



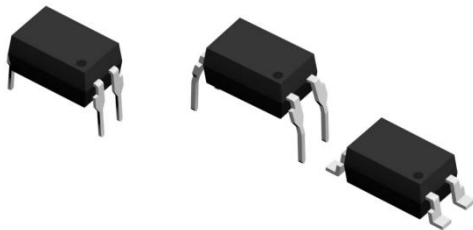
# ***HT series***

## **Photocoupler Product Data Sheet**

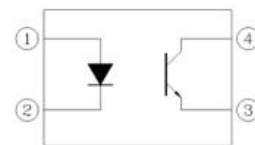
# **HT-851X**

Spec No:HT-PC-851X-P-014-A1  
Effective Date:07/03/2024

## ■ Package



Schematic



Pin Configuration

1. Anode
2. Cathode
3. Emitter
4. Collector

## ■ Description

The HT-851X is a photoelectric coupler composed of light-emitting diode and phototransistor with high voltage resistance. It is packaged in a 4-pin package and in wide-lead spacing and SMD option.

## ■ Features

- Current transfer ratio(CTR : MIN. 50% at  $I_F = 5\text{mA}$ ,  $V_{CE} = 5\text{V}$ )
- Collector - Emitter Voltage:  $V_{CEO} \geq 350\text{V}$
- High input-output isolation voltage( $V_{iso} = 5,000\text{Vrms}$ )
- Operating Temperature:  $-55^\circ\text{C} \sim 110^\circ\text{C}$
- Safety approval  
(UL 1577, VDE DIN EN60747-5-5 (VDE 0884-5) , CQC11-471543-2022)
- RoHS
- MSL1

## ■ Applications

- Programmable controllers
- Switching power supply, intelligent meter
- Home appliances: such as air conditioners, fans, water heaters, etc

## ■ Product Nomenclature

The product name is designated as below:

**HT -851 X -X X- X X X- XX**

① ② ③ ④ ⑤ ⑥ ⑦

Designation:

HT =Hengtuo Technology Co.,LTD.

851= Product Series

① = Lead form option(S1,M,NONE)<sub>(1)</sub>

② = CTR Rank(A,B,C,D,E)<sub>(2)</sub>

③ = Tape and Reel option(TP,TP1,NONE)<sub>(3)</sub>

④ = Lead frame Material(F,NONE)<sub>(4)</sub>

⑤ = VDE order option(fixed code "V")

⑥ = Halogen free option(fixed code"G")

⑦ = Customer code

### Notes

#### 1. Lead form option:

Symbol	Description
S1	DIP4-S1
M	DIP4-M
NONE	DIP4 Normal

#### 2. CTR Rank:

Symbol	Description
A,B,C,D,E...	CTR Rank
NONE	No Rank

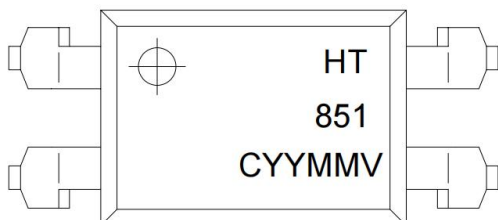
#### 3. Tape and Reel option:

Symbol	Description
TP&TP1	Tape and Reel Type
NONE	DIP Type

#### 4. Lead frame Material

Symbol	Description
F	Iron
NONE	Copper

## ■ Marking Information



### Designation:

HT denotes Hengtuo  
851 denotes Device  
C denotes CTR Rank  
YY denotes year code  
WW denotes week code  
V denotes VDE

## ■ Maximum

	Parameter	Symbol	Values	Unit
Input	Forward Current	$I_F$	50	mA
	Reverse Voltage	$V_R$	6	V
	Power Dissipation	P	70	mW
	Peak Forward Current (100μs pulse, 100Hz)	$I_{FP}$	1	A
	Thermal Resistance Junction-Ambient	$R_{thJ-A}$	325	°C/W
	Thermal Resistance Junction-Case	$R_{thJ-C}$	200	°C/W
Output	Collector - Emitter Voltage	$V_{CEO}$	350	V
	Emitter - Collector Voltage	$V_{ECO}$	7	V
	Collector Current	$I_C$	50	mA
	Collector Power Dissipation	$P_C$	150	mW
Operating temperature range		$T_{op}$	-55 ~ 110	°C
Storage temperature range		$T_{stg}$	-55 ~ 125	°C
Total Power consumption		P(W)	200	mW
Isolation Voltage <sup>(1)</sup>		$V_{ISO}$	5000	V <sub>rms</sub>
Soldering Temperature <sup>(2)</sup>		$T_{SOL}$	260	°C

### Notes:

(1). AC for 1 minute, R.H.= 40 ~ 60% R.H. In this test, pins 1, 2 are shorted together, and pins 3, 4 are shorted together.

(2).For 10 seconds

## ■ Electronic Optical Characteristics

(TA = 25°C)

	Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditon
Input	Forward Voltage	$V_F$	-	1.2	1.4	V	$I_F=20\text{mA}$
	Reverse Current	$I_R$	-	-	10	$\mu\text{A}$	$V_R=5\text{V}$
	Terminal Capacitance	$C_t$	-	30	250	pF	$V=0, f=1\text{KHz}$
Output	Collector Dark Current	$I_{CEO}$	-	-	100	nA	$V_{CE}=200\text{V}, I_F=0$
	Collector-Emitter Breakdown Voltage	$BV_{CEO}$	350	-	-	V	$I_C=0.1\text{mA}, I_F=0$
	Emitter-Collector Breakdown Voltage	$BV_{ECO}$	7	-	-	V	$I_E=0.1\text{mA}, I_F=0$
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	-	-	0.4	V	$I_F=20\text{mA}, I_C=1\text{mA}$
Isolation Resistance		$R_{iso}$	$5 \times 10^{10}$	$1 \times 10^{11}$	-	$\Omega$	DC500V, 40 ~ 60% R.H.
Floating Capacitance		$C_f$		0.6	1	pF	$V=0, f=1\text{MHz}$
Cut-off Frequency		$f_c$		80		kHz	$V_{CE}=5\text{V}, I_C=2\text{mA}, R_L=100\Omega, -3\text{dB}$
Response Time (Rise)		$t_r$		4	18	$\mu\text{s}$	$V_{CE}=2\text{V}, I_C=2\text{mA}, R_L=100\Omega,$
Response Time (Fall)		$t_f$		3	18	$\mu\text{s}$	

## ■ Rank Table Of Current Transfer Ratio

(CTR= $I_C/I_F \times 100\%$ )

Rank Code	Symbol	Min	Max	Conditon
NONE	CTR	50	600	$I_F=5\text{mA}, V_{CE}=5\text{V}, T_a=25^\circ\text{C}$

## ■ Characteristics Curves

Fig.1 Relative Current Transfer Ratio vs. Forward Current

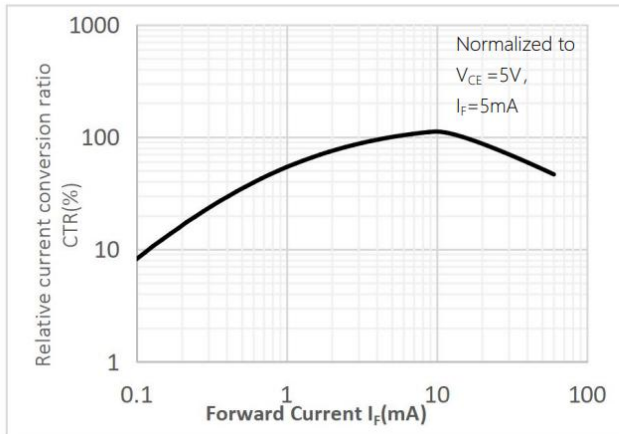


Fig.2 Forward Current vs. Forward Voltage

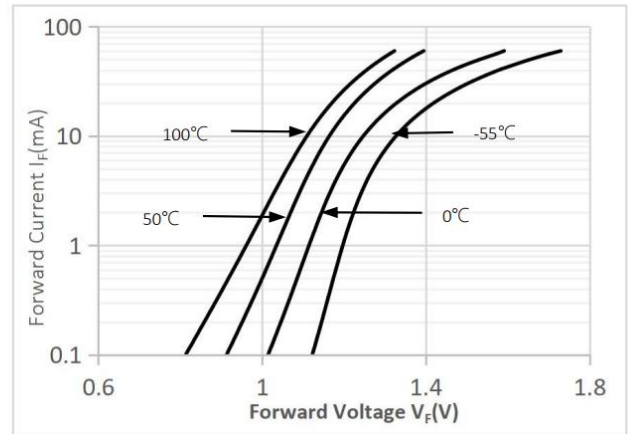


Fig.3 Collector Current vs. Collector-emitter Voltage

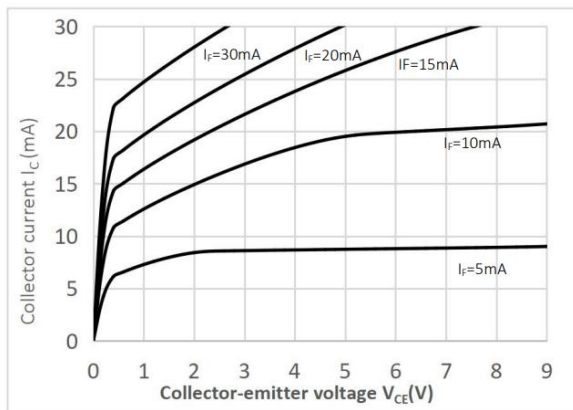


Fig.4 Relative Current Transfer Ratio vs. Ambient Temperature

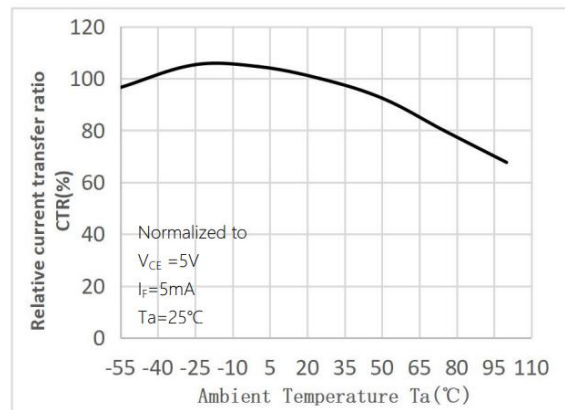


Fig.5 Collector-emitter Saturation Voltage vs. Ambient Temperature

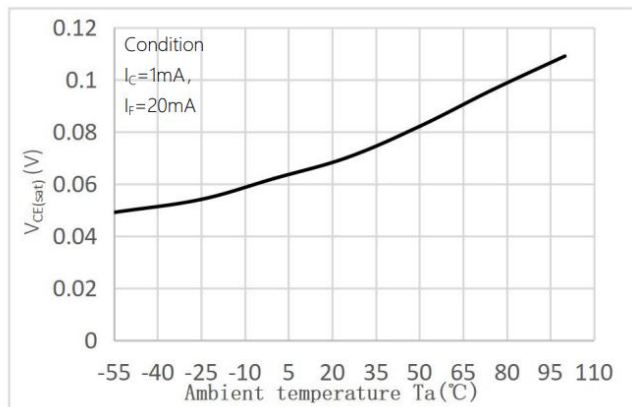


Fig.6 Collector Dark Current vs Ambient Temperature

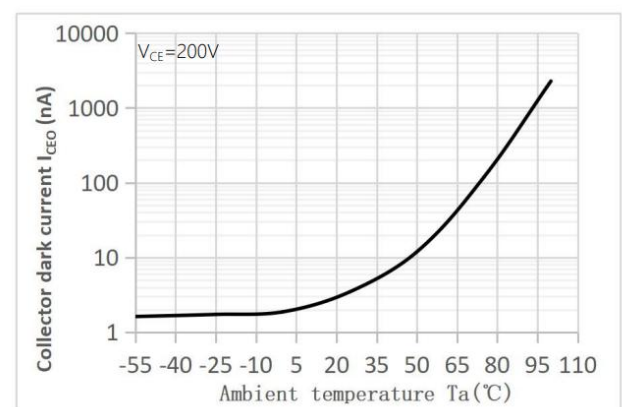


Fig.7 Collector-emitter Saturation Voltage vs Forward Current

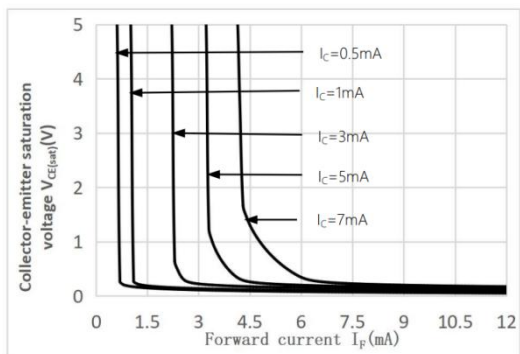
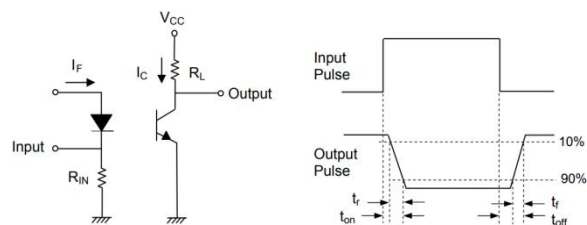
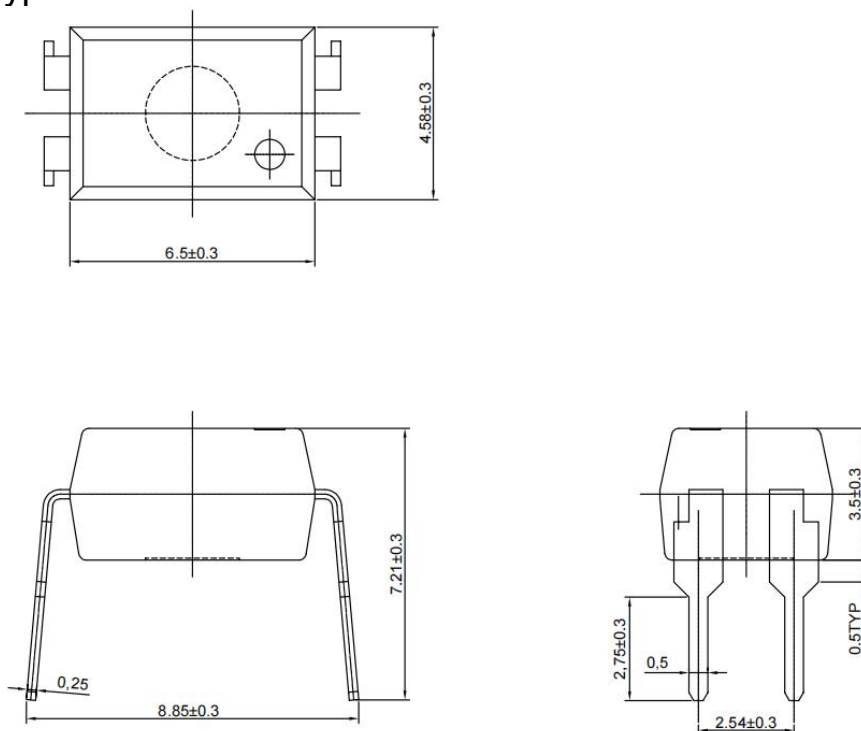


Fig.8 Switching Time Test Circuit & Waveforms

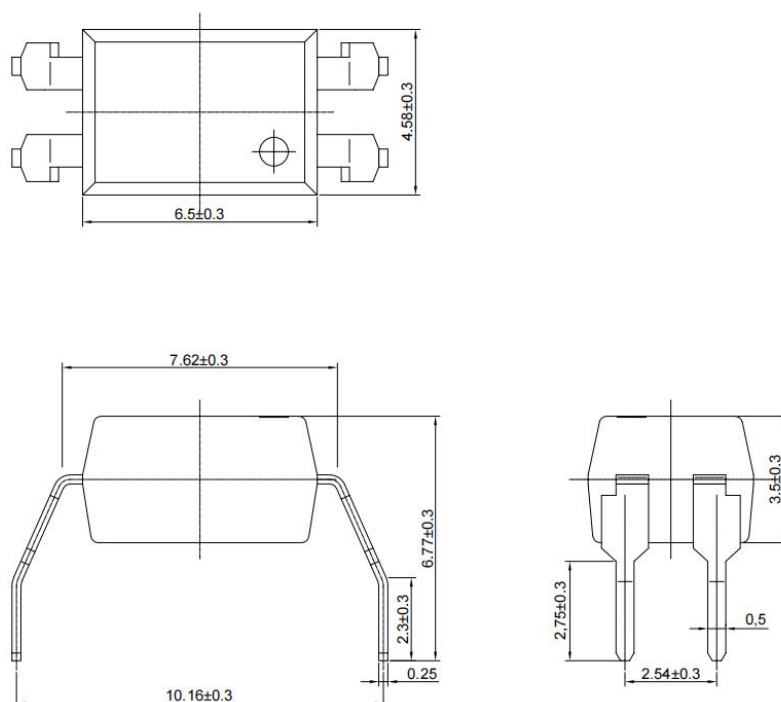


## ■ Outline Dimension

DIP Normal Type:

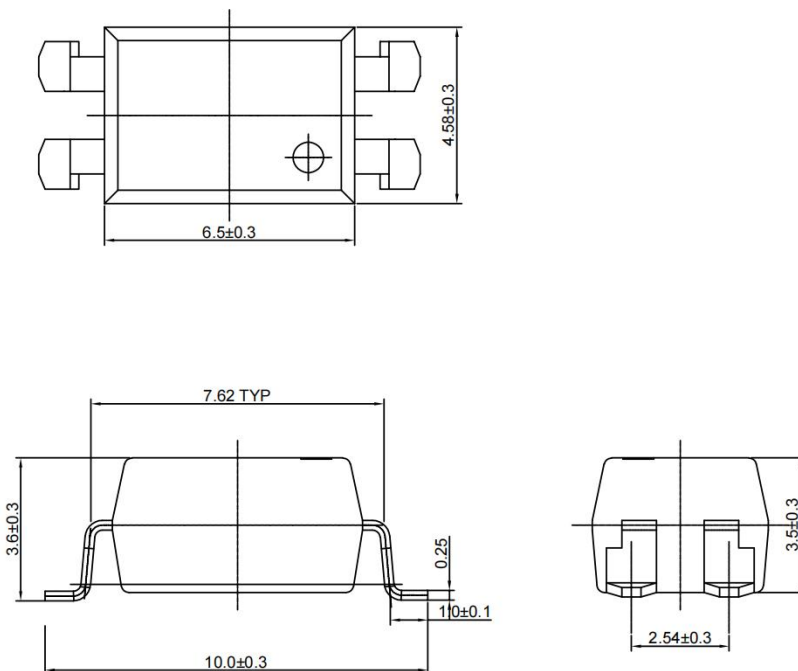


DIP M Type:





DIP S1 Type:

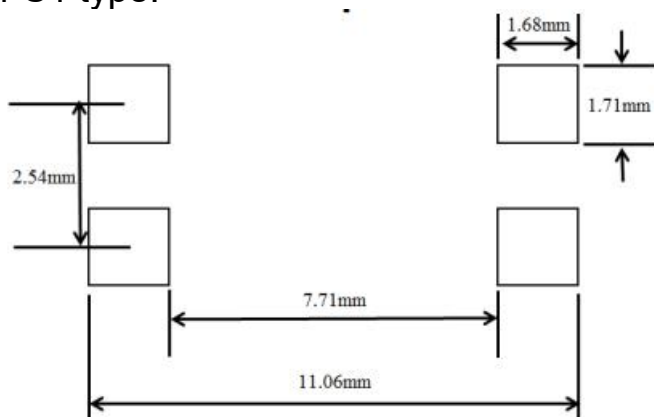


Unit: mm

Tolerance:  $\pm 0.1\text{mm}$

## ■ Recommended solder pad Design

For S1 type:



Unit: mm

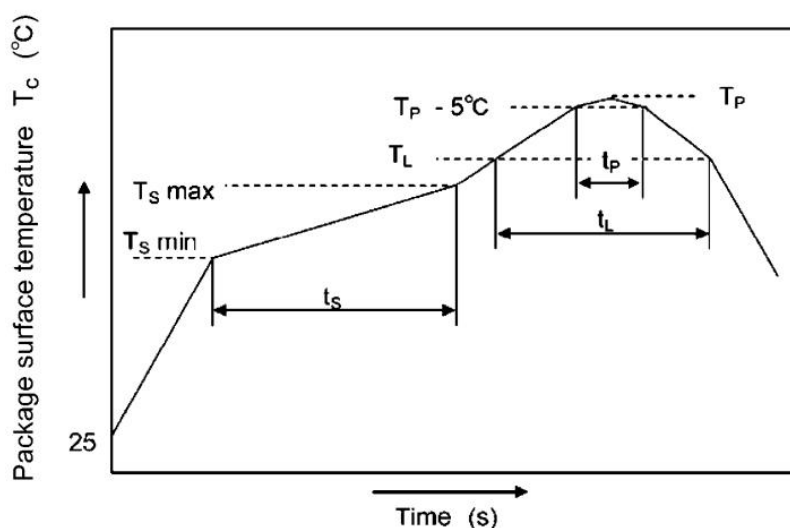
Tolerance:  $\pm 0.1\text{mm}$

## ■ Temperature Profile Of Soldering

### 1. IR Reflow soldering

**(JEDEC-STD-020D compliant)**

Profile item	Conditon
Preheat	
-Temperature Min (TSmin)	150°C
-Temperature Max (TSmax)	200°C
-Time (min to max) (ts)	90 ± 30 sec
Soldering zone	
-Temperature (TL)	217°C
-Time (tL)	60-150 sec
Peak Temperature (TP)	260°C
-Time (TP-5°C to TP) (ts)	30 sec
Ramp-up rate	3°C / sec max
Ramp-down rate	3~6°C/ sec



Notes:

One time soldering reflow is recommended within the condition of temperature and time profile shown below. Do not solder more than three times.

## 2. Wave soldering (JEDEC22A111 compliant)

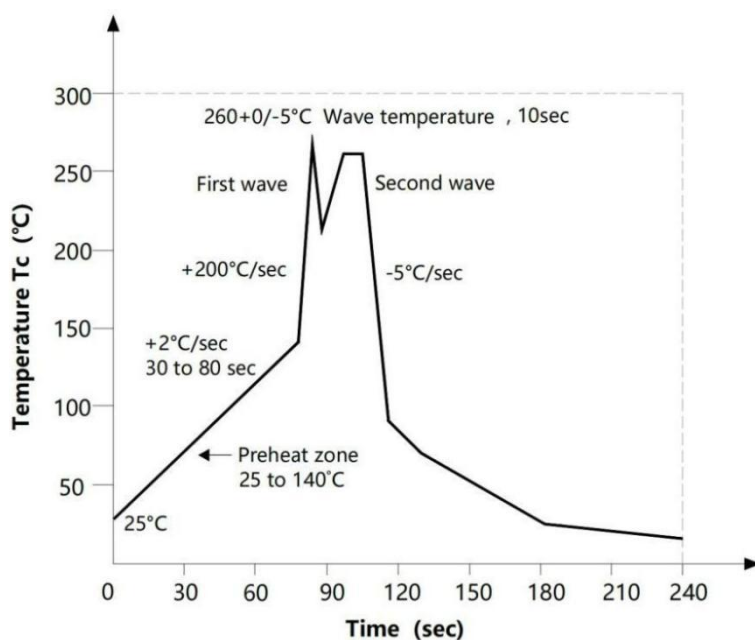
One time soldering is recommended within the condition.

Temperature:  $260 \pm 0/-5^{\circ}\text{C}$ .

Time: 10 sec.

Preheat temperature: 25 to  $140^{\circ}\text{C}$ .

Preheat time: 30 to 80 sec.



## 3. Hand soldering by soldering iron

Allow single lead soldering in every single process. One time soldering is recommended.

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

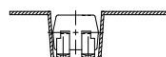
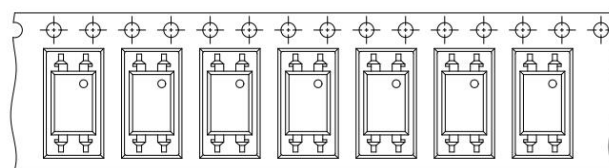
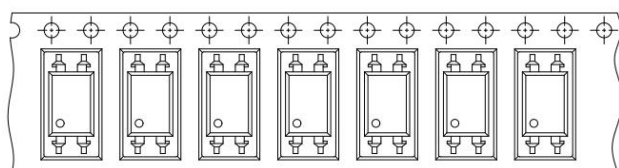
Time: 3 sec max.

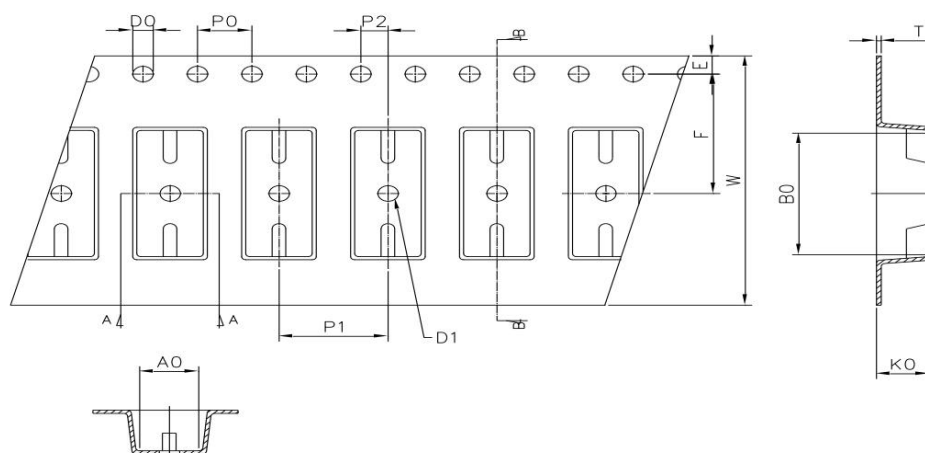
## ■ Packing

### 1. Tape and Reel

Option TP:

Option TP1:





Deminsion/mm	W	E	F	P0	P1	P2
Packagetype:DIP S1	$16 \pm 0.2$	$1.75 \pm 0.1$	$7.5 \pm 0.1$	$4 \pm 0.1$	$8 \pm 0.1$	$2 \pm 0.1$

Deminsion/mm	A0	B0	D0	D1	K0	T
Packagetype:DIP S1	$4.6 \pm 0.1$	$10.4 \pm 0.1$	$1.5 \pm 0.1$	$1.5 \pm 0.1$	$4.2 \pm 0.1$	$0.4 \pm 0.1$

Packagetype:DIP S1	Reel	Inner carton	Outer carton
QTY/PCS	2K/reel	4K(2 reels)	40K

## 2. Tape and Tube

Packagetype:Normal&M	Tube	Inner carton	Outer carton
QTY/PCS	100	5K(50 Tubes)	50K

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