TIP31A / TIP31C
NPN Epitaxial Silicon Transistor

Features
• Medium Power Linear Switching Applications
• Complementary to TIP32 Series

Ordering Information

<table>
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<tr>
<th>Part Number</th>
<th>Top Mark</th>
<th>Package Description</th>
<th>Packing Method</th>
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<tbody>
<tr>
<td>TIP31A</td>
<td>TIP31A</td>
<td>TO-220 3L (Single Gauge)</td>
<td>Bulk</td>
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<tr>
<td>TIP31C</td>
<td>TIP31C</td>
<td>TO-220 3L (Single Gauge)</td>
<td>Bulk</td>
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<tr>
<td>TIP31CTU</td>
<td>TIP31C</td>
<td>TO-220 3L (Single Gauge)</td>
<td>Rail</td>
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</tbody>
</table>

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at $T_J = 25^\circ C$ unless otherwise noted.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter Description</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{CBO}$</td>
<td>Collector-Base Voltage</td>
<td>TIP31A</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TIP31C</td>
<td>100</td>
</tr>
<tr>
<td>$V_{CEO}$</td>
<td>Collector-Emitter Voltage</td>
<td>TIP31A</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TIP31C</td>
<td>100</td>
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<tr>
<td>$V_{EBO}$</td>
<td>Emitter-Base Voltage</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>$I_C$</td>
<td>Collector Current (DC)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>$I_{CP}$</td>
<td>Collector Current (Pulse)</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>$I_B$</td>
<td>Base Current</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>$T_J$</td>
<td>Junction Temperature</td>
<td></td>
<td>150</td>
</tr>
<tr>
<td>$T_{STG}$</td>
<td>Storage Temperature Range</td>
<td></td>
<td>-65 to 150</td>
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Thermal Characteristics
Values are at \( T_C = 25^\circ C \) unless otherwise noted.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>( P_C )</td>
<td>Collector Dissipation (( T_A = 25^\circ C ))</td>
<td>2</td>
<td>W</td>
</tr>
<tr>
<td></td>
<td>Collector Dissipation (( T_C = 25^\circ C ))</td>
<td>40</td>
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</table>

Electrical Characteristics
Values are at \( T_C = 25^\circ C \) unless otherwise noted.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min.</th>
<th>Max.</th>
<th>Unit</th>
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<tbody>
<tr>
<td>( V_{CEO(sus)} )</td>
<td>Collector-Emitter Sustaining Voltage(^{(1)} )</td>
<td>TIP31A</td>
<td>( I_C = 30 \text{ mA, } I_B = 0 )</td>
<td>60</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TIP31C</td>
<td>( V_{CE} = 30 \text{ V, } I_B = 0 )</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>( I_{CEO} )</td>
<td>Collector Cut-Off Current</td>
<td>TIP31A</td>
<td>( V_{CE} = 60 \text{ V, } I_B = 0 )</td>
<td>0.3</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TIP31C</td>
<td>( V_{CE} = 100 \text{ V, } I_B = 0 )</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>( I_{CES} )</td>
<td>Collector Cut-Off Current</td>
<td>TIP31A</td>
<td>( V_{CE} = 60 \text{ V, } V_{EB} = 0 )</td>
<td>200</td>
<td>( \mu A )</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TIP31C</td>
<td>( V_{CE} = 100 \text{ V, } V_{EB} = 0 )</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>( I_{EBO} )</td>
<td>Emitter Cut-Off Current</td>
<td>( V_{EB} = 5 \text{ V, } I_C = 0 )</td>
<td>1</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>( h_{FE} )</td>
<td>DC Current Gain(^{(1)} )</td>
<td>( V_{CE} = 4 \text{ V, } I_C = 1 \text{ A} )</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>( V_{CE} = 4 \text{ V, } I_C = 3 \text{ A} )</td>
<td>10</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>( V_{CE(sat)} )</td>
<td>Collector-Emitter Saturation Voltage(^{(1)} )</td>
<td>( I_C = 3 \text{ A, } I_B = 375 \text{ mA} )</td>
<td>1.2</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>( V_{BE(on)} )</td>
<td>Base-Emitter On Voltage(^{(1)} )</td>
<td>( V_{CE} = 4 \text{ V, } I_C = 3 \text{ A} )</td>
<td>1.8</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>( f_T )</td>
<td>Current Gain Bandwidth Product</td>
<td>( V_{CE} = 10 \text{ V, } I_C = 500 \text{ mA, } f = 1 \text{ MHz} )</td>
<td>3.0</td>
<td>MHz</td>
<td></td>
</tr>
</tbody>
</table>

Note:
1. Pulse test: \( pw \leq 300 \text{ \mu s, duty cycle } \leq 2\% \).
Typical Performance Characteristics

Figure 1. DC Current Gain

Figure 2. Base-Emitter Saturation Voltage and Collector-Emitter Saturation Voltage

Figure 3. Safe Operating Area

Figure 4. Power Derating
Physical Dimensions

Figure 5. TO-220, MOLDED, 3LEAD, JEDEC VARIATION AB
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<th>Product Status</th>
<th>Definition</th>
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<td>Advance Information</td>
<td>Formative / In Design</td>
<td>Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.</td>
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