

LM748 Operational Amplifier

General Description

The LM48 is a general purpose operational amplifier with external frequency compensation.

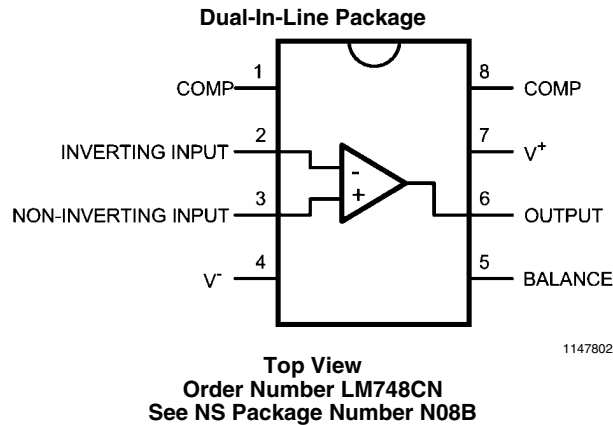
The unity-gain compensation specified makes the circuit stable for all feedback configurations, even with capacitive loads. It is possible to optimize compensation for best high frequency performance at any gain. As a comparator, the output can be clamped at any desired level to make it compatible with 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 $\pm 5V$ to $\pm 20V$
- Continuous short-circuit protection
- Operation as a comparator with differential inputs as high as $\pm 30V$
- No latch-up when common range is exceeded
- Same pin configuration as the LM101

Connection Diagram



Absolute Maximum Ratings (Note 1)

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 2) | 500 mW |
| Differential Input Voltage | ±30V |

| | |
|--|-----------------|
| Input Voltage (Note 3) | ±15V |
| Output Short-Circuit Duration (Note 4) | |
| Operating Temperature Range: LM748C | 0°C to +70°C |
| Storage Temperature Range | -65°C to +150°C |
| Lead Temperature (Soldering, 10 sec.) | +300°C |

Electrical Characteristics (Note 5)

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

Note 1: Absolute maximum ratings indicate limits beyond which damage to the device may occur. Electrical characteristic specifications do not apply when operating the device outside of its rated operating conditions.

Note 2: 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).

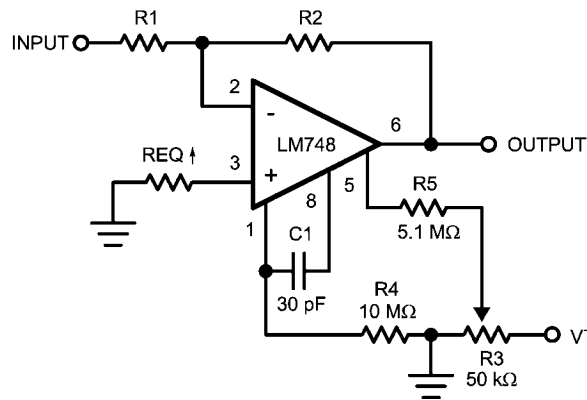
Note 3: For supply voltages less than ±15V, the absolute maximum input voltage is equal to the supply voltage.

Note 4: Continuous short circuit is allowed for case temperatures to +125°C and ambient temperatures to +70°C.

Note 5: These specifications apply for $\pm 5\text{V} \leq V_S \leq +15\text{V}$ and $0^\circ\text{C} \leq T_A \leq +70^\circ\text{C}$, unless otherwise specified.

Typical Applications

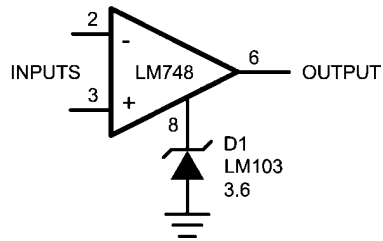
Inverting Amplifier with Balancing Circuit



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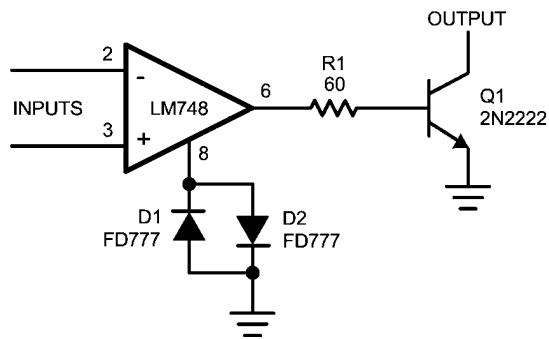
†May be zero or equal to parallel combination of R1 and R2 for minimum offset.

Voltage Comparable for Driving DTL or TTL Integrated Circuits



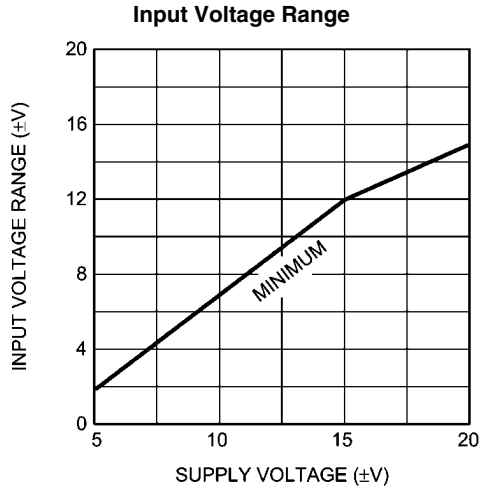
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Voltage Comparable for Driving RTL Logic or High Current Driver

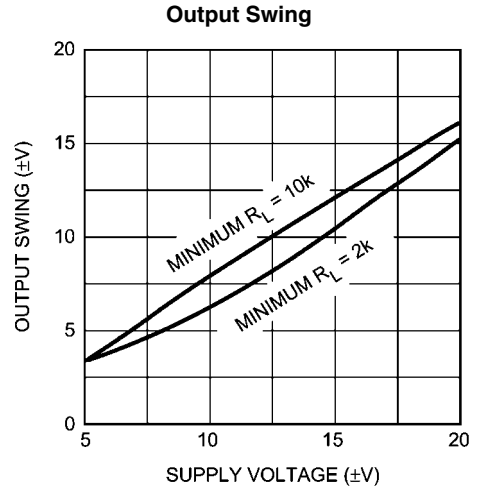


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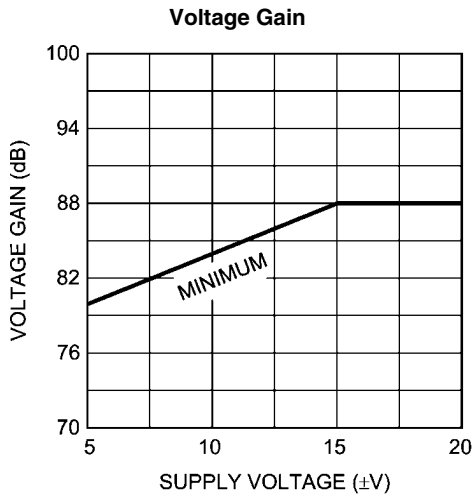
Guaranteed Performance Characteristics (Note 5)



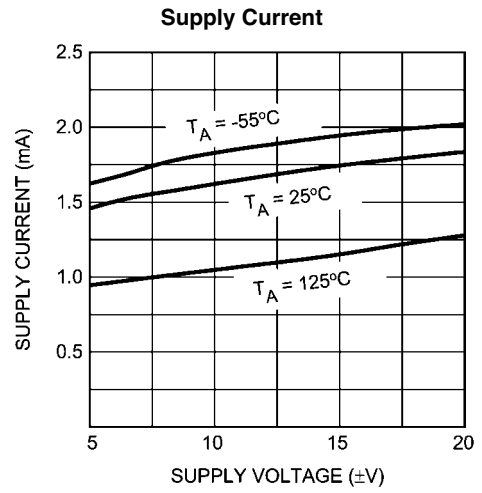
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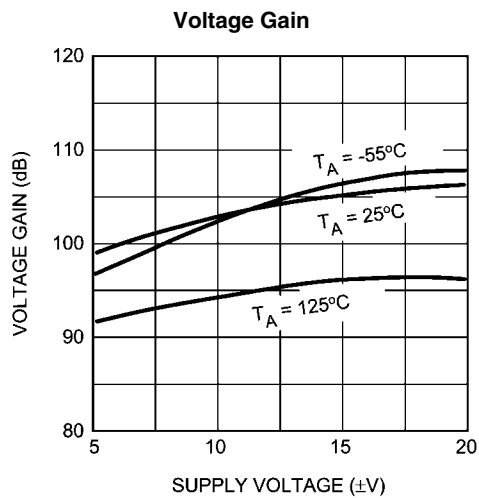
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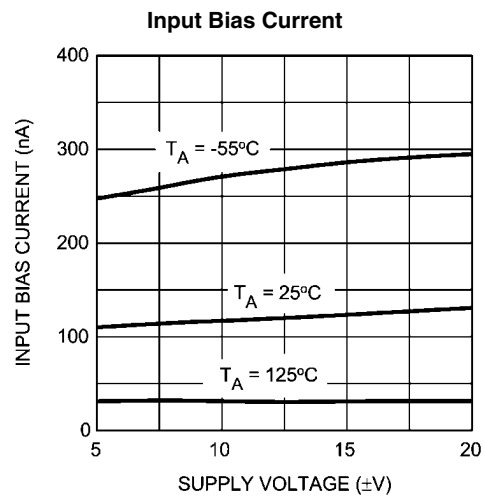
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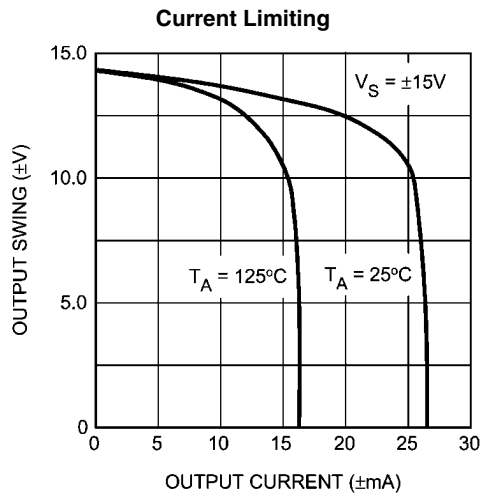
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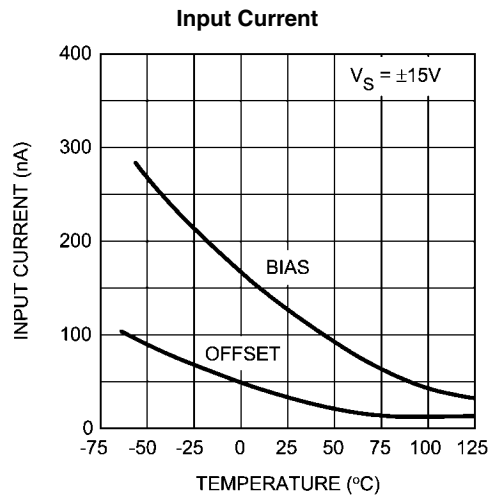
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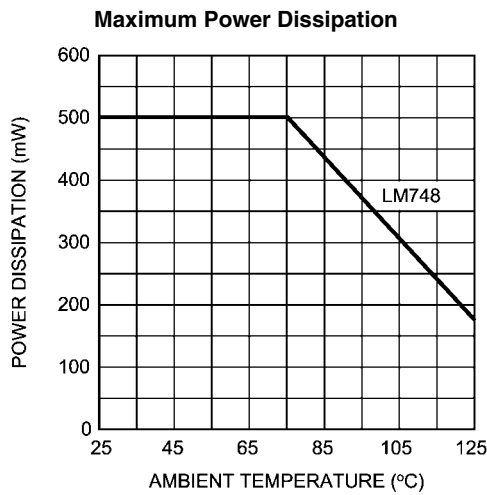
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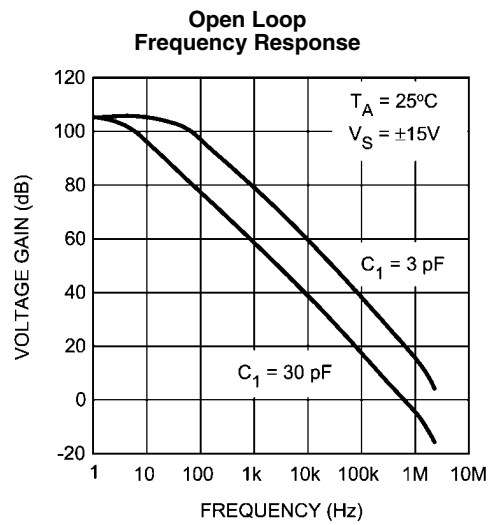
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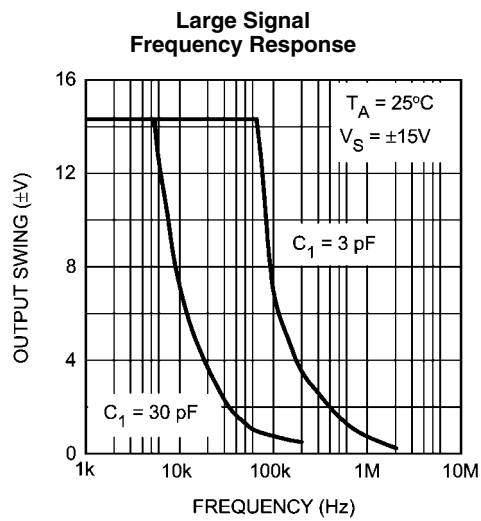
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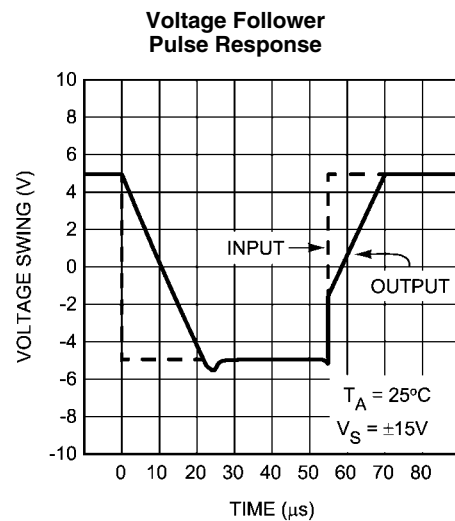
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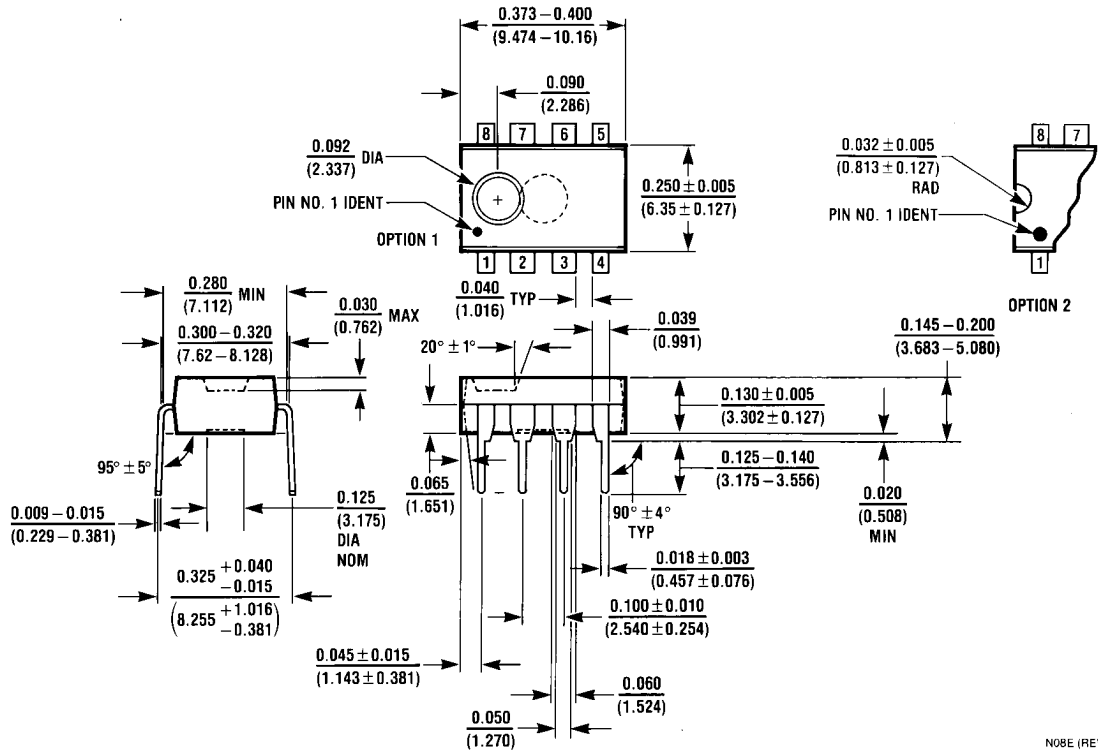


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Physical Dimensions inches (millimeters) unless otherwise noted



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

N08E (REV F)

Notes

LM748

Notes

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