

6A High-Speed Power MOSFET Drivers

Features

- High Peak Output Current: 6A
- Wide Supply Voltage Operating Range: 4.5V to 25V
- High Capacitive Load Drive Capability 10 nF
- Short Delay Times: 44ns (typ.)
- Matched Rise/Fall Times (14ns typ.)
- Low Output Impedance: 1.0Ω (typ.)
- Low Supply Current
- Over-temperature Protection
- Under-voltage Lockout (UVLO)
- Non-overlapped Drive Tech
- Input withstands negative inputs up to 5V
- Available in Green SOP8, DIP8 and DFN8 Packages

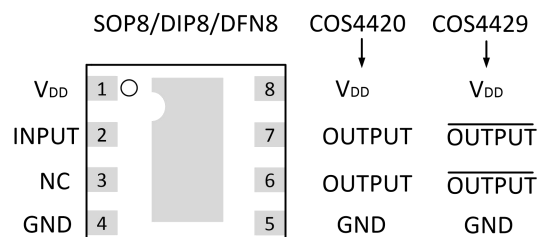
Applications

- Switch Mode Power Supplies
- Power MOSFET Drivers
- Pulse Transformer Drivers
- Line Drivers
- CCD Driver
- Class D Switching Amplifiers

General Description

The COS4420/4429 are single-output power MOSFET drivers. Unique circuit design enables high speed operation capable of delivering peak currents of 6A into 10,000pF capacitive loads. Improved speed and drive capability are enhanced by matched rise and fall delay times. Dynamic switching losses are minimized with non-overlapped drive techniques. These devices are highly latch-up resistant within their power and voltage ratings. They are not subject to damage when up to 5V of noise spiking (of either polarity) occurs on the ground pin.

The COS4420/4429 inputs can be driven directly from either TTL or CMOS (1.6V to 25V). In addition, the 300 mV of built-in hysteresis provides noise immunity and allows the device to be driven from slow rising or falling waveforms. Output is held LOW if Input is unbiased or floating.

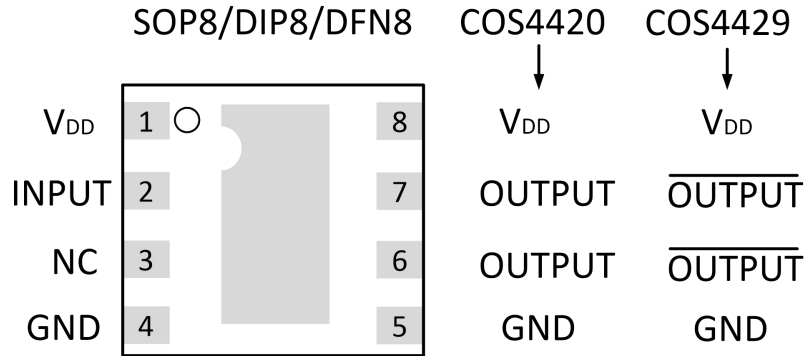


Pin Diagram

Rev1.0

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1. Pin Configuration and Functions



COS4420: Output in phase with input

COS4429: Output out of phase with input

Figure 1. Pin Diagram

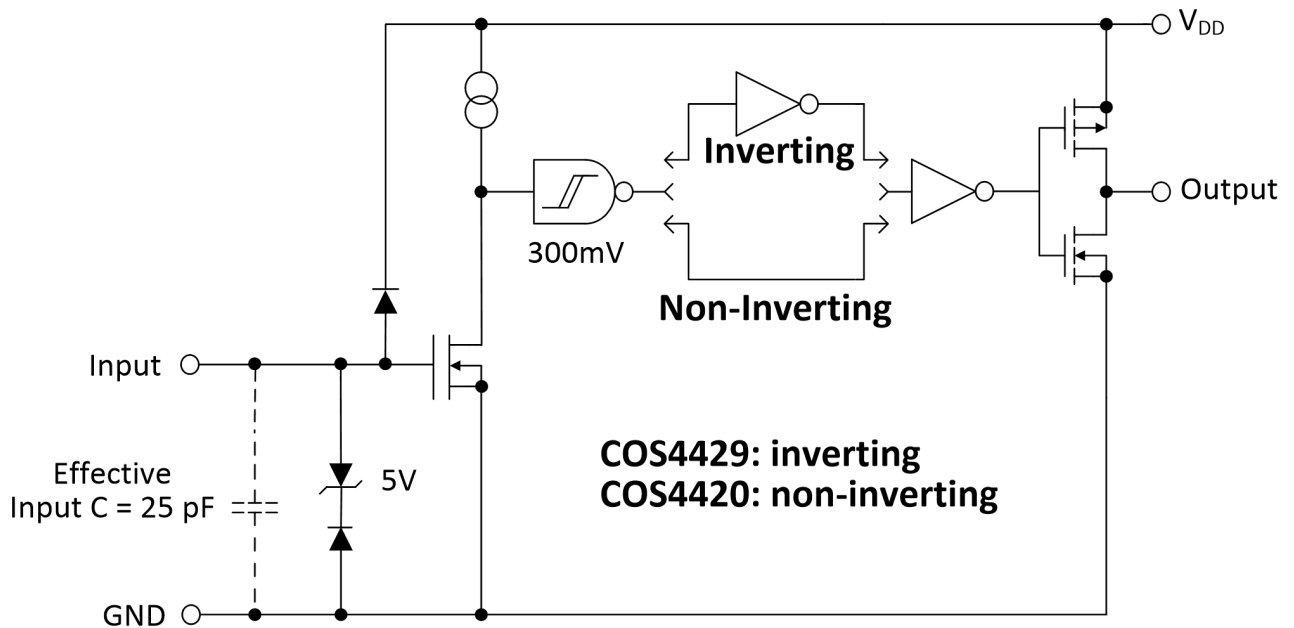


Figure 2. Functional Block Diagram

Pin Description

| Pin | Name | Description |
|-----|--------|--|
| 1 | VDD | Power Supply |
| 2 | INPUT | Control input, TTL/CMOS compatible input |
| 3 | NC | No Connection |
| 4 | GND | Ground |
| 5 | GND | Ground |
| 6 | OUTPUT | CMOS push-pull output |
| 7 | OUTPUT | CMOS push-pull output |
| 8 | VDD | Power Supply |
| - | PAD | Exposed Metal Pad, electrically isolated |

Note: Duplicate pins must both be connected for proper operation.

1.1 Input

MOSFET driver input is a high-impedance, TTL/CMOS compatible input. It also has 300 mV of hysteresis between the high and low thresholds that prevents output glitching even when the rise and fall time of the input signal is very slow.

1.2 Ground (GND)

Ground is the device return pin. The Ground pin(s) should have a low-impedance connection to the bias supply source return. High peak current flows out the Ground pin(s) when the capacitive load is being discharged.

1.3 Output

MOSFET driver outputs are low-impedance, CMOS push-pull style outputs. The pull-down and pullup devices are of equal strength, making the rise and fall times equivalent. The Output is held LOW if Input is unbiased or floating.

1.4 Supply Input (VDD)

The VDD input is the bias supply for the MOSFET driver and is rated for 4.5V to 25V with respect to the Ground pin. The VDD input should be bypassed with local ceramic capacitors. The value of these capacitors should be chosen based on the capacitive load that is being driven. A value of 1.0 μ F is suggested.

1.5 Exposed Metal Pad

The exposed metal pad of the DFN-S package is not internally connected to any potential. Therefore, this pad can be connected to a ground plane or other copper plane on a Printed Circuit Board (PCB), to aid in heat removal from the package.

2. Ordering Information

| Model | Order Number | Package | Package Option | Marking Information |
|---------|--------------|---------|---------------------|---------------------|
| COS4420 | COS4420SR | SOP-8 | Tape and Reel, 3000 | COS4420SR |
| | COS4420FR | DFN-8 | Tape and Reel, 3000 | COS4420FR |
| | COS4420DR | DIP-8 | Tube 50 | COS4420DR |
| COS4429 | COS4429SR | SOP-8 | Tape and Reel, 3000 | COS4429SR |
| | COS4429FR | DFN-8 | Tape and Reel, 3000 | COS4429FR |
| | COS4429DR | DIP-8 | Tube 50 | COS4429DR |

3. Product Specification

3.1 Absolute Maximum Ratings ⁽¹⁾

| Parameter | Min | Max | Unit |
|--------------------------------|-------|---------|------|
| DC supply voltage V_{DD} | | 28 | V |
| Operating junction temperature | -40 | +125 | °C |
| Storage temperature | -55 | +150 | °C |
| Maximum input voltage | GND-5 | VDD+0.3 | V |

(1) Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

3.2 Thermal Data

| Parameter | Rating | Unit |
|----------------------------|---|------|
| Package Thermal Resistance | 155(SOP8) 125(DIP8) 118(FDN8,2x2) | °C/W |

3.3 Recommended Operating Conditions

| Parameter | Rating | Unit |
|-------------------------------|-------------|------|
| DC Supply Voltage | 4.5V ~ 25V | V |
| Operating ambient temperature | -40 to +125 | °C |

3.4 Electrical Characteristics

(Typical values are tested at $T_A=25\text{ }^\circ\text{C}$, $V_{DD}=18\text{V}$)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|------------------------------------|-----------|--|------------------|------|-------|---------------|
| INPUT | | | | | | |
| Input Signal High Threshold | V_{IH} | | 1.6 | | | V |
| Input Signal Low Threshold | V_{IL} | | | | 0.7 | V |
| Input Signal Hysteresis | V_{HYS} | | | 0.3 | | V |
| Input Signal High Current | I_{IH} | Inverting Input Current, $V_{INX}=18\text{V}$ | | | 0.01 | μA |
| | | Non-inverting Input Current, $V_{INX}=18\text{V}$ | | 88 | 125 | |
| Input Signal High Current | I_{IL} | Inverting Input Current, $V_{INX}=0\text{V}$ | | 88 | 125 | μA |
| | | Non-inverting Input Current, $V_{INX}=0\text{V}$ | | | 0.01 | |
| OUTPUT | | | | | | |
| High Output Voltage V_{OH} | V_{OH} | DC Test | $V_{DD} - 0.025$ | | | V |
| Low Output Voltage | V_{OL} | DC Test | | | 0.025 | V |
| Pull-Up Resistance | R_{OH} | Source Current = 10mA | | 1.25 | | Ω |
| Pull-Down Resistance | R_{OL} | Sink Current = -10mA | | 0.75 | | Ω |
| Peak Output Current | I_{PK} | $10\text{V} \leq V_{DD} \leq 18\text{V}$ | | 6.0 | | A |
| POWER SUPPLY | | | | | | |
| Power Supply Current | I_{CC} | $V_{IN}=3\text{V}$ | | 0.85 | | mA |
| | | $V_{IN}=0\text{V}$ | | 0.65 | | |
| Operating Voltage Range | V_{DD} | | 4.5 | | 25 | V |
| Under-Voltage Lockout ON Threshold | | | | 3.7 | 4.1 | V |
| Under-Voltage Lockout Hysteresis | | | | 0.5 | | V |
| SWITCHING CHARACTERISTICS | | | | | | |
| Rise Time | t_R | $C_L = 2500\text{pF}$, See Figure 3 | | 14 | | ns |
| Fall Time | t_F | $C_L = 2500\text{pF}$, See Figure 3 | | 14 | | ns |

| | | | | |
|---------------------------------------|----------|---------|-----|----|
| Turn-On Delay Time | t_{D1} | COS4420 | 42 | ns |
| | | COS4429 | 44 | ns |
| Turn-Off Delay Time | t_{D2} | COS4420 | 45 | ns |
| | | COS4429 | 44 | ns |
| OVER-TEMPERATURE PROTECTION | | | | |
| Thermal Shutdown Threshold | | | 150 | °C |
| Thermal Shutdown Threshold Hysteresis | | | 25 | °C |

4. Application Information

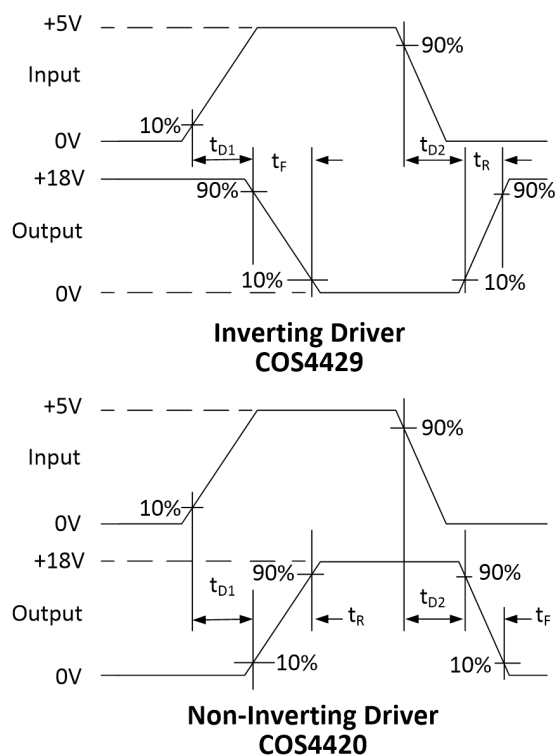
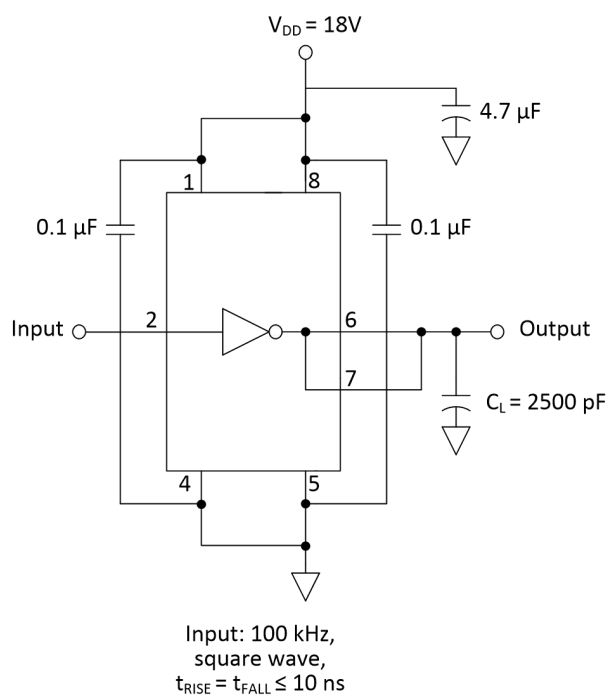
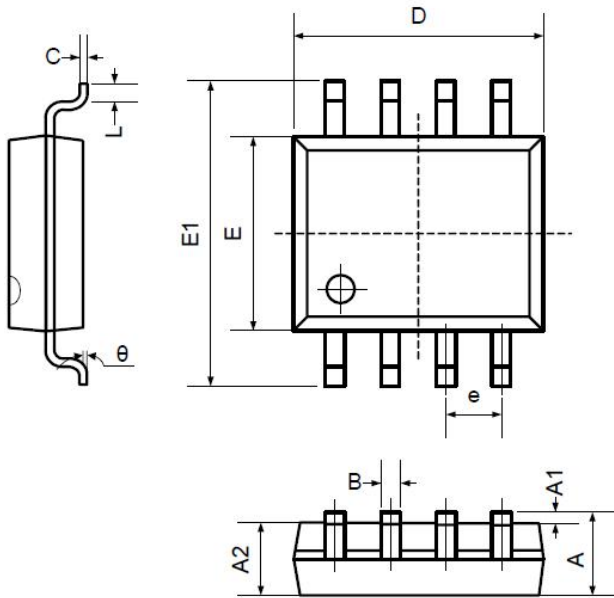


Figure 3. Switching Time Test Circuit

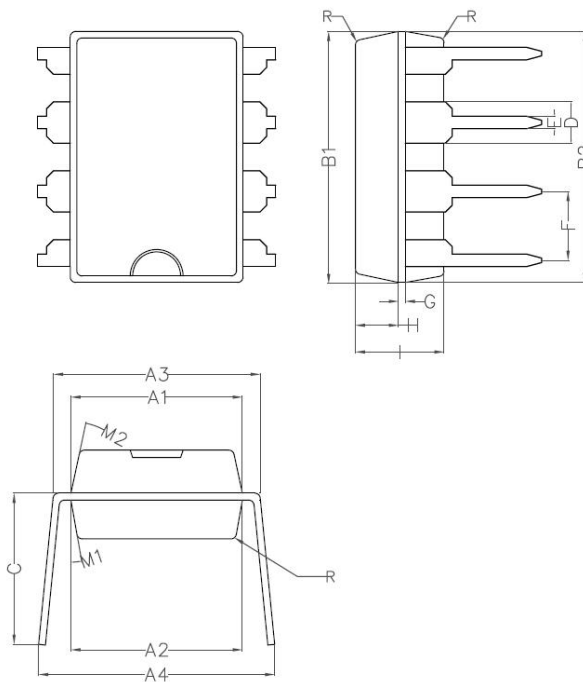
5. Package Information

5.1 SOP8 (Package Outline Dimensions)



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 1.350 | 1.750 | 0.053 | 0.069 |
| A1 | 0.100 | 0.250 | 0.004 | 0.010 |
| A2 | 1.350 | 1.550 | 0.053 | 0.061 |
| B | 0.330 | 0.510 | 0.013 | 0.020 |
| C | 0.190 | 0.250 | 0.007 | 0.010 |
| D | 4.780 | 5.000 | 0.188 | 0.197 |
| E | 3.800 | 4.000 | 0.150 | 0.157 |
| E1 | 5.800 | 6.300 | 0.228 | 0.248 |
| e | 1.270TYP | | 0.050TYP | |
| L | 0.400 | 1.270 | 0.016 | 0.050 |
| θ | 0° | 8° | 0° | 8° |

5.2 DIP8 (Package Outline Dimensions)



| Symbol | Min | Non | Max |
|--------|------|------|------|
| A1 | 6.28 | 6.33 | 6.38 |
| A2 | 6.33 | 6.38 | 6.43 |
| A3 | 7.52 | 7.62 | 7.72 |
| A4 | 7.80 | 8.40 | 9.00 |
| B1 | 9.15 | 9.20 | 9.25 |
| B2 | 9.20 | 9.25 | 9.30 |
| C | | 5.57 | |
| D | | 1.52 | |
| E | 0.43 | 0.45 | 0.47 |
| F | | 2.54 | |
| G | | 0.25 | |
| H | 1.54 | 1.59 | 1.64 |
| I | 3.22 | 3.27 | 3.32 |
| R | | 0.20 | |
| M1 | 9° | 10° | 11° |
| M2 | 11° | 12° | 13° |