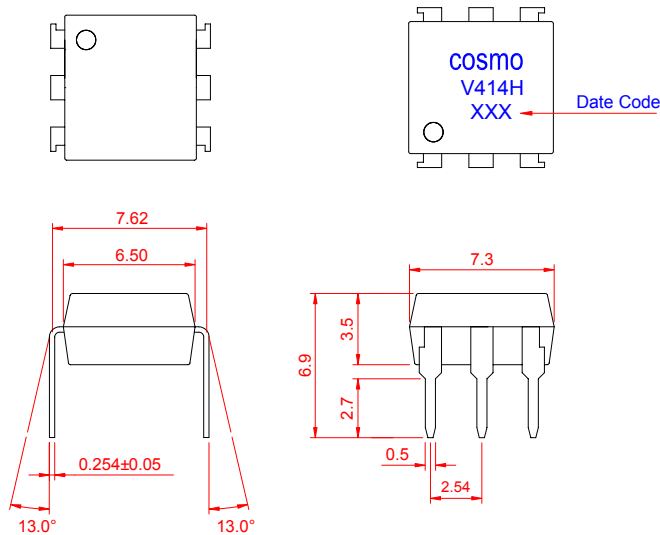


# PRODUCT SPECIFICATION

DATE : 03/01/2005

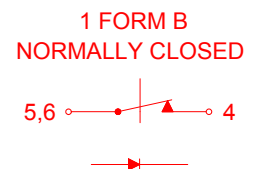
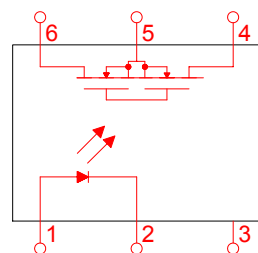
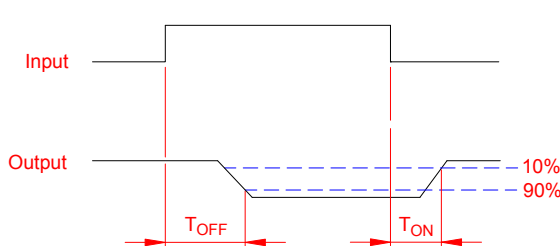
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|---|--|--------------|------|
| <b>cosmo</b><br>ELECTRONICS CORPORATION | SOLID STATE RELAY - MOSFET OUTPUT<br><b>KAQV414H</b> | Preliminary  | REV. |
|   |  | SHEET 1 OF 7 | 0    |

## ● OUTSIDE DIMENSION :



Unit : mm  
Tolerance : ±0.2mm

## ● Operate / Reverse time



## ● Absolute Maximum Ratings

( Ta=25°C )

| Emitter ( Input )                             | Detector ( Output )                             |
|---|---|
| Reverse Voltage ..... 5.0V                    | Output Breakdown Voltage ..... ± 400V           |
| Continuous Forward Current ..... 50mA         | Continuous Load Current ..... ± 130mA           |
| Peak Forward Current ..... 1A                 | Power Dissipation ..... 500mW                   |
| Power Dissipation ..... 100mW                 |   |
| Derate Linearly from 25°C ..... 1.3mW/°C      |   |
| General Characteristics                       |   |
| Isolation Test Voltage ..... 5000VACrms       | Storage Temperature Range ..... -40°C to +125°C |
| Isolation Resistance                          | Operating Temperature Range ... -40°C to +85°C  |
| Vio=500V , Ta=25°C ..... ≥ 10 <sup>10</sup> Ω | Junction Temperature ..... 100°C                |
| Total Power Dissipation ..... 550mW           | Soldering Temperature ,                         |
| Derate Linearly from 25°C ..... 2.5mW/°C      | 2mm from case , 10 sec ..... 260°C              |

# PRODUCT SPECIFICATION

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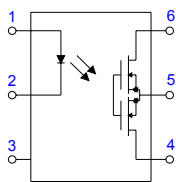
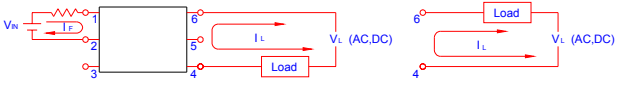
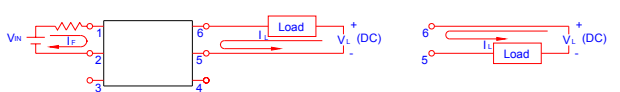
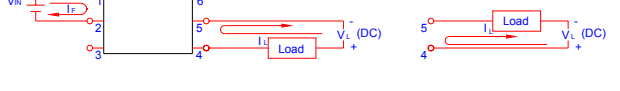
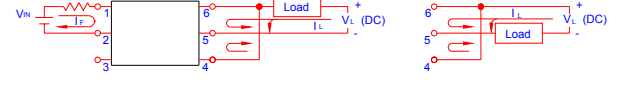
|   |  |              |           |
|---|--|--------------|-----------|
| <b>cosmo</b><br>ELECTRONICS CORPORATION | SOLID STATE RELAY - MOSFET OUTPUT<br><b>KAQV414H</b> | Preliminary  | REV.<br>0 |
|   |  | SHEET 2 OF 7 |           |

## ● Electro-optical Characteristics

(Ta=25°C)

| Parameter                | Symbol            | Conditions  | Min.            | Typ.                                  | Max. | Unit.         |          |
|--------------------------|-------------------|---|-----------------|---------------------------------------|------|---------------|----------|
| Emitter ( Input )        |                   |   |                 |                                       |      |               |          |
| Forward Voltage          | $V_F$             | $I_F=10\text{mA}$   |                 | 1.2                                   | 1.5  | V             |          |
| Operation Input Current  | $I_{F\text{OFF}}$ | $V_L=\pm 20\text{V}$ , $I_L \leq 5\mu\text{A}$              |                 |                                       | 5.0  | mA            |          |
| Recovery Input Current   | $I_{F\text{ON}}$  | $V_L=\pm 20\text{V}$ , $I_L=100\text{mA}$ , $t=10\text{ms}$ | 0.2             |                                       |      | mA            |          |
| Detector ( Output )      |                   |   |                 |                                       |      |               |          |
| Output Breakdown Voltage | $V_B$             | $I_B=50\mu\text{A}$ , $I_F=10\text{mA}$                     | 400             |                                       |      | V             |          |
| Output Off-State Leakage | $I_{T\text{OFF}}$ | $V_T=100\text{V}$ , $I_F=10\text{mA}$                       |                 | 0.2                                   | 2    | $\mu\text{A}$ |          |
| I/O Capacitance          | $C_{\text{ISO}}$  | $I_F=0$ , $f=1\text{MHz}$                                   |                 | 6                                     |      | pF            |          |
| ON Resistance            | Connection        | A   | $R_{\text{ON}}$ | $I_L=100\text{mA}$ , $I_F=0\text{mA}$ | 40   | 50            | $\Omega$ |
|                          |                   | B   |                 |                                       | 20   | 25            |          |
|                          |                   | C   |                 |                                       | 10   | 12.5          |          |
| Reverse ( ON ) Time      | $T_{\text{ON}}$   | $I_F=10\text{mA}$ , $V_L=\pm 20\text{V}$                    |                 | 0.6                                   | 1.5  | ms            |          |
| Operate ( OFF ) Time     | $T_{\text{OFF}}$  | $t=10\text{ms}$ , $I_L=\pm 100\text{mA}$                    |                 | 0.3                                   | 1.0  | ms            |          |

## ● Schematic and Wiring Diagrams

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

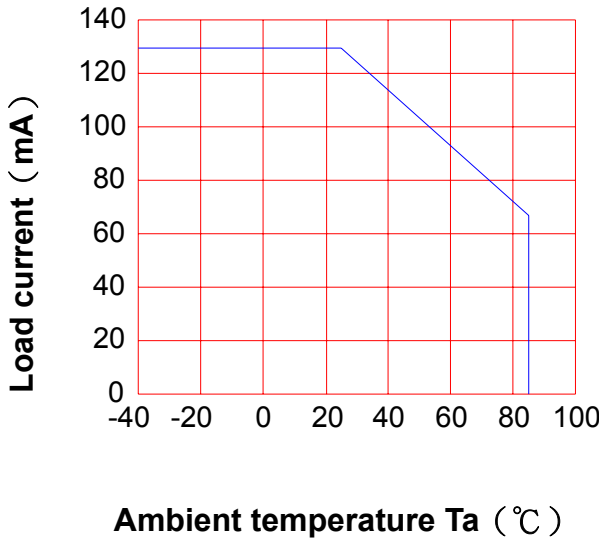
# PRODUCT SPECIFICATION

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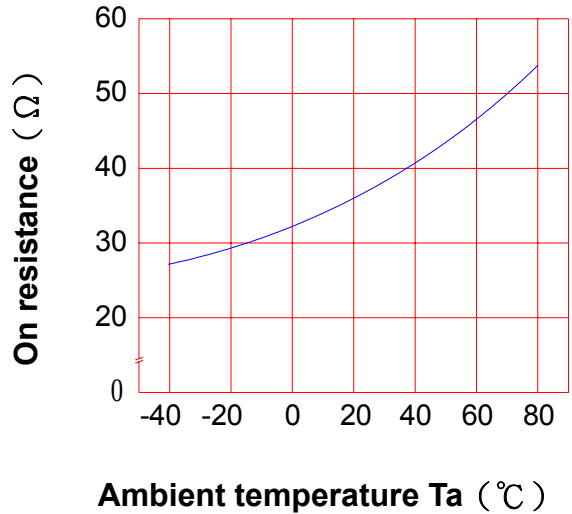
|   |  |              |      |
|---|--|--------------|------|
| <b>cosmo</b><br>ELECTRONICS CORPORATION | SOLID STATE RELAY - MOSFET OUTPUT<br><b>KAQV414H</b> | Preliminary  | REV. |
|   |  | SHEET 3 OF 7 | 0    |

## ● Data Curve

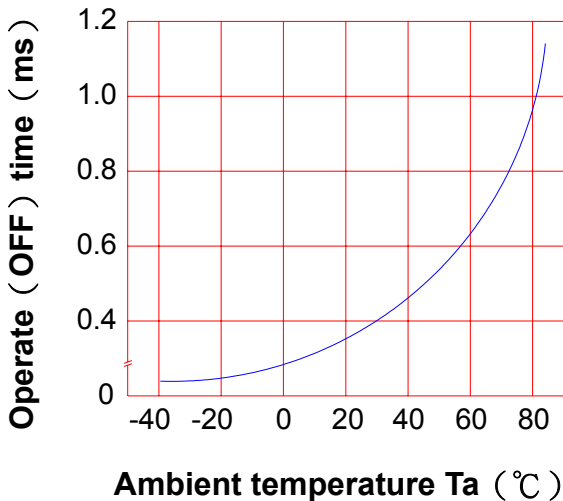
Load current vs. ambient temperature  
 Allowable ambient Temperature :  
 -40°C to +85°C



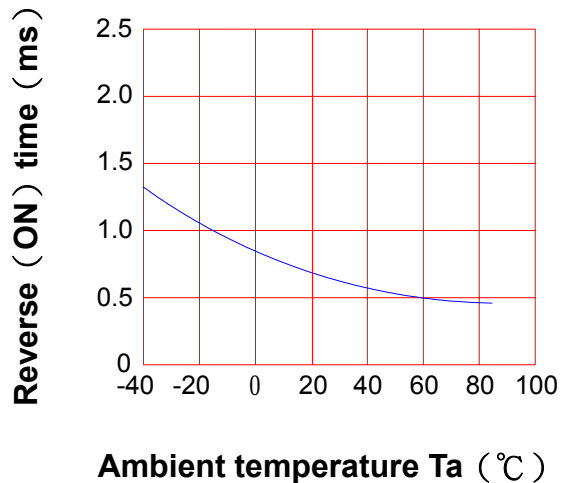
On resistance vs. ambient temperature  
 across terminals 4 and 6 pin  
 LED current : 5mA  
 Continuous load current : 130mA (DC)



Operate (OFF) time vs.  
 ambient temperature  
 Load voltage 400V (DC)  
 LED current : 5mA  
 Continuous load current : 130mA (DC)



Reverse (ON) time vs.  
 ambient temperature  
 Load voltage 400V (DC)  
 LED current : 5mA  
 Continuous load current : 130mA (DC)



# PRODUCT SPECIFICATION

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SOLID STATE RELAY - MOSFET OUTPUT  
**KAQV414H**

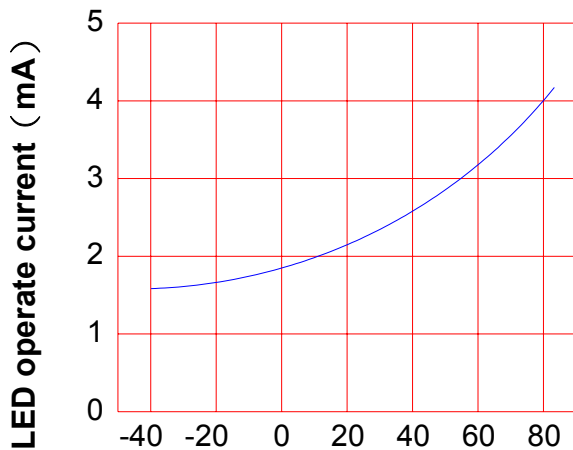
Preliminary  
SHEET 4 OF 7

REV.  
0

LED operate current vs.  
ambient temperature

Load Voltage : 400V (DC)

Continuous load current : 130mA (DC)

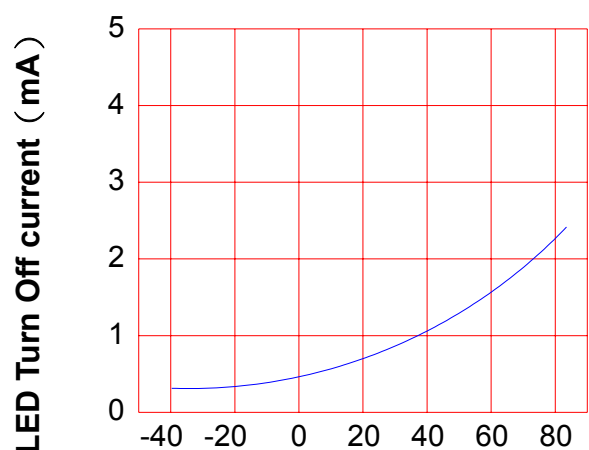


Ambient temperature Ta (°C)

LED Turn Off current vs.  
ambient temperature

Load Voltage : 400V (DC)

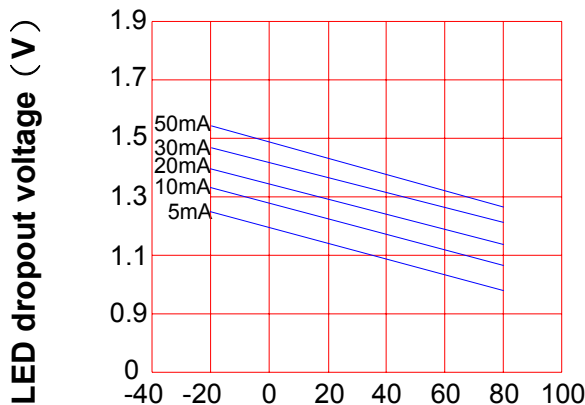
Continuous load current : 130mA (DC)



Ambient temperature Ta (°C)

LED dropout voltage vs.  
ambient temperature

LED current : 5 to 50mA

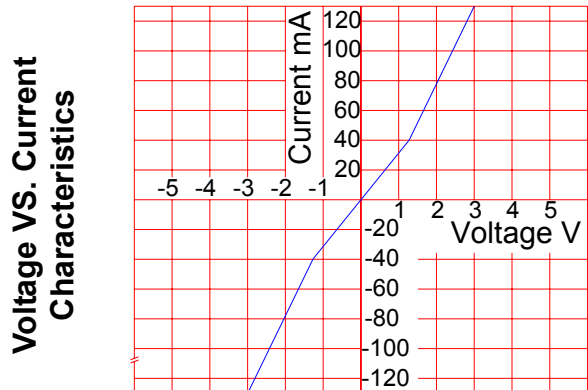


Ambient temperature Ta (°C)

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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|   |  |              |      |
|---|--|--------------|------|
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|   |  | SHEET 5 OF 7 | 0    |

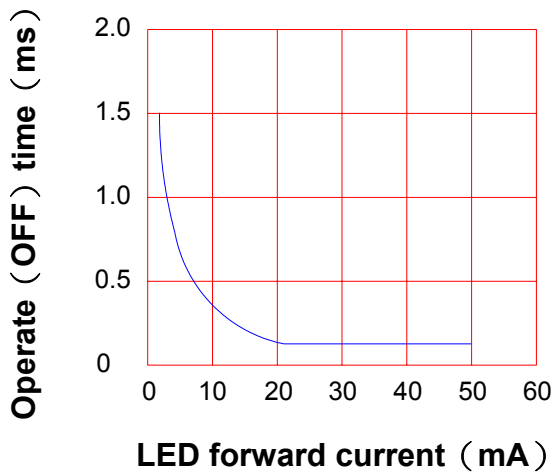
## LED forward current vs. Operate ( OFF ) time

Across terminals 4 and 6 pin

Load voltage : 400V ( DC )

Continuous load current : 130mA ( DC )

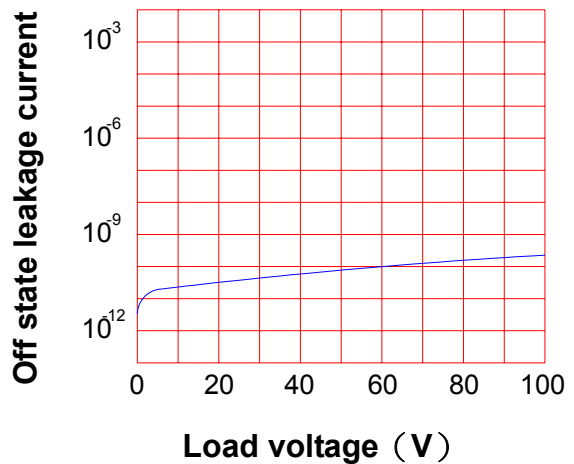
Ambient temperature : 25°C



## Off state leakage current

Across terminals 4 and 6 pin

Ambient temperature : 25°C



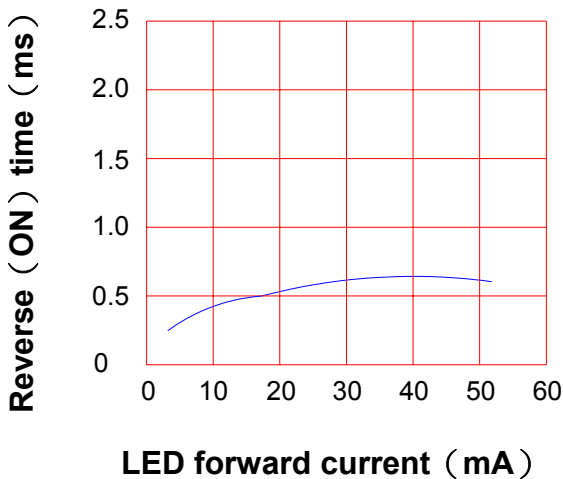
## LED forward current vs. reverse ( ON ) time

Across terminals 4 and 6 pin

Load voltage : 400V ( DC )

Continuous load current : 130mA ( DC )

Ambient temperature : 25°C

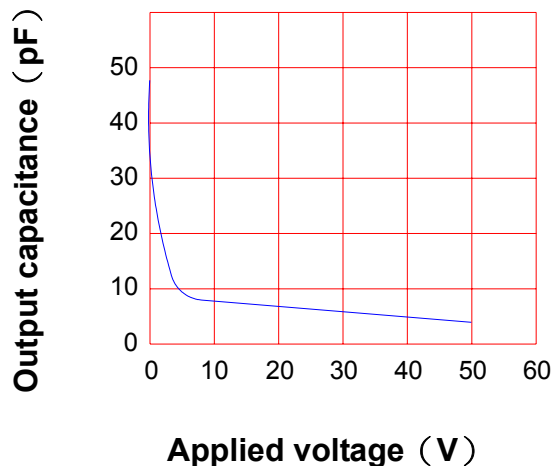


## Applied voltage vs. output capacitance

Across terminals 4 and 6 pin

Frequency : 1MHz

Ambient temperature : 25°C



# PRODUCT SPECIFICATION

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SOLID STATE RELAY - MOSFET OUTPUT  
**KAQV414H**

Preliminary  
SHEET 6 OF 7

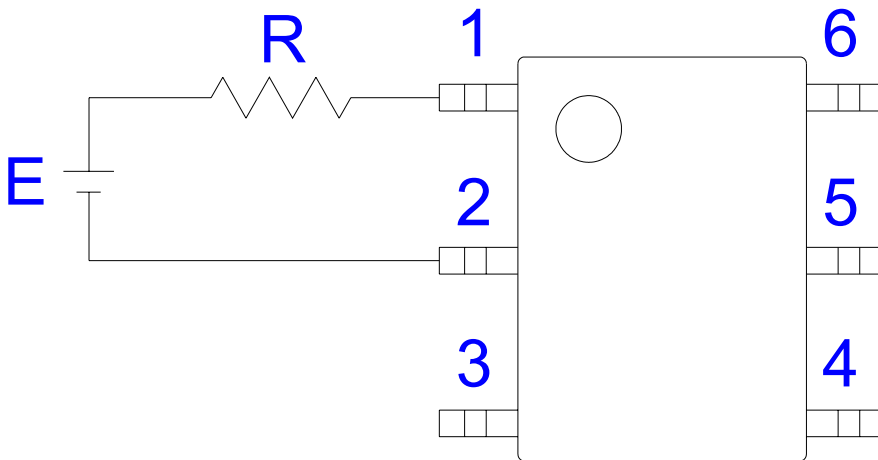
REV.  
0

## ● USING METHODS

Examples of resistance value to control LED forward current ( $I_F$ )

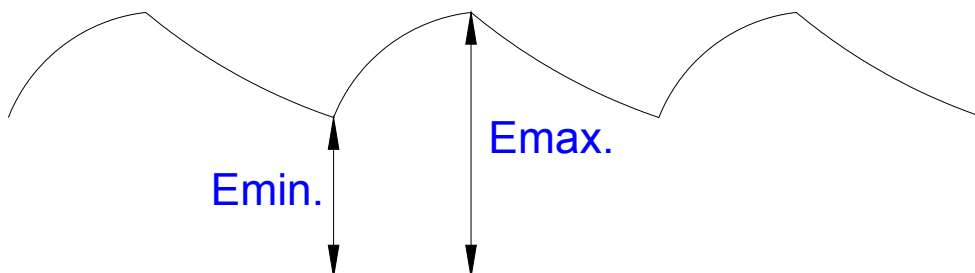
SSR-MOSFET OUTPUT

( $I_F=5\text{mA}$ )



| 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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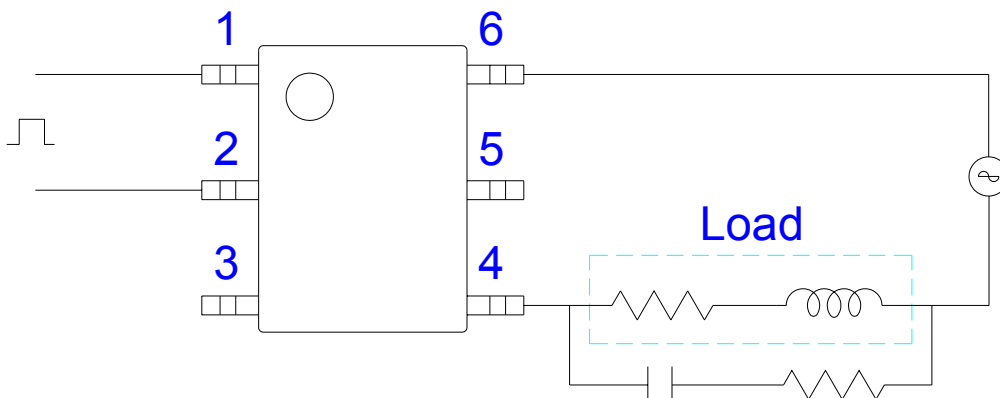
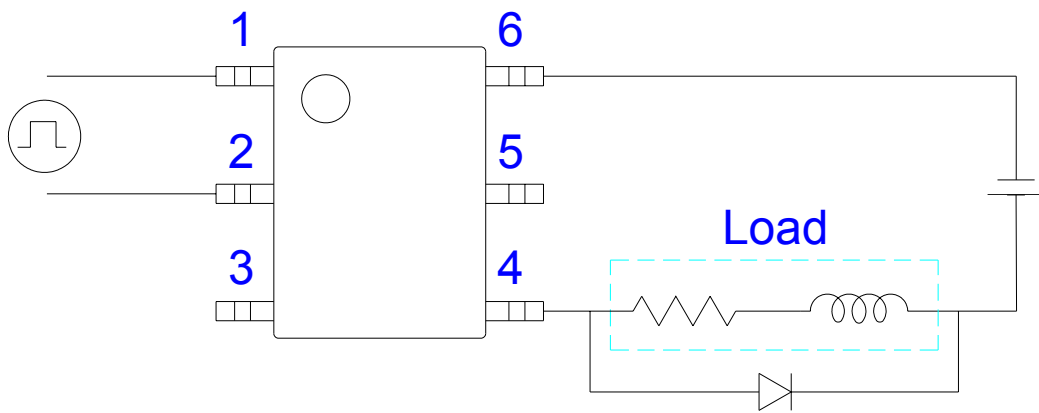
SOLID STATE RELAY - MOSFET OUTPUT  
**KAQV414H**

Preliminary  
SHEET 7 OF 7

REV.  
0

## ● USING METHODS

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



R-C Snubber