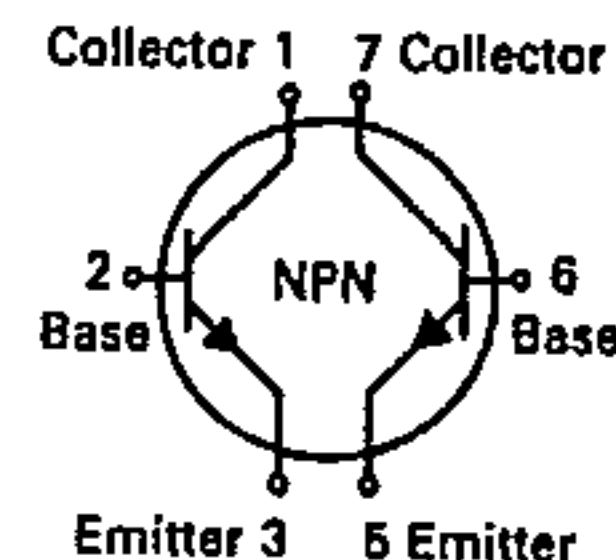
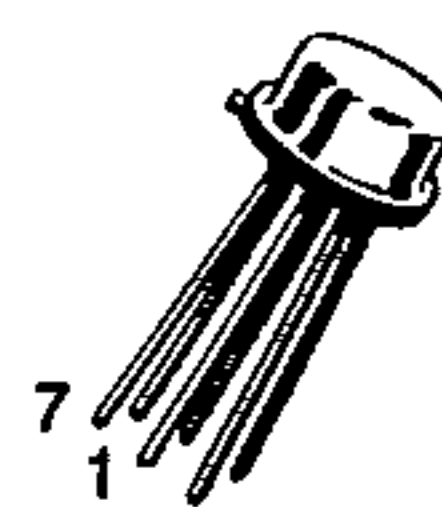


2N2639 thru 2N2644

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_{CBO}	45		Vdc
Emitter-Base Voltage	V_{EBO}	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 1.72	600 3.43	mW mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	600 3.43	1200 6.87	mW mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200		$^\circ\text{C}$

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_{CBO}	— —	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 ($I_C = 10 \mu\text{Adc}, V_{CE} = 5.0 \text{ Vdc}$) ($I_C = 10 \mu\text{Adc}, V_{CE} = 5.0 \text{ Vdc}, T_A = -55^\circ\text{C}$) ($I_C = 100 \mu\text{Adc}, V_{CE} = 5.0 \text{ Vdc}$) ($I_C = 1.0 \text{ mAdc}, V_{CE} = 5.0 \text{ Vdc}$)	2N2639, 2N2640, 2N2641 2N2642, 2N2643, 2N2644 2N2639, 2N2640, 2N2641 2N2642, 2N2643, 2N2644 2N2639, 2N2640, 2N2641 2N2642, 2N2643, 2N2644 2N2639, 2N2640, 2N2641 2N2642, 2N2643, 2N2644	h_{FE}	50 100 10 20 55 110 65 130	300 300 — — — — — —	—
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 ($I_C = 10\text{ }\mu\text{A dc}$, $V_{CB} = 5.0\text{ V dc}$, $R_S = 10\text{ k}\Omega$, Bandwidth = 10 Hz to 15 kHz)	NF	—	4.0	dB

MATCHING CHARACTERISTICS

DC Current Gain Ratio(2) ($I_C = 10\text{ }\mu\text{A dc}$, $V_{CE} = 5.0\text{ V dc}$) 2N2639, 2N2642 2N2640, 2N2643	h_{FE1}/h_{FE2}	0.9 0.8	1.0 1.0	—
Base-Emitter Voltage Differential ($I_C = 10\text{ }\mu\text{A dc}$, $V_{CE} = 5.0\text{ V dc}$) 2N2639, 2N2642 2N2640, 2N2643	$ V_{BE1} - V_{BE2} $	— —	5.0 10	mVdc
Base-Emitter Voltage Differential Gradient ($I_C = 10\text{ }\mu\text{A dc}$, $V_{CE} = 5.0\text{ V dc}$, $T_A = -55\text{ to }+125^\circ\text{C}$) 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 $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2.0\%$.(2) The lowest h_{FE} reading is taken as h_{FE1} for this test.