

Features

- **Current transfer ratio**
(CTR: 20~300% at $I_F = \pm 1\text{mA}$, $V_{CE} = 5\text{V}$)
- **High isolation voltage between input and output** (Viso = 5000V rms)
- **Collector - emitter breakdown voltage** $BV_{CEO} \geq 80\text{V}$
- **Operating Temperature:** -55°C~110°C

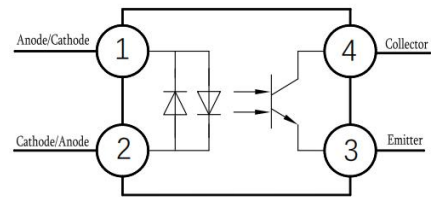
HF

Applications

- Switching power supply, intelligent meter
- Industrial control, measuring instruments
- Office equipment such as copiers
- Household appliances: such as air conditioners, fans, water heaters, etc.
-

Mechanical Data

- **Case:** DIP-4L, DIP-4L(M), SMD-4L, SMD-4L(SS)
- **Molding Compound:** UL Flammability Classification Rating 94V-0
- **Terminals:** Matte tin-plated leads; solderability-per MIL-STD-202, Method 208



Ordering Information

TWS 814 (M) (G) (X) - (U) (N) (Y)

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

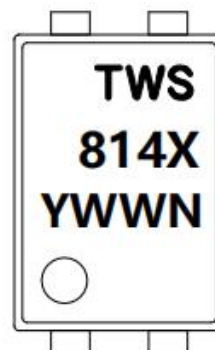
- ① Brand(TWS)
- ② Product series(814)
- ③ Package type(DIP-4L:None, DIP-4L(M):M,SMD-4L:S,SMD-4L(SS):SS)
- ④ Halogen option(None :Halogen free)
- ⑤ CTR Bank(A,B or None)
- ⑥ Lead frame (None: Copper)
- ⑦ Customer option 1 (0-9 or A-Z or None)
- ⑧ Customer option 2 (0-9 or A-Z or None)

Part Number	Package	Shipping Quantity	Marking Code
TWS814X ^{*1}	DIP-4L	100 pcs / Tube	TWS814X ^{*1}
TWS814MX ^{*1}	DIP-4L(M)	100 pcs / Tube	TWS814X ^{*1}
TWS814SX ^{*1}	SMD-4L	2000 pcs / Tape & Reel	TWS814X ^{*1}
TWS814SSX ^{*1}	SMD-4L(SS)	2000 pcs / Tape & Reel	TWS814X ^{*1}

Notes 1: X denotes CTR Rank : A, B or None.

Marking Information

- "TWS" denotes brand.
- "814" denotes Product series.
- "X" denotes CTR Rank : A, B , None.
- "Y" denotes Year : A(2024), B(2025), C(2026)
- "WW" denotes Week's number .
- "N" denotes the day of Week.



Maximum Ratings (@ T_A = 25°C unless otherwise specified)

Parameter		Symbol	Value	Unit
Input	Forward Current	I _F	±60	mA
	Power Dissipation	P _D	100	mW
	Power Dissipation Derating factor (above T _a = 100°C)	P _{DD}	2.9	mW/°C
	Thermal Resistance Junction-Ambient	R _{thJ-A}	325	°C/W
	Thermal Resistance Junction-Case	R _{thJ-C}	200	°C/W
Output	Power Dissipation	P _C	150	mW
	Collector Current	I _C	50	mA
	Collector-Emitter Voltage	V _{CEO}	80	V
	Emitter-Collector Voltage	V _{ECO}	7	V

Thermal Characteristics

Parameter	Symbol	Value	Unit
Total Power Dissipation	P _{TOT}	200	mW
Isolation Voltage *1	V _{ISO}	5000	V _{rms}
Operating Temperature	T _{OPR}	-55 ~ +110	°C
Storage Temperature Range	T _{STG}	-55 ~ +125	°C
Soldering Temperature *2	T _{SOL}	260	°C

Notes:

1. 40 to 60% RH, AC for 1 minute

2. For 10 seconds

Electrical Characteristics (@ T_A = 25°C unless otherwise specified)

Parameter		Symbol	Test Condition	Min.	Typ.	Max.	Unit
Input	Forward Voltage	V _F	I _F =±20mA	-	1.2	1.4	V
	Terminal Capacitance	C _t	V=0, f=1kHz	-	30	250	pF
Output	Collector-Emitter Dark Current	I _{CEO}	V _{CE} = 20V, I _F = 0	-	-	100	nA
	Collector-Emitter Breakdown Voltage	BV _{CEO}	I _C = 0.1mA, I _F = 0	80	-	-	V
	Emitter-Collector Breakdown Voltage	BV _{ECO}	I _E = 10μA, I _F = 0	7	-	-	V
Transfer Characteristics	Current Transfer Ratio	CTR	I _F =±1mA, V _{CE} =5V	20	-	300	%
	Collector-Emitter Saturation Voltage	V _{CE(sat)}	I _F =±20mA, I _C =1mA	-	0.1	0.2	V

	Isolation Resistance	R _{ISO}	DC500V, 40~60%R.H	5x10 ¹⁰	1x10 ¹¹	-	Ω
	Floating Capacitance	C _f	V=0, f=1MHz	-	0.6	1.0	pF
	Cut-off Frequency	F _c	V _{CE} =5V, I _C =2mA, R _L =100Ω, -3dB	-	80	-	kHz
	Rise Time	T _r	V _{CE} =2V, R _L = 100Ω I _C =2mA	-	-	18	μs
	Fall Time	T _f		-	-	18	

Rank Table of Current Transfer Ratio CTR

Rank Mark	Min. (%)	Max. (%)	Condition
A	50	150	I _F = ±1mA, V _{CE} = 5V
B	100	300	
No mark	20	300	

Ratings and Characteristics Curves (@ $T_A = 25^\circ\text{C}$ unless otherwise specified)

Fig.1 Relative Current Transfer Ratio vs Forward Current

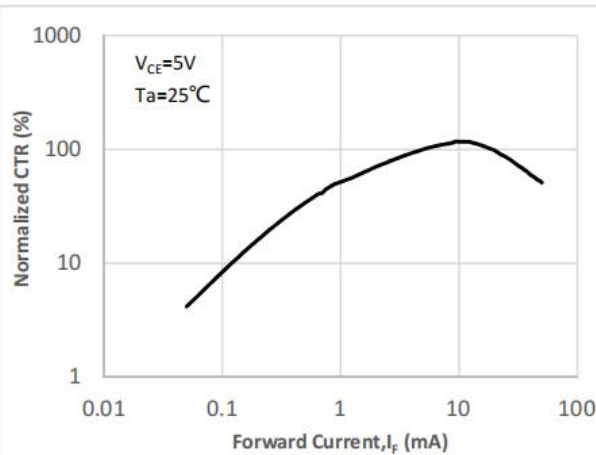


Fig.2 Forward Current vs Forward Voltage

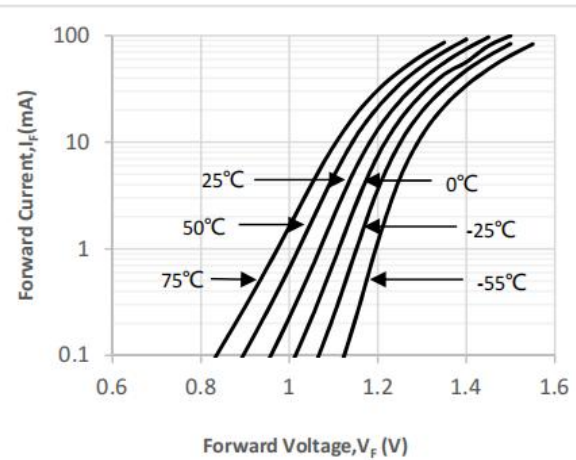


Fig.3 Collector Current vs Collector Emitter voltage

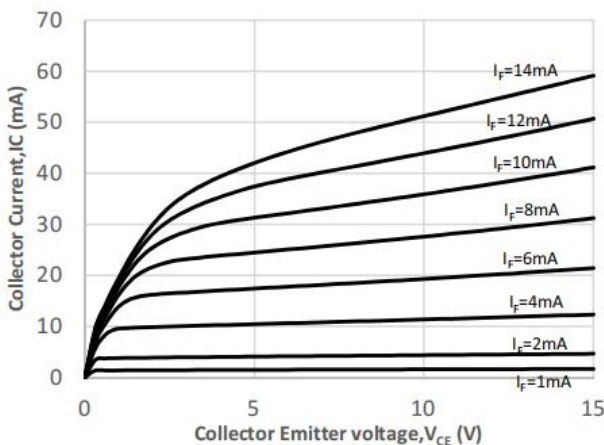


Fig.4 Relative Current Transfer Ratio vs Ambient Temperature

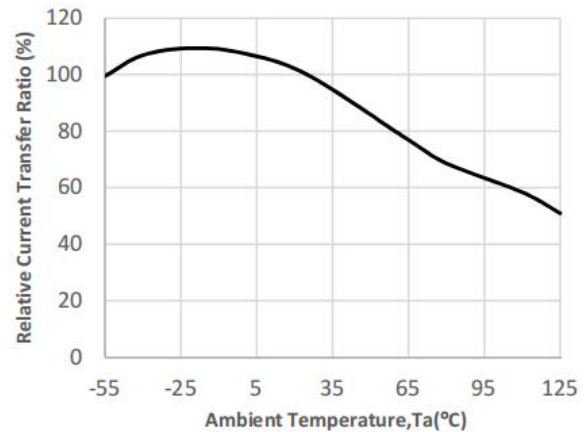


Fig.5 Collector-emitter saturation voltage vs. Ambient Temperature

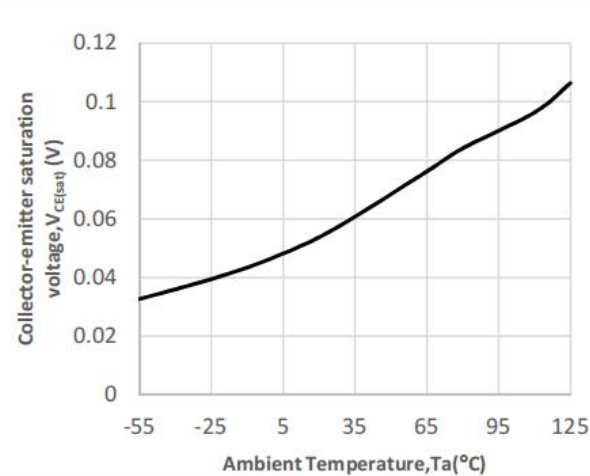


Fig.6 Collector Dark Current vs. Ambient Temperature

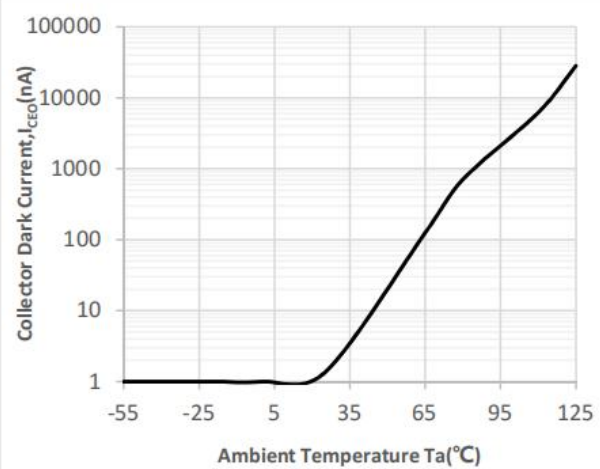


Fig.7 Response Time vs. Load Resistance



Fig.8 Frequency Response

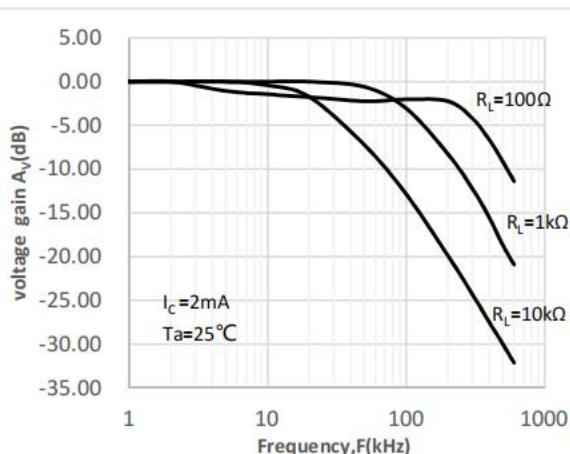


Fig.9 Collector-emitter Saturation Voltage vs. Forward Current

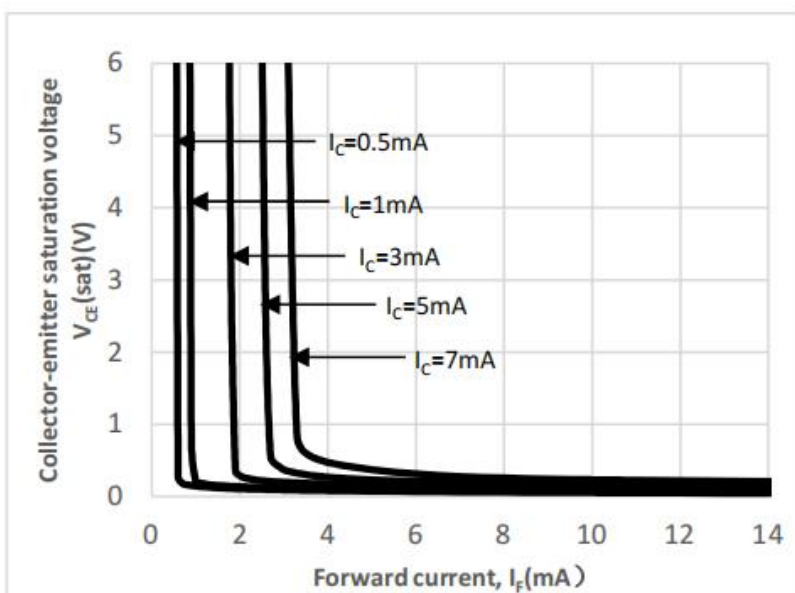
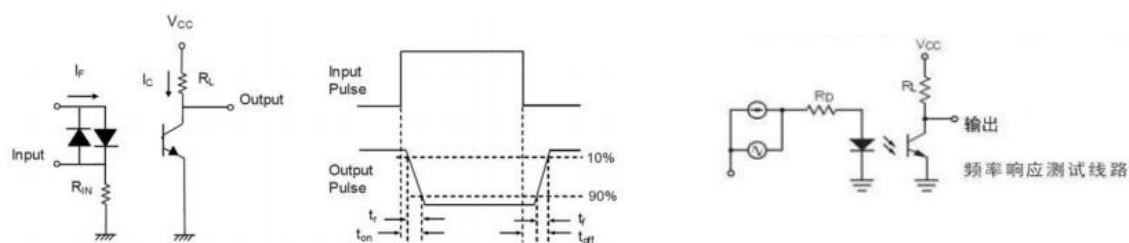
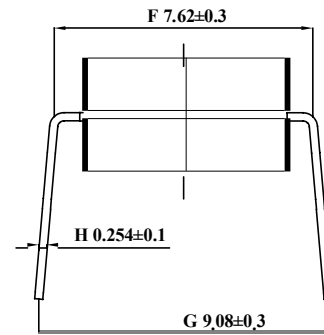
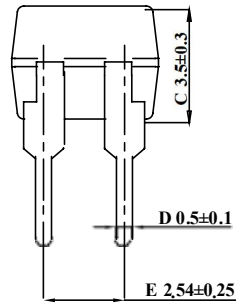
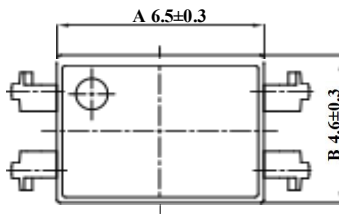


Fig.10 Switching Time Test Circuit & Waveforms

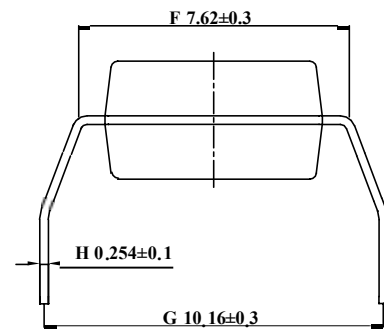
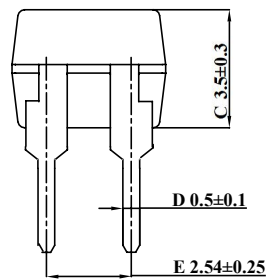
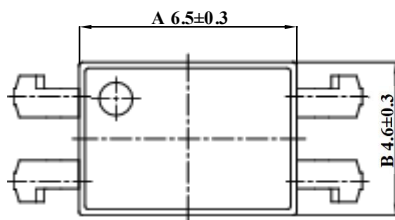


Package Outline Dimensions (unit: mm)

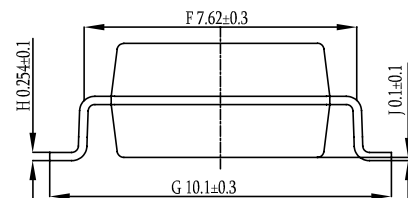
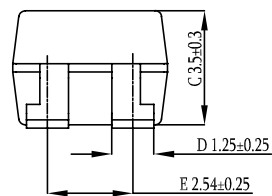
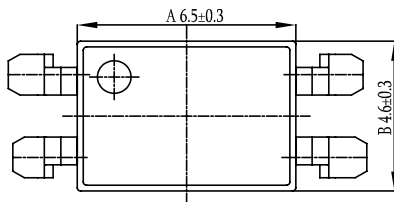
DIP-4L



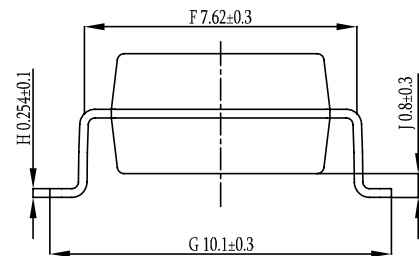
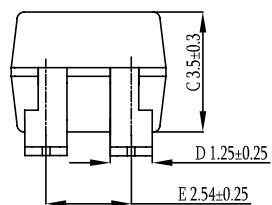
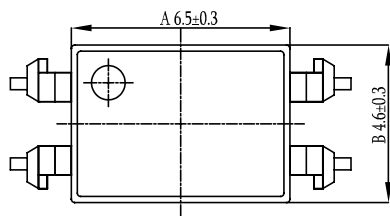
DIP-4L (M)



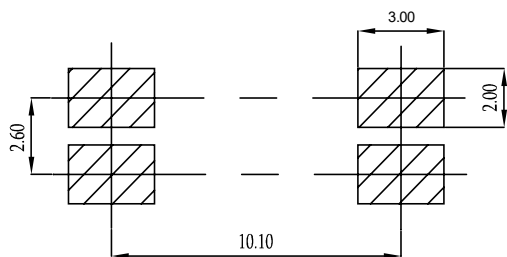
SMD-4L



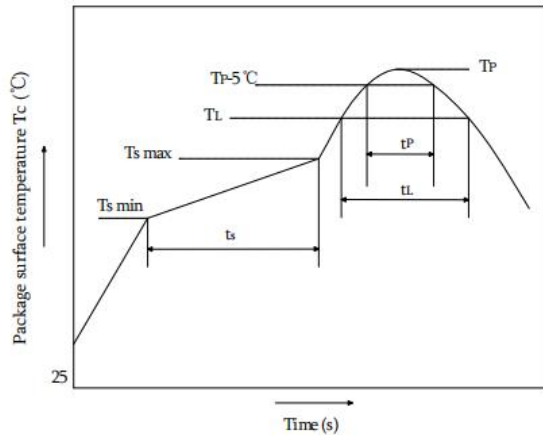
SMD-4L(SS)



SOLDERING FOOTPRINT (unit: mm)



Reflow soldering

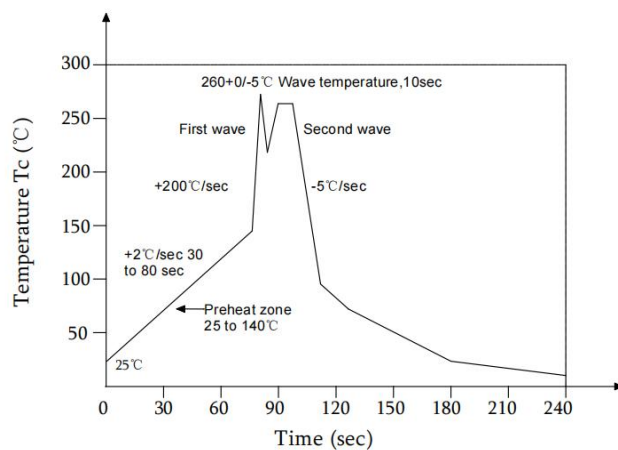


	Symbol	Min	Max	Unit
Preheat temperature	T_s	150	200	$^{\circ}\text{C}$
Preheat time	t_s	60	120	s
Ramp-up rate(T_L to T_P)			3	$^{\circ}\text{C/s}$
Liquidus temperature	T_L	217		$^{\circ}\text{C}$
Time above T_L	t_L	60	150	s
Peak temperature	T_P		260	$^{\circ}\text{C}$
Time during which T_c is between (T_P-5) and T_P	t_P		30	s
Ramp-down rate(T_P to T_L)			6	$^{\circ}\text{C/s}$

Note:

Reflow soldering is recommended at the temperatures and times shown, no more than three times.

Wave soldering



Profile feature	
Average ramp-up rate	$\sim 200^{\circ}\text{C/s}$
Heating rate during preheat	1 $^{\circ}\text{C/s}$ to 2 $^{\circ}\text{C/s}$ typical; 4 $^{\circ}\text{C/s}$ maximum
Final preheat temperature T_s	$\sim 130^{\circ}\text{C}$
Preheat time (25 $^{\circ}\text{C}$ to T_s)	$> 60\text{s}$
Peak temperature T_P	260 $^{\circ}\text{C}$
Time within peak temperature t_P	10s
Ramp-down rate	5 $^{\circ}\text{C/s}$ maximum

Soldering with hand soldering iron

- Hand soldering iron is only used for product rework or sample testing.
- Hand soldering iron requirements: Temperature: 360 $^{\circ}\text{C}$ $\pm$ 5 $^{\circ}\text{C}$ within 3s.

Packing

Package Type	Packing Form	Quantity per Tube & Reel	Quantity per Box	Quantity per Carton	Antistatic Bag Specification	Box Specification	Carton Specification	Note
DIP-4L/ DIP-4L(M)	Tube(500mm)	100 pcs/tube	25 tubes /box	12 boxes /ctn	190*670mm	520*105*50mm	545*372*235mm	Straight insert type material tube
SMD-4L/ SMD-4L(SS)	Reel(φ330mm)	2000 pcs/reel	2 reels /box	5 boxes /ctn	380*420mm	350*340*60mm	365*330*370mm	Leave 25 Spaces at the beginning and 50 Spaces at the end

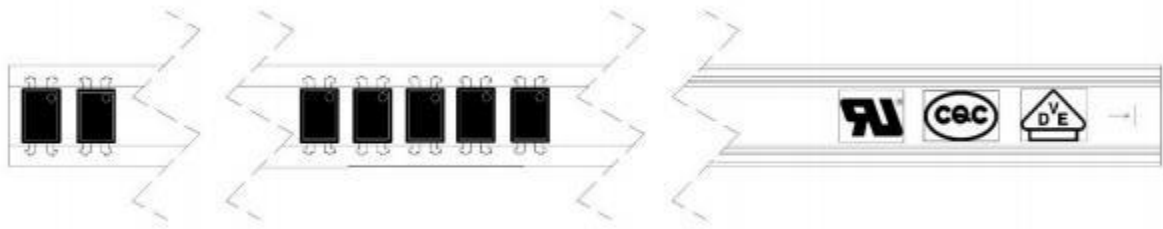
■ Summary table

■ DIP-4L/ DIP-4L(M) (Tube)

Qty/ tube : 100 pcs. Qty/box: 2500 pcs.

Qty/ctn : 30000 pcs.

Schematic: (unit:mm)

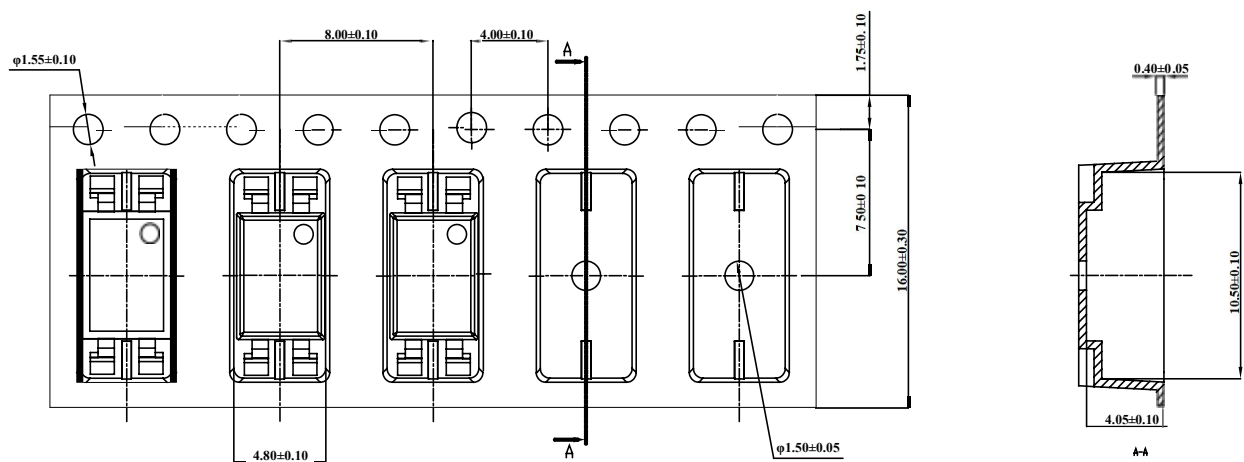


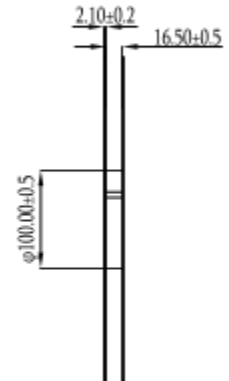
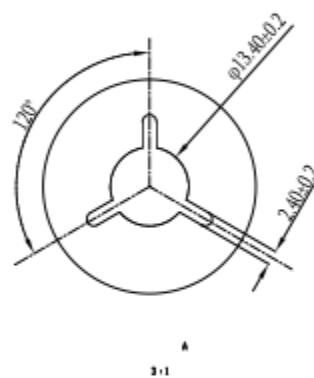
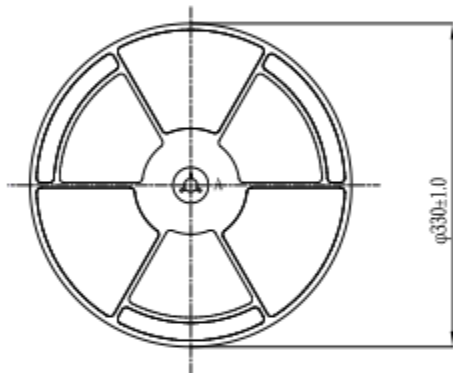
■ SMD-4L/ SMD-4L(SS) (Reel)

Qty/reel: 2000 pcs. Qty/box: 4000 pcs.

Qty/ctn : 20000 pcs.

Schematic: (unit:mm)





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