DATA SHEET

BYV42E, BYV42EB series
Rectifier diodes
ultrafast, rugged

Product specification    July 1998
Rectifier diodes
ultrafast, rugged

BEV42E, BEV42EB series

FEATURES
• Low forward volt drop
• Fast switching
• Soft recovery characteristic
• Reverse surge capability
• High thermal cycling performance
• Low thermal resistance

SYMBOL

QUICK REFERENCE DATA

\[ V_R = 150 \text{ V} / 200 \text{ V} \]
\[ V_F \leq 0.85 \text{ V} \]
\[ I_{(AV)} = 30 \text{ A} \]
\[ I_{RRM} = 0.2 \text{ A} \]
\[ t_{rr} \leq 28 \text{ ns} \]

GENERAL DESCRIPTION
Dual, ultra-fast, epitaxial rectifier diodes intended for use as output rectifiers in high frequency switched mode power supplies.

The BEV42E series is supplied in the SOT78 conventional leaded package.
The BEV42EB series is supplied in the SOT404 surface mounting package.

PINNING

SOT78 (TO220AB)

SOT404

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

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>CONDITIONS</th>
<th>MIN.</th>
<th>MAX.</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>( V_{RRM} )</td>
<td>Peak repetitive reverse voltage</td>
<td>( T_{mb} \leq 144^\circ \text{C} )</td>
<td>-150</td>
<td>200</td>
<td>V</td>
</tr>
<tr>
<td>( V_{RWM} )</td>
<td>Crest working reverse voltage</td>
<td>( T_{mb} \leq 108^\circ \text{C} )</td>
<td>-150</td>
<td>200</td>
<td>V</td>
</tr>
<tr>
<td>( V_R )</td>
<td>Continuous reverse voltage</td>
<td>( \delta = 0.5 ); ( T_{mb} \leq 108^\circ \text{C} )</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>( I_{(AV)} )</td>
<td>Average rectified output current (both diodes conducting)</td>
<td>( \delta = 0.5 ); ( T_{mb} \leq 108^\circ \text{C} )</td>
<td>-30</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>( I_{FRM} )</td>
<td>Repetitive peak forward current per diode</td>
<td>( t = 25 \mu \text{s} ); ( \delta = 0.5 ); ( T_{mb} \leq 108^\circ \text{C} )</td>
<td>-30</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>( I_{FSM} )</td>
<td>Non-repetitive peak forward current per diode</td>
<td>( t = 10 \text{ ms} ); ( \delta = 0.001 )</td>
<td>-150</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>( I_{RRM} )</td>
<td>Repetitive peak reverse current per diode</td>
<td>( \delta = 0.001 ); with reapplied ( V_{RWM(max)} )</td>
<td>-0.2</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>( I_{RSM} )</td>
<td>Non-repetitive peak reverse current per diode</td>
<td>( \delta = 0.001 ); ( T_{sp} \leq 100 \mu \text{s} )</td>
<td>-0.2</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>( T_{stg} )</td>
<td>Storage temperature</td>
<td>( \delta = 0.001 );</td>
<td>-40</td>
<td>150</td>
<td>^\circ \text{C}</td>
</tr>
<tr>
<td>( T_j )</td>
<td>Operating junction temperature</td>
<td>( \delta = 0.001 );</td>
<td>-</td>
<td>150</td>
<td>^\circ \text{C}</td>
</tr>
</tbody>
</table>

1. It is not possible to make connection to pin 2 of the SOT404 package
2. SOT78 package, For output currents in excess of 20 A, the cathode connection should be made to the mounting tab.

July 1998 1 Rev 1.200
### ESD LIMITING VALUE

<table>
<thead>
<tr>
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<th>MIN.</th>
<th>MAX.</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_C$</td>
<td>Electrostatic discharge capacitor voltage</td>
<td>Human body model; $C = 250 \text{ pF}; R = 1.5 \text{ k}\Omega$</td>
<td>-</td>
<td>8</td>
<td>kV</td>
</tr>
</tbody>
</table>

### THERMAL RESISTANCES

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>CONDITIONS</th>
<th>MIN.</th>
<th>TYP.</th>
<th>MAX.</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R_{thjmb}$</td>
<td>Thermal resistance junction to mounting base</td>
<td>per diode</td>
<td>-</td>
<td>-</td>
<td>2.4</td>
<td>K/W</td>
</tr>
<tr>
<td>$R_{thja}$</td>
<td>Thermal resistance junction to ambient</td>
<td>both diodes</td>
<td>-</td>
<td>-</td>
<td>1.4</td>
<td>K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SOT78 package, in free air</td>
<td>-</td>
<td>60</td>
<td>-</td>
<td>K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SOT404 and SOT428 packages, pcb mounted, minimum footprint,</td>
<td>-</td>
<td>50</td>
<td>-</td>
<td>K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FR4 board</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### ELECTRICAL CHARACTERISTICS

Characteristics are per diode at $T_j = 25 \degree \text{C}$ unless otherwise stated.

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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>$V_F$</td>
<td>Forward voltage</td>
<td>$I_F = 15 \text{ A}; T_j = 150\degree \text{C}$</td>
<td>-</td>
<td>0.78</td>
<td>0.85</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 15 \text{ A}$</td>
<td>-</td>
<td>0.95</td>
<td>1.05</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 30 \text{ A}$</td>
<td>-</td>
<td>1.00</td>
<td>1.20</td>
<td>V</td>
</tr>
<tr>
<td>$I_R$</td>
<td>Reverse current</td>
<td>$V_R = V_{RWM}; T_j = 100 \degree \text{C}$</td>
<td>-</td>
<td>0.5</td>
<td>1</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = V_{RWM}$</td>
<td>-</td>
<td>10</td>
<td>100</td>
<td>mA</td>
</tr>
<tr>
<td>$Q_r$</td>
<td>Reverse recovery charge</td>
<td>$I_F = 2 \text{ A}; V_R \geq 30 \text{ V}; -dI_F/dt = 20 \text{ A}/\mu\text{s}$</td>
<td>-</td>
<td>6</td>
<td>15</td>
<td>nC</td>
</tr>
<tr>
<td>$t_{rr1}$</td>
<td>Reverse recovery time</td>
<td>$I_F = 1 \text{ A}; V_R \geq 30 \text{ V};$</td>
<td>-</td>
<td>20</td>
<td>28</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$-dI_F/dt = 100 \text{ A}/\mu\text{s}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$t_{rr2}$</td>
<td>Reverse recovery time</td>
<td>$I_F = 0.5 \text{ A}$ to $I_R = 1 \text{ A}; I_{rec} = 0.25 \text{ A}$</td>
<td>-</td>
<td>13</td>
<td>22</td>
<td>ns</td>
</tr>
<tr>
<td>$V_{fr}$</td>
<td>Forward recovery voltage</td>
<td>$I_F = 1 \text{ A}; dI_F/dt = 10 \text{ A}/\mu\text{s}$</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>V</td>
</tr>
</tbody>
</table>
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Fig.1. Definition of $t_{rr}$, $Q_s$ and $I_{rm}$

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

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

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

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.6. Maximum forward dissipation $P_F = f(I_{F(AV)})$ per diode; sinusoidal current waveform where $a = \text{form factor} = \frac{I_{F(RMS)}}{I_{F(AV)}}$. 
Fig. 7. Maximum \( t_r \) at \( T_j = 25 \, ^\circ\text{C} \); per diode

Fig. 8. Maximum \( I_{\text{rm}} \) at \( T_j = 25 \, ^\circ\text{C} \); per diode

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

Fig. 10. Maximum \( Q_s \) at \( T_j = 25 \, ^\circ\text{C} \); per diode

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

Dimensions in mm
Net Mass: 2 g

Fig.12. SOT78 (TO220AB); pin 2 connected to mounting base.

Notes
1. Refer to mounting instructions for SOT78 (TO220) envelopes.
2. Epoxy meets UL94 V0 at 1/8".
MECHANICAL DATA

Dimensions in mm

Net Mass: 1.4 g

Fig. 13. SOT404: centre pin connected to mounting base.

MOUNTING INSTRUCTIONS

Dimensions in mm

Fig. 14. SOT404: soldering pattern for surface mounting.

Notes
1. Epoxy meets UL94 V0 at 1/8".
DATA SHEET STATUS

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<tr>
<td>Objective data sheet</td>
<td>Development</td>
<td>This document contains data from the objective specification for product</td>
</tr>
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<td></td>
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<td>development.</td>
</tr>
<tr>
<td>Preliminary data sheet</td>
<td>Qualification</td>
<td>This document contains data from the preliminary specification.</td>
</tr>
<tr>
<td>Product data sheet</td>
<td>Production</td>
<td>This document contains the product specification.</td>
</tr>
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</table>

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