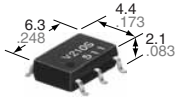
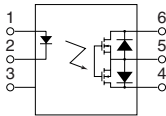


**Super miniature design,  
SOP(1 Form A) 6-pin type.  
Controls load voltage  
60V to 400V**

## GU PhotoMOS (AQV210S)



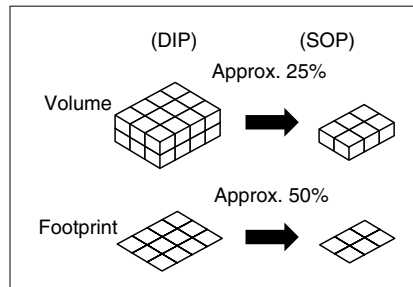
mm inch



### FEATURES

#### 1. 1 channel (Form A) in super miniature design

The device comes in a super-miniature SO package measuring (W) 4.4 × (L) 6.3 × (H) 2.1 mm (W) .173 × (L) .248 × (H) .083 inch —approx. 25% of the volume and 50% of the footprint size of DIP type PhotoMOS Relays.



#### 2. Tape and reel

The device comes standard in a tape and reel (1,000 pcs./reel) to facilitate automatic insertion machines.

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

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

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

In contrast to the SSR with an off state leakage current of several milliamperes, the PhotoMOS relay features a very small off state leakage current of typ. 100 pA even at the rated load voltage of 400 V (AQV214S).

**RoHS Directive compatibility information**  
<http://www.nais-e.com/>

### TYPICAL APPLICATIONS

- Telephones
- Measuring instruments
- Computer
- Industrial robots
- High-speed inspection machines

### TYPES

| Type       | Output rating* |              | Package size | Part No.           |  |  | Packing quantity   |               |
|------------|----------------|--------------|--------------|--------------------|--|--|--|---------------|
|            | Load voltage   | Load current |              | Tube packing style | Tape and reel packing style                  |  | Tube   | Tape and reel |
| AC/DC type | 60V            | 500mA        | SOP6pin      | AQV212S            | AQV212SX<br>(Picked from the 1/2/3-pin side) | AQV212SZ<br>(Picked from the 4/5/6-pin side) | 1 tube contains:<br>75 pcs.<br>1 batch contains:<br>1,500 pcs. | 1,000 pcs.    |
|            | 100V           | 300mA        |              | AQV215S            | AQV215SX<br>(Picked from the 1/2/3-pin side) | AQV215SZ<br>(Picked from the 4/5/6-pin side) |  |               |
|            | 200V           | 160mA        |              | AQV217S            | AQV217SX<br>(Picked from the 1/2/3-pin side) | AQV217SZ<br>(Picked from the 4/5/6-pin side) |  |               |
|            | 350V           | 120mA        |              | AQV210S            | AQV210SX<br>(Picked from the 1/2/3-pin side) | AQV210SZ<br>(Picked from the 4/5/6-pin side) |  |               |
|            | 400V           | 100mA        |              | AQV214S            | AQV214SX<br>(Picked from the 1/2/3-pin side) | AQV214SZ<br>(Picked from the 4/5/6-pin side) |  |               |
|            | 600V           | 40mA         |              | AQV216S            | AQV216SX<br>(Picked from the 1/2/3-pin side) | AQV216SZ<br>(Picked from the 4/5/6-pin side) |  |               |

\* Indicate the peak AC and DC values.

Note: For space reasons, the initial letters of the product number "AQ" are omitted on the product seal.

The package type indicator "X" and "Z" are omitted from the seal (Ex. the label for product number AQV214S is V214S).

## RATING

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

| Item                    |                         | Symbol     | Type of connection | AQV212S                         | AQV215S | AQV217S | AQV210S | AQV214S | AQV216S | Remarks   |
|-------------------------|-------------------------|------------|--------------------|---------------------------------|---------|---------|---------|---------|---------|---|
| Input                   | LED forward current     | $I_F$      |                    | 50 mA                           |         |         |         |         |         | f = 100 Hz,<br>Duty factor = 0.1%   |
|                         | LED reverse voltage     | $V_R$      |                    | 5 V                             |         |         |         |         |         |   |
|                         | Peak forward current    | $I_{FP}$   |                    | 1 A                             |         |         |         |         |         |   |
|                         | Power dissipation       | $P_{in}$   |                    | 75 mW                           |         |         |         |         |         |   |
| Output                  | Load voltage (peak AC)  | $V_L$      |                    | 60 V                            | 100 V   | 200 V   | 350 V   | 400 V   | 600 V   | A connection: Peak AC, DC<br>B,C connection: DC<br><br>A connection: 100 ms (1 shot) $V_L = DC$ |
|                         | Continuous load current | $I_L$      | A                  | 0.50 A                          | 0.30 A  | 0.16 A  | 0.12 A  | 0.10 A  | 0.04 A  |   |
|                         |                         |            | B                  | 0.65 A                          | 0.40 A  | 0.20 A  | 0.13 A  | 0.11 A  | 0.05 A  |   |
|                         |                         |            | C                  | 0.80 A                          | 0.56 A  | 0.28 A  | 0.15 A  | 0.12 A  | 0.06 A  |   |
|                         | Peak load current       | $I_{peak}$ |                    | 1.0A                            | 0.90A   | 0.48A   | 0.3 A   | 0.3 A   | 0.12 A  |   |
| Power dissipation       | $P_{out}$               |            | 450 mW             |                                 |         |         |         |         |         |   |
| Total power dissipation |                         |            | $P_T$              | 500 mW                          |         |         |         |         |         |   |
| I/O isolation voltage   |                         |            | $V_{iso}$          | 1,500 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 |         |         |         |         |         |   |

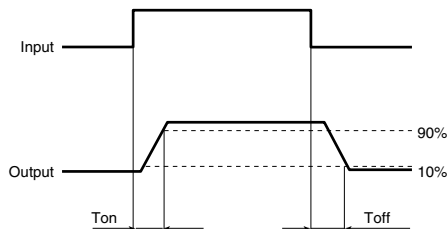
### 2. Electrical characteristics (Ambient temperature: 25°C 77°F)

| Item                             |                      | Symbol     | Type of connection               | AQV212S  | AQV215S | AQV217S | AQV210S | AQV214S | AQV216S       | Remarks  |  |
|----------------------------------|----------------------|------------|----------------------------------|----------|---------|---------|---------|---------|---------------|--|--|
| Input                            | LED operate current  | Typical    | $I_{Fon}$                        | 0.7 mA   |         |         |         |         |               | $I_L = Max.$                                       |  |
|                                  |                      | Maximum    |                                  | 3 mA     |         |         |         |         |               |  |  |
|                                  | LED turn off current | Minimum    | $I_{Foff}$                       | 0.4 mA   |         |         |         |         |               | $I_L = Max.$                                       |  |
|                                  |                      | Typical    |                                  | 0.65 mA  |         |         |         |         |               |  |  |
| LED dropout voltage              | Typical              | $V_F$      | 1.25 V (1.14 V at $I_F = 5 mA$ ) |          |         |         |         |         | $I_F = 50 mA$ |  |  |
|                                  | Maximum              |            | 1.5 V                            |          |         |         |         |         |               |  |  |
| Output                           | On resistance        | Typical    | $R_{on}$                         | A        | 0.83 Ω  | 2.3 Ω   | 11 Ω    | 23 Ω    | 30 Ω          | 70 Ω   | $I_F = 5 mA$<br>$I_L = Max.$<br>Within 1 s on time |
|                                  |                      | Maximum    |                                  |          | 2.5 Ω   | 4.0 Ω   | 15 Ω    | 35 Ω    | 50 Ω          | 120 Ω  |  |
|                                  |                      | Typical    | $R_{on}$                         | B        | 0.44 Ω  | 1.15 Ω  | 5.5 Ω   | 11.5 Ω  | 22.5 Ω        | 55 Ω   |  |
|                                  |                      | Maximum    |                                  |          | 1.25 Ω  | 2.0 Ω   | 7.5 Ω   | 17.5 Ω  | 25 Ω          | 100 Ω  |  |
|                                  | Typical              | $R_{on}$   | C                                | 0.25 Ω   | 0.6 Ω   | 2.8 Ω   | 6.0 Ω   | 11.3 Ω  | 28 Ω          | $I_F = 5 mA$<br>$I_L = Max.$<br>Within 1 s on time |  |
|                                  | Maximum              |            |                                  | 0.63 Ω   | 1.0 Ω   | 3.8 Ω   | 8.8 Ω   | 12.5 Ω  | 50 Ω          |  |  |
| Off state leakage current        | Maximum              | $I_{Leak}$ |                                  | 1 μA     |         |         |         |         |               | $I_F = 0 mA$<br>$V_L = Max.$                       |  |
| Transfer characteristics         | Turn on time*        | Typical    | $T_{on}$                         | 0.65 ms  | 0.60 ms | 0.25 ms | 0.25 ms | 0.25 ms | 0.25 ms       | $I_F = 5 mA$<br>$V_L = Max.$                       |  |
|                                  |                      | Maximum    |                                  | 2.0 ms   | 2.0 ms  | 1.0 ms  | 0.5 ms  | 0.5 ms  | 0.5 ms        |  |  |
|                                  | Turn off time        | Typical    | $T_{off}$                        | 0.08 ms  | 0.06 ms | 0.05 ms | 0.05 ms | 0.05 ms | 0.05 ms       | $I_F = 5 mA$<br>$V_L = Max.$                       |  |
|                                  |                      | Maximum    |                                  | 0.2 ms   |         |         |         |         |               |  |  |
|                                  | I/O capacitance      | Typical    | $C_{iso}$                        | 0.8 pF   |         |         |         |         |               | f = 1 MHz<br>$V_B = 0 V$                           |  |
| Maximum                          |                      | 1.5 pF     |                                  |          |         |         |         |         |               |  |  |
| Initial I/C isolation resistance | Minimum              | $R_{iso}$  |                                  | 1,000 MΩ |         |         |         |         |               | 500 V DC   |  |

Note: Recommendable LED forward current  $I_F = 5mA$ .

For type of connection

\*Turn on/Turn off time



- For Dimensions
- For Schematic and Wiring Diagrams
- For Cautions for Use

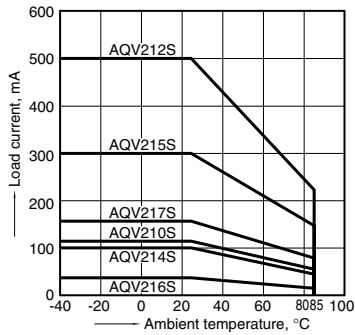
# GU PhotoMOS (AQV210S)

## REFERENCE DATA

### 1. Load current vs. ambient temperature characteristics

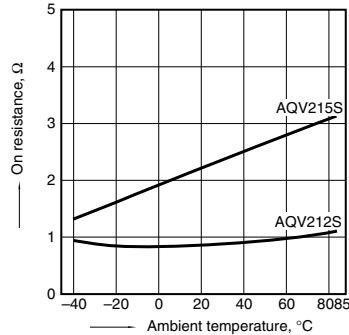
Allowable ambient temperature:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$   
 $-40^{\circ}\text{F}$  to  $+185^{\circ}\text{F}$

Type of connection: A



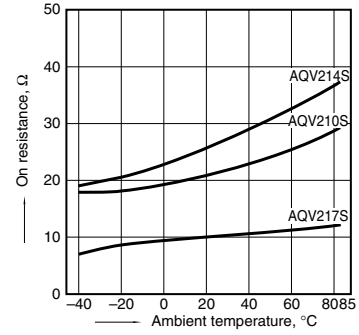
### 2.-(1) On resistance vs. ambient temperature characteristics

Measured portion: between terminals 4 and 6;  
 LED current: 5 mA; Load voltage: Max. (DC);  
 Continuous load current: Max. (DC)



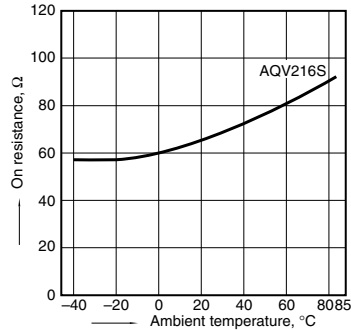
### 2.-(2) On resistance vs. ambient temperature characteristics

Measured portion: between terminals 4 and 6;  
 LED current: 5 mA; Load voltage: Max. (DC);  
 Continuous load current: Max. (DC)



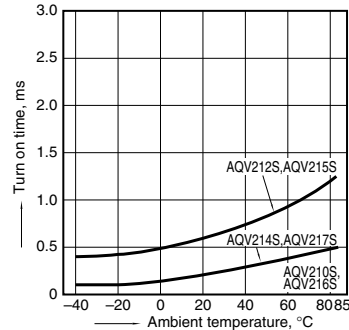
### 2.-(3) On resistance vs. ambient temperature characteristics

Measured portion: between terminals 4 and 6;  
 LED current: 5 mA; Load voltage: Max. (DC);  
 Continuous load current: Max. (DC)



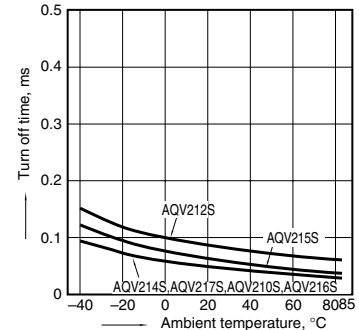
### 3. Turn on time vs. ambient temperature characteristics

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



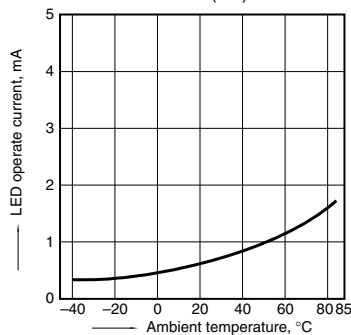
### 4. Turn off time vs. ambient temperature characteristics

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



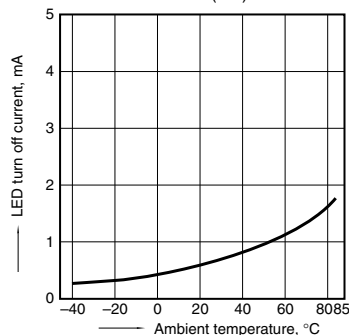
### 5. LED operate current vs. ambient temperature characteristics

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



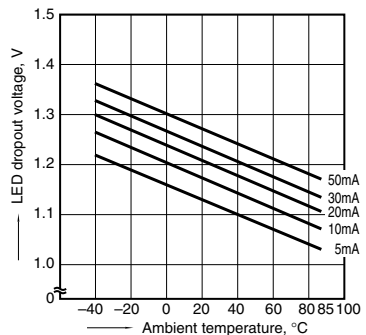
### 6. LED turn off current vs. ambient temperature characteristics

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



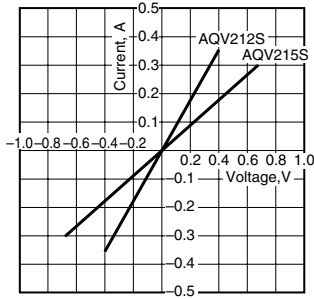
### 7. LED dropout voltage vs. ambient temperature characteristics

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

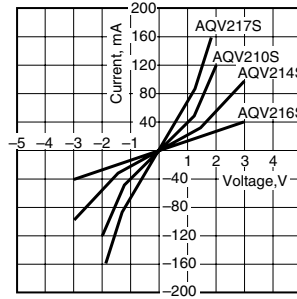


# GU PhotoMOS (AQV210S)

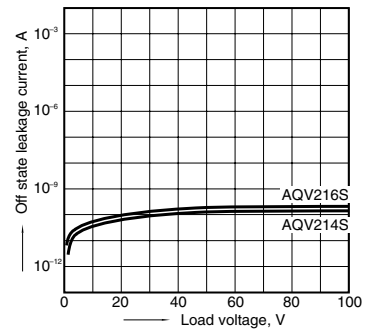
8.-(1). Current vs. voltage characteristics of output at MOS portion  
 Measured portion: between terminals 4 and 6;  
 Ambient temperature: 25°C 77°F



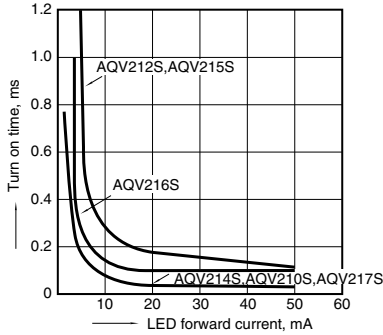
8.-(2). Current vs. voltage characteristics of output at MOS portion  
 Measured portion: between terminals 4 and 6;  
 Ambient temperature: 25°C 77°F



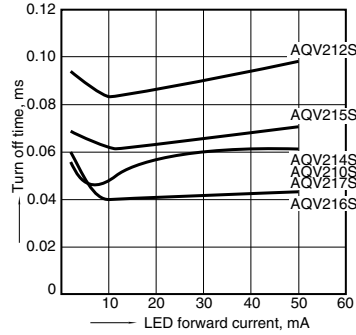
9. Off state leakage current vs. load voltage characteristics  
 Measured portion: between terminals 4 and 6;  
 Ambient temperature: 25°C 77°F



10. Turn on time vs. LED forward current characteristics  
 Measured portion: between terminals 4 and 6;  
 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 4 and 6;  
 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 4 and 6;  
 Frequency: 1 MHz;  
 Ambient temperature: 25°C 77°F

