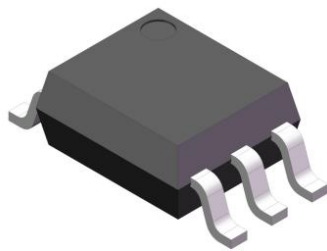
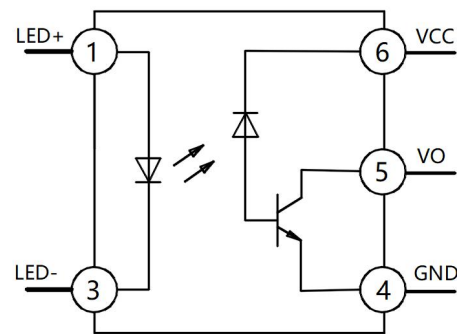


**Product packaging logic diagram**

SOP5



in Configuration

**Features**

- Very high speed: 1MBit/s
- High isolation voltage between input and output ( $V_{iso} = 3750V$  rms)
- Operating Temperature:  $-40^{\circ}C \sim 100^{\circ}C$
- Environmentally friendly products, compliant with CQC, UL, and VDE requirements

**Mechanical Data**

- Case: SOP5
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solder ability-per MIL-STD-202, Method 208

**Applications**

- Fiber optic communication, photoelectric conversion, and digital signal processing are widely used. Can improve data transmission speed and reliability
- In motor control, PLC systems, and industrial robots, Achieve precise control through microsecond-level response and enhance system stability.
- Relying on high-speed optocouplers to achieve real-time data transmission and electrical isolation, ensuring patient safety and data accuracy. Medical imaging equipment and vital signs monitors.
- Spacecraft, satellite communications and radar systems, High-speed digital signal transmission, whose anti-interference capability is crucial in complex environments
- Power system monitoring, frequency converters and renewable energy converters, Ensure the safe operation of equipment.
- In-vehicle entertainment system, BMS (Battery Management System), Improve audio quality and circuit safety.



### Ordering Information

| <u>XL</u> | <u>M453</u> | <u>(M)</u> | <u>(G)</u> | <u>(X)</u> | - | <u>(U)</u> | <u>(N)</u> | <u>(Y)</u> |
|-----------|-------------|------------|------------|------------|---|------------|------------|------------|
| ①         | ②           | ③          | ④          | ⑤          |   | ⑥          | ⑦          | ⑧          |

- ① Brand (XL)
- ② Product series (M453)
- ③ Package type( SOP5:None)
- ④ Halogen option (None : Halogen free)
- ⑤ CTR Bank(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 |
|-------------|---------|-----------------------|--------------|
| XLM453P     | SOP5    | 3000pcs / Tape & Reel | XLM453       |

### Marking Information

- " XL" denotes brand
- " M453" denotes Product series: 01, 11.
- " Y" denotes Year : A(2024), B(2025), C(2026)
- " WW" denotes Week' s number
- " N" denotes the day of Week.



### Maximum Ratings (@ T<sub>A</sub> = 25°C unless otherwise specified)

| Parameter |                   | Symbol          | Value | Unit |
|-----------|-------------------|-----------------|-------|------|
| Emitter   | Forward Current   | I <sub>F</sub>  | 50    | mA   |
|           | Reverse Voltage   | V <sub>R</sub>  | 5     | V    |
|           | Power Dissipation | P <sub>D</sub>  | 45    | mW   |
| Detector  | Collector Output  | P <sub>O</sub>  | 100   | mW   |
|           | Output Current    | I <sub>O</sub>  | 16    | mA   |
|           | Supply Voltage    | V <sub>CC</sub> | 30    | V    |
|           | Output Voltage    | V <sub>O</sub>  | 20    | V    |

### Thermal Characteristics

| Parameter                 | Symbol           | Value      | Unit             |
|---------------------------|------------------|------------|------------------|
| Isolation Voltage *2      | V <sub>ISO</sub> | 3750       | V <sub>rms</sub> |
| Operating Temperature     | T <sub>OPR</sub> | -40 ~ +100 | °C               |
| Storage Temperature Range | T <sub>STG</sub> | -55 ~ +125 | °C               |
| Soldering Temperature *3  | T <sub>SOL</sub> | 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<sub>A</sub> = 25°C unless otherwise specified)

| Parameter                |                               | Symbol                           | Test Condition                                                          | Min. | Typ.               | Max. | Unit  |
|--------------------------|-------------------------------|----------------------------------|-------------------------------------------------------------------------|------|--------------------|------|-------|
| Input                    | Forward Voltage               | V <sub>F</sub>                   | I <sub>F</sub> = 16mA                                                   | -    | 1.45               | 1.7  | V     |
|                          | Reverse Breakdown Voltage     | B <sub>VR</sub>                  | I <sub>R</sub> = 10μA                                                   | 5    | 20                 | -    | V     |
|                          | Diode Temperature Coefficient | ΔV <sub>F</sub> /ΔT <sub>A</sub> | I <sub>F</sub> = 10mA                                                   | -    | -1.6               | -    | mV/°C |
| Output                   | High Level Supply Current     | I <sub>CCH</sub>                 | V <sub>CC</sub> = 15V, I <sub>F</sub> = 0mA<br>V <sub>O</sub> = Open    | -    |                    | 1    | μA    |
|                          |                               |                                  | T <sub>A</sub> = 0-70°C                                                 |      |                    | 2    | μA    |
|                          | Low Level Supply Current      | I <sub>CCL</sub>                 | V <sub>CC</sub> = 15V, I <sub>F</sub> = 16mA,<br>V <sub>O</sub> = Open  | -    | 120                | 800  | μA    |
| Transfer Characteristics | High Level Output Current     | I <sub>OH</sub>                  | I <sub>F</sub> = 0mA, V <sub>O</sub> = 5.5V<br>V <sub>CC</sub> = 5.5V   |      | 0.001              | 0.5  |       |
|                          |                               |                                  | I <sub>F</sub> = 0mA, V <sub>O</sub> = 15V<br>V <sub>CC</sub> = 15V     |      | 0.005              | 1    | μA    |
|                          |                               |                                  | T <sub>A</sub> = 0-70°C                                                 |      |                    | 50   |       |
|                          | Low Level Output Voltage      | V <sub>OL</sub>                  | V <sub>CC</sub> = 4.5V, I <sub>F</sub> = 16mA<br>I <sub>O</sub> = 3mA   | -    | 0.1                | 0.4  | V     |
|                          |                               |                                  | V <sub>CC</sub> = 4.5V, I <sub>F</sub> = 16mA<br>I <sub>O</sub> = 2.4mA |      | 0.1                | 0.5  | V     |
|                          | Current transfer ratio        | CTR                              | I <sub>F</sub> = 16mA, V <sub>CC</sub> = 4.5V<br>V <sub>O</sub> = 0.4V  | 19   | 24                 | 80   | %     |
|                          |                               |                                  | I <sub>F</sub> = 16mA, V <sub>CC</sub> = 4.5V<br>V <sub>O</sub> = 0.5V  | 15   | 25                 |      |       |
|                          | Isolation Resistance          | R <sub>IO</sub>                  | V <sub>IO</sub> = 500Vdc<br>40~60% R.H.                                 | -    | 1×10 <sup>12</sup> | -    | Ω     |
|                          | Floating Capacitance          | C <sub>IO</sub>                  | f = 1MHz                                                                | -    | 0.6                | -    | pF    |

**Switching Characteristics** (@  $T_A = -40^{\circ}\text{C} \sim 85^{\circ}\text{C}$ ,  $V_{CC} = 5\text{V}$ ,  $I_F = 7.5\text{mA}$ , unless otherwise specified)

| Parameter                                     | Symbol    | Test Condition                                                                                                                       | Min. | Typ. | Max. | Unit             |
|-----------------------------------------------|-----------|--------------------------------------------------------------------------------------------------------------------------------------|------|------|------|------------------|
| Propagation Delay Time to Output HIGH Level   | $T_{PLH}$ | $I_F = 16\text{mA}$ , $R_L = 1.9\text{k}\Omega$ , $T_A = 25^{\circ}\text{C}$                                                         | -    | 150  | 800  | ns               |
|                                               |           | $I_F = 16\text{mA}$ , $R_L = 1.9\text{k}\Omega$                                                                                      |      |      | 800  |                  |
| Propagation Delay Time to Output Low Level    | $T_{PHL}$ | $I_F = 16\text{mA}$ , $R_L = 1.9\text{k}\Omega$ , $T_A = 25^{\circ}\text{C}$                                                         | -    | 200  | 800  | ns               |
|                                               |           | $I_F = 16\text{mA}$ , $R_L = 1.9\text{k}\Omega$                                                                                      |      |      | 800  |                  |
| Common Mode Transient Immunity(at Logic High) | $ CM_H $  | $T_A = 25^{\circ}\text{C}$ , $I_F = 0\text{mA}$<br>$ V_{CM}  = 10\text{V(Peak)}$<br>$C_L = 15\text{pF}$ , $R_L = 1.9\text{k}\Omega$  | 5000 | -    | -    | V/ $\mu\text{s}$ |
| Common Mode Transient Immunity (at Logic Low) | $ CM_L $  | $T_A = 25^{\circ}\text{C}$ , $I_F = 16\text{mA}$<br>$ V_{CM}  = 10\text{V(Peak)}$<br>$C_L = 15\text{pF}$ , $R_L = 1.9\text{k}\Omega$ | 5000 | -    | -    | V/ $\mu\text{s}$ |

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

Fig.1 Normalized CTR vs Forward Current

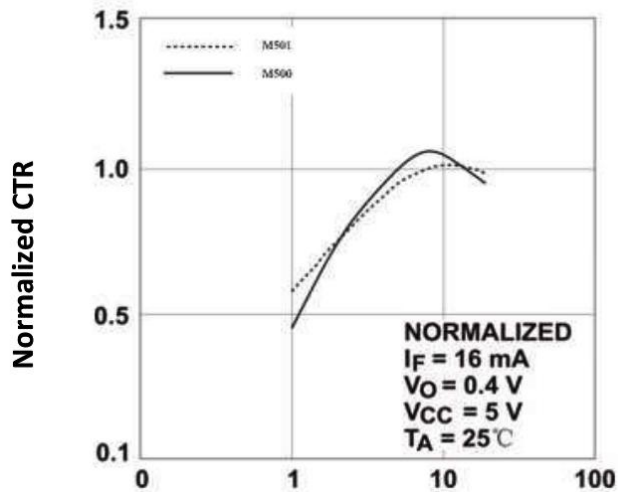


Fig.2 Normalized CTR vs Temperature

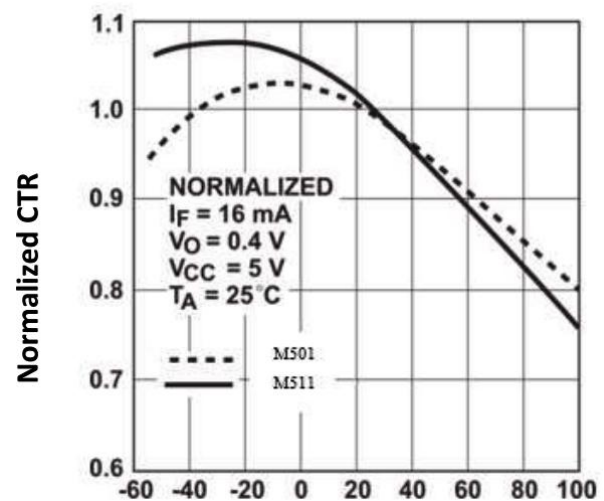


Fig.3 Output Current vs Output Voltage

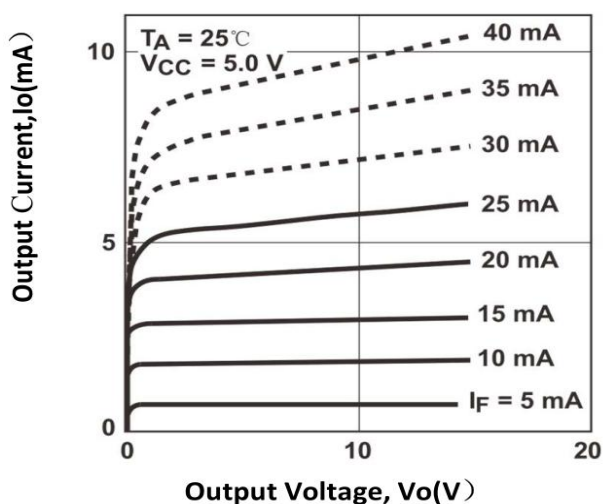


Fig.4 Logic High Output Current vs Temperature

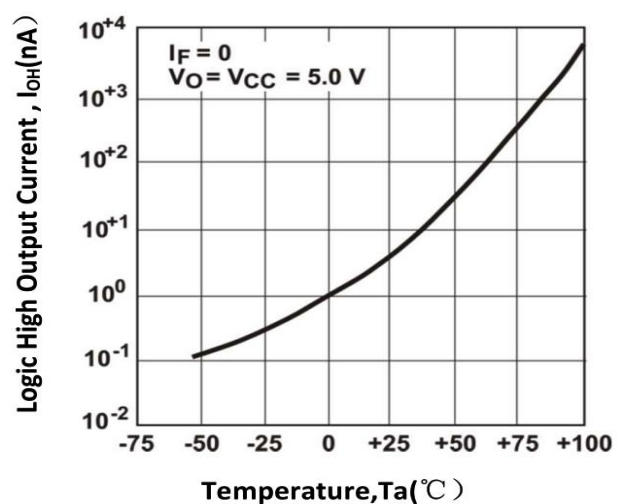


Fig. 5 Propagation Delay vs Temperature

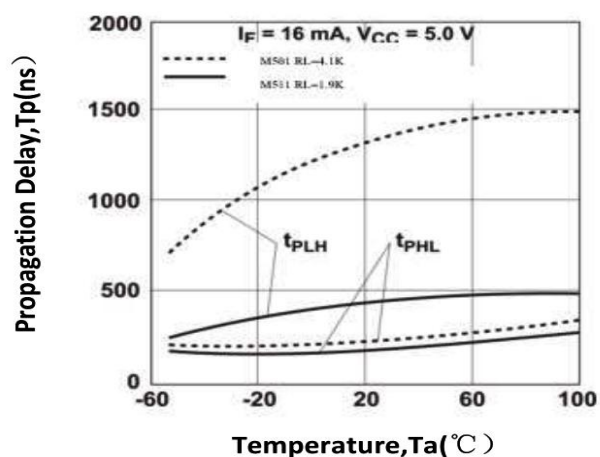
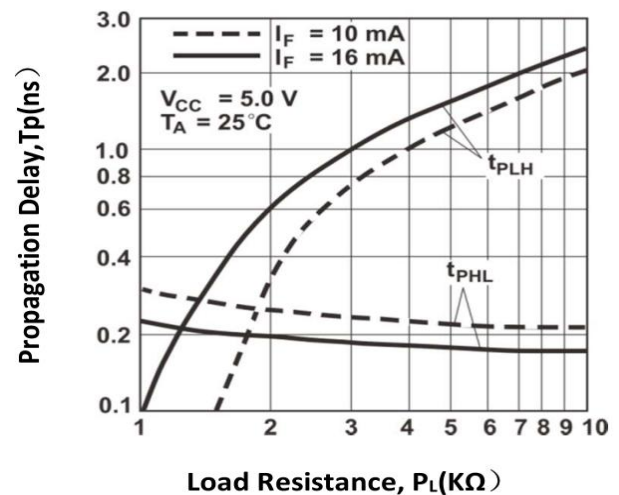


Fig.6 Propagation Delay vs Load Resistance



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

Fig.7 Test Circuit and Wave forms for  $t_{PLH}$ ,  $t_{PHL}$ ,  $t_r$  and  $t_f$

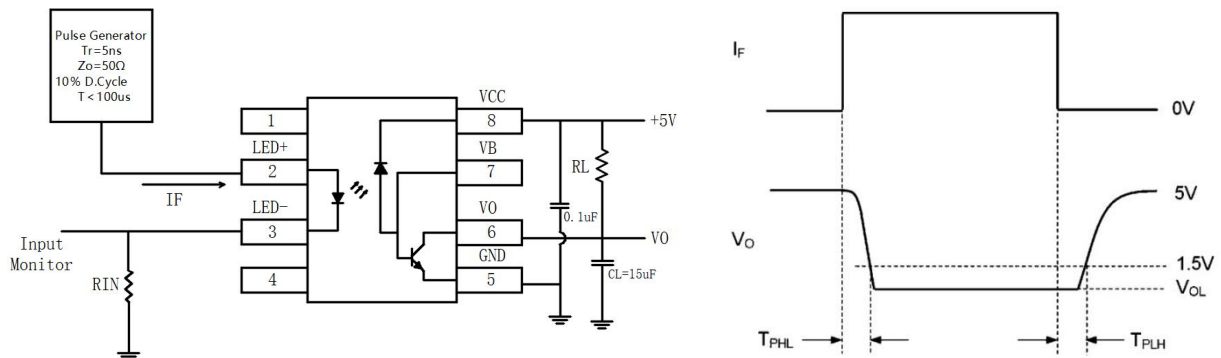
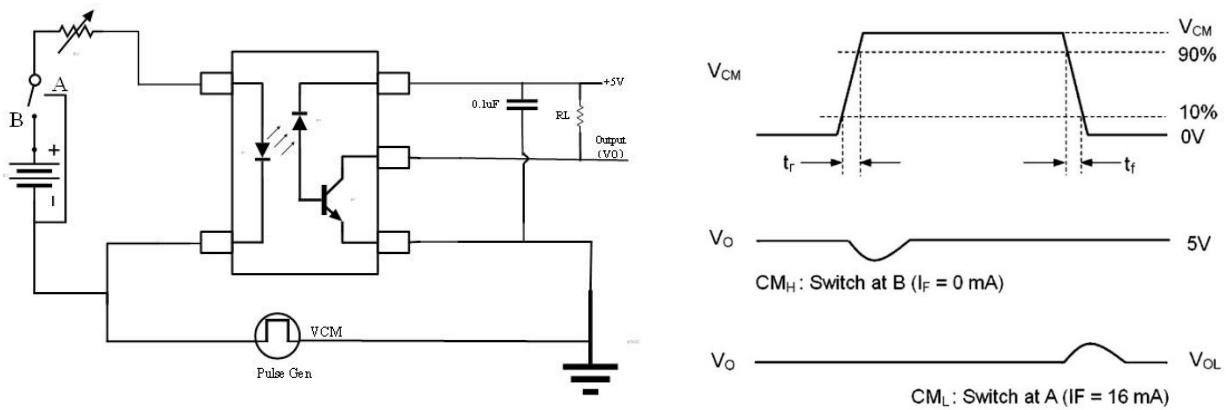
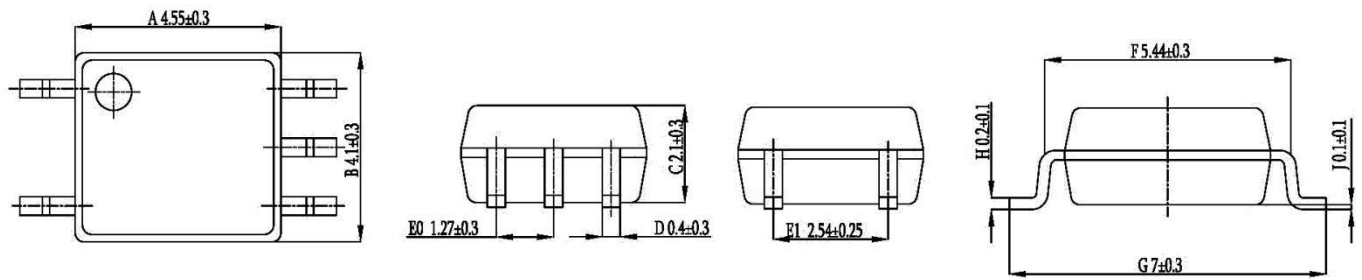


Fig.8 Test Circuit Common Mode Transient Immunity

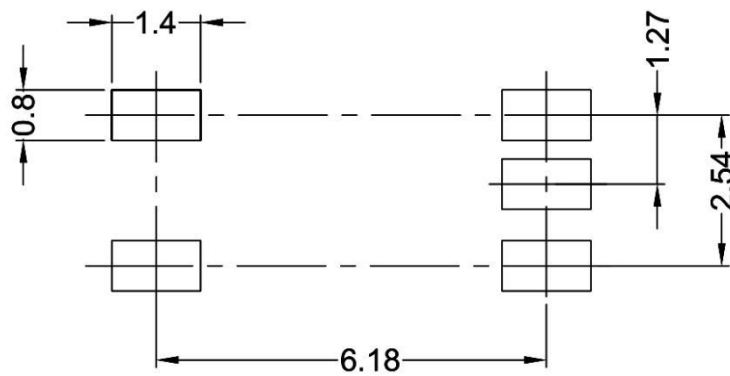


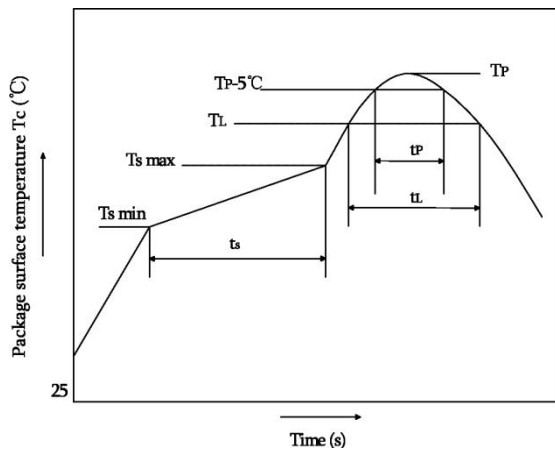
### Package Outline Dimensions (unit: mm)

#### SOP5



### SOLDERING FOOTPRINT (unit: mm)



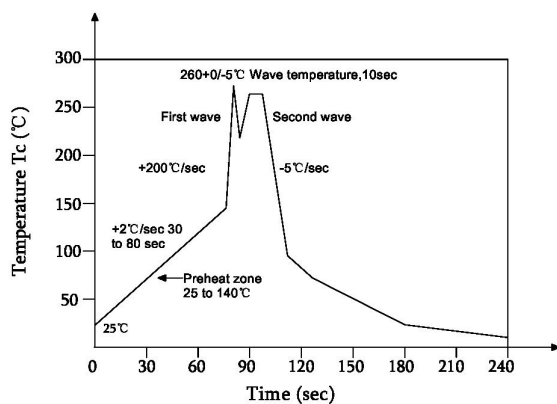


|                                                                                    | Symbol         | Min | Max | Unit |
|------------------------------------------------------------------------------------|----------------|-----|-----|------|
| Preheat temperayure                                                                | Ts             | 150 | 200 | °C   |
| Preheat time                                                                       | ts             | 60  | 120 | s    |
| Ramp-up ratea(T <sub>L</sub> to T <sub>P</sub> )                                   |                |     | 3   | °C/s |
| Liquidus temperature                                                               | T <sub>L</sub> | 217 |     | °C   |
| Time above T <sub>L</sub>                                                          | t <sub>L</sub> | 60  | 150 | s    |
| Peak temperature                                                                   | T <sub>P</sub> |     | 260 | °C   |
| Time during which T <sub>c</sub> is between (T <sub>P</sub> -5) and T <sub>P</sub> | t <sub>p</sub> |     | 30  | s    |
| Ramp-down rate(T <sub>P</sub> to T <sub>L</sub> )                                  |                |     | 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 Ts    | ~130°C                                |
| Preheat time (25°C to Ts)       | >60s                                  |
| Peak temperature Tp             | 260°C                                 |
| Time within peak temperature tp | 10s                                   |
| Ramp-down rate                  | 5°C/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 °C+5°C within 3s.

| Package Type | Packing Form         | Quantity per Tube &Reel | Quantity per Box | Quantity per Carton | Antistatic Bag Specification | Box Specification | Carton Specification | Note                  |
|--------------|----------------------|-------------------------|------------------|---------------------|------------------------------|-------------------|----------------------|-----------------------|
| SOP5         | Reel( $\phi 330$ mm) | 3000pcs/reel            | 2 reels /box     | 5 boxes /ctn        | 380*420mm                    | 350*340*60mm      | 365*330*370mm        | Guard band 200mm/min. |

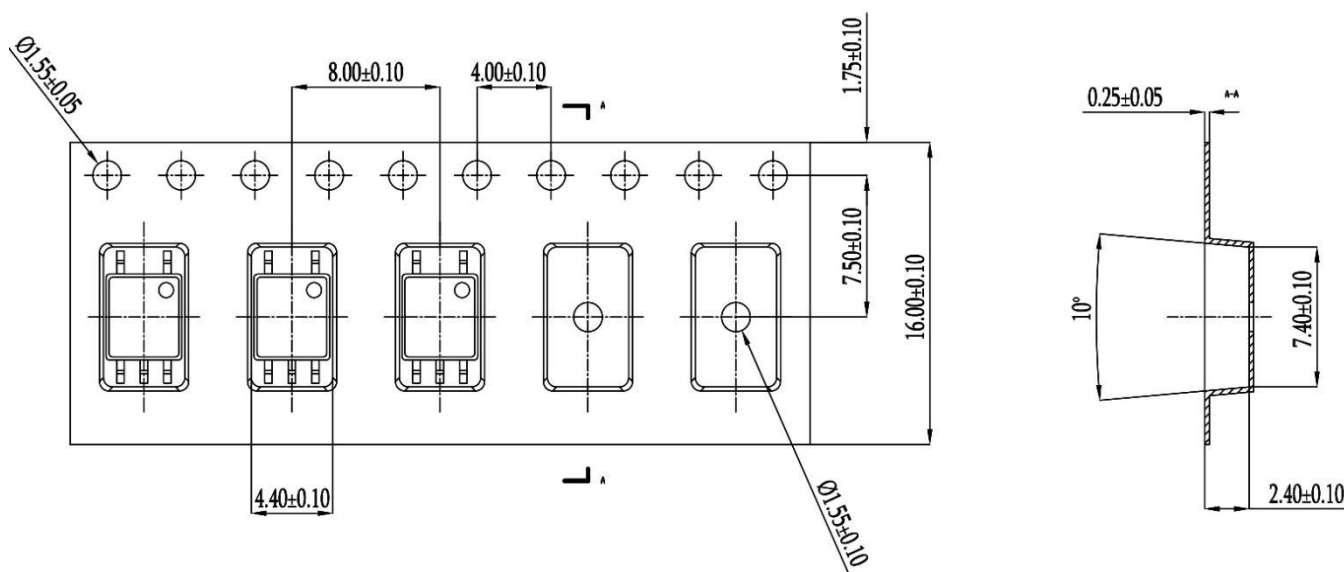
■ Summary table

■ SOP5 (Reel)

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

Qty/ctn : 30000pcs.

Schematic: (unit:mm)



## IMPORTANT NOTICE

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