1.5A DUAL HIGH-SPEED POWER MOSFET DRIVERS

FEATURES

- High Peak Output Current ...................... 1.5A
- Wide Operating Range ......................... 4.5V to 18V
- High Capacitive Load
  Drive Capability .......................... 1000pF in 25nsec
- Short Delay Time .......................... < 40nsec Typ.
- Consistent Delay Times With Changes in
  Supply Voltage
- Low Supply Current
  — With Logic “1” Input .......................... 4mA
  — With Logic “0” Input ....................... 400μA
- Low Output Impedance ....................... 7Ω
- Latch-Up Protected .......................... Will Withstand >.5A
- Reverse Current ......................... Down to – 5V
- Input Will Withstand Negative Inputs
- ESD Protected ............................... 4kV
- Pinout Same as TC426/TC427/TC428

GENERAL DESCRIPTION

The TC4426/4427/4428 are improved versions of the earlier TC426/427/428 family of buffer/drivers (with which they are pin compatible). They will not latch up under any conditions within their power and voltage ratings. They are not subject to damage when up to 5V of noise spiking (of either polarity) occurs on the ground pin. They can accept, without damage or logic upset, up to 500 mA of reverse current (of either polarity) being forced back into their outputs. All terminals are fully protected against up to 4kV of electrostatic discharge.

As MOSFET drivers, the TC4426/4427/4428 can easily switch 1000pF gate capacitances in under 30nsec, and provide low enough impedances in both the ON and OFF states to ensure the MOSFET’s intended state will not be affected, even by large transients.

Other compatible drivers are the TC4426A/27A/28A. These drivers have matched input to output leading edge and falling edge delays, tD1 and tD2, for processing short duration pulses in the 25 nsec range. They are pin compatible with the TC4426/27/28.

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Package</th>
<th>Temperature Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC4426COA</td>
<td>8-Pin SOIC</td>
<td>0°C to +70°C</td>
</tr>
<tr>
<td>TC4426CPA</td>
<td>8-Pin Plastic DIP</td>
<td>0°C to +70°C</td>
</tr>
<tr>
<td>TC4426EOA</td>
<td>8-Pin SOIC</td>
<td>0°C to +70°C</td>
</tr>
<tr>
<td>TC4426EPA</td>
<td>8-Pin Plastic DIP</td>
<td>-40°C to +85°C</td>
</tr>
<tr>
<td>TC4426MJA</td>
<td>8-Pin CerDIP</td>
<td>-55°C to +125°C</td>
</tr>
<tr>
<td>TC4427COA</td>
<td>8-Pin SOIC</td>
<td>0°C to +70°C</td>
</tr>
<tr>
<td>TC4427CPA</td>
<td>8-Pin Plastic DIP</td>
<td>0°C to +70°C</td>
</tr>
<tr>
<td>TC4427EOA</td>
<td>8-Pin SOIC</td>
<td>0°C to +70°C</td>
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<tr>
<td>TC4427EPA</td>
<td>8-Pin Plastic DIP</td>
<td>-40°C to +85°C</td>
</tr>
<tr>
<td>TC4427MJA</td>
<td>8-Pin CerDIP</td>
<td>-55°C to +125°C</td>
</tr>
<tr>
<td>TC4428COA</td>
<td>8-Pin SOIC</td>
<td>0°C to +70°C</td>
</tr>
<tr>
<td>TC4428CPA</td>
<td>8-Pin Plastic DIP</td>
<td>0°C to +70°C</td>
</tr>
<tr>
<td>TC4428EOA</td>
<td>8-Pin SOIC</td>
<td>0°C to +70°C</td>
</tr>
<tr>
<td>TC4428EPA</td>
<td>8-Pin Plastic DIP</td>
<td>-40°C to +85°C</td>
</tr>
<tr>
<td>TC4428MJA</td>
<td>8-Pin CerDIP</td>
<td>-55°C to +125°C</td>
</tr>
</tbody>
</table>

FUNCTIONAL BLOCK DIAGRAM

NOTES: 1. TC4426 has 2 inverting drivers; TC4427 has 2 noninverting drivers.
2. TC4428 has one inverting and one noninverting driver.
3. Ground any unused driver input.
1.5A DUAL HIGH-SPEED POWER MOSFET DRIVERS
TC4426
TC4427
TC4428

ABSOLUTE MAXIMUM RATINGS*
Supply Voltage ......................................................... +22V
Input Voltage, IN A or IN B . (V DD + 0.3V) to (GND – 5.0V)
Maximum Chip Temperature ................................. +150°C
Storage Temperature Range ................ – 65°C to +150°C
Lead Temperature (Soldering, 10 sec) ...................... +300°C
Package Thermal Resistance
CerDIP RθJA ................................................ 150°C/W
CerDIP RθJC ................................................ 50°C/W
PDIP RθJA ................................................ 125°C/W
PDIP RθJC ................................................ 42°C/W
SOIC RθJA .................................................. 155°C/W
SOIC RθJC .................................................. 45°C/W

Operating Temperature Range
C Version .................................................. 0°C to +70°C
E Version .................................................. – 40°C to +85°C
M Version .................................................. – 55°C to +125°C

Package Power Dissipation (TA ≤ 70°C)
Plastic ......................................................... 730mW
CerDIP ......................................................... 800mW
SOIC ......................................................... 470mW

*Static-sensitive device. Unused devices must be stored in conductive material. Protect devices from static discharge and static fields. 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.

PIN CONFIGURATIONS

ELECTRICAL CHARACTERISTICS: TA = +25°C with 4.5V ≤ VDD ≤ 18V, unless otherwise specified.

Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit
--- | --- | --- | --- | --- | --- | ---
Input | VIH | Logic 1 High Input Voltage | 2.4 | — | — | V
| VIL | Logic 0 Low Input Voltage | — | — | 0.8 | V
| IIN | Input Current | 0V ≤ V IN ≤ V DD | –1 | — | 1 | µA

Output | VOH | High Output Voltage | VDD – 0.025 | — | — | V
| VOL | Low Output Voltage | — | — | 0.025 | V
| RO | Output Resistance | V DD = 18V, IO = 10mA | — | 7 | 10 | Ω
| IPEK | Peak Output Current | Duty Cycle ≤ 2%, t ≤ 30µsec | — | 1.5 | — | A
| IREV | Latch-Up Protection | Duty Cycle ≤ 2%
| | Withstand Reverse Current | t ≤ 30 µsec | > 0.5 | — | — | A

Switching Time (Note 1)

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit
--- | --- | --- | --- | --- | --- | ---
| tR | Rise Time | Figure 1 | — | 19 | 30 | nsec
| tF | Fall Time | Figure 1 | — | 19 | 30 | nsec
| tD1 | Delay Time | Figure 1 | — | 20 | 30 | nsec
| tD2 | Delay Time | Figure 1 | — | 40 | 50 | nsec

Power Supply | IS | Power Supply Current | V IN = 3V (Both Inputs) | — | — | 4.5 | mA
| | | V IN = 0V (Both Inputs) | — | — | 0.4 | mA

NOTE: 1. Switching times are guaranteed by design.
ELECTRICAL CHARACTERISTICS: Specifications measured over operating temperature range with $4.5V \leq V_{DD} \leq 18V$, unless otherwise specified.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Test Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Input</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>$V_{IH}$</td>
<td>Logic 1 High Input Voltage</td>
<td></td>
<td></td>
<td>2.4</td>
<td></td>
<td>V</td>
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<tr>
<td>$V_{IL}$</td>
<td>Logic 0 Low Input Voltage</td>
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<td></td>
<td>—</td>
<td>0.8</td>
<td>V</td>
</tr>
<tr>
<td>$I_{IN}$</td>
<td>Input Current</td>
<td>$0V \leq V_{IN} \leq V_{DD}$</td>
<td></td>
<td></td>
<td>10</td>
<td>µA</td>
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<tr>
<td></td>
<td><strong>Output</strong></td>
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<td></td>
<td></td>
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<tr>
<td>$V_{OH}$</td>
<td>High Output Voltage</td>
<td>$V_{DD} - 0.025$</td>
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<td></td>
<td></td>
<td>V</td>
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<tr>
<td>$V_{OL}$</td>
<td>Low Output Voltage</td>
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<td></td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>$R_O$</td>
<td>Output Resistance</td>
<td>$V_{DD} = 18V$, $I_O = 10mA$</td>
<td></td>
<td>9</td>
<td>12</td>
<td>Ω</td>
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<tr>
<td>$I_{PK}$</td>
<td>Peak Output Current</td>
<td>Duty Cycle $\leq 2%$, $t \leq 300µsec$</td>
<td></td>
<td>1.5</td>
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<td>A</td>
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<tr>
<td>$I_{REV}$</td>
<td>Latch-Up Protection</td>
<td>Duty Cycle $\geq 2%$, $t \leq 300µsec$</td>
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<td>&gt; 0.5</td>
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<td>A</td>
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<td></td>
<td><strong>Switching Time (Note 1)</strong></td>
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<tr>
<td>$I_R$</td>
<td>Rise Time</td>
<td>Figure 1</td>
<td></td>
<td></td>
<td>40</td>
<td>nsec</td>
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<tr>
<td>$I_F$</td>
<td>Fall Time</td>
<td>Figure 1</td>
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<td></td>
<td>40</td>
<td>nsec</td>
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<tr>
<td>$I_{D1}$</td>
<td>Delay Time</td>
<td>Figure 1</td>
<td></td>
<td></td>
<td>40</td>
<td>nsec</td>
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<tr>
<td>$I_{D2}$</td>
<td>Delay Time</td>
<td>Figure 1</td>
<td></td>
<td></td>
<td>60</td>
<td>nsec</td>
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<td></td>
<td><strong>Power Supply</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>$I_S$</td>
<td>Power Supply Current</td>
<td>$V_{IN} = 3V$ (Both Inputs)</td>
<td></td>
<td></td>
<td>8</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{IN} = 0V$ (Both Inputs)</td>
<td></td>
<td></td>
<td>0.6</td>
<td>mA</td>
</tr>
</tbody>
</table>

NOTE: 1. Switching times are guaranteed by design.

Figure 1. Switching Time Test Circuit

NOTE: The values on this graph represent the loss seen by both drivers in a package during one complete cycle. For a single driver, divide the stated values by 2. For a single transition of a single driver, divide the stated value by 4.
TYPICAL CHARACTERISTICS

Rise Time vs. Supply Voltage

Fall Time vs. Supply Voltage

Rise Time vs. Capacitive Load

Fall Time vs. Capacitive Load

Rise and Fall Times vs. Temperature

Propagation Delay vs. Supply Voltage
1.5A DUAL HIGH-SPEED POWER MOSFET DRIVERS

TYPICAL CHARACTERISTICS (Cont.)

Effect of Input Amplitude on Delay Time

Quiescent Supply Current vs. Voltage

Propagation Delay Time vs. Temperature

Quiescent Supply Current vs. Temperature

High-State Output Resistance

Low-State Output Resistance
1.5A DUAL HIGH-SPEED POWER MOSFET DRIVERS

TC4426
TC4427
TC4428

SUPPLY CURRENT CHARACTERISTICS (Load on Single Output Only)

Supply Current vs. Capacitive Load

![Graph showing supply current vs. capacitive load for VDD = 18V, 12V, and 6V.]

Supply Current vs. Frequency

![Graph showing supply current vs. frequency for VDD = 18V, 12V, and 6V.]

<table>
<thead>
<tr>
<th>VDD</th>
<th>2 MHz</th>
<th>1 MHz</th>
<th>100 kHz</th>
<th>10 kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>18V</td>
<td>60 mA</td>
<td>30 mA</td>
<td>10 mA</td>
<td>1 mA</td>
</tr>
<tr>
<td>12V</td>
<td>40 mA</td>
<td>20 mA</td>
<td>10 mA</td>
<td>1 mA</td>
</tr>
<tr>
<td>6V</td>
<td>20 mA</td>
<td>10 mA</td>
<td>5 mA</td>
<td>1 mA</td>
</tr>
</tbody>
</table>

Supply Current vs. Capacitive Load

![Graph showing supply current vs. capacitive load for different frequencies and capacitance values.]

Supply Current vs. Frequency

![Graph showing supply current vs. frequency for different frequencies and capacitance values.]

<table>
<thead>
<tr>
<th>Frequency (kHz)</th>
<th>600 kHz</th>
<th>2200 pF</th>
<th>1000 pF</th>
<th>100 pF</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 MHz</td>
<td>30 mA</td>
<td>15 mA</td>
<td>7.5 mA</td>
<td>3.75 mA</td>
</tr>
<tr>
<td>1 MHz</td>
<td>20 mA</td>
<td>10 mA</td>
<td>5 mA</td>
<td>2.5 mA</td>
</tr>
<tr>
<td>100 kHz</td>
<td>10 mA</td>
<td>5 mA</td>
<td>2.5 mA</td>
<td>1.25 mA</td>
</tr>
<tr>
<td>10 kHz</td>
<td>5 mA</td>
<td>2.5 mA</td>
<td>1.25 mA</td>
<td>0.625 mA</td>
</tr>
</tbody>
</table>
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PACKAGE DIMENSIONS

8-Pin CerDIP

8-Pin Plastic DIP

Dimensions: inches (mm)
1.5A DUAL HIGH-SPEED POWER MOSFET DRIVERS

TC4426
TC4427
TC4428

PACKAGE DIMENSIONS Cont.)

8-Pin SOIC

Dimensions: inches (mm)