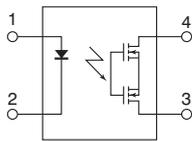
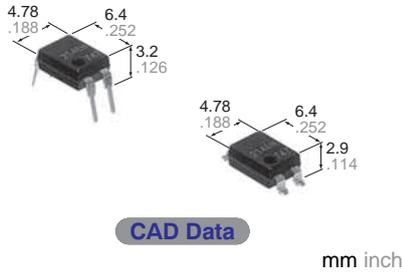


**High cost-performance  
DIP4-pin type with  
reinforced insulation**

**PhotoMOS®  
GU-E 1 Form A  
(AQY210EH)**



## FEATURES

**1. Reinforced insulation of 5,000 V**  
More than 0.4 mm internal insulation distance between inputs and outputs. Con-forms to EN41003, EN60950 (reinforced insulation).

**2. Controls low-level analog signals**  
PhotoMOS relays feature extremely low closed-circuit offset voltage to enable control of low-level analog signals without distortion.

**3. High sensitivity and low on-resistance**  
Can control max. 0.13 A load current with 5 mA input current.  
Low on-resistance of typ. 25Ω (AQY211EH).

**4. Low-level off state leakage current of max. 1 μA**

## TYPICAL APPLICATIONS

- Modem
- Telephone equipment
- Security equipment
- Sensing equipment

## TYPES

|                | I/O isolation voltage | Output rating* |              | Package  | Part No.                     |                              |            |                             | Packing quantity  |               |
|----------------|-----------------------|----------------|--------------|----------|------------------------------|------------------------------|------------|-----------------------------|---|---------------|
|                |                       |                |              |          | Through hole terminal        | Surface-mount terminal       |            |                             | Tube  | Tape and reel |
|                |                       |                |              |          |                              | Tube packing style           |            | Tape and reel packing style |   |               |
|                |                       | Load voltage   | Load current |          | Picked from the 1/2-pin side | Picked from the 3/4-pin side |            |                             |   |               |
| AC/DC dual use | Reinforced 5,000 V    | 30 V           | 1,000 mA     | DIP4-pin | AQY211EH                     | AQY211EHA                    | AQY211EHAX | AQY211EHAZ                  | 1 tube contains: 100 pcs.<br>1 batch contains: 1,000 pcs. | 1,000 pcs.    |
|                |                       | 60 V           | 550 mA       |          | AQY212EH                     | AQY212EHA                    | AQY212EHAX | AQY212EHAZ                  |   |               |
|                |                       | 350 V          | 130 mA       |          | AQY210EH                     | AQY210EHA                    | AQY210EHAX | AQY210EHAZ                  |   |               |
|                |                       | 400 V          | 120 mA       |          | AQY214EH                     | AQY214EHA                    | AQY214EHAX | AQY214EHAZ                  |   |               |
|                |                       | 600 V          | 50 mA        |          | AQY216EH                     | AQY216EHA                    | AQY216EHAX | AQY216EHAZ                  |   |               |

\*Indicate the peak AC and DC values.

Note: For space reasons, the initial letters of the part number "AQY", the surface mount terminal shape indicator "A" and the packing style indicator "X" or "Z" are not marked on the relay. (Ex. the label for product number AQY211EHAX is 211EH)

## RATING

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

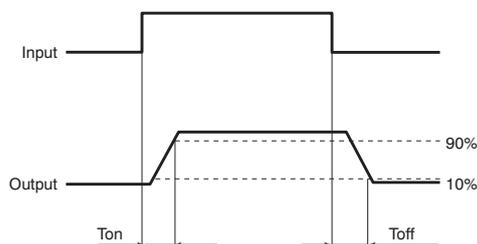
| Item                    |                         | Symbol            | AQY211EH(A)                     | AQY212EH(A) | AQY210EH(A) | AQY214EH(A) | AQY216EH(A) | Remarks                                 |
|-------------------------|-------------------------|-------------------|---------------------------------|-------------|-------------|-------------|-------------|---|
| Input                   | LED forward current     | I <sub>F</sub>    | 50mA                            |             |             |             |             |   |
|                         | LED reverse voltage     | V <sub>R</sub>    | 5 V                             |             |             |             |             |   |
|                         | Peak forward current    | I <sub>FP</sub>   | 1 A                             |             |             |             |             | f =100 Hz,<br>Duty factor = 0.1%        |
|                         | Power dissipation       | P <sub>in</sub>   | 75mW                            |             |             |             |             |   |
| Output                  | Load voltage (peak AC)  | V <sub>L</sub>    | 30 V                            | 60 V        | 350 V       | 400 V       | 600 V       |   |
|                         | Continuous load current | I <sub>L</sub>    | 1 A                             | 0.55 A      | 0.13 A      | 0.12 A      | 0.05 A      | Peak AC, DC                             |
|                         | Peak load current       | I <sub>peak</sub> | 3 A                             | 1.5 A       | 0.4 A       | 0.3 A       | 0.15 A      | 100 ms (1 shot),<br>V <sub>L</sub> = DC |
|                         | Power dissipation       | P <sub>out</sub>  | 500mW                           |             |             |             |             |   |
| Total power dissipation |                         | P <sub>T</sub>    | 550mW                           |             |             |             |             |   |
| I/O isolation voltage   |                         | V <sub>iso</sub>  | 5,000 V AC                      |             |             |             |             |   |
| Temperature limits      | Operating               | T <sub>opr</sub>  | -40°C to +85°C -40°F to +185°F  |             |             |             |             | Non-condensing at low temperatures      |
|                         | Storage                 | T <sub>stg</sub>  | -40°C to +100°C -40°F to +212°F |             |             |             |             |   |

# GU-E 1 Form A (AQY210EH)

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

| Item                             |                           | Symbol                               | AQY211EH(A) | AQY212EH(A) | AQY210EH(A) | AQY214EH(A) | AQY216EH(A)          | Condition   |
|----------------------------------|---------------------------|--------------------------------------|-------------|-------------|-------------|-------------|----------------------|---|
| Input                            | LED operate current       | Typical                              | 1.2mA       |             |             |             |                      | I <sub>L</sub> =Max.  |
|                                  |                           | Maximum                              | 3.0mA       |             |             |             |                      |   |
|                                  | LED turn off current      | Minimum                              | 0.4mA       |             |             |             |                      | I <sub>L</sub> =Max.  |
|                                  |                           | Typical                              | 1.1mA       |             |             |             |                      |   |
| LED dropout voltage              | Typical                   | 1.25 (1.14 V at I <sub>F</sub> =5mA) |             |             |             |             | I <sub>F</sub> =50mA |   |
|                                  | Maximum                   | 1.5V                                 |             |             |             |             |                      |   |
| Output                           | On resistance             | Typical                              | 0.25Ω       | 0.85Ω       | 18Ω         | 26Ω         | 52Ω                  | I <sub>F</sub> =5mA<br>I <sub>L</sub> =Max.<br>Within 1 s on time |
|                                  |                           | Maximum                              | 0.5Ω        | 2.5Ω        | 25Ω         | 35Ω         | 120Ω                 |   |
|                                  | Off state leakage current | Maximum                              | 1μA         |             |             |             |                      | I <sub>F</sub> =0mA<br>V <sub>L</sub> =Max.                       |
| Transfer characteristics         | Turn on time*             | Typical                              | 1.5ms       | 1ms         | 0.5ms       |             |                      | I <sub>F</sub> =5mA<br>I <sub>L</sub> =Max.                       |
|                                  |                           | Maximum                              | 5ms         | 4ms         | 2.0ms       |             |                      |   |
|                                  | Turn off time*            | Typical                              | 0.1ms       | 0.05ms      | 0.08ms      |             | 0.04ms               | I <sub>F</sub> =5mA<br>I <sub>L</sub> =Max.                       |
|                                  |                           | Maximum                              | 1.0ms       |             |             |             |                      |   |
|                                  | I/O capacitance           | Typical                              | 0.8pF       |             |             |             |                      | f = 1MHz<br>V <sub>B</sub> = 0V                                   |
| Maximum                          |                           | 1.5pF                                |             |             |             |             |                      |   |
| Initial I/O isolation resistance | Minimum                   | 1,000MΩ                              |             |             |             |             | 500V DC              |   |

\*Turn on/Turn off 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 <sub>F</sub> | 5 to 10           | mA   |

### ■ Dimensions

### ■ Schematic and Wiring Diagrams

### ■ Cautions for Use

■ These products are not designed for automotive use.

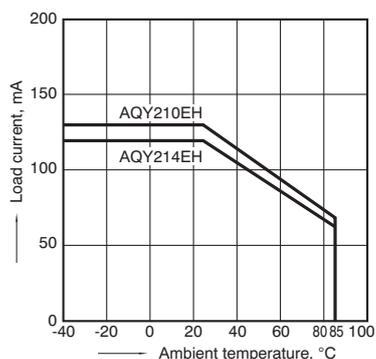
If you are considering to use these products for automotive applications, please contact your local Panasonic technical representative.

Please refer to our information on [PhotoMOS Relays for Automotive Applications](#).

## REFERENCE DATA

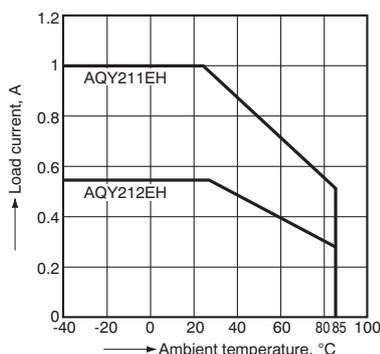
1-(1). Load current vs. ambient temperature characteristics

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



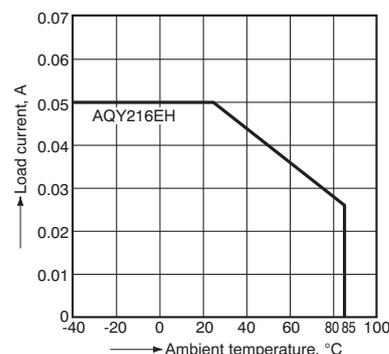
1-(2). Load current vs. ambient temperature characteristics

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



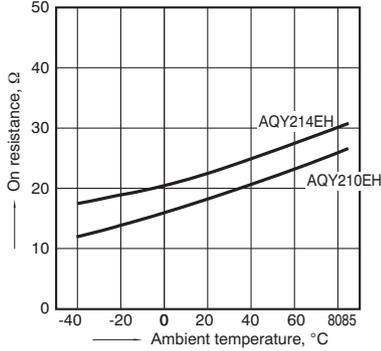
1-(3). Load current vs. ambient temperature characteristics

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



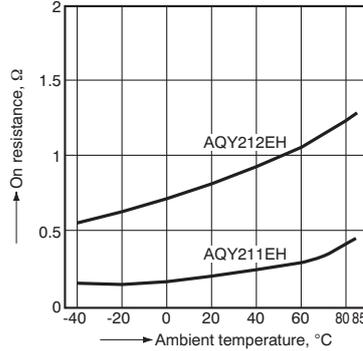
## 2-(1). On resistance vs. ambient temperature characteristics

Measured portion: between terminals 3 and 4;  
LED current: 5 mA; Load voltage: Max. (DC);  
Continuous load current: Max. (DC)



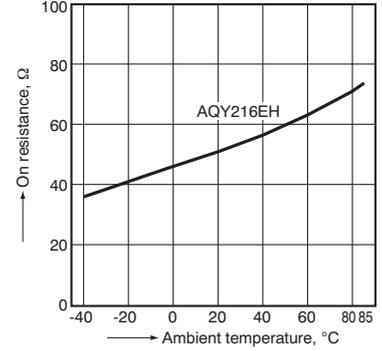
## 2-(2). On resistance vs. ambient temperature characteristics

Measured portion: between terminals 3 and 4;  
LED current: 5 mA; Load voltage: Max. (DC);  
Continuous load current: Max. (DC)



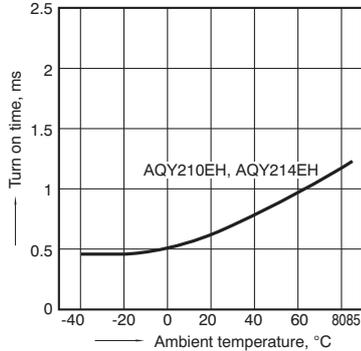
## 2-(3). On resistance vs. ambient temperature characteristics

Measured portion: between terminals 3 and 4;  
LED current: 5 mA; Load voltage: Max. (DC);  
Continuous load current: Max. (DC)



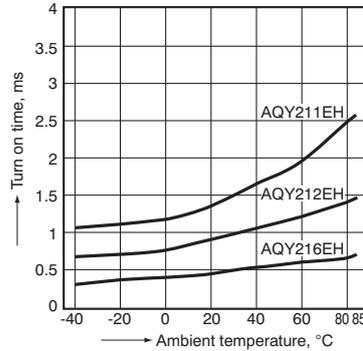
## 3-(1). Turn on time vs. ambient temperature characteristics

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



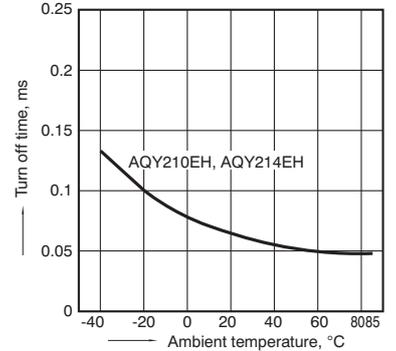
## 3-(2). Turn on time vs. ambient temperature characteristics

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



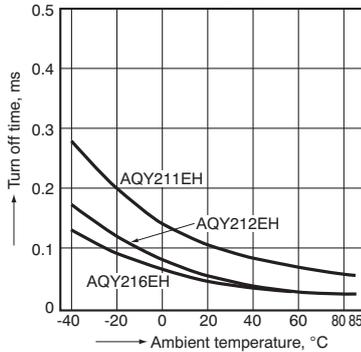
## 4-(1). Turn off time vs. ambient temperature characteristics

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



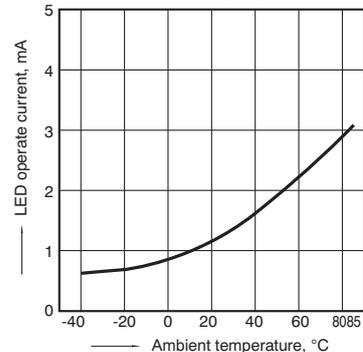
## 4-(2). Turn off time vs. ambient temperature characteristics

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



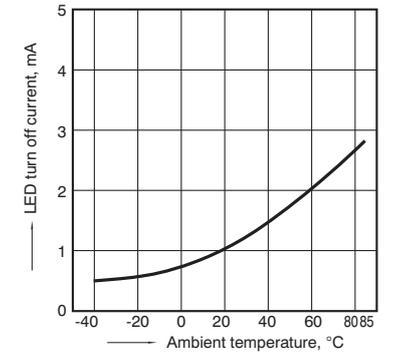
## 5. LED operate current vs. ambient temperature characteristics

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



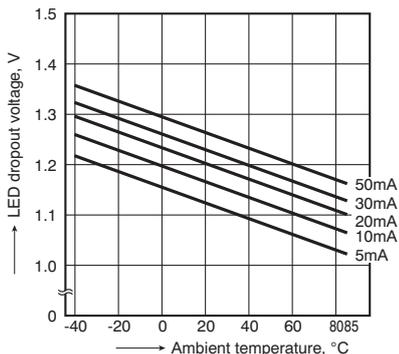
## 6. LED turn off current vs. ambient temperature characteristics

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



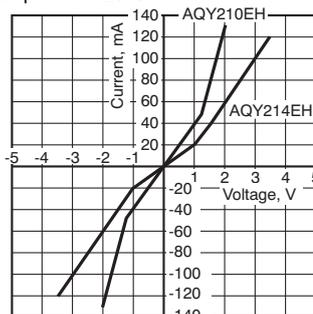
## 7. LED dropout voltage vs. ambient temperature characteristics

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



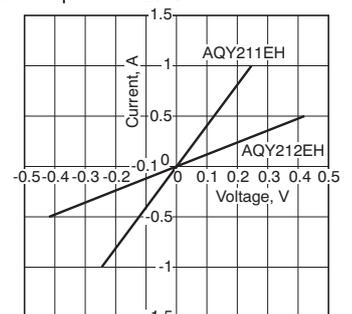
## 8-(1). Current vs. voltage characteristics of output at MOS portion

Measured portion: between terminals 3 and 4;  
Ambient temperature: 25°C 77°F



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

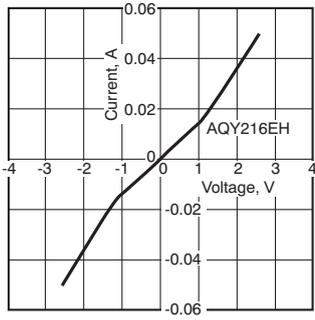
Measured portion: between terminals 3 and 4;  
Ambient temperature: 25°C 77°F



# GU-E 1 Form A (AQY210EH)

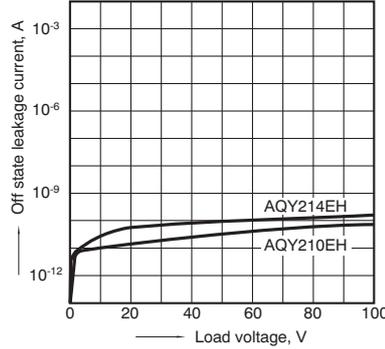
8-(3). Current vs. voltage characteristics of output at MOS portion

Measured portion: between terminals 3 and 4;  
Ambient temperature: 25°C 77°F



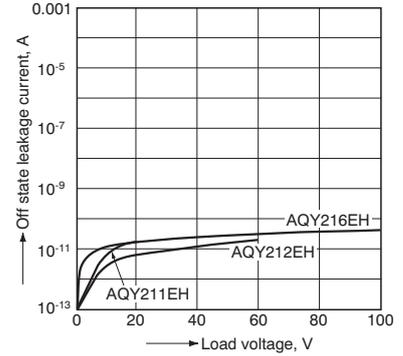
9-(1). Off state leakage current vs. load voltage characteristics

Measured portion: between terminals 3 and 4;  
Ambient temperature: 25°C 77°F



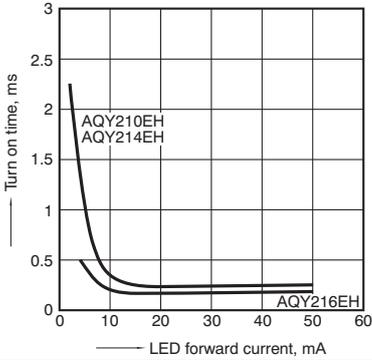
9-(2). Off state leakage current vs. load voltage characteristics

Measured portion: between terminals 3 and 4;  
Ambient temperature: 25°C 77°F



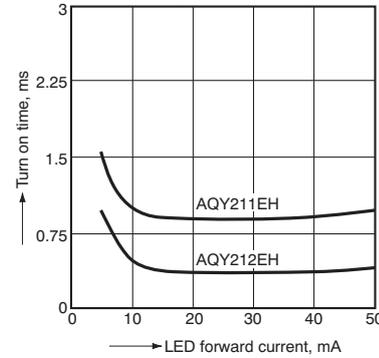
10-(1). Turn on time vs. LED forward current characteristics

Measured portion: between terminals 3 and 4;  
Load voltage: Max. (DC); Continuous load current: Max. (DC); Ambient temperature: 25°C 77°F



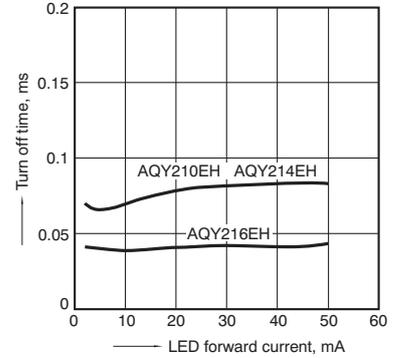
10-(2). Turn on time vs. LED forward current characteristics

Measured portion: between terminals 3 and 4;  
Load voltage: Max. (DC); Continuous load current: Max. (DC); Ambient temperature: 25°C 77°F



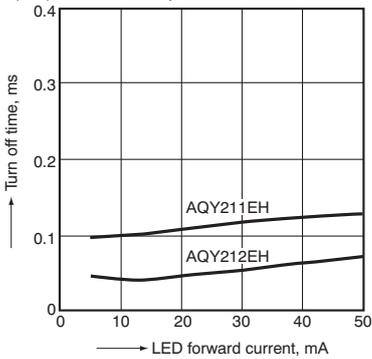
11-(1). Turn off time vs. LED forward current characteristics

Measured portion: between terminals 3 and 4;  
Load voltage: Max. (DC); Continuous load current: Max. (DC); Ambient temperature: 25°C 77°F



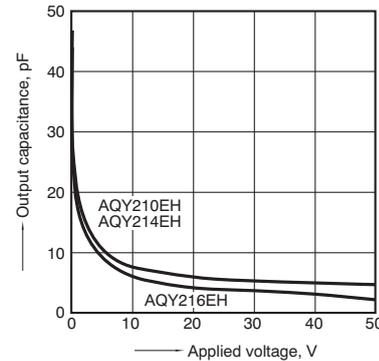
11-(2). Turn off time vs. LED forward current characteristics

Measured portion: between terminals 3 and 4;  
Load voltage: Max. (DC); Continuous load current: Max. (DC); Ambient temperature: 25°C 77°F



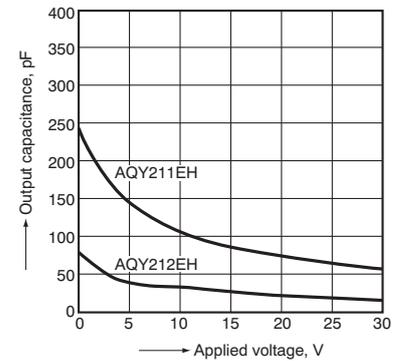
12-(1). Output capacitance vs. applied voltage characteristics

Measured portion: between terminals 3 and 4;  
Frequency: 1 MHz; Ambient temperature: 25°C 77°F



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

Measured portion: between terminals 3 and 4;  
Frequency: 1 MHz; Ambient temperature: 25°C 77°F



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