

|                             |                           |                                                           |                                                    |                                                                       |
|-----------------------------|---------------------------|-----------------------------------------------------------|----------------------------------------------------|-----------------------------------------------------------------------|
|                             |                           |                                                           |                                                    |                                                                       |
| CIRCUIT                     | COMMON<br>EMITTER (CE)    | CE with EMITTER<br>DEGENERATION                           | COMMON<br>BASE (CB)                                | EMITTER<br>FOLLOWER (CC)                                              |
| INPUT<br>RESISTANCE         | $r_{\pi}$                 | $\approx r_{\pi} (1 + g_m R_E)$                           | $\frac{\alpha_o}{g_m} \approx \frac{1}{g_m} = r_e$ | $r_{\pi} + (\beta + 1)R_L$                                            |
| OUTPUT<br>RESISTANCE        | $r_o \parallel R_C$       | $[r_o(1 + g_m R_E)] \parallel R_C$                        | $R_C$                                              | $\frac{R_S + r_{\pi}}{\beta + 1} \approx \frac{R_S}{\beta + 1} + r_e$ |
| STAGE TRANS-<br>CONDUCTANCE | $g_m$                     | $\frac{g_m}{(1 + g_m R_E)}$                               | $g_m$                                              | $g_m + \frac{1}{r_{\pi}} \approx g_m$                                 |
| VOLTAGE<br>GAIN             | $-g_m(r_o \parallel R_C)$ | $\frac{-g_m}{(1 + g_m R_E)} R_C \approx \frac{-R_C}{R_E}$ | $g_m R_C$                                          | $\approx \frac{R_L}{R_L + r_e + R_S/(\beta + 1)}$                     |
| CURRENT<br>GAIN             | $\beta$                   | $\beta$                                                   | $\alpha_o \approx 1$                               | $\beta + 1$                                                           |