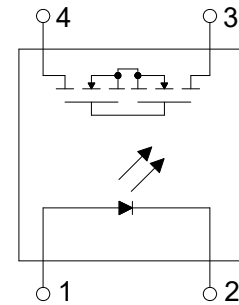


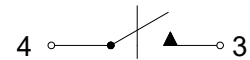
● **Description**

The KAQY212SE series is robust, ideal for telecom and ground fault applications. It is a SPST normally open switch (1 Form A) that replaces electromechanical relays in many applications. It is constructed using a GaAlAs LED for actuation control and an integrated monolithic die for the switch output. The die, fabricated in a high-voltage dielectrically isolated technology, is comprised of a photodiode array, switch control circuitry and MOSFET switches.

● **Schematic**



1 FORM A
NORMALLY OPEN



● **Features**

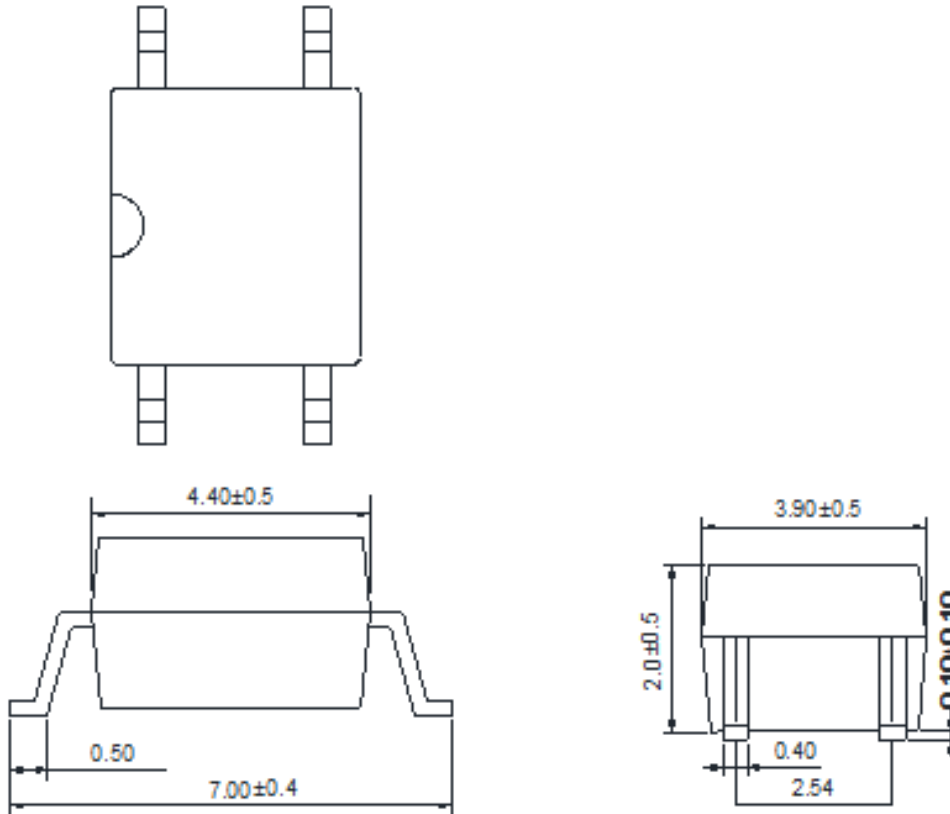
1. Normally open, single pole single throw
2. Control 60V AC or DC Voltage
3. Switch 200mA Loads
4. Controls low-level analog signals
5. High sensitivity, low ON resistance
6. Low-level off-state leakage current
7. High isolation Voltage
8. Pb free and RoHS compliant
9. MSL class 1
10. Agency Approvals :
 - UL Approved (No. E108430): UL508
 - c-UL Approved (No. E108430)
 - FIMKO Approved: EN62368-1, EN60601-1
 - VDE Approved (No. 40053989): EN60747-5-5

● **Application**

- Telecommunications (PC, electronic notepad)
- Modem
- Telephone equipment
- Security equipment
- Sensors
- Measuring and testing equipment
- Factory automation equipment
- High speed inspection machines

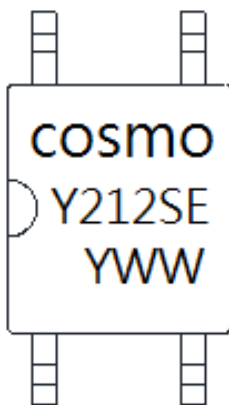
● **Outside Dimension**

Unit : mm



TOLERANCE : ±0.2mm

● **Device Marking**



Notes :

cosmo
Y212SE
YWW

Y : Year code / W : Week code

● Absolute Maximum Ratings

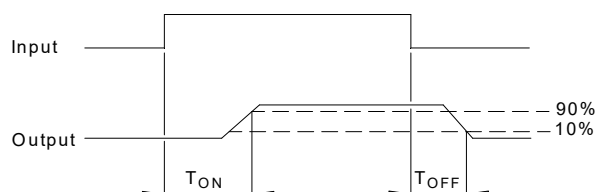
(Ta=25°C)

| Item | | Symbol | Rating | Unit |
|----------------------------------|----------------------------|-----------|----------------|----------|
| Input | Continuous forward current | I_F | 50 | mA |
| | Peak forward current | I_{FP} | 1 | A |
| | Reverse voltage | V_R | 5 | V |
| | Power dissipation | P_{in} | 100 | mW |
| | Derate linearly from 25°C | - | 1.3 | mW/°C |
| Output | Breakdown voltage | V_B | 60 | V |
| | Continuous load current | I_L | 200 | mA |
| | Power dissipation | P_{out} | 500 | mW |
| Isolation voltage | | V_{iso} | 1500 | Vrms |
| Isolation resistance (Vio=500V) | | R_{iso} | $\geq 10^{10}$ | Ω |
| Total power dissipation | | P_t | 550 | mW |
| Derate linearly from 25°C | | - | 2.5 | mW/°C |
| Operating temperature | | T_{opr} | -40 to +85 | °C |
| Storage temperature | | T_{stg} | -40 to +125 | °C |
| Junction temperature | | T_j | 100 | °C |
| Soldering temperature 10 seconds | | T_{sot} | 260 | °C |

● Electro-optical Characteristics

(Ta=25°C)

| Parameter | | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|-----------------|---------------------------|------------|----------------------------|------|------|------|----------|
| Input | Forward voltage | V_F | $I_F=10mA$ | - | 1.2 | 1.5 | V |
| | Operation input current | I_{FON} | $V_L=20V, I_L=100mA$ | - | - | 2.0 | mA |
| | Recovery input Voltage | V_{FOFF} | $V_L=20V, I_L \leq 5\mu A$ | 0.2 | - | - | V |
| Output | Breakdown voltage | V_B | $I_B=50\mu A$ | 60 | - | - | V |
| | Off-state leakage current | I_{LEAK} | $V_L=60V, I_F=0mA$ | - | 0.2 | 1.0 | μA |
| I/O capacitance | | C_{iso} | $V_B=0V, f=1MHz$ | - | 6 | - | pF |
| ON resistance | | R_{ON} | $I_F=10mA, I_L=100mA$ | - | 7 | 10 | Ω |
| Turn-on time | | T_{ON} | $I_F=10mA, V_L=20V$ | - | 0.3 | 1.5 | ms |
| Turn-off time | | T_{OFF} | $I_L=100mA, t=10ms$ | - | 0.1 | 1.0 | ms |

● Turn-on / Turn-off Time


● Schematic and Wiring Diagrams

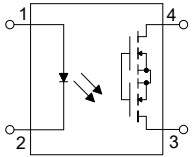
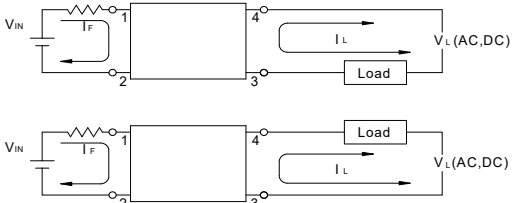
| Schematic | Output Configuration | Load | Connection | Wiring Diagrams |
|---|----------------------|----------|------------|--|
|  | 1a | AC DC | - |  |

Fig.1 Load Current vs. Ambient Temperature

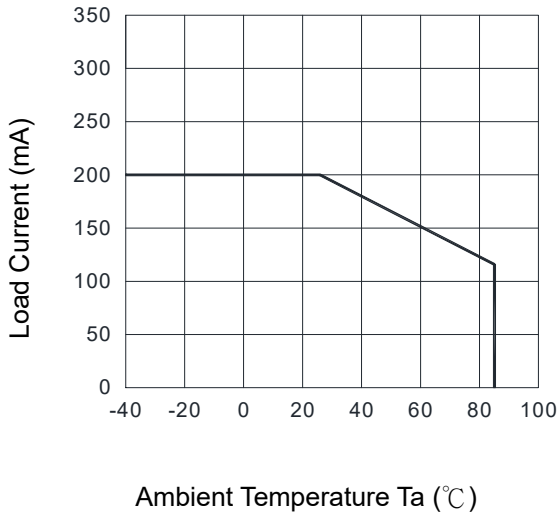


Fig.2 On Resistance vs. Ambient Temperature

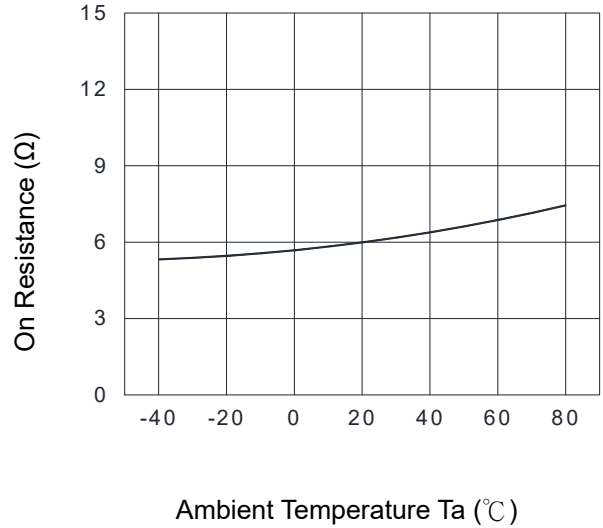


Fig.3 Turn-on Time vs. Ambient Temperature

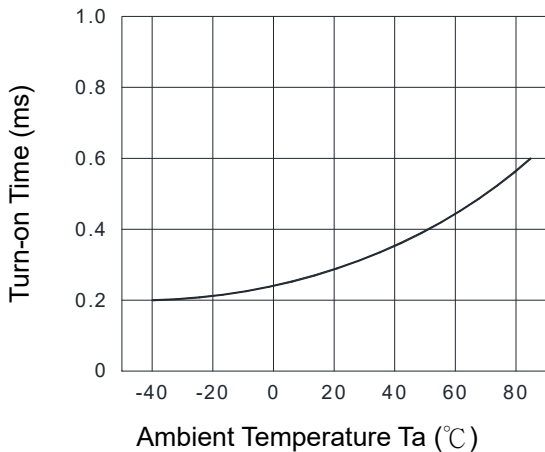


Fig.4 Turn-off Time vs. Ambient Temperature

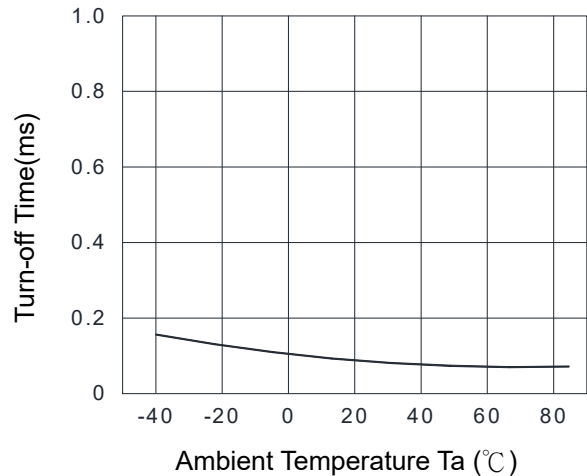


Fig.5 LED Operate Current vs. Ambient Temperature

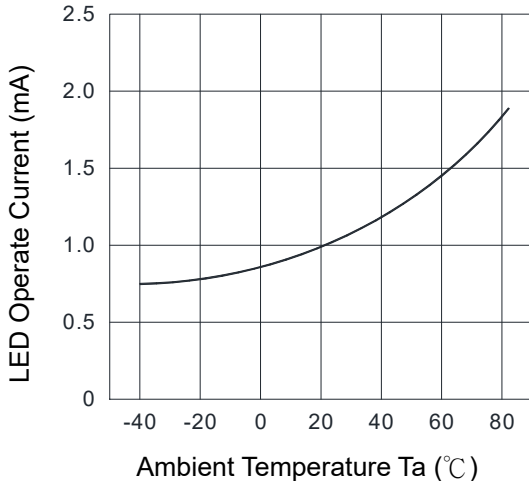


Fig.6 Output Capacitance vs. Applied Voltage

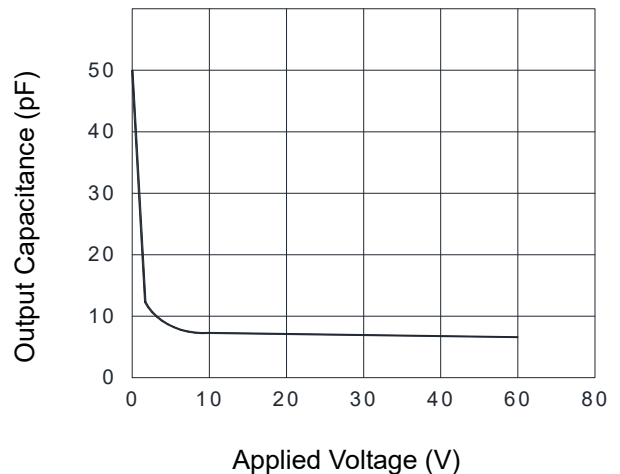


Fig.7 LED Dropout Voltage vs. Ambient Temperature

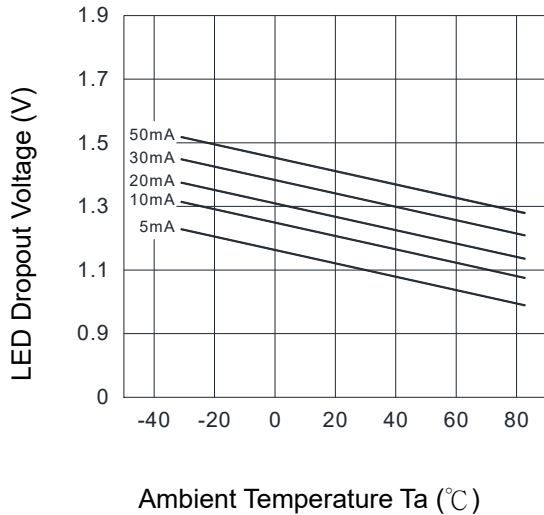


Fig.8 Voltage vs. Current Characteristics of Output at MOSFET Portion

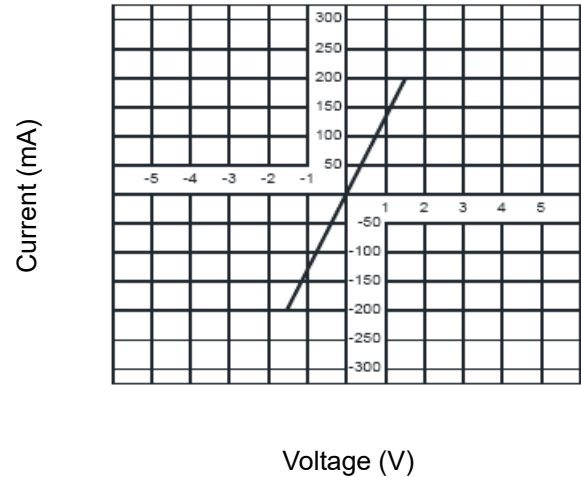


Fig.9 Turn-on Time vs. LED Forward Current

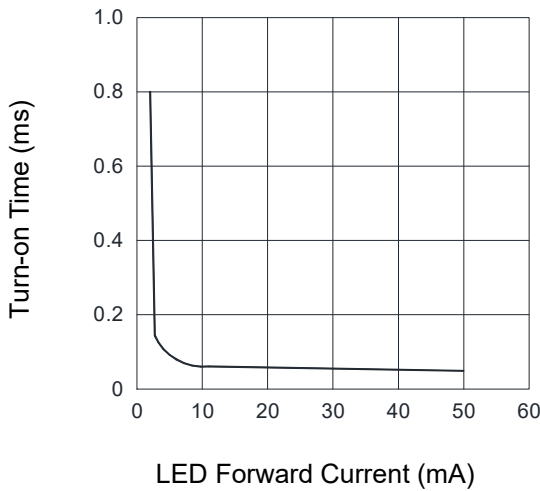


Fig.10 Off-state Leakage Current vs. Load Voltage

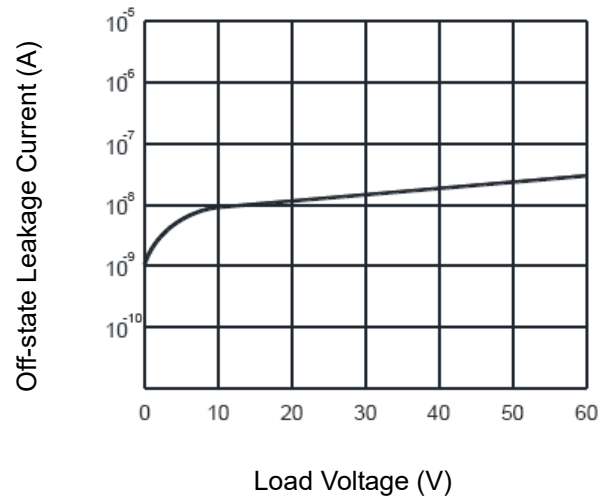


Fig.11 Turn-off Time vs. LED Forward Current

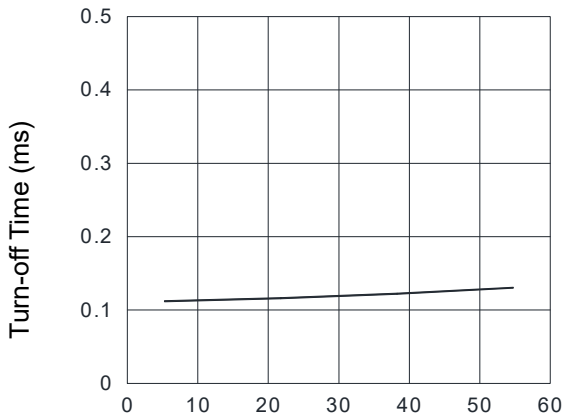
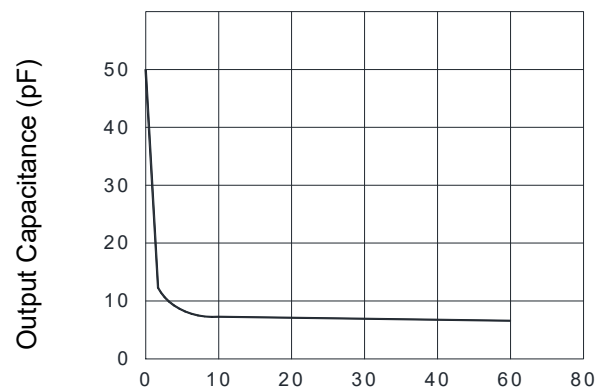


Fig.12 Output Capacitance vs. Applied Voltage

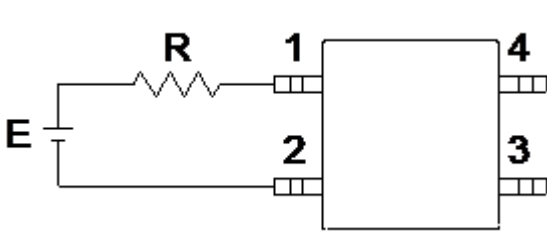


LED Forward Current (mA)

Applied Voltage (V)

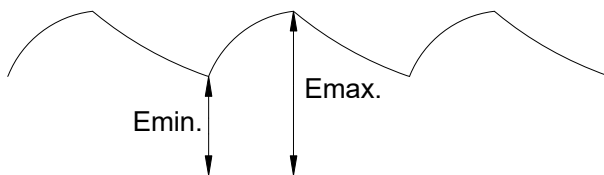
● **Using Methods**

Examples of resistance value to control LED forward current ($I_f=1\text{mA}$)

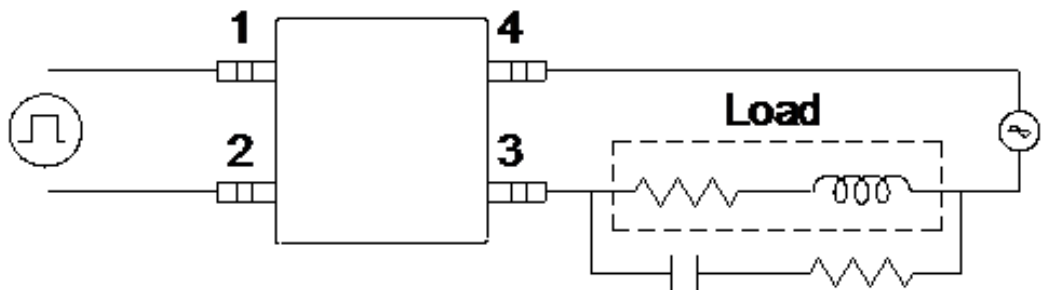
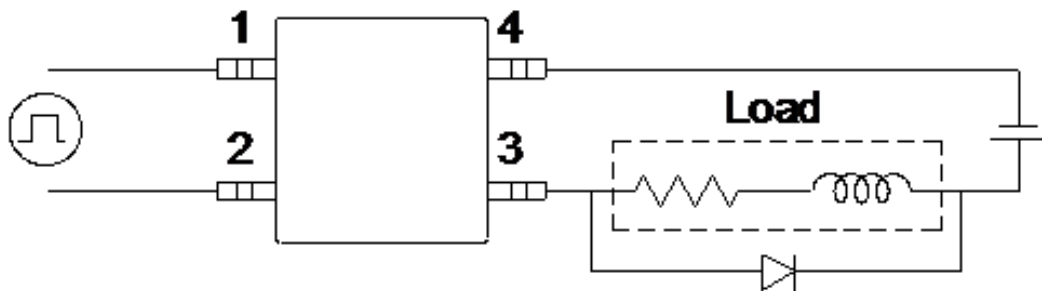


| E | R |
|------|-----------------------|
| 3.3V | Approx. 720 Ω |
| 5V | Approx. 1.5K Ω |
| 12V | Approx. 4.5K Ω |
| 15V | Approx. 6.0K Ω |
| 24V | Approx. 9.5K Ω |

1. LED forward current must be more than 2mA · at E min.
2. LED forward current must be less than 50mA · at E max.



Regulate the spike voltage generated on the inductive load as follows :



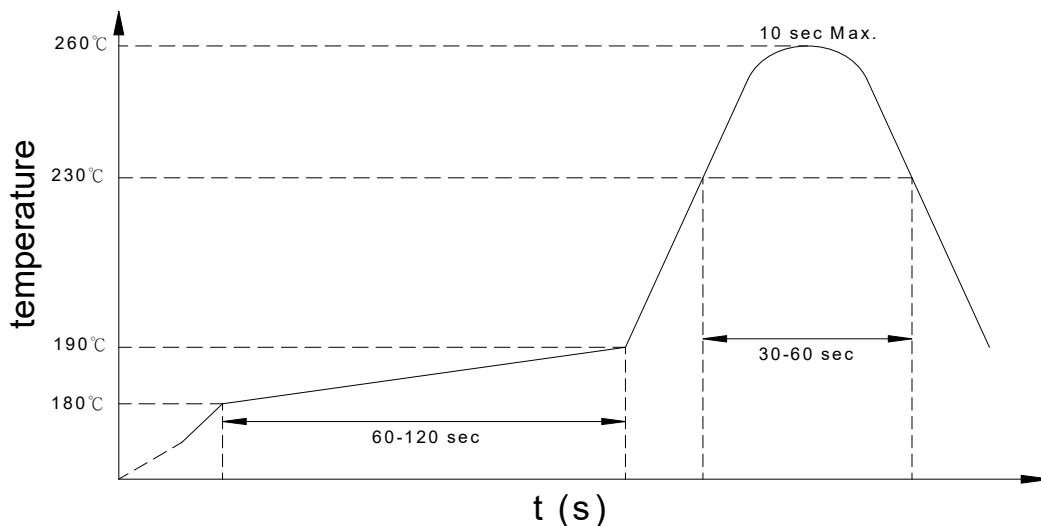
R-C Snubber

● **Recommended Soldering Conditions**

(a) **Infrared reflow soldering :**

- Peak reflow soldering : 260°C or below (package surface temperature)
- Time of peak reflow temperature: 10 sec
- Time of temperature higher than 230°C : 30-60 sec
- Time to preheat temperature from 180~190°C : 60-120 sec
- Number of reflows : Rosin flux containing small amount of chlorine
- Flux : (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

Recommended Temperature Profile of Infrared Reflow



(b) **Wave soldering :**

- Temperature : 260°C or below (molten solder temperature)
- Time : 10 seconds or less
- Preheating conditions: 120°C or below (package surface temperature)
- Number of times : One
- Flux : Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

(c) **Cautions :**

- Fluxes : Avoid removing the residual flux with freon-based and chlorine-based cleaning solvent.
- Avoid shorting between portion of frame and leads.

- **Numbering System**

KAQY212SE (X)

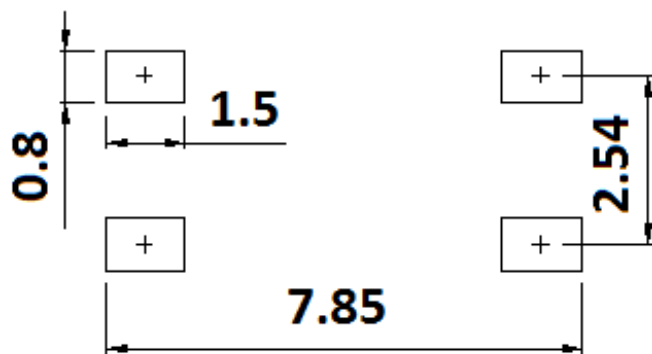
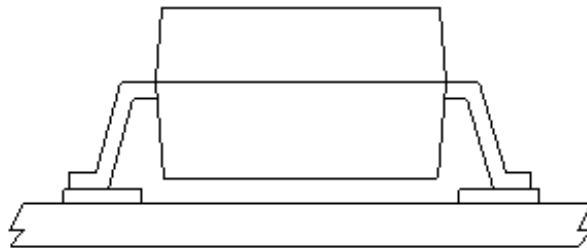
Note :

KAQY212SE = Part No.

X = Tape and reel option (TLD · TRU)

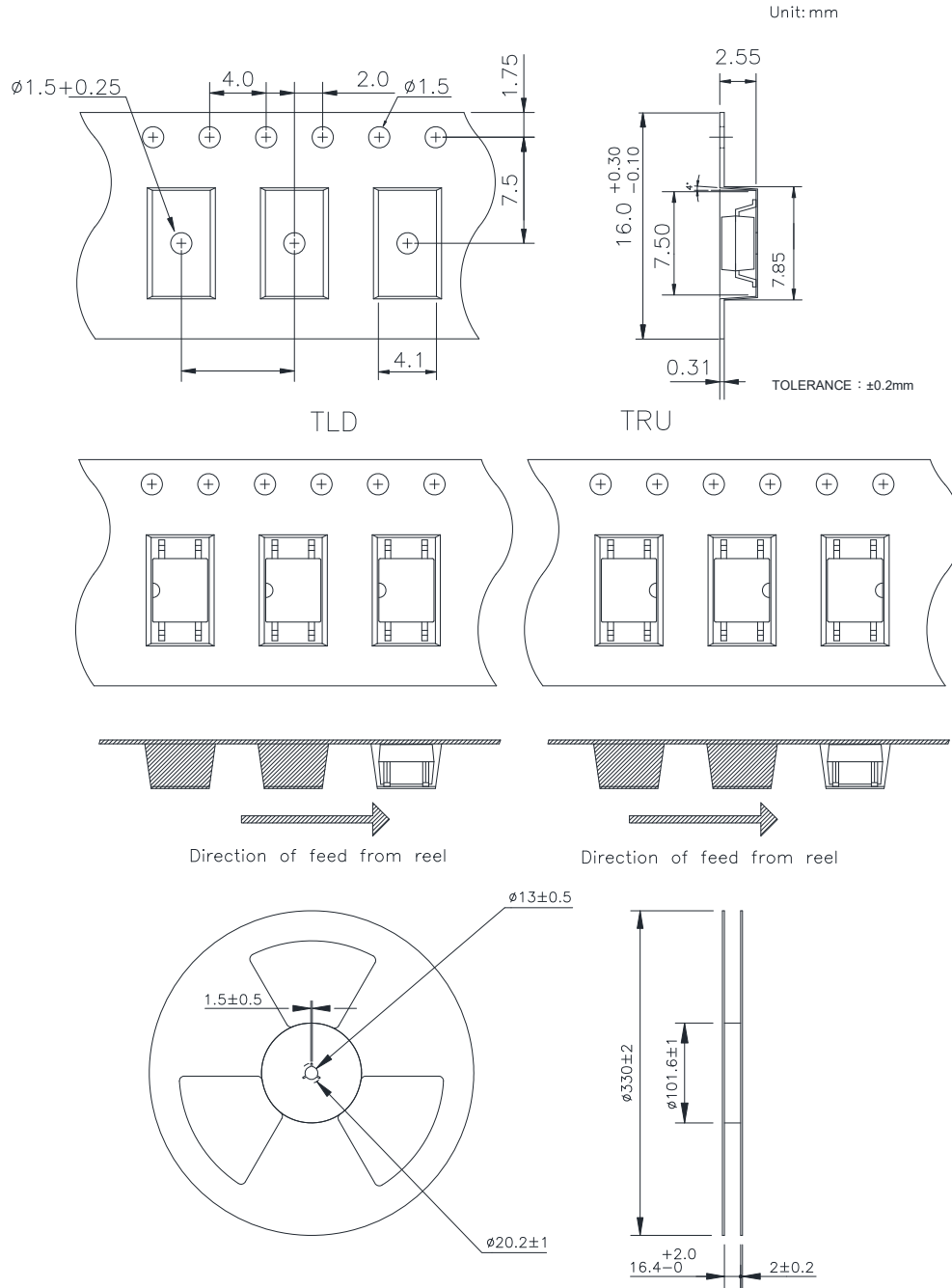
| Option | Description | Packing quantity |
|----------|--|---------------------|
| SE (TLD) | small outline for surface mount type package + TLD tape & reel option | 3000 units per reel |
| SE (TRU) | small outline for surface mount type package + TRU tape & reel option | 3000 units per reel |

- **Recommended Pad Layout for Surface Mount Lead Form**



Unit : mm

● 4-pin SOP Carrier Tape & Reel



- **Application Notice**

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