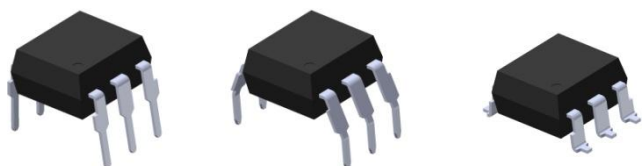


## 6 PIN DIP PHOTOTRANSISTOR PHOTOCOUPLER

### 4N2X Series

### 4N3X Series

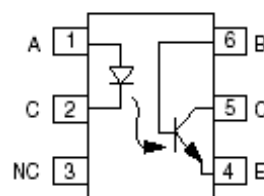
### H11AX Series



#### 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 >7.62 mm
- Operating temperature up to +110°C
- Compact dual-in-line package
- The product itself will remain within RoHS compliant version
- Compliance with EU REACH
- UL and cUL approved(No. E214129)
- VDE approved (No. 132249)
- SEMKO approved
- NEMKO approval
- DEMKO approval
- FIMKO approval
- CQC approved

#### Schematic



#### Pin Configuration

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

#### Description

The 4N2X, 4N3X, H11AX series of devices each consist of an infrared emitting diode optically coupled to a phototransistor. They are 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

## Absolute Maximum Ratings (Ta=25°C)

	Parameter	Symbol	Rating	Unit
Input	Forward current	$I_F$	60	mA
	Peak forward current (t = 10μs)	$I_{FM}$	1	A
	Reverse voltage	$V_R$	6	V
	Power dissipation ( $T_A = 25^\circ\text{C}$ )	$P_D$	100	mW
	Derating factor (above 100°C)		3.8	mW/°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°C)		9.0	mW/°C
	Total Power Dissipation	$P_{TOT}$	200	mW
	Isolation Voltage* <sup>1</sup>	$V_{ISO}$	5000	V rms
	Operating Temperature	$T_{OPR}$	-55 to 110	°C
	Storage Temperature	$T_{STG}$	-55 to 125	°C
	Soldering Temperature* <sup>2</sup>	$T_{SOL}$	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	$I_F = 10\text{mA}$
Reverse current	$I_R$	-	-	10	$\mu\text{A}$	$V_R = 6\text{V}$
Input capacitance	$C_{in}$	-	30	-	pF	$V = 0, f = 1\text{MHz}$

### Output

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Collector-Base dark current	$I_{CBO}$	-	-	20	nA	$V_{CB} = 10\text{V}$
Collector-Emitter dark current	4N2X	-	-	50	nA	$V_{CE} = 10\text{V}, I_F = 0\text{mA}$
	H11AX	-	-	50		$V_{CE} = 60\text{V}, I_F = 0\text{mA}$
	4N3X	-	-	50		$V_{CE} = 60\text{V}, I_F = 0\text{mA}$
Collector-Emitter breakdown voltage	$BV_{CEO}$	80	-	-	V	$I_C = 1\text{mA}$
Collector-Base breakdown voltage	$BV_{CBO}$	80	-	-	V	$I_C = 0.1\text{mA}$
Emitter-Collector breakdown voltage	$BV_{ECO}$	7	-	-	V	$I_E = 0.1\text{mA}$
Emitter-Base breakdown voltage	$BV_{EBO}$	7	-	-	V	$I_E = 0.1\text{mA}$
Collector-Emitter capacitance	$C_{CE}$	-	8	-	pF	$V_{CE} = 0\text{V}, f = 1\text{MHz}$

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

### Transfer Characteristics

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Current Transfer ratio	4N35, 4N36, 4N37	100	-	-	%	$I_F = \pm 10\text{mA}$ , $V_{CE} = 10\text{V}$
	H11A1	50	-	-		
	H11A5	30	-	-		
	4N25, 4N26, 4N38, H11A2, H11A3	20	-	-		
	4N27, 4N28, H11A4	10	-	-		
Collector-Emitter saturation voltage	4N25, 4N26, 4N27, 4N28	-	-	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		$I_F = 20\text{mA}$ , $I_C = 4\text{mA}$
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	-	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, H11A5	-	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  $T_a = 25^\circ\text{C}$

## Typical Electro-Optical Characteristics Curves

Figure 1. Forward Current vs Forward Voltage

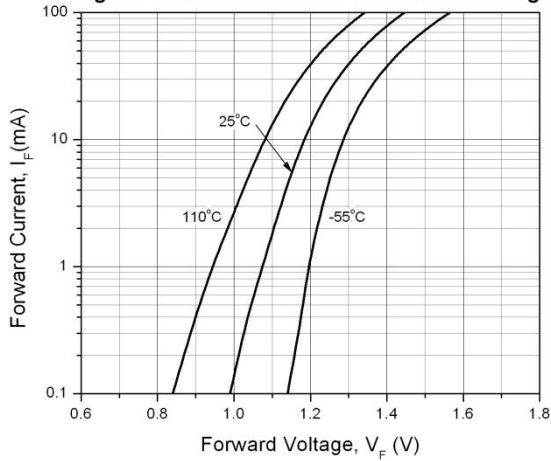


Figure 2. Current Transfer Ratio vs Forward Current

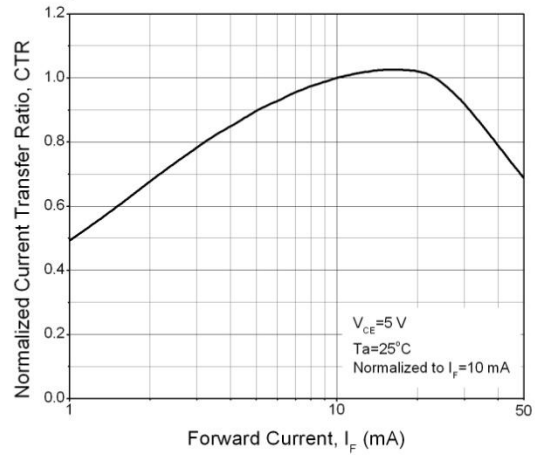


Figure 3. Current Transfer Ratio vs Ambient Temperature

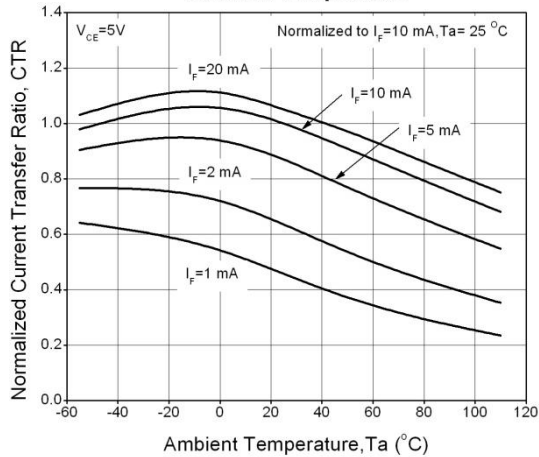


Figure 4. Current Transfer Ratio (Saturated) vs Base-Emitter Resistance

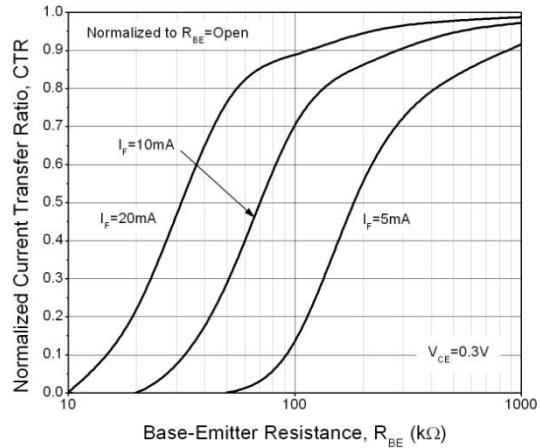


Figure 5. Current Transfer Ratio (Unsaturated) vs Base-Emitter Resistance

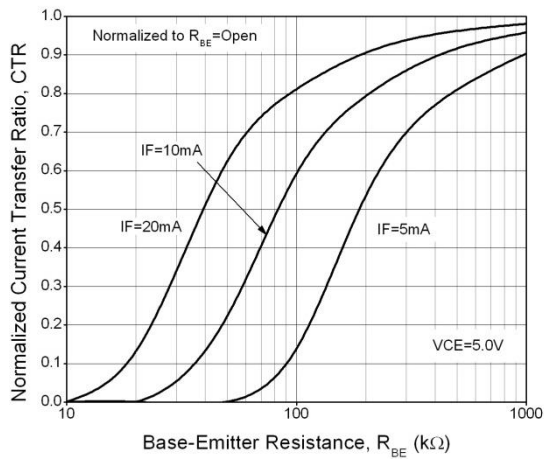
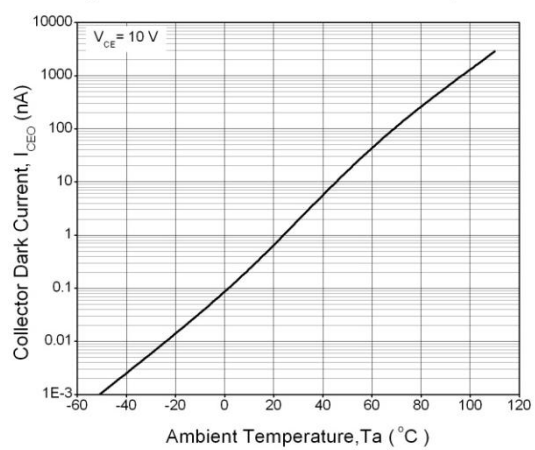
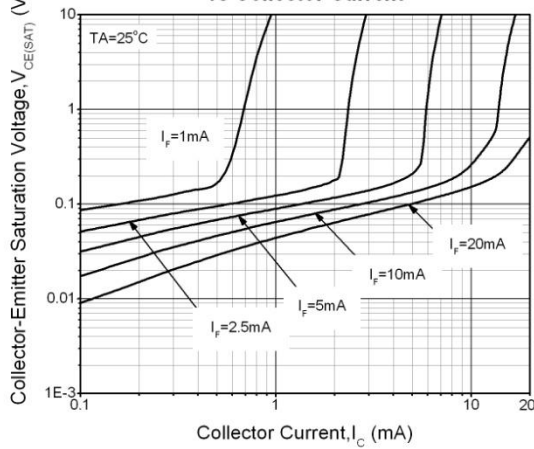


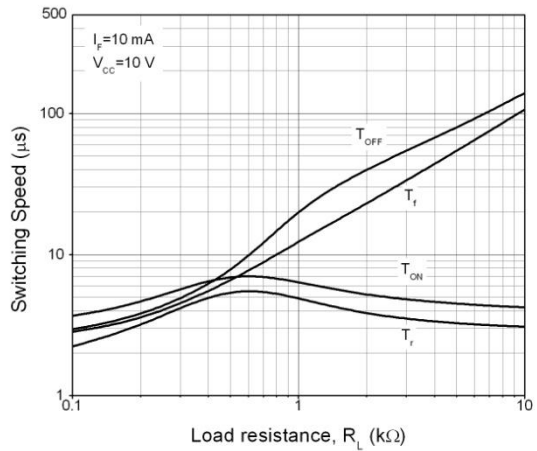
Figure 6. Dark Current vs Ambient Temperature



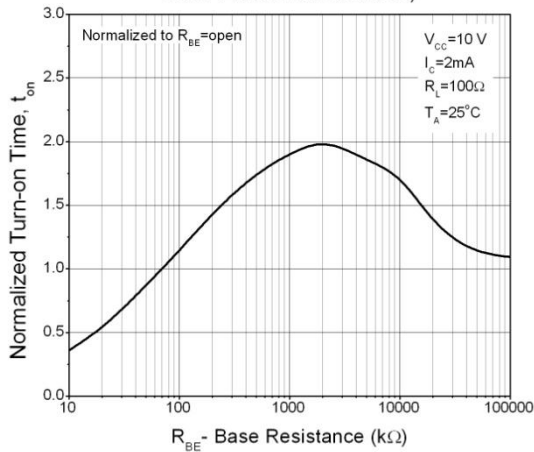
**Figure 7. Collector-Emitter Saturation Voltage vs Collector Current**



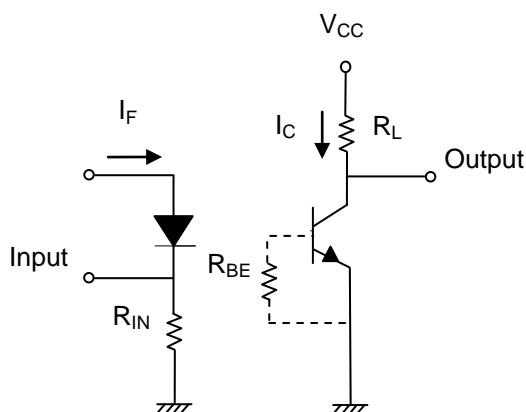
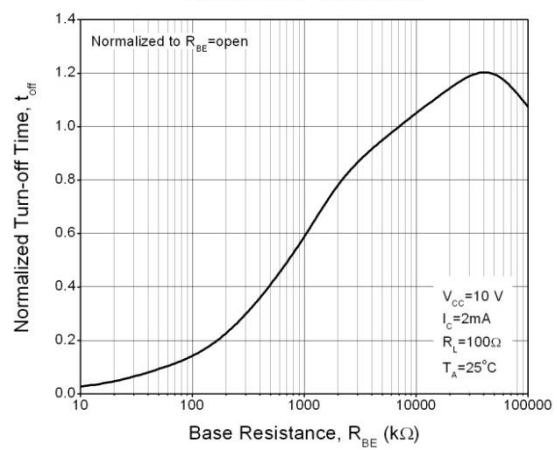
**Figure 8. Switching Time vs Load Resistance**



**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**

## Order Information

### Part Number

**4NXXY(Z)-V**

or

**H11AXY(Z)-V**

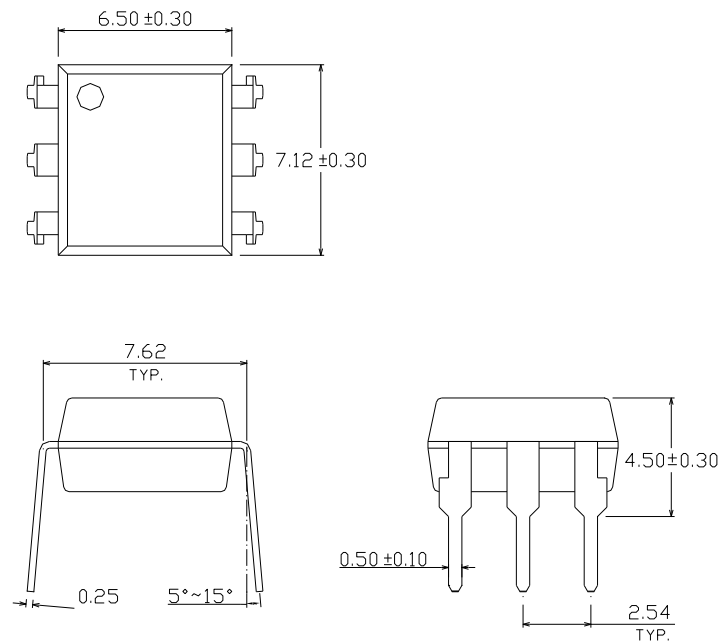
### Note

- 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 safety (optional)

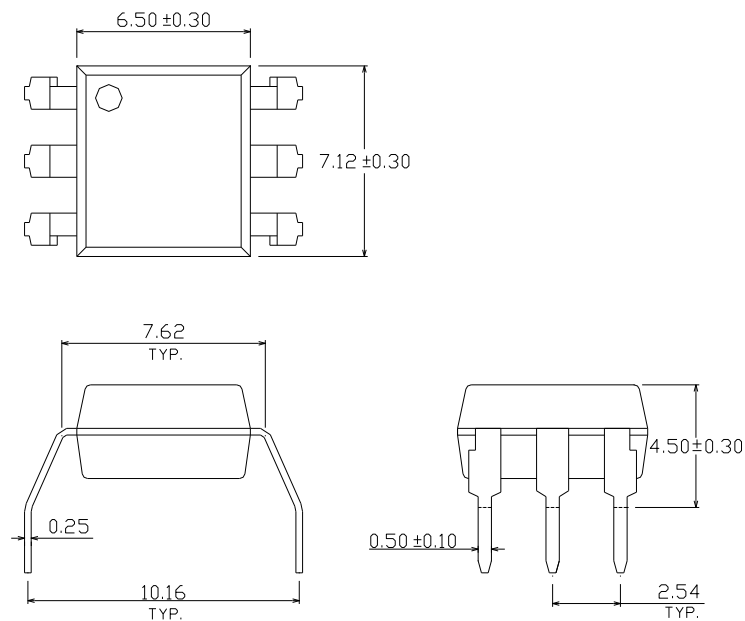
Option	Description	Packing quantity
None	Standard DIP-6	65 units per tube
M	Wide lead bend (0.4 inch spacing)	65 units per tube
S (TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
S (TB)	Surface mount lead form + TB tape & reel option	1000 units per reel
S1 (TA)	Surface mount lead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

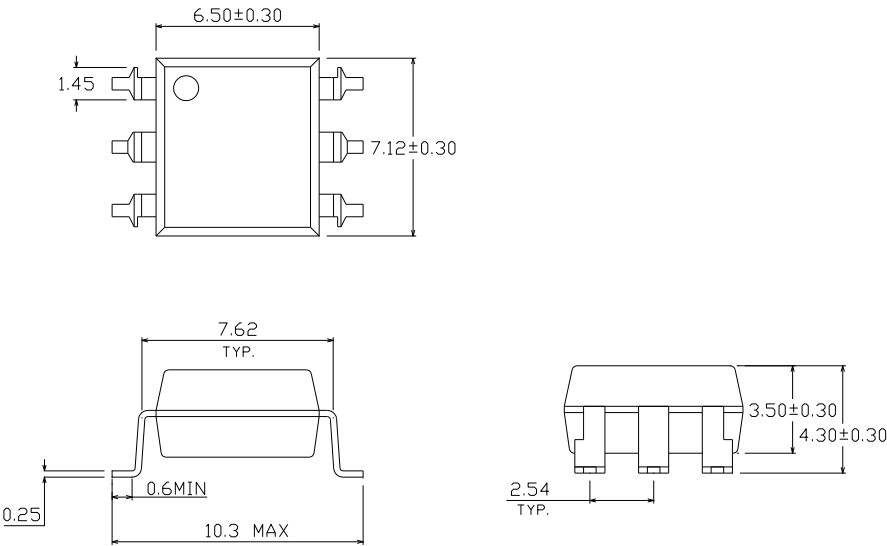
Standard DIP Type



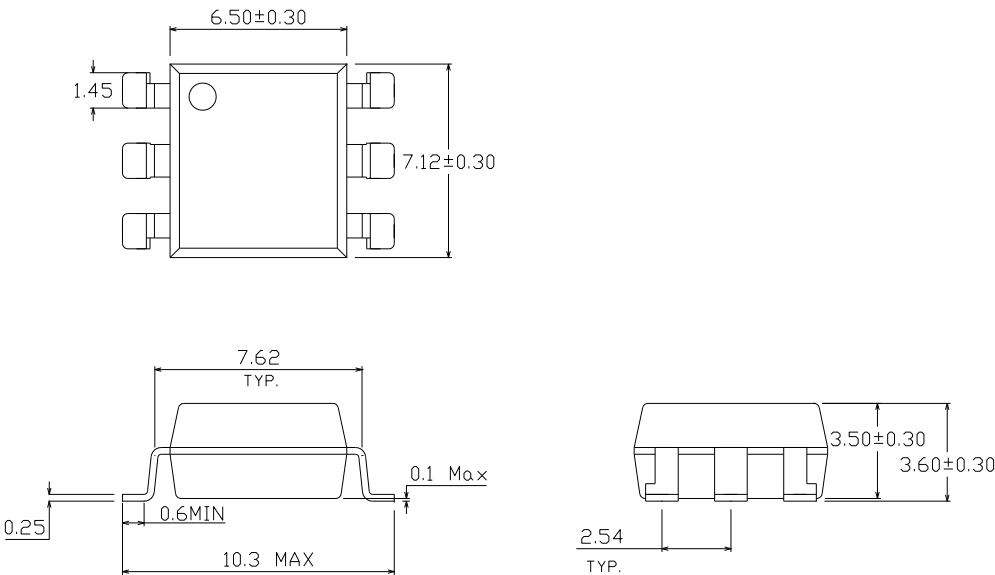
Option M Type



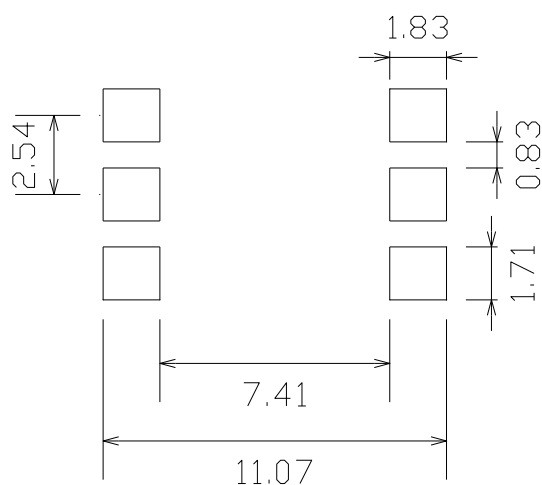
Option S Type



Option S1 Type



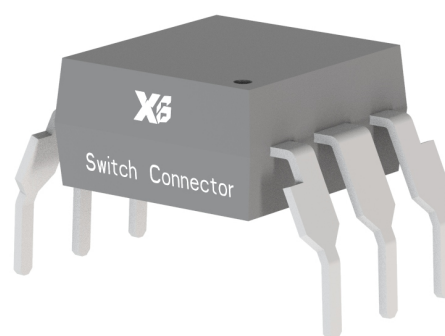
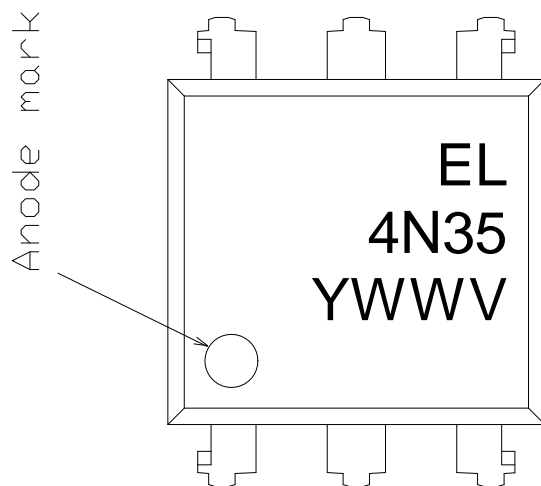
## Recommended pad layout for surface mount leadform



### Notes

Suggested pad dimension is just for reference only.  
 Please modify the pad dimension based on individual need.

## Device Marking

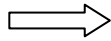
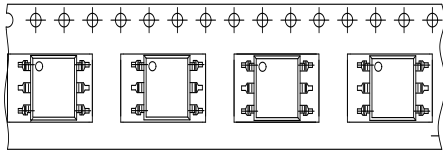


### Notes

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

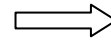
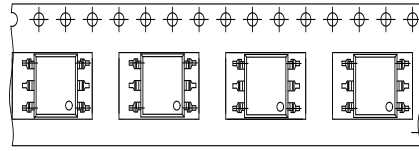
## Tape & Reel Packing Specifications

### Option TA



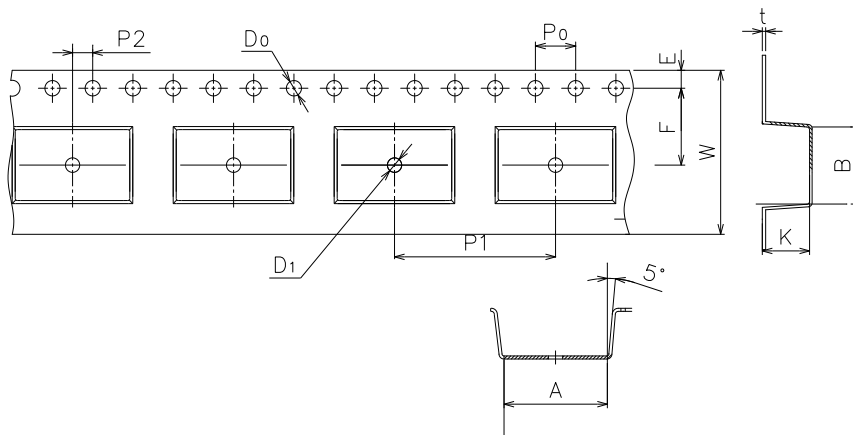
Direction of feed from reel

### Option TB



Direction of feed from reel

## Tape dimensions

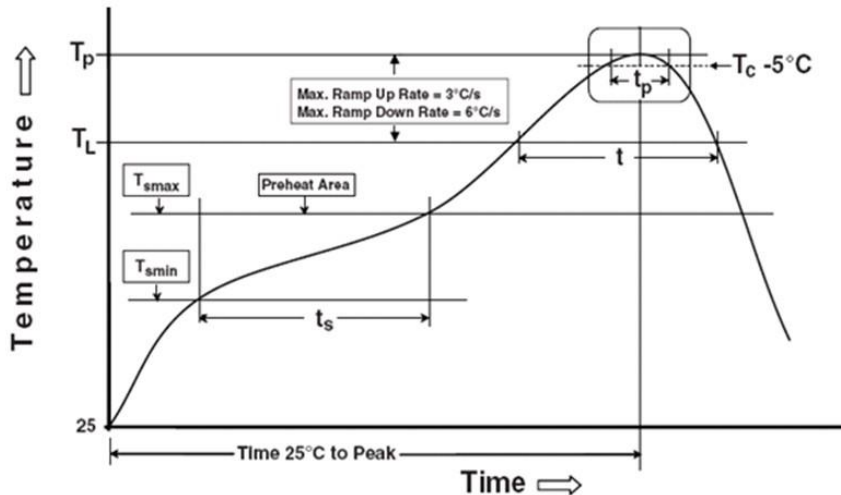


Dimension No.	A	B	Do	D1	E	F
Dimension (mm)	10.8±0.1	7.55±0.1	1.5±0.1	1.5+0.1/-0	1.75±0.1	7.5±0.1
Dimension No.	Po	P1	P2	t	W	K
Dimension (mm)	4.0±0.15	12±0.1	2.0±0.1	0.35±0.03	16.0±0.2	4.5±0.1

## 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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