

# 1.5A Single-Channel High-Speed Power MOSFET Driver

## Features

- High Peak Output Current: 1.5A
- Wide Supply Voltage Operating Range: 4.5V to 25V
- High Capacitive Load Drive Capability 1000pF in 11ns (typical)
- Short Delay Times: 35ns (typical)
- Matched Rise/Fall Times
- Low Output Impedance
- Low Supply Current
- Over-temperature Protection
- Under-voltage Lockout
- Non-overlapped Drive Tech
- ESD Protected: 2.0kV
- Input withstands negative inputs up to 5V
- Available in Small SOT23-5 Package

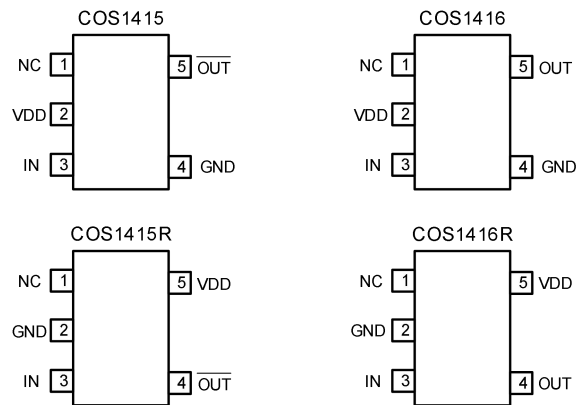
## Applications

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

## General Description

The COS1415 and COS1416 are single channel power MOSFET drivers. Unique circuit design enables high speed operation capable of delivering peak currents of 1.5A into 1000pF capacitive loads. Improved speed and drive capability are enhanced by matched rise and fall delay times. These matched delays maintain the integrity of input-to-output pulse-widths to reduce timing errors and clock skew problems. 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.

## Pin Configuration



SOT23-5

Rev1.0  
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## 1. Pin Configuration and Functions

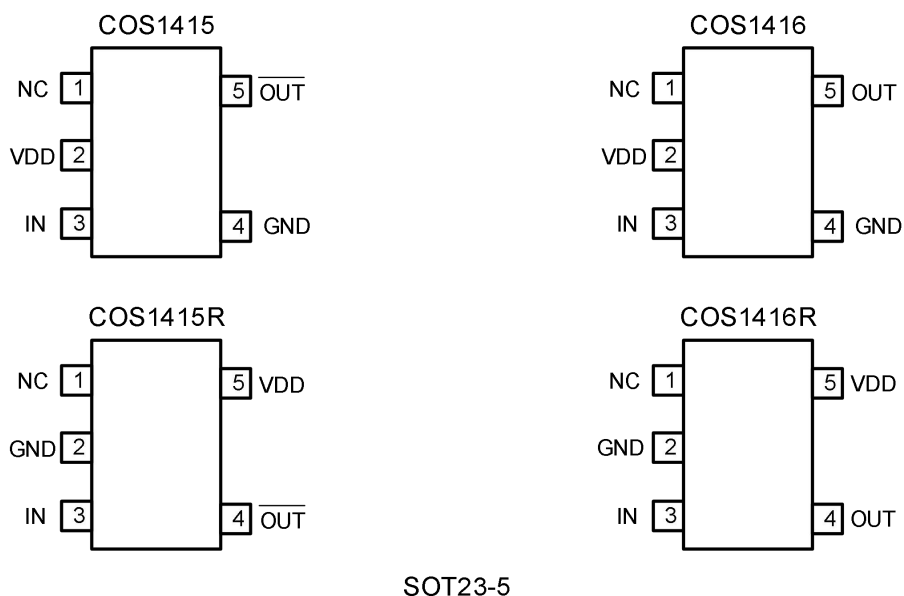


Figure 1. Pin Diagram

### Pin Description

Pin No.		Pin Name	Description
COS1415/16	COS1415R/16R		
1	1	NC	No connection
2	5	VDD	Power Supply
3	3	IN	Control Input
4	2	GND	Ground
5	4	$\overline{\text{OUT}}/\text{OUT}$	Output

### 1.1 Input (IN)

MOSFET driver input is a high-impedance, TTL/CMOS compatible input. The input 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 (OUT)

MOSFET driver output is a low-impedance, CMOS push-pull style output. The pull-down and pull-up devices are of equal strength, making the rise and fall times equivalent.

### 1.4 Supply Input (V<sub>DD</sub>)

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 μF is suggested.

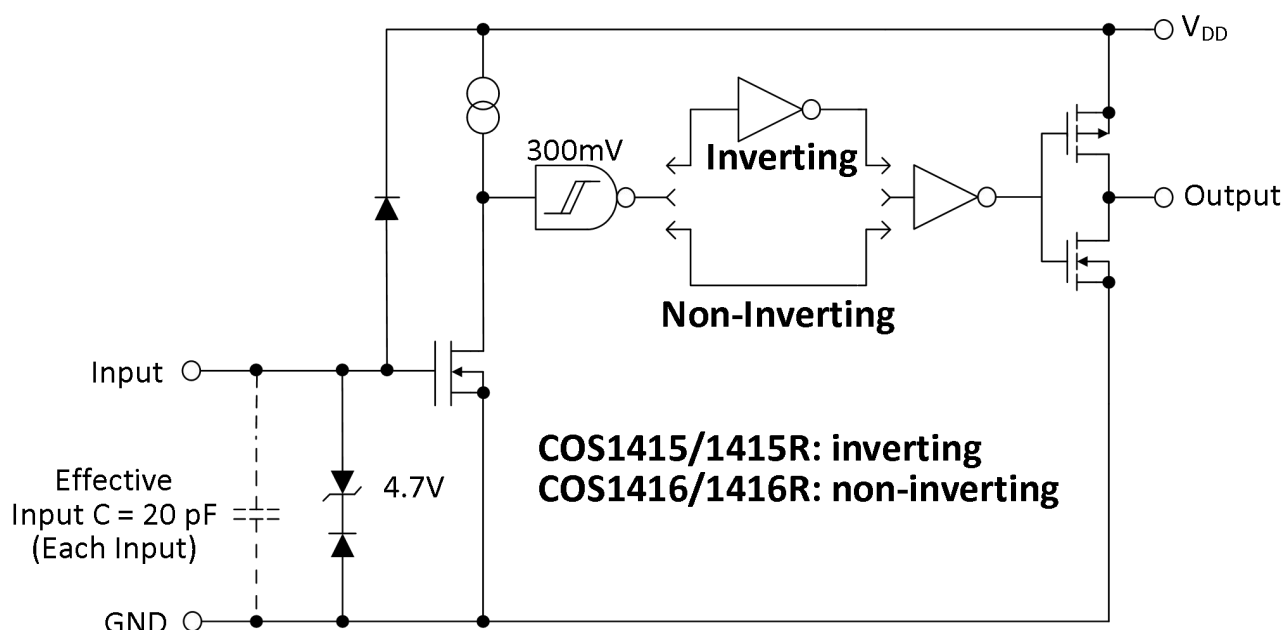


Figure 2. Functional Block Diagram

Function Table

	COS1415/1415R	COS1416/1416R
IN	$\overline{\text{OUT}}$	OUT
L	H	L
H	L	H

## 2. Product Specification

### 2.1 Absolute Maximum Ratings <sup>(1)</sup>

Parameter	Min	Max	Unit
DC supply voltage $V_s$		26	V
Operating junction temperature	-40	125	°C
Storage temperature	-55	150	°C
Maximum input voltage	GND-5	$V_{DD}+0.3$	V
Peak output current		2	A

(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.

### 2.2 Thermal Data

Parameter	Rating	Unit
Package Thermal Resistance	190 (SOT23-5)	°C/W

### 2.3 Recommended Operating Conditions

Parameter	Rating	Unit
DC Supply Voltage	4.5V ~ 25V	V
Operating ambient temperature	-40 to +85	°C

### 2.4 Electrical Characteristics

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>INPUT</b>						
Input Signal High Threshold	$V_{IH}$		1.8			V
Input Signal Low Threshold	$V_{IL}$				0.7	V
Input Signal Hysteresis	$V_{HYS}$			0.3		V
Input Current	$I_{IN}$	$0\text{V} \leq V_{IN} \leq V_{DD}$			±1	μA

<b>OUTPUT</b>						
Pull-Up Resistance	$R_{OH}$	Source Current = 10mA		2.0		$\Omega$
Pull-Down Resistance	$R_{OL}$	Sink Current = -10mA		2.0		$\Omega$
Peak Output Current	$I_{PK}$	Source Current, f=1kHz, $C_L=1000pF$		1.5		A
		Sink Current, f=1kHz, $C_L=1000pF$		-1.5		
Continuous Output Current	$I_{DC}$	Source / Sink Current		$\pm 200$		mA
<b>POWER SUPPLY</b>						
Power Supply Current	$I_{CC}$	$V_{INA}=V_{INB}=3V$		0.6		mA
		$V_{INA}=V_{INB}=0V$		0.4		
Operating Voltage Range	$V_{DD}$		4.5		25	V
Under-Voltage Lockout ON Threshold				3.6	4	V
Under-Voltage Lockout Hysteresis				0.5		V
<b>SWITCHING CHARACTERISTICS</b>						
Rise Time	$t_R$	$C_L = 1000pF$ , See Figure 3.1		11		ns
Fall Time	$t_F$	$C_L = 1000pF$ , See Figure 3.1		11		ns
Turn-On Delay Time	$t_{D1}$	Non-inverting Input		34		ns
		Inverting Input		44		ns
Turn-Off Delay Time	$t_{D2}$	Non-inverting Input		34		ns
		Inverting Input		44		ns
<b>OVER-TEMPERATURE PROTECTION</b>						
Thermal Shutdown Threshold				150		$^{\circ}C$
Thermal Shutdown Threshold Hysteresis				25		$^{\circ}C$

### 3. Application Information

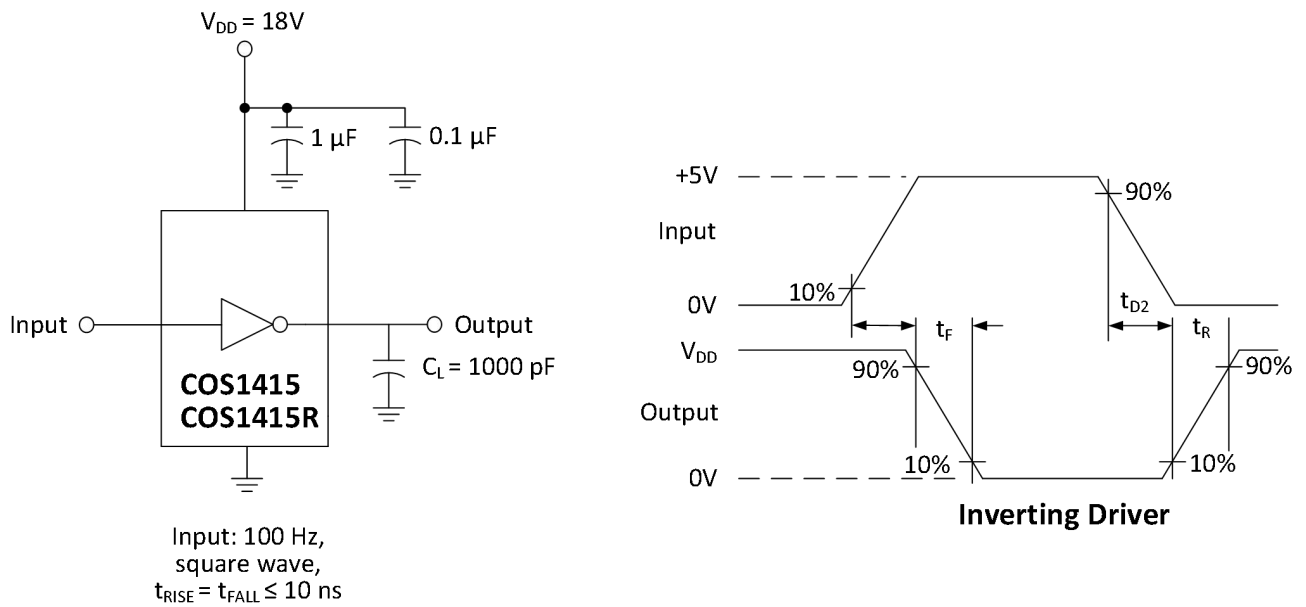


Figure 3.1 COS1415/1415R Switching Time Test Circuit

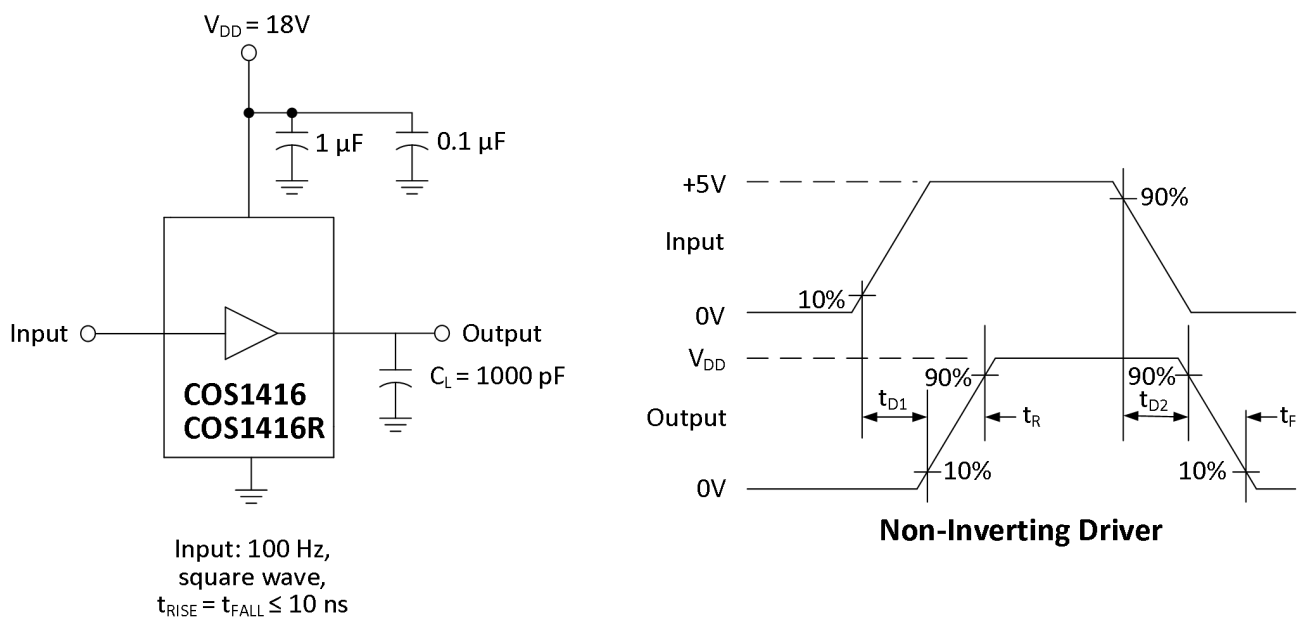


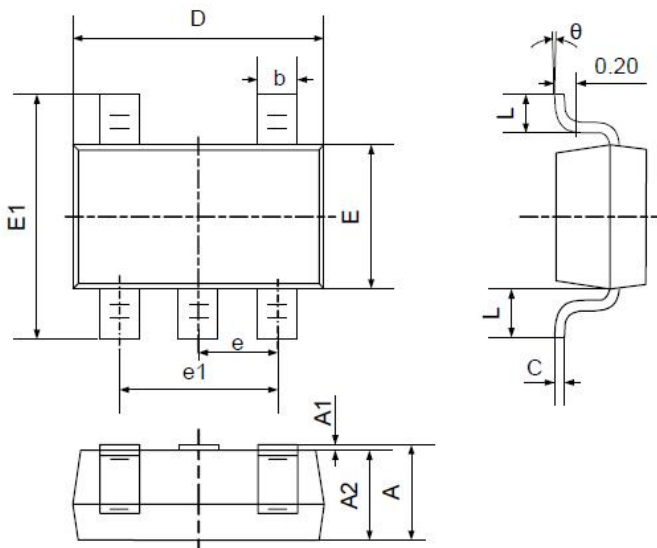
Figure 3.2 COS1416/1416R Switching Time Test Circuit

## 4. Package and Ordering Information

Model	Order Number	Package	Package Option	Marking Information
COS1415	COS1415	SOT23-5	Tape and Reel, 3000	COS1415
COS1415R	COS1415R	SOT23-5	Tape and Reel, 3000	COS1415R
COS1416	COS1416	SOT23-5	Tape and Reel, 3000	COS1416
COS1416R	COS1416R	SOT23-5	Tape and Reel, 3000	COS1416R

## 5. Package Information

### 5.1 SOT23-5 (Package Outline Dimensions)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.400	0.012	0.016
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950TYP		0.037TYP	
e1	1.800	2.000	0.071	0.079
L	0.700REF		0.028REF	
L1	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

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