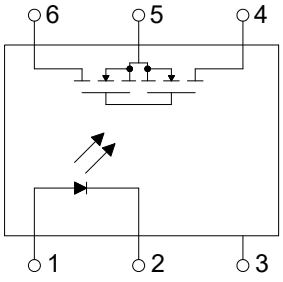
KAQV212 Series

6PIN 60V N.O TYPE
SOLID STATE RELAY-MOSFET OUTPUT

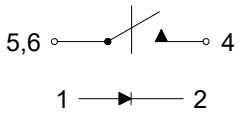
Description

The KAQV212 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 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

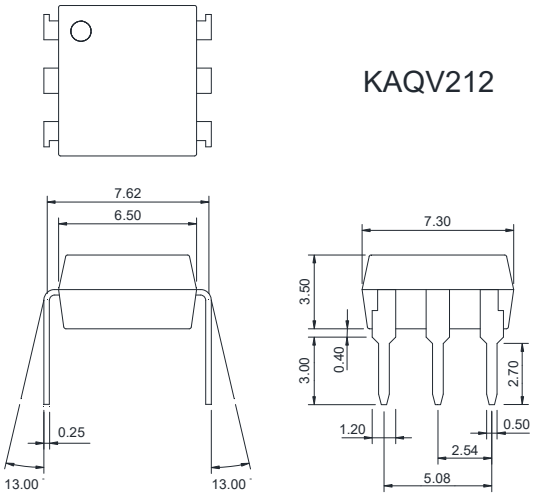
Application

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

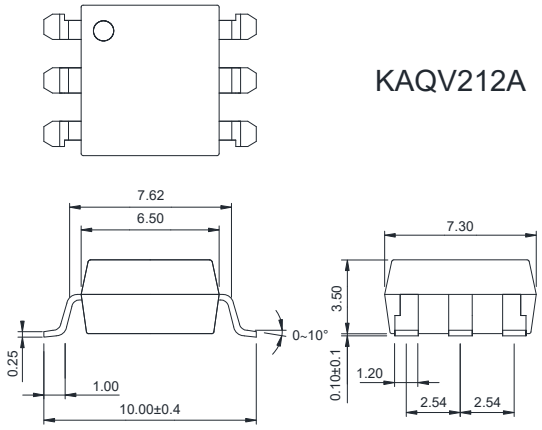
● Outside Dimension

Unit：mm

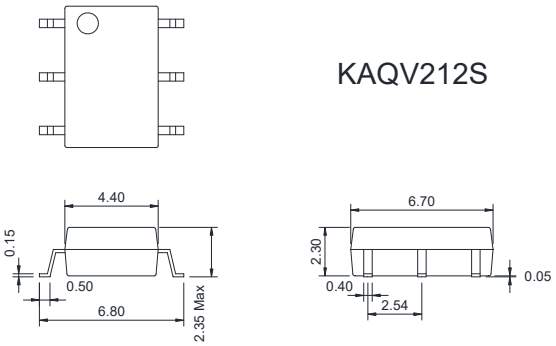
1. Dual-in-line type.



2. Surface mount type.

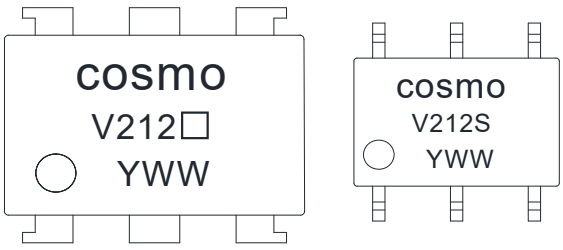


3. Small outline for surface mount type.



TOLERANCE：±0.2mm

● Device Marking



Notes：

cosmo

V212□	□(Blank): DIP or SMD
V212S	S：SOP
YWW	Y：Year code / W：Week code

● Absolute Maximum Ratings

(Ta=25℃)

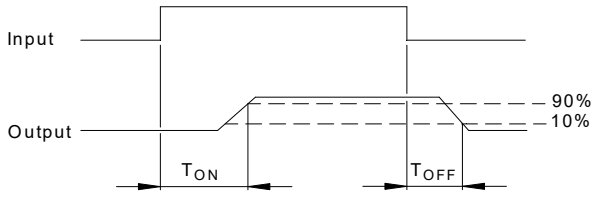
Parameter		Symbol	Rating	Unit
Input	Continuous forward current	I_F	50	mA
	Peak forward current	I_{FP}	1	A
	Reverse voltage	V_R	5	V
	Power dissipation	P_{in}	100	mW
	Derate linearly from 25℃	-	1.3m	mW/℃
Output	Breakdown voltage	V_B	60	V
	Continuous load current	I_L	400	mA
	Power dissipation	P_{out}	500	mW
Isolation voltage		V_{iso}	**KAQV212S**	**KAQV212**
			1500Vrms	5000Vrms
Isolation resistance (Vio=500V)		R_{iso}	$\geqq 10^{10}$	Ω
Total power dissipation		P_t	550	mW
Derate linearly from 25℃		-	2.5m	mW/℃
Operating temperature		T_{opr}	-40 to +85	℃
Storage temperature		T_{stg}	-40 to +125	℃
Junction temperature		T_j	100	℃
Soldering temperature 10 seconds		T_{sot}	260	℃

● Electro-optical Characteristics

(Ta=25℃)

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 \leqq$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	connection	A	R_{ON}	I_F=10mA, I_L=100mA	-	0.83	2.50	Ω
		B			-	0.44	1.25	
		C			-	0.25	0.63	
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



● Schematic and Wiring Diagrams

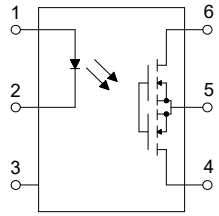
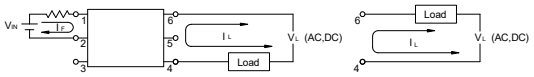
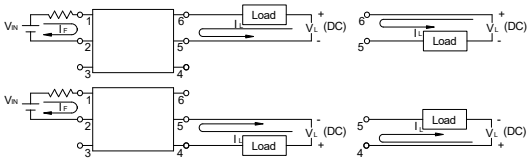
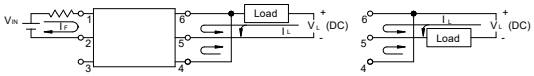
Schematic	Output Configuration	Load	Connection	Wiring Diagrams
	1a	AC DC	A	
		DC	B	
		DC	C	

Fig.1 Load Current vs. Ambient Temperature

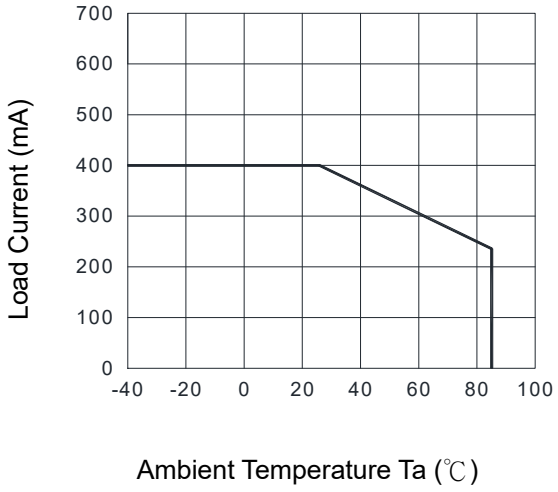


Fig.2 On Resistance vs. Ambient Temperature

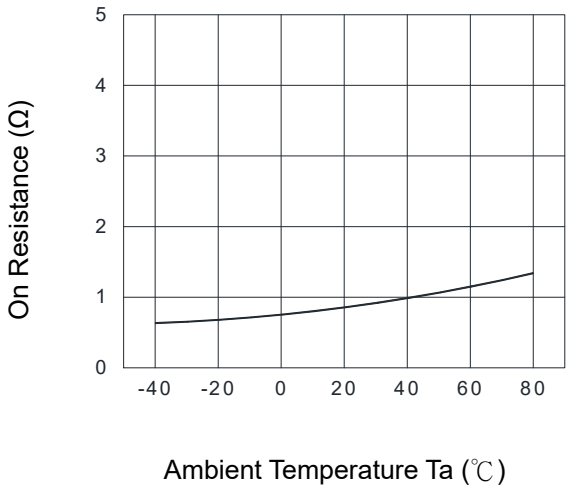


Fig.3 Turn-on Time vs. Ambient Temperature

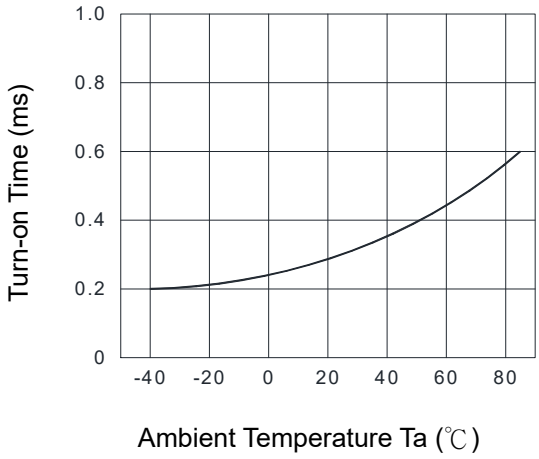


Fig.4 Turn-off Time vs. Ambient Temperature

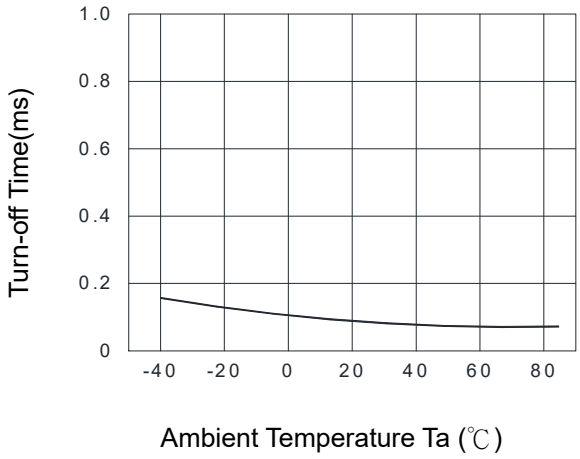


Fig.5 LED Operate Current vs. Ambient Temperature

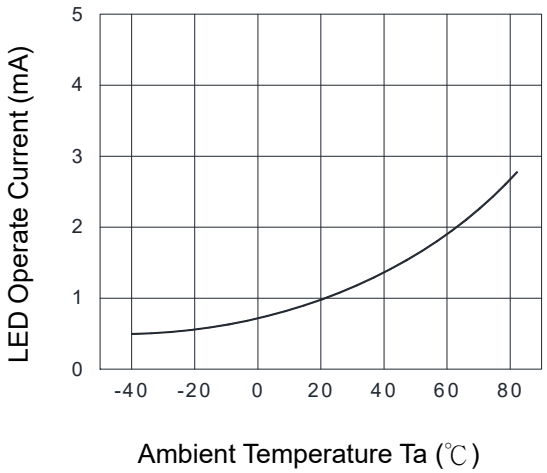


Fig.6 LED Turn-off Current vs. Ambient Temperature

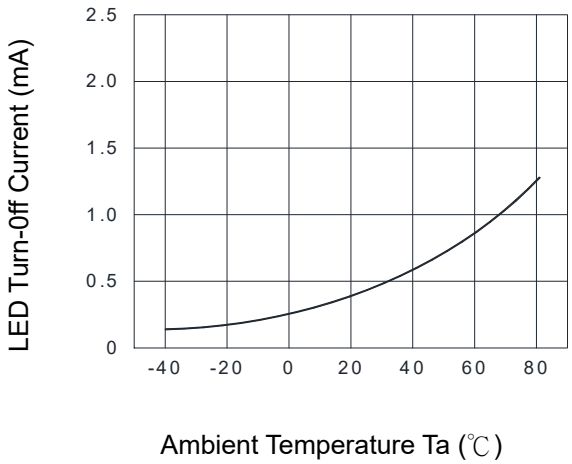


Fig.7 LED Dropout Voltage vs. Ambient Temperature

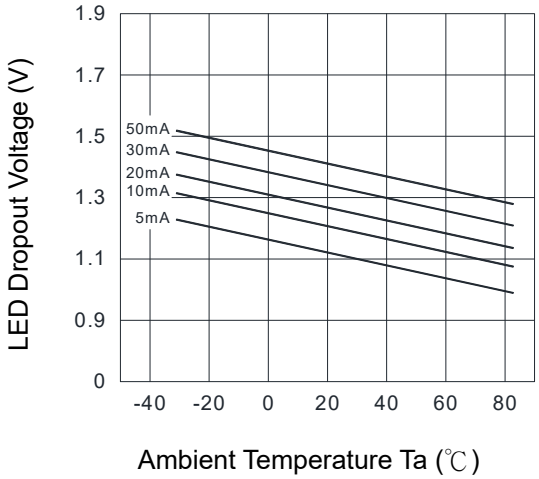


Fig.8 Voltage vs. Current Characteristics of Output at MOSFET Portion

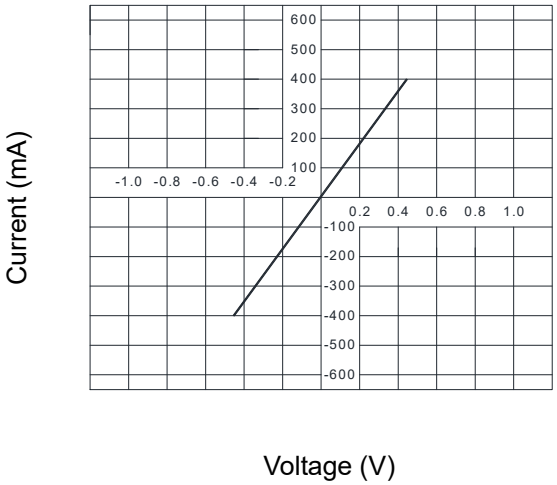


Fig.9 Turn-on Time vs. LED Forward Current

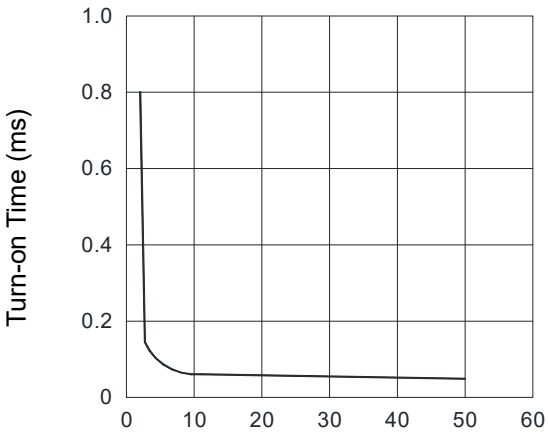


Fig.10 Off-state Leakage Current vs. Load Voltage

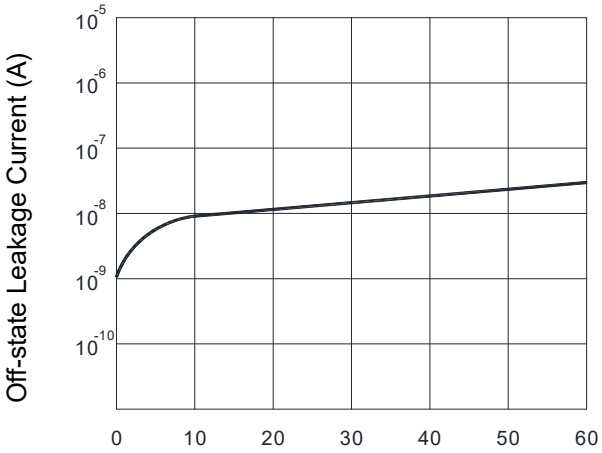


Fig.11 Turn-off Time vs. LED Forward Current

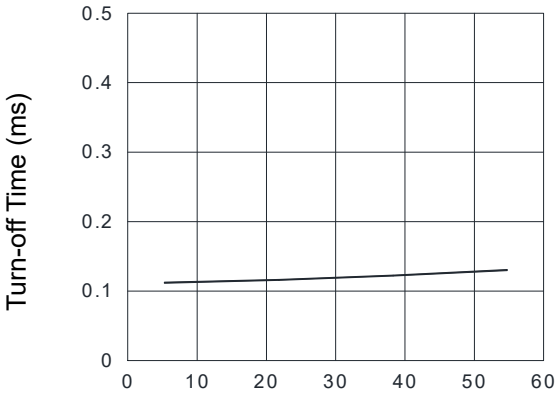
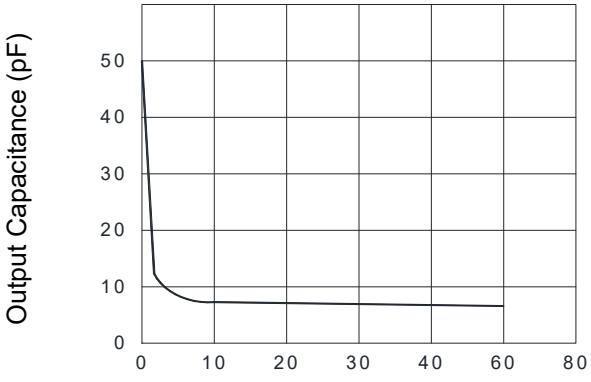
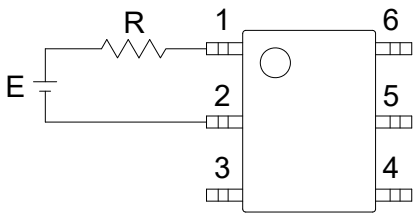


Fig.12 Output Capacitance vs. Applied Voltage



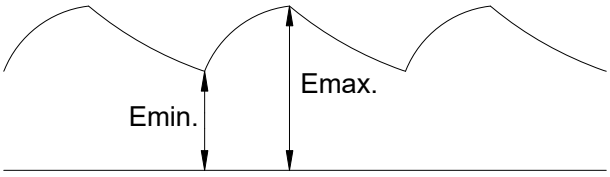
Using Methods

Examples of resistance value to control LED forward current (I_F=5mA)

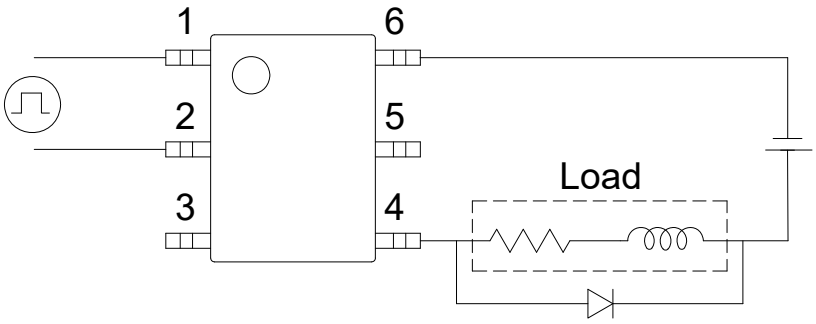


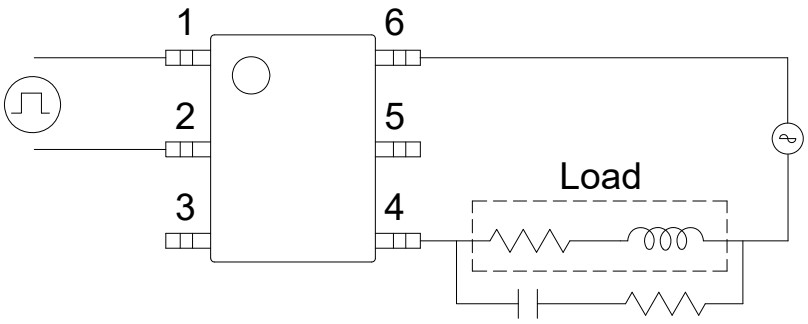
E	R
3.3V	Approx. 330 Ω
5V	Approx. 640 Ω
12V	Approx. 1.9K Ω
15V	Approx. 2.5K Ω
24V	Approx. 4.1K Ω

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：





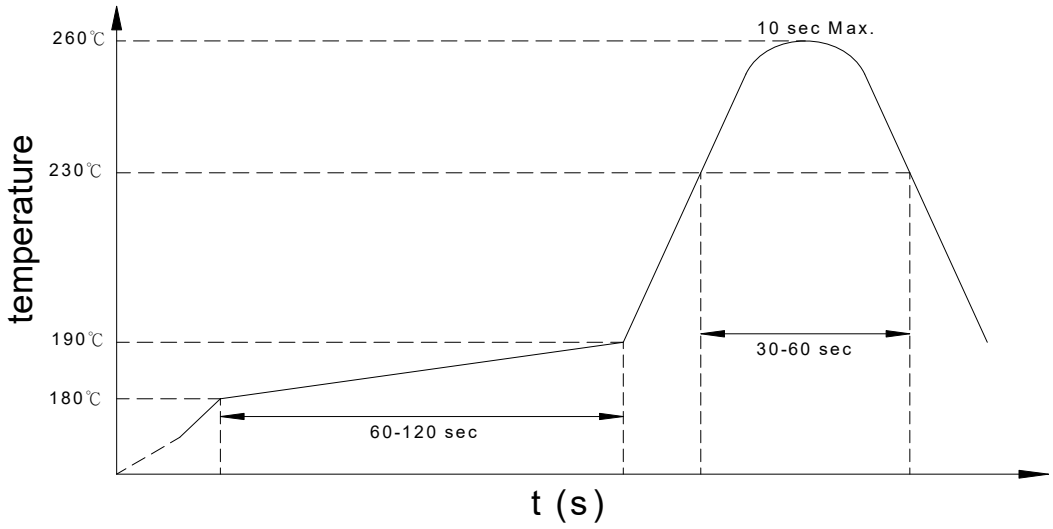
R-C Snubber

● Recommended Soldering Conditions

(a) Infrared reflow soldering：

- ■ Peak reflow soldering： 260℃ or below (package surface temperature)
- ■ Time of peak reflow temperature: 10 sec
- ■ Time of temperature higher than 230℃： 30-60 sec
- ■ Time to preheat temperature from 180~190℃： 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℃ or below (molten solder temperature)
- ■ Time： 10 seconds or less
- ■ Preheating conditions: 120℃ 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**

KAQV212 X (Y)

Notes:

KAQV212 = Part No.

X = Lead form option (blank、S or A)

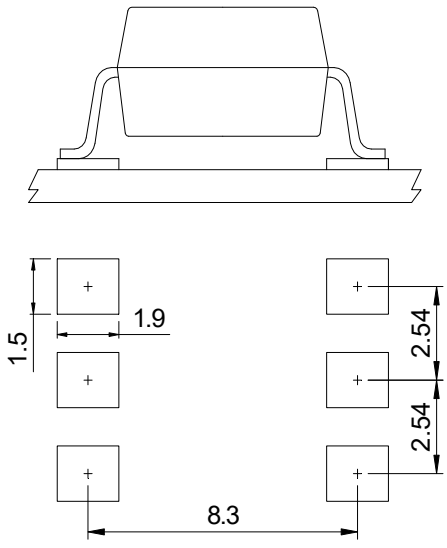
Y = Tape and reel option (TL、TR)

Option	Description	Packing quantity
A (TL)	surface mount type package + TL tape & reel option	1000 units per reel
A (TR)	surface mount type package + TR tape & reel option	1000 units per reel
S (TL)	small outline for surface mount type package + TL tape & reel option	2000 units per reel
S (TR)	small outline for surface mount type package + TR tape & reel option	2000 units per reel

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

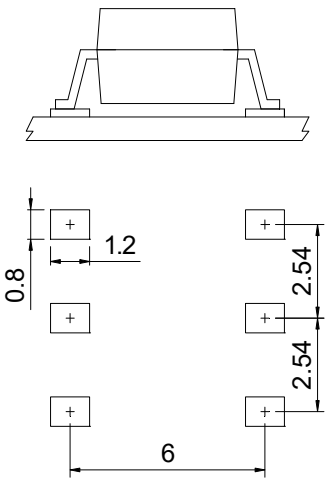
1. Surface mount type.

6-pin SMD



2. Small outline for surface mount type.

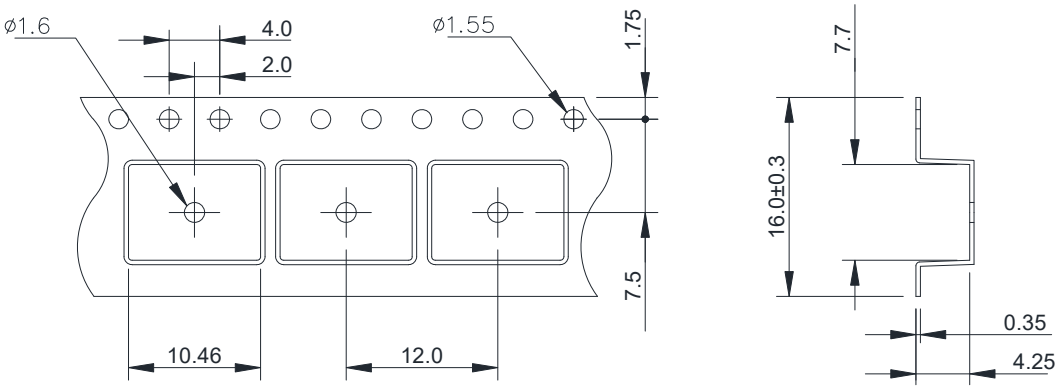
6-pin SOP



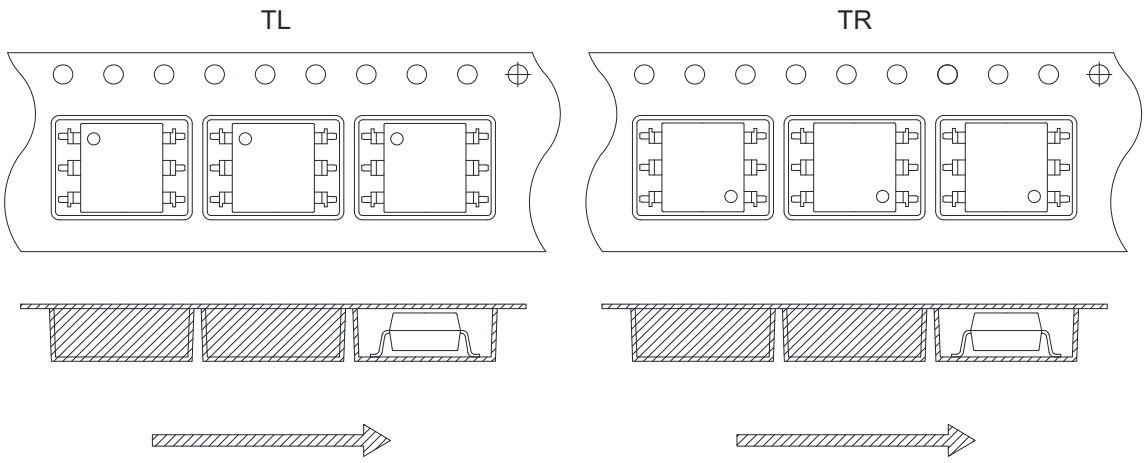
Unit：mm

● 6-pin SMD Carrier Tape & Reel

Unit：mm

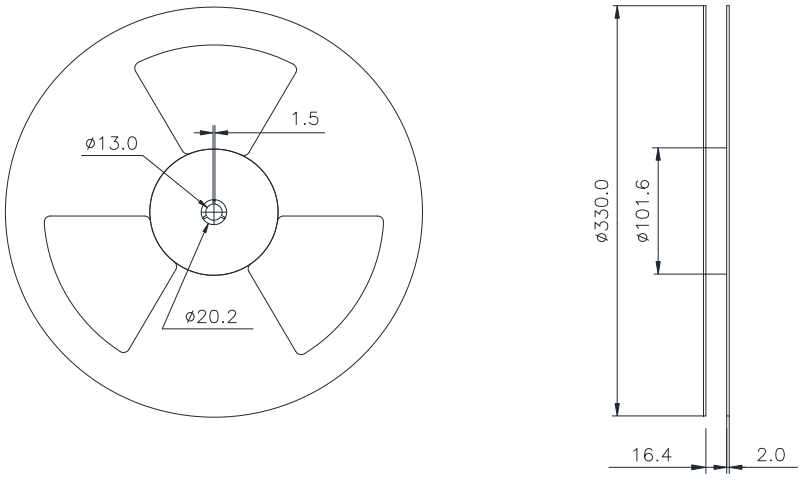


TOLERANCE：±0.2mm



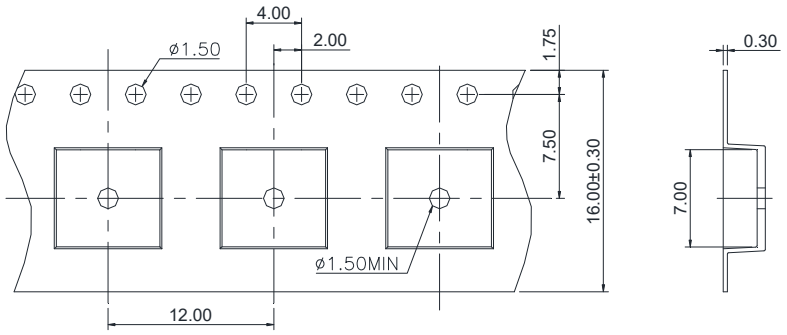
Direction of feed from reel

Direction of feed from reel



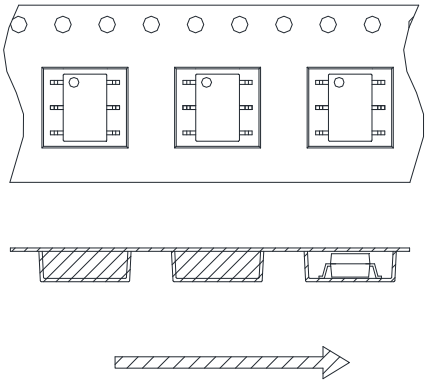
● 6-pin SOP Carrier Tape & Reel

Unit：mm



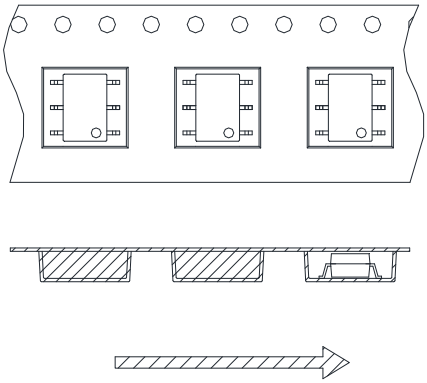
TOLERANCE：±0.2mm

TL

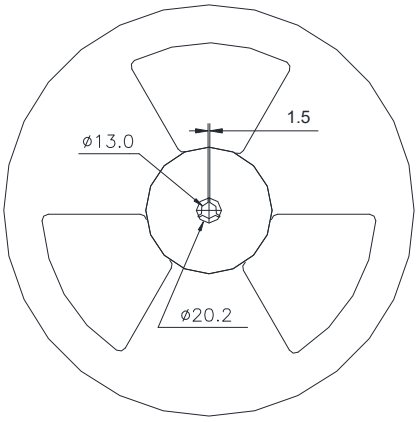


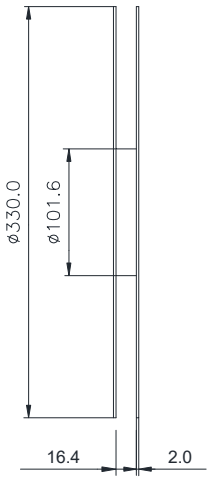
Direction of feed from reel

TR



Direction of feed from reel





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