# BYV32E-200P

## Dual ultrafast power diode

Rev.01 - 5 June 2018 Product data sheet

## 1. General description

Dual ultrafast power diode in a SOT78 (TO-220AB) plastic package.

## 2. Features and benefits

- Ultra low leakage current
- High junction temperature up to 175 °C
- Low on-state loss
- Fast switching
- Soft recovery characteristic minimizes power consuming oscillations
- High reverse surge capability
- High thermal cycling performance
- Low thermal resistance

## 3. Applications

- Home appliance power supply

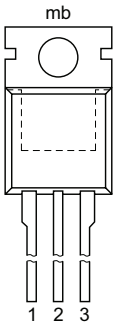
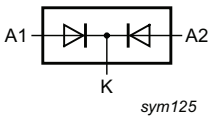
## 4. Quick reference data

**Table 1. Quick reference data**

| Symbol | Parameter | Conditions | Values | | | | Unit |
|---|---|---|---|---|---|---|---|
| **Absolute maximum rating** | | | | | | | |
| $V_{RRM}$ | repetitive peak reverse voltage | | 200 | | | | V |
| $I_{O(AV)}$ | average output current | δ = 0.5; $T_{mb} \leq 149$ °C; Square-wave pulse | 20 | | | | A |
| $I_{RRM}$ | repetitive peak reverse current | δ = 0.001; $t_p$ = 2 µs; per diode | 0.2 | | | | A |
| $V_{ESD}$ | electrostatic discharge voltage | HBM; C = 250 pF; R = 1.5 kΩ; all pins | 8 | | | | kV |
| $I_{FSM}$ | non-repetitive peak forward current | $t_p$ = 10 ms; $T_{j(init)}$ = 25 °C; SIN; per diode; Fig. 4 | 125 | | | | A |
| **Symbol** | **Parameter** | **Conditions** | | **Min** | **Typ** | **Max** | **Unit** |
| **Static characteristics** | | | | | | | |
| $V_F$ | forward voltage | $I_F$ = 8 A; $T_j$ = 150 °C; Fig. 6 | | - | 0.76 | 0.85 | V |
| **Dynamic characteristics** | | | | | | | |
| $t_{rr}$ | reverse recovery time | $I_F$ = 1 A; $V_R$ = 30 V; $dI_F/dt$ = 100 A/µs; $T_j$ = 25 °C; Fig. 7 | | - | 18 | 25 | ns |

## 5. Pinning information

**Table 2. Pinning information**

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|---|---|---|---|---|
| 1 | A1 | anode 1 |  |  |
| 2 | K | cathode | | |
| 3 | A2 | anode 2 | | |

## 6. Ordering information

**Table 3. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| BYV32E-200P | TO-220AB | plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB | SOT78 |

## 7. Marking

**Table 4. Marking codes**

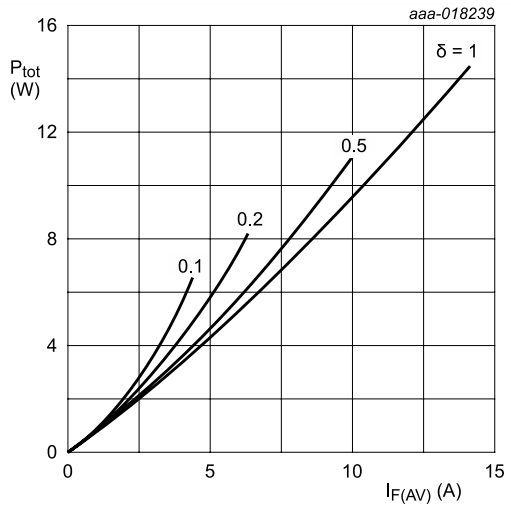
| Type number | Marking codes |
|---|---|
| BYV32E-200P | BYV32E-200P |

# 8. Limiting values

**Table 5. Limiting values**

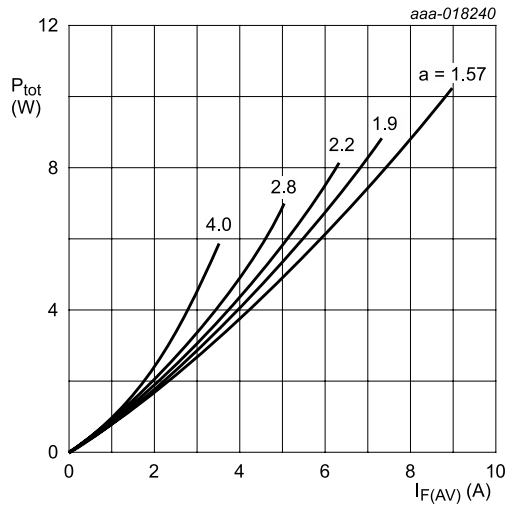
*In accordance with the Absolute Maximum Rating System (IEC 60134).*

| Symbol | Parameter | Conditions | Values | Unit |
|---|---|---|---|---|
| $V_{RRM}$ | repetitive peak reverse voltage | | 200 | V |
| $V_{RWM}$ | crest working reverse voltage | | 200 | V |
| $V_R$ | reverse voltage | DC | 200 | V |
| $I_{F(AV)}$ | average forward current | δ = 0.5; $T_{mb} \leq 149$ °C; Square-ware pulse; Fig. 1; Fig. 2; Fig. 3 | 10 | A |
| $I_{O(AV)}$ | average output current | δ = 0.5; $T_{mb} \leq 149$ °C; Square-ware pulse | 20 | A |
| $I_{FSM}$ | non-repetitive peak forward current | SIN; $t_p$ = 10 ms; $T_{j(init)}$ = 25 °C; per diode; Fig. 4 | 125 | A |
| | | SIN; $t_p$ = 8.3 ms; $T_{j(init)}$ = 25 °C; per diode | 137 | A |
| $I_{RRM}$ | repetitive peak reverse current | δ = 0.001; $t_p$ = 2 µs; per diode | 0.2 | A |
| $I_{RSM}$ | non-repetitive peak reverse current | $t_p$ = 100 µs; per diode | 0.2 | A |
| $T_{stg}$ | storage temperature | | -65 to 175 | °C |
| $T_j$ | junction temperature | | 175 | °C |
| **Electrostatic discharge** | | | | |
| $V_{ESD}$ | electrostatic discharge voltage | HBM; C = 250 pF; R = 1.5 kΩ; all pins | 8 | kV |




$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$
$V_O$ = 0.802 V; $R_S$ = 0.015 Ω

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




a = form factor = $I_{F(RMS)} / I_{F(AV)}$
$V_O$ = 0.802 V; $R_S$ = 0.015 Ω

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

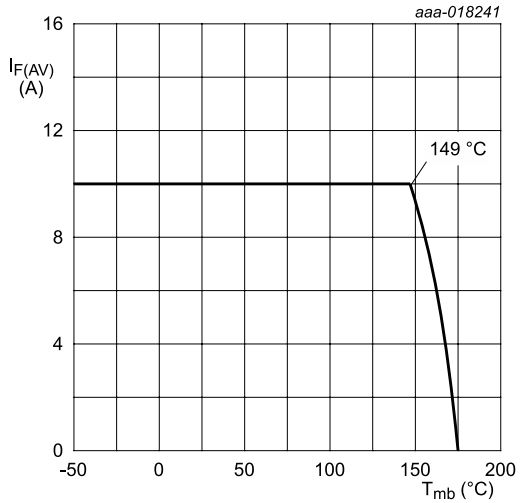



**Fig. 3. Forward current as a function of mounting base temperature; maximum values**

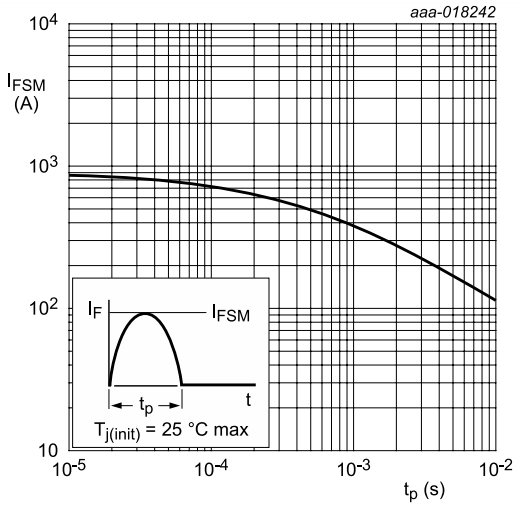



**Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values**

# 9. Thermal characteristics

**Table 6. 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 | | - | - | 1.4 | K/W |
| | | with heatsink compound; per diode; Fig. 5 | | - | - | 2.4 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | | - | 60 | - | K/W |

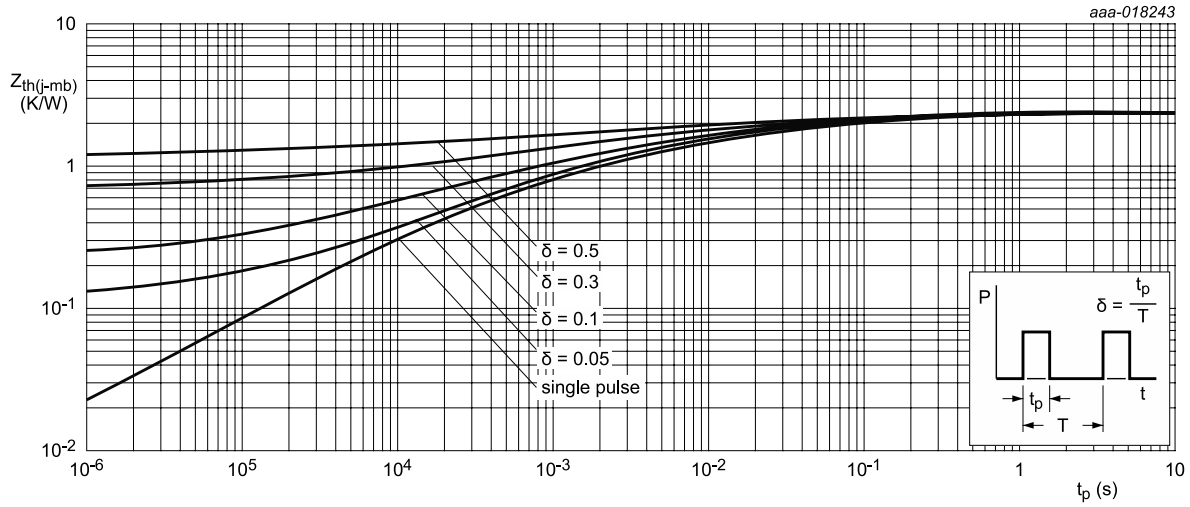
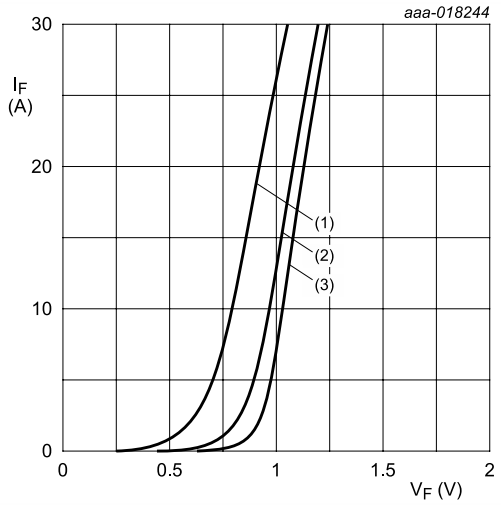



**Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration**

# 10. Characteristics

**Table 7. Characteristics**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| **Static characteristics** | | | | | | | |
| $V_F$ | forward voltage | $I_F$ = 8 A; $T_j$ = 150 °C; Fig. 6 | | - | 0.76 | 0.85 | V |
| | | $I_F$ = 20 A; $T_j$ = 25 °C; Fig. 6 | | - | 1.06 | 1.15 | V |
| | | $I_F$ = 10 A; $T_j$ = 25 °C; Fig. 6 | | - | 0.95 | - | V |
| $I_R$ | reverse current | $V_R$ = 200 V; $T_j$ = 25 °C | | - | 0.3 | 5 | µA |
| | | $V_R$ = 200 V; $T_j$ = 150 °C | | - | 70 | 250 | µA |
| **Dynamic characteristics** | | | | | | | |
| $Q_r$ | recovered charge | $I_F$ = 2 A; $V_R$ = 30 V; $dI_F/dt$ = 20 A/µs; $T_j$ = 25 °C; Fig. 7 | | - | 13.5 | - | nC |
| | | $I_F$ = 1 A; $V_R$ = 30 V; $dI_F/dt$ = 100 A/µs; $T_j$ = 25 °C; Fig. 7 | | - | 14.5 | - | nC |
| $t_{rr}$ | reverse recovery time | $I_F$ = 1 A; $V_R$ = 30 V; $dI_F/dt$ = 100 A/µs; $T_j$ = 25 °C; Fig. 7 | | - | 18 | 25 | ns |
| $I_{RM}$ | peak reverse recovery current | $I_F$ = 1 A; $V_R$ = 30 V; $dI_F/dt$ = 100 A/µs; $T_j$ = 25 °C | | - | 1.7 | - | A |




$V_O$ = 0.802 V; $R_S$ = 0.015 Ω
(1) $T_j$ = 150 °C; typical values
(2) $T_j$ = 150 °C; maximum values
(3) $T_j$ = 25 °C; maximum values

**Fig. 6. Forward current as a function of forward voltage**

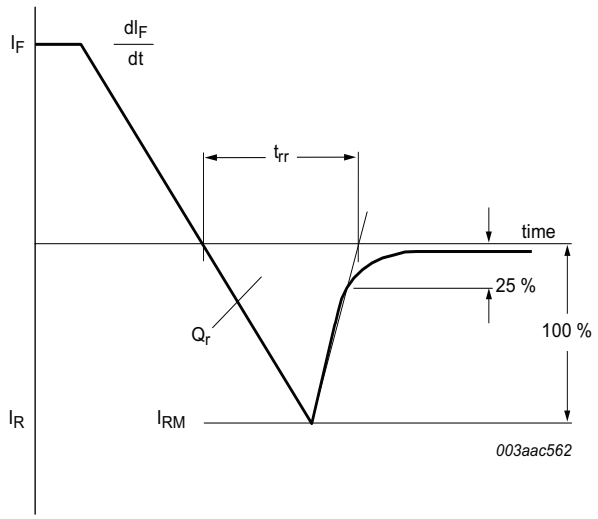
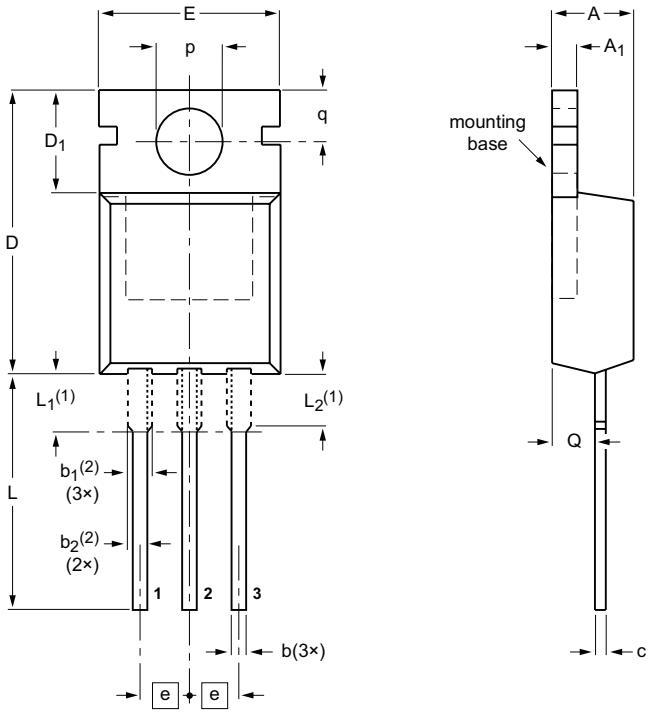



**Fig. 7. Reverse recovery definitions; ramp recovery**

# 11. Package outline

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




**DIMENSIONS (mm are the original dimensions)**

| UNIT | A | $A_1$ | b | $b_1$(2) | $b_2$(2) | c | D | $D_1$ | E | e | L | $L_1$(1) | $L_2$(1) max. | p | q | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 4.7<br>4.1 | 1.40<br>1.25 | 0.9<br>0.6 | 1.6<br>1.0 | 1.3<br>1.0 | 0.7<br>0.4 | 16.0<br>15.2 | 6.6<br>5.9 | 10.3<br>9.7 | 2.54 | 15.0<br>12.8 | 3.30<br>2.79 | 3.0 | 3.8<br>3.5 | 3.0<br>2.7 | 2.6<br>2.2 |

**Notes**

1. Lead shoulder designs may vary.
2. Dimension includes excess dambar.

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT78 | | 3-lead TO-220AB | SC-46 | | | ~~08-04-23~~<br>08-06-13 |

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