KTLP3503 Series
8PIN ZERO-CROSS TRIAC DRIVER PHOTOCOUPLER

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● **Description**

The KTLP3503 series consist of a GaAs infrared emitting diode optically coupled to a monolithic silicon detector performing the function of a zero voltage crossing bilateral TRIAC and a main output power TRIAC. They are designed for use with a TRIAC in the interface of logic systems to equipment powered from 115 VAC lines, such as solid-state relays, industrial controls, motors, solenoids and consumer appliances, etc.
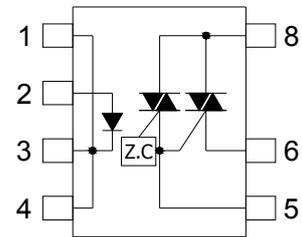
● **Schematic**

1.Cathode	5. Gate
2.Anode	6. T1
3.Cathode	8. T2
4.Cathode	

● **Features**

1. Pb free and RoHS compliant
2. 400V peak blocking voltage
3. On-State R.M.S Current 0.5A
4. Simplifies logic control of 115 VAC power
5. Zero voltage crossing
6. Isolation voltage between input and output (Viso：5300Vms)
7. MSL class 1
8. Agency Approvals：
   • UL Approved (No. E169586): UL1577
   • c-UL Approved (No. E169586)
   • VDE Approved (No. 40020973): DIN EN60747-5-5

● **Applications**

• TRIAC driver
• Programmable controllers
• AC-output module
• Solid state relay
• Isolated interface between high voltage AC devices and lower voltage DC control circuitry
• Switching motors, fans, heaters, solenoids and valves
• Phase or power control in applications, such as lighting and temperature control equipment

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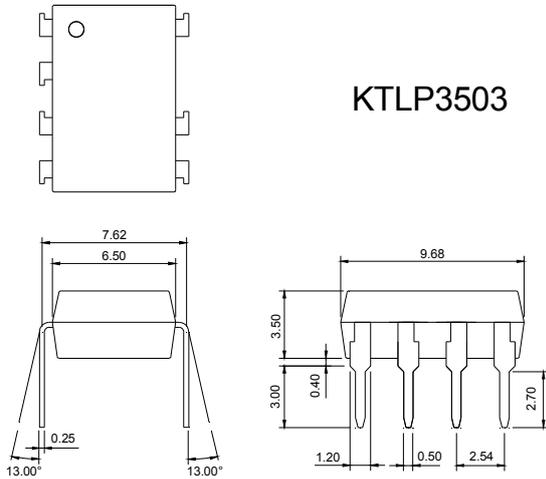● **Outside Dimension**

Unit：mm

1. Dual-in-line type.

KTLP3503

2. Surface mount type.

KTLP3503S
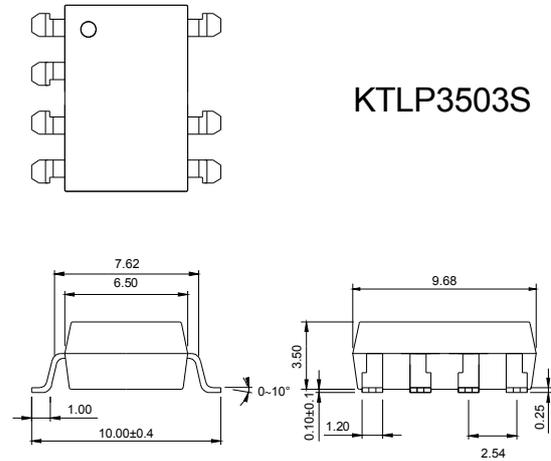
3. Long creepage distance type.

KTLP3503H
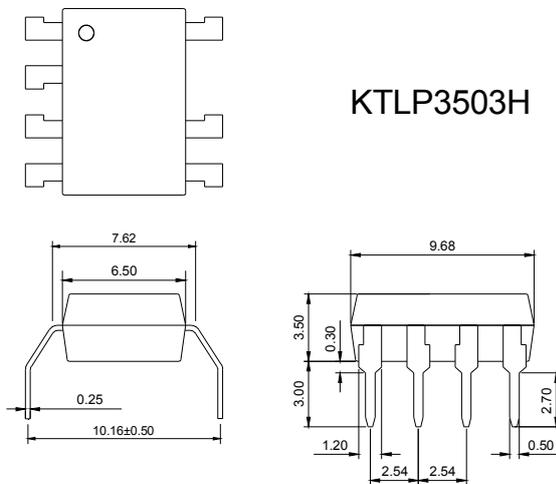
4. Long creepage distance for surface mount type.

KTLP3503L
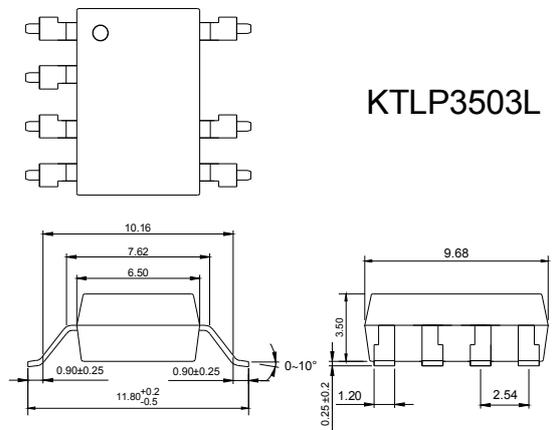
TOLERANCE：±0.2mm

● **Device Marking**
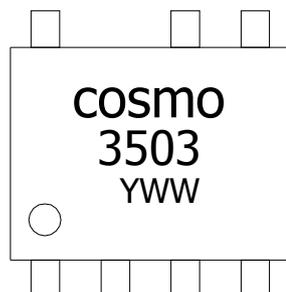
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YWW

Notes：

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YWW   Y：Year code / W：Week code

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● **Absolute Maximum Ratings** (Ta=25℃)

Parameter		Symbol	Rating	Unit
Input	Forward current	I_F	50	mA
	Peak forward current	I_{FM}	1	A
	Reverse voltage	V_R	6	V
	Power dissipation	P_D	70	mW
Output	Off-state output terminal voltage	V_{DRM}	400	V_{PEAK}
	On-state R.M.S. current	$I_{T(RMS)}$	0.5	A
	Peak repetitive surge current (60Hz , Peak)	I_{TSM}	5	A
Isolation voltage 1 minute		V_{iso}	5300	Vrms
Operating temperature		T_{opr}	-40 to +115	℃
Storage temperature		T_{stg}	-50 to +125	℃
Soldering temperature 10 seconds		T_{sol}	260	℃

● **Electro-optical Characteristics** (Ta=25℃)

Parameter		Symbol	Conditions	Min.	Typ.	Max.	Unit
Input	Forward voltage	V_F	I_F=10mA	-	1.2	1.4	V
	Reverse current	I_R	V_R=4V	-	-	10	µA
Output	Peak blocking current	I_{DRM}	V_{DRM} Rated	-	-	100	µA
	On-state voltage	V_{TM}	I_{TM}=0.5A	-	-	3	V
Transfer charac-teristics	Holding current	I_H		-	-	25	mA
	Critical rate of rise of off-state voltage	dv/dt	V_{DRM}=(1/$\sqrt{2}$)*Rated	-	1000	-	V/µs
	Inhibit voltage (MT1-MT2 voltage above which device will not trigger)	V_{INH}	I_F= Rated I_{FT}	-	-	50	V
	Leakage in inhibited state	I_{DRM2}	I_F=Rated I_{FT}, Rated V_{DRM}, Off State	-	200	-	µA
	Isolation resistance	R_{iso}	DC500V	$5x10^{10}$	-	-	Ω
	Minimum trigger current	I_{FT}	Main terminal voltage=3V	-	-	10	mA

Fig.1 Forward Current e vs. Ambient Temperature

Forward Current I_F (mA) vs. Ambient Temperature Ta (℃)

Fig.2 On-State R.M.S. Current vs. Ambient Temperature

On-state Current I_{TM} (mA) vs. Ambient Temperature Ta (℃)

Fig.3 Peak Forward Current vs. Duty Ratio

Pulse width <= 100us
Ta=25°C
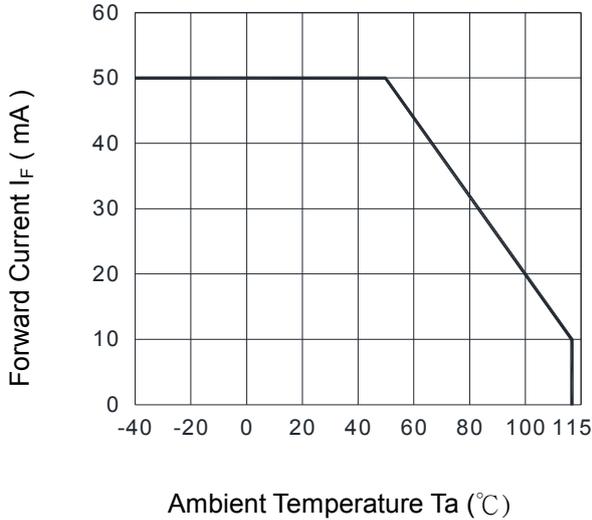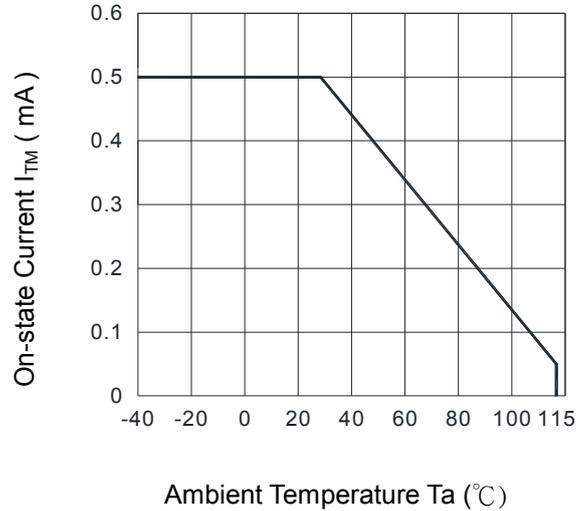
Peak Forward Current I_{FT} (mA) vs. Duty Ratio

Fig.4 Forward Current vs. Forward Voltage

Ta=75°C
50°C
25°C
0°C
-25°C

Forward Current I_F (mA) vs. Forward Voltage (V)

Fig.5 Trigger Current vs. Ambient Temperature

Normalized to Ta=25°C

I_{FT}, Normalized vs. Ambient Temperature Ta (℃)
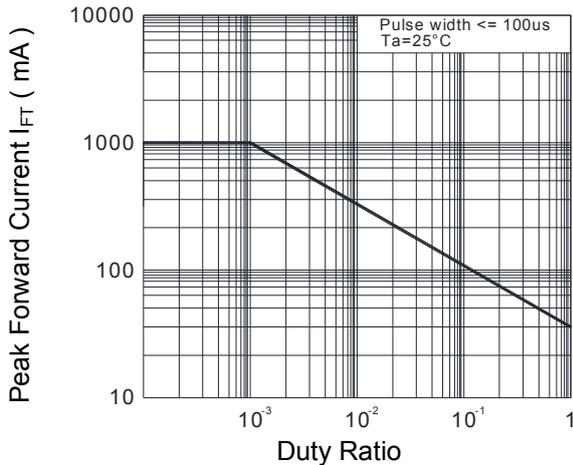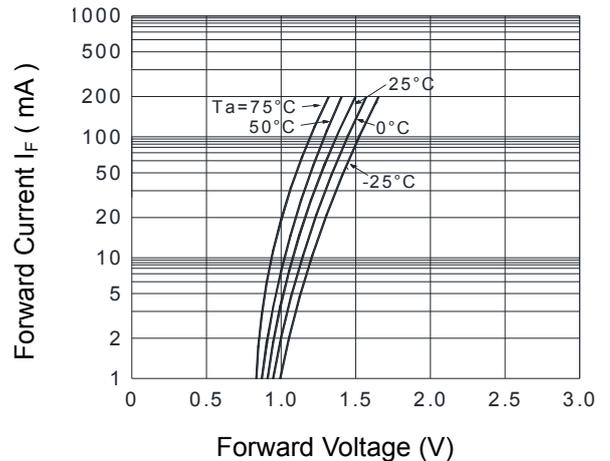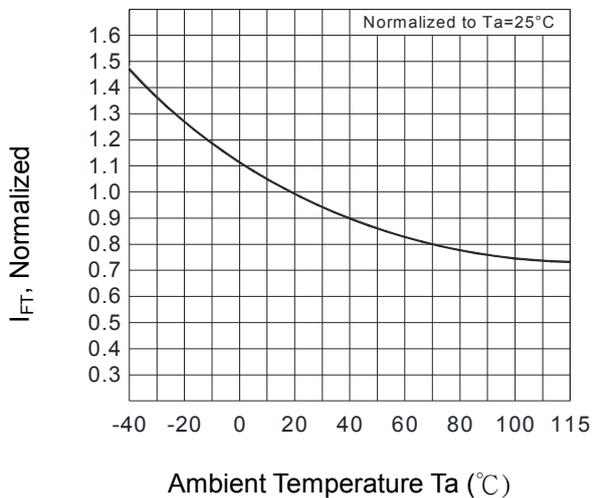
Fig.6 Inhibited Voltage vs. Ambient Temperature

V_{INH}, Normalized vs. Ambient Temperature Ta (℃)
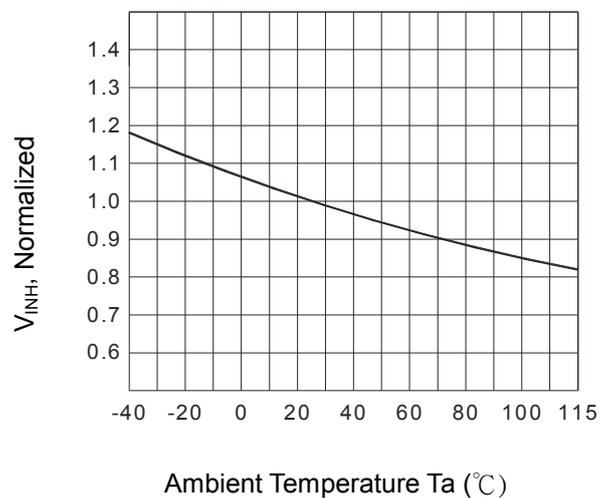
Fig.7 On-state Characteristics

Output pulse width 80us
I_F =30mA, f=60Hz, Ta=25°C

On-state Current I_{TM} (A)

On-state Voltage (V)
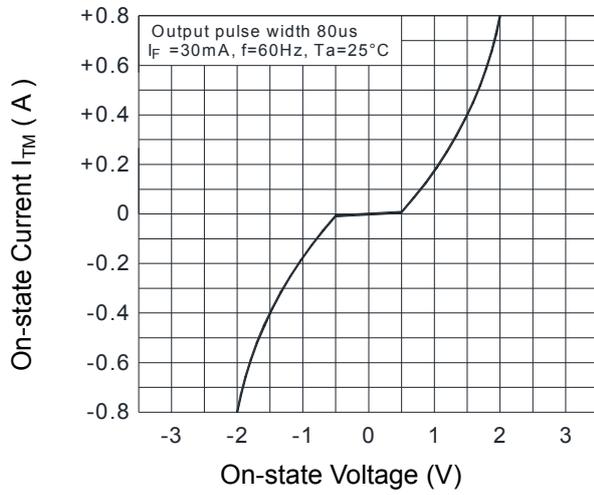
**Fig.8 Leakage with LED off
vs. Ambient Temperature**

Peak Blocking Current (nA)

Ambient Temperature Ta (℃)

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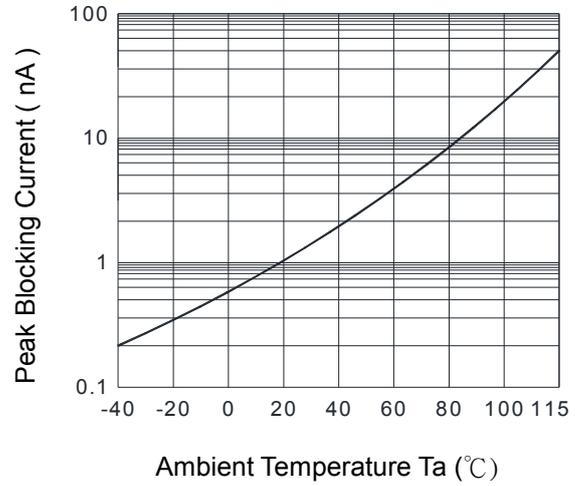
● **Recommended Soldering Conditions**

(a) Infrared reflow soldering：

■ Peak reflow soldering： 260℃ or below (package surface temperature)

■ Time of peak reflow temperature： 10 sec

■ Time of temperature higher than 230℃： 30-60 sec

■ Time to preheat temperature from 180~190℃： 60-120 sec

■ Time(s) of reflow： Two

■ Flux： Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

Recommended Temperature Profile of Infrared Reflow
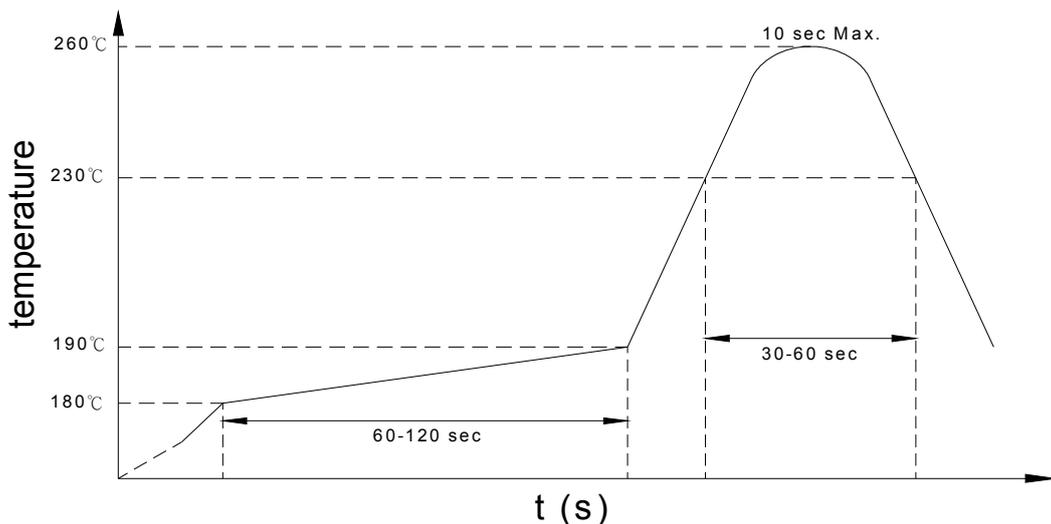
(b) Wave soldering：

■ Temperature： 260℃ or below (molten solder temperature)

■ Time： 10 seconds or less

■ Preheating conditions： 120℃ or below (package surface temperature)

■ Time(s) of reflow： One

■ Flux： Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

(c) Cautions：

■ Fluxes： Avoid removing the residual flux with freon-based and chlorine-based cleaning solvent.

■ Avoid shorting between portion of frame and leads.

● **Numbering System**
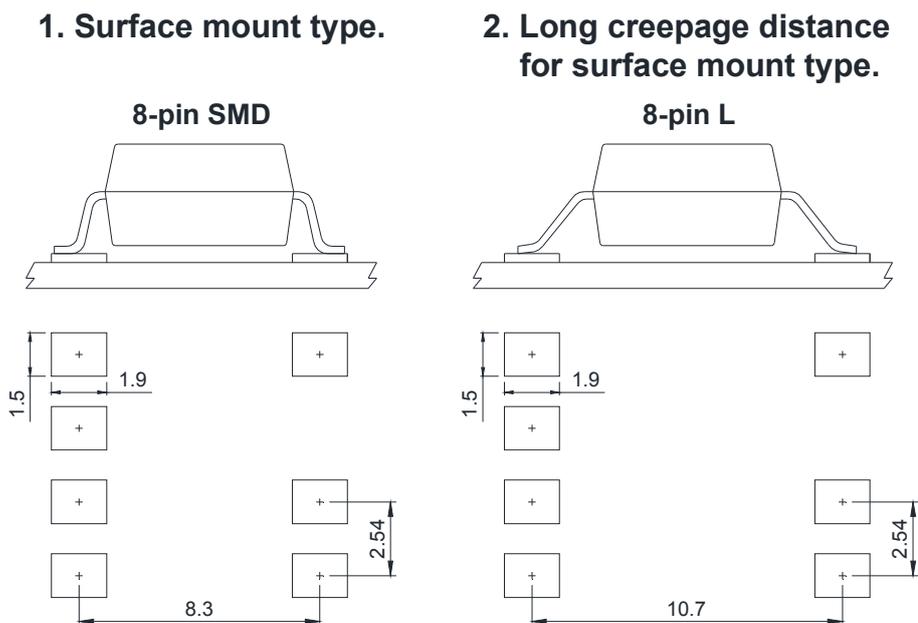
KTLP3503 <u>X</u> (Y)

Notes：

KTLP3503 = Part No.

X = Lead form option (blank、S、H、L)
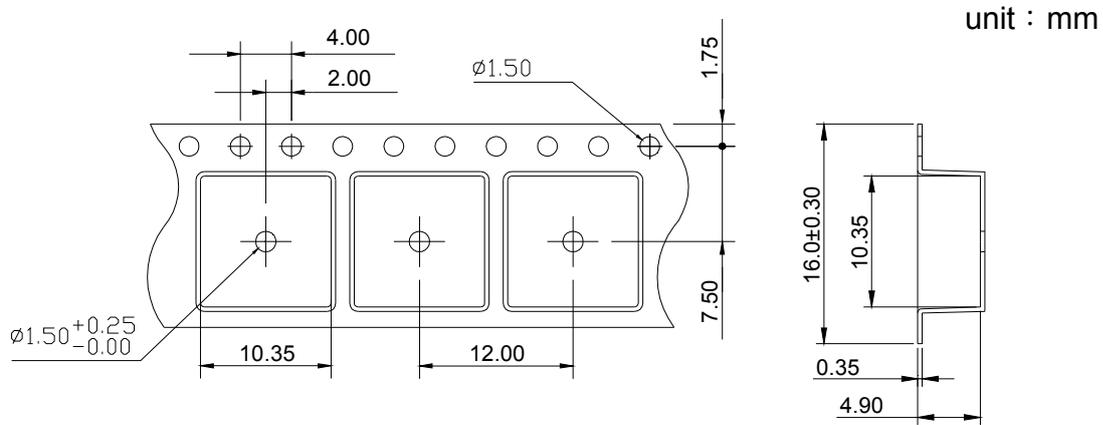
Y = Tape and reel option (TL、TR、TLD、TRU)

Option	Description	Packing quantity
S (TL)	surface mount type package + TL tape & reel option	1000 units per reel
S (TR)	surface mount type package + TR tape & reel option	1000 units per reel
L (TLD)	long creepage distance for surface mount type package + TLD tape & reel option	800 units per reel
L (TRU)	long creepage distance for surface mount type package + TRU tape & reel option	800 units per reel

● **Recommended Pad Layout for Surface Mount Lead Form**

1. Surface mount type.

2. Long creepage distance for surface mount type.

8-pin SMD

8-pin L

1.5   1.9

2.54

8.3

1.5   1.9

2.54

10.7

Unit：mm

● **SMD Carrier Tape & Reel**

unit：mm

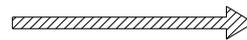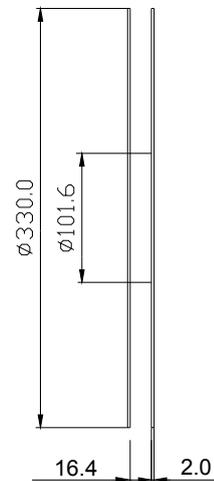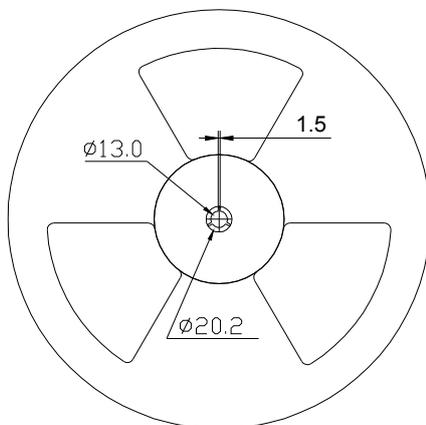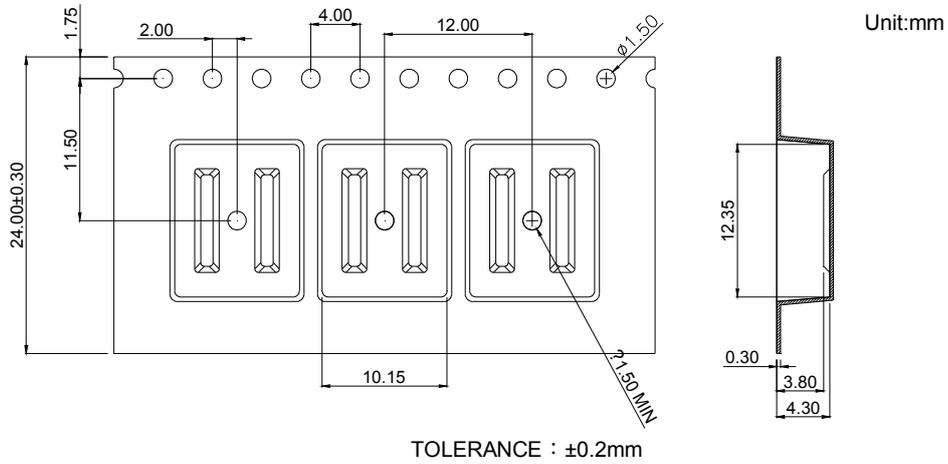TOLERANCE：±0.2mm

TL

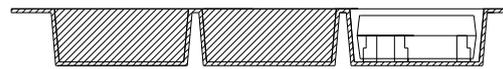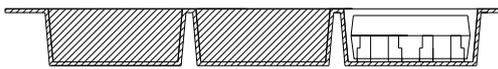TR
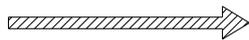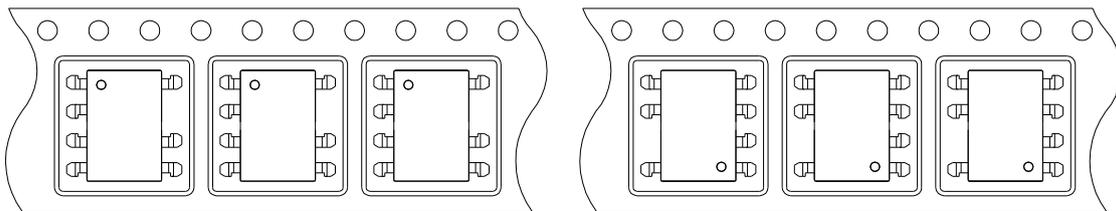
Direction of feed from reel

Direction of feed from reel

● **L Carrier tape & Reel**

Unit:mm

TOLERANCE：±0.2mm
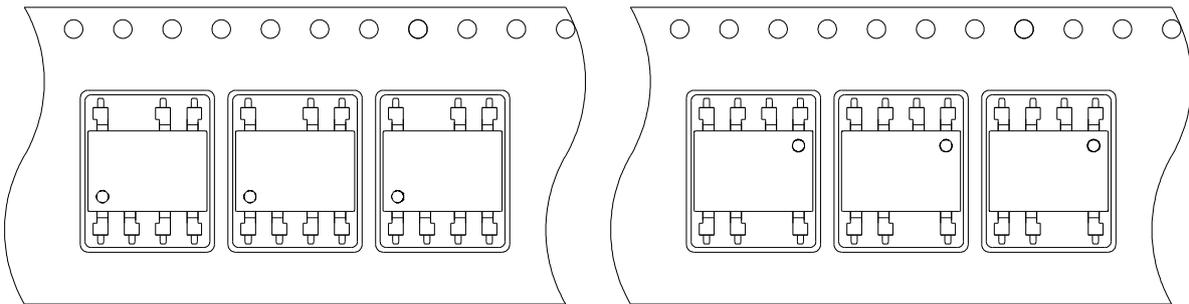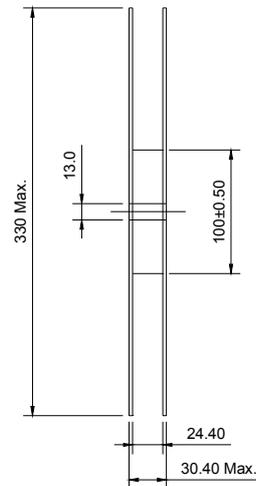
TLD

TRU

Direction of feed from reel

Direction of feed from reel
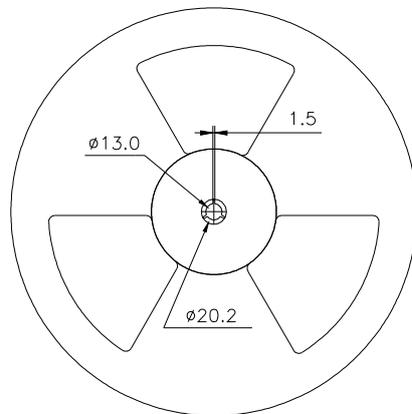
● **Application Notice**

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a. Personal computer
b. OA machine
c. Audio / Video
d. Instrumentation
e. Electrical application
f. Measurement equipment
g. Consumer electronics
h. Telecommunication

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b. Space application
c. Telecommunication equipment (trunk lines)
d. Nuclear power control
e. Equipment used for automotive vehicles, trains, ships...etc.