LM1558JAN
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

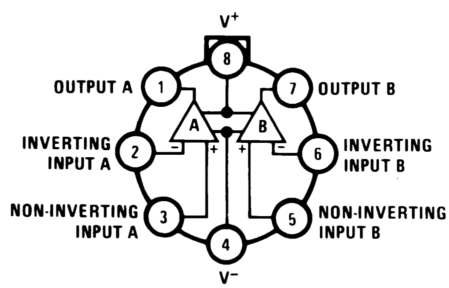
- No frequency compensation required
- Short-circuit protection
- Wide common-mode and differential voltage ranges
- Low-power consumption
- 8-lead can and 8-lead mini DIP
- No latch up when input common mode range is exceeded

Ordering Information

NS PART NUMBER	SMD PART NUMBER	NS PACKAGE NUMBER	PACKAGE DISCRIPTION
JL1558BGA	JM38510/10108BGA	H08C	8LD Metal Can

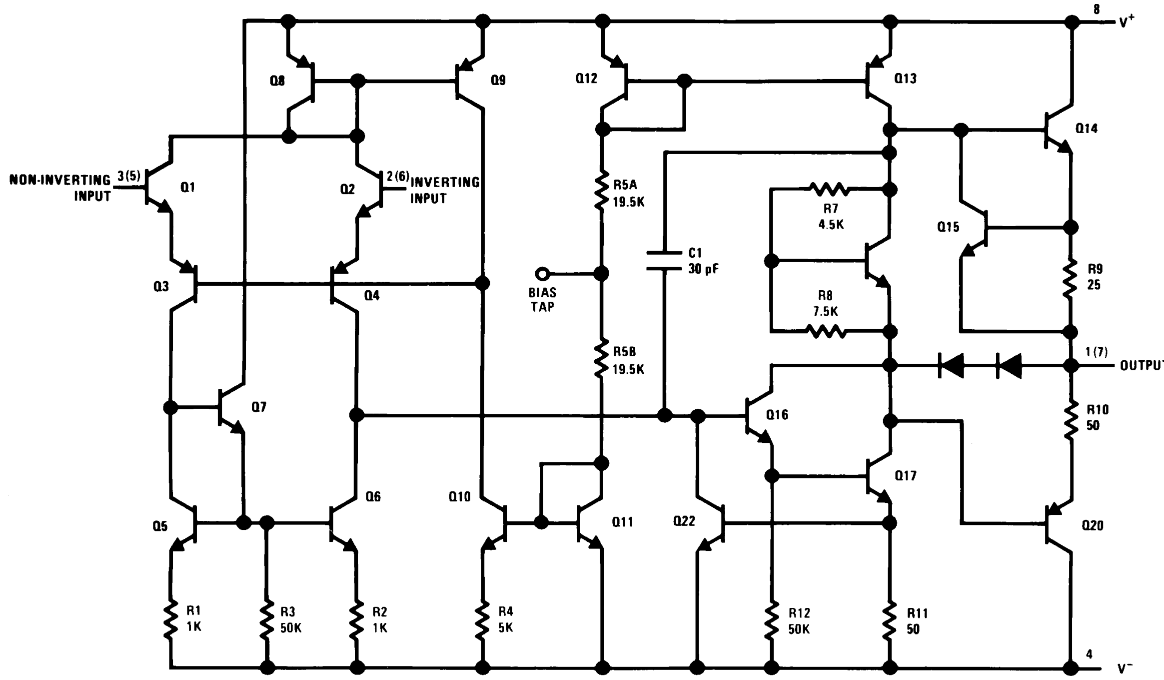
Connection Diagram

Metal Can Package



Top View
See NS Package Number H08C

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
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}	
Still Air	150˚C/W
500LF/Min Air flow	85˚C/W
θ_{JC}	30˚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 JAN Electrical Characteristics

DC Parameters

The following conditions apply, unless otherwise specified. $V_{CC} = \pm 20V$, $V_{CM} = 0V$

Symbol	Parameter	Conditions	Notes	Min	Max	Unit	Sub-groups
V_{IO}	Input Offset Voltage	$+V_{CC} = 35V$, $-V_{CC} = -5V$, $V_{CM} = -15V$		-3.0	+3.0	mV	1
		$+V_{CC} = 35V$, $-V_{CC} = -5V$, $V_{CM} = -15V$		-4.0	+4.0	mV	2, 3
		$+V_{CC} = 5V$, $-V_{CC} = -35V$, $V_{CM} = +15V$		-3.0	+3.0	mV	1
		$+V_{CC} = 5V$, $-V_{CC} = -35V$, $V_{CM} = +15V$		-4.0	+4.0	mV	2, 3
		$V_{CM} = 0$		-3.0	+3.0	mV	1
		$V_{CM} = 0$		-4.0	+4.0	mV	2, 3
		$+V_{CC} = 5V$, $-V_{CC} = -5V$, $V_{CM} = 0V$		-3.0	+3.0	mV	1
		$+V_{CC} = 5V$, $-V_{CC} = -5V$, $V_{CM} = 0V$		-4.0	+4.0	mV	2, 3
I_{IO}	Input Offset Current	$+V_{CC} = 35V$, $-V_{CC} = -5V$, $V_{CM} = -15V$		-30	+30	nA	1, 2
		$+V_{CC} = 35V$, $-V_{CC} = -5V$, $V_{CM} = -15V$		-70	+70	nA	3
		$+V_{CC} = 5V$, $-V_{CC} = -35V$, $V_{CM} = +15V$		-30	+30	nA	1, 2
		$+V_{CC} = 5V$, $-V_{CC} = -35V$, $V_{CM} = +15V$		-70	+70	nA	3
		$V_{CM} = 0V$		-30	+30	nA	1, 2
		$V_{CM} = 0V$		-70	+70	nA	3
		$+V_{CC} = 5V$, $-V_{CC} = -5V$, $V_{CM} = 0V$		-30	+30	nA	1, 2
		$+V_{CC} = 5V$, $-V_{CC} = -5V$, $V_{CM} = 0V$		-70	+70	nA	3
$-I_{IB}$	Input Bias Current	$+V_{CC} = 35V$, $-V_{CC} = -5V$, $V_{CM} = -15V$		-0.1	110	nA	1, 2
		$+V_{CC} = 35V$, $-V_{CC} = -5V$, $V_{CM} = -15V$		-0.1	265	nA	3
		$+V_{CC} = 5V$, $-V_{CC} = -35V$, $V_{CM} = +15V$		-0.1	110	nA	1, 2
		$+V_{CC} = 5V$, $-V_{CC} = -35V$, $V_{CM} = +15V$		-0.1	265	nA	3
		$V_{CM} = 0V$		-0.1	110	nA	1, 2
		$V_{CM} = 0V$		-0.1	265	nA	3
		$+V_{CC} = 5V$, $-V_{CC} = -5V$, $V_{CM} = 0V$		-0.1	110	nA	1, 2
		$+V_{CC} = 5V$, $-V_{CC} = -5V$, $V_{CM} = 0V$		-0.1	265	nA	3

LM1558 JAN Electrical Characteristics (Continued)

DC Parameters (Continued)

The following conditions apply, unless otherwise specified. V_{CC} = ±20V, V_{CM} = 0V

Symbol	Parameter	Conditions	Notes	Min	Max	Unit	Sub-groups
$+I_{IB}$	Input Bias Current	$+V_{CC}$ = 35V, $-V_{CC}$ = -5V, V_{CM} = -15V		-0.1	110	nA	1, 2
		$+V_{CC}$ = 35V, $-V_{CC}$ = -5V, V_{CM} = -15V		-0.1	265	nA	3
		$+V_{CC}$ = 5V, $-V_{CC}$ = -35V, V_{CM} = +15V		-0.1	110	nA	1, 2
		$+V_{CC}$ = 5V, $-V_{CC}$ = -35V, V_{CM} = +15V		-0.1	265	nA	3
		V_{CM} = 0V		-0.1	110	nA	1, 2
		V_{CM} = 0V		-0.1	265	nA	3
		$+V_{CC}$ = 5V, $-V_{CC}$ = -5V, V_{CM} = 0V		-0.1	110	nA	1, 2
		$+V_{CC}$ = 5V, $-V_{CC}$ = -5V, V_{CM} = 0V		-0.1	265	nA	3
+PSRR	Power Supply Rejection Ratio	$+V_{CC}$ = 10V, $-V_{CC}$ = -20V		-50	50	μV/V	1
		$+V_{CC}$ = 10V, $-V_{CC}$ = -20V		-100	100	μV/V	2, 3
-PSRR	Power Supply Rejection Ratio	$+V_{CC}$ = 20V, $-V_{CC}$ = -10V		-50	50	μV/V	1
		$+V_{CC}$ = 20V, $-V_{CC}$ = -10V		-100	100	μV/V	2, 3
CMRR	Common Mode Rejection Ratio	V_{CM} = ±15V, V_{CC} = ±35V to ±5V		80		dB	1, 2, 3
$+I_{OS}$	Output Short Circuit Current	$+V_{CC}$ = +15V, $-V_{CC}$ = -15V, V_{CM} = -15V, t ± 25mS		-60		mA	1, 2, 3
$-I_{OS}$	Output Short Circuit Current	$+V_{CC}$ = +15V, $-V_{CC}$ = -15V, V_{CM} = 15V, t ± 25mS			+60	mA	1, 2, 3
I_{CC}	Power Supply Current	$+V_{CC}$ = +15V, $-V_{CC}$ = -15V			7.6	mA	1
		$+V_{CC}$ = +15V, $-V_{CC}$ = -15V			6.8	mA	2
		$+V_{CC}$ = +15V, $-V_{CC}$ = -15V			8.4	mA	3
$\Delta V_{IO} / \Delta T$	Temperature Coefficient of Input Offset Voltage	25˚C ≤ T_A ≤ 125˚C	(Note 5)	-15	+15	μV/ ˚C	2
		-55˚C ≤ T_A ≤ 25˚C	(Note 5)	-20	+20	μV/ ˚C	3
$\Delta I_{IO} / \Delta T$	Temperature Coefficient of Input Offset Current	25˚C ≤ T_A ≤ 125˚C	(Note 5)	-200	200	pA/ ˚C	2
		-55˚C ≤ T_A ≤ 25˚C		-500	500	pA/ ˚C	3
$+A_{VS}$	Large Signal (Open Loop) Voltage Gain	V_O = +15V, R_L = 2KΩ		50		V/mV	4
		V_O = +15V, R_L = 2KΩ		25		V/mV	5, 6
		V_O = +15V, R_L = 10KΩ		50		V/mV	4
		V_O = +15V, R_L = 10KΩ		25		V/mV	5, 6
$-A_{VS}$	Large Signal (Open Loop) Voltage Gain	V_O = -15V, R_L = 2KΩ		50		V/mV	4
		V_O = -15V, R_L = 2KΩ		25		V/mV	5, 6
		V_O = -15V, R_L = 10KΩ		50		V/mV	4
		V_O = -15V, R_L = 10KΩ		25		V/mV	5, 6
A_{VS}	Large Signal (Open Loop) Voltage Gain	$\pm V_{CC}$ = ±5V, V_O = ±2V, R_L = 2KΩ		10		V/mV	4, 5, 6
		$\pm V_{CC}$ = ±5V, V_O = ±2V, R_L = 10KΩ		10		V/mV	4, 5, 6
$+V_{OP}$	Output Voltage Swing	R_L = 10KΩ		+16		V	4, 5, 6
		R_L = 2KΩ		+15		V	4, 5, 6
$-V_{OP}$	Output Voltage Swing	R_L = 10KΩ			-16	V	4, 5, 6
		R_L = 2KΩ			-15	V	4, 5, 6

LM1558 JAN Electrical Characteristics (Continued)

AC Parameters

The following conditions apply, unless otherwise specified. $V_{CC} = \pm 20V$, $V_{CM} = 0V$

Symbol	Parameter	Conditions	Notes	Min	Max	Unit	Sub-groups
TR_{TR}	Rise Time	$R_L = 2K\Omega$, $C_L = 100pF$, $V_I = +50mV$, $A_V = 1$, $f < 1KHz$			800	nS	7, 8A, 8B
TR_{OS}	Overshoot	$R_L = 2K\Omega$, $C_L = 100pF$, $V_I = +50mV$, $A_V = 1$, $f < 1KHz$			25	%	7, 8A, 8B
SR+	Slew Rate (Rise)	$A_V = 1$, $V_I = -5V$ to $+5V$		0.4		V/µS	7, 8A, 8B
SR-	Slew Rate (Fall)	$A_V = 1$, $V_I = +5V$ to $-5V$		0.4		V/µS	7, 8A, 8B
NI_{BB}	Noise Input Broadband	BW = 10Hz to 5KHz, $R_S = 0\Omega$			15	μV_{RMS}	7
NI_{PC}	Noise Input Popcorn	BW = 10Hz to 5KHz, $R_S = 20K\Omega$			40	μV_{PK}	7
CS	Channel Separation			80		dB	7

Drift Values

The following conditions apply, unless otherwise specified. $V_{CC} = \pm 20V$, $V_{CM} = 0V$

Symbol	Parameter	Conditions	Notes	Min	Max	Unit	Sub-groups
V_{IO}	Input Offset Voltage	$V_{CM} = 0$		-0.5	0.5	mV	1
$-I_{IB}$	Input Bias Current	$V_{CM} = 0V$		-12	12	nA	1
$+I_{IB}$	Input Bias Current	$V_{CM} = 0V$		-12	12	nA	1

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.

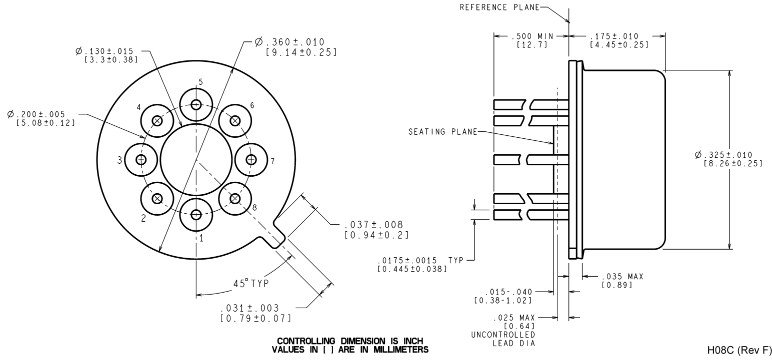
Note 4: Human body model, 1.5 KΩ in series with 100 pF.

Note 5: Calculated parameter.

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 MJLM1558–X, Rev. 1A1 will be achrived.
08/04/05	B	Added Thermal Resistance limit in the Absolute Maximum Ratings Section for H package.	R. Malone	Added Thermal Resistance limit in the Absolute Maximum Ratings Section for H package.

Physical Dimensions inches (millimeters) unless otherwise noted



Metal Can Package (H)
NS Package Number H08C

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