



### Description

The TDR214-6L series combine an AlGaAs infrared emitting diode as the emitter which is optically coupled to a photovoltaic chip to drive two MOSFET in a plastic DIP6 package with different lead forming options.

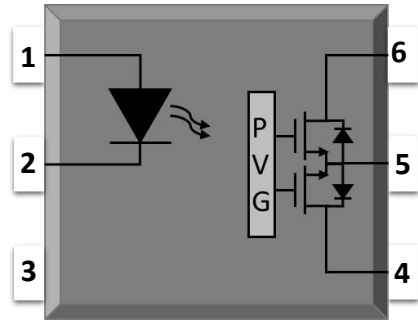
### Features

- Normally open signal pole signal throw relay
- Low operating current
- 400V output withstand voltage
- Low on resistance
- High isolation 5000 VRMS
- Operating temperature range - 40 °C to 85 °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

- Computer peripheral interface
- Telephone equipment
- Data communication equipment
- Computers

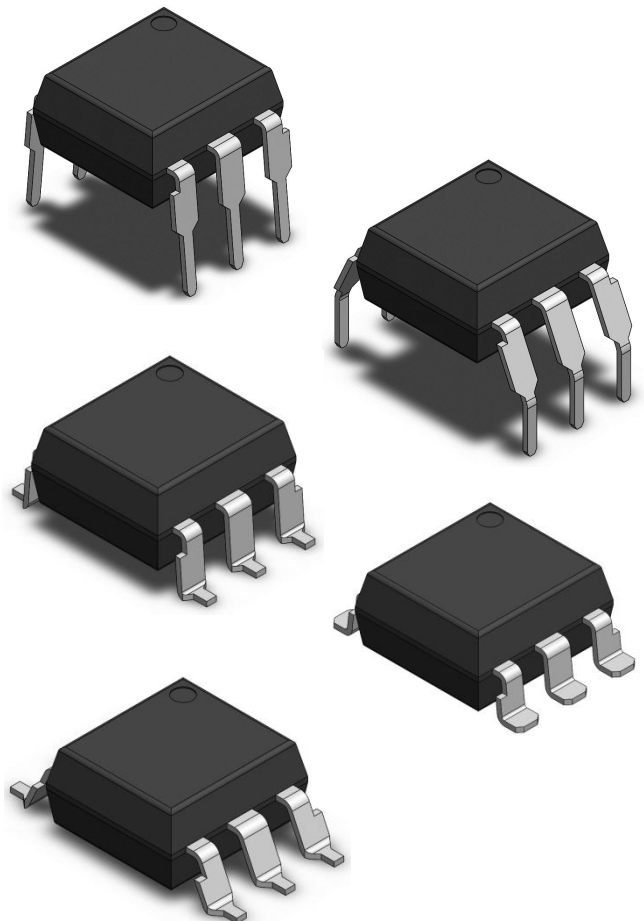
### SCHEMATIC



### PIN DEFINITION

1.LED Anode	4.MOSFET Drain
2.LED Cathode	5.MOSFET Source
3.NC	6.MOSFET Drain

### PACKAGE OUTLINE





ABSOLUTE MAXIMUM RATINGS					
PARAMETER	SYMBOL		VALUE	UNIT	NOTE
INPUT					
Forward Current	$I_F$		60	mA	
Peak Forward Current	$I_{FP}$		1	A	1
Reverse Voltage	$V_R$		6	V	
Input Power Dissipation	$P_I$		100	mW	
OUTPUT					
Load Voltage	$V_L$		400	V	
Continuous Load Current	$I_L$	A	0.12	A	
		B	0.13	A	
		C	0.15	A	
Peak Load Current	$I_{PEAK}$		0.30	A	
Output Power Dissipation	$P_O$		500	mW	
COMMON					
Total Power Dissipation	$P_{tot}$		550	mW	
Isolation Voltage	Viso		5000	Vrms	2
Operating Temperature	Topr		-40~85	°C	
Storage Temperature	Tstg		-40~110	°C	
Soldering Temperature	Tsol		260	°C	

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

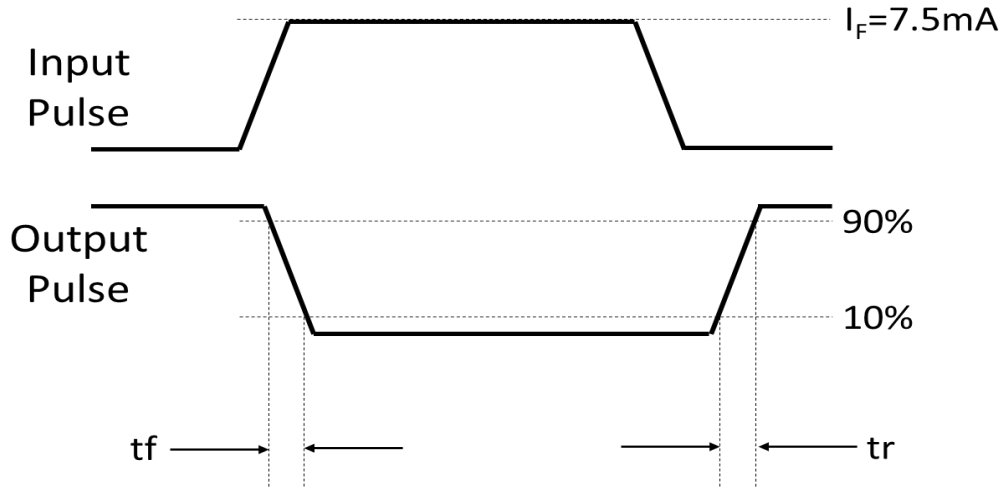
Note 2. For 10 seconds



<b>ELECTRICAL OPTICAL CHARACTERISTICS at Ta=25°C</b>							
PARAMETER	SYMBOL	MIN	TYP.	MAX.	UNIT	TEST CONDITION	NOTE
<b>INPUT</b>							
Forward Voltage	V <sub>F</sub>	-	1.3	1.5	V	IF=10mA	
Reverse Current	I <sub>R</sub>	-	-	1	μA	VR=5V	
<b>OUTPUT</b>							
Off State Leakage Current	I <sub>LEAK</sub>	-	-	1	μA	V <sub>L</sub> =Rated V <sub>L</sub> , IF=0	
On Resistance	Rd(ON)A	-	20	30	Ω	IF=5mA, IL=Rated IL t=1s	
	Rd(ON)B		15.2	20	Ω		
	Rd(ON)C		7.6	15	Ω		
Output Capacitance	C <sub>OUT</sub>	-	50	-	pF	VL=0, f=1MHz	
<b>TRANSFER CHARACTERISTICS</b>							
Isolation Resistance	R <sub>ISO</sub>	10 <sup>10</sup>	-	-	Ω	DC500V, 40 ~ 60% R.H.	
Floating Capacitance	C <sub>IO</sub>	-	1.5	-	pF	VL=0, f=1MHz	
LED turn on Current	IF(on)	-	1.10	3	mA	IL=Rated IL	
LED turn off Current	IF(off)	0.4	1.10	-	mA		
Turn On Time	Ton	-	0.3	3	ms	IF=10mA, IL=Rated IL RL=200Ω	
Turn Off Time	Toff	-	0.3	0.5	ms		

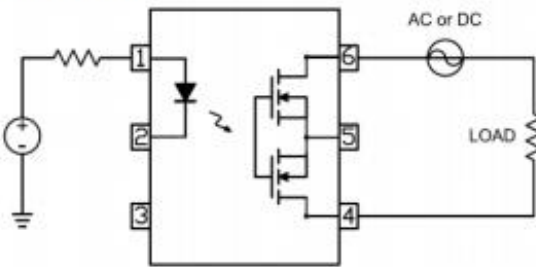
### TEST CIRCUITS

#### Waveforms of tr, tf

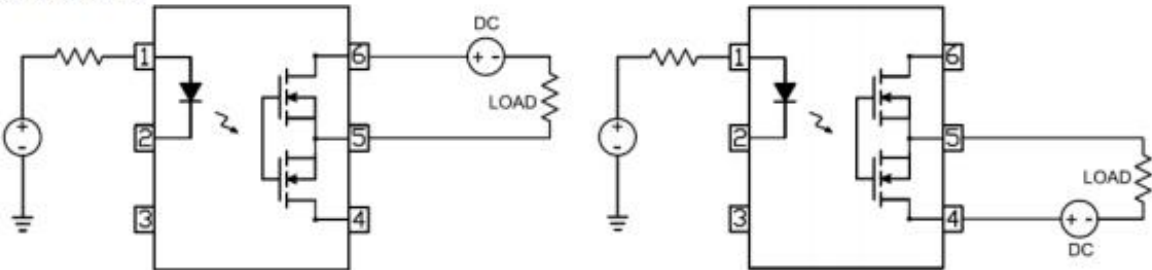


#### On Resistance test

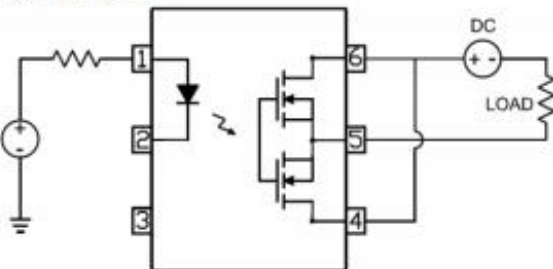
Connection A



Connection B



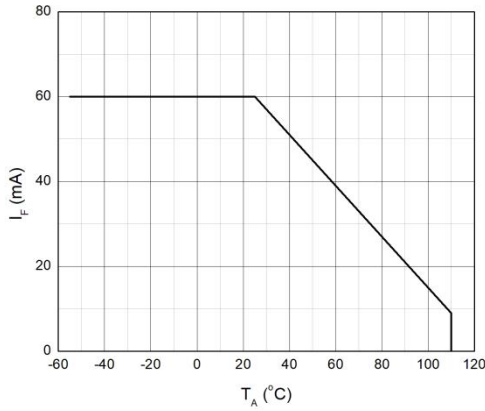
Connection C



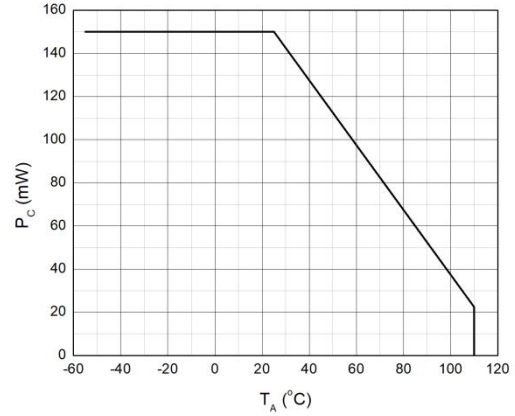


### CHARACTERISTIC CURVES

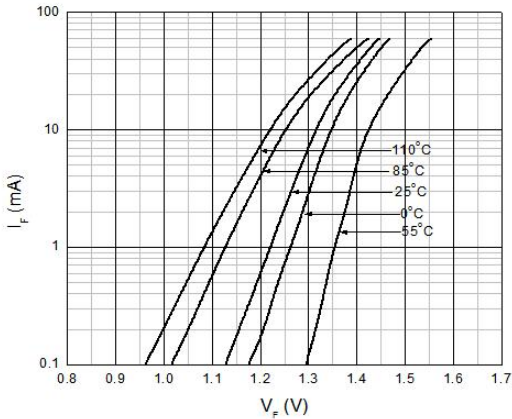
**Fig.1 Forward Current vs. Ambient Temperature**



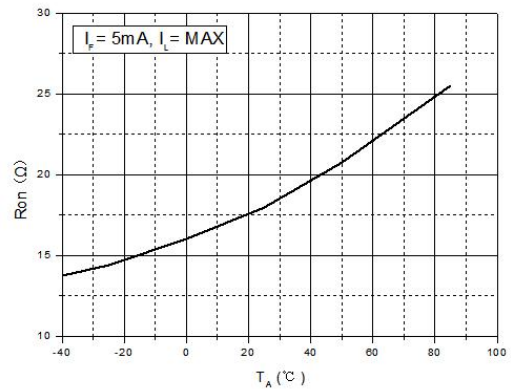
**Fig.2 Collector Power Dissipation vs. Ambient Temperature**



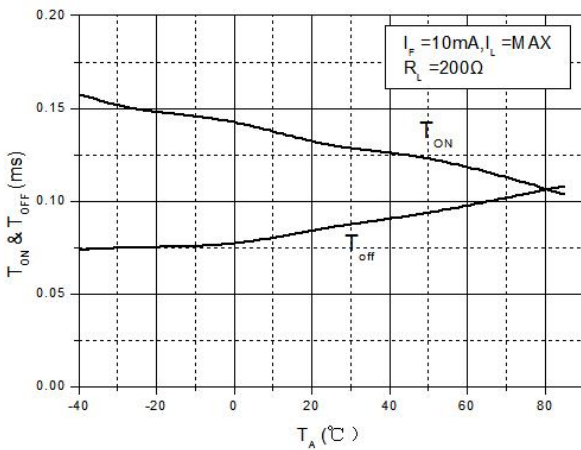
**Fig.3 Forward Current vs. Forward Voltage**



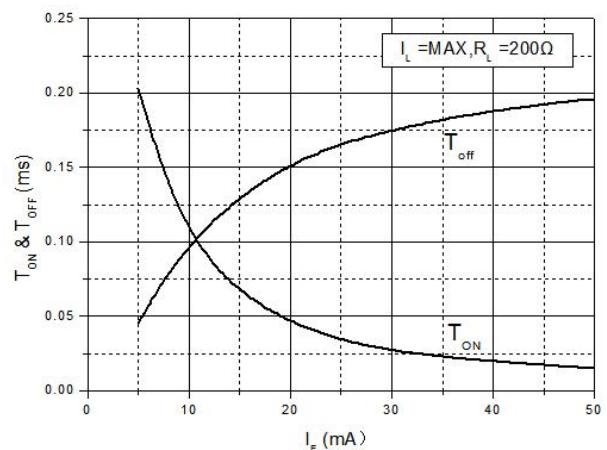
**Fig.4 On Resistance vs. Ambient Temperature**



**Fig.5 Switching Time vs. Ambient Temperature**

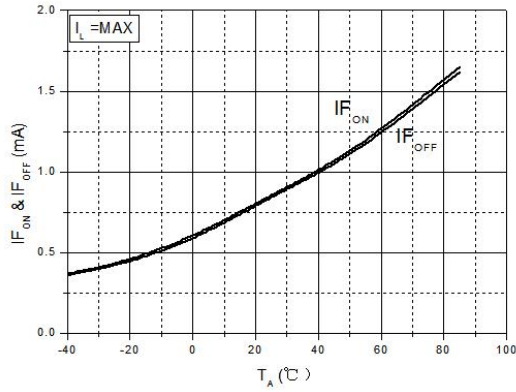


**Fig.6 Switching Time vs. LED Forward Current**

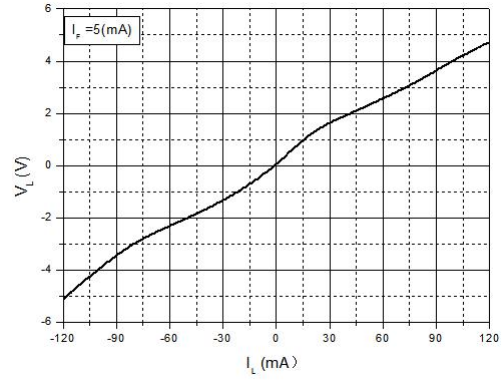


**CHARACTERISTIC CURVES**

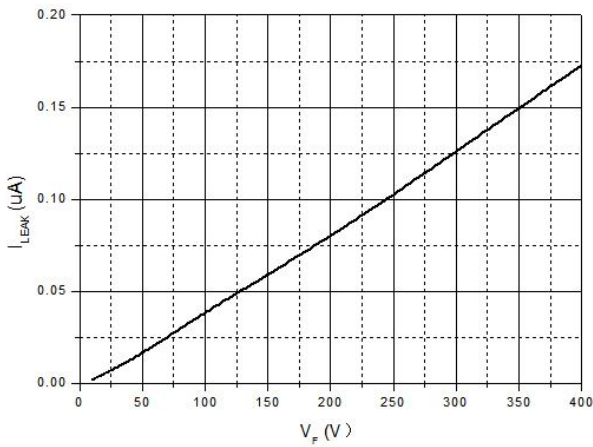
**Fig.7 LED turn on&off Current vs. Ambient Temperature**



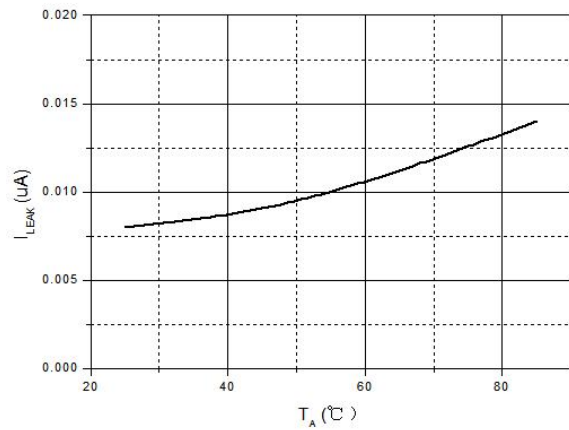
**Fig.8 Load Current vs. Load voltage**



**Fig.9 Off State Leakage Current vs. Load voltage**

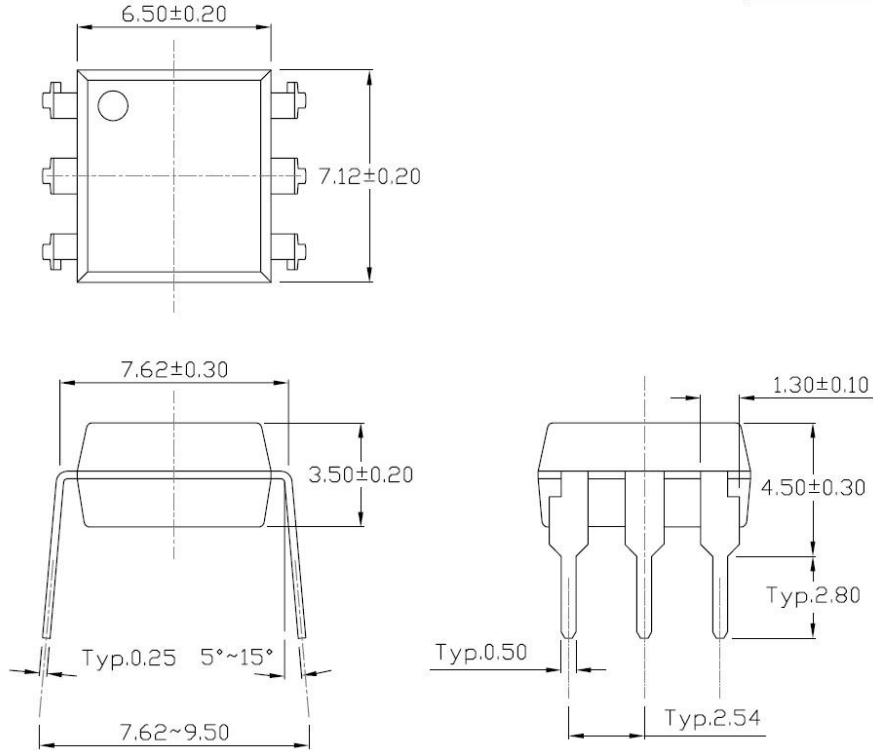


**Fig.10 Off State Leakage Current vs. Ambient Temperature**

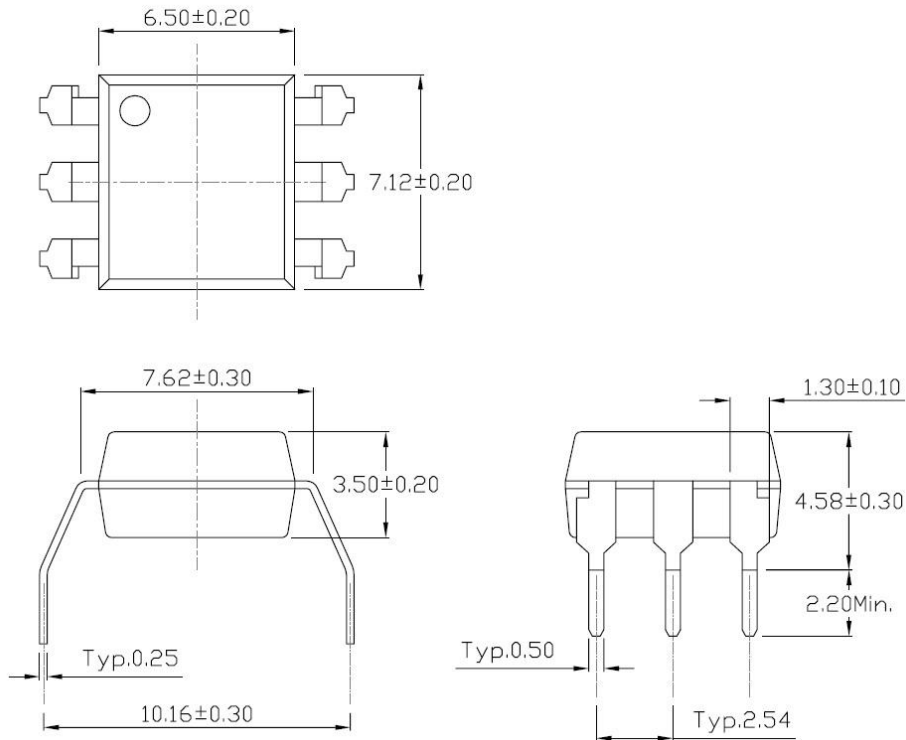


**PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)**

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

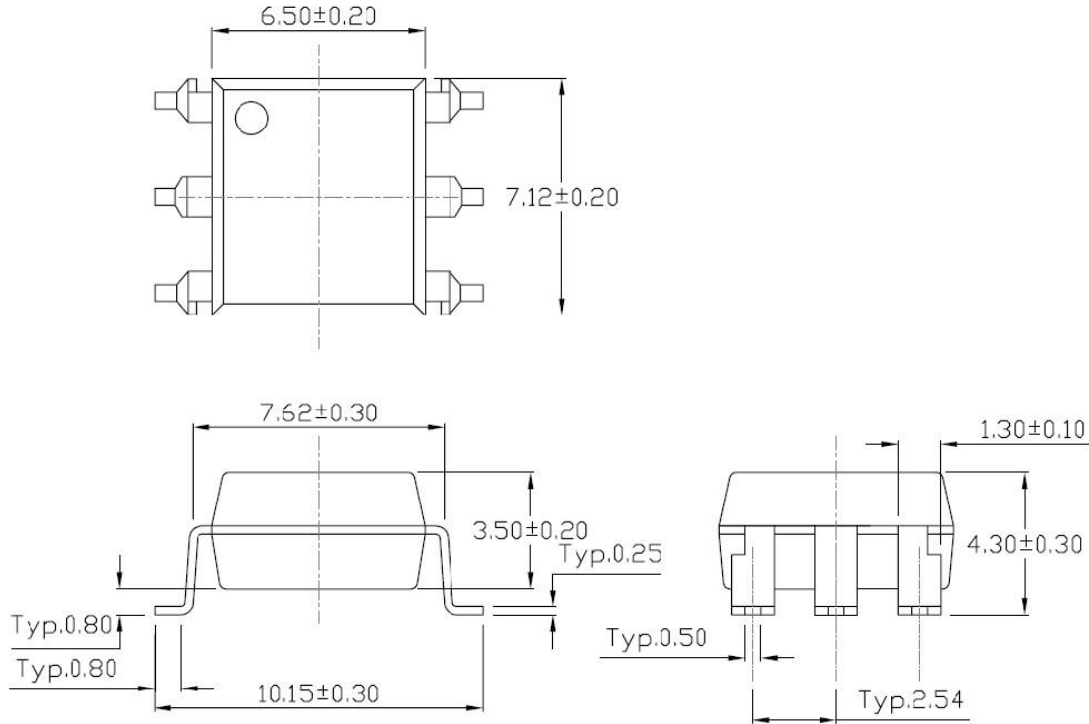


**Gullwing (400mil) Lead Forming – Through Hole (M Type)**

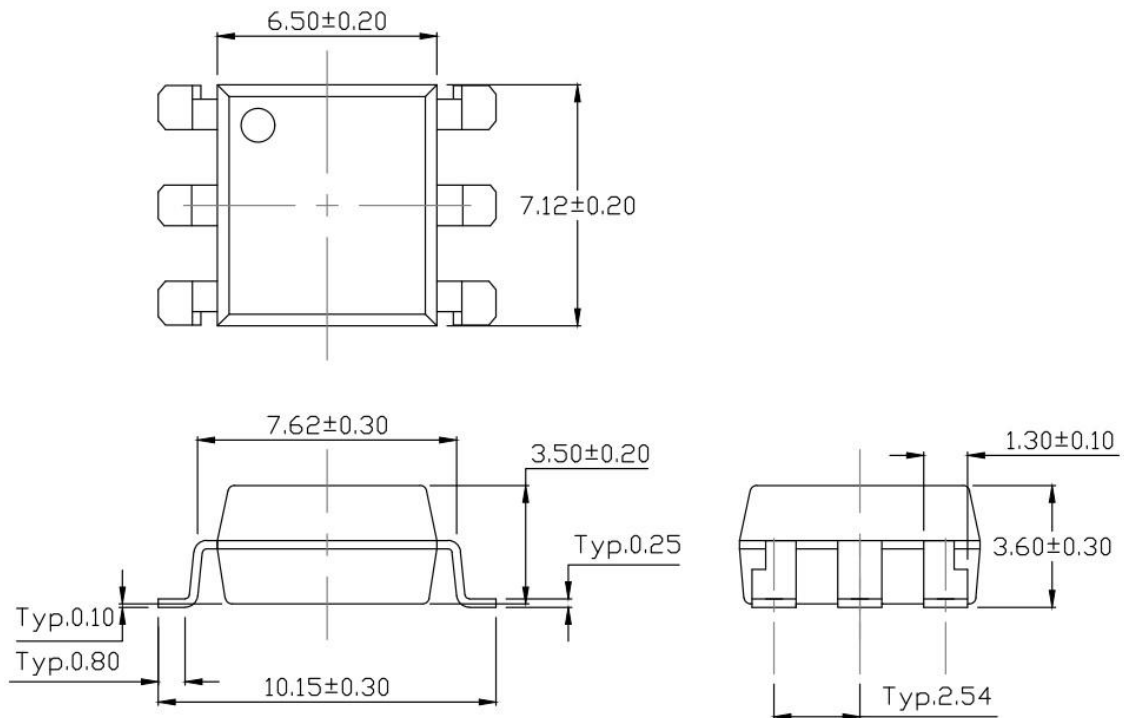


**PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)**

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



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

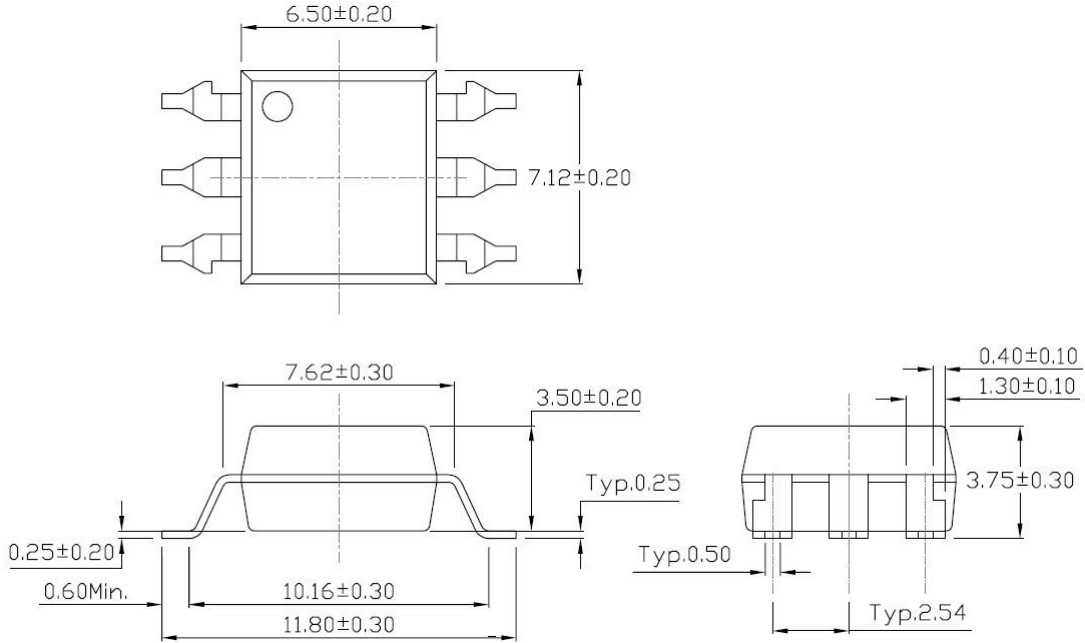






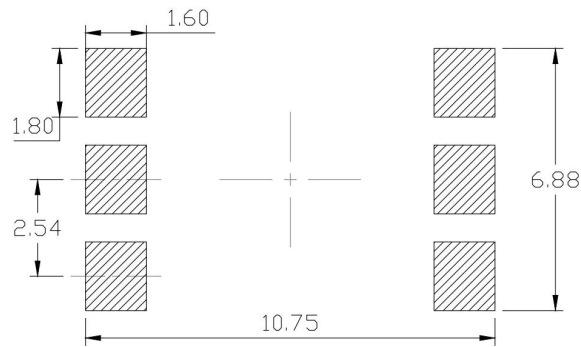
**PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)**

**Surface Mount (Gullwing) Lead Forming (SLM Type)**

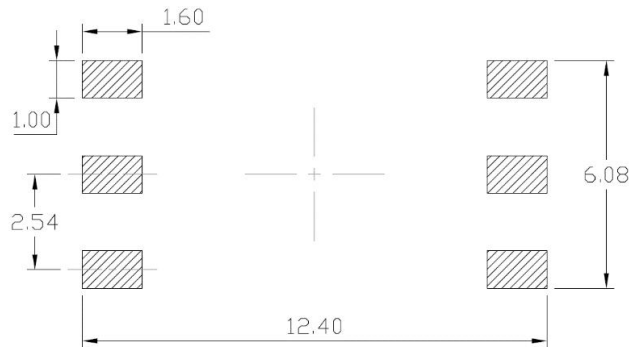


**Recommended Solder Mask (Dimensions in mm unless otherwise stated)**

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



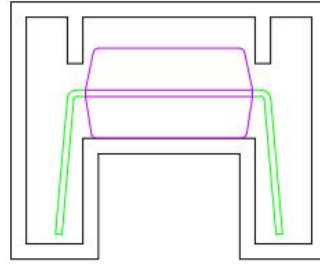
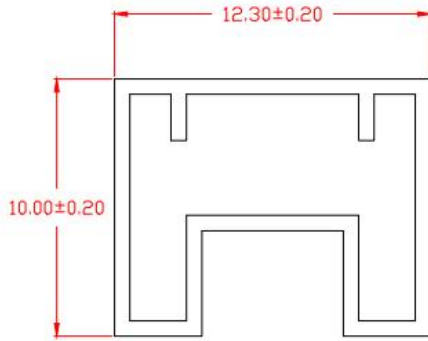
**Surface Mount (Gullwing) Lead Forming**





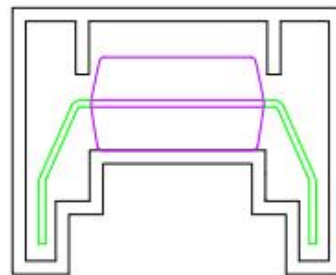
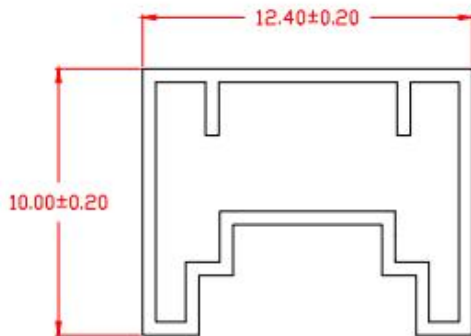
### TUBE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

#### Standard DIP



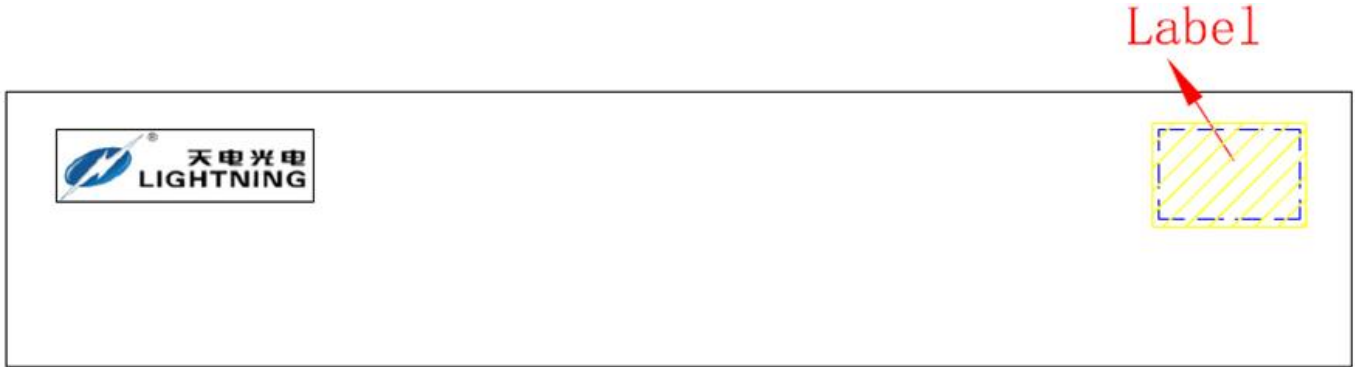
### TUBE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

#### Standard M



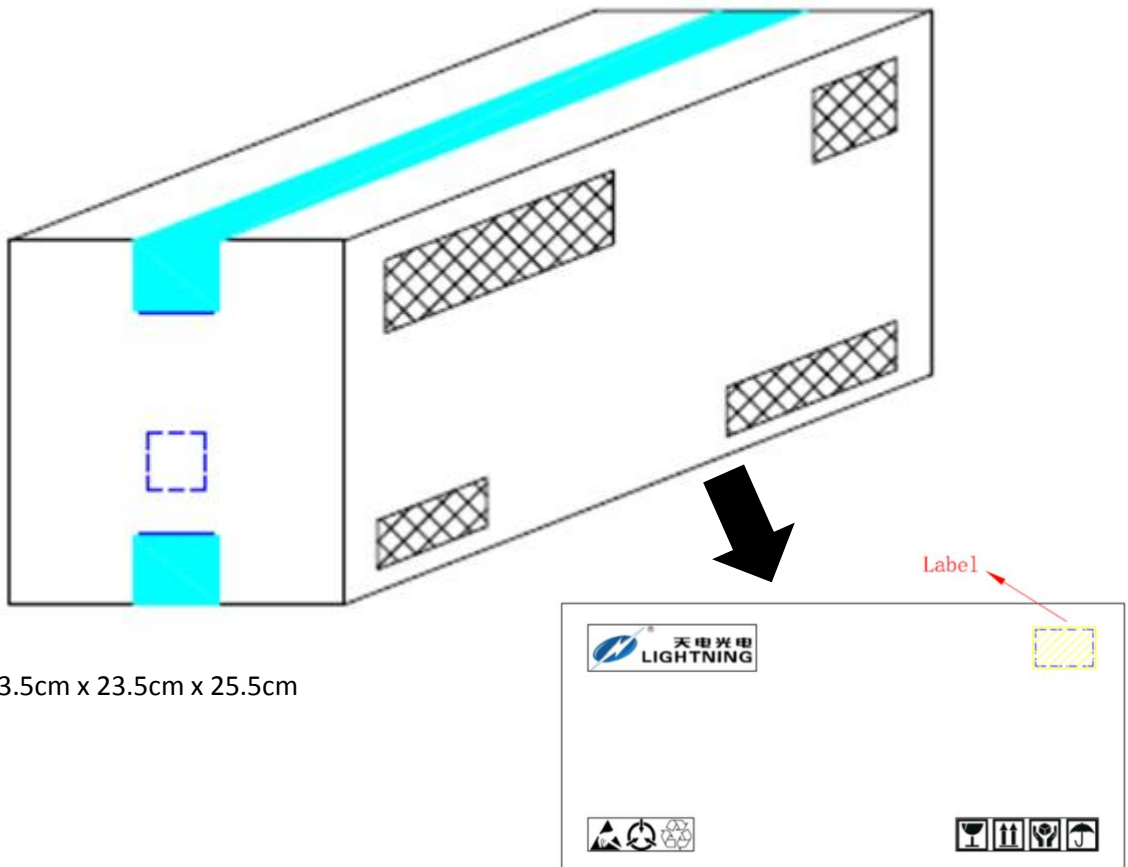
## BOX SPECIFICATIONS (Tube Type)

### Inner Box



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

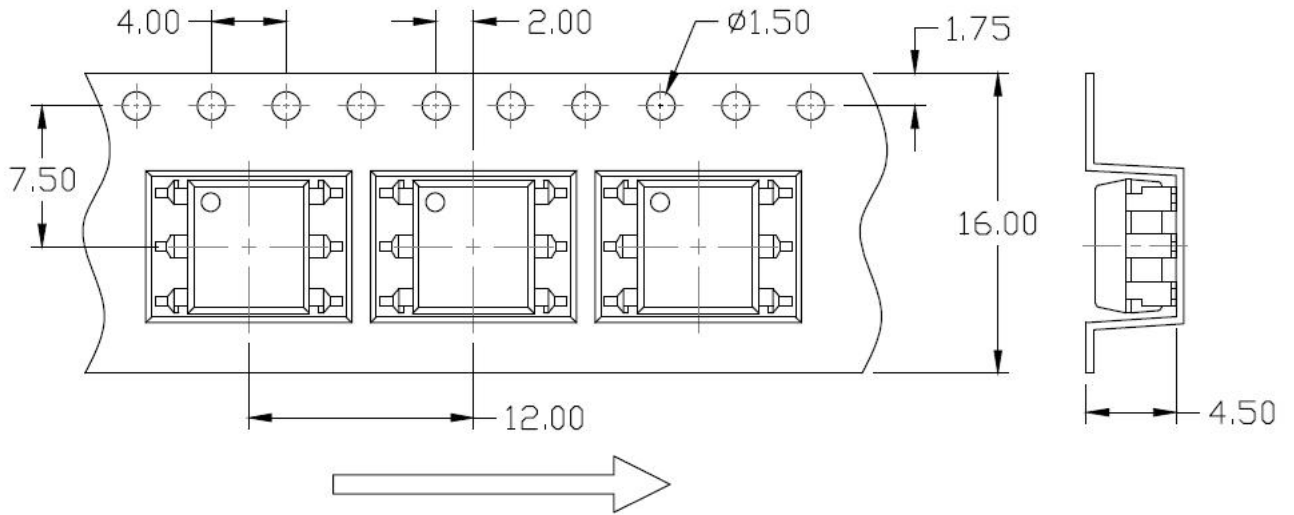
### Outer Box



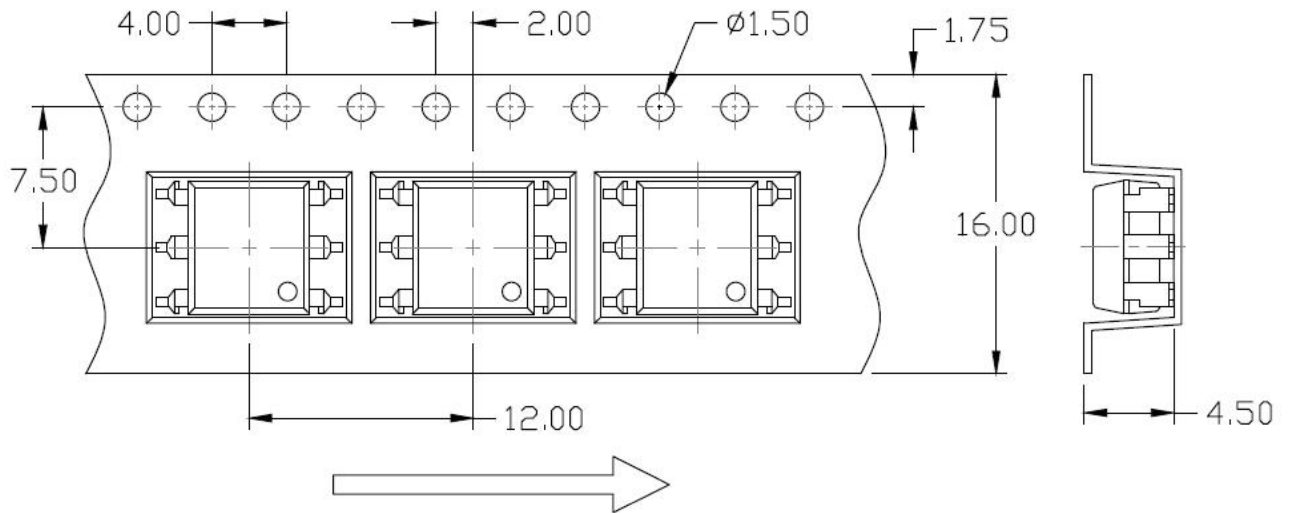
- L x W x H = 53.5cm x 23.5cm x 25.5cm

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

**Option S(T1)**



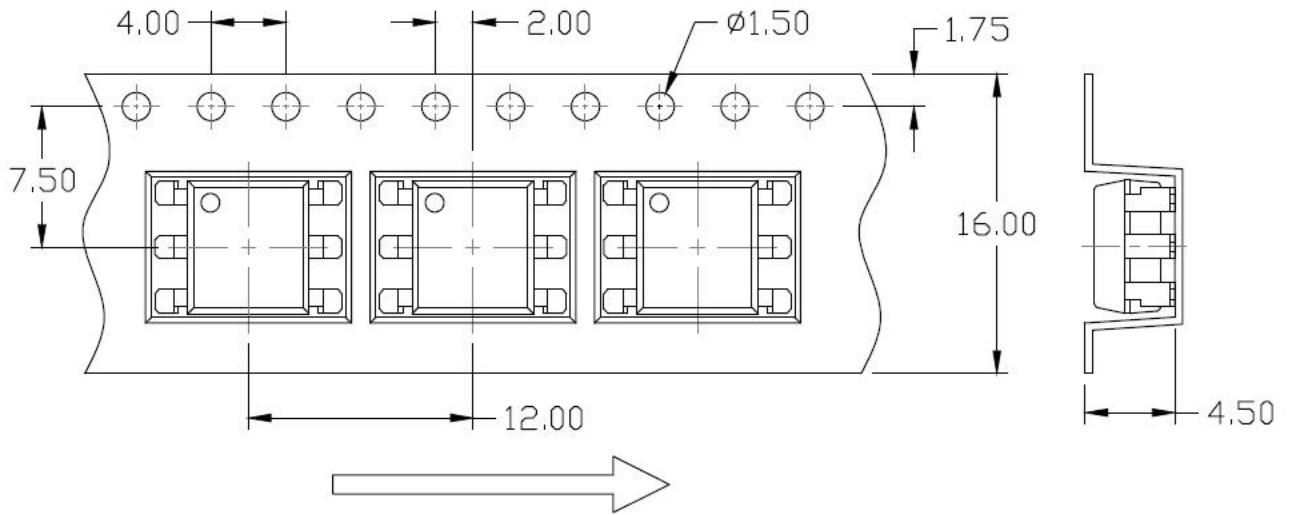
**Option S(T2)**



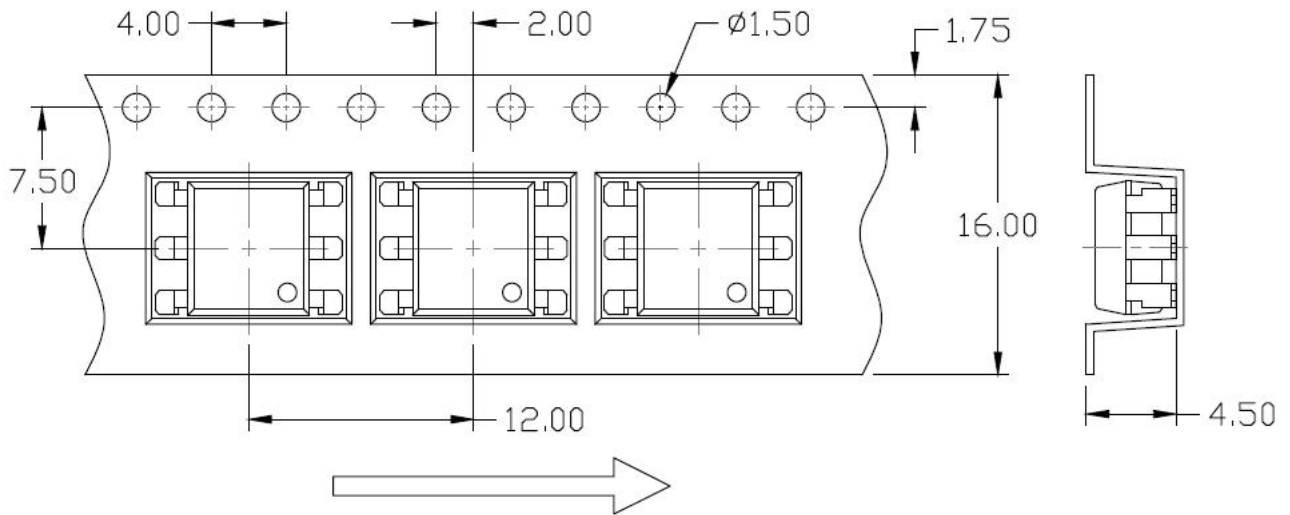


### Carrier Tape Specifications (Dimensions in mm unless otherwise stated)

#### Option SL(T1)

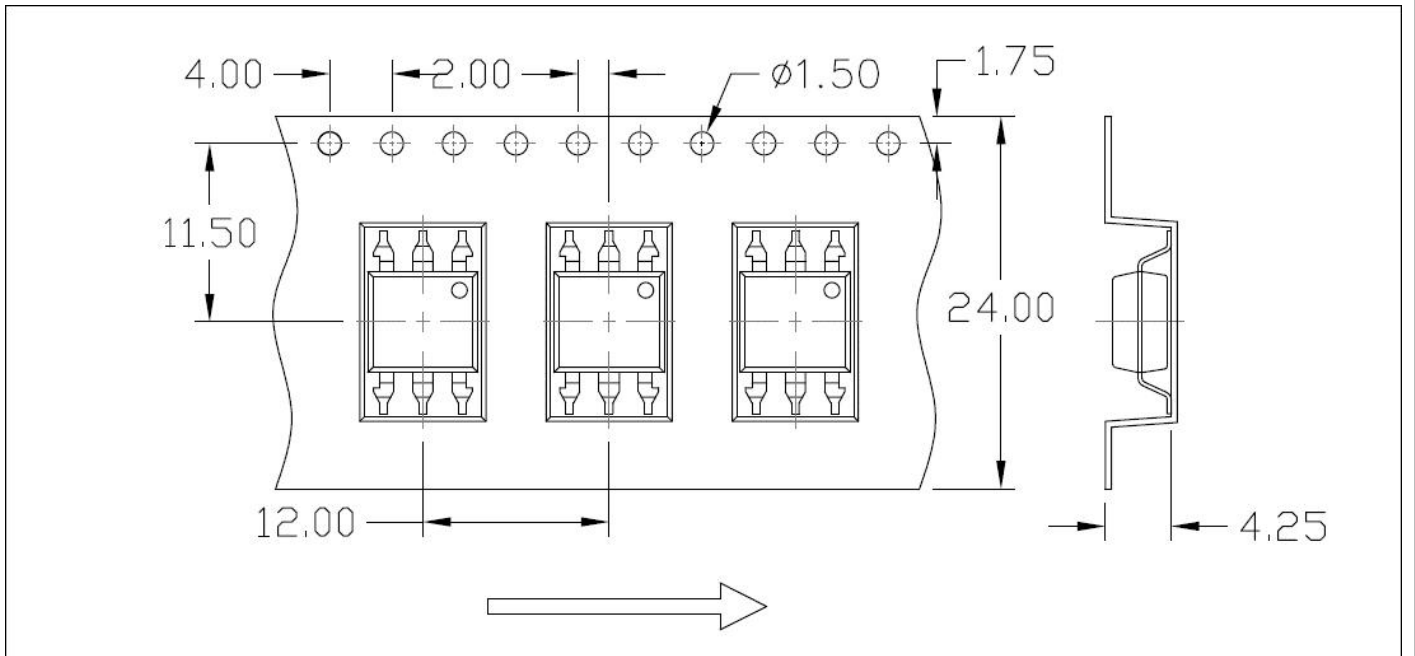


#### Option SL(T2)

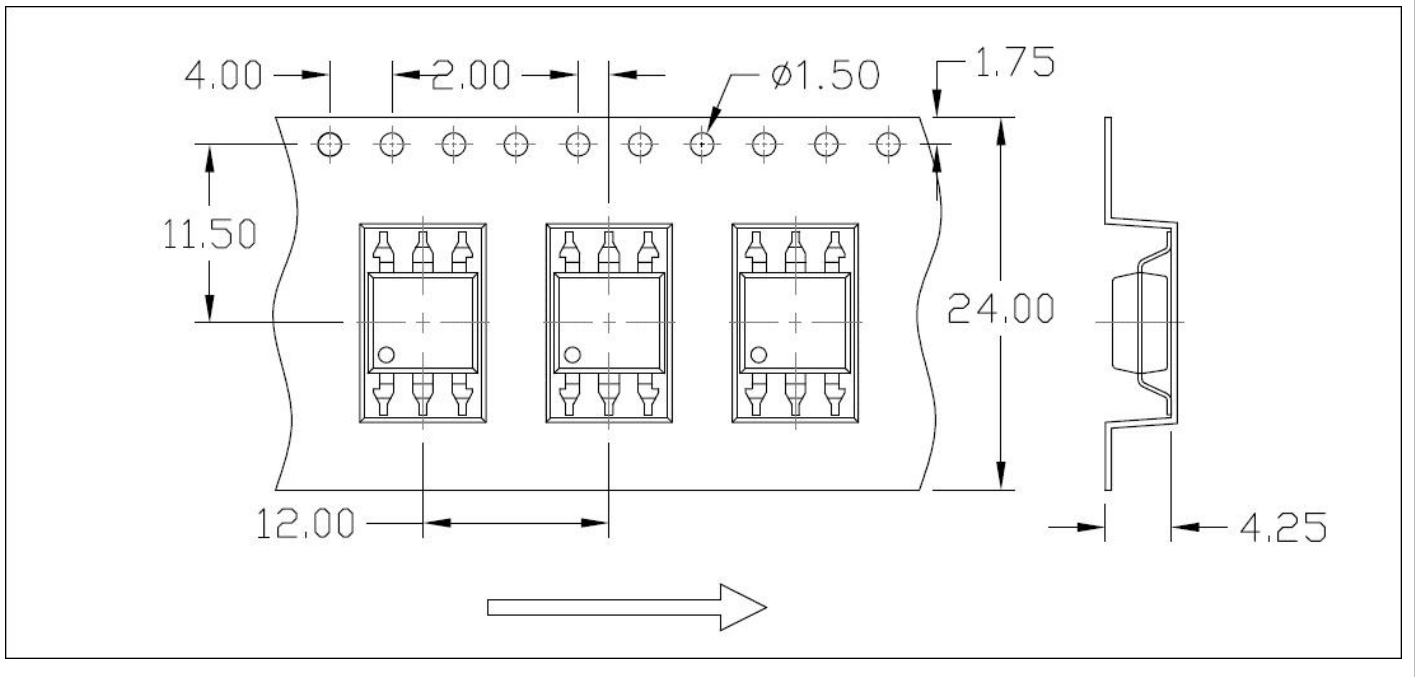


**Carrier Tape Specifications (Dimensions in mm unless otherwise stated)**

**Option SLM(T1)**



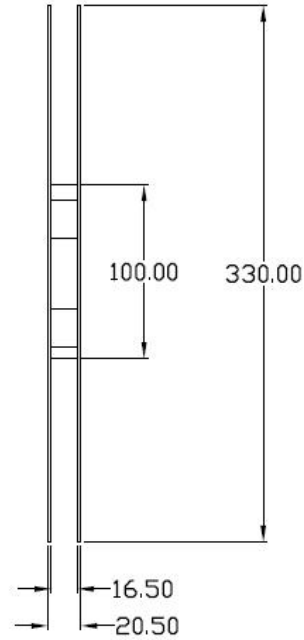
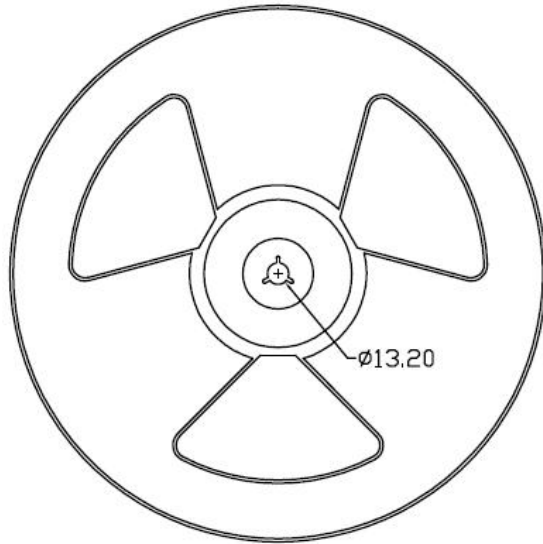
**Option SLM(T2)**



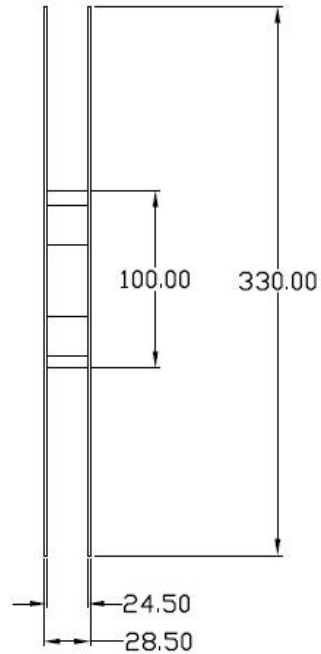
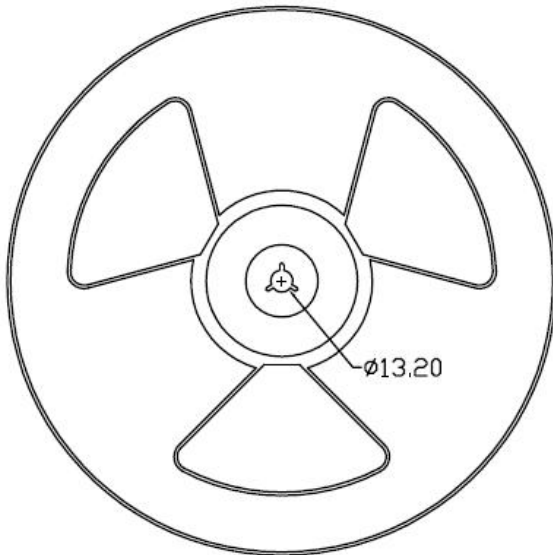


### REEL SPECIFICATIONS (Dimensions in mm unless otherwise stated)

#### Option S & Option SL

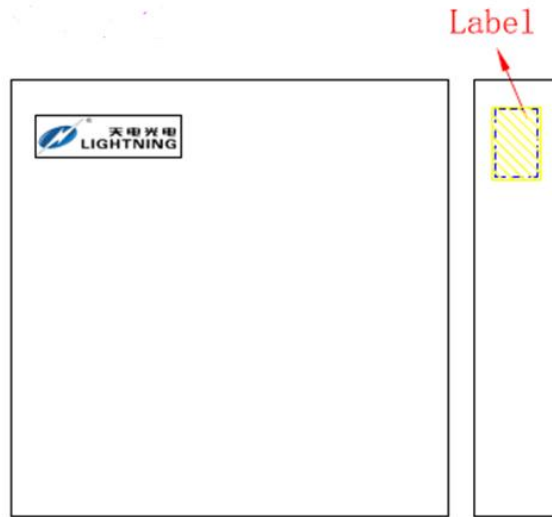


#### Option SLM



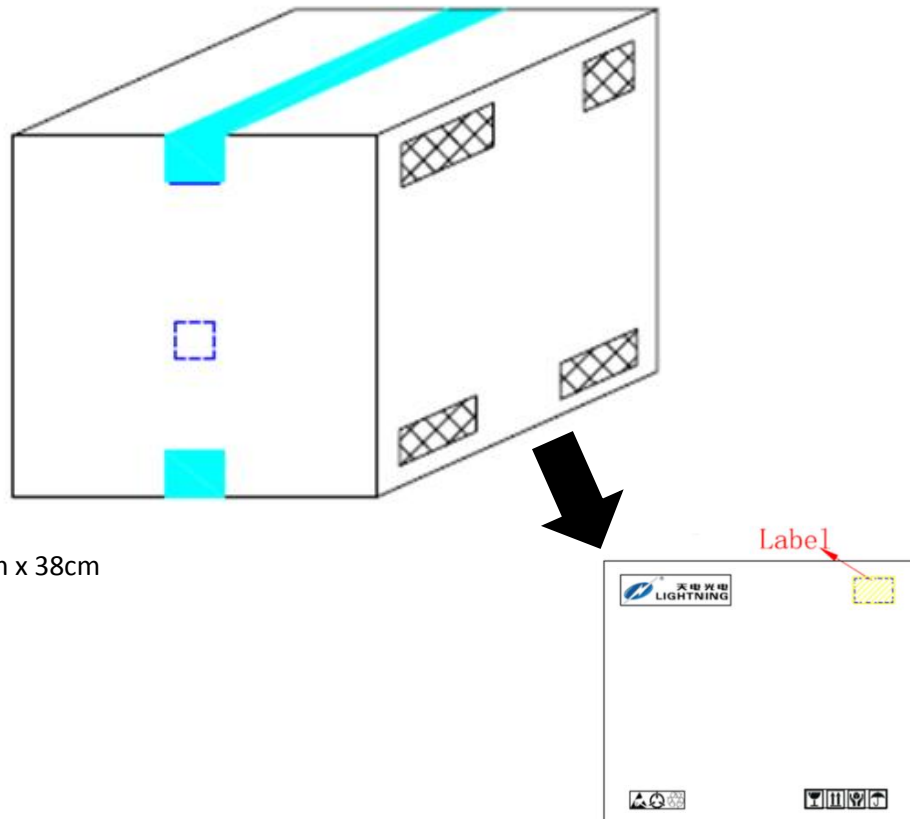
### BOX SPECIFICATIONS (Reel Type)

#### 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





**ORDERING AND MARKING INFORMATION**

**MARKING INFORMATION**



**TD** : Company Abbr.  
**R214** : Part Number & Rank  
**V** : VDE Option  
**Y** : Fiscal Year  
**A** : Manufacturing Code  
**WW** : Work Week

**ORDERING INFORMATION**

**TDR214-6L(Y)(Z)-GV**

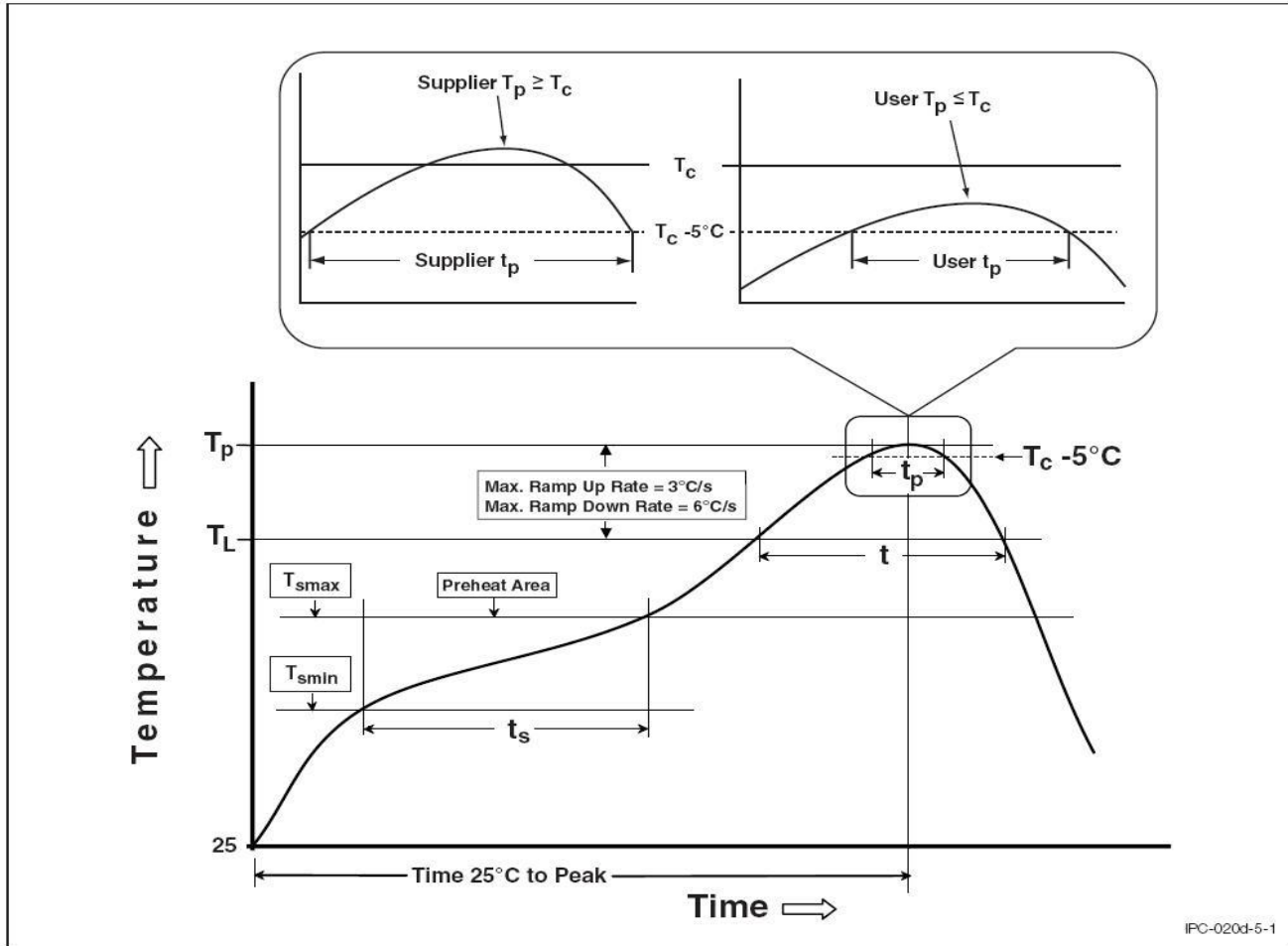
TD – Company Abbr.  
 R214 – Part Number  
 -6L – DIP6  
 Y – Lead Form Option (M/S/SL/SLM/None)  
 Z – Tape and Reel Option (T1/T2)  
 G – Green  
 V – VDE Option (V or None)

**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

**REFLOW INFORMATION**

**REFLOW PROFILE**

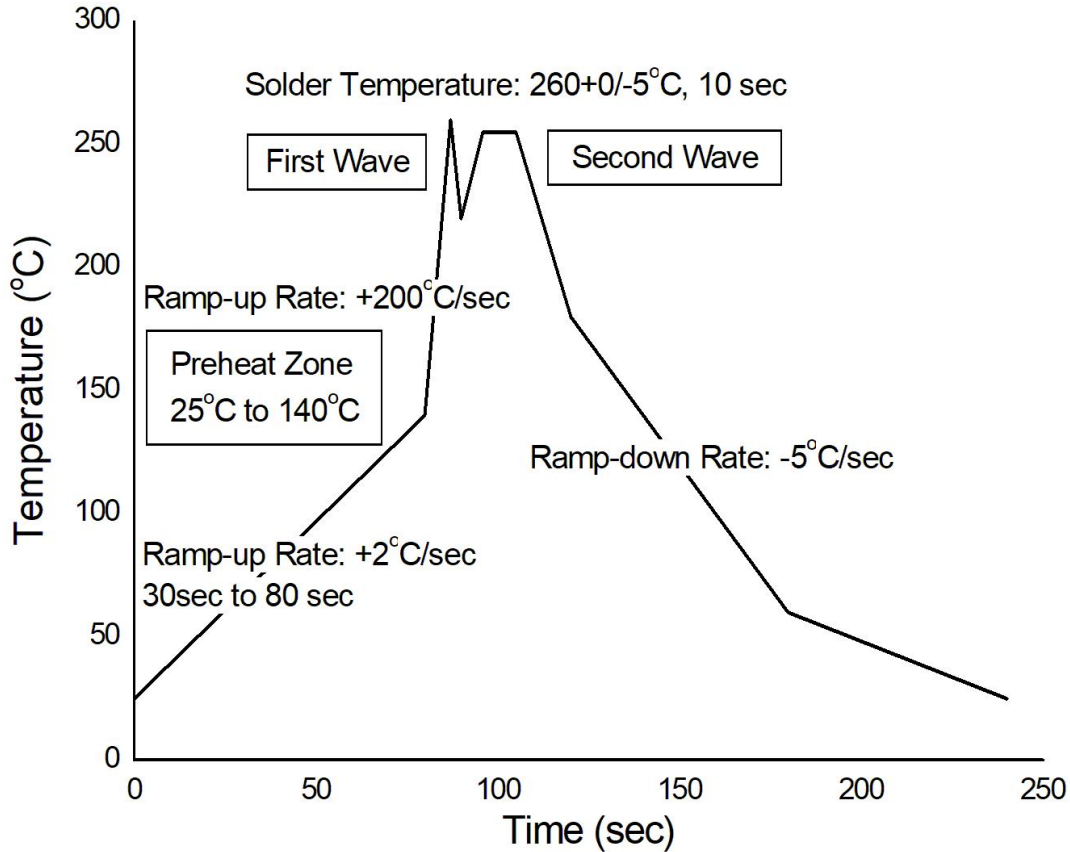


Profile Feature	Sn-Pb Assembly Profile	Pb-Free Assembly Profile
Temperature Min. ( $T_{smin}$ )	100	150°C
Temperature Max. ( $T_{smax}$ )	150	200°C
Time ( $t_s$ ) from ( $T_{smin}$ to $T_{smax}$ )	60-120 seconds	60-120 seconds
Ramp-up Rate ( $t_L$ to $t_P$ )	3°C/second max.	3°C/second max.
Liquidous Temperature ( $T_L$ )	183°C	217°C
Time ( $t_L$ ) Maintained Above ( $T_L$ )	60 – 150 seconds	60 – 150 seconds
Peak Body Package Temperature	235°C +0°C / -5°C	260°C +0°C / -5°C
Time ( $t_p$ ) within 5°C of 260°C	20 seconds	30 seconds
Ramp-down Rate ( $T_P$ to $T_L$ )	6°C/second max	6°C/second max
Time 25°C to Peak Temperature	6 minutes max.	8 minutes max.



**TEMPERATURE PROFILE OF SOLDERING**

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



**HAND SOLDERING BY SOLDERING IRON**

Soldering Temperature	$380 \pm 0/-5^{\circ}\text{C}$
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.



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- 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.