

### CLM6121 / CLM6321

#### FEATURES

- Slew Rate ..... 1200V/ $\mu$ s
- Wide Bandwidth..... 100MHz
- Output current ..... 230mA
- High Input Impedance..... 2M $\Omega$
- No Oscillations with Capacitive Loads
- 5V to  $\pm$ 15V Operation Guaranteed
- Current and Thermal Limiting
- Fully Specified to Drive 50 $\Omega$  Lines

#### APPLICATIONS

- Line Driving
- Radar
- Sonar

#### GENERAL DESCRIPTION

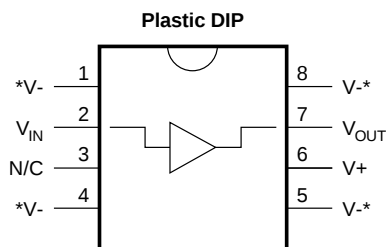
The CLM6121 family are high speed unity gain buffers that slew at 1200V/ $\mu$ s, having a small signal bandwidth of 100MHz, and capable of providing a continuous output current of  $\pm$ 200mA. They are monolithic ICs which are pin to pin compatible with the LH0002H/CH with the additional feature of current limiting.

The internal output short circuit current limiting feature has been designed in the device such that when the junction temperature reaches 170 $^{\circ}$ C, the current is limited to 100mA.

#### ORDERING INFORMATION

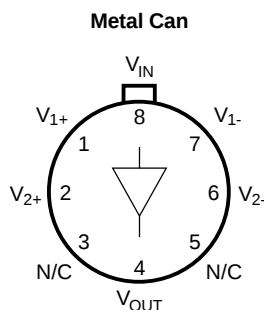
| Part      | Package              | Temperature Range                    |
|-----------|----------------------|--------------------------------------|
| CLM6121 H | Hermetic TO5 8 Lead  | -55 $^{\circ}$ C to 125 $^{\circ}$ C |
| CLM6321 H | Hermetic TO5 8 Lead  | -40 $^{\circ}$ C to 85 $^{\circ}$ C  |
| CLM6121 N | Plastic P Dip 8 Lead | -40 $^{\circ}$ C to 85 $^{\circ}$ C  |
| CLM6321 N | Plastic P Dip 8 Lead | -40 $^{\circ}$ C to 85 $^{\circ}$ C  |
| CLM6121 M | SOIC 8 Lead          | -25 $^{\circ}$ C to 70 $^{\circ}$ C  |
| CLM6321 M | SOIC 8 Lead          | -25 $^{\circ}$ C to 70 $^{\circ}$ C  |
| CLM6321 S | SOIC 14 Lead         | -25 $^{\circ}$ C to 70 $^{\circ}$ C  |

#### CONNECTION DIAGRAMS



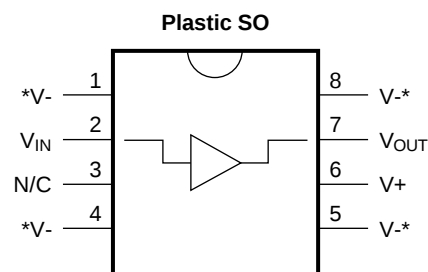
\*Heat-sinking pins. Pin 1 and Pin 8 must be connected to the negative supply.

Package NO8A



Top View

Package HO8A

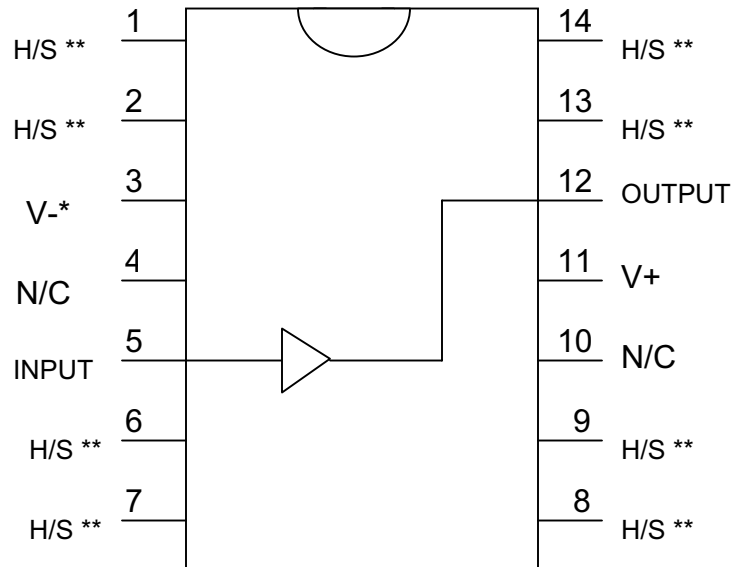


\*Heat-sinking pins. Pin 1 and Pin 8 must be connected to the negative supply.

Package MO8A

New Package Release April 2004

Plastic SO-14



\*Pin 3 must be connected to the negative supply.

\*\*Heat-sinking pins. See application section on heat sinking requirements.  
These pins are at  $V^-$  Potential.

**ABSOLUTE MAXIMUM RATINGS** (Note 1)

If Military/Aerospace specified devices are required, please contact the Calogic Sales Office for availability and specifications.

Supply Voltage .....  $\pm 18$   
 Input Voltage .....  $\pm V_{\text{supply}}$   
 Short Circuit to GND (Note 2) ..... Continuous  
 Storage Temperature Range .....  $-65^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$   
 Lead Temperature  
 (Soldering 10 seconds) .....  $260^{\circ}\text{C}$

ESD Tolerance (Note 4) .....  $\pm 2000\text{V}$   
 Thermal Resistance ( $\theta_{JA}$ ) (Note 7)  
   H Package .....  $125^{\circ}\text{C/W}$   
   N Package .....  $50^{\circ}\text{C/W}$   
   M Package .....  $60^{\circ}\text{C/W}$   
 Thermal Resistance ( $\theta_{JC}$ )  
   H Package .....  $15^{\circ}\text{C/W}$

**DC ELECTRICAL CHARACTERISTICS**

The following specifications apply for Supply Voltage =  $\pm 15\text{V}$ ,  $V_{CM} = 0$ ,  $R_L \geq 100\text{k}\Omega$  and  $R_S = 50\Omega$  unless otherwise noted.

**Boldface** limits apply for  $T_A = T_J = T_{MIN}$  to  $T_{MAX}$ ; all other limits  $T_A = T_J = 25^{\circ}\text{C}$ .

| SYMBOL   | CHARACTERISTICS              | TYP   | CLM6121               | CLM6321               | UNITS             | CONDITIONS                                                 |
|----------|------------------------------|-------|-----------------------|-----------------------|-------------------|------------------------------------------------------------|
|          |                              |       | Limit<br>(Note 6)     | Limit<br>(Note 6)     |                   |                                                            |
| $A_{V1}$ | Voltage Gain 1               | 0.990 | 0.980<br><b>0.970</b> | 0.970<br><b>0.950</b> | V/V Min           | $R_L = 1\text{k}\Omega$ , $V_{IN} = \pm 10\text{V}$        |
| $A_{V2}$ | Voltage Gain 2               | 0.900 | 0.860<br><b>0.800</b> | 0.850<br><b>0.820</b> |                   | $R_L = 50\Omega$ , $V_{IN} = \pm 10\text{V}$               |
| $A_{V3}$ | Voltage Gain 3               | 0.840 | 0.780<br><b>0.750</b> | 0.750<br><b>0.700</b> |                   | $R_L = 50\Omega$ , $V^+ = 5\text{V}$<br>$V_{IN} = 2V_{PP}$ |
| $V_{OS}$ | Offset Voltage               | 15    | 30<br><b>50</b>       | 50<br><b>100</b>      | mV Max            | $R_L = 1\text{k}\Omega$                                    |
| $I_B$    | Input Bias Current           | 1     | 4<br><b>7</b>         | 5<br><b>7</b>         | $\mu\text{A}$ Max | $R_L = 1\text{k}\Omega$ , $R_S = 10\text{k}\Omega$ ,       |
| $R_{IN}$ | Input Resistance             | 5     |                       |                       | M $\Omega$        | $R_L = 50\Omega$                                           |
| $C_{IN}$ | Input Capacitance            | 3.5   |                       |                       | pF                |                                                            |
| $R_O$    | Output Resistance            | 3     | 5<br><b>10</b>        | 5<br><b>6</b>         | $\Omega$ Max      | $I_{OUT} = \pm 10\text{mA}$                                |
| $I_{S1}$ | Supply Current 1             | 15    | 18<br><b>20</b>       | 20<br><b>22</b>       | mA Max            | $R_L = \infty$                                             |
| $I_{S2}$ | Supply Current 2             | 14    | 16<br><b>18</b>       | 18<br><b>20</b>       |                   | $R_L = \infty$ , $V^+ = 5\text{V}$                         |
| $V_{O1}$ | Output Swing 1               | 13.5  | 13.3<br><b>13</b>     | 13.2<br><b>13</b>     | $\pm\text{V}$ Min | $R_L = 1\text{k}$                                          |
| $V_{O2}$ | Output Swing 2               | 12.7  | 11.5<br><b>10</b>     | 11<br><b>10</b>       |                   | $R_L = 100\Omega$                                          |
| $V_{O3}$ | Output Swing 3               | 12    | 11<br><b>9</b>        | 10<br><b>9</b>        |                   | $R_L = 50\Omega$                                           |
| $V_{O4}$ | Output Swing 4               | 1.8   | 1.6<br><b>1.3</b>     | 1.6<br><b>1.5</b>     | $V_{PP}$ Min      | $R_L = 50\Omega$ , $V^+ = 5\text{V}$ (Note 6)              |
| PSSR     | Power Supply Rejection Ratio | 70    | 60<br><b>55</b>       | 60<br><b>50</b>       | dB Min            | $V^{\pm} = \pm 5\text{V}$ to $\pm 15\text{V}$              |

**AC ELECTRICAL CHARACTERISTICS**

The following specifications apply for Supply Voltage =  $\pm 15\text{V}$ ,  $V_{\text{CM}} = 0$ ,  $R_{\text{L}} \geq 100\text{k}\Omega$  and  $R_{\text{S}} = 50\Omega$  unless otherwise noted.

**Boldface** limits apply for  $T_{\text{A}} = T_{\text{J}} = T_{\text{MIN}}$  to  $T_{\text{MAX}}$ ; all other limits  $T_{\text{A}} = T_{\text{J}} = 25^{\circ}\text{C}$ .

| SYMBOL                          | CHARACTERISTICS        | TYP  | CLM6121        | CLM6321        | UNITS            | CONDITIONS                                                                                                      |
|---------------------------------|------------------------|------|----------------|----------------|------------------|-----------------------------------------------------------------------------------------------------------------|
|                                 |                        |      | Limit (Note 6) | Limit (Note 6) |                  |                                                                                                                 |
| SR <sub>1</sub>                 | Slew Rate 1            | 1200 | 550            | 550            | V/ $\mu\text{s}$ | $V_{\text{IN}} = \pm 11\text{V}$ , $R_{\text{L}} = 1\text{k}\Omega$                                             |
| SR <sub>2</sub>                 | Slew Rate 2            | 800  | 550            | 550            | V/ $\mu\text{s}$ | $V_{\text{IN}} = \pm 5\text{V}$ , $R_{\text{L}} = 50\Omega$ (Note 3)                                            |
| SR <sub>3</sub>                 | Slew Rate 3            | 650  | 550            | 550            | V/ $\mu\text{s}$ | $V_{\text{IN}} = 2 V_{\text{PP}}$ , $R_{\text{L}} = 50\Omega$<br>$V^+ = 5\text{V}$                              |
| BW                              | -3 dB Bandwidth        | 50   | 30             | 30             | MHz              | $V_{\text{IN}} = \pm 100 \text{ mV}_{\text{PP}}$ , $R_{\text{L}} = 50\Omega$<br>$C_{\text{L}} \leq 10\text{pF}$ |
| t <sub>r</sub> , t <sub>f</sub> | Rise Time<br>Fall Time | 7.0  |                |                | ns               | $R_{\text{L}} = 50\Omega$ , $C_{\text{L}} \leq 10\text{pF}$<br>$V_{\text{O}} = 100\text{mV}_{\text{PP}}$        |
| t <sub>pd</sub>                 | Propagation Delay Time | 4.0  |                |                | ns               | $R_{\text{L}} = 50\Omega$ , $C_{\text{L}} \leq 10\text{pF}$<br>$V_{\text{O}} = 100\text{mV}_{\text{PP}}$        |
| O <sub>S</sub>                  | Overshoot              | 10   |                |                | %                | $R_{\text{L}} = 50\Omega$ , $C_{\text{L}} \leq 10\text{pF}$<br>$V_{\text{O}} = 100\text{mV}_{\text{PP}}$        |

**Note 1:** Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. DC and AC electrical specifications do not apply when operating the device beyond its rated operating conditions.

**Note 2:** The CLM6121 series buffers contain current limit and thermal shutdown to protect against fault conditions.

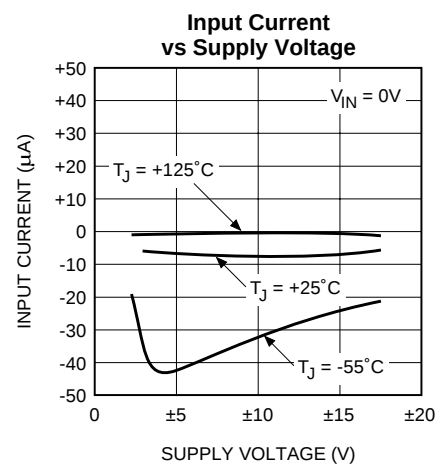
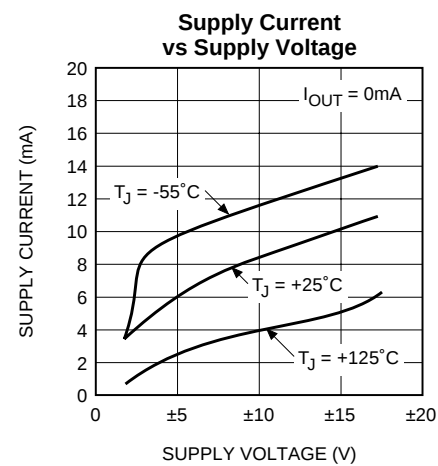
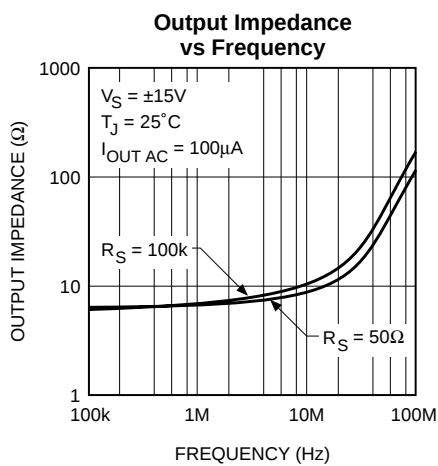
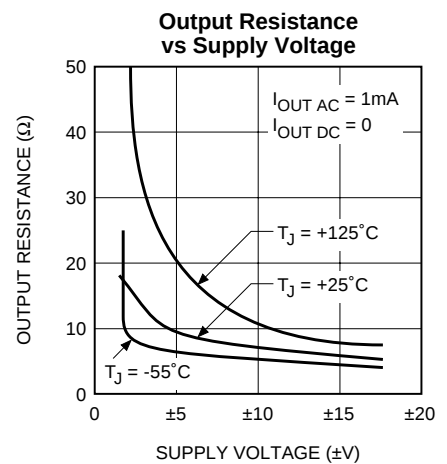
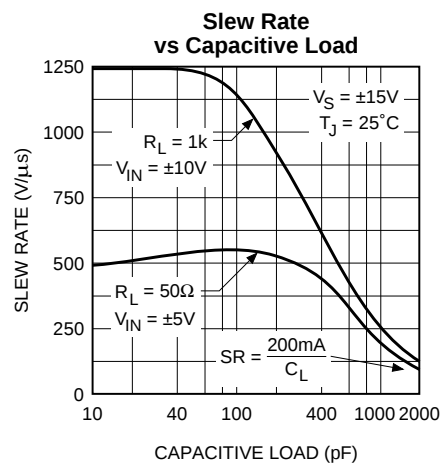
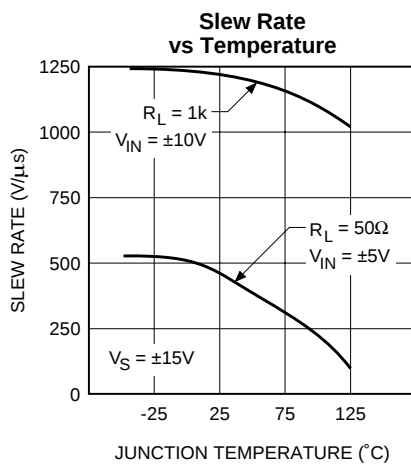
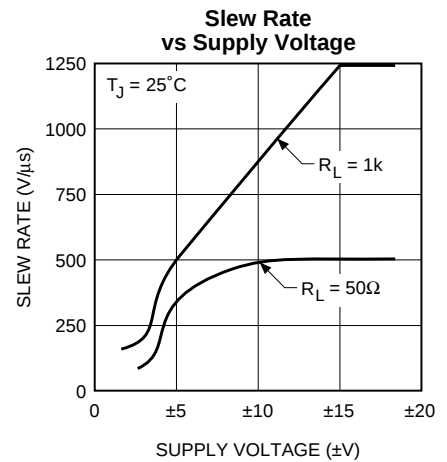
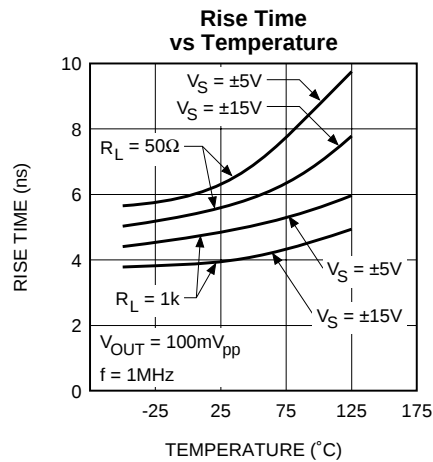
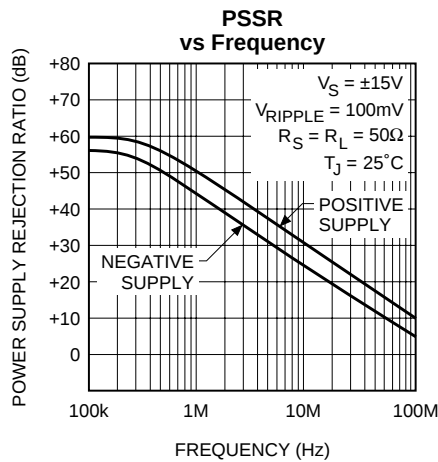
**Note 3:** Slew rate is measured with a  $\pm 11\text{V}$  input pulse and  $50\Omega$  source impedance at  $25^{\circ}\text{C}$ . For accurate measurements, the input slew rate should be at least  $1700\text{V}/\mu\text{s}$ .

**Note 4:** The test circuit consists of the human body model of  $120\text{pF}$  in series with  $1500\Omega$ .

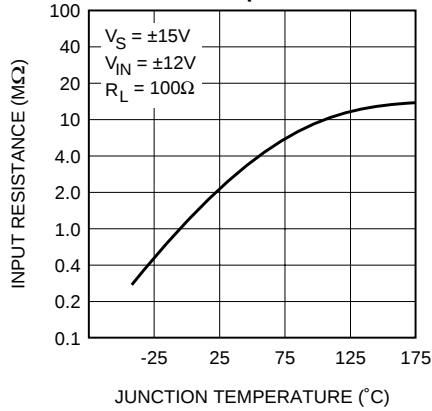
**Note 5:** The maximum power dissipation is a function of  $T_{\text{J(max)}}$ ,  $\theta_{\text{JA}}$  and  $T_{\text{A}}$ . The maximum allowable power dissipation at any ambient temperature is  $P_{\text{D}} = (T_{\text{J(max)}} - T_{\text{A}})/\theta_{\text{JA}}$ .

**Note 6:** Limits are guaranteed by testing, correlation or periodic characterization.

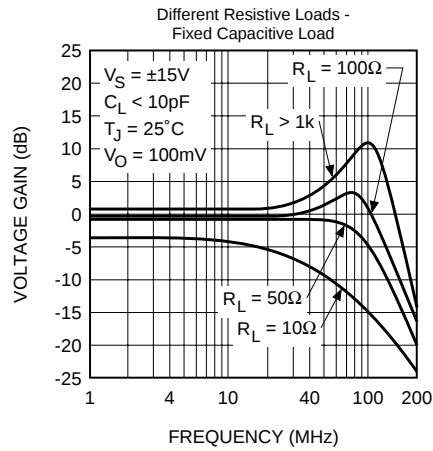
**Note 7:** For M & N package,  $\theta_{\text{JA}}$  is measured by soldering the unit directly on a printed circuit board and V<sup>-</sup> pins are connected to 2 square inches of 2 oz copper.



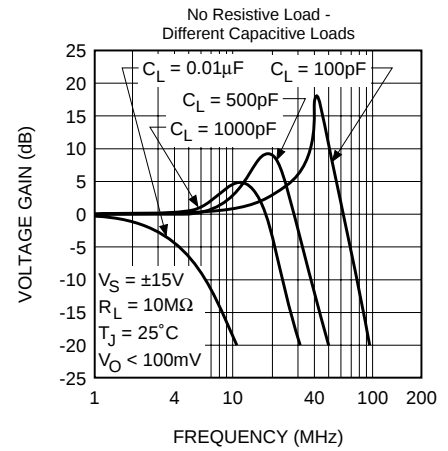
**Input Resistance vs Temperature**



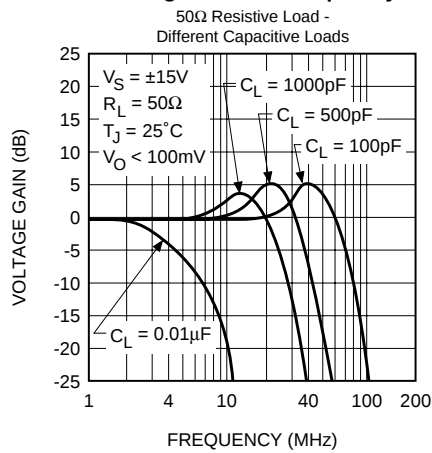
**Voltage Gain vs Frequency**



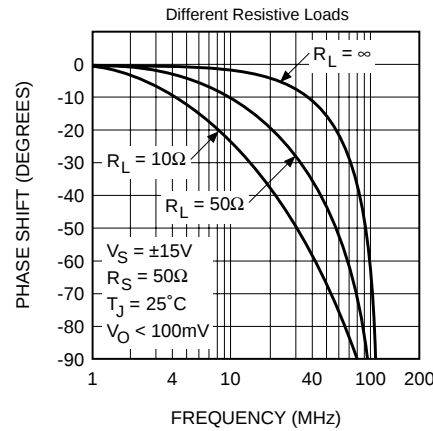
**Voltage Gain vs Frequency**



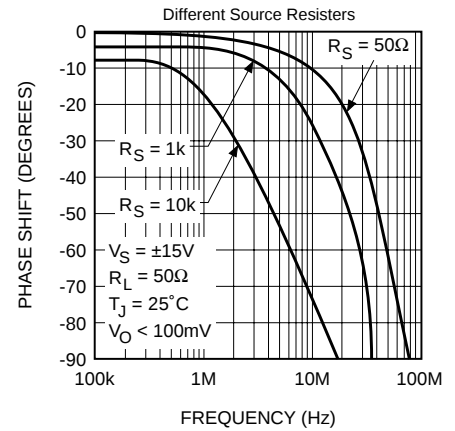
**Voltage Gain vs Frequency**



**Phase Shift vs Frequency**



**Phase Shift vs Frequency**



**Small Signal Bandwidth vs Supply Voltage**

