



# 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

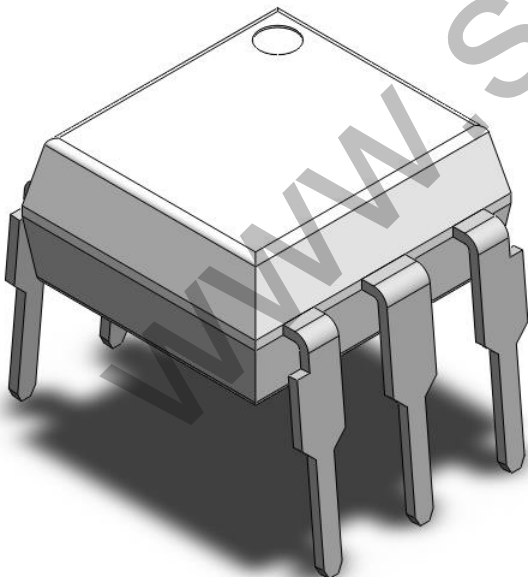
## Applications

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

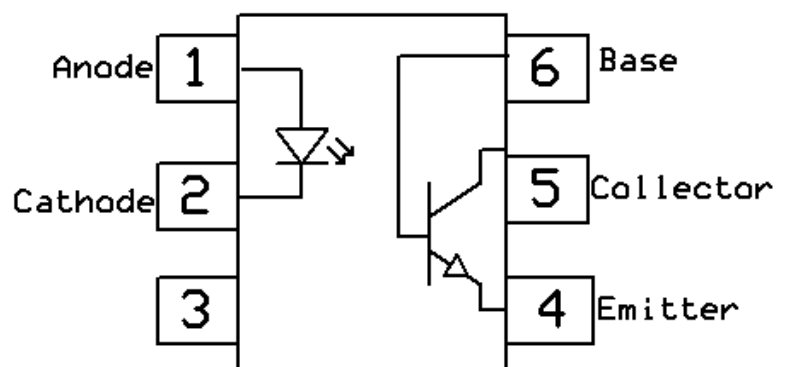
## Description

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



## Schematic



Note: Different bending options available. See package dimension.



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**

Symbol	Parameters	Ratings	Units	Notes
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	



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## 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

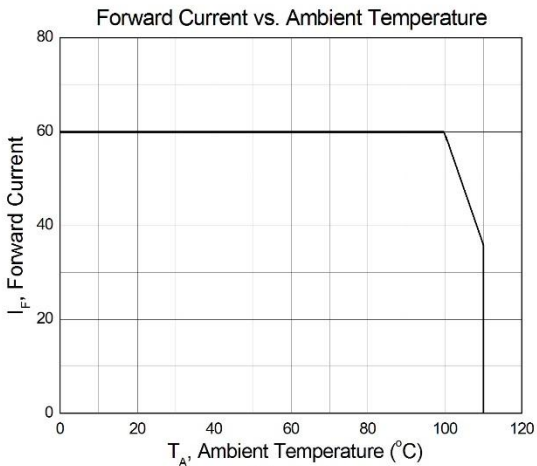


Figure 1

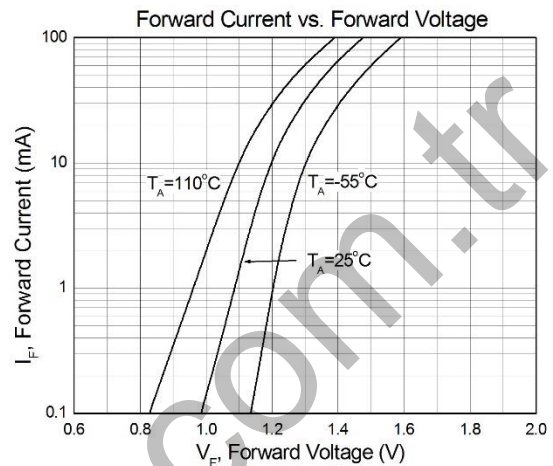


Figure 2

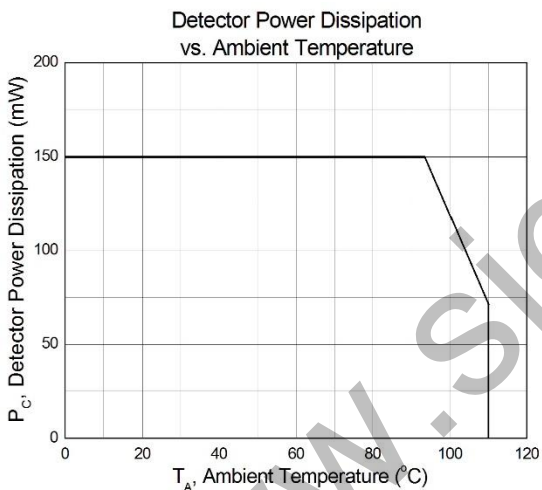


Figure 3

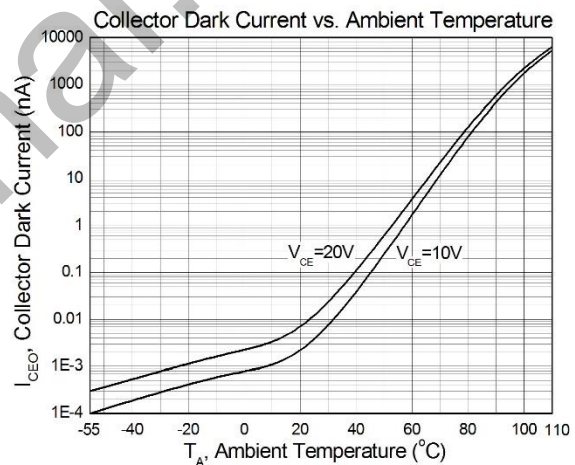


Figure 4

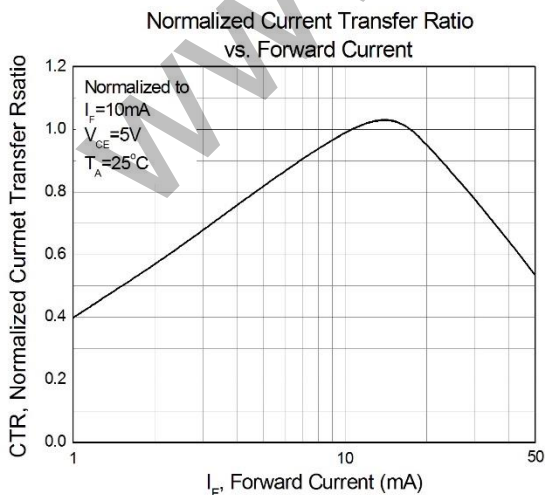


Figure 5

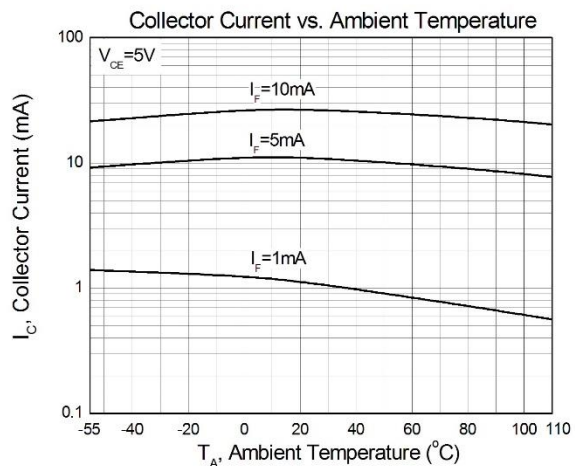


Figure 6



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

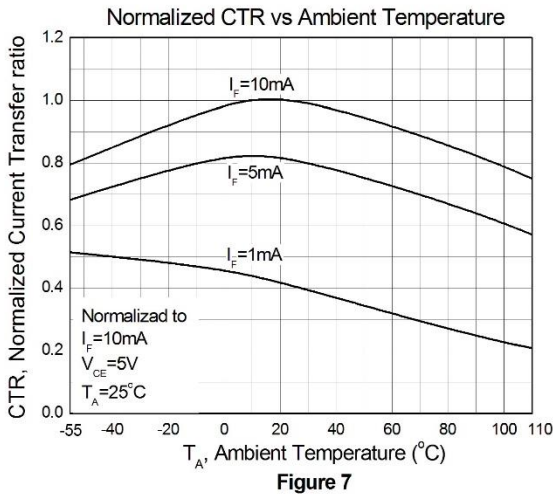


Figure 7

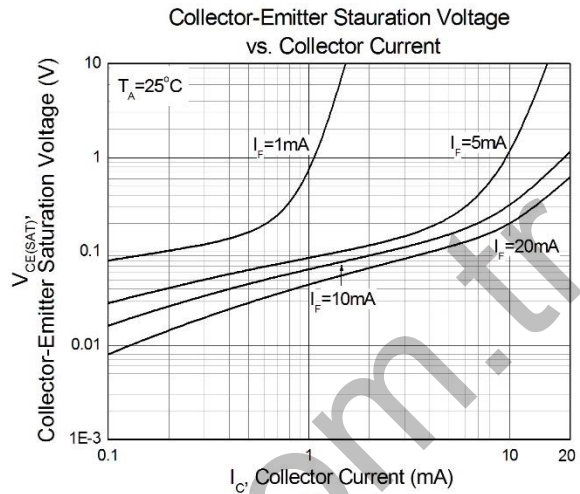


Figure 8

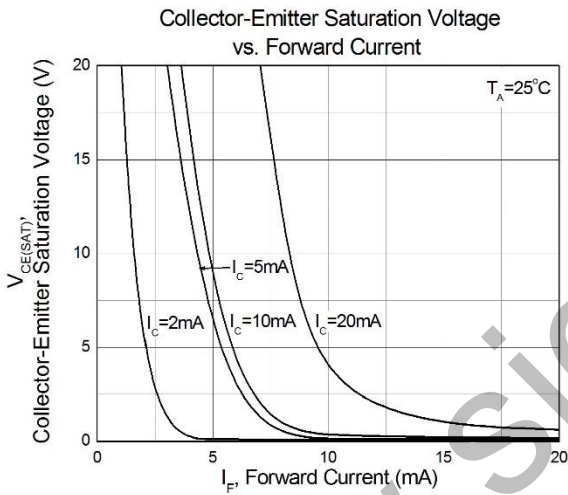


Figure 9

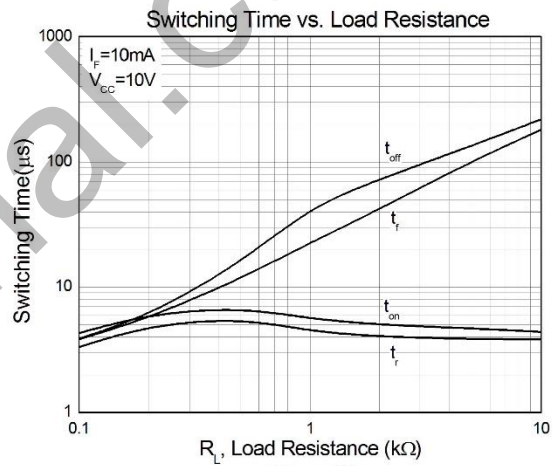


Figure 10

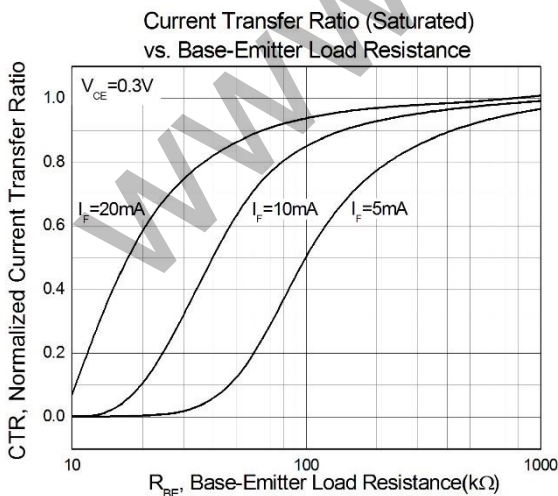


Figure 11

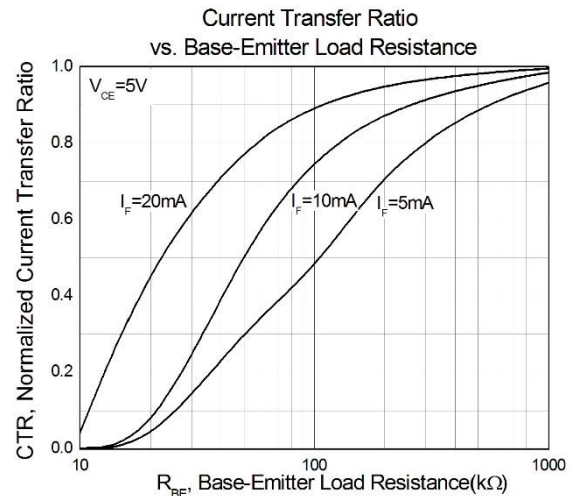


Figure 12



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

H11A1, H11A2, H11A3, H11A4, H11A5

DC Input 6-Pin Phototransistor Optocoupler

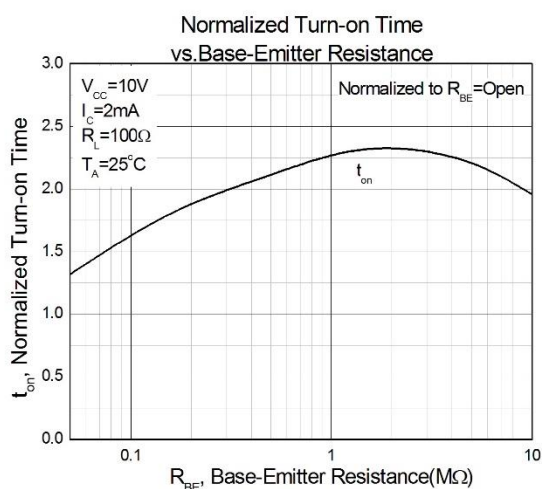


Figure 13

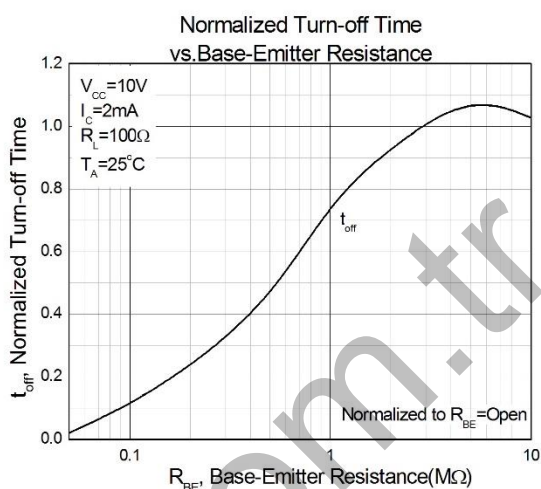


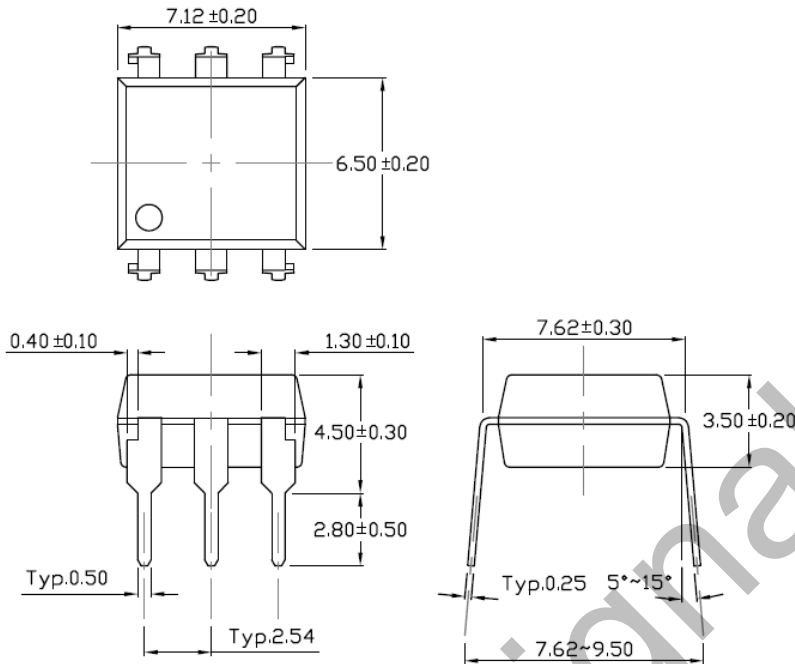
Figure 14



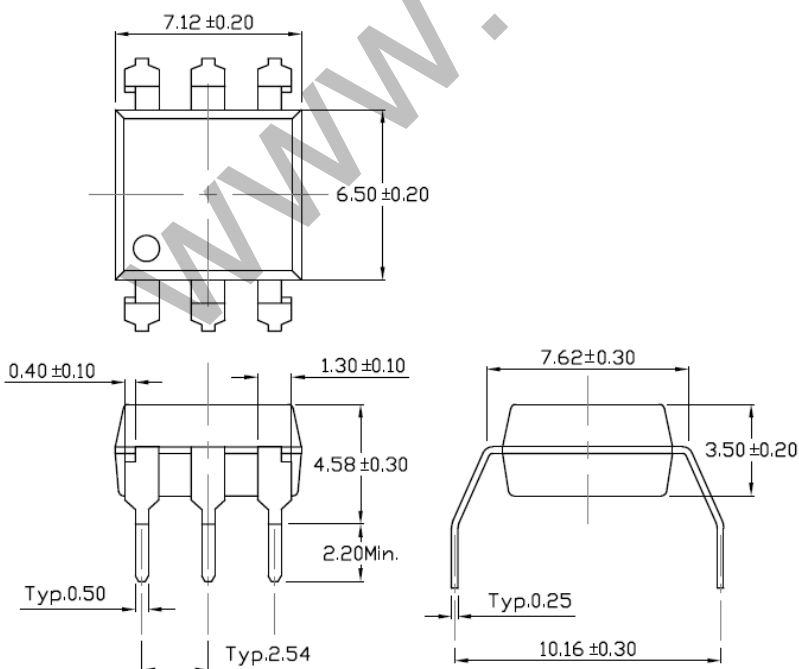
**4N25, 4N26, 4N27, 4N28, 4N35, 4N36, 4N37, 4N38**  
**H11A1, H11A2, H11A3, H11A4, H11A5**  
**DC Input 6-Pin Phototransistor Optocoupler**

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

**Standard DIP – Through Hole**



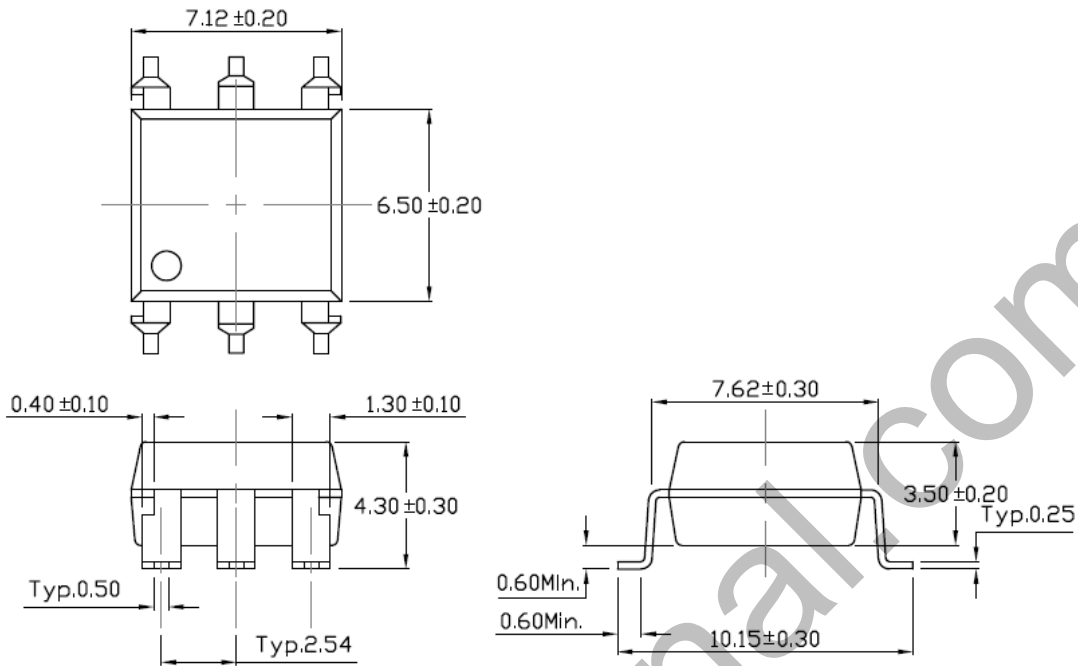
**Wide Lead Forming – Through Hole (M Type)**



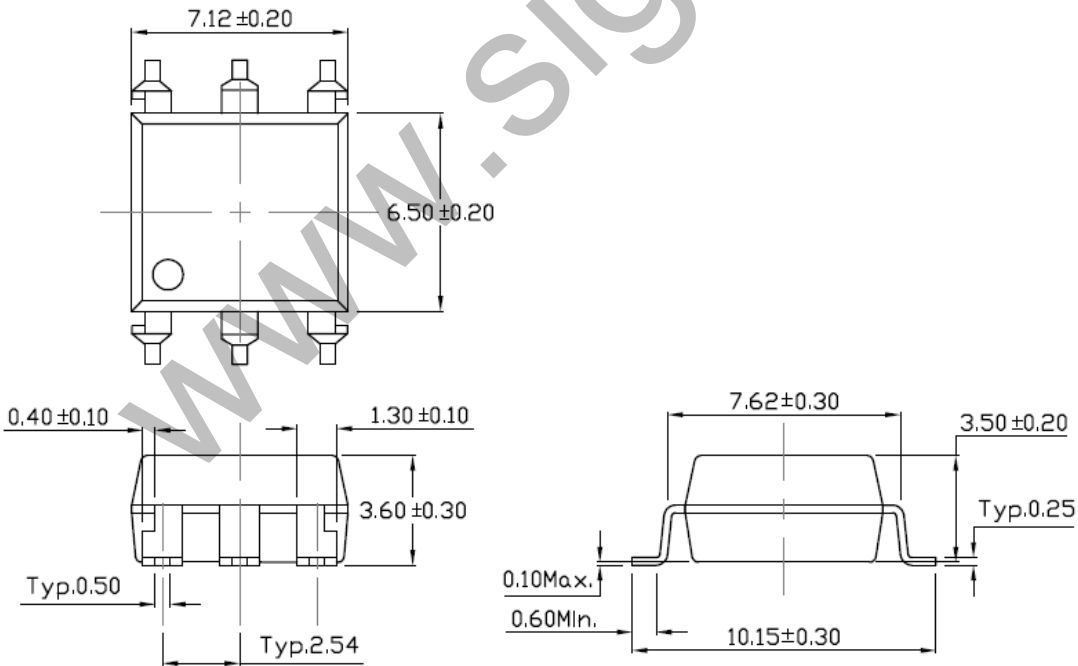


4N25, 4N26, 4N27, 4N28, 4N35, 4N36, 4N37, 4N38  
H11A1, H11A2, H11A3, H11A4, H11A5  
DC Input 6-Pin Phototransistor Optocoupler

Surface Mount Forming (S Type)



Surface Mount Forming (Low Profile) (SL Type)



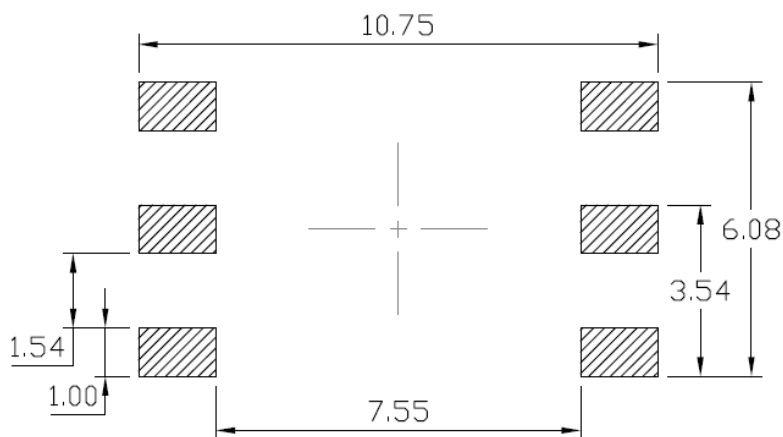


4N25, 4N26, 4N27, 4N28, 4N35, 4N36, 4N37, 4N38

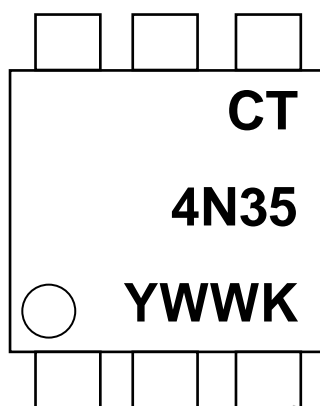
H11A1, H11A2, H11A3, H11A4, H11A5

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



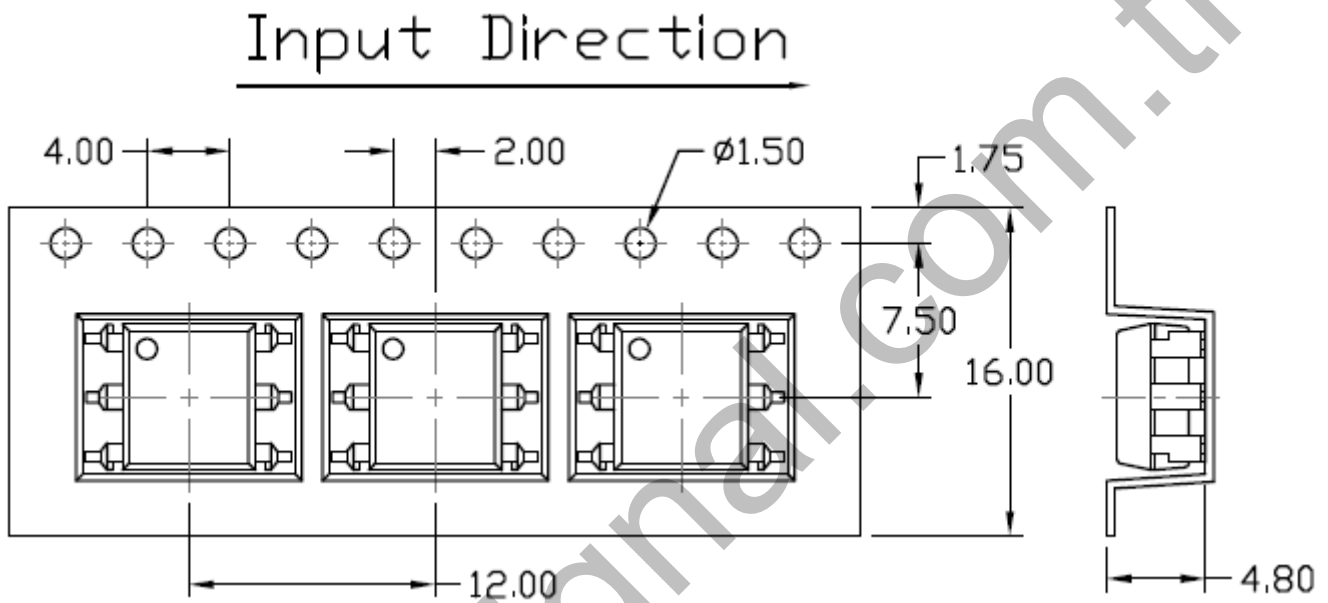
4N25, 4N26, 4N27, 4N28, 4N35, 4N36, 4N37, 4N38

H11A1, H11A2, H11A3, H11A4, H11A5

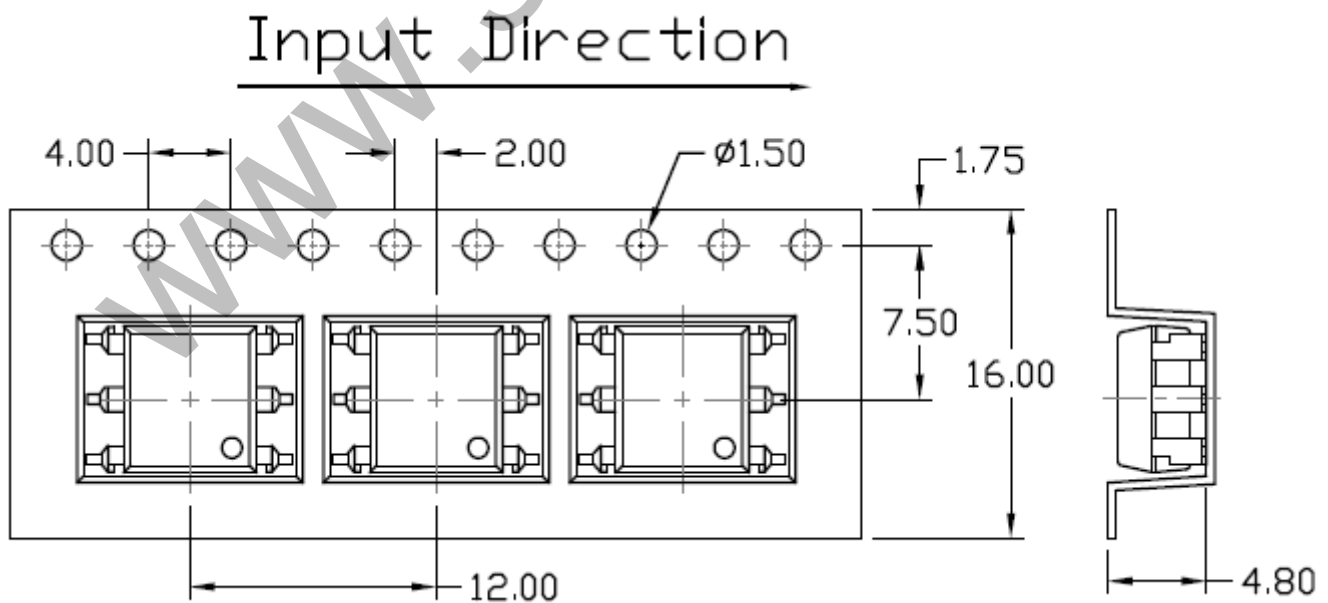
DC Input 6-Pin Phototransistor Optocoupler

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

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



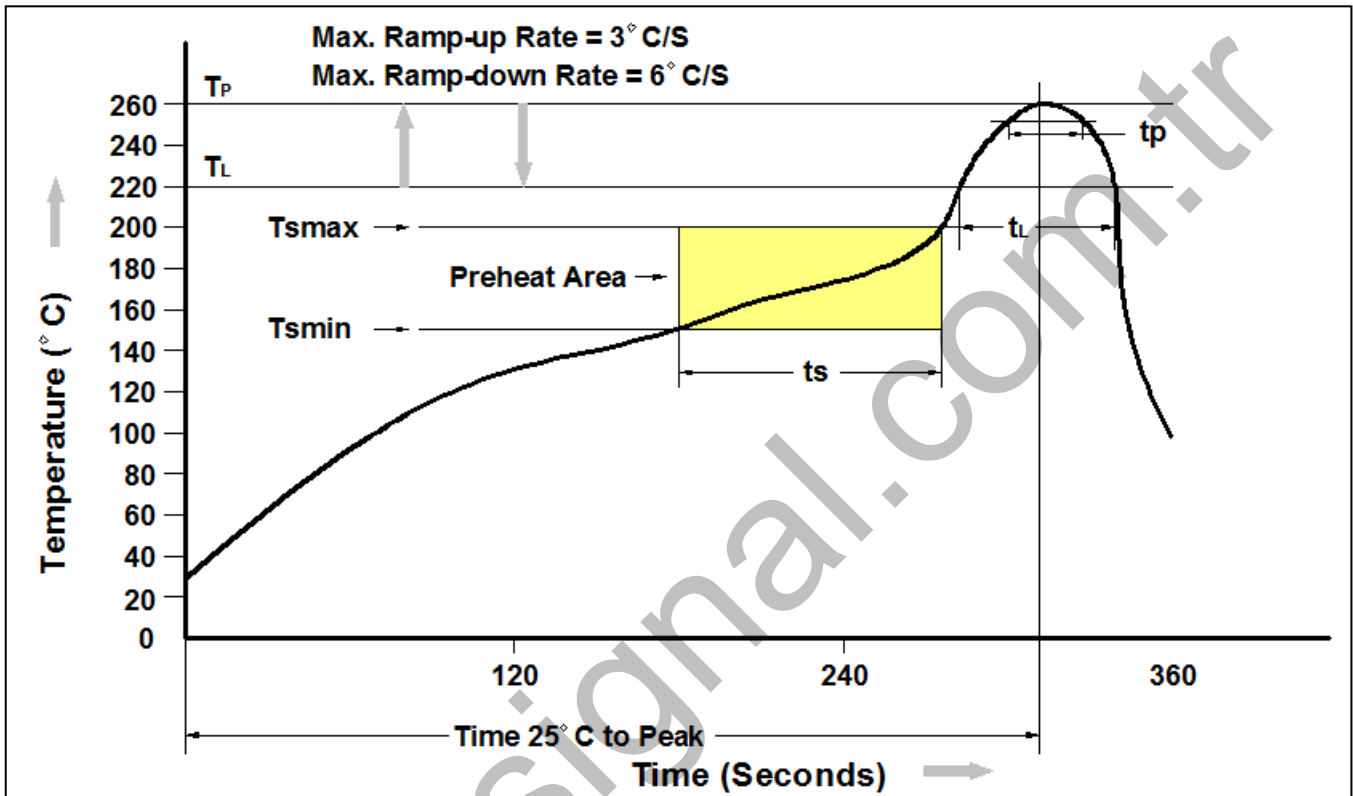
**Option S(T2) & SL(T2)**





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**H11A1, H11A2, H11A3, H11A4, H11A5**  
**DC Input 6-Pin Phototransistor Optocoupler**

**Reflow Profile**



Profile Feature	Pb-Free Assembly Profile
Temperature Min. (Tsmin)	150°C
Temperature Max. (Tsmax)	200°C
Time (ts) from (Tsmin to Tsmax)	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.



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H11A1, H11A2, H11A3, H11A4, H11A5  
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