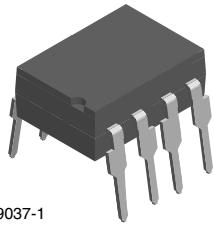
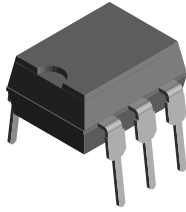




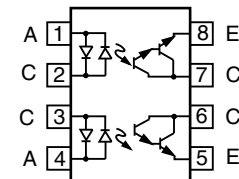
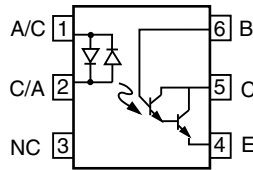
**THE DATASHEET OF  
IL755-1**



# Optocoupler, Photodarlington Output, AC Input, High Gain (Single, Dual Channel)



i179037-1



## FEATURES

- AC or polarity insensitive inputs
- Built-in reverse polarity input protection
- Industry standard DIP package
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC



RoHS COMPLIANT

## APPLICATIONS

- Designed for applications requiring detection or monitoring of AC signals

## AGENCY APPROVALS

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

## DESCRIPTION

The IL755, ILD755 are bidirectional input optically coupled isolators. They consist of two gallium arsenide infrared emitting diodes coupled to a silicon NPN photodarlington per channel.

The IL755 is single channel Darlington optocoupler. The ILD755 has two isolated channels in a single DIP package.

| ORDERING INFORMATION  |                             |              |                     |               |
|---|-----------------------------|--------------|---------------------|---------------|
| <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px;">I</div> <div style="border: 1px solid black; padding: 2px;">L</div> <div style="border: 1px solid black; padding: 2px;">x</div> <div style="border: 1px solid black; padding: 2px;">7</div> <div style="border: 1px solid black; padding: 2px;">5</div> <div style="border: 1px solid black; padding: 2px;">5</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;"> <span style="margin-right: 100px;">PART NUMBER</span> <span style="margin-right: 100px;">CTR BIN</span> <span style="margin-right: 100px;">PACKAGE OPTION</span> <span style="margin-right: 100px;">TAPE AND REEL</span> </p> |                             |              |                     |               |
| AGENCY CERTIFIED/PACKAGE  | CTR (%)                     |              |                     |               |
|   | SINGLE CHANNEL, 6 PIN       |              | DUAL CHANNEL, 8 PIN |               |
|   | ± 2 mA                      | ± 1 mA       | ± 2 mA              | ± 1 mA        |
| UL, CSA, BSI, CQC   | ≥ 750                       | ≥ 1000       | ≥ 750               | ≥ 1000        |
| DIP-#   | IL755-1                     | IL755-2      | ILD755-1            | ILD755-2      |
| SMD-#, option 7   | IL755-1X007T <sup>(1)</sup> | IL755-2X007T | -                   | ILD755-2X007T |
| VDE, UL, CSA, BSI, CQC  | ≥ 750                       | ≥ 1000       | ≥ 750               | ≥ 1000        |
| DIP-#   | IL755-1X001                 | -            | -                   | -             |
| SMD-#, option 7   | -                           | -            | ILD755-1X017        | -             |

### Notes

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



| ABSOLUTE MAXIMUM RATINGS (T <sub>amb</sub> = 25 °C, unless otherwise specified) |                |          |                   |               |  |
|---|----------------|----------|-------------------|---------------|--|
| PARAMETER   | TEST CONDITION | PART     | SYMBOL            | VALUE         | UNIT                                   |
| <b>INPUT</b>  |                |          |                   |               |  |
| Forward continuous current  |                |          | I <sub>F</sub>    | 60            | mA                                     |
| Power dissipation   |                |          | P <sub>diss</sub> | 100           | mW                                     |
| Derate linearly from 25°C   |                |          |                   | 1.33          | mW/°C                                  |
| <b>OUTPUT</b>   |                |          |                   |               |  |
| Collector emitter breakdown voltage   |                |          | BV <sub>CEO</sub> | 60            | V                                      |
| Collector base breakdown voltage  |                |          | BV <sub>CBO</sub> | 60            | V                                      |
| Power dissipation   |                | IL755-1  | P <sub>diss</sub> | 200           | mW                                     |
|   |                | IL755-2  |                   | 200           | mW                                     |
|   |                | ILD755-1 |                   | 150           | mW                                     |
|   |                | ILD755-2 |                   | 150           | mW                                     |
| Derate linearly from 25°C   |                | IL755-1  |                   | 2.6           | mW/°C                                  |
|   |                | IL755-2  |                   | 2.6           | mW/°C                                  |
|   |                | ILD755-1 |                   | 2.0           | mW/°C                                  |
|   |                | ILD755-2 |                   | 2.0           | mW/°C                                  |
| <b>COUPLER</b>  |                |          |                   |               |  |
| Isolation test voltage between emitter and detector                             | t = 1 s        |          | V <sub>ISO</sub>  | 7500/5300     | V <sub>AC peak</sub> /V <sub>RMS</sub> |
| Creepage distance   |                |          |                   | ≥ 7           | mm                                     |
| Clearance distance  |                |          |                   | ≥ 7           | mm                                     |
| Total power dissipation   |                | IL755-1  | P <sub>tot</sub>  | 250           | mW                                     |
|   |                | IL755-2  |                   | 250           | mW                                     |
|   |                | ILD755-1 |                   | 400           | mW                                     |
|   |                | ILD755-2 |                   | 400           | mW                                     |
| Derate linearly from 25 °C  |                | IL755-1  |                   | 3.0           | mW/°C                                  |
|   |                | IL755-2  |                   | 3.0           | mW/°C                                  |
|   |                | ILD755-1 |                   | 3.0           | mW/°C                                  |
|   |                | ILD755-2 |                   | 3.0           | mW/°C                                  |
| Storage temperature   |                |          | T <sub>stg</sub>  | - 55 to + 150 | °C                                     |
| Operating temperature   |                |          | T <sub>amb</sub>  | - 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 <sub>amb</sub> = 25 °C, unless otherwise specified) |  |                    |      |      |      |      |
|---|--|--------------------|------|------|------|------|
| PARAMETER   | TEST CONDITION                                   | SYMBOL             | MIN. | TYP. | MAX. | UNIT |
| <b>INPUT</b>  |  |                    |      |      |      |      |
| Forward voltage   | I <sub>F</sub> = ± 10 mA                         | V <sub>F</sub>     |      | 1.2  | 1.5  | V    |
| <b>OUTPUT</b>   |  |                    |      |      |      |      |
| Collector emitter breakdown voltage   | I <sub>C</sub> = 1.0 mA                          | BV <sub>CEO</sub>  | 60   | 75   |      | V    |
| Collector base breakdown voltage  | I <sub>C</sub> = 10 µA                           | BV <sub>CBO</sub>  | 60   | 90   |      | V    |
| Collector emitter leakage current   | V <sub>CE</sub> = 10 V, I <sub>F</sub> = 0 A     | I <sub>CEO</sub>   |      | 10   | 100  | nA   |
| <b>COUPLER</b>  |  |                    |      |      |      |      |
| Collector emitter saturation voltage  | I <sub>C</sub> = 10 mA, I <sub>F</sub> = ± 10 mA | V <sub>CEsat</sub> |      |      | 1    | 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.

| <b>CURRENT TRANSFER RATIO</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |   |          |        |      |      |      |      |
|--|---|----------|--------|------|------|------|------|
| PARAMETER  | TEST CONDITION                                    | PART     | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| Current transfer ratio   | $I_F = \pm 2\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ | IL755-1  | CTR    | 750  |      |      | %    |
|  | $I_F = \pm 2\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ | ILD755-1 | CTR    | 750  |      |      | %    |
|  | $I_F = \pm 1\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ | IL755-2  | CTR    | 1000 |      |      | %    |
|  | $I_F = \pm 1\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ | ILD755-2 | CTR    | 1000 |      |      | %    |

| <b>SWITCHING CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |  |          |        |      |      |      |               |
|---|--|----------|--------|------|------|------|---------------|
| PARAMETER   | TEST CONDITION   | PART     | SYMBOL | MIN. | TYP. | MAX. | UNIT          |
| Rise time   | $V_{CC} = 10\text{ V}$ , $I_F = \pm 2\text{ mA}$ , $R_L = 100\text{ }\Omega$ | IL755-1  | $t_r$  |      | 50   |      | $\mu\text{s}$ |
|   |  | ILD755-1 | $t_r$  |      | 50   |      | $\mu\text{s}$ |
| Fall time   | $V_{CC} = 10\text{ V}$ , $I_F = \pm 2\text{ mA}$ , $R_L = 100\text{ }\Omega$ | IL755-1  | $t_f$  |      | 50   |      | $\mu\text{s}$ |
|   |  | ILD755-1 | $t_f$  |      | 50   |      | $\mu\text{s}$ |
| Rise time   | $V_{CC} = 10\text{ V}$ , $I_F = \pm 1\text{ mA}$ , $R_L = 100\text{ }\Omega$ | IL755-2  | $t_r$  |      | 70   |      | $\mu\text{s}$ |
|   |  | ILD755-2 | $t_r$  |      | 70   |      | $\mu\text{s}$ |
| Fall time   | $V_{CC} = 10\text{ V}$ , $I_F = \pm 1\text{ mA}$ , $R_L = 100\text{ }\Omega$ | IL755-2  | $t_f$  |      | 70   |      | $\mu\text{s}$ |
|   |  | ILD755-2 | $t_f$  |      | 70   |      | $\mu\text{s}$ |

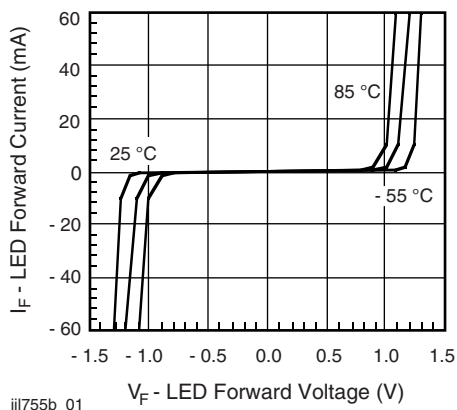
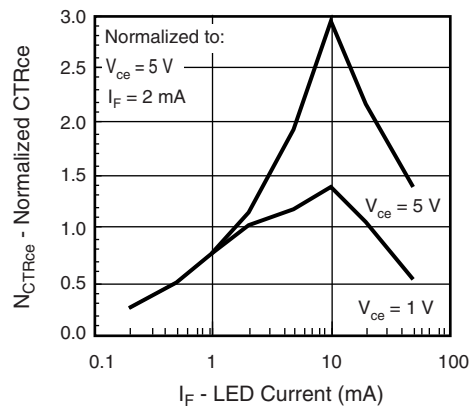
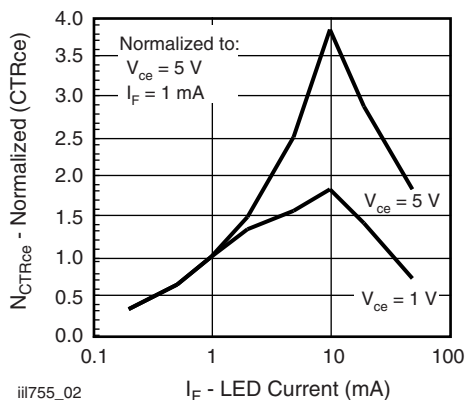
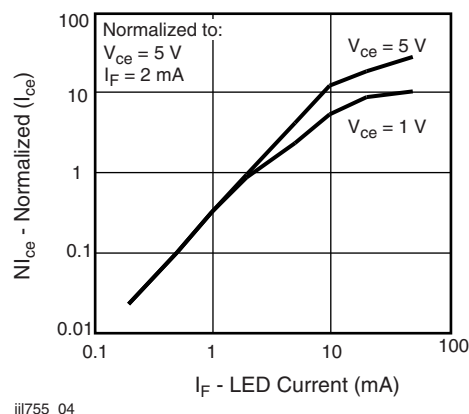
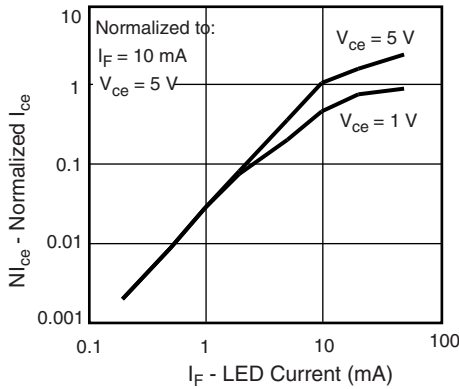
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


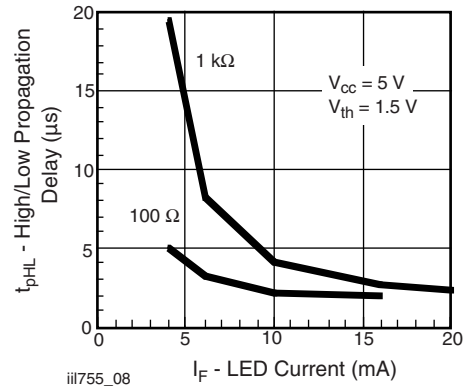
Fig. 1 - LED Forward Current vs. Forward Voltage


 Fig. 3 - Normalized Non-Saturated and Saturated  $CTR_{CE}$  vs. LED Current

 Fig. 2 - Normalized Non-Saturated and Saturated  $CTR_{CE}$  vs. LED Current

 Fig. 4 - Normalized Non-Saturated and Saturated  $I_{CE}$  vs. LED Current



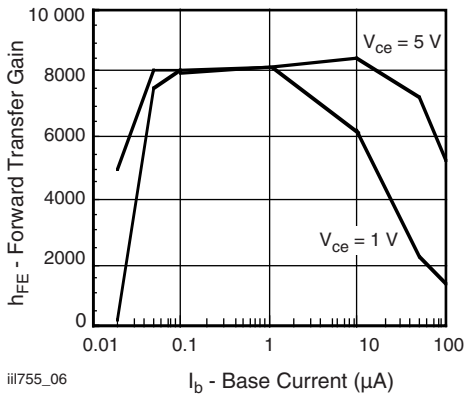
iii755\_05

Fig. 5 - Normalized Non-Saturated and Saturated Collector-Emitter Current vs. LED Current



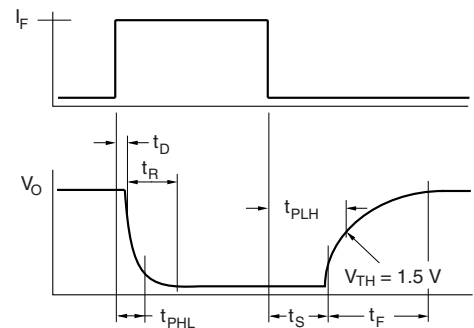
iii755\_08

Fig. 8 - High to Low Propagation Delay vs. Collector Load Resistance and LED Current



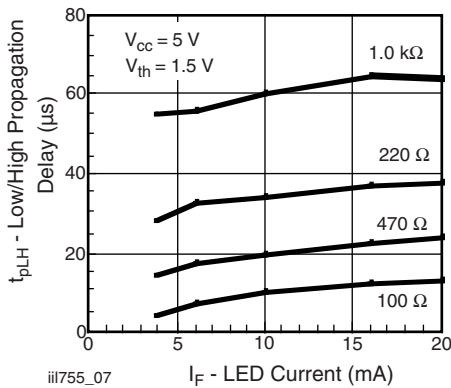
iii755\_06

Fig. 6 - Non-Saturated and Saturated  $h_{FE}$  vs. Base Current



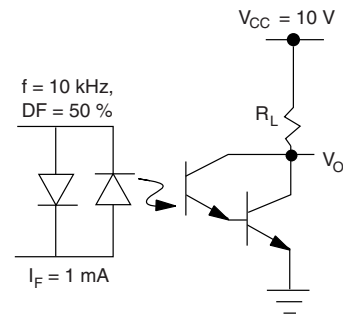
iii755\_09

Fig. 9 - Switching Waveform



iii755\_07

Fig. 7 - Low to High Propagation Delay vs. Collector Load Resistance and LED Current

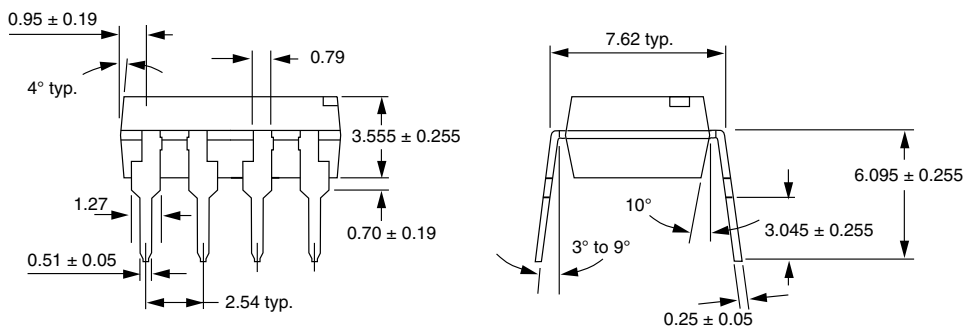
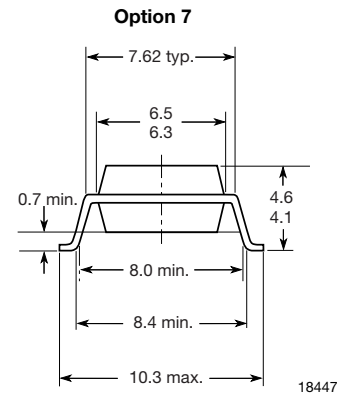
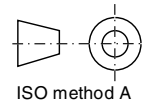
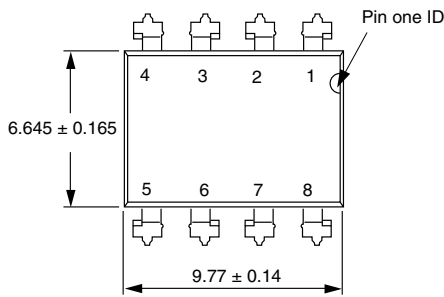
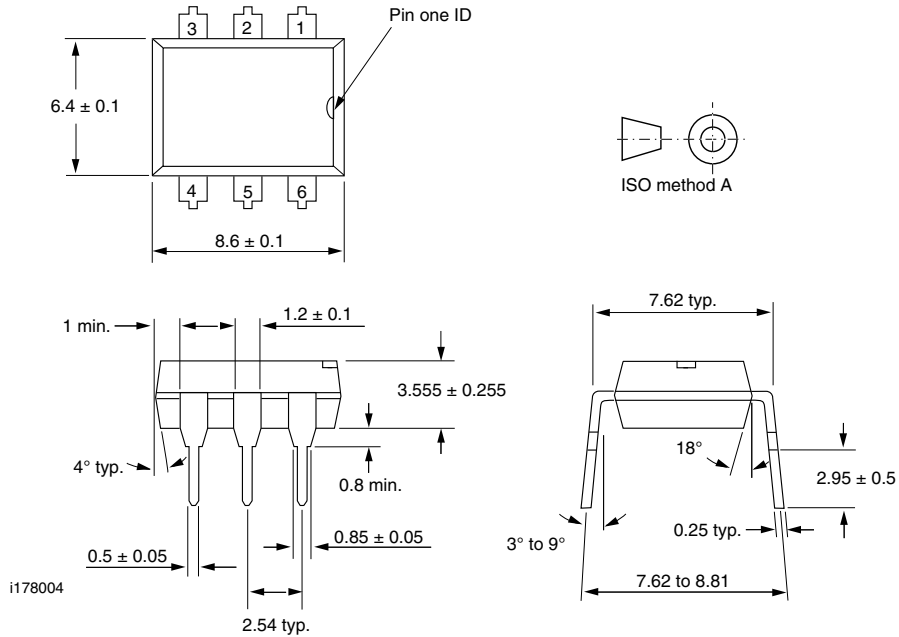


iii755\_10

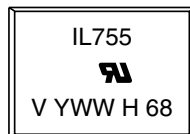
Fig. 10 - Test Circuit, Saturated and Non-Saturated Operation



PACKAGE DIMENSIONS in millimeters



PACKAGE MARKING (example)



Notes

- 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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