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## 6 PIN DIP PHOTOTRANSISTOR PHOTOCOUPLER

4N2X Series  
4N3X Series  
H11AX Series

### Features:

- 4N2X series: 4N25, 4N26, 4N27, 4N28
- 4N3X series: 4N35, 4N36, 4N37, 4N38
- H11AX series: H11A1, H11A2, H11A3, H11A4, H11A5
- High isolation voltage between input and output  
(Viso=5000 V rms)
- Creepage distance >7.6mm
- Operating temperature up to +110°C
- Compact dual-in-line package
- Pb free and RoHS compliant.
- UL approved (No. E214129)
- VDE approved (No. 132249)
- SEMKO approval pending
- NEMKO approval pending
- DEMKO approval pending
- FIMKO approval pending
- CSA approval pending

### Description

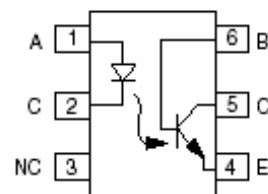
The 4N2X, 4N3X, H11AX series contains an infrared emitting diode optically coupled to a phototransistor. It is packaged in a 6-pin DIP package and available in wide-lead spacing and SMD option.

### Applications

- Power supply regulators
- Digital logic inputs
- Microprocessor inputs



Schematic



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



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**4N2X Series**  
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**H11AX Series**

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

Parameter		Symbol	Rating	Unit
Input	Forward current	$I_F$	50	mA
	Peak forward current ( $t = 10\mu\text{s}$ )	$I_{FM}$	1	A
	Reverse voltage	$V_R$	6	V
	Power dissipation ( $T_A = 25^{\circ}\text{C}$ )	$P_D$	70	mW
	Derating factor (above $100^{\circ}\text{C}$ )		3.8	mW/ $^{\circ}\text{C}$
Output	Collector-Emitter voltage	$V_{CEO}$	80	V
	Collector-Base voltage	$V_{CBO}$	80	V
	Emitter-Collector voltage	$V_{ECO}$	7	V
	Emitter-Base voltage	$V_{EBO}$	7	V
	Power dissipation ( $T_A = 25^{\circ}\text{C}$ )	$P_C$	150	mW
Derating factor (above $100^{\circ}\text{C}$ )	9.0		mW/ $^{\circ}\text{C}$	
Total power dissipation		$P_{tot}$	200	mW
Isolation voltage <sup>*1</sup>		$V_{iso}$	5000	V <sub>rms</sub>
Operating temperature		$T_{opr}$	-55~+110	$^{\circ}\text{C}$
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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## Electrical Characteristics (T<sub>a</sub>=25°C unless specified otherwise)

### Input

Parameter	Symbol	Min.	Typ.*	Max.	Unit	Condition
Forward voltage	V <sub>F</sub>	-	1.2	1.5	V	I <sub>F</sub> = 10mA
Reverse current	I <sub>R</sub>	-	-	10	μA	V <sub>R</sub> = 6V
Input capacitance	C <sub>in</sub>	-	30	-	pF	V = 0, f = 1MHz

### Output

Parameter	Symbol	Min.	Typ.*	Max.	Unit	Condition
Collector-Base dark current	I <sub>CBO</sub>	-	-	20	nA	V <sub>CB</sub> = 10V
Collector-Emitter dark current	I <sub>CEO</sub>	-	-	50	nA	V <sub>CE</sub> = 10V, I <sub>F</sub> =0mA
		-	-	50		V <sub>CE</sub> = 60V, I <sub>F</sub> =0mA
Collector-Emitter breakdown voltage	BV <sub>CEO</sub>	80	-	-	V	I <sub>C</sub> =1mA
Collector-Base breakdown voltage	BV <sub>CBO</sub>	80	-	-	V	I <sub>C</sub> =0.1mA
Emitter-Collector breakdown voltage	BV <sub>ECO</sub>	7	-	-	V	I <sub>E</sub> =0.1mA
Emitter-Base breakdown voltage	BV <sub>EBO</sub>	7	-	-	V	I <sub>E</sub> =0.1mA
Collector-Emitter capacitance	C <sub>CE</sub>	-	8	-	pF	V <sub>CE</sub> =0V, f=1MHz

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



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

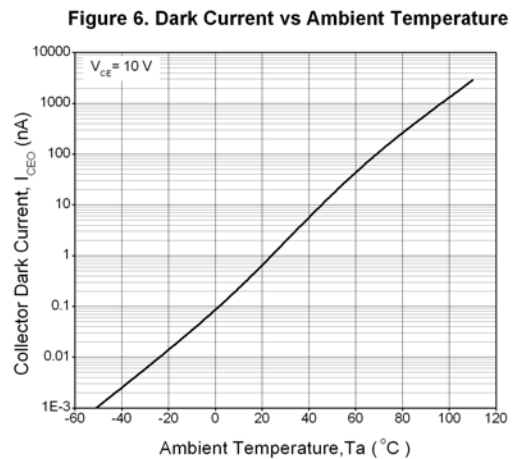
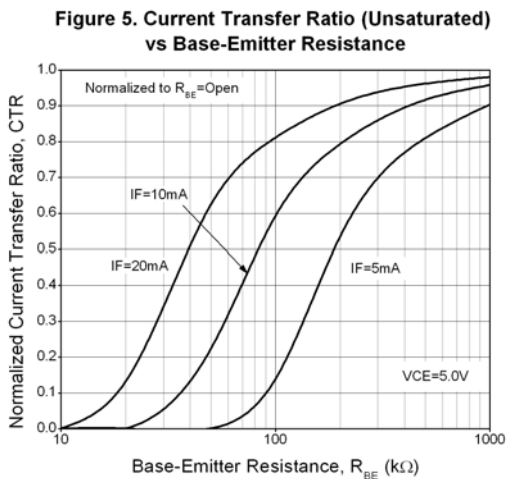
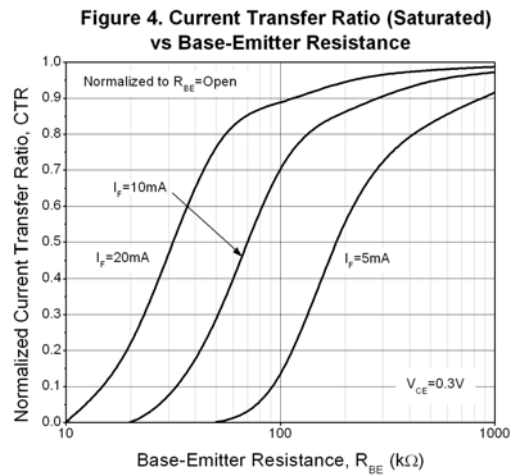
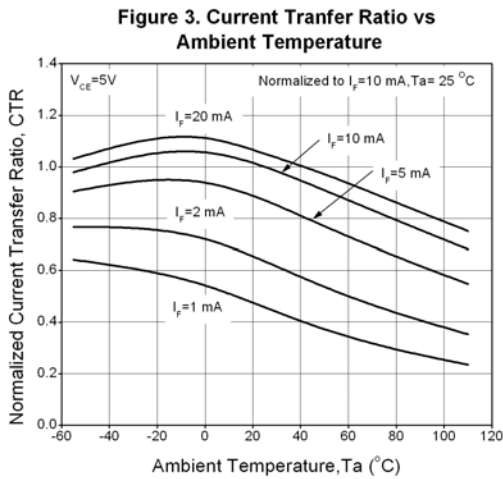
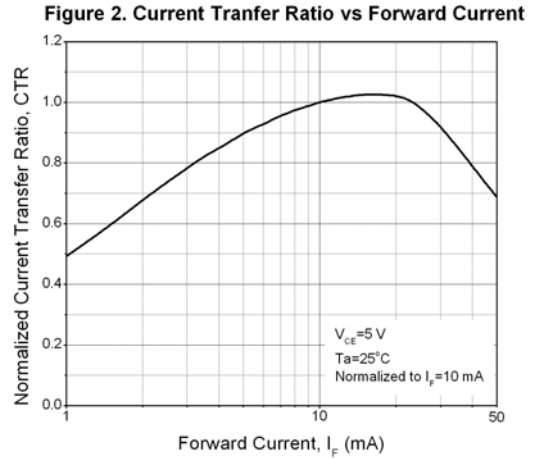
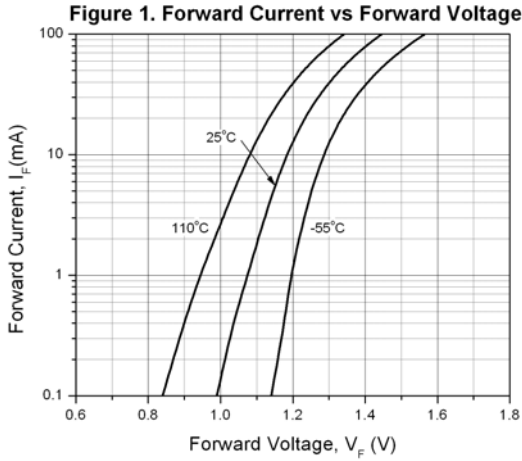
Parameter		Symbol	Min.	Typ.*	Max.	Unit	Condition
Current transfer ratio	4N35, 4N36, 4N37	CTR	100	-	-	%	$I_F = 10\text{mA}, V_{CE} = 10\text{V}$
	H11A1		50	-	-		
	H11A5		30	-	-		
	4N25, 4N26, 4N38, H11A2, H11A3		20	-	-		
	4N27, 4N28, H11A4		10	-	-		
Collector-Emitter saturation voltage	4N25, 4N26, 4N27, 4N28	$V_{CE(sat)}$	-	-	0.5	V	$I_F = 50\text{mA}, I_C = 2\text{mA}$
	4N35, 4N36, 4N37		-	-	0.3		$I_F = 10\text{mA}, I_C = 0.5\text{mA}$
	H11A1, H11A2, H11A3, H11A4, H11A5		-	-	0.4		
	4N38		-	-	1.0		
Isolation resistance		$R_{IO}$	$10^{11}$	-	-	$\Omega$	$V_{IO} = 500\text{Vdc}$
Input-output capacitance		$C_{IO}$	-	0.2	-	pF	$V_{IO} = 0, f = 1\text{MHz}$
Turn-on time	4N25, 4N26, 4N27, 4N28, H11A1, H11A2, H11A3, H11A4, H11A5	Ton	-	3	10	$\mu\text{s}$	$V_{CC} = 10\text{V}, I_F = 10\text{mA}, R_L = 100\Omega$ See Fig. 11
	4N35, 4N36, 4N37, 4N38		-	10	12		$V_{CC} = 10\text{V}, I_C = 2\text{mA}, R_L = 100\Omega$ , See Fig. 11
Turn-off time	4N25, 4N26, 4N27, 4N28, H11A1, H11A2, H11A3, H11A4	Toff	-	3	10	$\mu\text{s}$	$V_{CC} = 10\text{V}, I_F = 10\text{mA}, R_L = 100\Omega$ See Fig. 11
	4N35, 4N36, 4N37, 4N38		-	9	12		$V_{CC} = 10\text{V}, I_C = 2\text{mA}, R_L = 100\Omega$ , See Fig. 11

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

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H11AX Series**

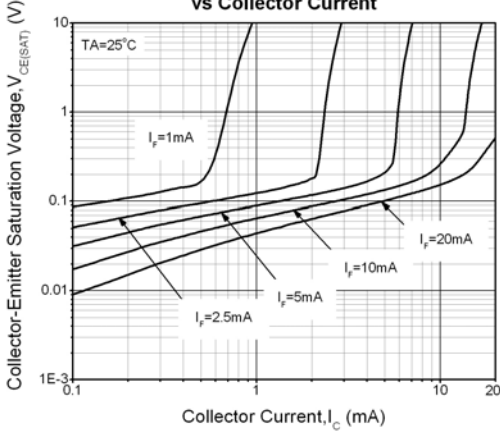
## Typical Performance Curves



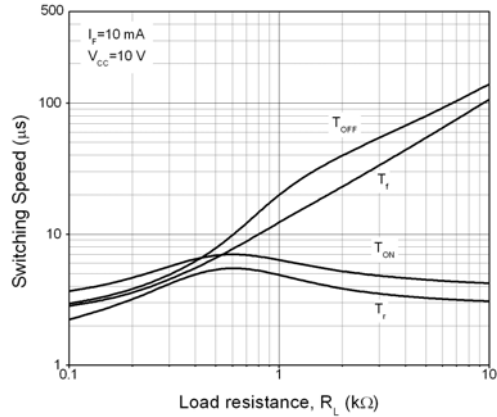
**6 PIN DIP PHOTOTRANSISTOR  
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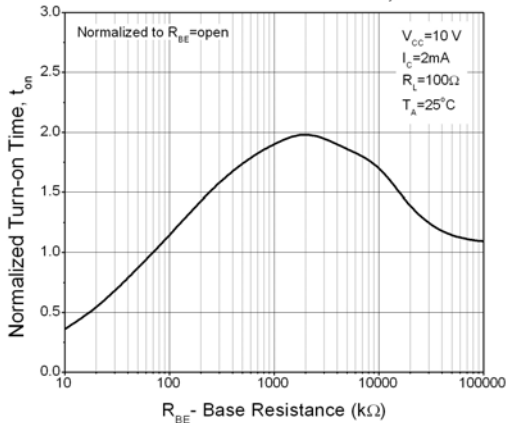
**Figure 7. Collector-Emitter Saturation Voltage vs Collector Current**



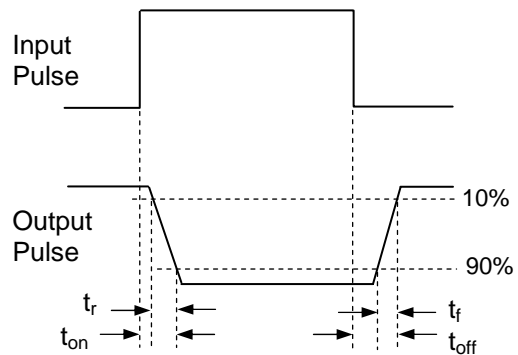
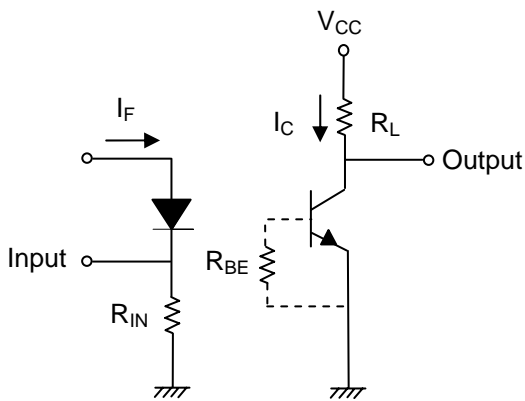
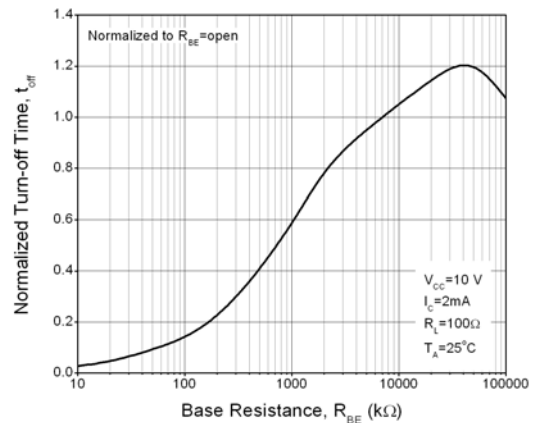
**Figure 8. Switching Time vs Load Resistance**



**Figure 9. Turn-on Time vs Base-Emitter Resistance**



**Figure 10. Turn-off Time vs Base-Emitter Resistance**



**Figure 11. Switching Time Test Circuit & Waveforms**



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**H11AX Series**

## Order Information

### Part Number

**4NXXY(Z)-V**

or

**H11AXY(Z)-V**

### Note

XX = Part no. for 4NXX series (25, 26, 27, 28, 35, 36, 37 or 38)

X = Part no. for H11AX series (1, 2, 3, 4, or 5)

Y = Lead form option (S, S1, M or none)

Z = Tape and reel option (TA, TB or none).

V = VDE (optional)

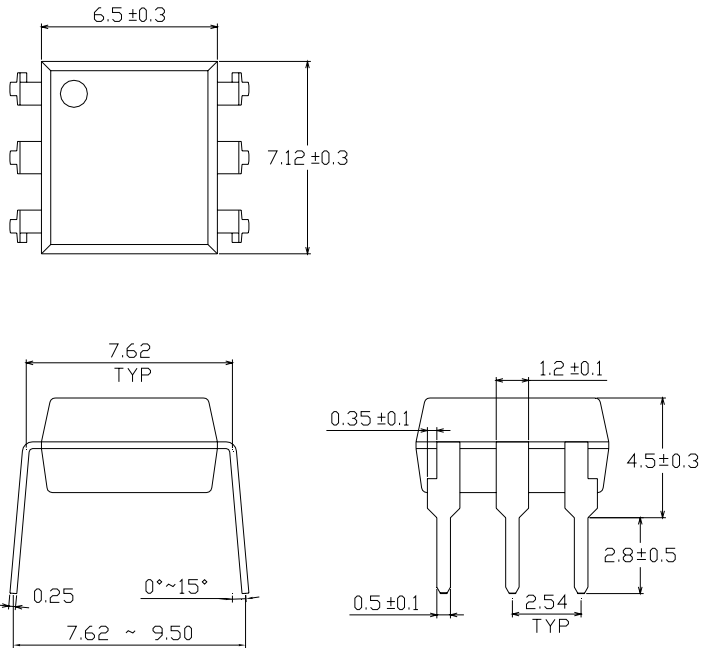
Option	Description	Packing quantity
None	Standard DIP-6	65 units per tube
M	Wide lead bend (0.4 inch spacing)	65 units per tube
S (TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
S (TB)	Surface mount lead form + TB tape & reel option	1000 units per reel
S1 (TA)	Surface mount lead 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 DIP PHOTOTRANSISTOR  
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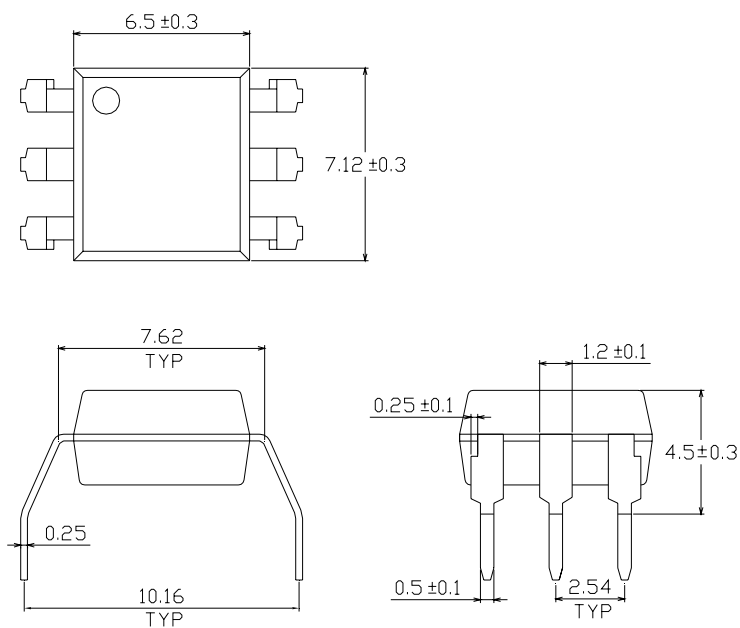
**4N2X Series  
4N3X Series  
H11AX Series**

**Package Drawings  
(Dimensions in mm)**

**Standard DIP Type**



**Option M Type**

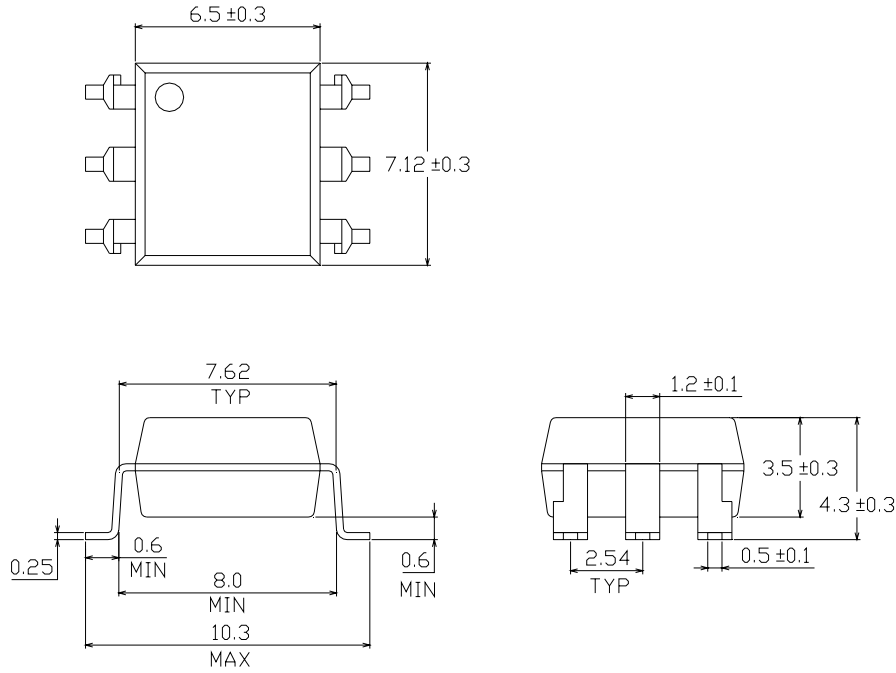




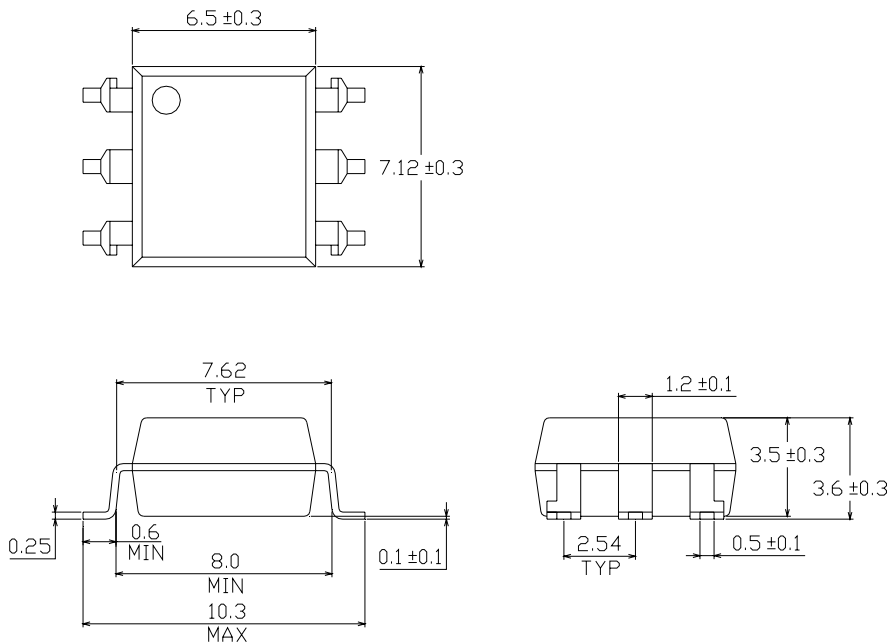
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**4N2X Series  
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H11AX Series**

**Option S Type**



**Option S1 Type**



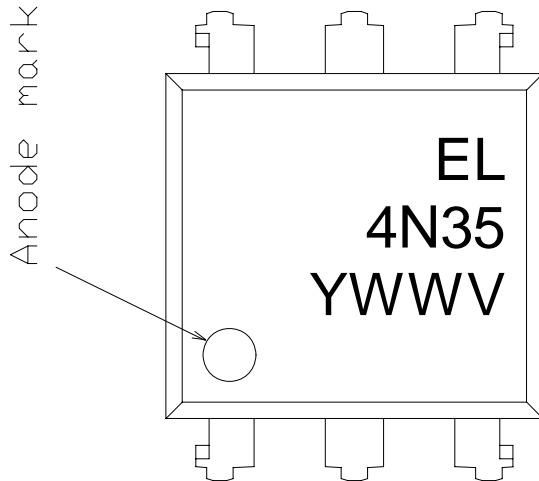


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## Device Marking



## Notes

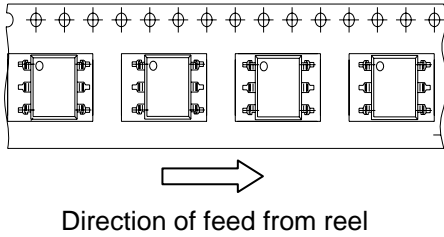
EL	denotes Everlight
4N35	denotes Device Number
Y	denotes 1 digit Year code
WW	denotes 2 digit Week code
V	denotes VDE (optional)

**6 PIN DIP PHOTOTRANSISTOR  
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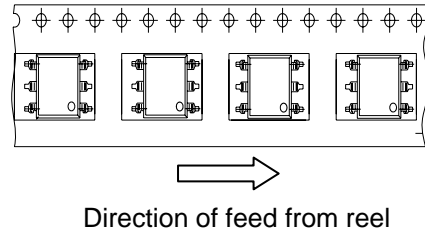
**4N2X Series  
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H11AX Series**

**Tape & Reel Packing Specifications**

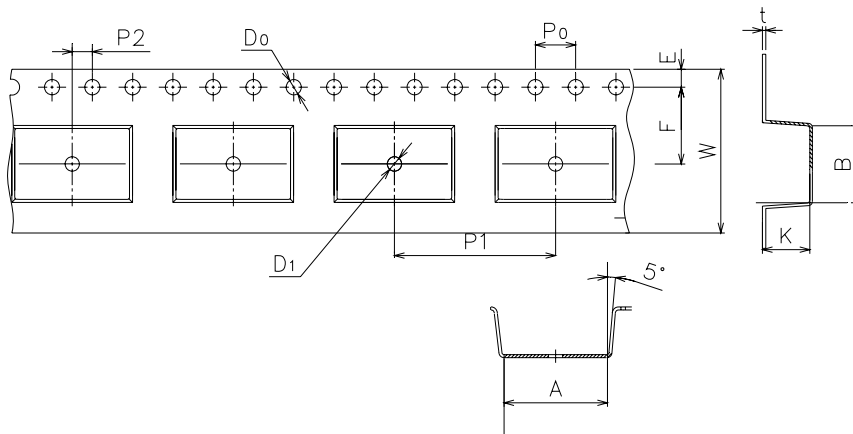
**Option TA**



**Option TB**



**Tape dimensions**



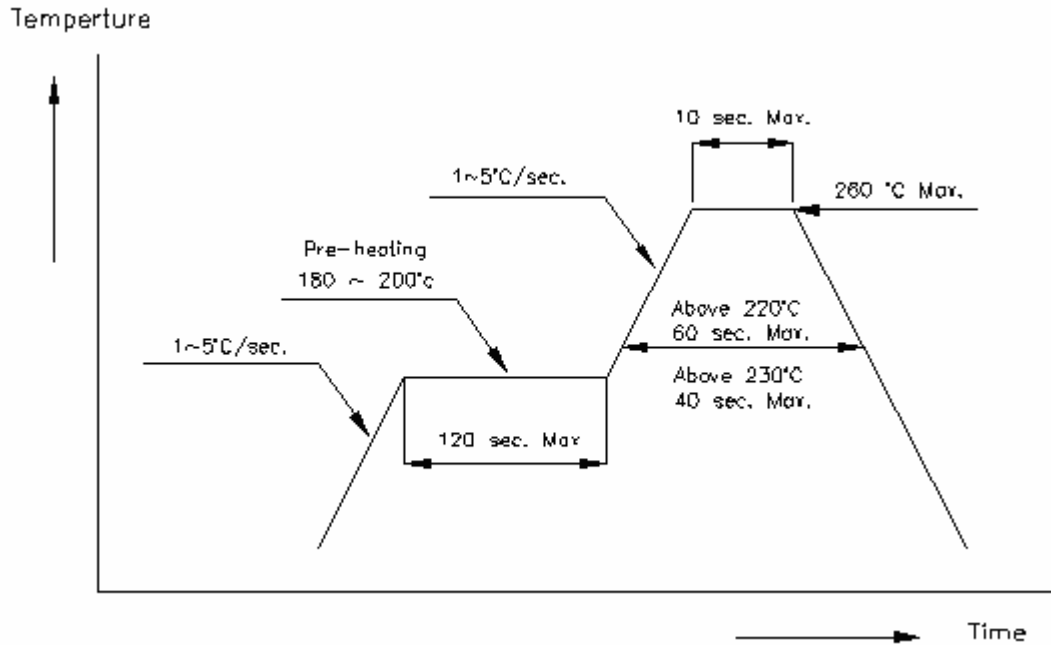
Dimension No.	A	B	Do	D1	E	F
Dimension (mm)	10.4±0.1	7.52±0.1	1.5±0.1	1.5+0.1/-0	1.75±0.1	7.5±0.1

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

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## Solder Reflow Temperature Profile





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