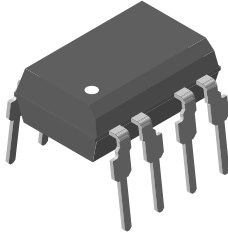
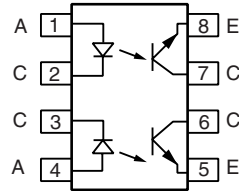


## Optocoupler, Phototransistor Output, Dual Channel



I179016



### FEATURES

- Current transfer ratio, 50 % typical
- Leakage current, 1.0 nA typical
- Two isolated channels per package
- Lead (Pb)-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC


**RoHS**  
COMPLIANT

### AGENCY APPROVALS

- UL1577, file no. E52744 system code H or J, double protection
- DIN EN 60747-5-2 (VDE 0884)/DIN EN 60747-5-5 pending available with option 1
- CSA 93751
- BSI IEC 60950; IEC 60065

### DESCRIPTION

The ILCT6/MCT6 is a two channel optocoupler for high density applications. Each channel consists of an optically coupled pair with a gallium arsenide infrared LED and a silicon NPN phototransistor. Signal information, including a DC level, can be transmitted by the device while maintaining a high degree of electrical isolation between input and output.

The ILCT6/MCT6 is especially designed for driving medium-speed logic, where it may be used to eliminate troublesome ground loop and noise problems. It can also be used to replace relays and transformers in many digital interface applications, as well as analog applications such as CRT modulation.

### ORDER INFORMATION

| PART       | REMARKS                           |
|------------|-----------------------------------|
| ILCT6      | CTR $\geq$ 20 %, DIP-8            |
| MCT6       | CTR $\geq$ 20 %, DIP-8            |
| ILCT6-X007 | CTR $\geq$ 20 %, SMD-8 (option 7) |
| ILCT6-X009 | CTR $\geq$ 20 %, SMD-8 (option 9) |
| MCT6-X007  | CTR $\geq$ 20 %, SMD-8 (option 7) |
| MCT6-X009  | CTR $\geq$ 20 %, SMD-8 (option 9) |

#### Note

For additional information on the available options refer to option information.

| ABSOLUTE MAXIMUM RATINGS            |                                      |            |                |           |
|-------------------------------------|--------------------------------------|------------|----------------|-----------|
| PARAMETER                           | TEST CONDITION                       | SYMBOL     | VALUE          | UNIT      |
| <b>INPUT</b>                        |                                      |            |                |           |
| Rated forward current, DC           |                                      |            | 60             | mA        |
| Peak forward current, DC            | 1.0 $\mu$ s pulse, 300 pps           | $I_{FM}$   | 3.0            | A         |
| Power dissipation                   |                                      | $P_{diss}$ | 100            | mW        |
| Derate linearly from 25 °C          |                                      |            | 1.3            | mW/°C     |
| <b>OUTPUT</b>                       |                                      |            |                |           |
| Collector current                   |                                      | $I_C$      | 30             | mA        |
| Collector emitter breakdown voltage |                                      | $BV_{CEO}$ | 30             | V         |
| Power dissipation                   |                                      | $P_{diss}$ | 150            | mW        |
| Derate linearly from 25 °C          |                                      |            | 2.0            | mW/°C     |
| <b>COUPLER</b>                      |                                      |            |                |           |
| Isolation test voltage              |                                      | $V_{ISO}$  | 5300           | $V_{RMS}$ |
| Isolation resistance                | $V_{IO} = 500$ V, $T_{amb} = 25$ °C  | $R_{IO}$   | $\geq 10^{12}$ | $\Omega$  |
|                                     | $V_{IO} = 500$ V, $T_{amb} = 100$ °C | $R_{IO}$   | $\geq 10^{11}$ | $\Omega$  |
| Creepage distance                   |                                      |            | $\geq 7.0$     | mm        |
| Clearance distance                  |                                      |            | $\geq 7.0$     | mm        |
| Total package dissipation           |                                      | $P_{tot}$  | 400            | mW        |
| Derate linearly from 25 °C          |                                      |            | 5.33           | mW/°C     |
| Storage temperature                 |                                      | $T_{stg}$  | - 55 to + 150  | °C        |
| Operating temperature               |                                      | $T_{amb}$  | - 55 to + 100  | °C        |
| Lead soldering time at 260 °C       |                                      |            | 10             | s         |

## Note

$T_{amb} = 25$  °C, unless otherwise specified.

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute maximum ratings for extended periods of the time can adversely affect reliability.

| ELECTRICAL CHARACTERISTICS            |                                                       |             |      |      |      |         |
|---------------------------------------|-------------------------------------------------------|-------------|------|------|------|---------|
| PARAMETER                             | TEST CONDITION                                        | SYMBOL      | MIN. | TYP. | MAX. | UNIT    |
| <b>INPUT</b>                          |                                                       |             |      |      |      |         |
| Forward voltage                       | $I_F = 20$ mA                                         | $V_F$       |      | 1.25 | 1.50 | V       |
| Reverse current                       | $V_R = 3.0$ V                                         | $I_R$       |      | 0.1  | 10   | $\mu$ A |
| Junction capacitance                  | $V_F = 0$ V                                           | $C_j$       |      | 25   |      | pF      |
| <b>OUTPUT</b>                         |                                                       |             |      |      |      |         |
| Collector emitter breakdown voltage   | $I_C = 1.0$ $\mu$ A, $I_E = 10$ $\mu$ A               | $BV_{CEO}$  | 30   | 65   |      | V       |
| Emitter collector breakdown voltage   | $I_C = 10$ $\mu$ A, $I_E = 10$ $\mu$ A                | $BV_{ECO}$  | 7.0  | 10   |      | V       |
| Collector emitter leakage current     | $V_{CE} = 10$ V                                       | $I_{CEO}$   |      | 1.0  | 100  | nA      |
| Collector emitter capacitance         | $V_{CE} = 0$ V                                        | $C_{CE}$    |      | 8.0  |      | pF      |
| <b>COUPLER</b>                        |                                                       |             |      |      |      |         |
| Saturation voltage, collector emitter | $I_C = 2.0$ mA, $I_F = 16$ mA                         | $V_{CEsat}$ |      |      | 0.40 | V       |
| Capacitance (input to output)         | $f = 1.0$ MHz                                         | $C_{IO}$    |      | 0.5  |      | pF      |
| Capacitance between channels          | $f = 1.0$ MHz                                         |             |      | 0.4  |      | pF      |
| Bandwidth                             | $I_C = 2.0$ mA, $V_{CC} = 10$ V, $R_L = 100$ $\Omega$ |             |      | 150  |      | kHz     |

## Note

$T_{amb} = 25$  °C, unless otherwise specified.

Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluation. Typical values are for information only and are not part of the testing requirements.

**CURRENT TRANSFER RATIO**

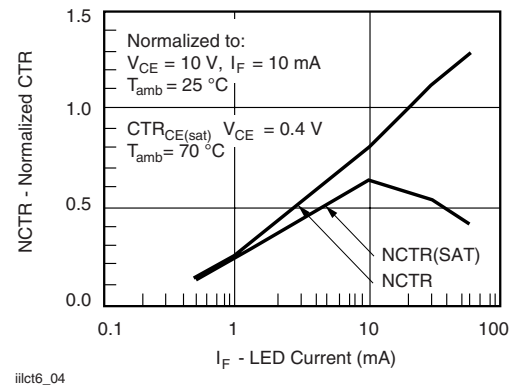
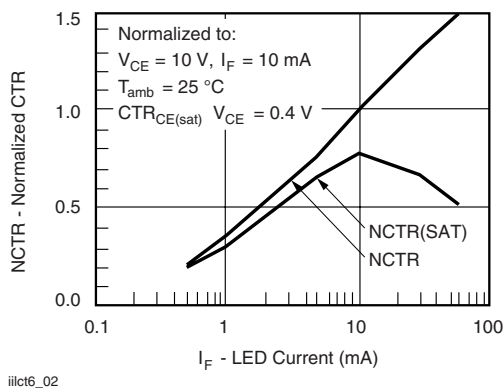
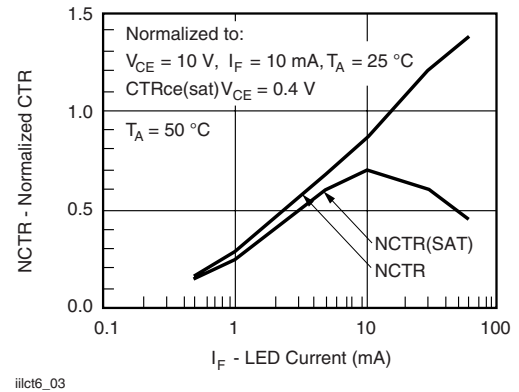
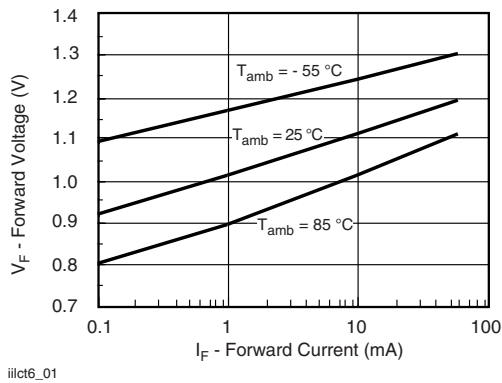
| PARAMETER                 | TEST CONDITION                                  | SYMBOL     | MIN. | TYP. | MAX. | UNIT |
|---------------------------|-------------------------------------------------|------------|------|------|------|------|
| DC current transfer ratio | $I_F = 10 \text{ mA}$ , $V_{CE} = 10 \text{ V}$ | $CTR_{DC}$ | 20   | 50   |      | %    |

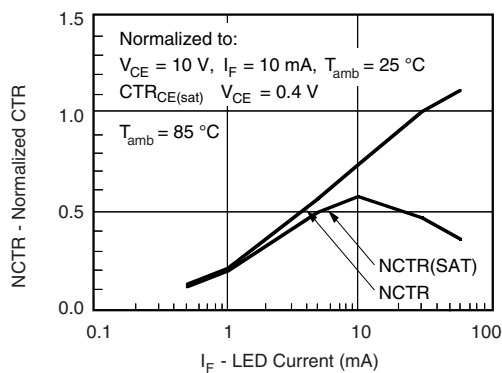
**SWITCHING CHARACTERISTICS**

| PARAMETER                          | TEST CONDITION                                                        | SYMBOL               | MIN. | TYP. | MAX. | UNIT          |
|------------------------------------|-----------------------------------------------------------------------|----------------------|------|------|------|---------------|
| Switching times, output transistor | $I_C = 2.0 \text{ mA}$ , $R_E = 100 \Omega$ , $V_{CE} = 10 \text{ V}$ | $t_{on}$ , $t_{off}$ |      | 3.0  |      | $\mu\text{s}$ |

**TYPICAL CHARACTERISTICS**

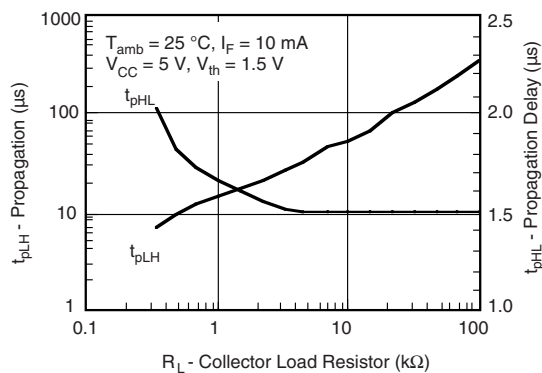
$T_{amb} = 25^\circ\text{C}$ , unless otherwise specified





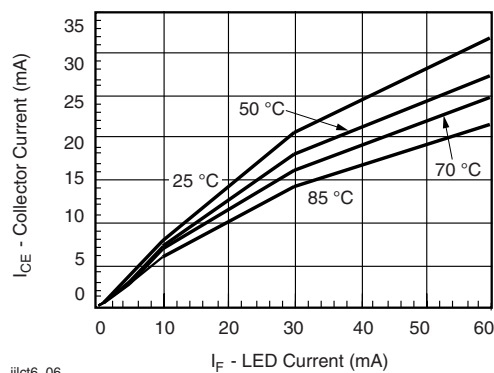
iiict6\_05

Fig. 5 - Normalized Non-Saturated and Saturated CTR vs. LED Current



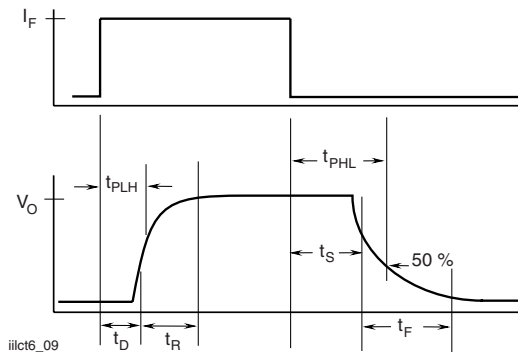
iiict6\_08

Fig. 8 - Propagation Delay vs. Collector Load Resistor



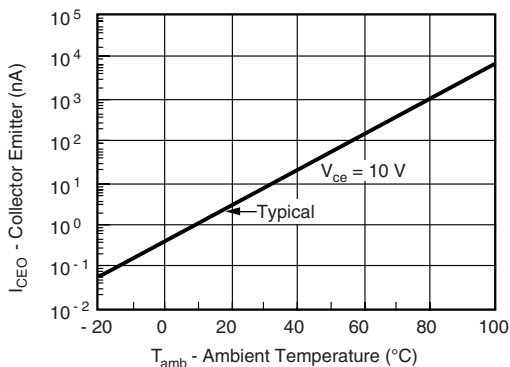
iiict6\_06

Fig. 6 - Collector Emitter Current vs. Temperature and LED Current



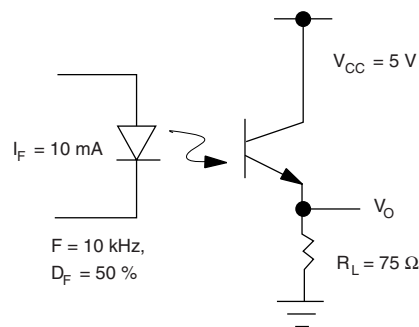
iiict6\_09

Fig. 9 - Switching Timing



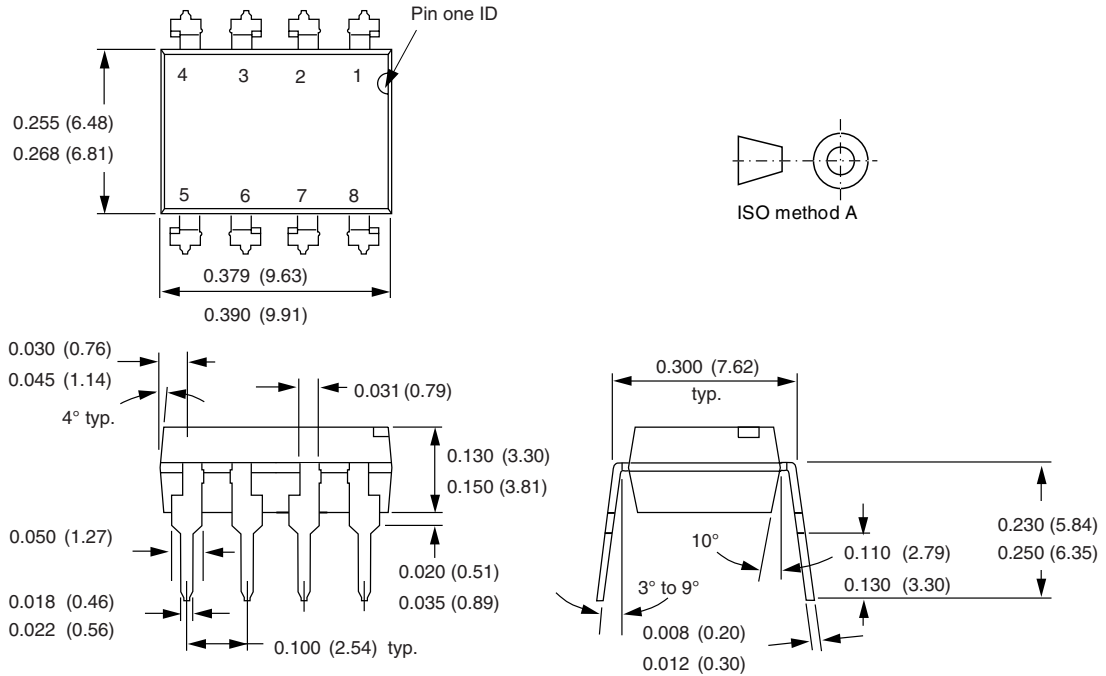
iiict6\_07

Fig. 7 - Collector Emitter Leakage Current vs. Temperature

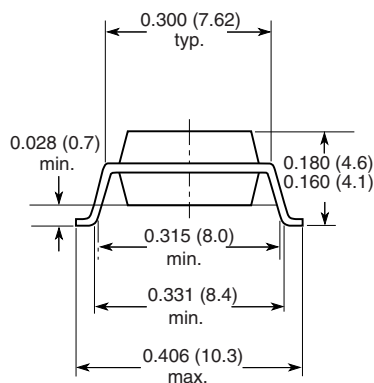
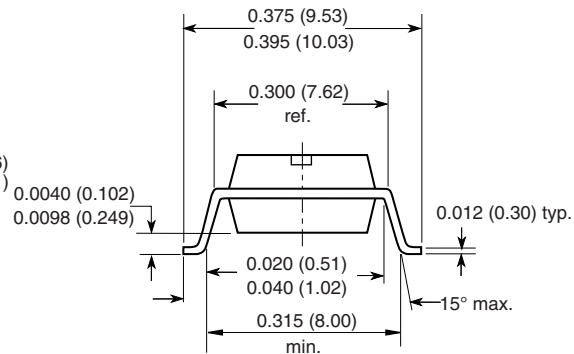


iiict6\_10

Fig. 10 - Switching Schematic

**PACKAGE DIMENSIONS** in inches (millimeters)

i178006

**Option 7****Option 9**

18494



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It is the policy of Vishay Semiconductor GmbH to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively.
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA.
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

We reserve the right to make changes to improve technical design  
and may do so without further notice.

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use Vishay Semiconductors products for any unintended or unauthorized application, the buyer shall indemnify Vishay Semiconductors against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany



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