

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

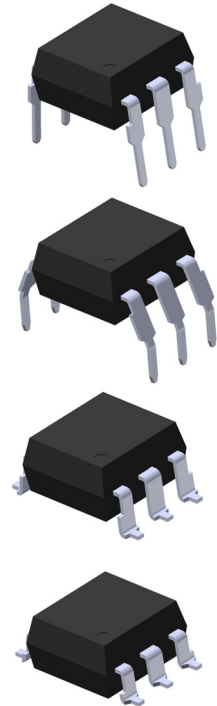
Description

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

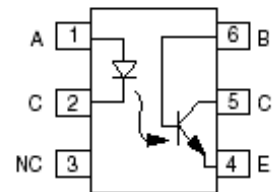
They are packaged in a 6-pin DIP package and available in wide-lead spacing and SMD option.

Applications

- Power supply regulators
- Digital logic inputs
- Microprocessor inputs



Schematic



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

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

Parameter		Symbol	Rating	Unit
Input	Forward current	I_F	60	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	100	mW
	Derating factor (above 100°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°C)		9.0	mW/ $^{\circ}\text{C}$
Total power dissipation		P_{tot}	200	mW
Isolation voltage ^{*1}		V_{iso}	5000	V _{rms}
Operating temperature		T_{opr}	-55~+110	$^{\circ}\text{C}$
Storage temperature		T_{stg}	-55~+125	$^{\circ}\text{C}$
Soldering temperature ^{*2}		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 ($T_a=25^{\circ}\text{C}$ 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	I_{CEO}	-	-	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 $T_a = 25^{\circ}\text{C}$

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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		$I_F = 20\text{mA}$, $I_C = 4\text{mA}$
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	T_{on}	-	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	T_{off}	-	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 $T_a = 25^{\circ}\text{C}$

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Typical Performance Curves

Figure 1. Forward Current vs Forward Voltage

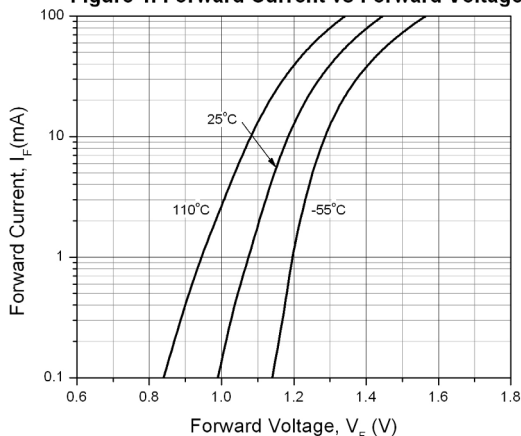


Figure 2. Current Transfer Ratio vs Forward Current

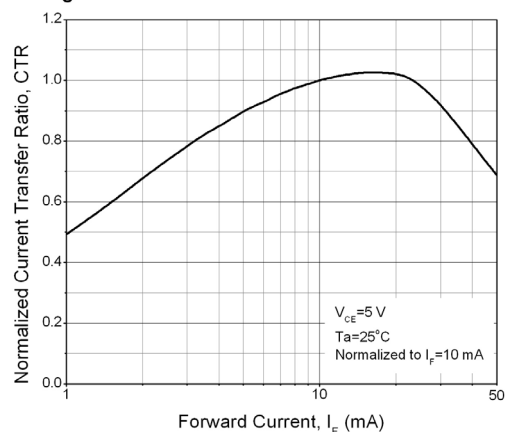


Figure 3. Current Transfer Ratio vs Ambient Temperature

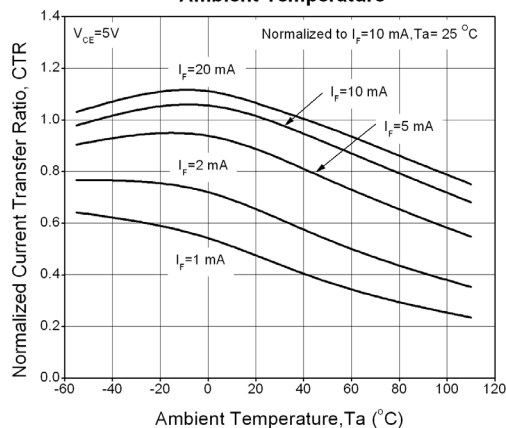


Figure 4. Current Transfer Ratio (Saturated) vs Base-Emitter Resistance

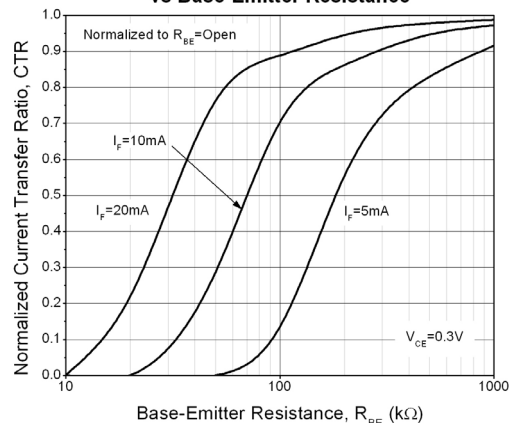


Figure 5. Current Transfer Ratio (Unsaturated) vs Base-Emitter Resistance

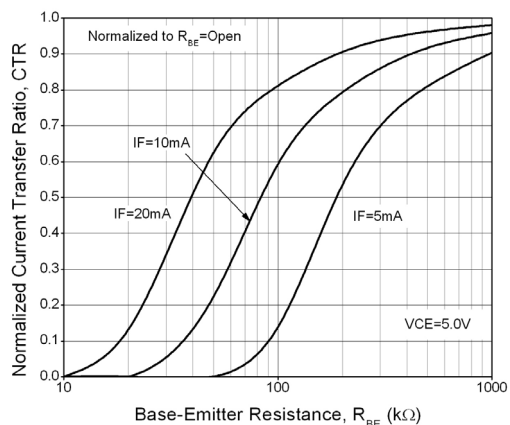
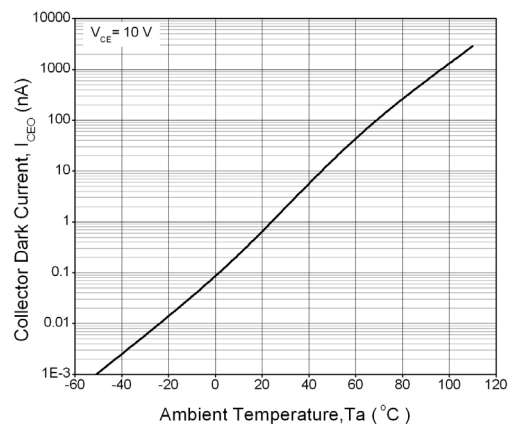


Figure 6. Dark Current vs Ambient Temperature



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Figure 7. Collector-Emitter Saturation Voltage vs Collector Current

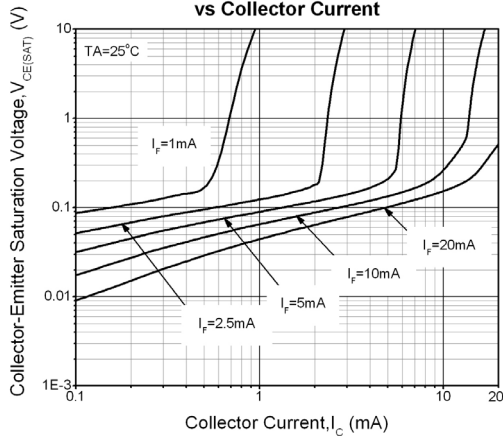


Figure 8. Switching Time vs Load Resistance

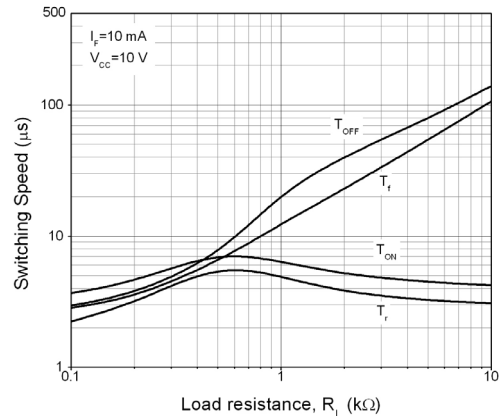


Figure 9. Turn-on Time vs Base-Emitter Resistance

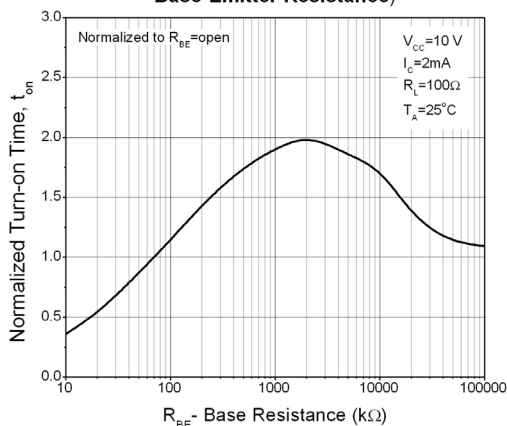


Figure 10. Turn-off Time vs Base-Emitter Resistance

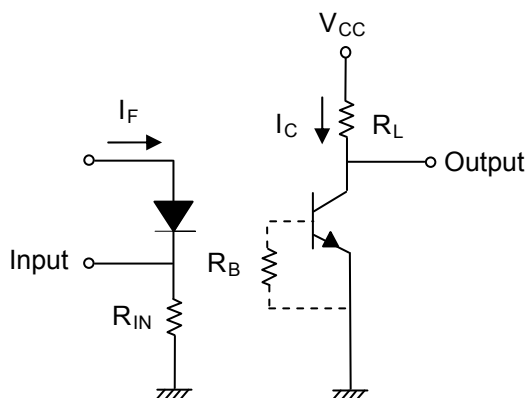
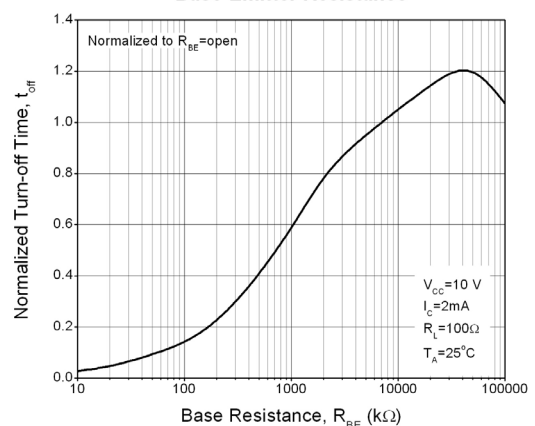


Figure 11. Switching Time Test Circuit & Waveforms



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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)

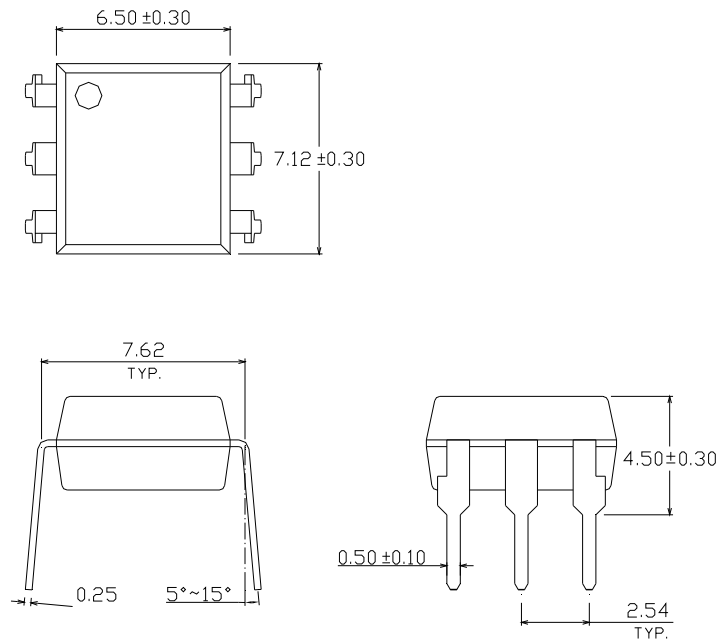
Option	Description	Packing quantity
None	Standard DIP-6	65 units per tube
M	Wide lead bend (0.4 inch spacing)	65 units per tube
S (TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
S (TB)	Surface mount lead form + TB tape & reel option	1000 units per reel
S1 (TA)	Surface mount lead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

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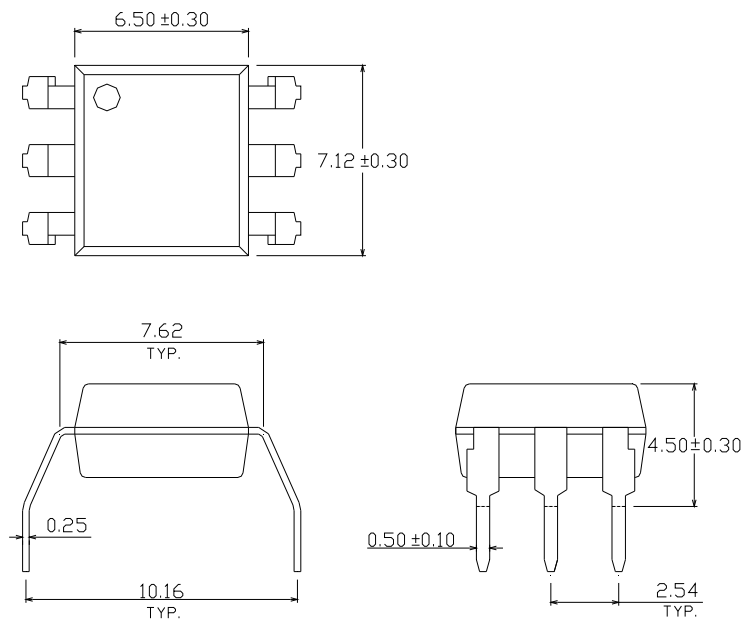
4N2X Series
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Package Drawings (Dimensions in mm)

Standard DIP Type



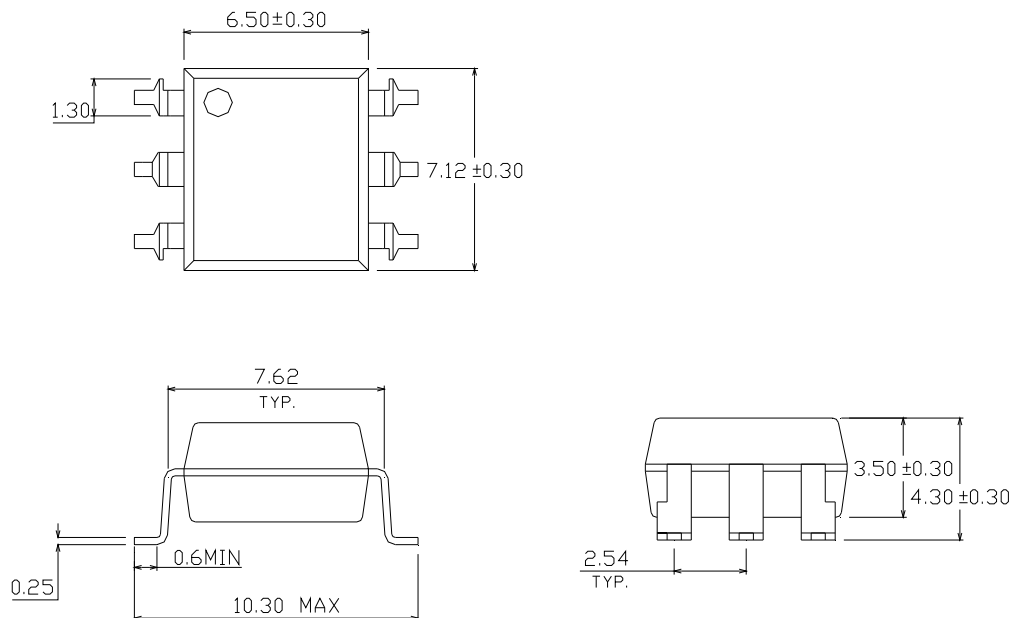
Option M Type



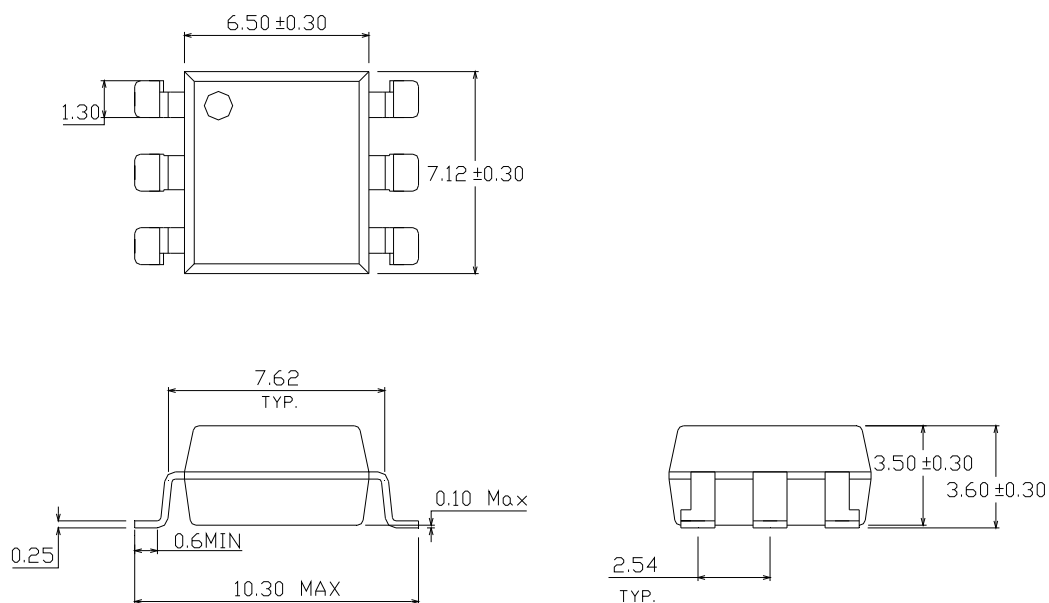
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Option S Type



Option S1 Type



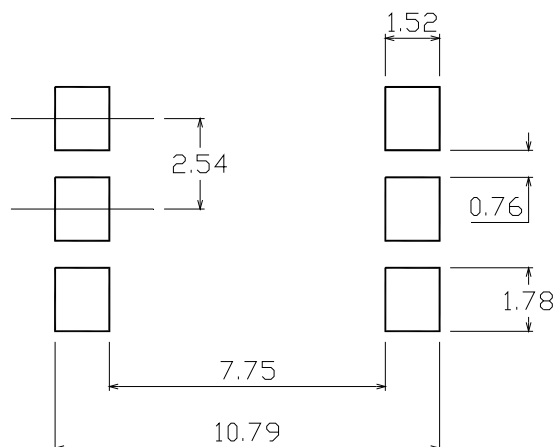


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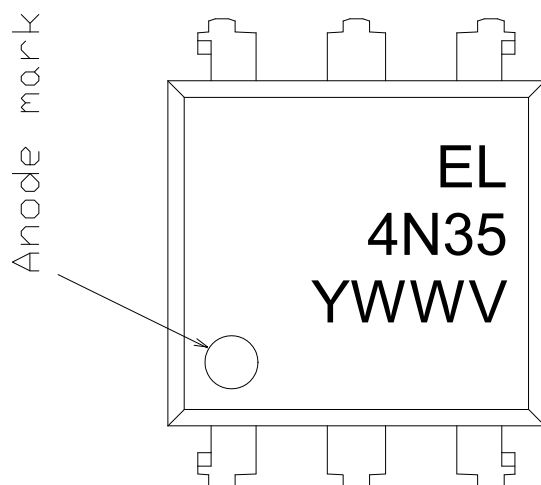
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Recommended pad layout for surface mount leadform



Device Marking



Notes

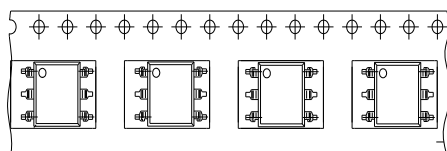
EL	denotes Everlight
4N35	denotes Device Number
Y	denotes 1 digit Year code
WW	denotes 2 digit Week code
V	denotes VDE (optional)

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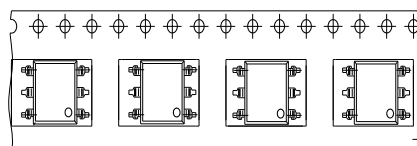
Tape & Reel Packing Specifications

Option TA



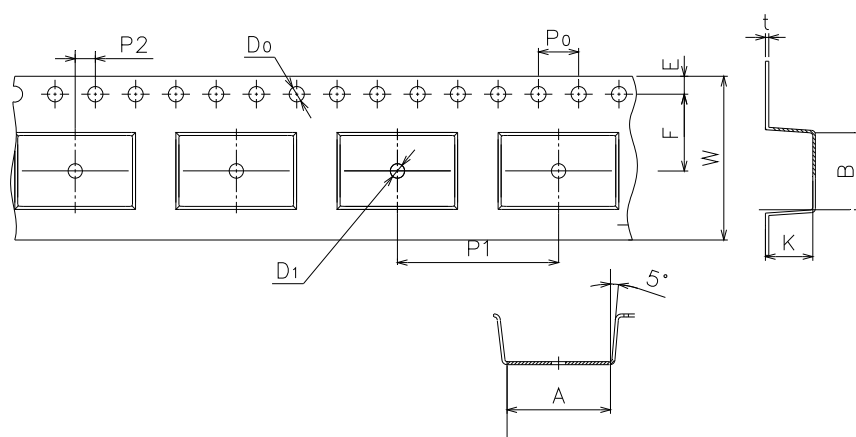
Direction of feed from reel

Option TB



Direction of feed from reel

Tape dimensions



Dimension No.	A	B	Do	D1	E	F
Dimension (mm)	10.4±0.1	7.52±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

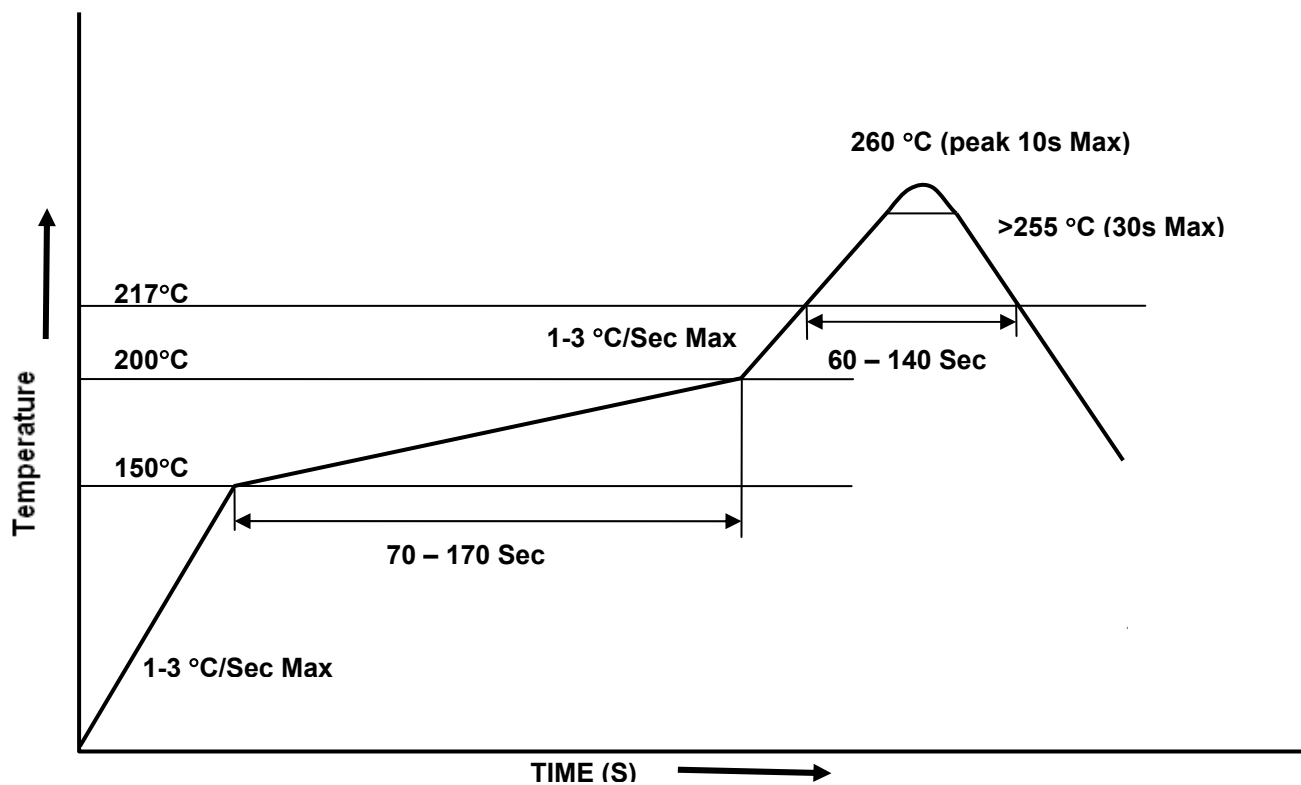


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Solder Reflow Temperature Profile



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