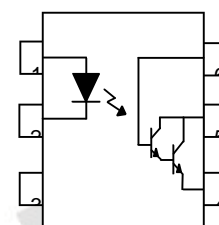


### 6 PIN DIP PHOTODARLINGTON PHOTOCOUPLER TIL113, 4NXX, H11BX Series



Schematic



Pin Configuration

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

#### 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
- Operating temperature up to +110°C
- Compact small outline package
- Pb free and RoHS compliant.
- UL and cUL approved(No. E214129)
- VDE approved (No. 132249)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved

#### 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

**Absolute Maximum Ratings (Ta=25°C)**

	Parameter	Symbol	Rating	Unit
Input	Forward current	$I_F$	60	mA
	Peak forward current (1us, pulse)	$I_{FP}$	1	A
	Reverse voltage	$V_R$	6	V
	Power dissipation No derating required up to Ta = 100°C	$P_D$	120 3.8	mW mW/°C
	Power dissipation Derating factor (above Ta = 80°C)	$P_C$	150 6.5	mW mW/°C
Output	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	$V_{ISO}$	5000	Vrms	
Operating temperature	$T_{OPR}$	-55~+100	°C	
Storage temperature	$T_{STG}$	-55~+125	°C	
Soldering temperature *2	$T_{SOL}$	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

**Electro-Optical Characteristics (Ta=25°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	$I_C = 1\text{mA}$
Emitter-Collector breakdown voltage	$BV_{CBO}$	55	-	-	V	$I_C = 0.1\text{mA}$
Emitter-Collector breakdown voltage	$BV_{ECO}$	7	-	-	V	$I_E = 0.1\text{mA}$

**Transfer Characteristics (Ta=25°C unless specified otherwise)**

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Current transfer ratio	4N32 4N33	500	-	-	%	$I_F = 10\text{mA}, V_{CE} = 10\text{V}$
	4N29 4N30	100	-	-		
	4N31	50	-	-		
	H11B1	500	-	-		$I_F = 1\text{mA}, V_{CE} = 5\text{V}$
	H11B2	200	-	-		
	H11B3	100	-	-		
	H11B255	100	-	-		$I_F = 10\text{mA}, V_{CE} = 5\text{V}$
	TIL113	300	-	-		$I_F = 10\text{mA}, V_{CE} = 1\text{V}$

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

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Collector-emitter saturation voltage	4N29 4N30 4N32 4N33	-	-	1.0		$I_F = 8\text{mA}, I_C = 2\text{mA}$
	4N31 TIL113	-	-	1.2	V	$I_F = 8\text{mA}, I_C = 2\text{mA}$
	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	$V_{IO} = 0, f = 1\text{MHz}$
Turn-on time	H11B1 H11B2 H11B3 H11B255	-	25	-		$V_{CC} = 10\text{V}, I_F = 10\text{mA}, R_L = 100\Omega$
	4N29 4N30 4N31 4N32 4N33 TIL113	-	-	5	$\mu\text{s}$	$V_{CC} = 10\text{V}, I_C = 50\text{mA}, I_F = 200\text{mA}$
Turn-off time	H11B1 H11B2 H11B3 H11B255	-	18	-		$V_{CC} = 10\text{V}, I_F = 10\text{mA}, R_L = 100\Omega$
	4N32 4N33 TIL113 4N29 4N30 4N31	-	-	100 40	$\mu\text{s}$	$V_{CC} = 10\text{V}, I_C = 50\text{mA}, I_F = 200\text{mA}$

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

Typical Electro-Optical Characteristics Curves

Figure 1. Forward Current vs Forward Voltage

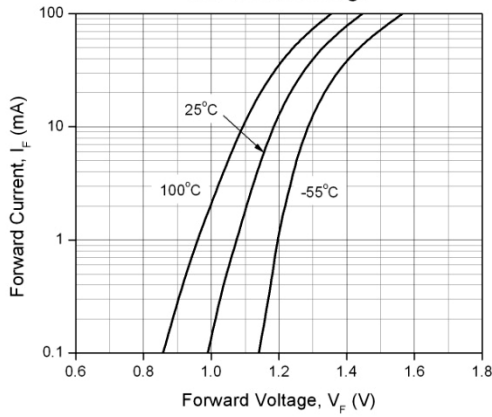


Figure 2. Current Transfer Ratio vs. Ambient Temperature

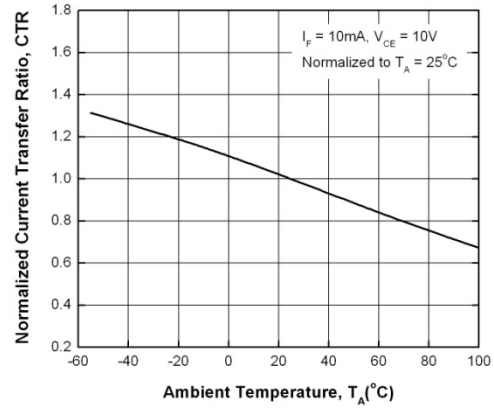


Figure 3. Normalized Current Transfer Ratio vs Forward Current

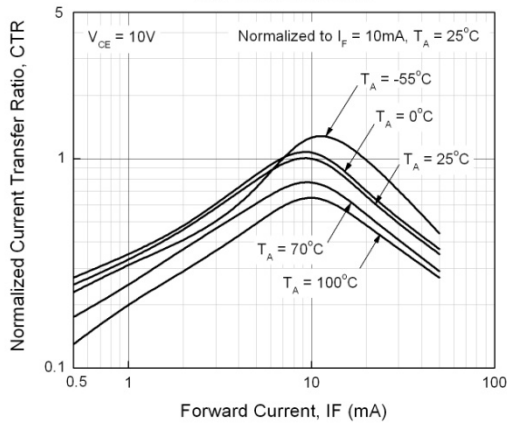


Figure 4. Collector Dark Current vs Ambient Temperature

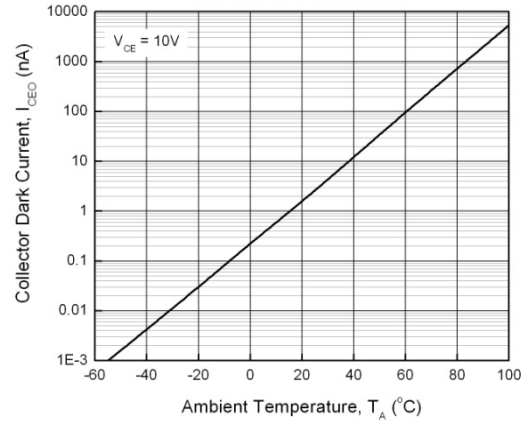


Figure 5. Turn-on Time vs Forward Current

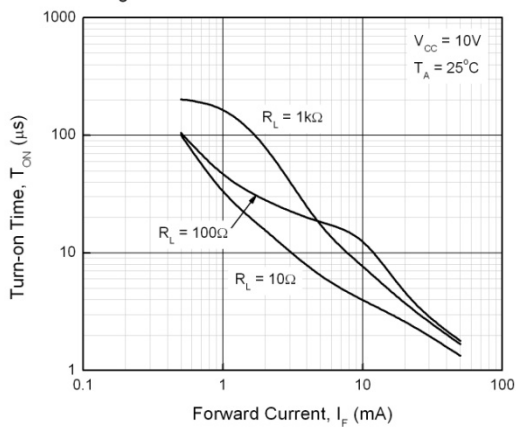
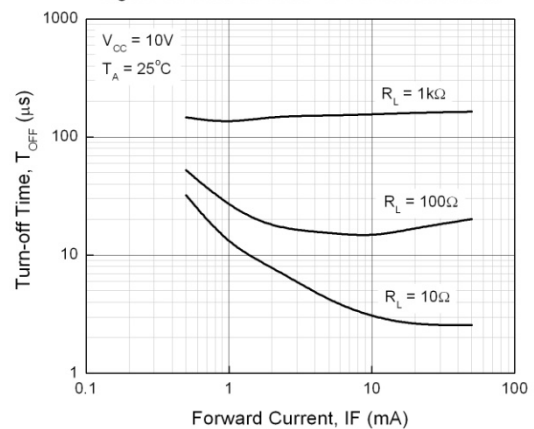


Figure 6. Turn-off Time vs Forward Current



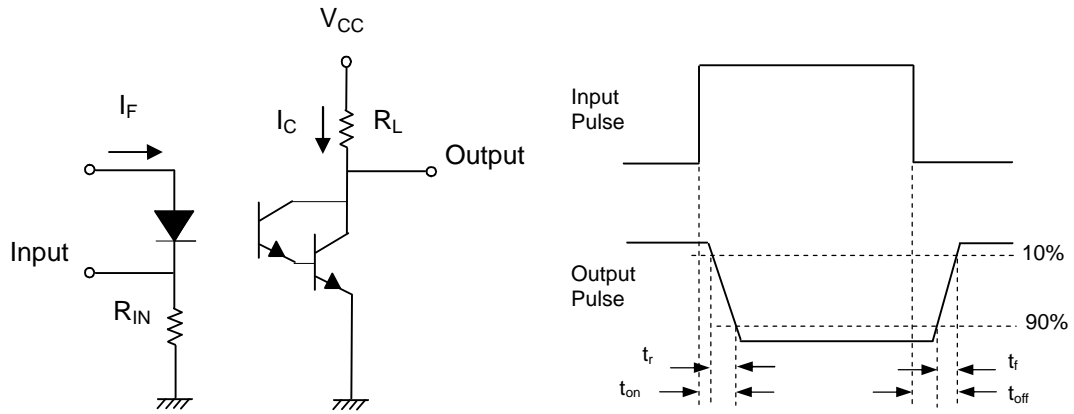


Figure 7. Switching Time Test Circuit & Waveforms

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## Order Information

### Part Number

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

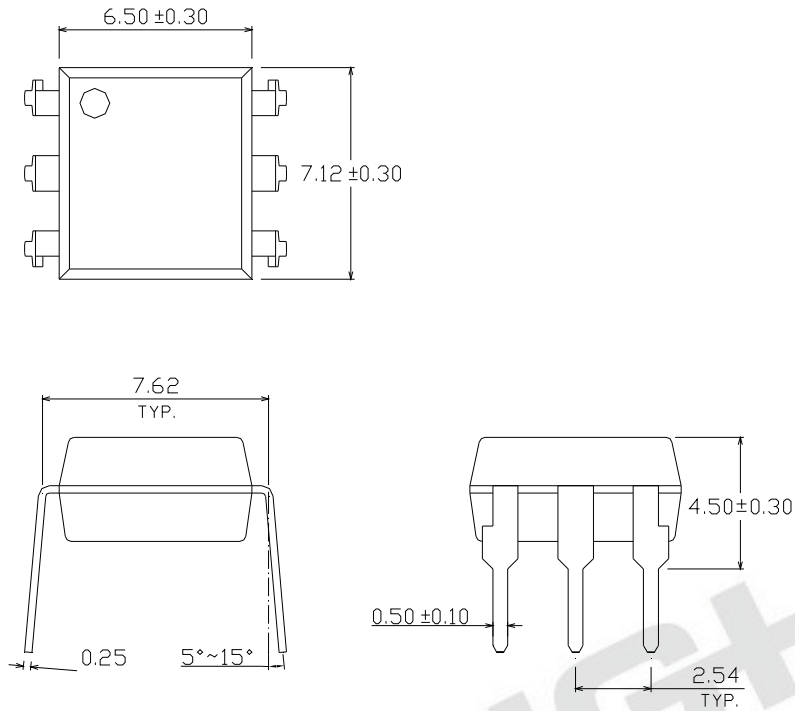
### Note

XX = Part No. for 4NXX 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)

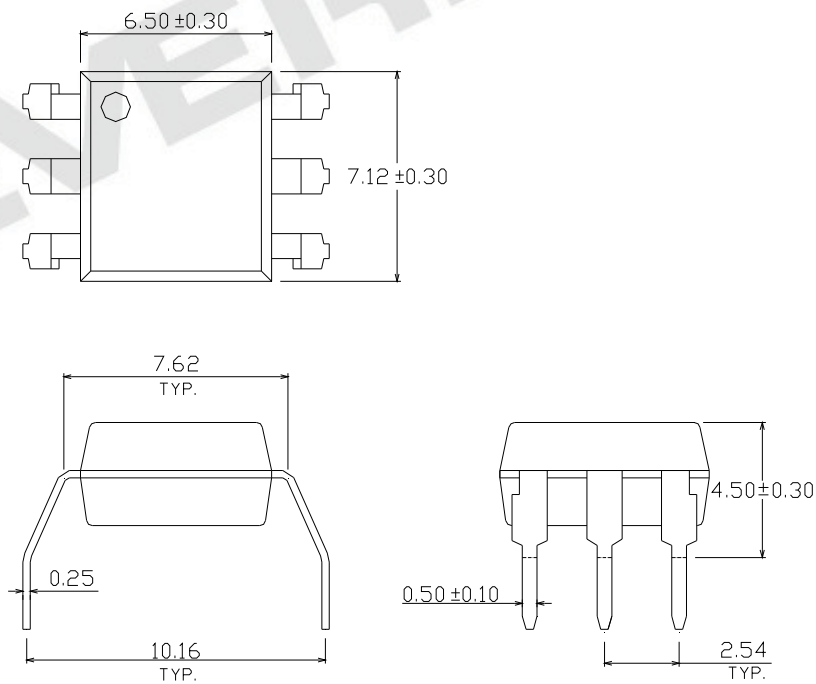
Option	Description	Packing quantity
None	Standard DIP-6	65 units per tube
M	Wide lead bend (0.4 inch spacing)	65 units per tube
S (TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
S (TB)	Surface mount lead form + TB tape & reel option	1000 units per reel
S1 (TA)	Surface mount lead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

Package Dimension (Dimensions in mm)

Standard DIP Type

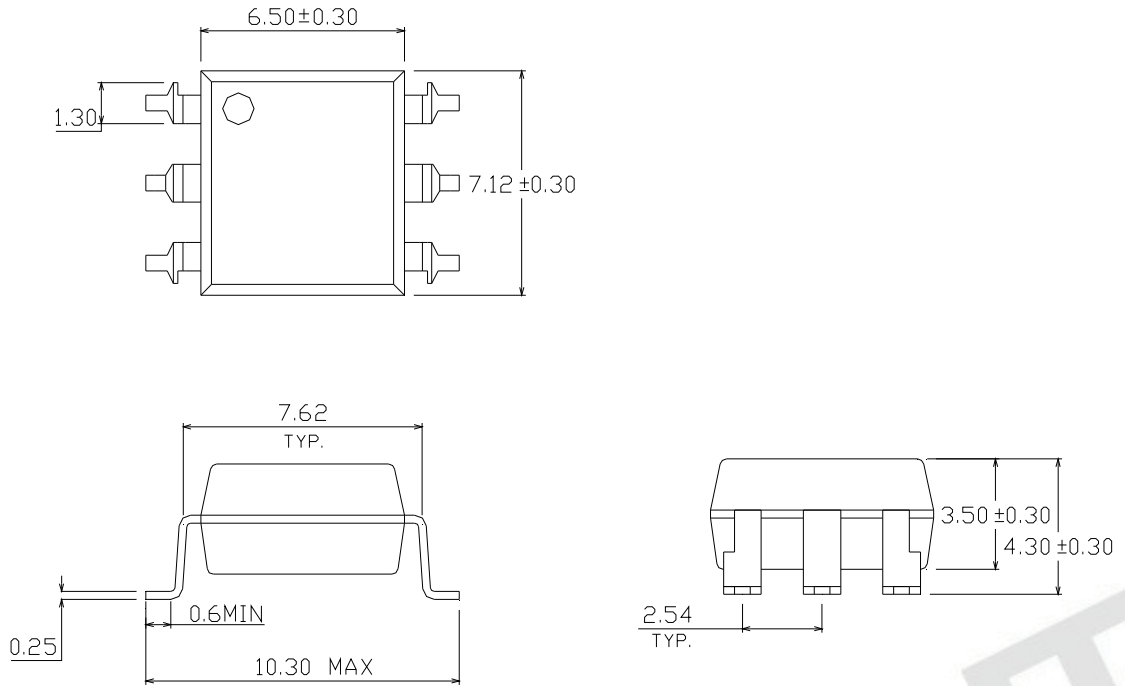


Option M Type

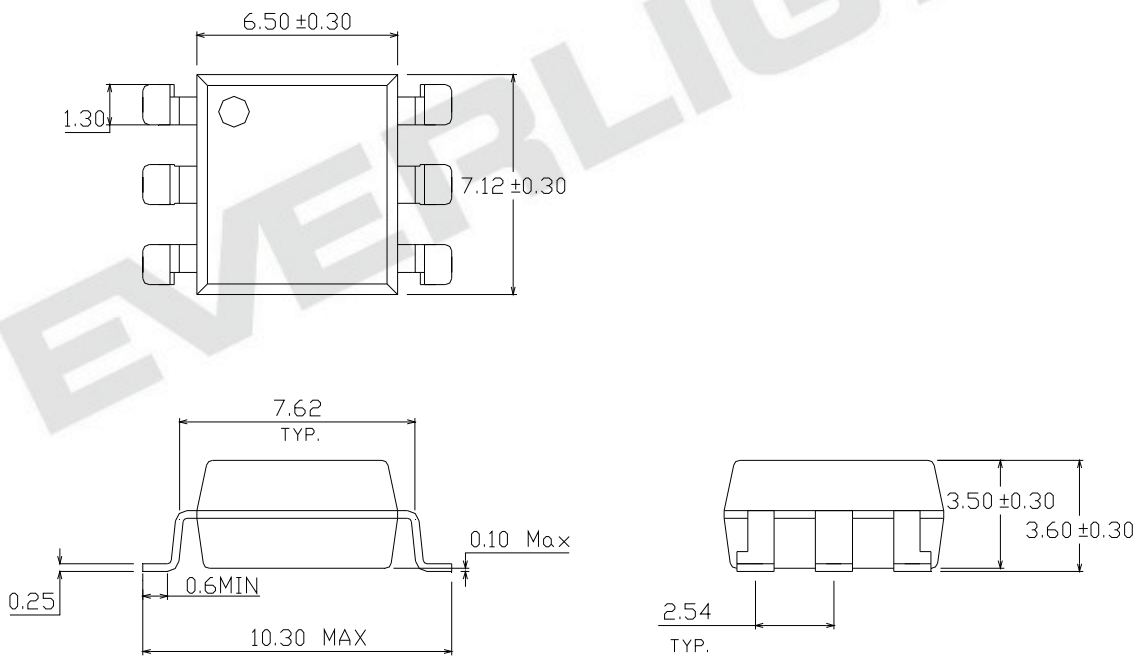




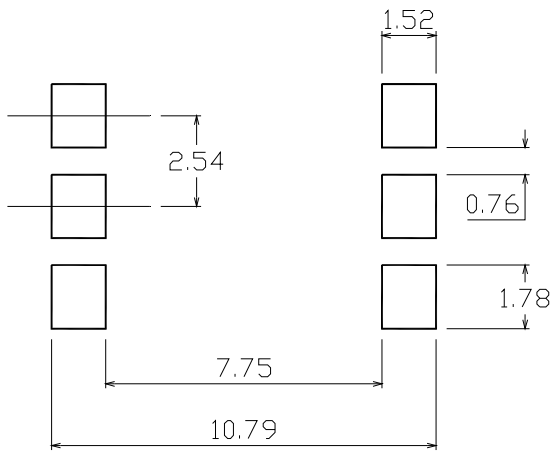
Option S Type



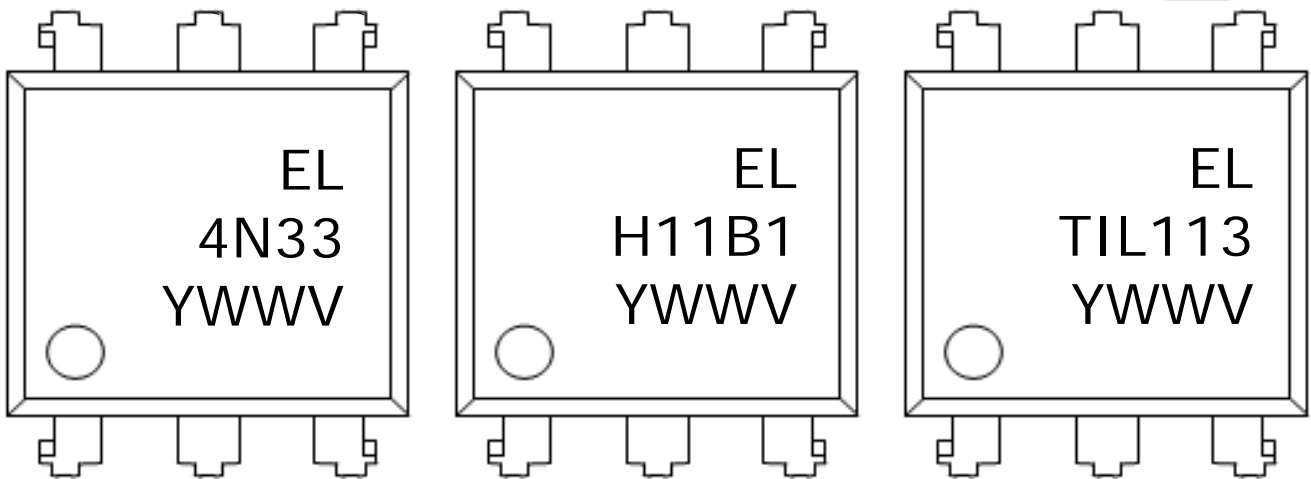
Option S1 Type



Recommended pad layout for surface mount leadform



Device Marking

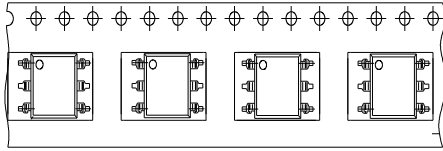


Notes

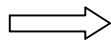
- EL denotes Everlight
- 4N33
- TIL113
- H11B1 denotes Part Number
- Y denotes 1 digit Year code
- WW denotes 2 digit Week code
- V denotes VDE safety (optional)

**Tape & Reel Packing Specifications**

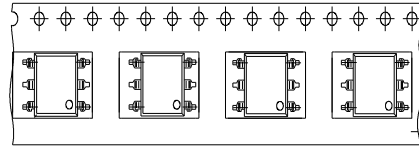
**Option TA**



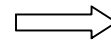
Direction of feed from reel



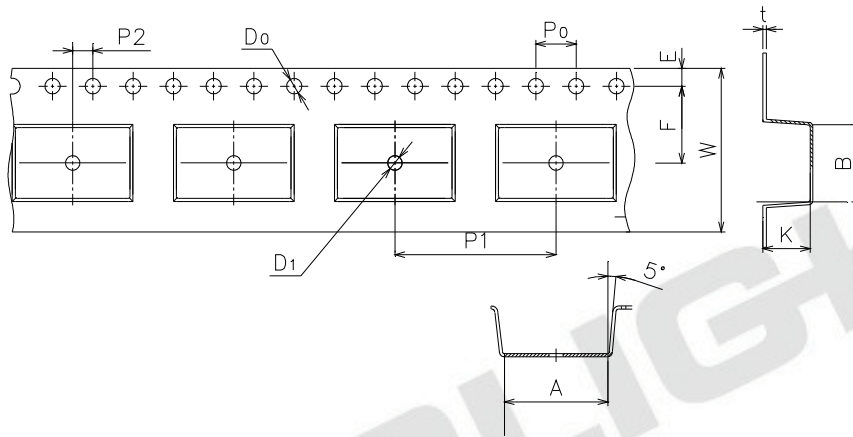
**Option TB**



Direction of feed from reel



**Tape dimensions**

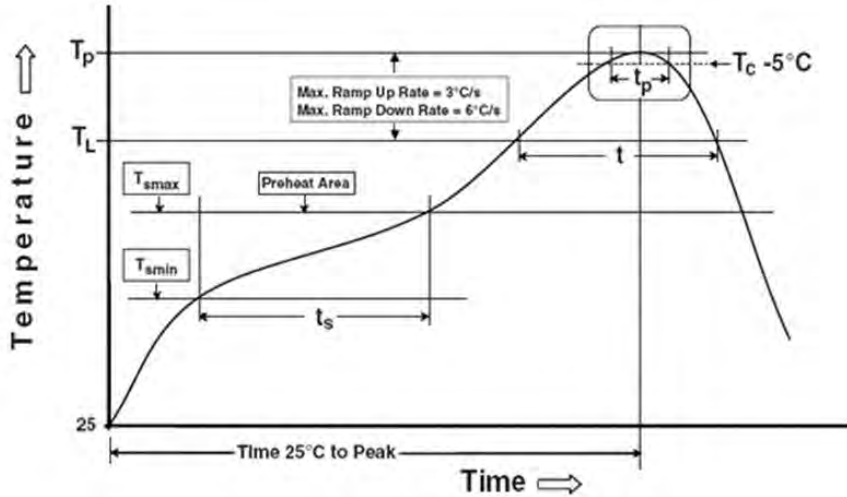


Dimension No.	<b>A</b>	<b>B</b>	<b>Do</b>	<b>D1</b>	<b>E</b>	<b>F</b>
Dimension(mm)	10.4±0.1	7.5±0.1	1.5±0.1	1.5+0.1/-0	1.75±0.1	7.5±0.1
Dimension No.	<b>Po</b>	<b>P1</b>	<b>P2</b>	<b>t</b>	<b>W</b>	<b>K</b>
Dimension(mm)	4.0±0.15	12±0.1	2.0±0.1	0.35±0.03	16.0±0.2	4.5±0.1

## Precautions for Use

### 1. Soldering Condition

#### 1.1 (A) Maximum Body Case Temperature Profile for evaluation of Reflow Profile



Note:

Reference: IPC/JEDEC J-STD-020D

#### Preheat

Temperature min ( $T_{smin}$ )	150 °C
Temperature max ( $T_{smax}$ )	200°C
Time ( $T_{smin}$ to $T_{smax}$ ) ( $t_s$ )	60-120 seconds
Average ramp-up rate ( $T_{smax}$ to $T_p$ )	3 °C/second max

#### Other

Liquidus Temperature ( $T_L$ )	217 °C
Time above Liquidus Temperature ( $t_L$ )	60-100 sec
Peak Temperature ( $T_p$ )	260°C
Time within 5 °C of Actual Peak Temperature: $T_p - 5^\circ\text{C}$	30 s
Ramp- Down Rate from Peak Temperature	6°C /second max.
Time 25°C to peak temperature	8 minutes max.
Reflow times	3 times

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