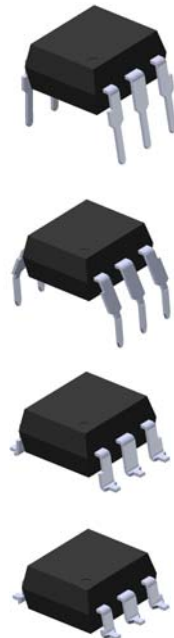


# 6 PIN PHOTODARLINGTON PHOTOCOUPLER

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

## 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

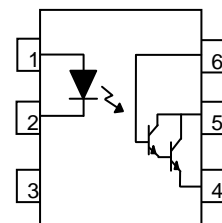
The TIL113, 4NXX and H11BX series of devices each consist of an infrared emitting diode optically coupled to a photo darlington detector.

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	$I_F = 10\text{mA}$ $I_F = 50\text{mA}$ 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 4N33	CTR	500	-	-	%	$I_F = 10\text{mA}, V_{CE} = 10\text{V}$
	4N29 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 4N30 4N32 4N33	$V_{CE(sat)}$	-	-	1.0	V	$I_F = 8\text{mA}, I_C = 2\text{mA}$
	4N31 TIL113		-	-	1.2		$I_F = 8\text{mA}, I_C = 2\text{mA}$
	H11B1 H11B2 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

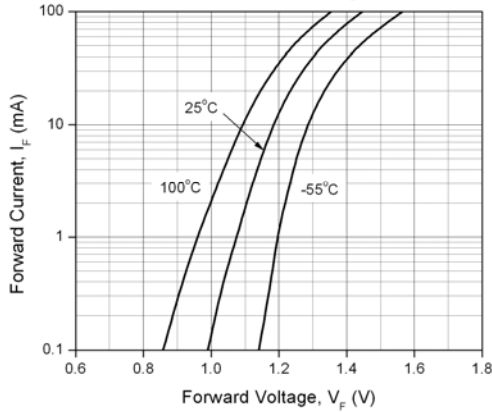
Parameter		Symbol	Min.	Typ.*	Max.	Unit	Condition
Turn-on time	H11B1 H11B2 H11B3 H11B255	Ton	-	25		μs	$V_{CC} = 10V, I_F = 10mA,$ $R_L = 100\Omega$
	4N29 4N30 4N31 4N32 4N33 TIL113		-	-	5		$V_{CC} = 10V, I_C = 50mA,$ $I_F = 200mA$
Turn-off time	H11B1 H11B2 H11B3 H11B255	Toff	-	18		μs	$V_{CC} = 10V, I_F = 10mA,$ $R_L = 100\Omega$
	4N32 4N33 TIL113		-	-	100		$V_{CC} = 10V, I_C = 50mA,$ $I_F = 200mA$
	4N29 4N30 4N31				40		

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

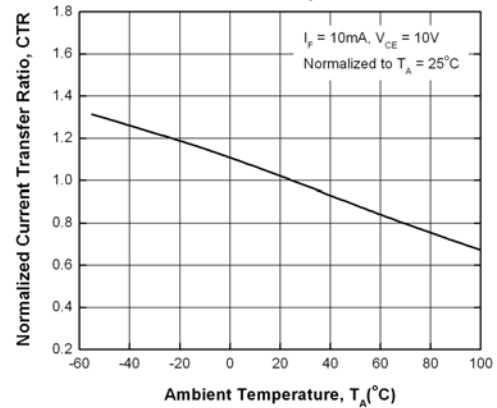
**6 PIN PHOTODARLINGTON  
PHOTOCOUPLER**

**Typical Performance Curves**

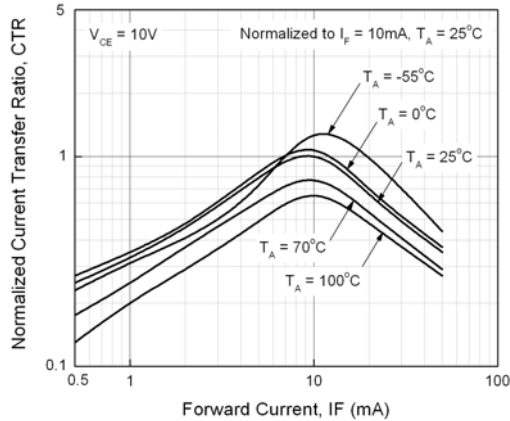
**Figure 1. Forward Current vs Forward Voltage**



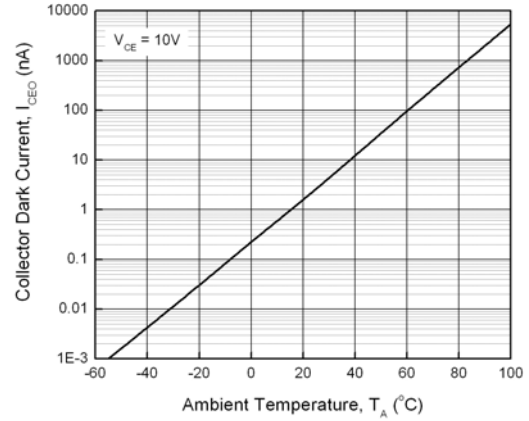
**Figure 2. Current Transfer Ratio vs. Ambient Temperature**



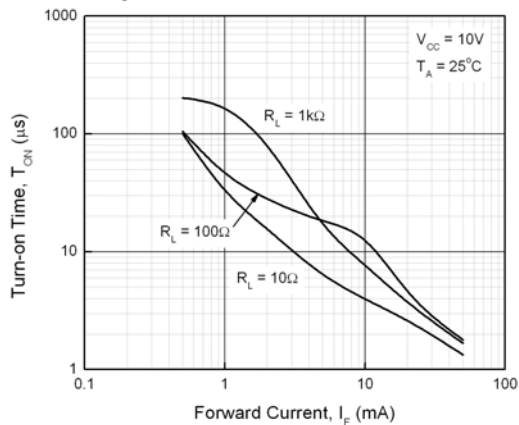
**Figure 3. Normalized Current Transfer Ratio vs Forward Current**



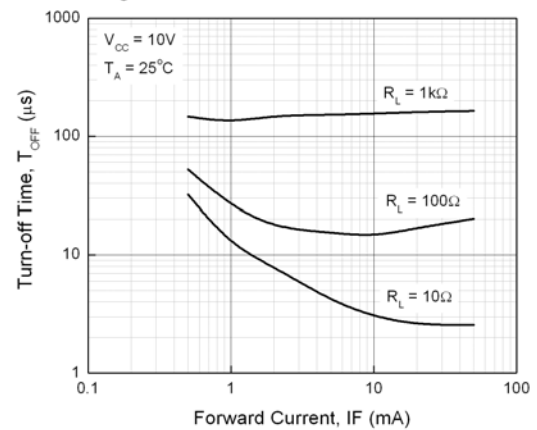
**Figure 4. Collector Dark Current vs Ambient Temperature**



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



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



# 6 PIN PHOTODARLINGTON PHOTOCOUPLER

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

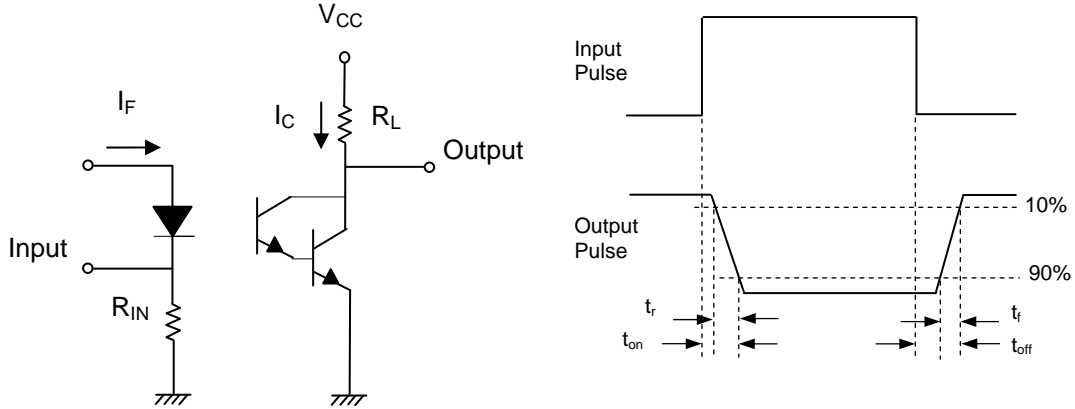


Figure 7. Switching Time Test Circuit & Waveforms

## Order Information

### Part Number

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

### Note

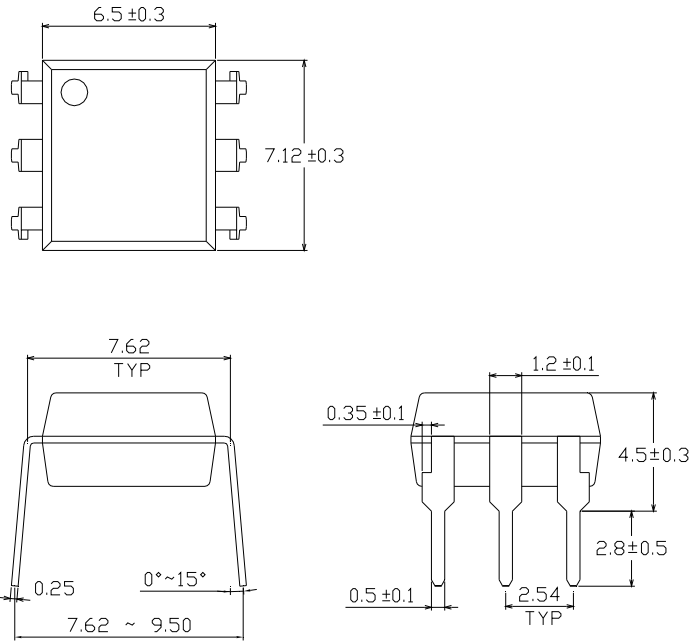
- XX = Part No. for 4NX series (29, 30, 31, 32 or 33)
- X = Part No. for H11BX series (1, 2, 3 or 255)
- Y = Lead form option (S, S1, M or none)
- Z = Tape and reel option (TA, TB or none).
- V = VDE safety (optional)

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

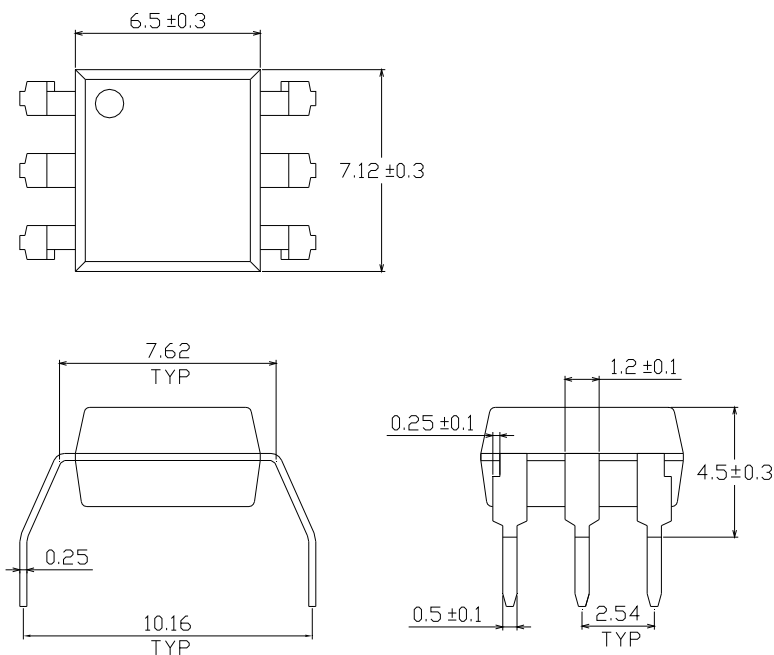
**6 PIN PHOTODARLINGTON  
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**Package Drawings**  
(Dimensions in mm)

**Standard DIP Type**



**Option M Type**

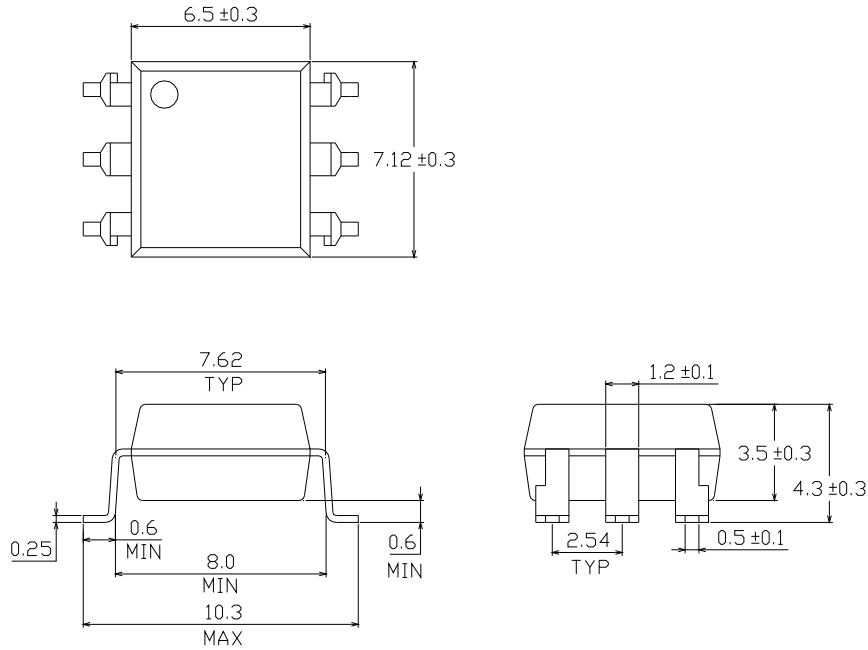




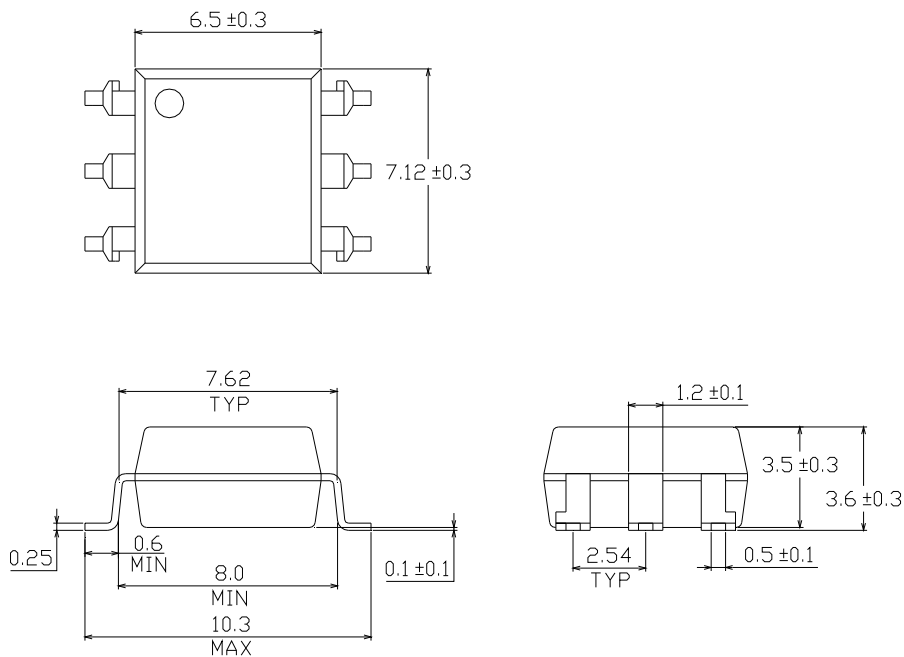
# 6 PIN PHOTODARLINGTON PHOTOCOUPLER

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**H11BX Series**

## Option S Type



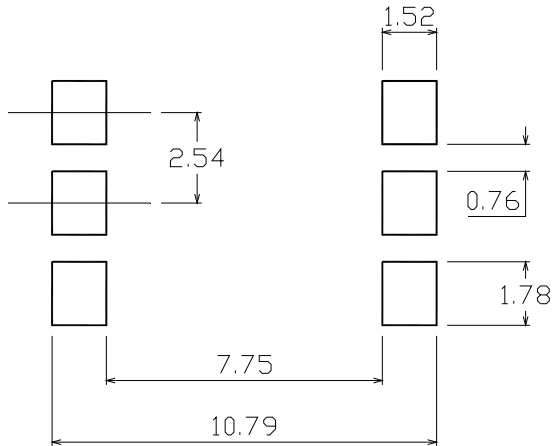
## Option S1 Type



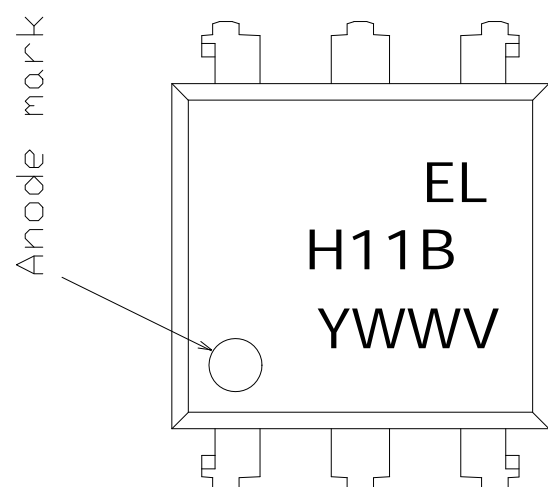
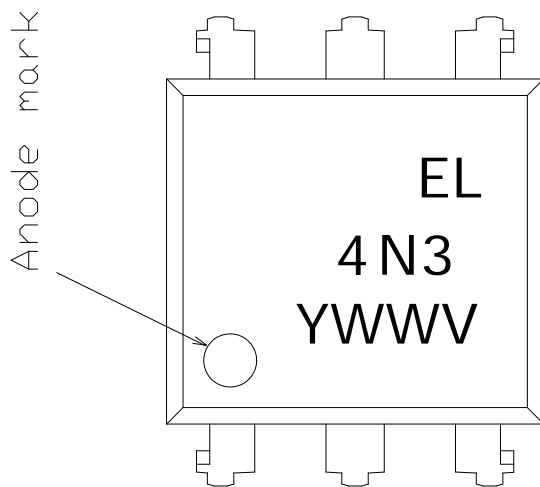
# 6 PIN PHOTODARLINGTON PHOTOCOUPLER

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

Recommended pad layout for surface mount leadform



## Device Marking



## Notes

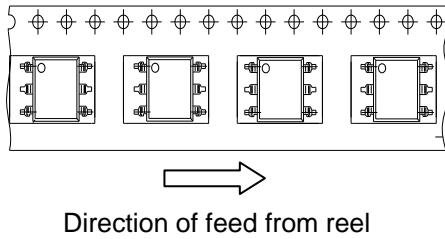
- EL denotes Everlight
- 4N33 denotes Part Number
- H11B1 denotes Part Number
- Y denotes 1 digit Year code
- WW denotes 2 digit Week code
- V denotes VDE safety (optional)

# 6 PIN PHOTODARLINGTON PHOTOCOUPLER

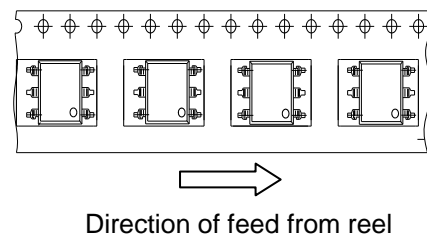
**TIL113**  
**4NXX Series**  
**H11BX Series**

## Tape & Reel Packing Specifications

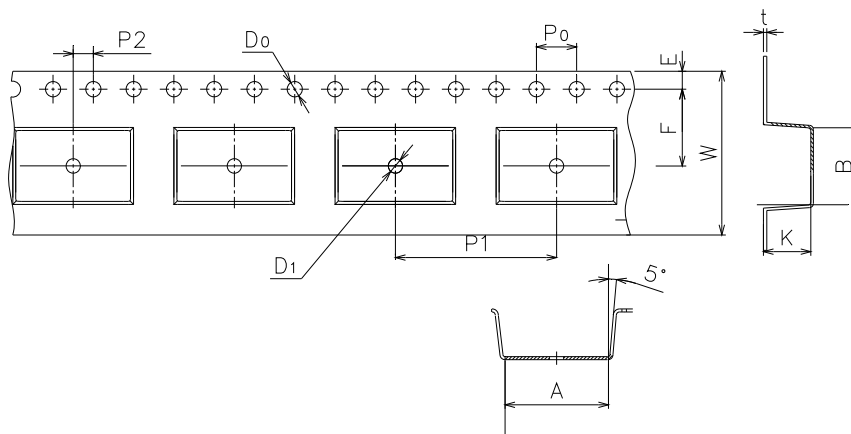
**Option TA**



**Option TB**



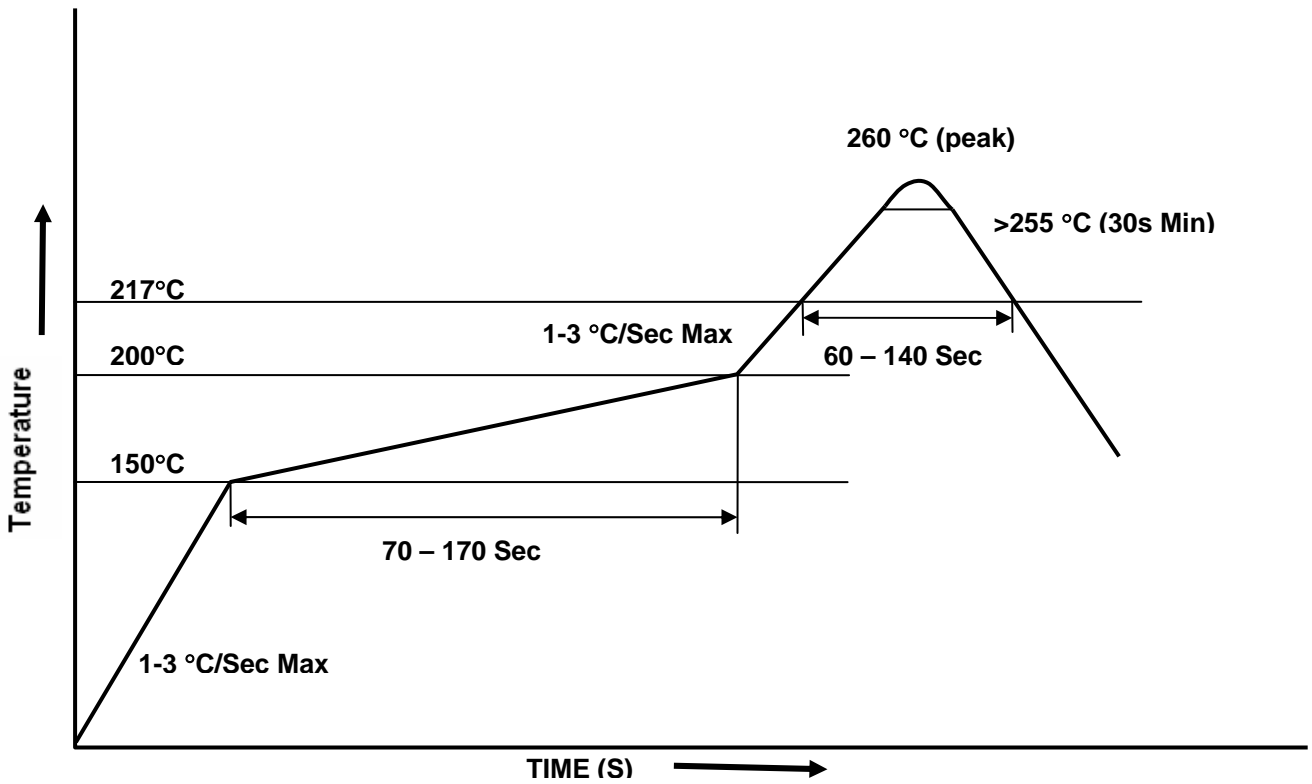
## Tape dimensions



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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## 6 PIN PHOTODARLINGTON PHOTOCOUPLER

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

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