

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

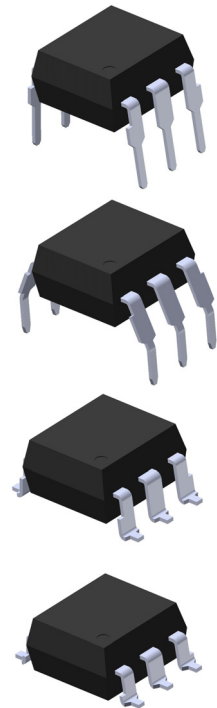
Description

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

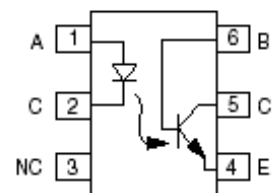
They are packaged in a 6-pin DIP package and available in wide-lead spacing and SMD option.

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)

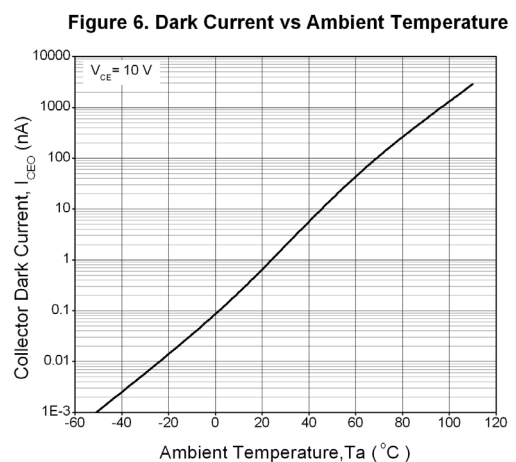
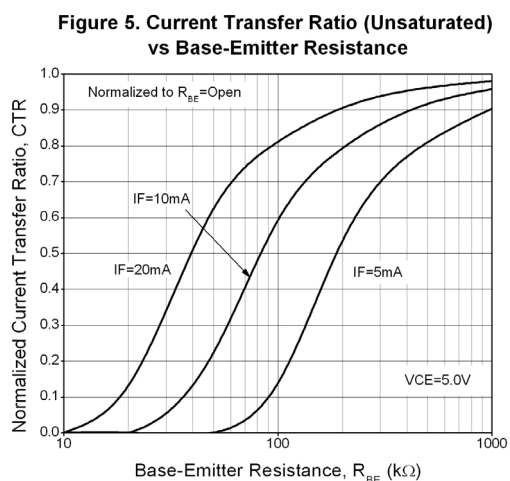
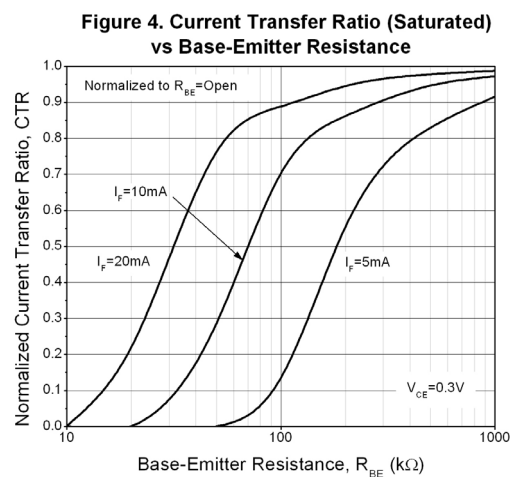
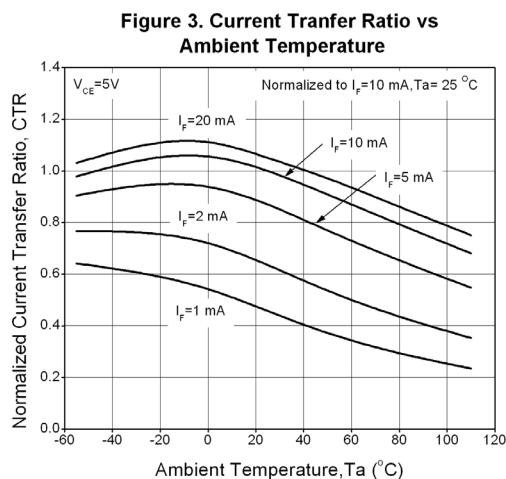
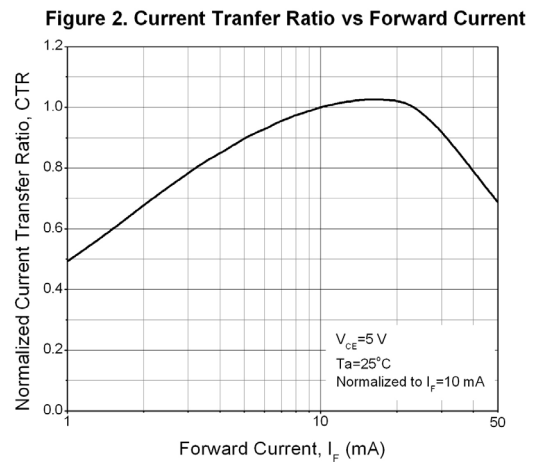
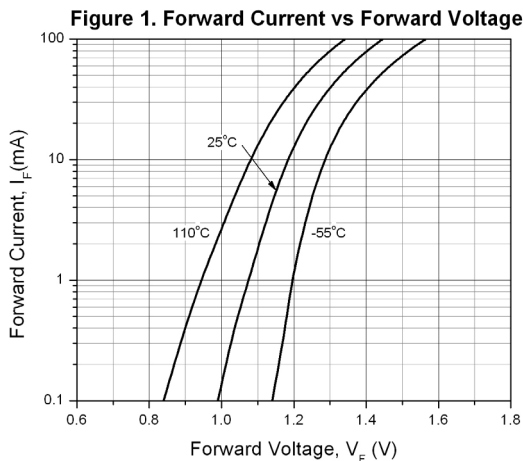
Parameter		Symbol	Min.	Typ.*	Max.	Unit	Condition
Current transfer ratio	4N35, 4N36, 4N37	CTR	100	-	-	%	$I_F = 10\text{mA}$, $V_{CE} = 10\text{V}$
	H11A1		50	-	-		
	H11A5		30	-	-		
	4N25, 4N26, 4N38, H11A2, H11A3		20	-	-		
	4N27, 4N28, H11A4		10	-	-		
Collector-Emitter saturation voltage	4N25, 4N26, 4N27,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



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Figure 7. Collector-Emitter Saturation Voltage vs Collector Current

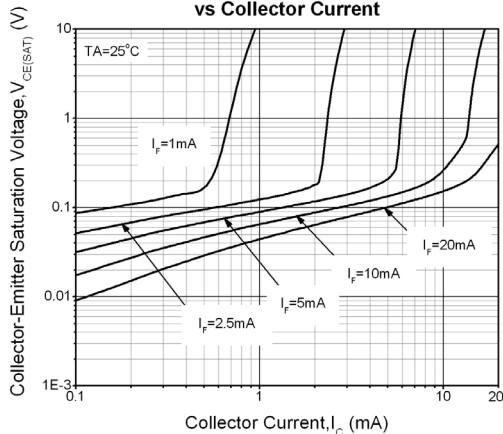


Figure 8. Switching Time vs Load Resistance

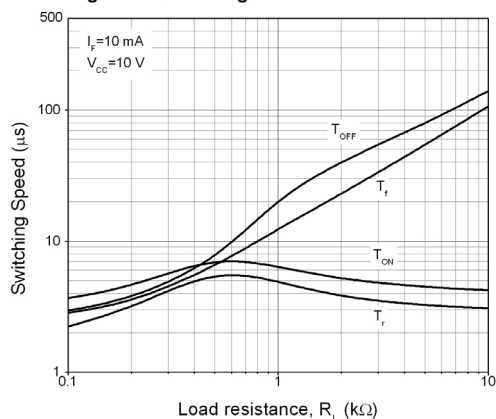


Figure 9. Turn-on Time vs Base-Emitter Resistance

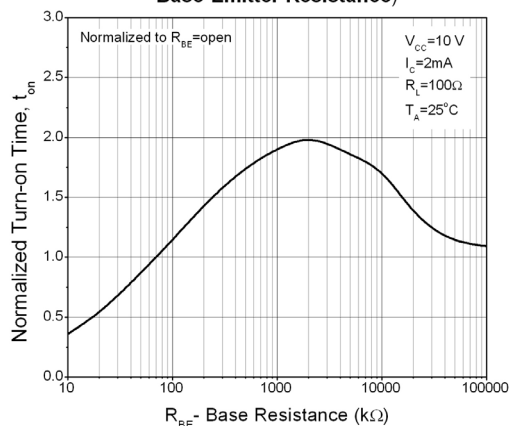


Figure 10. Turn-off Time vs Base-Emitter Resistance

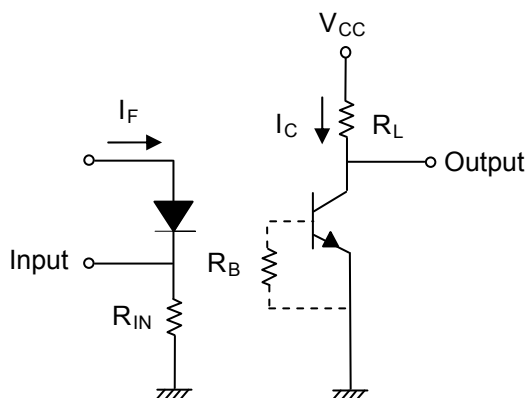
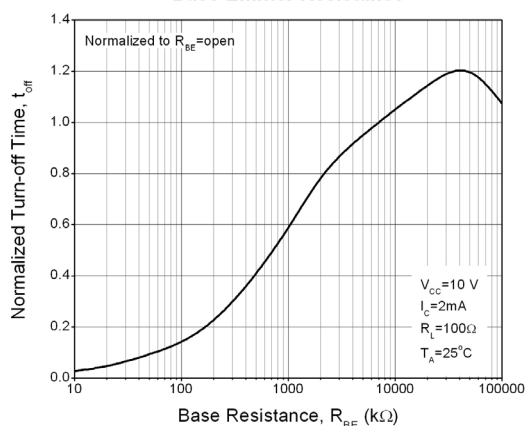


Figure 11. Switching Time Test Circuit & Waveforms



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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

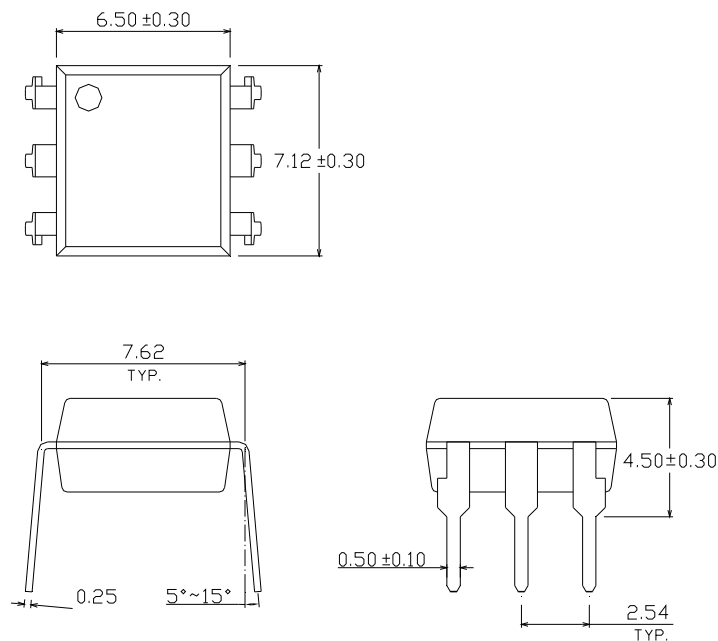
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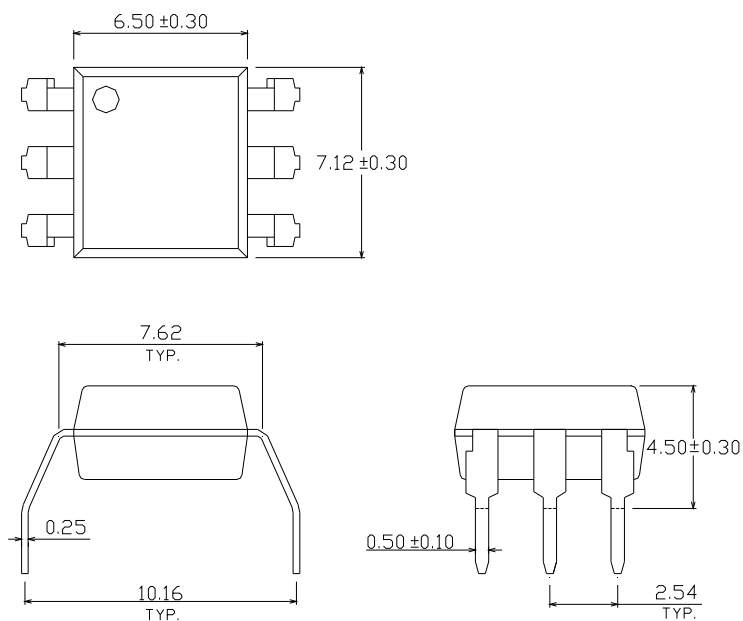
Package Drawings

(Dimensions in mm)

Standard DIP Type



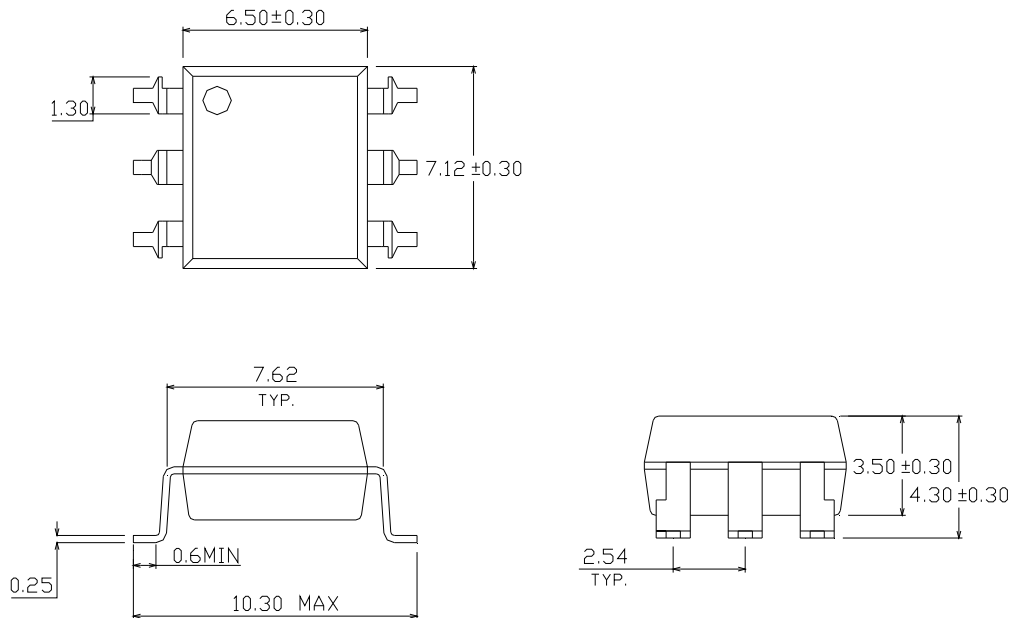
Option M Type



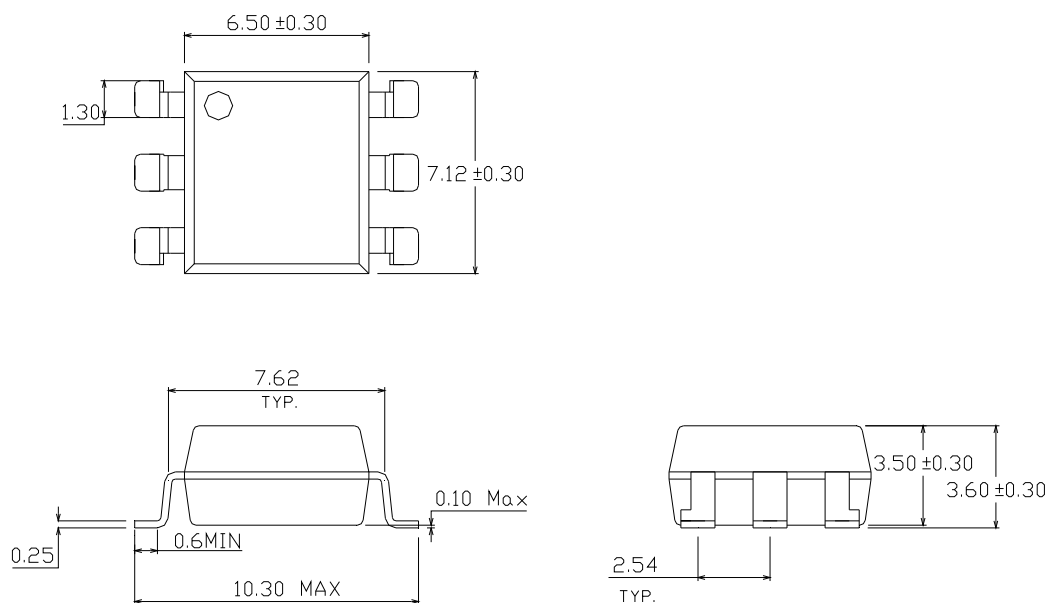
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Option S Type



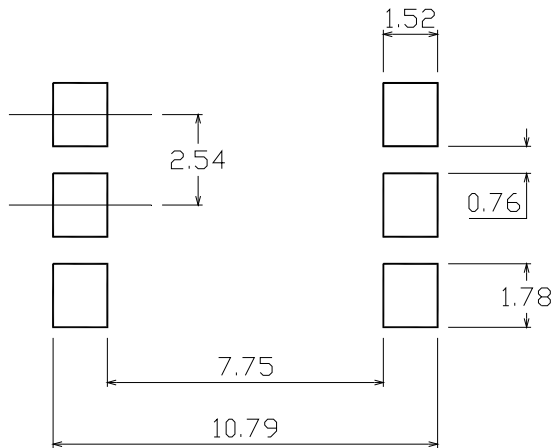
Option S1 Type



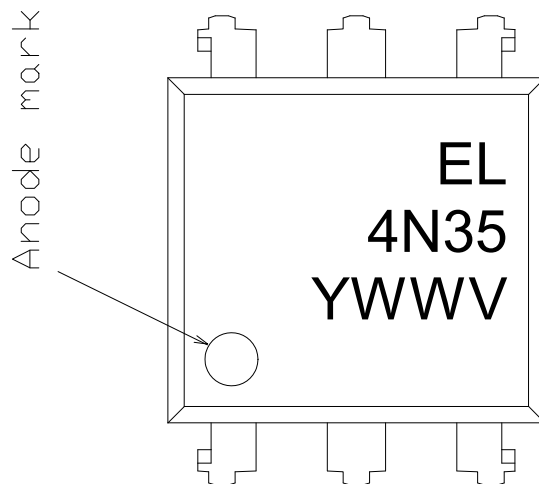
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Recommended pad layout for surface mount leadform



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	D0	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.	P0	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

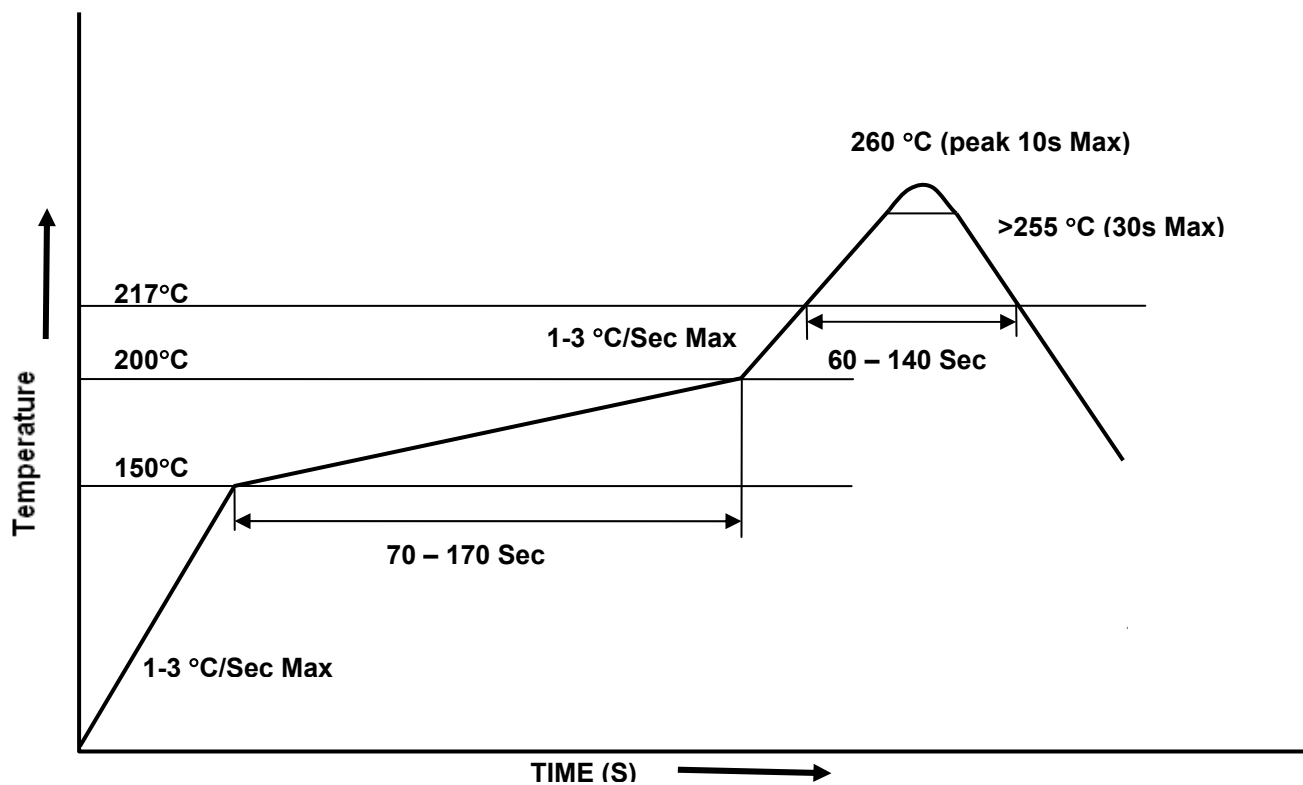


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Solder Reflow Temperature Profile



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