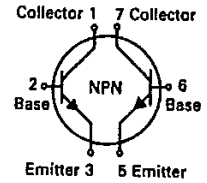
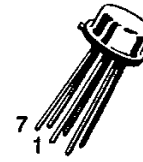


2N2639 thru 2N2644

CASE 654-07, STYLE 1



**DUAL
AMPLIFIER TRANSISTORS**

NPN SILICON

Refer to 2N2913 for graphs.

MAXIMUM RATINGS

| Rating | Symbol | Value | | Unit |
|--|----------------|-------------|----------|-------|
| Collector-Emitter Voltage | V_{CEO} | 45 | | Vdc |
| Collector-Base Voltage | V_{CB0} | 45 | | Vdc |
| Emitter-Base Voltage | V_{EB0} | 5.0 | | Vdc |
| Collector Current — Continuous | I_C | 30 | | mAdc |
| | | One Die | Both Die | |
| Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 300 | 600 | mW |
| | | 1.72 | 3.43 | mW/°C |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C | P_D | 600 | 1200 | mW |
| | | 3.43 | 6.87 | mW/°C |
| Operating and Storage Junction Temperature Range | T_J, T_{stg} | -65 to +200 | | °C |

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted.)

| Characteristic | Symbol | Min | Max | Unit |
|--|----------------|--|-------------|------------------|
| OFF CHARACTERISTICS | | | | |
| Collector-Emitter Sustaining Voltage(1) ($I_C = 10 \text{ mAdc}, I_B = 0$) | $V_{CEO(sus)}$ | 45 | — | Vdc |
| Collector Cutoff Current ($V_{CE} = 5.0 \text{ Vdc}, I_B = 0$) | I_{CEO} | — | 0.010 | μAdc |
| Collector Cutoff Current ($V_{CB} = 45 \text{ Vdc}, I_E = 0$) ($V_{CB} = 45 \text{ Vdc}, I_E = 0, T_A = +150^\circ\text{C}$) | I_{CB0} | — | 0.010 10 | μAdc |
| Emitter Cutoff Current ($V_{EB} = 5.0 \text{ Vdc}, I_C = 0$) | I_{EBO} | — | 0.010 | μAdc |
| ON CHARACTERISTICS(1) | | | | |
| DC Current Gain ($I_C = 10 \mu\text{Adc}, V_{CE} = 5.0 \text{ Vdc}$) | h_{FE} | 2N2639, 2N2640, 2N2641 2N2642, 2N2643, 2N2644 | | — |
| | | 50 | 300 | |
| | | 100 | 300 | |
| ($I_C = 10 \mu\text{Adc}, V_{CE} = 5.0 \text{ Vdc}, T_A = -55^\circ\text{C}$) | | 10 | — | |
| | | 20 | — | |
| ($I_C = 100 \mu\text{Adc}, V_{CE} = 5.0 \text{ Vdc}$) | | 55 | — | |
| | | 110 | — | |
| ($I_C = 1.0 \text{ mAdc}, V_{CE} = 5.0 \text{ Vdc}$) | | 65 | — | |
| | | 130 | — | |
| Collector-Emitter Saturation Voltage ($I_C = 10 \text{ mAdc}, I_B = 0.5 \text{ mAdc}$) | $V_{CE(sat)}$ | — | 1.0 | Vdc |
| Base-Emitter Saturation Voltage ($I_C = 10 \text{ mAdc}, I_B = 0.5 \text{ mAdc}$) | $V_{BE(sat)}$ | 0.6 | 1.0 | Vdc |
| SMALL-SIGNAL CHARACTERISTICS | | | | |
| Current-Gain — Bandwidth Product ($I_C = 1.0 \text{ mAdc}, V_{CE} = 5.0 \text{ Vdc}, f = 20 \text{ MHz}$) | f_T | 40 | — | MHz |
| Output Capacitance ($V_{CB} = 5.0 \text{ Vdc}, I_E = 0, f = 1.0 \text{ MHz}$) | C_{obo} | — | 8.0 | pF |
| Input Impedance ($I_C = 1.0 \text{ mAdc}, V_{CB} = 5.0 \text{ Vdc}, f = 1.0 \text{ kHz}, I_E = -1.0 \text{ mA}$) | h_{ib} | 25 | 32 | ohms |
| Voltage Feedback Ratio ($I_C = 1.0 \text{ mAdc}, V_{CB} = 5.0 \text{ Vdc}, f = 1.0 \text{ kHz}, I_E = -1.0 \text{ mA}$) | h_{rb} | — | 600 | $\times 10^{-6}$ |

2N2639 thru 2N2644

ELECTRICAL CHARACTERISTICS (continued) ($T_A = 25^\circ\text{C}$ unless otherwise noted.)

| Characteristic | Symbol | Min | Max | Unit |
|--|----------|-----------|------------|------------------|
| Small-Signal Current Gain ($I_C = 1.0 \text{ mA dc}$, $V_{CB} = 5.0 \text{ V dc}$, $f = 1.0 \text{ kHz}$) 2N2639, 2N2640, 2N2641 2N2642, 2N2643, 2N2644 | h_{fe} | 65 130 | 600 600 | — |
| Output Admittance ($I_C = 1.0 \text{ mA dc}$, $V_{CB} = 5.0 \text{ V dc}$, $f = 1.0 \text{ kHz}$, $I_E = -1.0 \text{ mA}$) | h_{ob} | — | 1.0 | μmhos |
| Noise Figure ($I_C = 10 \mu\text{A dc}$, $V_{CB} = 5.0 \text{ V dc}$, $R_S = 10 \text{ k}\Omega$, Bandwidth = 10 Hz to 15 kHz) | NF | — | 4.0 | dB |

MATCHING CHARACTERISTICS

| | | | | |
|---|--|------------|------------|------------------------------|
| DC Current Gain Ratio(2) ($I_C = 10 \mu\text{A dc}$, $V_{CE} = 5.0 \text{ V dc}$) 2N2639, 2N2642 2N2640, 2N2643 | h_{FE1}/h_{FE2} | 0.9 0.8 | 1.0 1.0 | — |
| Base-Emitter Voltage Differential ($I_C = 10 \mu\text{A dc}$, $V_{CE} = 5.0 \text{ V dc}$) 2N2639, 2N2642 2N2640, 2N2643 | $ V_{BE1} - V_{BE2} $ | — — | 5.0 10 | mVdc |
| Base-Emitter Voltage Differential Gradient ($I_C = 10 \mu\text{A dc}$, $V_{CE} = 5.0 \text{ V dc}$, $T_A = -55$ to $+125^\circ\text{C}$) 2N2639, 2N2642 2N2640, 2N2643 | $\frac{\Delta(V_{BE1} - V_{BE2})}{\Delta T_A}$ | — — | 10 20 | $\mu\text{V}/^\circ\text{C}$ |

(1) Pulse Test: Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2.0\%$.(2) The lowest h_{FE} reading is taken as h_{FE1} for this test.