



# 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

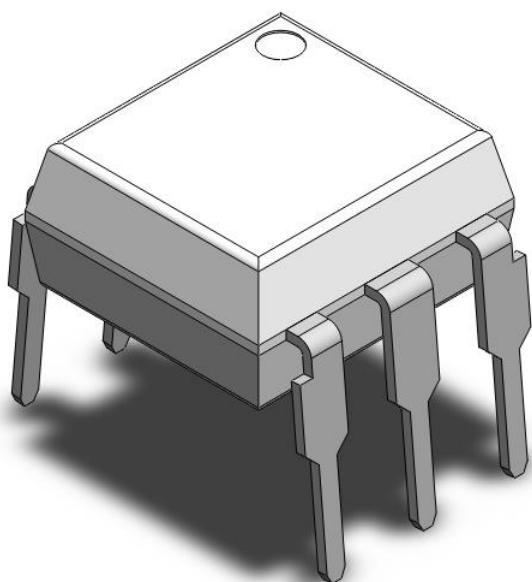
## Applications

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

## Description

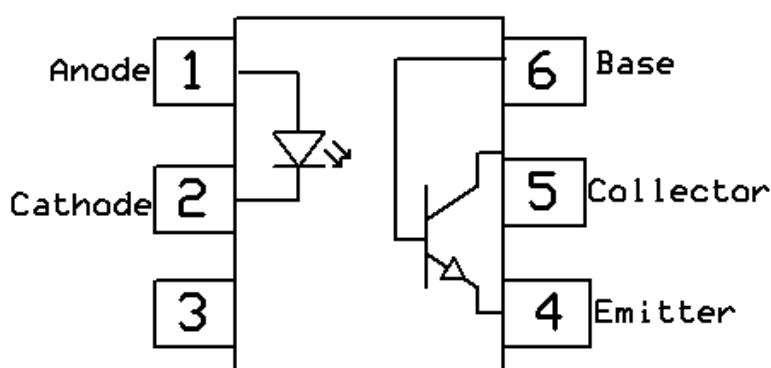
The 4N25, 4N26, 4N27, 4N28, 4N35, 4N36, 4N37, 4N38, H11A1, H11A2, H11A3, H11A4, H11A5 series consists of a photo transistor optically coupled to a gallium arsenide Infrared-emitting diode in a 6-lead DIP package different lead forming options.

## 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 Dark Current	4N25,4N26,4N27,4N28	$V_{CE} = 10\text{V}, I_F = 0\text{mA}$	-	-	50	nA
		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	100	-	-	%	
		4N25,4N26, 4N38, H11A2, H11A3	20	-	-		
		4N27, 4N28, H11A4	10	-	-		
		H11A1	50	-	-		
		H11A5	30	-	-		
		4N36	130	-	260		
		4N37	200	-	400		
$V_{CE(SAT)}$	Collector-E mitter Saturation Voltage	4N25,4N26, 4N27,4N28	$I_F = 50\text{mA}, I_C = 2\text{mA}$	-	-	0.5	V
		4N35,4N36,4N37		-	-	0.3	
		H11A1,H11A2, H11A3,H11A4,H11A5	$I_F = 10\text{mA}, I_C = 0.5\text{mA}$	-	-	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 <sub>IO</sub>	Isolation Resistance	V <sub>IO</sub> = 500V <sub>DC</sub>	1x10 <sup>11</sup>			Ω	
C <sub>IO</sub>	Isolation Capacitance	f= 1MHz		0.25		pF	

## Switching Characteristics

Symbol	Parameters		Test Conditions	Min	Typ	Max	Units	Notes
t <sub>on</sub>	Turn On Time	4N25,4N26,4N27,4N28 H11A1,A2,A3,A4,A5	I <sub>F</sub> = 10mA, V <sub>CC</sub> = 10V, R <sub>L</sub> = 100Ω	-	4.3	9.8	μs	
		4N35,4N36,4N37,4N38	I <sub>C</sub> = 2mA, V <sub>CC</sub> = 10V, R <sub>L</sub> = 100Ω	-	9.8	11.5		
t <sub>off</sub>	Turn Off Time	4N25,4N26,4N27,4N28 H11A1,A2,A3,A4,A5	I <sub>F</sub> = 10mA, V <sub>CC</sub> = 10V, R <sub>L</sub> = 100Ω	-	3.9	9.8	μs	
		4N35,4N36,4N37,4N38	I <sub>C</sub> = 2mA, V <sub>CC</sub> = 10V, R <sub>L</sub> = 100Ω	-	6.9	11.5		



4N25, 4N26, 4N27, 4N28, 4N35, 4N36, 4N37, 4N38

H11A1, H11A2, H11A3, H11A4, H11A5

DC Input 6-Pin Phototransistor Optocoupler

## Typical Characteristic Curves

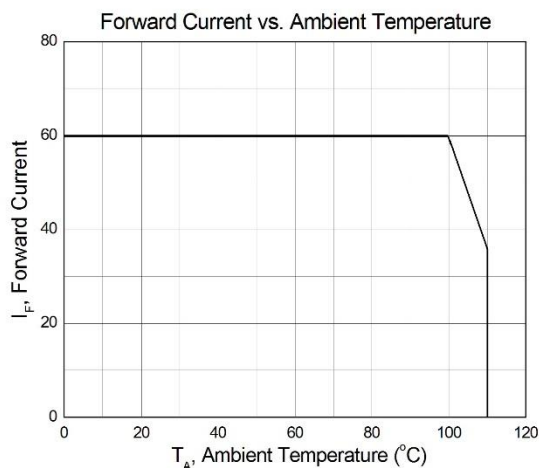


Figure 1

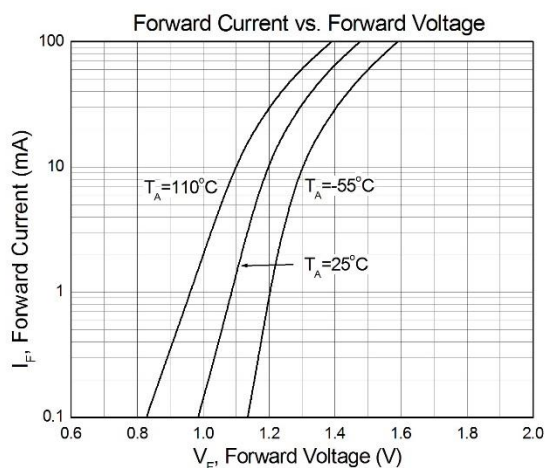


Figure 2

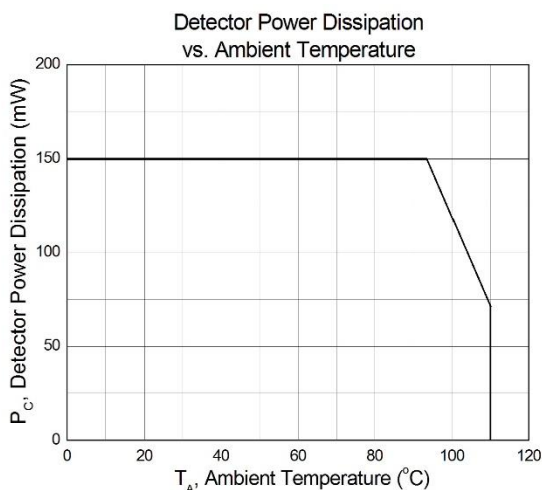


Figure 3

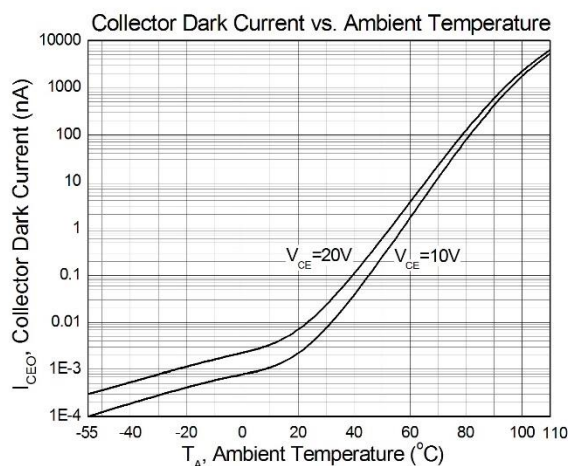


Figure 4

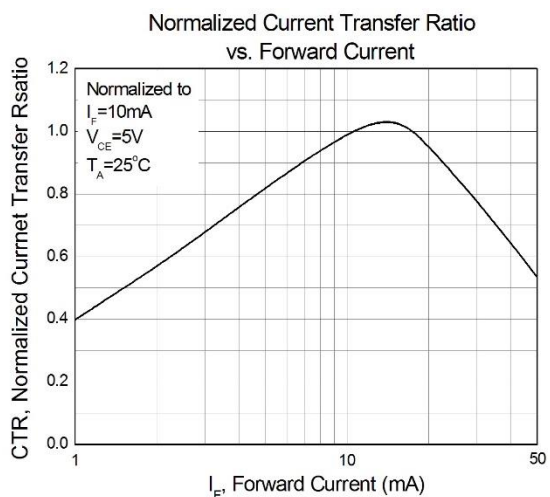


Figure 5

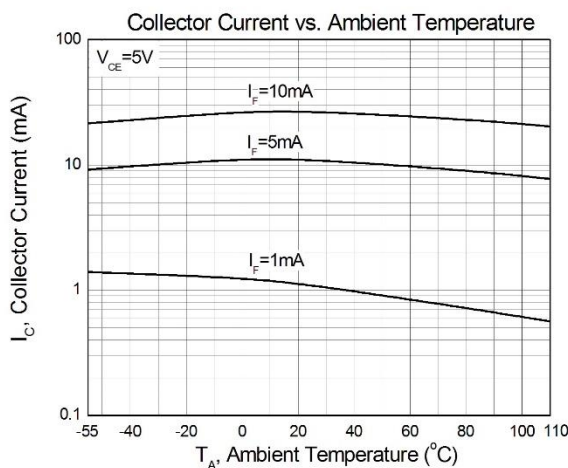


Figure 6



4N25, 4N26, 4N27, 4N28, 4N35, 4N36, 4N37, 4N38

H11A1, H11A2, H11A3, H11A4, H11A5

## DC Input 6-Pin Phototransistor Optocoupler

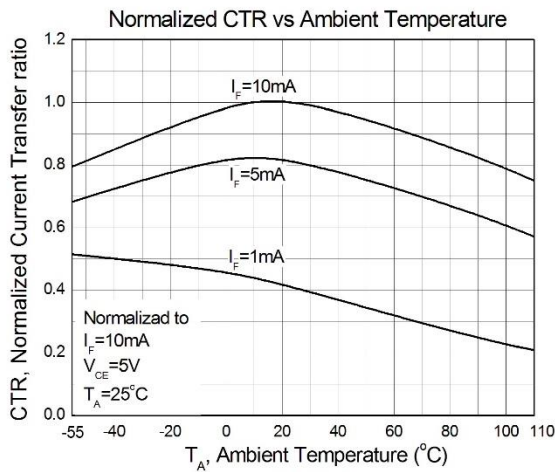


Figure 7

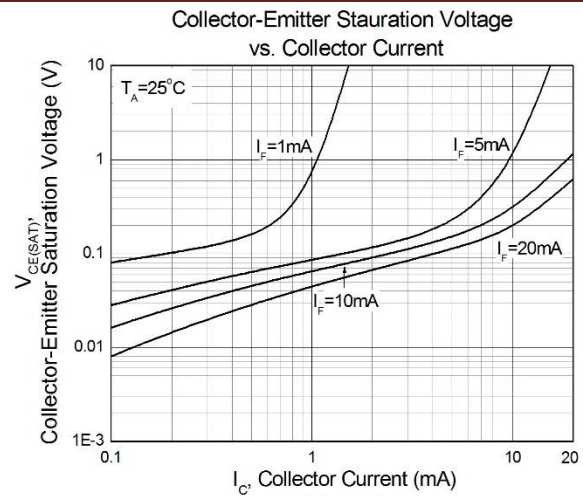


Figure 8

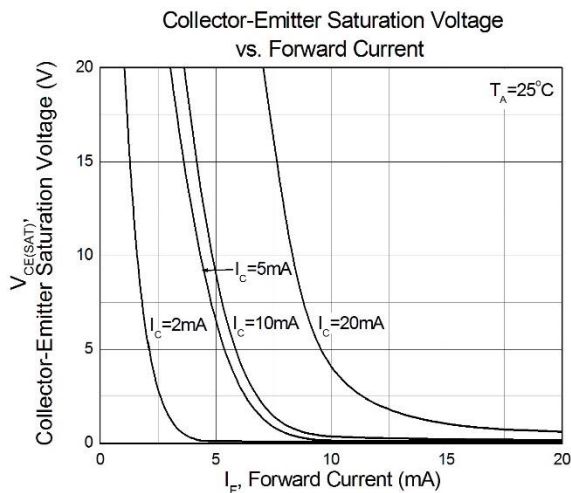


Figure 9

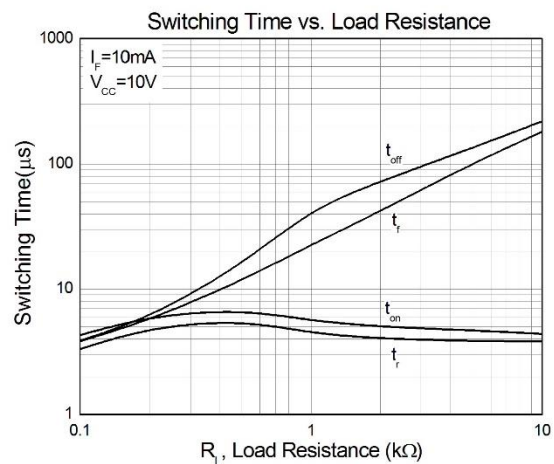


Figure 10

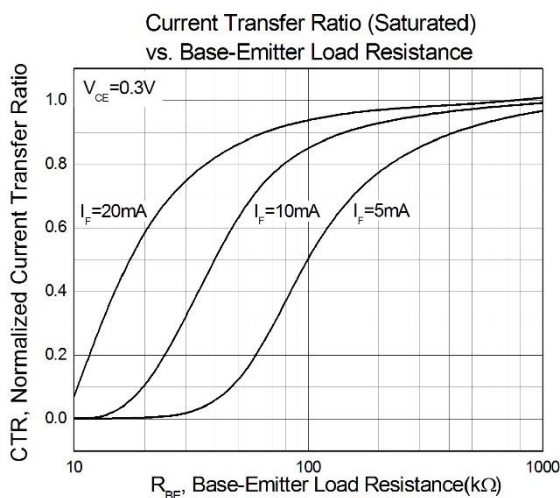


Figure 11

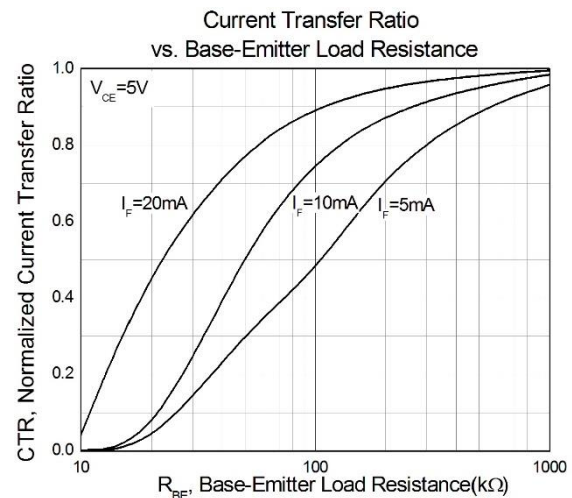


Figure 12



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

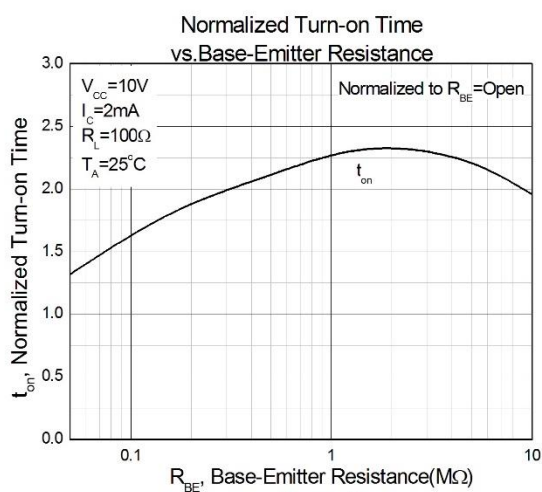


Figure 13

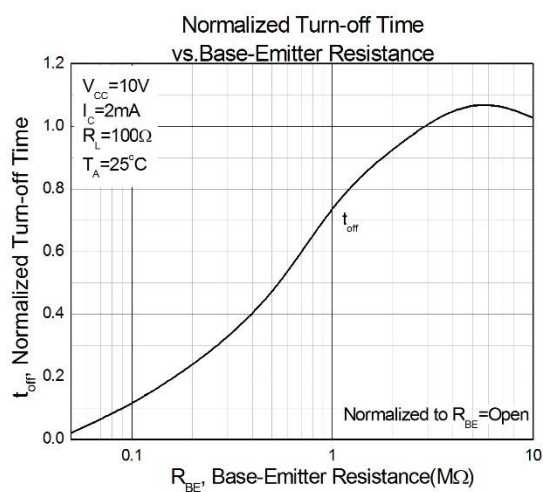


Figure 14



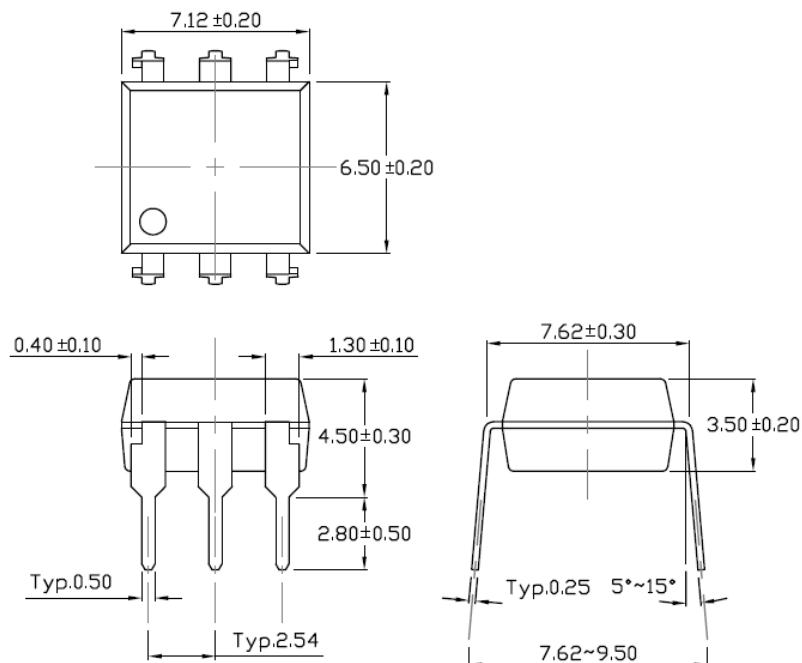
4N25, 4N26, 4N27, 4N28, 4N35, 4N36, 4N37, 4N38

H11A1, H11A2, H11A3, H11A4, H11A5

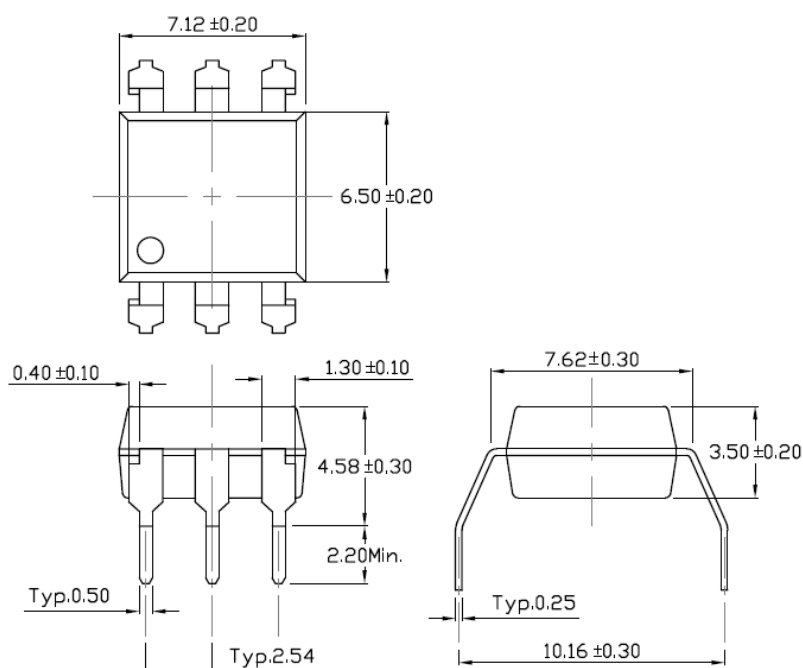
DC Input 6-Pin Phototransistor Optocoupler

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

### Standard DIP – Through Hole



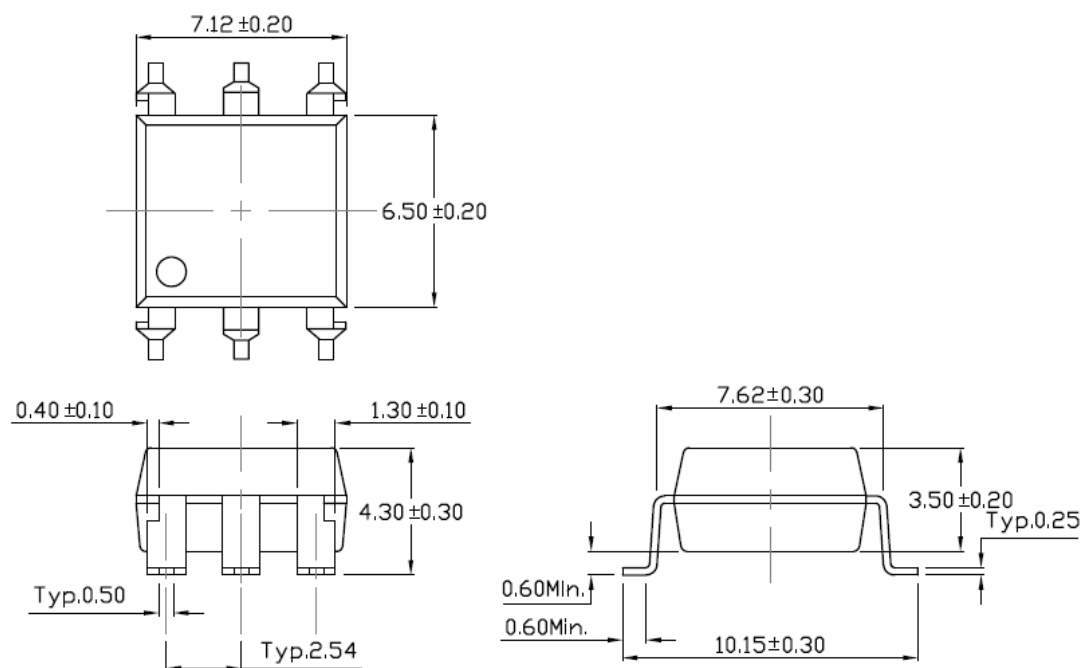
### Wide Lead Forming – Through Hole (M Type)



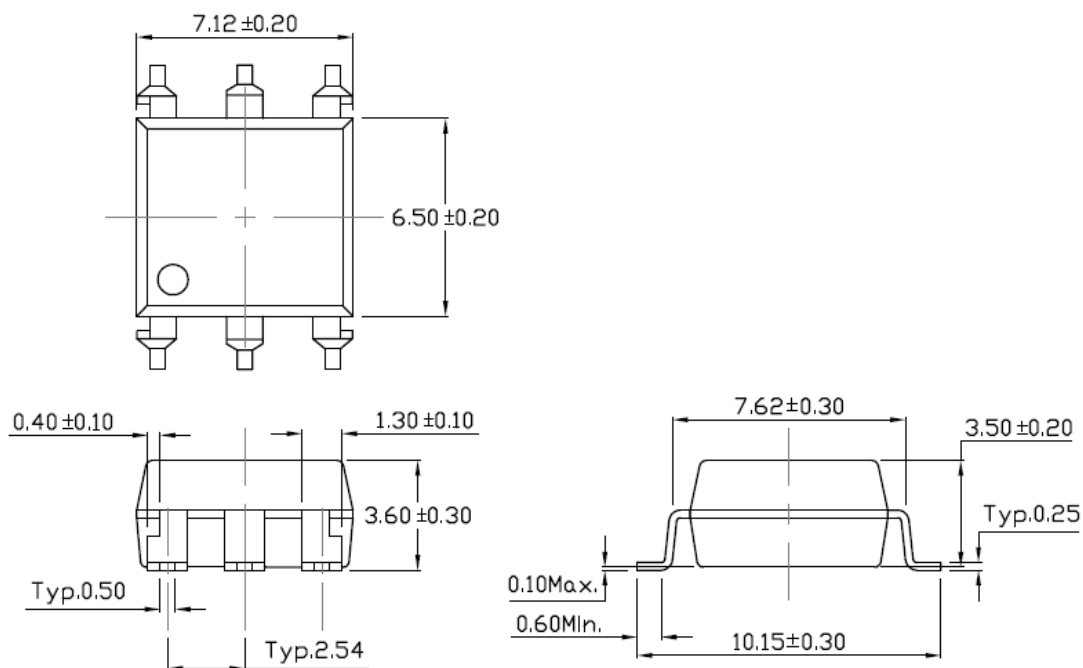


# 4N25, 4N26, 4N27, 4N28, 4N35, 4N36, 4N37, 4N38 H11A1, H11A2, H11A3, H11A4, H11A5 DC Input 6-Pin Phototransistor Optocoupler

## Surface Mount Forming (S Type)



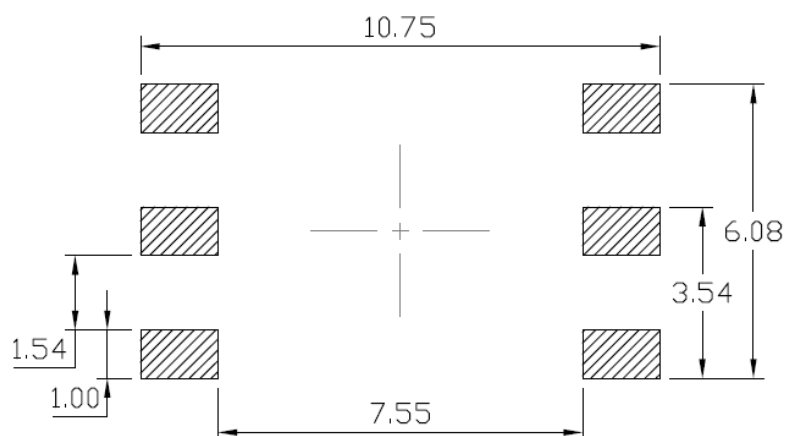
## Surface Mount Forming (Low Profile) (SL Type)



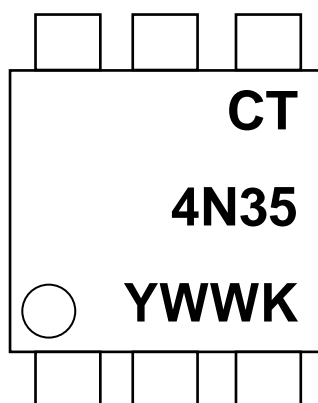


# 4N25, 4N26, 4N27, 4N28, 4N35, 4N36, 4N37, 4N38 H11A1, H11A2, H11A3, H11A4, H11A5 DC Input 6-Pin Phototransistor Optocoupler

## 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

## 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)

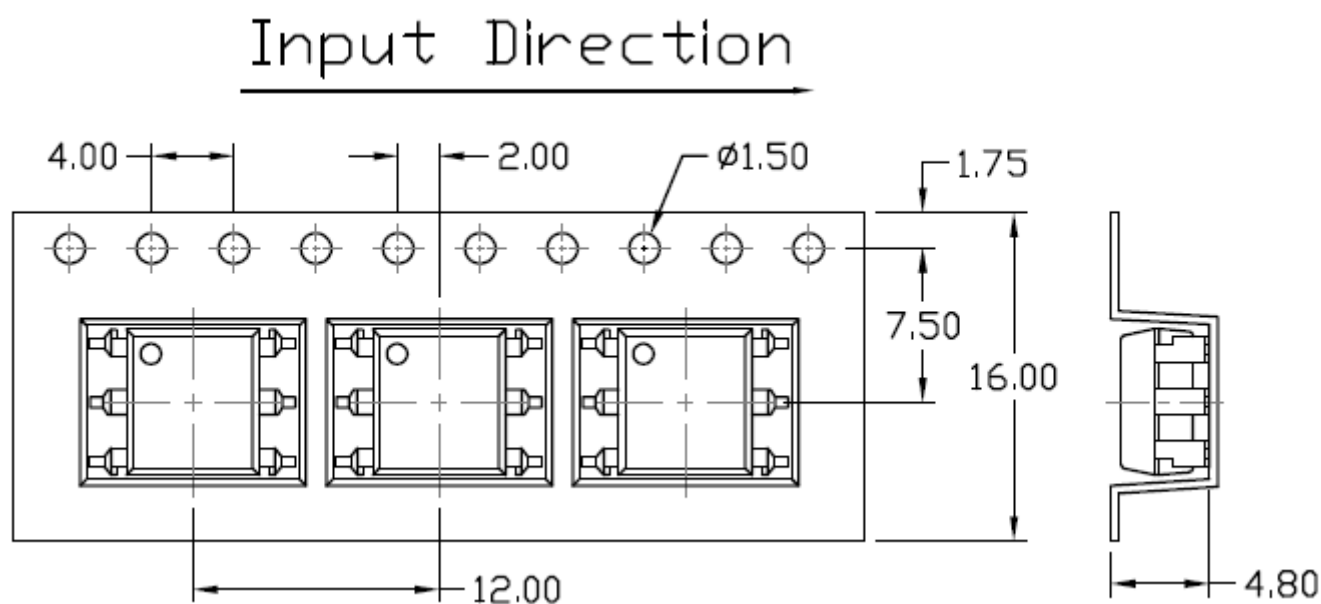
<b>Option</b>	<b>Description</b>	<b>Quantity</b>
None	Standard 6 Pin Dip	50Units/Tube
M	Wide Lead Forming	50Units/Tube
S(T1)	Surface Mount Lead Forming – With Option A Taping	1000 Units/Reel
S(T2)	Surface Mount Lead Forming – With Option B Taping	1000 Units/Reel
SL(T1)	Surface Mount Lead Forming(Low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



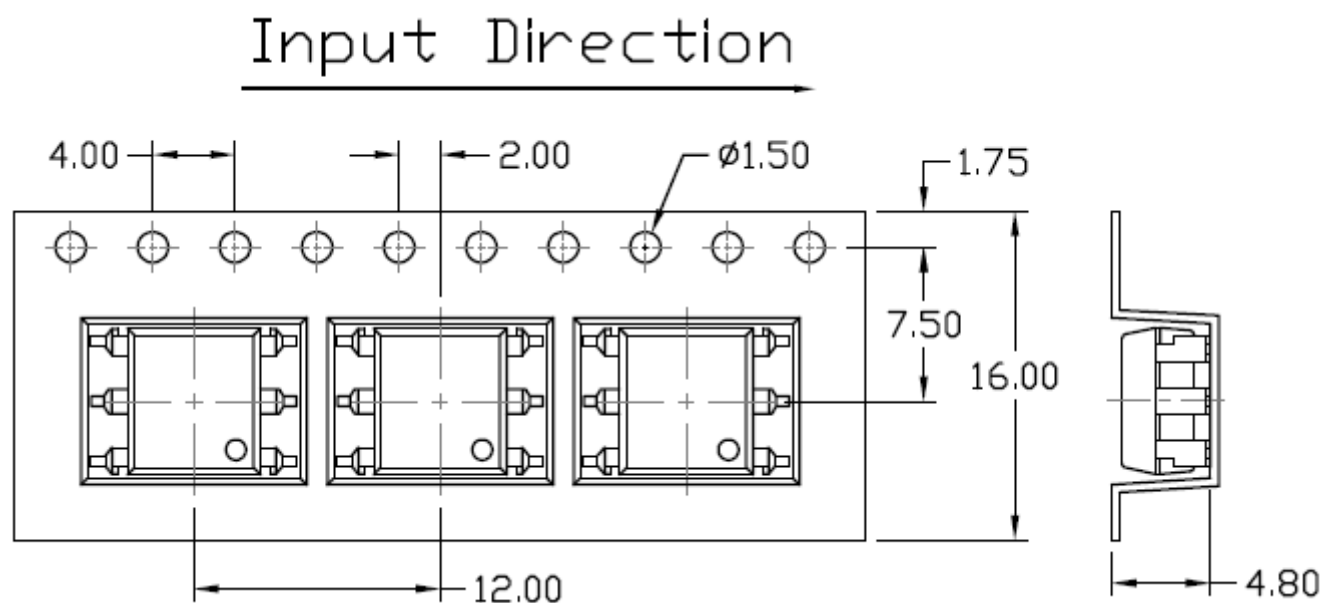
# 4N25, 4N26, 4N27, 4N28, 4N35, 4N36, 4N37, 4N38 H11A1, H11A2, H11A3, H11A4, H11A5 DC Input 6-Pin Phototransistor Optocoupler

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

### Option S(T1) & SL(T1)



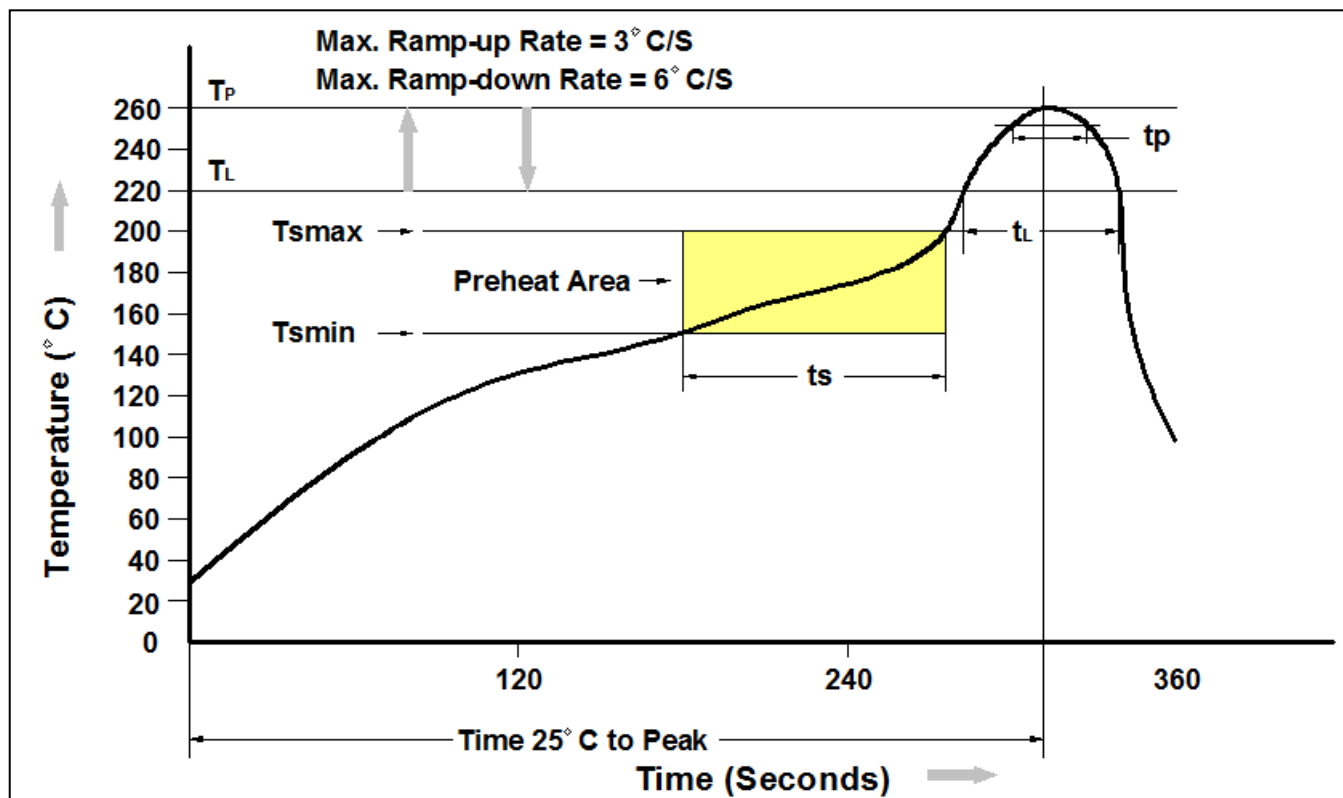
### Option S(T2) & SL(T2)





# 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. (Tsm)	150°C
Temperature Max. (Tsm)	200°C
Time (ts) from (Tsm to Tsm)	60-120 seconds
Ramp-up Rate (tl to tp)	3°C/second max.
Liquidous Temperature (Tl)	217°C
Time (tl) Maintained Above (Tl)	60 – 150 seconds
Peak Body Package Temperature	260°C +0°C / -5°C
Time (tp) within 5°C of 260°C	30 seconds
Ramp-down Rate (Tp to Tl)	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

---

## DISCLAIMER

CT MICRO RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. CT MICRO DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

---

DISCOLORATION MIGHT OCCUR ON THE PACKAGE SURFACE AFTER SOLDERING, REFLOW OR LONG TERM USE. THIS DOES NOT IMPACT THE PRODUCT PERFORMANCE NOR THE PRODUCT RELIABILITY.

---

CT MICRO ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT EXPRESS WRITTEN APPROVAL OF CT MICRO INTERNATIONAL CORPORATION.

---

- 1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instruction for use provided in the labelling, can be reasonably expected to result in significant injury to the user.*
- 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.*