**Features**

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

**Applications**

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

**Device Selection Table**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
<th>Temp. Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC1426COA</td>
<td>8-Pin SOIC</td>
<td>0°C to +70°C</td>
</tr>
<tr>
<td>TC1426CPA</td>
<td>8-Pin PDIP</td>
<td>0°C to +70°C</td>
</tr>
<tr>
<td>TC1427COA</td>
<td>8-Pin SOIC</td>
<td>0°C to +70°C</td>
</tr>
<tr>
<td>TC1427CPA</td>
<td>8-Pin PDIP</td>
<td>0°C to +70°C</td>
</tr>
<tr>
<td>TC1428COA</td>
<td>8-Pin SOIC</td>
<td>0°C to +70°C</td>
</tr>
<tr>
<td>TC1428CPA</td>
<td>8-Pin PDIP</td>
<td>0°C to +70°C</td>
</tr>
</tbody>
</table>

**General Description**

The TC1426/TC1427/TC1428 are a family of 1.2A dual high-speed MOSFET drivers. 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/TC1427/TC1428 are also compatible with the TC426/TC427/TC428, but with 1.2A peak output current rather than the 1.5A of the TC426/TC427/TC428 devices.

Other compatible drivers are the TC4426/TC4427/TC4428 and the TC4426A/TC4427A/TC4428A. The TC4426/TC4427/TC4428 have the added feature that the inputs can withstand negative voltage up to 5V with diode protection circuits. The TC4426A/TC4427A/TC4428A have matched input to output leading edge and falling edge delays, tD1 and tD2, for processing short duration pulses in the 25 nanoseconds range. All of the above drivers are pin compatible.

The high-input impedance TC1426/TC1427/TC1428 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.
NOTE: TC1428 has one inverting and one noninverting driver. Ground any unused driver input.
1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings*

Supply Voltage.......................................................... +18V
Input Voltage, Any Terminal ............................................. VDD + 0.3V to GND – 0.3V
Power Dissipation (TA ≤ 70°C)
PDIP ........................................................................ 730mW
SOIC ......................................................................... 470mW
Derating Factor
PDIP ......................................................................... 8mW/°C
SOIC .......................................................................... 4mW/°C
Operating Temperature Range
C Version ................................................................. 0°C to +70°C
Storage Temperature Range ....................... -65°C to +150°C

TC1426/TC1427/TC1428 ELECTRICAL SPECIFICATIONS

Electrical Characteristics: TA = +25°C, with 4.5V ≤ VDD ≤ 16V, unless otherwise noted.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
<th>Test Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VIH</td>
<td>Logic 1, High Input Voltage</td>
<td>3</td>
<td>—</td>
<td>—</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>VIL</td>
<td>Logic 0, Low Input Voltage</td>
<td>—</td>
<td>—</td>
<td>0.8</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>IIN</td>
<td>Input Current</td>
<td>—1</td>
<td>—</td>
<td>1</td>
<td>µA</td>
<td>0V ≤ VIN ≤ VDD</td>
</tr>
<tr>
<td>VOH</td>
<td>High Output Voltage</td>
<td>VDD – 0.025</td>
<td>—</td>
<td>—</td>
<td>V</td>
<td>Figure 3-1, Figure 3-2</td>
</tr>
<tr>
<td>VOL</td>
<td>Low Output Voltage</td>
<td>—</td>
<td>—</td>
<td>0.025</td>
<td>V</td>
<td>Figure 3-1, Figure 3-2</td>
</tr>
<tr>
<td>RO</td>
<td>Output Resistance</td>
<td>—</td>
<td>12</td>
<td>18</td>
<td>12</td>
<td>Ω</td>
</tr>
<tr>
<td>IPK</td>
<td>Peak Output Current</td>
<td>—</td>
<td>1.2</td>
<td>—</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>IREV</td>
<td>Latch-Up Current Withstand Reverse Current</td>
<td>—</td>
<td>&gt;500</td>
<td>—</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Switching Time (Note 1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IR</td>
<td>Rise Time</td>
<td>—</td>
<td>—</td>
<td>35</td>
<td>nsec</td>
<td>Figure 3-1, Figure 3-2</td>
</tr>
<tr>
<td>IF</td>
<td>Fall Time</td>
<td>—</td>
<td>—</td>
<td>25</td>
<td>nsec</td>
<td>Figure 3-1, Figure 3-2</td>
</tr>
<tr>
<td>ID1</td>
<td>Delay Time</td>
<td>—</td>
<td>—</td>
<td>75</td>
<td>nsec</td>
<td>Figure 3-1, Figure 3-2</td>
</tr>
<tr>
<td>ID2</td>
<td>Delay Time</td>
<td>—</td>
<td>—</td>
<td>75</td>
<td>nsec</td>
<td>Figure 3-1, Figure 3-2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Power Supply Current</td>
<td>—</td>
<td>—</td>
<td>9</td>
<td>mA</td>
<td>VIN = 3V (Both Inputs)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.5</td>
<td>mA</td>
<td>VIN = 0V (Both Inputs)</td>
</tr>
</tbody>
</table>

Note 1: Switching times ensured by design.

*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.
## TC1426/TC1427/TC1428 ELECTRICAL SPECIFICATIONS (CONTINUED)

**Electrical Characteristics:** Over operating temperature range with 4.5V ≤ VDD ≤ 16V, unless otherwise noted.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
<th>Test Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VIH</td>
<td>Logic 1, High Input Voltage</td>
<td>3</td>
<td>—</td>
<td>—</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>VIL</td>
<td>Logic 0, Low Input Voltage</td>
<td>—</td>
<td>—</td>
<td>0.8</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>IIN</td>
<td>Input Current</td>
<td>-10</td>
<td>—</td>
<td>10</td>
<td>μA</td>
<td>0V ≤ VIN ≤ VDD</td>
</tr>
<tr>
<td><strong>Output</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VOH</td>
<td>High Output Voltage</td>
<td>VDD – 0.025</td>
<td>—</td>
<td>—</td>
<td>V</td>
<td>Figure 3-1, Figure 3-2</td>
</tr>
<tr>
<td>VOL</td>
<td>Low Output Voltage</td>
<td>—</td>
<td>—</td>
<td>0.025</td>
<td>V</td>
<td>Figure 3-1, Figure 3-2</td>
</tr>
<tr>
<td>RO</td>
<td>Output Resistance</td>
<td>—</td>
<td>15</td>
<td>23</td>
<td>18</td>
<td>Ω</td>
</tr>
<tr>
<td>IREV</td>
<td>Latch-Up Current</td>
<td>—</td>
<td>&gt;500</td>
<td>—</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>IREV</td>
<td>Withstand Reverse Current</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

### Switching Time (Note 1)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
<th>Test Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>tR</td>
<td>Rise Time</td>
<td>—</td>
<td>—</td>
<td>60</td>
<td>nsec</td>
<td>Figure 3-1, Figure 3-2</td>
</tr>
<tr>
<td>tF</td>
<td>Fall Time</td>
<td>—</td>
<td>—</td>
<td>40</td>
<td>nsec</td>
<td>Figure 3-1, Figure 3-2</td>
</tr>
<tr>
<td>tD1</td>
<td>Delay Time</td>
<td>—</td>
<td>—</td>
<td>125</td>
<td>nsec</td>
<td>Figure 3-1, Figure 3-2</td>
</tr>
<tr>
<td>tD2</td>
<td>Delay Time</td>
<td>—</td>
<td>—</td>
<td>125</td>
<td>nsec</td>
<td>Figure 3-1, Figure 3-2</td>
</tr>
</tbody>
</table>

### Power Supply

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
<th>Test Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS</td>
<td>Power Supply Current</td>
<td>—</td>
<td>—</td>
<td>13</td>
<td>mA</td>
<td>VIN = 3V (Both Inputs)</td>
</tr>
</tbody>
</table>

**Note 1:** Switching times ensured by design.
2.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in Table 2-1.

**TABLE 2-1: PIN FUNCTION TABLE**

<table>
<thead>
<tr>
<th>Pin No. (8-Pin PDIP, SOIC)</th>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NC</td>
<td>No connection.</td>
</tr>
<tr>
<td>2</td>
<td>IN A</td>
<td>Control input A, TTL/CMOS compatible logic input.</td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
<td>Ground.</td>
</tr>
<tr>
<td>4</td>
<td>IN B</td>
<td>Control input B, TTL/CMOS compatible logic input.</td>
</tr>
<tr>
<td>5</td>
<td>OUT B</td>
<td>Output B, CMOS totem-pole output.</td>
</tr>
<tr>
<td>6</td>
<td>(V_{DD})</td>
<td>Supply input, 4.5V to 16V.</td>
</tr>
<tr>
<td>7</td>
<td>OUT A</td>
<td>Output A, CMOS totem-pole output.</td>
</tr>
<tr>
<td>8</td>
<td>NC</td>
<td>No connection.</td>
</tr>
</tbody>
</table>
3.0 APPLICATIONS INFORMATION

3.1 SUPPLY BYPASSING

Large currents are required to charge and discharge capacitive loads quickly. For example, charging a 1000pF load to 16V in 25nsec requires a 0.8A current from the device’s 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 1.0μF film capacitor in parallel with one or two 0.1μF ceramic MLC capacitors normally provides adequate bypassing.

3.2 GROUNDING

The TC1426 and TC1428 contain inverting drivers. Individual ground returns for the input and output circuits or a ground plane should be used. This will reduce negative feedback that causes degradation in switching speed characteristics.

FIGURE 3-1: INVERTING DRIVER SWITCHING TIME

3.3 INPUT STAGE

The input voltage level changes the no-load or quiescent supply current. The N-channel MOSFET input stage transistor drives a 2.5mA current source load. With a logic "1" input, the maximum quiescent supply current is 9mA. Logic "0" input level signals reduce quiescent current to 500μA maximum. Unused driver inputs must be connected to VDD or GND. Minimum power dissipation occurs for logic "0" inputs for the TC1426/TC1427/TC1428.

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

The TC1426/TC1427/TC1428 may be directly driven by the TL494, SG1526/27, TC38C42, TC170 and similar switch-mode power supply integrated circuits.

FIGURE 3-2: NONINVERTING DRIVER SWITCHING TIME
4.0 TYPICAL CHARACTERISTICS

Note: The graphs and tables provided following this note are a statistical summary based on a limited number of samples and are provided for informational purposes only. The performance characteristics listed herein are not tested or guaranteed. In some graphs or tables, the data presented may be outside the specified operating range (e.g., outside specified power supply range) and therefore outside the warranted range.

- **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**
TYPICAL CHARACTERISTICS (CONTINUED)

**Low-State Output Resistance**

![Graph showing Low-State Output Resistance](image)

**High-State Output Resistance**

![Graph showing High-State Output Resistance](image)

**Crossover Energy Loss**

![Graph showing Crossover Energy Loss](image)

**Quiescent Power Supply Current vs. Supply Voltage**

- **BOTH INPUTS LOGIC “0”**
- **BOTH INPUTS LOGIC “1”**

![Graph showing Quiescent Power Supply Current vs. Supply Voltage](image)

**Thermal Derating Curves**

![Graph showing Thermal Derating Curves](image)
5.0 PACKAGING INFORMATION

5.1 Package Marking Information
Package marking data not available at this time.

5.2 Package Dimensions

8-Pin Plastic DIP

Dimensions: inches (mm)

8-Pin SOIC

Dimensions: inches (mm)
Sales and Support

Data Sheets
Products supported by a preliminary Data Sheet may have an errata sheet describing minor operational differences and recommended workarounds. To determine if an errata sheet exists for a particular device, please contact one of the following:

1. Your local Microchip sales office
2. The Microchip Corporate Literature Center U.S. FAX: (480) 792-7277
3. The Microchip Worldwide Site (www.microchip.com)

Please specify which device, revision of silicon and Data Sheet (include Literature #) you are using.

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Microchip:
TC1427CUA713 TC1426CUA713 TC1426COA TC1426CPA TC1428CUA TC1428CPA TC1428COA
TC1427COA TC1427CPA TC1427CUA TC1427CPAG TC1427VPAG TC1426CUA TC1428CUA713
TC1428COA713 TC1427EPAG TC1426COA713 TC1427COA713