National Semiconductor

LH740A/LH740AC FET Input Operational Amplifier

General Description

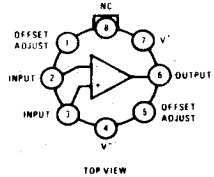
The LH740A/LH740AC is a FET input, general purpose operational amplifier with high input impedance, closely matched input characteristics, and good slew rates. Input offset voltage is typically 10.0 mV at 25°C, while input bias current is less than 100 pA at 25°C. Offset current is typically less than 40 pA at 25°C. Other important design features include:

- Internal 6 dB/octave frequency compensation
- Unity gain slew rate in excess of 6 V/μs
- Unity gain bandwidth of 1 MHz
- Input offset is adjustable with a single 10k pot
- **Pin compatible with LM741, LM709, LM101A.**
- Excellent offset current match over temperature, typically 100 pA
- Output is continuously short-circuit proof
- Excellent open loop gain, typically in excess of 100 dB
- Guaranteed over the full military temperature range

The LH740A/LH740AC is intended to fulfill a wide variety of applications requiring extremely low bias currents such as integrators, sample and hold amplifiers, and general purpose operational amplifier applications.

The LH740A is specified for operation over the −55°C to +125°C military temperature range. The LH740AC is specified for operation over the 0°C to +85°C temperature range.

Connection Diagram

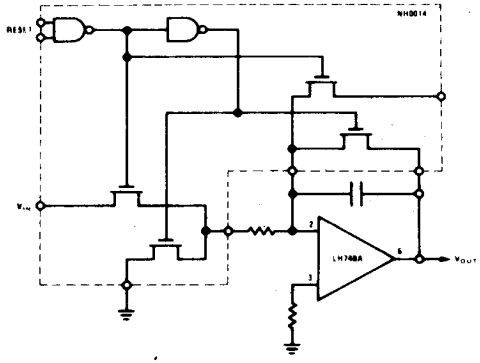


TOP VIEW

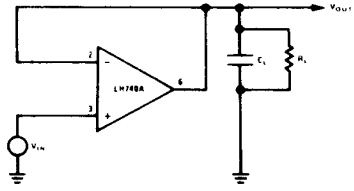
Order Number LH740AH or LH740ACH
See Package H08A

Typical Applications

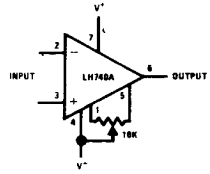
Integrator



Transient Response



Offset Null



Absolute Maximum Ratings

Supply Voltage		±22V
Maximum Power Dissipation		500 mW
Differential Input Voltage		±5V
Input Voltage		±15V
Short Circuit Duration		Continuous
Operating Temperature Range	LH740A	−55°C to +125°C
	LH740AC	0°C to +85°C
Storage Temperature Range		−65°C to +150°C
Lead Temperature (soldering, 10 sec.)		300°C

Electrical Characteristics (Note 1) ($V_S = \pm 15V$, $T_A = 25°C$ unless otherwise noted)

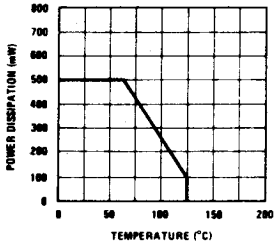
PARAMETER	CONDITIONS	LH740A MIN	LH740A TYP	LH740A MAX	LH740AC MIN	LH740AC TYP	LH740AC MAX	UNITS
Input Offset Voltage	$R_S \leq 100\ k\Omega$		10	15		10	20	mV
Input Offset Current	$T_J = 25°C$ (Note 2)		40	100		60	150	pA
Input Current (either input)	$T_J = 25°C$ (Note 2)		100	200		100	500	pA
Input Resistance	$T_J = 25°C$ (Note 2)		1,000,000			1,000,000		MΩ
Large Signal Voltage Gain	$R_L \geq 2\ k\Omega$, $V_{OUT} = \pm 10V$	50,000	100,000		50,000	100,000		V/V
Output Resistance			75			75		Ω
Output Short-Circuit Current			20			20		mA
Common Mode Rejection Ratio		80			80			dB
Supply Voltage Rejection Ratio		80			80			dB
Supply Current			3.0	4.0		3.0	4.0	mA
Slew Rate			6.0			6.0		V/μs
Unity Gain Bandwidth			1.0			1.0		MHz
Transient Response (Unity Gain)	$C_L \leq 100\ pF$, $R_L = 2\ k\Omega$, $V_{IN} = 100\ mV$							
Risetime			110			300		ns
Overshoot			10	20		10		%
(These specifications apply for $-55°C \leq T_A \leq 125°C$ for the LH740A and $0°C \leq T_A \leq 85°C$ for the LH740AC unless otherwise noted.)								
Input Voltage Range		±12			±12			V
Common Mode Rejection Ratio		80			80			dB
Supply Voltage Rejection Ratio		80			80			dB
Large Signal Voltage Gain		40,000			40,000			V/V
Output Voltage Swing	$R_L \geq 10\ k\Omega$	±12	±14		±12	±14		V
	$R_L \geq 2\ k\Omega$	±10	±13		±10	±13		V
Input Offset Voltage			15	20		30		mV
Input Offset Current			100	500		60	500	pA
Input Current (either input)			2.5	4.0		1.1	5.0	nA
Offset Voltage Drift	$R_S \leq 100K$		5.0			5.0		μV/°C

Note 1: For supply voltages less than ±10V, the absolute maximum input voltage is equal to the supply voltage.

Note 2: Due to high speed automatic testing, these parameters are correlated to junction temperature.

Typical Performance Characteristics

Maximum Power Dissipation



Open Loop Frequency Response