

## LM748QML Operational Amplifier

 Check for Samples: [LM748QML](#)

### FEATURES

- Frequency Compensation with a Single 30 pF Capacitor
- Operation from  $\pm 5V$  to Operation from  $\pm 20V$
- Continuous Short-Circuit Protection
- Operation as a Comparator with Differential Inputs as High as  $\pm 30V$
- No Latch-Up when Common Mode Range is Exceeded
- Same Pin Configuration as the LM101

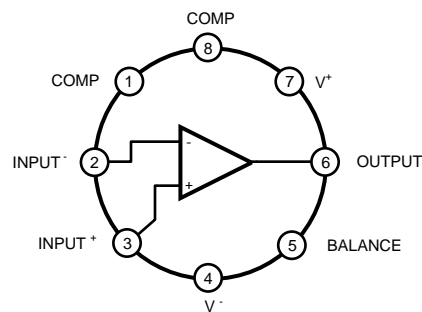
### DESCRIPTION

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 LM748 is specified for operation over the  $-55^{\circ}C$  to  $+125^{\circ}C$  military temperature range.

### Connection Diagram



**Figure 1. 8LD Metal Can Package (Top View)  
See Package Number LMC0008C**



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<sup>(1)</sup>

Supply Voltage	±22V
Power Dissipation <sup>(2)</sup>	500mW
Differential Input Voltage	±30V
Input Voltage <sup>(3)</sup>	±15V
Output Short-Circuit Duration <sup>(4)</sup>	Indefinite
Operating Temperature Range	-55°C ≤ T <sub>A</sub> ≤ 125°C
Storage Temperature Range	-65°C ≤ T <sub>A</sub> ≤ 150°C
Maximum Junction Temperature	150°C
Lead Temperature (Soldering, 10 seconds)	300°C

- (1) Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is functional, but do not ensure specific performance limits. For ensured specifications and test conditions, see the Electrical Characteristics. The ensured specifications apply only for the test conditions listed. Some performance characteristics may degrade when the device is not operated under the listed test conditions.
- (2) For operating at elevated temperatures, the device must be derated based on a maximum junction to case thermal resistance of 45°C/W, or 150°C/W
- (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.

### Quality Conformance Inspection

**Table 1. Mil-Std-883, Method 5005 - Group A**

Subgroup	Description	Temp (°C)
1	Static tests at	+25
2	Static tests at	+125
3	Static tests at	-55
4	Dynamic tests at	+25
5	Dynamic tests at	+125
6	Dynamic tests at	-55
7	Functional tests at	+25
8A	Functional tests at	+125
8B	Functional tests at	-55
9	Switching tests at	+25
10	Switching tests at	+125
11	Switching tests at	-55
12	Settling time at	+25
13	Settling time at	+125
14	Settling time at	-55

## LM748 Electrical Characteristics DC Parameters

The following conditions apply, unless otherwise specified. DC:  $V_{CC} = \pm 15V$ ,  $V_{CM} = 0V$

Symbol	Parameter	Conditions	Notes	Min	Max	Units	Sub-groups
$V_{IO}$	Input Offset Voltage	$V_{CM} = 12V$			3.0	mV	1
					4.0	mV	2, 3
		$V_{CM} = -12V$			3.0	mV	1
					4.0	mV	2, 3
		$V_{CC} = \pm 5V$			3.0	mV	1
					4.0	mV	2, 3
					3.0	mV	1
					4.0	mV	2, 3
$I_{IO}$	Input Offset Current	$V_{CM} = 12V$			200	nA	1
					500	nA	2, 3
		$V_{CM} = -12V$			200	nA	1
					500	nA	2, 3
		$V_{CC} = \pm 5V$			200	nA	1
					500	nA	2, 3
					200	nA	1
					500	nA	2, 3
$I_{IB}$	Input Bias Current	$V_{CM} = 12V$			500	nA	1
					1500	nA	2, 3
		$V_{CM} = -12V$			500	nA	1
					1500	nA	2, 3
		$V_{CC} = \pm 5V$			500	nA	1
					1500	nA	2, 3
					500	nA	1
					1500	nA	2, 3
PSRR+	Power Supply Rejection Ratio	$+V_{CC} = 15V$ to $5V$ , $-V_{CC} = -15V$		77		dB	1, 2, 3
PSRR-	Power Supply Rejection Ratio	$-V_{CC} = -15V$ to $-5V$ , $+V_{CC} = +15V$		77		dB	1, 2, 3
CMRR	Common Mode Rejection Ratio	$-12V \leq V_{CM} \leq +12V$		70		dB	1, 2, 3
$-A_{VS}$	Large Signal Voltage Gain	$R_L = 2K\Omega$ , $V_O = -10V$	See <sup>(1)</sup>		50	V/mV	1
					25	V/mV	2, 3
$+A_{VS}$	Large Signal Voltage Gain	$R_L = 2K\Omega$ , $V_O = +10V$	See <sup>(1)</sup>		50	V/mV	1
					25	V/mV	2, 3
$+V_{IO Adj}$	Offset Null	$V_{CC} = \pm 20V$		4.0		mV	1
$-V_{IO Adj}$	Offset Null	$V_{CC} = \pm 20V$			-4.0	mV	1

(1) Datalog reading in K = V/mV.

### LM748 Electrical Characteristics DC Parameters (continued)

The following conditions apply, unless otherwise specified. DC:  $V_{CC} = \pm 15V$ ,  $V_{CM} = 0V$

Symbol	Parameter	Conditions	Notes	Min	Max	Units	Sub-groups
+I <sub>OS</sub>	Short Circuit Current			-45	-7.0	mA	1
				-45	-5.0	mA	2
				-55	-7.0	mA	3
-I <sub>OS</sub>	Short Circuit Current			7.0	45	mA	1
				5.0	45	mA	2
				7.0	55	mA	3
V <sub>O+</sub>	Output Voltage Swing	R <sub>L</sub> = 10KΩ		12		V	1, 2, 3
		R <sub>L</sub> = 2KΩ		10		V	1, 2, 3
V <sub>O-</sub>	Output Voltage Swing	R <sub>L</sub> = 2KΩ			-10	V	1, 2, 3
		R <sub>L</sub> = 10KΩ			-12	V	1, 2, 3
I <sub>CC</sub>	Supply Current				2.8	mA	1
					2.25	mA	2
					3.3	mA	3

### REVISION HISTORY

Released	Revision	Section	Changes
12/16/2010	A	New Release, Corporate format	1 MDS data sheet converted into one Corp. data sheet format. The drift table was eliminated from the 883 section since it did not apply; MNLM748-X Rev 0BL will be archived.
03/26/13	A	All	Changed layout of National Data Sheet to TI format.

**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Op Temp (°C)	Top-Side Markings (4)	Samples
LM748H/883	ACTIVE	TO-99	LMC	8	20	TBD	Call TI	Call TI	-55 to 125	LM748H/883 Q ACO LM748H/883 Q >T	Samples

(1) The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

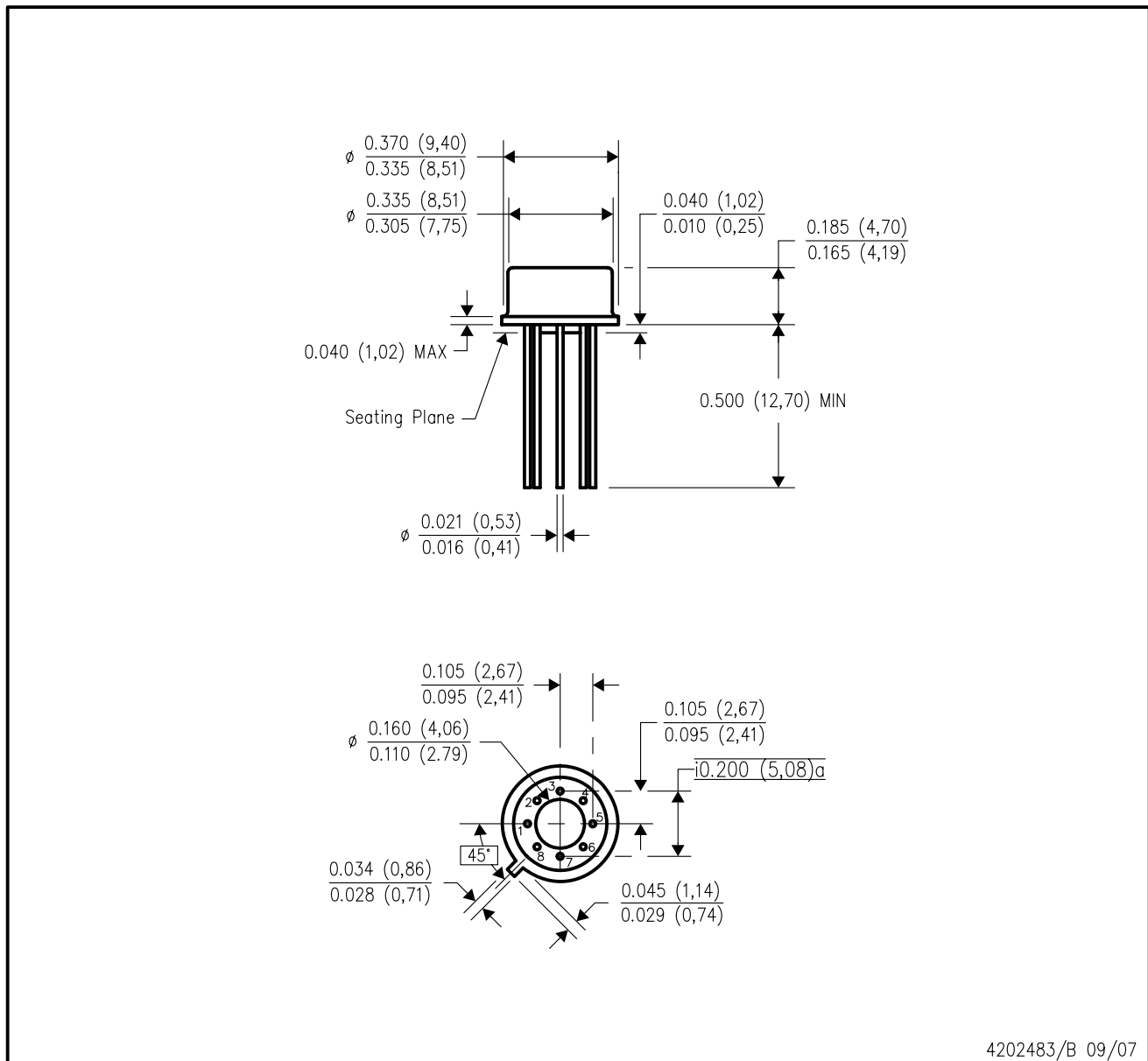
(4) Multiple Top-Side Markings will be inside parentheses. Only one Top-Side Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Top-Side Marking for that device.

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## LMC (O-MBCY-W8)

## METAL CYLINDRICAL PACKAGE



- NOTES:
- All linear dimensions are in inches (millimeters).
  - This drawing is subject to change without notice.
  - Leads in true position within 0.010 (0,25) R @ MMC at seating plane.
  - Pin numbers shown for reference only. Numbers may not be marked on package.
  - Falls within JEDEC MO-002/TO-99.

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