

Features

HF

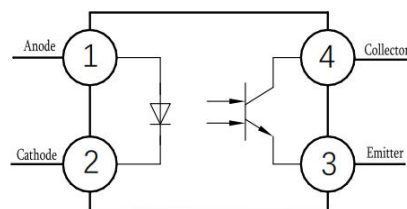
- Current transfer ratio
(CTR: 80~600% at $I_F = 5\text{mA}$, $V_{CE} = 5\text{V}$)
- High isolation voltage between input and output ($V_{iso} = 3750\text{V rms}$)
- Collector - emitter breakdown voltage $BV_{CEO} \geq 80\text{V}$
- Operating Temperature: $-55^\circ\text{C} \sim 110^\circ\text{C}$

Applications

- Programmable controllers
- System appliances, measuring instruments
- Telecommunication equipments
- Home appliances, such as Fan Heaters, etc
- Signal transmission between circuits of different potentials and impedances

Mechanical Data

- Case: SOP4
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solderability-per MIL-STD-202, Method 208



Ordering Information

TWS 357 (M) (G) (X) - (U) E

① ② ③ ④ ⑤ ⑥ ⑦

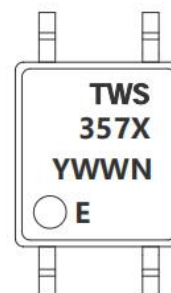
- ① Brand(TWS)
- ② Product series(357)
- ③ Package type(None: SOP4)
- ④ Halogen option(None : Halogen free)
- ⑤ CTR Bank(A,B,C,D,E,F or None)
- ⑥ Lead frame (None: Copper)
- ⑦ Product Versions: E

Part Number	Package	Shipping Quantity	Marking Code
TWS357X ¹ -E	SOP4	3000 pcs / Tape & Reel	TWS357X ¹ ...E

Notes 1: X denotes CTR Rank : A, B, C, D, E, F, None.

Marking Information

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



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

	Parameter	Symbol	Value	Unit
Input	Forward Current	I _F	50	mA
	Peak Forward Current ^{*1}	I _{FM}	1	A
	Reverse Voltage	V _R	6	V
	Power Dissipation	P _D	70	mW
Output	Collector 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 ^{*2}	V _{ISO}	3750	V _{rms}
Rated Impulse Isolation Voltage	V _{IOTM}	5000	V
Rated Repetitive Peak Isolation Voltage	V _{IORM}	600	V
Thermal Resistance Junction-to-Air	R _{θJA}	430	°C/W
Thermal Resistance Junction-to-Case	R _{θJC}	350	°C/W
Thermal Resistance Junction-to-Lead	R _{θJL}	368	°C/W
Operating Temperature	T _{OPR}	-55 ~ +110	°C
Storage Temperature Range	T _{STG}	-55 ~ +125	°C
Soldering Temperature ^{*3}	T _{SOL}	260	°C

Notes:

1. Pulse width ≤ 1μs, Duty ratio: 0.001
2. 40 to 60% RH, AC for 1 minute
3. 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
	Peak Forward Voltage	V _{FM}	I _{FM} = 0.5A	-	-	3.0	V
	Reverse Current	I _R	V _R = 4V	-	-	10	μA
	Input Capacitance	C _{in}	V _R = 0V, 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	Collector Current	I _C	I _F = 5mA, V _{CE} = 5V	2.5	-	30	mA
	Current Transfer Ratio	CTR	I _F = 5 mA, V _{CE} = 5V	80	-	600	%
	Collector-Emitter Saturation Voltage	V _{CE(sat)}	I _F = 20mA, I _C = 1mA	-	0.1	0.2	V
	Isolation Resistance	R _{ISO}	V _{IO} = 500Vdc 40~60% R.H.	1×10 ¹²	-	-	Ω
	Isolation current	R _{ISC}	DC6000V, 40~60% R.H	-	-	2	μA
	Floating Capacitance	C _{IO}	V _{IO} = 0, f = 1MHz	-	0.6	1.0	pF

	Cut-off frequency	f_c	$V_{CE} = 5V, I_C = 2mA$ $R_L = 100\Omega, -3dB$	-	80	-	kHz
	Turn On Time	T_{on}	$V_{CE} = 2V, R_L = 100\Omega$	-	3	-	μs
	Turn Off Time	T_{off}	$I_C = 2mA$	-	3	-	

Rank Table of Current Transfer Ratio CTR

Rank Mark	Min. (%)	Max. (%)	Condition
A	80	160	$I_F = 5mA, V_{CE} = 5V$
B	130	260	
C	200	400	
D	300	600	
E	100	200	
F	150	300	
No mark	80	600	

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

Fig.1 Allowable Forward Current vs. Ambient Temperature

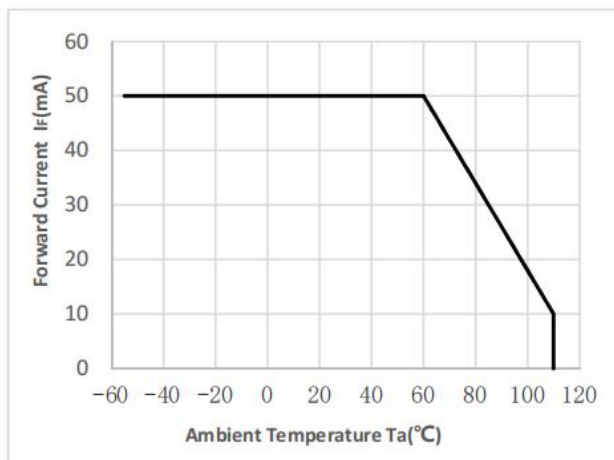


Fig.2 Allowable collector power dissipation vs. Ambient Temperature ($^\circ\text{C}$)

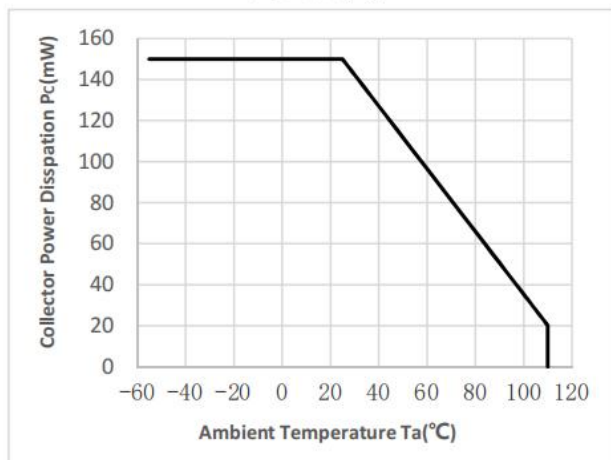


Fig.3 Relative Current Transfer Ratio vs. Forward Current

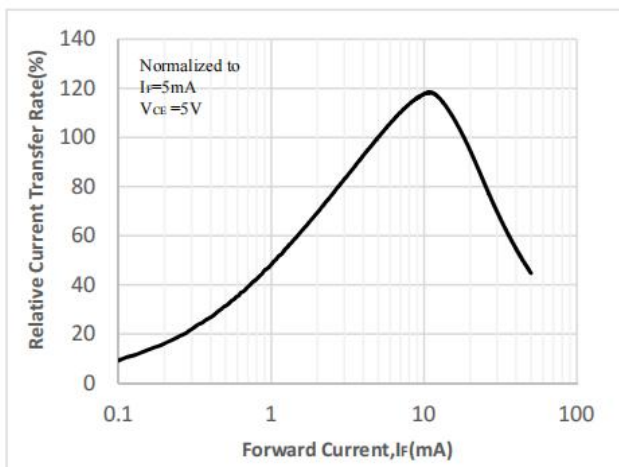


Fig.4 Forward Current vs. Forward Voltage

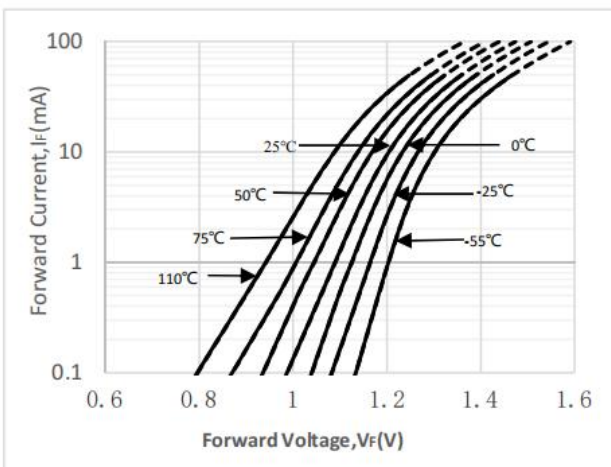


Fig.5 Collector Current vs. Collector-emitter Voltage

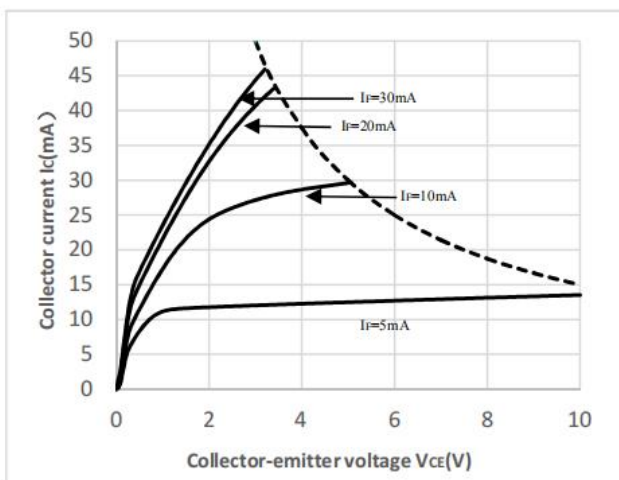


Fig.6 Relative Current Transfer Ratio vs. Ambient Temperature

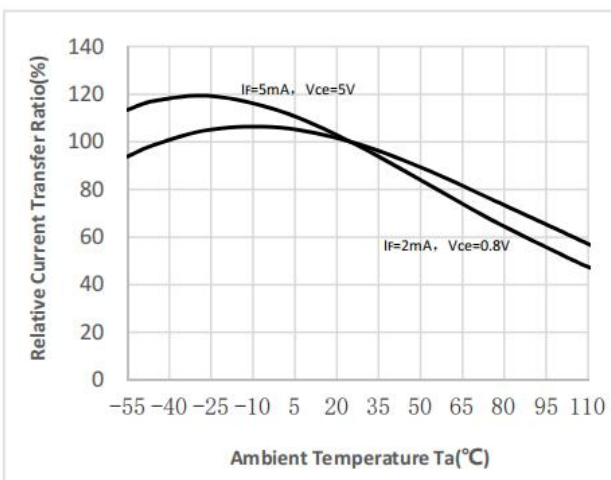


Fig.7 Collector-emitter Saturation Voltage vs. Ambient Temperature

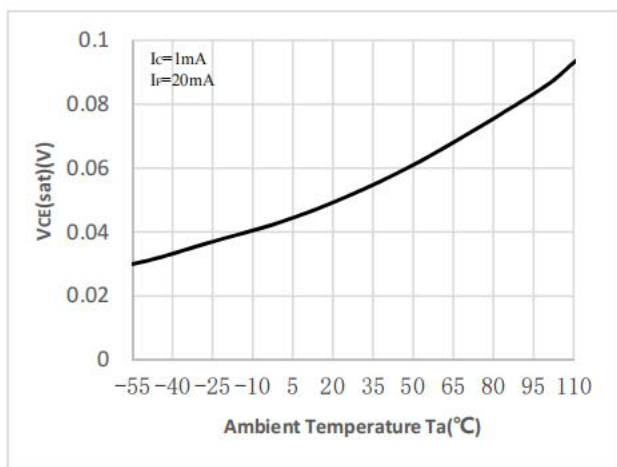


Fig.8 Collector Dark Current vs. Ambient Temperature

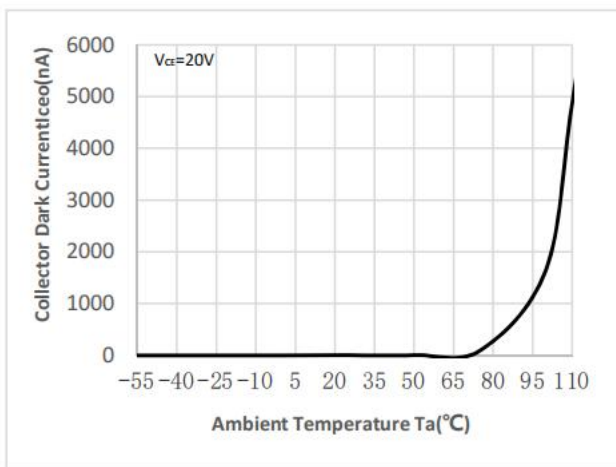


Fig.9 Response Time vs. Load Resistance

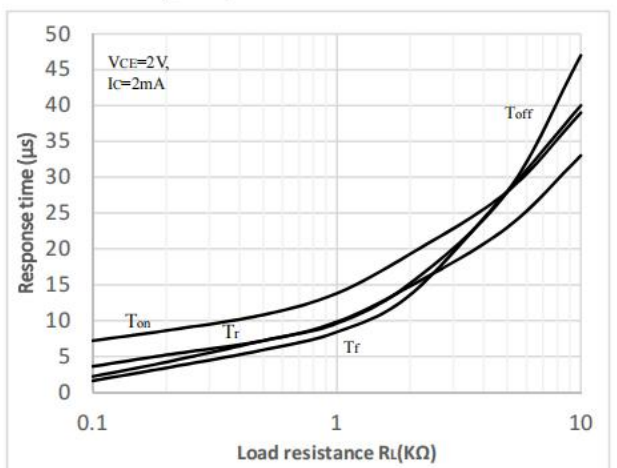


Fig.10 Frequency Response

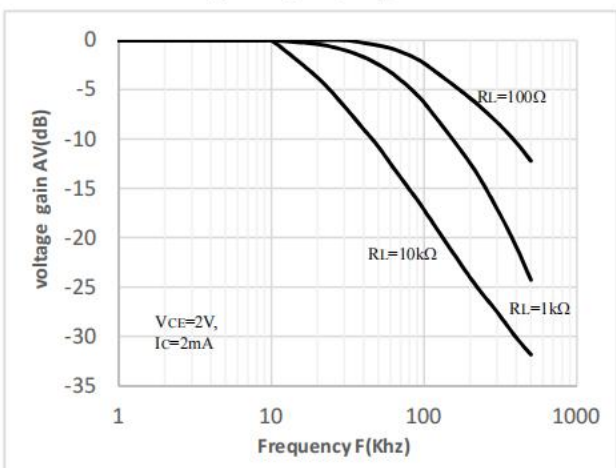


Fig.11 Collector-emitter Saturation Voltage vs. Forward Current

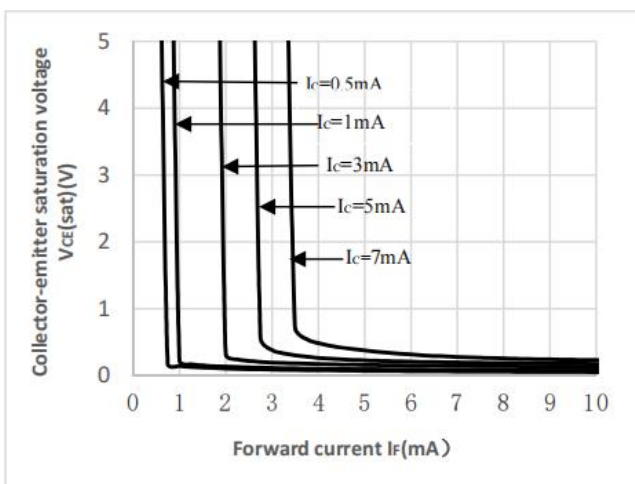
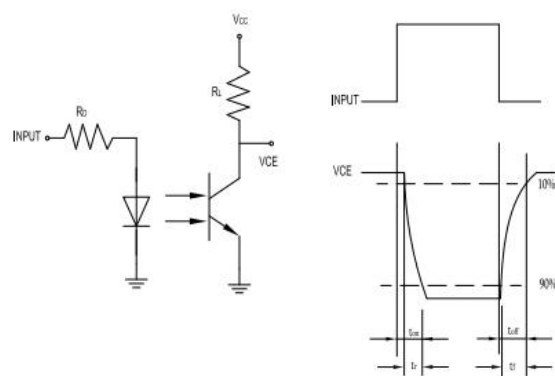
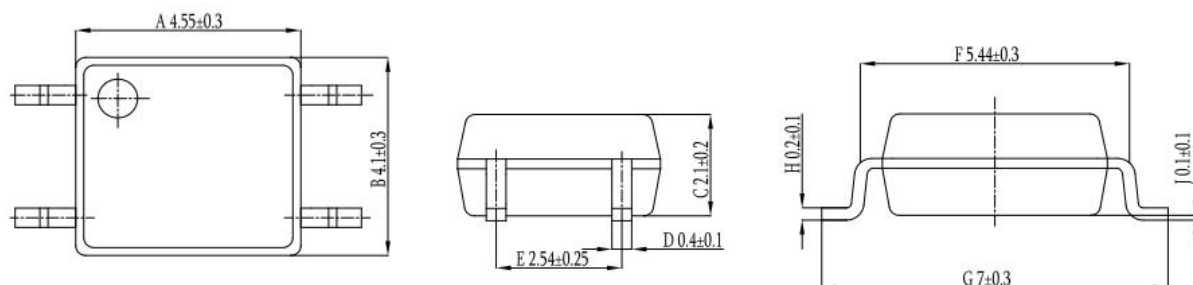


Fig.12 Switching Time Test Circuit & Waveforms

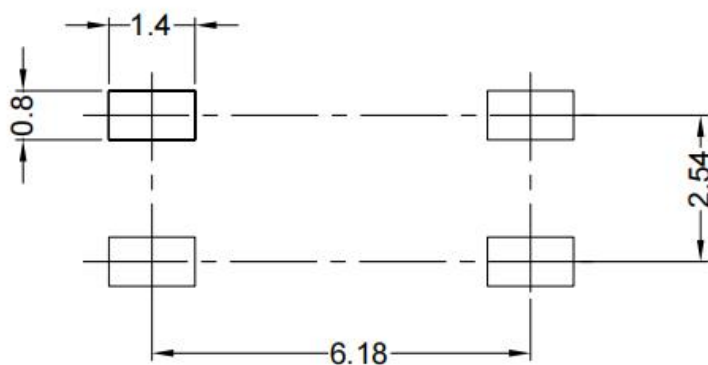


Package Outline Dimensions (unit: mm)

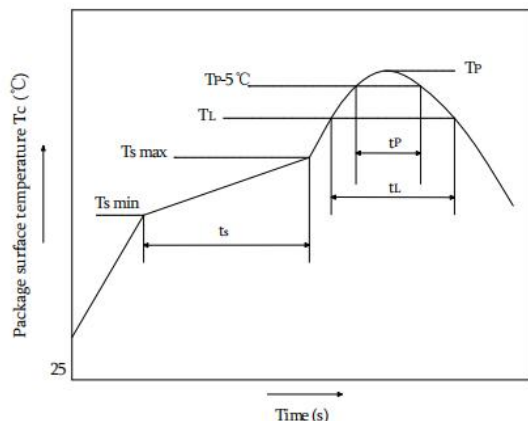
SOP4



SOLDERING FOOTPRINT (unit: mm)



Reflow soldering

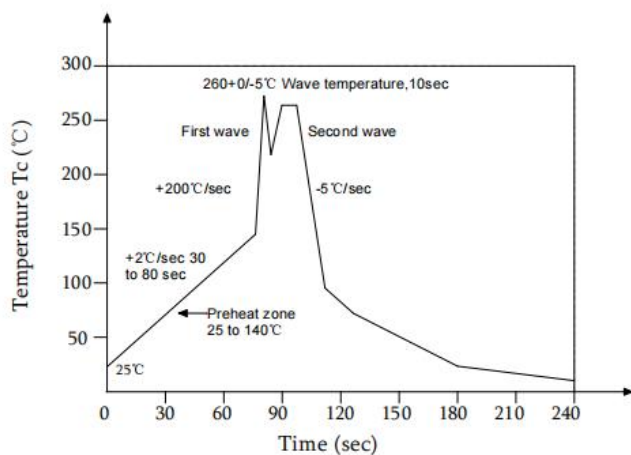


	Symbol	Min	Max	Unit
Preheat temperature	T_s	150	200	°C
Preheat time	t_s	60	120	s
Ramp-up rate(T_L to T_P)			3	°C/s
Liquidus temperature	T_L	217		°C
Time above T_L	t_L	60	150	s
Peak temperature	T_P		260	°C
Time during which T_c is between (T_P-5) and T_P	t_P		30	s
Ramp-down rate(T_P to T_L)			6	°C/s

Note:

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

Wave soldering



Profile feature	
Average ramp-up rate	~200°C/s
Heating rate during preheat	1°C/s to 2°C/s typical; 4°C/s maximum
Final preheat temperature T_s	~130°C
Preheat time (25°C to T_s)	>60s
Peak temperature T_P	260°C
Time within peak temperature t_P	10s
Ramp-down rate	5°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 °C ± 5°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
SOP4	Reel($\phi 330$ mm)	3000 pcs/reel	2 reels /box	5 boxes /ctn	/	350*340*60mm	365*330*370mm	Leave 25 Spaces at the beginning and 50 Spaces at the end

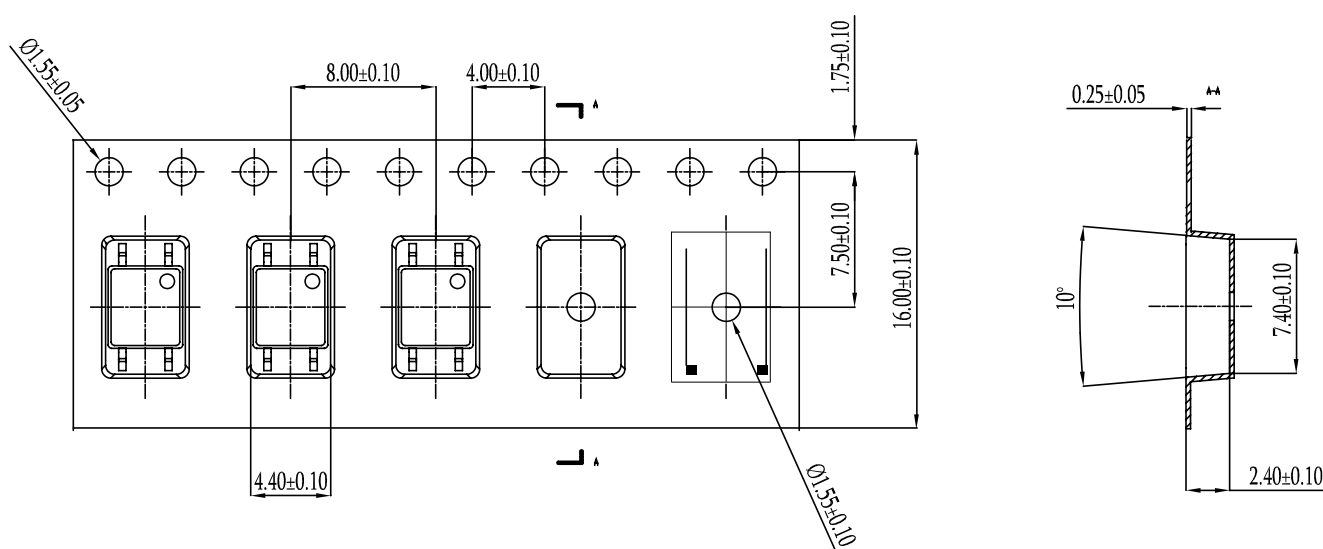
■Summary table

■SOP4 (Reel)

Qty/reel: 3000 pcs. Qty/box: 6000 pcs.

Qty/ctn : 30000 pcs.

Schematic: (unit:mm)



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