

KAQY212 Series

4PIN 60V N.O TYPE
SOLID STATE RELAY-MOSFET OUTPUT

● Description

The KAQY212 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.

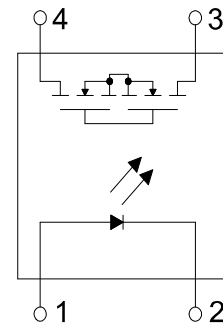
● Features

1. Normally open, single pole single throw
2. Control 60V AC or DC voltage
3. Switch 400mA 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. E108430): UL508
 - c-UL Approved (No. E108430)
 - FIMKO Approved: EN62368-1, EN60601-1
 - VDE Approved (No. 40053989): EN60747-5-5

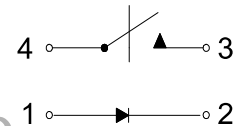
● Application

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

● Schematic



1 FORM A
NORMALLY OPEN



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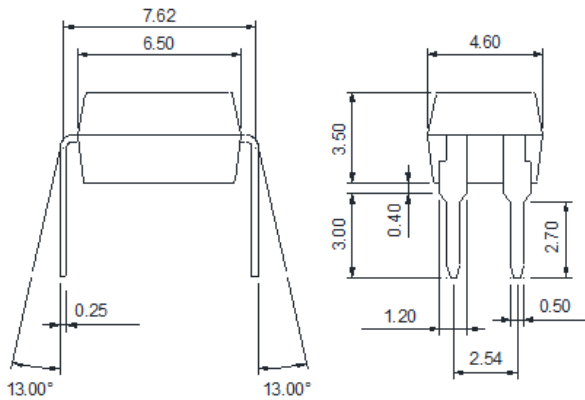
● Outside Dimension

Unit : mm

1. Dual-in-line type.



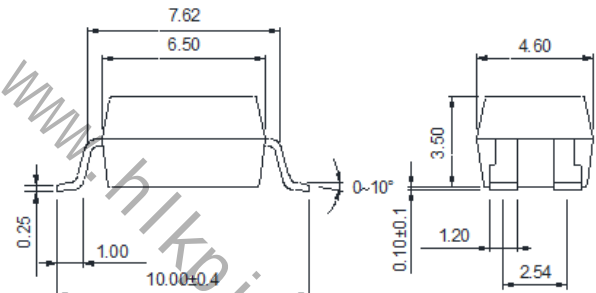
KAQY212



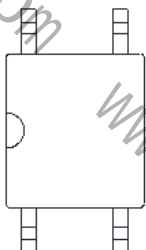
2. Surface mount type.



KAQY212A



3. Small outline for surface mount type.

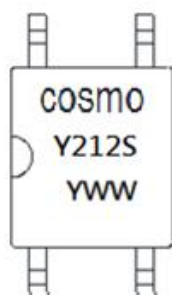


KAQY212S



TOLERANCE : ±0.2mm

● Device Marking



Notes :

COSMO

Y212 ☐ (Blank) : DIP or SMD

Y212S S : SOP

YWW Y : Year code / W : Week code

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● Absolute Maximum Ratings

(Ta=25°C)

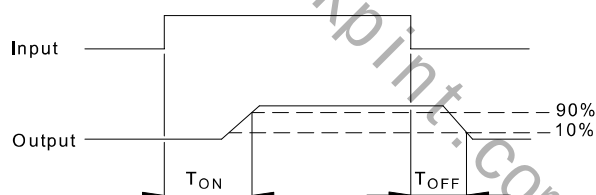
Item	Symbol	Rating	Unit
Input	Continuous forward current	I _F	50 mA
	Peak forward current	I _{FP}	1 A
	Reverse voltage	V _R	5 V
	Power dissipation	P _{in}	100 mW
	Derate linearly from 25°C	-	1.3 mW/°C
Output	Breakdown voltage	V _B	60 V
	Continuous load current	I _L	400 mA
	Power dissipation	P _{out}	500 mW
Isolation voltage		V _{iso}	KAQY212S 1500Vrms
			KAQY212 5000Vrms
Isolation resistance (Vio=500V)		R _{iso}	≥ 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	-	-	3.0 mA
	Recovery input current	I _{FOFF}	V _L =20V, I _L ≤5μA	0.2	-	- mA
Output	Breakdown voltage	V _B	I _B =50μA	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	-	0.83	2.5 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	1.5 ms

● Turn-on / Turn-off Time

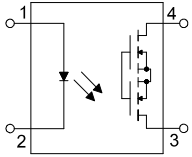
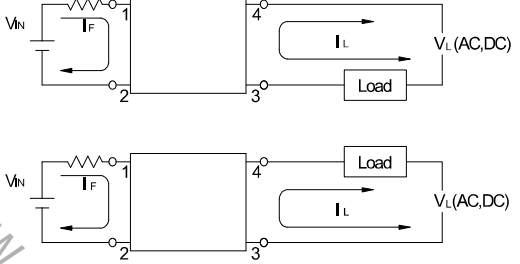


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4PIN 60V N.O TYPE

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● Schematic and Wiring Diagrams

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

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4PIN 60V N.O TYPE

SOLID STATE RELAY-MOSFET OUTPUT

Fig.1 Load Current vs. Ambient Temperature

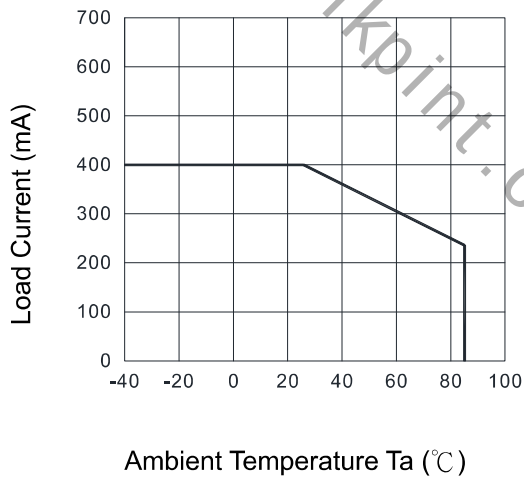


Fig.2 On Resistance vs. Ambient Temperature

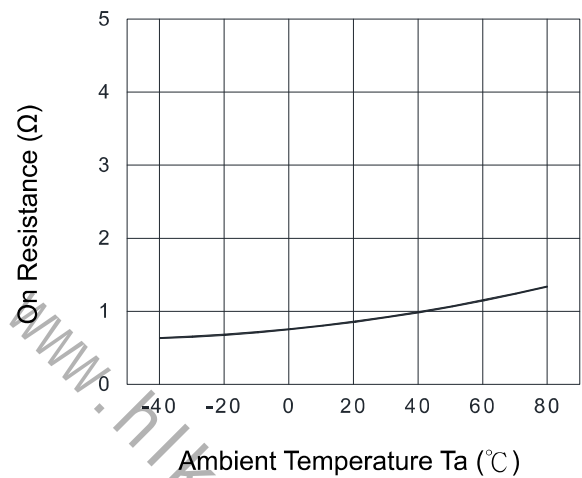


Fig.3 Turn-on Time vs. Ambient Temperature

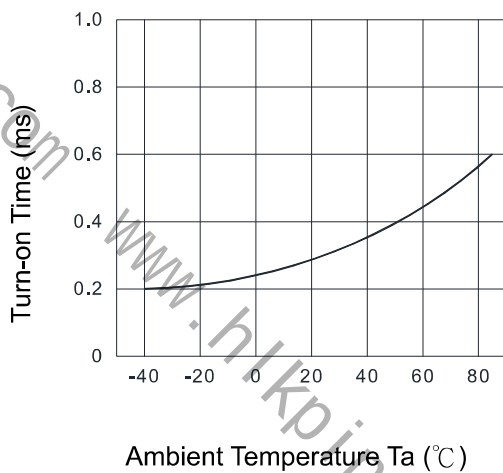


Fig.4 Turn-off Time vs. Ambient Temperature

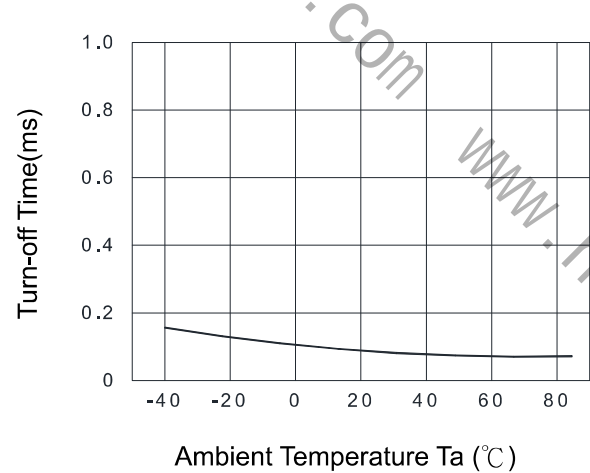


Fig.5 LED Operate Current vs. Ambient Temperature

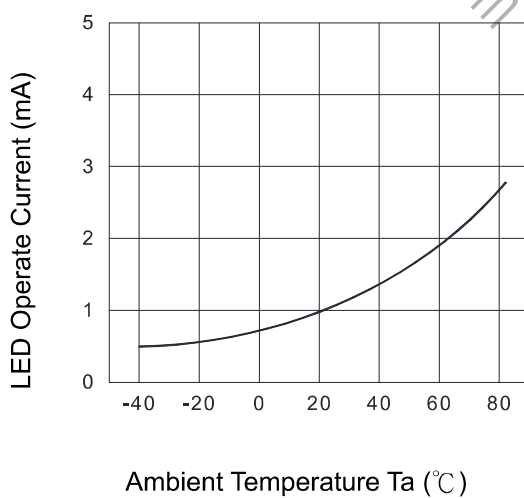
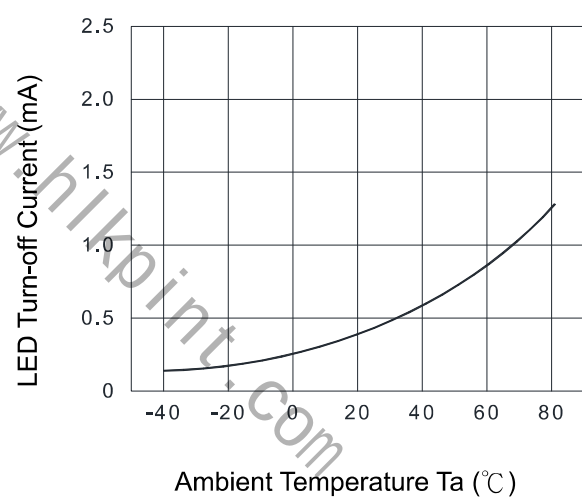


Fig.6 LED Turn-off Current vs. Ambient Temperature



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Fig.7 LED Dropout Voltage vs. Ambient Temperature

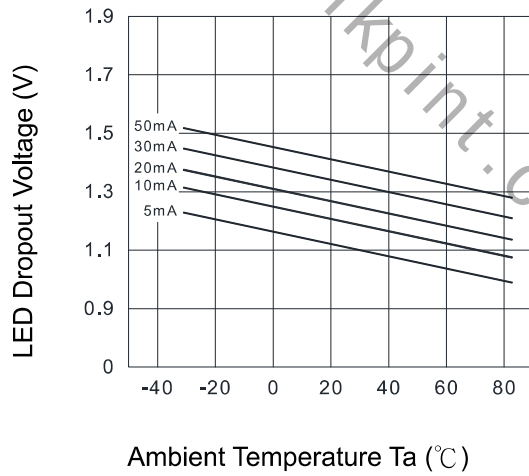


Fig.8 Voltage vs. Current Characteristics of Output at MOSFET Portion

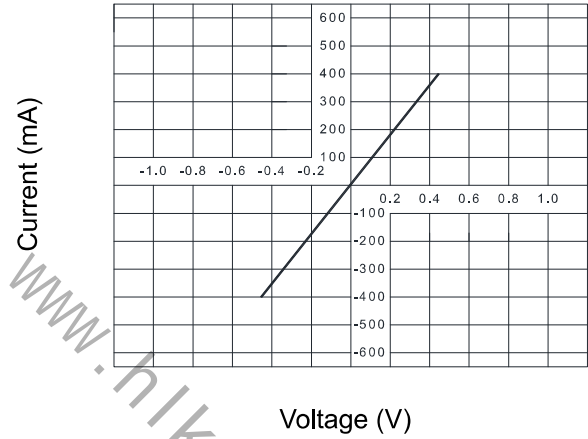


Fig.9 Turn-on Time vs. LED Forward Current

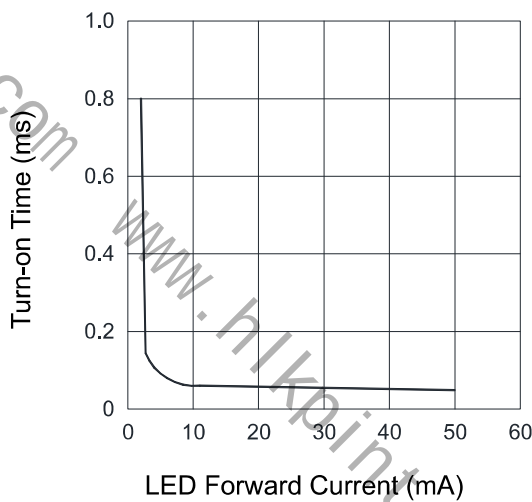


Fig.10 Off-state Leakage Current vs. Load Voltage

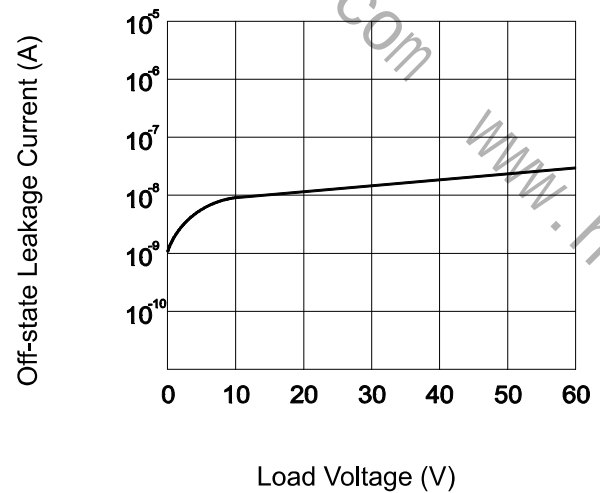


Fig.11 Turn-off Time vs. LED Forward Current

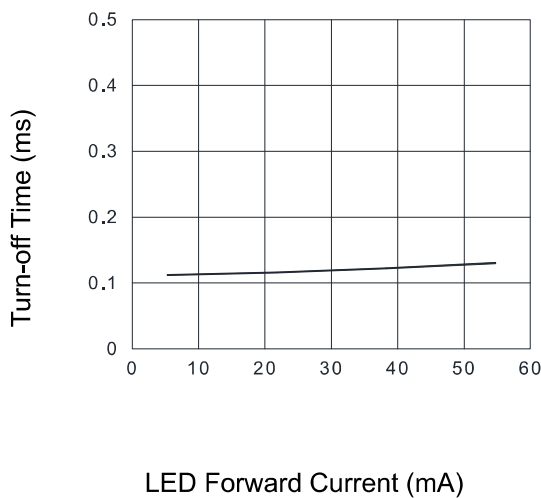
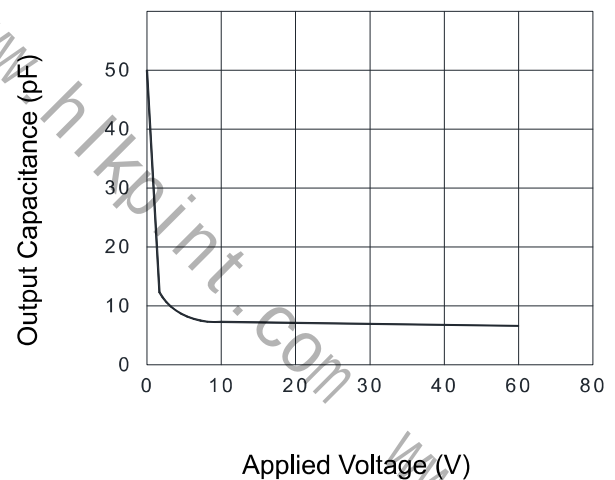


Fig.12 Output Capacitance vs. Applied Voltage



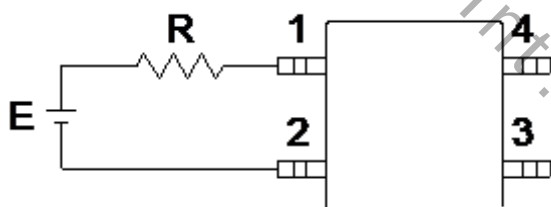
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4PIN 60V N.O TYPE

SOLID STATE RELAY-MOSFET OUTPUT

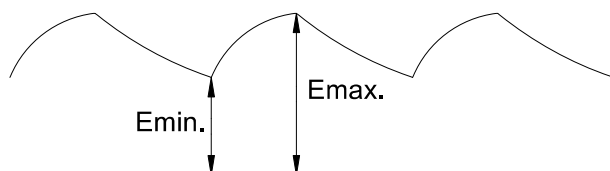
● Using Methods

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

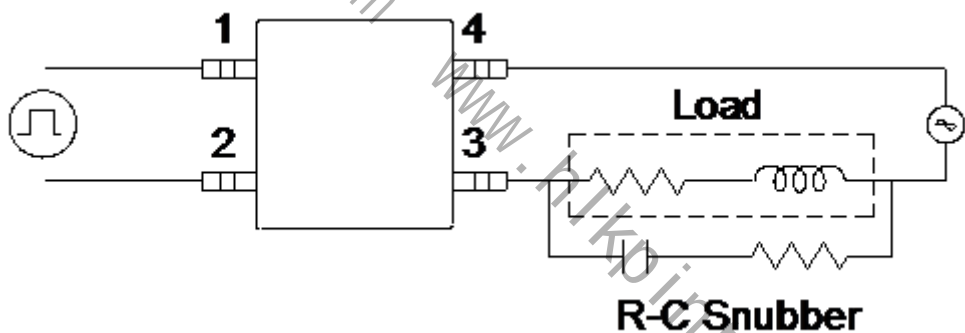
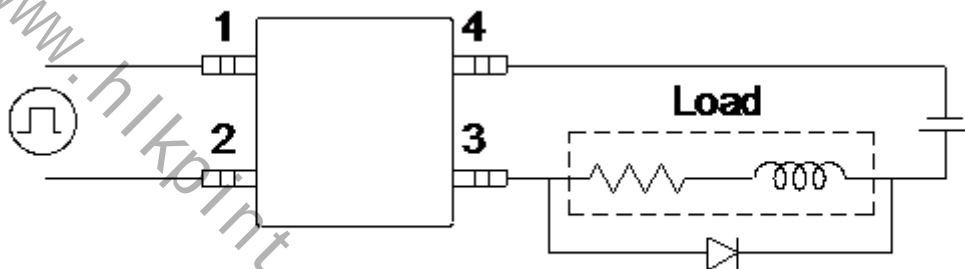


E	R
3.3V	Approx. 330 Ω
5V	Approx. 640 Ω
12V	Approx. 1.9K Ω
15V	Approx. 2.5K Ω
24V	Approx. 4.1K Ω

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 :



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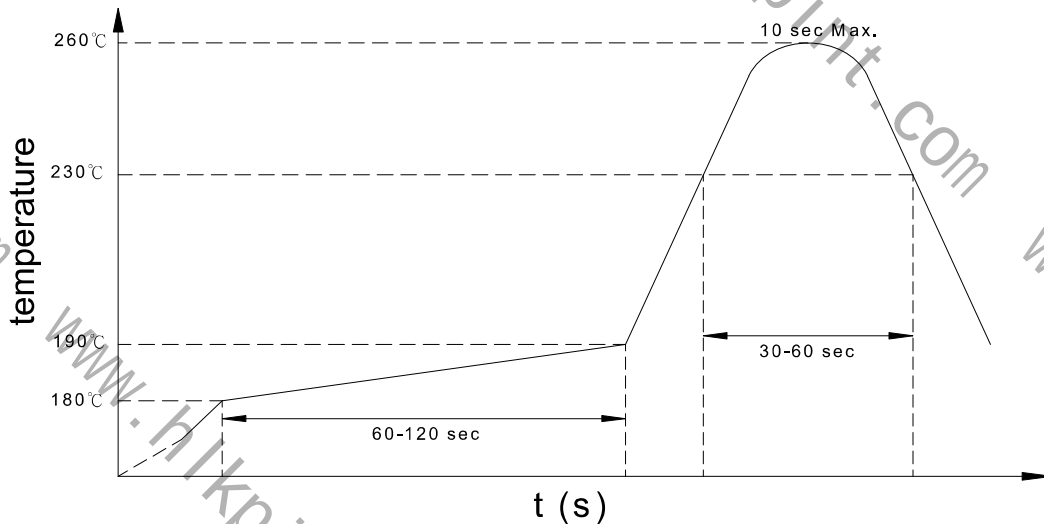
SOLID STATE RELAY-MOSFET OUTPUT

● 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.

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SOLID STATE RELAY-MOSFET OUTPUT

● Numbering System

KAQY212 X (Y)

Note :

KAQY212 = Part No.

X = Lead form option (blank 、 S or A)

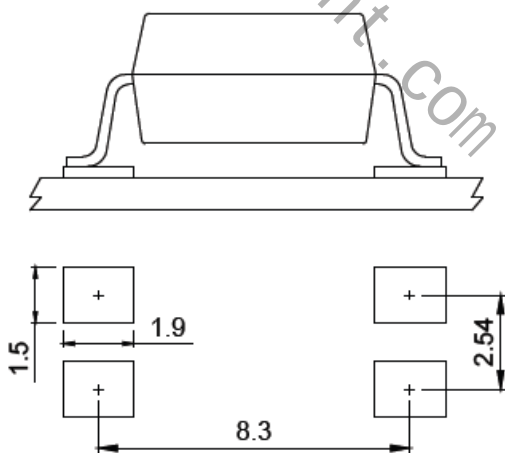
Y = Tape and reel option (TLD 、 TRU)

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

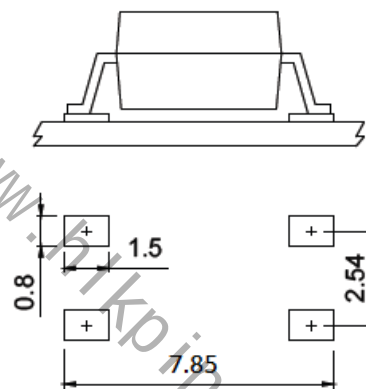
1. Surface mount type.

4-pin SMD



2. Small outline for surface mount type.

4-pin SOP



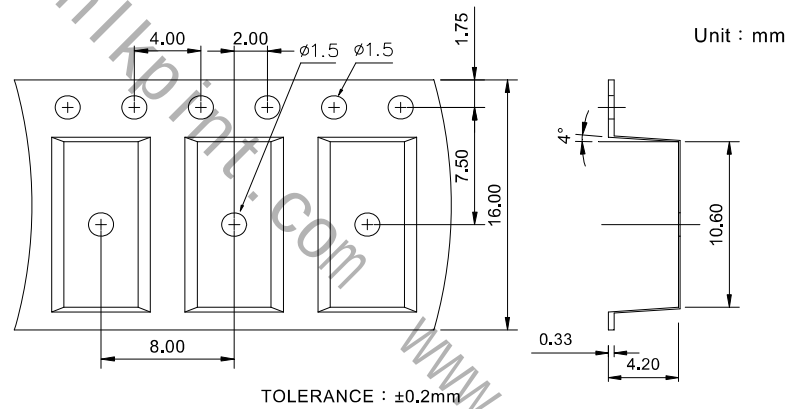
Unit : mm

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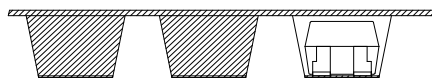
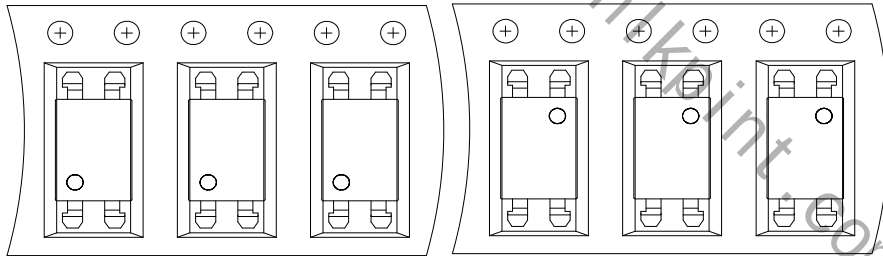
SOLID STATE RELAY-MOSFET OUTPUT

● 4-pin SMD Carrier Tape & Reel

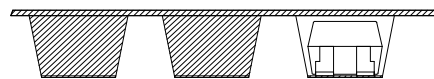


TLD

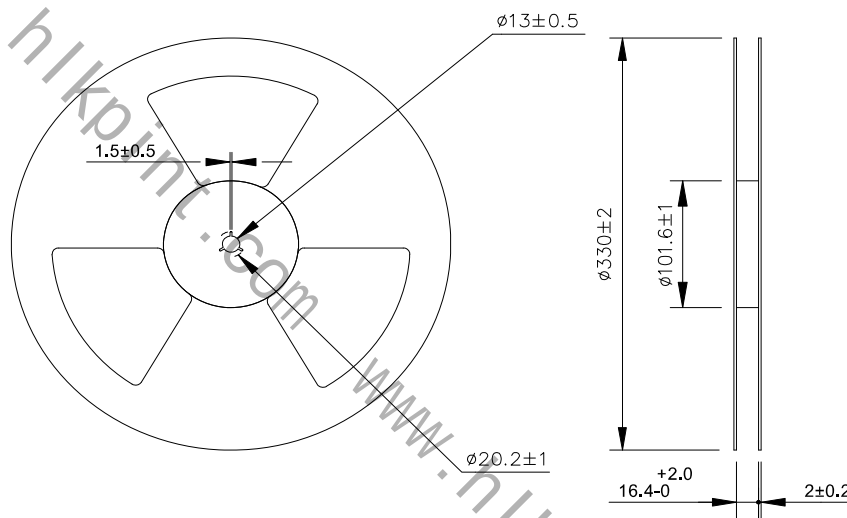
TRU



Direction of feed from reel



Direction of feed from reel



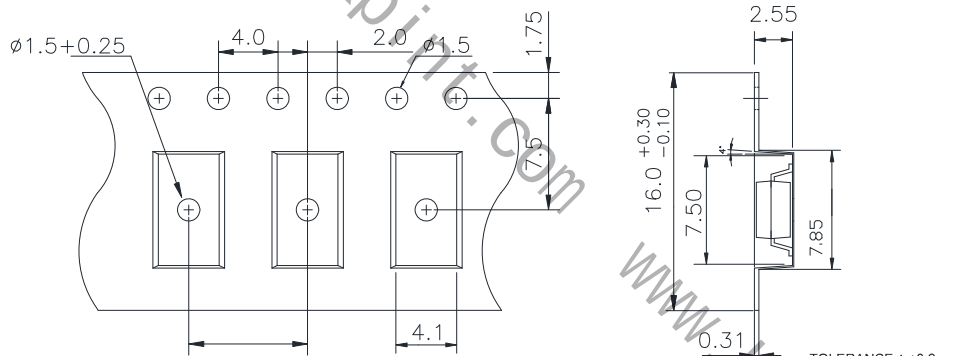
KAQY212 Series

4PIN 60V N.O TYPE

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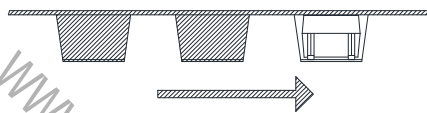
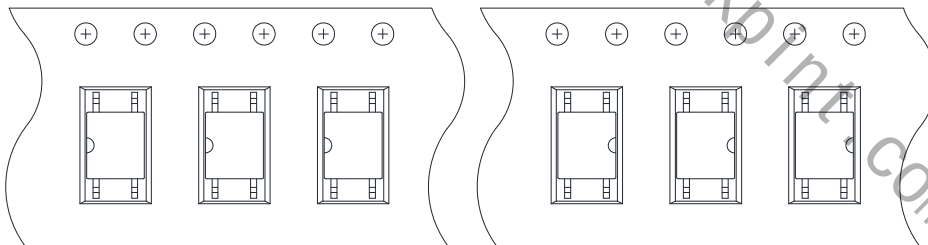
● 4-pin SOP Carrier Tape & Reel

Unit: mm

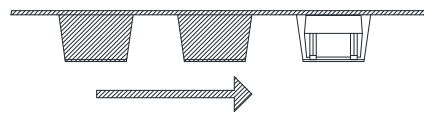


TLD

TRU



Direction of feed from reel



Direction of feed from reel

