Operational Amplifiers

LM748/LM748C operational amplifier

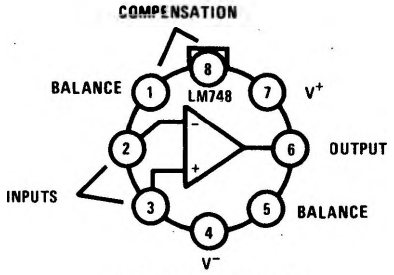
general description

The LM748/LM748C is a general-purpose operational amplifier built on a single silicon chip. The resulting close match and tight thermal coupling gives low offsets and temperature drift as well as fast recovery from thermal transients. In addition, the device features:

- Frequency compensation with a single 30 pF capacitor
- Operation from ±5V to ±20V
- Low current drain: 1.8 mA at ±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.

The unity-gain compensation specified makes the circuit stable for all feedback configurations, even with capacitive loads. However, 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.

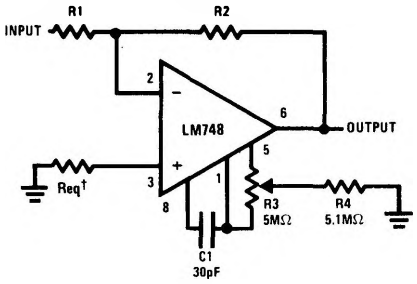
connection diagram



NOTE: Pin 4 connected to case.

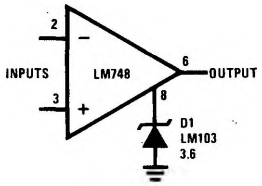
typical applications

Inverting Amplifier with Balancing Circuit

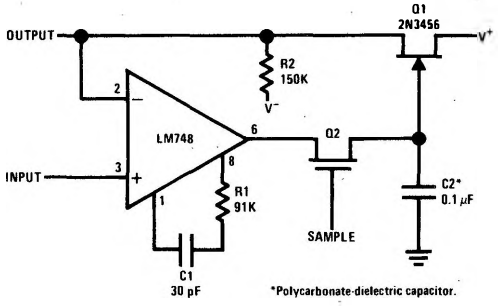


†May be zero or equal to parallel combination of R1 and R2 for minimum offset.

Voltage Comparator for Driving DTL or TTL Integrated Circuits

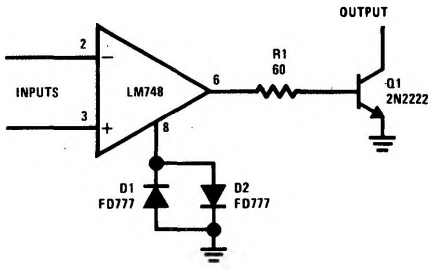


Low Drift Sample and Hold



*Polycarbonate-dielectric capacitor.

Voltage Comparator for Driving RTL Logic or High Current Driver



absolute maximum ratings

Supply Voltage	±22V
Power Dissipation (Note 1)	500 mW
Differential Input Voltage	±30V
Input Voltage (Note 2)	±15V
Output Short-Circuit Duration (Note 3)	Indefinite
Operating Temperature Range: LM748	−55°C to +125°C
LM748C	0°C to +70°C
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	$V_S = \pm 15V$, $R_L = 10\Omega$	±12	±14		V
	$R_L = 2\,k\Omega$	±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 devices 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.)

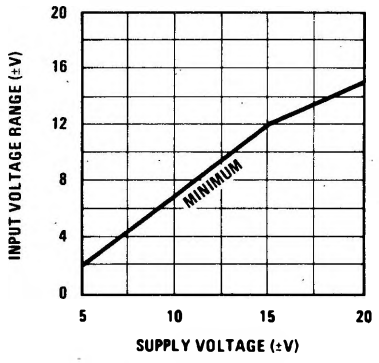
Note 2: For supply voltages less than ±15V, the absolute maximum input voltage is equal to the supply voltage.

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

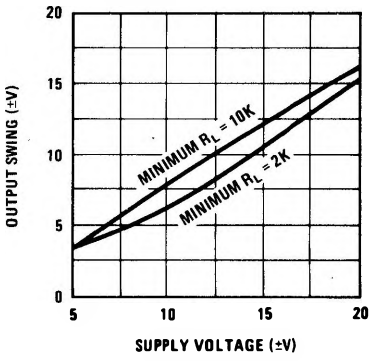
Note 4: These specifications apply for $\pm 5V \leq V_S \leq \pm 20V$ and $-55°C \leq T_A \leq 125°C$, unless otherwise specified. With the LM748C, however, all temperature specifications are limited to $0°C \leq T_A \leq 70°C$.

guaranteed performance (Note 4)

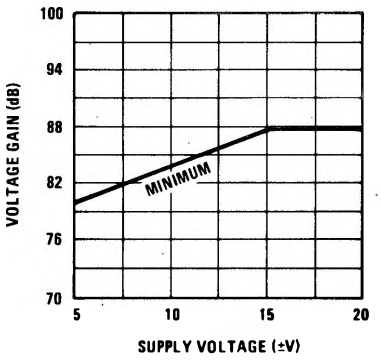
Input Voltage Range



Output Swing

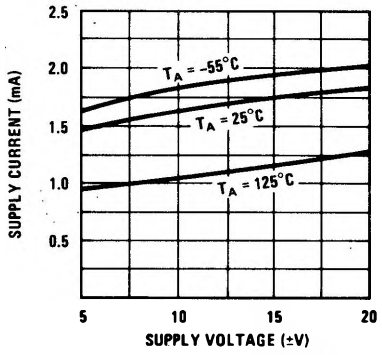


Voltage Gain

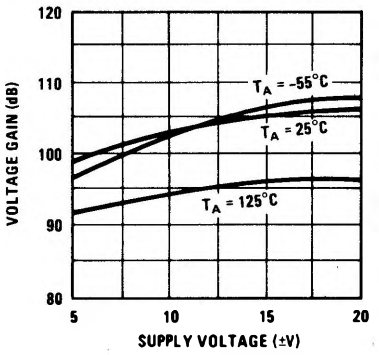


typical performance

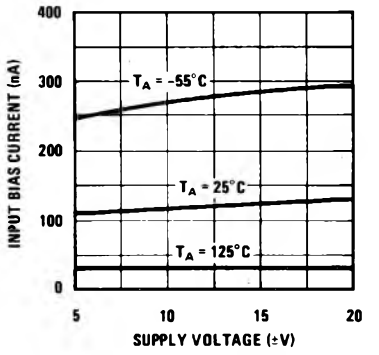
Supply Current



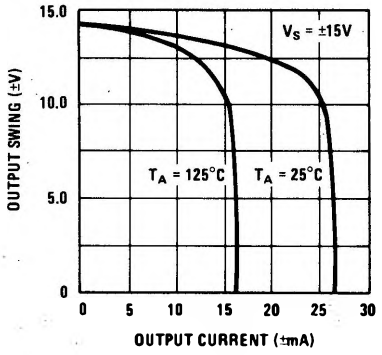
Voltage Gain



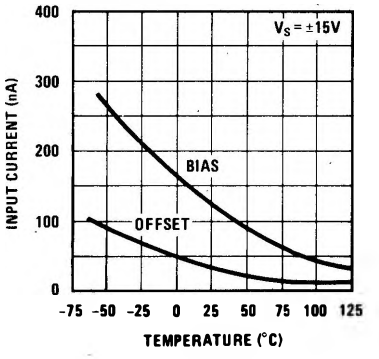
Input Bias Current



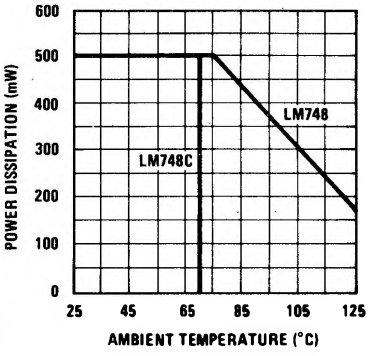
Current Limiting



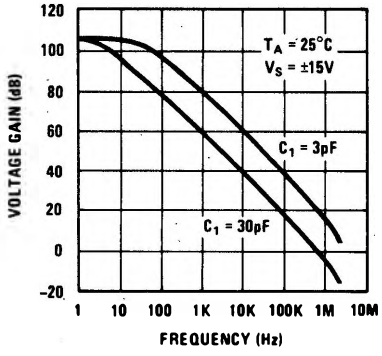
Input Current



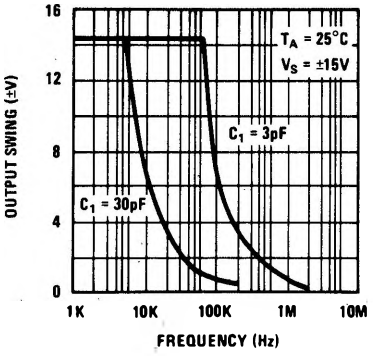
Maximum Power Dissipation



Open Loop Frequency Response



Large Signal Frequency Response



Voltage Follower Pulse Response