

## CLM4420 / CLM4429

### FEATURES

- Latch Up Protected ..... >1.5A
- Logic Input Swing ..... **Negative 5V**
- ESD ..... **4kV**
- Matched Rise and Fall Times ..... **20ns**

### APPLICATIONS

- Motor Controls
- Switch-Mode Power Supplies
- Pulse Transformer Driver
- Class D Switching Amplifiers

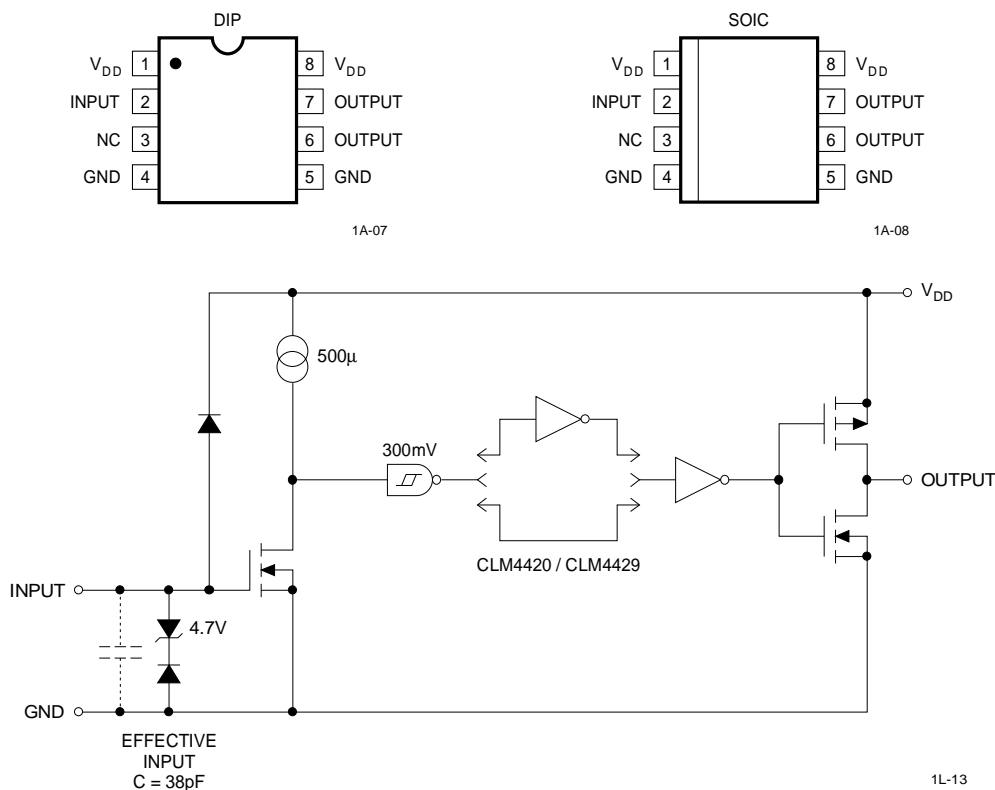
### DESCRIPTION

The CLM4420 and CLM4429 family operate over 4.5V to 18V, can withstand high current peaking of 6A and have matched rise and fall times under 25ns. The product has been designed utilizing Calogic's rugged CMOS process with protection for latch up and ESD. The product is available in inverting (CLM4429) and noninverting (CLM4420) configurations.

### ORDERING INFORMATION

| Part#     | Logic        | Package    | Temperature Range |
|-----------|--------------|------------|-------------------|
| CLM4420CP | Noninverting | 8-Pin PDIP | 0°C to +70°C      |
| CLM4420EP | Noninverting | 8-Pin PDIP | -40°C to +85°C    |
| CLM4420CY | Noninverting | 8-Pin SOIC | 0°C to +70°C      |
| CLM4420EY | Noninverting | 8-Pin SOIC | -40°C to +85°C    |
| CLM4429CP | Inverting    | 8-Pin PDIP | 0°C to +70°C      |
| CLM4429EP | Inverting    | 8-Pin PDIP | -40°C to +85°C    |
| CLM4429CY | Inverting    | 8-Pin SOIC | 0°C to +70°C      |
| CLM4429EY | Inverting    | 8-Pin SOIC | -40°C to +85°C    |

### FUNCTIONAL DIAGRAM AND PIN CONFIGURATIONS



**ABSOLUTE MAXIMUM RATINGS**

|  |   |
|--|---|
| Supply Voltage.....                            | +20V  |
| Input Voltage.....                             | -5V to $>V_{DD}$                            |
| Input Current ( $V_{IN} > V_{DD}$ ).....       | 50mA  |
| Power Dissipation, $T_A \leq 25^\circ\text{C}$ |   |
| PDIP.....                                      | 1W  |
| SOIC.....                                      | 500mW                                       |
| Derating Factors (To Ambient)                  |   |
| PDIP.....                                      | 8mW/ $^\circ\text{C}$                       |
| SOIC.....                                      | 4mW/ $^\circ\text{C}$                       |
| Storage Temperature Range.....                 | $-55^\circ\text{C}$ to $+150^\circ\text{C}$ |
| Operating Temperature (Chip).....              | $+150^\circ\text{C}$                        |
| Operating Temperature Range (Ambient)          |   |
| C Version.....                                 | $0^\circ\text{C}$ to $+70^\circ\text{C}$    |
| E Version.....                                 | $-40^\circ\text{C}$ to $+85^\circ\text{C}$  |
| Lead Temperature (Soldering, 10 sec).....      | $+300^\circ\text{C}$                        |

Static-sensitive device. Unused devices must be stored in conductive material. Protect devices from static discharge and static fields. Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions above those indicated in the operation sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended-periods may affect device reliability.

**ELECTRICAL CHARACTERISTICS:**  $T_A = +25^\circ\text{C}$  with  $4.5\text{V} \leq V_{DD} \leq 18\text{V}$ , unless otherwise specified.

| SYMBOL                         | PARAMETER  | MIN            | TYP     | MAX          | UNIT                | TEST CONDITIONS                                  |
|--------------------------------|--|----------------|---------|--------------|---------------------|--|
| <b>INPUT</b>                   |  |                |         |              |                     |  |
| $V_{IH}$                       | Logic 1 High Input Voltage                       | 2.4            | 1.8     |              | V                   |  |
| $V_{IL}$                       | Logic 0 Low Input Voltage                        |                | 1.3     | 0.8          | V                   |  |
| $V_{IN}(\text{Max})$           | Input Voltage Range                              | -5             |         | $V_{DD}+0.3$ | V                   |  |
| $I_{IN}$                       | Input Current                                    | -10            |         | 10           | $\mu\text{A}$       | $0\text{V} \leq V_{IN} \leq V_{DD}$              |
| <b>OUTPUT</b>                  |  |                |         |              |                     |  |
| $V_{OH}$                       | High Output Voltage                              | $V_{DD}-0.025$ |         |              | V                   | See Figure 1                                     |
| $V_{OL}$                       | Low Output Voltage                               |                |         | 0.025        | V                   | See Figure 1                                     |
| $R_O$                          | Output Resistance, High                          |                | 2.1     | 2.8          | $\Omega$            | $I_{OUT} = 10\text{mA}$ , $V_{DD} = 18\text{V}$  |
| $R_O$                          | Output Resistance, Low                           |                | 1.5     | 2.5          | $\Omega$            | $I_{OUT} = 10\text{mA}$ , $V_{DD} = 18\text{V}$  |
| $I_{PK}$                       | Peak Output Current                              |                | 6       |              | A                   | $V_{DD} = 18\text{V}$ (See Figure 5)             |
| $I_{REV}$                      | Latch-Up Protection<br>Withstand Reverse Current | $>1.5$         |         |              | A                   | Duty Cycle $\leq 2\%$<br>$t \leq 300\mu\text{s}$ |
| <b>SWITCHING TIME (Note 1)</b> |  |                |         |              |                     |  |
| $t_R$                          | Rise Time  |                | 25      | 35           | ns                  | Figure 1, $C_L = 2500\text{pF}$                  |
| $t_F$                          | Fall Time  |                | 25      | 35           | ns                  | Figure 1, $C_L = 2500\text{pF}$                  |
| $t_{D1}$                       | Delay Time                                       |                | 20      | 40           | ns                  | Figure 1   |
| $t_{D2}$                       | Delay Time                                       |                | 20      | 40           | ns                  | Figure 1   |
| <b>POWER SUPPLY</b>            |  |                |         |              |                     |  |
| $I_S$                          | Power Supply Current                             |                | 1<br>55 | 1.5<br>150   | mA<br>$\mu\text{A}$ | $V_{IN} = 3\text{V}$<br>$V_{IN} = 0\text{V}$     |
| $V_{DD}$                       | Operating Input Voltage                          | 4.5            |         | 18           | V                   |  |

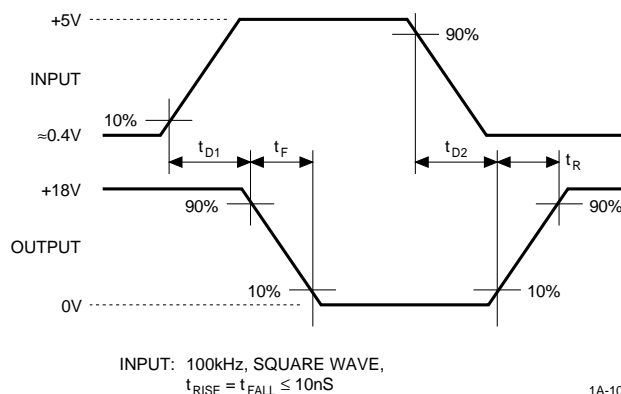
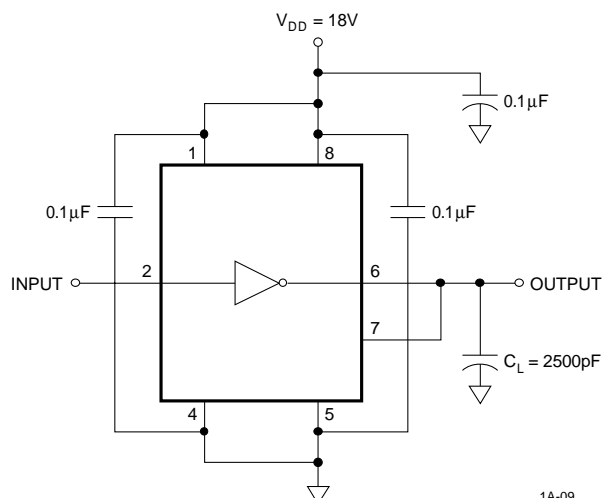
**ELECTRICAL CHARACTERISTICS:**

Measured over operating temperature range with  $4.5V \leq V_{DD} \leq 18V$ , unless otherwise specified.

| SYMBOL                         | PARAMETER                  | MIN            | TYP     | MAX          | UNIT          | TEST CONDITIONS                |
|--------------------------------|----------------------------|----------------|---------|--------------|---------------|--------------------------------|
| <b>INPUT</b>                   |                            |                |         |              |               |                                |
| $V_{IH}$                       | Logic 1 High Input Voltage | 2.4            |         |              | V             |                                |
| $V_{IL}$                       | Logic 0 Low Input Voltage  |                |         | 0.8          | V             |                                |
| $V_{IN} (Max)$                 | Input Voltage Range        | -5             |         | $V_{DD}+0.3$ | V             |                                |
| $I_{IN}$                       | Input Current              | -10            |         | 10           | $\mu A$       | $0V \leq V_{IN} \leq V_S$      |
| <b>OUTPUT</b>                  |                            |                |         |              |               |                                |
| $V_{OH}$                       | High Output Voltage        | $V_{DD}-0.025$ |         |              | V             | See Figure 1                   |
| $V_{OL}$                       | Low Output Voltage         |                |         | 0.025        | V             | See Figure 1                   |
| $R_O$                          | Output Resistance, High    |                | 3       | 5            | $\Omega$      | $I_{OUT} = 10mA, V_{DD} = 18V$ |
| $R_O$                          | Output Resistance, Low     |                | 2.3     | 5            | $\Omega$      | $I_{OUT} = 10mA, V_{DD} = 18V$ |
| <b>SWITCHING TIME (Note 1)</b> |                            |                |         |              |               |                                |
| $t_R$                          | Rise Time                  |                | 32      | 60           | ns            | Figure 1, $C_L = 2500pF$       |
| $t_F$                          | Fall Time                  |                | 34      | 60           | ns            | Figure 1, $C_L = 2500pF$       |
| $t_{D1}$                       | Delay Time                 |                | 20      | 50           | ns            | Figure 1                       |
| $t_{D2}$                       | Delay Time                 |                | 20      | 50           | ns            | Figure 1                       |
| <b>POWER SUPPLY</b>            |                            |                |         |              |               |                                |
| $I_S$                          | Power Supply Current       |                | 1<br>60 | 3<br>400     | mA<br>$\mu A$ | $V_{IN} = 3V$<br>$V_{IN} = 0V$ |
| $V_{DD}$                       | Operating Input Voltage    | 4.5            |         | 18           | V             |                                |

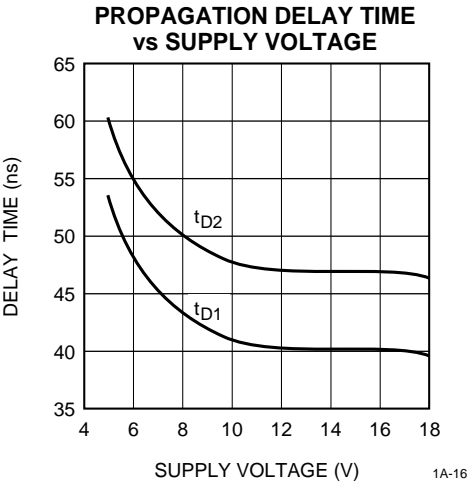
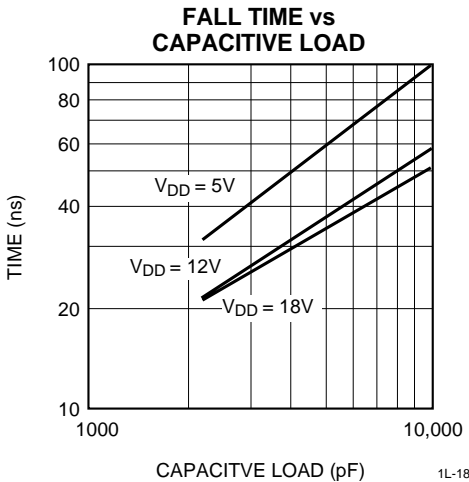
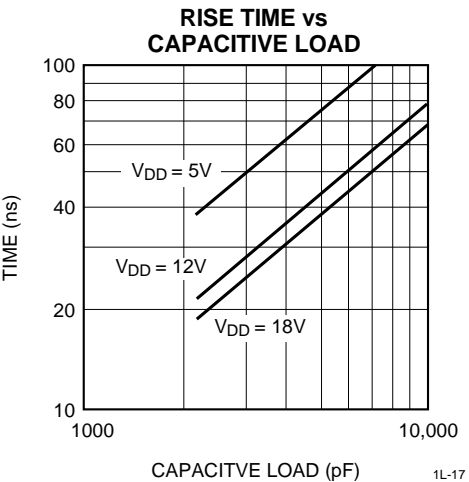
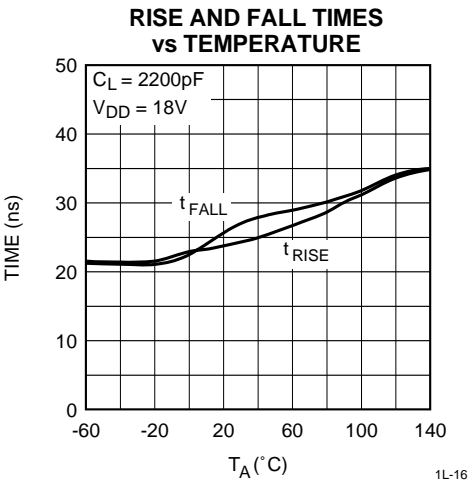
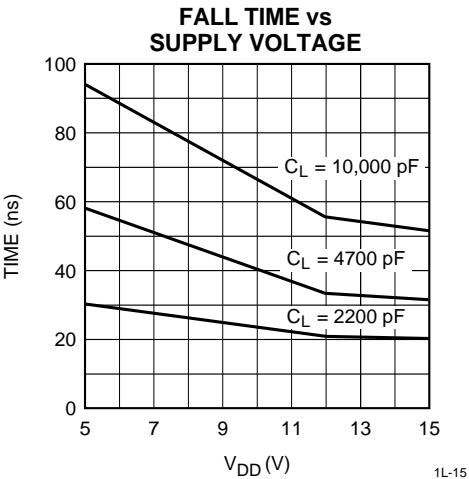
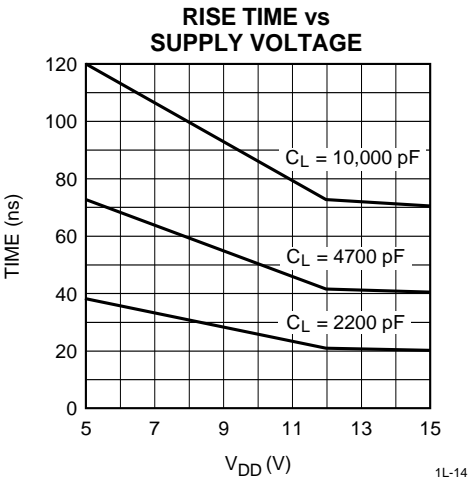
**Note:** 1. Switching times guaranteed by design.

**FIGURE 1. SWITCHING TIME TEST CIRCUIT**

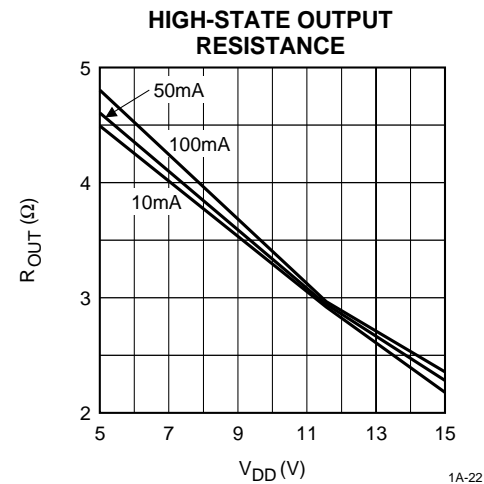
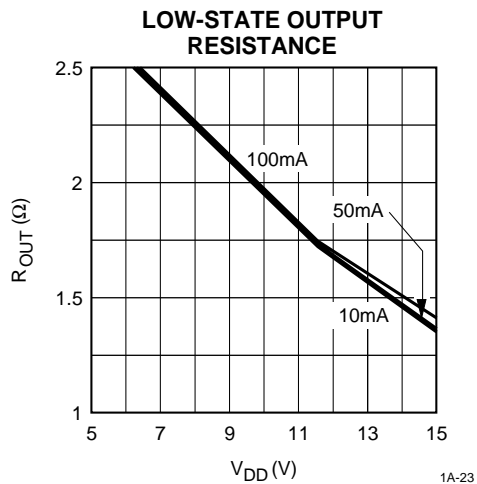
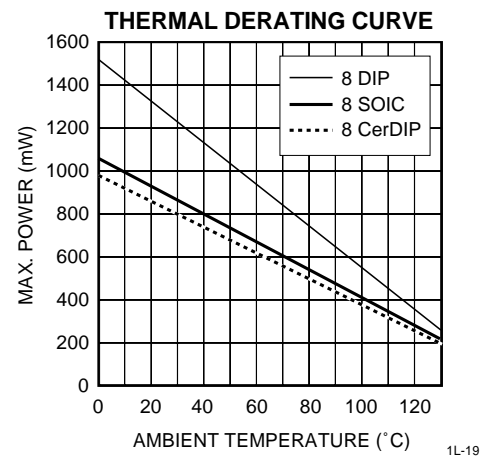
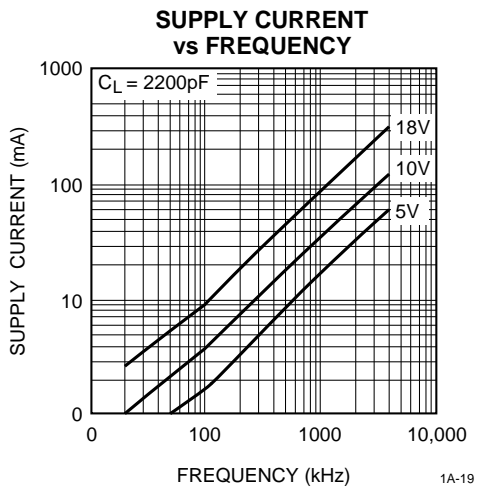
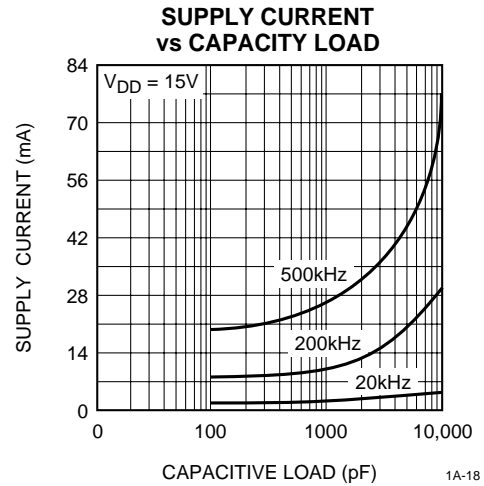
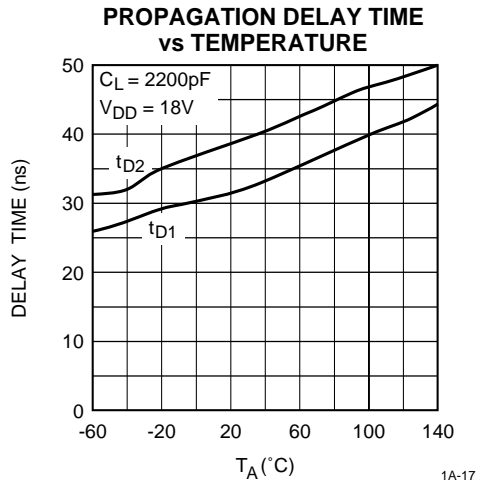


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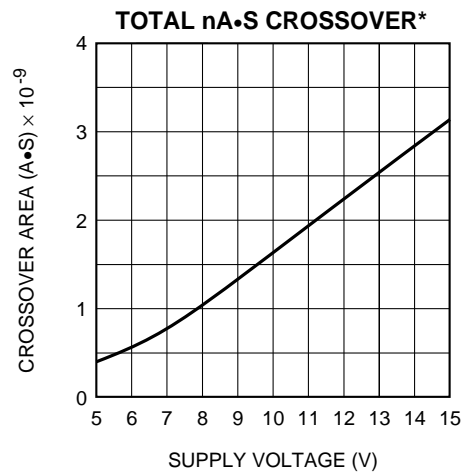
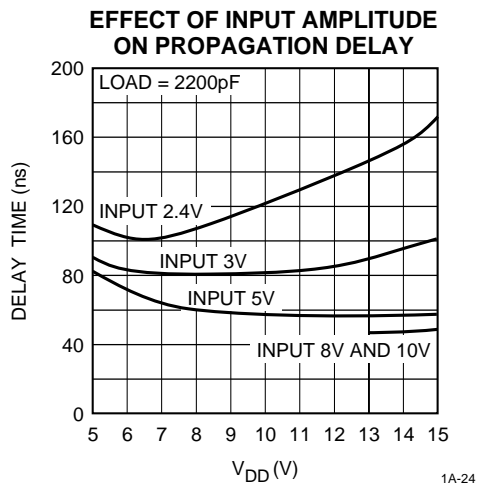
TYPICAL CHARACTERISTICS CURVES



**TYPICAL CHARACTERISTICS CURVES (Cont.)**



TYPICAL CHARACTERISTICS CURVES (Cont.)



\* The values on this graph represent the loss seen by the driver during one complete cycle. For a single transition, divide the value by 2.

