



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 1.5Ω 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 10μA. 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 45μA and 450μA 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 ($I_{IN} \leq 10\mu A$)
- ◆ 4.5V to 18V Supply Range (MAX4420/MAX4429)
- ◆ 1.5Ω 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 $T_A = +25^\circ C$.

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

Typical Operating Circuit



MAX4420/MAX4429/MXT429

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ABSOLUTE MAXIMUM RATINGS

| | | | |
|--|-----------------------------|-------------------------------------|-----------------|
| Supply Voltage V_{DD} to GND | +20V | Operating Temperature Ranges: | |
| Input Voltage V_{IN} | -0.3V to (V_{DD} + 0.3V) | MAX442_C__, MXT429C__ | 0°C to +70°C |
| Continuous Power Dissipation ($T_A = +70^\circ\text{C}$) | | MAX442_E__, MXT429E__ | -40°C to +85°C |
| Plastic DIP (derate 9.09mW/°C above +70°C) | 727mW | MAX442_MJA, MXT429MJA | -55°C to +125°C |
| SO (derate 5.88mW/°C above +70°C) | 471mW | Storage Temperature Range | -65°C to +160°C |
| CERDIP (derate 8.00mW/°C above +70°C) | 640mW | Lead Temperature (soldering, 10sec) | +300°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 +18V, MXT429 $V_{DD} = +7\text{V}$ to +18V, $T_A = T_{MIN}$ to T_{MAX} , unless otherwise noted.)

| PARAMETER | SYMBOL | CONDITIONS | | MAX4420/MAX4429 | | | MXT429 | | | UNITS |
|-----------------------|-----------|---|------------------------------|-----------------|-------|----------|---------------|----------|---------------|-------|
| | | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| Operating Range | V_{DD} | | | 4.5 | | 18 | 7 | | 18 | V |
| Power Supply Current | I_{DD} | $V_{IN} = 3\text{V}$ | $T_A = +25^\circ\text{C}$ | 0.45 | 1.5 | | 0.45 | 5.0 | | mA |
| | | | $T_A = T_{MIN}$ to T_{MAX} | | | 3.0 | | 12.0 | | |
| | | $V_{IN} = 0\text{V}$ | $T_A = +25^\circ\text{C}$ | 0.045 | 0.150 | | 0.045 | 0.5 | | |
| | | | $T_A = T_{MIN}$ to T_{MAX} | | | 0.400 | | 1.0 | | |
| Logic 1 Input Voltage | V_{IH} | | | 2.4 | | | 2.4 | | V | |
| Logic 0 Input Voltage | V_{IL} | | | | | 0.8 | | 0.8 | V | |
| IN Leakage Current | I_{IN} | $V_{IN} = 0\text{V}$ to V_{DD} | | | | ± 10 | | ± 10 | μA | |
| Output High Voltage | V_{OH} | No load | | $V_{DD} - 25$ | | | $V_{DD} - 25$ | | | mV |
| Output Low Voltage | V_{OL} | No load | | 25 | | | 25 | | | mV |
| Peak Output Current | I_{OUT} | $V_{DD} = 18\text{V}$ | $T_A = +25^\circ\text{C}$ | 6 | | | 6 | | A | |
| Output Resistance | R_{OUT} | $V_{DD} = 18\text{V}$, $I_{OUT} = 10\text{mA}$, $V_{IN} = 0.8\text{V}$ or 2.4V | $T_A = +25^\circ\text{C}$ | 1.5 | 2.5 | | 1.5 | 2.5 | Ω | |
| | | | $T_A = T_{MIN}$ to T_{MAX} | | | 5.0 | | 5.0 | | |
| Rise Time (Note 1) | t_R | Figure 1 | $T_A = +25^\circ\text{C}$ | 25 | 30 | | 25 | 35 | ns | |
| | | | $T_A = T_{MIN}$ to T_{MAX} | | | 60 | | 70 | | |
| Fall Time (Note 1) | t_F | Figure 1 | $T_A = +25^\circ\text{C}$ | 25 | 30 | | 25 | 35 | ns | |
| | | | $T_A = T_{MIN}$ to T_{MAX} | | | 60 | | 70 | | |
| Delay Time (Note 1) | t_{D1} | Figure 1 | $T_A = +25^\circ\text{C}$ | 35 | 60 | | 35 | 75 | ns | |
| | | | $T_A = T_{MIN}$ to T_{MAX} | | | 100 | | 100 | | |
| | t_{D2} | Figure 1 | $T_A = +25^\circ\text{C}$ | 40 | 60 | | 40 | 75 | | |
| | | | $T_A = T_{MIN}$ to T_{MAX} | | | 100 | | 120 | | |

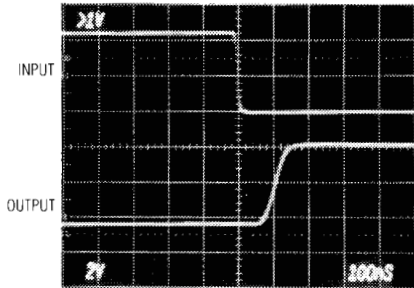
Note 1: Switching times guaranteed by design, not tested. See Figure 1 for timing measurement circuit, $V_{DD} = 18\text{V}$.

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Typical Operating Characteristics

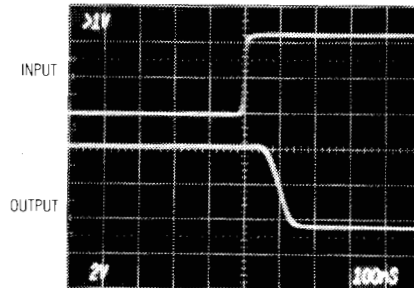
MAX4420/MAX4429/MXT429

MAX4429 SWITCHING SPEED (INPUT HIGH TO LOW)



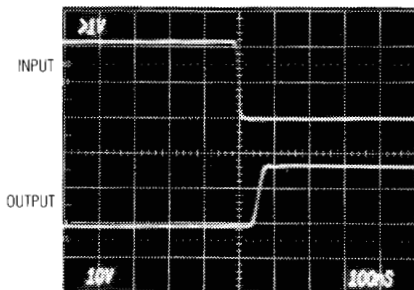
$V_{DD} = 4.5V$, $C_L = 2500pF$, TIME = 100ns/div,
 $V_{IN} = 5V$ TO $0V$,
 $T_A = +25^\circ C$

MAX4429 SWITCHING SPEED (INPUT LOW TO HIGH)



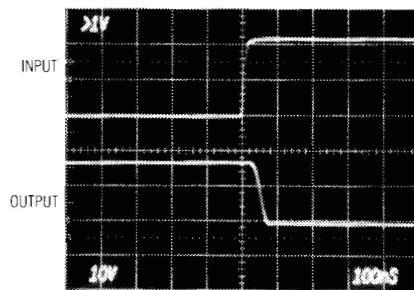
$V_{DD} = 4.5V$, $C_L = 2500pF$, TIME = 100ns/div,
 $V_{IN} = 0V$ TO $5V$,
 $T_A = +25^\circ C$

MAX4429 SWITCHING SPEED (INPUT HIGH TO LOW)



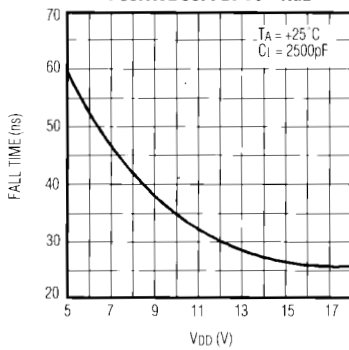
$V_{DD} = 18V$, $C_L = 2500pF$, TIME = 100ns/div,
 $V_{IN} = 5V$ TO $0V$,
 $T_A = +25^\circ C$

MAX4429 SWITCHING SPEED (INPUT LOW TO HIGH)

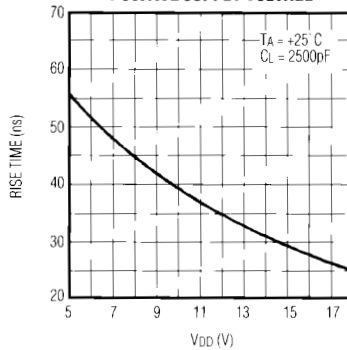


$V_{DD} = 18V$, $C_L = 2500pF$, TIME = 100ns/div,
 $V_{IN} = 0V$ TO $5V$,
 $T_A = +25^\circ C$

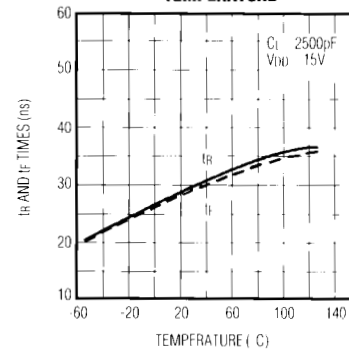
FALL TIME vs. POSITIVE SUPPLY VOLTAGE



RISE TIME vs. POSITIVE SUPPLY VOLTAGE

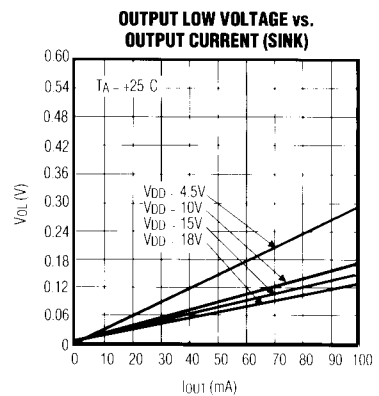
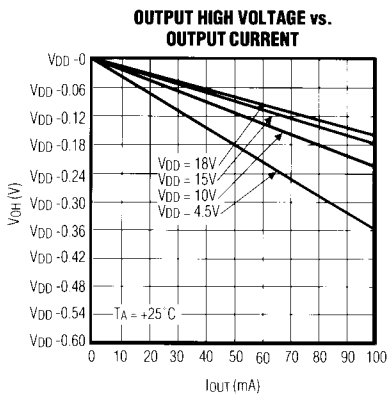
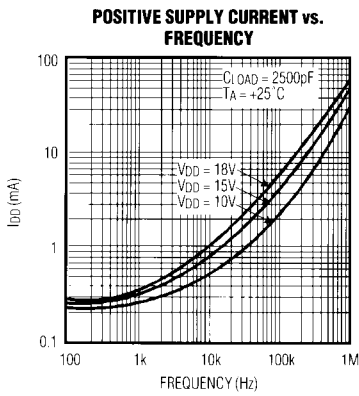


RISE AND FALL TIMES vs. TEMPERATURE



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Typical Operating Characteristics (continued)



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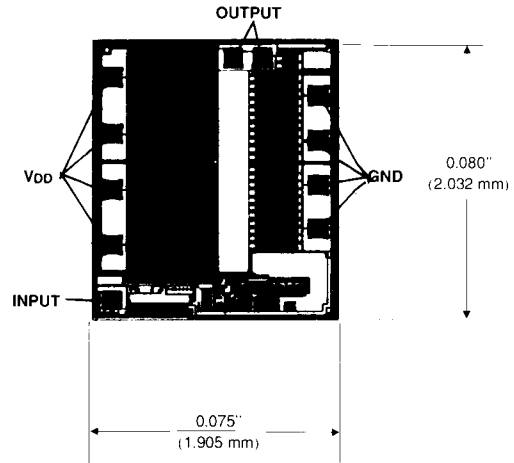
Ordering Information (continued)

| PART | TEMP. RANGE | PIN-PACKAGE |
|-----------|-----------------|---------------|
| MXT429CPA | 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 $T_A = +25^\circ\text{C}$.

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Chip Topography



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

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