

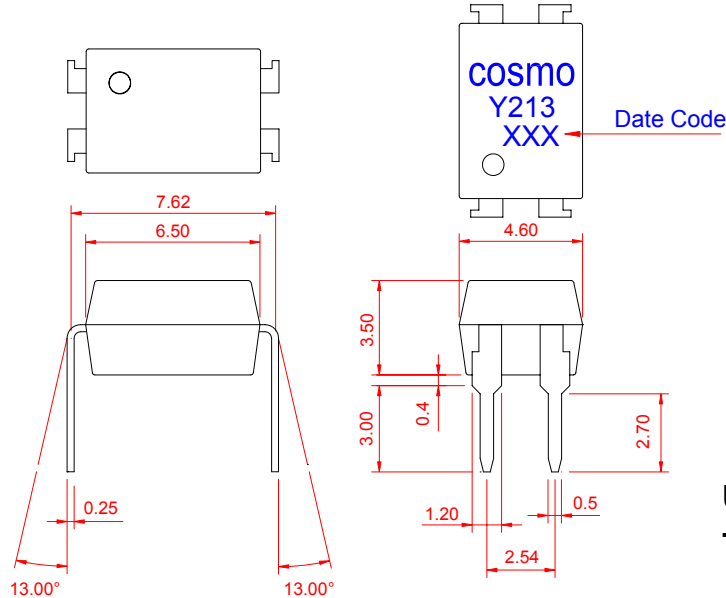
# PRODUCT SPECIFICATION

RoHS Compliance

DATE : 02/12/2008

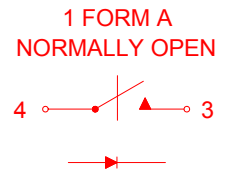
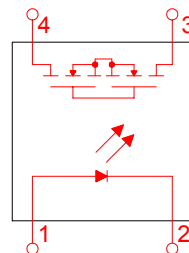
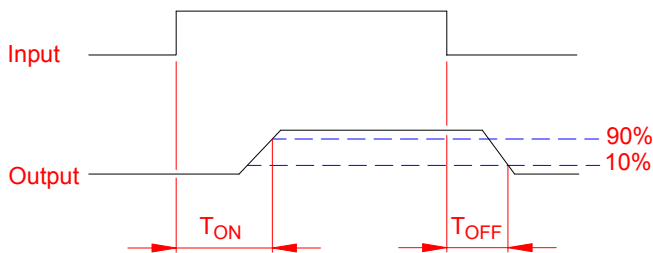
|   |                                   |              |           |
|---|-----------------------------------|--------------|-----------|
| <b>cosmo</b><br>ELECTRONICS CORPORATION | SOLID STATE RELAY - MOSFET OUTPUT | NO.60M00019  | REV.<br>3 |
|   | <b>KAQY213</b>                    | SHEET 1 OF 7 |           |

## ● OUTSIDE DIMENSION :



Unit : mm  
Tolerance : ±0.2mm

## ● Turn On / Turn Off time



## ● Absolute Maximum Ratings

(Ta=25°C)

| Emitter ( Input )                |                      | Detector ( Output )             |                 |
|----------------------------------|----------------------|---------------------------------|-----------------|
| Reverse Voltage .....            | 5.0V                 | Output Breakdown Voltage .....  | ± 250V          |
| Continuous Forward Current ..... | 50mA                 | Continuous Load Current .....   | ± 200mA         |
| 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           |

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## ● 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  | $I_{F\text{ON}}$  | $V_L=\pm 20\text{V}$ , $I_L=100\text{mA}$ , $t=10\text{ms}$                          |      |      | 5.0  | mA            |
| Recovery Input Current   | $I_{F\text{OFF}}$ | $V_L=\pm 20\text{V}$ , $I_L \leq 5\mu\text{A}$                                       | 0.2  |      |      | mA            |
| Detector ( Output )      |                   |  |      |      |      |               |
| Output Breakdown Voltage | $V_B$             | $I_B=50\mu\text{A}$  | 250  |      |      | V             |
| Output Off-State Leakage | $I_{T\text{OFF}}$ | $V_T=250\text{V}$ , $I_F=0\text{mA}$   |      | 0.2  | 1    | $\mu\text{A}$ |
| I/O Capacitance          | $C_{\text{ISO}}$  | $I_F=0$ , $f=1\text{MHz}$  |      | 6    |      | pF            |
| ON Resistance            | $R_{\text{ON}}$   | $I_L=100\text{mA}$ , $I_F=10\text{mA}$   |      | 8    | 16   | $\Omega$      |
| Turn-On Time             | $T_{\text{ON}}$   | $I_F=10\text{mA}$ , $V_L=\pm 20\text{V}$<br>$t=10\text{ms}$ , $I_L=\pm 100\text{mA}$ |      | 0.3  | 1.0  | ms            |
| Turn-Off Time            | $T_{\text{OFF}}$  |  |      | 0.5  | 1.5  | ms            |

## ● MOS Relay Schematic and Wiring Diagrams

| Schematic | Output configuration | Load  | Connection | Wiring Diagrams |
|-----------|----------------------|-------|------------|-----------------|
|           | 1a                   | AC/DC | -          |                 |

# PRODUCT SPECIFICATION

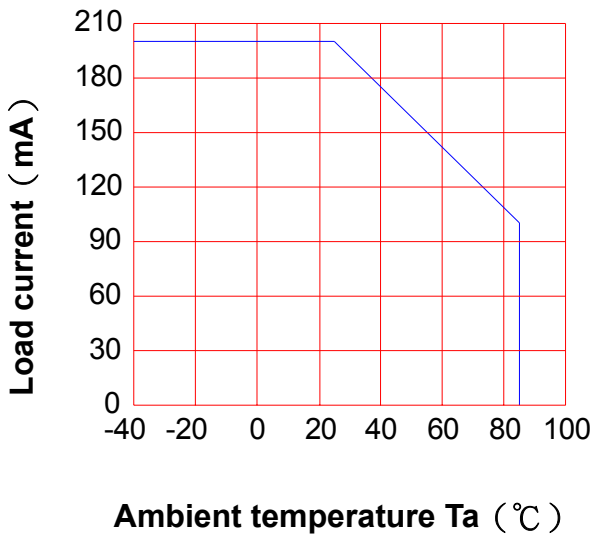
RoHS Compliance

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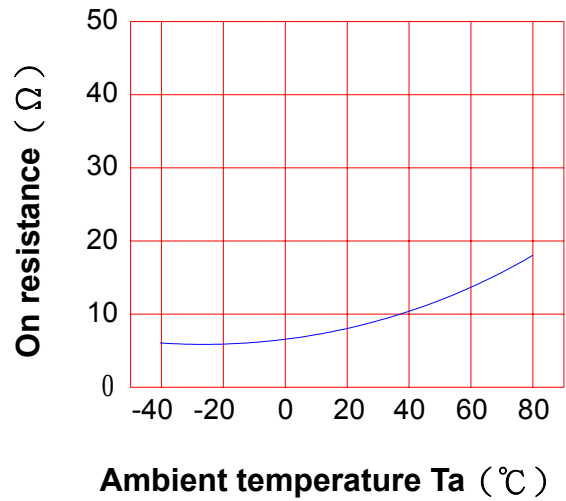
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## ● Data Curve

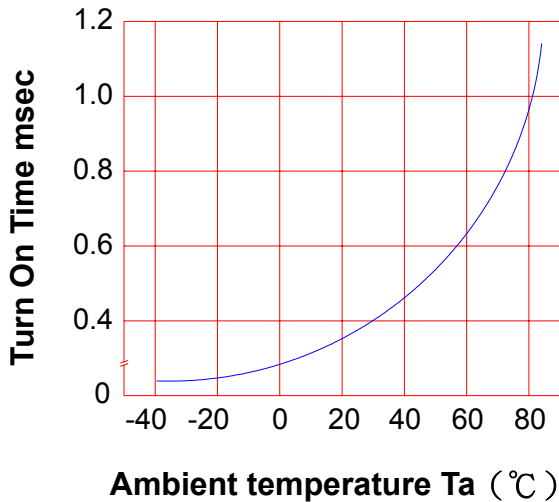
**Load current vs. ambient temperature**  
 Allowable ambient Temperature :  
 -40°C to +85°C



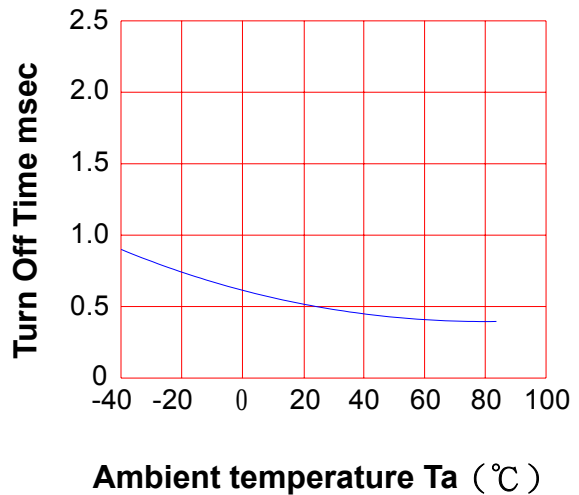
**On resistance vs. ambient temperature**  
 across terminals 3 and 4 pin  
 LED current : 5mA  
 Continuous load current : 200mA (DC)



**Turn On Time vs. ambient temperature**  
 Load voltage 250V (DC)  
 LED current : 5mA  
 Continuous load current : 200mA (DC)



**Turn Off Time vs. ambient temperature**  
 Load voltage 250V (DC)  
 LED current : 5mA  
 Continuous load current : 200mA (DC)



# PRODUCT SPECIFICATION

RoHS Compliance

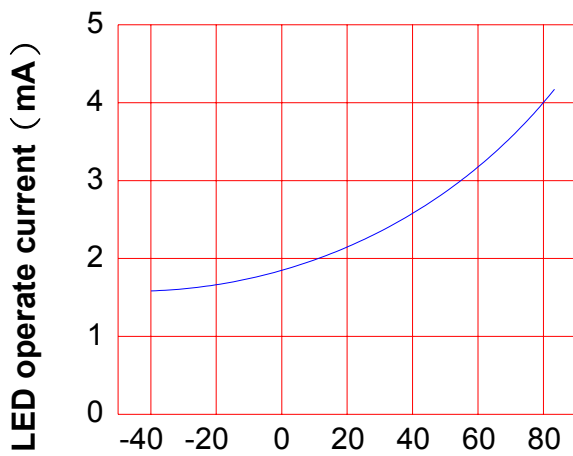
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|   |   | SHEET 4 OF 7 | 3    |

LED operate current vs.  
ambient temperature

Load Voltage : 250V (DC)

Continuous load current : 200mA (DC)

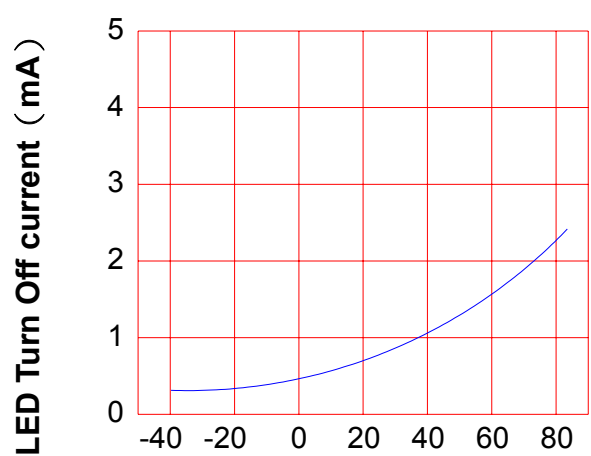


Ambient temperature Ta (°C)

LED Turn Off current vs.  
ambient temperature

Load Voltage : 250V (DC)

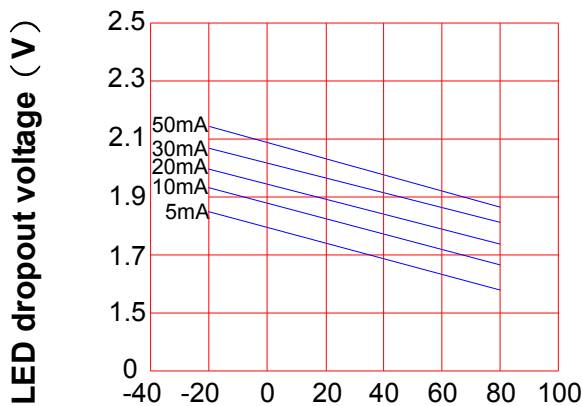
Continuous load current : 200mA (DC)



Ambient temperature Ta (°C)

LED dropout voltage vs.  
ambient temperature

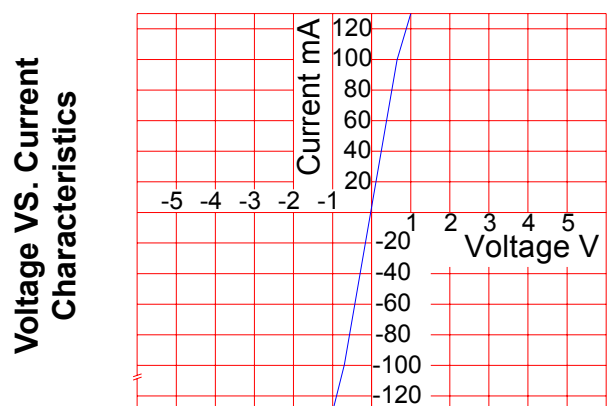
LED current : 5 to 50mA



Ambient temperature Ta (°C)

Voltage vs. current characteristics  
of output at MOSFET portion  
Measured portion : across terminals  
3 and 4 pin

Ambient temperature : 25°C



Ambient temperature : 25°C

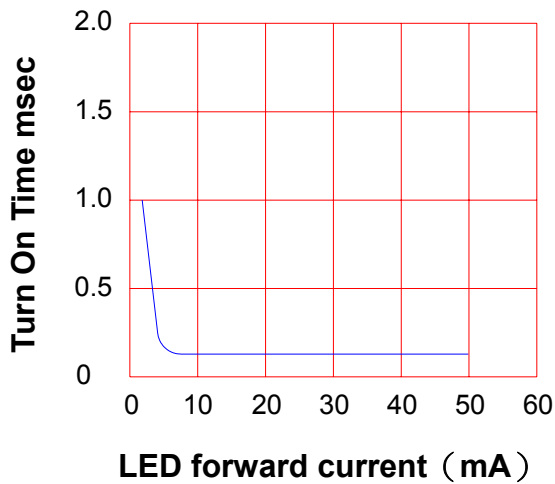
# PRODUCT SPECIFICATION

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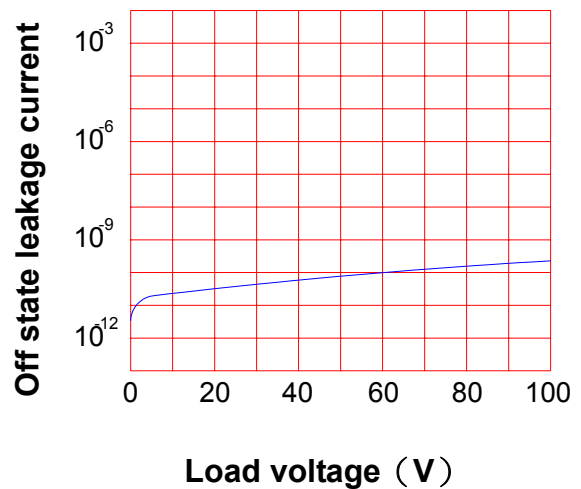
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|---|---|--------------|-----------|
| <b>cosmo</b><br>ELECTRONICS CORPORATION | SOLID STATE RELAY - MOSFET OUTPUT<br><b>KAQY213</b> | NO.60M00019  | REV.<br>3 |
|   |   | SHEET 5 OF 7 |           |

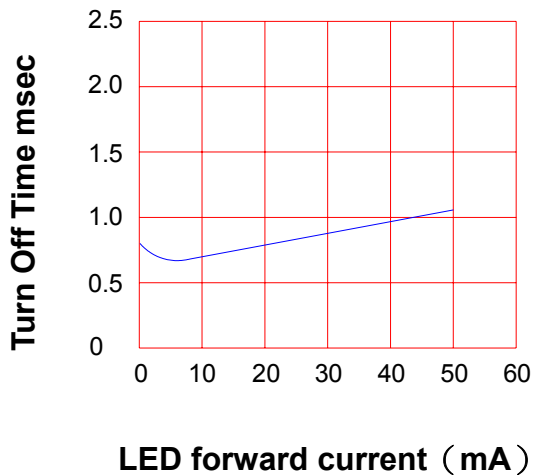
**LED forward current vs. Turn On Time**  
Across terminals 3 and 4 pin  
Load voltage : 250V (DC)  
Continuous load current : 200mA (DC)  
Ambient temperature : 25°C



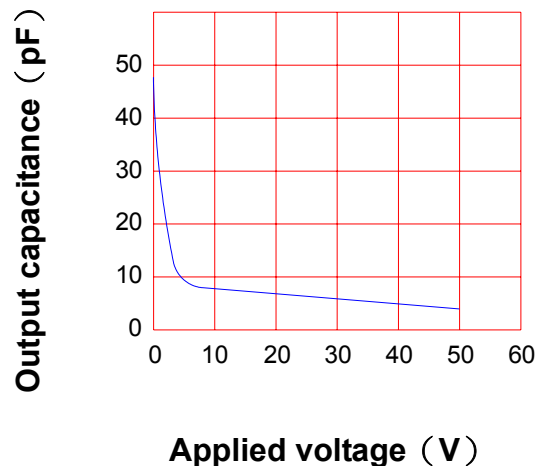
**Off state leakage current**  
Across terminals 3 and 4 pin  
Ambient temperature : 25°C



**LED forward current vs. Turn Off Time**  
Across terminals 3 and 4 pin  
Load voltage : 250V (DC)  
Continuous load current : 200mA (DC)  
Ambient temperature : 25°C



**Applied voltage vs. output capacitance**  
Across terminals 3 and 4 pin  
Frequency : 1MHz  
Ambient temperature : 25°C



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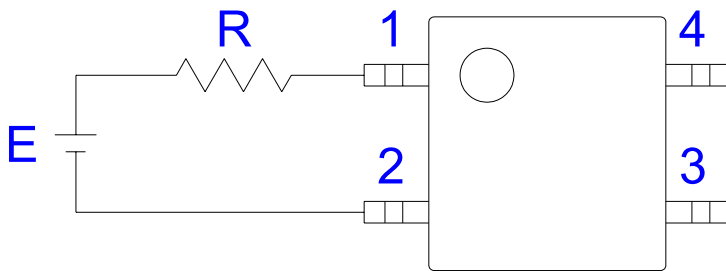
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## ● USING METHODS

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

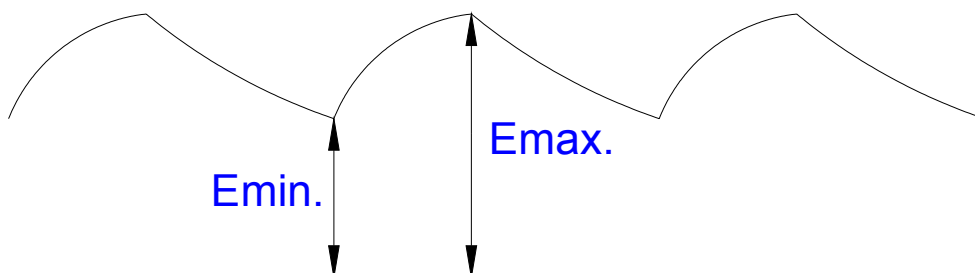
SSR-MOSFET OUTPUT

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



| 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.



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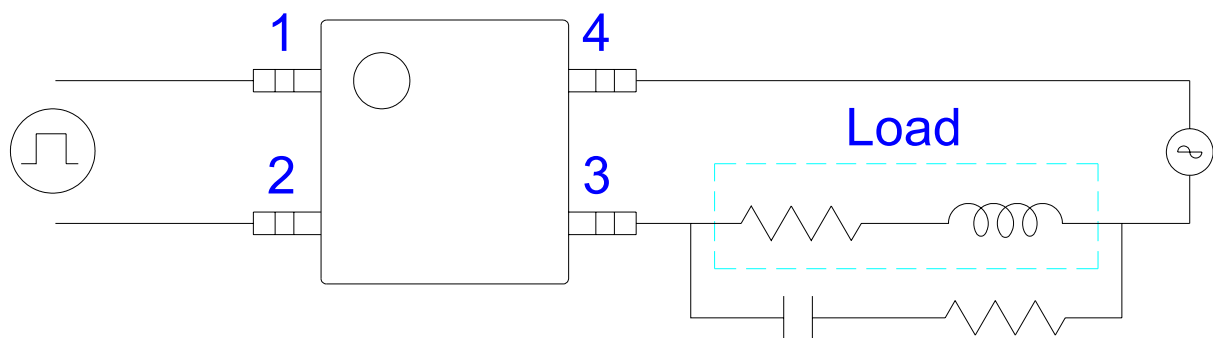
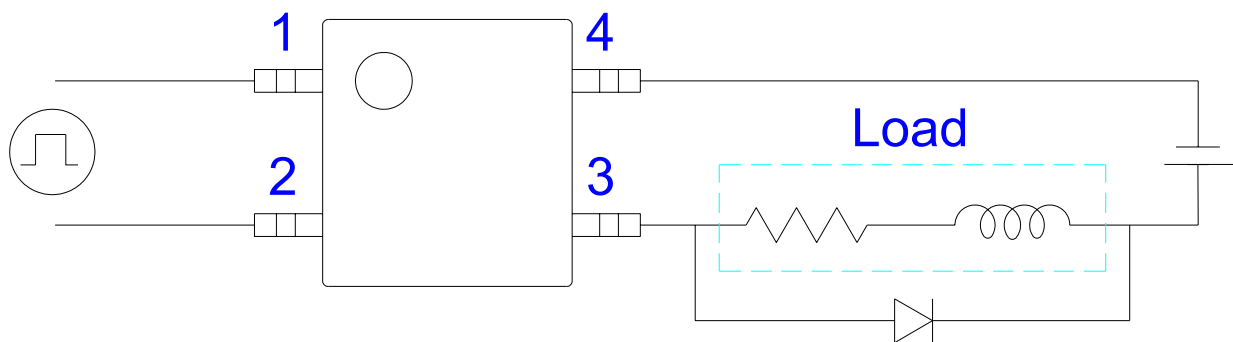
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## ● USING METHODS

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



R-C Snubber