

## Power CMOS Drivers With Voltage Tripler

### Features

- Power Driver With On Board Voltage Booster
- Low  $I_{DD}$  – <4mA
- Small Package – 8-Pin PDIP
- Under-Voltage Circuitry
- Fast Rise-Fall Time – <40nsec @ 1000pF
- Below-Rail Input Protection

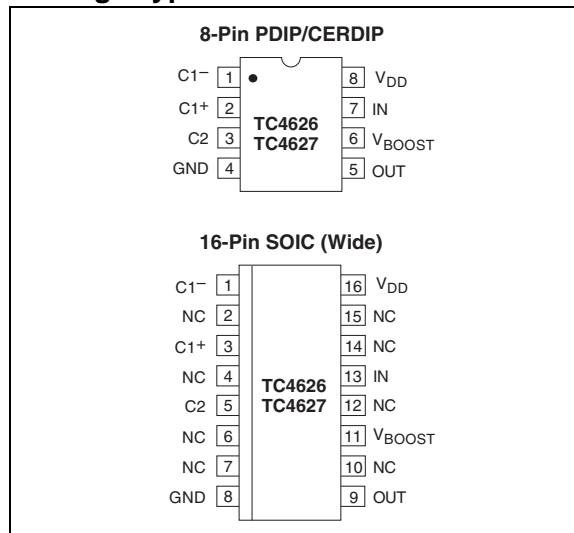
### Applications

- Raises 5V to drive higher –  $V_{GS}$  (ON) MOSFETs
- Eliminates one system power supply

### Device Selection Table

| Part Number | Package            | Temp. Range     |
|-------------|--------------------|-----------------|
| TC4626COE   | 16-Pin SOIC (Wide) | -55°C to +125°C |
| TC4626CPA   | 8-Pin PDIP         | -40°C to +85°C  |
| TC4626EOE   | 16-Pin SOIC (Wide) | -40°C to +85°C  |
| TC4626EPA   | 8-Pin PDIP         | 0°C to +70°C    |
| TC4626MJA   | 8-Pin CERDIP       | 0°C to +70°C    |
| TC4627COE   | 16-Pin SOIC (Wide) | -55°C to +125°C |
| TC4627CPA   | 8-Pin PDIP         | -40°C to +85°C  |
| TC4627EOE   | 16-Pin SOIC (Wide) | -40°C to +85°C  |
| TC4627EPA   | 8-Pin PDIP         | 0°C to +70°C    |
| TC4627MJA   | 8-Pin CERDIP       | 0°C to +70°C    |

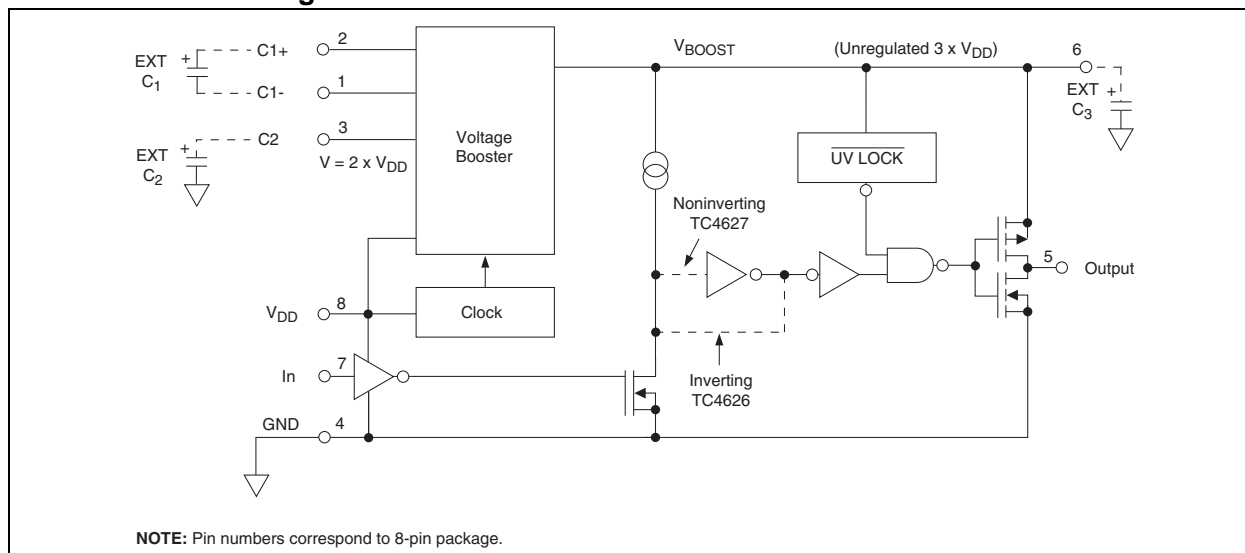
### Package Type



### General Description

The TC4626/TC4627 are single CMOS high speed drivers with an on-board voltage boost circuit. These parts work with an input supply voltage from 4 to 6 volts. The internal voltage booster will produce a  $V_{BOOST}$  potential up to 12 volts above  $V_{IN}$ . This  $V_{BOOST}$  is not regulated, so its voltage is dependent on the input  $V_{DD}$  voltage and output drive loading requirements. An internal undervoltage lockout circuit keeps the output in a low state when  $V_{BOOST}$  drops below 7.8 volts. Output is enabled when  $V_{BOOST}$  is above 11.3 volts.

### Functional Block Diagram



# TC4626/TC4627

## 1.0 ELECTRICAL CHARACTERISTICS

### Absolute Maximum Ratings\*

|   |                                       |
|---|---------------------------------------|
| Supply Voltage .....                                | 6.2V                                  |
| Input Voltage, Any Terminal .....                   | $V_S + 0.3V$ to $GND - 0.3V$          |
| Package Power Dissipation ( $T_A \leq 70^\circ C$ ) |                                       |
| PDIP .....  | 730mW                                 |
| CERDIP .....  | 800mW                                 |
| SOIC .....  | 760mW                                 |
| Derating Factor   PDIP .....                        | 5.6 mW/ $^\circ C$ Above $36^\circ C$ |
| CERDIP .....  | 6.0mW/ $^\circ C$                     |
| Operating Temperature Range (Ambient)               |                                       |
| C Version .....                                     | $0^\circ C$ to $+70^\circ C$          |
| E Version .....                                     | $-40^\circ C$ to $+85^\circ C$        |
| M Version .....                                     | $-55^\circ C$ to $+125^\circ C$       |
| Storage Temperature Range .....                     | $-65^\circ C$ to $+150^\circ C$       |

\*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 in the operation sections of the specifications is not implied. Exposure to Absolute Maximum Rating conditions for extended periods may affect device reliability.

### TC4626/TC4627 ELECTRICAL SPECIFICATIONS

| Electrical Characteristics: $T_A = +25^\circ C$ , $V_{DD} = 5V$ , $C_1 = C_2 = C_3 = 10\mu F$ unless otherwise noted. |  |                     |      |       |          |   |
|---|--|---------------------|------|-------|----------|---|
| Symbol  | Parameter                                | Min                 | Typ  | Max   | Units    | Test Conditions                                 |
| <b>Input</b>  |  |                     |      |       |          |   |
| $V_{IH}$  | Logic 1, High Input Voltage              | 2.4                 | —    | —     | V        |   |
| $V_{IL}$  | Logic 0, Low Input Voltage               | —                   | —    | 0.8   | V        |   |
| $I_{IN}$  | Input Current                            | -1                  | —    | 1     | $\mu A$  | $0V \leq V_{IN} \leq V_{DRIVE}$                 |
| <b>Output</b>   |  |                     |      |       |          |   |
| $V_{OH}$  | High Output Voltage                      | $V_{BOOST} - 0.025$ | —    | —     | V        |   |
| $V_{OL}$  | Low Output Voltage                       | —                   | —    | 0.025 | V        |   |
| $R_O$   | Output Resistance, High                  | —                   | 10   | 15    | $\Omega$ | $I_{OUT} = 10mA$ , $V_{DD} = 5V$                |
| $R_O$   | Output Resistance, Low                   | —                   | 8    | 10    | $\Omega$ | $I_{OUT} = 10mA$ , $V_{DD} = 5V$                |
| $I_{PK}$  | Peak Output Current                      | —                   | 1.5  | —     | A        |   |
| <b>Switching Time</b>   |  |                     |      |       |          |   |
| $t_R$   | Rise Time                                | —                   | 33   | 40    | nsec     | Figure 3-1, Figure 3-2                          |
| $t_F$   | Fall Time                                | —                   | 27   | 35    | nsec     | Figure 3-1, Figure 3-2                          |
| $t_{D1}$  | Delay Time                               | —                   | 35   | 45    | nsec     | Figure 3-1, Figure 3-2                          |
| $t_{D2}$  | Delay Time                               | —                   | 45   | 55    | nsec     | Figure 3-1, Figure 3-2                          |
| $F_{MAX}$   | Maximum Switching Frequency              | 1.0                 | —    | —     | MHz      | $V_{DD} = 5V$ , $V_{BOOST} > 8.5V$ , Figure 3-1 |
| <b>Voltage Booster</b>  |  |                     |      |       |          |   |
| $R_3$   | Voltage Tripler Output Source Resistance | —                   | 300  | 400   | $\Omega$ | $I_L = 10mA$ , $V_{DD} = 5V$                    |
| $R_2$   | Voltage Doubler Output Source Resistance | —                   | 120  | 200   | $\Omega$ |   |
| $F_{OSC}$   | Oscillator Frequency                     | 12                  | —    | 28    | kHz      |   |
| $V_{OSC}$   | Oscillator Amplitude Measured at C1-     | 4.5                 | —    | 10    | V        | $R_{LOAD} = 10k\Omega$                          |
| $UV @ V_{BOOST}$  | Undervoltage Threshold                   | 7.0                 | 7.8  | 8.5   | V        |   |
| $V_{START} @ V_{BOOST}$   | Start Up Voltage                         | 10.5                | 11.3 | 12    | V        |   |
| $V_{BOOST}$   | @ $V_{DD} = 5V$                          | 14.6                | —    | —     | V        | No Load   |

## TC4626/TC4627 ELECTRICAL SPECIFICATIONS (CONTINUED)

| Symbol   | Parameter                                | Min                        | Typ      | Max      | Units | Test Conditions  |
|--|--|----------------------------|----------|----------|-------|--|
| <b>Power Supply</b>  |  |                            |          |          |       |  |
| I <sub>DD</sub>  | Power Supply Current                     | —                          | —        | 2.5      | mA    | V <sub>IN</sub> = LOW or HIGH  |
| V <sub>DD</sub>  | Supply Voltage                           | 4.0                        | —        | 6.0      | V     |  |
| <b>Electrical Characteristics:</b> Over operating temperature range, V <sub>DD</sub> = 5V, C <sub>1</sub> = C <sub>2</sub> = C <sub>3</sub> 10μF unless otherwise noted. |  |                            |          |          |       |  |
| Symbol   | Parameter                                | Min                        | Typ      | Max      | Units | Test Conditions  |
| <b>Input</b>   |  |                            |          |          |       |  |
| V <sub>IH</sub>  | Logic 1, High Input Voltage              | 2.4                        | —        | —        | V     |  |
| V <sub>IL</sub>  | Logic 0, Low Input Voltage               | —                          | —        | 0.8      | V     |  |
| I <sub>IN</sub>  | Input Current                            | -10                        | —        | 1        | μA    | 0V ≤ V <sub>IN</sub> ≤ V <sub>BOOST</sub>  |
| <b>Output</b>  |  |                            |          |          |       |  |
| V <sub>OH</sub>  | High Output Voltage                      | V <sub>DRIVE</sub> - 0.025 | —        | —        | V     |  |
| V <sub>OL</sub>  | Low Output Voltage                       | —                          | —        | 0.025    | V     |  |
| R <sub>O</sub>   | Output Resistance, High                  | —                          | 15<br>15 | 20<br>25 | Ω     | I <sub>OUT</sub> = 10mA, V <sub>DD</sub> = 5V<br>C & E Version (T <sub>A</sub> = 70°C or 85°C)<br>M Version (T <sub>A</sub> = 125°C) |
| R <sub>O</sub>   | Output Resistance, Low                   | —                          | 10<br>10 | 13<br>15 | Ω     | I <sub>OUT</sub> = 10mA, V <sub>DD</sub> = 5V<br>C & E Version (T <sub>A</sub> = 70°C or 85°C)<br>M Version (T <sub>A</sub> = 125°C) |
| I <sub>PK</sub>  | Peak Output Current                      | —                          | 1.5      | —        | A     |  |
| <b>Switching Time</b>  |  |                            |          |          |       |  |
| t <sub>R</sub>   | Rise Time                                | —                          | —        | 55       | nsec  | Figure 3-1, Figure 3-2   |
| t <sub>F</sub>   | Fall Time                                | —                          | —        | 50       | nsec  | Figure 3-1, Figure 3-2   |
| t <sub>D1</sub>  | Delay Time                               | —                          | —        | 60       | nsec  | Figure 3-1, Figure 3-2   |
| t <sub>D2</sub>  | Delay Time                               | —                          | —        | 70       | nsec  | Figure 3-1, Figure 3-2   |
| F <sub>MAX</sub>   | Maximum Switching Frequency              | 750                        | —        | —        | kHz   | V <sub>DD</sub> = 5V, V <sub>BOOST</sub> > 8.5V,<br>Figure 3-1   |
| <b>Voltage Booster</b>   |  |                            |          |          |       |  |
| R <sub>3</sub>   | Voltage Boost Output Source Resistance   | —                          | 400      | 500      | Ω     | I <sub>L</sub> = 10mA, V <sub>DD</sub> = 5V  |
| R <sub>2</sub>   | Voltage Doubler Output Source Resistance | —                          | 170      | 300      | Ω     |  |
| F <sub>OSC</sub>   | Oscillator Frequency                     | 5                          | —        | 50       | kHz   |  |
| V <sub>OSC</sub>   | Oscillator Amplitude Measured at C1-     | 4.5                        | —        | 10       | V     | R <sub>LOAD</sub> = 10kΩ   |
| UV @V <sub>BOOST</sub>   | Undervoltage Threshold                   | 7.0                        | 7.8      | 8.5      | V     |  |
| V <sub>START</sub> @V <sub>BOOST</sub>   | Start Up Voltage                         | 10.5                       | 11.3     | 12       | V     |  |
| V <sub>BOOST</sub>   | @V <sub>DD</sub> = 5V                    | 14.6                       | —        | —        | V     | No Load  |
| <b>Power Supply</b>  |  |                            |          |          |       |  |
| I <sub>DD</sub>  | Power Supply Current                     | —                          | —        | 4        | mA    | V <sub>IN</sub> = LOW or HIGH  |
| V <sub>DD</sub>  | Supply Voltage                           | 4.0                        | —        | 6.0      | V     |  |

# TC4626/TC4627

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## 2.0 PIN DESCRIPTIONS

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

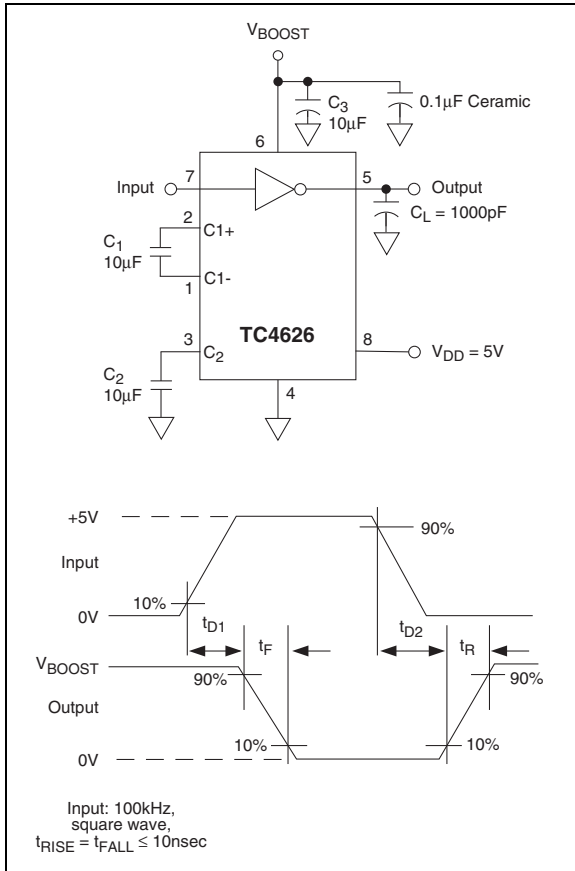
**TABLE 2-1: PIN FUNCTION TABLE**

| Pin No.<br>(8-Pin PDIP,<br>CERDIP) | Symbol             | Description |
|------------------------------------|--------------------|-------------|
| 1                                  | C1-                |             |
| 2                                  | C1+                |             |
| 3                                  | C2                 |             |
| 4                                  | GND                | Ground.     |
| 5                                  | OUT                |             |
| 6                                  | V <sub>BOOST</sub> |             |
| 7                                  | IN                 |             |
| 8                                  | V <sub>DD</sub>    |             |

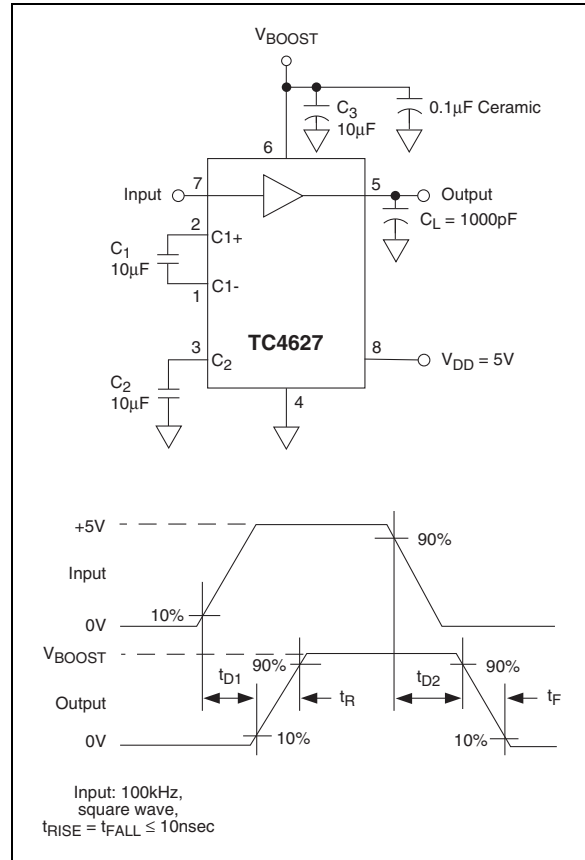
| Pin No.<br>(16-Pin SOIC<br>Wide) | Symbol             | Description |
|----------------------------------|--------------------|-------------|
| 1                                | C1-                |             |
| 2                                | NC                 | No connect. |
| 3                                | C1+                |             |
| 4                                | NC                 | No connect. |
| 5                                | C2                 |             |
| 6                                | NC                 | No connect. |
| 7                                | NC                 | No connect. |
| 8                                | GND                | Ground.     |
| 9                                | OUT                |             |
| 10                               | NC                 | No connect. |
| 11                               | V <sub>BOOST</sub> |             |
| 12                               | NC                 | No connect. |
| 13                               | IN                 |             |
| 14                               | NC                 | No connect. |
| 15                               | NC                 | No connect. |
| 16                               | V <sub>DD</sub>    |             |

## 3.0 APPLICATIONS INFORMATION

**FIGURE 3-1: INVERTING DRIVER SWITCHING TIME**



**FIGURE 3-2: NONINVERTING DRIVER SWITCHING TIME**



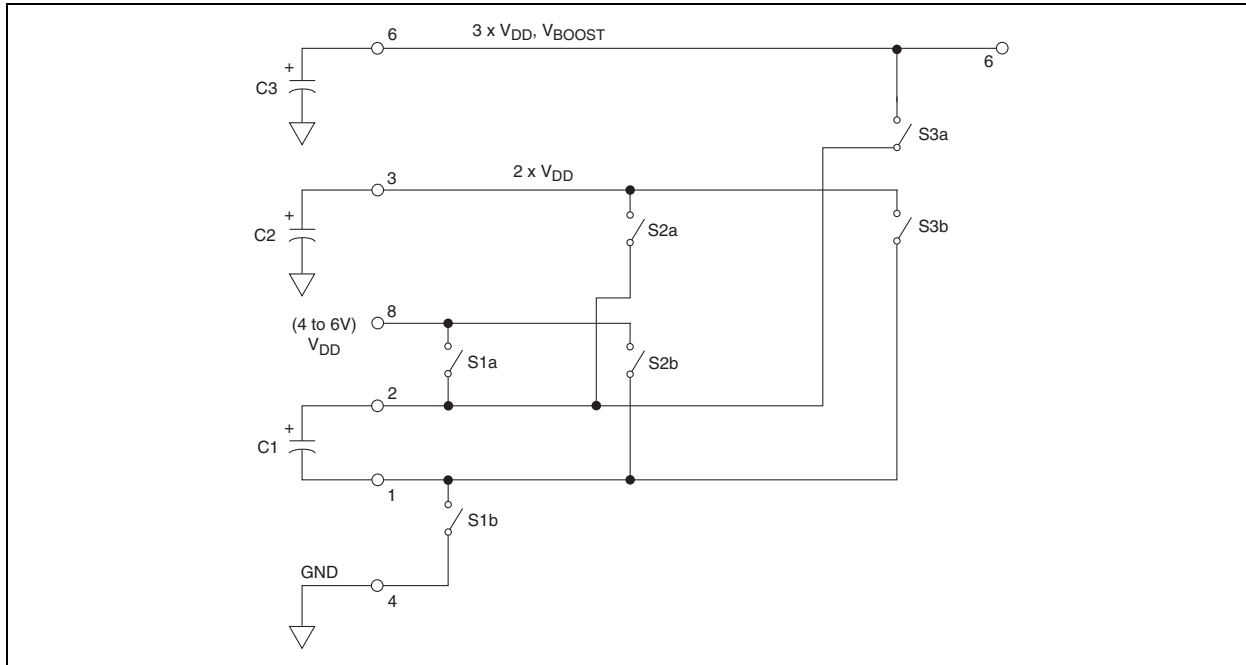
# TC4626/TC4627

## 3.1 BOOSTER FUNCTION

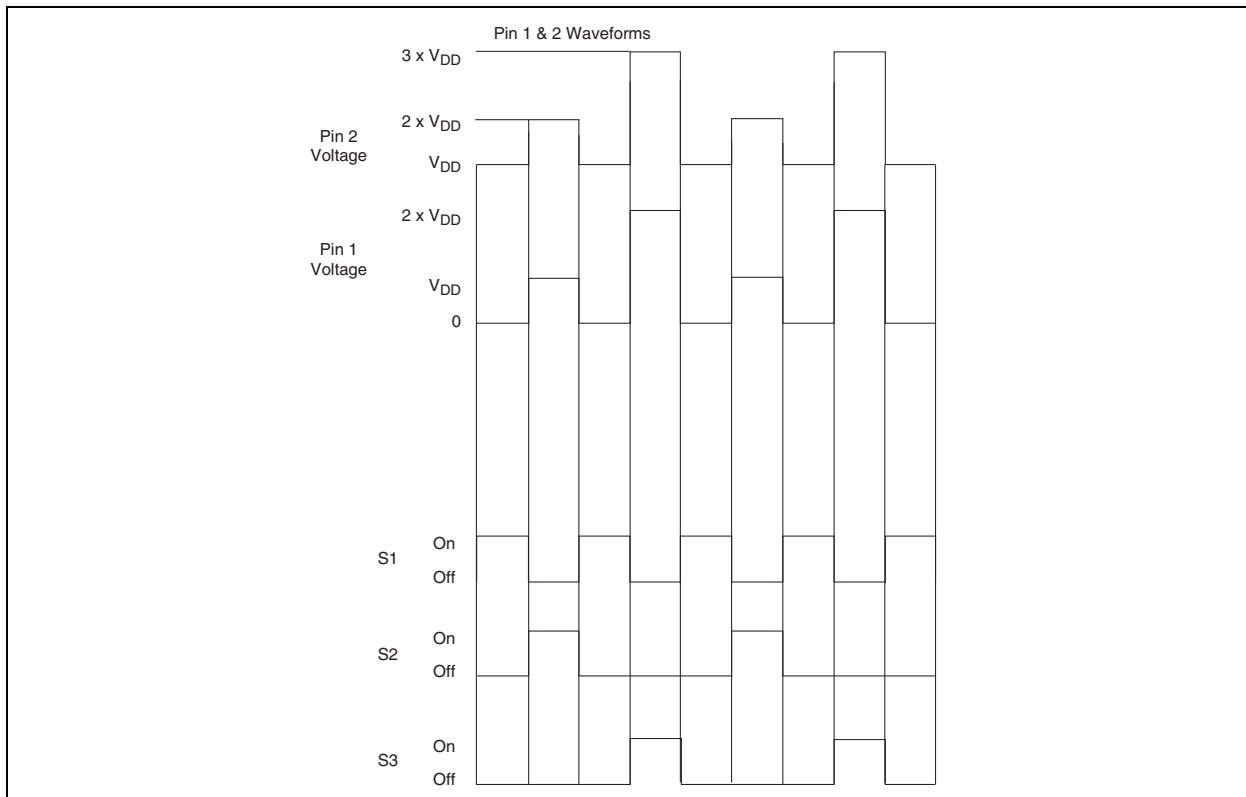
The voltage booster is an unregulated voltage tripler circuit. The tripler consists of three sets of internal switches and three external capacitors. S1a and S1b charge capacitor C1 to  $V_{DD}$  potential. S2a and S2b add

C1 potential to  $V_{DD}$  input to charge C2 to  $2 \times V_{DD}$ . S3a and S3b add C1 potential to C2 to charge C3 to  $3 \times V_{DD}$ . The position of the switches is controlled by the internal 4 phase clock.

**FIGURE 3-3: VOLTAGE BOOSTER**

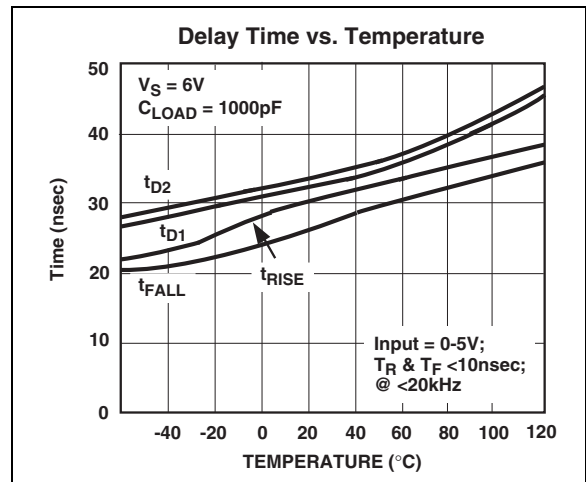
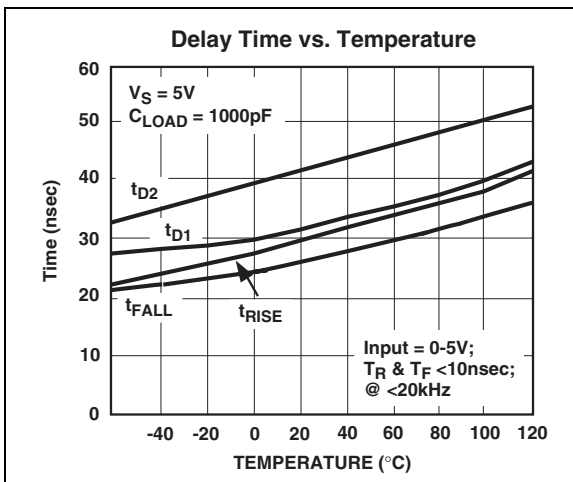
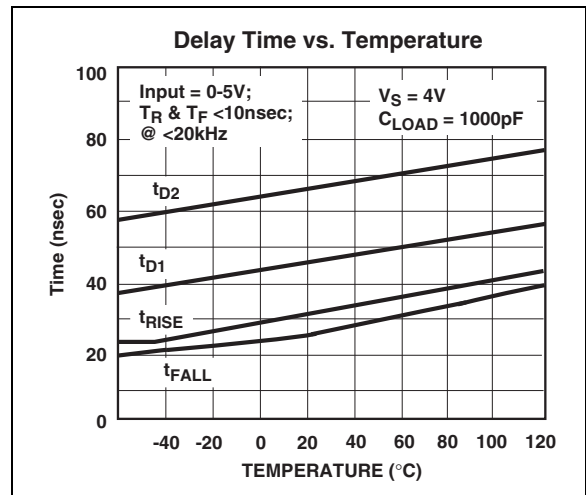
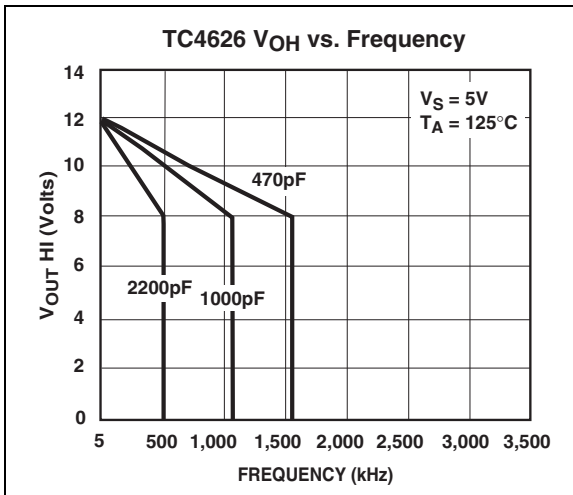
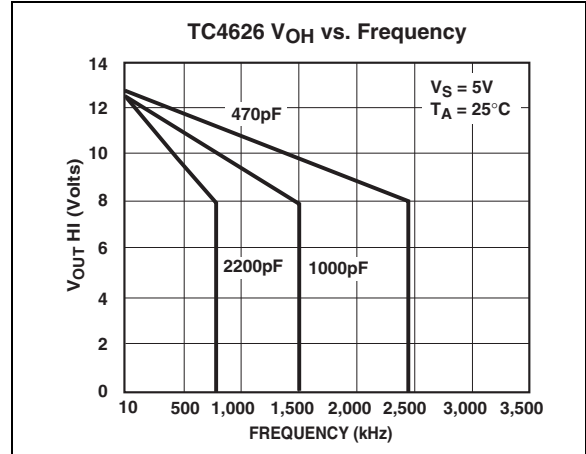
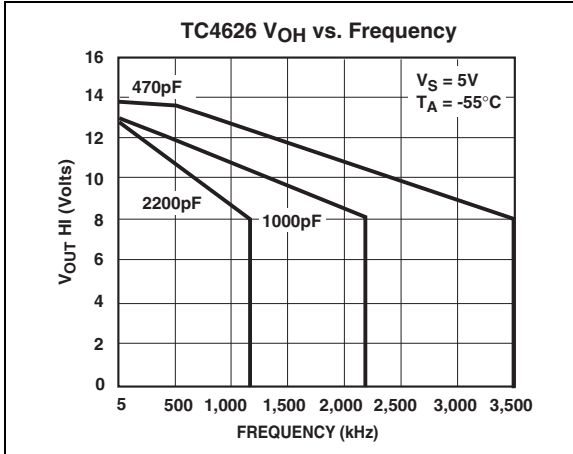


**FIGURE 3-4: POSITION OF SWITCHES**



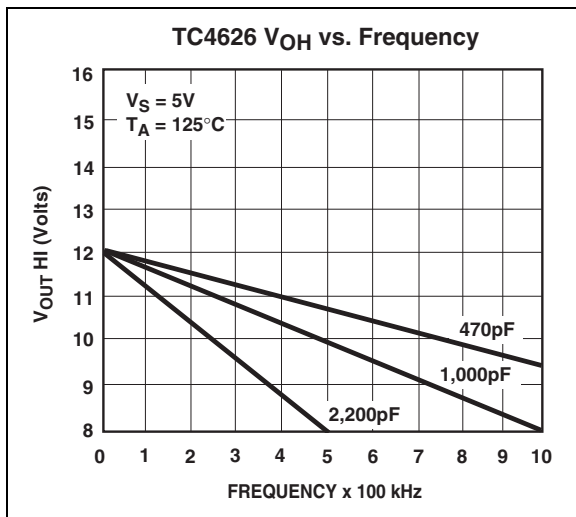
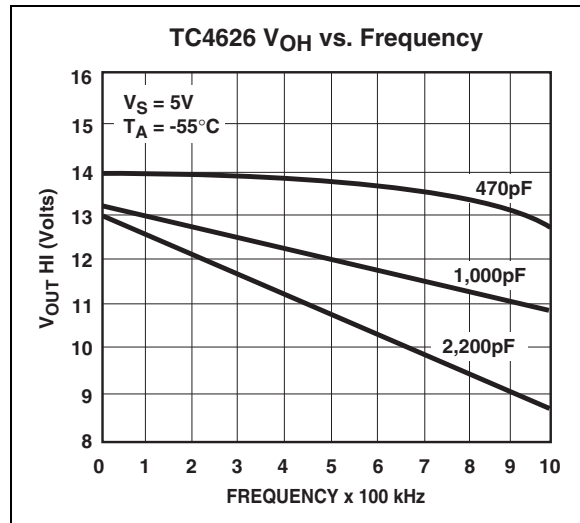
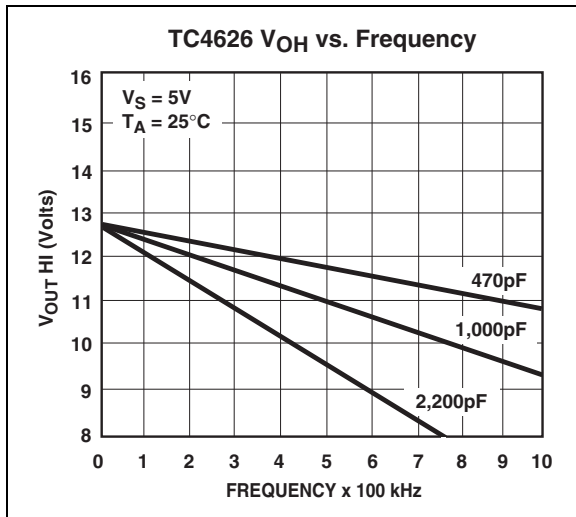
## 4.0 TYPICAL CHARACTERISTICS

**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.



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## TYPICAL CHARACTERISTICS (CONTINUED)





## 5.0 PACKAGING INFORMATION

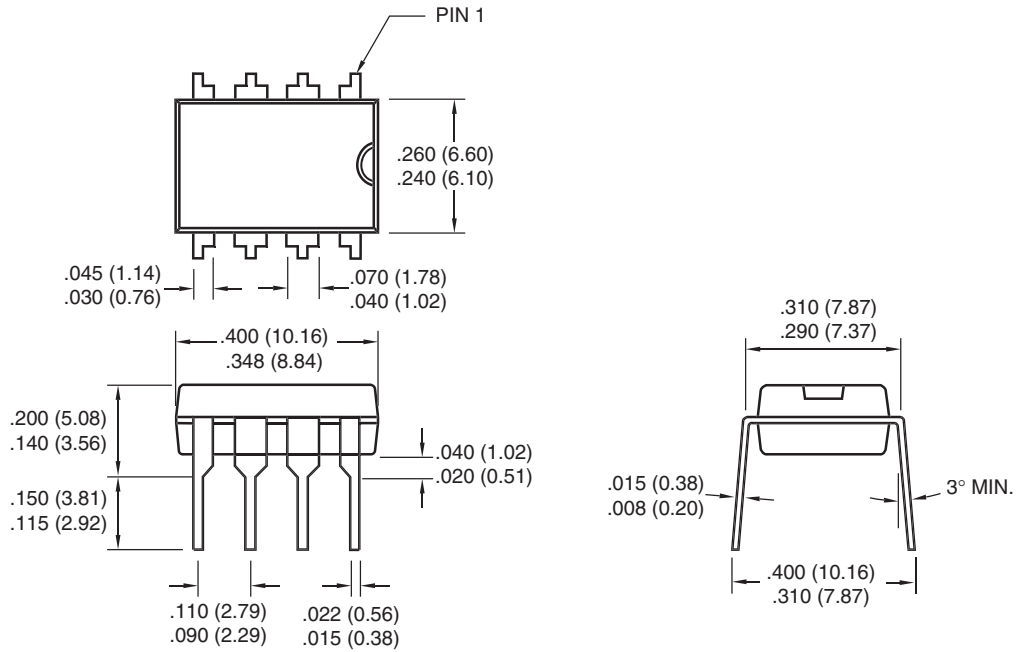
Package marking data not available at this time.

# TC4626/TC4627

## 5.1 Package Dimensions

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

### 8-Pin Plastic DIP

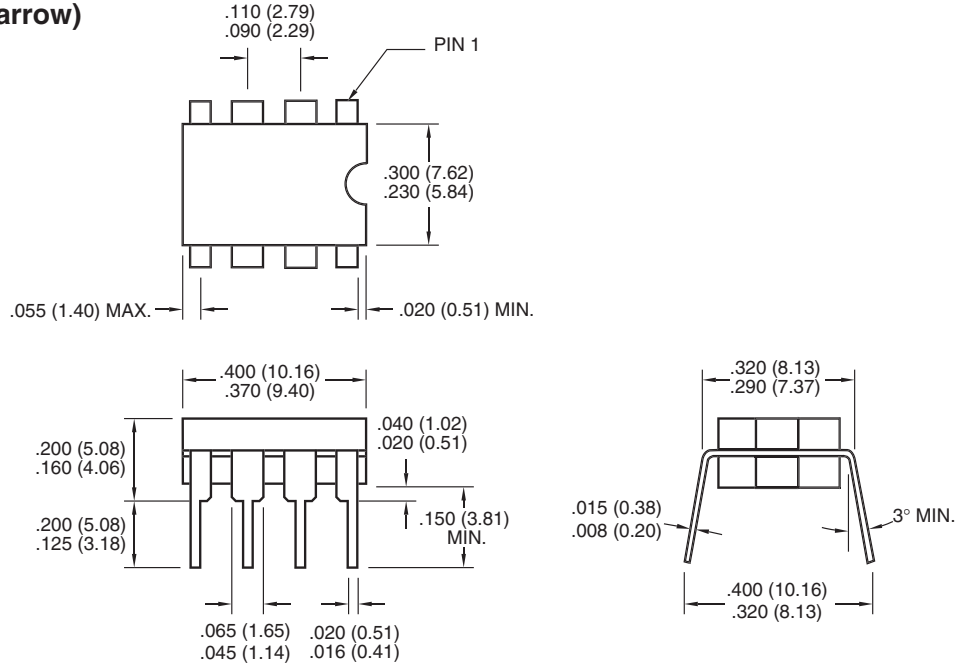


**Dimensions: inches (mm)**

## Package Dimensions (Continued)

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

### 8-Pin CDIP (Narrow)



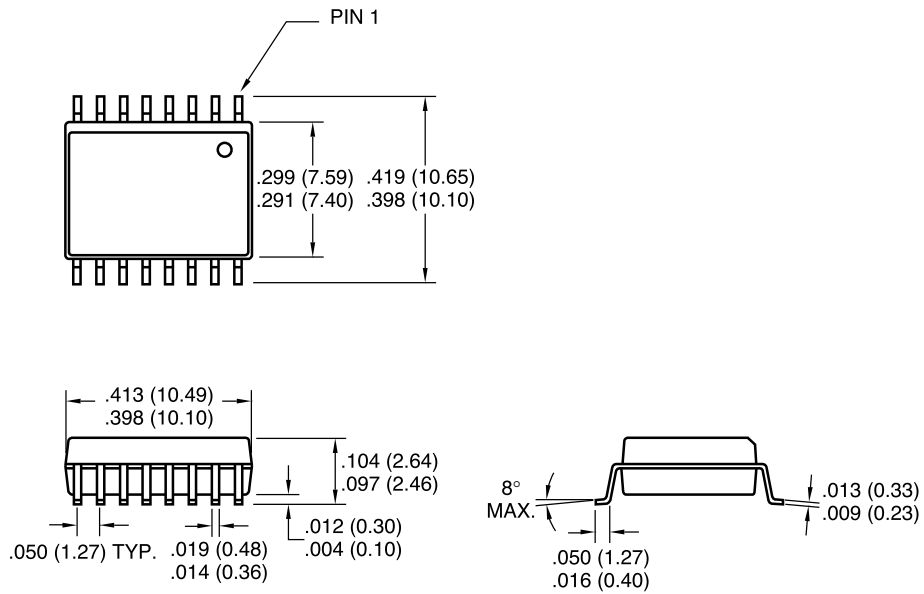
**Dimensions: inches (mm)**

# TC4626/TC4627

## Package Dimensions (Continued)

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

### 16-Pin SOIC (Wide)



Dimensions: inches (mm)

## 6.0 REVISION HISTORY

### Revision C (December 2012)

Added a note to each package outline drawing.



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NOTES:



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**China - Zhuhai**  
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Fax: 91-80-3090-4123

**India - New Delhi**  
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Fax: 91-11-4160-8632

**India - Pune**  
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**Japan - Yokohama**  
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**Korea - Daegu**  
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Fax: 82-53-744-4302

**Korea - Seoul**  
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Fax: 82-2-558-5932 or  
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**Malaysia - Kuala Lumpur**  
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**Philippines - Manila**  
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Fax: 63-2-634-9069

**Singapore**  
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**Taiwan - Hsin Chu**  
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Fax: 886-3-5770-955

**Taiwan - Kaohsiung**  
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**Spain - Madrid**  
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Fax: 34-91-708-08-91

**UK - Wokingham**  
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Fax: 44-118-921-5820

11/27/12

Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров

Мы предлагаем:

- Конкуренеспособные цены и скидки постоянным клиентам.
- Специальные условия для постоянных клиентов.
- Подбор аналогов.
- Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.
- Приемлемые сроки поставки, возможна ускоренная поставка.
- Доставку товара в любую точку России и стран СНГ.
- Комплексную поставку.
- Работу по проектам и поставку образцов.
- Формирование склада под заказчика.
- Сертификаты соответствия на поставляемую продукцию (по желанию клиента).
- Тестирование поставляемой продукции.
- Поставку компонентов, требующих военную и космическую приемку.
- Входной контроль качества.
- Наличие сертификата ISO.

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- Регистрацию проекта у производителя компонентов.
- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



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