

1. General description

Dual ultrafast power diode in a SOT429 (3-lead TO-247) 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

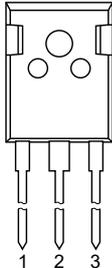
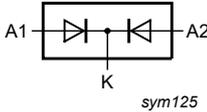
3. Quick reference data

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 | $\delta = 0.5$; $T_{mb} \leq 113$ °C; square-wave pulse; per diode; 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 | $I_F = 15$ A; $T_j = 25$ °C; Fig. 6 | - | 0.95 | 1.05 | V |
| | | $I_F = 30$ A; $T_j = 25$ °C; Fig. 6 | - | 1 | 1.2 | V |
| | | $I_F = 15$ A; $T_j = 150$ °C; Fig. 6 | - | 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/ μ s; $T_j = 25$ °C; Fig. 7 | - | 18 | 25 | ns |

4. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------|--|---|
| 1 | A1 | anode 1 |  <p>TO-247 (SOT429)</p> |  <p>sym125</p> |
| 2 | K | cathode | | |
| 3 | A2 | anode 2 | | |

5. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|---|---------|
| | Name | Description | Version |
| BYQ72EW-200 | TO-247 | plastic single-ended through-hole package; heatsink mounted; 1 mounting hole; 3 lead TO-247 | SOT429 |

6. 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 | $\delta = 0.5$; $T_{mb} \leq 113$ °C; square-wave pulse; per diode; Fig. 1 ; Fig. 2 ; Fig. 3 | - | 15 | A |
| $I_{O(AV)}$ | average output current | $\delta = 0.5$; $T_{mb} \leq 113$ °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 | $\delta = 0.001$; $t_p = 2$ μ s; per diode | - | 0.2 | A |
| I_{RSM} | non-repetitive peak reverse current | $t_p = 100$ μ s; 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 | HBM; C = 250 pF; R = 1.5 k Ω | - | 8 | kV |

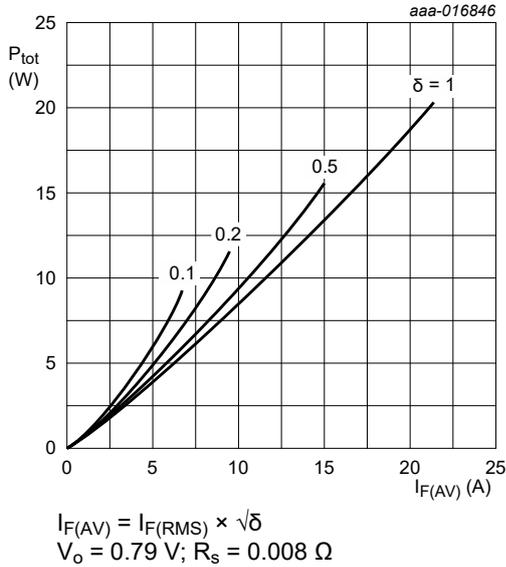


Fig. 1. Forward power dissipation as a function of average forward current; square waveform; per diode; maximum values

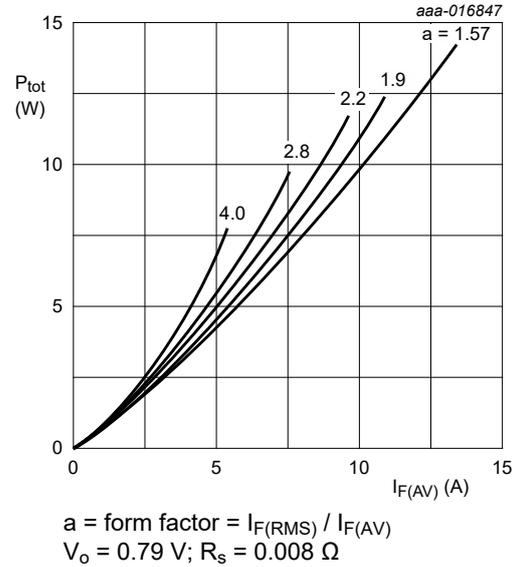


Fig. 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; per diode; maximum values

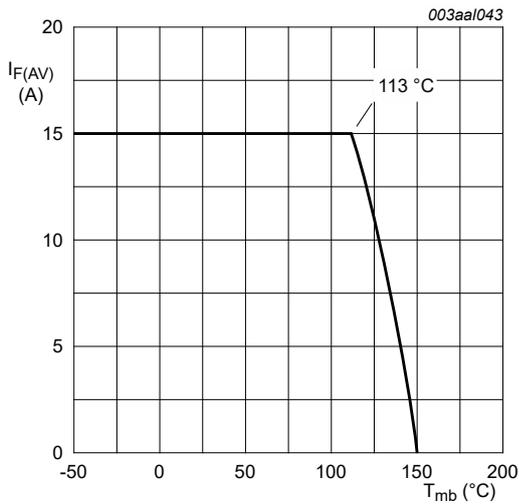


Fig. 3. Average forward current as a function of mounting base temperature; per diode; maximum values

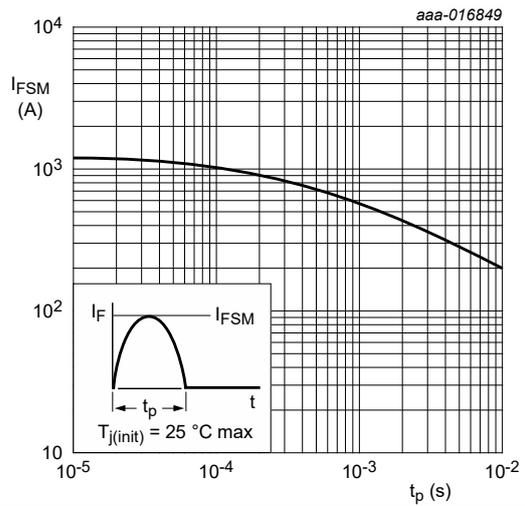


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; per diode; maximum values

7. 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 | - | 1.2 | 2.4 | K/W |
| | | with heatsink compound; both diodes conducting | - | 0.7 | 1.4 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient free air | in free air | - | 45 | - | K/W |

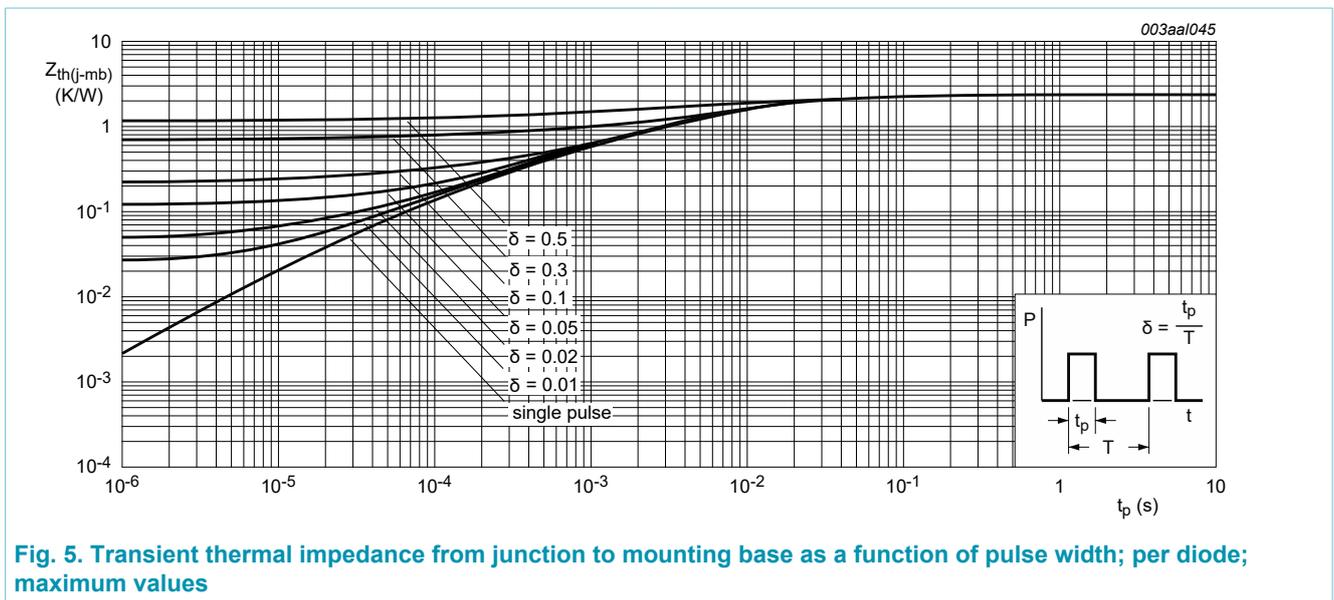


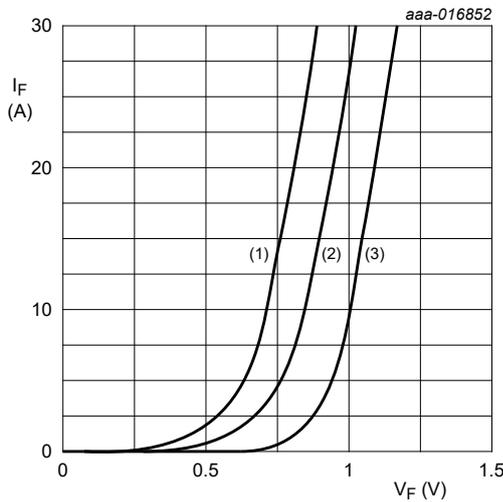
Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse width; per diode; maximum values

8. Characteristics

Table 6. Characteristics

characteristics are per diode unless otherwise stated

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|-------------------------------|---|-----|------|------|---------------|
| Static characteristics | | | | | | |
| V_F | forward voltage | $I_F = 15 \text{ A}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 6}$ | - | 0.95 | 1.05 | V |
| | | $I_F = 30 \text{ A}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 6}$ | - | 1 | 1.2 | V |
| | | $I_F = 15 \text{ A}; T_j = 150 \text{ }^\circ\text{C}; \text{ Fig. 6}$ | - | 0.78 | 0.9 | V |
| I_R | reverse current | $V_R = 200 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$ | - | 3 | 20 | μA |
| | | $V_R = 200 \text{ V}; T_j = 100 \text{ }^\circ\text{C}$ | - | 0.3 | 1 | mA |
| Dynamic characteristics | | | | | | |
| t_{rr} | reverse recovery time | $I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 100 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 7}$ | - | 18 | 25 | ns |
| I_{RM} | peak reverse recovery current | $I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 100 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}$ | - | 1 | - | A |
| Q_r | recovered charge | $I_F = 2 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 20 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 7}$ | - | 6 | 15 | nC |
| | | $I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 100 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}$ | - | 10 | - | nC |
| V_{FR} | forward recovery voltage | $I_F = 1 \text{ A}; dI_F/dt = 10 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 8}$ | - | 1 | - | V |



$V_o = 0.79 \text{ V}; R_s = 0.008 \text{ } \Omega$
 (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. 6. Forward current as a function of forward voltage, per diode

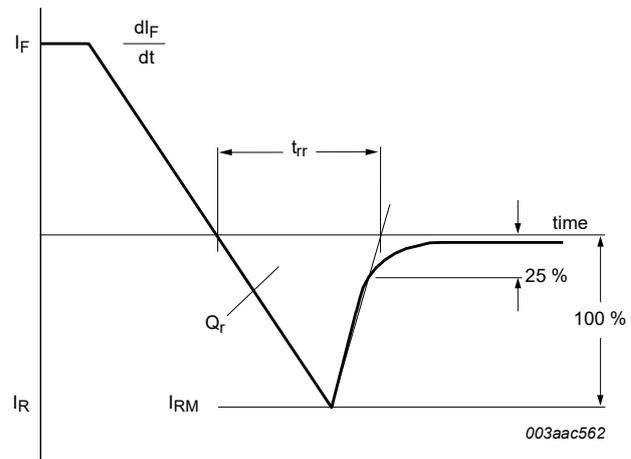


Fig. 7. Reverse recovery definitions; ramp recovery

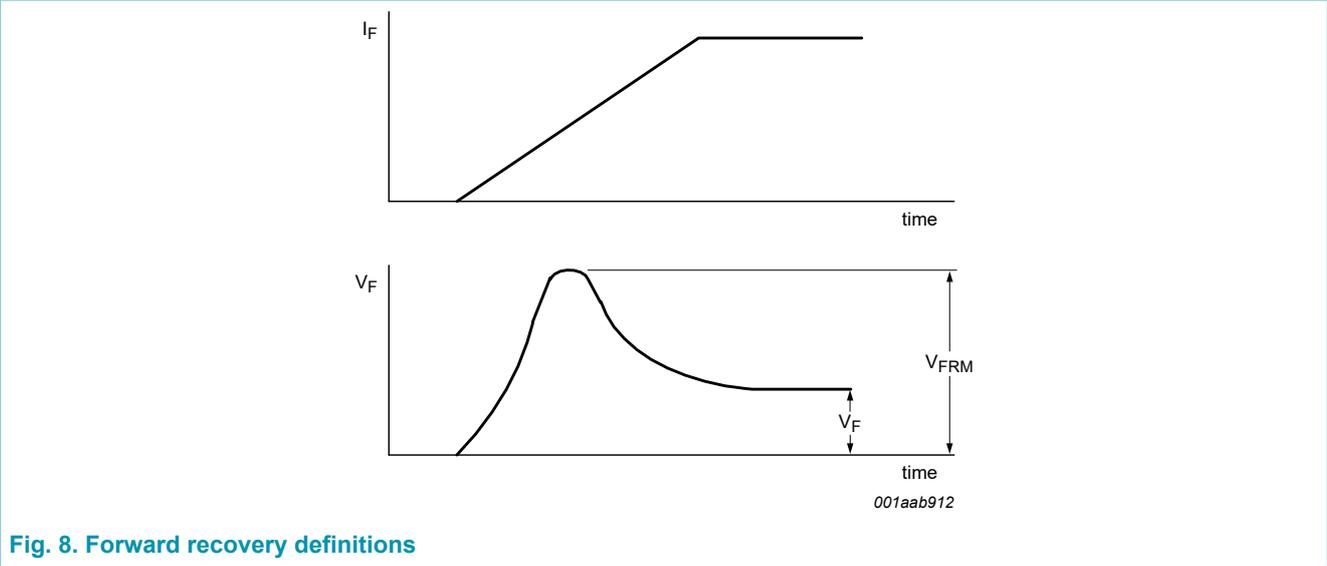
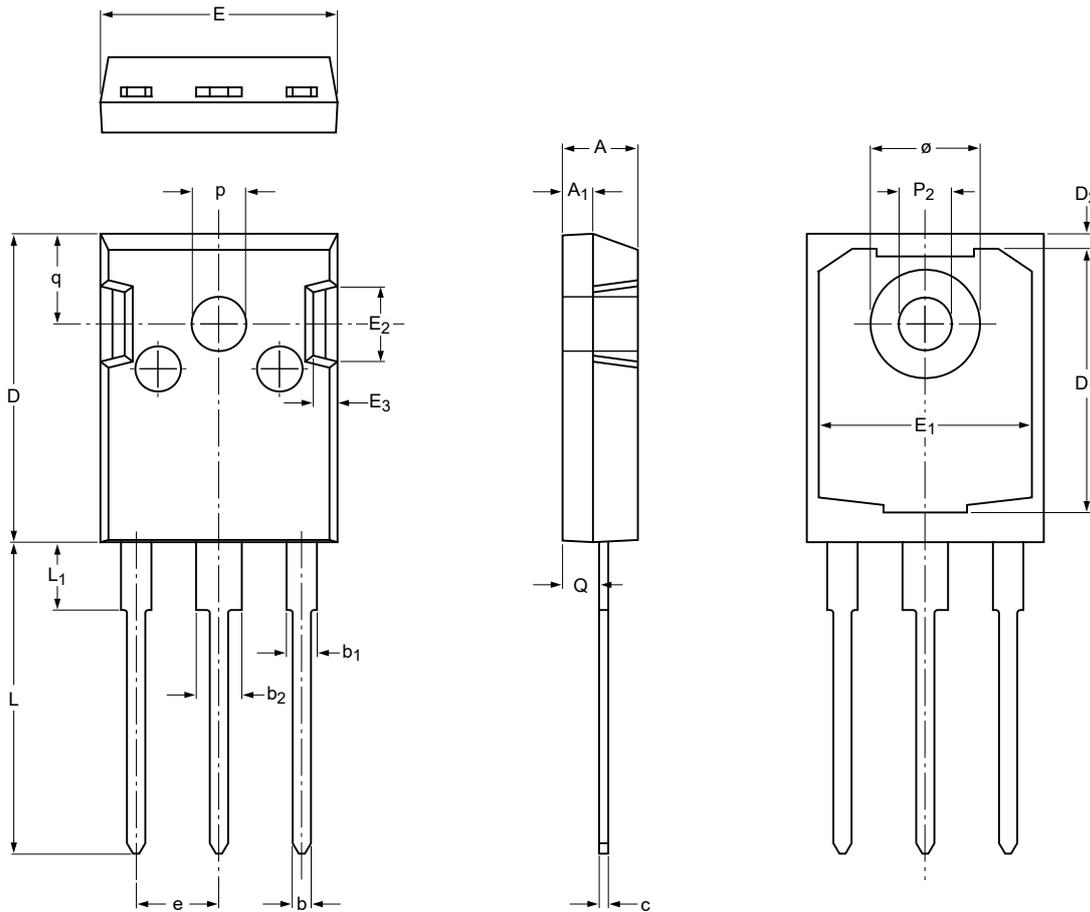


Fig. 8. Forward recovery definitions

9. Package outline

Plastic single-ended through-hole package; heatsink mounted; 1 mounting hole; 3-lead TO-247 SOT429



Dimensions (mm are the original dimensions)

| Unit ⁽¹⁾ | A | A ₁ | b | b ₁ | b ₂ | c | D | D ₁ | D ₂ | E | E ₁ | E ₂ | E ₃ | e ⁽¹⁾ | L | L ₁ | P ₂ | p | Q | q | ø | |
|---------------------|------|----------------|------|----------------|----------------|------|------|----------------|----------------|-------|----------------|----------------|----------------|------------------|-------|----------------|----------------|------|------|------|------|--|
| max | 5.20 | 2.10 | 1.40 | 2.20 | 3.20 | 0.70 | 20.6 | 17.68 | 1.20 | 15.75 | 14.22 | 5.20 | 1.80 | 5.45 | 20.90 | 4.75 | 3.60 | 3.70 | 2.60 | 6.18 | 7.30 | |
| nom | | | | | | | | | | | | | | | | | | | | | | |
| min | 4.70 | 1.90 | 1.00 | 1.80 | 2.80 | 0.50 | 20.3 | 17.28 | 0.80 | 15.45 | 13.82 | 4.80 | 1.40 | 20.40 | 4.25 | 3.40 | 3.50 | 2.20 | 5.78 | 7.10 | | |

Note

1. Basic spacing between centers.

sot429_po

| Outline version | References | | | European projection | Issue date |
|-----------------|------------|--------|-------|---------------------|------------------------|
| | IEC | JEDEC | JEITA | | |
| SOT429 | | TO-247 | | | -04-09-14- 13-03-25 |

Fig. 9. Package outline TO-247 (SOT429)

10. Legal information

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. |
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