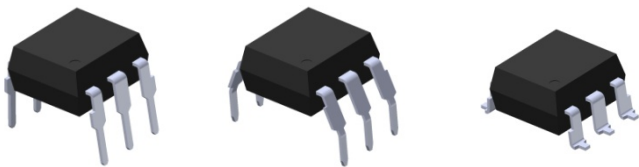


6 PIN DIP PHOTOTRANSISTOR PHOTOCOUPLER

4N2X Series

4N3X Series

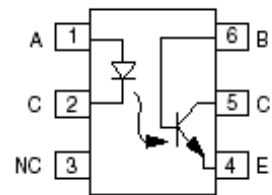
H11AX Series



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
- Pb free and RoHS compliant.
- UL approved (No. E214129)
- VDE approved (No. 132249)
- SEMKO approved
- NEMKO approval
- DEMKO approval
- FIMKO approval
- CSA approved
- 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* ¹	V_{ISO}	5000	V rms
	Operating Temperature	T_{OPR}	-55 to 110	°C
	Storage Temperature	T_{STG}	-55 to 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	$I_F = 10\text{mA}$
Reverse current	I_R	-	-	10	μA	$V_R = 6\text{V}$
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		$V_{CE} = 10\text{V}, I_F = 0\text{mA}$
	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}	-	-	Ω	$V_{IO} = 500\text{Vdc}$
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	μs	$V_{CC} = 10\text{V}$, $I_F = 10\text{mA}$, $R_L = 100\Omega$ 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	μs	$V_{CC} = 10\text{V}$, $I_F = 10\text{mA}$, $R_L = 100\Omega$ 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

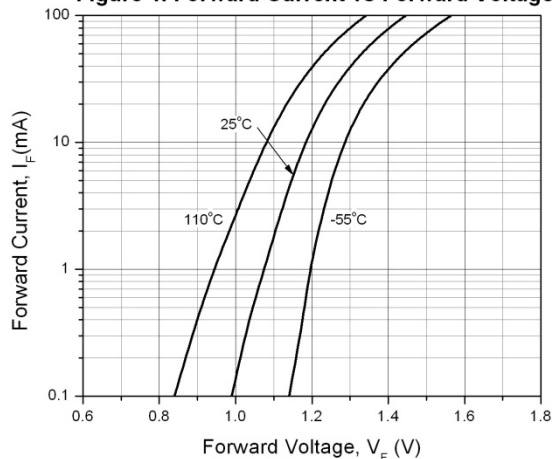


Figure 2. Current Transfer Ratio vs Forward Current

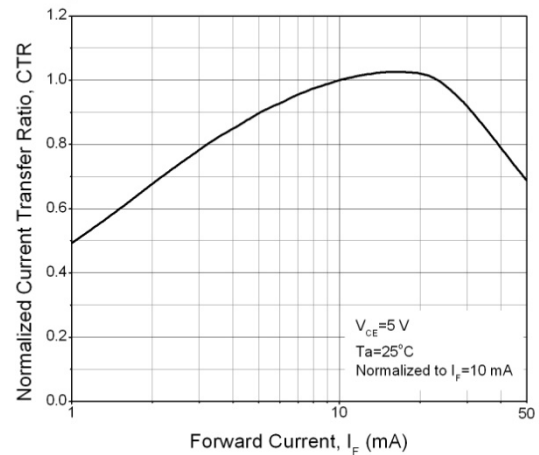


Figure 3. Current Transfer Ratio vs Ambient Temperature

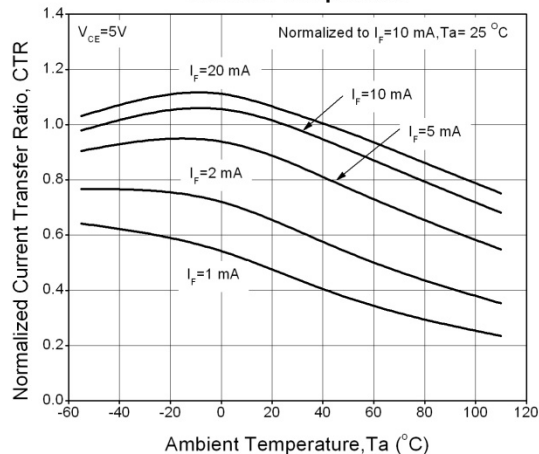


Figure 4. Current Transfer Ratio (Saturated) vs Base-Emitter Resistance

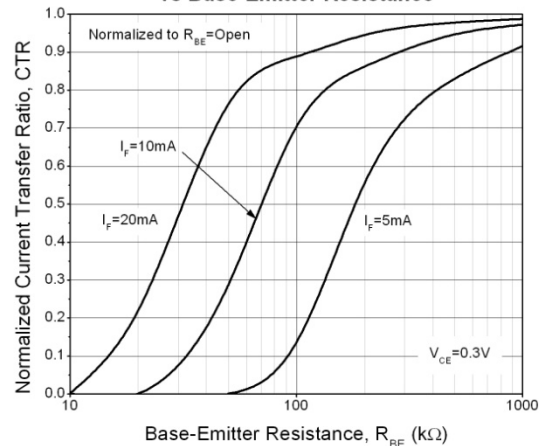


Figure 5. Current Transfer Ratio (Unsaturated) vs Base-Emitter Resistance

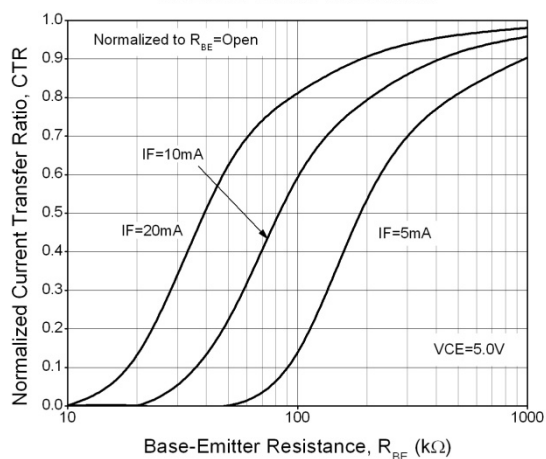


Figure 6. Dark Current vs Ambient Temperature

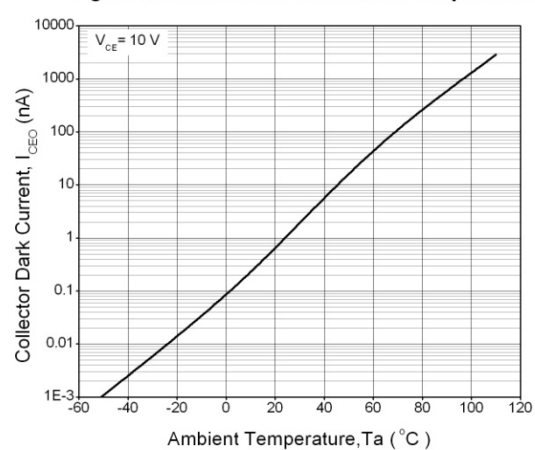


Figure 7. Collector-Emitter Saturation Voltage vs Collector Current

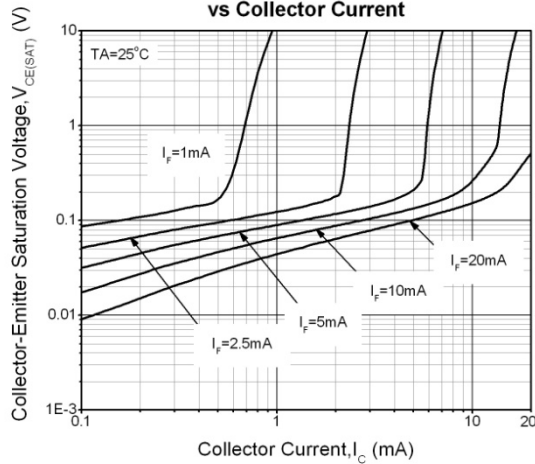


Figure 8. Switching Time vs Load Resistance

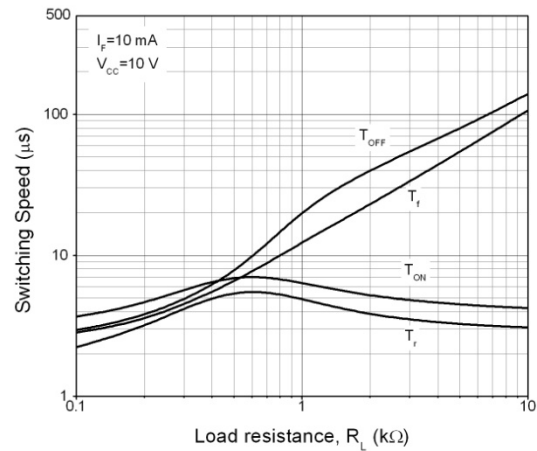


Figure 9. Turn-on Time vs Base-Emitter Resistance

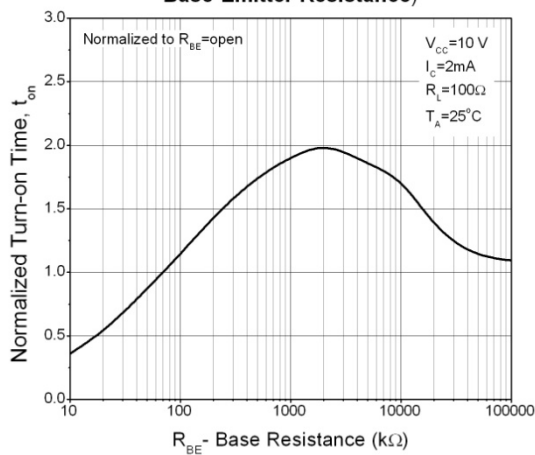


Figure 10. Turn-off Time vs Base-Emitter Resistance

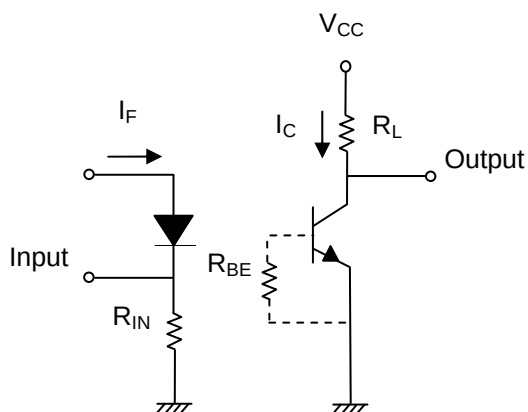
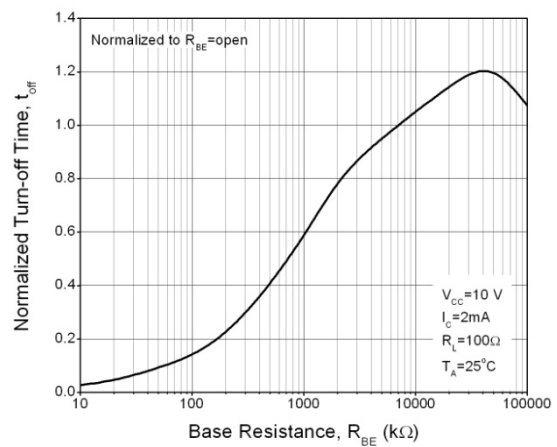


Figure 11. Switching Time Test Circuit & Waveforms

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)

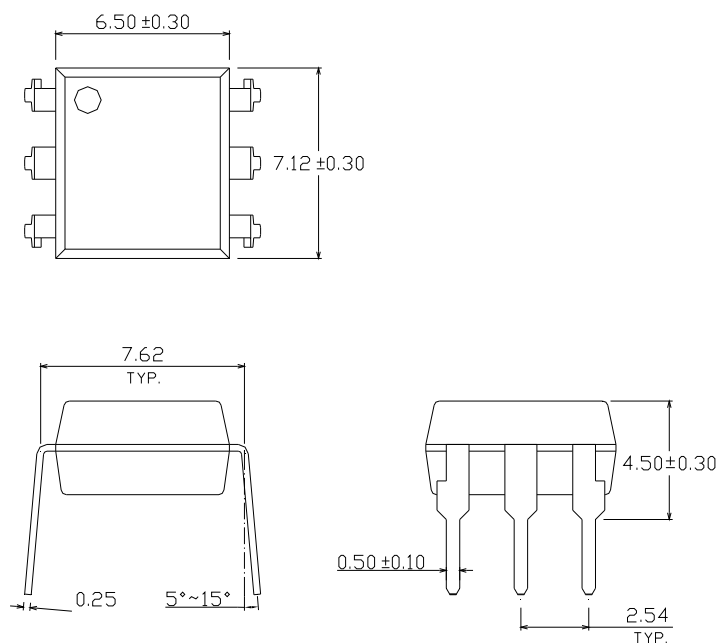
Z = Tape and reel option (TA, TB or none).

V = VDE safety (optional)

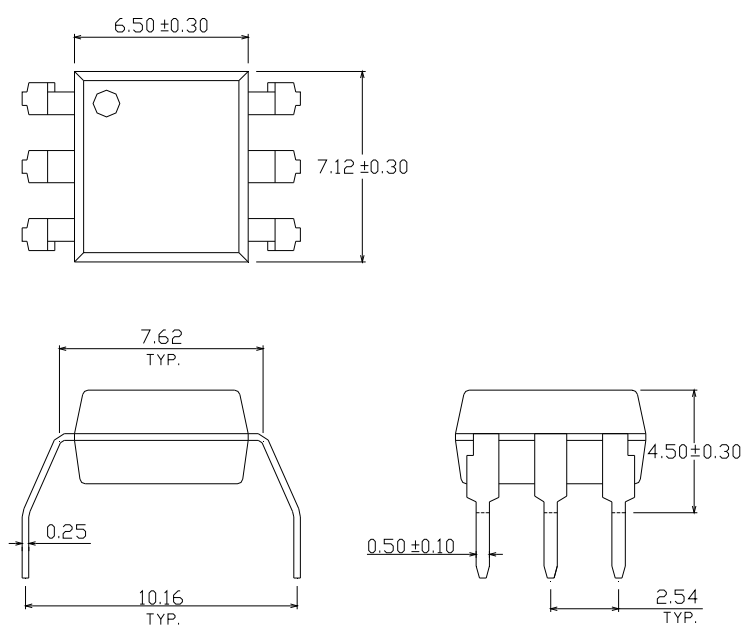
Option	Description	Packing quantity
None	Standard DIP-6	65 units per tube
M	Wide lead bend (0.4 inch spacing)	65 units per tube
S (TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
S (TB)	Surface mount lead form + TB tape & reel option	1000 units per reel
S1 (TA)	Surface mount lead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

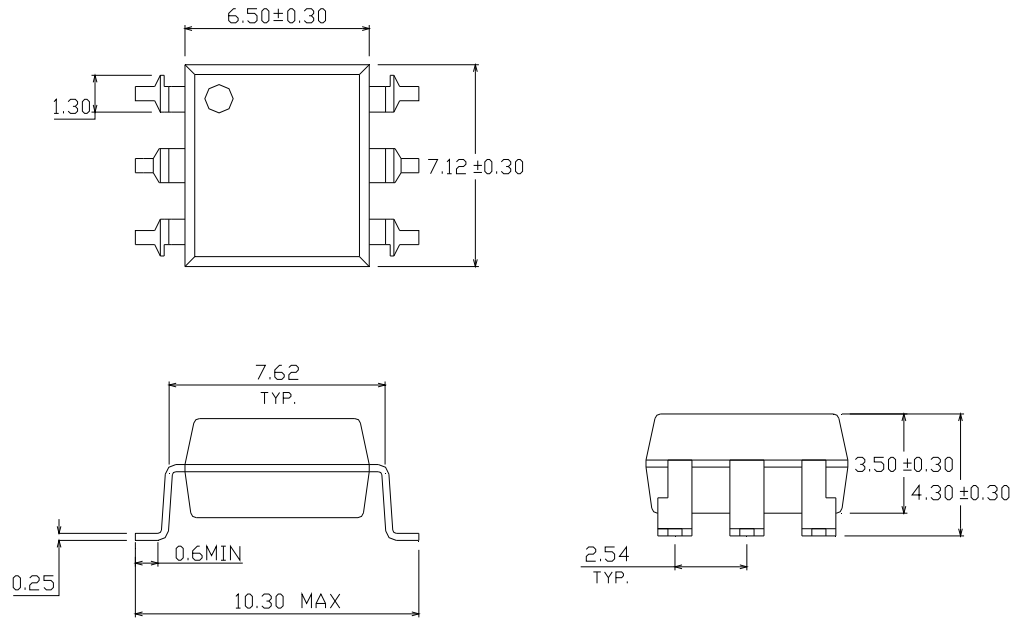
Standard DIP Type



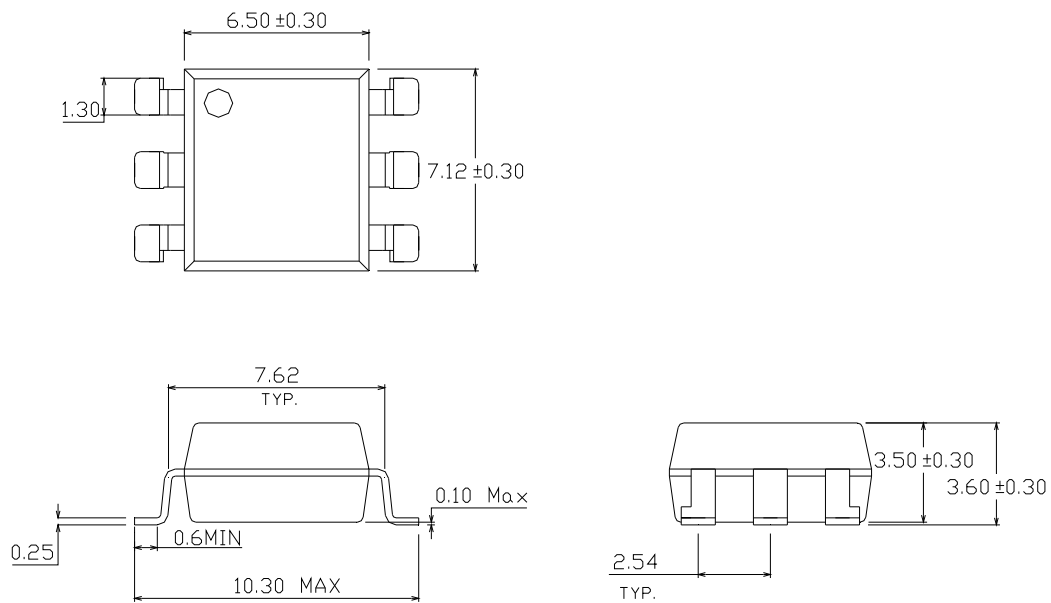
Option M Type



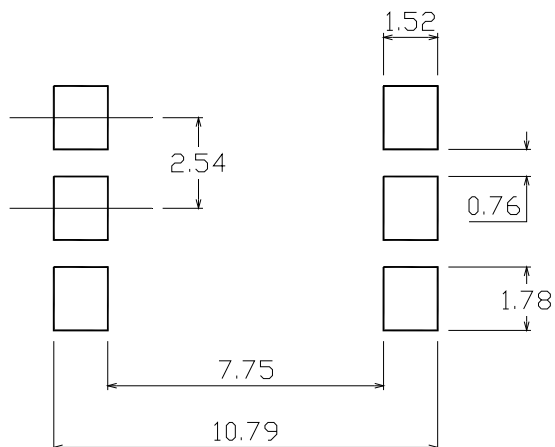
Option S Type



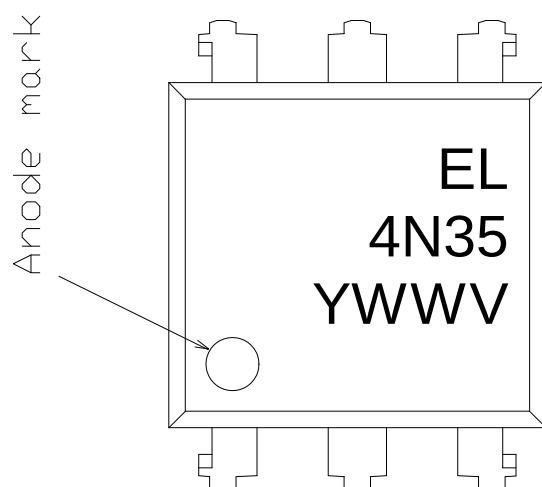
Option S1 Type



Recommended pad layout for surface mount leadform



Device Marking

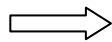
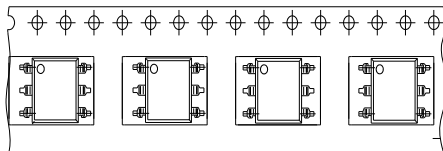


Notes

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

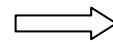
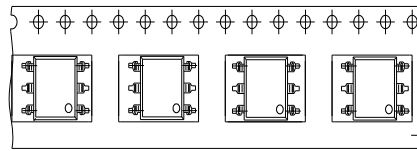
Tape & Reel Packing Specifications

Option TA



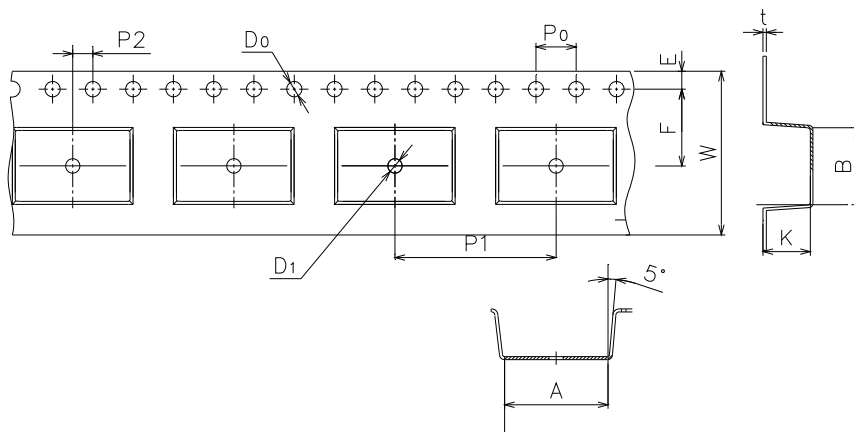
Direction of feed from reel

Option TB



Direction of feed from reel

Tape dimensions

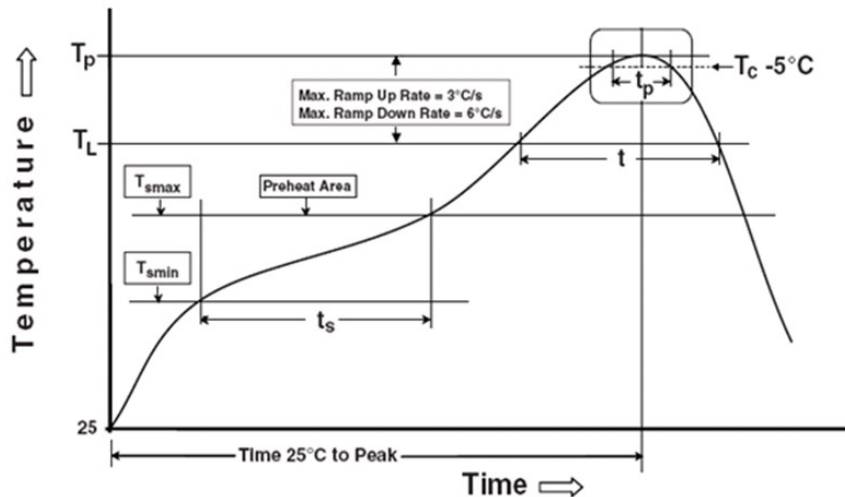


Dimension No.	A	B	Do	D1	E	F
Dimension (mm)	10.4±0.1	7.5±0.1	1.5±0.1	1.5+0.1/-0	1.75±0.1	7.5±0.1
Dimension No.	Po	P1	P2	t	W	K
Dimension (mm)	4.0±0.15	12±0.1	2.0±0.1	0.35±0.03	16.0±0.2	4.5±0.1

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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Everlight:

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[4N37S\(TA\)](#) [4N37S\(TA\)-V](#) [4N37S\(TB\)](#) [4N37S\(TB\)-V](#) [4N37S1\(TA\)](#) [4N37S1\(TA\)-V](#) [4N37S1\(TB\)](#) [4N37S1\(TB\)-V](#)
[4N37-V](#) [4N38](#) [4N38M](#) [4N38M-V](#) [4N38S\(TA\)](#) [4N38S\(TA\)-V](#) [4N38S\(TB\)](#) [4N38S\(TB\)-V](#) [4N38S1\(TA\)](#) [4N38S1\(TA\)-V](#)
[4N38S1\(TB\)](#) [4N38S1\(TB\)-V](#) [4N38-V](#) [H11A1M](#) [H11A1M-V](#) [H11A1S\(TA\)](#) [H11A1S\(TA\)-V](#) [H11A1S\(TB\)](#)
[H11A1S\(TB\)-V](#) [H11A1S1\(TA\)](#) [H11A1S1\(TA\)-V](#) [H11A1S1\(TB\)](#) [H11A1S1\(TB\)-V](#) [H11A1-V](#) [H11A2M-V](#) [H11A2S\(TA\)](#)
[H11A2S\(TA\)-V](#) [H11A2S\(TB\)](#) [H11A2S\(TB\)-V](#) [H11A2S1\(TA\)](#) [H11A2S1\(TA\)-V](#) [H11A2S1\(TB\)](#) [H11A2S1\(TB\)-V](#) [H11A2-](#)
[V](#) [H11A3M-V](#) [H11A3S\(TA\)](#) [H11A3S\(TA\)-V](#) [H11A3S\(TB\)](#) [H11A3S\(TB\)-V](#) [H11A3S1\(TA\)](#) [H11A3S1\(TA\)-V](#)
[H11A3S1\(TB\)](#) [H11A3S1\(TB\)-V](#) [H11A3-V](#) [H11A4M-V](#) [H11A4S\(TA\)](#) [H11A4S\(TA\)-V](#) [H11A4S\(TB\)](#) [H11A4S\(TB\)-V](#)
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[H11A5S\(TB\)-V](#) [H11A5S1\(TA\)](#) [H11A5S1\(TA\)-V](#) [H11A5S1\(TB\)](#) [H11A5S1\(TB\)-V](#) [H11A5-V](#) [4N25M](#) [4N25M-V](#)
[4N25S\(TA\)](#) [4N25S\(TA\)-V](#) [4N25S\(TB\)](#) [4N25S\(TB\)-V](#) [4N25S1\(TA\)](#) [4N25S1\(TA\)-V](#) [4N25S1\(TB\)](#) [4N25S1\(TB\)-V](#)
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[4N26S1\(TB\)](#)