



## High-Speed, 6A Single MOSFET Drivers

### General Description

The MAX4420, MAX4429 and MXT429 are single-output MOSFET drivers designed to translate TTL/CMOS inputs to high-voltage/high-current outputs. The low  $1.5\Omega$  output impedance and 6A peak current output allow them to rapidly switch high-capacitance power MOSFETs, improving efficiency.

A 40ns delay time and a 25ns rise or fall time (while driving 2500pF to 18V) minimize power losses during MOSFET switching transitions.

The MAX4420/MAX4429/MXT429 interface easily with either CMOS or bipolar switch-mode controllers because their logic inputs draw under  $10\mu\text{A}$ . The outputs swing to within 25mV of GND or the power-supply rail, which can be 4.5V to 18V for the MAX4420/MAX4429, and 7V to 18V for the MXT429.

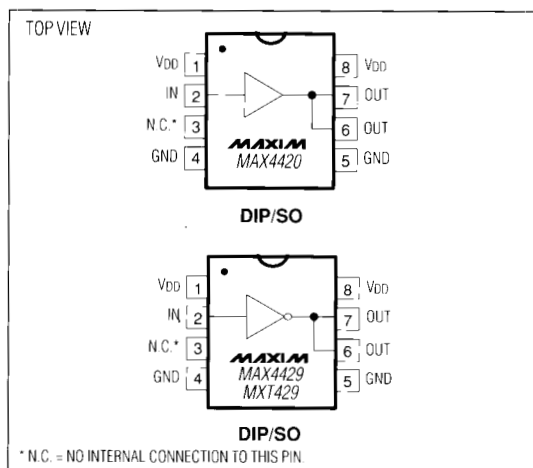
Power-supply quiescent current is typically  $45\mu\text{A}$  and  $450\mu\text{A}$  for logic input low and high, respectively. The MAX4420 has a non inverting output. The MAX4429 and MXT429 have inverting outputs.

For dual drivers, refer to the MAX626/MAX627/MAX628 and MAX4426/MAX4427/MAX4428 data sheets.

### Applications

Switching Power Supplies  
DC-DC Converters  
Motor Controllers  
Pin-Diode Drivers

### Pin Configurations



### Features

- ◆ TTL/CMOS Compatible ( $I_{IN} \leq 10\mu\text{A}$ )
- ◆ 4.5V to 18V Supply Range (MAX4420/MAX4429)
- ◆  $1.5\Omega$  Output Resistance
- ◆ 6A Peak Output Current
- ◆ 40ns Delay Time
- ◆ 25ns Rise and Fall Times (2500pF Load)
- ◆ Output Swings to within 25mV of  $V_{DD}$  and GND

### Ordering Information

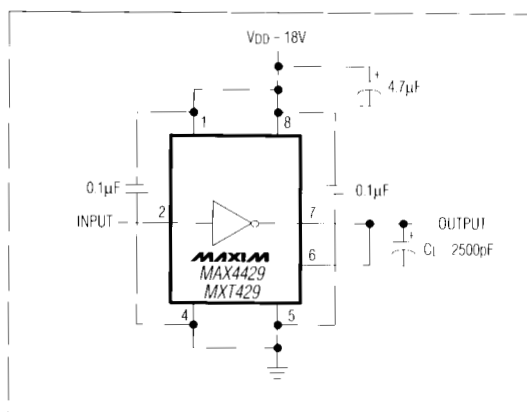
| PART       | TEMP. RANGE     | PIN-PACKAGE   |
|------------|-----------------|---------------|
| MAX4420CPA | 0°C to +70°C    | 8 Plastic DIP |
| MAX4420CSA | 0°C to +70°C    | 8 SO          |
| MAX4420C/D | 0°C to +70°C    | Dice*         |
| MAX4420EPA | -40°C to +85°C  | 8 Plastic DIP |
| MAX4420ESA | -40°C to +85°C  | 8 SO          |
| MAX4420MJA | -55°C to +125°C | 8 CERDIP**    |
| MAX4429CPA | 0°C to +70°C    | 8 Plastic DIP |
| MAX4429CSA | 0°C to +70°C    | 8 SO          |
| MAX4429C/D | 0°C to +70°C    | Dice*         |
| MAX4429EPA | -40°C to +85°C  | 8 Plastic DIP |
| MAX4429ESA | -40°C to +85°C  | 8 SO          |
| MAX4429MJA | -55°C to +125°C | 8 CERDIP**    |

Ordering information continued on last page.

\* Dice are specified at  $T_A = +25^\circ\text{C}$ .

\*\* Contact factory for availability and processing to MIL-STD-883 and DESC-SMD.

### Typical Operating Circuit



## High-Speed, 6A Single MOSFET Drivers

### ABSOLUTE MAXIMUM RATINGS

|                                                                          |                             |
|--------------------------------------------------------------------------|-----------------------------|
| Supply Voltage $V_{DD}$ to GND                                           | +20V                        |
| Input Voltage $V_{IN}$                                                   | -0.3V to ( $V_{DD}$ + 0.3V) |
| Continuous Power Dissipation ( $T_A = +70^\circ\text{C}$ )               |                             |
| Plastic DIP (derate 9.09mW/ $^\circ\text{C}$ above $+70^\circ\text{C}$ ) | 727mW                       |
| SO (derate 5.88mW/ $^\circ\text{C}$ above $+70^\circ\text{C}$ )          | 471mW                       |
| CERDIP (derate 8.00mW/ $^\circ\text{C}$ above $+70^\circ\text{C}$ )      | 640mW                       |

Operating Temperature Ranges:

|                                     |                                             |
|-------------------------------------|---------------------------------------------|
| MAX442_C__, MXT429C__               | $0^\circ\text{C}$ to $+70^\circ\text{C}$    |
| MAX442_E__, MXT429E__               | $-40^\circ\text{C}$ to $+85^\circ\text{C}$  |
| MAX442_MJA, MXT429MJA               | $-55^\circ\text{C}$ to $+125^\circ\text{C}$ |
| Storage Temperature Range           | $-65^\circ\text{C}$ to $+160^\circ\text{C}$ |
| Lead Temperature (soldering, 10sec) | $+300^\circ\text{C}$                        |

Stresses beyond 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 beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

### ELECTRICAL CHARACTERISTICS

(MAX4420/MAX4429  $V_{DD} = +4.5\text{V}$  to  $+18\text{V}$ , MXT429  $V_{DD} = +7\text{V}$  to  $+18\text{V}$ ,  $T_A = T_{MIN}$  to  $T_{MAX}$ , unless otherwise noted.)

| PARAMETER             | SYMBOL | CONDITIONS                                       |                   | MAX4420/MAX4429 |     |          | MXT429 |     |     | UNITS |
|-----------------------|--------|--------------------------------------------------|-------------------|-----------------|-----|----------|--------|-----|-----|-------|
|                       |        |                                                  |                   | MIN             | TYP | MAX      | MIN    | TYP | MAX |       |
| Operating Range       | VDD    |                                                  |                   | 4.5             |     | 18       | 7      |     | 18  | V     |
| Power Supply Current  | IDD    | VIN = 3V                                         | TA = +25°C        | 0.45            |     | 1.5      | 0.45   |     | 5.0 | mA    |
|                       |        |                                                  | TA = TMIN to TMAX | 3.0             |     | 12.0     |        |     |     |       |
|                       |        | VIN = 0V                                         | TA = +25°C        | 0.045           |     | 0.150    | 0.045  |     | 0.5 |       |
|                       |        |                                                  | TA = TMIN to TMAX | 0.400           |     | 1.0      |        |     |     |       |
| Logic 1 Input Voltage | VIH    |                                                  |                   | 2.4             |     | 2.4      |        |     | V   |       |
| Logic 0 Input Voltage | VIL    |                                                  |                   | 0.8             |     | 0.8      |        |     | V   |       |
| IN Leakage Current    | IIN    | VIN = 0V to VDD                                  |                   | ±10             |     | ±10      |        |     | µA  |       |
| Output High Voltage   | VOH    | No load                                          |                   | VDD - 25        |     | VDD - 25 |        |     | mV  |       |
| Output Low Voltage    | VOL    | No load                                          |                   | 25              |     | 25       |        |     | mV  |       |
| Peak Output Current   | IOUT   | VDD = 18V                                        | TA = +25°C        | 6               |     | 6        |        |     | A   |       |
| Output Resistance     | ROUT   | VDD = 18V,<br>IOUT = 10mA,<br>VIN = 0.8V or 2.4V | TA = +25°C        | 1.5             |     | 2.5      | 1.5    |     | 2.5 | Ω     |
|                       |        |                                                  | TA = TMIN to TMAX | 5.0             |     | 5.0      |        |     |     |       |
| Rise Time (Note 1)    | tR     | Figure 1                                         | TA = +25°C        | 25              |     | 30       | 25     |     | 35  | ns    |
|                       |        |                                                  | TA = TMIN to TMAX | 60              |     | 70       |        |     |     |       |
| Fall Time (Note 1)    | tF     | Figure 1                                         | TA = +25°C        | 25              |     | 30       | 25     |     | 35  | ns    |
|                       |        |                                                  | TA = TMIN to TMAX | 60              |     | 70       |        |     |     |       |
| Delay Time (Note 1)   | tD1    | Figure 1                                         | TA = +25°C        | 35              |     | 60       | 35     |     | 75  | ns    |
|                       |        |                                                  | TA = TMIN to TMAX | 100             |     | 100      |        |     |     |       |
|                       | tD2    | Figure 1                                         | TA = +25°C        | 40              |     | 60       | 40     |     | 75  |       |
|                       |        |                                                  | TA = TMIN to TMAX | 100             |     | 120      |        |     |     |       |

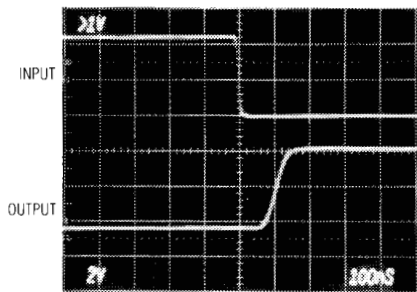
**Note 1:** Switching times guaranteed by design, not tested. See Figure 1 for timing measurement circuit,  $V_{DD} = 18\text{V}$ .

# High-Speed, 6A Single MOSFET Drivers

## Typical Operating Characteristics

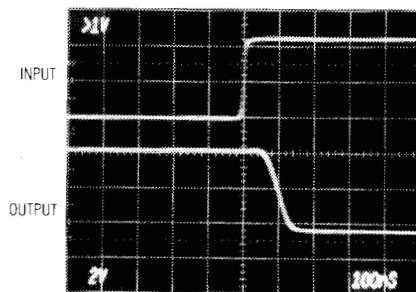
MAX4420/MAX4429/MXT429

MAX4429 SWITCHING SPEED (INPUT HIGH TO LOW)



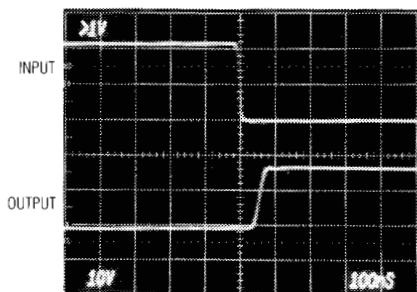
$V_{DD} = 4.5V$ ,  $C_L = 2500pF$ , TIME = 100ns/div,  
 $V_{IN} = 5V$  TO  $0V$ ,  
 $T_A = +25^\circ C$

MAX4429 SWITCHING SPEED (INPUT LOW TO HIGH)



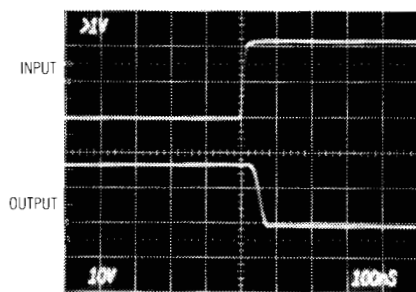
$V_{DD} = 4.5V$ ,  $C_L = 2500pF$ , TIME = 100ns/div,  
 $V_{IN} = 0V$  TO  $5V$ ,  
 $T_A = +25^\circ C$

MAX4429 SWITCHING SPEED (INPUT HIGH TO LOW)



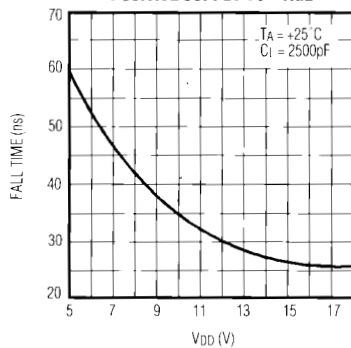
$V_{DD} = 18V$ ,  $C_L = 2500pF$ , TIME = 100ns/div,  
 $V_{IN} = 5V$  TO  $0V$ ,  
 $T_A = +25^\circ C$

MAX4429 SWITCHING SPEED (INPUT LOW TO HIGH)

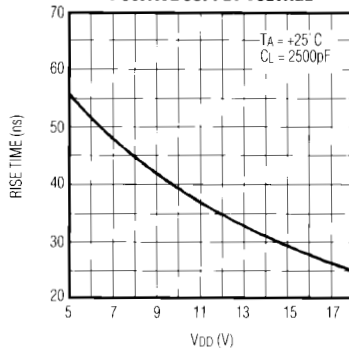


$V_{DD} = 18V$ ,  $C_L = 2500pF$ , TIME = 100ns/div,  
 $V_{IN} = 0V$  TO  $5V$ ,  
 $T_A = +25^\circ C$

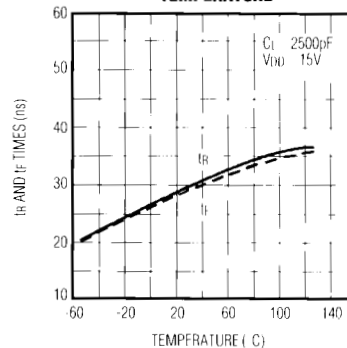
FALL TIME vs.  
POSITIVE SUPPLY VOLTAGE



RISE TIME vs.  
POSITIVE SUPPLY VOLTAGE

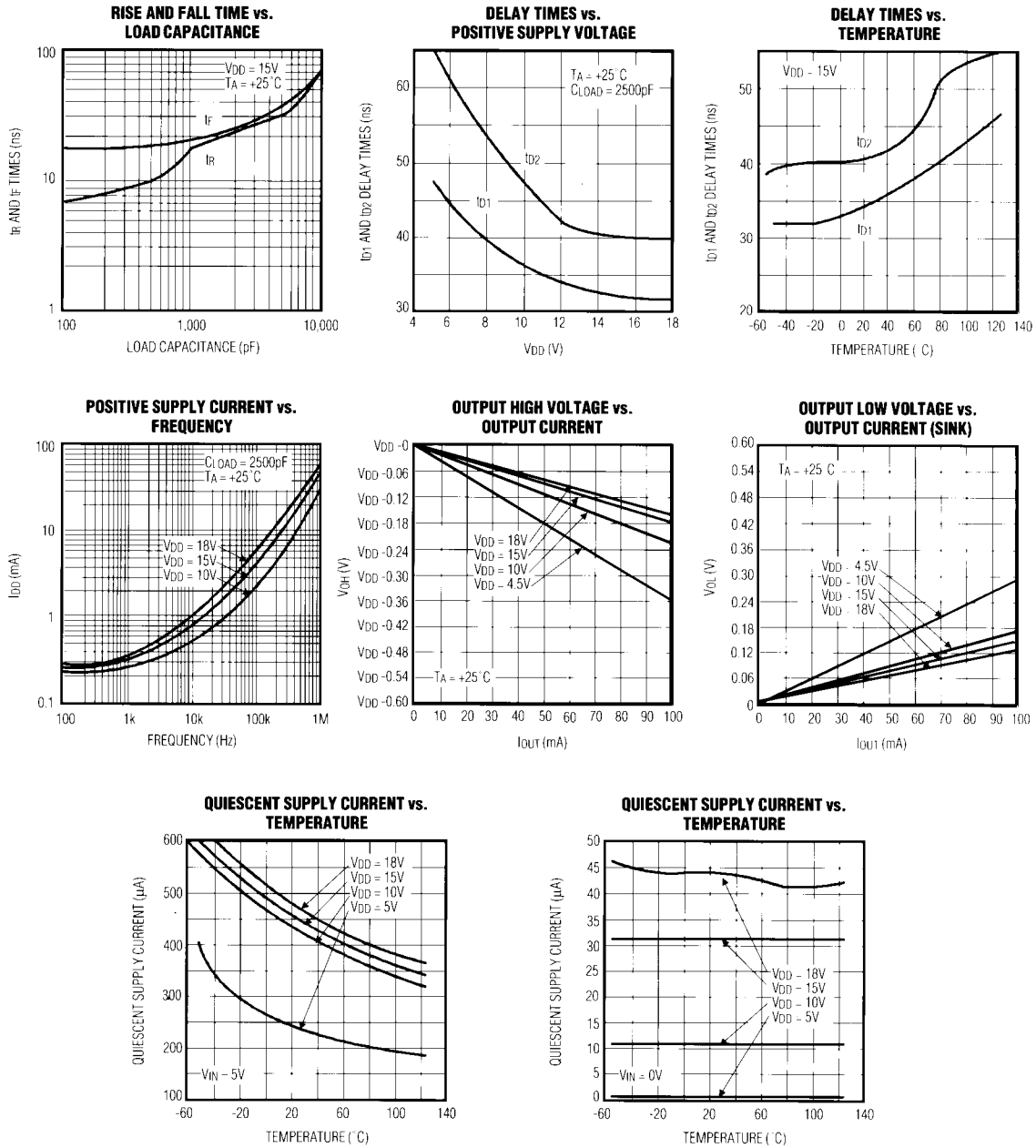


RISE AND FALL TIMES vs.  
TEMPERATURE



# High-Speed, 6A Single MOSFET Drivers

## Typical Operating Characteristics (continued)



**MAX4420/MAX4429/MXT429**



# High-Speed, 6A Single MOSFET Drivers

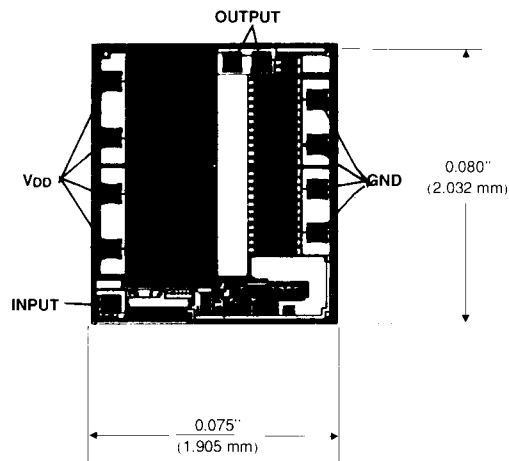
## Ordering Information (continued)

| PART             | TEMP. RANGE     | PIN-PACKAGE   |
|------------------|-----------------|---------------|
| <b>MXT429CPA</b> | 0°C to +70°C    | 8 Plastic DIP |
| MXT429CSA        | 0°C to +70°C    | 8 SO          |
| MXT429C/D        | 0°C to +70°C    | Dice*         |
| MXT429EPA        | -40°C to +85°C  | 8 Plastic DIP |
| MXT429ESA        | -40°C to +85°C  | 8 SO          |
| MXT429MJA        | -55°C to +125°C | 8 CERDIP**    |

\* Dice are specified at  $T_A = +25^\circ\text{C}$ .

\*\* Contact factory for availability and processing to MIL-STD-883 and DESC-SMD.

## Chip Topography



TRANSISTOR COUNT: 16;  
SUBSTRATE CONNECTED TO  $V_{DD}$ .

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### Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: [info@moschip.ru](mailto:info@moschip.ru)

Skype отдела продаж:

moschip.ru

moschip.ru\_4

moschip.ru\_6

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