Am148 • Am149

Quad 741 Operational Amplifiers

Distinctive Characteristics

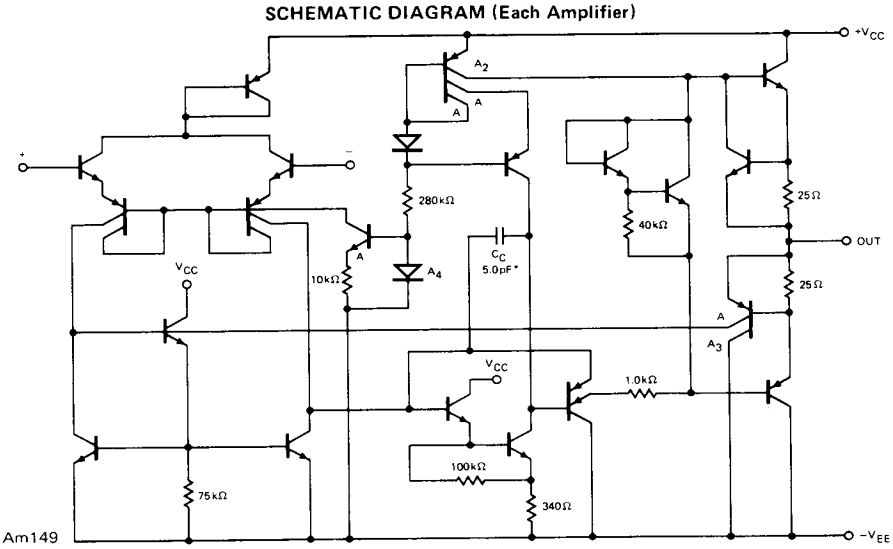
- 741 op amp operating characteristics
- Low supply current drain — 0.6mA/amplifier
- Class AB output state — no crossover distortion
- Pin compatible with the Am124
- Low input offset voltage — 1.0mV
- Low input offset current — 4.0nA
- Low input bias current — 30nA
- Gain bandwidth product
  Am148 (unity gain) — 1.0MHz
  Am149 ($A_V \geq 5$) — 4.0MHz
- High degree of isolation between amplifiers — 120dB
- Overload protection for inputs and outputs

FUNCTIONAL DESCRIPTION

The Am148 series is a true quad 741. It consists of four independent, high gain, internally compensated, low-power operational amplifiers which have been designed to provide functional characteristics identical to those of the familiar 741 operational amplifier. In addition the total supply current for all four amplifiers is comparable to the supply current of a single 741 type op amp. Other features include input offset currents and input bias current which are much less than those of a standard 741. Also, excellent isolation between amplifiers has been achieved by independently biasing each amplifier and using layout techniques which minimize thermal coupling. The Am149 series has the same features as the Am148 plus a gain bandwidth product of 4.0MHz at a gain of 5.0 or greater.

The Am148 can be used anywhere multiple 741 or 1558 type amplifiers are being used and in applications where amplifier matching or high packing density is required.

SCHEMATIC DIAGRAM (Each Amplifier)



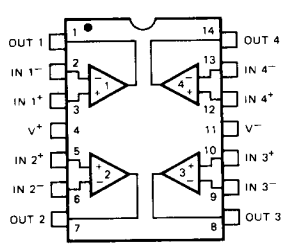
*1.0pF on the Am149

LIC-712

ORDERING INFORMATION

Part Number	Package Type	Temperature Range	Order Number
Am348	Hermetic DIP	0°C to +70°C	LM348D
	Molded DIP	0°C to +70°C	LM348N
	Dice	0°C to +70°C	LD348
Am248	Hermetic DIP	−25°C to +85°C	LM248D
Am148	Hermetic DIP	−55°C to +125°C	LM148D
	Dice	−55°C to +125°C	LD148
Am349	Hermetic DIP	0°C to +70°C	LM349D
	Molded DIP	0°C to +70°C	LM349N
	Dice	0°C to +70°C	LD349
Am249	Hermetic DIP	−25°C to +85°C	LM249D
Am149	Hermetic DIP	−55°C to +125°C	LM149D
	Dice	−55°C to +125°C	LD149

CONNECTION DIAGRAM
Top View



Note: Pin 1 is marked for orientation.

LIC-713

ABSOLUTE MAXIMUM RATINGS

	Am148/Am149	Am248/Am249	Am348/Am349
Supply Voltage	±22V	±18V	±18V
Differential Input Voltage	±44V	±36V	±36V
Input Voltage	±22V	±18V	±18V
Output Short Circuit Duration (Note 1)	Continuous	Continuous	Continuous
Power Dissipation (P_d at 25°C) and Thermal Resistance (θ_{jA}), (Note 2)			
Molded DIP (N) – P_d		570mW	500mW
– θ_{jA}		150°C/W	150°C/W
Cavity DIP (D) (J) – P_d	900mW	900mW	900mW
– θ_{jA}	100°C/W	100°C/W	100°C/W
Maximum Junction Temperature ($T_{jmax.}$)	150°C	110°C	100°C
Operating Temperature Range	$-55°C \leq T_A \leq +125°C$	$-25°C \leq T_A \leq +85°C$	$0°C \leq T_A \leq +70°C$
Storage Temperature Range	−65°C to +150°C	−65°C to +150°C	−65°C to +150°C
Lead Temperature (Soldering, 60 seconds)	300°C	300°C	300°C

See Am741 for Typical Performance Characteristics.

ELECTRICAL CHARACTERISTICS (Note 3)

			Am148/Am149			Am248/Am249			Am348/Am349			
Parameters	**Conditions**		**Min.**	**Typ.**	**Max.**	**Min.**	**Typ.**	**Max.**	**Min.**	**Typ.**	**Max.**	**Units**
Input Offset Voltage	$T_A = 25°C$, $R_S \leq 10k\Omega$			1.0	5.0		1.0	6.0		1.0	6.0	mV
Input Offset Current	$T_A = 25°C$			4.0	25		4.0	50		4.0	50	nA
Input Bias Current	$T_A = 25°C$			30	100		30	200		30	200	nA
Input Resistance	$T_A = 25°C$		0.8	2.5		0.8	2.5		0.8	2.5		MΩ
Supply Current All Amplifiers	$T_A = 25°C$, $V_S = \pm15V$			2.4	3.6		2.4	4.5		2.4	4.5	mA
Large Signal Voltage Gain	$T_A = 25°C$, $V_S = \pm15V$, $V_{OUT} = \pm10V$, $R_L \geq 2.0k\Omega$		50	160		25	160		25	160		V/mV
Amplifier to Amplifier Coupling	$T_A = 25°C$, f = 1.0Hz to 20kHz (Input Referred)			−120			−120			−120		dB
Small Signal Bandwidth	$T_A = 25°C$	Am148 Series		1.0			1.0			1.0		MHz
		Am149 Series		4.0			4.0			4.0		
Phase Margin	$T_A = 25°C$	Am148 Series ($A_V = 1$)		60			60			60		degrees
		Am149 Series ($A_V = 5$)		60			60			60		
Slew Rate	$T_A = 25°C$	Am148 Series ($A_V = 1$)		0.5			0.5			0.5		V/μs
		Am149 Series ($A_V = 5$)		2.0			2.0			2.0		
Output Short Circuit Current	$T_A = 25°C$			25			25			25		mA
Input Offset Voltage	$R_S \leq 10k\Omega$				6.0			7.5			7.5	mV
Input Offset Current					75			125			100	nA
Input Bias Current					325			500			400	nA
Large Signal Voltage Gain	$V_S = \pm15V$, $V_{OUT} = \pm10V$, $R_L > 2.0k\Omega$		25			15			15			V/mV
Output Voltage Swing	$V_S = \pm15V$	$R_L = 10k\Omega$	±12	±13		±12	±13		±12	±13		V
		$R_L = 2.0k\Omega$	±10	±12		±10	±12		±10	±12		
Input Voltage Range	$V_S = \pm15V$		±12			±12			±12			V
Common-Mode Rejection Ratio	$R_S \leq 10k\Omega$		70	90		70	90		70	90		dB
Supply Voltage Rejection	$R_S \leq 10k\Omega$		77	96		77	96		77	96		dB

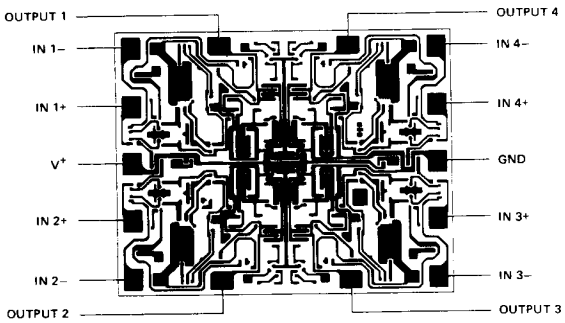
Notes: 1. Any of the amplifier outputs can be shorted to ground indefinitely; however, more than one should not be simultaneously shorted as the maximum junction temperature will be exceeded.

2. The maximum power dissipation for these devices must be derated at elevated temperatures and is dictated by $T_{jmax.}$, θ_{jA}, and the ambient temperature, T_A. The maximum available power dissipation at any temperature is $P_d = (T_{jmax.} - T_A)/\theta_{jA}$ or the 25°C $P_{dmax.}$, whichever is less. Derate Dual In-Line package at 9mW/°C for operation at ambient temperatures above 95°C.

3. These specifications apply for $V_S = \pm15V$ and over the absolute maximum operating temperature range ($T_L \leq T_A \leq T_H$) unless otherwise noted.

4. For supply voltages less than ±15V, the maximum input voltage is equal to the supply voltage.

Metallization and Pad Layout



61 X 73 Mils