

### 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

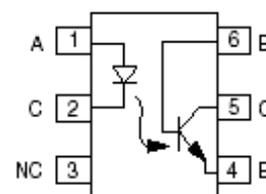
#### Description

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

#### Schematic



#### Pin Configuration

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

### 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		
	4N3X	-	-	50		
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		
	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	-	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		
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		

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

## Typical Electro-Optical Characteristics Curves

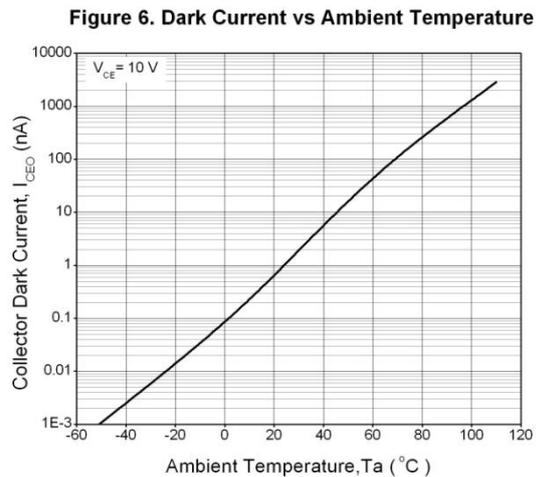
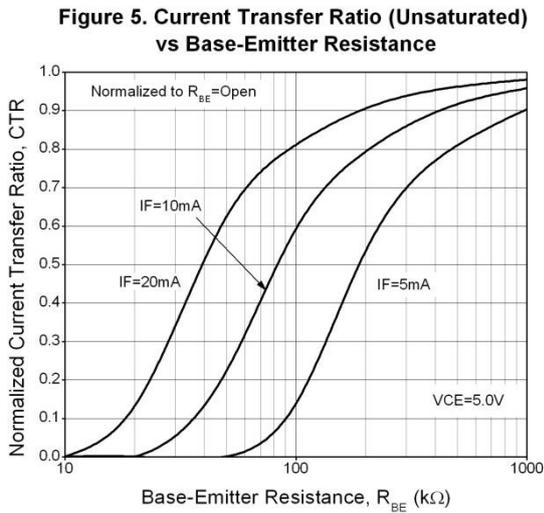
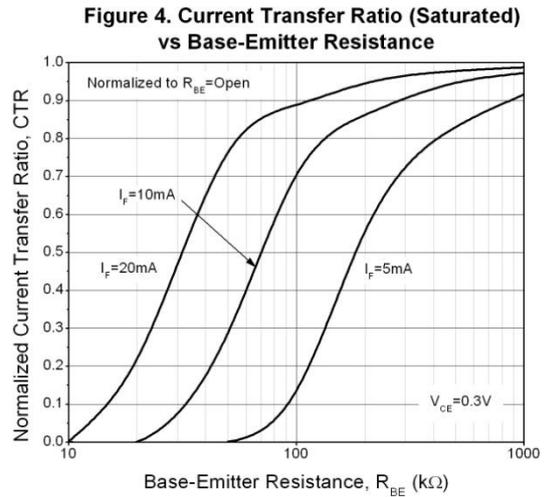
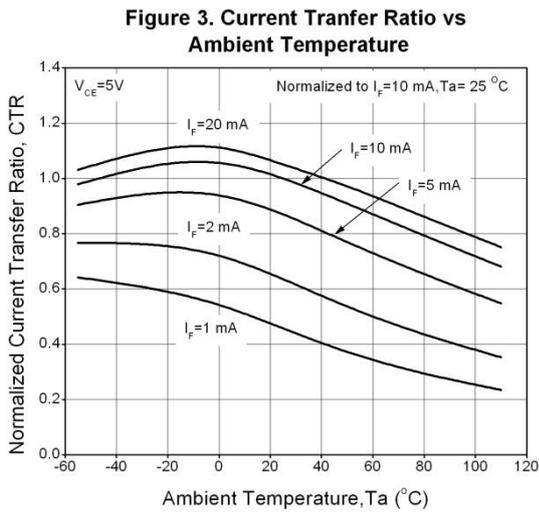
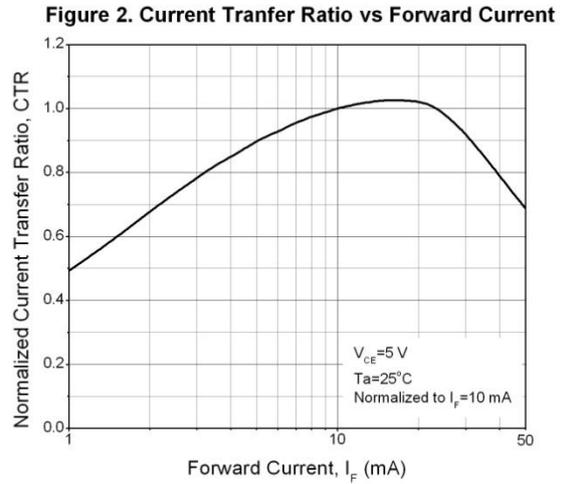
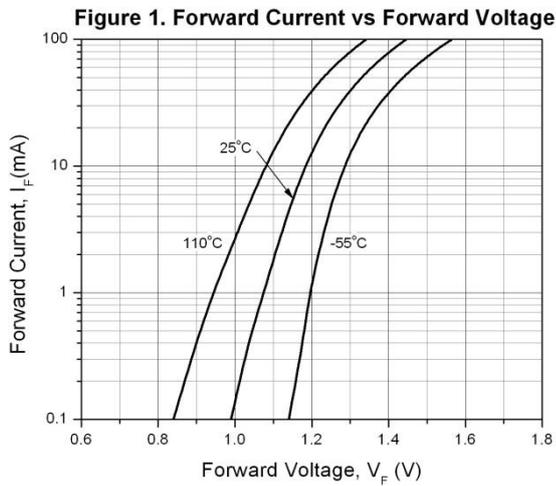


Figure 7. Collector-Emitter Saturation Voltage vs Collector Current

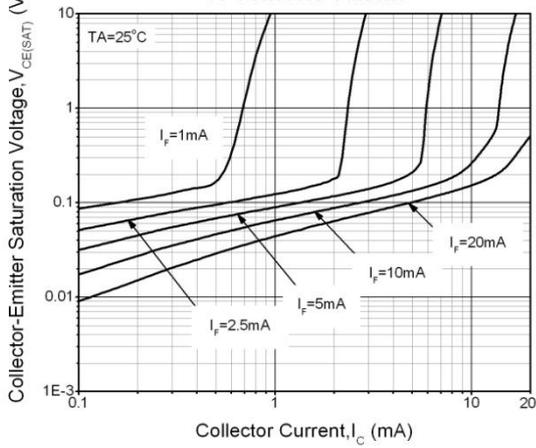


Figure 8. Switching Time vs Load Resistance

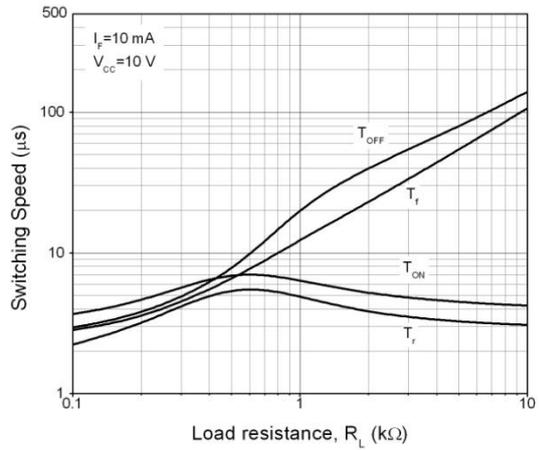


Figure 9. Turn-on Time vs Base-Emitter Resistance

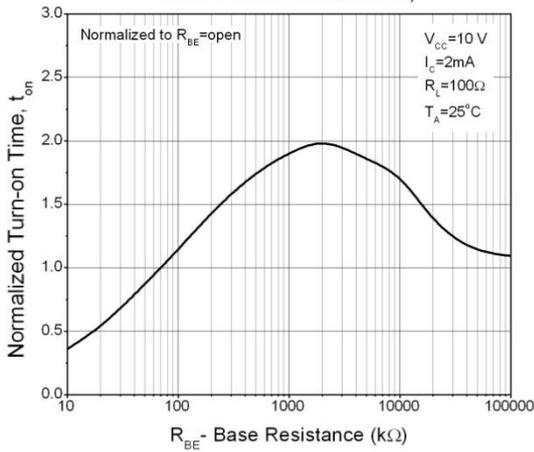


Figure 10. Turn-off Time vs Base-Emitter Resistance

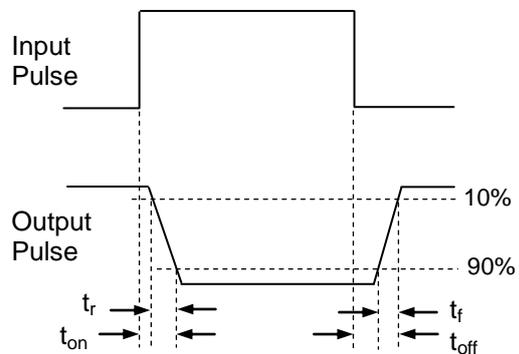
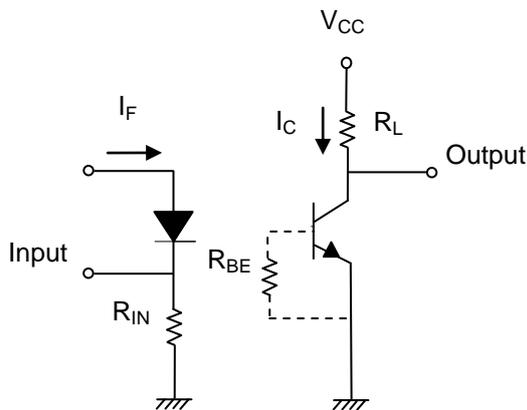
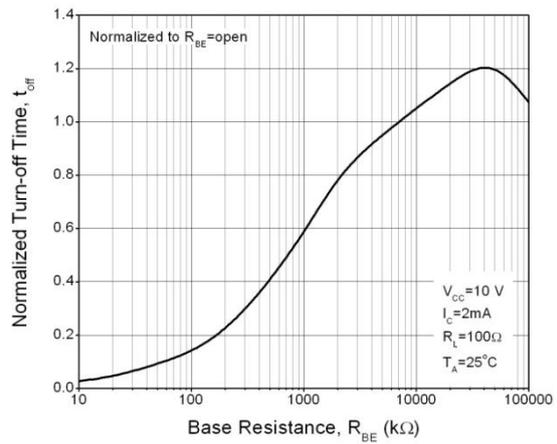


Figure 11. Switching Time Test Circuit & Waveforms

## Order Information

### Part Number

**4NXXY(Z)-V**

or

**H11AXY(Z)-V**

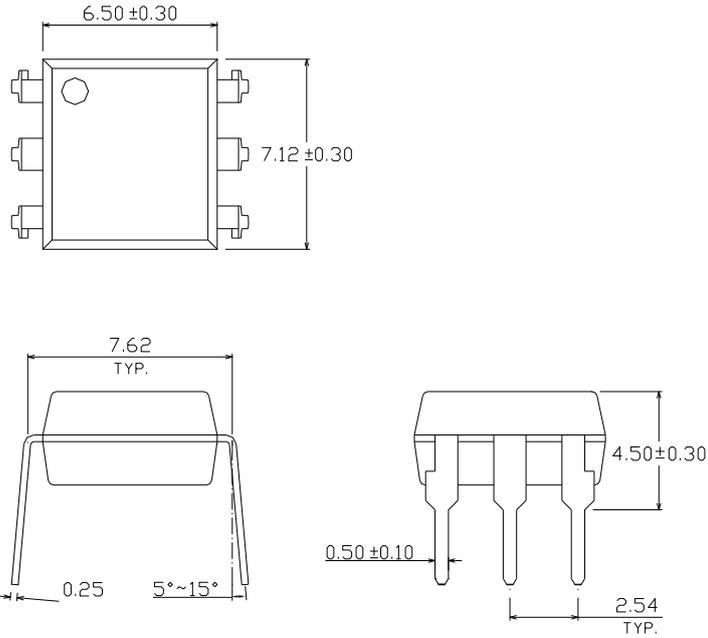
### Note

- 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)

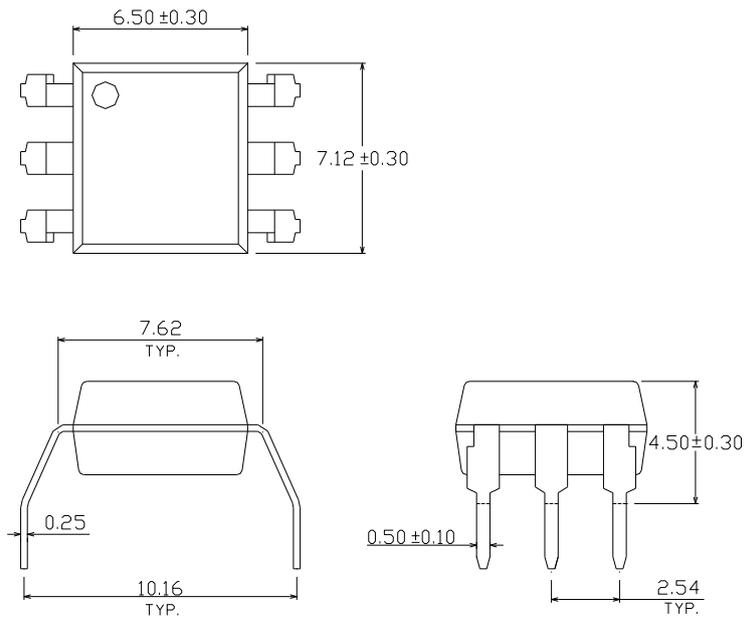
Option	Description	Packing quantity
None	Standard DIP-6	65 units per tube
M	Wide lead bend (0.4 inch spacing)	65 units per tube
S (TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
S (TB)	Surface mount lead form + TB tape & reel option	1000 units per reel
S1 (TA)	Surface mount lead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

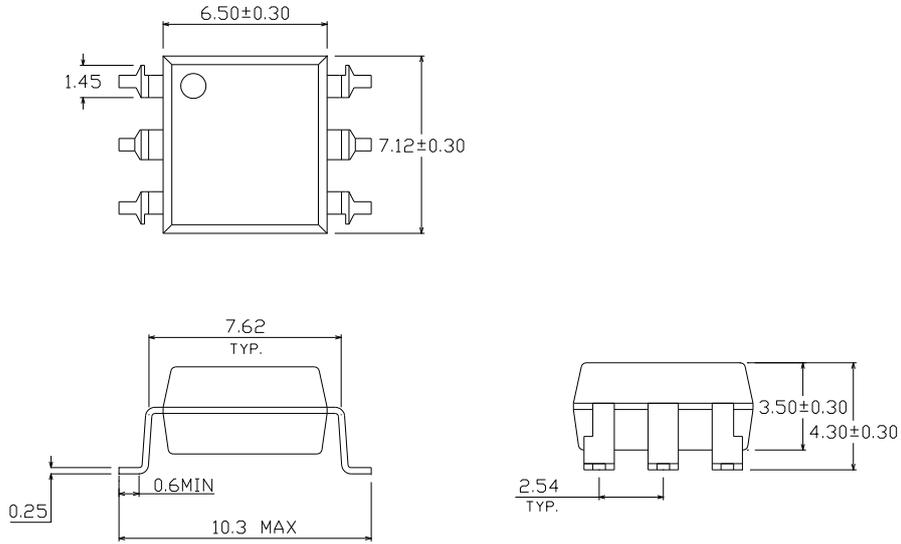
### Standard DIP Type



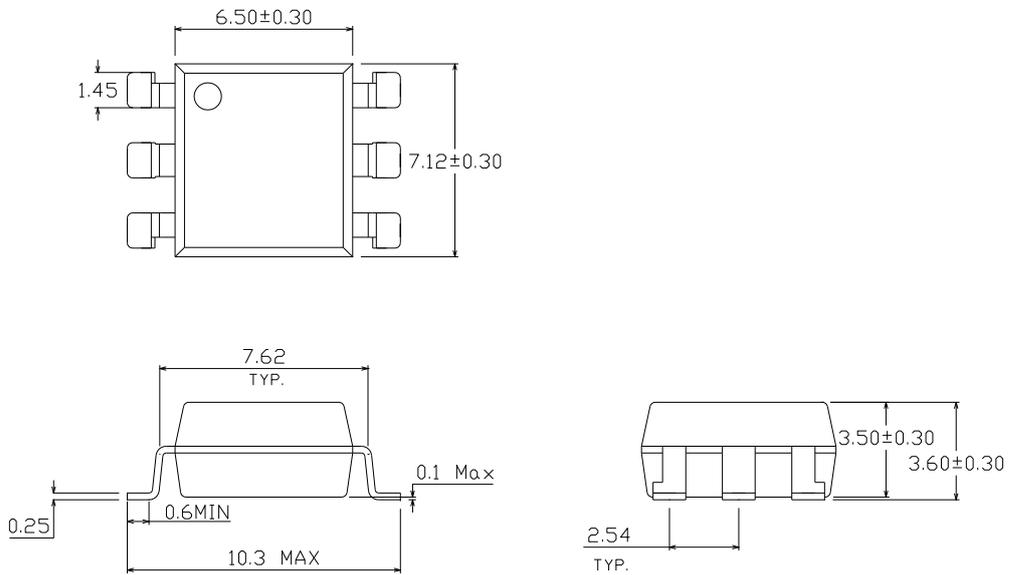
### Option M Type



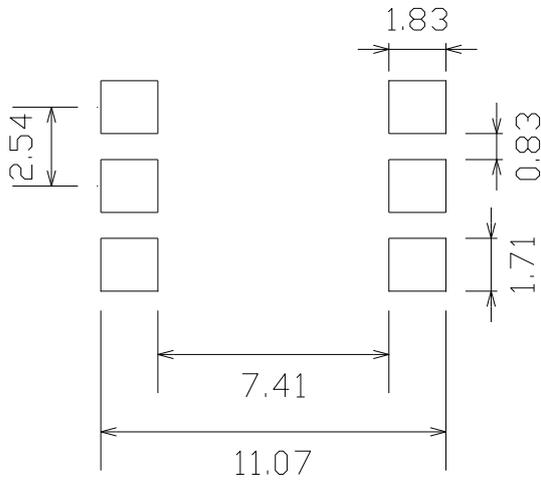
### Option S Type



### Option S1 Type



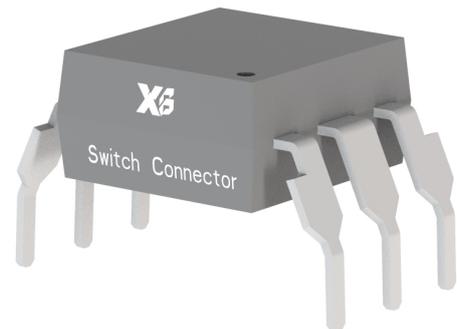
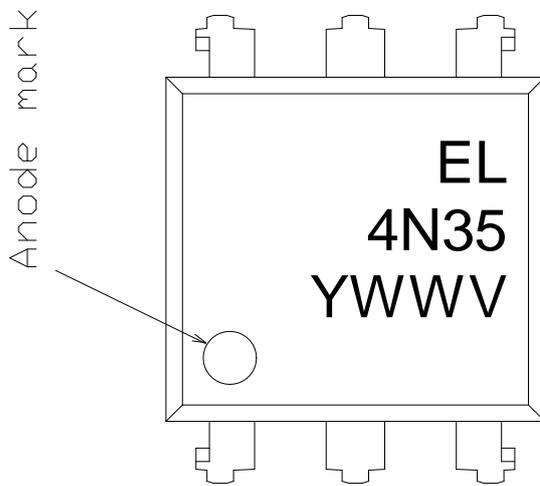
### Recommended pad layout for surface mount leadform



### Notes

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

### Device Marking

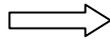
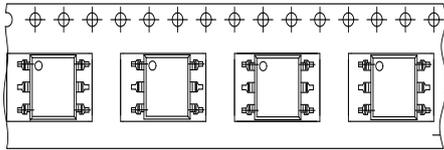


### Notes

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

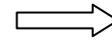
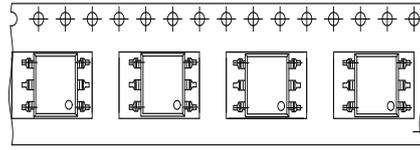
### Tape & Reel Packing Specifications

#### Option TA



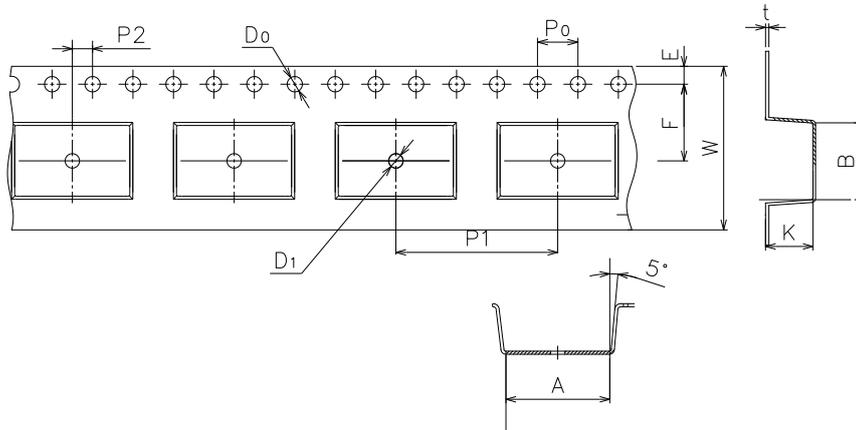
Direction of feed from reel

#### Option TB



Direction of feed from reel

### Tape dimensions

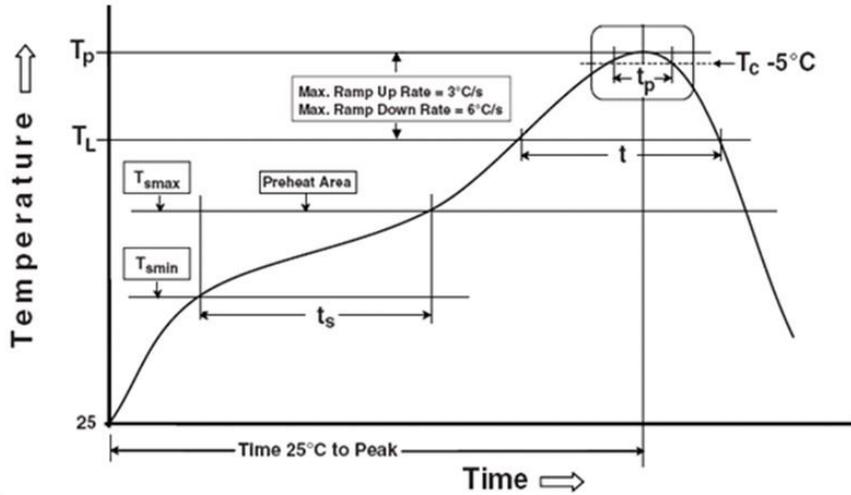


Dimension No.	<b>A</b>	<b>B</b>	<b>Do</b>	<b>D1</b>	<b>E</b>	<b>F</b>
Dimension (mm)	10.8±0.1	7.55±0.1	1.5±0.1	1.5+0.1/-0	1.75±0.1	7.5±0.1
Dimension No.	<b>Po</b>	<b>P1</b>	<b>P2</b>	<b>t</b>	<b>W</b>	<b>K</b>
Dimension (mm)	4.0±0.15	12±0.1	2.0±0.1	0.35±0.03	16.0±0.2	4.5±0.1

## 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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