

**6A, High Speed MOSFET Drivers**

**FEATURES**

- Latch Up Protected >1.5A
- Logic Input Swing Negative 5V
- ESD 4kV
- Matched Rise And Fall Times 20ns
- Reverse Output Current
- High Peak Output Current..... 6A Peak
- Wide Operating Range..... 4.5V to 18V
- High Capacitive Load Drive..... 10,000pF
- Short Delay Time..... 20ns Typ
- Logic High Input, Any Voltage..... 2.4V to  $V_{DD}$
- Low Supply Current With Logic..... "1" Input 450 $\mu$ A
- Output Voltage Swing to Within 25mV of Ground or  $V_{DD}$
- Pin Out Same as AS429

**APPLICATIONS**

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

**PRODUCT DESCRIPTION**

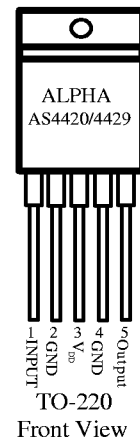
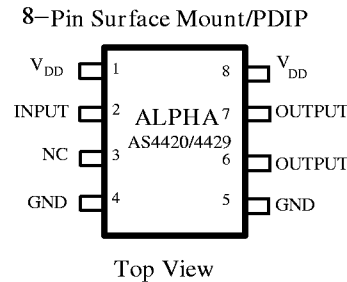
The ALPHA Semiconductor AS4420 and AS4429 family operates over 4.5V to 18V, can withstand high current peaking of 6A and have matched rise and fall times under 25ns. The product has been designed utilizing ALPHA Semiconductor's rugged CMOS process with protection for latch up and ESD. The product is available in inverting (AS4429) and noninverting (AS4420) configurations.

**ORDERING INFORMATION**

| Part Number | Package Type | Logic        |
|-------------|--------------|--------------|
| AS4420XS    | 8-Pin SOIC   | Noninverting |
| AS4420XU    | 5-Pin TO-220 | Noninverting |
| AS4420XP    | 8-Pin PDIP   | Noninverting |
| AS4429XS    | 8-Pin SOIC   | Inverting    |
| AS4429XU    | 5-Pin TO-220 | Inverting    |
| AS4429XP    | 8-Pin PDIP   | Inverting    |

X= I Industrial; C Commercial; M Military

**PIN CONNECTIONS**



## ABSOLUTE MAXIMUM RATINGS

|  |                  |
|--|------------------|
| Supply Voltage.....                      | +20V             |
| Input Voltage.....                       | -5V to $>V_{DD}$ |
| Input Current ( $V_{IN} > V_{DD}$ )..... | 50mA             |
| Power Dissipation, $T_A \leq 25^\circ$   |                  |
| PDIP .....                               | 1W               |
| SOIC .....                               | 500mW            |
| 5-Pin TO-220 .....                       | 1.5W             |
| Power Dissipation, $T_C \leq 25^\circ C$ |                  |
| 5-Pin TO-220 .....                       | 12.5W            |
| Derating Factors (To Ambient)            |                  |
| PDIP .....                               | 8mW/ $^\circ C$  |
| SOIC .....                               | 4mW/ $^\circ C$  |
| 5-Pin TO-220 .....                       | 12mW/ $^\circ C$ |

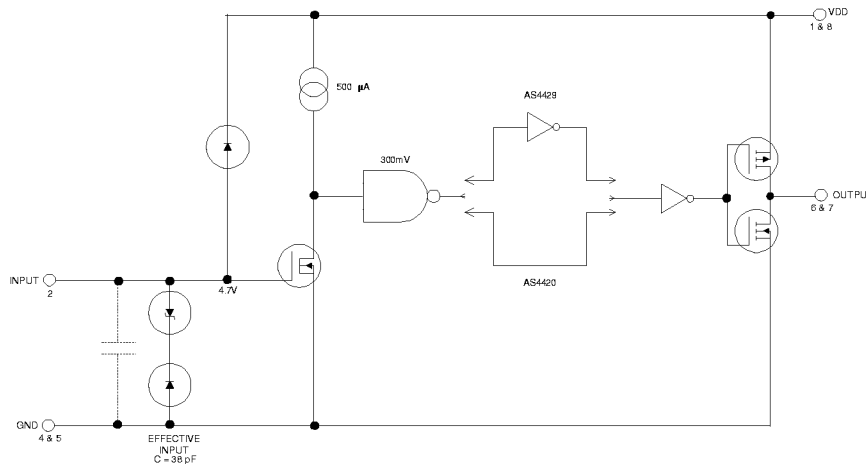
## Thermal Impedances (To Case)

|   |                                   |
|---|-----------------------------------|
| 5-Pin TO-220 $R_{\theta J-A}$ .....       | 10 $^\circ C/W$                   |
| Storage Temperature Range.....            | -55 $^\circ C$ to +150 $^\circ C$ |
| Operating Temperature (Chip) .....        | +150 $^\circ C$                   |
| Operating Temperature Range (Ambient)     |                                   |
| C Version .....                           | 0 $^\circ C$ to +70 $^\circ C$    |
| I Version .....                           | -40 $^\circ C$ to +85 $^\circ C$  |
| Lead Temperature (Soldering, 10 sec)..... | +300 $^\circ C$                   |

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

| Parameter                                     | Conditions                                 | Min            | Typ     | Max          | Units         |
|---|--|----------------|---------|--------------|---------------|
| <b>INPUT</b>                                  |  |                |         |              |               |
| Logic 1 High Input Voltage                    |  | 2.4            | 1.8     |              | V             |
| Logic 0 Low Input Voltage                     |  |                | 1.3     | 0.8          | V             |
| Input Voltage Range                           |  | -5             |         | $V_{DD}+0.3$ |               |
| Input Current                                 | $0V \leq V_{IN} \leq V_{DD}$               | -10            |         | 10           | $\mu A$       |
| <b>OUTPUT</b>                                 |  |                |         |              |               |
| High Output Voltage                           | See Figure 1                               | $V_{DD}-0.025$ |         |              | V             |
| Low Output Voltage                            | See Figure 1                               |                |         | .025         | V             |
| Output Resistance, High                       | $I_{OUT} = 10mA, V_{DD} = 18V$             |                | 2.1     | 2.8          | $\Omega$      |
| Output Resistance, Low                        | $I_{OUT} = 10mA, V_{DD} = 18V$             |                | 1.5     | 2.5          | $\Omega$      |
| Peak Output Current                           | $V_{DD} = 18V$ (See Figure 5)              |                | 6       |              | A             |
| Latch-Up Protection Withstand Reverse Current | Duty Cycle $\leq 2\%$<br>$t \leq 300\mu A$ | $>1.5$         |         |              | A             |
| <b>SWITCHING TIME (Note 1)</b>                |  |                |         |              |               |
| Rise Time                                     | Figure 1, $C_L = 2500pF$                   |                | 25      | 35           | ns            |
| Fall Time                                     | Figure 1, $C_L = 2500pF$                   |                | 25      | 35           | ns            |
| Delay Time                                    | Figure 1                                   |                | 20      | 40           | ns            |
| Delay Time                                    | Figure 1                                   |                | 20      | 40           | ns            |
| <b>POWER SUPPLY</b>                           |  |                |         |              |               |
| Power Supply Current                          | $V_{IN} = 3V$<br>$V_{IN} = 0V$             |                | 1<br>55 | 1.5<br>150   | mA<br>$\mu A$ |
| Operating Input Voltage                       |  | 4.5            |         | 18           | V             |

## BLOCK DIAGRAM



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

| Parameter                      | Conditions                     | Min            | Typ     | Max          | Units         |
|--------------------------------|--------------------------------|----------------|---------|--------------|---------------|
| <b>INPUT</b>                   |                                |                |         |              |               |
| Logic 1 High Input Voltage     |                                | 2.4            |         |              | V             |
| Logic 0 Low Input Voltage      |                                |                |         | 0.8          | V             |
| Input Voltage Range            |                                | -5             |         | $V_{DD}+0.3$ | V             |
| Input Current                  | $0V \leq V_{IN} \leq V_S$      | -10            |         | 10           | $\mu A$       |
| <b>OUTPUT</b>                  |                                |                |         |              |               |
| High Output Voltage            | See Figure 1                   | $V_{DD}-0.025$ |         |              | V             |
| Low Output Voltage             | See Figure 1                   |                |         | .025         | V             |
| Output Resistance, High        | $I_{OUT} = 10mA, V_{DD} = 18V$ |                | 3       | 5            | $\Omega$      |
| Output Resistance, Low         | $I_{OUT} = 10mA, V_{DD} = 18V$ |                | 2.3     | 5            | $\Omega$      |
| <b>SWITCHING TIME (Note 1)</b> |                                |                |         |              |               |
| Rise Time                      | Figure 1, $C_L = 2500pF$       |                | 35      | 60           | ns            |
| Fall Time                      | Figure 1, $C_L = 2500pF$       |                | 34      | 60           | ns            |
| Delay Time                     | Figure 1                       |                | 20      | 50           | ns            |
| Delay Time                     | Figure 1                       |                | 20      | 50           | ns            |
| <b>POWER SUPPLY</b>            |                                |                |         |              |               |
| Power Supply Current           | $V_{IN} = 3V$<br>$V_{in} = 0V$ |                | 1<br>60 | 3<br>400     | mA<br>$\mu A$ |
| Operating Input Voltage        |                                | 4.5            |         | 18           | V             |

Note: 1. Switching times guaranteed by design.

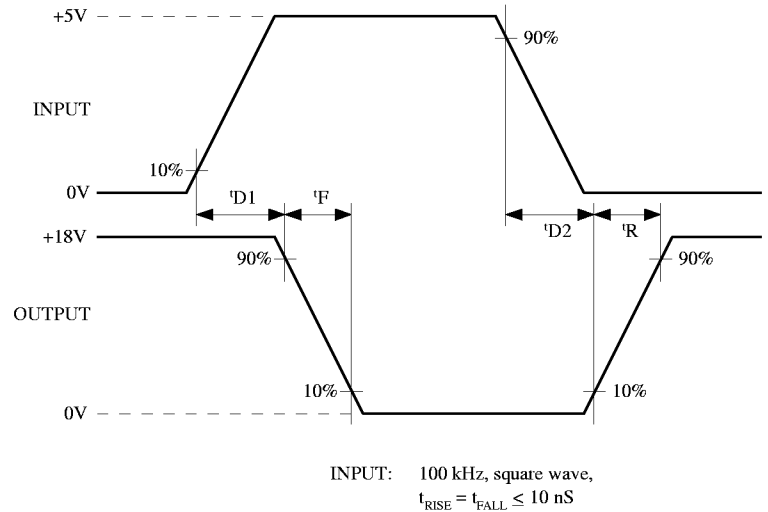
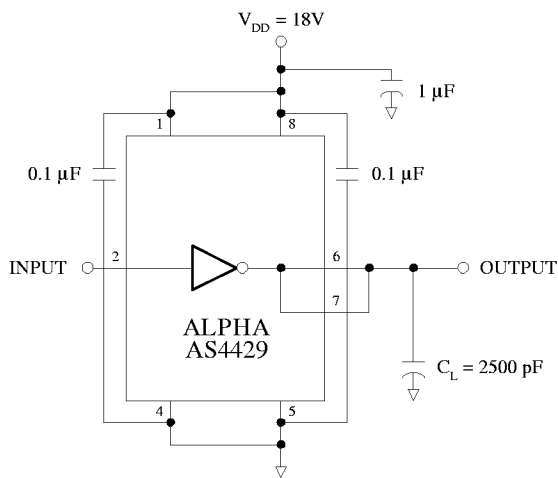
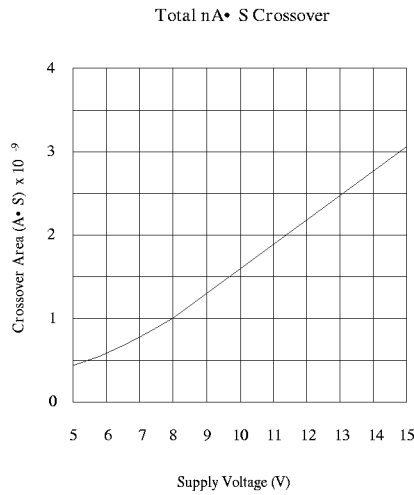
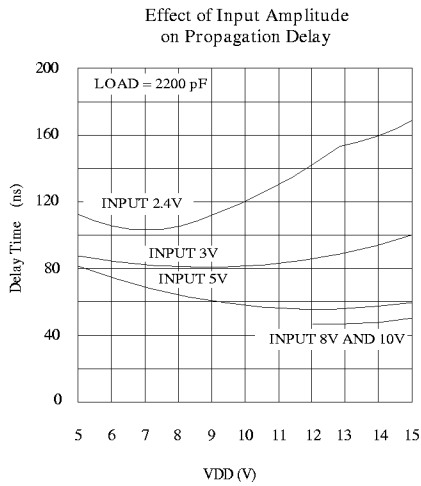
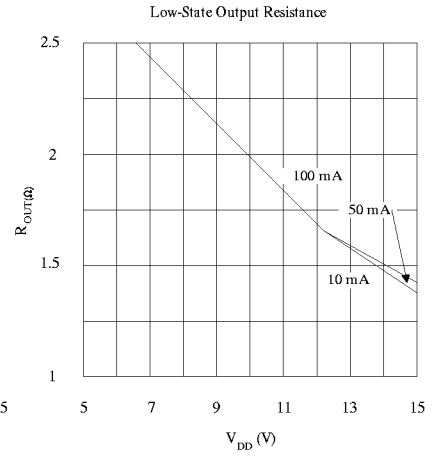
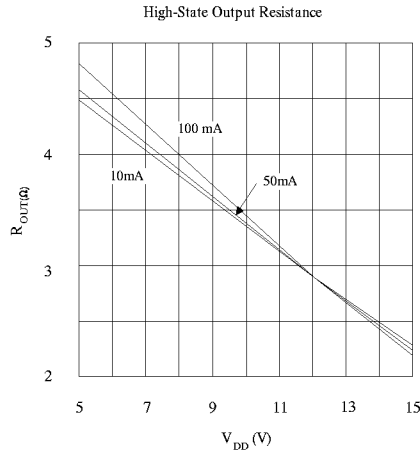
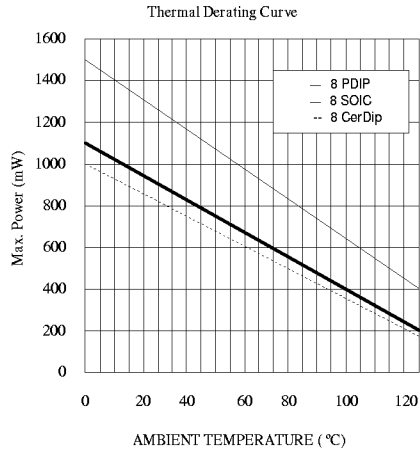
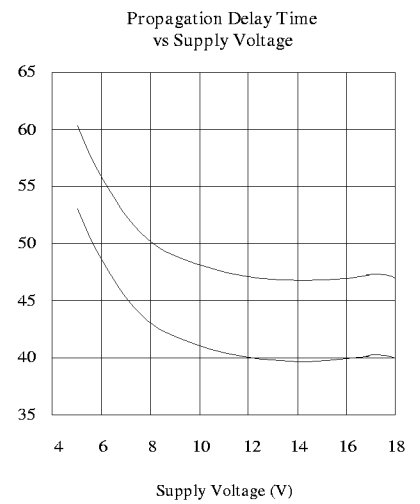
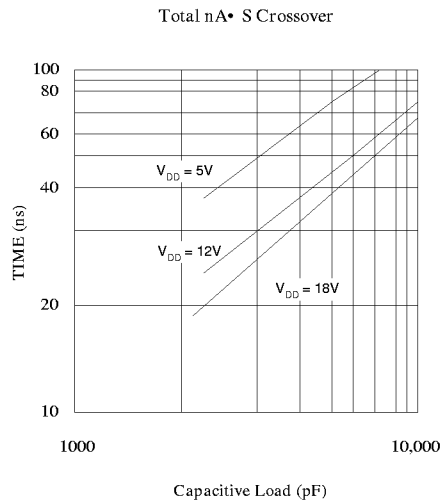
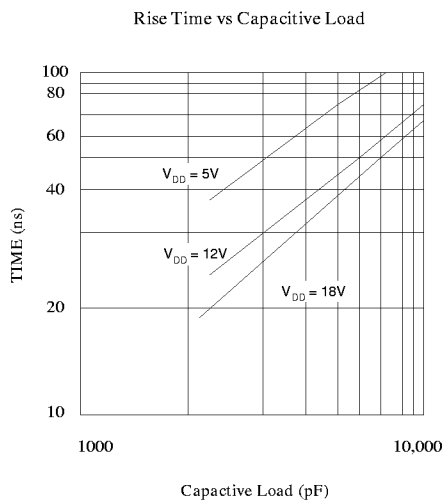
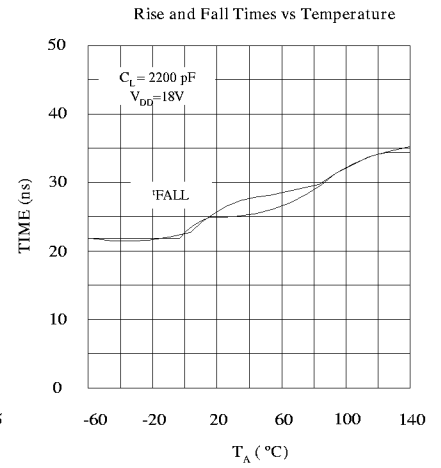
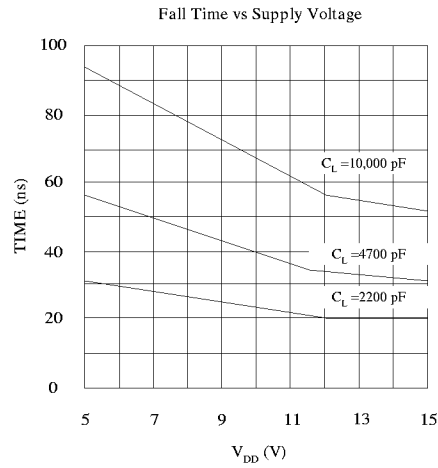
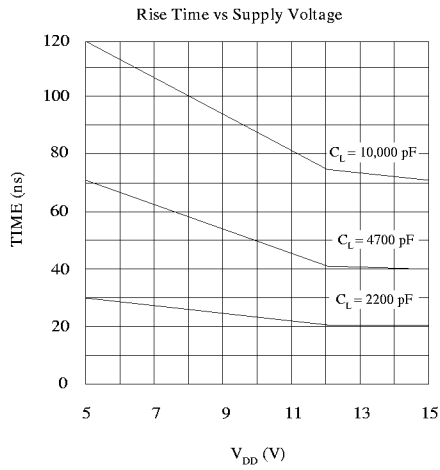


Figure 1. Switching Time Test Circuit

## TYPICAL CHARACTERISTICS



## TYPICAL CHARACTERISTICS (Cont.)



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