# Rectifier diodes ultrafast, rugged

# BYV42E series

## GENERAL DESCRIPTION

Glass passivated high efficiency rugged dual rectifier diodes in a plastic envelope, 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.

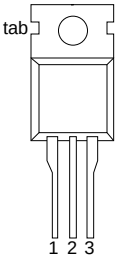
## QUICK REFERENCE DATA

| SYMBOL | PARAMETER | MAX. | MAX. | MAX. | UNIT |
|---|---|---|---|---|---|
| | **BYV42E-** | **100** | **150** | **200** | |
| $V_{RRM}$ | Repetitive peak reverse voltage | 100 | 150 | 200 | V |
| $V_F$ | Forward voltage | 0.85 | 0.85 | 0.85 | V |
| $I_{O(AV)}$ | Output current (both diodes conducting) | 30 | 30 | 30 | A |
| $t_{rr}$ | Reverse recovery time | 28 | 28 | 28 | ns |
| $I_{RRM}$ | Repetitive peak reverse current per diode | 0.2 | 0.2 | 0.2 | A |

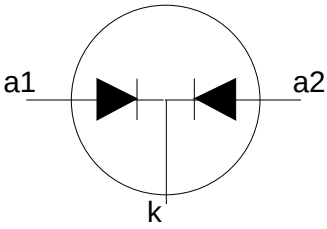
## PINNING - TO220AB

| PIN | DESCRIPTION |
|---|---|
| 1 | anode 1 (a) |
| 2 | cathode (k) |
| 3 | anode 2 (a) |
| tab | cathode (k) |

## 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[1] | | - | 100 | 150 | 200 | V |
| $I_{O(AV)}$ | Output current (both diodes conducting)[2] | square wave $\delta = 0.5$; $T_{mb} \leq 108$ ˚C | - | 30 | | | A |
| | | sinusoidal $a = 1.57$; $T_{mb} \leq 111$ ˚C | - | 27 | | | A |
| $I_{O(RMS)}$ | RMS forward current | | - | 43 | | | A |
| $I_{FRM}$ | Repetitive peak forward current per diode | $t = 25$ µs; $\delta = 0.5$; $T_{mb} \leq 108$ ˚C | - | 30 | | | A |
| $I_{FSM}$ | Non-repetitive peak forward current per diode | $t = 10$ ms | - | 150 | | | A |
| | | $t = 8.3$ ms sinusoidal; with reapplied $V_{RWM(max)}$ | - | 160 | | | A |
| $I^2t$ | $I^2t$ for fusing | $t = 10$ ms | - | 112 | | | $A^2s$ |
| $I_{RRM}$ | 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 $T_{mb} \leq 144$˚C for thermal stability.
2 Neglecting switching and reverse current losses.
For output currents in excess of 20 A, connection should be made to the exposed metal mounting base.

## 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 | - | - | 2.4 | K/W |
| | | both diodes conducting | - | - | 1.4 | K/W |
| $R_{th\ j\text{-}a}$ | Thermal resistance junction to ambient | in free air | - | 60 | - | K/W |

## STATIC CHARACTERISTICS

$T_j$ = 25 ˚C unless otherwise stated

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| $V_F$ | Forward voltage (per diode) | $I_F$ = 15 A; $T_j$ = 150˚C | - | 0.78 | 0.85 | V |
| | | $I_F$ = 15 A | - | 0.95 | 1.05 | V |
| | | $I_F$ = 30 A | - | 1.00 | 1.20 | V |
| $I_R$ | Reverse current (per diode) | $V_R = V_{RWM}$; $T_j$ = 100 ˚C | - | 0.5 | 1 | mA |
| | | $V_R = V_{RWM}$ | - | 10 | 100 | 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 | - | 6 | 15 | nC |
| $t_{rr1}$ | Reverse recovery time (per diode) | $I_F$ = 1 A; $V_R \geq$ 30 V; $-dI_F/dt$ = 100 A/µs | - | 20 | 28 | ns |
| $t_{rr2}$ | Reverse recovery time (per diode) | $I_F$ = 0.5 A to $I_R$ = 1 A; $I_{rec}$ = 0.25 A | - | 13 | 22 | ns |
| $V_{fr}$ | Forward recovery voltage (per diode) | $I_F$ = 1 A; $dI_F/dt$ = 10 A/µs | - | 1 | - | V |

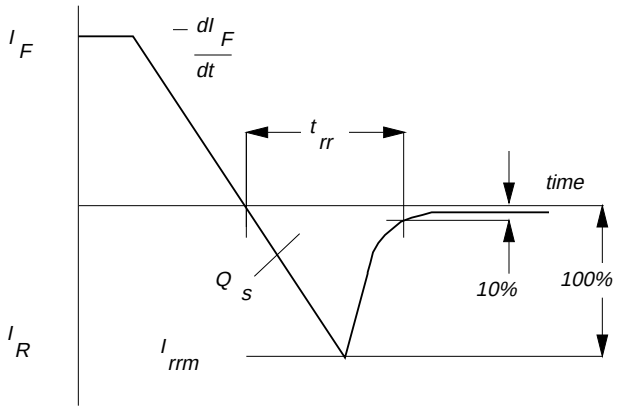



*Fig.1. Definition of $t_{rr1}$, $Q_s$ and $I_{rrm}$*

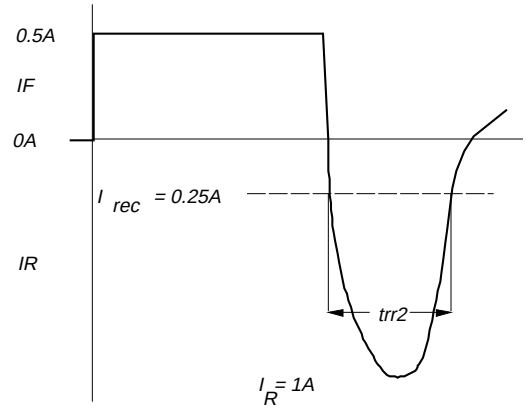



*Fig.4. Definition of $t_{rr2}$*

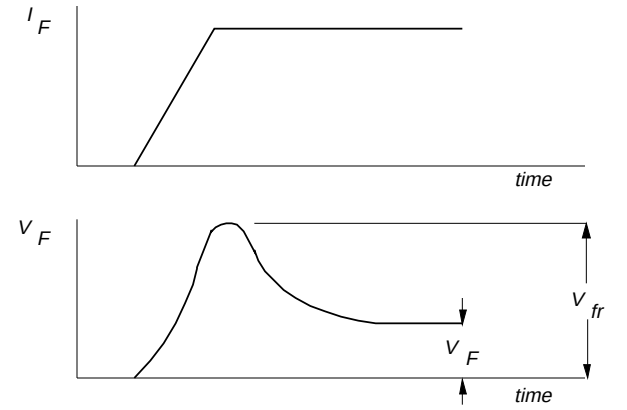



*Fig.2. Definition of $V_{fr}$*

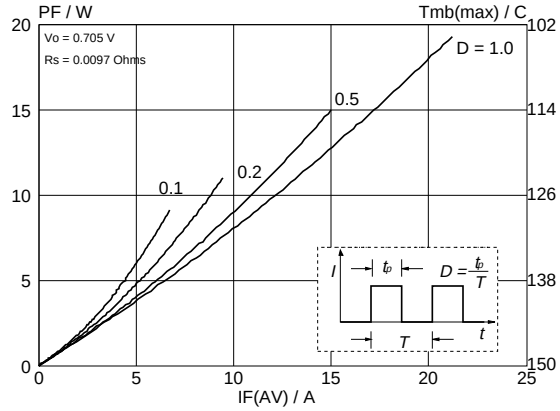



*Fig.5. Maximum forward dissipation $P_F = f(I_{F(AV)})$ per diode; square current waveform where $I_{F(AV)} = I_{F(RMS)} \times \sqrt{D}$.*

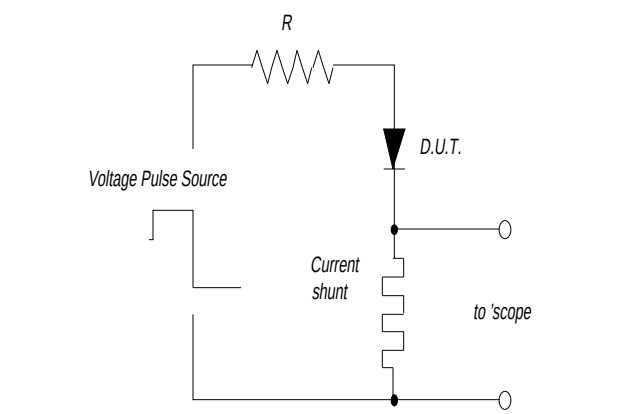



*Fig.3. Circuit schematic for $t_{rr2}$*

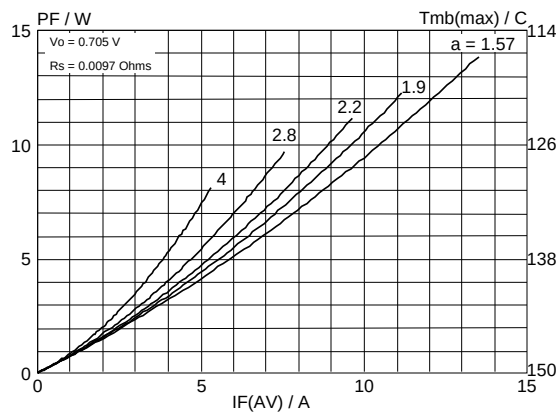



*Fig.6. Maximum forward dissipation $P_F = f(I_{F(AV)})$ per diode; sinusoidal current waveform where a = form factor = $I_{F(RMS)} / I_{F(AV)}$.*

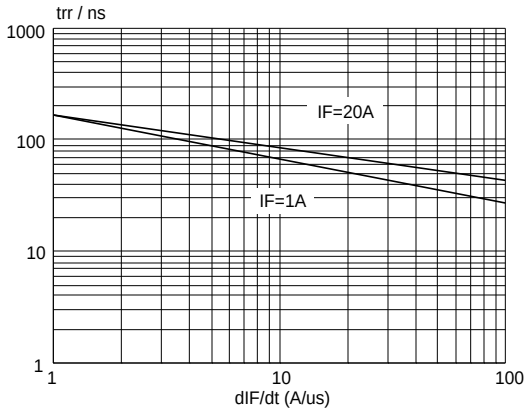



*Fig.7. Maximum $t_{rr}$ at $T_j$ = 25 ˚C; per diode*

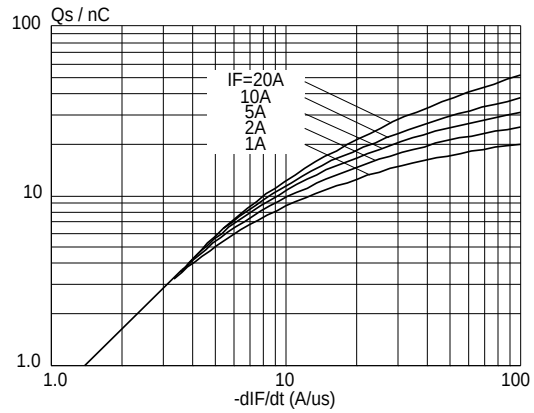



*Fig.10. Maximum $Q_s$ at $T_j$ = 25 ˚C; per diode*

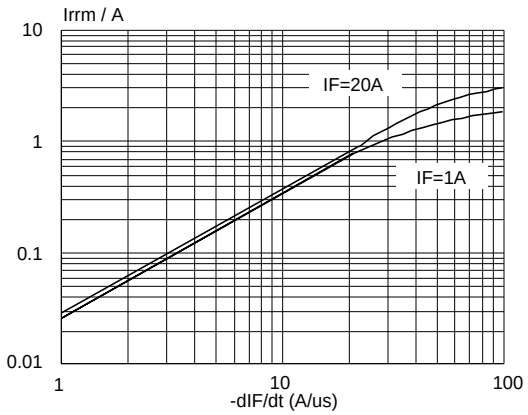



*Fig.8. Maximum $I_{rrm}$ at $T_j$ = 25 ˚C; per diode*

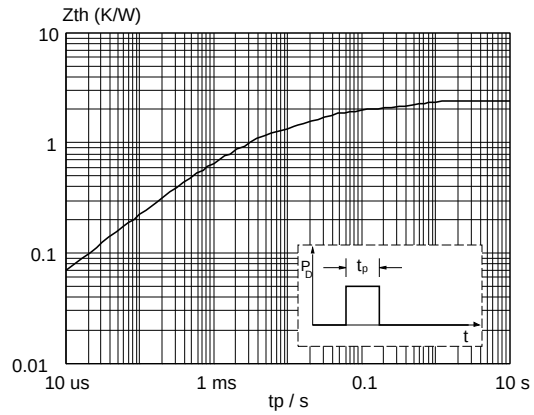



*Fig.11. Transient thermal impedance; per diode; $Z_{th\ j\text{-}mb} = f(t_p)$.*

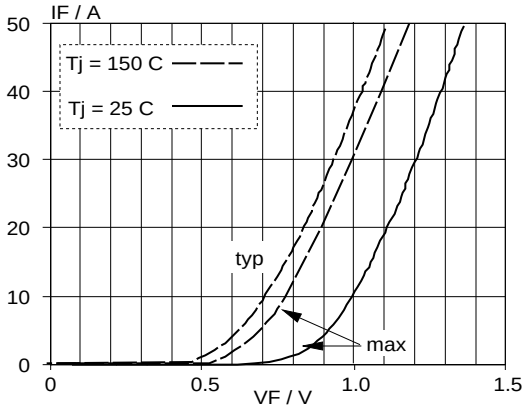



*Fig.9. Typical and maximum forward characteristic $I_F = f(V_F)$; parameter $T_j$*

## MECHANICAL DATA

*Dimensions in mm*

*Net Mass: 2 g*

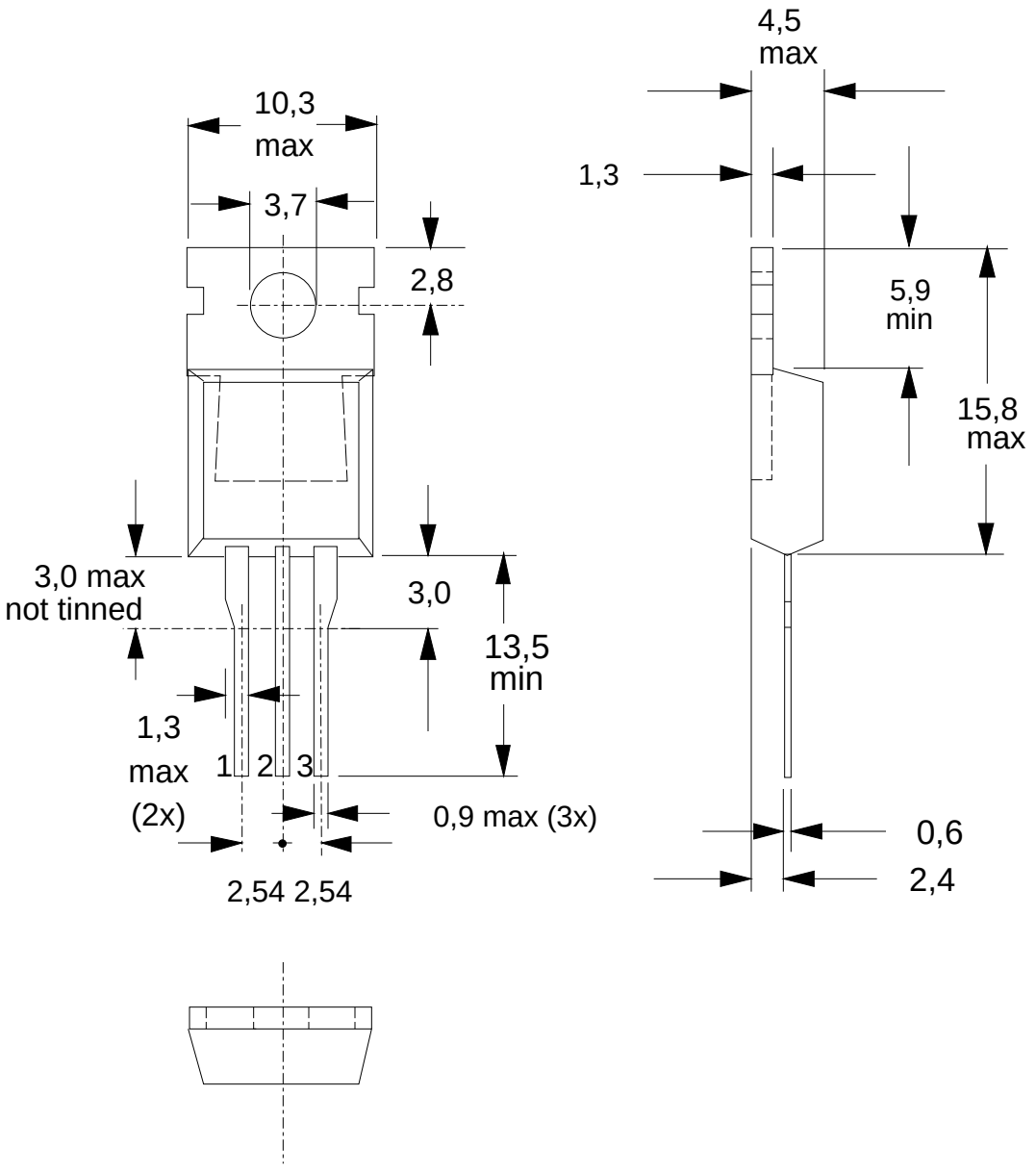



*Fig.12. TO220AB; pin 2 connected to mounting base.*

**Notes**
1. Accessories supplied on request: refer to mounting instructions for TO220 envelopes.
2. Epoxy 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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## LIFE SUPPORT APPLICATIONS

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