

1.5A High-Speed 30V MOSFET Drivers

Features

- High Peak Output Current – 1.5A
- Wide Operating Range
 - 4.5V to 30V
- High Capacitive Load Drive Capability – 1000pF in 25nsec
- Short Delay Times – <78nsec Typ.
- Low Supply Current:
 - With Logic "1" Input – 2.5mA
 - With Logic "0" Input – 300μA
- Low Output Impedance – 7Ω
- Latch-Up Protected: Will Withstand >300mA Reverse Current
- ESD Protected – 4kV

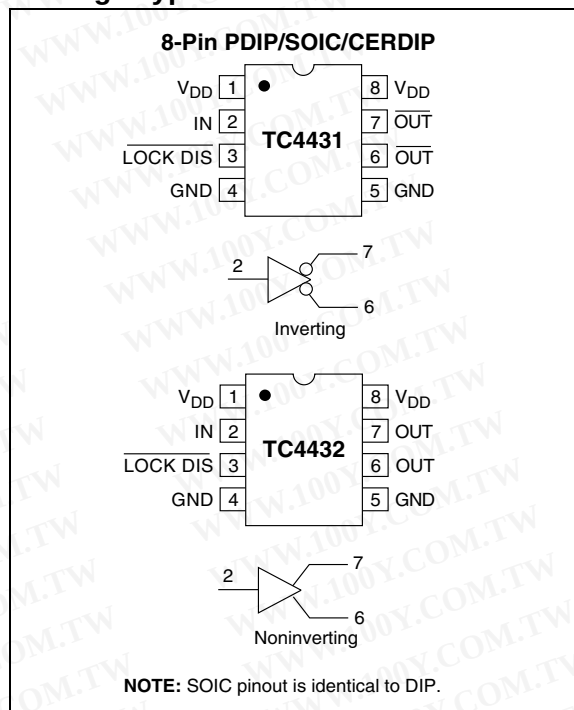
Applications

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Device Selection Table

Part Number	Package	Temp. Range
TC4431COA	8-Pin SOIC	0°C to +70°C
TC4431CPA	8-Pin PDIP	0°C to +70°C
TC4431EJA	8-Pin Cerdip	-40°C to +85°C
TC4431EOA	8-Pin SOIC	-40°C to +85°C
TC4431EPA	8-Pin PDIP	-40°C to +85°C
TC4432COA	8-Pin SOIC	0°C to +70°C
TC4432CPA	8-Pin PDIP	0°C to +70°C
TC4432EJA	8-Pin Cerdip	-40°C to +85°C
TC4432EOA	8-Pin SOIC	-40°C to +85°C
TC4432EPA	8-Pin PDIP	-40°C to +85°C

Package Type



General Description

The TC4431/TC4432 are 30V CMOS buffer/drivers suitable for use in high-side driver applications. They will not latch up under any conditions within their power and voltage ratings. They can accept, without damage or logic upset, up to 300mA of reverse current (of either polarity) being forced back into their outputs. All terminals are fully protected against up to 4kV of electrostatic discharge.

Under-voltage lockout circuitry forces the output to a "low" state when the input supply voltage drops below 7V. For operation in lower voltages, disable the lockout and start-up circuit by grounding pin 3 (LOCK DIS); for all other situations, pin 3 (LOCK DIS) should be left floating. The under-voltage lockout and start-up circuit gives brown out protection when driving MOSFETS.

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Functional Block Diagram



1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings*

Supply Voltage	36V
Input Voltage (Note 1)	$V_{DD} + 0.3V$ to GND
Package Power Dissipation ($T_A \leq 70^\circ C$)	
PDIP	730mW
CERDIP	800mW
SOIC	470mW
Package Thermal Resistance	
CERDIP $R_{\theta JA}$	150°C/W
CERDIP $R_{\theta JC}$	50°C/W
PDIP $R_{\theta JA}$	125°C/W
PDIP $R_{\theta JC}$	42°C/W
SOIC $R_{\theta JA}$	250°C/W
SOIC $R_{\theta JC}$	75°C/W
Operating Temperature Range	
C Version	0°C to +70°C
E Version	-40°C to +85°C
Storage Temperature Range	-65°C to +150°C

*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.

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TC4431/TC4432 ELECTRICAL SPECIFICATIONS

Electrical Characteristics: $T_A = +25^\circ C$, with $4.5V \leq V_{DD} \leq 30V$, unless otherwise noted..						
Symbol	Parameter	Min	Typ	Max	Units	Test Conditions
Input						
V_{IH}	Logic 1, High Input Voltage	2.4	—	—	V	
V_{IL}	Logic 0, Low Input Voltage	—	—	0.8	V	
I_{IN}	Input Current (Note 1)	-1	—	1	μA	$0V \leq V_{IN} \leq 12V$
Output						
V_{OH}	High Output Voltage	$V_{DD} - 1.0$	$V_{DD} - 0.8$	—	V	$I_{OUT} = 100mA$
V_{OL}	Low Output Voltage	—	—	0.025	V	
R_O	Output Resistance	—	7	10	Ω	$I_{OUT} = 10mA$, $V_{DD} = 30V$
I_{PK}	Peak Output Current	—	3.0	—	A	Source: $V_{DD} = 30V$ Sink: $V_{DD} = 30V$
I_{REV}	Latch-Up Protection Withstand Reverse Current	0.3	—	—	A	Duty cycle $\leq 2\%$, $t \leq 300\mu sec$
Switching Time (Note 2)						
t_R	Rise Time	—	25	40	nsec	Figure 3-1
t_F	Fall Time	—	33	50	nsec	Figure 3-1
t_{D1}	Delay Time	—	62	80	nsec	Figure 3-1
t_{D2}	Delay Time	—	78	90	nsec	Figure 3-1
Power Supply						
I_S	Power Supply Current	—	2.5	4	mA	$V_{IN} = 3V$ $V_{IN} = 0V$
V_S	Start-up Threshold	—	8.4	10	V	
V_{DO}	Drop-out Threshold	7	7.7	—	V	Note 3

- Note**
- 1: For inputs >12V, add a 1k Ω resistor in series with the input. See "Typical Characteristics" graph for input current.
 - 2: Switching times are ensured by design.
 - 3: For operation below 7V, pin 3 (LOCK DIS) should be tied to ground to disable the lockout and start-up circuit, otherwise, pin 3 **must** be left floating.

TC4431/TC4432

TC4431/TC4432 ELECTRICAL SPECIFICATIONS (CONTINUED)

Electrical Characteristics: Over operating temperature range with $4.5V \leq V_{DD} \leq 30V$, unless otherwise noted.

Symbol	Parameter	Min	Typ	Max	Units	Test Conditions
Input						
V_{IH}	Logic 1, High Input Voltage	2.4	—	—	V	
V_{IL}	Logic 0, Low Input Voltage	—	—	0.8	V	
I_{IN}	Input Current (Note 1)	-1	—	1	μA	$0V \leq V_{IN} \leq 12V$
Output						
V_{OH}	High Output Voltage	$V_{DD} - 1.2$	—	—	V	$I_{OUT} = 100mA$
V_{OL}	Low Output Voltage	—	—	0.025	V	
R_O	Output Resistance	—	—	10	Ω	$I_{OUT} = 10mA, V_{DD} = 30V$
Switching Time (Note 2)						
t_R	Rise Time	—	—	60	nsec	Figure 3-1
t_F	Fall Time	—	—	70	nsec	Figure 3-1
t_{D1}	Delay Time	—	—	100	nsec	Figure 3-1
t_{D2}	Delay Time	—	—	110	nsec	Figure 3-1
Power Supply						
I_S	Power Supply Current	—	—	6 0.7	mA	$V_{IN} = 3V$ $V_{IN} = 0V$
V_S	Start-up Threshold	—	8.4	10	V	
V_{DO}	Drop-out Threshold	7	7.7	—	V	Note 3

- Note** 1: For inputs >12V, add a 1k Ω resistor in series with the input. See "Typical Characteristics" graph for input current.
 2: Switching times are ensured by design.
 3: For operation below 7V, pin 3 (LOCK DIS) should be tied to ground to disable the lockout and start-up circuit, otherwise, pin 3 **must** be left floating.

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2.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in Table 2-1.

TABLE 2-1: PIN FUNCTION TABLE

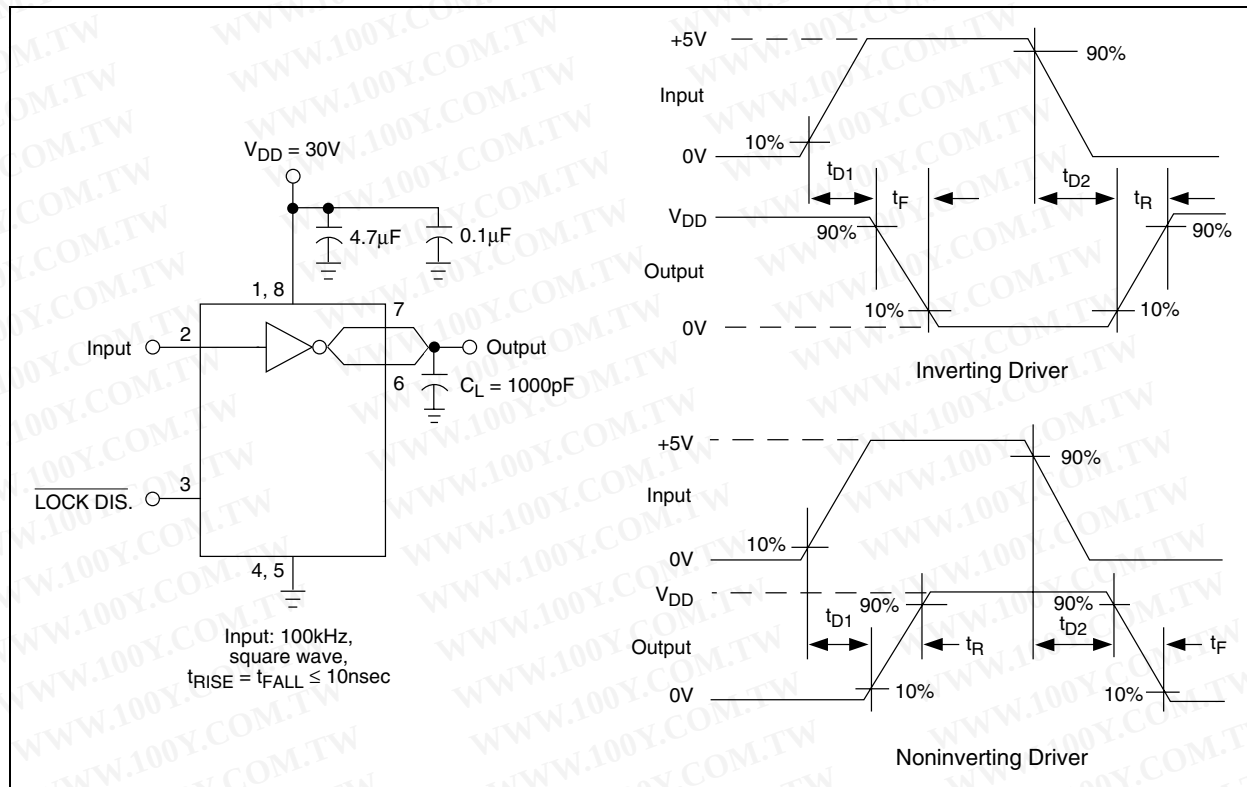
Pin No. (8-Pin PDIP, SOIC, CERDIP)	Symbol	Description
1	V_{DD}	
2	IN	
3	$\overline{\text{LOCK DIS}}$	
4	GND	Ground.
5	GND	Ground.
6	OUT	
7	OUT	
8	V_{DD}	

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TC4431/TC4432

3.0 APPLICATIONS INFORMATION

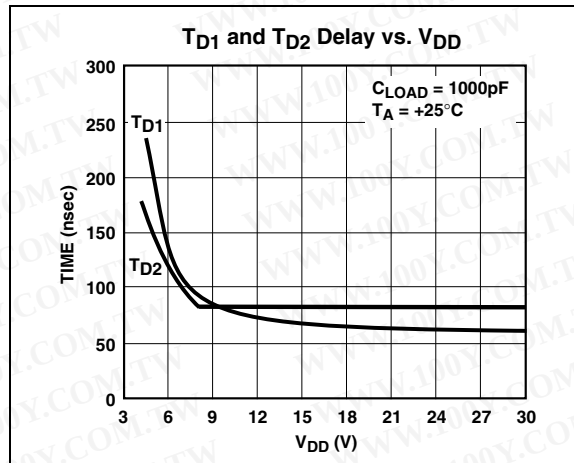
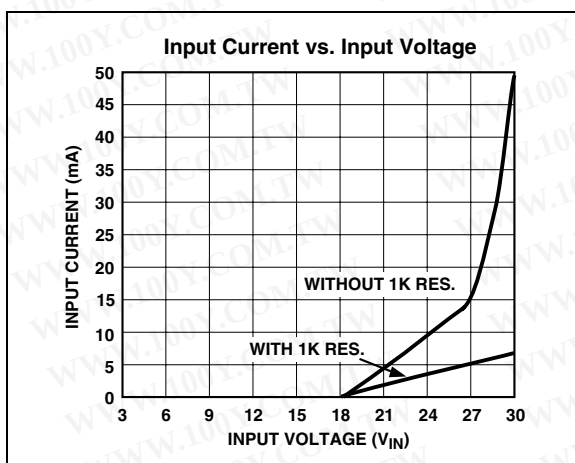
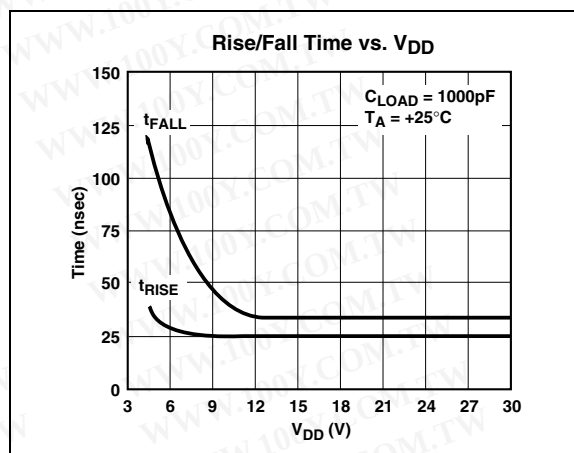
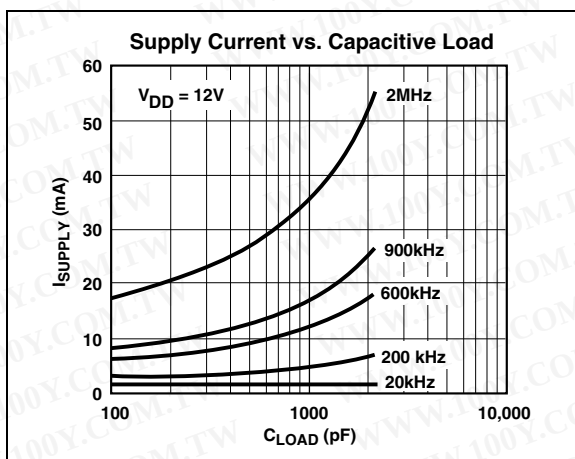
FIGURE 3-1: SWITCHING TIME TEST CIRCUIT



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4.0 TYPICAL CHARACTERISTICS

Note: The graphs and tables provided following this note are a statistical summary based on a limited number of samples and are provided for informational purposes only. The performance characteristics listed herein are not tested or guaranteed. In some graphs or tables, the data presented may be outside the specified operating range (e.g., outside specified power supply range) and therefore outside the warranted range.



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TC4431/TC4432

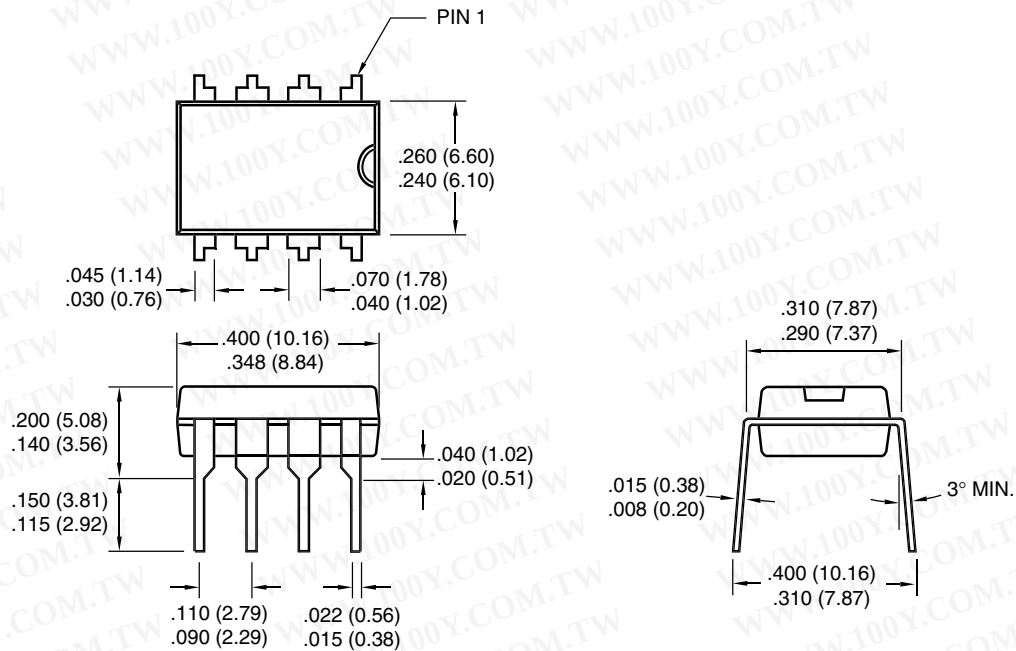
5.0 PACKAGING INFORMATION

Package marking data not available at this time.

5.1 Package Dimensions

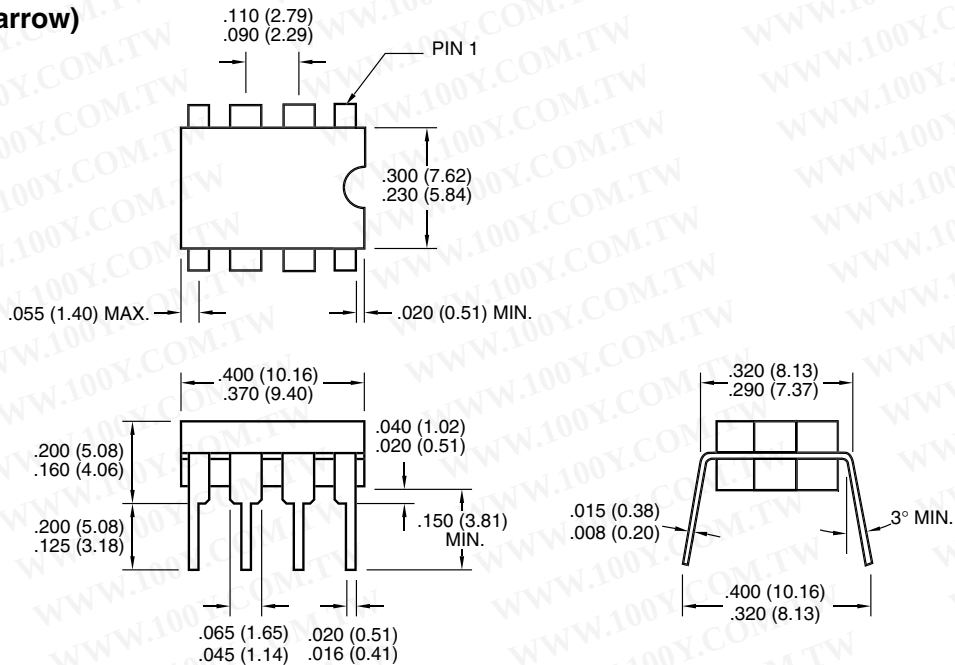
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8-Pin Plastic DIP



Dimensions: inches (mm)

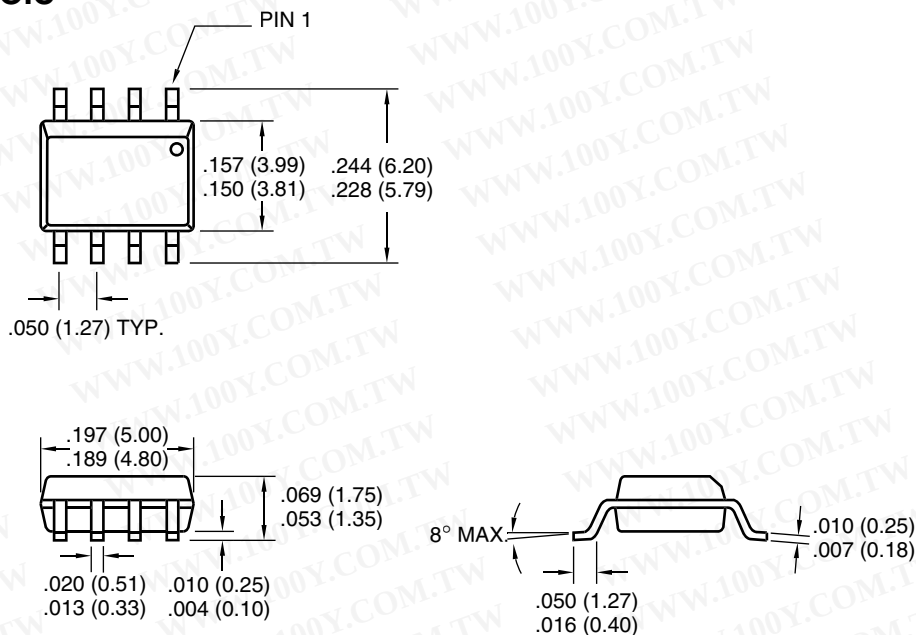
8-Pin CDIP (Narrow)



Dimensions: inches (mm)

Package Dimensions (Continued)

8-Pin SOIC



Dimensions: inches (mm)

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