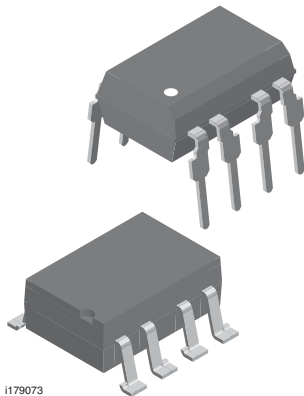
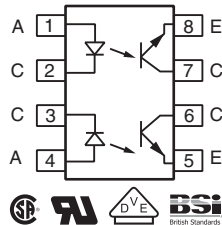


# Optocoupler, Phototransistor Output, Dual Channel



i179073



## FEATURES

- Current transfer ratio, 50 % typical
- Leakage current, 1.0 nA typical
- Two isolated channels per package
- Compliant to RoHS Directive and in accordance to WEEE 2002/96/EC


**RoHS**  
COMPLIANT

## AGENCY APPROVALS

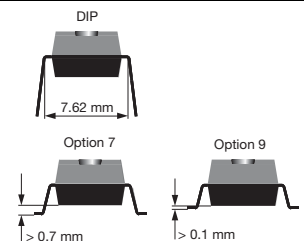
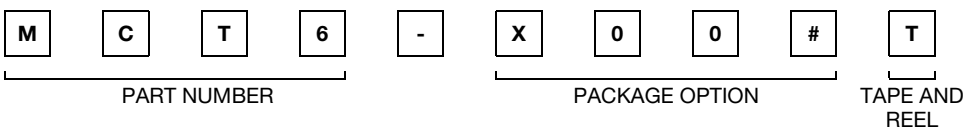
- UL1577, file no. E52744 system code H, double protection
- DIN EN 60747-5-2 (VDE 0884)/DIN EN 60747-5-5 pending available with option 1
- CSA 93751
- BSI IEC 60950; IEC 60065

## DESCRIPTION

The 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 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.

## ORDERING INFORMATION



| AGENCY CERTIFIED/PACKAGE | CTR                       |
|--------------------------|---------------------------|
| UL, CSA, BSI             | ≥ 20                      |
| DIP-8                    | MCT6                      |
| SMD-8, option 7          | MCT6-X007T <sup>(1)</sup> |
| SMD-8, option 9          | MCT6-X009T <sup>(1)</sup> |
| VDE, UL, CSA, BSI        | ≥ 20                      |
| DIP-8                    | MCT6-X001                 |

## Notes

- Additional options may be possible, please contact sales office.
- <sup>(1)</sup> Also available in tubes, do not put "T" on the end.



# Optocoupler, Phototransistor Output, Vishay Semiconductors Dual Channel

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

**Note**

- 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.

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

**Note**

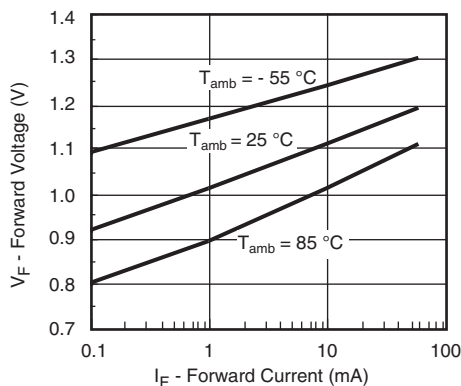
- Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluation. Typical values are for information only and are not part of the testing requirements.

**CURRENT TRANSFER RATIO** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

| 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   |      | %    |

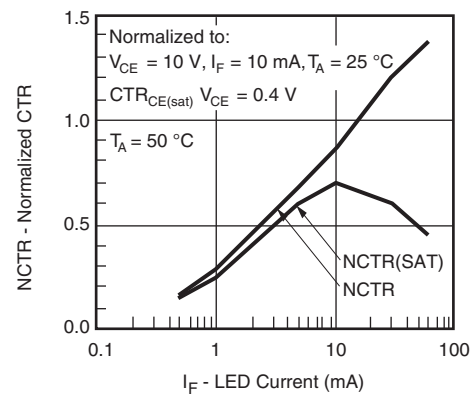
**SWITCHING CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

| PARAMETER                          | TEST CONDITION                                                            | SYMBOL               | MIN. | TYP. | MAX. | UNIT          |
|------------------------------------|---------------------------------------------------------------------------|----------------------|------|------|------|---------------|
| Switching times, output transistor | $I_C = 2.0\text{ mA}$ , $R_L = 100\text{ }\Omega$ , $V_{CE} = 5\text{ V}$ | $t_{on}$ , $t_{off}$ |      | 3.0  |      | $\mu\text{s}$ |

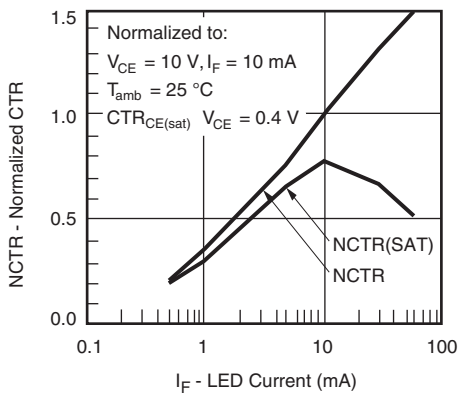
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

iilct6\_01

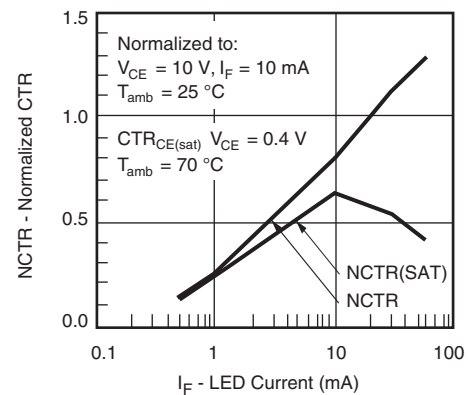
Fig. 1 - Forward Voltage vs. Forward Current



iilct6\_03

Fig. 3 - Normalized Non-Saturated and Saturated CTR vs.  
LED Current

iilct6\_02

Fig. 2 - Normalized Non-Saturated and Saturated CTR vs.  
LED Current

iilct6\_04

Fig. 4 - Normalized Non-Saturated and Saturated CTR vs.  
LED Current

# Optocoupler, Phototransistor Output, Vishay Semiconductors Dual Channel

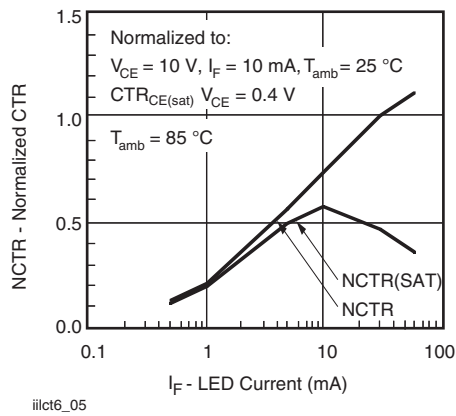


Fig. 5 - Normalized Non-Saturated and Saturated CTR vs. LED Current

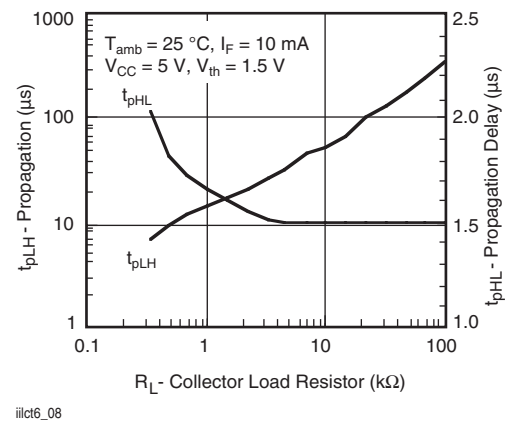


Fig. 8 - Propagation Delay vs. Collector Load Resistor

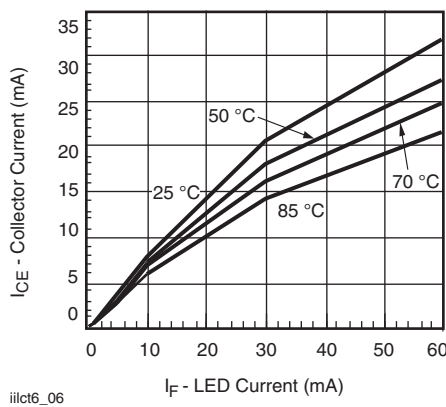


Fig. 6 - Collector Emitter Current vs. Temperature and LED Current

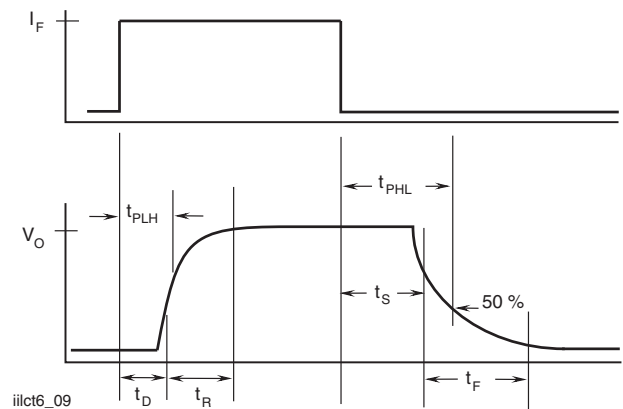


Fig. 9 - Switching Timing

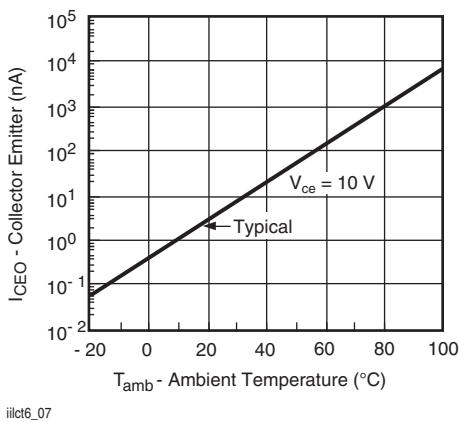


Fig. 7 - Collector Emitter Leakage Current vs. Temperature

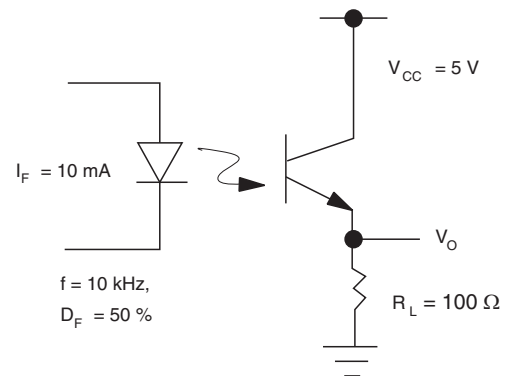
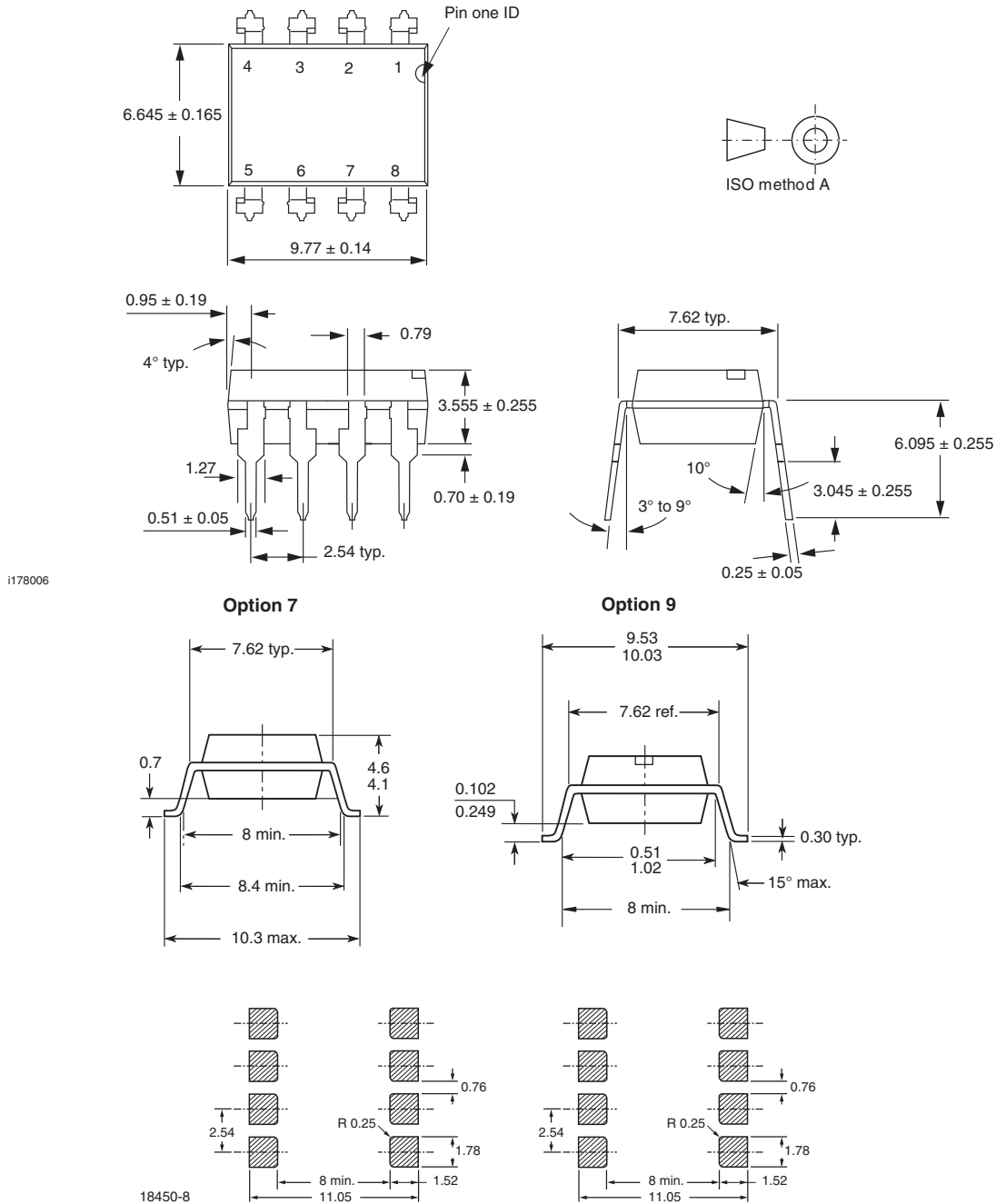
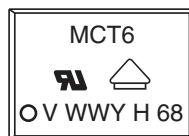


Fig. 10 - Switching Schematic

### PACKAGE DIMENSIONS in millimeters



### PACKAGE MARKING



#### Notes

- Only options 1 and 7 reflected in the package marking
- The VDE logo is only marked on option 1 parts
- Tape and reel suffix (T) is not part of the package marking



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