1.2A DUAL HIGH-SPEED MOSFET DRIVERS

FEATURES

- Low Cost
- Latch-Up Protected: Will Withstand 500 mA Reverse Output Current
- ESD Protected ..... ±2 kV
- High Peak Output Current ..... 1.2A Peak
- High Capacitive Load Drive Capability ..... 1000 pF in 38 ns
- Wide Operating Range ..... 4.5V to 16V
- Low Delay Time ..... 75 ns Max
- Logic Input Threshold Independent of Supply Voltage
- Output Voltage Swing to Within 25 mV of Ground or V_{DD}
- Low Output Impedance 8Ω

APPLICATIONS

- Power MOSFET Drivers
- Switched Mode Power Supplies
- Pulse Transformer Drive
- Small Motor Controls
- Print Head Drive

GENERAL DESCRIPTION

The TC1426/27/28 are a family of 1.2A dual high-speed drivers. They are ideal for high-volume OEM manufacturers, with latch-up protection, ESD protection, and a proprietary molding compound for high reliability. CMOS fabrication is used for low power consumption and high efficiency.

These devices are fabricated using an epitaxial layer to effectively short out the intrinsic parasitic transistor responsible for CMOS latch-up. They incorporate a number of other design and process refinements to increase their long-term reliability.

The TC1426 is compatible with the bipolar DS0026, but only draws 1/5 of the quiescent current. The TC1426/27/28 are also compatible with the TC426/27/28, but with 1.2A peak output current rather than the 1.5A of theTC426/27/28 devices.

The high-input impedance TC1426/27/28 drivers are CMOS/TTL input-compatible, do not require the speed-up needed by the bipolar devices, and can be directly driven by most PWM ICs.

This family of devices is available in inverting and non-inverting versions. Specifications have been optimized to achieve low-cost and high-performance devices, well-suited for the high-volume manufacturer.

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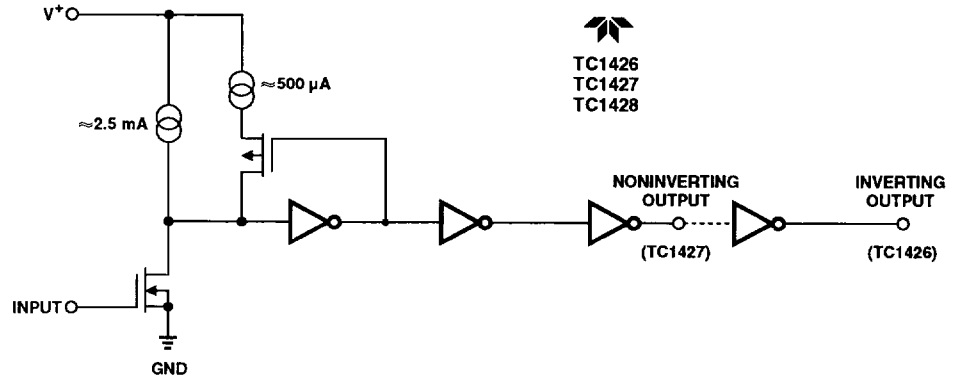
FUNCTIONAL DIAGRAM



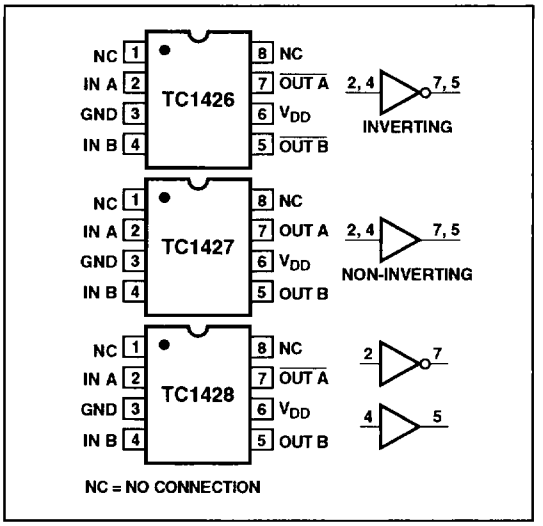
NOTE: TC1428 has one inverting and one noninverting driver. Ground any unused driver input.

TC1426
TC1427
TC1428

ORDERING INFORMATION

Part No.	Package	Configuration	Range
TC1426COA	8-Pin SO	Inverting	0°C to +70°C
TC1426CPA	8-Pin Plastic DIP	Inverting	0°C to +70°C
TC1426EPA	8-Pin Plastic DIP	Inverting	-40°C to +85°C
TC1426EOA	8-Pin SO	Inverting	-40°C to +85°C
TC1427COA	8-Pin SO	Non-Inverting	0°C to +70°C
TC1427CPA	8-Pin Plastic DIP	Non-Inverting	0°C to +70°C
TC1427EPA	8-Pin Plastic DIP	Non-Inverting	-40°C to +85°C
TC1427EOA	8-Pin SO	Non-Inverting	-40°C to +85°C
TC1428COA	8-Pin SO	Inverting and Non-Inverting	0°C to +70°C
TC1428CPA	8-Pin Plastic DIP	Inverting and Non-Inverting	0°C to +70°C
TC1428EPA	8-Pin Plastic DIP	Inverting and Non-Inverting	-40°C to +85°C
TC1428.EOA	8-Pin SO	Inverting and Non-Inverting	-40°C to +85°C

PIN CONFIGURATIONS



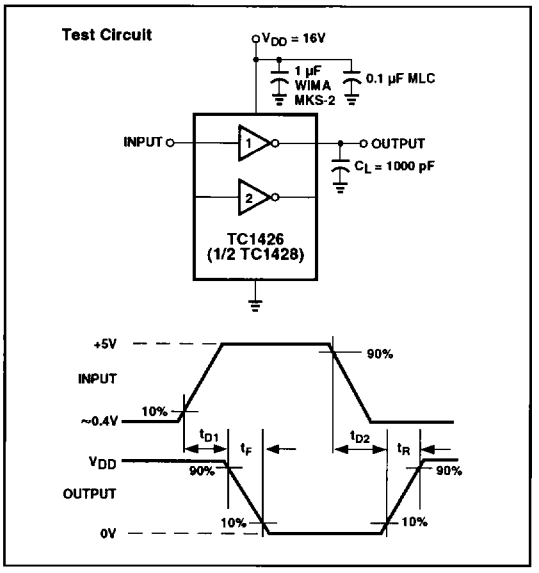


Figure 1. Inverting Driver Switching Time

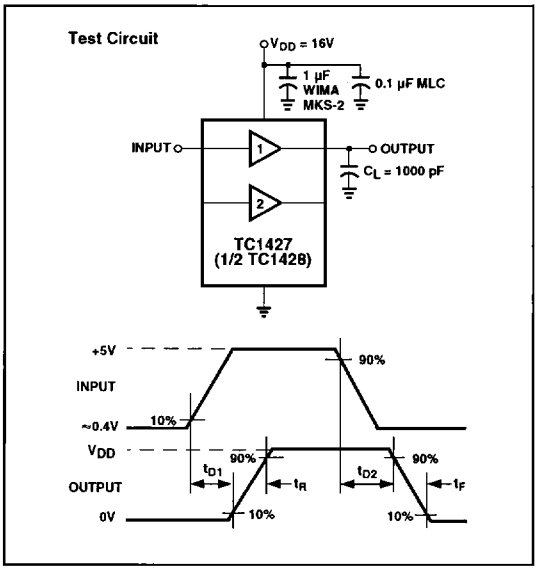


Figure 2. Non-Inverting Driver Switching Time

ABSOLUTE MAXIMUM RATINGS (Notes 1, 2 and 3)

Power Dissipation
- Plastic DIP 1W
- SOIC ..... 500 mW

Derating Factor
- Plastic DIP ..... 8 mW/°C
- SOIC ..... 4 mW/°C

Supply Voltage 18V
Input Voltage, Any Terminal ..... V_S + 0.3V to GND –0.3V
Operating Temperature: C Version ..... 0°C to +70°C
: E Version ..... -40°C to +85°C
Maximum Chip Temperature ..... +150°C
Storage Temperature ..... +65°C to +160°C
Lead Temperature (10 sec) ..... +300°C

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 inthe operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

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ELECTRICAL CHARACTERISTICS (T_A = 25°C with 4.5V ≤ V_{DD} ≤ 16V unless otherwise specified.)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Input						
V_{IH}	Logic 1, Input Voltage		3	—	—	V
V_{IL}	Logic 0, Input Voltage		—	—	0.8	V
I_{IN}	Input Current	0V ≤ V_{IN} ≤ V_{DD}	–1	—	1	µA
Output						
V_{OH}	High Output Voltage	Test Figures 1 and 2	V_{DD}–0.025	—	—	V
V_{OL}	Low Output Voltage	Test Figures 1 and 2	—	—	0.025	V
R_O	Output Resistance	V_{IN} = 0.8V I_{OUT} = 10 mA, V_{DD} = 16V	—	12	18	Ω
		V_{IN} = 3V I_{OUT} = 10 mA, V_{DD} = 16V	—	8	12	Ω
I_{PK}	Peak Output Current		—	1.2	—	A
I	Latch-Up Current	Withstand Reverse Current	>500	—	—	mA
Switching Time (Note 1)						
t_R	Rise Time	Test Figures 1 and 2	—	—	35	ns
t_F	Fall Time	Test Figures 1 and 2	—	—	25	ns
t_{D1}	Delay Time	Test Figures 1 and 2	—	—	75	ns
t_{D2}	Delay Time	Test Figures 1 and 2	—	—	75	ns
Power Supply						
I_S	Power Supply Current	V_{IN} = 3V (Both Inputs)	—	—	9	mA
		V_{IN} = 0V (Both Inputs)	—	—	0.5	mA

Note: 1. Switching times guaranteed by design.

TC1426
TC1427
TC1428

ELECTRICAL CHARACTERISTICS

(Over operating temperature range with 4.5V ≤ V_{DD} ≤ 16V unless otherwise specified.)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Input						
V_{IH}	Logic 1, Input Voltage		3	—	—	V
V_{IL}	Logic 0, Input Voltage		—	—	0.8	V
I_{IN}	Input Current	0V ≤ V_{IN} ≤ V_{DD}	–10	—	10	µA
Output						
V_{OH}	High Output Voltage	Test Figures 1 and 2	V_{DD}–0.025	—	—	V
V_{OL}	Low Output Voltage	Test Figures 1 and 2	—	—	0.025	V
R_O	Output Resistance	V_{IN} = 0.8V I_{OUT} = 10 mA, V_{DD} = 16V	—	15	23	Ω
		V_{IN} = 3V I_{OUT} = 10 mA, V_{DD} = 16V	—	10	18	Ω
I	Latch-Up Current	Withstand Reverse Current	>500	—	—	mA
Switching Time						
t_R	Rise Time	Test Figures 1 and 2	—	—	60	ns
t_F	Fall Time	Test Figures 1 and 2	—	—	40	ns
t_{D1}	Delay Time	Test Figures 1 and 2	—	—	125	ns
t_{D2}	Delay Time	Test Figures 1 and 2	—	—	125	ns
Power Supply						
I_S	Power Supply Current	V_{IN} = 3V (Both Inputs)	—	—	13	mA
		V_{IN} = 0V (Both Inputs)	—	—	0.7	mA

SUPPLY BYPASSING

Large currents are required to charge and discharge large capacitive loads quickly. For example, charging a 1000-pF load 16V in 25 ns requires an 0.8A current from the device power supply.

To guarantee low supply impedance over a wide frequency range, a parallel capacitor combination is recommended for supply bypassing. Low-inductance ceramic MLC capacitors with short lead lengths (<0.5-in.) should be used. A 1.0-µF film capacitor in parallel with one or two 0.1-µF ceramic MLC capacitors normally provides adequate bypassing.

GROUNDING

The TC1426 and TC1428 contain inverting drivers. Ground potential drops developed in common ground impedances from input to output will appear as negative feedback and degrade switching speed characteristics.

Individual ground returns for the input and output circuits or a ground plane should be used.

INPUT STAGE

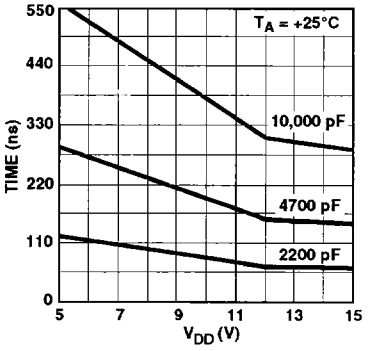
The input voltage level changes the no-load or quiescent supply current. The N-channel MOSFET input stage transistor drives a 2.5 mA current source load. With a logic "1" input, the maximum quiescent supply current is 9 mA. Logic "0" input level signals reduce quiescent current to 500 µA maximum. **Unused driver inputs must be connected to V_{DD} or GND.** Minimum power dissipation occurs for logic "0" inputs for the TC1426/27/28.

The drivers are designed with 100 mV of hysteresis. This provides clean transitions and minimizes output stage current spiking when changing states. Input voltage thresholds are approximately 1.5V, making logic "1" input any voltage greater than 1.5V up to V_{DD}. Input current is less than 1 µA over this range.

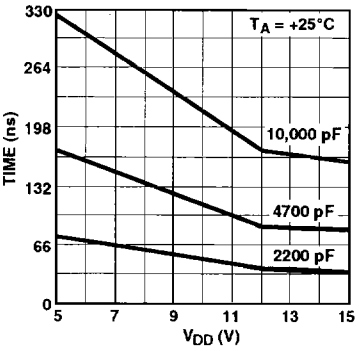
The TC1426/27/28 may be directly driven by the TL494, SG1526/27, TC38C42, TC170 and similar switch-mode power supply integrated circuits.

TYPICAL CHARACTERISTIC CURVES

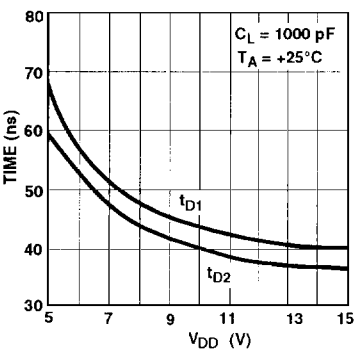
Rise Time vs Supply Voltage



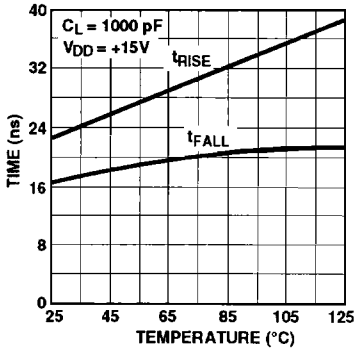
Fall Time vs Supply Voltage



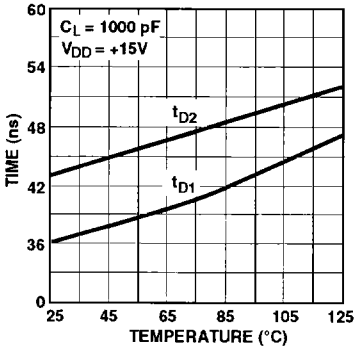
Delay Time vs Supply Voltage



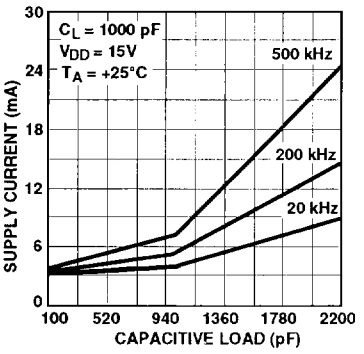
Rise and Fall Times vs Temperature



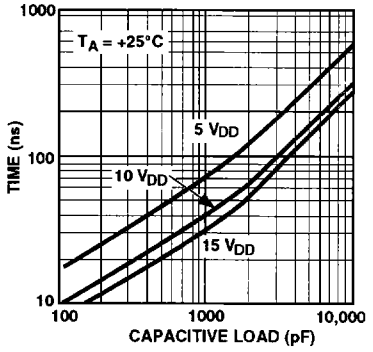
Delay Time vs Temperature



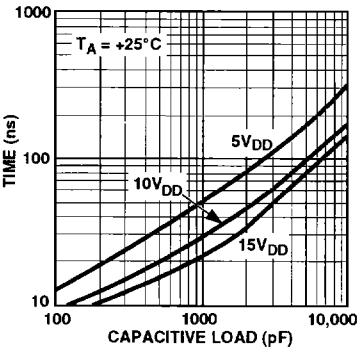
Supply Current vs Capacitive Load



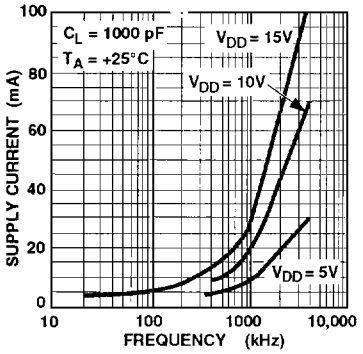
Rise Time vs Capacitive Load



Fall Time vs Capacitive Load



Supply Current vs Frequency



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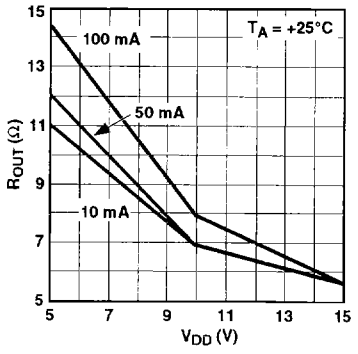
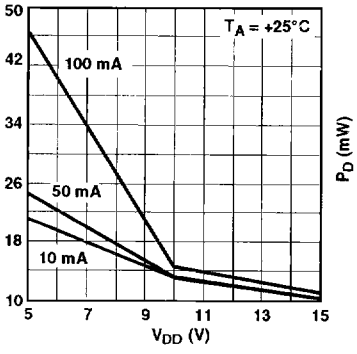
TYPICAL CHARACTERISTIC CURVES (Cont.)

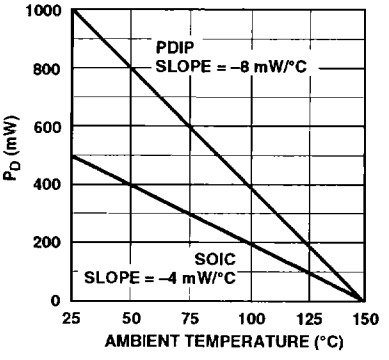
Low-State Output Resistance



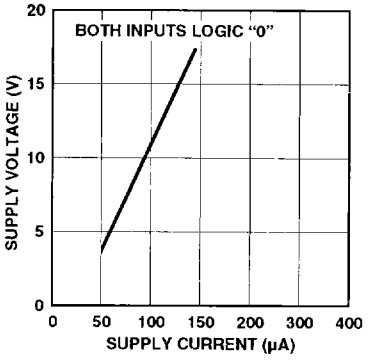
High-State Output Resistance



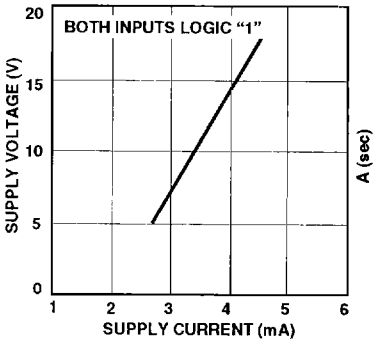
Package Power Dissipation



Quiescent Power Supply Current vs Supply Voltage



Quiescent Power Supply Current vs Supply Voltage



Crossover Energy Loss