

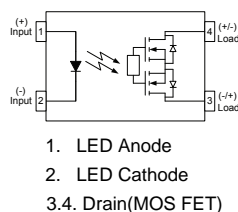
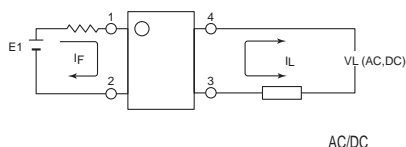
| Parameter             | Symbol   | Rating | Units    |
|-----------------------|----------|--------|----------|
| Load Voltage          | $V_L$    | 60     | V        |
| Load Current          | $I_L$    | 0.5    | A        |
| On-Resistance         | $R_{on}$ | 0.8    | $\Omega$ |
| I/O Isolation Voltage | $V_{io}$ | 5000   | Vrms     |



DIP-4



SMD-4



## SUPSiC PhotoRelays

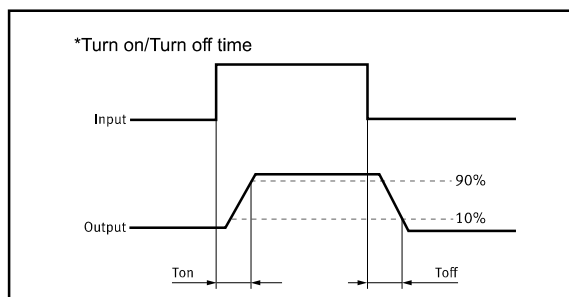
- Long life (No limit on mechanical and electrical lifetime) Bounce-free switching
- Higher speed and high frequency switching
- Higher sensitivity (less power consumption)
- Immunity to EMI or RFI
- No have voltaic arc, bounce, and noise More
- resistant to vibration and impact AC or DC load
- switching
- Small package size

## Applications

- Telecom/Datacom switching
- Multiplexers
- Meter reading systems
- Data acquisition
- Medical equipment
- Battery monitoring
- I/O Sub-Systems
- Robotics
- Aerospace
- Home/Safety security systems
- Process Control
- Energy Management
- Reed Relay EMR Replacement
- Programmable Controllers

## TPYES

| Category | Output rating |              | Package | Part No.  | Packing quantity |
|----------|---------------|--------------|---------|-----------|------------------|
|          | Load voltage  | Load current |         |           |                  |
| AC/DC    | 60V           | 0.5A         | DIP-4   | GAQY212E  | 100pcs/tube      |
|          |               |              | SMD-4   | GAQY212EH | 2000pcs/1reel    |



## Absolute Maximum Ratings (Ta = 25°C)

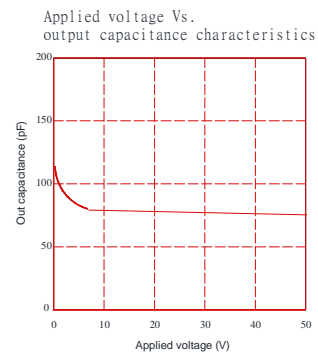
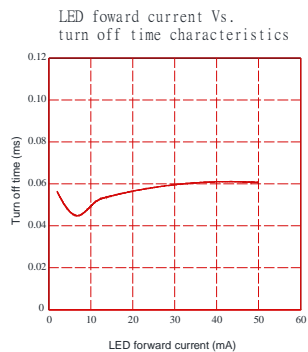
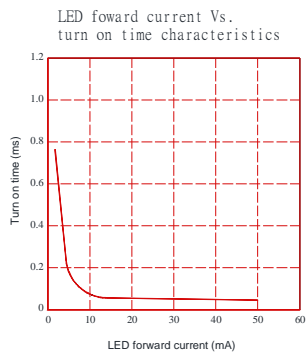
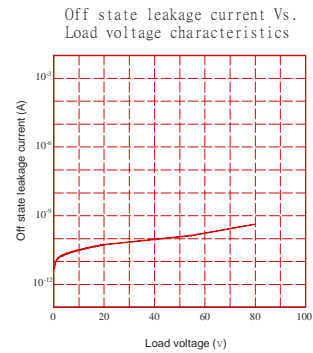
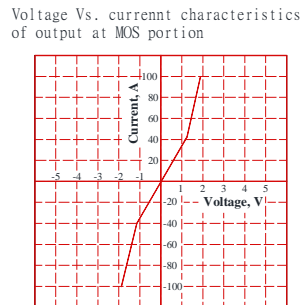
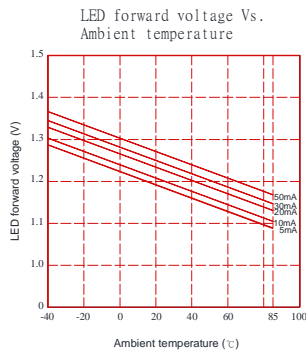
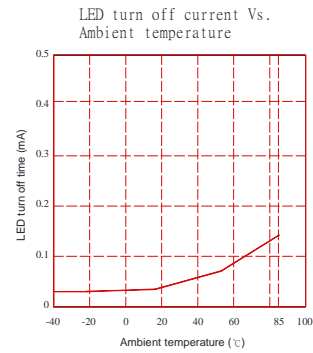
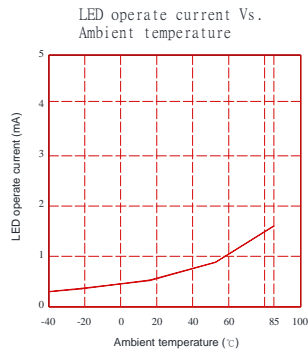
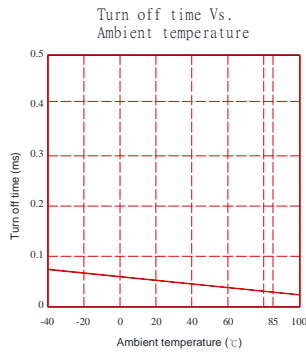
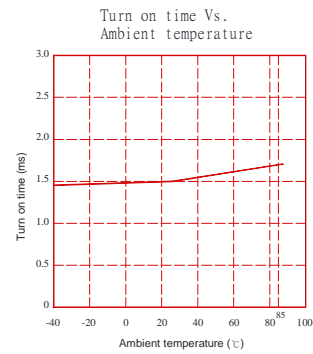
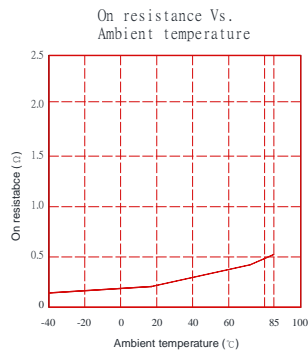
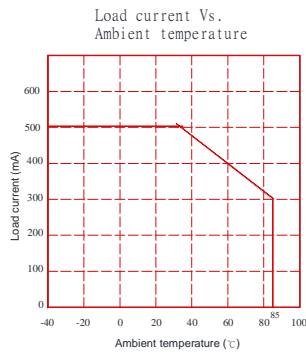
|                           | Item                     | Symbol            | Value       | Units            | Note                |
|---------------------------|--------------------------|-------------------|-------------|------------------|---------------------|
| Input                     | Continuous LED Current   | I <sub>F</sub>    | 50          | mA               |                     |
|                           | Peak LED Current         | I <sub>FP</sub>   | 1000        | mA               | f=100Hz,<br>duty=1% |
|                           | LED Reverse Voltage      | V <sub>R</sub>    | 5           | V                |                     |
|                           | Input Power Dissipation  | P <sub>In</sub>   | 75          | mW               |                     |
| Output                    | Load Voltage             | V <sub>L</sub>    | 60          | V(AC peak or DC) |                     |
|                           | Load Current             | I <sub>L</sub>    | 0.5         | A                |                     |
|                           | Peak Load Current        | I <sub>Peak</sub> | 1.5         | A                | 100ms(1 pulse)      |
|                           | Output Power Dissipation | P <sub>out</sub>  | 380         | mW               |                     |
| Total Power Dissipation   |                          | P <sub>T</sub>    | 500         | mW               |                     |
| I/O Isolation Voltage     |                          | V <sub>I/O</sub>  | 5000        | V <sub>rms</sub> | RH=60%, 1min        |
| Operating Temperature     |                          | T <sub>opr</sub>  | -40 to +85  | °C               |                     |
| Storage Temperature       |                          | T <sub>stg</sub>  | -40 to +100 | °C               |                     |
| Pin Soldering Temperature |                          | T <sub>sol</sub>  | 260         | °C               | 10 sec max.         |

## Electrical Specifications (Ambient Temperature: 25°C)

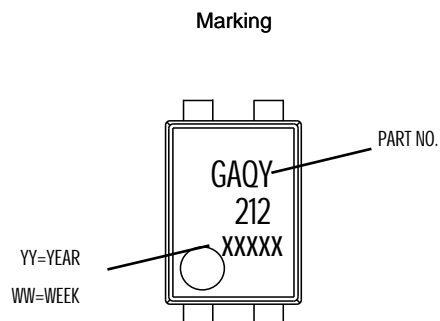
|                  | Item                      | Symbol             | MIN. | TYP. | MAX. | Units | Conditions  |
|------------------|---------------------------|--------------------|------|------|------|-------|---|
| Input            | LED Forward Voltage       | V <sub>F</sub>     |      | 1.2  | 1.4  | V     | I <sub>F</sub> =10mA  |
|                  | Operation LED Current     | I <sub>F on</sub>  |      | 0.5  | 5.0  | mA    |   |
|                  | Recovery LED Current      | I <sub>F off</sub> |      | 0.35 | 0.5  | mA    |   |
|                  | Recovery LED Voltage      | V <sub>F off</sub> | 0.7  |      |      | V     |   |
| Output           | On-Resistance             | R <sub>on</sub>    |      | 0.80 | 2.5  | Ω     | I <sub>F</sub> =5mA, I <sub>L</sub> =Max<br>Time to flow is within 1 sec. |
|                  | Off-State Leakage Current | I <sub>Leak</sub>  |      | 0.10 |      | uA    | V <sub>L</sub> =Rating  |
|                  | Output Capacitance        | C <sub>out</sub>   |      | 105  |      | pF    | V <sub>L</sub> =0, f=1MHz   |
| Transmis<br>sion | Turn-On Time              | T <sub>on</sub>    |      | 1.5  | 4    | ms    | I <sub>F</sub> =5mA, I <sub>L</sub> =Max                                  |
|                  | Turn-Off Time             | T <sub>off</sub>   |      | 0.05 | 1    | ms    |   |
| Coupled          | I/O Isolation Resistance  | R <sub>I/O</sub>   | 5    |      |      | GΩ    | DC500V  |
|                  | I/O Capacitance           | C <sub>I/O</sub>   |      | 0.8  | 1.5  | pF    | f=1MHz  |

Please obey the following conditions to ensure proper device operation and resetting. Input LED current (Recommended value): I<sub>F</sub> ≥5mA and ≤30mA

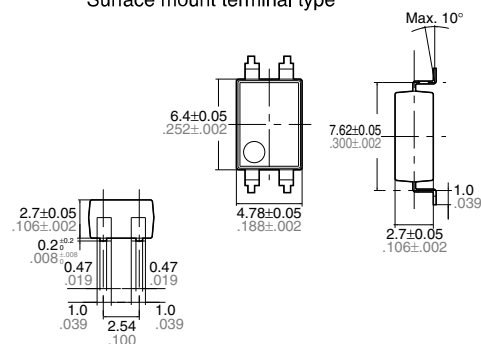
## Engineering Data



## Dimensions and SMD-4 Package Unit: mm

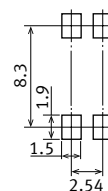


### Surface mount terminal type



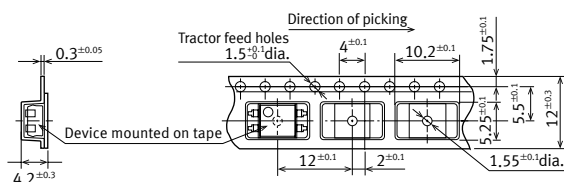
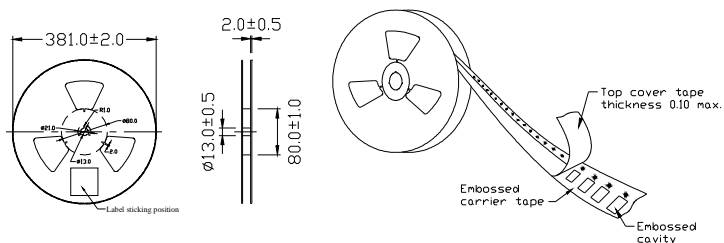
Terminal thickness:  $t = 0.2$   
General tolerance:  $\pm 0.1$

### Recommended mounting pad (TOP VIEW)

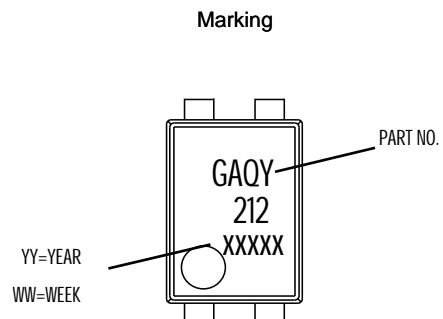


Tolerance:  $\pm 0.1$

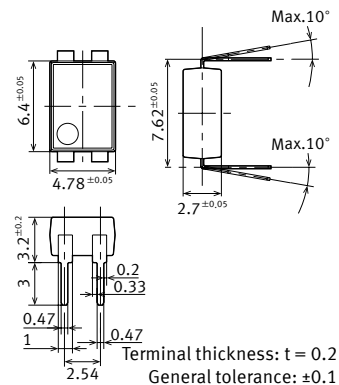
## Tape dimensions ( tape reel )



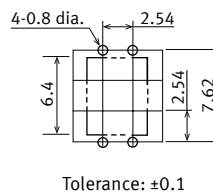
## Dimensions and DIP-4 Package Unit: mm



### Surface mount terminal type



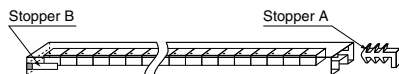
### PC board pattern (BOTTOM VIEW)



## Tape dimensions ( tape reel )

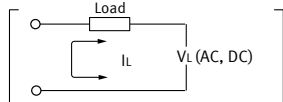
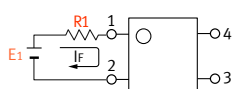
### DIP type

Devices are packaged in a tube so that pin No. 1 is on the stopper B side. Observe correct orientation when mounting them on PC boards.



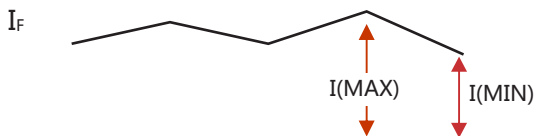
## Using Methods

Examples of resistance value to control LED forward current ( $I_F=5\text{mA}$ )



| E1   | R1 (Approx)   |
|------|---------------|
| 3.3V | 300 $\Omega$  |
| 5.0V | 600 $\Omega$  |
| 12V  | 1.9K $\Omega$ |
| 24V  | 4.1K $\Omega$ |

LED forward current must be more than 5mA , at  $I(\text{MIN})$  ,and less than 30mA , at  $I(\text{MAX})$ .



## Recommended Operating Conditions

Please obey the following conditions to ensure proper device operation and resetting. Input LED current (Recommended value):

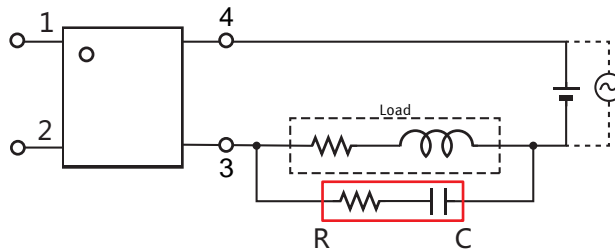
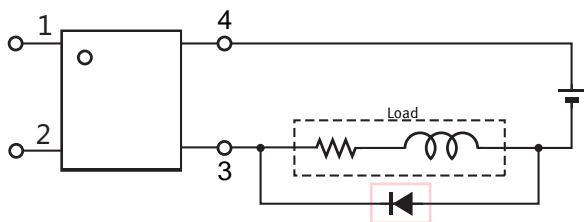
| Characteristic  | Symbol | Min | Typ. | Max | Unit |
|-----------------|--------|-----|------|-----|------|
| Forward current | $I_F$  | 5.0 | 7.0  | 30  | mA   |

## Protection Circuit

Output spike voltages:if an inductive load generates spike voltages which exceed heabsolute maximum rating, the spike voltage shall be limited.

Clamp diode is connected in parallel with the load.  
Absorb capacity with external diode.

CR Snubber is connected in parallel with the load.  
Absorb capacity with buffer capacity.



When adding diodes, buffer circuits (C-R), and other protections, they need to be installed near the MOS RELAY to be effective.  
Adding protection elements may result in a slow reset time, so adjust them according to the actual situation before use.

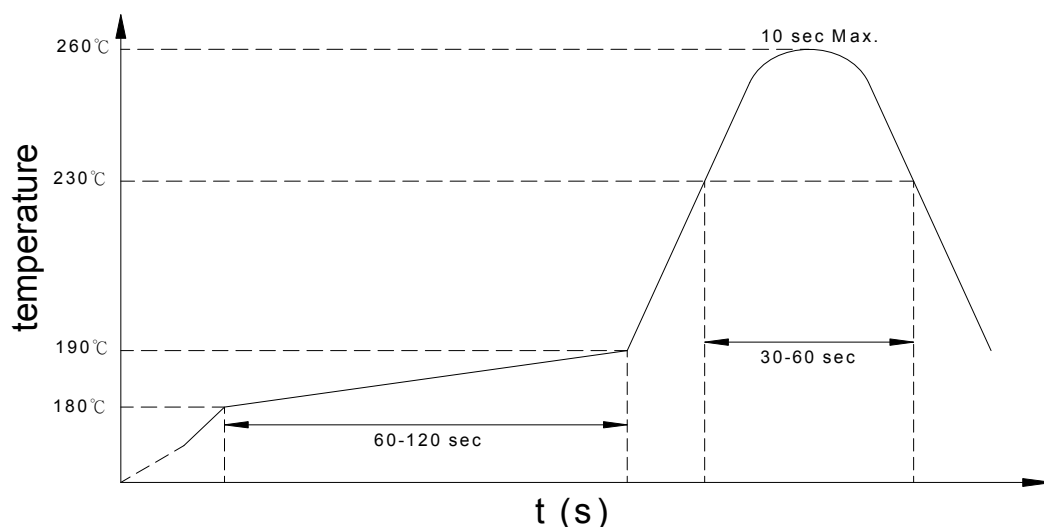
Note: When developing designs using this product, perform the expected performance of the equipment under the operating conditions recommended by the guidelines in this document. Continuous use under heavy loads (including, but not limited to, the application of high temperatures/current/voltage and significant changes in temperature, etc.) may result in deterioration of the reliability of this product.

## Recommended Soldering Conditions

### (a) Infrared reflow soldering :

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