



# 4N29, 4N30, 4N31, 4N32, 4N33 H11B1, H11B2, H11B3, H11B255, TIL113 DC Input 6-Pin Photodarlington Optocoupler

## Features

- High isolation 5000 VRMS
- CTR flexibility available see order information
- DC input with transistor output
- Temperature range - 55 °C to 100 °C
- Regulatory Approvals
  - UL - UL1577 (E364000)
  - VDE - EN60747-5-5(VDE0884-5)
  - CQC – GB4943.1, GB8898
  - IEC60065, IEC60950

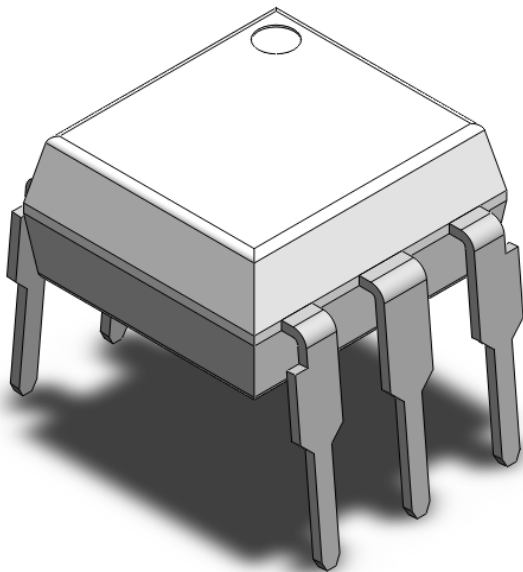
## Applications

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

## Description

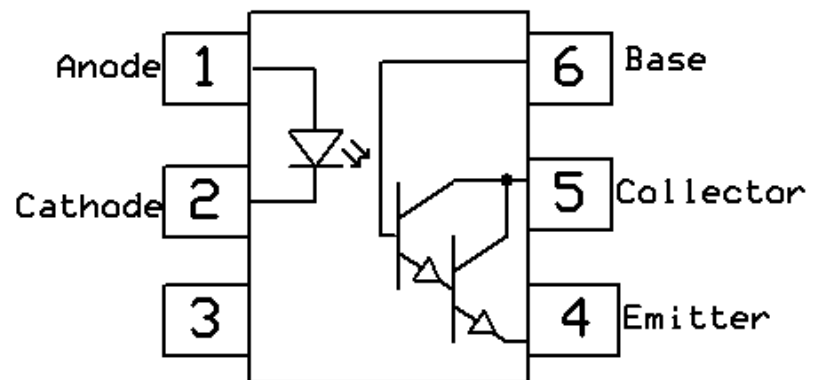
The 4N29, 4N30, 4N31, 4N32, 4N33, H11B1, H11B2, H11B3, H11B255, and TIL113 series consists of a photodarlington transistor optically coupled to a gallium arsenide Infrared-emitting diode in a 4-lead DIP package with bending option.

## Package Outline



Note: Different bending options available. See package dimension.

## Schematic





4N29, 4N30, 4N31, 4N32, 4N33  
H11B1, H11B2, H11B3, H11B255, TIL113  
DC Input 6-Pin Photodarlington 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 ~ +100	°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	120	mW	
<b>Detector</b>				
P <sub>D</sub>	Power dissipation	150	mW	
B <sub>VCEO</sub>	Collector-Emitter Breakdown Voltage	55	V	
B <sub>VCBO</sub>	Collector-Base Breakdown Voltage	55	V	
B <sub>VECO</sub>	Emitter-Collector Breakdown Voltage	7	V	
B <sub>VEBO</sub>	Emitter-Base Breakdown Voltage	7	V	



# 4N29, 4N30, 4N31, 4N32, 4N33 H11B1, H11B2, H11B3, H11B255, TIL113 DC Input 6-Pin Photodarlington 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	
$V_F$	Forward voltage	H11B3 $I_F=50\text{mA}$		1.45	1.5	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	$I_C= 100\mu\text{A}$	55	-	-	V	
$B_{V_{ECO}}$	Emitter-Collector Breakdown	$I_E= 100\mu\text{A}$	7	-	-	V	
$B_{V_{CBO}}$	Collector-Base Breakdown	$I_C= 100\mu\text{A}$	55	-	-	V	
$I_{CEO}$	Collector-Emitter Dark Current	$V_{CE}= 10\text{V}, I_F=0\text{mA}$	-	-	100	nA	

### Transfer Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
CTR	Current Transfer Ratio	4N29, 4N30	$I_F= 10\text{mA}, V_{CE}= 10\text{V}$	100	-	-	%
		4N31		50	-	-	
		4N32, 4N33		500	-	-	
		H11B1	$I_F= 1\text{mA}, V_{CE}= 10\text{V}$	500	-	-	
		H11B2		200	-	-	
		H11B3		100	-	-	
		H11B255	$I_F= 10\text{mA}, V_{CE}= 5\text{V}$	100	-	-	
		TIL113	$I_F= 10\text{mA}, V_{CE}= 1\text{V}$	300	-	-	
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage	4N29, 4N30, 4N32, 4N33	$I_F= 8\text{mA}, I_C= 2\text{mA}$	-	-	1.0	V
		4N31, TIL113	$I_F= 8\text{mA}, I_C= 2\text{mA}$	-	-	1.2	
		H11B1, H11B2, H11B3	$I_F= 1\text{mA}, I_C= 1\text{mA}$	-	-	1.0	
		H11B255	$I_F=50\text{mA}, I_C= 50\text{mA}$	-	-	1.0	
$R_{IO}$	Isolation Resistance	$V_{IO}= 500\text{V}_{DC}$	$1 \times 10^{11}$			$\Omega$	
$C_{IO}$	Isolation Capacitance	$f= 1\text{Mhz}$		0.25		pF	



# 4N29, 4N30, 4N31, 4N32, 4N33 H11B1, H11B2, H11B3, H11B255, TIL113 DC Input 6-Pin Photodarlington Optocoupler

## Switching Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
T <sub>ON</sub>	4N29, 4N30, 4N31, 4N32, 4N33, TIL113	I <sub>F</sub> = 200mA, I <sub>C</sub> = 50mA, R <sub>L</sub> = 100Ω	-	-	4.7	μs	
	H11B1, H11B2, H11B3, H11B255	I <sub>F</sub> = 10mA, V <sub>CE</sub> = 10V, R <sub>L</sub> = 100Ω	-	24	-		
T <sub>OFF</sub>	4N29, 4N30, 4N31	I <sub>F</sub> = 200mA, I <sub>C</sub> = 50mA, R <sub>L</sub> = 100Ω	-	-	30	μs	
	4N32, 4N33, TIL113		-	-	90		
	H11B1, H11B2, H11B3, H11B255	I <sub>F</sub> = 10mA, V <sub>CE</sub> = 10V, R <sub>L</sub> = 100Ω	-	17	-		



# 4N29, 4N30, 4N31, 4N32, 4N33 H11B1, H11B2, H11B3, H11B255, TIL113 DC Input 6-Pin Photodarlington Optocoupler

## Typical Characteristic Curves

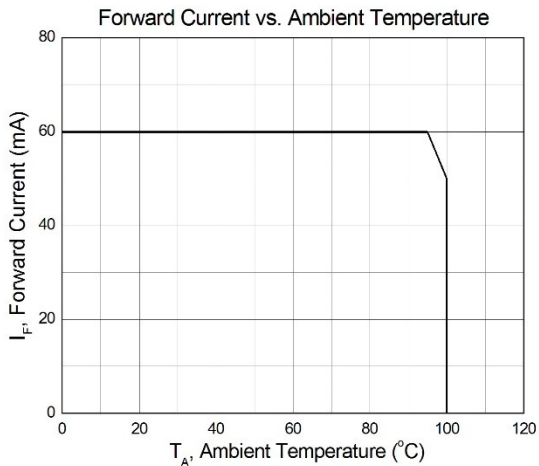


Figure 1

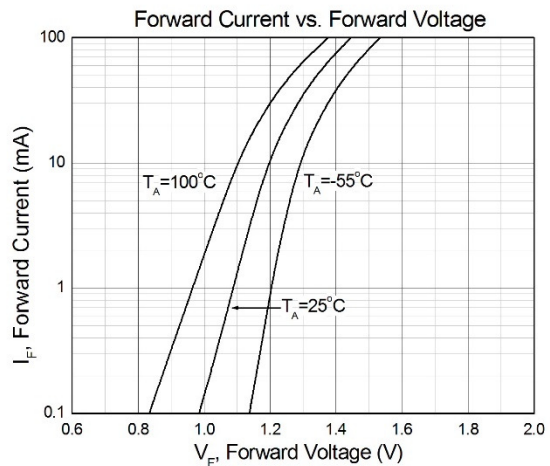


Figure 2

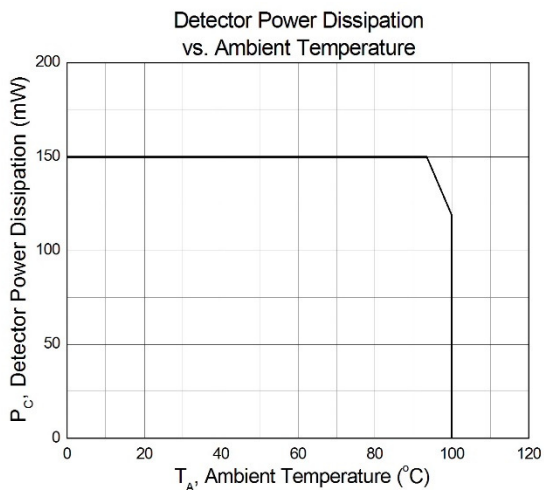


Figure 3

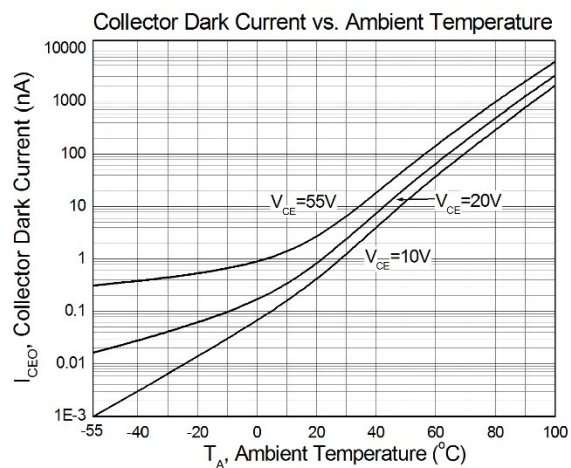


Figure 4

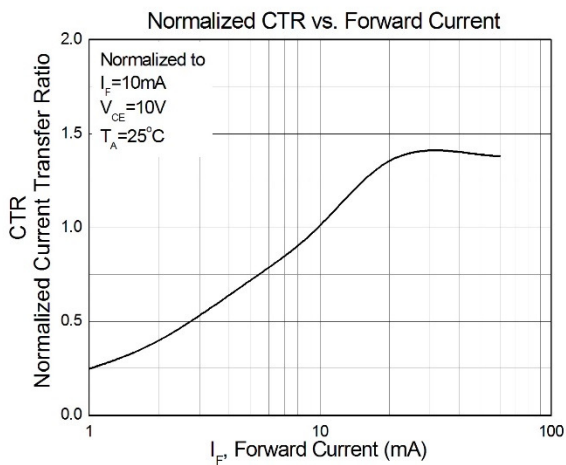


Figure 5

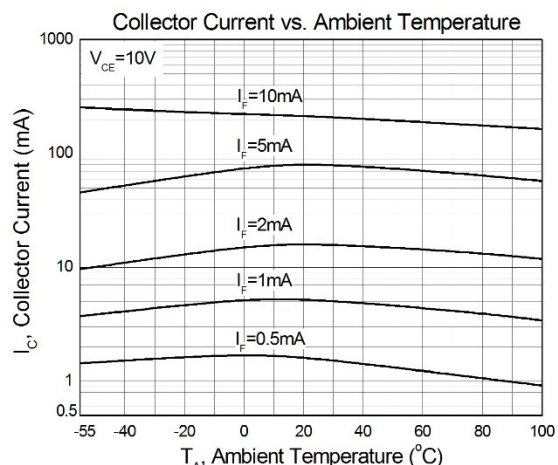


Figure 6



# 4N29, 4N30, 4N31, 4N32, 4N33 H11B1, H11B2, H11B3, H11B255, TIL113 DC Input 6-Pin Photodarlington Optocoupler

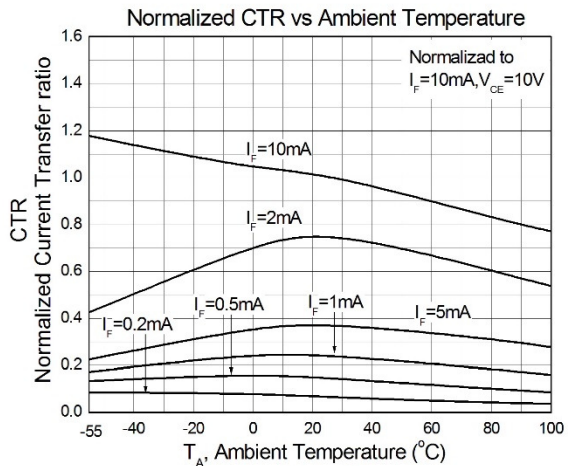


Figure 7

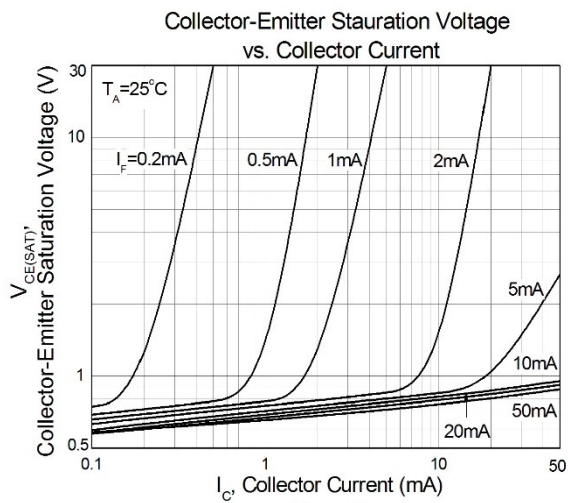


Figure 8

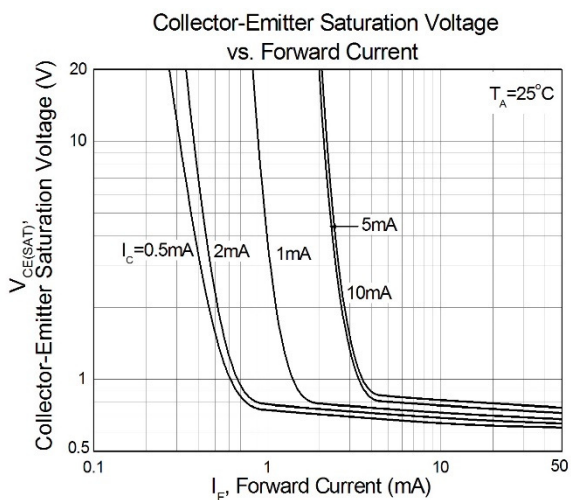


Figure 9

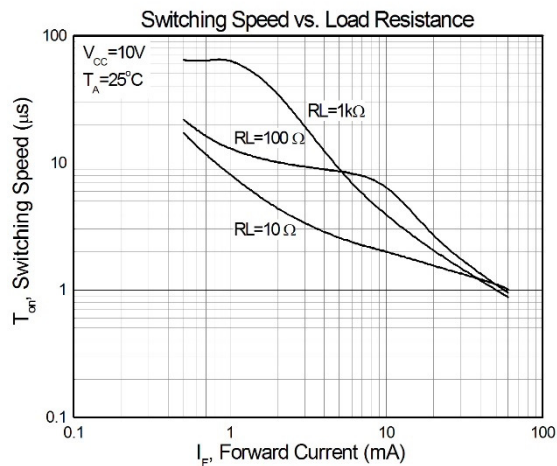


Figure 10

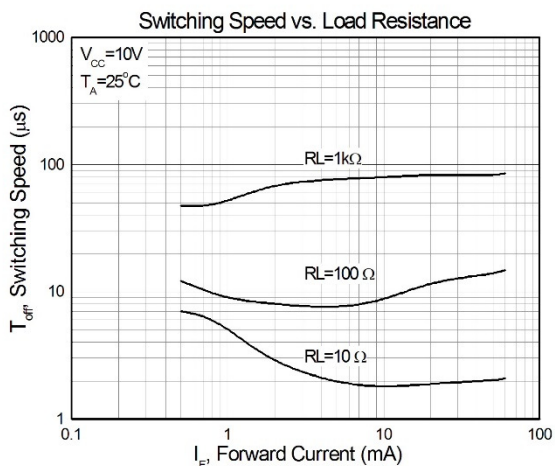


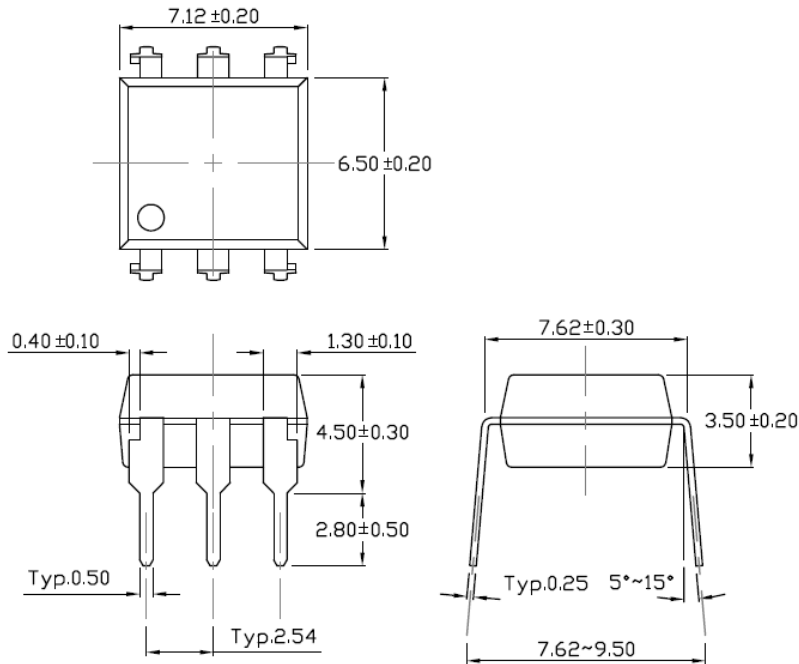
Figure 11



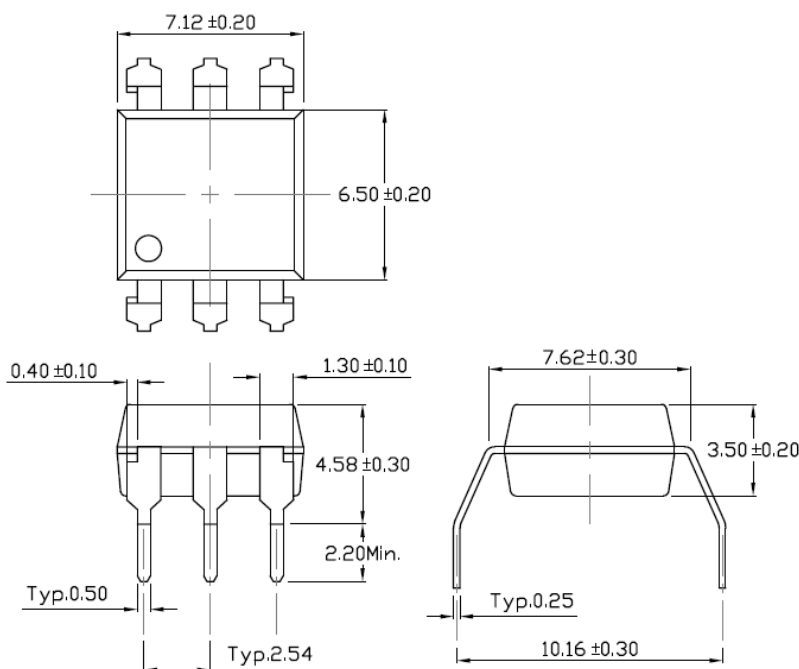
# 4N29, 4N30, 4N31, 4N32, 4N33 H11B1, H11B2, H11B3, H11B255, TIL113 DC Input 6-Pin Photodarlington Optocoupler

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

### Standard DIP – Through Hole



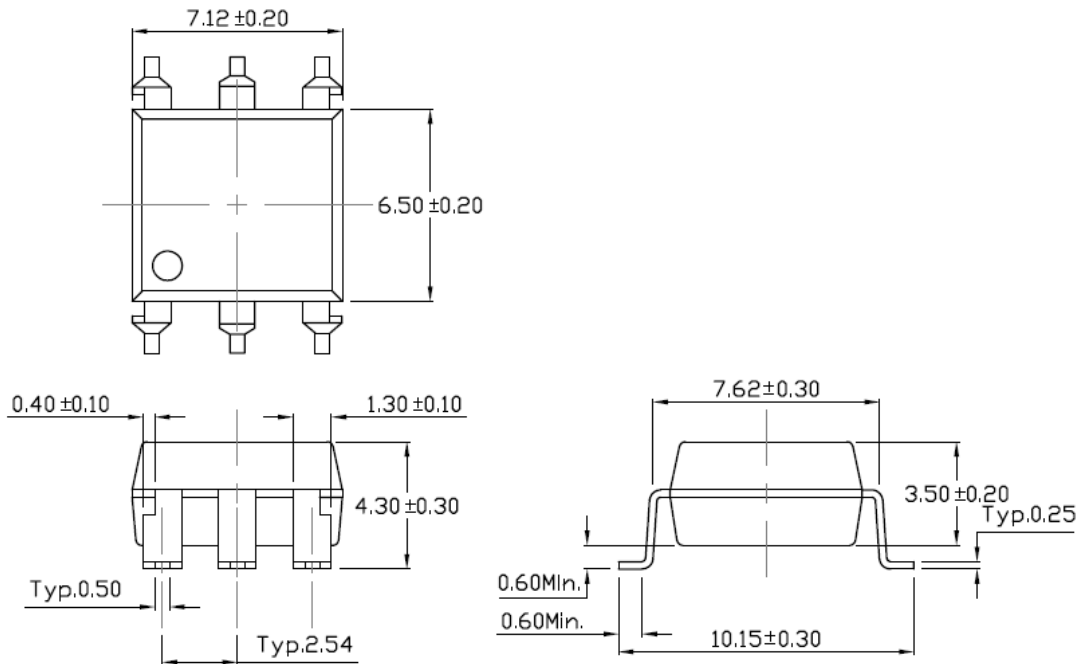
### Wide Lead Forming – Through Hole (M Type)



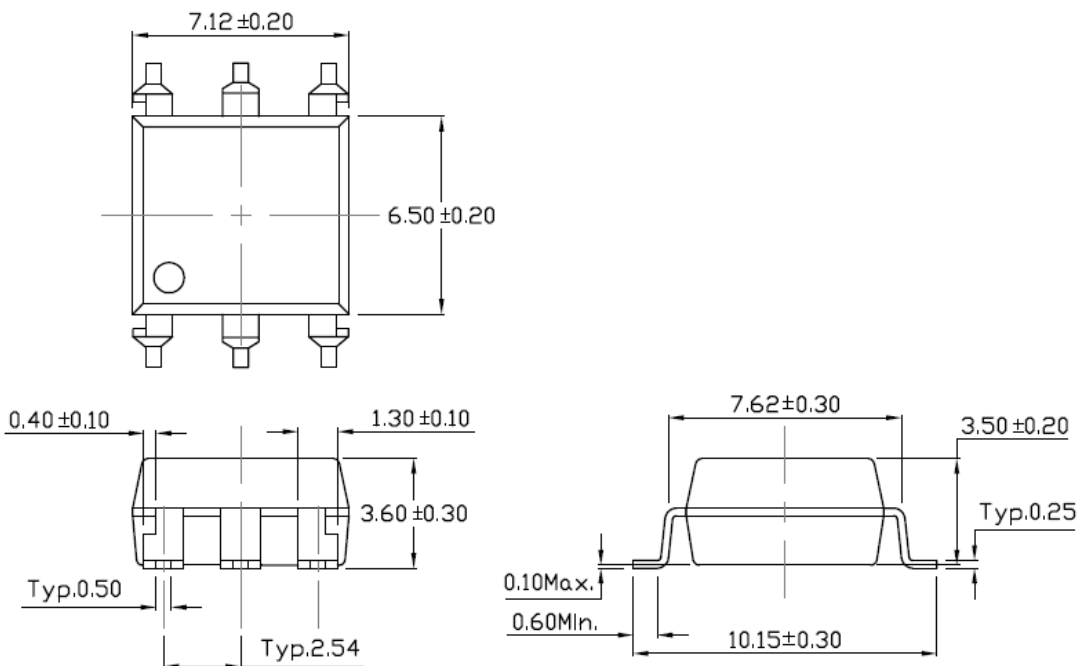


# 4N29, 4N30, 4N31, 4N32, 4N33 H11B1, H11B2, H11B3, H11B255, TIL113 DC Input 6-Pin Photodarlington Optocoupler

## Surface Mount Forming (S Type)



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

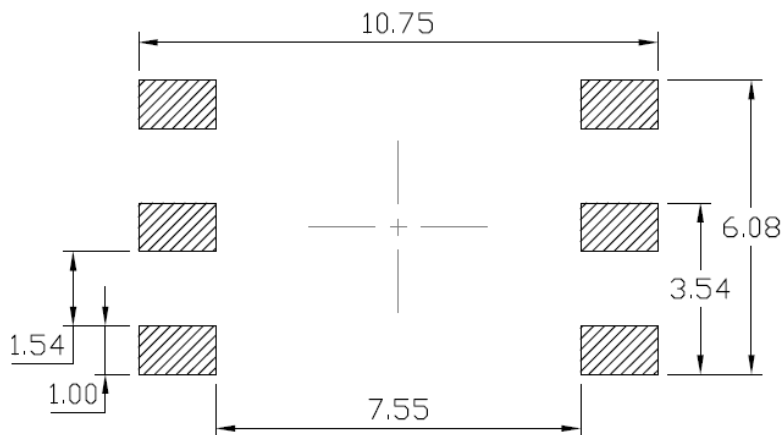




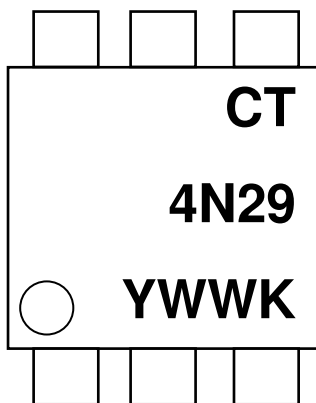


# 4N29, 4N30, 4N31, 4N32, 4N33 H11B1, H11B2, H11B3, H11B255, TIL113 DC Input 6-Pin Photodarlington Optocoupler

## Recommended Solder Mask *Dimensions in mm unless otherwise stated*



## Marking Information



### Note:

- CT : Denotes "CT Micro"
- 4N29 : Part Number
- Y : Fiscal Year
- WW : Work Week
- K : Manufacturing Code



**4N29, 4N30, 4N31, 4N32, 4N33**  
**H11B1, H11B2, H11B3, H11B255, TIL113**  
**DC Input 6-Pin Photodarlington Optocoupler**

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## Ordering Information

4N2X(Y)(Z)-G, 4N3X(Y)(Z)-G, H11BX(Y)(Z)-G, TIL113(Y)(Z)-G

X = (9 for 4N2X), (0,1,2,3 for 4N3X series), (1,2,3,255 for H11BX series)

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)

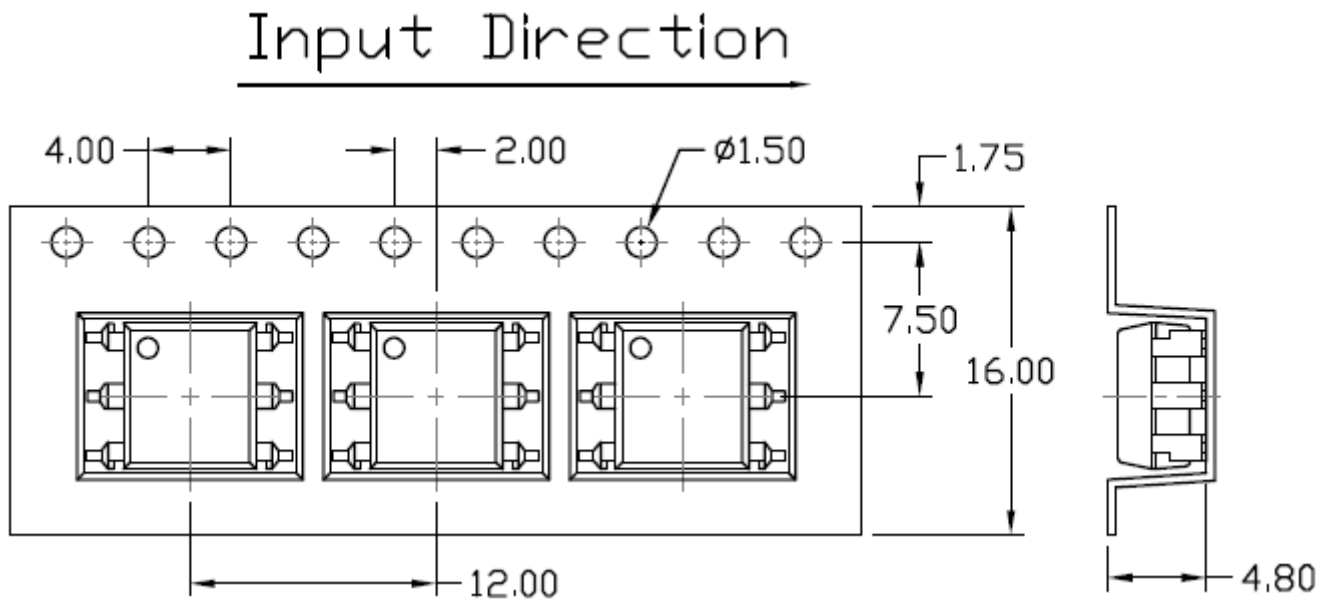
<b>Option</b>	<b>Description</b>	<b>Quantity</b>
None	Standard 6 Pin Dip	65Units/Tube
M	Wide Lead Forming	65Units/Tube
S(T1)	Surface Mount Lead Forming – With Option 1 Taping	1000 Units/Reel
S(T2)	Surface Mount Lead Forming – With Option 2 Taping	1000 Units/Reel
SL(T1)	Surface Mount Lead Forming(Low Profile) – With Option 1 Taping	1000 Units/Reel
SL(T2)	Surface Mount Lead Forming(Low Profile) – With Option 2 Taping	1000 Units/Reel



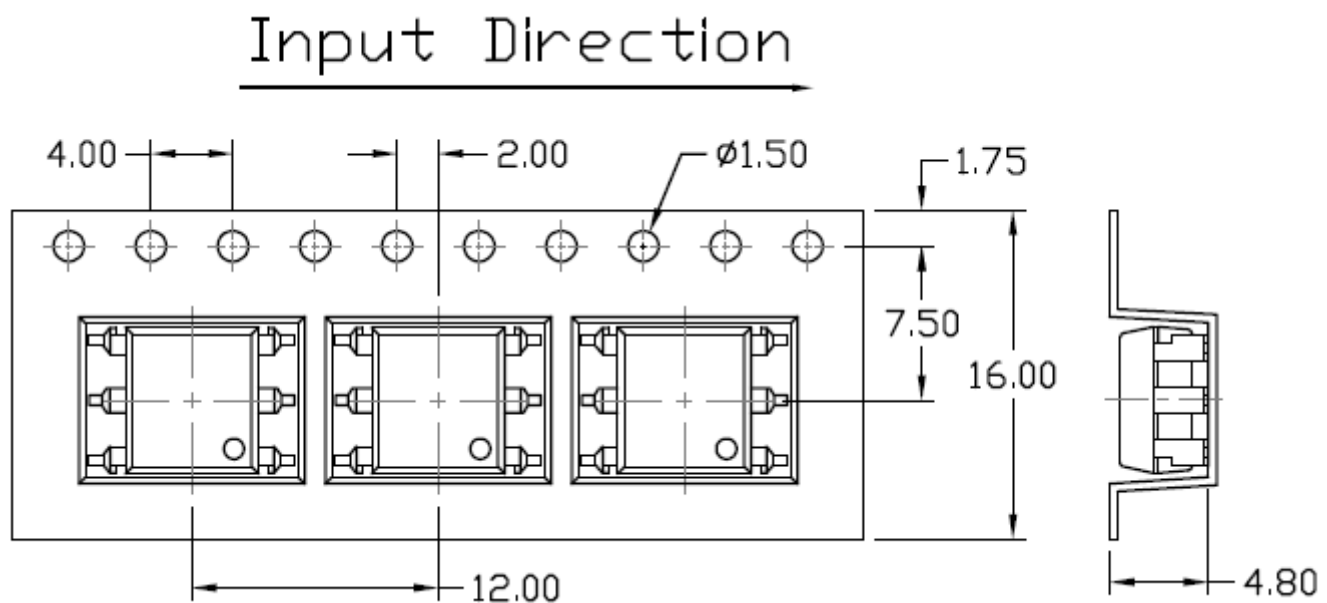
4N29, 4N30, 4N31, 4N32, 4N33  
H11B1, H11B2, H11B3, H11B255, TIL113  
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**Carrier Tape Specifications** *Dimensions in mm unless otherwise stated*

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



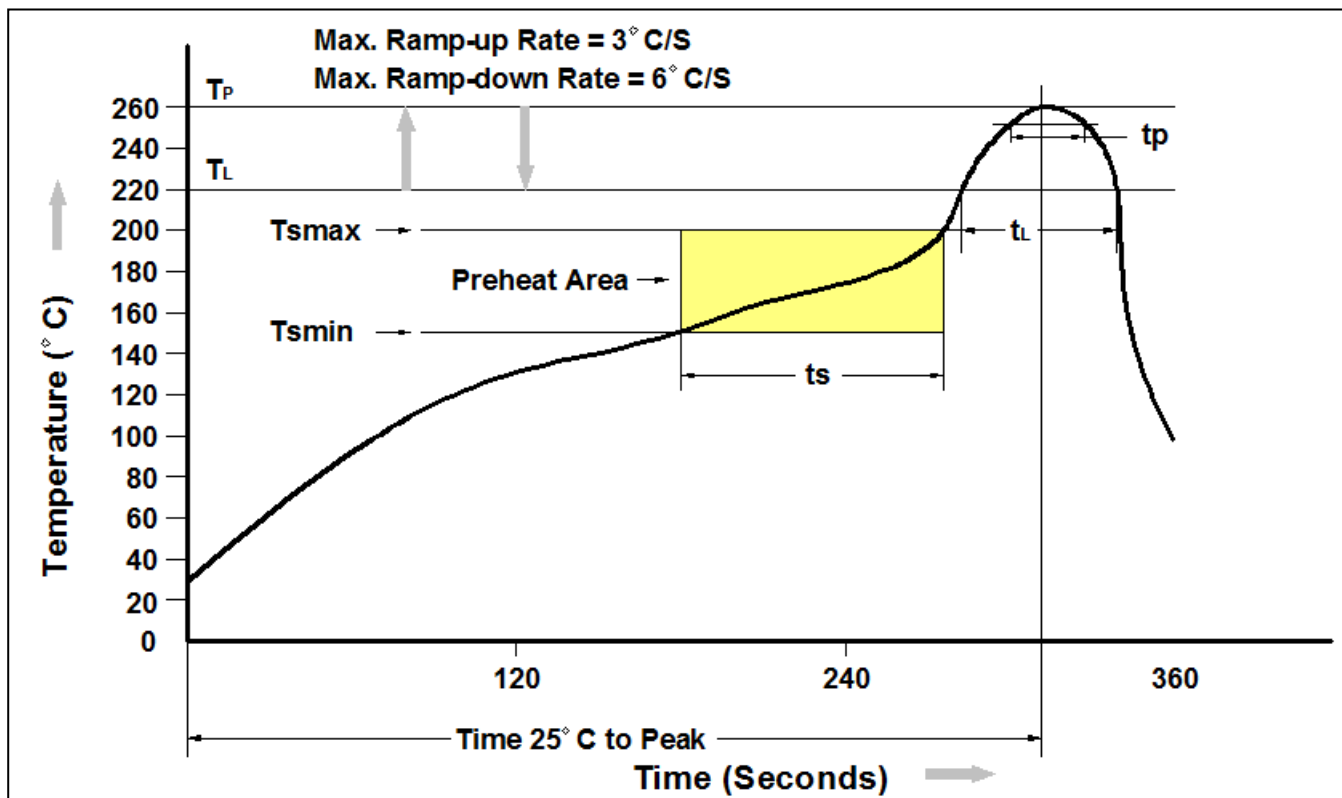
**Option S(T2) & SL(T2)**





# 4N29, 4N30, 4N31, 4N32, 4N33 H11B1, H11B2, H11B3, H11B255, TIL113 DC Input 6-Pin Photodarlington 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.



4N29, 4N30, 4N31, 4N32, 4N33  
H11B1, H11B2, H11B3, H11B255, TIL113  
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