DEVELOPMENTAL

This unit is subject to change in mechanical and/or electrical characteristics. Please consult Western Electric Company, Incorporated, Radio Division, 120 Broadway, New York, for current applicable design and availability.

INTERMEDIATE TRANSISTOR DATA SHEET

WESTERN ELECTRIC GA-52830 TRANSISTOR
(DEVELOPMENT MODEL 2012)

THIS TRANSISTOR IS BEING MADE BY WESTERN ELECTRIC COMPANY IN LIMITED QUANTITIES FOR DEVELOPMENT USE ONLY.

DESCRIPTION

The GA-52830 transistor is of the fused junction, p-n-p type. Depending on the effectiveness of the heat sink to which it is attached, it is capable of about one-half watt dissipation. The minimum alpha cut-off frequency of four megacycles makes this a useful transistor for broad-band amplifiers and high speed switching.

MECHANICAL DATA

Mounting (See Note 1) - - - - - - - - - - - - - - - - - Any position
Dimensions and Connections- - - - - - - - - - See outline on page 1
MAXIMUM RATINGS (Continuous Duty)

Dissipation

Internal temperature rise, mounting surface to collector junction 24°C/watt

Temperature rise on typical mountings, 3"x3"x1/16" Aluminum or Copper plate 40°C/watt

Maximum collector junction temperature 80°C

I_co approximately doubles for each temperature increase of 9°C

Voltage*

Collector to base, emitter open 40 volts
Emitter to base, collector open 40 volts
Collector to emitter, base open 20 volts

Current*

Emitter and collector 500 ma
Base 50 ma

*The voltage and current ratings apply only if the dissipation is not excessive.

STATIC MEASUREMENTS (25°C ambient)

<table>
<thead>
<tr>
<th>Junctions</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collector Current with Open Emitter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(I_e = 0, V_cb = -4.5 volts)</td>
<td>I_c</td>
<td>10 µa</td>
</tr>
<tr>
<td>(I_e = 0, V_cb = -40 volts)</td>
<td>I_c</td>
<td>100 µa</td>
</tr>
<tr>
<td>Emitter Current with Open Collector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(I_c = 0, V_empty = -4.5 volts)</td>
<td>I_e</td>
<td>10 µa</td>
</tr>
<tr>
<td>(I_c = 0, V_empty = -40 volts)</td>
<td>I_e</td>
<td>100 µa</td>
</tr>
<tr>
<td>Electrical Reach-through</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(I_e = 0, V_cb = -40 volts)</td>
<td>V_e</td>
<td>1.0 volt</td>
</tr>
<tr>
<td>Emitter floating potential test measured with 20,000 ohms/volt meter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage for Alpha = 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(I_c = 20 ma, I_b = 0)</td>
<td>V_ce</td>
<td>20 volts</td>
</tr>
<tr>
<td>Minimum Collector Voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(I_b = 20 ma, I_c = 200 ma)</td>
<td>V_ce</td>
<td>0.25 volt</td>
</tr>
</tbody>
</table>
STATIC MEASUREMENTS (Cont'd.)

Base Input Voltage

\((I_b = 20 \text{ ma, } I_c = 0)\)

\(V_{be} --- 1 \text{ volt}\)

Base Input Current

\((I_c = 200 \text{ ma, } V_c = -1 \text{ volt})\)
\((I_c = 400 \text{ ma, } V_c = -1 \text{ volt})\)

\(I_b --- 10 \text{ ma}\)
\(I_b --- 30 \text{ ma}\)

SMALL SIGNAL MEASUREMENTS (25°C ambient)

Common Emitter Short Circuit Current Gain

\((I_c = 20 \text{ ma, } V_c = -4.5 \text{ volts})\)
Test frequency \(5K\text{c/s or lower}\)

\(\frac{a}{1-a} \quad 50 \quad ---\)

Effective \(\alpha\) Cut-off Frequency

(See Note 2)

\((I_c = 20 \text{ ma, } V_c = -4.5 \text{ volts})\)
\((I_c = 200 \text{ ma, } V_c = -1 \text{ volt})\)

\(f_{\alpha} \quad 4 \quad --- \text{ mc/s}\)
\(f_{\alpha} \quad 2 \quad --- \text{ mc/s}\)

Inverted Common Emitter Current Gain

\((I_c = 200 \text{ ma, } V_c = -1 \text{ volt})\)

\(\frac{a}{1-a} \quad 2.3 \quad ---\)

Emitter and Collector interchanged

SMALL SIGNAL PARAMETERS (25°C ambient)

\((I_e = 1 \text{ ma, } V_c = -4.5V)\)

Typical

Short Circuit Input Impedance \(H_{11} \quad 28 \quad \text{ohms}\)
Open Circuit Feedback Voltage Ratio \(H_{12} \quad 5 \times 10^{-4}\)
Short Circuit Current Multiplication Ratio \(H_{21} \quad -0.99\)
Open Circuit Output Admittance \(H_{22} \quad 5 \quad \mu\text{mhos}\)
Base Resistance for 1-\(\alpha\) Current \(r_b \quad 100 \quad \text{ohms}\)
Short Circuit Current Multiplication \((I_c = 20 \text{ ma, } V_c = -4.5 \text{ volts})\)

\(a \quad 0.99\)

Collector Capacitance \((V_c = -4.5 \text{ volts})\)

\(C_c \quad 40 \quad \mu\text{fd}\)
Note 1: Two .112-40 tapped holes are provided in bottom of transistor for mounting. Adequate heat sink must be provided. Care should be taken to get good contact between transistor and heat sink.

Note 2: The effective alpha cut-off frequency is the product of the low frequency, common-emitter, short-circuit current transfer ratio and the 3db cut-off frequency of that ratio. Ideally: \((\alpha/1-\alpha) \times (1-\alpha) \times a \approx f_a\).

Reasons for reissue: The collector voltage for certain tests at 20 ma collector current was incorrectly given as one volt and is corrected to -4.5 volts. The upper limit on base current for 400 ma collector current has been reduced from 40 ma to 30 ma. The high alpha of this transistor also required a change in the emitter floating potential test for electrical reach-through. The theoretical floating potential of 0.1 to 0.3 volts given by the formula \(0.026 \ln (1-\alpha)\) is observed at low voltages. To avoid confusing this normal voltage with the reach-through effect, the reach-through voltage is to be measured at an emitter floating potential of one volt. No significant change in the collector reach-through voltage limit is implied.