### Specifications

- **40 W at 25°C Case Temperature**
- **2 A Continuous Collector Current**
- **3 A Peak Collector Current**
- **Typical $t_f = 200$ ns at 25°C**

This series is obsolete and not recommended for new designs.

### Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>RATING</th>
<th>SYMBOL</th>
<th>VALUE</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collector-base voltage ($I_E = 0$)</td>
<td>$V_{CB0}$</td>
<td>800</td>
<td>V</td>
</tr>
<tr>
<td>Collector-emitter voltage ($V_{BE} = 0$)</td>
<td>$V_{CES}$</td>
<td>800</td>
<td>V</td>
</tr>
<tr>
<td>Collector-emitter voltage ($I_B = 0$)</td>
<td>$V_{CEO}$</td>
<td>400</td>
<td>V</td>
</tr>
<tr>
<td>Continuous collector current</td>
<td>$I_O$</td>
<td>2</td>
<td>A</td>
</tr>
<tr>
<td>Peak collector current (see Note 1)</td>
<td>$I_{CM}$</td>
<td>3</td>
<td>A</td>
</tr>
<tr>
<td>Continuous device dissipation at (or below) 25°C case temperature</td>
<td>$P_{DSS}$</td>
<td>40</td>
<td>W</td>
</tr>
<tr>
<td>Operating junction temperature range</td>
<td>$T_J$</td>
<td>-65 to +150</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>$T_{stg}$</td>
<td>-65 to +150</td>
<td>°C</td>
</tr>
</tbody>
</table>

**NOTE 1:** This value applies for $t_p \leq 2$ ms, duty cycle $\leq 2\%$. 

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**PRODUCT INFORMATION**

AUGUST 1978 - REVISED SEPTEMBER 2002
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## Electrical Characteristics at 25°C Case Temperature (Unless Otherwise Noted)

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TEST CONDITIONS</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{CEO(sus)}$ (Collector-emitter sustaining voltage)</td>
<td>$I_C = 0.1 \text{ A}$, $L = 25 \text{ mH}$ (see Note 2)</td>
<td>400</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>$I_{CES}$ (Collector-emitter cut-off current)</td>
<td>$V_{CE} = 800 \text{ V}$, $V_{BE} = 0$</td>
<td>0.2</td>
<td></td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>$I_{EBO}$ (Emitter cut-off current)</td>
<td>$V_{EB} = 5 \text{ V}$, $I_C = 0$</td>
<td>1</td>
<td></td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>$h_{FE}$ (Forward current transfer ratio)</td>
<td>$V_{CE} = 5 \text{ V}$, $I_C = 0.1 \text{ A}$ (see Notes 3 and 4)</td>
<td>35</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_{CE(sat)}$ (Collector-emitter saturation voltage)</td>
<td>$I_B = 0.03 \text{ A}$, $I_C = 0.3 \text{ A}$ (see Notes 3 and 4)</td>
<td>0.8</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>$V_{BE(sat)}$ (Base-emitter saturation voltage)</td>
<td>$I_B = 0.2 \text{ A}$, $I_C = 1 \text{ A}$ (see Notes 3 and 4)</td>
<td>1.1</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>$f_t$ (Current gain bandwidth product)</td>
<td>$V_{CE} = 10 \text{ V}$, $I_C = 0.2 \text{ A}$</td>
<td>12</td>
<td></td>
<td></td>
<td>MHz</td>
</tr>
<tr>
<td>$C_{ob}$ (Output capacitance)</td>
<td>$V_{CB} = 20 \text{ V}$, $I_C = 0$</td>
<td>60</td>
<td></td>
<td></td>
<td>pF</td>
</tr>
</tbody>
</table>

**NOTES:**
1. Inductive loop switching measurement.
2. These parameters must be measured using pulse techniques, $t_p = 300 \mu\text{s}$, duty cycle $\leq 2\%$.
3. These parameters must be measured using voltage-sensing contacts, separate from the current carrying contacts.
4. To obtain $f_t$ the $[h_{FE}]$ response is extrapolated at the rate of -6 dB per octave from $f = 1 \text{ MHz}$ to the frequency at which $[h_{FE}] = 1$.

## Thermal Characteristics

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R_{JC}$ (Junction to case thermal resistance)</td>
<td></td>
<td></td>
<td>2.5</td>
<td>°C/W</td>
</tr>
</tbody>
</table>

## Resistive-Load-Switching Characteristics at 25°C Case Temperature (Unless Otherwise Noted)

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TEST CONDITIONS †</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>$t_{on}$ (Turn on time)</td>
<td>$I_C = 1 \text{ A}$</td>
<td>0.25</td>
<td>0.5</td>
<td></td>
<td>µs</td>
</tr>
<tr>
<td>$t_s$ (Storage time)</td>
<td>$V_{CC} = 250 \text{ V}$ (see Figures 1 and 2)</td>
<td>1.8</td>
<td></td>
<td></td>
<td>µs</td>
</tr>
<tr>
<td>$t_f$ (Fall time)</td>
<td>$V_{CC} = 250 \text{ V}$</td>
<td>0.2</td>
<td></td>
<td></td>
<td>µs</td>
</tr>
<tr>
<td>$t_f$ (Fall time)</td>
<td>$V_{CC} = 250 \text{ V}$, $T_C = 95°C$</td>
<td>0.4</td>
<td></td>
<td></td>
<td>µs</td>
</tr>
</tbody>
</table>

† Voltage and current values shown are nominal; exact values vary slightly with transistor parameters.
PARAMETER MEASUREMENT INFORMATION

$t_p = 20 \mu s$
Duty cycle = 1%
$V_1 = 15 V$, Source Impedance = 50 $\Omega$

Figure 1. Resistive-Load Switching Test Circuit

Figure 2. Resistive-Load Switching Waveforms
TYPICAL CHARACTERISTICS

TYPICAL DC CURRENT GAIN

Figure 3.

COLLECTOR CUT-OFF CURRENT

Figure 4.

MAXIMUM SAFE OPERATING REGIONS

Figure 5.

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THERMAL INFORMATION

THERMAL RESPONSE JUNCTION TO CASE
VS
POWER PULSE DURATION

Figure 6.

TCP741AL

5%
10%
20%
50%

TCP741AL

5%
10%
20%
50%

TJ(max) - TC = PD(peak) · ZθJC(max)

Read time at end of t1,

duty cycle = t1/t2

ZθJC - Normalised Transient Thermal Impedance

RθJC - Normalised Transient Resistance

t1 - Power Pulse Duration - s

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