

LM748 Operational Amplifier

Check for Samples: [LM748](#)

FEATURES

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

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 $+70^{\circ}\text{C}$ temperature range.

Connection Diagram

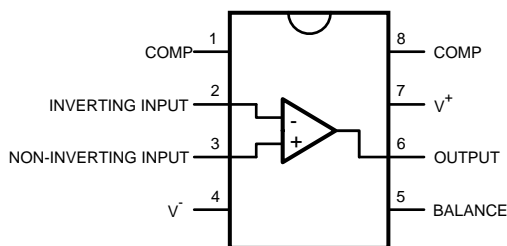


Figure 1. Dual-In-Line Package - Top View



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.



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Absolute Maximum Ratings ⁽¹⁾

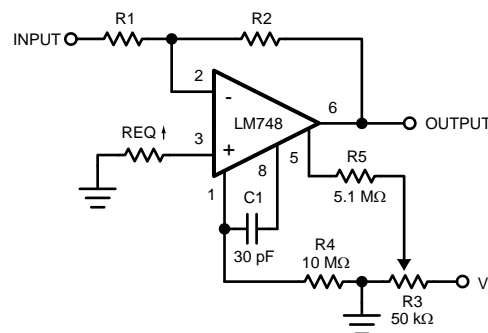
| | |
|--|-----------------|
| Supply Voltage | ±22V |
| Power Dissipation ⁽²⁾ | 500 mW |
| Differential Input Voltage | ±30V |
| Input Voltage ⁽³⁾ | ±15V |
| Output Short-Circuit Duration ⁽⁴⁾ | |
| Operating Temperature Range: LM748C | 0°C to +70°C |
| Storage Temperature Range | -65°C to +150°C |
| Lead Temperature (Soldering, 10 sec.) | +300°C |

- (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.
- (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).
- (3) For supply voltages less than ±15V, the absolute maximum input voltage is equal to the supply voltage.
- (4) Continuous short circuit is allowed for case temperatures to +125°C and ambient temperatures to +70°C.

Electrical Characteristics ⁽¹⁾

| 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 | $T_A = 25^\circ\text{C}$, $V_S = \pm 15\text{V}$ $V_{\text{OUT}} = \pm 10\text{V}$, $R_L \geq 2\text{ k}\Omega$ | 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 | $V_S = \pm 15\text{V}$, $V_{\text{OUT}} = \pm 10\text{V}$ $R_L \geq 2\text{ k}\Omega$ | 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 |

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

Typical Applications
Figure 2. Inverting Amplifier with Balancing Circuit


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

Figure 3. Voltage Comparable for Driving DTL or TTL Integrated Circuits

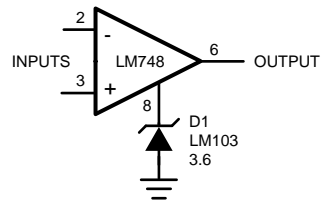
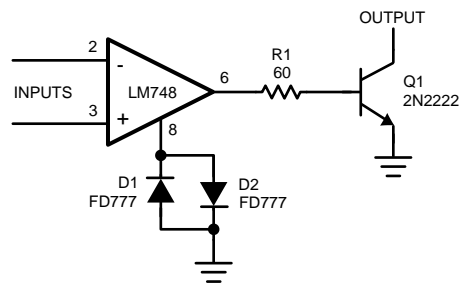
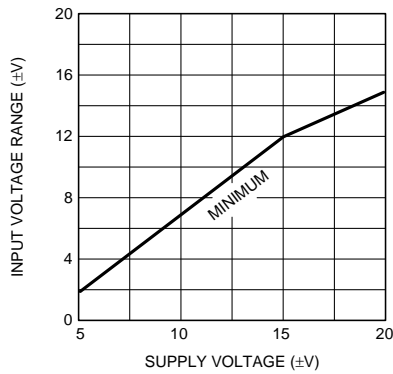


Figure 4. Voltage Comparable for Driving RTL Logic or High Current Driver

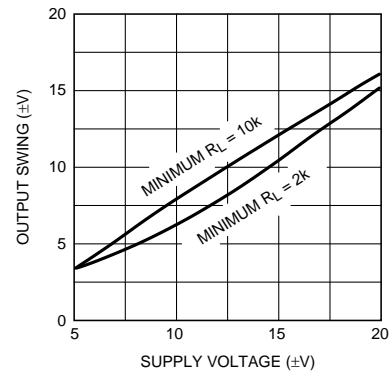


Guaranteed Performance Characteristics (1)

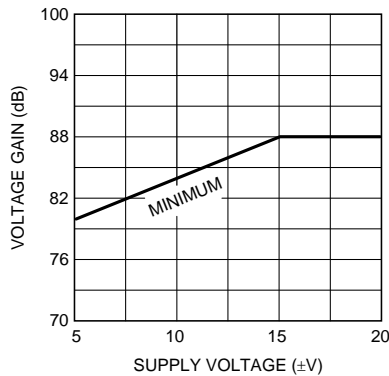
Input Voltage Range



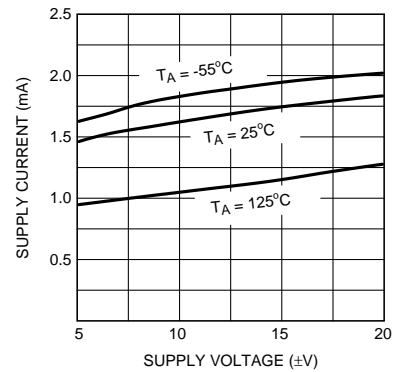
Output Swing



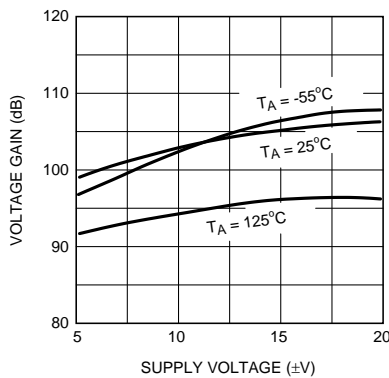
Voltage Gain



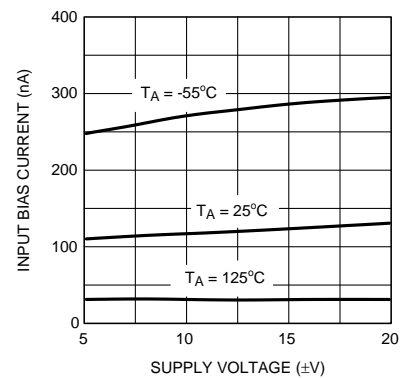
Supply Current



Voltage Gain



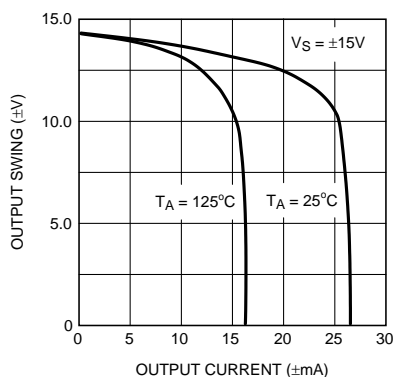
Input Bias Current



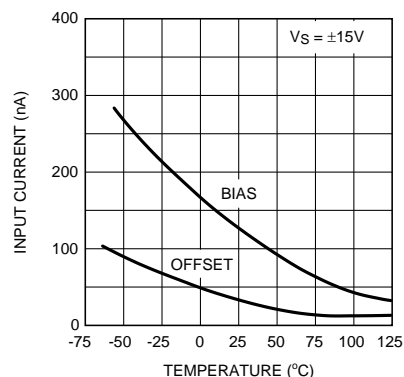
(1) These specifications apply for $\pm 5V \leq V_S \leq +15V$ and $0^\circ C \leq T_A \leq +70^\circ C$, unless otherwise specified.

Guaranteed Performance Characteristics ⁽¹⁾ (continued)

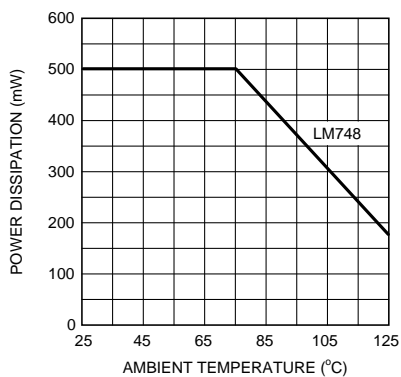
Current Limiting



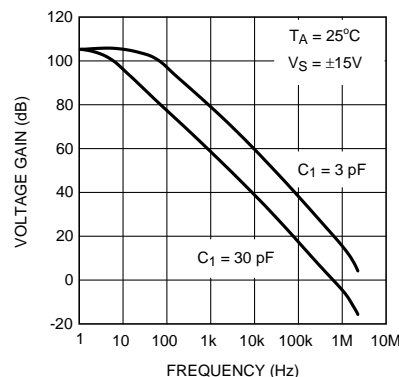
Input Current



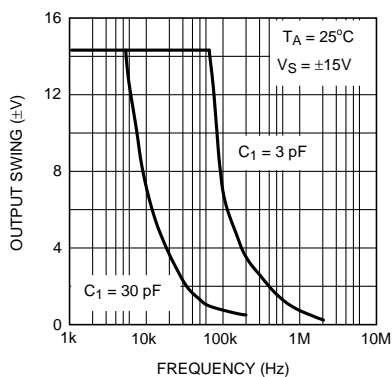
Maximum Power Dissipation



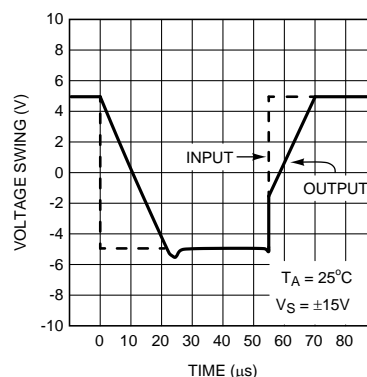
Open Loop Frequency Response



Large Signal Frequency Response



Voltage Follower Pulse Response



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