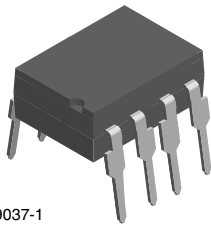
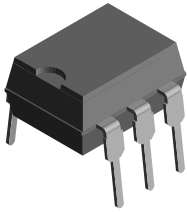
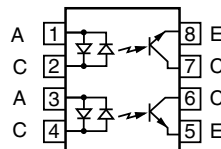
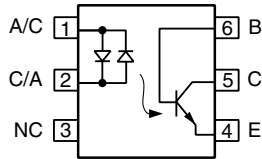


Optocoupler, Phototransistor Output, AC Input, with Base Connection



i179037-1



FEATURES

- AC or polarity insensitive inputs
- Built-in reverse polarity input protection
- Improved CTR symmetry
- Industry standard DIP package
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS COMPLIANT

APPLICATIONS

- Ideal for AC signal detection and monitoring

AGENCY APPROVALS

- UL1577, file no. E52744, double protection
- cUL tested to CSA 22.2 bulletin 5A
- CSA 93751
- BSI EN 60950, BSI EN 60065
- DIN EN 60747-5-5 (VDE 0884-5)
- CQC GB4943.1-2011 and GB8898-2011 (suitable for installation altitude below 2000 m)

DESCRIPTION

The IL250, IL251, IL252, ILD252 are bidirectional input optically coupled isolators consisting of two gallium arsenide infrared LEDs coupled to a silicon NPN phototransistor per channel.

The IL250 has a minimum CTR of 50 %, the IL251 has a minimum CTR of 20 %, and the IL252, ILD252 has a minimum CTR of 100 %.

The IL250, IL251, IL252 are single channel optocouplers. The ILD252 has two isolated channels in a single DIP package.

| ORDERING INFORMATION | | | | | | | | | | | | | |
|--------------------------|-------------------|------|-------|-----------------------|-------------|----------------------------|----------------------------|-------------|---|---------------|---|---|--|
| I | L | x | 2 | 5 | x | - | # | X | 0 | # | # | T | |
| PART NUMBER | | | | | | CTR BIN | PACKAGE OPTION | | | TAPE AND REEL | | | |
| AGENCY CERTIFIED/PACKAGE | CTR (%) | | | SINGLE CHANNEL, 6 PIN | | | DUAL CHANNEL, 8 PIN | | | | | | |
| | UL, CSA, BSI, CQC | ≥ 20 | ≥ 50 | ≥ 100 | IL251 | IL250 | IL252 | ≥ 100 | | | | | |
| DIP-# | - | - | - | - | IL251 | IL250 | IL252 | - | | | | | |
| SMD-#, option 7 | - | - | - | - | - | IL250-X007 | IL252-X007T ⁽¹⁾ | - | | | | | |
| SMD-#, option 9 | - | - | - | - | IL251-X009T | IL250-X009T ⁽¹⁾ | IL252-X009T ⁽¹⁾ | - | | | | | |
| VDE, UL, CSA, BSI, CQC | ≥ 20 | ≥ 50 | ≥ 100 | ≥ 100 | IL250-X001 | IL252-X001 | ≥ 100 | | | | | | |
| DIP-# | - | - | - | - | IL250-X001 | IL252-X001 | - | | | | | | |
| DIP-#, option 6 | - | - | - | - | - | - | IL252-X016 | - | | | | | |
| SMD-#, option 7 | - | - | - | - | - | - | IL252-X017T ⁽¹⁾ | ILD252-X017 | | | | | |

Notes

- Additional options may be possible, please contact sales office
- ⁽¹⁾ Also available in tubes; do not add "T" to end



| ABSOLUTE MAXIMUM RATINGS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) | | | | |
|--|----------------|------------|-------------|-------|
| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
| INPUT | | | | |
| Forward continuous current | | I_F | 60 | mA |
| Power dissipation | | P_{diss} | 100 | mW |
| Derate linearly from 25 °C | | | 1.33 | mW/°C |
| OUTPUT | | | | |
| Collector emitter breakdown voltage | | BV_{CEO} | 30 | V |
| Emitter base breakdown voltage | | BV_{EBO} | 5 | V |
| Collector base breakdown voltage | | BV_{CBO} | 70 | V |
| Power dissipation single channel | | P_{diss} | 200 | mW |
| Power dissipation dual channel | | P_{diss} | 150 | mW |
| Derate linearly from 25 °C single channel | | | 2.6 | mW/°C |
| Derate linearly from 25 °C dual channel | | | 2 | mW/°C |
| COUPLER | | | | |
| Total dissipation single channel | | P_{tot} | 250 | mW |
| Total dissipation dual channel | | P_{tot} | 400 | mW |
| Derate linearly from 25 °C single channel | | | 3.3 | mW/°C |
| Derate linearly from 25 °C dual channel | | | 5.3 | 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

- 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 ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) | | | | | | |
|--|--|-------------|------|------|------|------|
| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| INPUT | | | | | | |
| Forward voltage | $I_F = \pm 10\text{ mA}$ | V_F | - | 1.2 | 1.5 | V |
| OUTPUT | | | | | | |
| Collector emitter breakdown voltage | $I_C = 1\text{ mA}$ | BV_{CEO} | 30 | 50 | - | V |
| Emitter base breakdown voltage | $I_E = 100\text{ }\mu\text{A}$ | BV_{EBO} | 7 | 10 | - | V |
| Collector base breakdown voltage | $I_C = 10\text{ }\mu\text{A}$ | BV_{CBO} | 70 | 90 | - | V |
| Collector emitter leakage current | $V_{CE} = 10\text{ V}$ | I_{CEO} | - | 5 | 50 | nA |
| COUPLER | | | | | | |
| Collector emitter saturation voltage | $I_F = \pm 16\text{ mA}$, $I_C = 2\text{ mA}$ | V_{CEsat} | - | - | 0.4 | V |

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 | PART | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| I_C/I_F | $I_F = \pm 10\text{ mA}$, $V_{CE} = 10\text{ V}$ | IL250 | CTR_{DC} | 50 | - | - | % |
| | | IL251 | CTR_{DC} | 20 | - | - | % |
| | | IL252, ILD252 | CTR_{DC} | 100 | - | - | % |
| Symmetry | $I_F = \pm 10\text{ mA}$ | | | 0.50 | 1 | 2 | |

| SWITCHING CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) | | | | | | | |
|--|----------------|-----------|------|------|------|---------------|--|
| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT | |
| Turn-on time | | t_{on} | - | TBD | - | μs | |
| Turn-off time | | t_{off} | - | TBD | - | μs | |

| SAFETY AND INSULATION RATINGS | | | | |
|--|---|------------|----------------|--------------------|
| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
| Climatic classification | According to IEC 68 part 1 | | 55/100/21 | |
| Comparative tracking index | | CTI | 175 | |
| Maximum rated withstanding isolation voltage | $t = 1\text{ min}$ | V_{ISO} | 4420 | V_{RMS} |
| Maximum transient isolation voltage | | V_{IOTM} | 10 000 | V_{peak} |
| Maximum repetitive peak isolation voltage | | V_{IORM} | 890 | V_{peak} |
| Isolation resistance | $V_{IO} = 500\text{ V}$, $T_{amb} = 25\text{ }^{\circ}\text{C}$ | R_{IO} | $\geq 10^{12}$ | Ω |
| | $V_{IO} = 500\text{ V}$, $T_{amb} = 100\text{ }^{\circ}\text{C}$ | R_{IO} | $\geq 10^{11}$ | Ω |
| Output safety power | | P_{SO} | 400 | mW |
| Input safety current | | I_{SI} | 275 | mA |
| Safety temperature | | T_S | 175 | $^{\circ}\text{C}$ |
| Creepage distance | | | ≥ 7 | mm |
| Clearance distance | | | ≥ 7 | mm |
| Insulation thickness | | DTI | ≥ 0.4 | mm |

Note

- As per IEC 60747-5-5, § 7.4.3.8.2, this optocoupler is suitable for “safe electrical insulation” only within the safety ratings. Compliance with the safety ratings shall be ensured by means of protective circuits

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

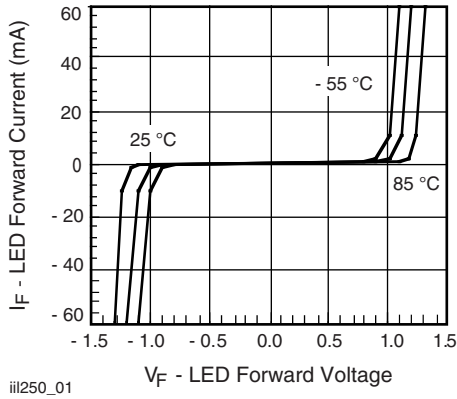


Fig. 1 - LED Forward Current vs. Forward Voltage

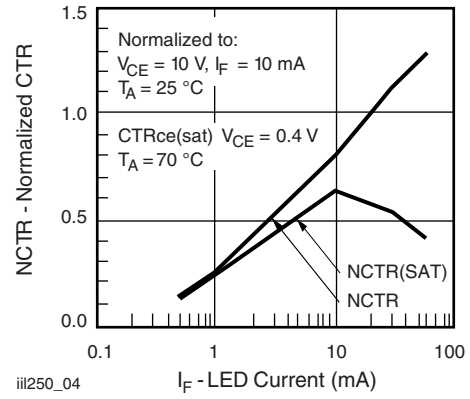


Fig. 4 - Normalized Non-Saturated and Saturated CTR vs. LED Current

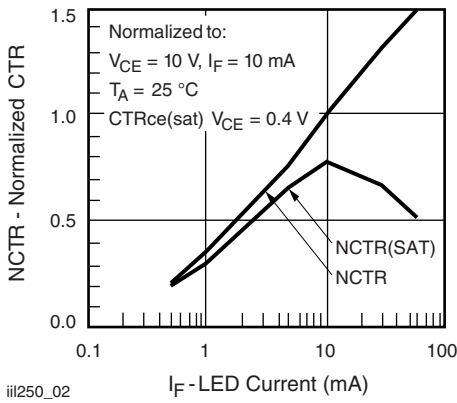


Fig. 2 - Normalized Non-Saturated and Saturated CTR vs. LED Current

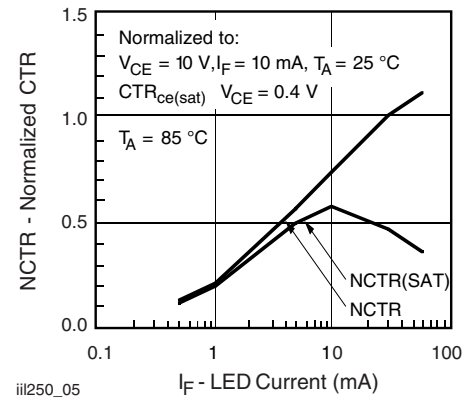


Fig. 5 - Normalized Non-Saturated and Saturated CTR vs. LED Current

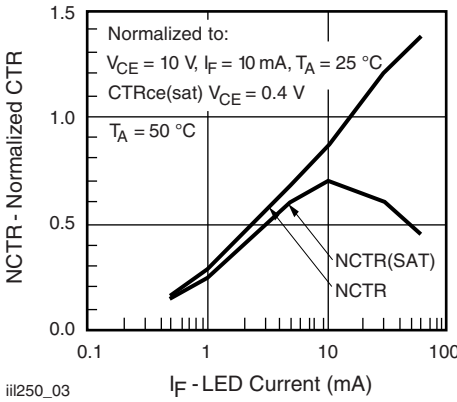


Fig. 3 - Normalized Non-Saturated and Saturated CTR vs. LED Current

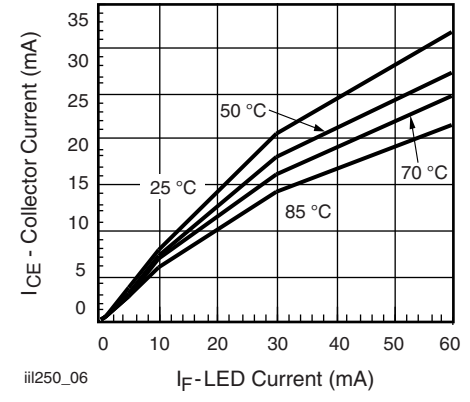


Fig. 6 - Collector Emitter Current vs. Temperature and LED Current

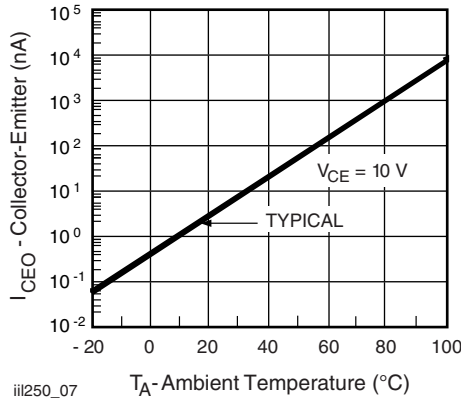


Fig. 7 - Collector Emitter Leakage Current vs. Temperature

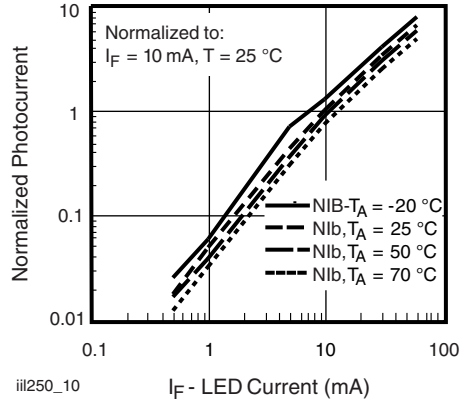


Fig. 10 - Normalized Photocurrent vs. I_F and Temperature

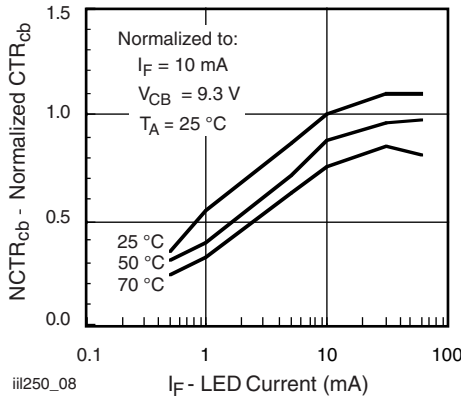


Fig. 8 - Normalized CTR_{CB} vs. LED Current and Temperature

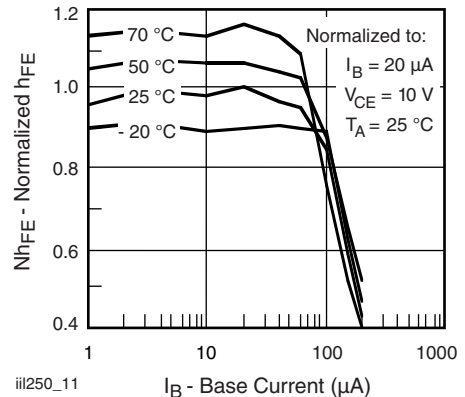


Fig. 11 - Normalized Non Saturated h_{FE} vs. Base Current and Temperature

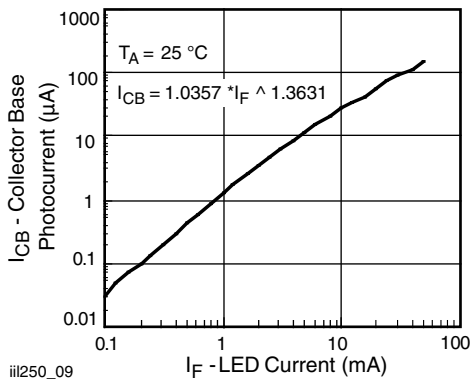


Fig. 9 - Collector Base Photocurrent vs. LED Current

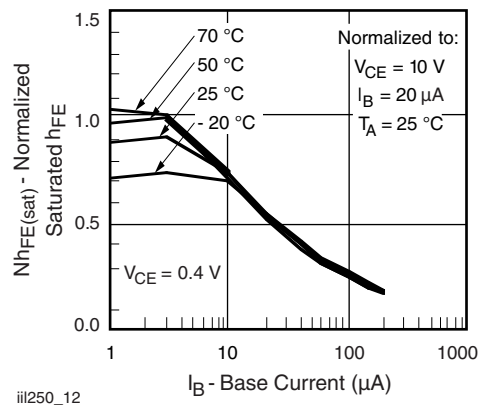


Fig. 12 - Normalized Saturated h_{FE} vs. Base Current and Temperature

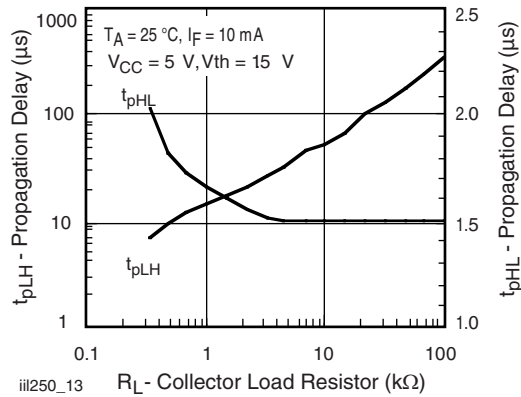


Fig. 13 - Propagation Delay vs. Collector Load Resistor

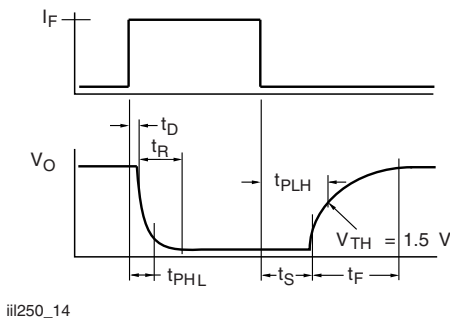


Fig. 14 - Switching Timing

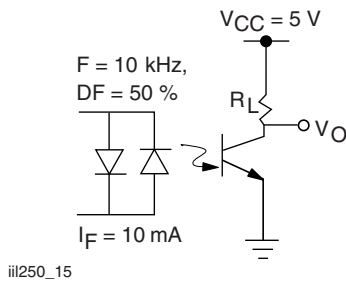
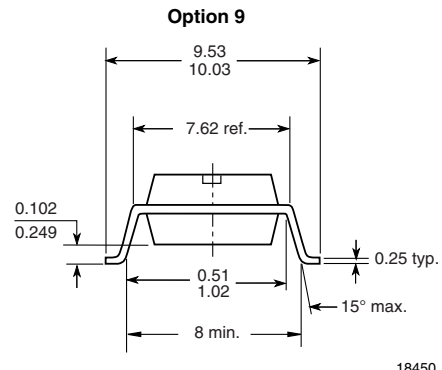
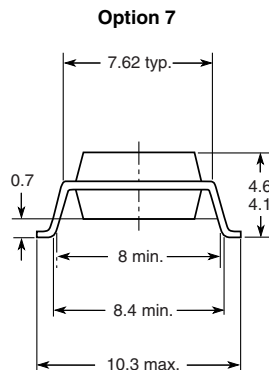
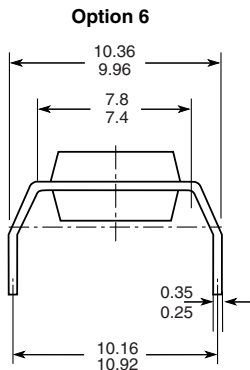
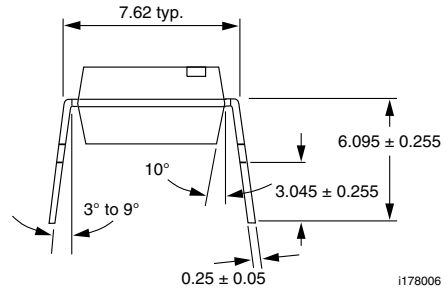
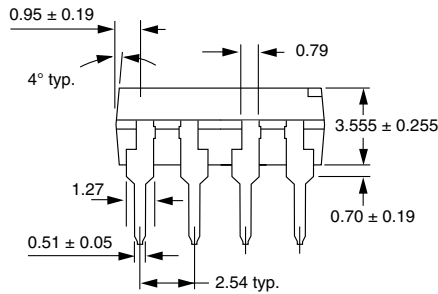
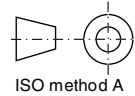
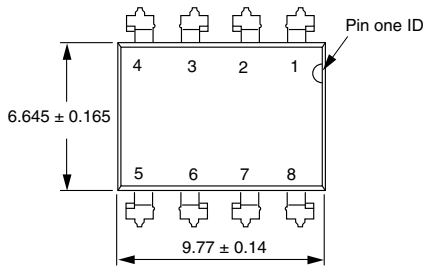
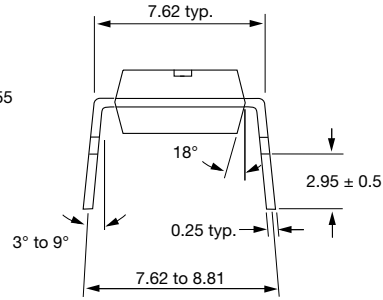
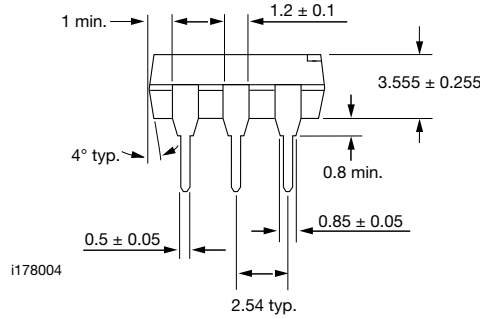
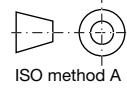
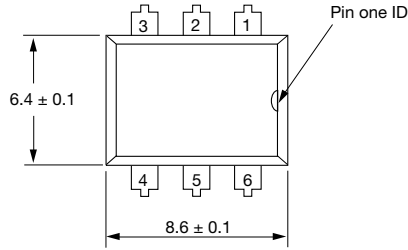


Fig. 15 - Switching Schematic



PACKAGE DIMENSIONS in inches (millimeters)





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