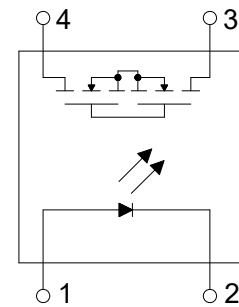


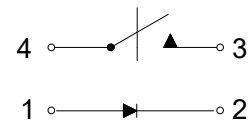
## ● Description

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

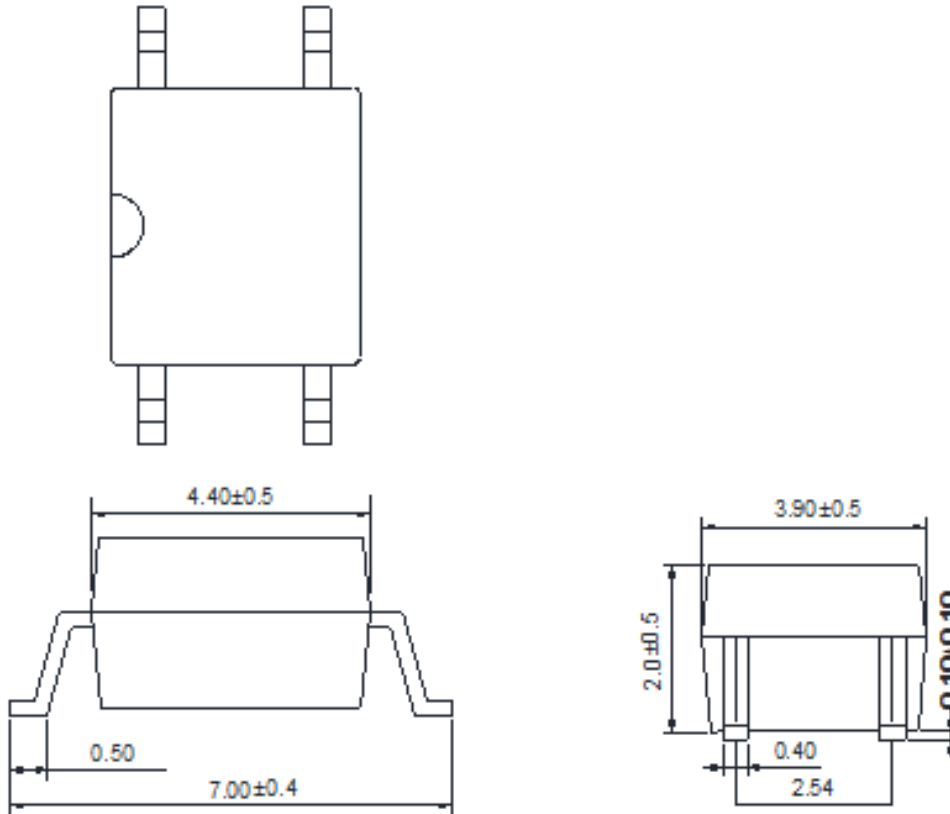
1. Normally open, single pole single throw
2. Control 60V AC or DC Voltage
3. Switch 200mA Loads
4. Controls low-level analog signals
5. High sensitivity, low ON resistance
6. Low-level off-state leakage current
7. High isolation Voltage
8. Pb free and RoHS compliant
9. MSL class 1
10. Agency Approvals :
  - 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

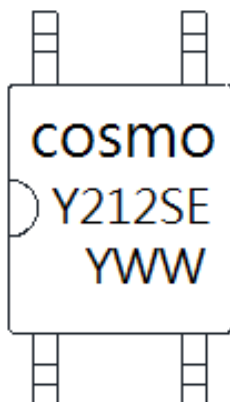
● **Outside Dimension**

Unit : mm



**TOLERANCE :  $\pm 0.2$ mm**

● **Device Marking**



**Notes :**

cosmo  
Y212SE  
YWW

Y : Year code / W : Week code

**● Absolute Maximum Ratings**

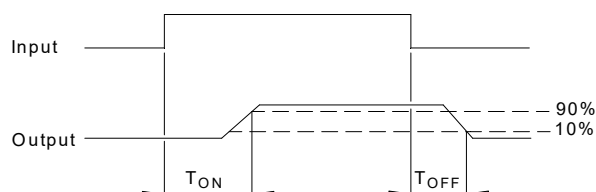
(Ta=25°C)

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)		$R_{iso}$	$\geq 10^{10}$	$\Omega$
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

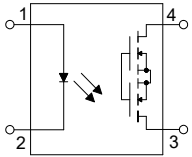
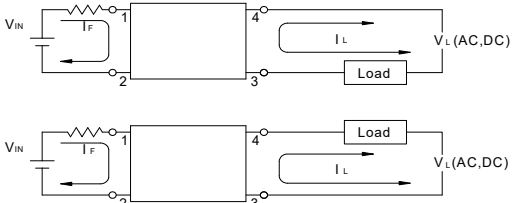
**● Electro-optical Characteristics**

(Ta=25°C)

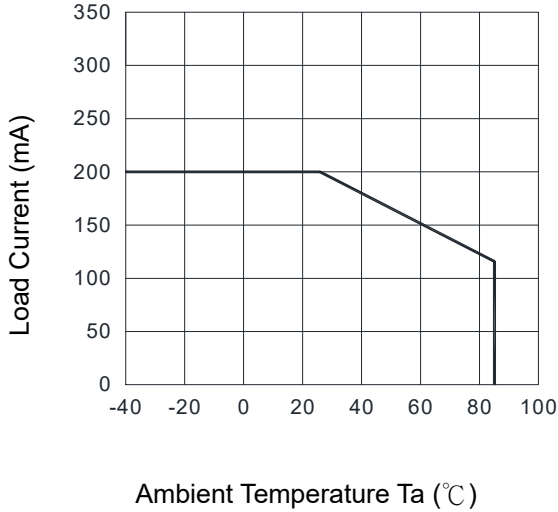
Parameter		Symbol	Conditions	Min.	Typ.	Max.	Unit
Input	Forward voltage	$V_F$	$I_F=10\text{mA}$	-	1.2	1.5	V
	Operation input current	$I_{FON}$	$V_L=20\text{V}, I_L=100\text{mA}$	-	-	2.0	mA
	Recovery input Voltage	$V_{FOFF}$	$V_L=20\text{V}, I_L \leq 5\mu\text{A}$	0.2	-	-	V
Output	Breakdown voltage	$V_B$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

**● Turn-on / Turn-off Time**


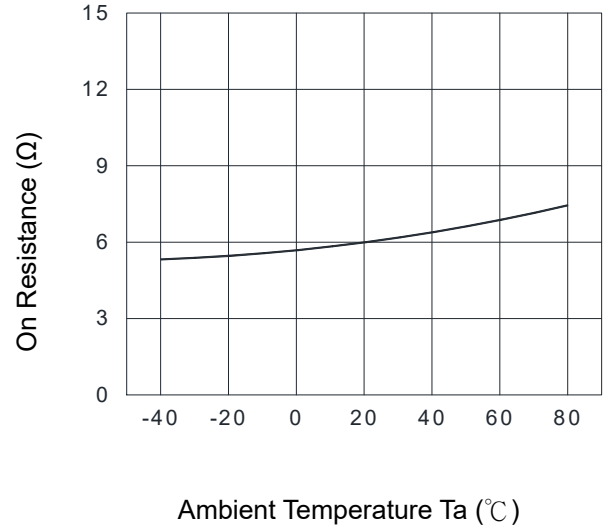
● Schematic and Wiring Diagrams

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

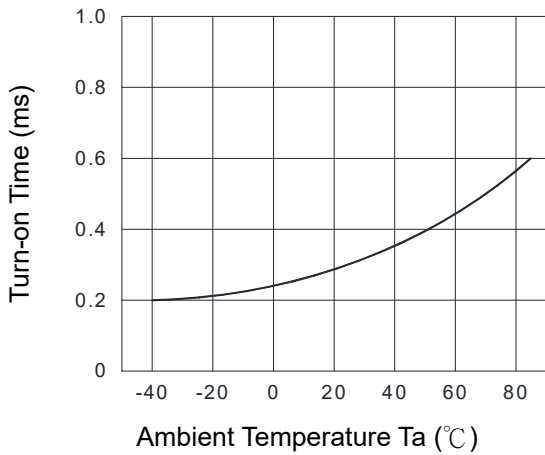
**Fig.1 Load Current vs. Ambient Temperature**



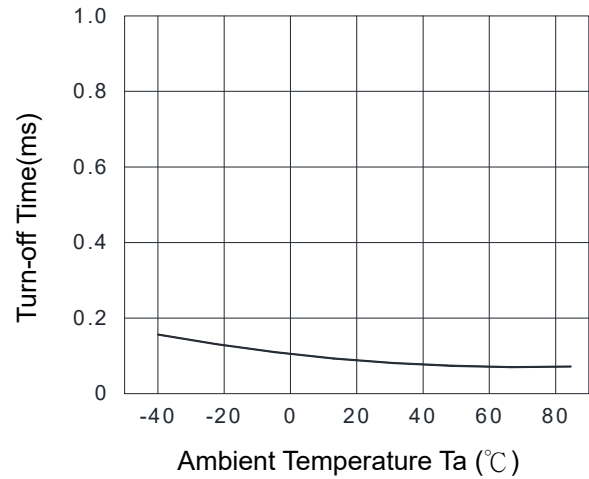
**Fig.2 On Resistance vs. Ambient Temperature**



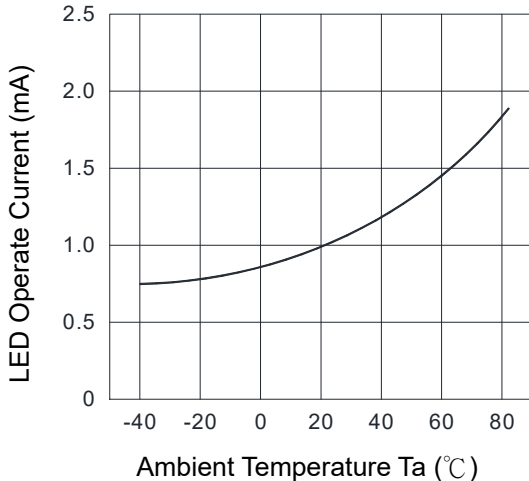
**Fig.3 Turn-on Time vs. Ambient Temperature**



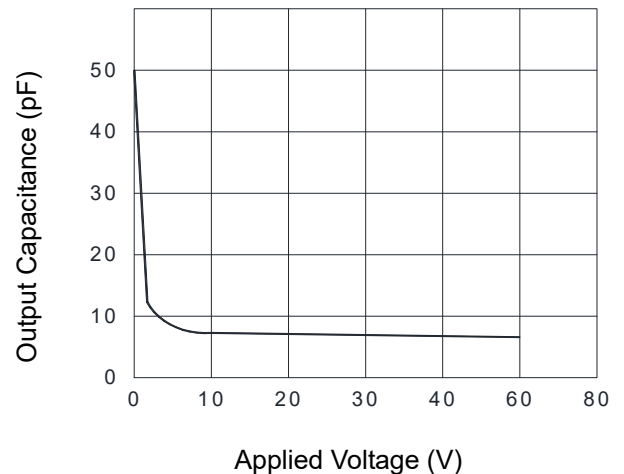
**Fig.4 Turn-off Time vs. Ambient Temperature**



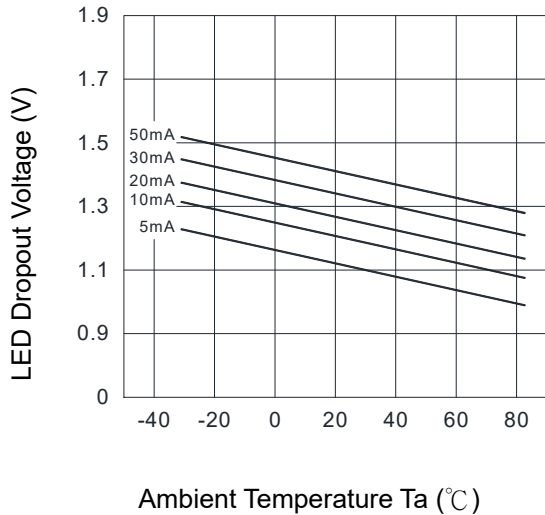
**Fig.5 LED Operate Current vs. Ambient Temperature**



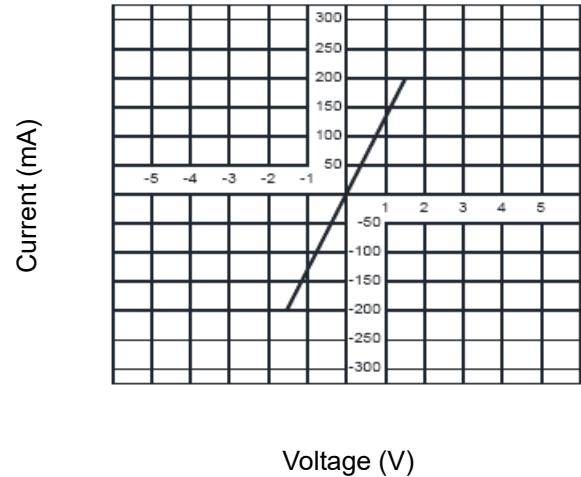
**Fig.6 Output Capacitance vs. Applied Voltage**



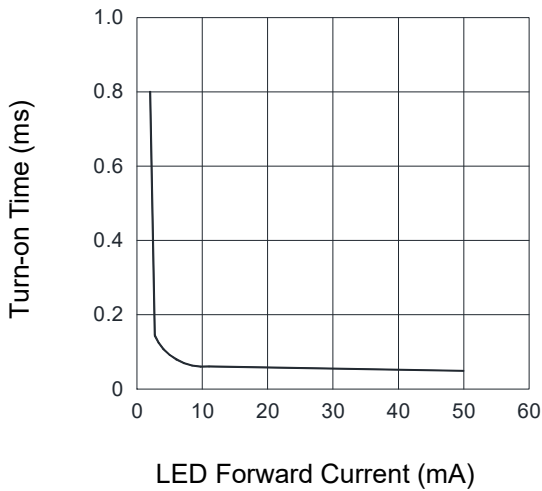
**Fig.7 LED Dropout Voltage vs. Ambient Temperature**



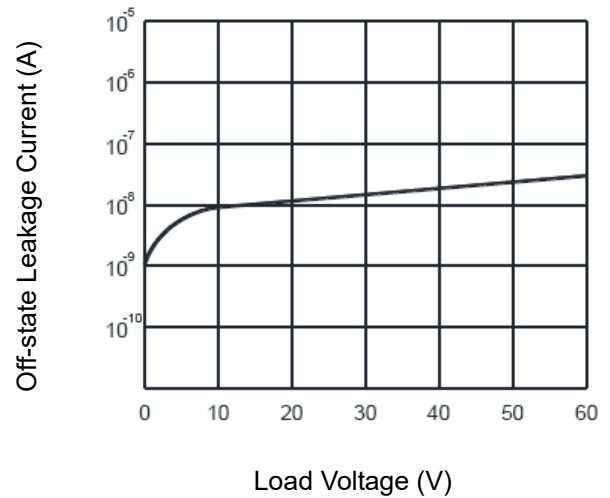
**Fig.8 Voltage vs. Current Characteristics of Output at MOSFET Portion**



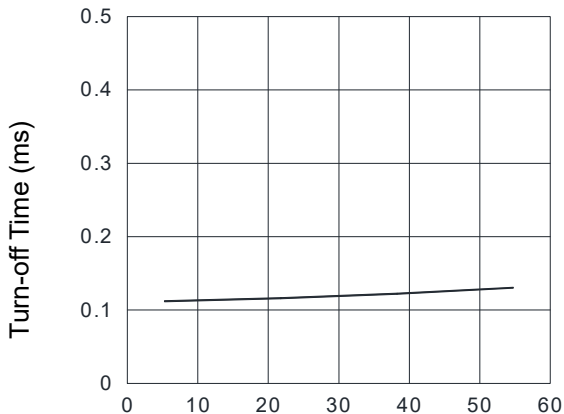
**Fig.9 Turn-on Time vs. LED Forward Current**



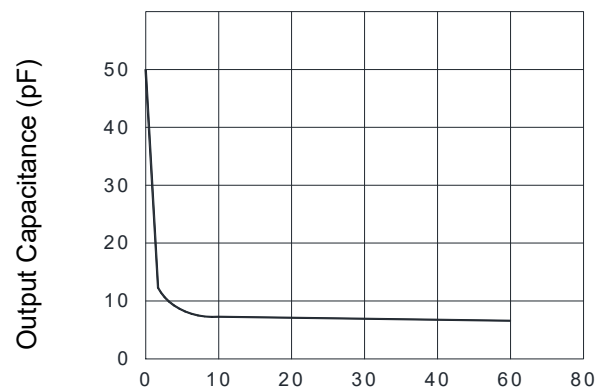
**Fig.10 Off-state Leakage Current vs. Load Voltage**



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



**Fig.12 Output Capacitance vs. Applied Voltage**

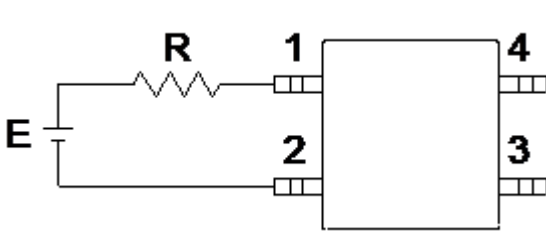


LED Forward Current (mA)

Applied Voltage (V)

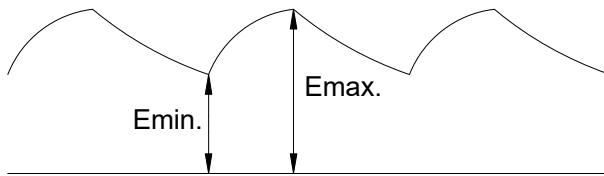
● **Using Methods**

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

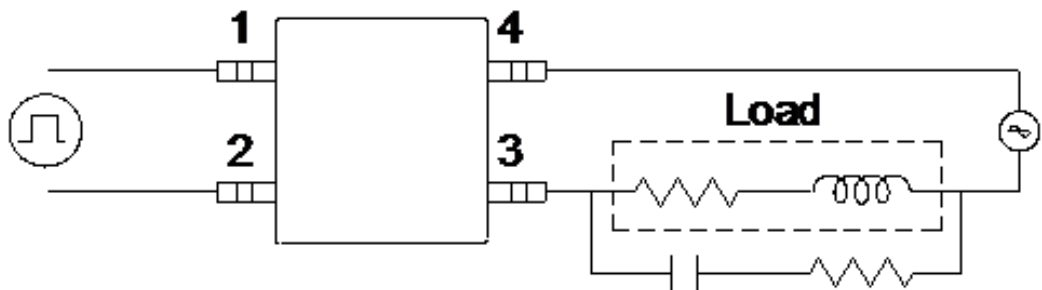
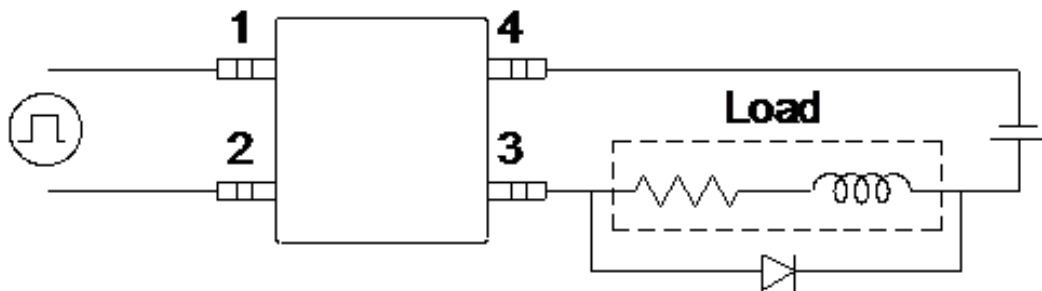


E	R
3.3V	Approx. 720 $\Omega$
5V	Approx. 1.5K $\Omega$
12V	Approx. 4.5K $\Omega$
15V	Approx. 6.0K $\Omega$
24V	Approx. 9.5K $\Omega$

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 :



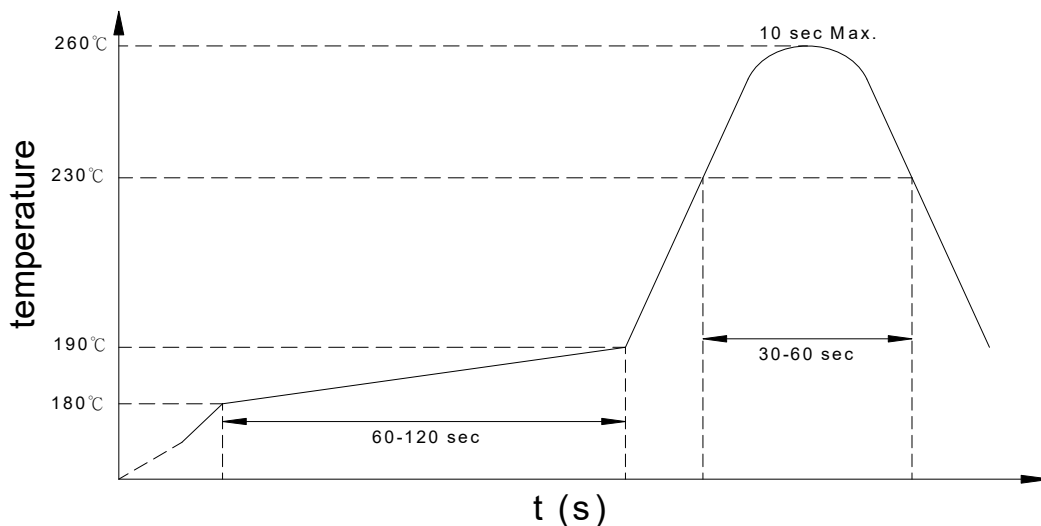
**R-C Snubber**

● **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)

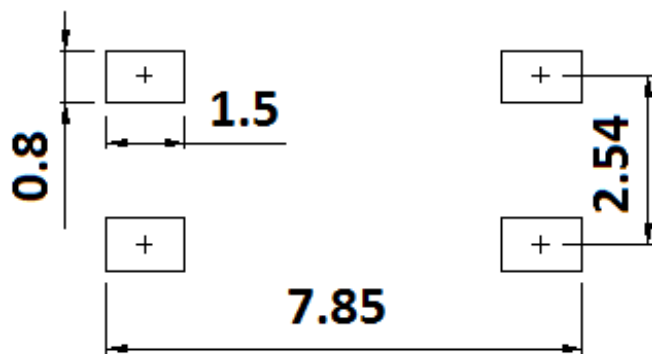
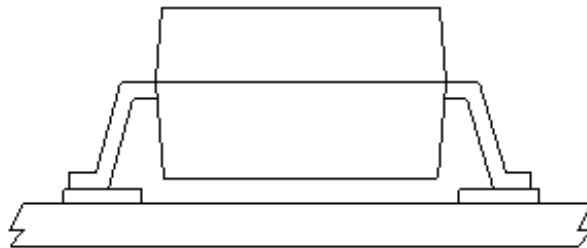
**Note :**

KAQY212SE = Part No.

X = Tape and reel option ( TLD · TRU )

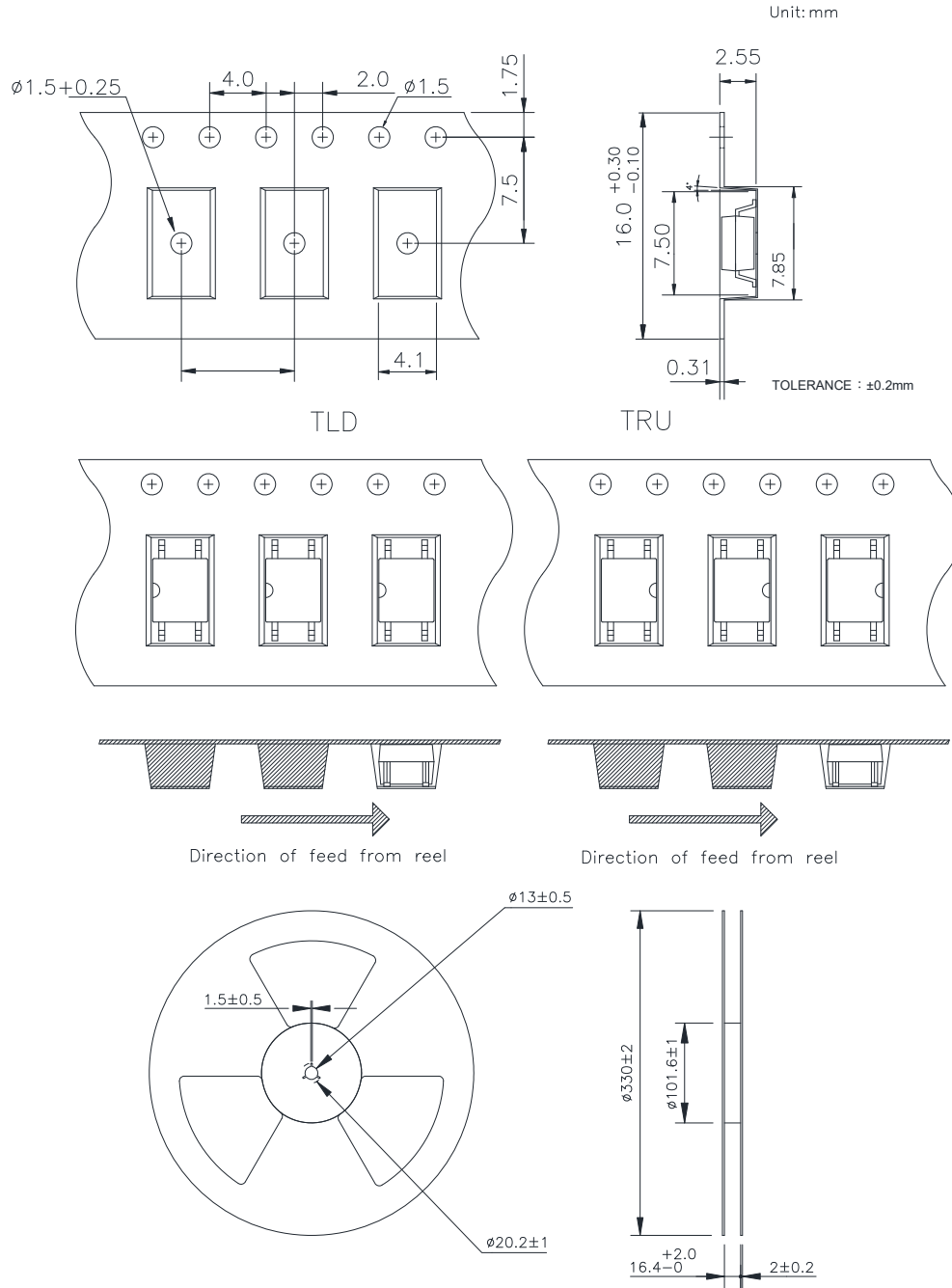
Option	Description	Packing quantity
SE (TLD)	small outline for surface mount type package + TLD tape & reel option	3000 units per reel
SE (TRU)	small outline for surface mount type package + TRU tape & reel option	3000 units per reel

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



Unit : mm

● 4-pin SOP Carrier Tape & Reel



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