

1. General description

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

2. Features and benefits

- Fast switching
- Low thermal resistance
- High thermal cycling performance
- Low forward voltage drop
- Reverse surge capability
- Soft recovery characteristic

3. Applications

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

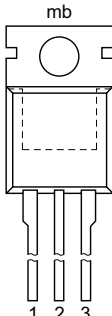
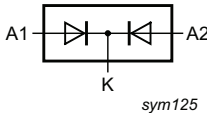
4. Quick reference data

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 | $\delta = 0.5$; square-wave pulse; $T_{mb} \leq 104\text{ °C}$; both diodes conducting; Fig. 1 ; Fig. 2 | 16 | | | A |
| I_{FRM} | repetitive peak forward current | $\delta = 0.5$; $t_p = 25\ \mu\text{s}$; $T_{mb} \leq 104\text{ °C}$; square-wave pulse; per diode | 16 | | | A |
| I_{FSM} | non-repetitive peak forward current | $t_p = 10\text{ ms}$; sine-wave pulse; per diode $T_{j(\text{init})} = 25\text{ °C}$ | 80 | | | A |
| | | $t_p = 8.3\text{ ms}$; sine-wave pulse; per diode $T_{j(\text{init})} = 25\text{ °C}$ | 88 | | | A |
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
| Static characteristics | | | | | | |
| V_F | forward voltage | $I_F = 8\text{ A}$; $T_j = 150\text{ °C}$; Fig. 4 | - | 0.84 | 0.95 | V |
| Dynamic characteristics | | | | | | |
| t_{rr} | reverse recovery time | $I_R = 1\text{ A}$; $I_F = 0.5\text{ A}$; $I_{R(\text{meas})} = 0.25\text{ A}$; $T_j = 25\text{ °C}$; step recovery; Fig. 6 | - | 12 | 22 | 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 | | |
| mb | K | mounting base; cathode | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|----------|--|---------|
| | Name | Description | Version |
| BYQ30E-200 | TO-220AB | plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB | SOT78 |

7. Marking

Table 4. Marking codes

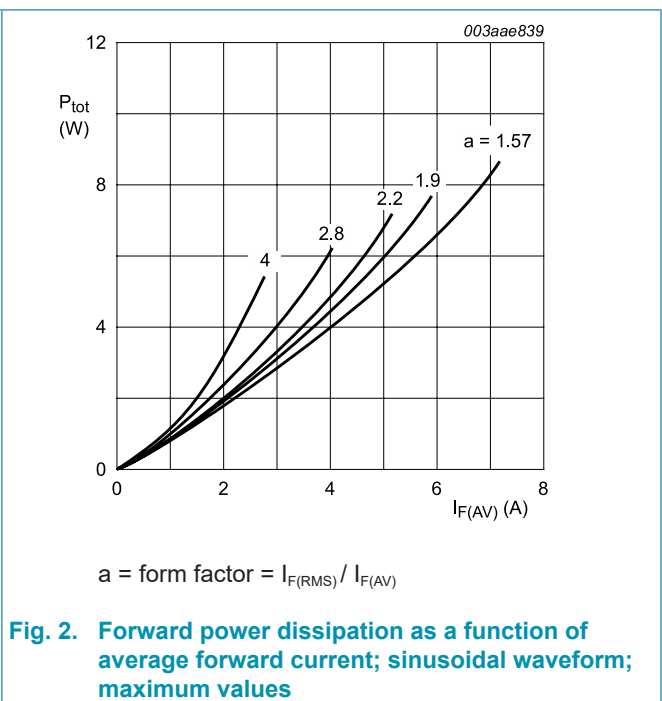
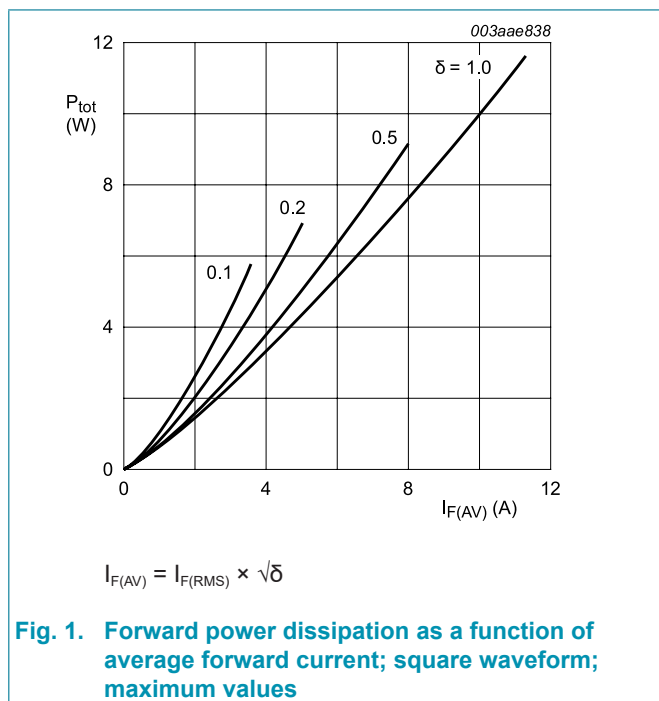
| Type number | Marking codes |
|-------------|---------------|
| BYQ30E-200 | BYQ30E-200 |

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 |
| $I_{O(AV)}$ | average output current | $\delta = 0.5$; square-wave pulse; $T_{mb} \leq 104 \text{ }^\circ\text{C}$; both diodes conducting; Fig. 1 ; Fig. 2 | 16 | A |
| I_{FRM} | repetitive peak forward current | $\delta = 0.5$; $t_p = 25 \text{ } \mu\text{s}$; $T_{mb} \leq 104 \text{ }^\circ\text{C}$; square-wave pulse; per diode | 16 | A |
| I_{FSM} | non-repetitive peak forward current | $t_p = 10 \text{ ms}$; sine-wave pulse; per diode $T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$ | 80 | A |
| | | $t_p = 8.3 \text{ ms}$; sine-wave pulse; per diode $T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$ | 88 | 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 to 150 | $^\circ\text{C}$ |
| T_j | junction temperature | | 150 | $^\circ\text{C}$ |
| Electrostatic discharge | | | | |
| V_{ESD} | electrostatic discharge voltage | HBM; all pins; C = 250 pF; R = 1.5 k Ω | 8 | kV |



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; Fig. 3 | - | - | 2.5 | K/W |
| | | with heatsink compound; per diode; Fig. 3 | - | - | 3 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | | - | 60 | - | K/W |

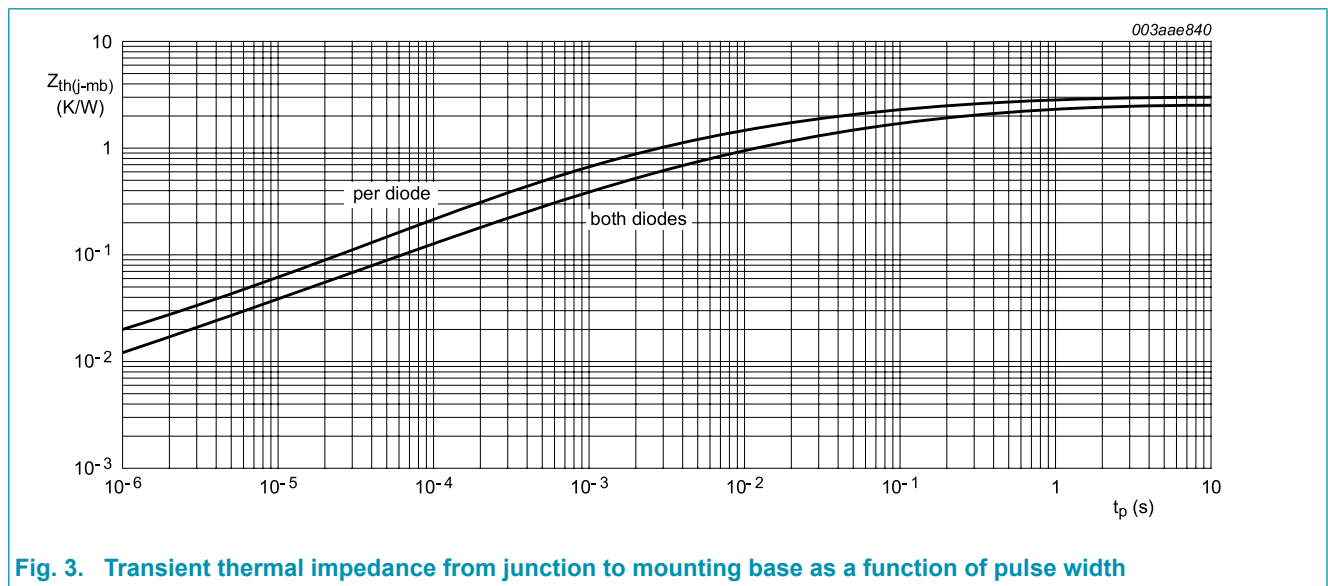
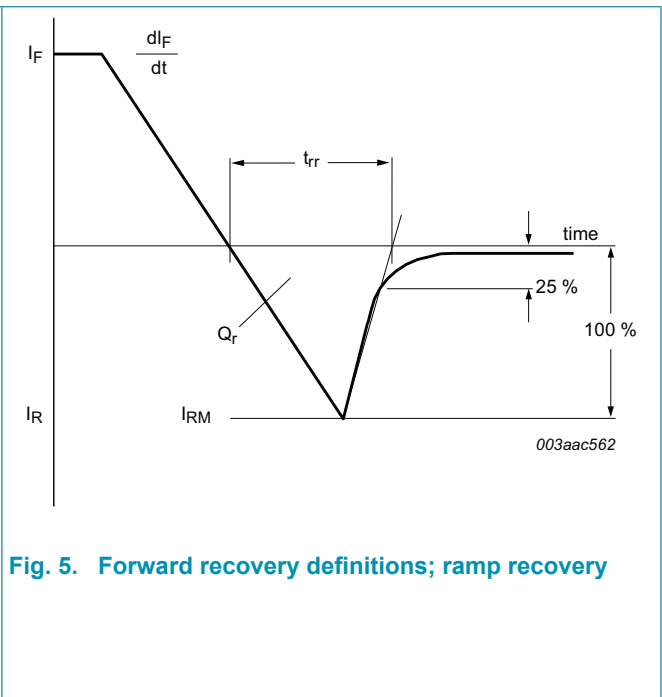
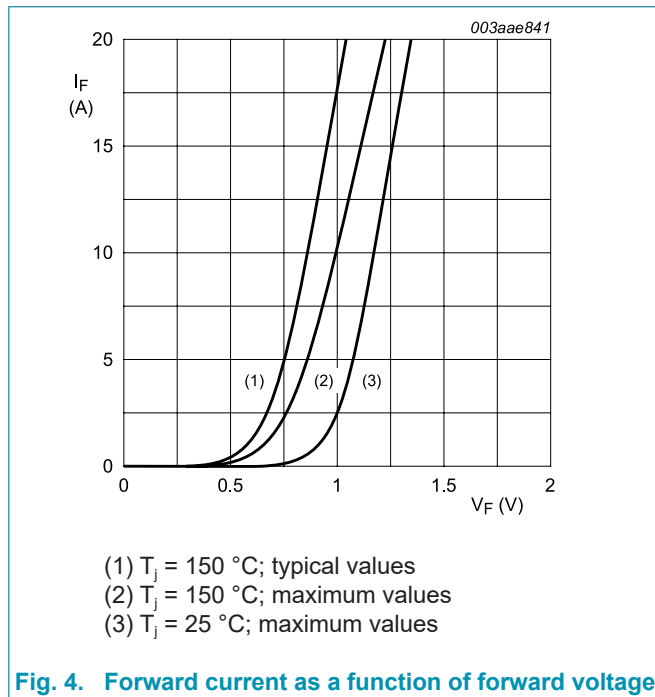


Fig. 3. Transient thermal impedance from junction to mounting base as a function of pulse width

10. Characteristics

Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|--------------------------|---|-----|------|------|---------------|
| Static characteristics | | | | | | |
| V_F | forward voltage | $I_F = 16 \text{ A}; T_j = 150 \text{ }^\circ\text{C}; \text{Fig. 4}$ | - | 1 | 1.15 | V |
| | | $I_F = 16 \text{ A}; T_j = 25 \text{ }^\circ\text{C}; \text{Fig. 4}$ | - | 1.12 | 1.25 | V |
| | | $I_F = 8 \text{ A}; T_j = 150 \text{ }^\circ\text{C}; \text{Fig. 4}$ | - | 0.84 | 0.95 | V |
| I_R | reverse current | $V_R = 200 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$ | - | 4 | 30 | μA |
| | | $V_R = 200 \text{ V}; T_j = 100 \text{ }^\circ\text{C}$ | - | 0.3 | 0.6 | mA |
| Dynamic characteristics | | | | | | |
| Q_r | recovered charge | $I_F = 2 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 20 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{Fig. 5}$ | - | 4 | 11 | nC |
| t_{rr} | reverse recovery time | $I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 100 \text{ A}/\mu\text{s}; \text{ramp recovery}; T_j = 25 \text{ }^\circ\text{C}; \text{Fig. 5}$ | - | 20 | 25 | ns |
| | | $I_F = 0.5 \text{ A}; I_R = 1 \text{ A}; \text{step recovery}; I_{R(\text{meas})} = 0.25 \text{ A}; T_j = 25 \text{ }^\circ\text{C}; \text{Fig. 6}$ | - | 12 | 22 | ns |
| V_{FR} | forward recovery voltage | $I_F = 1 \text{ A}; dI_F/dt = 10 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{Fig. 7}$ | - | 1 | - | V |



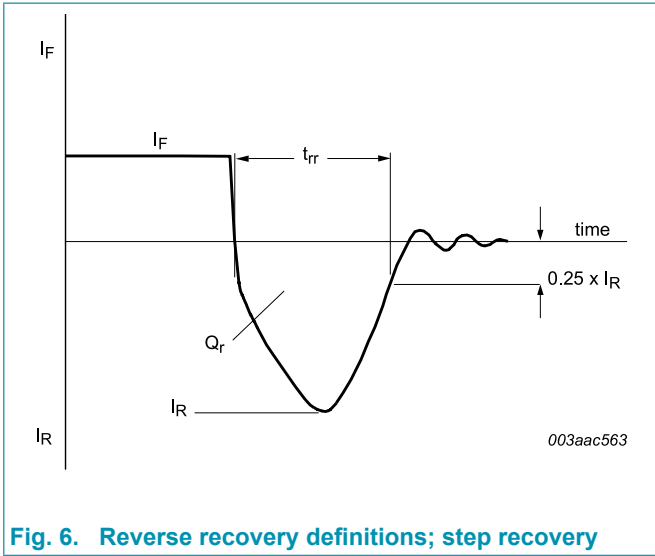


Fig. 6. Reverse recovery definitions; step recovery

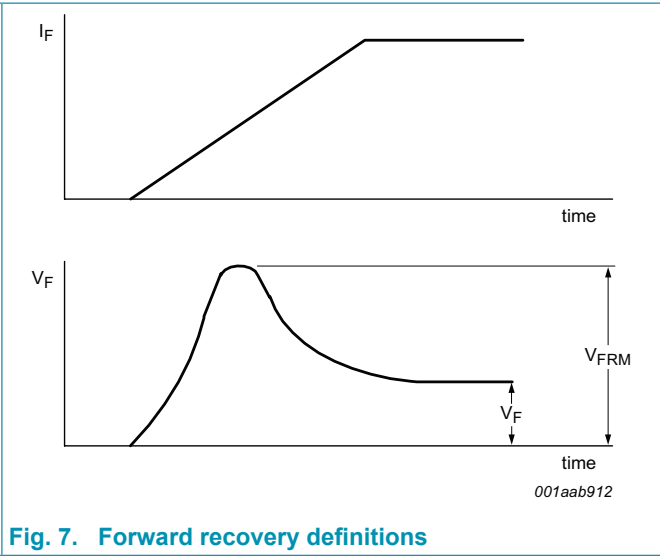
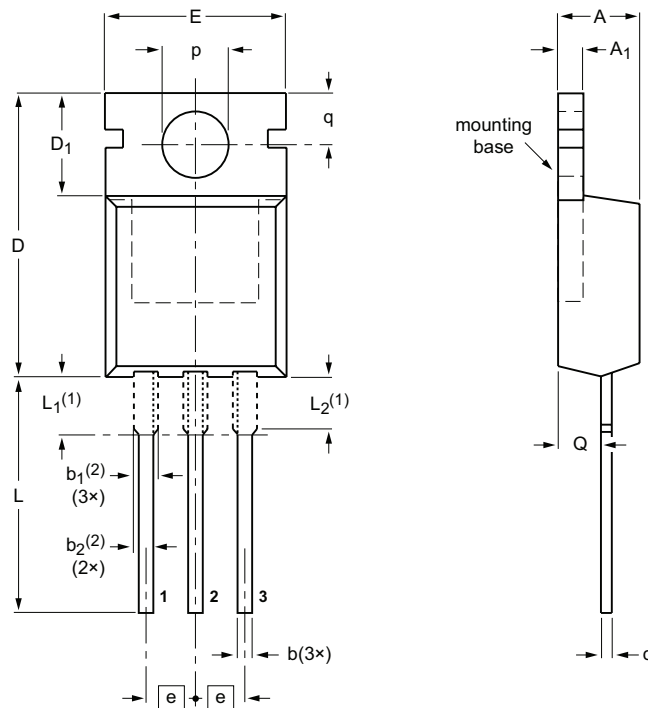


Fig. 7. Forward recovery definitions

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 4.1 | 1.40 1.25 | 0.9 0.6 | 1.6 1.0 | 1.3 1.0 | 0.7 0.4 | 16.0 15.2 | 6.6 5.9 | 10.3 9.7 | 2.54 | 15.0 12.8 | 3.30 2.79 | 3.0 | 3.8 3.5 | 3.0 2.7 | 2.6 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 08-06-13 |

12. Revision history

Table 8. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|-----------------|---|-----------------------|---------------|-----------------|
| BYQ30E-200 v.5 | 20180605 | Product data sheet | - | BYQ30E-200 v.4 |
| Modifications: | Change from NXP version to WeEn version | | | |
| BYQ30E-200 v.4 | 20100901 | Product data sheet | - | BYQ30E_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. Type number BYQ30E-200 separated from datasheet BYQ30E_SERIES. | | | |
| BYQ30E_SERIES_3 | 19981001 | Product specification | - | BYQ30E_SERIES_2 |

13. 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. |
| 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".
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