



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 $10\mu\text{A}$. 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.

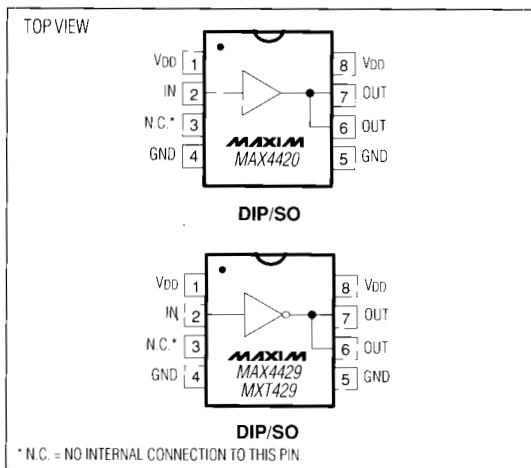
Power-supply quiescent current is typically $45\mu\text{A}$ and $450\mu\text{A}$ for logic input low and high, respectively. The MAX4420 has a non inverting output. The MAX4429 and MXT429 have inverting outputs.

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)
- ◆ 1.5Ω 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

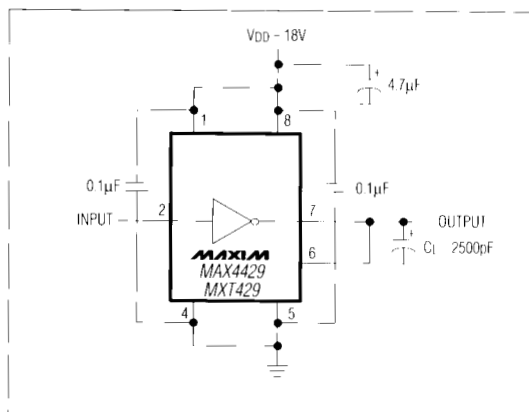
PART	TEMP. RANGE	PIN-PACKAGE
MAX4420CPA	0°C to +70°C	8 Plastic DIP
MAX4420CSA	0°C to +70°C	8 SO
MAX4420C/D	0°C to +70°C	Dice*
MAX4420EPA	-40°C to +85°C	8 Plastic DIP
MAX4420ESA	-40°C to +85°C	8 SO
MAX4420MJA	-55°C to +125°C	8 CERDIP**
MAX4429CPA	0°C to +70°C	8 Plastic DIP
MAX4429CSA	0°C to +70°C	8 SO
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 $T_A = +25^\circ\text{C}$.

** 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 $V_{DD} = +4.5V$ to $+18V$, MXT429 $V_{DD} = +7V$ 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	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	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, IOUT = 10mA, 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				

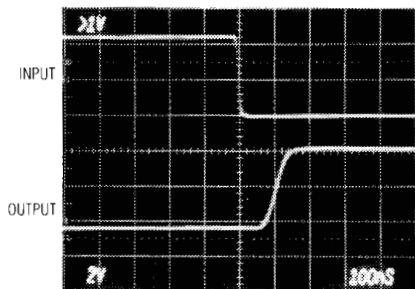
Note 1: Switching times guaranteed by design, not tested. See Figure 1 for timing measurement circuit, $V_{DD} = 18V$.

High-Speed, 6A Single MOSFET Drivers

Typical Operating Characteristics

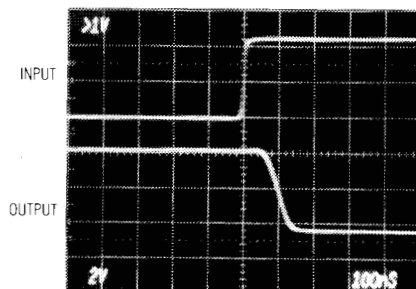
MAX4420/MAX4429/MXT429

MAX4429 SWITCHING SPEED (INPUT HIGH TO LOW)



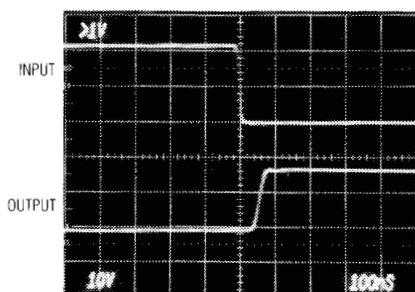
$V_{DD} = 4.5V$, $C_L = 2500pF$, $TIME = 100ns/div$,
 $V_{IN} = 5V TO 0V$,
 $T_A = +25^{\circ}C$

MAX4429 SWITCHING SPEED (INPUT LOW TO HIGH)



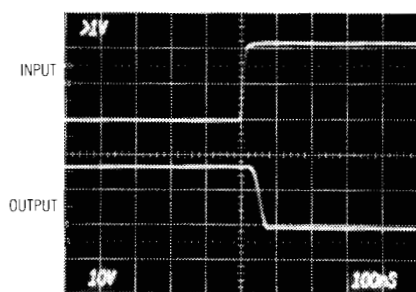
$V_{DD} = 4.5V$, $C_L = 2500pF$, $TIME = 100ns/div$,
 $V_{IN} = 0V TO 5V$,
 $T_A = +25^{\circ}C$

MAX4429 SWITCHING SPEED (INPUT HIGH TO LOW)



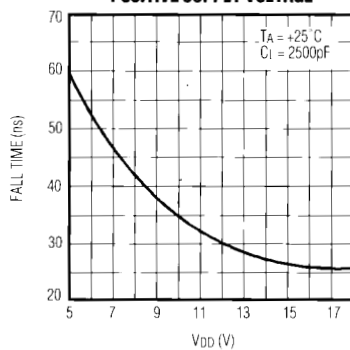
$V_{DD} = 18V$, $C_L = 2500pF$, $TIME = 100ns/div$,
 $V_{IN} = 5V TO 0V$,
 $T_A = +25^{\circ}C$

MAX4429 SWITCHING SPEED (INPUT LOW TO HIGH)

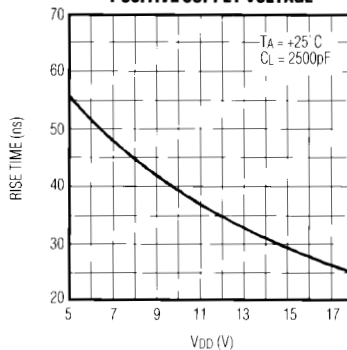


$V_{DD} = 18V$, $C_L = 2500pF$, $TIME = 100ns/div$,
 $V_{IN} = 0V TO 5V$,
 $T_A = +25^{\circ}C$

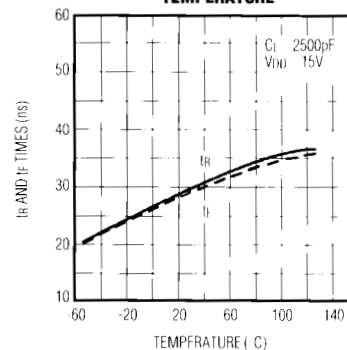
FALL TIME vs.
POSITIVE SUPPLY VOLTAGE



RISE TIME vs.
POSITIVE SUPPLY VOLTAGE

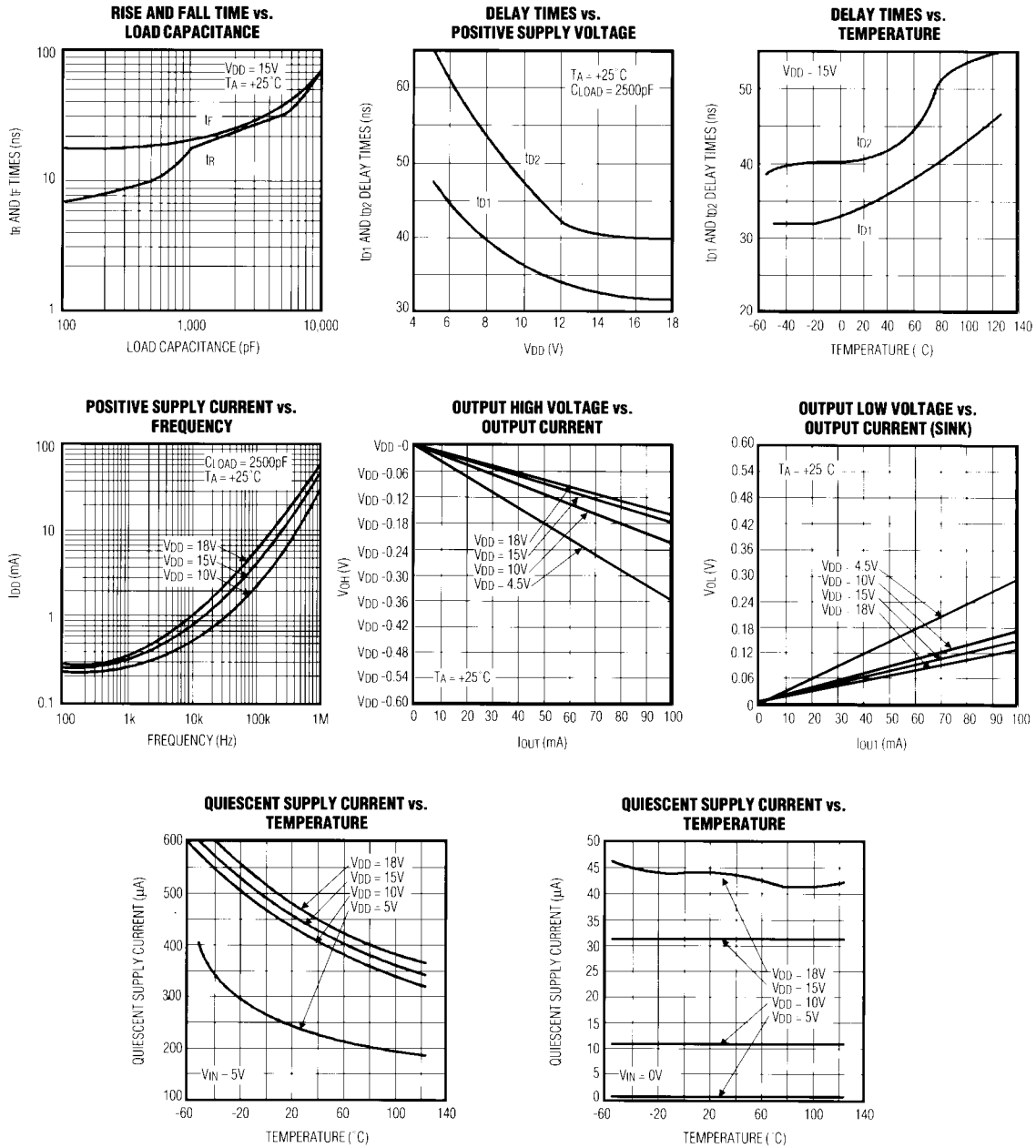


RISE AND FALL TIMES vs.
TEMPERATURE



High-Speed, 6A Single MOSFET Drivers

Typical Operating Characteristics (continued)



MAX4420/MAX4429/MXT429



High-Speed, 6A Single MOSFET Drivers

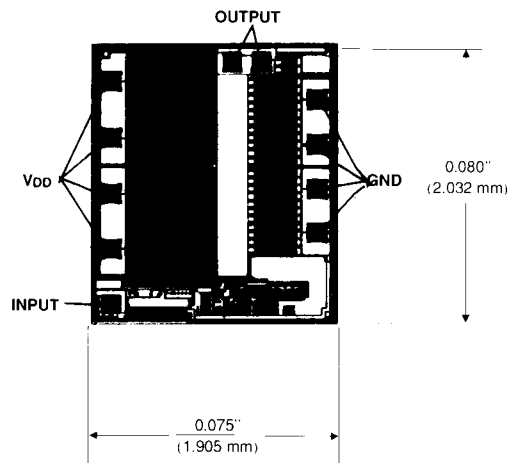
Ordering Information (continued)

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

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

Chip Topography



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

Maxim cannot assume responsibility for use of any circuitry other than circuitry entirely embodied in a Maxim product. No circuit patent licenses are implied. Maxim reserves the right to change the circuitry and specifications without notice at any time.

6 Maxim Integrated Products, 120 San Gabriel Drive, Sunnyvale, CA 94086 (408) 737-7600

© 1992 Maxim Integrated Products

Printed USA

MAXIM is a registered trademark of Maxim Integrated Products.