

**MNLMC6482AM-X REV 0A0**

Original Creation Date: 08/16/95  
Last Update Date: 05/19/98  
Last Major Revision Date: 04/22/96

**CMOS DUAL RAIL-TO-RAIL INPUT AND OUTPUT OPERATIONAL  
AMPLIFIER**

**General Description**

The LMC6482 provides a common-mode range that extends to both supply rails. This rail-to-rail performance combined with excellent accuracy, due to a high CMRR, makes it unique among rail-to-rail input amplifiers.

It is ideal for systems, such as data acquisition, that require a large input signal range. The LMC6482 is also an excellent upgrade for circuits using limited common-mode range amplifiers such as the TLC272 and TLC277.

Maximum dynamic signal range is assured in low voltage and single supply systems by the LMC6482's rail-to-rail output swing. The LMC6482's rail-to-rail output swing is guaranteed for loads down to 600 Ohms.

Guaranteed low voltage characteristics and low power dissipation make the LMC6482 especially well-suited for battery-operated systems.

See the LMC6484 data sheet for a Quad CMOS operational amplifier with these same features.

**Industry Part Number**

LMC6482AM

**NS Part Numbers**

LMC6482AMJ/883

**Prime Die**

LMC6482

**Controlling Document**

5962-9453401MPA

**Processing**

MIL-STD-883, Method 5004

**Quality Conformance Inspection**

MIL-STD-883, Method 5005

Subgrp	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

## Features

(Typical Unless Otherwise Noted)

- Rail-to-Rail input common-mode voltage range.  
(Guaranteed Over Temperature)
- Rail-to-Rail output swing.  
(within 20mV of supply rail, 100k Ohms load)
- Guaranteed 3V, 5V and 15V performance.
- Excellent CMRR and PSRR. 82dB
- Ultra low input current. 20fA
- High voltage gain (R<sub>L</sub> = 500k Ohms) 130dB
- Specified for 2k Ohms and 600 Ohms load.

## Applications

- Data Acquisition Systems.
- Transducer Amplifiers.
- Hand-held Analytic Instruments.
- Medical Instrumentation.
- Active Filter, Peak Detector, Sample and Hold, pH Meter, Current Source.
- Improved Replacement for TLC272, TLC277.



## **Recommended Operating Conditions**

(Note 1)

Supply Voltage

$$3.0V \leq V+ \leq 15.5V$$

Note 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 guarantee specific performance limits. For guaranteed specifications and test conditions, see the Electrical Characteristics. The guaranteed specifications apply only for the test conditions listed. Some performance characteristics may degrade when the device is not operated under the listed test conditions.

## Electrical Characteristics

### DC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)  
 DC:  $V_+=5V$ ,  $V_-=0V$ ,  $R_l > 1M$ ,  $V_{cm} = V_o = V_+/2$

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
Vos	Input Offset Voltage				0.75		mV	1
					1.35		mV	2, 3
Iib	Input Bias Current				25		pA	1
					100		pA	2, 3
Ios	Input Offset Current				25		pA	1
					100		pA	2, 3
CMRR	Common Mode Rejection Ratio	$0V \leq V_{cm} \leq 15.0V$ , $V_+ = 15V$			65		dB	1
					62		dB	2, 3
		$0V \leq V_{cm} \leq 5.0V$ , $V_+ = 5V$			65		dB	1
					62		dB	2, 3
+PSRR	Positive Power Supply Rejection Ratio	$5V \leq V_+ \leq 15V$ , $V_o = 2.5V$			65		dB	1
					62		dB	2, 3
-PSRR	Negative Power Supply Rejection Ratio	$-5V \leq V_- \leq -15V$ , $V_o = -2.5V$ , $V_+ = 0V$			65		dB	1
					62		dB	2, 3
Vcm	Input Common Mode Voltage Range	$5V \geq V_{cm} \geq 15V$ , For CMRR $\geq 50dB$			$V_{++} + 0.25$	$-0.25$	V	1
					$V_+$	0	V	2, 3
Isc	Output Short Circuit Current	Sourcing, $V_o = 0V$			16		mA	1
					12		mA	2, 3
		Sinking, $V_o = 5V$			11		mA	1
					9		mA	2, 3
		$V_+ = 15V$ , Sourcing, $V_o = 0V$			28		mA	1
					22		mA	2, 3
$V_+ = 15V$ , Sinking, $V_o = 12V$			1		30		mA	1
			1		24		mA	2, 3
Icc	Supply Current	Both Amps				1.4	mA	1
						1.8	mA	2, 3
		Both Amps, $V_+ = +15V$				1.6	mA	1
						2.0	mA	2, 3

## Electrical Characteristics

### DC PARAMETERS (Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)  
DC:  $V_+=5V$ ,  $V_-=0V$ ,  $R_l > 1M$ ,  $V_{cm} = V_o = V_+/2$

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
Vo	Output Swing	$V_+=5V$ , $R_l=2K$ Ohms to $V_+/2$			4.8	0.18	V	4
					4.7	0.24	V	5, 6
		$V_+=5V$ , $R_l=600$ Ohms to $V_+/2$			4.5	0.50	V	4
					4.24	0.65	V	5, 6
		$V_+=15V$ , $R_l=2K$ Ohms to $V_+/2$			14.4	0.32	V	4
					14.2	0.45	V	5, 6
$V_+=15V$ , $R_l=600$ Ohms to $V_+/2$			13.4	1.00	V	4		
			13.0	1.30	V	5, 6		
Av	Large Signal Voltage Gain	$R_l=2K$ Ohms Sourcing	2		140		V/mV	4
			2		84		V/mV	5, 6
		$R_l=2K$ Ohms Sinking	2		35		V/mV	4
			2		20		V/mV	5, 6
		$R_l=600$ Ohms Sourcing	2		80		V/mV	4
			2		48		V/mV	5, 6
		$R_l=600$ Ohms Sinking	2		18		V/mV	4
			2		13		V/mV	5, 6

### AC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)  
AC:  $V_+=5V$ ,  $V_-=0V$ ,  $R_l > 1M$ ,  $V_{cm} = V_o = V_+/2$

Sr	Slew Rate		3		0.9		V/uS	4
			3		0.6		V/uS	5, 6
Gbw	Gain Bandwidth	$V_+ = 15V$ , set up as non-inverting			1.25		MHz	4
					1.15		MHz	5, 6

Note 1: Do not short circuit output to  $V_+$ , when  $V_+$  is greater than 13V or reliability will be adversely affected.

Note 2:  $V_+=15V$ ,  $V_{cm}=7.5V$  and  $R_l$  connected to 7.5V. For Sourcing tests,  $7.5V \leq V_o \leq 11.5V$ . For Sinking tests,  $3.5V \leq V_o \leq 7.5V$ .

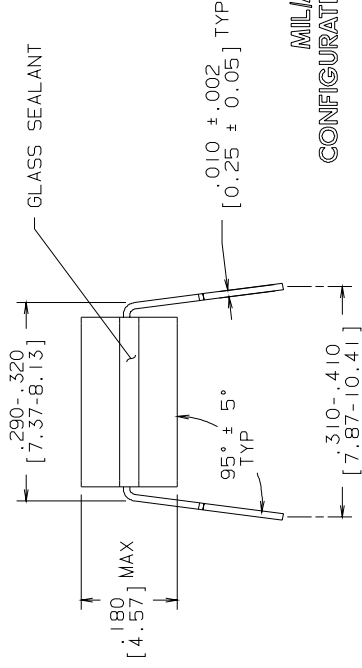
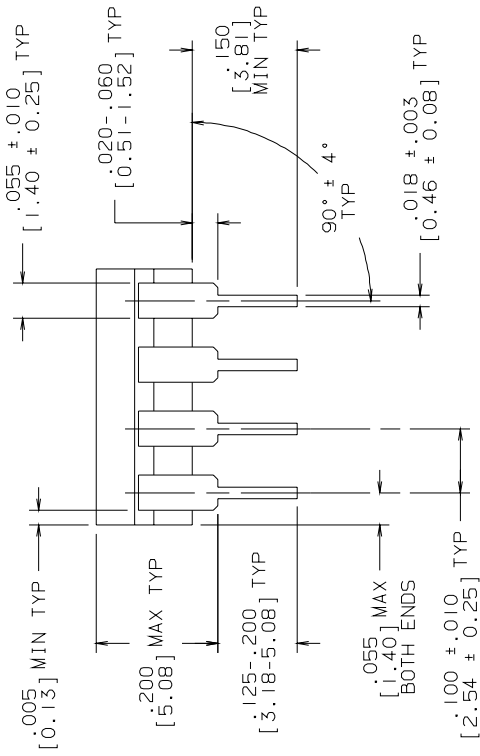
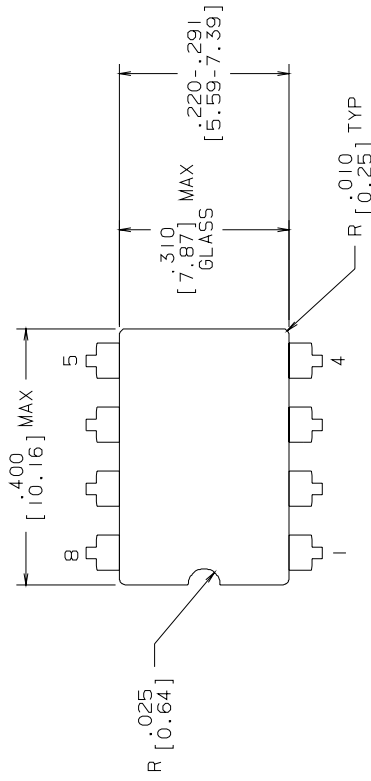
Note 3:  $V_+=15V$ . Connected as Voltage Follower with 10V step input, 2.5V to 12.5V for +Slew, and 12.5V to 2.5V for -Slew. Number specified is the slower of either the positive or negative slew rates.

## Graphics and Diagrams

GRAPHICS#	DESCRIPTION
06086HRC4	CERDIP (J), 8 LEAD (B/I CKT)
J08ARL	CERDIP (J), 8 LEAD (P/P DWG)
P000346A	CERDIP (J), 8 LEAD (PINOUT)

See attached graphics following this page.

R E V I S I O N S			
LTR	DESCRIPTION	E. C. N.	DATE
L	REVISE PER CURRENT STD; REDRAW	10002	09/21/93
			BY/APP'D TL/



MILAERO  
CONFIGURATION CONTROL  
MIL-M-38510  
CONFIGURATION CONTROL

CONTROLLING DIMENSION: INCH

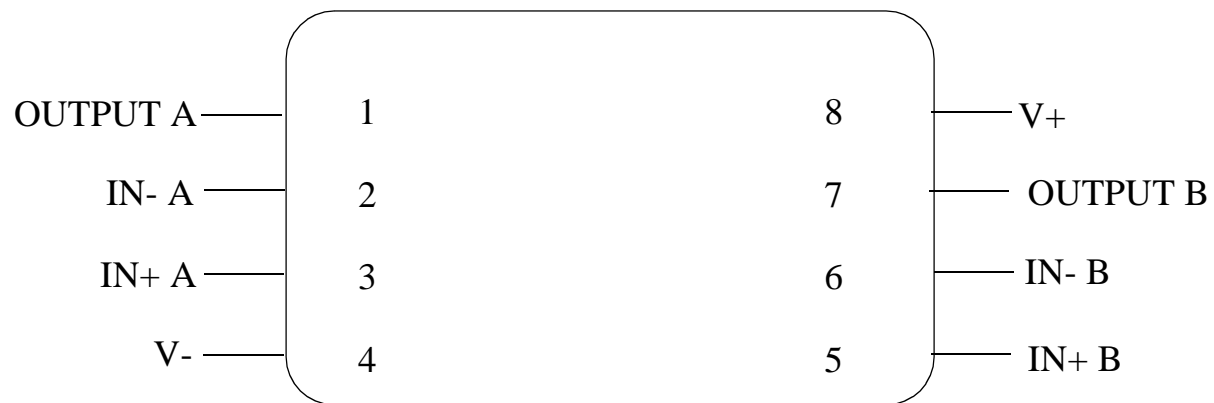
APPROVALS	DATE	NATIONAL SEMICONDUCTOR CORPORATION	
DRAWN <b>T. LEQUANG</b>	09/21/93	2900 Semiconductor Drive, Santa Clara, CA 95052-8090	
DFTG. CHK.			
ENGR. CHK.			
APPROVAL			
		SCALE	DRAWING NUMBER
		N/A	B
		DO NOT SCALE DRAWING	SHEET 1 OF 1
		REV	L

NOTES: UNLESS OTHERWISE SPECIFIED

- LEAD FINISH TO BE 200 MICROMETERS / 5.08 MICROMETERS MINIMUM SOLDER MEASURED AT THE CREST OF THE MAJOR FLATS.
- JEDEC REGISTRATION MO-036, VARIATION AA, DATED 04/1981.

CERDIP (J),  
8 LEAD





LMC6482AMJ

8 - LEAD DIP

CONNECTION DIAGRAM

TOP VIEW

P000346A



National Semiconductor™  
MIL/AEROSPACE OPERATIONS  
2900 SEMICONDUCTOR DRIVE  
SANTA CLARA, CA 95050

**Revision History**

Rev	ECN #	Rel Date	Originator	Changes
0A0	M0002889	05/19/98	Rose Malone	Changed MDS: MNLMC6482AM-X Rev. 0A1 to MNLMC6482AM-X Rev. 0A0. Updated subgroups to match SMD. Added Pinout. Updated Burn-In circuit.