National Semiconductor

November 1994

LM748 Operational Amplifier

General Description

The LM748 is a general purpose operational amplifier with external frequency compensation.

The unity-gain compensation specified makes the circuit stable for all feedback configurations, even with capacitive loads. It is possible to optimize compensation for best high frequency performance at any gain. As a comparator, the output can be clamped at any desired level to make it compatible with logic circuits.

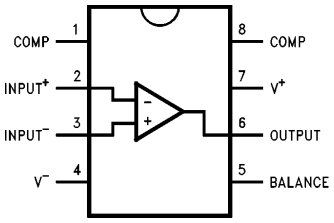
The LM748C is specified for operation over the 0°C to +70°C temperature range.

Features

- Frequency compensation with a single 30 pF capacitor
- Operation from ±5V to ±20V
- Continuous short-circuit protection
- Operation as a comparator with differential inputs as high as ±30V
- No latch-up when common mode range is exceeded
- Same pin configuration as the LM101

Connection Diagram

Dual-In-Line Package



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Top View

Order Number LM748CN
See NS Package Number N08B

  RRD-B30M115/Printed in U. S. A.

Absolute Maximum Ratings

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage	±22V
Power Dissipation (Note 1)	500 mW
Differential Input Voltage	±30V
Input Voltage (Note 2)	±15V
Output Short-Circuit Duration (Note 3)	
Operating Temperature Range: LM748C	0°C to +70C
Storage Temperature Range	−65°C to +150°C
Lead Temperature (Soldering, 10 sec.)	+300°C

Electrical Characteristics (Note 4)

Parameter	Conditions	Min	Typ	Max	Units
Input Offset Voltage	$T_A = 25°C$, $R_S \leq 10\ k\Omega$		1.0	5.0	mV
Input Offset Current	$T_A = 25°C$		40	200	nA
Input Bias Current	$T_A = 25°C$		120	500	nA
Input Resistance	$T_A = 25°C$	300	800		kΩ
Supply Current	$T_A = 25°C$, $V_S = \pm 15V$		1.8	2.8	mA
Large Signal Voltage Gain	$T_A = 25°C$, $V_S = \pm 15V$ $V_{OUT} = \pm 10V$, $R_L \geq 2\ k\Omega$	50	160		V/mV
Input Offset Voltage	$R_S \leq 10\ k\Omega$			6.0	mV
Average Temperature Coefficient of Input Offset Voltage	$R_S \leq 50\Omega$		3.0		μV/°C
	$R_S \leq 10\ k\Omega$		6.0		μV/°C
Input Offset Current	$T_A = 0°C$ to $+70°C$			300	nA
	$T_A = -55°C$ to $+125°C$			500	nA
Input Bias Current	$T_A = 0°C$ to $+70°C$			0.8	μA
	$T_A = -55°C$ to $+125°C$			1.5	μA
Supply Current	$T_A = +125°C$, $V_S = \pm 15V$		1.2	2.25	mA
	$T_A = -55°C$ to $+125°C$		1.9	3.3	mA
Large Signal Voltage Gain	$V_S = \pm 15V$, $V_{OUT} = \pm 10V$ $R_L \geq 2\ k\Omega$	25			V/mV
Output Voltage Swing	$V_S = \pm 15V$, $R_L = 10\ k\Omega$	±12	±14		V
	$V_S = \pm 15V$, $R_L = 2\ k\Omega$	±10	±13		V
Input Voltage Range	$V_S = \pm 15V$	±12			V
Common-Mode Rejection Ratio	$R_S \leq 10\ k\Omega$	70	90		dB
Supply Voltage Rejection Ratio	$R_S \leq 10\ k\Omega$	77	90		dB

Note 1: For operating at elevated temperatures, the device must be derated based on a maximum junction to case thermal resistance of 45°C per watt, or 150°C per watt junction to ambient. (See Curves).

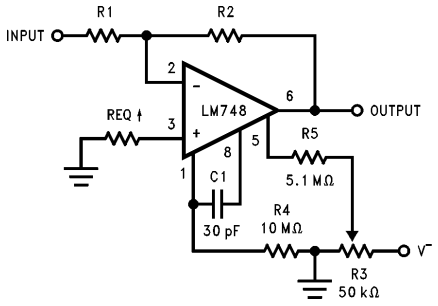
Note 2: For supply voltages less than ±15V, the absolute maximum input voltage is equal to the supply voltage.

Note 3: Continuous short circuit is allowed for case temperatures to +125°C and ambient temperatures to +70°C.

Note 4: These specifications apply for $\pm 5V \leq V_S \leq +15V$ and $0°C \leq T_A \leq +70°C$, unless otherwise specified.

Typical Applications

Inverting Amplifier with Balancing Circuit



†May be zero or equal to parallel combination of R1 and R2 for minimum offset.

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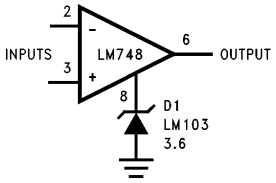
Voltage Comparator for Driving DTL or TTL Integrated Circuits



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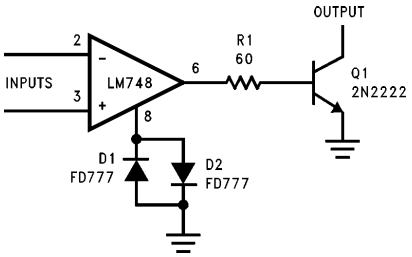
Voltage Comparator for Driving RTL Logic or High Current Driver



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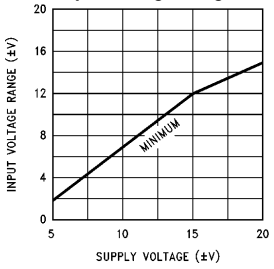
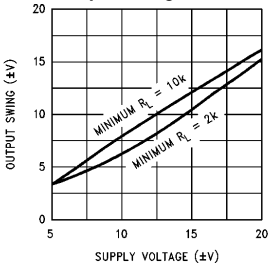
Guaranteed Performance Characteristics (Note 4)

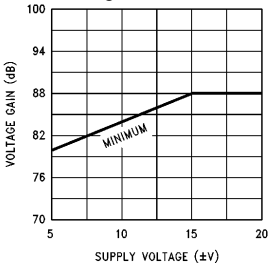
Input Voltage Range



Output Swing



Voltage Gain



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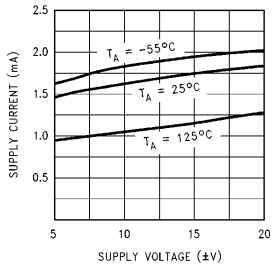
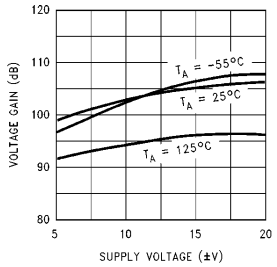
Typical Performance Characteristics

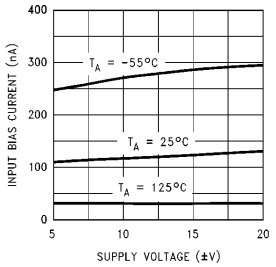
Supply Current



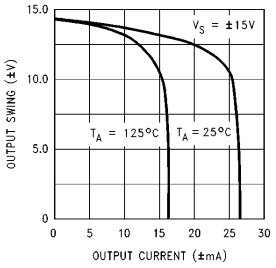
Voltage Gain



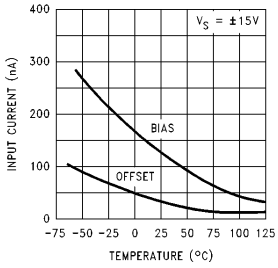
Input Bias Current



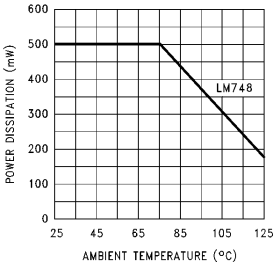
Current Limiting



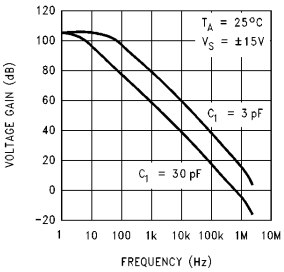
Input Current



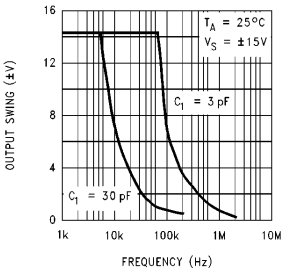
Maximum Power Dissipation



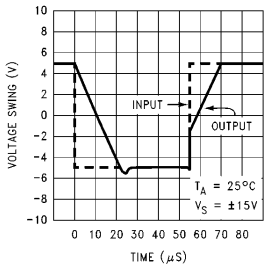
Open Loop Frequency Response



Large Signal Frequency Response



Voltage Follower Pulse Response



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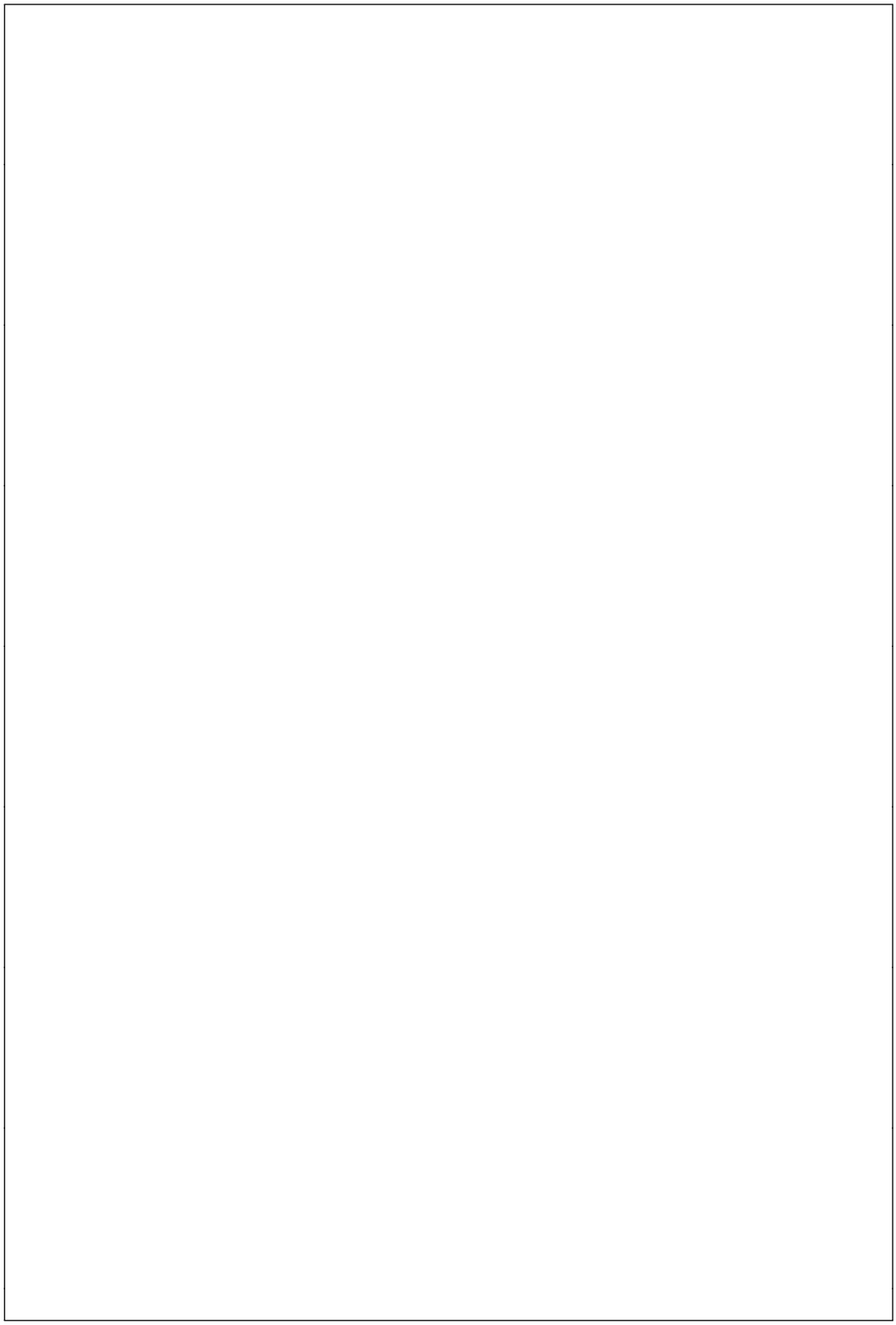
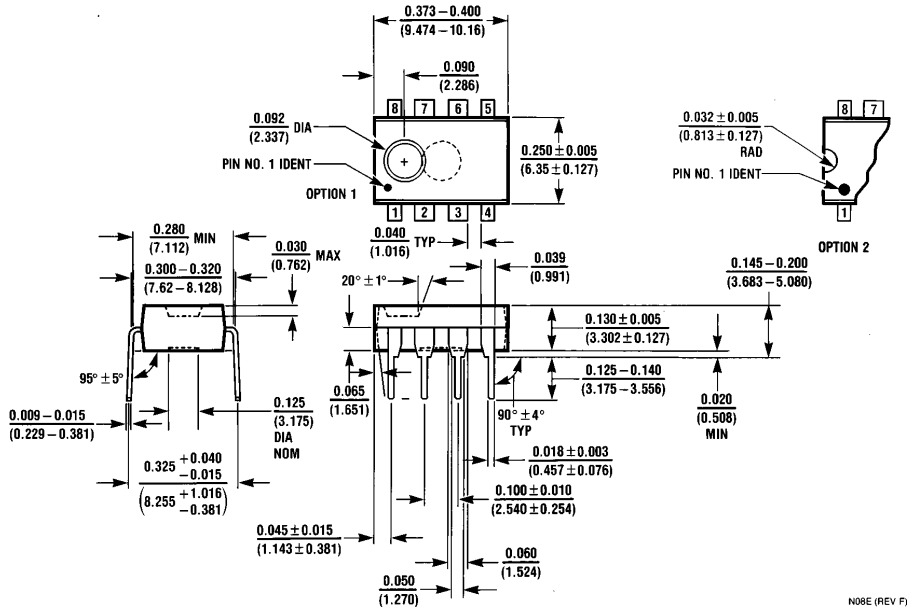


Physical Dimensions inches (millimeters)



Dual-In-Line Package (N)
Order Number LM748CN
NS Package Number N08E

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