

6A HIGH-SPEED MOSFET DRIVERS

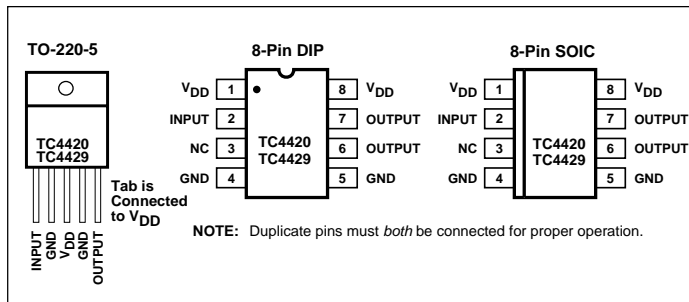
FEATURES

- 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 μ A
- Low Output Impedance 2.5 Ω
- Output Voltage Swing to Within 25mV of Ground or V_{DD}

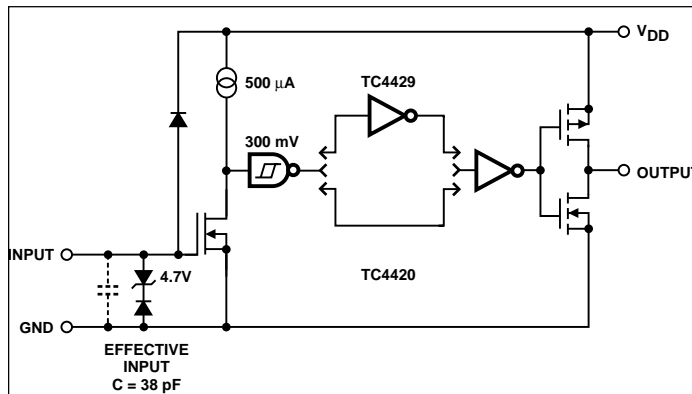
APPLICATIONS

- 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 _{DD} |
| Input Current (V _{IN} > V _{DD}) | 50mA |
| Power Dissipation, (T _A ≤ 70°C) | |
| PDIP | 730mW |
| SOIC | 470mW |
| CerDIP | 800mW |
| 5-Pin TO-220 | 1.6W |
| Package Power Dissipation, T _C ≤ 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 _{θJ-C} | 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_A = +25°C with 4.5V ≤ V_{DD} ≤ 18V, unless otherwise specified.

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|--------------------------------|--|---|-------------------------|------------|-----------------------|----------|
| Input | | | | | | |
| V _{IH} | Logic 1 High Input Voltage | | 2.4 | 1.8 | — | V |
| V _{IL} | Logic 0 Low Input Voltage | | — | 1.3 | 0.8 | V |
| V _{IN} (Max) | Input Voltage Range | | - 5 | — | V _{DD} + 0.3 | V |
| I _{IN} | Input Current | 0V ≤ V _{IN} ≤ V _{DD} | - 10 | — | 10 | μA |
| Output | | | | | | |
| 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} = 10 mA, V _{DD} = 18V | — | 2.1 | 2.8 | Ω |
| R _O | Output Resistance, Low | I _{OUT} = 10 mA, V _{DD} = 18V | — | 1.5 | 2.5 | Ω |
| I _{PK} | Peak Output Current | V _{DD} = 18V (See Figure 5) | — | 6 | — | A |
| I _{REV} | Latch-Up Protection Withstand Reverse Current | Duty Cycle ≤ 2% t ≤ 300μsec | 1.5 | — | — | A |
| Switching Time (Note 1) | | | | | | |
| t _R | Rise Time | Figure 1, C _L = 2500pF | — | 25 | 35 | nsec |
| t _F | Fall Time | Figure 1, C _L = 2500pF | — | 25 | 35 | nsec |
| t _{D1} | Delay Time | Figure 1 | — | 55 | 75 | nsec |
| t _{D2} | Delay Time | Figure 1 | — | 55 | 75 | nsec |
| Power Supply | | | | | | |
| I _S | Power Supply Current | V _{IN} = 3V V _{IN} = 0V | — | 0.45 55 | 1.5 150 | mA μA |
| V _{DD} | 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 |
|--------------------------------|----------------------------|--------------------------------|------------------|------------|----------------|-----------------|
| Input | | | | | | |
| 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 | μA |
| Output | | | | | | |
| 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 | Ω |
| R_O | Output Resistance, Low | $I_{OUT} = 10mA, V_{DD} = 18V$ | — | 2.3 | 5 | Ω |
| Switching Time (Note 1) | | | | | | |
| 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 |
| Power Supply | | | | | | |
| I_S | Power Supply Current | $V_{IN} = 3V$ $V_{IN} = 0V$ | — | 0.45 60 | 3 400 | mA μA |
| V_{DD} | Operating Input Voltage | | 4.5 | — | 18 | V |

NOTE: 1. Switching times guaranteed by design.

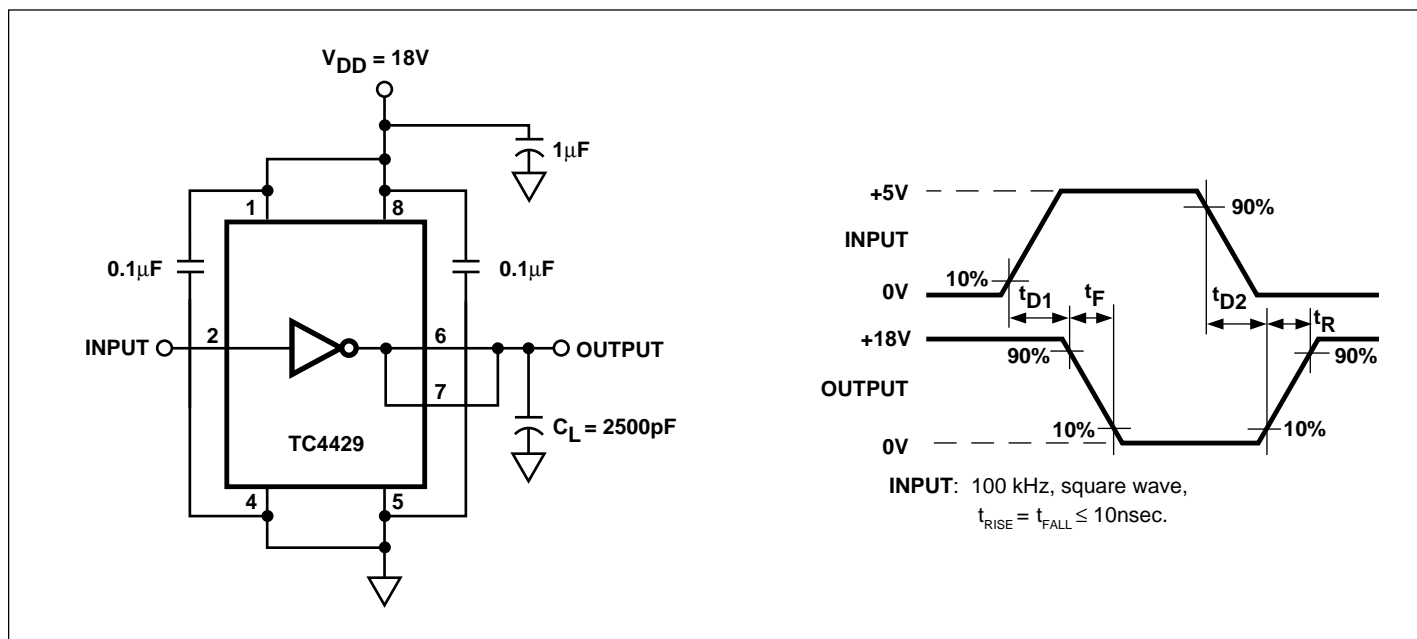
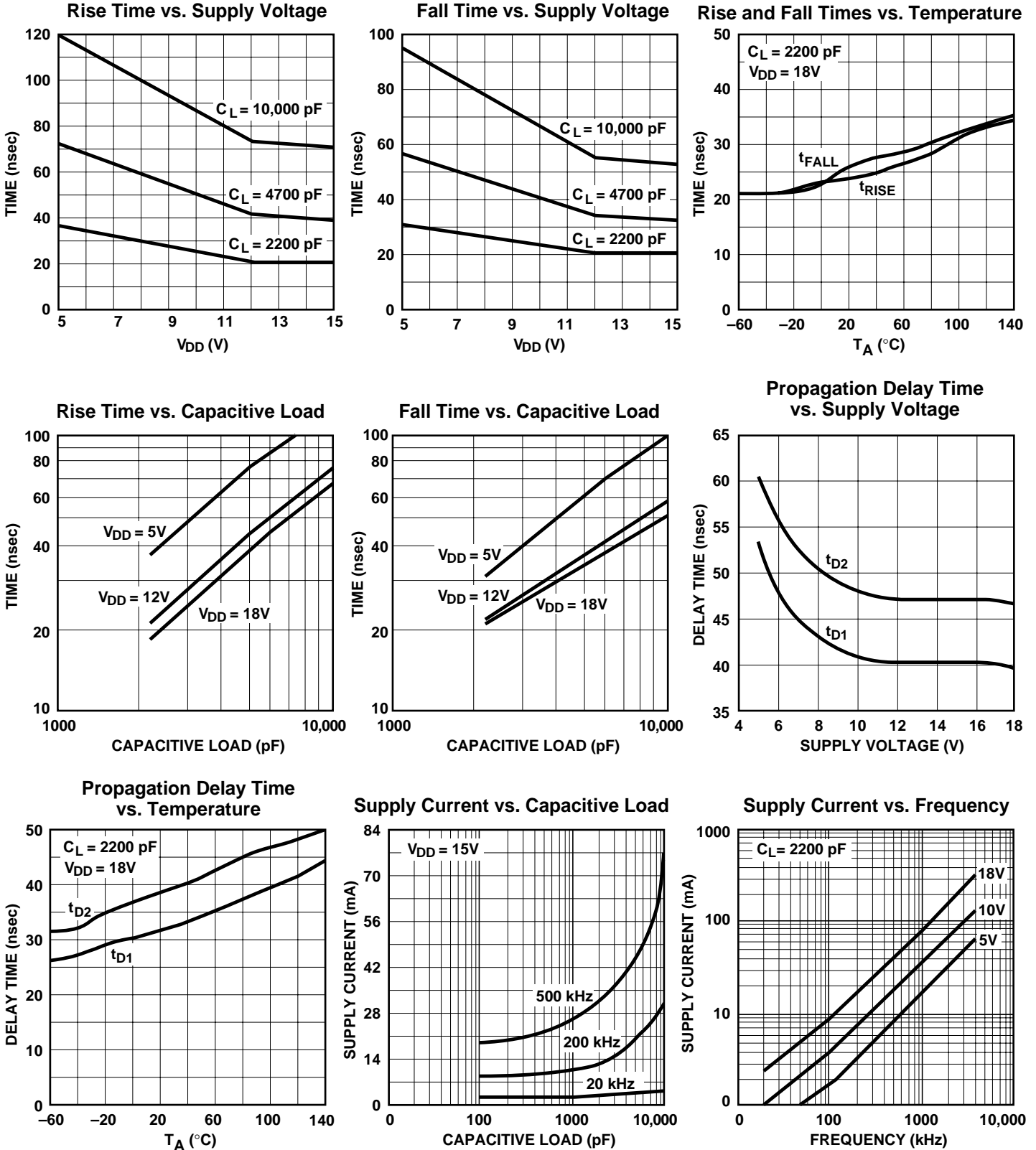


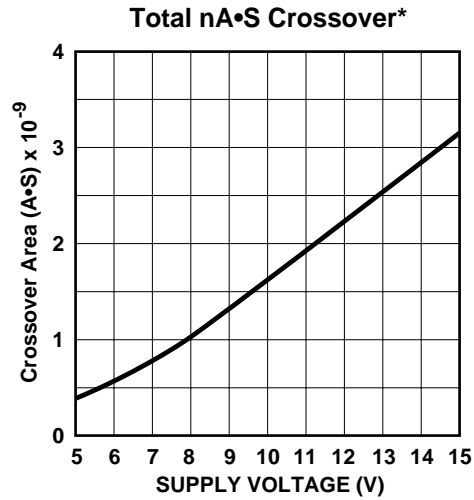
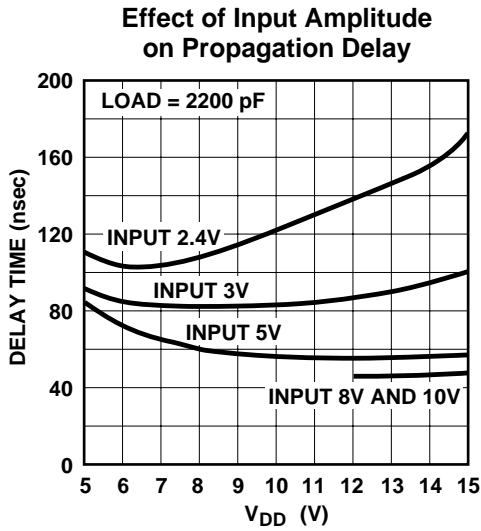
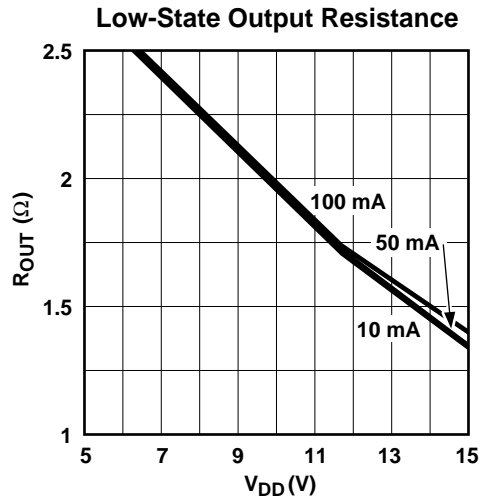
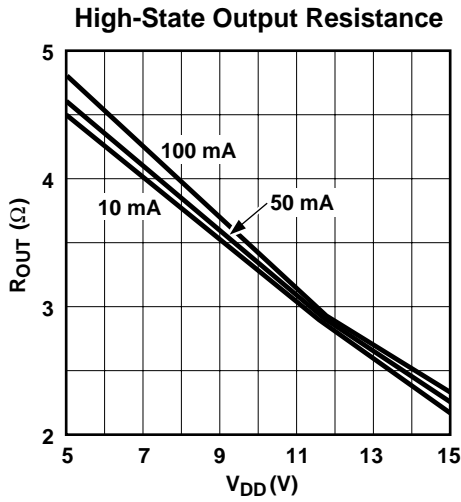
Figure 1. Switching Time Test Circuit

TC4420 TC4429

TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS (Cont.)



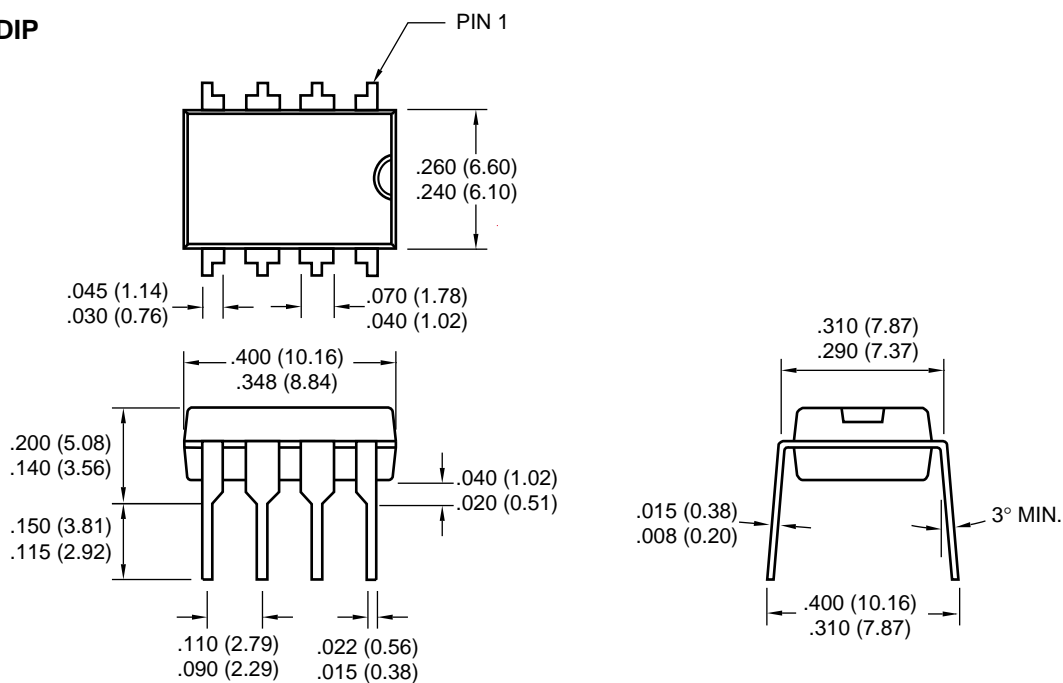
* The values on this graph represent the loss seen by the driver during one complete cycle. For a single transition, divide the value by 2.

6A HIGH-SPEED MOSFET DRIVERS

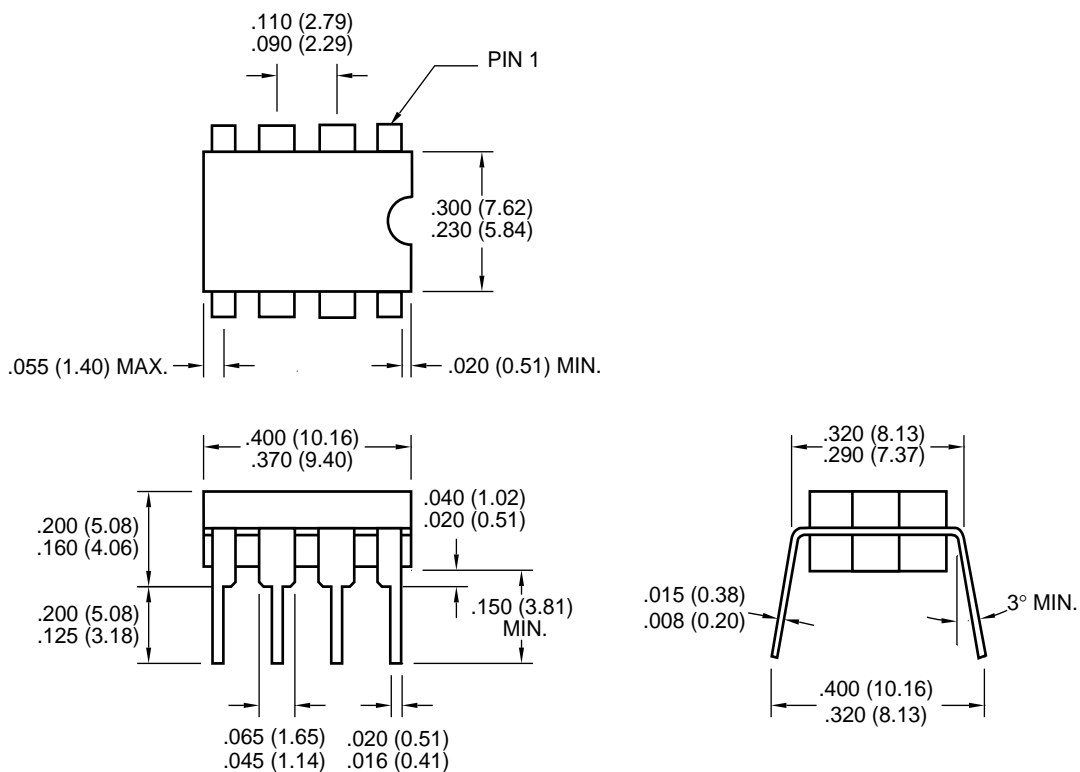
TC4420
TC4429

PACKAGE DIMENSIONS

8-Pin Plastic DIP



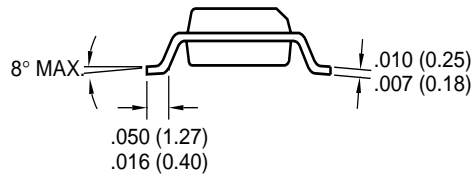
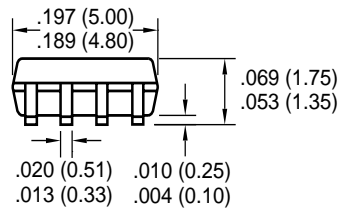
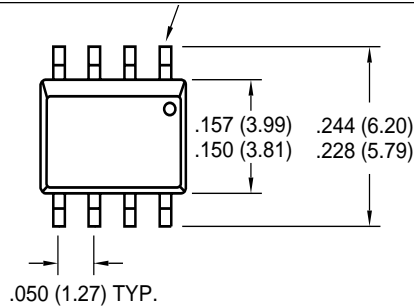
8-Pin CerDIP



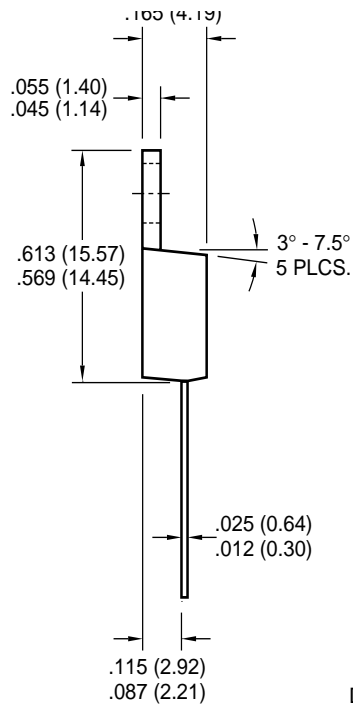
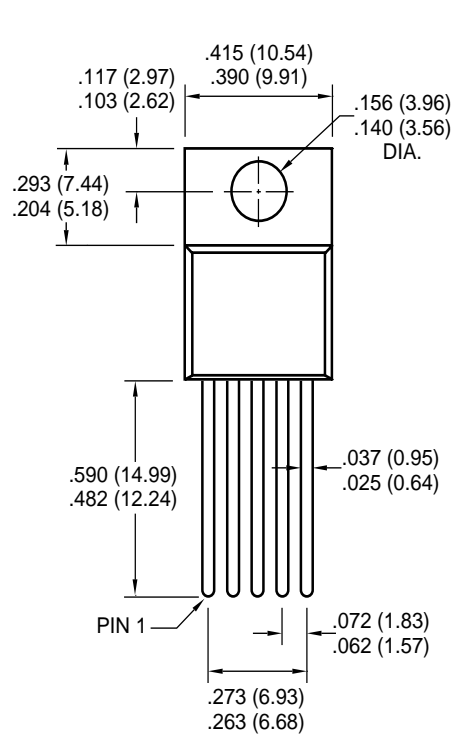
Dimensions: inches (mm)

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.