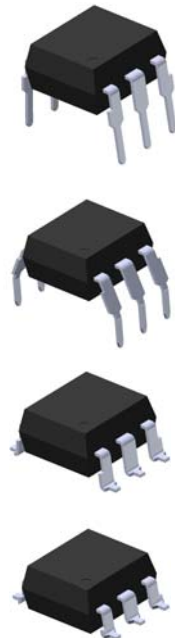


# 6 PIN PHOTODARLINGTON PHOTOCOUPLER

## Features:

- 4NXX series: 4N29, 4N30, 4N31, 4N32, 4N33
- H11BX series: H11B1, H11B2, H11B3, H11B255
- High isolation voltage between input and output (Viso=5000 V rms )
- Creepage distance >7.62 mm
- Meets or exceeds all JEDEC registered specifications
- Pb free and RoHS compliant.
- UL approved (No. E214129)
- VDE approval (pending)
- SEMKO approval (pending)
- NEMKO approval (pending)
- DEMKO approval (pending)
- FIMKO approval (pending)
- CSA approval (pending)



## Description

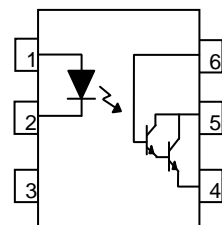
The TIL113, 4NXX and H11BX series of devices each consist of an infrared emitting diode optically coupled to a photo darlington detector.

They are packaged in a 6-pin DIP package and available in wide-lead spacing and SMD option.

## Applications

- Low power logic circuits
- Telecommunications equipment
- Portable electronics
- Interfacing coupling systems of different potentials and impedances

### Schematic



### Pin Configuration

1. Anode
2. Cathode
3. No Connection
4. Emitter
5. Collector
6. Base



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# 6 PIN PHOTODARLINGTON PHOTOCOUPLER

**TIL113**  
**4NXX Series**  
**H11BX Series**

## Absolute Maximum Ratings ( $T_a=25^{\circ}\text{C}$ )

| Parameter                           |  | Symbol    | Rating   | Unit               |
|-------------------------------------|--|-----------|----------|--------------------|
| Input                               | Forward current                              | $I_F$     | 60       | mA                 |
|                                     | Peak forward current ( $t = 10\mu\text{s}$ ) | $I_{FM}$  | 1        | A                  |
|                                     | Reverse voltage                              | $V_R$     | 6        | V                  |
|                                     | Power dissipation                            | $P_D$     | 120      | mW                 |
| Output                              | Power dissipation                            | $P_C$     | 150      | mW                 |
|                                     | Collector-Emitter voltage                    | $V_{CEO}$ | 55       | V                  |
|                                     | Collector-Base voltage                       | $V_{CBO}$ | 55       | V                  |
|                                     | Emitter-Collector voltage                    | $V_{ECO}$ | 7        | V                  |
|                                     | Emitter-Base voltage                         | $V_{EBO}$ | 7        | V                  |
| Total power dissipation             |  | $P_{tot}$ | 200      | mW                 |
| Isolation voltage <sup>*1</sup>     |  | $V_{iso}$ | 5000     | V rms              |
| Operating temperature               |  | $T_{opr}$ | -55~+100 | $^{\circ}\text{C}$ |
| Storage temperature                 |  | $T_{stg}$ | -55~+125 | $^{\circ}\text{C}$ |
| Soldering temperature <sup>*2</sup> |  | $T_{sol}$ | 260      | $^{\circ}\text{C}$ |

### Notes

\*1 AC for 1 minute, R.H.= 40 ~ 60% R.H. In this test, pins 1, 2 & 3 are shorted together, and pins 4, 5 & 6 are shorted together.

\*2 For 10 seconds.



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## 6 PIN PHOTODARLINGTON PHOTOCOUPLER

**TIL113**  
**4NXX Series**  
**H11BX Series**

### Electrical Characteristics ( $T_a=25^{\circ}\text{C}$ unless specified otherwise)

#### Input

| Parameter         | Symbol   | Min. | Typ.* | Max. | Unit          | Condition  |
|-------------------|----------|------|-------|------|---------------|--|
| Forward voltage   | $V_F$    | -    | 1.2   | 1.5  | V             | $I_F = 10\text{mA}$<br>$I_F = 50\text{mA}$ for H11B3 |
| Reverse current   | $I_R$    | -    | -     | 10   | $\mu\text{A}$ | $V_R = 6\text{V}$                                    |
| Input capacitance | $C_{in}$ | -    | 50    | -    | pF            | $V = 0, f = 1\text{MHz}$                             |

#### Output

| Parameter                           | Symbol     | Min. | Typ.* | Max. | Unit | Condition             |
|-------------------------------------|------------|------|-------|------|------|-----------------------|
| Collector-Emitter dark current      | $I_{CEO}$  | -    | -     | 100  | nA   | $V_{CE} = 10\text{V}$ |
| Collector-Emitter breakdown voltage | $BV_{CEO}$ | 55   | -     |      | V    | $I_C = 1\text{mA}$    |
| Collector-Base breakdown voltage    | $BV_{CBO}$ | 55   | -     |      | V    | $I_C = 0.1\text{mA}$  |
| Emitter-Collector breakdown voltage | $BV_{ECO}$ | 7    | -     | -    | V    | $I_E = 0.1\text{mA}$  |

\* Typical values at  $T_a = 25^{\circ}\text{C}$



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# 6 PIN PHOTODARLINGTON PHOTOCOUPLER

## TIL113 4NXX Series H11BX Series

Transfer Characteristics ( $T_a=25^{\circ}\text{C}$  unless specified otherwise)

| Parameter                            |                              | Symbol        | Min. | Typ.* | Max.     | Unit                          | Condition                                |
|--------------------------------------|------------------------------|---------------|------|-------|----------|-------------------------------|--|
| Current transfer ratio               | 4N32<br>4N33                 | CTR           | 500  | -     | -        | %                             | $I_F = 10\text{mA}, V_{CE} = 10\text{V}$ |
|                                      | 4N29<br>4N30                 |               | 100  |       |          |                               |  |
|                                      | 4N31                         |               | 50   | -     | -        |                               |  |
|                                      | H11B1                        |               | 500  |       |          |                               |  |
|                                      | H11B2                        |               | 200  | -     | -        |                               | $I_F = 1\text{mA}, V_{CE} = 5\text{V}$   |
|                                      | H11B3                        |               | 100  |       |          |                               |  |
|                                      | H11B255                      |               | 100  |       |          |                               |  |
|                                      | TIL113                       |               | 300  |       |          |                               |  |
| Collector-emitter saturation voltage | 4N29<br>4N30<br>4N32<br>4N33 | $V_{CE(sat)}$ | -    | -     | 1.0      | V                             | $I_F = 8\text{mA}, I_C = 2\text{mA}$     |
|                                      | 4N31<br>TIL113               |               | -    | -     | 1.2      |                               | $I_F = 8\text{mA}, I_C = 2\text{mA}$     |
|                                      | H11B1<br>H11B2<br>H11B3      |               | -    | -     | 1.0      |                               | $I_F = 1\text{mA}, I_C = 1\text{mA}$     |
|                                      | H11B255                      |               |      |       | 1.0      |                               | $I_F = 50\text{mA}, I_C = 50\text{mA}$   |
|                                      |                              |               |      |       |          |                               |  |
| Isolation resistance                 | $R_{IO}$                     | $10^{11}$     | -    | -     | $\Omega$ | $V_{IO} = 500\text{Vdc}$      |  |
| Input-output capacitance             | $C_{IO}$                     | -             | 0.8  | -     | pF       | $V_{IO} = 0, f = 1\text{MHz}$ |  |

### Transfer Characteristics



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# 6 PIN PHOTODARLINGTON PHOTOCOUPLER

# TIL113 4NXX Series H11BX Series

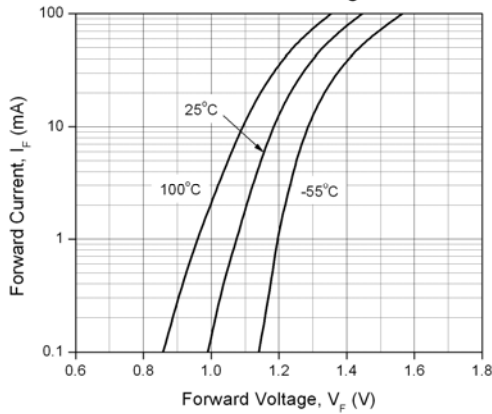
| Parameter     |  | Symbol | Min. | Typ.* | Max. | Unit | Condition   |
|---------------|--|--------|------|-------|------|------|---|
| Turn-on time  | H11B1<br>H11B2<br>H11B3<br>H11B255             | Ton    | -    | 25    |      | μs   | V <sub>CC</sub> = 10V, I <sub>F</sub> = 10mA,<br>R <sub>L</sub> = 100Ω  |
|               | 4N29<br>4N30<br>4N31<br>4N32<br>4N33<br>TIL113 |        | -    | -     | 5    |      | V <sub>CC</sub> = 10V, I <sub>C</sub> = 50mA,<br>I <sub>F</sub> = 200mA |
| Turn-off time | H11B1<br>H11B2<br>H11B3<br>H11B255             | Toff   | -    | 18    |      | μs   | V <sub>CC</sub> = 10V, I <sub>F</sub> = 10mA,<br>R <sub>L</sub> = 100Ω  |
|               | 4N32<br>4N33<br>TIL113                         |        | -    | -     | 100  |      | V <sub>CC</sub> = 10V, I <sub>C</sub> = 50mA,<br>I <sub>F</sub> = 200mA |
|               | 4N29<br>4N30<br>4N31                           |        |      |       | 40   |      |   |

\* Typical values at T<sub>a</sub> = 25°C

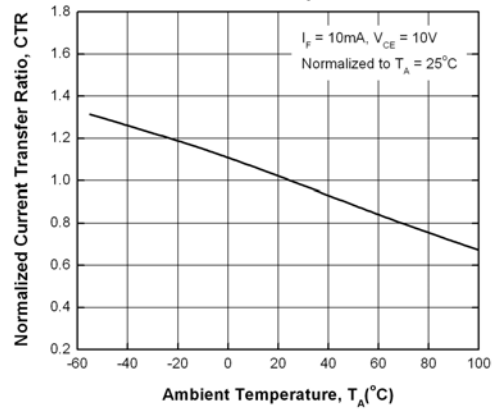
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**Typical Performance Curves**

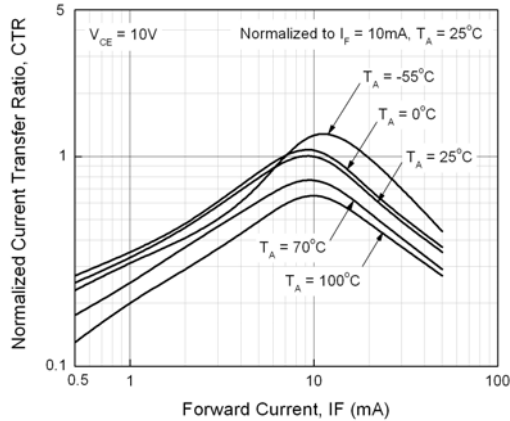
**Figure 1. Forward Current vs Forward Voltage**



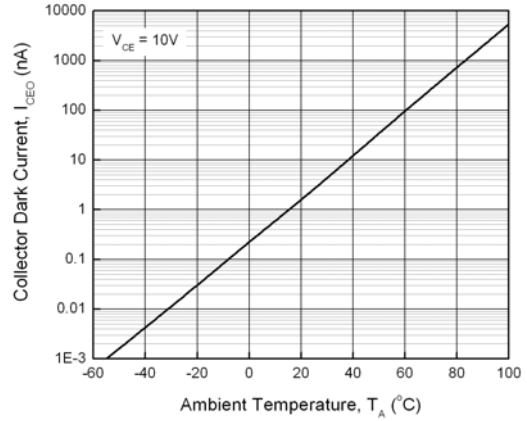
**Figure 2. Current Transfer Ratio vs. Ambient Temperature**



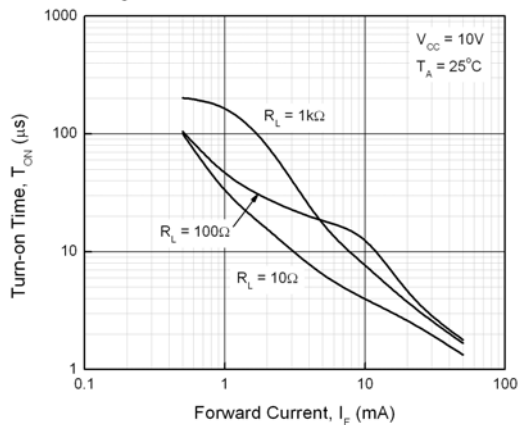
**Figure 3. Normalized Current Transfer Ratio vs Forward Current**



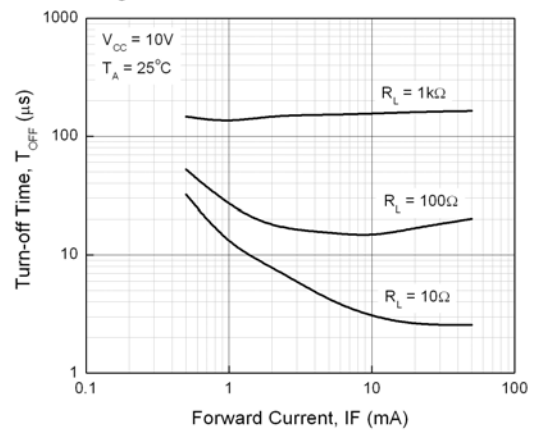
**Figure 4. Collector Dark Current vs Ambient Temperature**

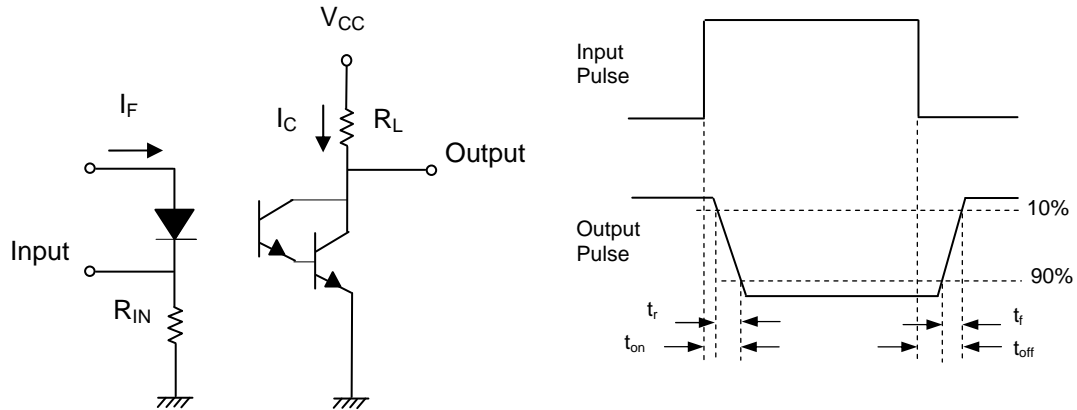


**Figure 5. Turn-on Time vs Forward Current**



**Figure 6. Turn-off Time vs Forward Current**





**Figure 7. Switching Time Test Circuit & Waveforms**

**Order Information**

**Part Number**

**4NXXY(Z)-V**  
or **H11BXY(Z)-V**  
or **TIL113Y(Z)-V**

**Note**

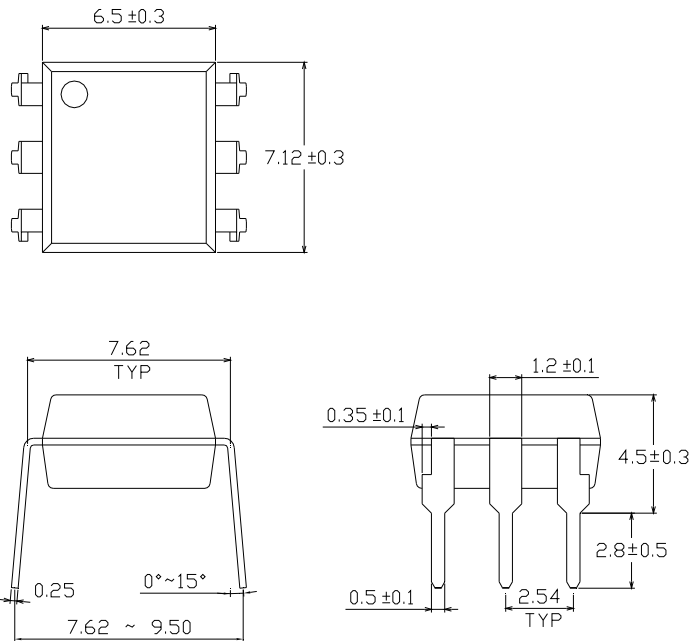
- XX = Part No. for 4NX series (29, 30, 31, 32 or 33)
- X = Part No. for H11BX series (1, 2, 3 or 255)
- Y = Lead form option (S, S1, M or none)
- Z = Tape and reel option (TA, TB or none).
- V = VDE safety (optional)

| Option  | Description   | Packing quantity    |
|---------|---|---------------------|
| None    | Standard DIP-6  | 65 units per tube   |
| M       | Wide lead bend (0.4 inch spacing)                             | 65 units per tube   |
| S (TA)  | Surface mount lead form + TA tape & reel option               | 1000 units per reel |
| S (TB)  | Surface mount lead form + TB tape & reel option               | 1000 units per reel |
| S1 (TA) | Surface mount lead form (low profile) + TA tape & reel option | 1000 units per reel |
| S1 (TB) | Surface mount lead form (low profile) + TB tape & reel option | 1000 units per reel |

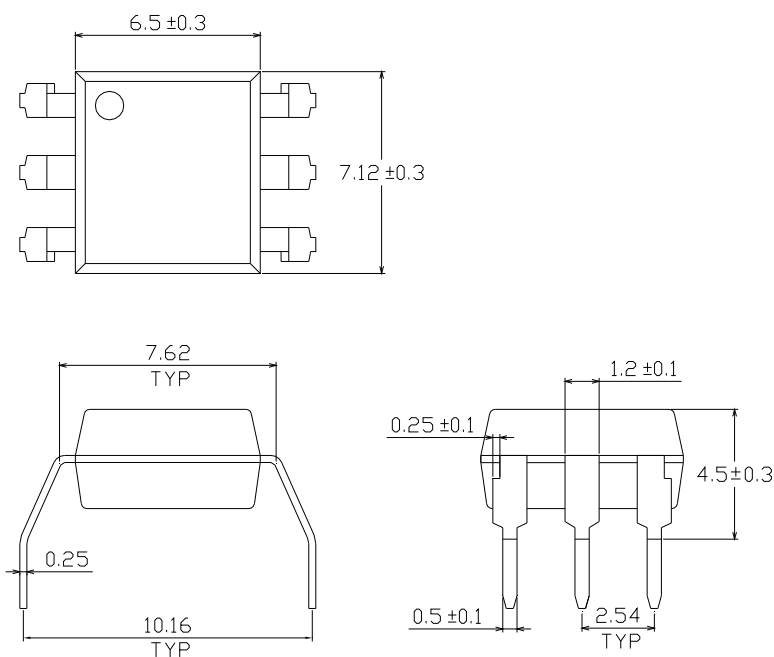
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**Package Drawings**  
(Dimensions in mm)

**Standard DIP Type**



**Option M Type**

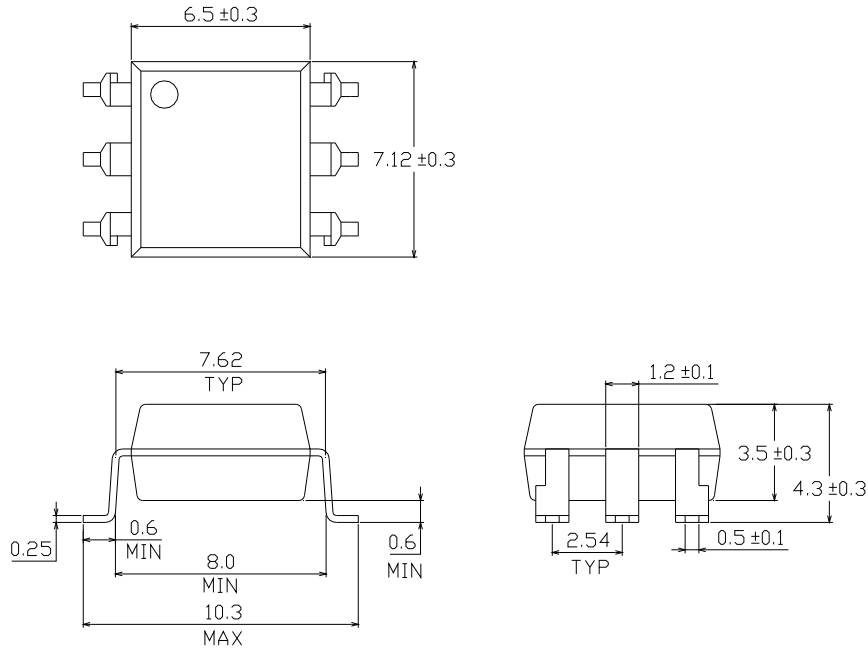




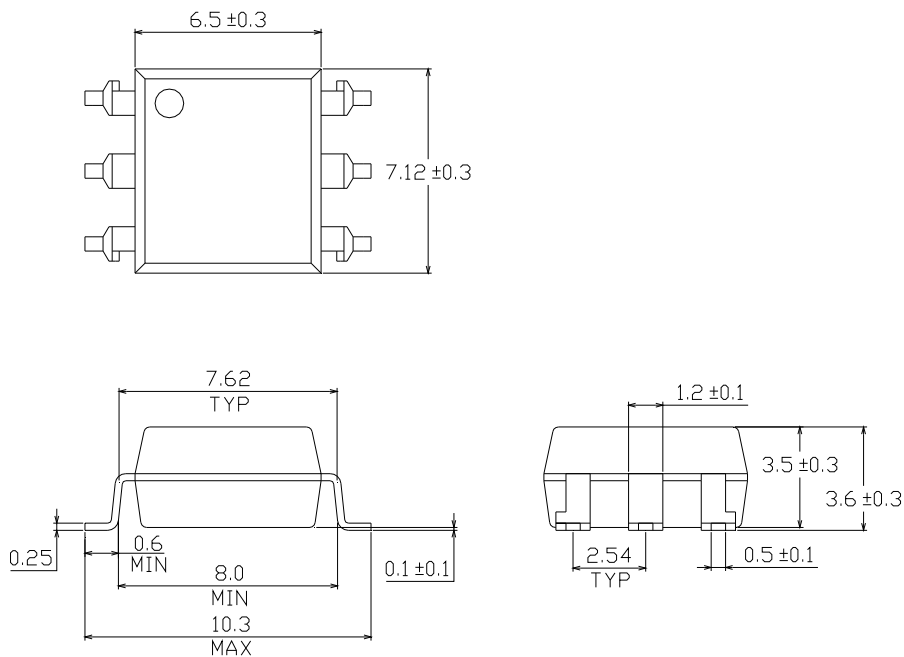
# 6 PIN PHOTODARLINGTON PHOTOCOUPLER

**TIL113**  
**4NXX Series**  
**H11BX Series**

## Option S Type

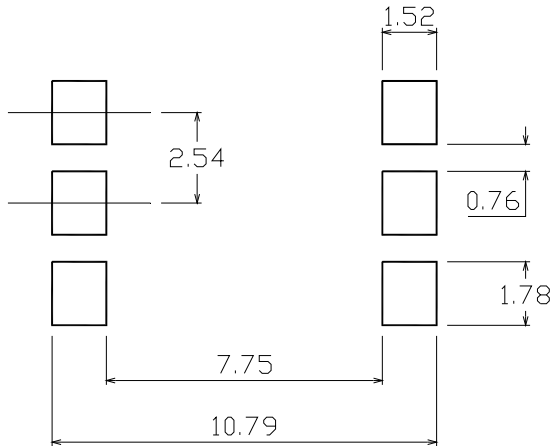


## Option S1 Type

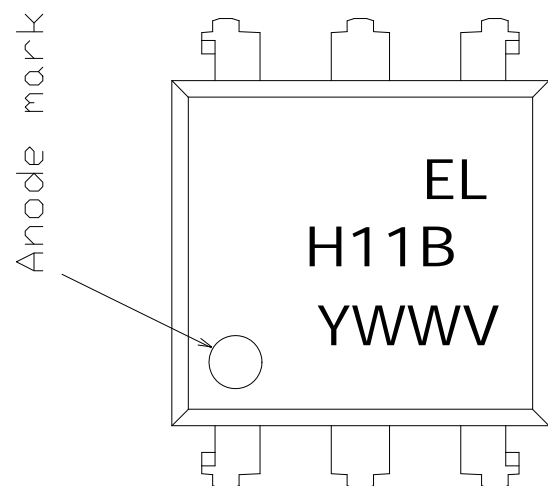
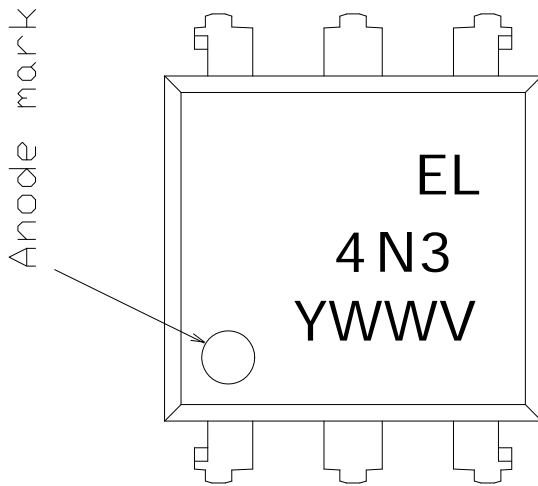


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Recommended pad layout for surface mount leadform



**Device Marking**



**Notes**

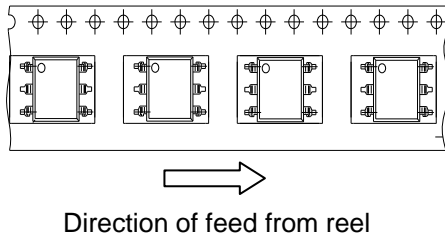
- EL denotes Everlight
- 4N33 denotes Part Number
- H11B1 denotes Part Number
- Y denotes 1 digit Year code
- WW denotes 2 digit Week code
- V denotes VDE safety (optional)

# 6 PIN PHOTODARLINGTON PHOTOCOUPLER

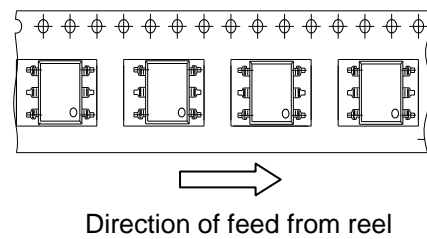
**TIL113**  
**4NXX Series**  
**H11BX Series**

## Tape & Reel Packing Specifications

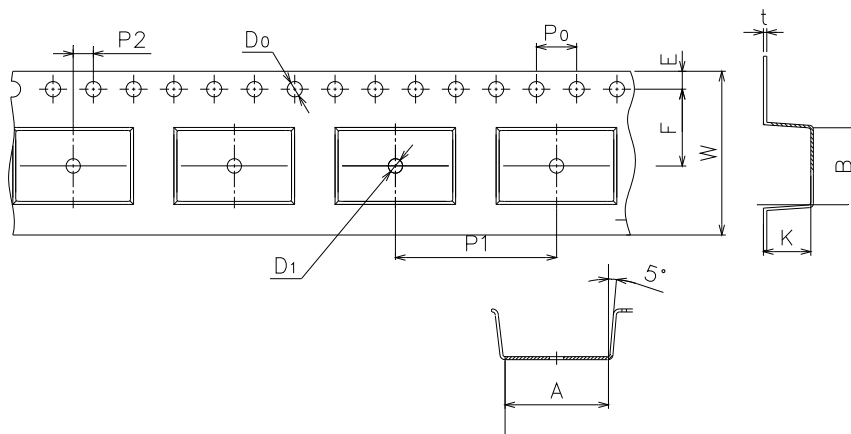
**Option TA**



**Option TB**



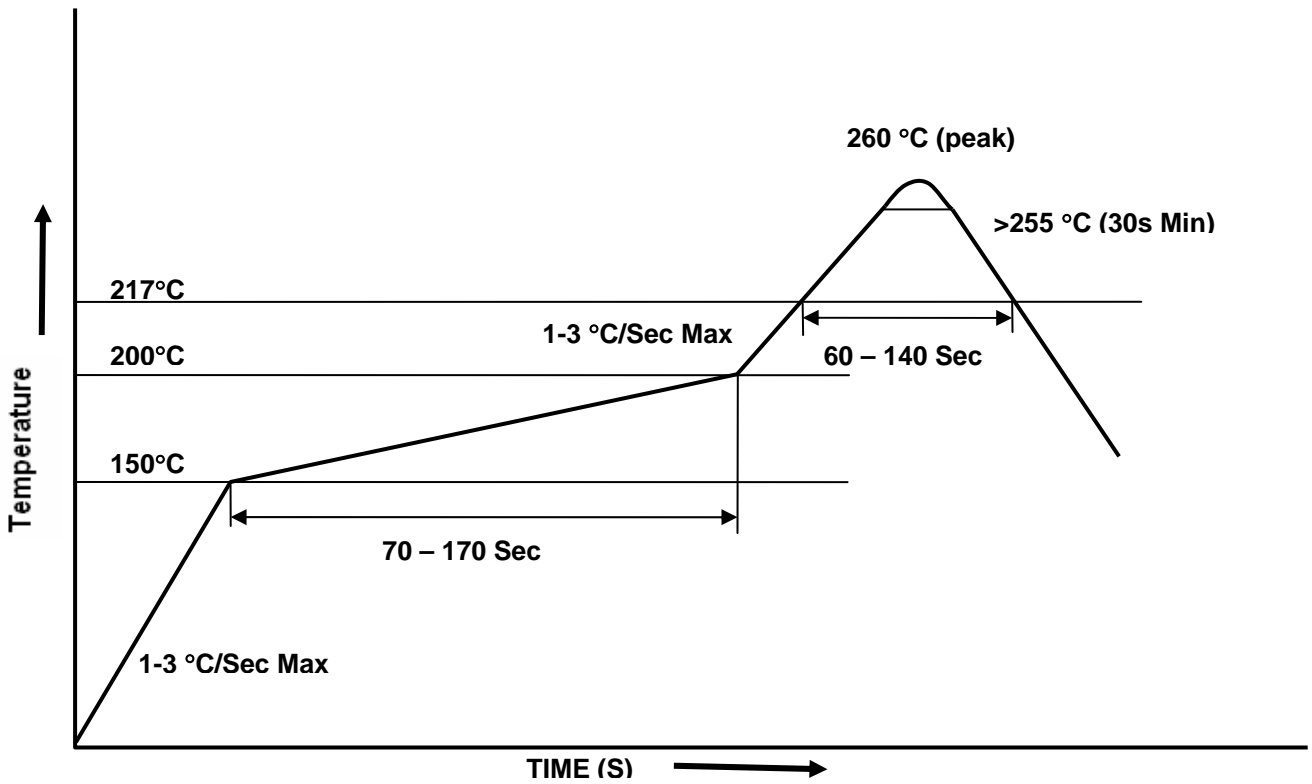
## Tape dimensions



| Dimension No.  | A        | B        | Do      | D1         | E        | F       |
|----------------|----------|----------|---------|------------|----------|---------|
| Dimension (mm) | 10.4±0.1 | 7.52±0.1 | 1.5±0.1 | 1.5+0.1/-0 | 1.75±0.1 | 7.5±0.1 |

| Dimension No.  | Po       | P1       | P2      | t         | W        | K       |
|----------------|----------|----------|---------|-----------|----------|---------|
| Dimension (mm) | 4.0±0.15 | 16.0±0.1 | 2.0±0.1 | 0.35±0.03 | 16.0±0.2 | 4.5±0.1 |

**Solder Reflow Temperature Profile**





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**TIL113**  
**4NXX Series**  
**H11BX Series**

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