

## 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 Time ..... <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

### GENERAL DESCRIPTION

The TC4431/4432 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 4 kV of electrostatic discharge.

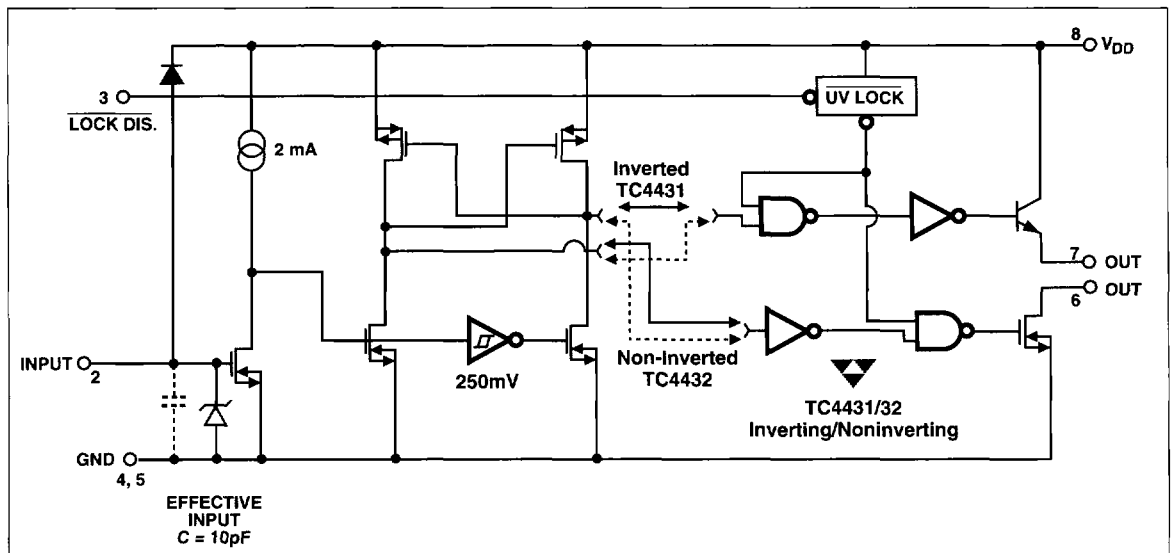
Under-voltage lockout circuitry forces the output to a "low" state when the input supply voltage drops below 7V. Maximum start-up  $V_{DD}$  bias voltage threshold is 10V. For operation at lower voltages, the LOCK DIS, Pin 3 can be grounded to disable the lockout and start-up circuit. The under-voltage lockout and start-up circuit gives brown out protection when driving MOSFETS.

### ORDERING INFORMATION

Part No.	Package	Temperature Range
TC4431COA	8-Pin SOIC	0°C to +70°C
TC4431CPA	8-Pin Plastic DIP	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 Plastic DIP	-40°C to +85°C

Part No.	Package	Temperature Range
TC4432COA	8-Pin SOIC	0°C to +70°C
TC4432CPA	8-Pin Plastic DIP	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 Plastic DIP	-40°C to +85°C

### FUNCTIONAL BLOCK DIAGRAM



TC4431/2-9 1/8/97

**TC4431**  
**TC4432**

## ABSOLUTE MAXIMUM RATINGS

Supply Voltage .....	36V
Input Voltage (Note 1) .....	$V_{DD} + 0.3V$ to GND
Maximum Chip Temperature .....	+150°C
Storage Temperature Range .....	- 65°C to +150°C
Lead Temperature (Soldering, 10 sec) .....	+300°C
Package Thermal Resistance	
CerDIP $R_{\theta J-A}$ .....	150°C/W
CerDIP $R_{\theta J-C}$ .....	50°C/W
PDIP $R_{\theta J-A}$ .....	125°C/W
PDIP $R_{\theta J-C}$ .....	42°C/W
SOIC $R_{\theta J-A}$ .....	250°C/W
SOIC $R_{\theta J-C}$ .....	75°C/W

## Operating Temperature Range

C Version .....	0°C to +70°C
E Version .....	- 40°C to +85°C
Package Power Dissipation ( $T_A \leq 70^\circ\text{C}$ )	
Plastic .....	730mW
CerDIP .....	800mW
SOIC .....	470mW

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 $4.5 \leq V_{DD} \leq 30V$ , unless otherwise specified.

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
<b>Input</b>						
$V_{IH}$	Logic 1 High Input Voltage		2.4	—	—	V
$V_{IL}$	Logic 0 Low Input Voltage		—	—	0.8	V
$I_{IN}$	Input Current (Note 1)	$0V \leq V_{IN} \leq 12V$	-1	—	1	$\mu\text{A}$
<b>Output</b>						
$V_{OH}$	High Output Voltage	$I_{OUT} = 100\text{mA}$	$V_{DD} - 1.0$	$V_{DD} - 0.8$	—	V
$V_{OL}$	Low Output Voltage		—	—	0.025	V
$R_O$	Output Resistance ( $V_{OL}$ )	$V_{DD} = 30V, I_O = 10\text{mA}$	—	7	10	$\Omega$
$I_{PK}$	Peak Output Current	Source: $V_{DD} = 30V$ Sink: $V_{DD} = 30V$	—	3.0	—	A
$I_{REV}$	Latch-Up Protection Withstand Reverse Current	Duty Cycle $\leq 2\%$ $t \leq 300\mu\text{sec}$	0.3	—	—	A
<b>Switching Time (Note 2)</b>						
$t_R$	Rise Time	Figure 1	—	25	40	nsec
$t_F$	Fall Time	Figure 1	—	33	50	nsec
$t_{D1}$	Delay Time	Figure 1	—	62	80	nsec
$t_{D2}$	Delay Time	Figure 1	—	78	90	nsec
<b>Power Supply</b>						
$I_S$	Power Supply Current	$V_{IN} = 3V$ $V_{IN} = 0V$	—	2.5	4	mA
			—	0.3	0.4	mA
$V_S$	Start-up Threshold		—	8.4	10	V
$V_{DO}$	Drop-out Threshold	(Note 3)	7	7.7	—	V

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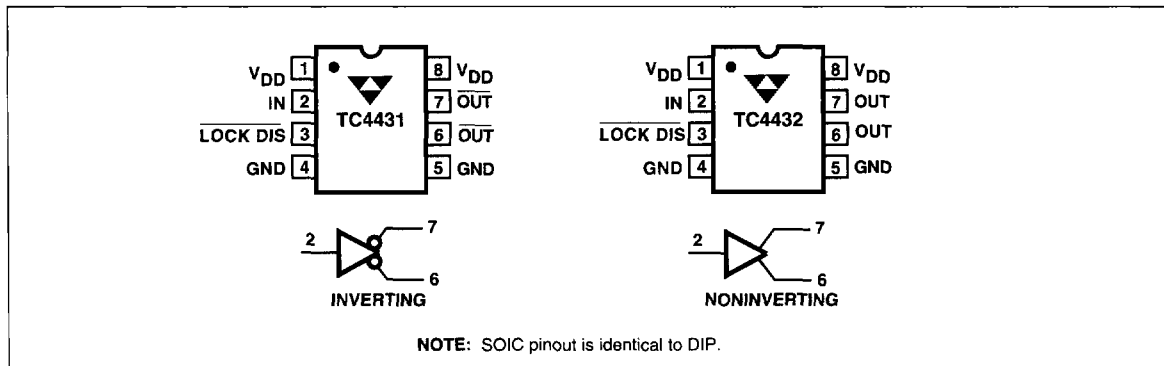
**TC4431**  
**TC4432**

**ELECTRICAL CHARACTERISTICS:** Specifications measured over operating temperature range with 4.5V ≤ V<sub>DD</sub> ≤ 30V, unless otherwise specified.

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
<b>Input</b>						
V <sub>IH</sub>	Logic 1 High Input Voltage		2.4	—	—	V
V <sub>IL</sub>	Logic 0 Low Input Voltage		—	—	0.8	V
I <sub>IN</sub>	Input Current (Note 1)	0V ≤ V <sub>IN</sub> ≤ 12V	-1	—	1	μA
<b>Output</b>						
V <sub>OH</sub>	High Output Voltage	I <sub>OUT</sub> = 100mA	V <sub>DD</sub> - 1.2	—	—	V
V <sub>OL</sub>	Low Output Voltage		—	—	0.025	V
R <sub>O</sub>	Output Resistance	V <sub>DD</sub> = 30V, I <sub>O</sub> = 10mA	—	—	12	Ω
<b>Switching Time (Note 2)</b>						
t <sub>R</sub>	Rise Time	Figure 1	—	—	60	nsec
t <sub>F</sub>	Fall Time	Figure 1	—	—	70	nsec
t <sub>D1</sub>	Delay Time	Figure 1	—	—	100	nsec
t <sub>D2</sub>	Delay Time	Figure 1	—	—	110	nsec
<b>Power Supply</b>						
I <sub>S</sub>	Power Supply Current	V <sub>IN</sub> = 3V V <sub>IN</sub> = 0V	— —	— —	6 0.7	mA mA
V <sub>S</sub>	Start-up Threshold		—	8.4	10	V
V <sub>DO</sub>	Drop-out Threshold	(Note 3)	7	7.7	—	V

- NOTES:** 1. For inputs >12V, add a 1kΩ resistor in series with the input. See graph on page 4 for input current.  
2. Switching times are guaranteed by design.  
3. For operation below 7V, the LOCK DIS., Pin 3 can be grounded to disable the lockout and start-up circuit.

## PIN CONFIGURATIONS



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TC4432

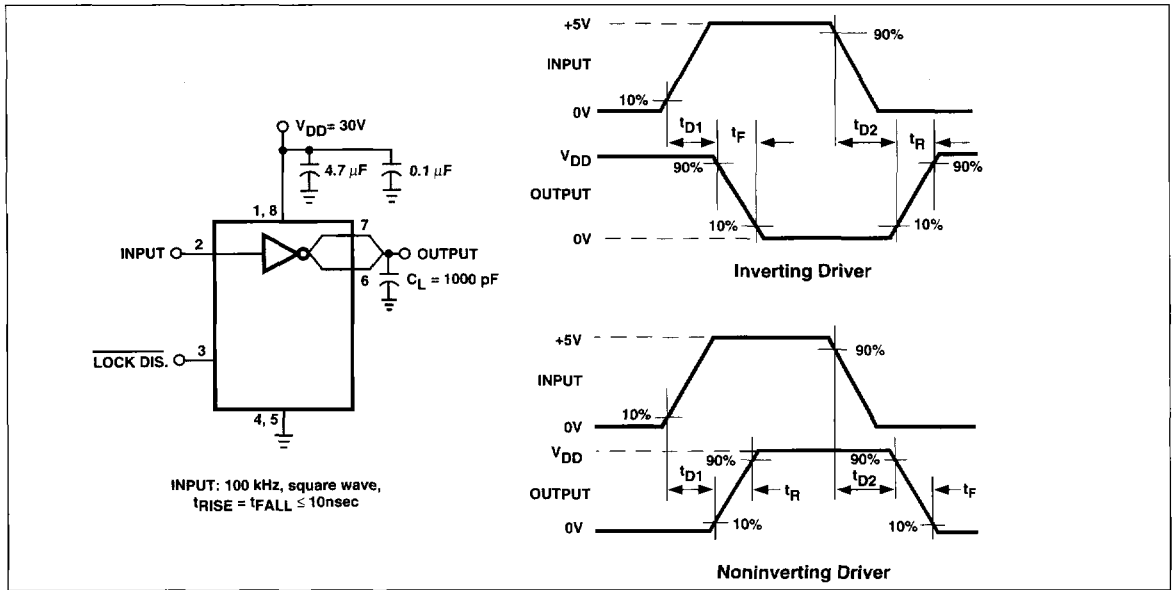


Figure 1. Switching Time Test Circuit

## TYPICAL CHARACTERISTICS

