

## 6A HIGH-SPEED MOSFET DRIVERS

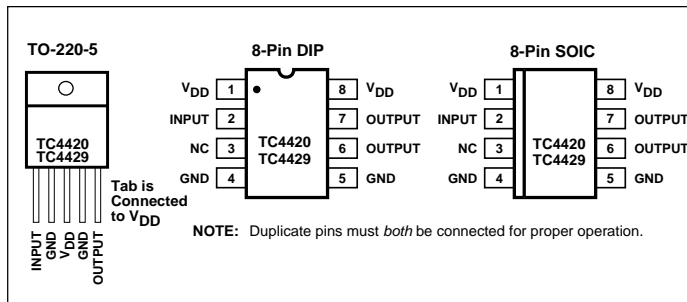
### FEATURES

- Latch-Up Protected ..... Will Withstand >1.5A Reverse Output Current
- Logic Input Will Withstand Negative Swing Up to 5V
- ESD Protected ..... 4kV
- Matched Rise and Fall Times ..... 25nsec
- High Peak Output Current ..... 6A Peak
- Wide Operating Range ..... 4.5V to 18V
- High Capacitive Load Drive ..... 10,000pF
- Short Delay Time ..... 55nsec Typ.
- Logic High Input, Any Voltage ..... 2.4V to  $V_{DD}$
- Low Supply Current With Logic "1" Input ... 450 $\mu$ A
- Low Output Impedance ..... 2.5 $\Omega$
- Output Voltage Swing to Within 25mV of Ground or  $V_{DD}$

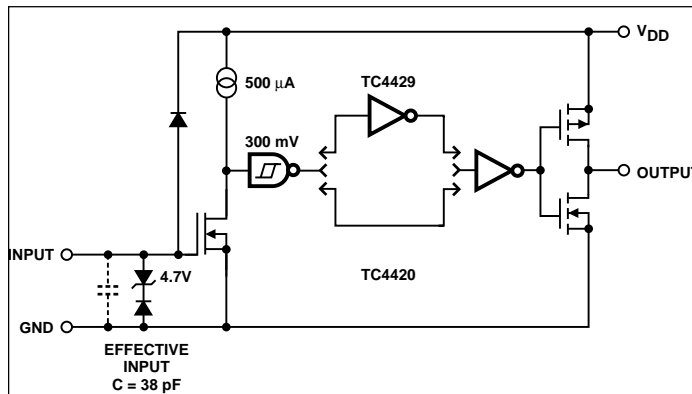
### APPLICATIONS

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

### PIN CONFIGURATIONS



### FUNCTIONAL BLOCK DIAGRAM



### GENERAL DESCRIPTION

The TC4420/4429 are 6A (peak), single output MOSFET drivers. The TC4429 is an inverting driver (pin-compatible with the TC429), while the TC4420 is a non-inverting driver. These drivers are fabricated in CMOS for lower power, more efficient operation versus bipolar drivers.

Both devices have TTL-compatible inputs, which can be driven as high as  $V_{DD} + 0.3V$  or as low as  $-5V$  without upset or damage to the device. This eliminates the need for external level shifting circuitry and its associated cost and size. The output swing is rail-to-rail ensuring better drive voltage margin, especially during power up/power down sequencing. Propagational delay time is only 55nsec (typ.) and the output rise and fall times are only 25nsec (typ.) into 2500pF across the usable power supply range.

Unlike other drivers, the TC4420/4429 are virtually latch-up proof. They replace three or more discrete components saving PCB area, parts and improving overall system reliability.

### ORDERING INFORMATION

Part No.	Logic	Package	Temperature Range
TC4420CAT	Noninverting	5-Pin TO-220	0°C to +70°C
TC4420COA	Noninverting	8-Pin SOIC	0°C to +70°C
TC4420CPA	Noninverting	8-Pin PDIP	0°C to +70°C
TC4420EOA	Noninverting	8-Pin SOIC	-40°C to +85°C
TC4420EPA	Noninverting	8-Pin PDIP	-40°C to +85°C
TC4420IJA	Noninverting	8-Pin CerDIP	-25°C to +85°C
TC4420MJA	Noninverting	8-Pin CerDIP	-55°C to +125°C
TC4429CAT	Inverting	5-Pin TO-220	0°C to +70°C
TC4429COA	Inverting	8-Pin SOIC	0°C to +70°C
TC4429CPA	Inverting	8-Pin PDIP	0°C to +70°C
TC4429EOA	Inverting	8-Pin SOIC	-40°C to +85°C
TC4429EPA	Inverting	8-Pin PDIP	-40°C to +85°C
TC4429IJA	Inverting	8-Pin CerDIP	-25°C to +85°C
TC4429MJA	Inverting	8-Pin CerDIP	-55°C to +125°C

## TC4420 TC4429

### ABSOLUTE MAXIMUM RATINGS\*

Supply Voltage .....	+20V
Input Voltage .....	- 5V to > V <sub>DD</sub>
Input Current (V <sub>IN</sub> > V <sub>DD</sub> ) .....	50mA
Power Dissipation, (T <sub>A</sub> ≤ 70°C)	
PDIP .....	730mW
SOIC .....	470mW
CerDIP .....	800mW
5-Pin TO-220 .....	1.6W
Package Power Dissipation, T <sub>C</sub> ≤ 25°C	
5-Pin TO-220 (With Heat Sink) .....	12.5W
Derating Factors (To Ambient)	
PDIP .....	8mW/°C
SOIC .....	4mW/°C
CerDIP .....	6.4mW/°C
5-Pin TO-220 .....	12mW/°C
Thermal Impedances (To Case)	
5-Pin TO-220 R <sub>θJ-C</sub> .....	10°C/W

Storage Temperature Range .....	- 65°C to +150°C
Operating Temperature (Chip) .....	+150°C
Operating Temperature Range (Ambient)	
C Version .....	0°C to +70°C
I Version .....	- 25°C to +85°C
E Version .....	- 40°C to +85°C
M Version .....	- 55°C to +125°C
Lead Temperature (Soldering, 10 sec) .....	+300°C

\*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<sub>A</sub> = +25°C with 4.5V ≤ V<sub>DD</sub> ≤ 18V, 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	1.8	—	V
V <sub>IL</sub>	Logic 0 Low Input Voltage		—	1.3	0.8	V
V <sub>IN</sub> (Max)	Input Voltage Range		- 5	—	V <sub>DD</sub> + 0.3	V
I <sub>IN</sub>	Input Current	0V ≤ V <sub>IN</sub> ≤ V <sub>DD</sub>	- 10	—	10	μA
<b>Output</b>						
V <sub>OH</sub>	High Output Voltage	See Figure 1	V <sub>DD</sub> - 0.025	—	—	V
V <sub>OL</sub>	Low Output Voltage	See Figure 1	—	—	0.025	V
R <sub>O</sub>	Output Resistance, High	I <sub>OUT</sub> = 10 mA, V <sub>DD</sub> = 18V	—	2.1	2.8	Ω
R <sub>O</sub>	Output Resistance, Low	I <sub>OUT</sub> = 10 mA, V <sub>DD</sub> = 18V	—	1.5	2.5	Ω
I <sub>PK</sub>	Peak Output Current	V <sub>DD</sub> = 18V (See Figure 5)	—	6	—	A
I <sub>REV</sub>	Latch-Up Protection Withstand Reverse Current	Duty Cycle ≤ 2% t ≤ 300μsec	1.5	—	—	A
<b>Switching Time (Note 1)</b>						
t <sub>R</sub>	Rise Time	Figure 1, C <sub>L</sub> = 2500pF	—	25	35	nsec
t <sub>F</sub>	Fall Time	Figure 1, C <sub>L</sub> = 2500pF	—	25	35	nsec
t <sub>D1</sub>	Delay Time	Figure 1	—	55	75	nsec
t <sub>D2</sub>	Delay Time	Figure 1	—	55	75	nsec
<b>Power Supply</b>						
I <sub>S</sub>	Power Supply Current	V <sub>IN</sub> = 3V V <sub>IN</sub> = 0V	—	0.45 55	1.5 150	mA μA
V <sub>DD</sub>	Operating Input Voltage		4.5	—	18	V

**ELECTRICAL CHARACTERISTICS:** Measured over operating temperature range with  $4.5V \leq V_{DD} \leq 18V$ , 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
$V_{IN}$ (Max)	Input Voltage Range		-5	—	$V_{DD} + 0.3$	V
$I_{IN}$	Input Current	$0V \leq V_{IN} \leq V_{DD}$	-10	—	10	$\mu A$
<b>Output</b>						
$V_{OH}$	High Output Voltage	See Figure 1	$V_{DD} - 0.025$	—	—	V
$V_{OL}$	Low Output Voltage	See Figure 1	—	—	0.025	V
$R_O$	Output Resistance, High	$I_{OUT} = 10mA, V_{DD} = 18V$	—	3	5	$\Omega$
$R_O$	Output Resistance, Low	$I_{OUT} = 10mA, V_{DD} = 18V$	—	2.3	5	$\Omega$
<b>Switching Time (Note 1)</b>						
$t_R$	Rise Time	Figure 1, $C_L = 2500pF$	—	32	60	nsec
$t_F$	Fall Time	Figure 1, $C_L = 2500pF$	—	34	60	nsec
$t_{D1}$	Delay Time	Figure 1	—	50	100	nsec
$t_{D2}$	Delay Time	Figure 1	—	65	100	nsec
<b>Power Supply</b>						
$I_S$	Power Supply Current	$V_{IN} = 3V$ $V_{IN} = 0V$	—	0.45 60	3 400	$mA$ $\mu A$
$V_{DD}$	Operating Input Voltage		4.5	—	18	V

**NOTE:** 1. Switching times guaranteed by design.

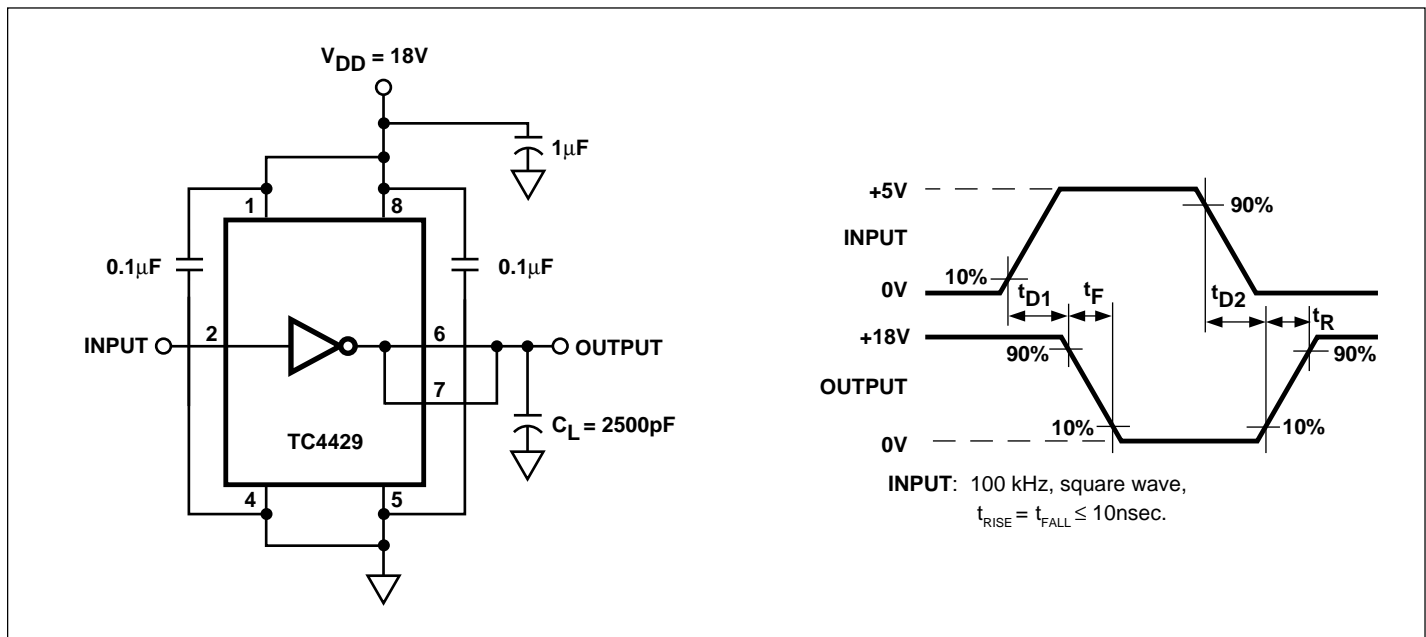
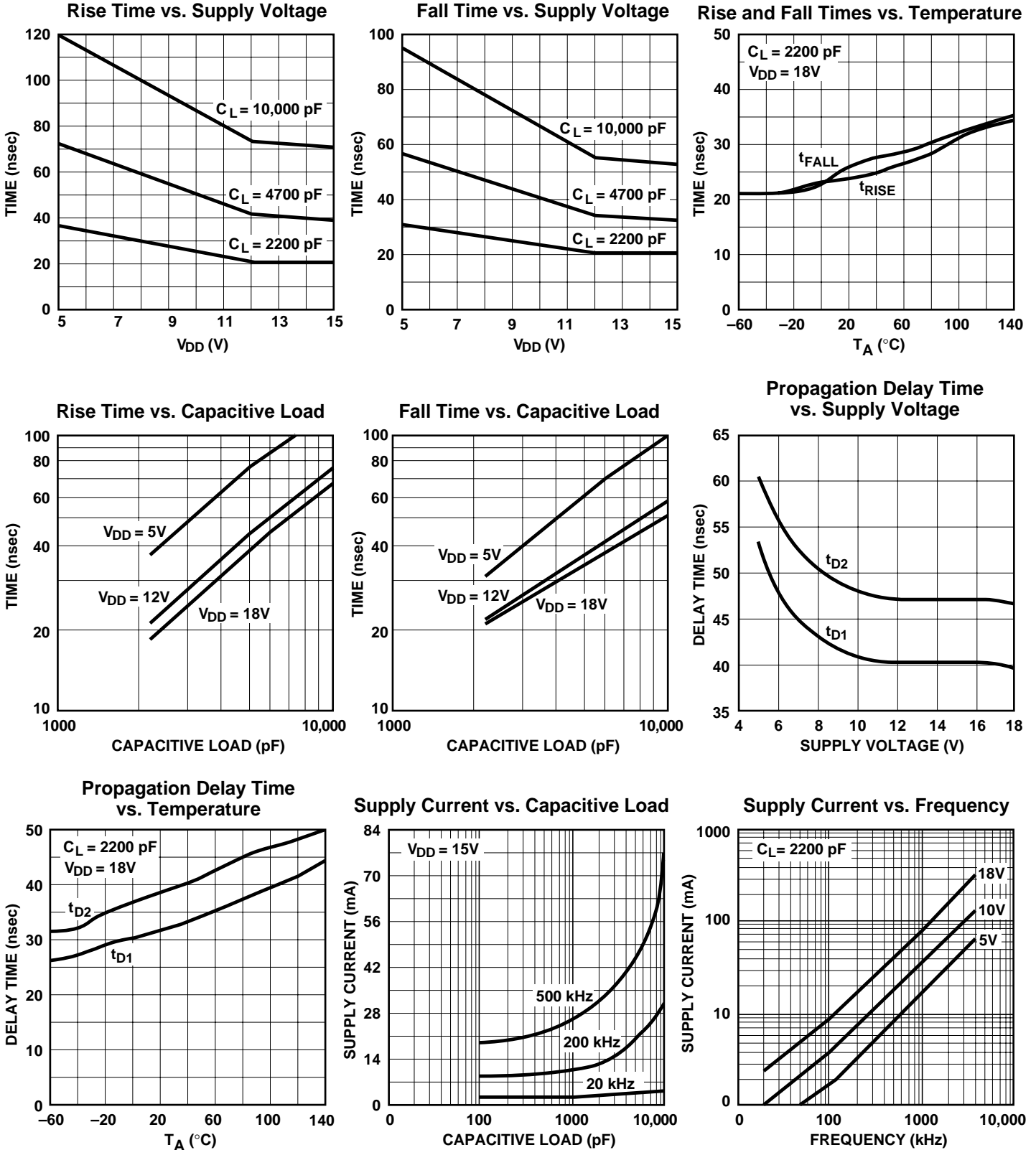


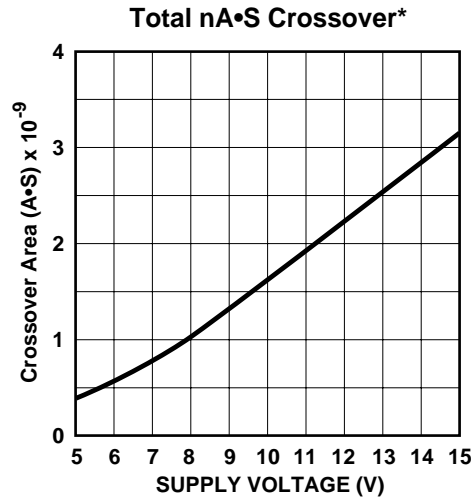
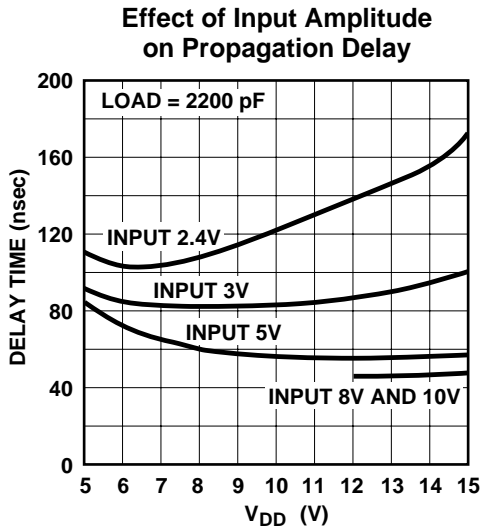
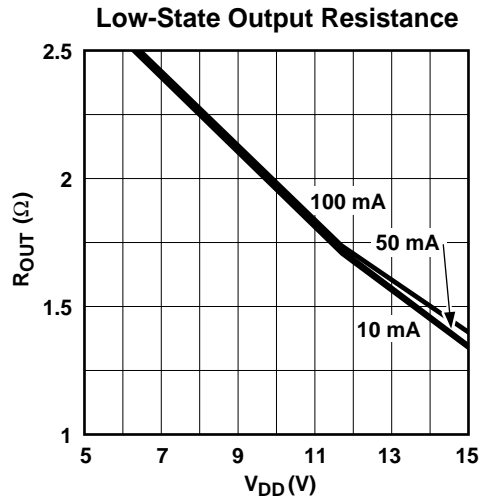
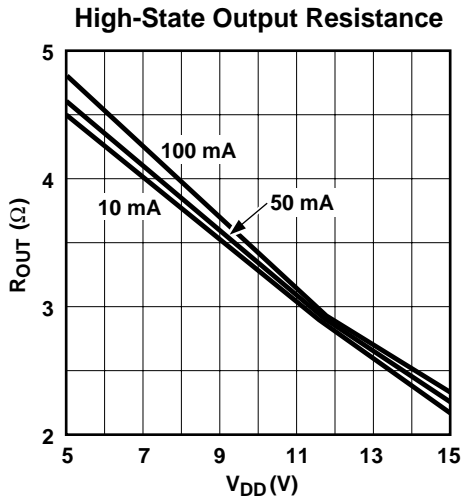
Figure 1. Switching Time Test Circuit

## TC4420 TC4429

### TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS (Cont.)

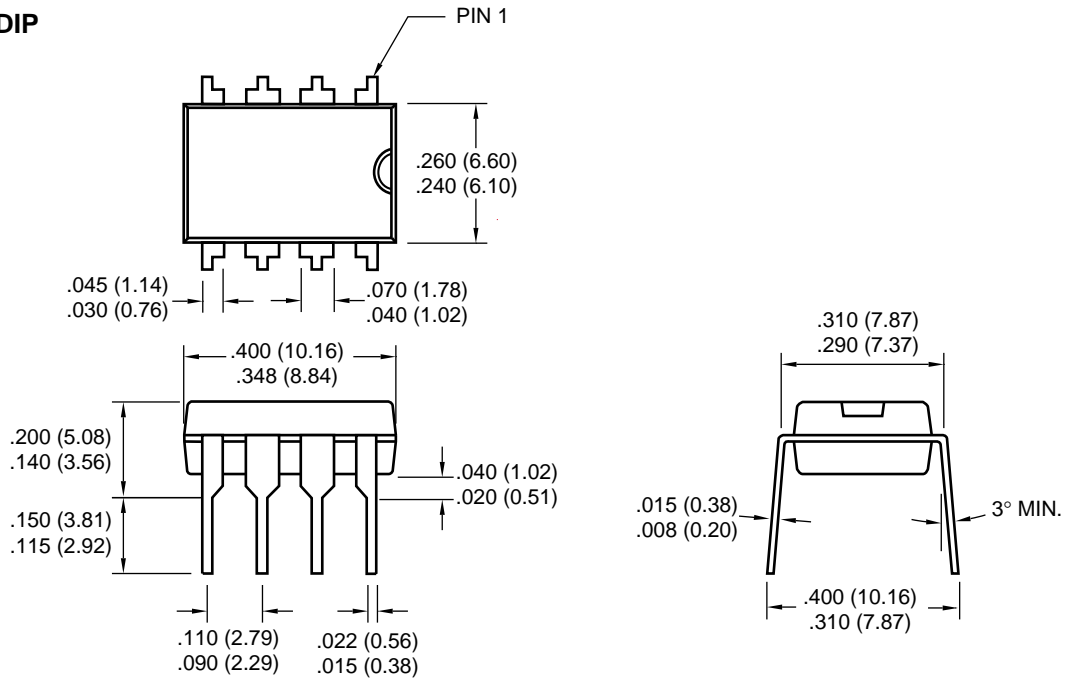


\* The values on this graph represent the loss seen by the driver during one complete cycle. For a single transition, divide the value by 2.

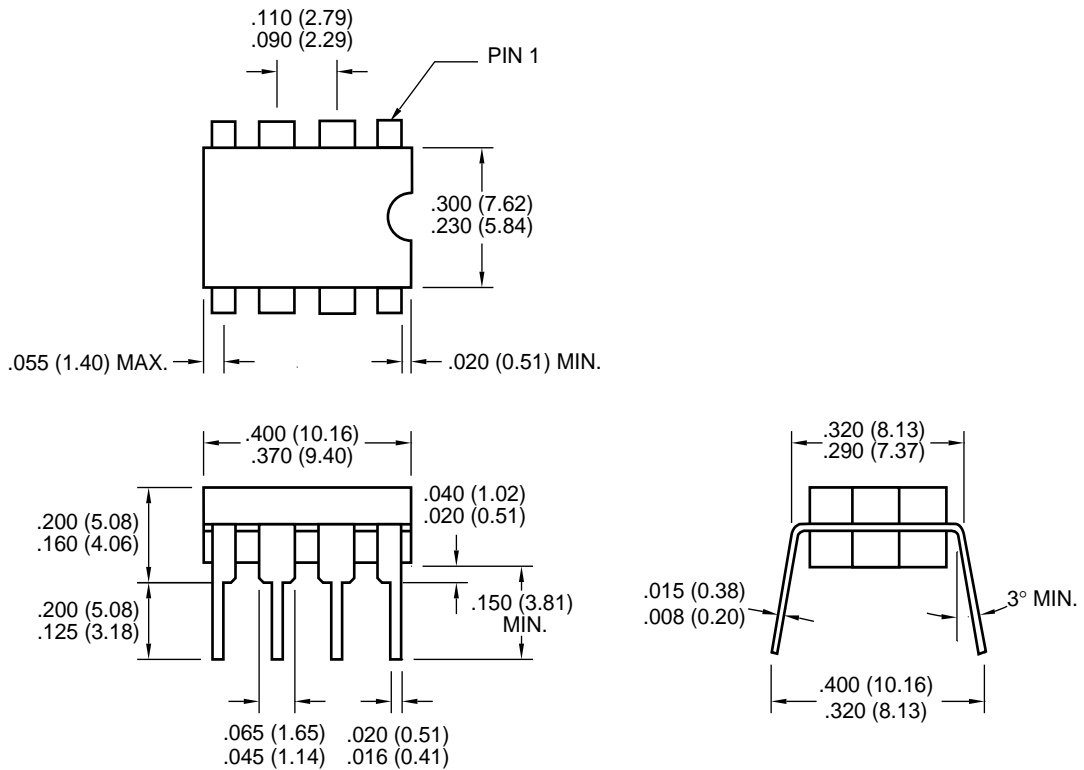
## TC4420 TC4429

### PACKAGE DIMENSIONS

#### 8-Pin Plastic DIP



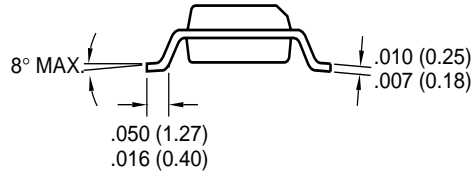
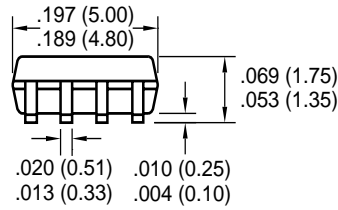
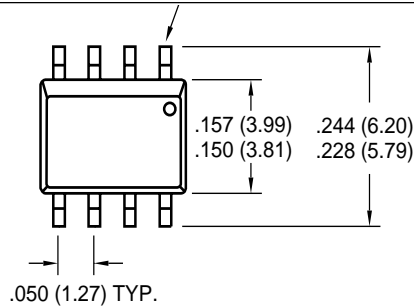
#### 8-Pin CerDIP



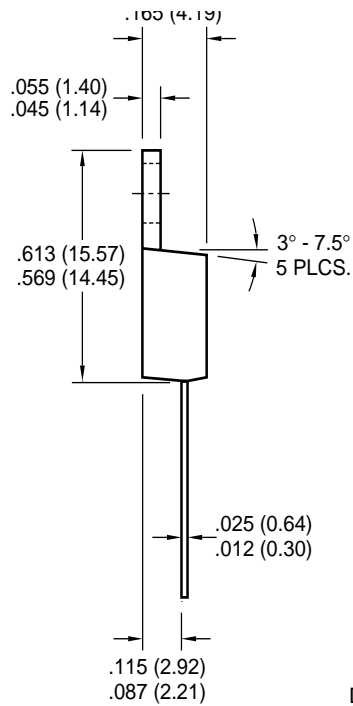
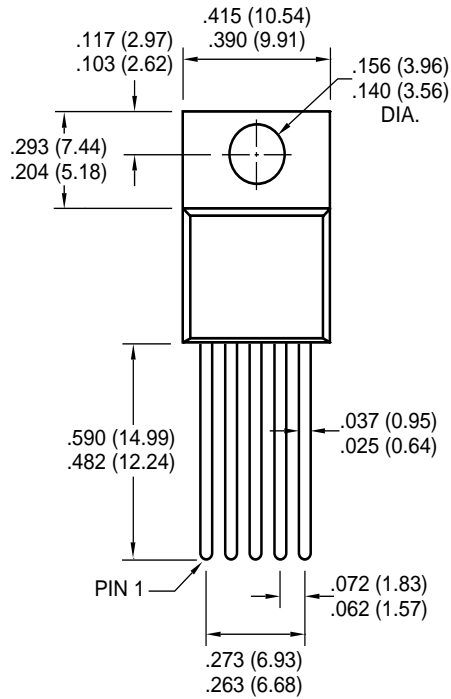
Dimensions: inches (mm)

PACKAGE DIMENSIONS (Cont.)

8-Pin SOIC



5-Pin TO-220



Dimensions: inches (mm)



## WORLDWIDE SALES AND SERVICE

### AMERICAS

#### Corporate Office

2355 West Chandler Blvd.  
Chandler, AZ 85224-6199  
Tel: 480-792-7200 Fax: 480-792-7277  
Technical Support: 480-792-7627  
Web Address: <http://www.microchip.com>

#### Rocky Mountain

2355 West Chandler Blvd.  
Chandler, AZ 85224-6199  
Tel: 480-792-7966 Fax: 480-792-7456

#### Atlanta

500 Sugar Mill Road, Suite 200B  
Atlanta, GA 30350  
Tel: 770-640-0034 Fax: 770-640-0307

#### Austin

Analog Product Sales  
8303 MoPac Expressway North  
Suite A-201  
Austin, TX 78759  
Tel: 512-345-2030 Fax: 512-345-6085

#### Boston

2 Lan Drive, Suite 120  
Westford, MA 01886  
Tel: 978-692-3848 Fax: 978-692-3821

#### Boston

Analog Product Sales  
Unit A-8-1 Millbrook Tarry Condominium  
97 Lowell Road  
Concord, MA 01742  
Tel: 978-371-6400 Fax: 978-371-0050

#### Chicago

333 Pierce Road, Suite 180  
Itasca, IL 60143  
Tel: 630-285-0071 Fax: 630-285-0075

#### Dallas

4570 Westgrove Drive, Suite 160  
Addison, TX 75001  
Tel: 972-818-7423 Fax: 972-818-2924

#### Dayton

Two Prestige Place, Suite 130  
Miamisburg, OH 45342  
Tel: 937-291-1654 Fax: 937-291-9175

#### Detroit

Tri-Atria Office Building  
32255 Northwestern Highway, Suite 190  
Farmington Hills, MI 48334  
Tel: 248-538-2250 Fax: 248-538-2260

#### Los Angeles

18201 Von Karman, Suite 1090  
Irvine, CA 92612  
Tel: 949-263-1888 Fax: 949-263-1338

#### Mountain View

Analog Product Sales  
1300 Terra Bella Avenue  
Mountain View, CA 94043-1836  
Tel: 650-968-9241 Fax: 650-967-1590

#### New York

150 Motor Parkway, Suite 202  
Hauppauge, NY 11788  
Tel: 631-273-5305 Fax: 631-273-5335

#### San Jose

Microchip Technology Inc.  
2107 North First Street, Suite 590  
San Jose, CA 95131  
Tel: 408-436-7950 Fax: 408-436-7955

#### Toronto

6285 Northam Drive, Suite 108  
Mississauga, Ontario L4V 1X5, Canada  
Tel: 905-673-0699 Fax: 905-673-6509

### ASIA/PACIFIC

#### China - Beijing

Microchip Technology Beijing Office  
Unit 915  
New China Hong Kong Manhattan Bldg.  
No. 6 Chaoyangmen Beidajie  
Beijing, 100027, No. China  
Tel: 86-10-85282100 Fax: 86-10-85282104

#### China - Shanghai

Microchip Technology Shanghai Office  
Room 701, Bldg. B  
Far East International Plaza  
No. 317 Xian Xia Road  
Shanghai, 200051  
Tel: 86-21-6275-5700 Fax: 86-21-6275-5060

#### Hong Kong

Microchip Asia Pacific  
RM 2101, Tower 2, Metroplaza  
223 Hing Fong Road  
Kwai Fong, N.T., Hong Kong  
Tel: 852-2401-1200 Fax: 852-2401-3431

#### India

Microchip Technology Inc.  
India Liaison Office  
Divyasree Chambers  
1 Floor, Wing A (A3/A4)  
No. 11, OisShaughnessey Road  
Bangalore, 560 025, India  
Tel: 91-80-2290061 Fax: 91-80-2290062

#### Japan

Microchip Technology Intl. Inc.  
Benex S-1 6F  
3-18-20, Shinyokohama  
Kohoku-Ku, Yokohama-shi  
Kanagawa, 222-0033, Japan  
Tel: 81-45-471- 6166 Fax: 81-45-471-6122

#### Korea

Microchip Technology Korea  
168-1, Youngbo Bldg. 3 Floor  
Samsung-Dong, Kangnam-Ku  
Seoul, Korea  
Tel: 82-2-554-7200 Fax: 82-2-558-5934

### ASIA/PACIFIC (continued)

#### Singapore

Microchip Technology Singapore Pte Ltd.  
200 Middle Road  
#07-02 Prime Centre  
Singapore, 188980  
Tel: 65-334-8870 Fax: 65-334-8850

#### Taiwan

Microchip Technology Taiwan  
11F-3, No. 207  
Tung Hua North Road  
Taipei, 105, Taiwan  
Tel: 886-2-2717-7175 Fax: 886-2-2545-0139

### EUROPE

#### Australia

Microchip Technology Australia Pty Ltd  
Suite 22, 41 Rawson Street  
Epping 2121, NSW  
Australia  
Tel: 61-2-9868-6733 Fax: 61-2-9868-6755

#### Denmark

Microchip Technology Denmark ApS  
Regus Business Centre  
Lautrup høj 1-3  
Ballerup DK-2750 Denmark  
Tel: 45 4420 9895 Fax: 45 4420 9910

#### France

Arizona Microchip Technology SARL  
Parc d'Activite du Moulin de Massy  
43 Rue du Saule Trapu  
Batiment A - 1er Etage  
91300 Massy, France  
Tel: 33-1-69-53-63-20 Fax: 33-1-69-30-90-79

#### Germany

Arizona Microchip Technology GmbH  
Gustav-Heinemann Ring 125  
D-81739 Munich, Germany  
Tel: 49-89-627-144 0 Fax: 49-89-627-144-44

#### Germany

Analog Product Sales  
Lochhamer Strasse 13  
D-82152 Martinsried, Germany  
Tel: 49-89-895650-0 Fax: 49-89-895650-22

#### Italy

Arizona Microchip Technology SRL  
Centro Direzionale Colleoni  
Palazzo Taurus 1 V. Le Colleoni 1  
20041 Agrate Brianza  
Milan, Italy  
Tel: 39-039-65791-1 Fax: 39-039-6899883

#### United Kingdom

Arizona Microchip Technology Ltd.  
505 Eskdale Road  
Winnersh Triangle  
Wokingham  
Berkshire, England RG41 5TU  
Tel: 44 118 921 5869 Fax: 44-118 921-5820

All rights reserved. © 2001 Microchip Technology Incorporated. Printed in the USA. 1/01  Printed on recycled paper.

01/09/01

Information contained in this publication regarding device applications and the like is intended through suggestion only and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. No representation or warranty is given and no liability is assumed by Microchip Technology Incorporated with respect to the accuracy or use of such information, or infringement of patents or other intellectual property rights arising from such use or otherwise. Use of Microchip's products as critical components in life support systems is not authorized except with express written approval by Microchip. No licenses are conveyed, implicitly or otherwise, except as maybe explicitly expressed herein, under any intellectual property rights. The Microchip logo and name are registered trademarks of Microchip Technology Inc. in the U.S.A. and other countries. All rights reserved. All other trademarks mentioned herein are the property of their respective companies.