National Semiconductor

August 2005

LM1558QML
Dual Operational Amplifier

General 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.

Features

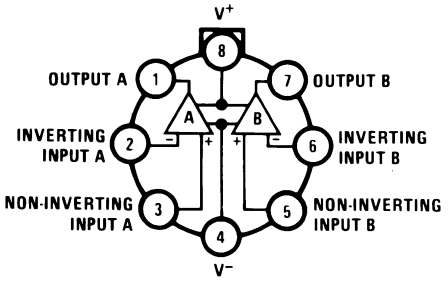
- No frequency compensation required
- Short-circuit protection
- Wide common-mode and differential voltage ranges
- Low-power consumption
- 8-lead can and 8-lead mini DIP
- No latch up when input common mode range is exceeded

Ordering Information

NS PART NUMBER	SMD PART NUMBER	NS PACKAGE NUMBER	PACKAGE DISCRIPTION
LM1558H/883		H08C	8LD Metal Can
LM1558J/883		J08A	8LD Cerdip

Connection Diagrams

Metal Can Package



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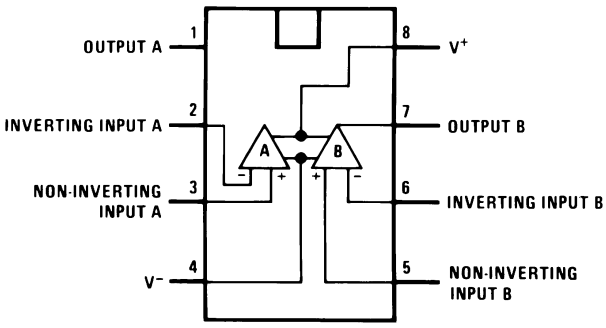
Top View
See NS Package Number H08C

Dual-In-Line Package



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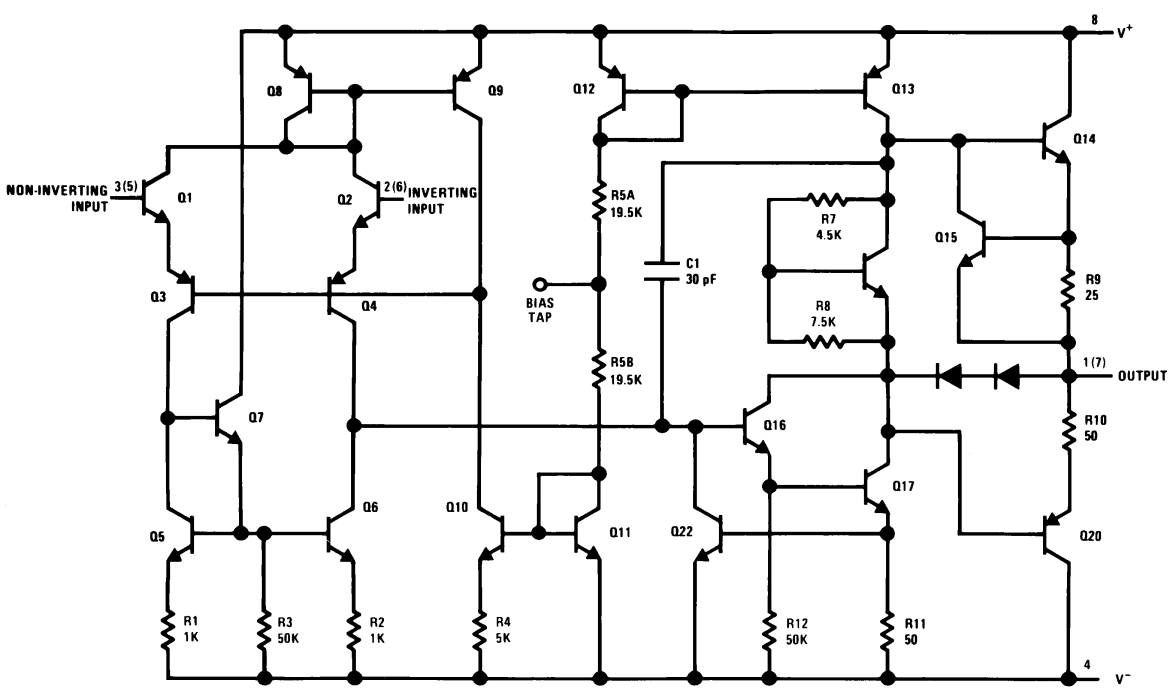
Top View
See NS Package Number J08A

Schematic Diagram



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Numbers in parentheses are pin numbers for amplifier B.

Absolute Maximum Ratings (Note 1)

Supply Voltage	±22V
Power Dissipation (Note 2)	
8LD Metal Can	500 mW
8LD CERDIP	TBD
Differential Input Voltage	±30V
Input Voltage (Note 3)	±15V
Output Short-Circuit Duration	Continuous
Operating Temperature Range	$-55^{\circ}C \leq T_A \leq +125^{\circ}C$
Maximum Junction Temperature	150˚C
Storage Temperature Range	$-65^{\circ}C \leq T_A \leq +150^{\circ}C$
Lead Temperature (Soldering, 10 sec.)	260˚C
Thermal Resistance	
θ_{JA}	
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_{JC}	
Metal Can 8LD	30˚C/W
CERDIP 8LD	22˚C/W
ESD tolerance (Note 4)	300V

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} = ±15V, V_{CM} = 0V, R_S = 10KΩ

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 = 50Ω		-5.0	5.0	mV	1
				-6.0	6.0	mV	2, 3
		V_{CC} = ±5V, V_{CM} = 0V		-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} = ±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} = ±5V, V_{CM} = 0V			500	nA	1
					1500	nA	2, 3
PSRR	Power Supply Rejection Ratio	±5V ≤ V_{CC} ≤ ±15V		77		dB	1, 2, 3
CMRR	Common Mode Rejection Ratio	-12V ≤ V_{CM} ≤ 12V		70		dB	1, 2, 3
I_{CC}	Power Supply Current	R_S = 50Ω (both amplifiers measured together)			5.0	mA	1, 2,
					7.0	mA	3
$+I_{OS}$	Short Circuit Current	R_S = 50Ω, V_O = 0V		-45	-14	mA	1
				-45	-9	mA	2
				-50	-9	mA	3
$-I_{OS}$	Short Circuit Current	R_S = 50Ω, V_O = 0V		14	45	mA	1
				9.0	45	mA	2
				9.0	50	mA	3
V_I	Input Voltage Range		(Note 5)	-12	12	V	1, 2, 3
R_I	Input Resistance	R_I = 5(KT/q I_{IB})	(Note 6)	0.3		MΩ	1
$+V_{OP}$	Output Voltage Swing	R_S = 50Ω, R_L = 10KΩ, V_{CC} = ±20V		16		V	4, 5, 6
		R_S = 50Ω, R_L = 2KΩ, V_{CC} = ±20V		15		V	4, 5, 6
		R_S = 50Ω, R_L = 10KΩ		12		V	4, 5, 6
		R_S = 50Ω, R_L = 2KΩ		10		V	4, 5, 6

LM1558 Electrical Characteristics (Continued)

DC Parameters (Continued)

The following conditions apply, unless otherwise specified. V_{CC} = ±15V, V_{CM} = 0V, R_S = 10KΩ

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

AC Parameters

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

Symbol	Parameter	Conditions	Note	Min	Max	Unit	Sub-group
+SR	Slew Rate	V_I = -5 to 5V		0.2		V/µS	9
		V_I = -5 to 5V, R_L = 2KΩ, C_L = 100pF	(Note 6)	0.2		V/µS	9
-SR	Slew Rate	V_I = 5 to -5V		0.2		V/µS	9
		V_I = 5 to -5V, R_L = 2KΩ, C_L = 100pF	(Note 6)	0.2		V/µS	9
GBW	Gain Bandwidth	V_I = 50mV_{RMS}, f = 20KHz, R_S = 50Ω, R_L = 2KΩ		250		KHz	9
t_R	Rise Time	R_L = 2KΩ, C_L = 100pF	(Note 6)		1	µS	9
OS	Overshoot	R_L = 2KΩ, C_L = 100pF	(Note 6)		30	%	9

Note 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.

Note 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 $P_{Dmax} = (T_{Jmax} - T_A)/\theta_{JA}$ or the number given in the Absolute Maximum Ratings, whichever is lower.

Note 3: For supply Voltages less than ±15V, the absolute maximum input Voltage is equal to the supply Voltage.

Note 4: Human body model, 1.5 KΩ in series with 100 pF.

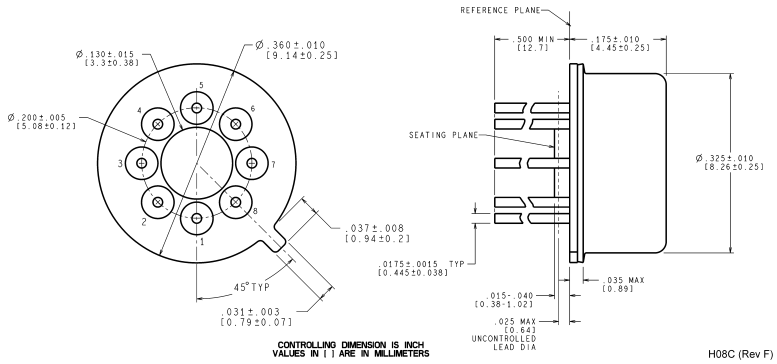
Note 5: Guaranteed by the CMRR test.

Note 6: Guaranteed parameter not tested.

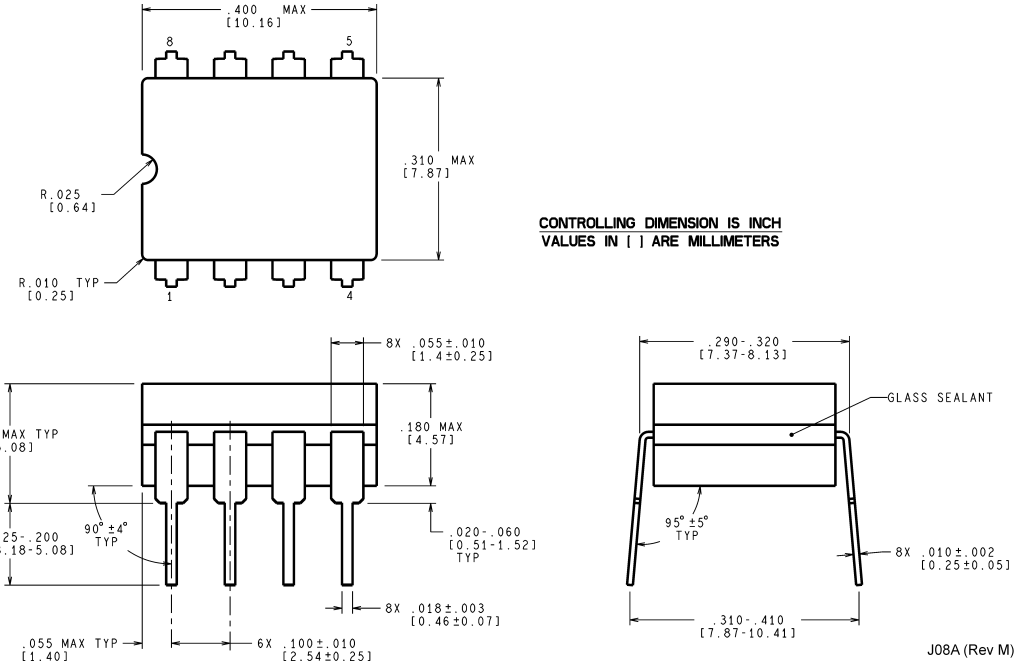
Revision History Section

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 MNLM1558–X, Rev. 0B0 will be achrived. 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.

Physical Dimensions inches (millimeters) unless otherwise noted



Metal Can Package (H)
NS Package Number H08C



Ceramic Dual-In-Line Package (J)
NS Package Number J08A

Notes

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