

**DIP6, DC Input, Photo Transistor Coupler**

**Description**

The 4N25, 4N26, 4N27, 4N28, 4N35, 4N36, 4N37, 4N38, H11A1, H11A2, H11A3, H11A4, H11A5 series combine an AlGaAs infrared emitting diode as the emitter which is optically coupled to a silicon planar phototransistor detector in a plastic DIP6 package with different lead forming options.

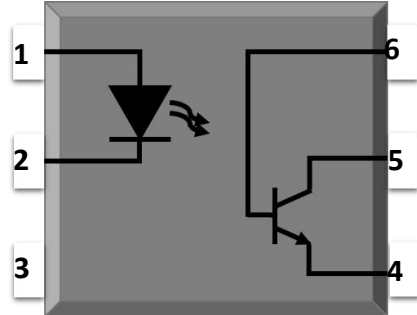
**Features**

- High isolation 5000 VRMS
- DC input with transistor output
- Operating temperature range - 55 °C to 110 °C
- RoHS & REACH Compliance
- MSL class 1
- Regulatory Approvals
  - UL - UL1577
  - VDE - EN60747-5-5(VDE0884-5)
  - CQC - GB4943.1, GB8898
  - cUL- CSA Component Acceptance Service Notice No. 5A

**Applications**

- Sequence controller
- Telephone/FAX
- System appliances, measuring instrument
- Programmable logic controller

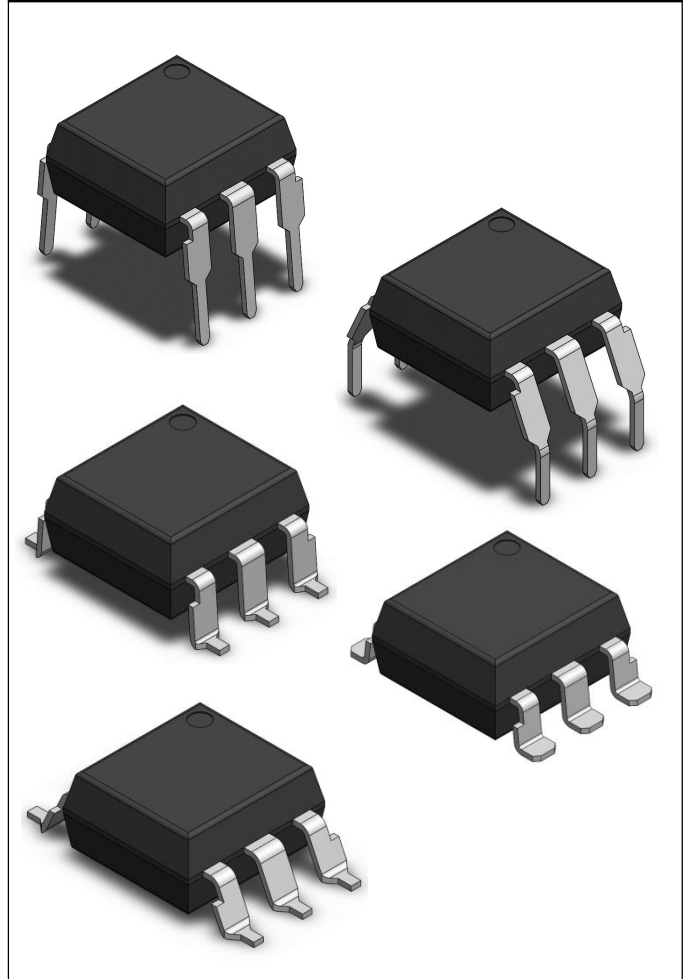
**SCHEMATIC**



**PIN DEFINITION**

<b>1. Anode</b>	<b>6. Base</b>
<b>2. Cathode</b>	<b>5. Collector</b>
<b>3. NC</b>	<b>4. Emitter</b>

**PACKAGE OUTLINE**





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**ABSOLUTE MAXIMUM RATINGS**

PARAMETER	SYMBOL	VALUE	UNIT	NOTE
<b>INPUT</b>				
Forward Current	$I_F$	50	mA	
Peak Forward Current( $t=10\mu s$ )	$I_{FM}$	1	A	1
Reverse Voltage	$V_R$	6	V	
Power Dissipation( $T_A=25^\circ C$ )	$P_D$	70	mW	
<b>OUTPUT</b>				
Collector - Emitter Voltage	$V_{CEO}$	80	V	
Collector-Base Breakdown Voltage	$V_{CBO}$	80	V	
Emitter - Collector Voltage	$V_{ECO}$	7	V	
Emitter-Base Breakdown Voltage	$V_{EBO}$	7	V	
Collector Current	$I_C$	80	mA	
Power Dissipation( $T_A=25^\circ C$ )	$P_C$	150	mW	
<b>COMMON</b>				
Total Power Dissipation	$P_{tot}$	200	mW	
Isolation Voltage	$V_{iso}$	5000	Vrms	2
Operating Temperature	$T_{opr}$	-55~+110	$^\circ C$	
Storage Temperature	$T_{stg}$	-55~+110	$^\circ C$	
Soldering Temperature	$T_{sol}$	260	$^\circ C$	

Note 1. AC For 1 Minute, R.H. = 40 ~ 60%

Note 2. For 10 seconds



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**ELECTRICAL OPTICAL CHARACTERISTICS at Ta=25°C**

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNIT	TEST CONDITION	NOTE
INPUT							
Forward Voltage	$V_F$	-	1.24	1.4	V	$I_F=10mA$	
Reverse Current	$I_R$	-	-	10	$\mu A$	$V_R=6V$	
Input Capacitance	$C_{in}$	-	30	-	pF	$V=0, f=1kHz$	
OUTPUT							
Collector Dark Current	$I_{CEO}$	-	-	50	nA	$V_{CE}=10V, I_F=0$	
Collector-Emitter Breakdown Voltage	$BV_{CEO}$	80	-	-	V	$I_C=1mA, I_F=0$	
Emitter-Collector Breakdown Voltage	$BV_{ECO}$	7	-	-	V	$I_E=0.1mA, I_F=0$	
Collector-Base Breakdown	$BV_{CBO}$	80	-	-	V	$I_C=0.1mA, I_F=0$	
Emitter-Base Breakdown	$BV_{EBO}$	7	-	-	V	$I_E=0.1mA, I_F=0$	



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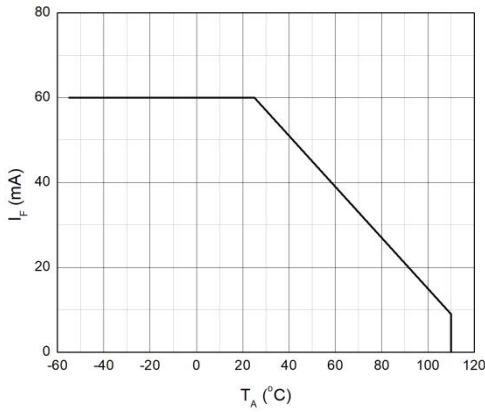
TRANSFER CHARACTERISTICS							
Current Transfer Ratio	CTR	4N35, 4N36, 4N37	100	-	-	%	IF=10mA, VCE=10V
		4N25,4N26, 4N38 H11A2, H11A3	20	-	-		
		4N27, 4N28,H11A4	10	-	-		
		H11A1	50	-	-		
		H11A5	30	-	-		
Collector-Emitt er Saturation Voltage	V <sub>CE(sat)</sub>	4N35,4N36,4N37	-	-	0.3	V	IF= 10mA, IC= 0.5mA
		4N38	-	-	1.0		IF= 20mA, IC= 4mA
		4N25,4N26, 4N27,4N28	-	-	0.5		IF= 50mA, IC= 2mA
		H11A1,H11A2, H11A3,H11A4, H11A5	-	-	0.4		IF= 10mA, IC= 0.5mA
Isolation Resistance	R <sub>IO</sub>		10 <sup>12</sup>	10 <sup>14</sup>	-	Ω	V <sub>IO</sub> =500Vdc.
Floating Capacitance	C <sub>IO</sub>		-	0.2	1	pF	V=0, f=1MHz
Cut-off Frequency	f <sub>c</sub>		-	6	-	kHz	VCE=5V, IC=2mA RL=100Ω,-3dB
Turn On Time	t <sub>on</sub>	4N25,4N26,4N27, 4N28,H11A1, H11A2,H11A3, H11A4,H11A5	-	3	15	-	IF= 10mA, VCC= 10V, RL= 100Ω
		4N35,4N36,4N37, 4N38	-	10	12	-	Ic= 2mA, VCC= 10V, RL= 100Ω
Turn Off Time	t <sub>off</sub>	4N25,4N26,4N27, 4N28,4N28,H11A1, H11A2,H11A3, H11A4,H11A5	-	3	16	-	IF= 10mA, VCC= 10V, RL= 100Ω
		4N35,4N36,4N37, 4N38	-	9	12	-	Ic= 10mA, VCC= 10V, RL= 100Ω



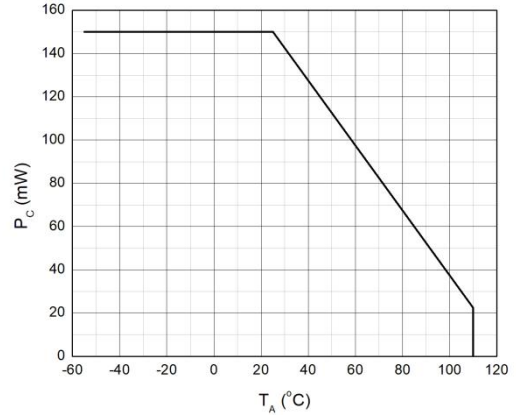
**DIP6, DC Input, Photo Transistor Coupler**

**CHARACTERISTIC CURVES**

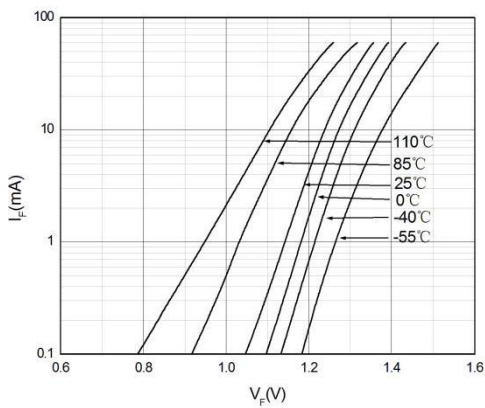
**Fig.1 Forward Current vs. Ambient Temperature**



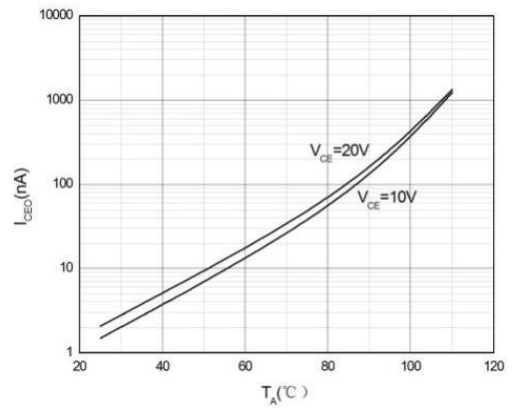
**Fig.2 Collector Power Dissipation vs. Ambient Temperature**



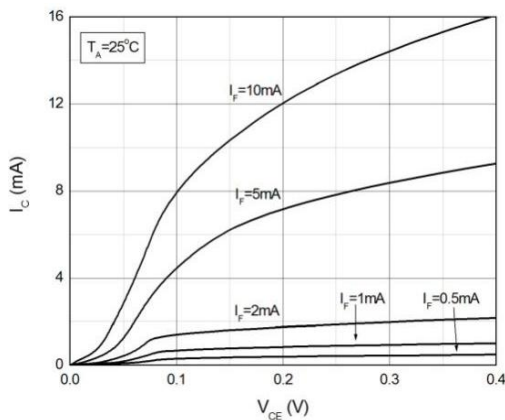
**Fig.3 Forward Current vs. Forward Voltage**



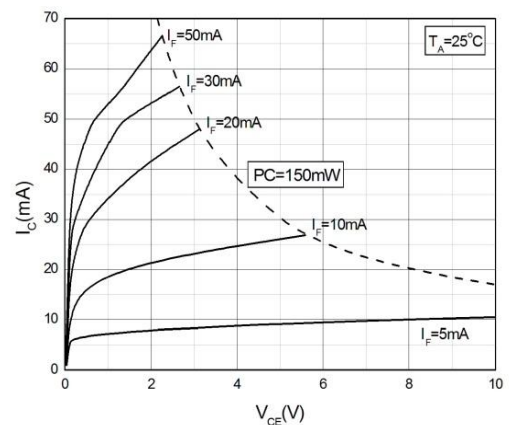
**Fig.4 Collector Dark Current vs. Ambient Temperature**



**Fig.5 Collector Current vs. Collector-emitter Voltage**

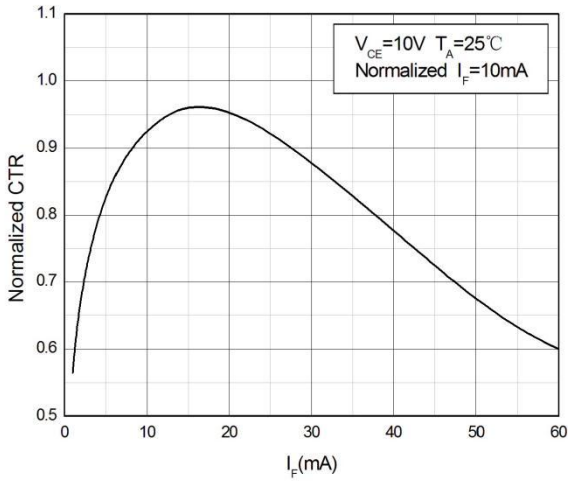


**Fig.6 Collector Current vs. Collector-emitter Voltage**

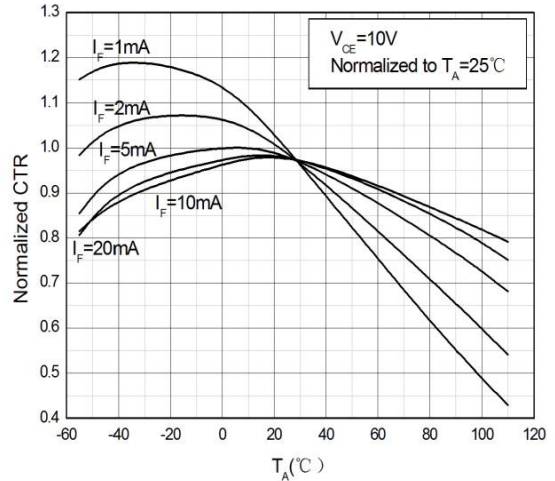


**CHARACTERISTIC CURVES**

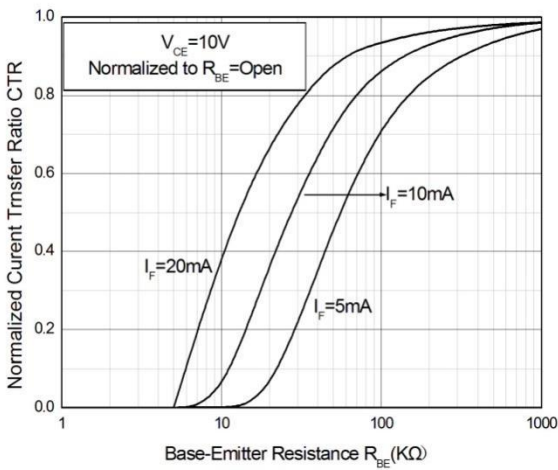
**Fig.7 Normalized Current Transfer Ratio vs. Forward Current**



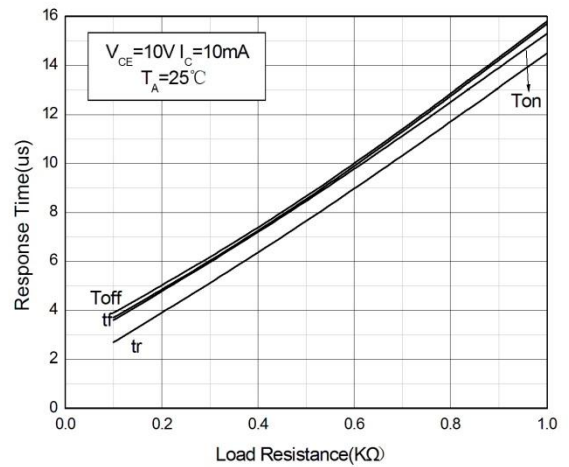
**Fig.8 Normalized Current Transfer Ratio vs. Ambient Temperature**



**Fig.9 Current Transfer Ratio(Unsaturated) vs Base-Emitter Resistance**



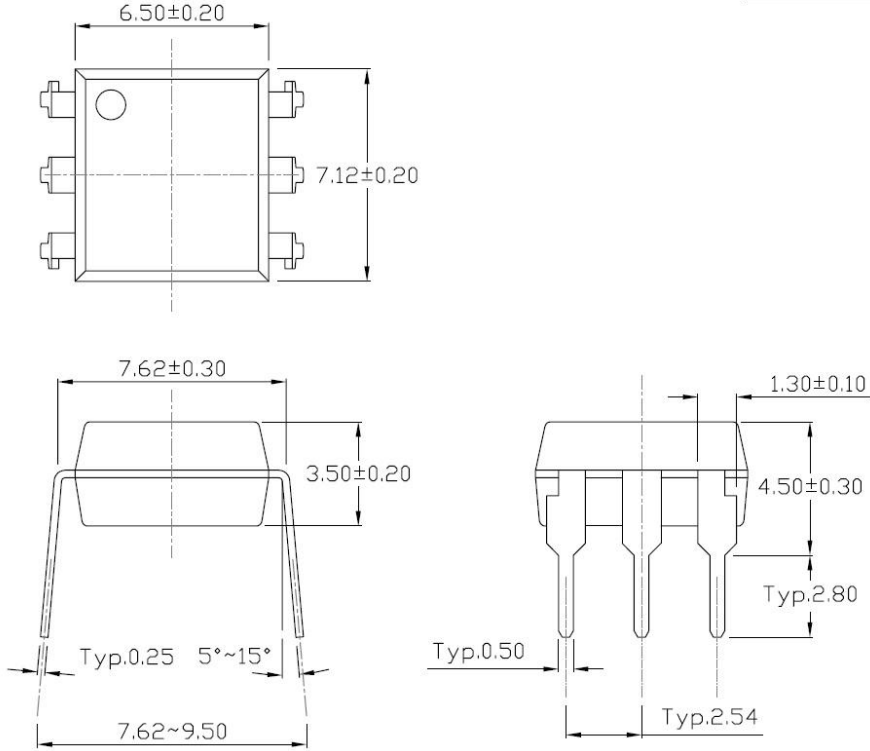
**Fig.10 Switching Time vs. Load Resistance**



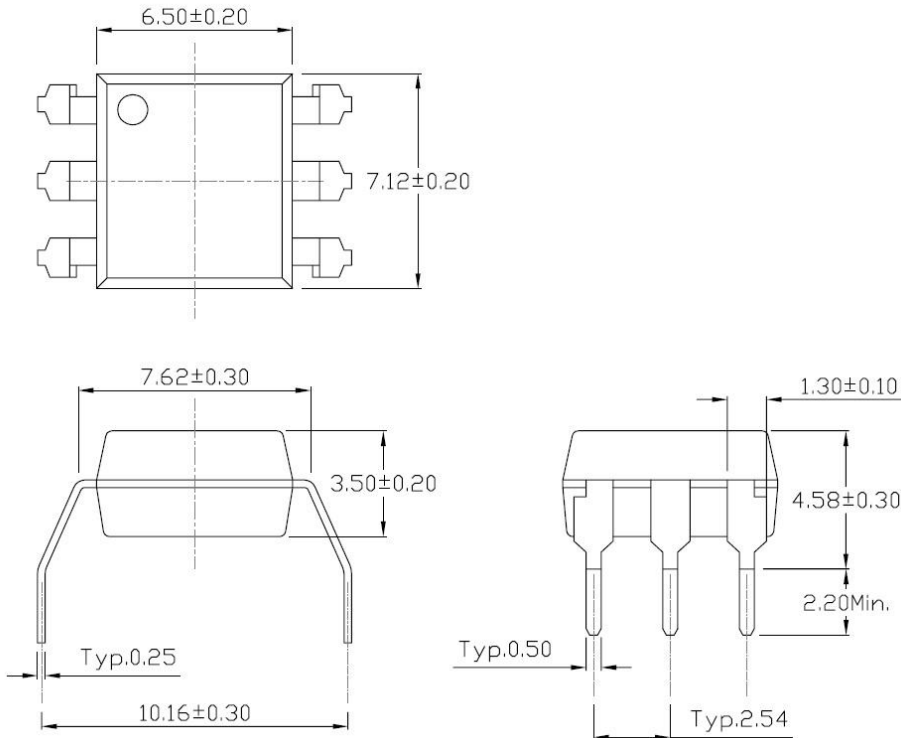
**DIP6, DC Input, Photo Transistor Coupler**

**PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)**

**Standard DIP – Through Hole (DIP Type)**



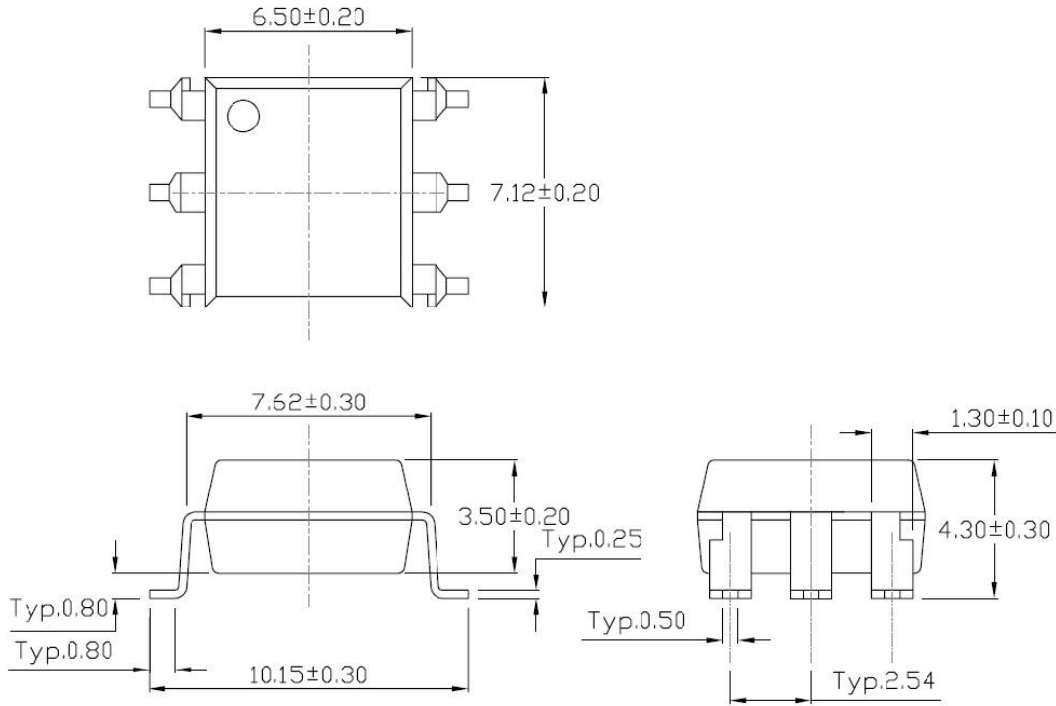
**Gullwing (400mil) Lead Forming – Through Hole (M Type)**



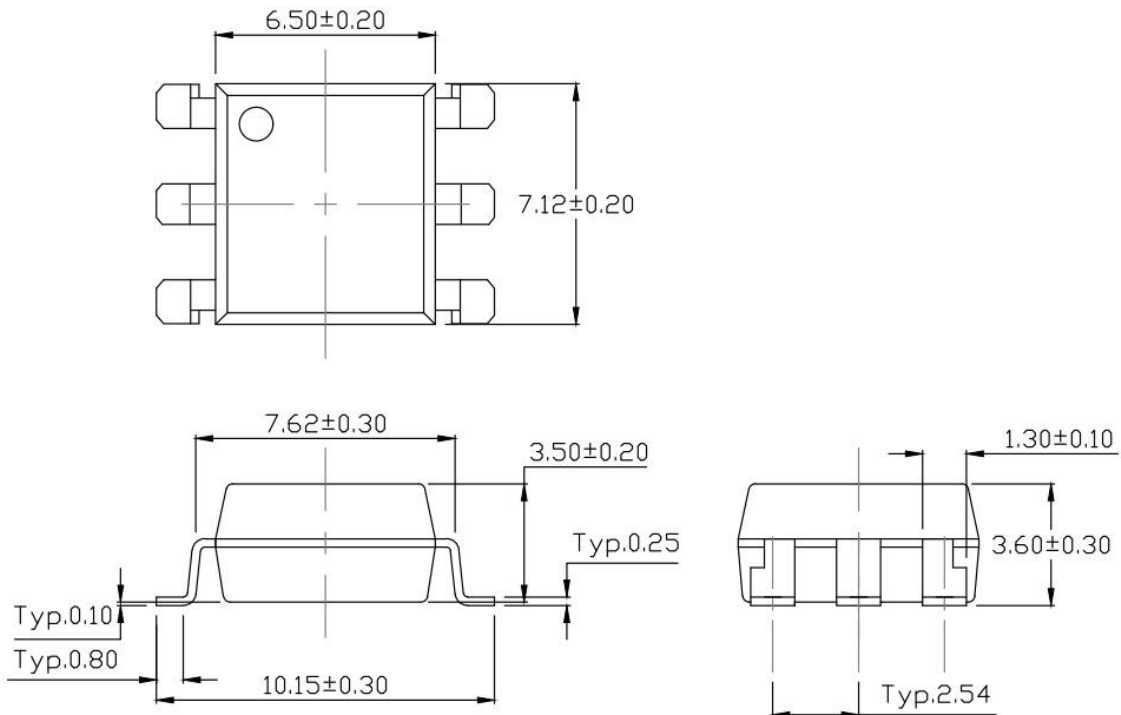
**DIP6, DC Input, Photo Transistor Coupler**

**PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)**

**Surface Mount Lead Forming (S Type)**



**Surface Mount (Low Profile) Lead Forming (SL Type)**

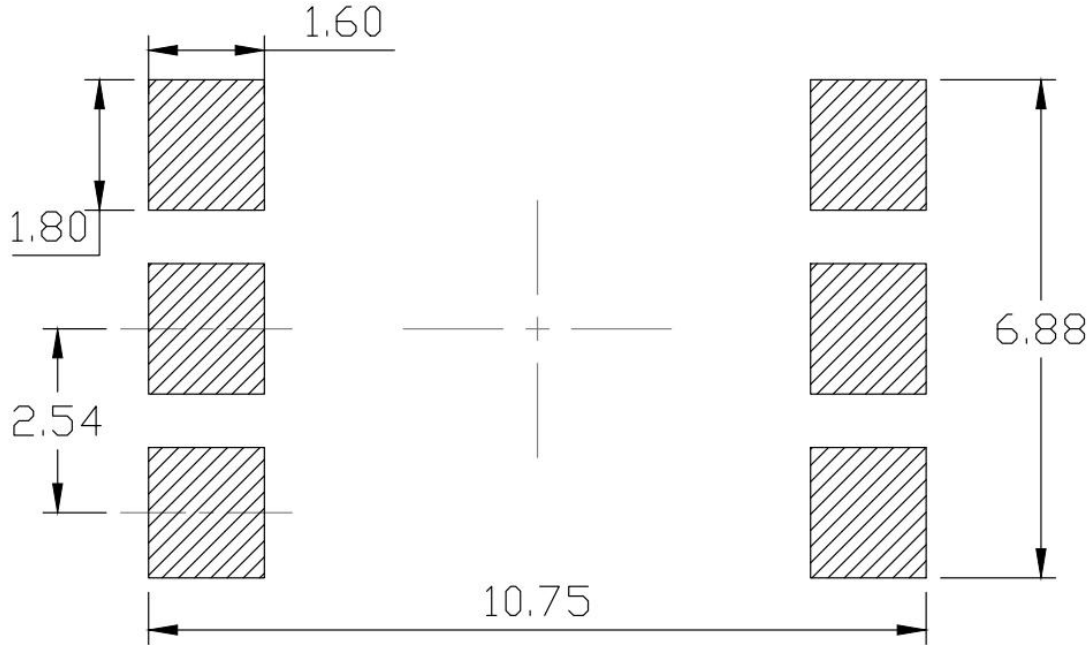




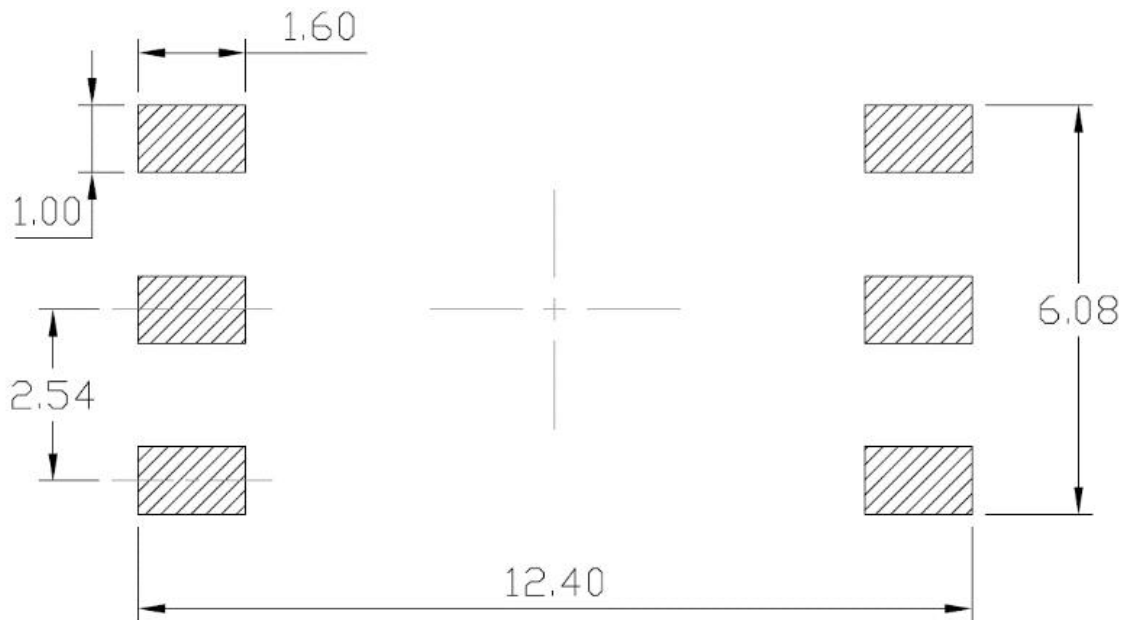
**DIP6, DC Input, Photo Transistor Coupler**

**Recommended Solder Mask (Dimensions in mm unless otherwise stated)**

**Surface Mount Lead Forming & Surface Mount (Low Profile) Lead Forming**

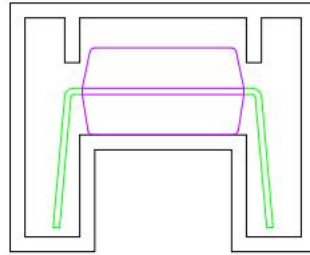
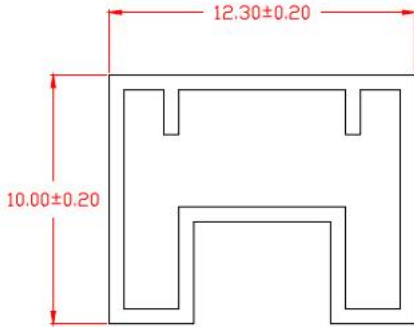


**Surface Mount (Gullwing) Lead Forming**

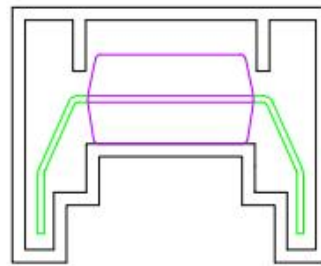
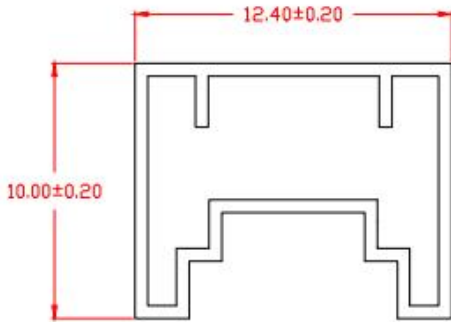


**TUBE SPECIFICATIONS (Dimensions in mm unless otherwise stated)**

**Standard DIP**



**Option M**



**DIP6, DC Input, Photo Transistor Coupler**

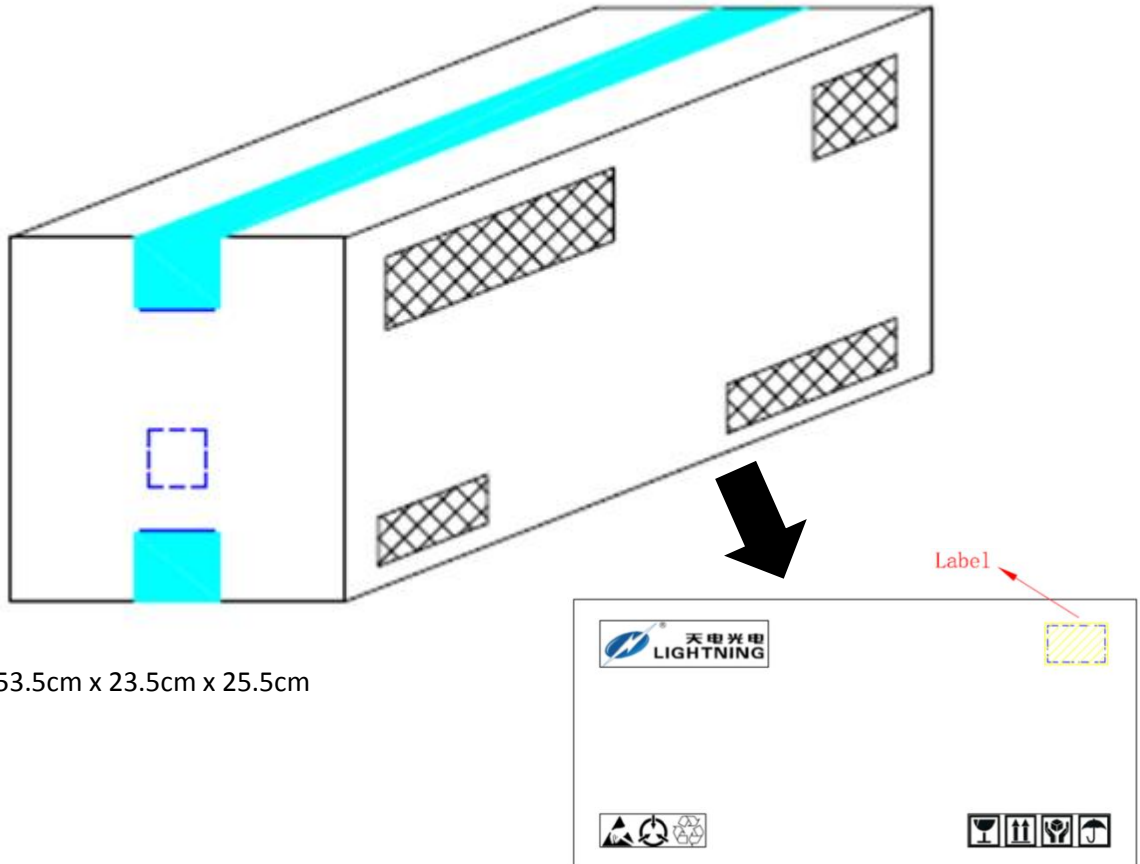
**BOX SPECIFICATIONS (Tube Type)**

**Inner Box**



- L x W x H = 52.5cm x 10.7cm x 4.7cm

**Outer Box**

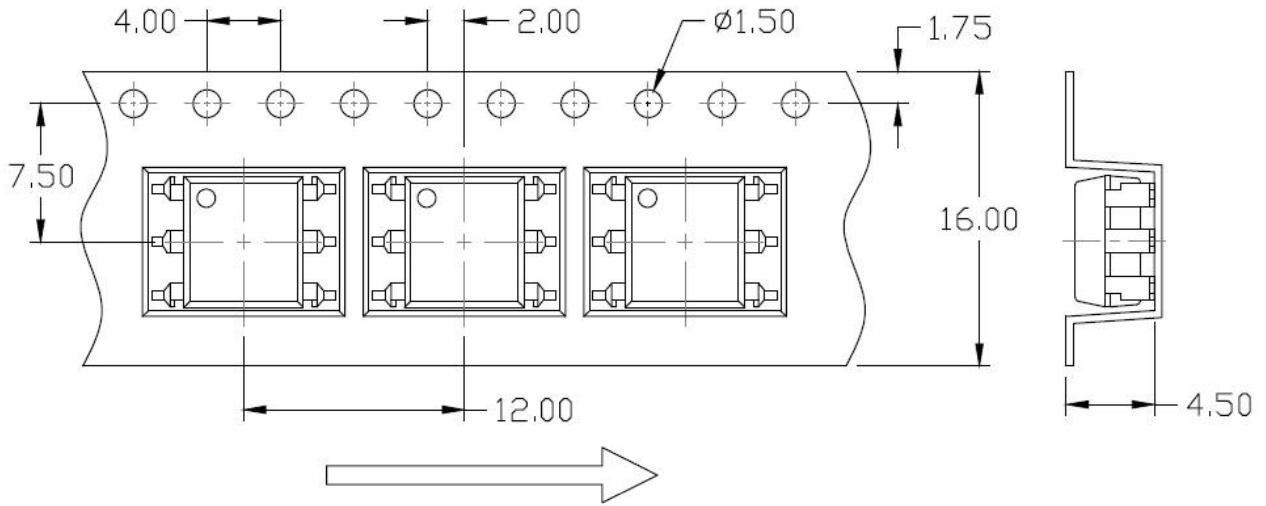


- L x W x H = 53.5cm x 23.5cm x 25.5cm

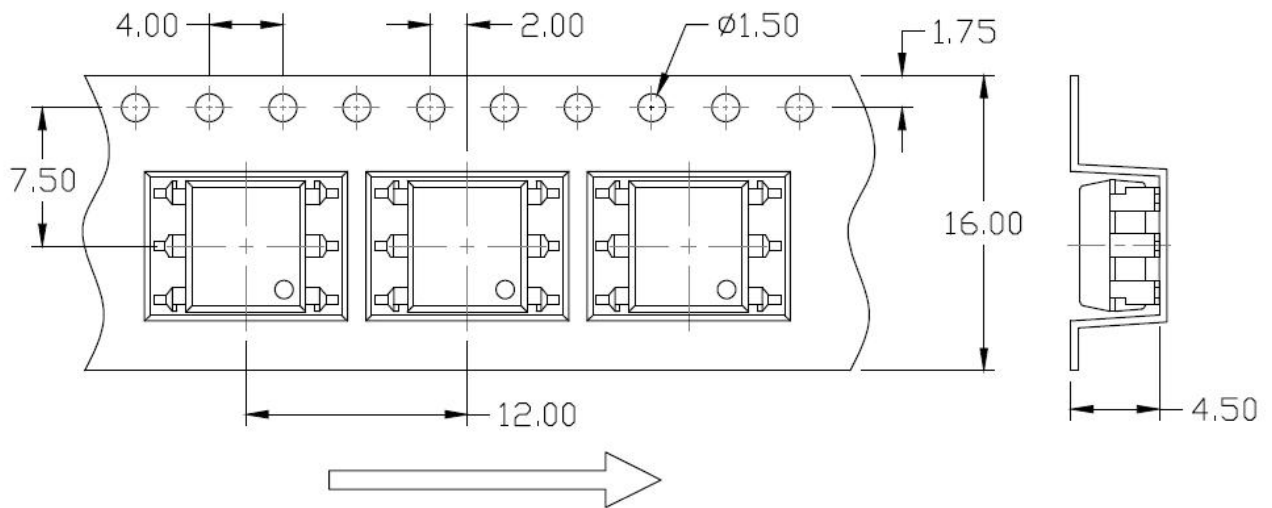
**DIP6, DC Input, Photo Transistor Coupler**

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

**Option S(T1)**



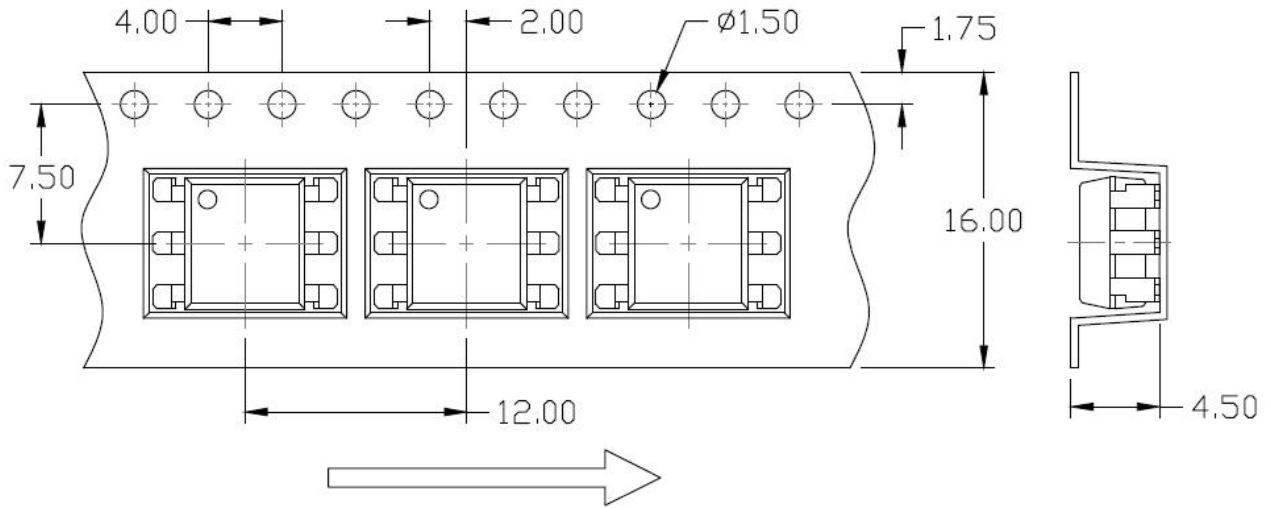
**Option S(T2)**



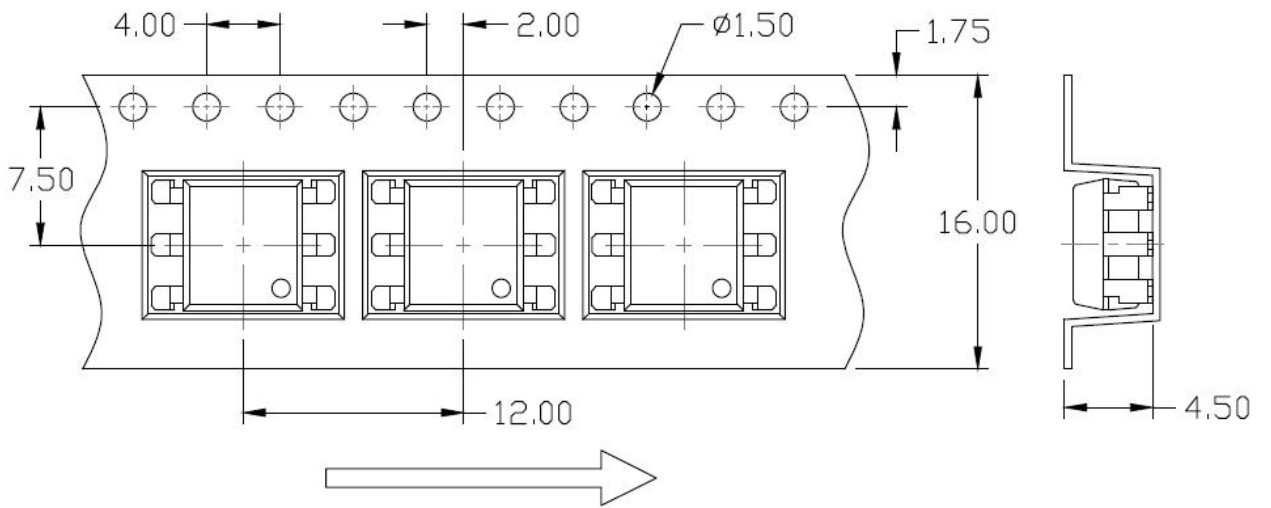
**DIP6, DC Input, Photo Transistor Coupler**

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

**Option SL(T1)**



**Option SL(T2)**





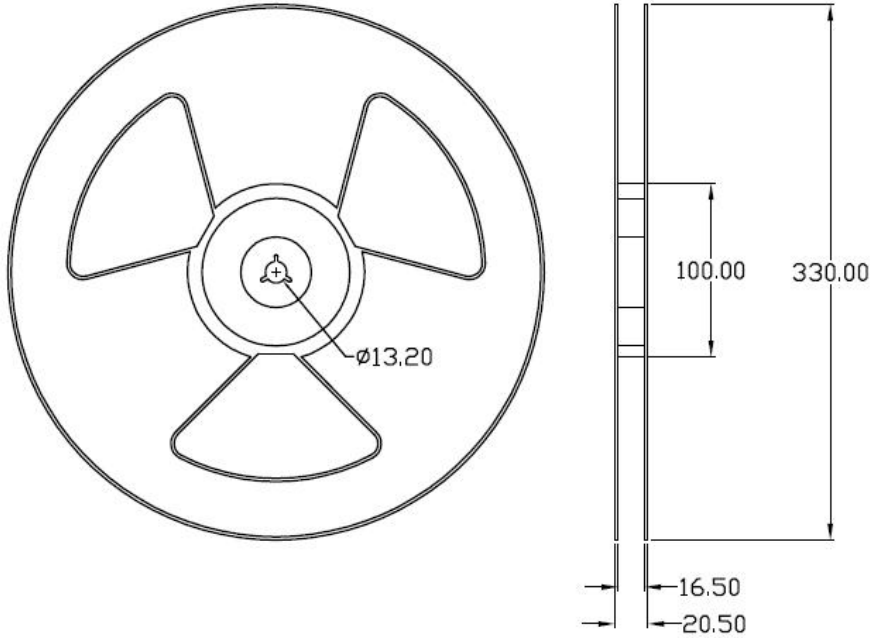
[www.tdled.com](http://www.tdled.com)

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

**DIP6, DC Input, Photo Transistor Coupler**

**REEL SPECIFICATIONS (Dimensions in mm unless otherwise stated)**

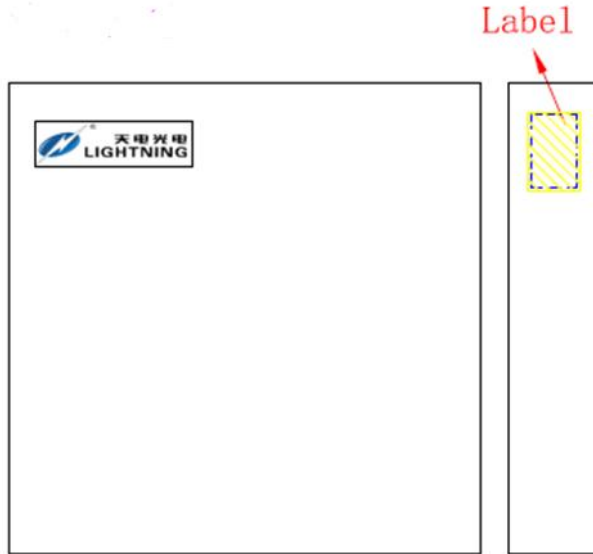
**Option S & Option SL**



**DIP6, DC Input, Photo Transistor Coupler**

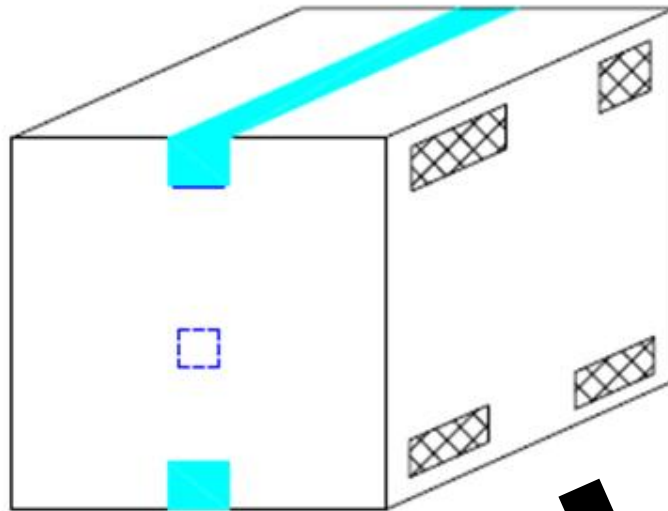
**BOX SPECIFICATIONS (Reel Type)**

**Inner Box**

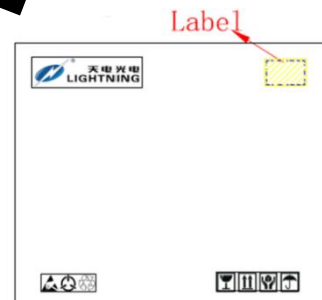


- L x W x H = 36cm x 36cm x 6.9cm

**Outer Box**



- L x W x H = 45cm x 38cm x 38cm





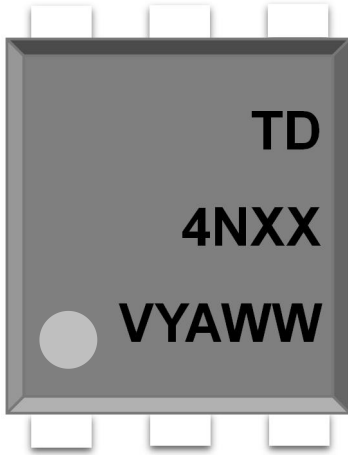
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**4N25, 4N26, 4N27, 4N28, 4N35, 4N36, 4N37, 4N38,  
H11A1, H11A2, H11A3, H11A4, H11A5**

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**ORDERING AND MARKING INFORMATION**

**MARKING INFORMATION**



**TD** : Company Abbr.  
**4NXX** : Part Number & Rank  
**V** : VDE Option  
**Y** : Fiscal Year  
**A** : Manufacturing Code  
**WW** : Work Week

**ORDERING INFORMATION**

**LABEL INFORMATION**

**4NXX(Y)(Z)-GV**

TD – Company Abbr.  
 4NXX – Part Number and Rank  
 (XX=25/26/27/28/35/36/37/38)  
 Y – Lead Form Option  
 (M/S/SL/None)  
 Z – Tape and Reel Option (T1/T2)  
 G – Material Option  
 (G: Green, None: Non-Green)  
 V – VDE Option (V or None)



**PACKING QUANTITY**

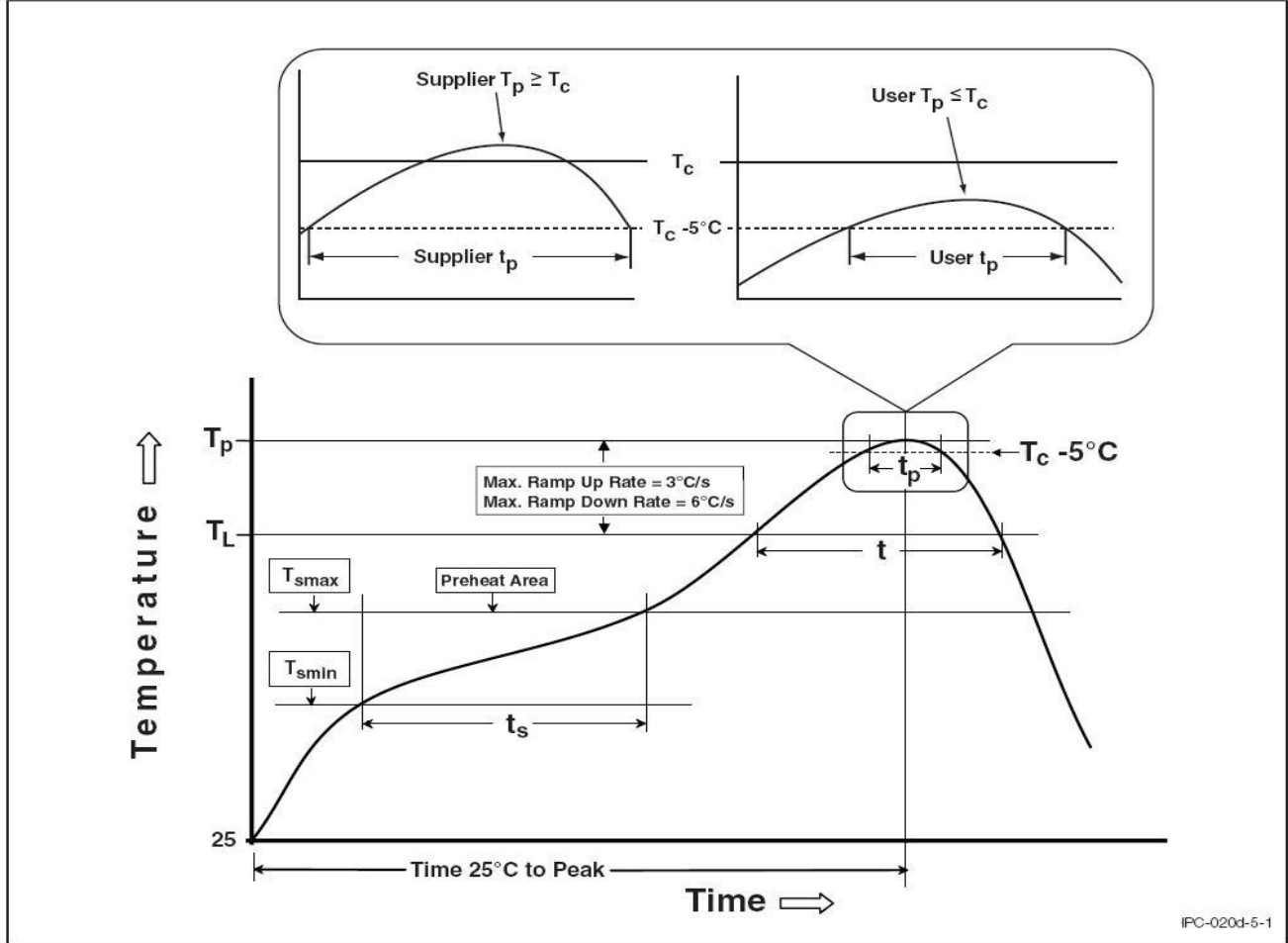
Option	Quantity	Quantity – Inner box	Quantity – Outer box
None	65 Units/Tube	32 Tubes/Inner box	10 Inner box/Outer box = 20.8k Units
M	65 Units/Tube	32 Tubes/Inner box	10 Inner box/Outer box = 20.8k Units
S(T1)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units
S(T2)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units
SL(T1)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units
SL(T2)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units



**DIP6, DC Input, Photo Transistor Coupler**

**REFLOW INFORMATION**

**REFLOW PROFILE**



IPC-020d-5-1

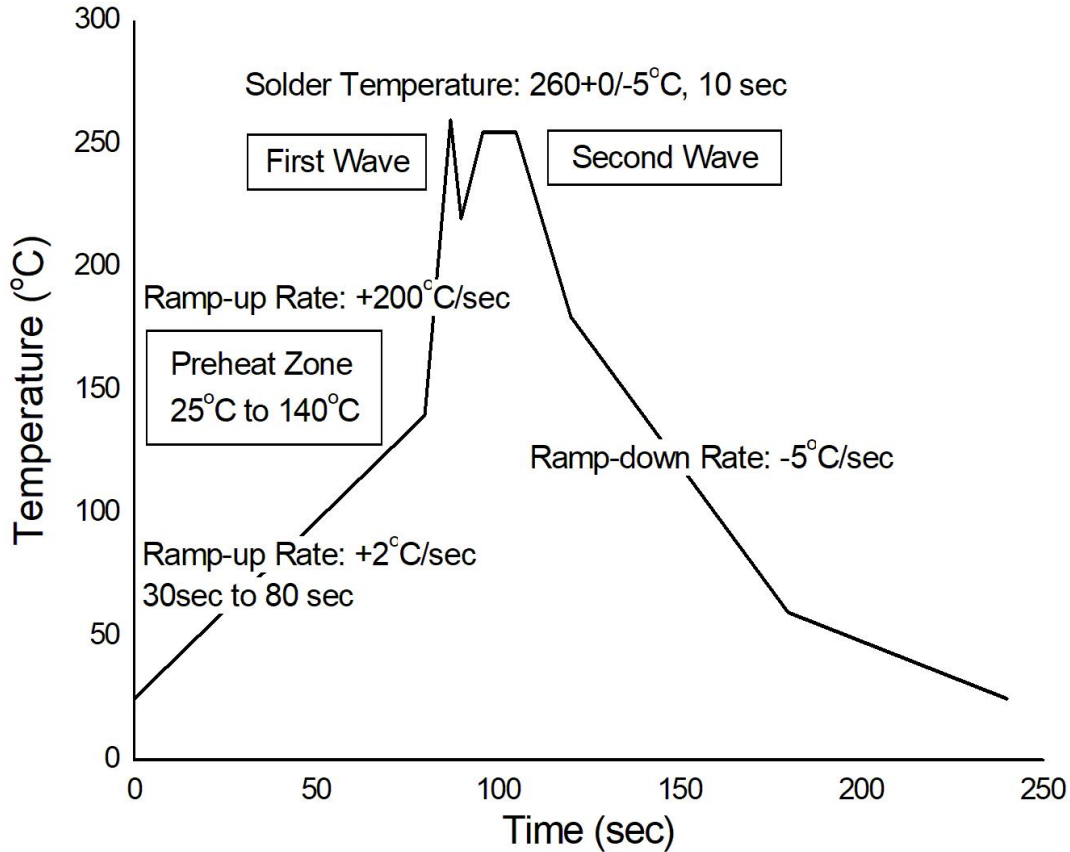
Profile Feature	Sn-Pb Assembly Profile	Pb-Free Assembly Profile
Temperature Min. (T <sub>smin</sub> )	100	150°C
Temperature Max. (T <sub>smax</sub> )	150	200°C
Time (t <sub>s</sub> ) from (T <sub>smin</sub> to T <sub>smax</sub> )	60-120 seconds	60-120 seconds
Ramp-up Rate (t <sub>L</sub> to t <sub>P</sub> )	3°C/second max.	3°C/second max.
Liquidous Temperature (T <sub>L</sub> )	183°C	217°C
Time (t <sub>L</sub> ) Maintained Above (T <sub>L</sub> )	60 – 150 seconds	60 – 150 seconds
Peak Body Package Temperature	235°C +0°C / -5°C	260°C +0°C / -5°C
Time (t <sub>P</sub> ) within 5°C of 260°C	20 seconds	30 seconds
Ramp-down Rate (T <sub>P</sub> to T <sub>L</sub> )	6°C/second max	6°C/second max
Time 25°C to Peak Temperature	6 minutes max.	8 minutes max.



**DIP6, DC Input, Photo Transistor Coupler**

**TEMPERATURE PROFILE OF SOLDERING**

**WAVE SOLDERING (JESD22-A111 COMPLIANT)**



**HAND SOLDERING BY SOLDERING IRON**

Soldering Temperature	380+0/-5°C
Soldering Time	3 sec max.

- One time soldering is recommended for all soldering method.
- Do not solder more than three times for IR reflow soldering.



### **DISCLAIMER**

- LIGHTNING is continually improving the quality, reliability, function and design. LIGHTNING reserves the right to make changes without further notices.
- The characteristic curves shown in this datasheet are representing typical performance which are not guaranteed.
- LIGHTNING makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, LIGHTNING disclaims (a) any and all liability arising out of the application or use of any product, (b) any and all liability, including without limitation special, consequential or incidental damages, and (c) any and all implied warranties, including warranties of fitness for particular
- The products shown in this publication are designed for the general use in electronic applications such as office automation, equipment, communications devices, audio/visual equipment, electrical application and instrumentation purpose, non-infringement and merchantability.
- This product is not intended to be used for military, aircraft, automotive, medical, life sustaining or lifesaving applications or any other application which can result in human injury or death.
- Please contact LIGHTNING sales agent for special application request.
- Immerge unit's body in solder paste is not recommended.
- Parameters provided in datasheets may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated in each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify LIGHTNING's terms and conditions of purchase, including but not limited to the warranty expressed therein.
- Discoloration might be occurred on the package surface after soldering, reflow or long-time use. It neither impacts the performance nor reliability.