# BYQ72EK-200

## Dual ultrafast power diode

26 September 2018 Product data sheet

## 1. General description

Dual ultrafast power diode in a SOT1259 (3-lead TO-3P) plastic package.

## 2. Features and benefits

- Very 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

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

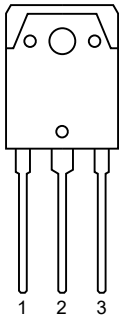
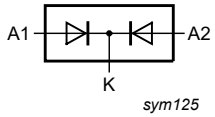
## 4. Quick reference data

**Table 1. Quick reference data**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_R$ | reverse voltage | DC | | - | - | 200 | V |
| $I_{F(AV)}$ | average forward current | $\delta = 0.5$ ; $T_{mb} \leq 119$ °C; square-wave pulse; Fig. 1; Fig. 2; Fig. 3 | | - | - | 15 | A |
| $I_{FSM}$ | non-repetitive peak forward current | $t_p = 10$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse; per diode; Fig. 4 | | - | - | 200 | A |
| | | $t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse; per diode | | - | - | 220 | A |
| **Static characteristics** | | | | | | | |
| $V_F$ | forward voltage | $I_F = 30$ A; $T_j = 25$ °C; Fig. 6 | | - | 1 | 1.2 | V |
| | | $I_F = 15$ A; $T_j = 25$ °C; Fig. 6 | | - | 0.95 | 1.05 | V |
| | | $I_F = 15$ A; $T_j = 150$ °C | | - | 0.78 | 0.9 | 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 |   TO3P (SOT1259) |   |
| 2 | K | cathode | | |
| 3 | A2 | anode 2 | | |
| mb | mb | mounting base; connected to cathode | | |

## 6. Ordering information

**Table 3. Ordering information**

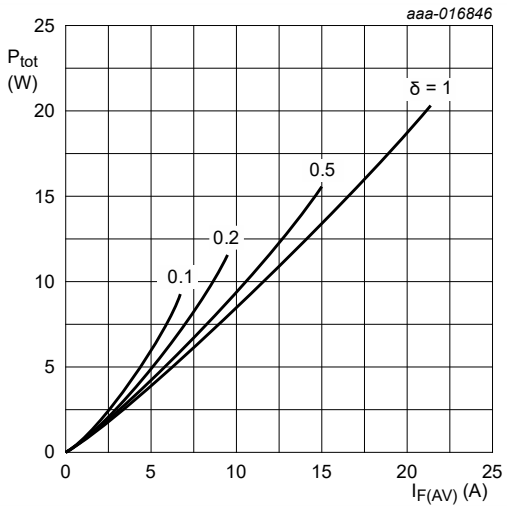
| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| BYQ72EK-200 | TO3P | Plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO3P | SOT1259 |

# 7. Limiting values

**Table 4. Limiting values**

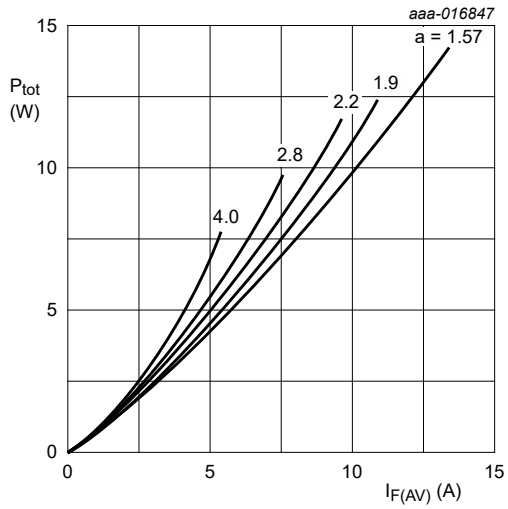
*In accordance with the Absolute Maximum Rating System (IEC 60134).*

| 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 |
| $I_{F(AV)}$ | average forward current | δ = 0.5 ; $T_{mb}$ ≤ 119 °C; square-wave pulse; Fig. 1; Fig. 2; Fig. 3 | | - | 15 | A |
| $I_{O(AV)}$ | average output current | δ = 0.5 ; $T_{mb}$ ≤ 119 °C; square-wave pulse; both diodes conducting | | - | 30 | A |
| $I_{FSM}$ | non-repetitive peak forward current | $t_p$ = 10 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse; per diode; Fig. 4 | | - | 200 | A |
| | | $t_p$ = 8.3 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse; per diode | | - | 220 | A |
| $I_{RRM}$ | repetitive peak reverse current | $t_p$ = 2 µs; δ = 0.001; 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 | | | -40 | 150 | °C |
| $T_j$ | junction temperature | | | - | 150 | °C |
| **Electrostatic discharge** | | | | | | |
| $V_{ESD}$ | electrostatic discharge voltage | C = 250 pF; R = 1.5 kΩ; HBM | | - | 8 | V |




$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$
$V_o = 0.79$ V; $R_s = 0.008$ Ω

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




a = form factor = $I_{F(RMS)} / I_{F(AV)}$
$V_o = 0.79$ V; $R_s = 0.008$ Ω

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

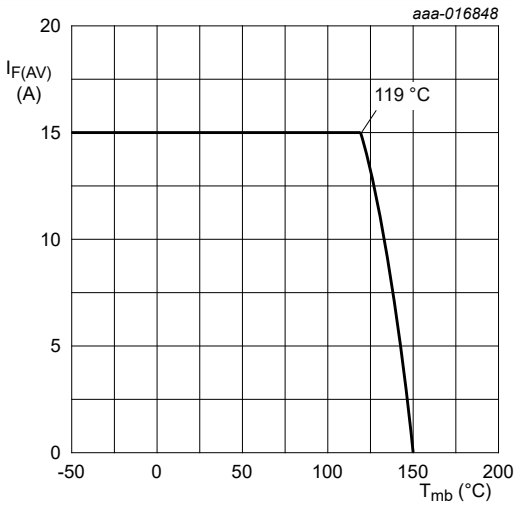



**Fig. 3. Average forward current as a function of mounting base temperature; per diode; maximum values**

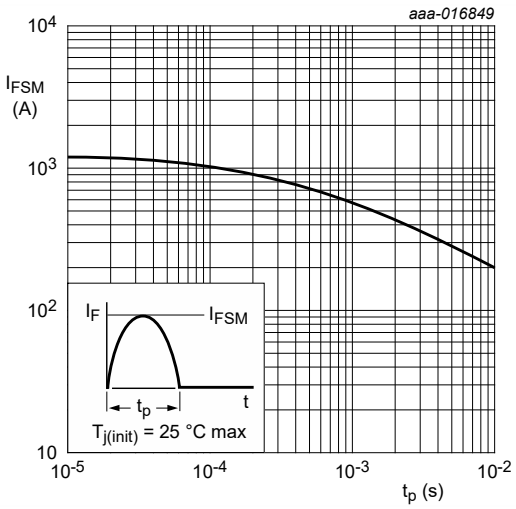



**Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; per diode; maximum values**

# 8. 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; per diode; Fig. 5 | | - | 1.1 | 2 | K/W |
| | | with heatsink compound; both diodes conducting | | - | 0.7 | 1.2 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient free air | in free air | | - | 45 | - | K/W |

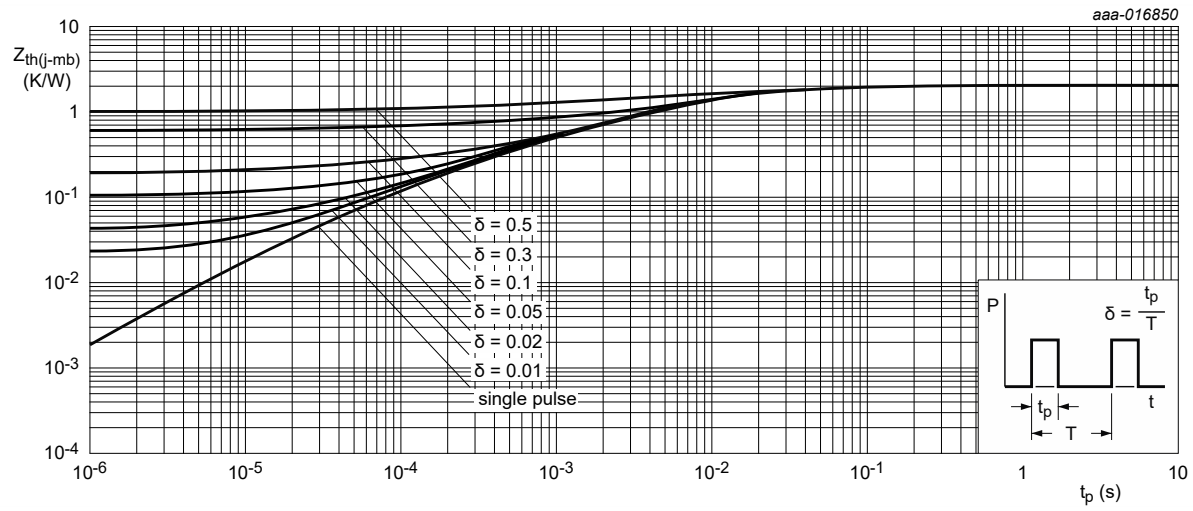


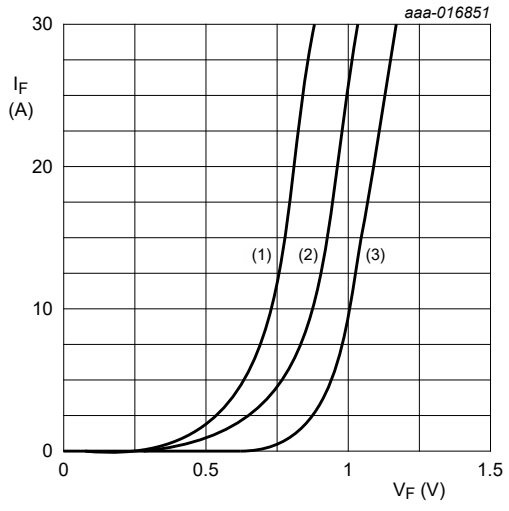

**Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration; per diode; maximum values**

# 9. Characteristics

**Table 6. Characteristics**

*characteristics are per diode unless otherwise stated*

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| **Static characteristics** | | | | | | | |
| $V_F$ | forward voltage | $I_F$ = 30 A; $T_j$ = 25 °C; Fig. 6 | | - | 1 | 1.2 | V |
| | | $I_F$ = 15 A; $T_j$ = 25 °C; Fig. 6 | | - | 0.95 | 1.05 | V |
| | | $I_F$ = 15 A; $T_j$ = 150 °C | | - | 0.78 | 0.9 | V |
| $I_R$ | reverse current | $V_R$ = 200 V; $T_j$ = 25 °C | | - | 3 | 20 | µA |
| | | $V_R$ = 200 V; $T_j$ = 100 °C | | - | 0.3 | 1 | mA |
| **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 |
| $I_{RM}$ | peak reverse recovery current | | | - | 1 | - | A |
| $Q_r$ | recovered charge | $I_F$ = 2 A; $V_R$ = 30 V; $dI_F/dt$ = 20 A/µs; $T_j$ = 25 °C; Fig. 7 | | - | 6 | 15 | nC |
| | | $I_F$ = 1 A; $V_R$ = 30 V; $dI_F/dt$ = 100 A/µs; $T_j$ = 25 °C; Fig. 7 | | - | 10 | - | nC |
| $V_{FR}$ | forward recovery voltage | $I_F$ = 1 A; $dI_F/dt$ = 10 A/µs; $T_j$ = 25 °C; Fig. 8 | | - | 1 | - | V |




$V_o$ = 0.79 V; $R_s$ = 0.008 Ω
(1) Tj = 150 °C; typical values
(2) Tj = 150 °C; maximum values
(3) Tj = 25 °C; maximum values

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

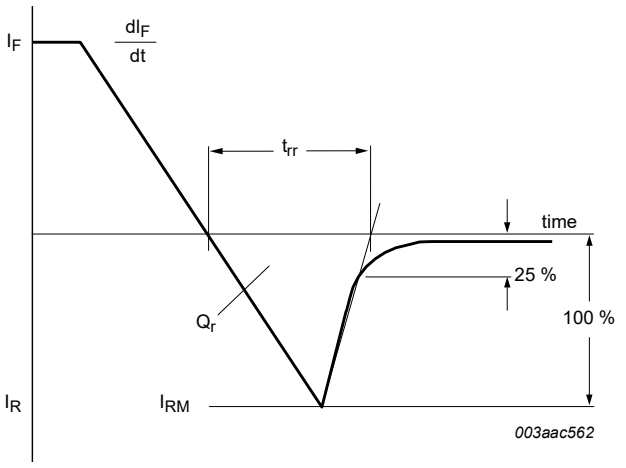



**Fig. 7. Reverse recovery definitions; ramp recovery**

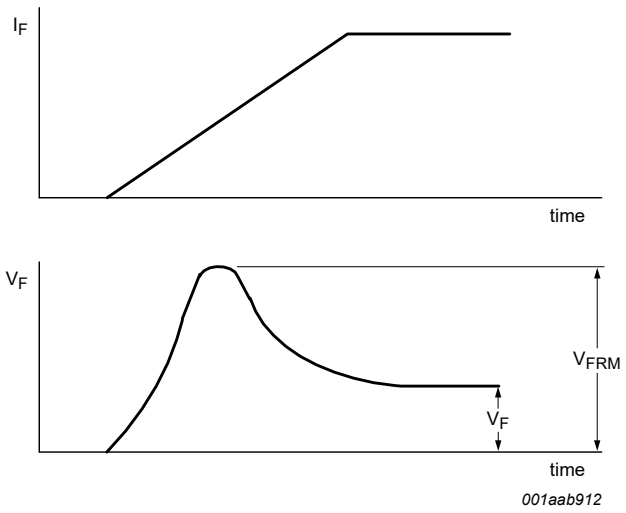
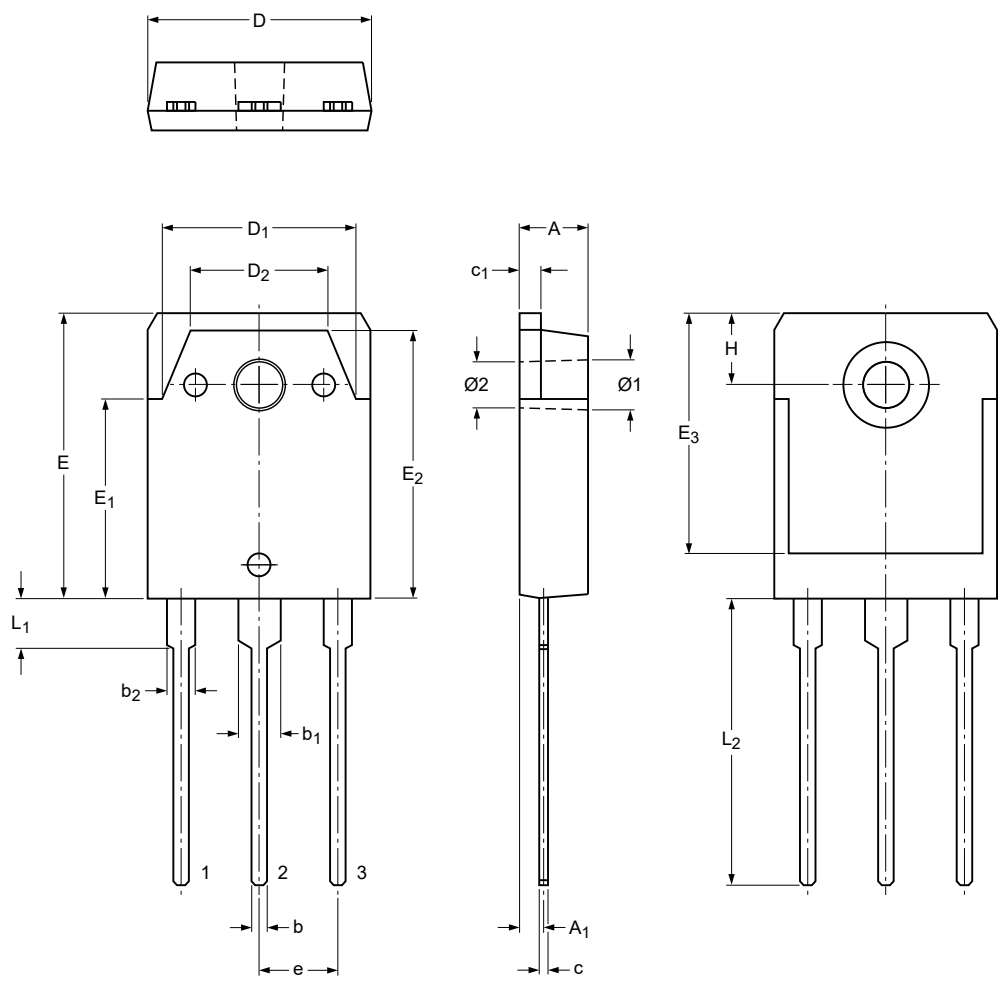



**Fig. 8. Forward recovery definitions**

## 10. Package outline

**Plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO3P** **SOT1259**




Dimensions (mm are the original dimensions)

| Unit | | A | $A_1$ | b | $b_1$ | $b_2$ | c | $c_1$ | D | $D_1$ | $D_2$ | e | E | $E_1$ | $E_2$ | $E_3$ | H | $L_1$ | $L_2$ | Ø1 | Ø2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | max | 5.0 | 1.6 | 1.2 | 3.2 | 2.2 | 0.75 | 1.65 | 15.8 | 13.8 | 9.8 | | 20.1 | 14.1 | 18.9 | 17.06 | 5.2 | 3.7 | 20.3 | 3.5 | 3.3 |
| | nom | | | | | | | | | | | 5.45 | | | | | | | | | |
| | min | 4.6 | 1.2 | 0.8 | 2.8 | 1.8 | 0.55 | 1.45 | 15.4 | 13.4 | 9.4 | (typ) | 19.7 | 13.7 | 18.5 | 16.46 | 4.8 | 3.3 | 19.7 | 3.3 | 3.1 |

*sot1259_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT1259 | | TO3P | | | | ~~14-10-21~~ 14-10-22 |

**Fig. 9. Package outline TO3P (SOT1259)**

## 11. Package outline

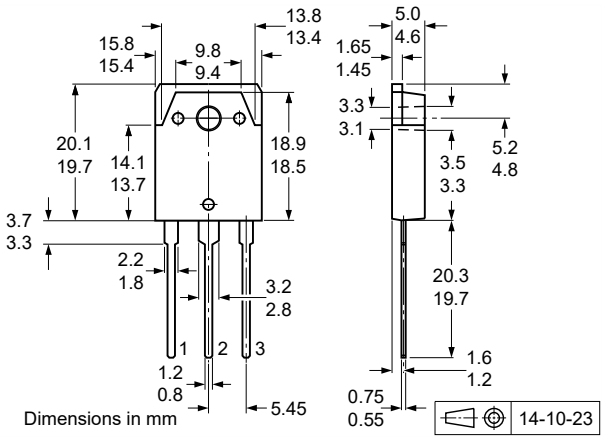



**Fig. 10. Package outline TO3P (SOT1259)**

# 12. Legal information

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| Document status [1][2] | Product status [3] | Definition |
|---|---|---|
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## 13. Contents





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