

FEATURES

- Four Matched PNP Transistors
- Low noise — $0.75 \text{ nV}/\sqrt{\text{Hz}}$
- High Speed — $325 \text{ MHz } f_t$
- Excellent Matching - $500 \text{ } \mu\text{V}$ (typ)
- Dielectrically Isolated
- $-25 \text{ V } V_{\text{CEO}}$

APPLICATIONS

- Microphone Preamplifiers
- Tape Head Preamplifiers
- Current Sources
- Current Mirrors
- Log/Antilog Amplifiers
- Multipliers

DESCRIPTION

THAT120 is a quad, large-geometry monolithic PNP transistor array which combines low noise, high speed and excellent parametric matching. The large geometry typically results in $25 \text{ } \Omega$ base spreading resistance, producing $0.75 \text{ nV}/\sqrt{\text{Hz}}$ voltage noise. This makes these parts an excellent choice for low-noise amplifier input stages.

Fabricated on a Complementary Bipolar Dielectrically Isolated process, all four transistors are electrically isolated from each other by a layer of oxide.

The resulting low collector-to-substrate capacitance produces a typical f_t of 325 MHz , for AC performance similar to 2N3906-class devices. The dielectric isolation also minimizes crosstalk and provides complete DC isolation.

Substrate biasing is not required for normal operation, though the substrate should be grounded to optimize speed. The one-chip construction assures excellent parameter matching and tracking over temperature.

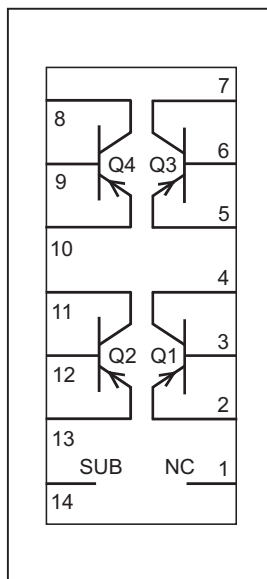


Figure 1. Pin Configuration

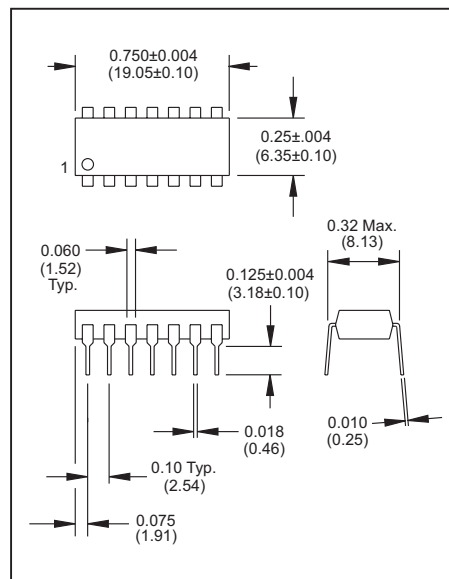


Figure 2. Dual-In-Line Package Outline

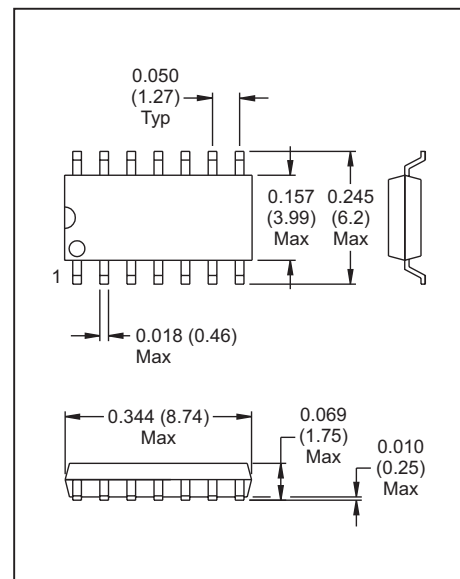


Figure 3. Surface Mount Package Outline

SPECIFICATIONS¹

Maximum Ratings ($T_A = 25^\circ\text{C}$)						
Parameter	Symbol	Conditions	Min	Typ	Max	Units
Collector-Emitter Voltage	BV_{CEO}	$I_C = 1\text{ mA}, I_B = 0$	-25	-40	—	V
Collector-Base Voltage	BV_{CBO}	$I_C = 10\ \mu\text{A}, I_E = 0$	-25	40	—	V
Emitter-Base Voltage	BV_{EBO}	$I_E = 10\ \mu\text{A}, I_C = 0$	-5	—	—	V
Collector-Collector Voltage	BV_{CC}		± 100	± 200	—	V
Emitter-Emitter Voltage	BV_{EE}		± 100	± 200	—	V
Collector Current	I_C		-10	-20		mA
Emitter Current	I_E		-10	-20		mA
Operating Temperature Range	T_A		0		70	$^\circ\text{C}$
Maximum Junction Temperature	T_{JMAX}				150	$^\circ\text{C}$
Storage Temperature	T_{STORE}		-45		125	$^\circ\text{C}$

Electrical Characteristics²						
Parameter	Symbol	Conditions	Min	Typ	Max	Units
Current Gain	h_{fe}	$V_{CB} = 10\text{ V}$				
		$I_C = 1\text{ mA}$	50	75	—	
		$I_C = 10\ \mu\text{A}$	50	75	—	
Current Gain Matching	Δh_{fe}	$V_{CB} = 10\text{ V}, I_C = 1\text{ mA}$	—	5	—	%
Noise Voltage Density	e_N	$V_{CB} = 10\text{ V}, I_C = 1\text{ mA}, 1\text{ kHz}$	—	0.75	—	$\text{nV} / \sqrt{\text{Hz}}$
Gain-Bandwidth Product	f_t	$I_C = 1\text{ mA}, V_{CB} = 10\text{ V}$		325		MHz
ΔV_{BE} ($V_{BE1}-V_{BE2}; V_{BE3}-V_{BE4}$)	V_{OS}	$I_C = 1\text{ mA}$	—	± 0.5	± 3	mV
		$I_C = 10\ \mu\text{A}$	—	± 0.5	± 3	mV
ΔI_B ($I_{B1}-I_{B2}; I_{B3}-I_{B4}$)	I_{OS}	$I_C = 1\text{ mA}$	—	± 700	± 1800	nA
		$I_C = 10\ \mu\text{A}$	—	± 7	± 18	nA
Collector-Base Leakage Current	I_{CBO}	$V_{CB} = 25\text{ V}$	—	-25	—	pA
Bulk Resistance	r_{BE}	$V_{CB} = 0\text{ V}, 10\ \mu\text{A} < I_C < 10\text{ mA}$	—	2	—	Ω
Base Spreading Resistance	r_{bb}	$V_{CB} = 10\text{ V}, I_C = 1\text{ mA}$	—	25	—	Ω
Collector Saturation Voltage	$V_{CE(SAT)}$	$I_C = 1\text{ mA}, I_B = 100\ \mu\text{A}$	—	-0.05		V
Output Capacitance	C_{OB}	$V_{CB} = 10\text{ V}, I_E = 0\text{ mA}, 100\text{ kHz}$		3		pF
Collector-Collector Capacitance $Q_1/Q_2; Q_3/Q_4$	C_{CC}	$V_{CC} = 0\text{ V}, 100\text{ kHz}$		0.6		pF

1. All specifications subject to change without notice.
2. Unless otherwise noted, $T_A = 25^\circ\text{C}$.