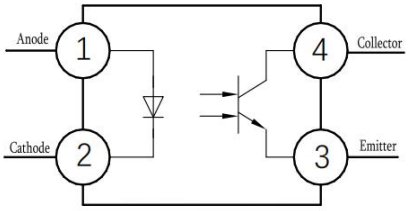
# Phototransistor

## PC357-E Series

## Features

HF

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

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

① ② ③ ④ ⑤ ⑥ ⑦

① Brand(PC)
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 |
|---|---|---|---|
| PC357X*1-E | SOP4 | 3000 pcs / Tape & Reel | PC357X*1...E |

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

## Marking Information

- "PC" 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 | Vrms |
| Rated Impulse Isolation Voltage | $V_{IOTM}$ | 5000 | V |
| Rated Repetitive Peak Isolation Voltage | $V_{IORM}$ | 600 | V |
| Thermal Resistance Junction-to-Air | $R_{\theta JA}$ | 430 | °C/W |
| Thermal Resistance Junction-to-Case | $R_{\theta JC}$ | 350 | °C/W |
| Thermal Resistance Junction-to-Lead | $R_{\theta JL}$ | 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. | $1\times10^{12}$ | - | - | Ω |
| | Isolation current | Risc | DC6000V,40~60%R.H | - | - | 2 | μA |
| | Floating Capacitance | $C_{IO}$ | $V_{IO}$ = 0, f = 1MHz | - | 0.6 | 1.0 | pF |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Cut-off frequency | $f_C$ | VCE = 5V, IC = 2mA RL=100Ω, -3dB | - | 80 | - | kHz |
| | Turn On Time | $T_{on}$ | $V_{CE}$=2V, RL= 100Ω $I_C$=2mA | - | 3 | - | μs |
| | Turn Off Time | $T_{off}$ | | - | 3 | - | |

## Rank Table of Current Transfer Ratio CTR

| Rank Mark | Min. (%) | Max. (%) | Condition |
|---|---|---|---|
| A | 80 | 160 | $I_F$ = 5 mA, $V_{CE}$ = 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°C unless otherwise specified)

Fig.1 Allowable Forward Current vs. Ambient Temperature

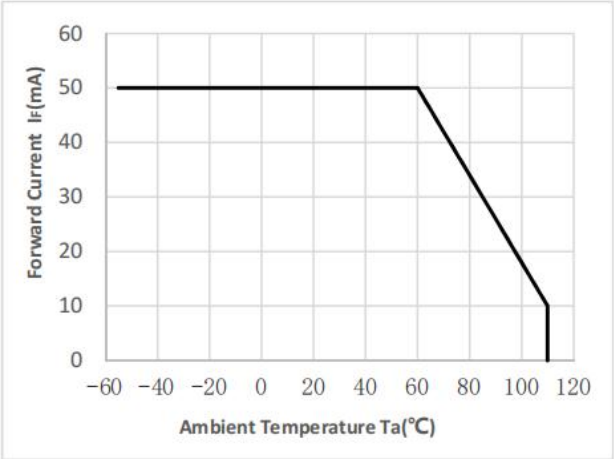



Fig.2 Allowable collector power disspation vs. Ambient Temperature(℃)

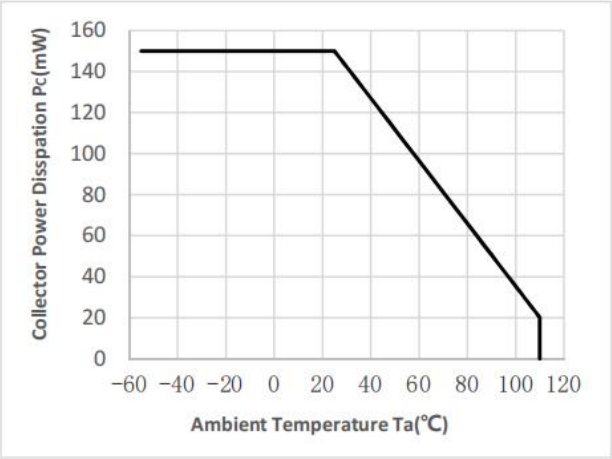



Fig.3 Relative Current Transfer Ratio vs. Forward Current

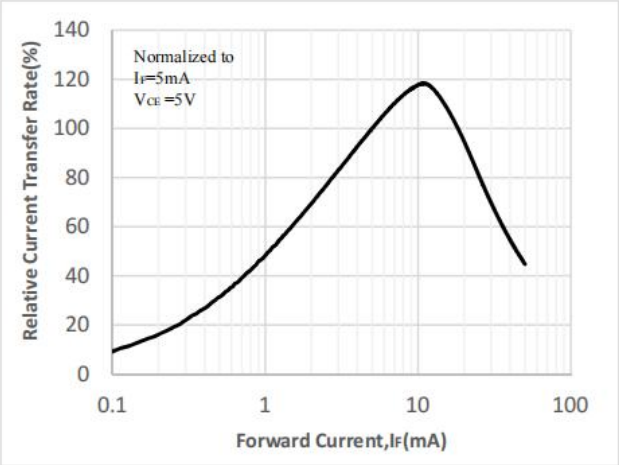



Fig4 Forward Current vs. Forward Voltage

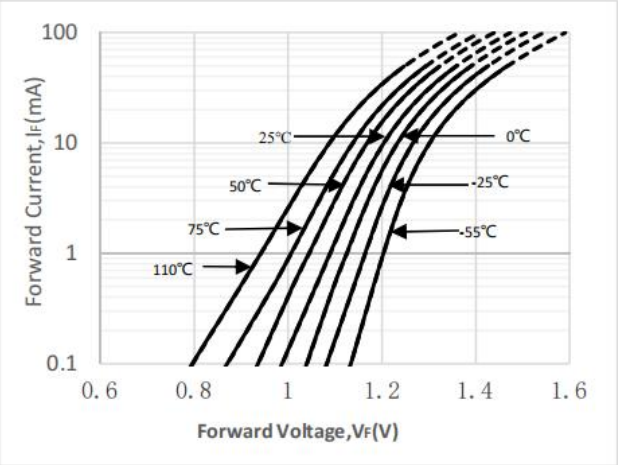



Fig.5 Collector Current vs. Collector-emitter Voltage

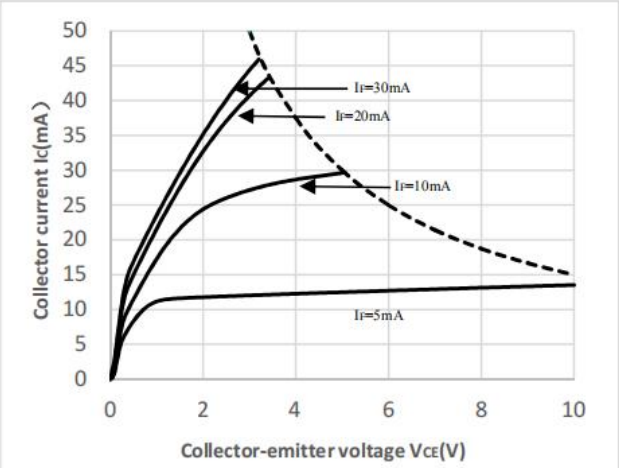



Fig.6 Relative Current Transfer Ratio vs. Ambient Temperature

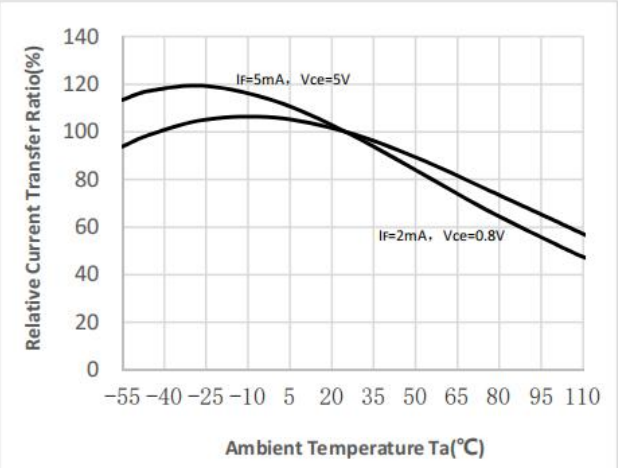


Fig.7 Collector-emitter Saturation Voltage vs. Ambient Temperature

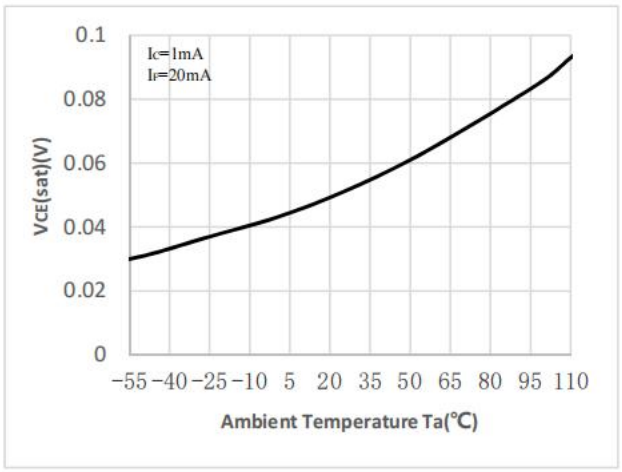



Fig.8 Collector Dark Current vs. Ambient Temperature

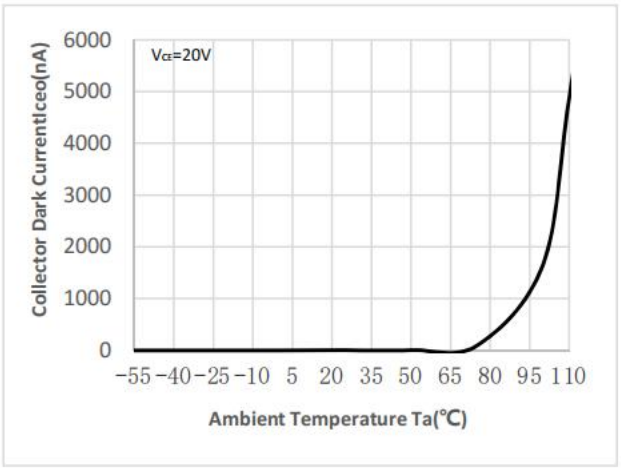



Fig.9 Response Time vs. Load Resistance

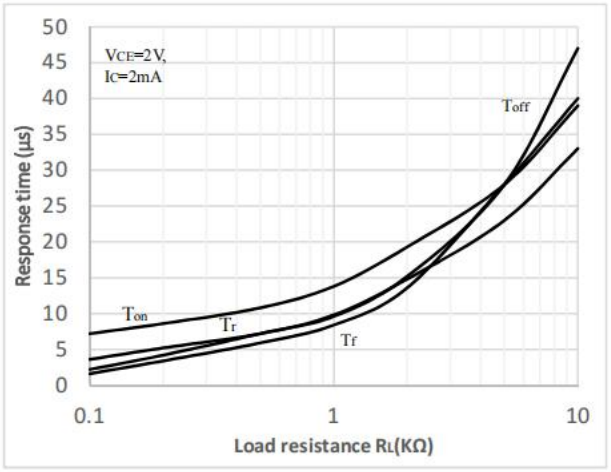



Fig.10 Frequency Response

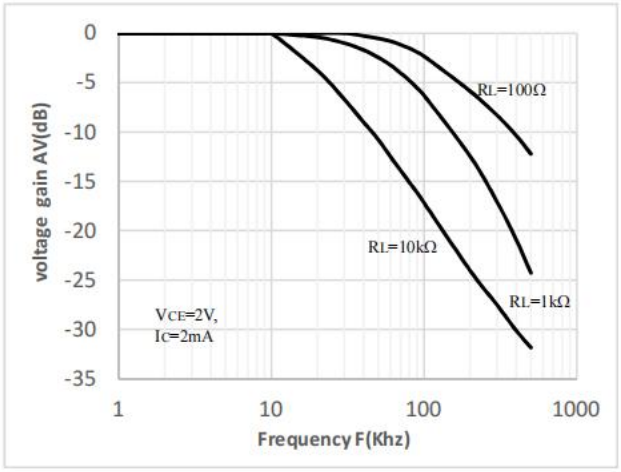



Fig.11 Collector-emitter Saturation Voltage vs. Forward Current

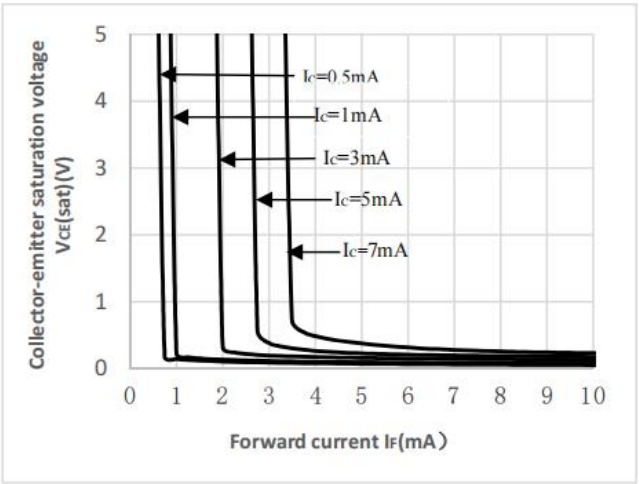
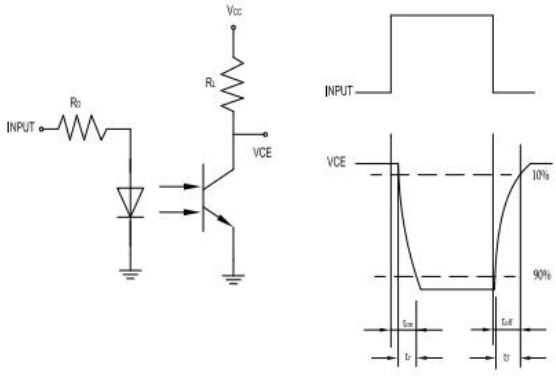
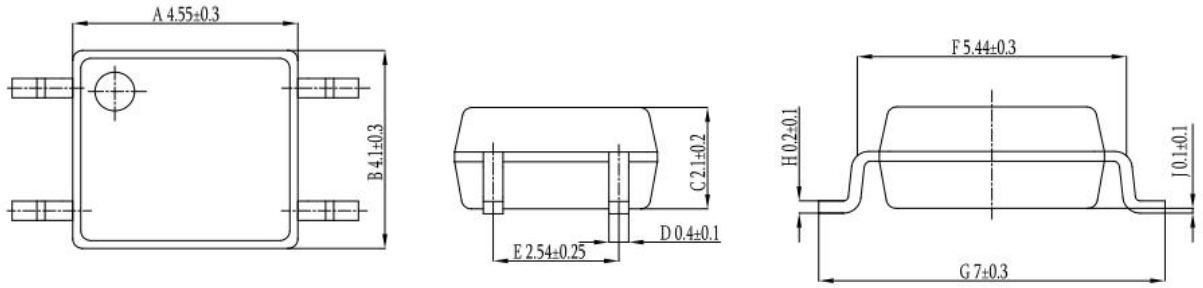



Fig.12 Switching Time Test Circuit & Waveforms

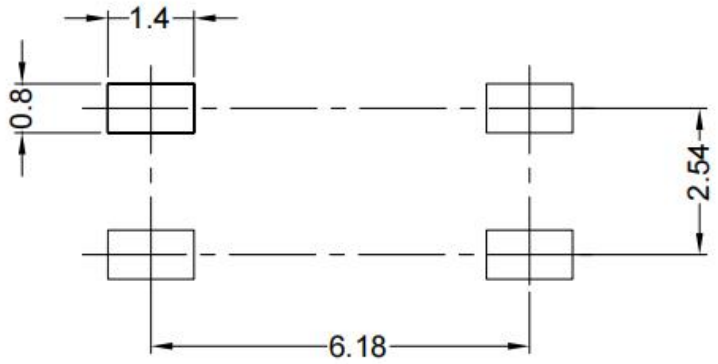


## Package Outline Dimensions (unit: mm)

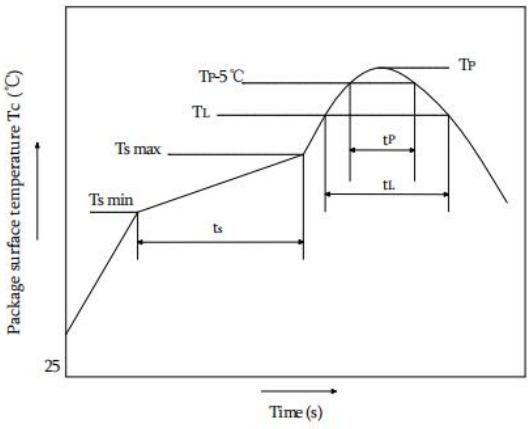
### SOP4




## SOLDERING FOOTPRINT (unit: mm)



## Reflow soldering

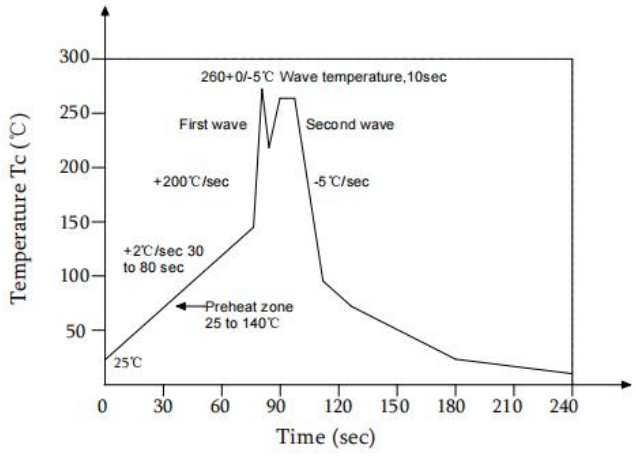



| | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| Preheat temperature | Ts | 150 | 200 | ℃ |
| Preheat time | ts | 60 | 120 | s |
| Ramp-up rate($T_L$ to $T_P$) | | | 3 | ℃/s |
| Liquidus temperature | $T_L$ | 217 | | ℃ |
| Time above $T_L$ | $t_L$ | 60 | 150 | s |
| Peak temperature | Tp | | 260 | ℃ |
| Time during which Tc is between ($T_P$-5) and $T_P$ | $t_p$ | | 30 | s |
| Ramp-down rate($T_P$ to $T_L$) | | | 6 | ℃/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℃/s |
| Heating rate during preheat | 1℃/s to 2℃/s typical;4℃/s maximum |
| Final preheat temperature Ts | ~130℃ |
| Preheat time (25℃ to Ts) | >60s |
| Peak temperature Tp | 260℃ |
| Time within peak temperature tp | 10s |
| Ramp-down rate | 5℃/s maximum |

**Soldering with hand soldering iron**

**A. Hand soldering iron is only used for product rework or sample testing.**

**B. Hand soldering iron requirements:Temperature:360 ℃+5℃ 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(ϕ330mm) | 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 |

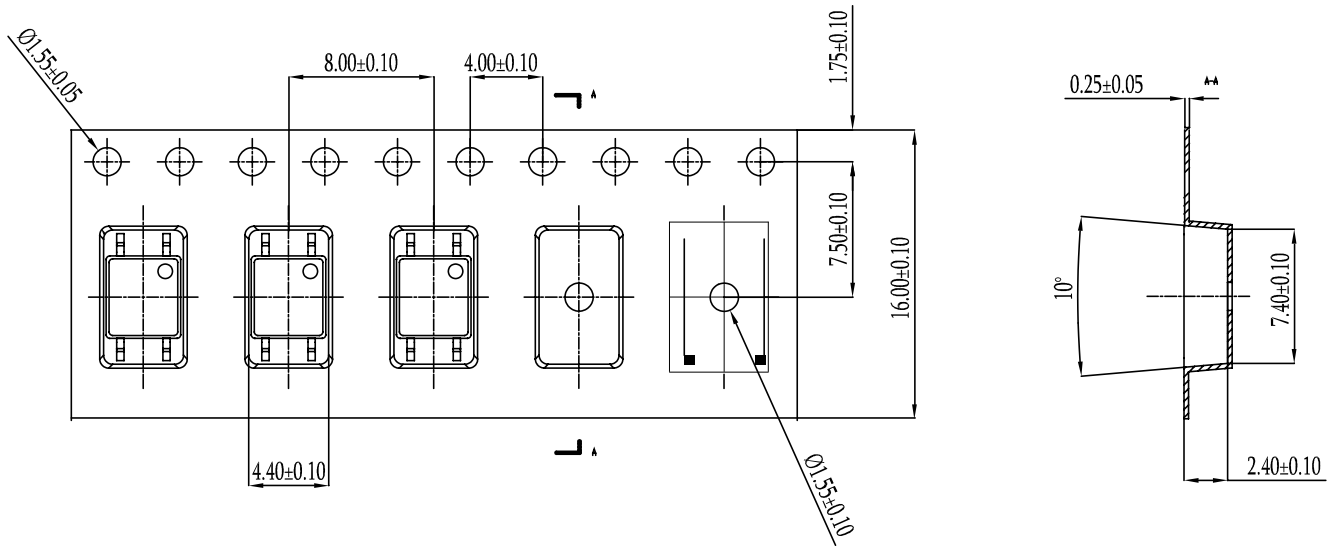
■Summary table

■SOP4 (Reel)

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

Qty/ctn : 30000 pcs.

Schematic: (unit:mm)




## IMPORTANT NOTICE

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