

LM108,LM108AQML

LM108/LM108AQML Operational Amplifiers



Literature Number: SNOSAH4A

LM108/LM108AQML

Operational Amplifiers

General Description

The LM108 is a precision operational amplifier having specifications a factor of ten better than FET amplifiers over a -55°C to $+125^{\circ}\text{C}$ temperature range.

The devices operate with supply voltages from $\pm 2\text{V}$ to $\pm 20\text{V}$ and have sufficient supply rejection to use unregulated supplies. Although the circuit is interchangeable with, and uses the same compensation as the LM101A, an alternate compensation scheme can be used to make it particularly insensitive to power supply noise and to make supply bypass capacitors unnecessary.

The low current error of the LM108 makes possible many designs that are not practical with conventional amplifiers. In

fact, it operates from $10\text{ M}\Omega$ source resistances, introducing less error than devices like the 709 with $10\text{ k}\Omega$ sources. Integrators with drifts less than $500\text{ }\mu\text{V/sec}$ and analog time delays in excess of one hour can be made using capacitors no larger than $1\text{ }\mu\text{F}$.

Features

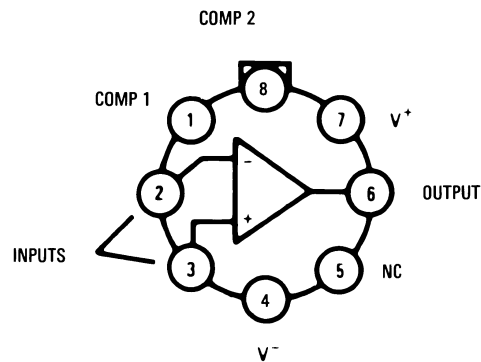
- Maximum input bias current of 3.0 nA over temperature
- Offset current less than 400 pA over temperature
- Supply current of only $300\text{ }\mu\text{A}$, even in saturation
- Guaranteed drift characteristics

Ordering Information

NS PART NUMBER	SMD PART NUMBER	NS PACKAGE NUMBER	PACKAGE DISCRIPTION
LM108AH/883		H08C	8LD Metal Can
LM108AJ-8/883		J08A	8LD Cerdip
LM108AJ/883		J14A	14LD Cerdip
LM108AWG/883		WG10A	10LD Ceramic SOIC
LM108AHRQML	5962R9863702QGA 100k rd(Si)	H08C	8LD Metal Can
LM108AHRQMLV	5962R9863702VGA 100k rd(Si)	H08C	8LD Metal Can
LM108AJ-8RQMLV	5962R9863702VPA 100k rd(Si)	J08A	8LD Cerdip
LM108AJRQML	5962R9863702QCA 100k rd(Si)	J14A	14LD Cerdip
LM108AJRQMLV	5962R9863702VCA 100k rd(Si)	J14A	14LD Cerdip
LM108AWGRQML	5962R9863702QZA 100k rd(Si)	WG10A	10LD Ceramic SOIC
LM108AWGRQMLV	5962R9863702VZA 100k rd(Si)	WG10A	10LD Ceramic SOIC
LM108AWRQML	5962R9863702QHA 100k rd(Si)	W10A	10LD CERPAC
LM108AWRQMLV	5962R9863702VHA 100k rd(Si)	W10A	10LD CERPAC
LM108H/883		H08C	8LD Metal Can
LM108J/883		J14A	14LD Cerdip
LM108J-8/883		J08A	8LD Cerdip

Connection Diagrams

Metal Can Package



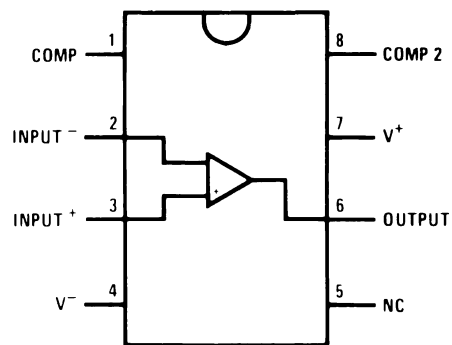
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*Package is connected to Pin 4 (V^-)

**Unused pin (no internal connection) to allow for input anti-leakage guard ring on printed circuit board layout.

See NS Package Number H08C

8 Lead Dual-In-Line Package

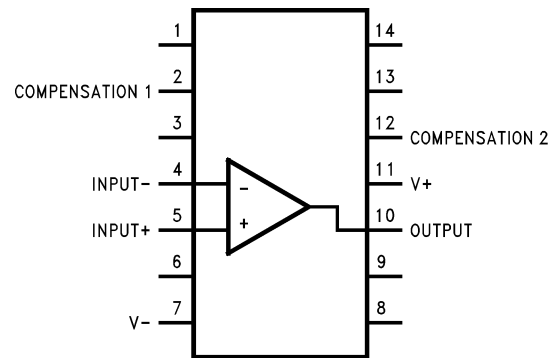


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Top View

See NS Package Number J08A

14 Lead Dual-In-Line Package

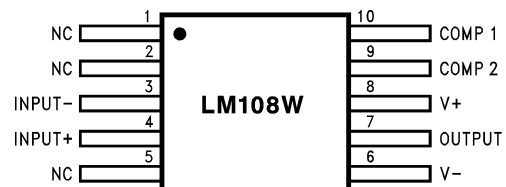


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Top View

See NS Package Number J14A

10 Lead Flatpack/SOIC Package

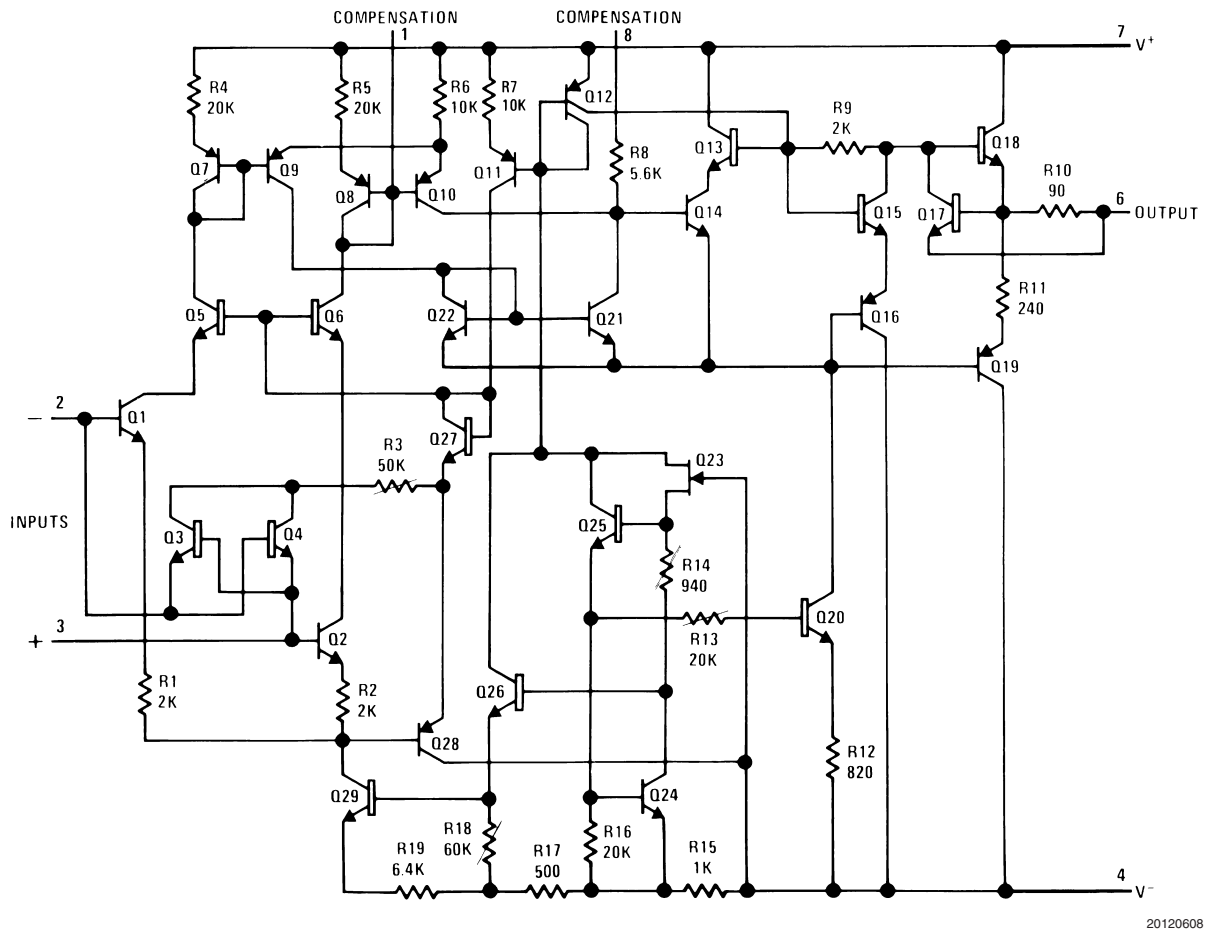


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Top View

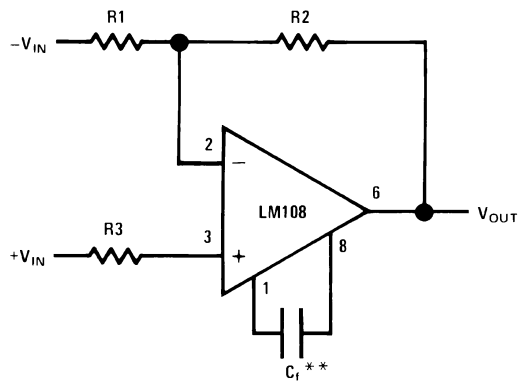
See NS Package Number W10A, WG10A

Schematic Diagram



Compensation Circuits

Standard Compensation Circuit



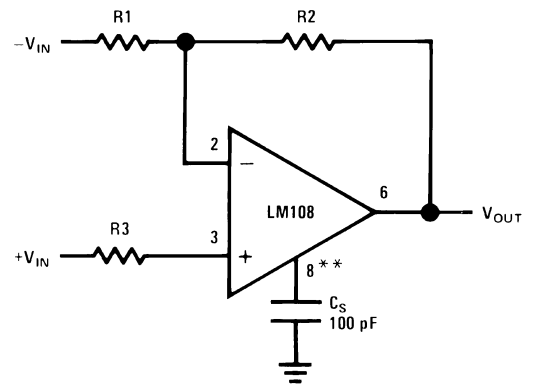
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$$C_f \geq \frac{R_1 C_O}{R_1 + R_2}$$

$C_O = 30 \text{ pF}$

**Bandwidth and slew rate are proportional to $1/C_f$

Alternate Frequency Compensation (Note 1)

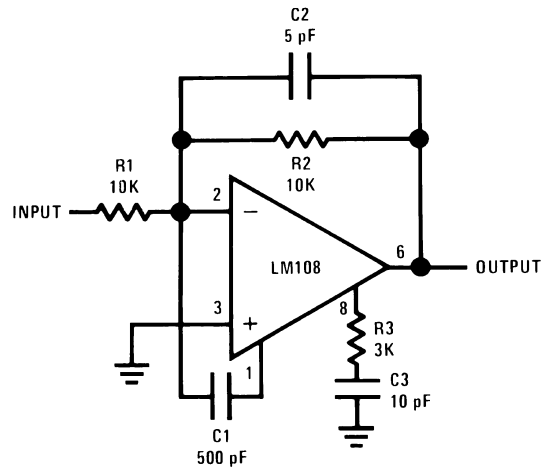


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**Bandwidth and slew rate are proportional to $1/C_s$

Note 1: Improves rejection of power supply noise by a factor of ten.

Feedforward Compensation



20120603

Absolute Maximum Ratings (Notes 2, 3)

	LM108RH	LM108/LM108A
Supply Voltage	±22V	±20V
Power Dissipation (Note 4)		
Metal Can 8 LD	330mW @ +125°C	
CERDIP 14LD	400mW @ +125°C	
CERDIP 8LD	400mW @ +125°C	
CERPACK 10LD	330mW @ +125°C	
Ceramic SOIC 10 LD	330mW @ +125°C	
Differential Input Current (Note 5)	±10 mA	
Differential Input Voltage (Note 7)	±30V	N/A
Input Voltage (Note 6)	±20V	±15V
Output Short-Circuit Duration	Continuous	
Operating Temperature Range	-55°C ≤ T _A ≤ +125°C	
Storage Temperature Range	-65°C ≤ T _A ≤ +150°C	
Thermal Resistance		
θ _{JA}		
Metal Can 8 LD Still Air	150°C/W	
500LF / Min Air Flow	86°C/W	
CERDIP 14LD Still Air	94°C/W	
500LF / Min Air Flow	55°C/W	
CERDIP 8LD Still Air	120°C/W	
500LF / Min Air Flow	68°C/W	
CERPACK 10LD Still Air	225°C/W	
500LF / Min Air Flow	142°C/W	
Ceramic SOIC 10 LD Still Air	225°C/W	
500LF / Min Air Flow	142°C/W	
θ _{JC}		
Metal Can 8 LD	38°C/W	
CERDIP 14LD	13°C/W	
CERDIP 8LD	17°C/W	
CERPACK 10LD	21°C/W	
Ceramic SOIC 10 LD	21°C/W	
Package Weight (typical)		
Metal Can 8 LD	990mg	
CERDIP 14LD	2,180mg	
CERDIP 8LD	1,090mg	
CERPACK 10LD	225mg	
Ceramic SOIC 10 LD	210mg	
Maximum Junction Temperature	175°C	150°C
Lead Temperature (Soldering, 10 sec)	300°C	
ESD Tolerance (Note 8)	2000V	

Quality Conformance Inspection

Mil-Std-883, Method 5005 - Group A

Subgroup	Description	Temp (°C)
1	Static tests at	+25°C
2	Static tests at	+125°C
3	Static tests at	-55°C
4	Dynamic tests at	+25°C
5	Dynamic tests at	+125°C
6	Dynamic tests at	-55°C
7	Functional tests at	+25°C
8A	Functional tests at	+125°C
8B	Functional tests at	-55°C
9	Switching tests at	+25°C
10	Switching tests at	+125°C
11	Switching tests at	-55°C

LM108 Electrical Characteristics

DC Parameters

The following conditions apply to all the following parameters, unless otherwise specified.

$V_{CC} = \pm 20V$, $V_{CM} = 0V$

Symbol	Parameter	Conditions	Notes	Min	Max	Units	Sub-groups
V_{IO}	Input Offset Voltage	$V_{CM} = -15V$		-2.0	2.0	mV	1
				-3.0	3.0	mV	2, 3
		$V_{CM} = 15V$		-2.0	2.0	mV	1
				-3.0	3.0	mV	2, 3
		$V_{CC} = \pm 5V$		-2.0	2.0	mV	1
				-3.0	3.0	mV	2, 3
				-2.0	2.0	mV	1
				-3.0	3.0	mV	2, 3
				-2.0	2.0	mV	1
				-3.0	3.0	mV	2, 3
I_{IO}	Input Offset Current	$V_{CM} = -15V$		-0.2	0.2	nA	1
				-0.4	0.4	nA	2, 3
		$V_{CM} = 15V$		-0.2	0.2	nA	1
				-0.4	0.4	nA	2, 3
		$V_{CC} = \pm 5V$		-0.2	0.2	nA	1
				-0.4	0.4	nA	2, 3
				-0.2	0.2	nA	1
				-0.4	0.4	nA	2, 3
				-0.2	0.2	nA	1
				-0.4	0.4	nA	2, 3
$\pm I_{IB}$	Input Bias Current	$V_{CM} = -15V$		-0.1	2.0	nA	1
				-1.0	3.0	nA	2,
				-0.1	3.0	nA	3
		$V_{CM} = 15V$		-0.1	2.0	nA	1
				-1.0	3.0	nA	2,
				-0.1	3.0	nA	3
				-0.1	2.0	nA	1
				-1.0	3.0	nA	2,
				-0.1	3.0	nA	3
		$V_{CC} = \pm 5V$		-0.1	2.0	nA	1
				-1.0	3.0	nA	2,
				-0.1	3.0	nA	3
PSRR	Power Supply Rejection $\pm$ Ratio	$\pm 20V \leq V_{CC} \leq \pm 5V$		80		dB	1, 2, 3

LM108 Electrical Characteristics (Continued)

DC Parameters (Continued)

The following conditions apply to all the following parameters, unless otherwise specified.

$$V_{CC} = \pm 20V, V_{CM} = 0V$$

Symbol	Parameter	Conditions	Notes	Min	Max	Units	Sub-groups
CMRR	Common Mode Rejection Ratio	$-15V \leq V_{CM} \leq 15V$		85		dB	1, 2, 3
$+I_{OS}$	Short Circuit Current	$V_{CC} = \pm 15V$		-30	-1.0	mA	1, 2, 3
$-I_{OS}$	Short Circuit Current	$V_{CC} = \pm 15V$		1	30	mA	1, 2, 3
I_{CC}	Power Supply Current				0.6	mA	1
					0.4	mA	2
					0.8	mA	3
R_{IN}	Input Resistance		(Note 13)	30		M Ω	1
V_{IN}	Input Voltage Range	$V_{CC} = \pm 15V$	(Note 12)	14		V	1, 2
			(Note 12)		-14	V	1, 2
			(Note 12)	13.5		V	3
			(Note 12)		-13.5	V	3
			(Note 12)	15		V	1, 2, 3
			(Note 12)		-15	V	1, 2, 3
$+V_{OP}$	Output Voltage Swing	$V_{CC} = \pm 15V, R_L = 10K\Omega$		13		V	4, 5, 6
$-V_{OP}$	Output Voltage Swing	$V_{CC} = \pm 15V, R_L = 10K\Omega$			-13	V	4, 5, 6
$+A_{VS}$	Open Loop Voltage Gain	$V_{CC} = \pm 15V, R_L = 10K\Omega$, $V_{out} = 0$ to $10V$	(Note 10)	50		V/mV	4
			(Note 10)	25		V/mV	5, 6
$-A_{VS}$	Open Loop Voltage Gain	$V_{CC} = \pm 15V, R_L = 10K\Omega$, $V_{out} = 0$ to $-10V$	(Note 10)	50		V/mV	4
			(Note 10)	25		V/mV	5, 6

AC Parameters

The following conditions apply to all the following parameters, unless otherwise specified.

$$V_{CC} = \pm 20V, V_{CM} = 0V.$$

Symbol	Parameter	Conditions	Notes	Min	Max	Units	Sub-groups
TR_{TR}	Rise Time		(Note 13)		1.0	μS	7
TR_{OS}	Overshoot		(Note 13)		30	%	7

LM108A Electrical Characteristics

DC Parameters

The following conditions apply to all the following parameters, unless otherwise specified.

$$V_{CC} = \pm 20V, V_{CM} = 0V$$

Symbol	Parameter	Conditions	Notes	Min	Max	Units	Sub-groups
V_{IO}	Input Offset Voltage	$V_{CM} = -15V$		-0.5	0.5	mV	1
				-1.0	1.0	mV	2, 3
		$V_{CM} = 15V$		-0.5	0.5	mV	1
				-1.0	1.0	mV	2, 3
		$V_{CC} = \pm 5V$		-0.5	0.5	mV	1
				-1.0	1.0	mV	2, 3
I_{IO}	Input Offset Current	$V_{CM} = -15V$		-0.2	0.2	nA	1
				-0.4	0.4	nA	2, 3
		$V_{CM} = 15V$		-0.2	0.2	nA	1
				-0.4	0.4	nA	2, 3
		$V_{CC} = \pm 5V$		-0.2	0.2	nA	1
				-0.4	0.4	nA	2, 3
$\pm I_{IB}$	Input Bias Current	$V_{CM} = -15V$		-0.1	2.0	nA	1
				-1.0	3.0	nA	2
				-0.1	3.0	nA	3
		$V_{CM} = 15V$		-0.1	2.0	nA	1
				-1.0	3.0	nA	2
				-0.1	3.0	nA	3
				-0.1	2.0	nA	1
				-1.0	3.0	nA	2
				-0.1	3.0	nA	3
		$V_{CC} = \pm 5V$		-0.1	2.0	nA	1
				-1.0	3.0	nA	2
				-0.1	3.0	nA	3
PSRR	Power Supply Rejection Ratio	$\pm 20V \leq V_{CC} \leq \pm 5V$		96		dB	1, 2, 3
CMRR	Common Mode Rejection Ratio	$-15V \leq V_{CM} \leq 15V$		96		dB	1, 2, 3
$+I_{OS}$	Short Circuit Current	$V_{CC} = \pm 15V$		-30	-1.0	mA	1, 2, 3
$-I_{OS}$	Short Circuit Current	$V_{CC} = \pm 15V$		1.0	30	mA	1, 2, 3
I_{CC}	Power Supply Current				0.6	mA	1
					0.4	mA	2
					0.8	mA	3
R_{IN}	Input Resistance		(Note 13)	30		M Ω	1
V_{IN}	Input Voltage Range	$V_{CC} = \pm 15V$	(Note 12)	14		V	1, 2
			(Note 12)		-14	V	1, 2
			(Note 12)	13.5		V	3
			(Note 12)		-13.5	V	3
			(Note 12)	15		V	1, 2, 3
			(Note 12)		-15	V	1, 2, 3
Delta V_{IO} / Delta T	Temperature Coefficient of Input Offset Voltage		(Note 13)		5.0	$\mu V/^{\circ}C$	1, 2, 3

LM108A Electrical Characteristics (Continued)

DC Parameters (Continued)

The following conditions apply to all the following parameters, unless otherwise specified.

$$V_{CC} = \pm 20V, V_{CM} = 0V$$

Symbol	Parameter	Conditions	Notes	Min	Max	Units	Sub-groups
$\Delta I_{IO}/\Delta T$	Temperature Coefficient of Input Offset Current		(Note 13)		2.5	pA/°C	1, 2, 3
+V _{OP}	Output Voltage Swing	V _{CC} = ±15V, R _L = 10KΩ		13		V	4, 5, 6
-V _{OP}	Output Voltage Swing	V _{CC} = ±15V, R _L = 10KΩ			-13	V	4, 5, 6
+A _{VS}	Open Loop Voltage Gain	V _{CC} = ±15V, R _L = 10KΩ, V _{out} = 0 to 10V	(Note 10)	80		V/mV	4
			(Note 10)	40		V/mV	5, 6
-A _{VS}	Open Loop Voltage Gain	V _{CC} = ±15V, R _L = 10KΩ, V _{out} = 0 to -10V	(Note 10)	80		V/mV	4
			(Note 10)	40		V/mV	5, 6

AC Parameters

The following conditions apply to all the following parameters, unless otherwise specified.

$$V_{CC} = \pm 20V, V_{CM} = 0V$$

Symbol	Parameter	Conditions	Notes	Min	Max	Units	Sub-groups
TR _{TR}	Transient Response Rise Time		(Note 13)		1.0	μS	7

LM108A Rad Hard — Electrical Characteristics

DC Parameters

The following conditions apply to all the following parameters, unless otherwise specified.

$$\pm V_{CC} = \pm 20V, V_{CM} = 0V, R_S = 50\Omega$$

Symbol	Parameter	Conditions	Notes	Min	Max	Units	Sub-groups
V_{IO}	Input Offset Voltage	$+V_{CC} = 35V, -V_{CC} = -5V,$ $V_{CM} = -15V$		-0.5	0.5	mV	1
				-1.0	1.0	mV	2, 3
		$+V_{CC} = 5V, -V_{CC} = -35V,$ $V_{CM} = 15V$		-0.5	0.5	mV	1
				-1.0	1.0	mV	2, 3
				-0.5	0.5	mV	1
				-1.0	1.0	mV	2, 3
		$+V_{CC} = +5V, -V_{CC} = -5V$		-0.5	0.5	mV	1
				-1.0	1.0	mV	2, 3
Delta V_{IO} / Delta T	Temperature Coefficient of Input Offset Voltage	$25^\circ C \leq T_A \leq +125^\circ C$	(Note 9)	-5.0	5.0	$\mu V/^\circ C$	2
		$-55^\circ C \leq T_A \leq 25^\circ C$	(Note 9)	-5.0	5.0	$\mu V/^\circ C$	3
I_{IO}	Input Offset Current	$+V_{CC} = 35V, -V_{CC} = -5V,$ $V_{CM} = -15V$		-0.2	0.2	nA	1
				-0.4	0.4	nA	2, 3
		$+V_{CC} = 5V, -V_{CC} = -35V,$ $V_{CM} = 15V$		-0.2	0.2	nA	1
				-0.4	0.4	nA	2, 3
				-0.2	0.2	nA	1
				-0.4	0.4	nA	2, 3
		$+V_{CC} = +5V, -V_{CC} = -5V$		-0.2	0.2	nA	1
				-0.4	0.4	nA	2, 3
Delta I_{IO} / Delta T	Temperature Coefficient of Input Offset Current	$25^\circ C \leq T_A \leq +125^\circ C$	(Note 9)	-2.5	2.5	$pA/^\circ C$	2
		$-55^\circ C \leq T_A \leq 25^\circ C$	(Note 9)	-2.5	2.5	$pA/^\circ C$	3
$\pm I_{IB}$	Input Bias Current	$+V_{CC} = 35V, -V_{CC} = -5V,$ $V_{CM} = -15V$		-0.1	2.0	nA	1
				-1.0	2.0	nA	2
				-0.1	3.0	nA	3
		$+V_{CC} = 5V, -V_{CC} = -35V,$ $V_{CM} = 15V$		-0.1	2.0	nA	1
				-1.0	2.0	nA	2
				-0.1	3.0	nA	3
				-0.1	2.0	nA	1
				-1.0	2.0	nA	2
				-0.1	3.0	nA	3
		$+V_{CC} = +5V, -V_{CC} = -5V$		-0.1	2.0	nA	1
				-1.0	2.0	nA	2
				-0.1	3.0	nA	3
+PSRR	Power Supply Rejection Ratio	$+V_{CC} = 10V, -V_{CC} = -20V$		-16	16	$\mu V/V$	1, 2, 3
-PSRR	Power Supply Rejection Ratio	$+V_{CC} = 20V, -V_{CC} = -10V$		-16	16	$\mu V/V$	1, 2, 3
CMRR	Common Mode Rejection Ratio	$V_{CM} = \pm 15V$		96		dB	1, 2, 3
$+I_{OS}$	Short Circuit Current	$+V_{CC} = +15V,$ $-V_{CC} = -15V, t \leq 25mS$		-20		mA	1, 2, 3
$-I_{OS}$	Short Circuit Current	$+V_{CC} = +15V,$ $-V_{CC} = -15V, t \leq 25mS$			20	mA	1, 2, 3
I_{CC}	Power Supply Current	$+V_{CC} = +15V,$ $-V_{CC} = -15V$			0.6	mA	1, 2
					0.8	mA	3
$+V_{OP}$	Output Voltage Swing	$R_L = 10K\Omega$		16		V	4, 5, 6
$-V_{OP}$	Output Voltage Swing	$R_L = 10K\Omega$			-16	V	4, 5, 6
$+A_{VS}$	Open Loop Voltage Gain	$R_L = 10K\Omega, V_{out} = +15V$	(Note 10)	80		V/mV	4
			(Note 10)	40		V/mV	5, 6

LM108A Rad Hard — Electrical Characteristics (Continued)

DC Parameters (Continued)

The following conditions apply to all the following parameters, unless otherwise specified.

$$\pm V_{CC} = \pm 20V, V_{CM} = 0V, R_S = 50\Omega$$

Symbol	Parameter	Conditions	Notes	Min	Max	Units	Sub-groups
$-A_{VS}$	Open Loop Voltage Gain	$R_L = 10K\Omega, V_{out} = -15V$	(Note 10)	80		V/mV	4
			(Note 10)	40		V/mV	5, 6
A_{VS}	Open Loop Voltage Gain	$\pm V_{CC} = \pm 5V, R_L = 10K\Omega, V_{out} = \pm 2V$	(Note 10)	20		V/mV	4, 5, 6

DC Drift Parameters

The following conditions apply to all the following parameters, unless otherwise specified.

$$\pm V_{CC} = \pm 20V, V_{CM} = 0V, R_S = 50\Omega$$

Delta calculations performed on JAN S and QMLV devices at group B, subgroup 5 only.

Symbol	Parameter	Conditions	Notes	Min	Max	Units	Sub-groups
V_{IO}	Input Offset Voltage			-0.25	0.25	mV	1
$\pm I_{IB}$	Input Bias Current			-0.5	0.5	nA	1

AC Parameters

The following conditions apply to all the following parameters, unless otherwise specified.

$$AC \quad \pm V_{CC} = \pm 20V, V_{CM} = 0V, R_S = 50\Omega$$

Symbol	Parameter	Conditions	Notes	Min	Max	Units	Sub-groups
TR_{TR}	Transient Response Rise Time	$R_L = 10K\Omega, C_L = 100pF, f < 1KHz, V_{in} = +50mV$			1,000	nS	9, 10, 11
TR_{OS}	Transient Response Overshoot	$R_L = 10K\Omega, C_L = 100pF, f < 1KHz, V_{in} = +50mV$			50	%	9, 10, 11
$+S_R$	Slew Rate	$A_V = 1, V_{IN} = -5V \text{ to } +5V$		0.05		V/ μ S	9, 10, 11
$-S_R$	Slew Rate	$A_V = 1, V_{IN} = +5V \text{ to } -5V$		0.05		V/ μ S	9, 10, 11
NI_{BB}	Noise Broadband	$BW = 10Hz \text{ to } 5KHz, R_S = 0\Omega$			15	μV_{RMS}	9
NI_{PC}	Noise Popcorn	$BW = 10Hz \text{ to } 5KHz, R_S = 100K\Omega$			40	μV_{PK}	9

Post Radiation Parameters @ +25°C (Note 11)

The following conditions apply to all the following parameters, unless otherwise specified.

$$DC: \quad \pm V_{CC} = \pm 20V, V_{CM} = 0V, R_S = 50\Omega$$

Symbol	Parameter	Conditions	Notes	Min	Max	Units	Sub-groups
$\pm I_{IB}$	Input Bias Current	$+V_{CC} = 35V, -V_{CC} = -5V, V_{CM} = -15V$	(Note 11)		5.0	nA	1
		$+V_{CC} = 5V, -V_{CC} = -35V, V_{CM} = -15V$	(Note 11)		5.0	nA	1
			(Note 11)		5.0	nA	1
		$+V_{CC} = +5V, -V_{CC} = -5V$	(Note 11)		5.0	nA	1

LM108A Rad Hard — Electrical Characteristics (Continued)

Post Radiation Parameters @ +25°C (Note 11) (Continued)

The following conditions apply to all the following parameters, unless otherwise specified.

DC: $\pm V_{CC} = \pm 20V$, $V_{CM} = 0V$, $R_S = 50\Omega$

Symbol	Parameter	Conditions	Notes	Min	Max	Units	Sub-groups
I_{IO}	Input Offset Current	$+V_{CC} = 35V$, $-V_{CC} = -5V$, $V_{CM} = -15V$	(Note 11)		0.5	nA	1
		$+V_{CC} = 5V$, $-V_{CC} = -35V$, $V_{CM} = -15V$	(Note 11)		0.5	nA	1
			(Note 11)		0.5	nA	1
		$+V_{CC} = +5V$, $-V_{CC} = -5V$	(Note 11)		0.5	nA	1

Note 2: Parameters have only been entered in the LM108 / LM108A column if different from LM108RH

Note 3: 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.

Note 4: 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 5: The inputs are shunted with back-to-back diodes for over voltage protection. Therefore, excessive current will flow if a differential input voltage in excess of 1V is applied between the inputs unless some limiting resistance is used.

Note 6: For supply voltages less than $\pm 20V$, the absolute maximum input voltage is equal to the supply voltage.

Note 7: This rating is $\pm 1.0V$ unless resistances of 2K Ohms or greater are inserted in series with the inputs to limit current in the input shunt diodes to the maximum allowable value..

Note 8: Human body model, 1.5 k Ω in series with 100 pF.

Note 9: Calculated parameter

Note 10: Datalog reading in K = V/mV

Note 11: Pre and post irradiation limits are identical to those listed under AC and DC electrical characteristics except as listed in the Post Radiation Limits Table. These parts may be dose rate sensitive in a space environment and demonstrate enhanced low dose rate effect. Radiation end point limits for the noted parameters are guaranteed only for the conditions as specified in MIL-STD-883, Method 1019.5.

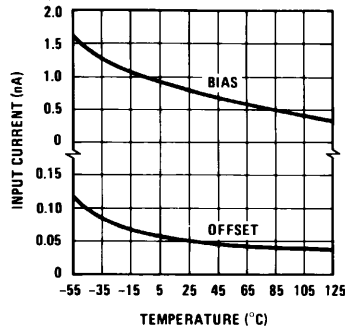
Note 12: Parameter tested Go-No-Go

Note 13: Guaranteed parameter not tested.

Note 14: Calculated parameter for Class "S" only

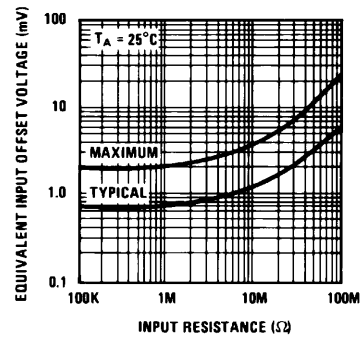
Typical Performance Characteristics

Input Currents



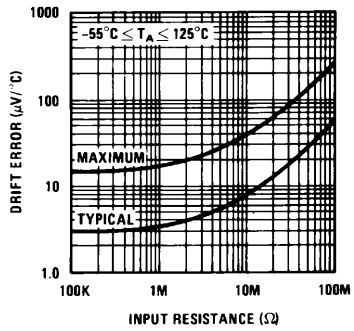
20120618

Offset Error



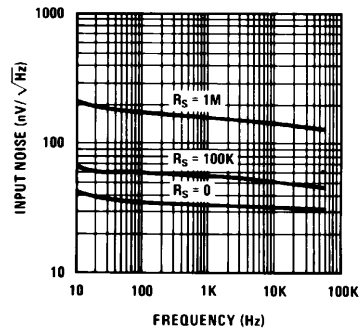
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Drift Error



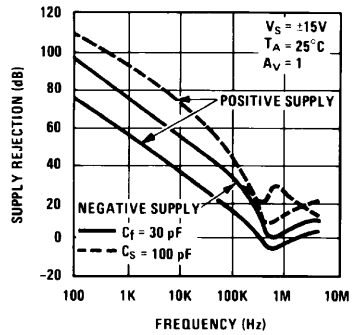
20120620

Input Noise Voltage



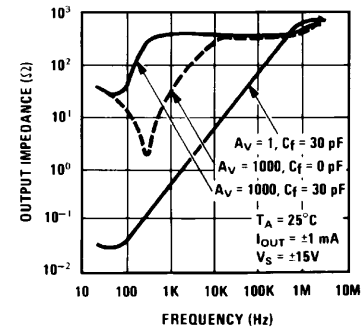
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Power Supply Rejection



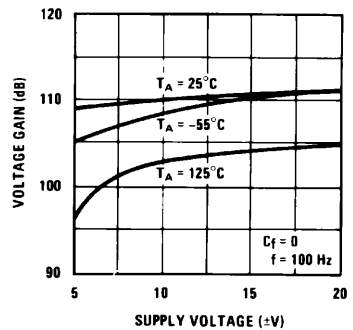
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Closed Loop Output Impedance



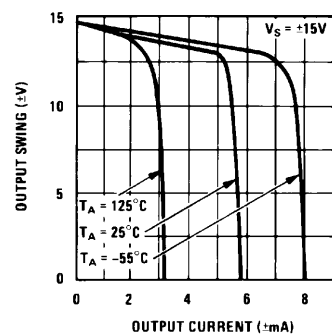
20120623

Voltage Gain



20120624

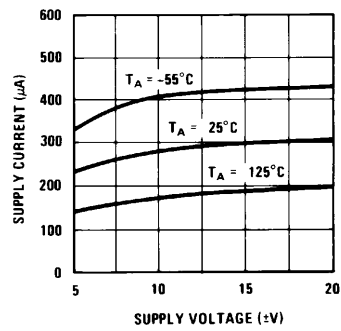
Output Swing



20120625

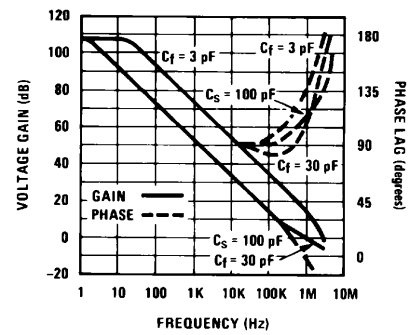
Typical Performance Characteristics (Continued)

Supply Current



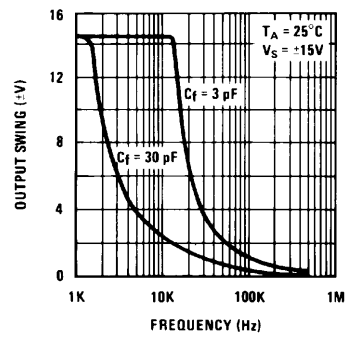
20120626

Open Loop Frequency Response



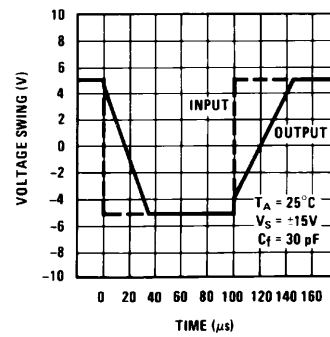
20120627

Large Signal Frequency Response



20120628

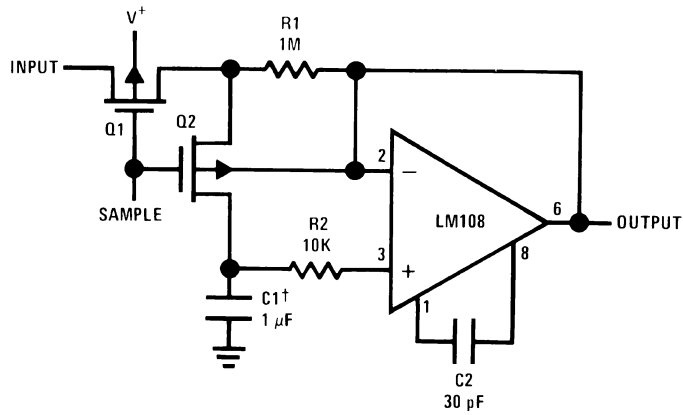
Voltage Follower Pulse Response



20120629

Typical Applications

Sample and Hold

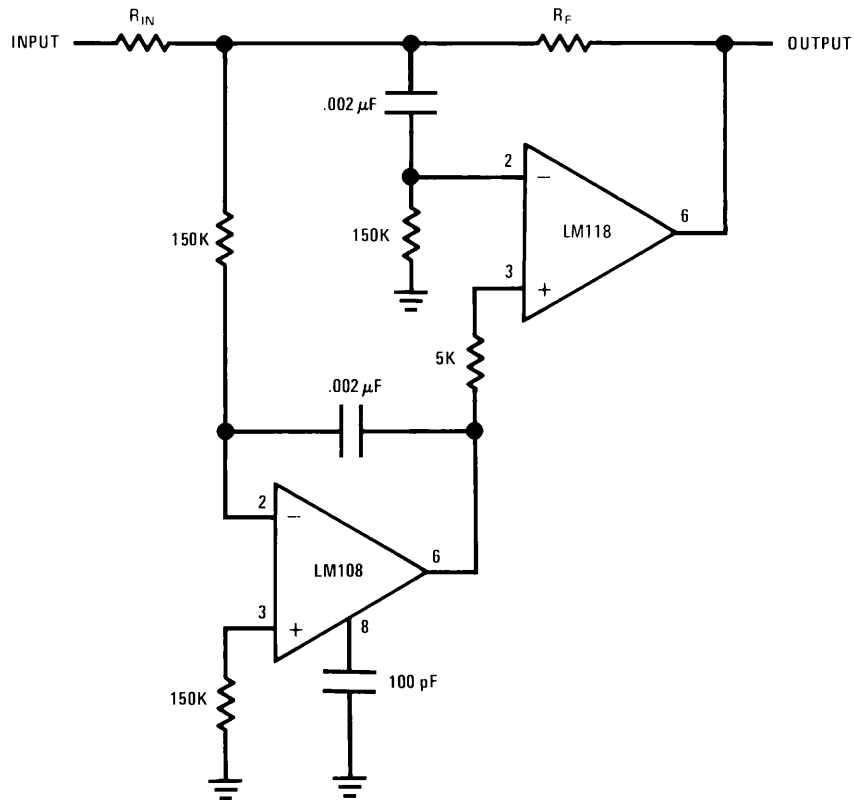


20120604

†Teflon polyethylene or polycarbonate dielectric capacitor

Worst case drift less than 2.5 mV/sec

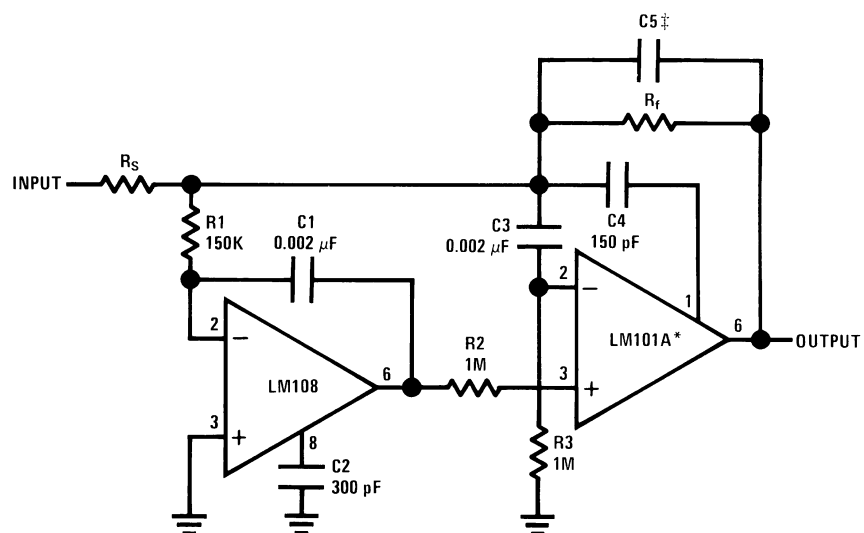
High Speed Amplifier with Low Drift and Low Input Current



20120605

Typical Applications (Continued)

Fast Summing Amplifier (Note 15)



20120612

$$\ddagger C5 = \frac{6 \times 10^{-8}}{R_f}$$

*In addition to increasing speed, the LM101A raises high and low frequency gain, increases output drive capability and eliminates thermal feedback.

Note 15: Power Bandwidth: 250 KHz

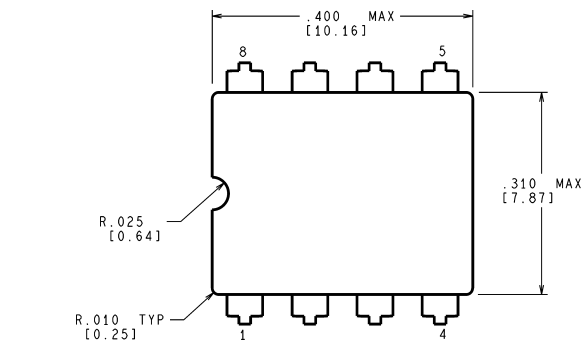
Small Signal Bandwidth: 3.5 MHz

Slew Rate: 10V/ μ S

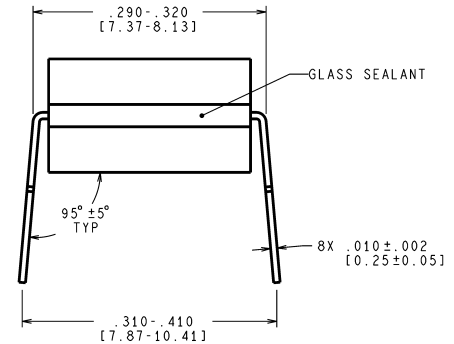
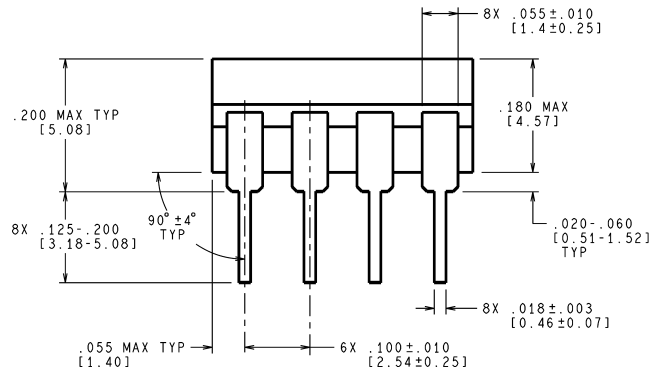
Revision History

Date Released	Revision	Section	Originator	Changes
03/23/05	A	New release, corporate format. Ordering information table, Electrical sections for the LM108 and LM108A.	L. Lytle	3 MDS data sheets converted into one Corp. datasheet format. MRLM108A-X-RH rev. 1A0, MNLM108A-X rev 1A1, MNLM108-X rev 0BL. Deleted following: NSID LM108AW/883 and LM108AJ-8RQML, no longer offered; from LM108 electrical's Delta $V_{IO}/\Delta T$, Delta $I_{IO}/\Delta T$, Drift Parameters; from LM108A electrical's Drift Parameters. Reason: referenced products are 883 only.
12/14/05	B	Rad Hard Electricals, DC Parameters	R. Malone	+ I_{OS} from -15 mA min to -20 mA min and - I_{OS} from +15 mA max to +20 mA max. Reason: To reflect SMD update. Revision A will be archived.

Physical Dimensions inches (millimeters) unless otherwise noted

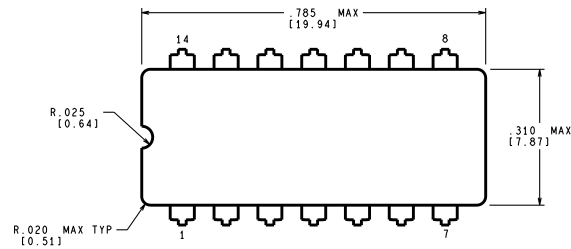


CONTROLLING DIMENSION IS INCH
VALUES IN [] ARE MILLIMETERS

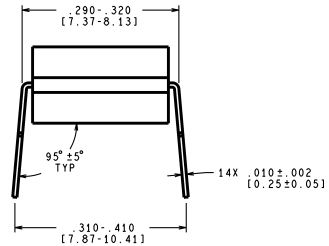
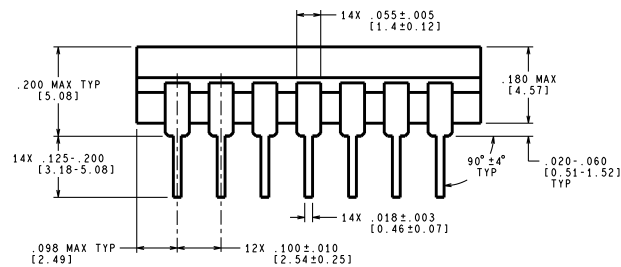


J08A (Rev M)

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



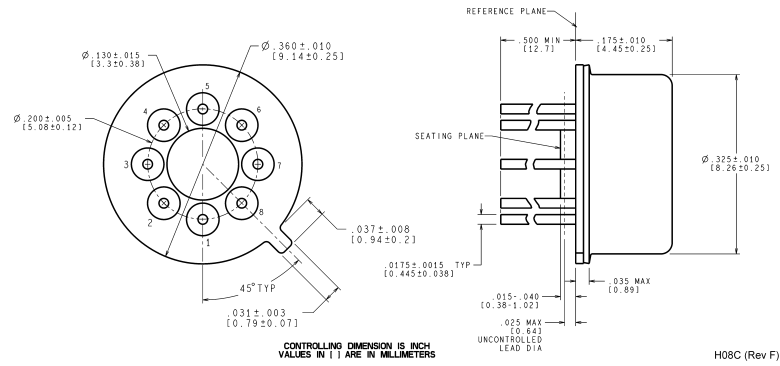
CONTROLLING DIMENSION IS INCH
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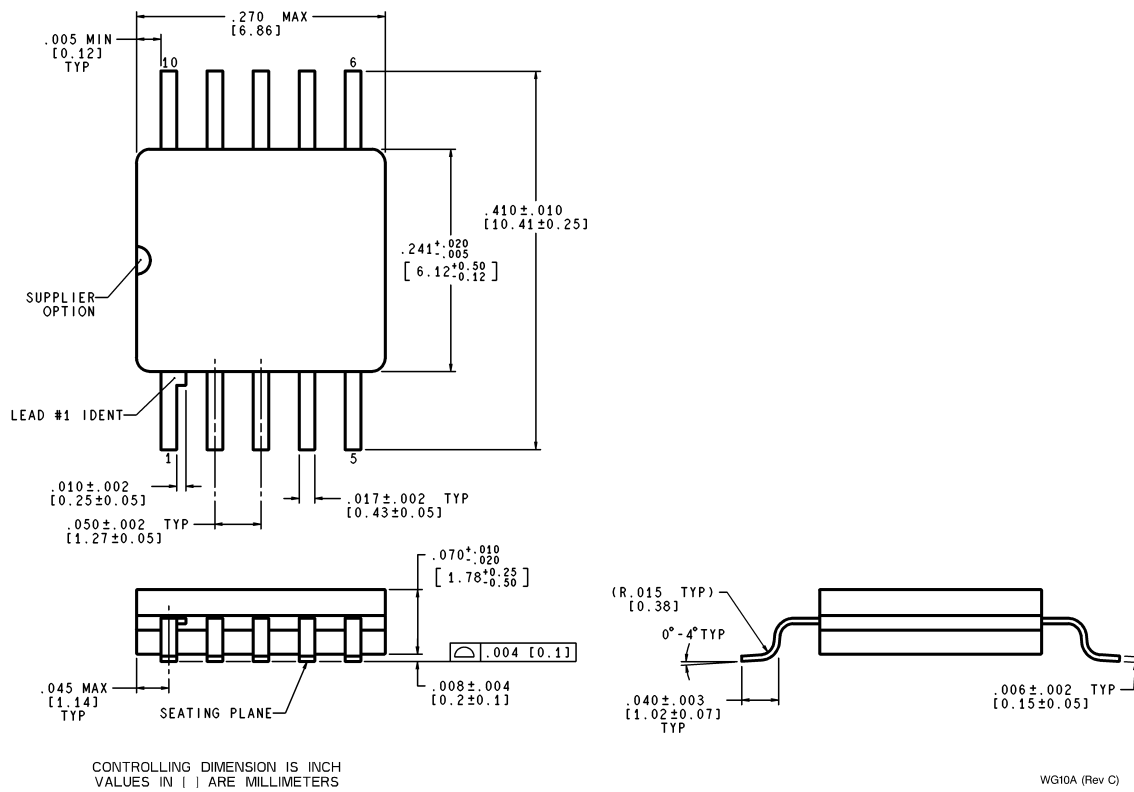
J14A (Rev J)

Ceramic Dual-In-Line Package (J)
NS Package Number J14A

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)

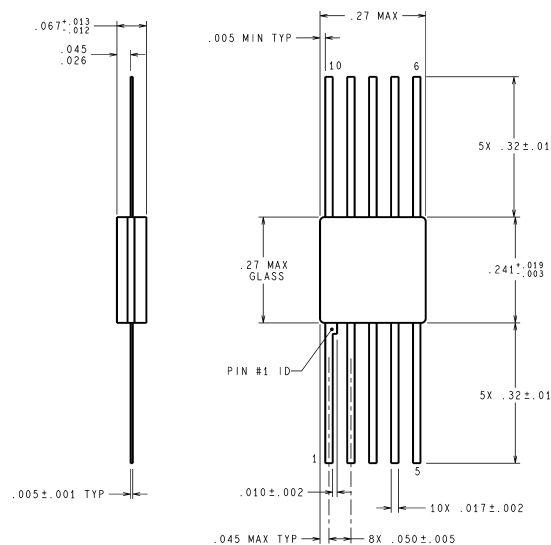


Metal Can Package (H)
NS Package Number H08C



S.O. Package (WG)
NS Package Number WG10A

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



DIMENSIONS ARE IN INCHES

W10A (Rev H)

Ceramic Flatpack Package (W) NS Package Number W10A

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