# Rectifier diodes ultrafast, rugged

# BYQ30EB series

## GENERAL DESCRIPTION

Glass passivated high efficiency rugged dual rectifier diodes in a plastic envelope suitable for surface mounting, featuring low forward voltage drop, ultra-fast recovery times and soft recovery characteristic. These devices can withstand reverse voltage transients and have guaranteed reverse surge and ESD capability. They are intended for use in switched mode power supplies and high frequency circuits in general where low conduction and switching losses are essential.

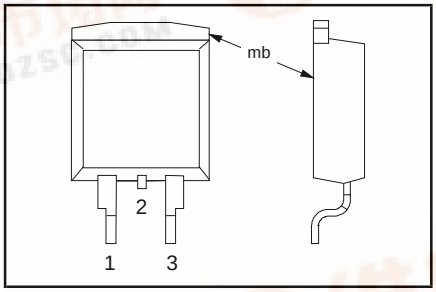
## QUICK REFERENCE DATA

| SYMBOL | PARAMETER | MAX. | MAX. | MAX. | UNIT |
|---|---|---|---|---|---|
| | **BYQ30EB-** | **100** | **150** | **200** | |
| $V_{RRM}$ | Repetitive peak reverse voltage | 100 | 150 | 200 | V |
| $V_F$ | Forward voltage | 0.95 | 0.95 | 0.95 | V |
| $I_{O(AV)}$ | Output current (both diodes conducting) | 16 | 16 | 16 | A |
| $t_{rr}$ | Reverse recovery time | 25 | 25 | 25 | ns |
| $I_{RRM}$ | Repetitive peak reverse current per diode | 0.2 | 0.2 | 0.2 | A |

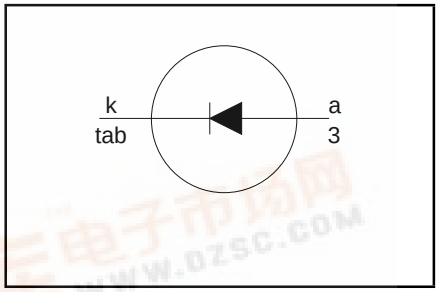
## PINNING - SOT404

| PIN | DESCRIPTION |
|---|---|
| 1 | no connection |
| 2 | cathode |
| 3 | anode |
| mb | cathode |

## PIN CONFIGURATION




## SYMBOL




## LIMITING VALUES

Limiting values in accordance with the Absolute Maximum System (IEC 134).

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | | | UNIT |
|---|---|---|---|---|---|---|---|
| | | | | **-100** | **-150** | **-200** | |
| $V_{RRM}$ | Repetitive peak reverse voltage | | - | 100 | 150 | 200 | V |
| $V_{RWM}$ | Crest working reverse voltage | | - | 100 | 150 | 200 | V |
| $V_R$ | Continuous reverse voltage | | - | 100 | 150 | 200 | V |
| $I_{O(AV)}$ | Output current (both diodes conducting)[1] | square wave $\delta = 0.5$; $T_{mb} \leq 104$ ˚C | - | 16 | | | A |
| $I_{O(RMS)}$ | RMS forward current | | - | 23 | | | A |
| $I_{FRM}$ | Repetitive peak forward current per diode | t = 25 µs; $\delta = 0.5$; $T_{mb} \leq 104$ ˚C | - | 16 | | | A |
| $I_{FSM}$ | Non-repetitive peak forward current per diode | t = 10 ms | - | 100 | | | A |
| | | t = 8.3 ms sinusoidal; with reapplied $V_{RWM(max)}$ | - | 110 | | | A |
| $I^2t$ | $I^2t$ for fusing | t = 10 ms | - | 50 | | | $A^2s$ |
| $I_{RRM}$ | Repetitive peak reverse current per diode | $t_p$ = 2 µs; $\delta = 0.001$ | - | 0.2 | | | A |
| $I_{RSM}$ | Non-repetitive peak reverse current per diode | $t_p$ = 100 µs | - | 0.2 | | | A |
| $T_{stg}$ | Storage temperature | | -40 | 150 | | | ˚C |
| $T_j$ | Operating junction temperature | | - | 150 | | | ˚C |

1 Neglecting switching and reverse current losses.

## ESD LIMITING VALUE

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|---|---|---|---|---|---|
| $V_C$ | Electrostatic discharge capacitor voltage | Human body model; C = 250 pF; R = 1.5 kΩ | - | 8 | kV |

## THERMAL RESISTANCES

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| $R_{th\ j\text{-}mb}$ | Thermal resistance junction to mounting base | per diode | - | - | 3.0 | K/W |
| | | both diodes conducting | - | - | 2.5 | K/W |
| $R_{th\ j\text{-}a}$ | Thermal resistance junction to ambient | minimum footprint, FR4 board | - | 50 | - | K/W |

## STATIC CHARACTERISTICS

$T_j$ = 25 ˚C unless otherwise stated

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| $V_F$ | Forward voltage (per diode) | $I_F$ = 8 A; $T_j$ = 150˚C | - | 0.83 | 0.95 | V |
| | | $I_F$ = 16 A; $T_j$ = 150˚C | - | 1.0 | 1.15 | V |
| | | $I_F$ = 16 A; | - | 0.98 | 1.25 | |
| $I_R$ | Reverse current (per diode) | $V_R = V_{RWM}$; $T_j$ = 100 ˚C | - | 0.3 | 0.6 | mA |
| | | $V_R = V_{RWM}$ | - | 2 | 30 | µA |

## DYNAMIC CHARACTERISTICS

$T_j$ = 25 ˚C unless otherwise stated

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| $Q_s$ | Reverse recovery charge (per diode) | $I_F$ = 2 A; $V_R \geq$ 30 V; $-dI_F/dt$ = 20 A/µs | - | 4 | 11 | nC |
| $t_{rr}$ | Reverse recovery time (per diode) | $I_F$ = 1 A; $V_R \geq$ 30 V; $-dI_F/dt$ = 100 A/µs | - | 20 | 25 | ns |
| $I_{rrm}$ | Peak reverse recovery current (per diode) | $I_F$ = 1 A; $V_R \geq$ 30 V; $-dI_F/dt$ = 50 A/µs; $T_j$ = 100 ˚C | - | 1.0 | 2 | A |
| $V_{fr}$ | Forward recovery voltage (per diode) | $I_F$ = 1 A; $dI_F/dt$ = 10 A/µs | - | 1 | - | V |

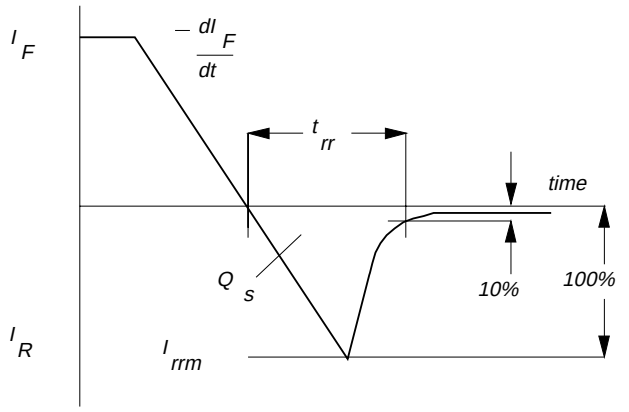



*Fig.1. Definition of $t_{rr}$, $Q_s$ and $I_{rrm}$*

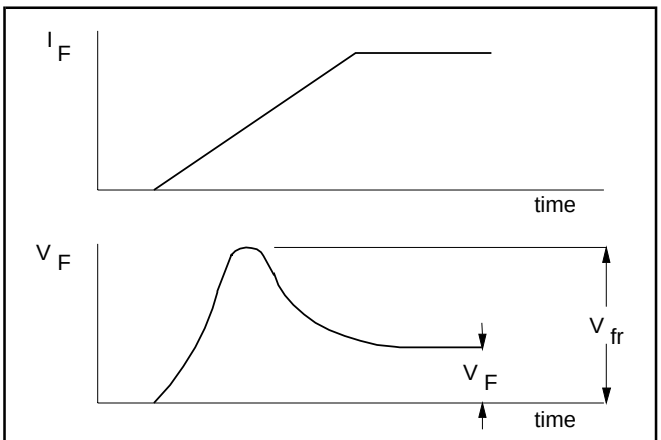



*Fig.2. Definition of $V_{fr}$*

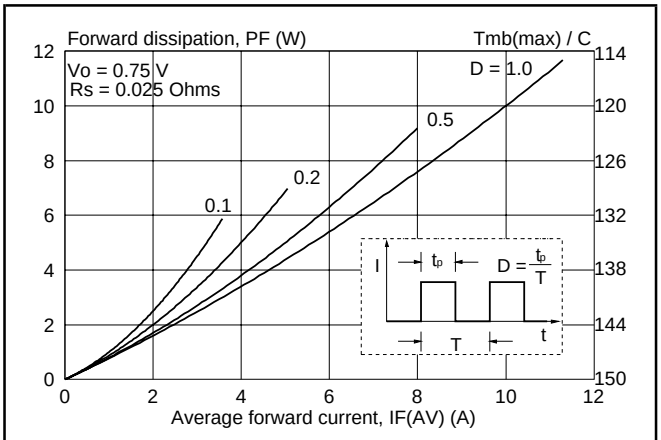



*Fig.3. Maximum forward dissipation $P_F = f(I_{F(AV)})$ per diode; square current waveform where $I_{F(AV)} = I_{F(RMS)} \times \sqrt{D}$.*

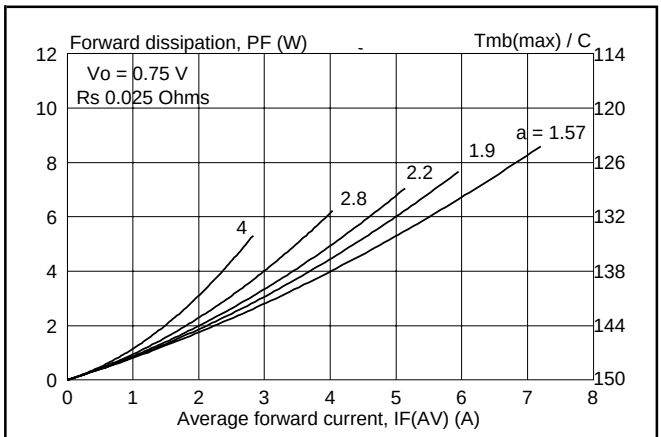



*Fig.4. Maximum forward dissipation $P_F = f(I_{F(AV)})$ per diode; sinusoidal current waveform where a = form factor = $I_{F(RMS)} / I_{F(AV)}$.*

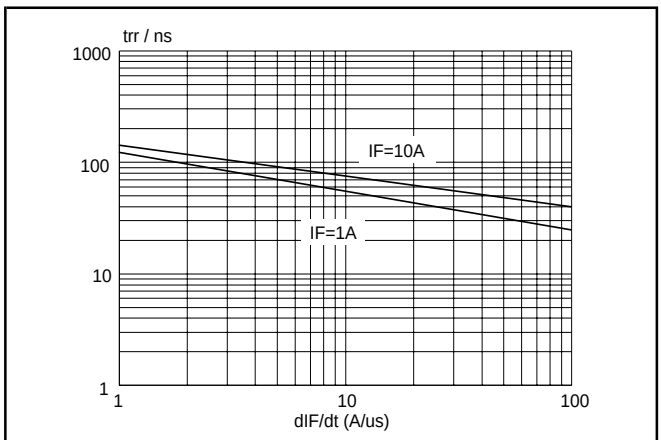



*Fig.5. Maximum $t_{rr}$ at $T_j$ = 25 ˚C.*

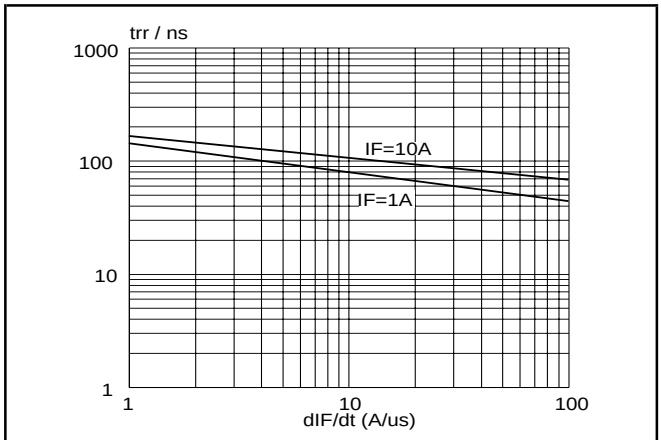



*Fig.6. Maximum $t_{rr}$ at $T_j$ = 100 ˚C.*

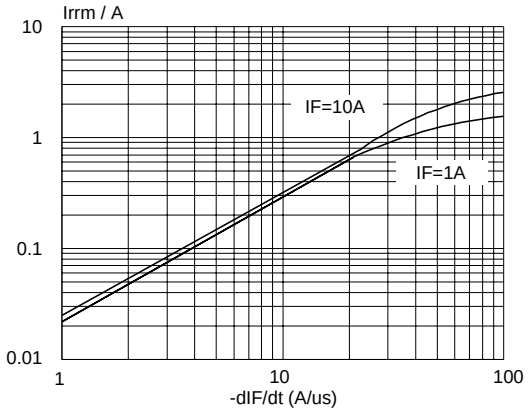



*Fig.7. Maximum $I_{rrm}$ at $T_j$ = 25 ˚C.*

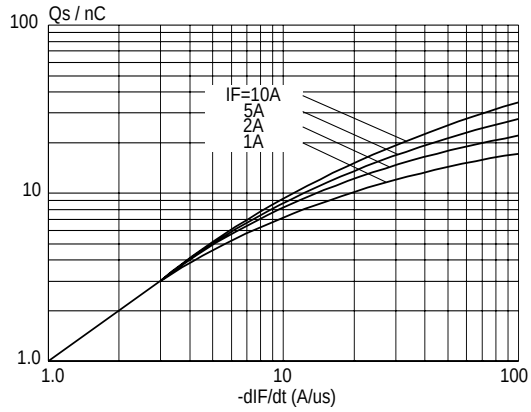



*Fig.10. Maximum $Q_s$ at $T_j$ = 25 ˚C.*

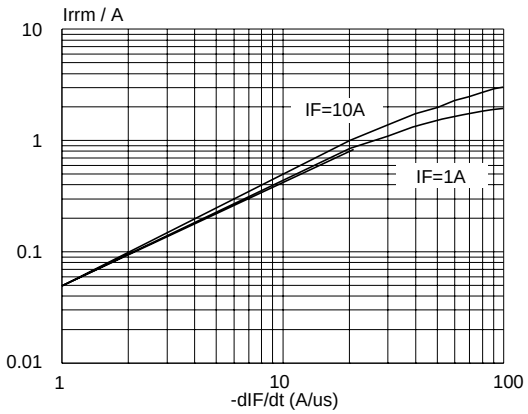



*Fig.8. Maximum $I_{rrm}$ at $T_j$ = 100 ˚C.*

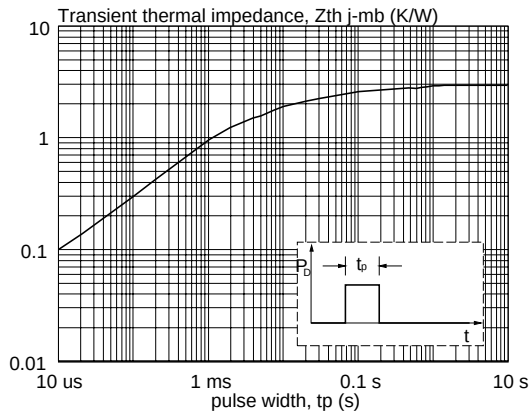



*Fig.11. Transient thermal impedance; $Z_{th\ j\text{-}mb} = f(t_p)$.*

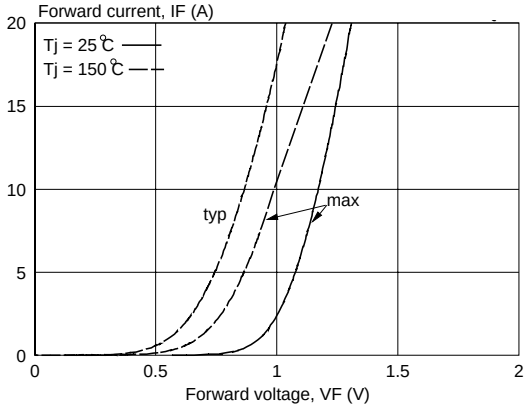



*Fig.9. Typical and maximum forward characteristic $I_F = f(V_F)$; parameter $T_j$*

## MECHANICAL DATA

*Dimensions in mm*

*Net Mass: 1.4 g*

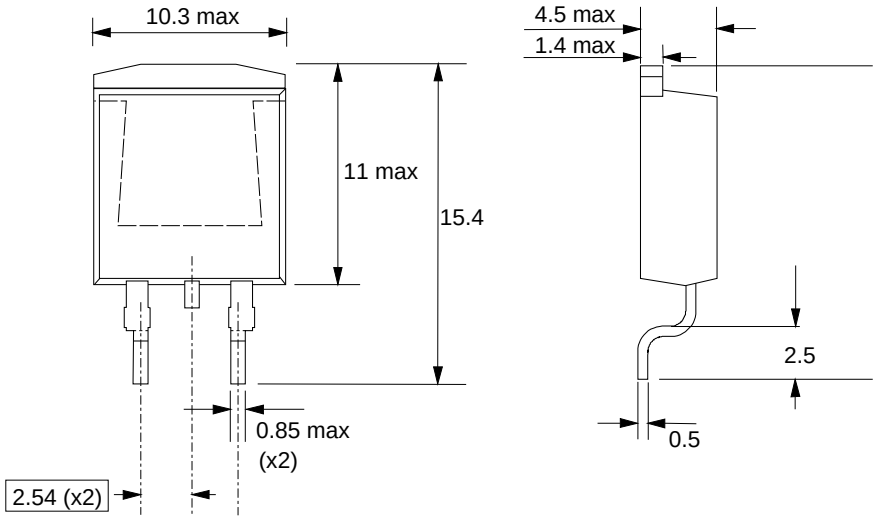



*Fig.12. SOT404 : centre pin connected to mounting base.*

**Notes**
1. Epoxy meets UL94 V0 at 1/8".

## MOUNTING INSTRUCTIONS

*Dimensions in mm*

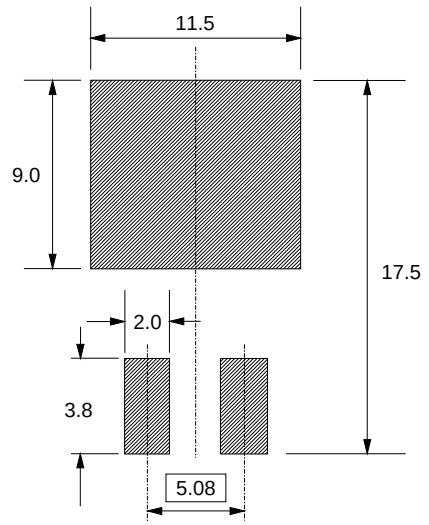



*Fig.13. SOT404 : minimum pad sizes for surface mounting.*

**Notes**
1. Plastic meets UL94 V0 at 1/8".

## DEFINITIONS

| **Data sheet status** | |
|---|---|
| Objective specification | This data sheet contains target or goal specifications for product development. |
| Preliminary specification | This data sheet contains preliminary data; supplementary data may be published later. |
| Product specification | This data sheet contains final product specifications. |
| **Limiting values** | |
| Limiting values are given in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of this specification is not implied. Exposure to limiting values for extended periods may affect device reliability. | |
| **Application information** | |
| Where application information is given, it is advisory and does not form part of the specification. | |



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