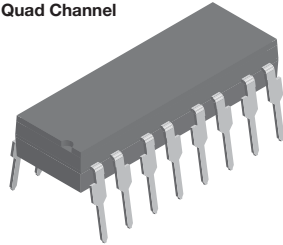
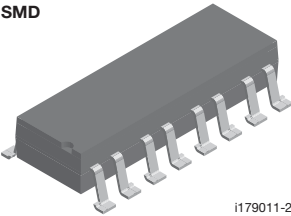


# Optocoupler, Photodarlington Output, High Gain (Quad Channel)

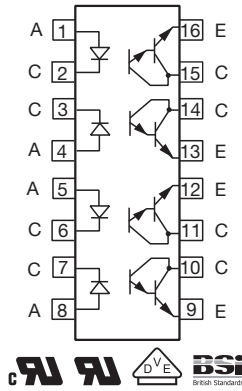
Quad Channel



SMD



i179011-2



## FEATURES

- Isolation test voltage, 5300 V<sub>RMS</sub>
- High isolation resistance, 10<sup>11</sup> Ω typical
- Low coupling capacitance
- Standard plastic DIP package
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC


**RoHS**  
COMPLIANT

## AGENCY APPROVALS

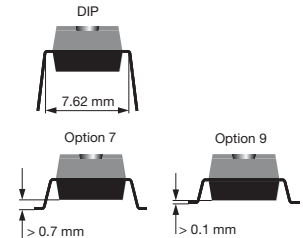
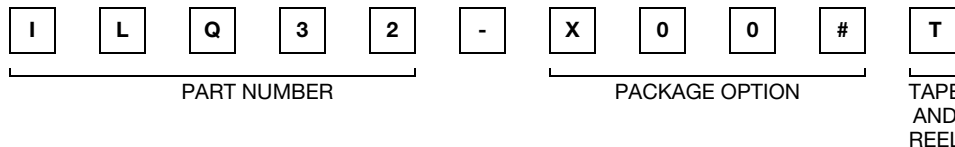
- UL1577, file no. E52744 system code H, double protection
- cUL tested to CSA 22.2 bulletin 5A
- DIN EN 60747-5-2 (VDE 0884)/DIN EN 60747-5-5 (pending), available with option 1
- BSI IEC 60950; IEC 60065

## DESCRIPTION

The ILQ32 is 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



| AGENCY CERTIFIED/PACKAGE | CTR (%)                    |
|--------------------------|----------------------------|
| <b>UL, cUL, BSI</b>      | <b>≥ 500</b>               |
| DIP-16                   | ILQ32                      |
| SMD-16, option 7         | ILQ32-X007T <sup>(1)</sup> |
| SMD-16, option 9         | ILQ32-X009T <sup>(1)</sup> |
| <b>VDE, UL, cUL, BSI</b> | <b>≥ 500</b>               |
| DIP-16                   | ILQ32-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.

| ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |                                                                |       |            |               |           |
|-------------------------------------------------------------------------------------------------|----------------------------------------------------------------|-------|------------|---------------|-----------|
| PARAMETER                                                                                       | TEST CONDITION                                                 | PART  | SYMBOL     | VALUE         | UNIT      |
| <b>INPUT</b>                                                                                    |                                                                |       |            |               |           |
| Peak reverse voltage                                                                            |                                                                |       | $V_R$      | 3             | V         |
| Forward continuous current                                                                      |                                                                |       | $I_F$      | 60            | mA        |
| Power dissipation                                                                               |                                                                |       | $P_{diss}$ | 100           | mW        |
| Derate linearly from 25°C                                                                       |                                                                |       |            | 1.33          | mW/°C     |
| <b>OUTPUT</b>                                                                                   |                                                                |       |            |               |           |
| Collector emitter breakdown voltage                                                             |                                                                |       | $BV_{CEO}$ | 30            | V         |
| Collector (load) current                                                                        |                                                                |       | $I_C$      | 125           | mA        |
| Power dissipation                                                                               |                                                                |       | $P_{diss}$ | 150           | mW        |
| Derate linearly from 25°C                                                                       |                                                                |       |            | 2             | mW/°C     |
| <b>COUPLER</b>                                                                                  |                                                                |       |            |               |           |
| Isolation test voltage between emitter and detector                                             | $t = 1\text{ s}$                                               |       | $V_{ISO}$  | 5300          | $V_{RMS}$ |
| Creepage distance                                                                               |                                                                |       |            | $\geq 7$      | mm        |
| Clearance distance                                                                              |                                                                |       |            | $\geq 7$      | mm        |
| Comparative tracking index per DIN IEC 112/VDE 0303, part 1                                     |                                                                |       | CTI        | $\geq 175$    |           |
| Isolation resistance                                                                            | $V_{IO} = 500\text{ V}, T_{amb} = 25\text{ }^{\circ}\text{C}$  |       | $R_{IO}$   | $10^{12}$     | $\Omega$  |
|                                                                                                 | $V_{IO} = 500\text{ V}, T_{amb} = 100\text{ }^{\circ}\text{C}$ |       | $R_{IO}$   | $10^{11}$     | $\Omega$  |
| Total dissipation                                                                               |                                                                | ILQ32 | $P_{tot}$  | 500           | mW        |
| Derate linearly from 25 °C                                                                      |                                                                | ILQ32 |            | 6.67          | 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          |
| <b>INPUT</b>                                                                                      |                                                  |             |      |      |      |               |
| Forward voltage                                                                                   | $I_F = 10\text{ mA}$                             | $V_F$       |      | 1.25 | 1.5  | V             |
| Reverse current                                                                                   | $V_R = 3\text{ V}$                               | $I_R$       |      | 0.1  | 100  | $\mu\text{A}$ |
| Capacitance                                                                                       | $V_R = 0\text{ V}$                               | $C_O$       |      | 25   |      | pF            |
| <b>OUTPUT</b>                                                                                     |                                                  |             |      |      |      |               |
| Collector emitter breakdown voltage                                                               | $I_C = 100\text{ }\mu\text{A}, I_F = 0\text{ A}$ | $BV_{CEO}$  | 30   |      |      | V             |
| Breakdown voltage emitter collector                                                               | $I_E = 100\text{ }\mu\text{A}$                   | $BC_{ECO}$  | 5    | 10   |      | V             |
| Collector emitter leakage current                                                                 | $V_{CE} = 10\text{ V}, I_F = 0\text{ A}$         | $I_{CEO}$   |      | 1    | 100  | nA            |
| <b>COUPLER</b>                                                                                    |                                                  |             |      |      |      |               |
| Collector emitter                                                                                 | $I_C = 2\text{ mA}, I_F = 8\text{ mA}$           | $V_{CEsat}$ |      |      | 1    | V             |
| Capacitance (input to output)                                                                     |                                                  | $C_{IO}$    |      | 0.5  |      | pF            |

## 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 |
|------------------------|-----------------------------------------------|--------|------|------|------|------|
| Current transfer ratio | $I_F = 10\text{ mA}$ , $V_{CE} = 10\text{ V}$ | CTR    | 500  |      |      | %    |

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

| PARAMETER     | TEST CONDITION                                                              | SYMBOL    | MIN. | TYP. | MAX. | UNIT          |
|---------------|-----------------------------------------------------------------------------|-----------|------|------|------|---------------|
| Turn-on time  | $V_{CC} = 10\text{ V}$ , $I_F = 5\text{ mA}$ ,<br>$R_L = 100\text{ }\Omega$ | $t_{on}$  |      | 15   |      | $\mu\text{s}$ |
| Turn-off time | $V_{CC} = 10\text{ V}$ , $I_F = 5\text{ mA}$ ,<br>$R_L = 100\text{ }\Omega$ | $t_{off}$ |      | 30   |      | $\mu\text{s}$ |

**SAFETY AND INSULATION RATINGS**

| PARAMETER                                               | TEST CONDITION         | SYMBOL | MIN.   | TYP.      | MAX. | UNIT               |
|---------------------------------------------------------|------------------------|--------|--------|-----------|------|--------------------|
| Climatic classification<br>(according to IEC 68 part 1) |                        |        |        | 55/100/21 |      |                    |
| Comparative tracking index                              |                        | CTI    | 175    |           | 399  |                    |
| $V_{IOTM}$                                              |                        |        | 10 000 |           |      | V                  |
| $V_{IORM}$                                              |                        |        | 890    |           |      | V                  |
| $P_{SO}$                                                |                        |        |        |           | 400  | mW                 |
| $I_{SI}$                                                |                        |        |        |           | 275  | mA                 |
| $T_{SI}$                                                |                        |        |        |           | 175  | $^{\circ}\text{C}$ |
| Creepage distance                                       |                        |        | 7      |           |      | mm                 |
| Clearance distance                                      |                        |        | 7      |           |      | mm                 |
| Insulation thickness,<br>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.

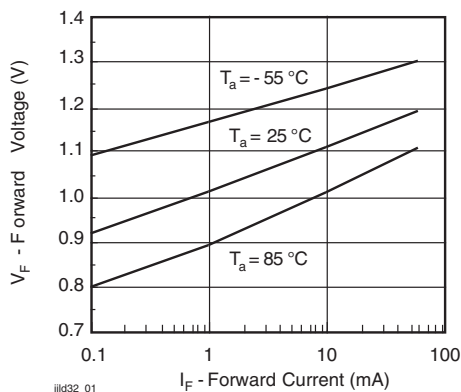
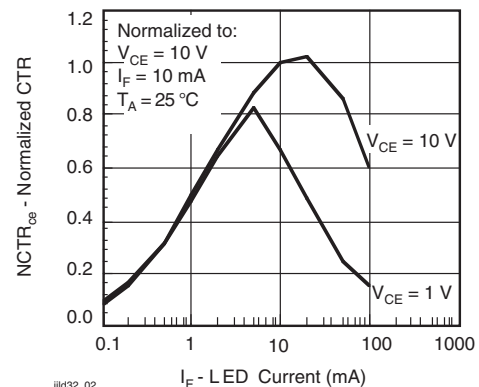
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 1 - Forward Voltage vs. Forward Current


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

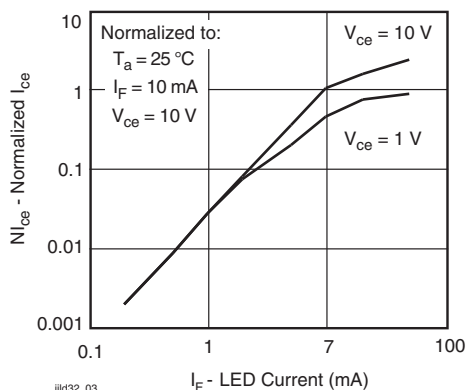


Fig. 3 - Normalized Non-Saturated and Saturated Collector Emitter Current vs. LED Current

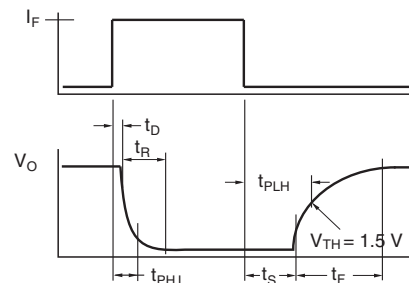


Fig. 6 - Switching Timing

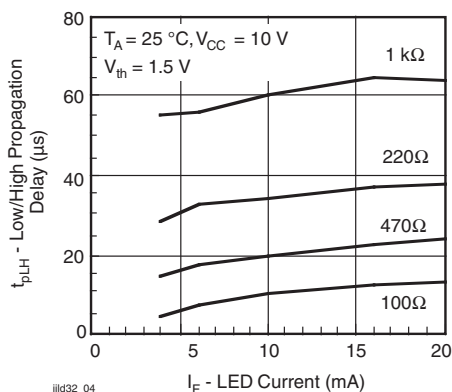


Fig. 4 - Low to High Propagation Delay vs. Collector Load Resistance and LED Current

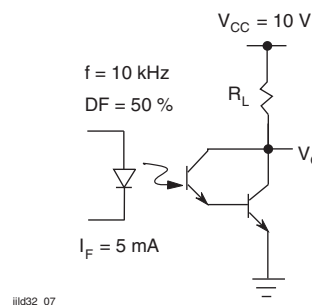


Fig. 7 - Switching Schematic

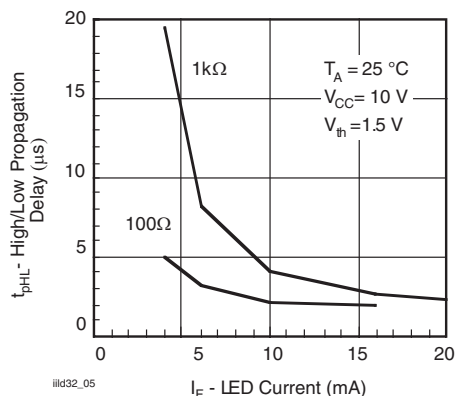
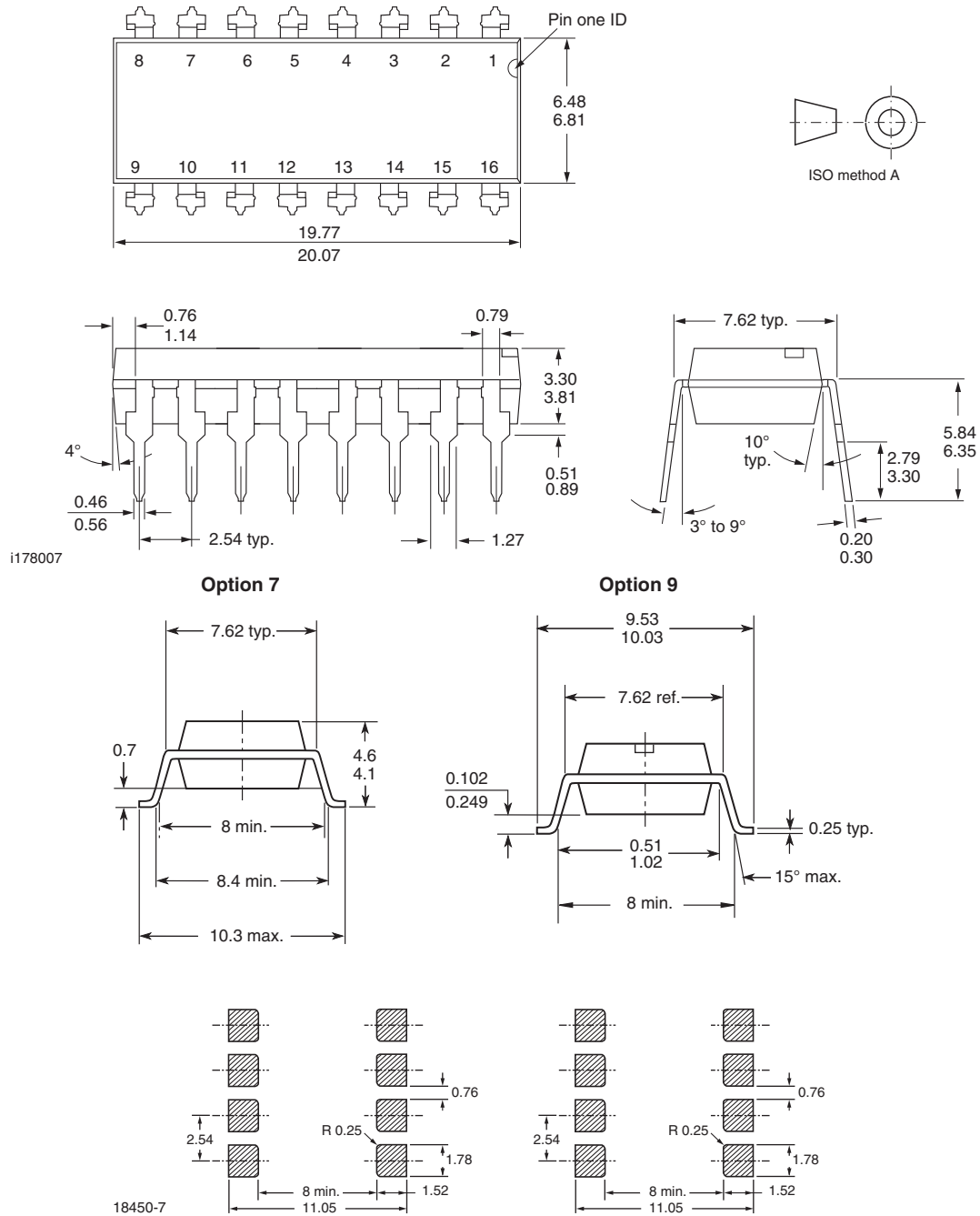


Fig. 5 - High to low Propagation Delay vs. Collector Load Resistance and LED Current

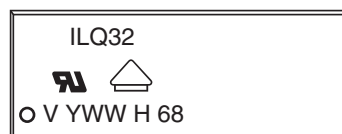
# Optocoupler, Photodarlington Output, High Gain (Quad Channel)

Vishay Semiconductors

## 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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