

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

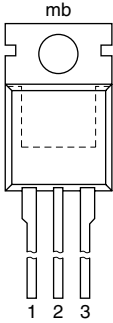
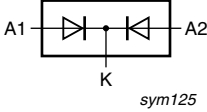
1.4 Quick reference data

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 Figure 1 ; see Figure 2	-	-	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; $C = 250\ \text{pF}$; $R = 1.5\ \text{k}\Omega$; all pins	-	-	8	kV
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1\ \text{A}$; $V_R = 30\ \text{V}$; $dI_F/dt = 100\ \text{A}/\mu\text{s}$; $T_j = 25\ \text{°C}$; ramp recovery; see Figure 5	-	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 = $0.25\ \text{A}$; see Figure 6	-	10	20	ns
Static characteristics						
V_F	forward voltage	$I_F = 8\ \text{A}$; $T_j = 150\ \text{°C}$; see Figure 4	-	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

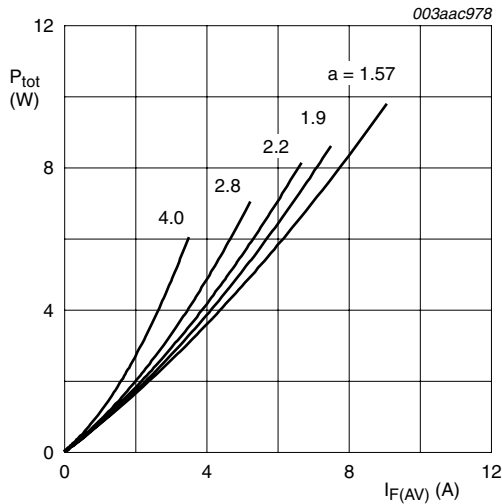
Type number	Package		Version
	Name	Description	
BYV32E-150	TO-220AB;	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead	SOT78
	SC-46		

4. Limiting values

Table 4. Limiting values

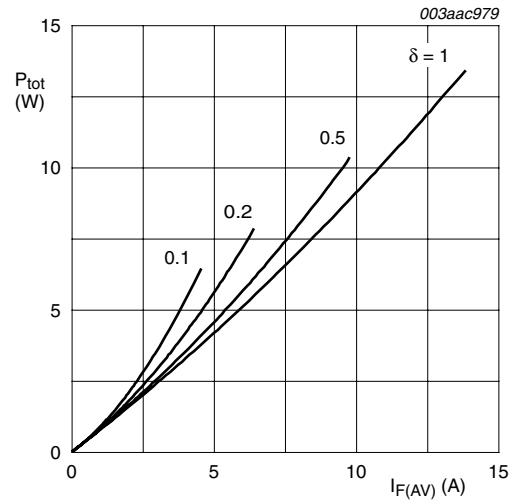
In accordance with the Absolute Maximum Rating System (IEC 60134).

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 Figure 1 ; see Figure 2	-	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 Ω ; 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 Figure 3	-	-	2.4	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient		-	60	-	K/W

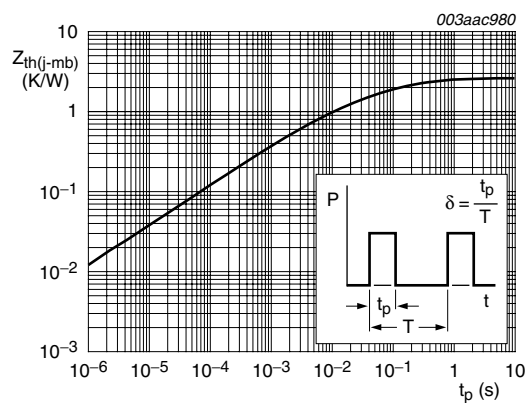
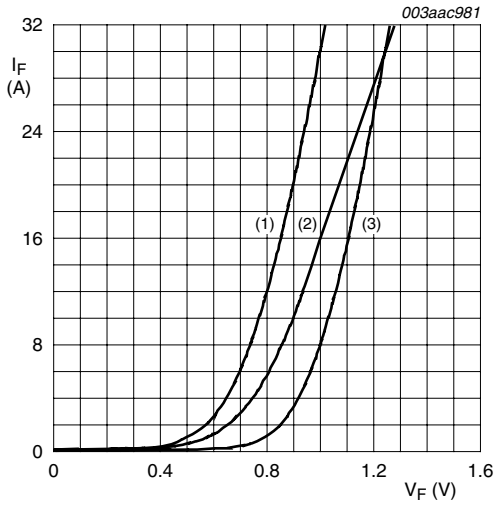


Fig 3. Transient thermal impedance from junction to mounting base as a function of pulse width

6. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 8\text{ A}; T_j = 150\text{ °C};$ see Figure 4	-	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	μA
Dynamic characteristics						
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 Figure 5	-	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 Figure 6	-	10	20	ns
V_{FR}	forward recovery voltage	$I_F = 1\text{ A}; di_F/dt = 10\text{ A}/\mu\text{s};$ 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

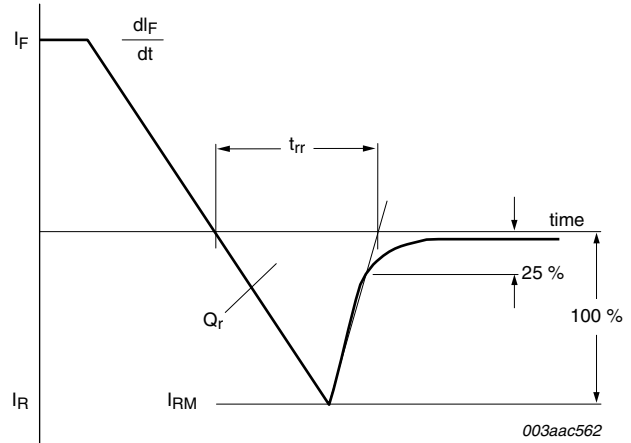


Fig 5. Reverse recovery definitions; ramp recovery

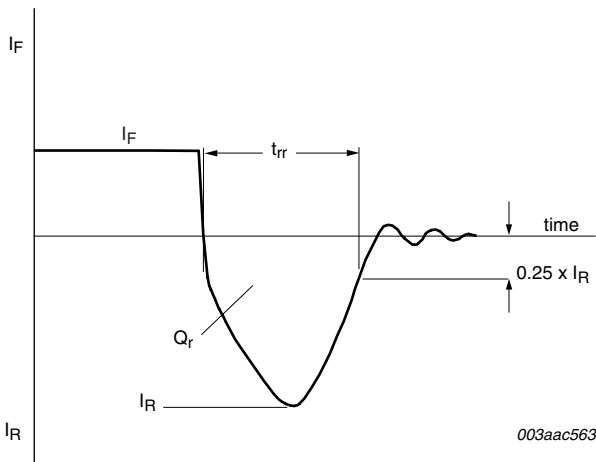


Fig 6. Reverse recovery definitions; step recovery

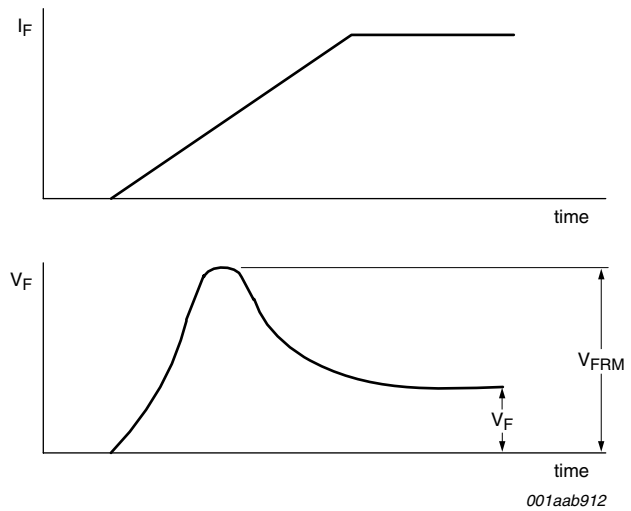


Fig 7. Forward recovery definitions

7. Package outline

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

SOT78

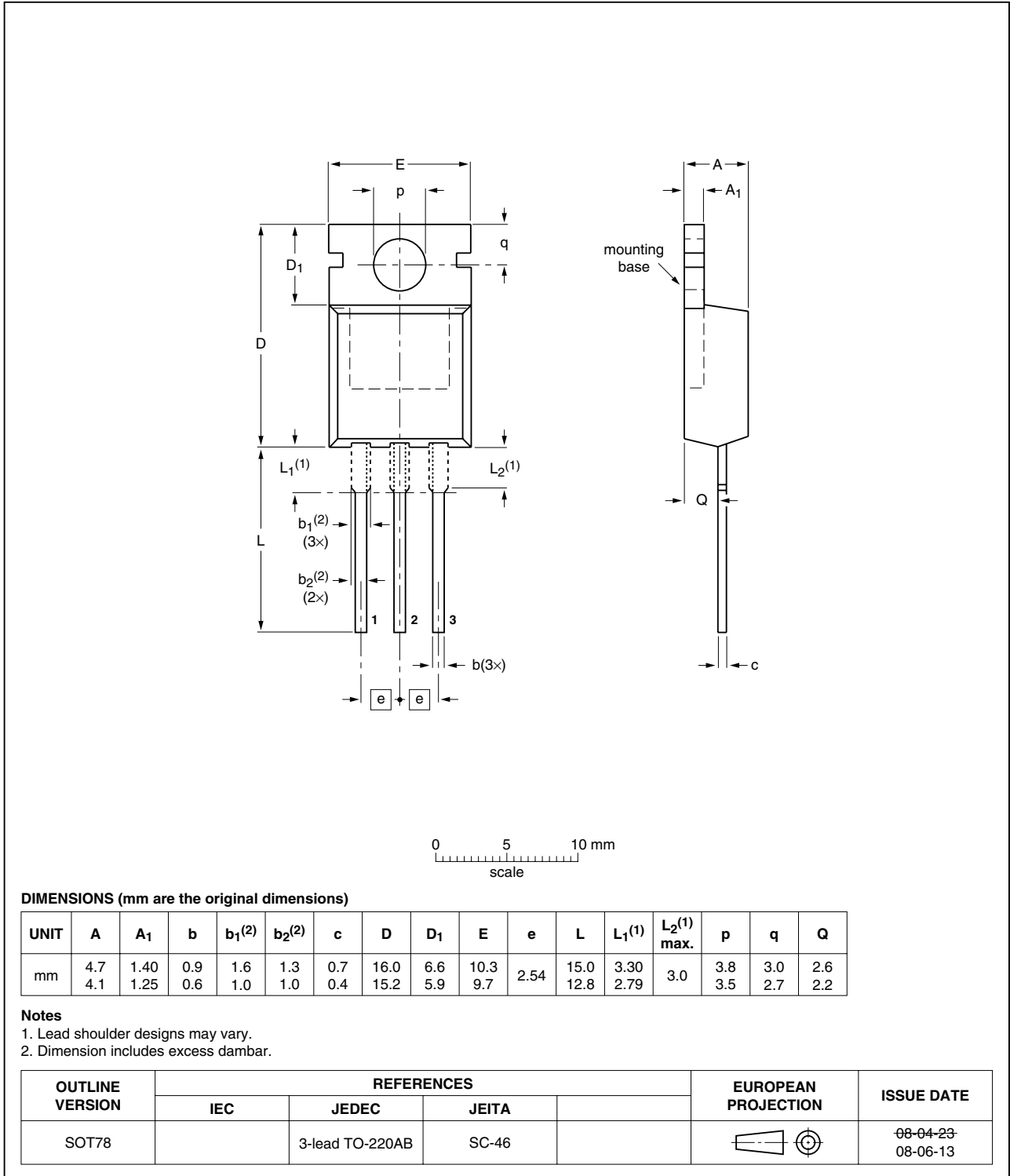


Fig 8. Package outline SOT78 (TO-220AB)

8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYV32E-150_4	20090302	Product data sheet	-	BYV32E_SERIES_3
Modifications:		<ul style="list-style-type: none"> • 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. • Package outline updated. • Type number BYV32E-150 separated from data sheet BYV32E_SERIES_3 		
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 ^{[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".

[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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