

KAQY213 Series

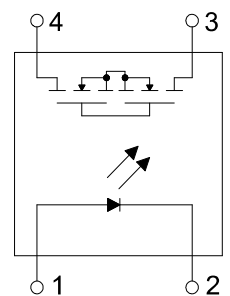
4PIN 250V N.O TYPE

SOLID STATE RELAY-MOSFET Output

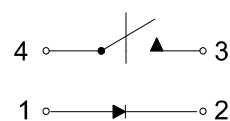
● Description

The KAQY213 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 250V 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 5KV (DIP / SMD)
8. Pb free and RoHS compliant
9. MSL class 1
10. Agency Approvals :
 - UL Approved (No. E169586, E108430): UL1577, UL508
 - c-UL Approved (No. E169586, E108430)
 - 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

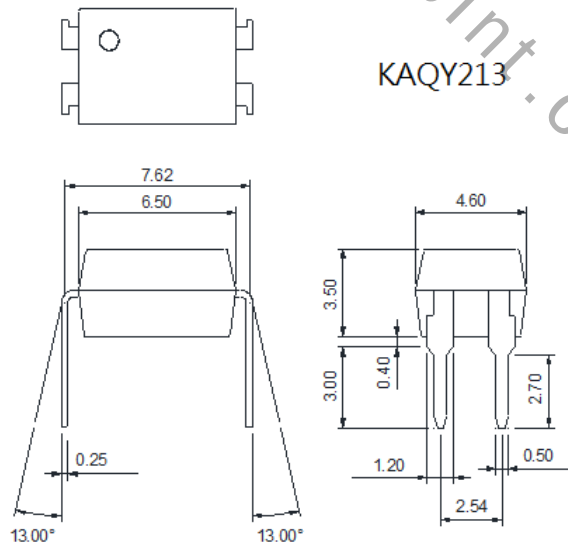
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4PIN 250V N.O TYPE
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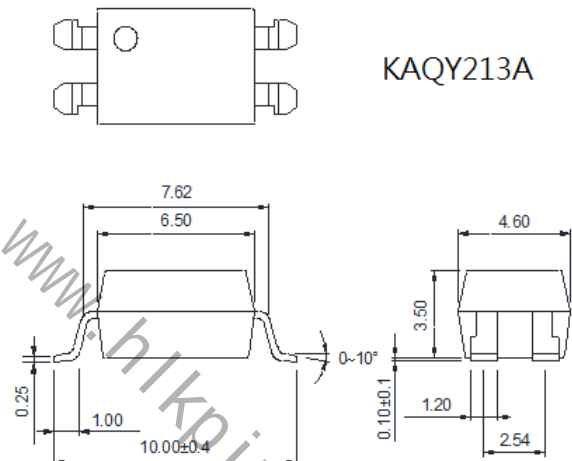
● Outside Dimension

Unit : mm

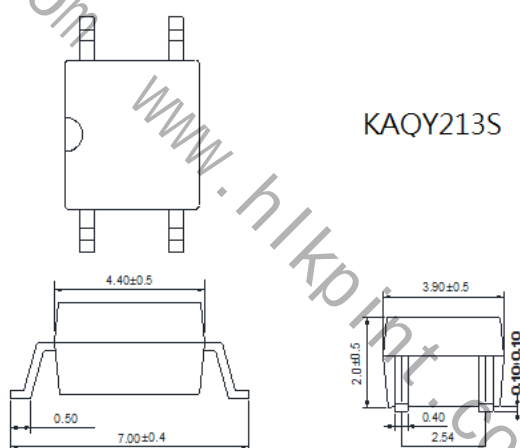
1. Dual-in-line type.



2. Surface mount type.

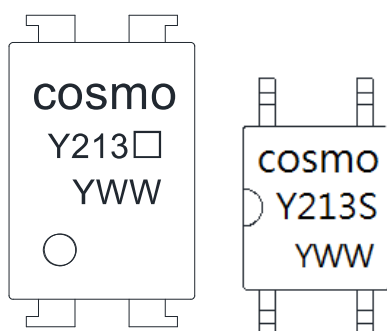


3. Small outline for surface mount type.



TOLERANCE : ±0.2mm

● Device Marking



Notes :

cosmo

Y213□ □(Blank) : DIP or SMD
Y213S S : SOP
YWW Y : Year code / W : Week code

KAQY213 Series

4PIN 250V N.O TYPE

SOLID STATE RELAY-MOSFET Output

● Absolute Maximum Ratings

(Ta=25°C)

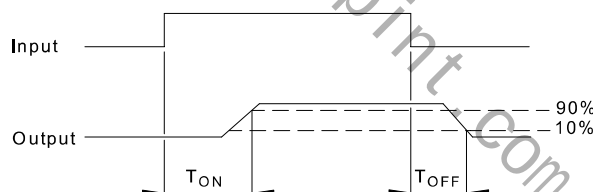
Item	Symbol	Rating	Unit
Input	Continuous forward current	I _F	50
	Peak forward current	I _{FP}	1
	Reverse voltage	V _R	5
	Power dissipation	P _{in}	100
	Derate linearly from 25°C	-	1.3
Output	Breakdown voltage	V _B	250
	Continuous load current	I _L	200
	Power dissipation	P _{out}	500
Isolation voltage		V _{iso}	KAQY213S 1500Vrms
Isolation resistance (Vio=500V)		R _{iso}	KAQY213 5000Vrms
Total power dissipation		P _t	≥ 10 ¹⁰ Ω
Derate linearly from 25°C		-	550
Storage temperature		T _{stg}	2.5
Operating temperature		T _{opr}	mW/°C
Junction temperature		T _j	-40 to +125
Soldering temperature 10 seconds		T _{sot}	-40 to +85
			°C
			°C

● Electro-optical Characteristics

(Ta=25°C)

Parameter	Symbol	Conditions	Min.	Avg.	Max.	Unit
Input	Forward voltage	V _F	I _F =10mA	-	1.2	1.5
	Operation input current	I _{FON}	V _L =20V, I _L =100mA	-	-	3.0
	Recovery input current	I _{FOFF}	V _L =20V, I _L ≤5μA	0.2	-	-
Output	Breakdown voltage	V _B	I _B =50μA	250	-	-
	Off-state leakage current	I _{LEAK}	V _L =250V, I _F =0mA	-	0.2	1.0
I/O capacitance		C _{iso}	V _B =0V, f=1MHz	-	6	-
ON resistance		R _{ON}	I _F =10mA, I _L =100mA	-	8	16
Turn-on time		T _{ON}	I _F =10mA, V _L =20V	-	0.3	1.0
Turn-off time		T _{OFF}	I _L =100mA, t=10ms	-	0.1	1.5

● Turn-on / Turn-off Time

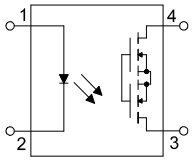
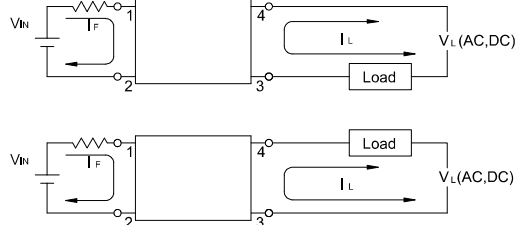


KAQY213 Series

4PIN 250V N.O TYPE

SOLID STATE RELAY-MOSFET Output

● Schematic and Wiring Diagrams

Schematic	Output Configuration	Load	Connection	Wiring Diagrams
	1a	AC DC		

KAQY213 Series

4PIN 250V N.O TYPE
SOLID STATE RELAY-MOSFET Output

Fig.1 Load Current vs. Ambient Temperature

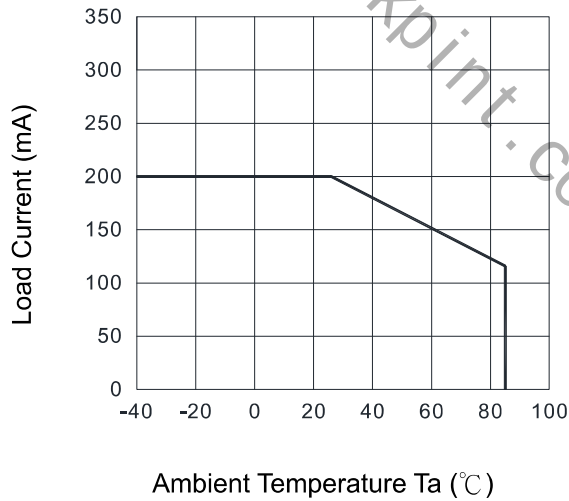


Fig.2 On Resistance vs. Ambient Temperature

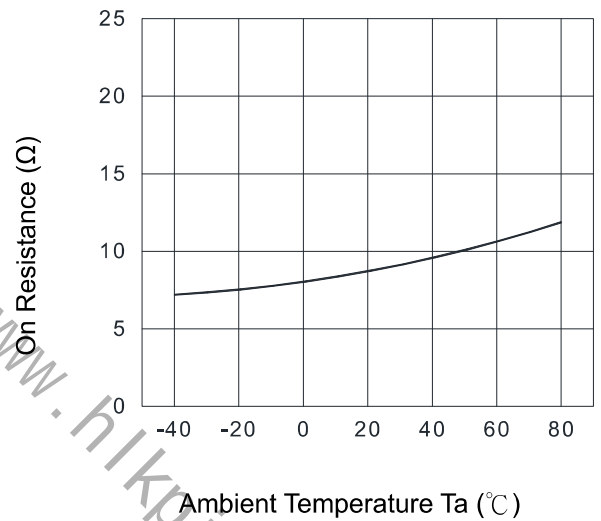


Fig.3 Turn-on Time vs. Ambient Temperature

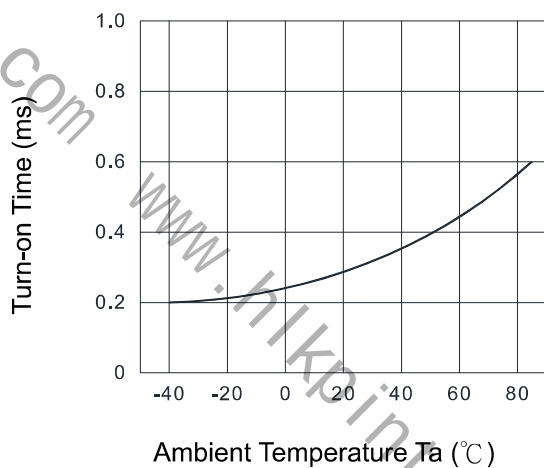


Fig.4 Turn-off Time vs. Ambient Temperature

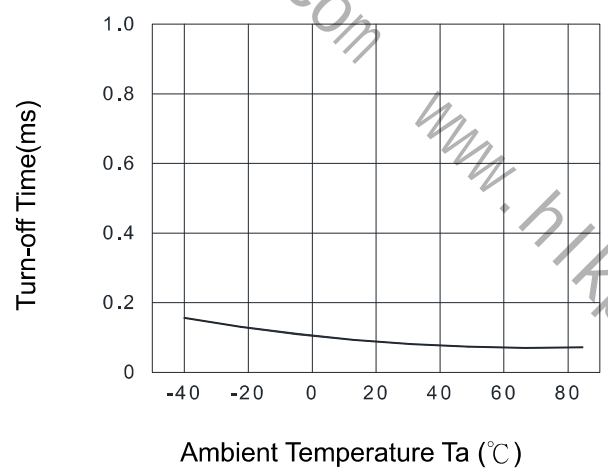


Fig.5 LED Operate Current vs. Ambient Temperature

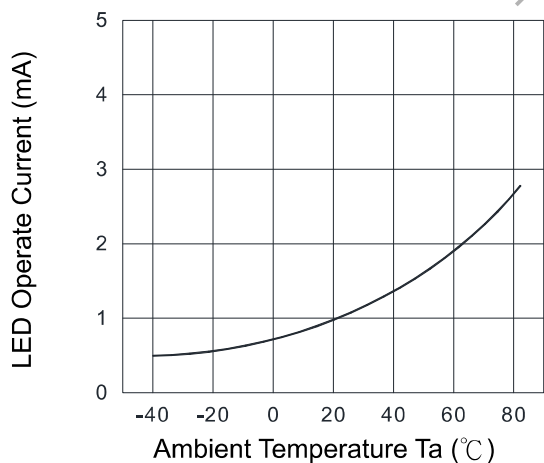
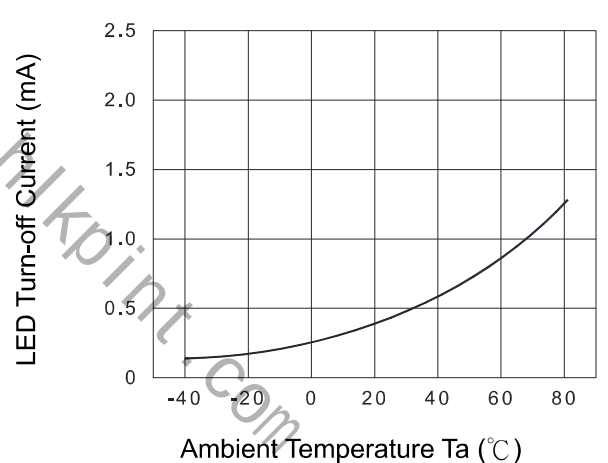


Fig.6 LED Turn-off Current vs. Ambient Temperature



KAQY213 Series

4PIN 250V N.O TYPE

SOLID STATE RELAY-MOSFET Output

Fig.7 LED Dropout Voltage vs. Ambient Temperature

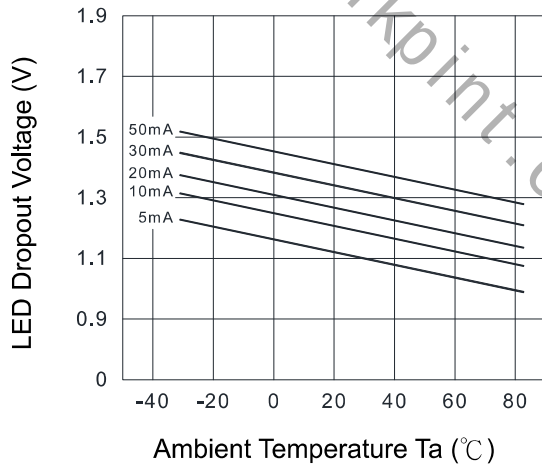


Fig.8 Voltage vs. Current Characteristics of Output at MOSFET Portion

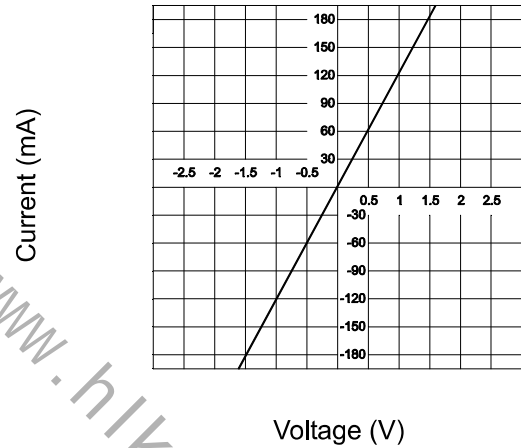


Fig.9 Turn-on Time vs. LED Forward Current

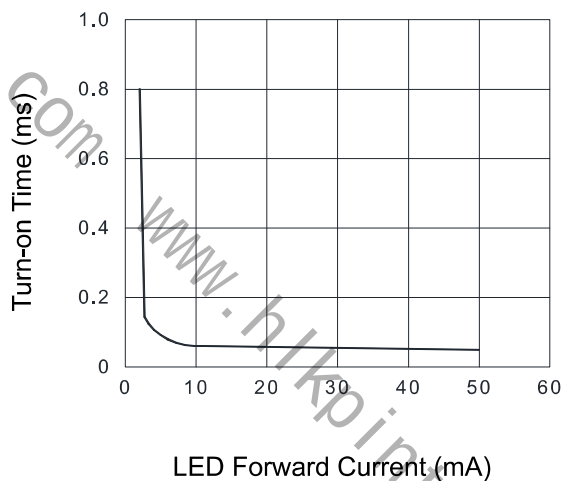


Fig.10 Off-state Leakage Current vs. Load Voltage

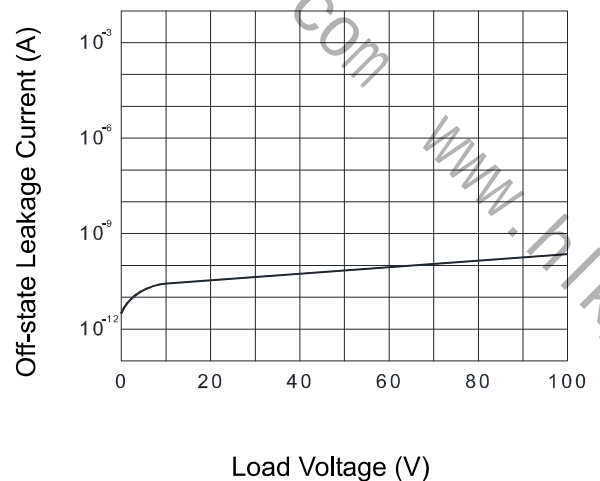


Fig.11 Turn-off Time vs. LED Forward Current

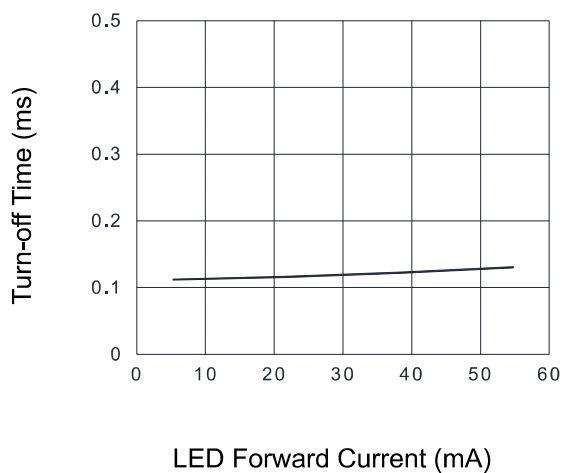
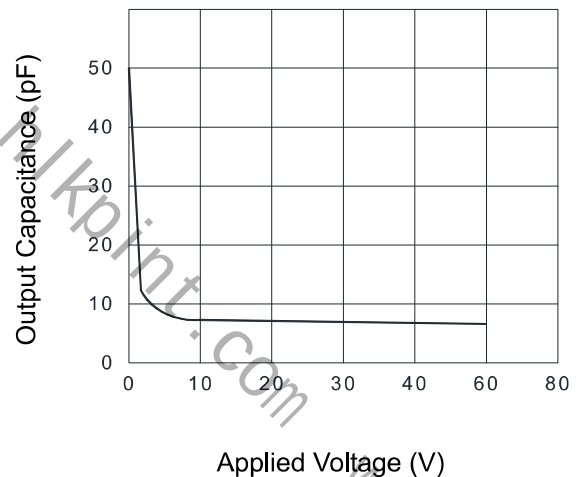


Fig.12 Output Capacitance vs. Applied Voltage



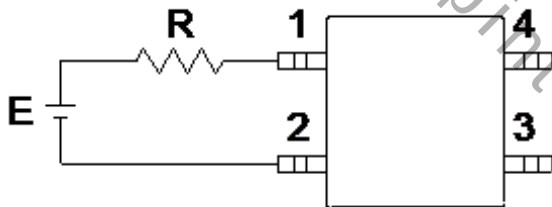
KAQY213 Series

4PIN 250V N.O TYPE

SOLID STATE RELAY-MOSFET Output

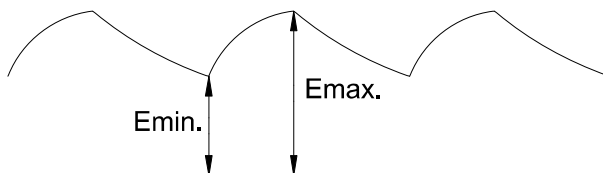
● Using Methods

Examples of resistance value to control LED forward current ($I_F=5\text{mA}$)

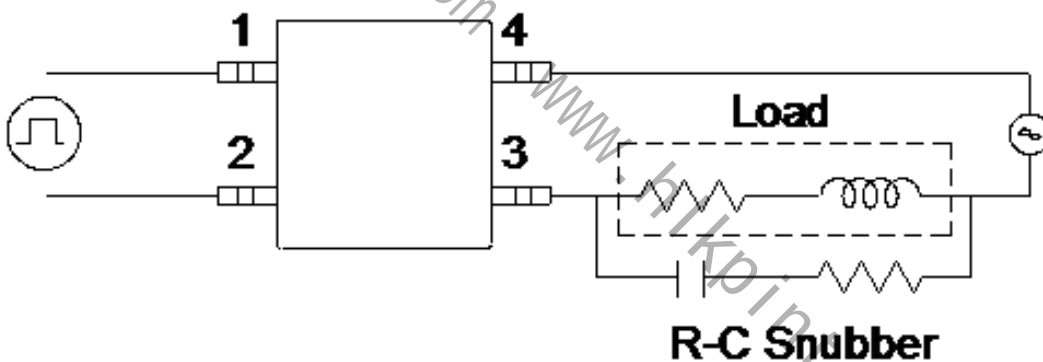
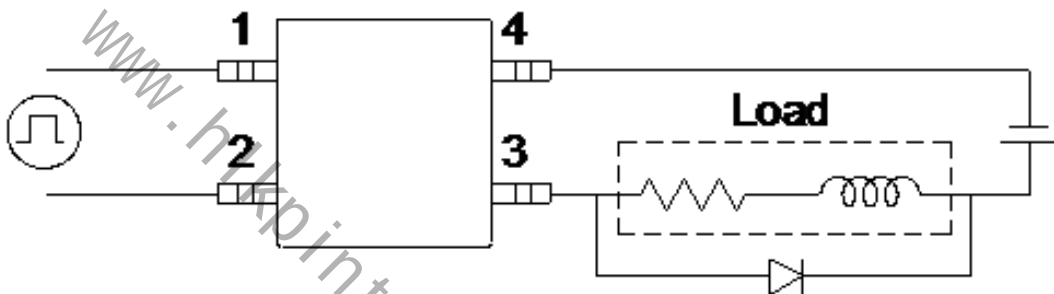


E	R
3.3V	Approx. 330 Ω
5V	Approx. 640 Ω
12V	Approx. 1.9K Ω
15V	Approx. 2.5K Ω
24V	Approx. 4.1K Ω

1. LED forward current must be more than 5mA , 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 :

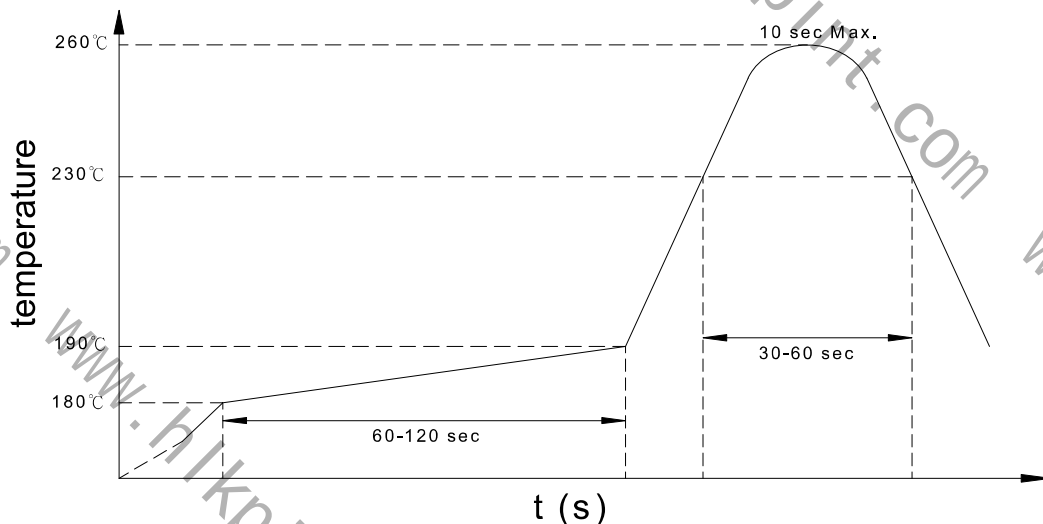


● **Recommended Soldering Conditions**

(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 : | Two |
| ■ Flux : | Rosin flux containing small amount of chlorine
(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. |

KAQY213 Series

4PIN 250V N.O TYPE

SOLID STATE RELAY-MOSFET Output

● Numbering System

KAQY213 X (Y)

Note :

KAQY213 = Part No.

X = Lead form option (blank 、 S or A)

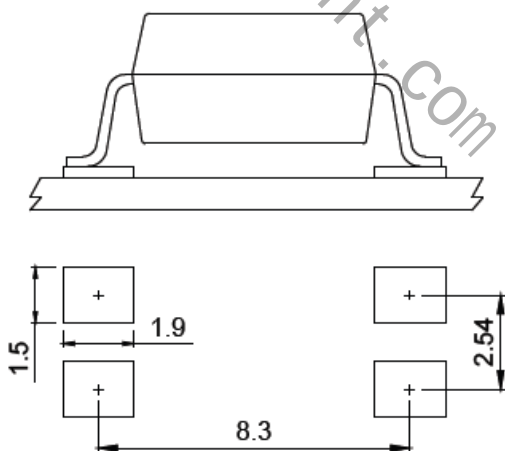
Y = Tape and reel option (TLD 、 TRU)

Option	Description	Packing quantity
A (TLD)	surface mount type package + TLD tape & reel option	2000 units per reel
A (TRU)	surface mount type package + TRU tape & reel option	2000 units per reel
S (TLD)	small outline for surface mount type package + TLD tape & reel option	3000 units per reel
S (TRU)	small outline for surface mount type package + TRU tape & reel option	3000 units per reel

● Recommended Pad Layout for Surface Mount Lead Form

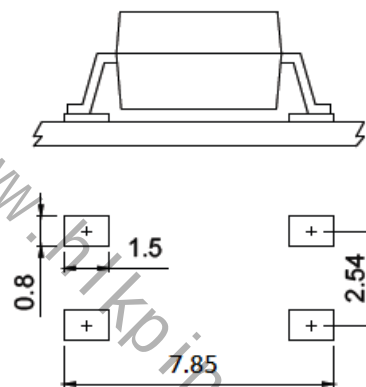
1. Surface mount type.

4-pin SMD



2. Small outline for surface mount type.

4-pin SOP



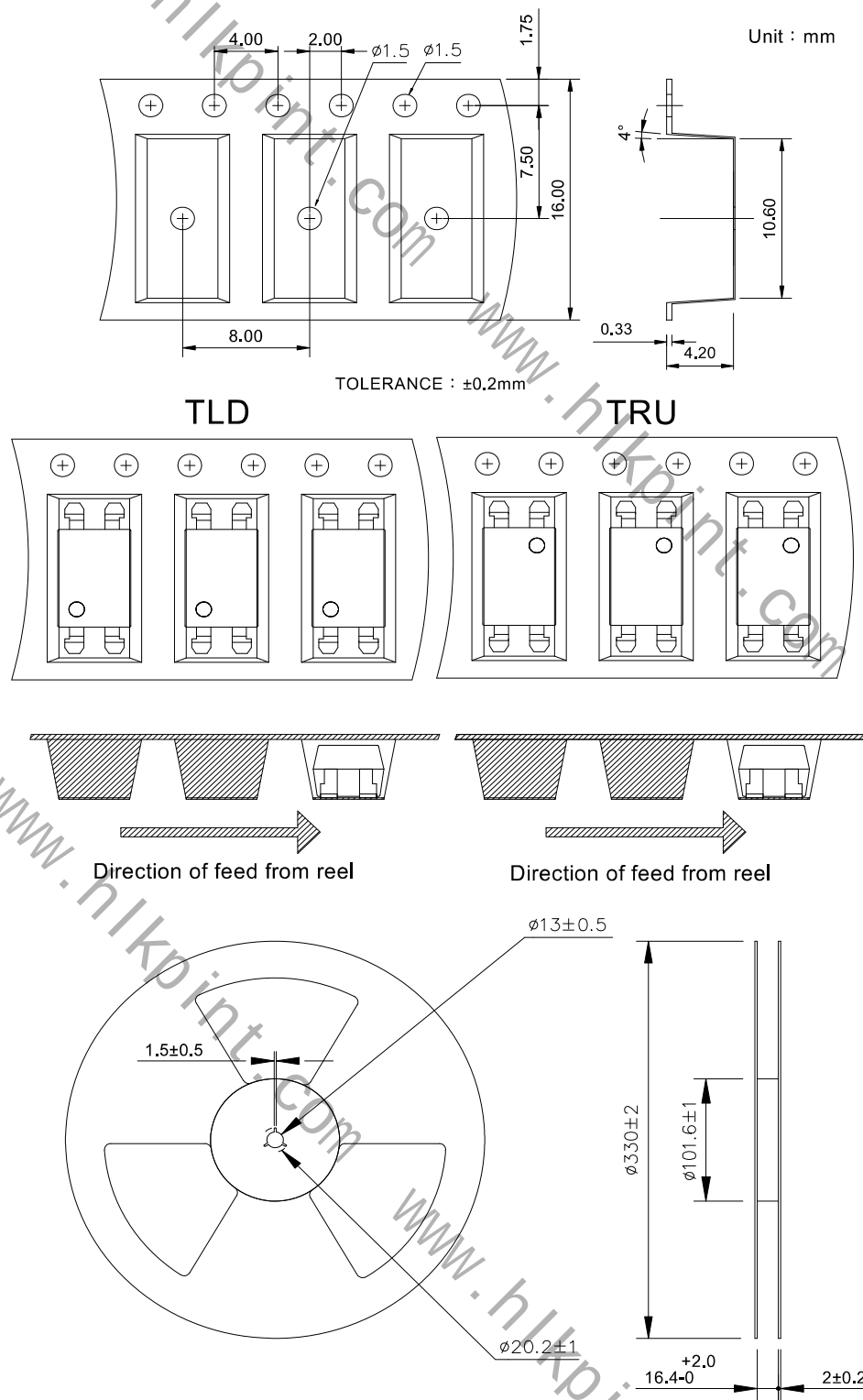
Unit : mm

KAQY213 Series

4PIN 250V N.O TYPE

SOLID STATE RELAY-MOSFET Output

● 4-pin SMD Carrier Tape & Reel



KAQY213 Series

4PIN 250V N.O TYPE

SOLID STATE RELAY-MOSFET Output

● 4-pin SOP Carrier Tape & Reel

