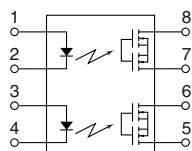
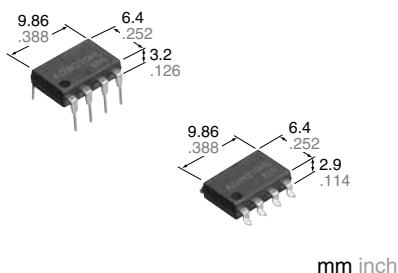




**Two output type with  
current limiting and  
reinforced insulation**

**PhotoMOS®**  
**GU 2 Form A**  
Current Limiting (AQW210HL)



**RoHS compliant**

### FEATURES

#### 1. Current Limiting Function

To control an over current from flowing, the current limit function has been realized. It keeps an output current at a constant value when the current reaches a specified current limit value.

#### 2. Enhances the capability of surge resistance between output terminals

The current limit function controls the ON time surge current to enhance the capability of surge resistance between output terminals.

#### 3. 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).

#### 4. Applicable for 2 Form A use as well as two independent 1 Form A use.

#### 5. Controls low-level analog signals

#### 6. High sensitivity and high speed response.

Can control max. 0.12 A load current with 5 mA input current. This enables fast operation speed of typ. 0.5 ms

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

### TYPICAL APPLICATIONS

- Telephone equipment
- Modem

### 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 AC | 350 V          | 100 mA       | DIP8-pin                         | AQW210HL                         | AQW210HLA              | AQW210HLAX                  | AQW210HLAZ | 1 tube contains: 50 pcs.<br>1 batch contains: 500 pcs. | 1,000 pcs.    |

\*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 device.

### RATING

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

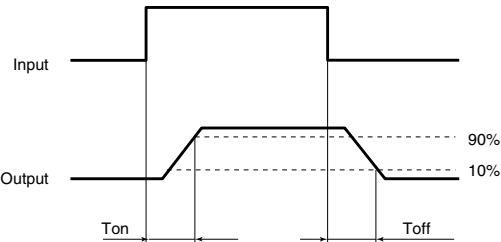
| Item                    |                         | Symbol           | AQW210HL(A)                     | Remarks   |
|-------------------------|-------------------------|------------------|---------------------------------|---|
| Input                   | LED forward current     | I <sub>F</sub>   | 50 mA                           |   |
|                         | LED reverse voltage     | V <sub>R</sub>   | 5 V                             |   |
|                         | Peak forward current    | I <sub>FP</sub>  | 1 A                             | f = 100 Hz, Duty factor = 0.1%                      |
|                         | Power dissipation       | P <sub>in</sub>  | 75 mW                           |   |
| Output                  | Load voltage (peak AC)  | V <sub>L</sub>   | 350 V                           |   |
|                         | Continuous load current | I <sub>L</sub>   | 0.1 A (0.12 A)                  | Peak AC, DC<br>( ): in case of using only 1 channel |
|                         | Power dissipation       | P <sub>out</sub> | 800 mW                          |   |
| Total power dissipation |                         | P <sub>T</sub>   | 850 mW                          |   |
| 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 2 Form A Current Limiting (AQW210HL)

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

| Item                     |                                  |         | Symbol             | AQW210HL(A)                            | Condition  |
|--------------------------|----------------------------------|---------|--------------------|--|--|
| Input                    | LED operate current              | Typical | I <sub>Fon</sub>   | 1.2 mA                                 | I <sub>L</sub> = Max.  |
|                          |                                  | Maximum |                    | 3.0 mA                                 |  |
|                          | LED turn off current             | Minimum | I <sub>Foff</sub>  | 0.4 mA                                 | I <sub>L</sub> = Max.  |
|                          |                                  | Typical |                    | 1.1 mA                                 |  |
|                          | LED dropout voltage              | Minimum | V <sub>F</sub>     | 1.25 (1.14 V at I <sub>F</sub> = 5 mA) | I <sub>F</sub> = 50 mA   |
|                          |                                  | Typical |                    | 1.5 V                                  |  |
| Output                   | On resistance                    | Typical | R <sub>on</sub>    | 20Ω                                    | I <sub>F</sub> = 5 mA<br>I <sub>L</sub> = Max.<br>Within 1 s on time |
|                          |                                  | Maximum |                    | 25Ω                                    |  |
|                          | Off state leakage current        | Maximum | I <sub>Lleak</sub> | 1μA                                    | I <sub>F</sub> = 0 mA<br>V <sub>L</sub> = Max.                       |
|                          | Current limit                    | Typical | —                  | 0.18 A                                 | I <sub>F</sub> = 5 mA  |
| Transfer characteristics | Turn on time*                    | Typical | T <sub>on</sub>    | 0.5 ms                                 | I <sub>F</sub> = 5 mA  |
|                          |                                  | Maximum |                    | 2.0 ms                                 | I <sub>L</sub> = Max.  |
|                          | Turn off time*                   | Typical | T <sub>off</sub>   | 0.08 ms                                | I <sub>F</sub> = 5 mA  |
|                          |                                  | Maximum |                    | 1.0 ms                                 | I <sub>L</sub> = Max.  |
|                          | I/O capacitance                  | Typical | C <sub>iso</sub>   | 0.8 pF                                 | f = 1 MHz  |
|                          |                                  | Maximum |                    | 1.5 pF                                 | V <sub>B</sub> = 0 V   |
|                          | Initial I/O isolation resistance | Minimum | R <sub>iso</sub>   | 1,000 MΩ                               | 500 V DC   |

\*Turn on/Turn off time



RECOMMENDED OPERATING CONDITIONS

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

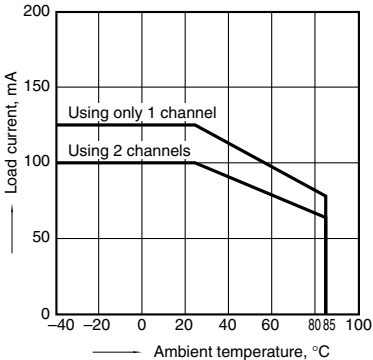
| Item              | Symbol         | Recommended value | Unit |
|-------------------|----------------|-------------------|------|
| Input LED current | I <sub>F</sub> | 5 to 10           | mA   |

■ These products are not designed for automotive use.  
If you are considering to use these products for automotive applications, please contact your local Panasonic Corporation technical representative.

REFERENCE DATA

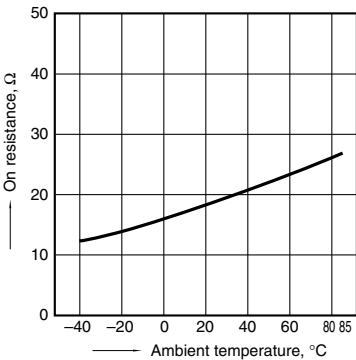
1. Load current vs. ambient temperature characteristics

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



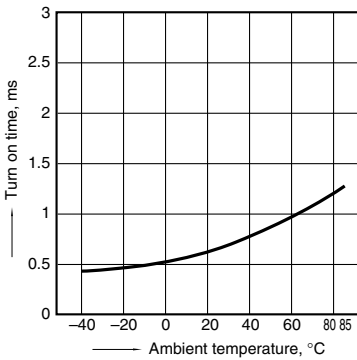
2. On resistance vs. ambient temperature characteristics

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



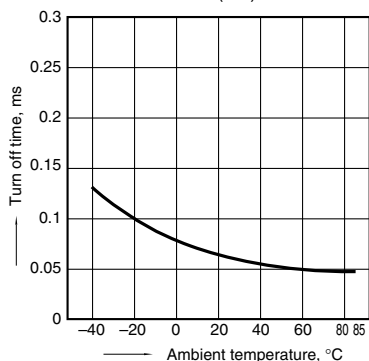
3. Turn on time vs. ambient temperature characteristics

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



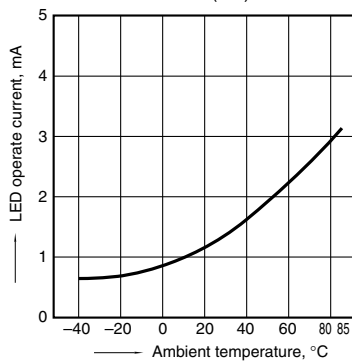
4. Turn off time vs. ambient temperature characteristics

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



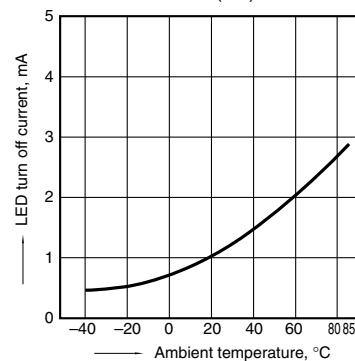
5. LED operate current vs. ambient temperature characteristics

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



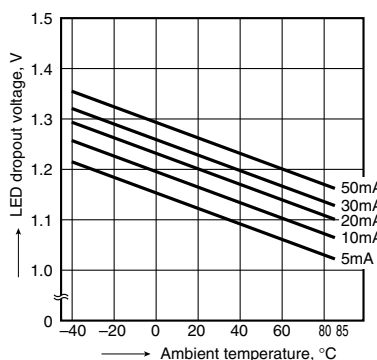
6. LED turn off current vs. ambient temperature characteristics

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



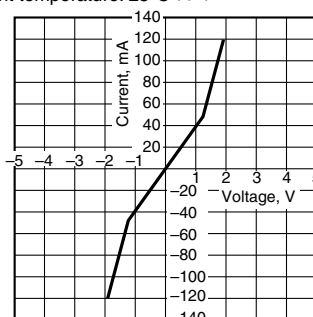
7. LED dropout voltage vs. ambient temperature characteristics

LED current: 5 to 50 mA



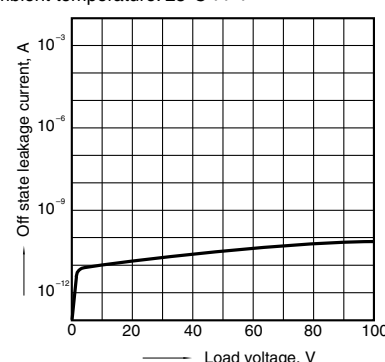
8. Current vs. voltage characteristics of output at MOS portion

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



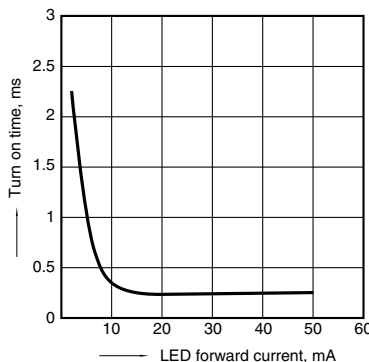
9. Off state leakage current vs. load voltage characteristics

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



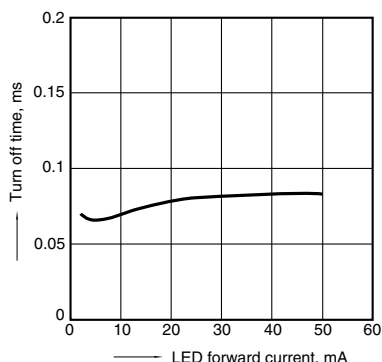
10. Turn on time vs. LED forward current characteristics

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



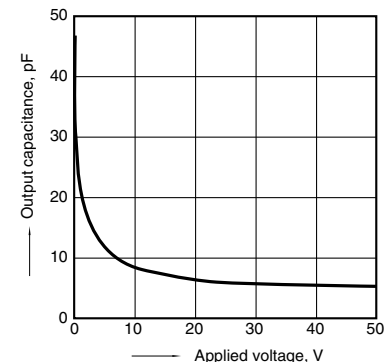
11. Turn off time vs. LED forward current characteristics

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. 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



## What is current limit

When a load current reaches the specified output control current, a current limit function works against the load current to keep the current a constant value.

The current limit circuit built into the PhotoMOS thus controls the instantaneous load current to effectively ensure circuit safety.

This safety feature protects circuits downstream of the PhotoMOS against over-current.

But, if the current-limiting feature is used longer than the specified time, the PhotoMOS can be destroyed. Therefore, set the output loss to the max. rate or less.

## • Comparison of output voltage and output current characteristics

### V-I Characteristics

