

# BYV32EB-200

Dual rugged ultrafast rectifier diode, 20 A, 200 V

Rev. 04 — 2 March 2009

Product data sheet

## 1. Product profile

### 1.1 General description

Ultrafast dual epitaxial rectifier diode in a SOT404 (D2PAK) surface-mountable 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
- Surface-mountable package
- Very low on-state loss

### 1.3 Applications

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

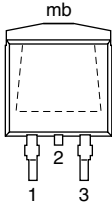
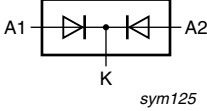
### 1.4 Quick reference data

Table 1. Quick reference

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{RRM}$	repetitive peak reverse voltage		-	-	200	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
$I_{RRM}$	repetitive peak reverse current	$t_p = 2\text{ }\mu\text{s}$ ; $\delta = 0.001$	-	-	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	$I_F = 1\text{ A}$ ; $V_R = 30\text{ V}$ ; $dI_F/dt = 100\text{ A}/\mu\text{s}$ ; $T_j = 25\text{ }^{\circ}\text{C}$ ; ramp recovery; see <a href="#">Figure 5</a>	-	20	25	ns
		$I_R = 1\text{ A}$ ; $I_F = 0.5\text{ A}$ ; $T_j = 25\text{ }^{\circ}\text{C}$ ; measured at reverse current = 0.25 A; step recovery; see <a href="#">Figure 6</a>	-	10	20	ns
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 8\text{ A}$ ; $T_j = 150\text{ }^{\circ}\text{C}$ ; 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	 SOT404 (D2PAK)	
2	K	cathode		
3	A2	anode 2		
mb	K	mounting base; cathode		

[1] it is not possible to make a connection to pin 2 of the SOT404 package

3. Ordering information

Table 3. Ordering information

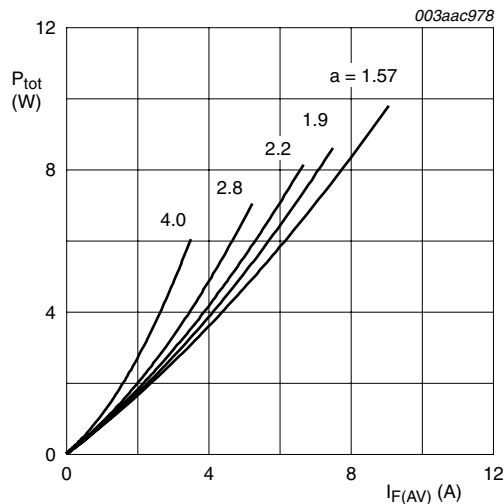
Type number	Package		Version
	Name	Description	
BYV32EB-200	D2PAK	plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped)	SOT404

## 4. Limiting values

**Table 4. Limiting values**

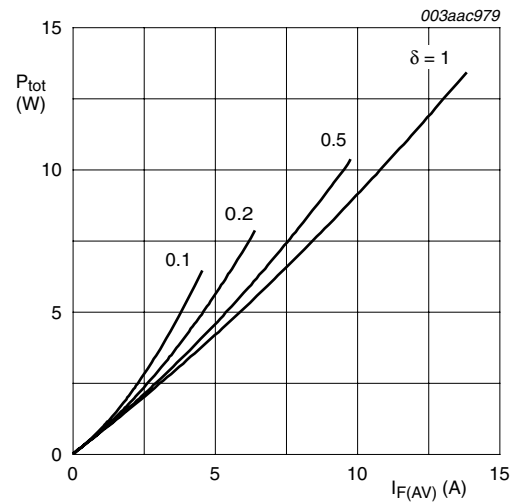
In accordance with the Absolute Maximum Rating System (IEC 60134).

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; $\delta = 0.5$ ; $T_{mb} \leq 115^\circ\text{C}$ ; both diodes conducting; see <a href="#">Figure 1</a> ; see <a href="#">Figure 2</a>	-	20	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\ \mu\text{s}$ ; $T_{mb} \leq 115^\circ\text{C}$ ; per diode	-	20	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	-	137	A
		$t_p = 10\ \text{ms}$ ; sine-wave pulse; $T_{j(\text{init})} = 25^\circ\text{C}$ ; per diode	-	125	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	$^\circ\text{C}$
$V_{ESD}$	electrostatic discharge voltage	HBM; $C = 250\ \text{pF}$ ; $R = 1.5\ \text{k}\Omega$ ; 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	minimum footprint FR4 board	-	50	-	K/W

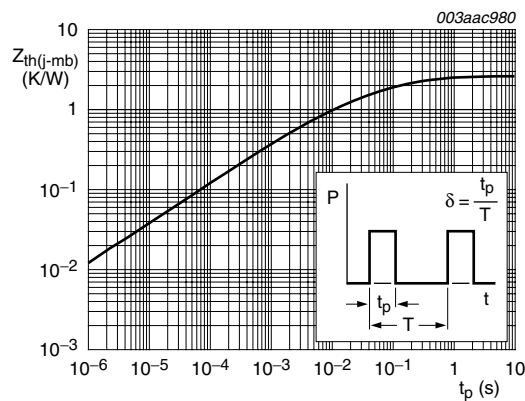
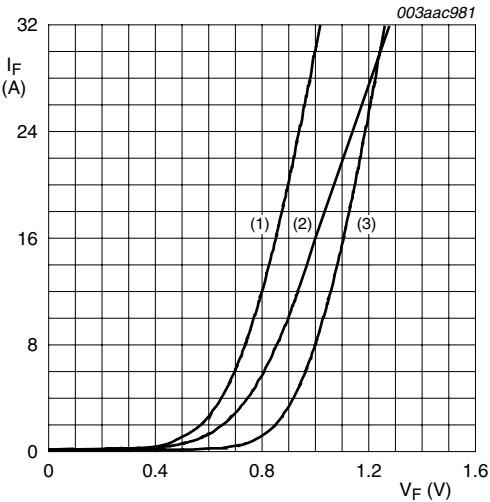


Fig 3. Transient thermal impedance from junction to mounting base as a function of pulse width

## 6. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 8 A; T <sub>j</sub> = 150 °C; see <a href="#">Figure 4</a>	-	0.72	0.85	V
		I <sub>F</sub> = 20 A; T <sub>j</sub> = 25 °C	-	1	1.15	V
I <sub>R</sub>	reverse current	V <sub>R</sub> = 200 V; T <sub>j</sub> = 25 °C	-	6	30	μA
		V <sub>R</sub> = 200 V; T <sub>j</sub> = 100 °C	-	0.2	0.6	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	-	8	12.5	nC
t <sub>rr</sub>	reverse recovery time	I <sub>F</sub> = 1 A; V <sub>R</sub> = 30 V; dI <sub>F</sub> /dt = 100 A/μs; ramp recovery; T <sub>j</sub> = 25 °C; see <a href="#">Figure 5</a>	-	20	25	ns
		I <sub>F</sub> = 0.5 A; I <sub>R</sub> = 1 A; measured at reverse current = 0.25 A; step recovery; T <sub>j</sub> = 25 °C; see <a href="#">Figure 6</a>	-	10	20	ns
V <sub>FR</sub>	forward recovery voltage	I <sub>F</sub> = 1 A; dI <sub>F</sub> /dt = 10 A/μs; 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

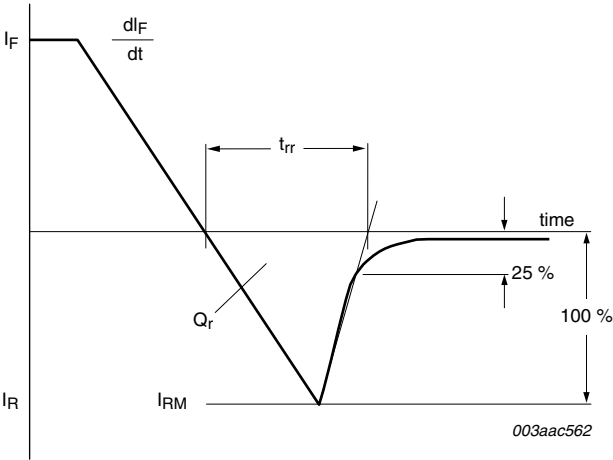


Fig 5. Reverse recovery definitions; ramp recovery

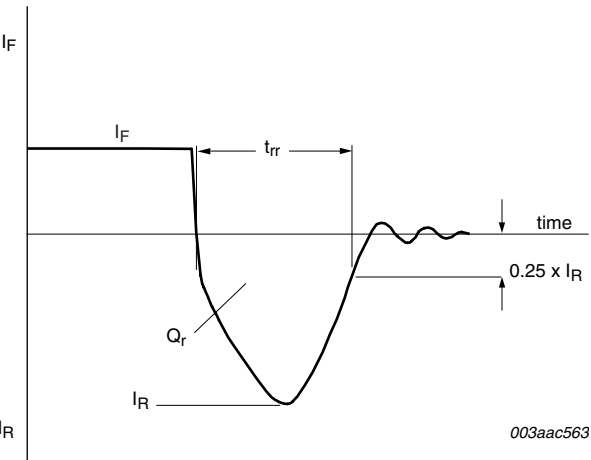


Fig 6. Reverse recovery definitions; step recovery

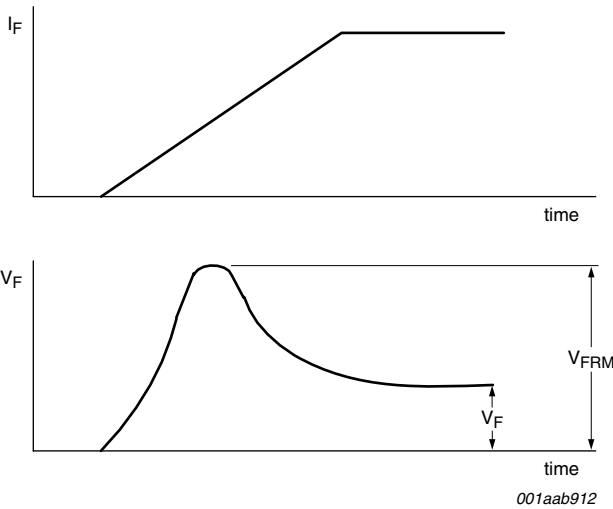


Fig 7. Forward recovery definitions

7. Package outline

Plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped)

SOT404

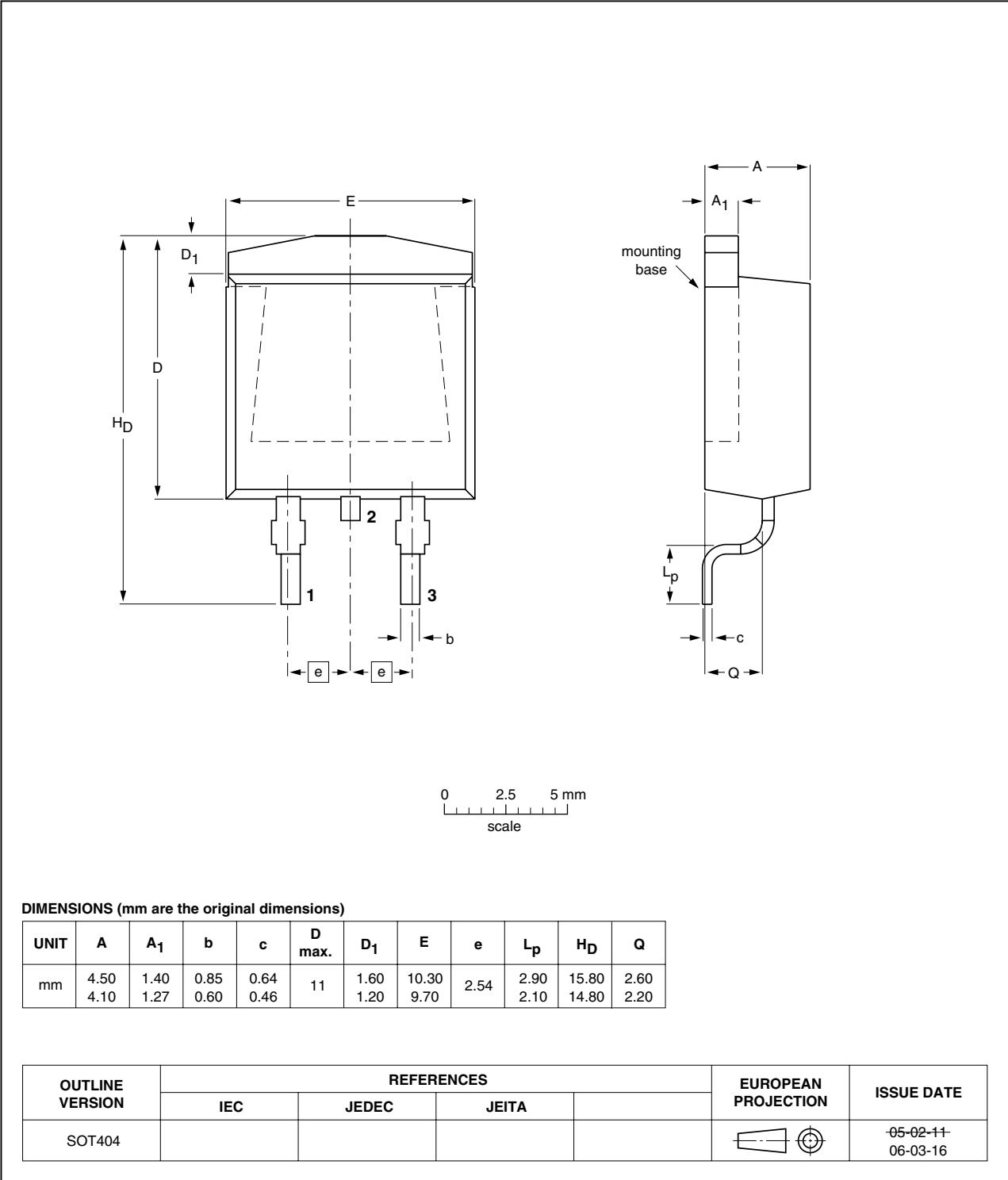


Fig 8. Package outline SOT404 (D2PAK)

## 8. Revision history

**Table 7.** Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYV32EB-200_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 BYV32EB-200 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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

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