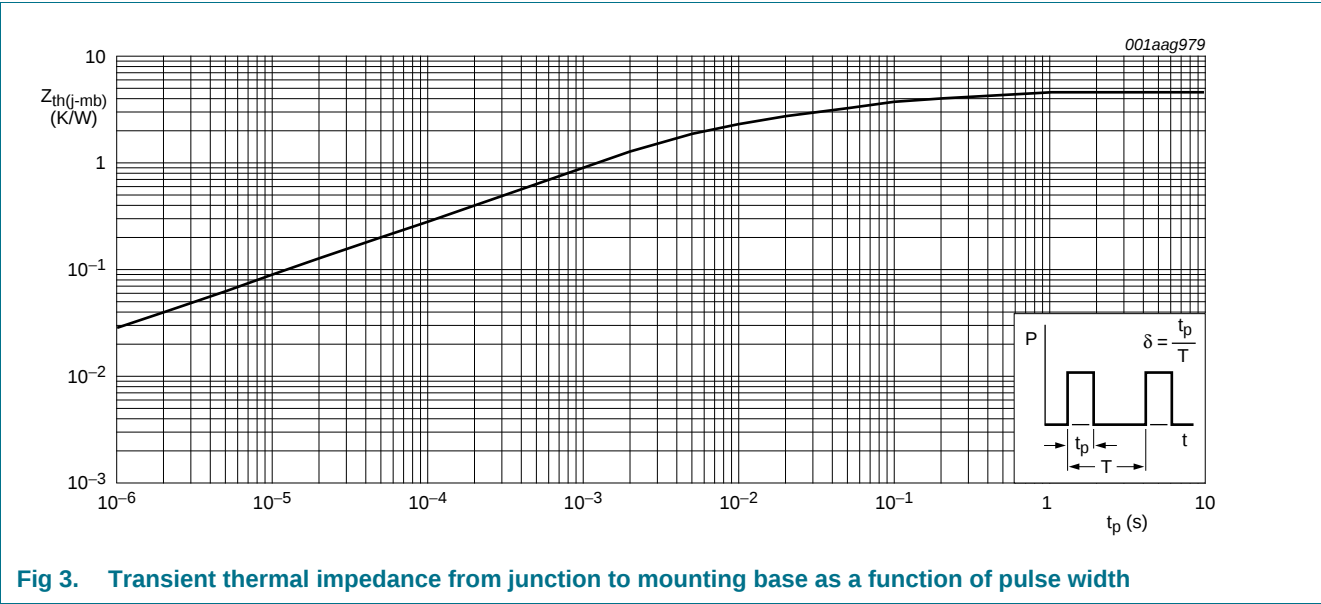


Fig 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values

5. Thermal characteristics

Table 5. Thermal characteristics

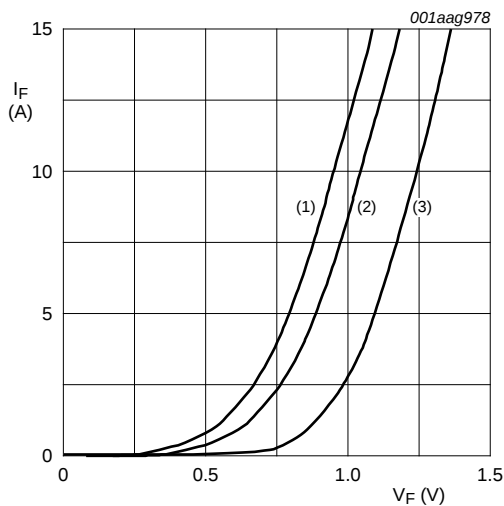
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	with heatsink compound; both diodes conducting	-	-	3	K/W
		with heatsink compound; per diode; see Figure 3	-	-	4.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient		-	60	-	K/W



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) $T_j = 150\text{ °C}$; typical values
- (2) $T_j = 150\text{ °C}$; maximum values
- (3) $T_j = 25\text{ °C}$; maximum values

Fig 4. Forward current as a function of forward voltage

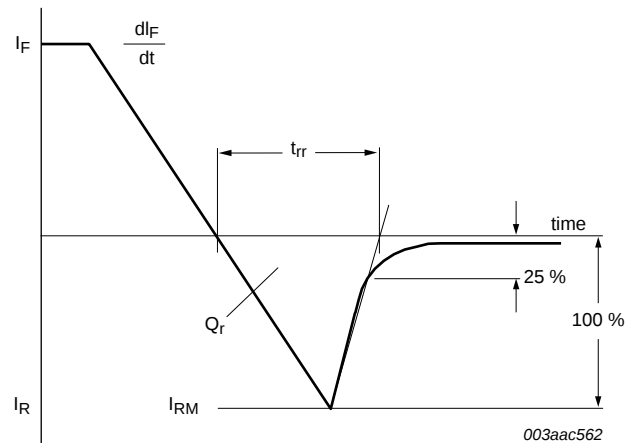


Fig 5. Reverse recovery definitions; ramp recovery

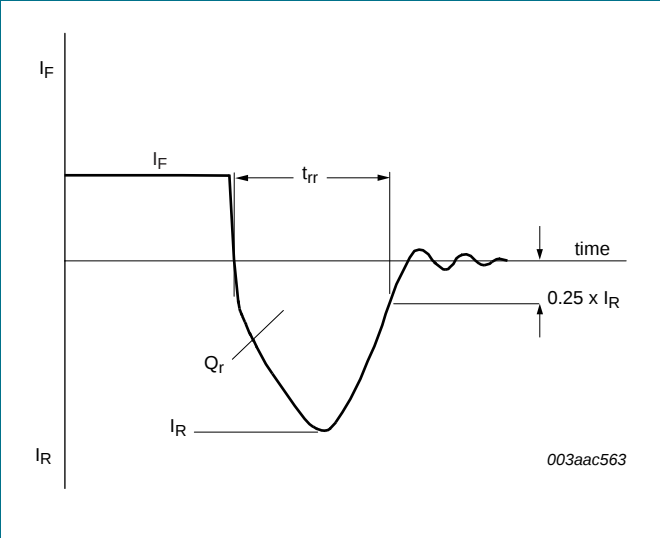


Fig 6. Reverse recovery definitions; step recovery

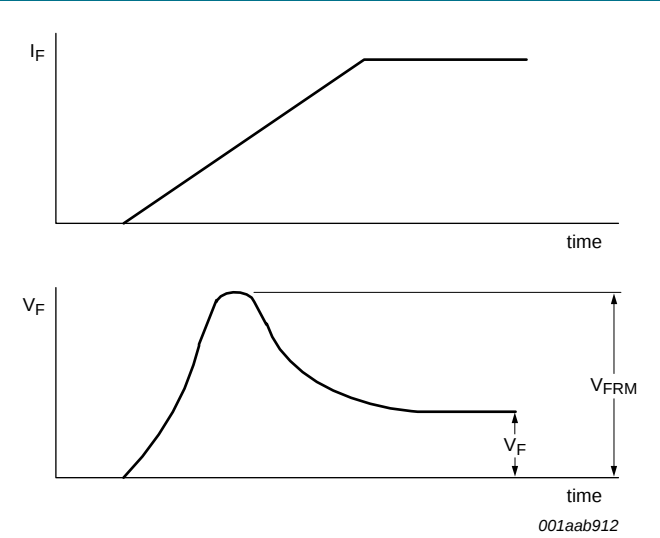


Fig 7. Forward recovery definitions

7. Package outline

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

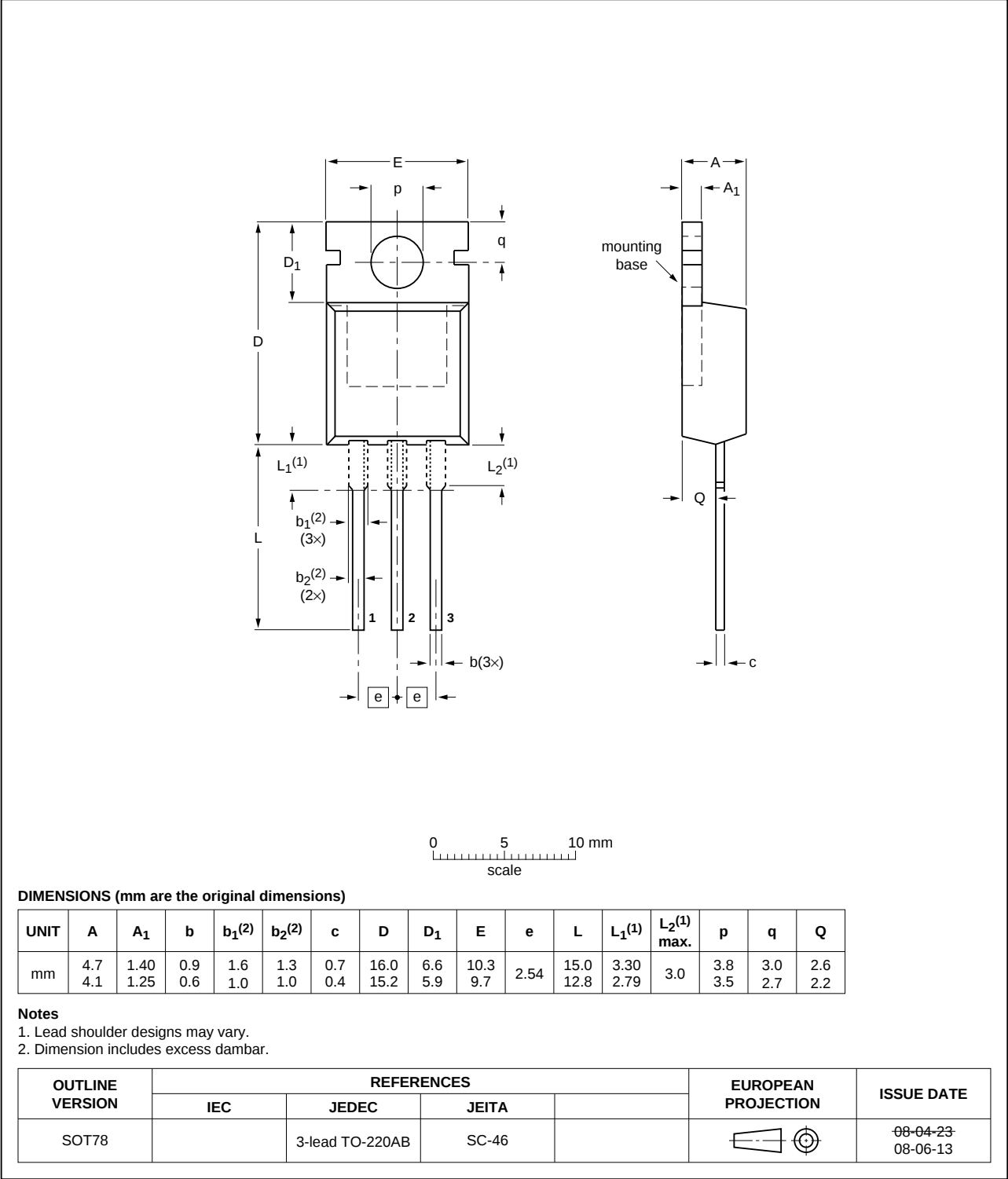


Fig 8. Package outline SOT78 (TO-220AB)

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:	- 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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