ELECTRONICS, INC.
44 FARRAND STREET
BLOOMFIELD, NJ 07003
(973) 748–5089

NTE992
Integrated Circuit
Quad, Single Supply Operational Amplifier

Description:

The NTE992 is an internally compensated Norton operational amplifier in a 14–Lead DIP type package designed specifically for single positive power supply applications found in industrial control systems and automotive electronics. This device contains four independent amplifiers – making it ideal for applications such as active filters, multi–channel amplifiers, tachometers, oscillators, and other similar usages.

Features:

- Single–Supply Operation
- Internally Compensated
- Wide Unity Gain Bandwidth: 4MHz Typ
- Low Input Bias Current: 50nA Typ
- High Open–Loop Gain: 1000V/V Min
- Large Output Voltage Swing: $(V_{CC} - 1)\ V_{P-P}$

Absolute Maximum Ratings:

Supply Voltage, V_{CC} 28V
Input Currents (I_{in}+ or I_{in}–), I_{in} 5mA
Output Current, I_O 50mA
Power Dissipation (T_A = +25°C), P_D 625mW
Derate Above 25°C . . . . . 5mW/°C
Operating Ambient Temperature, T_A . . . . . –40° to +85°C
Storage Temperature Range, T_{stg} . . . . . –65° to +150°C

Electrical Characteristics: (T_A = +25°C, V_{CC} = +15V unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Open–Loop Voltage Gain	A_{VOL}	f = 100Hz, R_L = 5kΩ, Note 1	1.2	2.0	–	V/mV
Input Resistance (Inverting Input)	r_i		–	1.0	–	MΩ
Output Resistance	r_O		–	8.0	–	kΩ
Input Bias Current (Inverting Input)	I_{IB}		–	50	300	nA

Note 1. Open–loop voltage gain is defined as voltage gain from the inverting input to the output.

Electrical Characteristics (Cont'd): (T_A = +25°C, V_{CC} = +15V unless otherwise specified)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
Slew Rate Positive Output Swing	SR	C_L = 100pF, R_L = 2kΩ		–	0.5	–	V/μs
Negative Output Swing				–	20	–	V/μs
Unity Gain Bandwidth	BW			–	4.0	–	MHz
Output Voltage Swing (Note 6)	V_{OH}	V_{CC} = +15V, R_L = 2kΩ	V_{out} High (I_{in}– = 0, I_{in}+ = 0	13.5	14.2	–	V
	V_{OL}		V_{out} Low (I_{in}– = 10μA, I_{in}+ = 0	–	0.03	0.2	V
	V_{OH}	V_{CC} = Max Rating, R_L = ∞, V_{out} High (I_{in}– = 0, I_{in}+ = 0)		–	25.5	–	V
Output Current Source	I_{source}			5.0	10.0	–	mA
Sink (Note 2)	I_{sink}			0.5	0.87	–	mA
Low Level Output Current	I_{OL}	I_{in}– = 5μA, V_{OL} = 1V		–	5.0	–	mA
Supply Current (All Four Amps) Non–Inverting Inputs Open	I_{DO}			–	6.9	10.0	mA
Non–Inverting Inputs Grounded	I_{DG}			–	7.8	14.0	mA
Power Supply Rejection	PSRR	f = 100Hz		–	55	–	dB
Mirror Gain	A_i	I_{in}+ = 20μA	T_A = –40° to +85°C, Note 3	0.90	1.0	1.1	μA
		I_{in}+ = 200μA		0.90	1.0	1.1	μA
Δ Mirror Gain	ΔA_i	20μA ≤ I_{in}+ ≤ 200μA, T_A = –40° to +85°C, Note 3		–	2.0	5.0	%
Mirror Current		T_A = –40° to +85°C		–	10	500	μA
Negative Input Current		Note 5		–	1.0	–	mA

Note 2. Sink current is specified for linear operation. When the device is used as a comparator (non–linear operation) where the inverting input is overdriven, the sink current (low level output current) capability is typically 5mA.

Note 3. This specification indicates the current gain of the current mirror which is used as the non–inverting input.

Note 4. Input V_{BE} match between the non–inverting and inverting inputs occurs for a mirror current (non–inverting input current) of approximately 10μA.

Note 5. Clamp transistors are included to prevent the input voltages from swinging below GND more than approximately –0.3V. The negative input currents that may result from large signal overdrive with capacitance input coupling must be limited externally to values of approximately 1mA. Negative input currents in excess of 4mA will cause the output to drop to a low voltage. These values apply for any one of the input terminals. If more than one of the input terminals are simultaneously driven negative, maximum currents are reduced. Common–mode biasing can be used to prevent negative input voltages.

Note 6. When used as a non–inverting amplifier, the minimum output voltage is the V_{BE} of the inverting input transistor.

Pin Connection Diagram