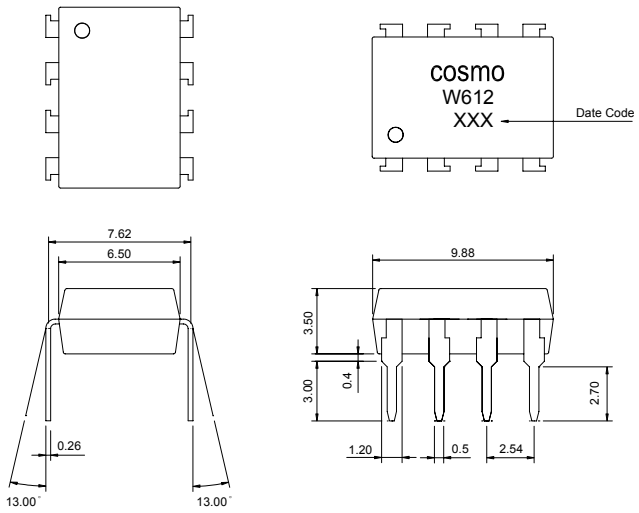
# PRODUCT SPECIFICATION

**DATE：09/01/2006**

| cosmo ELECTRONICS CORPORATION | SOLID STATE RELAY - MOSFET OUTPUT **KAQW612** | NO.60M22006 | REV. 1 |
|---|---|---|---|
| | | SHEET 1 OF 10 | |

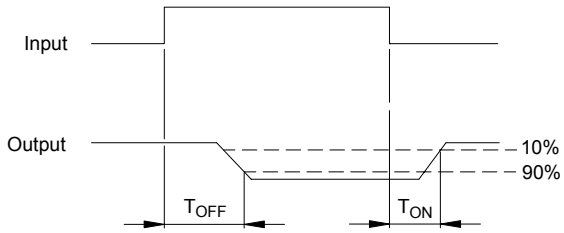
## ● OUTSIDE DIMENSION：



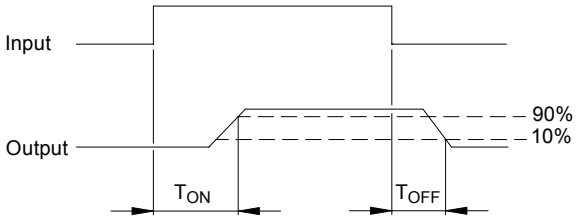

**Unit：mm**

**Tolerance：±0.2mm**

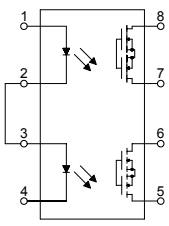
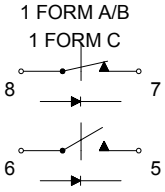
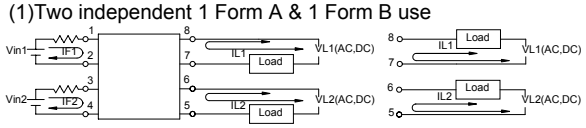
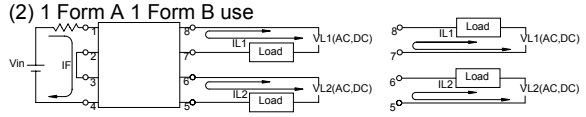
## ● Operate / Reverse time ( N.C )




## ● Turn on / Turn off time ( N.O )




## ● Schematic and Wiring Diagrams

| Schematic | Output Configuration | Load | Connection | Wiring Diagrams |
|---|---|---|---|---|
|  | 1a1b<br>  | AC/DC | - | (1)Two independent 1 Form A & 1 Form B use<br>  <br>(2) 1 Form A 1 Form B use<br>  |

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| cosmo ELECTRONICS CORPORATION | SOLID STATE RELAY - MOSFET OUTPUT **KAQW612** | NO.60M22006 | REV. 1 |
|---|---|---|---|
| | | SHEET 2 OF 10 | |

## ● Absolute Maximum Ratings

（Ta=25℃）

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

## ● Electro-optical Characteristics

（Ta=25℃）

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Emitter ( Input )** | | | | | | |
| Forward Voltage | $V_F$ | $I_F$=10mA | | 1.2 | 1.5 | V |
| Operation Input Current | $IF_{ON}$ ( N.O )<br>$IF_{OFF}$ ( N.C ) | $V_L$=±20V, $I_L$=100mA ( N.O )<br>$V_L$=±20V, $I_L \leqq$5μA ( N.C )<br>t=10ms | | | 5 | mA |
| Recovery Input Current | $IF_{OFF}$ ( N.O )<br>$IF_{ON}$ ( N.C ) | $V_L$=±20V, $I_L \leqq$5μA ( N.C )<br>$V_L$=±20V, $I_L$=100mA ( N.O )<br>t=10ms | 0.2 | | | mA |
| **Detector ( Output ) normally open** | | | | | | |
| Output Breakdown Voltage | $V_B$ | $I_B$=50μA | 60 | | | V |
| Output Off-State Leakage | $I_{TOFF}$ | $V_T$=100V, $I_F$=0mA | | 0.2 | 1 | μA |
| I/O Capacitance | $C_{ISO}$ | $I_F$=0, f=1MHz | | 6 | | pF |
| ON Resistance | $R_{ON}$ | $I_L$=100mA, $I_F$=10mA | | 0.83 | 2.5 | Ω |
| Turn-On Time | $T_{ON}$ | $I_F$=10mA, $V_L$=±20V | | 0.2 | 1.5 | ms |
| Turn-Off Time | $T_{OFF}$ | t=10mS, $I_L$=±100mA | | 0.3 | 1.5 | ms |
| **Detector ( Output ) normally close** | | | | | | |
| Output Breakdown Voltage | $V_B$ | $I_B$=50μA, $I_F$=10mA | 60 | | | V |
| Output Off-State Leakage | $I_{TOFF}$ | $V_T$=100V, $I_F$=10mA | | 0.2 | 2 | μA |
| I/O Capacitance | $C_{ISO}$ | $I_F$=0, f=1MHz | | 6 | | pF |
| ON Resistance | $R_{ON}$ | $I_L$=100mA, $I_F$=0mA | | 2.5 | 5 | Ω |
| Operate ( OFF ) Time | $T_{OFF}$ | $I_F$=10mA, $V_L$=±20V | | 0.6 | 1.5 | ms |
| Reverse ( ON ) Time | $T_{ON}$ | t=10ms, $I_L$=±100mA | | 0.3 | 1.5 | ms |

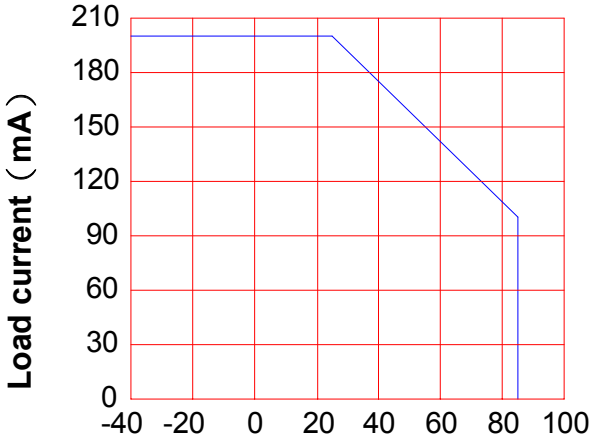
# PRODUCT SPECIFICATION

DATE：09/01/2006

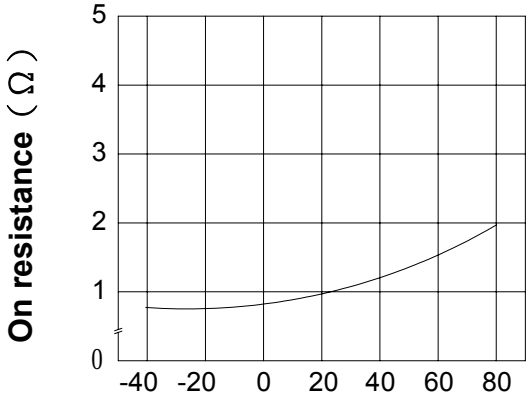
| cosmo ELECTRONICS CORPORATION | SOLID STATE RELAY - MOSFET OUTPUT KAQW612 | NO.60M22006 SHEET 3 OF 10 | REV. 1 |
|---|---|---|---|

## ● Data Curve ( Normally Open Characteristics )

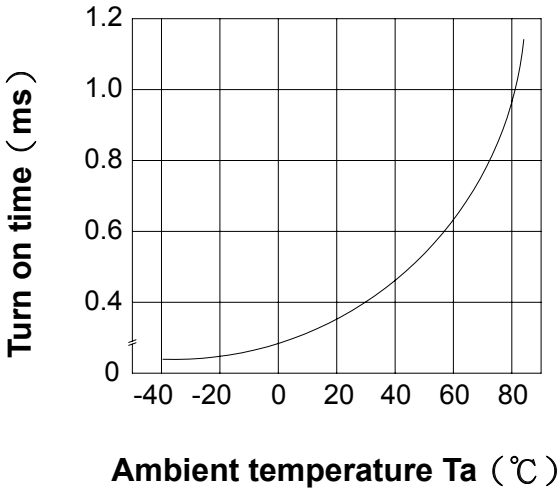
**Load current vs. ambient temperature**
**Allowable ambient Temperature：**
**-40℃ to +85℃**



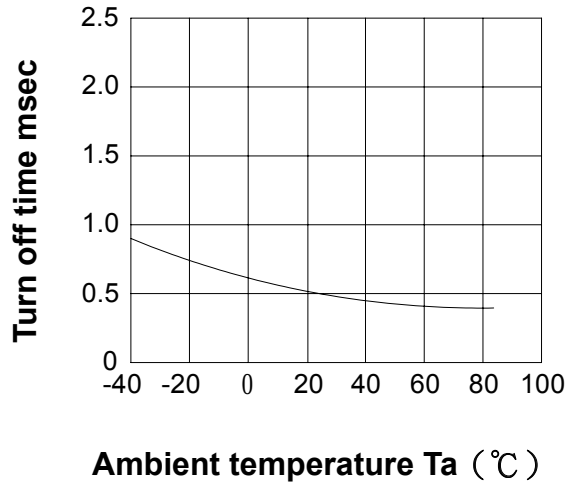

**On resistance vs. ambient temperature across terminals 5 and 6 pin**
**LED current：5mA**
**Continuous load current：200mA（DC）**




**Turn on time vs. ambient temperature**
**Load voltage 400V（DC）**
**LED current：5mA**
**Continuous load current：200mA（DC）**




**Turn off time vs. ambient temperature**
**Load voltage 400V（DC）**
**LED current：5mA**
**Continuous load current：200mA（DC）**

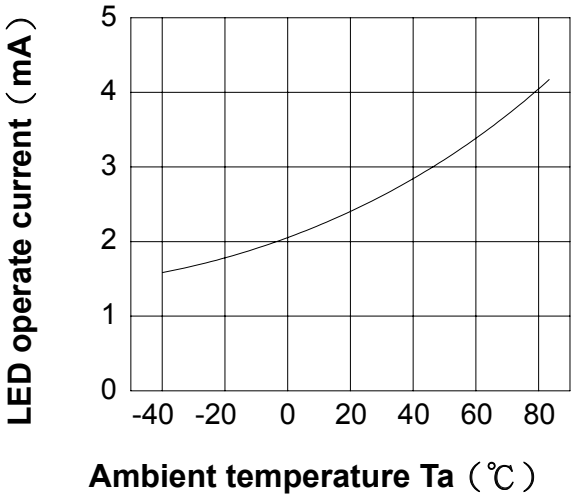


# PRODUCT SPECIFICATION

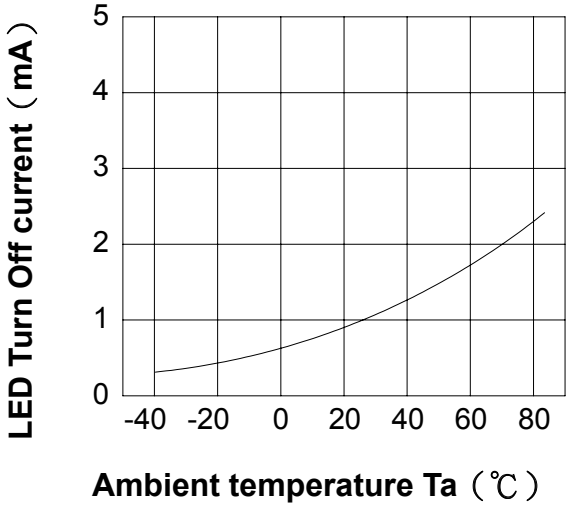
DATE：09/01/2006

| cosmo ELECTRONICS CORPORATION | SOLID STATE RELAY - MOSFET OUTPUT KAQW612 | NO.60M22006 SHEET 4 OF 10 | REV. 1 |
|---|---|---|---|

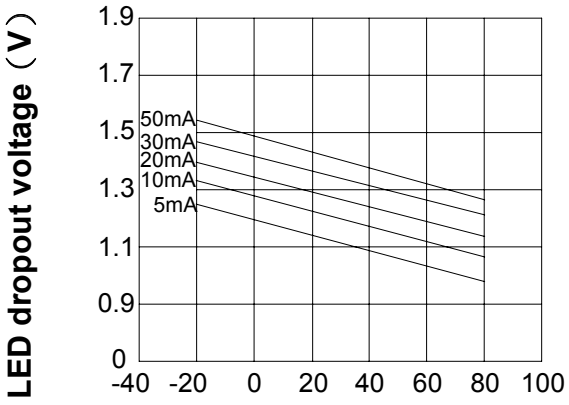
**LED operate current vs.**
**ambient temperature**
**Load Voltage：60V（DC）**
**Continuous load current：200mA（DC）**



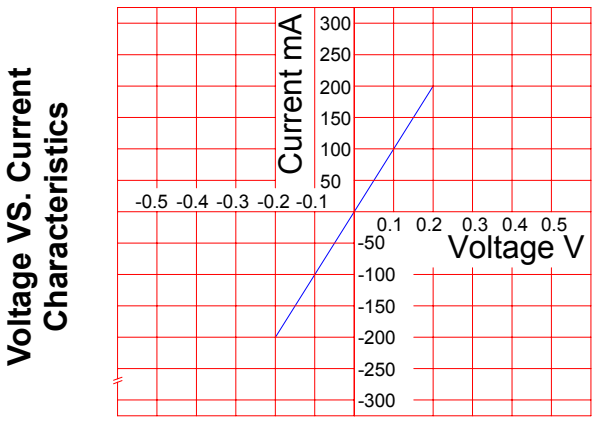

**LED Turn Off current vs.**
**ambient temperature**
**Load Voltage：60V（DC）**
**Continuous load current：200mA（DC）**




**LED dropout voltage vs.**
**ambient temperature**
**LED current：5 to 50mA**




**Voltage vs. current characteristics**
**of output at MOSFET portion**
**Measured portion：across terminals**
**5 and 6 pin**
**Ambient temperature：25℃**



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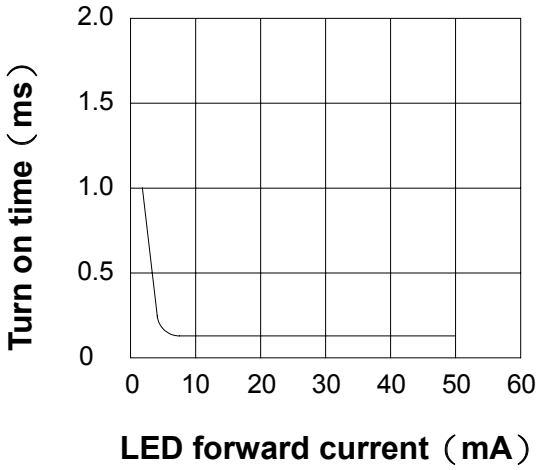
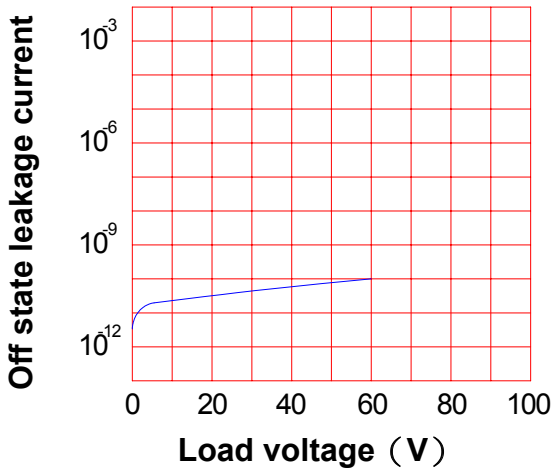
DATE：09/01/2006

| cosmo ELECTRONICS CORPORATION | SOLID STATE RELAY - MOSFET OUTPUT KAQW612 | NO.60M22006 | REV. 1 |
|---|---|---|---|
| | | SHEET 5 OF 10 | |

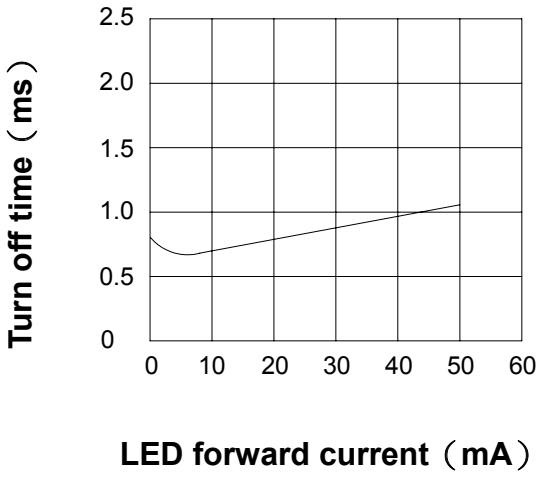
**LED forward current vs. turn on time**
**Across terminals 5 and 6 pin**
**Load voltage：60V（DC）**
**Continuous load current：200mA（DC）**
**Ambient temperature：25℃**



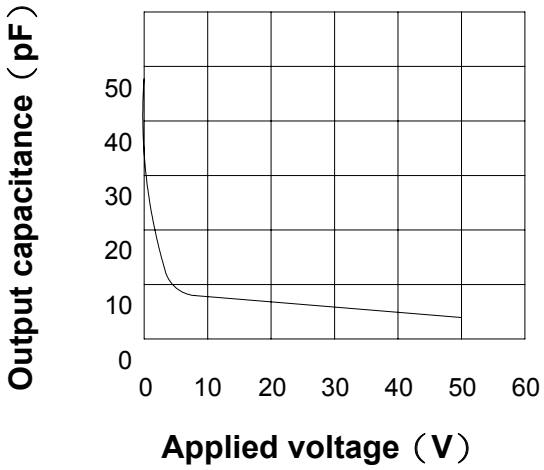

**Off state leakage current**
**Across terminals 5 and 6 pin**
**Ambient temperature：25℃**




**LED forward current vs. turn off time**
**Across terminals 5 and 6 pin**
**Load voltage：60V（DC）**
**Continuous load current：200mA（DC）**
**Ambient temperature：25℃**




**Applied voltage vs. output capacitance**
**Across terminals 5 and 6 pin**
**Frequency：1MHz**
**Ambient temperature：25℃**



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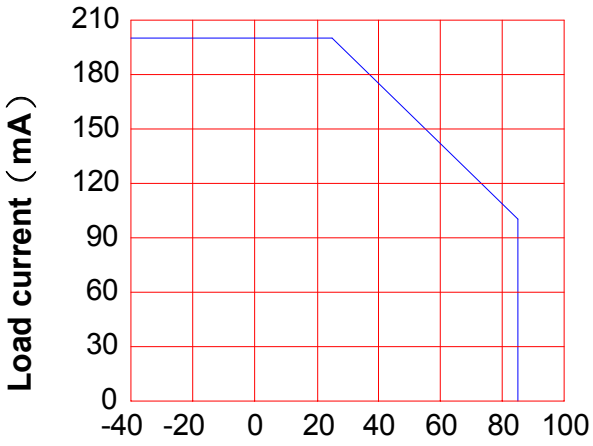
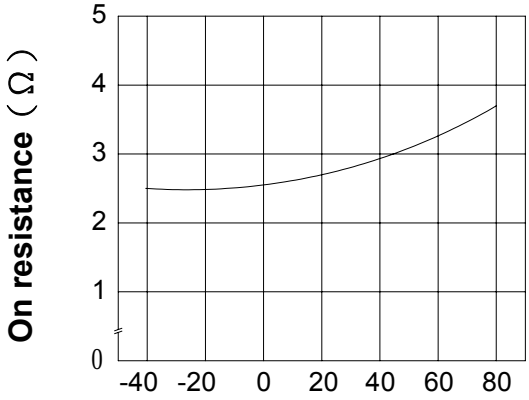
| cosmo ELECTRONICS CORPORATION | SOLID STATE RELAY - MOSFET OUTPUT KAQW612 | NO.60M22006 SHEET 6 OF 10 | REV. 1 |
|---|---|---|---|

## ● Data Curve ( Normally Close Characteristics )

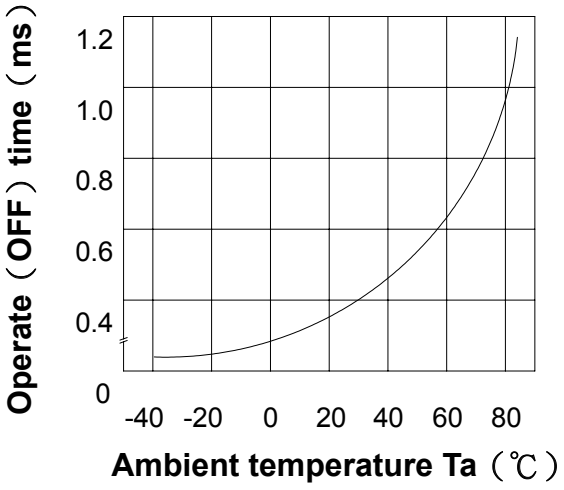
**Load current vs. ambient temperature**
**Allowable ambient Temperature：**
**-40℃ to +85℃**



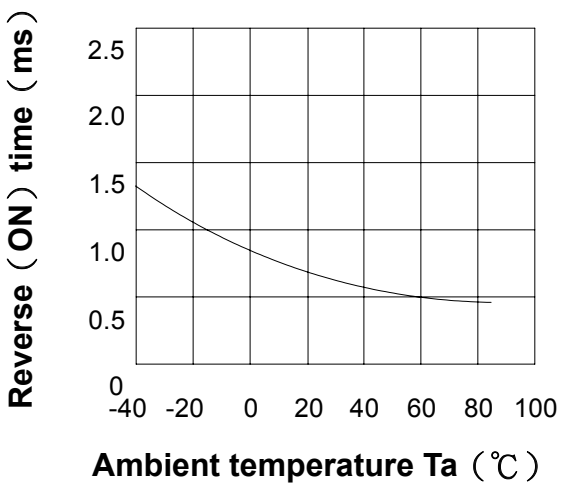

**On resistance vs. ambient temperature across terminals 7 and 8 pin**
**LED current：0mA**
**Continuous load current：200mA（DC）**




**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）**



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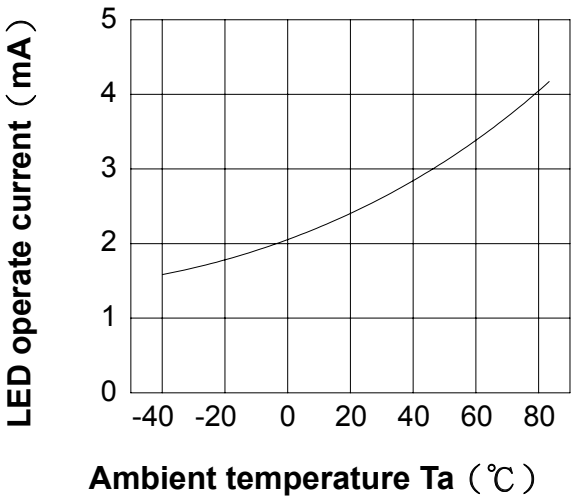
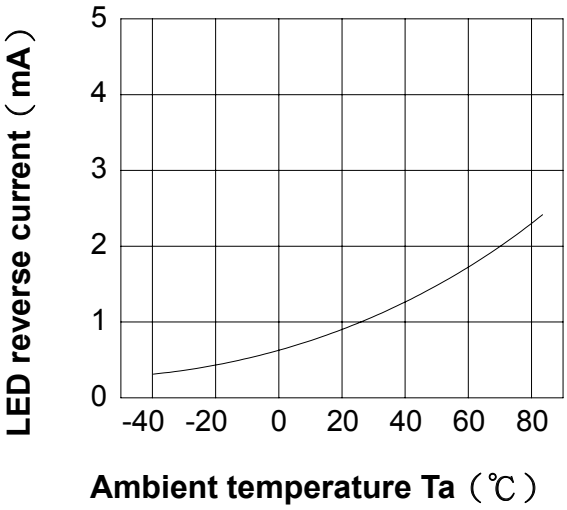
| cosmo ELECTRONICS CORPORATION | SOLID STATE RELAY - MOSFET OUTPUT KAQW612 | NO.60M22006 | REV. 1 |
|---|---|---|---|
| | | SHEET 7 OF 10 | |

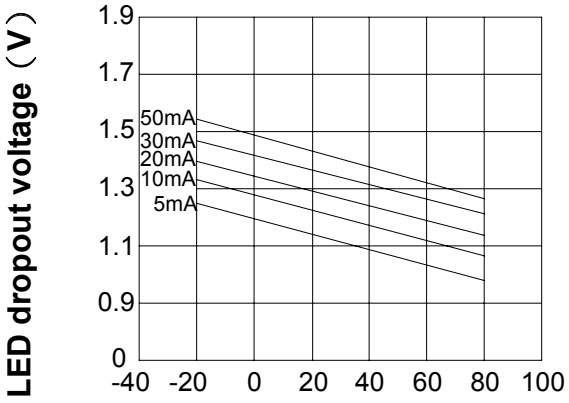
**LED Operate ( OFF ) current vs. ambient temperature**
**Load Voltage：60V（DC）**
**Continuous load current：200mA（DC）**



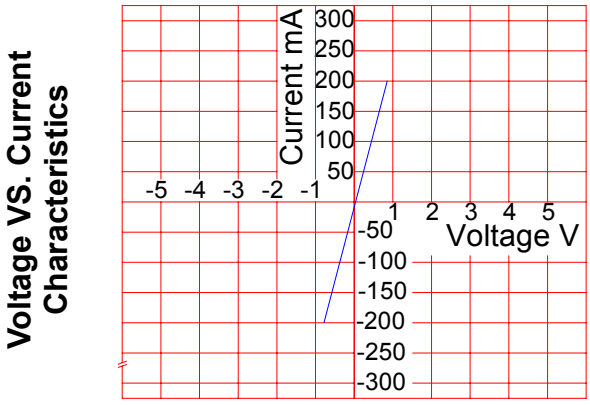

**LED Reverse ( ON ) current vs. ambient temperature**
**Load Voltage：60V（DC）**
**Continuous load current：200mA（DC）**




**LED dropout voltage vs. ambient temperature**
**LED current：5 to 50mA**




**Voltage vs. current characteristics of output at MOSFET portion**
**Measured portion：across terminals 7 and 8 pin**
**Ambient temperature：25℃**



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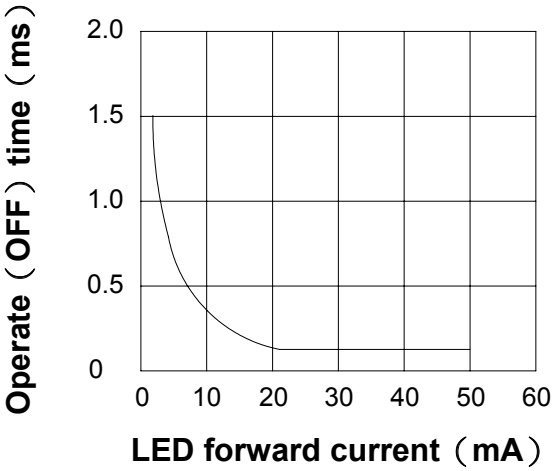
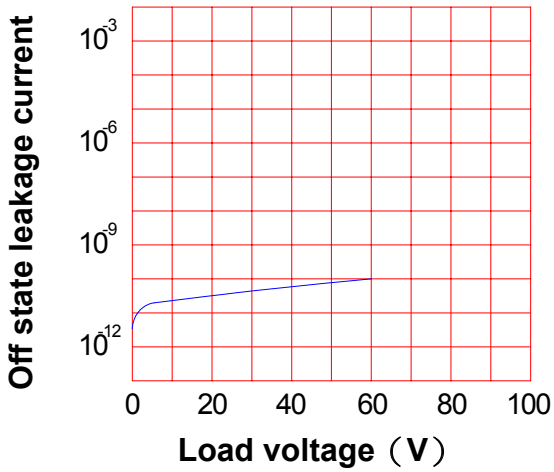
| cosmo ELECTRONICS CORPORATION | SOLID STATE RELAY - MOSFET OUTPUT KAQW612 | NO.60M22006 | REV. 1 |
|---|---|---|---|
| | | SHEET 8 OF 10 | |

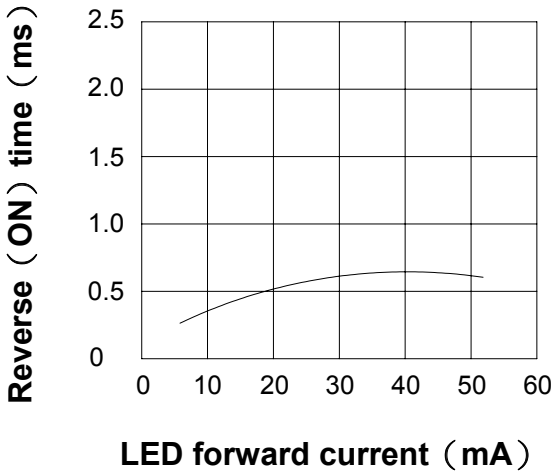
**LED forward current vs. operate（OFF）time**
**Across terminals 7 and 8 pin**
**Load voltage：60V（DC）**
**Continuous load current：200mA（DC）**
**Ambient temperature：25℃**



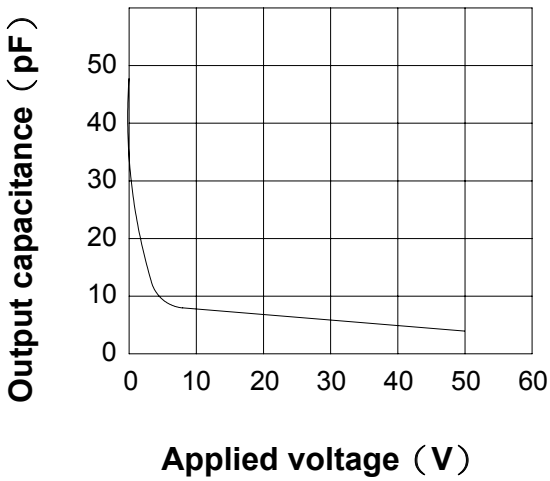

**Off state leakage current**
**Across terminals 7 and 8 pin**
**Ambient temperature：25℃**




**LED forward current vs. reverse（ON）time**
**Across terminals 7 and 8 pin**
**Load voltage：60V（DC）**
**Continuous load current：200mA（DC）**
**Ambient temperature：25℃**




**Applied voltage vs. output capacitance**
**Across terminals 7 and 8 pin**
**Frequency：1MHz**
**Ambient temperature：25℃**



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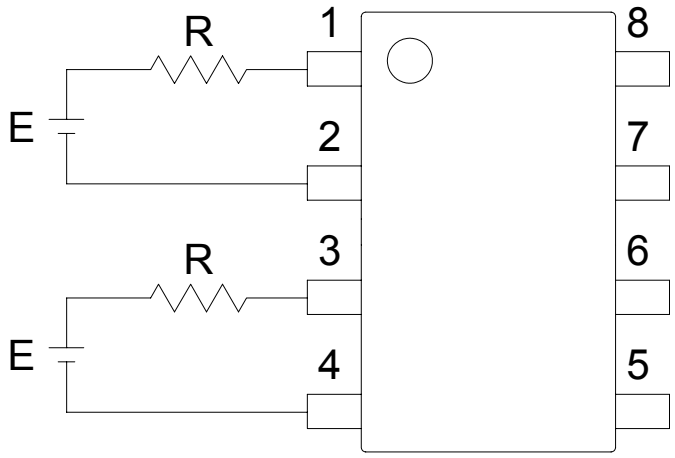
| cosmo ELECTRONICS CORPORATION | SOLID STATE RELAY - MOSFET OUTPUT KAQW612 | NO.60M22006 | REV. 1 |
|---|---|---|---|
| | | SHEET 9 OF 10 | |

## ● USING METHODS

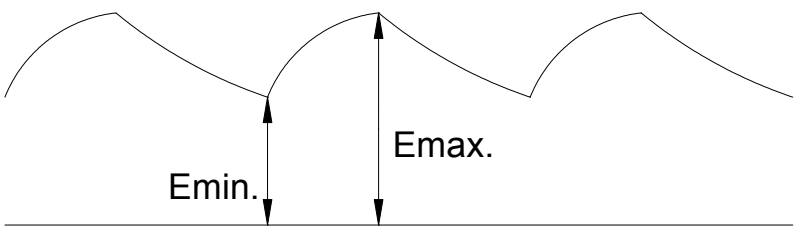
**Examples of resistance value to control LED forward current（IF）**

**SSR-MOSFET OUTPUT** **（IF=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.



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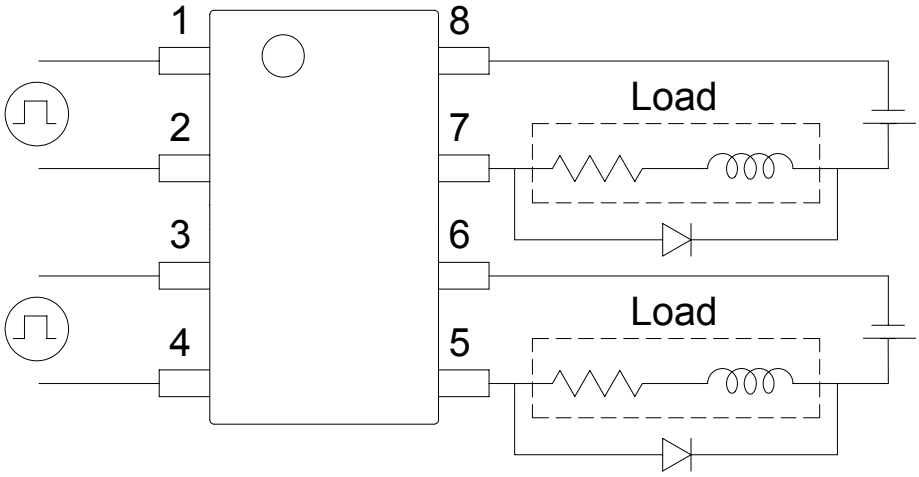
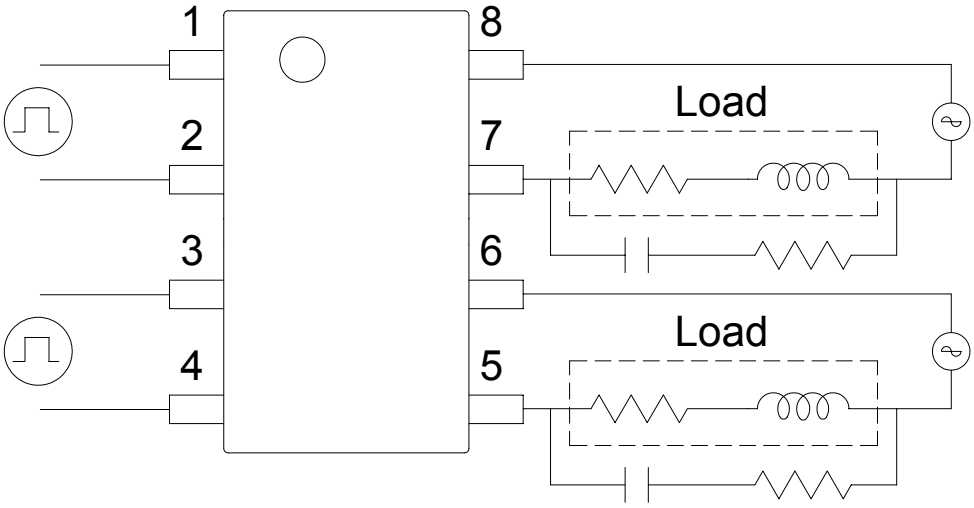
|---|---|---|---|
| | | SHEET 10 OF 10 | |

## ● USING METHODS

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




R-C Snubber