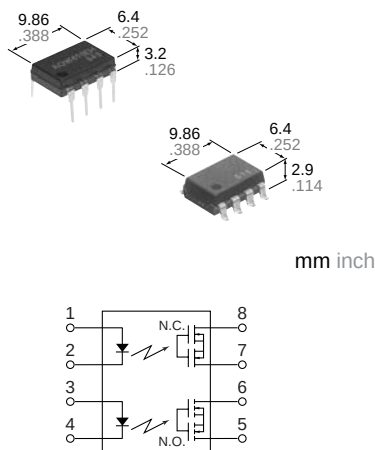


**Both NO and NC contacts  
incorporated in a compact  
DIP8-pin  
Reinforced insulation**

**PhotoMOS Relays**  
**GU-E Form A & B**  
**(AQW610EH)**



**Compliance with RoHS Directive**

## FEATURES

- 1. 60V type couples high capacity (0.5A) with low on-resistance (typ. 1Ω).**
- 2. Reinforced insulation 5,000 V**  
More than 0.4 mm internal insulation distance between inputs and outputs. Conforms to EN41003, EN60950 (reinforced insulation).
- 3. Approx. 1/2 the space compared with the mounting area of a set of 1 Form A and 1 Form B PhotoMOS relays**
- 4. Applicable for 1 Form A 1 Form B use as well as two independent 1 Form A and 1 Form B use**
- 5. Controls low-level analog signals**  
PhotoMOS relays feature extremely low closed-circuit offset voltage to enable control of low-level analog signals without distortion.

## 6. High sensitivity and high speed response

Can control max. 0.14 A load current with 5 mA input current. Fast operation speed of typ. 0.5 ms [N.O.] (AQW610EH).

## 7. Low-level off-state leakage current

## TYPICAL APPLICATIONS

- Power supply
- Measuring instruments
- Security equipment
- Modem
- Telephone equipment
- Electricity, plant equipment
- Sensing equipment

## TYPES

|                | I/O isolation voltage | Output rating* |              | Package  | Part No.              |                        |            |            | Packing quantity                                       |            |                                  |                                  |      |               |
|----------------|-----------------------|----------------|--------------|----------|-----------------------|------------------------|------------|------------|--------------------------------------------------------|------------|----------------------------------|----------------------------------|------|---------------|
|                |                       |                |              |          | Through hole terminal | Surface-mount terminal |            |            |                                                        |            |                                  |                                  |      |               |
|                |                       | Load voltage   | Load current |          |                       |                        |            |            | Tube packing style                                     |            | Tape and reel packing style      |                                  | Tube | Tape and reel |
|                |                       |                |              |          |                       |                        |            |            |                                                        |            | Picked from the 1/2/3/4-pin side | Picked from the 5/6/7/8-pin side |      |               |
| AC/DC dual use | Reinforced 5,000 V    | 60 V           | 500 mA       | DIP8-pin | AQW612EH              | AQW612EHA              | AQW612EHAX | AQW612EHAZ | 1 tube contains: 40 pcs.<br>1 batch contains: 400 pcs. | 1,000 pcs. |                                  |                                  |      |               |
|                |                       | 350 V          | 120 mA       |          | AQW610EH              | AQW610EHA              | AQW610EHAX | AQW610EHAZ |                                                        |            |                                  |                                  |      |               |
|                |                       | 400 V          | 100 mA       |          | AQW614EH              | AQW614EHA              | AQW614EHAX | AQW614EHAZ |                                                        |            |                                  |                                  |      |               |

\*Indicate the peak AC and DC values.

Note: The surface mount terminal shape indicator "A" and the packing style indicator "X" or "Z" are not marked on the relay.

## RATING

### 1. Absolute maximum ratings (Ambient temperature: 25°C 77°F)

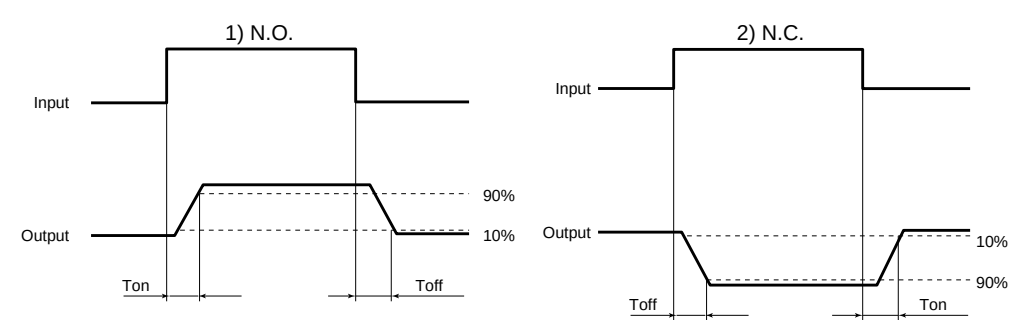
| Item                    |                         | Symbol     | AQW612EH(A)                     | AQW610EH(A)     | AQW614EH(A)    | Remarks                                                          |
|-------------------------|-------------------------|------------|---------------------------------|-----------------|----------------|------------------------------------------------------------------|
| Input                   | LED forward current     | $I_F$      | 50 mA                           |                 |                |                                                                  |
|                         | LED reverse voltage     | $V_R$      | 5 V                             |                 |                |                                                                  |
|                         | Peak forward current    | $I_{FP}$   | 1 A                             |                 |                | $f = 100 \text{ Hz}$ , Duty factor = 0.1%                        |
|                         | Power dissipation       | $P_{in}$   | 75 mW                           |                 |                |                                                                  |
| Output                  | Load voltage (peak AC)  | $V_L$      | 60 V                            | 350 V           | 400 V          |                                                                  |
|                         | Continuous load current | $I_L$      | 0.5 A (0.6 A)                   | 0.12 A (0.14 A) | 0.1 A (0.13 A) | Peak AC, DC<br>( ): in case of using only 1a or 1b,<br>1 channel |
|                         | Peak load current       | $I_{peak}$ | 1.5 A                           | 0.36 A          | 0.3 A          | 100 ms (1 shot), $V_L = \text{DC}$                               |
|                         | Power dissipation       | $P_{out}$  | 800 mW                          |                 |                |                                                                  |
| Total power dissipation |                         | $P_T$      | 850 mW                          |                 |                |                                                                  |
| I/O isolation voltage   |                         | $V_{iso}$  | 5,000 V AC                      |                 |                |                                                                  |
| Temperature limits      | Operating               | $T_{opr}$  | -40°C to +85°C -40°F to +185°F  |                 |                | Non-condensing at low temperatures                               |
|                         | Storage                 | $T_{stg}$  | -40°C to +100°C -40°F to +212°F |                 |                |                                                                  |

# GU-E Form A & B (AQW610EH)

## 2. Electrical characteristics (Ambient temperature: 25°C 77°F)

| Item                             |                           |               | Symbol                                            | AQW612EH(A)                                       | AQW610EH(A)                    | AQW614EH(A)                    | Condition                                                                         |
|----------------------------------|---------------------------|---------------|---------------------------------------------------|---------------------------------------------------|--------------------------------|--------------------------------|-----------------------------------------------------------------------------------|
| Input                            | LED operate current       | Typical       | I <sub>Fon</sub> (N.O.)                           | 1.3 mA                                            |                                |                                | I <sub>L</sub> =Max.                                                              |
|                                  |                           | Maximum       | I <sub>Foff</sub> (N.C.)                          | 3.0 mA                                            |                                |                                |                                                                                   |
|                                  | LED reverse current       | Minimum       | I <sub>Foff</sub> (N.O.)                          | 0.4 mA                                            |                                |                                | I <sub>L</sub> =Max.                                                              |
|                                  |                           | Typical       | I <sub>Fon</sub> (N.C.)                           | 1.3 mA                                            |                                |                                |                                                                                   |
|                                  | LED dropout voltage       | Typical       | V <sub>F</sub>                                    | 1.25 (1.14 V at I <sub>F</sub> = 5 mA)            |                                |                                | I <sub>F</sub> =50 mA                                                             |
|                                  |                           | Maximum       |                                                   | 1.5 V                                             |                                |                                |                                                                                   |
| Output                           | On resistance             | Typical       | R <sub>on</sub>                                   | 1Ω                                                | 18Ω                            | 26Ω                            | I <sub>F</sub> =5mA (N.O.) I <sub>F</sub> = 0mA (N.C.)                            |
|                                  |                           | Maximum       |                                                   | 2.5Ω                                              | 25Ω                            | 35Ω                            | I <sub>L</sub> = Max.<br>Within 1 s on time                                       |
|                                  | Off state leakage current | Maximum       | I <sub>Leak</sub>                                 | 1μA (N.O.), 10μA (N.C.)                           |                                |                                | I <sub>F</sub> =0 mA (N.O.) I <sub>F</sub> = 5 mA (N.C.)<br>V <sub>L</sub> = Max. |
|                                  | Transfer characteristics  | Operate time* | Typical                                           | T <sub>on</sub> (N.O.)<br>T <sub>off</sub> (N.C.) | 1.0 ms (N.O.)<br>3.0 ms (N.C.) | 0.5 ms (N.O.)<br>1.0 ms (N.C.) | 0.5 ms (N.O.)<br>0.8 ms (N.C.)                                                    |
| Maximum                          |                           |               | 4.0 ms (N.O.)<br>10.0 ms (N.C.)                   |                                                   | 3.0 ms                         |                                |                                                                                   |
| Reverse time*                    |                           | Typical       | T <sub>off</sub> (N.O.)<br>T <sub>on</sub> (N.C.) | 0.05ms (N.O.),<br>0.2ms (N.C.)                    | 0.08ms (N.O.),<br>0.3ms (N.C.) | 0.08ms (N.O.),<br>0.2ms (N.C.) | I <sub>F</sub> = 5 mA → 0 mA<br>I <sub>L</sub> = Max.                             |
|                                  |                           | Maximum       |                                                   | 1.0ms                                             |                                |                                |                                                                                   |
| I/O capacitance                  |                           | Typical       | C <sub>iso</sub>                                  | 0.8 pF                                            |                                |                                | f = 1MHz<br>V <sub>B</sub> = 0 V                                                  |
|                                  |                           | Maximum       |                                                   | 1.5 pF                                            |                                |                                |                                                                                   |
| Initial I/O isolation resistance |                           | Minimum       | R <sub>iso</sub>                                  | 1,000MΩ                                           |                                |                                | 500 V DC                                                                          |

\*Operate/Reverse time



## RECOMMENDED OPERATING CONDITIONS

Please obey the following conditions to ensure proper relay operation and resetting.

| Item              | Symbol | Recommended value | Unit |
|-------------------|--------|-------------------|------|
| Input LED current | $I_F$  | 5 to 10           | mA   |

### ■ For Dimensions

### ■ For Schematic and Wiring Diagrams

### ■ For Cautions for Use

### ■ These products are not designed for automotive use.

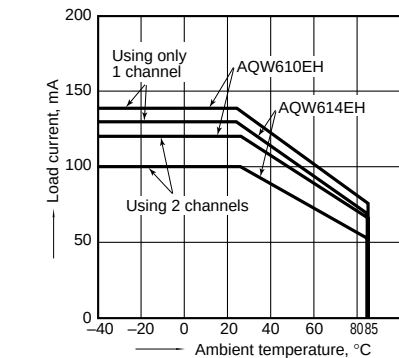
If you are considering to use these products for automotive applications, please contact your local Panasonic Electric Works technical representative.

For more information

## REFERENCE DATA

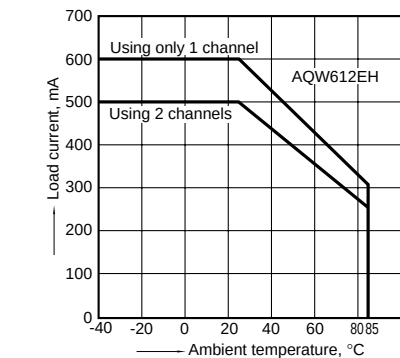
### 1-(1). Load current vs. ambient temperature characteristics

Allowable ambient temperature: -40°C to +85°C  
-40°F to +185°F



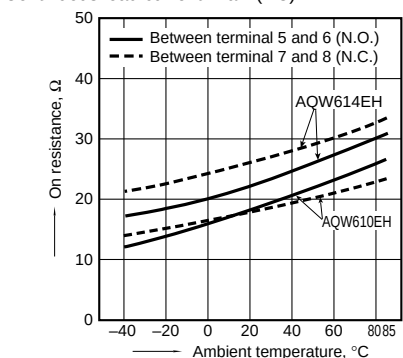
### 1-(2). Load current vs. ambient temperature characteristics

Allowable ambient temperature: -40°C to +85°C  
-40°F to +185°F



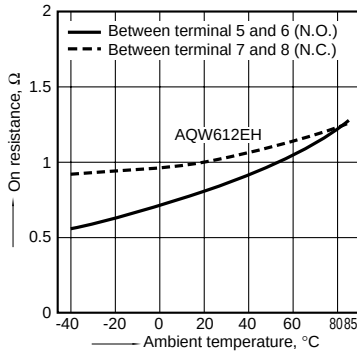
### 2-(1). On resistance vs. ambient temperature characteristics

Measured portion: between terminals 5 and 6, 7 and 8;  
LED current: 5 mA; Load voltage; Max. (DC)  
Continuous load current: Max. (DC)



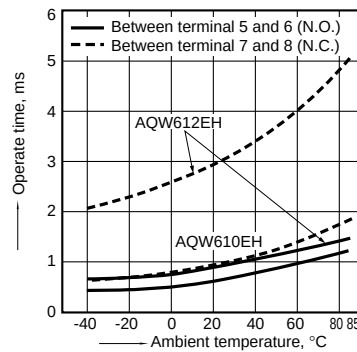
## 2-(2). On resistance vs. ambient temperature characteristics

Measured portion: between terminals 5 and 6, 7 and 8;  
LED current: 5 mA; Load voltage: Max. (DC)  
Continuous load current: Max. (DC)



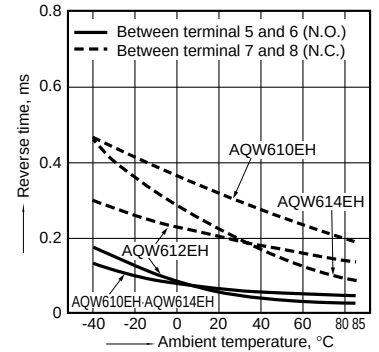
## 3. Operate time vs. ambient temperature characteristics

LED current: 5 mA; Load voltage: Max. (DC);  
Continuous load current: Max. (DC)



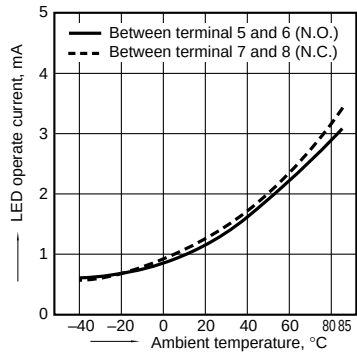
## 4. Reverse time vs. ambient temperature characteristics

LED current: 5 mA; Load voltage: Max. (DC);  
Continuous load current: Max. (DC)



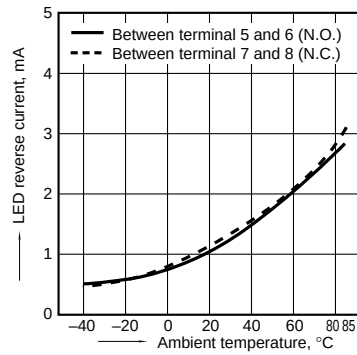
## 5. LED operate current vs. ambient temperature characteristics

Sample: All types;  
Load voltage: Max. (DC);  
Continuous load current: Max. (DC)



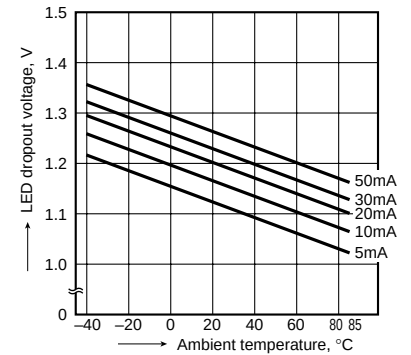
## 6. LED reverse current vs. ambient temperature characteristics

Sample: All types;  
Load voltage: Max. (DC);  
Continuous load current: Max. (DC)



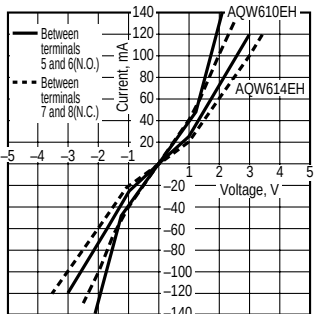
## 7. LED dropout voltage vs. ambient temperature characteristics

Sample: All types;  
LED current: 5 to 50 mA



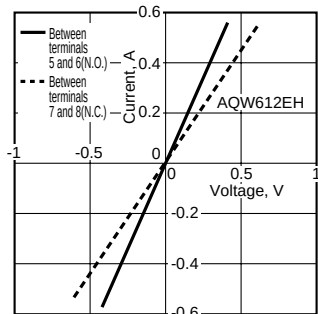
## 8-(1). Current vs. voltage characteristics of output at MOS portion

Measured portion: between terminals 5 and 6, 7 and 8;  
Ambient temperature: 25°C 77°F



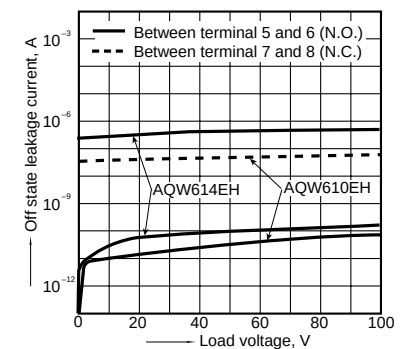
## 8-(2). Current vs. voltage characteristics of output at MOS portion

Measured portion: between terminals 5 and 6, 7 and 8;  
Ambient temperature: 25°C 77°F



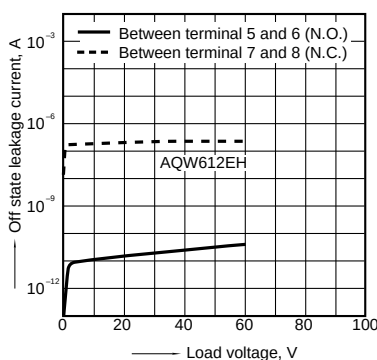
## 9-(1). Off state leakage current vs. load voltage characteristics

Measured portion: between terminals 5 and 6, 7 and 8;  
Ambient temperature: 25°C 77°F



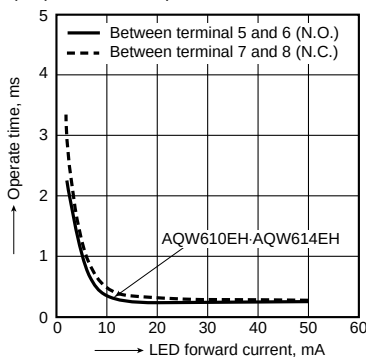
## 9-(2). Off state leakage current vs. load voltage characteristics

Measured portion: between terminals 5 and 6, 7 and 8;  
Ambient temperature: 25°C 77°F



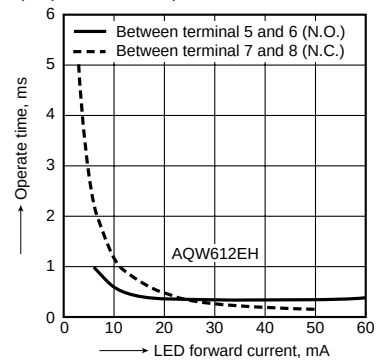
## 10-(1). Operate time vs. LED forward current characteristics

Measured portion: between terminals 5 and 6, 7 and 8;  
Load voltage: Max. (DC); Continuous load current: Max. (DC); Ambient temperature: 25°C 77°F



## 10-(2). Operate time vs. LED forward current characteristics

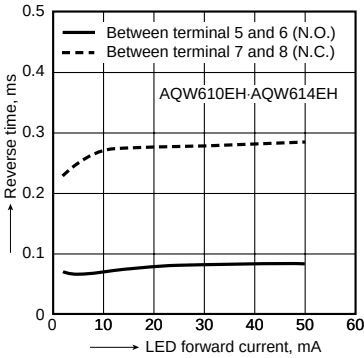
Measured portion: between terminals 5 and 6, 7 and 8;  
Load voltage: Max. (DC); Continuous load current: Max. (DC); Ambient temperature: 25°C 77°F



# GU-E Form A & B (AQW61○EH)

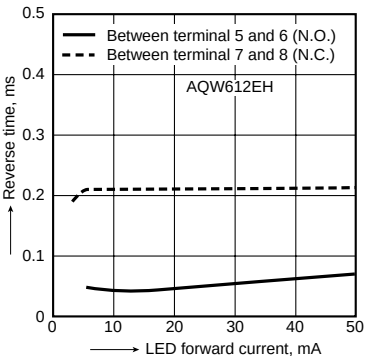
## 11-(1). Reverse time vs. LED forward current characteristics

Measured portion: between terminals 5 and 6, 7 and 8;  
Load voltage: Max. (DC); Continuous load current:  
Max. (DC); Ambient temperature: 25°C 77°F



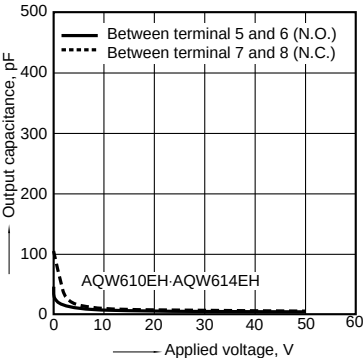
## 11-(2). Reverse time vs. LED forward current characteristics

Measured portion: between terminals 5 and 6, 7 and 8;  
Load voltage: Max. (DC); Continuous load current:  
Max. (DC); Ambient temperature: 25°C 77°F



## 12-(1). Output capacitance vs. applied voltage characteristics

Measured portion: between terminals 5 and 6, 7 and 8;  
Frequency: 1 MHz;  
Ambient temperature: 25°C 77°F



## 12-(2). Output capacitance vs. applied voltage characteristics

Measured portion: between terminals 5 and 6, 7 and 8;  
Frequency: 1 MHz;  
Ambient temperature: 25°C 77°F

