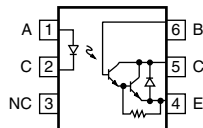
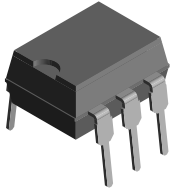


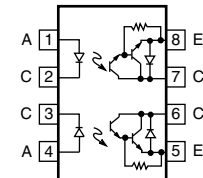
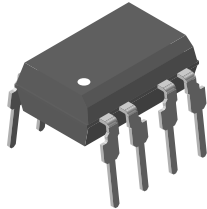


# Optocoupler, Photodarlington Output, With Internal RBE (Single, Dual, Quad Channel)

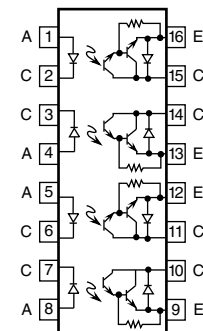
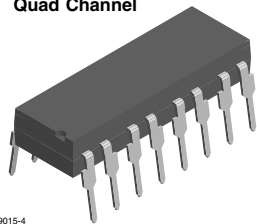
Single Channel



Dual Channel



Quad Channel



1179015-4



## FEATURES

- Internal RBE for high stability
- Four available CTR categories per package type
- $BV_{CEO} > 60\text{ V}$
- Standard DIP packages
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



RoHS  
COMPLIANT

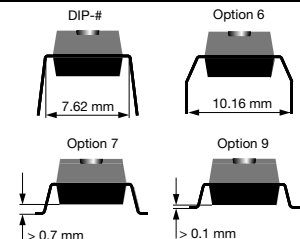
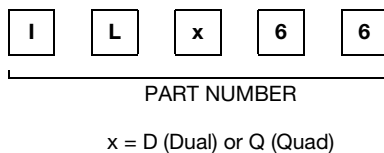
## DESCRIPTION

IL66, ILD66, and ILQ66 are optically coupled isolators employing gallium arsenide infrared emitters and silicon photodarlington detectors. Switching can be accomplished while maintaining a high degree of isolation between driving and load circuits, with no crosstalk between channels.

## AGENCY APPROVALS

- UL1577, file no. E52744, double protection
- cUL tested to CSA 22.2 bulletin 5A
- DIN EN 60747-5-5 (VDE 0884-5) available with option 1
- BSI EN 60950, BSI EN 60065

## ORDERING INFORMATION



| AGENCY CERTIFIED/PACKAGE | 2 mA           |              |              | 0.7 mA       |         | 2 mA    |              |
|--------------------------|----------------|--------------|--------------|--------------|---------|---------|--------------|
|                          | CTR (%)        |              |              |              |         |         |              |
|                          | SINGLE CHANNEL | DUAL CHANNEL |              | QUAD CHANNEL |         |         |              |
| UL, cUL, BSI             | ≥ 100          | ≥ 300        | ≥ 500        | ≥ 100        | ≥ 300   | ≥ 400   | ≥ 500        |
| DIP-6                    | IL66-1         | -            | -            | -            | -       | -       | -            |
| DIP-8                    | -              | ILD66-2      | ILD66-4      | -            | -       | -       | -            |
| SMD-8, option 7          | -              | -            | ILD66-4X007T | -            | -       | -       | -            |
| SMD-8, option 9          | -              | -            | ILD66-4X009  | -            | -       | -       | -            |
| DIP-16                   | -              | -            | -            | ILQ66-1      | ILQ66-2 | ILQ66-3 | ILQ66-4      |
| SMD-16, option 7         | -              | -            | -            | -            | -       | -       | ILQ66-4X007T |
| SMD-16, option 9         | -              | -            | -            | -            | -       | -       | ILQ66-4X009T |
| VDE, UL, cUL, BSI        | ≥ 100          | ≥ 300        | ≥ 500        | ≥ 100        | ≥ 300   | ≥ 400   | ≥ 500        |
| DIP-6, 400 mil, option 6 | IL66-1X016     | -            | -            | -            | -       | -       | -            |
| DIP-16                   | -              | -            | -            | -            | -       | -       | ILQ66-4X001  |

**Note**

- Additional options may be possible, please contact sales office



| ABSOLUTE MAXIMUM RATINGS (T <sub>amb</sub> = 25 °C, unless otherwise specified) |                |       |                   |             |       |
|---|----------------|-------|-------------------|-------------|-------|
| PARAMETER   | TEST CONDITION | PART  | SYMBOL            | VALUE       | UNIT  |
| <b>INPUT</b>  |                |       |                   |             |       |
| Peak reverse voltage  |                |       | V <sub>RM</sub>   | 6.0         | V     |
| 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>   |                |       |                   |             |       |
| Power dissipation   |                |       | P <sub>diss</sub> | 150         | mW    |
| Derate from 25 °C   |                |       |                   | 2.0         | mW/°C |
| <b>COUPLER</b>  |                |       |                   |             |       |
| Total package power dissipation   |                | IL66  | P <sub>tot</sub>  | 250         | mW    |
|   |                | ILD66 | P <sub>tot</sub>  | 400         | mW    |
|   |                | ILQ66 | P <sub>tot</sub>  | 500         | mW    |
| Derate linearly from 25 °C  |                | IL66  |                   | 3.3         | mW/°C |
|   |                | ILD66 |                   | 5.33        | mW/°C |
|   |                | ILQ66 |                   | 6.67        | mW/°C |
| Storage temperature   |                |       | T <sub>stg</sub>  | -55 to +125 | °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> = 20 mA                         | V <sub>F</sub>     | -    | 1.25 | 1.5  | V    |
| Reverse current   | V <sub>R</sub> = 6.0 V                         | I <sub>R</sub>     | -    | 0.1  | 10   | μA   |
| Capacitance   | V <sub>R</sub> = 0 V                           | C <sub>O</sub>     | -    | 25   | -    | pF   |
| <b>OUTPUT</b>   |  |                    |      |      |      |      |
| Collector emitter breakdown voltage   | I <sub>C</sub> = 1.0 mA, I <sub>F</sub> = 0 A  | BV <sub>CEO</sub>  | 60   | -    | -    | V    |
| Collector base breakdown voltage (IL66)   | I <sub>C</sub> = 10 μA                         | BV <sub>CBO</sub>  | 60   | -    | -    | V    |
| Collector emitter leakage current   | V <sub>CE</sub> = 50 V, I <sub>F</sub> = 0 A   | I <sub>CEO</sub>   | -    | 1.0  | 100  | nA   |
| Capacitance collector emitter   | V <sub>CE</sub> = 10 V                         |                    | -    | 3.4  |      | pF   |
| <b>COUPLER</b>  |  |                    |      |      |      |      |
| Saturation voltage, collector emitter   | I <sub>C</sub> = 10 mA, I <sub>F</sub> = 10 mA | V <sub>CEsat</sub> | -    | 0.9  | 1.0  | 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 <sub>amb</sub> = 25 °C, unless otherwise specified) |  |             |        |      |      |      |      |
|---|--|-------------|--------|------|------|------|------|
| PARAMETER   | TEST CONDITION                                   | PART        | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| Current transfer ratio  | I <sub>F</sub> = 2.0 mA, V <sub>CE</sub> = 10 V  | IL(D,Q)66-1 | CTR    | 100  | 400  | -    | %    |
|   |  | IL(D,Q)66-2 | CTR    | 300  | 500  | -    | %    |
|   | I <sub>F</sub> = 0.7 mA, V <sub>CE</sub> = 10 V  | IL(D,Q)66-3 | CTR    | 400  | 500  | -    | %    |
|   | I <sub>F</sub> = 2.0 mA, V <sub>CE</sub> = 5.0 V | IL(D,Q)66-4 | CTR    | 500  | 750  | -    | %    |



| SWITCHING CHARACTERISTICS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |  |        |      |      |      |               |
|--|--|--------|------|------|------|---------------|
| PARAMETER  | TEST CONDITION   | SYMBOL | MIN. | TYP. | MAX. | UNIT          |
| <b>NON SATURATED</b>   |  |        |      |      |      |               |
| Rise time -1, -2, -4   | $V_{CC} = 10\text{ V}$ , $I_F = 2.0\text{ mA}$ , $R_L = 100\text{ }\Omega$ | $t_r$  | -    | -    | 200  | $\mu\text{s}$ |
| Fall time -1, -2, -4   | $V_{CC} = 10\text{ V}$ , $I_F = 2.0\text{ mA}$ , $R_L = 100\text{ }\Omega$ | $t_f$  | -    | -    | 200  | $\mu\text{s}$ |
| Rise time -3   | $V_{CC} = 10\text{ V}$ , $I_F = 0.7\text{ mA}$ , $R_L = 100\text{ }\Omega$ | $t_r$  | -    | -    | 200  | $\mu\text{s}$ |
| Fall time -3   | $V_{CC} = 10\text{ V}$ , $I_F = 0.7\text{ mA}$ , $R_L = 100\text{ }\Omega$ | $t_f$  | -    | -    | 200  | $\mu\text{s}$ |

| 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                         | $V_{IO} = 500\text{ V}$ , $T_{amb} = 25\text{ }^{\circ}\text{C}$  | $R_{IO}$   | $\geq 10^{12}$ | $\Omega$           |
|  | $V_{IO} = 500\text{ V}$ , $T_{amb} = 100\text{ }^{\circ}\text{C}$ | $R_{IO}$   | $\geq 10^{11}$ | $\Omega$           |
| Output safety power                          |   | $P_{SO}$   | 400            | mW                 |
| Input safety current                         |   | $I_{SI}$   | 275            | mA                 |
| Safety temperature                           |   | $T_S$      | 175            | $^{\circ}\text{C}$ |
| Creepage distance                            |   |            | $\geq 7$       | mm                 |
| Clearance distance                           |   |            | $\geq 7$       | mm                 |
| Insulation thickness                         |   | DTI        | $\geq 0.4$     | 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

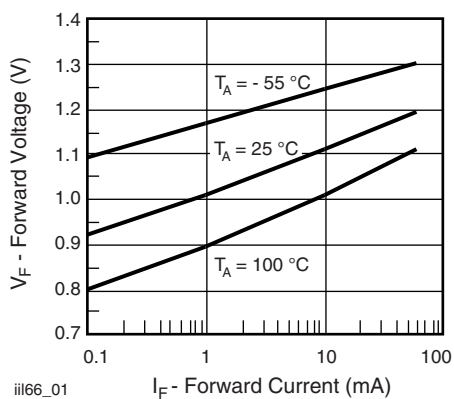
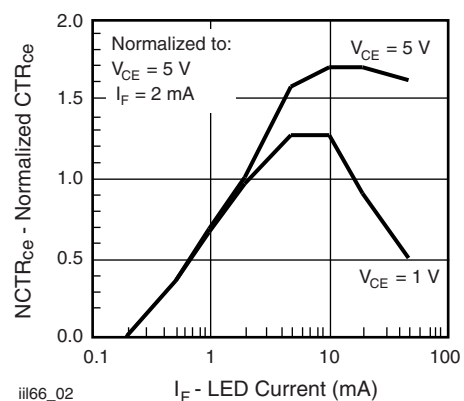
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

Fig. 1 - Forward Voltage vs. Forward Current

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

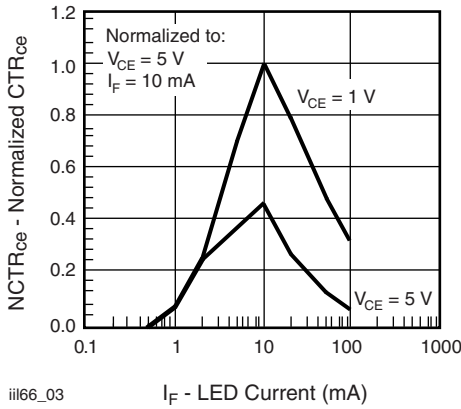


Fig. 3 - Normalized Non-Saturated and Saturated  $CTR_{CE}$  vs. LED Current

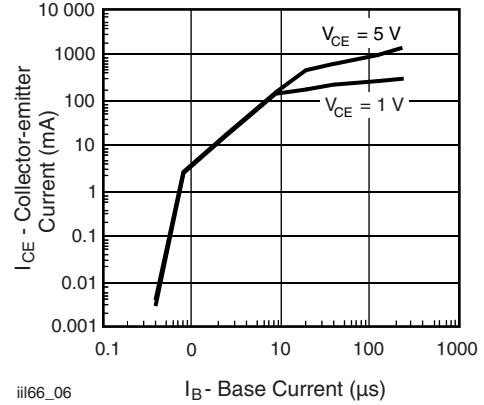


Fig. 6 - Collector Emitter Current vs. LED Current

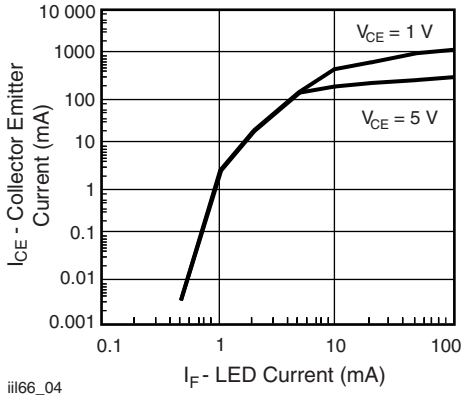


Fig. 4 - Non-Saturated and Saturated Collector Emitter Current vs. LED Current

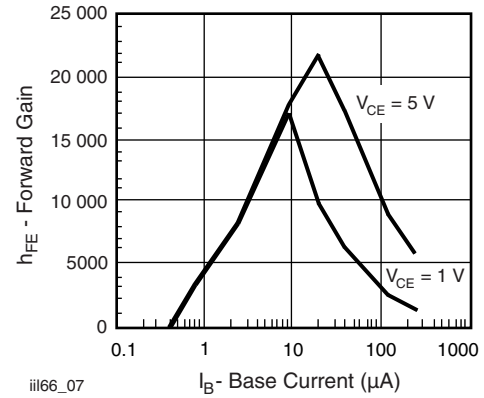


Fig. 7 - Non-Saturated and Saturated  $h_{FE}$  vs. LED Current

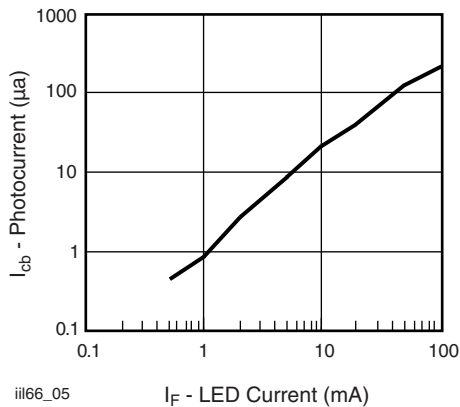


Fig. 5 - Collector Base Photocurrent vs. LED Current

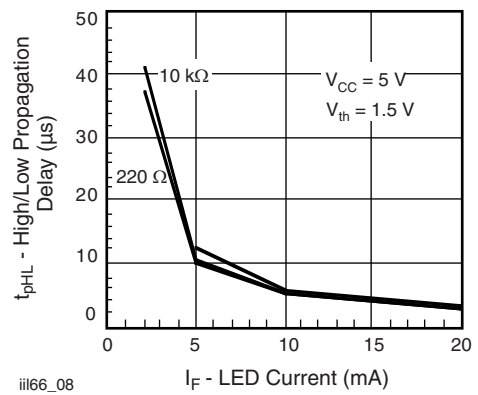


Fig. 8 - High to Low Propagation Delay vs. Collector Load Resistance and LED Current

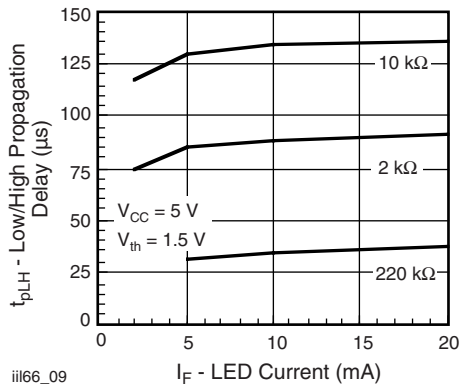


Fig. 9 - Low to High Propagation Delay vs. Collector Load Resistance and LED Current

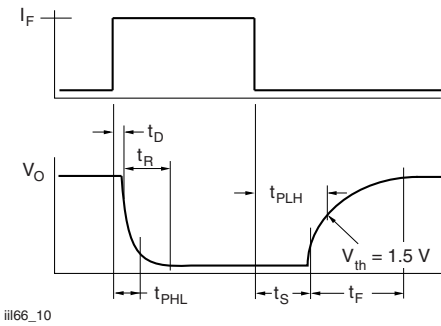


Fig. 10 - Switching Waveform

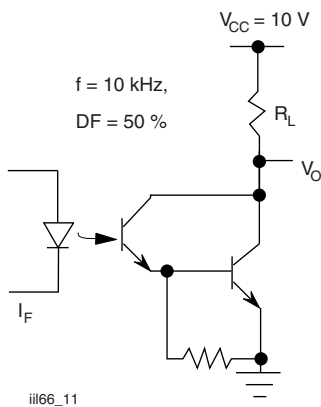
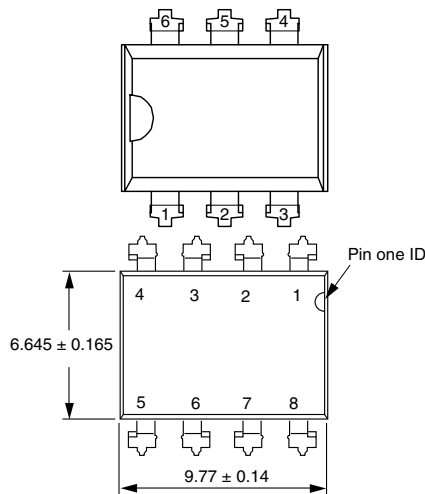
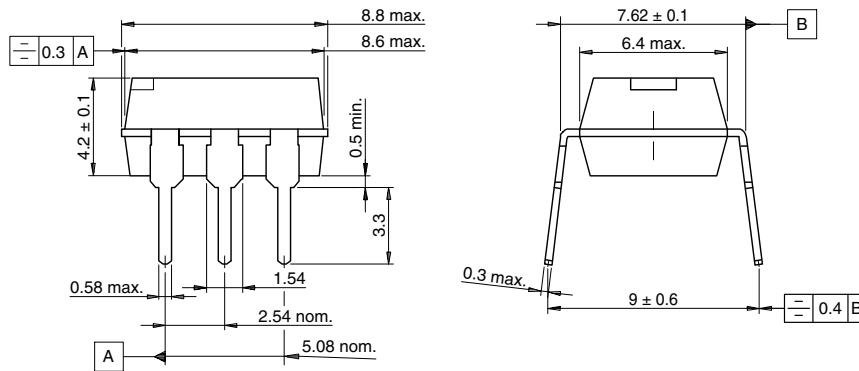


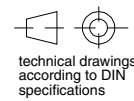
Fig. 11 - Switching Schematic



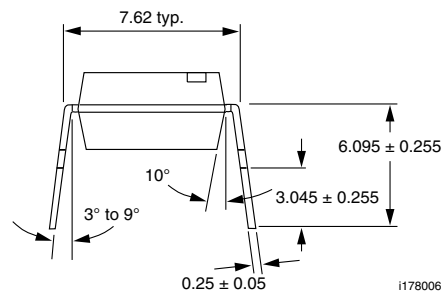
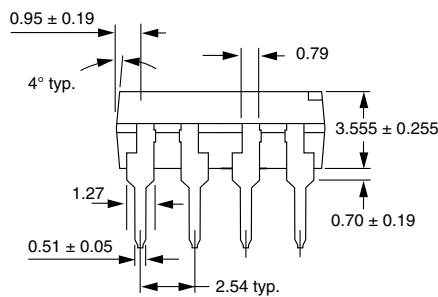
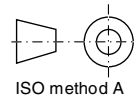
**PACKAGE DIMENSIONS** in millimeters



Weight: ca. 0.50 g  
 Creepage distance: > 6 mm  
 Air path: > 6 mm  
 after mounting on PC board



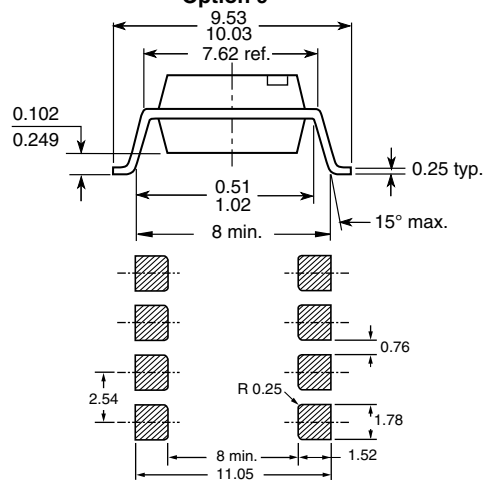
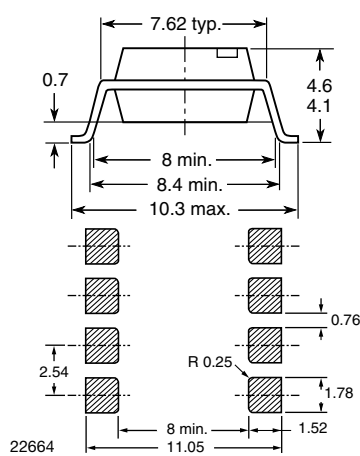
14770-1

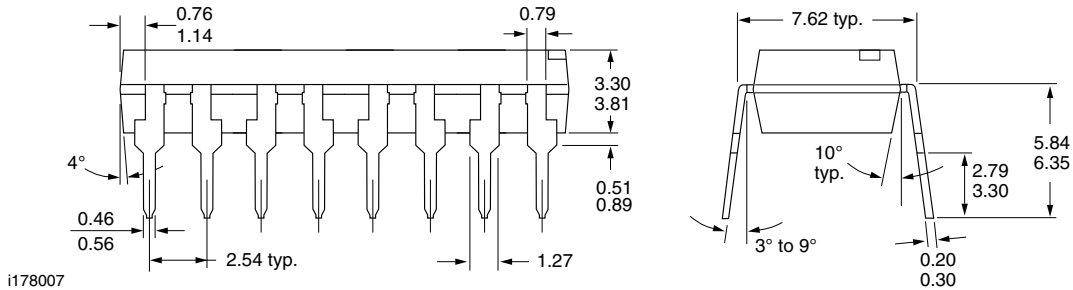
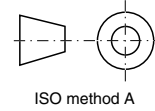
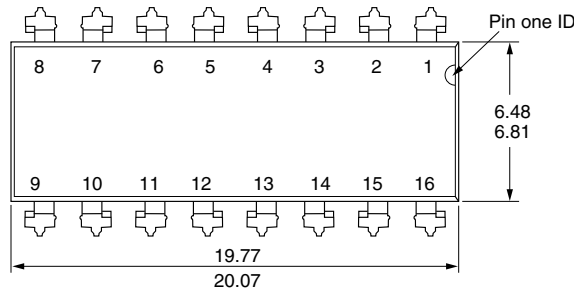


i178006

**Option 7**

**Option 9**

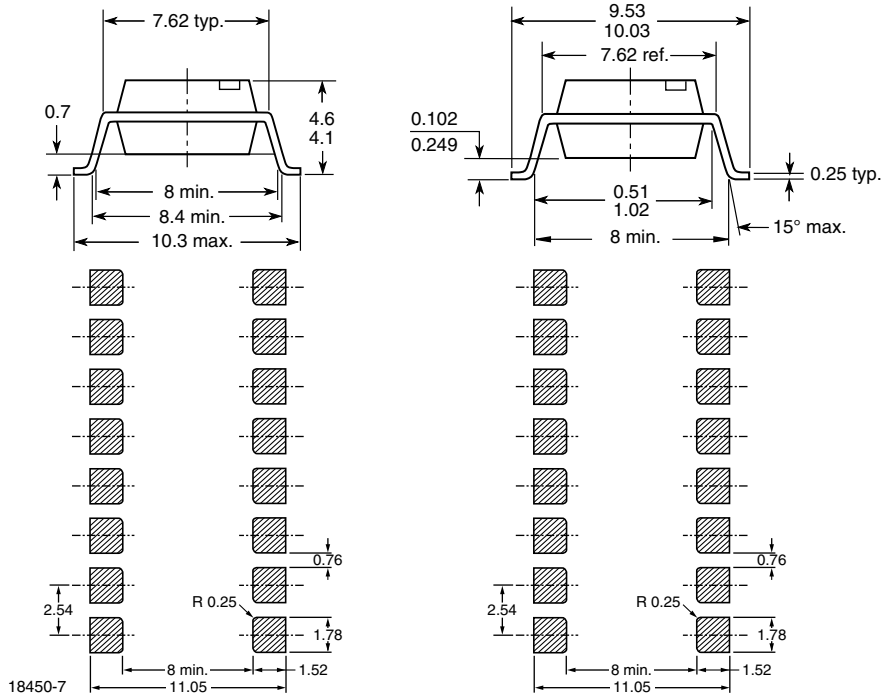




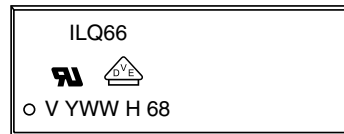
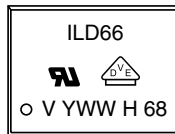
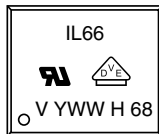
i178007

Option 7

Option 9



**PACKAGE MARKING (example)**



**Notes**

- The VDE logo is only marked on option 1 parts, option information is not marked on the part
- Tape and reel suffix (T) is not part of the package marking



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