

LM1558QML Dual Operational Amplifier

Check for Samples: [LM1558QML](#)

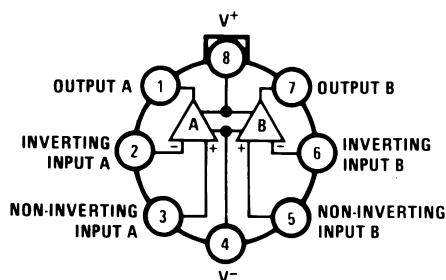
FEATURES

- No Frequency Compensation Required
- Short-Circuit Protection
- Wide Common-Mode and Differential Voltage Ranges
- Low-Power Consumption
- 8-Lead Can and 8-Lead mini DIP
- No Latch up when Input Common Mode Range is Exceeded

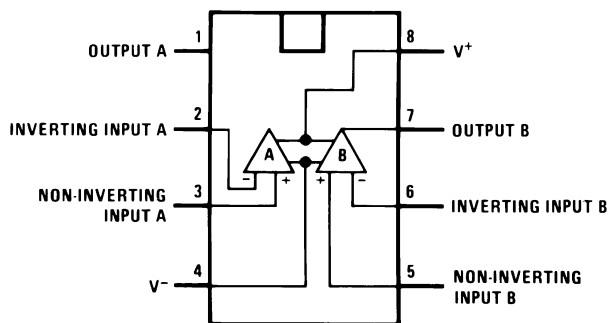
DESCRIPTION

The LM1558 is a general purpose dual operational amplifier. The two amplifiers share a common bias network and power supply leads. Otherwise, their operation is completely independent.

Connection Diagram



**Figure 1. TO-99 Package
Top View
See Package Number LMC**



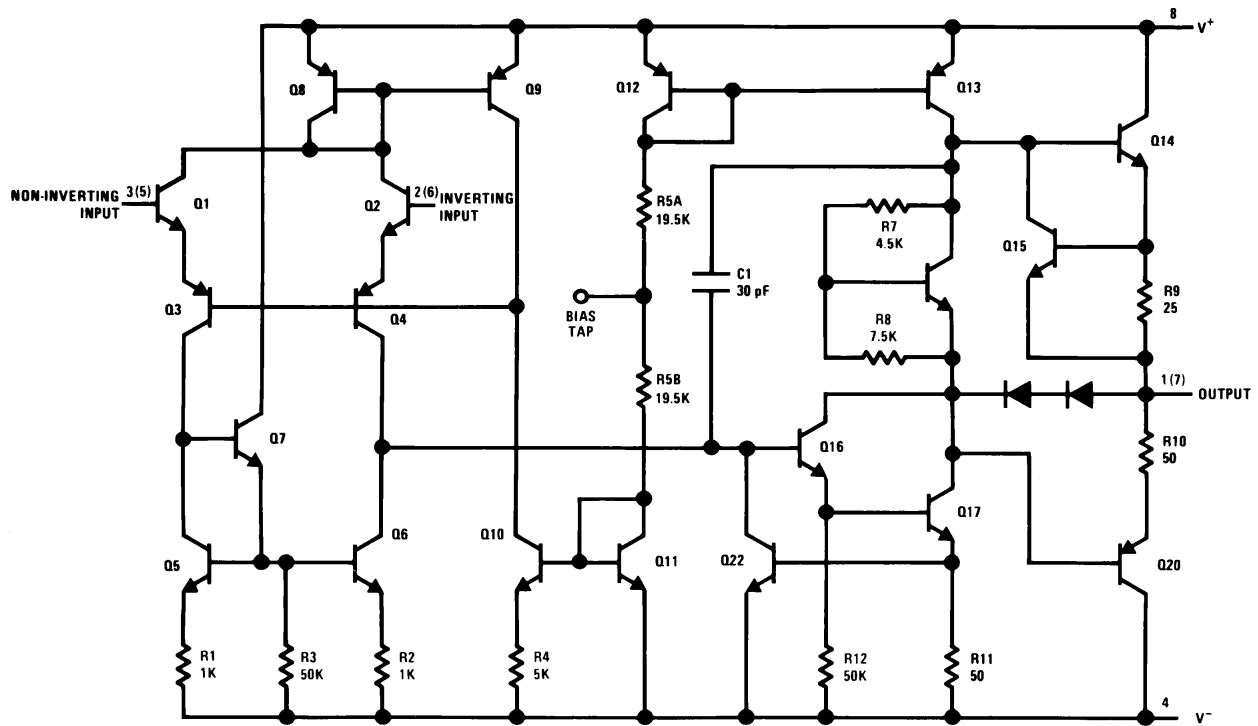
**Figure 2. CDIP Package
Top View
See Package Number NAB0008A**



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Schematic Diagram



Numbers in parentheses are pin numbers for amplifier B.



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.

Absolute Maximum Ratings⁽¹⁾

Supply Voltage				±22V
Power Dissipation ⁽²⁾		8LD TO-99	500 mW	
		8LD CERDIP	TBD	
Differential Input Voltage				±30V
Input Voltage ⁽³⁾				±15V
Output Short-Circuit Duration				Continuous
Operating Temperature Range				-55°C ≤ T _A ≤ +125°C
Maximum Junction Temperature				150°C
Storage Temperature Range				-65°C ≤ T _A ≤ +150°C
Lead Temperature (Soldering, 10 sec.)				260°C
Thermal Resistance	θ _{JA}	TO-99 8LD	Still Air	150°C/W
			500LF/Min Air flow	85°C/W
		CERDIP 8LD	Still Air	125°C/W
			500LF/Min Air flow	70°C/W
	θ _{JC}	TO-99 8LD	30°C/W	
		CERDIP 8LD	22°C/W	
ESD tolerance ⁽⁴⁾				300V

- (1) "Absolute Maximum Ratings" indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be 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.
- (2) The maximum power dissipation must be derated at elevated temperatures and is dictated by T_{Jmax} (maximum junction temperature), θ_{JA} (package junction to ambient thermal resistance), and T_A (ambient temperature). The maximum allowable power dissipation at any temperature is P_{Dmax} = (T_{Jmax} - T_A)/θ_{JA} or the number given in the Absolute Maximum Ratings, whichever is lower.
- (3) For supply Voltages less than ±15V, the absolute maximum input Voltage is equal to the supply Voltage.
- (4) Human body model, 1.5 kΩ in series with 100 pF.

Quality Conformance Inspection

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

LM1558 Electrical Characteristics DC Parameters

The following conditions apply, unless otherwise specified. $V_{CC} = \pm 15V$, $V_{CM} = 0V$, $R_S = 10K\Omega$

Symbol	Parameter	Conditions	Note	Min	Max	Unit	Sub-group
V_{IO}	Input Offset Voltage	$V_{CM} = -12V$		-5.0	5.0	mV	1
				-6.0	6.0	mV	2, 3
		$V_{CM} = +12V$		-5.0	5.0	mV	1
				-6.0	6.0	mV	2, 3
		$V_{CM} = 0V$		-5.0	5.0	mV	1
				-6.0	6.0	mV	2, 3
$V_{CC} = 0V, R_S = 50\Omega$		-5.0	5.0	mV	1		
		-6.0	6.0	mV	2, 3		
I_{IO}	Input Offset Current	$V_{CM} = -12V$		-200	200	nA	1
				-500	500	nA	2, 3
		$V_{CM} = +12V$		-200	200	nA	1
				-500	500	nA	2, 3
		$V_{CM} = 0V$		-200	200	nA	1
				-500	500	nA	2, 3
$V_{CC} = \pm 5V, V_{CM} = 0V$		-200	200	nA	1		
		-500	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
		$V_{CM} = 0V$			500	nA	1
					1500	nA	2, 3
$V_{CC} = \pm 5V, V_{CM} = 0V$			500	nA	1		
			1500	nA	2, 3		
PSRR	Power Supply Rejection Ratio	$\pm 5V \leq V_{CC} \leq \pm 15V$		77		dB	1, 2, 3
CMRR	Common Mode Rejection Ratio	$-12V \leq V_{CM} \leq 12V$		70		dB	1, 2, 3
I_{CC}	Power Supply Current	$R_S = 50\Omega$ (both amplifiers measured together)			5.0	mA	1, 2,
					7.0	mA	3
+ I_{OS}	Short Circuit Current	$R_S = 50\Omega, V_O = 0V$		-45	-14	mA	1
				-45	-9	mA	2
				-50	-9	mA	3
- I_{OS}	Short Circuit Current	$R_S = 50\Omega, V_O = 0V$		14	45	mA	1
				9.0	45	mA	2
				9.0	50	mA	3
V_I	Input Voltage Range		See ⁽¹⁾	-12	12	V	1, 2, 3
R_I	Input Resistance	$R_I = 5(KT/q I_{IB})$	See ⁽²⁾	0.3		M Ω	1
+ V_{OP}	Output Voltage Swing	$R_S = 50\Omega, R_L = 10K\Omega, V_{CC} = \pm 20V$		16		V	4, 5, 6
		$R_S = 50\Omega, R_L = 2K\Omega, V_{CC} = \pm 20V$		15		V	4, 5, 6
		$R_S = 50\Omega, R_L = 10K\Omega$		12		V	4, 5, 6
		$R_S = 50\Omega, R_L = 2K\Omega$		10		V	4, 5, 6

(1) Specified by the CMRR test.

(2) Specified parameter not tested.

LM1558 Electrical Characteristics DC Parameters (continued)

The following conditions apply, unless otherwise specified. $V_{CC} = \pm 15V$, $V_{CM} = 0V$, $R_S = 10K\Omega$

Symbol	Parameter	Conditions	Note	Min	Max	Unit	Sub-group
-V _{OP}	Output Voltage Swing	$R_S = 50\Omega$, $R_L = 10K\Omega$, $V_{CC} = \pm 20V$			-16	V	4, 5, 6
		$R_S = 50\Omega$, $R_L = 2K\Omega$, $V_{CC} = \pm 20V$			-15	V	4, 5, 6
		$R_S = 50\Omega$, $R_L = 10K\Omega$			-12	V	4, 5, 6
		$R_S = 50\Omega$, $R_L = 2K\Omega$			-10	V	4, 5, 6
+A _{VS}	Large Signal Voltage Gain	$R_S = 50\Omega$, $R_L = 2K\Omega$, $V_O = 10V$		50		V/mV	4
				25		V/mV	5, 6
-A _{VS}	Large Signal Voltage Gain	$R_S = 50\Omega$, $R_L = 2K\Omega$, $V_O = -10V$		50		V/mV	4
				25		V/mV	5, 6

LM1558 Electrical Characteristics AC Parameters

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

Symbol	Parameter	Conditions	Note	Min	Max	Unit	Sub-group
+SR	Slew Rate	$V_I = -5$ to $5V$		0.2		V/ μ S	9
		$V_I = -5$ to $5V$, $R_L = 2K\Omega$, $C_L = 100pF$	See ⁽¹⁾	0.2		V/ μ S	9
-SR	Slew Rate	$V_I = 5$ to $-5V$		0.2		V/ μ S	9
		$V_I = 5$ to $-5V$, $R_L = 2K\Omega$, $C_L = 100pF$	See ⁽¹⁾	0.2		V/ μ S	9
GBW	Gain Bandwidth	$V_I = 50mV_{RMS}$, $f = 20KHz$, $R_S = 50\Omega$, $R_L = 2K\Omega$		250		KHz	9
t _R	Rise Time	$R_L = 2K\Omega$, $C_L = 100pF$	See ⁽¹⁾		1	μ S	9
OS	Overshoot	$R_L = 2K\Omega$, $C_L = 100pF$	See ⁽¹⁾		30	%	9

(1) Specified parameter not tested.

REVISION HISTORY SECTION

Date Released	Revision	Section	Originator	Changes
05/24/05	A	New Released Corporate format. Electrical Section	R. Malone	1 MDS data sheet converted into one corp. data sheet format. MDS data MNLM1558–X, Rev. 0B0 will be archived. Deleted Drift table from electrical section. Reason: Referenced products are 883 only.
08/04/05	B	Added Thermal Resistance limit in the Absolute Maximum Ratings Section	R. Malone	Added Thermal Resistance limit in the Absolute Maximum Ratings Section for all packages.
03/20/13	B	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 finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
LM1558H/883	ACTIVE	TO-99	LMC	8	20	RoHS & Green	Call TI	Level-1-NA-UNLIM	-55 to 125	LM1558H/883 Q ACO LM1558H/883 Q >T	Samples
LM1558J/883	ACTIVE	CDIP	NAB	8	40	Non-RoHS & Green	Call TI	Level-1-NA-UNLIM	-55 to 125	LM1558J /883 Q ACO /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.

OBSELETE: TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

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

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device 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 Device Marking for that device.

(6) Lead finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

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TUBE


*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
LM1558J/883	NAB	CDIP	8	40	506.98	15.24	13440	NA

TRAY

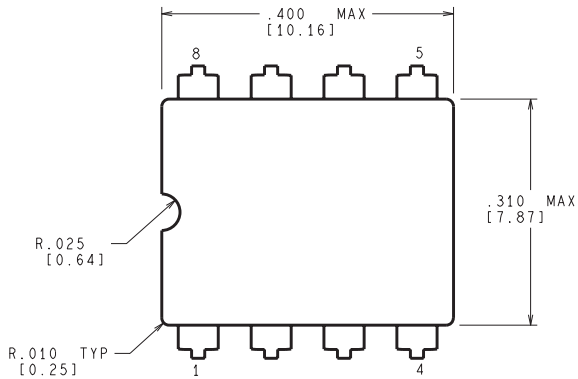


Chamfer on Tray corner indicates Pin 1 orientation of packed units.

*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	Unit array matrix	Max temperature (°C)	L (mm)	W (mm)	K0 (µm)	P1 (mm)	CL (mm)	CW (mm)
LM1558H/883	LMC	TO-CAN	8	20	2 X 10	150	126.49	61.98	8890	11.18	12.95	18.54

NAB0008A



CONTROLLING DIMENSION IS INCH
VALUES IN [] ARE MILLIMETERS



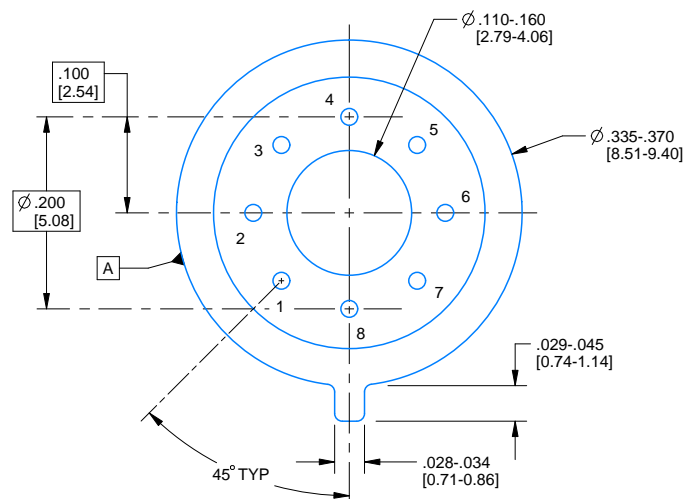
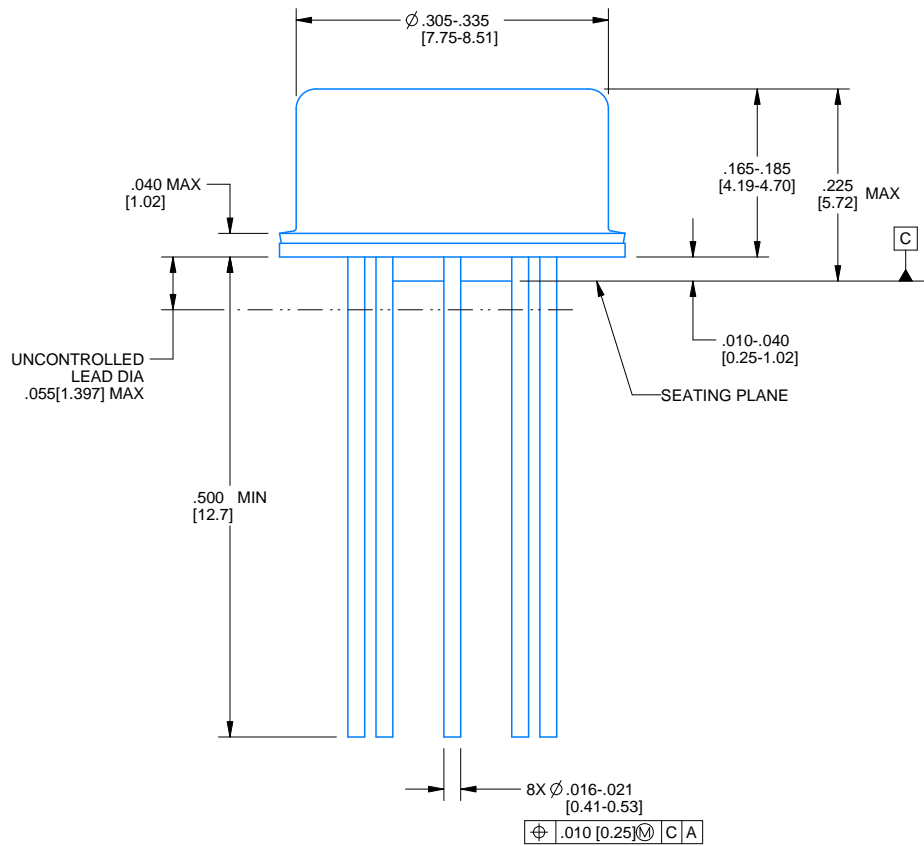
J08A (Rev M)

PACKAGE OUTLINE

LMC0008A

TO-CAN - 5.72 mm max height

TRANSISTOR OUTLINE



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NOTES:

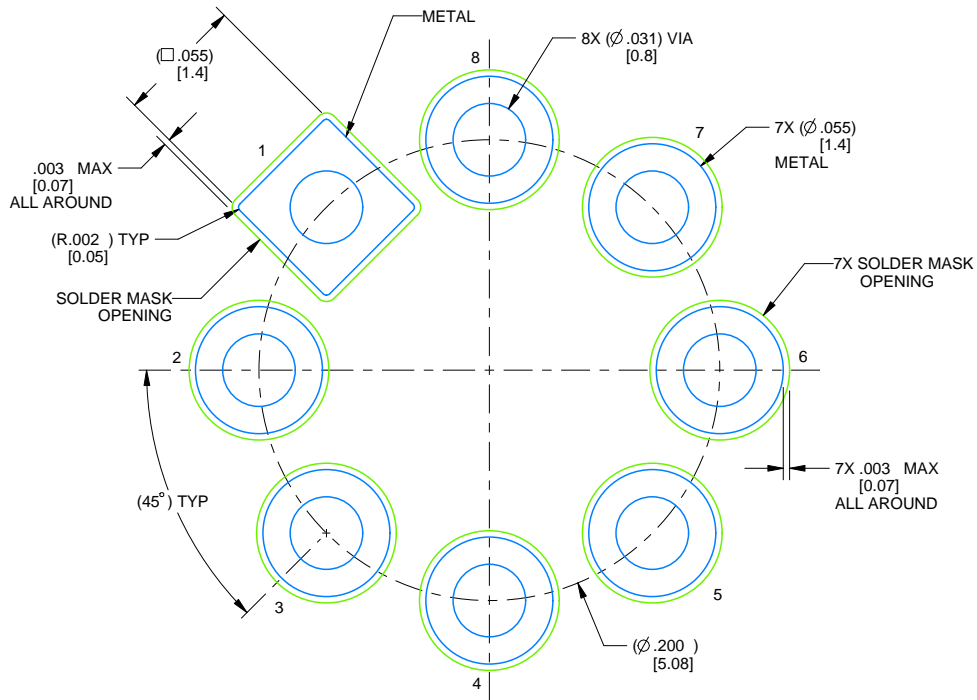
1. All linear dimensions are in inches [millimeters]. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Pin numbers shown for reference only. Numbers may not be marked on package.
4. Reference JEDEC registration MO-002/TO-99.

EXAMPLE BOARD LAYOUT

LMC0008A

TO-CAN - 5.72 mm max height

TRANSISTOR OUTLINE



LAND PATTERN EXAMPLE
NON-SOLDER MASK DEFINED
SCALE: 12X

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