恒拓电子
HENGTUO ELECTRONICS

HT series

Photocoupler
Product Date Sheet

HT-3H7X

Spec No:HT-PC-3H7X-P-003-A1
Effective Date:07/03/2024

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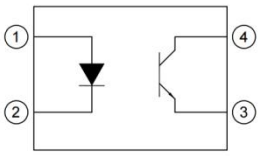
■ Package

Schematic



Pin Configuration
1 Anode
2 Cathode
3 Emitter
4 Collector

■ Description

The HT-3H7X is a photoelectric coupler composed of light-emitting diode and phototransistor. It is packaged in a 4-pin package.

■ Features

- Current transfer ratio(CTR : MIN. 50% at IF = 5mA, VCE = 5V)
- High input-output isolation voltage(Viso = 3,750Vrms)
- Operating Temperature: -55℃~110℃
- 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

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■ Product Nomenclature

The product name is designated as below:

HT -3H7 X -X X- X X X- XX
① ② ③ ④ ⑤ ⑥ ⑦

Designation:

HT =Hengtuo Technology Co.,LTD.
3H7= Product Series
① = Lead form option(NONE)(1)
② = CTR Rank(A,B,C,D,E)(2)
③ = Tape and Reel option(TP,TP1)(3)
④ = Lead frame Material(F,NONE)(4)
⑤ = VDE order option(fixed code "V")
⑥ = Halogen free option(fixed code"G")
⑦ = Customer code

Notes

1. Lead form option:

Symbol	Description
NONE	SSOP4

2. CTR Rank:

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

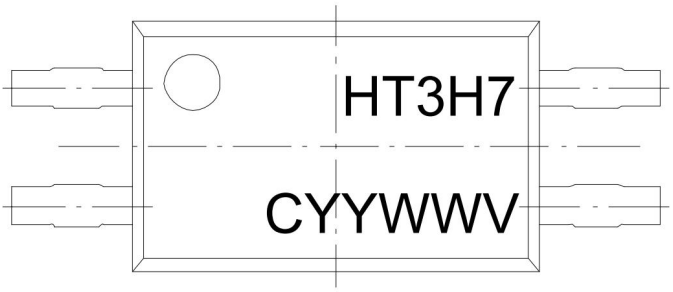
3. Tape and Reel option:

Symbol	Description
TP&TP1	Tape and Reel Type

4. Lead frame Material

Symbol	Description
NONE	Copper

■ Marking Information



Designation:

HT	denotes Hengtuo
3H7	denotes Device
C	denotes CTR Rank
YY	denotes year code
WW	denotes week code
V	denotes VDE

■ Maximum Ratings

Parameter		Symbol	Values	Unit
Input	Forward Current	I_F	50	mA
	Reverse Voltage	V_R	6	V
	Power Dissipation	P_D	70	mW
	Derating factor (above Ta = 90°C)		2.0	mW/°C
Output	Collector - Emitter Voltage	V_{CEO}	80	V
	Emitter - Collector Voltage	V_{ECO}	7	V
	Collector Current	I_C	50	mA
	Collector Power Dissipation	P_C	150	mW
	Derating factor (above Ta = 70°C)		3.1	mW/°C
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(1)		V_{ISO}	3750	Vrms
Soldering Temperature(2)		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

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■ 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=20mA
	Reverse Current	I_R	-	-	10	μA	V_R=4V
	Terminal Capacitance	C_t	-	30	250	pF	V=0, f=1KHz
Output	Collector Dark Current	I_{CEO}	-	-	100	nA	VCE=20V, IF=0
	Collector-Emitter Breakdown Voltage	BV_{CEO}	80			V	IC=0.1mA, IF=0
	Emitter-Collector Breakdown Voltage	BV_{ECO}	7			V	IE=10μA, IF=0
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$		0.1	0.2	V	IF=20mA, IC=1mA
Isolation Resistance		R_{iso}	5×10^{10}	1×10^{11}	-	Ω	DC500V, 40 ~ 60% R.H.
Floating Capacitance		Cf		0.6	1	pF	V=0, f=1MHz
Cut-off Frequency		fc		80		kHz	VCE=5V, IC=2mA RL=100Ω,-3dB
Response Time (Rise)		tr		4	18	μs	VCE=2V, IC=2mA RL=100Ω,
Response Time (Fall)		tf		3	18	μs	

■ Rank Table Of Current Transfer Ratio

(CTR=IC/IF x 100%)

Rank Code	Symbol	Min	Max	Conditon
NONE	CTR	50	600	IF=5mA, VCE=5V, Ta=25°C
A		80	160	
B		130	260	
C		200	400	
D		300	600	

■ Characteristics Curves

Fig.1 Relative Current Transfer Ratio vs. Forward Current

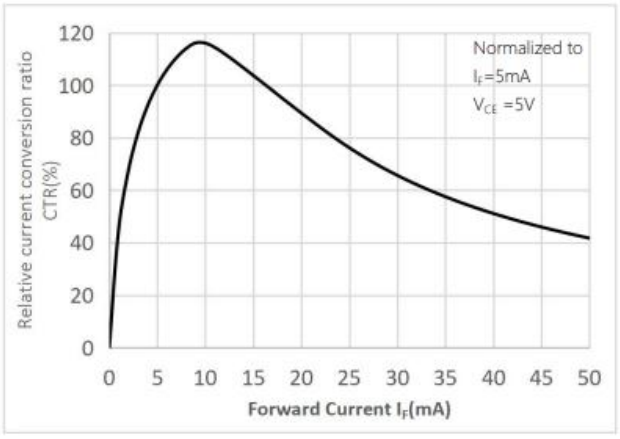


Fig.2 Forward Current vs. Forward Voltage

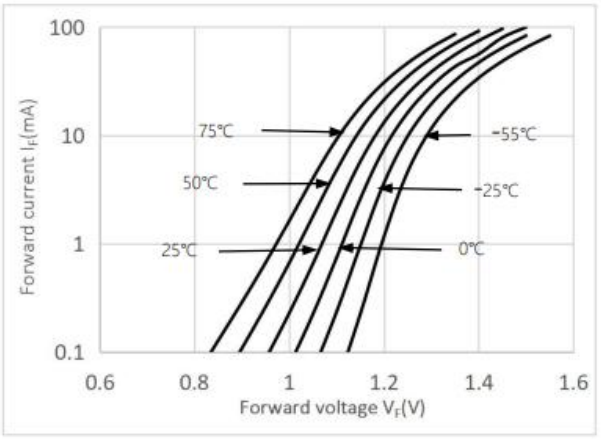


Fig.3 Collector Current vs. Collector-emitter Voltage

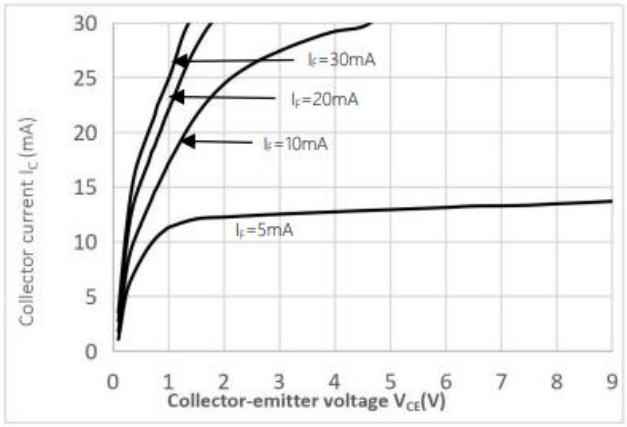


Fig.4 Relative Current Transfer Ratio vs.Ambient Temperature

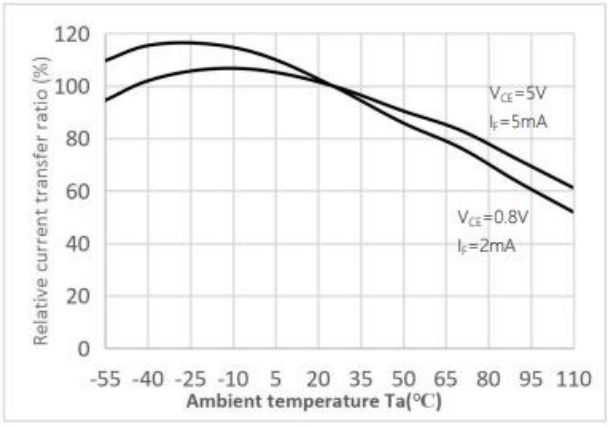


Fig.5 Collector-emitter Saturation Voltage vs. Ambient Temperature

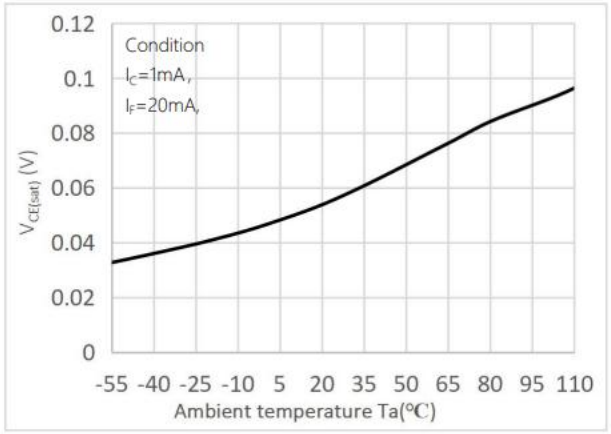


Fig.6 Collector Dark Current vs Ambient Temperature

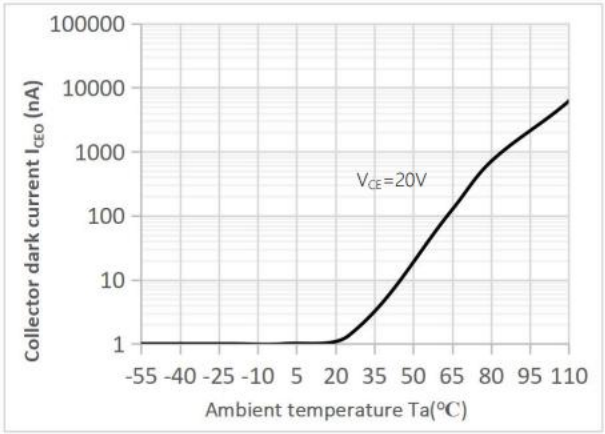
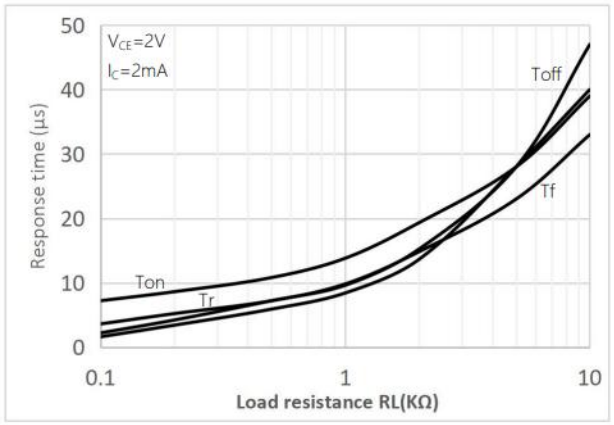


Fig.7 Response Time vs. Load Resistance

Fig.8 Frequency Response



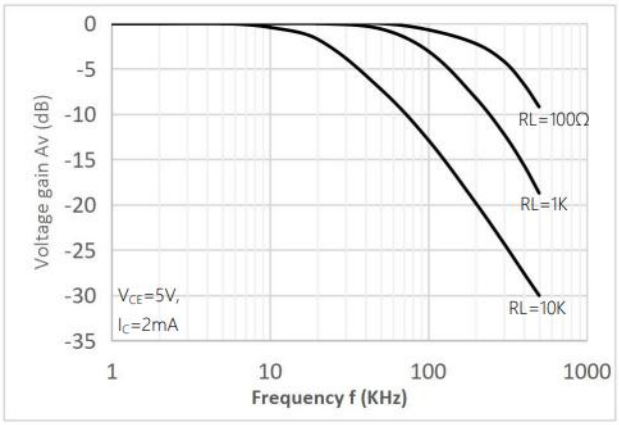
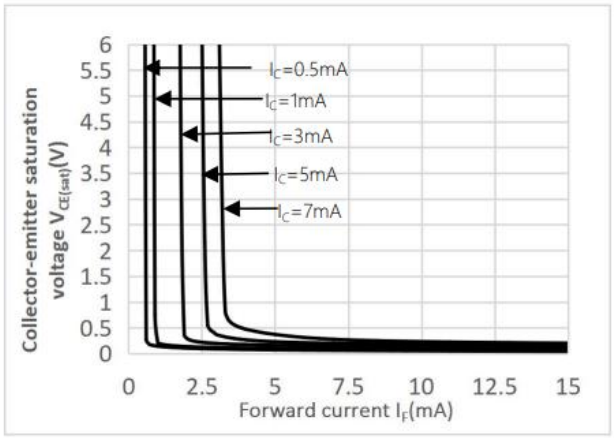
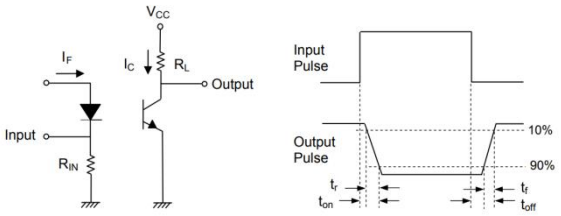


Fig.9 Collector-emitter Saturation Voltage vs Forward Current

Fig.10 Switching Time Test Circuit & Waveforms





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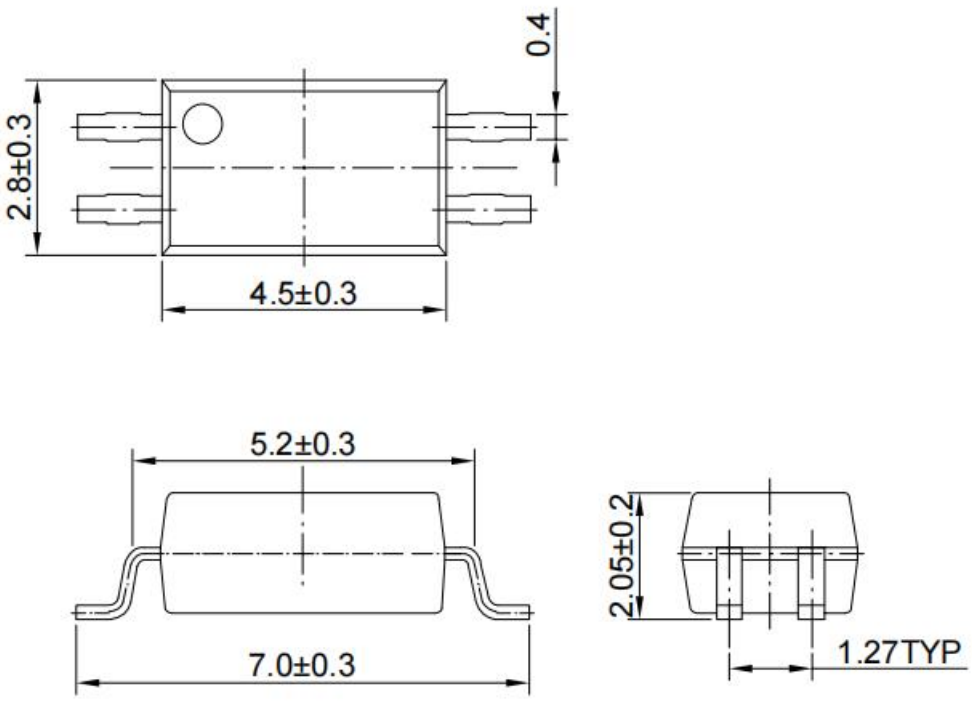
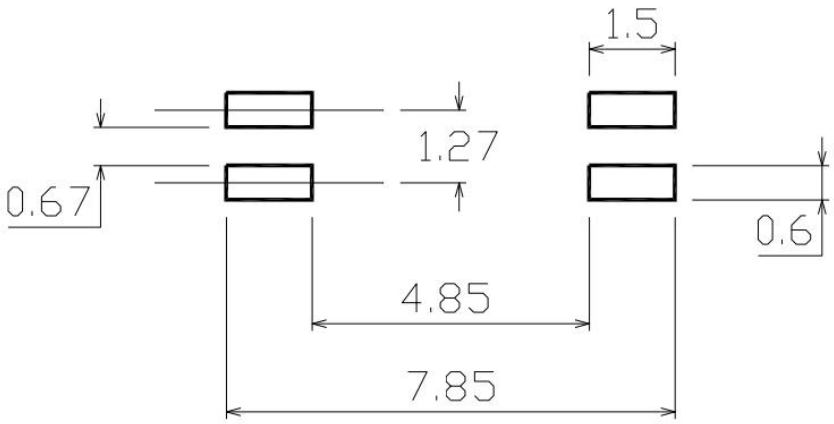
■ Outline Dimension



Unit: mm
Tolerance: ±0.1mm

■ Recommended solder pad Design



Unit: mm
Tolerance: ±0.1mm

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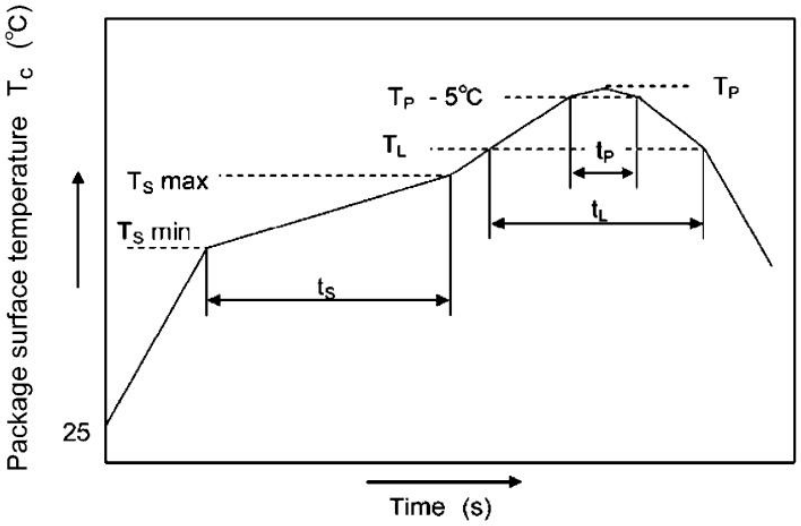
■ Temperature Profile Of Soldering

1. IR Reflow soldering

(JEDEC-STD-020D compliant)

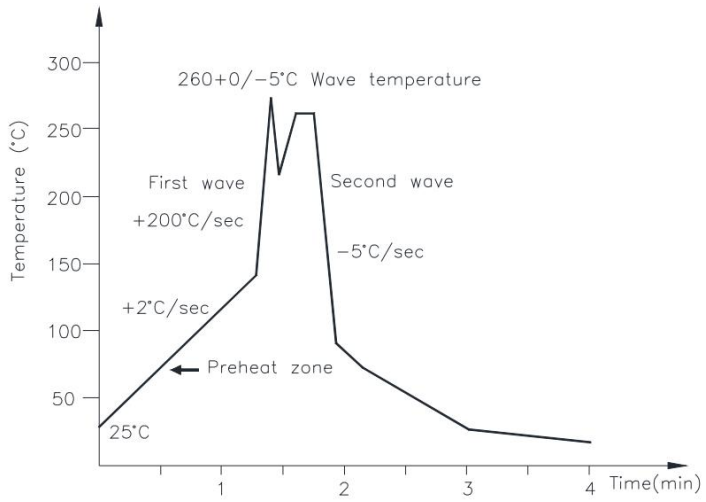
Profile item	Conditon
Preheat	
-Temperature Min (TSmin)	150°C
-Temperature Max (TSmax)	200°C
-Time (min to max) (ts)	90±30 sec
Soldering zone	
-Temperature (TL)	217°C
-Time (t_L)	60-150 sec
Peak Temperature (TP)	260°C
-Time (TP-5℃to TP) (ts)	30 sec
Ramp-up rate	3°C / sec max
Ramp-down rate	3~6°C/ sec



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+0/-5˚C.
Time:10 sec.
Preheat temperature:25 to 140˚C.
Preheat time:30 to 80 sec.



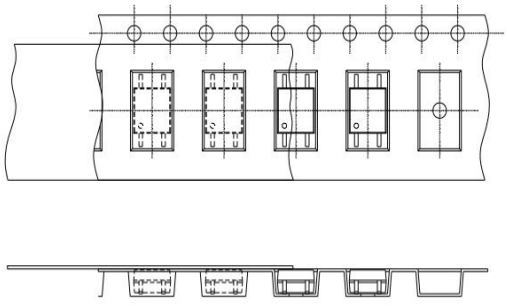
3. Hand soldering by soldering iron

Allow single lead soldering in every single process. One time soldering is recommended.
Temperature: 380+0/-5˚C
Time: 3 sec max.

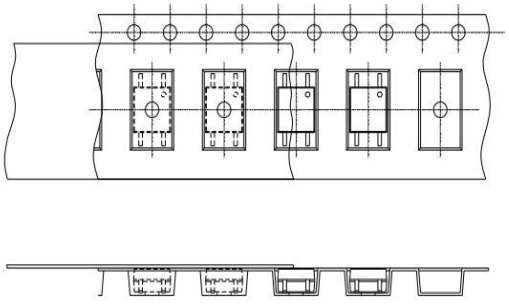
■ Packing

Tape and Reel

Option TP:



Option TP1:



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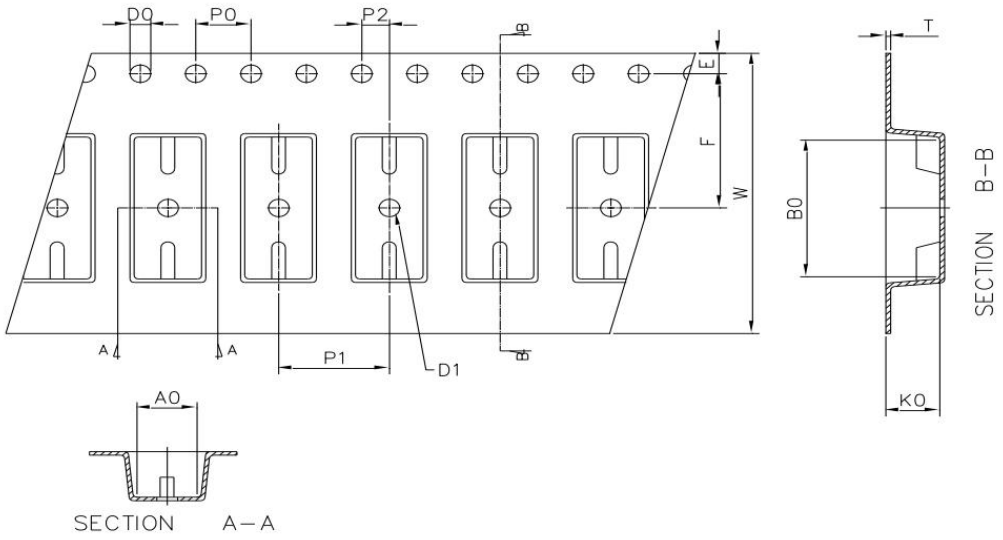

Deminsion/mm	W	E	F	P0	P1	P2
Packagetype:S	12±0.2	1.75±0.1	7.5±0.1	4±0.1	8±0.1	2±0.1

Deminsion/mm	A0	B0	D0	D1	K0	T
Packagetype:S	4.4±0.1	7.5±0.1	1.5±0.1	1.5±0.1	2.4±0.1	0.3±0.05

Packagetype:S	Reel	Inner carton	Outer carton
QTY/PCS	3K/reel	9K(3 reels)	90K

■ Attention:

- Hengtuo is continually improving the quality, reliability, function or design and Hengtuo reserves the right to make changes without further notices.
- 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.
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