

# BYV32E-150

Dual rugged ultrafast rectifier diode, 20 A, 150 V

Rev. 04 — 2 March 2009

Product data sheet

## 1. Product profile

### 1.1 General description

Ultrafast dual epitaxial rectifier diode in a SOT78 (TO-220AB) plastic package.

### 1.2 Features and benefits

- High reverse voltage surge capability
- High thermal cycling performance
- Low thermal resistance
- Soft recovery characteristic minimizes power consuming oscillations
- Very low on-state loss

### 1.3 Applications

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

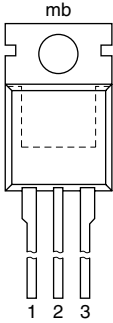
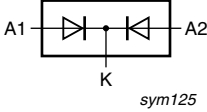
### 1.4 Quick reference data

Table 1. Quick reference

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{RRM}$	repetitive peak reverse voltage		-	-	150	V
$I_{O(AV)}$	average output current	square-wave pulse; $\delta = 0.5$ ; $T_{mb} \leq 115\text{ °C}$ ; both diodes conducting; see <a href="#">Figure 1</a> ; see <a href="#">Figure 2</a>	-	-	20	A
$I_{RRM}$	repetitive peak reverse current	$t_p = 2\ \mu\text{s}$ ; $\delta = 0.001$	-	-	0.2	A
$V_{ESD}$	electrostatic discharge voltage	HBM; C = 250 pF; R = 1.5 k $\Omega$ ; all pins	-	-	8	kV
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1\text{ A}$ ; $V_R = 30\text{ V}$ ; $dI_F/dt = 100\text{ A}/\mu\text{s}$ ; $T_j = 25\text{ °C}$ ; ramp recovery; see <a href="#">Figure 5</a>	-	20	25	ns
		$I_R = 0.5\text{ A}$ ; $I_F = 1\text{ A}$ ; $T_j = 25\text{ °C}$ ; step recovery; measured at reverse current = 0.25 A; see <a href="#">Figure 6</a>	-	10	20	ns
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 8\text{ A}$ ; $T_j = 150\text{ °C}$ ; see <a href="#">Figure 4</a>	-	0.72	0.85	V

## 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; SC-46)

## 3. Ordering information

**Table 3. Ordering information**

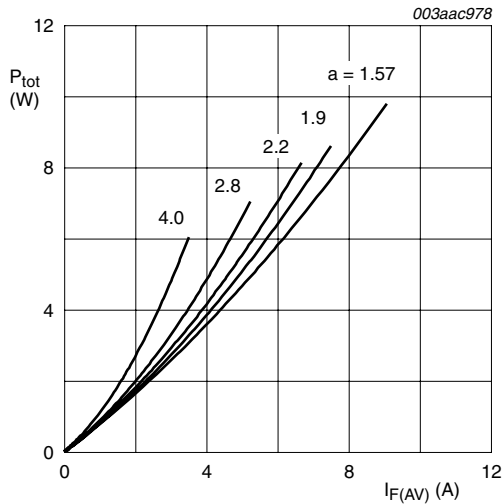
Type number	Package		Version
	Name	Description	
BYV32E-150	TO-220AB;	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead	SOT78
	SC-46		

### 4. Limiting values

**Table 4. Limiting values**

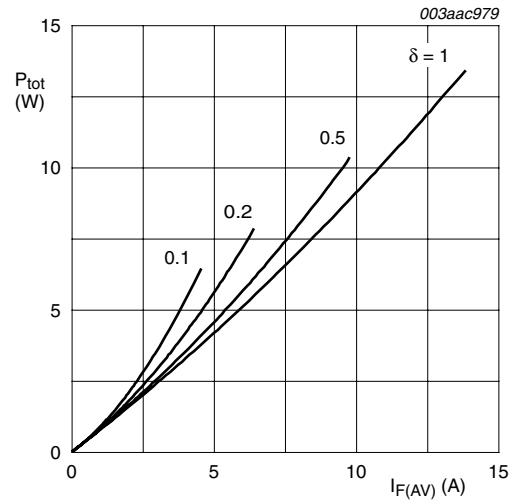
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{RRM}$	repetitive peak reverse voltage		-	150	V
$V_{RWM}$	crest working reverse voltage		-	150	V
$V_R$	reverse voltage	DC	-	150	V
$I_{O(AV)}$	average output current	square-wave pulse; $\delta = 0.5$ ; $T_{mb} \leq 115\text{ }^\circ\text{C}$ ; both diodes conducting; see <a href="#">Figure 1</a> ; see <a href="#">Figure 2</a>	-	20	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_{mb} \leq 115\text{ }^\circ\text{C}$ ; per diode	-	20	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	-	125	A
		$t_p = 8.3\text{ s}$ ; sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; per diode	-	137	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	150	$^\circ\text{C}$
$T_j$	junction temperature		-	150	$^\circ\text{C}$
$V_{ESD}$	electrostatic discharge voltage	HBM; C = 250 pF; R = 1.5 k $\Omega$ ; all pins	-	8	kV



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

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



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

**Fig 2. Forward power dissipation as a function of average forward current; square 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	-	-	1.6	K/W
		with heatsink compound; per diode; see <a href="#">Figure 3</a>	-	-	2.4	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient		-	60	-	K/W

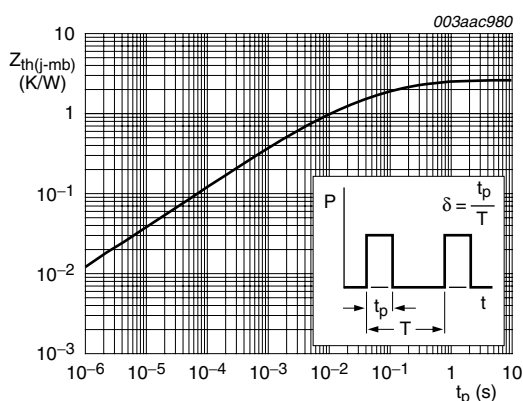
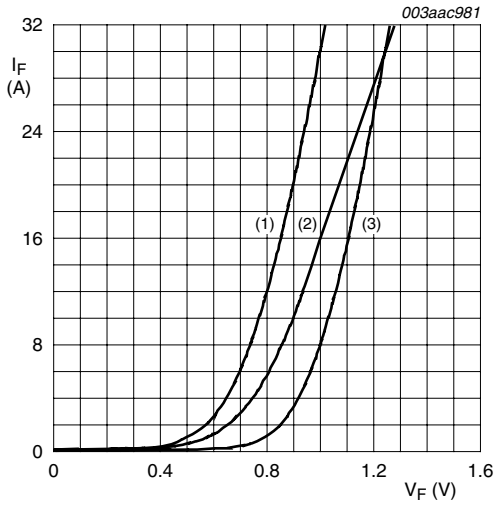


Fig 3. Transient thermal impedance from junction to mounting base as a function of pulse width

## 6. Characteristics

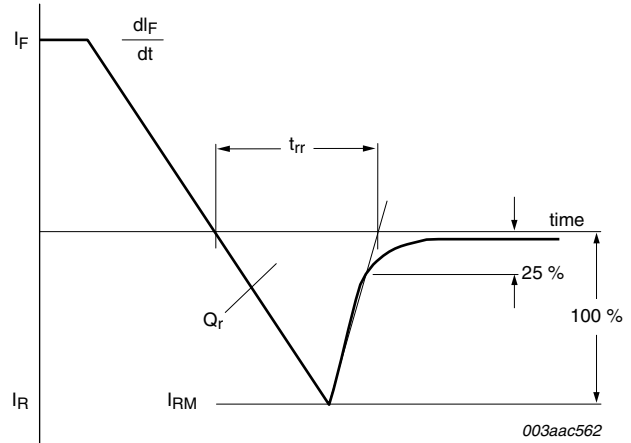
Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 8\text{ A}; T_j = 150\text{ °C}$ ; see <a href="#">Figure 4</a>	-	0.72	0.85	V
		$I_F = 20\text{ A}; T_j = 25\text{ °C}$	-	1	1.15	V
$I_R$	reverse current	$V_R = 150\text{ V}; T_j = 100\text{ °C}$	-	0.2	0.6	mA
		$V_R = 150\text{ V}; T_j = 25\text{ °C}$	-	6	30	$\mu\text{A}$
<b>Dynamic characteristics</b>						
$Q_r$	recovered charge	$I_F = 2\text{ A}; V_R = 30\text{ V}; di_F/dt = 20\text{ A}/\mu\text{s}; T_j = 25\text{ °C}$	-	8	12.5	nC
$t_{rr}$	reverse recovery time	$I_F = 1\text{ A}; V_R = 30\text{ V}; di_F/dt = 100\text{ A}/\mu\text{s};$ ramp recovery; $T_j = 25\text{ °C}$ ; see <a href="#">Figure 5</a>	-	20	25	ns
		$I_F = 1\text{ A}; I_R = 0.5\text{ A};$ step recovery; measured at reverse current = 0.25 A; $T_j = 25\text{ °C}$ ; see <a href="#">Figure 6</a>	-	10	20	ns
$V_{FR}$	forward recovery voltage	$I_F = 1\text{ A}; di_F/dt = 10\text{ A}/\mu\text{s}$ ; see <a href="#">Figure 7</a>	-	-	1	V

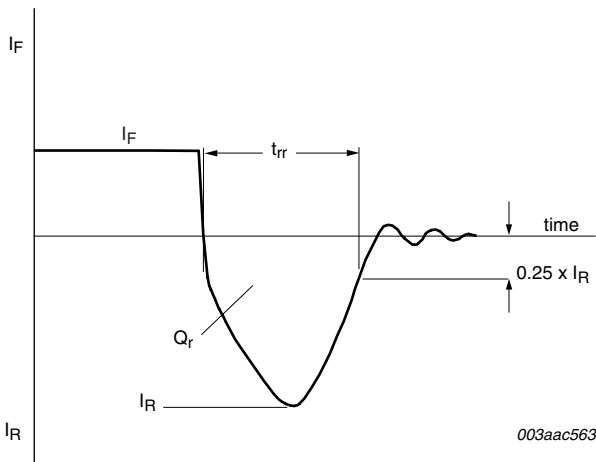


- (1)  $T_j = 150\text{ }^\circ\text{C}$ ; typical values
- (2)  $T_j = 150\text{ }^\circ\text{C}$ ; maximum values
- (3)  $T_j = 25\text{ }^\circ\text{C}$ ; maximum values

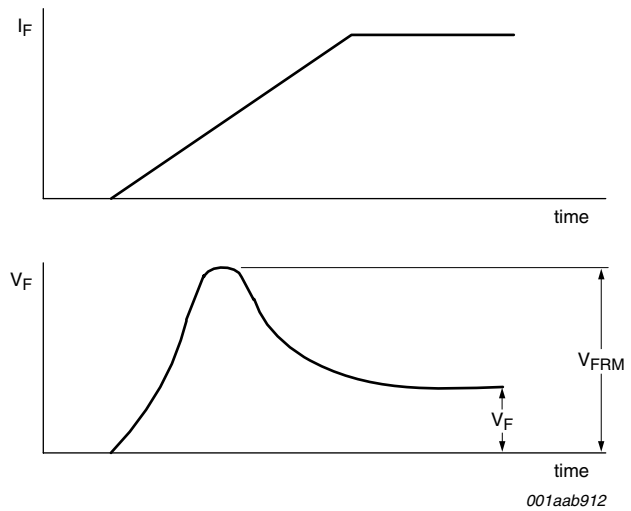
**Fig 4. Forward current as a function of forward voltage**



**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

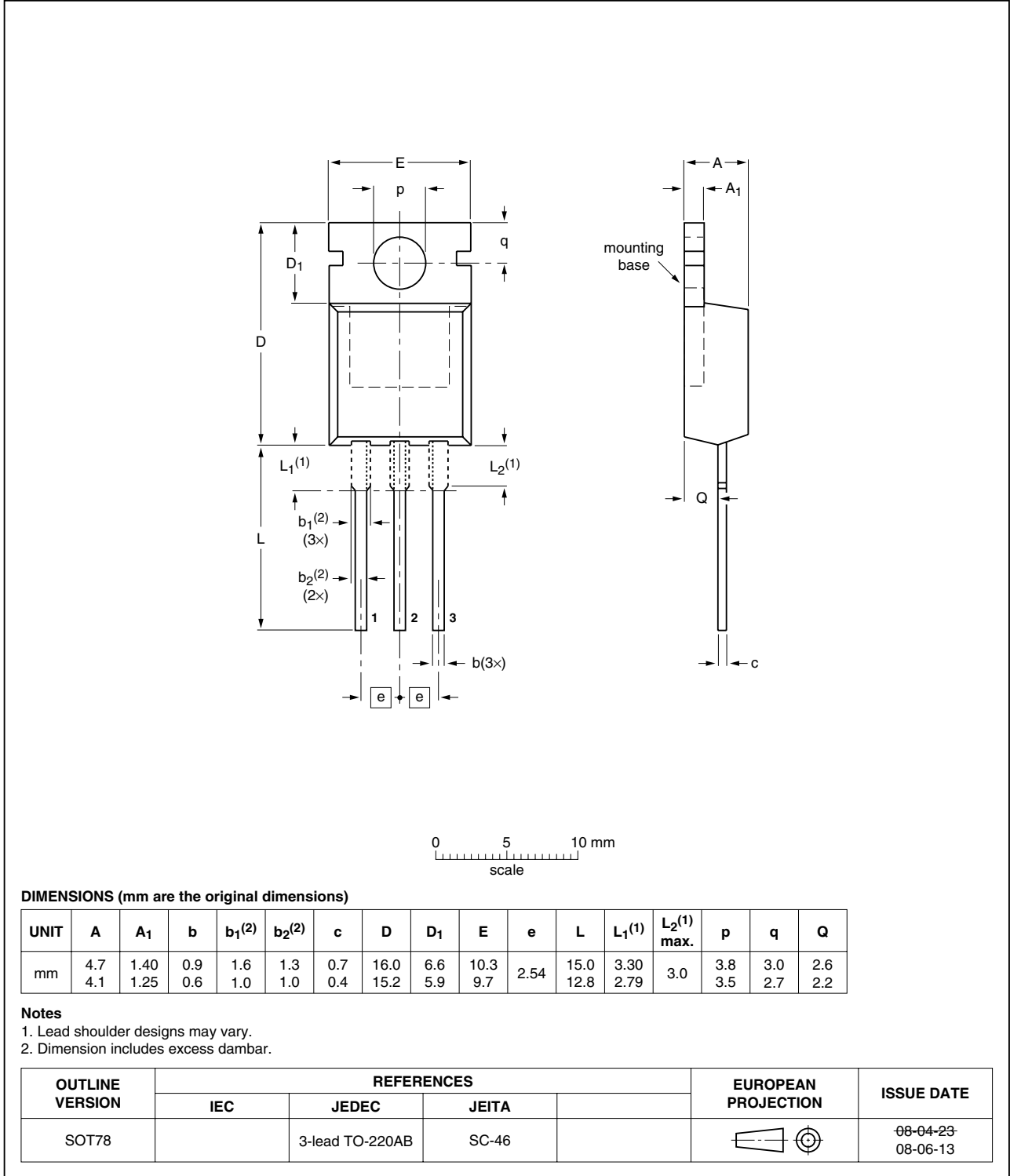


Fig 8. Package outline SOT78 (TO-220AB)

## 8. Revision history

**Table 7.** Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYV32E-150_4	20090302	Product data sheet	-	BYV32E_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>Package outline updated.</li> <li>Type number BYV32E-150 separated from data sheet BYV32E_SERIES_3</li> </ul>		
BYV32E_SERIES_3	20010301	Product specification	-	BYV32E_SERIES_2
BYV32E_SERIES_2	19980701	Product specification	-	BYV32EB_SERIES_1
BYV32EB_SERIES_1	19960801	Product specification	-	-

## 9. Legal information

### 9.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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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