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NTE937M
Integrated Circuit
JFET Input Operational Amplifier
8−Lead DIP Type Package

Description:

The NTE937M is a monolithic JFET input operational amplifier in an 8−Lead DIP type package incorporating well−matched, high voltage JFET's on the same chip with standard bi−polar transistors. This amplifier features low input bias and offset currents, low offset voltage and offset voltage drift, coupled with offset adjust which does not degrade drift or common−mode rejection. It is also designed for high slew rate, wide bandwidth, extremely fast settling time, low voltage and current noise and a low 1/f noise corner.

Advantages:

- Replaces Expensive Hybrid and Module FET OP Amps
- Rugged JFET's Allow Blow−Out Free Handling Compared with MOSFET Input Device
- Excellent for Low Noise Applications using either High or Low Source Impedance − Very Low 1/f Corner
- Offset Adjust does not Degrade Drift or Common−Mode Rejection as in Most Monolithic Amplifiers
- New Output Stage Allows use of Large Capacitive Loads (5,000pF) without Stability Problems
- Internal Compensation and Large Differential Input Voltage Capability

Features:

- Low Input Bias Current
- Low Input Offset Current
- High Input Impedance
- Low Input Noise Current
- High Common−Mode Rejection Ratio
- Large DC Voltage Gain

Applications:

- Precision High Speed Integrators
- Fast D/A and A/D Converters
- High Impedance Buffers
- Wideband, Low Noise, Low Drift Amplifiers
- Logarithmic Amplifiers
- Photocell Amplifiers
- Sample and Hold Circuits

Rev. 10−20

Absolute Maximum Ratings: (T_A = 0° to +70°C, Note 1, Note 2 unless otherwise specified)

Supply Voltage . . . . . ±18V
Maximum Power Dissipation (at +25°C, Note 2), P_d 670mW
Differential Input Voltage . . . . . ±30V
Input Voltage Range (Note 3) . . . . . ±16V
Output Short−Circuit Duration . . . . . Continuous
Maximum Operating Junction Temperature, $T_J$max . . . . . +100°C
Storage Temperature Range, T_{stg} . . . . . −65° to +150°C
Lead Temperature (During Soldering, 10sec), T_L . . . . . +260°C
Thermal Resistance, Junction−to−Ambient, R_{thJA} . . . . . +55.2°C/W

Note 1. Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions. Exposure to absolute maximum rated conditions for extended periods may affect device reliability.

Note 2. The maximum power dissipation for this device must be derated at elevated temperatures and is dictated by $T_J$max, R_{thJC}, and the ambient temperature, T_A. The maximum available power dissipation at any temperature is $P_d = (T_J max - T_A)/R_{thJC}$ or the +25°C $P_d$max, whichever is less.

Note 3. Unless otherwise specified, the absolute maximum negative input voltage is equal to the negative power supply voltage.

Recommended Operating Characteristics: (T_A = 0° to +70°C unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Supply Voltage	V_S		–	–	±15	V
Ambient Temperature Range	T_A		0	–	70	°C

AC Electrical Characteristics: (T_A = T_J = +25C, V_S = ±15V unless otherwise specified)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
Slew Rate	SR	A_V = 5		30	50	–	V/µs
Gain Bandwidth Product	GBW			–	5	–	MHz
Settling Time to 0.01%	t_s	Note 4		–	1.5	–	µs
Equivalent Input Noise Voltage	e_N	R_S = 100Ω	f = 100Hz	–	15	–	nV/√Hz
			f = 1000Hz	–	12	–	nV/√Hz
Equivalent Input Current Noise	i_N	f = 100Hz		–	0.01	–	pA/√Hz
		f = 1000Hz		–	0.01	–	pA/√Hz
Input Capacitance	C_{IN}			–	3	–	pF

Note 4. A_V = −5, the feedback resistor from output to input is 2kΩ and the output step is 10V.

DC Electrical Characteristics: (T_A = T_J = +25C, V_S = ±15V unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Supply Current	I_{CC}		–	5	10	mA

DC Electrical Characteristics: (Note 5, unless otherwise specified)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
Input Offset Voltage	V_{OS}	$R_S = 50\Omega$	$T_A = +25°C$	–	3	10	mV
			Over Temperature	–	–	13	mV
Average TC of Input Offset Voltage	$\Delta V_{OS}/\Delta T$	$R_S = 50\Omega$		–	5	–	μV/°C
Change in Average TC with V_{OS} Adjust	$\Delta TC/\Delta V_{OS}$	$R_S = 50\Omega$, Note 6		–	0.5	–	μV/°C
Input Offset Current	I_{OS}	$T_J = +25°C$, Note 5, Note 7		–	3	50	pA
		$T_J \le T_{HIGH}$		–	–	2	nA
Input Bias Current	I_B	$T_J = +25°C$, Note 5, Note 7		–	30	200	pA
		$T_J \le T_{HIGH}$		–	–	8	nA
Input Resistance	R_{IN}	$T_J = +25°C$		–	10^{12}	–	Ω
Large Signal Voltage Gain	A_{VOL}	$V_S = \pm15V$, $V_O = \pm10V$, $R_L = 2k$	$T_A = +25°C$	25	200	–	V/mV
			Over Temperature	15	–	–	V/mV
Output Voltage Swing	V_O	$V_S = \pm15V$	$R_L = 10k\Omega$	±12	±13	–	V
			$R_L = 2k\Omega$	±10	±12	–	V
Input Common–Mode Voltage Range	V_{CM}	$V_S = \pm15V$	$V_{CM, High}$	10	15.1	–	V
			$V_{CM, Low}$	–	–12	–10	V
Common–Mode Rejection Ratio	CMRR			80	100	–	dB
Supply Voltage Rejection Ratio	PSRR	Note 8		80	100	–	dB

Note 5. $V_S = \pm15V$, $T_A = 0°$ to $+70°C$, $T_{HIGH} = +70°C$ and V_{OS}, I_B, and I_{OS} are measured at $V_{CM} = 0$.

Note 6. The temperature coefficient of the adjust input offset voltage changes only a small amount (0.5μV/°C typically) for each mV of adjustment from its original unadjusted value. Common–mode rejection and open loop voltage gain are also unaffected by offset adjustment.

Note 7. The input bias currents are junction leakage currents which approximately double for every 10°C increase in the junction temperature, T_J. Due to limited production test time, the input bias currents measured are correlated to junction temperature. In normal operation the junction temperature rises above the ambient temperature as a result of internal power dissipation, P_d. $T_J = T_A + R_{thJC} P_d$ where R_{thJC} is the thermal resistance from junction to ambient. Use of a heat sink is recommended if input bias current is to be kept to a minimum.

Note 8. Supply Voltage Rejection is measured fo both magnitudes increasing simultaneously, in accordance with common practice.

Pin Connection Diagram