

# 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 (No.132249)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved
- CSA approved (No. 2007798)

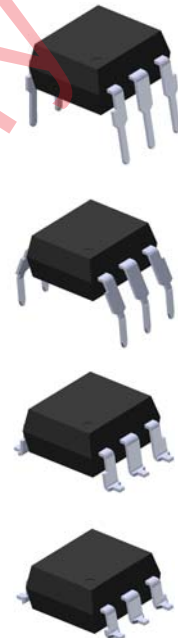
## Description

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

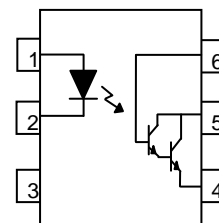
They are packaged in a 6-pin DIP package and available in wide-lead spacing and SMD option.

## 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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## TIL113 4NXX Series H11BX Series

### Absolute Maximum Ratings (T<sub>a</sub>=25°C)

Parameter		Symbol	Rating	Unit
Input	Forward current	I <sub>F</sub>	60	mA
	Peak forward current (t = 10μs)	I <sub>FM</sub>	1	A
	Reverse voltage	V <sub>R</sub>	6	V
	Power dissipation No derating needed	P <sub>D</sub>	120	mW
			3.8	mW/°C
Output	Power dissipation No derating needed	P <sub>C</sub>	150	mW
			6.5	mW/°C
	Collector-Emitter voltage	V <sub>CEO</sub>	55	V
	Collector-Base voltage	V <sub>CBO</sub>	55	V
	Emitter-Collector voltage	V <sub>ECO</sub>	7	V
	Emitter-Base voltage	V <sub>EBO</sub>	7	V
Total power dissipation		P <sub>tot</sub>	200	mW
Isolation voltage *1		V <sub>iso</sub>	5000	V rms
Operating temperature		T <sub>opr</sub>	-55~+100	°C
Storage temperature		T <sub>stg</sub>	-55~+125	°C
Soldering temperature *2		T <sub>sol</sub>	260	°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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### 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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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	$R_{IO}$	$10^{11}$	-	-	:	$V_{IO} = 500\text{Vdc}$	
Input-output capacitance	$C_{IO}$	-	0.8	-	pF	$V_{IO} = 0, f = 1\text{MHz}$	



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## TIL113 4NXX Series H11BX Series

### Transfer Characteristics

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

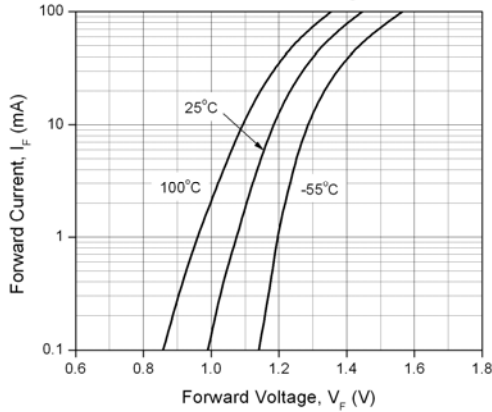


Figure 2. Current Transfer Ratio vs. Ambient Temperature

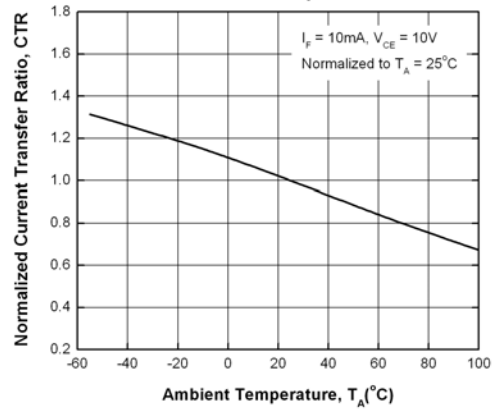


Figure 3. Normalized Current Transfer Ratio vs Forward Current

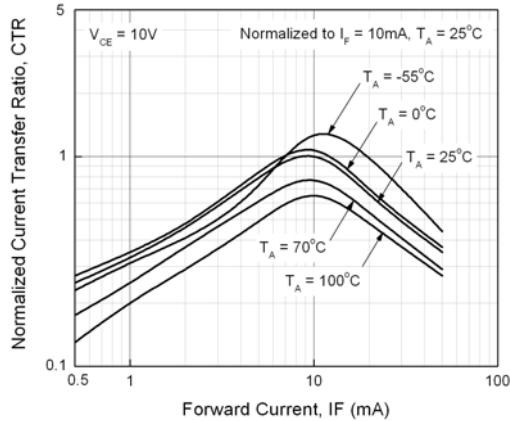


Figure 4. Collector Dark Current vs Ambient Temperature

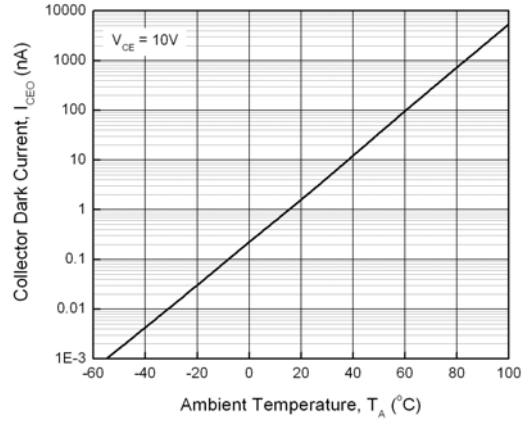


Figure 5. Turn-on Time vs Forward Current

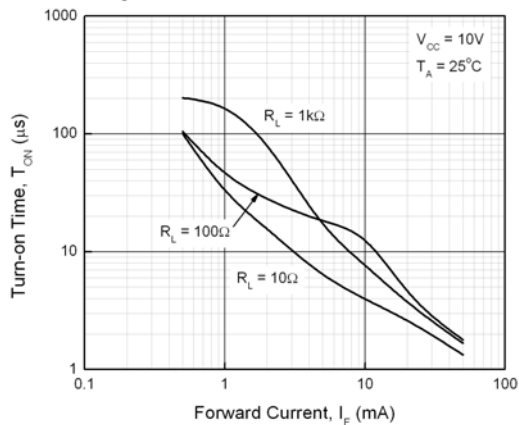
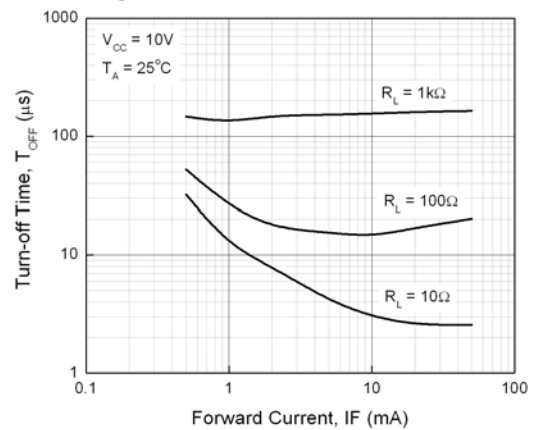
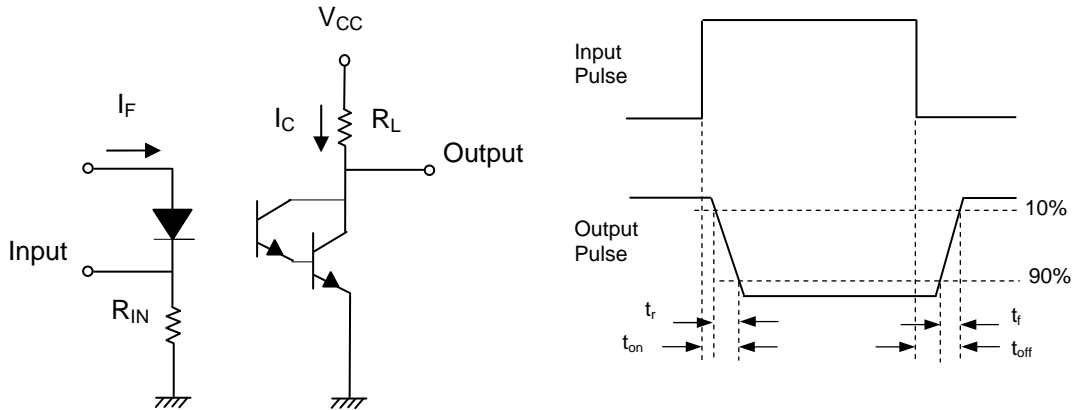


Figure 6. Turn-off Time vs Forward Current





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

**Order Information**

**Part Number**

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

**Note**

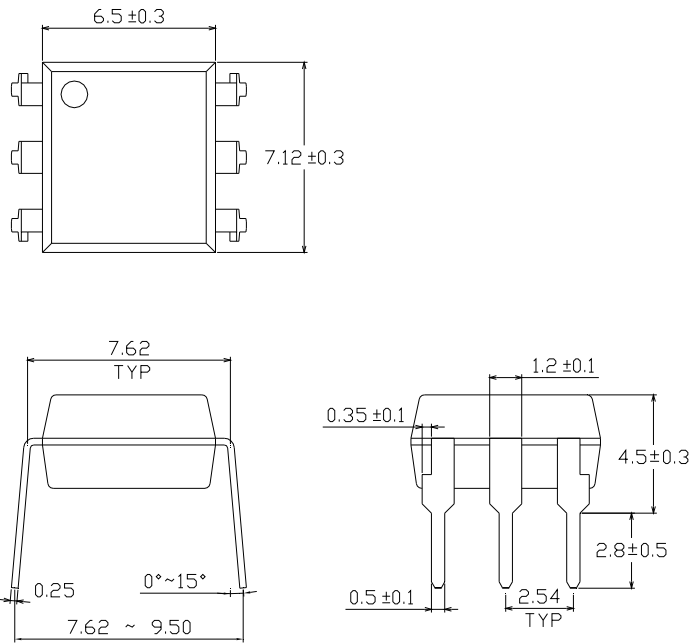
- XX = Part No. for 4NX series (29, 30, 31, 32 or 33)
- X = Part No. for H11BX series (1, 2, 3 or 255)
- Y = Lead form option (S, S1, M or none)
- Z = Tape and reel option (TA, TB or none).
- V = VDE safety (optional)

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

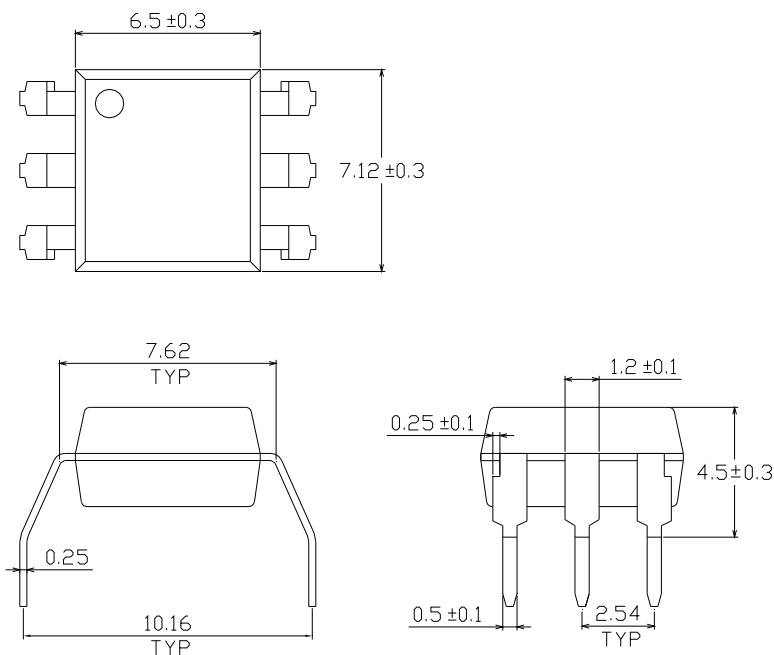
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**Package Drawings**  
(Dimensions in mm)

**Standard DIP Type**



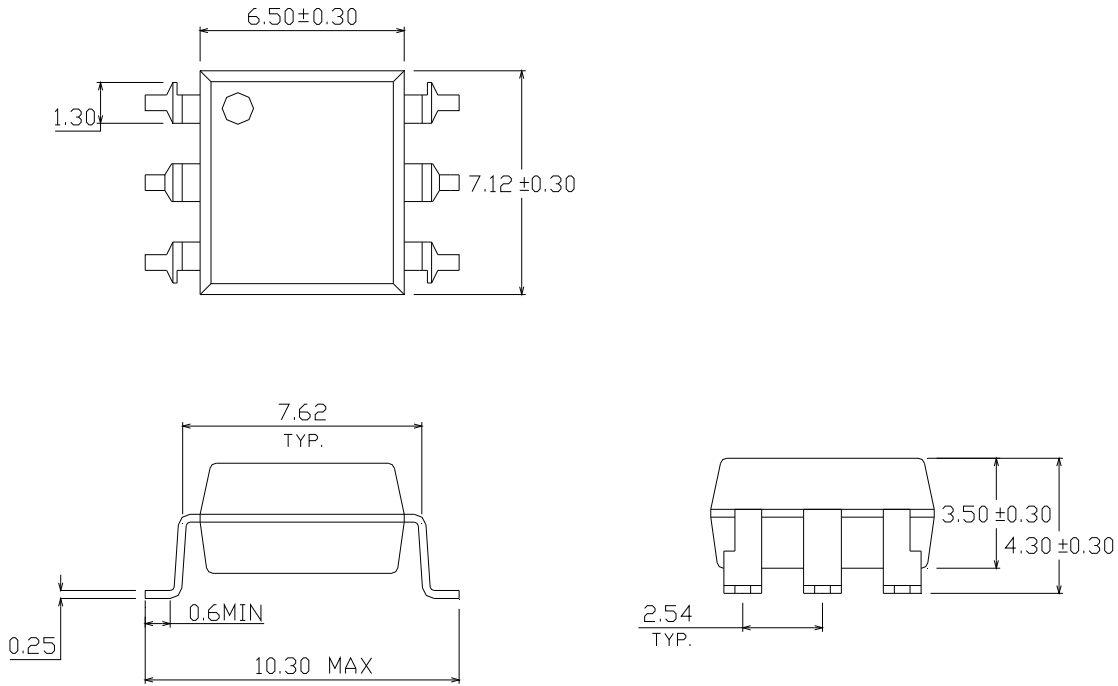
**Option M Type**



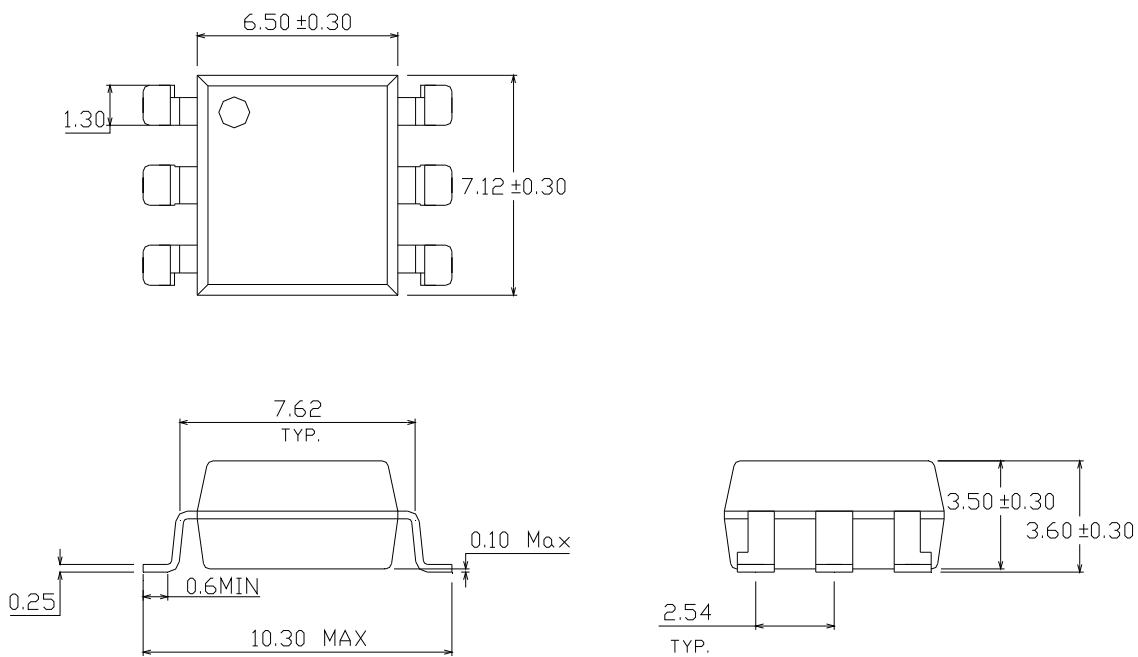


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**Option S Type**



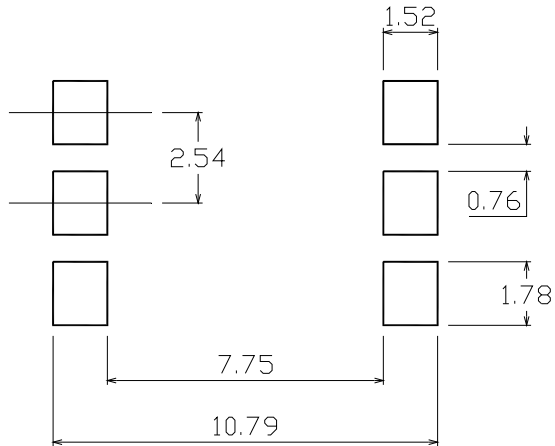
**Option S1 Type**



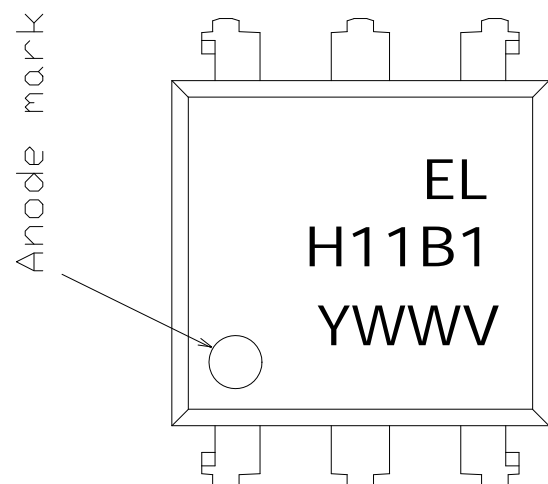
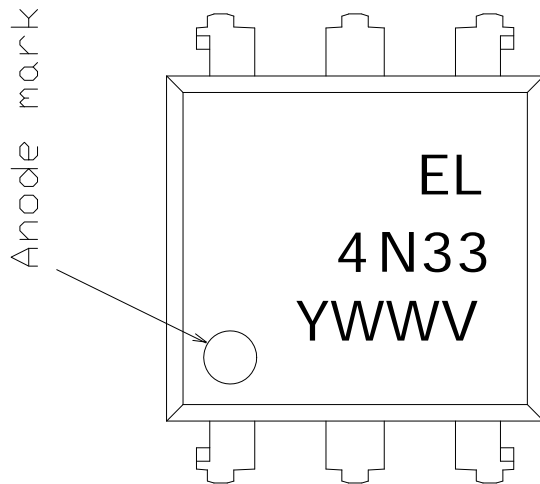
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Recommended pad layout for surface mount leadform



## Device Marking



## Notes

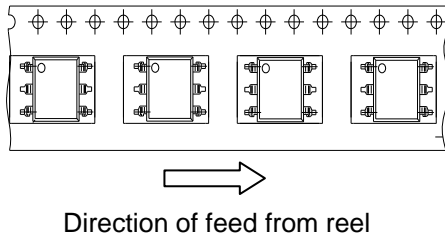
- EL denotes Everlight
- 4N33 denotes Part Number
- H11B1 denotes Part Number
- Y denotes 1 digit Year code
- WW denotes 2 digit Week code
- V denotes VDE safety (optional)

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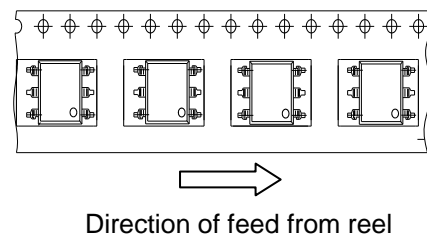
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## Tape & Reel Packing Specifications

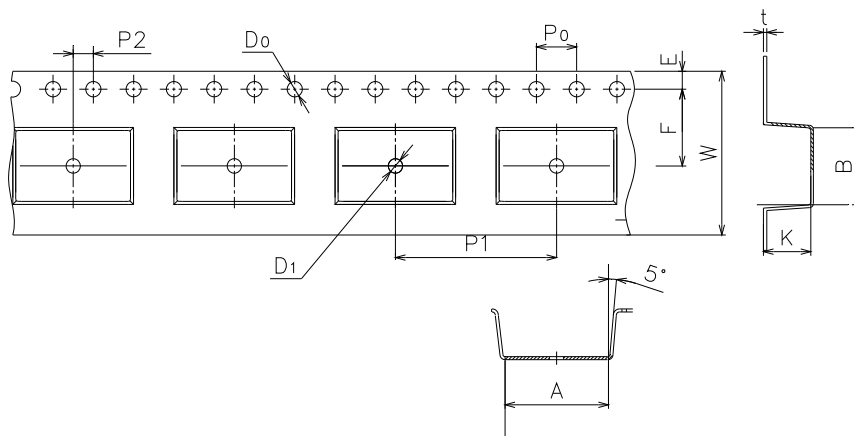
**Option TA**



**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

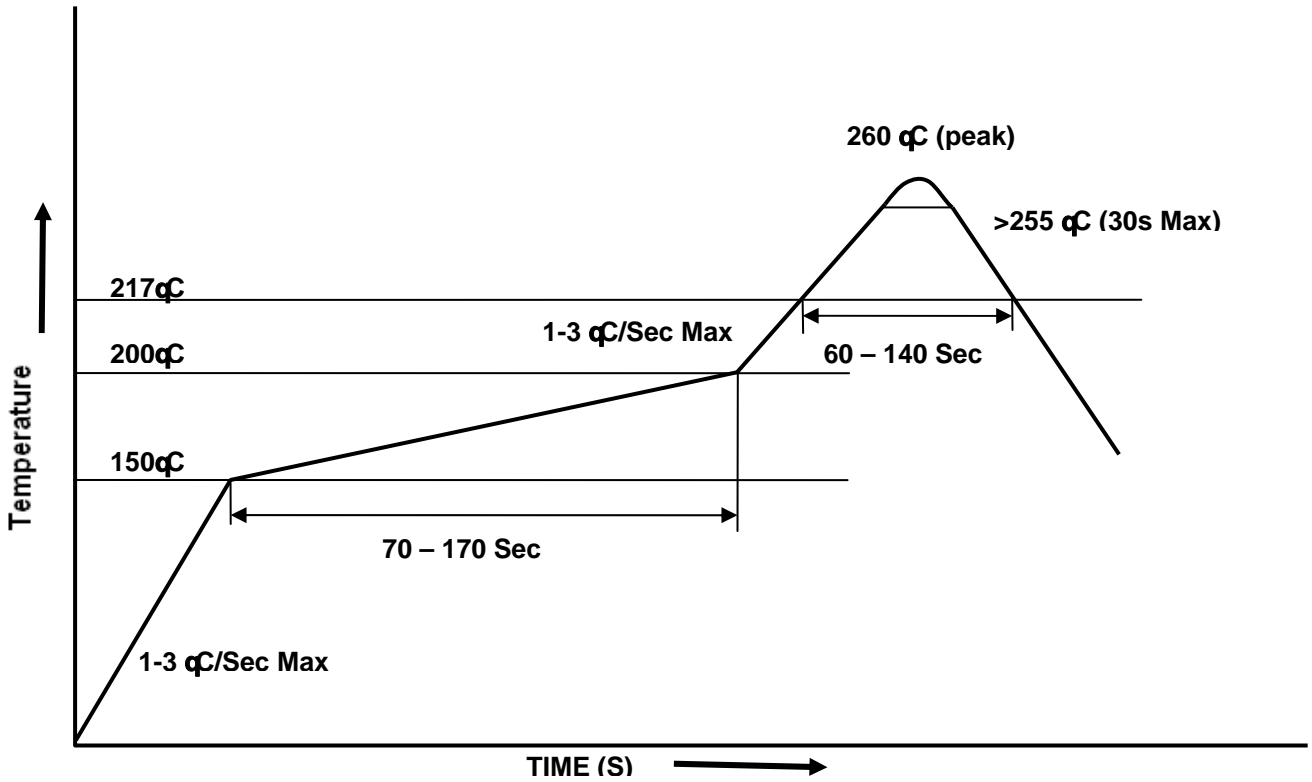


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## Solder Reflow Temperature Profile





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