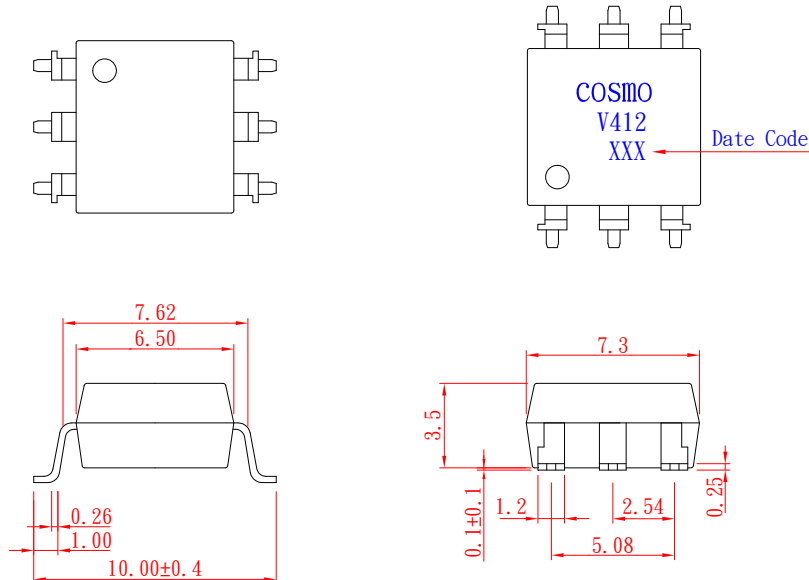


# PRODUCT SPECIFICATION

DATE : 02/22/2011

|   |  |              |        |
|---|--|--------------|--------|
| <b>cosmo</b><br>ELECTRONICS CORPORATION | SOLID STATE RELAY - MOSFET OUTPUT<br><b>KAQV412A</b> | NO.61M11007  | REV. 2 |
|   |  | SHEET 1 OF 7 |        |

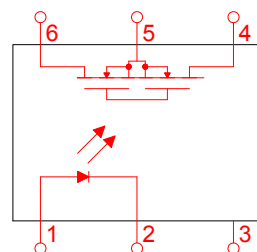
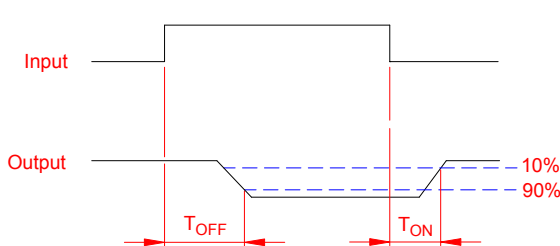
## ● OUTSIDE DIMENSION :



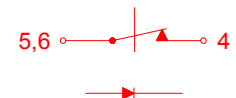
Unit : mm

Tolerance :  $\pm 0.2\text{mm}$

## ● Operate/Reverse time



1 FORM B  
NORMALLY CLOSED



## ● Absolute Maximum Ratings

( $T_a=25^\circ\text{C}$ )

| Emitter ( Input )   | Detector ( Output )   |
|---|---|
| Reverse Voltage ..... 5.0V  | Output Breakdown Voltage ..... $\pm 60\text{V}$                             |
| Continuous Forward Current ..... 50mA                                       | Continuous Load Current ..... $\pm 200\text{mA}$                            |
| Peak Forward Current ..... 1A   | Power Dissipation ..... 500mW   |
| Power Dissipation ..... 100mW   |   |
| Derate Linearly from $25^\circ\text{C}$ ..... $1.3\text{mW}/^\circ\text{C}$ |   |
| General Characteristics   |   |
| Isolation Test Voltage ..... 5000VACrms                                     | Storage Temperature Range ..... $-40^\circ\text{C}$ to $+125^\circ\text{C}$ |
| Isolation Resistance  | Operating Temperature Range ... $-40^\circ\text{C}$ to $+85^\circ\text{C}$  |
| $V_{io}=500\text{V}$ , $T_a=25^\circ\text{C}$ ..... $\geq 10^{10}\Omega$    | Junction Temperature ..... $100^\circ\text{C}$                              |
| Total Power Dissipation ..... 550mW   | Soldering Temperature ,   |
| Derate Linearly from $25^\circ\text{C}$ ..... $2.5\text{mW}/^\circ\text{C}$ | 2mm from case , 10 sec ..... $260^\circ\text{C}$                            |

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|---|--|--------------|------|
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## ● Electro-optical Characteristics

(Ta=25°C)

| Parameter                |            |   | Symbol             | Conditions   | Min. | Typ. | Max. | Unit. |
|--------------------------|------------|---|--------------------|--|------|------|------|-------|
| Emitter（Input）           |            |   |                    |  |      |      |      |       |
| Forward Voltage          |            |   | V <sub>F</sub>     | I <sub>F</sub> =10mA   |      | 1.2  | 1.5  | V     |
| Operation Input Current  |            |   | I <sub>F OFF</sub> | V <sub>L</sub> =±20V，I <sub>L</sub> ≤5μA                                   |      |      | 5.0  | mA    |
| Recovery Input Current   |            |   | I <sub>F on</sub>  | V <sub>L</sub> =±20V，I <sub>L</sub> =100mA，t=10ms                          | 0.2  |      |      | mA    |
| Detector（Output）         |            |   |                    |  |      |      |      |       |
| Output Breakdown Voltage |            |   | V <sub>B</sub>     | I <sub>B</sub> =50μA，I <sub>F</sub> =10mA                                  | 60   |      |      | V     |
| Output Off-State Leakage |            |   | I <sub>T OFF</sub> | V <sub>T</sub> =60V，I <sub>F</sub> =10mA                                   |      | 0.2  | 2    | μA    |
| I/O Capacitance          |            |   | C <sub>ISO</sub>   | I <sub>F</sub> =0，f=1MHz   |      | 6    |      | pF    |
| ON Resistance            | Connection | A | R <sub>ON</sub>    | I <sub>L</sub> =100mA，I <sub>F</sub> =0mA                                  |      | 2.5  | 5    | Ω     |
|                          |            | B |                    |  |      | 1.25 | 2.5  |       |
|                          |            | C |                    |  |      | 0.63 | 1.25 |       |
| Turn-On Time             |            |   | T <sub>ON</sub>    | I <sub>F</sub> =10mA，V <sub>L</sub> =±20V<br>t=10ms，I <sub>L</sub> =±100mA |      | 0.6  | 1.5  | ms    |
| Turn-Off Time            |            |   | T <sub>OFF</sub>   |  |      | 0.3  | 1.5  | ms    |

## ● Schematic and Wiring Diagrams

| Schematic | Output Configuration | Load  | Connection | Wiring Diagrams |
|-----------|----------------------|-------|------------|-----------------|
|           | 1b                   | AC/DC | A          |                 |
|           |                      | DC    | B          |                 |
|           |                      | DC    | C          |                 |

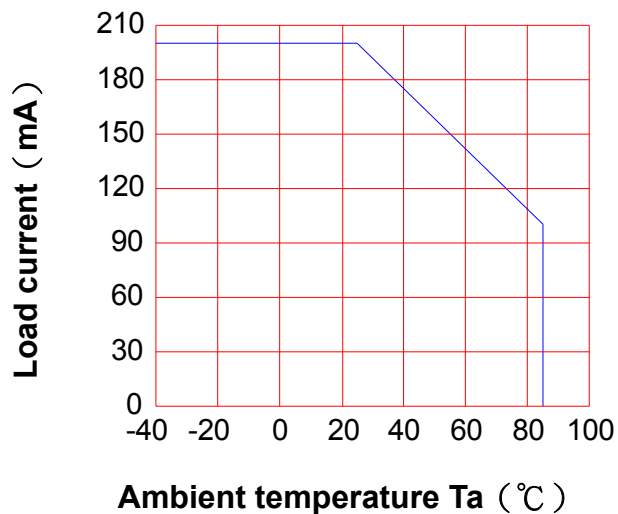
# PRODUCT SPECIFICATION

DATE : 02/22/2011

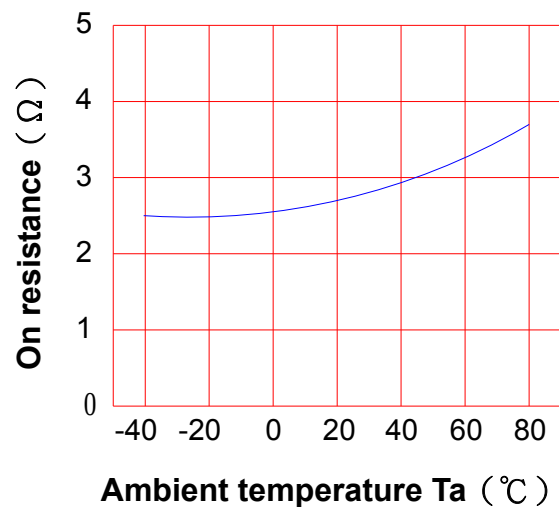
|   |  |              |           |
|---|--|--------------|-----------|
| <b>cosmo</b><br>ELECTRONICS CORPORATION | SOLID STATE RELAY - MOSFET OUTPUT<br><b>KAQV412A</b> | NO.61M11007  | REV.<br>2 |
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## ● Data Curve

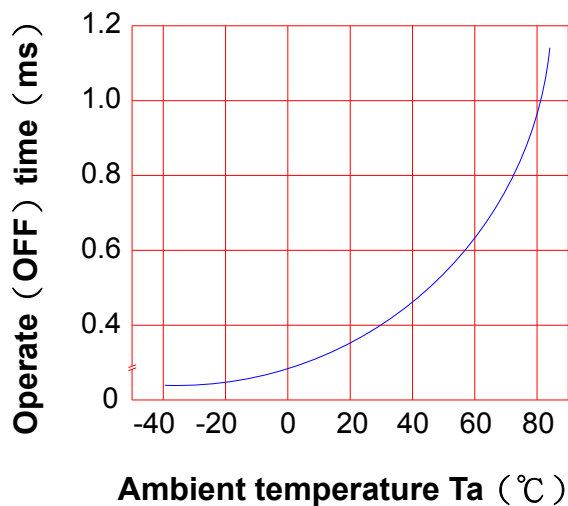
Load current vs. ambient temperature  
Allowable ambient Temperature :  
-40°C to +85°C



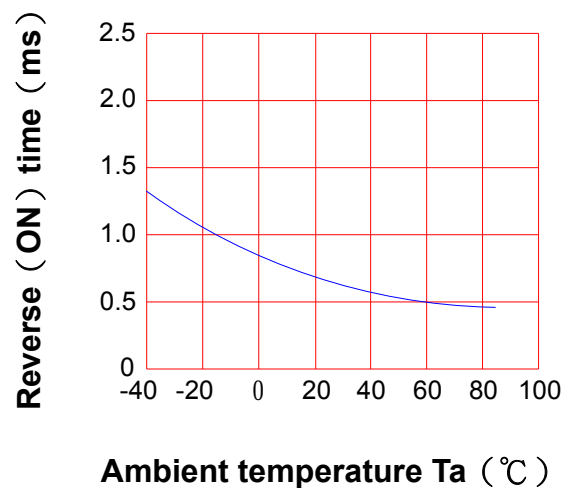
On resistance vs. ambient temperature  
across terminals 4 and 6 pin  
LED current : 0mA  
Continuous load current : 200mA (DC)



Operate (OFF) time vs.  
ambient temperature  
Load voltage 60V (DC)  
LED current : 5mA  
Continuous load current : 200mA (DC)



Reverse (ON) time vs.  
ambient temperature  
Load voltage 60V (DC)  
LED current : 5mA  
Continuous load current : 200mA (DC)



# PRODUCT SPECIFICATION

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SOLID STATE RELAY - MOSFET OUTPUT  
**KAQV412A**

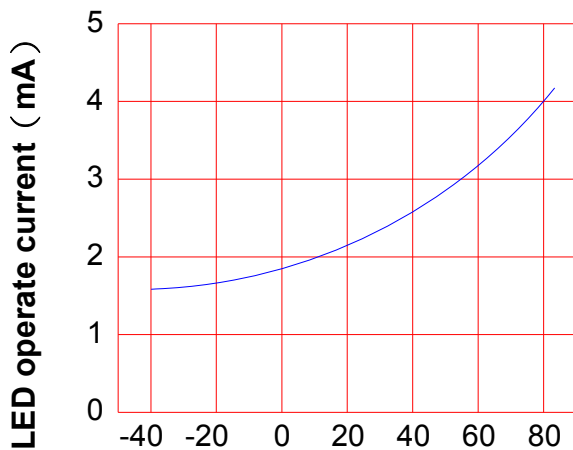
NO.61M11007  
SHEET 4 OF 7

REV.  
2

LED operate current vs.  
ambient temperature

Load Voltage : 60V (DC)

Continuous load current : 200mA (DC)

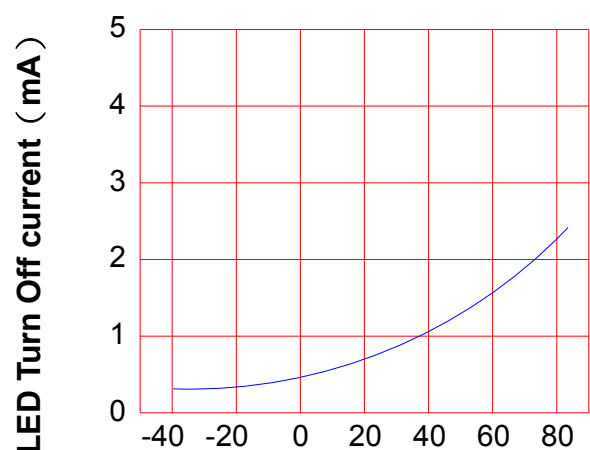


Ambient temperature Ta (°C)

LED Turn Off current vs.  
ambient temperature

Load Voltage : 60V (DC)

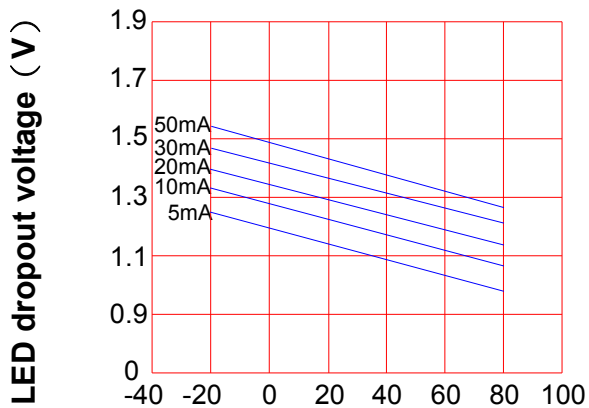
Continuous load current : 200mA (DC)



Ambient temperature Ta (°C)

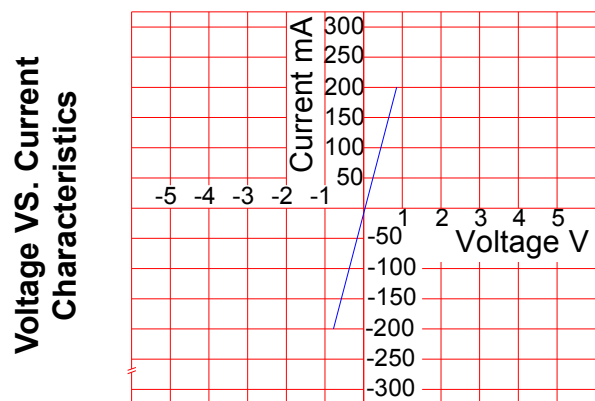
LED dropout voltage vs.  
ambient temperature

LED current : 5 to 50mA



Ambient temperature Ta (°C)

Voltage vs. current characteristics  
of output at MOSFET portion  
Measured portion : across terminals  
4 and 6 pin  
Ambient temperature : 25°C



Ambient temperature : 25°C

# PRODUCT SPECIFICATION

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SOLID STATE RELAY - MOSFET OUTPUT  
**KAQV412A**

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SHEET 5 OF 7

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2

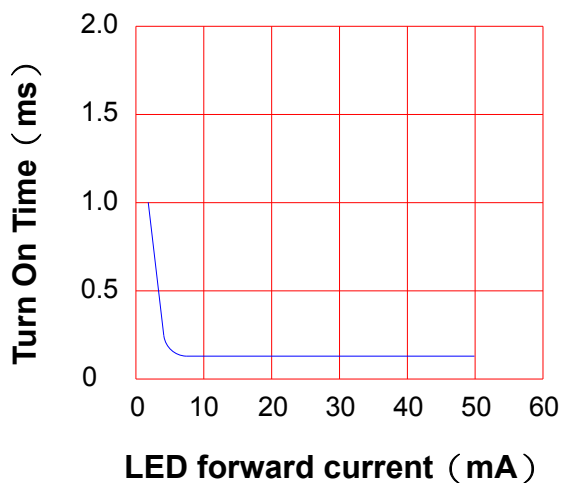
## LED forward current vs. Turn On Time

Across terminals 4 and 6 pin

Load voltage : 60V (DC)

Continuous load current : 200mA (DC)

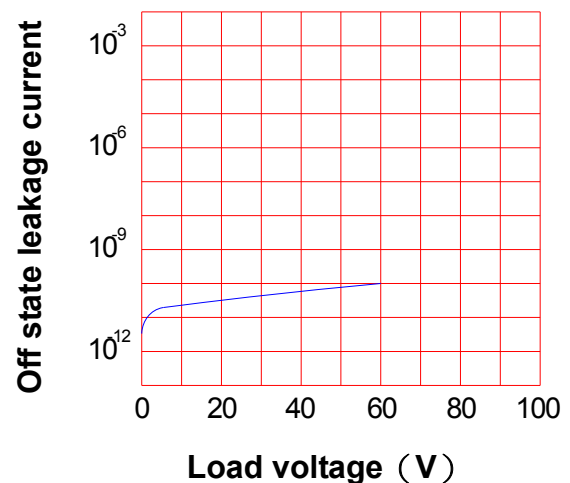
Ambient temperature : 25°C



## Off state leakage current

Across terminals 4 and 6 pin

Ambient temperature : 25°C



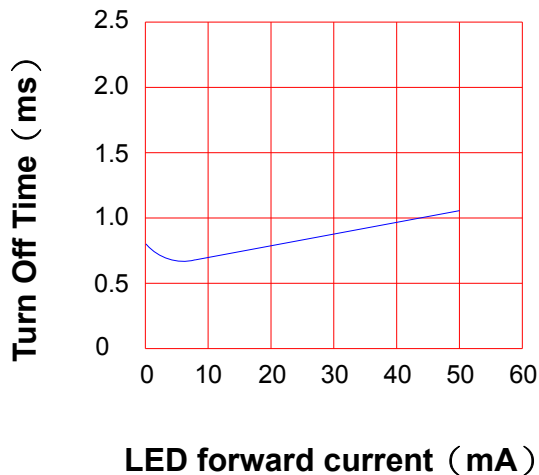
## LED forward current vs. reverse(ON) time

Across terminals 4 and 6 pin

Load voltage : 60V (DC)

Continuous load current : 200mA (DC)

Ambient temperature : 25°C

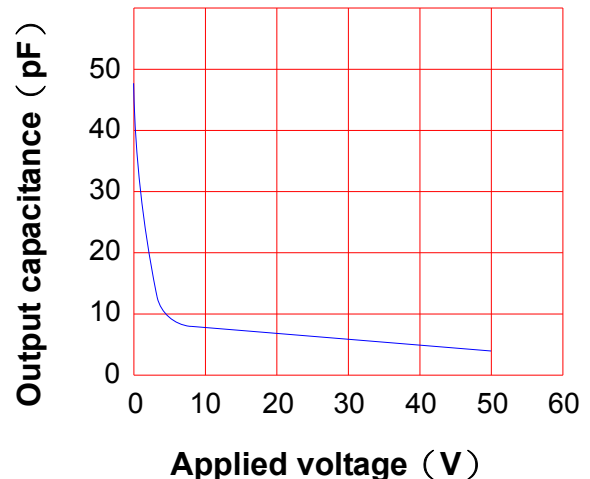


## Applied voltage vs. output capacitance

Across terminals 4 and 6 pin

Frequency : 1MHz

Ambient temperature : 25°C



# PRODUCT SPECIFICATION

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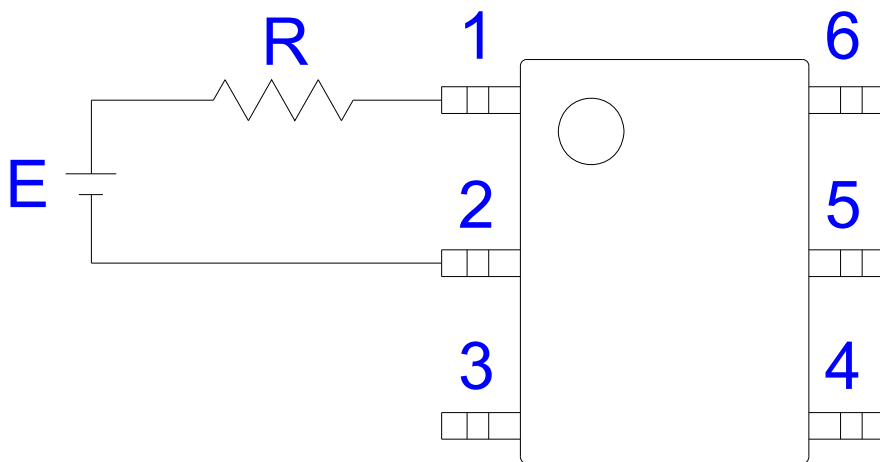
|   |  |              |           |
|---|--|--------------|-----------|
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## ● USING METHODS

Examples of resistance value to control LED forward current (IF)

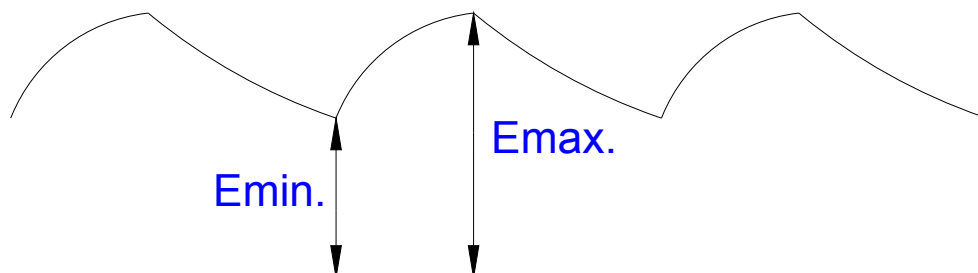
SSR-MOSFET OUTPUT

(IF=5mA)



| E    | R                     |
|------|-----------------------|
| 3.3V | Approx. 330 $\Omega$  |
| 5V   | Approx. 640 $\Omega$  |
| 12V  | Approx. 1.9K $\Omega$ |
| 15V  | Approx. 2.5K $\Omega$ |
| 24V  | Approx. 4.1K $\Omega$ |

- (1) LED forward current must be more than 5mA , at E min.
- (2) LED forward current must be less than 50mA , at E max.



# PRODUCT SPECIFICATION

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SOLID STATE RELAY - MOSFET OUTPUT  
**KAQV412A**

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2

## ● USING METHODS

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

