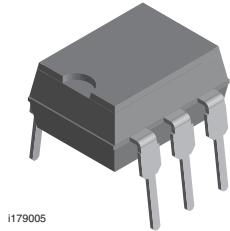
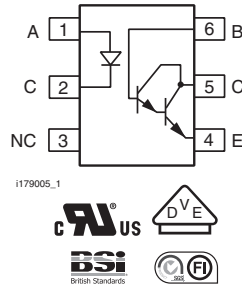


Optocoupler, Photodarlington Output, High Gain, With Base Connection



i179005



FEATURES

- Very high current transfer ratio, 500 % min.
- High isolation resistance, $10^{11} \Omega$ typical
- Standard plastic DIP package
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT

AGENCY APPROVALS

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

DESCRIPTION

The 4N32 and 4N33 are optically coupled isolators with a gallium arsenide infrared LED and a silicon photodarlington sensor.

Switching can be achieved while maintaining a high degree of isolation between driving and load circuits.

These optocouplers can be used to replace reed and mercury relays with advantages of long life, high speed switching and elimination of magnetic fields.

| ORDERING INFORMATION | | |
|---|---------|-------|
| <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px;">4</div> <div style="border: 1px solid black; padding: 2px;">N</div> <div style="border: 1px solid black; padding: 2px;">3</div> <div style="border: 1px solid black; padding: 2px;">#</div> <div style="border: 1px solid black; padding: 2px;">-</div> <div style="border: 1px solid black; padding: 2px;">X</div> <div style="border: 1px solid black; padding: 2px;">0</div> <div style="border: 1px solid black; padding: 2px;">#</div> <div style="border: 1px solid black; padding: 2px;">#</div> <div style="border: 1px solid black; padding: 2px;">T</div> </div> <p style="text-align: center;">PART NUMBER PACKAGE OPTION TAPE AND REEL</p> | | |
| AGENCY CERTIFIED/PACKAGE | CTR (%) | |
| UL, BSI, FIMKO | ≥ 500 | ≥ 500 |
| DIP-6 | 4N32 | 4N33 |

Note

- Additional options may be possible, please contact sales office



| ABSOLUTE MAXIMUM RATINGS (T _{amb} = 25 °C, unless otherwise specified) | | | | |
|---|--|-------------------|--------------------|------------------|
| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
| input | | | | |
| Reverse voltage | | V _R | 3 | V |
| Forward current | | I _F | 60 | mA |
| Power dissipation | | P _{diss} | 100 | mW |
| Derate linearly | From 55 °C | | 1.33 | mW/°C |
| output | | | | |
| Collector emitter breakdown voltage | | BV _{CEO} | 30 | V |
| Emitter base breakdown voltage | | BV _{EBO} | 8 | V |
| Collector base breakdown voltage | | BV _{CBO} | 50 | V |
| Emitter collector breakdown voltage | | BV _{ECO} | 5 | V |
| Collector (load) current | | I _C | 100 | mA |
| Power dissipation | | P _{diss} | 150 | mW |
| Derate linearly | | | 2 | mW/°C |
| coupler | | | | |
| Total dissipation | | P _{tot} | 250 | mW |
| Derate linearly | | | 3.3 | mW/°C |
| Isolation test voltage (between emitter | 1 s | V _{ISO} | 5300 | V _{RMS} |
| Leakage path | | | 7 | mm min. |
| Air path | | | 7 | mm min. |
| Isolation resistance | V _{IO} = 500 V, T _{amb} = 25 °C | R _{IO} | ≥ 10 ¹² | Ω |
| | V _{IO} = 500 V, T _{amb} = 100 °C | R _{IO} | ≥ 10 ¹¹ | Ω |
| Storage temperature | | T _{stg} | -55 to +150 | °C |
| Operating temperature | | T _{amb} | -55 to +100 | °C |
| Lead soldering time ⁽¹⁾ | At 260 °C | | 10 | s |

Notes

- 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
- ⁽¹⁾ Refer to reflow profile for soldering conditions for surface mounted devices (SMD). Refer to wave profile for soldering conditions for through hole devices (DIP)

| ELECTRICAL CHARACTERISTICS (T _{amb} = 25 °C, unless otherwise specified) | | | | | | |
|---|--|--------------------|------|------|------|------|
| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| input | | | | | | |
| Forward voltage | I _F = 50 mA | V _F | - | 1.25 | 1.5 | V |
| Reverse current | V _R = 3 V | I _R | - | 0.1 | 100 | μA |
| Capacitance | V _R = 0 V | C _O | - | 25 | | pF |
| output | | | | | | |
| Collector emitter breakdown voltage ⁽¹⁾ | I _C = 100 μA, I _F = 0 | BV _{CEO} | 30 | - | - | V |
| Collector base breakdown voltage ⁽¹⁾ | I _C = 100 μA, I _F = 0 | BV _{CBO} | 50 | - | - | V |
| Emitter base breakdown voltage ⁽¹⁾ | I _C = 100 μA, I _F = 0 | BV _{EBO} | 8 | - | - | V |
| Emitter collector breakdown voltage ⁽¹⁾ | I _C = 100 μA, I _F = 0 | BV _{ECO} | 5 | 10 | - | V |
| Collector emitter leakage current | V _{CE} = 10 V, I _F = 0 | I _{CEO} | - | 1 | 100 | nA |
| | I _C = 0.5 mA, V _{CE} = 5 V | h _{FE} | 13 | - | - | |
| coupler | | | | | | |
| Collector emitter saturation voltage | | V _{CEsat} | - | 1 | - | V |
| Coupling capacitance | | | - | 1.5 | - | pF |

Notes

- 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
- ⁽¹⁾ Indicates JEDEC[®] registered values

CURRENT TRANSFER RATIO

| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|------------------------|---|--------|------|------|------|------|
| Current transfer ratio | $V_{CE} = 10\text{ V}$, $I_F = 10\text{ mA}$ | CTR | 500 | - | - | % |

SWITCHING CHARACTERISTICS

| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---------------|---|-----------|------|------|------|---------------|
| Turn-on time | $V_{CC} = 10\text{ V}$, $I_C = 50\text{ mA}$ | t_{on} | - | - | 5 | μs |
| Turn-off time | $I_F = 200\text{ mA}$, $R_L = 180\ \Omega$ | t_{off} | - | - | 100 | μs |

SAFETY AND INSULATION RATINGS

| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|--|----------------------------|--------|------|---------------|------|--------------------|
| Climatic classification | According to IEC 68 part 1 | | - | 55 / 100 / 21 | - | |
| Comparative tracking index | | CTI | 175 | - | 399 | |
| V_{IOTM} | | | 8000 | - | - | V |
| V_{IORM} | | | 890 | - | - | V |
| P_{SO} | | | - | - | 700 | mW |
| I_{SI} | | | - | - | 400 | mA |
| T_{SI} | | | - | - | 175 | $^{\circ}\text{C}$ |
| Creepage distance | Standard DIP-6 | | 7 | - | - | mm |
| Clearance distance | Standard DIP-6 | | 7 | - | - | mm |
| Insulation thickness, reinforced rated | Per IEC 60950 2.10.5.1 | | 0.4 | - | - | mm |

Note

- As per IEC 60747-5-2, § 7.4.3.8.1, 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

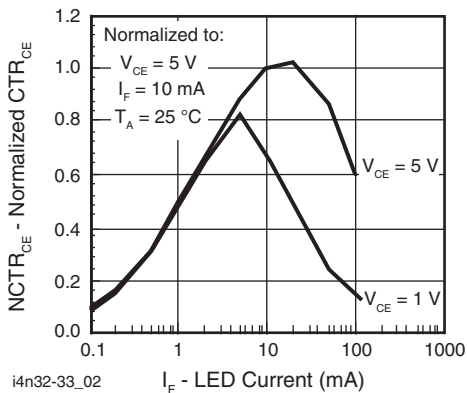
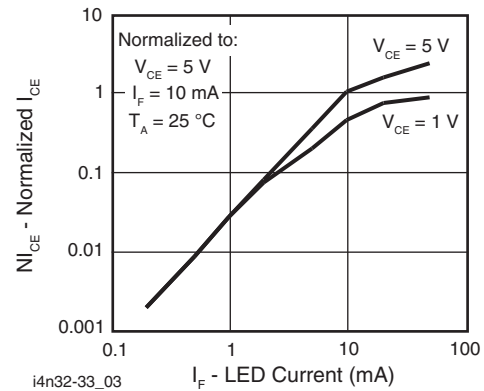
TYPICAL CHARACTERISTICS ($T_{amb} = 25\ ^{\circ}\text{C}$, unless otherwise specified)

 Fig. 1 - Normalized Non-Saturated and Saturated CTR_{CE} vs. LED Current


Fig. 2 - Normalized Non-Saturated and Saturated Collector Emitter Current vs. LED Current

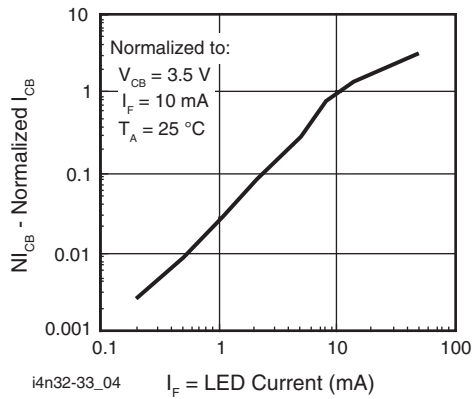


Fig. 3 - Normalized Collector Base Photocurrent vs. LED Current

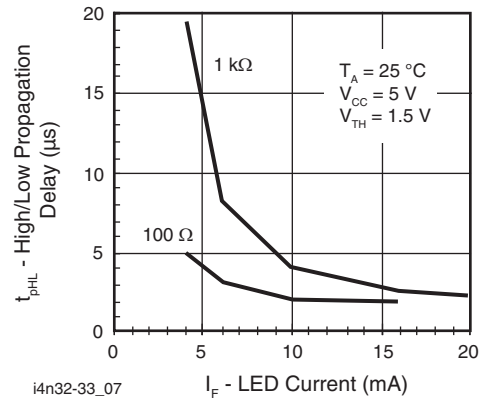


Fig. 6 - High to Low Propagation Delay vs. Collector Load Resistance and LED Current



Fig. 4 - Non-Saturated and Saturated h_{FE} vs. Base Current

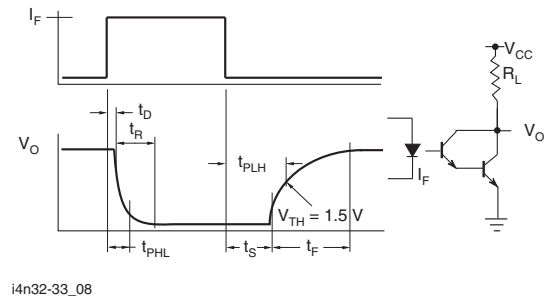


Fig. 7 - Switching Waveform and Switching Schematic

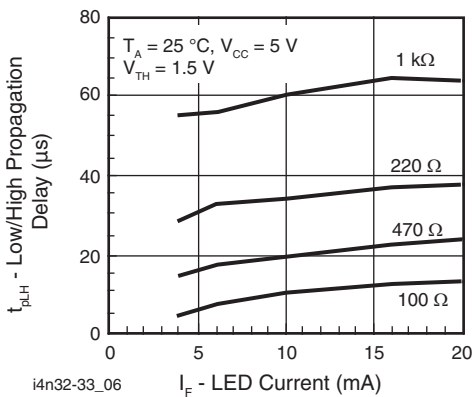
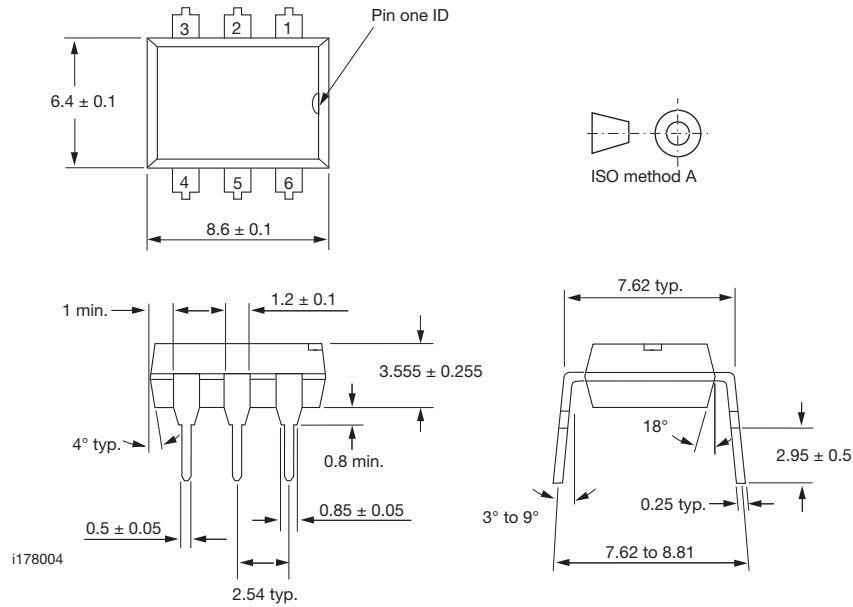


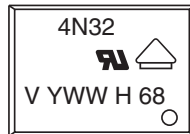
Fig. 5 - Low to High Propagation Delay vs. Collector Load Resistance and LED Current

PACKAGE DIMENSIONS in millimeters

DIP-6 Package Dimensions



PACKAGE MARKING



Notes

- Example marking for 4N32
- 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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