



# 4N25, 4N26, 4N27, 4N28, 4N35, 4N36, 4N37, 4N38 H11A1, H11A2, H11A3, H11A4, H11A5 DC Input 6-Pin Phototransistor Optocoupler

## Features

- High isolation 5000 VRMS
- CTR flexibility available see order information
- DC input with transistor output
- Operating temperature range - 55 °C to 110 °C
- Regulatory Approvals
  - UL - UL1577 (E364000)
  - VDE - EN60747-5-5(VDE0884-5)
  - CQC – GB4943.1, GB8898
  - IEC60065, IEC60950

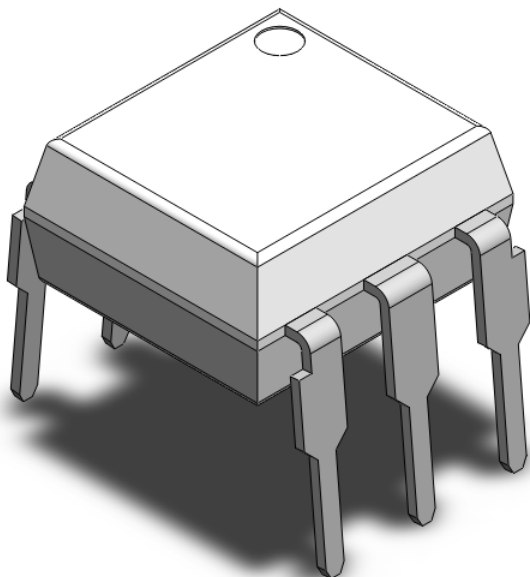
## Applications

- Switch mode power supplies
- Computer peripheral interface
- Microprocessor system interface

## Description

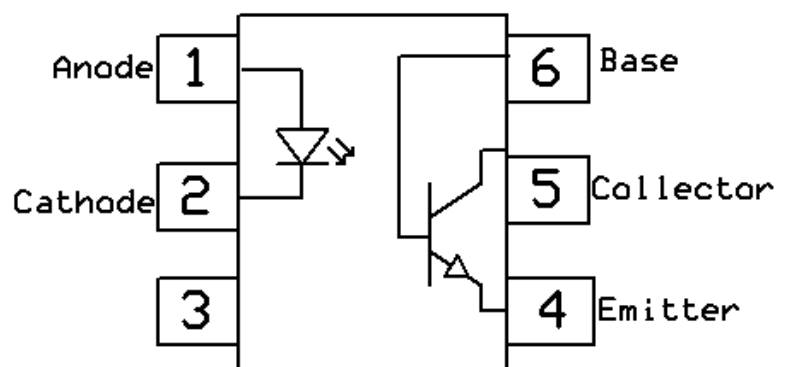
The 4N25, 4N26, 4N27, 4N28, 4N35, 4N36, 4N37, 4N38, H11A1, H11A2, H11A3, H11A4, H11A5 series consists of a photo transistor optically coupled to a gallium arsenide Infrared-emitting diode in a 6-lead DIP package different lead forming options.

## Package Outline



Note: Different bending options available. See package dimension.

## Schematic





4N25, 4N26, 4N27, 4N28, 4N35, 4N36, 4N37, 4N38  
H11A1, H11A2, H11A3, H11A4, H11A5  
DC Input 6-Pin Phototransistor Optocoupler

**Absolute Maximum Rating at 25°C**

<b>Symbol</b>	<b>Parameters</b>	<b>Ratings</b>	<b>Units</b>	<b>Notes</b>
V <sub>ISO</sub>	Isolation voltage	5000	V <sub>RMS</sub>	
T <sub>OPR</sub>	Operating temperature	-55 ~ +110	°C	
T <sub>STG</sub>	Storage temperature	-55 ~ +150	°C	
T <sub>SOL</sub>	Soldering temperature	260	°C	
<b>Emitter</b>				
I <sub>F</sub>	Forward current	60	mA	
I <sub>F(TRANS)</sub>	Peak transient current (≤1μs P.W,300pps)	1	A	
V <sub>R</sub>	Reverse voltage	6	V	
P <sub>D</sub>	Power dissipation	100	mW	
<b>Detector</b>				
P <sub>D</sub>	Power dissipation	150	mW	
B <sub>VCEO</sub>	Collector-Emitter Breakdown Voltage	80	V	
B <sub>VCBO</sub>	Collector-Base Breakdown Voltage	80	V	
B <sub>VECO</sub>	Emitter-Collector Breakdown Voltage	7	V	
B <sub>VEBO</sub>	Emitter-Base Breakdown Voltage	7	V	



# 4N25, 4N26, 4N27, 4N28, 4N35, 4N36, 4N37, 4N38 H11A1, H11A2, H11A3, H11A4, H11A5 DC Input 6-Pin Phototransistor Optocoupler

## Electrical Characteristics $T_A = 25^\circ\text{C}$ (unless otherwise specified)

### Emitter Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
$V_F$	Forward voltage	$I_F = 10\text{mA}$		1.24	1.4	V	
$I_R$	Reverse Current	$V_R = 6\text{V}$	-	-	5	$\mu\text{A}$	
$C_{IN}$	Input Capacitance	$f = 1\text{MHz}$	-	45	-	pF	

### Detector Characteristics

Symbol	Parameters		Test Conditions	Min	Typ	Max	Units	Notes
$B_{V_{CEO}}$	Collector-Emitter Breakdown		$I_C = 0.1\text{mA}$	80	-	-	V	
$B_{V_{ECO}}$	Emitter-Collector Breakdown		$I_E = 0.1\text{mA}$	7	-	-	V	
$B_{V_{CBO}}$	Collector-Base Breakdown		$I_C = 0.1\text{mA}$	80	-	-	V	
$B_{V_{EBO}}$	Emitter-Base Breakdown		$I_E = 0.1\text{mA}$	7	-	-	V	
$I_{CEO}$	Collector-Emitter	4N25,4N26,4N27,4N28	$V_{CE} = 10\text{V}, I_F = 0\text{mA}$	-	-	50	nA	
	Dark Current	H11A1,A2,A3,A4,A5						
		4N35,4N36,4N37,4N38						
$I_{CBO}$	Collector-Base Dark Current		$V_{CB} = 10\text{V}, I_F = 0\text{mA}$	-	-	20	nA	

### Transfer Characteristics

Symbol	Parameters		Test Conditions	Min	Typ	Max	Units	Notes	
CTR	Current Transfer Ratio	4N35	$I_F = 10\text{mA}, V_{CE} = 10\text{V}$	100	-	-	%		
		4N25,4N26, 4N38, H11A2, H11A3		20	-	-			
		4N27, 4N28, H11A4		10	-	-			
		H11A1		50	-	-			
		H11A5		30	-	-			
		4N36		$I_F = 2\text{mA}, V_{CE} = 5\text{V}$	130	-			260
		4N37			200	-			400
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage	4N25,4N26, 4N27,4N28	$I_F = 50\text{mA}, I_C = 2\text{mA}$	-	-	0.5	V		
		4N35,4N36,4N37	$I_F = 10\text{mA}, I_C = 0.5\text{mA}$	-	-	0.3			
	H11A1,H11A2, H11A3,H11A4,H11A5	-		-	0.4				
	4N38	$I_F = 20\text{mA}, I_C = 4\text{mA}$		-	-	1.0			



# 4N25, 4N26, 4N27, 4N28, 4N35, 4N36, 4N37, 4N38 H11A1, H11A2, H11A3, H11A4, H11A5 DC Input 6-Pin Phototransistor Optocoupler

## Transfer Characteristics

$R_{IO}$	Isolation Resistance	$V_{IO} = 500V_{DC}$	$1 \times 10^{11}$			$\Omega$	
$C_{IO}$	Isolation Capacitance	$f = 1MHz$		0.25		pF	

## Switching Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes	
$t_{on}$	Turn On Time	4N25,4N26,4N27,4N28 H11A1,A2,A3,A4,A5	$I_F = 10mA, V_{CC} = 10V, R_L = 100\Omega$	-	4.3	9.8	$\mu s$	
		4N35,4N36,4N37,4N38	$I_C = 2mA, V_{CC} = 10V, R_L = 100\Omega$	-	9.8	11.5		
$t_{off}$	Turn Off Time	4N25,4N26,4N27,4N28 H11A1,A2,A3,A4,A5	$I_F = 10mA, V_{CC} = 10V, R_L = 100\Omega$	-	3.9	9.8	$\mu s$	
		4N35,4N36,4N37,4N38	$I_C = 2mA, V_{CC} = 10V, R_L = 100\Omega$	-	6.9	11.5		



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## Typical Characteristic Curves

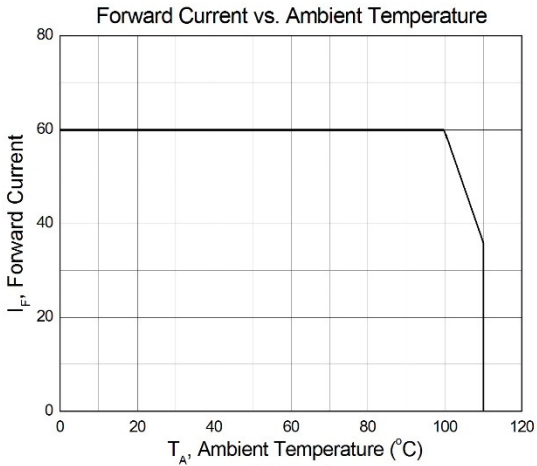


Figure 1

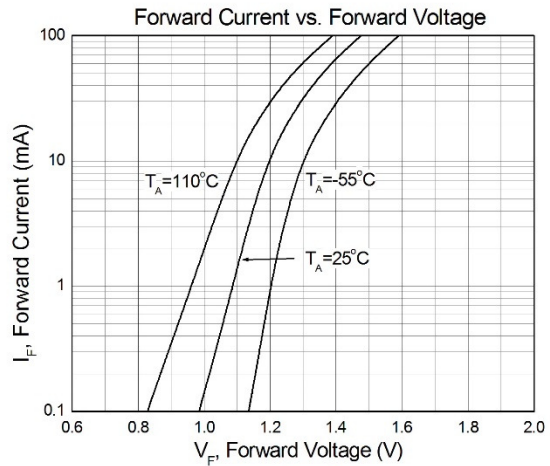


Figure 2

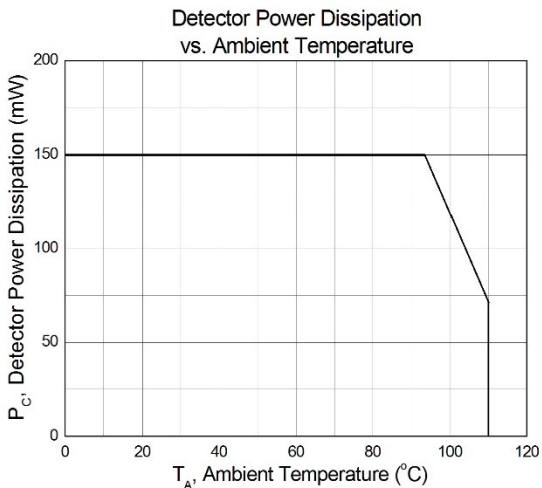


Figure 3

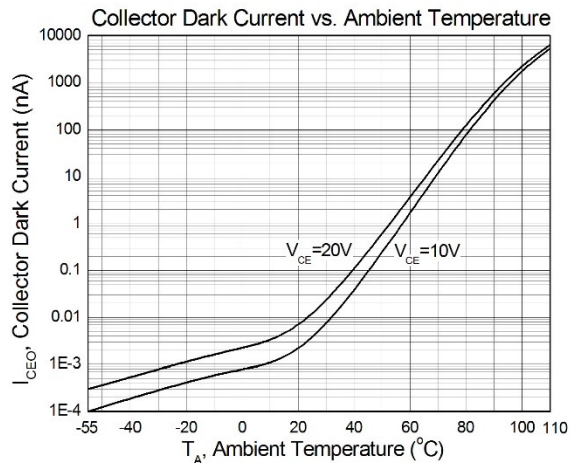


Figure 4

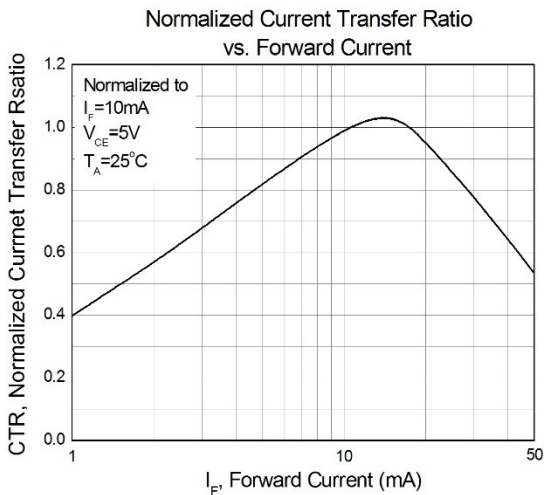


Figure 5

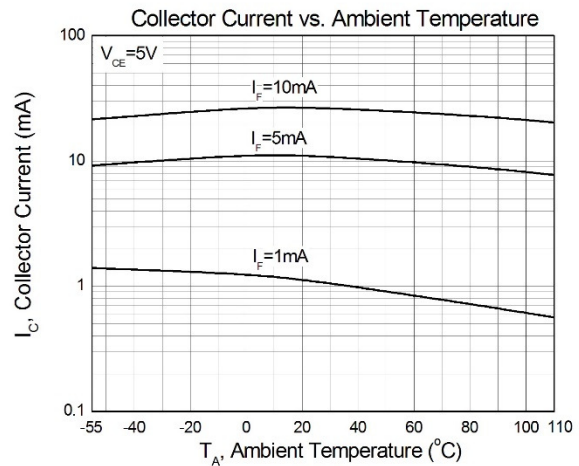


Figure 6



# 4N25, 4N26, 4N27, 4N28, 4N35, 4N36, 4N37, 4N38 H11A1, H11A2, H11A3, H11A4, H11A5 DC Input 6-Pin Phototransistor Optocoupler

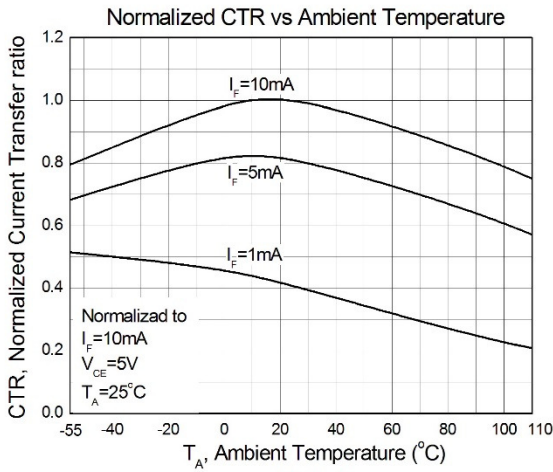


Figure 7

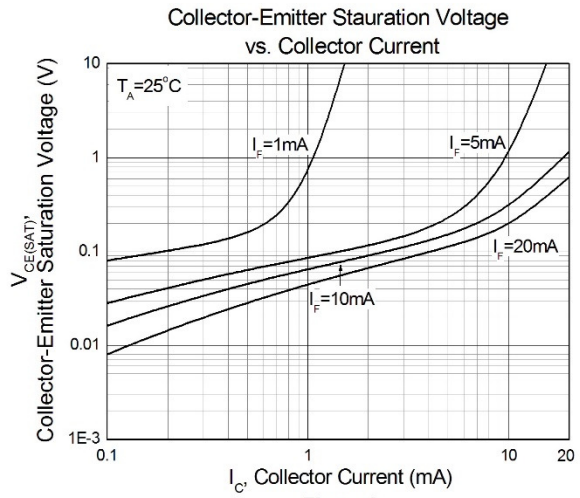


Figure 8

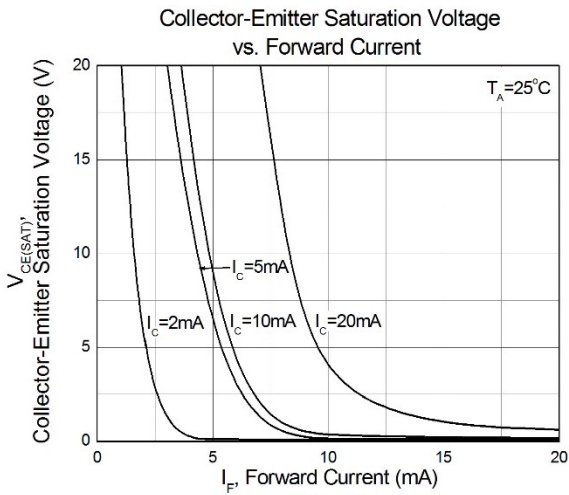


Figure 9

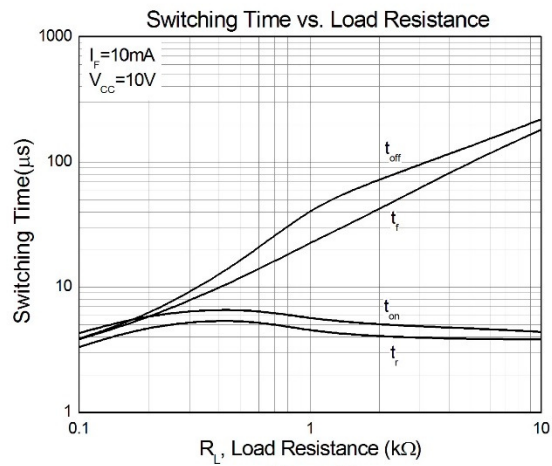


Figure 10

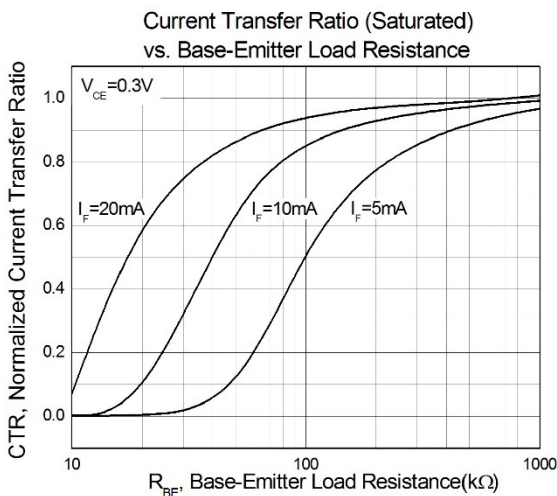


Figure 11

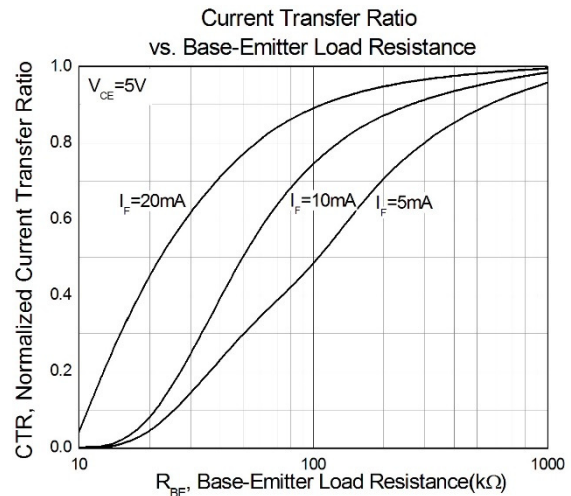


Figure 12



# 4N25, 4N26, 4N27, 4N28, 4N35, 4N36, 4N37, 4N38 H11A1, H11A2, H11A3, H11A4, H11A5 DC Input 6-Pin Phototransistor Optocoupler

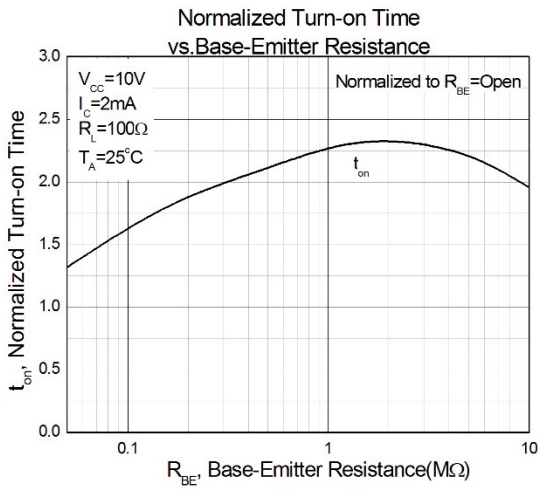


Figure 13

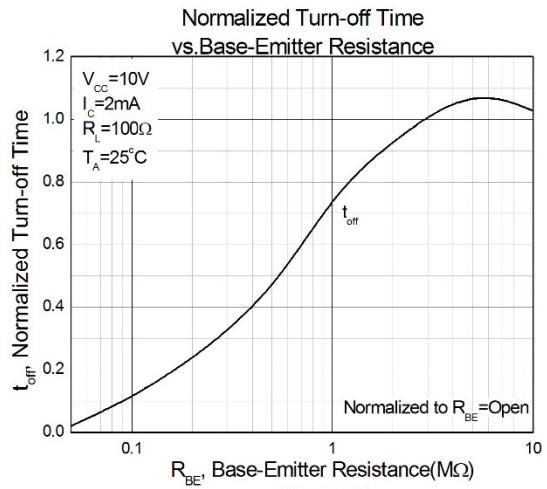


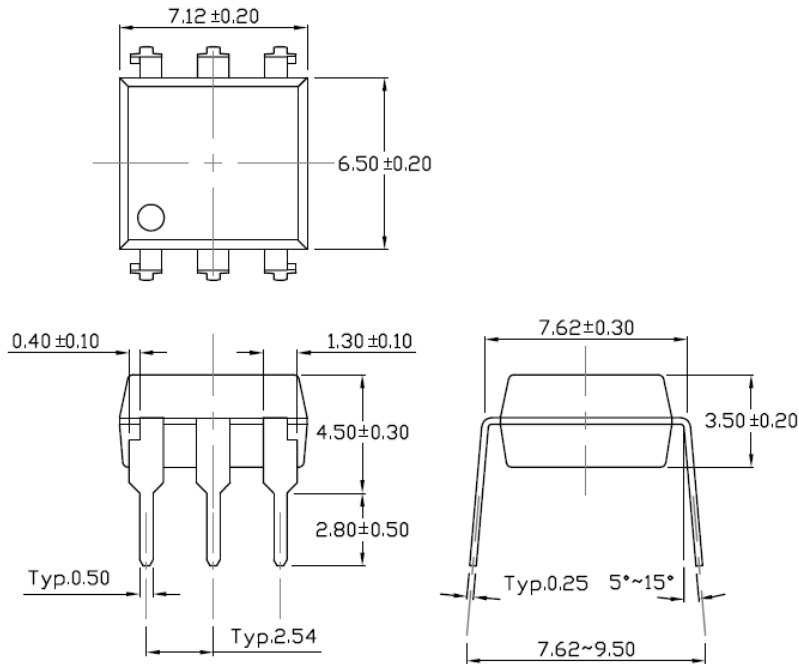
Figure 14



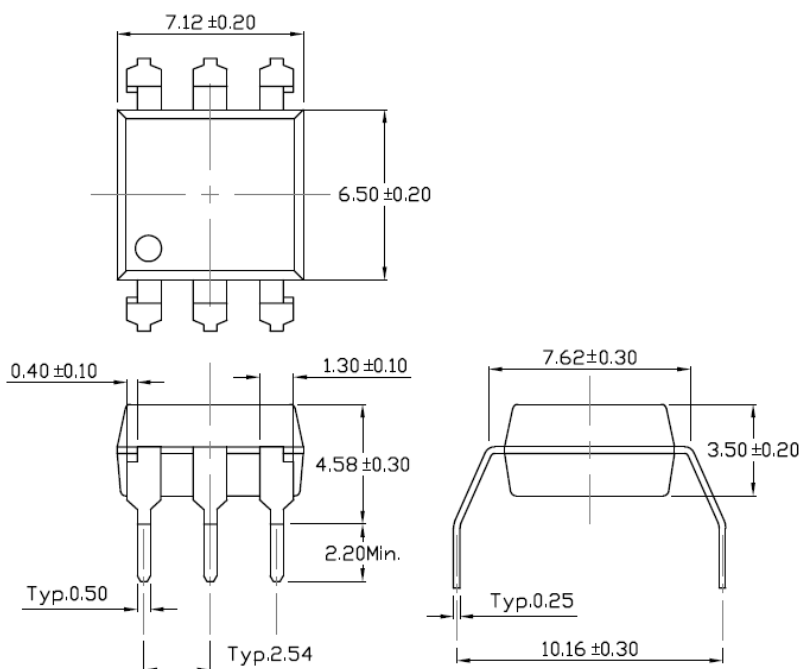
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## Package Dimension *Dimensions in mm unless otherwise stated*

### Standard DIP – Through Hole



### Wide Lead Forming – Through Hole (M Type)

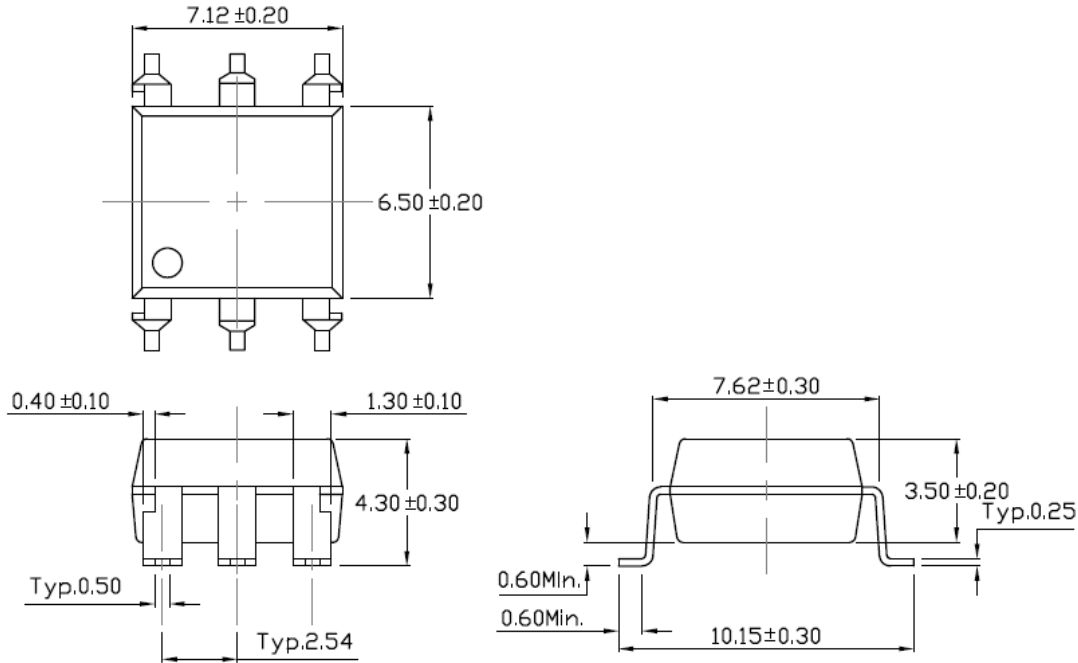




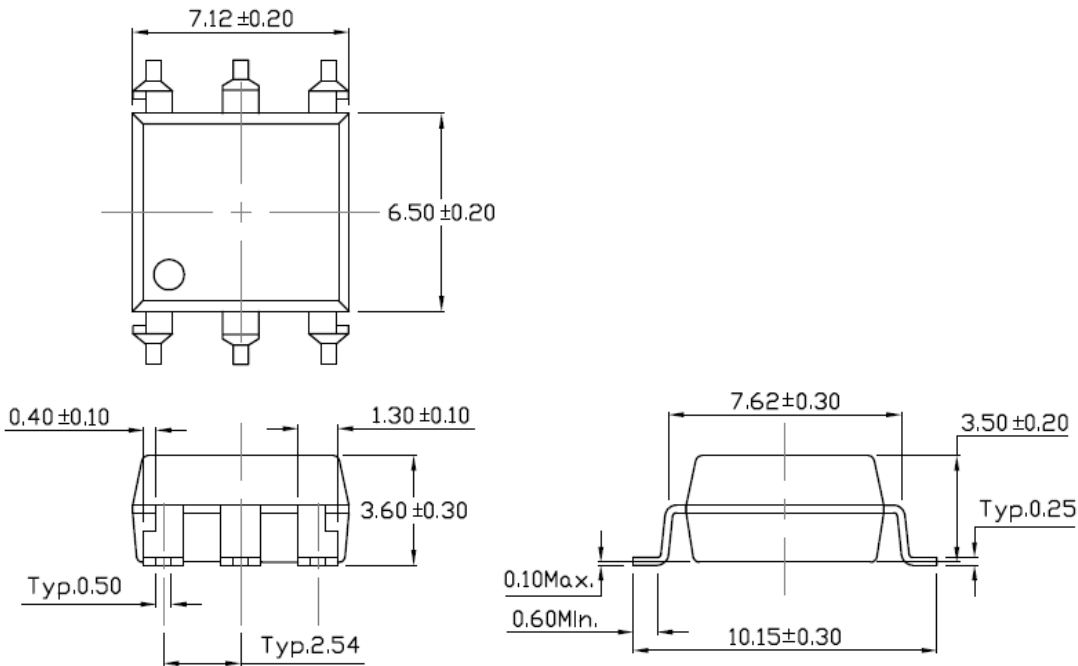


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## Surface Mount Forming (S Type)



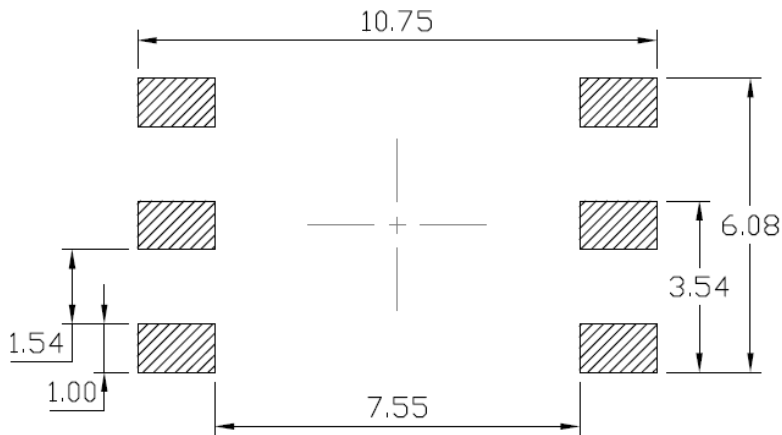
## Surface Mount Forming (Low Profile) (SL Type)



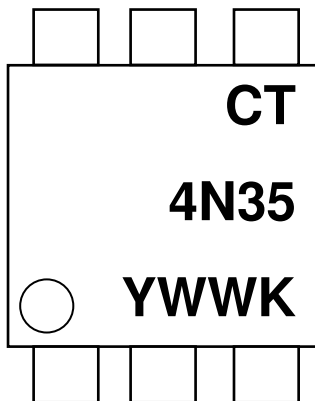


# 4N25, 4N26, 4N27, 4N28, 4N35, 4N36, 4N37, 4N38 H11A1, H11A2, H11A3, H11A4, H11A5 DC Input 6-Pin Phototransistor Optocoupler

## Recommended Solder Mask Dimensions in mm unless otherwise stated



## Marking Information



### Note:

- CT : Denotes "CT Micro"
- 4N35 : Part Number
- Y : Fiscal Year
- WW : Work Week
- K : Manufacturing Code



# 4N25, 4N26, 4N27, 4N28, 4N35, 4N36, 4N37, 4N38 H11A1, H11A2, H11A3, H11A4, H11A5 DC Input 6-Pin Phototransistor Optocoupler

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## Ordering Information

4N2X(Y)(Z)-G, 4N3X(Y)(Z)-G, H11AX(Y)(Z)-G

X = Part No.

(4N25, 4N26, 4N27, 4N28, 4N35, 4N36, 4N37, 4N38, H11A1, H11A2, H11A3, H11A4, H11A5)

Y = Lead form option (S, SL, M or none)

Z = Tape and reel option (T1, T2 or none)

G= Material option (G: Green, None: Non-green)

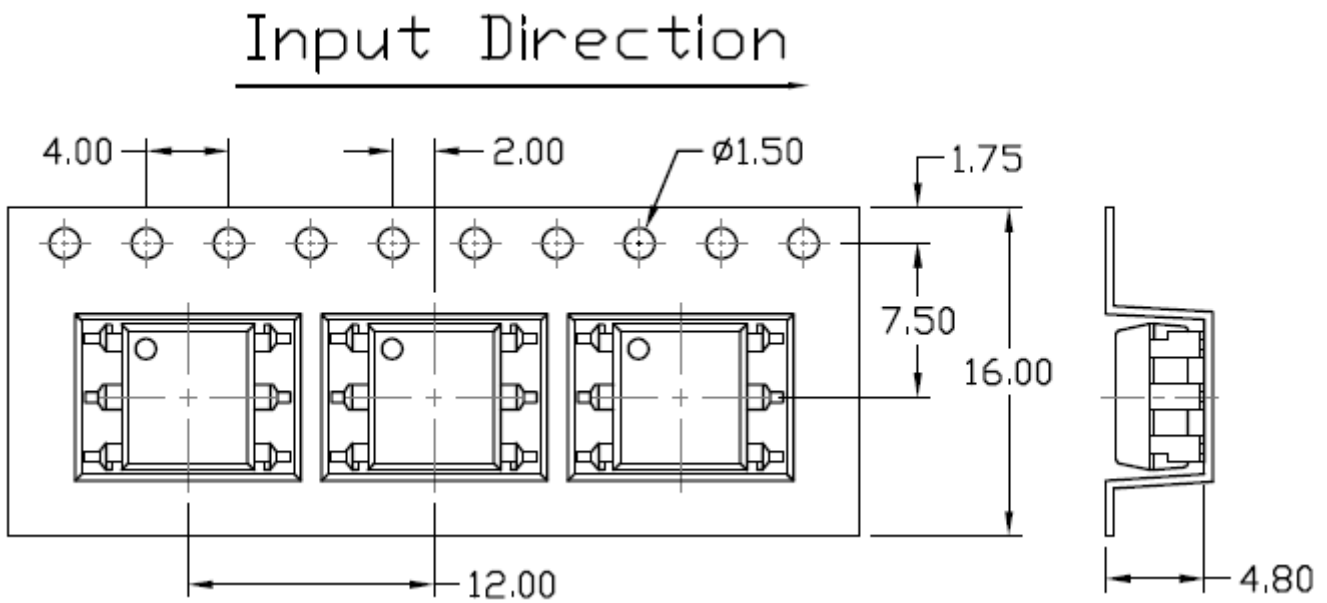
<b>Option</b>	<b>Description</b>	<b>Quantity</b>
None	Standard 6 Pin Dip	50Units/Tube
M	Wide Lead Forming	50Units/Tube
S(T1)	Surface Mount Lead Forming – With Option A Taping	1000 Units/Reel
S(T2)	Surface Mount Lead Forming – With Option B Taping	1000 Units/Reel
SL(T1)	Surface Mount Lead Forming(Low Profile) – With Option A Taping	1000 Units/Reel
SL(T2)	Surface Mount Lead Forming(Low Profile) – With Option B Taping	1000 Units/Reel



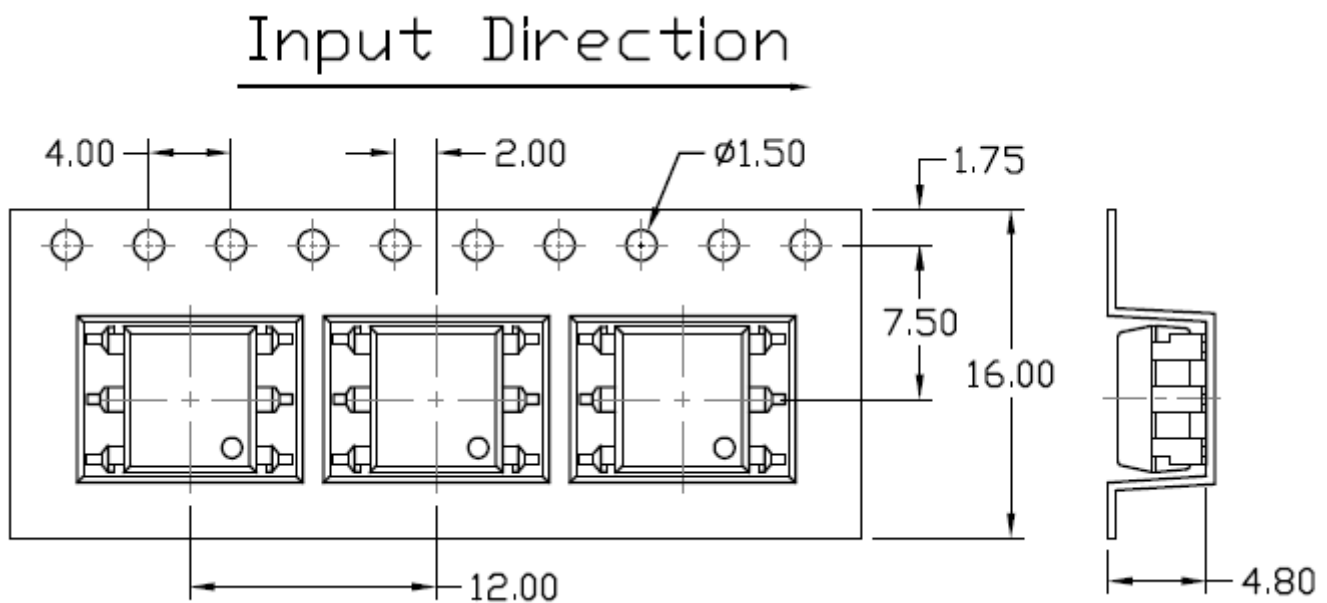
4N25, 4N26, 4N27, 4N28, 4N35, 4N36, 4N37, 4N38  
H11A1, H11A2, H11A3, H11A4, H11A5  
DC Input 6-Pin Phototransistor Optocoupler

**Carrier Tape Specifications** *Dimensions in mm unless otherwise stated*

**Option S(T1) & SL(T1)**



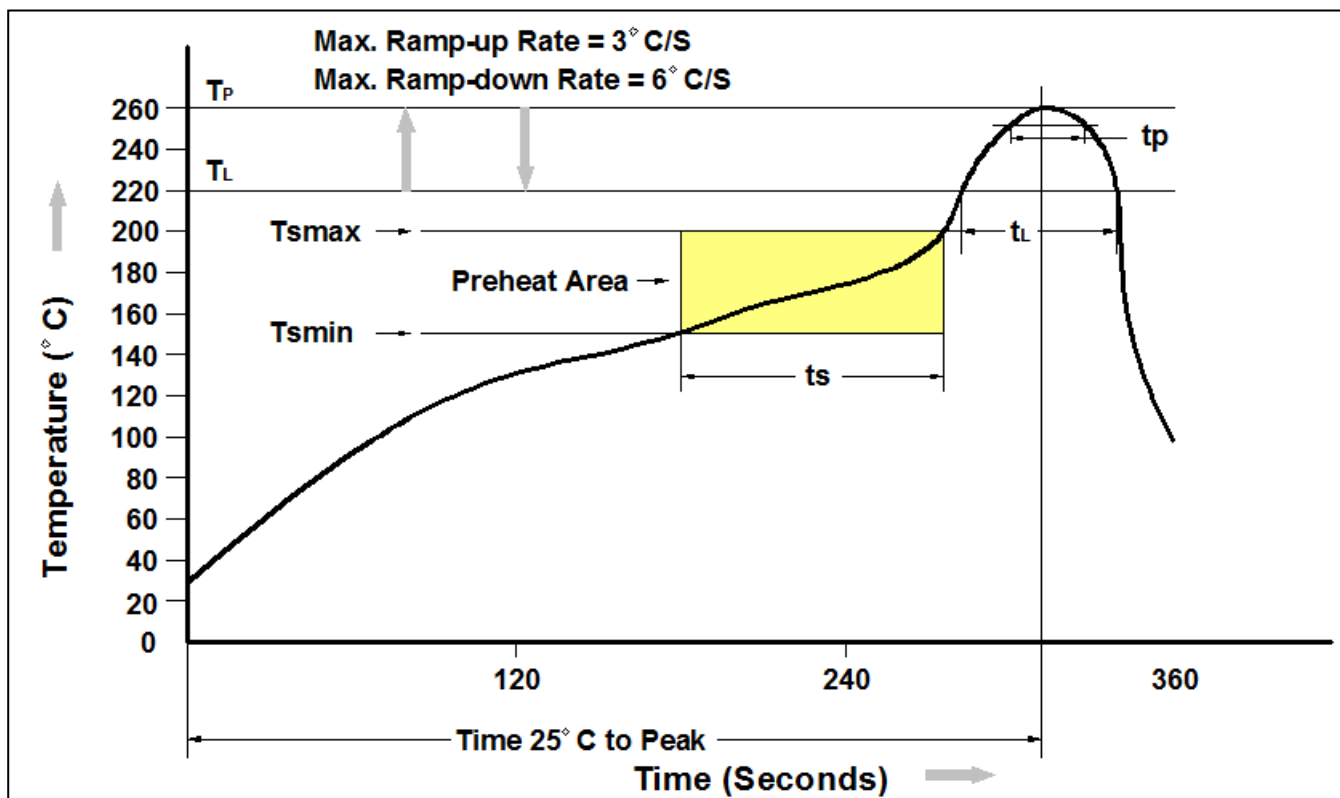
**Option S(T2) & SL(T2)**





# 4N25, 4N26, 4N27, 4N28, 4N35, 4N36, 4N37, 4N38 H11A1, H11A2, H11A3, H11A4, H11A5 DC Input 6-Pin Phototransistor Optocoupler

## Reflow Profile



Profile Feature	Pb-Free Assembly Profile
Temperature Min. (T <sub>smin</sub> )	150 °C
Temperature Max. (T <sub>smax</sub> )	200 °C
Time (t <sub>s</sub> ) from (T <sub>smin</sub> to T <sub>smax</sub> )	60-120 seconds
Ramp-up Rate (t <sub>L</sub> to t <sub>P</sub> )	3 °C/second max.
Liquidous Temperature (T <sub>L</sub> )	217 °C
Time (t <sub>L</sub> ) Maintained Above (T <sub>L</sub> )	60 – 150 seconds
Peak Body Package Temperature	260 °C +0 °C / -5 °C
Time (t <sub>P</sub> ) within 5 °C of 260 °C	30 seconds
Ramp-down Rate (T <sub>P</sub> to T <sub>L</sub> )	6 °C/second max
Time 25 °C to Peak Temperature	8 minutes max.



**4N25, 4N26, 4N27, 4N28, 4N35, 4N36, 4N37, 4N38  
H11A1, H11A2, H11A3, H11A4, H11A5  
DC Input 6-Pin Phototransistor Optocoupler**

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- 2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.*