

## LM1558QML Dual Operational Amplifier

 Check for Samples: [LM1558QML](#)

### FEATURES

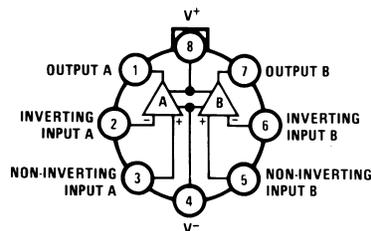
- No frequency compensation required
- Short-circuit protection
- Wide common-mode and differential voltage ranges
- Low-power consumption
- 8-lead can and 8-lead mini DIP
- No latch up when input common mode range is exceeded

### 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.

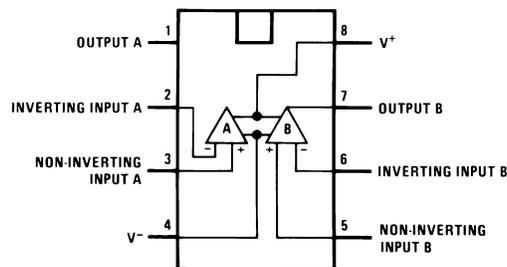
### Connection Diagram

#### Metal Can Package



**Figure 1. Top View**  
See NS Package Number H08C

#### Dual-In-Line Package



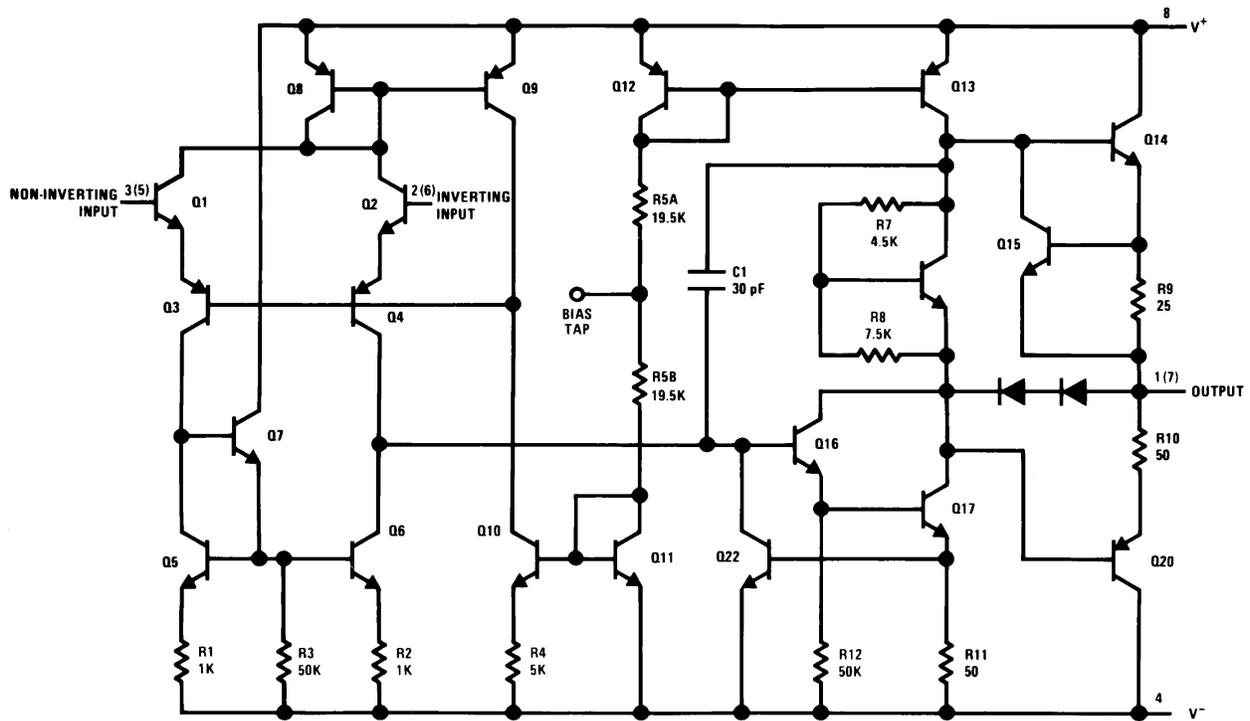
**Figure 2. Top View**  
See NS Package Number J08A



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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 <sup>(1)</sup>**

Supply Voltage	±22V
Power Dissipation <sup>(2)</sup>	
8LD Metal Can	500 mW
8LD CERDIP	TBD
Differential Input Voltage	±30V
Input Voltage <sup>(3)</sup>	±15V
Output Short-Circuit Duration	Continuous
Operating Temperature Range	-55°C ≤ T <sub>A</sub> ≤ +125°C
Maximum Junction Temperature	150°C
Storage Temperature Range	-65°C ≤ T <sub>A</sub> ≤ +150°C
Lead Temperature (Soldering, 10 sec.)	260°C
Thermal Resistance	
θ <sub>JA</sub>	
Metal Can 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 <sub>JC</sub>	
Metal Can 8LD	30°C/W
CERDIP 8LD	22°C/W
ESD tolerance <sup>(4)</sup>	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 guarantee specific performance limits. For guaranteed specifications and test conditions, see the Electrical Characteristics. The guaranteed specifications apply only for the test conditions listed.
- (2) The maximum power dissipation must be derated at elevated temperatures and is dictated by T<sub>Jmax</sub> (maximum junction temperature), θ<sub>JA</sub> (package junction to ambient thermal resistance), and T<sub>A</sub> (ambient temperature). The maximum allowable power dissipation at any temperature is P<sub>Dmax</sub> = (T<sub>Jmax</sub> - T<sub>A</sub>)/θ<sub>JA</sub> 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		(1)	-12	12	V	1, 2, 3
$R_I$	Input Resistance	$R_I = 5(KT/q I_{IB})$	(2)	0.3		M $\Omega$	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) Guaranteed by the CMRR test.

(2) Guaranteed 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		$V/\mu S$	9
		$V_I = -5$ to $5V$ , $R_L = 2K\Omega$ , $C_L = 100pF$	(1)	0.2		$V/\mu S$	9
-SR	Slew Rate	$V_I = 5$ to $-5V$		0.2		$V/\mu S$	9
		$V_I = 5$ to $-5V$ , $R_L = 2K\Omega$ , $C_L = 100pF$	(1)	0.2		$V/\mu S$	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	$R_L = 2K\Omega$ , $C_L = 100pF$	(1)		1	$\mu S$	9
OS	Overshoot	$R_L = 2K\Omega$ , $C_L = 100pF$	(1)		30	%	9

(1) Guaranteed 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 MNL1558-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.

**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Samples (Requires Login)
LM1558H/883	ACTIVE	TO-99	LMC	8	20	TBD	POST-PLATE	Level-1-NA-UNLIM	
LM1558J/883	ACTIVE	CDIP	NAB	8	40	TBD	A42 SNPB	Level-1-NA-UNLIM	

(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.

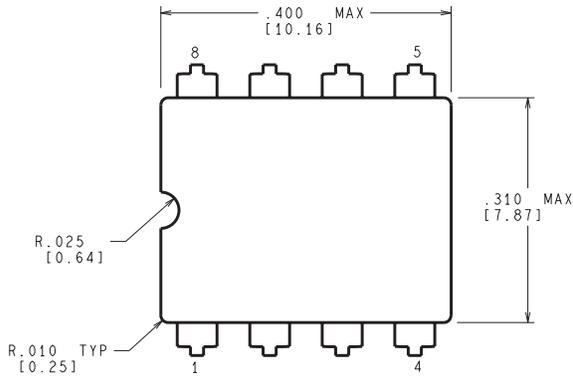
**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

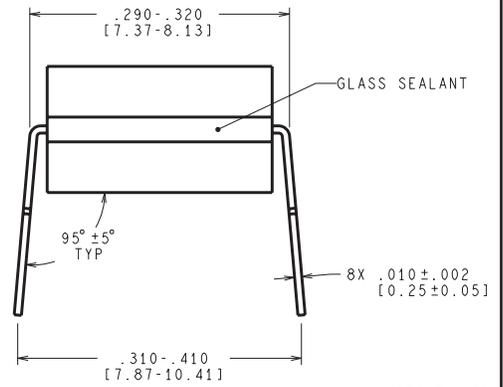
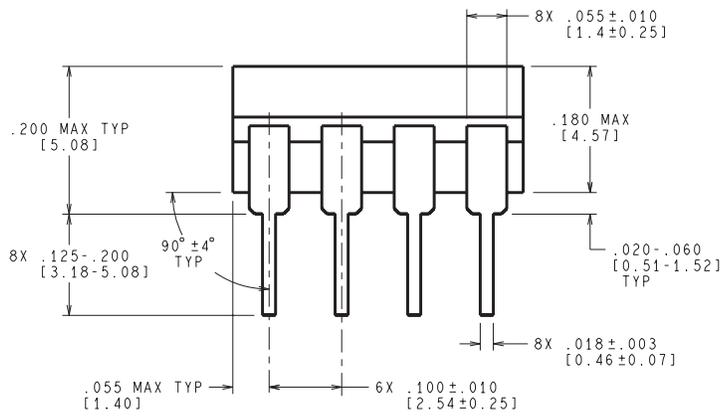
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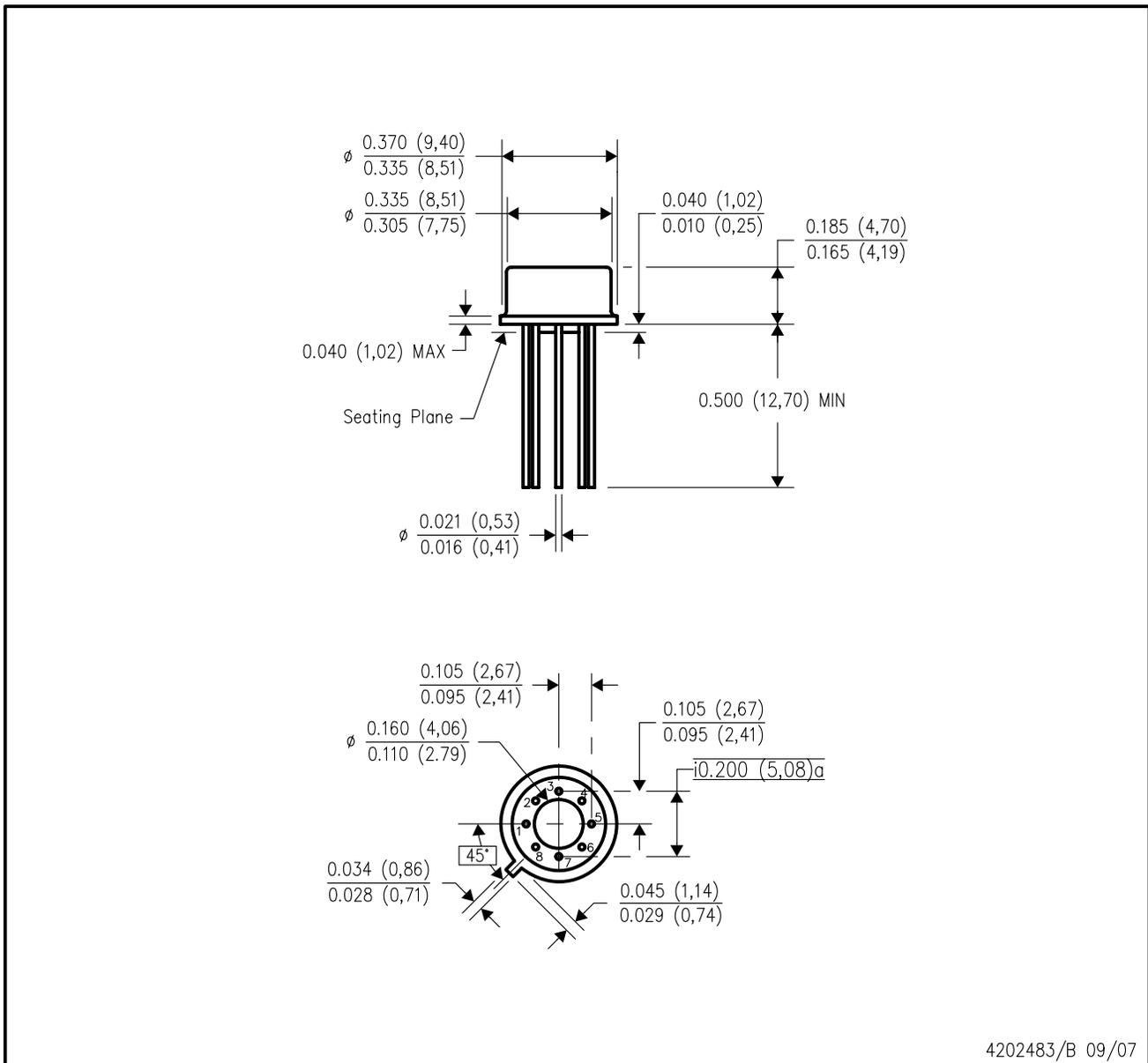
CONTROLLING DIMENSION IS INCH  
VALUES IN [ ] ARE MILLIMETERS



J08A (Rev M)

LMC (O-MBCY-W8)

METAL CYLINDRICAL PACKAGE



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

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